

REPORT NUMBER: NCAP-CAL-21-007

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

**Volkswagen Group of America
2021 Volkswagen Passat
Four Door Sedan**

NHTSA No: M20215803

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



August 18, 2021

FINAL REPORT

**PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE SE, ROOM W43-410
WASHINGTON, D.C. 20590**

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Date: August 18, 2021

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

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16. Abstract A 56.30 km/h (35 mph), NCAP frontal rigid barrier impact test was conducted on a 2021 Volkswagen Passat four door sedan in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. The test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on April 28, 2021. The impact velocity of the vehicle was 56.32 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 472 mm at C4 to the right of vehicles centerline. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (Serial No. 142)</th> <th colspan="2">Passenger ATD (Serial No. 139)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>196.249</td> <td>700</td> <td>305.443</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-34.793</td> <td>52</td> <td>-26.892</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.306</td> <td>1</td> <td>0.458</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1382.232</td> <td>2,620</td> <td>1239.294</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-274.126</td> <td>2,520</td> <td>-508.403</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-1468.532</td> <td>6,805</td> <td>-365.734</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-2955.584</td> <td>6,805</td> <td>-2194.556</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD (Serial No. 142)		Passenger ATD (Serial No. 139)		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	196.249	700	305.443	Maximum Chest Compression	mm	63	-34.793	52	-26.892	Nij		1	0.306	1	0.458	Neck Tension	N	4,170	1382.232	2,620	1239.294	Neck Compression	N	4,000	-274.126	2,520	-508.403	Left Femur Force	N	10,008	-1468.532	6,805	-365.734	Right Femur Force	N	10,008	-2955.584	6,805	-2194.556
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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 2021 Volkswagen Passat four door sedan at a velocity of 56.32 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on April 28, 2021. Pre- and post-test photographs of the vehicle and dummies to document the test can be found in Appendix A. One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and passenger's shoulder belts to measure dummy pelvic section loading. The driver (position 1) ATD (Serial No. 142) and the right-front passenger (position 2) ATD (Serial No. 139) 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 94.2 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was a total of 0.0 grams of stoddard solvent leakage after the event or during any phase of the static rollover. The maximum static crush of the vehicle was 472 mm and both driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

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

The occupant data is summarized below.

ATD Position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	196.249	0.306	1382.232	-274.126	45.649	-34.793	-1468.532	-2955.584
Passenger (5 th)	305.443	0.458	1239.294	-508.403	53.800	-26.892	-365.734	-2194.556

GENERAL COMMENTS:

1. P1 (Driver) serial number - 142
2. P2 (Passenger) serial number – 139
3. No seatbelt lap load cell data was collected on driver or passenger

Data Anomalies:

- Engine Bottom X, Exceeded calibration range at 30.2 ms 33.6 ms 36.6 ms

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Seat Belt Positioning Data

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

Data Sheet No. 7 – Vehicle Accelerometer Locations

Data Sheet No. 8 – Photographic Reference Target Locations

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

Data Sheet No. 10 – Test Vehicle Summary of Results

Data Sheet No. 11 – Post-Test Observations

Data Sheet No. 12 – Vehicle Profile Measurements

Data Sheet No. 13 – Accident Investigation Division Data

Data Sheet No. 14 – Vehicle Intrusion Measurements

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

Data Sheet No. 16 – FMVSS 301 Barrier Impact and Static Rollover Results

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

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20215803	Traction Control System (TCS)	Yes
Model Year	2021	Power Steering	Yes
Make	Volkswagen	Power Window Auto-Reverse	-
Model	Passat	Driver Frontal Airbag	Yes
Body Style	Four Door Sedan	Driver Curtain Airbag	Yes
VIN	1VWAA7A33MC008016	Driver Head/Torso Airbag	No
Body Color	Blue	Driver Torso Airbag	No
Odometer Reading (km /mi)	46 miles	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.0	Driver Pelvis Airbag	No
Type / No. Cylinders	I4	Driver Knee Airbag	No
Engine Placement	Transverse	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	6-Speed	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	Front Wheel Drive	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof / T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other –	-

Does owner's manual provide instructions to turn off automatic door locks?

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen Group of America	GVWR (kg)	2030
Date of Manufacture	03/2021	GAWR Front (kg)	1080
		GAWR Rear (kg)	1000

VEHICLE SEATING AND WEIGHT CAPACITY DATA

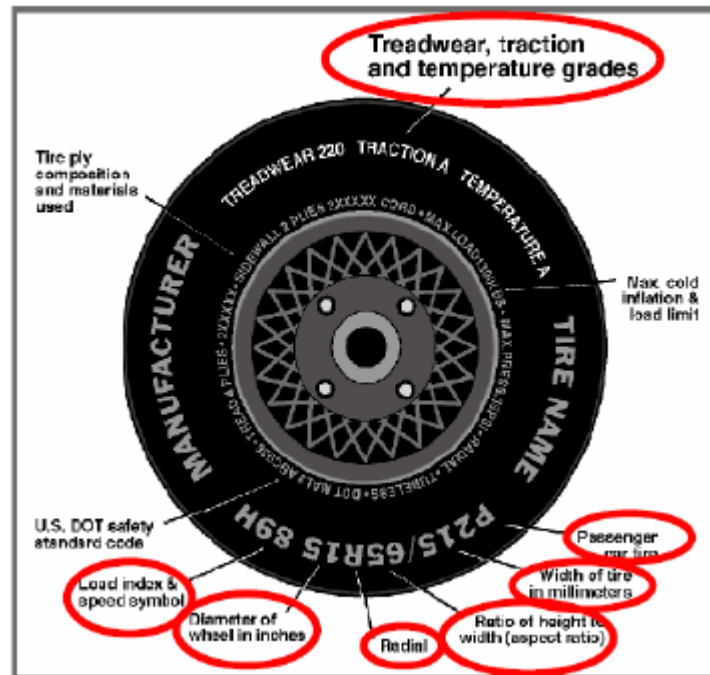
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				430
Cargo Wt. (RCLW) (kg)				89.8

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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	215/55R17	215/55R17
Tire Size on Vehicle	215/55R17	215/55R17
Tire Manufacturer	Continental	Continental
Tire Model	ProContact	ProContact
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index / Speed Symbol	94H	94H
Tire Material	Rubber	Rubber
DOT Safety Code Left	VY3RWCRK1020	VY3RWCRK1020
DOT Safety Code Right	VY3RWCRK1020	VY3RWCRK1020

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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	448	305		487	393	
Right	kg	445	309		470	381	
Ratio	%	59.3	40.7		55.3	44.7	
Totals	kg	893	614	1507	957	774	1731

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1507	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	142	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	89.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1738.8	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	724	722	721	724	1141
As Tested	mm	714	714	683	689	1252
Post-Test	mm	729	705	684	671	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2801
Total Vehicle Length at Left Side	mm	4824
Total Vehicle Length at Centerline	mm	4919
Total Vehicle Length at Right Side	mm	4824
Weight of Ballast in Cargo Area	kg	21
Weight of Vehicle Components Removed	kg	26
Amount of Stoddard Solvent in Fuel Tank	L	65.1

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk carpeting, spare tire, jack

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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	4919
2	Total Width	1793
3*	Bumper Top Height	511
4*	Bumper Bottom Height	411
5*	Longitudinal Member Top Height	528
6	Distance Between Longitudinal Members	1068
7	Longitudinal Member Width	91
8*	Engine Top Height	808
9*	Engine Bottom Height	208
10	Engine and Gearbox Width	426
11	Front Bumper-Engine Distance	706
12*	Front Shock Absorber Fixing Height	885
13*	Bonnet Leading Edge Height	772
14	Front Shock Absorber Fixing Width	1151
15	Front Bumper – Front Axle Distance	959
16	Front Axle – A Pillar Distance	500
17	A-Pillar – B-Pillar Distance	1117
18	B-Pillar – Rear Axle Distance	1188
19	B-Pillar – C-Pillar Distance	1012
20*	Roof Sill Bottom Height	1363
21*	Roof Sill Top Height	1400
22*	Floor Sill Bottom Height	271
23*	Floor Sill Top Height	396

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

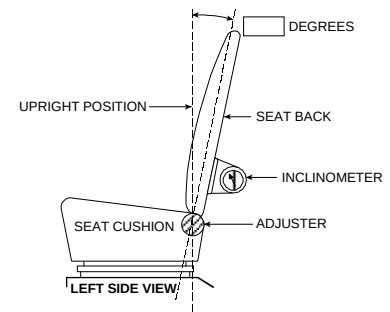
DATA SHEET NO. 2 SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021

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

SEAT FORE / AFT POSITIONS

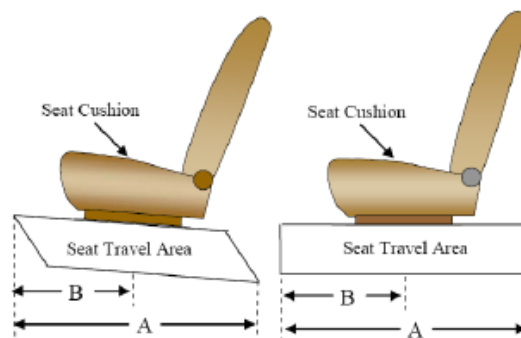
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	38 (0-37)	14
Passenger Seat	26 (0-25)	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
Passenger Seat	4	0



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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

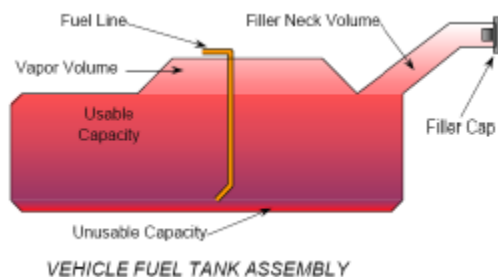
NHTSA No.: M20215803
 Test Date: 4/28/2021

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	70
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	64.4 – 65.8
Actual Amount of Solvent Used	65.1
1/3 of Usable Capacity	23.3

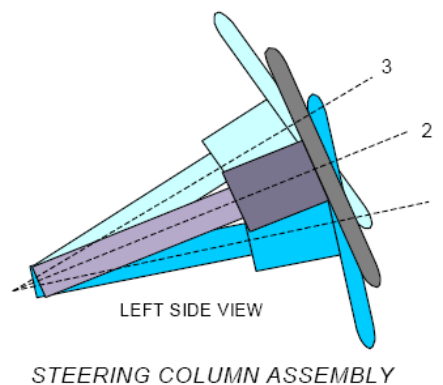
FUEL PUMP

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



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.



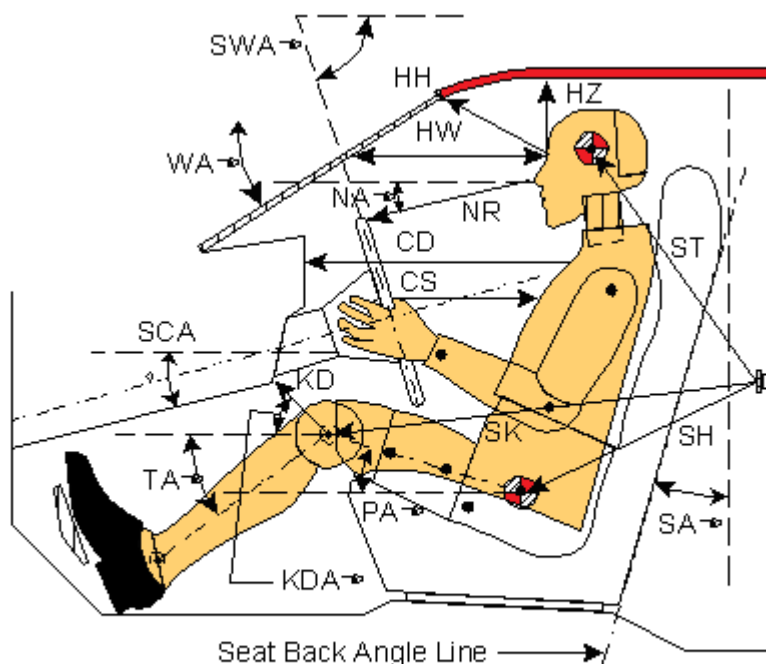
STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	21.6	
Geometric center position No. 2	24.1	
Uppermost position No. 3	26.6	
Telescoping Steering Wheel Travel		60
Test Position	24.1	30

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021



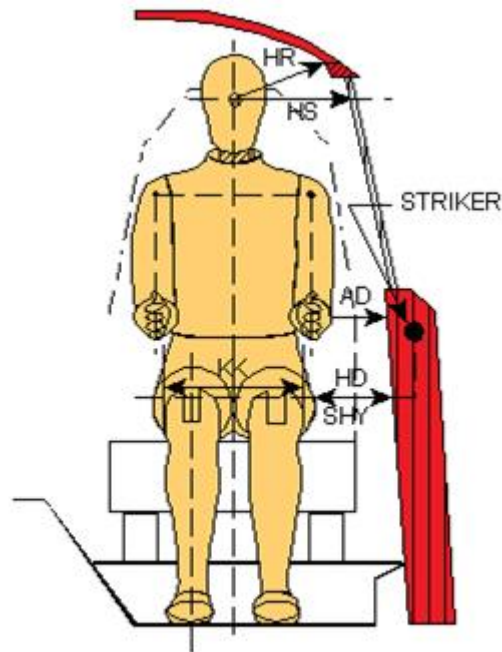
Left Side View

Code	Measurement Description	Driver (SN: 142)		Passenger (SN: 139)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		28.3		
SWA°	Steering Wheel Angle		24.0		
SCA°	Steering Column Angle		66.0		
SA°	Seat Back Angle (on headrest post)		1.6		5.3
HZ	Head to Roof (Z)	175	90	228	90
HH	Head to Header	350	22.6	345	37.8
HW	Head to Windshield	630	0.0	720	0.0
NR	Nose to Rim / Dash	409	8.8	461	12.1
CD	Chest to Dash	552		466	
CS	Chest to Steering Hub	346	0.6		
RA	Rim to Abdomen	233	0.0		
KDL	Left Knee to Dash	221	39.0	184	42.8
KDR	Right Knee to Dash	206	22.6	180	44.6
PA°	Pelvic Angle		22.0		19.8
TA°	Tibia Angle		24.4		38.5
SK	Striker to Knee	595	11.3	651	12.3
ST	Striker to Head	430	71.4	375	62.1
SH	Striker to H-Point	273	44.6	375	30.2

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021



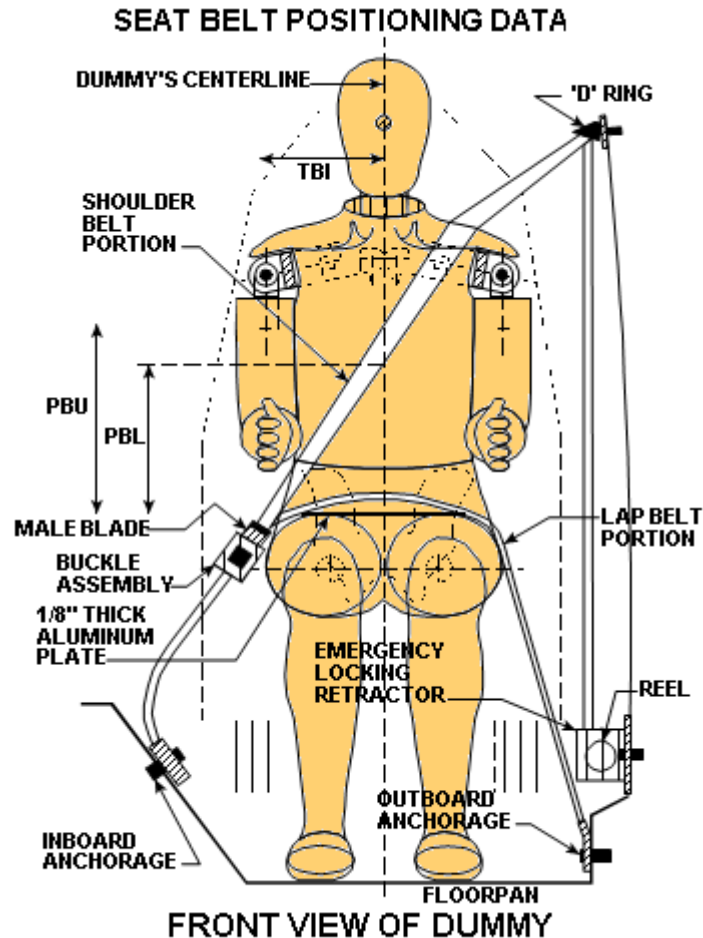
Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	164	108
HD	H-Point to Door	156	187
HR	Head to Side Header	220	261
HS	Head to Side Window	355	385
KK	Knee to Knee	360	212
SHY	Striker to H-Point (Y Direction)	245	265
AA	Ankle to Ankle	380	171

DATA SHEET NO. 5 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	310	308
PBL — Top surface of reference to belt lower edge	mm	230	210

BELT LENGTH DATA

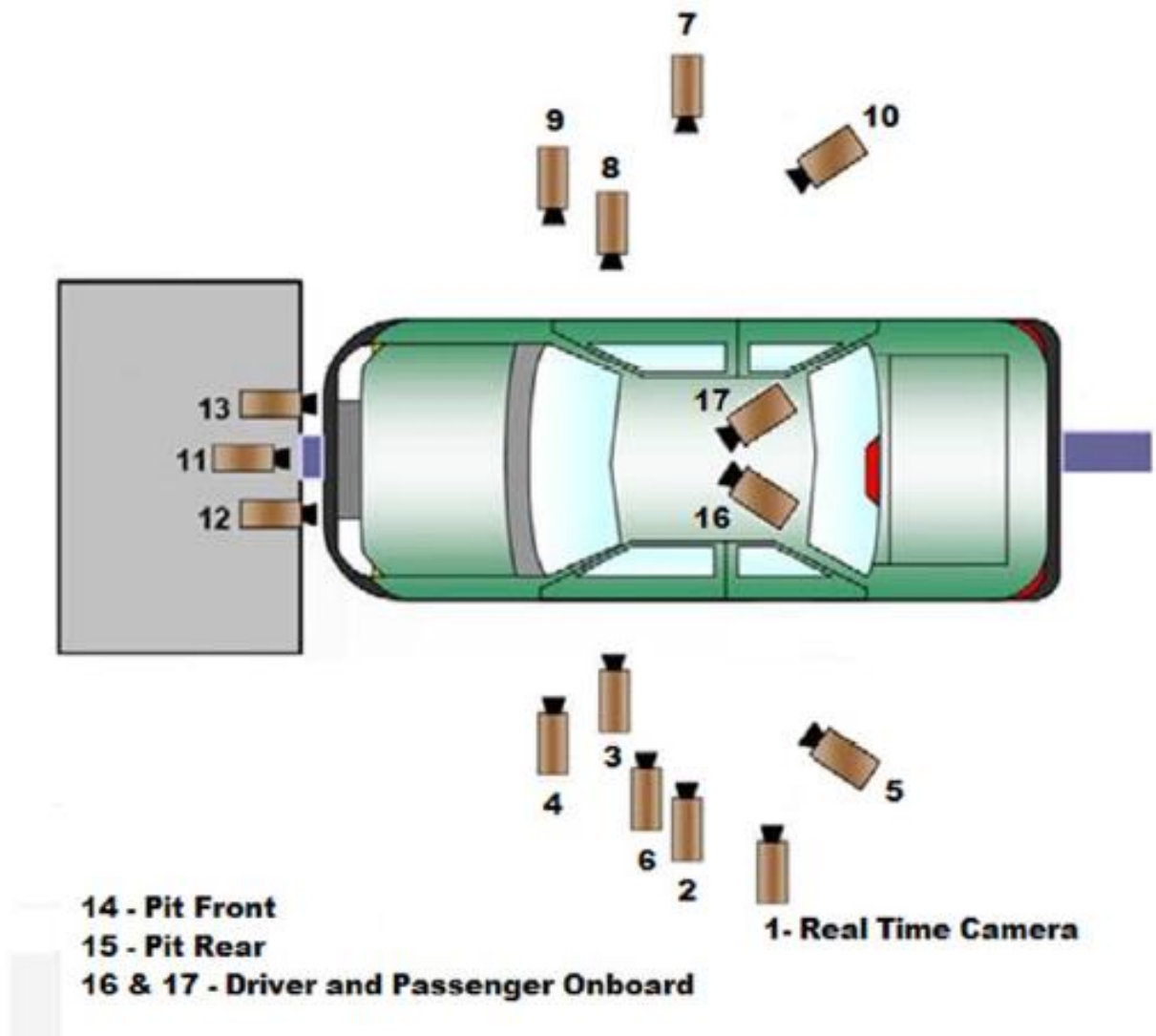
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	876	894
Lap Belt Length as measured on ATD	mm	688	670
Remainder of belt on reel	mm	1036	1136
Total belt length for continuous webbing systems	mm	2600	2700

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

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

CAMERA LOCATIONS

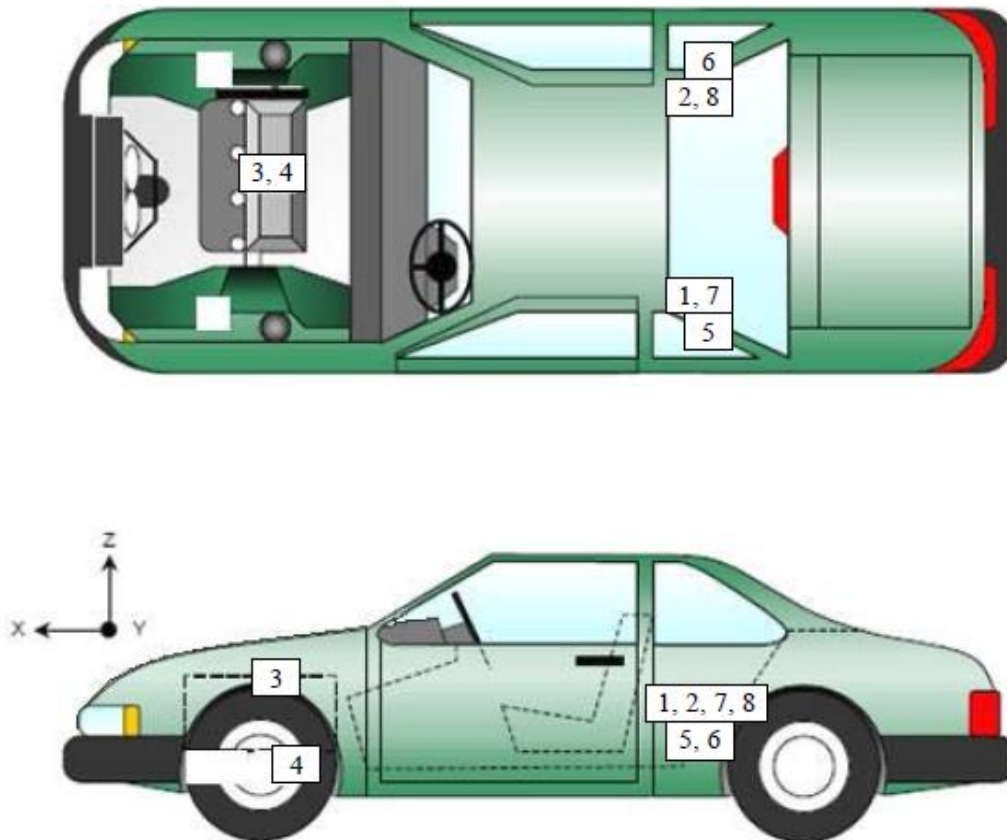
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-		60
2	Left Overall	-2182	-7713	-1406	24	1000
3	Driver Close-Up	-1610	-6098	-1448	50	1000
4	Left Front Half	-984	-5250	-1298	28	1000
5	Left Angle	-4263	-4874	-2453	50	1000
6	Steering Column	-1763	-8052	-2254	75	1000
7	Right Overall	-1993	7811	-1400	24	1000
8	Passenger Close-Up	-1474	6760	-1548	50	1000
9	Right Front Half	-1192	5486	-1347	28	1000
10	Right Angle	-4210	4822	-2420	50	1000
11	Windshield	1113	0	-3471	12.5	1000
12	Driver Windshield	978	-352	-2223	25	1000
13	Passenger Windshield	978	435	-2223	25	1000
14	Pit Front	-1479	0	2447	12.5	1000
15	Pit Rear	-2776	0	2463	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: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	2063	-386	147
2	Right Rear Accelerometer – X Direction	2063	361	159
3	Engine Top X	4137	190	-311
4	Engine Bottom X	4580	34	262
5	Left Rear Accelerometer – Z Direction	2063	-386	147
6	Right Rear Accelerometer – Z Direction	2063	361	159
7	Left Rear Accelerometer – X Direction Redundant	2063	-386	147
8	Right Rear Accelerometer – X Direction Redundant	2063	360	159

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

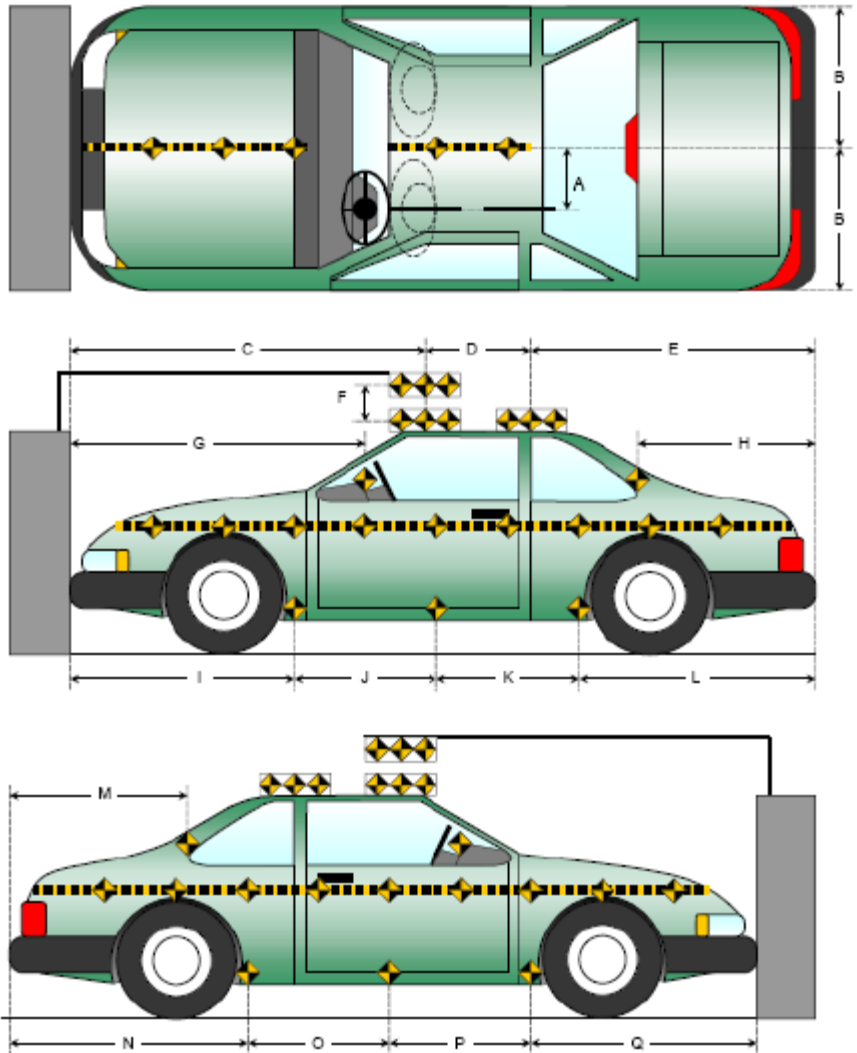
DATA SHEET NO. 8 **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

Item	Value
A	360
B	897
C	2662
D	612
E	1645
F	226
G	1746
H	1330
I	1412
J	956
K	952
L	1599
M	1334
N	1597
O	948
P	964
Q	1410

All units in millimeters



DATA SHEET NO. 9 **LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

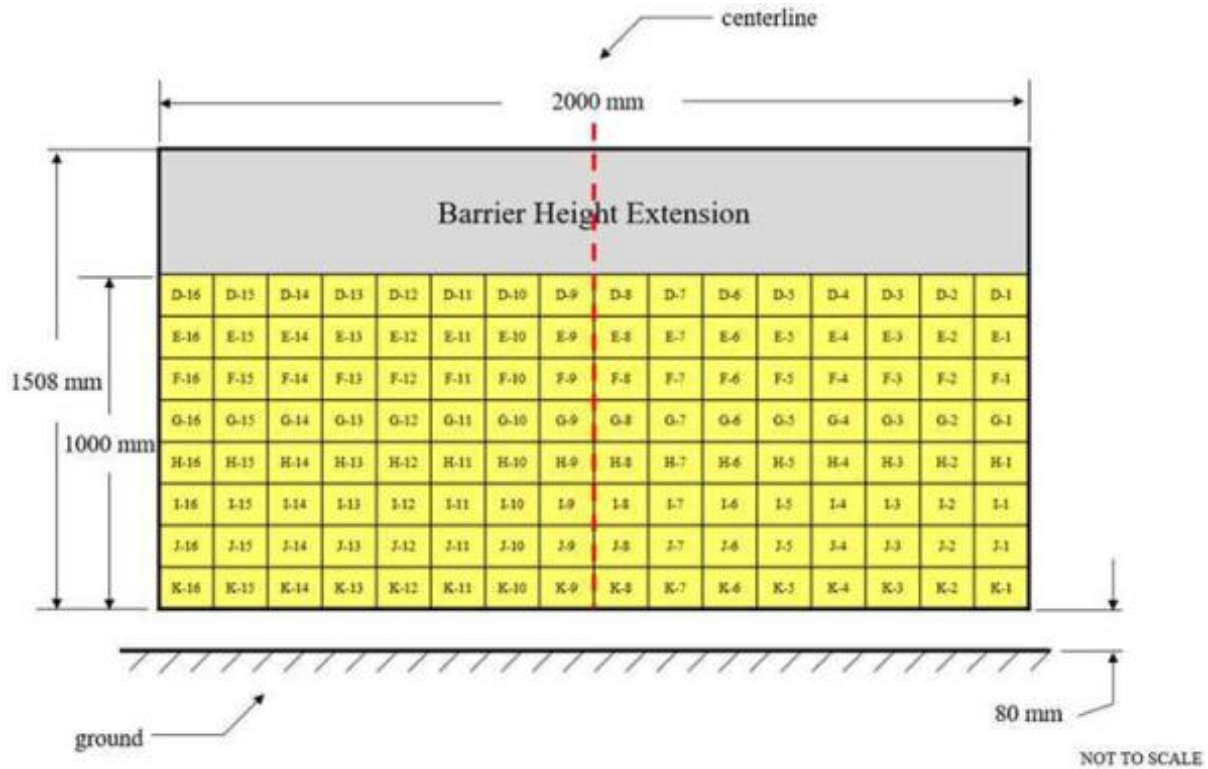


Figure 1 - Load Cell Locations on a 128-Load Cell Barrier with Plywood Height Extension*
 Please note above diagram is not actual representation of load cell barrier used.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021

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: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	P572E 50 th Male / 142	P5720 5 th Female / 139
Head Contact	Frontal Airbag & Headrest	Frontal Airbag & Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster & Steering Column	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

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

**NOTE: Indicate "No", "N/A, or "Yes" described

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Cracks throughout with some minor separation
Window Damage	None
Other	Driver belt bunched in seatbelt tongue

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	622
Center	mm	635
Right Side	mm	694
Average	mm	650

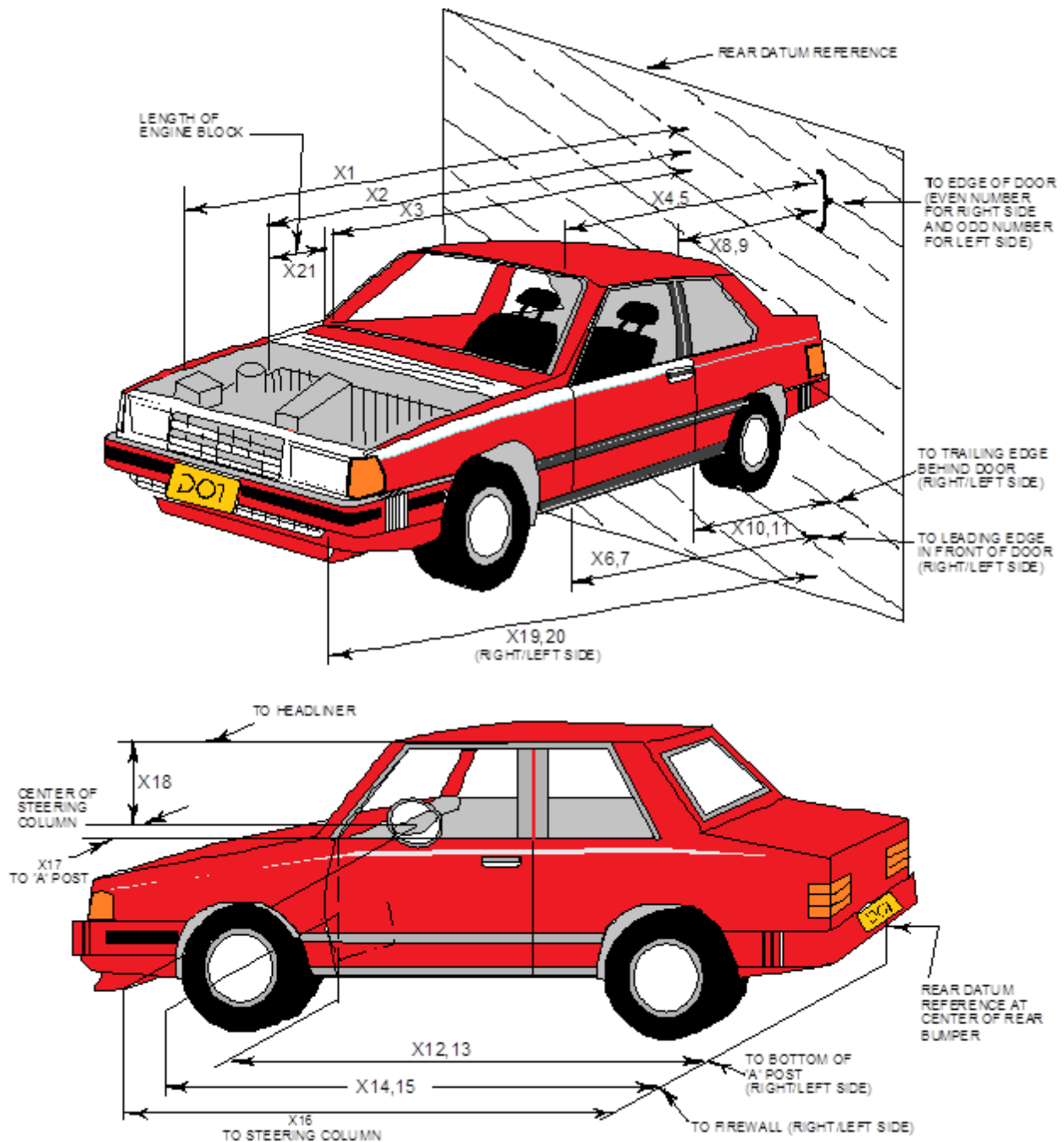
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021



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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4919	4628	-291
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4213	4036	-177
3	RSOV to Firewall	3843	3807	-36
4	RSOV to Upper Leading Edge of Right Door	3461	3464	3
5	RSOV to Upper Leading Edge of Left Door	3460	3461	1
6	RSOV to Lower Leading Edge of Right Door	3476	3475	-1
7	RSOV to Lower Leading Edge of Left Door	3475	3476	1
8	RSOV to Upper Trailing Edge of Right Door	2344	2345	1
9	RSOV to Upper Trailing Edge of Left Door	2343	2345	2
10	RSOV to Lower Trailing Edge of Right Door	2382	2379	-3
11	RSOV to Lower Trailing Edge of Left Door	2381	2381	0
12	RSOV to Bottom of "A" Post of Right Side	3452	3453	1
13	RSOV to Bottom of "A" Post of Left Side	3455	3455	0
14	RSOV to Firewall, Right Side	3796	3778	-18
15	RSOV to Firewall, Left Side	3791	3778	-13
16	RSOV to Steering Column	3019	3072	53
17	Center of Steering Column to "A" Post	323	320	-3
18	Center of Steering Column to Headliner	393	409	16
19	RSOV to Right Side of Front Bumper	4861	4578	-283
20	RSOV to Left Side of Front Bumper	4863	4650	-213
21	Length of Engine Block	203	203	0
RD	RSOV to Right Side of Dash Panel	3159	3160	1
CD	RSOV to Center of Dash Panel	3189	3187	-2
LD	RSOV to Left Side of Dash Panel	3196	3193	-3

*UR= Unrecoverable data point
 All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021

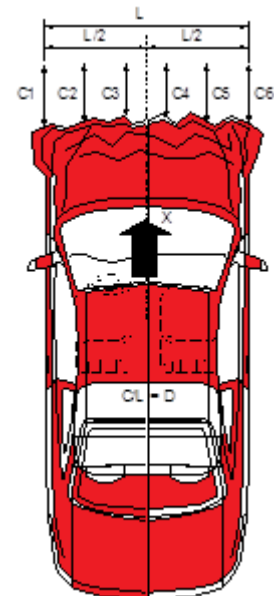
VEHICLE INFORMATION

VIN: 1VWAA7A33MC008016
Vehicle Size Category: Passenger Car

Wheelbase (mm): 2801
Test Weight (kg): 1731

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): 56.32
Velocity Change (km/h): 61.21
Time of Separation (ms): 135



CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: C4
Damage Region Length (mm): 1404
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	4705	4523	182
C2	Crush Zone 2 at Left Side	mm	4884	4586	298
C3	Crush Zone 3 at Left Side	mm	4914	4515	399
C4	Crush Zone 4 at Right Side	mm	4914	4442	472
C5	Crush Zone 5 at Right Side	mm	4884	4424	460
C6	Crush Zone 6 at Right Side	mm	4705	4425	280
L	C1 to C6	mm	1404	1480	-76

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

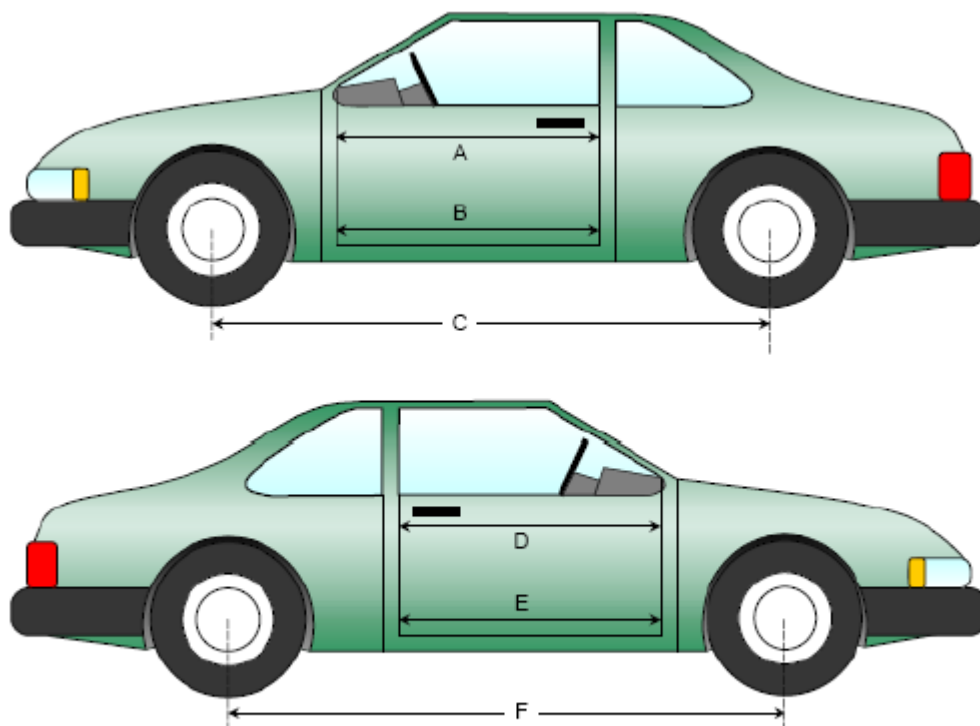
NHTSA No.: M20215803
Test Date: 4/28/2021

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1010	1008	-2
B	Left Side Lower	mm	873	873	0
D	Right Side Upper	mm	1008	1007	-1
E	Right Side Lower	mm	867	868	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2801	2800	-1
F	Right Side Wheelbase	mm	2801	2805	4



Left & Right Side Views

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

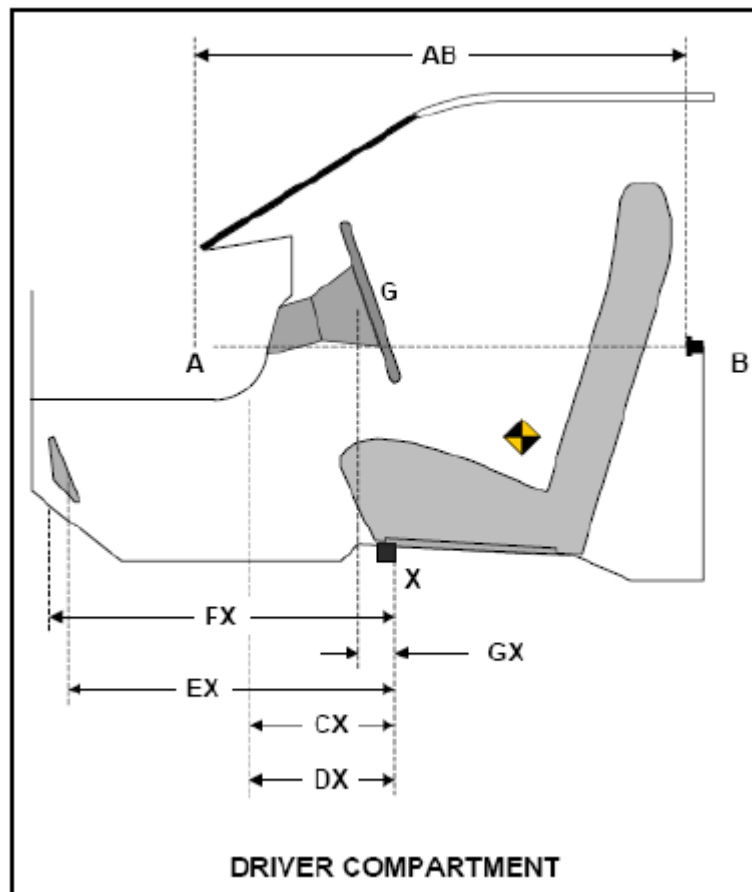
Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	816	816	0
CX	Left Knee Bolster to X	mm	316	324	8
DX	Right Knee Bolster to X	mm	313	322	9
EX	Brake Pedal to X	mm	567	538	-29
FX	Foot Rest to X	mm	579	580	1
GX	Center of Steering Column Wheel Hub to X	mm	84	140	56

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021

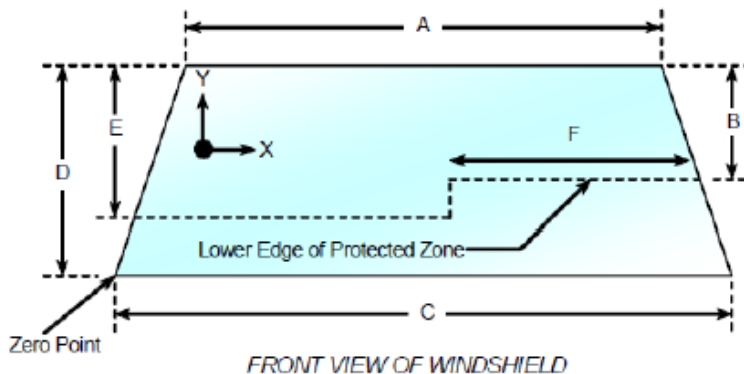
Windshield Mounting Details: A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2138	2138	100
Right Side	2138	1888	88.3
Total	4276	4026	94.2



Item	Units	Value
A	mm	1246
B	mm	430
C	mm	1410
D	mm	810
E	mm	445
F	mm	600

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

X	Y

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

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

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21 ° C

Test Time: 10:33 AM

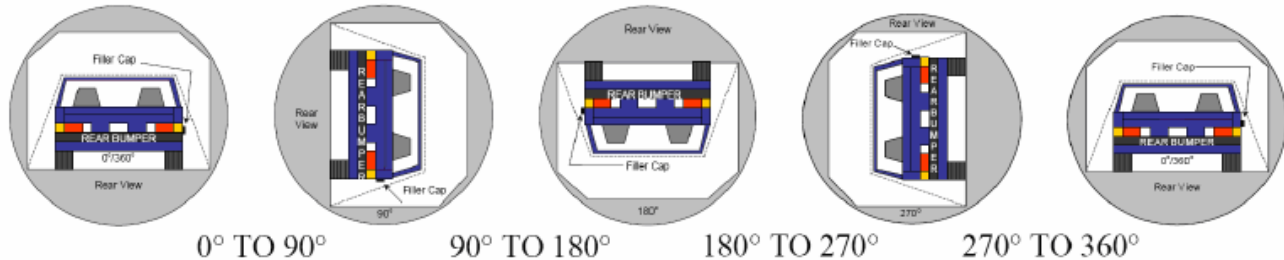
STODDARD SOLVENT SPILLAGE MEASUREMENTS

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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2021 Volkswagen Passat four door sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
 Test Date: 4/28/2021



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

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	73	300	373
90° to 180°	68	300	368
180° to 270°	63	300	363
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

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

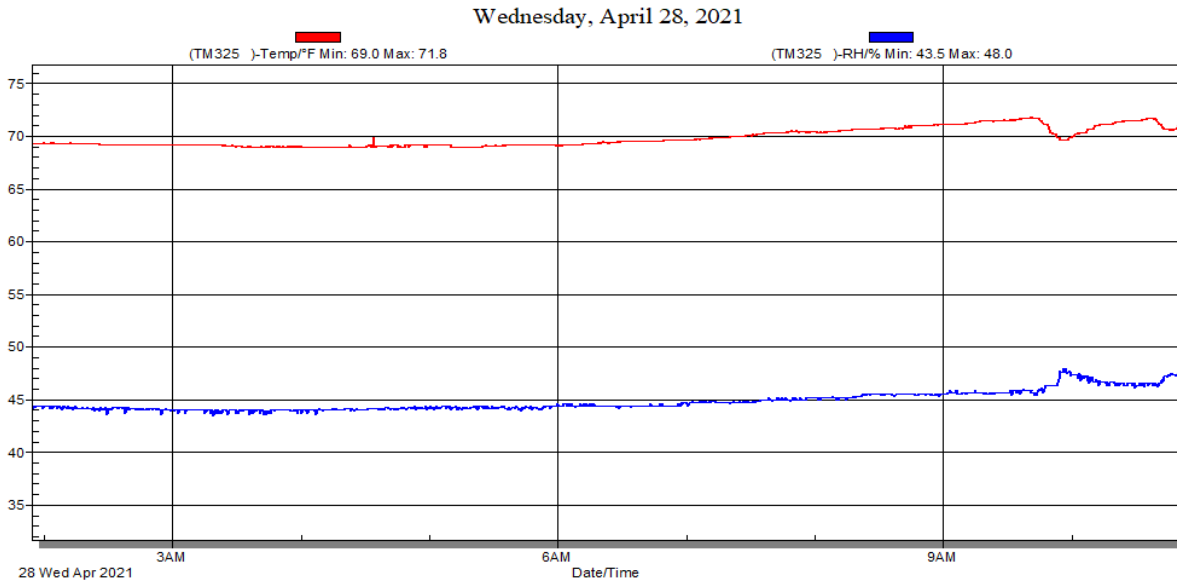
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 17
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2021 Volkswagen Passat four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20215803
Test Date: 4/28/2021



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

APPENDIX A
PHOTOGRAPHS

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

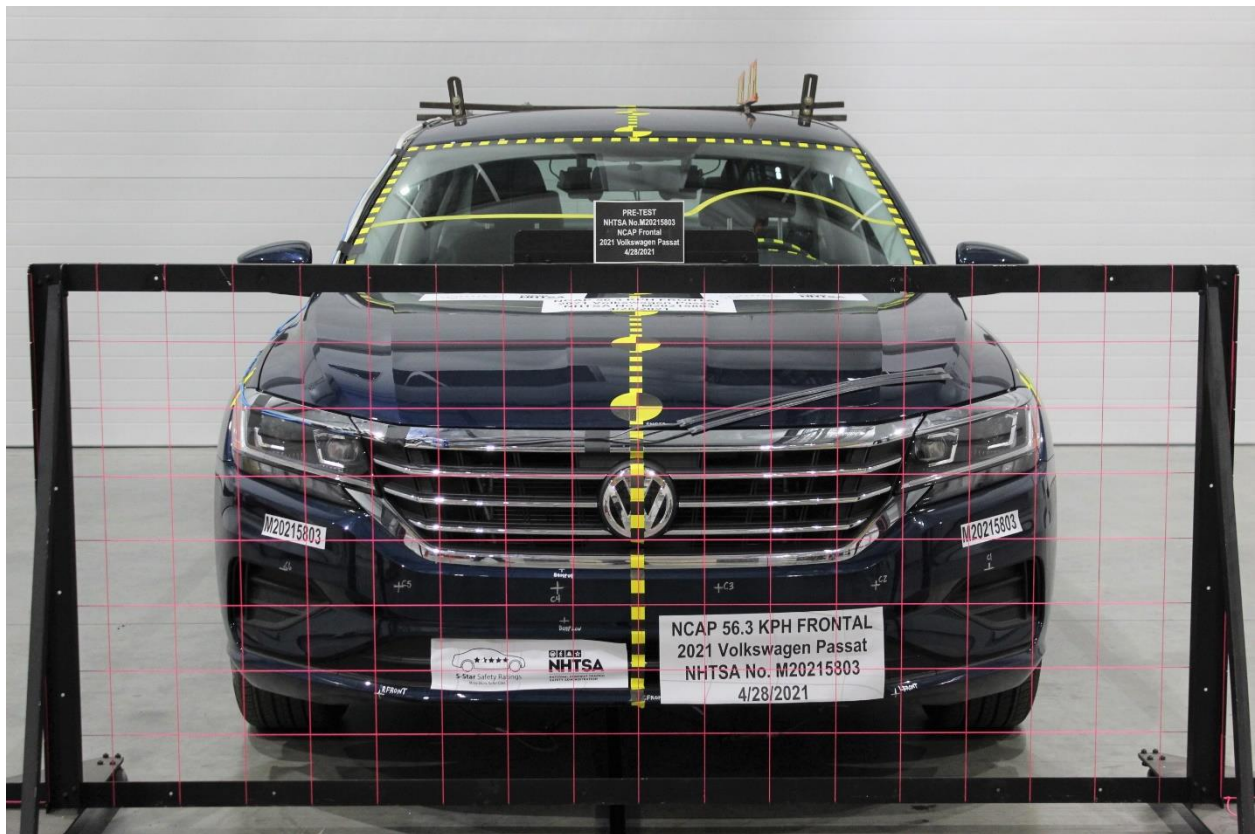


Figure A-1: Load Cell Location



Figure A-2: Pre-Test Load Cell Wall



Figure A-3: Post-Test Load Cell Wall

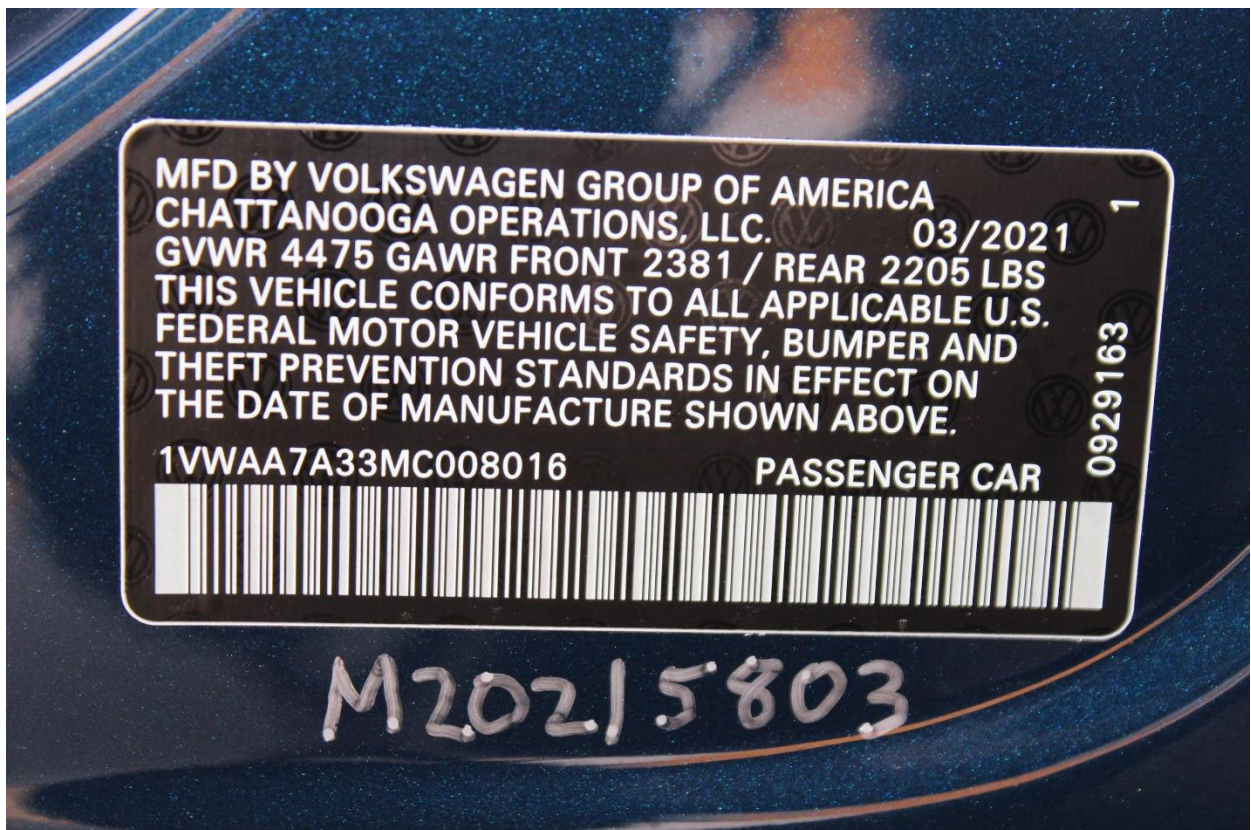


Figure A-4: Manufacturer's Label

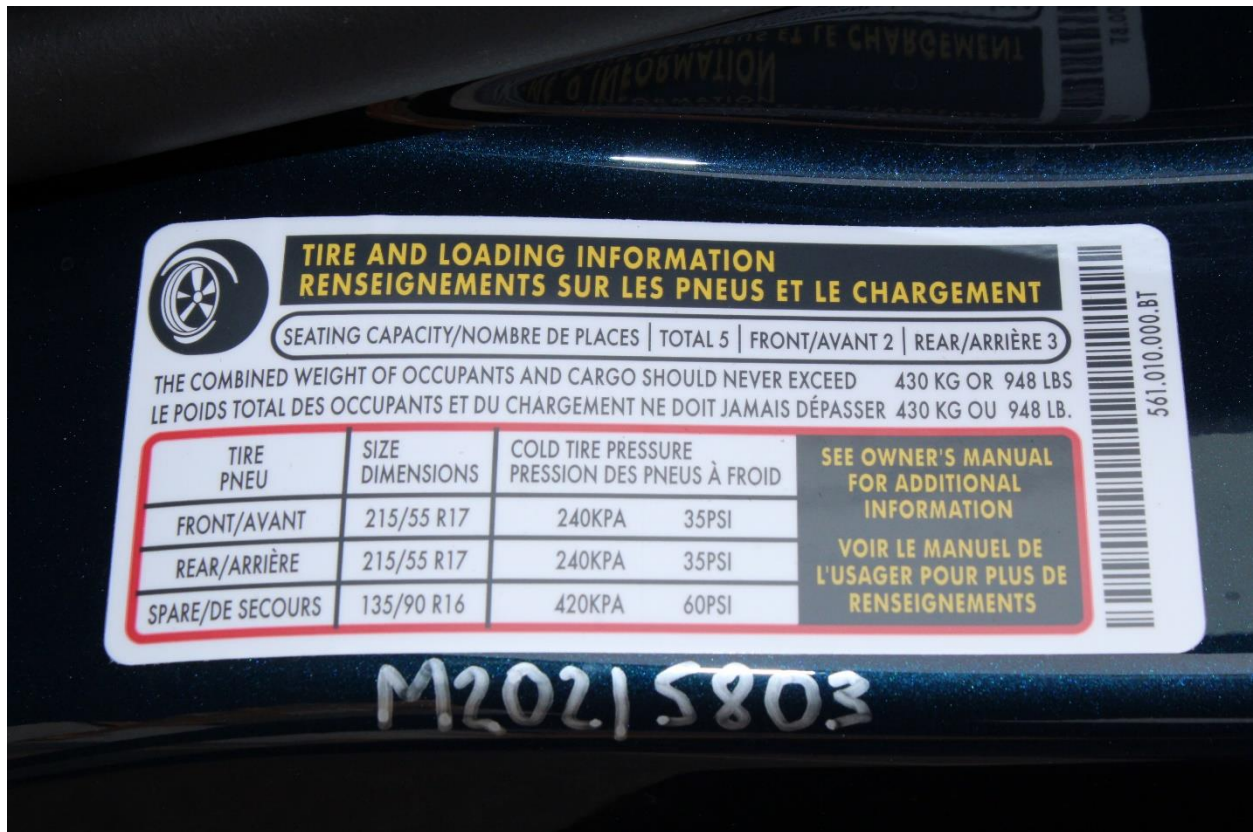


Figure A-5: Tire Placard



Figure A-6: 2021 Volkswagen Passat Frontal As Delivered



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

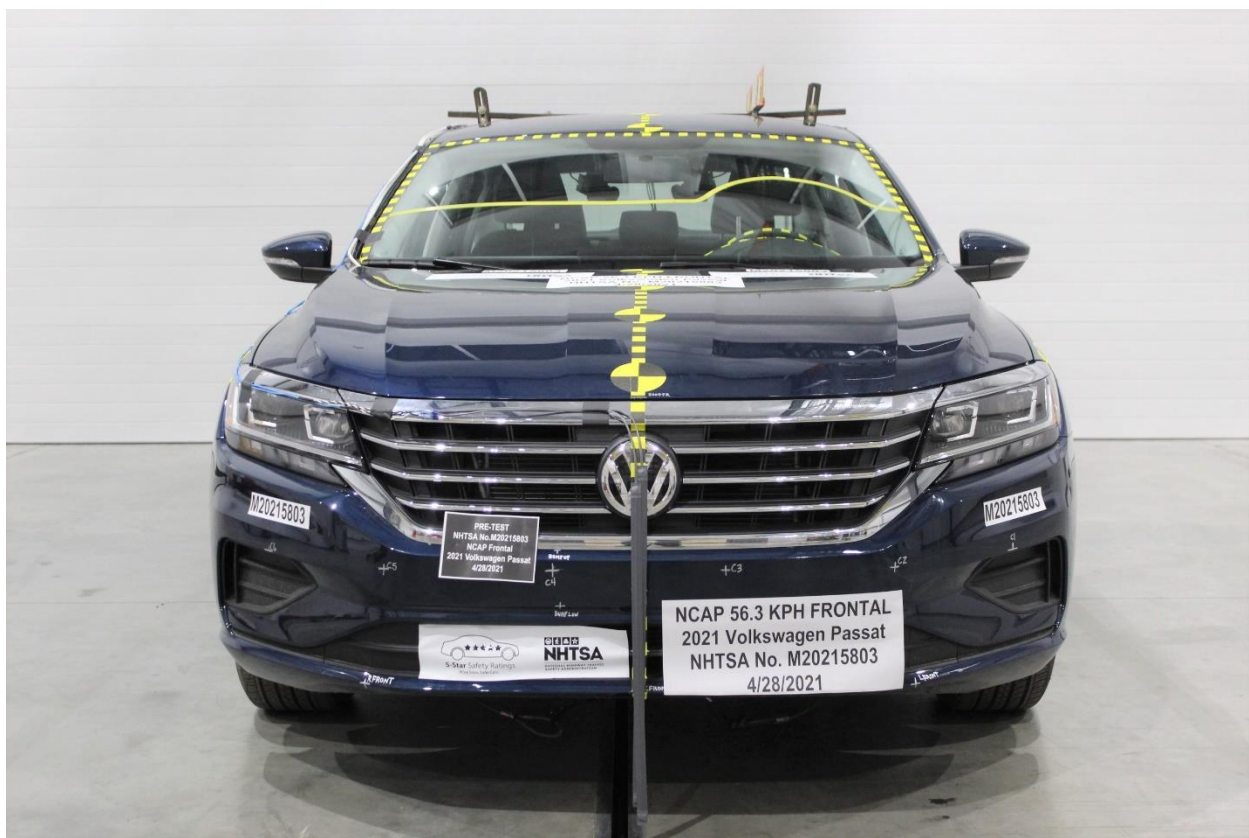


Figure A-8: Pre-Test Front View of Test Vehicle

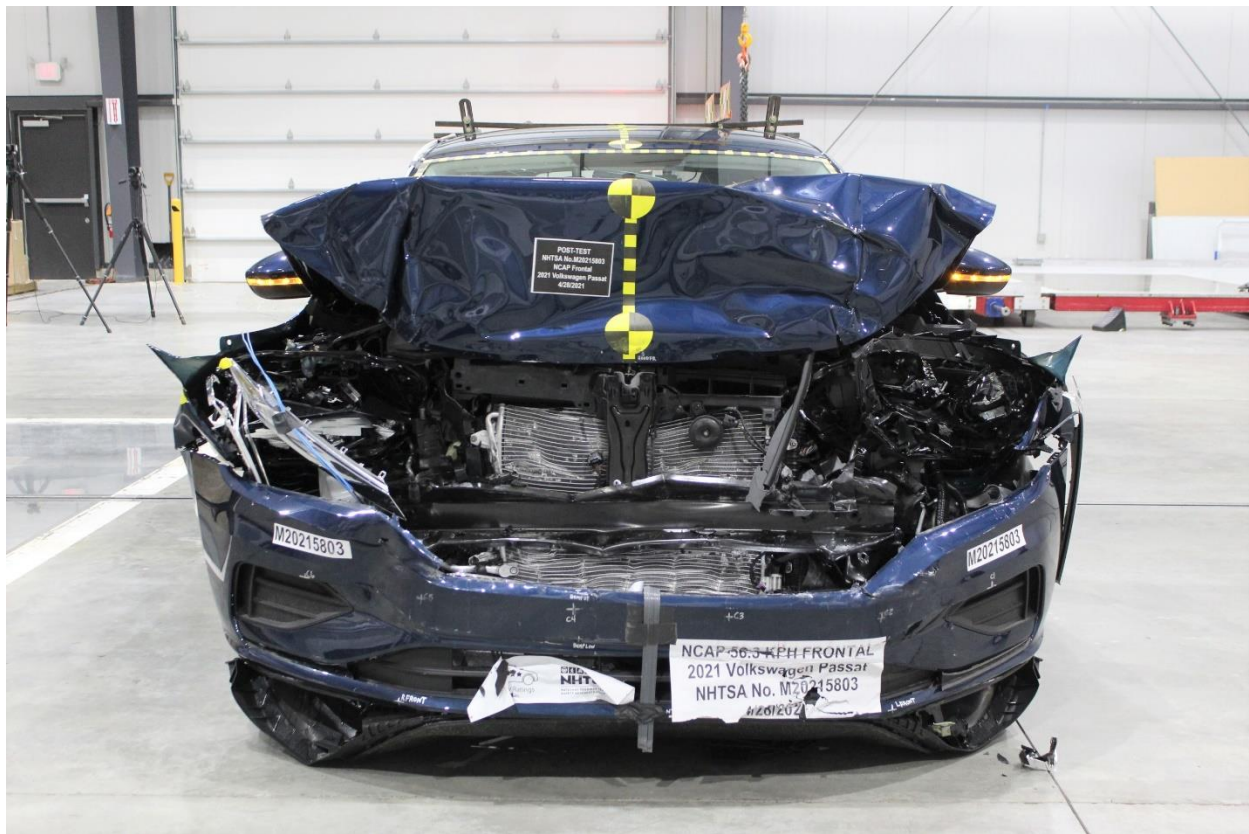


Figure A-9: Post-Test Front View of Test Vehicle

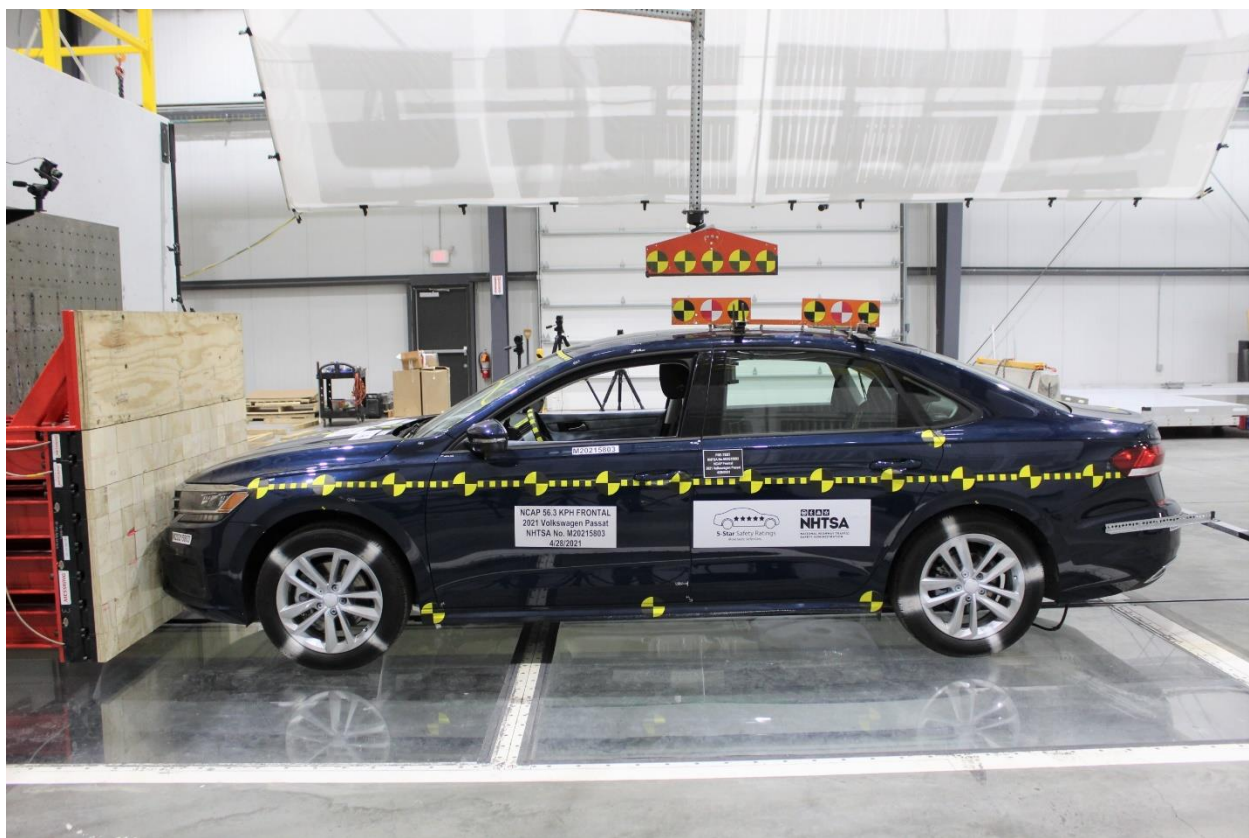


Figure A-10: Pre-Test Left View of Test Vehicle



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

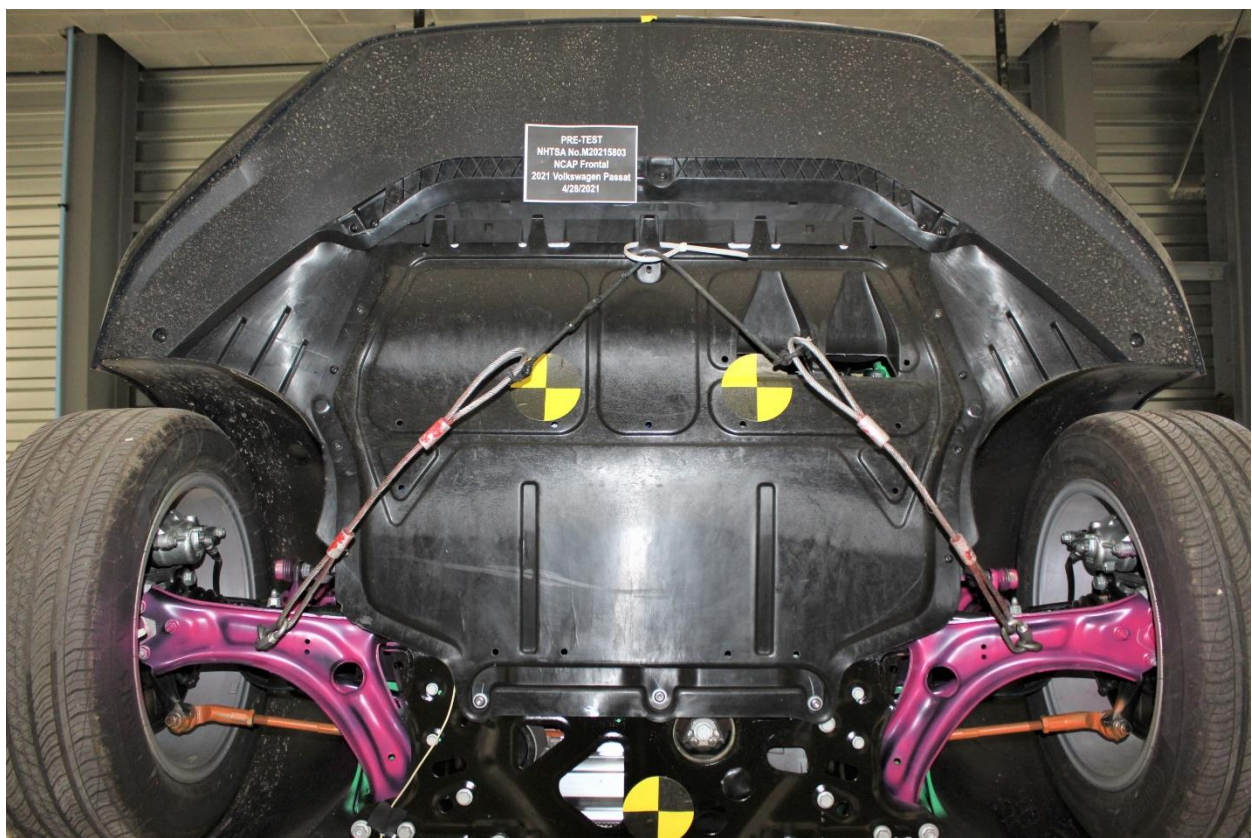


Figure A-24: Pre-Test Front Underbody View



Figure A-25: Post-Test Front Underbody View

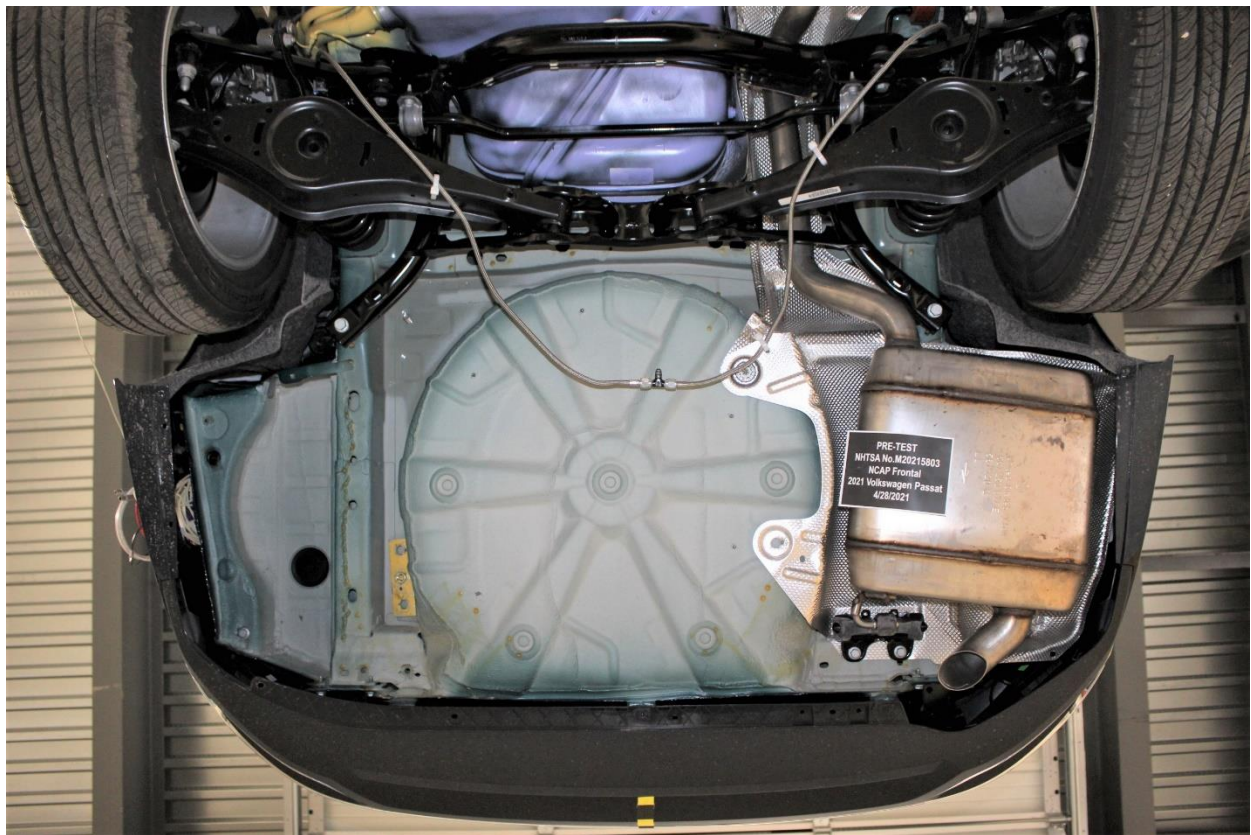


Figure A-26: Pre-Test Rear Underbody View

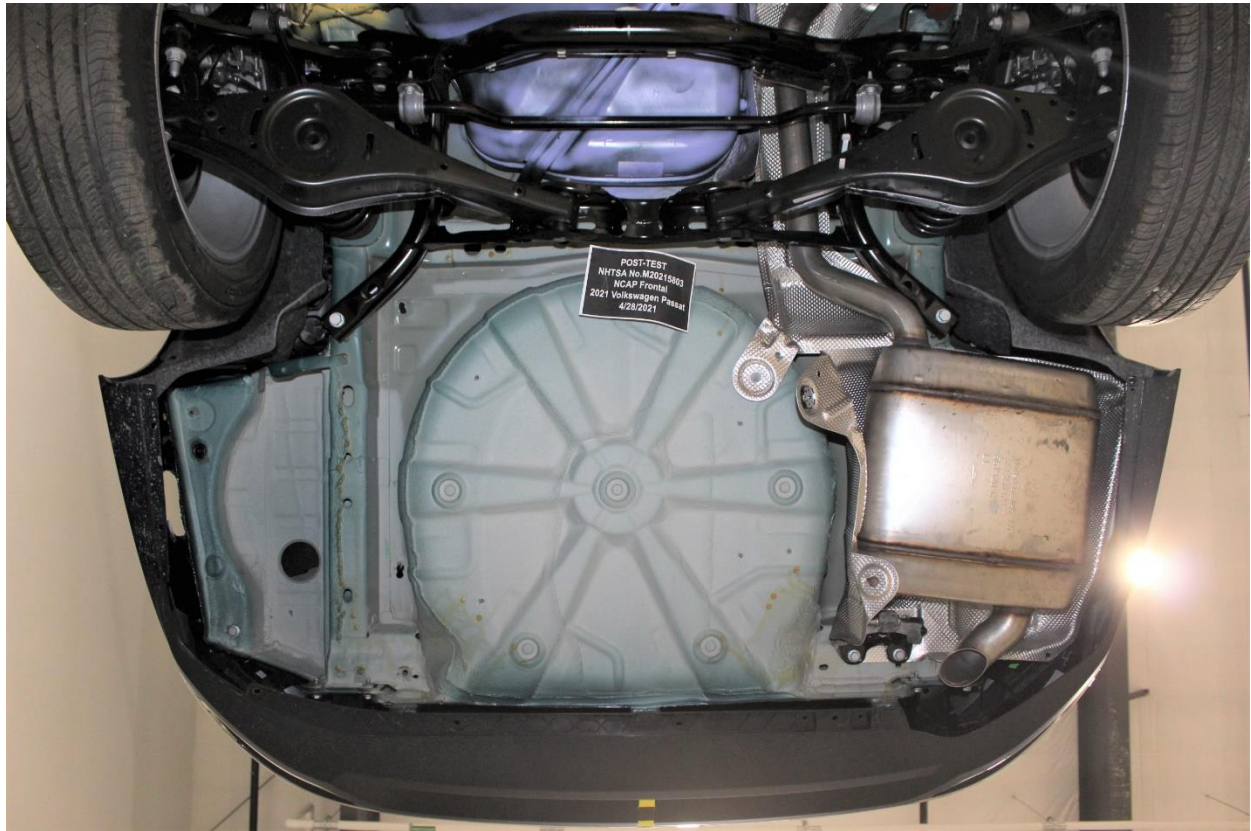


Figure A-27: Post-Test Rear Underbody View



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

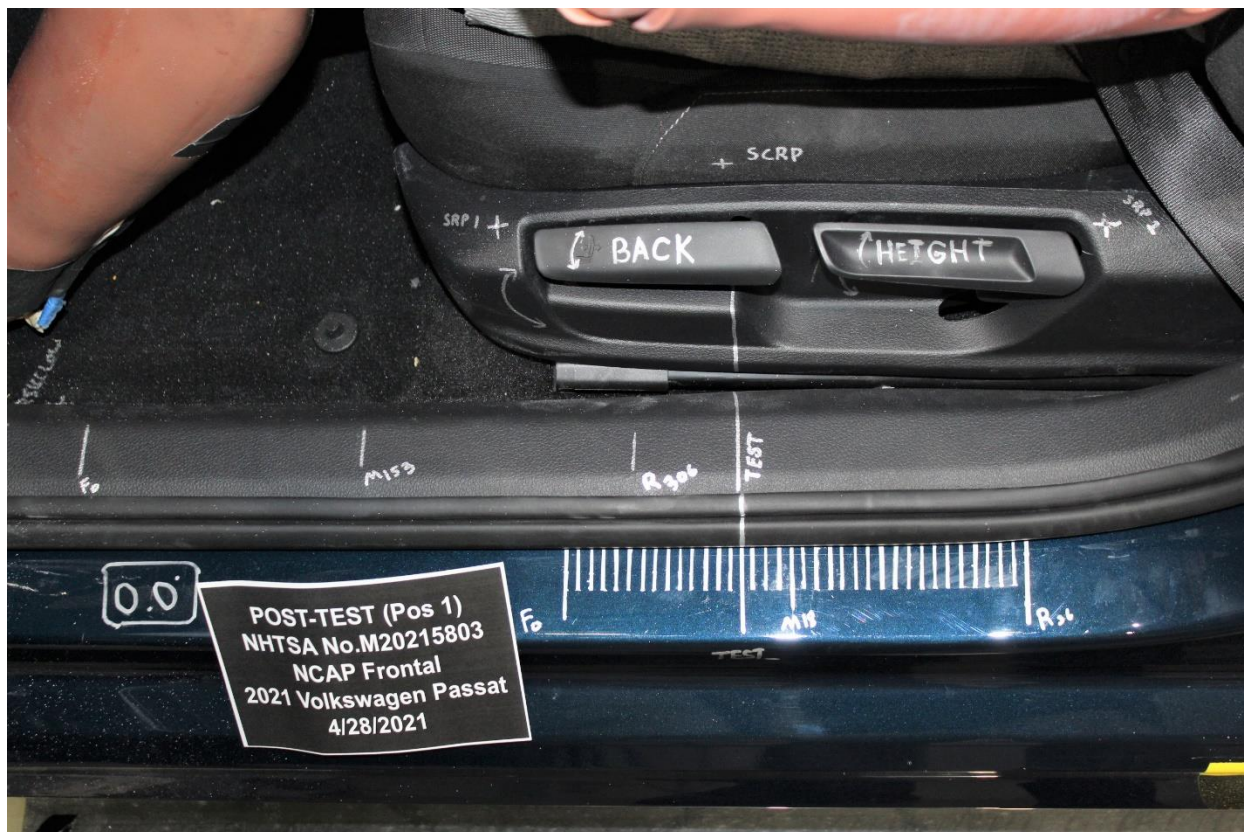


Figure A-37: Post-Test Driver's Seat Fore-Aft Markings

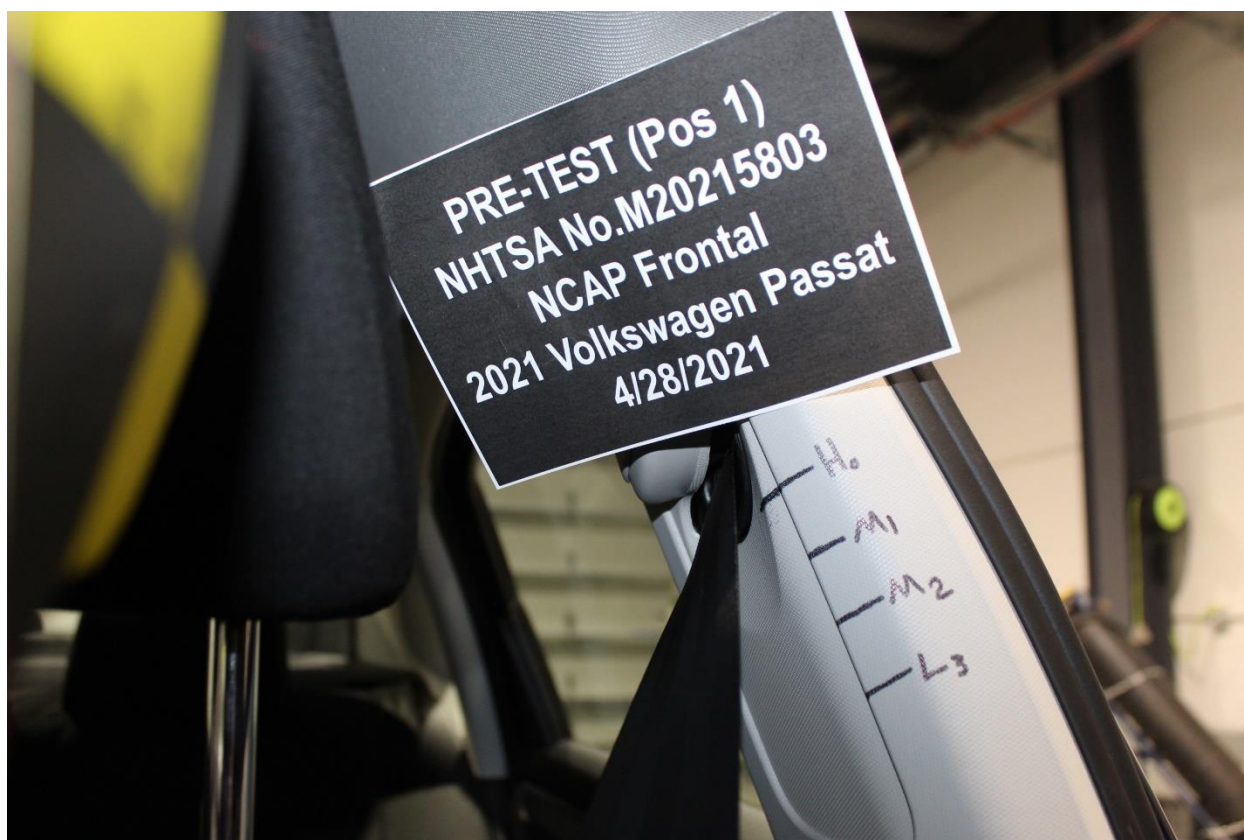


Figure A-38: Pre-Test View of Belt Anchorage for Driver Dummy



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

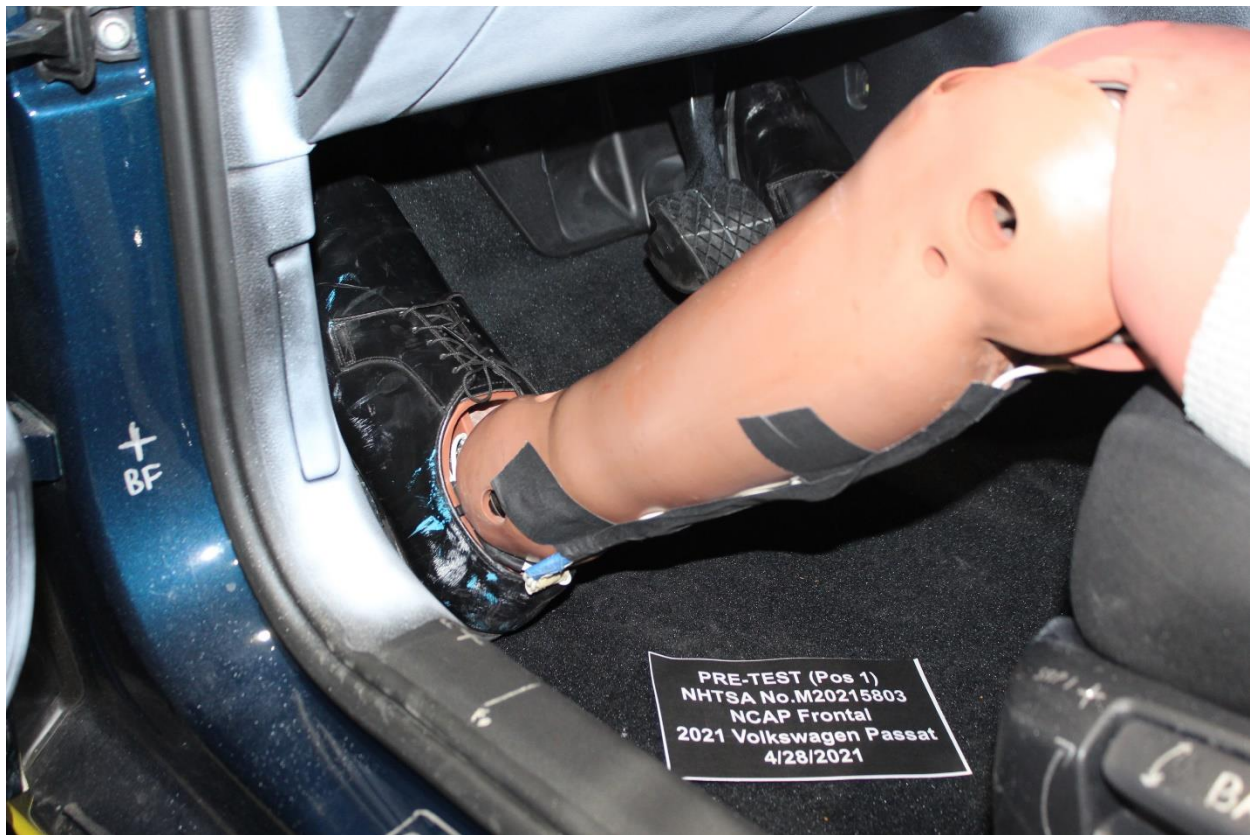


Figure A-42: Pre-Test Driver Dummy Feet



Figure A-43: Post-Test Driver Dummy Feet



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

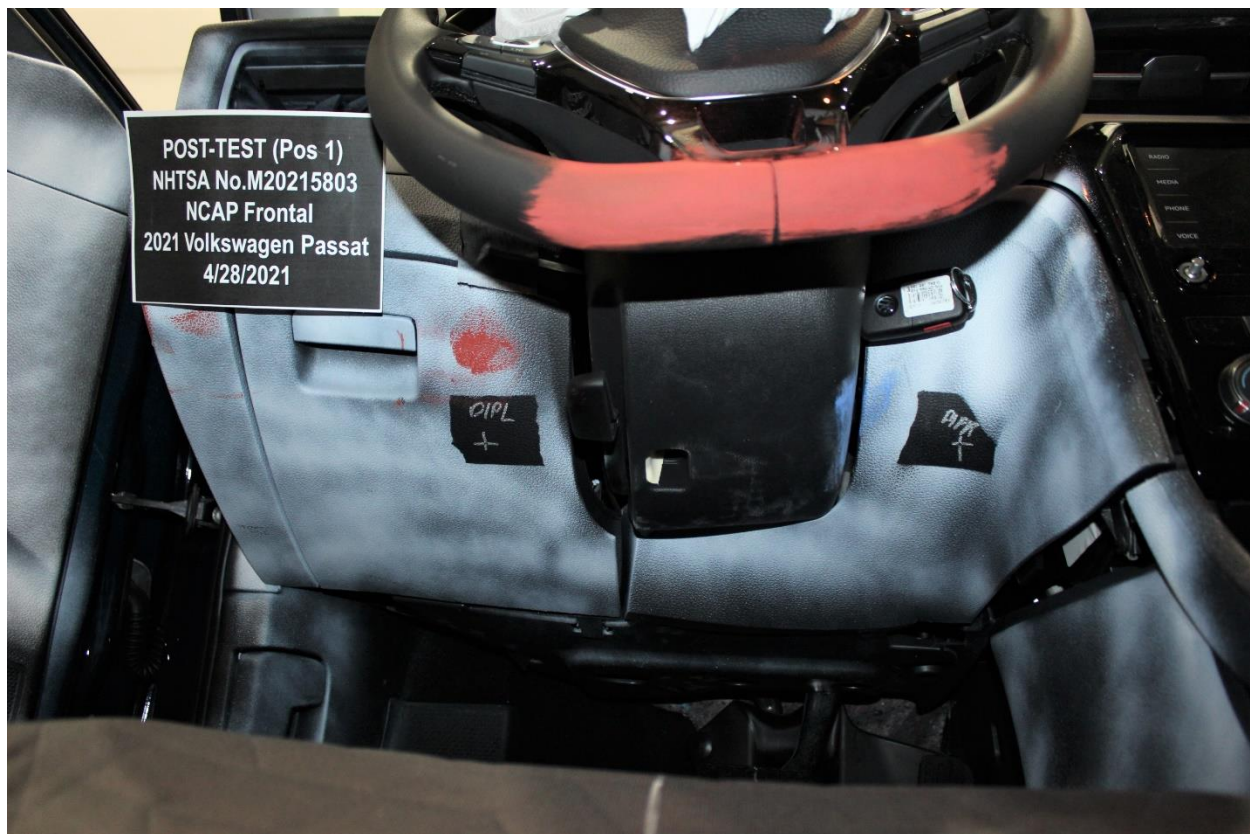


Figure A-45: Post-Test Driver's Side Knee Bolster



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



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

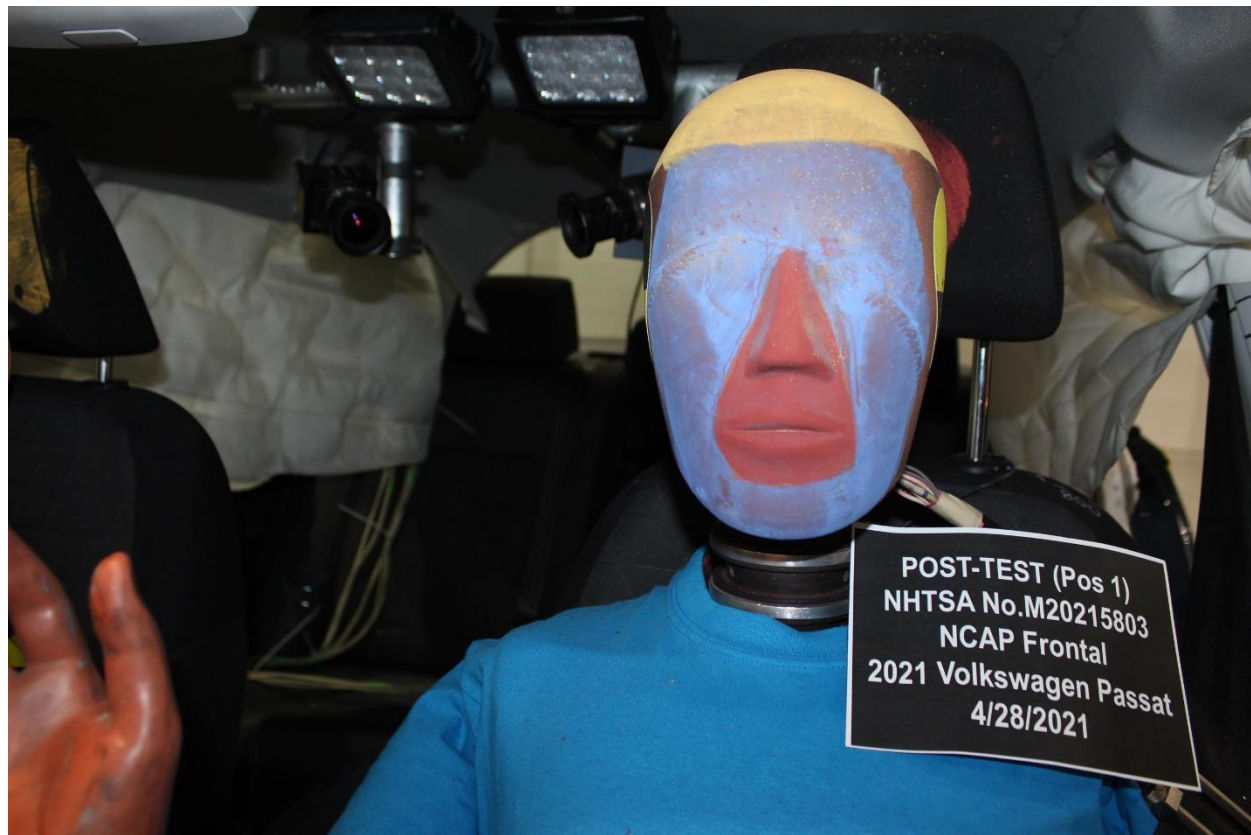


Figure A-48: Post-Test Driver Dummy Face



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

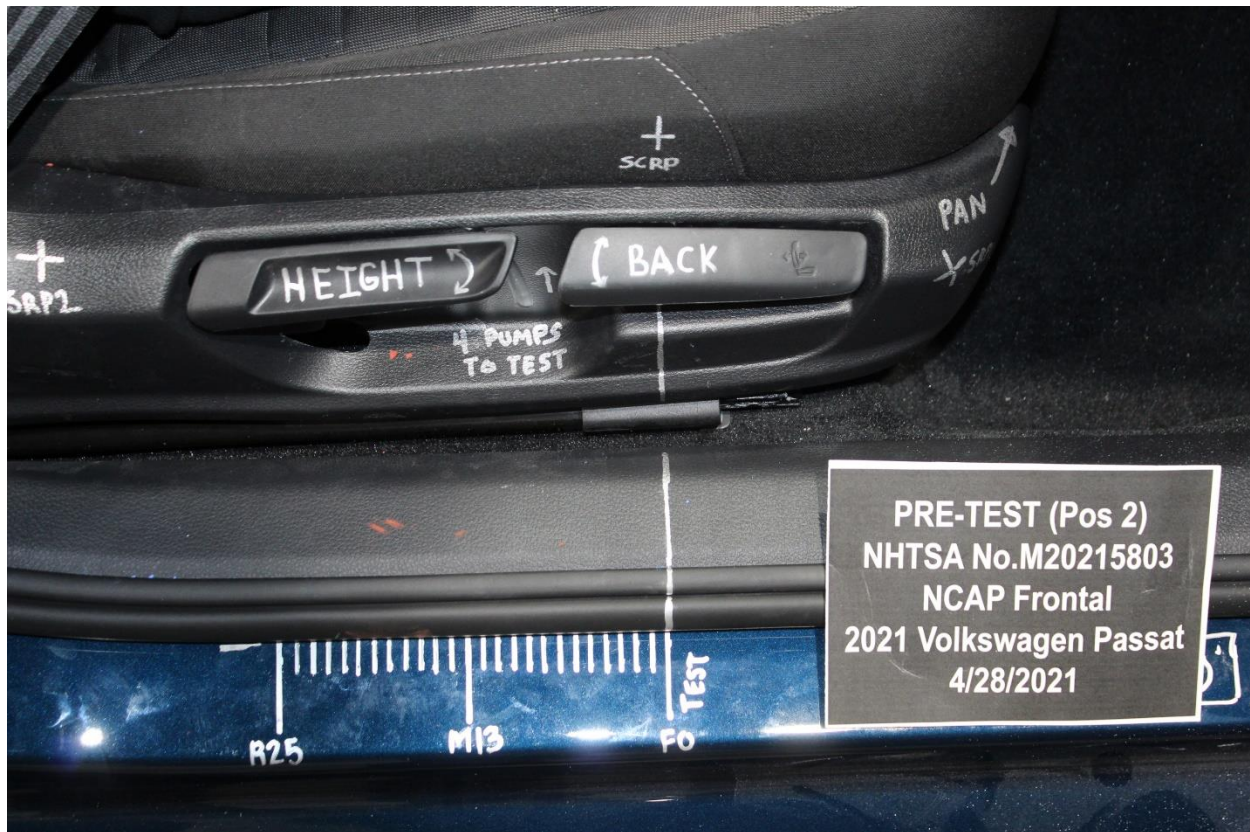


Figure A-59: Pre-Test Passenger's Seat Fore-Aft Markings



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

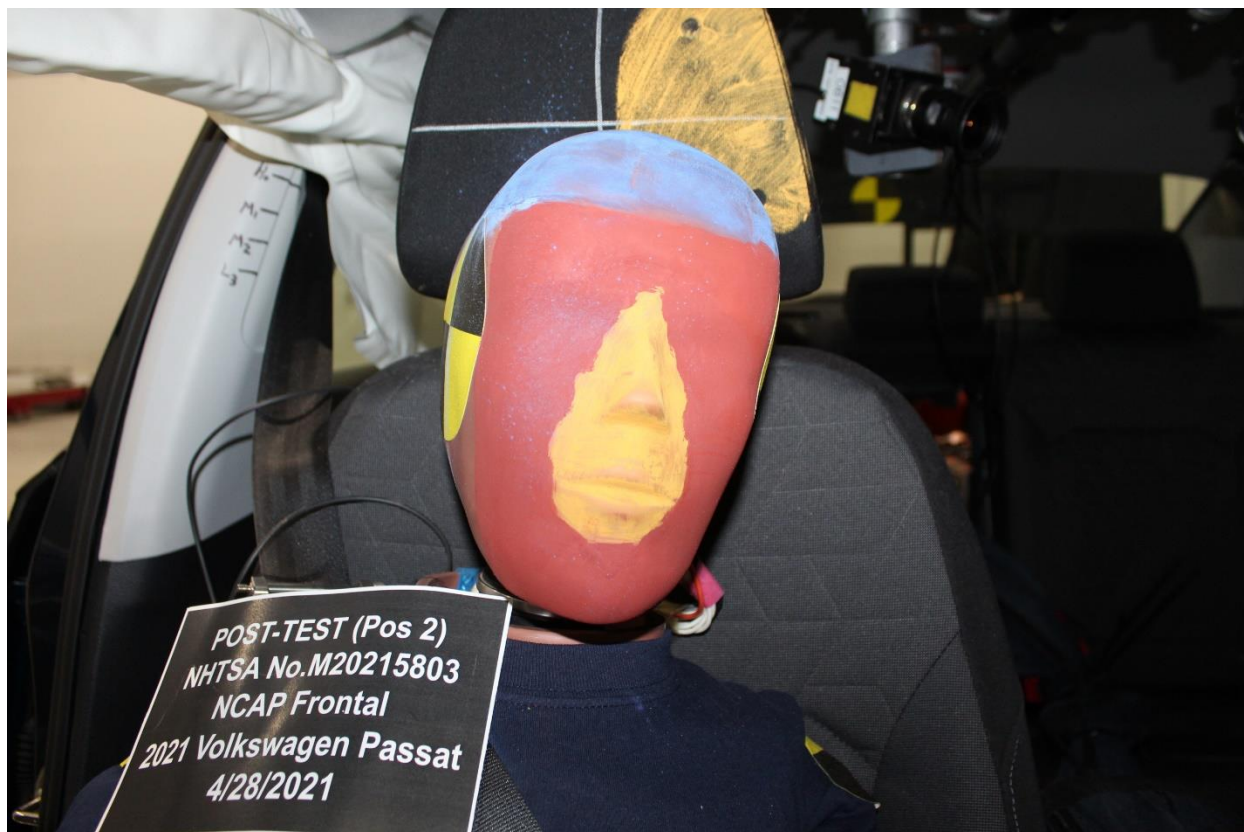


Figure A-71: Post-Test Passenger Dummy Face



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

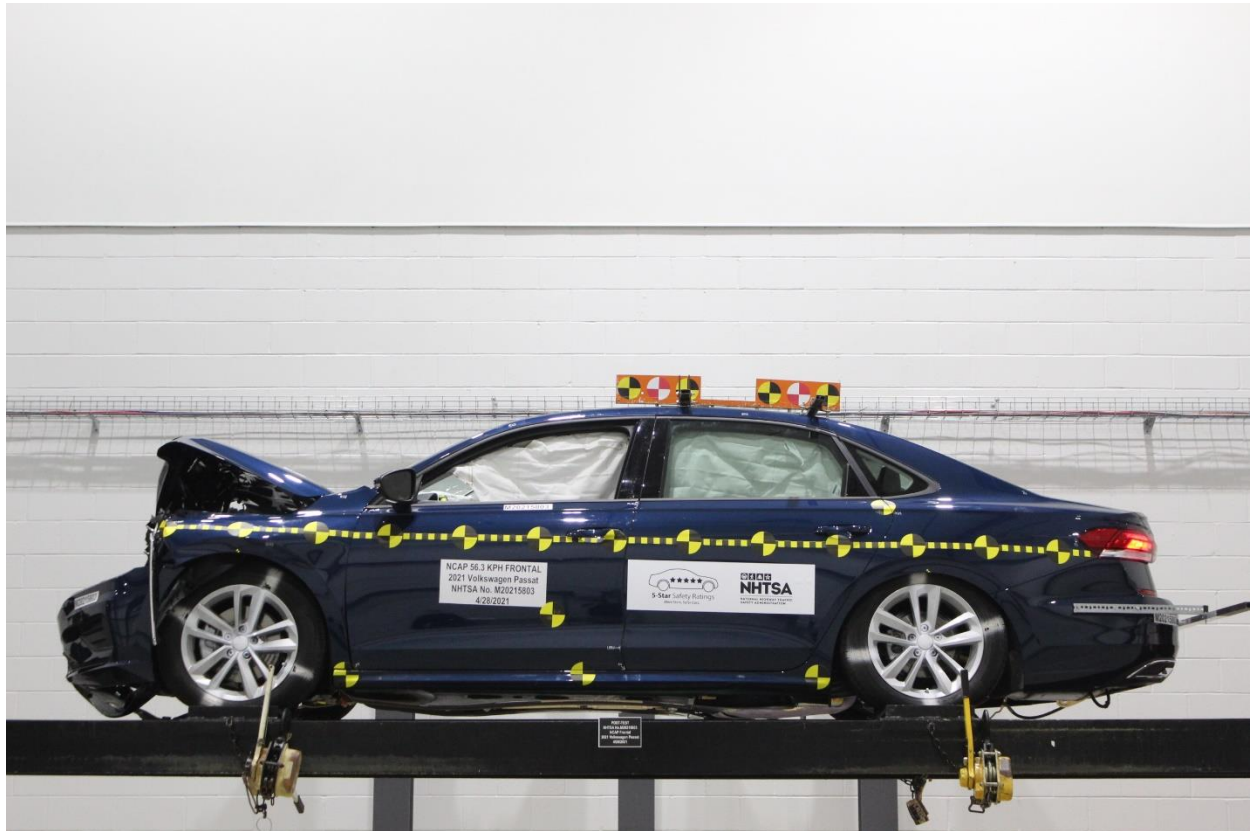


Figure A-77: Vehicle at 0° on Static Rollover Device



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

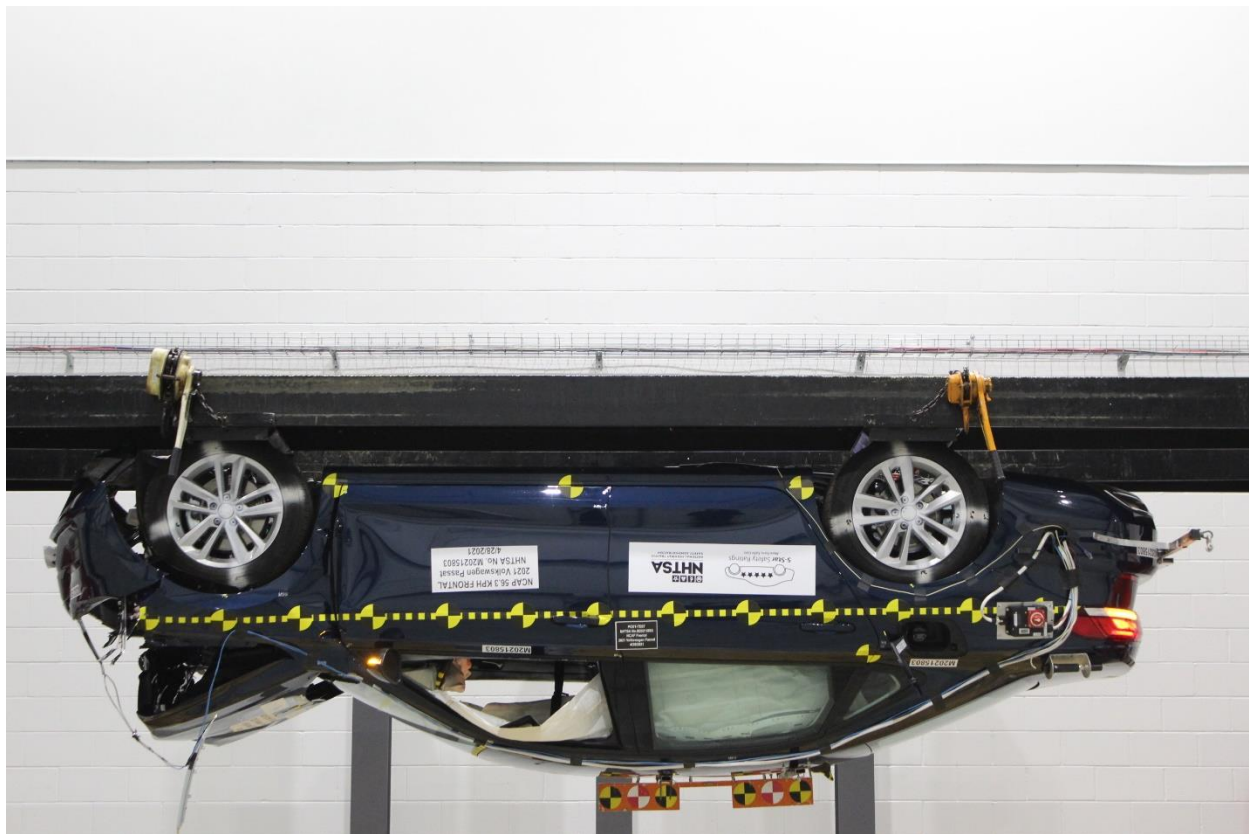


Figure A-79: Vehicle at 180° on Static Rollover Device



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



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



Figure A-82: 2021 Volkswagen Passat Frontal Impact Event

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

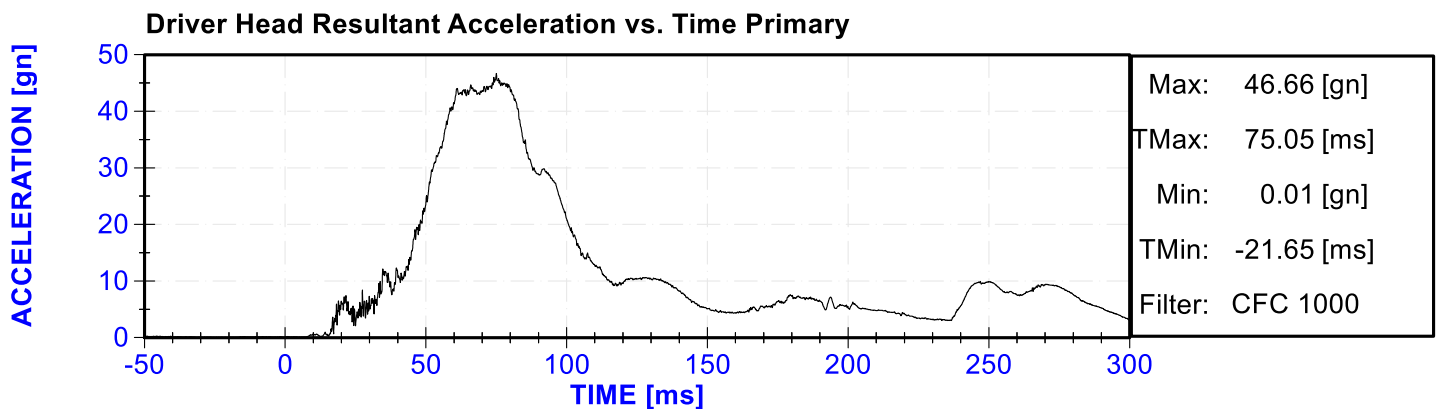
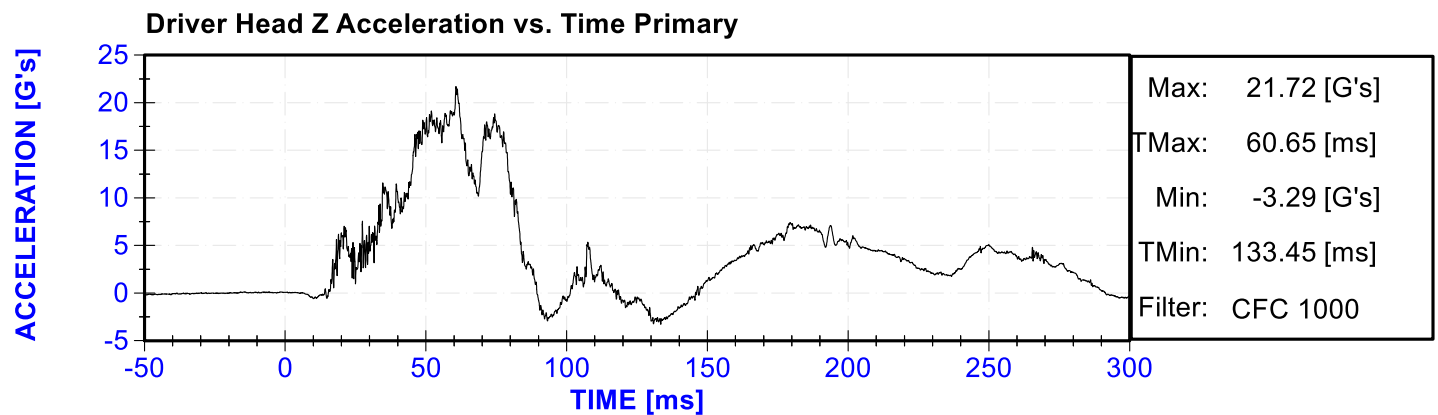
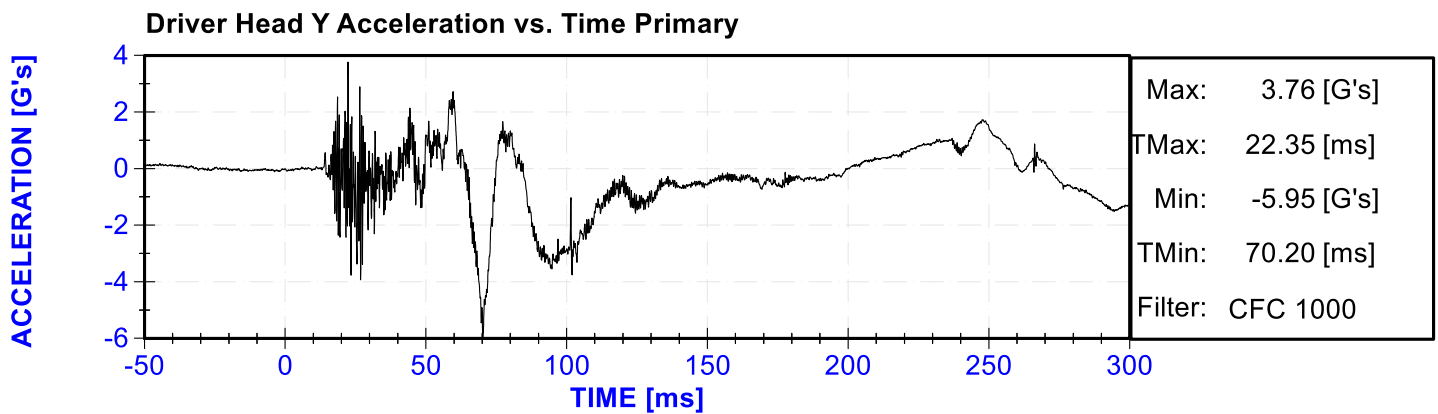
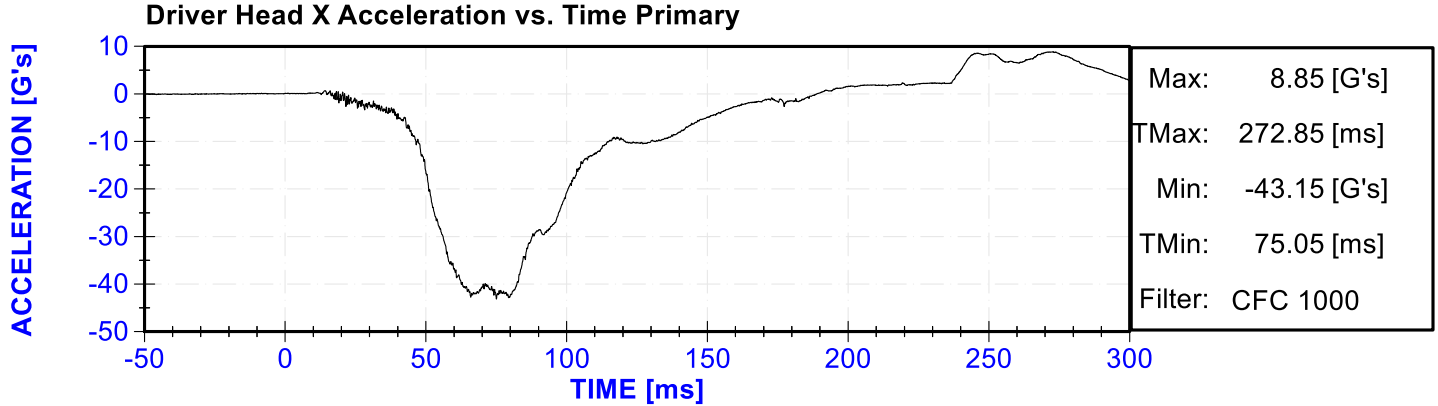
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Plot 1	Driver Head X Acceleration vs. Time Primary	B-5
Plot 2	Driver Head Y Acceleration vs. Time Primary	B-5
Plot 3	Driver Head Z Acceleration vs. Time Primary	B-5
Plot 4	Driver Head Resultant Acceleration vs. Time Primary	B-5
Plot 5	Driver Chest 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

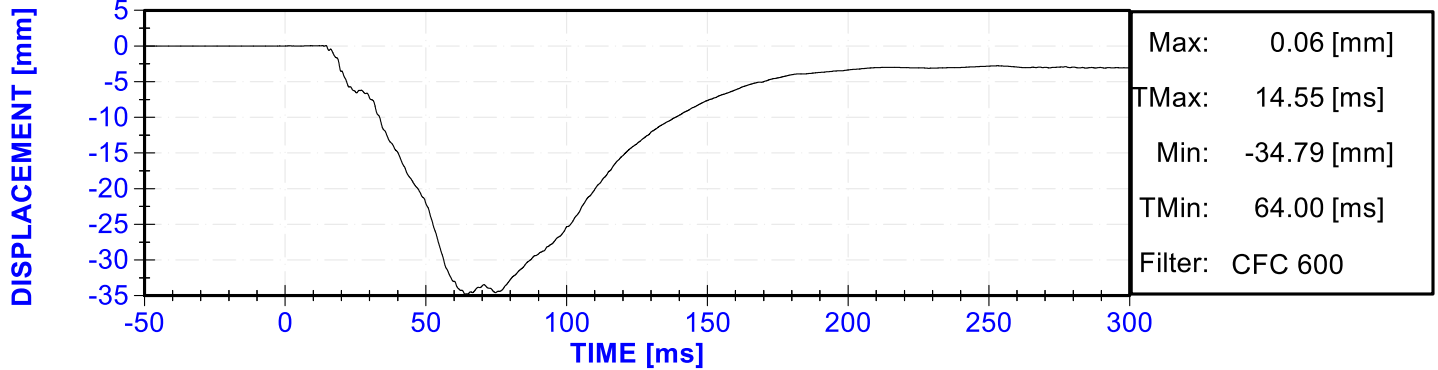
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 Driver Head Y Acceleration Redundant
 Driver Head Z Acceleration Redundant
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Acceleration Redundant
 Driver Chest Y Acceleration Redundant
 Driver Chest 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
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Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z

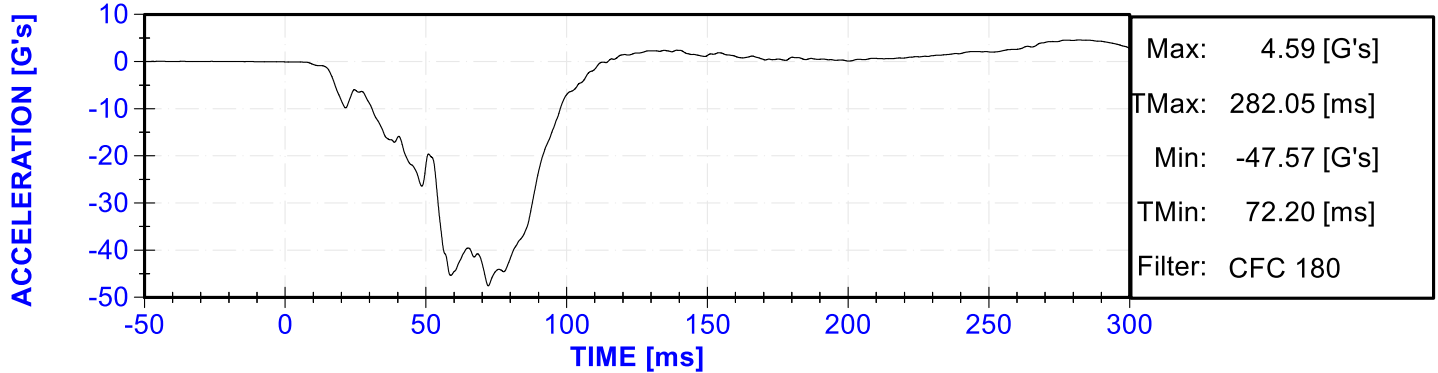
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Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Passenger Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
Left Rear Seat Crossmember X
Left Rear 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



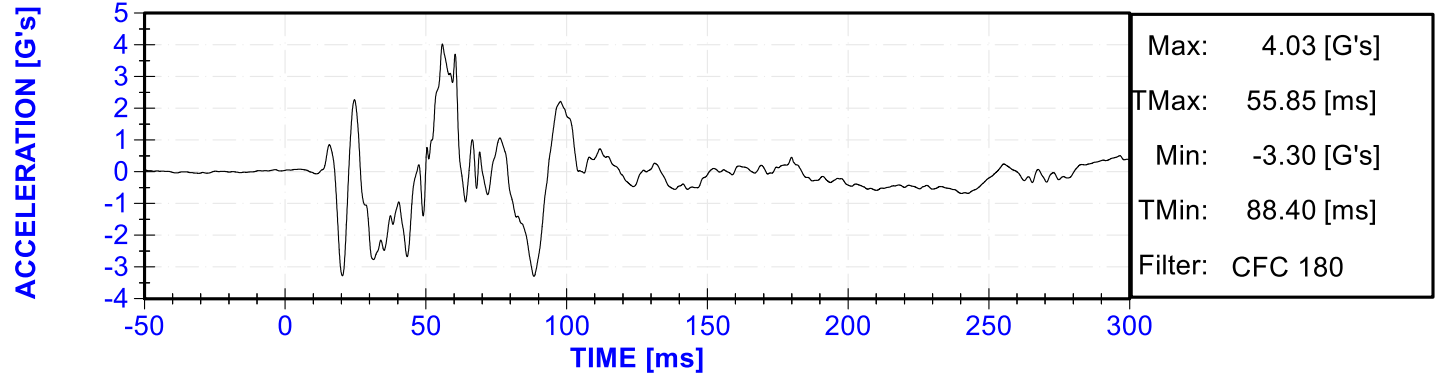
Driver Chest X Deflection vs. Time



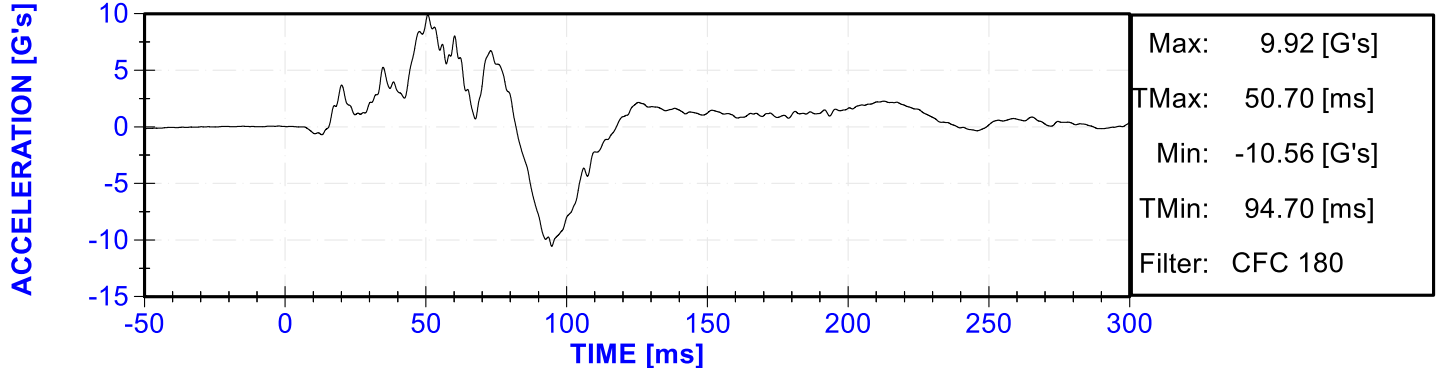
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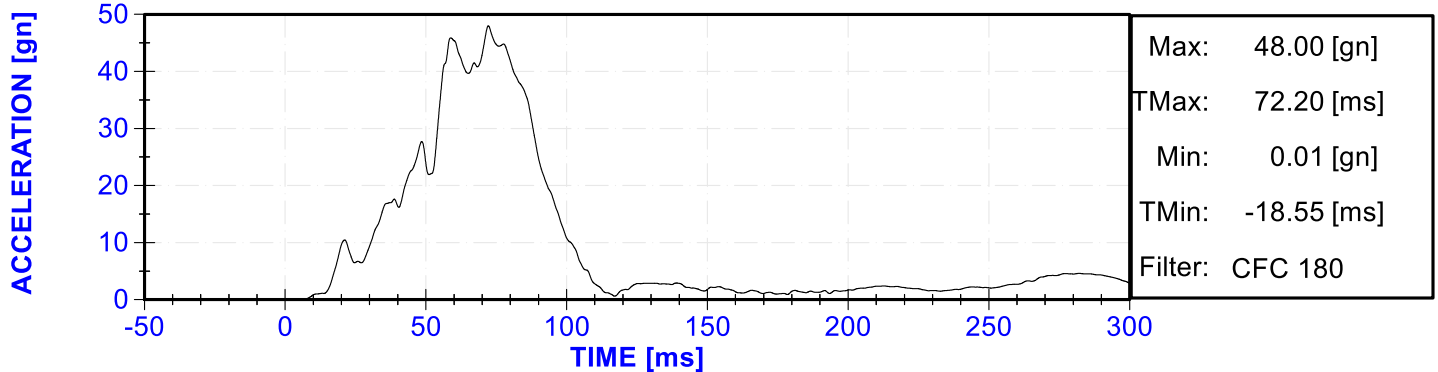
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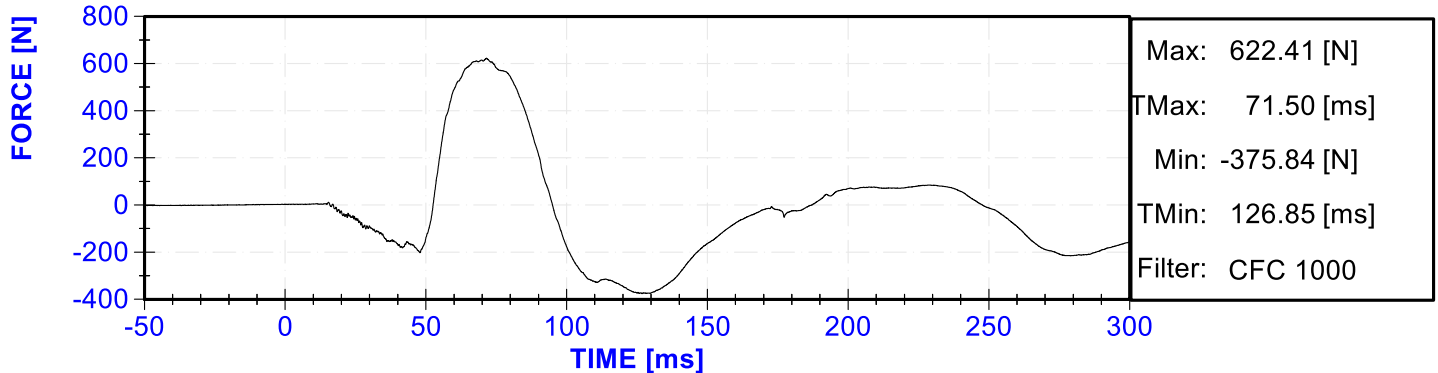
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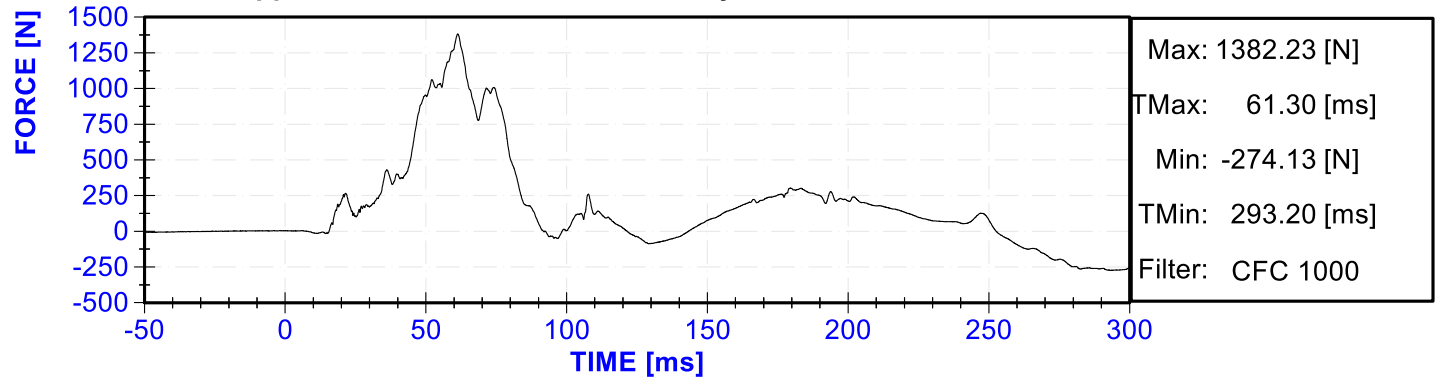
Driver Chest Resultant Acceleration vs. Time Primary



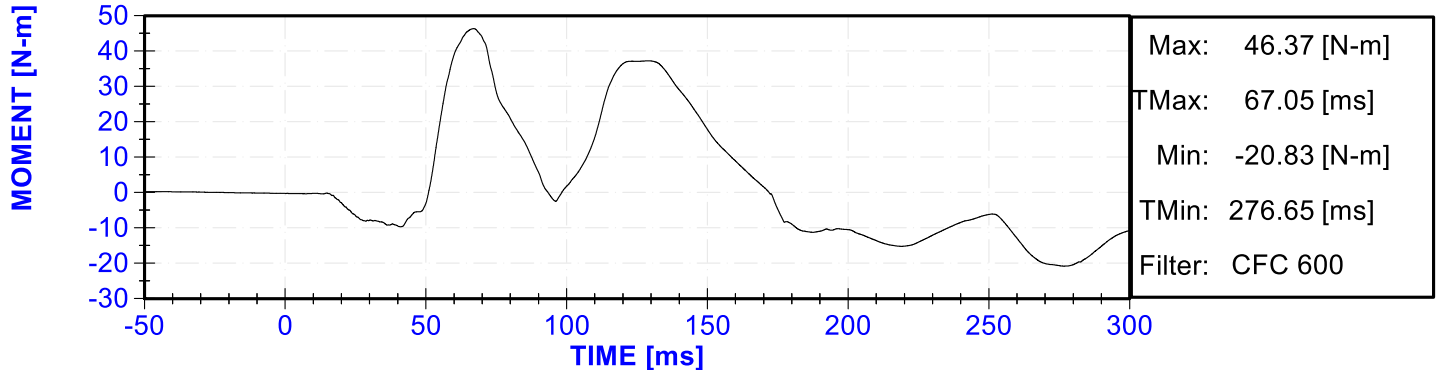
Driver Upper Neck Force X vs. Time Primary

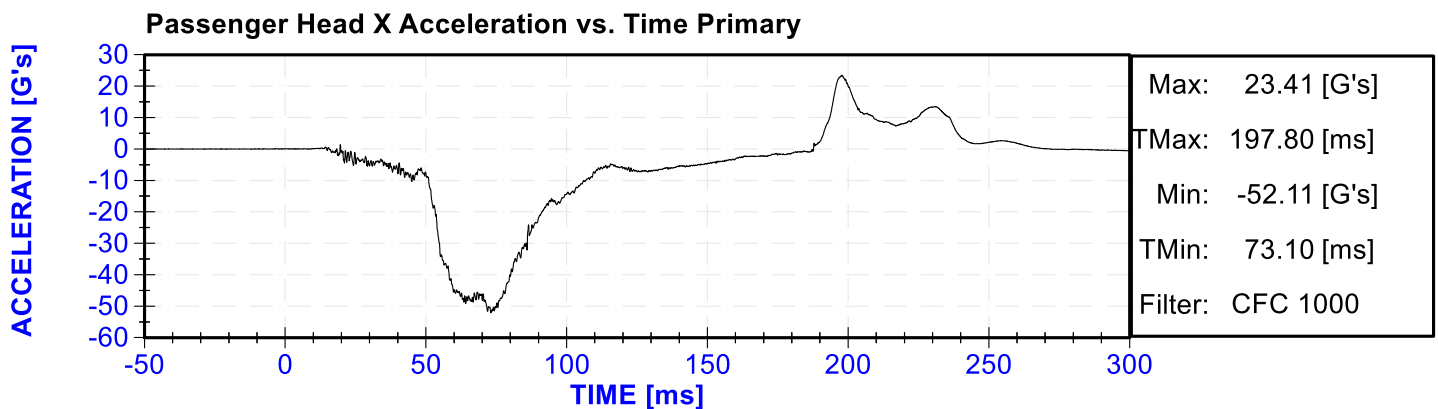
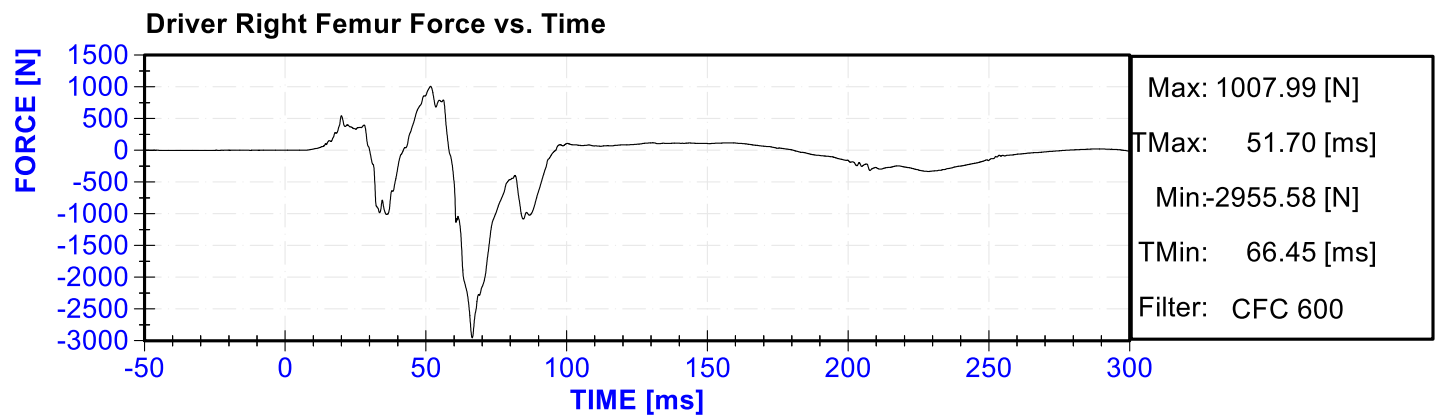
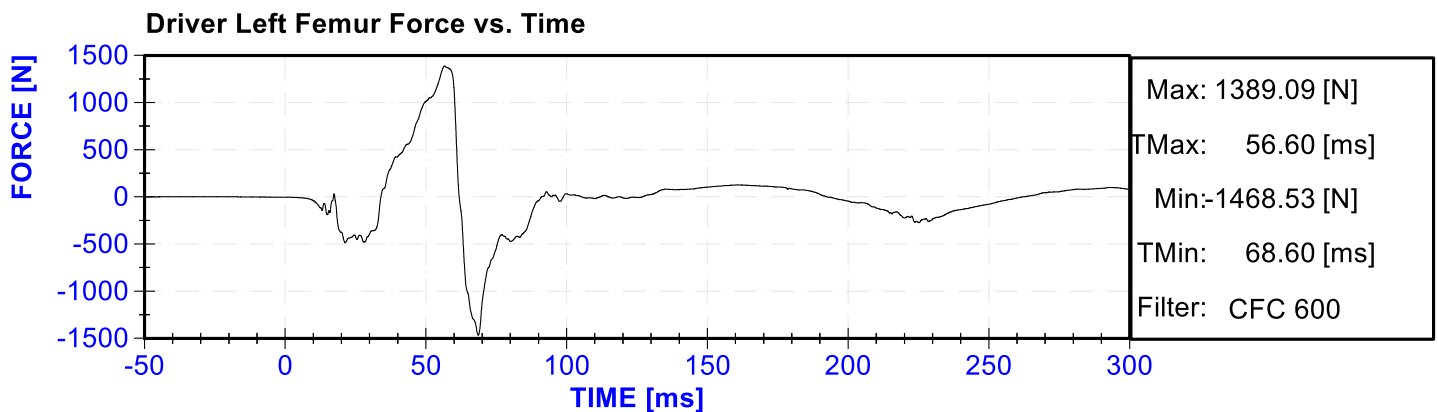
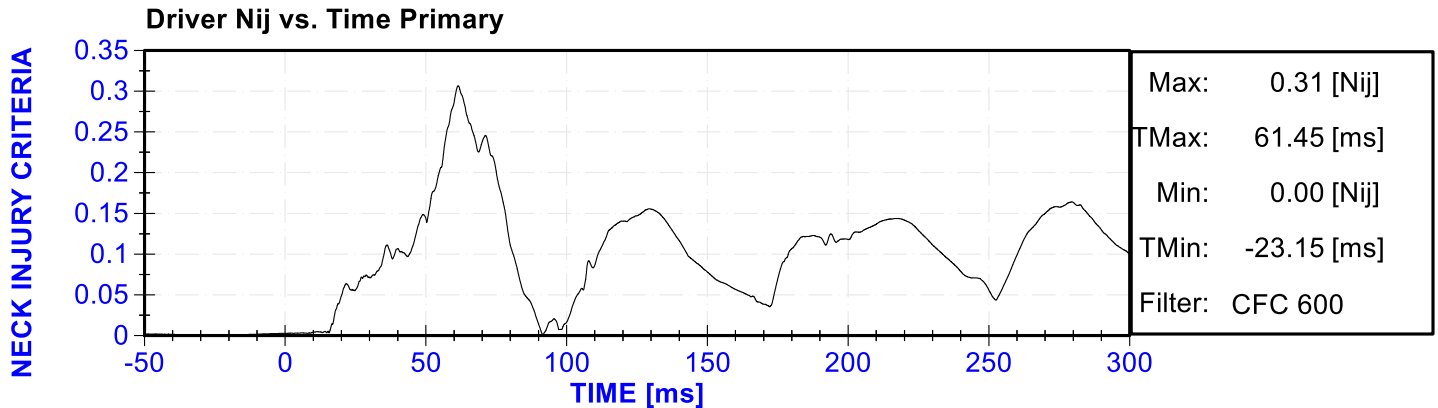


Driver Upper Neck Force Z vs. Time Primary

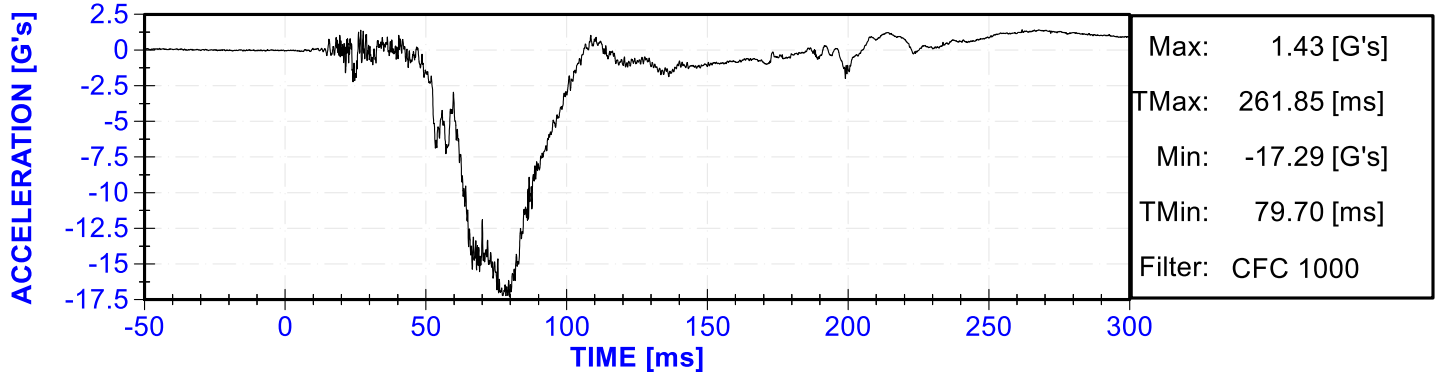


Driver Upper Neck Moment Y vs. Time Primary

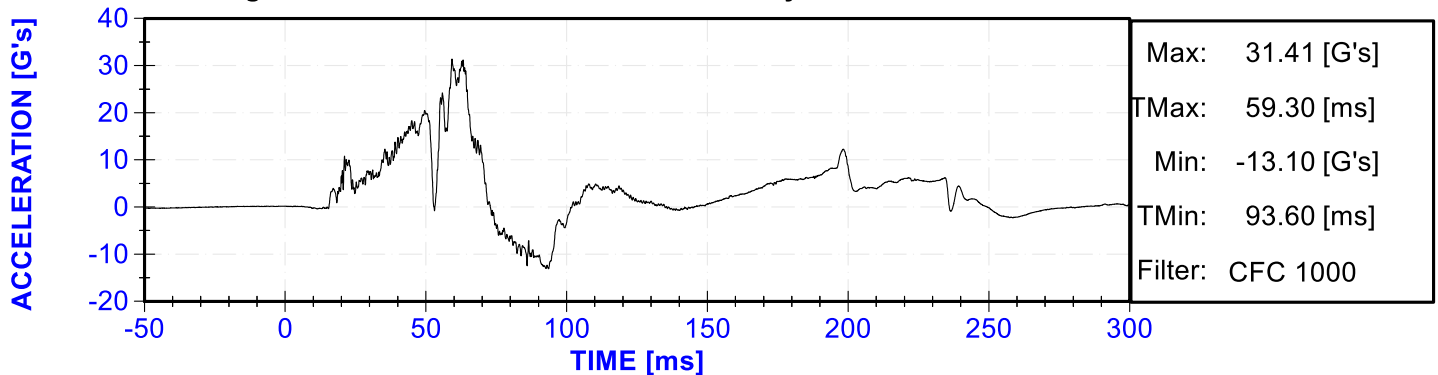




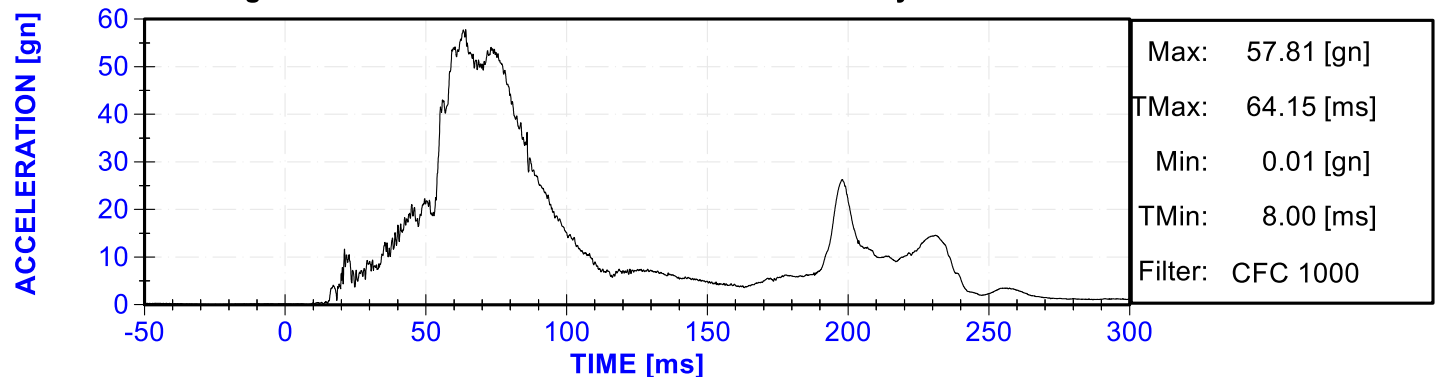
Passenger Head Y Acceleration vs. Time Primary



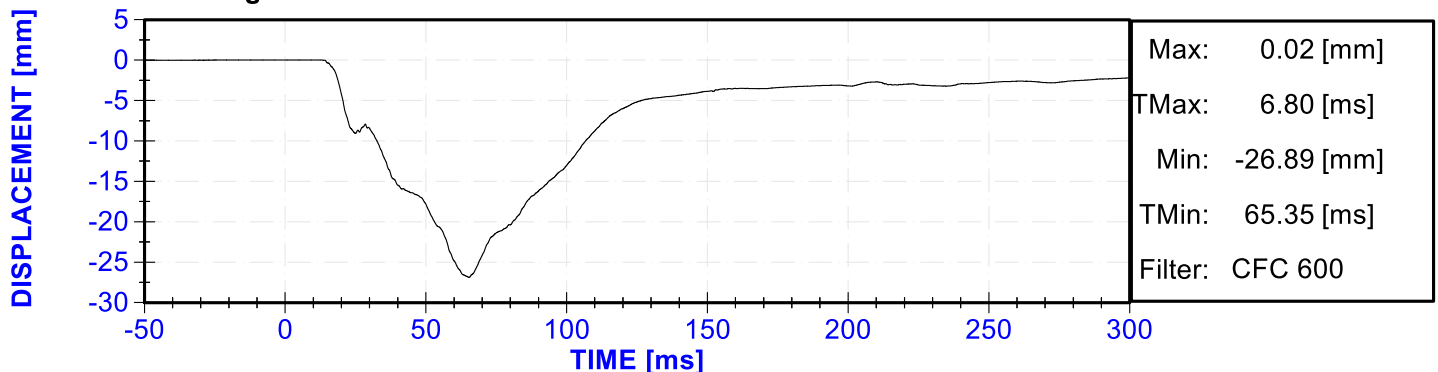
Passenger Head Z Acceleration vs. Time Primary



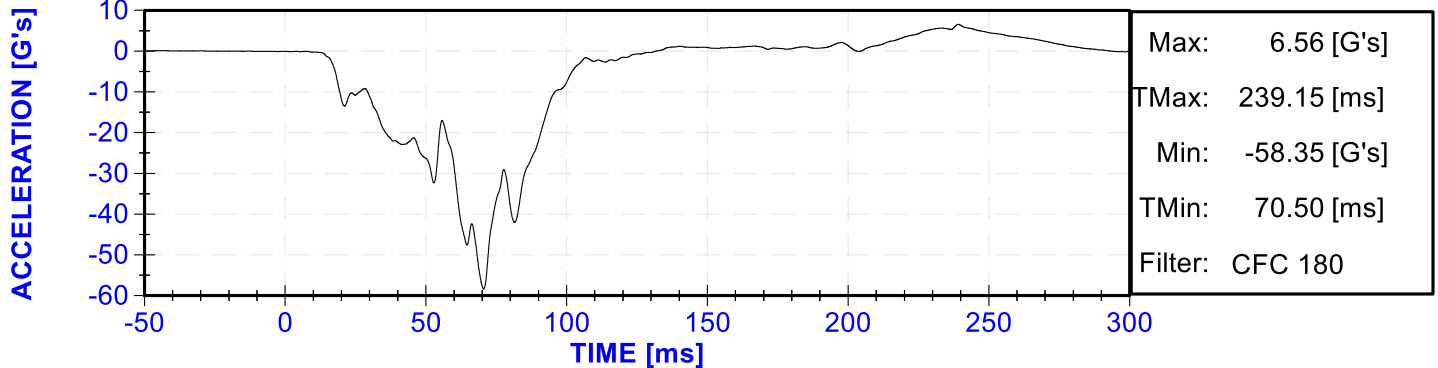
Passenger Head Resultant Acceleration vs. Time Primary



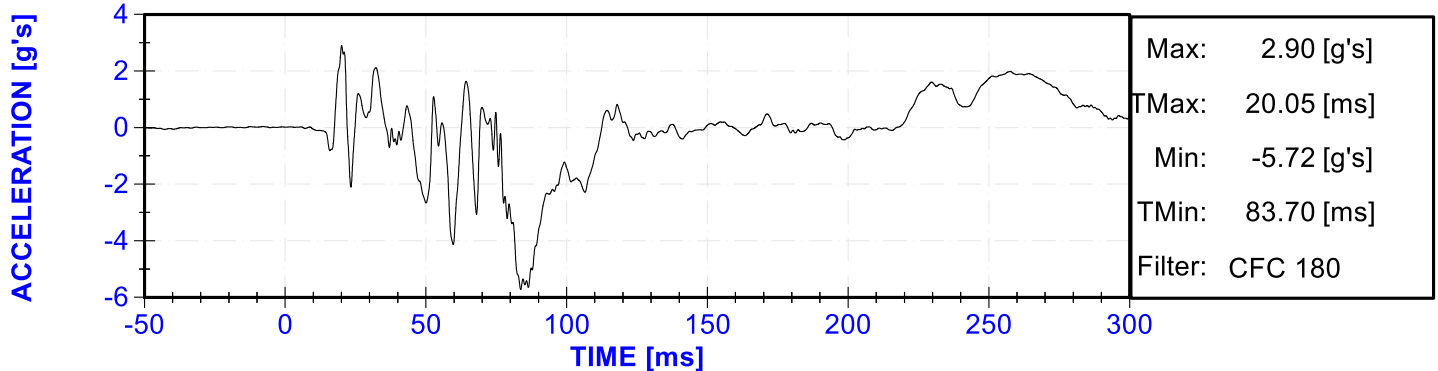
Passenger Chest X Deflection vs. Time



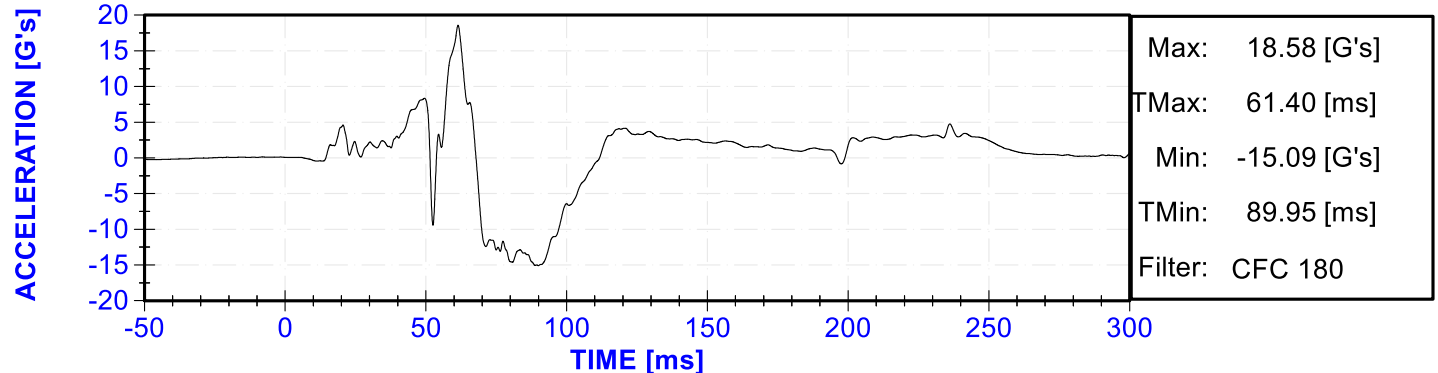
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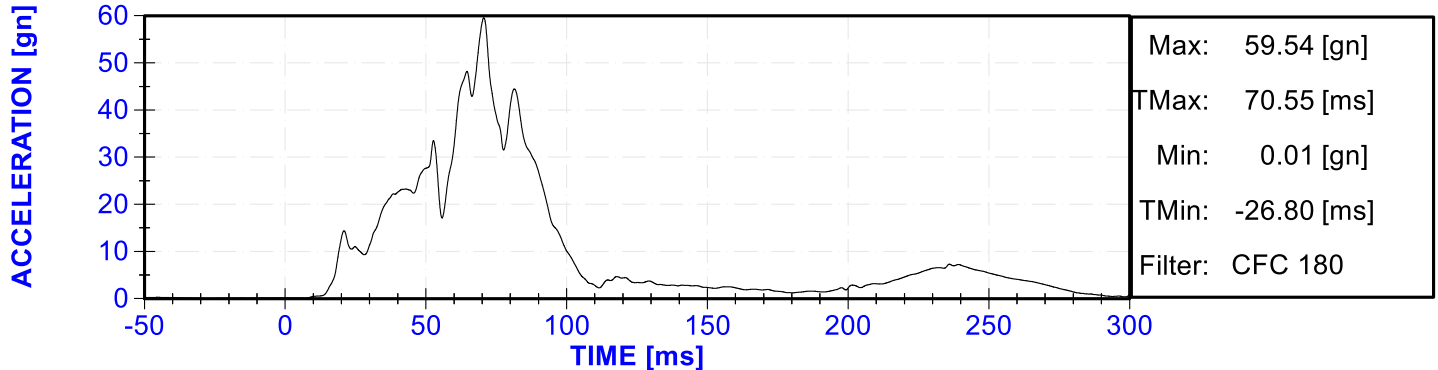
Passenger Chest Y Acceleration vs. Time Primary



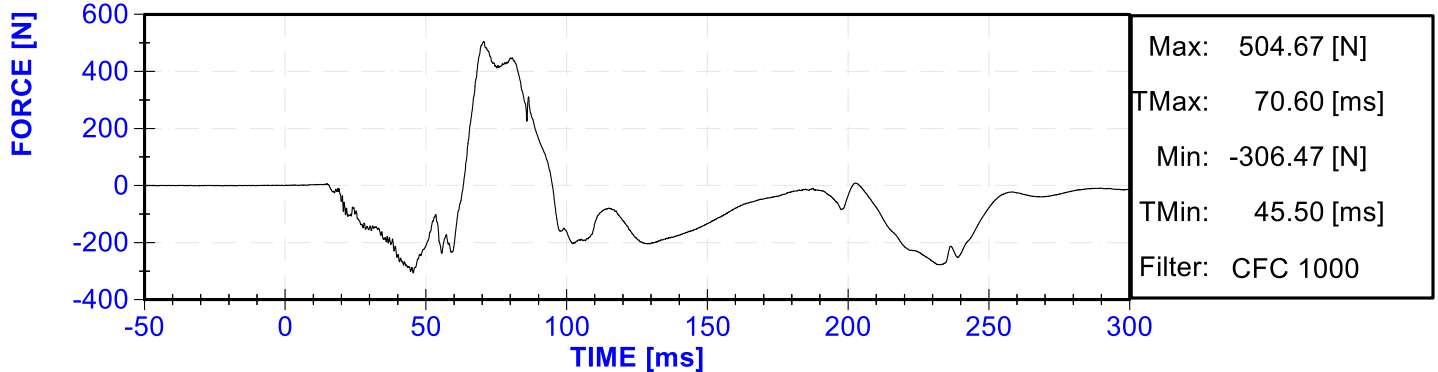
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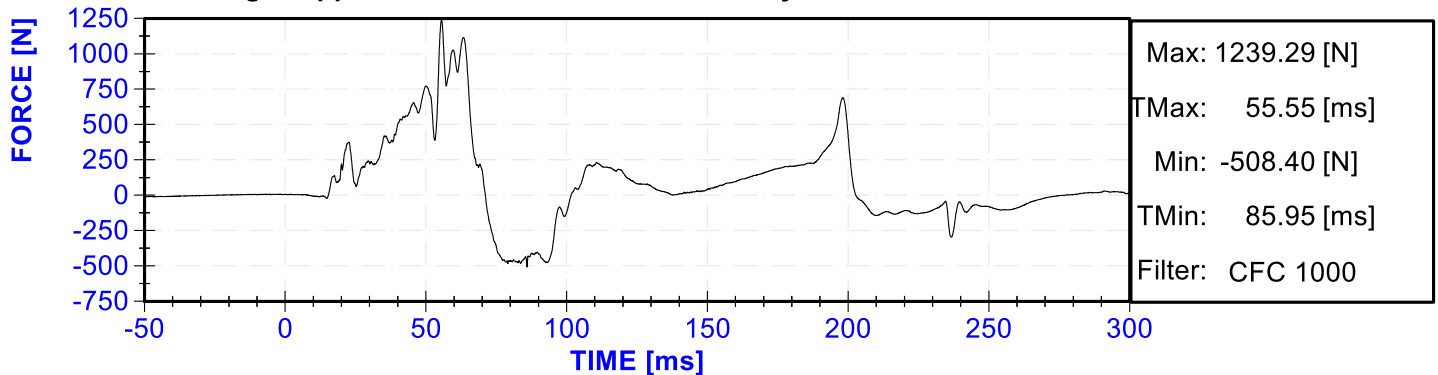
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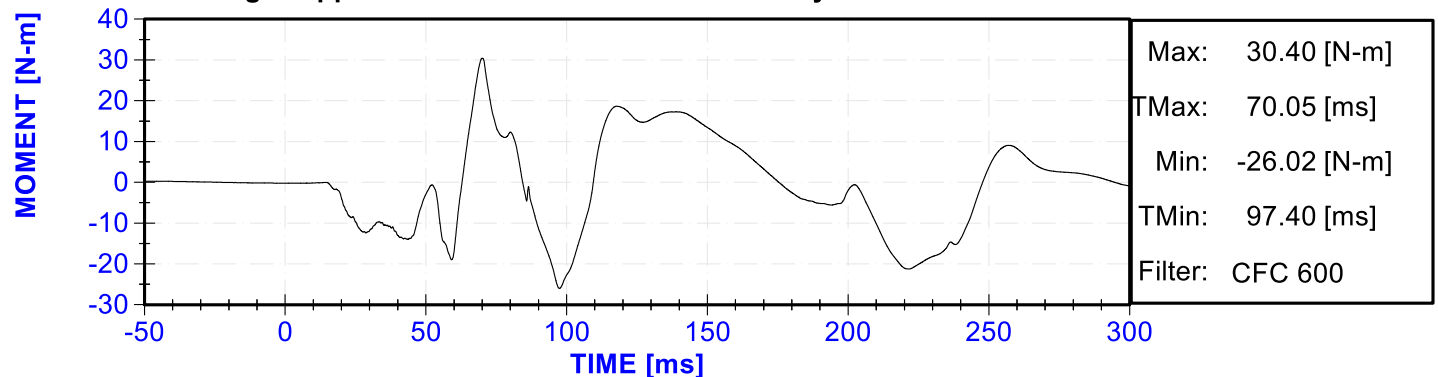
Passenger Upper Neck Force X vs. Time Primary



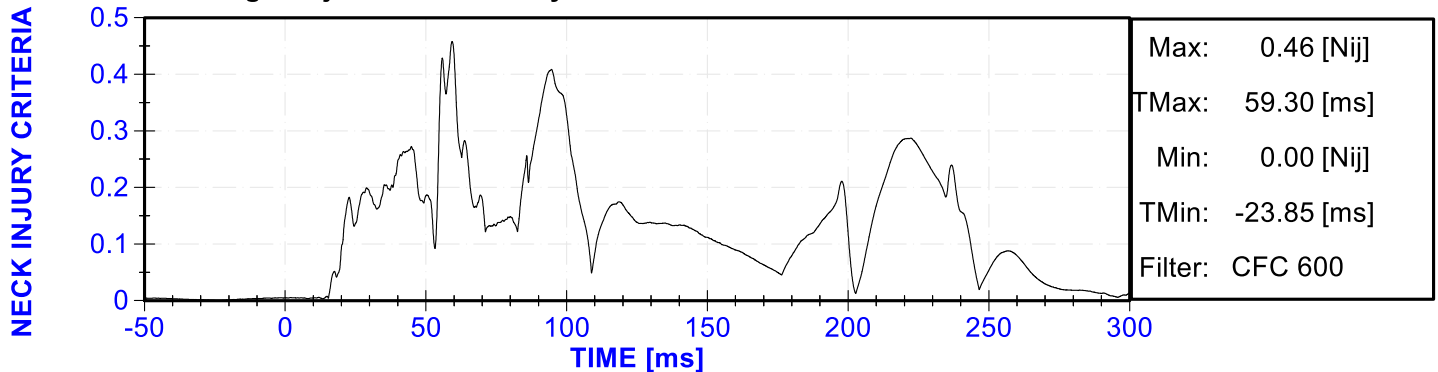
Passenger Upper Neck Force Z vs. Time Primary



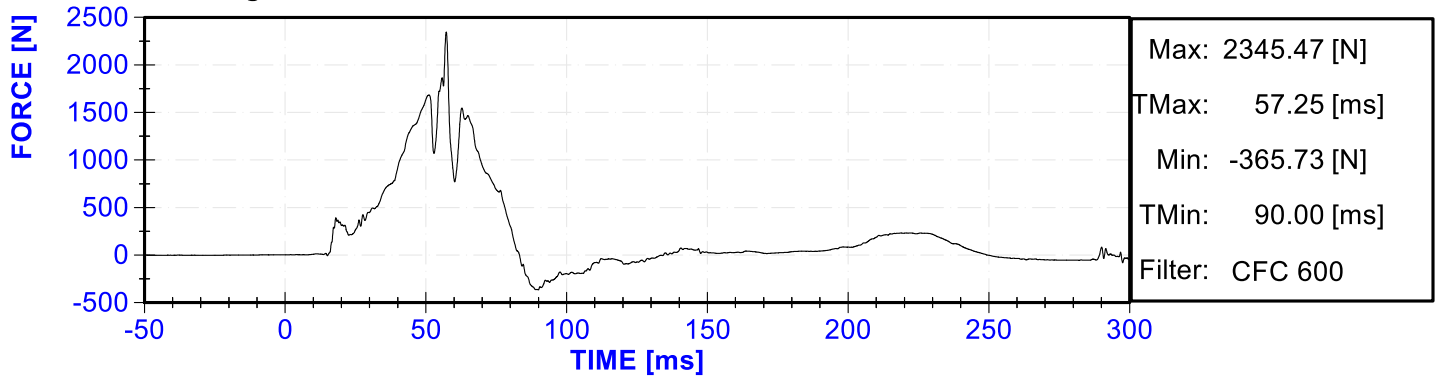
Passenger Upper Neck Moment Y vs. Time Primary



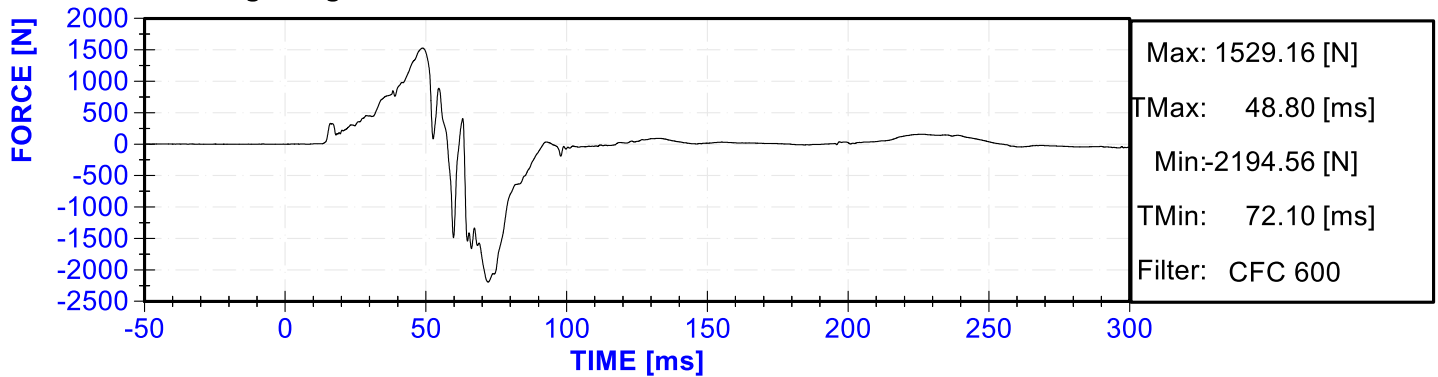
Passenger Nij vs. Time Primary



Passenger Left Femur Force vs. Time



Passenger Right Femur Force vs. Time



APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 142

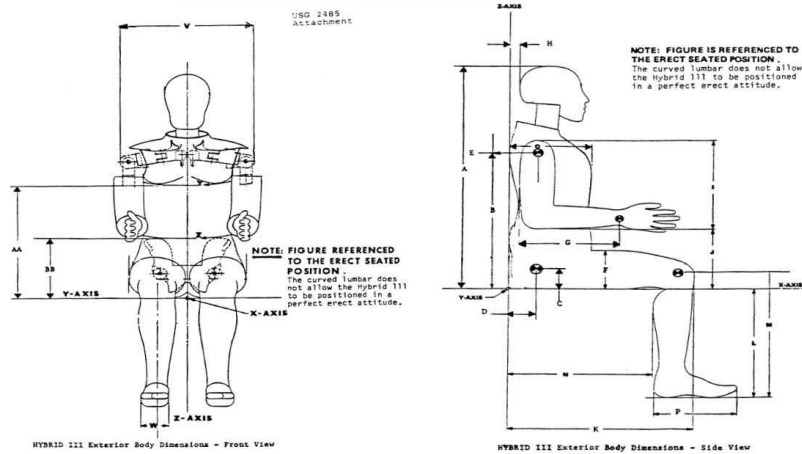


External Measurements - Hybrid 3 - 50th Male

Technician: K. Brogan

Date: 03/15/2021

Dummy Serial Number: 142



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.7	Pass
B	Shoulder Pivot Height	19.9	20.5	20.3	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.6	Pass
F	Thigh Clearance	5.5	6.1	6.0	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	13.4	Pass
J	Elbow Rest Height	7.5	8.3	8.1	Pass
K	Buttock to Knee Length	22.8	23.8	23.0	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.4	Pass
N	Buttock Popliteal Length	17.8	18.8	18.3	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.1	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.8	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.8	Pass
Z	Waist Circumference	32.9	34.1	33.7	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

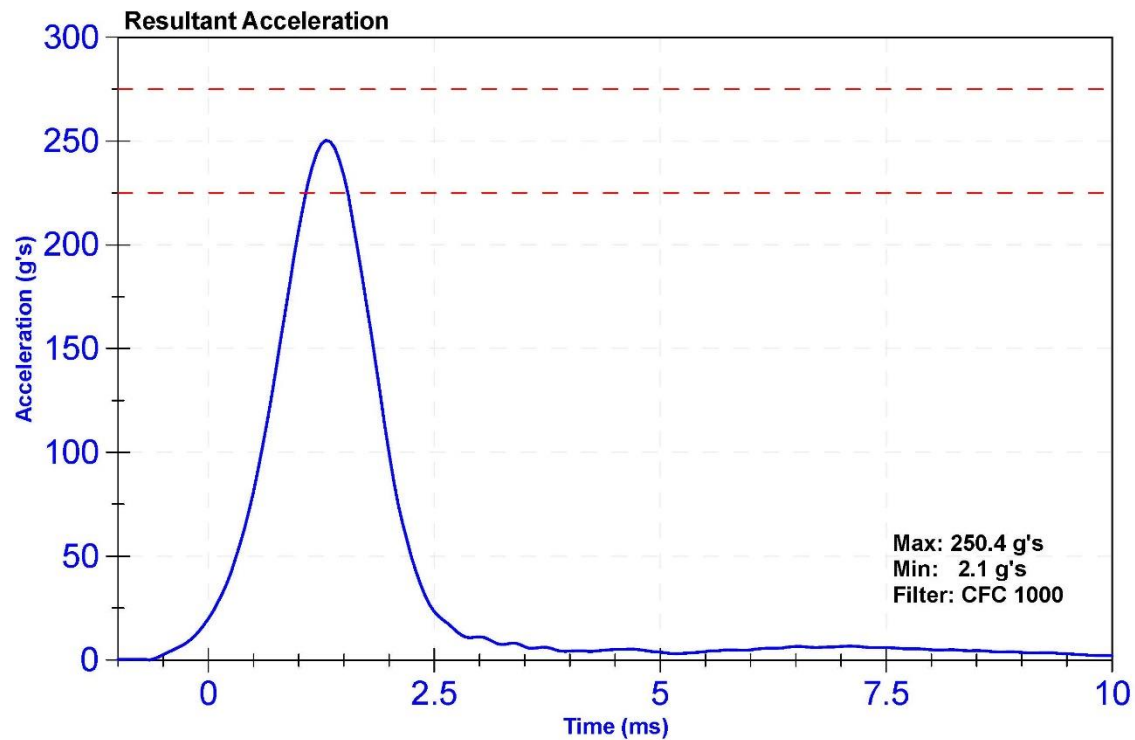
ATD Manufacturer	Humanetics	Test Technician	S. Vacanti
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

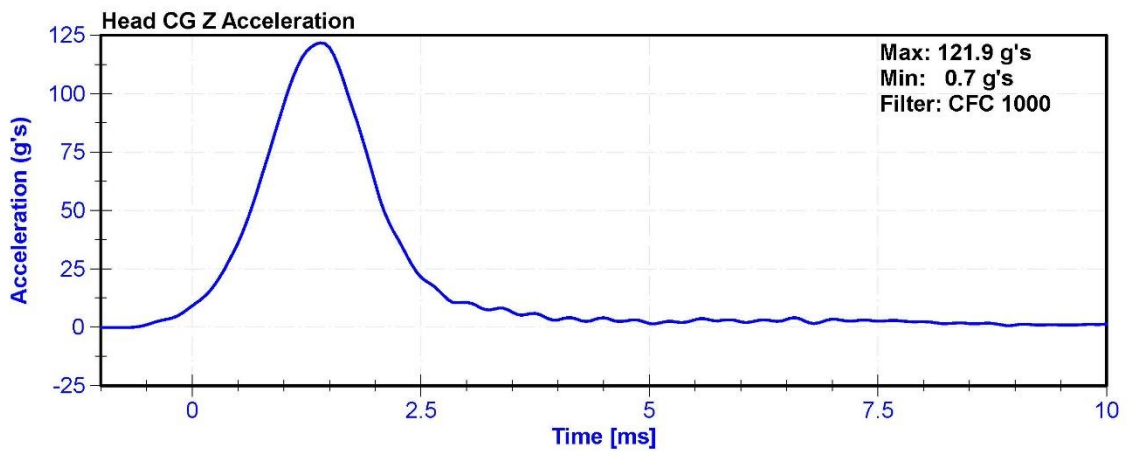
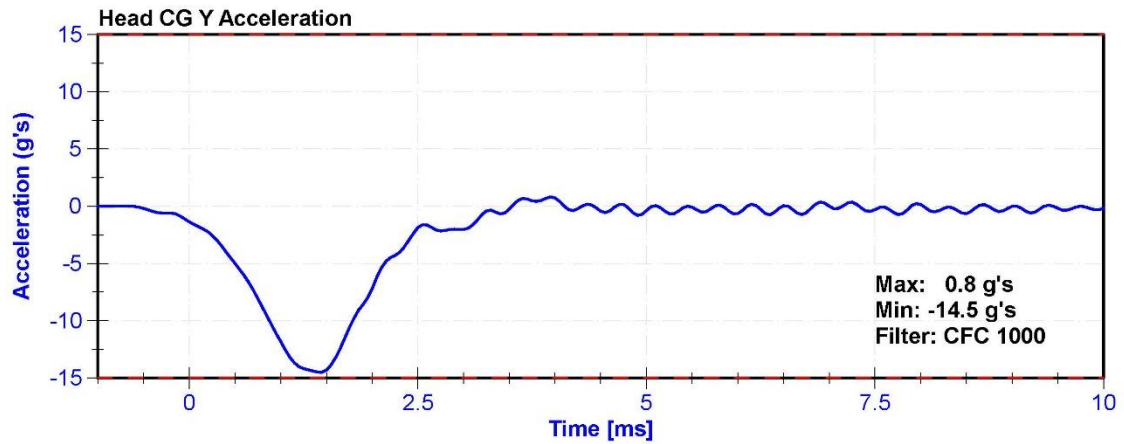
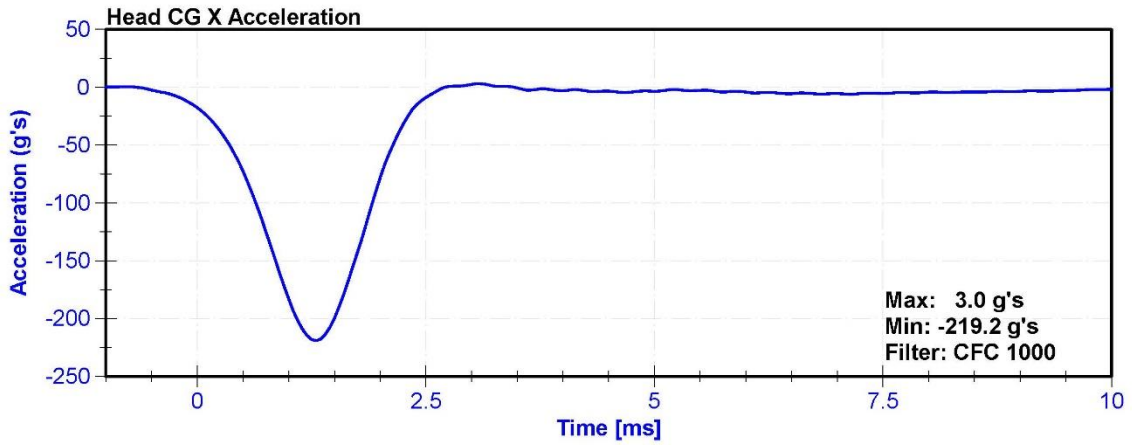
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Resultant Acceleration	225	275	g's	250.4	Pass
Oscillation	0	10	%	4.4	Pass
Lateral Acceleration	-15	15	g's	-14.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	P51681	11/3/2020	5/4/2021
Y Accelerometer	ENDEVCO 7264	P64151	11/3/2020	5/4/2021
Z Accelerometer	ENDEVCO 7264	P52114	11/3/2020	5/4/2021





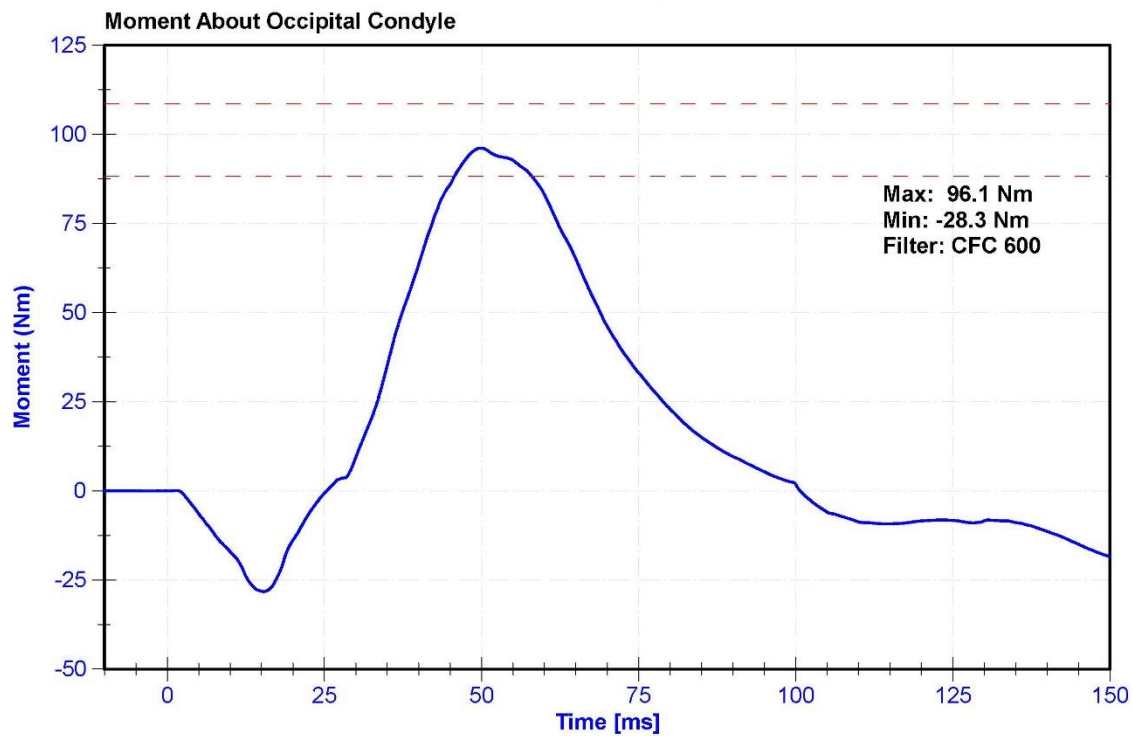
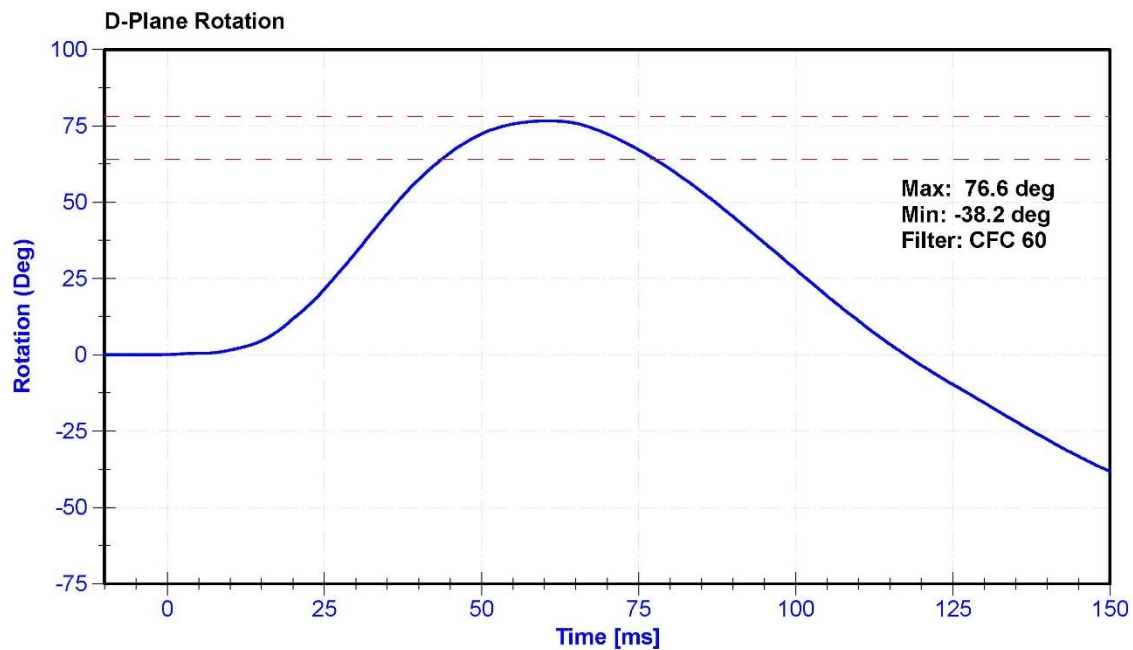
ATD Manufacturer	Humanetics	Test Technician	E. Helenbrook
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

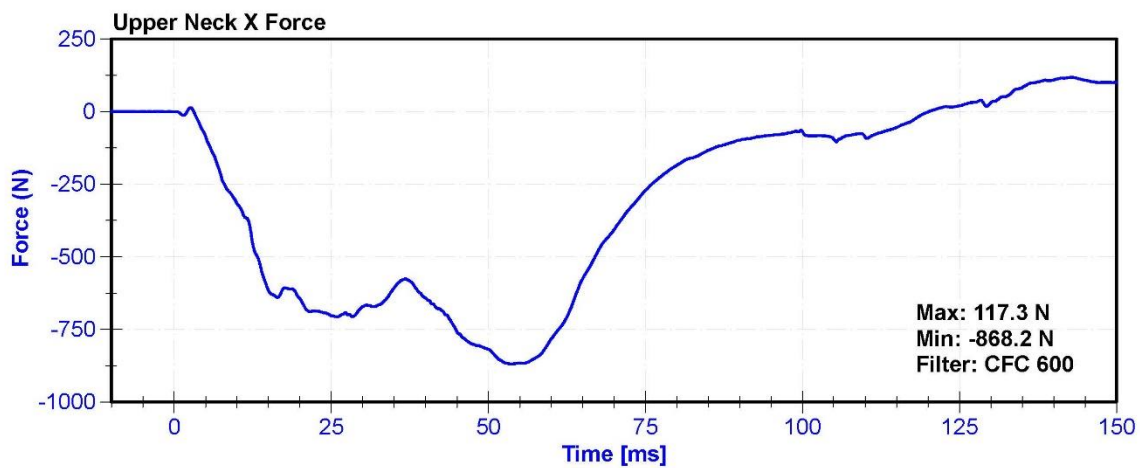
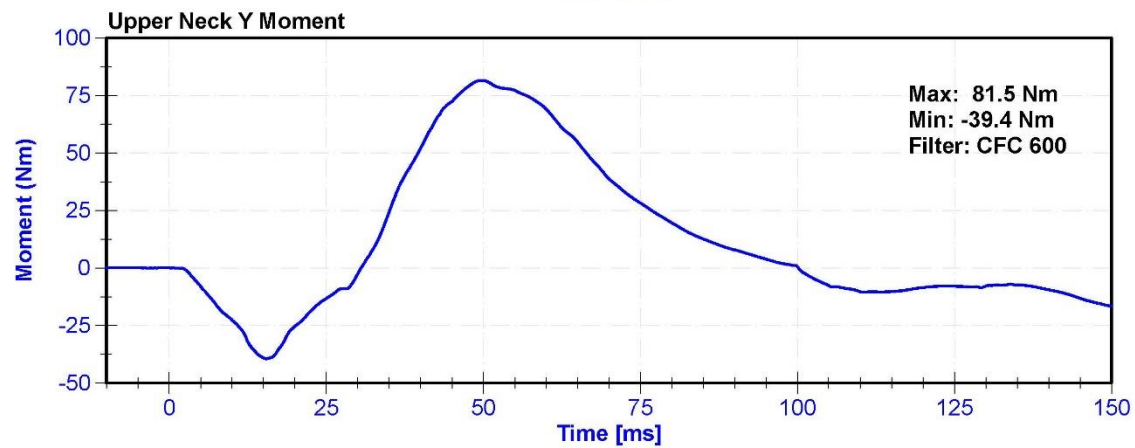
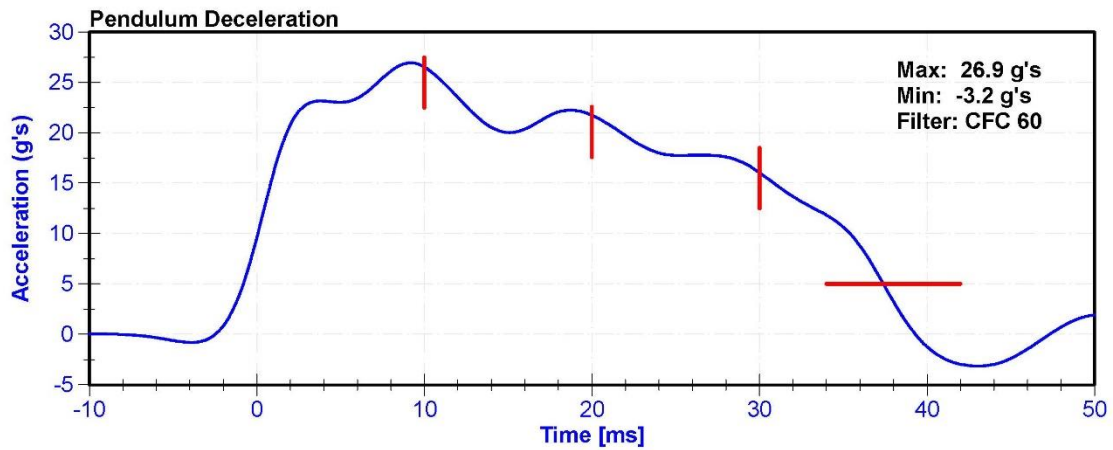
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	25.7	Pass
Velocity	6.89	7.13	m/s	6.958	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	26.53	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	21.74	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.05	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	26.9	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	37.4	Pass
Maximum D Plane Rotation	64	78	deg	76.6	Pass
Time to Maximum Rotation	57	64	ms	60.5	Pass
Rotation Decay to Zero	113	127	ms	117.5	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	96.06	Pass
Time to Maximum Moment	47	58	ms	50.1	Pass
Moment Decay to Zero	97	107	ms	100.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-LABPOT1	9/17/2020	9/17/2021
Condyle Potentiometer	ETI SP22G	DS-LABPOT2	9/17/2020	9/17/2021
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	11/10/2020	11/10/2021





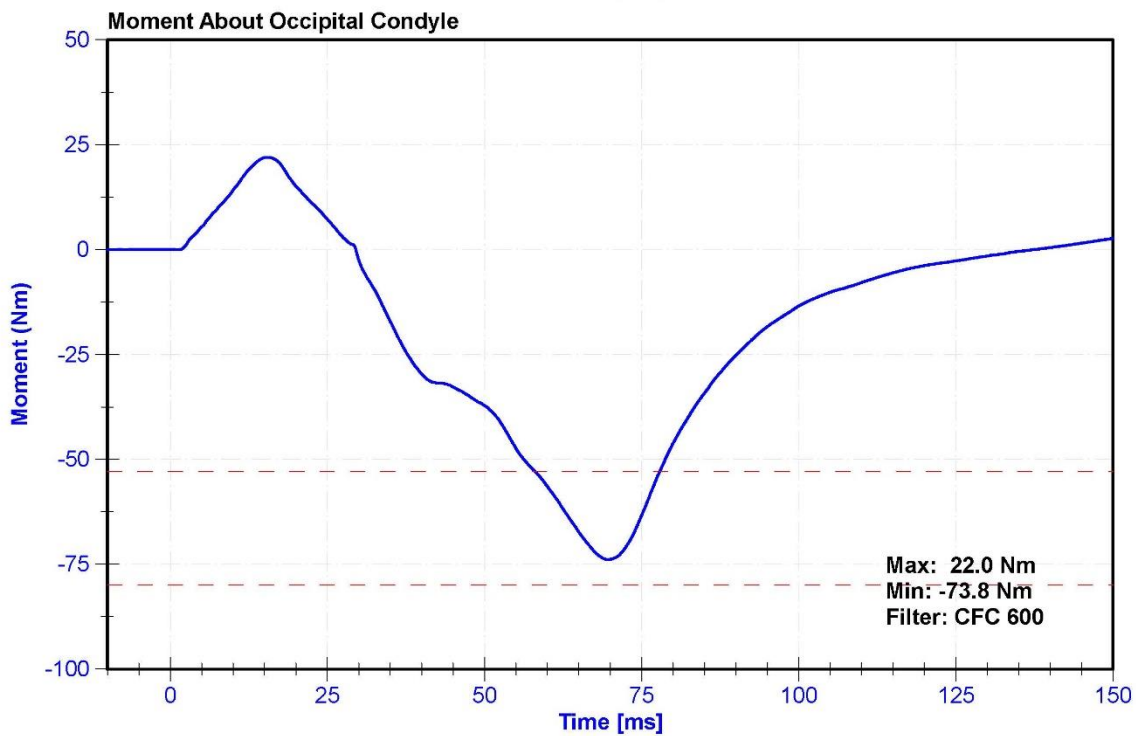
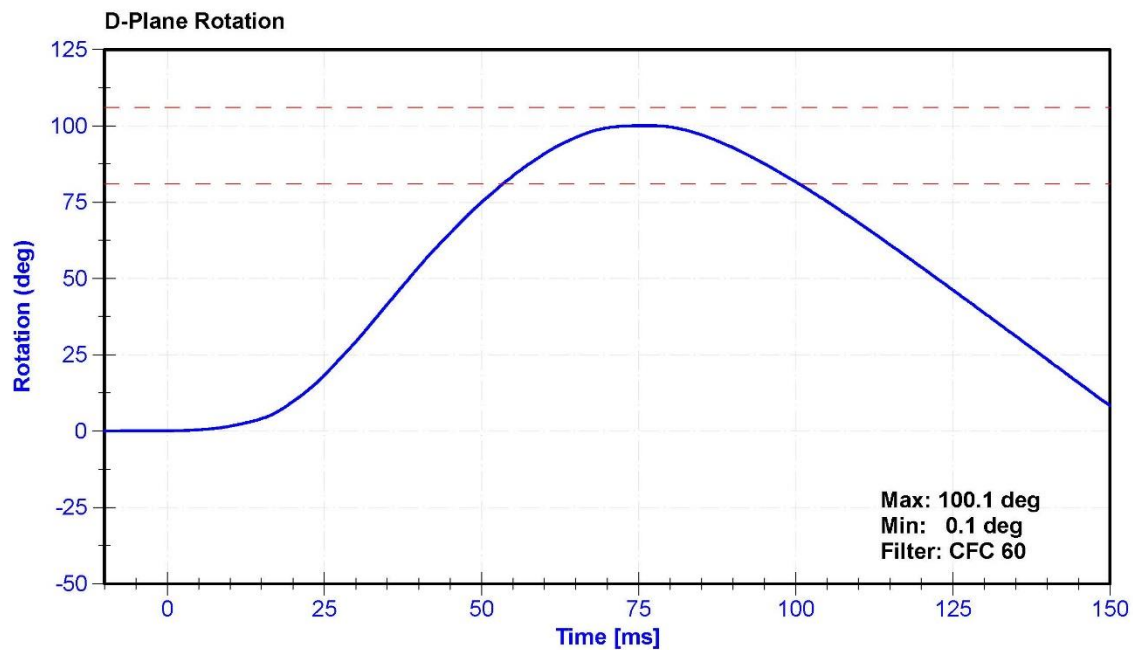
ATD Manufacturer	Humanetics	Test Technician	E. Helenbrook
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

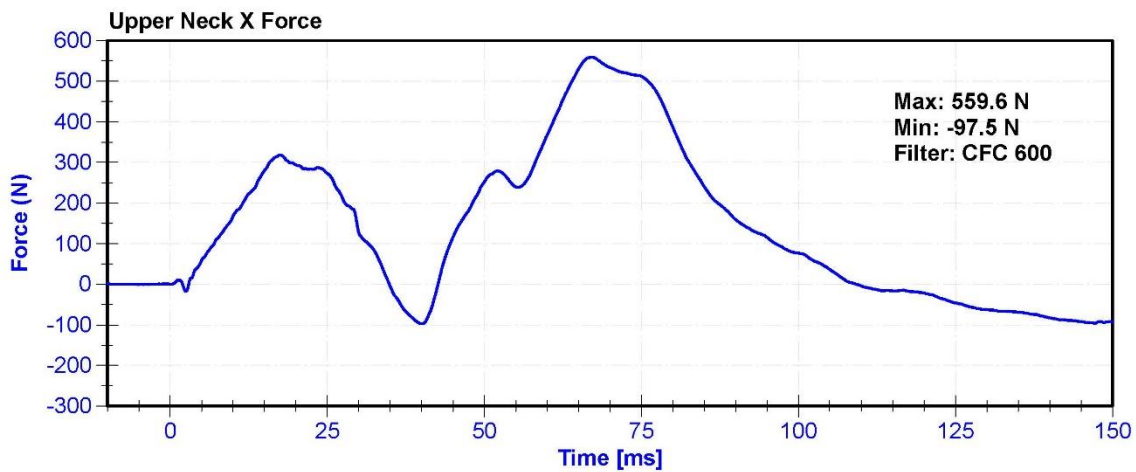
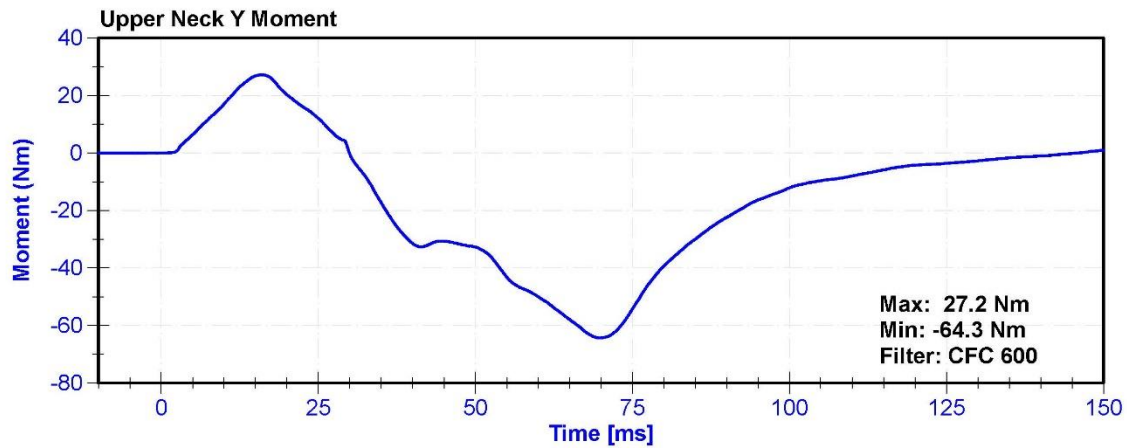
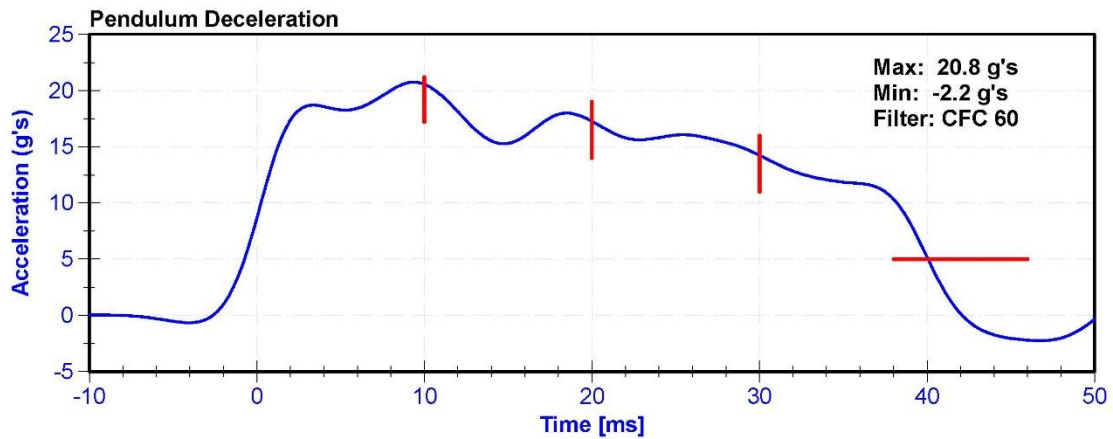
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	25.7	Pass
Velocity	5.94	6.19	m/s	6.005	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	20.56	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.3	Pass
Pendulum Deceleration at 30ms	11	16	g's	14.3	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	20.8	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	40.1	Pass
Maximum D Plane Rotation	81	106	deg	100.1	Pass
Time to Maximum Rotation	72	82	ms	76.0	Pass
Rotation Decay to Zero	147	174	ms	155.6	Pass
Minimum Moment About OC	-80	-52.9	Nm	-73.85	Pass
Time to Minimum Moment	65	79	ms	69.6	Pass
Moment Decay to Zero	120	148	ms	137.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-LABPOT1	9/17/2020	9/17/2021
Condyle Potentiometer	ETI SP22G	DS-LABPOT2	9/17/2020	9/17/2021
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	11/10/2020	11/10/2021





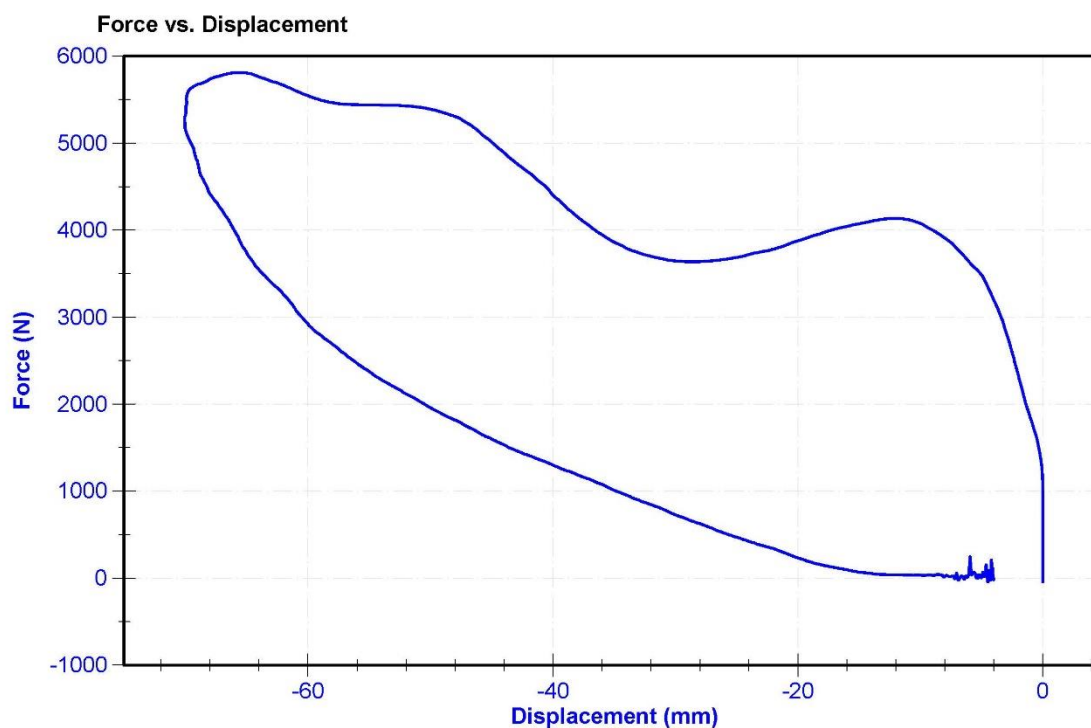
ATD Manufacturer	Humanetics	Test Technician	M. Dudek
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

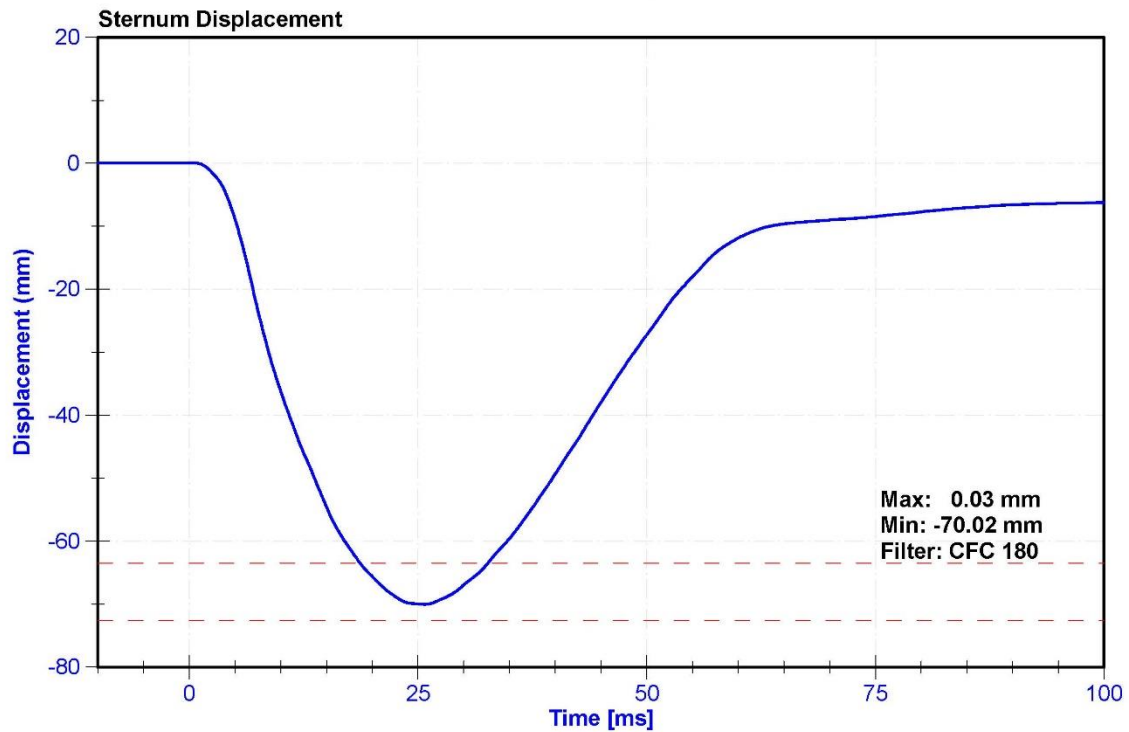
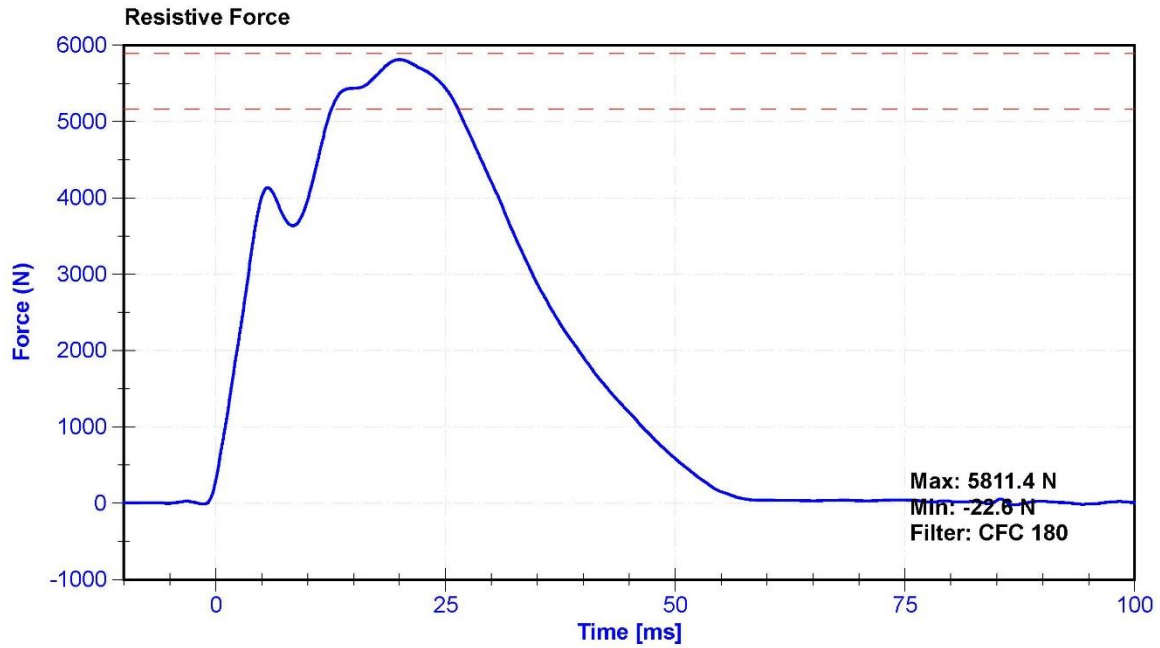
Results

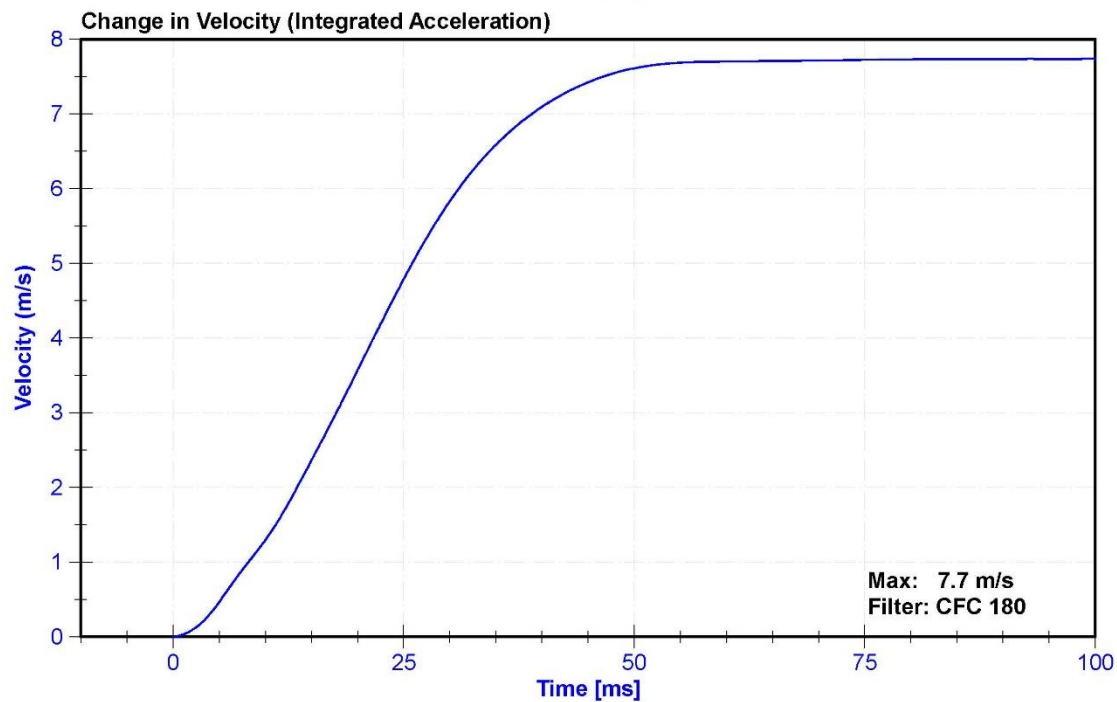
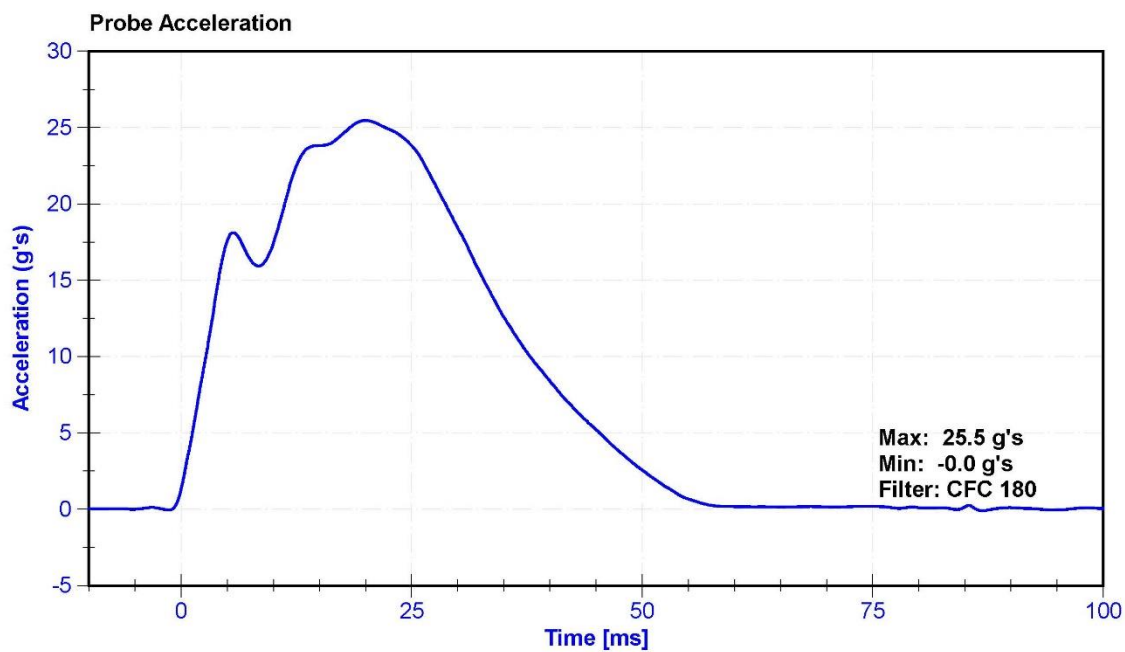
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	19.4	Pass
Velocity	6.59	6.83	m/s	6.641	Pass
Chest Displacement	-72.6	-63.5	mm	-70.02	Pass
Resistive Force	5160	5894	N	5811.4	Pass
Hysteresis	65	85	%	69.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Chest Potentiometer	Servo 6209-2038	DS-142	11/19/2020	5/20/2021







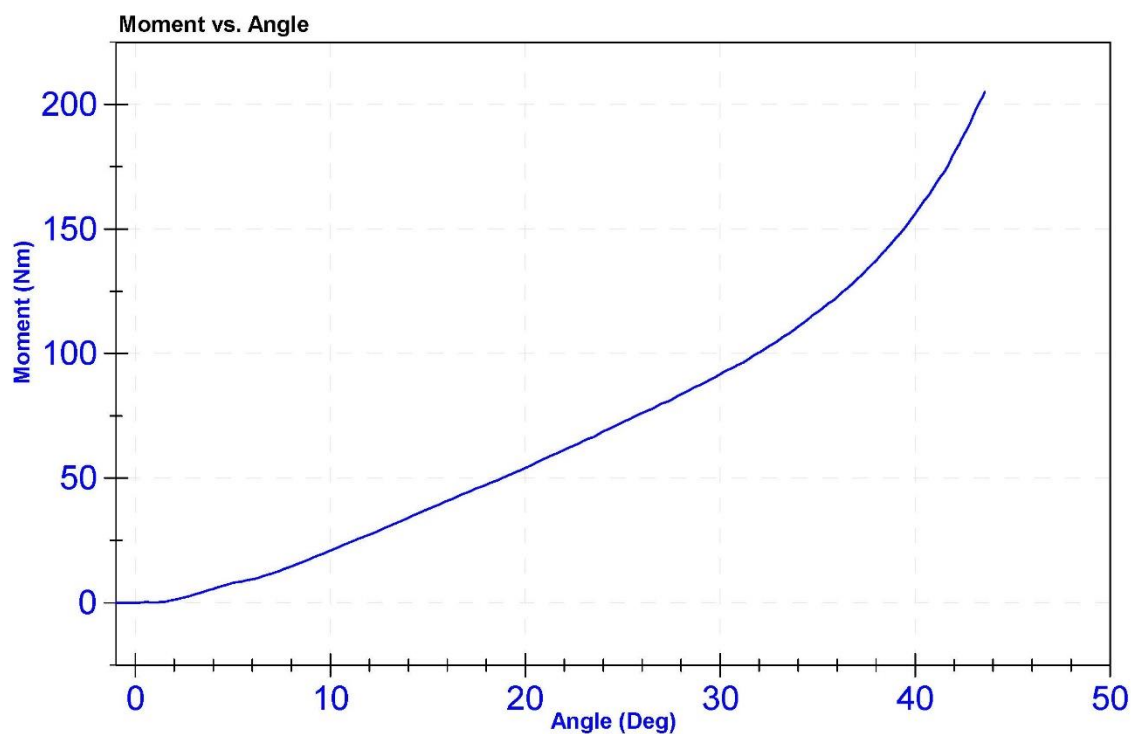
ATD Manufacturer	Humanetics	Test Technician	S. Vacanti
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Average Velocity	5	10	deg/s	7.2	Pass
Angle at 203Nm	40	50	deg	43.5	Pass
Moment at 30 degrees	0	94.9	Nm	91.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2020	9/18/2021
Load Cell	Key Trans 2301-02	LC-115 My	2020-09-12	2021-09-12



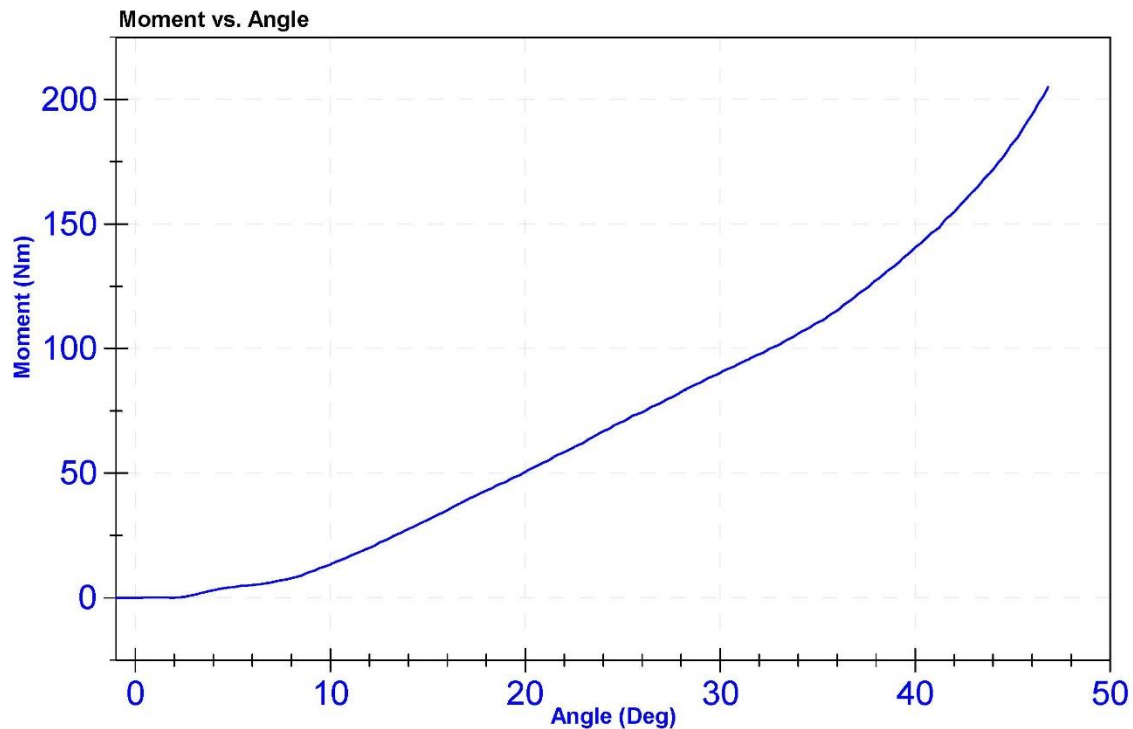
ATD Manufacturer	Humanetics	Test Technician	S. Vacanti
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Average Velocity	5	10	deg/s	7.2	Pass
Angle at 203Nm	40	50	deg	46.7	Pass
Moment at 30 degrees	0	94.9	Nm	90.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2020	9/18/2021
Load Cell	Key Trans 2301-02	LC-115 My	2020-09-12	2021-09-12



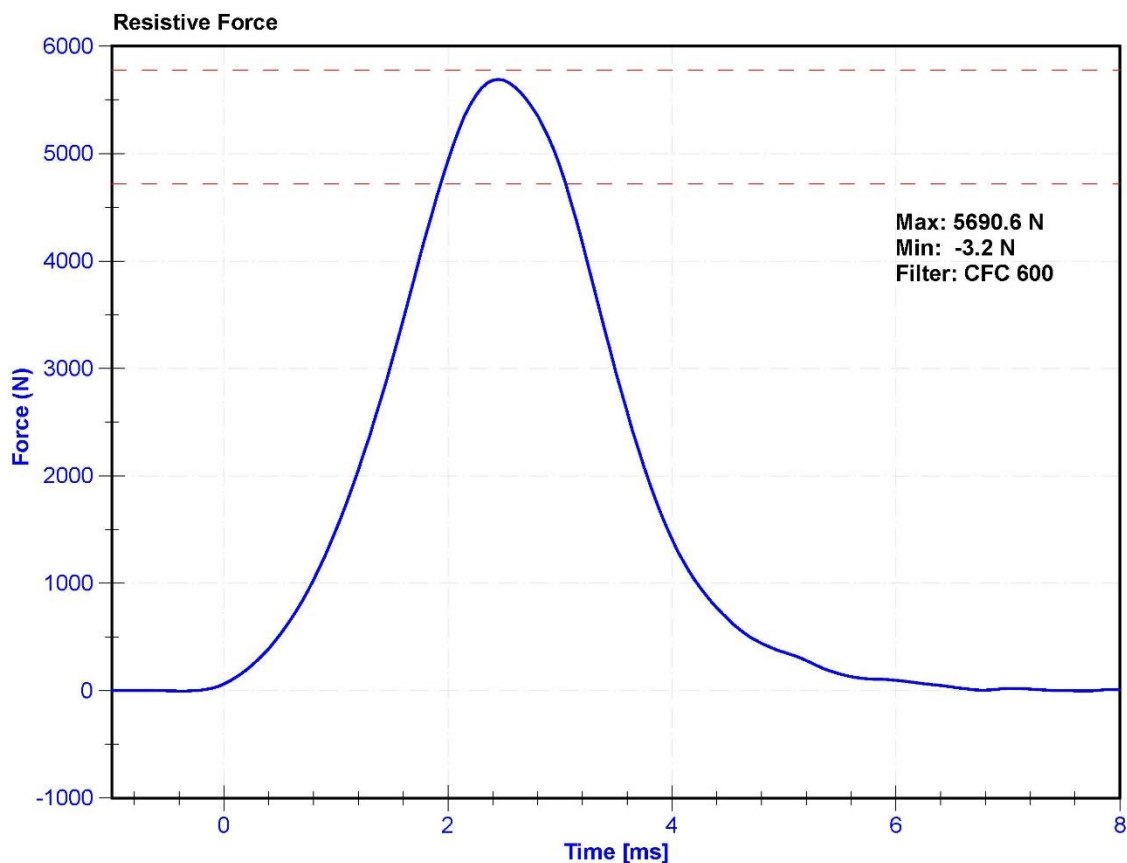
ATD Manufacturer	Humanetics	Test Technician	S. Vacanti
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

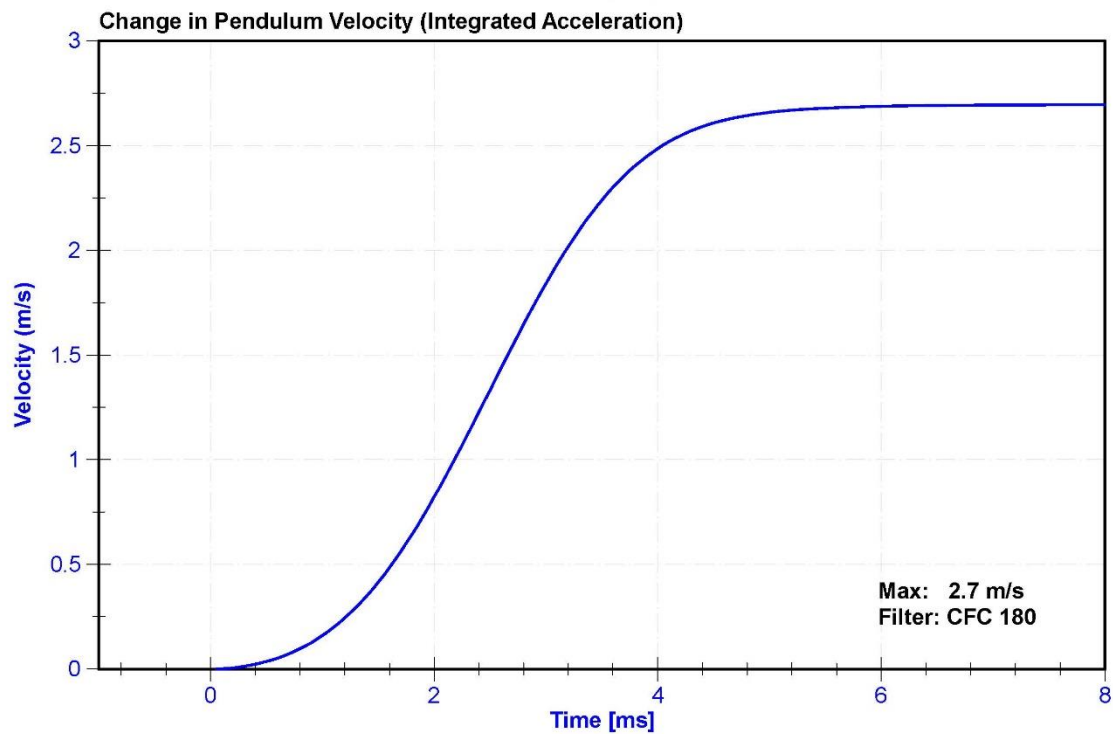
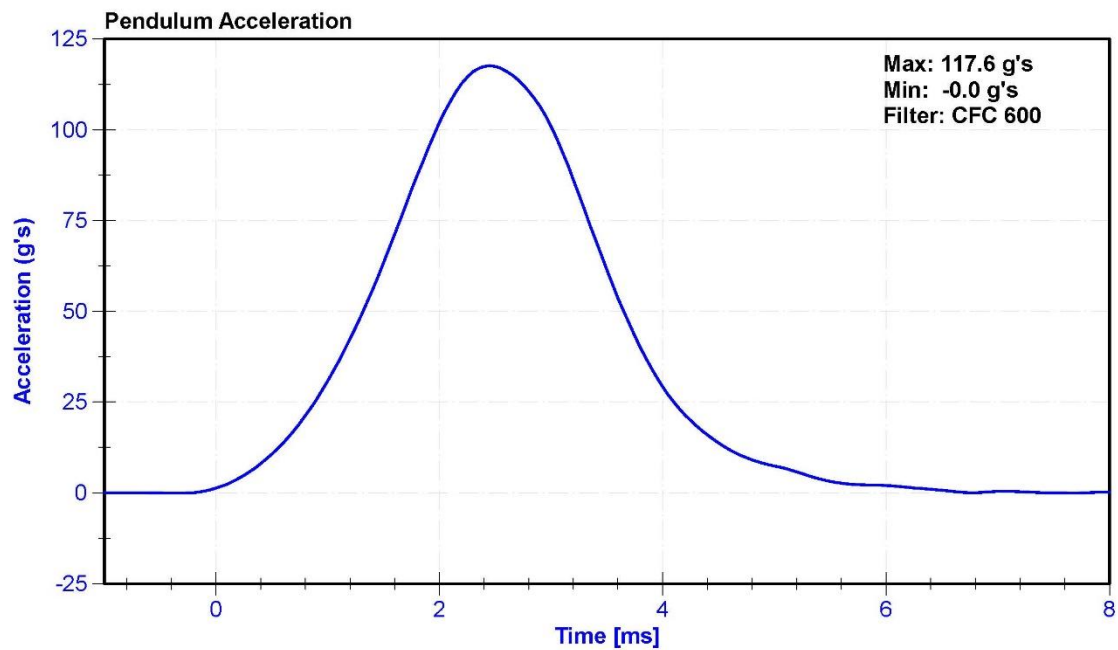
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Velocity	2.07	2.13	m/s	2.099	Pass
Maximum Resistive Force	4720	5780	N	5690.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





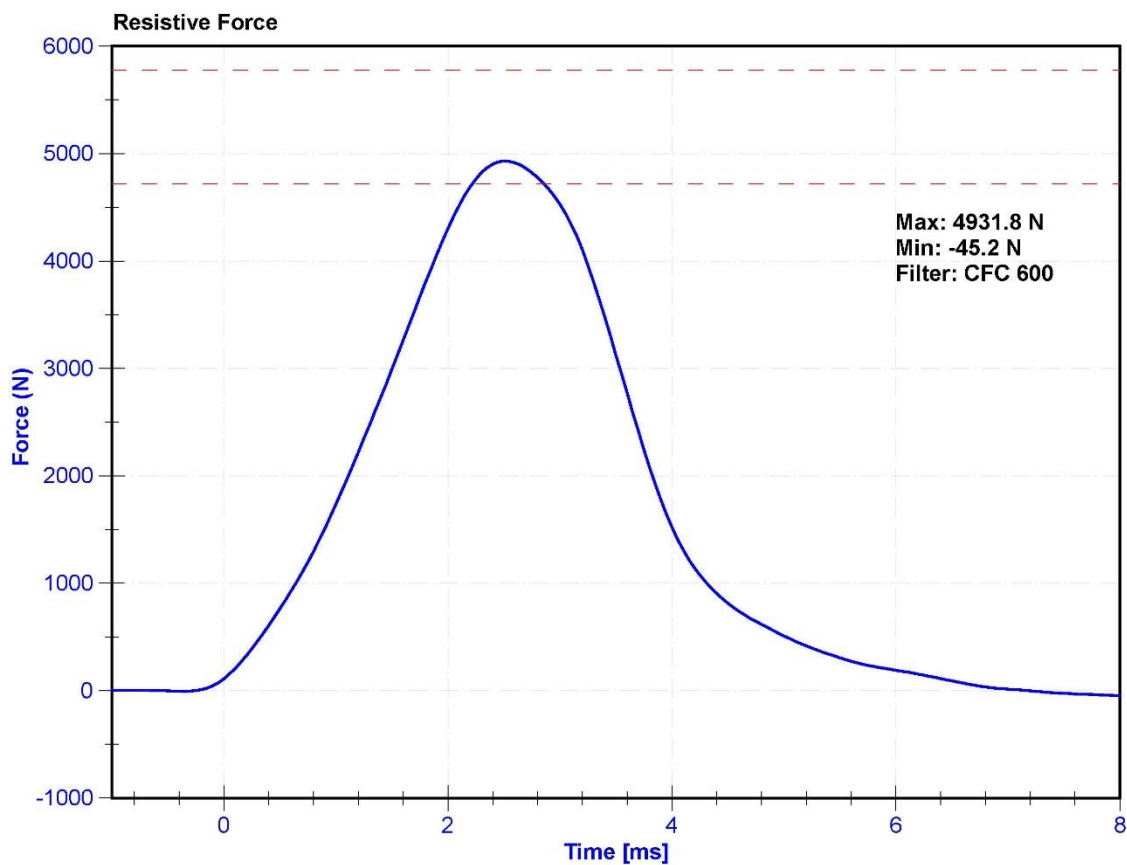
ATD Manufacturer	Humanetics	Test Technician	S. Vacanti
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

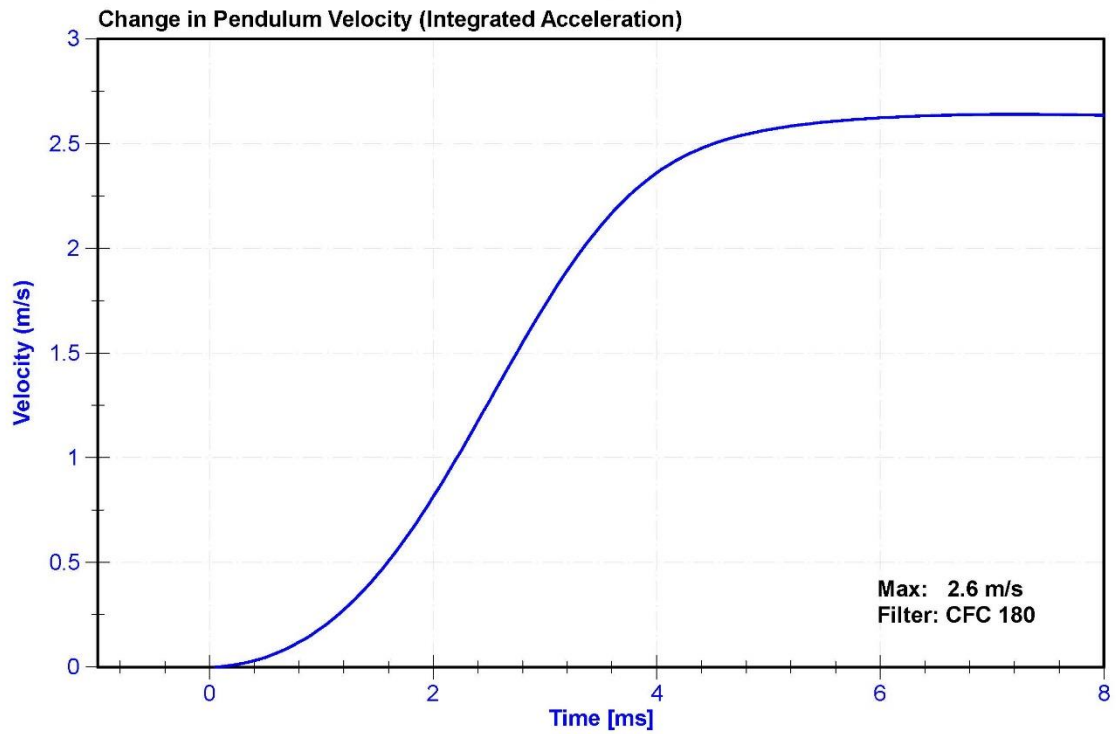
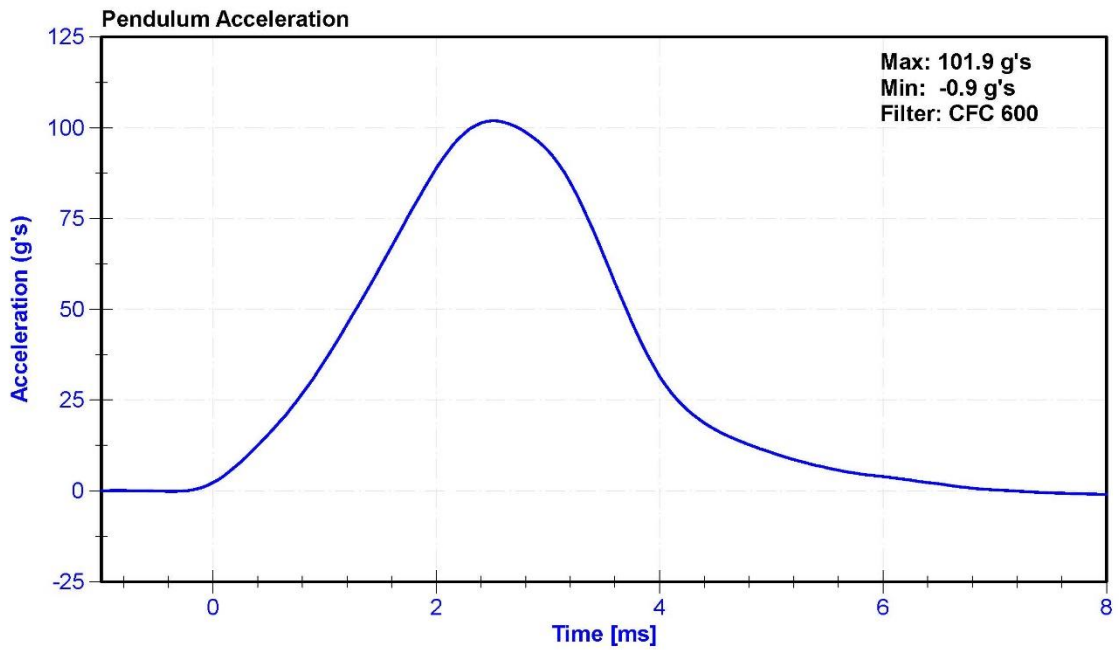
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Velocity	2.07	2.13	m/s	2.105	Pass
Maximum Resistive Force	4720	5780	N	4931.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE - PASSENGER ATD

SERIAL NO: 139

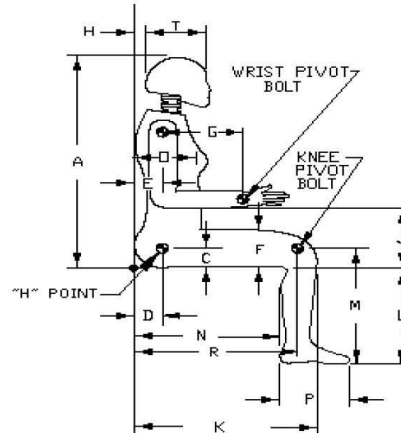
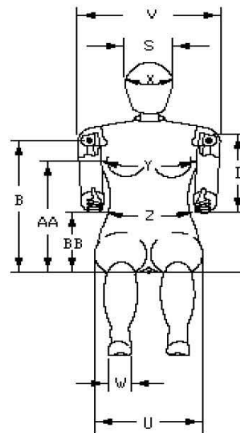


External Measurements - Hybrid 3 - 5th Female

Technician: K. Brogan

Date: 4/14/2021

Dummy Serial Number: 139



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	789	Pass
B	Shoulder Pivot Height	432	457	446	Pass
C	H-Point Height	81	86	84	Pass
D	H-Point from Backline	145	150	146	Pass
E	Shoulder Pivot from Backline	69	84	77	Pass
F	Thigh Clearance	119	135	128	Pass
G	Back of Elbow to Wrist Pivot	244	259	254	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	539	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	402	Pass
N	Buttock Popliteal Length	414	439	425	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	224	Pass
R	Buttock To Knee Pivot Length	457	483	475	Pass
S	Head Breadth	137	147	143	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	309	Pass
V	Shoulder Breadth	351	366	362	Pass
W	Foot Breadth	79	94	87	Pass
X	Head Circumference	528	549	535	Pass
Y	Chest Circumference with Jacket	851	881	861	Pass
Z	Waist Circumference	460	790	773	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

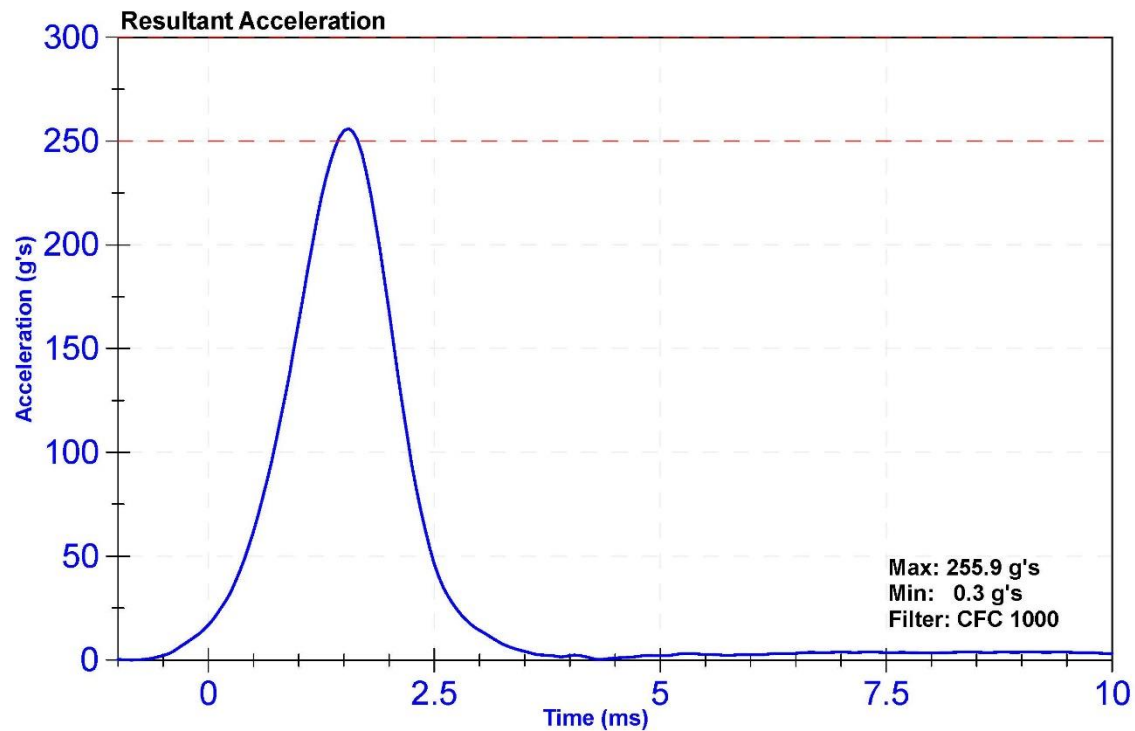
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

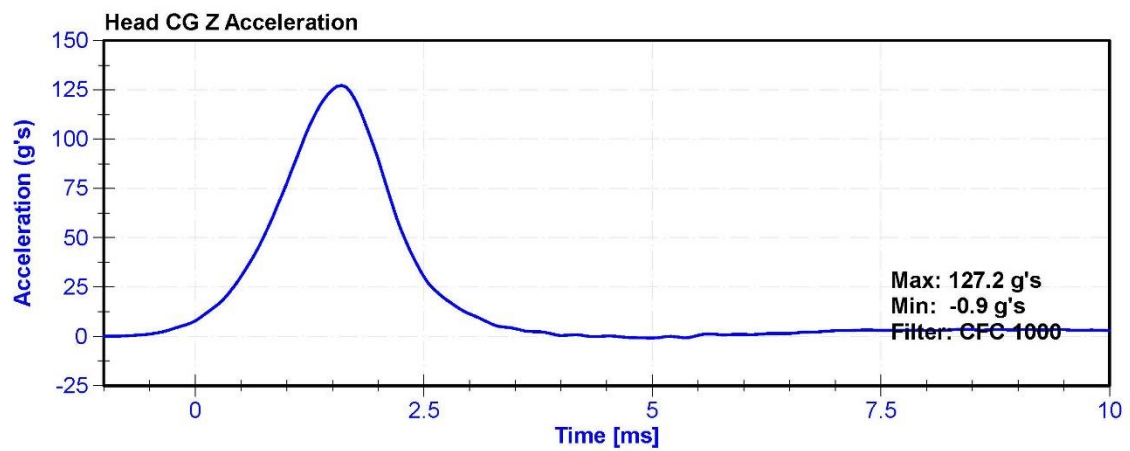
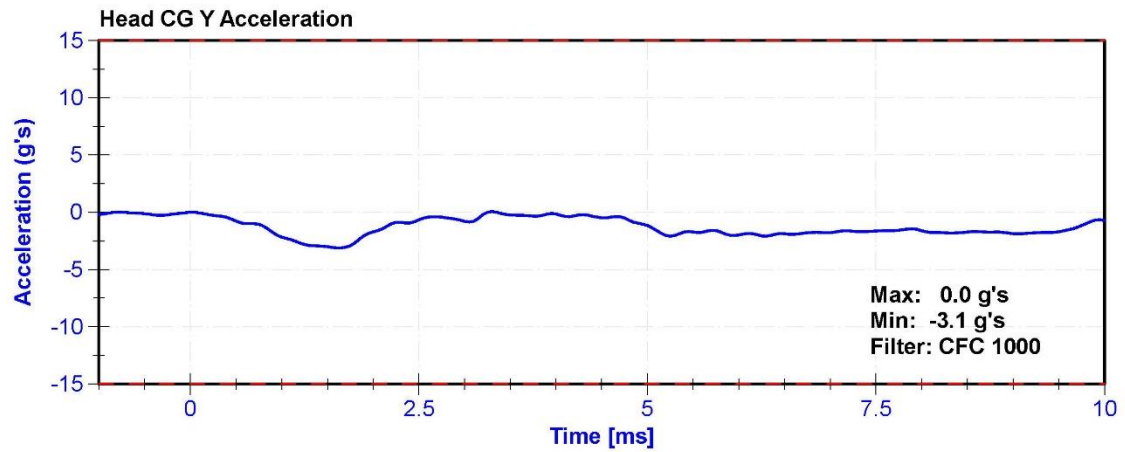
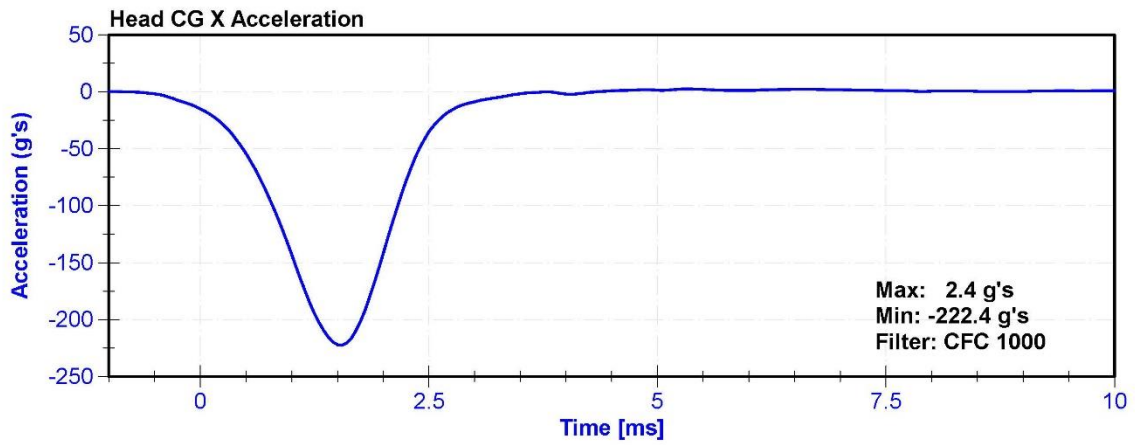
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	25.7	Pass
Resultant Acceleration	250	300	g's	255.9	Pass
Oscillation	0	10	%	1.5	Pass
Lateral Acceleration	-15	15	g's	-3.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58780	4/5/2021	10/4/2021
Y Accelerometer	ENDEVCO 7264	AC-P83320	4/5/2021	10/4/2021
Z Accelerometer	ENDEVCO 7264CT	AC-P58997	4/5/2021	10/4/2021





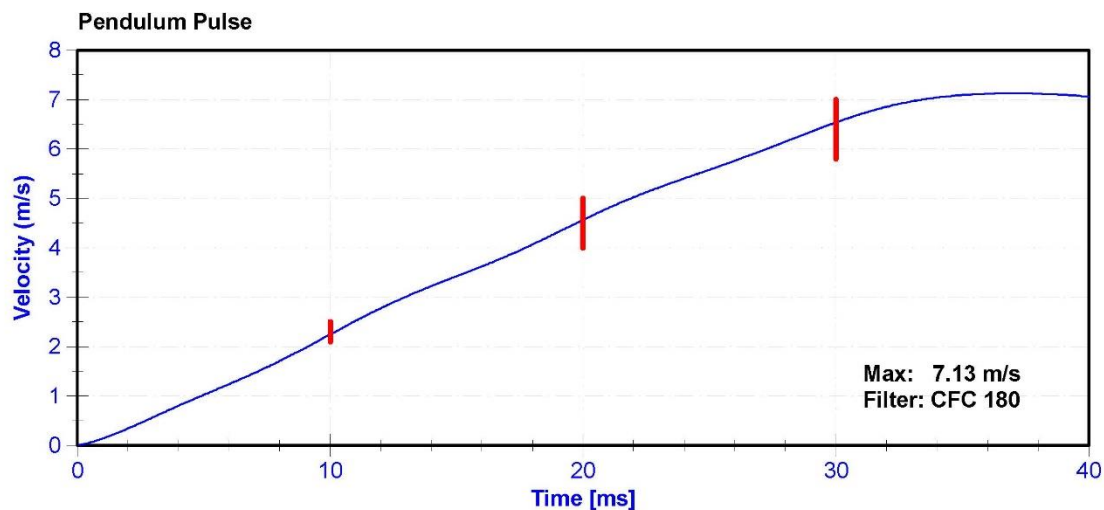
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

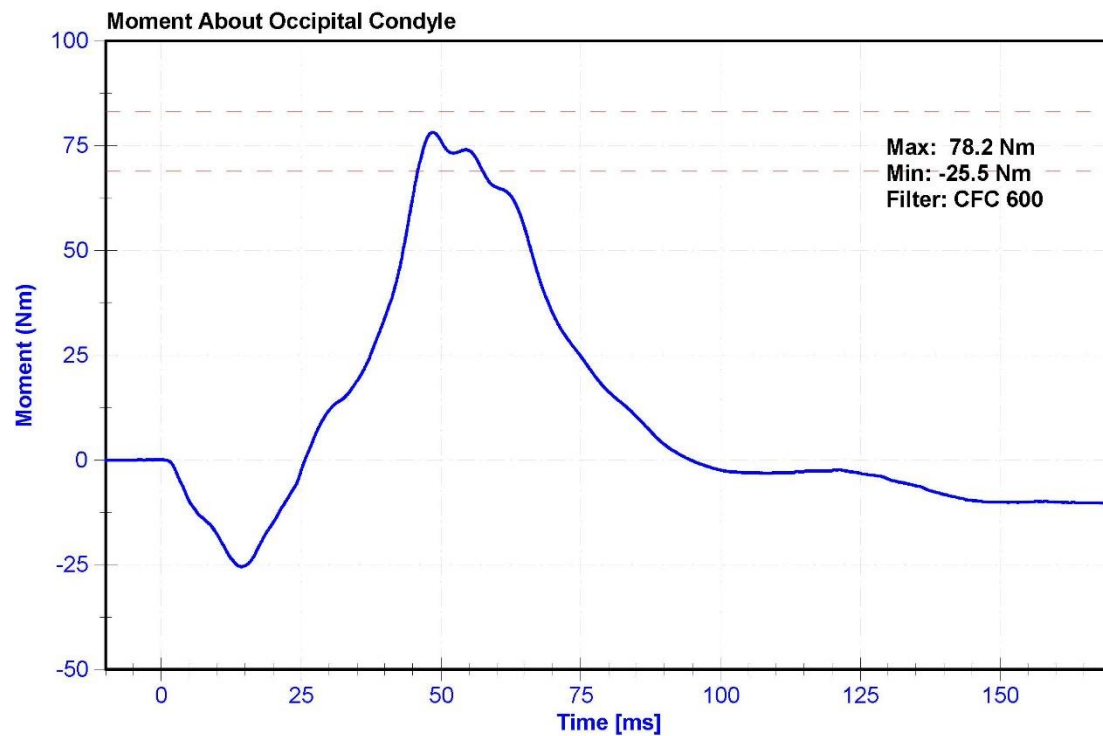
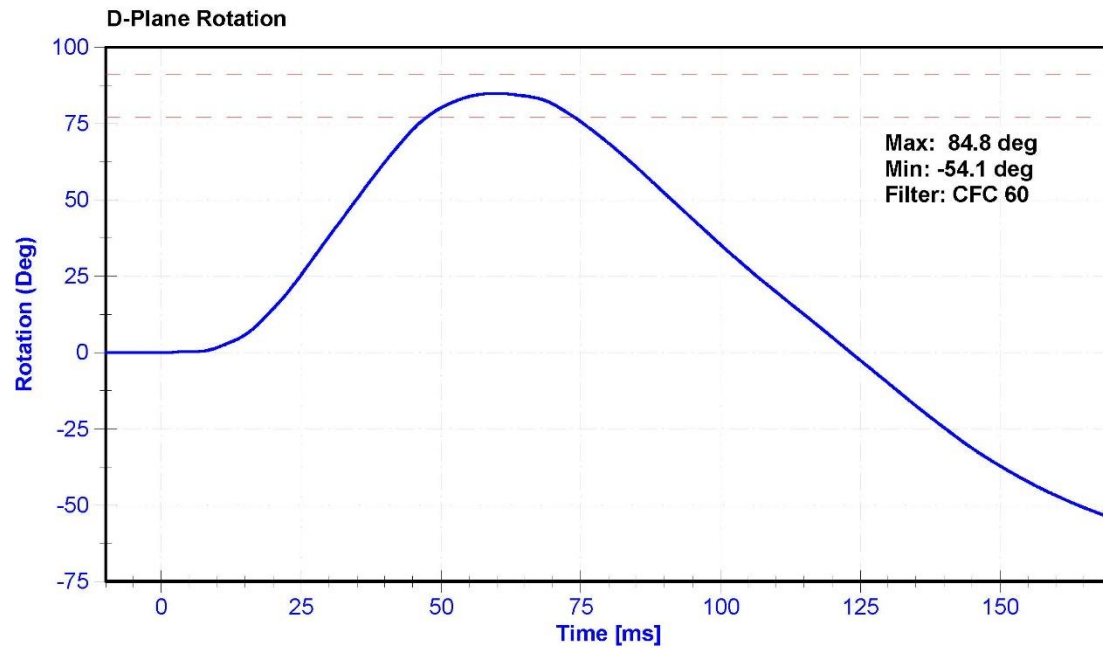
Results

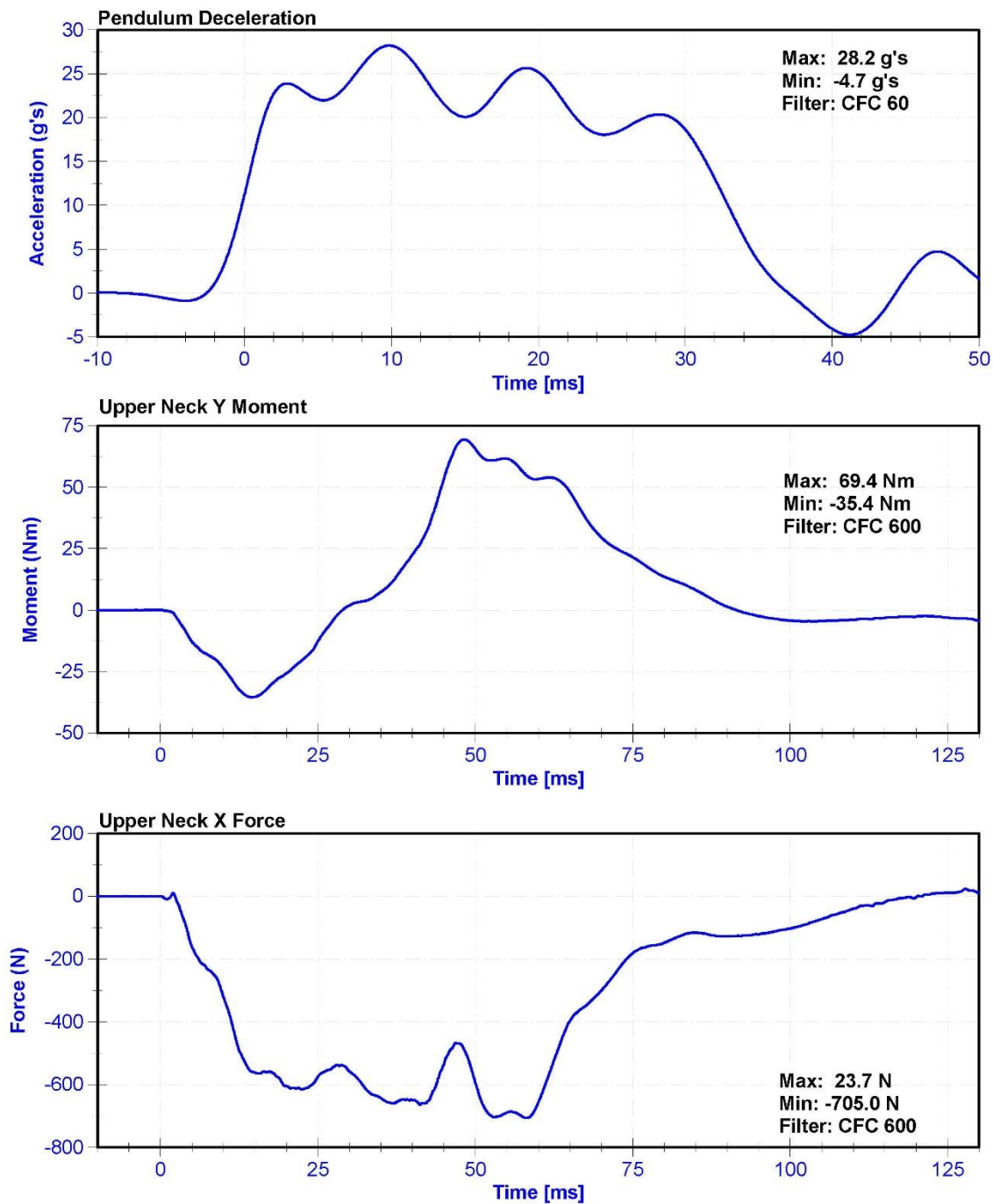
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	43.1	Pass
Velocity	6.89	7.13	m/s	6.958	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.24	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.56	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.54	Pass
Max D Plane Rotation	77	91	deg	84.8	Pass
Max Moment During Rotation Interval	69	83	Nm	78.2	Pass
Moment Decay to 10.0 Nm	80	100	ms	85.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-LABPOT1	9/17/2020	9/17/2021
Condyle Potentiometer	ETI SP22G	DS-LABPOT2	9/17/2020	9/17/2021
Upper Neck Load Cell	Denton 1716A	LC-2192Fx	7/17/2020	7/17/2021







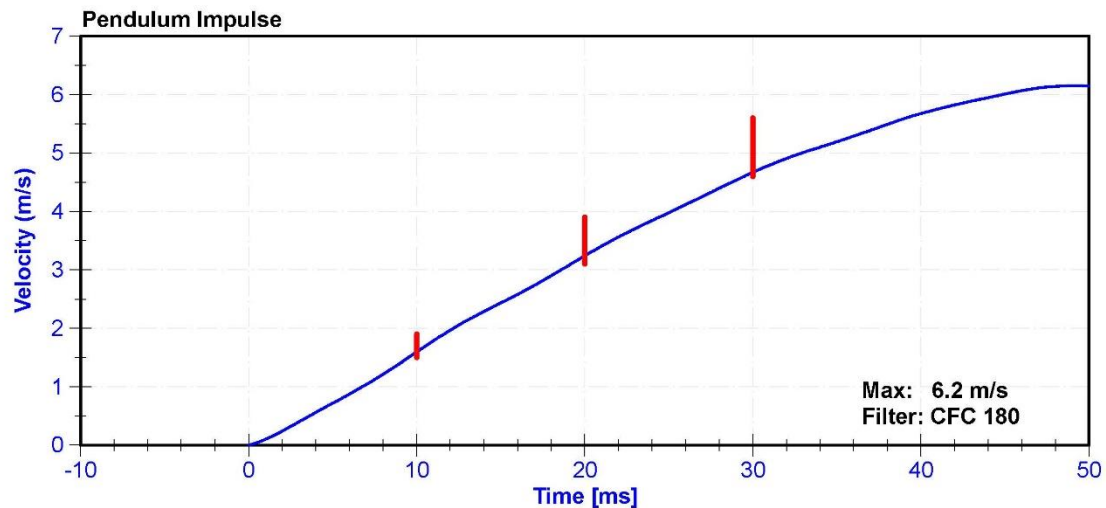
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

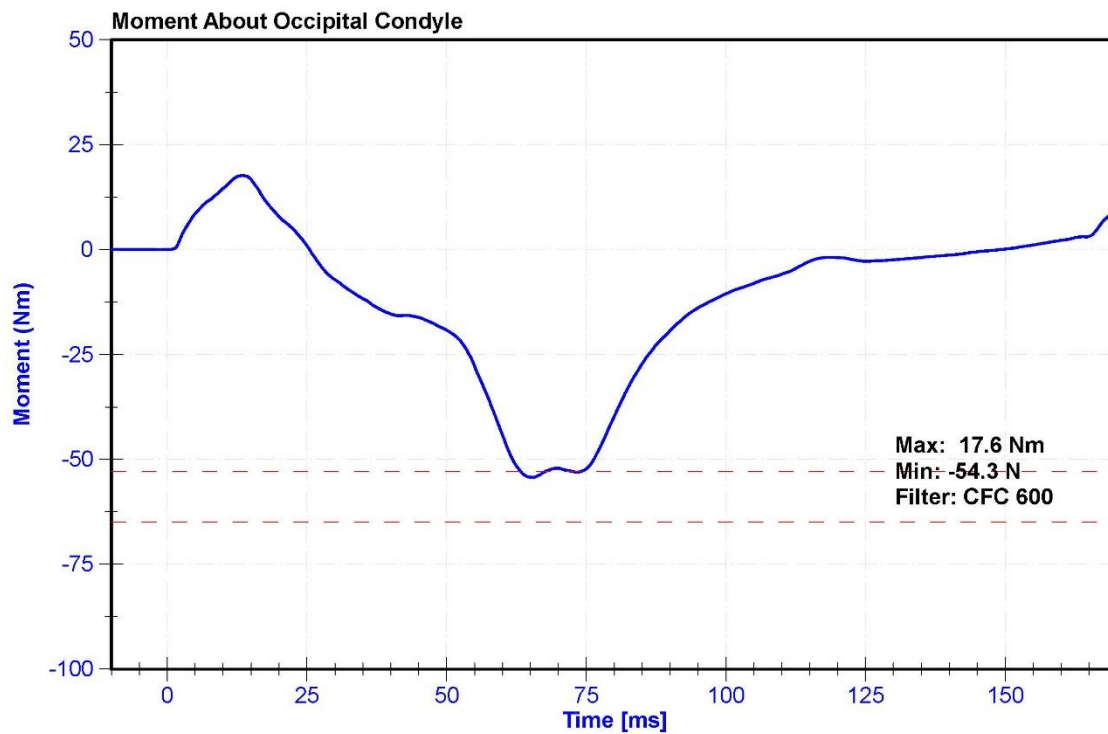
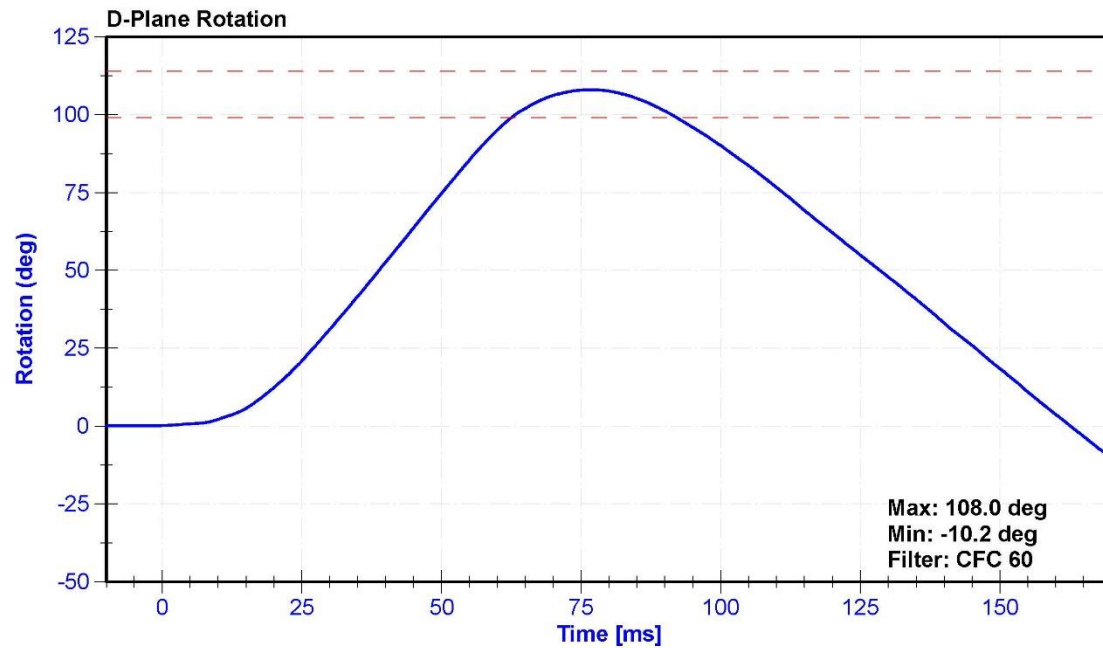
Results

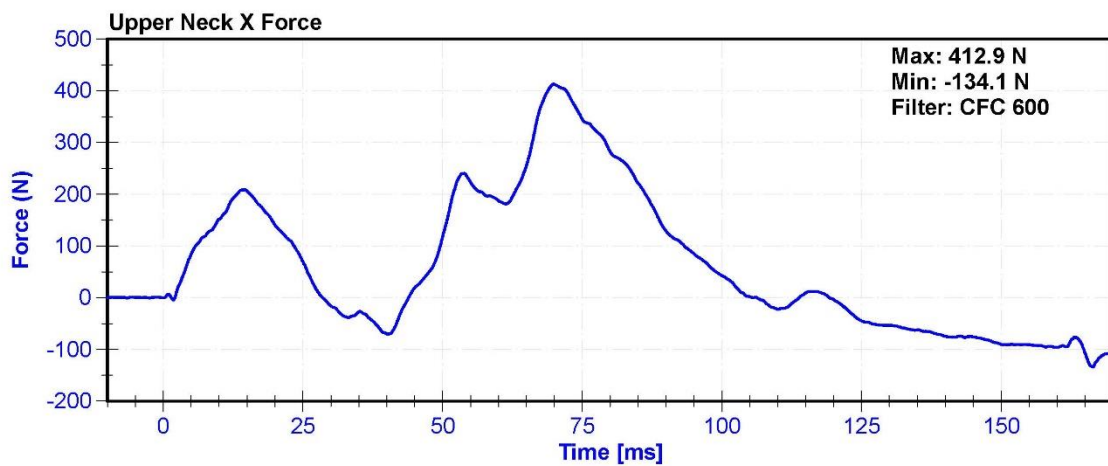
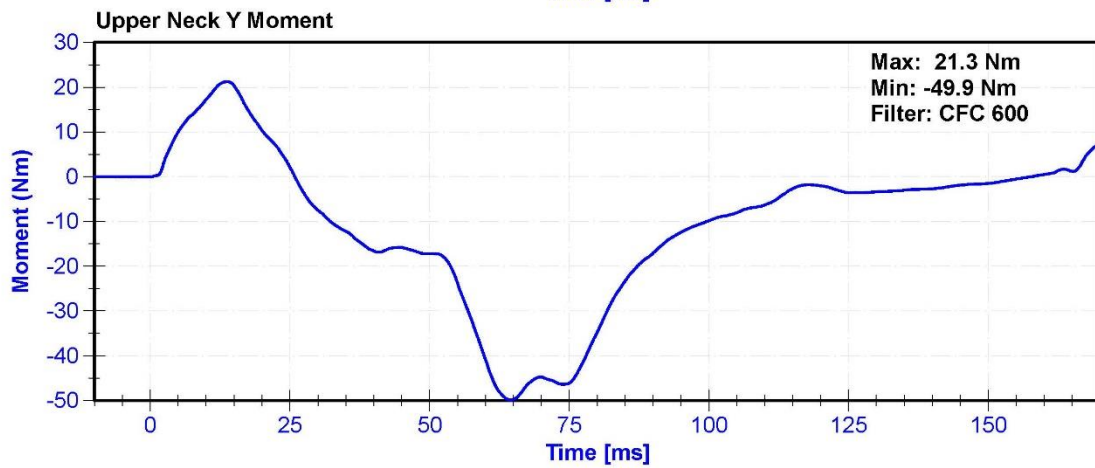
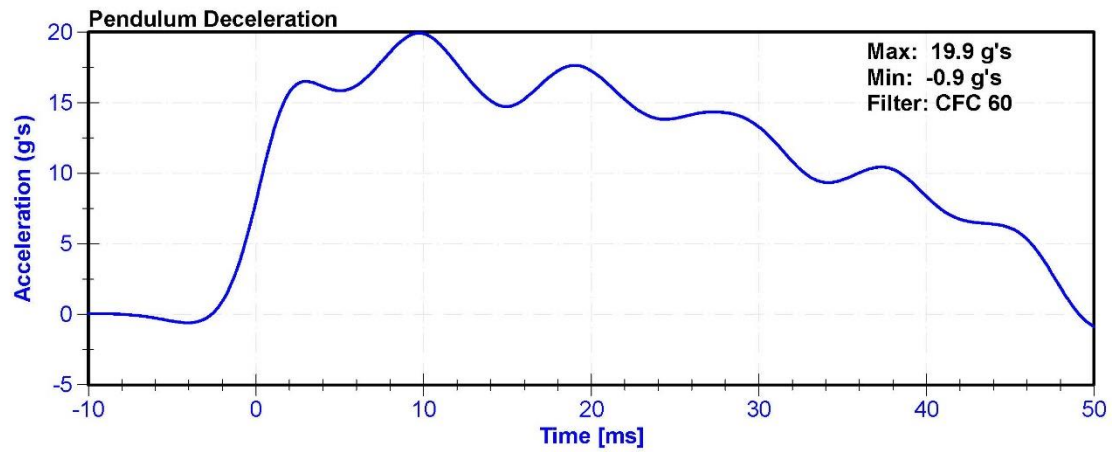
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	44.5	Pass
Velocity	5.95	6.19	m/s	6.005	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.59	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.24	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	4.67	Pass
D Plane Rotation	99	114	deg	108.0	Pass
Moment During Rotation Interval	-65	-53	Nm	-54.3	Pass
Moment Decay to -10Nm	94	114	ms	101.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-LABPOT1	9/17/2020	9/17/2021
Condyle Potentiometer	ETI SP22G	DS-LABPOT2	9/17/2020	9/17/2021
Upper Neck Load Cell	Denton 1716A	LC-2192Fx	7/17/2020	7/17/2021







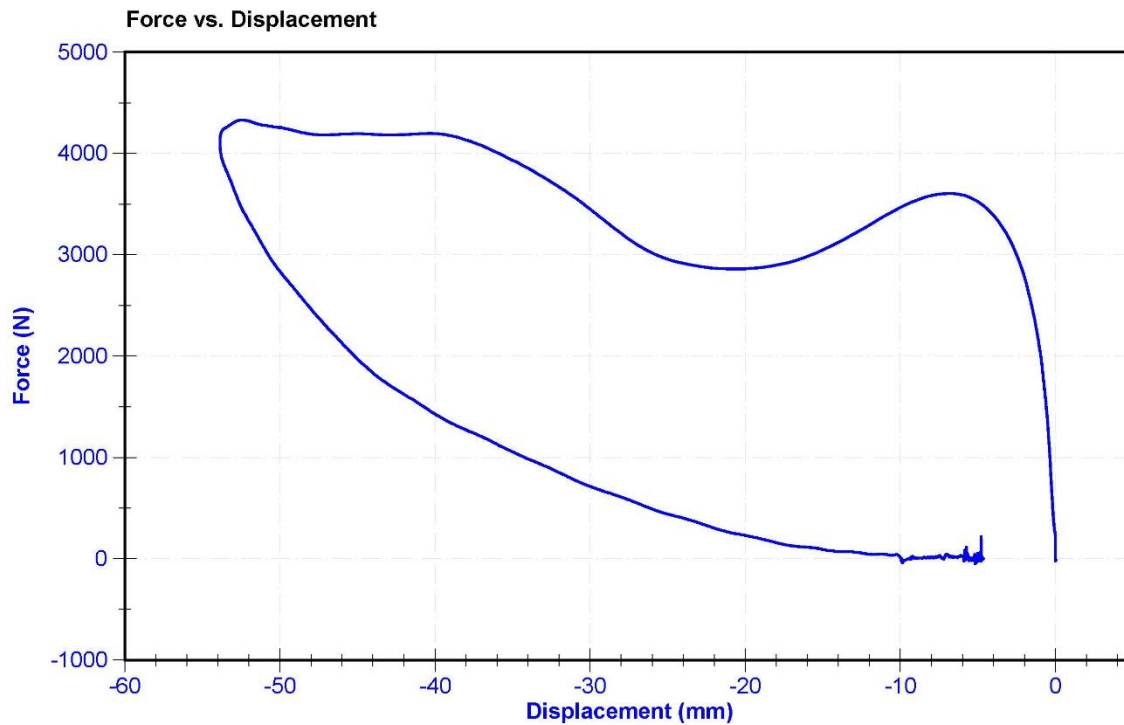
ATD Manufacturer	Denton	Test Technician	E. Helenbrook
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

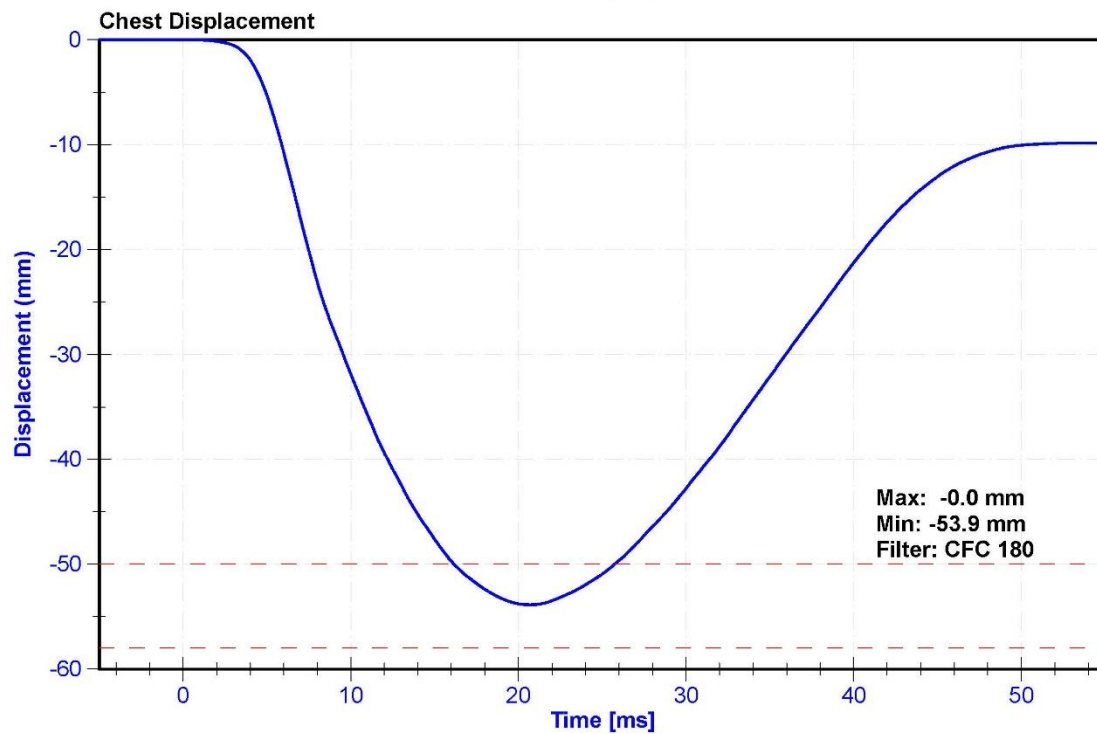
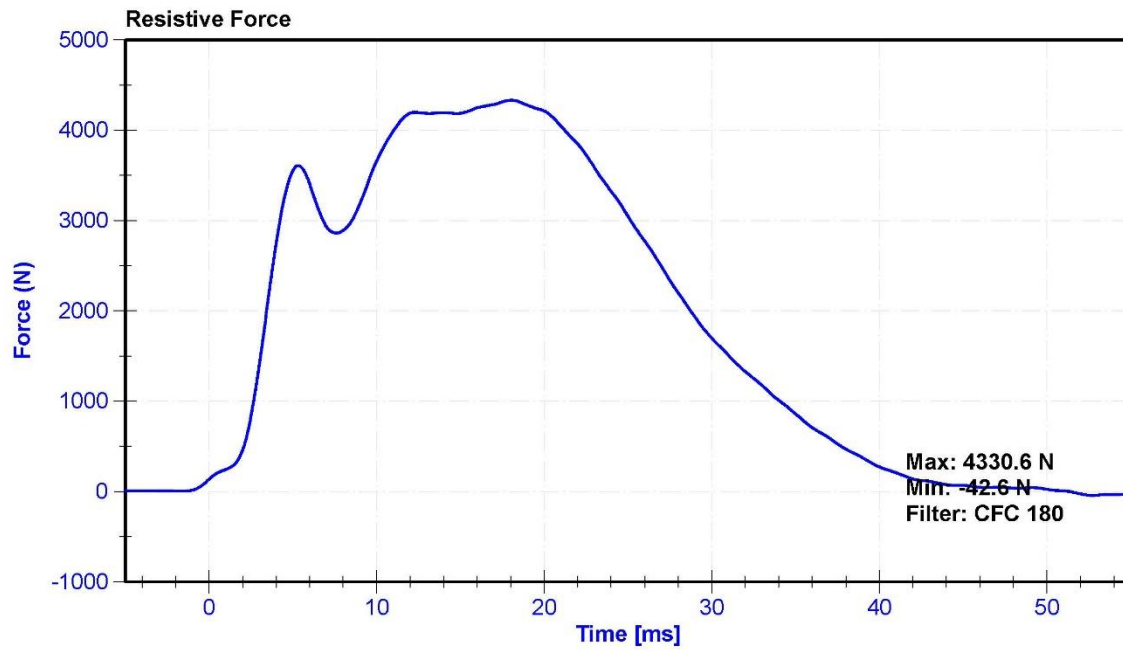
Results

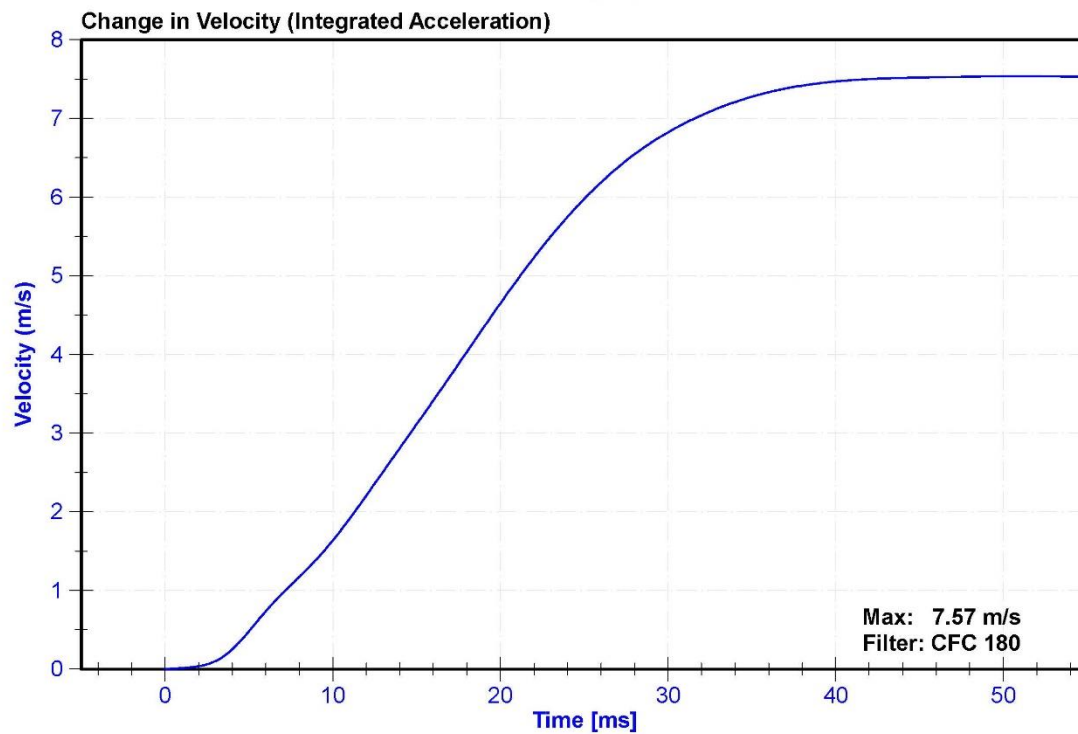
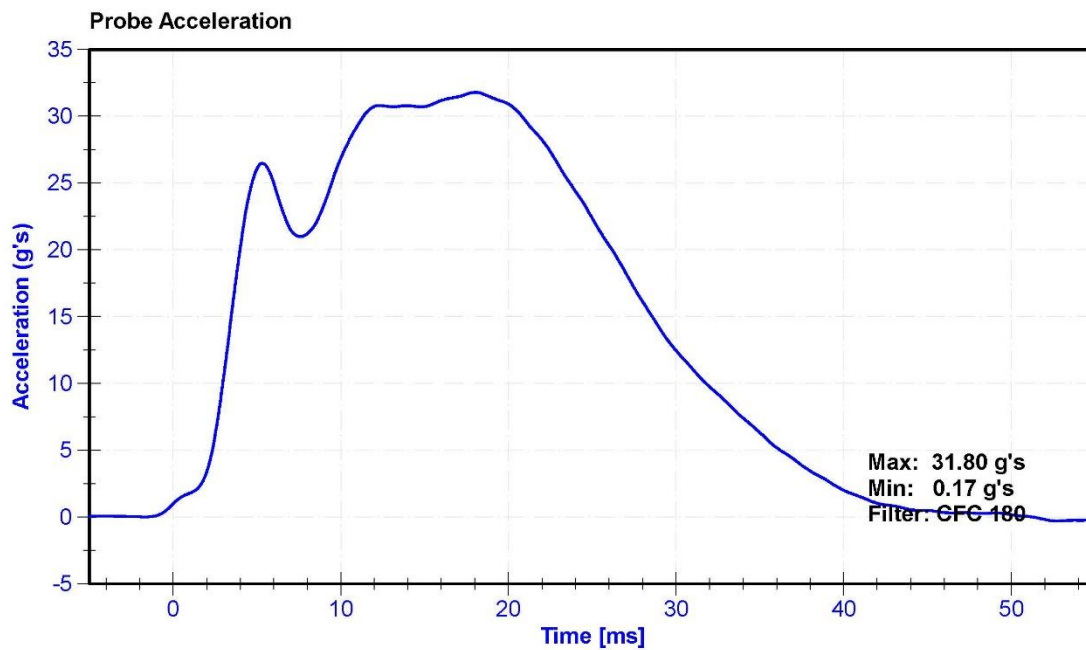
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	36.4	Pass
Velocity	6.59	6.83	m/s	6.641	Pass
Chest Deflection	-58	-50	mm	-53.9	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4330.6	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4255.3	Pass
Hysteresis	69	85	%	73.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Chest Potentiometer	SERVO H3CD	DS-503	4/23/2021	10/22/2021







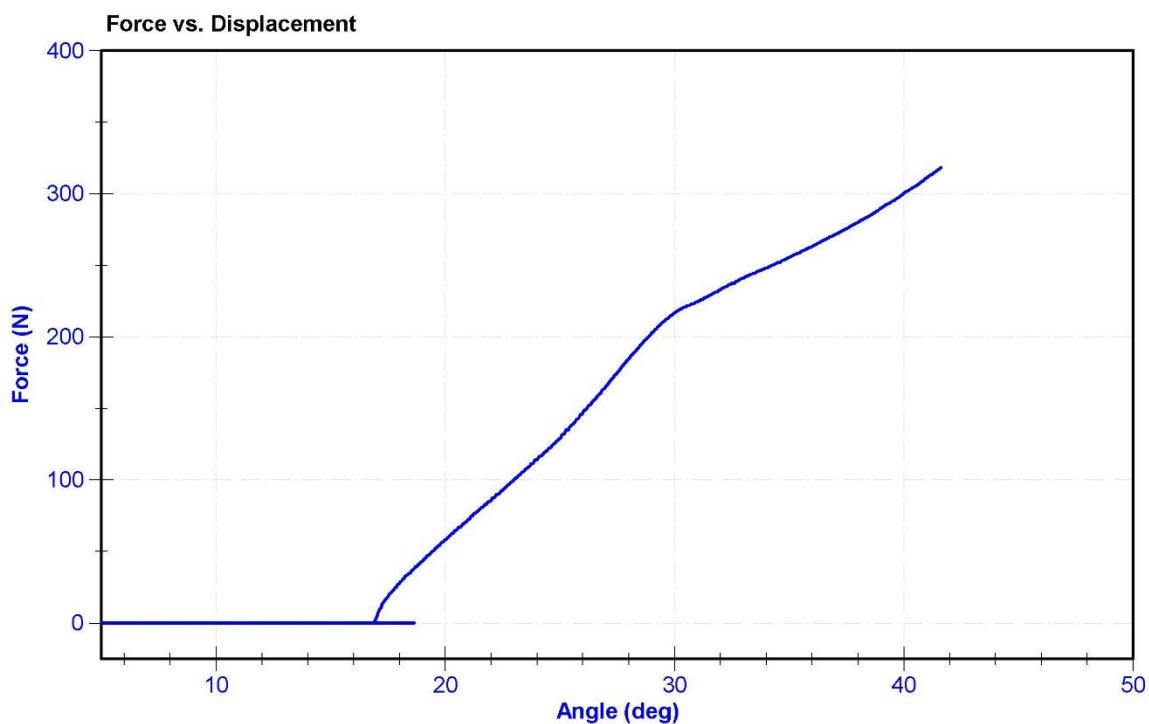
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.6	Pass
Humidity	10	70	%	25.7	Pass
Initial Angle	0	20	deg	16.9	Pass
Force at 45 Degrees	320	390	N	361.9	Pass
Return Angle Relative to Initial	0	8	deg	3.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Seika.de N4C-1	DS-1905226	10/12/2020	10/12/2021
Load Cell	Interface SML-200	LC-493319	10/8/2020	10/8/2021



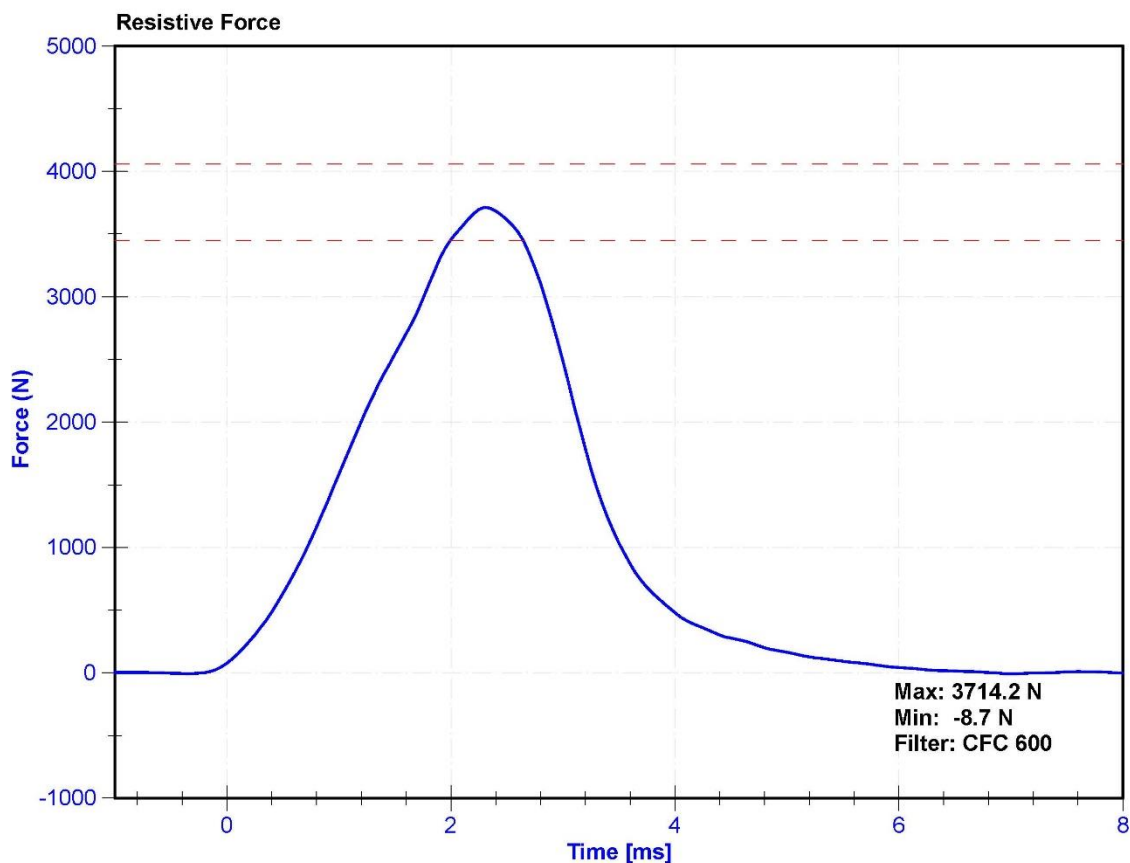
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

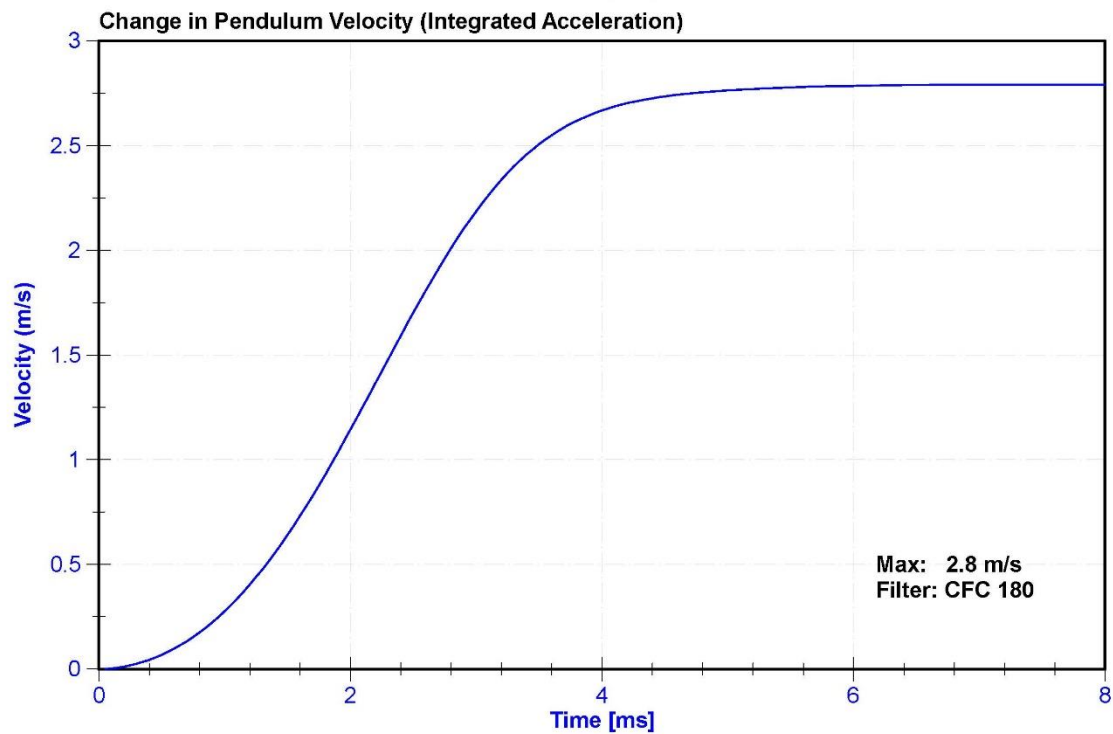
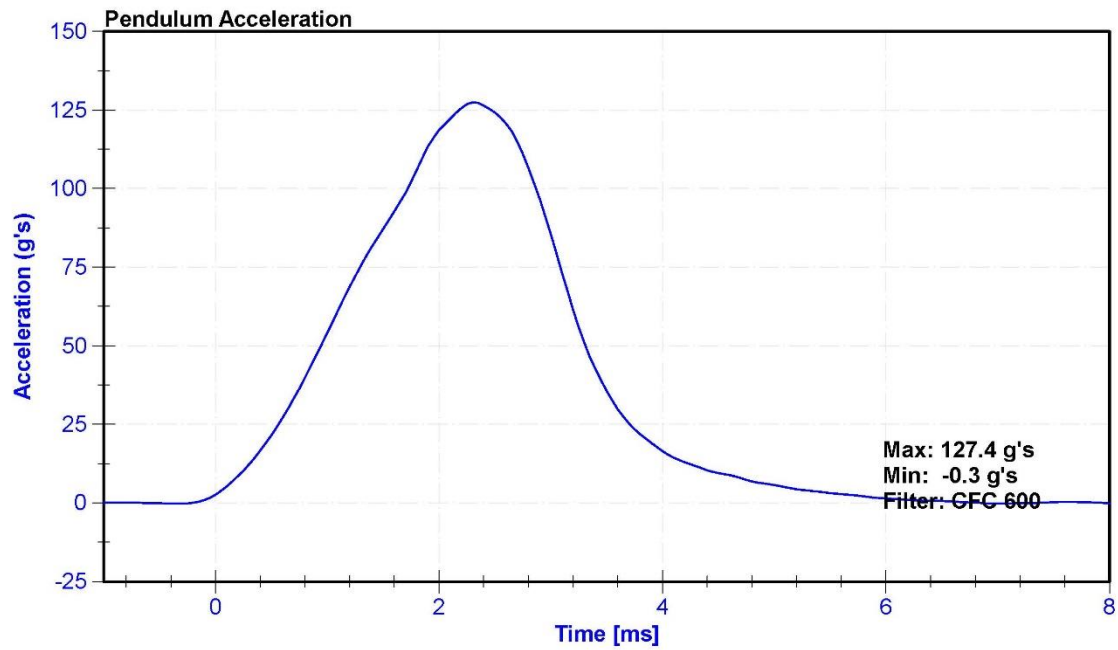
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.0	Pass
Humidity	10	70	%	45.6	Pass
Velocity	2.07	2.13	m/s	2.117	Pass
Resistive Force	3450	4060	N	3714.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





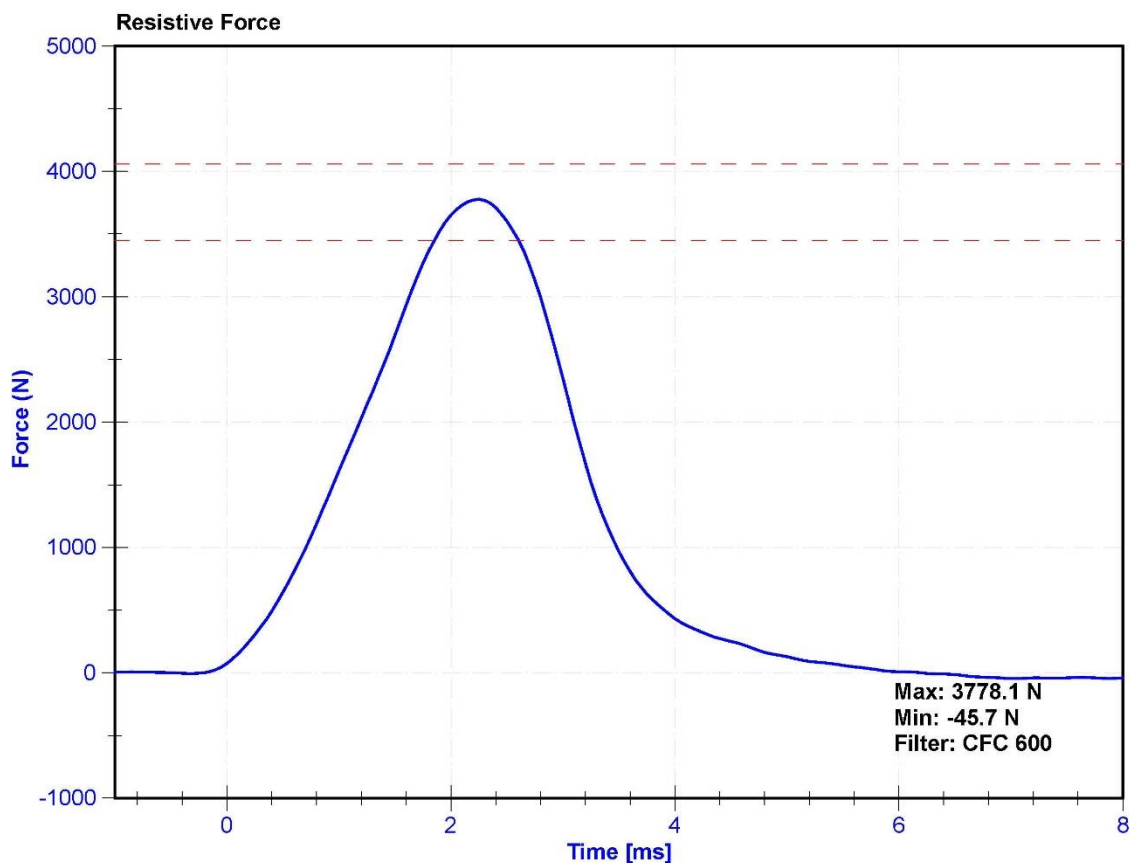
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

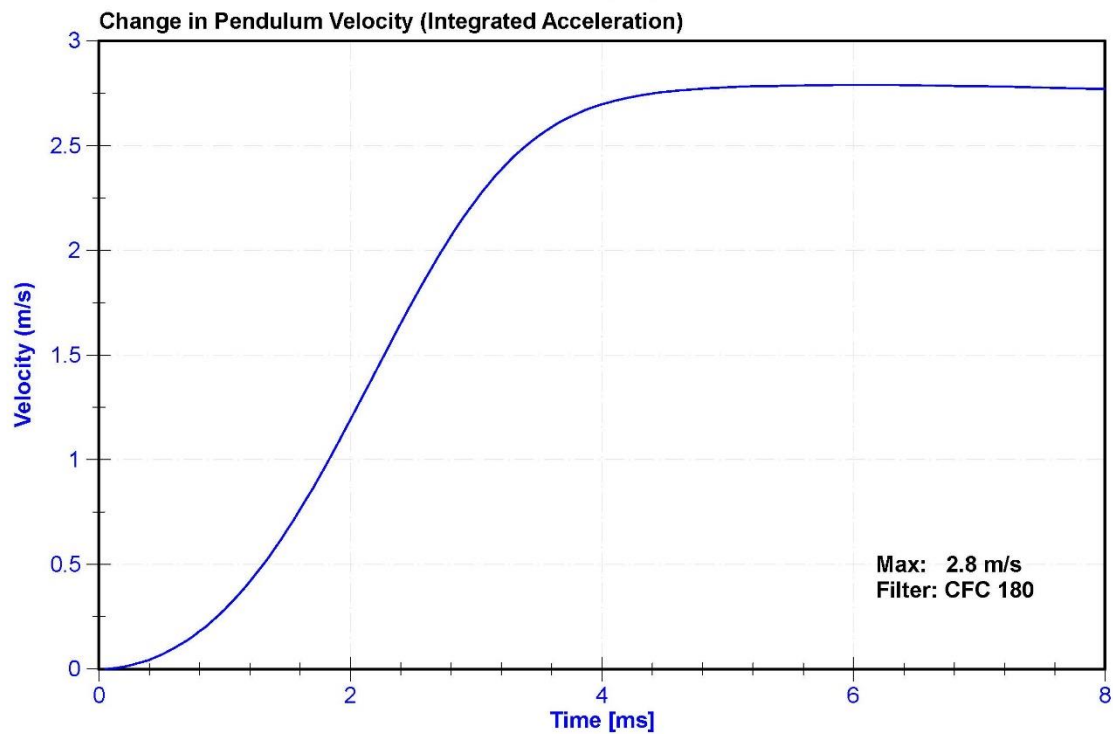
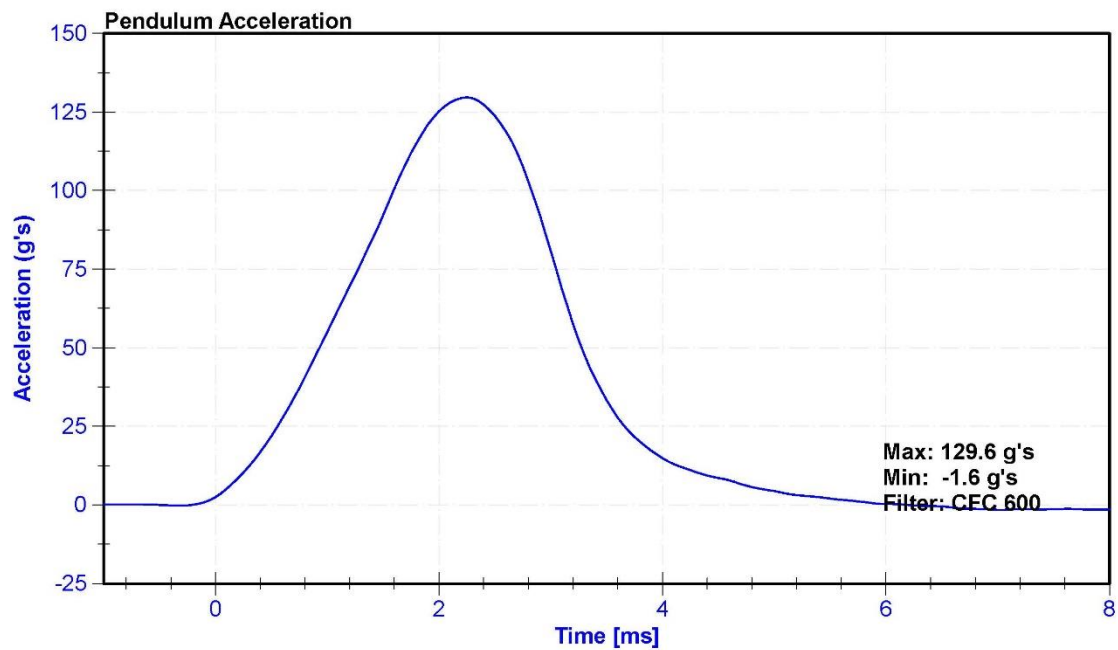
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	44.3	Pass
Velocity	2.07	2.13	m/s	2.117	Pass
Resistive Force	3450	4060	N	3778.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 142



Date: 04/30/2021

USD 2485
Attachment

NOTE: FIGURE IS REFERENCED TO THE ERCT SEATED POSITION.
The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.

HYBRID III Exterior Body Dimensions - Front View

HYBRID III Exterior Body Dimensions - Side View

Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.7	Pass
B	Shoulder Pivot Height	19.9	20.5	20.3	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.9	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	13.4	Pass
J	Elbow Rest Height	7.5	8.3	8.1	Pass
K	Buttock to Knee Length	22.8	23.8	23.0	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.4	Pass
N	Buttock Popliteal Length	17.8	18.8	18.3	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.1	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.8	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.8	Pass
Z	Waist Circumference	32.9	34.1	33.7	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

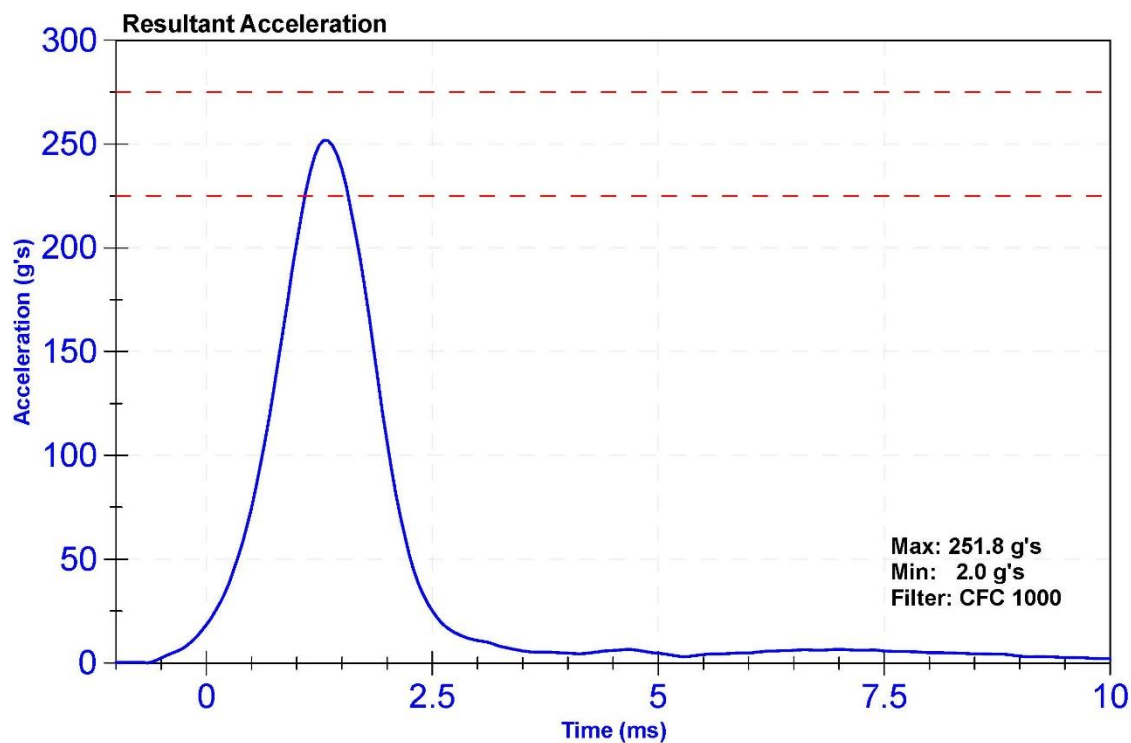
ATD Manufacturer	Humanetics	Test Technician	E. Helenbrook
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

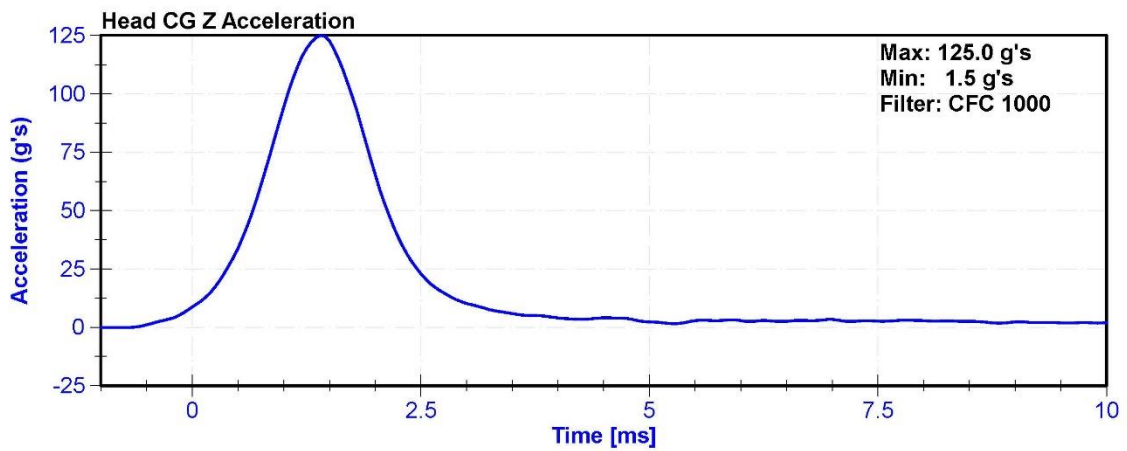
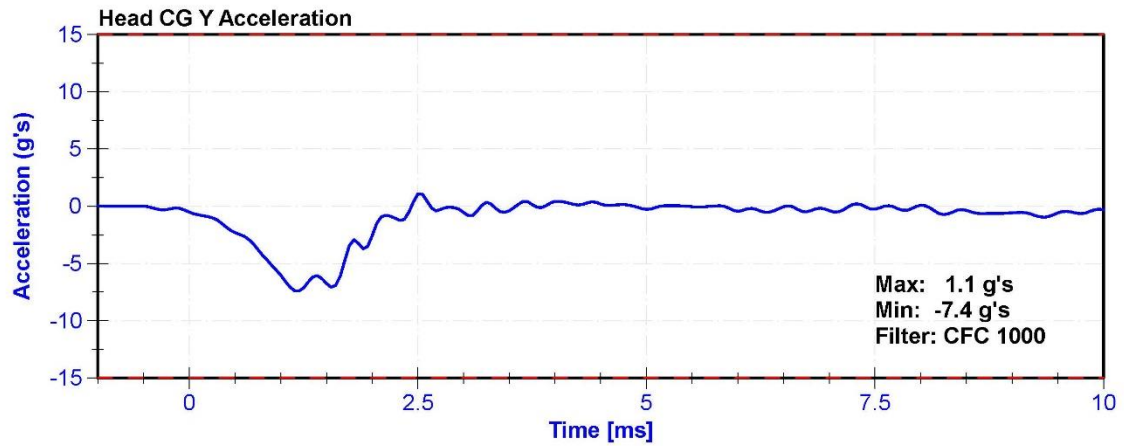
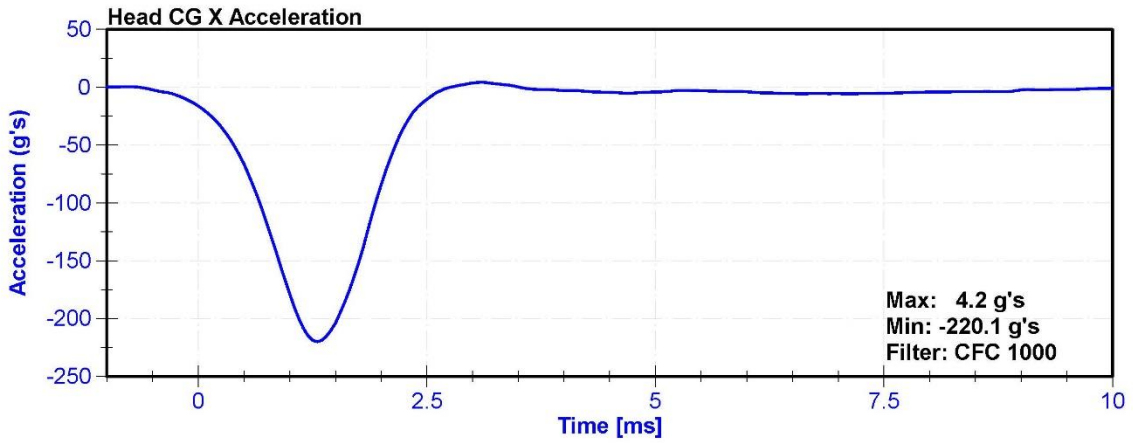
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	39.5	Pass
Resultant Acceleration	225	275	g's	251.8	Pass
Oscillation	0	10	%	2.6	Pass
Lateral Acceleration	-15	15	g's	-7.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	P51681	11/3/2020	5/4/2021
Y Accelerometer	ENDEVCO 7264	P64151	11/3/2020	5/4/2021
Z Accelerometer	ENDEVCO 7264	P52114	11/3/2020	5/4/2021





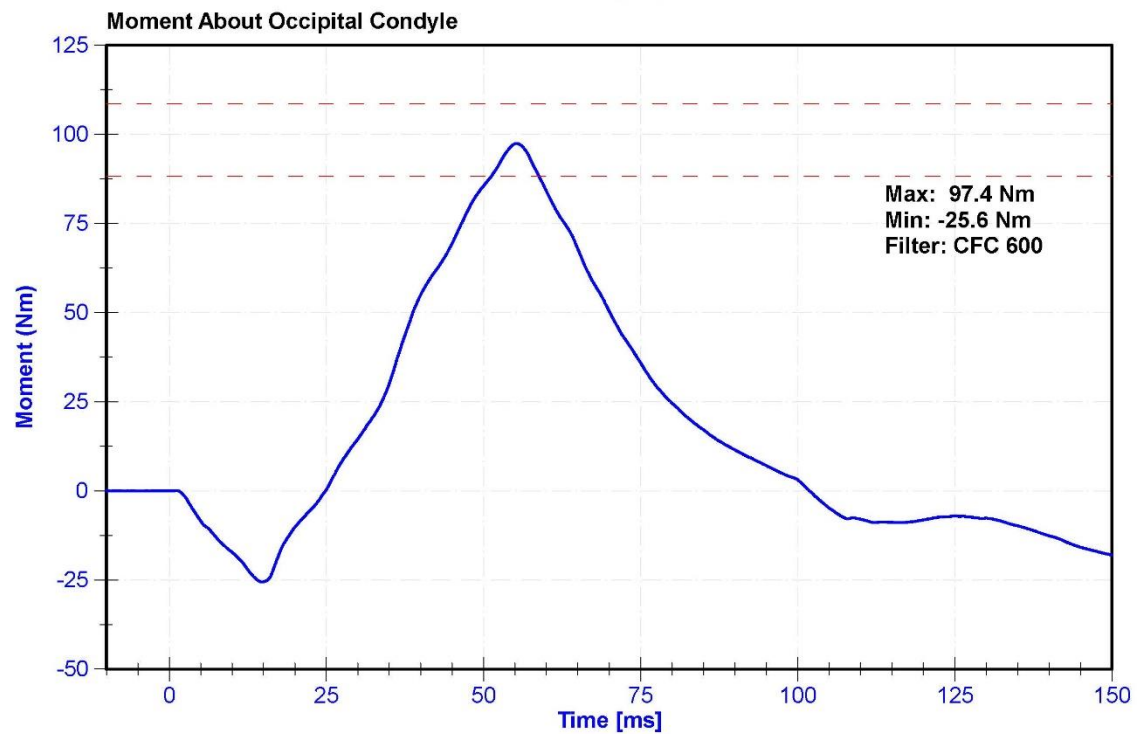
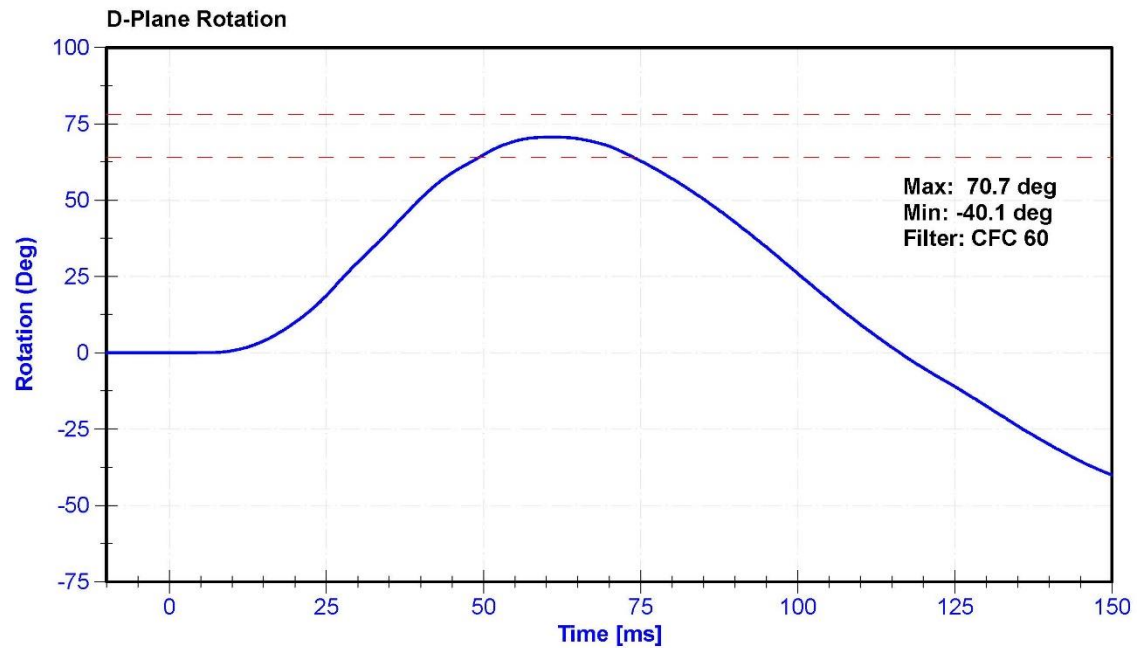
ATD Manufacturer	Humanetics	Test Technician	E. Helenbrook
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

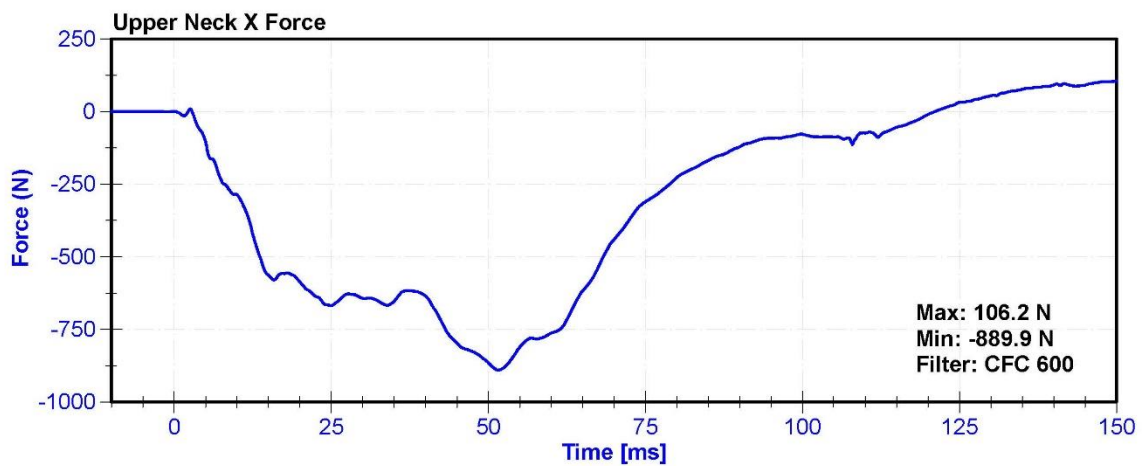
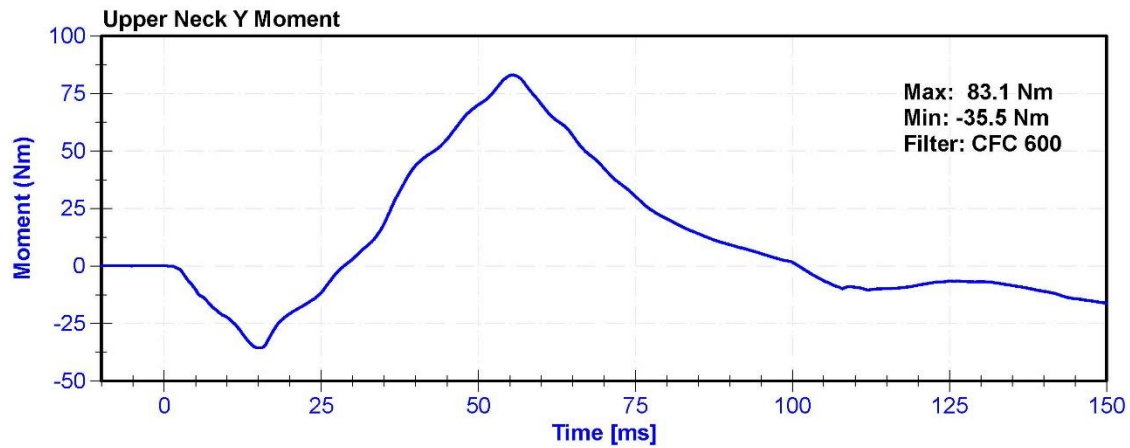
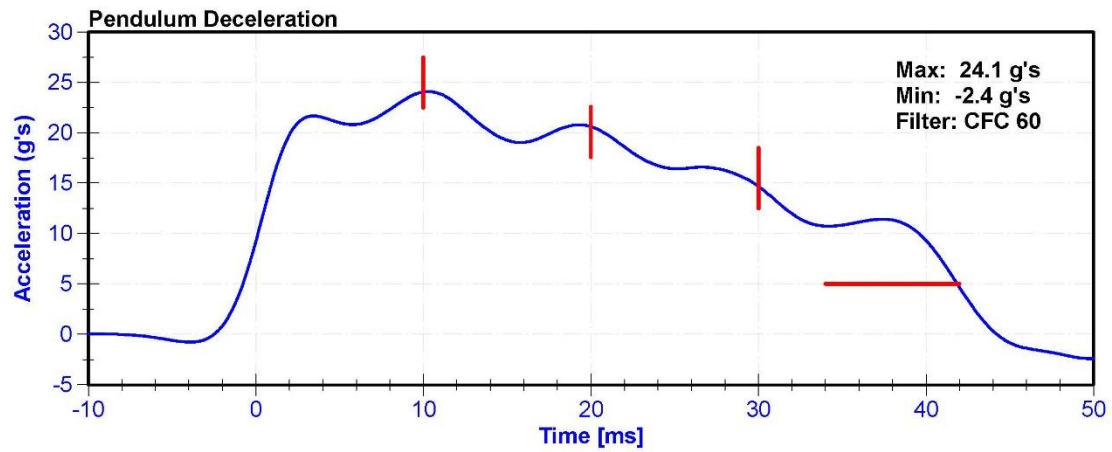
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	39.5	Pass
Velocity	6.89	7.13	m/s	6.950	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	24.07	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	20.62	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	14.69	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	24.1	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	41.9	Pass
Maximum D Plane Rotation	64	78	deg	70.7	Pass
Time to Maximum Rotation	57	64	ms	61.0	Pass
Rotation Decay to Zero	113	127	ms	116.3	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	97.38	Pass
Time to Maximum Moment	47	58	ms	55.3	Pass
Moment Decay to Zero	97	107	ms	101.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-PendPot	12/9/2020	12/9/2021
Condyle Potentiometer	ETI SP22G	DS-CondPot	12/3/2020	12/3/2021
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	11/10/2020	11/10/2021





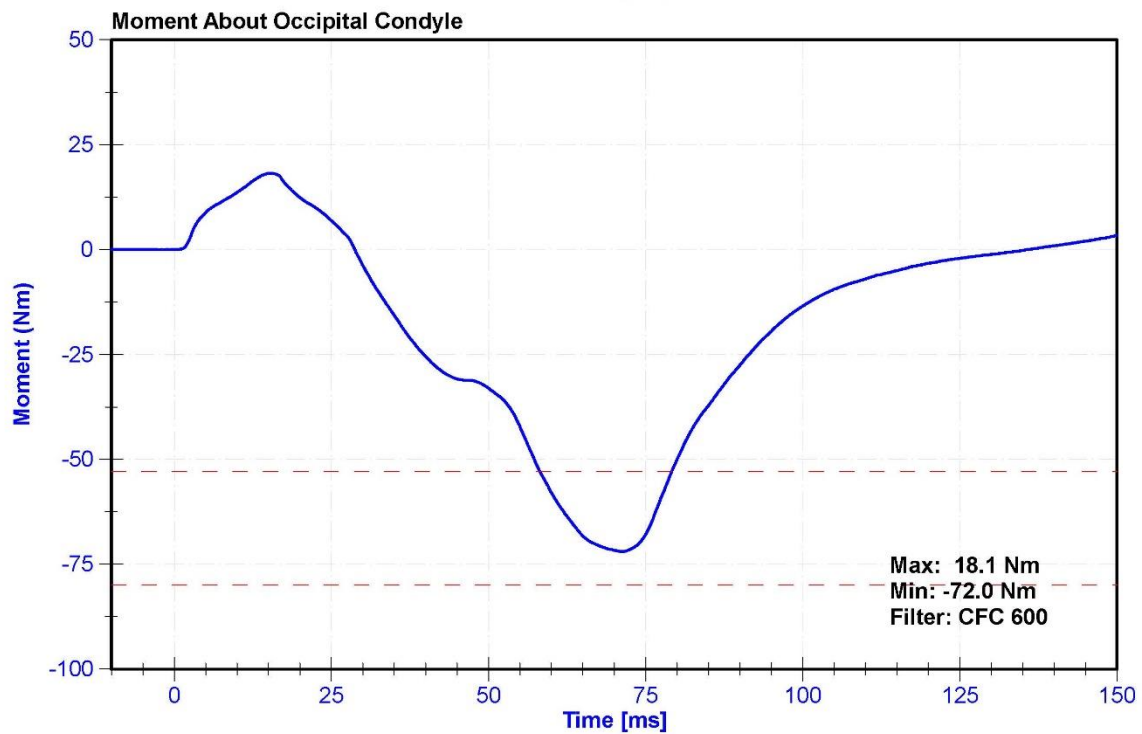
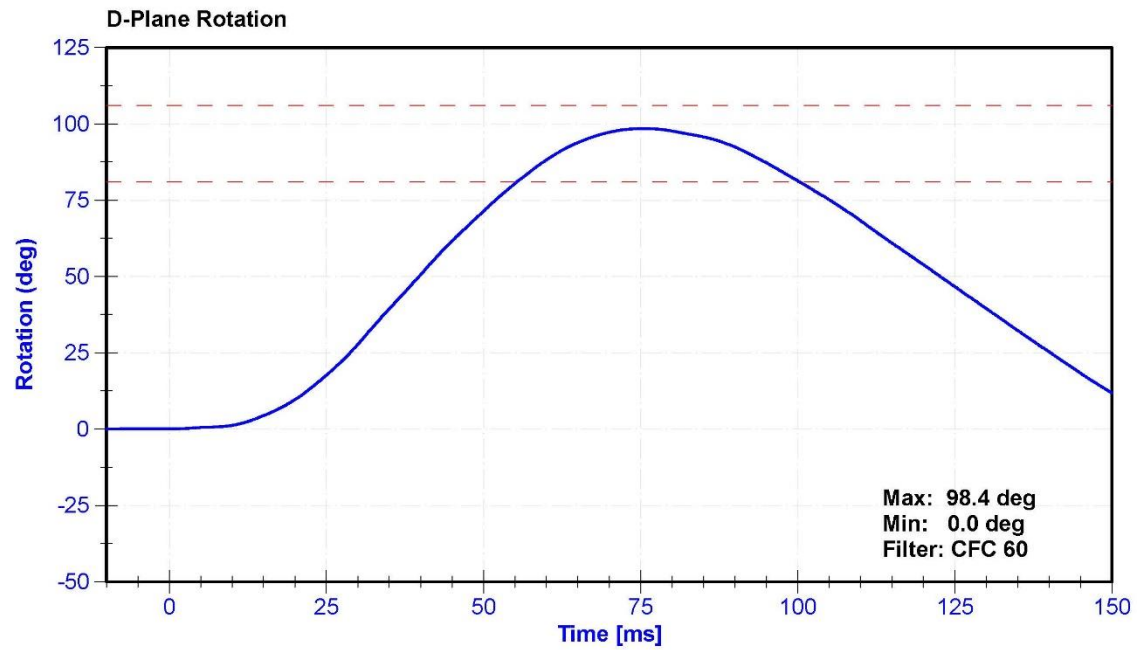
ATD Manufacturer	Humanetics	Test Technician	E. Helenbrook
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

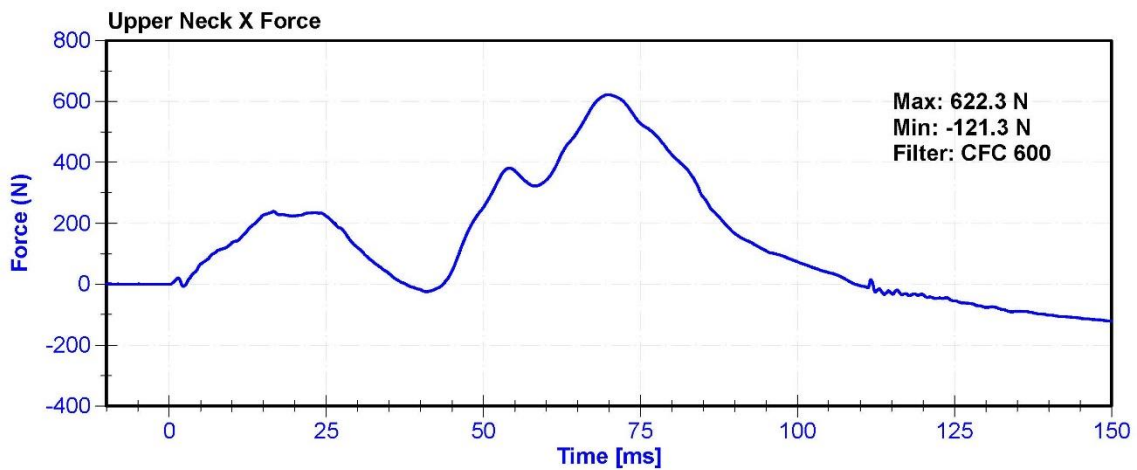
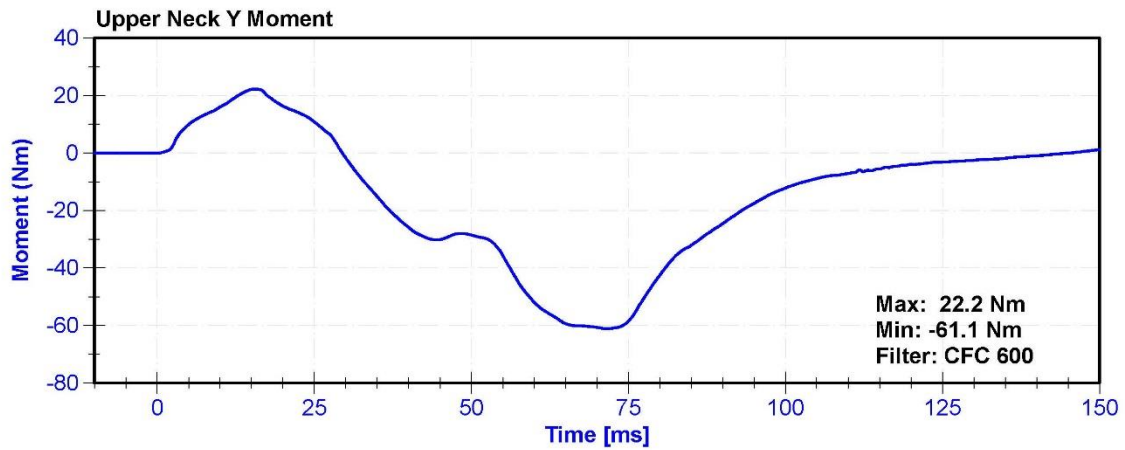
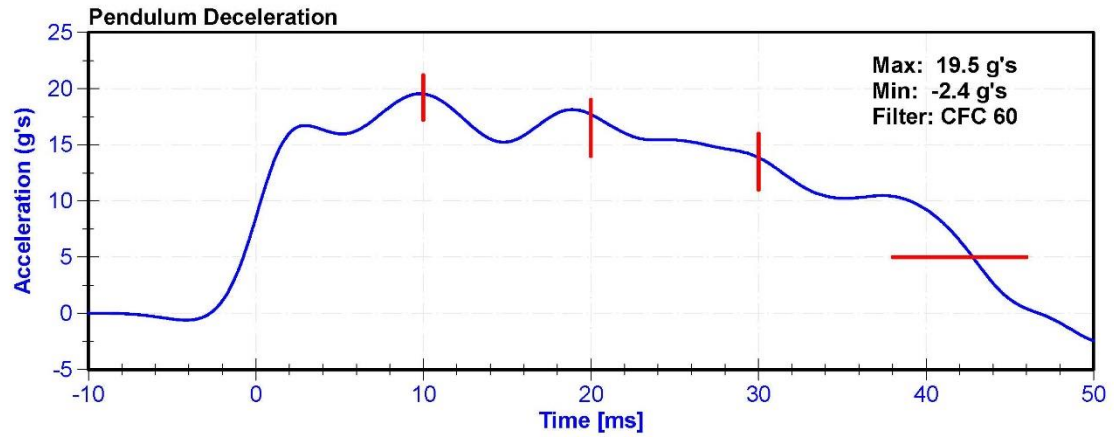
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	39.5	Pass
Velocity	5.94	6.19	m/s	5.990	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.53	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.7	Pass
Pendulum Deceleration at 30ms	11	16	g's	13.9	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	19.5	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	42.8	Pass
Maximum D Plane Rotation	81	106	deg	98.4	Pass
Time to Maximum Rotation	72	82	ms	75.5	Pass
Rotation Decay to Zero	147	174	ms	159.2	Pass
Minimum Moment About OC	-80	-52.9	Nm	-72.00	Pass
Time to Minimum Moment	65	79	ms	71.2	Pass
Moment Decay to Zero	120	148	ms	135.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-PendPot	12/9/2020	12/9/2021
Condyle Potentiometer	ETI SP22G	DS-CondPot	12/3/2020	12/3/2021
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	11/10/2020	11/10/2021





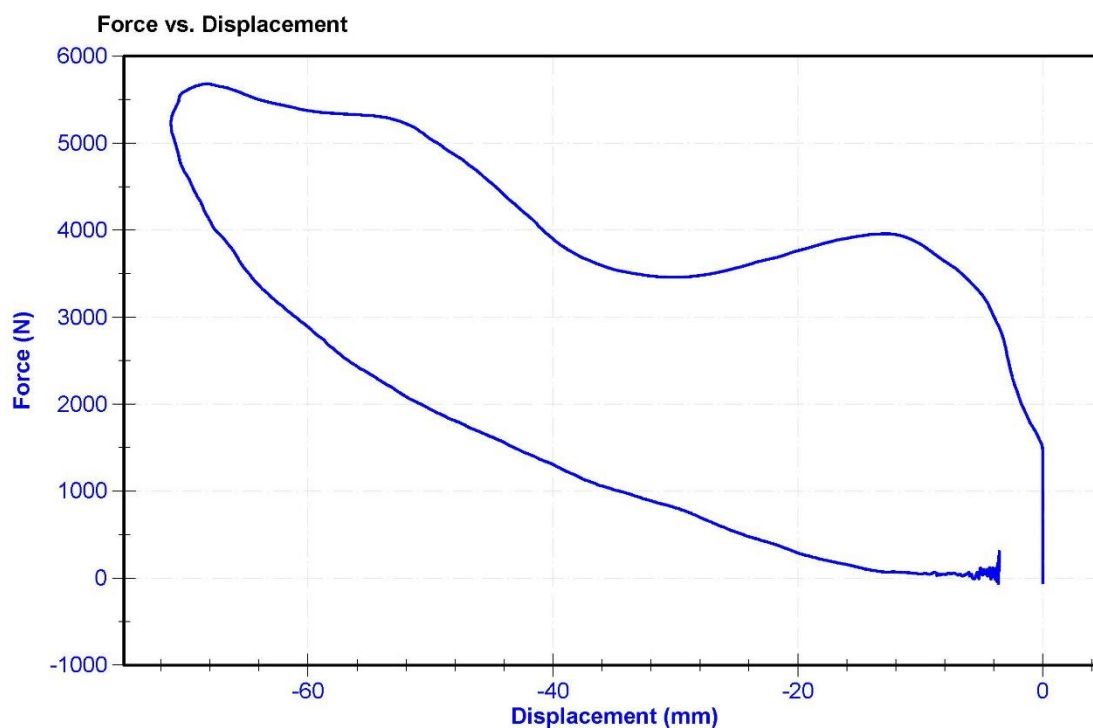
ATD Manufacturer	Humanetics	Test Technician	D.Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

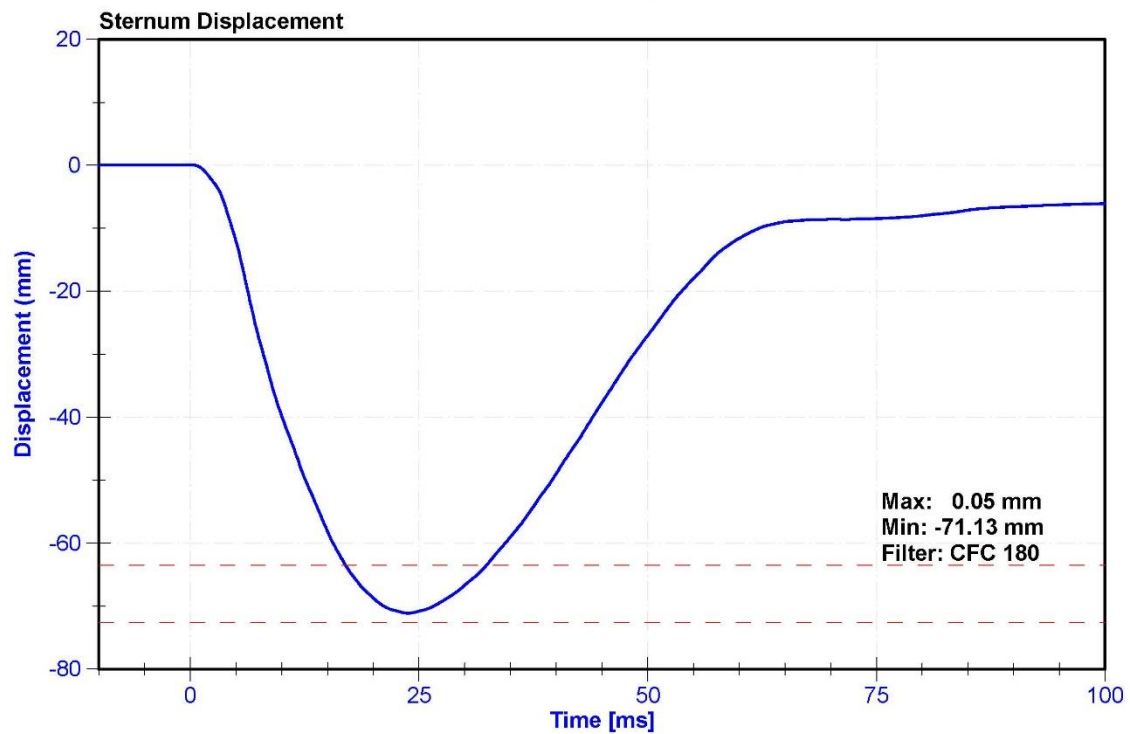
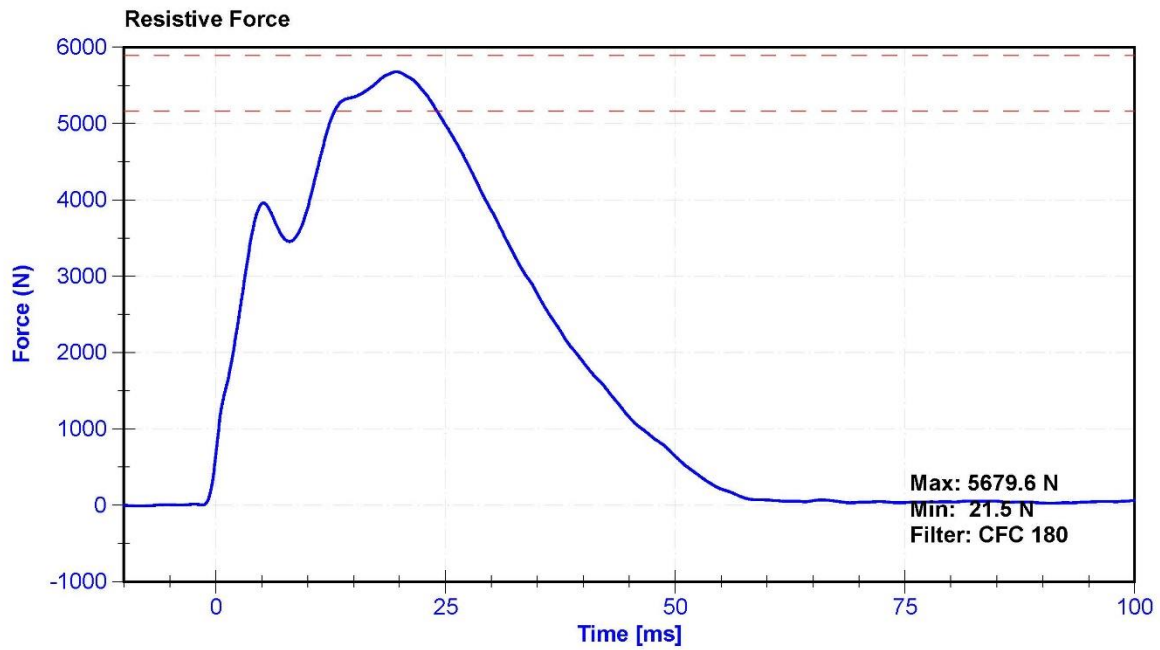
Results

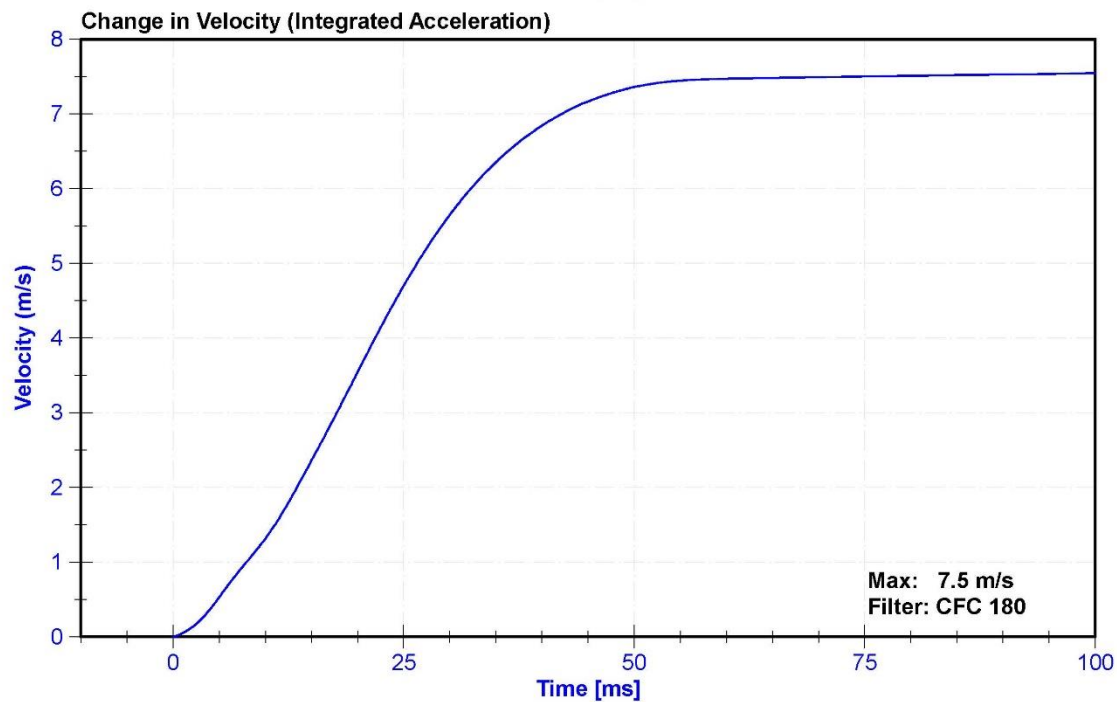
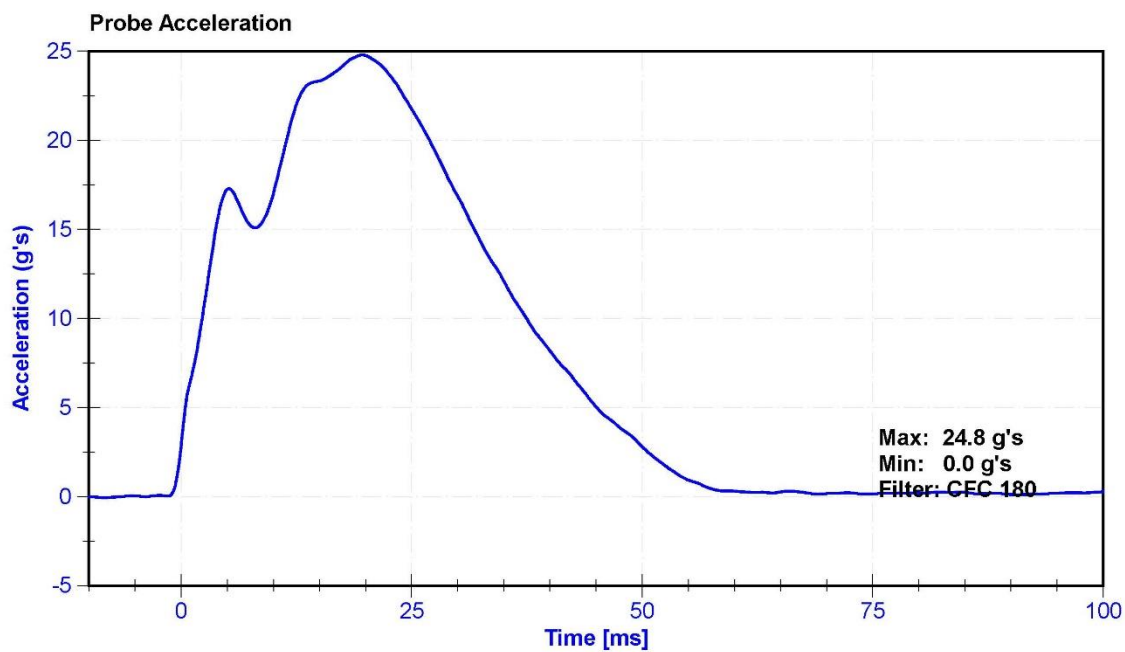
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	32	Pass
Velocity	6.59	6.83	m/s	6.602	Pass
Chest Displacement	-72.6	-63.5	mm	-71.13	Pass
Resistive Force	5160	5894	N	5679.6	Pass
Hysteresis	65	85	%	67.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Chest Potentiometer	Servo 6209-2038	DS-142	11/19/2020	5/20/2021







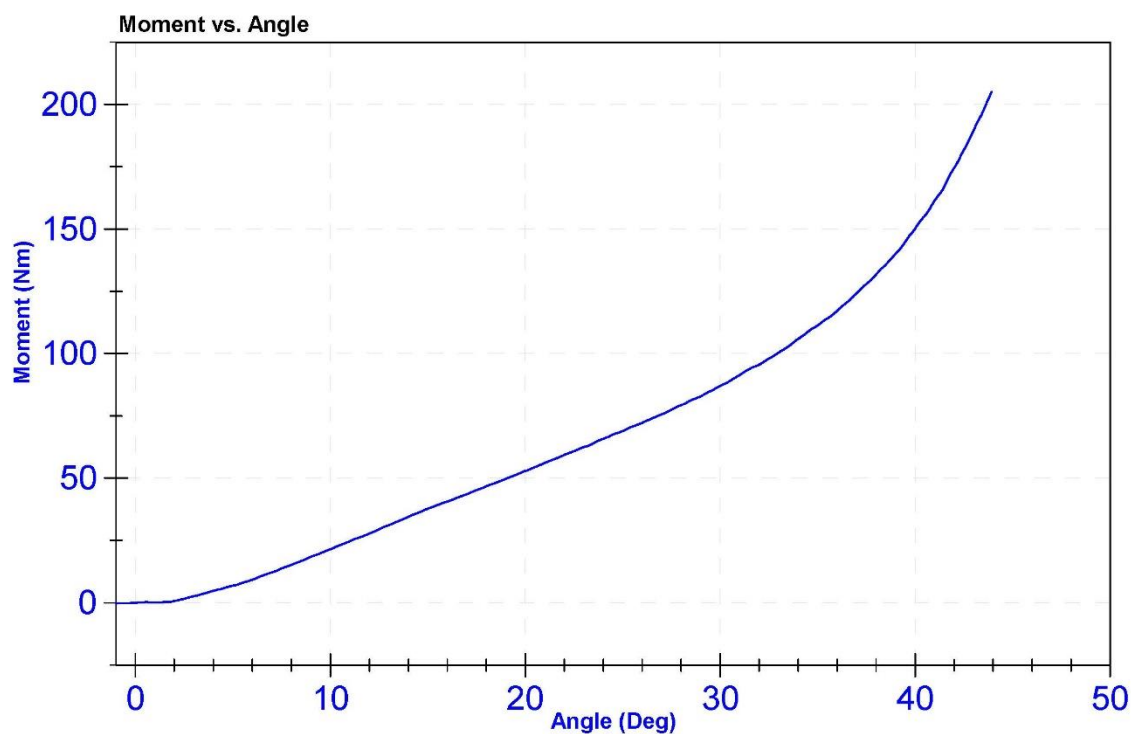
ATD Manufacturer	Humanetics	Test Technician	D. Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	32.2	Pass
Average Velocity	5	10	deg/s	7.2	Pass
Angle at 203Nm	40	50	deg	43.8	Pass
Moment at 30 degrees	0	94.9	Nm	87.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2020	9/18/2021
Load Cell	Key Trans 2301-02	LC-115 My	9/12/2020	9/12/2021



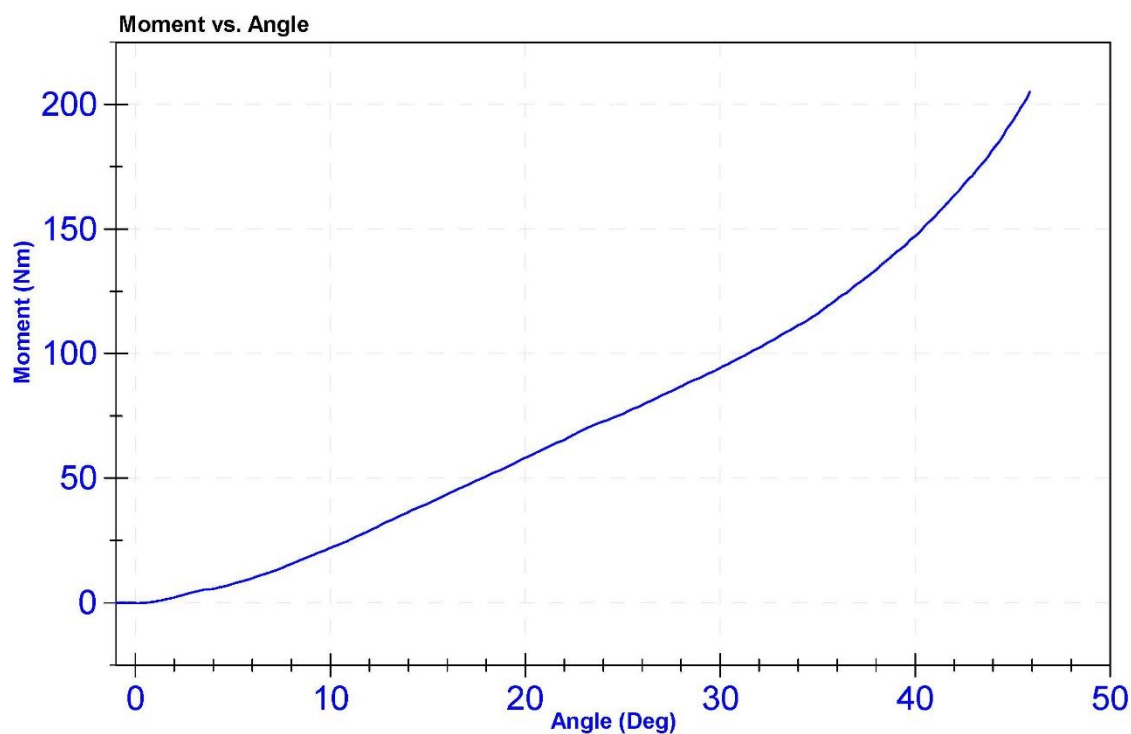
ATD Manufacturer	Humanetics	Test Technician	D. Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	32.2	Pass
Average Velocity	5	10	deg/s	7.3	Pass
Angle at 203Nm	40	50	deg	45.8	Pass
Moment at 30 degrees	0	94.9	Nm	94.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2020	9/18/2021
Load Cell	Key Trans 2301-02	LC-115 My	9/12/2020	9/12/2021



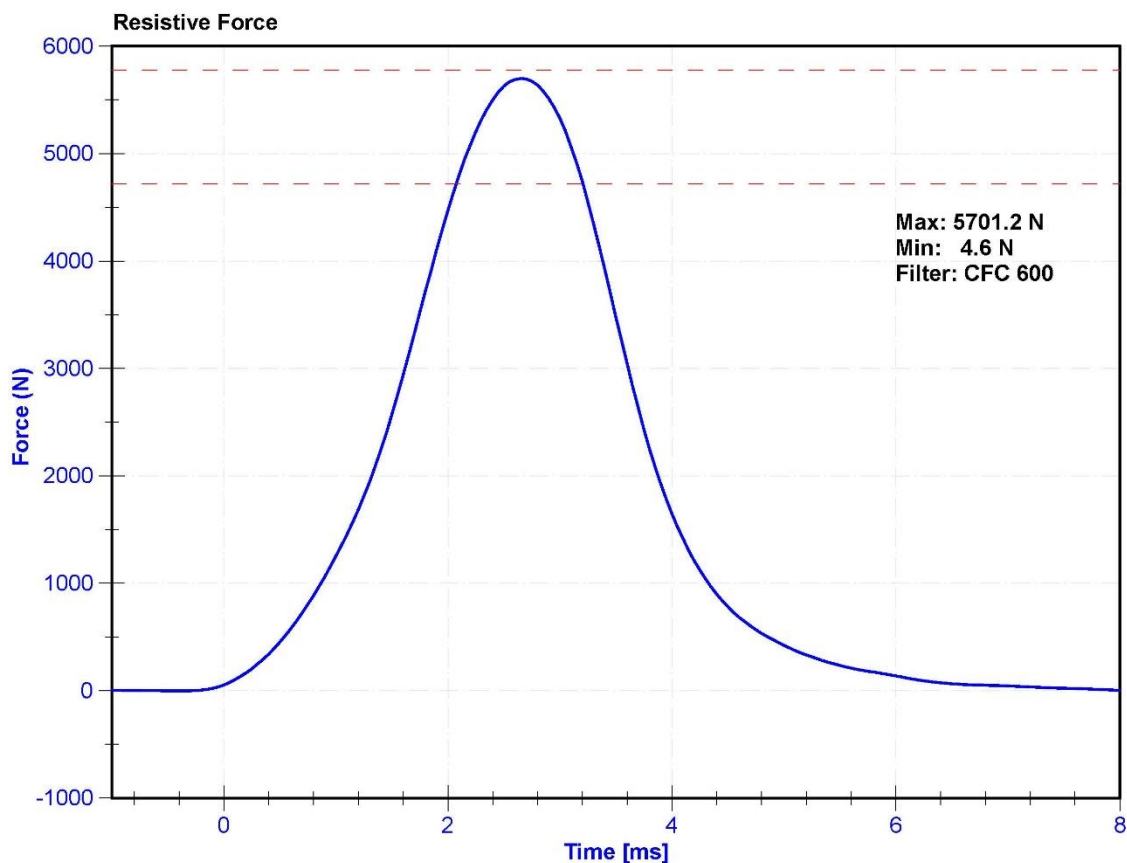
ATD Manufacturer	Humanetics	Test Technician	D. Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

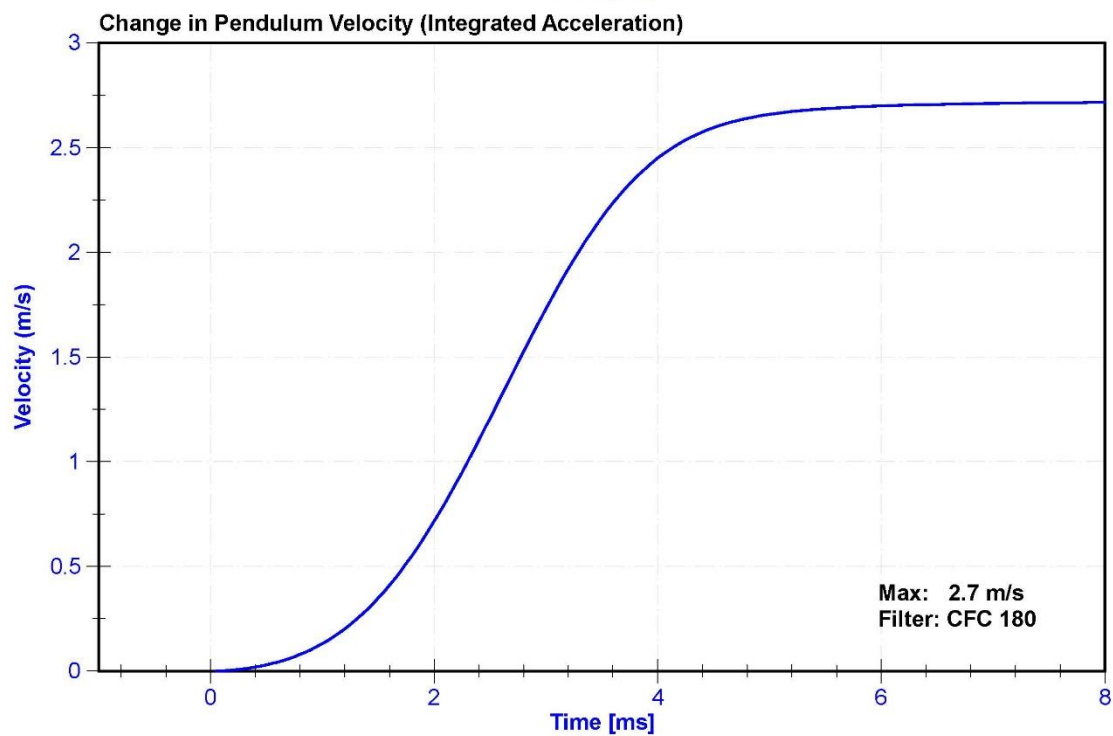
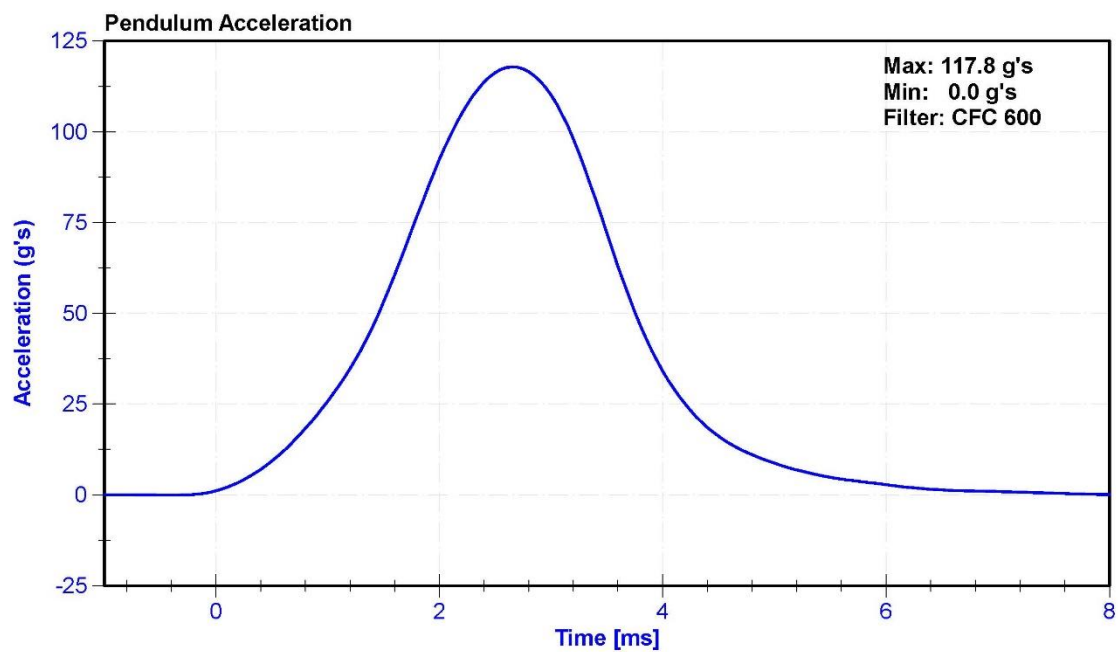
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Velocity	2.07	2.13	m/s	2.095	Pass
Maximum Resistive Force	4720	5780	N	5701.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





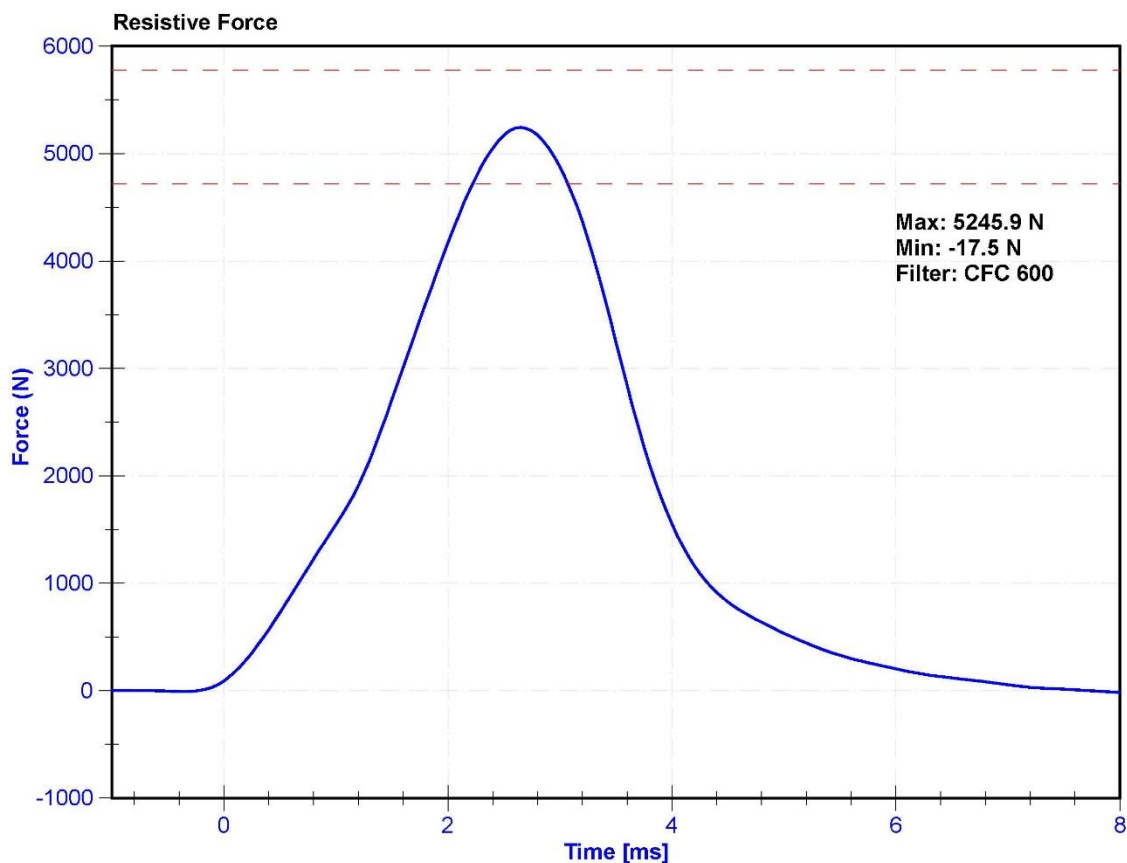
ATD Manufacturer	Humanetics	Test Technician	D. Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

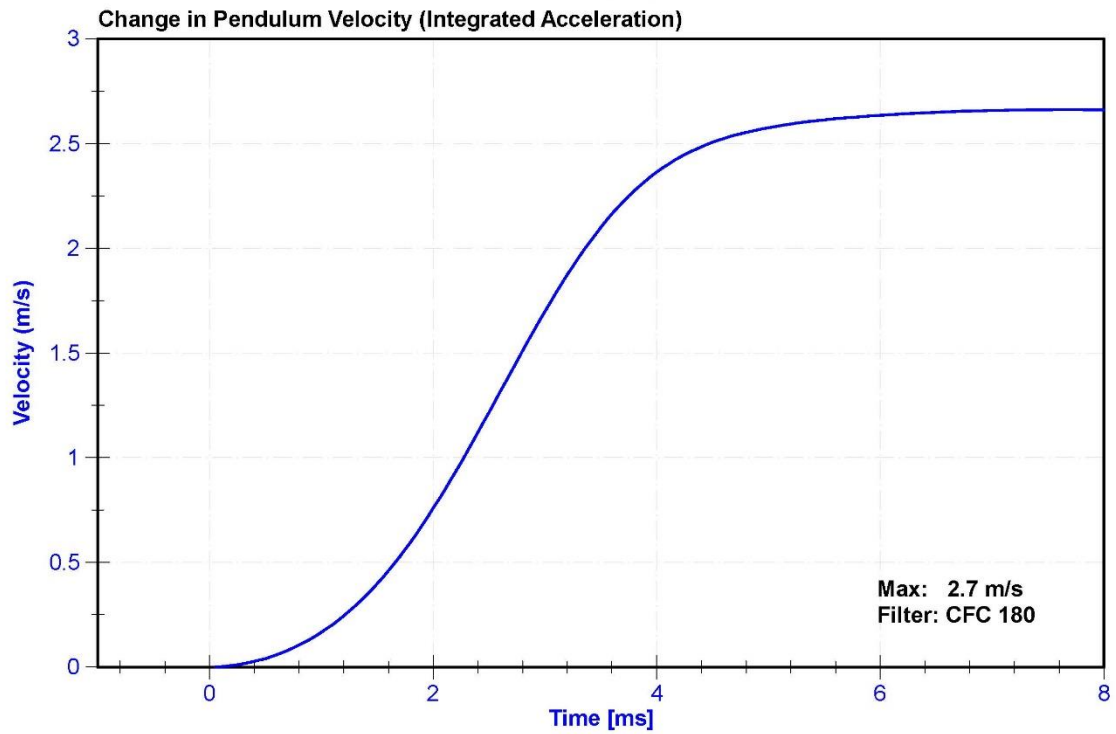
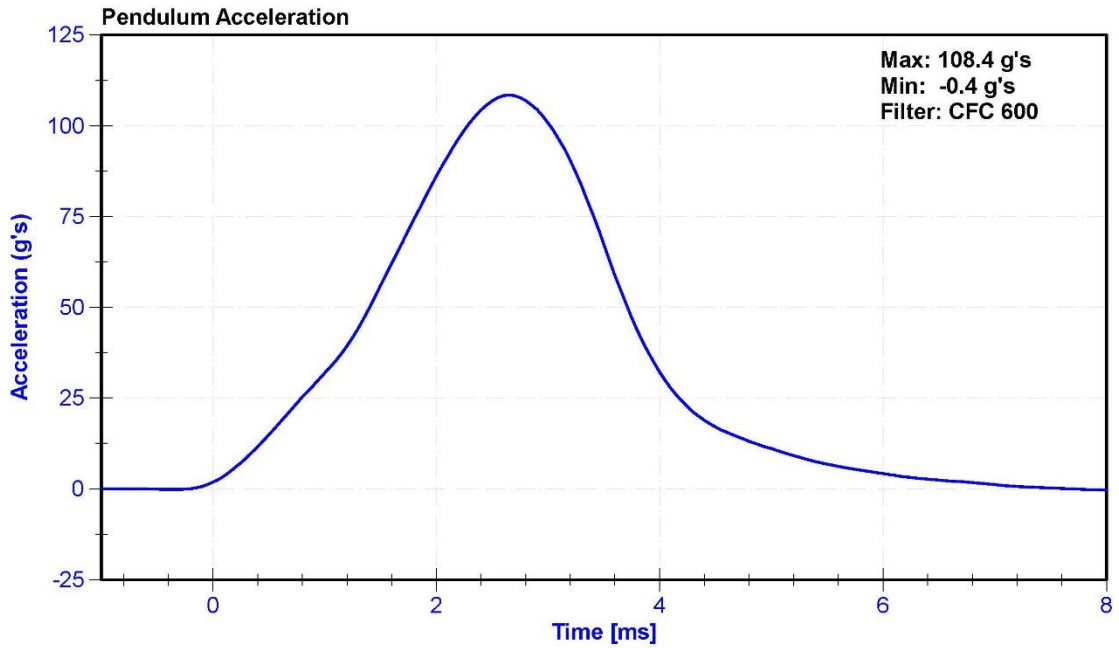
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	24	Pass
Velocity	2.07	2.13	m/s	2.093	Pass
Maximum Resistive Force	4720	5780	N	5245.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL NO: 139

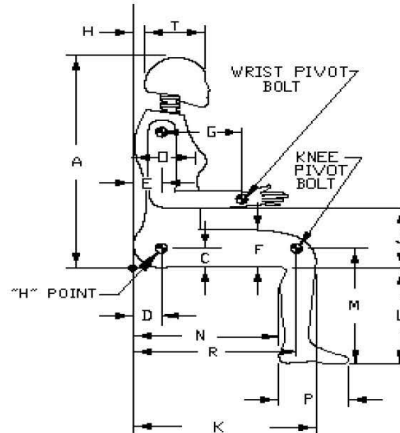
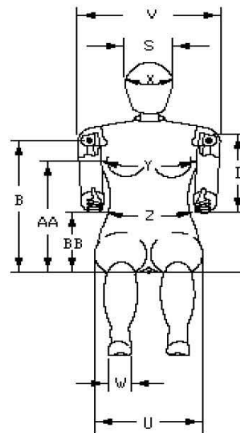


External Measurements - Hybrid 3 - 5th Female

Technician: K. Brogan

Date: 05/03/2021

Dummy Serial Number: 139



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	787	Pass
B	Shoulder Pivot Height	432	457	446	Pass
C	H-Point Height	81	86	83	Pass
D	H-Point from Backline	145	150	146	Pass
E	Shoulder Pivot from Backline	69	84	77	Pass
F	Thigh Clearance	119	135	128	Pass
G	Back of Elbow to Wrist Pivot	244	259	253	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	538	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	402	Pass
N	Buttock Popliteal Length	414	439	425	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	224	Pass
R	Buttock To Knee Pivot Length	457	483	475	Pass
S	Head Breadth	137	147	143	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	309	Pass
V	Shoulder Breadth	351	366	362	Pass
W	Foot Breadth	79	94	87	Pass
X	Head Circumference	528	549	535	Pass
Y	Chest Circumference with Jacket	851	881	861	Pass
Z	Waist Circumference	460	790	773	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

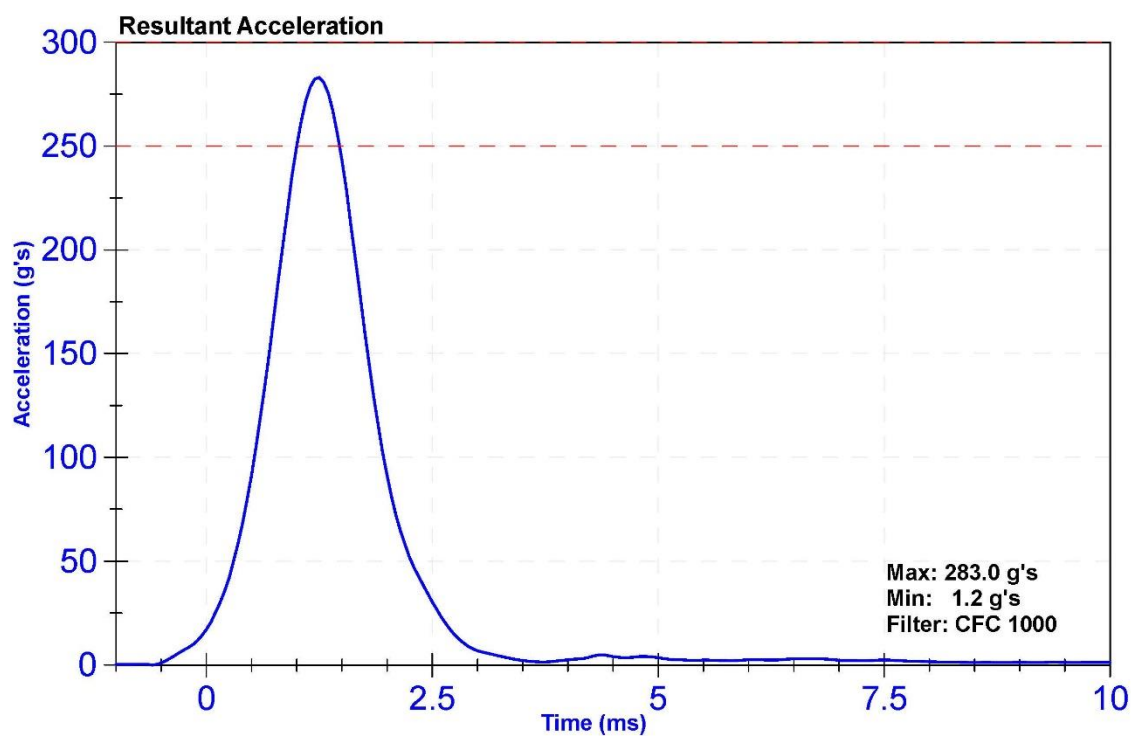
ATD Manufacturer	Denton	Test Technician	E. Helenbrook
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

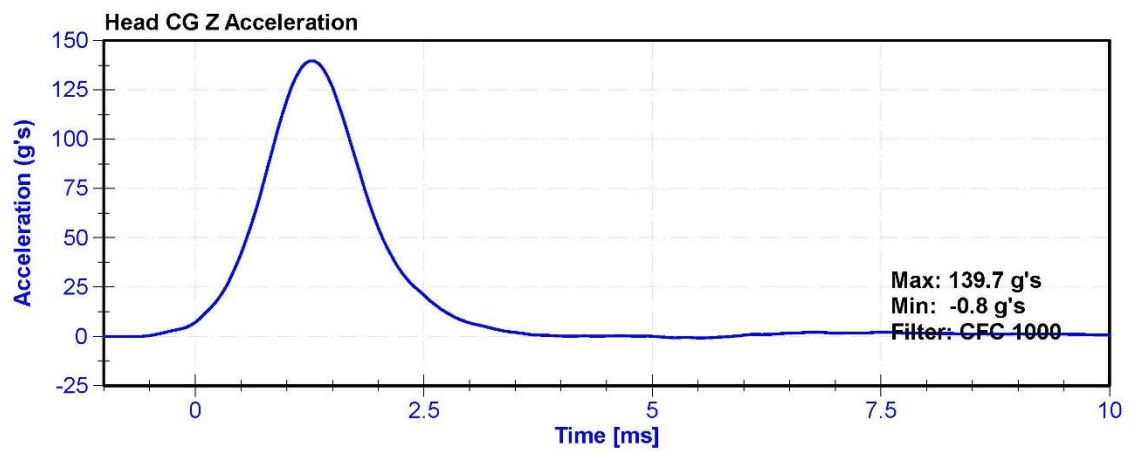
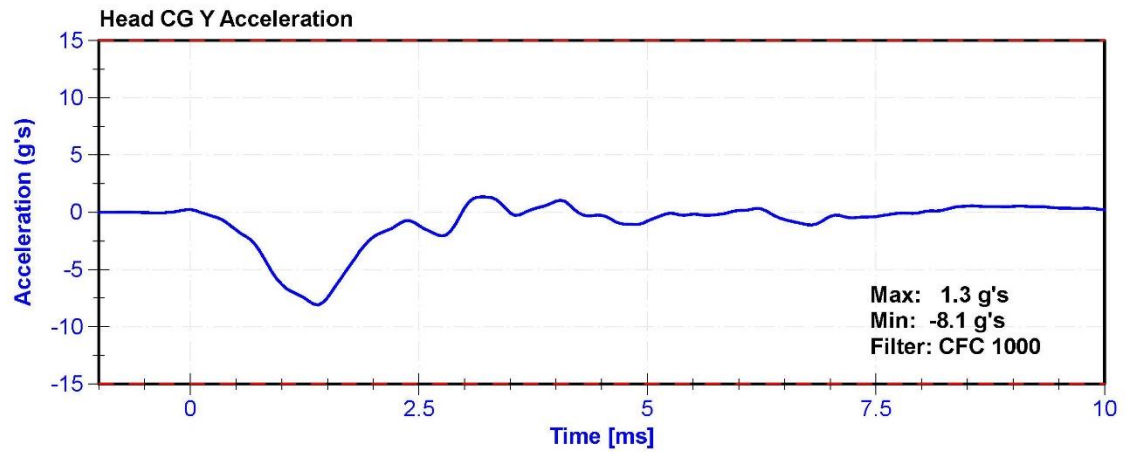
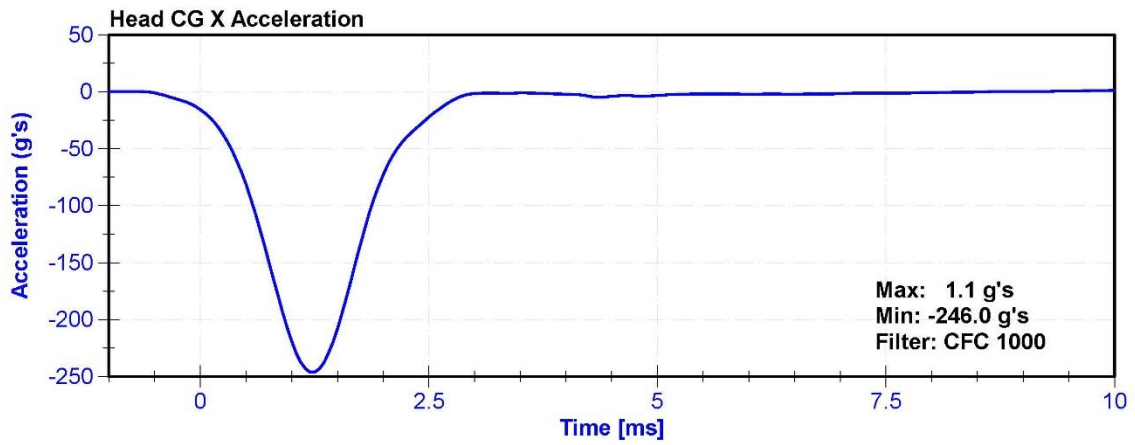
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	42.2	Pass
Resultant Acceleration	250	300	g's	283.0	Pass
Oscillation	0	10	%	1.7	Pass
Lateral Acceleration	-15	15	g's	-8.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58780	4/5/2021	10/4/2021
Y Accelerometer	ENDEVCO 7264	AC-P83320	4/5/2021	10/4/2021
Z Accelerometer	ENDEVCO 7264CT	AC-P58997	4/5/2021	10/4/2021





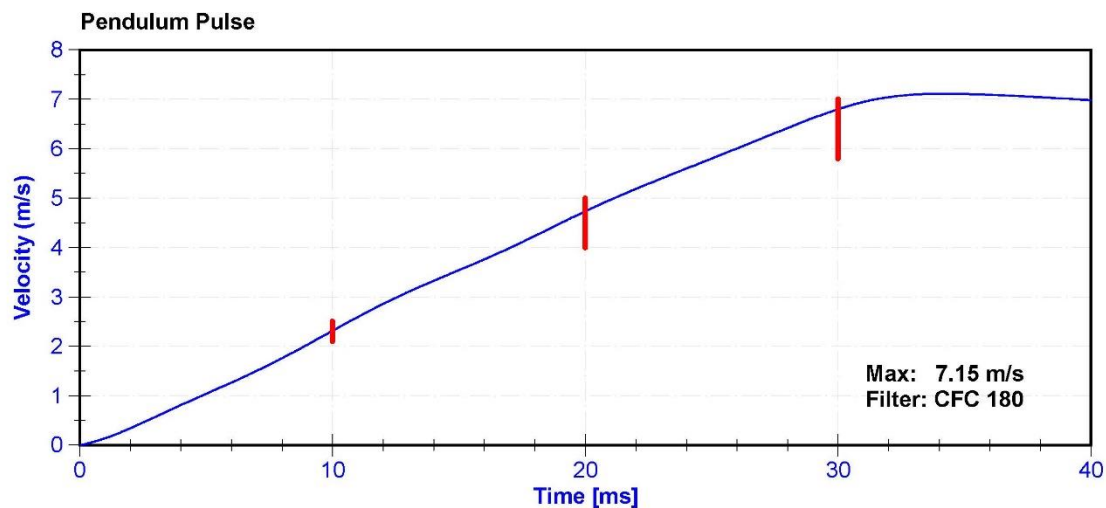
ATD Manufacturer	Denton	Test Technician	E. Helenbrook
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

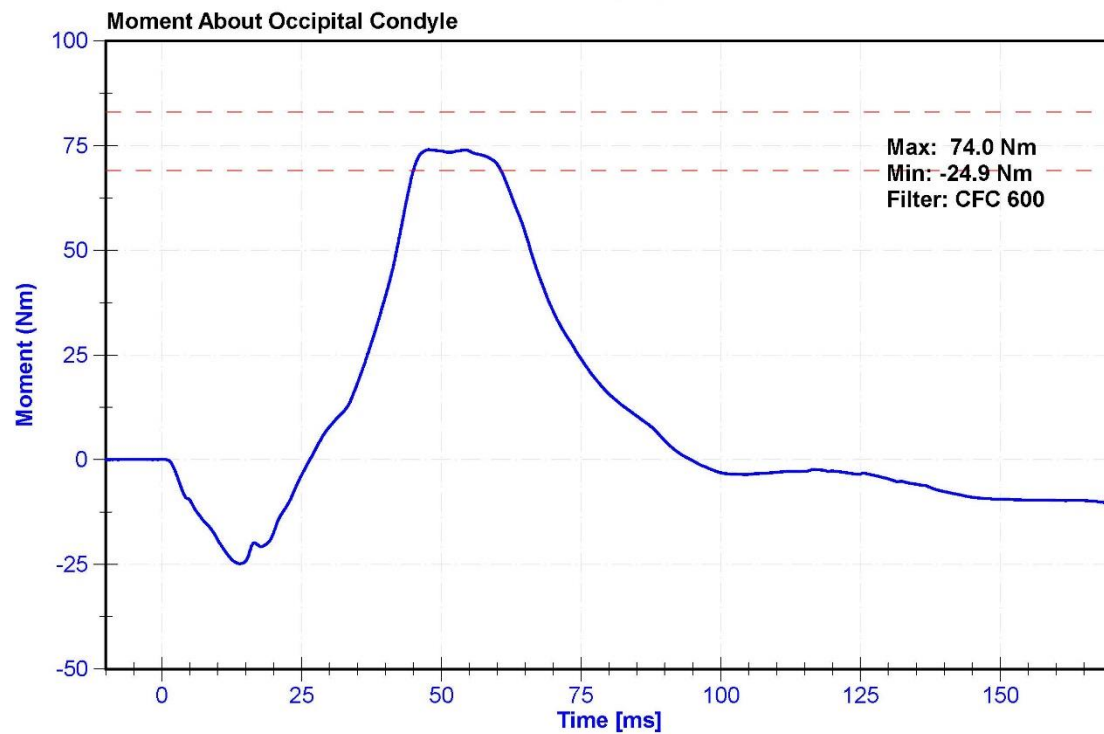
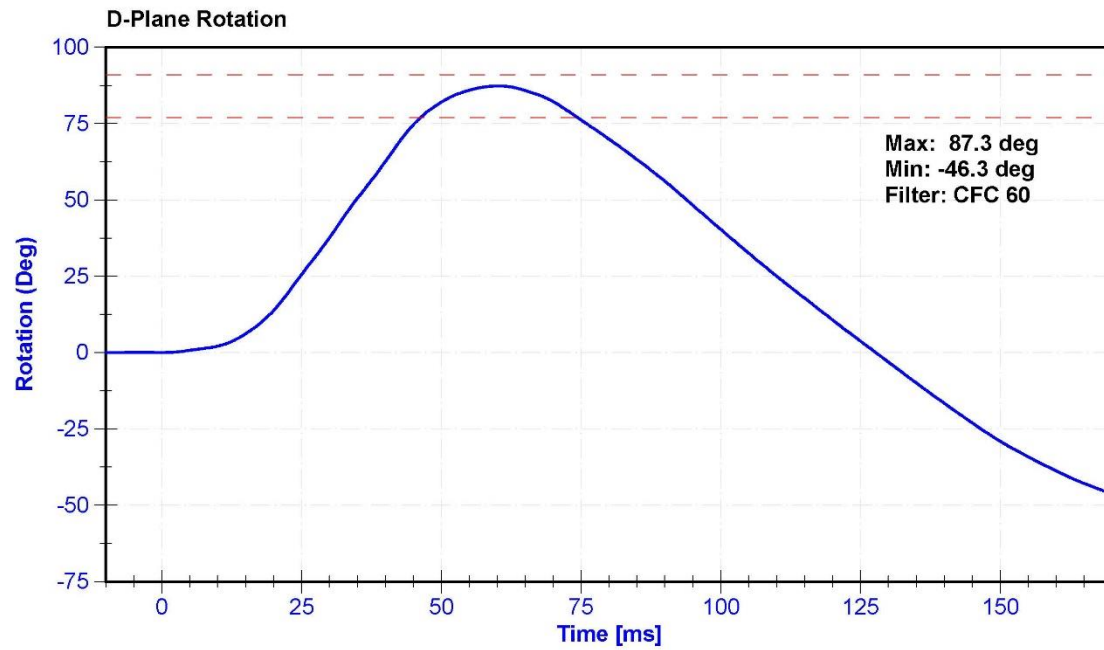
Results

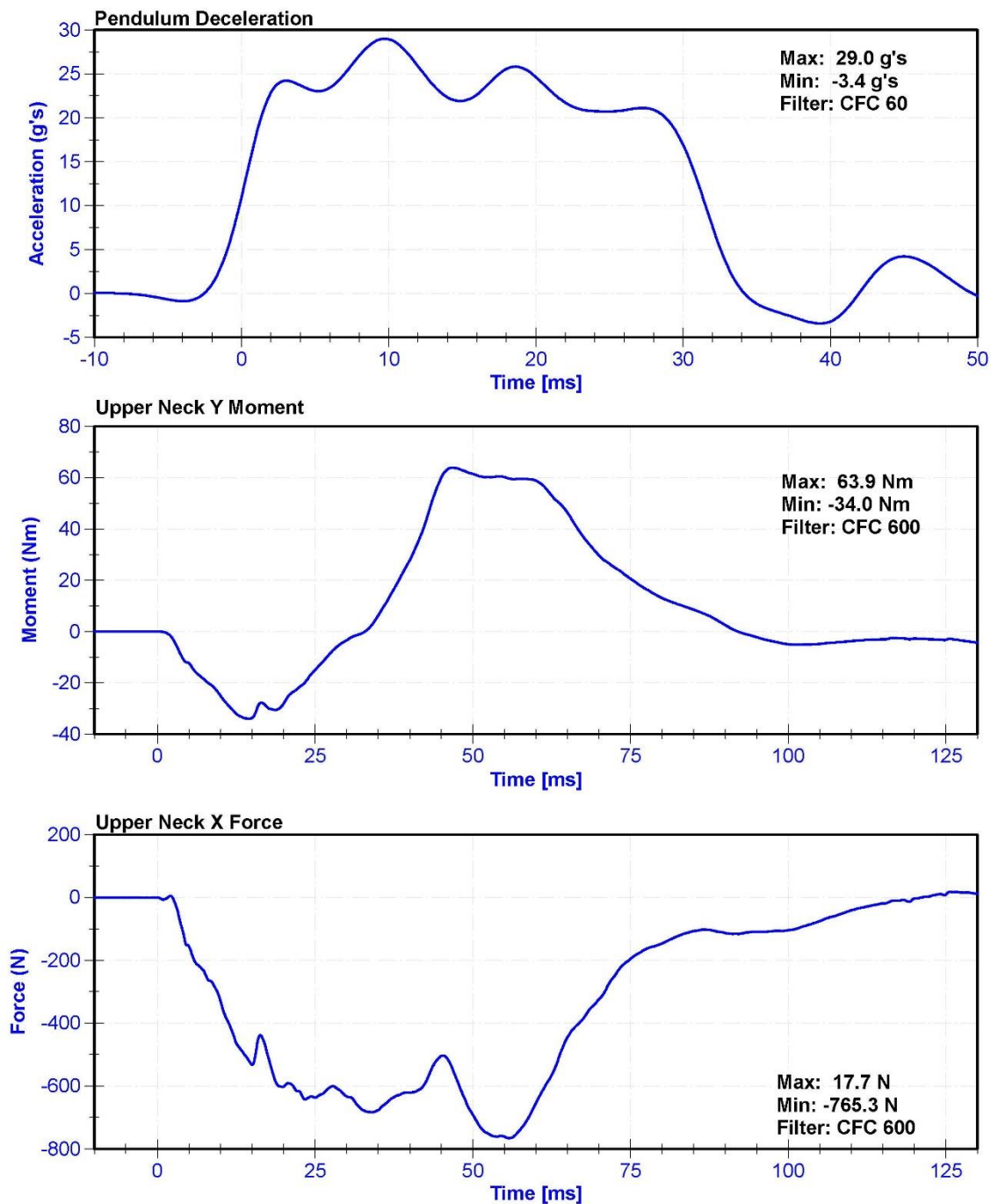
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	42.3	Pass
Velocity	6.89	7.13	m/s	6.969	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.31	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.73	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.80	Pass
Max D Plane Rotation	77	91	deg	87.3	Pass
Max Moment During Rotation Interval	69	83	Nm	74.0	Pass
Moment Decay to 10.0 Nm	80	100	ms	85.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-PendPot	12/9/2020	12/9/2021
Condyle Potentiometer	ETI SP22G	DS-CondPot	12/3/2020	12/3/2021
Upper Neck Load Cell	Denton 1716A	LC-2192Fx	7/17/2020	7/17/2021







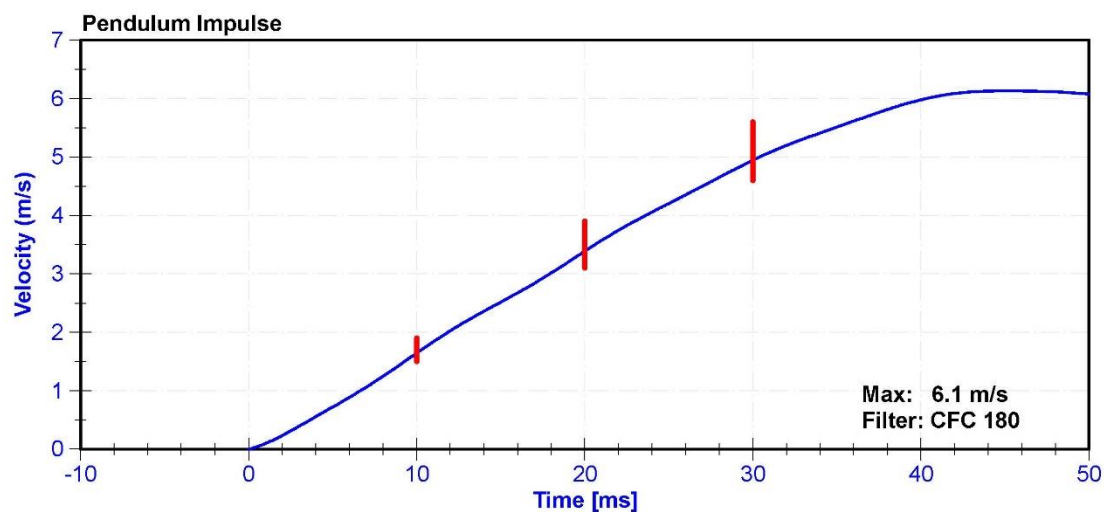
ATD Manufacturer	Denton	Test Technician	E. Helenbrook
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

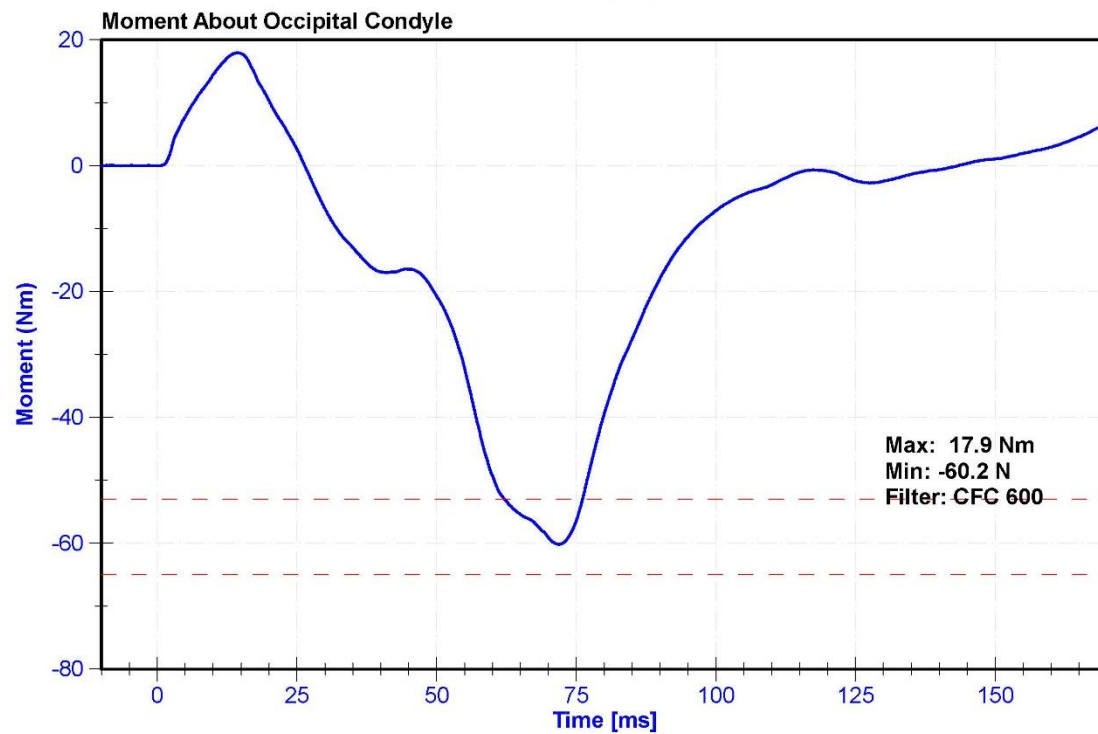
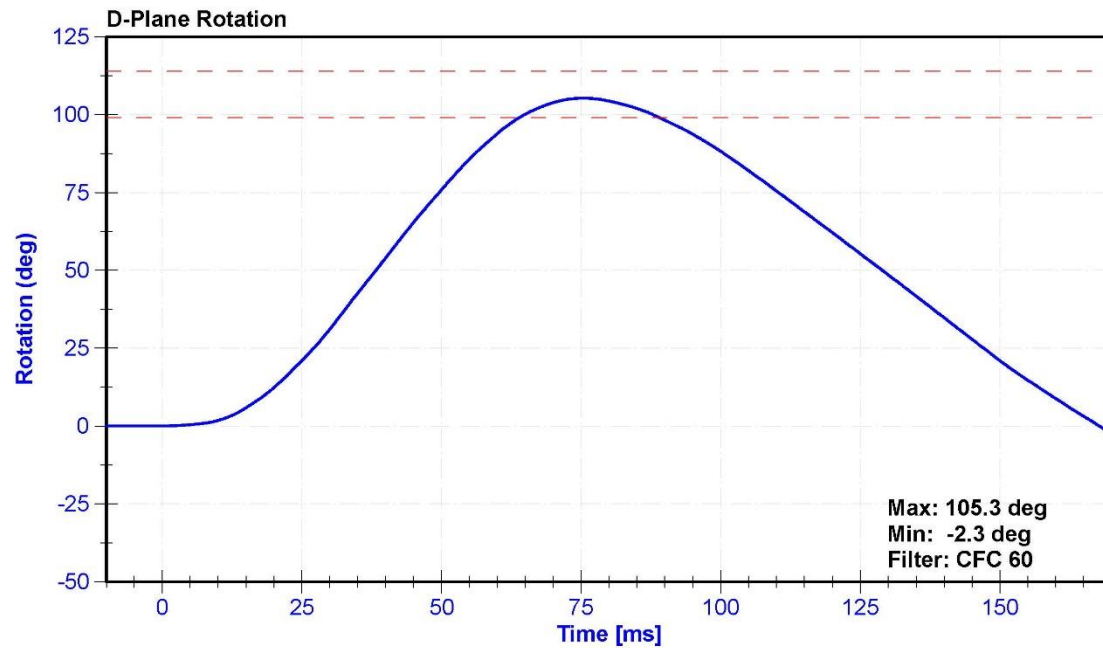
Results

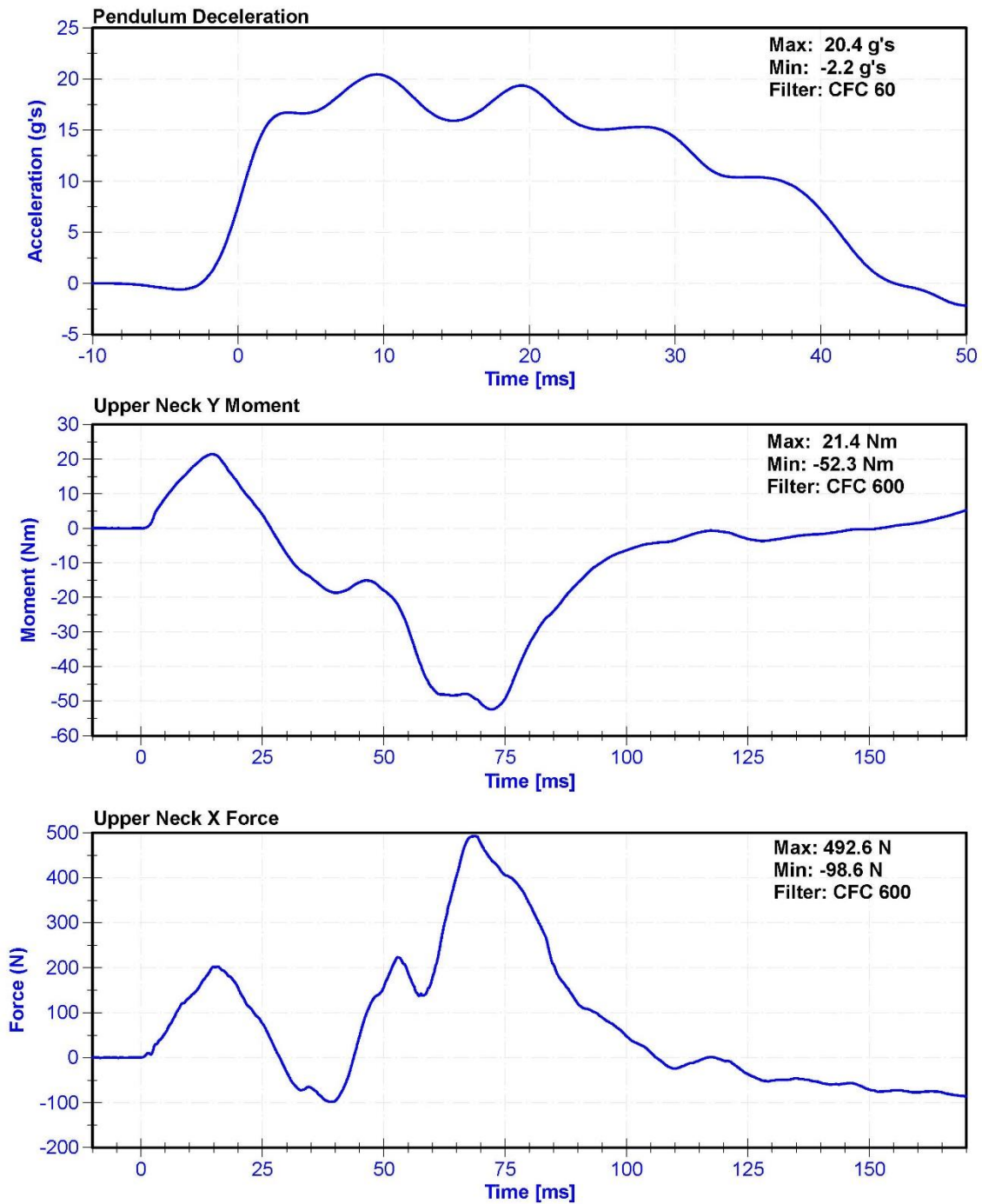
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	42.3	Pass
Velocity	5.95	6.19	m/s	5.982	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.64	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.39	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	4.95	Pass
D Plane Rotation	99	114	deg	105.3	Pass
Moment During Rotation Interval	-65	-53	Nm	-60.2	Pass
Moment Decay to -10Nm	94	114	ms	96.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	ETI SP22G	DS-PendPot	12/9/2020	12/9/2021
Condyle Potentiometer	ETI SP22G	DS-CondPot	12/3/2020	12/3/2021
Upper Neck Load Cell	Denton 1716A	LC-2192Fx	7/17/2020	7/17/2021







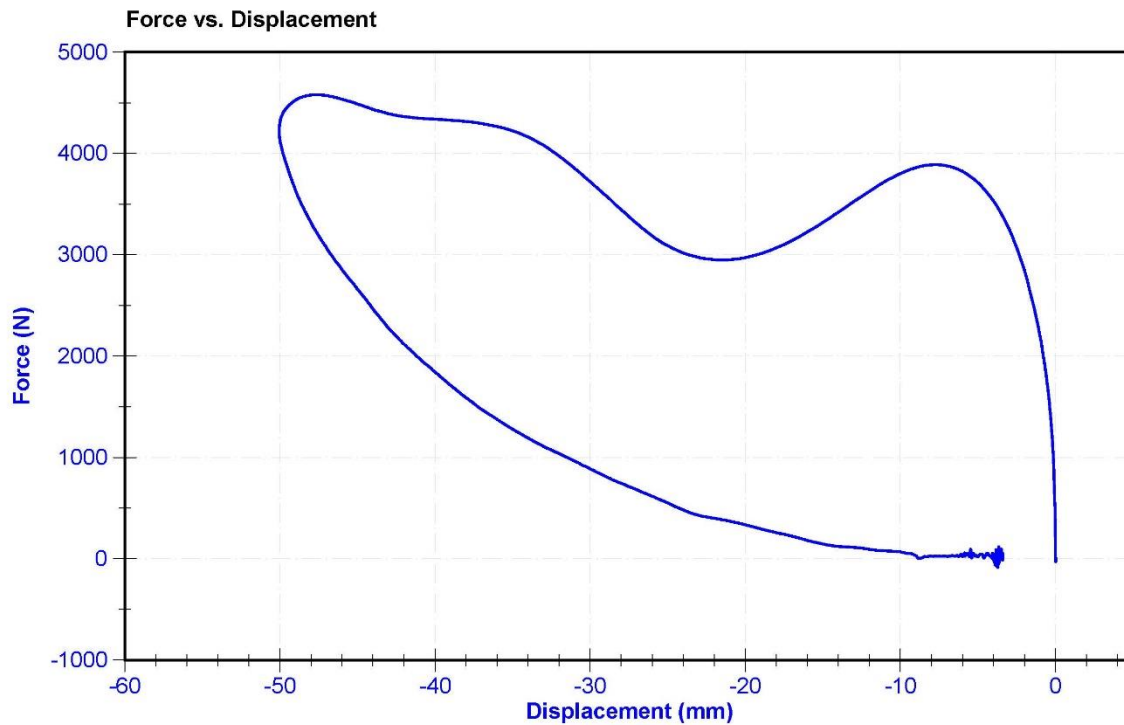
ATD Manufacturer	Denton	Test Technician	D.Reinhard
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

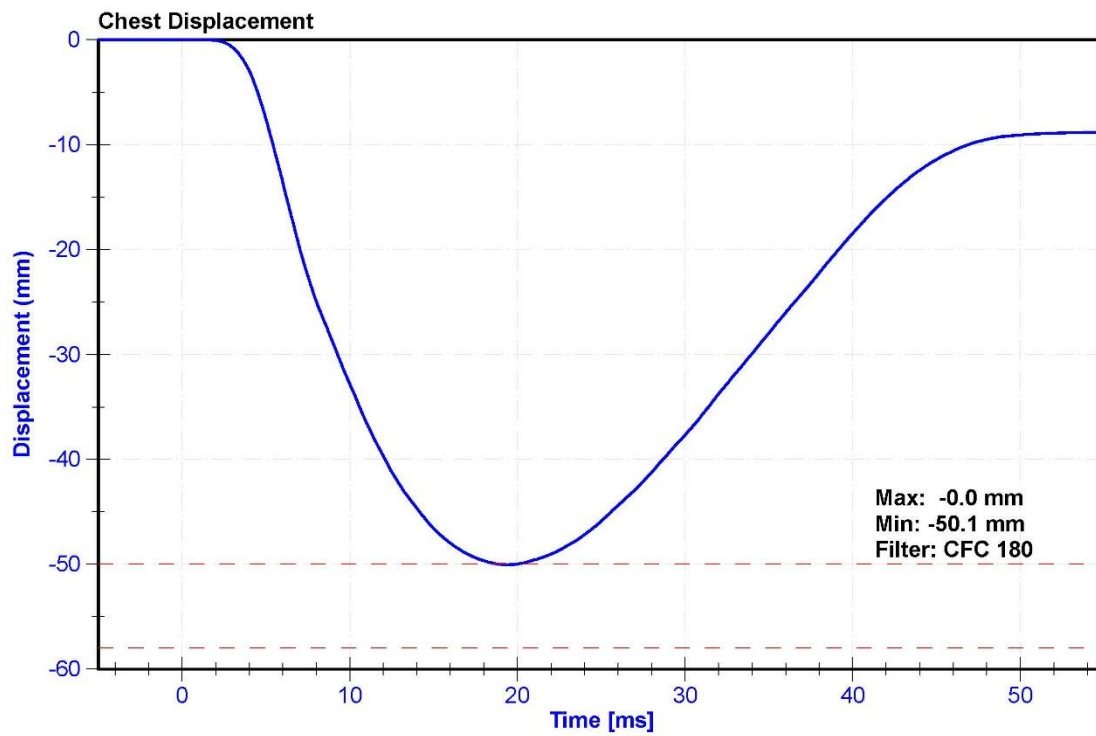
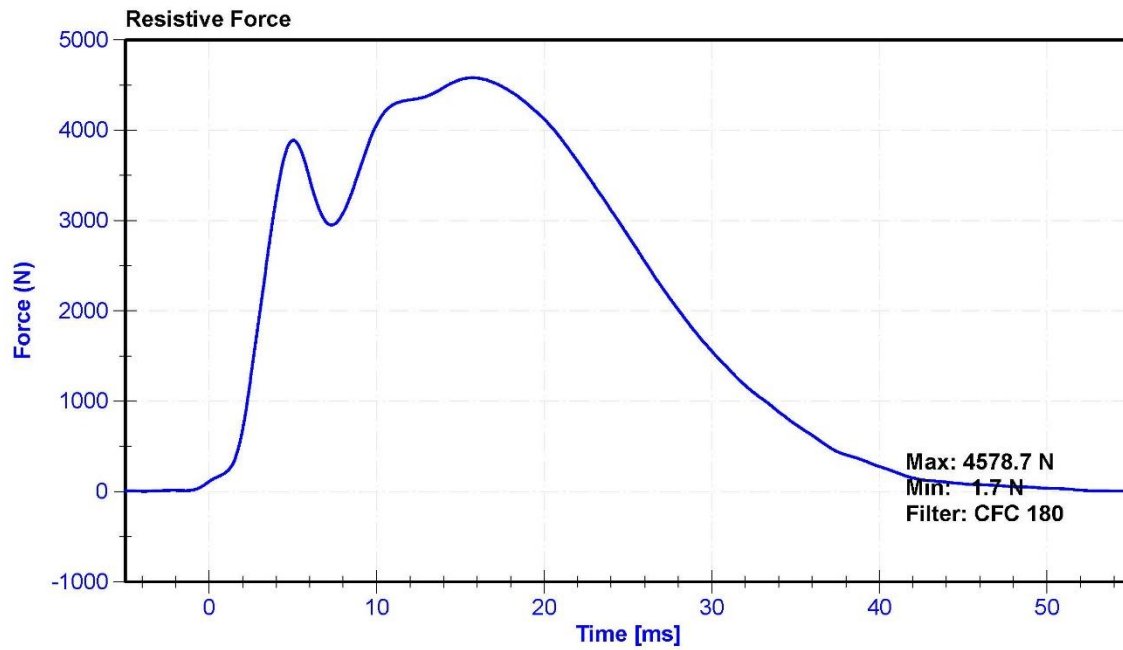
Results

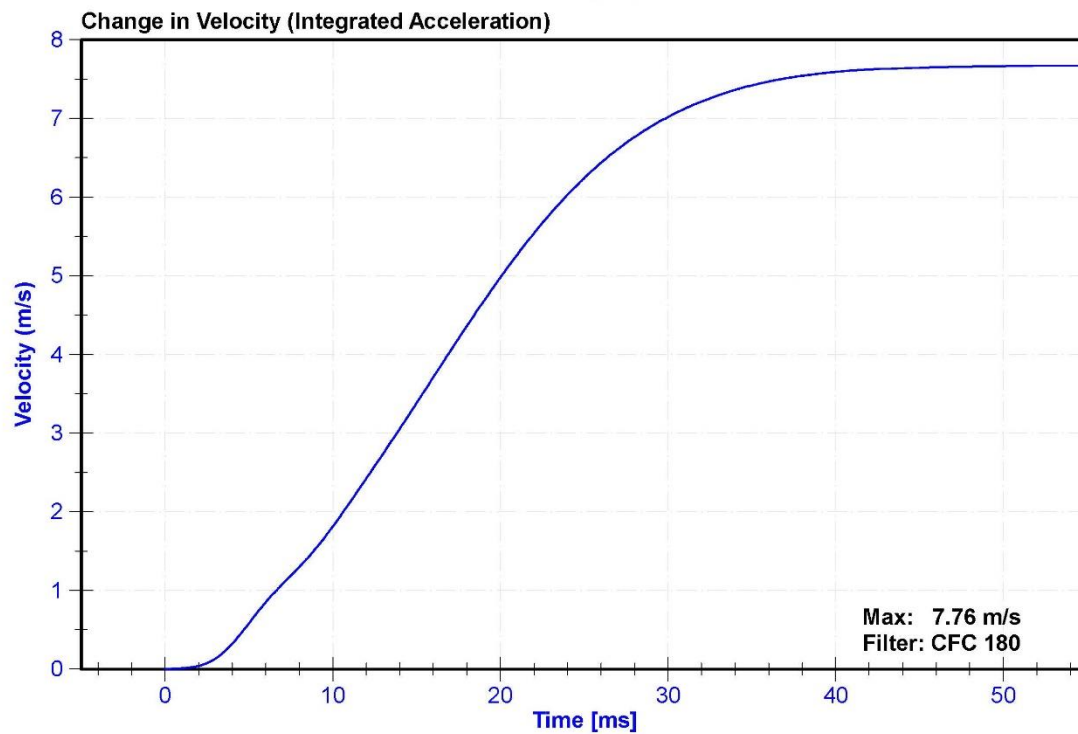
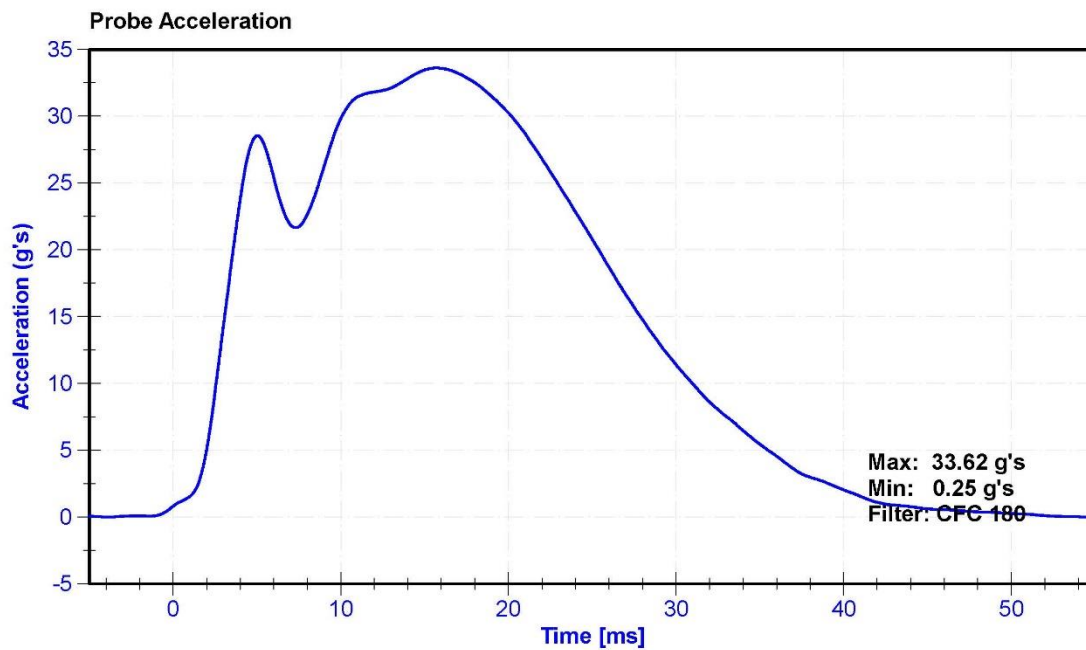
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	44	Pass
Velocity	6.59	6.83	m/s	6.625	Pass
Chest Deflection	-58	-50	mm	-50.1	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4312.2	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4578.7	Pass
Hysteresis	69	85	%	73.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Chest Potentiometer	SERVO H3CD	DS-503	4/23/2021	10/22/2021







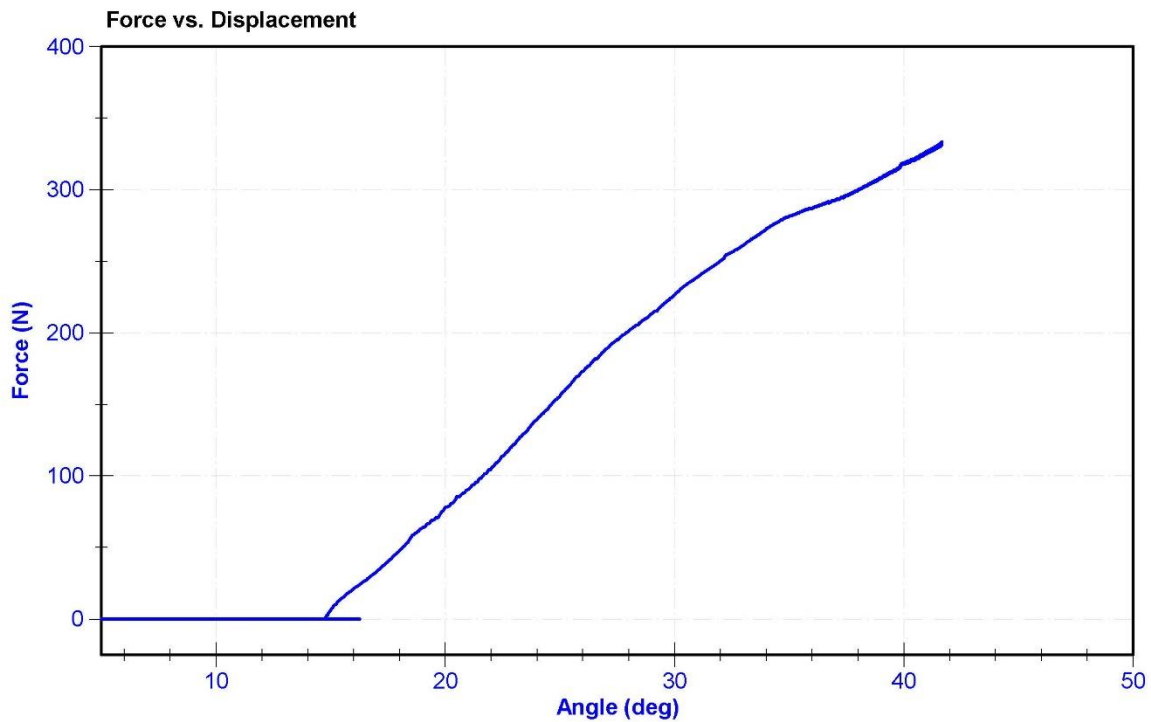
ATD Manufacturer	Denton	Test Technician	S. Vacanti
ATD Serial Number	139	Laboratory Supervisor	K.Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.5	Pass
Humidity	10	70	%	32	Pass
Initial Angle	0	20	deg	14.7	Pass
Force at 45 Degrees	320	390	N	364.8	Pass
Return Angle Relative to Initial	0	8	deg	3.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Seika.de N4C-1	DS-1905226	2020-10-12	2021-10-12
Load Cell	Interface SML-200	LC-493319	2020-10-08	2021-10-08



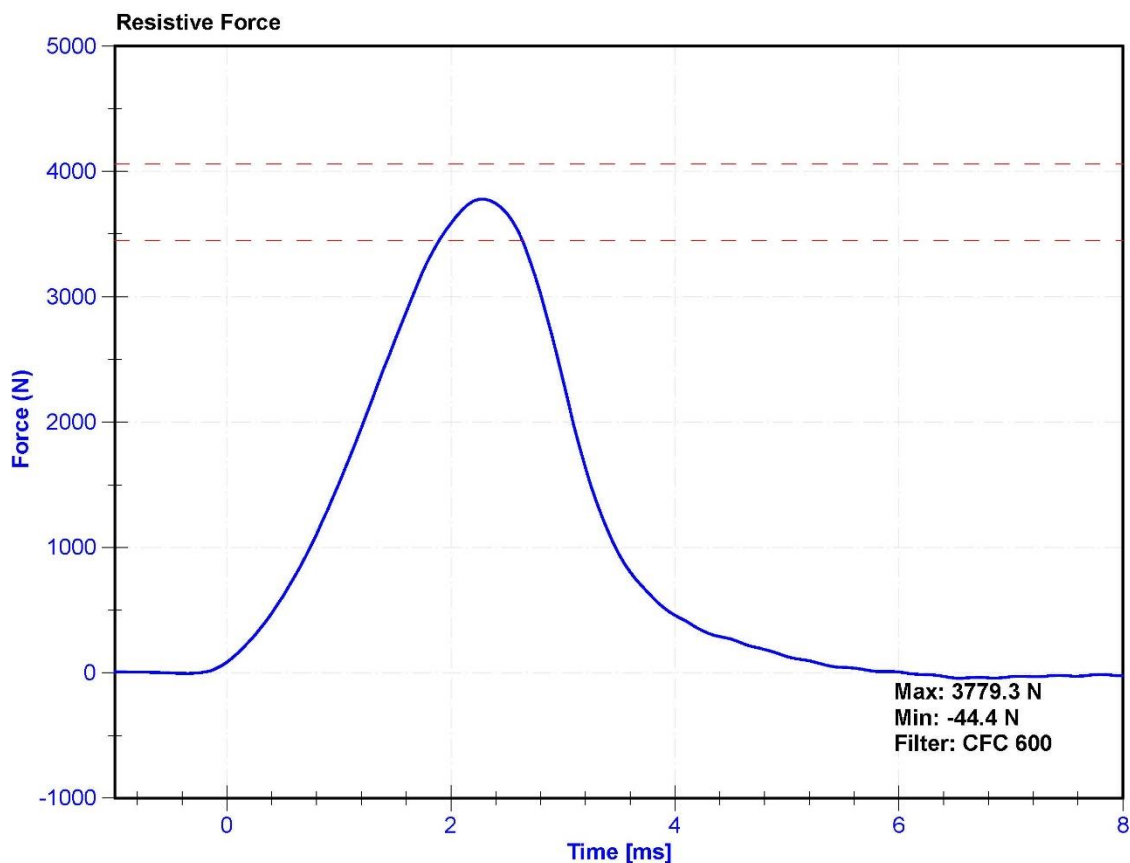
ATD Manufacturer	Denton	Test Technician	D.Reinhard
ATD Serial Number	139	Laboratory Supervisor	K.Brogan

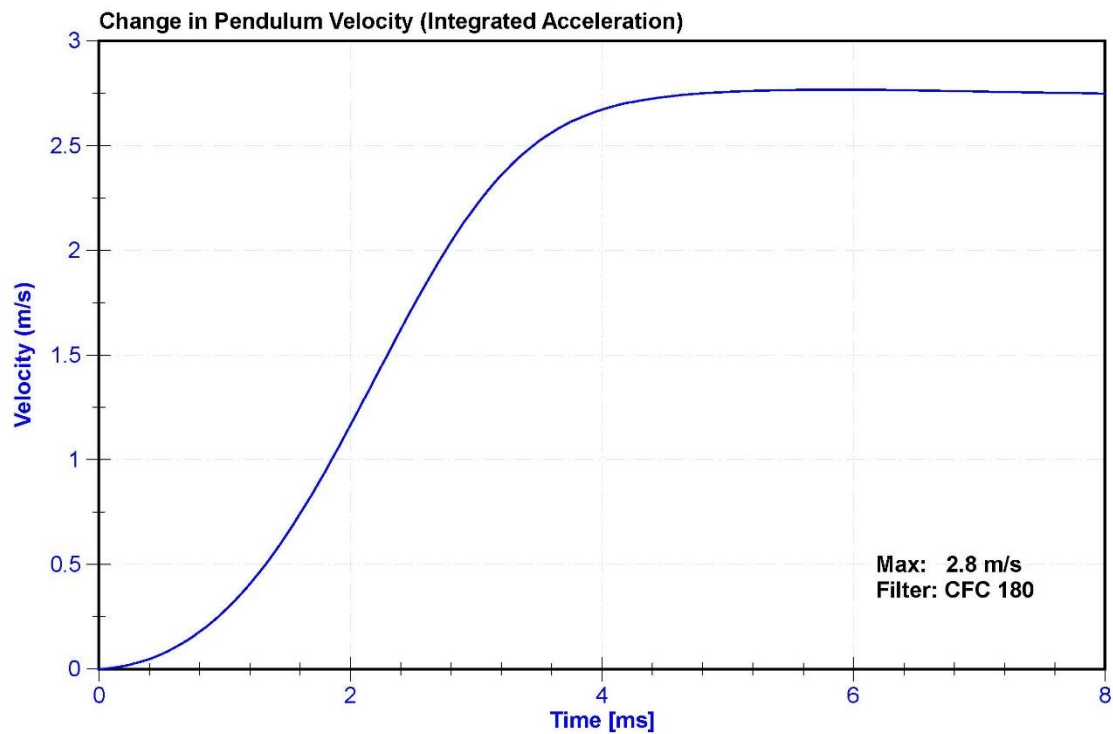
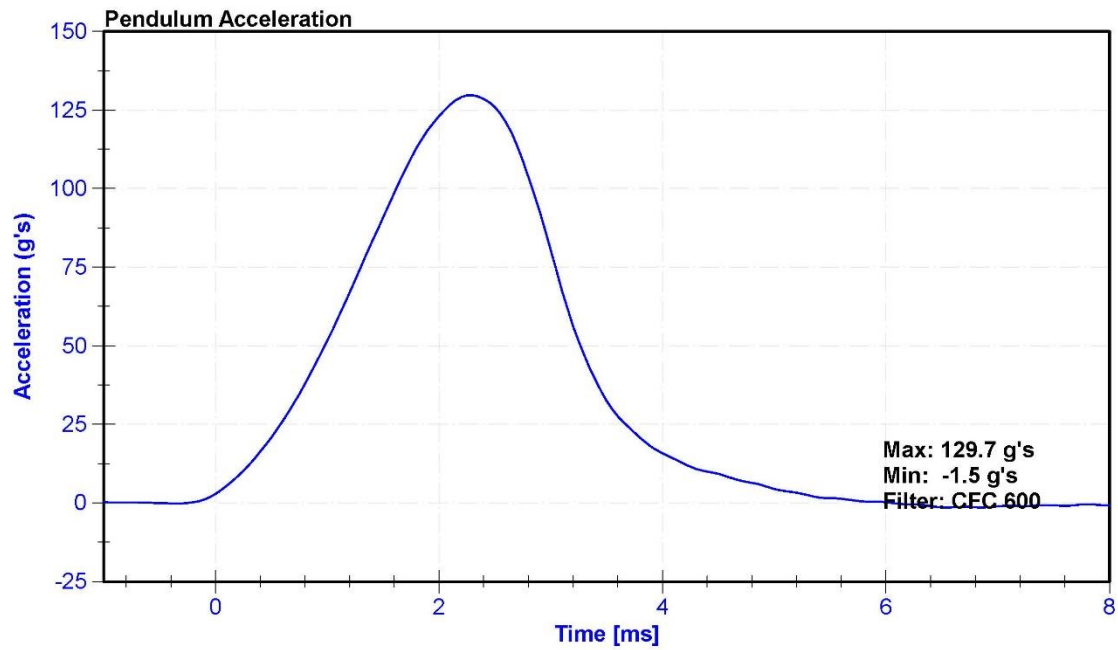
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.0	Pass
Humidity	10	70	%	35.0	Pass
Velocity	2.07	2.13	m/s	2.091	Pass
Resistive Force	3450	4060	N	3779.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





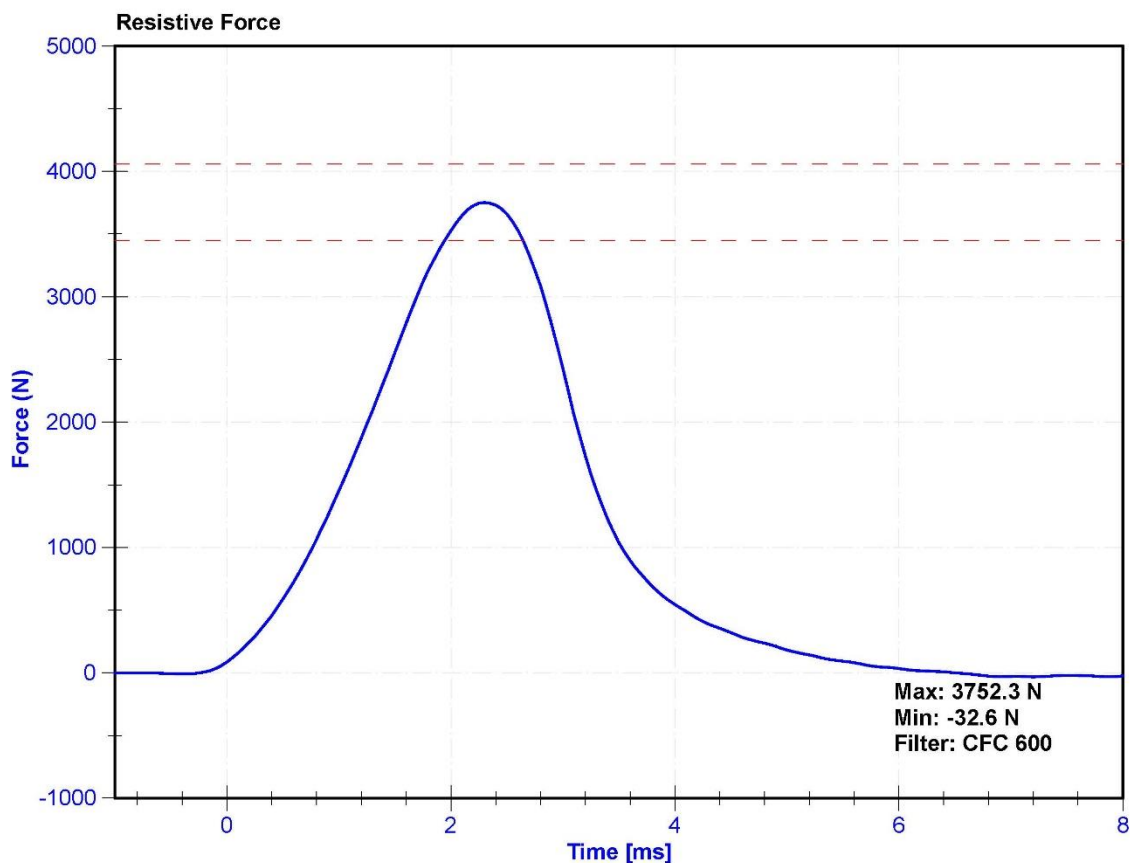
ATD Manufacturer	Denton	Test Technician	D. Reinhard
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

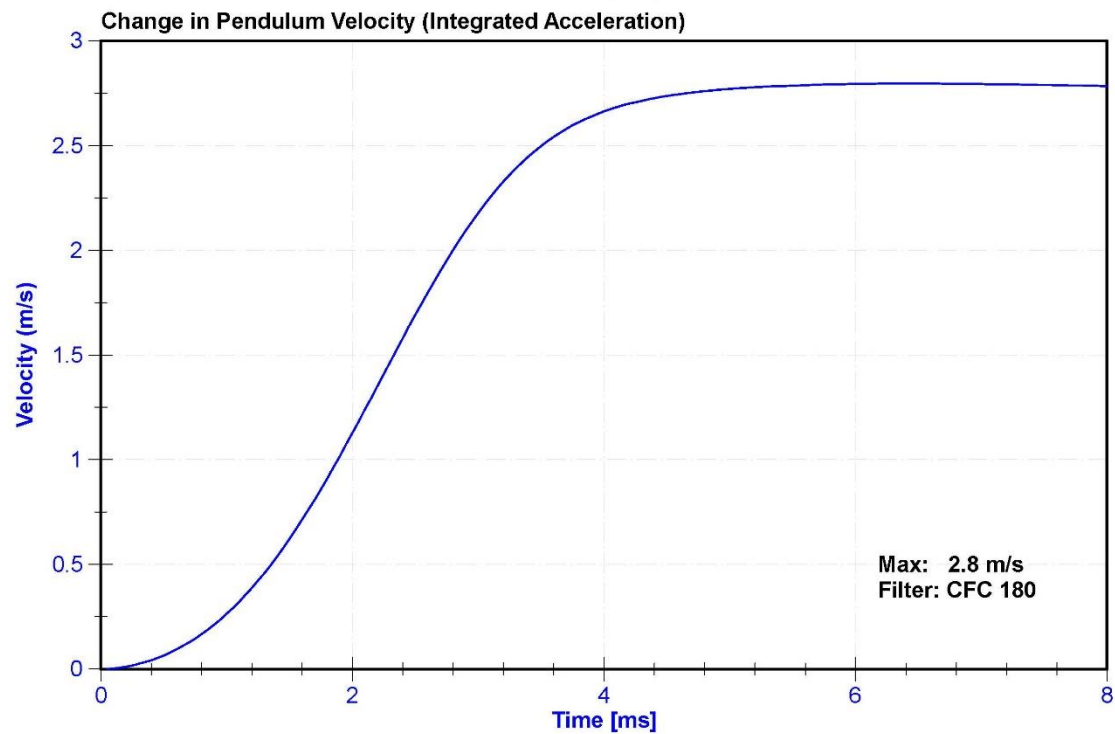
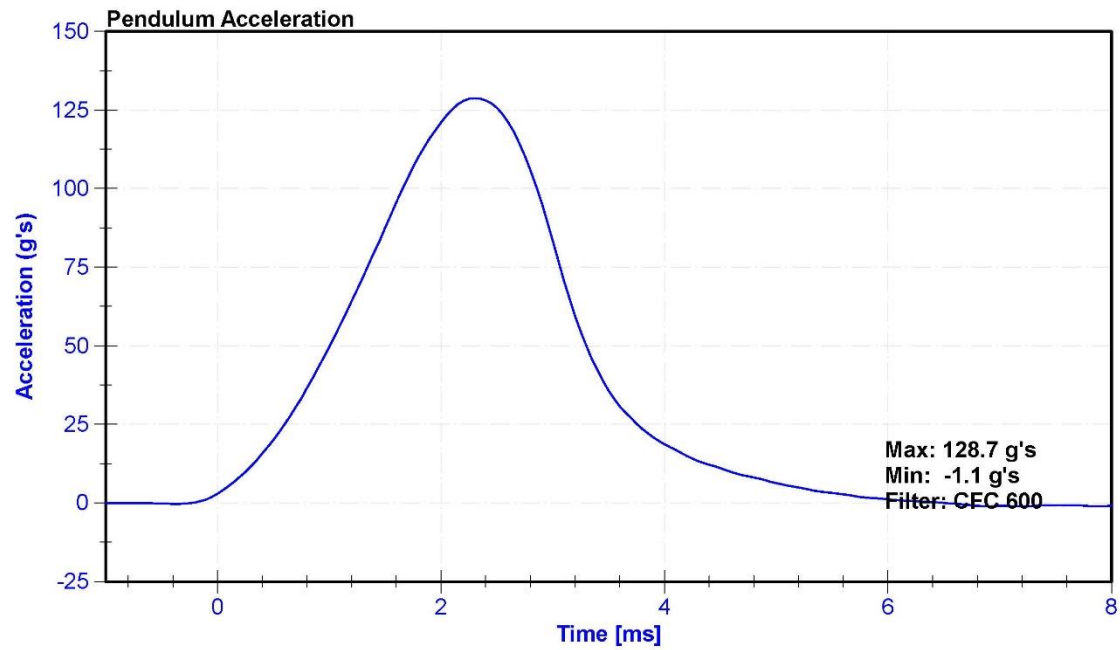
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	32.0	Pass
Velocity	2.07	2.13	m/s	2.090	Pass
Resistive Force	3450	4060	N	3752.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021





APPENDIX D

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

Table 1 – Driver Dummy Instrumentation

Instrumentation		Axis/Location	Hybrid III 50 th S/N: 142		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	P51681	ENDEVCO	11/3/2020
		Y	P64151	ENDEVCO	11/3/2020
		Z	P52114	ENDEVCO	11/3/2020
	Redundant	X	P58833	ENDEVCO	11/3/2020
		Y	P58905	ENDEVCO	11/3/2020
		Z	P63996	ENDEVCO	11/3/2020
Head Angular Rate Sensors		X	ARS-7603 GFE	DTS ARS-PRO-8K	8/4/2020
		Y	ARS-4718 GFE	DTS ARS-PRO-8K	8/4/2020
		Z	ARS-7521 GFE	DTS ARS-PRO-8K	8/4/2020
Upper Neck Load Cell		FX, Fy, Fz MX,MY, MZ	LC-2186Fx	DENTON	11/10/2020
Chest Accelerometers	Primary	X	AC-P51994	ENDEVCO	11/3/2020
		Y	AC-P51991	ENDEVCO	11/3/2020
		Z	AC-P49185	ENDEVCO	11/3/2020
	Redundant	X	AC-P51713	ENDEVCO	11/3/2020
		Y	AC-P68059	ENDEVCO	11/3/2020
		Z	AC-P78824	ENDEVCO	11/3/2020
Chest Potentiometer		X	DS-142	Servo	11/19/2020
Pelvis Accelerometer		X	AC-P58800	ENDEVCO	11/3/2020
		Y	AC-P52157	ENDEVCO	11/3/2020
		Z	AC-P52156	ENDEVCO	11/3/2020
Femur Load Cells - Left	Primary	Z	LC-136Fz1	Denton	11/10/2020
	Redundant	Z	LC-136Fz2	Denton	11/10/2020
Femur Load Cells - Right	Primary	Z	LC-DI4211FZ1	Denton	11/10/2020
	Redundant	Z	LC-DI4211FZ2	Denton	11/10/2020
Tibia Load Cells - Left	Upper	MX, MY, FZ	3643-93 Fz	Denton	11/20/2020
	Lower	MX, MY, FZ	36440495-FZ	Denton	11/20/2020
Tibia Load Cells – Right	Upper	MX, MY, FZ	36430362-FZ	Denton	11/20/2020
	Lower	MX, MY, FZ	LC-672 FZ	Denton	7/8/2020
Foot Accelerometers - Left	Rear	X	AC-P50084	ENDEVCO	11/3/2020
	Front	Z	AC-P58779	ENDEVCO	11/3/2020
Foot Accelerometers - Right	Rear	X	AC-P51872	ENDEVCO	11/3/2020
	Front	Z	AC-P58893	ENDEVCO	11/3/2020
Seat belt Load Cells	Lap		NA	NA	NA
	Shoulder		IF-964 DK1753	GFE IF-964	5/12/2020

Table 2 – Front Passenger Dummy Instrumentation

Instrumentation		Axis/Location	Hybrid III 5 th S/N: 139		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	AC-P58780	ENDEVCO	4/5/2021
		Y	AC-P83320	ENDEVCO	4/5/2021
		Z	AC-P58997	ENDEVCO	4/5/2021
	Redundant	X	AC-P58998	ENDEVCO	4/5/2021
		Y	AC-P58749	ENDEVCO	4/5/2021
		Z	AC-P49226	ENDEVCO	4/6/2021
Head Angular Rate Sensors		X	ARS14934GFE	DTS ARS PRO-18K	3/2/2021
		Y	ARS11059GFE	DTS ARS PRO-8K	3/2/2021
		Z	ARS11335GFE	DTS PRO-18K 2KHz	3/2/2021
Upper Neck Load Cell		FX, Fy, Fz MX,MY, MZ	LC-2192Fx	Denton	7/17/2020
Chest Accelerometers	Primary	X	AC-P51965	ENDEVCO	4/5/2021
		Y	AC-P23904	ENDEVCO	4/5/2021
		Z	AC-P50062	ENDEVCO	4/5/2021
	Redundant	X	AC-P52007	ENDEVCO	4/5/2021
		Y	AC-P49199	ENDEVCO	12/21/2020
		Z	AC-P58981	ENDEVCO	4/5/2021
Chest Potentiometer		X	DS-503	SERVO	4/23/2021
Pelvis Accelerometer		X	AC-P58895	ENDEVCO	4/6/2021
		Y	AC-P51220	ENDEVCO	4/5/2021
		Z	AC-P82759	ENDEVCO	4/5/2021
Femur Load Cells - Left	Primary	Z	LC-115-1 Fz	Denton	11/23/2020
	Redundant	Z	LC-115-2 Fz	Denton	11/23/2020
Femur Load Cells - Right	Primary	Z	LC-135Fz1	Denton	11/23/2020
	Redundant	Z	LC-135Fz2	Denton	11/23/2020
Tibia Load Cells - Left	Upper	MX, MY, FZ	36430407-FZ	Denton	7/9/2020
	Lower	MX, MY, FZ	36440674-FZ	Denton	11/20/2020
Tibia Load Cells – Right	Upper	MX, MY, FZ	36430486-FZ	Denton	11/20/2020
	Lower	MX, MY, FZ	LC-490Fz	Denton	11/20/2020
Foot Accelerometers - Left	Rear	X	AC-P82750	ENDEVCO	4/5/2021
	Front	Z	AC-P52040	ENDEVCO	4/6/2021
Foot Accelerometers - Right	Rear	X	AC-P78669	ENDEVCO	4/5/2021
	Front	Z	AC-P52054	ENDEVCO	4/5/2021
Seat belt Load Cells	Lap		NA	NA	NA
	Shoulder		LC-292	GFE IF-964	5/12/2020

Table 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	1201-1000_A281022	Measurement Specialties	12/29/2020
			Z	1201-1000_A352359	Measurement Specialties	3/18/2021
		Redundant	X	1201-1000_A352350	Measurement Specialties	3/18/2021
	Right	Primary	X	1201-1000_A336634	Measurement Specialties	3/8/2021
			Z	1201-1000_A352415	Measurement Specialties	3/8/2021
		Redundant	X	1201-1000_A350976	Measurement Specialties	3/8/2021
Engine Accelerometers	Top		X	1201-1000_A374238	Measurement Specialties	3/29/2021
	Bottom		X	1201-1000_A373173	Measurement Specialties	3/25/2021