REPORT NUMBER: NCAP-CAL-22-008

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

KIA CORPORATION
2022 KIA EV6 WIND
5 Door SUV

NHTSA No: O20224203

PREPARED BY:
CALSPAN CORPORATION
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January 11, 2023

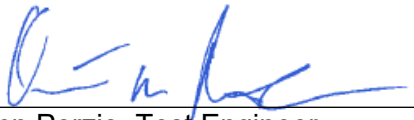
FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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1200 NEW JERSEY AVE SE
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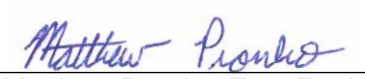
This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number 693JJ919D000005.

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Prepared by:  Date: January 11, 2023

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Approved by:  Date: January 11, 2023

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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing and FMVSS No. 305 Indicant Testing of a 2022 KIA EV6 WIND 5 Door SUV NHTSA No.: O20224203		***5. Report Date*** January 11, 2023 ***6. Performing Organization Code*** CAL
7. Author(s) Quinn Porzio, Test Engineer Matthew Pronko, Test Engineer		***8. Performing Organization Report No.*** CAL-DOT-2022-008
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** 693JJ919D000005
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report January 4, 2023 - January 11, 2023 ***14. Sponsoring Agency Code*** NRM-100
15. Supplementary Notes		

16. Abstract

A 56.30 km/h (35 mph), NCAP frontal rigid barrier impact test was conducted on a 2022 KIA EV6 WIND 5 Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. This test was conducted to obtain data related to FMVSS Nos. 208, 212, 219 (partial), 301, and 305 performance. The test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 4, 2023.

The impact velocity of the vehicle was 56.26 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 517 mm at crush zone 2. The test vehicle's occupant performance data is as follows:

Measurement Description	Units	Driver ATD (Serial No. 142)		Passenger ATD (Serial No. 137)	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC15)		700	122.271	700	169.856
Maximum Chest Compression	mm	63	-27.360	52	-16.904
Nij		1	0.192	1	0.325
Neck Tension	N	4170	848.026	2620	437.866
Neck Compression	N	4000	-87.458	2620	-395.169
Left Femur Force	N	10008	-900.654	6805	-2329.050
Right Femur Force	N	10008	-1227.495	6805	-408.983

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

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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.

SUMMARY

A load cell barrier consisting of 128 load cells was impacted by a 2022 KIA EV6 WIND 5 Door SUV at a velocity of 56.26 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 4, 2023. Pre- and post-test photographs of the vehicle and dummies to document the test can be found in Appendix A. One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 142) 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 486 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/electrolyte leakage after the event or during any phase of the static rollover. The maximum static crush of the vehicle was 517 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 passenger's visible contact points were as follows:

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)	122.271	0.192	848.026	-87.458	39.771	-27.360	-900.654	-1227.495
Passenger (5th)	169.856	0.325	437.866	-395.169	49.395	-16.904	-2329.050	-408.983

GENERAL COMMENTS:

1. P1 (Driver) serial number - 142
2. P2 (Passenger) serial number - 137
3. Passenger lap load cell not installed

Data Anomalies:

- Engine Bottom X Acceleration,Questionable data after 43.75 ms

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Seat Belt Positioning Data

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

Data Sheet No. 7 – Vehicle Accelerometer Locations

Data Sheet No. 8 – Photographic Reference Target Locations

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

Data Sheet No. 10 – Test Vehicle Summary of Results

Data Sheet No. 11 – Post-Test Observations

Data Sheet No. 12 – Vehicle Profile Measurements

Data Sheet No. 13 – Accident Investigation Division Data

Data Sheet No. 14 – Vehicle Intrusion Measurements

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

Data Sheet No. 16 – FMVSS 301 Static Rollover Results

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

Data Sheet No. 305-1 – General Test and Parameter Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-2 – Pre-Impact Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-3 – Pre-Impact Electrical Isolation Measurements and Calculations for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-4 – Post-Impact Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-5 – Static Rollover Test Data for Indicant FMVSS No. 305 Testing

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20224203
Model Year	2022
Make	Kia
Model	EV6 WIND
Body Style	SUV
VIN	KNDC3DLC2N5076265
Body Color	Steel Gray
Odometer Reading (km /mi)	60 mi
Engine Displacement (L)	168 kW Electric Motor
Type / No. Cylinders	Electric Vehicle
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	Direct Drive
Overdrive	No
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System (TCS)	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other –	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA CORPORATION
Date of Manufacture	07/22

GVWR	2520
GVWR Front	1280
GVWR Rear	1390

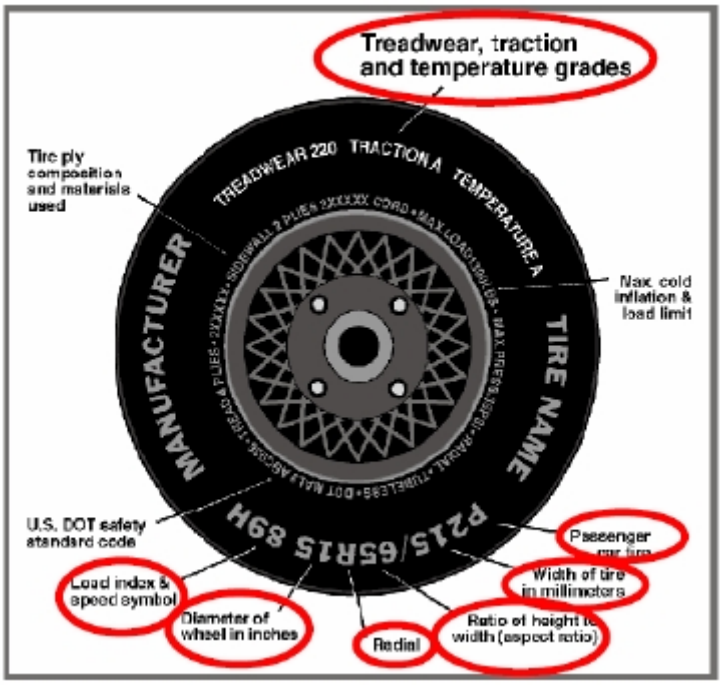
VEHICLE SEATING AND WEIGHT CAPACITY DATA

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)				375
Cargo Wt. (RCLW) (kg)				34.8

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

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

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)	250	250
Recommended Tire Size	235/55R19	235/55R19
Tire Size on Vehicle	235/55R19	235/55R19
Tire Manufacturer	KUMHO	KUMHO
Tire Model	CRUGEN HP71EV	CRUGEN HP71EV
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Polyamide	2 Steel, 2 Polyester, 1 Polyamide
Load Index / Speed Symbol	101H	101H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1H2 JTYABE	1H2 JTYABE
DOT Safety Code Right	1H2 JTYABE 2522	1H2 JTYABE

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

Test Vehicle: 2022 KIA EV6 WIND 5 Door SUV NHTSA No.: O20224203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/04/2023

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	498	540.5		551	581.5	
Right	kg	512.5	512.5		546	556.5	
Ratio	%	49.0	51.0		49.0	51.0	
Totals	kg	1010.5	1053	2063.5	1097	1138	2235

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2063.5	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	142	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	34.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2240.3	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	870	870	894	896	1495
As Tested	mm	855	859	884	887	1479
Post-Test	mm	884	896	884	892	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2906
Total Vehicle Length at Left Side	mm	4600
Total Vehicle Length at Centerline	mm	4676
Total Vehicle Length at Right Side	mm	4600
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	53.5
Amount of Stoddard Solvent in Fuel Tank	L	Electric Vehicle

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear Bumper, Rear fascia, Rear Door Panels, Rear Spoiler, Left Rear Tail Light, Right Rear Head Rest

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

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	4676
2	Total Width	1859
3*	Bumper Top Height	611
4*	Bumper Bottom Height	430
5*	Longitudinal Member Top Height	571
6	Distance Between Longitudinal Members	1004
7	Longitudinal Member Width	96
8*	Engine Top Height	795
9*	Engine Bottom Height	173
10	Engine and Gearbox Width	365
11	Front Bumper-Engine Distance	554
12*	Front Shock Absorber Fixing Height	969
13*	Bonnet Leading Edge Height	714
14	Front Shock Absorber Fixing Width	1205
15	Front Bumper – Front Axle Distance	828
16	Front Axle – A Pillar Distance	571
17	A-Pillar – B-Pillar Distance	1133
18	B-Pillar – Rear Axle Distance	1201
19	B-Pillar – C-Pillar Distance	999
20*	Roof Sill Bottom Height	1438
21*	Roof Sill Top Height	1491
22*	Floor Sill Bottom Height	366
23*	Floor Sill Top Height	409

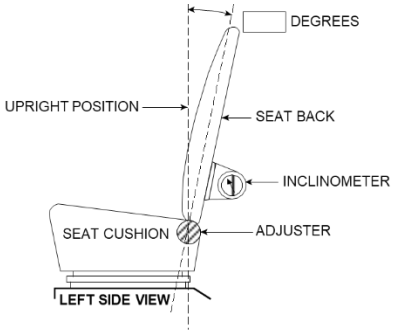
*Height Measurements are taken from the ground
Note: All measurements are in millimeters

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

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

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.



FRONT SEAT ASSEMBLY

Seating Position	Degrees
Driver Seat Back Angle	3.2
Passenger Seat Back Angle	3.7

SEAT FORE / AFT POSITIONS

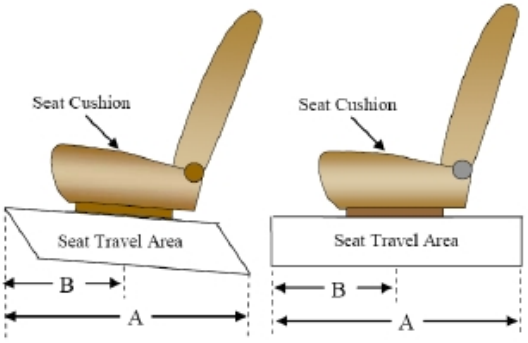
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	335	168
Passenger Seat	240	0

SEAT BELT UPPER ANCHORAGE

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

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



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

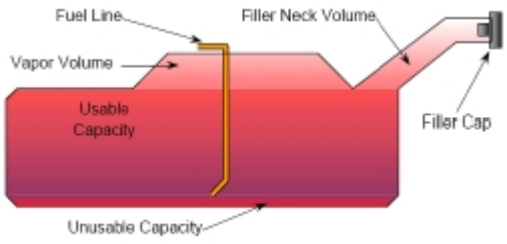
Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	N/A
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	N/A
Actual Amount of Solvent Used	Electric Vehicle
1/3 of Usable Capacity	N/A

FUEL PUMP

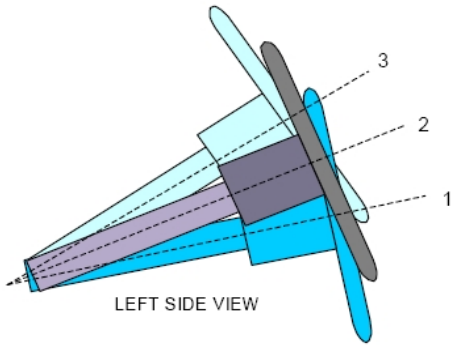
The charging port is on the right rear side of the vehicle. See form 1 for more information.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



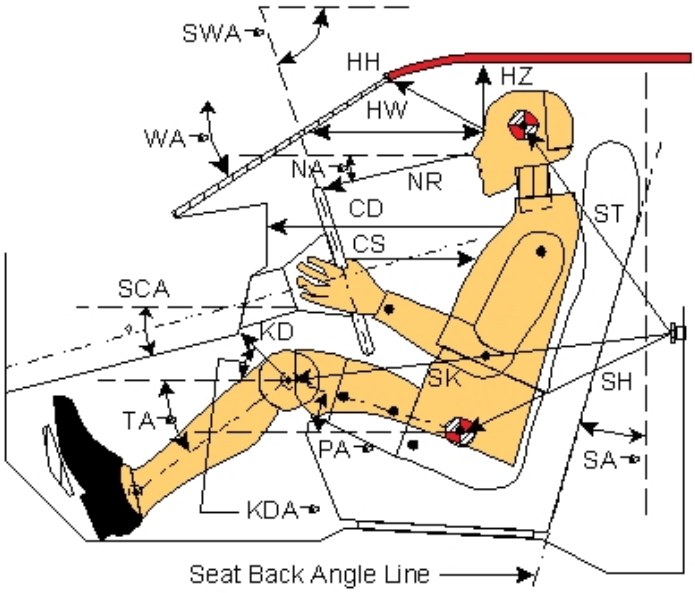
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	23.2	
Geometric center position No. 2	25.6	
Uppermost position No. 3	28.0	
Telescoping Steering Wheel Travel		55
Test Position	25.6	27.5

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

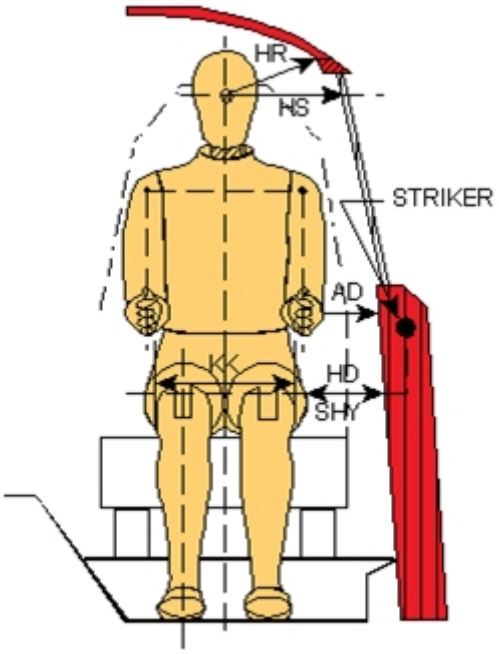


Left Side View

Code	Measurement Description	Driver (SN: 142)		Passenger (SN: 137)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		26.8		
SWA°	Steering Wheel Angle		25.6		
SCA°	Steering Column Angle		64.4		
SA°	Seat Back Angle (on headrest post)		3.2		3.7
HZ	Head to Roof (Z)	186	90.0	188	90.0
HH	Head to Header	330	21.3	263	49.0
HW	Head to Windshield	675	0.1	638	0.0
NR	Nose to Rim / Dash	418	9.5	453	29.0
CD	Chest to Dash	613		408	
CS	Chest to Steering Hub	328	0.2		
RA	Rim to Abdomen	215	0.2		
KDL	Left Knee to Dash	233	24.2	126	41.3
KDR	Right Knee to Dash	198	20.0	140	38.8
PA°	Pelvic Angle		23.6		20.3
TA°	Tibia Angle		27.6		35.5
SK	Striker to Knee	615	13.4	709	8.6
ST	Striker to Head	445	74.9	470	56.6
SH	Striker to H-Point	302	47.1	310	30.4

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

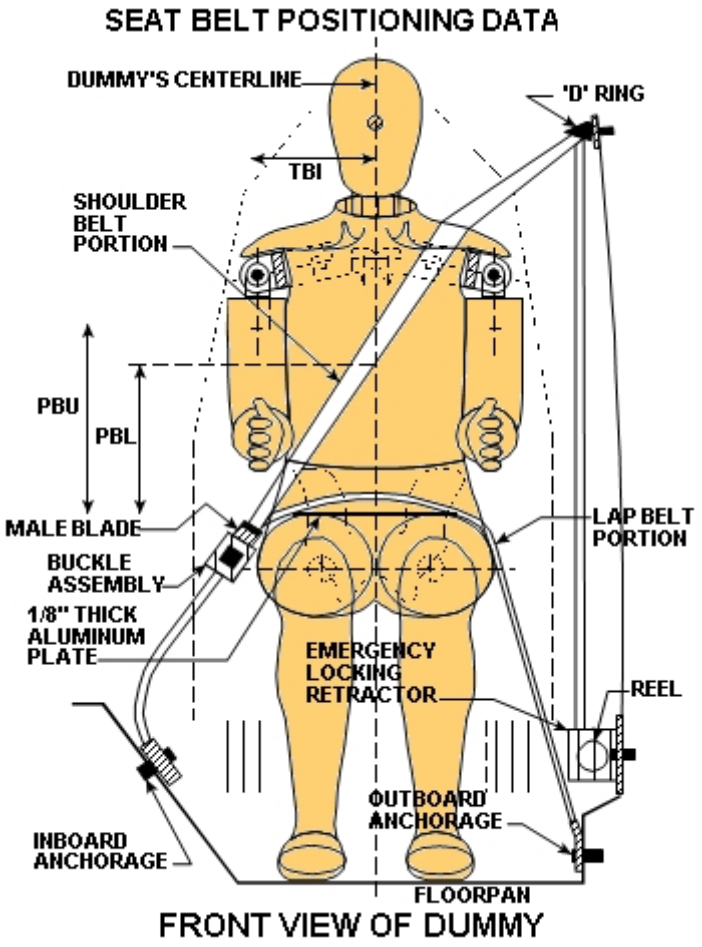


Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	80	91
HD	H-Point to Door	140	185
HR	Head to Side Header	202	218
HS	Head to Side Window	335	354
KK	Knee to Knee	330	211
SHY	Striker to H-Point (Y Direction)	240	304
AA	Ankle to Ankle	350	170

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	330	310
PBL — Top surface of reference to belt lower edge	mm	248	225

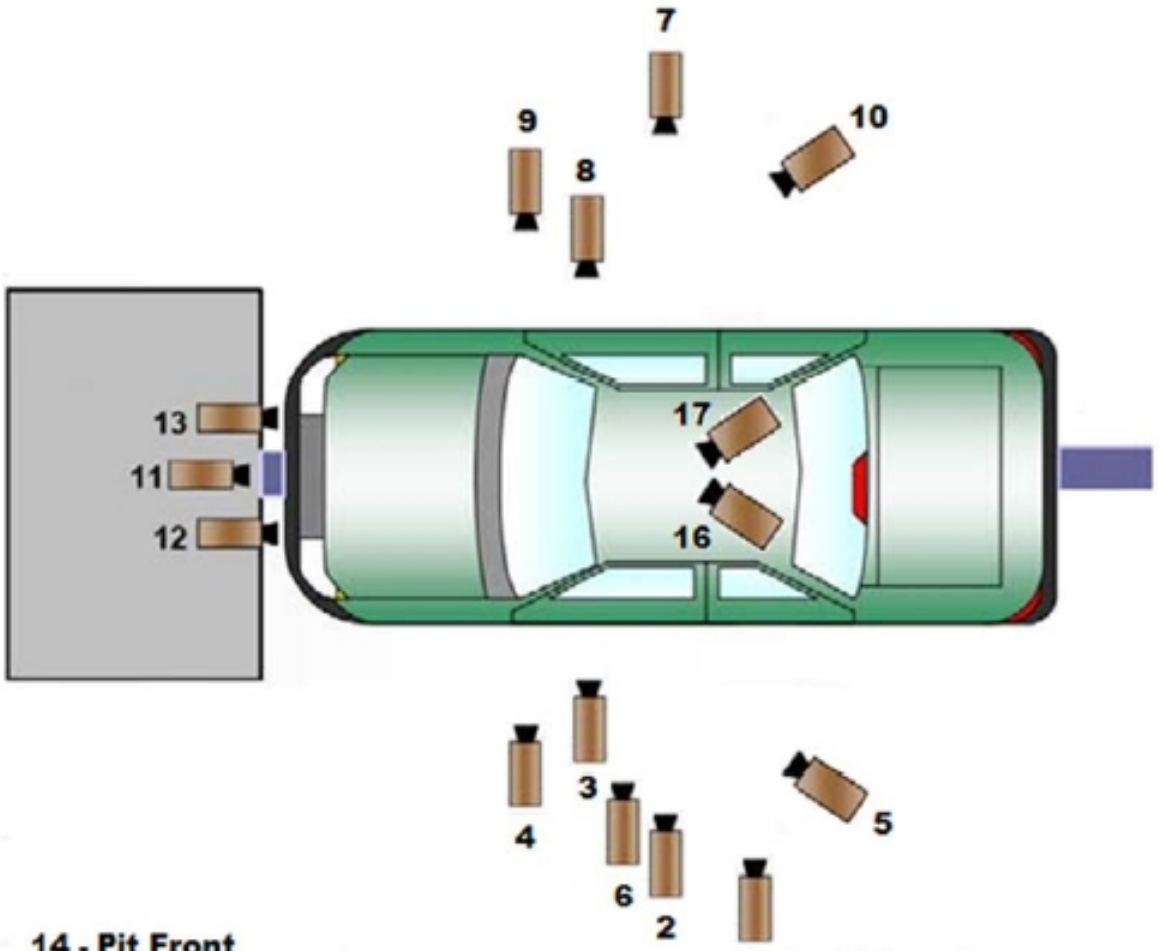
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	904	1004
Lap Belt Length as measured on ATD	mm	695	825
Remainder of belt on reel	mm	881	651
Total belt length for continuous webbing systems	mm	2480	2480

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

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

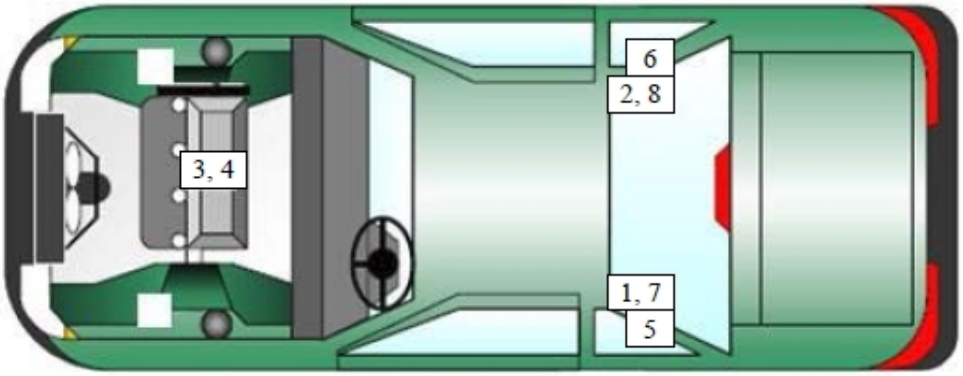
CAMERA LOCATIONS

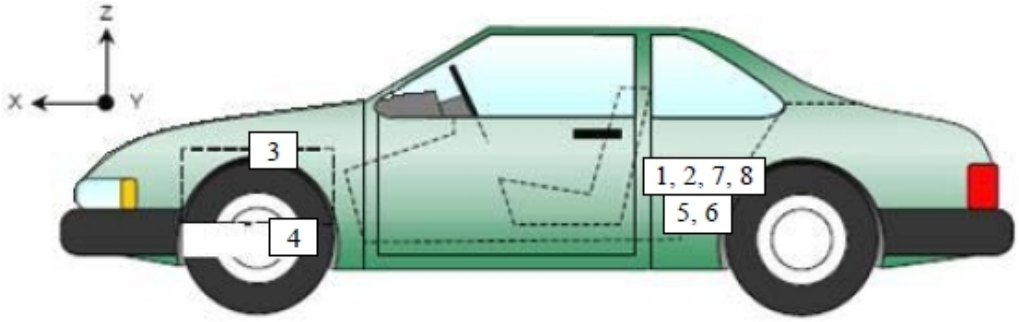
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall				Zoom	60
2	Left Overall	-2242	-8259	-1441	24	1000
3	Driver Close-Up	-1112	-7228	-1584	50	1000
4	Left Front Half	-629	-7720	-1425	28	1000
5	Left Angle	-4373	-4835	-2592	50	1000
6	Steering Column	-1440	-8628	-2234	75	1000
7	Right Overall	-1879	7842	-1450	24	1000
8	Passenger Close-Up	-886	7042	-1556	50	1000
9	Right Front Half	-393	6807	-1584	28	1000
10	Right Angle	-4243	4600	-2468	50	1000
11	Windshield	1233	0	-3153	12.5	1000
12	Driver Windshield	893	-553	-2290	25	1000
13	Passenger Windshield	893	553	-2290	25	1000
14	Pit Front	-814	0	2471	12.5	1000
15	Pit Rear	-2862	0	2496	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:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1843	-323	126
2	Right Rear Accelerometer – X Direction	1845	290	133
3	Engine Top X	3996	27	-312
4	Engine Bottom X	4360	-5	285
5	Left Rear Accelerometer – Z Direction	1843	-323	126
6	Right Rear Accelerometer – Z Direction	1845	290	133
7	Left Rear Accelerometer – X Direction Redundant	1843	-339	127
8	Right Rear Accelerometer – X Direction Redundant	1845	307	131

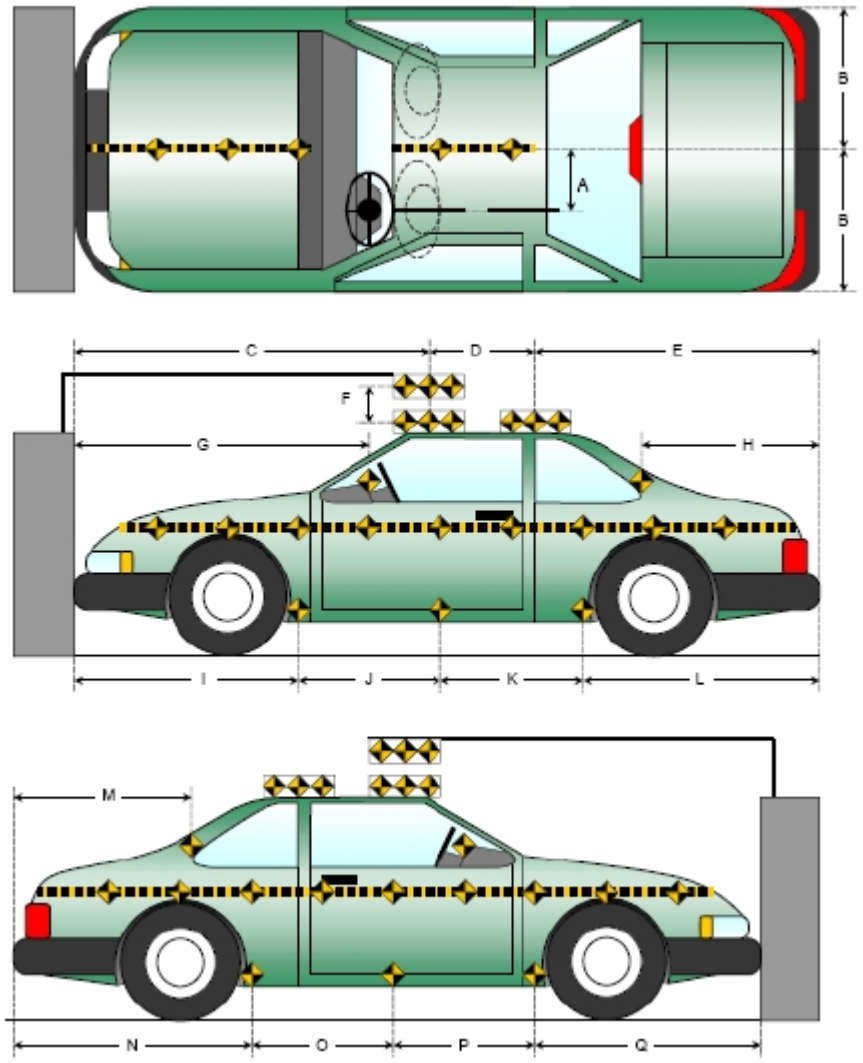
Reference Points:
X – Rear Surface of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

Item	Value
A	375
B	930
C	1988
D	607
E	2081
F	305
G	1696
H	1051
I	1320
J	956
K	964
L	1436
M	1050
N	1434
O	963
P	962
Q	1317

All units in millimeters



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

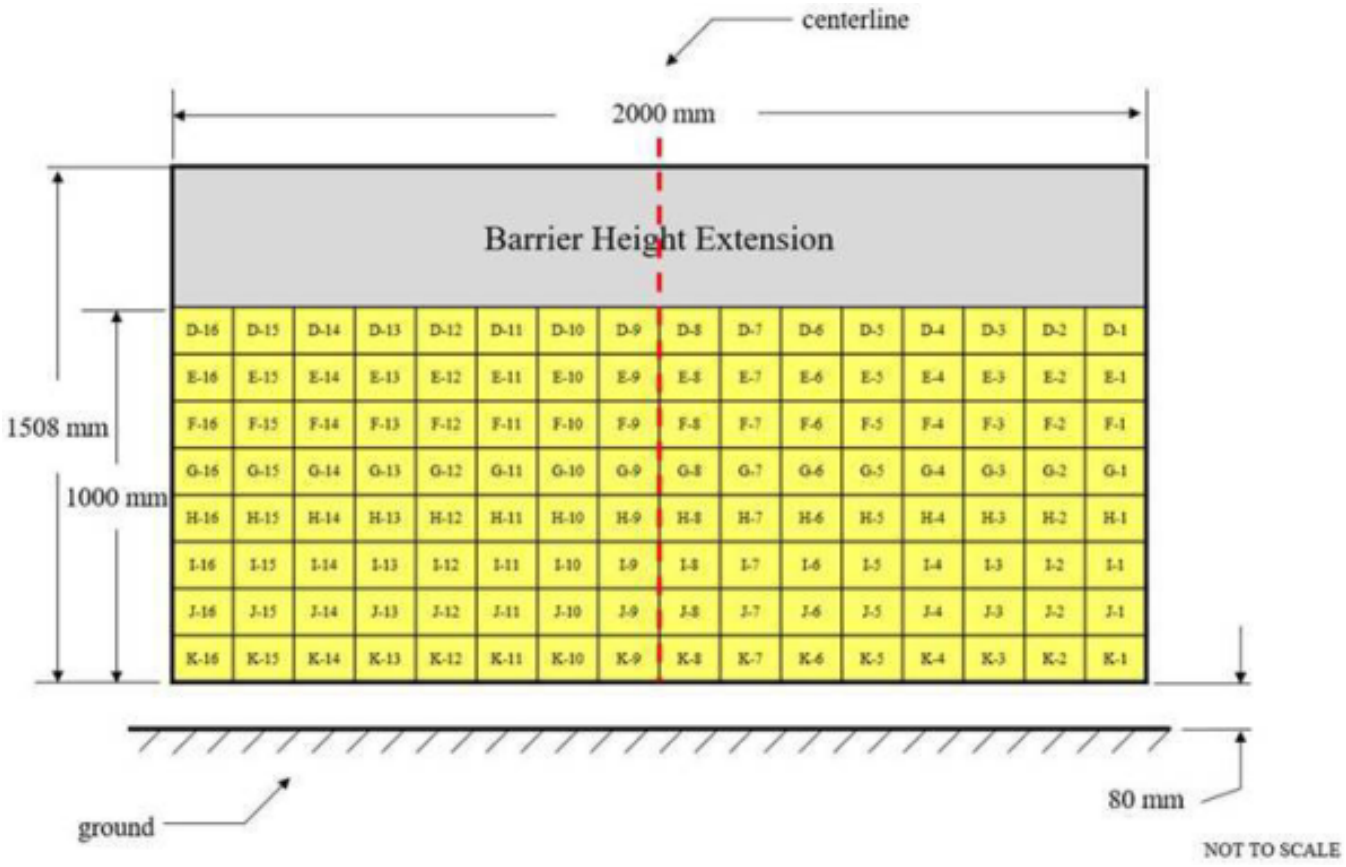


Figure 1 - Load Cell Locations on a 128-Load Cell Barrier with Plywood Height Extension*
Please note above diagram is not actual representation of load cell barrier used.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	47
Passenger Dummy Accelerometers	47
Vehicle Structure Accelerometers	8
Load Cell Barrier	384
Total	486

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: 2022 KIA EV6 WIND 5 Door SUV
NHTSA No.: O20224203
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 01/04/2023

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	H3-50th Male / S/N: 142	H3-5th Female / S/N: 137
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Bolster
Right Knee Contact	Knee Airbag	Knee Bolster

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST-TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	2281
Center	mm	2264
Right Side	mm	2260
Average	mm	2268

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

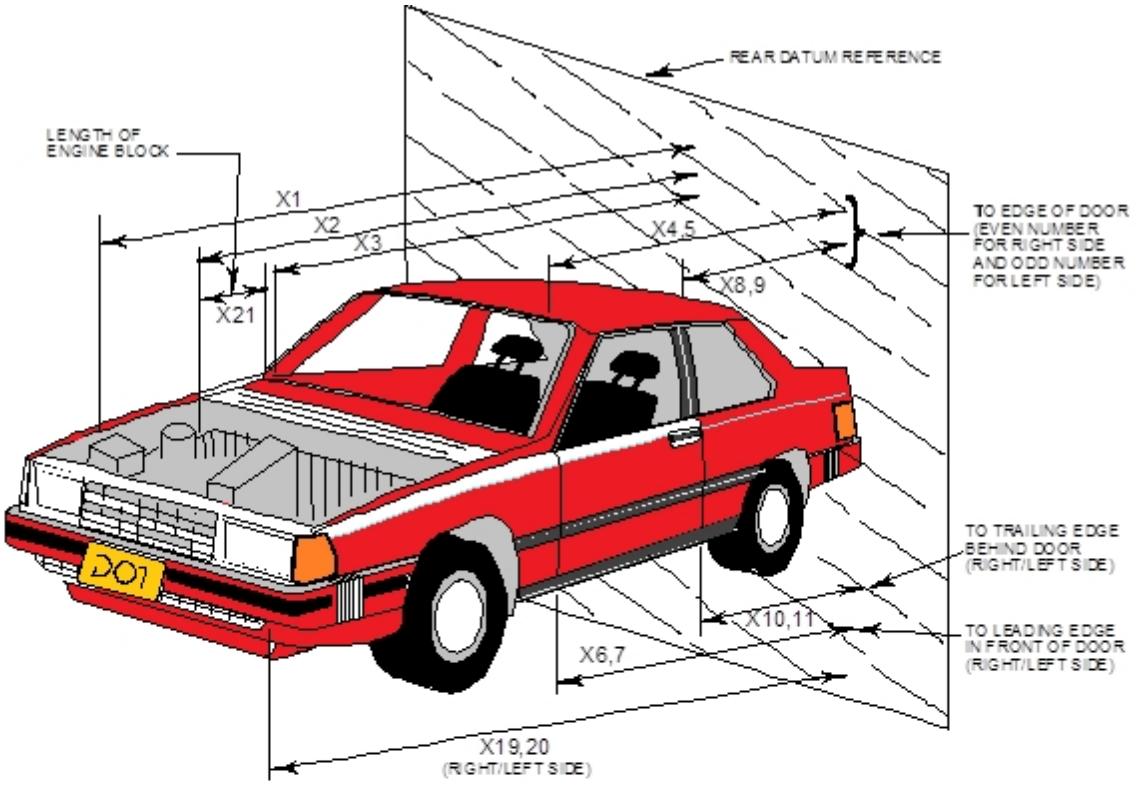
Test Vehicle: 2022 KIA EV6 WIND 5 Door SUV NHTSA No.: O20224203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/04/2023

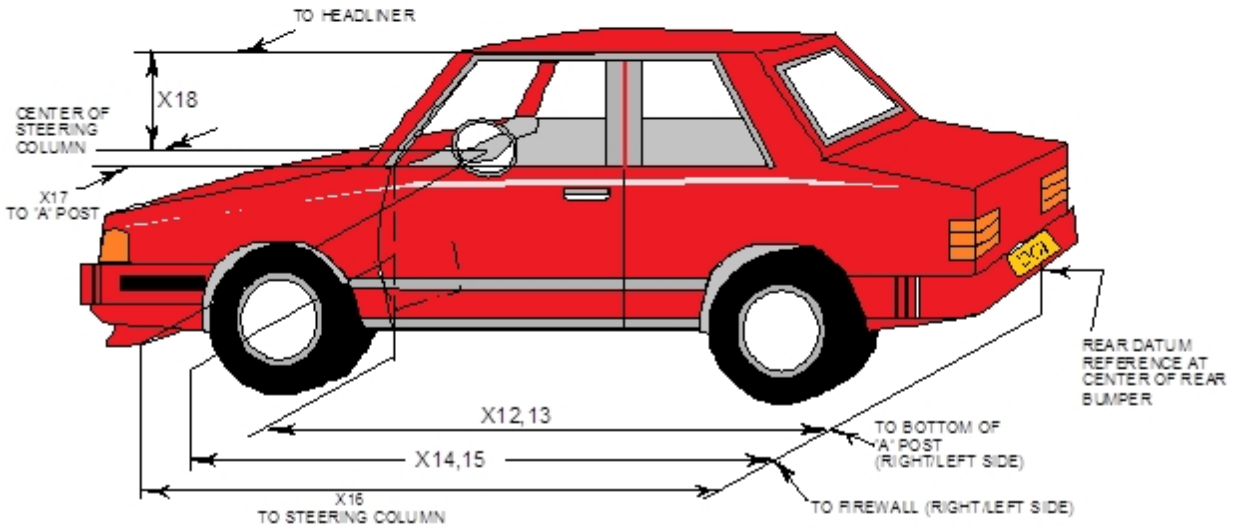
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023





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

Test Vehicle: 2022 KIA EV6 WIND 5 Door SUV NHTSA No.: O20224203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/04/2023

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	4676	4159	-517
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4122	3849	-273
3	RSOV to Firewall	3539	3501	-38
4	RSOV to Upper Leading Edge of Right Door	3272	3273	1
5	RSOV to Upper Leading Edge of Left Door	3273	3273	0
6	RSOV to Lower Leading Edge of Right Door	3265	3265	0
7	RSOV to Lower Leading Edge of Left Door	3266	3263	-3
8	RSOV to Upper Trailing Edge of Right Door	2147	2147	0
9	RSOV to Upper Trailing Edge of Left Door	2148	2147	-1
10	RSOV to Lower Trailing Edge of Right Door	2176	2175	-1
11	RSOV to Lower Trailing Edge of Left Door	2177	2174	-3
12	RSOV to Bottom of “A” Post of Right Side	3354	3354	0
13	RSOV to Bottom of “A” Post of Left Side	3354	3357	3
14	RSOV to Firewall, Right Side	3711	3698	-13
15	RSOV to Firewall, Left Side	3712	3693	-19
16	RSOV to Steering Column	2822	2845	23
17	Center of Steering Column to “A” Post	284	263	-21
18	Center of Steering Column to Headliner	385	382	-3
19	RSOV to Right Side of Front Bumper	4646	4202	-444
20	RSOV to Left Side of Front Bumper	4646	4236	-410
21	Length of Engine Block	259	259	0
RD	RSOV to Right Side of Dash Panel	3033	3035	2
CD	RSOV to Center of Dash Panel	2981	2962	-19
LD	RSOV to Left Side of Dash Panel	3027	3025	-2

All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

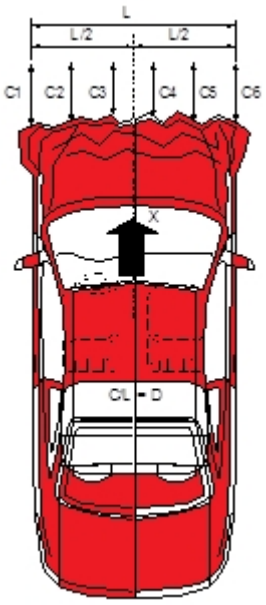
Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

VEHICLE INFORMATION

VIN:	KNDC3DLC2N5076265	Wheelbase (mm):	2906
Vehicle Size Category:	MPV	Test Weight (kg):	2235

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):	56.26
Velocity Change (km/h):	67.43
Time of Separation (ms):	154



CRUSH PROFILE

Collision Deformation Classification:	12FDEW3
Midpoint of Damage:	C3
Damage Region Length (mm):	1553
Impact Mode:	Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Crush
C1	Crush Zone 1 at Left Side	mm	4512	4122	390
C2	Crush Zone 2 at Left Side	mm	4651	4135	516
C3	Crush Zone 3 at Left Side	mm	4674	4161	513
C4	Crush Zone 4 at Right Side	mm	4675	4183	492
C5	Crush Zone 5 at Right Side	mm	4651	4193	458
C6	Crush Zone 6 at Right Side	mm	4511	4149	362
L	C1 to C6	mm	1499	1553	54

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

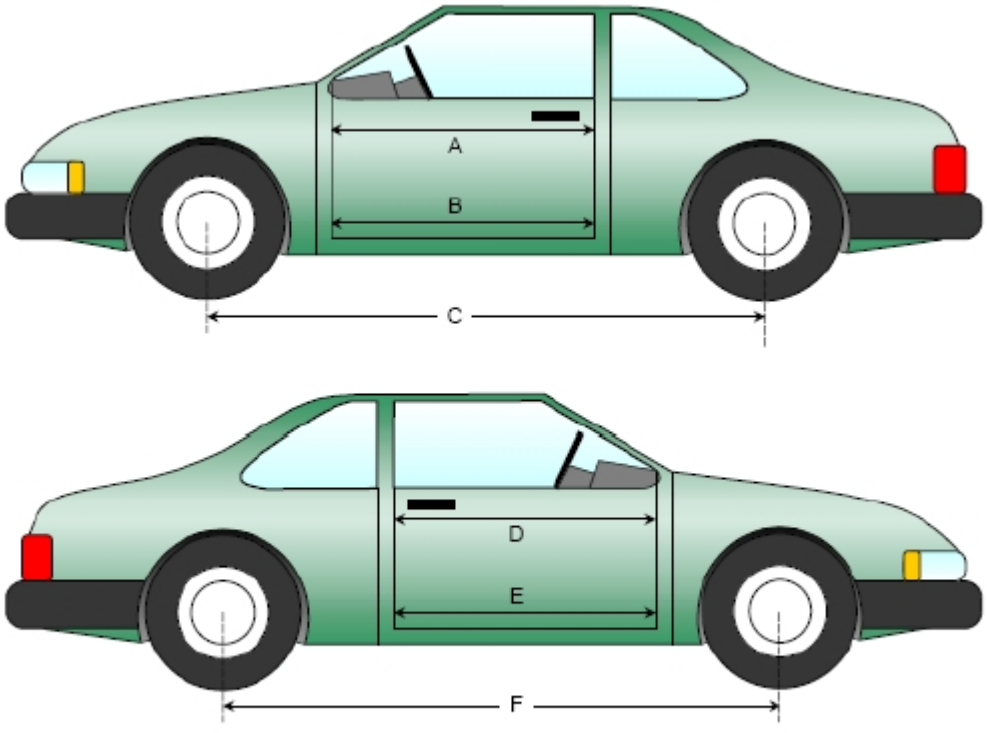
Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	999	998	-1
B	Left Side Lower	mm	852	851	-1
D	Right Side Upper	mm	998	997	-1
E	Right Side Lower	mm	855	854	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	2906	2809	-97
F	Right Side Wheelbase	mm	2906	2807	-99



Left & Right Side Views

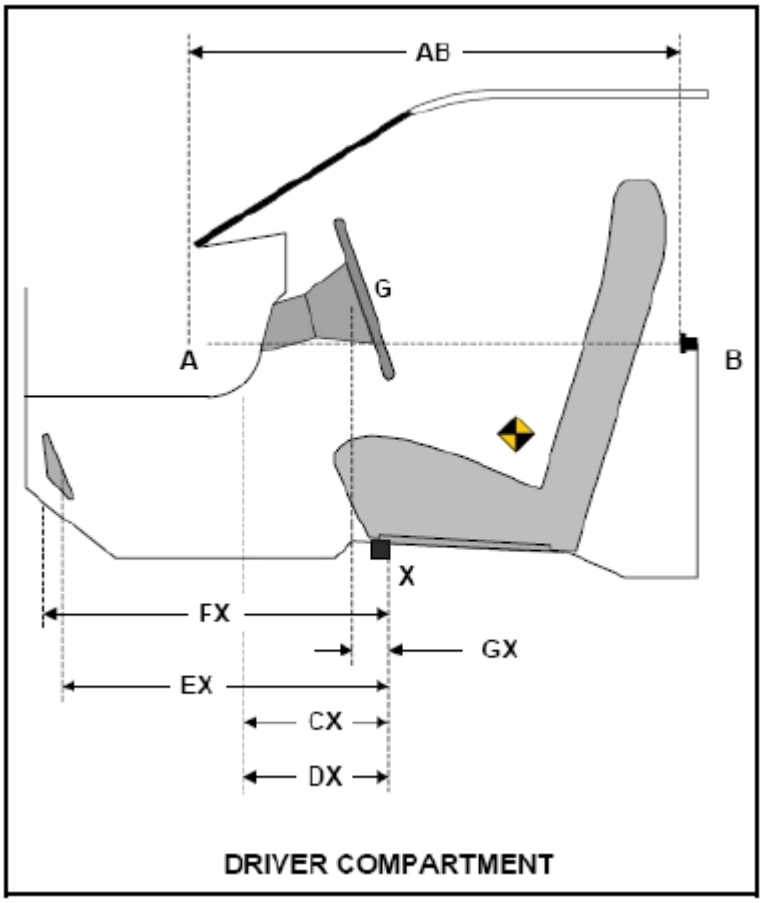
DATA SHEET NO.14 … (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	804	805	1
CX	Left Knee Bolster to X	mm	318	307	-11
DX	Right Knee Bolster to X	mm	306	286	-20
EX	Brake Pedal to X	mm	566	489	-77
FX	Foot Rest to X	mm	604	576	-28
GX	Center of Steering Column Wheel Hub to X	mm	62	85	23

X = Front of Seat Track (Stationary)



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

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

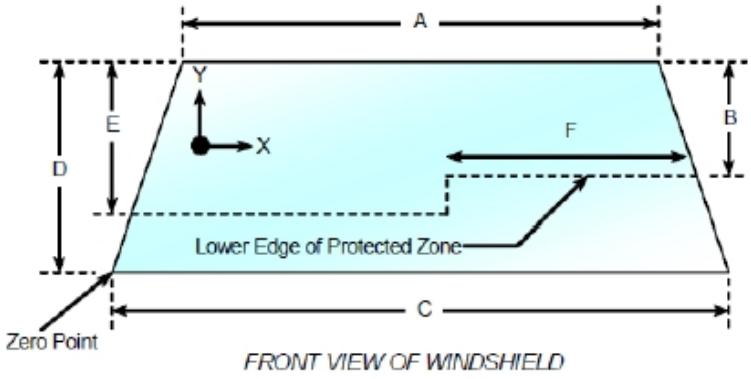
Windshield Mounting Details: A trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2372.5	2372.5	100%
Right Side	2372.5	2372.5	100%
Total	4745	4745	100%



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1240
B	mm	445
C	mm	1555
D	mm	975
E	mm	646
F	mm	475

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:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21°C Test Time: 11:09 AM

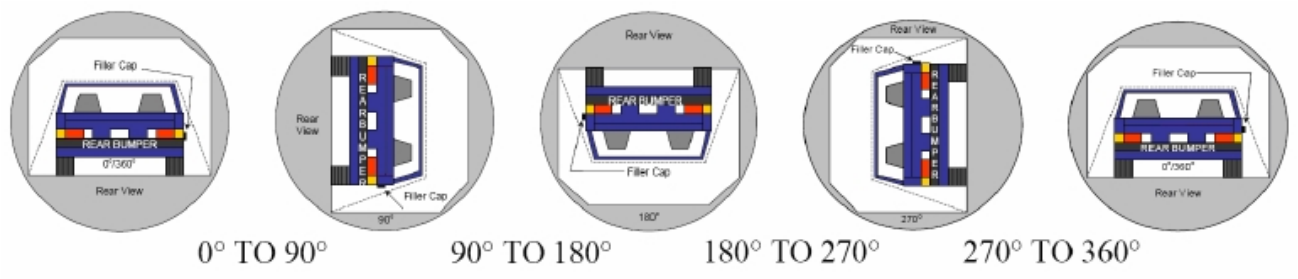
STODDARD SOLVENT SPILLAGE MEASUREMENTS

A. From impact until vehicle motion ceases (Maximum allowable is 1 oz.)	0	oz
B. For the 5-minute period after motion ceases (Maximum allowable is 5 oz.)	0	oz
C. For the following 25 minutes: (Maximum allowable is 1 oz.)	0	oz

D. Spillage Detail: Electric Vehicle

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023



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: Electric Vehicle

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°			
90° to 180°			
180° to 270°			
270° to 360°			

FMVSS 301 SPILLAGE TABLE

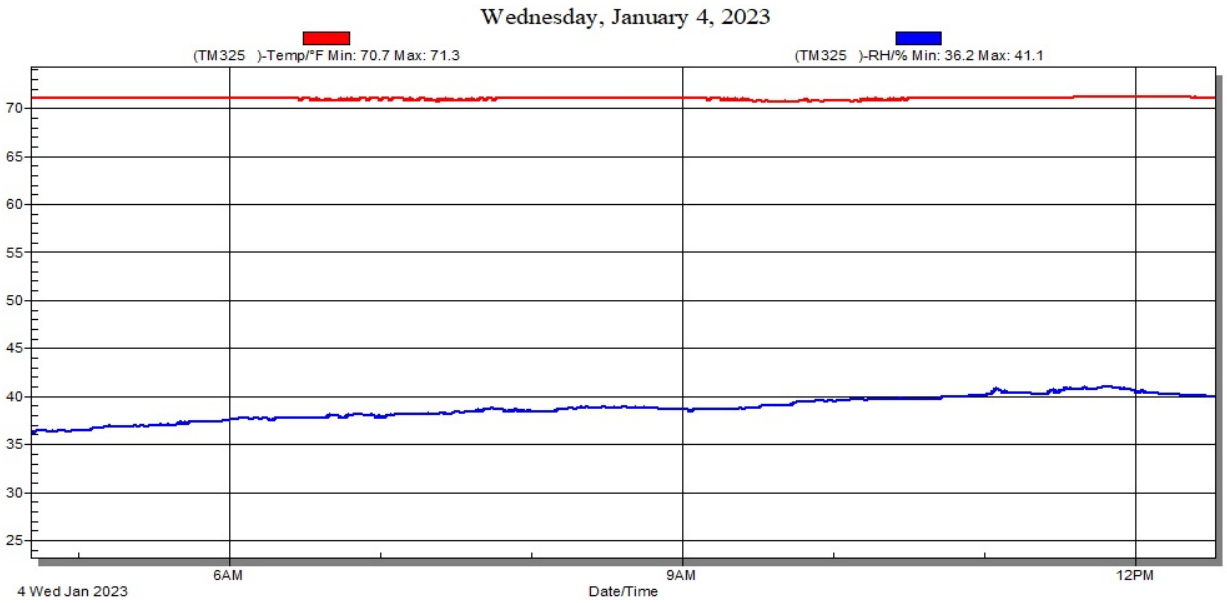
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°				
90° to 180°				
180° to 270°				
270° to 360°				

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 17
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023



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

DATA SHEET NO. 305-1
GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Electric
Propulsion Battery Type	Lithium-ion Battery
Nominal Voltage (Volts)	523
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside of propulsion battery on the rear side.
Auxiliary Battery Type	Lead-acid battery

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	Liquid solution, LiPF6 salt, Carbonate solvent
Electrolyte Fluid Specific Gravity	1.19 g/cm3
Electrolyte Fluid Kinematic Viscosity (centistokes)	2~3 cP @ 25˚C
Electrolyte Fluid Color	Transparent & Pale Yellow
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Applied (Water-cooled type), Blue
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside Passenger Compartment

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	480
Maximum State of Charge	V	826
95% of Maximum	V	784.7
Test Voltage *	V	793
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

* *For all battery types-No less than 95% of Maximum Operating Voltage; for batteries that are rechargeable ONLY by an energy source on the vehicle-maximum practicable state of charge within normal operating range.*

DATA SHEET NO. 305-2
PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

VEHICLE CHASSIS GROUND PT(S) LOCATION(S) & PROPULSION BATTERY SYSTEM

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Any door striker.
Details of Propulsion Battery Components	OEM provided necessary documentation.

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

PROPULSION BATTERY VOLTAGE, RESISTANCE & ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	800
Propulsion Battery Voltage: (ready to drive position)	V_b	V	793.0
Propulsion Battery to Vehicle Chassis	V_1	V	501.0
Propulsion Battery to Vehicle Chassis	V_2	V	503.0
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	400,000
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	144.0
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	144.0
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	1,987,292
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	1,990,479
Lesser value of R_{i1} and R_{i2}	R_i	Ω	1,987,292
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	2,506

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

NOTES:

- *The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.*
- *If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.*
- *The known resistance Ro (in Ohms) should be approximately 500 times the nominal operating voltage of the vehicle (in volts) per SAE J1766*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*

DATA SHEET NO. 305-4
POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 KIA EV6 WIND 5 Door SUV | NHTSA No.: O20224203
Test Program: NCAP Frontal Barrier Impact Test | Test Date: 01/04/2023

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Calibration Date		4/28/2022
Propulsion Battery Voltage (Vb)	V	0.43

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V_b =	0.430	V	Time:	0	Minutes	55	Seconds
V_1 =	0.110	V	Time:	1	Minutes	8	Seconds
V_2 =	0.100	V	Time:	1	Minutes	15	Seconds
R_o =	400,000	Ω					
V_1' =	0.030	V	Time:	1	Minutes	21	Seconds
V_2' =	0.080	Ω	Time:	1	Minutes	29	Seconds
R_{i1} =	2,036,364	Ω	Time:	1	Minutes	21	Seconds
R_{i2} =	210,000	Ω	Time:	1	Minutes	29	Seconds
R_i =	210,000	Ω/V	Time:	1	Minutes	29	Seconds
R_i/V_b =	488,372	Ω/V	Time:	1	Minutes	29	Seconds

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

NOTES:

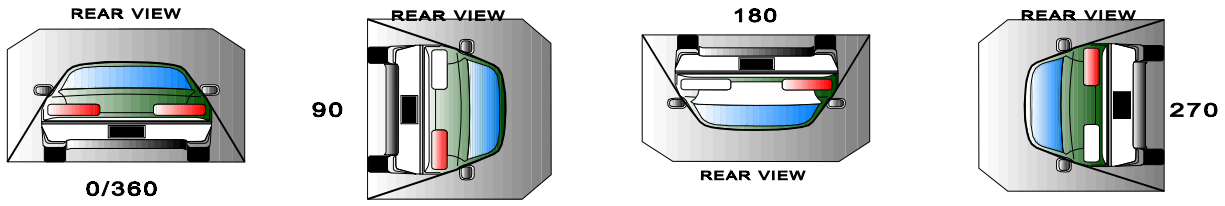
- *R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1'], R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2'], R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical Isolation Value is 500 Ω/V*

PROPULSION BATTERY SYSTEM COMPONENTS

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	None	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	None	X	
Is propulsion battery electrolyte spillage visible in the passenger compartment?	None	X	

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 KIA EV6 WIND 5 Door SUV	NHTSA No.:	O20224203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/04/2023



Rear View

DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1 -3 min)		FMVSS 301 Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	12	5	6	12	7
90° to 180°	1	5	5	6	5	7
180° to 270°	1	5	5	6	5	7
270° to 360°	1	10	5	6	10	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0.0	Liters	None
90° to 180°	0.0	Liters	None
180° to 270°	0.0	Liters	None
270° to 360°	0.0	Liters	None
Total Spillage	0.0	Liters	None

** FMVSS 305 Requirements: Maximum allowable propulsion battery electrolyte spillage is **5.0 Liters***

Is the total spillage of propulsion battery electrolyte greater than 5.0 Liters?		Yes (Fail)	X	No
Is propulsion battery electrolyte spillage visible in the passenger compartment?		Yes (Fail)	X	No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Calibration Date		4/28/2022
Propulsion Battery Voltage (Vb)	V	0.43

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

Test Vehicle: 2022 KIA EV6 WIND 5 Door SUV NHTSA No.: O20224203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/04/2023

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units		Minutes	Seconds
V_b =	90°	0.00	V	Time:	1	15
	180°	0.00	V		18	13
	270°	0.00	V		26	15
	360°	0.00	V		33	20
V_1 =	90°	0.00	V	Time:	1	22
	180°	0.01	V		18	22
	270°	0.00	V		26	32
	360°	0.00	V		33	29
V_2 =	90°	0.00	V	Time:	1	30
	180°	0.01	V		18	33
	270°	0.00	V		26	38
	360°	0.00	V		33	34
V_1' =	90°	0.00	V	Time:	1	37
	180°	0.00	V		18	43
	270°	0.00	V		26	44
	360°	0.00	V		33	39
V_2' =	90°	0.00	Ω	Time:	1	44
	180°	0.00	Ω		18	49
	270°	0.00	Ω		26	51
	360°	0.00	Ω		33	45
R_{i1} =	90°	Zero Volts	Ω	Time:	1	37
	180°	Zero Volts	Ω		18	43
	270°	Zero Volts	Ω		26	44
	360°	Zero Volts	Ω		33	39
R_{i2} =	90°	Zero Volts	Ω	Time:	1	44
	180°	Zero Volts	Ω		18	49
	270°	Zero Volts	Ω		26	51
	360°	Zero Volts	Ω		33	45
R_i =	90°	Zero Volts	Ω/V	Time:	1	44
	180°	Zero Volts	Ω/V		18	49
	270°	Zero Volts	Ω/V		26	51
	360°	Zero Volts	Ω/V		33	45
R_i/V_b =	90°	Zero Volts	Ω/V	Time:	1	44
	180°	Zero Volts	Ω/V		18	49
	270°	Zero Volts	Ω/V		26	51
	360°	Zero Volts	Ω/V		33	39

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

APPENDIX A

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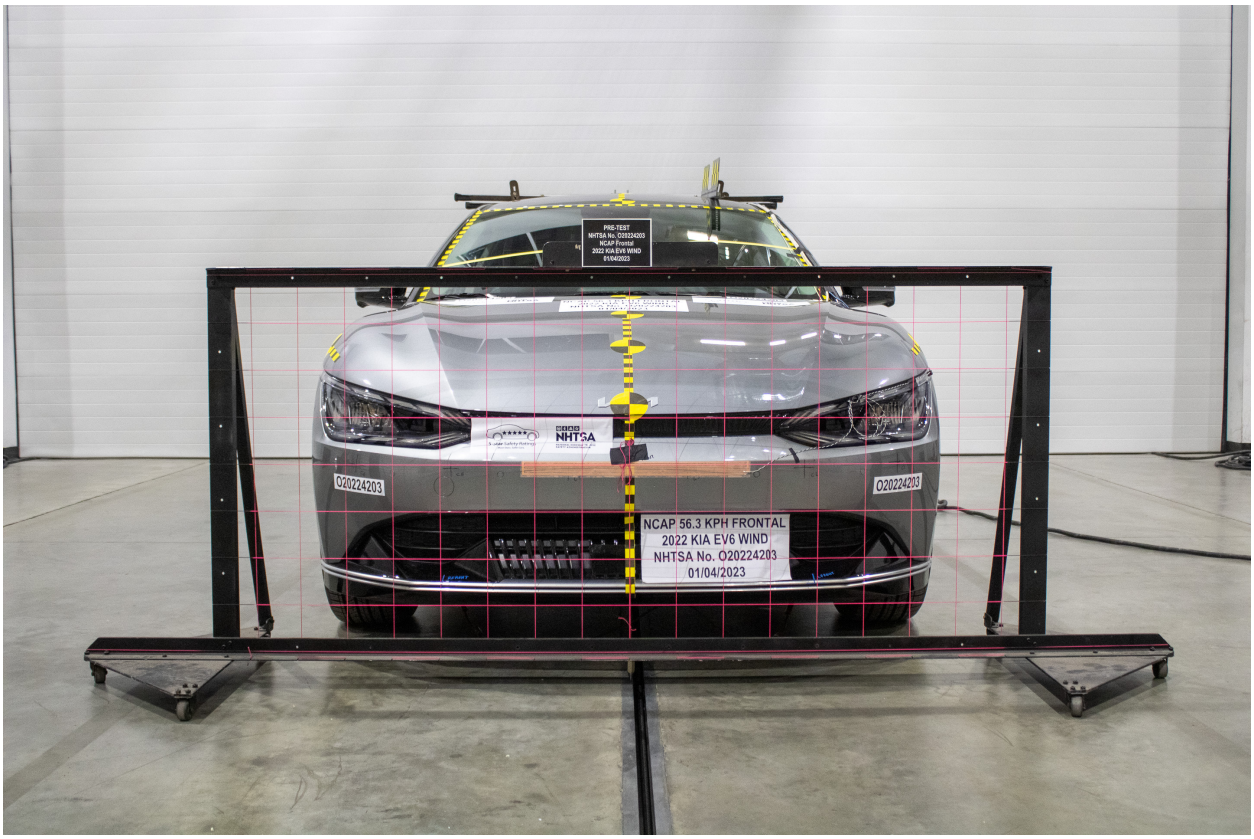


Figure A-1: Load Cell Location



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: 2022 KIA EV6 WIND 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

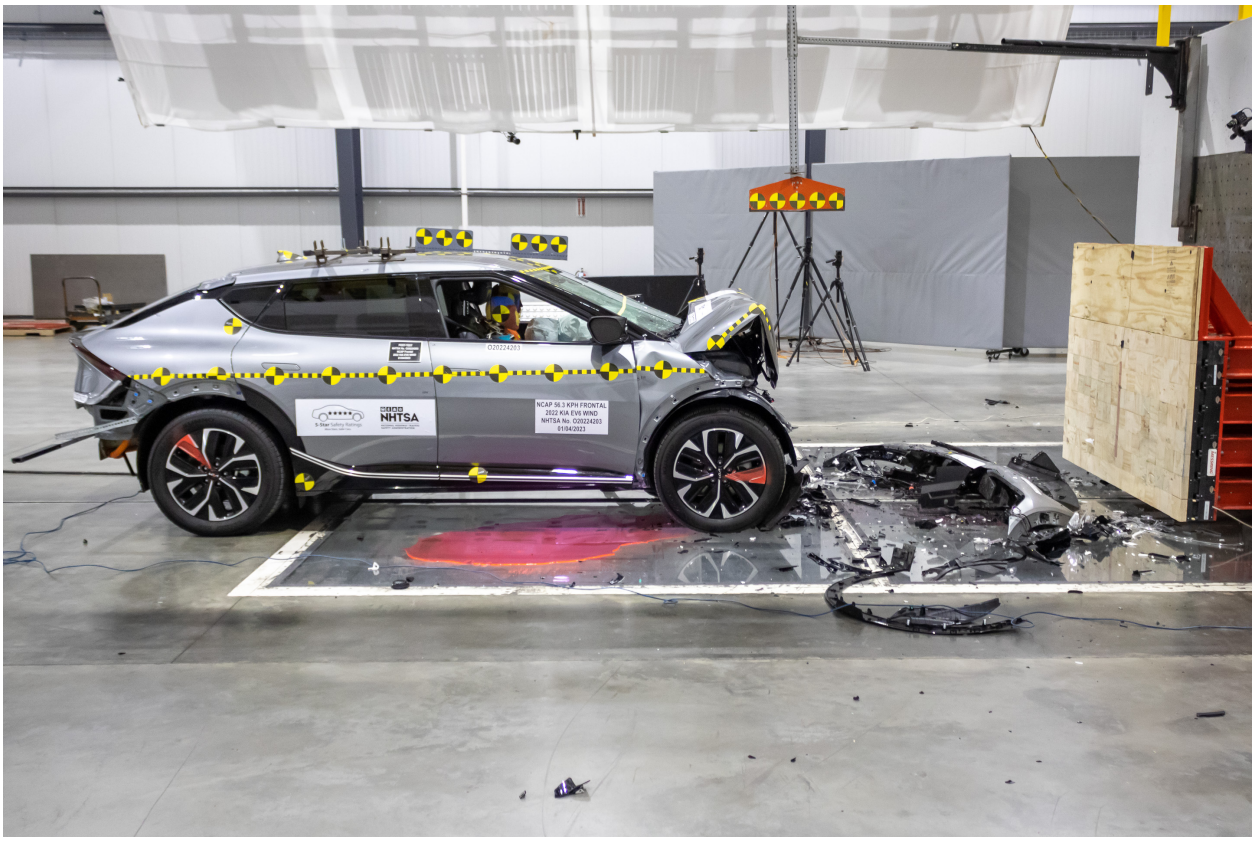


Figure A-13: Post-Test Right View of Test Vehicle



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

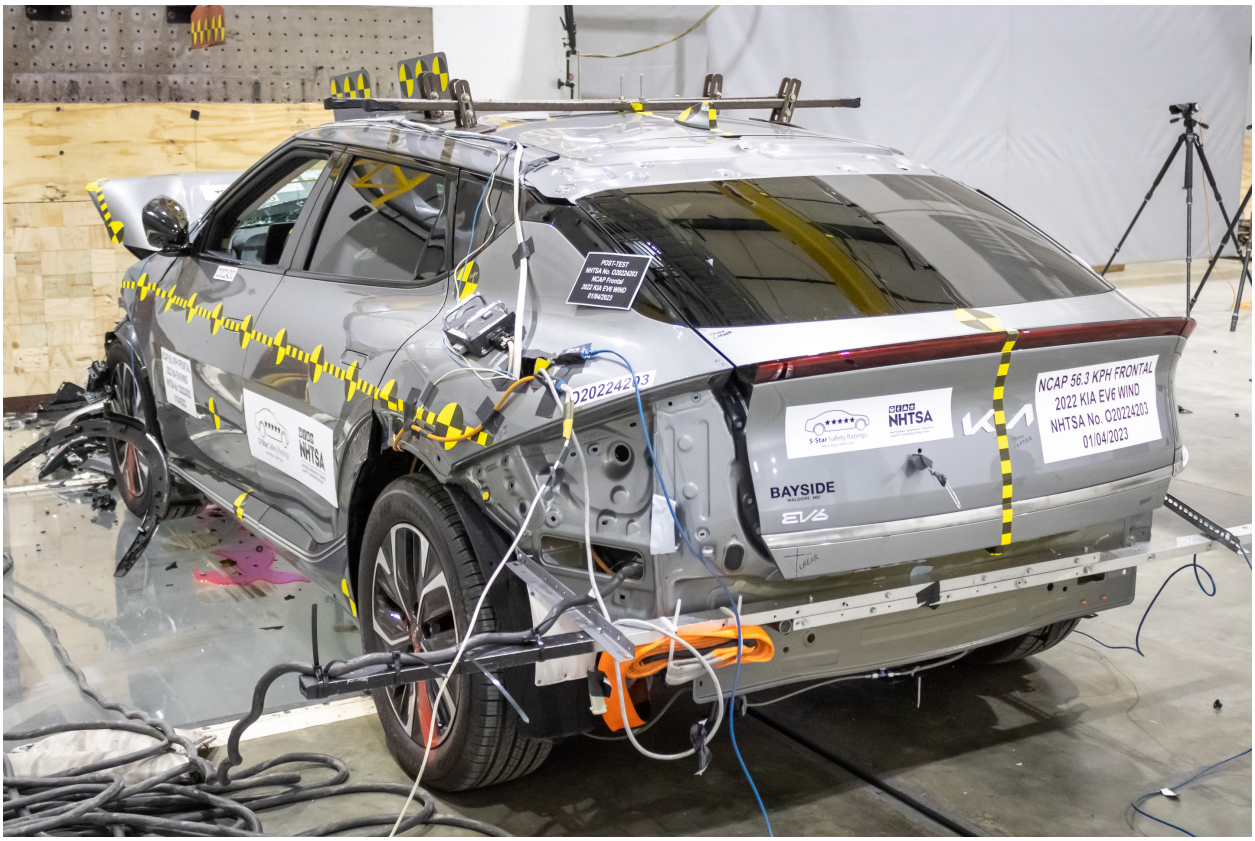


Figure A-17: Post-Test Left Rear 3-4 View



Figure A-18: Pre-Test Windshield View



Figure A-19: Post-Test Windshield View

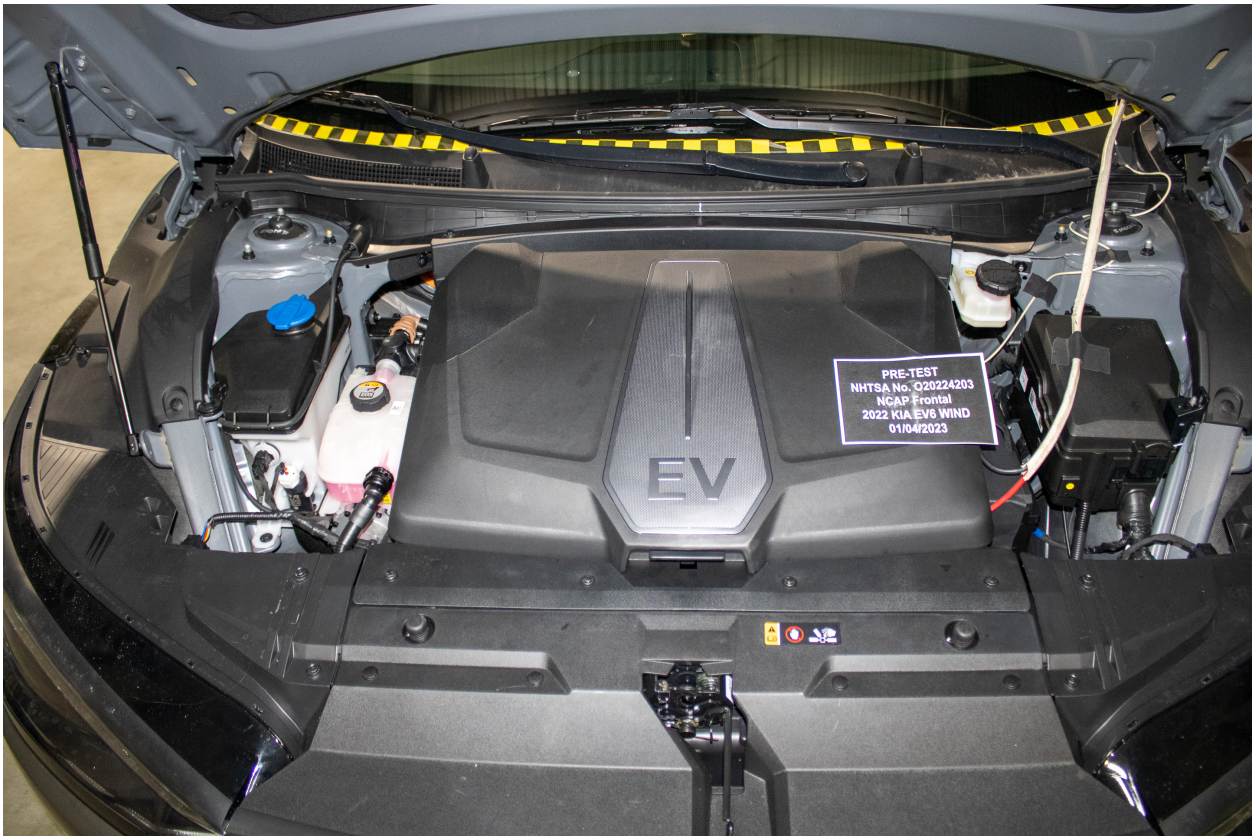


Figure A-20: Pre-Test Engine Compartment View

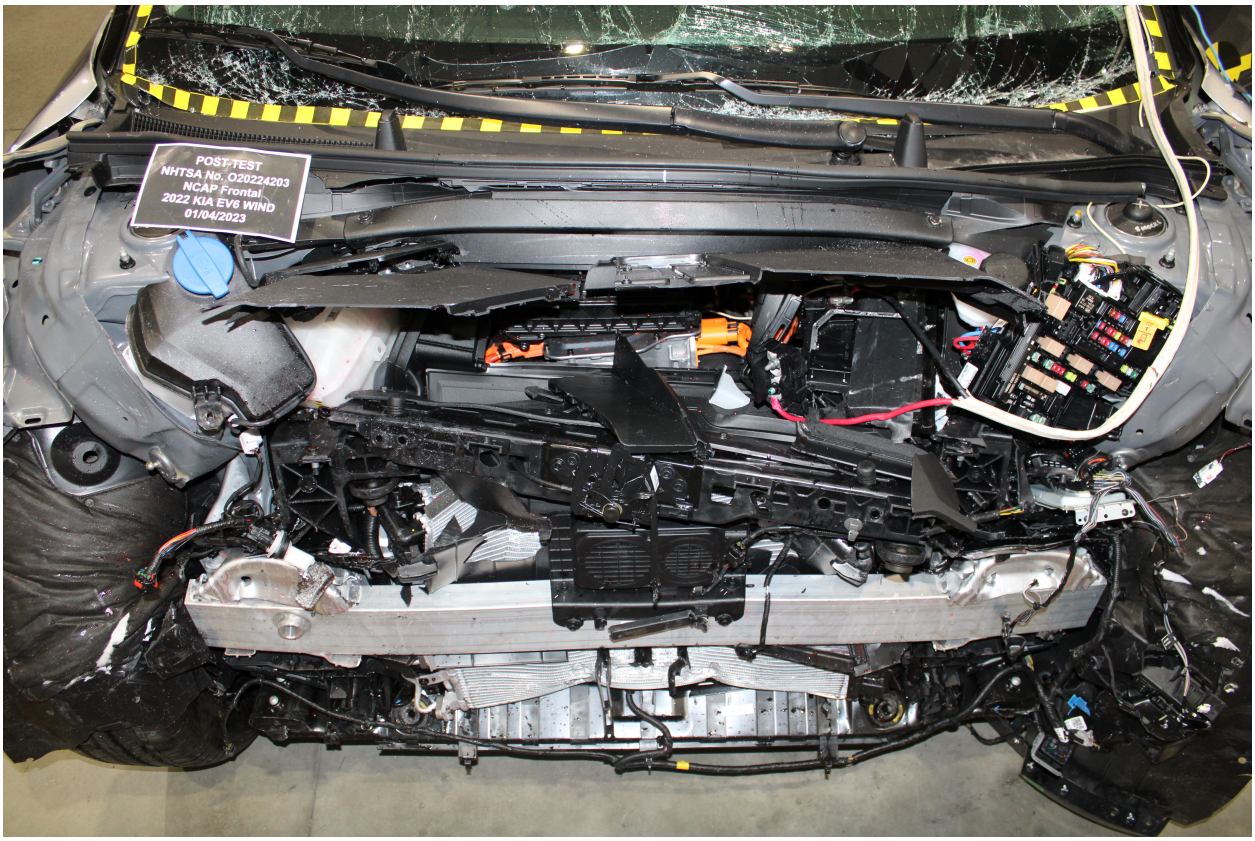


Figure A-21: Post-Test Engine Compartment View



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



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

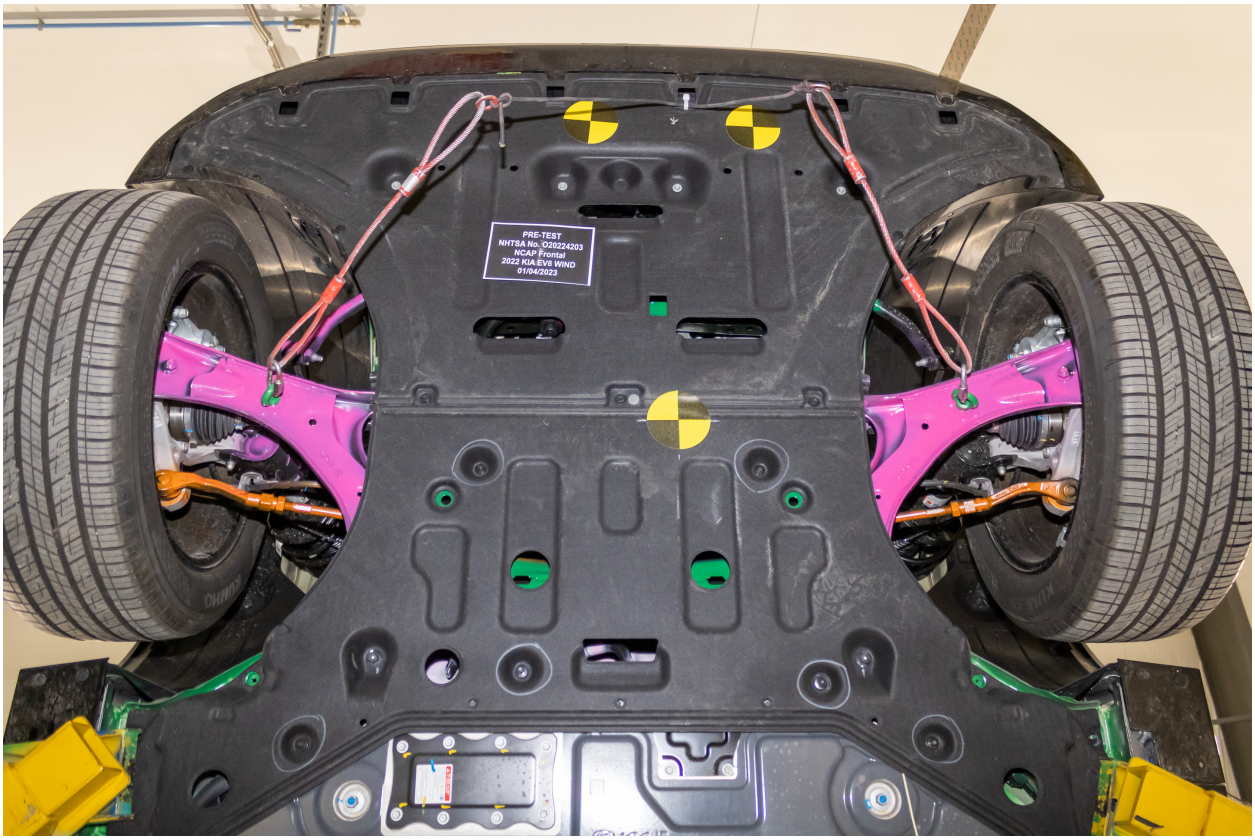


Figure A-24: Pre-Test Front Underbody View

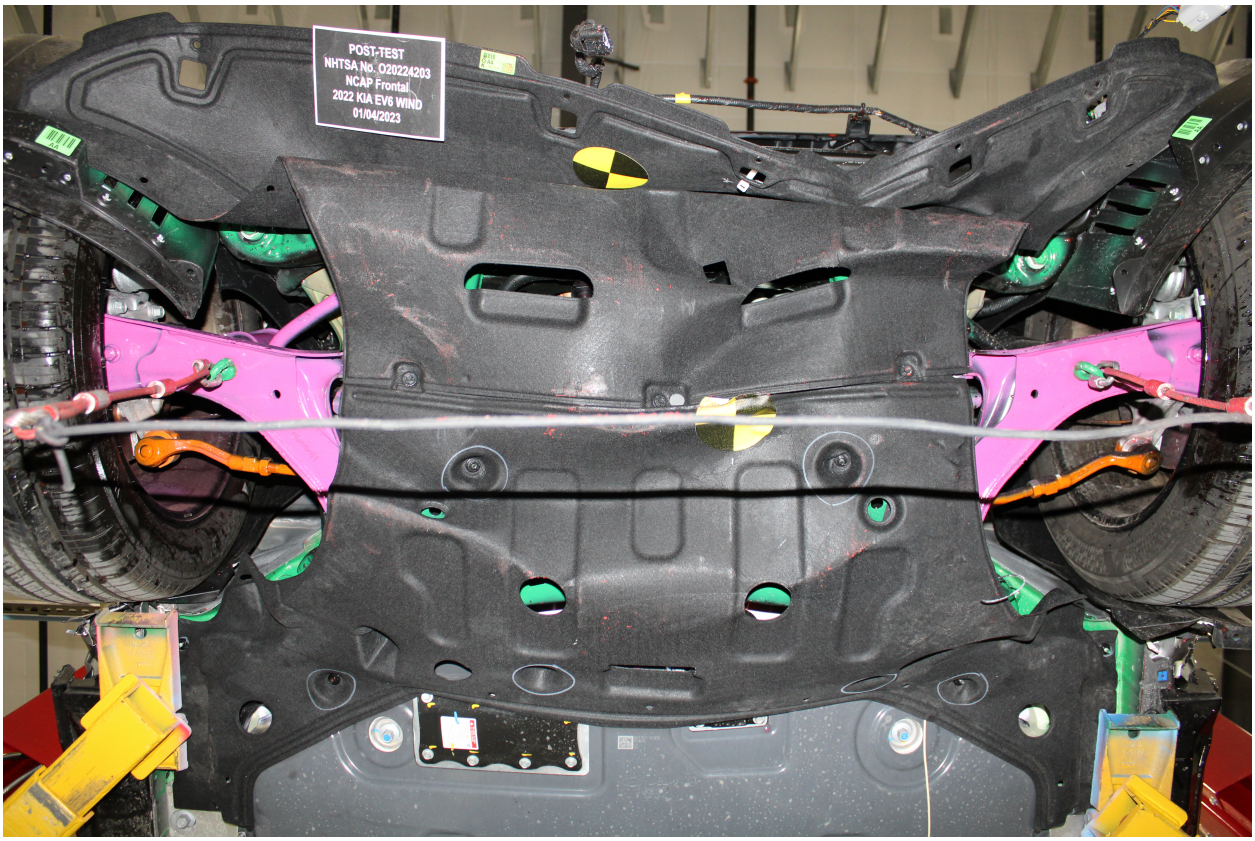


Figure A-25: Post-Test Front Underbody View

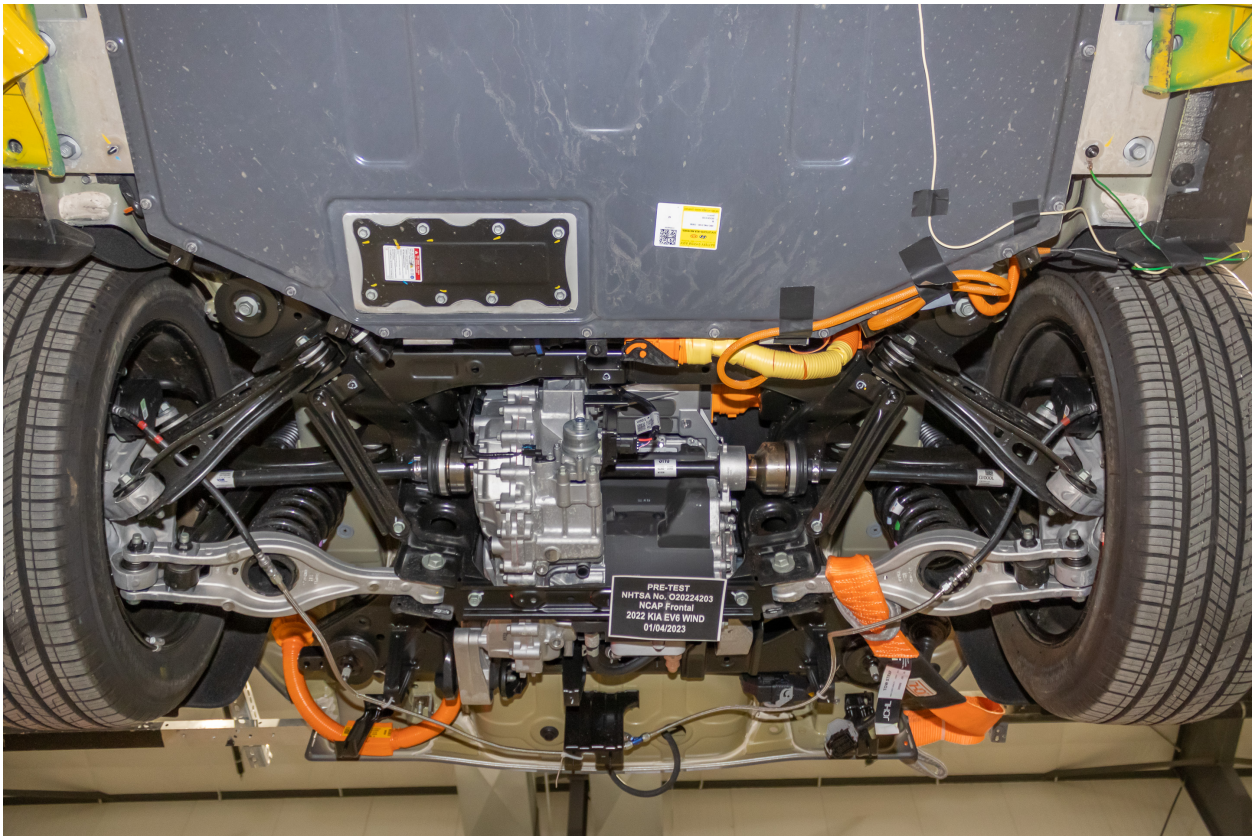


Figure A-26: Pre-Test Rear Underbody View

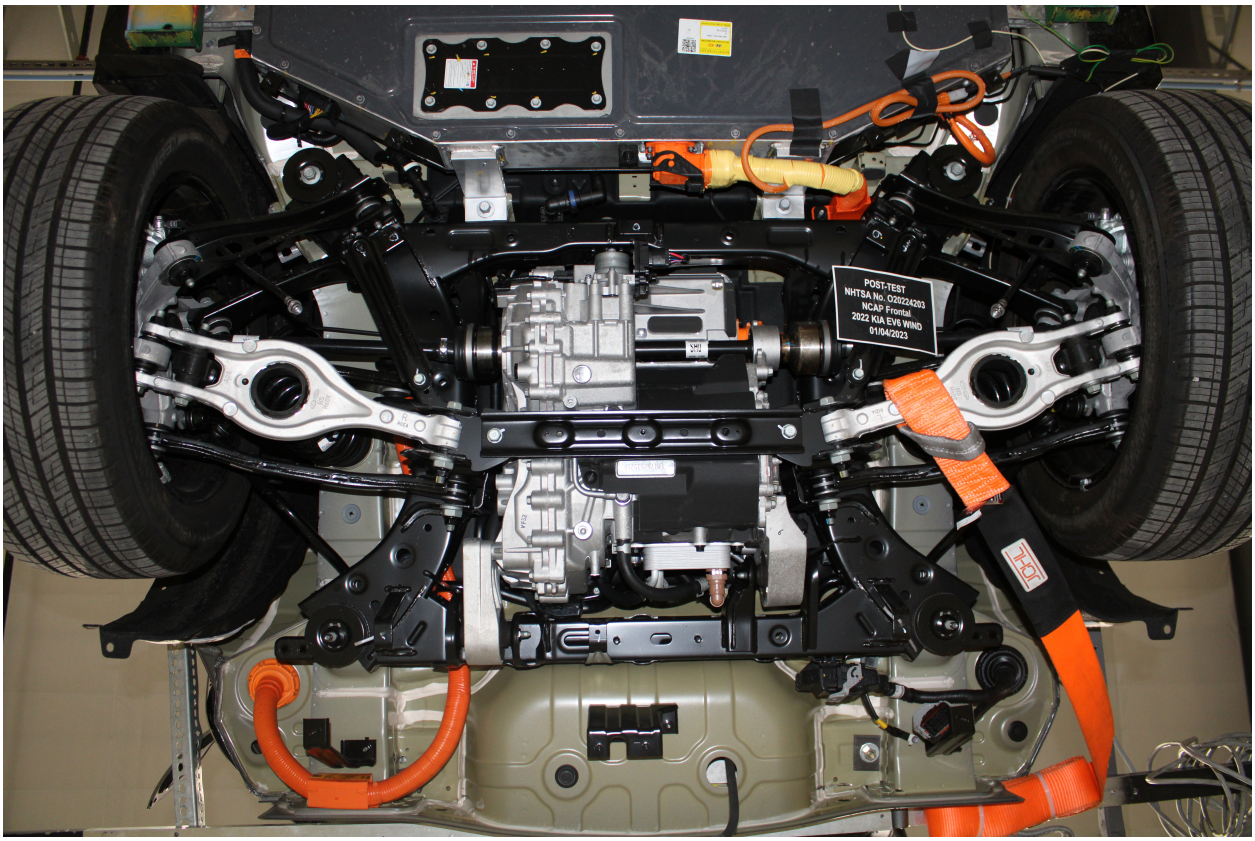


Figure A-27: Post-Test Rear Underbody View



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

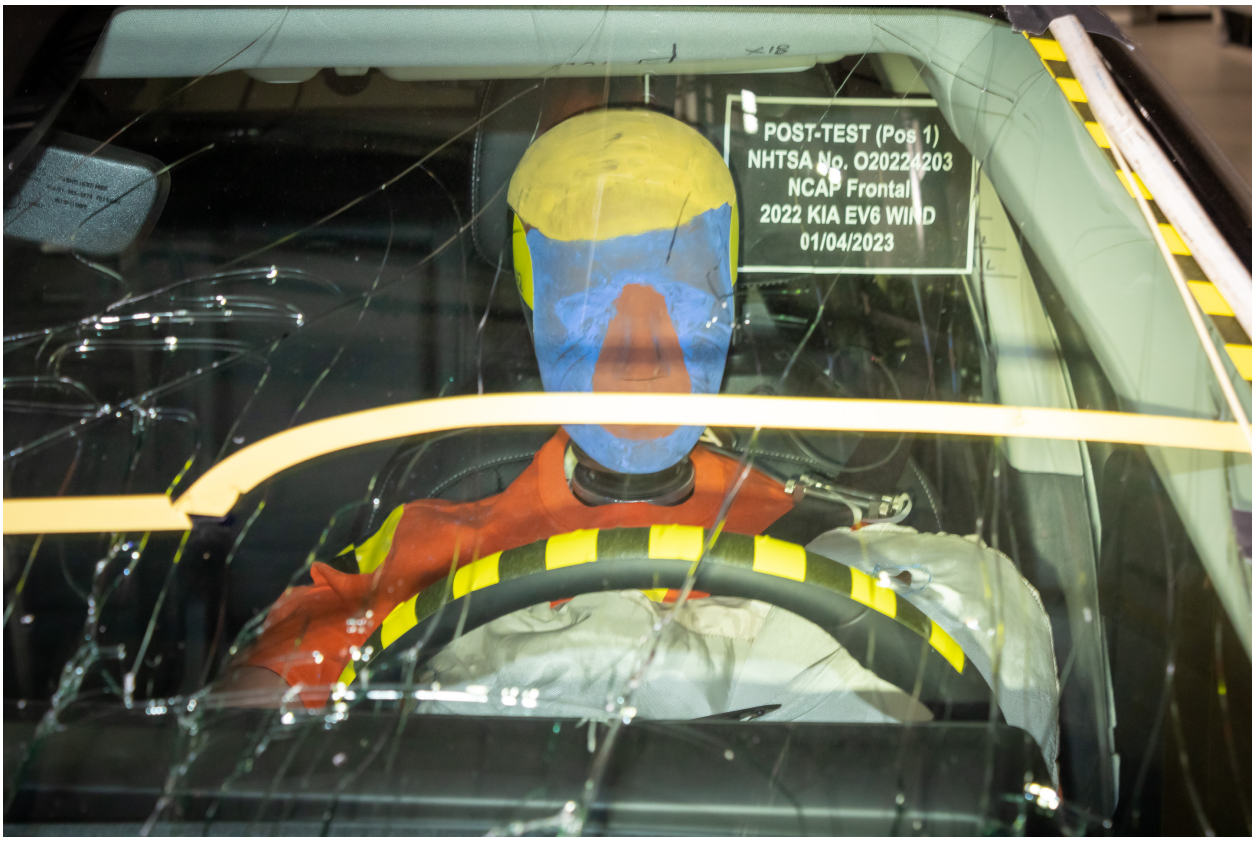


Figure A-31: Post-Test Driver Dummy Front View



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

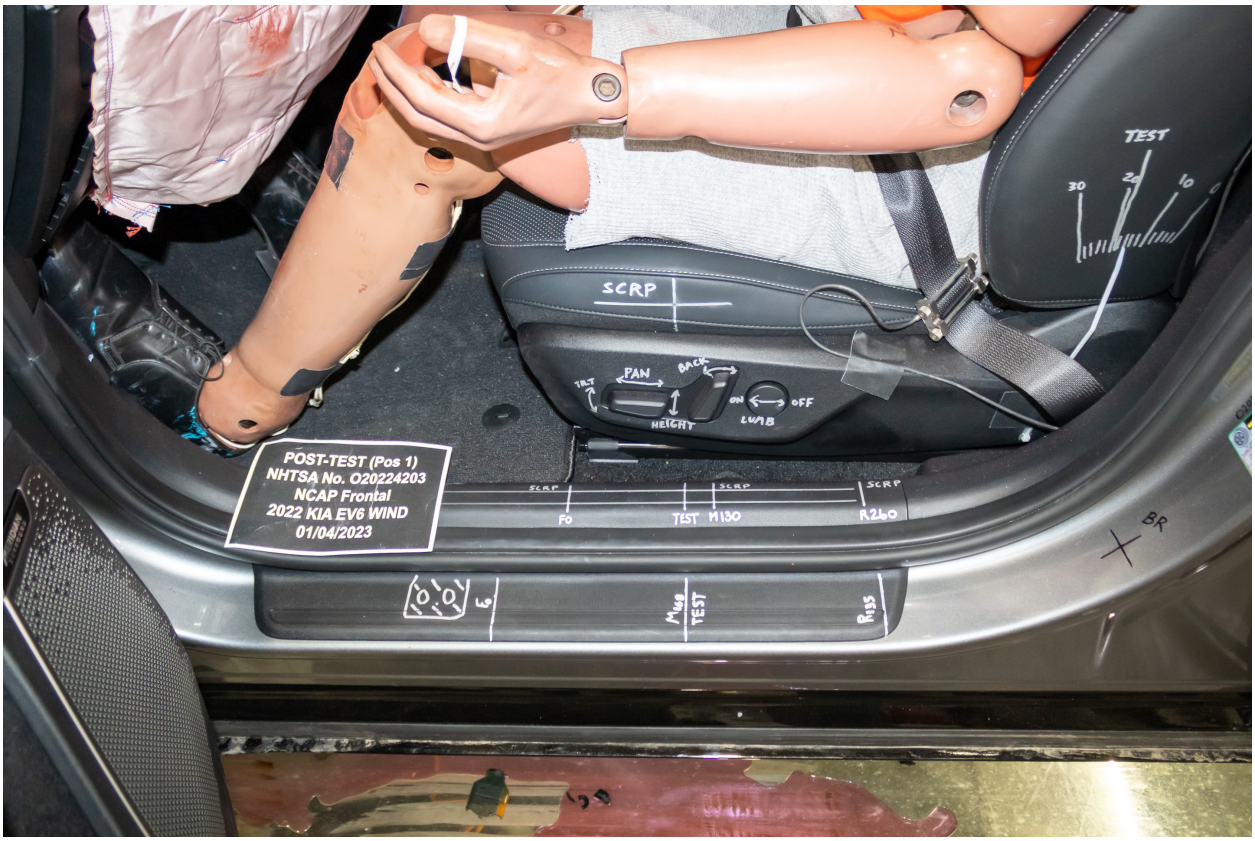


Figure A-37: Post-Test Driver's Seat Fore-Aft Markings



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

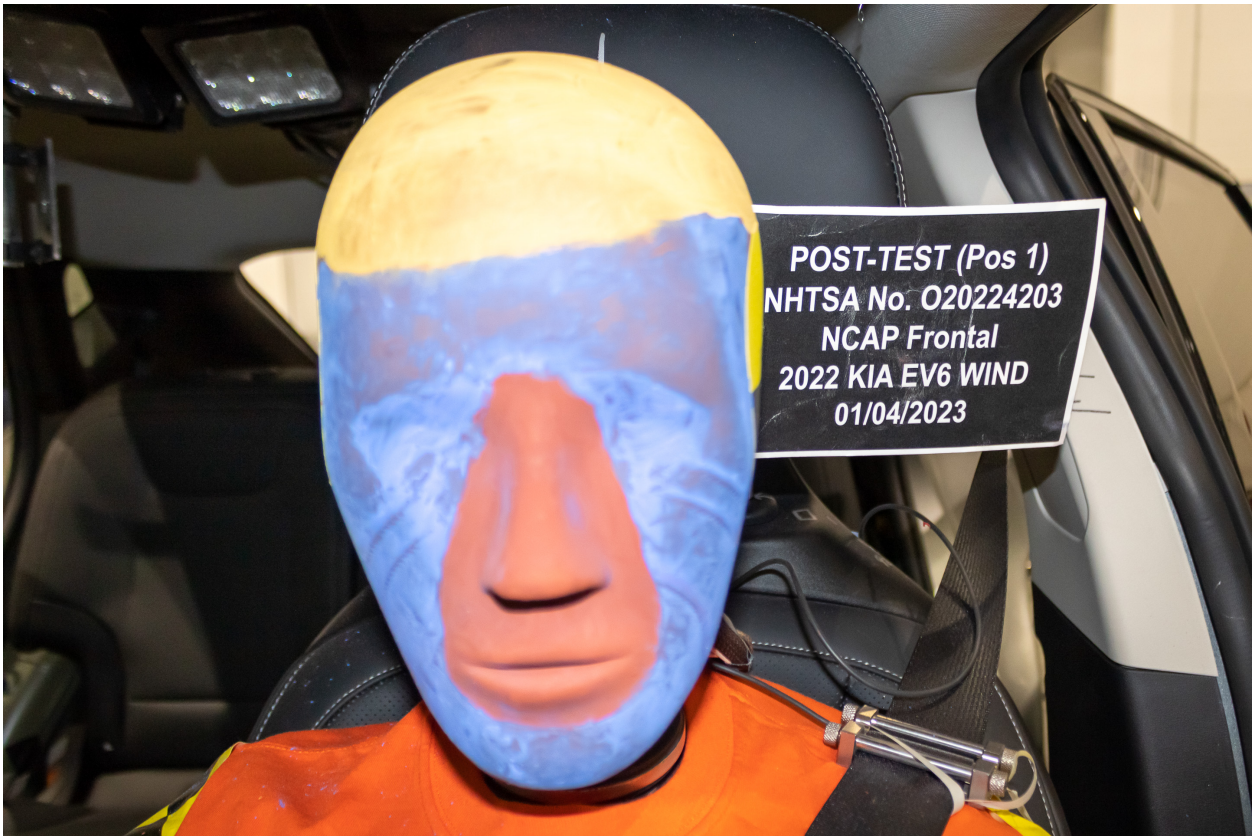


Figure A-48: Post-Test Driver Dummy Face



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

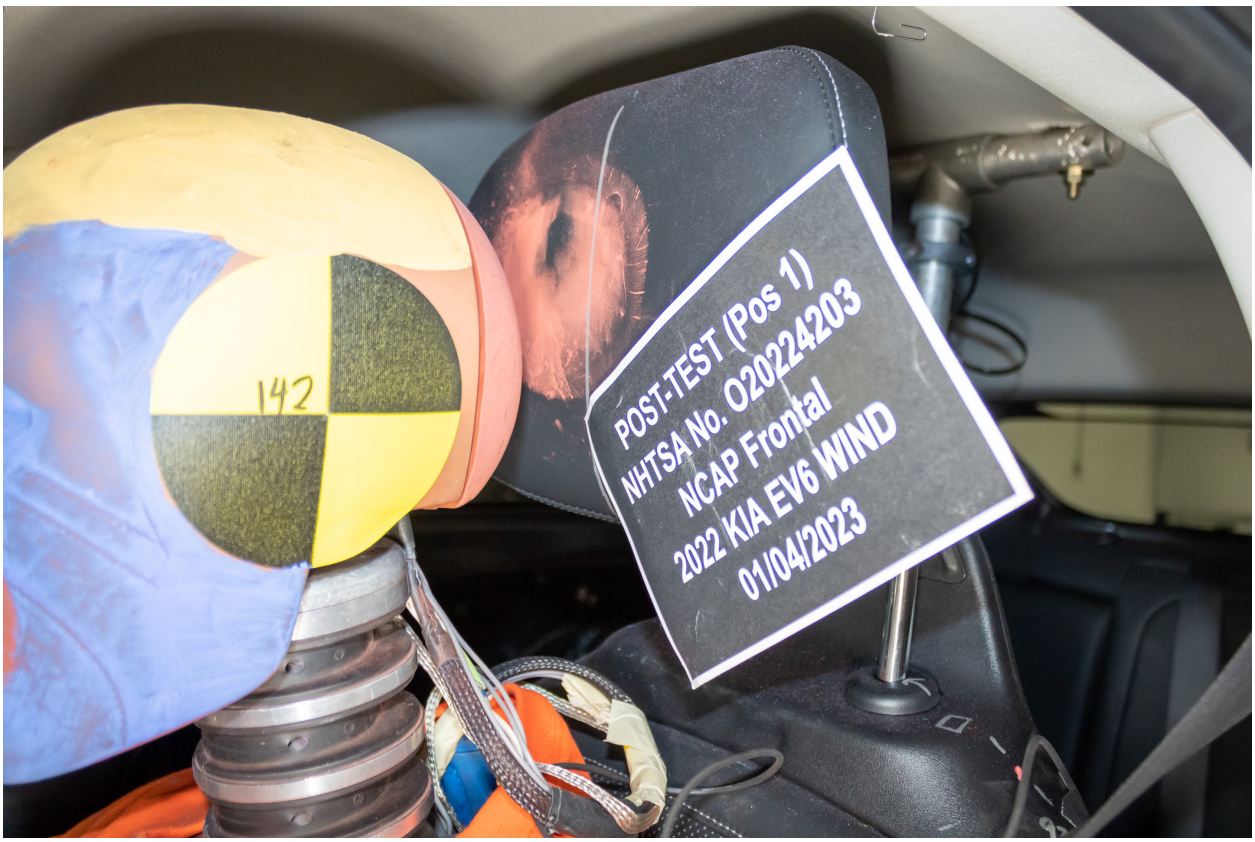


Figure A-50: Post-Test Driver Dummy Contact With Headrest



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

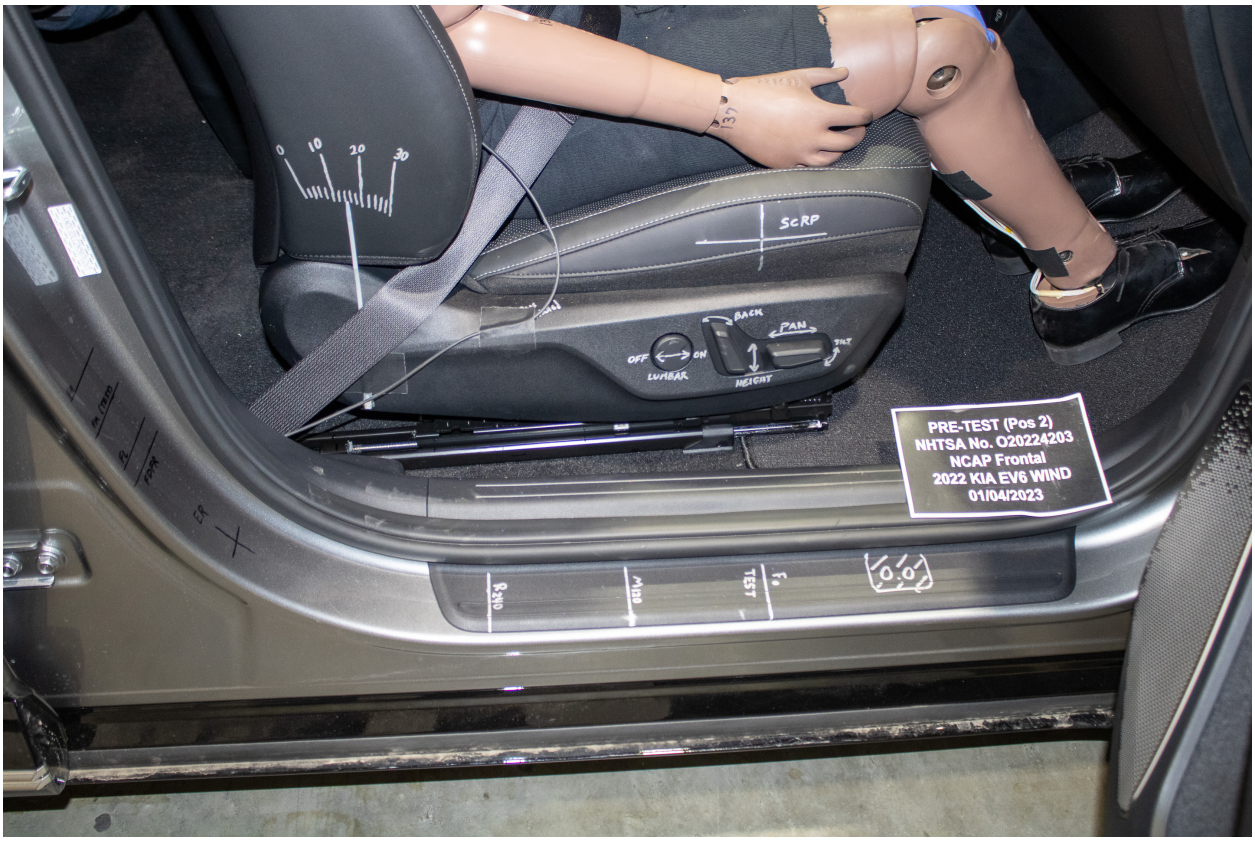


Figure A-59: Pre-Test Passenger's Seat Fore-Aft Markings

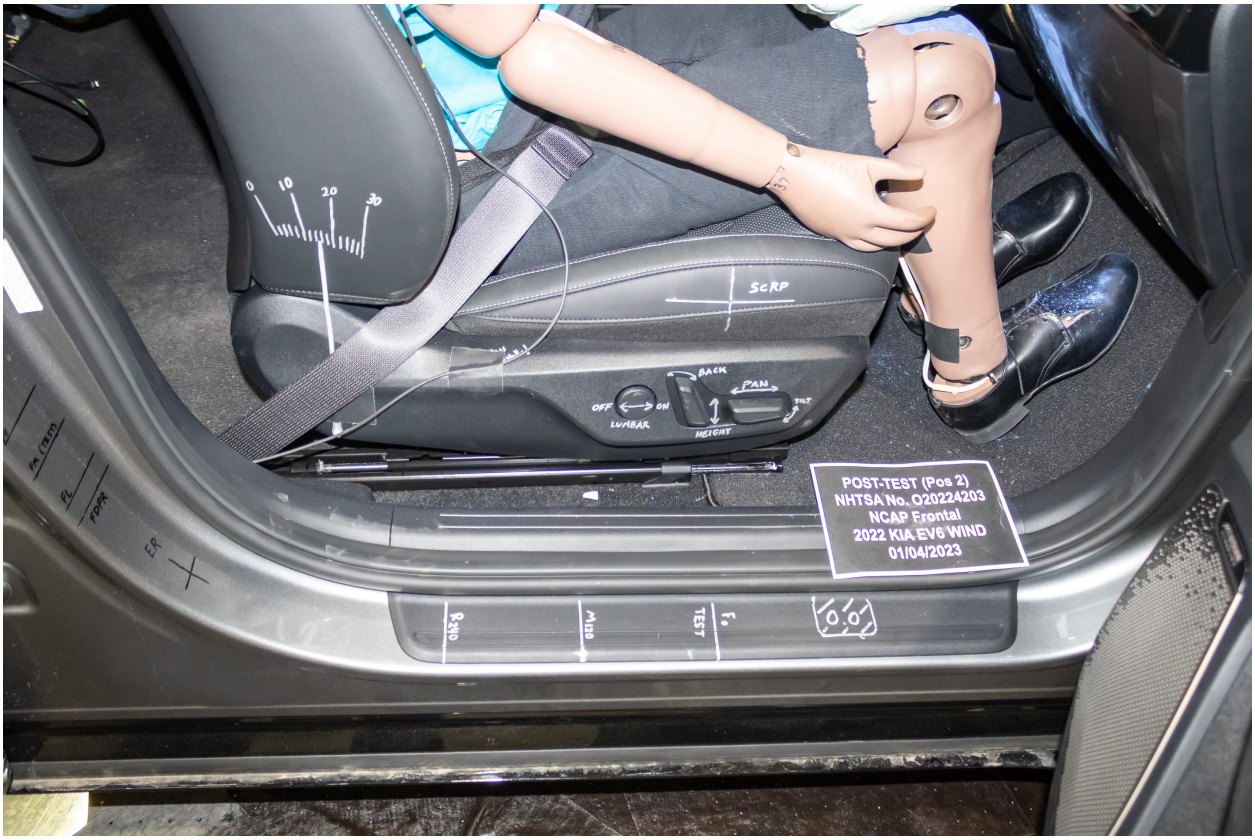


Figure A-60: Post-Test Passenger's Seat Fore-Aft Markings



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

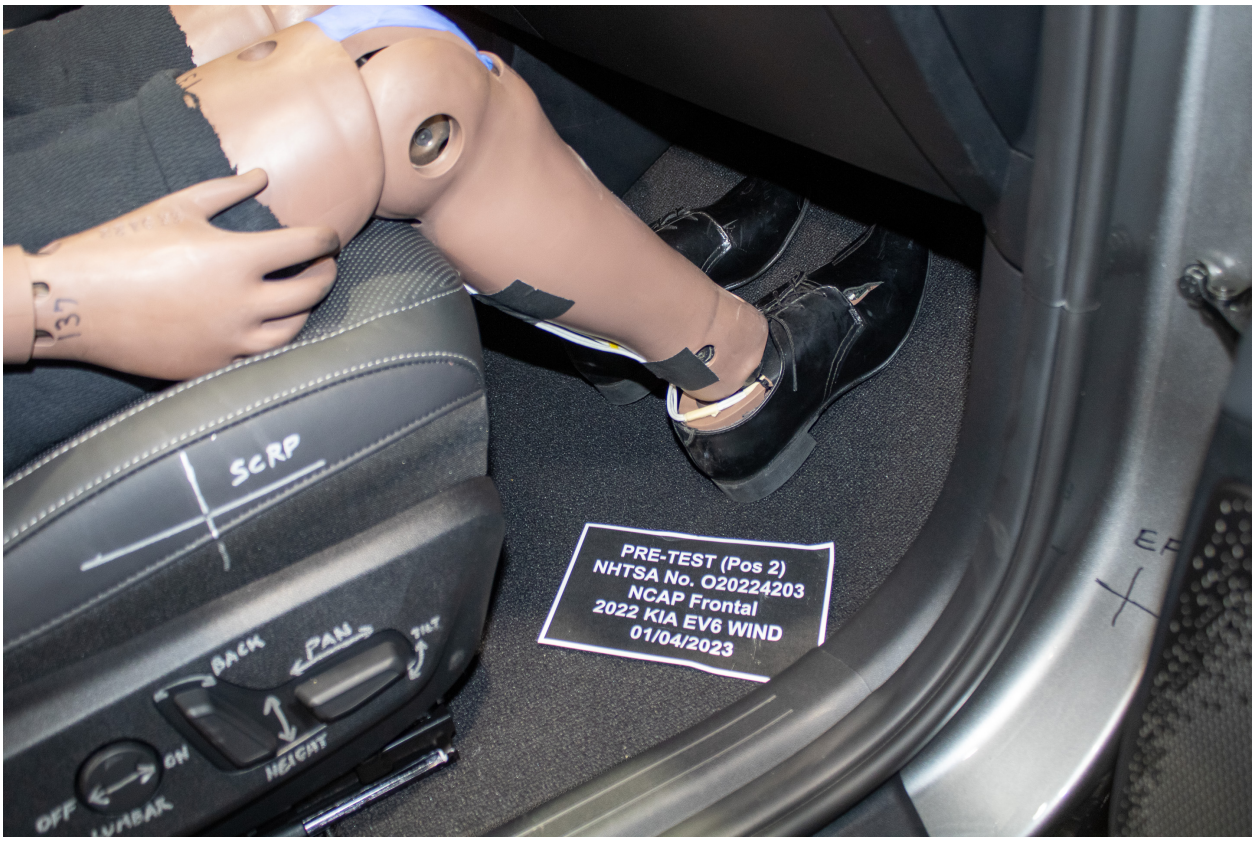


Figure A-65: Pre-Test Passenger Dummy Feet

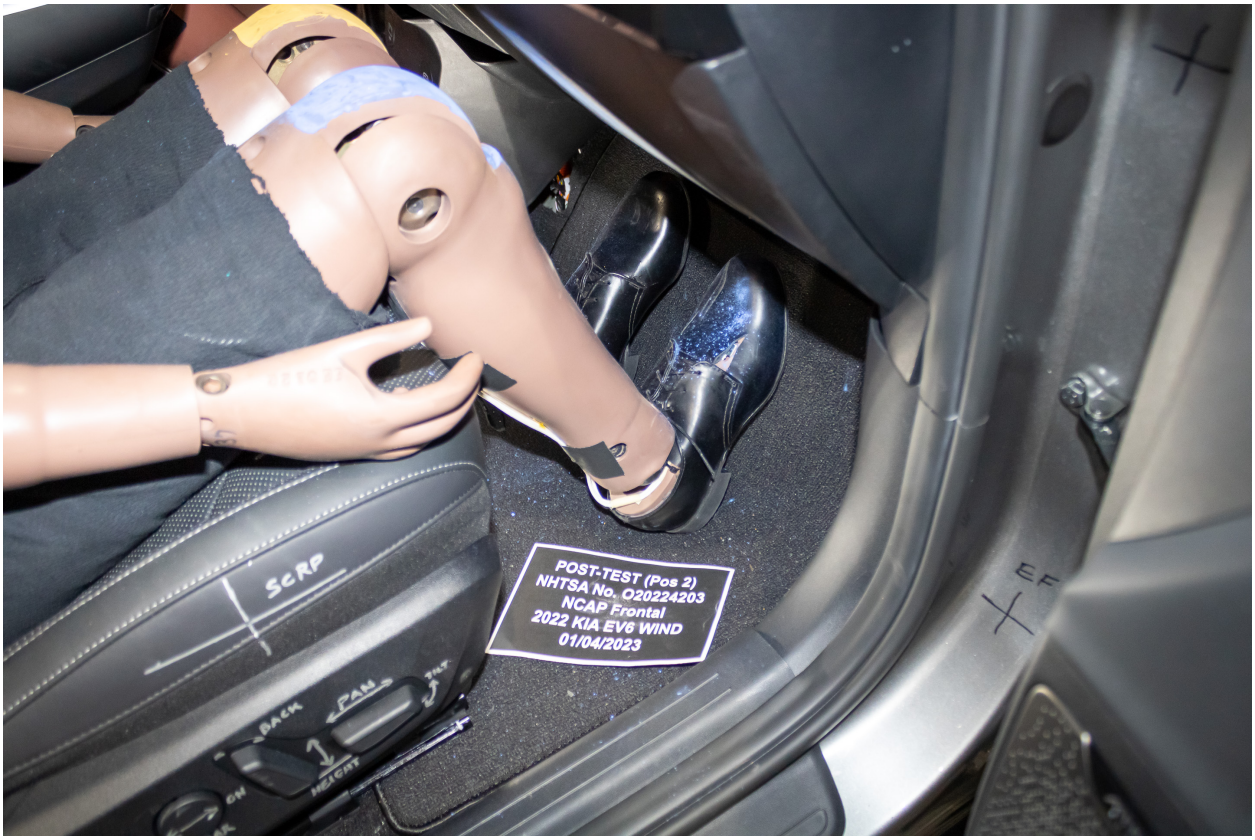


Figure A-66: Post-Test Passenger Dummy Feet



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

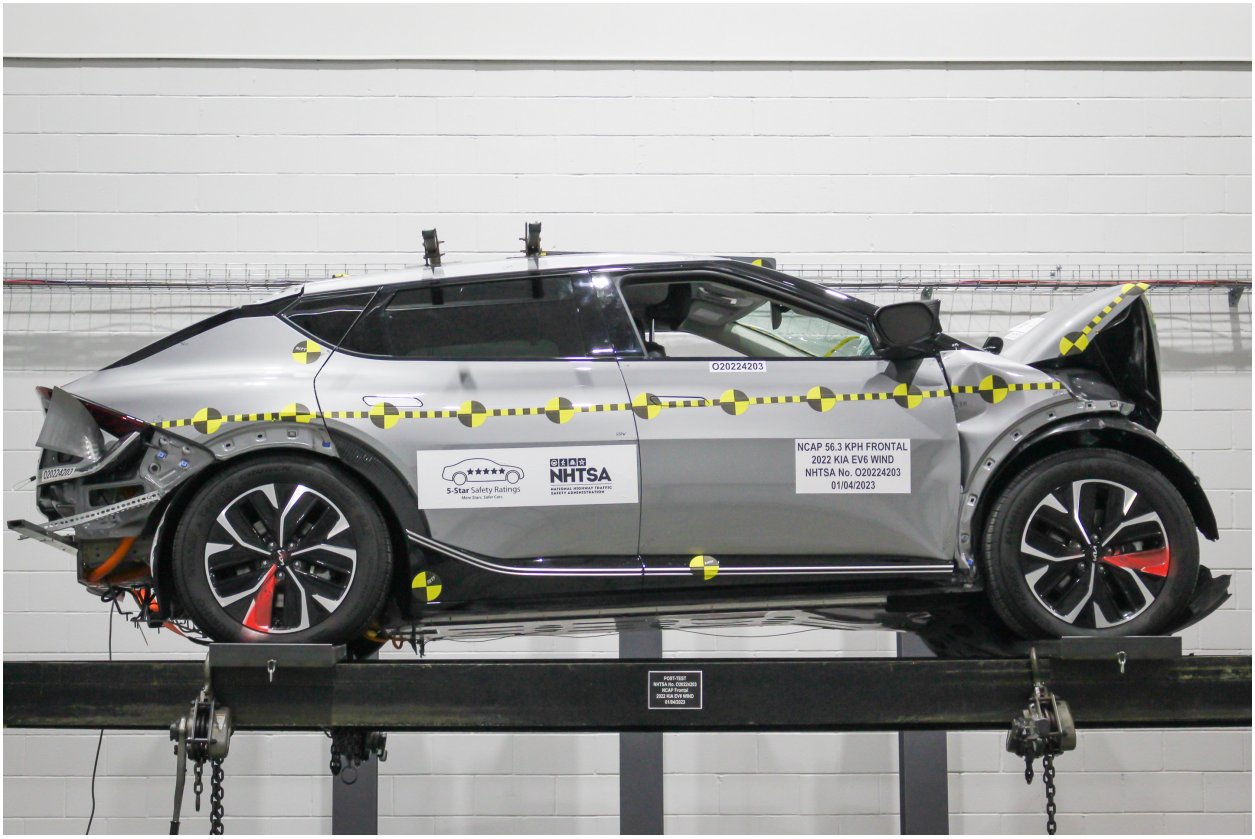


Figure A-77: Vehicle at 0º on Static Rollover Device

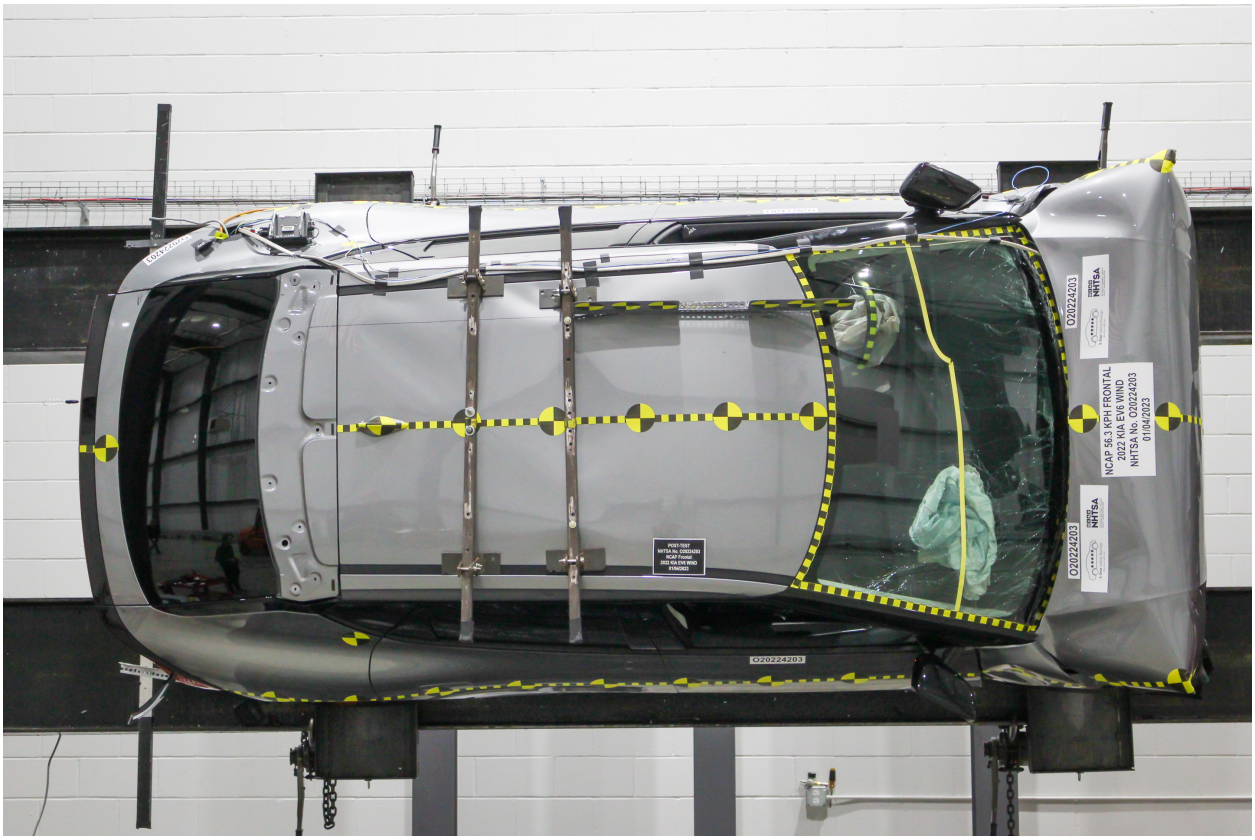


Figure A-78: Vehicle at 90º on Static Rollover Device

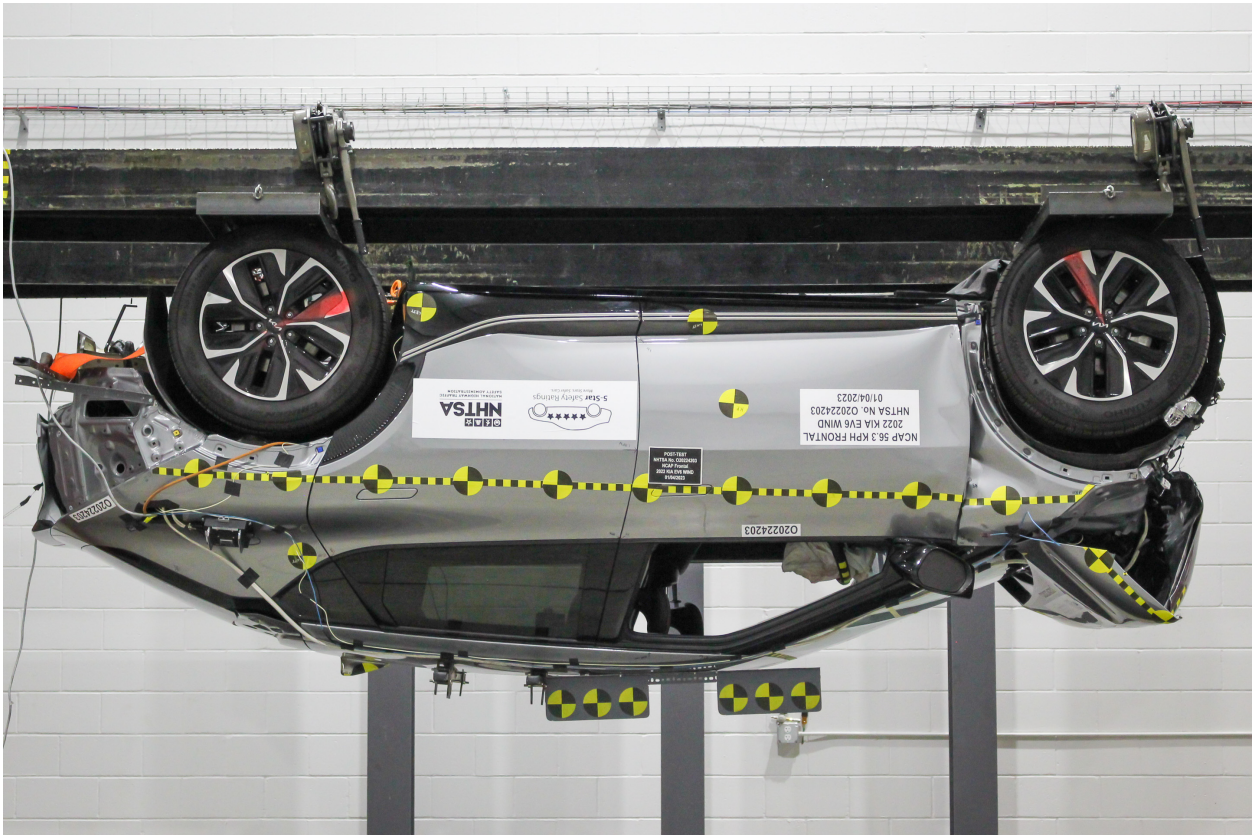


Figure A-79: Vehicle at 180º on Static Rollover Device

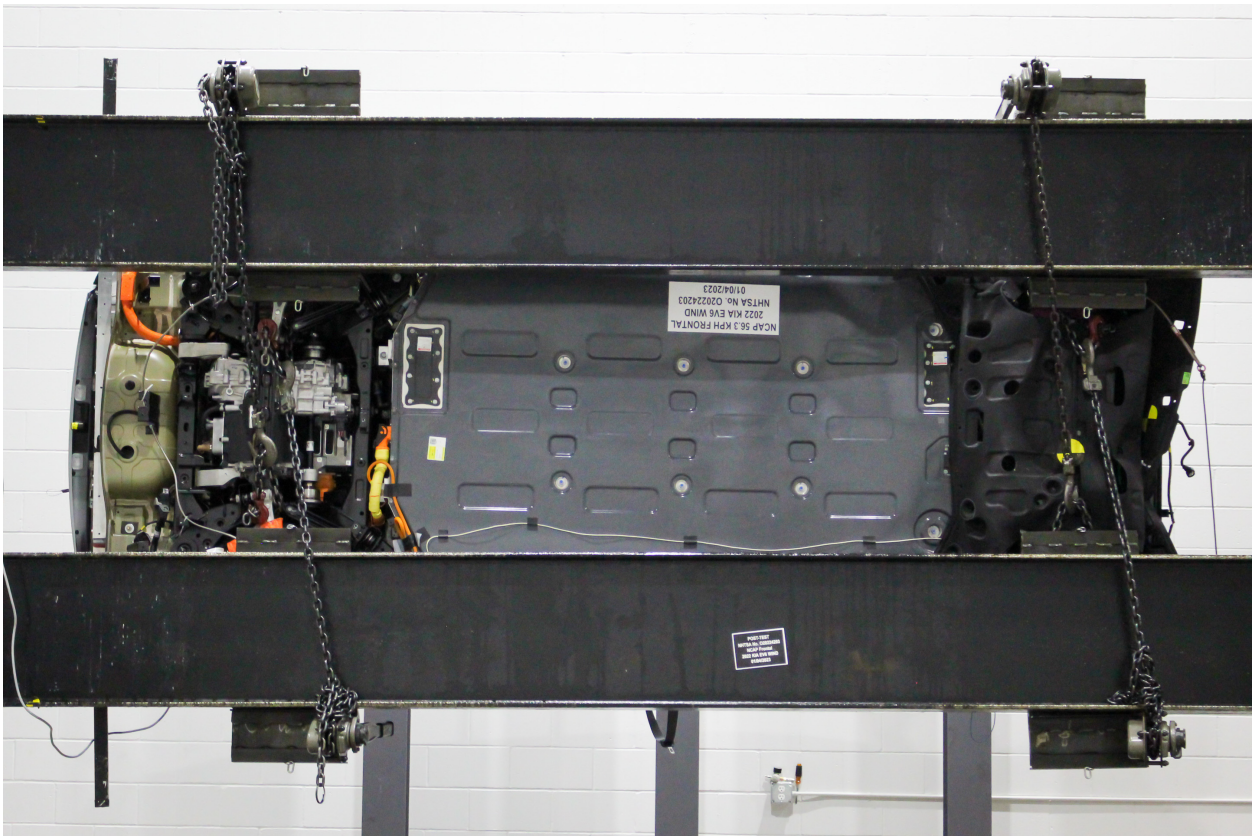


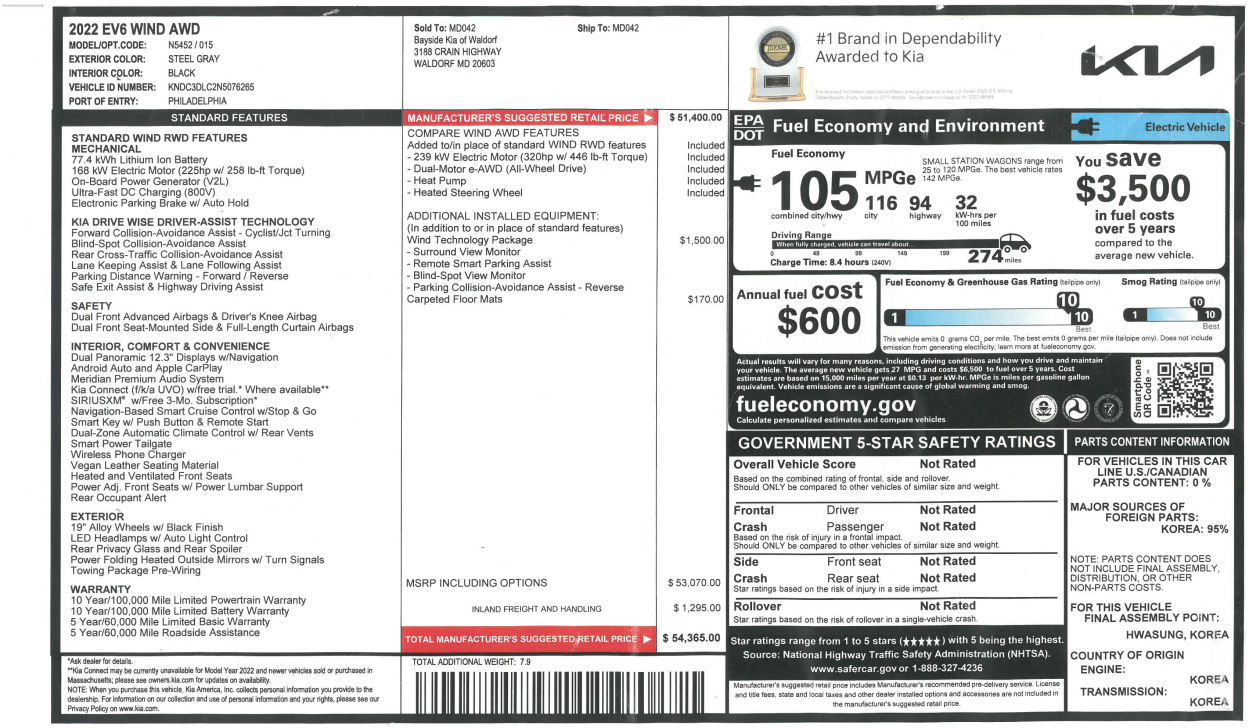
Figure A-80: Vehicle at 270º on Static Rollover Device



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



Figure A-82: 2022 KIA EV6 Frontal Impact Event



2022 EV6 WIND AWD
MODEL/OPT.CODE: N5452 / 015
EXTERIOR COLOR: STEEL GRAY
INTERIOR COLOR: BLACK
VEHICLE ID NUMBER: KNDC3DLC2N5076265
PORT OF ENTRY: PHILADELPHIA

Sold To: MD042
Bayside Kia of Waldorf
3188 CRAIN HIGHWAY
WALDORF MD 20603

Ship To: MD042

#1 Brand in Dependability
Awarded to Kia

STANDARD FEATURES

STANDARD WIND RWD FEATURES
MECHANICAL
77.4 kWh Lithium Ion Battery
168 kW Electric Motor (225hp w/ 258 lb-ft Torque)
On-Board Power Generator (V2L)
Ultra-Fast DC Charging (800V)
Electronic Parking Brake w/ Auto Hold

KIA DRIVE WISE DRIVER-ASSIST TECHNOLOGY
Forward Collision-Avoidance Assist - Cyclist/Jct Turning
Blind-Spot Collision-Avoidance Assist
Rear Cross-Traffic Collision-Avoidance Assist
Lane Keeping Assist & Lane Following Assist
Parking Distance Warning - Forward / Reverse
Safe Exit Assist & Highway Driving Assist

SAFETY
Dual Front Advanced Airbags & Driver's Knee Airbag
Dual Front Seat-Mounted Side & Full-Length Curtain Airbags

INTERIOR, COMFORT & CONVENIENCE
Dual Panoramic 12.3" Displays w/Navigation
Android Auto and Apple CarPlay
Meridian Premium Audio System
Kia Connect (f/k/a UVO) w/free trial.* Where available**
SIRIUSXM® w/Free 3-Mo. Subscription*
Navigation-Based Smart Cruise Control w/Stop & Go
Smart Key w/ Push Button & Remote Start
Dual-Zone Automatic Climate Control w/ Rear Vents
Smart Power Tailgate
Wireless Phone Charger
Vegan Leather Seating Material
Heated and Ventilated Front Seats
Power Adj. Front Seats w/ Power Lumbar Support
Rear Occupant Alert

EXTERIOR
19" Alloy Wheels w/ Black Finish
LED Headlamps w/ Auto Light Control
Rear Privacy Glass and Rear Spoiler
Power Folding Heated Outside Mirrors w/ Turn Signals
Towing Package Pre-Wiring

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

*Ask dealer for details.
**Kia Connect may be currently unavailable for Model Year 2022 and newer vehicles sold or purchased in Massachusetts; please see owners.kia.com for updates on availability.
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 ▶	$ 51,400.00
COMPARE WIND AWD FEATURES	
Added to/in place of standard WIND RWD features	Included
- 239 kW Electric Motor (320hp w/ 446 lb-ft Torque)	Included
- Dual-Motor e-AWD (All-Wheel Drive)	Included
- Heat Pump	Included
- Heated Steering Wheel	Included
ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features)	
Wind Technology Package	$1,500.00
- Surround View Monitor	
- Remote Smart Parking Assist	
- Blind-Spot View Monitor	
- Parking Collision-Avoidance Assist - Reverse	
Carpeted Floor Mats	$170.00
MSRP INCLUDING OPTIONS	$ 53,070.00
INLAND FREIGHT AND HANDLING	$ 1,295.00
TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 54,365.00

TOTAL ADDITIONAL WEIGHT: 7.9

EPA DOT Fuel Economy and Environment — Electric Vehicle

Fuel Economy
105 MPGe combined city/hwy
116 city
94 highway
32 kW-hrs per 100 miles
SMALL STATION WAGONS range from 25 to 120 MPGe. The best vehicle rates 142 MPGe.

You save $3,500 in fuel costs over 5 years compared to the average new vehicle.

Driving Range
When fully charged, vehicle can travel about
0 69 89 149 199 274 miles
Charge Time: 8.4 hours (240V)

Annual fuel cost $600

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

This vehicle emits 0 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Does not include emission from generating electricity; 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 27 MPG and costs $6,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $0.13 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of global warming 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 Crash — Driver: Not Rated; 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 Crash — Front seat: Not Rated; 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: 0 %

MAJOR SOURCES OF FOREIGN PARTS: KOREA: 95%

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

FOR THIS VEHICLE FINAL ASSEMBLY POINT: HWASUNG, KOREA

COUNTRY OF ORIGIN
ENGINE: KOREA
TRANSMISSION: KOREA

Figure A-83: Monroney Label Photograph



Figure 305-1: Auxiliary Power Module Warning Label



Figure 305-2: Power Inverter Warning Label



Figure 305-3 First Responder Warning Label

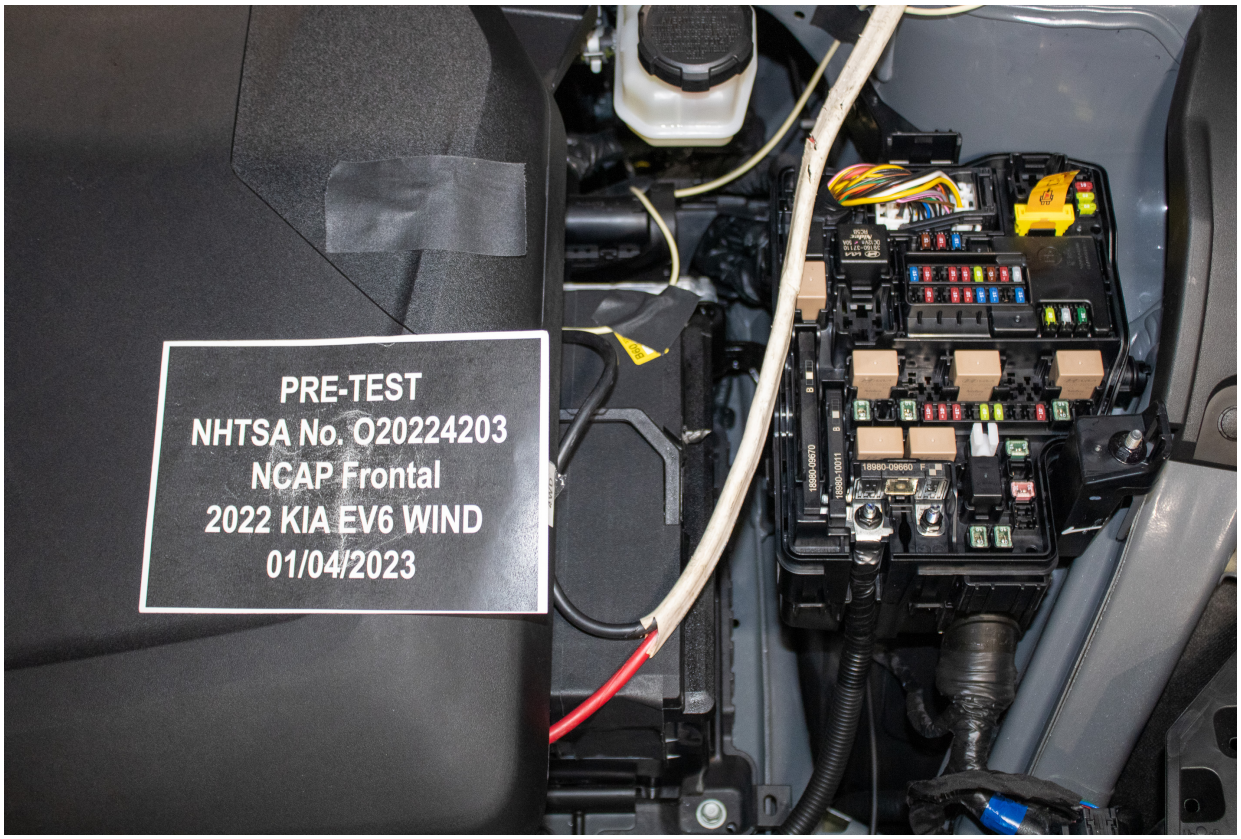


Figure 305-4: First Responder Warning Label Location



Figure 305-5: Other Vehicle Label Related to Electric Propulsion System



Figure 305-6: Manual High Voltage Service Disconnect in Place



Figure 305-7: Manual High Voltage Service Disconnect Removed (Show Plug)

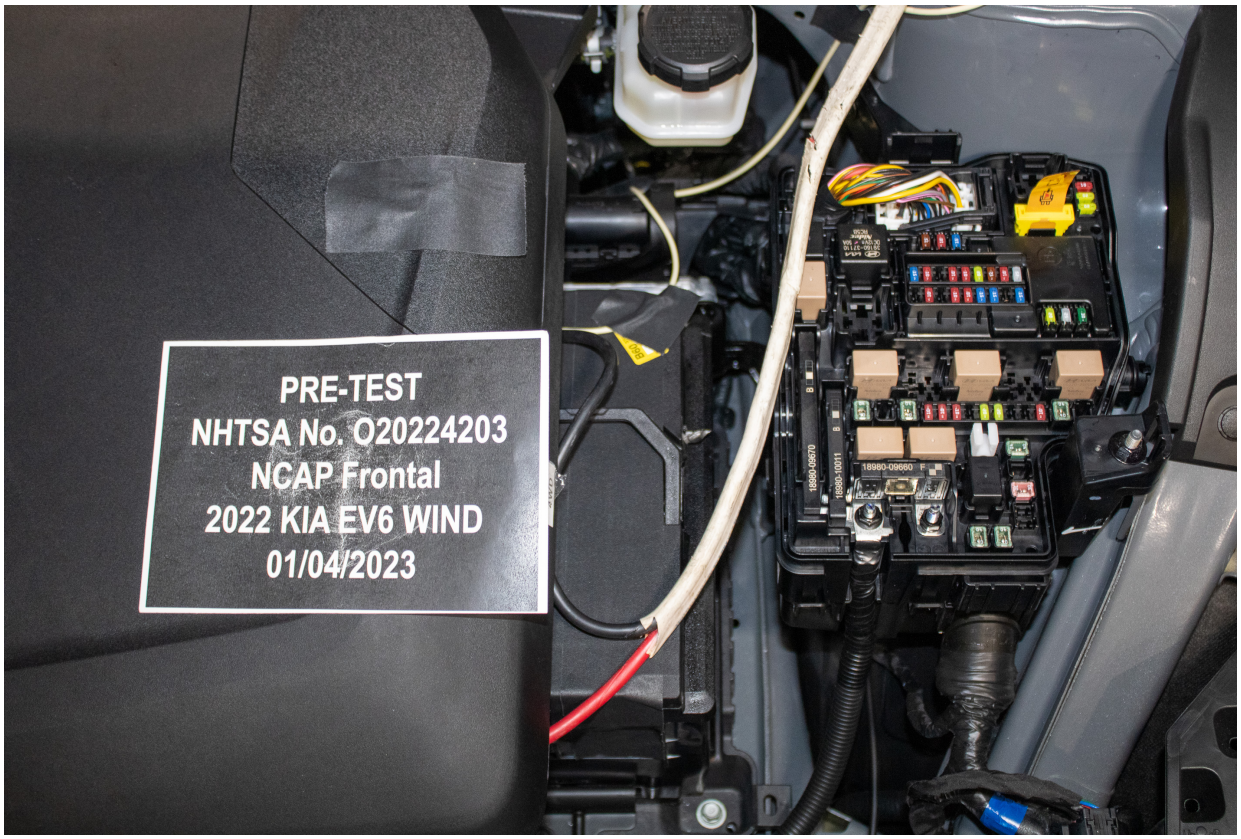


Figure 305-8: Manual High Voltage Service Disconnect Removed Location

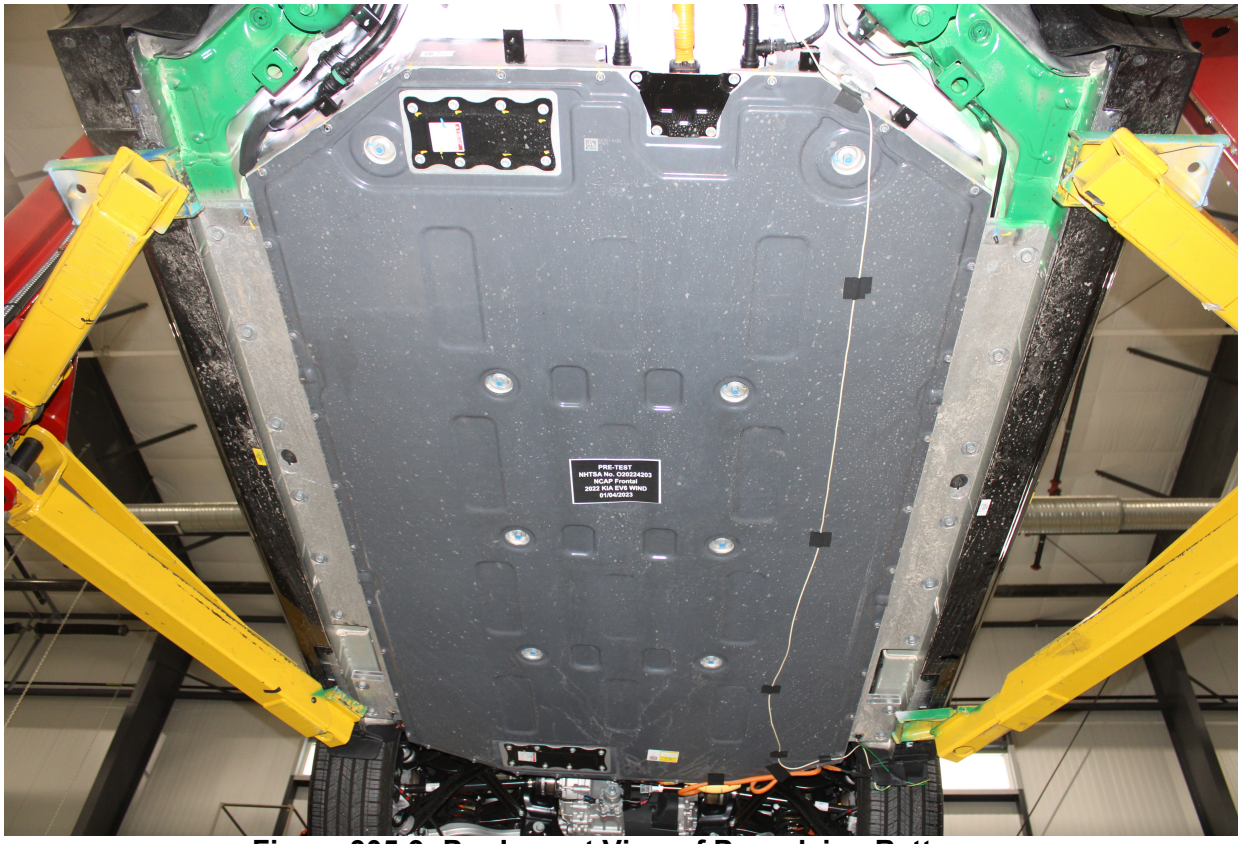


Figure 305-9: Pre-Impact View of Propulsion Battery

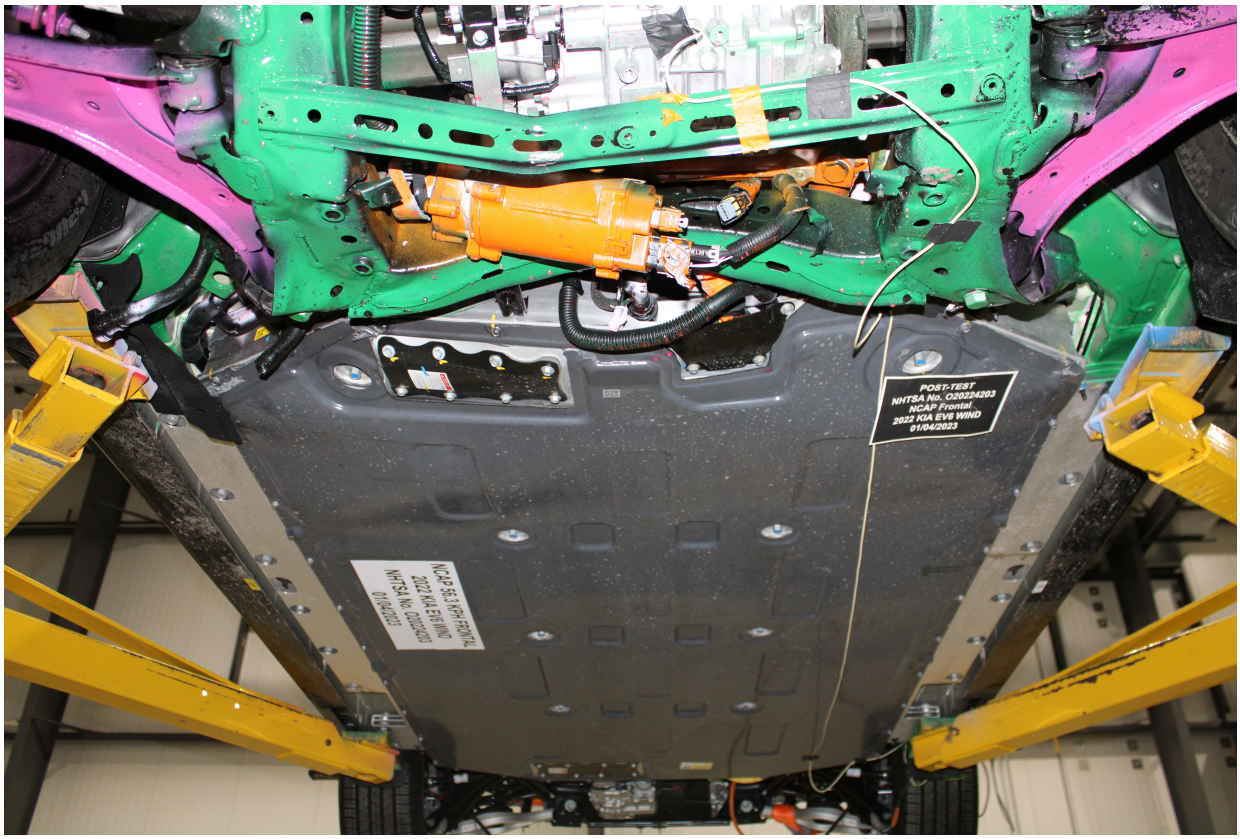


Figure 305-10: Post-Impact Front View of Propulsion Battery

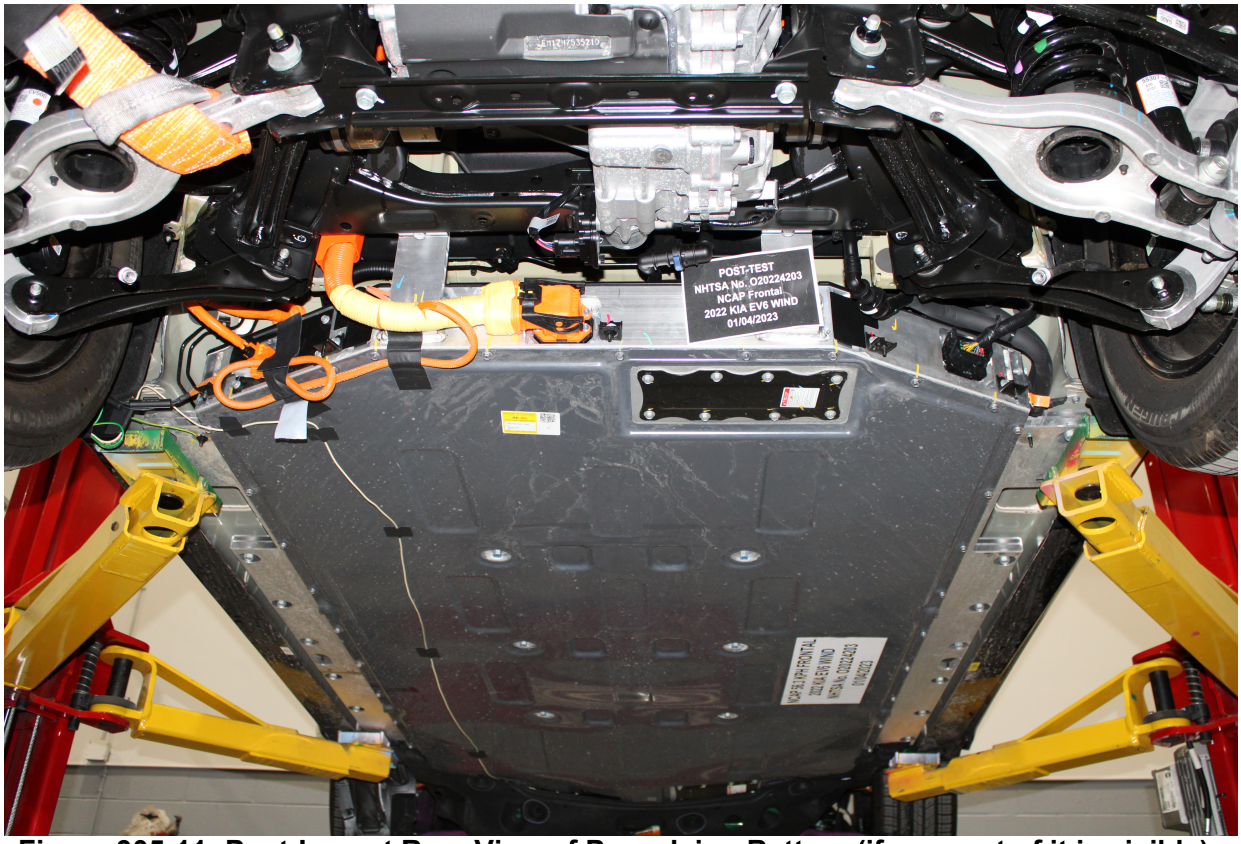


Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)

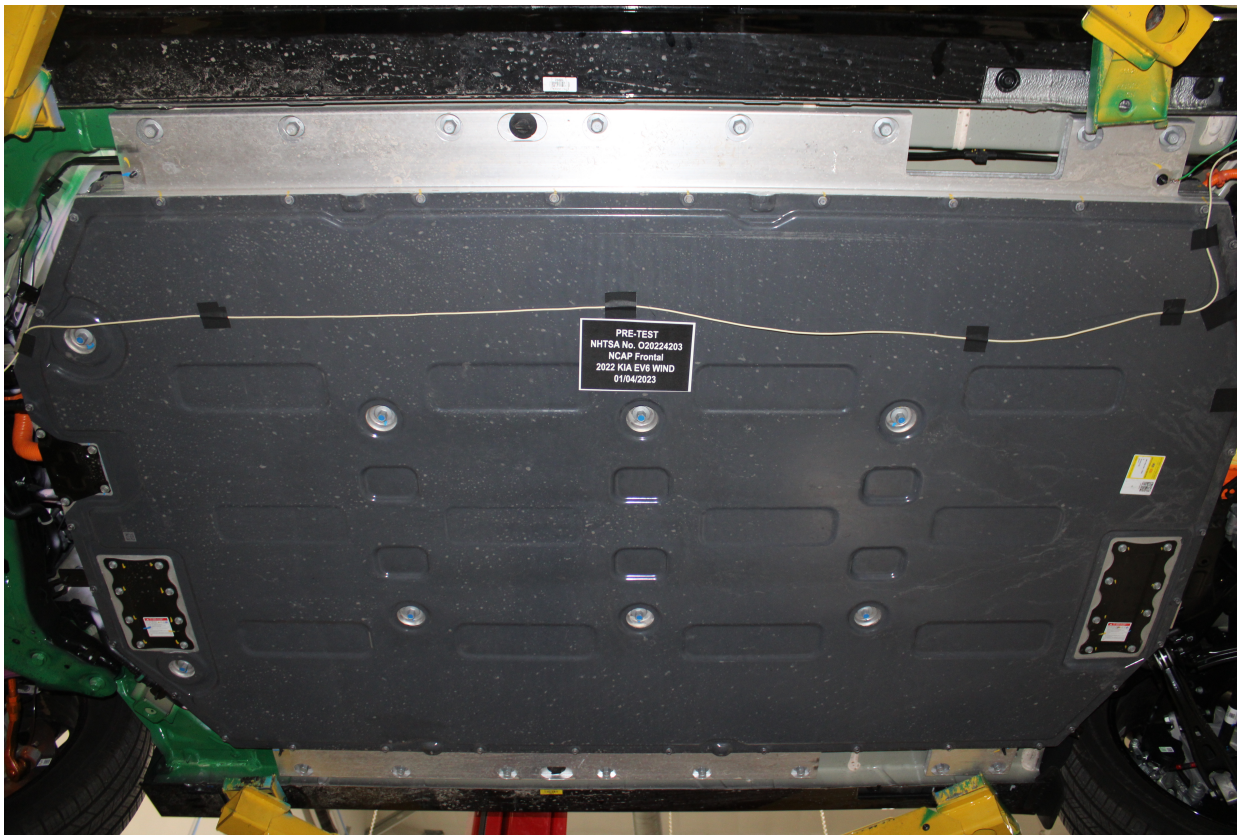


Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

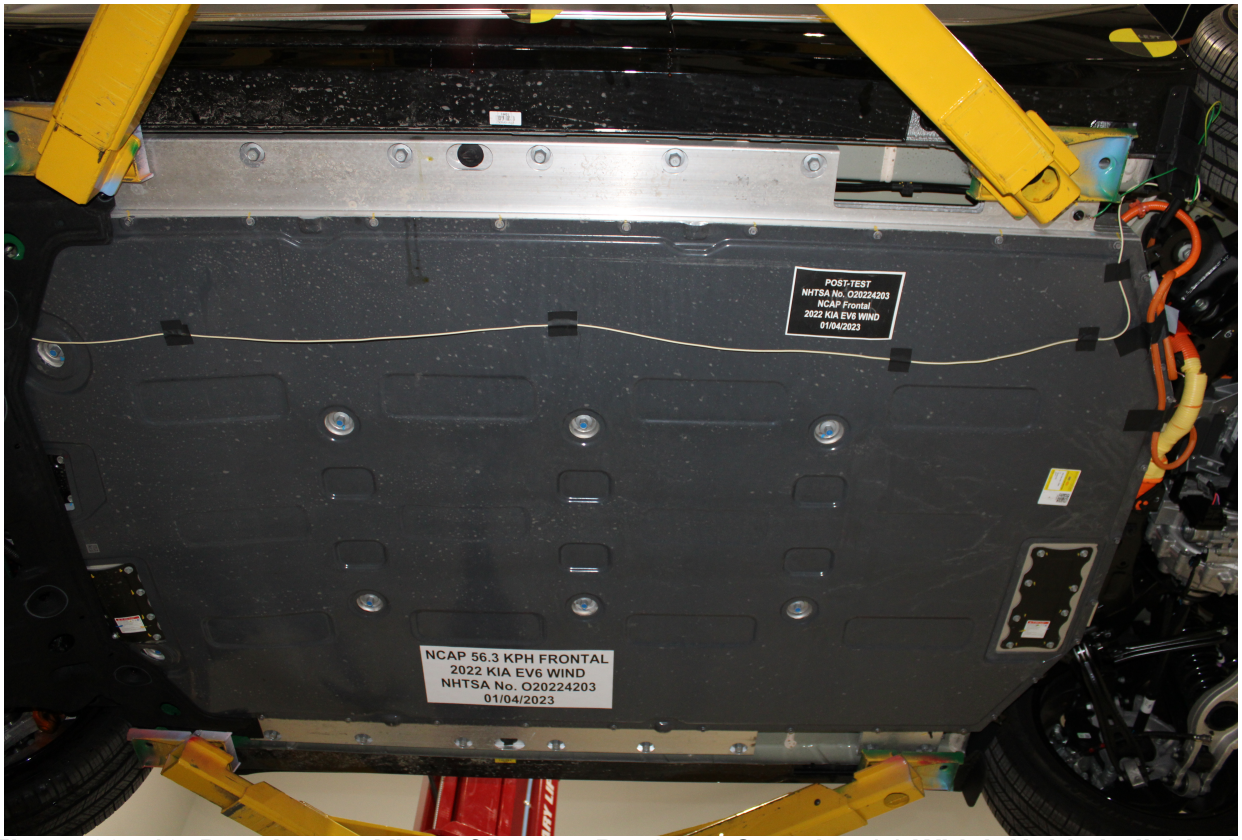


Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules



Figure 305-14: Pre-Impact View of Propulsion Battery Module(s)

Figure 305-15: Post-Impact View of Propulsion Battery Module(s)

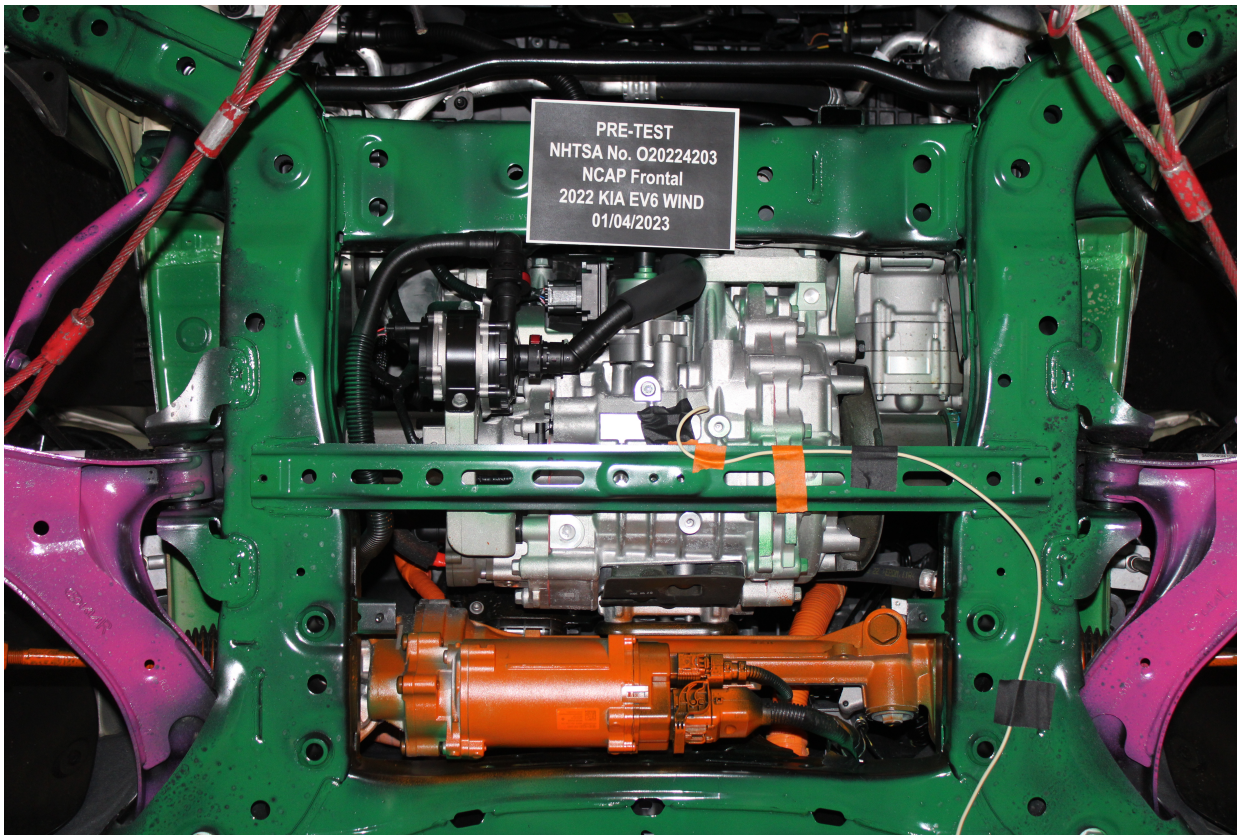


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

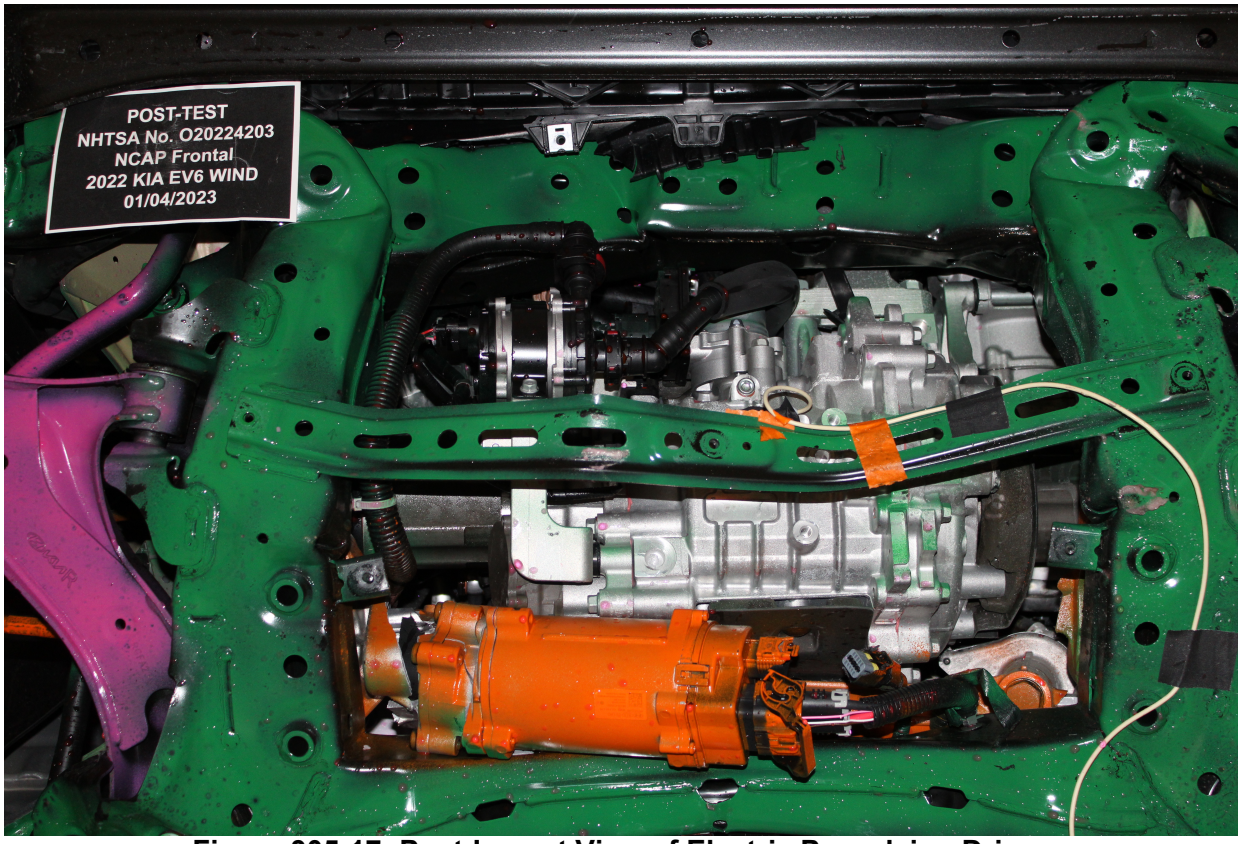


Figure 305-17: Post-Impact View of Electric Propulsion Drive



Figure 305-18: Pre-Impact View of High Voltage Interconnects

Photo Not Applicable

Figure 305-19: Pre-Impact View of Propulsion Battery Venting System

Photo Not Applicable

Figure 305-20: Pre-Impact View of Other Visible Electric Propulsion Components



Figure 305-21: Pre-Impact View of Ground Lead Attached



Figure 305-22: Pre-Impact View of High Voltage Leads Attached



Figure 305-23: Pre-Impact Close Up View of High Voltage Leads Attached

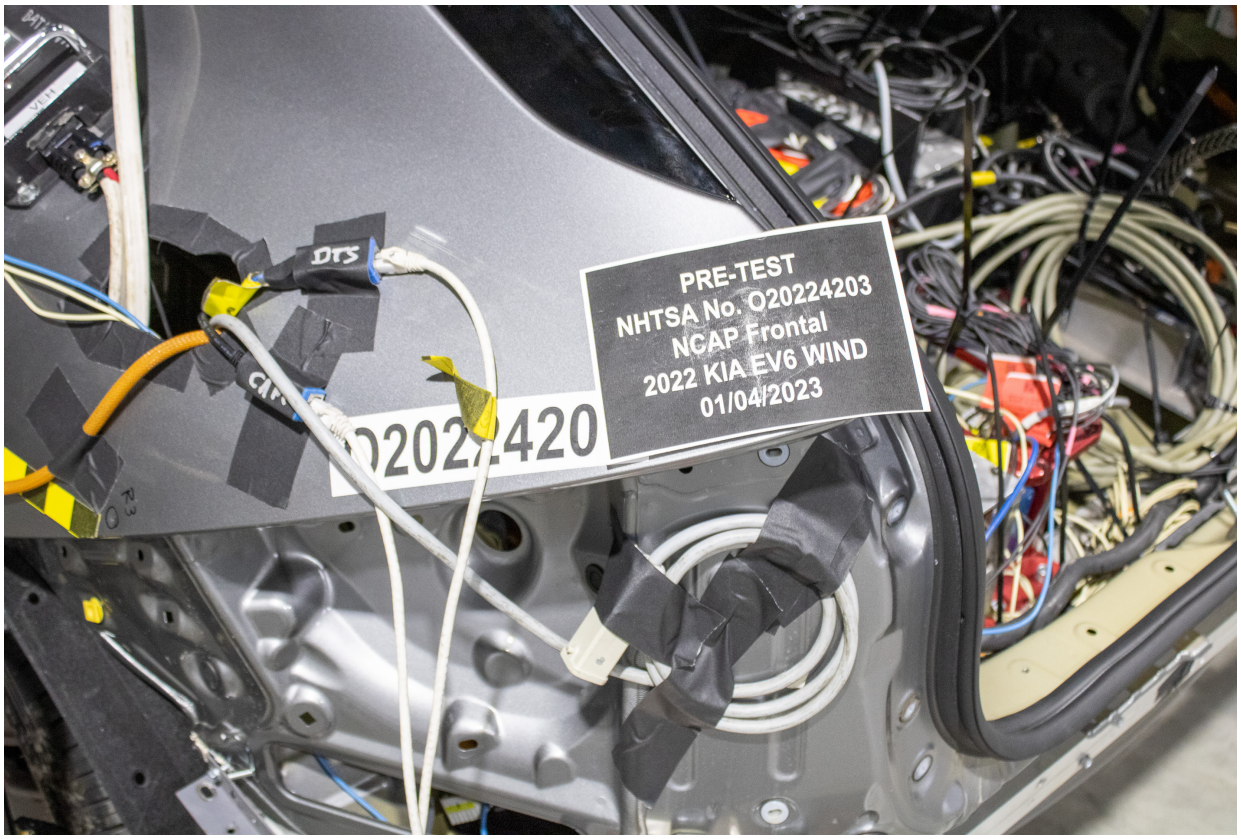


Figure 305-24: Pre-Impact View of Installed Test Interface Port

Photo Not Available

Figure 305-25: Post-Impact View of Installed Test Interface Port



Figure 305-26: Pre-Impact View of Other Test Devices

Figure 305-27: Post-Impact View of Other Test Devices

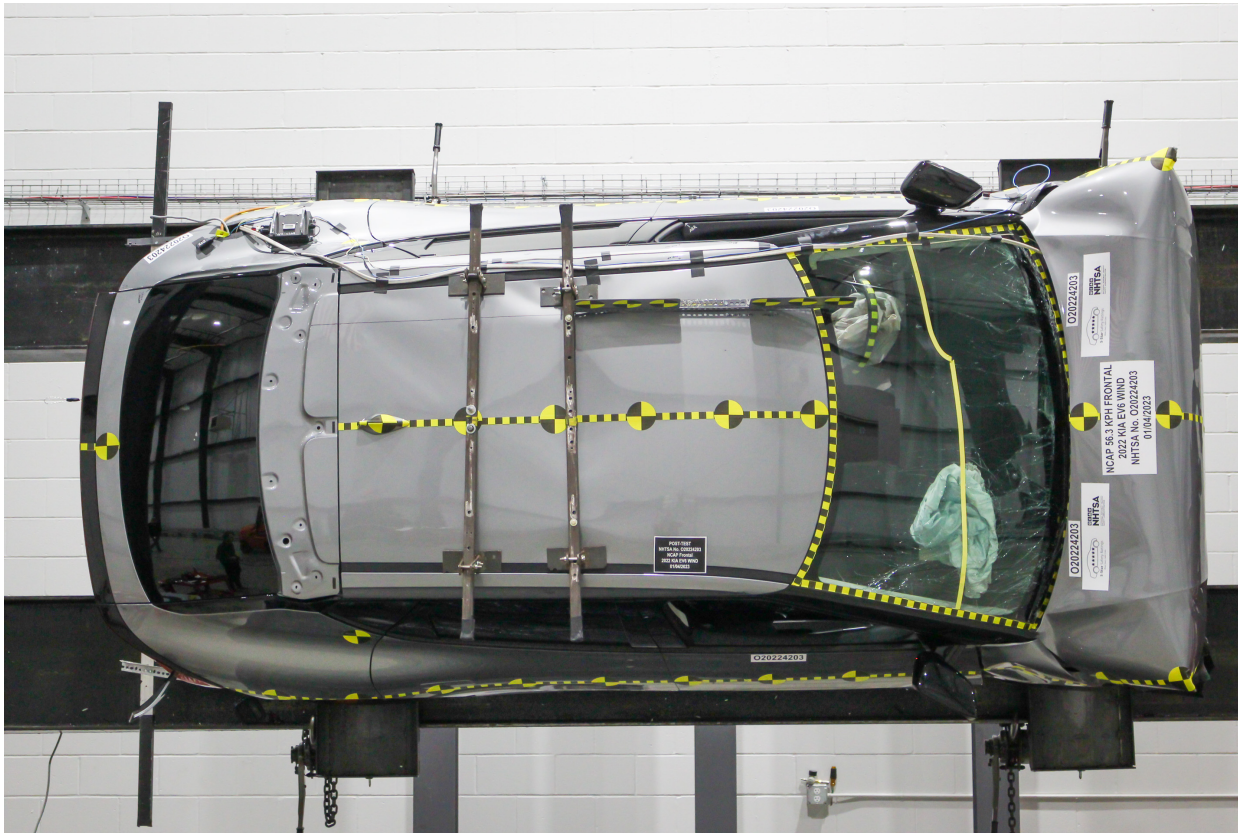


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

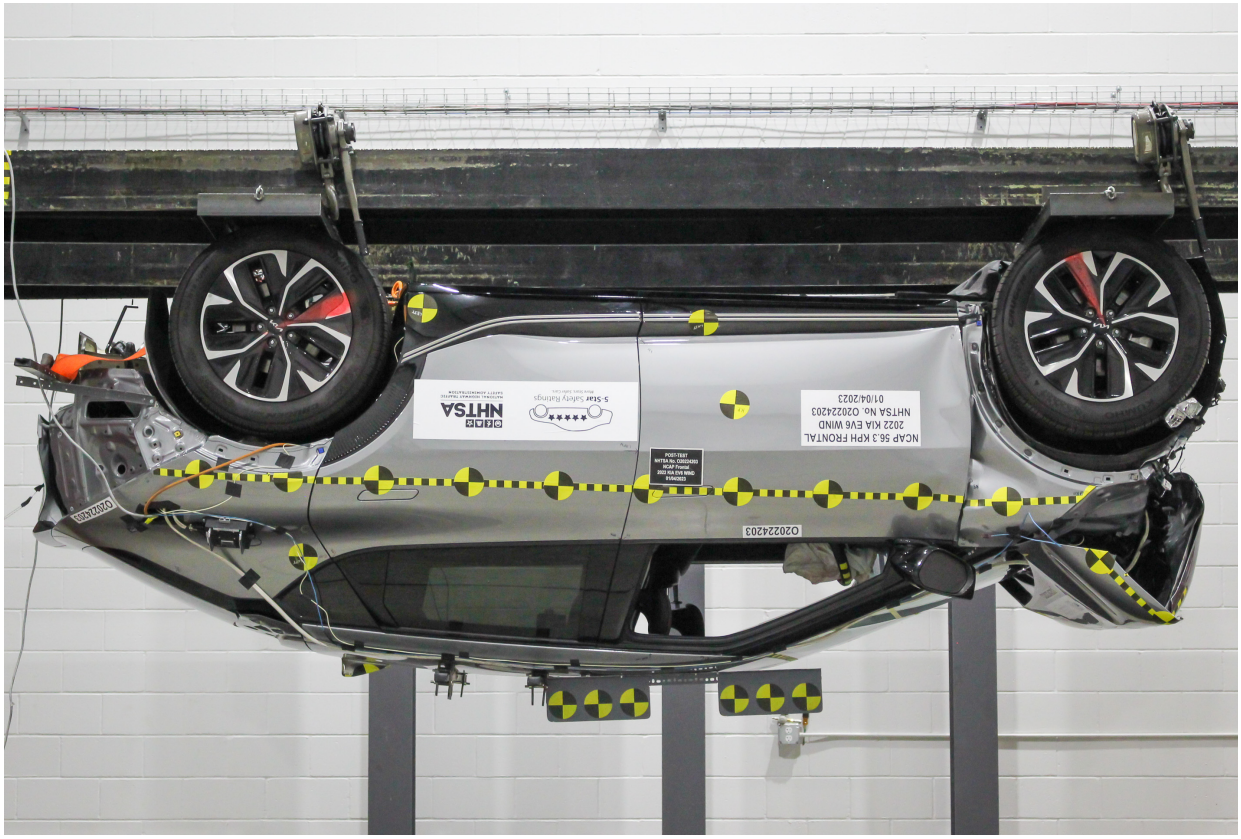


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

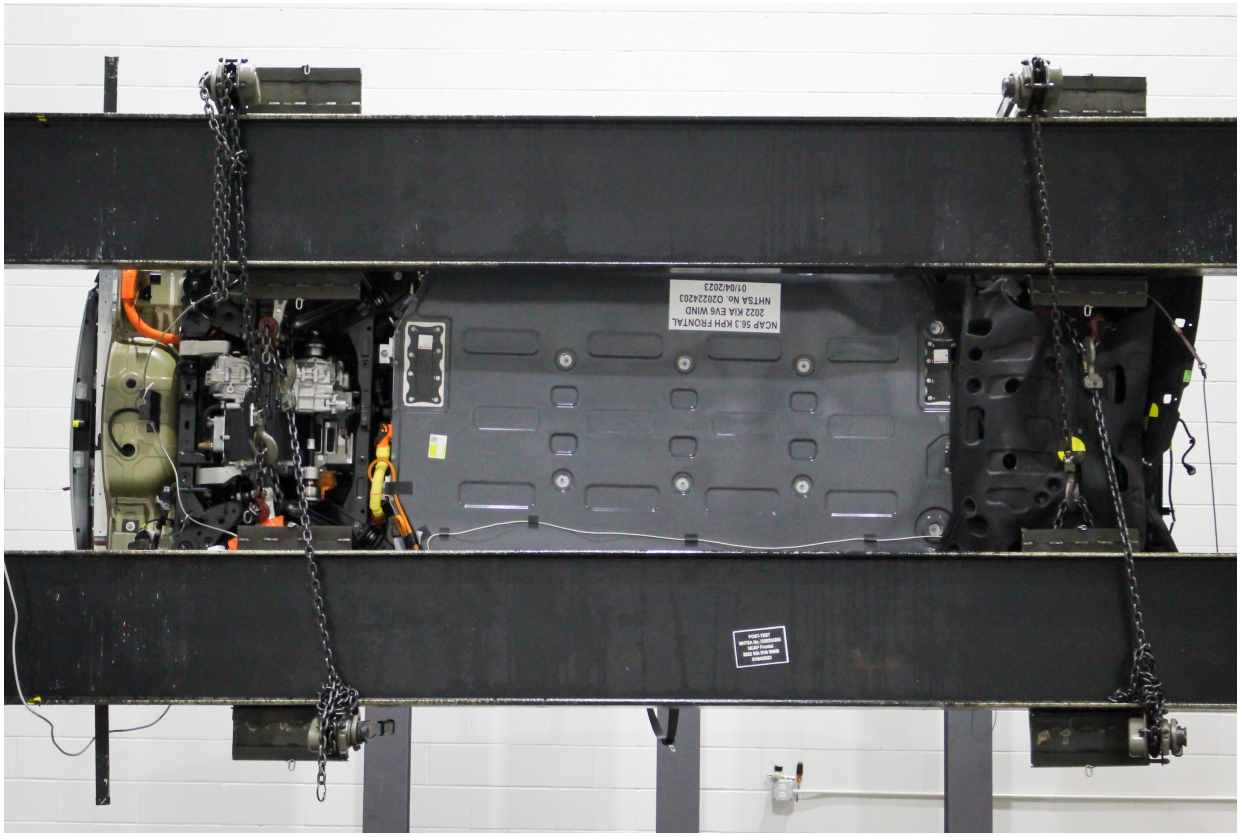


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees



Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees



Figure 305-32: Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



Figure 305-33: Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

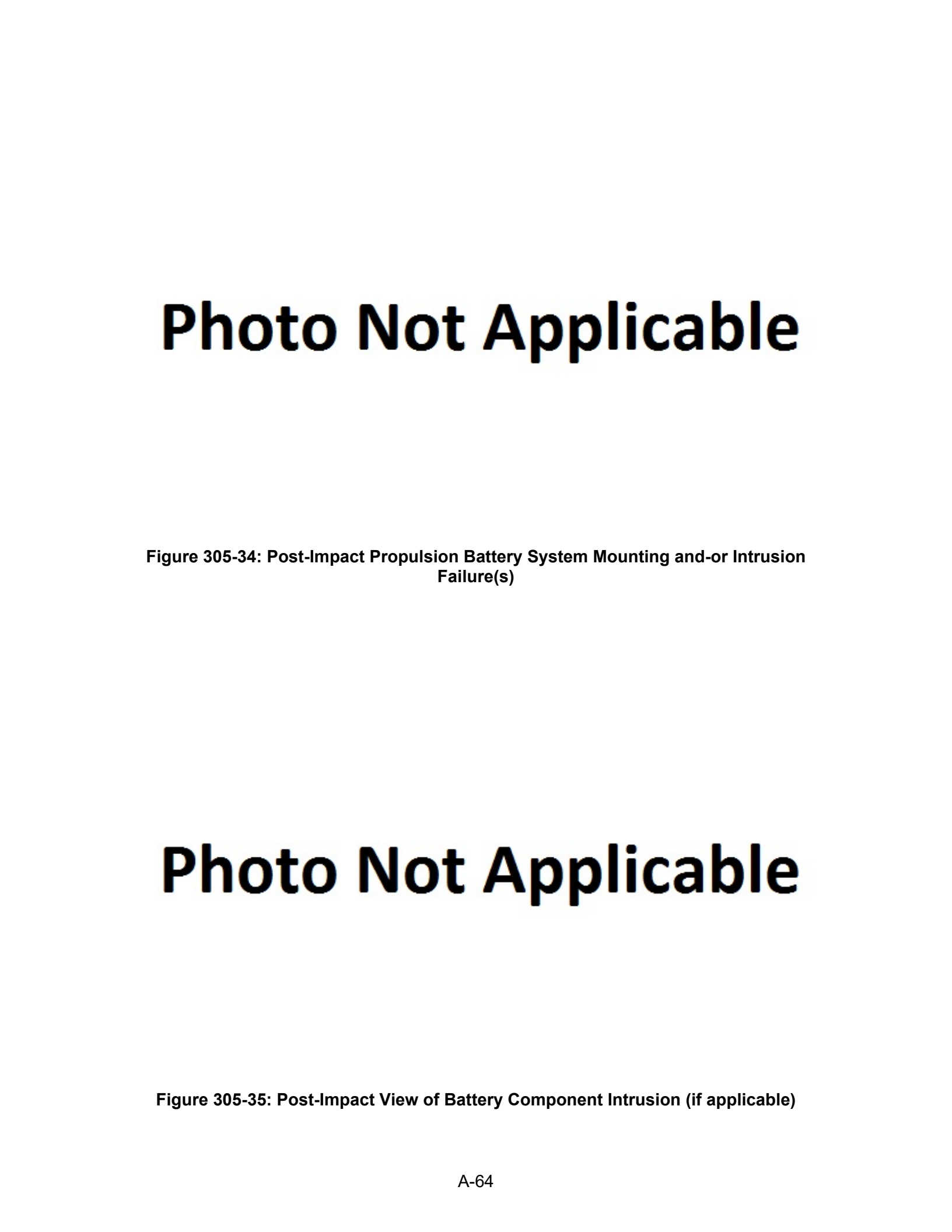


Figure 305-34: Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

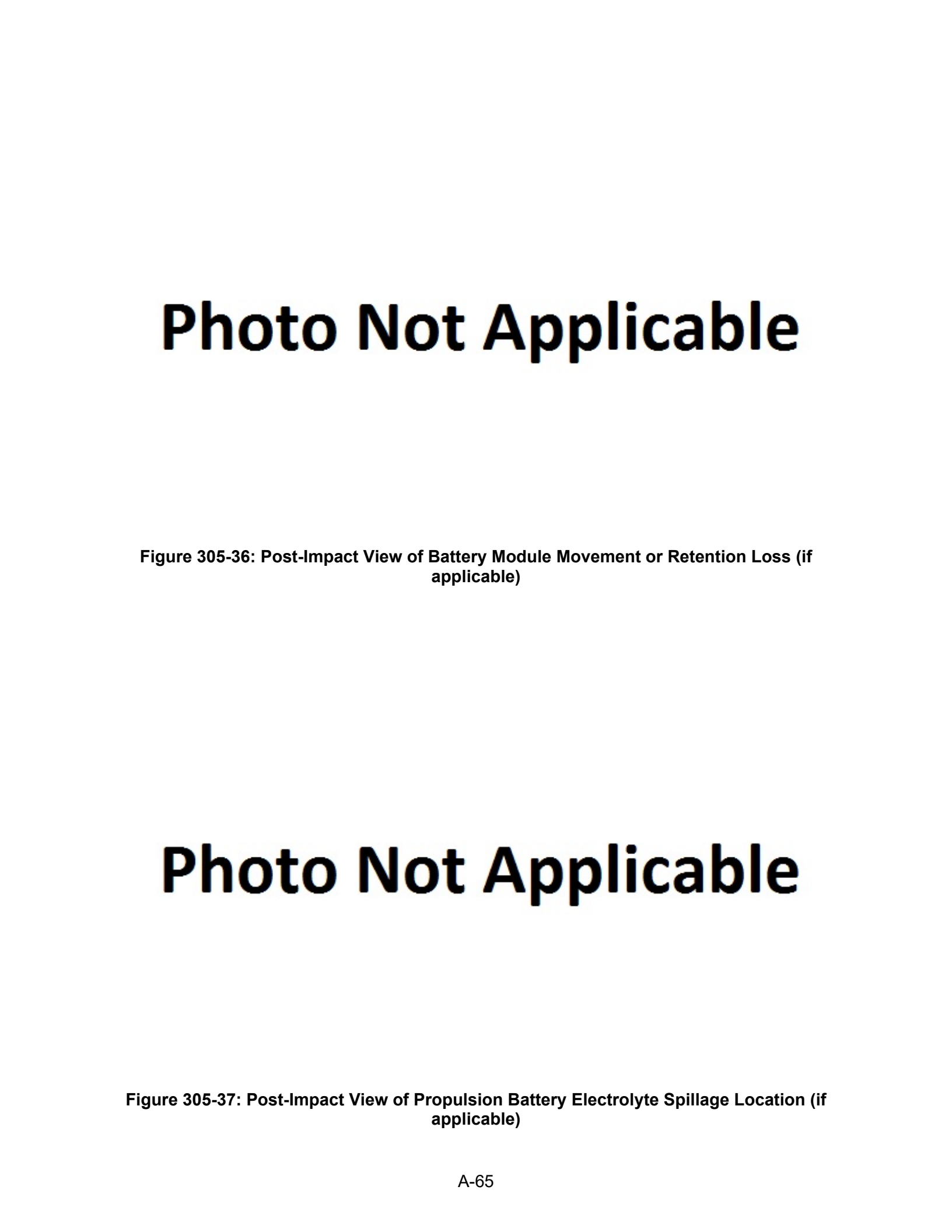


Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)



Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (after rollover)

Figure 305-39: Pre-Test Charging Port View

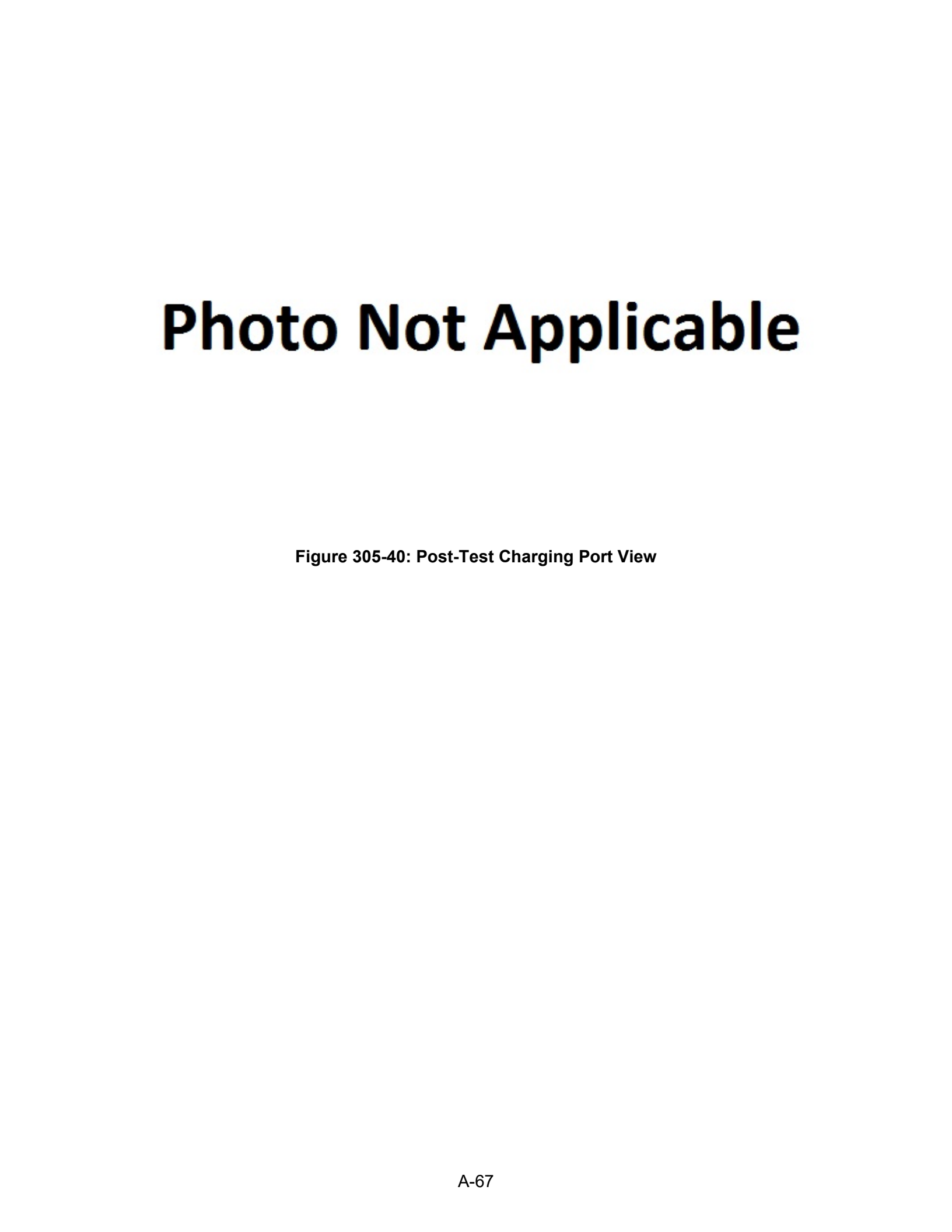


Figure 305-40: Post-Test Charging Port View

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA TRACES

Table of Data Plots

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

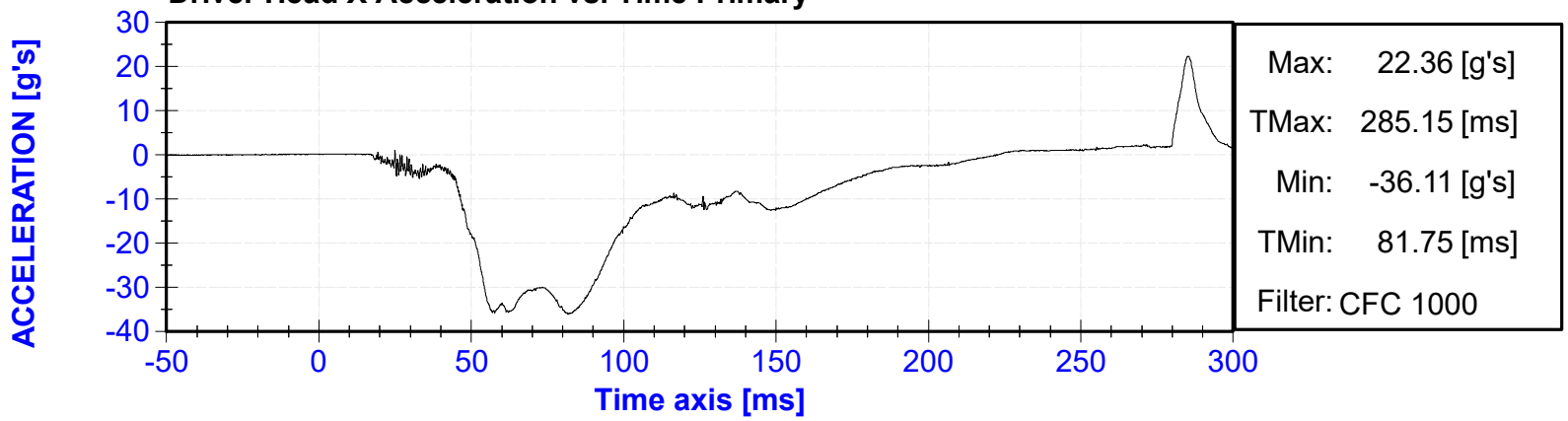
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.NHTSA.gov

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

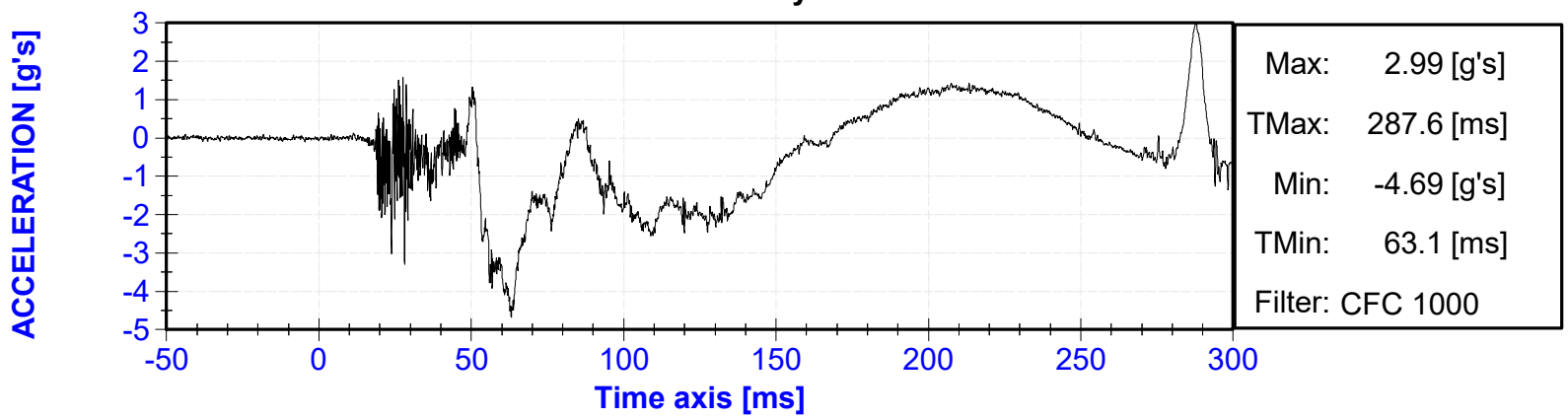
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver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

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

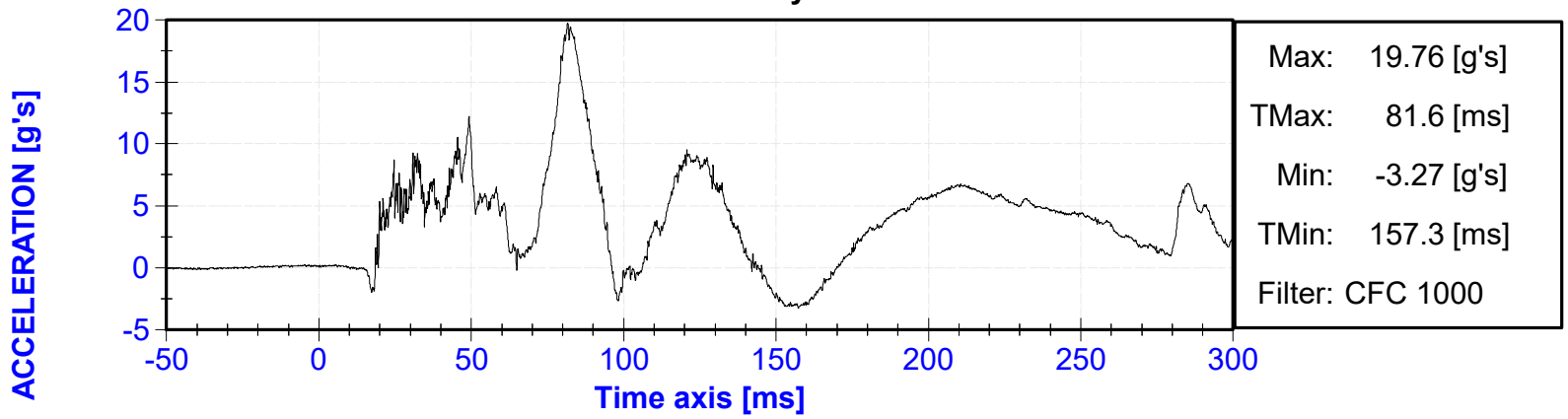
Driver Head X Acceleration vs. Time Primary



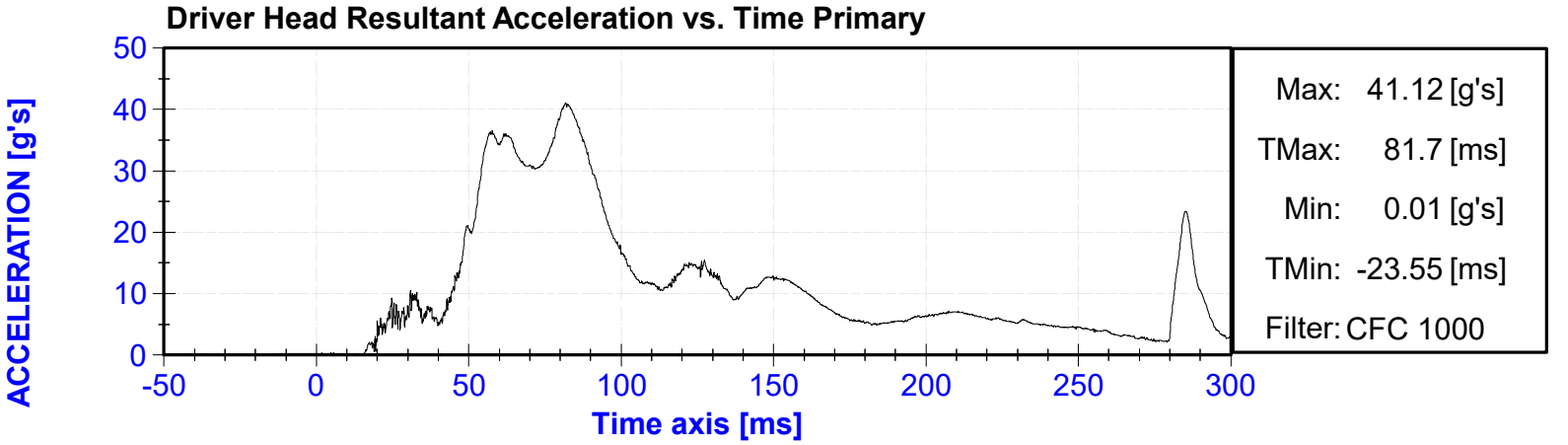
Driver Head Y Acceleration vs. Time Primary



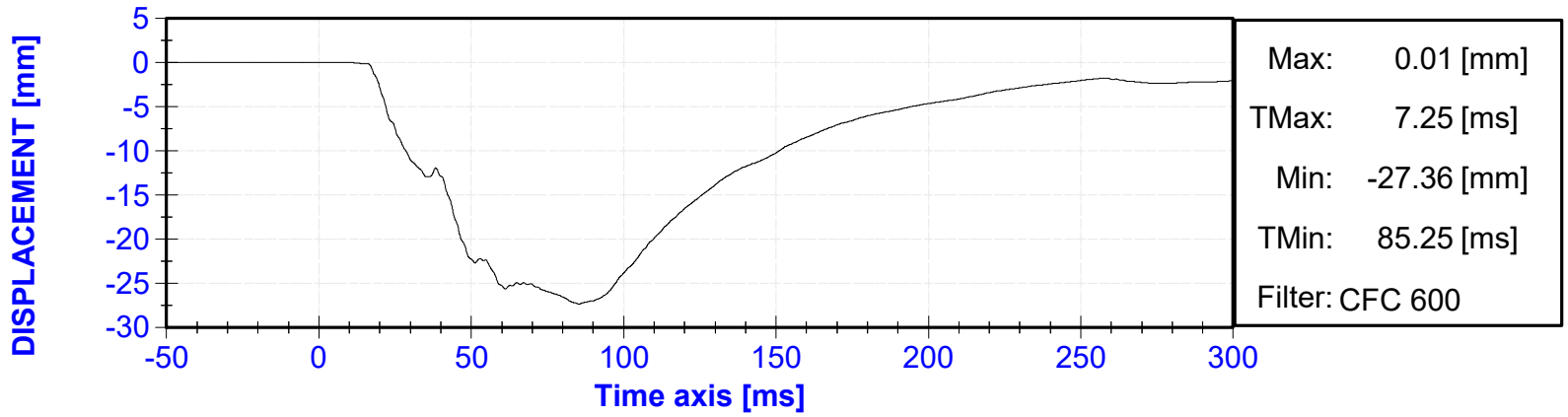
Driver Head Z Acceleration vs. Time Primary



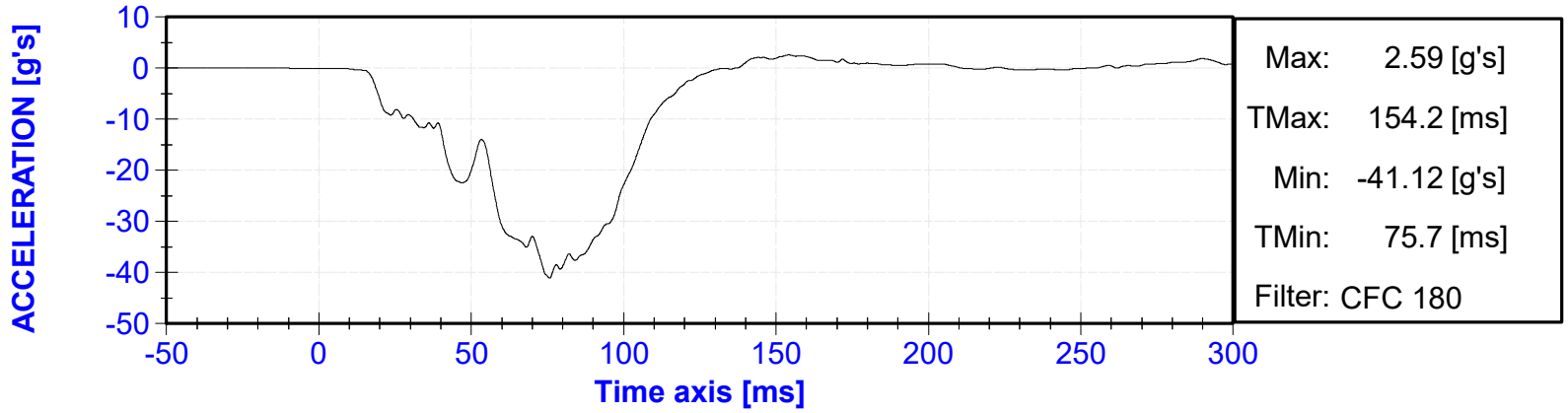
Driver Head Resultant Acceleration vs. Time Primary



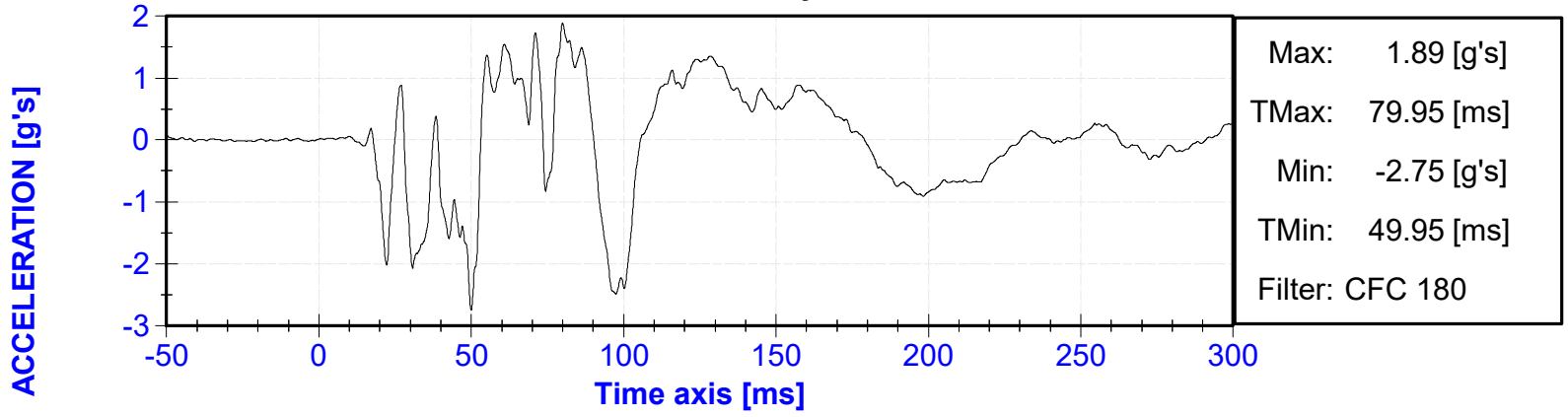
Driver Chest X Deflection vs. Time



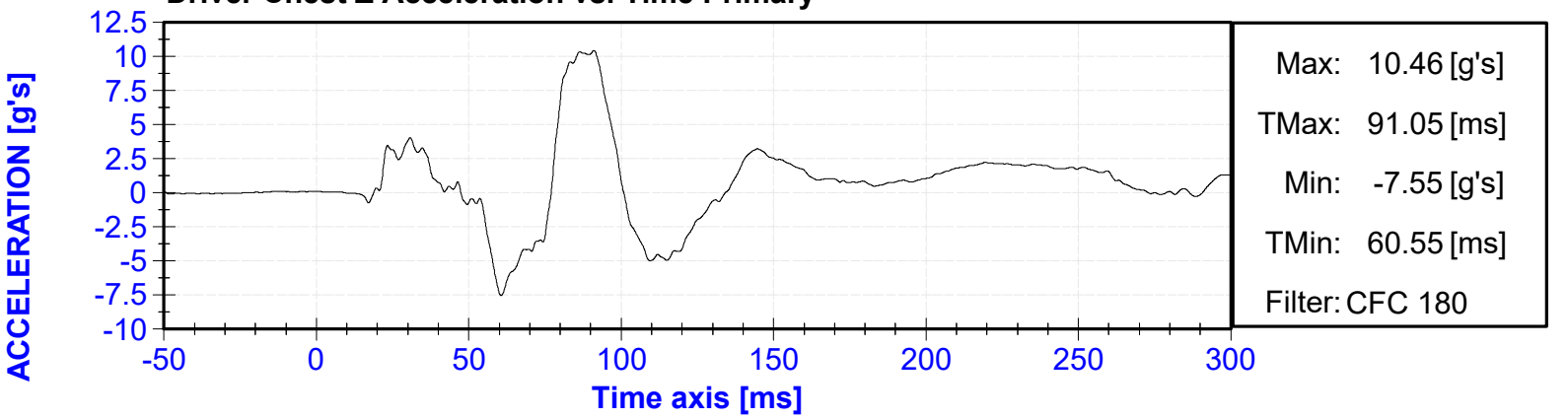
Driver Chest X Acceleration vs. Time Primary



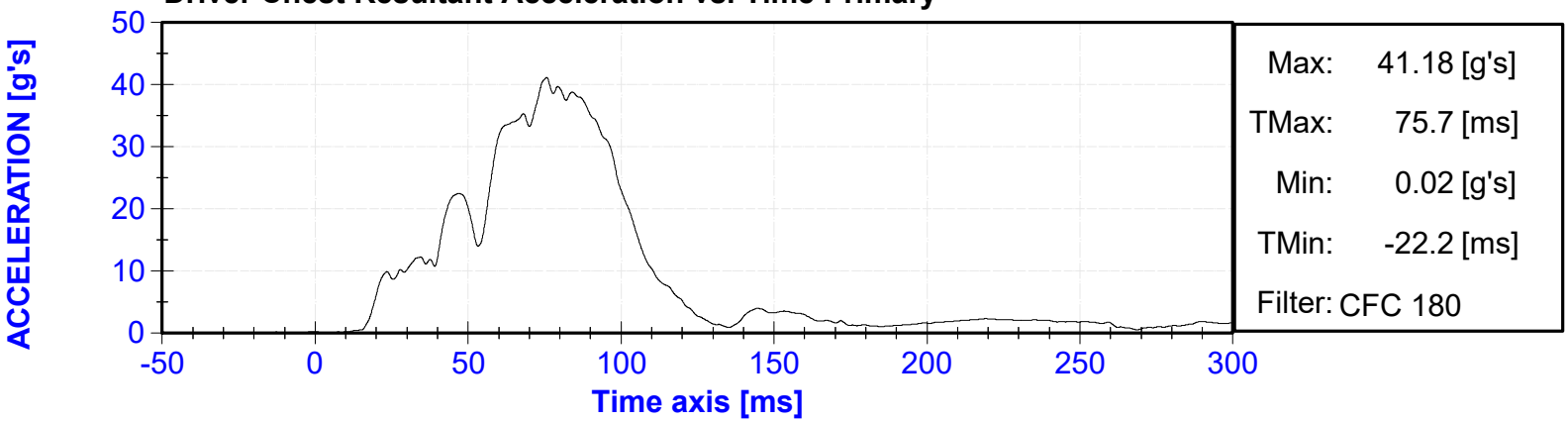
Driver Chest Y Acceleration vs. Time Primary



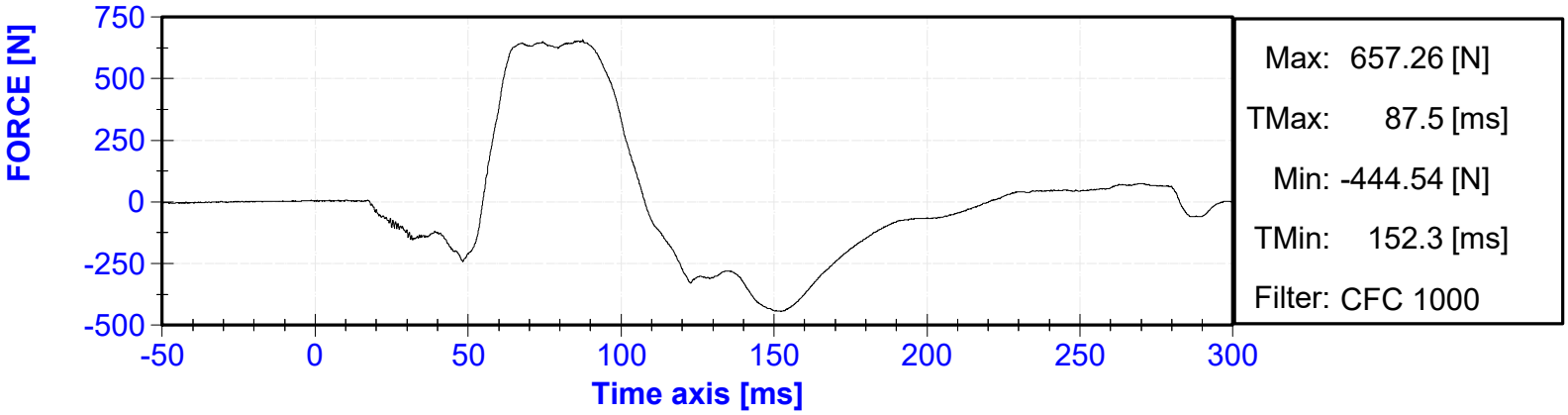
Driver Chest Z Acceleration vs. Time Primary



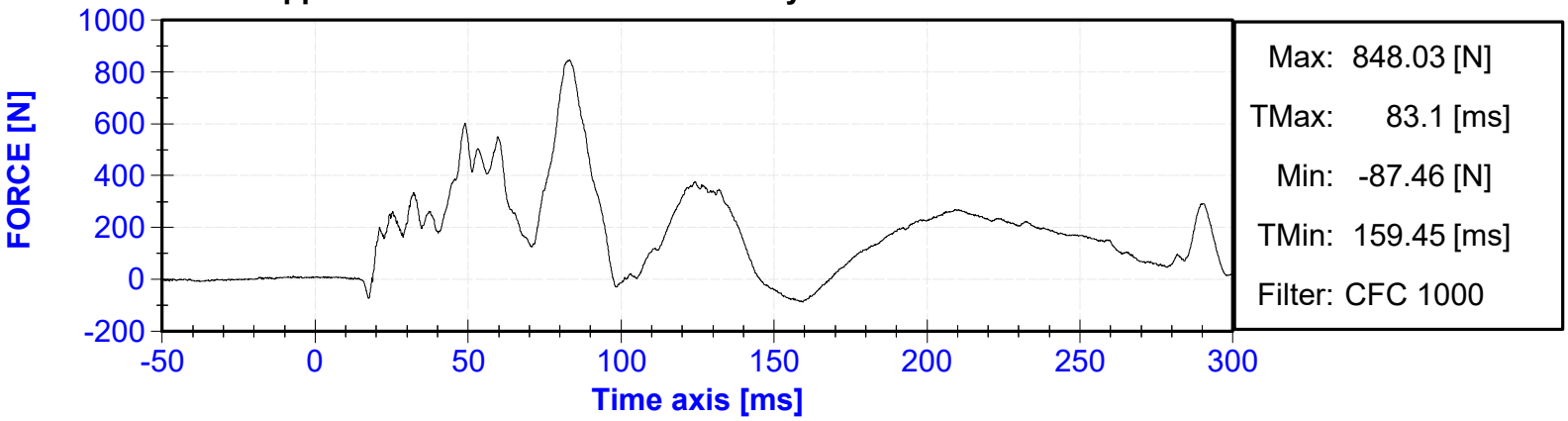
Driver Chest Resultant Acceleration vs. Time Primary



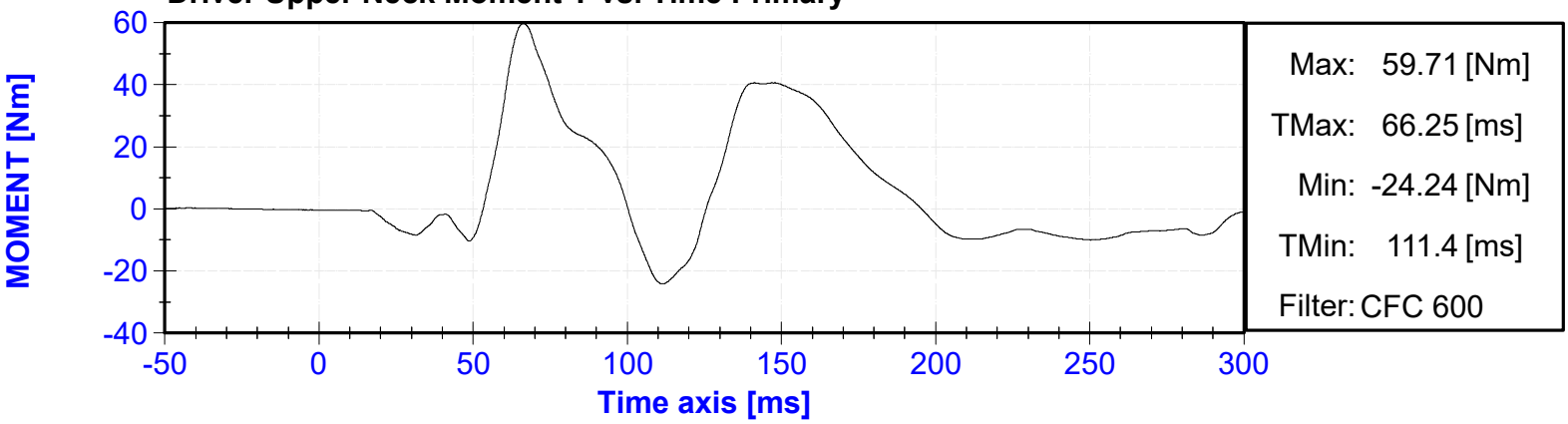
Driver Upper Neck Force X vs. Time Primary



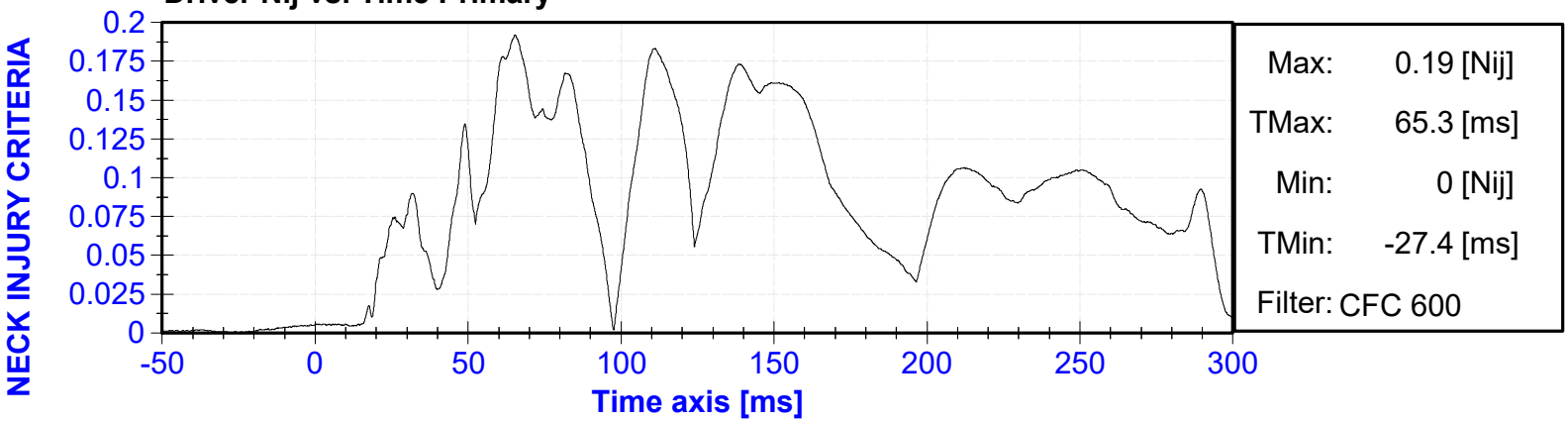
Driver Upper Neck Force Z vs. Time Primary



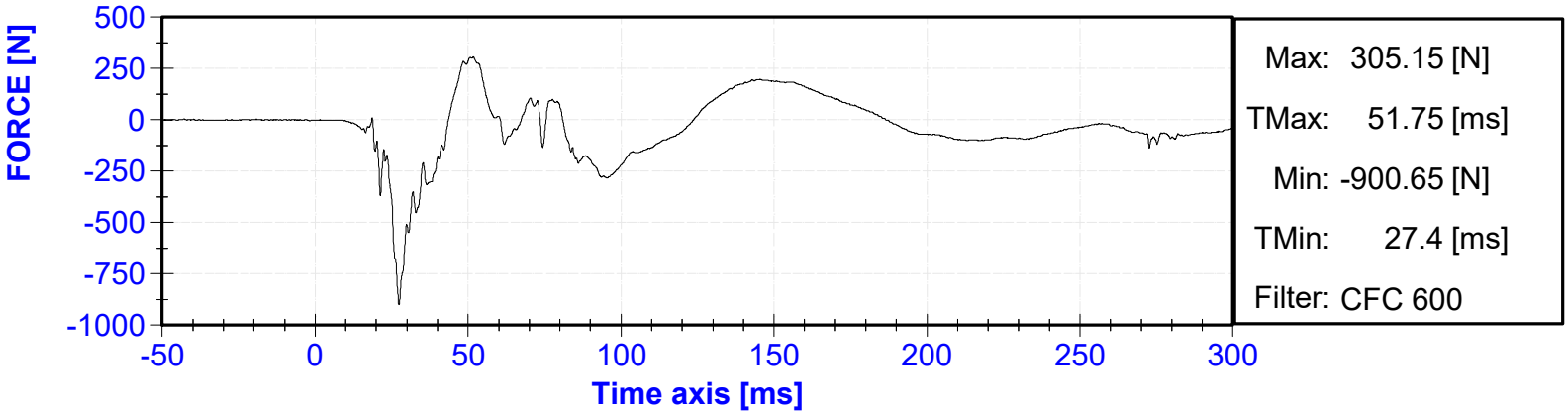
Driver Upper Neck Moment Y vs. Time Primary



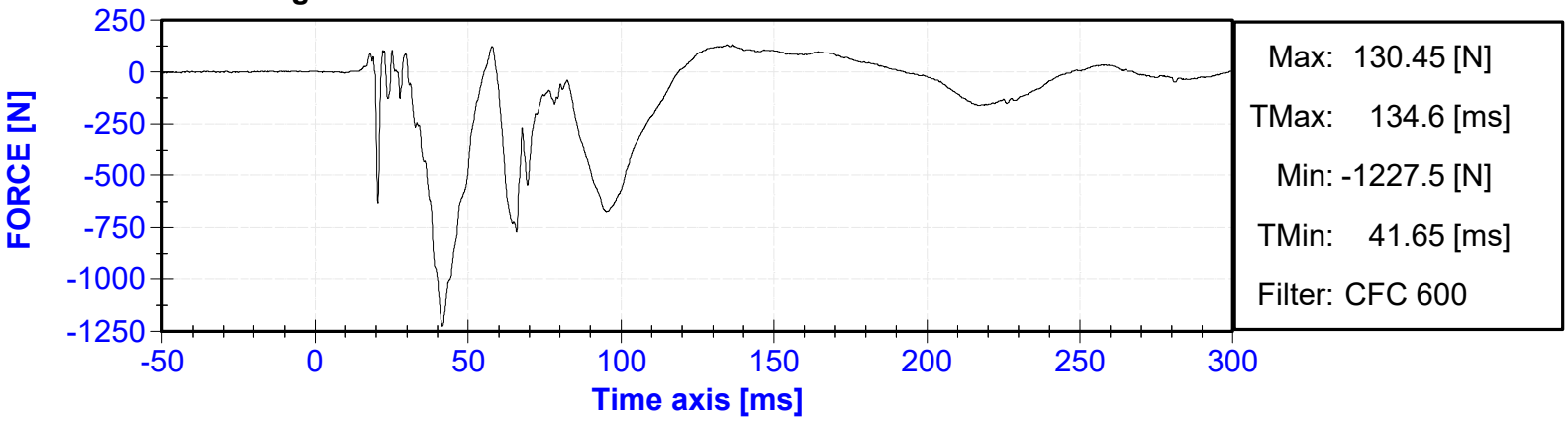
Driver Nij vs. Time Primary



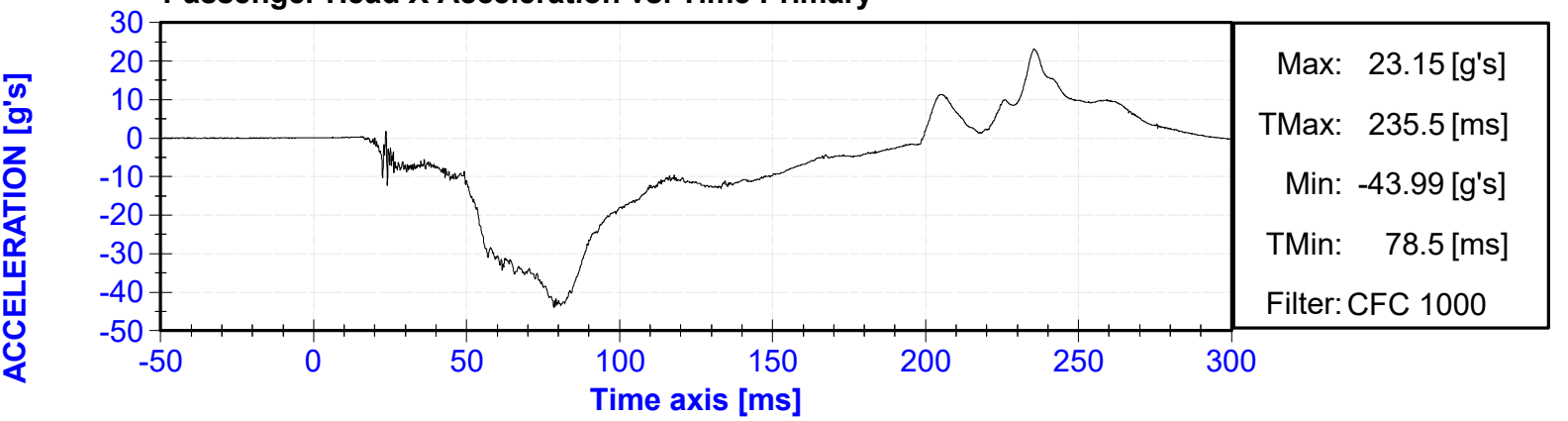
Driver Left Femur Force vs. Time



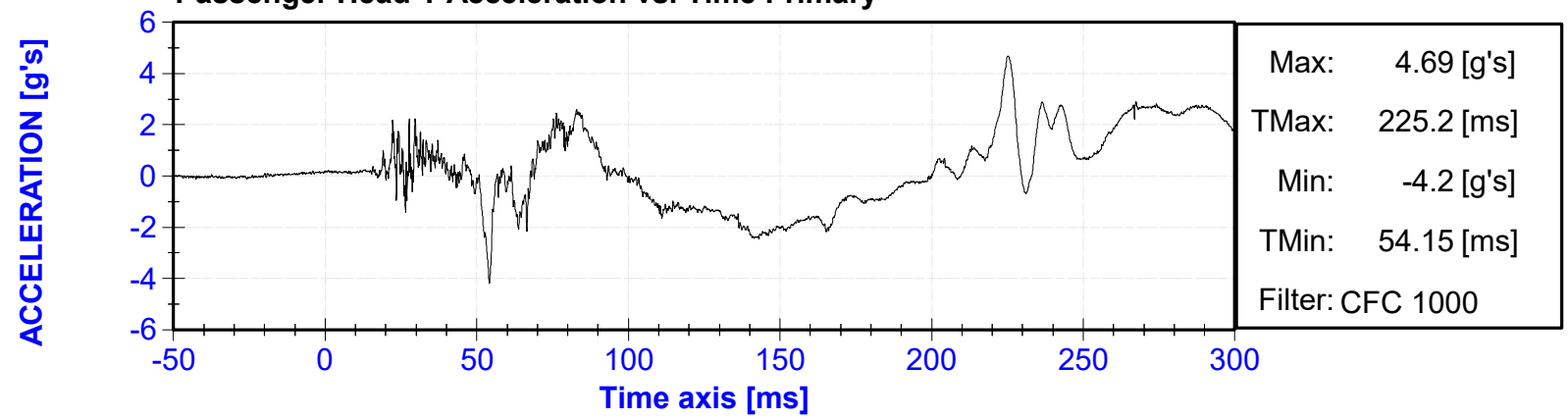
Driver Right Femur Force vs. Time



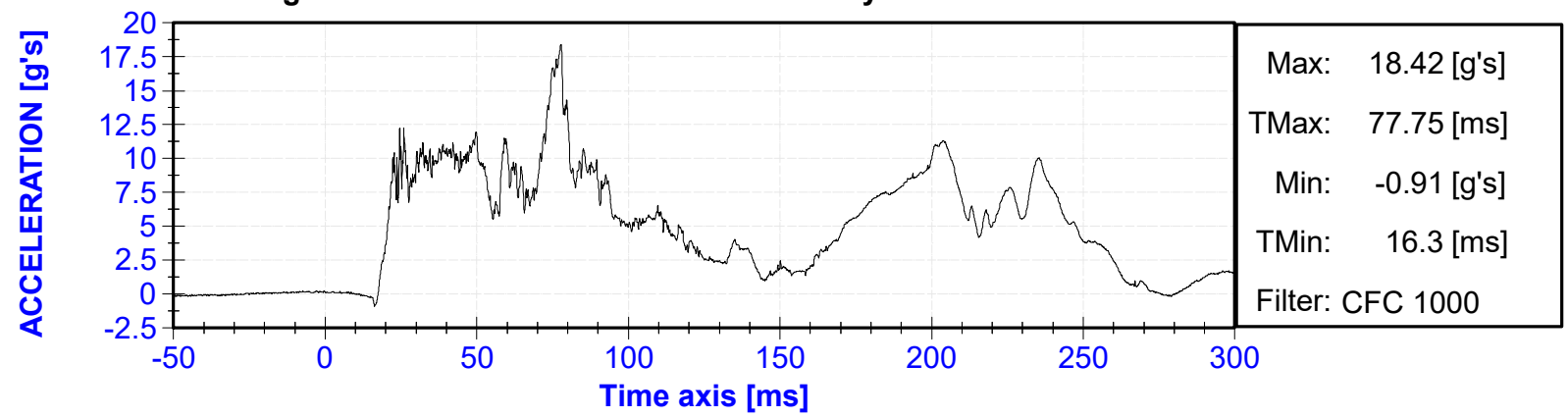
Passenger Head X Acceleration vs. Time Primary



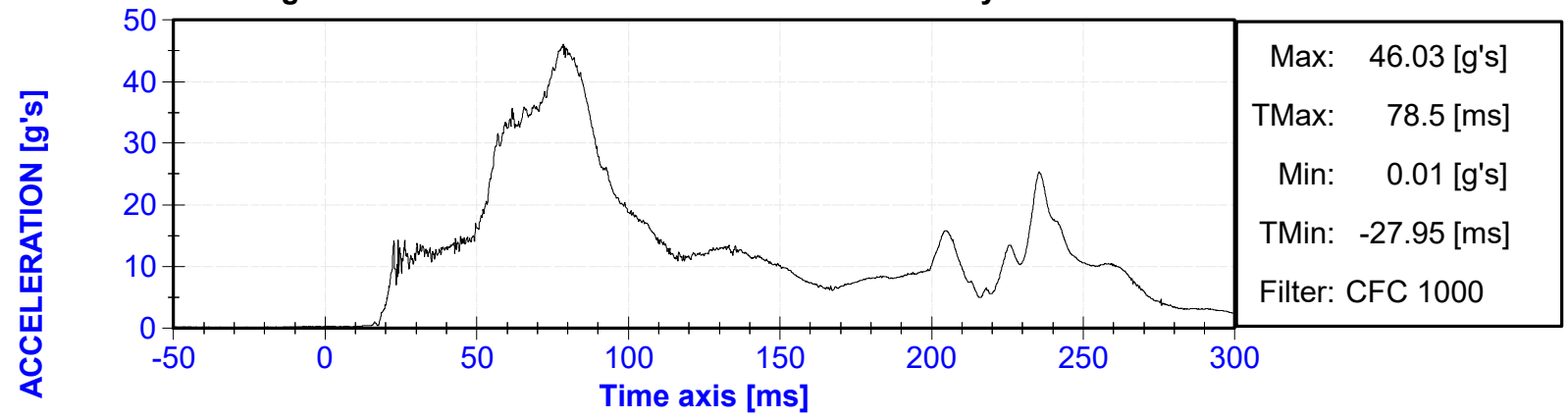
Passenger Head Y Acceleration vs. Time Primary



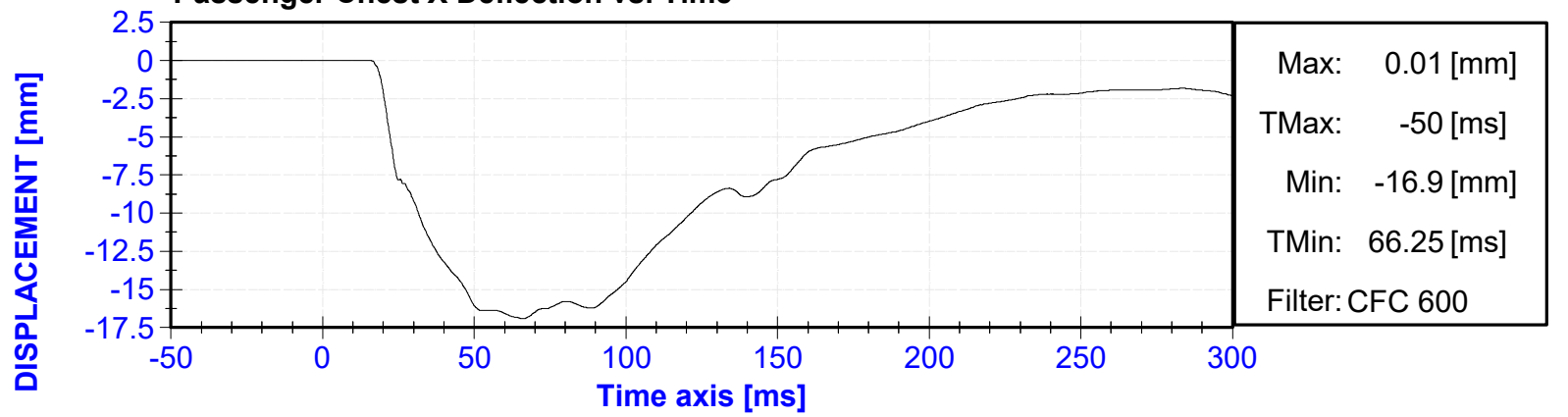
Passenger Head Z Acceleration vs. Time Primary



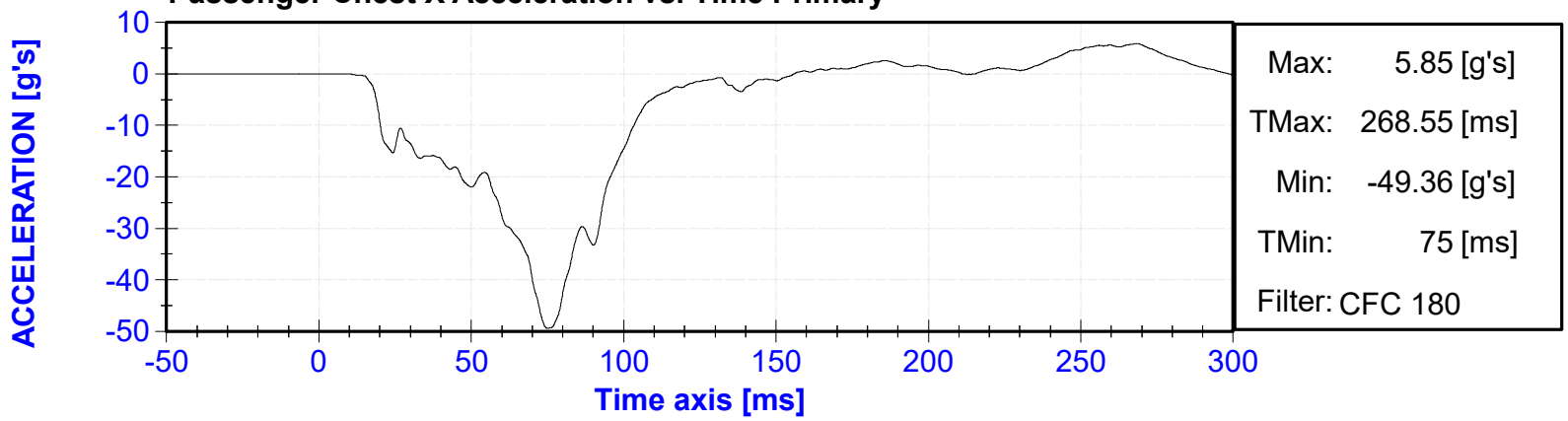
Passenger Head Resultant Acceleration vs. Time Primary



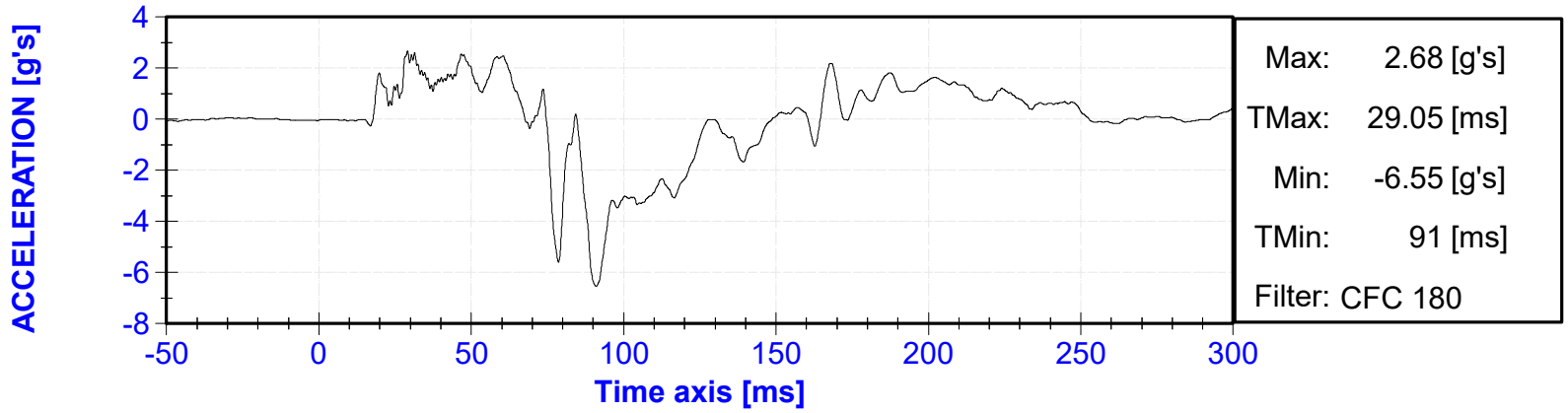
Passenger Chest X Deflection vs. Time



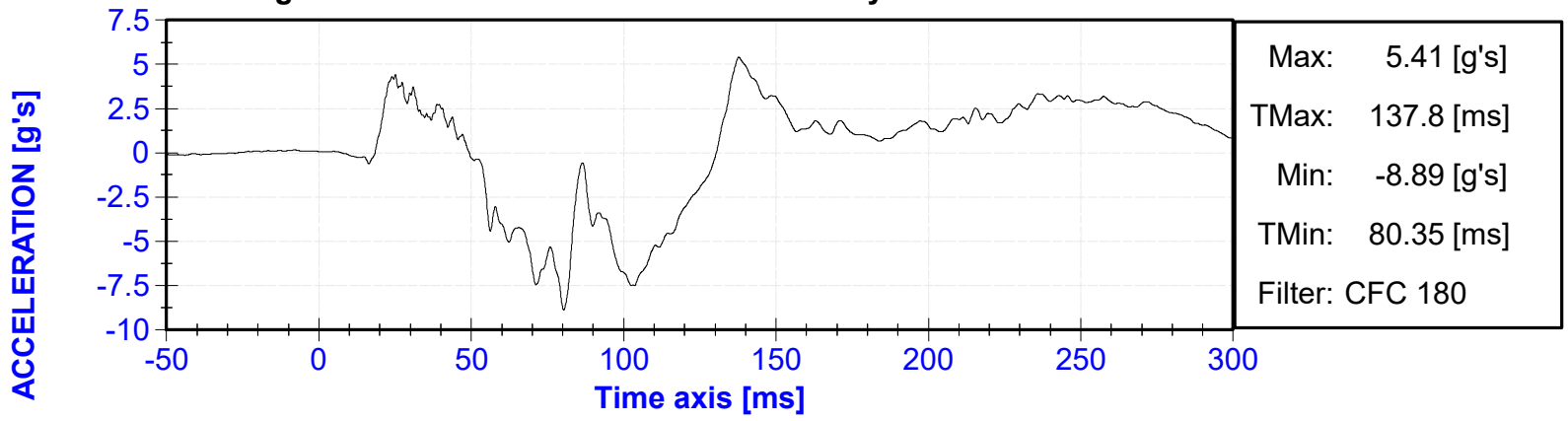
Passenger Chest X Acceleration vs. Time Primary



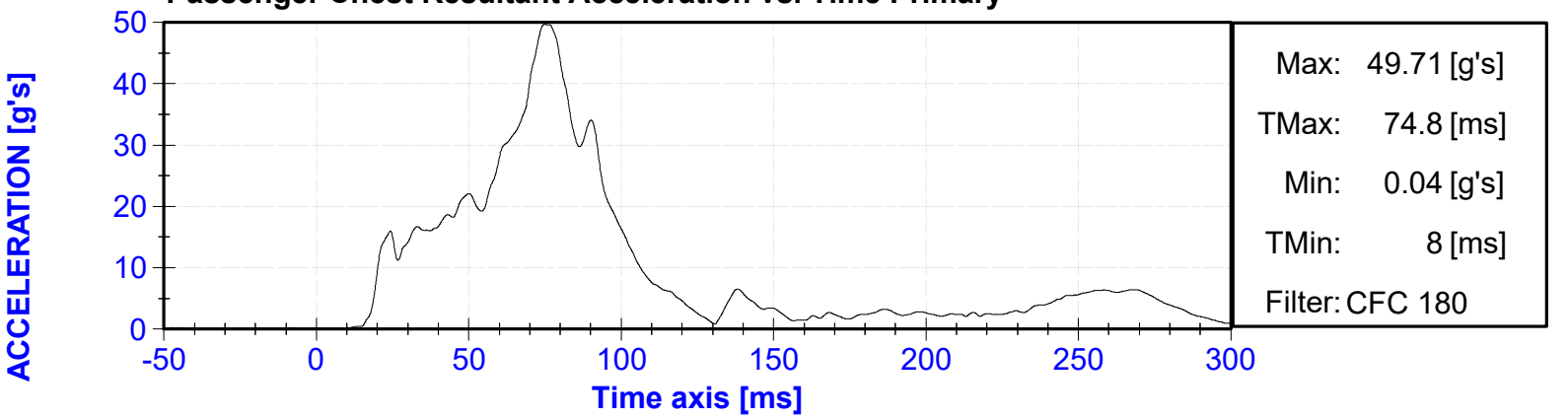
Passenger Chest Y Acceleration vs. Time Primary



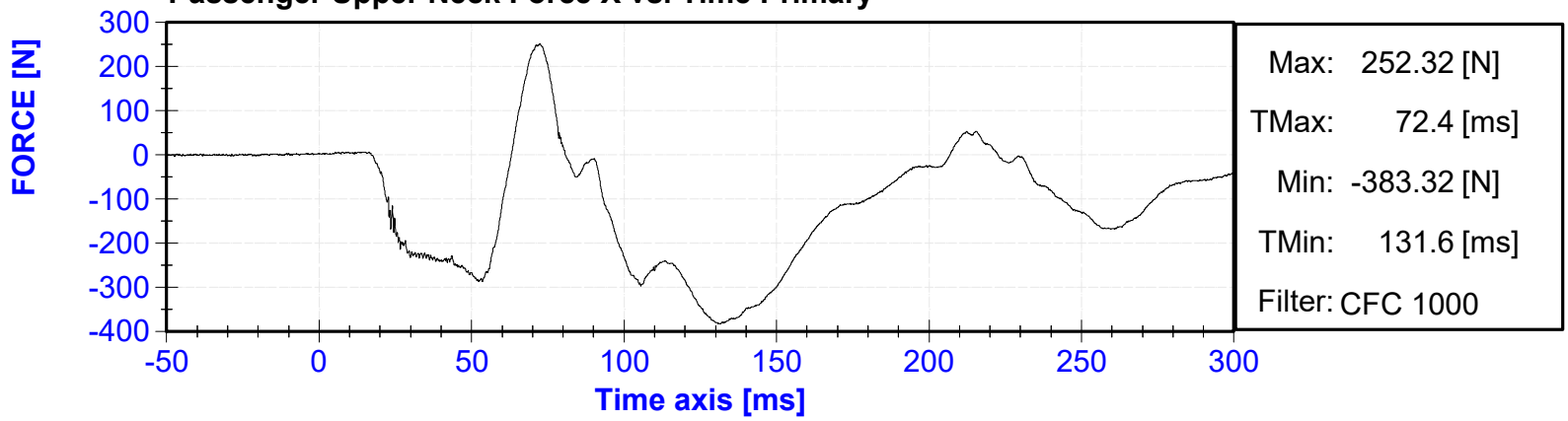
Passenger Chest Z Acceleration vs. Time Primary



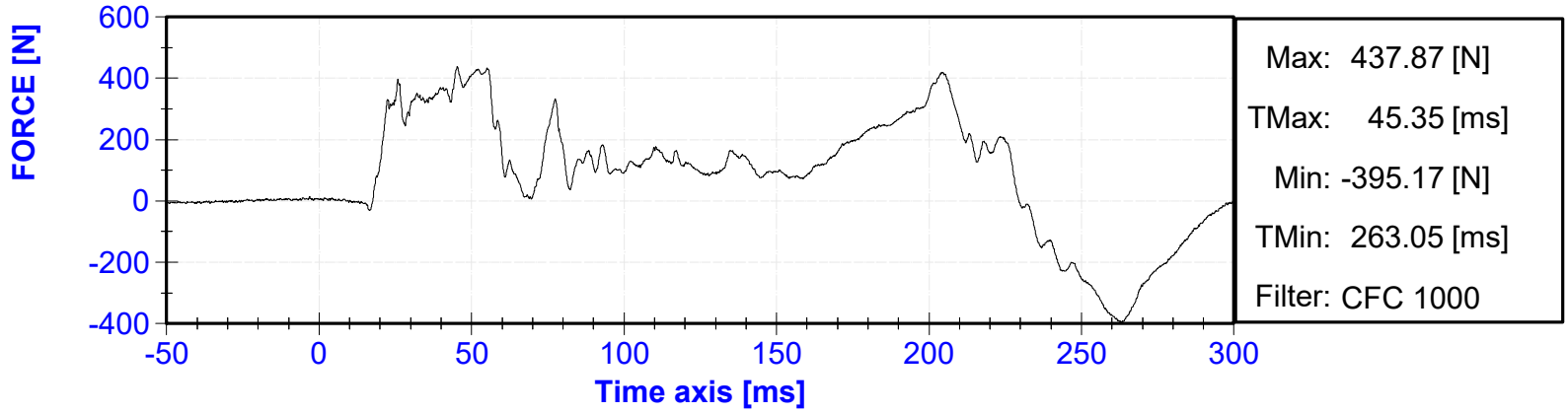
Passenger Chest Resultant Acceleration vs. Time Primary



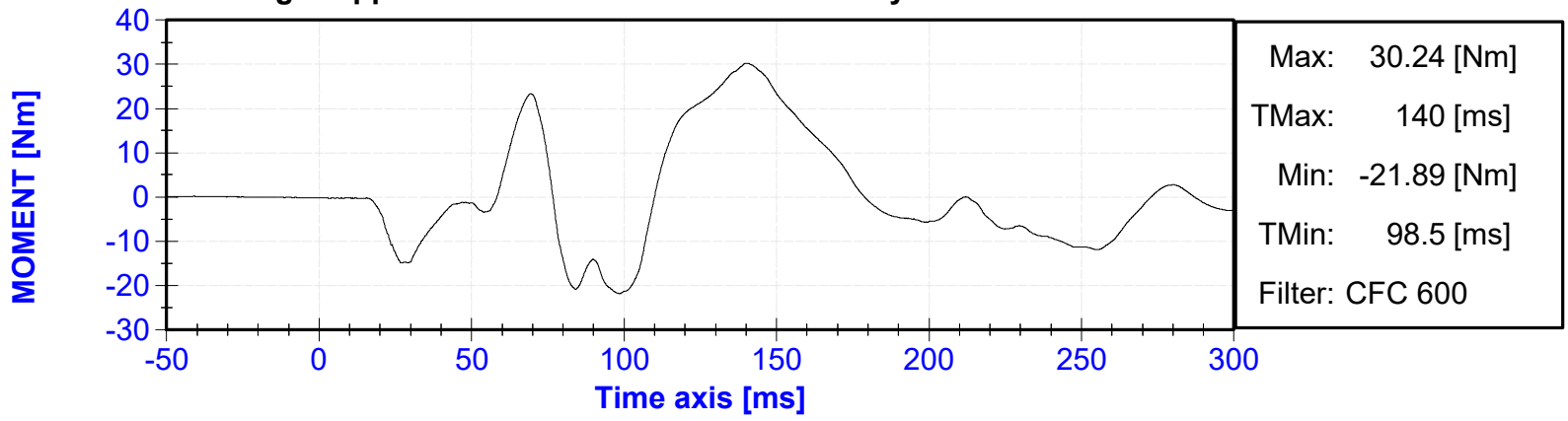
Passenger Upper Neck Force X vs. Time Primary



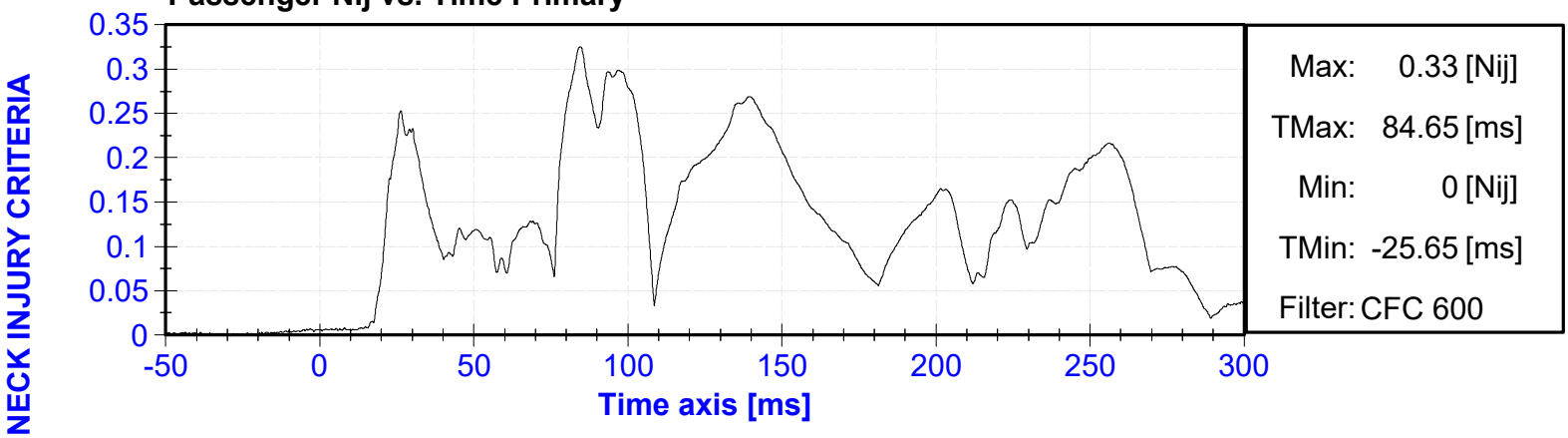
Passenger Upper Neck Force Z vs. Time Primary

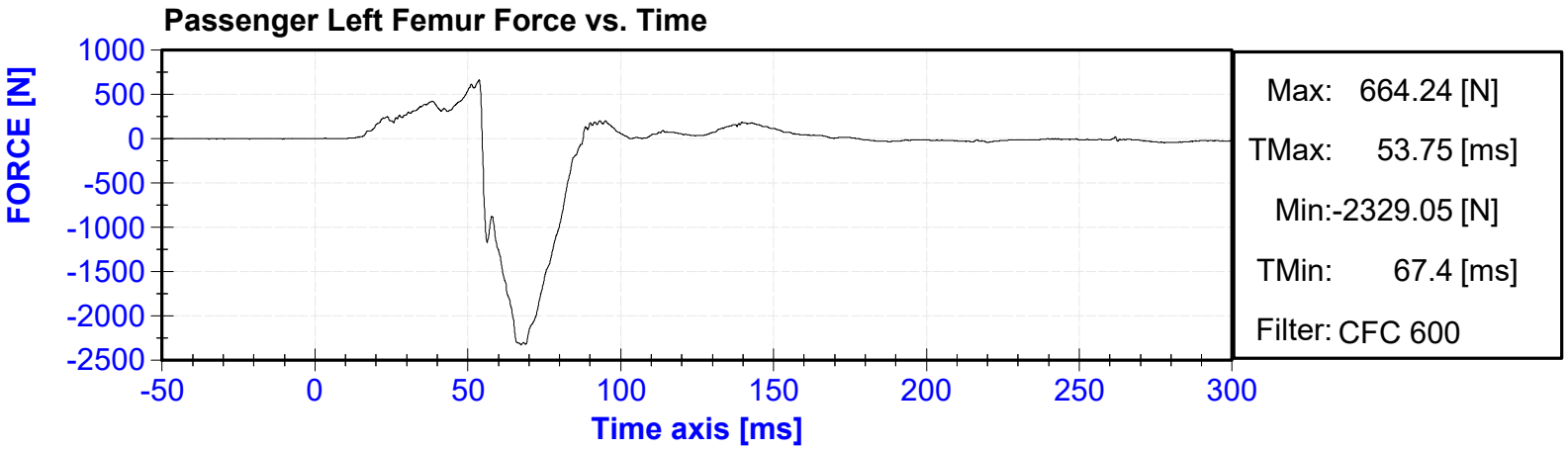


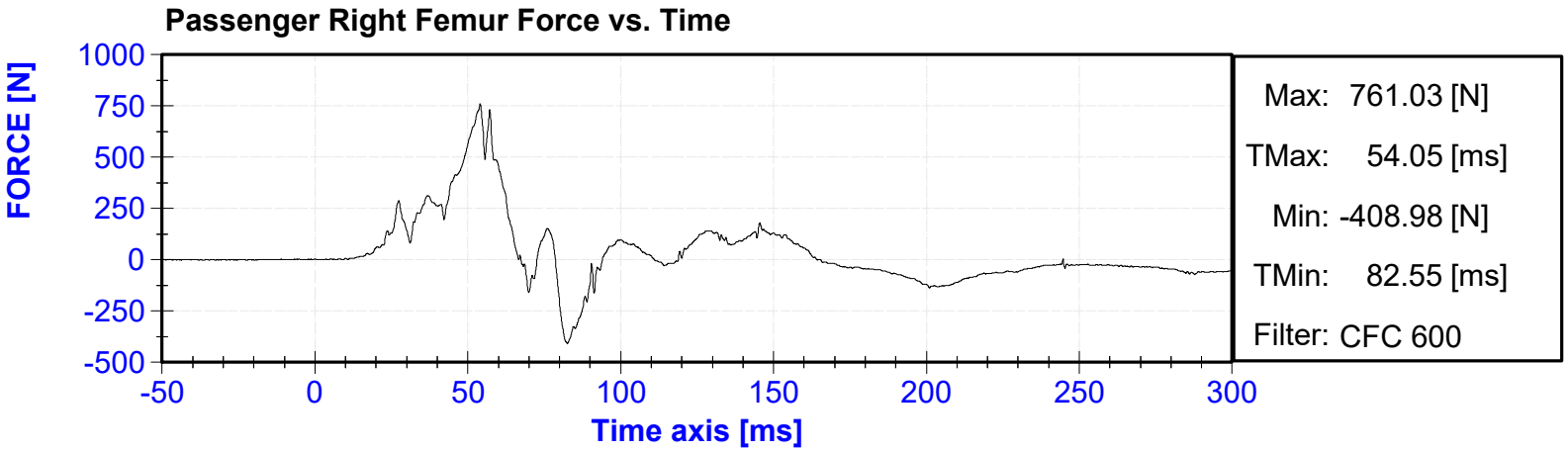
Passenger Upper Neck Moment Y vs. Time Primary



Passenger Nij vs. Time Primary




Passenger Left Femur Force vs. Time
FORCE [N]
1000
500
0
-500
-1000
-1500
-2000
-2500
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 664.24 [N]
TMax: 53.75 [ms]
Min:-2329.05 [N]
TMin: 67.4 [ms]
Filter: CFC 600


Passenger Right Femur Force vs. Time
FORCE [N]
1000
750
500
250
0
-250
-500
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 761.03 [N]
TMax: 54.05 [ms]
Min: -408.98 [N]
TMin: 82.55 [ms]
Filter: CFC 600

APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

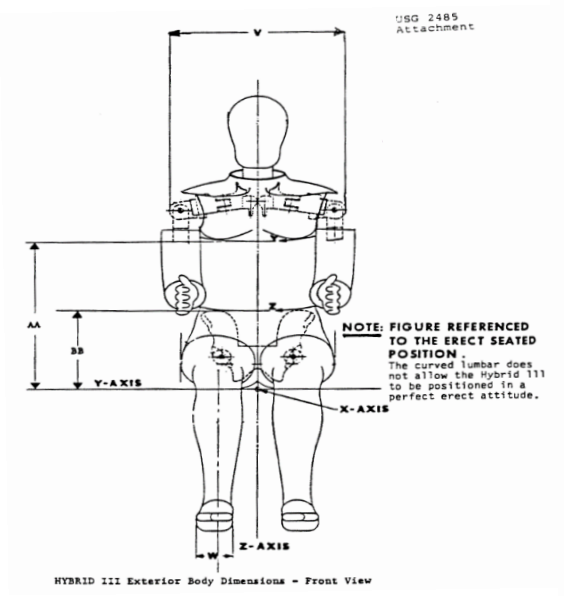
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 142

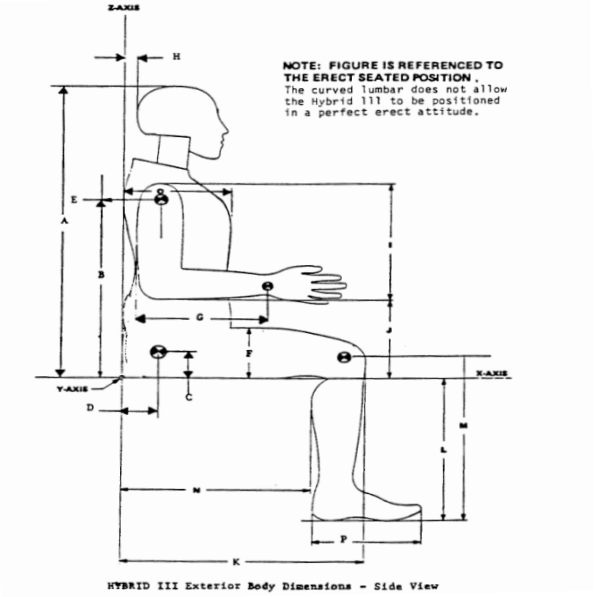
External Measurements - Hybrid 3 - 50th Male

Technician: K. Brogan Date: 12/12/2022

Dummy Serial Number: 142



HYBRID III Exterior Body Dimensions - Front View



HYBRID III Exterior Body Dimensions - Side View

Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.8	Pass
B	Shoulder Pivot Height	19.9	20.5	20.2	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.4	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.2	Pass
J	Elbow Rest Height	7.5	8.3	8.0	Pass
K	Buttock to Knee Length	22.8	23.8	23.1	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.4	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	16.8	Pass
W	Foot Breadth	3.6	4.2	3.9	Pass
Y	Chest Circumference with Jacket	38.2	39.4	39.1	Pass
Z	Waist Circumference	32.9	34.1	33.2	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

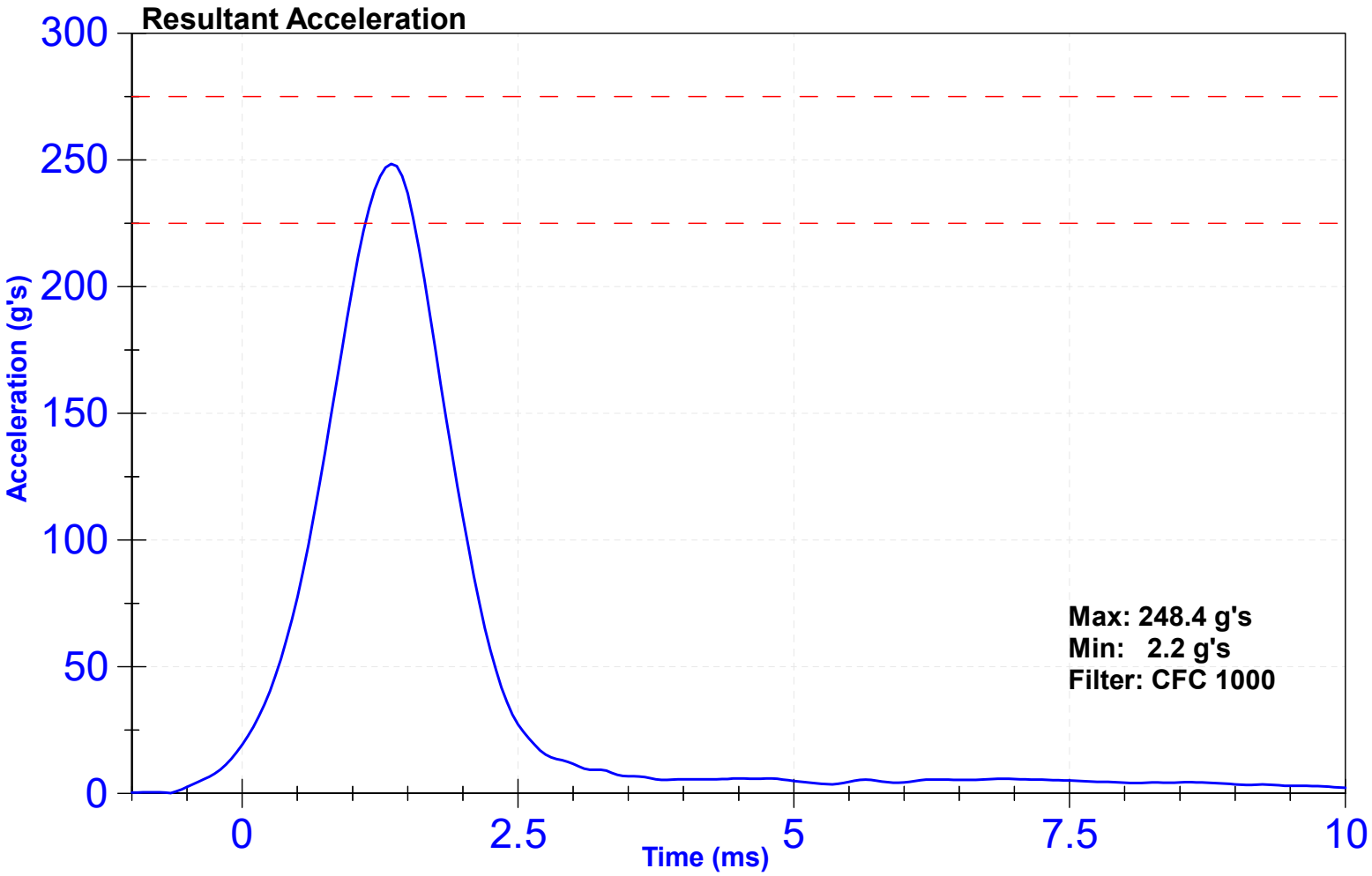
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

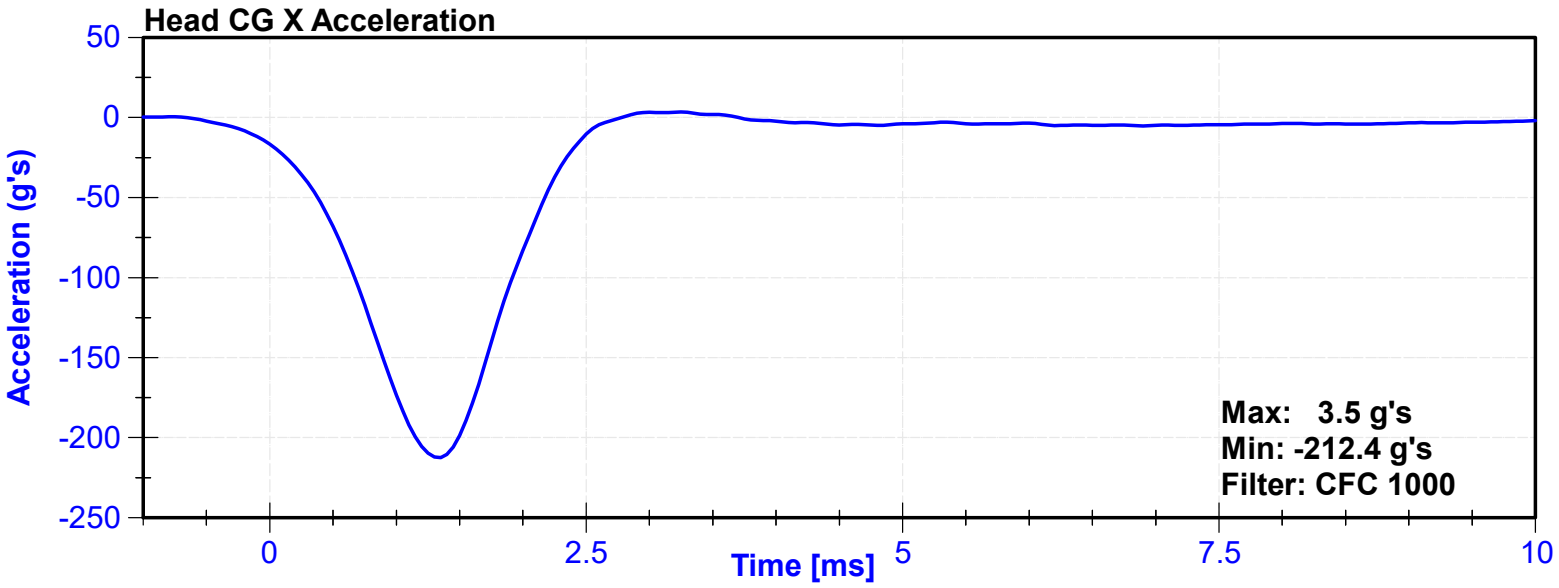
Results

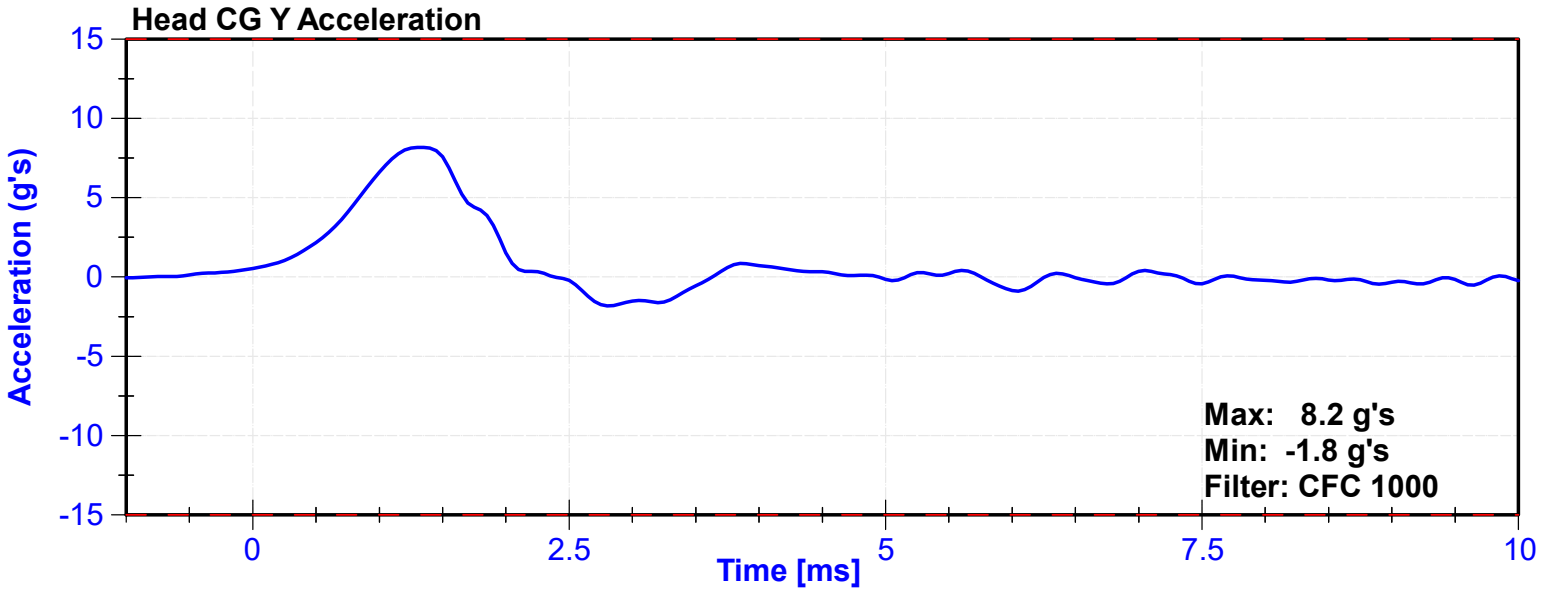
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	20.5	Pass
Resultant Acceleration	225	275	g's	248.4	Pass
Oscillation	0	10	%	3.7	Pass
Lateral Acceleration	-15	15	g's	8.2	Pass

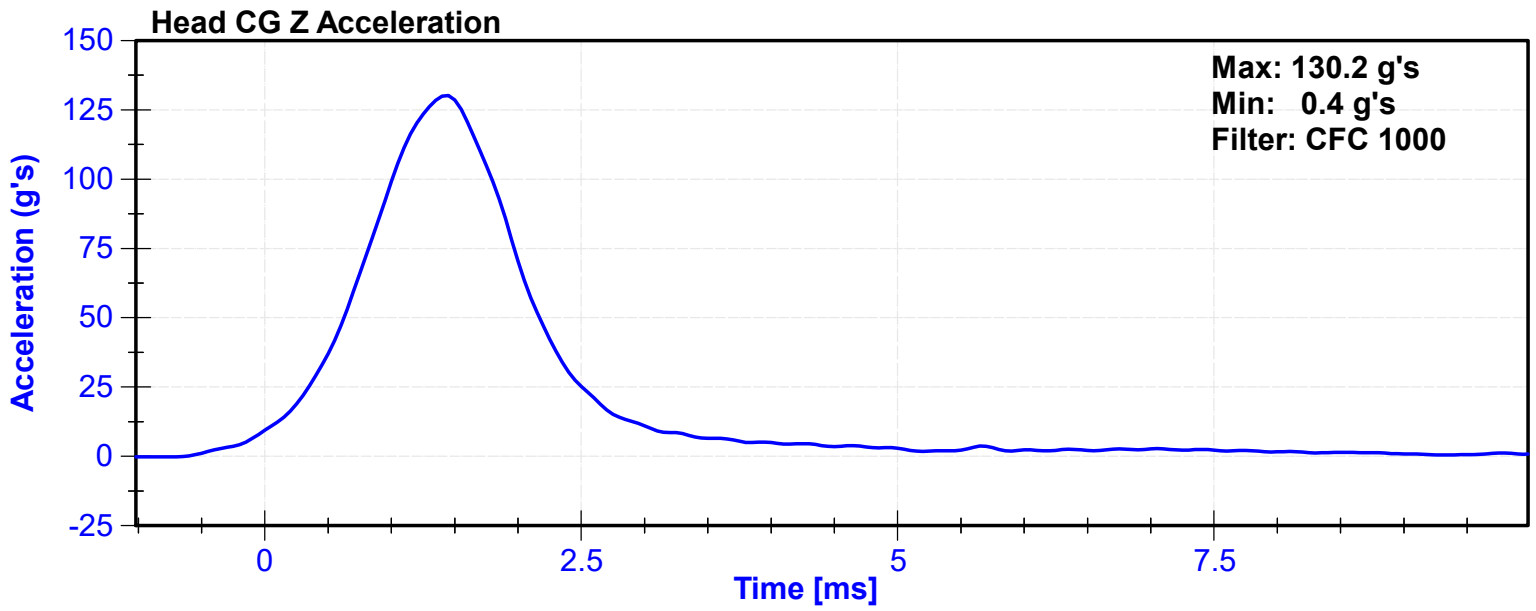
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P51681	9/30/2022	3/29/2023
Y Accelerometer	Endevco	P64151	9/30/2022	3/29/2023
Z Accelerometer	Endevco	P52114	9/30/2022	3/29/2023




Head CG X Acceleration
Acceleration (g's)
50
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 3.5 g's
Min: -212.4 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 8.2 g's
Min: -1.8 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
Time [ms]
Max: 130.2 g's
Min: 0.4 g's
Filter: CFC 1000

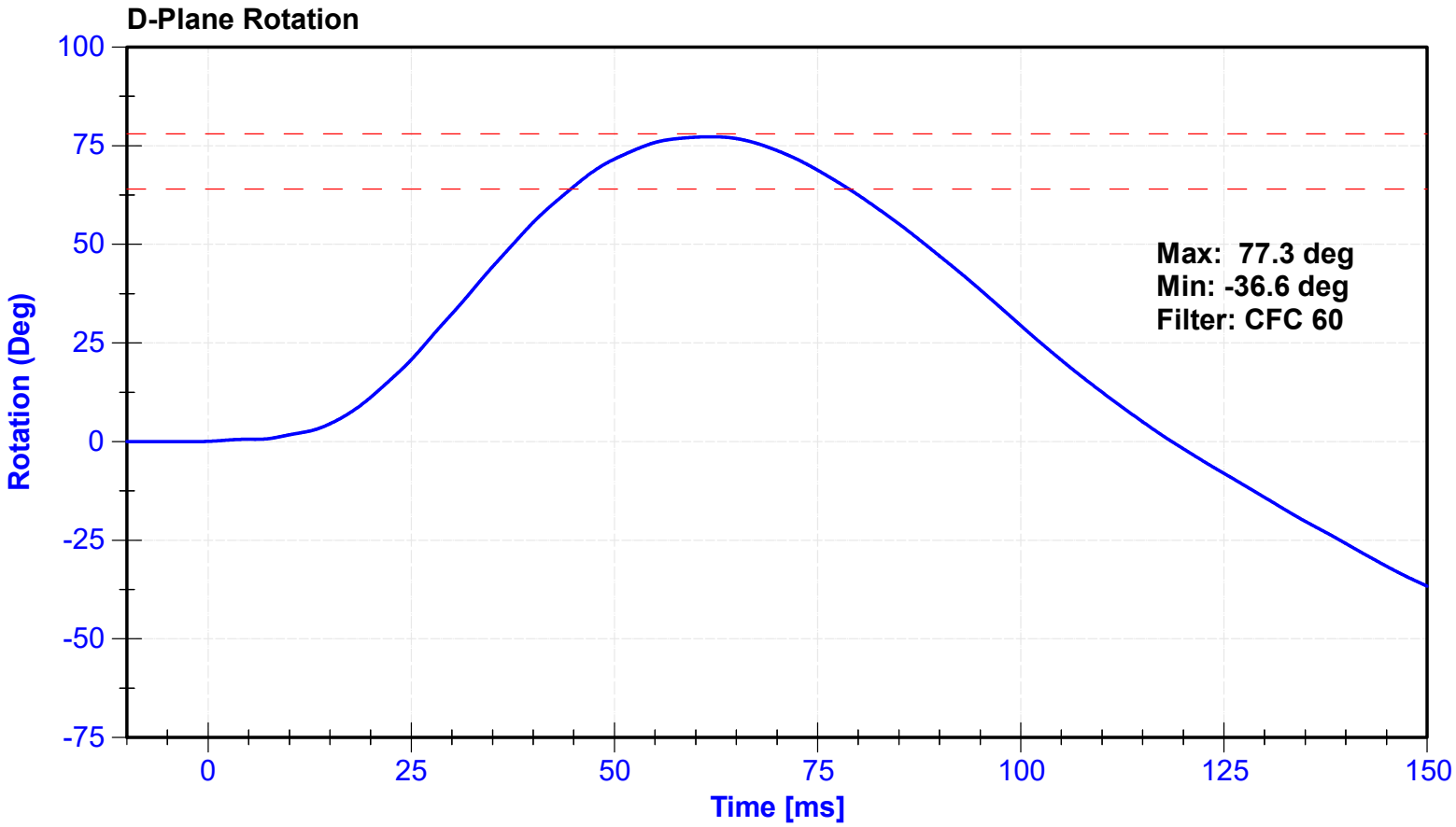
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	C. Mantell

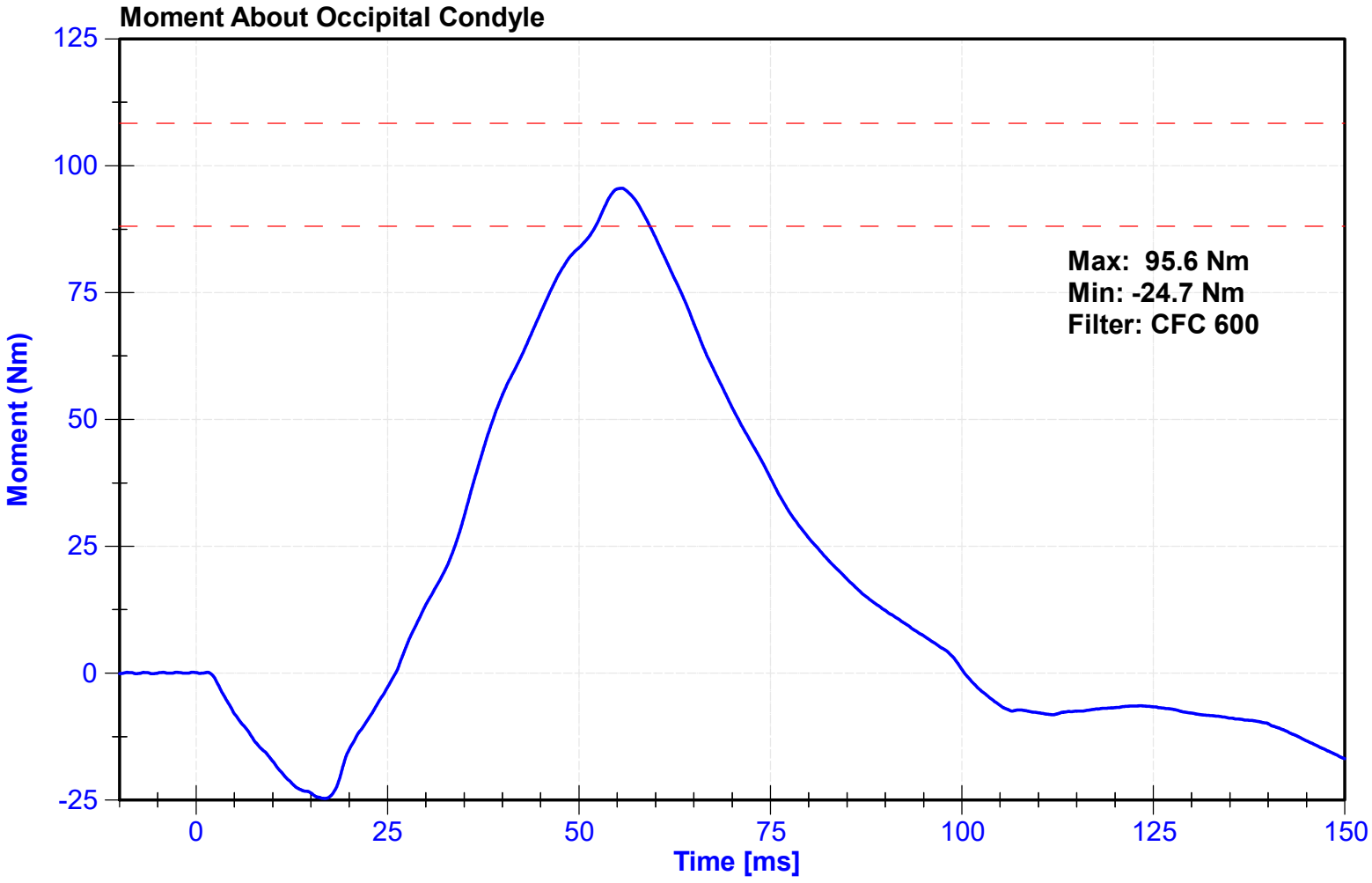
Results

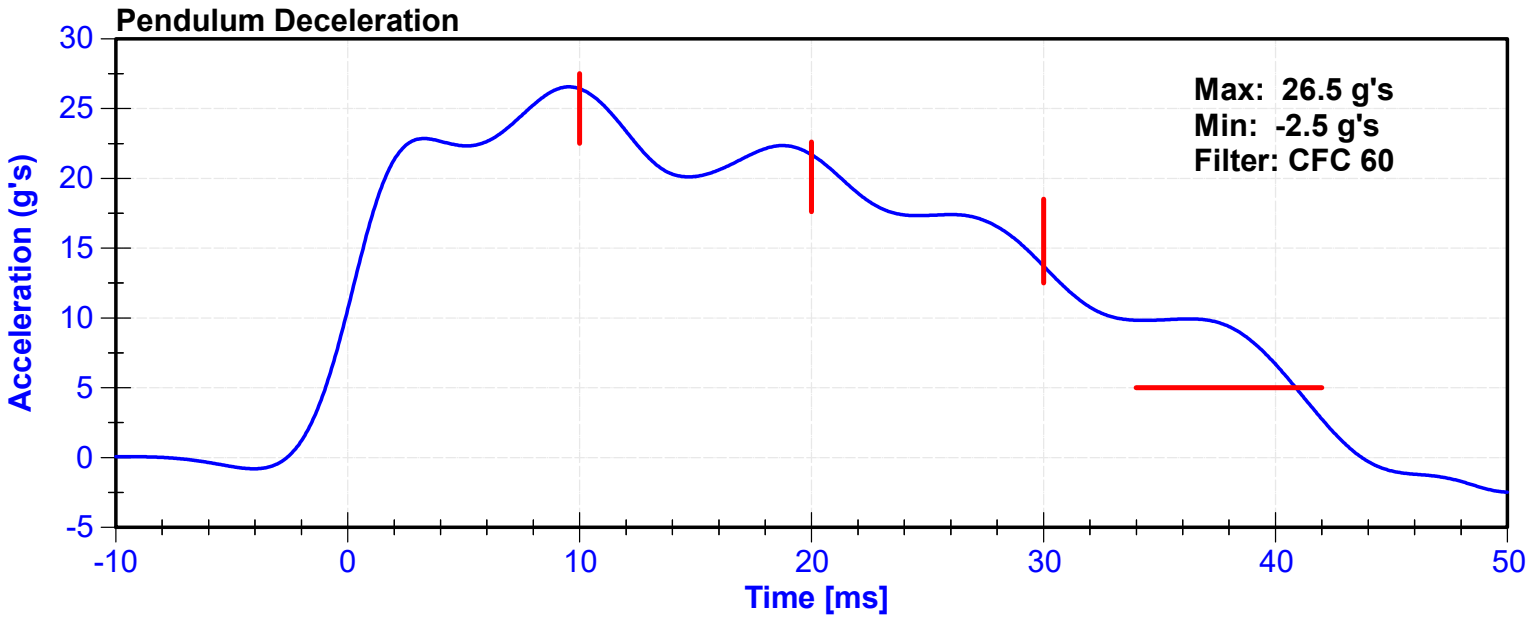
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	35.9	Pass
Velocity	6.89	7.13	m/s	6.936	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	26.41	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	21.69	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	13.72	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	26.5	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	40.9	Pass
Maximum D Plane Rotation	64	78	deg	77.3	Pass
Time to Maximum Rotation	57	64	ms	61.9	Pass
Rotation Decay to Zero	113	127	ms	118.6	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	95.58	Pass
Time to Maximum Moment	47	58	ms	55.6	Pass
Moment Decay to Zero	97	107	ms	100.4	Pass

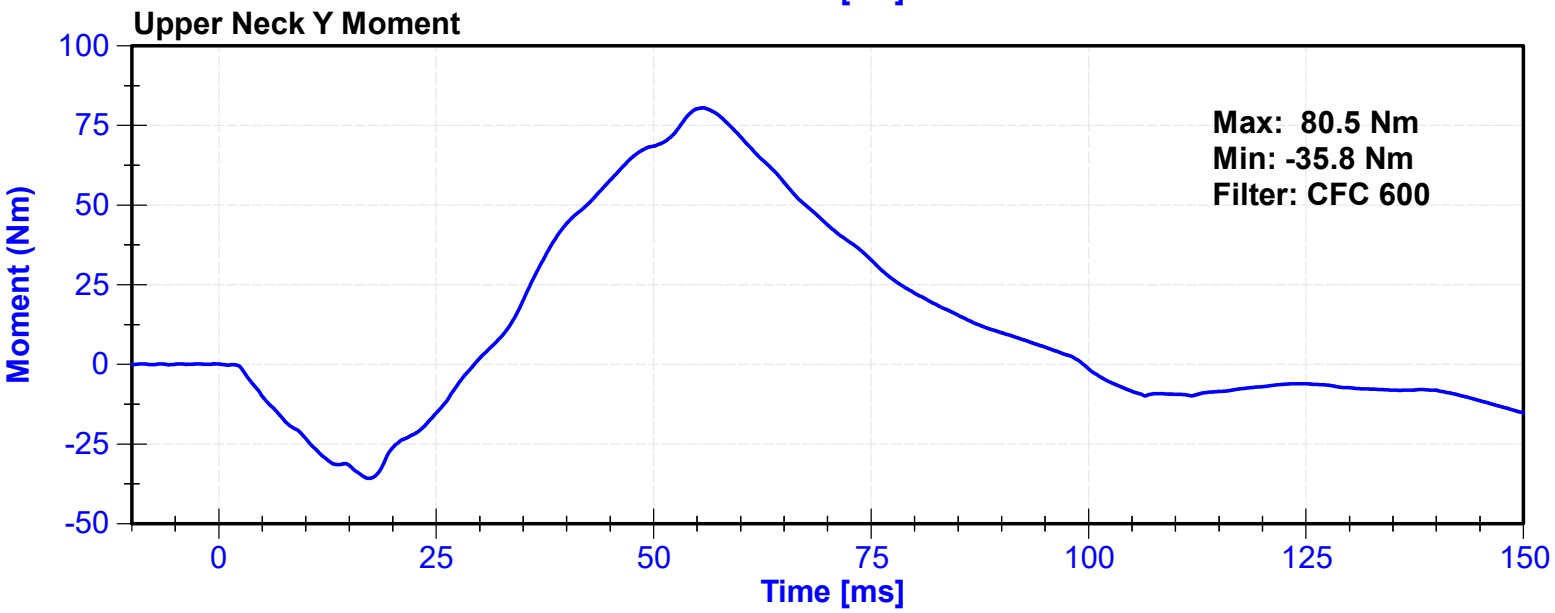
Transducer Calibrations

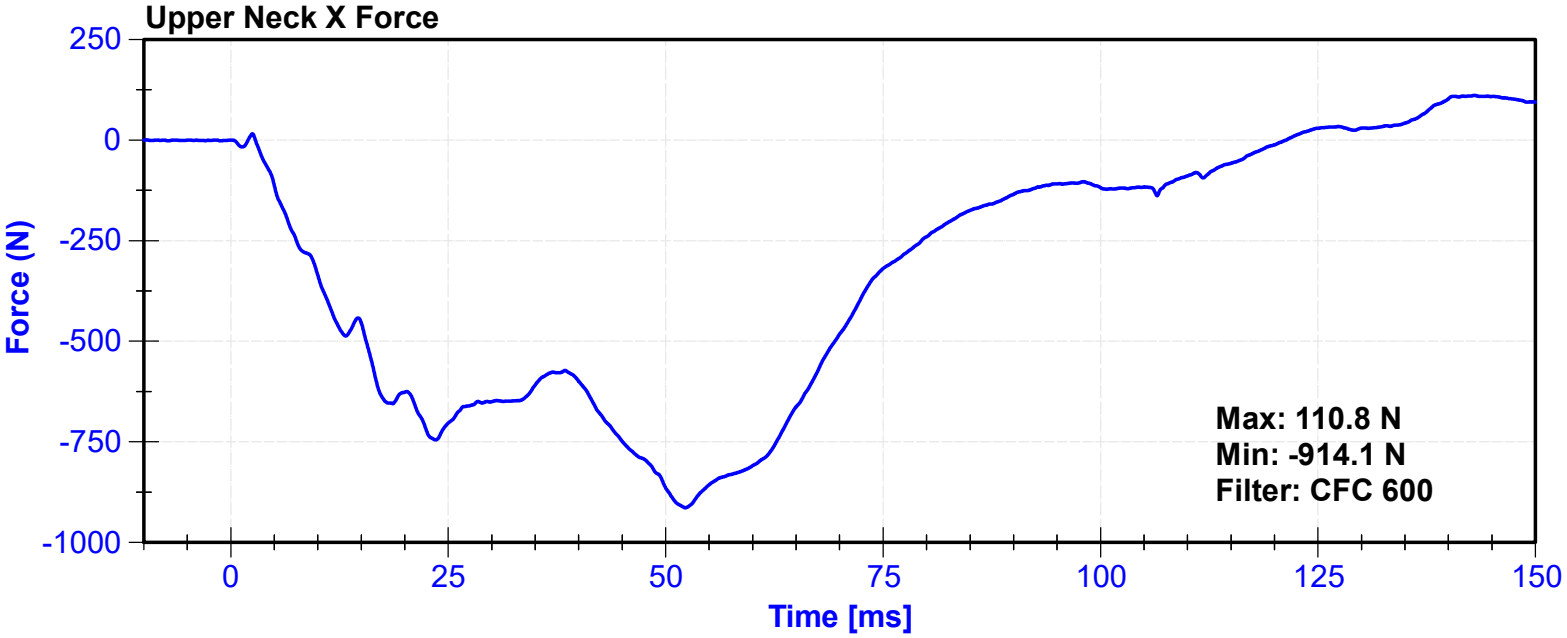
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Denton	2187-FX	6/13/2022	6/13/2023


D-Plane Rotation
Rotation (Deg)
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]
Max: 77.3 deg
Min: -36.6 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
125
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]
Max: 95.6 Nm
Min: -24.7 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 26.5 g's
Min: -2.5 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 80.5 Nm
Min: -35.8 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 110.8 N
Min: -914.1 N
Filter: CFC 600
Force (N)
Time [ms]

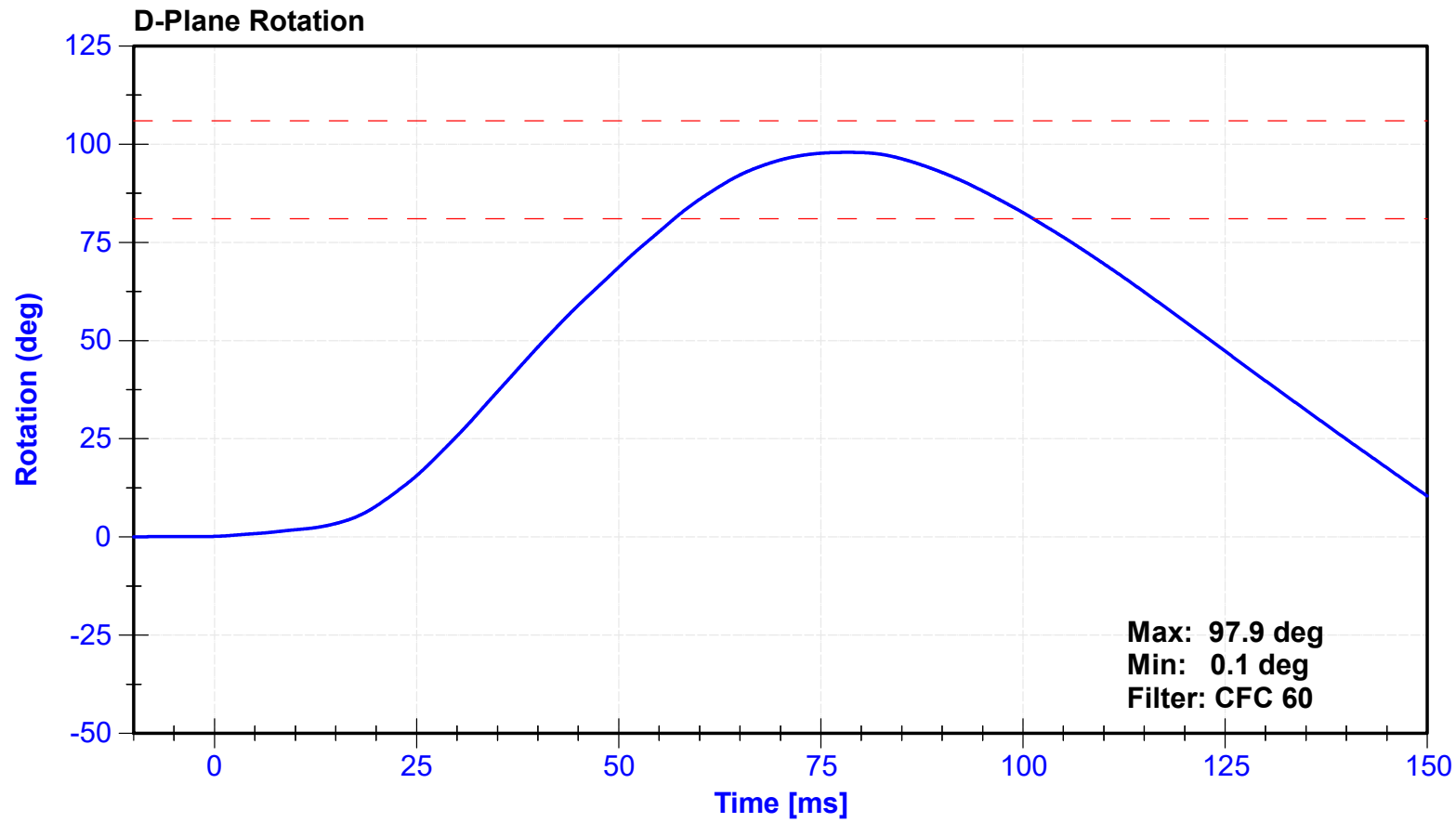
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	C. Mantell

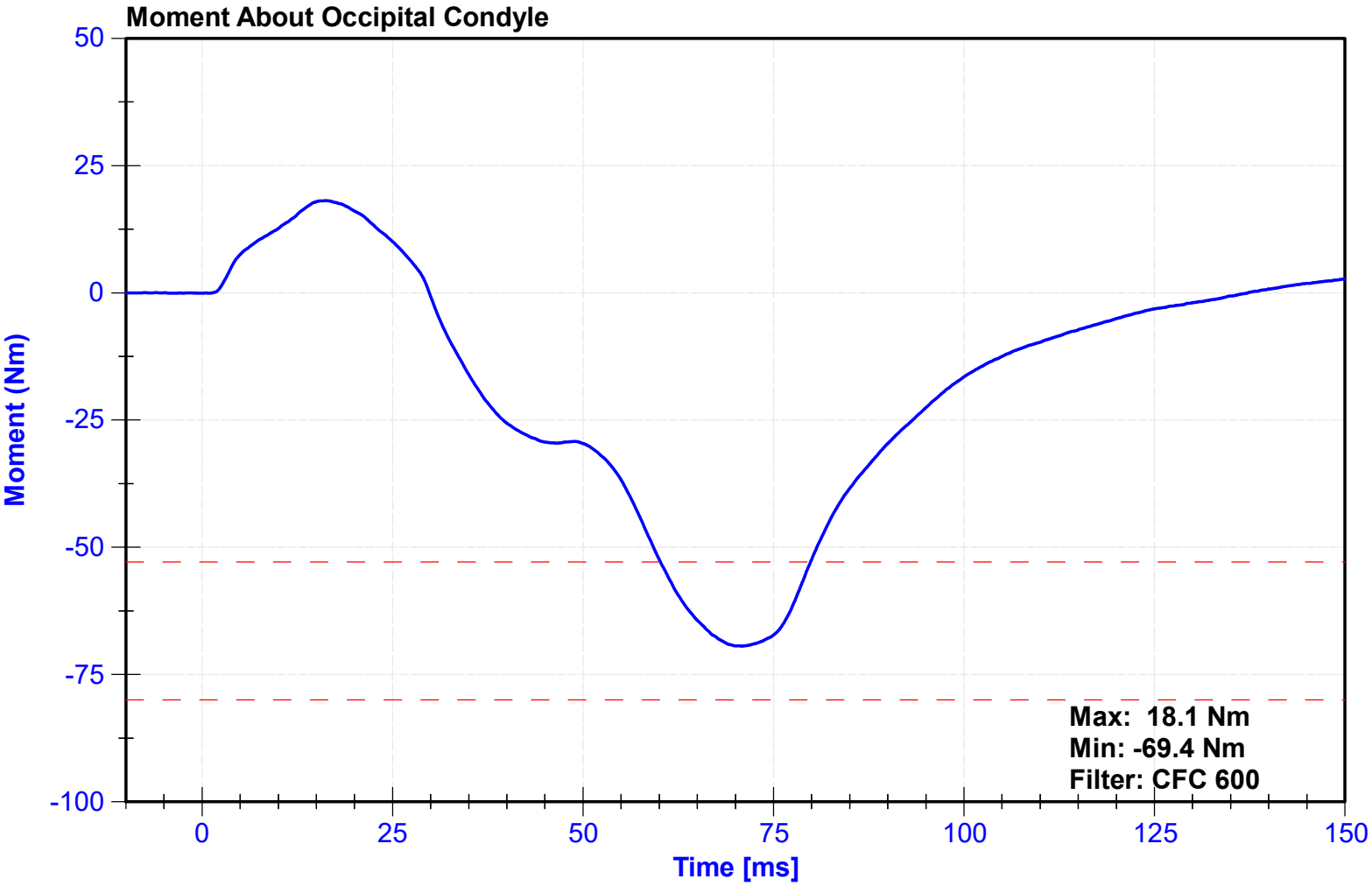
Results

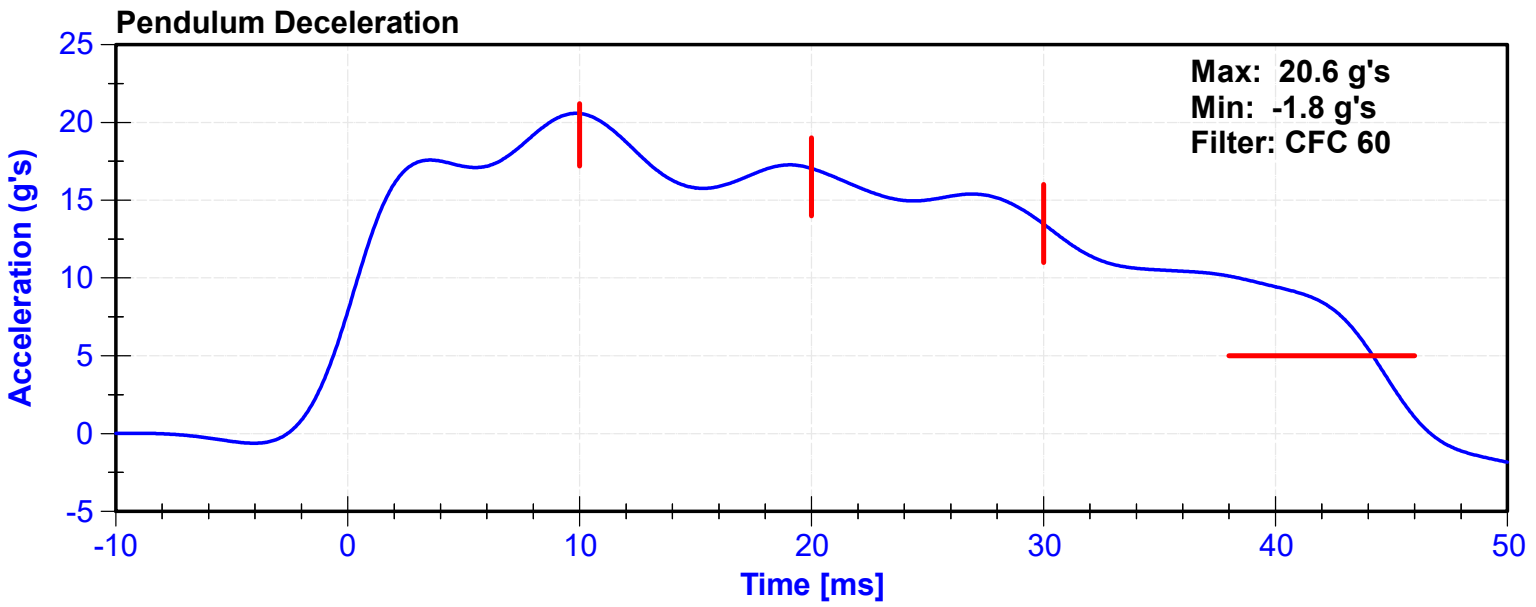
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	35.9	Pass
Velocity	5.94	6.19	m/s	6.055	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	20.57	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.0	Pass
Pendulum Deceleration at 30ms	11	16	g's	13.5	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	20.6	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	44.3	Pass
Maximum D Plane Rotation	81	106	deg	97.9	Pass
Time to Maximum Rotation	72	82	ms	78.3	Pass
Rotation Decay to Zero	147	174	ms	157.8	Pass
Minimum Moment About OC	-80	-52.9	Nm	-69.43	Pass
Time to Minimum Moment	65	79	ms	70.9	Pass
Moment Decay to Zero	120	148	ms	137.3	Pass

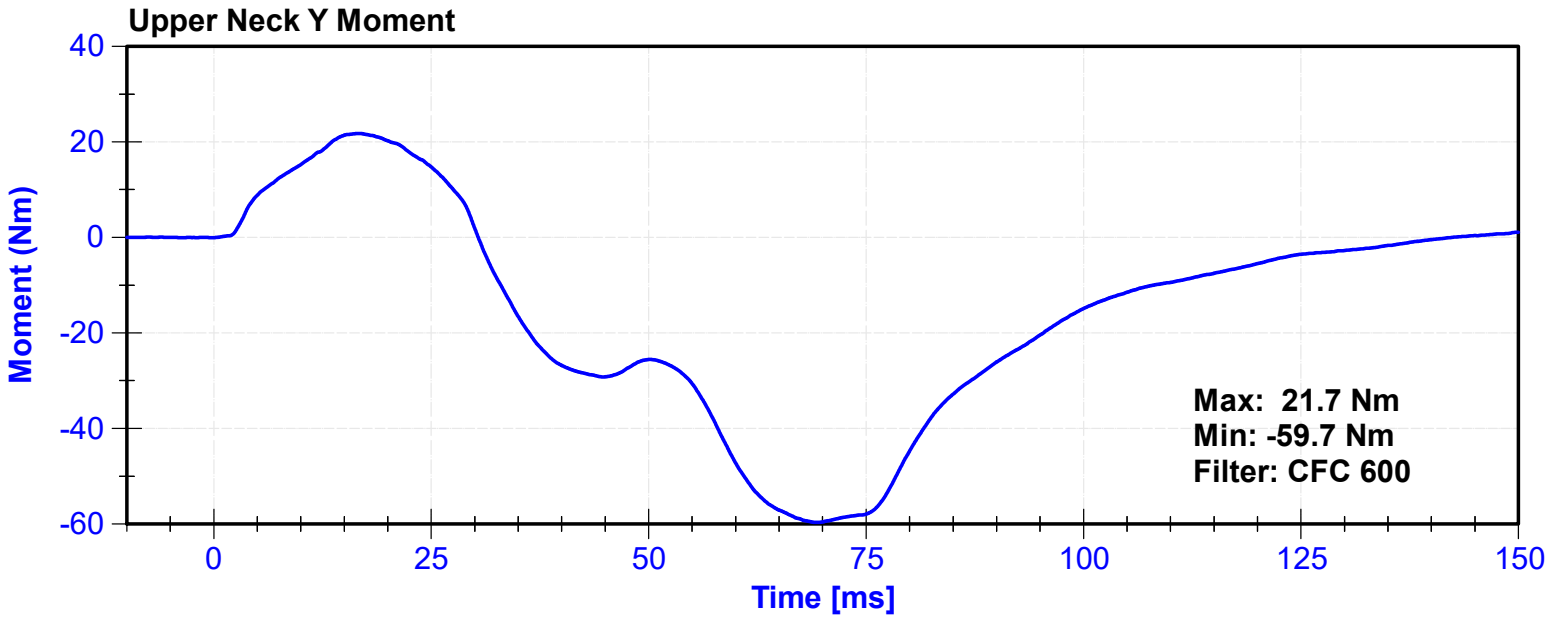
Transducer Calibrations

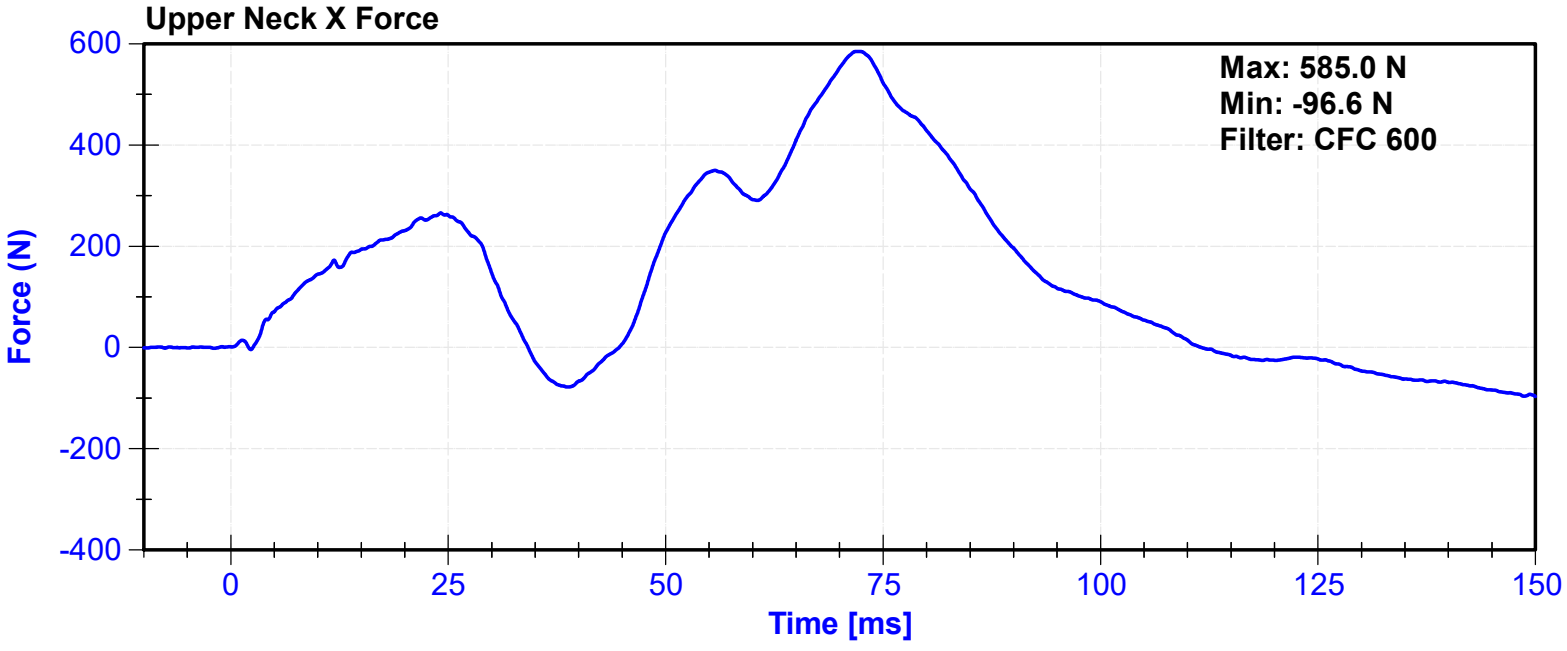
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Denton	2187-FX	6/13/2022	6/13/2023


D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 97.9 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: 18.1 Nm
Min: -69.4 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 20.6 g's
Min: -1.8 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: 21.7 Nm
Min: -59.7 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: 585.0 N
Min: -96.6 N
Filter: CFC 600
Force (N)
600
400
200
0
-200
-400
0
25
50
75
100
125
150
Time [ms]

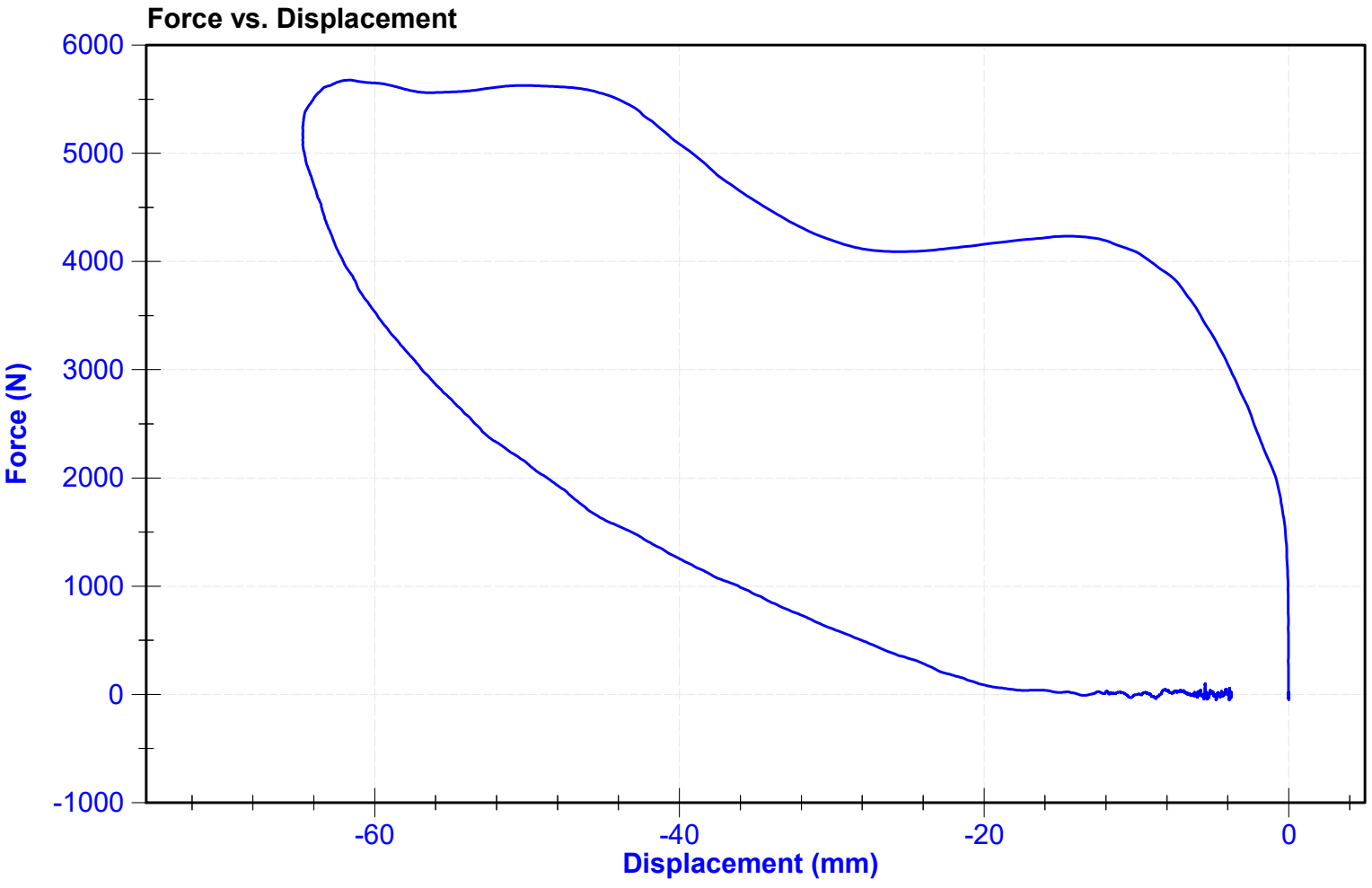
ATD Manufacturer	Humanetics	Test Technician	Z. Schneider
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

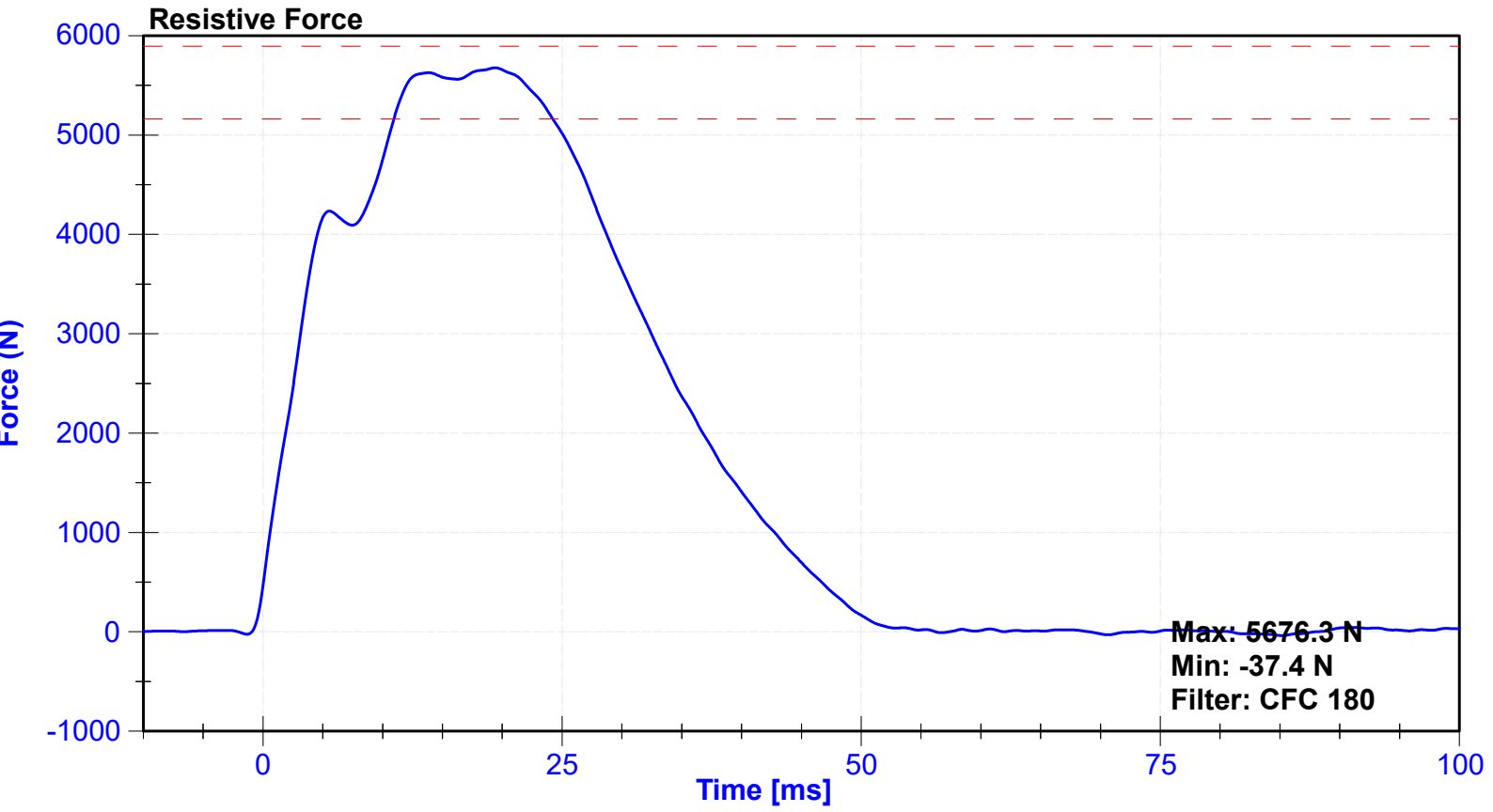
Results

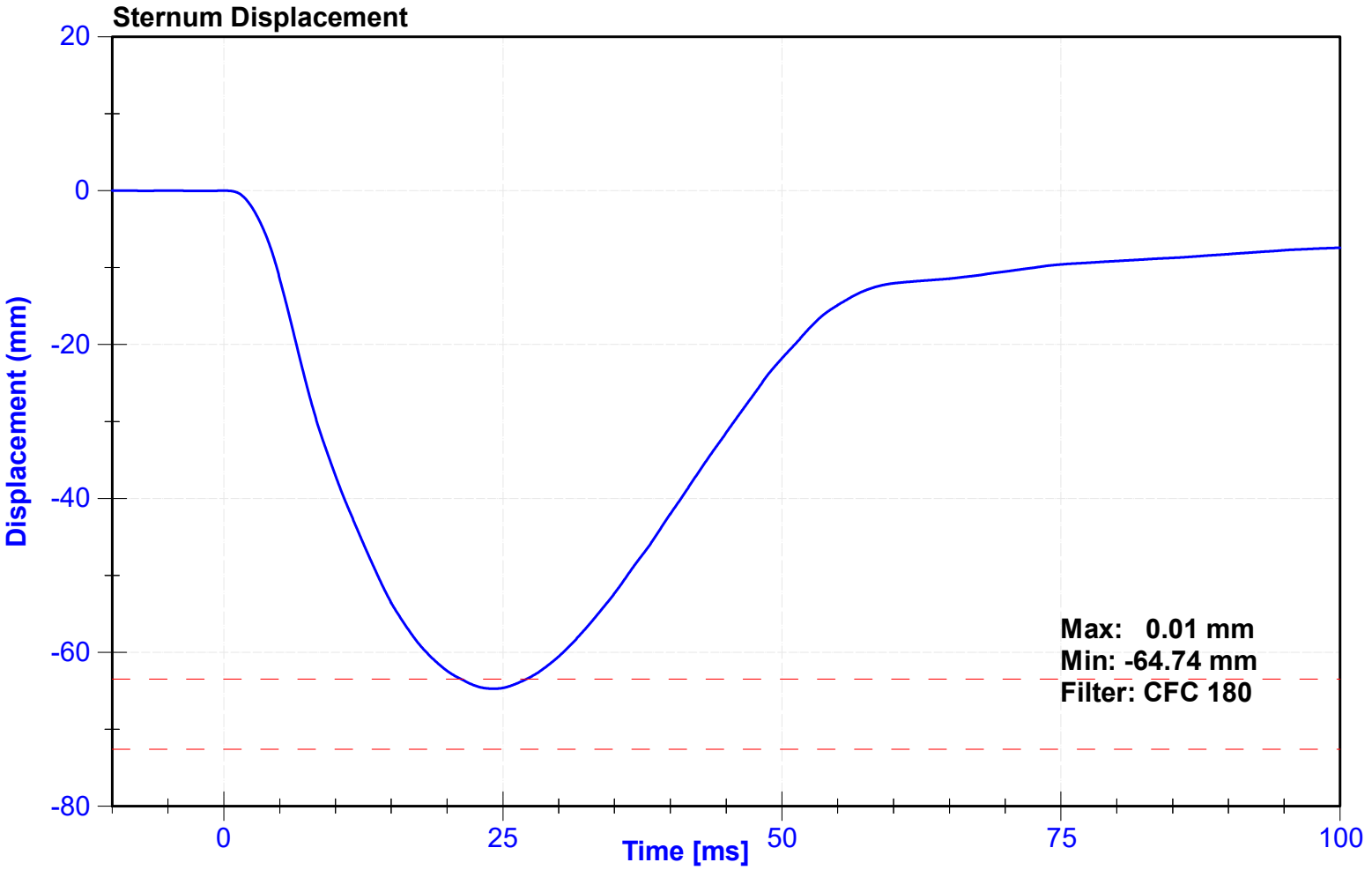
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	6.59	6.83	m/s	6.664	Pass
Chest Displacement	-72.6	-63.5	mm	-64.74	Pass
Resistive Force	5160	5894	N	5676.3	Pass
Hysteresis	69	85	%	74.2	Pass

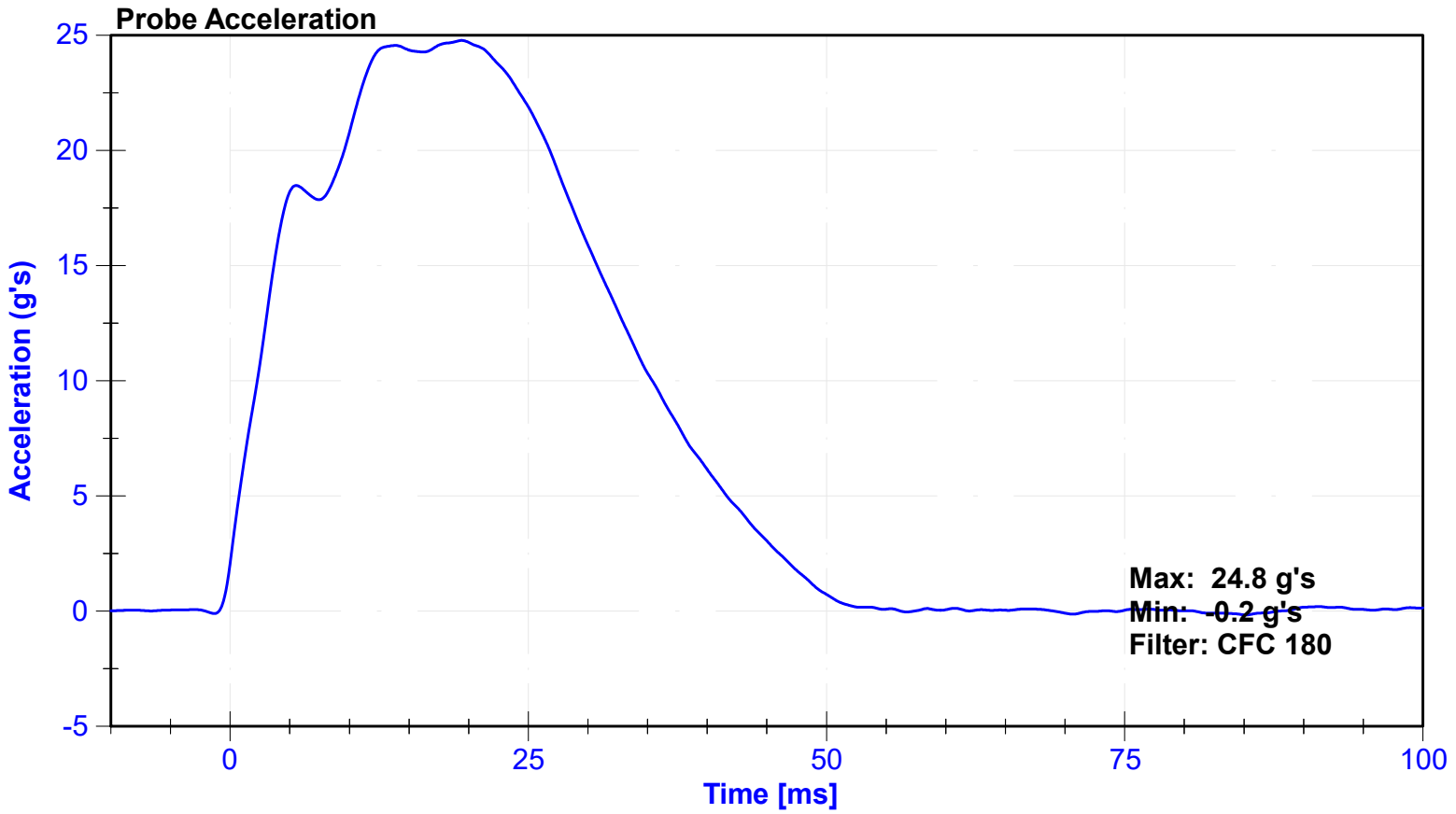
Transducer Calibrations

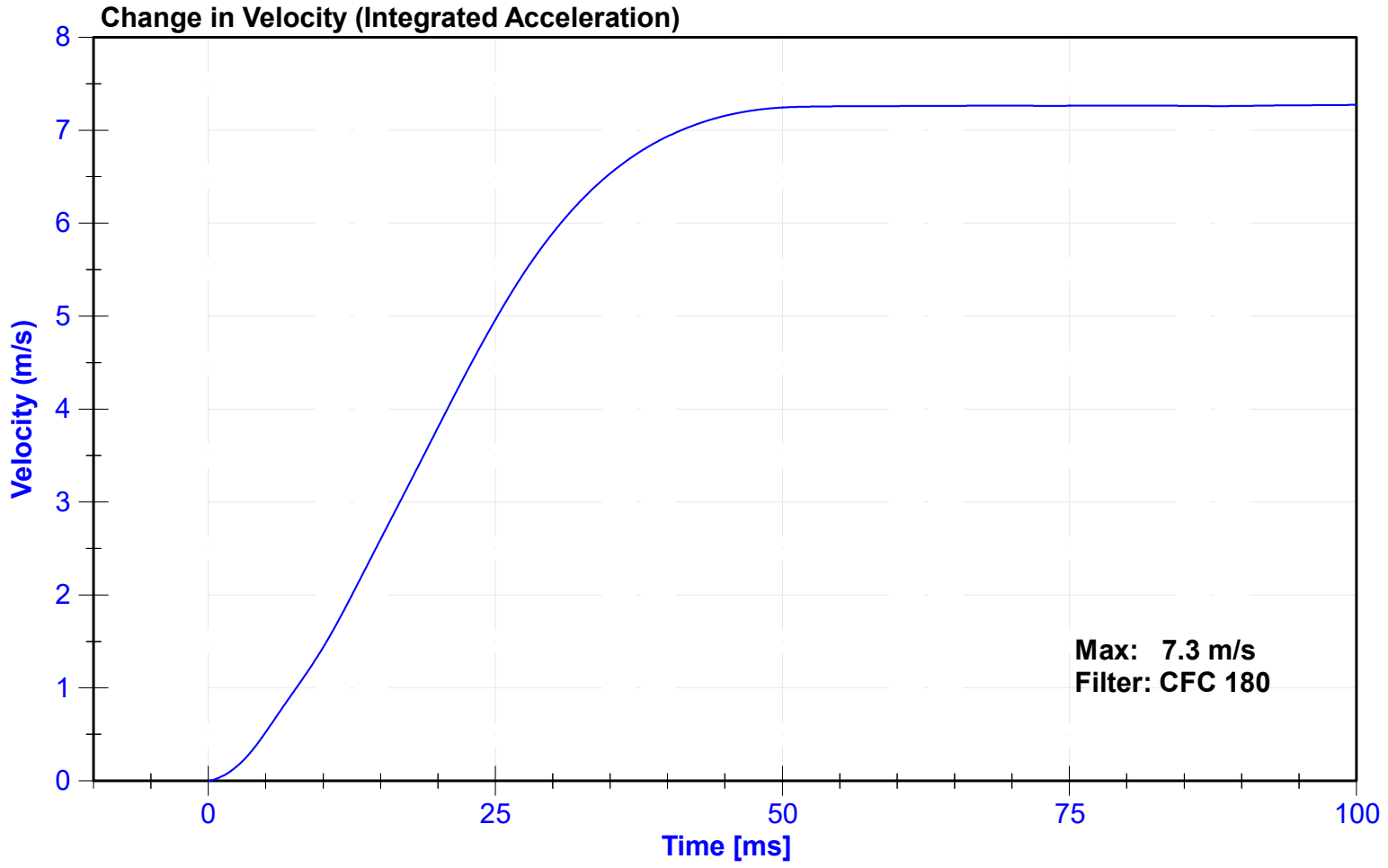
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Chest Potentiometer	JDK	0075	10/3/2022	4/3/2023




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
25
50
75
100
Time [ms]
Max: 5676.3 N
Min: -37.4 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
20
0
-20
-40
-60
-80
0
25
50
75
100
Time [ms]
Max: 0.01 mm
Min: -64.74 mm
Filter: CFC 180


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


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
25
50
75
100
Time [ms]
Max: 7.3 m/s
Filter: CFC 180

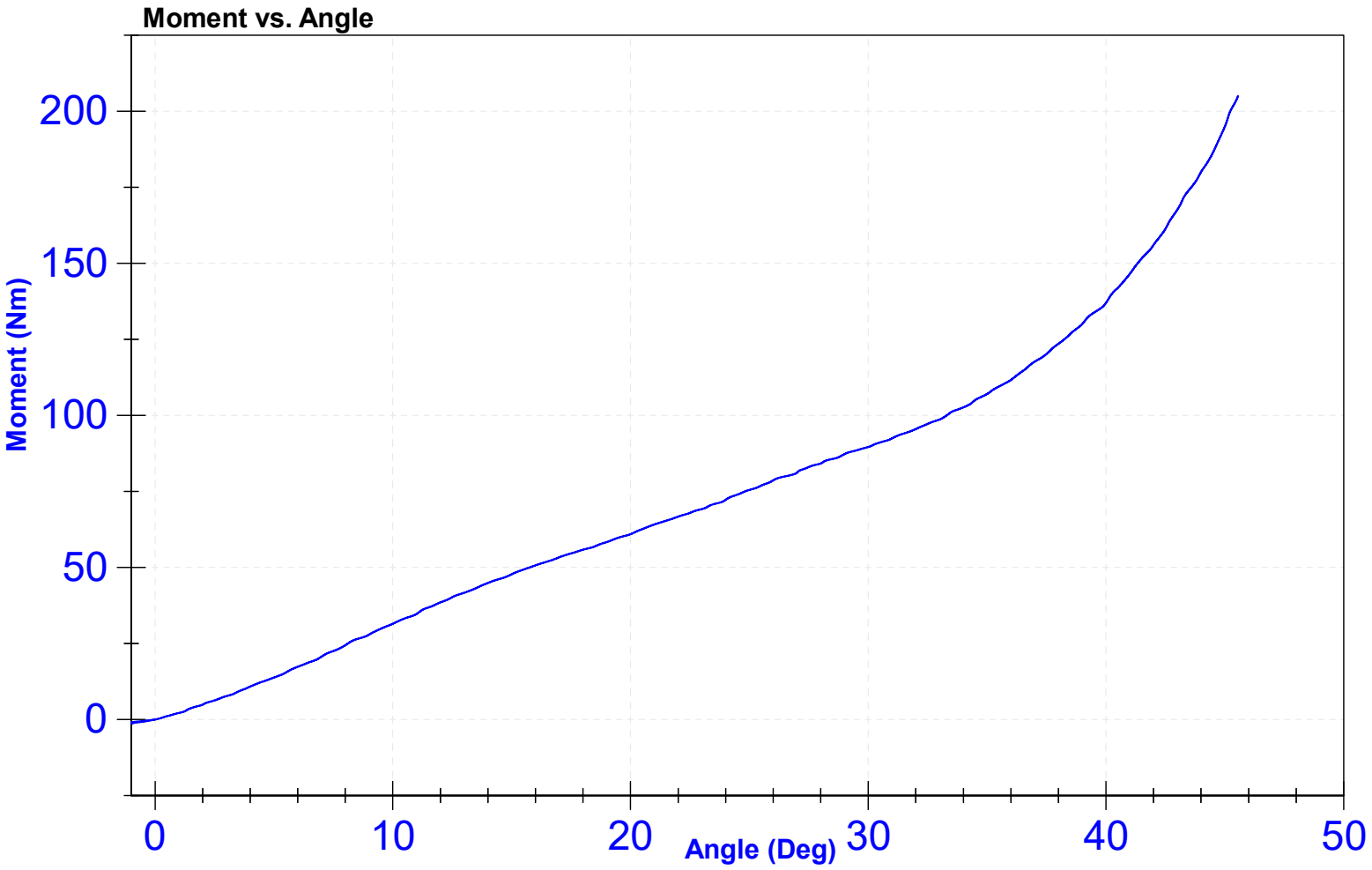
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	32.7	Pass
Average Velocity	5	10	deg/s	7.2	Pass
Angle at 203Nm	40	50	deg	45.4	Pass
Moment at 30 degrees	0	94.9	Nm	89.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	10/4/2022	10/4/2023
Load Cell	PCB 2301-02	2301-02_115	2022-09-06	2023-09-06



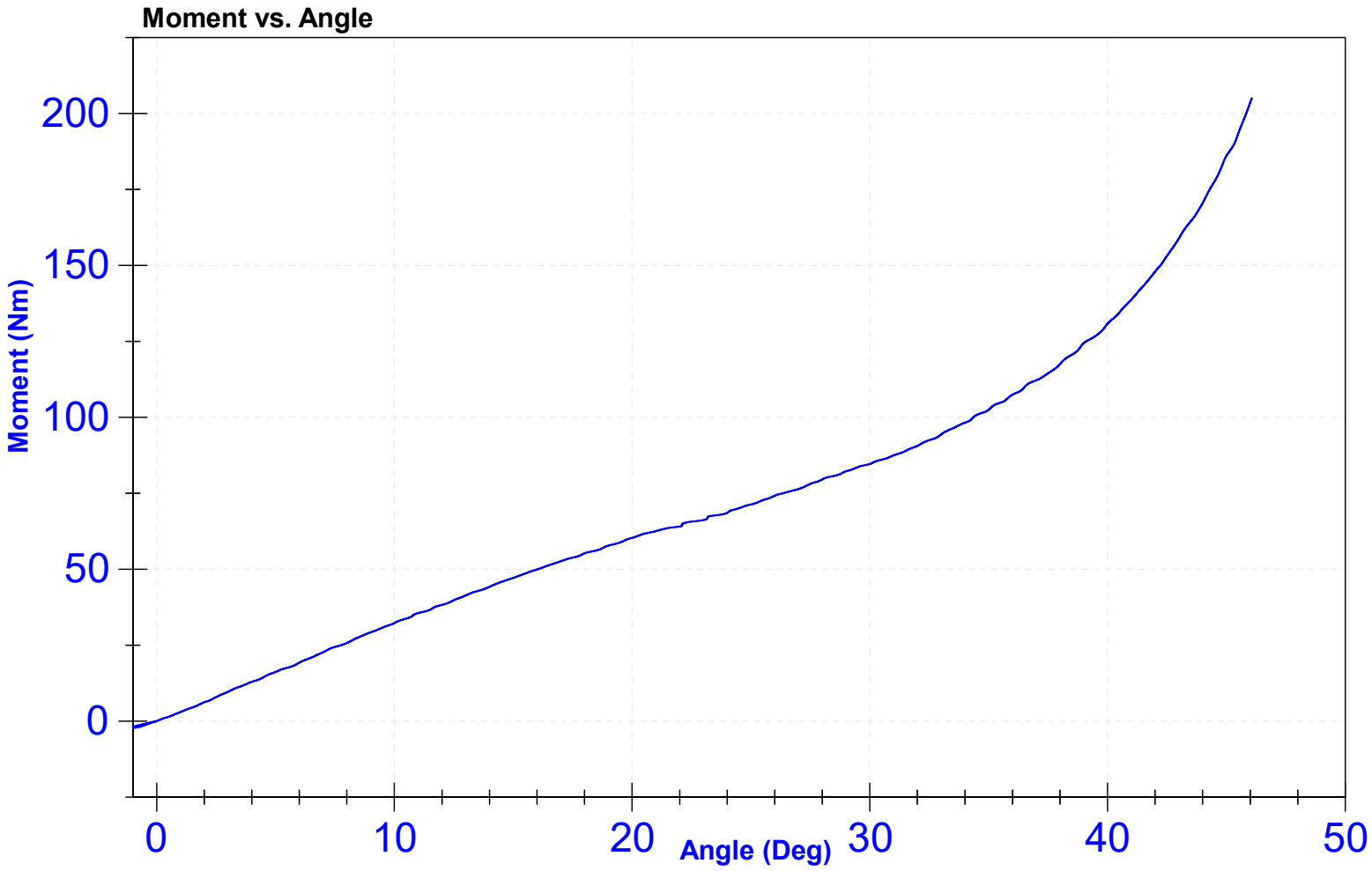
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	32.7	Pass
Average Velocity	5	10	deg/s	7.3	Pass
Angle at 203Nm	40	50	deg	46.0	Pass
Moment at 30 degrees	0	94.9	Nm	84.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	10/4/2022	10/4/2023
Load Cell	PCB 2301-02	2301-02_115	2022-09-06	2023-09-06



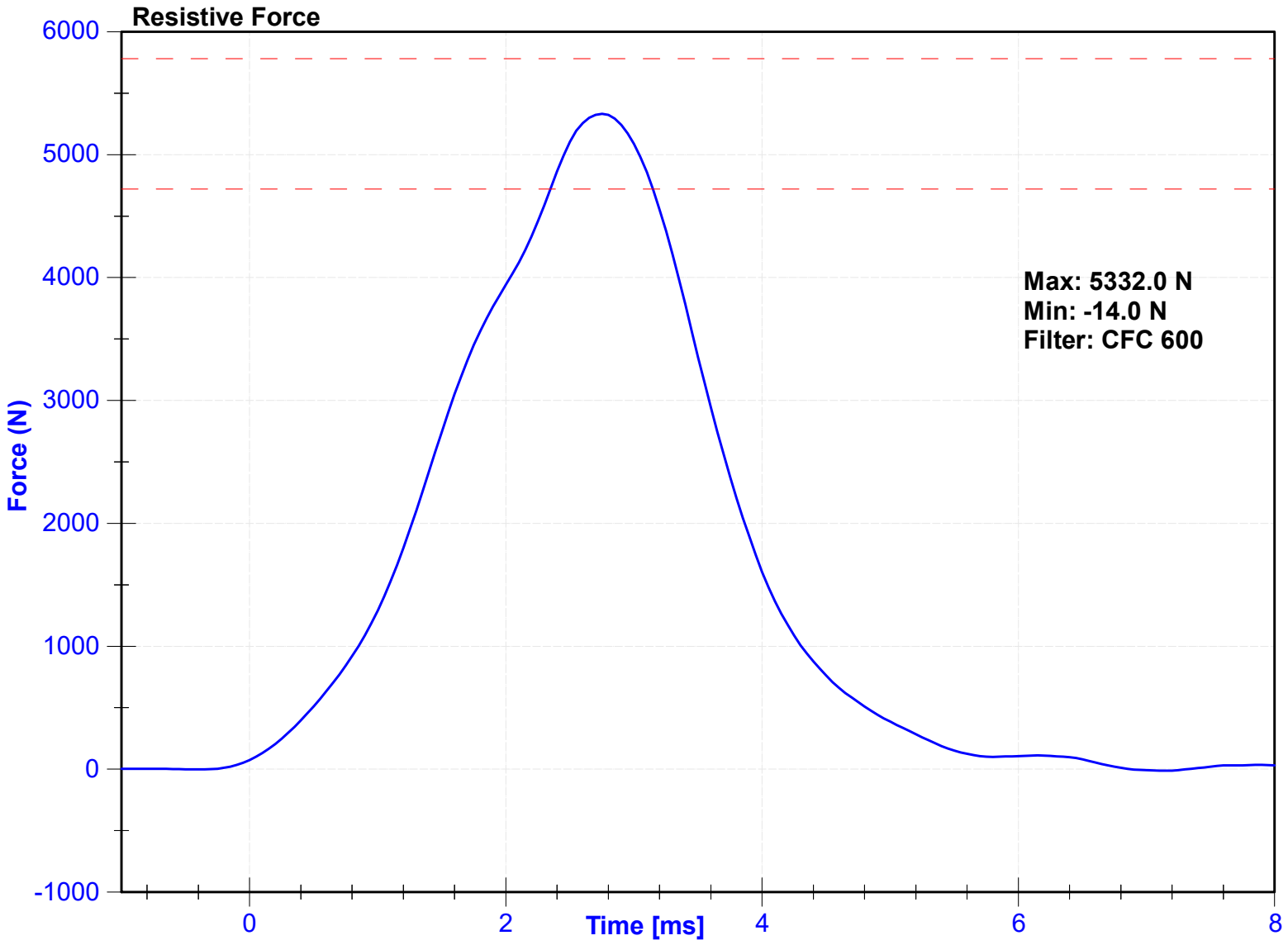
ATD Manufacturer	Humanetics	Test Technician	D. Kroll
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

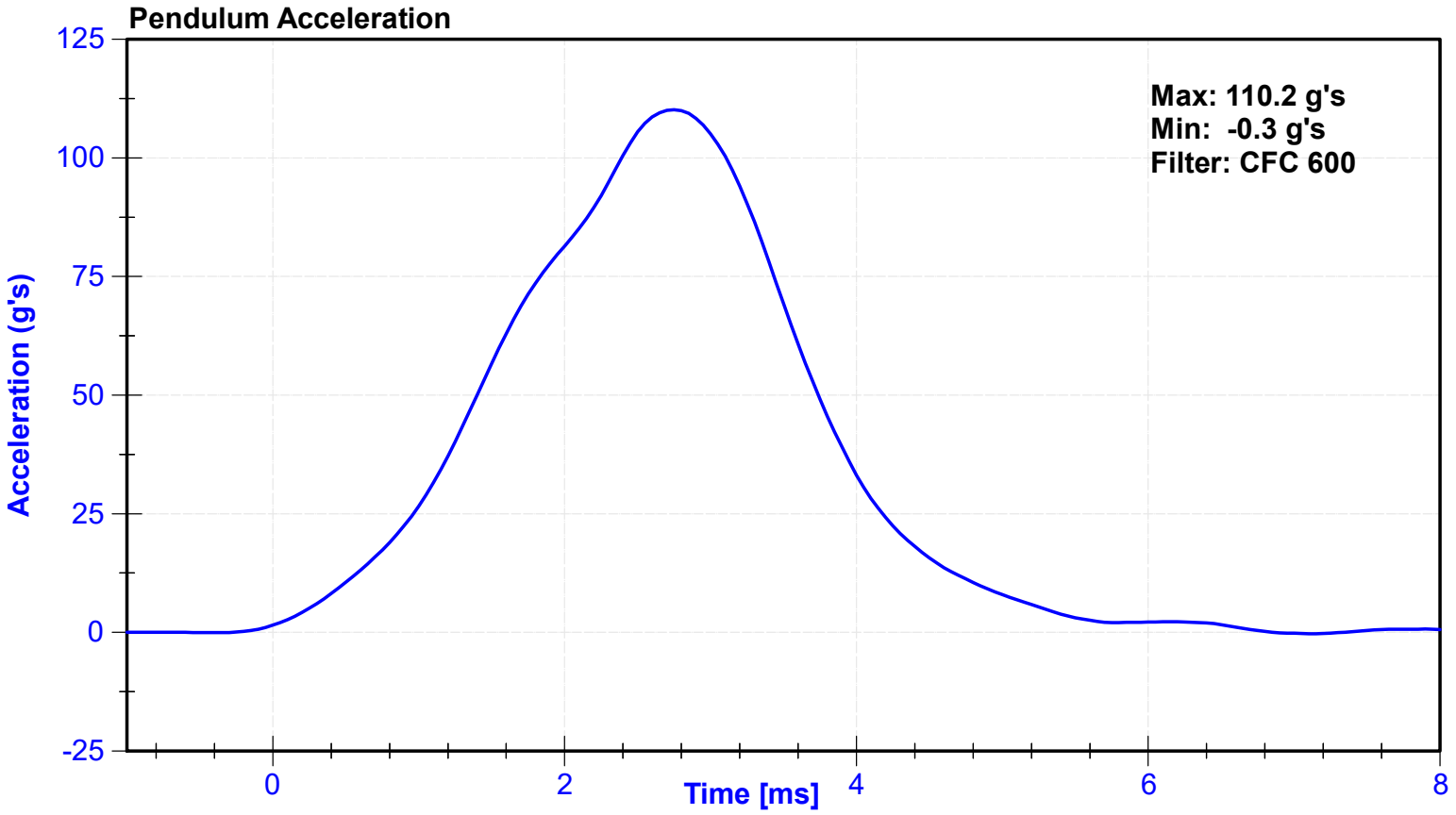
Results

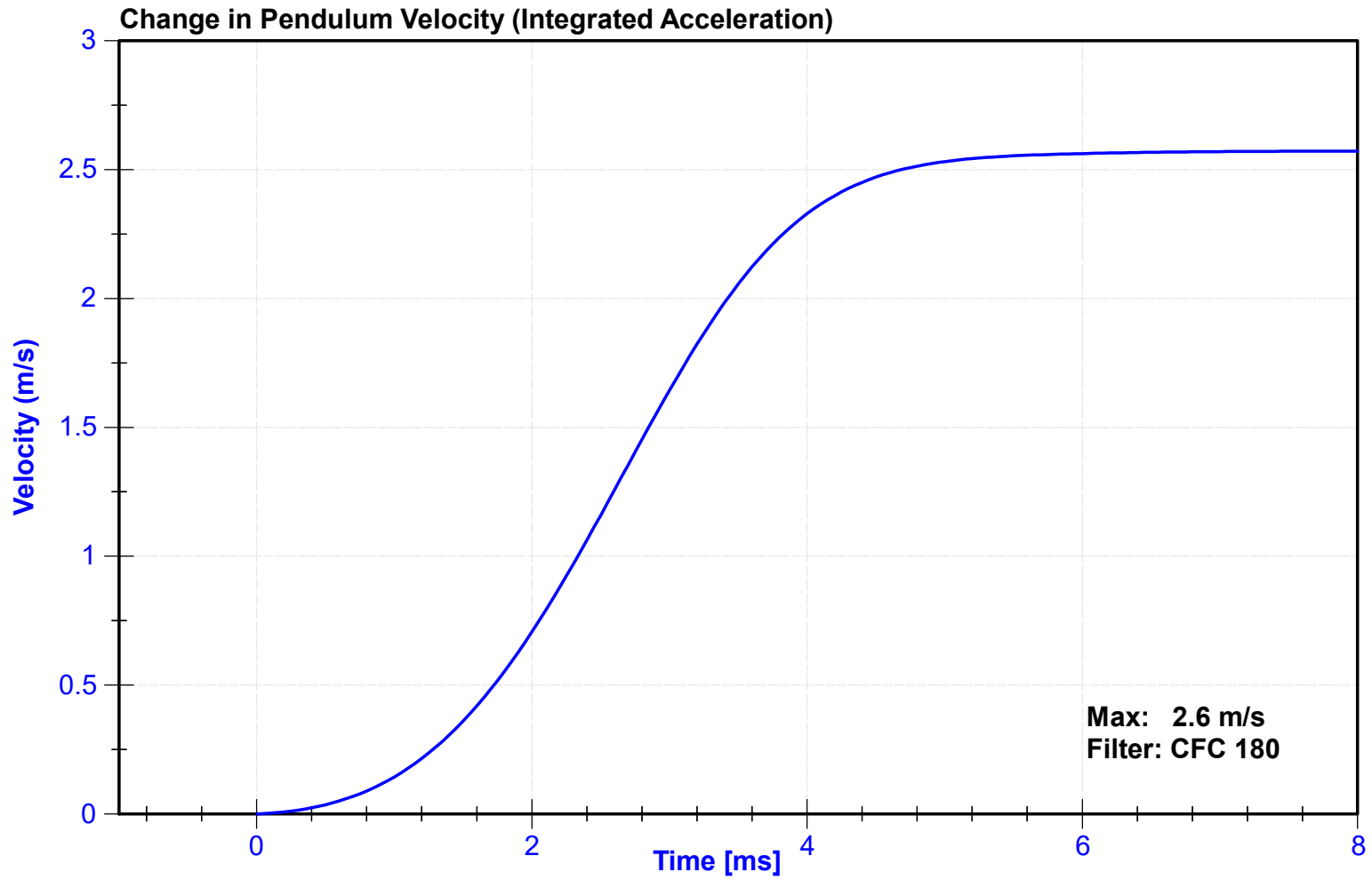
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	32.6	Pass
Velocity	2.07	2.13	m/s	2.088	Pass
Maximum Resistive Force	4720	5780	N	5332.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Max: 110.2 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: 2.6 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]

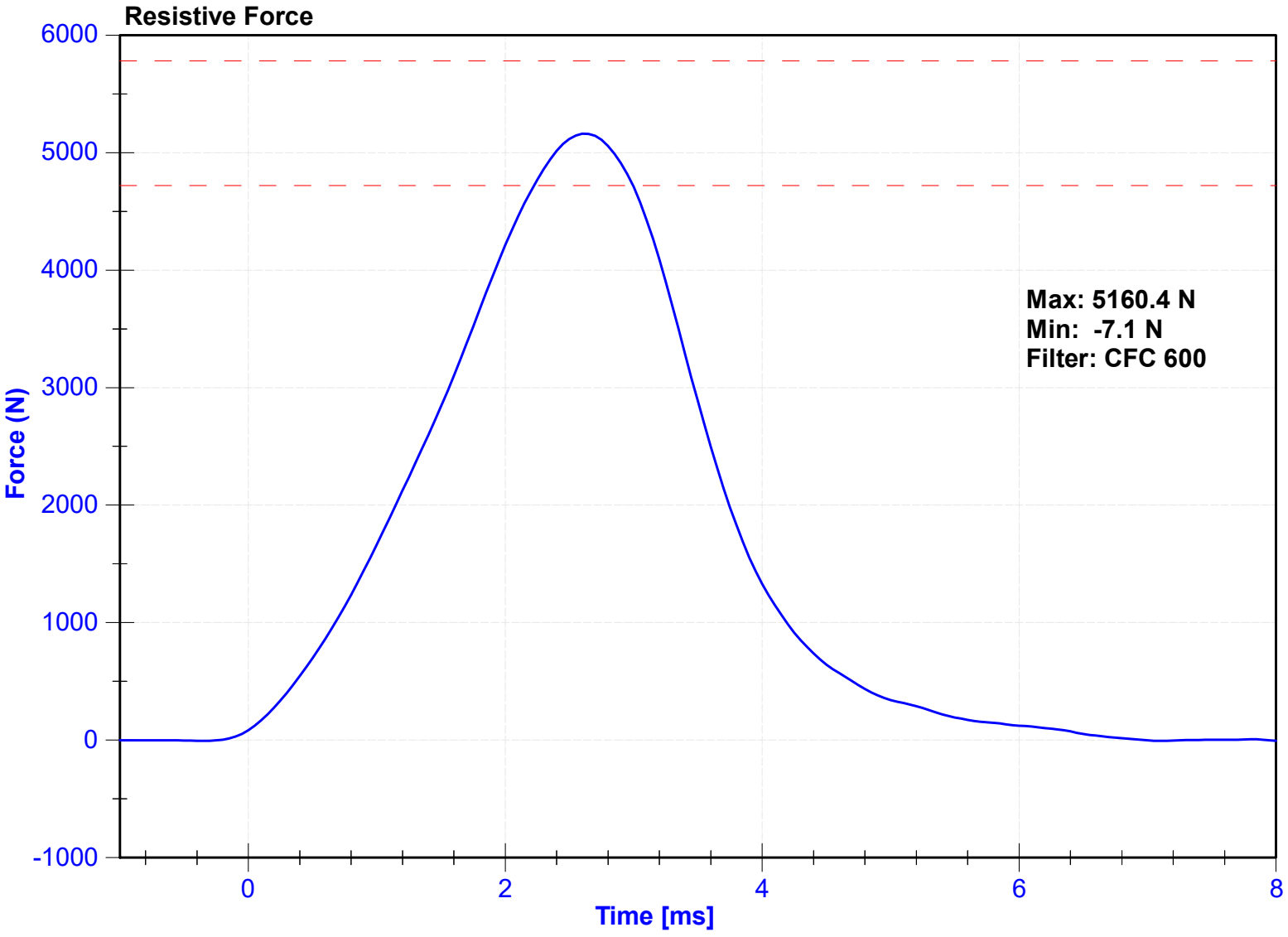
ATD Manufacturer	Humanetics	Test Technician	D. Kroll
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

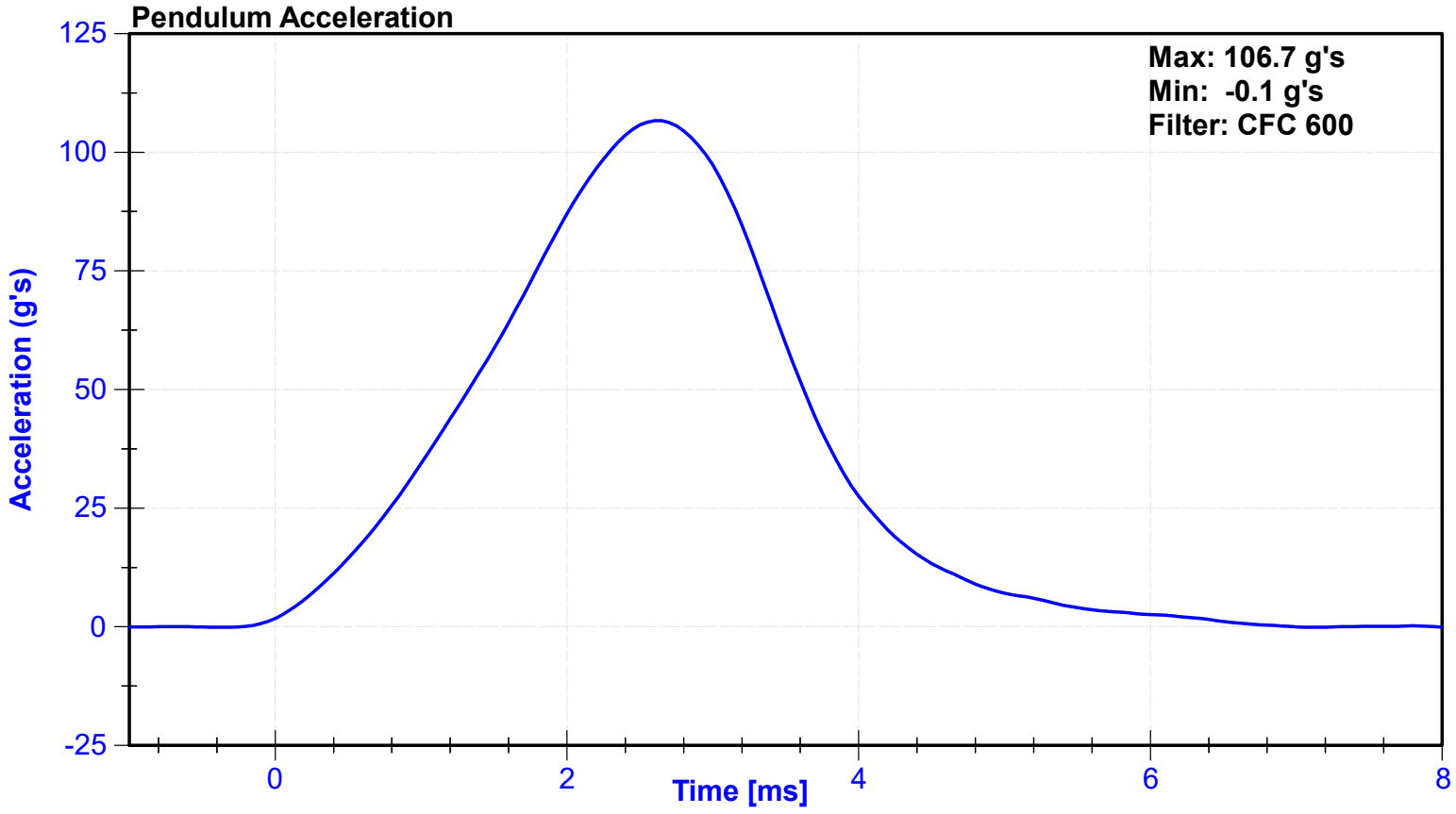
Results

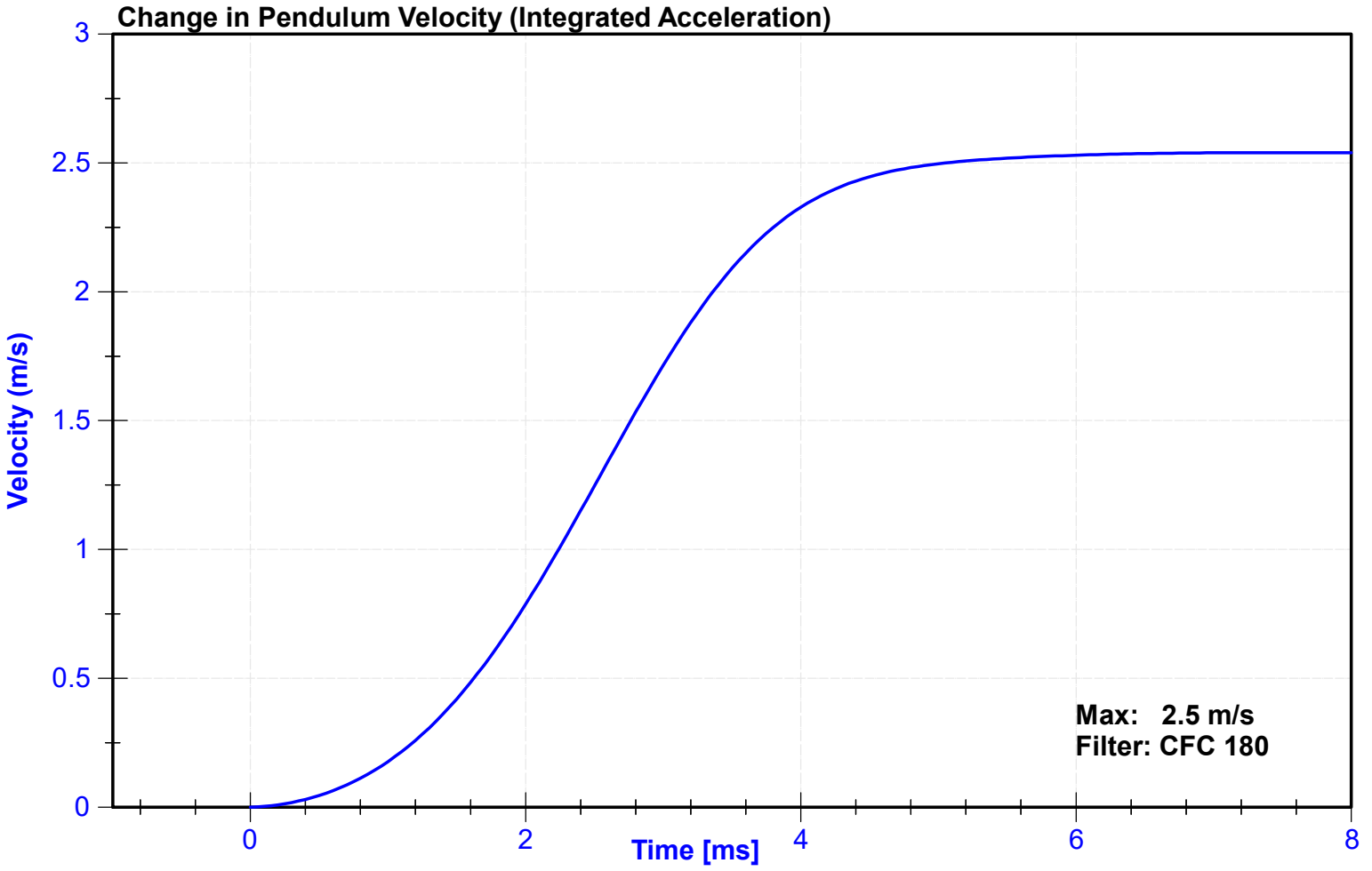
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	32.6	Pass
Velocity	2.07	2.13	m/s	2.080	Pass
Maximum Resistive Force	4720	5780	N	5160.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Max: 106.7 g's
Min: -0.1 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


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

CALIBRATION TEST RESULTS

PRE-TEST

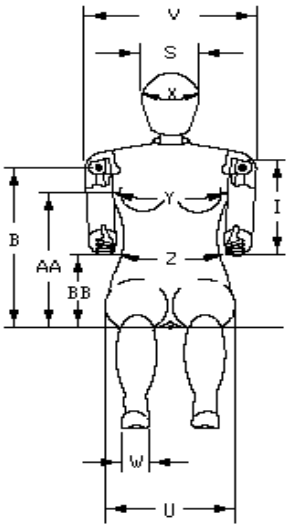
HYBRID III 5TH PERCENTILE - PASSENGER ATD

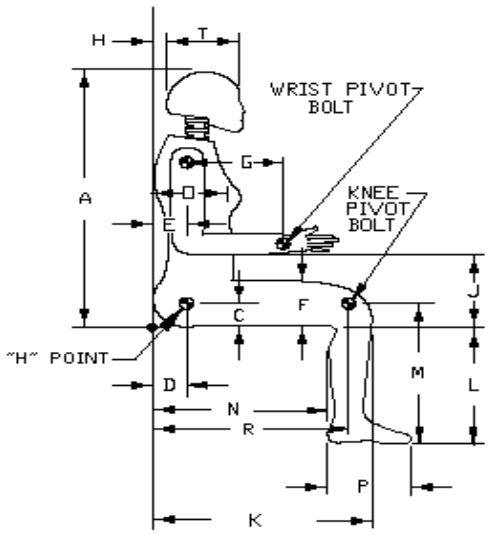
SERIAL NO: 137

External Measurements - Hybrid 3 - 5th Female

Technician: K. Brogan Date: 12/14/2022

Dummy Serial Number: 137





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	791	Pass
B	Shoulder Pivot Height	432	457	445	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	75	Pass
F	Thigh Clearance	119	135	129	Pass
G	Back of Elbow to Wrist Pivot	244	259	251	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	287	Pass
J	Elbow Rest Height	183	203	195	Pass
K	Buttock to Knee Length	521	546	534	Pass
L	Popliteal Height	356	376	369	Pass
M	Knee Pivot Height	394	419	407	Pass
N	Buttock Popliteal Length	414	439	425	Pass
O	Chest Depth without Jacket	175	191	182	Pass
P	Foot Length (right)	219	234	228	Pass
R	Buttock To Knee Pivot Length	457	483	465	Pass
S	Head Breadth	137	147	143	Pass
T	Head Depth	178	188	180	Pass
U	Hip Breadth	300	315	310	Pass
V	Shoulder Breadth	351	366	359	Pass
W	Foot Breadth	79	94	85	Pass
X	Head Circumference	528	549	540	Pass
Y	Chest Circumference with Jacket	851	881	872	Pass
Z	Waist Circumference	460	790	652	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	163	Pass

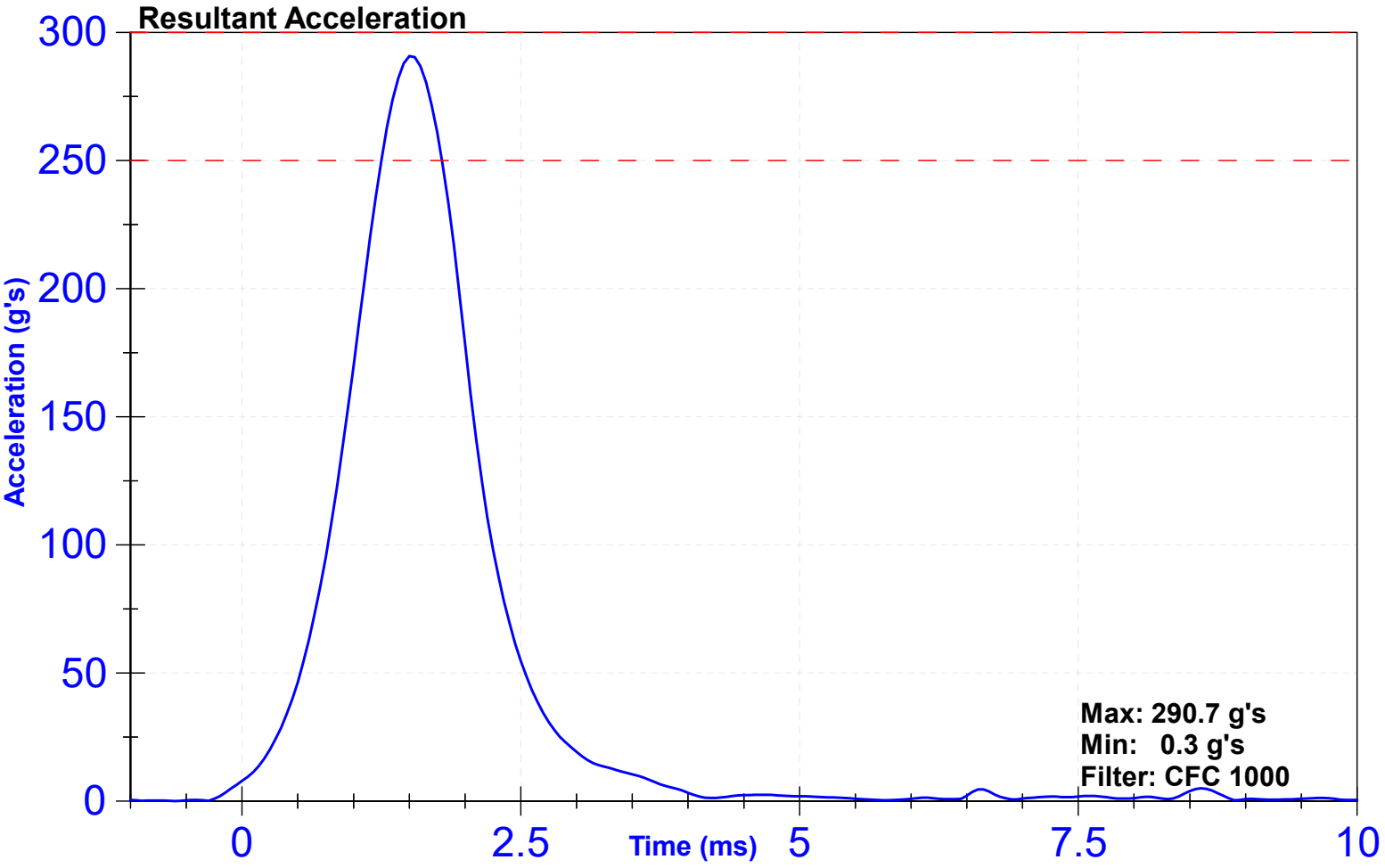
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	137	Laboratory Supervisor	C. Mantell

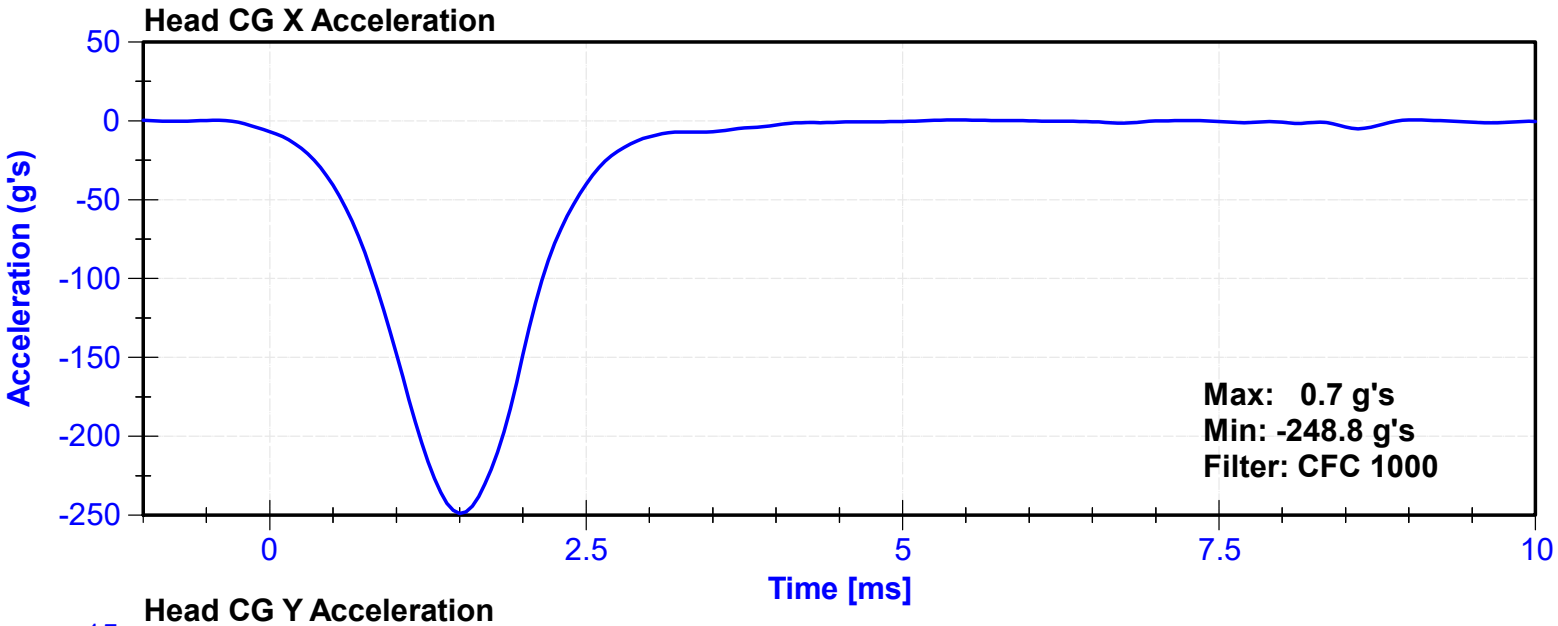
Results

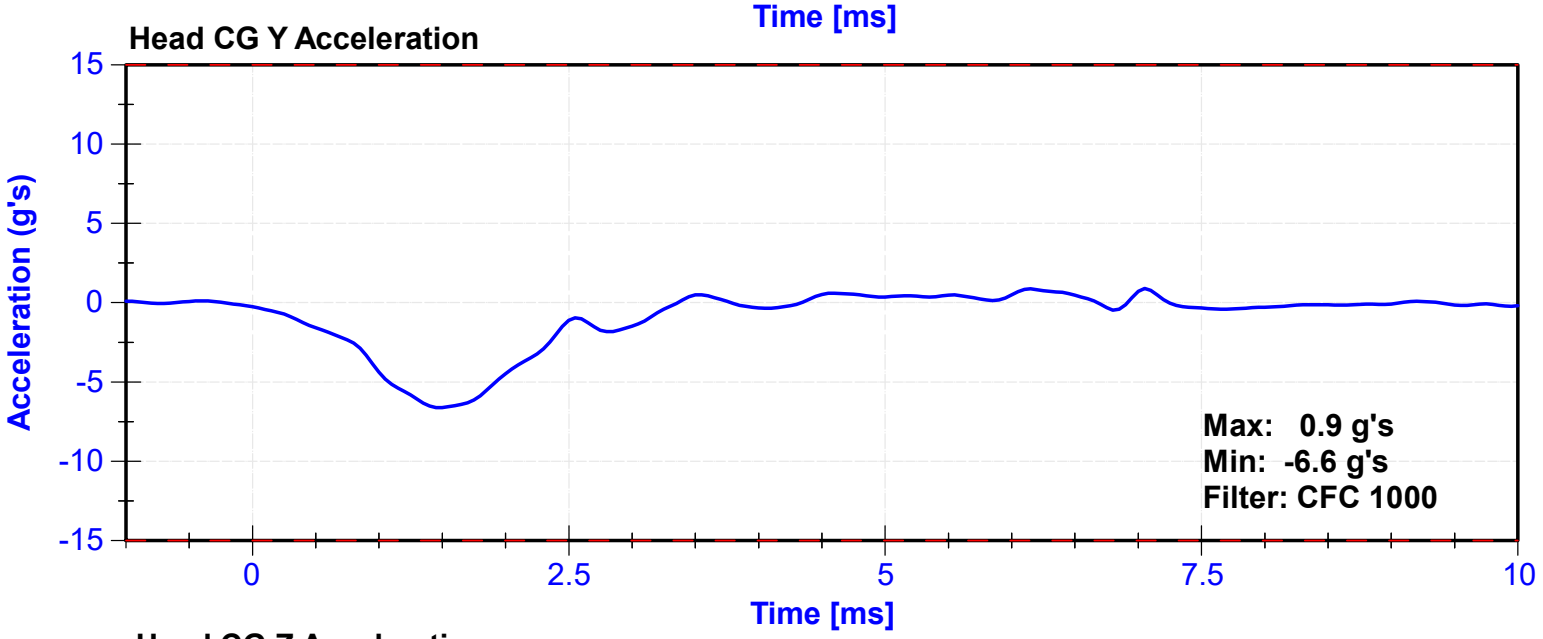
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21.4	Pass
Humidity	10	70	%	37.6	Pass
Resultant Acceleration	250	300	g's	290.7	Pass
Oscillation	0	10	%	1.7	Pass
Lateral Acceleration	-15	15	g's	-6.6	Pass

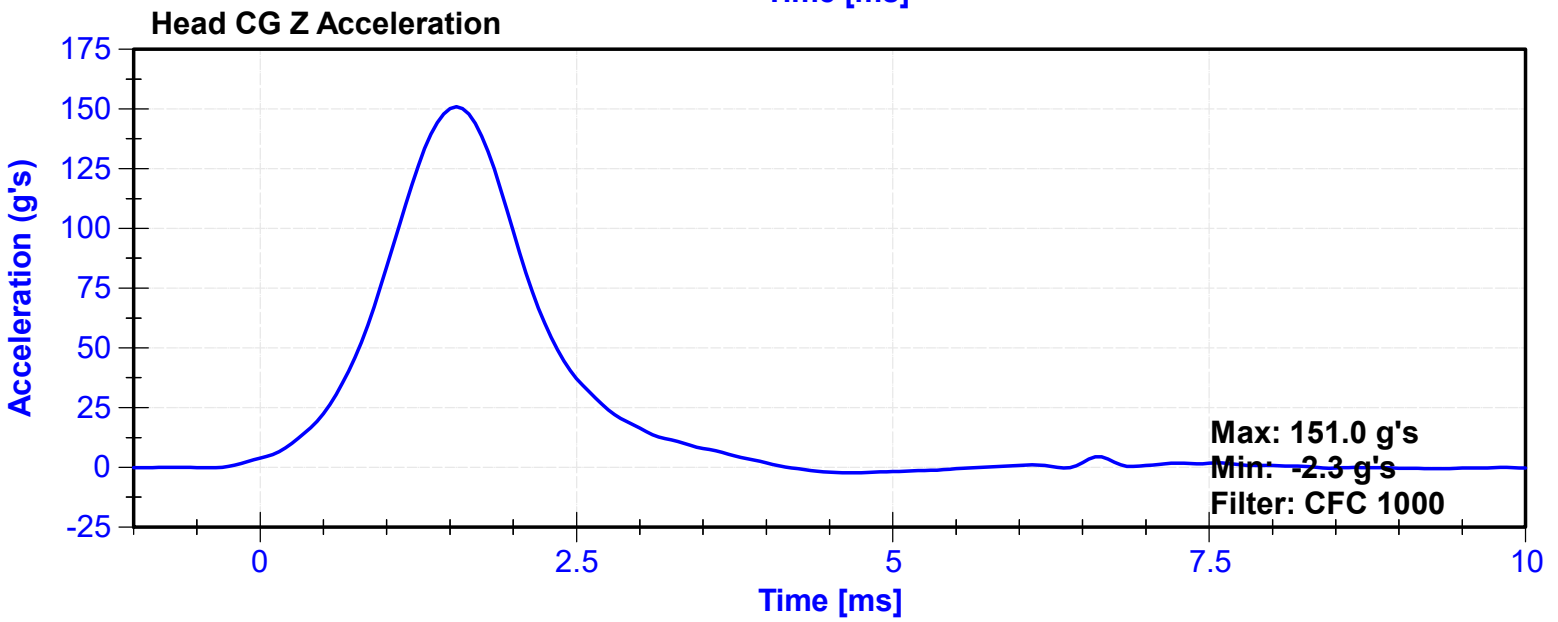
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P79417	7/18/2022	1/14/2023
Y Accelerometer	Endevco	P83335	7/18/2022	1/14/2023
Z Accelerometer	Endevco	P64149	12/12/2022	6/10/2023




Head CG X Acceleration
Acceleration (g's)
50
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 0.7 g's
Min: -248.8 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: 0.9 g's
Min: -6.6 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: 151.0 g's
Min: -2.3 g's
Filter: CFC 1000

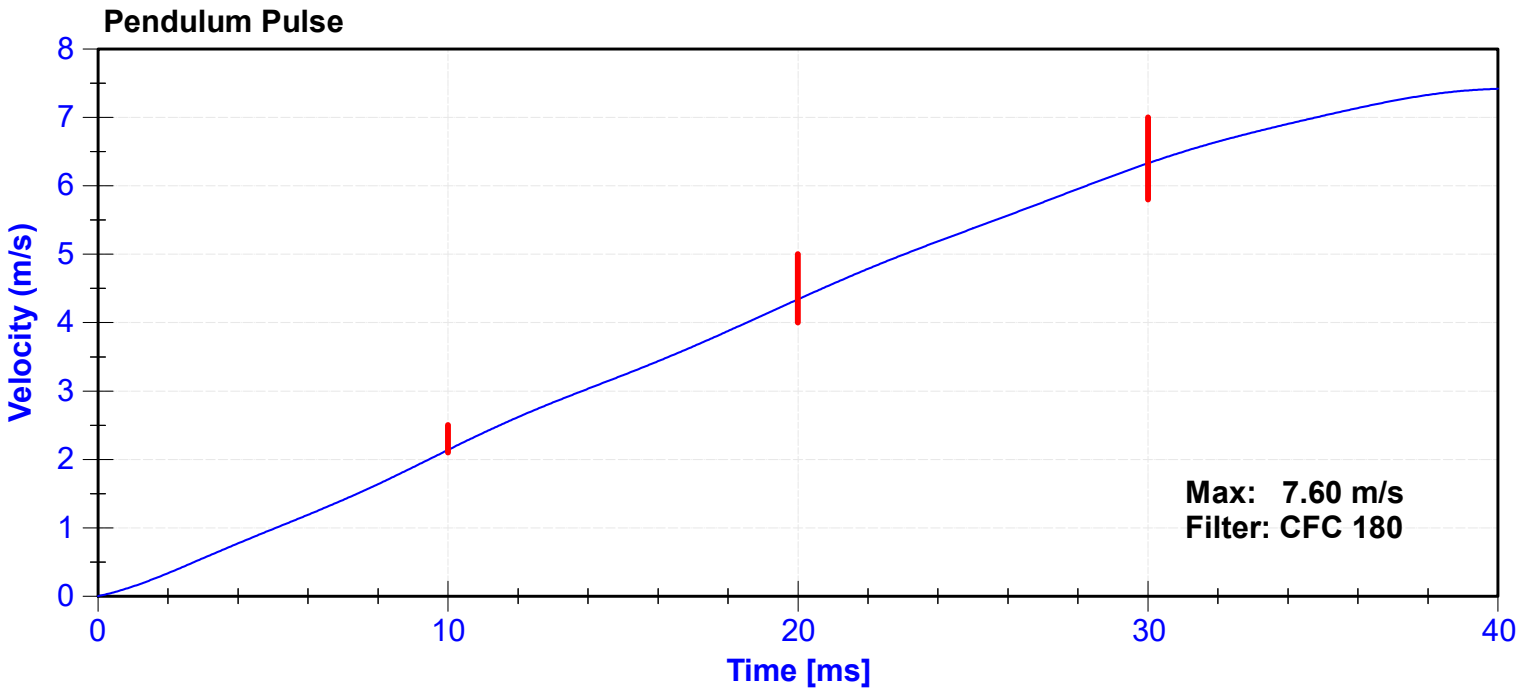
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

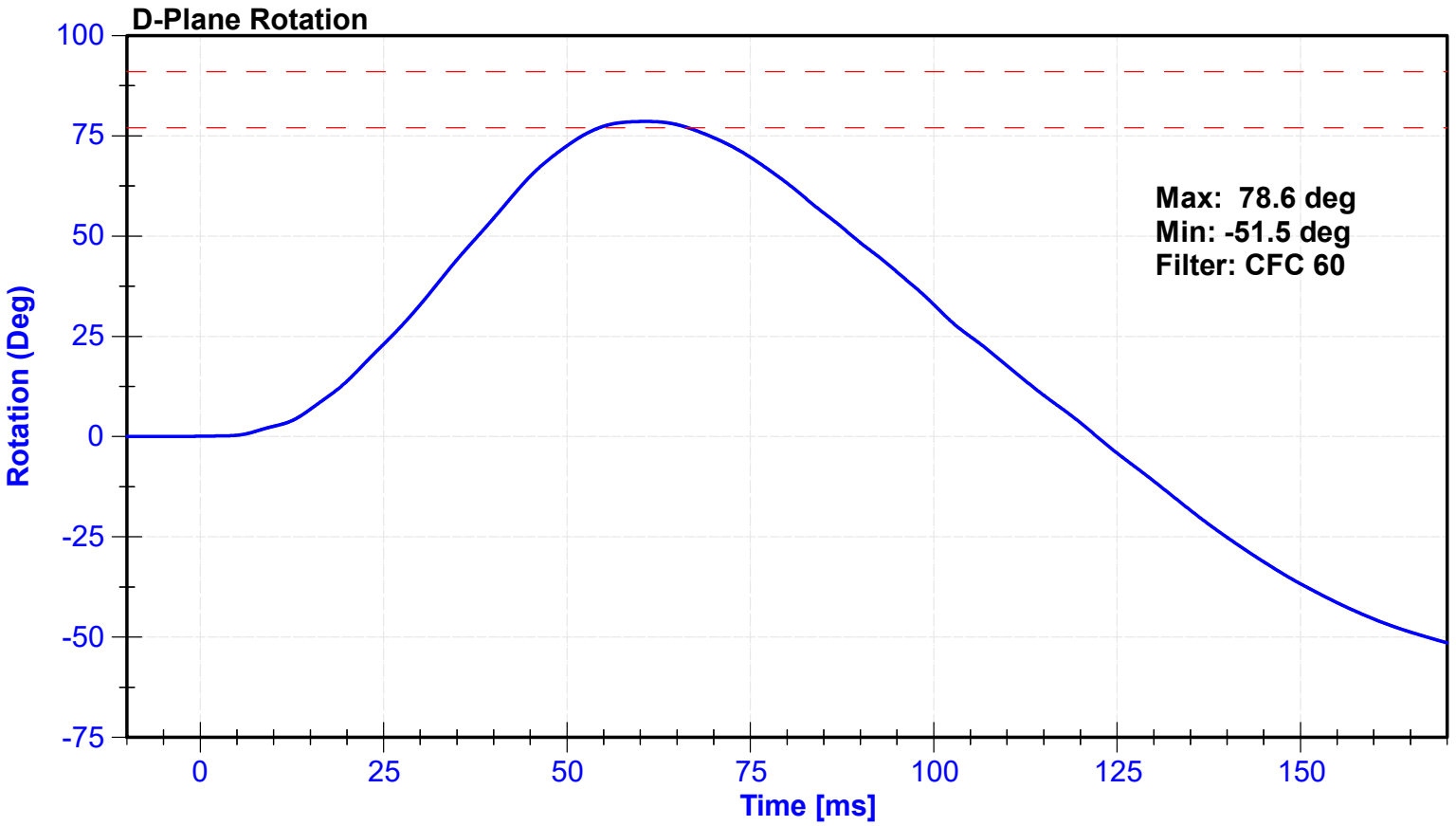
Results

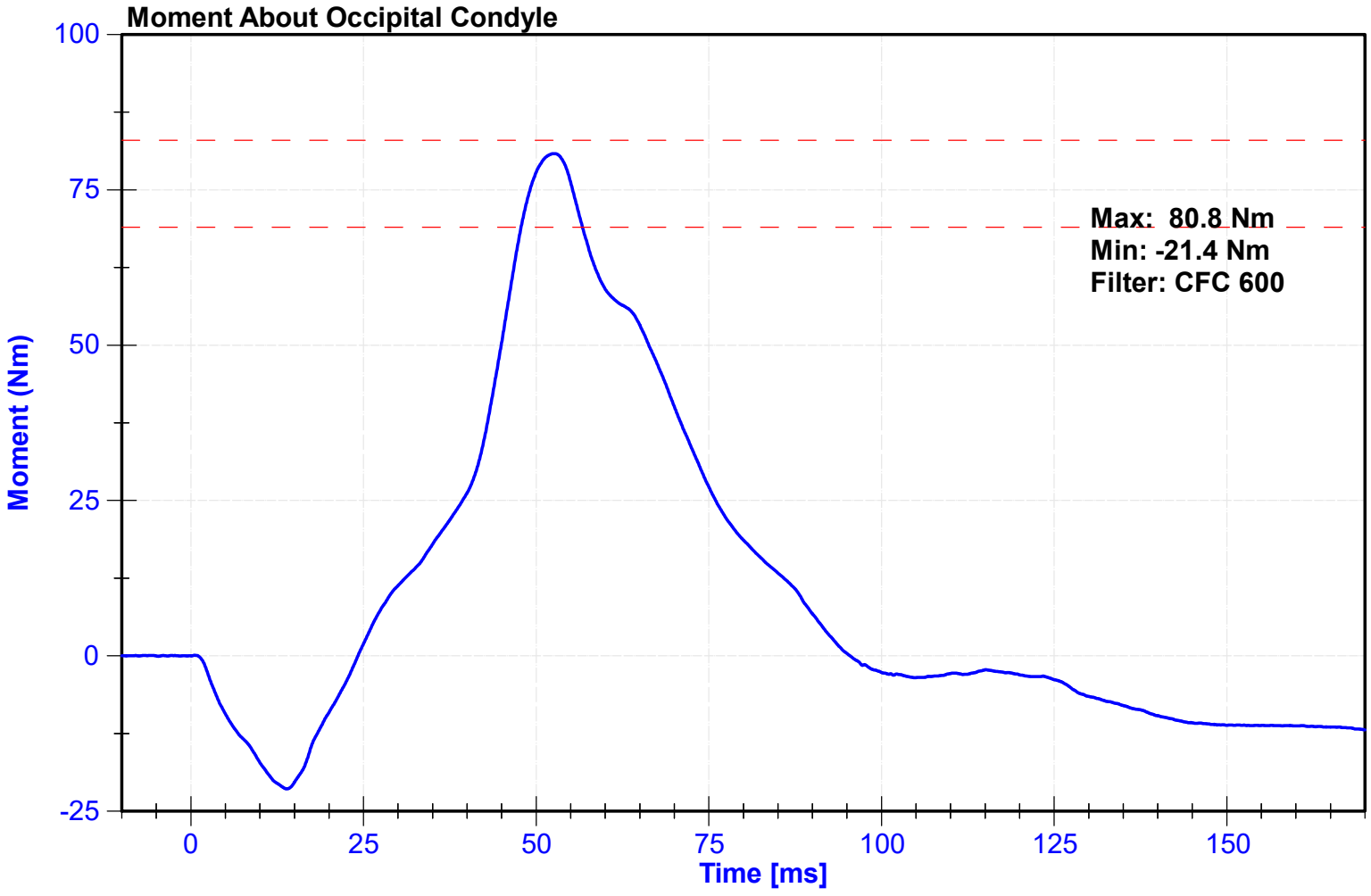
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	25.5	Pass
Velocity	6.89	7.13	m/s	7.063	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.14	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.34	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.33	Pass
Max D Plane Rotation	77	91	deg	78.6	Pass
Max Moment During Rotation Interval	69	83	Nm	80.8	Pass
Moment Decay to 10.0 Nm	80	100	ms	88.1	Pass

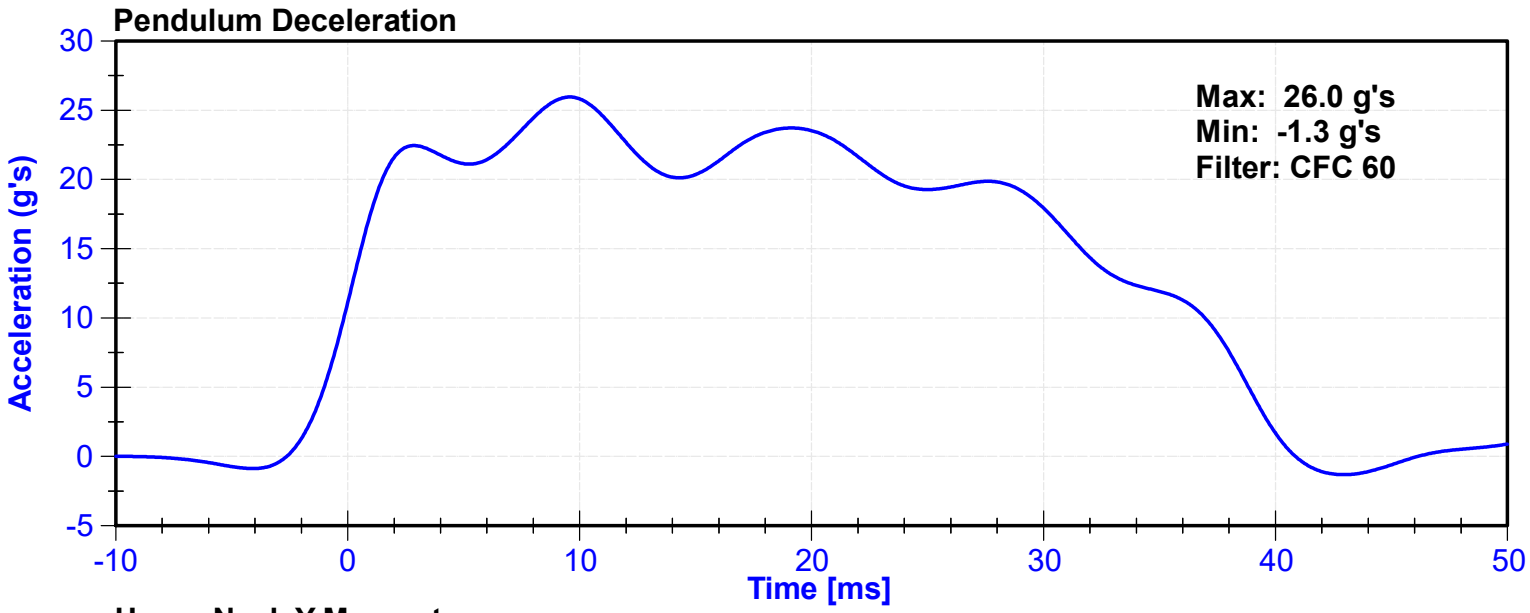
Transducer Calibrations

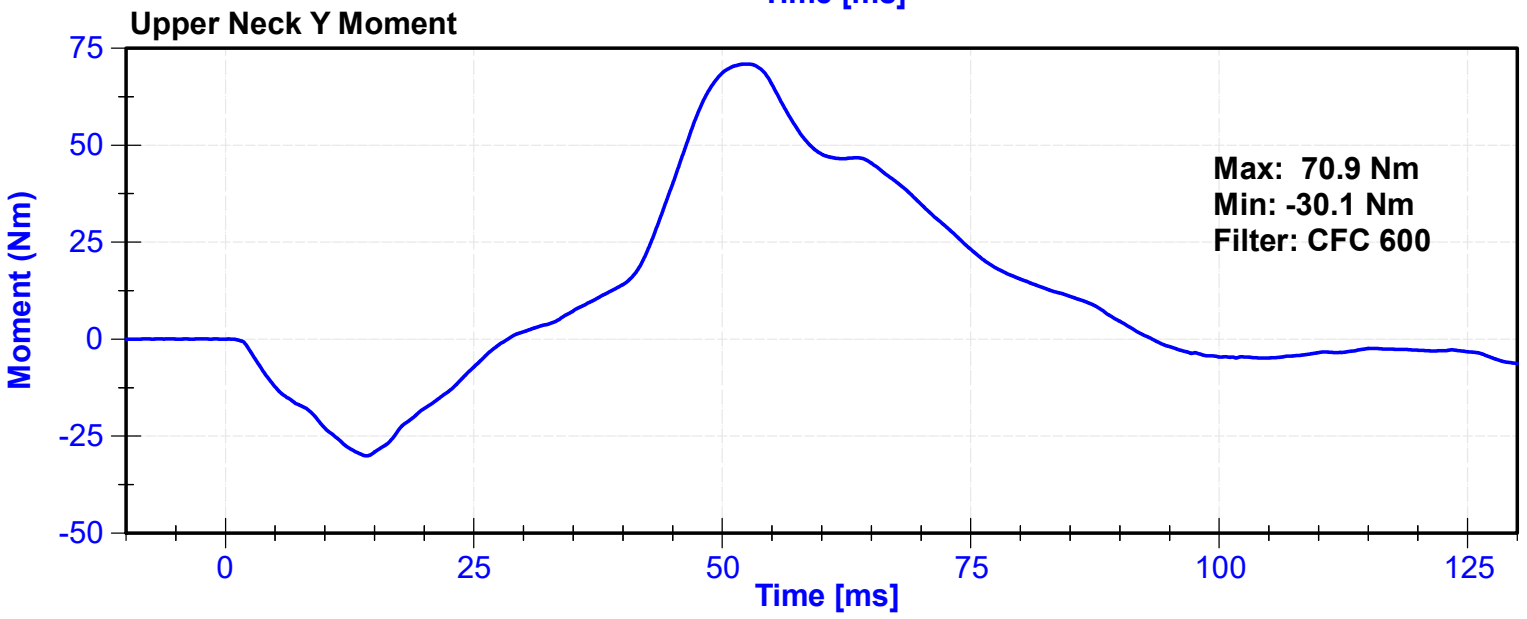
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Humanetics	1916-FX	6/10/2022	6/10/2023

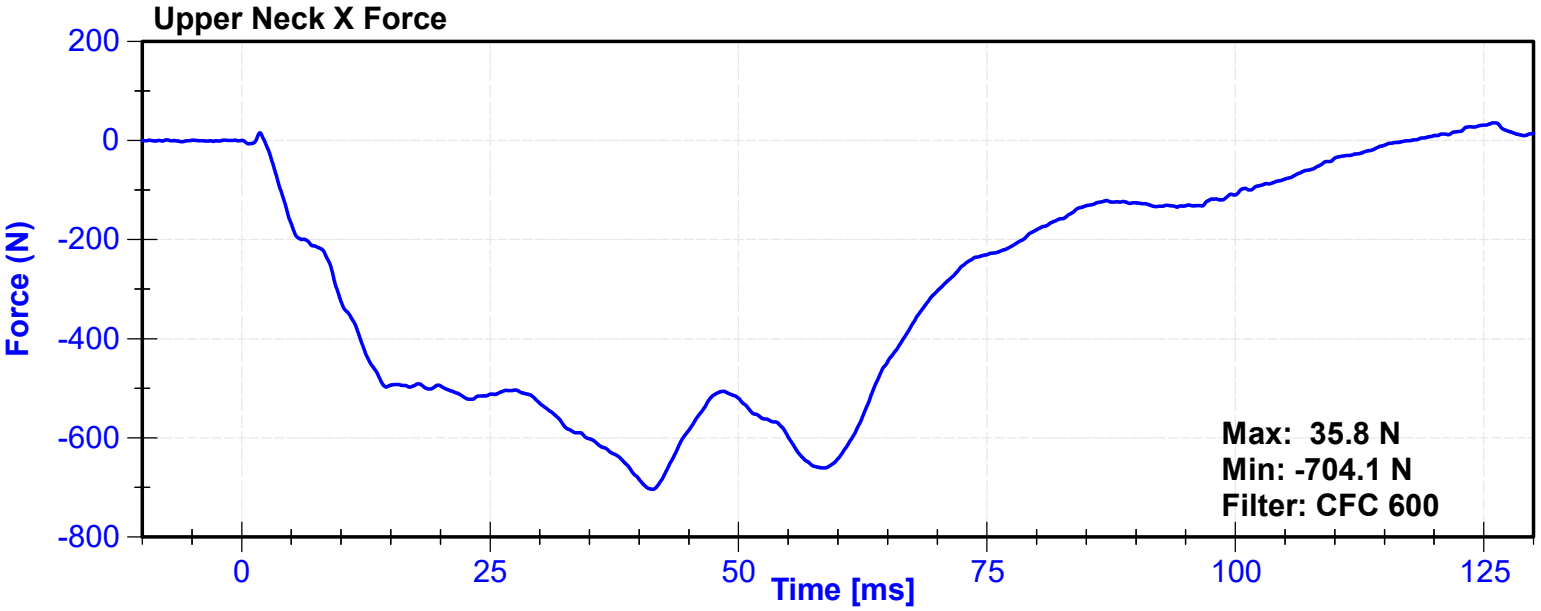



D-Plane Rotation
Max: 78.6 deg
Min: -51.5 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 80.8 Nm
Min: -21.4 Nm
Filter: CFC 600
Moment (Nm)
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]


Pendulum Deceleration
Max: 26.0 g's
Min: -1.3 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 70.9 Nm
Min: -30.1 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 35.8 N
Min: -704.1 N
Filter: CFC 600
Force (N)
Time [ms]

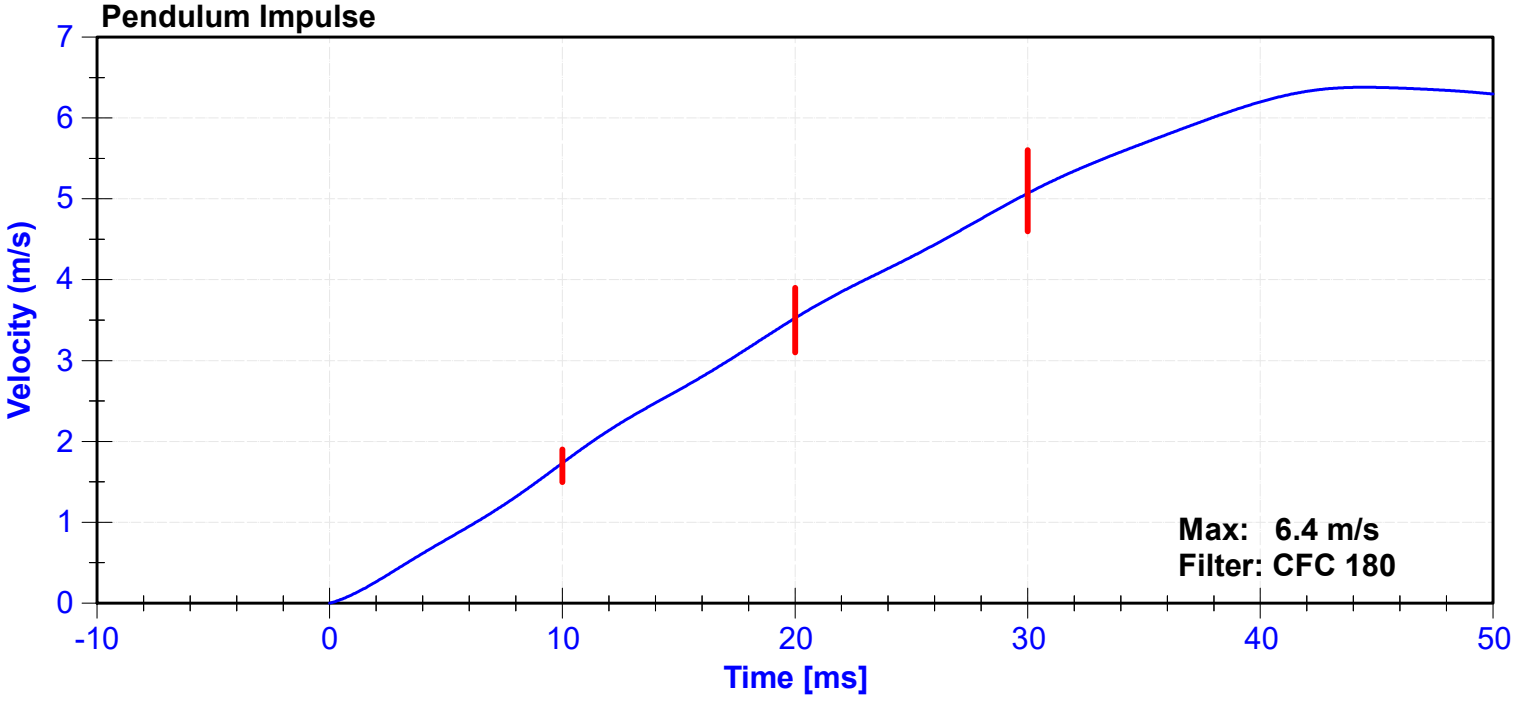
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

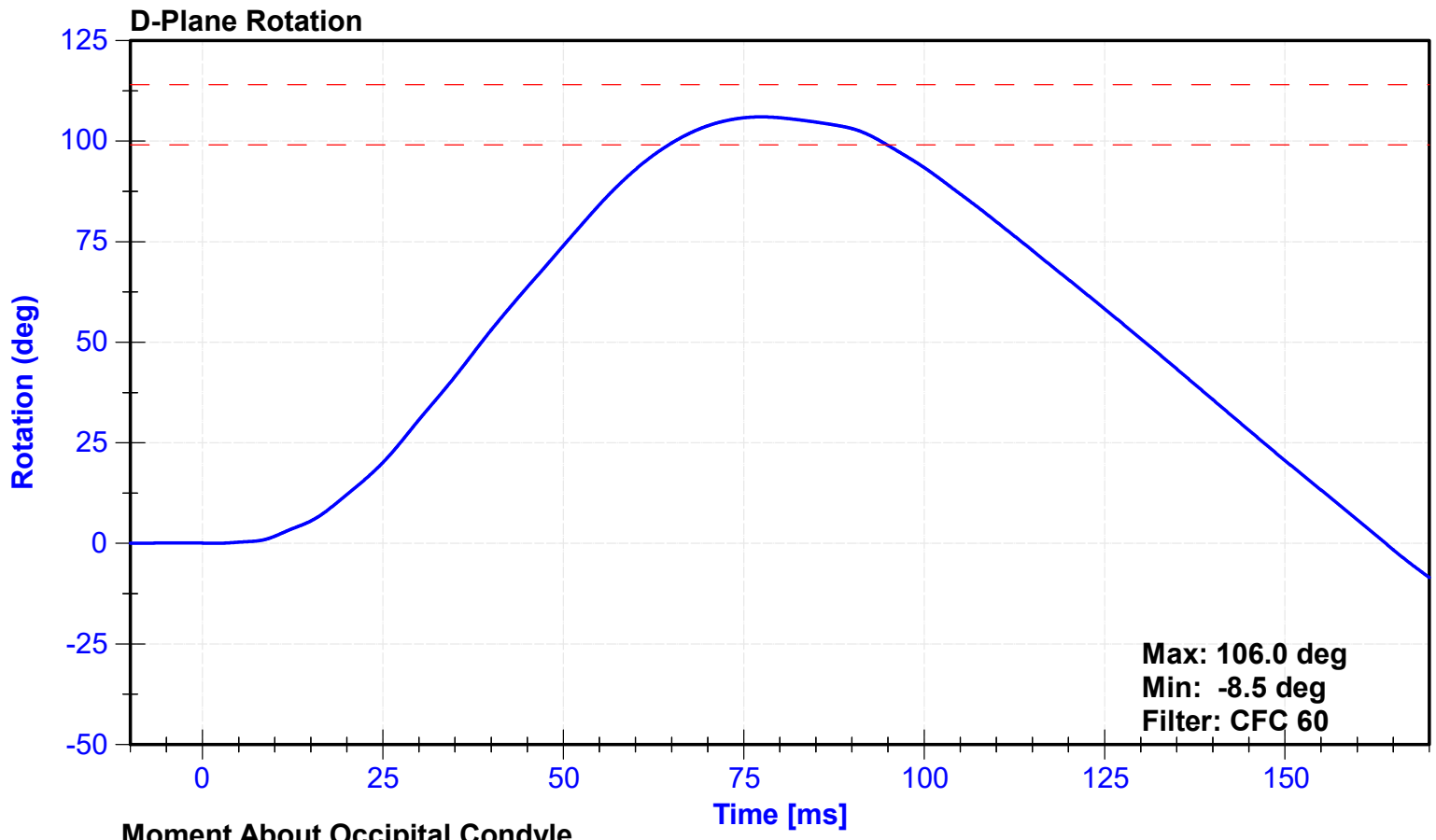
Results

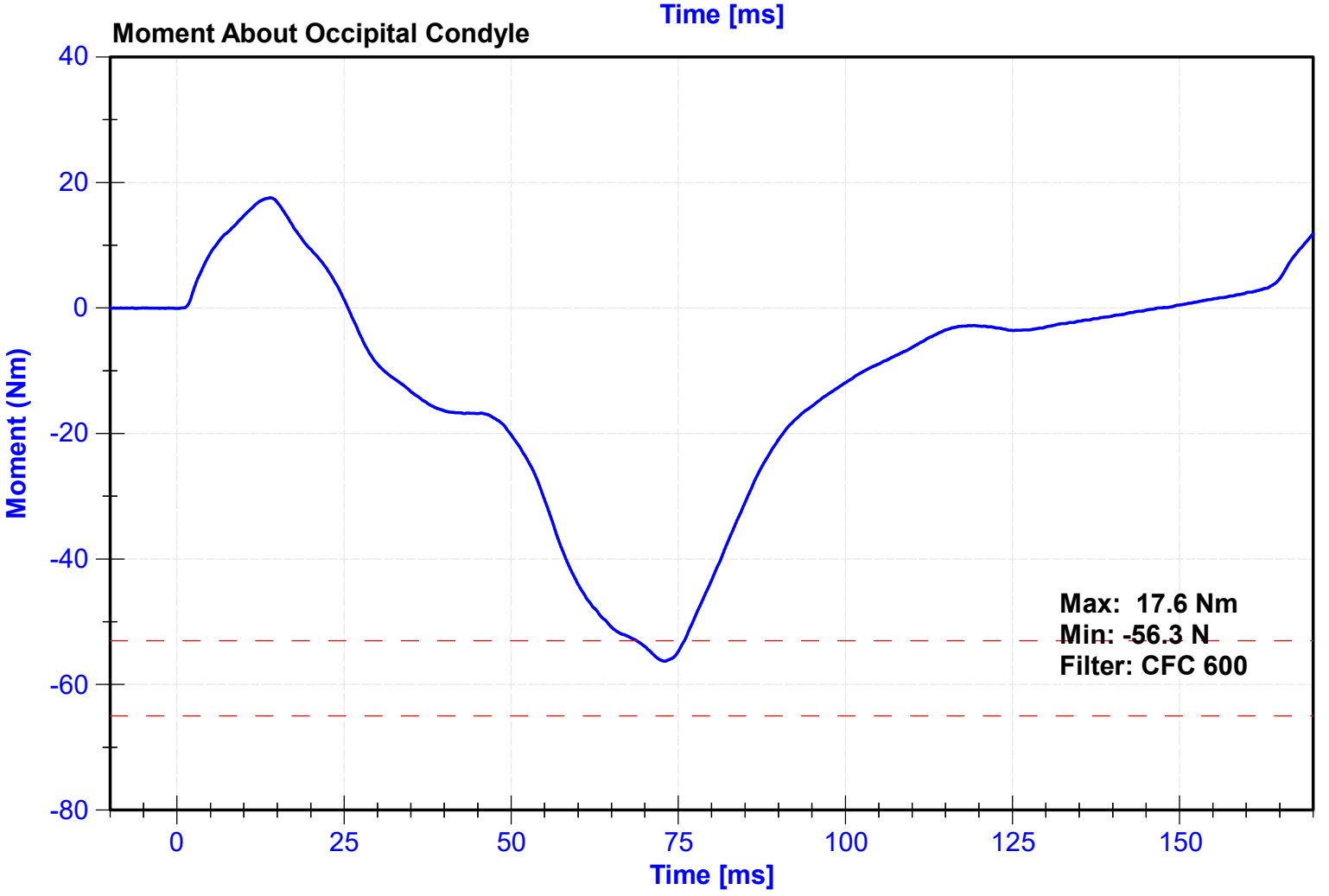
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	25.5	Pass
Velocity	5.95	6.19	m/s	6.116	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.73	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.53	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.07	Pass
D Plane Rotation	99	114	deg	106.0	Pass
Moment During Rotation Interval	-65	-53	Nm	-56.3	Pass
Moment Decay to -10Nm	94	114	ms	102.9	Pass

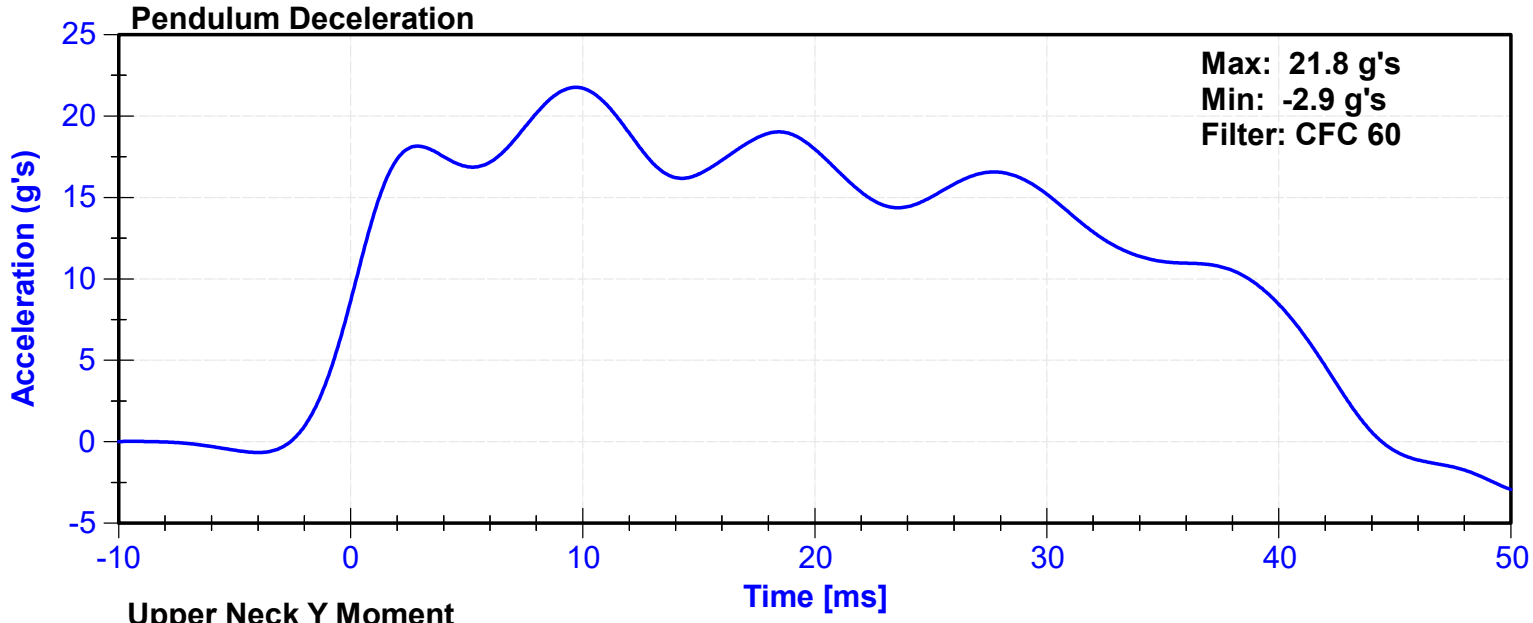
Transducer Calibrations

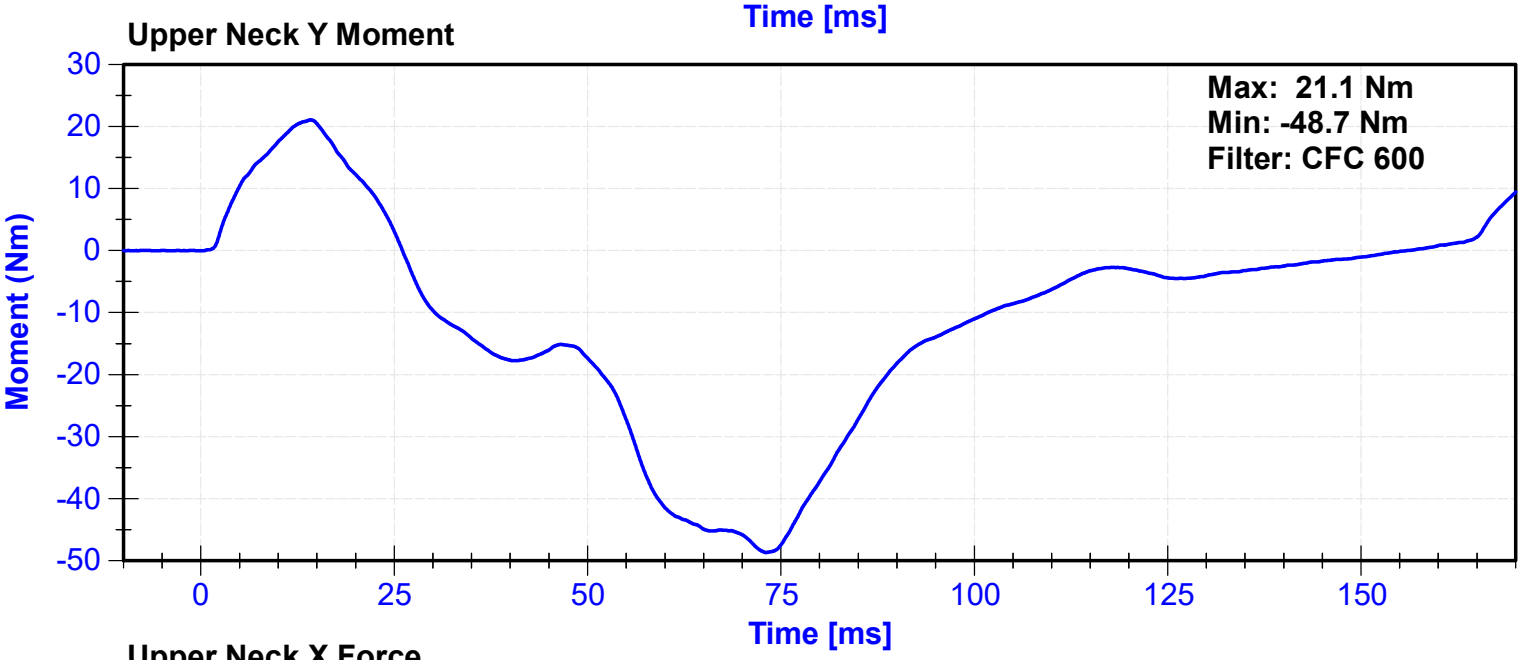
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Humanetics	1916-FX	6/10/2022	6/10/2023

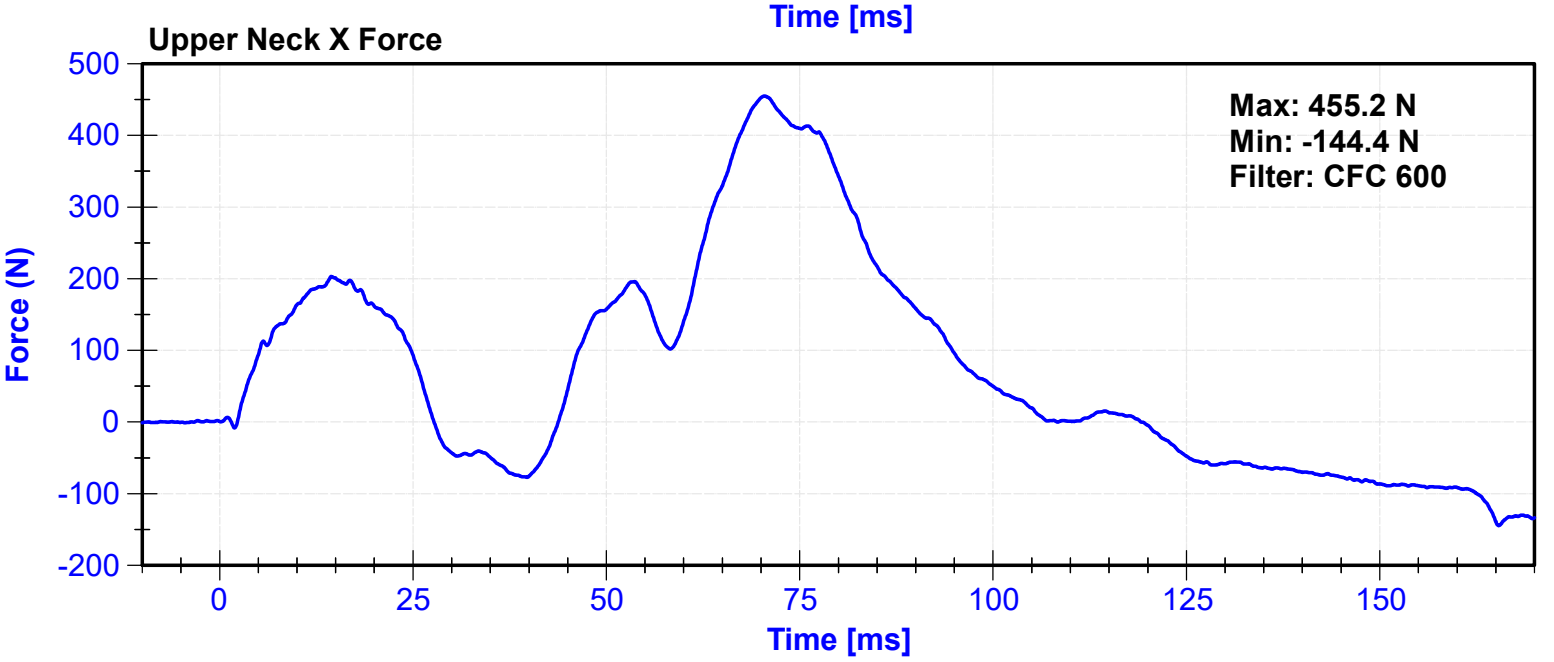



D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 106.0 deg
Min: -8.5 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
40
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
Time [ms]
Max: 17.6 Nm
Min: -56.3 N
Filter: CFC 600


Pendulum Deceleration
Max: 21.8 g's
Min: -2.9 g's
Filter: CFC 60
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 21.1 Nm
Min: -48.7 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: 455.2 N
Min: -144.4 N
Filter: CFC 600
Force (N)
500
400
300
200
100
0
-100
-200
0
25
50
75
100
125
150
Time [ms]

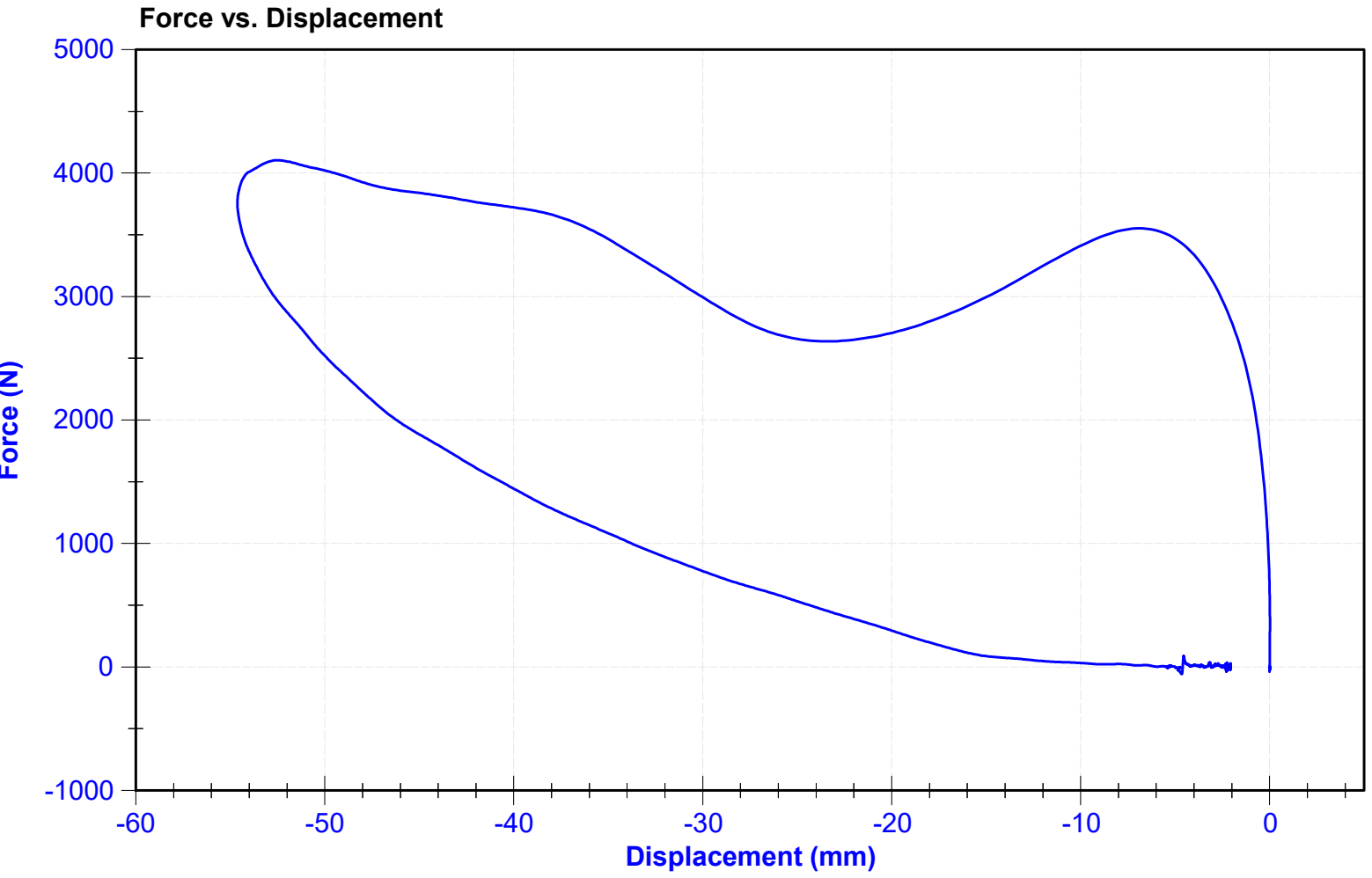
ATD Manufacturer	Humanetics	Test Technician	D. Kroll
ATD Serial Number	137	Laboratory Supervisor	C. Mantell

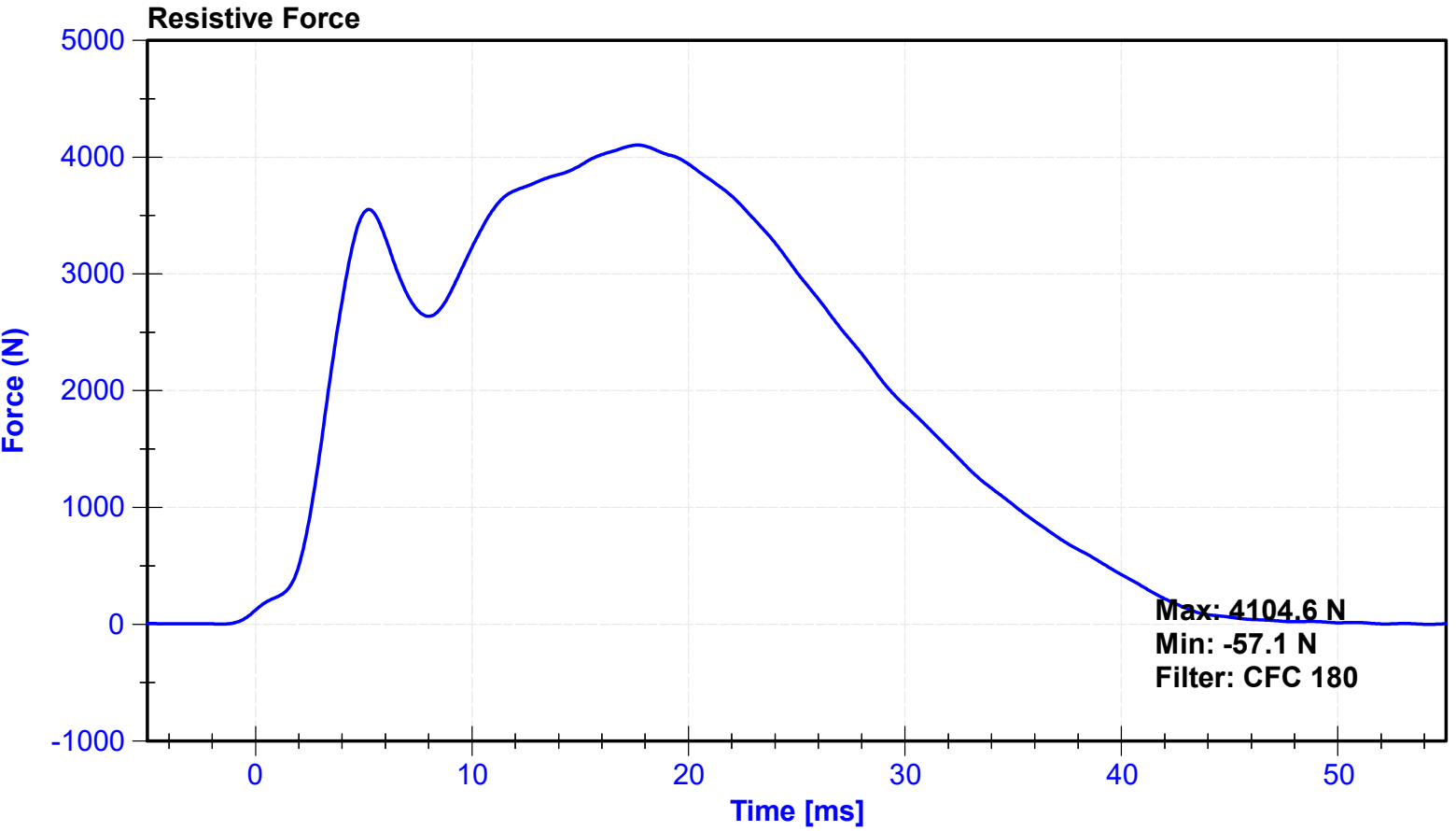
Results

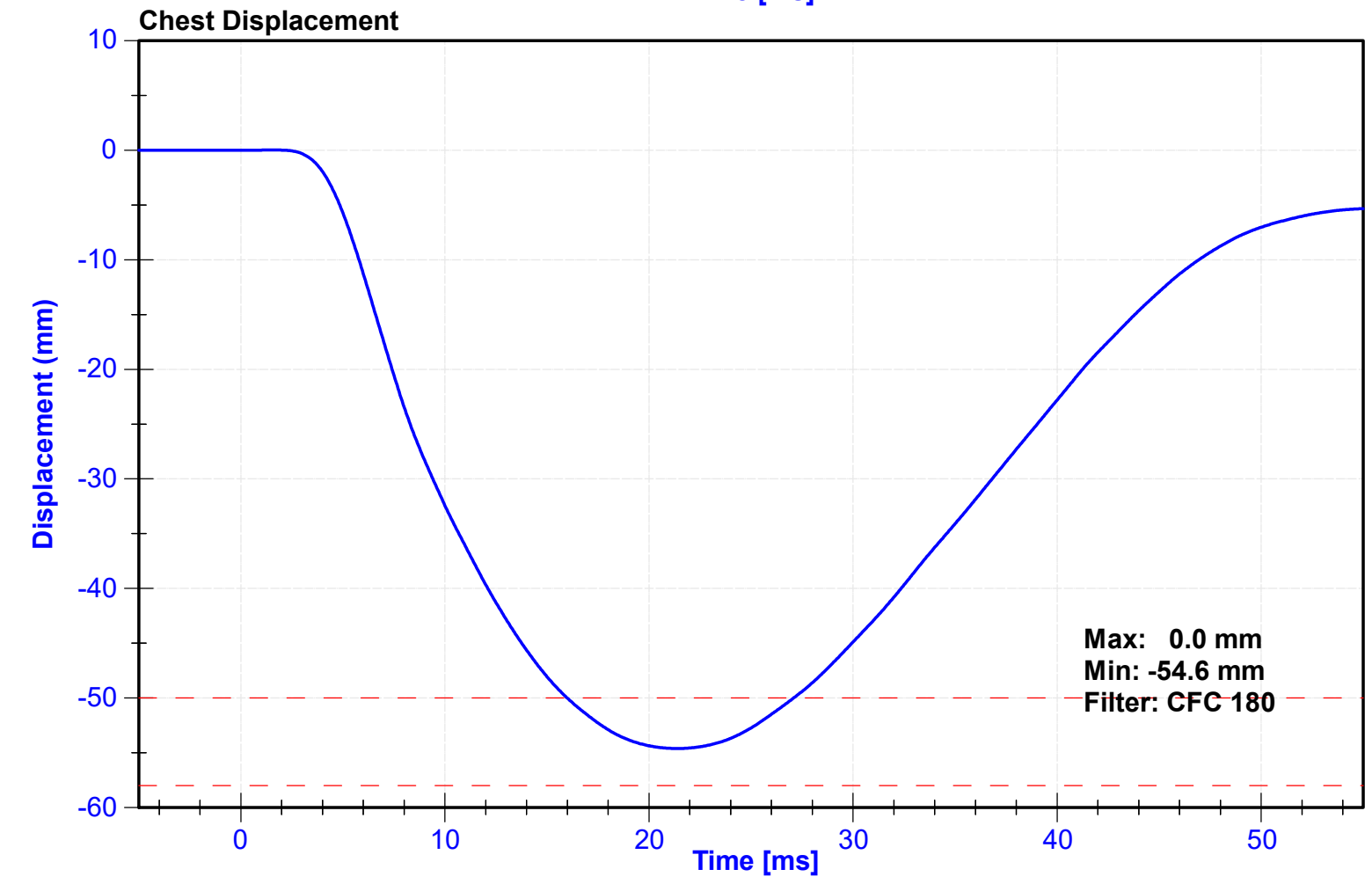
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22.3	Pass
Velocity	6.59	6.83	m/s	6.648	Pass
Chest Deflection	-58	-50	mm	-54.6	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4104.6	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4019.4	Pass
Hysteresis	69	85	%	72.0	Pass

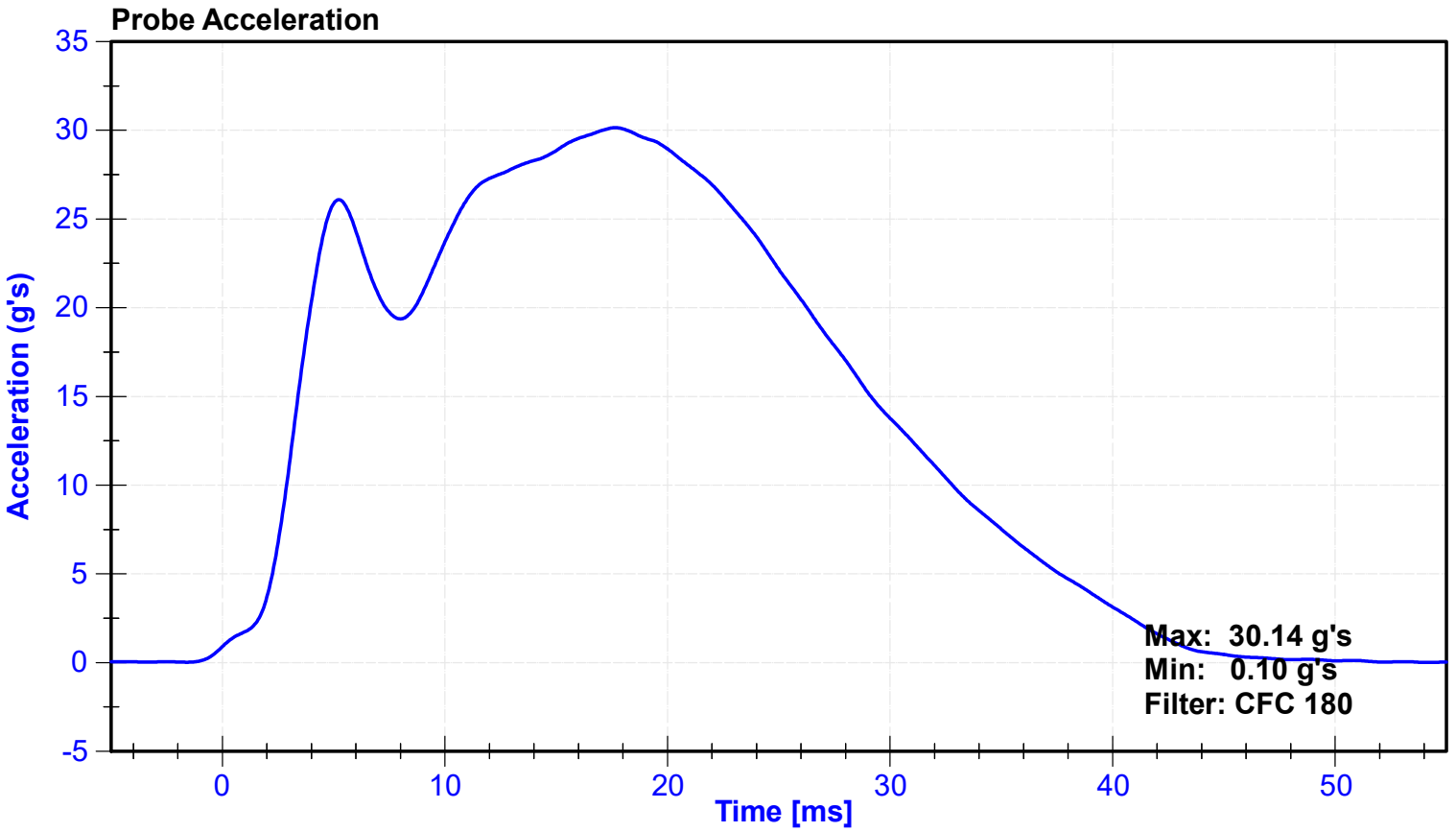
Transducer Calibrations

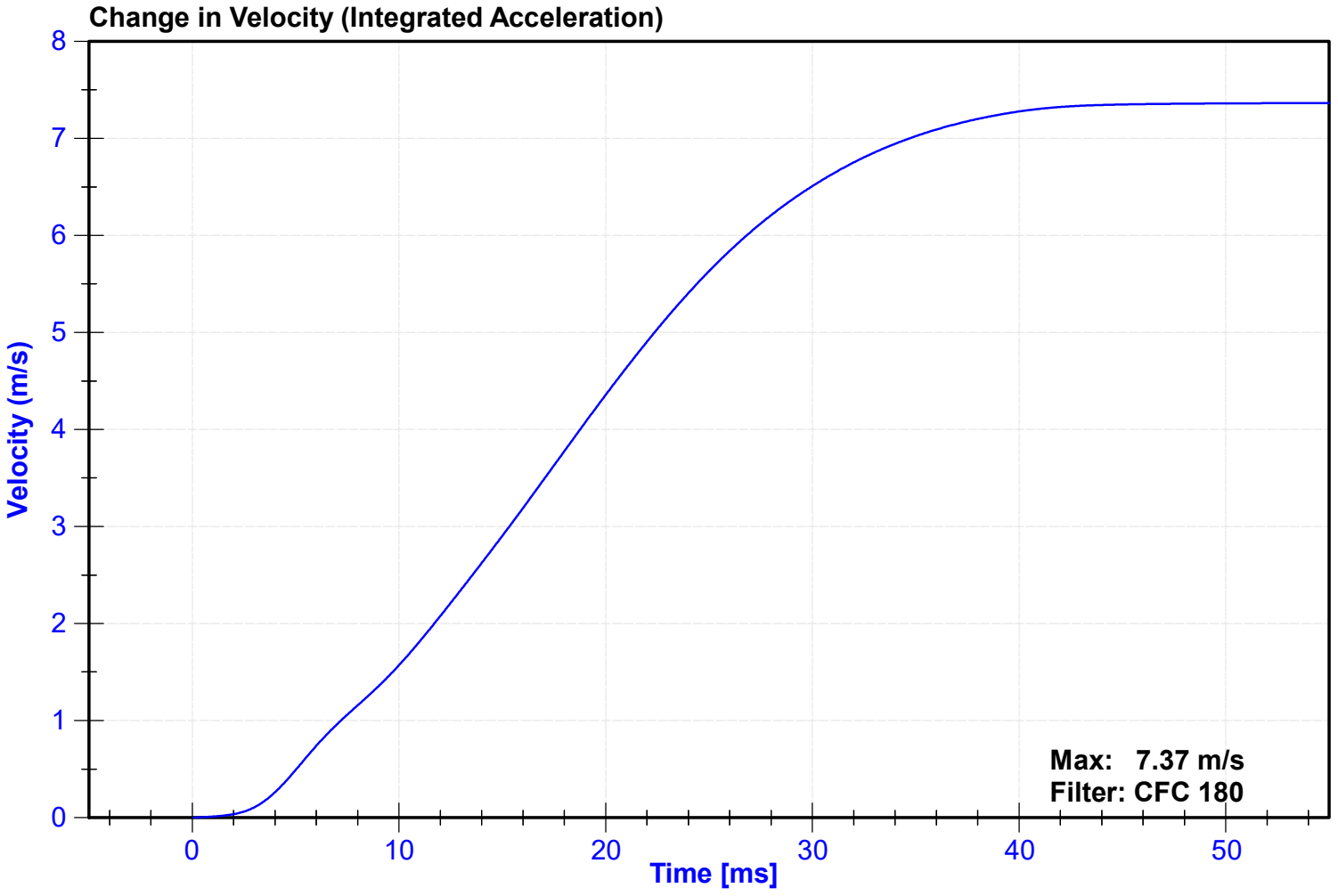
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	4/23/2023
Chest Potentiometer	Servo	0720	12/12/2022	6/12/2023




Resistive Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4104.6 N
Min: -57.1 N
Filter: CFC 180


Chest Displacement
Displacement (mm)
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
Time [ms]
Max: 0.0 mm
Min: -54.6 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
Time [ms]
Max: 30.14 g's
Min: 0.10 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
Time [ms]
Max: 7.37 m/s
Filter: CFC 180

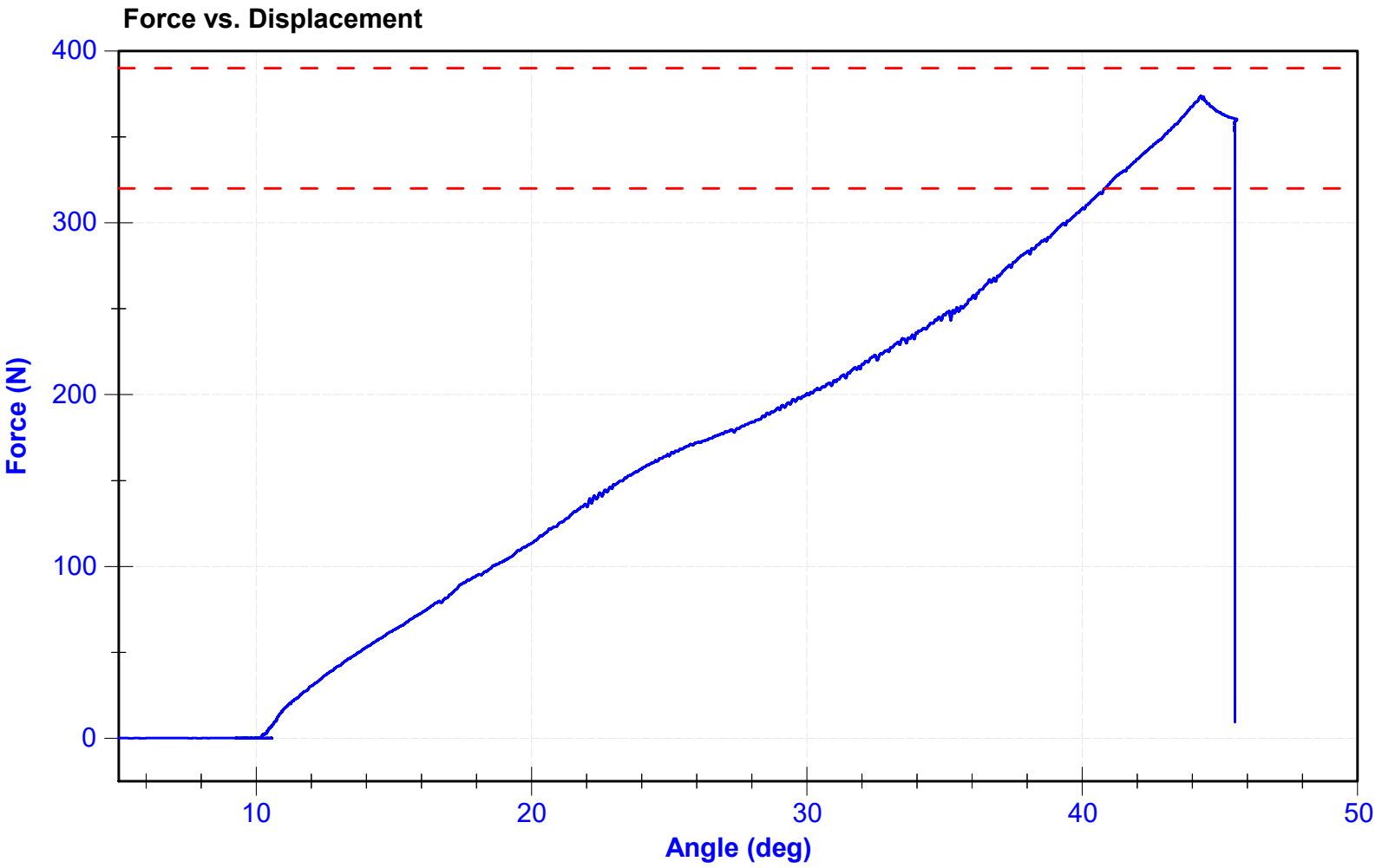
ATD Manufacturer	Humanetics	Test Technician	D. Kroll
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	ºC	21.1	Pass
Humidity	10	70	%	22.3	Pass
Initial Angle	0	20	deg	9.9	Pass
Force at 45 Degrees	320	390	N	373.9	Pass
Return Angle Relative to Initial	0	8	deg	0.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker	DS-1905226	2022-11-09	2023-11-09
Load Cell	Interface	1134516	2022-09-27	2023-09-27



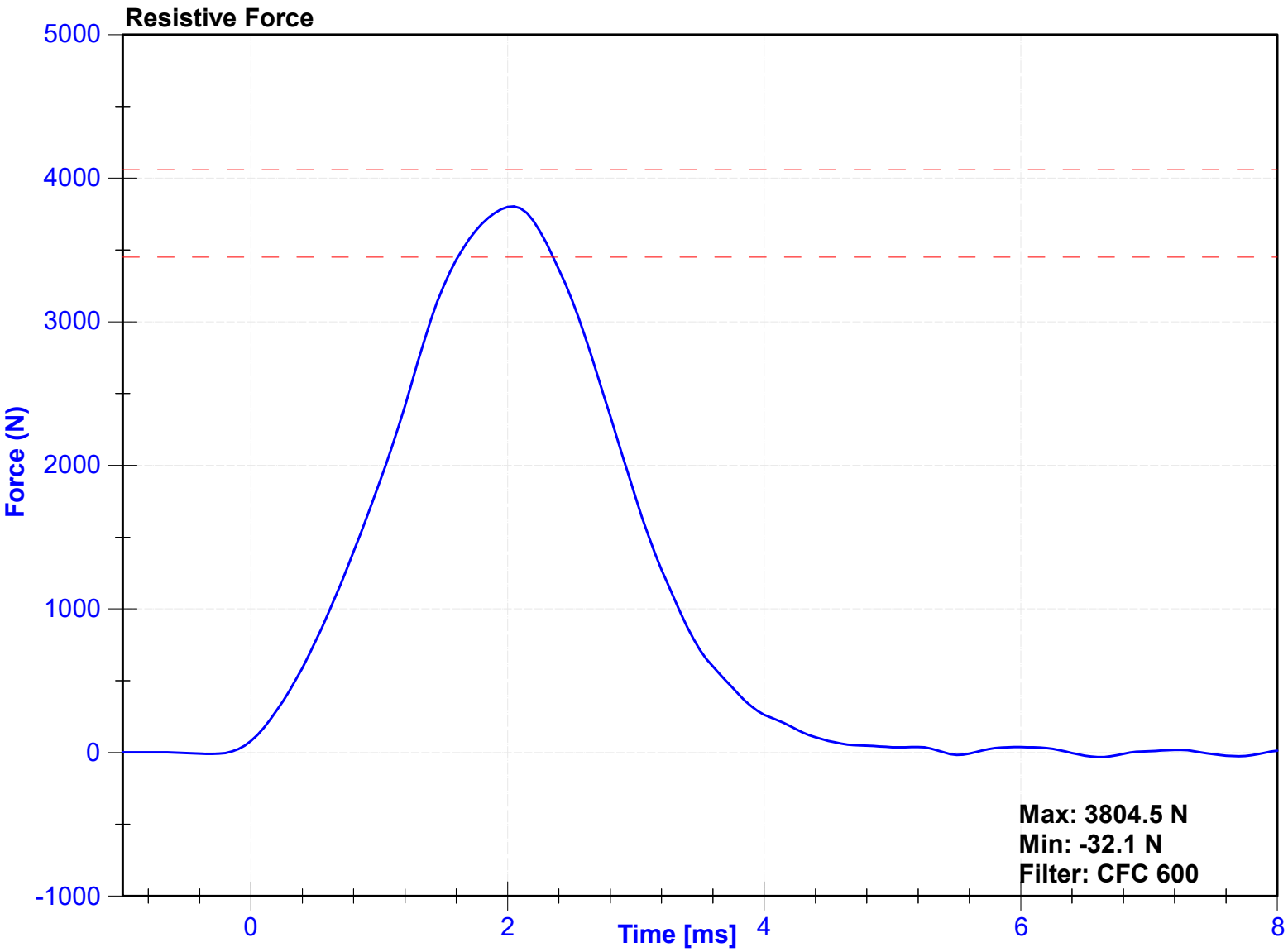
ATD Manufacturer	Humanetics	Test Technician	D. Kroll
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

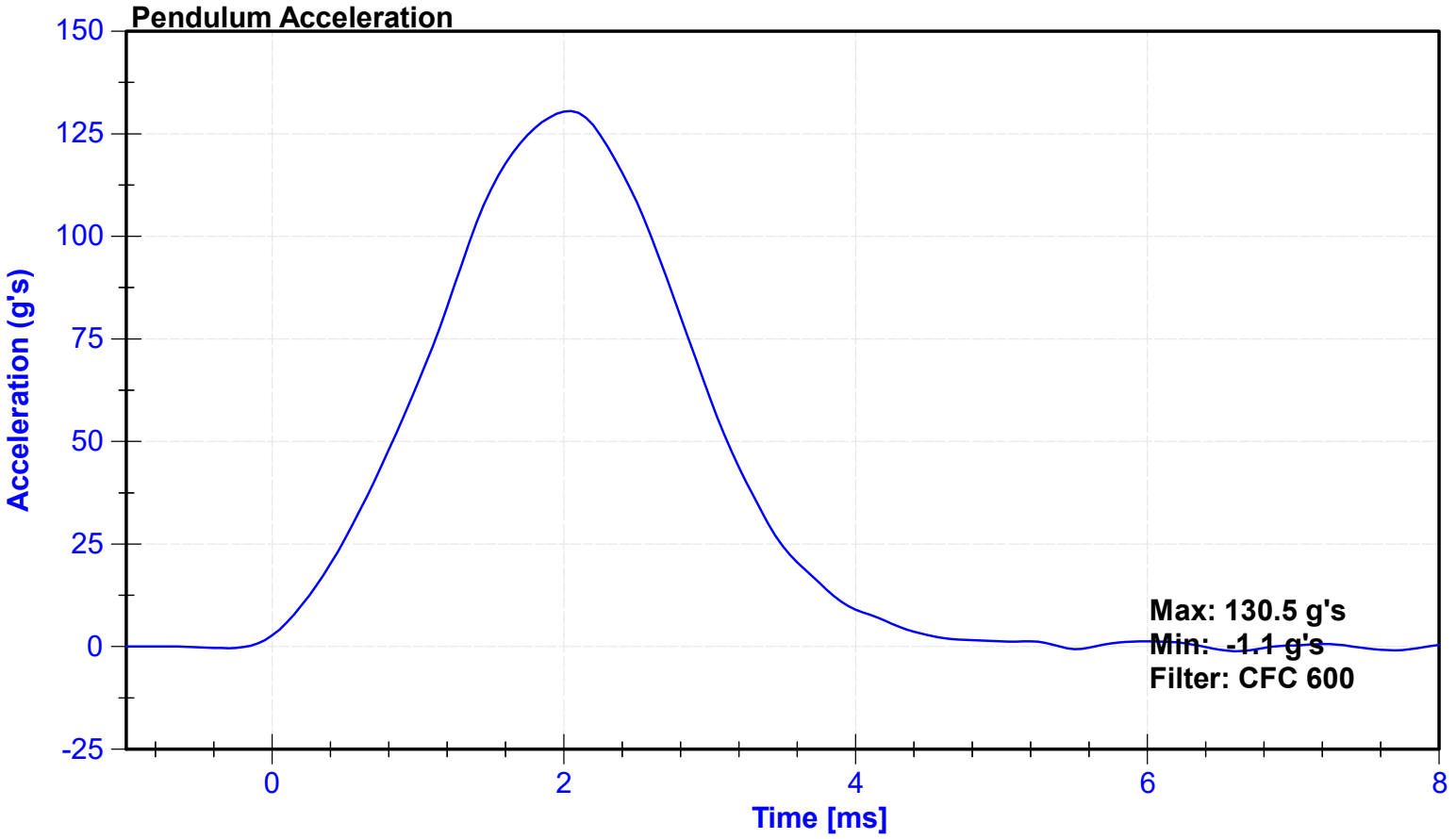
Results

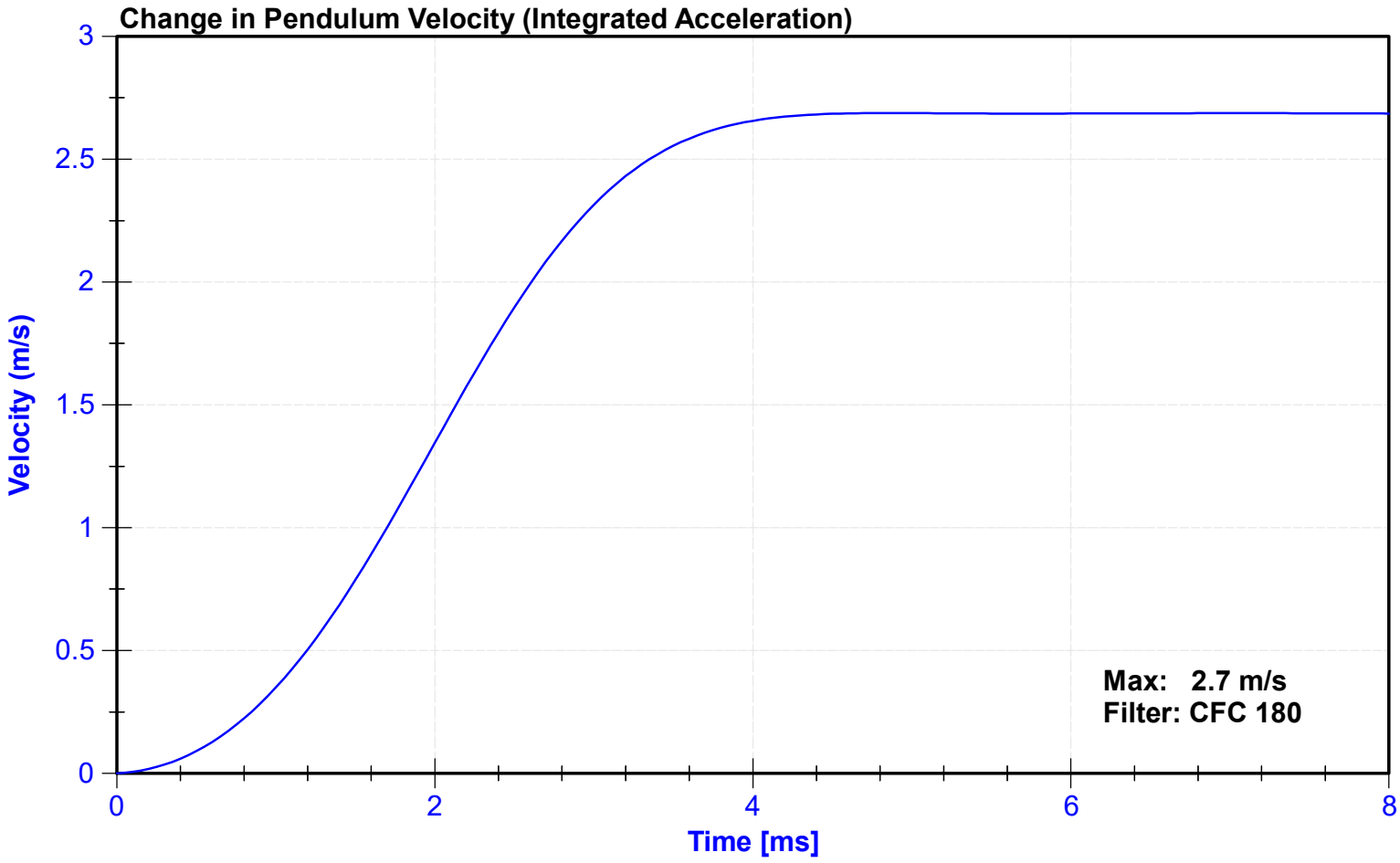
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	32.6	Pass
Velocity	2.07	2.13	m/s	2.081	Pass
Resistive Force	3450	4060	N	3804.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]
Max: 130.5 g's
Min: -1.1 g's
Filter: CFC 600


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

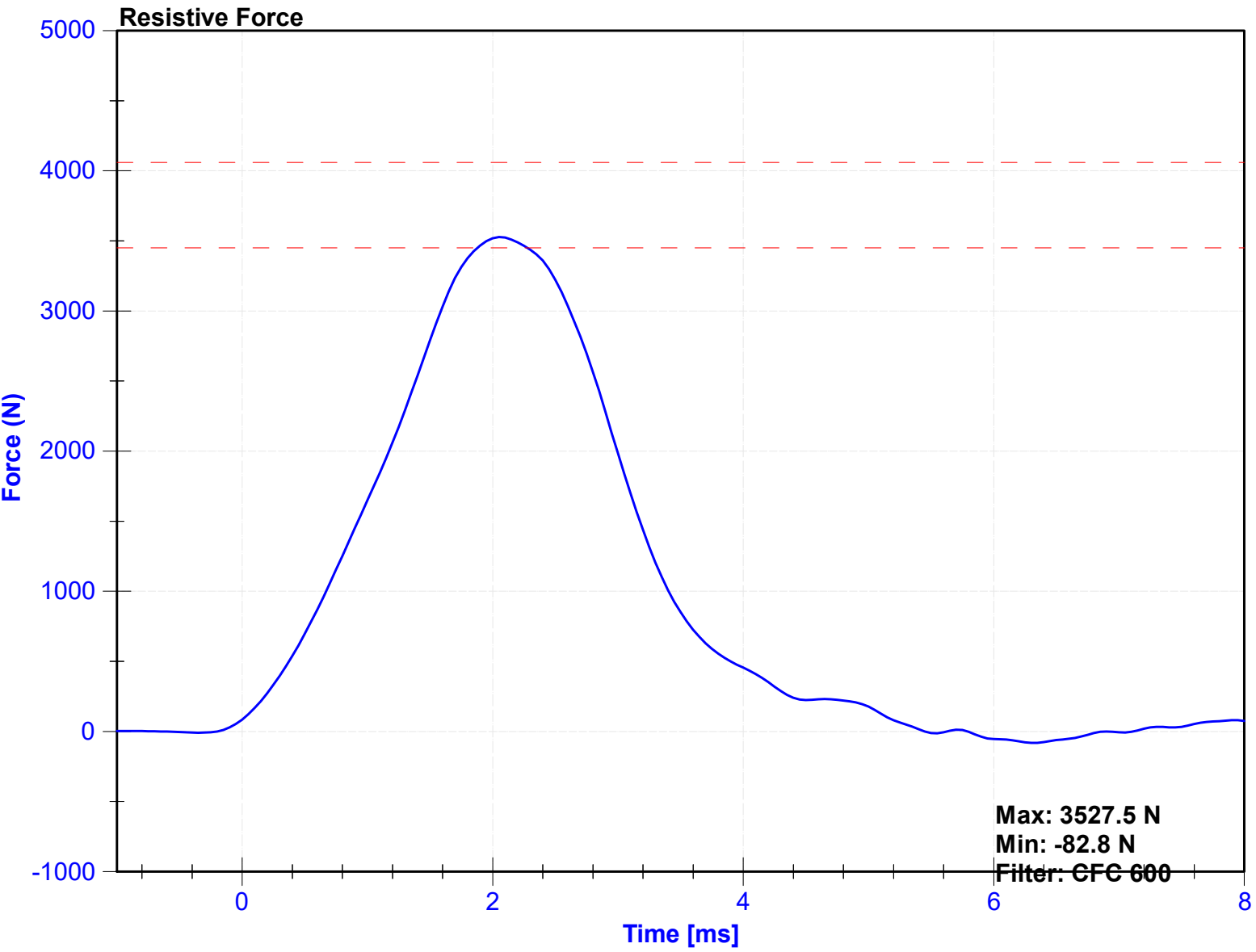
ATD Manufacturer	Humanetics	Test Technician	D. Kroll
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

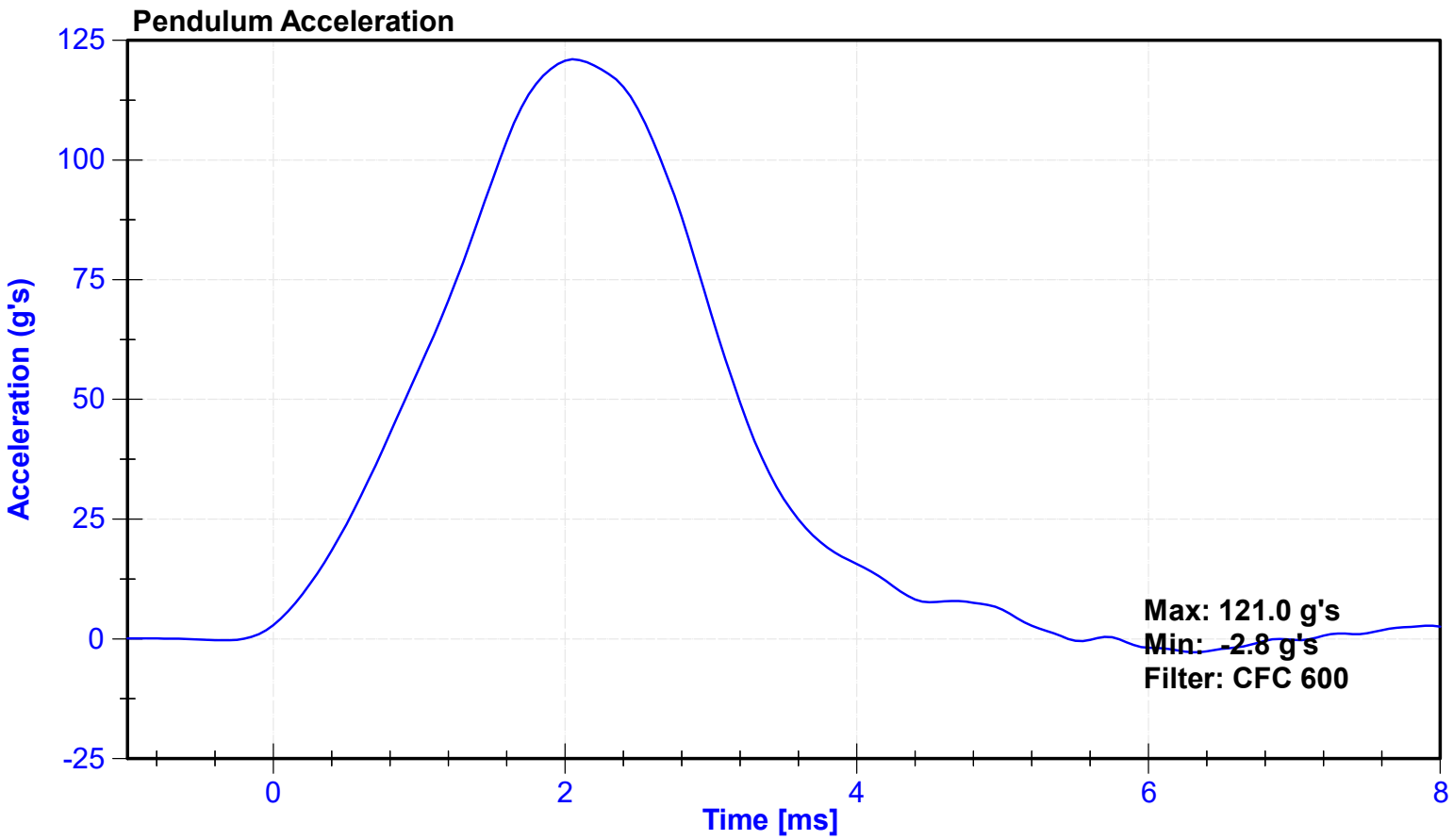
Results

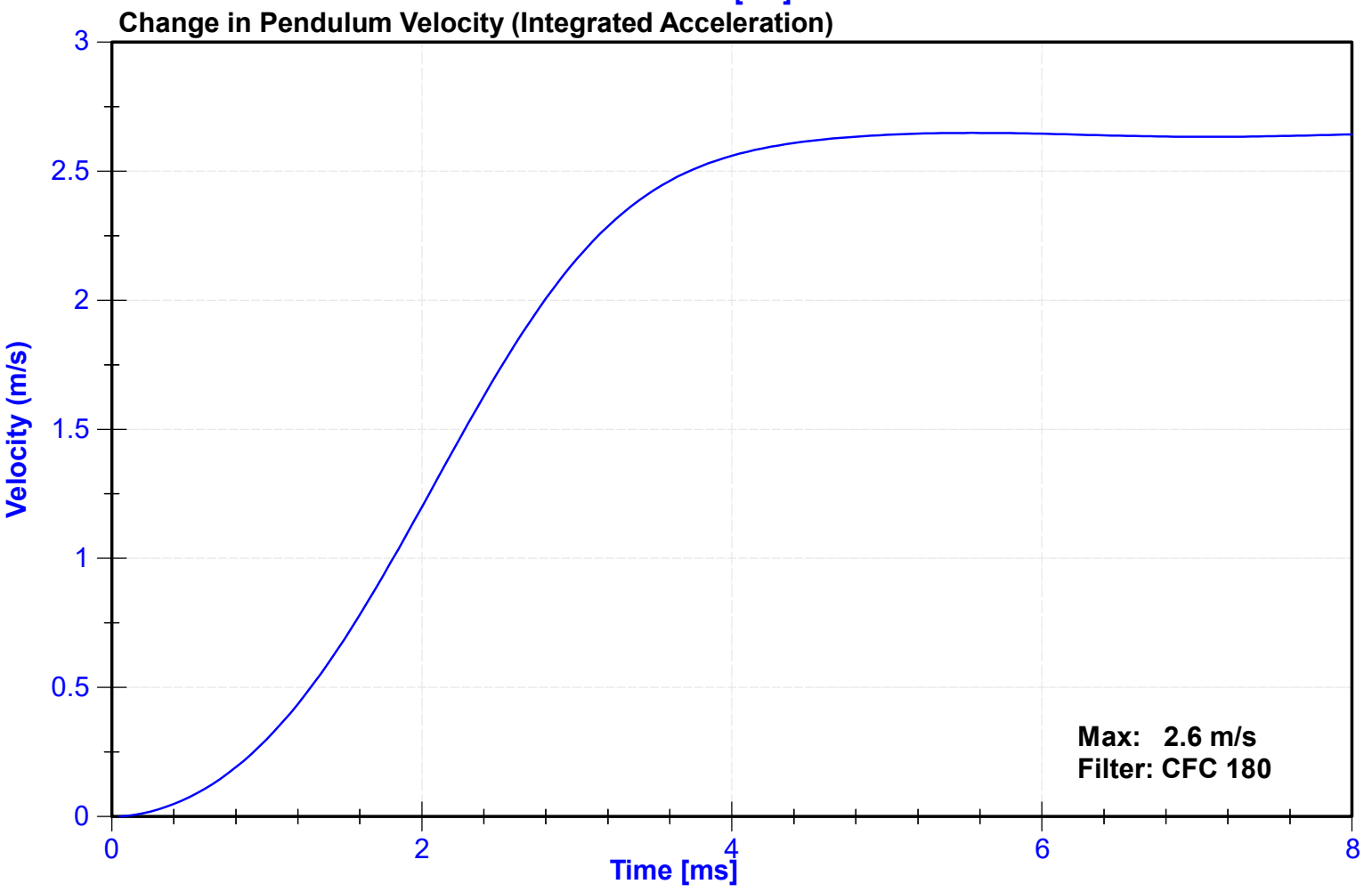
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	32.6	Pass
Velocity	2.07	2.13	m/s	2.084	Pass
Resistive Force	3450	4060	N	3527.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]
Max: 121.0 g's
Min: -2.8 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

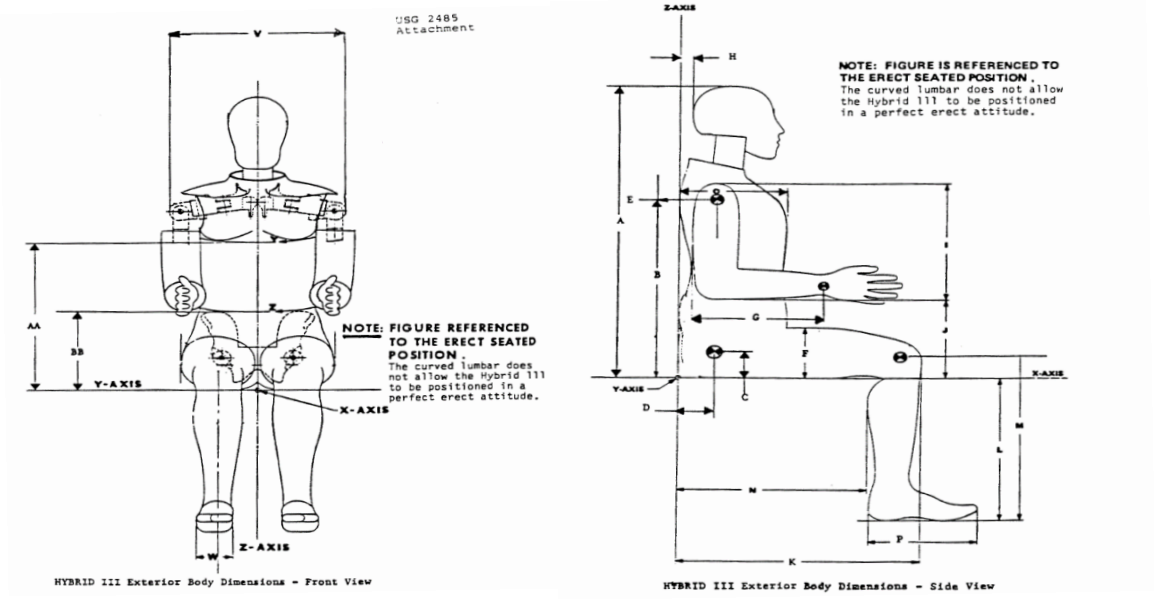
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 142

External Measurements - Hybrid 3 - 50th Male

Technician: K. Brogan Date: 01/06/2023

Dummy Serial Number: 142



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.8	Pass
B	Shoulder Pivot Height	19.9	20.5	20.3	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.4	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.7	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.2	Pass
J	Elbow Rest Height	7.5	8.3	8.0	Pass
K	Buttock to Knee Length	22.8	23.8	23.4	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.5	Pass
N	Buttock Popliteal Length	17.8	18.8	18.2	Pass
O	Chest Depth without Jacket	8.4	9.0	8.8	Pass
P	Foot Length (right)	9.9	10.5	10.2	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	39.0	Pass
Z	Waist Circumference	32.9	34.1	33.4	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

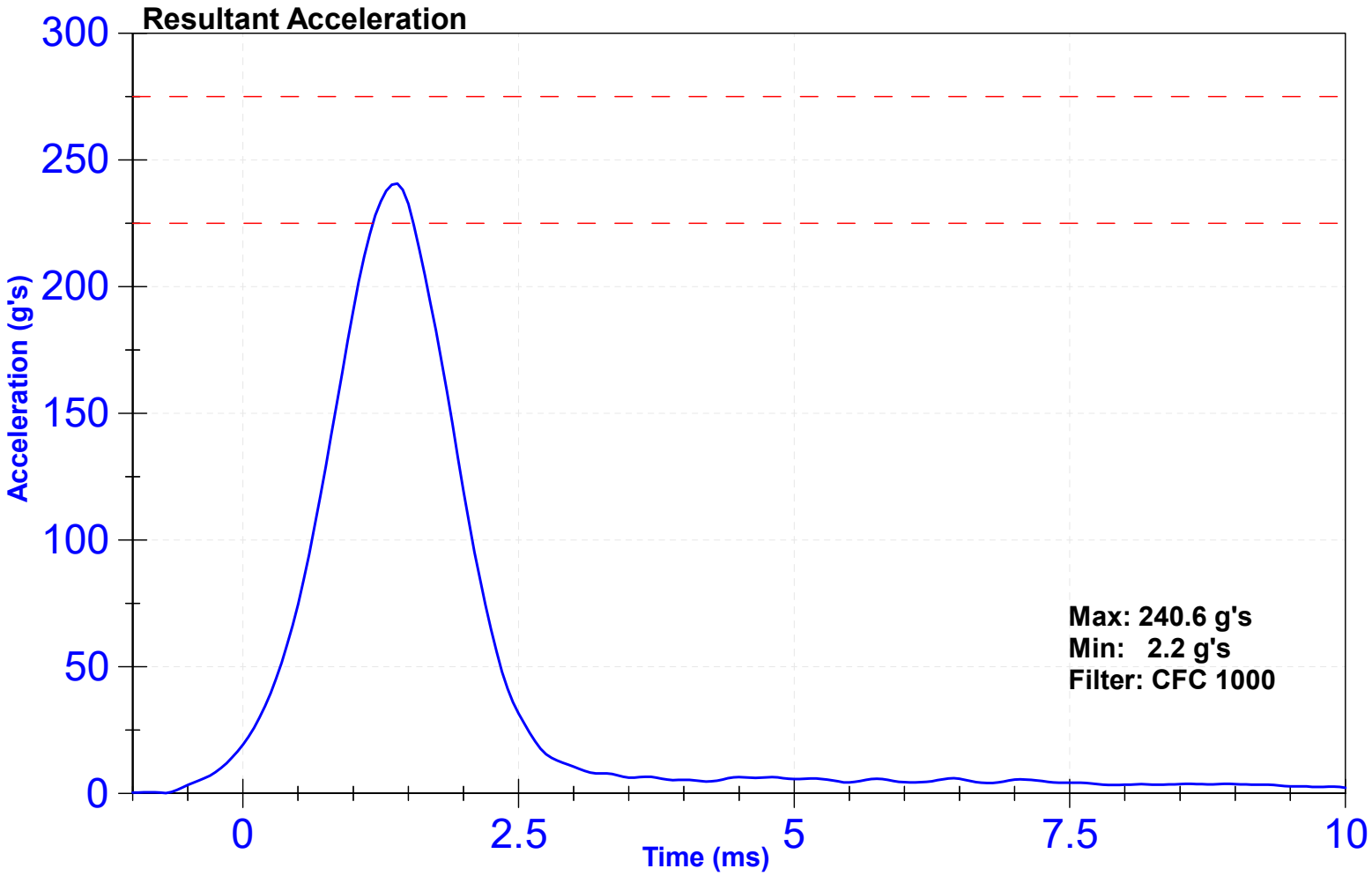
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

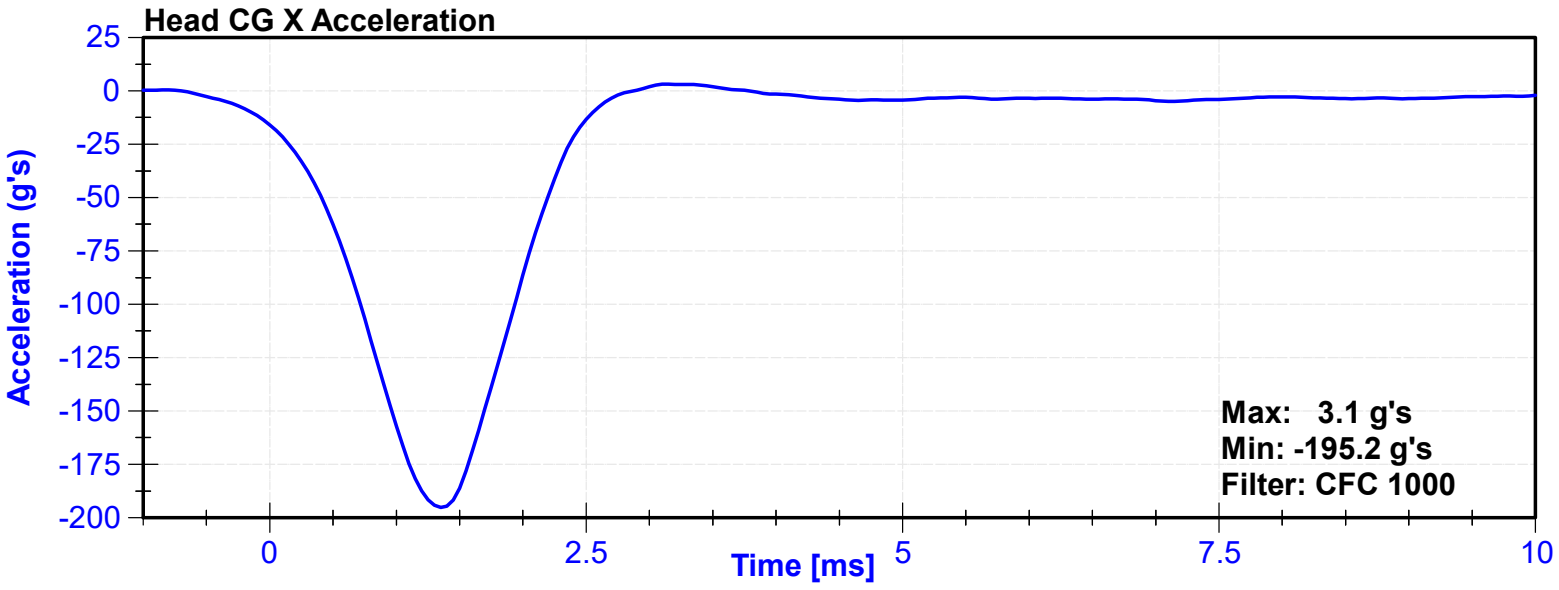
Results

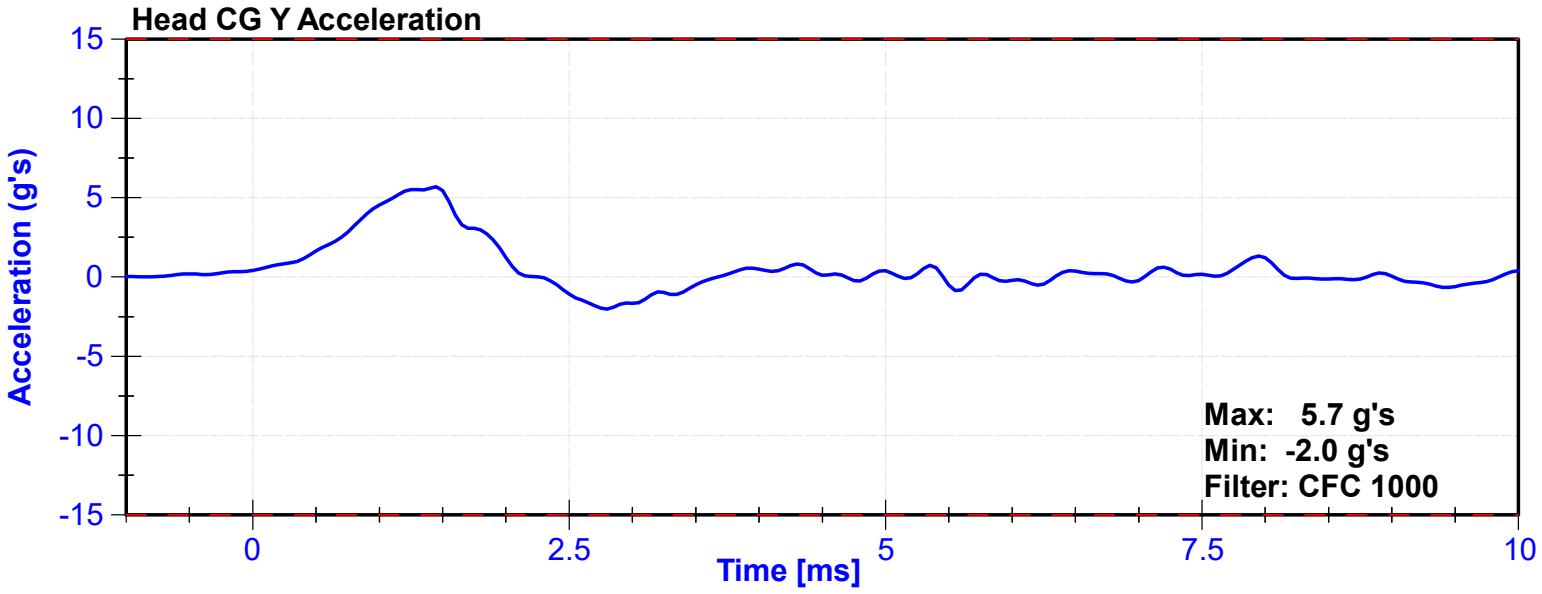
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.4	Pass
Humidity	10	70	%	29,5	Pass
Resultant Acceleration	225	275	g's	240.6	Pass
Oscillation	0	10	%	3.2	Pass
Lateral Acceleration	-15	15	g's	5.7	Pass

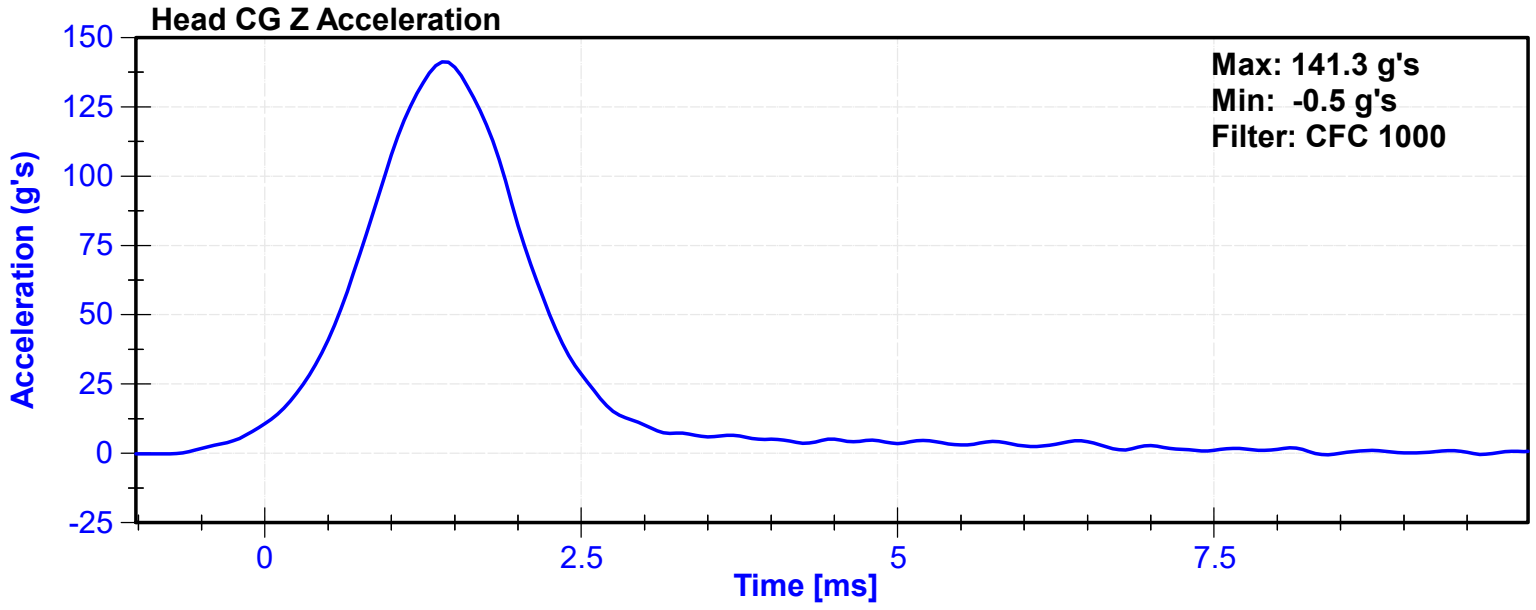
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P51681	9/30/2022	3/29/2023
Y Accelerometer	Endevco	P64151	9/30/2022	3/29/2023
Z Accelerometer	Endevco	P52114	9/30/2022	3/29/2023




Head CG X Acceleration
Acceleration (g's)
25
0
-25
-50
-75
-100
-125
-150
-175
-200
0
2.5
5
7.5
10
Time [ms]
Max: 3.1 g's
Min: -195.2 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: 5.7 g's
Min: -2.0 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
Time [ms]
Max: 141.3 g's
Min: -0.5 g's
Filter: CFC 1000

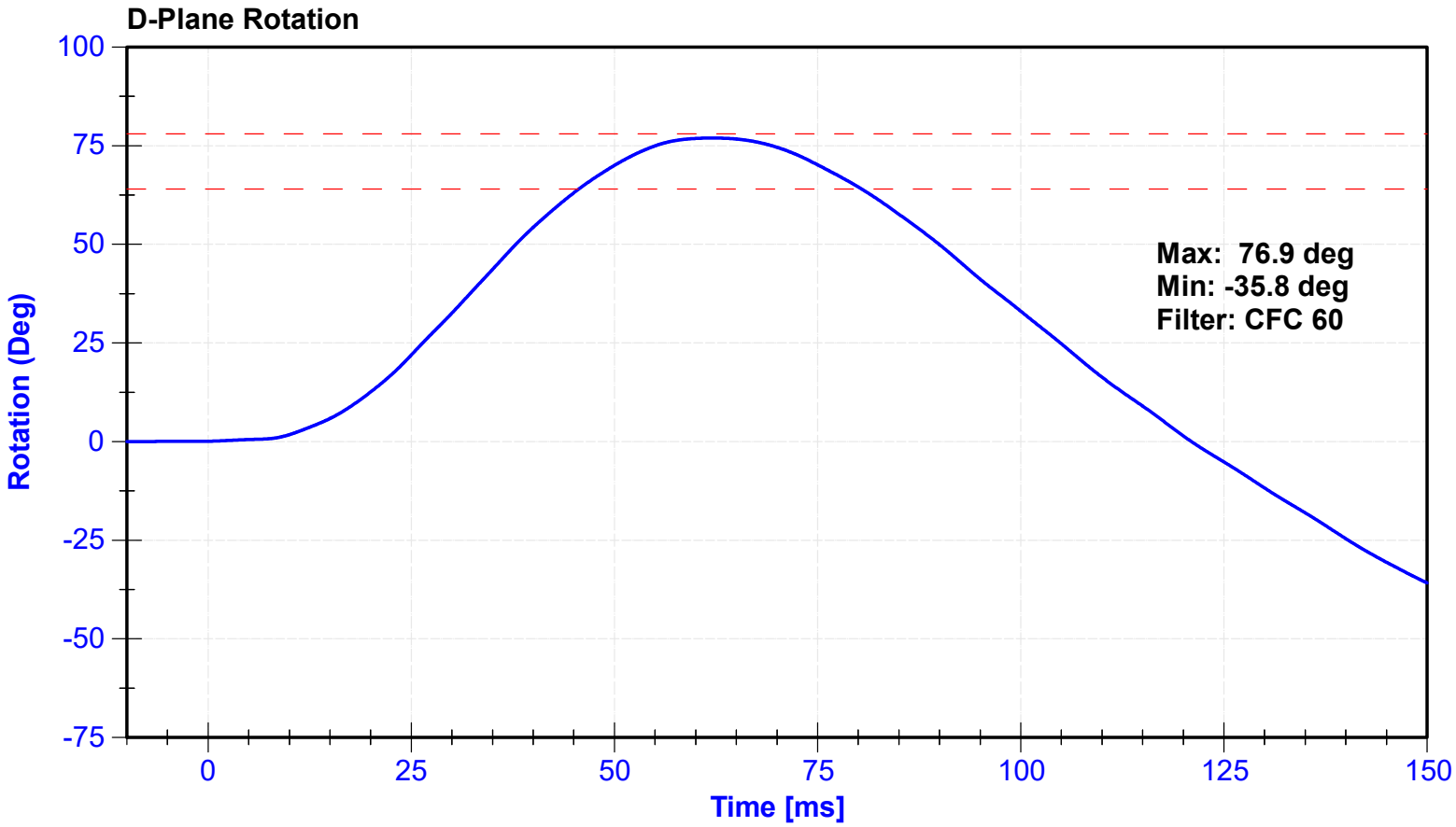
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

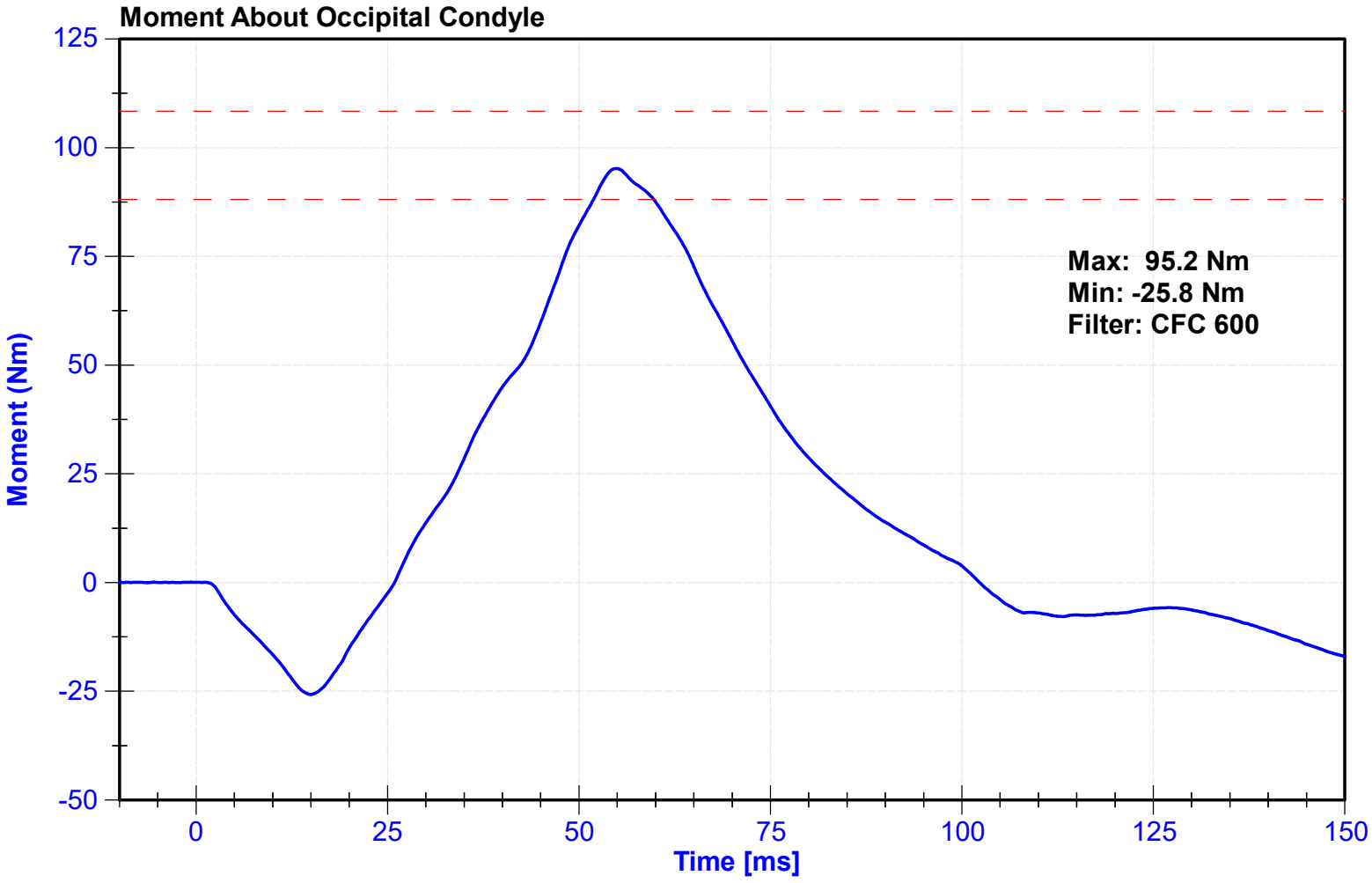
Results

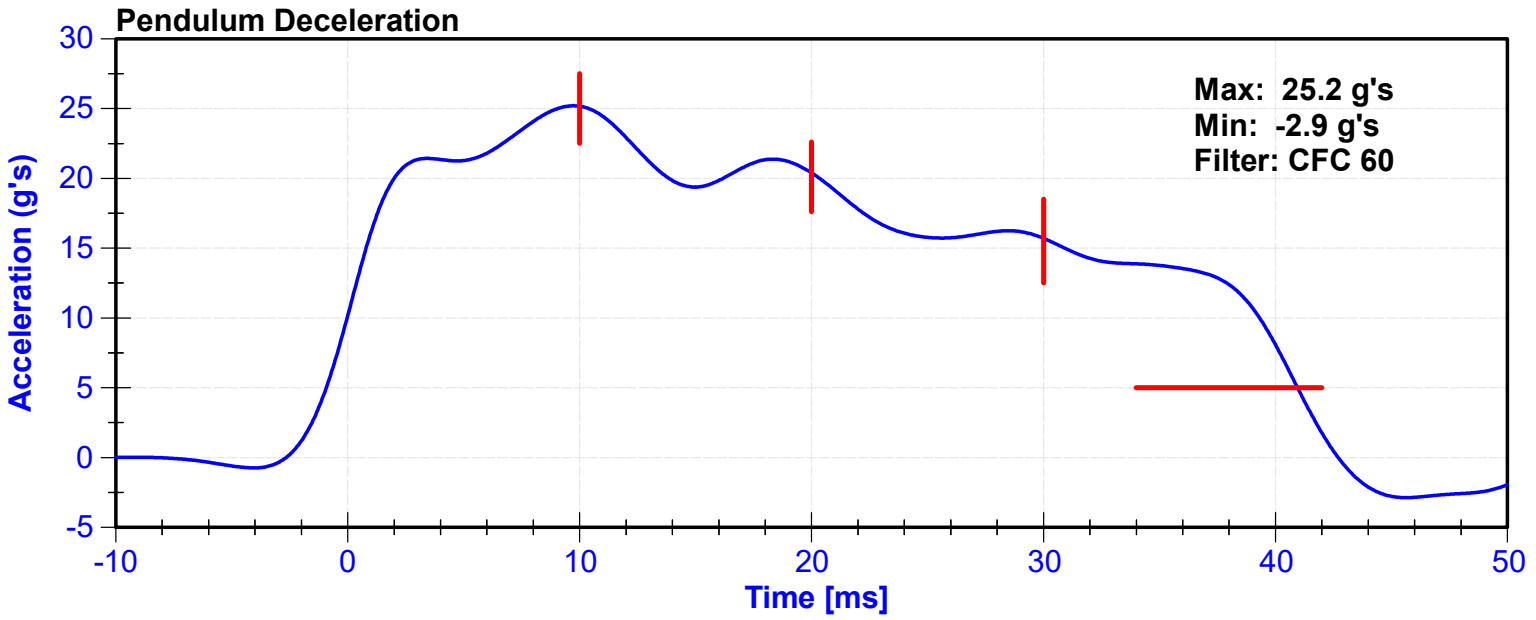
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	29.5	Pass
Velocity	6.89	7.13	m/s	6.924	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	25.16	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	20.38	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	15.70	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	25.2	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	41.0	Pass
Maximum D Plane Rotation	64	78	deg	76.9	Pass
Time to Maximum Rotation	57	64	ms	62.0	Pass
Rotation Decay to Zero	113	127	ms	121.0	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	95.21	Pass
Time to Maximum Moment	47	58	ms	55.0	Pass
Moment Decay to Zero	97	107	ms	102.3	Pass

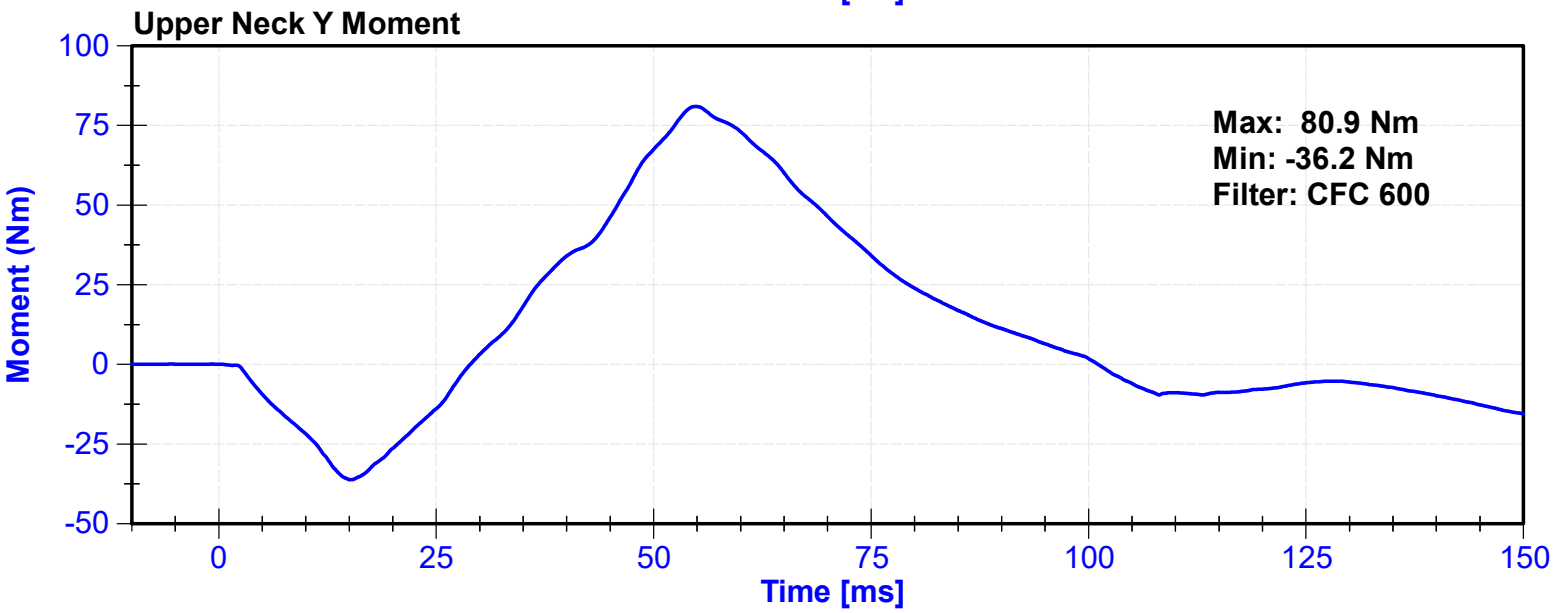
Transducer Calibrations

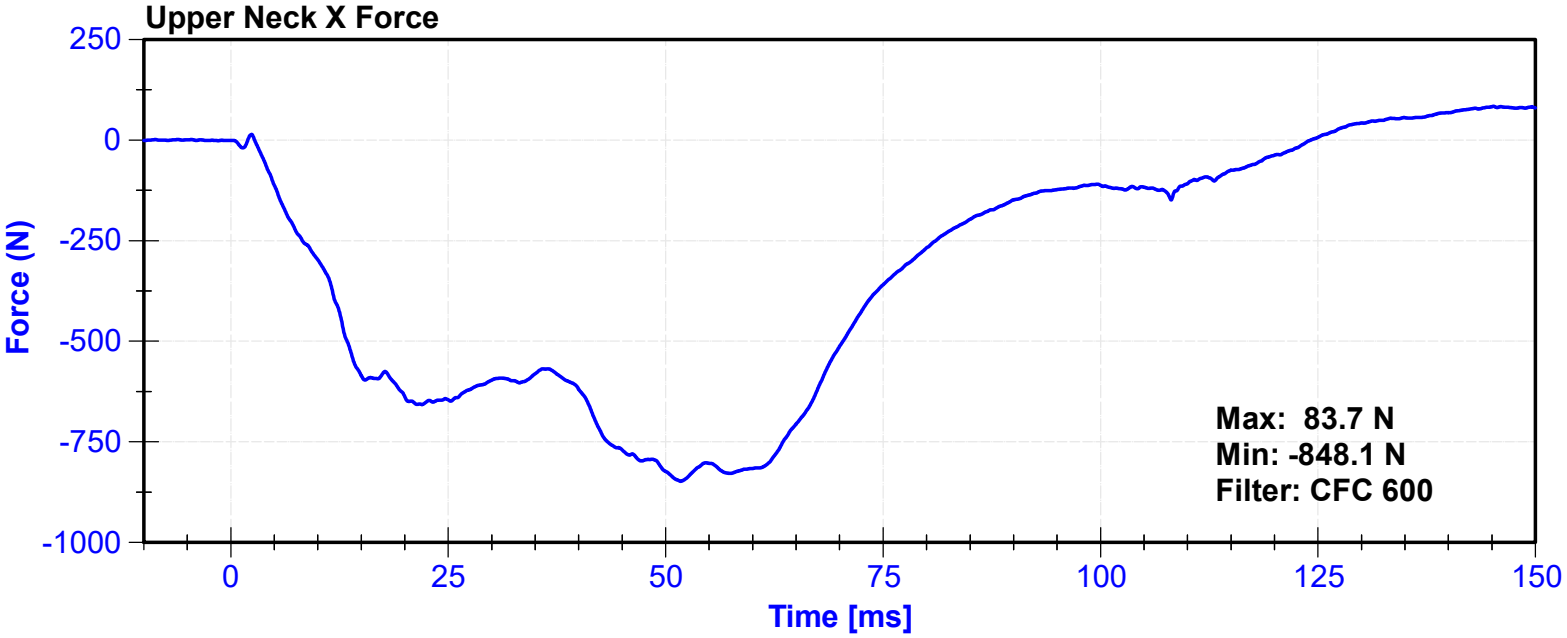
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Denton	2187-FX	6/13/2022	6/13/2023


D-Plane Rotation
Rotation (Deg)
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]
Max: 76.9 deg
Min: -35.8 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: 95.2 Nm
Min: -25.8 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 25.2 g's
Min: -2.9 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 80.9 Nm
Min: -36.2 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 83.7 N
Min: -848.1 N
Filter: CFC 600
Force (N)
Time [ms]

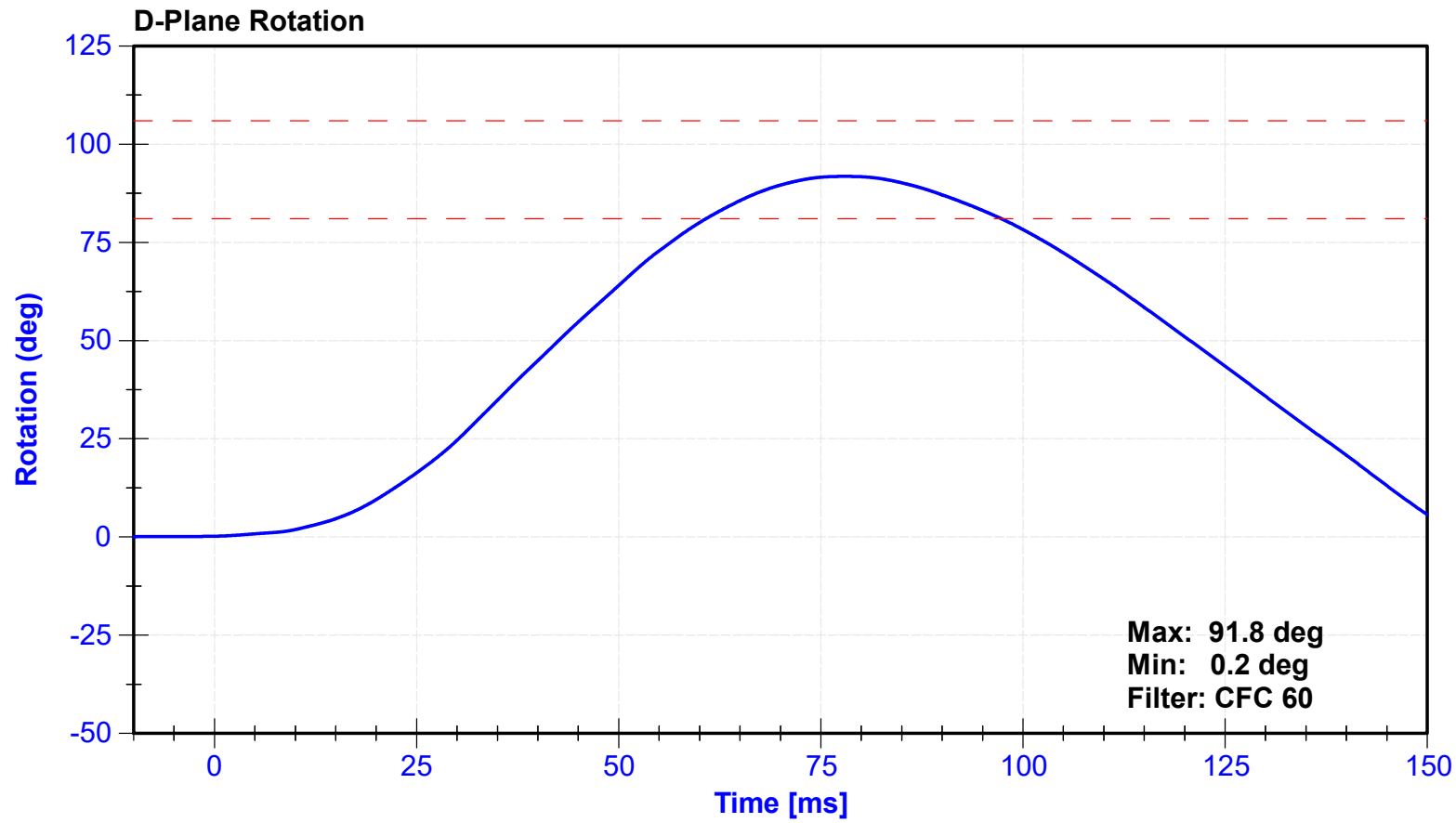
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

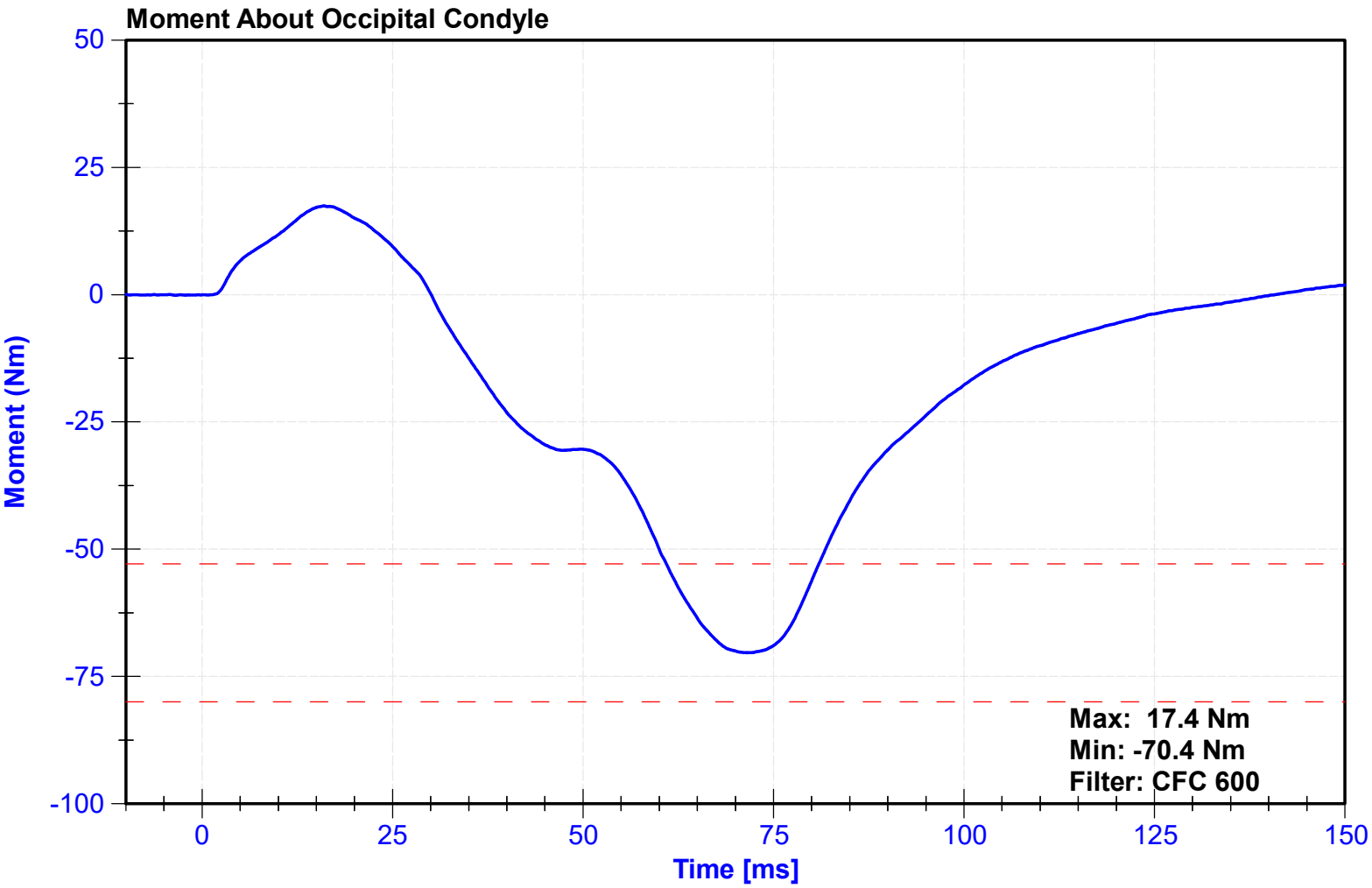
Results

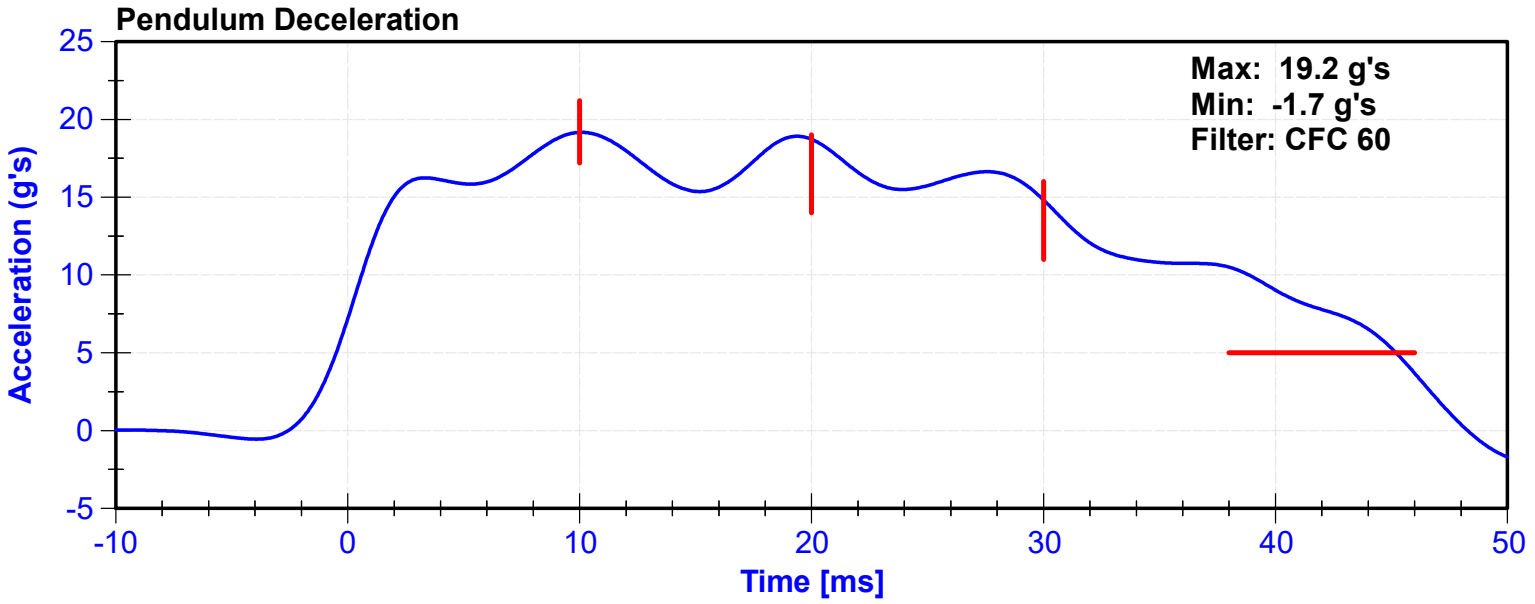
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	29.5	Pass
Velocity	5.94	6.19	m/s	6.072	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.16	Pass
Pendulum Deceleration at 20ms	14	19	g's	18.7	Pass
Pendulum Deceleration at 30ms	11	16	g's	14.8	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	19.2	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	45.2	Pass
Maximum D Plane Rotation	81	106	deg	91.8	Pass
Time to Maximum Rotation	72	82	ms	78.0	Pass
Rotation Decay to Zero	147	174	ms	154.2	Pass
Minimum Moment About OC	-80	-52.9	Nm	-70.36	Pass
Time to Minimum Moment	65	79	ms	71.5	Pass
Moment Decay to Zero	120	148	ms	140.9	Pass

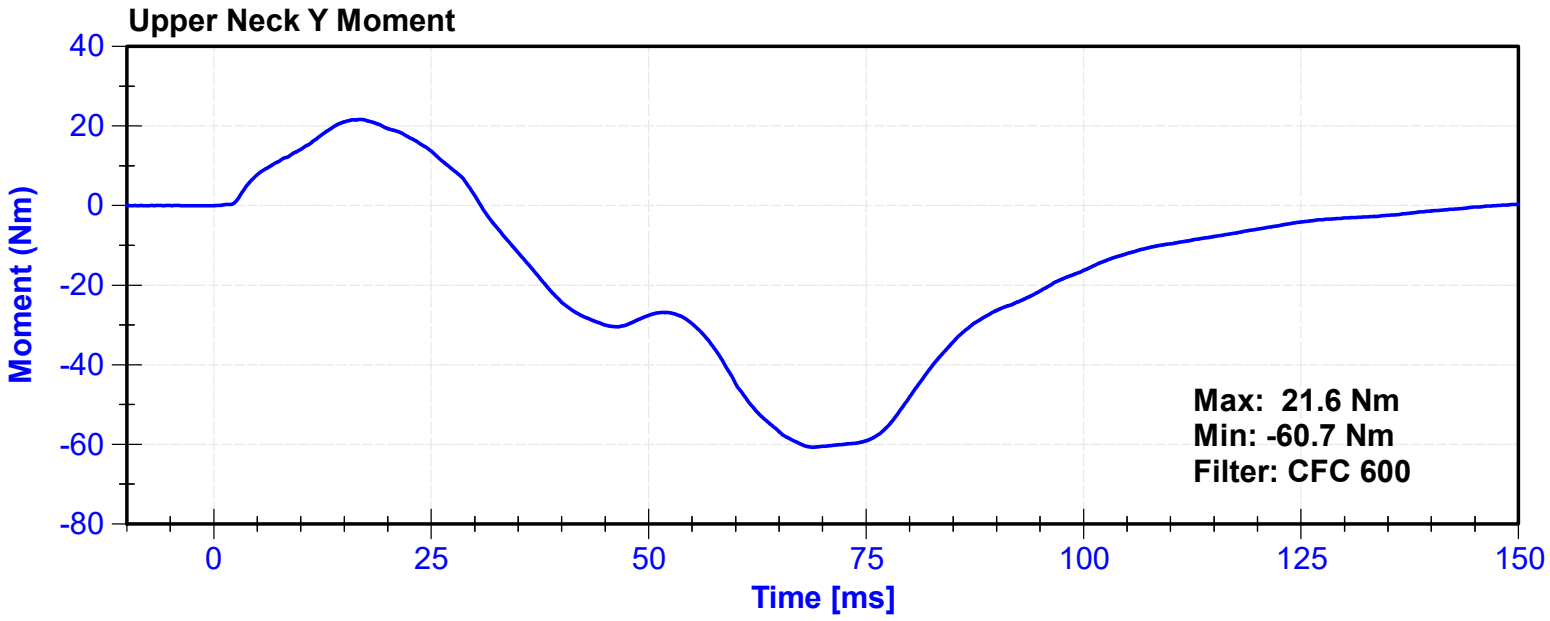
Transducer Calibrations

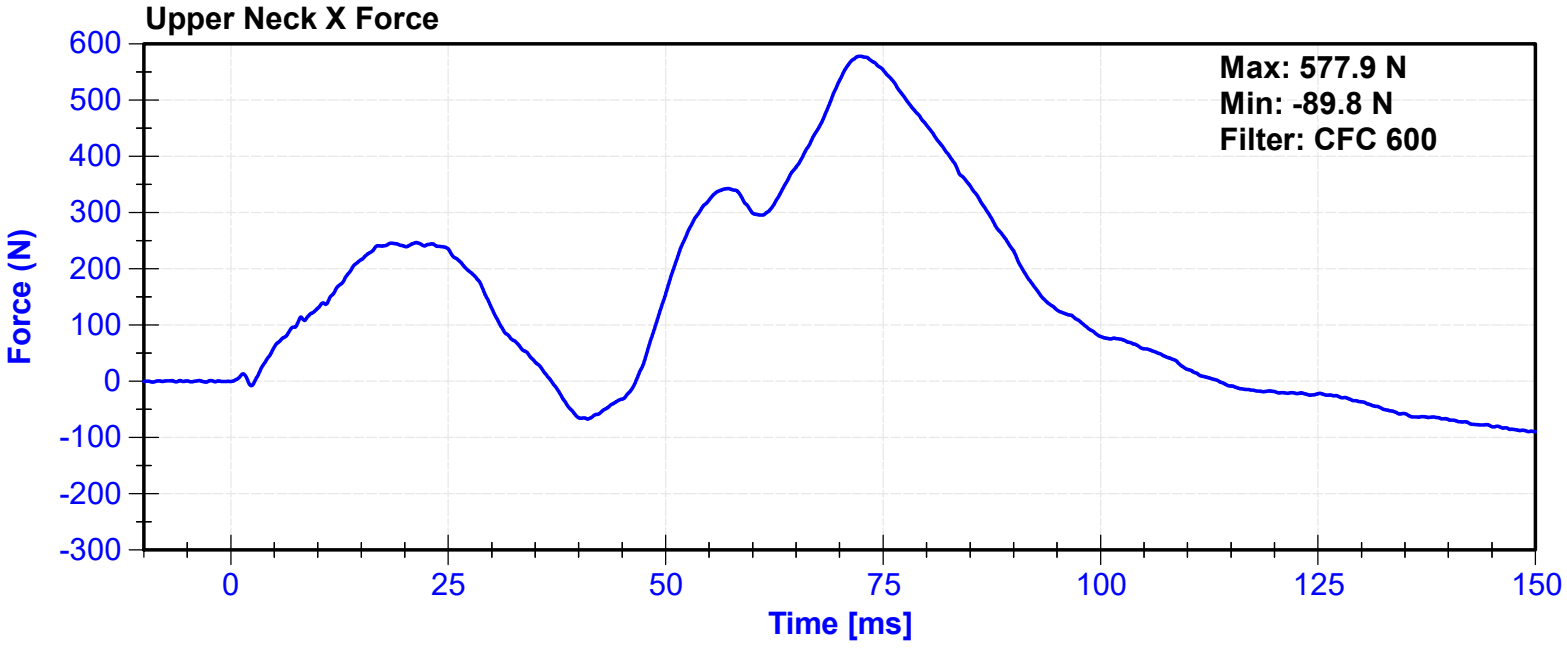
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Denton	2187-FX	6/13/2022	6/13/2023


D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 91.8 deg
Min: 0.2 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: 17.4 Nm
Min: -70.4 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 19.2 g's
Min: -1.7 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 21.6 Nm
Min: -60.7 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 577.9 N
Min: -89.8 N
Filter: CFC 600
Force (N)
Time [ms]

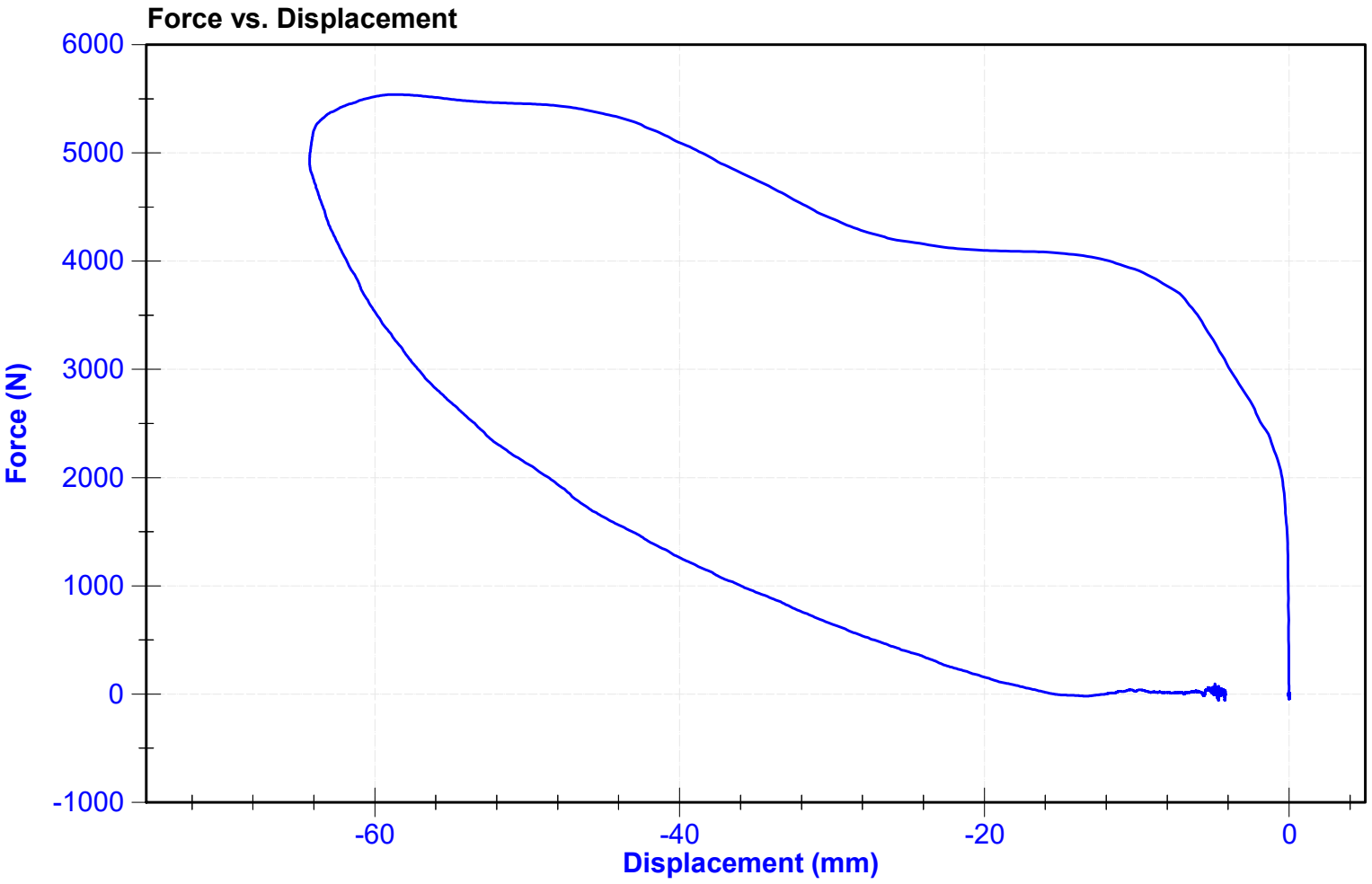
ATD Manufacturer	Humanetics	Test Technician	T. Roseman
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

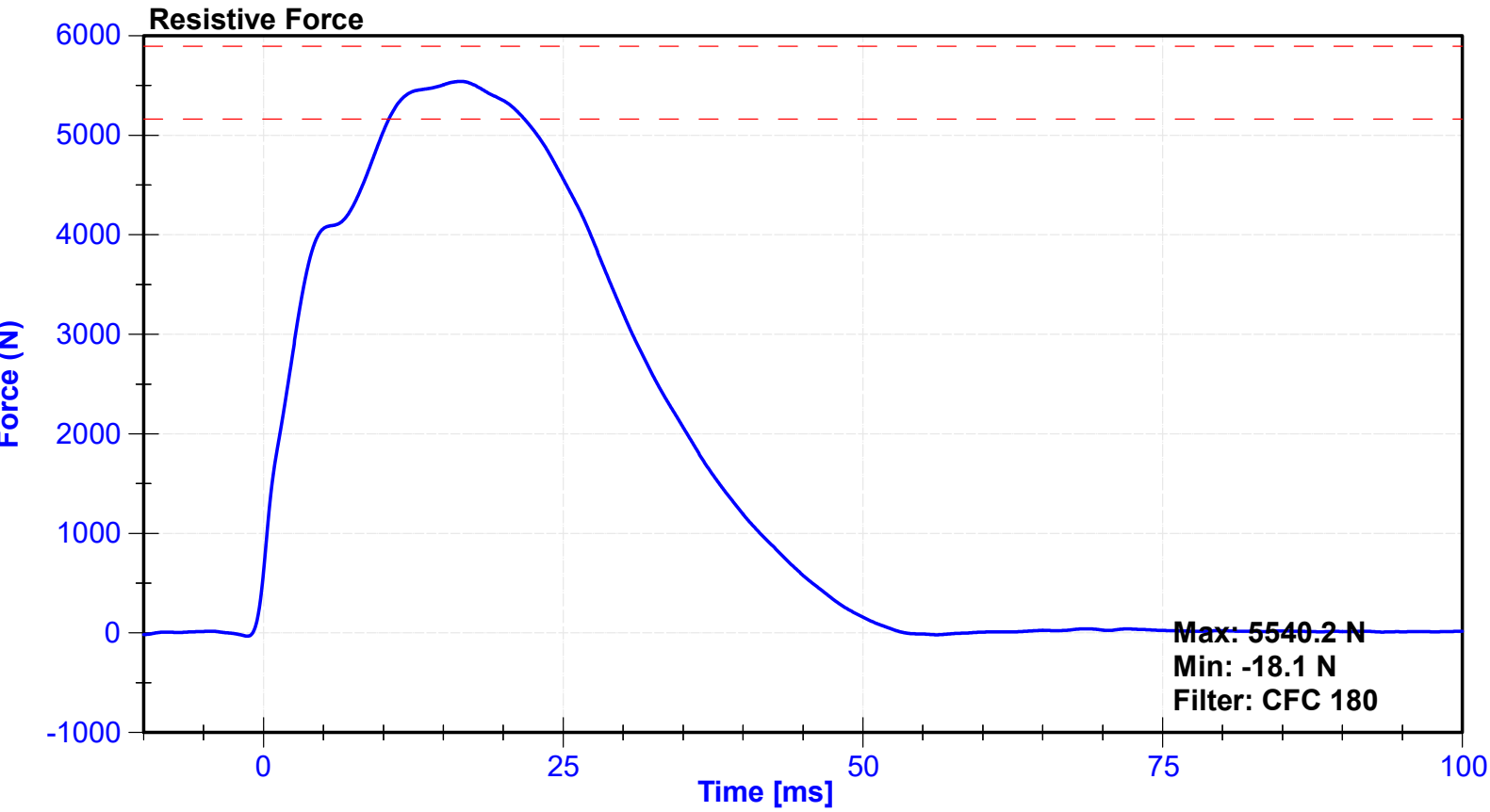
Results

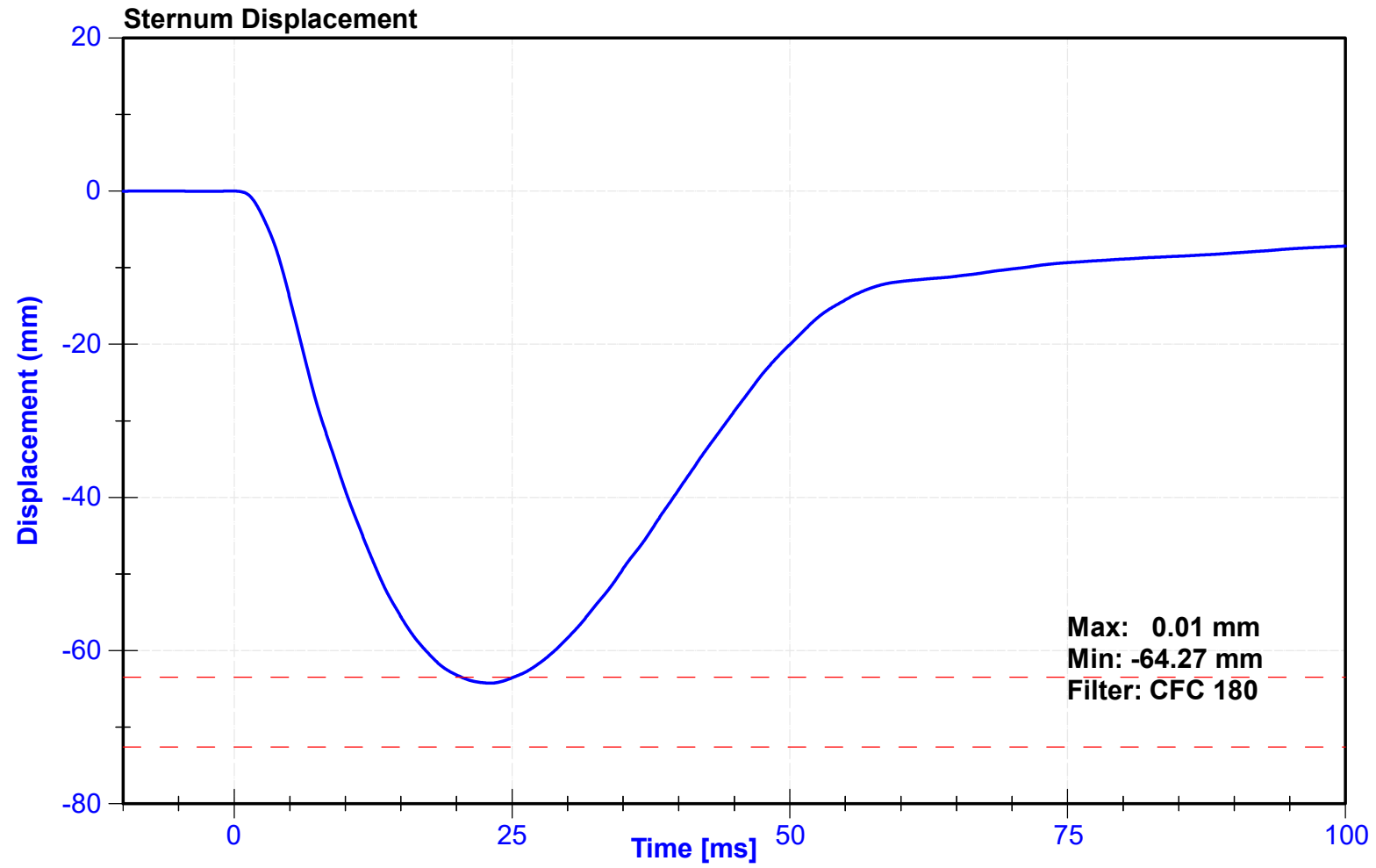
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	6.59	6.83	m/s	6.729	Pass
Chest Displacement	-72.6	-63.5	mm	-64.27	Pass
Resistive Force	5160	5894	N	5540.2	Pass
Hysteresis	69	85	%	74.2	Pass

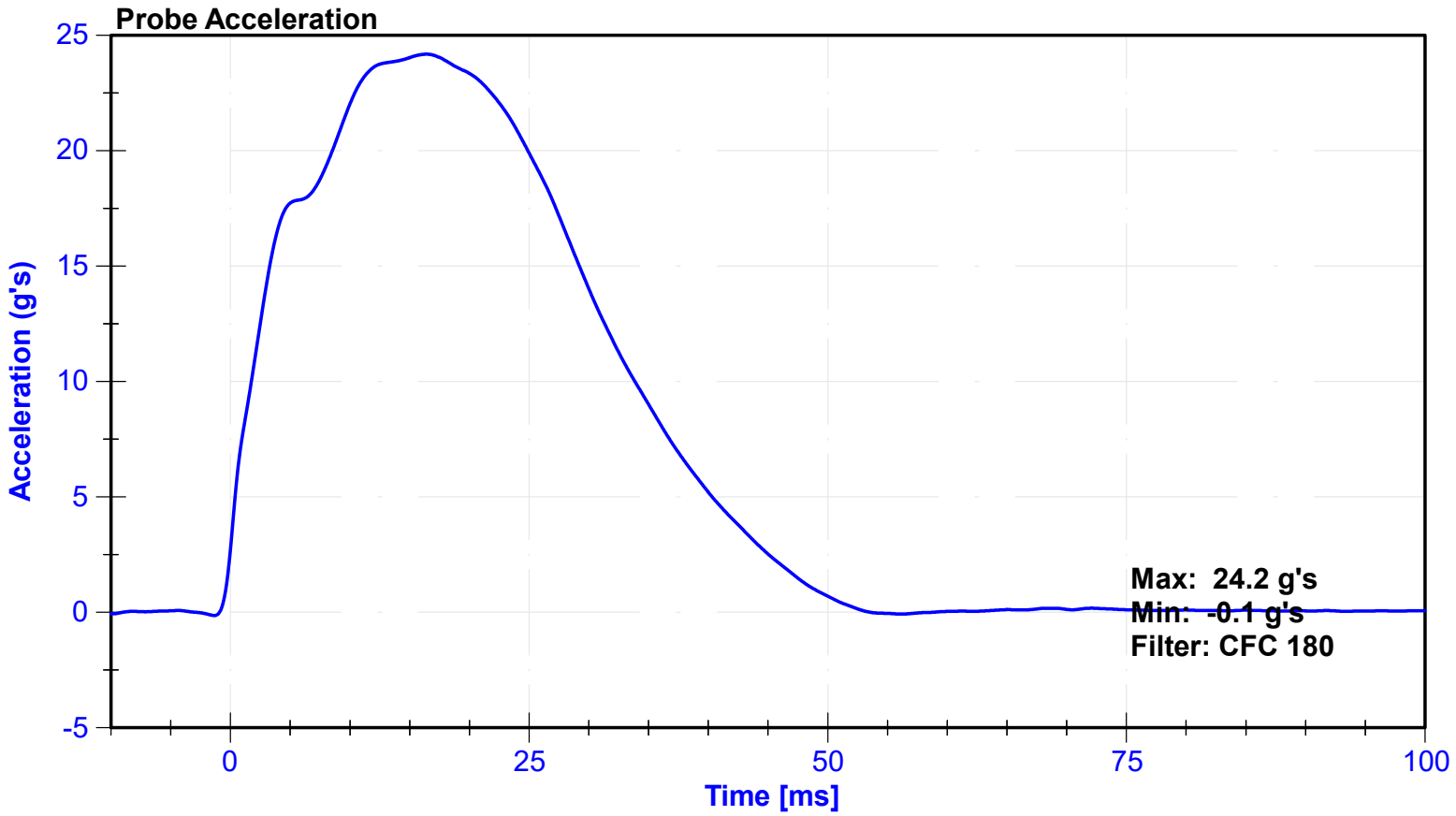
Transducer Calibrations

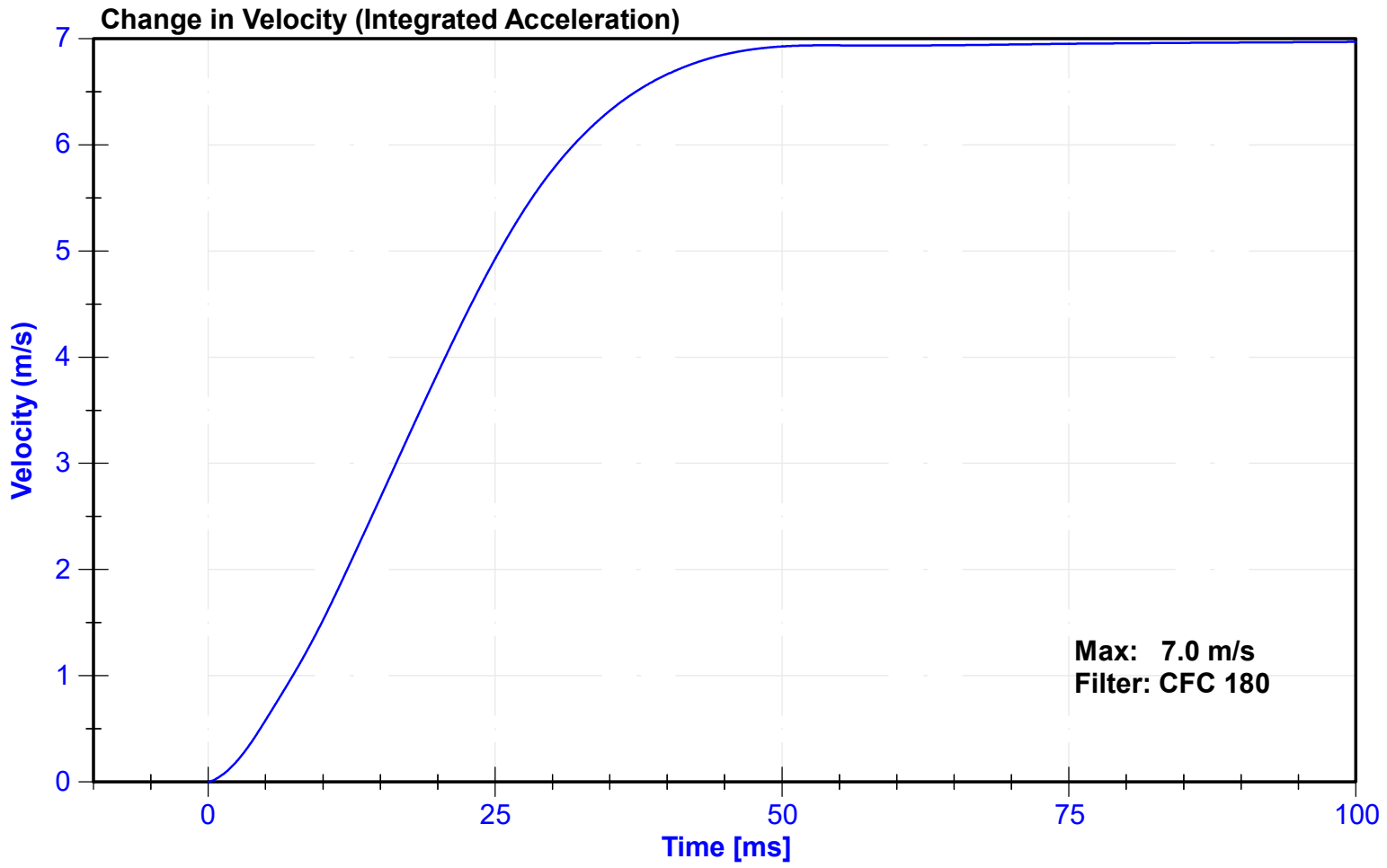
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Chest Potentiometer	JDK	0075	10/3/2022	4/3/2023




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
25
50
75
100
Time [ms]
Max: 5540.2 N
Min: -18.1 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
20
0
-20
-40
-60
-80
0
25
50
75
100
Time [ms]
Max: 0.01 mm
Min: -64.27 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
25
20
15
10
5
0
-5
0
25
50
75
100
Time [ms]
Max: 24.2 g's
Min: -0.1 g's
Filter: CFC 180


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

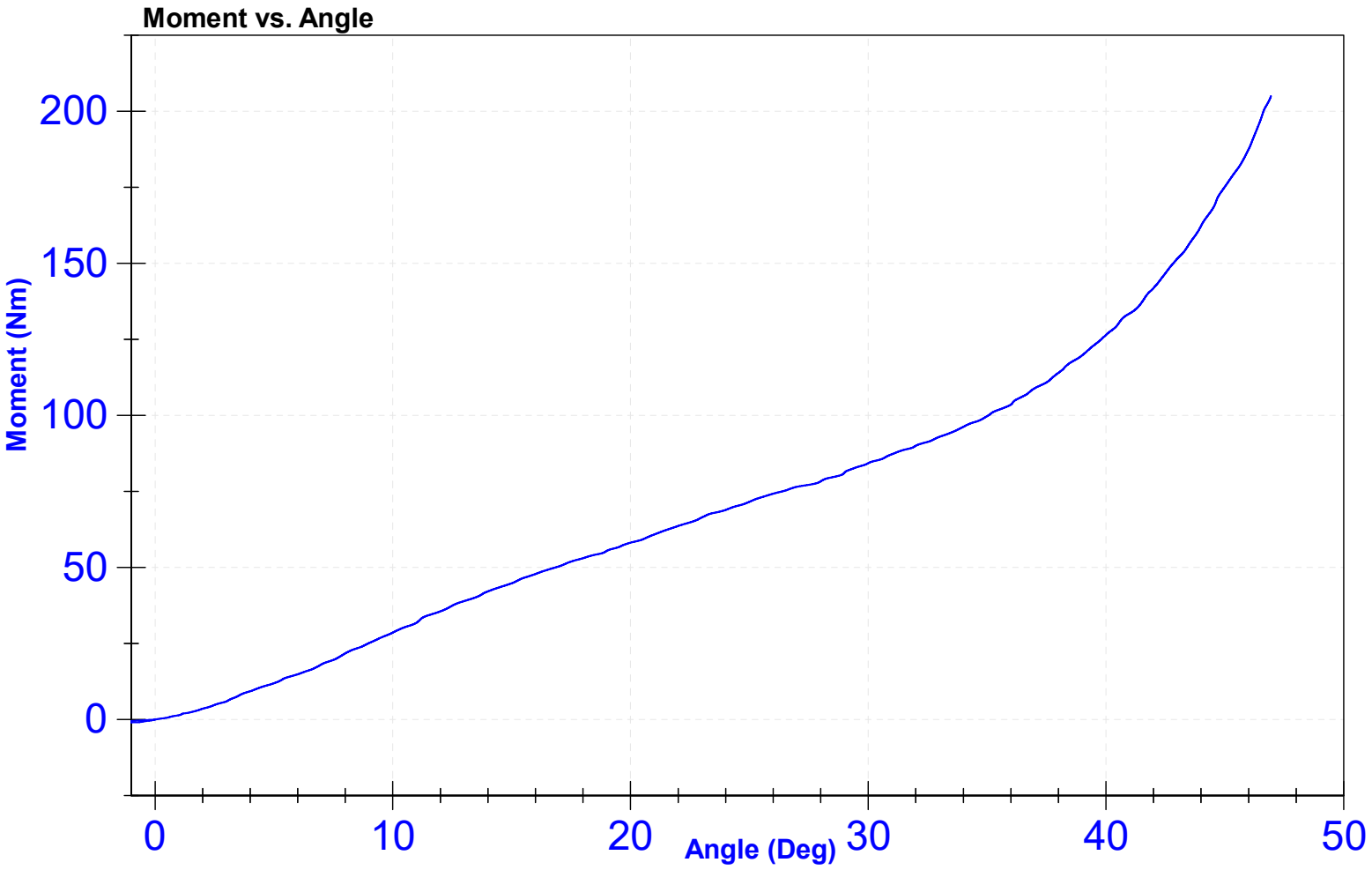
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	46.8	Pass
Moment at 30 degrees	0	94.9	Nm	84.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	10/4/2022	10/4/2023
Load Cell	PCB 2301-02	2301-02_115	2022-09-06	2023-09-06



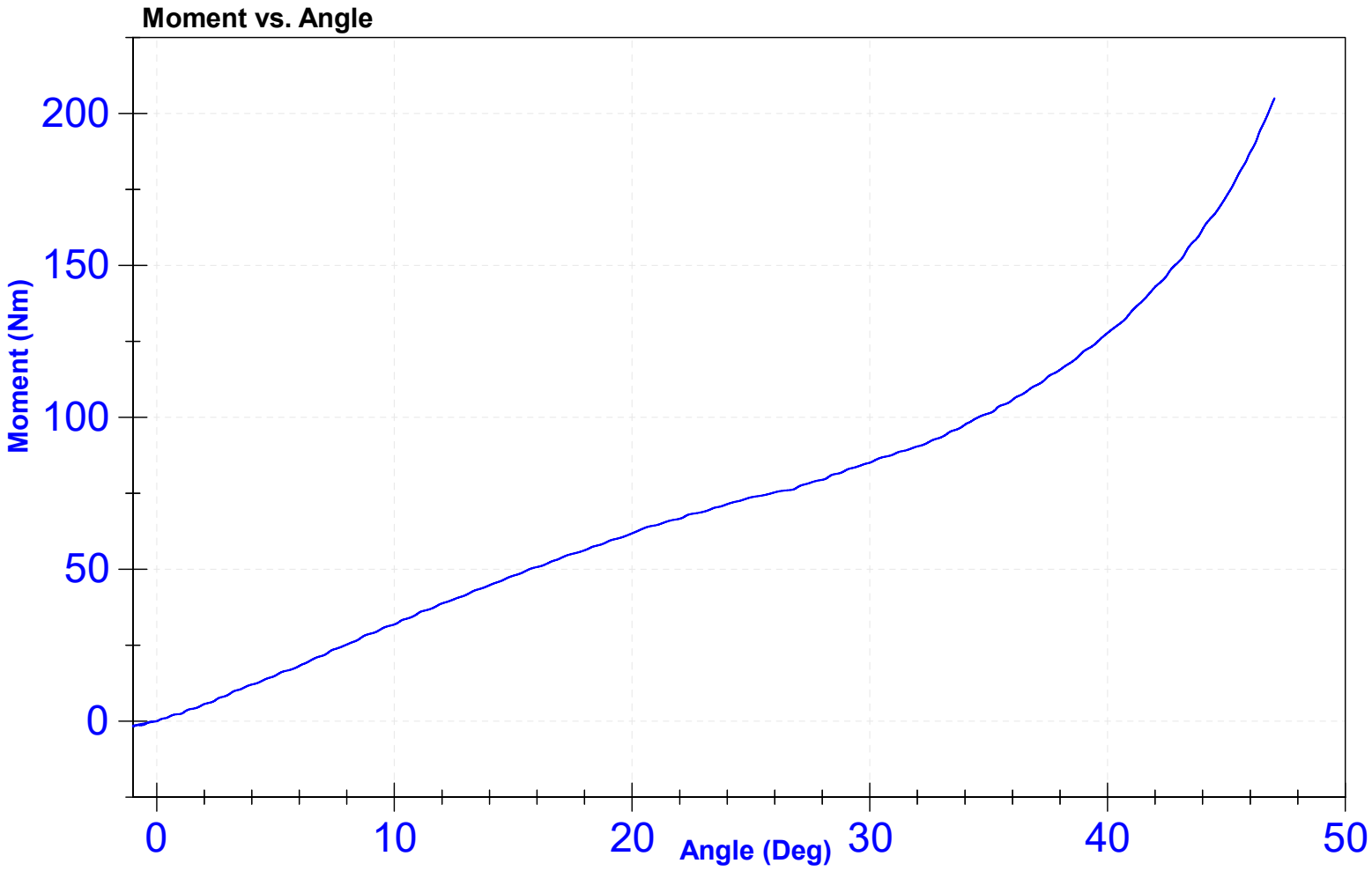
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	46.9	Pass
Moment at 30 degrees	0	94.9	Nm	85.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	10/4/2022	10/4/2023
Load Cell	PCB 2301-02	2301-02_115	2022-09-06	2023-09-06



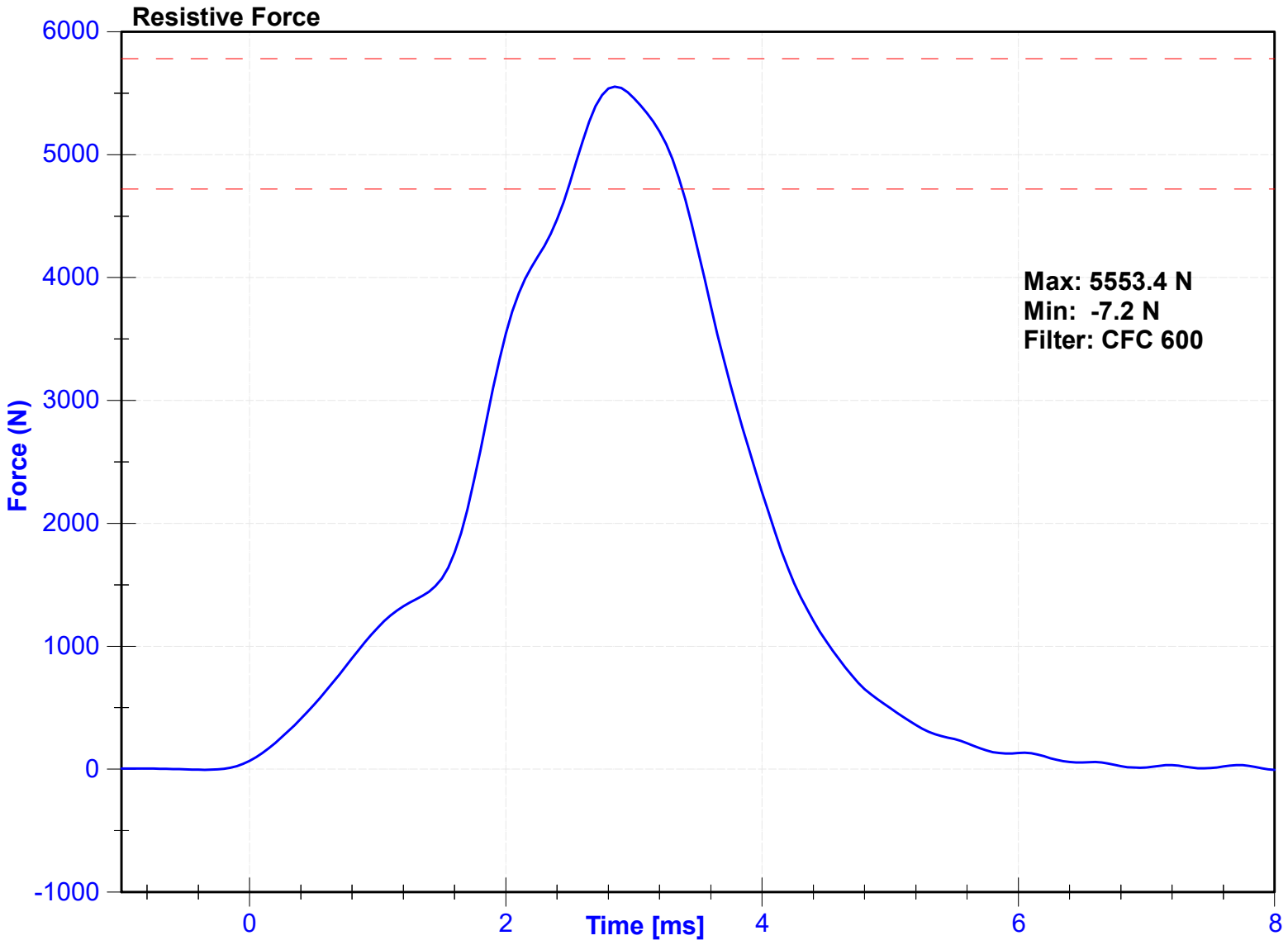
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

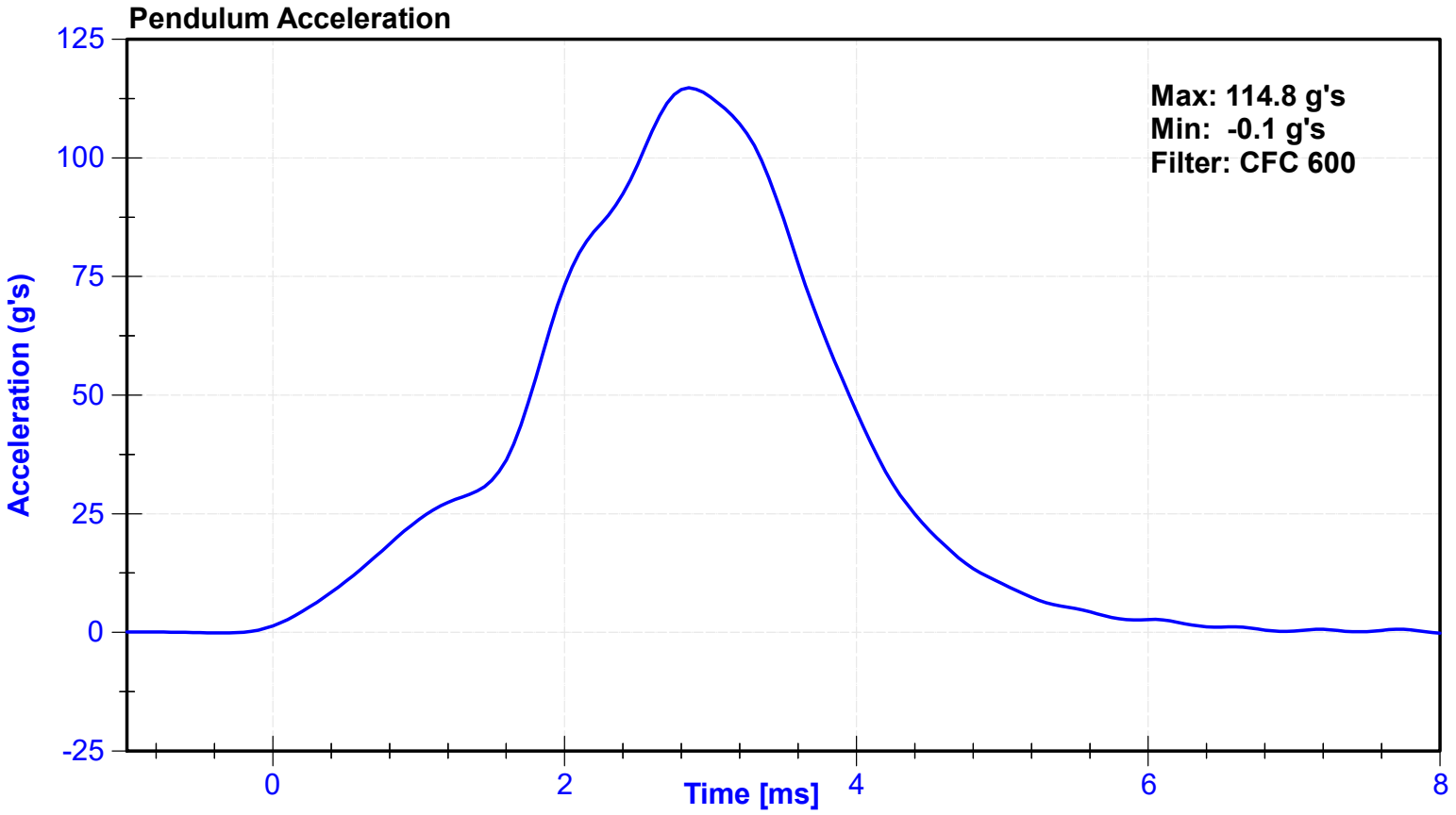
Results

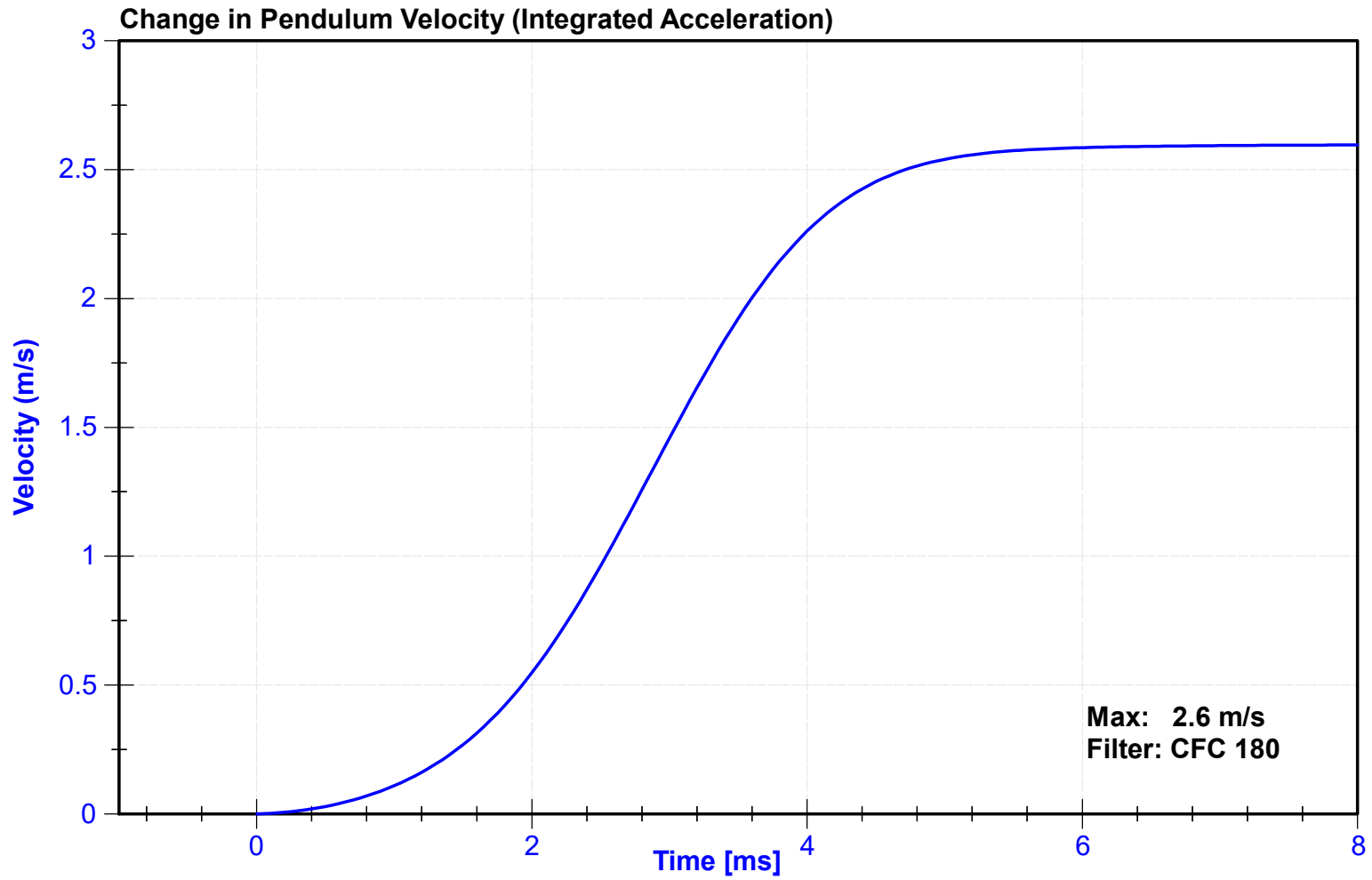
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	2.07	2.13	m/s	2.091	Pass
Maximum Resistive Force	4720	5780	N	5553.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Max: 114.8 g's
Min: -0.1 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


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

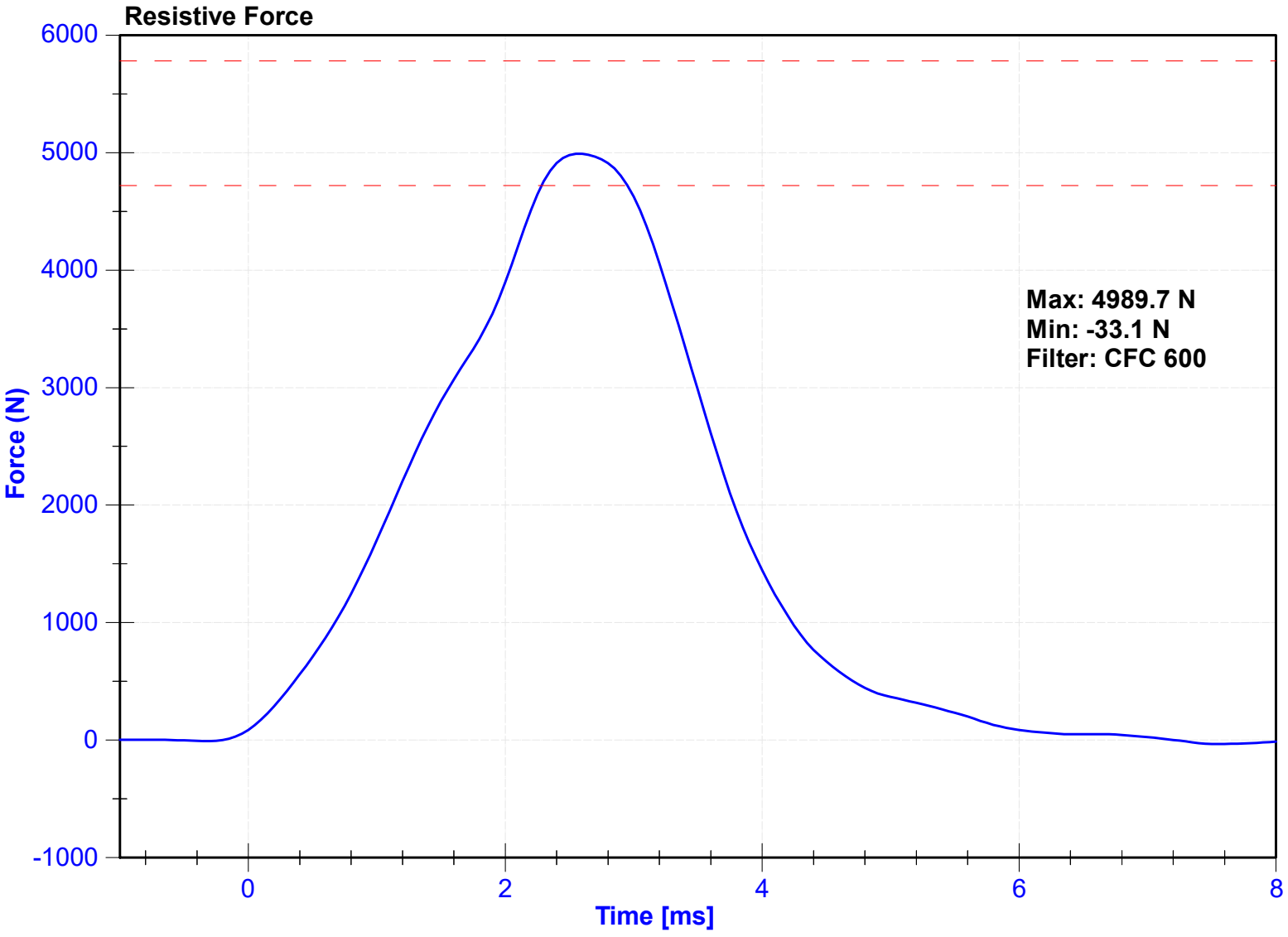
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

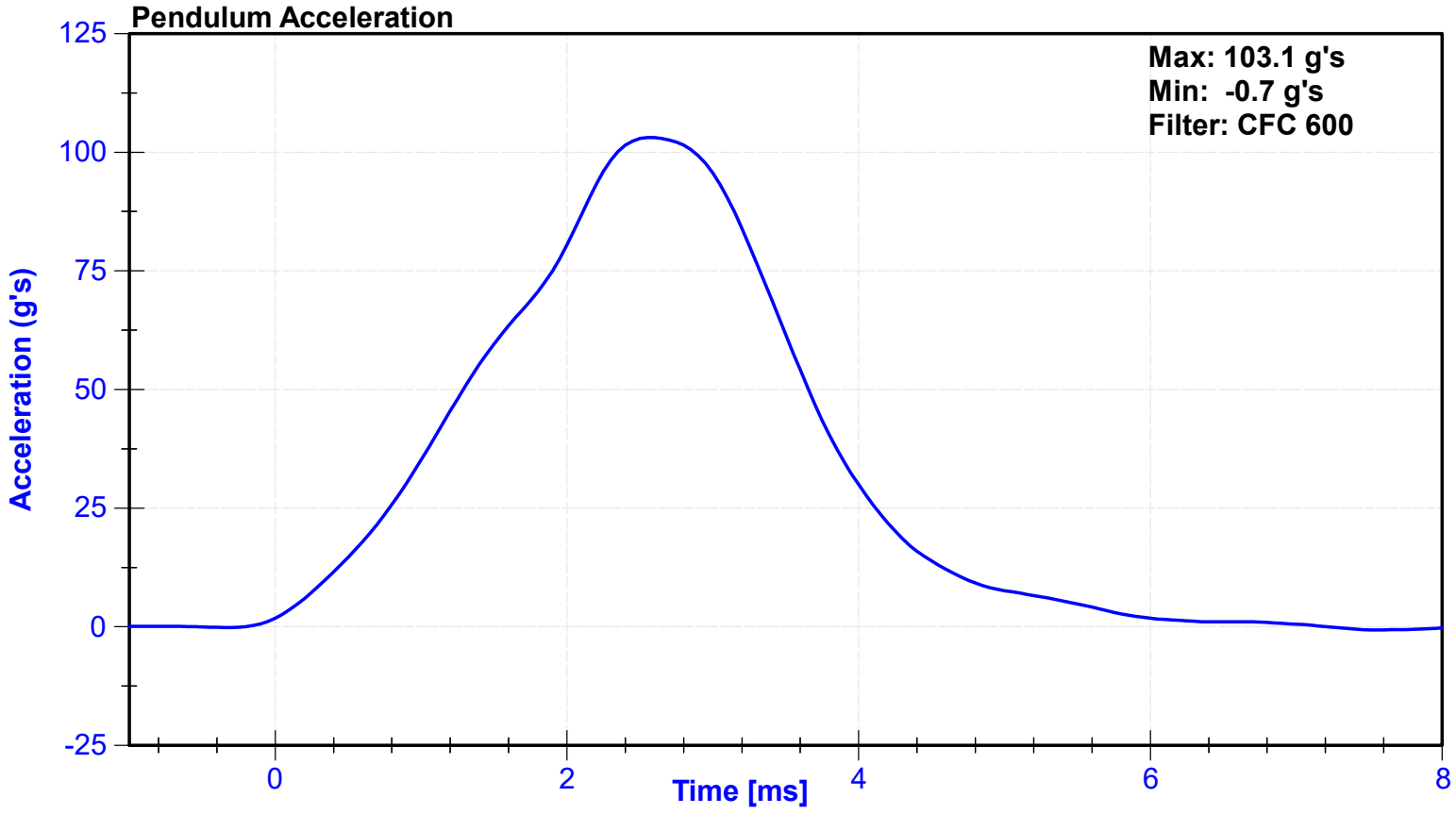
Results

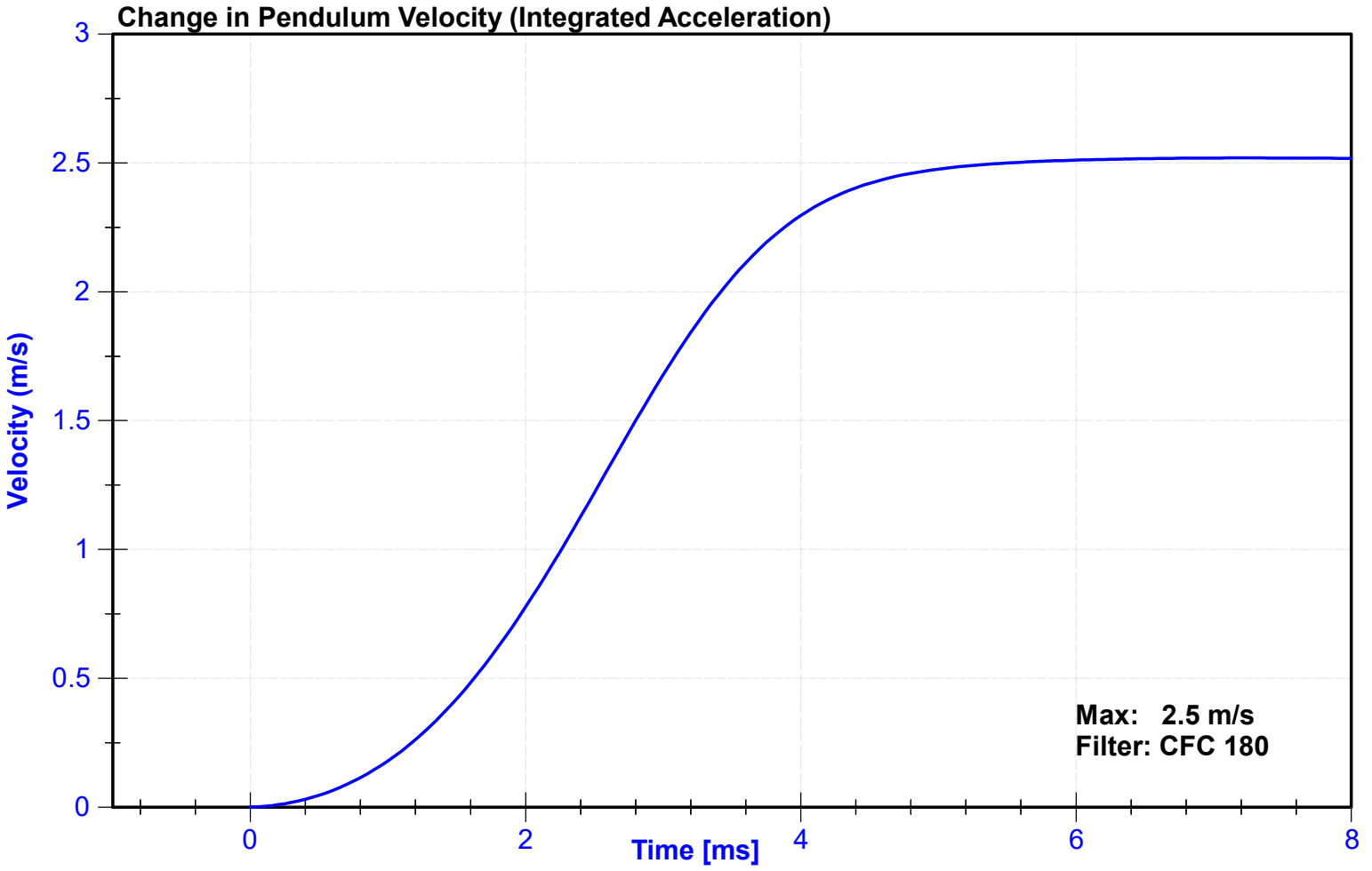
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	2.07	2.13	m/s	2.089	Pass
Maximum Resistive Force	4720	5780	N	4989.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Max: 103.1 g's
Min: -0.7 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


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

CALIBRATION TEST RESULTS

POST-TEST

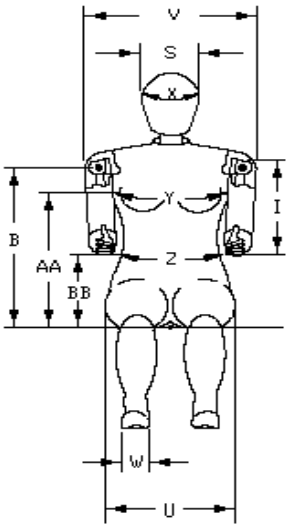
HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

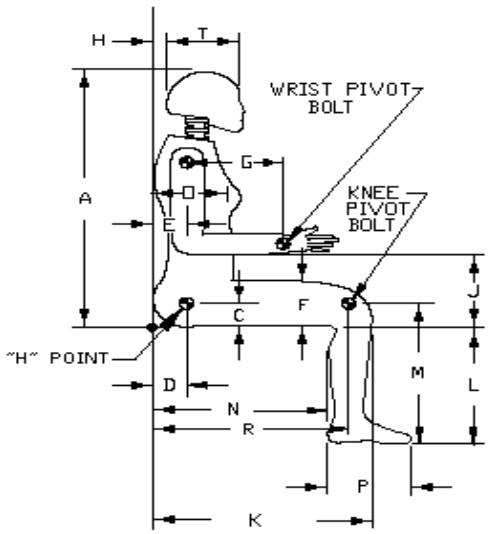
SERIAL NO: 137

External Measurements - Hybrid 3 - 5th Female

Technician: K. Brogan Date: 01/05/2023

Dummy Serial Number: 137





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	788	Pass
B	Shoulder Pivot Height	432	457	445	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	75	Pass
F	Thigh Clearance	119	135	127	Pass
G	Back of Elbow to Wrist Pivot	244	259	251	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	287	Pass
J	Elbow Rest Height	183	203	195	Pass
K	Buttock to Knee Length	521	546	536	Pass
L	Popliteal Height	356	376	369	Pass
M	Knee Pivot Height	394	419	407	Pass
N	Buttock Popliteal Length	414	439	425	Pass
O	Chest Depth without Jacket	175	191	182	Pass
P	Foot Length (right)	219	234	229	Pass
R	Buttock To Knee Pivot Length	457	483	465	Pass
S	Head Breadth	137	147	143	Pass
T	Head Depth	178	188	180	Pass
U	Hip Breadth	300	315	311	Pass
V	Shoulder Breadth	351	366	359	Pass
W	Foot Breadth	79	94	85	Pass
X	Head Circumference	528	549	542	Pass
Y	Chest Circumference with Jacket	851	881	872	Pass
Z	Waist Circumference	460	790	652	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	164	Pass

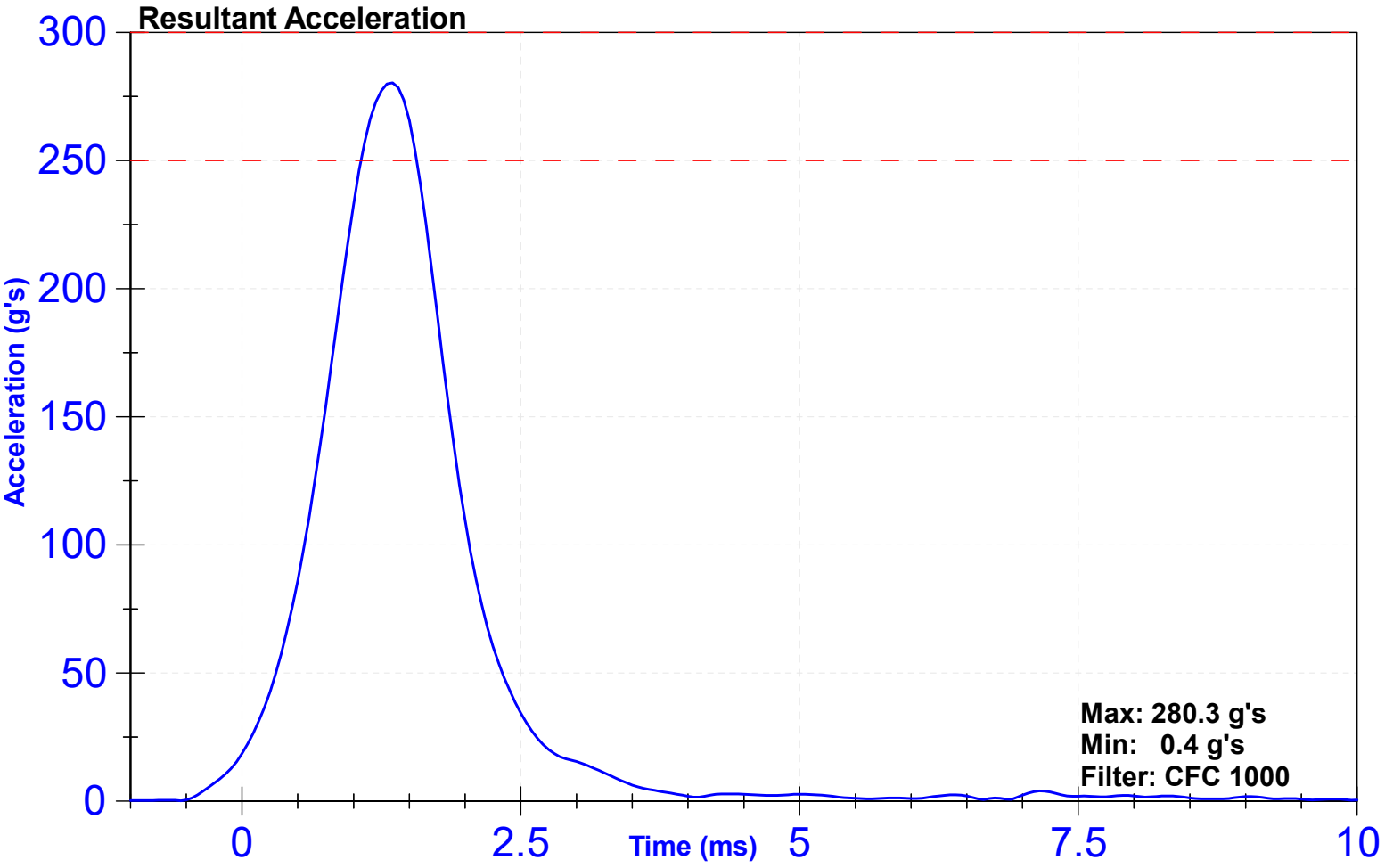
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

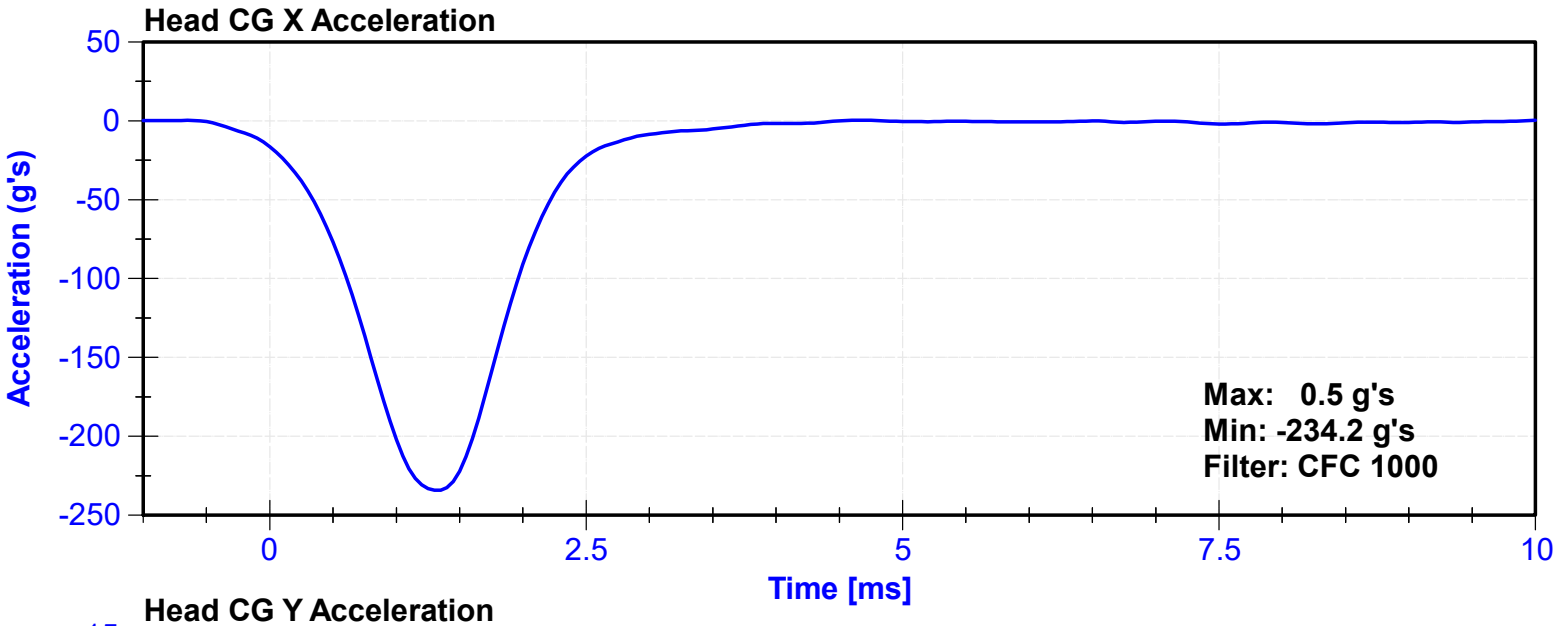
Results

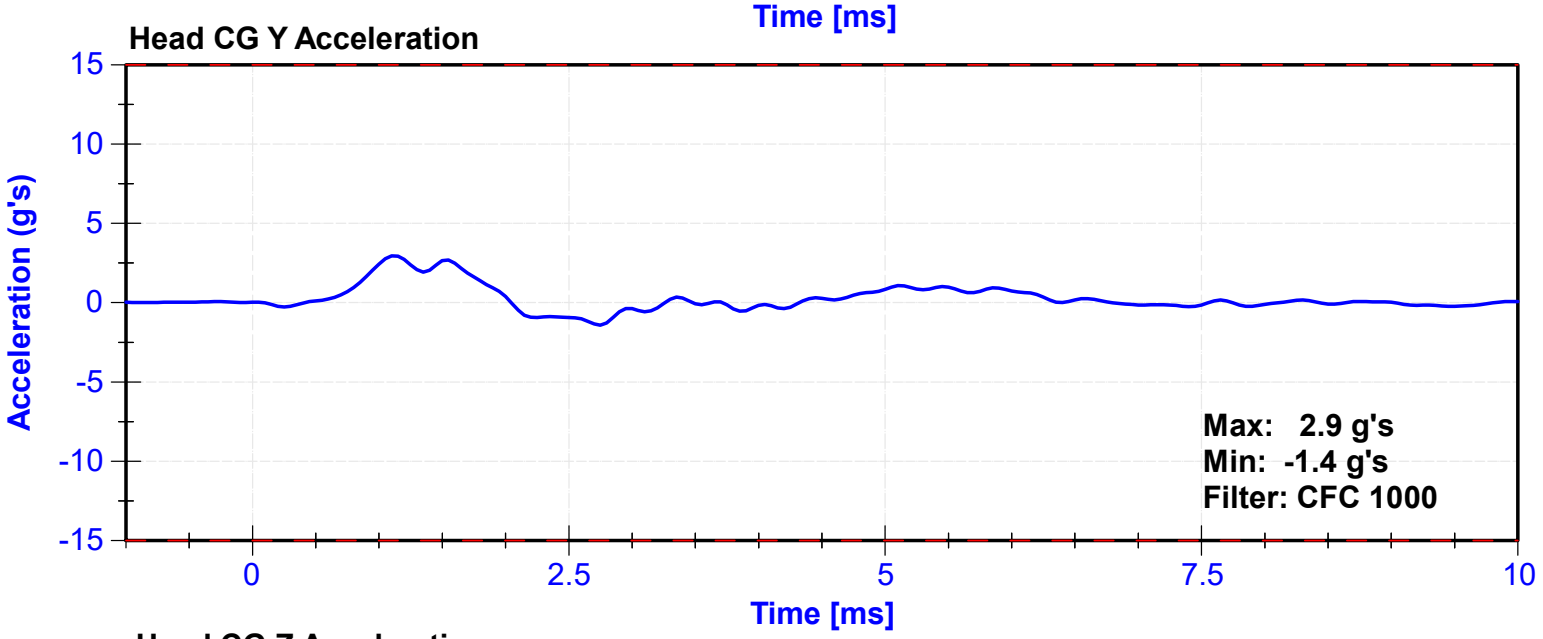
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21.1	Pass
Humidity	10	70	%	34.5	Pass
Resultant Acceleration	250	300	g's	280.3	Pass
Oscillation	0	10	%	1.4	Pass
Lateral Acceleration	-15	15	g's	2.9	Pass

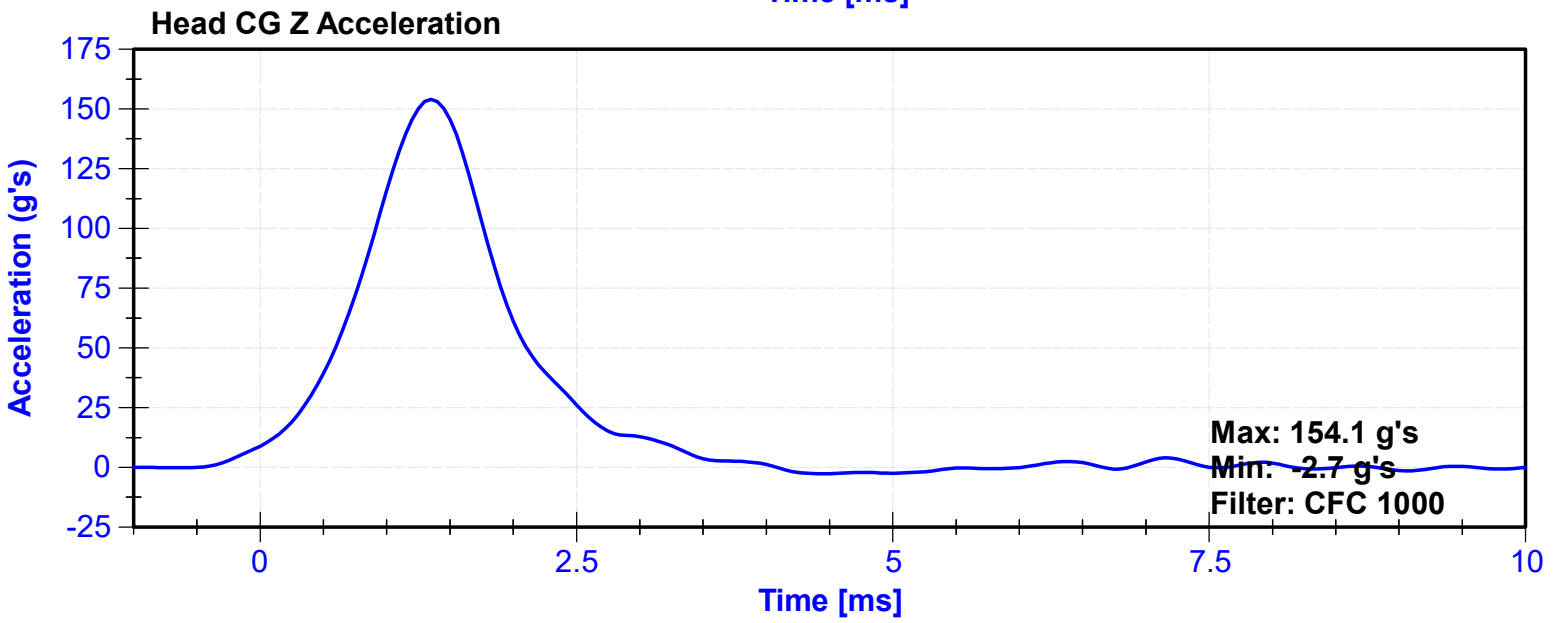
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P79417	12/13/2022	6/11/2023
Y Accelerometer	Endevco	P83335	12/13/2022	6/11/2023
Z Accelerometer	Endevco	P64149	12/12/2022	6/10/2023




Head CG X Acceleration
Acceleration (g's)
50
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 0.5 g's
Min: -234.2 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: 2.9 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: 154.1 g's
Min: -2.7 g's
Filter: CFC 1000

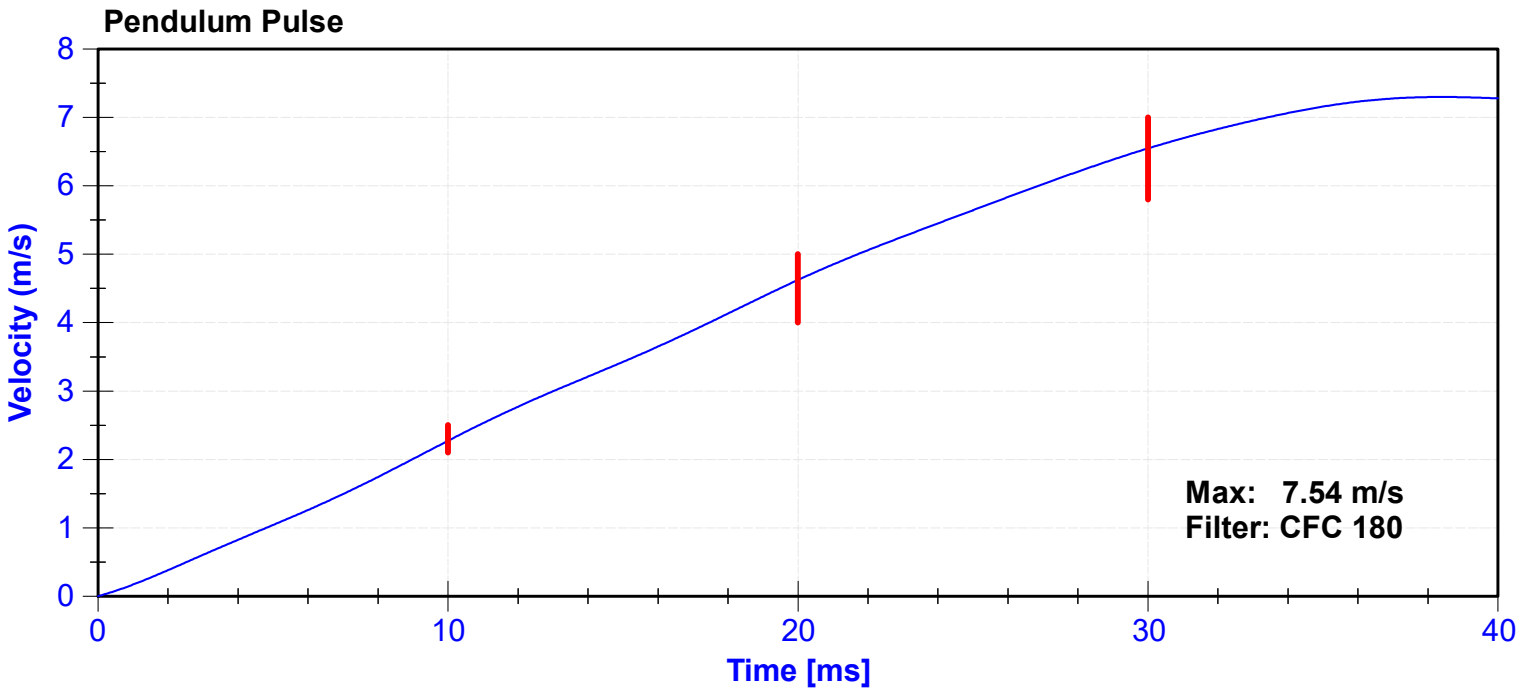
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

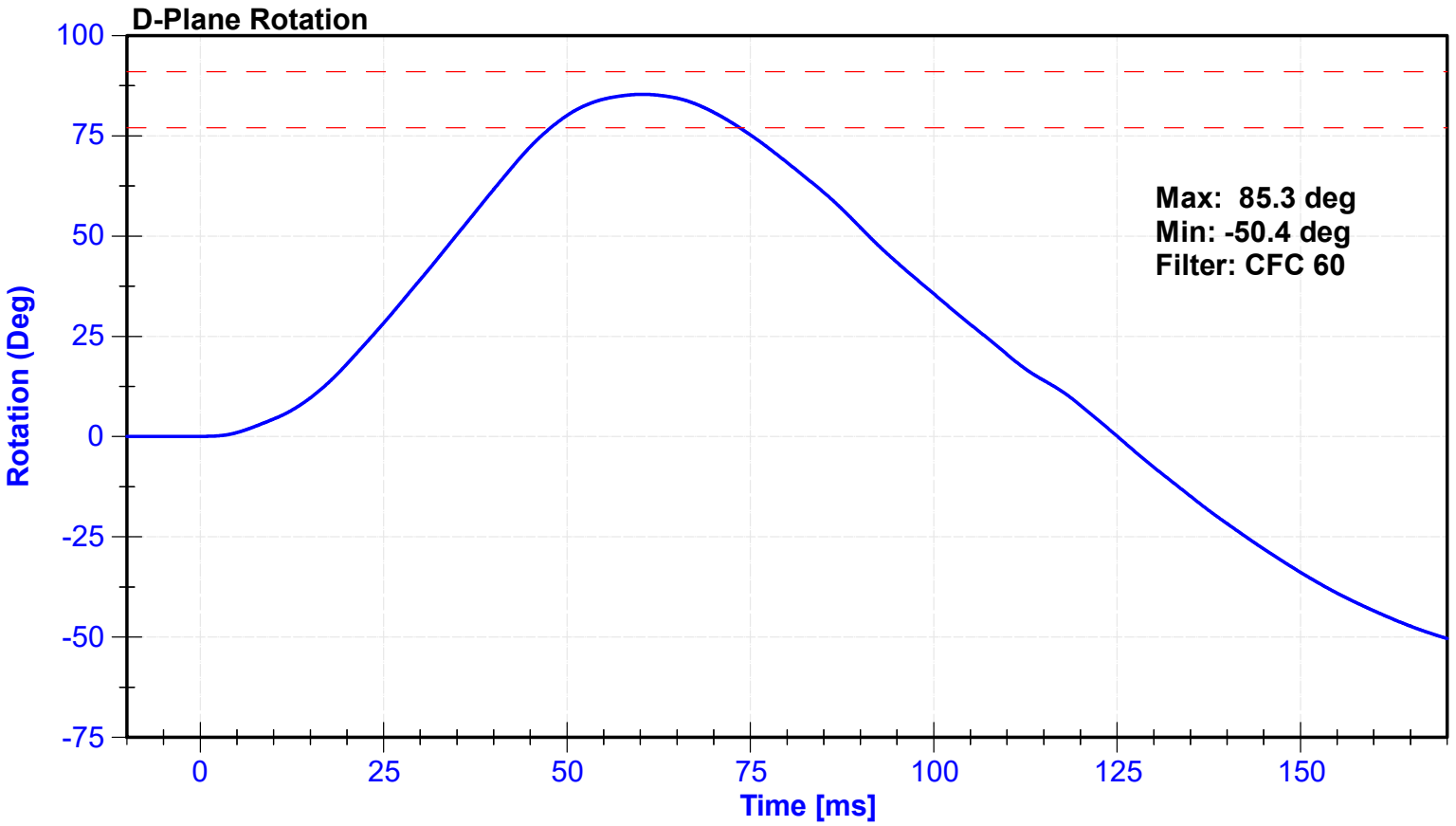
Results

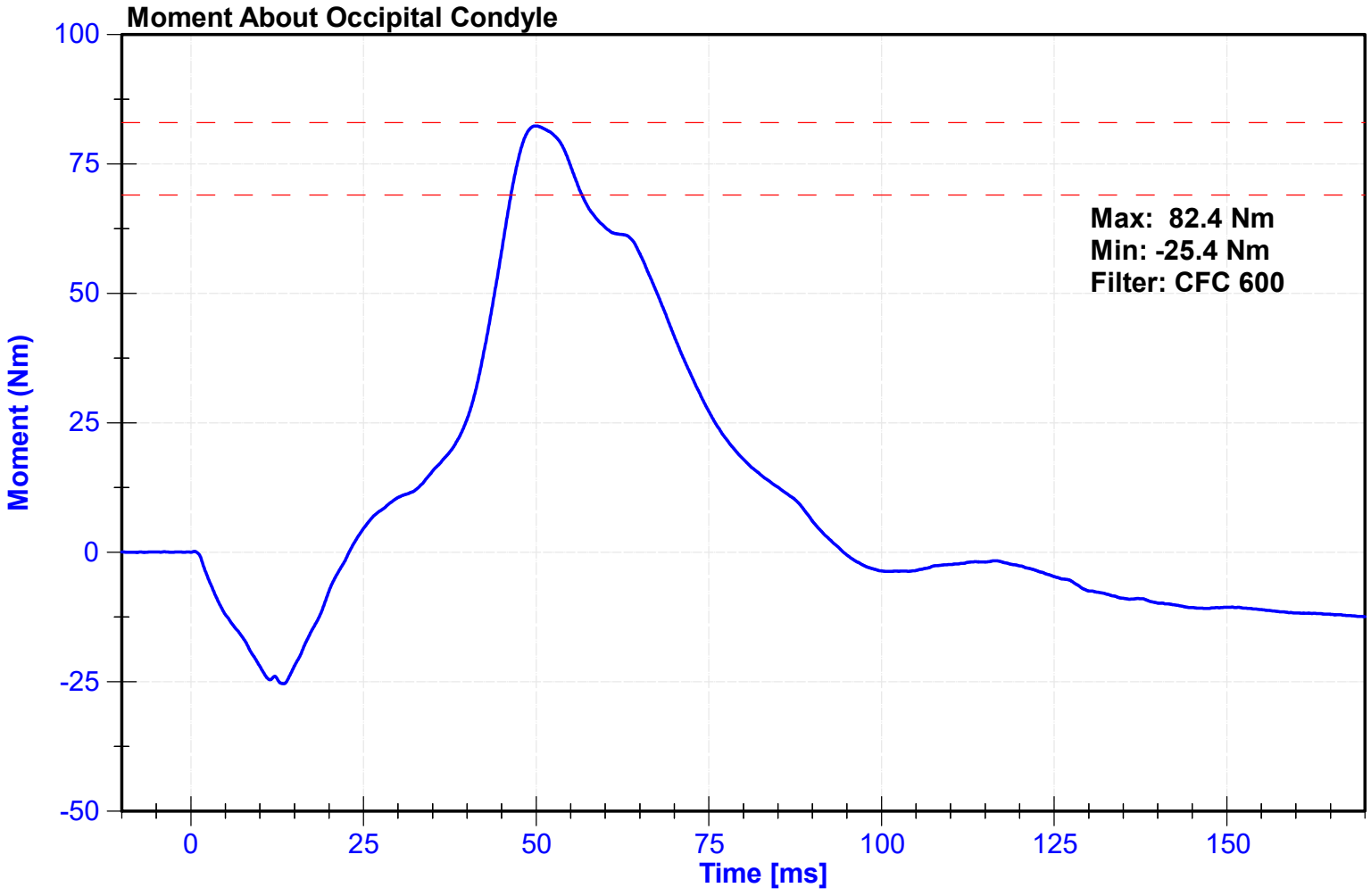
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	6.89	7.13	m/s	7.023	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.27	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.62	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.55	Pass
Max D Plane Rotation	77	91	deg	85.3	Pass
Max Moment During Rotation Interval	69	83	Nm	82.4	Pass
Moment Decay to 10.0 Nm	80	100	ms	87.7	Pass

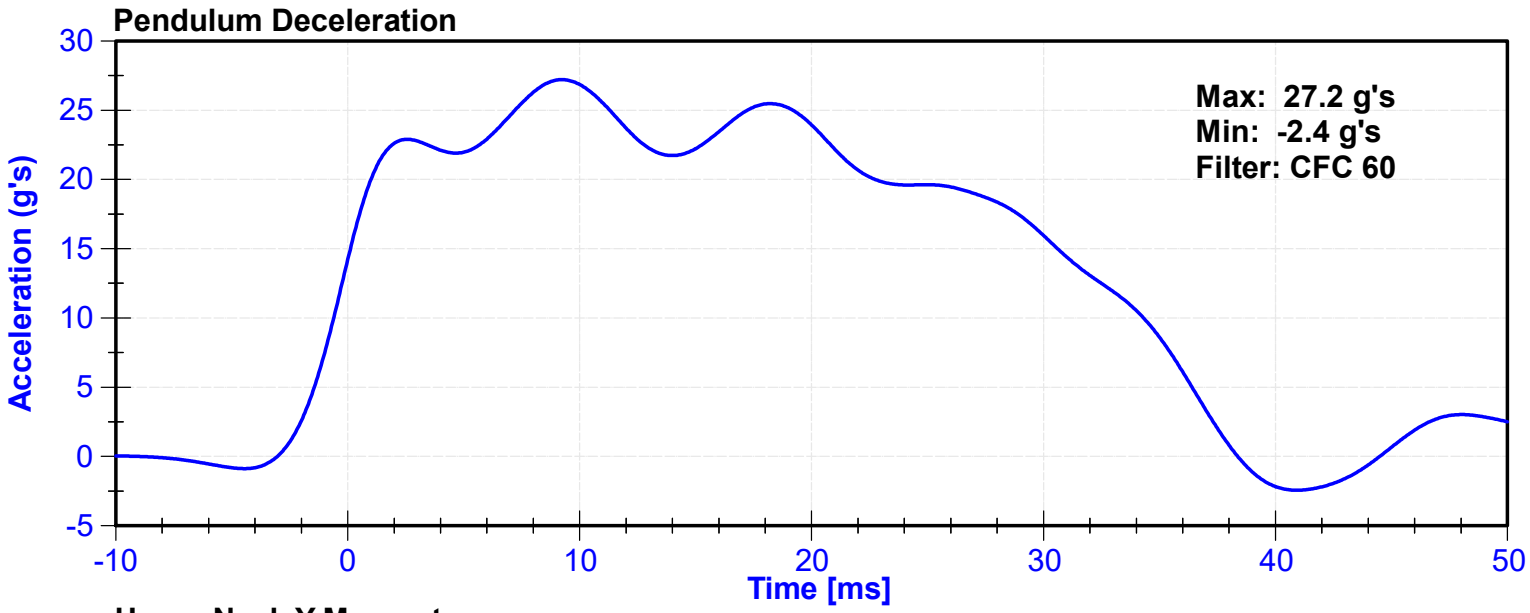
Transducer Calibrations

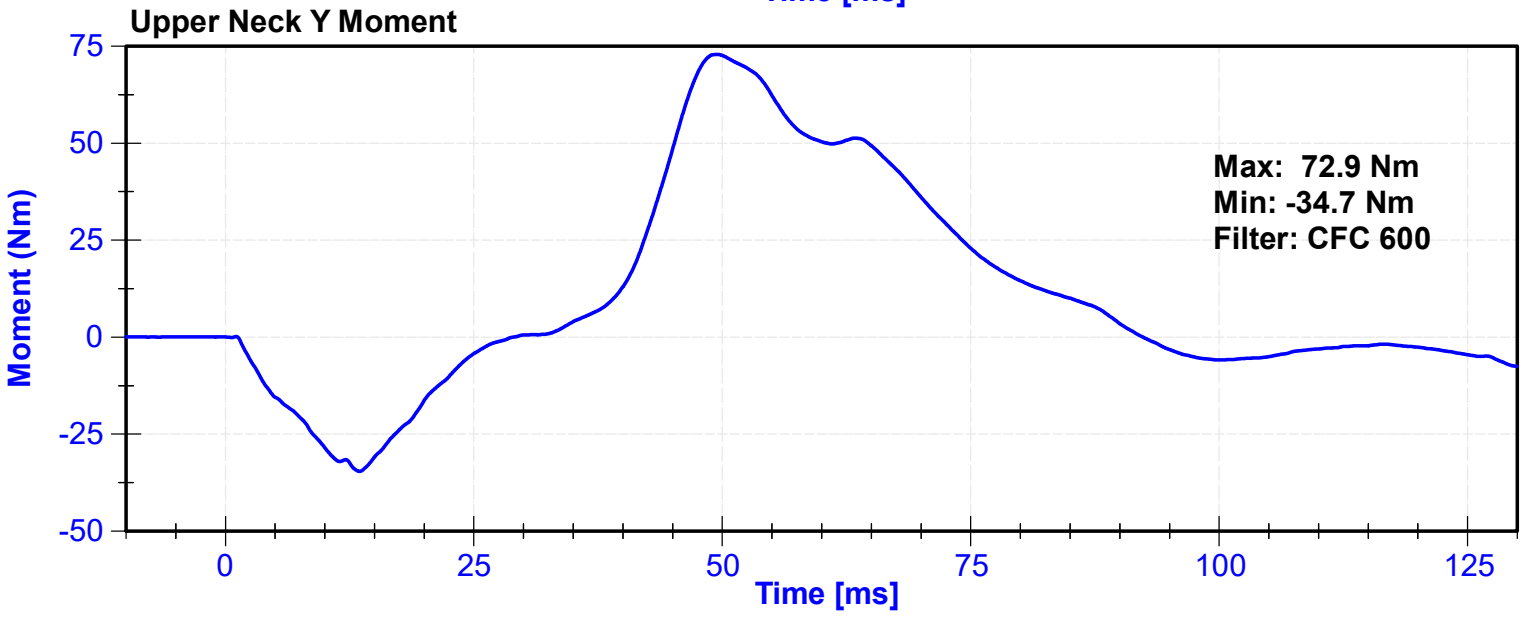
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Humanetics	1916-FX	6/10/2022	6/10/2023

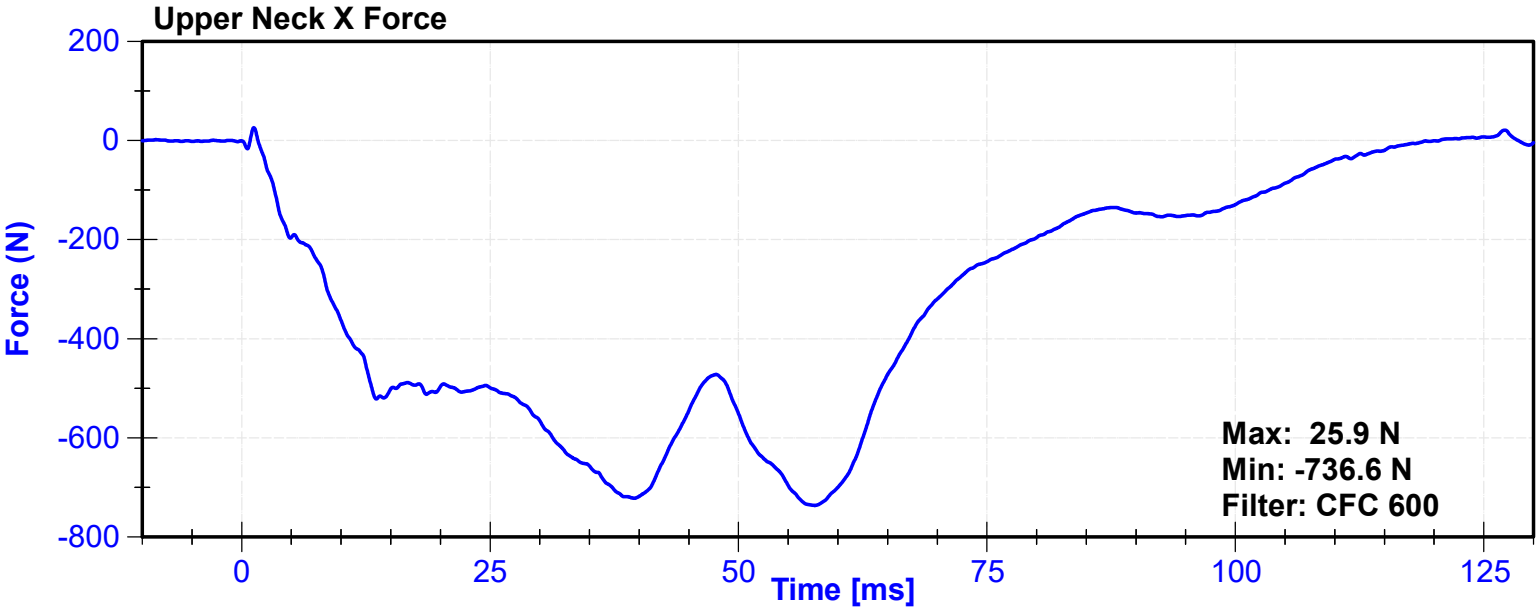



D-Plane Rotation
Max: 85.3 deg
Min: -50.4 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 82.4 Nm
Min: -25.4 Nm
Filter: CFC 600
Moment (Nm)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Pendulum Deceleration
Acceleration (g's)
Time [ms]
Max: 27.2 g's
Min: -2.4 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 72.9 Nm
Min: -34.7 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 25.9 N
Min: -736.6 N
Filter: CFC 600

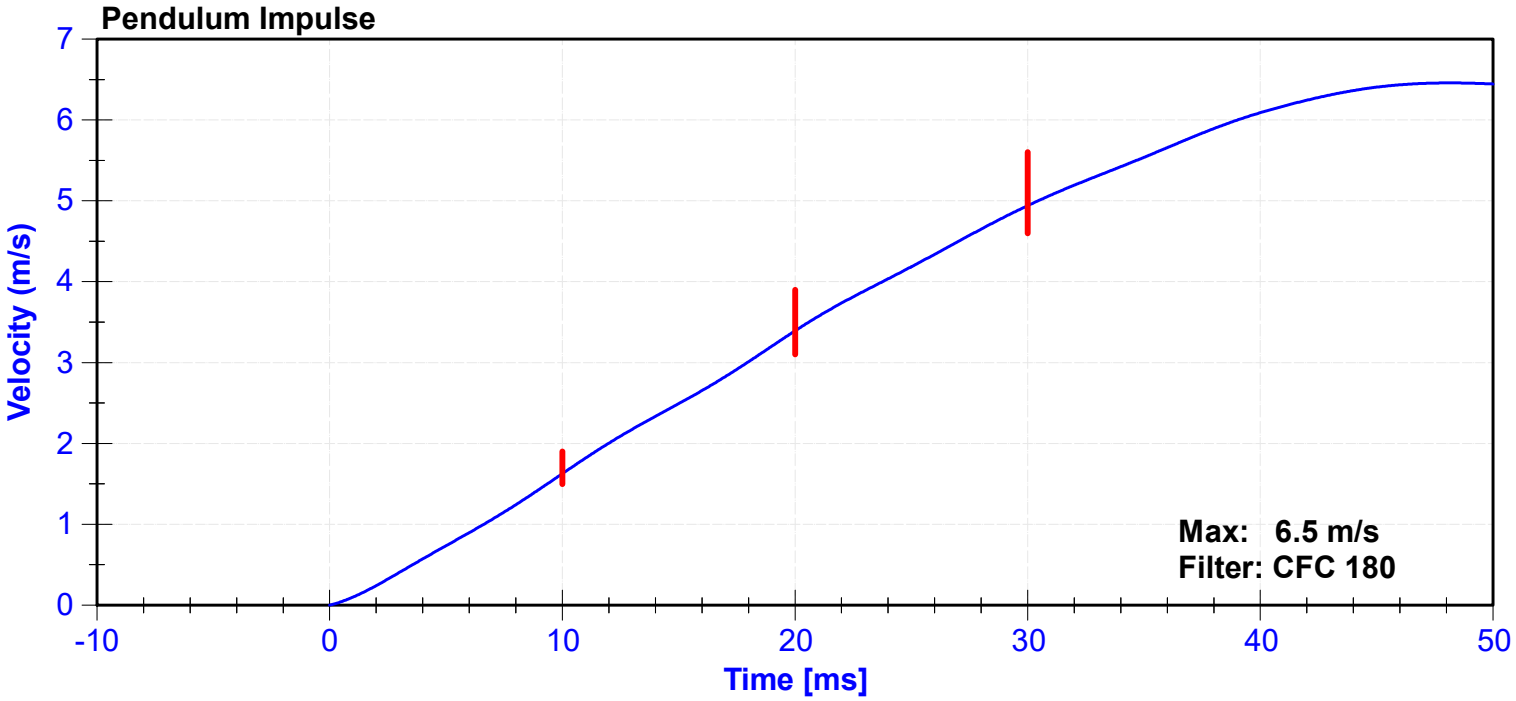
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

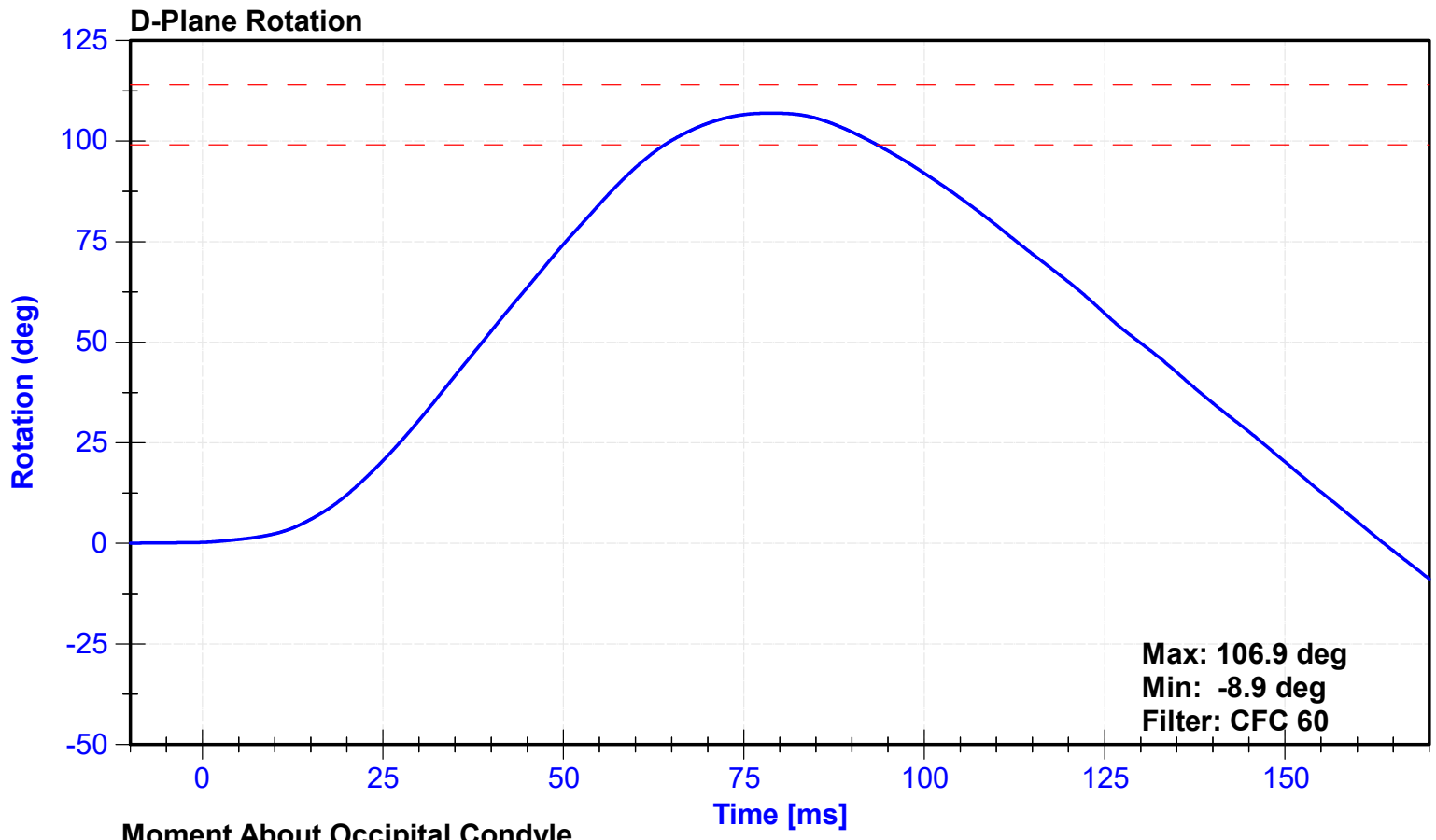
Results

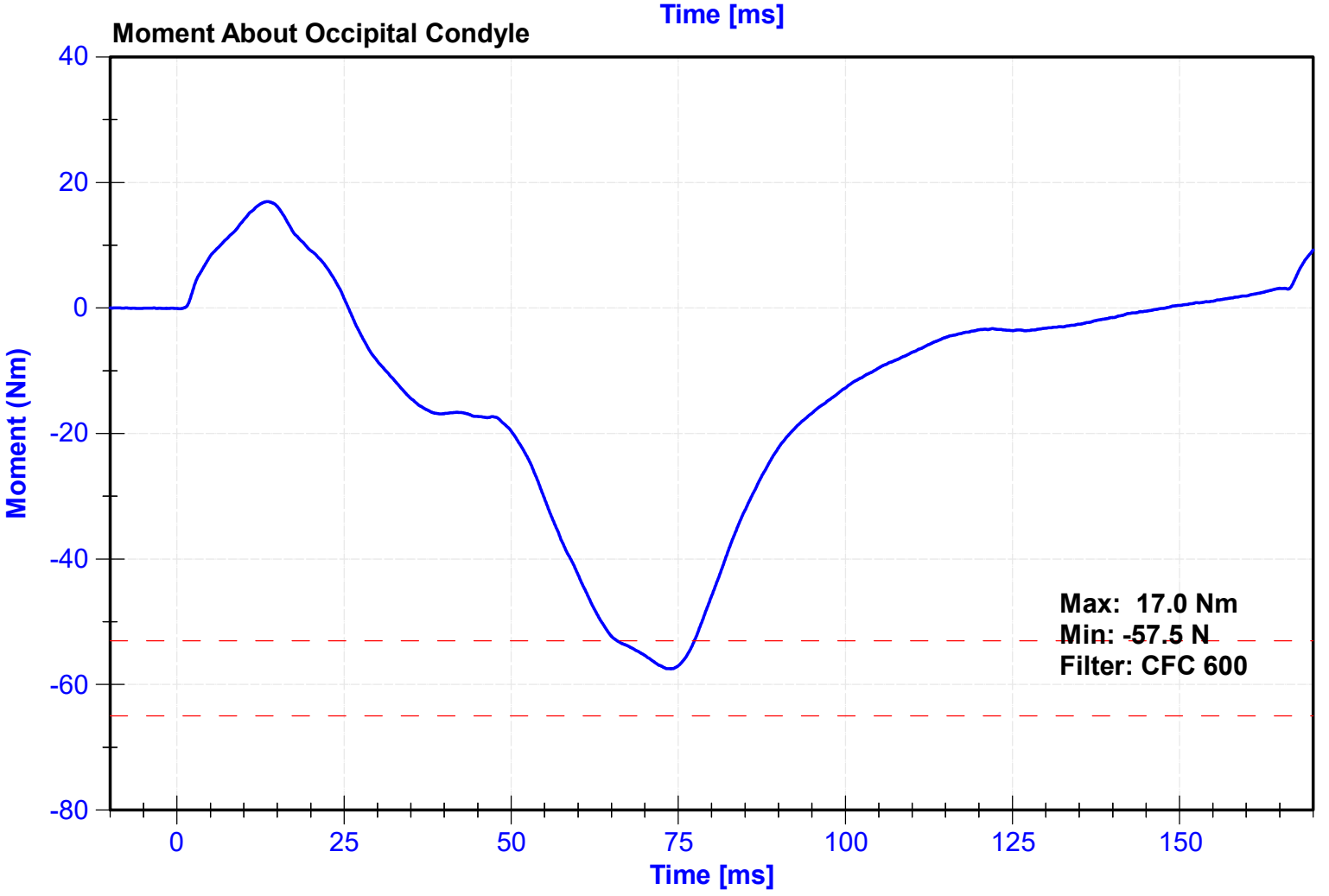
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	5.95	6.19	m/s	6.112	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.63	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.39	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	4.94	Pass
D Plane Rotation	99	114	deg	106.9	Pass
Moment During Rotation Interval	-65	-53	Nm	-57.5	Pass
Moment Decay to -10Nm	94	114	ms	104.4	Pass

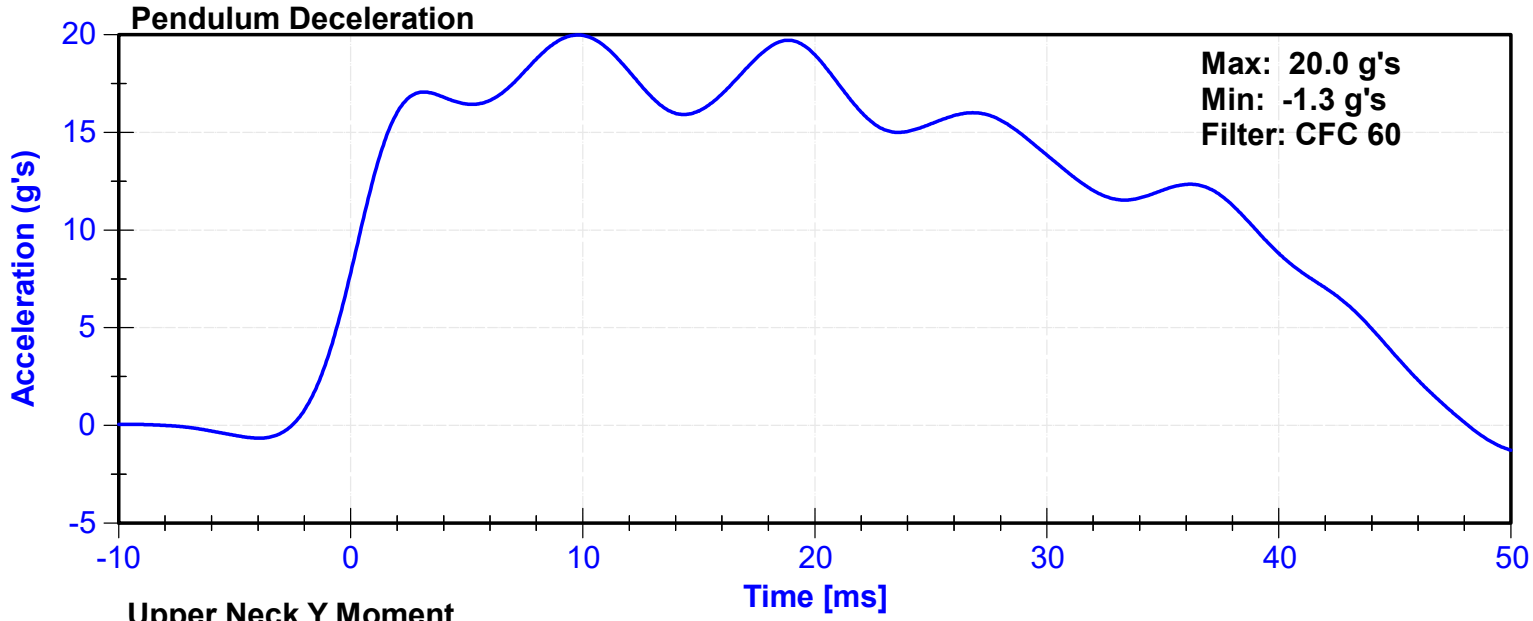
Transducer Calibrations

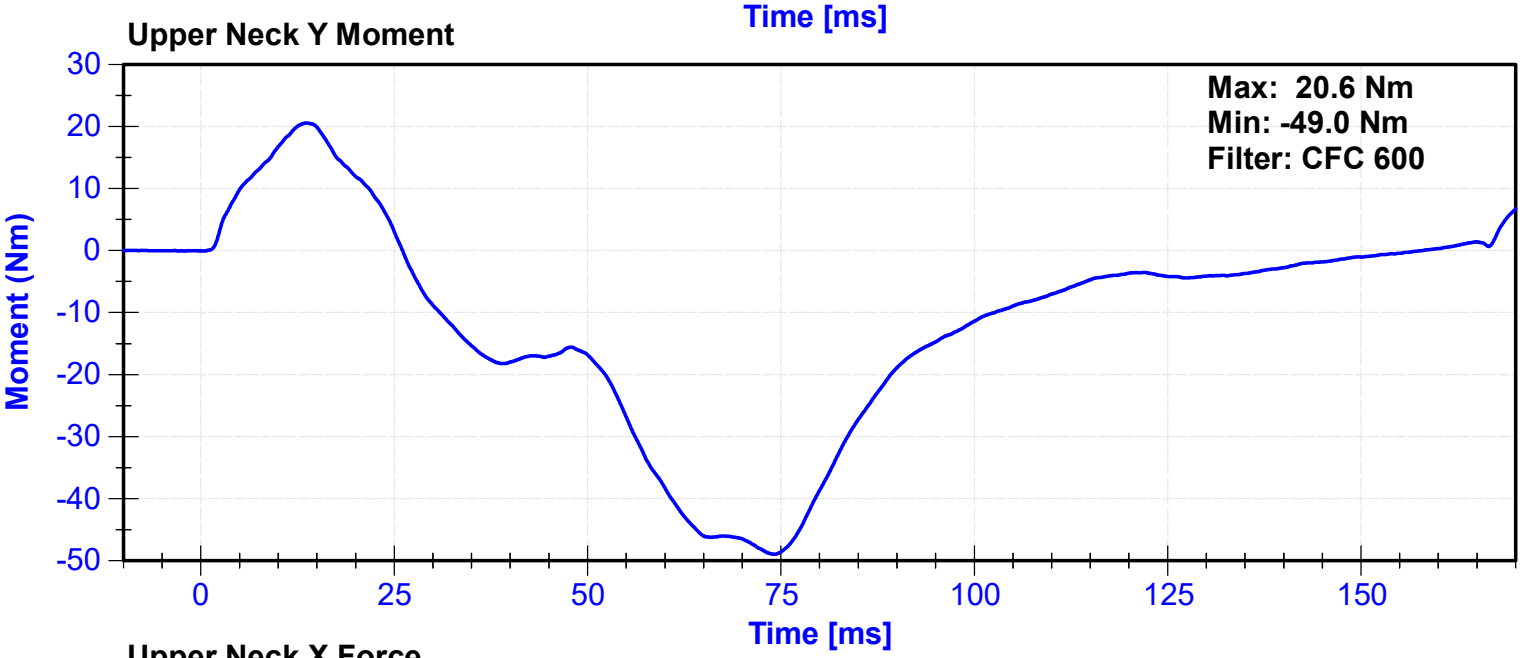
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum Potentiometer	ETI	LABPOT1	5/9/2022	5/9/2023
Condyle Potentiometer	ETI	LABPOT2	5/9/2022	5/9/2023
Upper Neck Load Cell	Humanetics	1916-FX	6/10/2022	6/10/2023

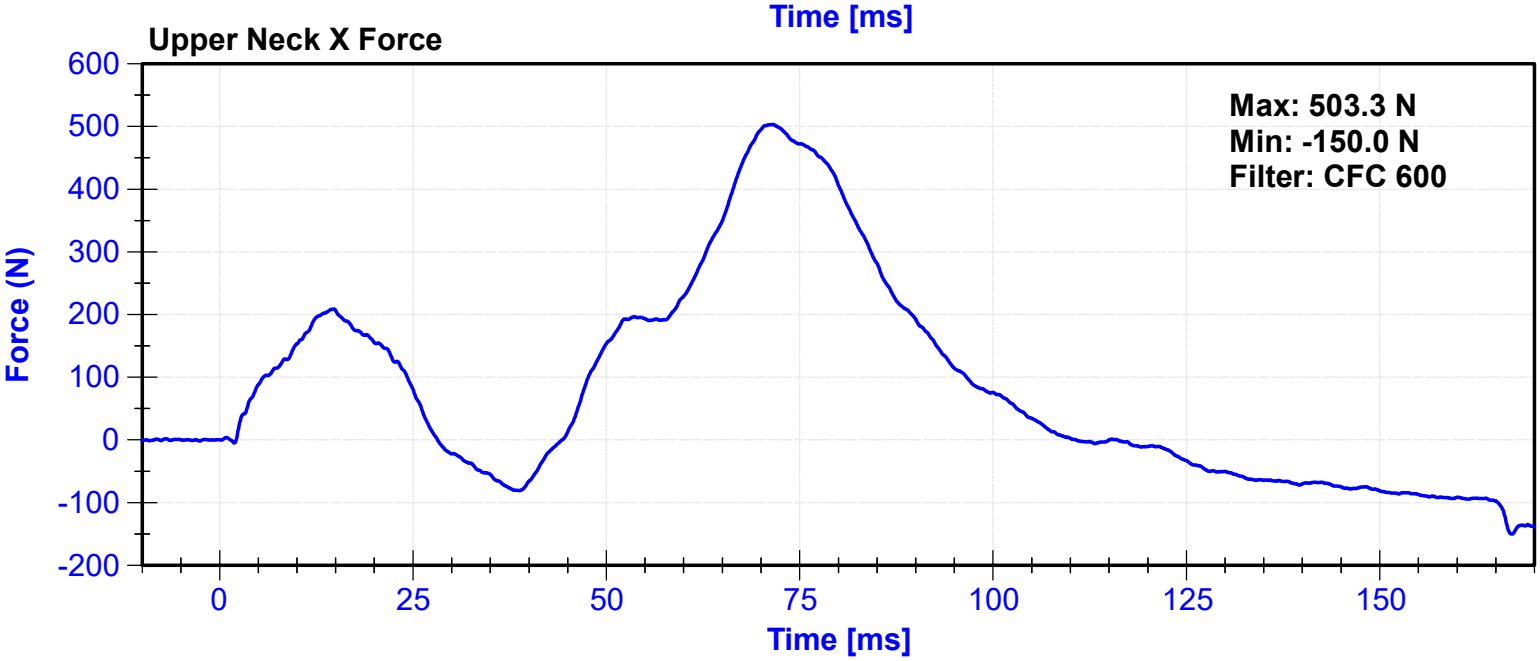



D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 106.9 deg
Min: -8.9 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
40
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
Time [ms]
Max: 17.0 Nm
Min: -57.5 N
Filter: CFC 600


Pendulum Deceleration
Max: 20.0 g's
Min: -1.3 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 20.6 Nm
Min: -49.0 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 503.3 N
Min: -150.0 N
Filter: CFC 600
Force (N)
Time [ms]

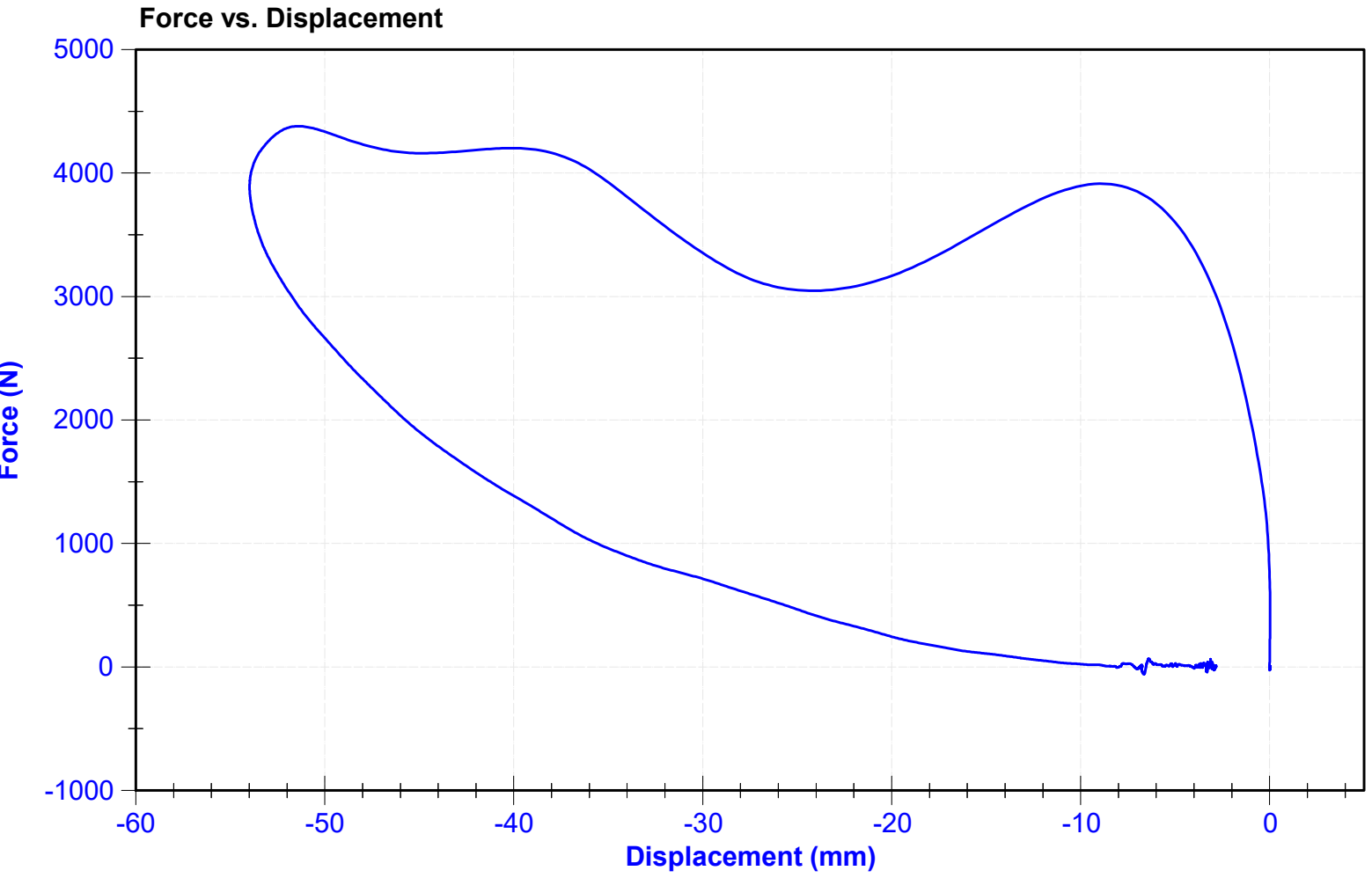
ATD Manufacturer	Humanetics	Test Technician	T. Roseman
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

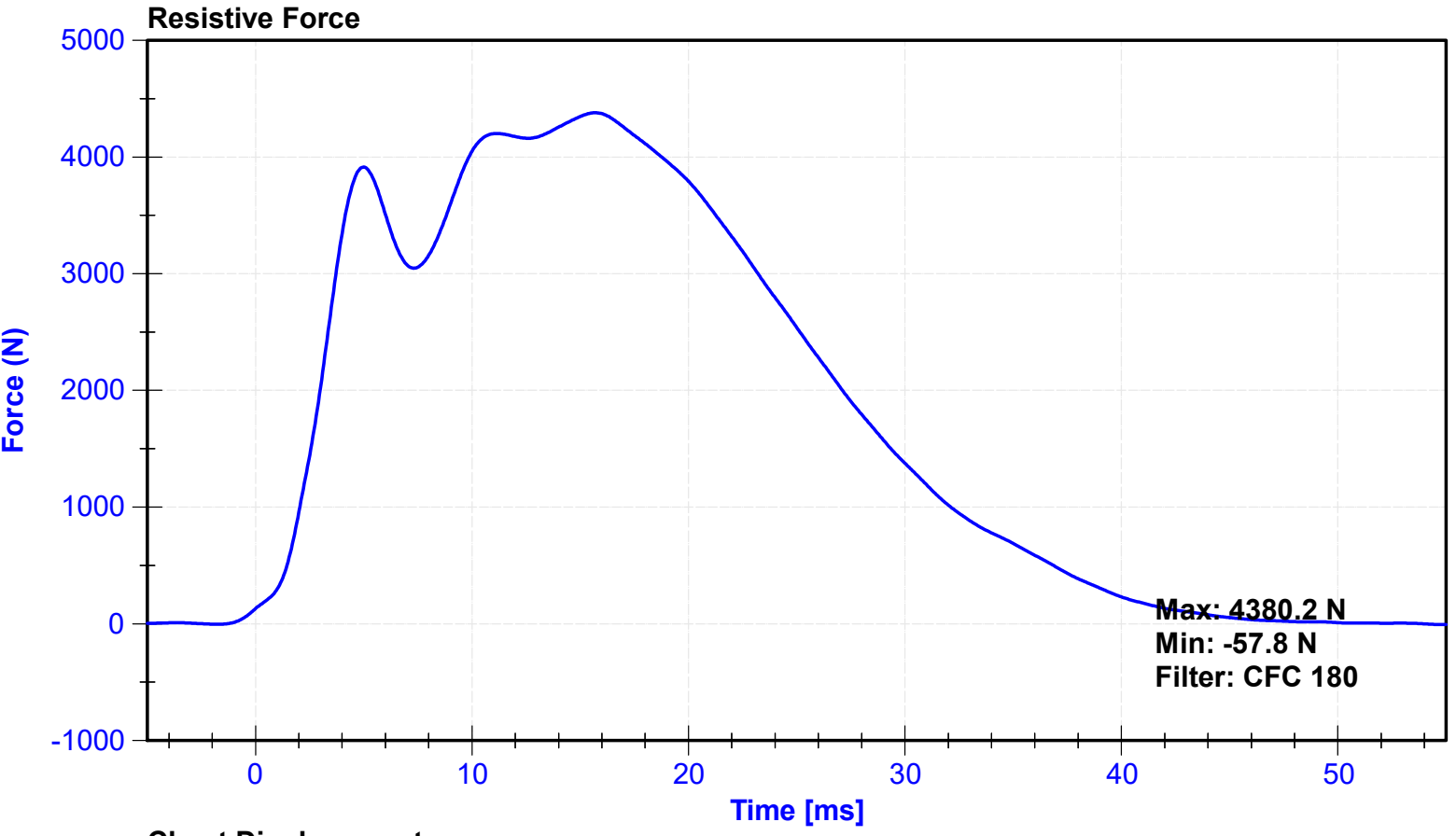
Results

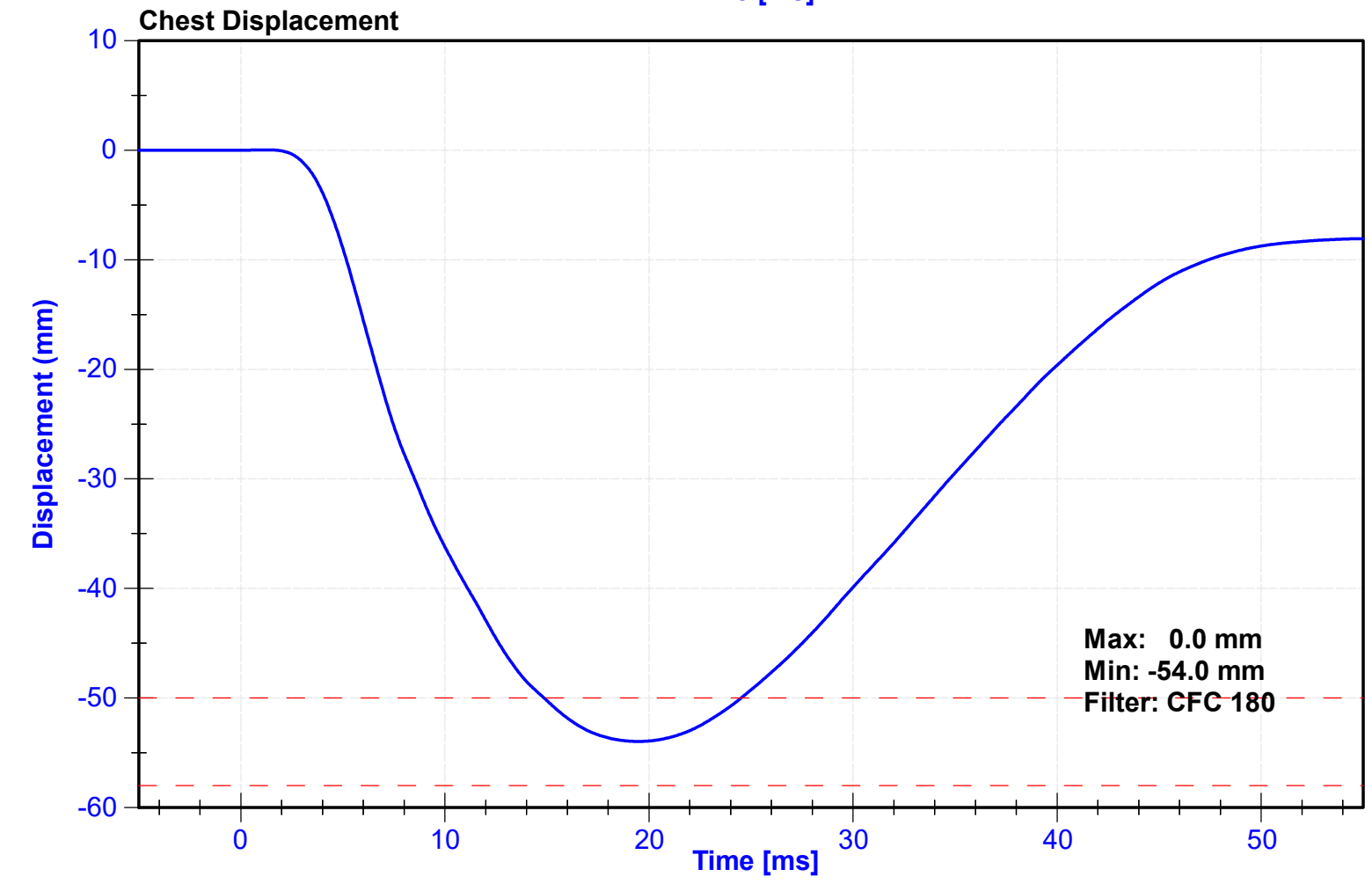
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	36.2	Pass
Velocity	6.59	6.83	m/s	6.724	Pass
Chest Deflection	-58	-50	mm	-54.0	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4380.2	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4331.4	Pass
Hysteresis	69	85	%	75.8	Pass

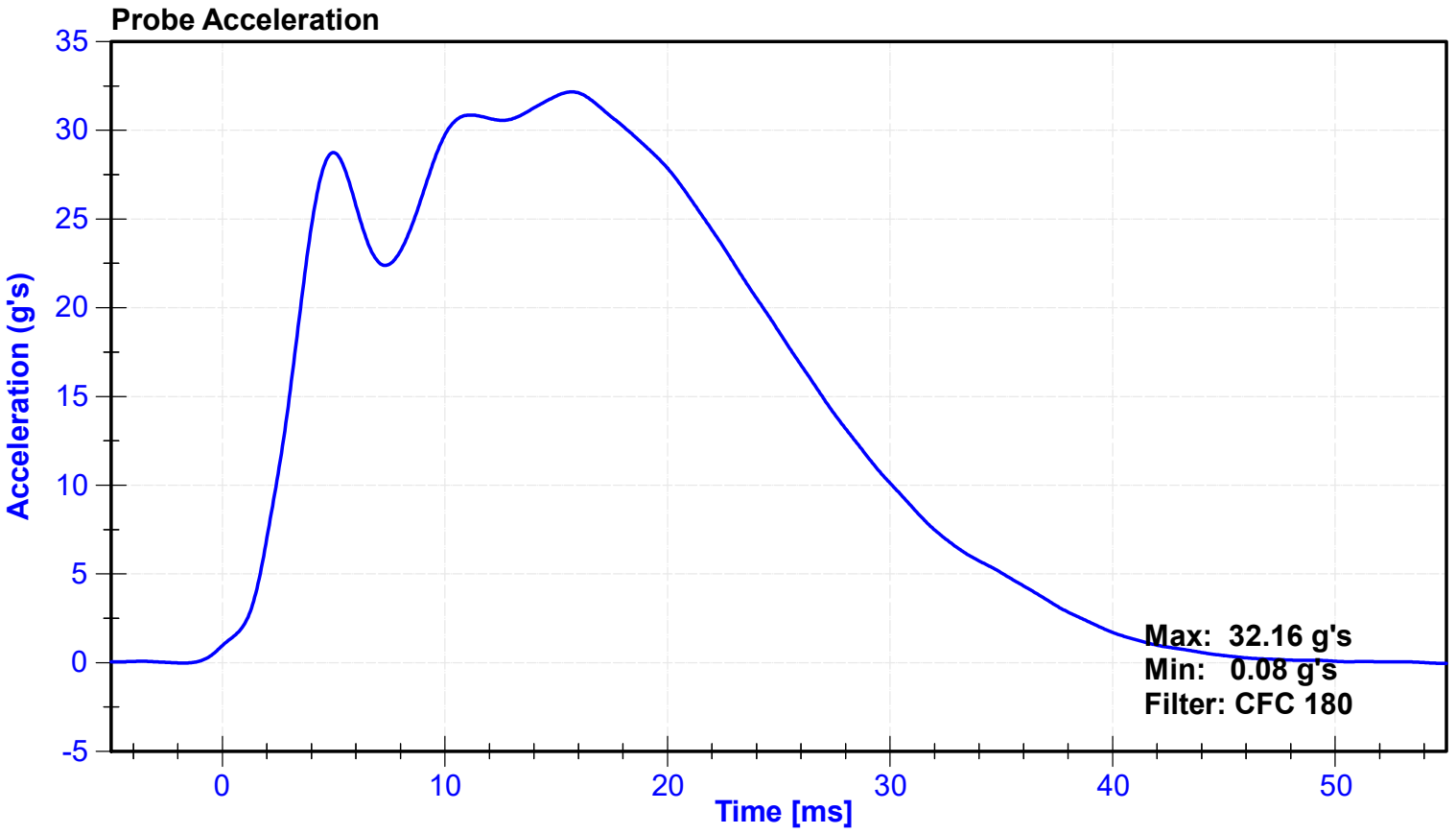
Transducer Calibrations

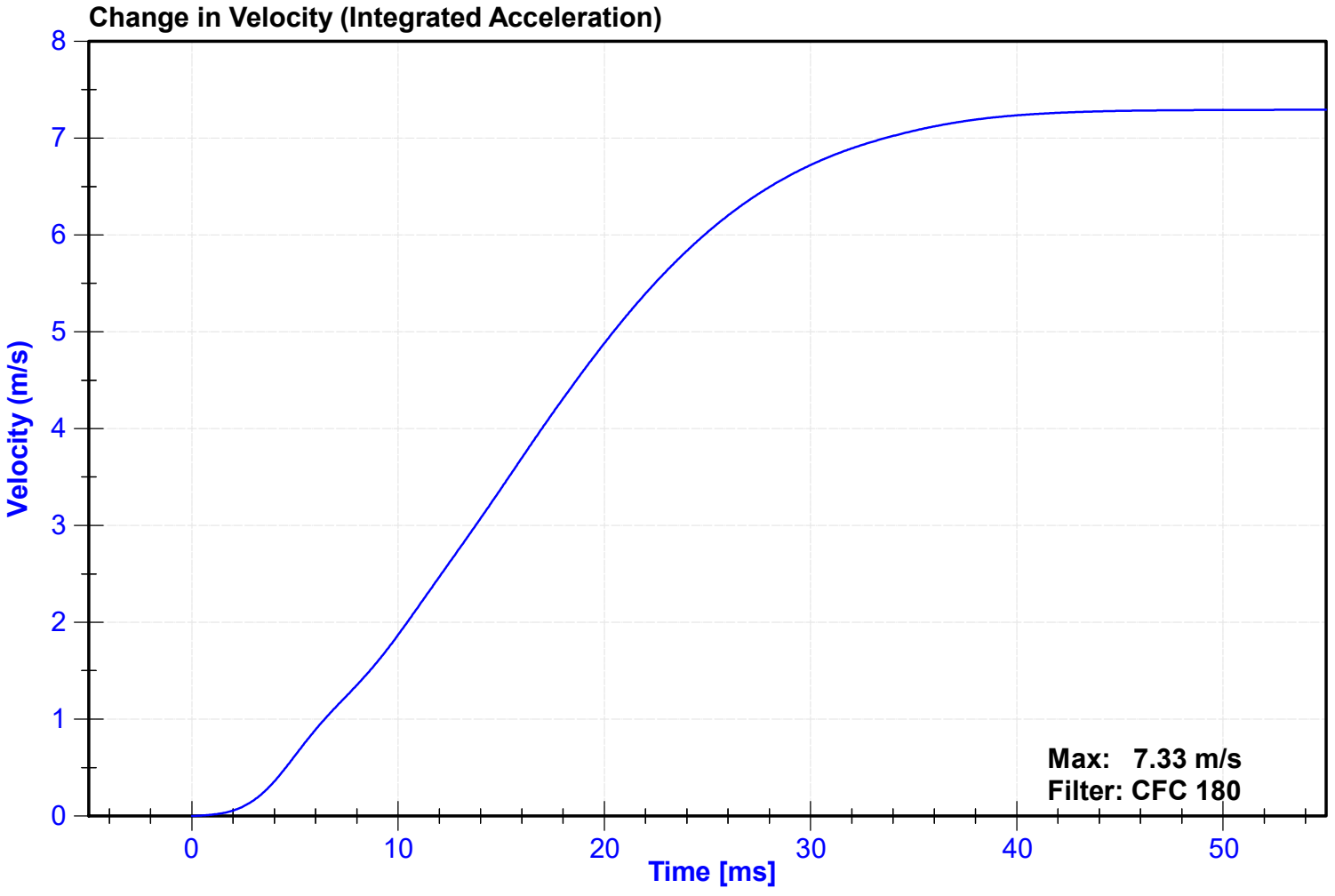
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Chest Potentiometer	Servo	0720	12/12/2022	6/12/2023




Resistive Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4380.2 N
Min: -57.8 N
Filter: CFC 180


Chest Displacement
Displacement (mm)
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
Time [ms]
Max: 0.0 mm
Min: -54.0 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
Time [ms]
Max: 32.16 g's
Min: 0.08 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
Time [ms]
Max: 7.33 m/s
Filter: CFC 180

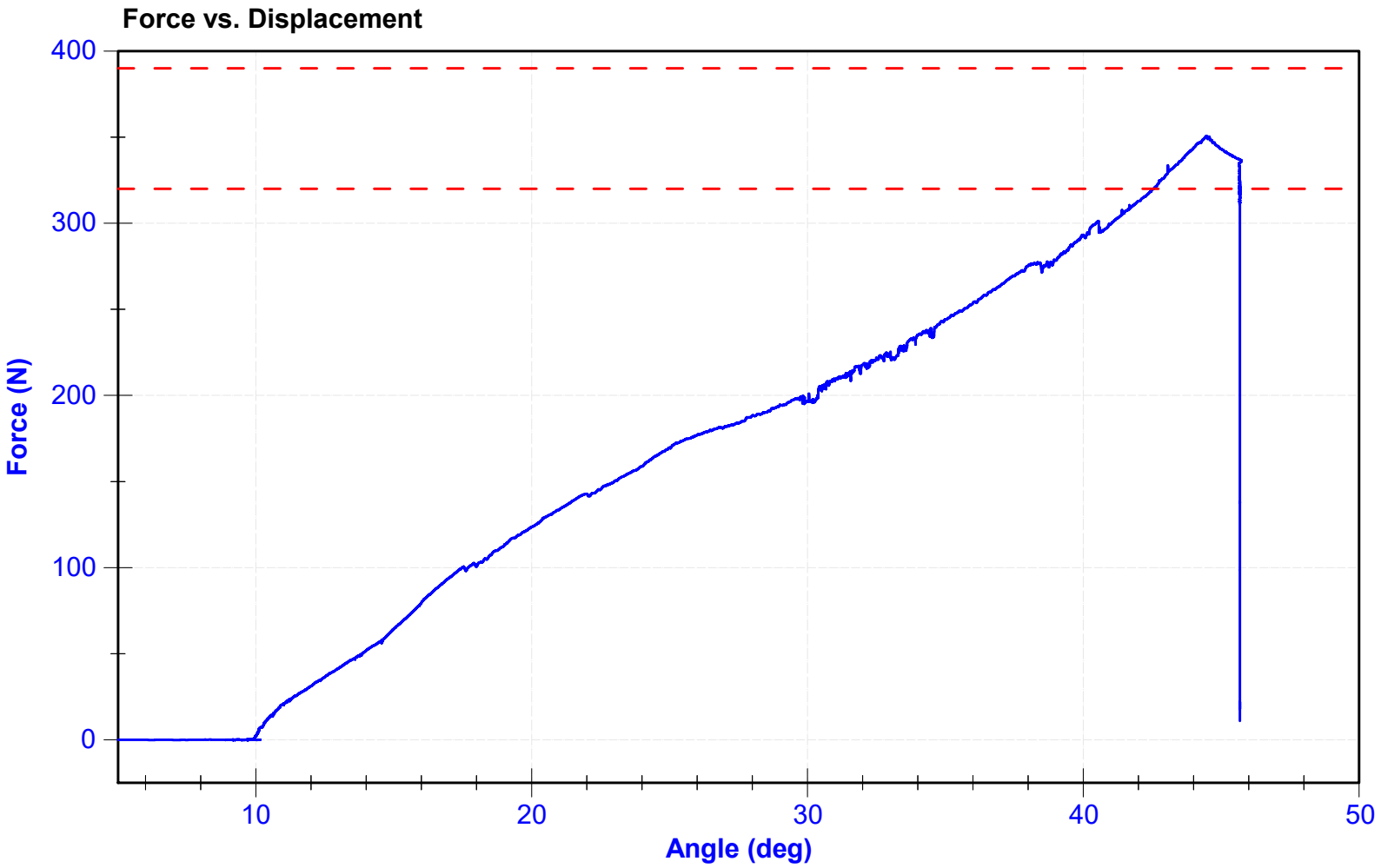
ATD Manufacturer	Humanetics	Test Technician	T. Roseman
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	ºC	21.1	Pass
Humidity	10	70	%	22.3	Pass
Initial Angle	0	20	deg	9.5	Pass
Force at 45 Degrees	320	390	N	350.7	Pass
Return Angle Relative to Initial	0	8	deg	2.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker	DS-1905226	2022-11-09	2023-11-09
Load Cell	Interface	1134516	2022-09-27	2023-09-27



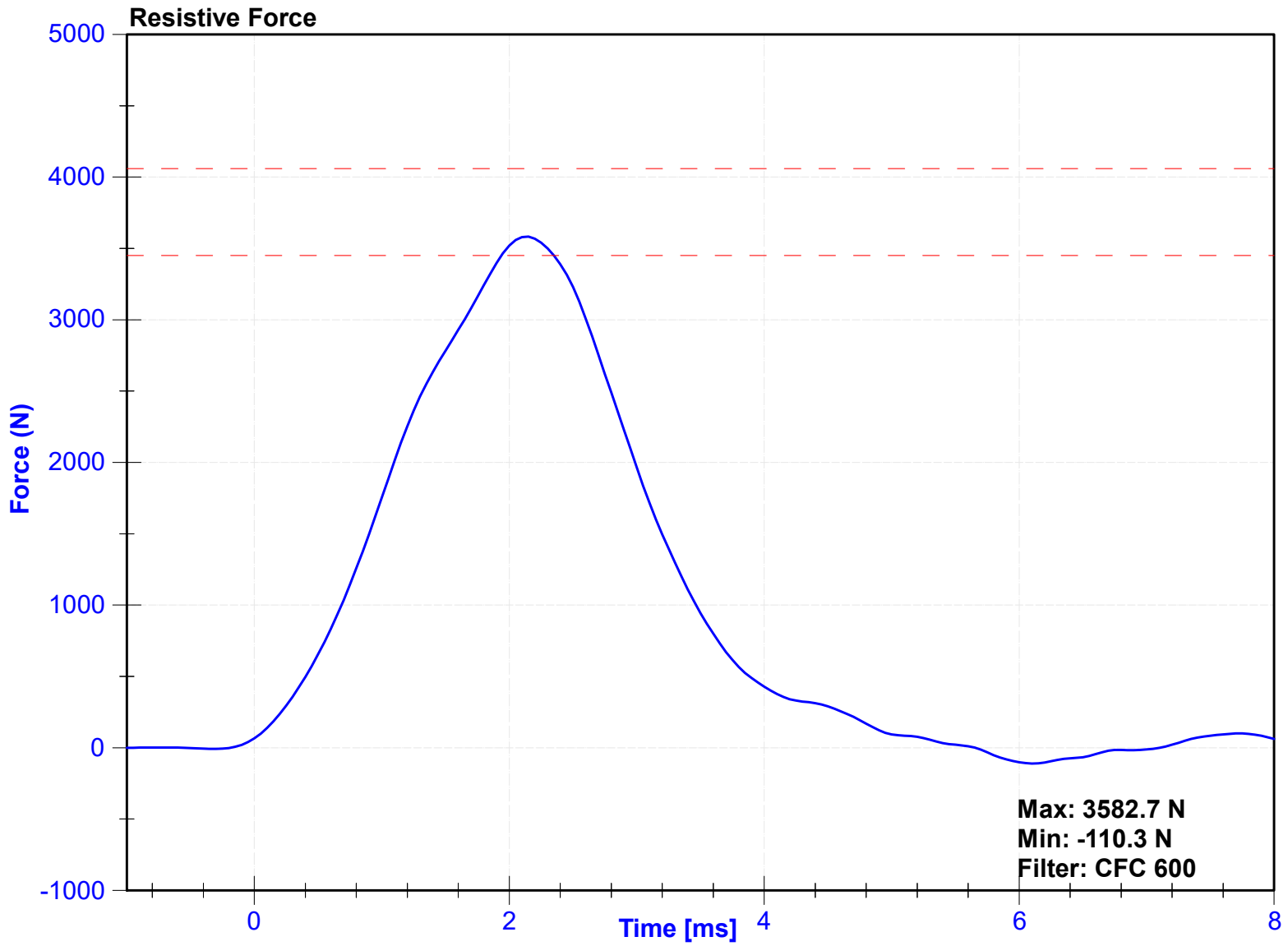
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

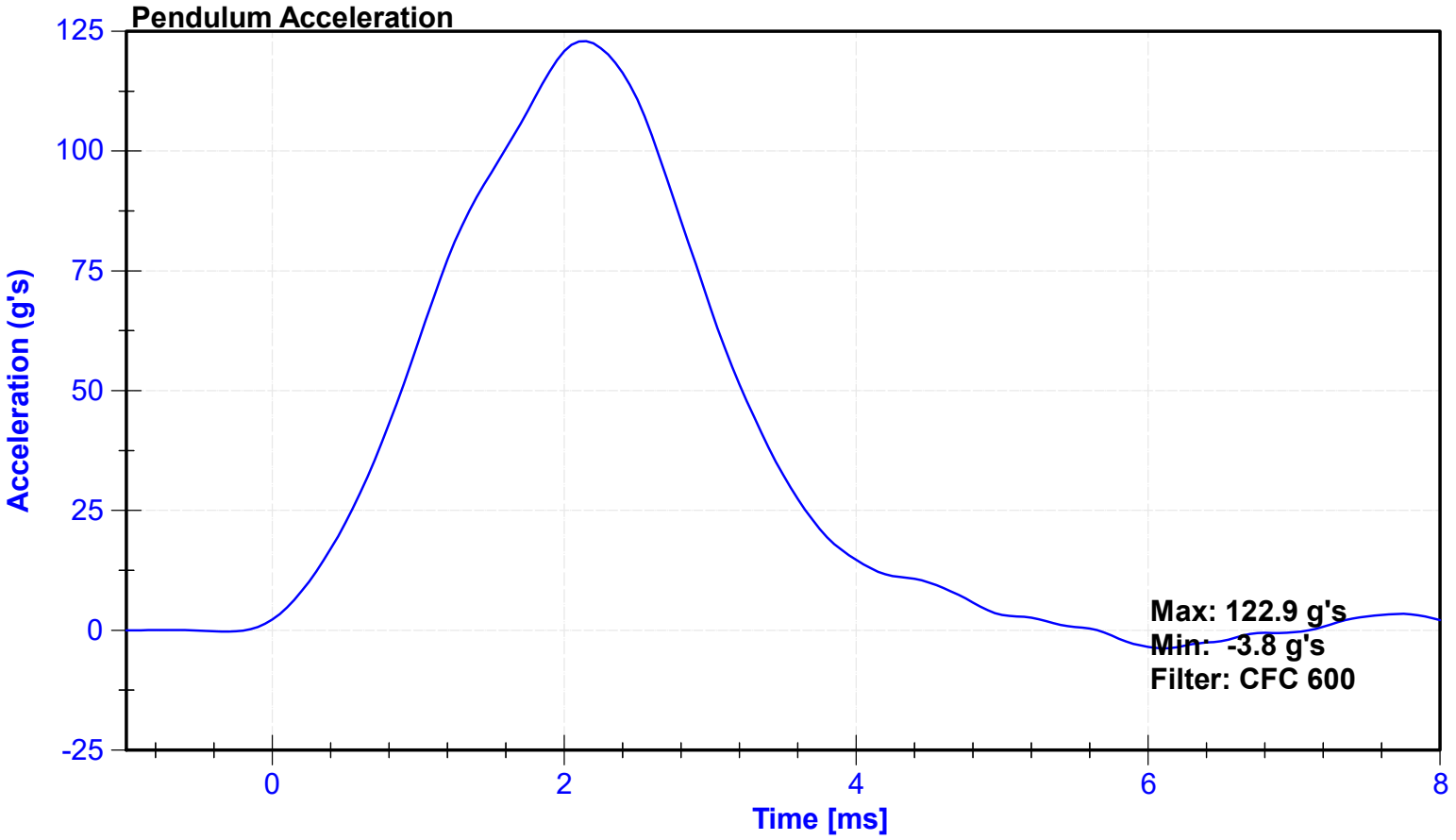
Results

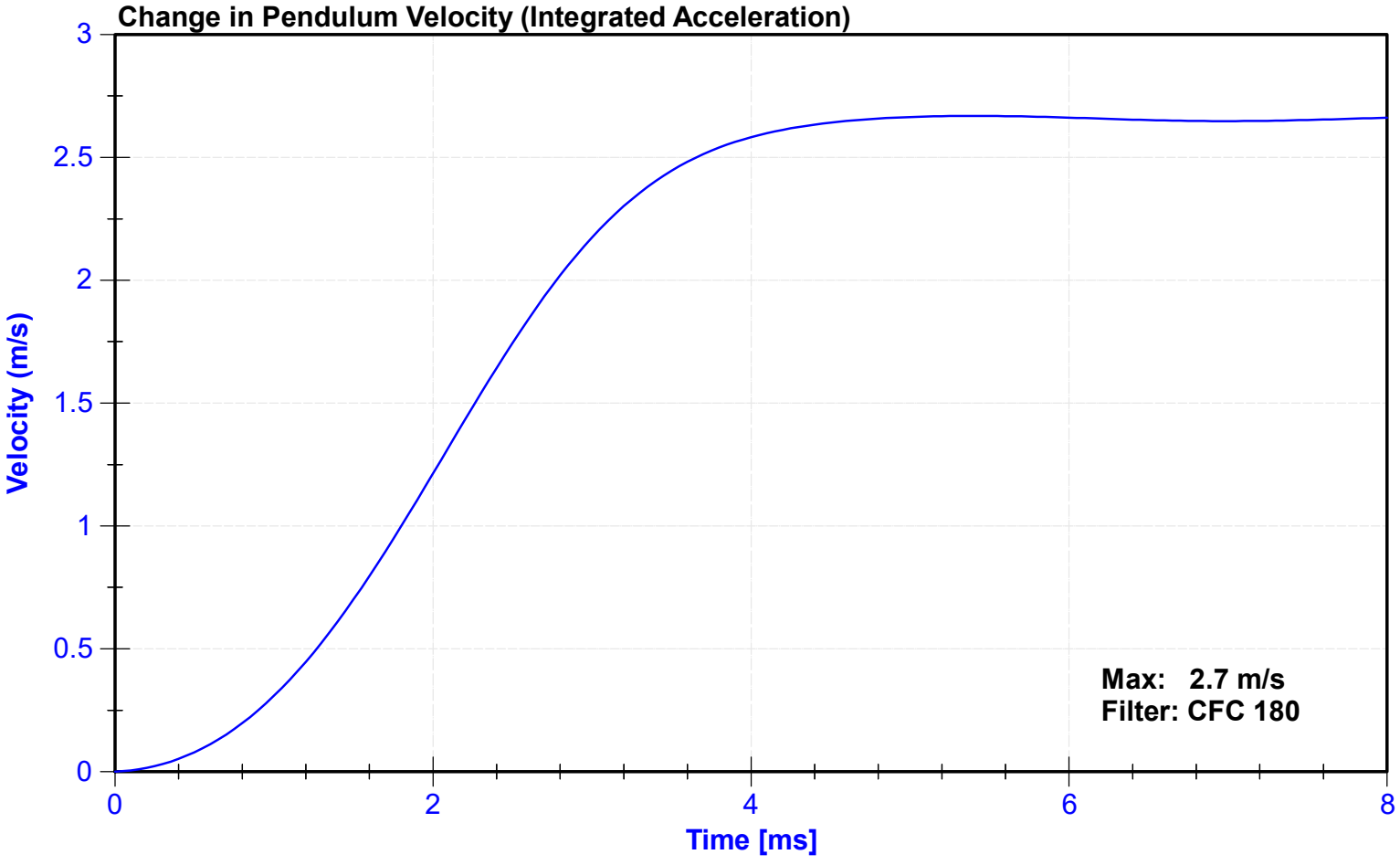
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	2.07	2.13	m/s	2.080	Pass
Resistive Force	3450	4060	N	3582.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
125
100
75
50
25
0
-25
Acceleration (g's)
0
2
4
6
8
Time [ms]
Max: 122.9 g's
Min: -3.8 g's
Filter: CFC 600


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

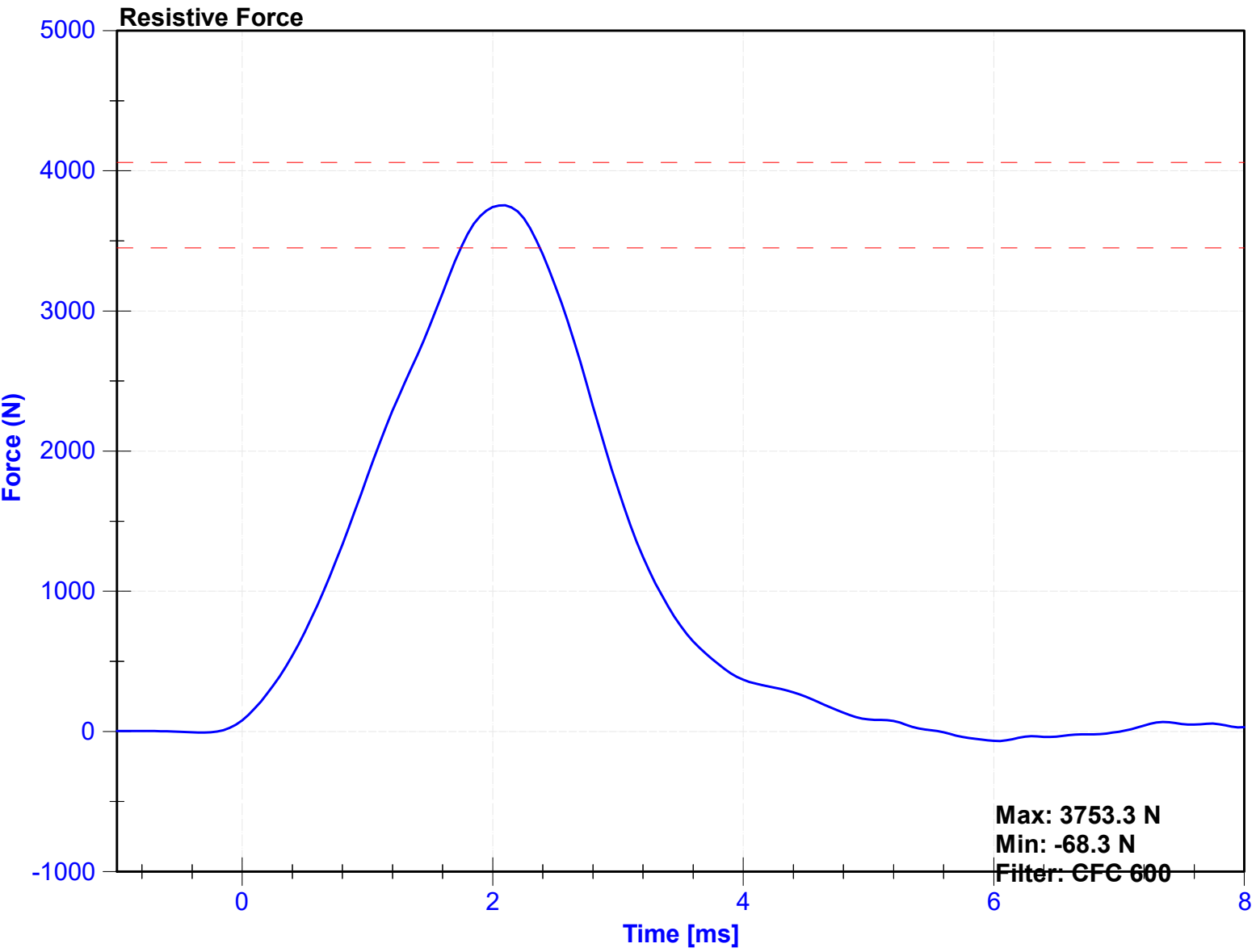
ATD Manufacturer	Humanetics	Test Technician	D. Sakona
ATD Serial Number	137	Laboratory Supervisor	K. Brogan

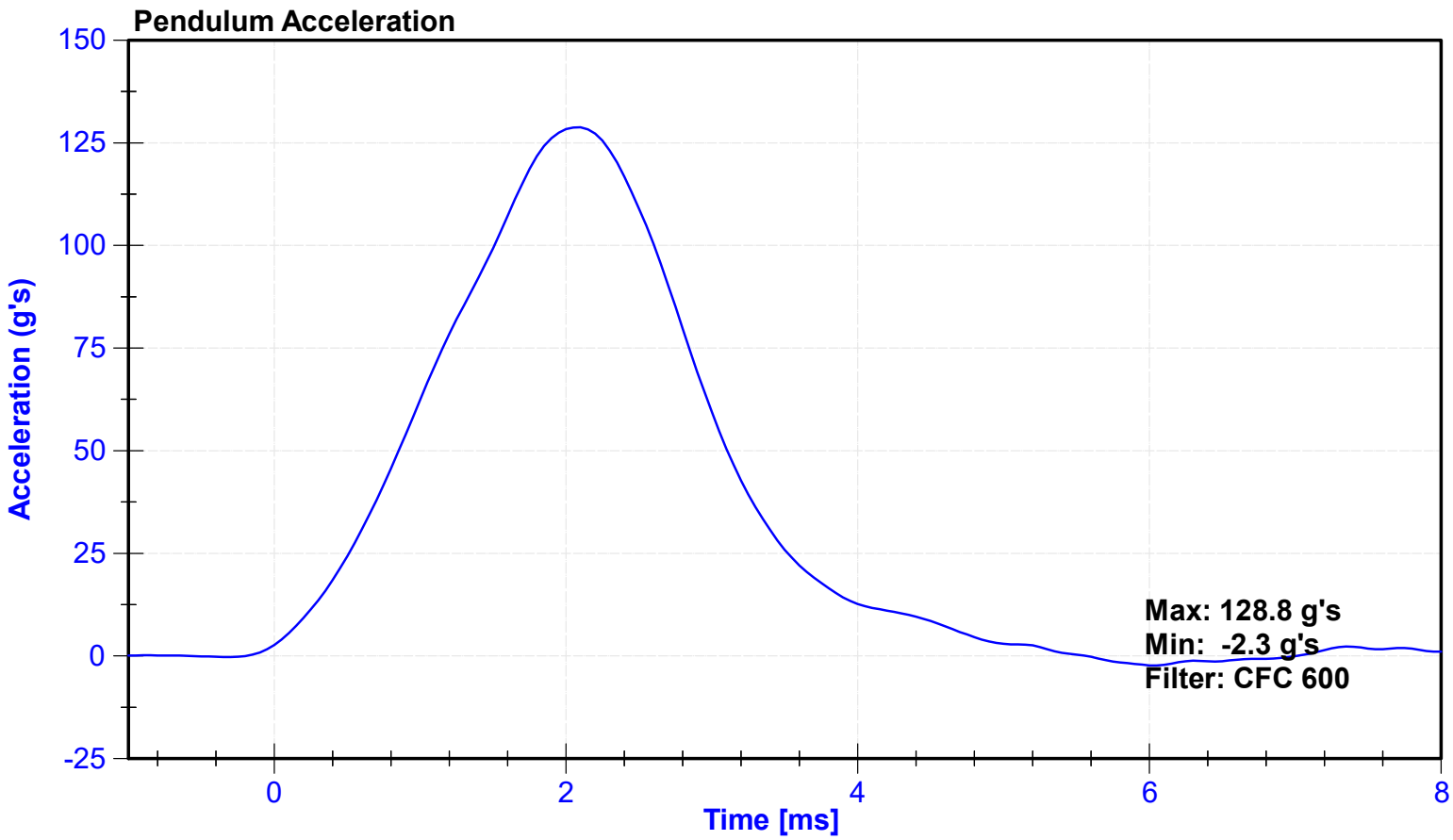
Results

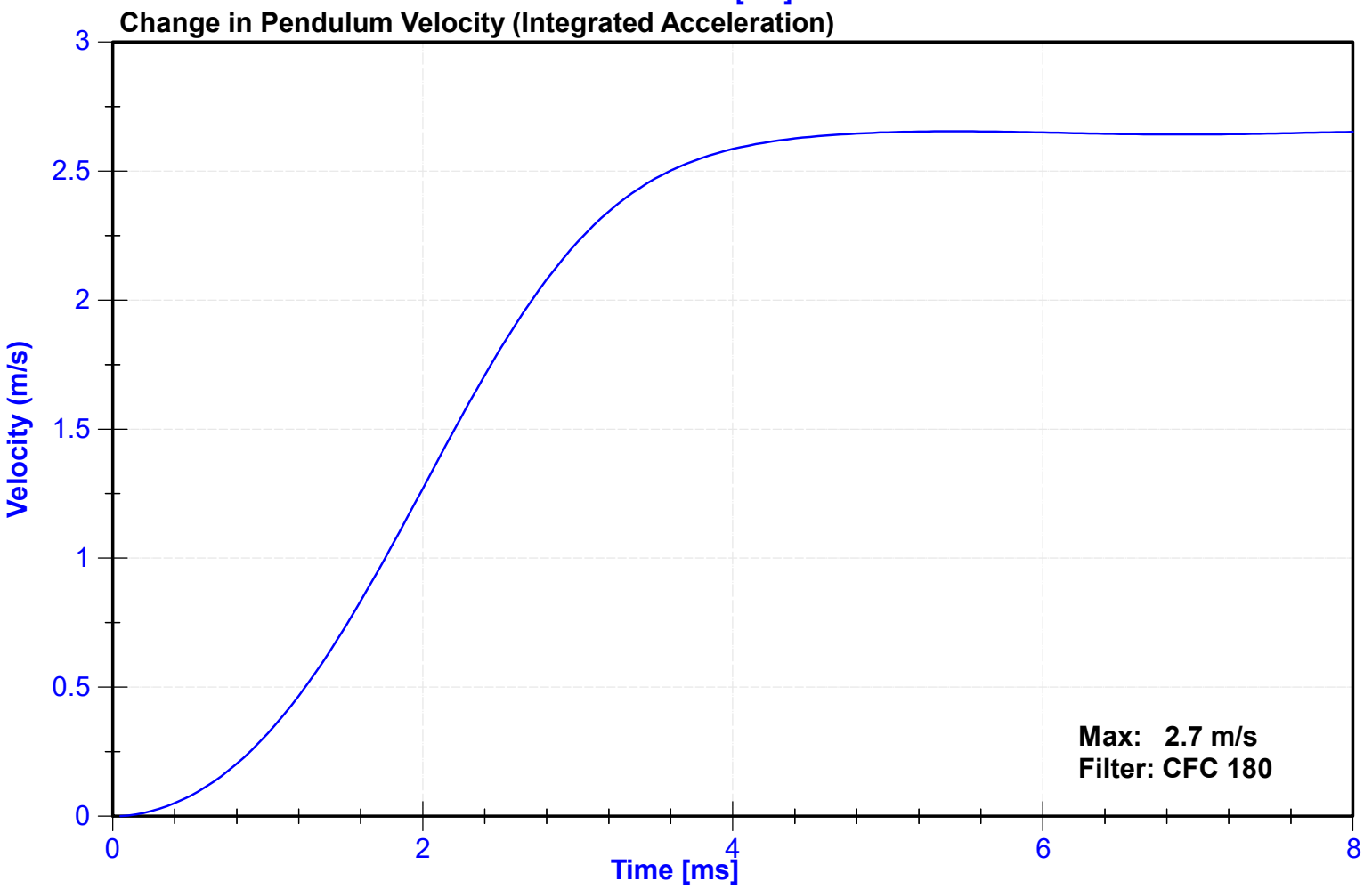
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	2.07	2.13	m/s	2.080	Pass
Resistive Force	3450	4060	N	3753.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023




Pendulum Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]
Max: 128.8 g's
Min: -2.3 g's
Filter: CFC 600


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

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

Table 1 – Driver Dummy Instrumentation

Instrumentation		Axis/Location	Hybrid III 50th S/N: 142		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	P51681	Endevco	9/30/2022
		Y	P64151	Endevco	9/30/2022
		Z	P52114	Endevco	9/30/2022
	Redundant	X	P52079	Endevco	9/30/2022
		Y	P58905	Endevco	9/30/2022
		Z	P63996	Endevco	9/30/2022
Head Angular Rate Sensors		X	15693	DTS ARS	3/15/2022
		Y	15224	DTS ARS	3/15/2022
		Z	14919	DTS ARS	3/15/2022
Upper Neck Load Cell		FX, Fy, Fz MX,MY, MZ	2187-FX	Denton	6/13/2022
Chest Accelerometers	Primary	X	P51991	Endevco	9/30/2022
		Y	P51269	Endevco	9/30/2022
		Z	P49185	Endevco	9/30/2022
	Redundant	X	P68059	Endevco	9/30/2022
		Y	P51713	Endevco	9/30/2022
		Z	P78824	Endevco	9/30/2022
Chest Potentiometer		X	0075	JDK	10/3/2022
Pelvis Accelerometer		X	P58800	Endevco	9/30/2022
		Y	P52157	Endevco	9/30/2022
		Z	P83317	Endevco	9/30/2022
Femur Load Cells - Left	Primary	Z	DI4211-FZ1	Denton	6/14/2022
	Redundant	Z	DI4211-FZ2	Denton	6/14/2022
Femur Load Cells - Right	Primary	Z	115-FZ1	Denton	6/14/2022
	Redundant	Z	115-FZ2	Denton	6/14/2022
Tibia Load Cells - Left	Upper	MX, MY, FZ	407-FZ	Denton	6/10/2022
	Lower	MX, MY, FZ	396-FZ	Denton	6/9/2022
Tibia Load Cells – Right	Upper	MX, MY, FZ	362-FZ	Denton	6/9/2022
	Lower	MX, MY, FZ	364-FZ	Denton	6/9/2022
Foot Accelerometers - Left	Rear	X	P82756	Endevco	9/30/2022
	Front	Z	P51872	Endevco	9/30/2022
Foot Accelerometers - Right	Rear	X	P66942	Endevco	9/30/2022
	Front	Z	P58779	Endevco	9/30/2022
Seat belt Load Cells	Lap		174	GFE	2/25/2022
	Shoulder		292	GFE	2/25/2022

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	12/13/2022
		Y	P83335	Endevco	12/13/2022
		Z	P64149	Endevco	12/12/2022
	Redundant	X	P52008	Endevco	12/13/2022
		Y	P52045	Endevco	12/13/2022
		Z	P74774	Endevco	12/12/2022
Head Angular Rate Sensors		X	15217	DTS	3/15/2022
		Y	15697	DTS PRO-18K	3/16/2022
		Z	15696	DTS ARS	3/16/2022
Upper Neck Load Cell		FX, Fy, Fz MX,MY, MZ	1916-FX	Humanetics	6/10/2022
Chest Accelerometers	Primary	X	T21142	Endevco	12/12/2022
		Y	P83346	Endevco	12/12/2022
		Z	P49190	Endevco	12/12/2022
	Redundant	X	P58794	Endevco	12/12/2022
		Y	P69791	Endevco	12/12/2022
		Z	T11253	Endevco	12/12/2022
Chest Potentiometer		X	0720	Servo	12/12/2022
Pelvis Accelerometer		X	P58735	Endevco	12/12/2022
		Y	P77587	Endevco	12/12/2022
		Z	P51285	Endevco	12/12/2022
Femur Load Cells - Left	Primary	Z	135-FZ1	Denton	6/14/2022
	Redundant	Z	135-FZ2	Denton	6/14/2022
Femur Load Cells - Right	Primary	Z	136-FZ1	Denton	6/14/2022
	Redundant	Z	136-FZ2	Denton	6/14/2022
Tibia Load Cells - Left	Upper	MX, MY, FZ	364-FZ	Denton	6/10/2022
	Lower	MX, MY, FZ	398-FZ	Denton	6/8/2022
Tibia Load Cells – Right	Upper	MX, MY, FZ	368-FZ	Denton	6/10/2022
	Lower	MX, MY, FZ	490-FZ	Denton	6/8/2022
Foot Accelerometers - Left	Rear	X	P78959	Endevco	12/12/2022
	Front	Z	P83418	Endevco	12/12/2022
Foot Accelerometers - Right	Rear	X	P83428	Endevco	12/12/2022
	Front	Z	P80265	Endevco	12/12/2022
Seat belt Load Cells	Lap		DK1753	GFE	2/25/2022
	Shoulder		295	GFE	2/25/2022

Table 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	A405611	Measurement Specialties	10/11/2022
			Z	A414757	Measurement Specialties	10/11/2022
		Redundant	X	A414756	Measurement Specialties	10/11/2022
	Right	Primary	X	A350949	Measurement Specialties	11/8/2022
			Z	A350950	Measurement Specialties	11/8/2022
		Redundant	X	A350947	Measurement Specialties	11/8/2022
Engine Accelerometers	Top		X	G22574	Endevco	10/22/2022
	Bottom		X	G22601	Endevco	11/2/2022