

**REPORT NUMBER: NCAP-CAL-19-003**

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

**Volkswagen de Mexico S.A. de C.V.  
2019 Volkswagen Jetta  
Four Door Sedan**

**NHTSA No: M20195800**

**PREPARED BY:  
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**April 19, 2019**


**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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**FINAL REPORT ACCEPTANCE BY OCWS:**

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

Date: \_\_\_\_\_

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

Date: \_\_\_\_\_

**TECHNICAL REPORT DOCUMENTATION PAGE**

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<b>15. Supplementary Notes</b>																																																									
<b>16. Abstract</b> A 56.30 km/h (35 mph), NCAP Frontal Impact Test was conducted on a 2019 Volkswagen Jetta four door sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 2, 2019.  The impact velocity of the vehicle was 56.47 km/h, and the ambient temperature at the barrier face at the time of impact was 21°C. The target vehicle's maximum post-test static crush was 380 mm at C2 to the left side of the front bumper. The test vehicle's occupant performance data is as follows:																																																									
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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. DTNH22-12-D-00260. 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 Frontal NCAP Laboratory Test procedure, dated October 2015.

#### SUMMARY

A ridged fixed barrier was impacted by a 2019 Volkswagen Jetta four door sedan at a velocity of 56.47 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 2, 2019. 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 14 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, 50<sup>th</sup> percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5<sup>th</sup> percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure. Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right / left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 142) and the right-front passenger (position 2) ATD (Serial No. 139) were calibrated previous to this test. Certification details, along with instrumentation calibration data, can be found in Appendix C of this report.

The 136 channels of data were recorded on an on-board data acquisition system. Please refer to Appendix B for the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was a total of 0.0 grams of stoddard solvent leakage after the event and including all phases of the static rollover. The maximum static crush of the test vehicle was 380 mm at C2 to the left side of front bumper. During and after the impact event, the driver's and passenger's side doors were closed and operational.

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 lower dash panel.

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. The left knee contacted the glove box.

The occupant data is summarized below.

ATD Position	HIC <sub>15</sub>	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 <sup>th</sup> )	247.256	0.317	1573.033	-258.962	42.189	-30.103	-203.598	-473.294
Passenger (5 <sup>th</sup> )	315.228	0.416	676.796	-628.374	50.814	-18.550	-1369.842	-280.639

**GENERAL COMMENTS:**

1. P1 (Driver) serial number - 142
2. P2 (Passenger) serial number - 139

**Data Anomalies:**

- Driver Head CG Redundant Y, Questionable spike near 137ms
- Right Rear Seat Cross Member X, Questionable data after 90ms
- Redundant Right Rear Seat Cross Member X, Questionable data after 90ms.
- Left Rear Seat Cross Member X Acceleration, Exceeded calibration range at 56.3ms
- Engine Bottom X Acceleration, Questionable data after 44.9ms
- Barrier Load Cell B3 Fx, Questionable data after 90ms
- Barrier Load Cell B7 Fx, Questionable data after 90ms

## **SECTION 2**

### **OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS**

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Seat Belt Positioning Data

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

Data Sheet No. 7 – Vehicle Accelerometer Locations

Data Sheet No. 8 – Photographic Reference Target Locations

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

Data Sheet No. 10 – Test Vehicle Summary of Results

Data Sheet No. 11 – Post-Test Observations

Data Sheet No. 12 – Vehicle Profile Measurements

Data Sheet No. 13 – Accident Investigation Division Data

Data Sheet No. 14 – Vehicle Intrusion Measurements

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

Data Sheet No. 16 – FMVSS 301 Static Rollover Results

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

**DATA SHEET NO. 1  
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA No.	M20195800	Traction Control System (TCS)	Yes
Model Year	2019	Power Steering	Yes
Make	Volkswagen	Power Window Auto-Reverse	No
Model	Jetta	Driver Frontal Airbag	Yes
Body Style	Four Door Sedan	Driver Curtain Airbag	Yes
VIN	3VWC57BU8KM061598	Driver Head/Torso Airbag	No
Body Color	Gray	Driver Torso Airbag	No
Odometer Reading (km /mi)	161 miles	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	1.4	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	8-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	No

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

No

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Volkswagen de Mexico S.A de C.V	GVWR (kg)	1870
Date of Manufacture	07/18	GAWR Front (kg)	980
		GAWR Rear (kg)	940

**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

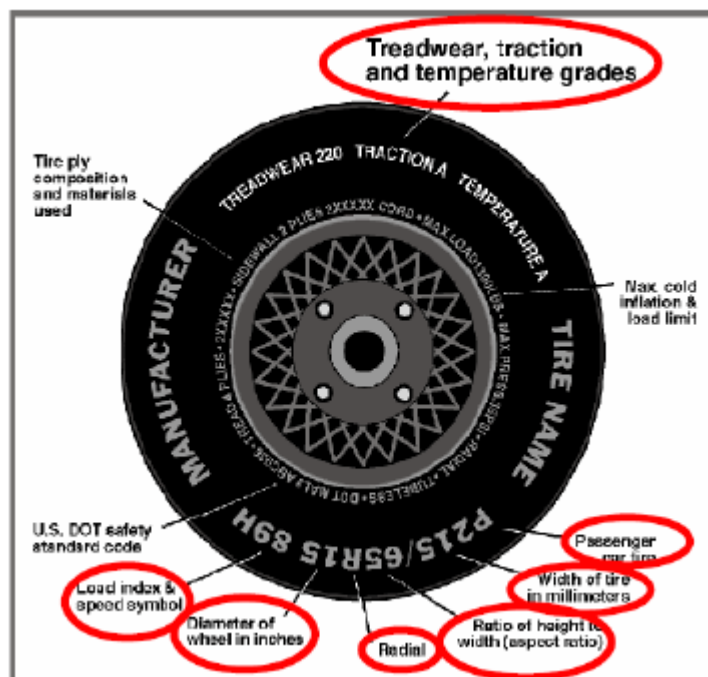
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	3	-	5
Capacity Wt. (VCW) (kg)				440
Cargo Wt. (RCLW) (kg)				99.8

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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

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



**VEHICLE TIRE INFORMATION**

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	205/60R16	205/60R16
Tire Size on Vehicle	205/65R16	205/65R16
Tire Manufacturer	Falken	Falken
Tire Model	Sincera SN 250 AA/S	Sincera SN 250 AA/S
Treadwear	320	320
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 2 Polyamide	1 Polyester, 2 Steel, 2 Polyamide
Load Index / Speed Symbol	92H	92H
Tire Material	Rubber	Rubber
DOT Safety Code Left	R820 3DHR 1318	R820 3DHR 1318
DOT Safety Code Right	R820 3DHR 1318	R820 3DHR 1318

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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	411	275		444	367	
Right	kg	400	264		422	351	
Ratio	%	60	40		55	45	
Totals	kg	811	539	1350	866	718	1584

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1350	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	142	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	99.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1591.8	(A+B+C)

**TEST VEHICLE ATTITUDES AND CG**

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	710	718	716	718	1072
As Tested	mm	698	700	677	679	1217
Post-Test	mm	716	714	664	695	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2685
Total Vehicle Length at Left Side	mm	4603
Total Vehicle Length at Centerline	mm	4704
Total Vehicle Length at Right Side	mm	4603
Weight of Ballast in Cargo Area	kg	22.7
Weight of Vehicle Components Removed	kg	12
Amount of Stoddard Solvent in Fuel Tank	L	46.6

**LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:**

None

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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**TARGET VEHICLE STRUCTURAL MEASUREMENT**

No.	Description	Pre-Test
1	Total Length	4704
2	Total Width	1795
3*	Bumper Top Height	562
4*	Bumper Bottom Height	430
5*	Longitudinal Member Top Height	557
6	Distance Between Longitudinal Members	1050
7	Longitudinal Member Width	77
8*	Engine Top Height	780
9*	Engine Bottom Height	205
10	Engine and Gearbox Width	495
11	Front Bumper-Engine Distance	640
12*	Front Shock Absorber Fixing Height	876
13*	Bonnet Leading Edge Height	743
14	Front Shock Absorber Fixing Width	1122
15	Front Bumper – Front Axle Distance	900
16	Front Axle – A Pillar Distance	476
17	A-Pillar – B-Pillar Distance	1131
18	B-Pillar – Rear Axle Distance	1077
19	B-Pillar – C-Pillar Distance	889
20*	Roof Sill Bottom Height	1320
21*	Roof Sill Top Height	1365
22*	Floor Sill Bottom Height	266
23*	Floor Sill Top Height	383

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

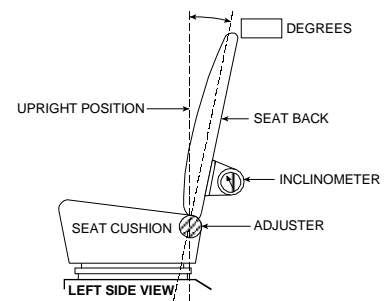
**DATA SHEET NO. 2**  
**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**NOMINAL DESIGN RIDING POSITION**

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



**FRONT SEAT ASSEMBLY**

Seating Position	Degrees
Driver Seat Back Angle	-15.2
Passenger Seat Back Angle	-14.4

**SEAT FORE / AFT POSITIONS**

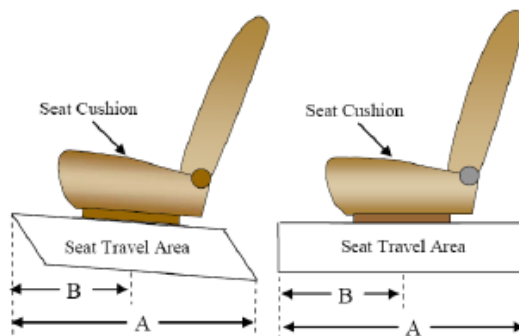
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	310 (0 - 37 detents)	14
Passenger Seat	254 (0 - 38 detents)	0

**SEAT BELT UPPER ANCHORAGE**

The driver's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 50<sup>th</sup> percentile adult male ATD. The passenger's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 5<sup>th</sup> 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: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

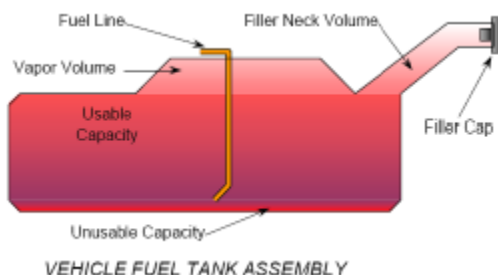
NHTSA No.: M20195800  
 Test Date: 2/2/2019

**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank"	50
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	46 – 47
Actual Amount of Solvent Used	46.6
1/3 of Usable Capacity	16.6

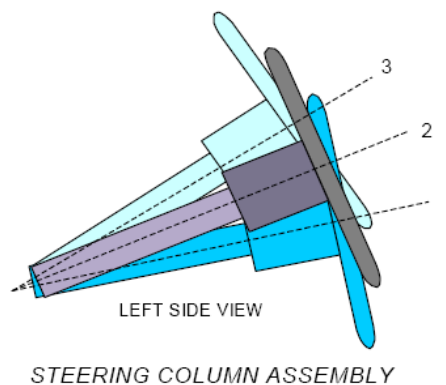
**FUEL PUMP**

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.



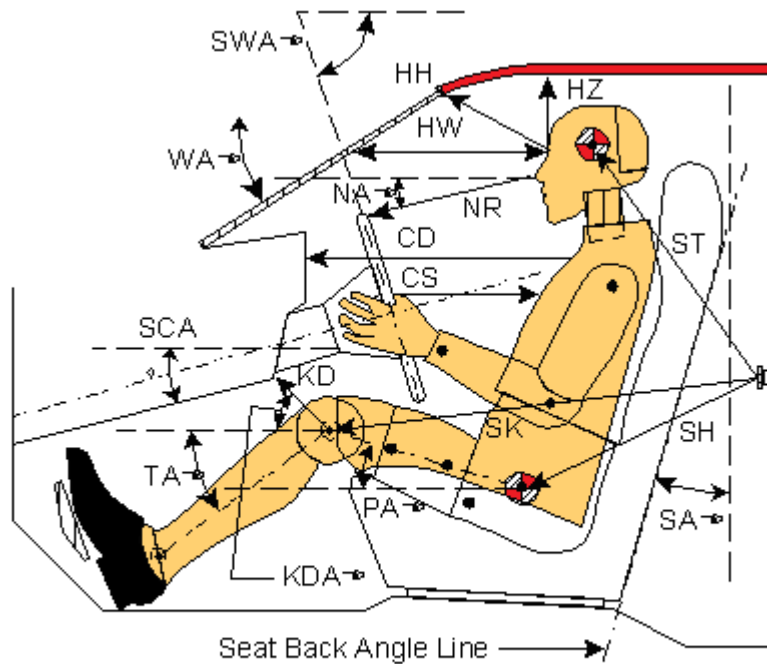
**STEERING COLUMN POSITIONS**

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	19.8	
Geometric center position No. 2	22.5	
Uppermost position No. 3	25.1	
Telescoping Steering Wheel Travel		56
Test Position	22.5	28

**DATA SHEET NO. 3**  
**DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
Test Date: 2/2/2019



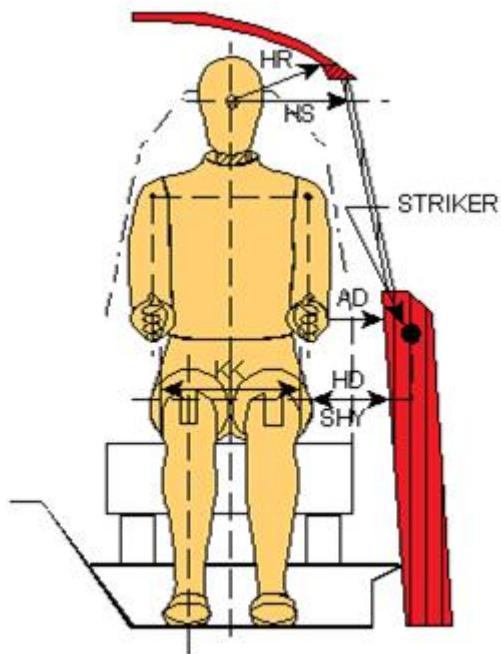
**Left Side View**

Code	Measurement Description	Driver (SN: 142)		Passenger (SN: 139)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		25.5		
SWA°	Steering Wheel Angle		22.4		
SCA°	Steering Column Angle		67.6		
SA°	Seat Back Angle (on headrest post)		15.2		14.4
HZ	Head to Roof (Z)	222	90	252	90
HH	Head to Header	376	22.5	335	51.2
HW	Head to Windshield	680	0	635	0
NR	Nose to Rim	374	6.1	370	13.1
CD	Chest to Dash	521		362	
CS	Chest to Steering Hub	316	2.7		
RA	Rim to Abdomen	221	27.2		
KDL	Left Knee to Dash	212	34.6	115	30.1
KDR	Right Knee to Dash	211	27.3	137	33.8
PA°	Pelvic Angle		23.4		21.6
TA°	Tibia Angle		27.2		35.2
SK	Striker to Knee	577	14.6	659	9.9
ST	Striker to Head	382	70.4	345	54.9
SH	Striker to H-Point	305	59.3	395	31.6

**DATA SHEET NO. 4**  
**DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019



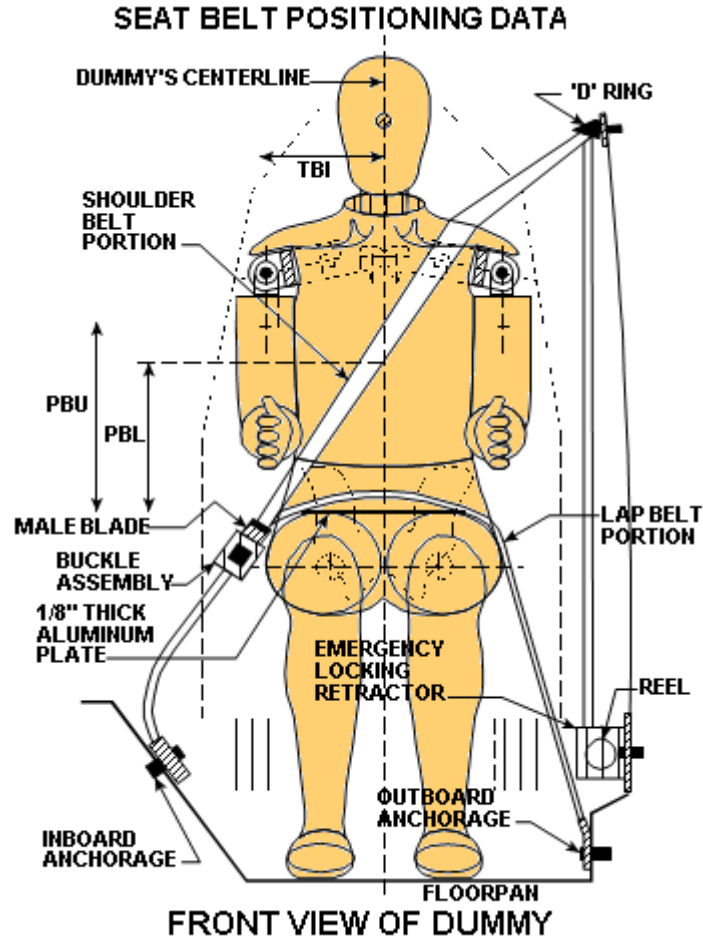
Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	57	98
HD	H-Point to Door	164	180
HR	Head to Side Header	258	287
HS	Head to Side Window	355	373
KK	Knee to Knee	322	190
SHY	Striker to H-Point (Y Direction)	255	275
AA	Ankle to Ankle	385	170

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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019



**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
<b>PBU</b> — Top surface of reference to belt upper edge	mm	320	265
<b>PBL</b> — Top surface of reference to belt lower edge	mm	240	175

**BELT LENGTH DATA**

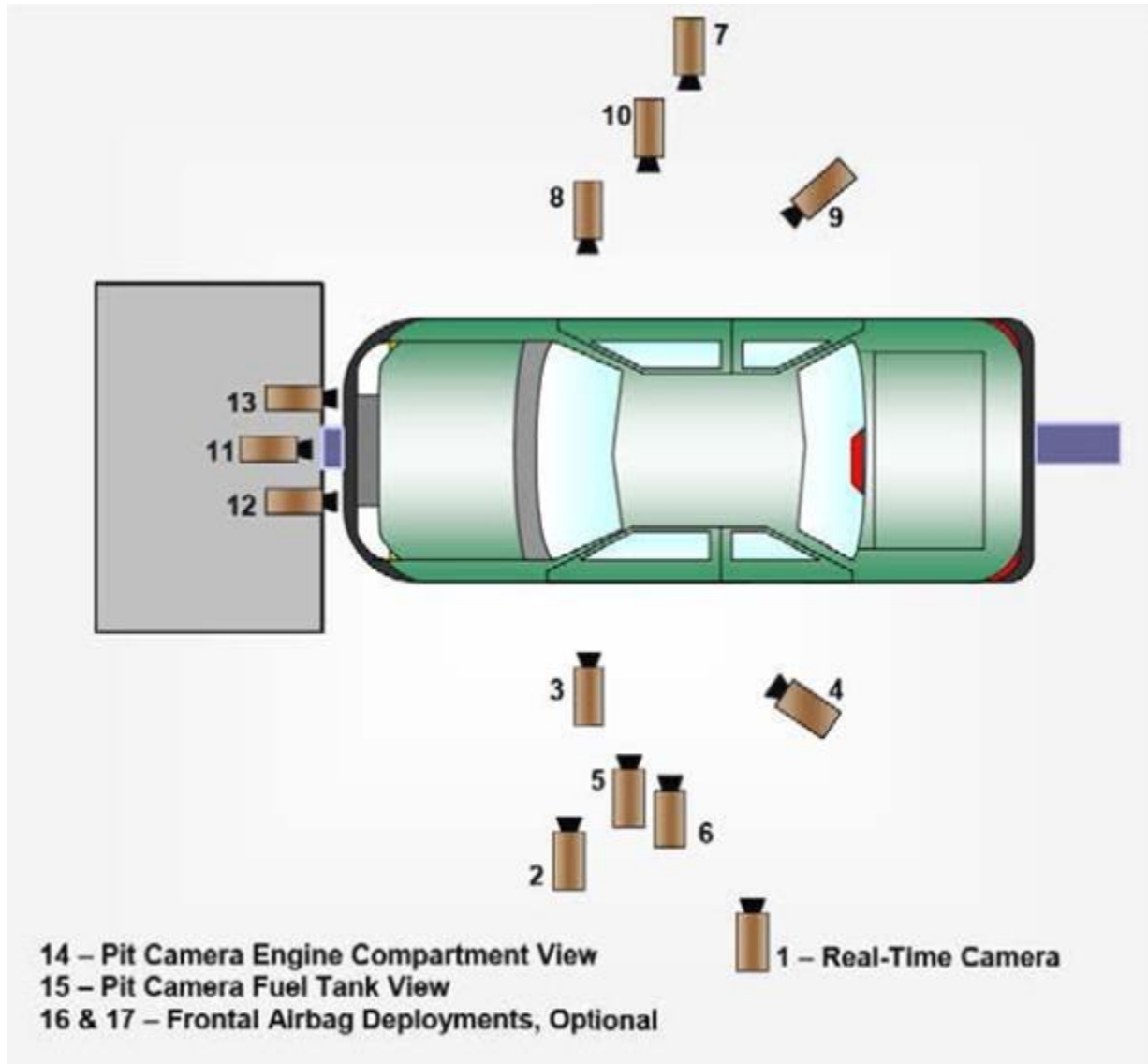
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	890	910
Lap Belt Length as measured on ATD	mm	740	830
Remainder of belt on reel	mm	820	710
Total belt length for continuous webbing systems	mm	2450	2450

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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
Test Date: 2/2/2019

**CAMERA POSITIONS FOR FRONTAL IMPACTS**



Top View

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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**CAMERA LOCATIONS**

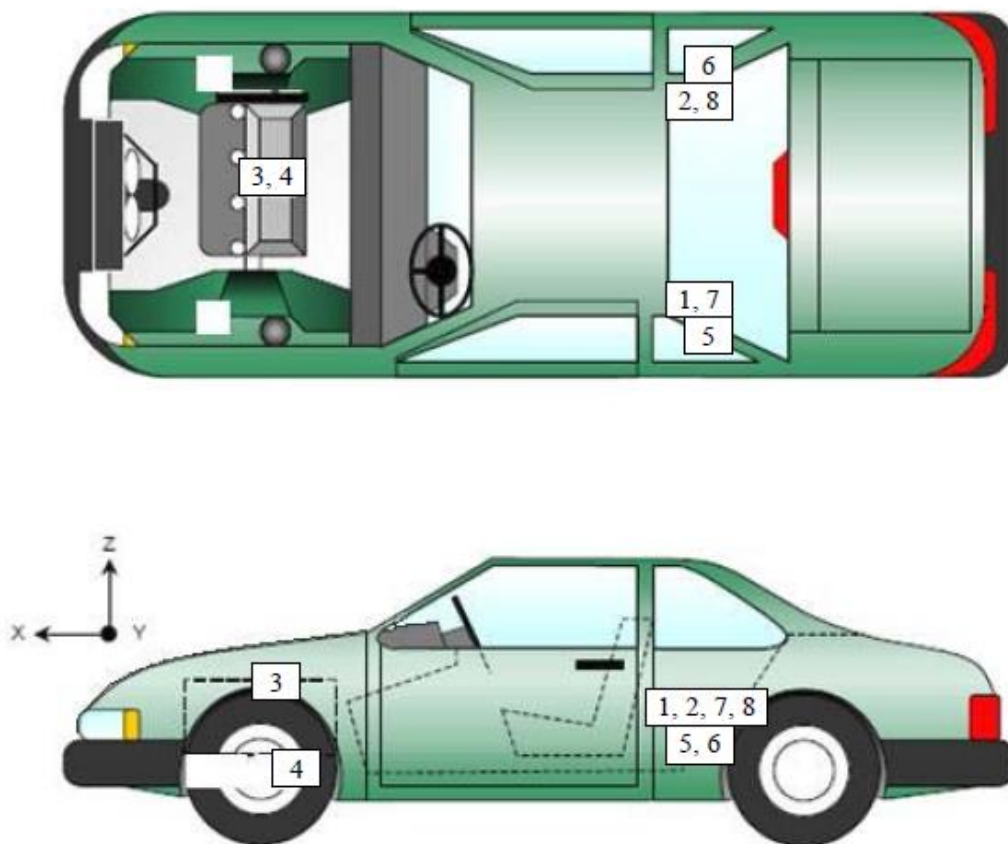
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-		60
2	Driver Close-Up	-1688	-6980	-1382	50	1000
3	Left Front Half	-1025	-5013	-1145	28	1000
4	Left Angle	-4558	-5085	-2316	50	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	-2009	6827	-1137	24	1000
8	Passenger Close-Up	-1514	7283	-1308	50	1000
9	Right Front Half	-1048	5179	-1134	28	1000
10	Right Angle	-4500	5128	-2300	50	1000
11	Windshield	825	0	-3475	20	1000
12	Driver Windshield	425	360	-2210	12.5	1000
13	Passenger Windshield	425	360	-2210	12.5	1000
14	Pit Front	-833	0	1350	12.5	1000
15	Pit Rear	-2486	0	1350	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: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1971	-336	263
2	Right Rear Accelerometer – X Direction	1971	341	257
3	Engine Top X	4044	272	-194
4	Engine Bottom X	4429	-21	396
5	Left Rear Accelerometer – Z Direction	1971	-336	263
6	Right Rear Accelerometer – Z Direction	1971	341	257
7	Left Rear Accelerometer – X Direction Redundant	1971	-318	265
8	Right Rear Accelerometer – X Direction Redundant	1971	358	254

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

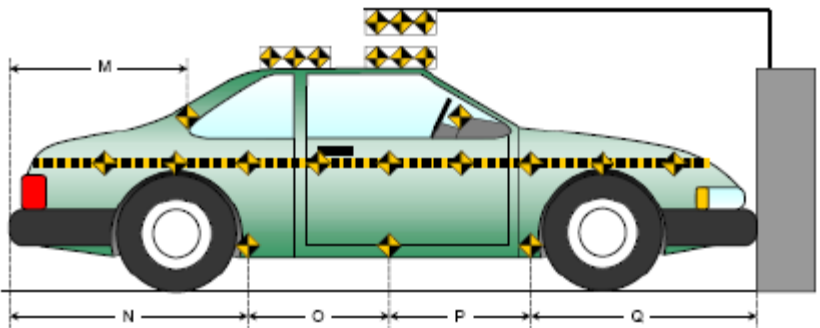
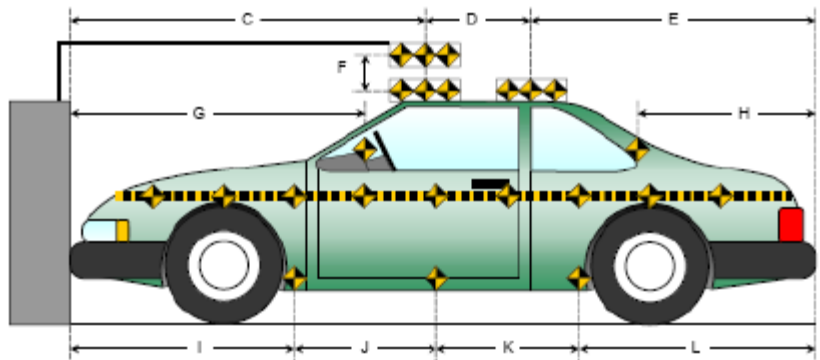
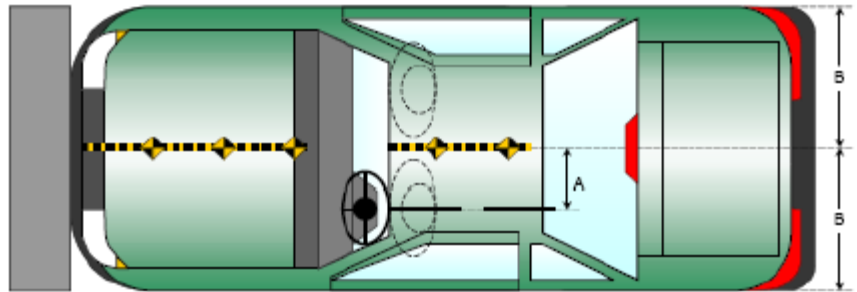
**DATA SHEET NO. 8**  
**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

Item	Value
A	371
B	897
C	2652
D	611
E	1441
F	265
G	1703
H	1359
I	1325
J	914
K	910
L	1555
M	1366
N	1547
O	918
P	919
Q	1321

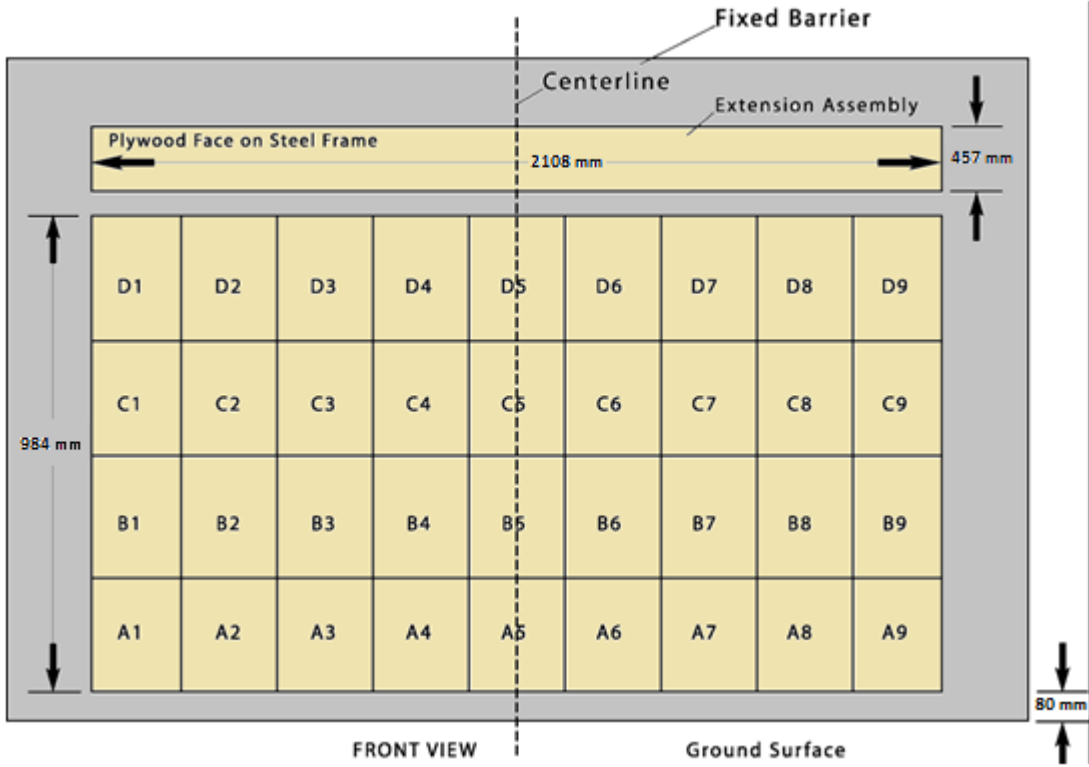
All units in millimeters



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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019



\* Load cell Barrier was not used

Figure 1 - Load Cell Locations on a 36-Load Cell Barrier with Plywood Height Extension\*

**DATA SHEET NO. 10**  
**TEST VEHICLE SUMMARY OF RESULTS**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**INSTRUMENTATION**

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	46
Passenger Dummy Accelerometers	46
Vehicle Structure Accelerometers	8
Load Cell Barrier	36
<b>Total</b>	<b>136</b>

**CAMERA COVERAGE**

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	12
Real-Time Panning	1
<b>Total</b>	<b>15</b>

**DATA SHEET NO. 11  
POST-TEST OBSERVATIONS**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**TEST DUMMY INFORMATION AND CONTACT LOCATIONS**

Description	Driver	Passenger
Dummy Type / Serial No.	P572E 50 <sup>th</sup> Male / 142	P5720 5 <sup>th</sup> Female / 139
Head Contact	Frontal Airbag & Head Restraint	Frontal Airbag & Head Restraint
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	Frontal Airbag	Frontal Airbag
Left Knee Contact	Lower Dash Panel	Glove Box
Right Knee Contact	Lower Dash Panel	None

**DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Closed & Operational	Closed & Operational
Rear Door Opening	Closed & Operational	Closed & Operational
Seat Track Shift (mm)	0	0
Seat Back Failure	No	No
Glazing Damage	None	None

**POST-TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Cracks throughout
Window Damage	None
Other Notable Effects	None

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	1164
Center	mm	966
Right Side	mm	1040
Average	mm	1057

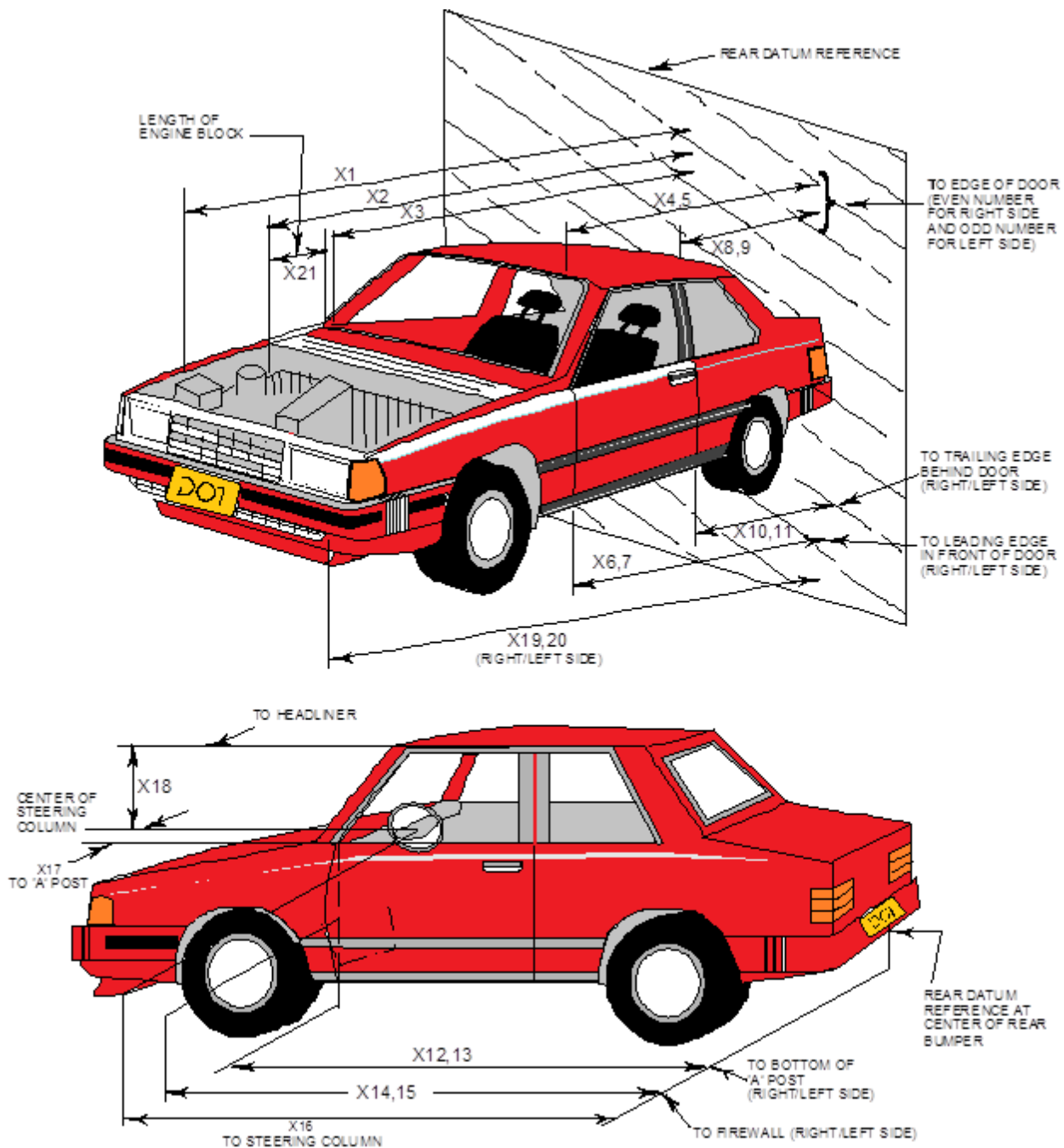
**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019



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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
Test Date: 2/2/2019

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4704	4387	-317
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4064	3899	-165
3	RSOV to Firewall	3684	3658	-26
4	RSOV to Upper Leading Edge of Right Door	3328	3328	0
5	RSOV to Upper Leading Edge of Left Door	3327	3325	-2
6	RSOV to Lower Leading Edge of Right Door	3310	3310	0
7	RSOV to Lower Leading Edge of Left Door	3309	3311	2
8	RSOV to Upper Trailing Edge of Right Door	2204	2202	-2
9	RSOV to Upper Trailing Edge of Left Door	2203	2221	18
10	RSOV to Lower Trailing Edge of Right Door	2248	2244	-4
11	RSOV to Lower Trailing Edge of Left Door	2246	2263	17
12	RSOV to Bottom of "A" Post of Right Side	3305	3305	0
13	RSOV to Bottom of "A" Post of Left Side	3301	3303	2
14	RSOV to Firewall, Right Side	3845	3836	-9
15	RSOV to Firewall, Left Side	3841	3820	-21
16	RSOV to Steering Column	2814	2908	94
17	Center of Steering Column to "A" Post	308	316	8
18	Center of Steering Column to Headliner	402	432	30
19	RSOV to Right Side of Front Bumper	4641	4374	-267
20	RSOV to Left Side of Front Bumper	4644	4297	-347
21	Length of Engine Block	243	243	0
RD	RSOV to Right Side of Dash Panel	2983	2984	1
CD	RSOV to Center of Dash Panel	2974	2993	19
LD	RSOV to Left Side of Dash Panel	2984	2987	3

\*UR= Unrecoverable data point

All Dimensions in mm

**DATA SHEET NO. 13**  
**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
Test Date: 2/2/2019

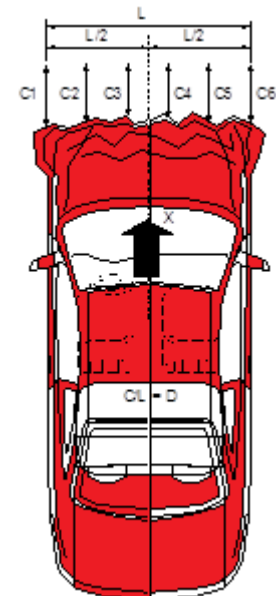
**VEHICLE INFORMATION**

VIN: 3VWC57BU8KM061598  
Vehicle Size Category: Passenger Car

Wheelbase (mm): 2685  
Test Weight (kg): 1584

**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): 56.47  
Velocity Change (km/h): 72.83  
Time of Separation (ms): 130



**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW2  
Midpoint of Damage: C3  
Damage Region Length (mm): 1325  
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	4515	4243	272
C2	Crush Zone 2 at Left Side	mm	4663	4283	380
C3	Crush Zone 3 at Left Side	mm	4697	4358	339
C4	Crush Zone 4 at Right Side	mm	4698	4400	298
C5	Crush Zone 5 at Right Side	mm	4667	4410	257
C6	Crush Zone 6 at Right Side	mm	4522	4337	185
L	C1 to C6	mm	1325	1350	-25

**DATA SHEET NO. 14  
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

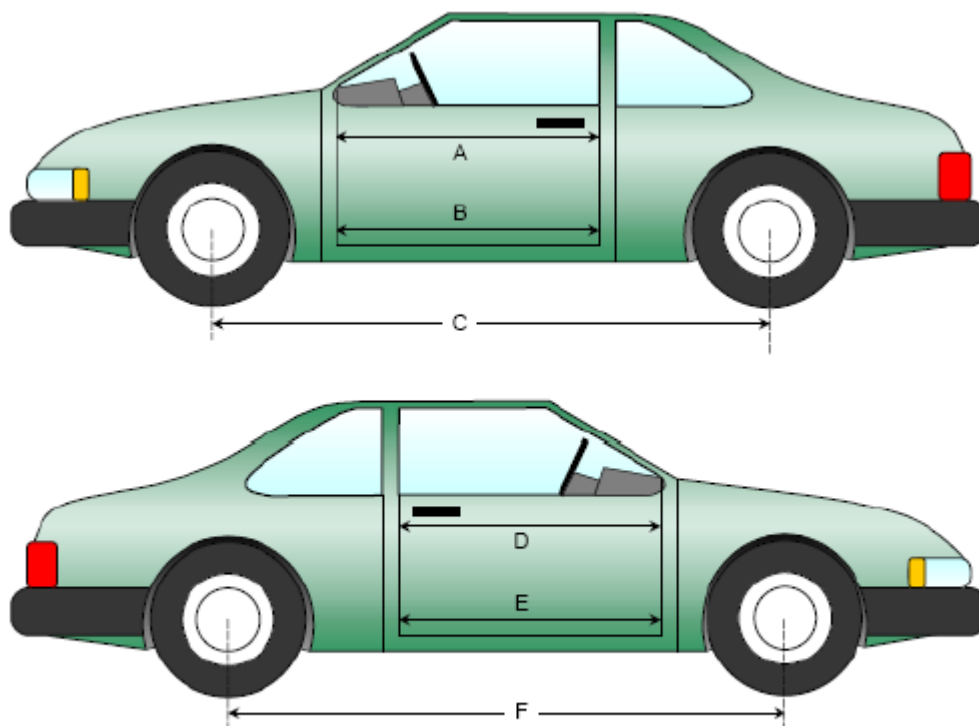
NHTSA No.: M20195800  
 Test Date: 2/2/2019

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	961	962	1
B	Left Side Lower	mm	830	830	0
D	Right Side Upper	mm	959	959	0
E	Right Side Lower	mm	824	823	-1

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2685	2657	-28
F	Right Side Wheelbase	mm	2685	2683	-2



**Left & Right Side Views**

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

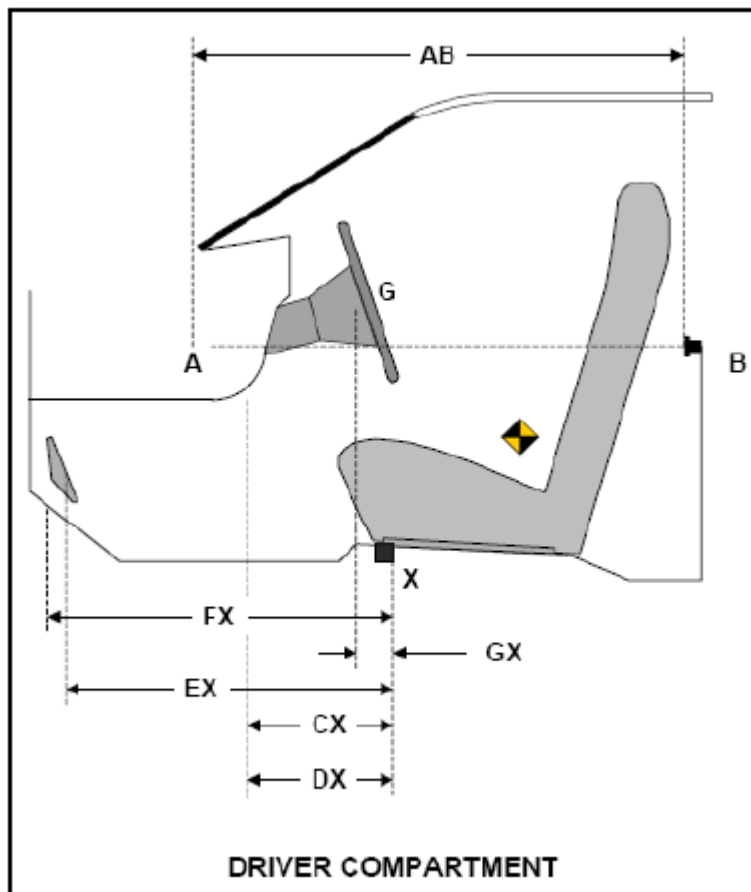
Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	774	773	-1
CX	Left Knee Bolster to X	mm	312	313	1
DX	Right Knee Bolster to X	mm	297	299	2
EX	Brake Pedal to X	mm	566	547	-19
FX	Foot Rest to X	mm	627	619	-8
GX	Center of Steering Column Wheel Hub to X	mm	56	150	94

*X = Front of Seat Track (Stationary)*



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

Test Vehicle: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019

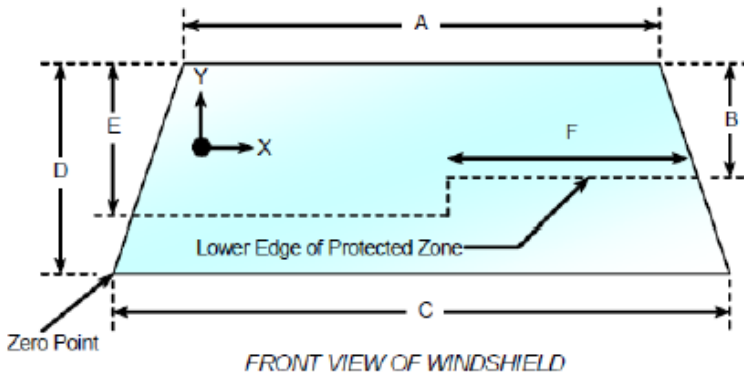
**Windshield Mounting Details:** A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

*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	2130	2130	100
Right Side	2130	2130	100
Total	4260	4260	100



Item	Units	Value
A	mm	1195
B	mm	385
C	mm	1480
D	mm	792
E	mm	412
F	mm	520

**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: 2019 Volkswagen Jetta four door sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
Test Date: 2/2/2019

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 21 ° C

Test Time: 9:46 AM

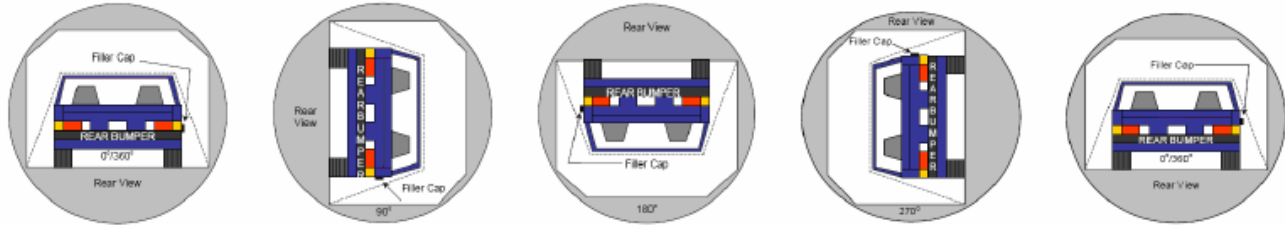
**STODDARD SOLVENT SPILLAGE MEASUREMENTS**

- 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: 2019 Volkswagen Jetta four door sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
 Test Date: 2/2/2019



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

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

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	71	300	371
90° to 180°	68	300	368
180° to 270°	70	300	370
270° to 360°	74	300	374

**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	

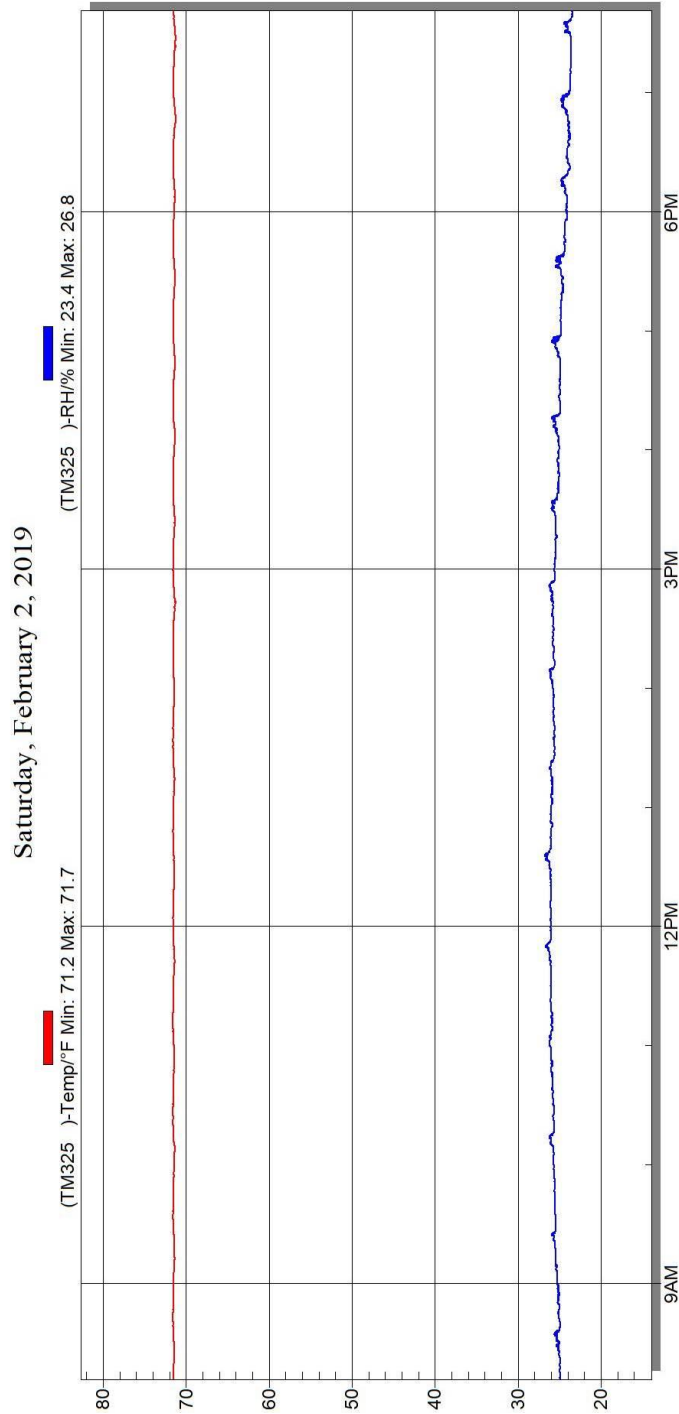
**SOLVENT SPILLAGE LOCATION TABLE**

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: 2019 Volkswagen Jetta four door sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20195800  
Test Date: 2/2/2019



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

**APPENDIX A**  
**PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

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2	Pre-Test Load Cell Wall	A-5
3	Post-Test Load Cell Wall	A-6
4	Manufacturer's Label	A-6
5	Tire Placard	A-7
6	2019 Volkswagen Jetta Frontal As Delivered	A-7
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10	Pre-Test Left View of Test Vehicle	A-9
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12	Pre-Test Right View of Test Vehicle	A-10
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33	Post-Test Driver Dummy Window View	A-21
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<b>Fig.</b>	<b>Description</b>	<b>Page</b>
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38	Pre-Test View of Belt Anchorage for Driver Dummy	A-23
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40	Pre-Test Driver Dummy Feet	A-24
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42	Pre-Test Driver's Side Knee Bolster	A-25
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44	Pre-Test Driver's Side Floorpan	A-26
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46	Post-Test Driver Dummy Face	A-27
47	Post-Test Driver Dummy Contact With Airbag	A-28
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55	Pre-Test Passenger Dummy and Vehicle Interior View	A-32
56	Post-Test Passenger Dummy and Vehicle Interior View	A-32
57	Pre-Test Passenger's Seat Fore-Aft Markings	A-33
58	Post-Test Passenger's Seat Fore-Aft Markings	A-33
59	Pre-Test View of Belt Anchorage for Passenger Dummy	A-34
60	Post-Test View of Belt Anchorage for Passenger Dummy	A-34
61	Pre-Test Passenger Dummy Feet	A-35
62	Post-Test Passenger Dummy Feet	A-35
63	Pre-Test Passenger's Side Knee Bolster	A-36
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65	Pre-Test Passenger's Side Floorpan	A-37
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67	Post-Test Passenger Dummy Face	A-38
68	Post-Test Passenger Dummy Contact With Airbag	A-38
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<b>Fig.</b>	<b>Description</b>	<b>Page</b>
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71	Post-Test Stoddard Solvent Spillage Location View, if Required	A-40
72	Post-Test Speed Trap Read-Out	A-40
73	Vehicle at 0° on Static Rollover Device	A-41
74	Vehicle at 90° on Static Rollover Device	A-41
75	Vehicle at 180° on Static Rollover Device	A-42
76	Vehicle at 270° on Static Rollover Device	A-42
77	Vehicle at 360° on Static Rollover Device	A-43
78	2019 Volkswagen Jetta Frontal Impact Event	A-43
79	Monroney Label Photograph	A-44

**<sup>1</sup>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.*

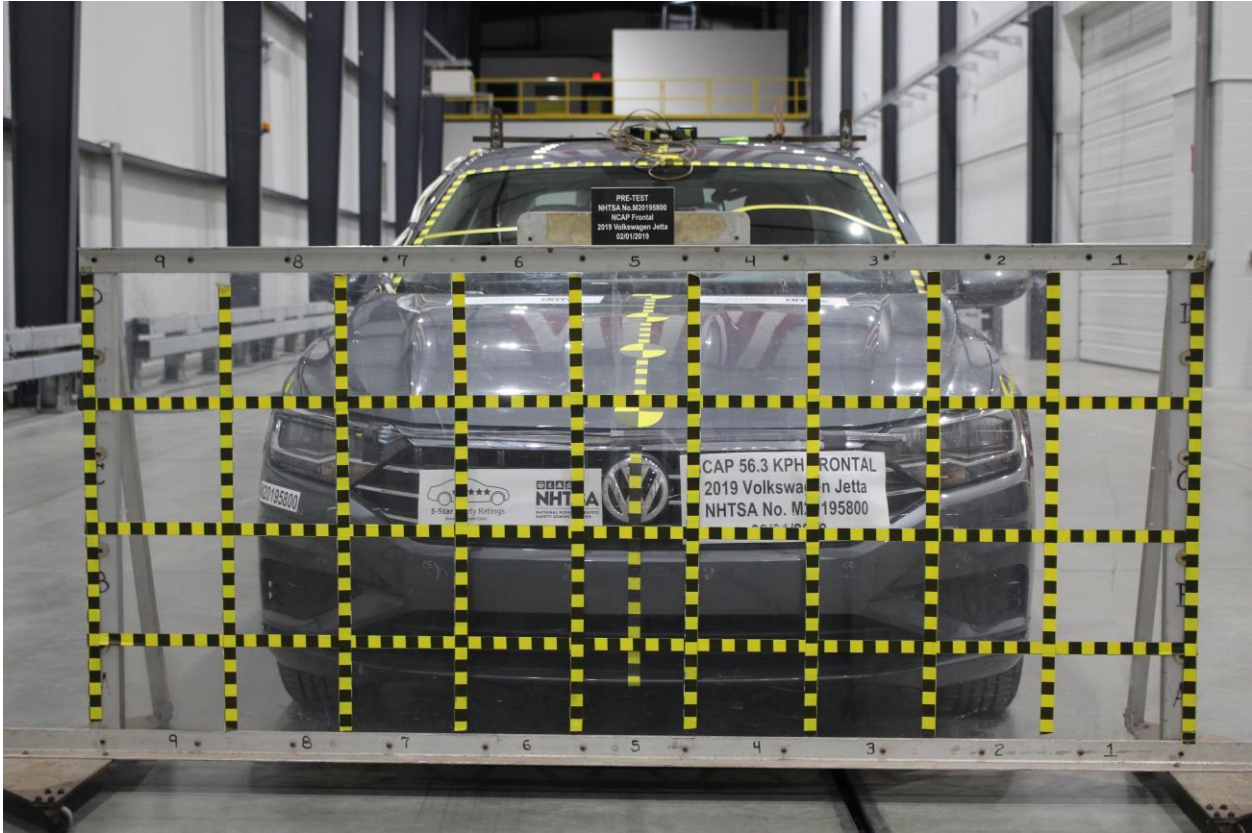


Figure A-1: Load Cell Location



Figure A-2: Pre-Test Load Cell Wall



Figure A-3: Post-Test Load Cell Wall

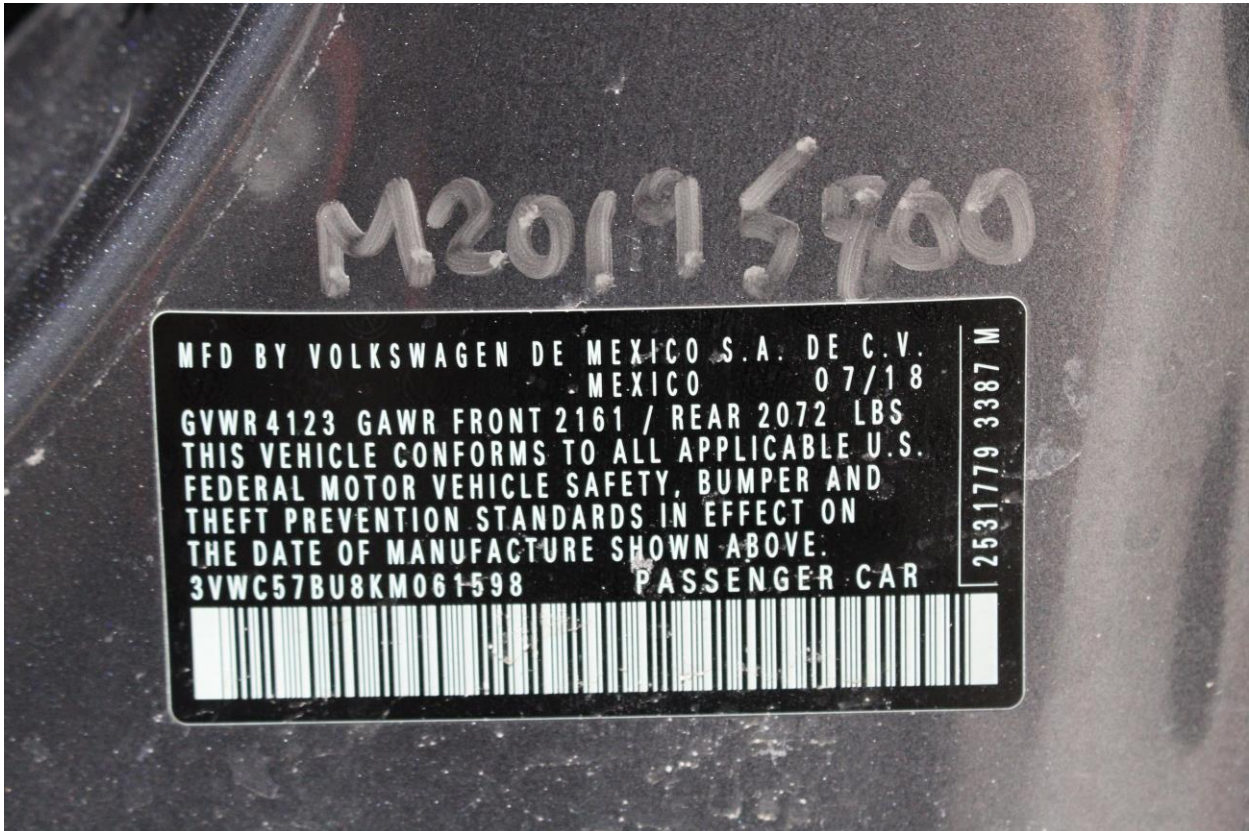


Figure A-4: Manufacturer's Label

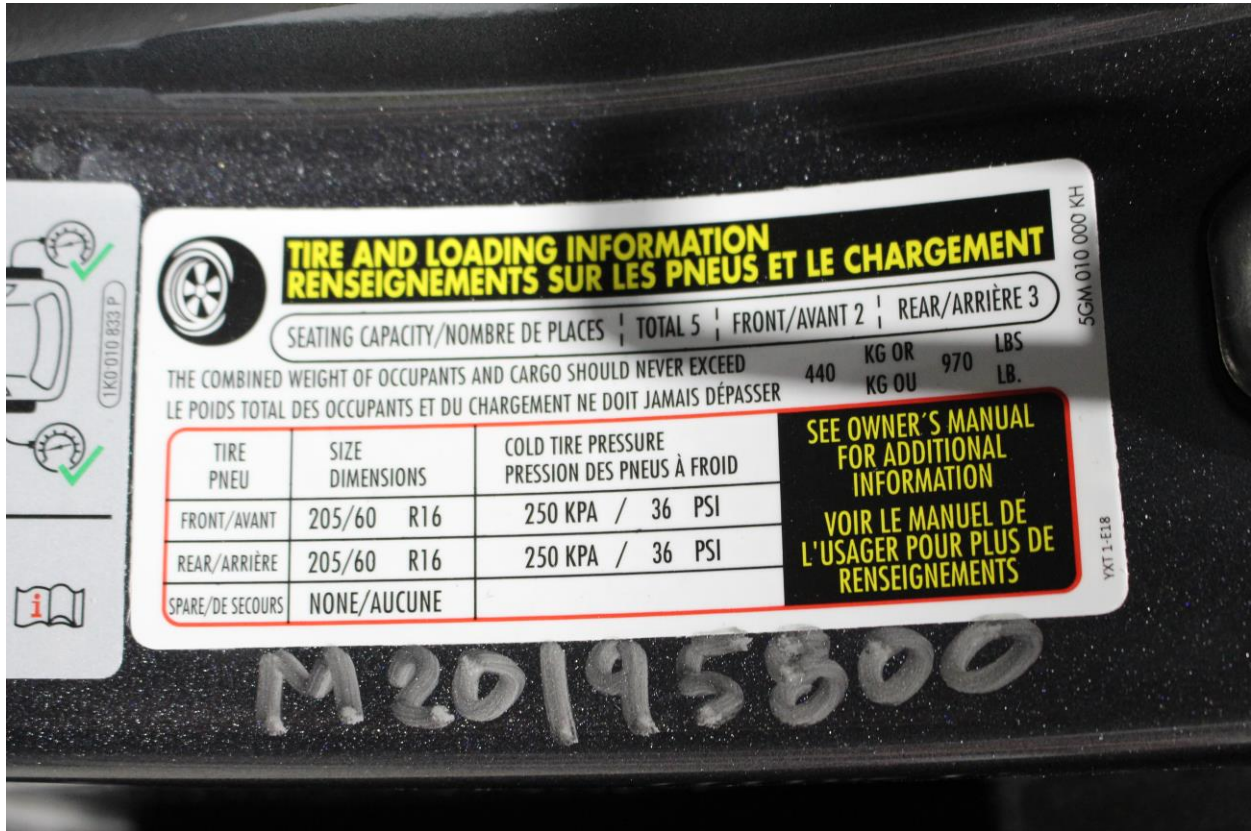


Figure A-5: Tire Placard



Figure A-6: 2019 Volkswagen Jetta 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**



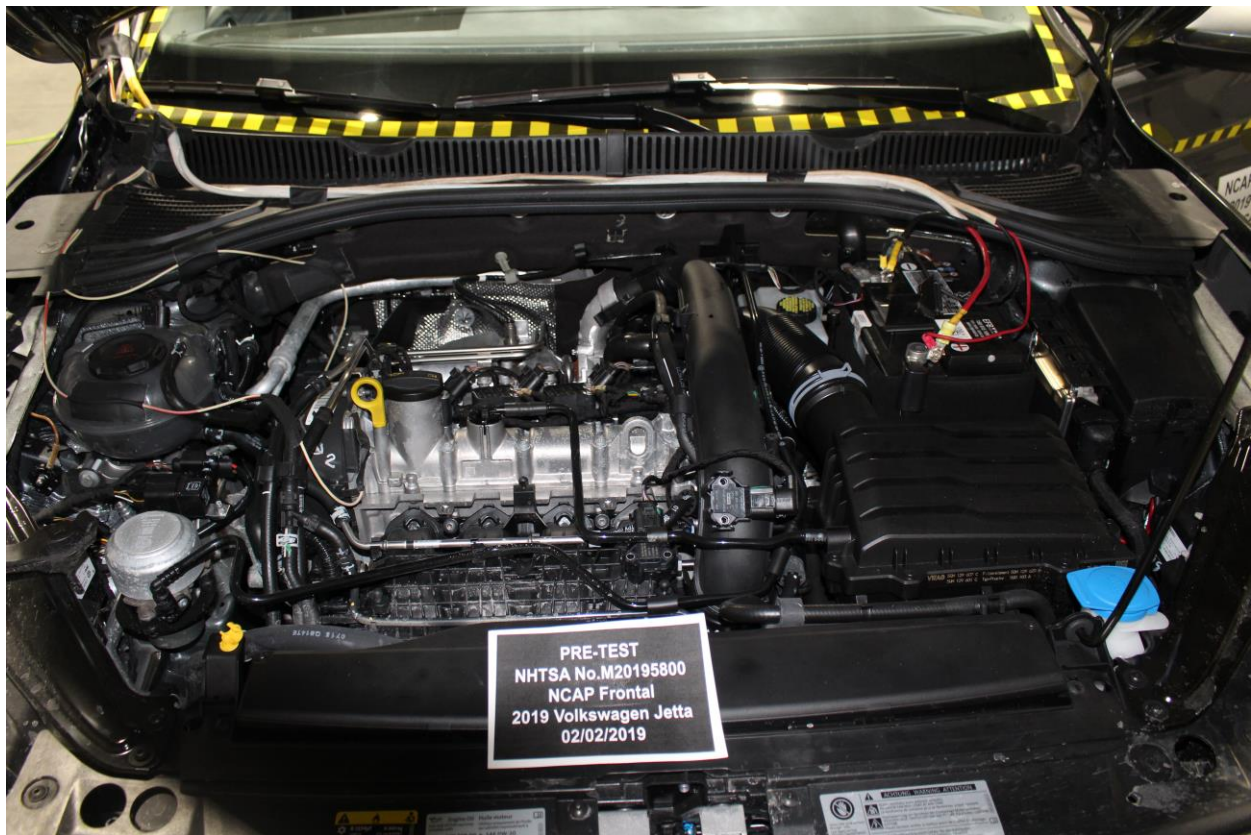
**Figure A-17: Post-Test Left Rear 3-4 View**



**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**

# Photo Not Available

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



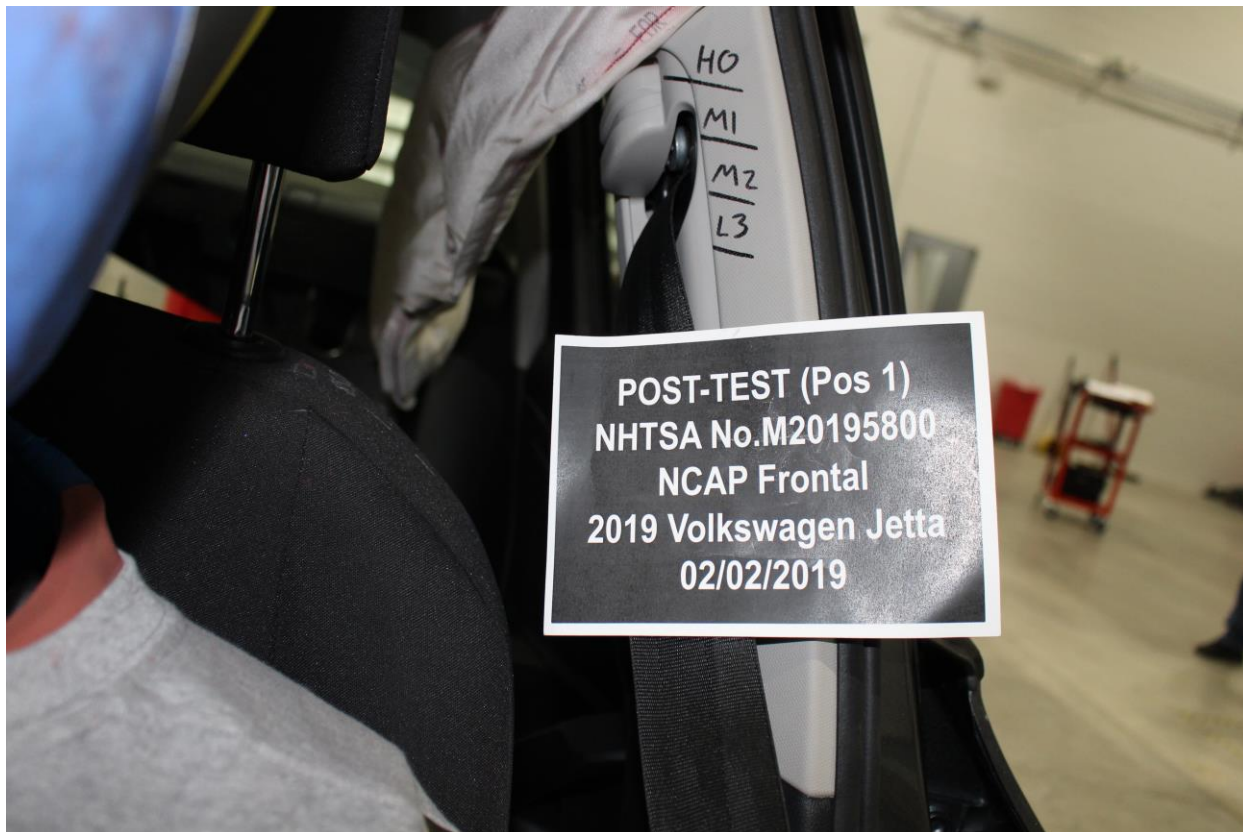
Figure A-36: Pre-Test Driver's Seat Fore-Aft Markings



**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 Driver Dummy Feet**



**Figure A-41: Post-Test Driver Dummy Feet**



**Figure A-42: Pre-Test Driver's Side Knee Bolster**



**Figure A-43: Post-Test Driver's Side Knee Bolster**



**Figure A-44: Pre-Test Driver's Side Floorpan**



**Figure A-45: Post-Test Driver's Side Floorpan**



**Figure A-46: Post-Test Driver Dummy Face**



**Figure A-47: Post-Test Driver Dummy Contact With Airbag**



**Figure A-48: Post-Test Driver Dummy Contact With Headrest**



**Figure A-49: Pre-Test View of the Steering Wheel**



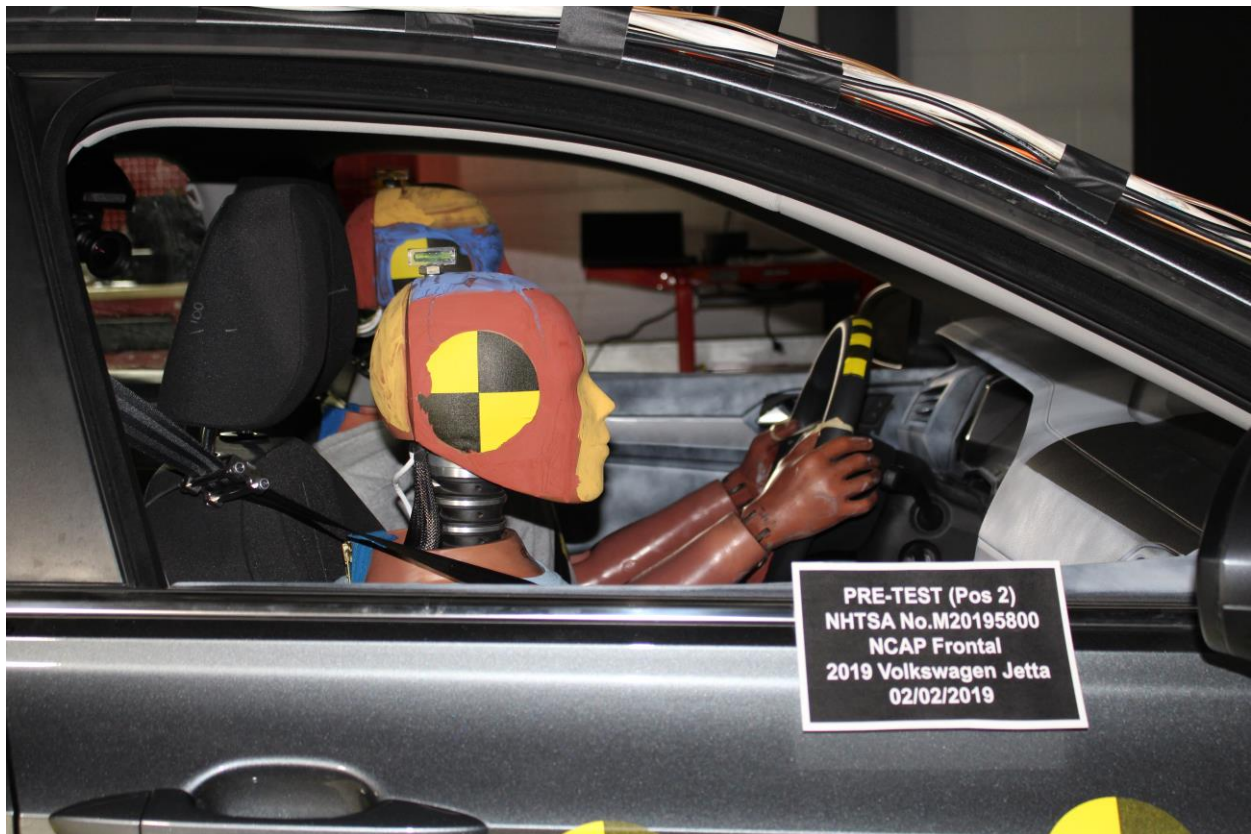
**Figure A-50: Post-Test View of the Steering Wheel**



**Figure A-51: Pre-Test Passenger Dummy Front View**



**Figure A-52: Post-Test Passenger Dummy Front View**



**Figure A-53: Pre-Test Passenger Dummy Window View**



**Figure A-54: Post-Test Passenger Dummy Window View**



**Figure A-55: Pre-Test Passenger Dummy and Vehicle Interior View**



**Figure A-56: Post-Test Passenger Dummy and Vehicle Interior View**



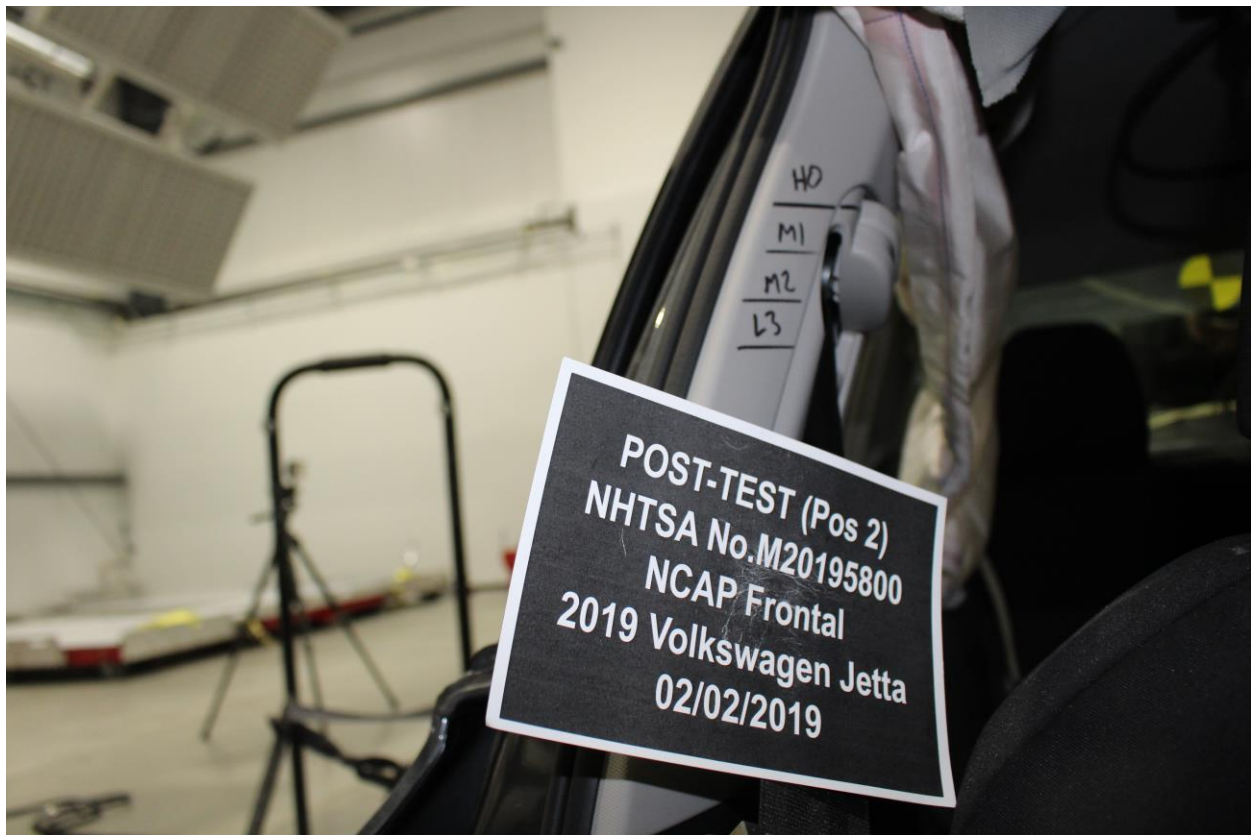
**Figure A-57: Pre-Test Passenger's Seat Fore-Aft Markings**



**Figure A-58: Post-Test Passenger's Seat Fore-Aft Markings**



**Figure A-59: Pre-Test View of Belt Anchorage for Passenger Dummy**



**Figure A-60: Post-Test View of Belt Anchorage for Passenger Dummy**



**Figure A-61: Pre-Test Passenger Dummy Feet**



**Figure A-62: Post-Test Passenger Dummy Feet**



**Figure A-63: Pre-Test Passenger's Side Knee Bolster**



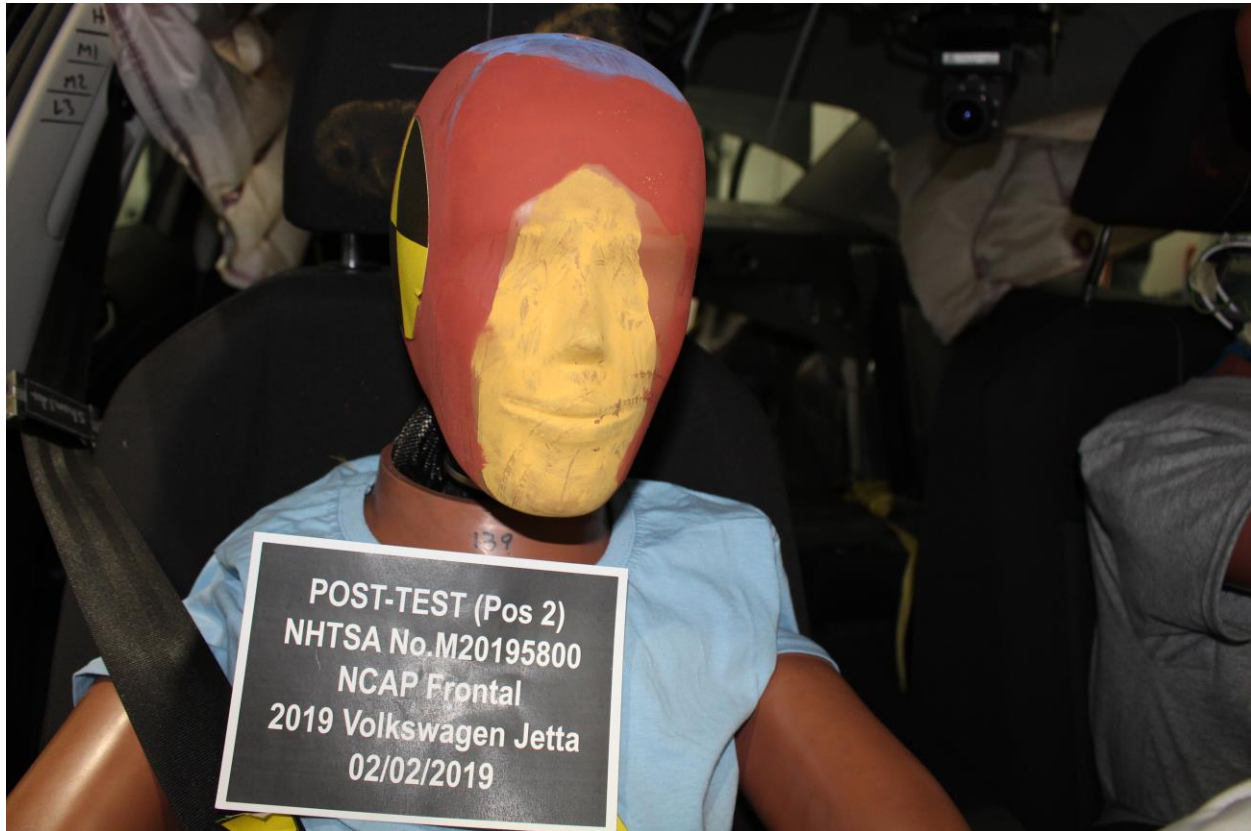
**Figure A-64: Post-Test Passenger's Side Knee Bolster**



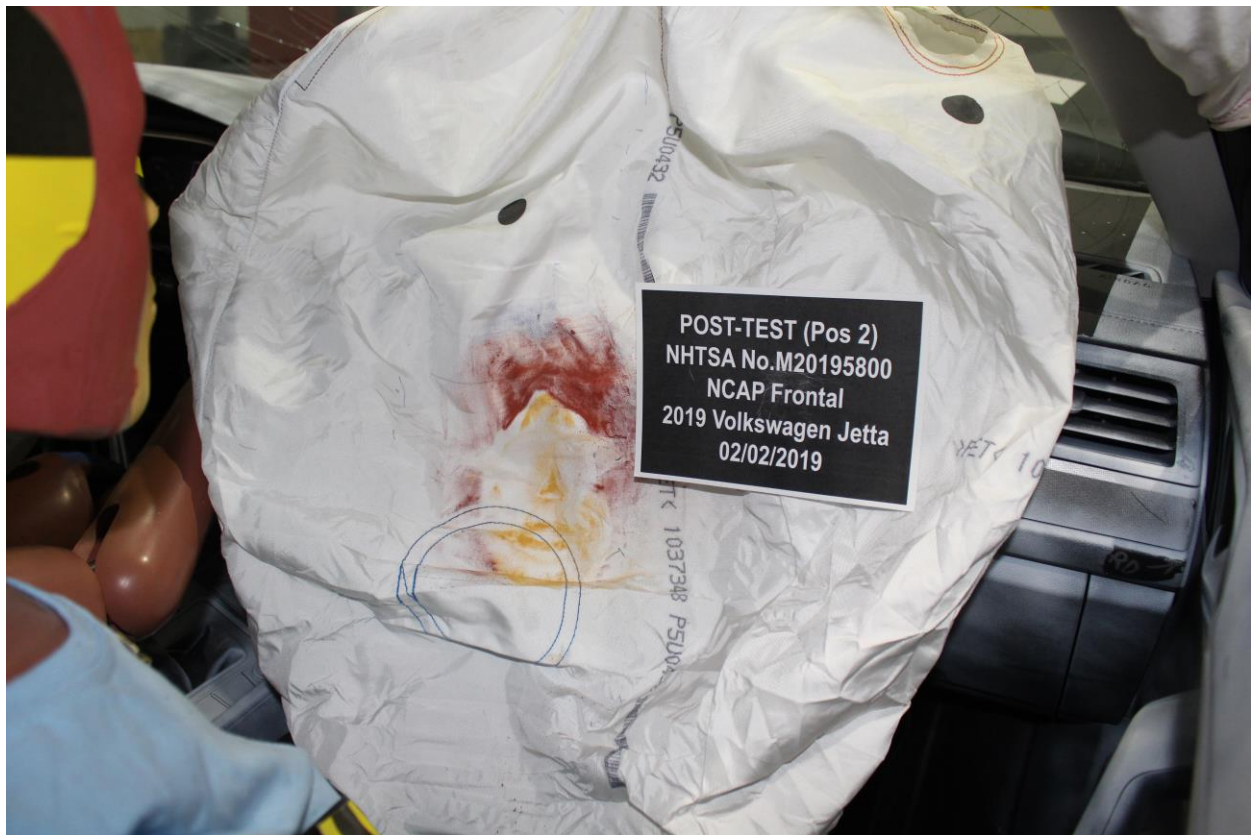
**Figure A-65: Pre-Test Passenger's Side Floorpan**



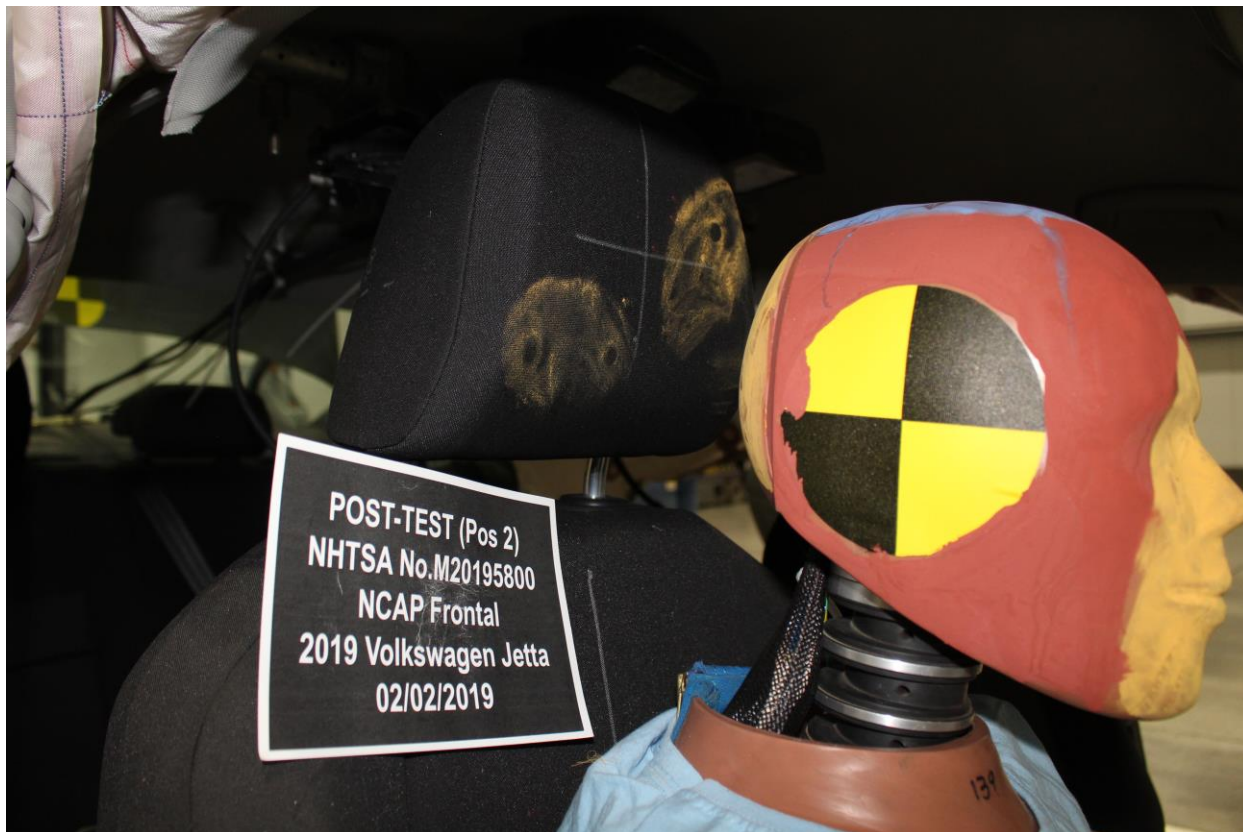
**Figure A-66: Post-Test Passenger's Side Floorpan**



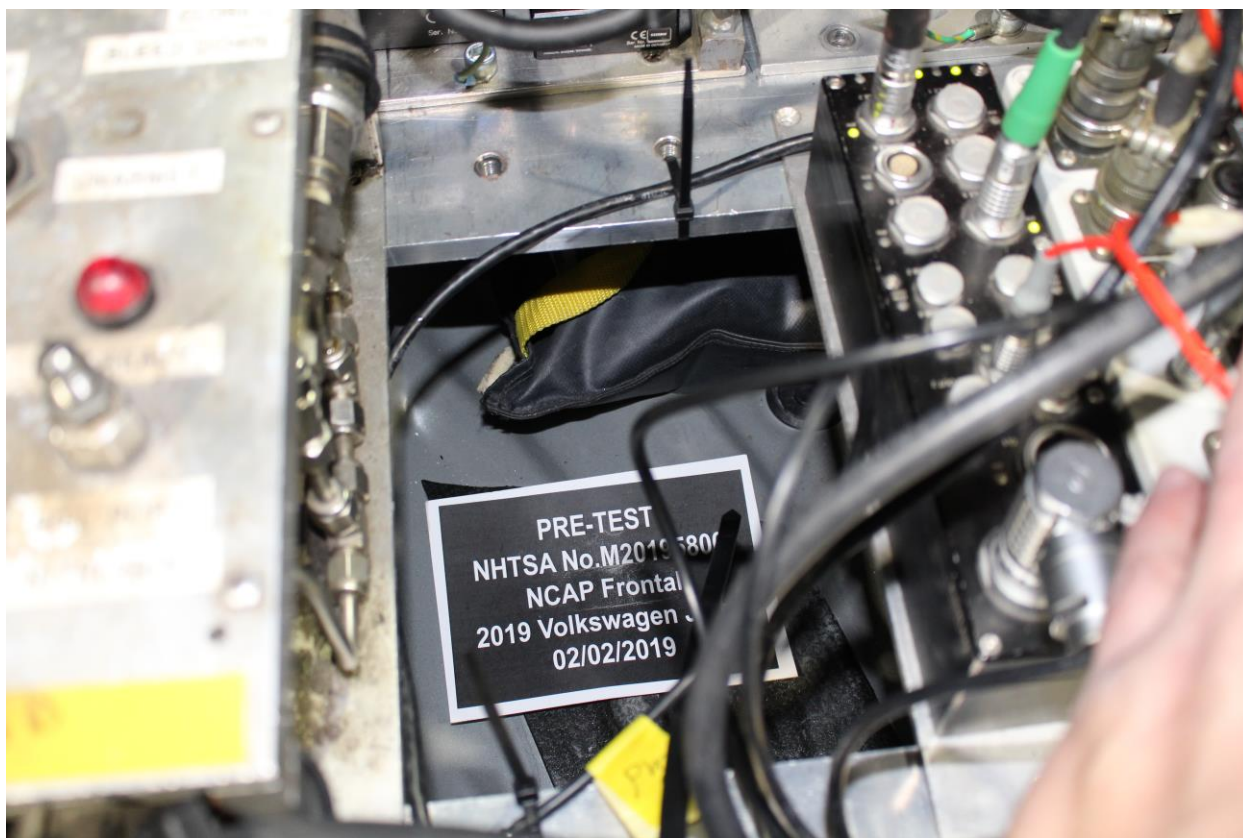
**Figure A-67: Post-Test Passenger Dummy Face**



**Figure A-68: Post-Test Passenger Dummy Contact With Airbag**



**Figure A-69: Post-Test Passenger Dummy Contact With Headrest**



**Figure A-70: Photograph of Ballast Installed in Vehicle**

# Photo Not Applicable

Figure A-71: Post-Test Stoddard Solvent Spillage Location View, If Required



Figure A-72: Post-Test Speed Trap Read-Out



**Figure A-73: Vehicle at 0° on Static Rollover Device**



**Figure A-74: Vehicle at 90° on Static Rollover Device**



**Figure A-75: Vehicle at 180° on Static Rollover Device**



**Figure A-76: Vehicle at 270° on Static Rollover Device**



**Figure A-77: Vehicle at 360° on Static Rollover Device**



**Figure A-78: 2019 Volkswagen Jetta Frontal Impact Event**

## 2019 Jetta 1.4T S

Platinum Gray Metallic Exterior Titan Black Cloth Interior

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**STANDARD FEATURES** (unless replaced by options)

**PERFORMANCE**

- 1.4L TSI® 16-valve DOHC turbo 4-cylinder engine w/ direct fuel injection
- Electro-mechanical power steering w/ variable assistance

**SAFETY FEATURES**

- 3-point safety belts, all seating positions
- Advanced Airbag Protection System w/ 6 airbags
- Anti-lock Braking System (ABS) w/ disc brakes
- Anti-Slip Regulation (ASR) & Engine Brake Assist (EBA)
- Electronic Brake-pressure Distribution (EBD) & Hydraulic Brake Assist (HBA)
- Electronic Stability Control (ESC) & Electronic Differential Lock (EDL)
- Intelligent Crash Response System (ICRS)
- Lower Anchors & Tethers for Children (LATCH)
- Rear View Camera System
- Tire Pressure Monitoring System (TPMS)

**EXTERIOR**

- 16" alloy wheels w/ all-season tires
- Automatic LED headlights w/ LED Daytime Running Lights (DRL)
- LED taillights
- Foldable, power adjustable side mirrors
- Variable intermittent front wipers

**INTERIOR**

- Manual climate control
- 3-spoke, multi-function steering wheel
- Tilt & telescoping adjustable steering column
- Driver's seat: 6-way manual including height adjustment
- Front passenger seat: 4-way manual
- Rear seat: 3-passenger, 60/40 split-folding
- Cloth seating surfaces
- Front center console w/ cup holders, armrest & storage
- Front row floor mats

**TECHNOLOGY**

- Eco Mode Selection
- Compatible Color 8.0" touchscreen AM/FM radio w/ USB input
- 4-speaker sound system
- Bluetooth® connectivity (for compatible devices)
- Cruise control
- Multi-function display (MFD) w/ info computer
- Power door locks w/ remote featuring panic button
- Electric parking brake

**Manufacturer's Suggested Retail Price:** **\$19,345.00**

**VW CAR-NET® EQUIPPED. Features Include:**  
-> App-Connect® (Smartphone Integration & Interface)

**WARRANTY INFORMATION**

- Volkswagen New Vehicle Limited Warranty
- 5 years/72,000 miles (whichever occurs first)
- \* Includes coverage for powertrain components
- Limited Warranty against Corrosion Perforation
- 7 years/100,000 miles (whichever occurs first)

Please ask your dealer for a copy of the Volkswagen warranty booklet for details.

**24-HOUR ROADSIDE ASSISTANCE**

- 3 years/36,000 miles (whichever occurs first)
- (Towing, Jump Starts, Tire Changes, Out of Fuel, and Lock-Out)
- Provided by a third party supplier

**PACKAGES/OPTIONS**

Platinum Gray Metallic Exterior No Charge

Titan Black Cloth Interior No Charge \$400.00

Driver Assistance Package:  
Forward Collision Warning & Autonomous Emergency Braking (Front Assist), Blind Spot Monitor w/ Rear Traffic Alert, Heated side mirrors \$235.00

Monitor Mate® w/ Logo (set of 4) & Heavy Duty Trunk Liner w/ VW CarGo Blocks \$85.00

Roadside Assistance 1st No Charge

8-Speed Automatic w/ Tiptronic®

Destination Charge **\$895.00**

**Total Price: \$21,010.00**

Fuel, license, title fees, taxes and dealer-installed accessories are not included.

Who better to get you into a Volkswagen than us?

---

**PARTS CONTENT INFORMATION**

FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN

FOR THIS VEHICLE: FINAL ASSEMBLY POINT: PUEBLA, MEXICO

MAJOR SOURCES OF FOREIGN PARTS CONTENT: COUNTRY OF ORIGIN: GERMANY

ENGINE: GERMANY

TRANSMISSION: JAPAN

GERMANY: 30%

MEXICO: 28%

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

**EPA DOT Fuel Economy and Environment** Gasoline Vehicle

**Fuel Economy** **34** **30** **40** **MPG**

combined city/hwy city highway

2.9 gallons per 100 miles

Compact Cars range from 14 to 107 MPG. The best vehicle rates 136 MPG.

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

**Annual fuel cost \$1,100**

**Fuel Economy & Greenhouse Gas Rating** (tailpipe only) **8**

**Smog Rating** (tailpipe only) **7**

This vehicle emits 262 grams of CO<sub>2</sub> per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at [fuelconomy.gov](http://fuelconomy.gov).

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.55 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

[fuelconomy.gov](http://fuelconomy.gov) Calculate personalized estimates and compare vehicles

**SOLD TO: 488158**  
MAGUIRE VOLKSWAGEN  
370 ELMIRA RD  
ITHACA, NY 14850

**SHIP TO: 468158**  
MAGUIRE VOLKSWAGEN  
370 ELMIRA RD  
ITHACA, NY 14850

Port of Entry: DAVISVILLE  
VIN: 3VWC57B8K0M061598

**GOVERNMENT 5-STAR SAFETY RATINGS**

**Overall Vehicle Score** Not Rated

Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	Not Rated
Side Crash	Front Seat Rear Seat	Not Rated Not Rated
Rollover		Not Rated

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.

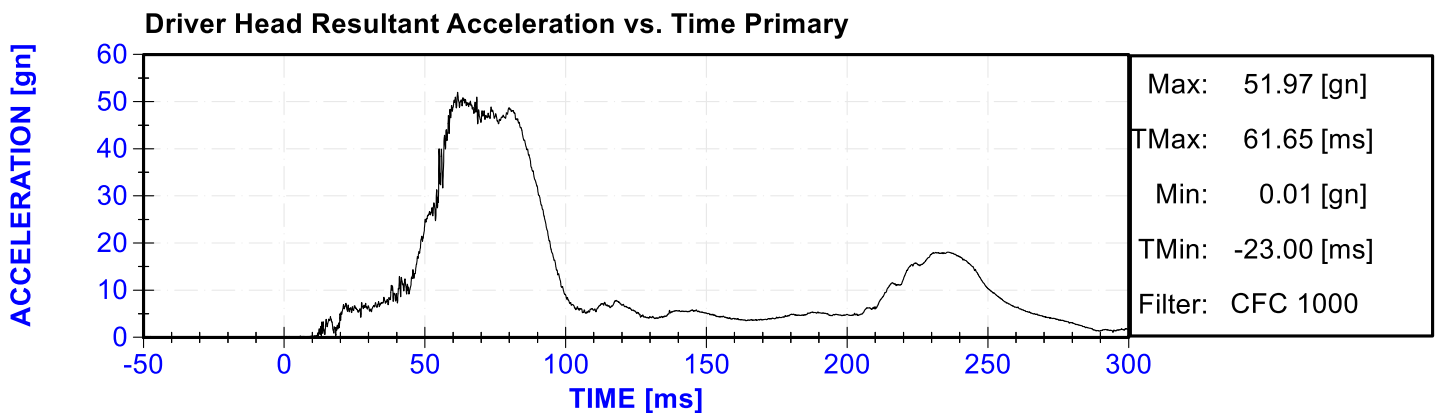
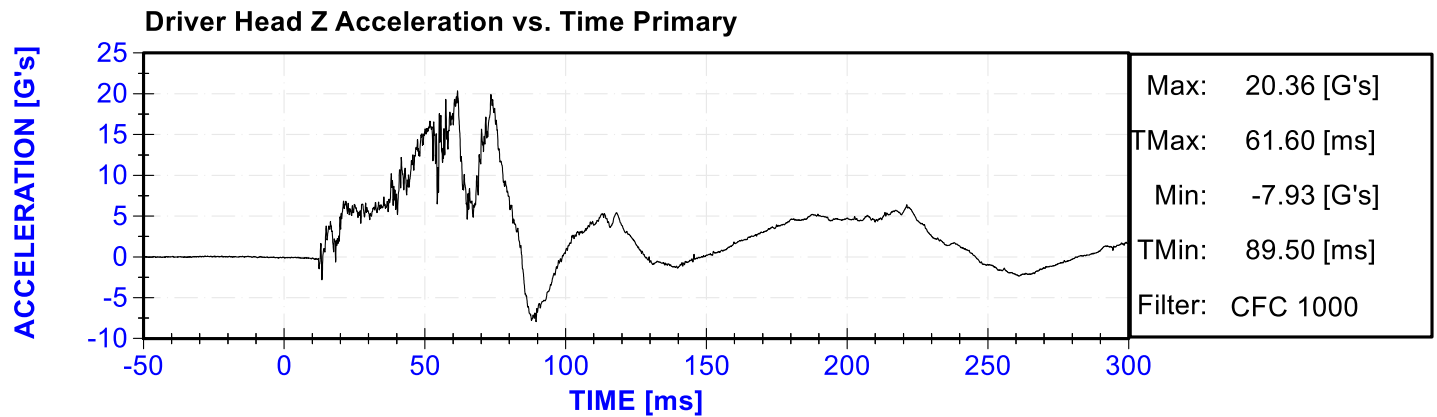
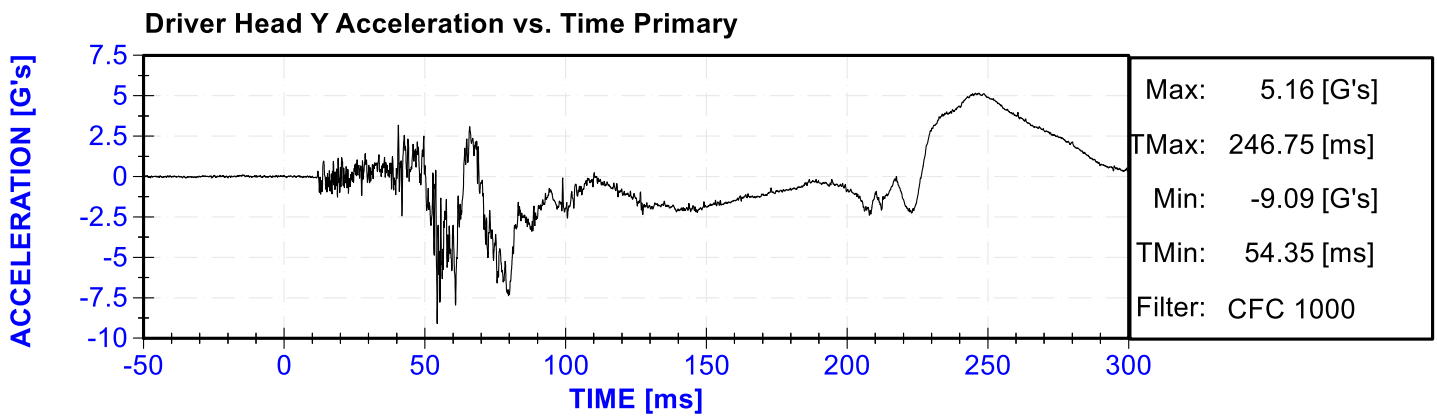
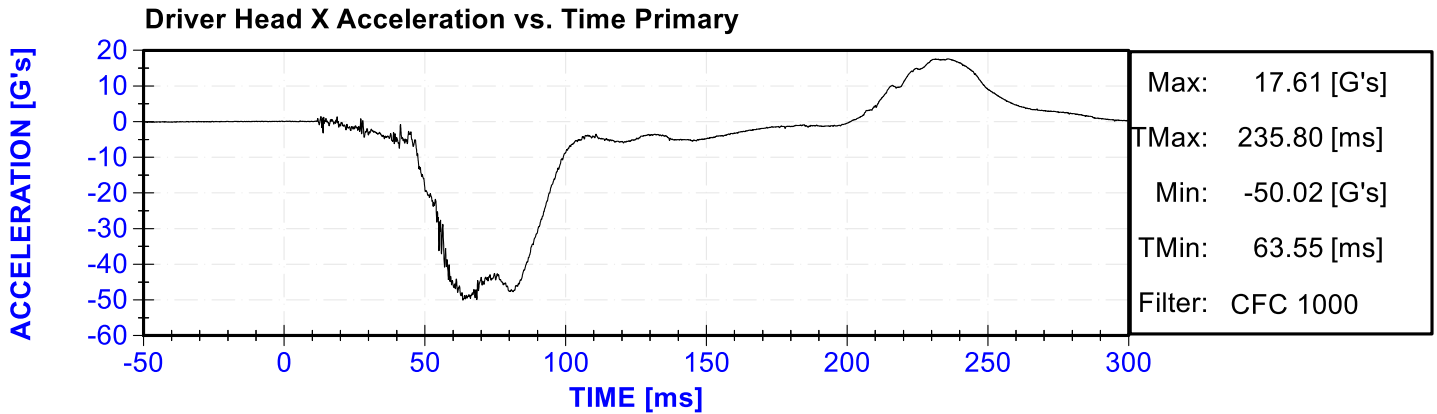
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[www.safercar.gov](http://www.safercar.gov) or 1-888-327-4236

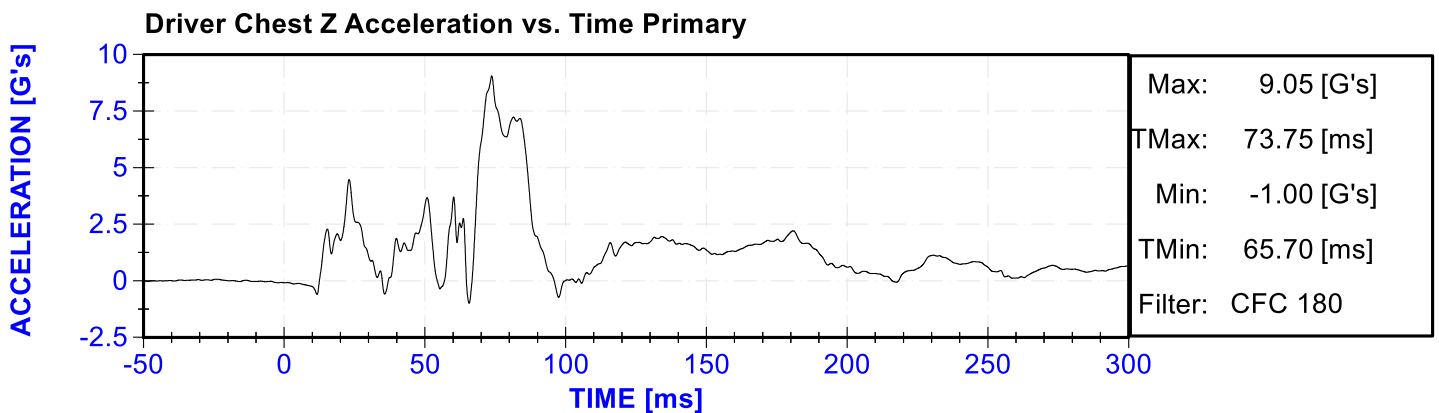
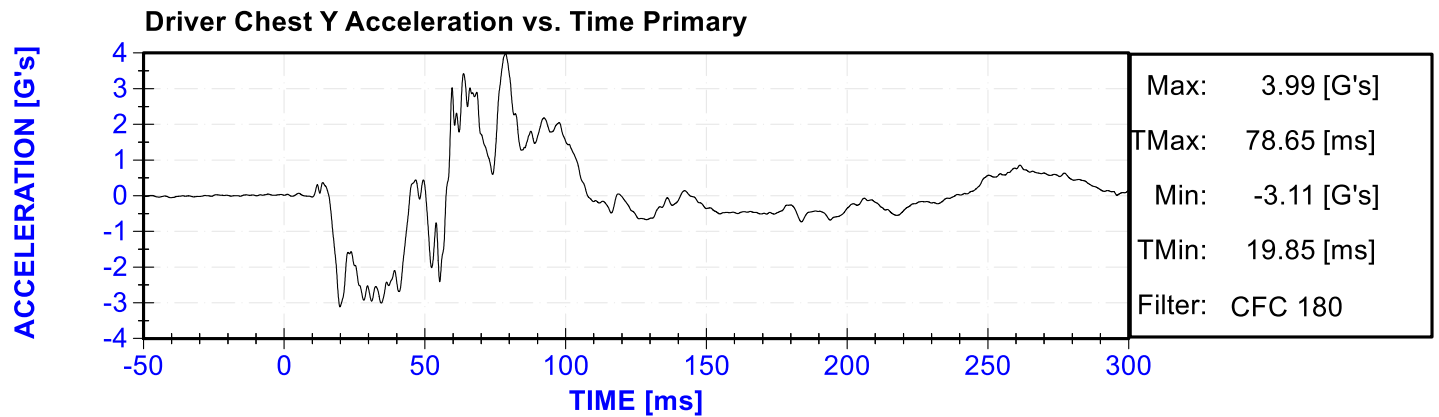
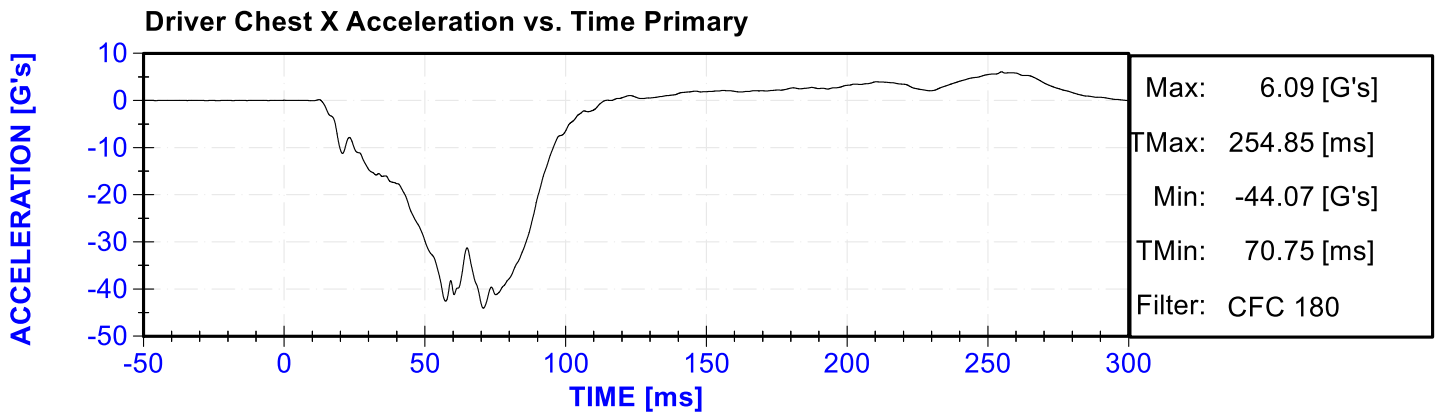
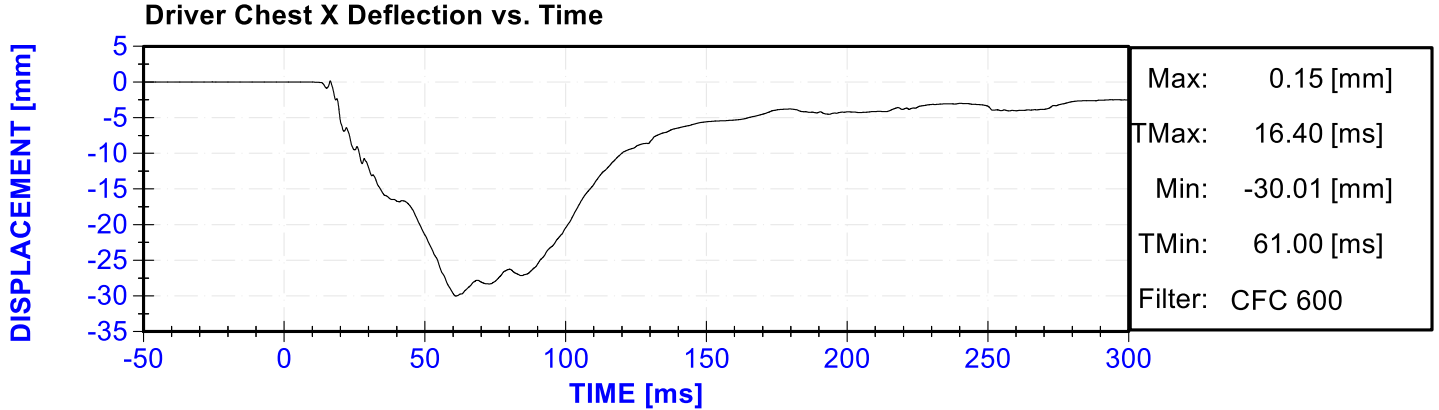
Figure A-79: Monroney Label Photograph

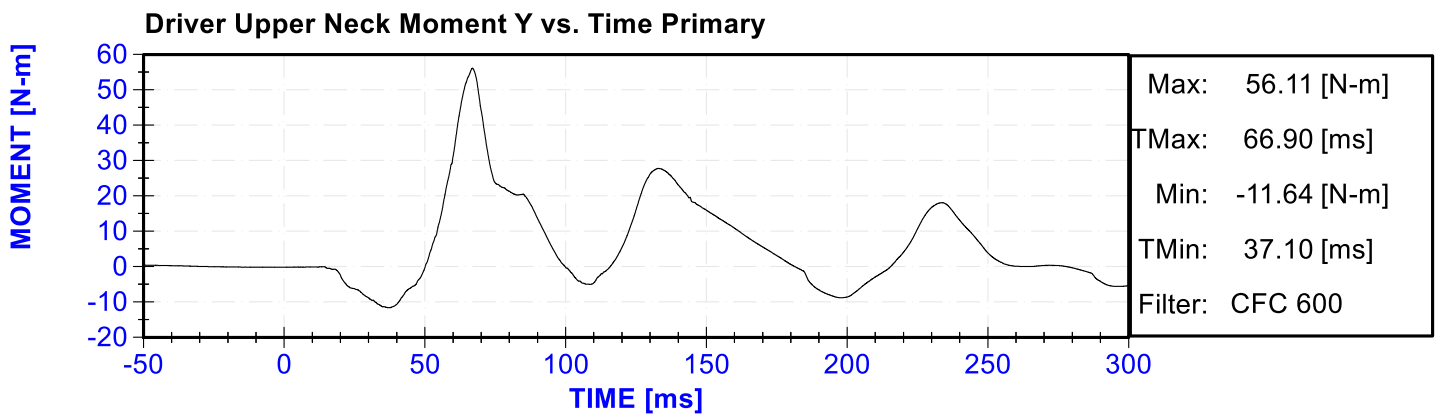
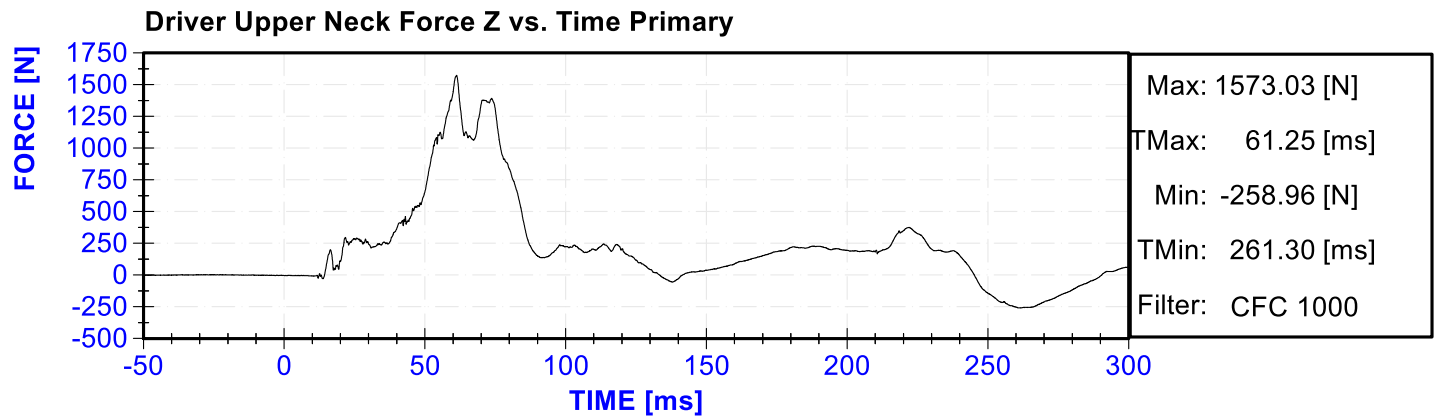
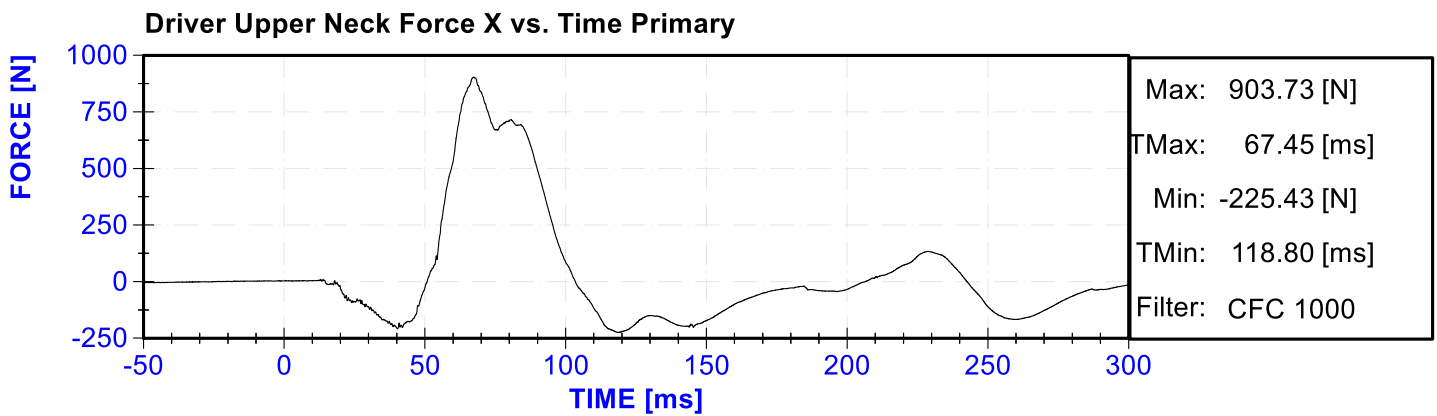
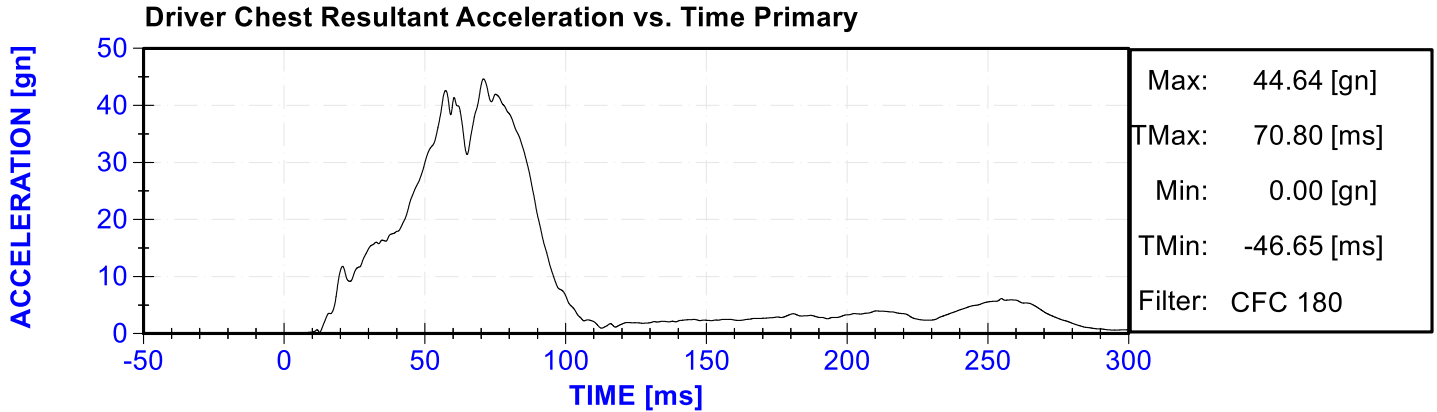
**APPENDIX B**  
**VEHICLE & DUMMY RESPONSE DATA TRACES**

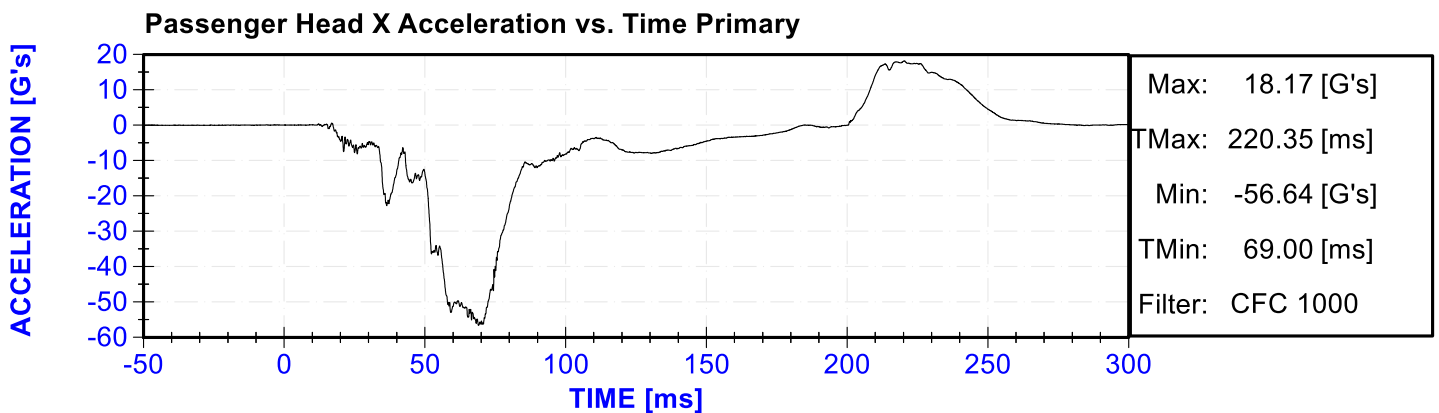
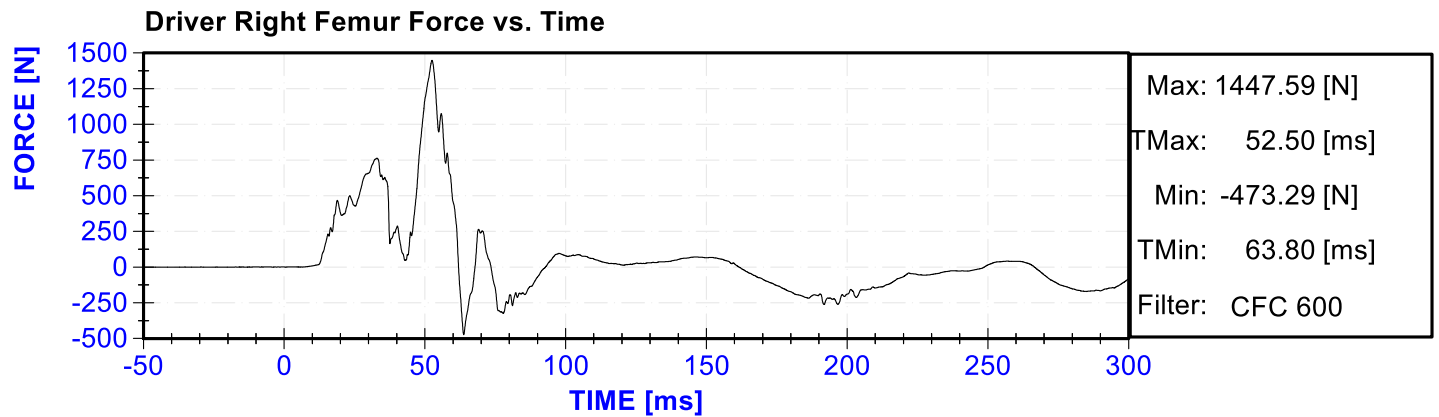
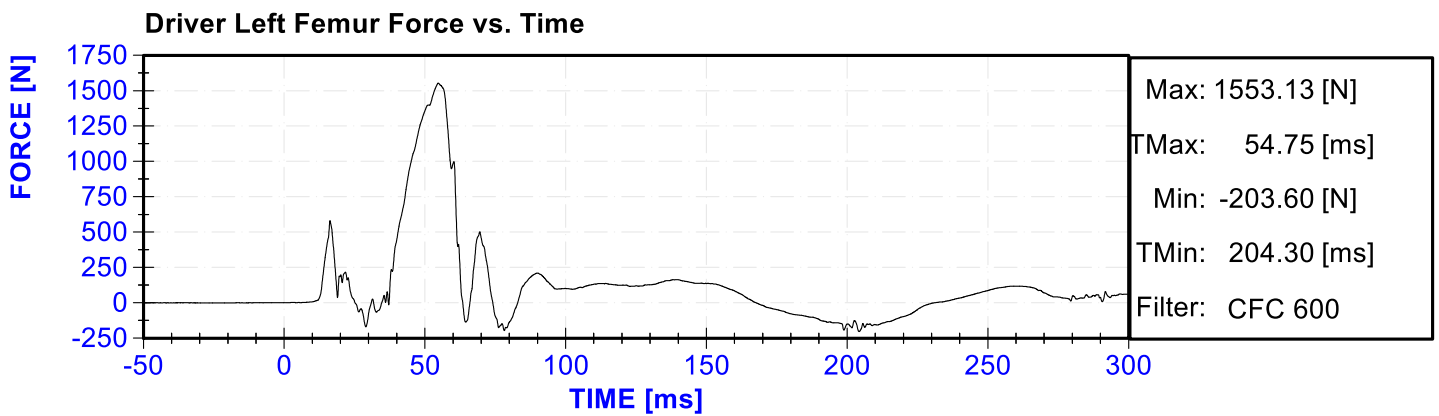
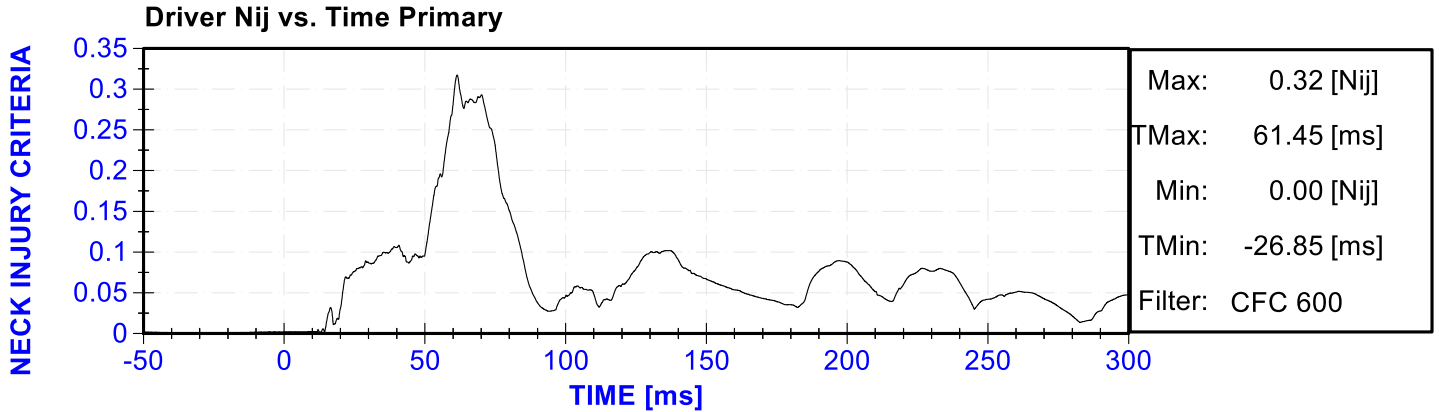
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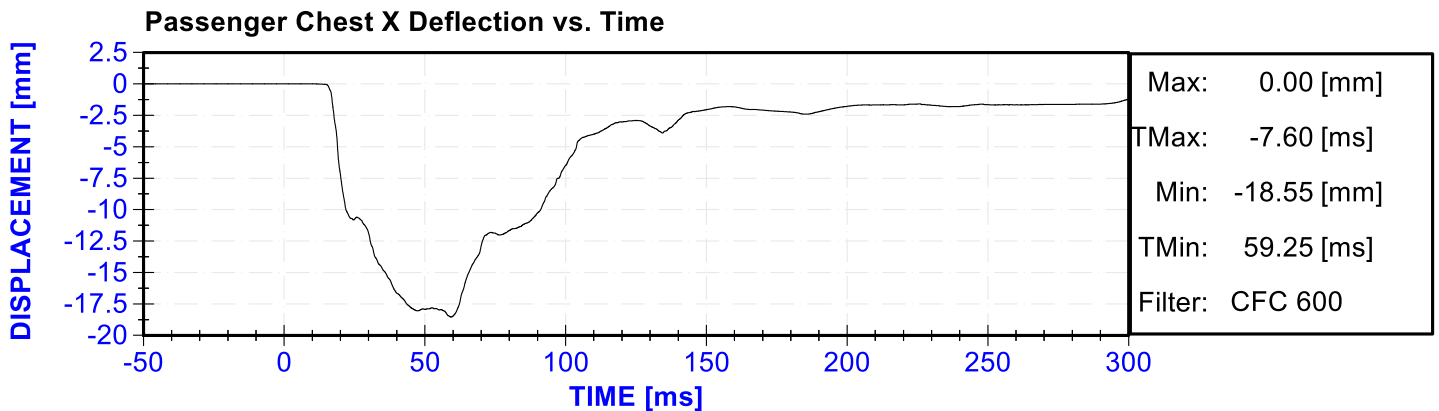
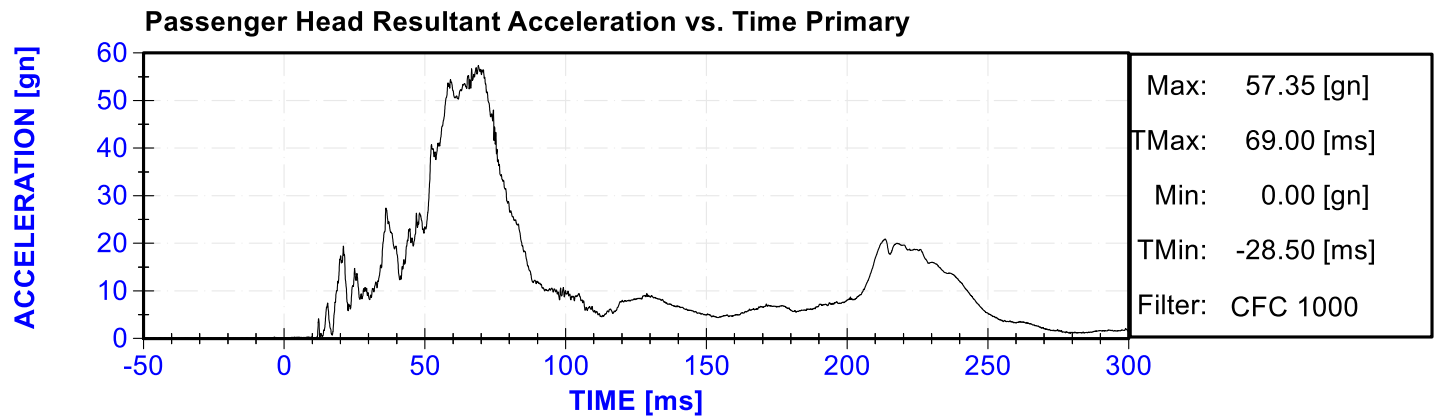
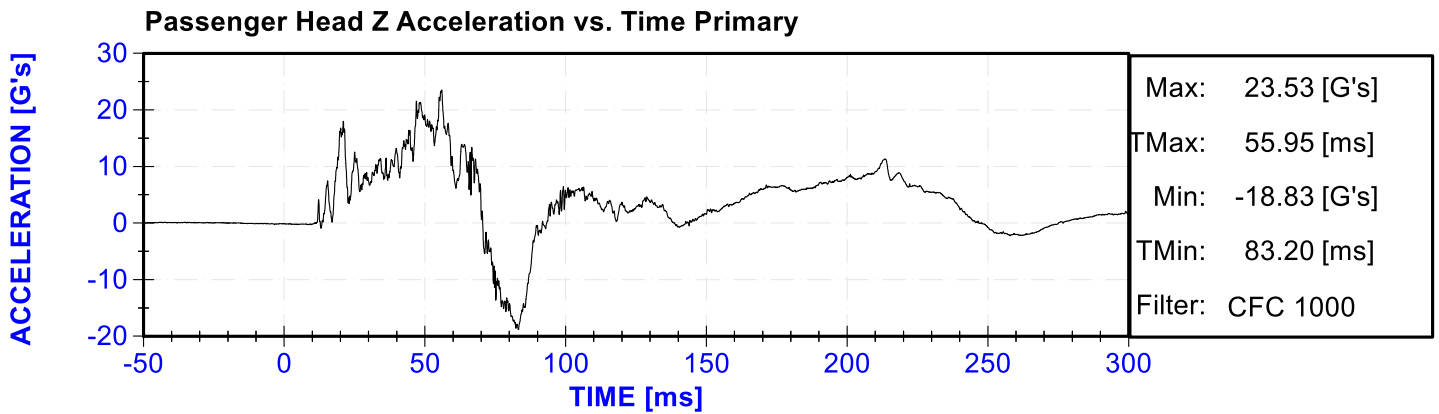
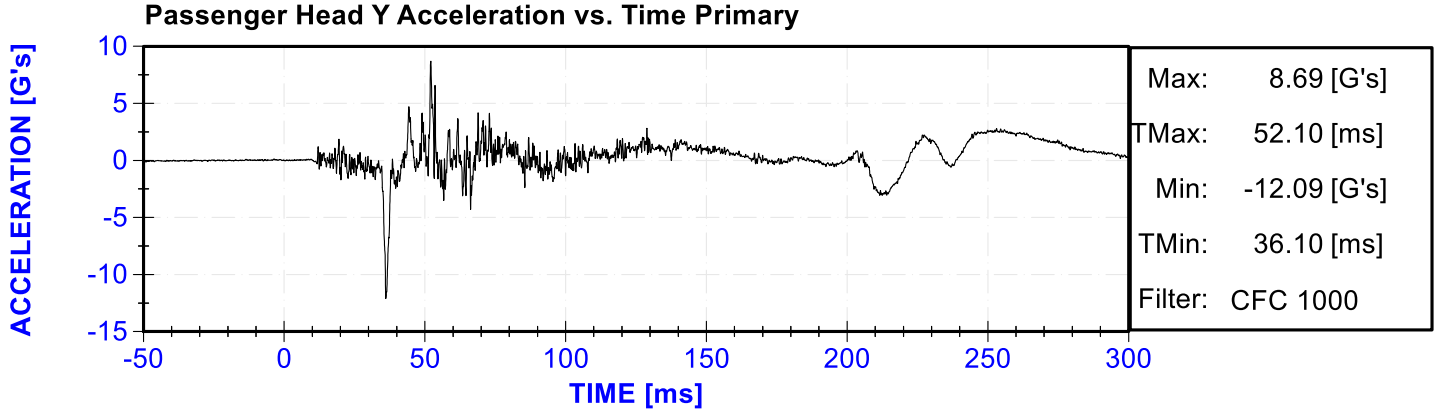
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Plot 2	Driver Head Y Acceleration vs. Time Primary	B-3
Plot 3	Driver Head Z Acceleration vs. Time Primary	B-3
Plot 4	Driver Head Resultant Acceleration vs. Time Primary	B-3
Plot 5	Driver Chest X Deflection vs. Time	B-4
Plot 6	Driver Chest X Acceleration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

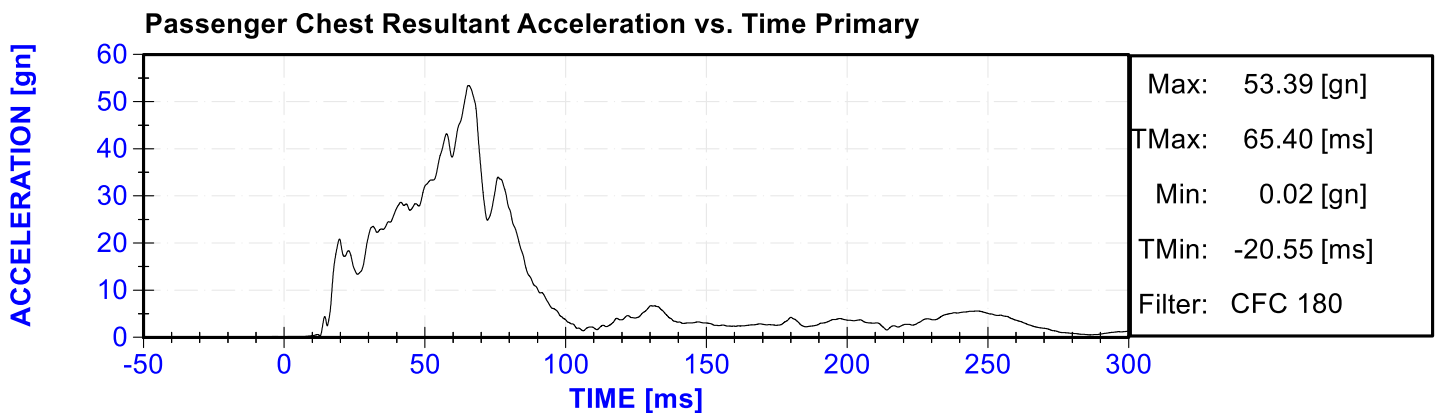
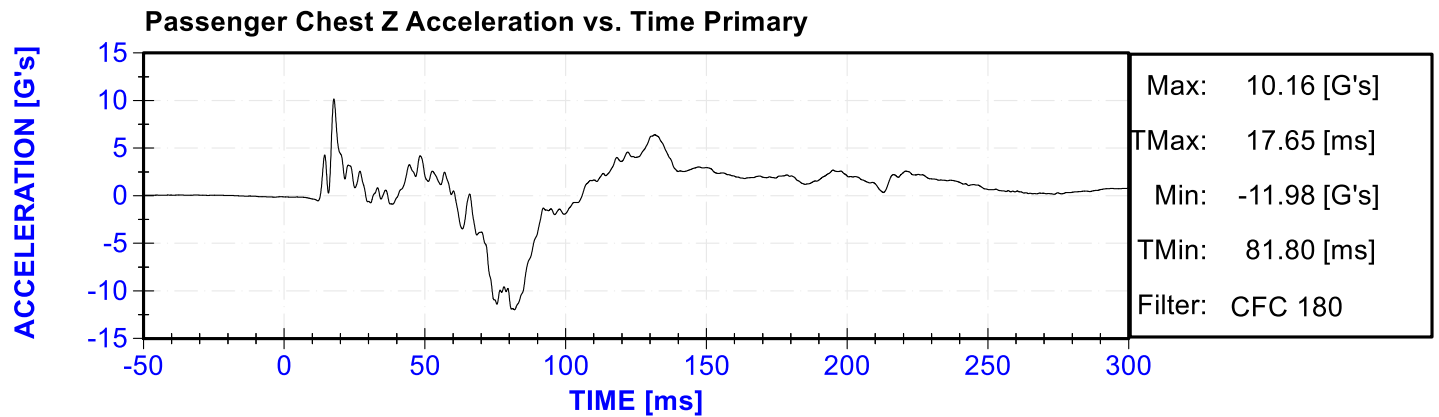
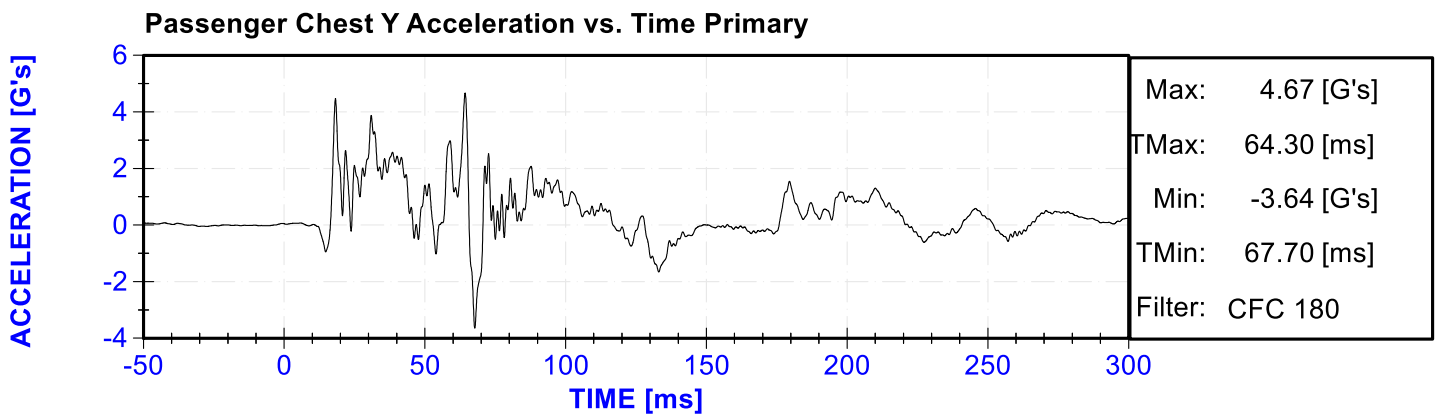
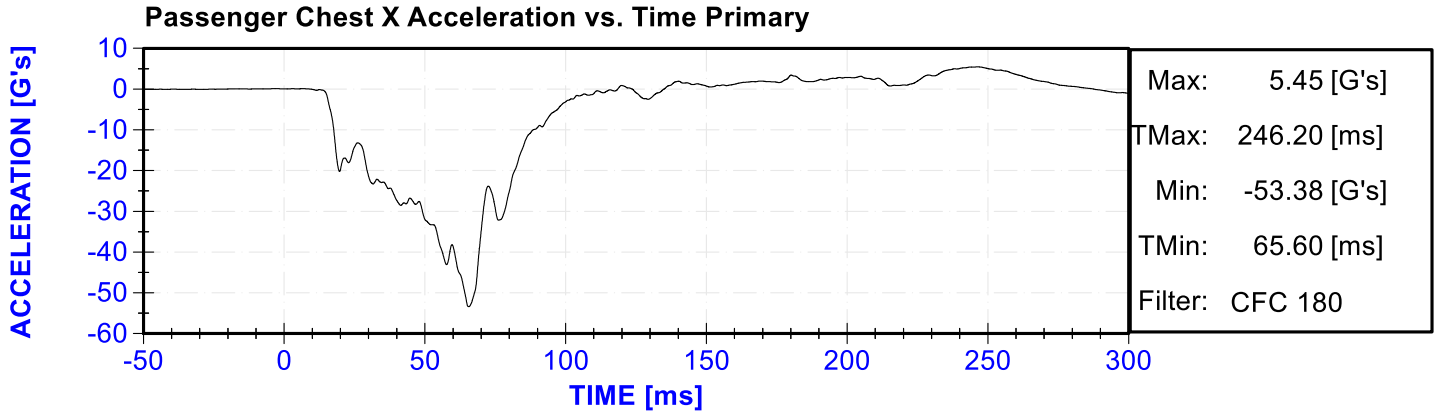




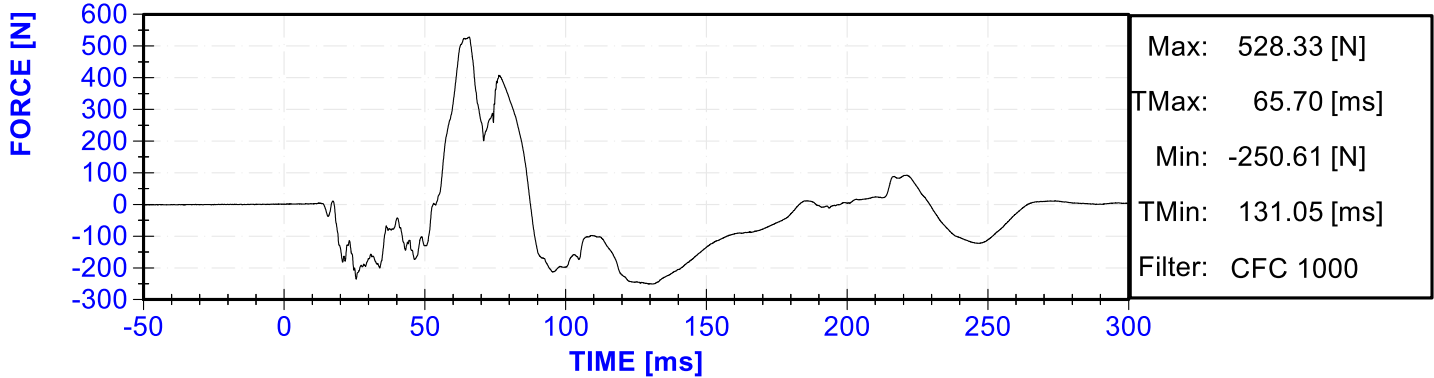




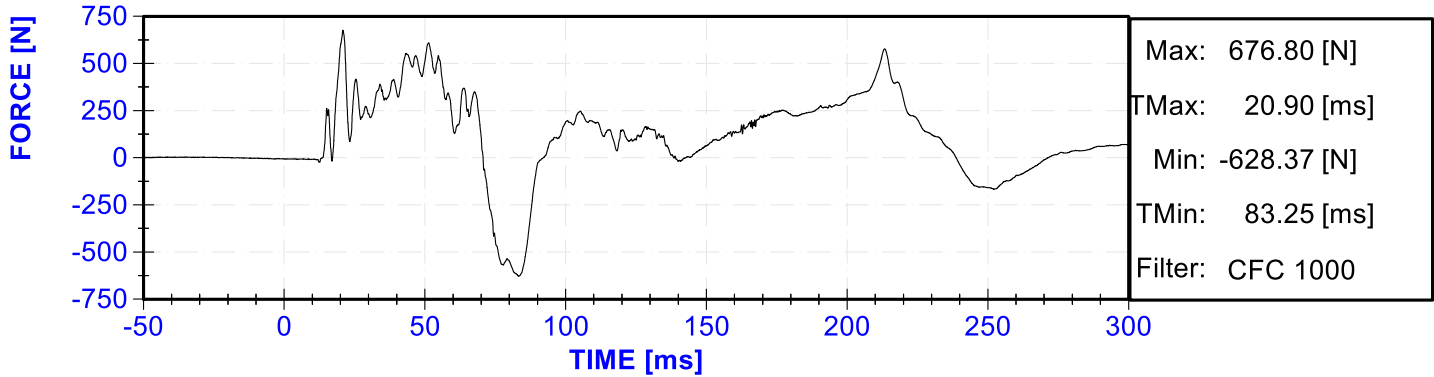




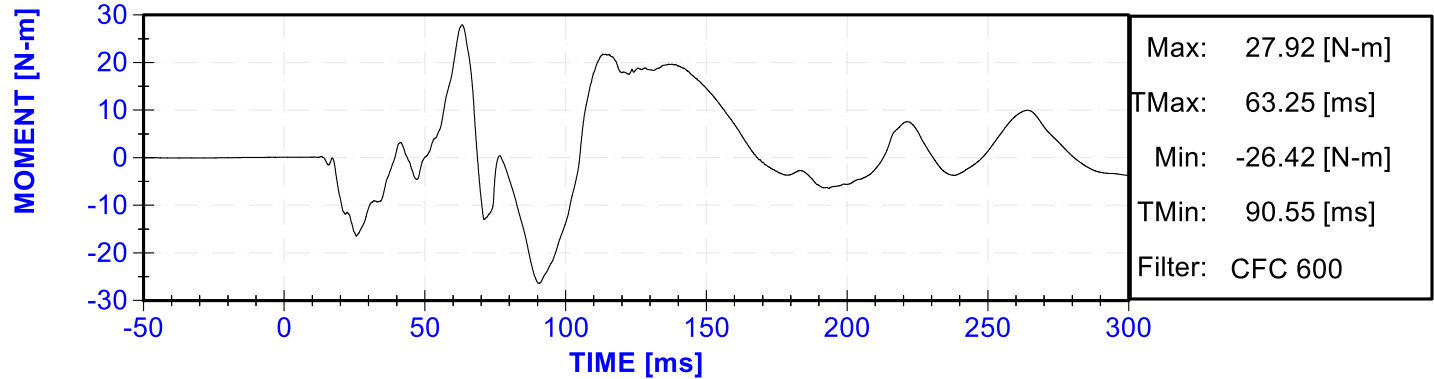
Passenger Upper Neck Force X vs. Time Primary



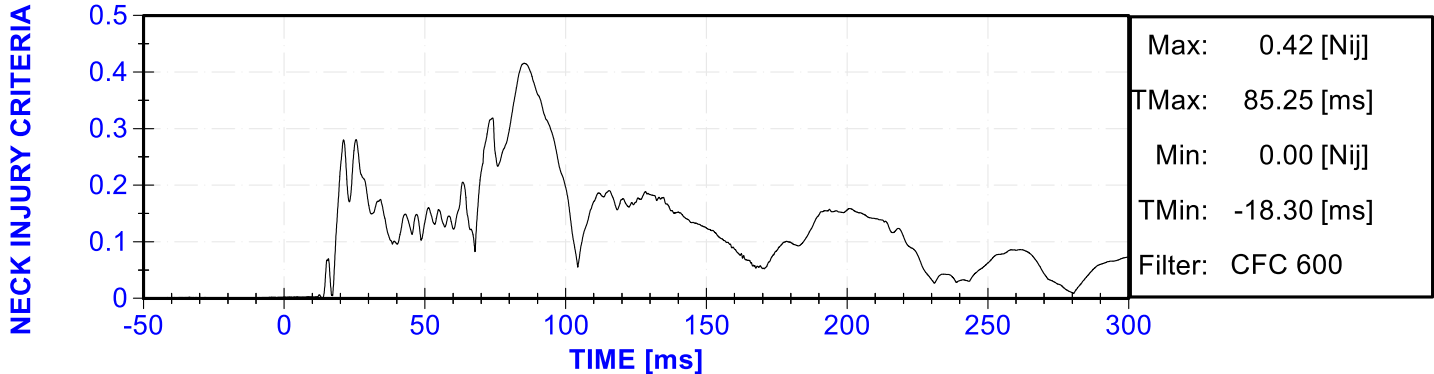
Passenger Upper Neck Force Z vs. Time Primary

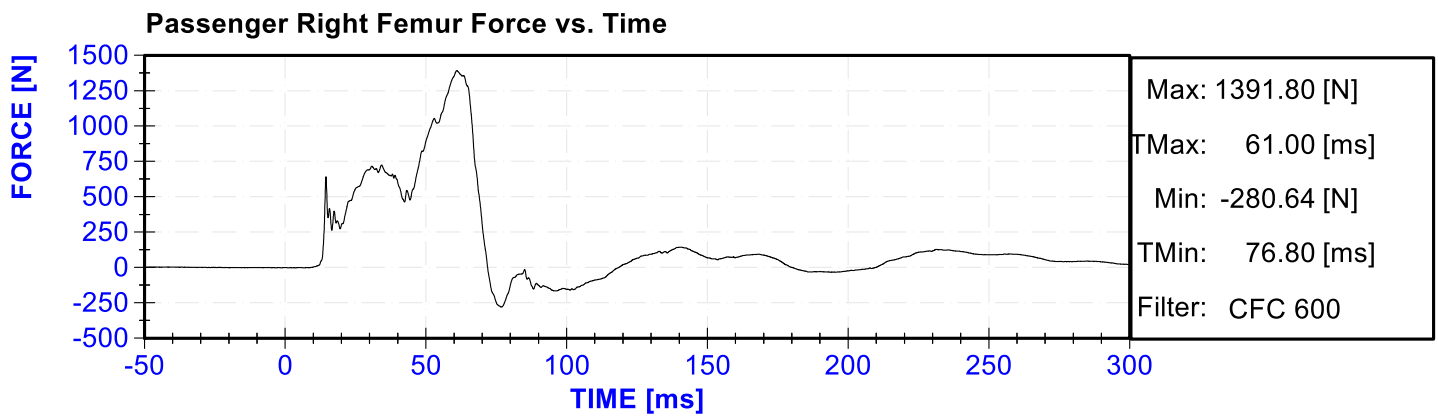
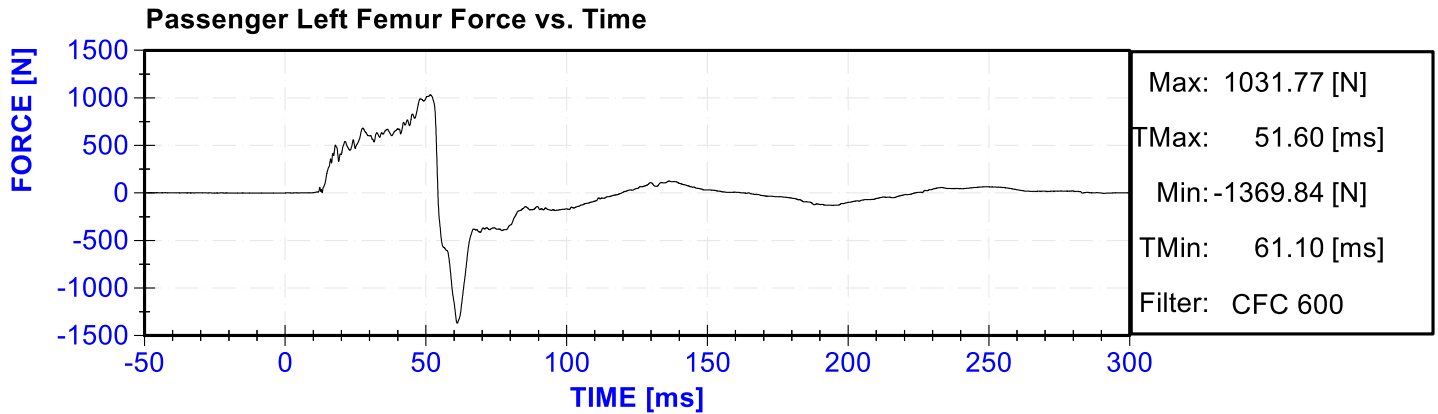


Passenger Upper Neck Moment Y vs. Time Primary



Passenger Nij vs. Time Primary





## **APPENDIX C**

### **DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA**

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**HYBRID III 50<sup>TH</sup> PERCENTILE MALE - DRIVER ATD**

**SERIAL NO: 142**

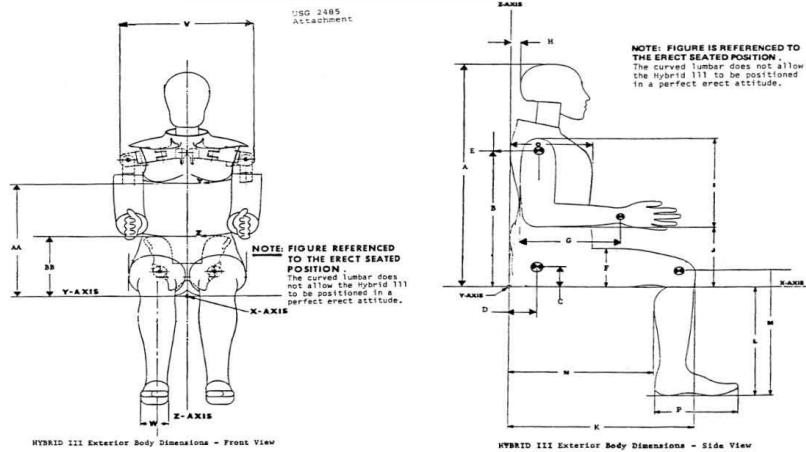


External Measurements - Hybrid 3 - 50th Male

Technician: K. Dutton

Date: 01/14/2019

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	20.2	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.4	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	17.3	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	10.2	Pass
V	Shoulder Breadth	16.3	17.2	16.7	Pass
W	Foot Breadth	3.6	4.2	3.8	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.9	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

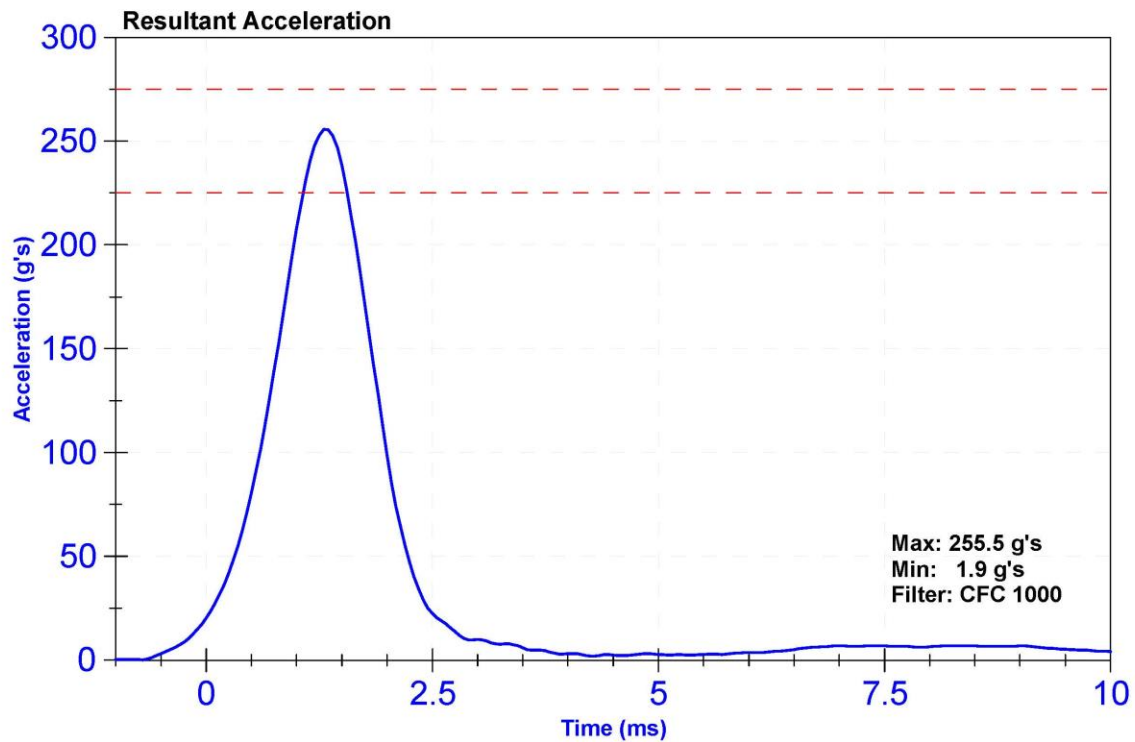
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

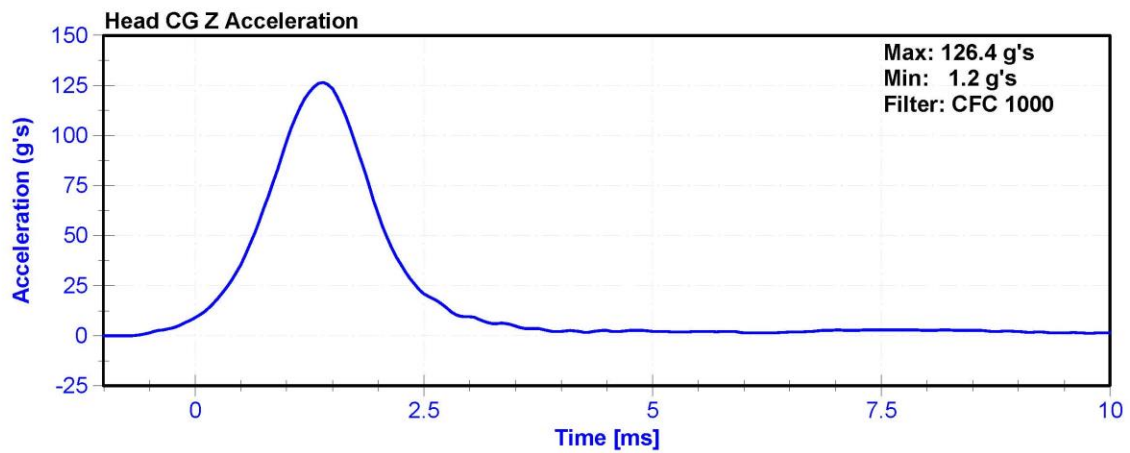
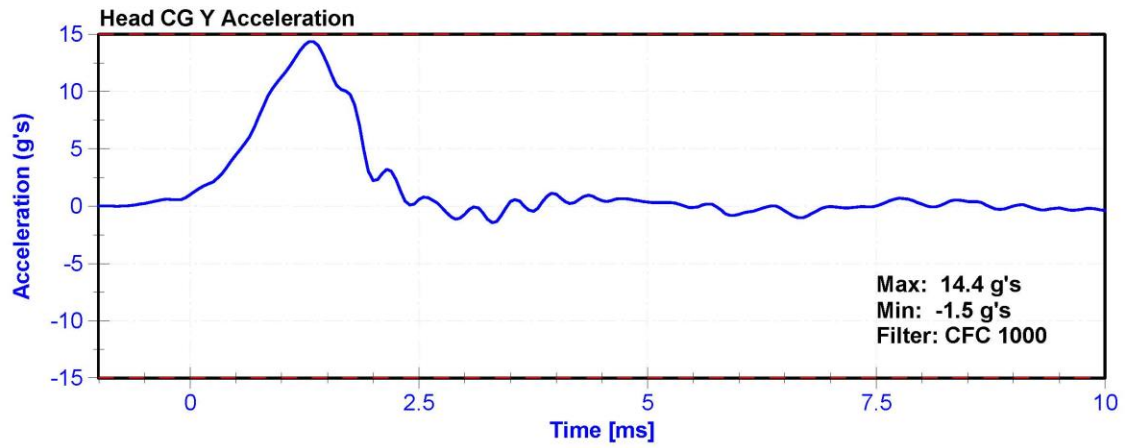
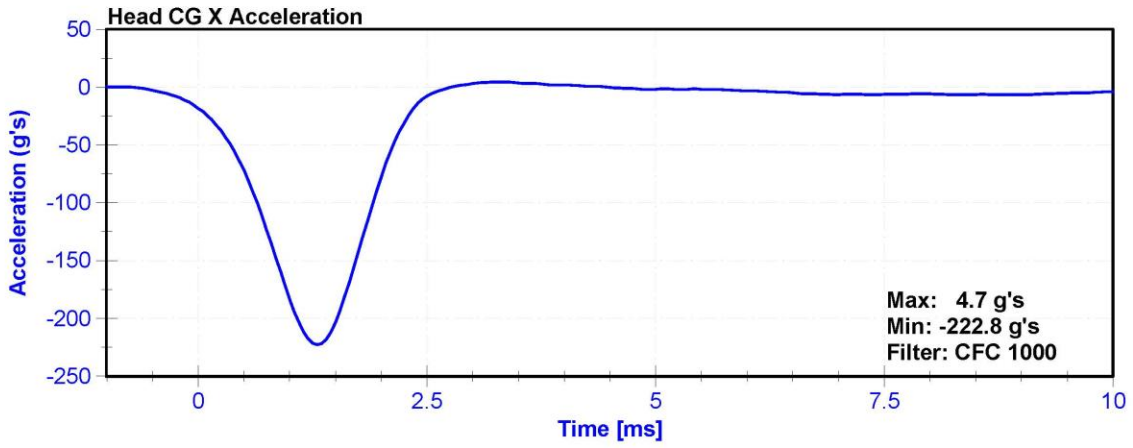
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.1	Pass
Humidity	10	70	%	17.9	Pass
Resultant Acceleration	225	275	g's	255.5	Pass
Oscillation	0	10	%	3.9	Pass
Lateral Acceleration	-15	15	g's	14.4	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58998	10/5/2018	4/5/2019
Y Accelerometer	ENDEVCO 7264CT	AC-P58912	10/6/2018	4/6/2019
Z Accelerometer	ENDEVCO 7264CT	AC-P58997	10/6/2018	4/6/2019





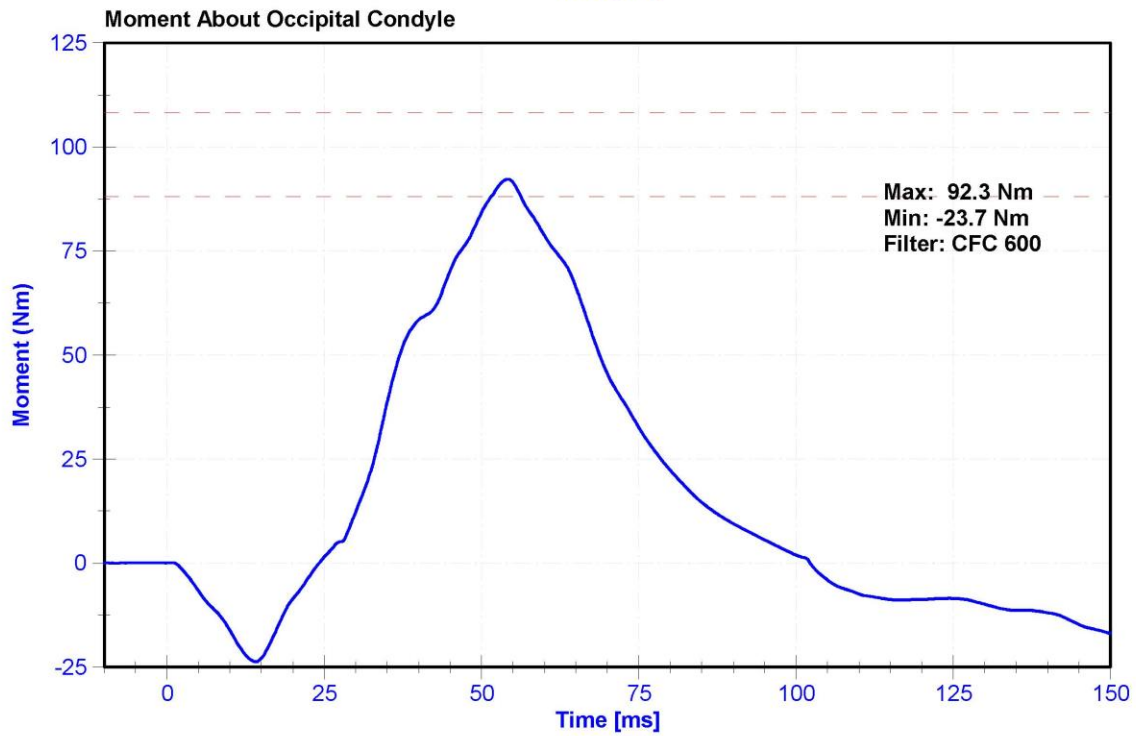
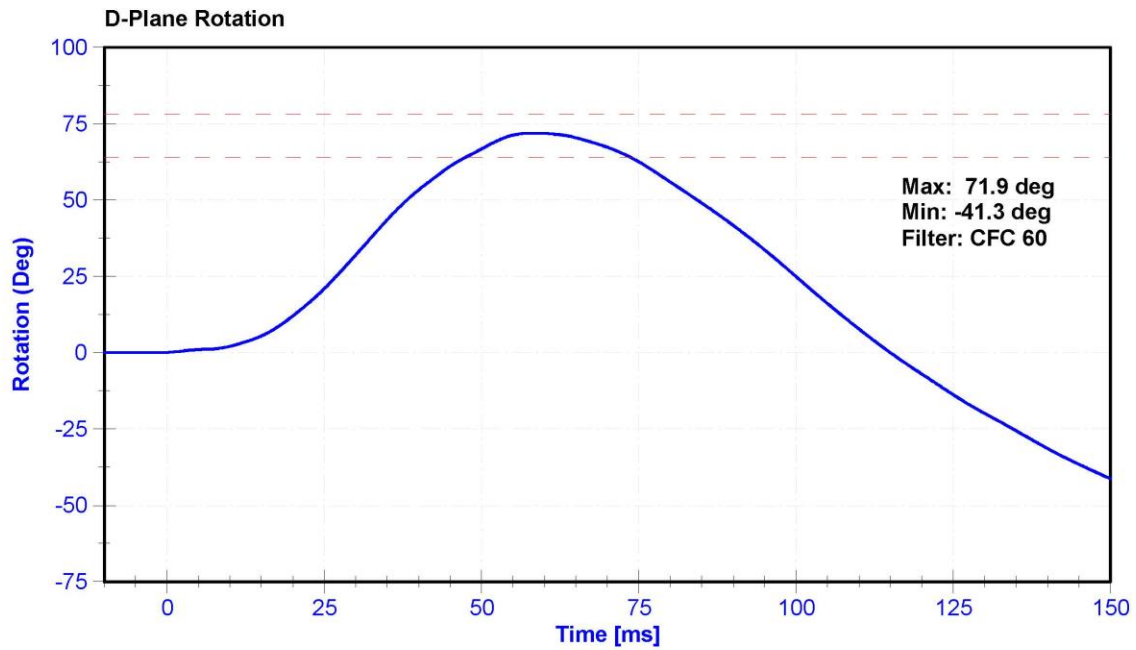
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

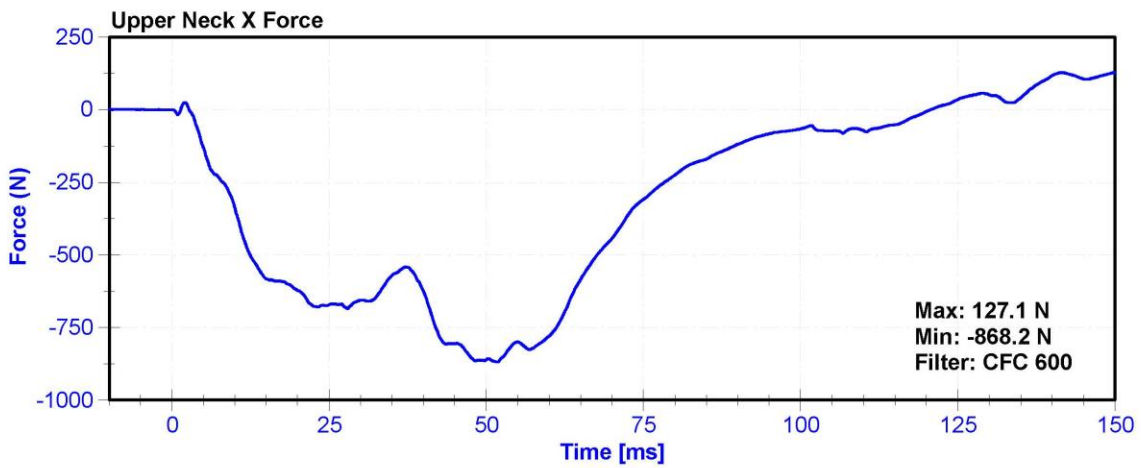
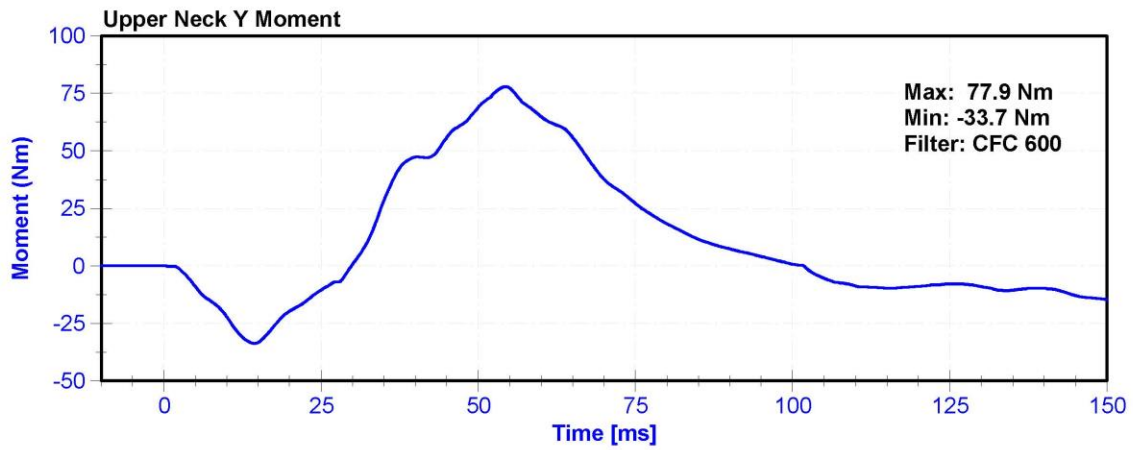
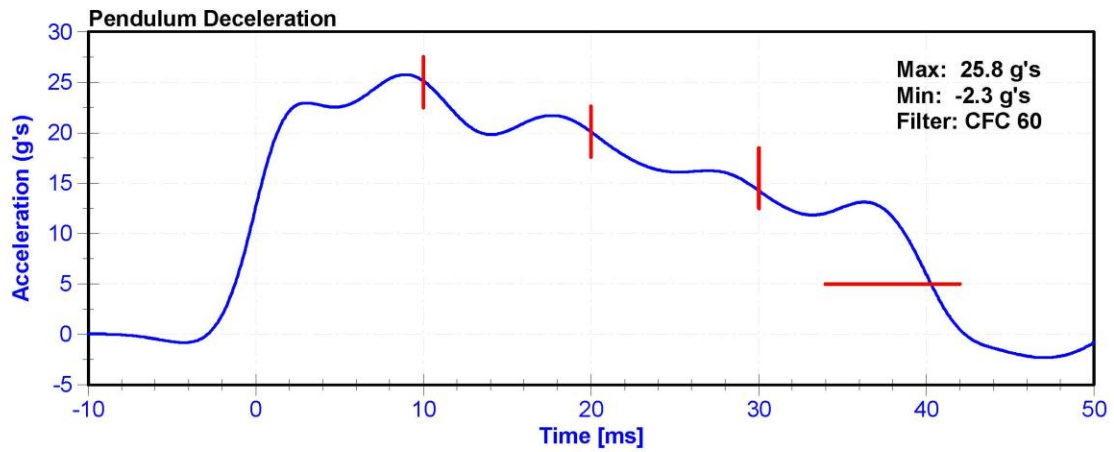
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	18.0	Pass
Velocity	6.89	7.13	m/s	7.037	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	25.13	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	20.09	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	14.27	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	25.8	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	40.3	Pass
Maximum D Plane Rotation	64	78	deg	71.9	Pass
Time to Maximum Rotation	57	64	ms	58.2	Pass
Rotation Decay to Zero	113	127	ms	115.0	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	92.28	Pass
Time to Maximum Moment	47	58	ms	54.1	Pass
Moment Decay to Zero	97	107	ms	102.3	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	9/28/2018	9/28/2019





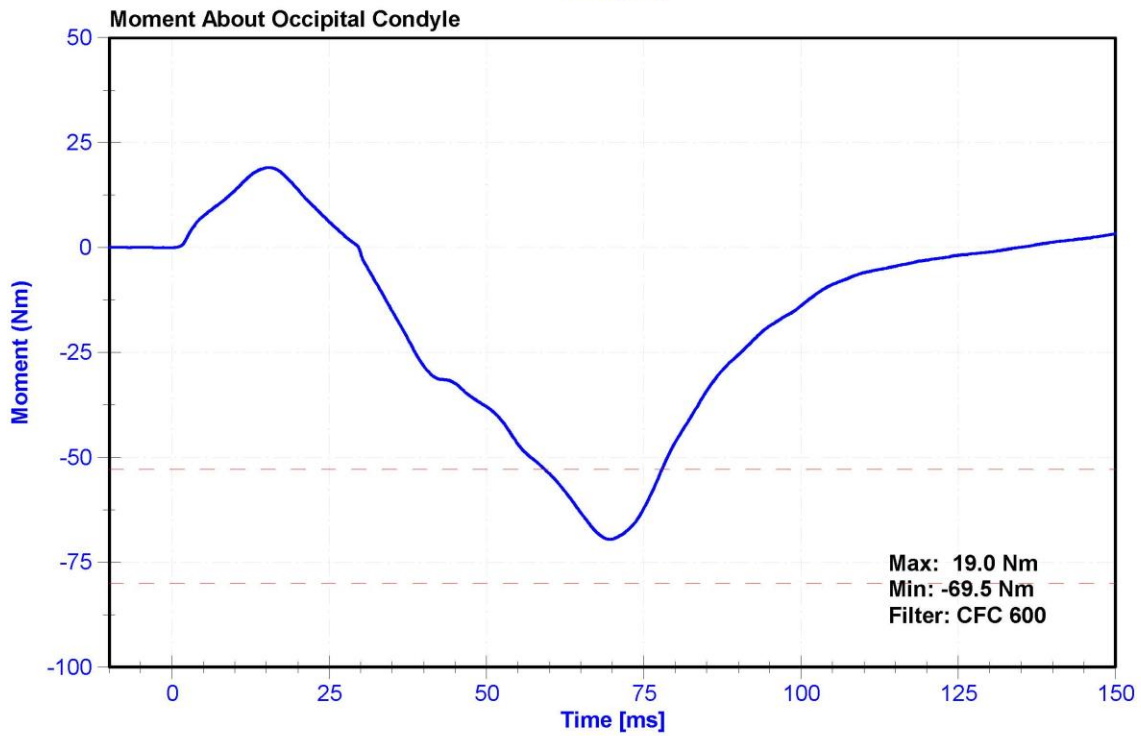
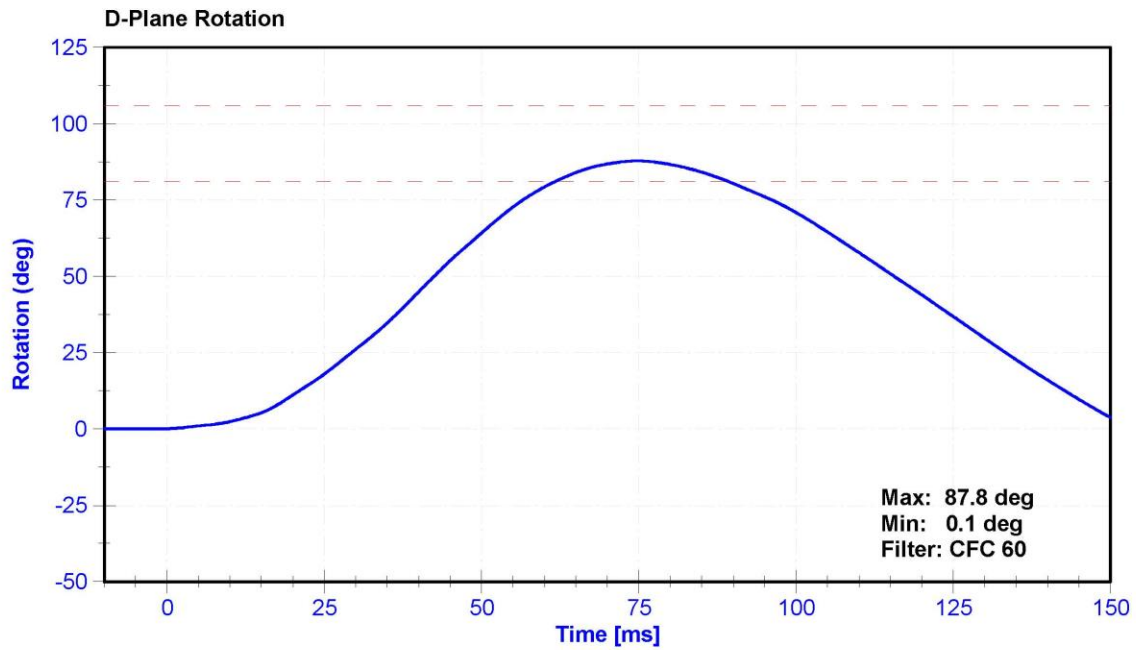
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

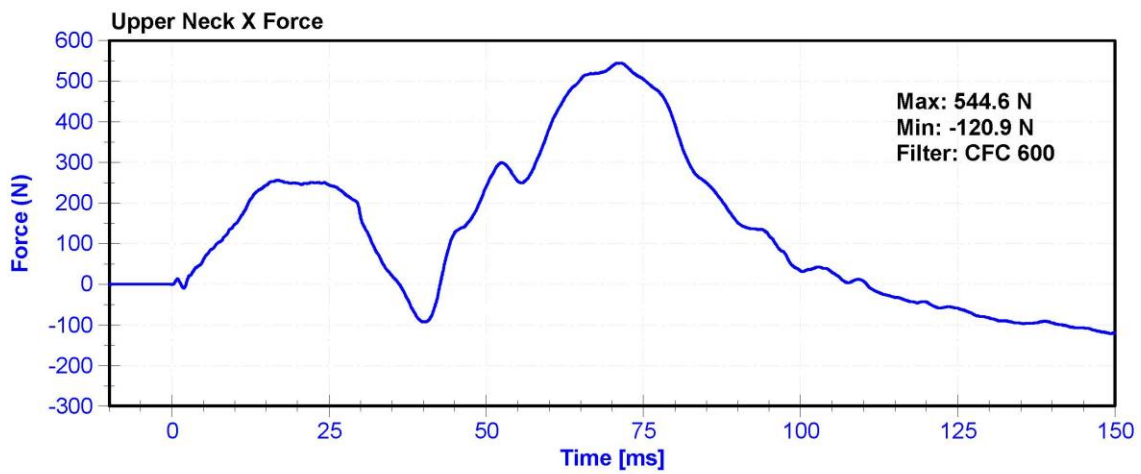
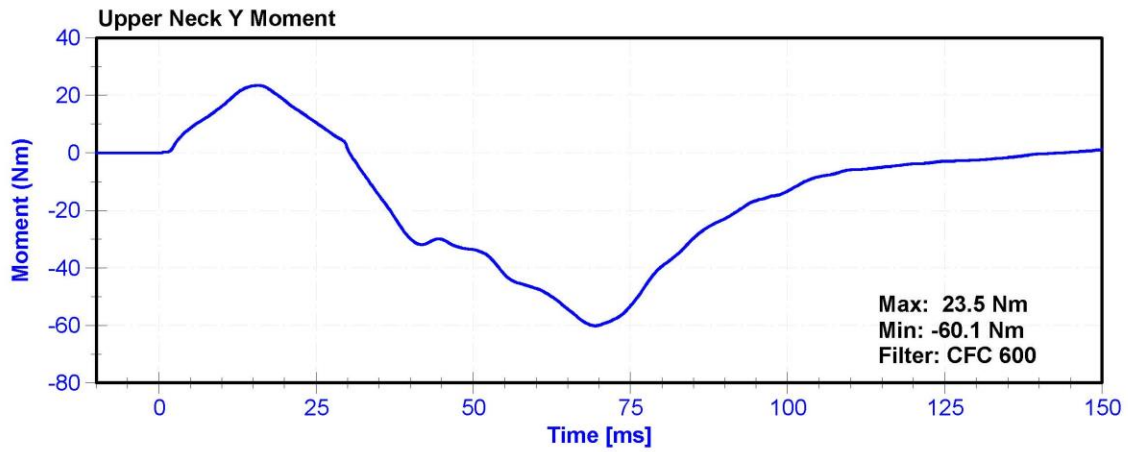
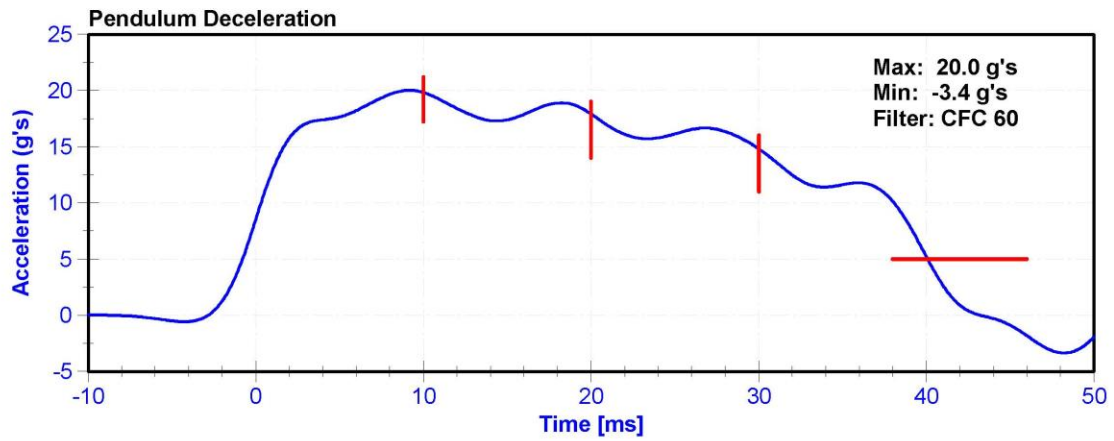
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	19.2	Pass
Velocity	5.94	6.19	m/s	6.068	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.83	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.9	Pass
Pendulum Deceleration at 30ms	11	16	g's	14.8	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	20.0	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	40.1	Pass
Maximum D Plane Rotation	81	106	deg	87.8	Pass
Time to Maximum Rotation	72	82	ms	74.8	Pass
Rotation Decay to Zero	147	174	ms	153.4	Pass
Minimum Moment About OC	-80	-52.9	Nm	-69.52	Pass
Time to Minimum Moment	65	79	ms	69.6	Pass
Moment Decay to Zero	120	148	ms	134.7	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	9/28/2018	9/28/2019





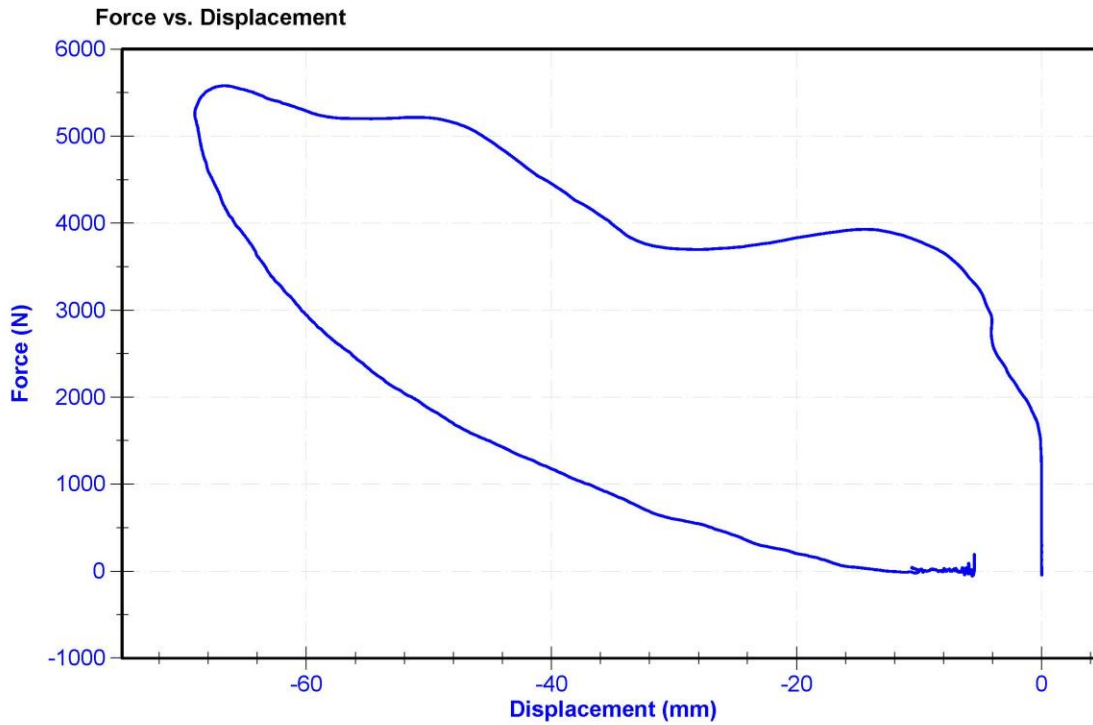
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

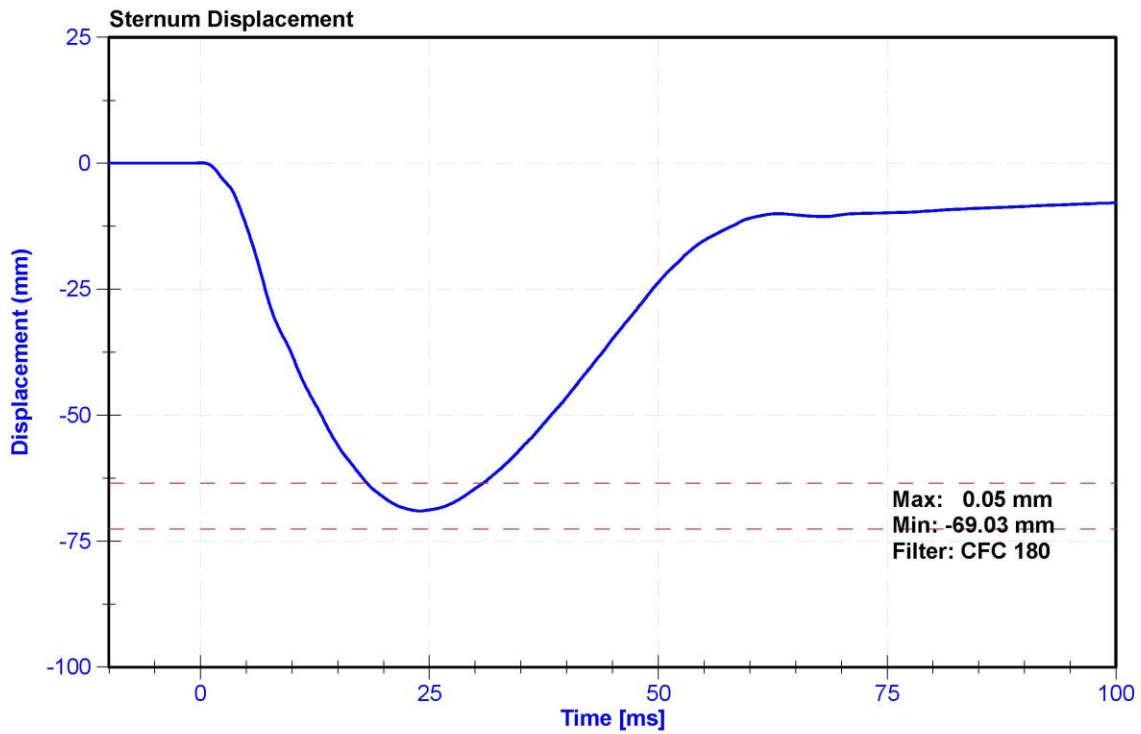
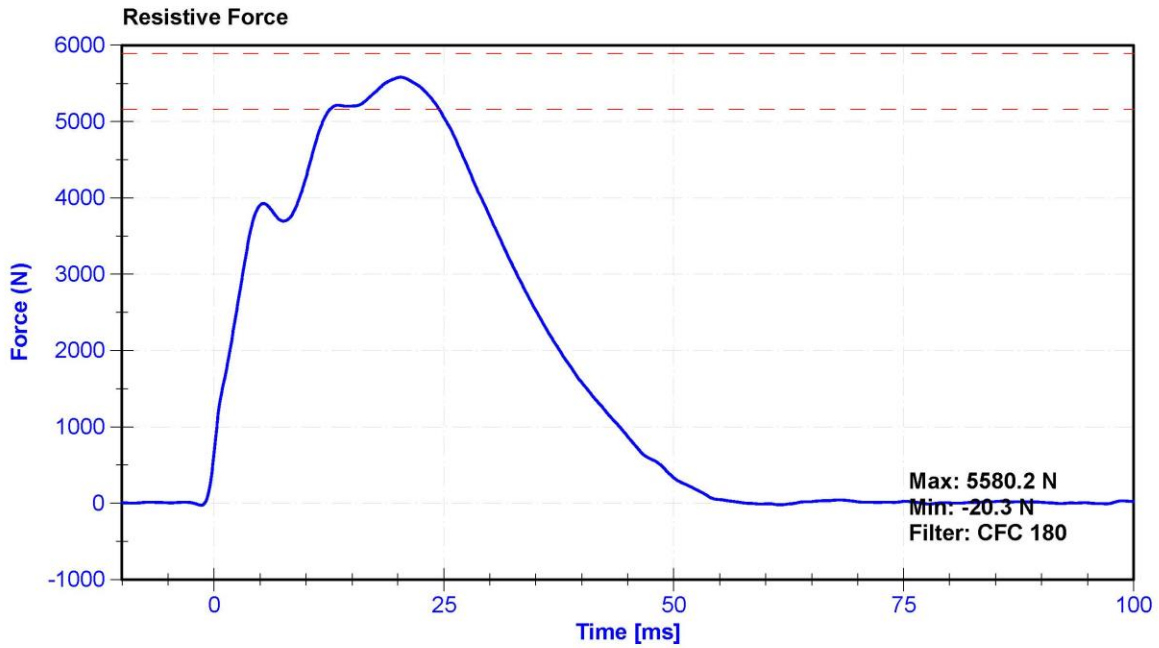
**Results**

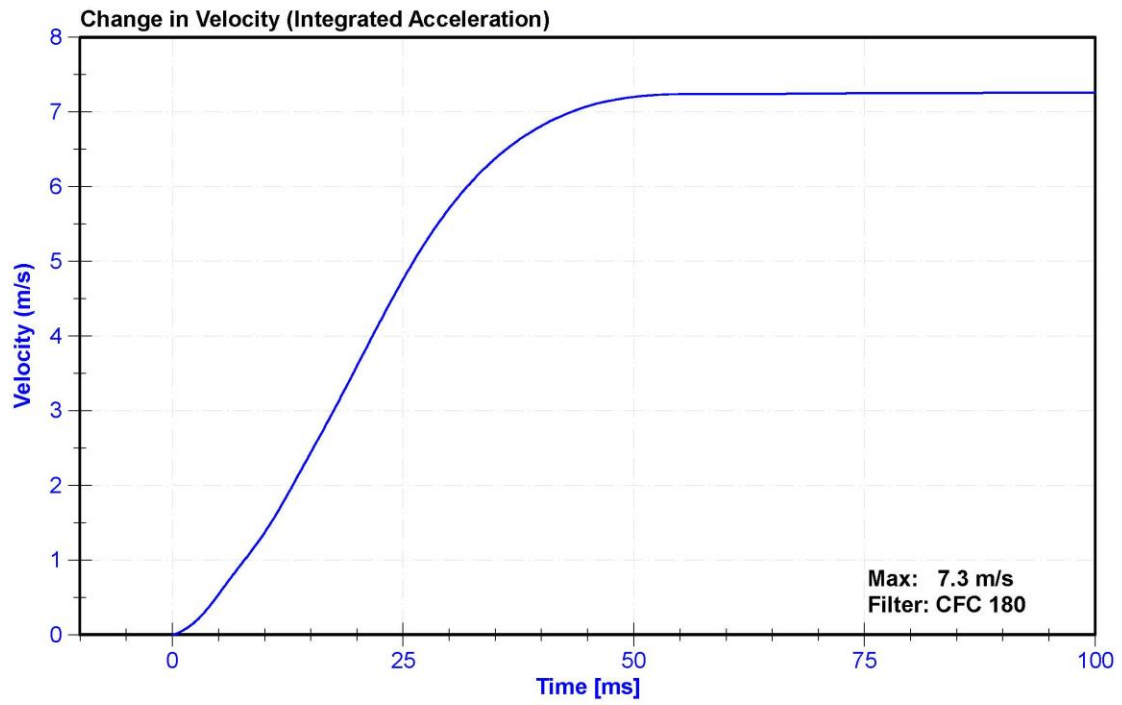
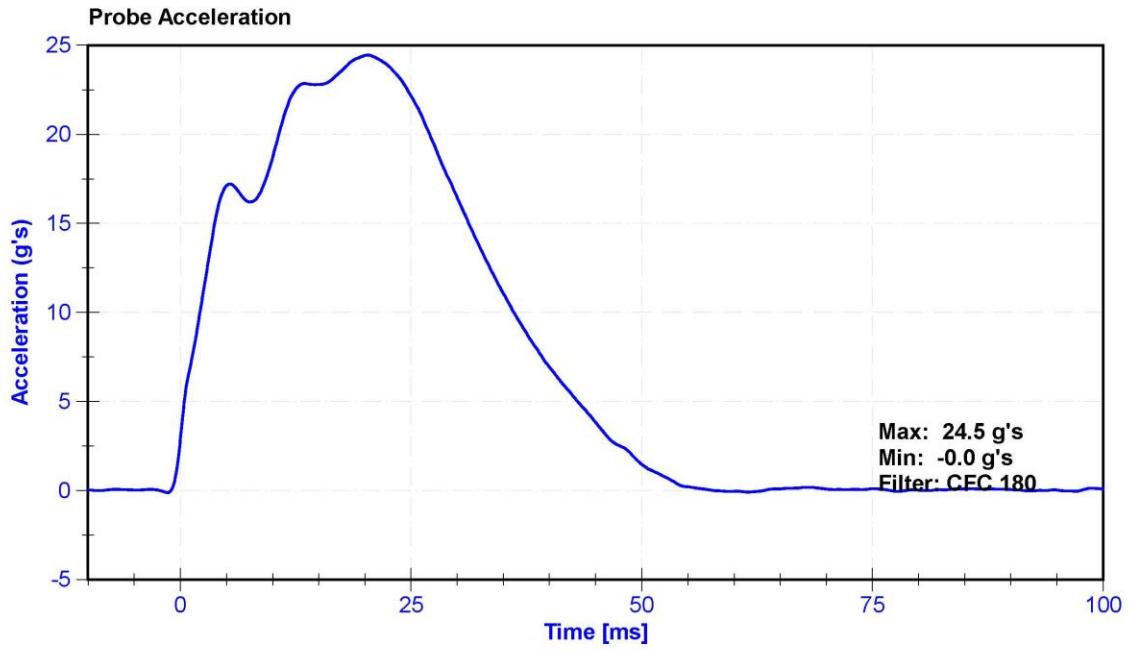
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	19	Pass
Velocity	6.59	6.83	m/s	6.670	Pass
Chest Displacement	-72.6	-63.5	mm	-69.03	Pass
Resistive Force	5160	5894	N	5580.2	Pass
Hysteresis	65	85	%	70.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	AC-P94667	11/1/2018	11/1/2019
Chest Potentiometer	JDK 6209-2038	DS-142	10/22/2018	10/22/2019







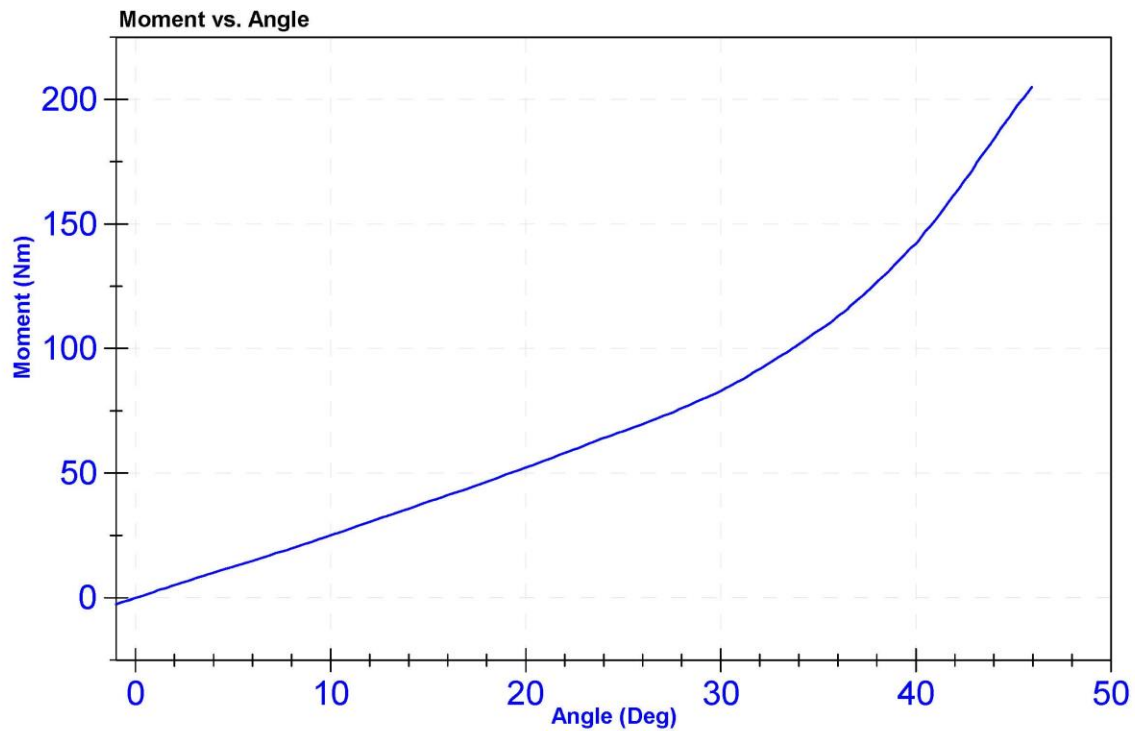
ATD Manufacturer	Humanetics	Test Technician	D. Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.9	Pass
Humidity	10	70	%	17.2	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	45.8	Pass
Moment at 30 degrees	0	94.9	Nm	83.0	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2018	9/18/2019
Load Cell	Key Trans 2301-02	LC-115 My	9/6/2018	9/6/2019



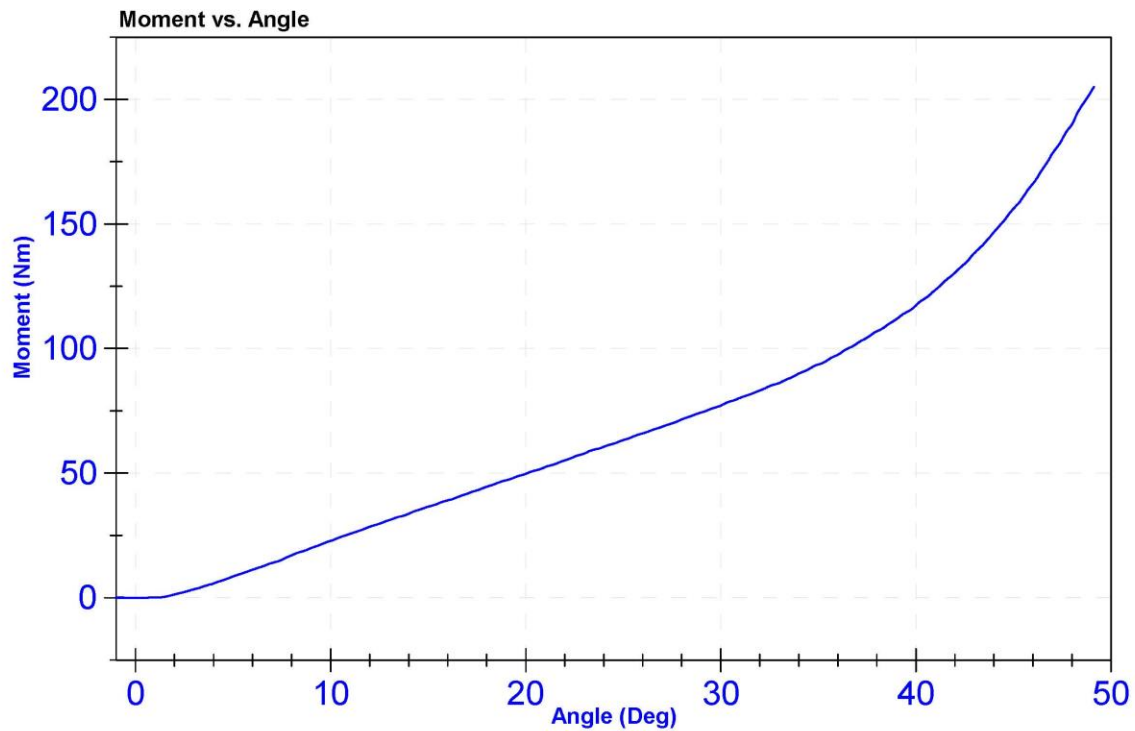
ATD Manufacturer	Humanetics	Test Technician	D. Reinhard
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.0	Pass
Humidity	10	70	%	16.0	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	49.0	Pass
Moment at 30 degrees	0	94.9	Nm	77.1	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2018	9/18/2019
Load Cell	Key Trans 2301-02	LC-115 My	9/6/2018	9/6/2019



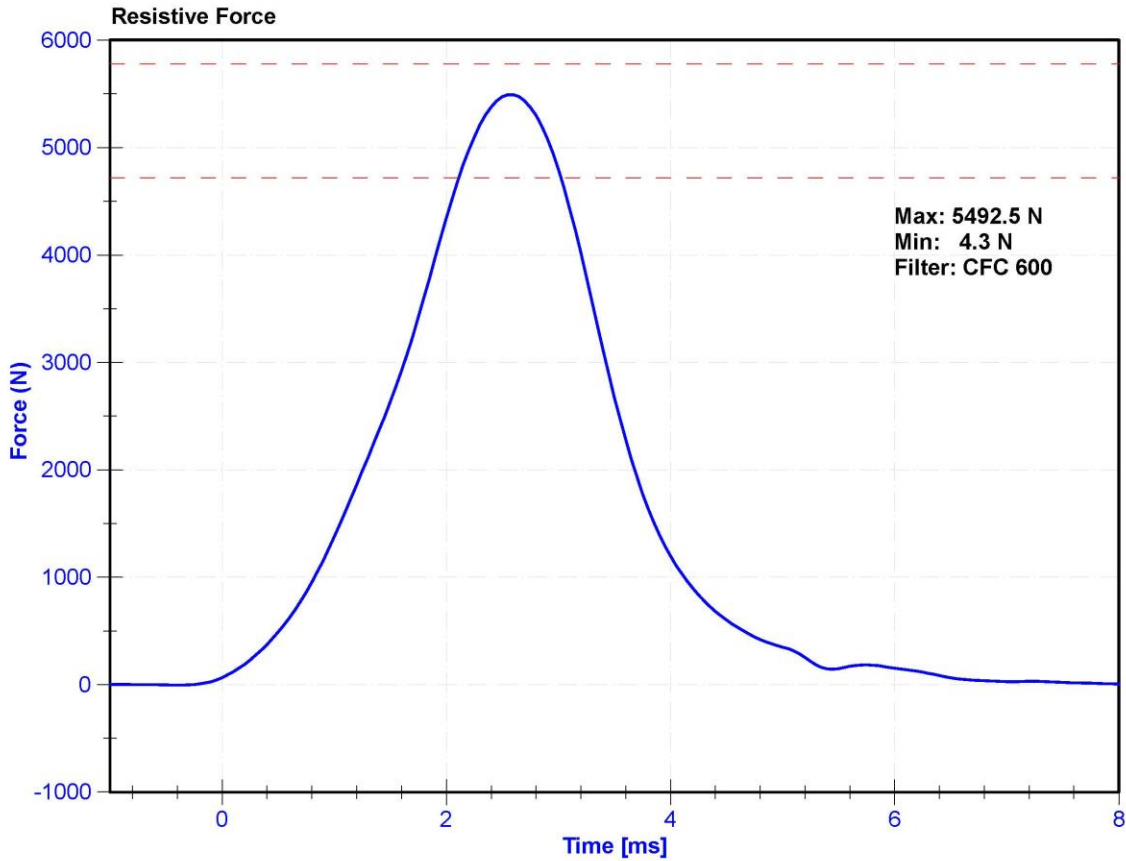
ATD Manufacturer	Humanetics	Test Technician	D.Reinhard
ATD Serial Number	142	Laboratory Supervisor	K.Brogan

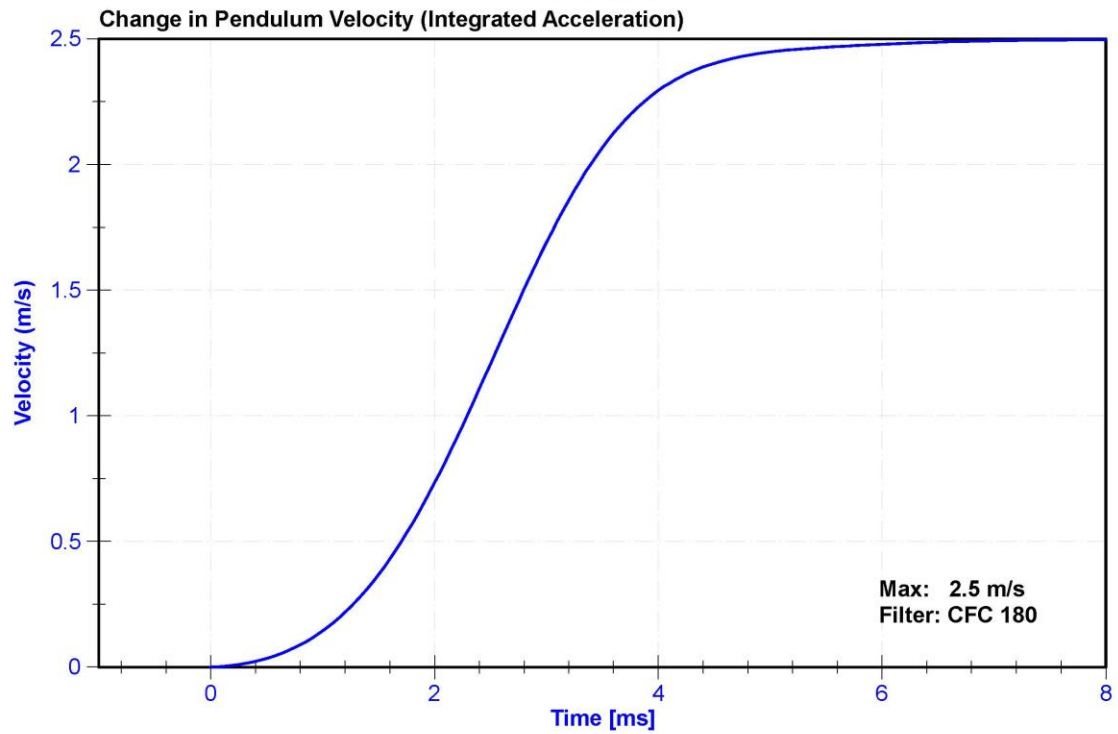
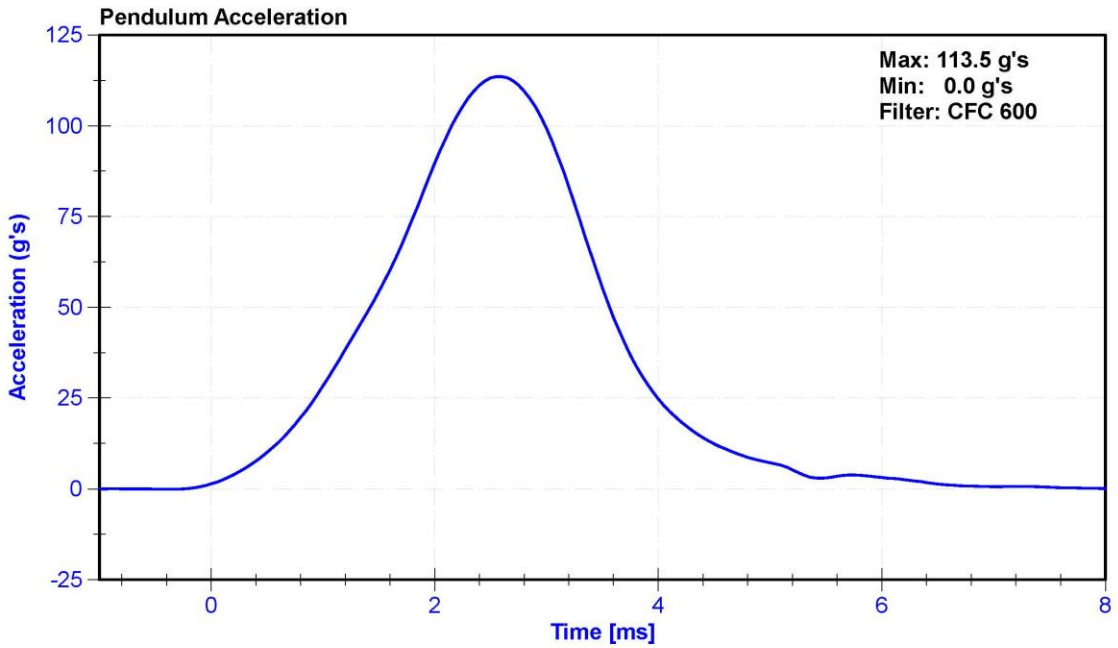
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22	Pass
Humidity	10	70	%	17.3	Pass
Velocity	2.07	2.13	m/s	2.115	Pass
Maximum Resistive Force	4720	5780	N	5492.5	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





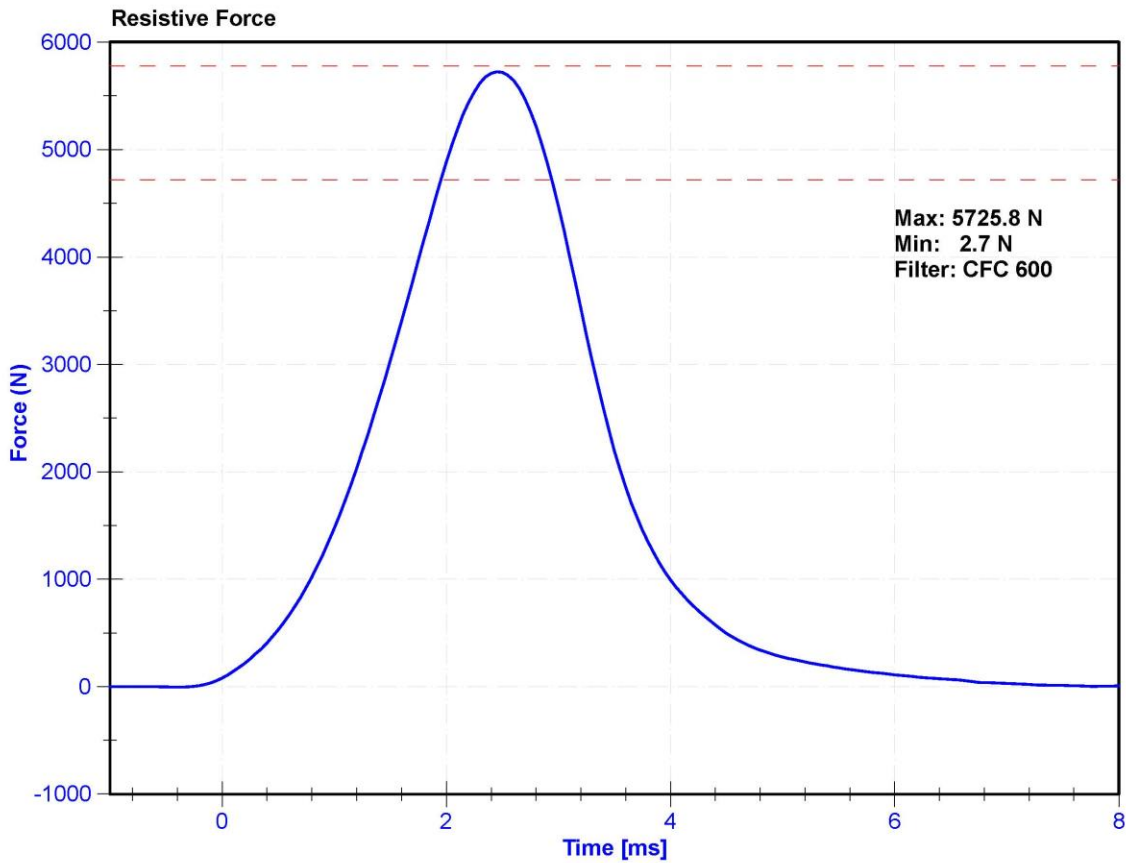
ATD Manufacturer	Humanetics	Test Technician	D.Reinhard
ATD Serial Number	142	Laboratory Supervisor	K.Brogan

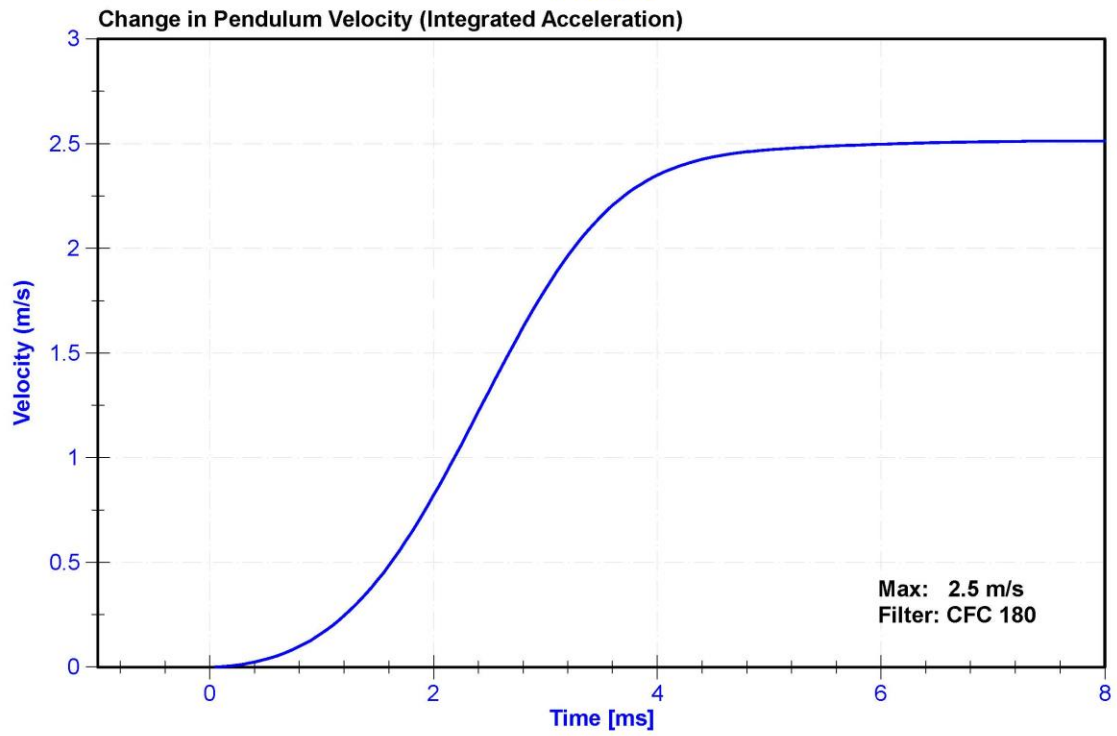
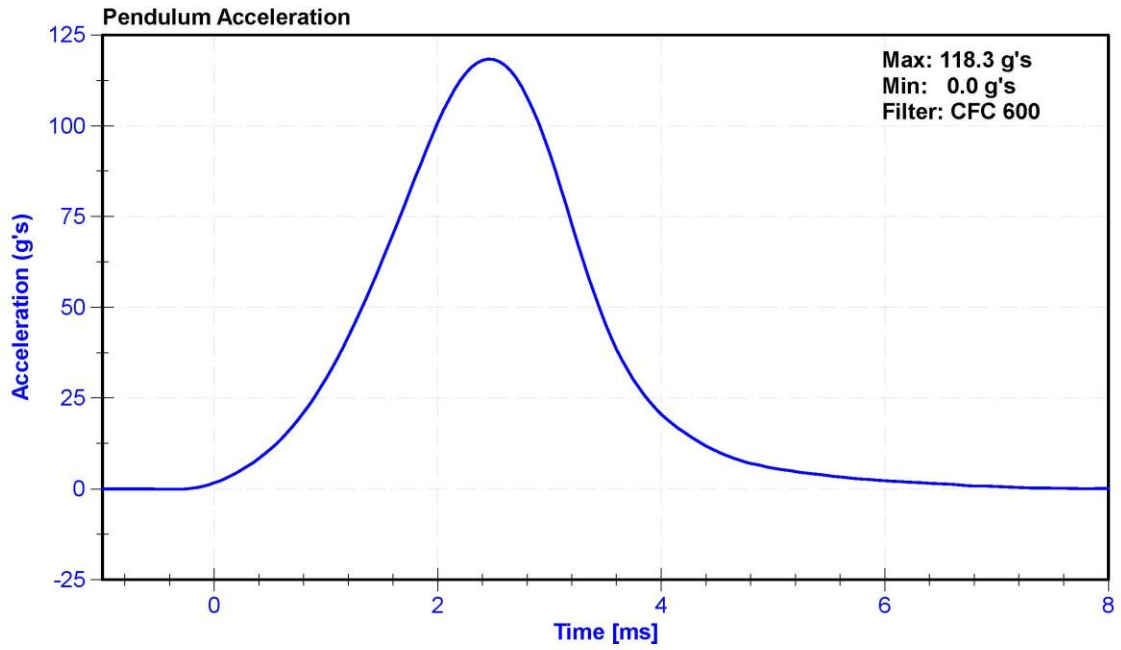
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22	Pass
Humidity	10	70	%	19.4	Pass
Velocity	2.07	2.13	m/s	2.118	Pass
Maximum Resistive Force	4720	5780	N	5725.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





**CALIBRATION TEST RESULTS**

**PRE-TEST**

**HYBRID III 5<sup>TH</sup> PERCENTILE - PASSENGER ATD**

**SERIAL NO: 139**

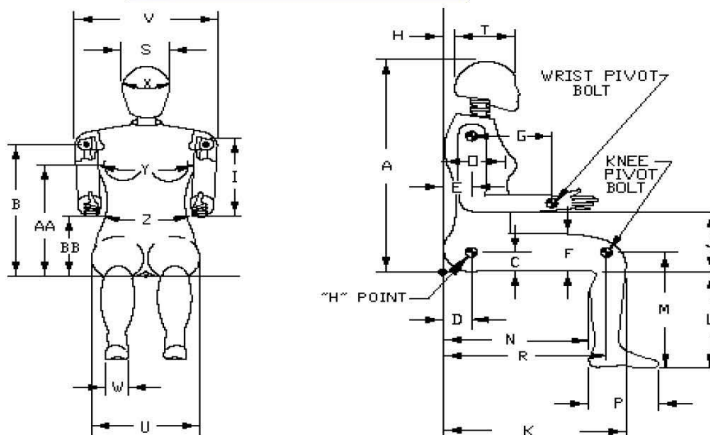


External Measurements - Hybrid 3 - 5th Female

Technician: K. Brogan

Date: 02/01/2018

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	83	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	76	Pass
F	Thigh Clearance	119	135	124	Pass
G	Back of Elbow to Wrist Pivot	244	259	250	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	289	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	398	Pass
N	Buttock Popliteal Length	414	439	424	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	225	Pass
R	Buttock To Knee Pivot Length	457	483	473	Pass
S	Head Breadth	137	147	141	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	304	Pass
V	Shoulder Breadth	351	366	362	Pass
W	Foot Breadth	79	94	86	Pass
X	Head Circumference	528	549	535	Pass
Y	Chest Circumference with Jacket	851	881	854	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

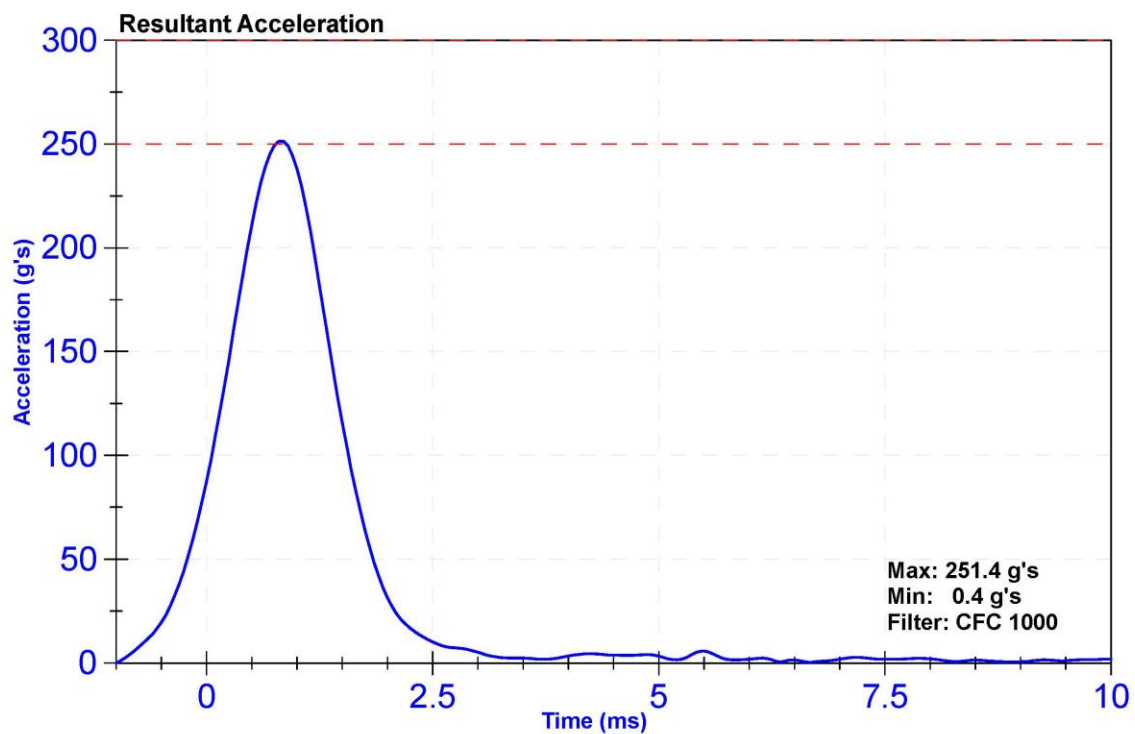
ATD Manufacturer	Denton	Test Technician	K. Dutton
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

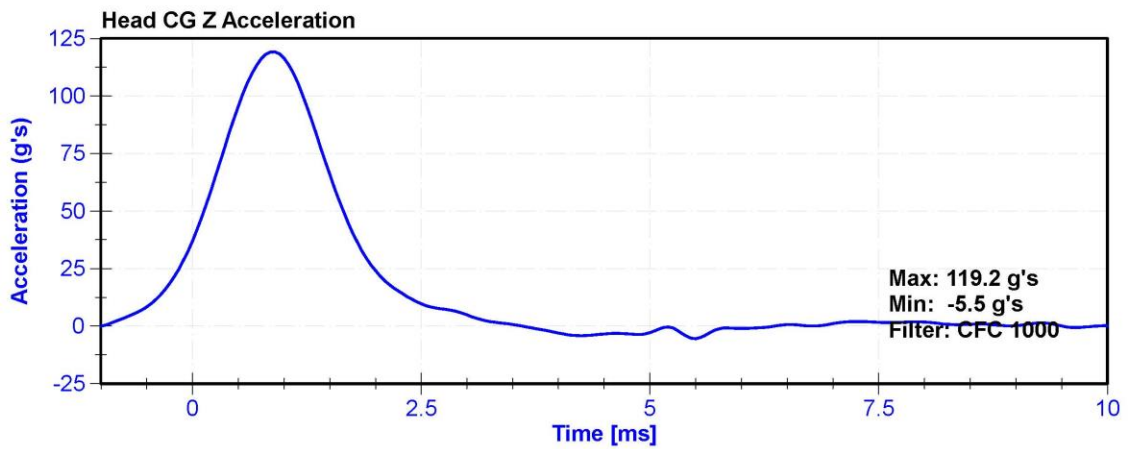
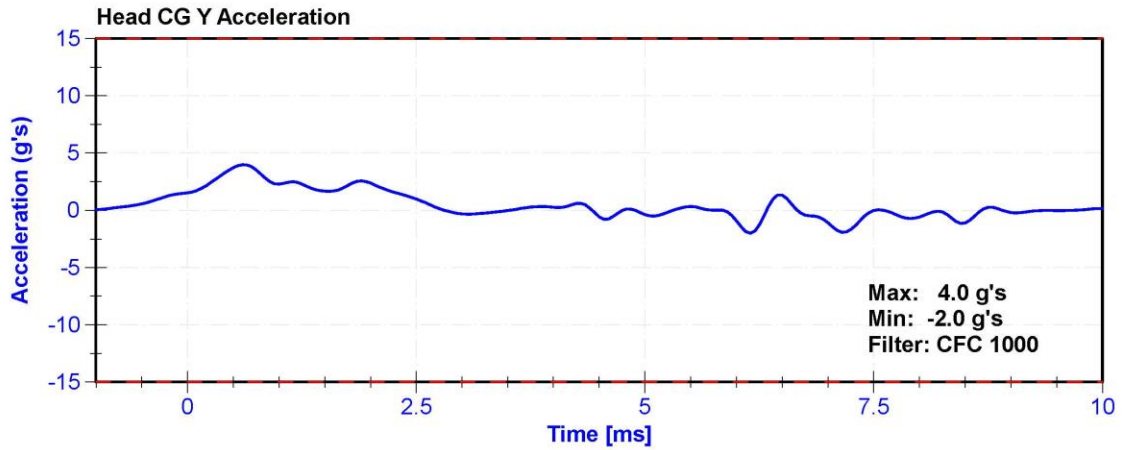
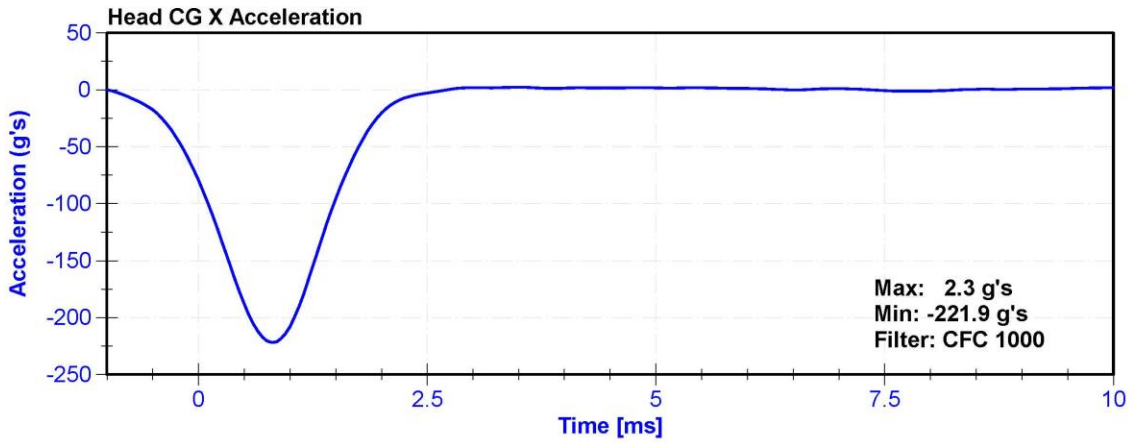
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22	Pass
Humidity	10	70	%	14.3	Pass
Resultant Acceleration	250	300	g's	251.4	Pass
Oscillation	0	10	%	2.3	Pass
Lateral Acceleration	-15	15	g's	4.0	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P51303	10/15/2018	4/15/2019
Y Accelerometer	ENDEVCO 7264CT	AC-P49216	10/15/2018	4/15/2019
Z Accelerometer	ENDEVCO 7264	AC-P58868	10/15/2018	4/15/2019





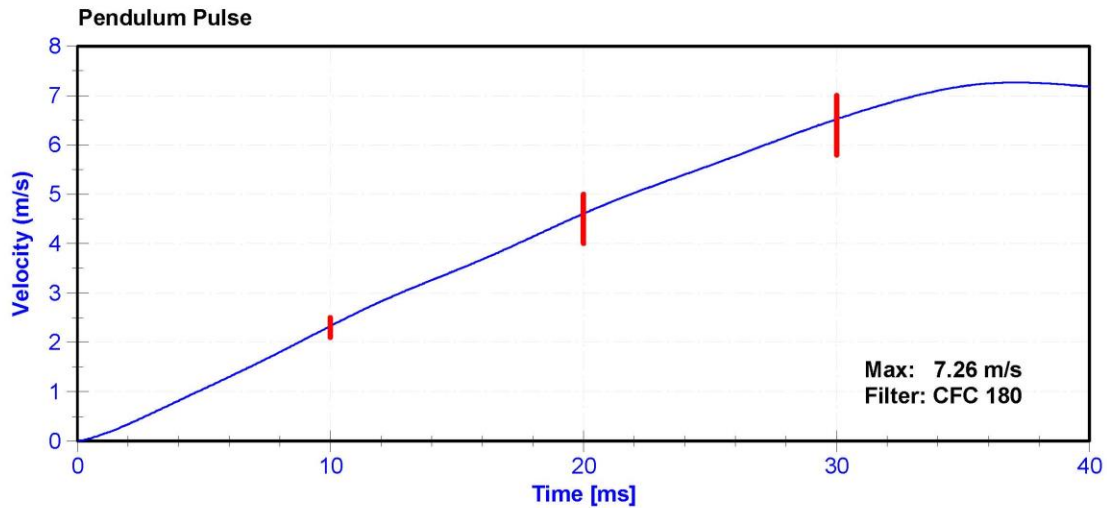
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

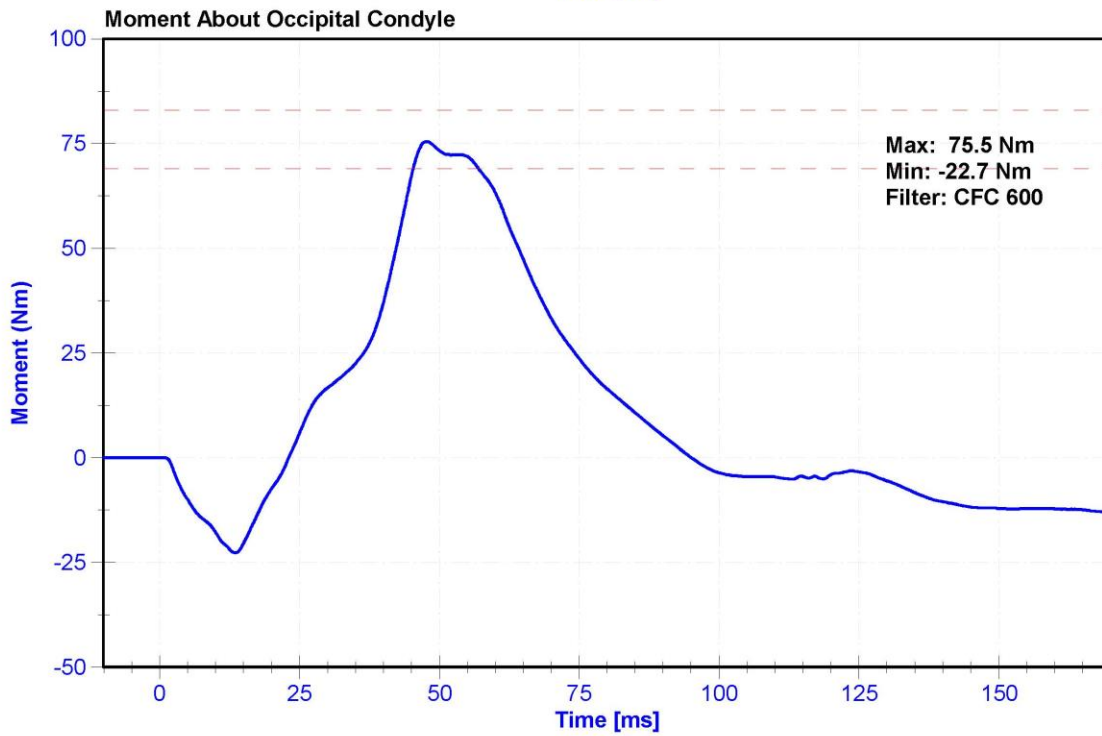
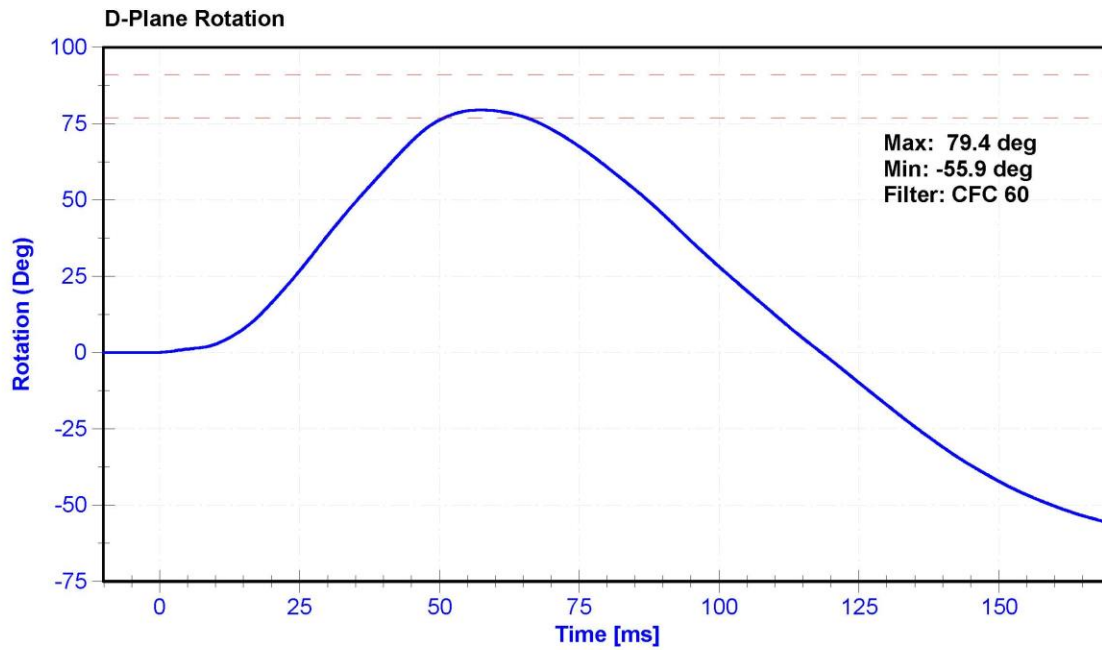
**Results**

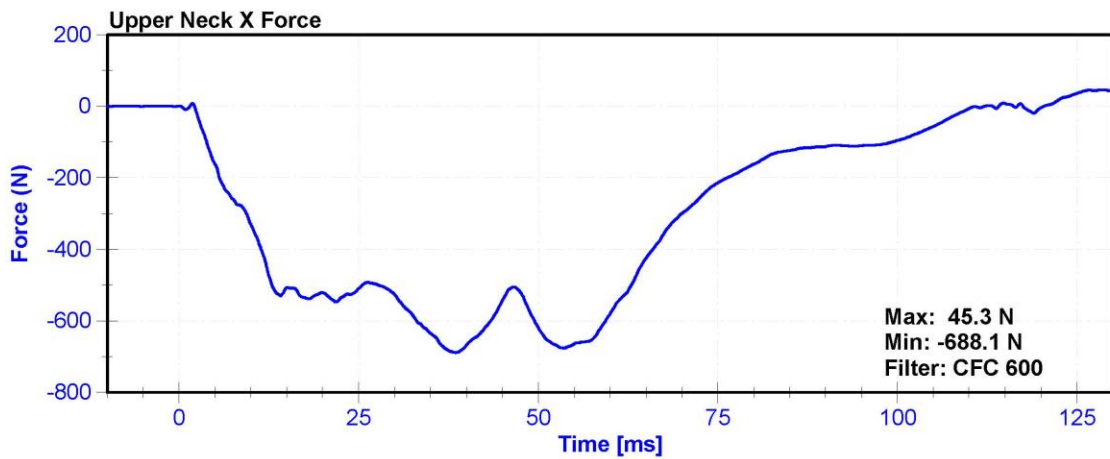
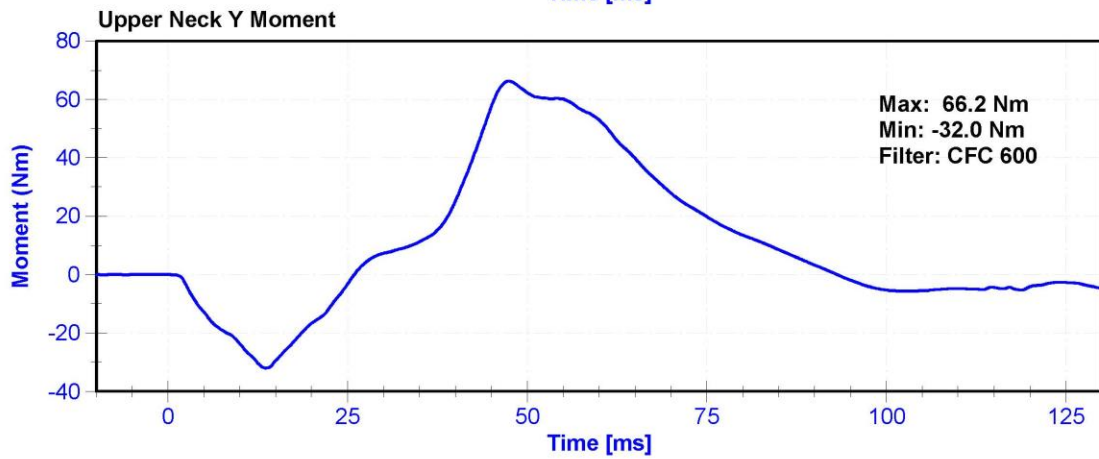
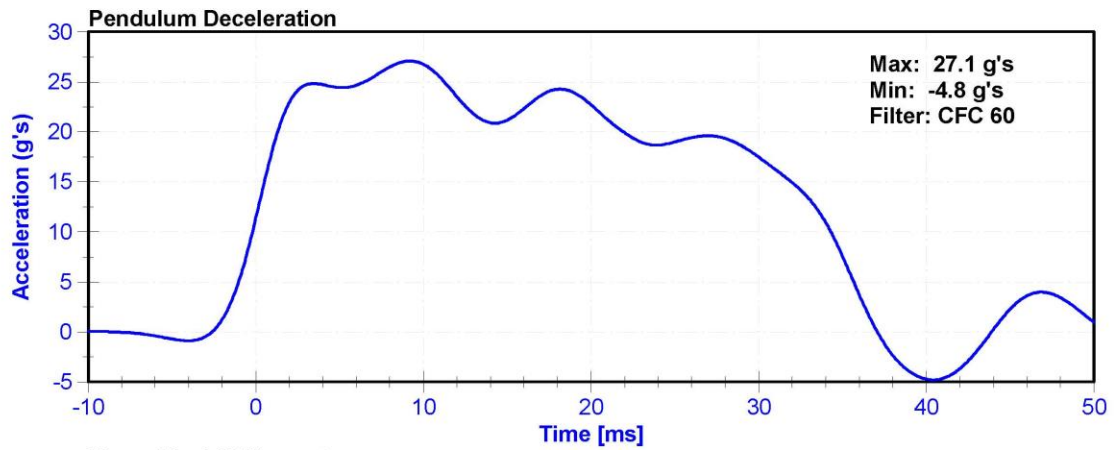
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21.4	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.33	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.61	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.52	Pass
Max D Plane Rotation	77	91	deg	79.4	Pass
Max Moment During Rotation Interval	69	83	Nm	75.5	Pass
Moment Decay to 10.0 Nm	80	100	ms	85.7	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	DENTON 1716A	LC-1591Fx	9/28/2018	9/28/2019







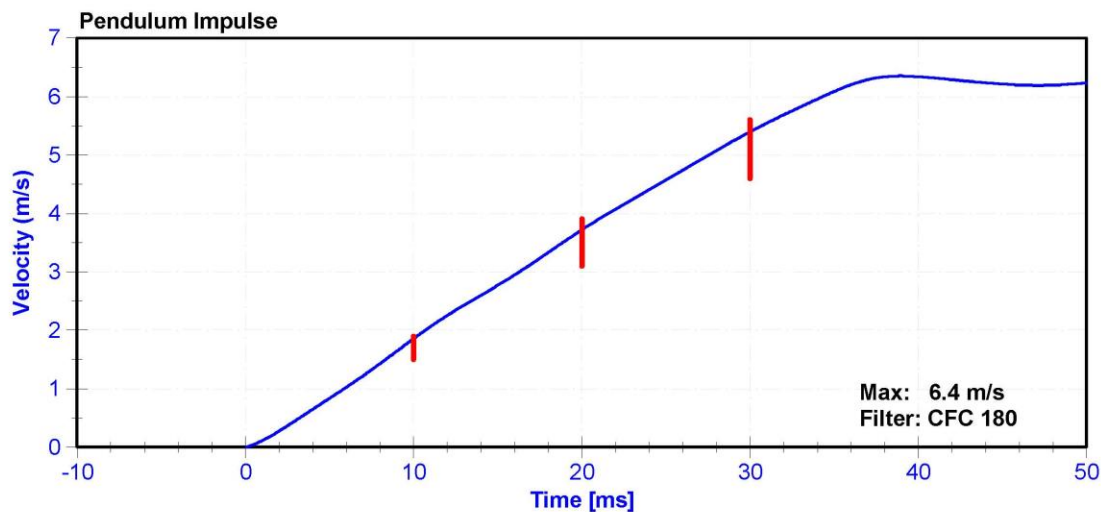
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

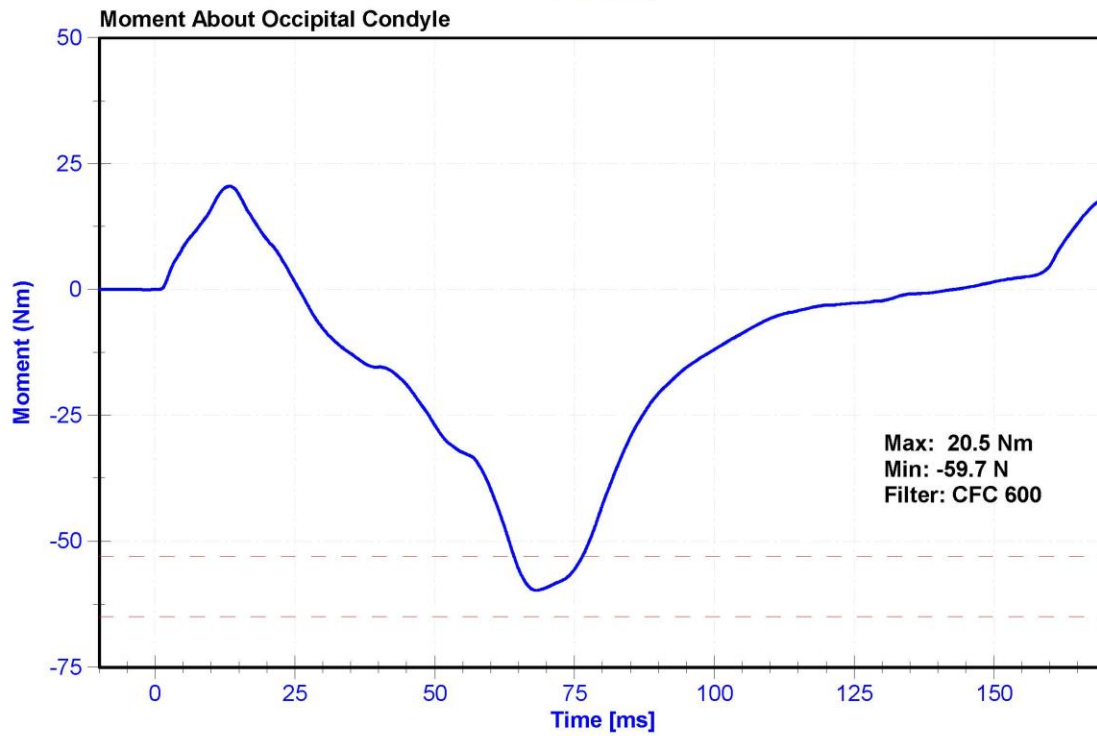
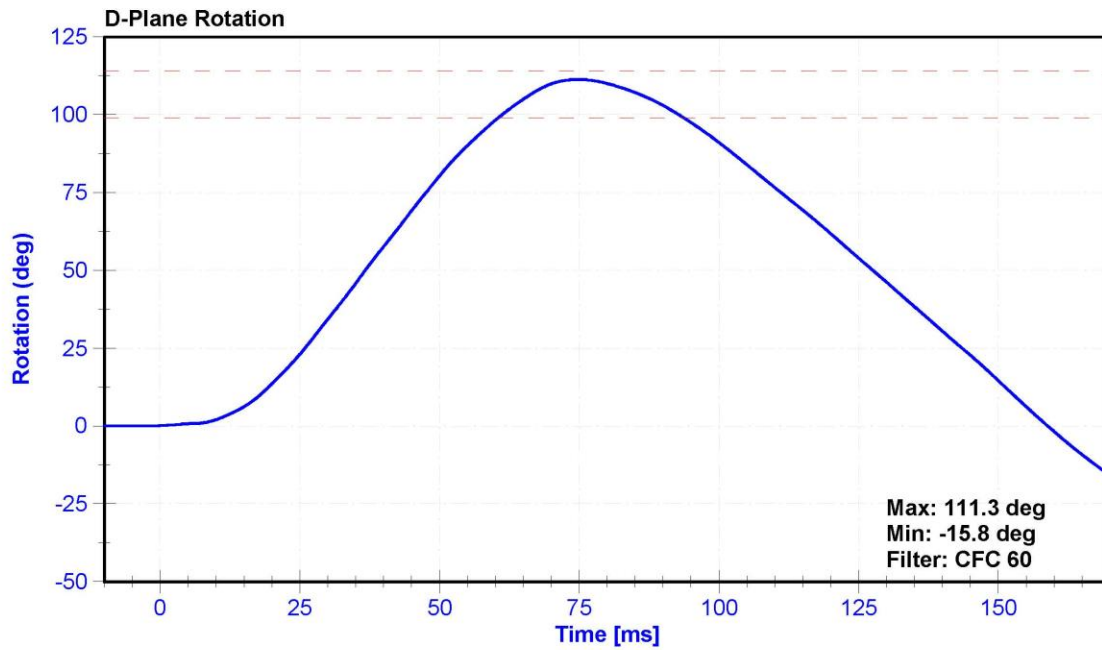
**Results**

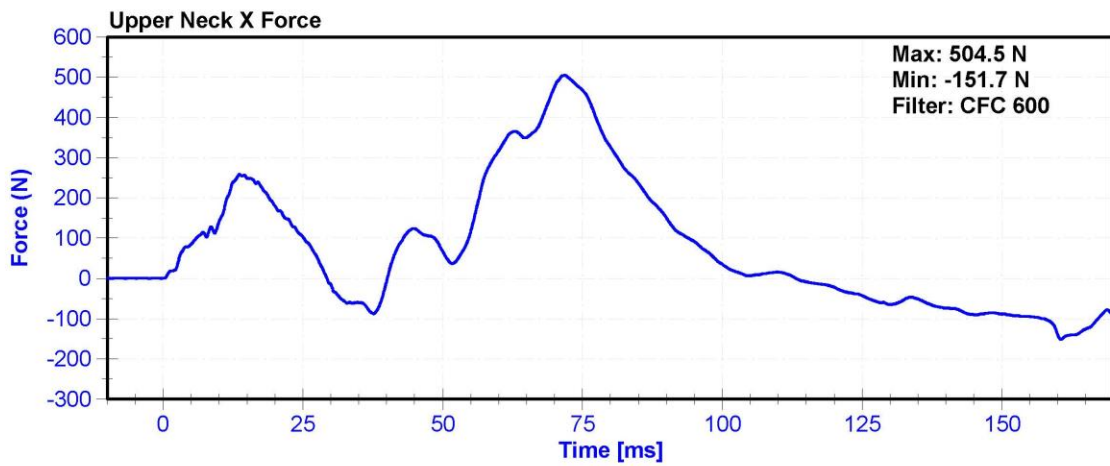
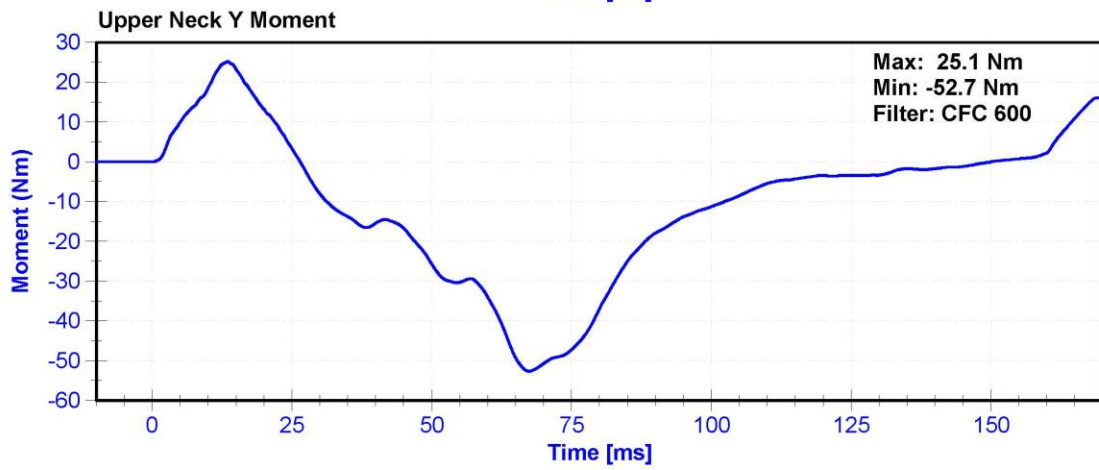
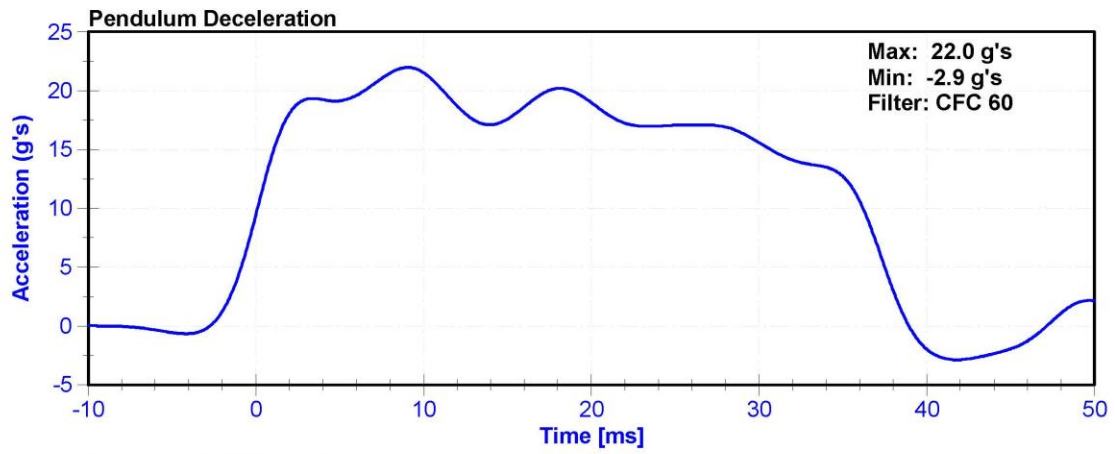
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	21.8	Pass
Velocity	5.95	6.19	m/s	6.158	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.86	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.72	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.40	Pass
D Plane Rotation	99	114	deg	111.3	Pass
Moment During Rotation Interval	-65	-53	Nm	-59.7	Pass
Moment Decay to -10Nm	94	114	ms	102.9	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	DENTON 1716A	LC-1591Fx	9/28/2018	9/28/2019







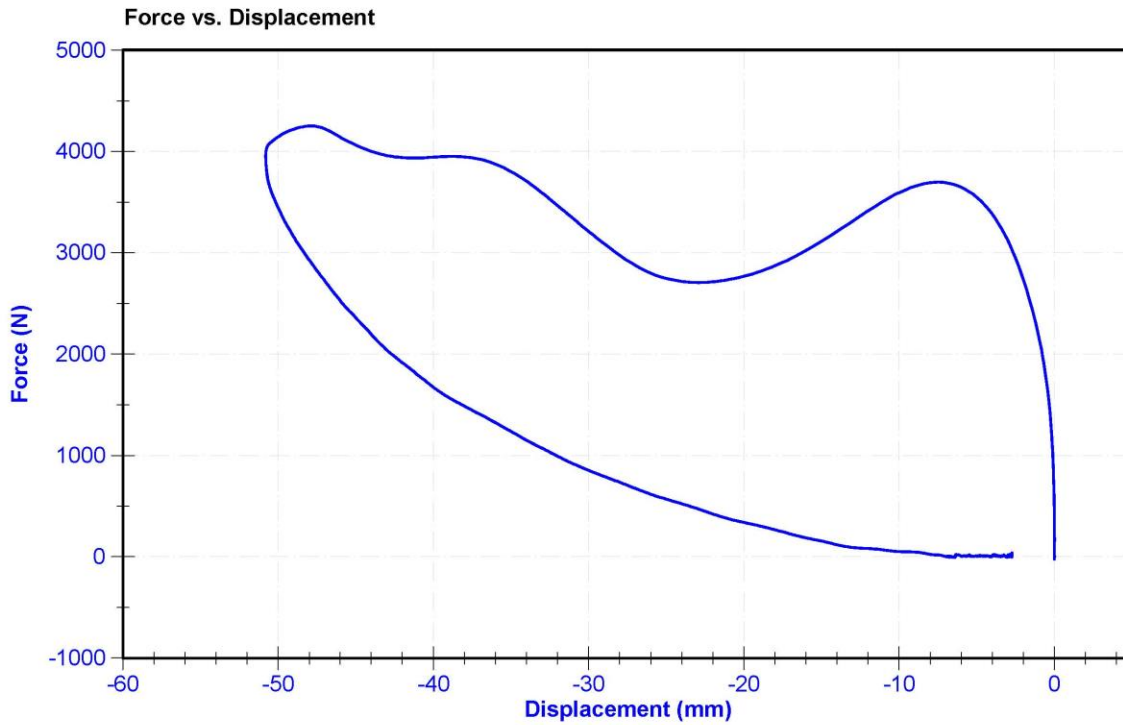
ATD Manufacturer	Denton	Test Technician	D. Reinhard
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

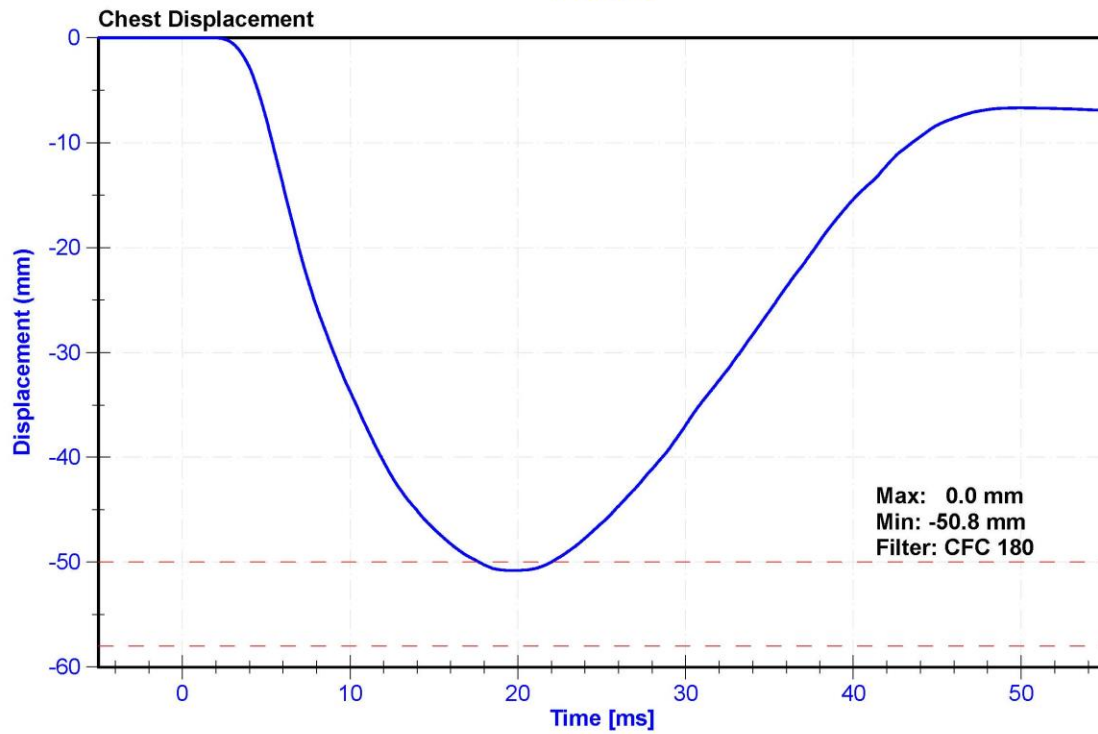
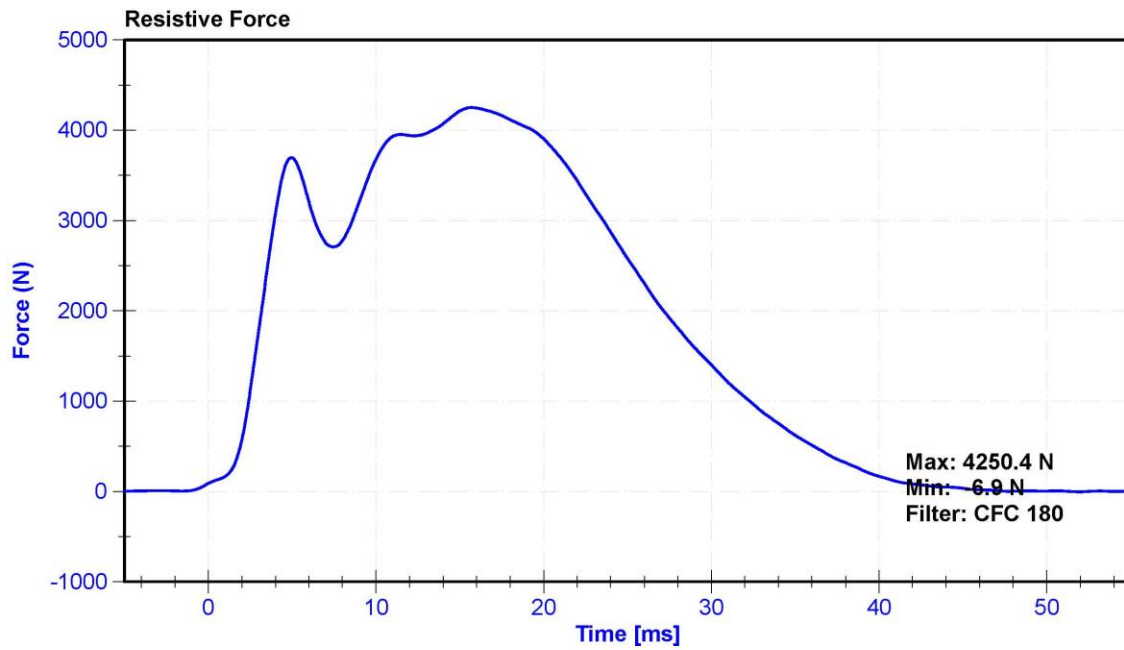
**Results**

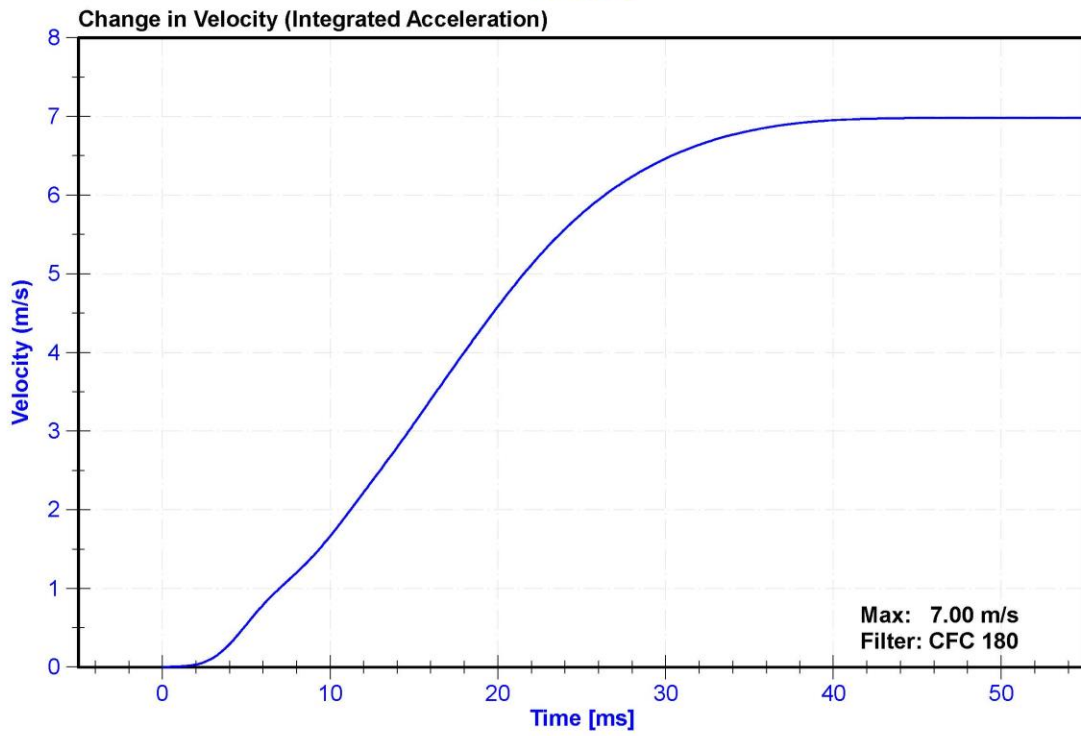
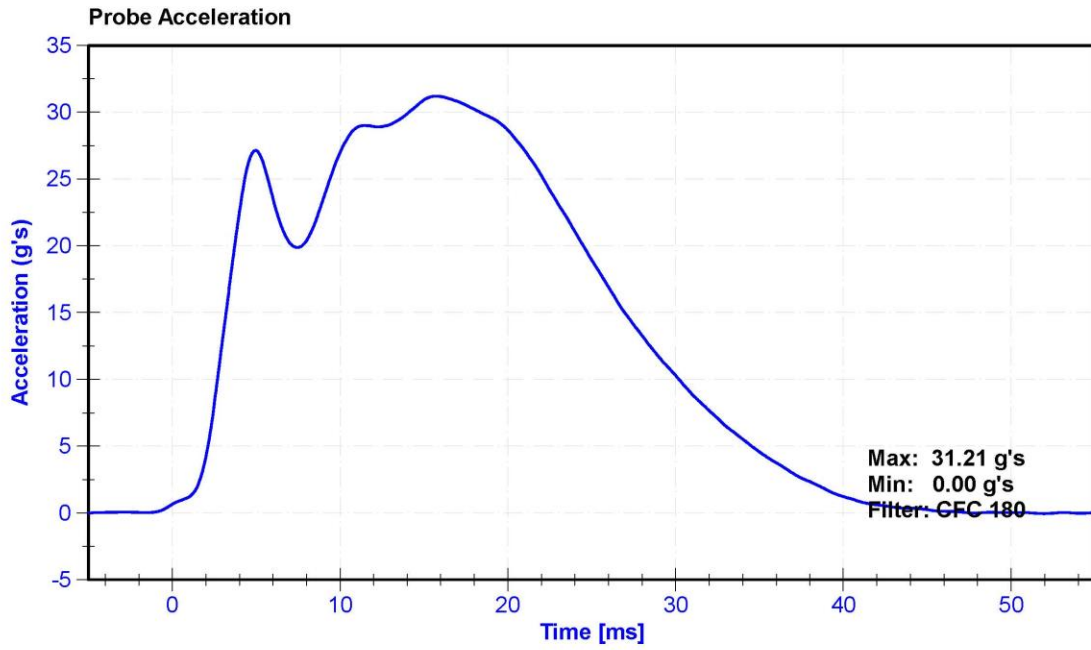
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	16.2	Pass
Velocity	6.59	6.83	m/s	6.819	Pass
Chest Deflection	-58	-50	mm	-50.8	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4147.9	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4250.4	Pass
Hysteresis	69	85	%	72.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	AC-P94667	11/1/2018	11/1/2019
Chest Potentiometer	SERVO 14CB1-2897	DS-288	10/22/2018	10/22/2019







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

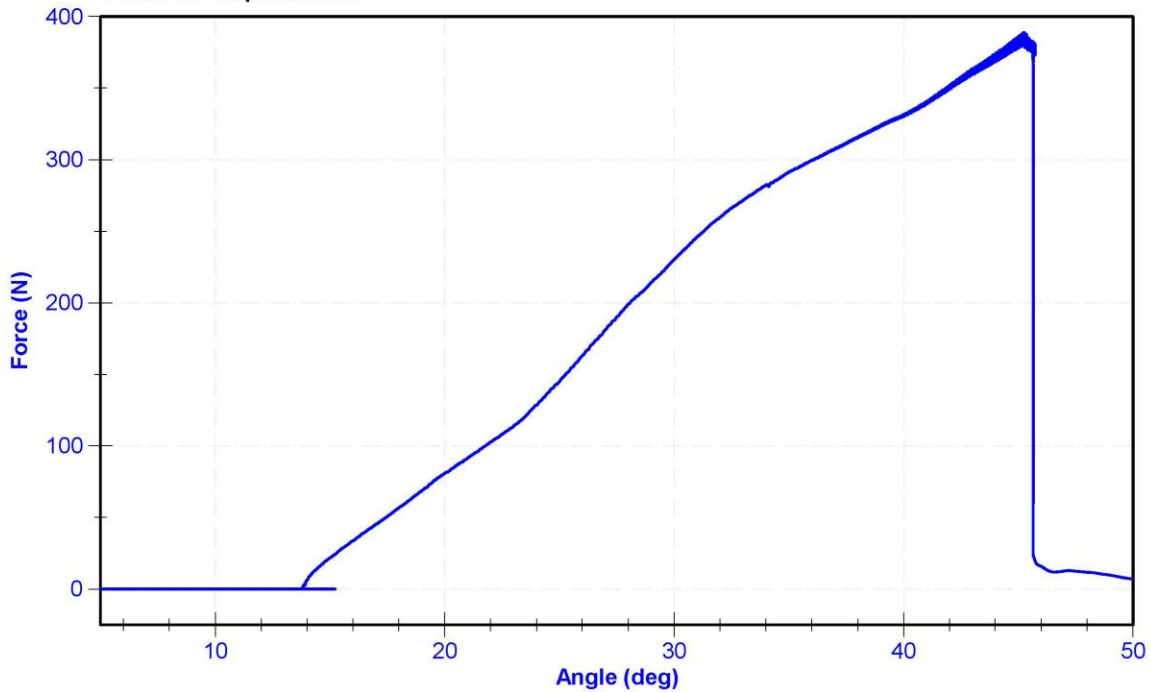
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	22	Pass
Humidity	10	70	%	15.3	Pass
Initial Angle	0	20	deg	13.8	Pass
Force at 45 Degrees	320	390	N	389.0	Pass
Return Angle Relative to Initial	0	8	deg	3.6	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	10/25/2018	10/25/2019
Load Cell	Interface SML-200	LC-493319	10/25/2018	10/25/2019

**Force vs. Displacement**



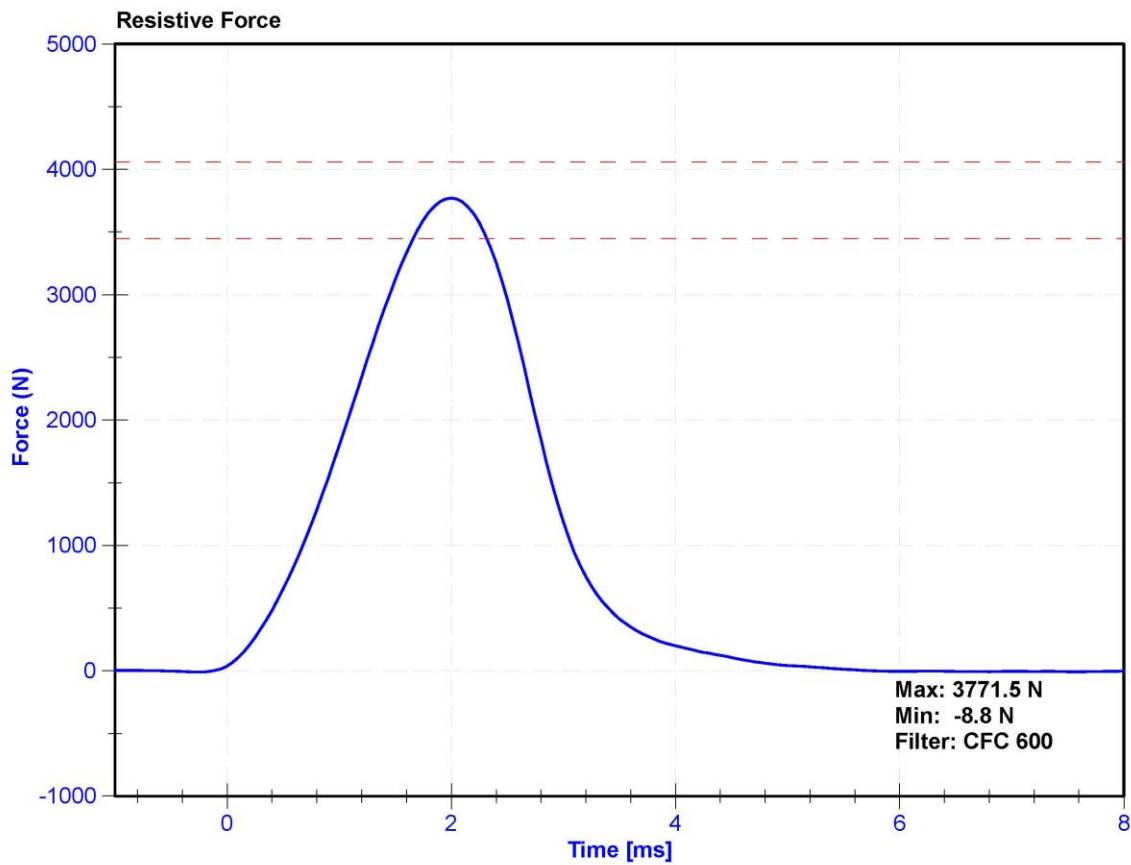
ATD Manufacturer	Denton	Test Technician	K. Dutton
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

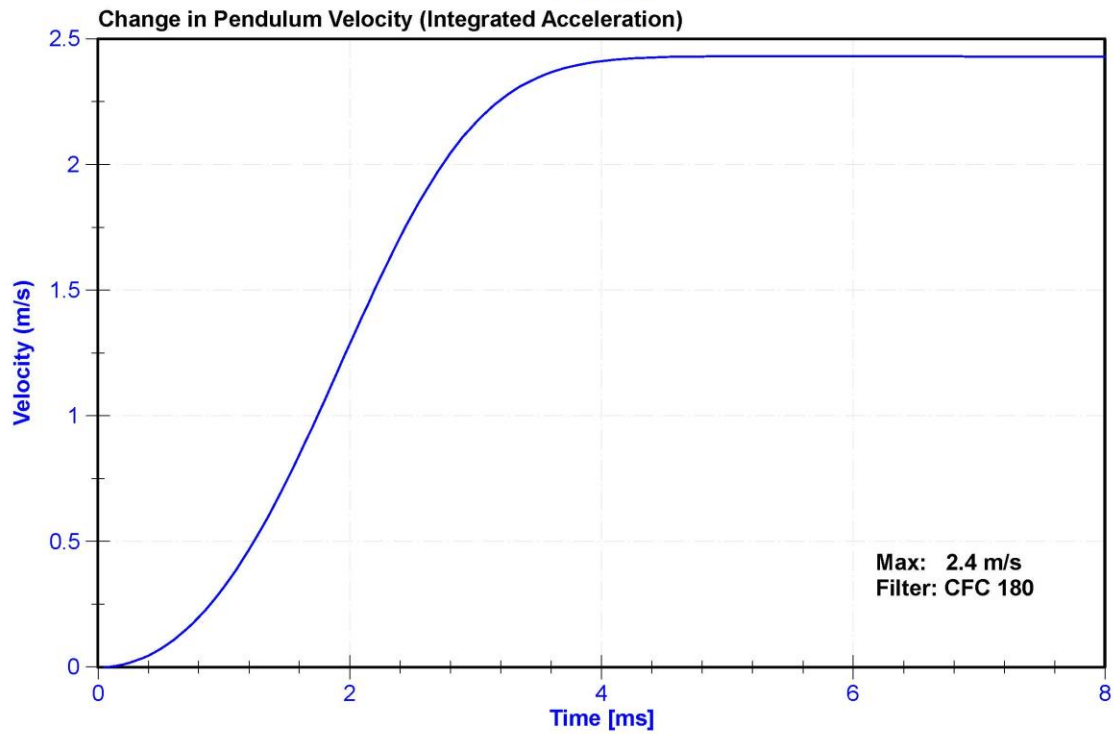
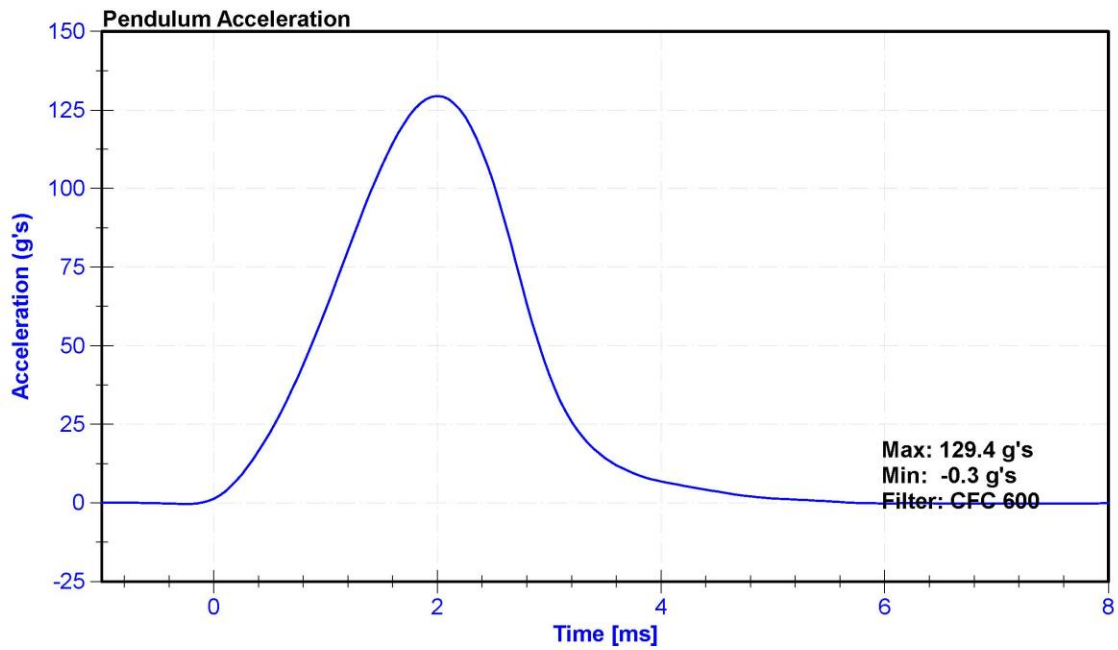
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.0	Pass
Humidity	10	70	%	15.3	Pass
Velocity	2.07	2.13	m/s	2.118	Pass
Resistive Force	3450	4060	N	3771.5	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





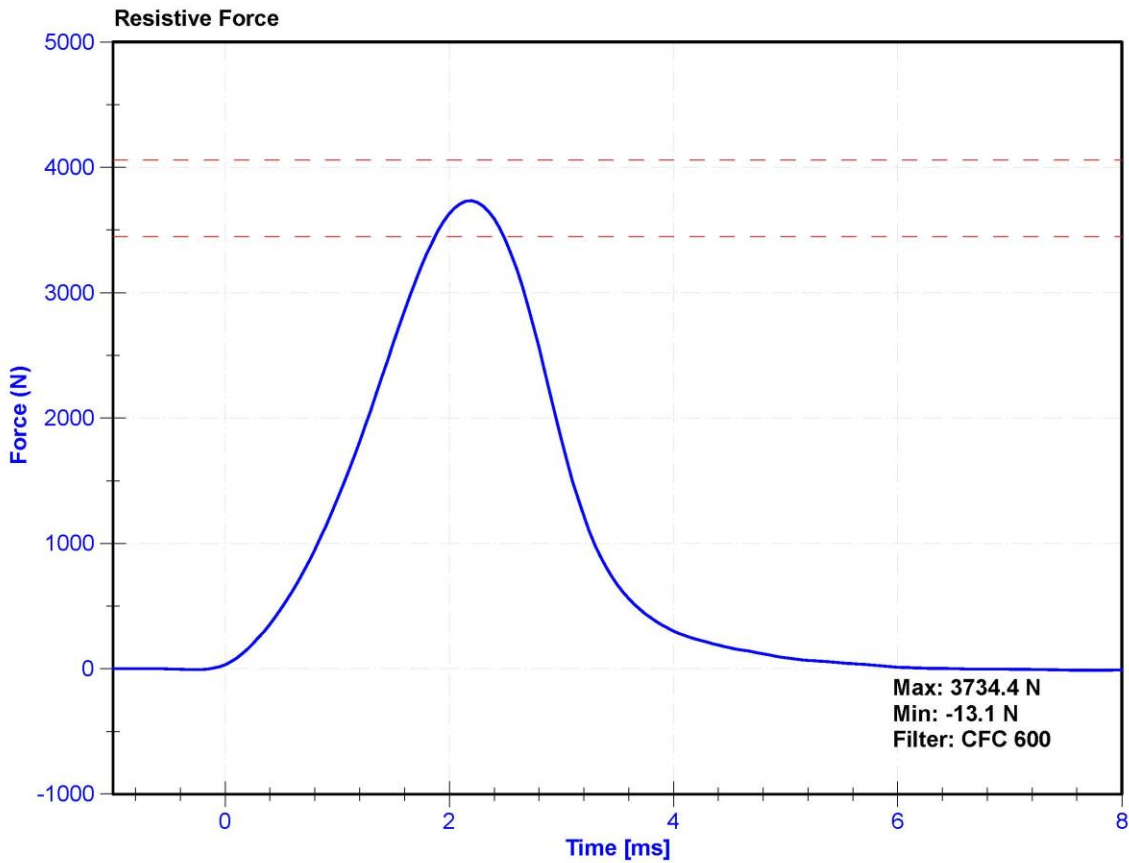
ATD Manufacturer	Denton	Test Technician	K. Dutton
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

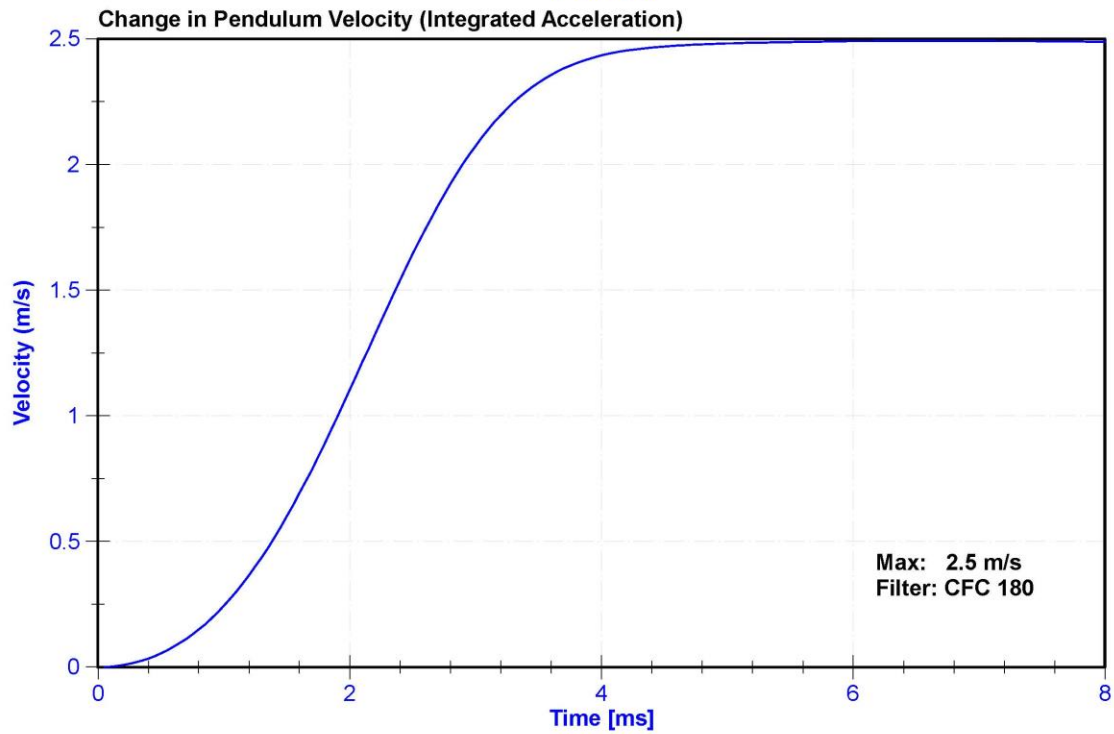
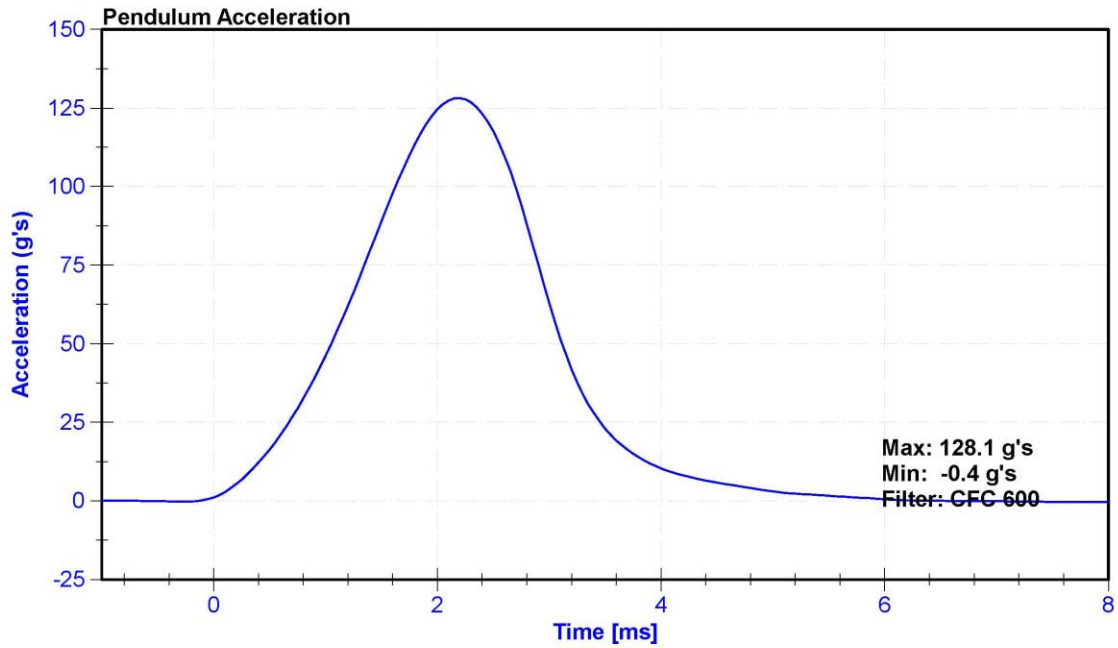
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.0	Pass
Humidity	10	70	%	15.2	Pass
Velocity	2.07	2.13	m/s	2.118	Pass
Resistive Force	3450	4060	N	3734.4	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





**CALIBRATION TEST RESULTS**

**POST-TEST**

**HYBRID III 50<sup>TH</sup> PERCENTILE MALE - DRIVER ATD**

**SERIAL NO: 142**

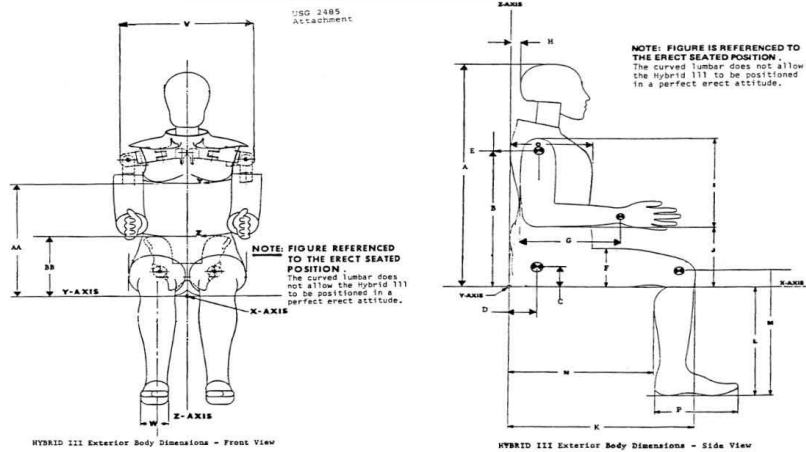


External Measurements - Hybrid 3 - 50th Male

Technician: K. Dutton

Date: 02/05/2019

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	20.1	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.9	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	17.3	Pass
M	Knee Pivot Height	19.1	19.7	19.4	Pass
N	Buttock Popliteal Length	17.8	18.8	18.5	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.2	Pass
V	Shoulder Breadth	16.3	17.2	16.7	Pass
W	Foot Breadth	3.6	4.2	3.8	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.9	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

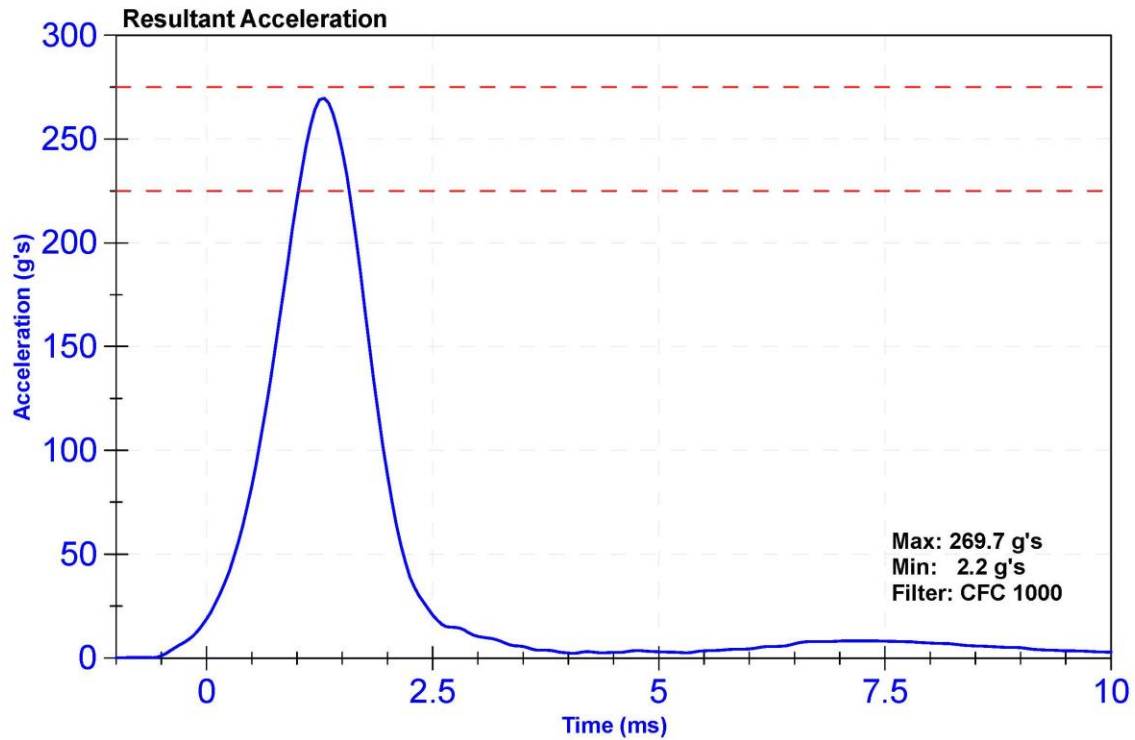
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

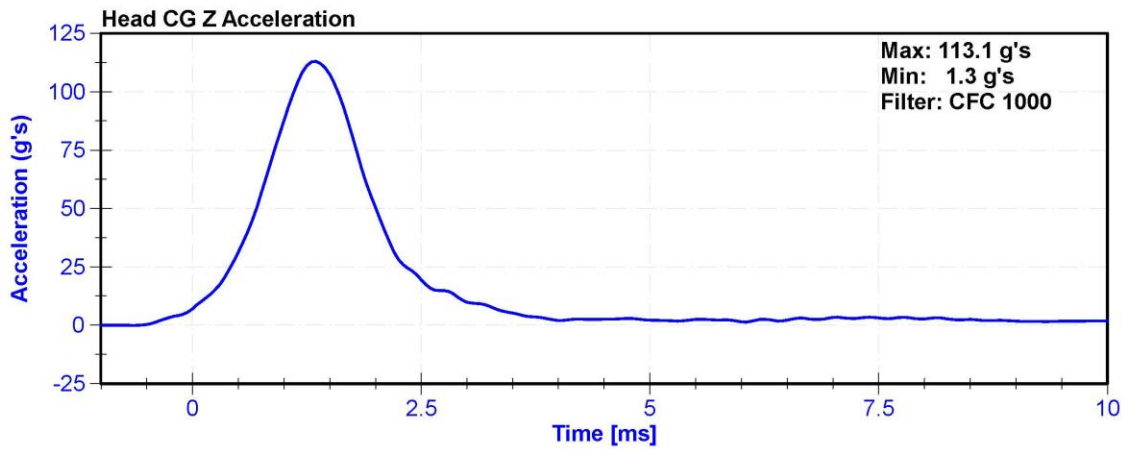
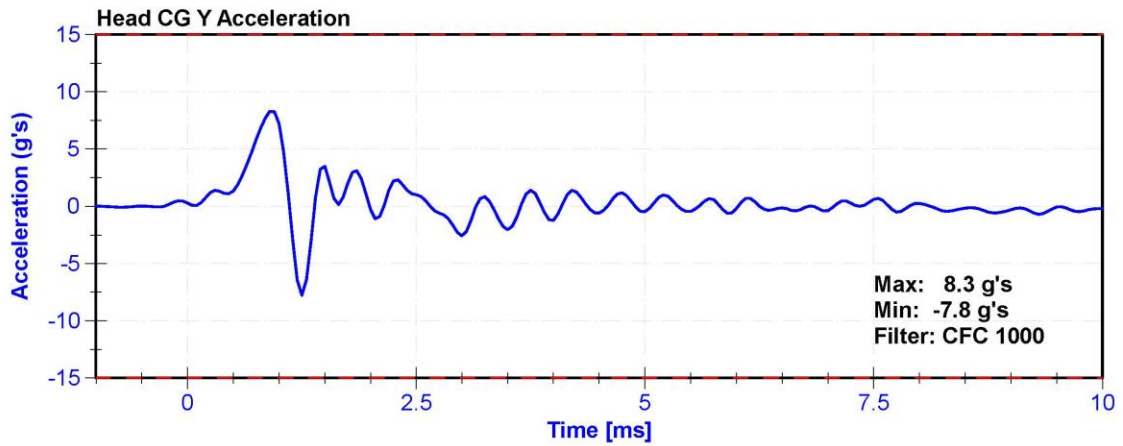
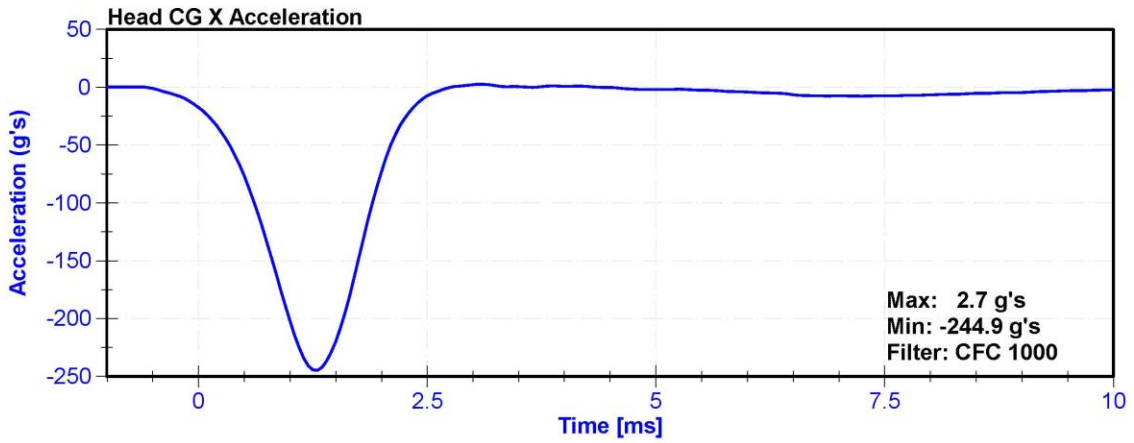
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	25.2	Pass
Resultant Acceleration	225	275	g's	269.7	Pass
Oscillation	0	10	%	3.0	Pass
Lateral Acceleration	-15	15	g's	8.3	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58998	10/5/2018	4/5/2019
Y Accelerometer	ENDEVCO 7264CT	AC-P58912	10/6/2018	4/6/2019
Z Accelerometer	ENDEVCO 7264CT	AC-P58997	10/6/2018	4/6/2019





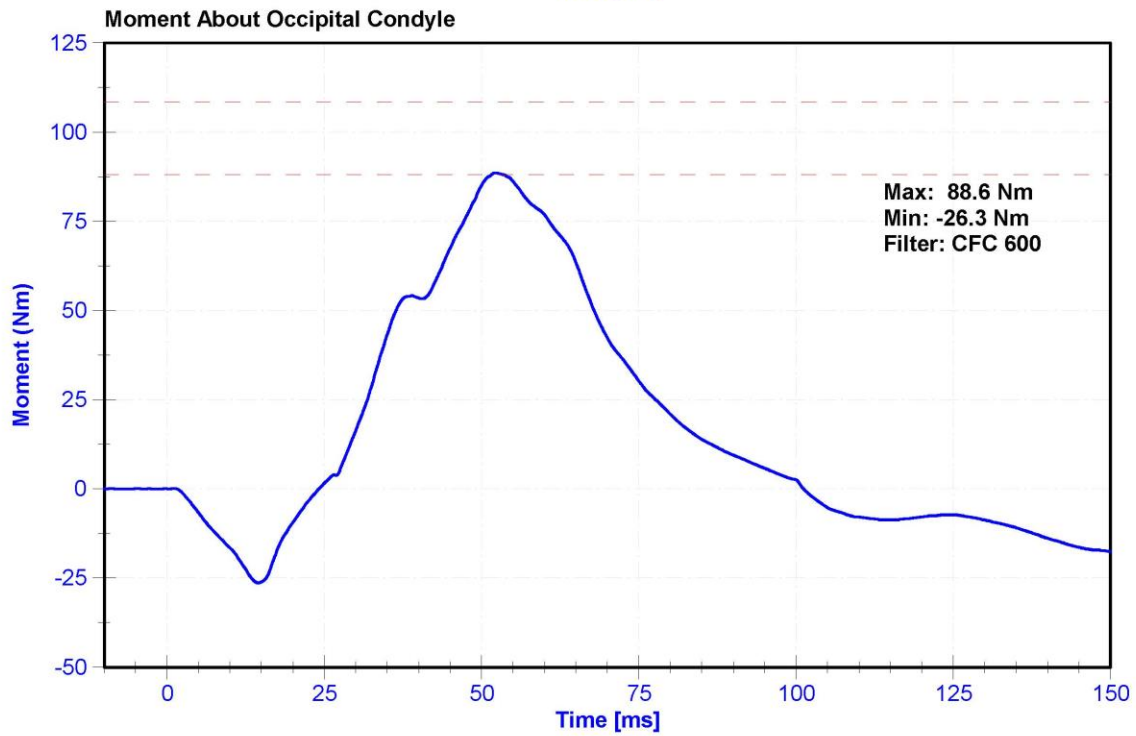
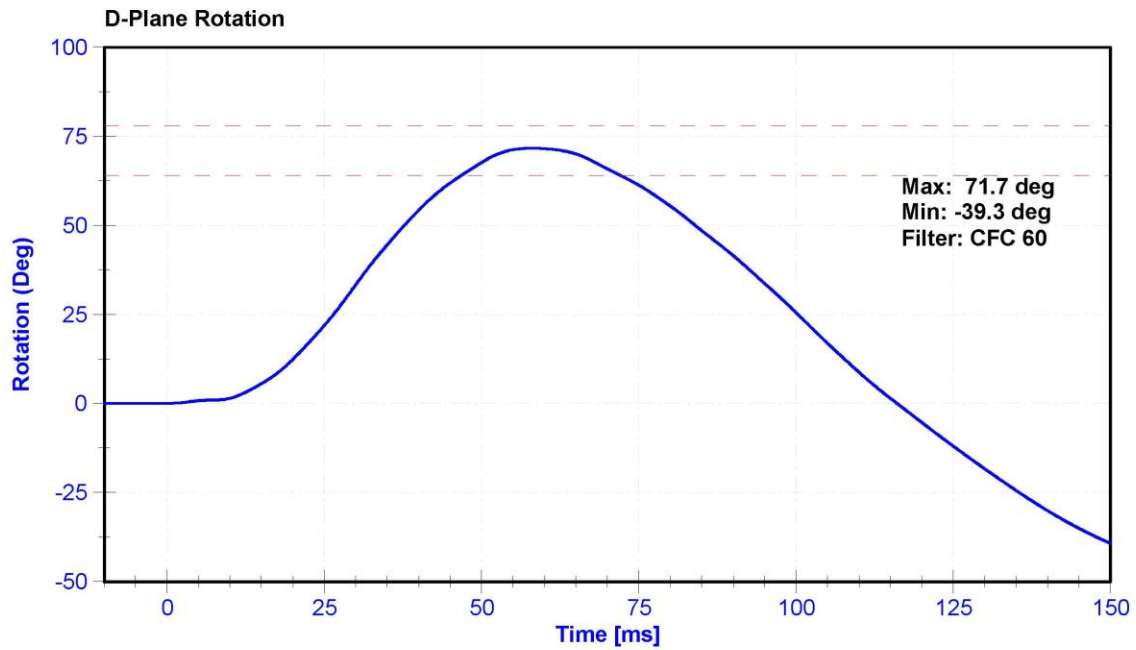
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

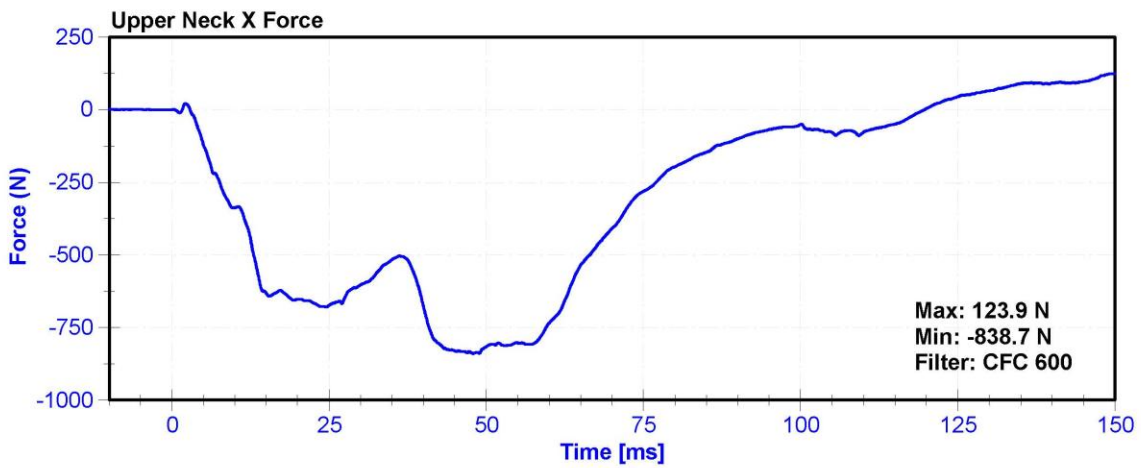
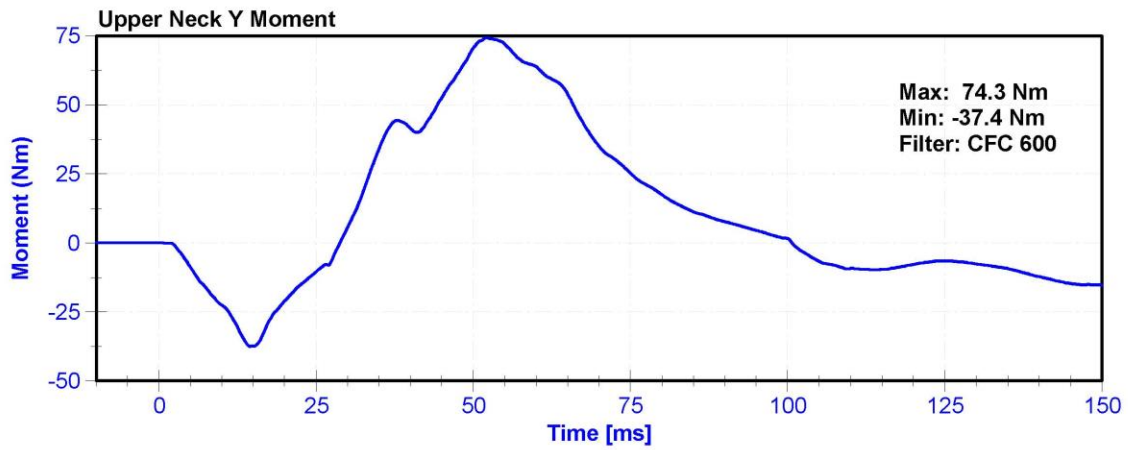
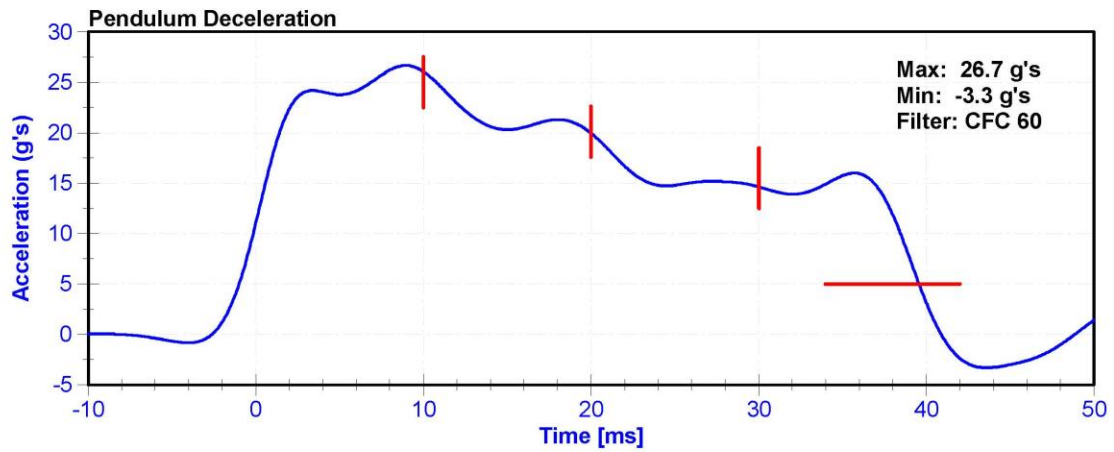
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	41.0	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	26.07	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	19.95	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	14.63	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	26.7	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	39.6	Pass
Maximum D Plane Rotation	64	78	deg	71.7	Pass
Time to Maximum Rotation	57	64	ms	58.0	Pass
Rotation Decay to Zero	113	127	ms	116.1	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	88.58	Pass
Time to Maximum Moment	47	58	ms	52.1	Pass
Moment Decay to Zero	97	107	ms	101.2	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	9/28/2018	9/28/2019





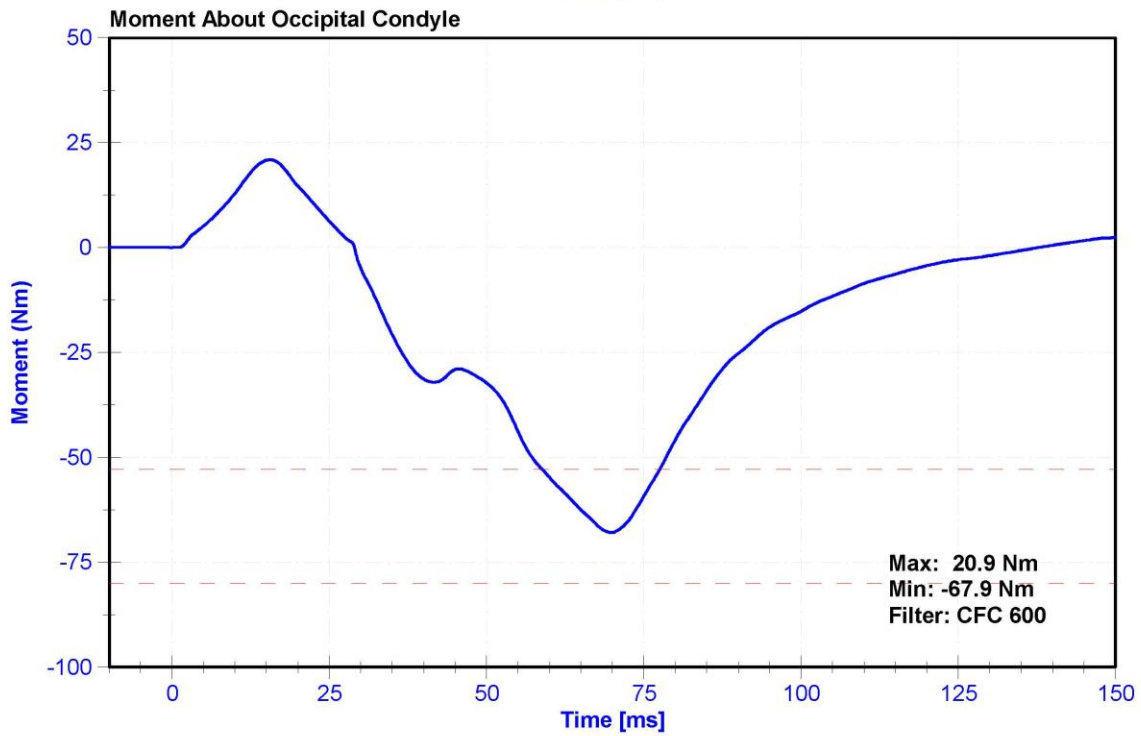
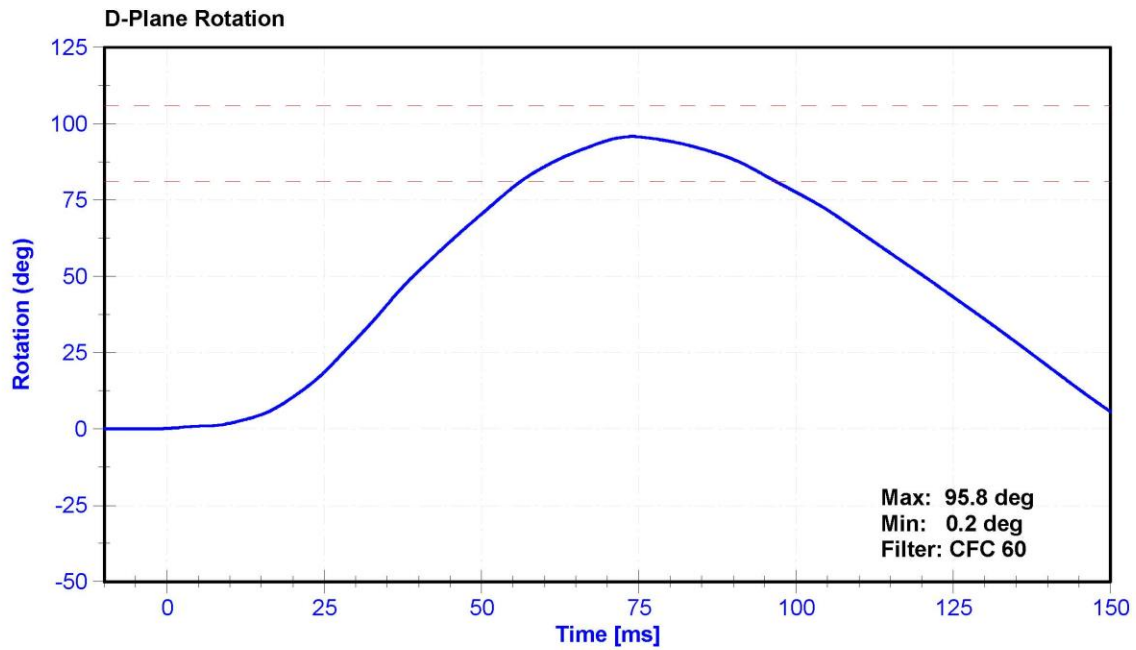
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

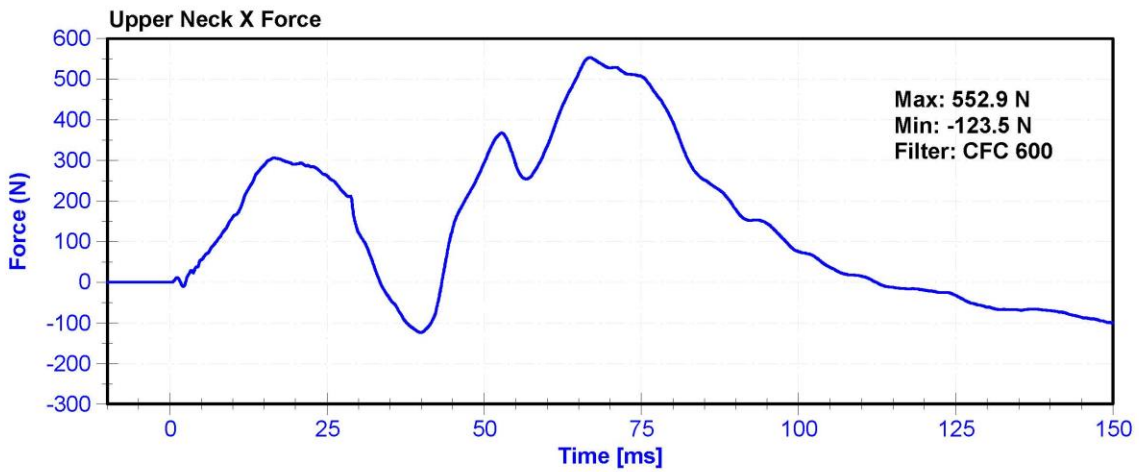
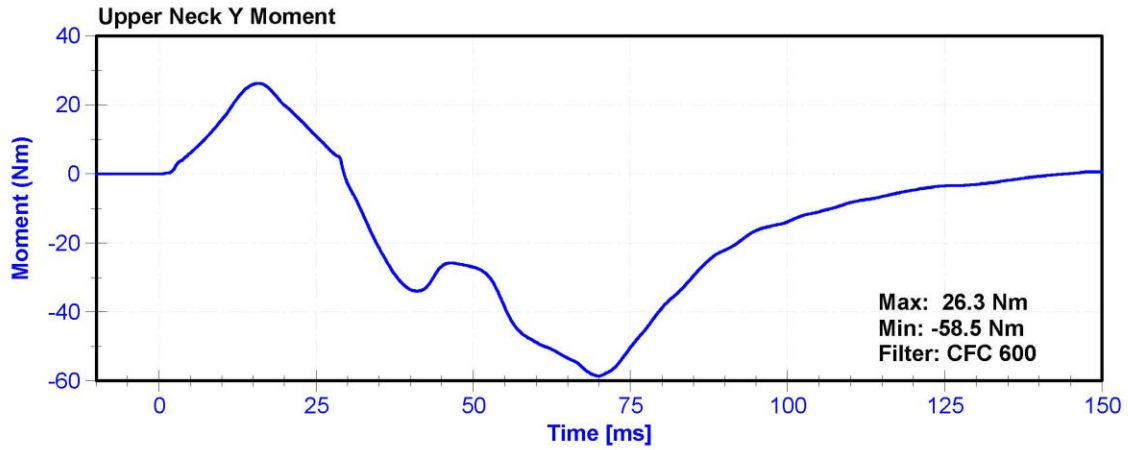
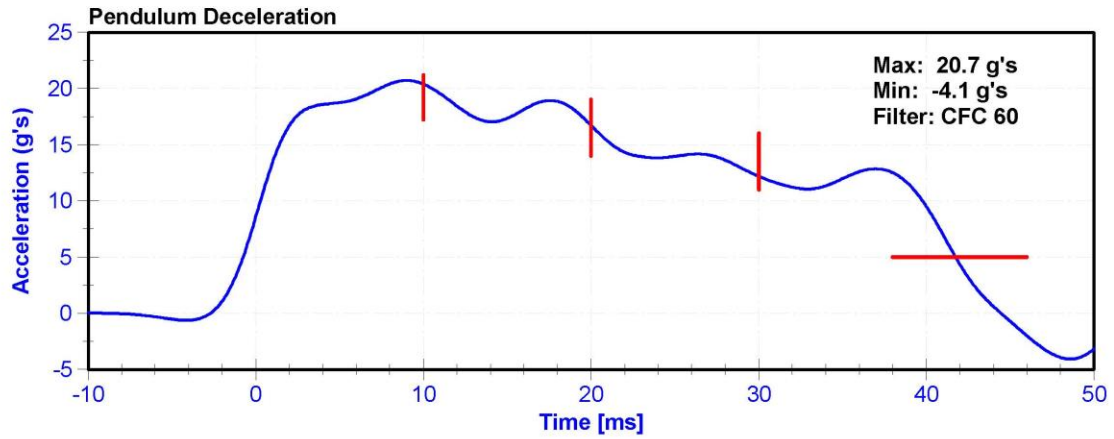
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	40.9	Pass
Velocity	5.94	6.19	m/s	6.068	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	20.39	Pass
Pendulum Deceleration at 20ms	14	19	g's	16.7	Pass
Pendulum Deceleration at 30ms	11	16	g's	12.2	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	20.7	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	41.7	Pass
Maximum D Plane Rotation	81	106	deg	95.8	Pass
Time to Maximum Rotation	72	82	ms	73.9	Pass
Rotation Decay to Zero	147	174	ms	153.9	Pass
Minimum Moment About OC	-80	-52.9	Nm	-67.92	Pass
Time to Minimum Moment	65	79	ms	69.9	Pass
Moment Decay to Zero	120	148	ms	137.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	9/28/2018	9/28/2019





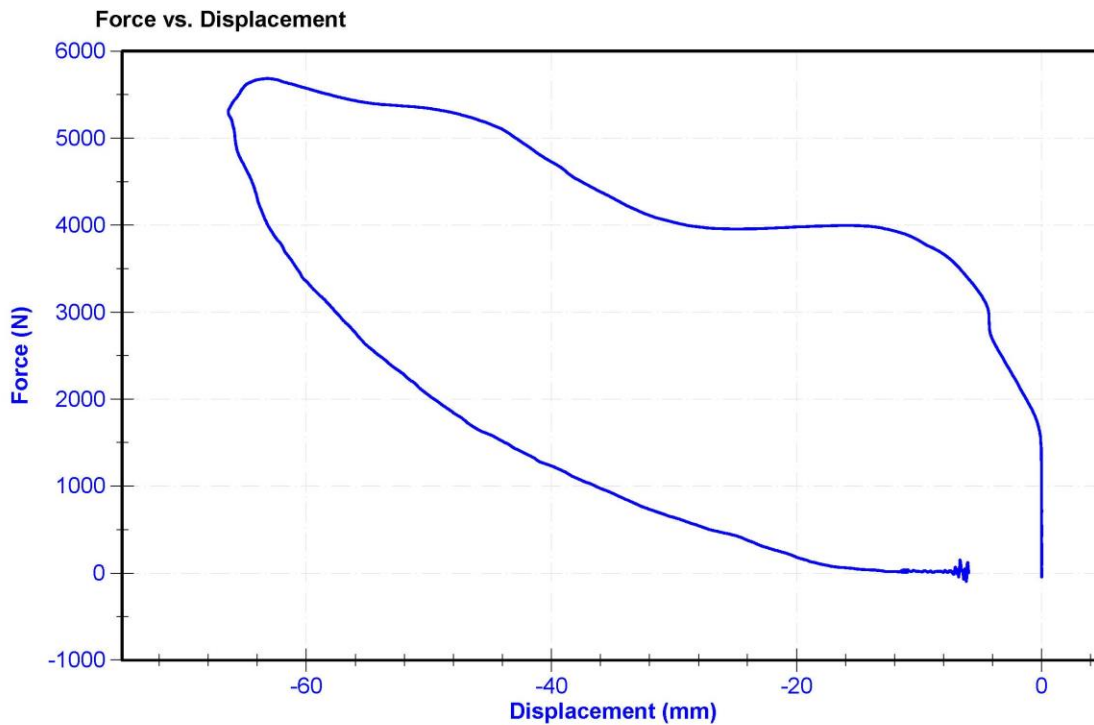
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

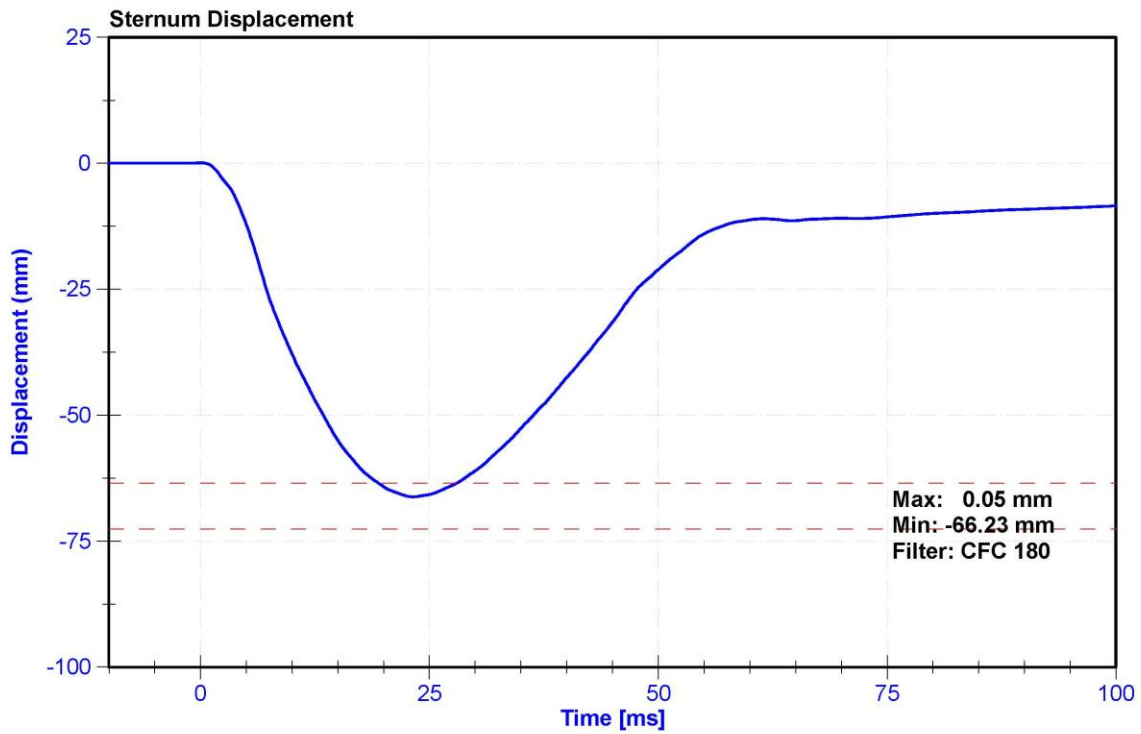
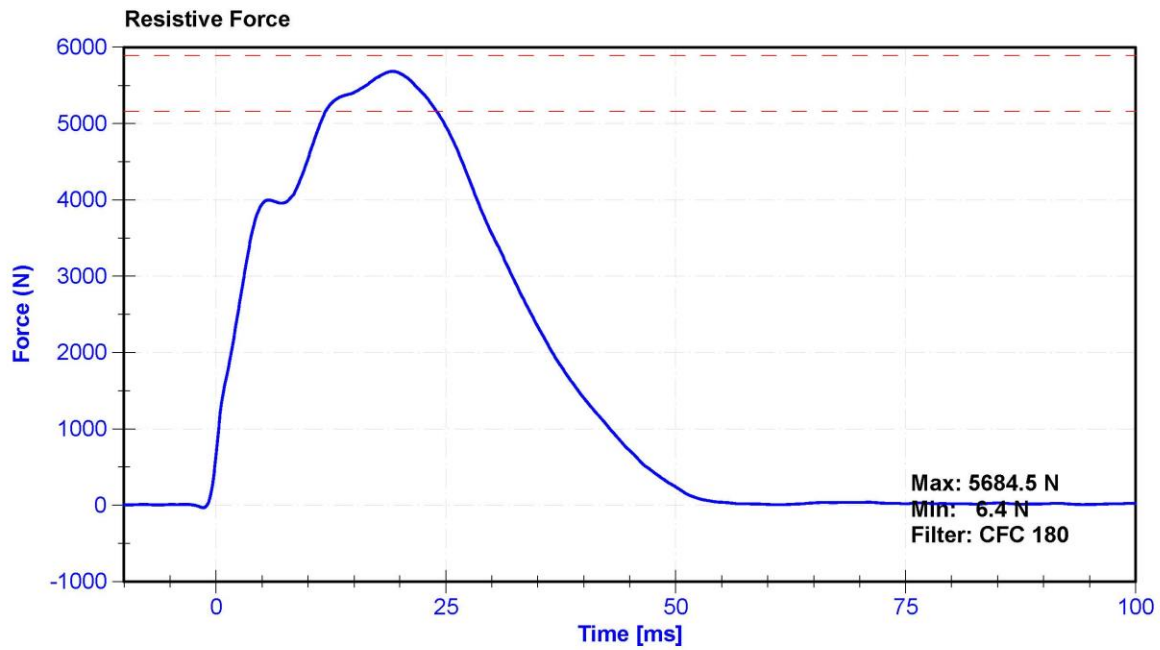
**Results**

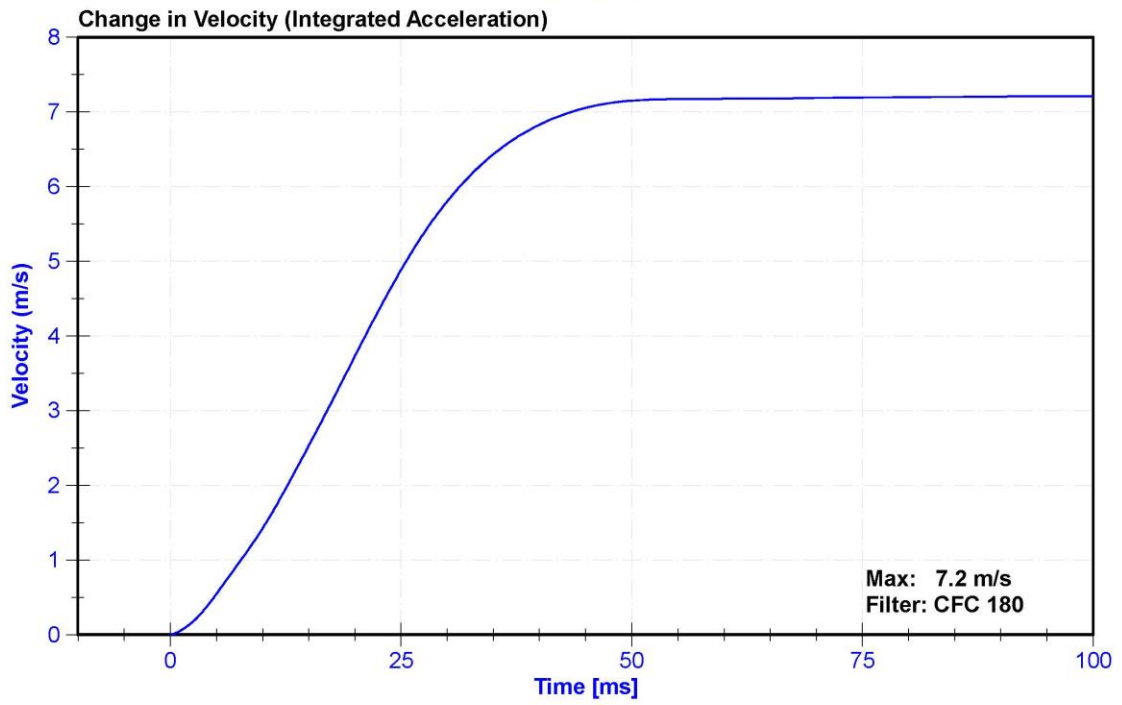
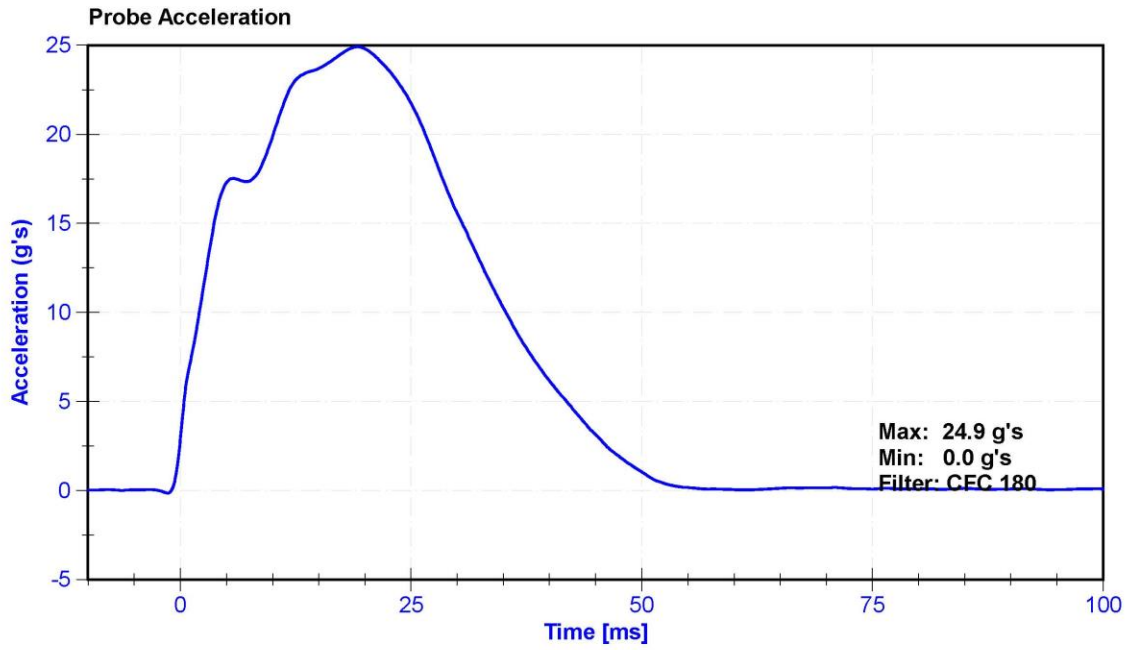
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	32.1	Pass
Velocity	6.59	6.83	m/s	6.655	Pass
Chest Displacement	-72.6	-63.5	mm	-66.23	Pass
Resistive Force	5160	5894	N	5684.5	Pass
Hysteresis	65	85	%	71.9	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	AC-94667	11/1/2018	11/1/2019
Chest Potentiometer	JDK 6209-2038	DS-142	10/22/2018	10/22/2019







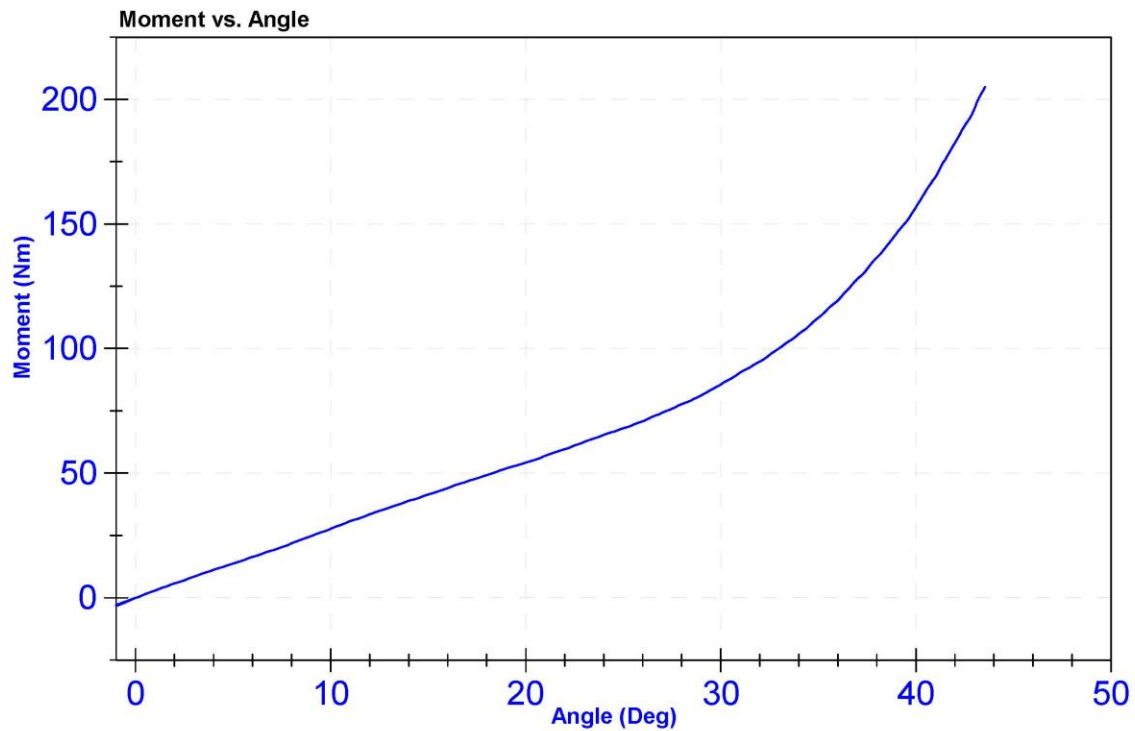
ATD Manufacturer	Humanetics	Test Technician	C. Mantell
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.4	Pass
Humidity	10	70	%	27.1	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	43.4	Pass
Moment at 30 degrees	0	94.9	Nm	85.6	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2018	9/18/2019
Load Cell	Key Trans 2301-02	LC-115 My	9/6/2018	9/6/2019



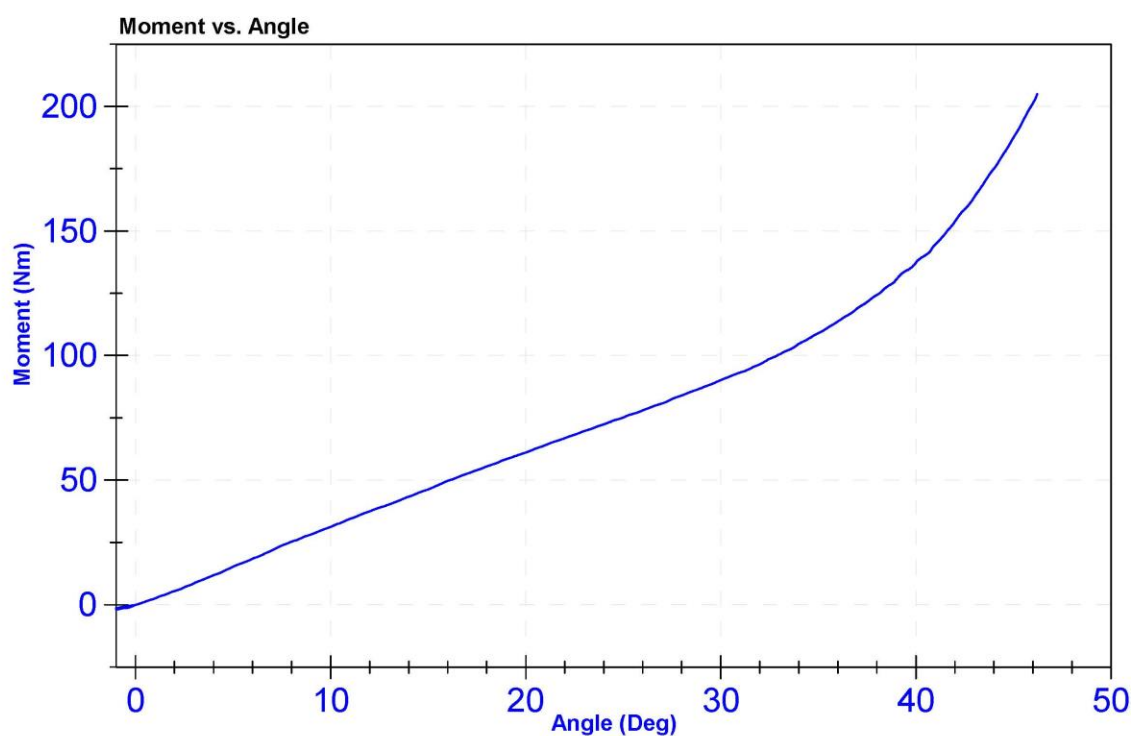
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	26.5	Pass
Average Velocity	5	10	deg/s	7.2	Pass
Angle at 203Nm	40	50	deg	46.1	Pass
Moment at 30 degrees	0	94.9	Nm	90.2	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/18/2018	9/18/2019
Load Cell	Key Trans 2301-02	LC-115 My	9/6/2018	9/6/2019



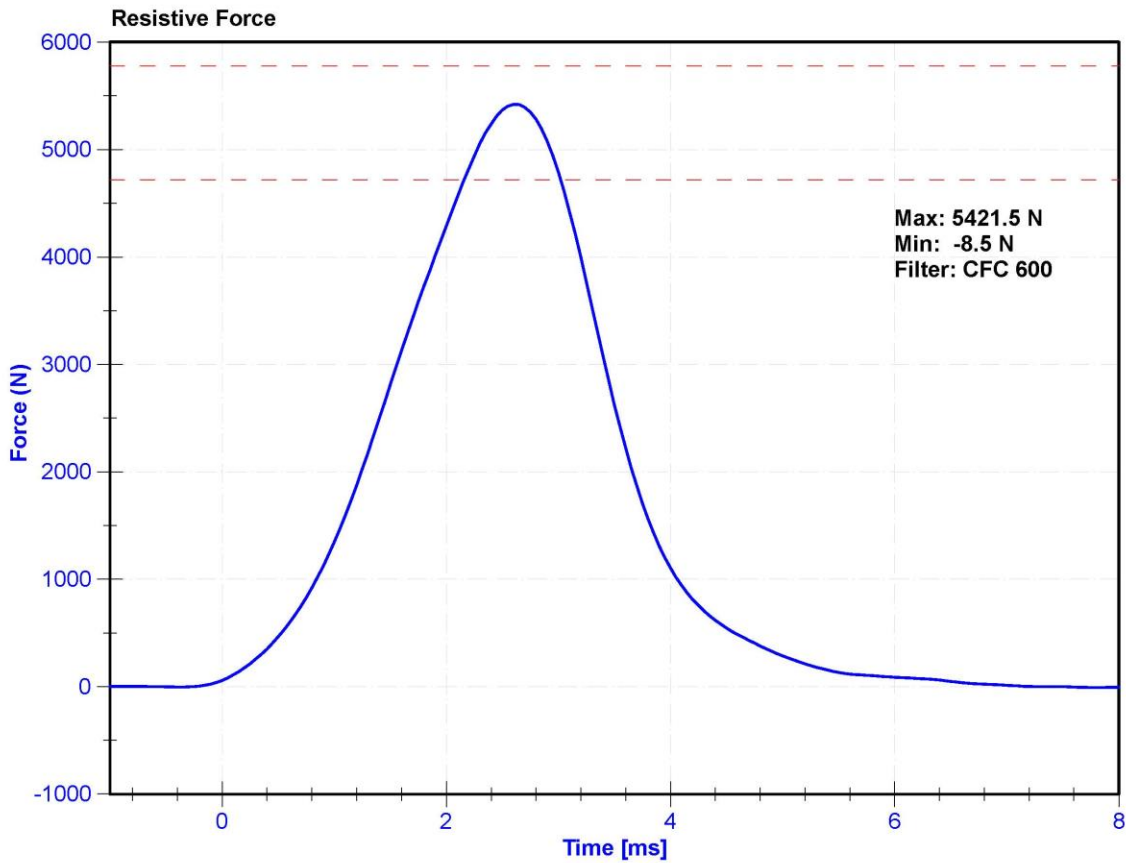
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

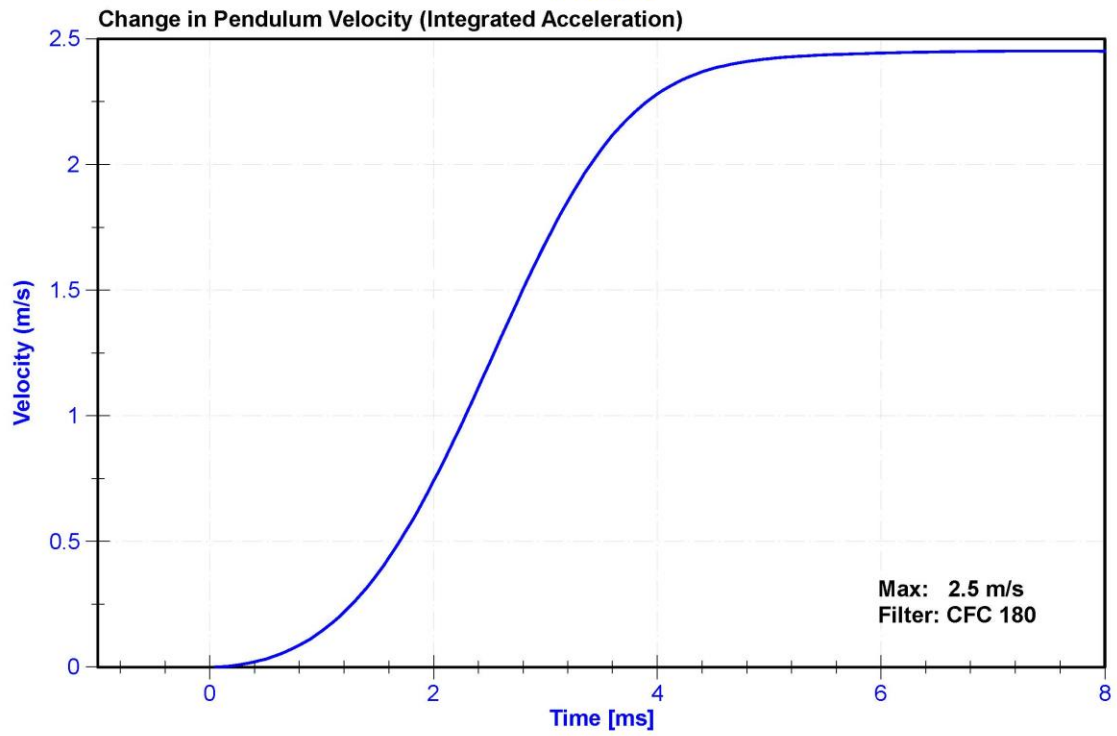
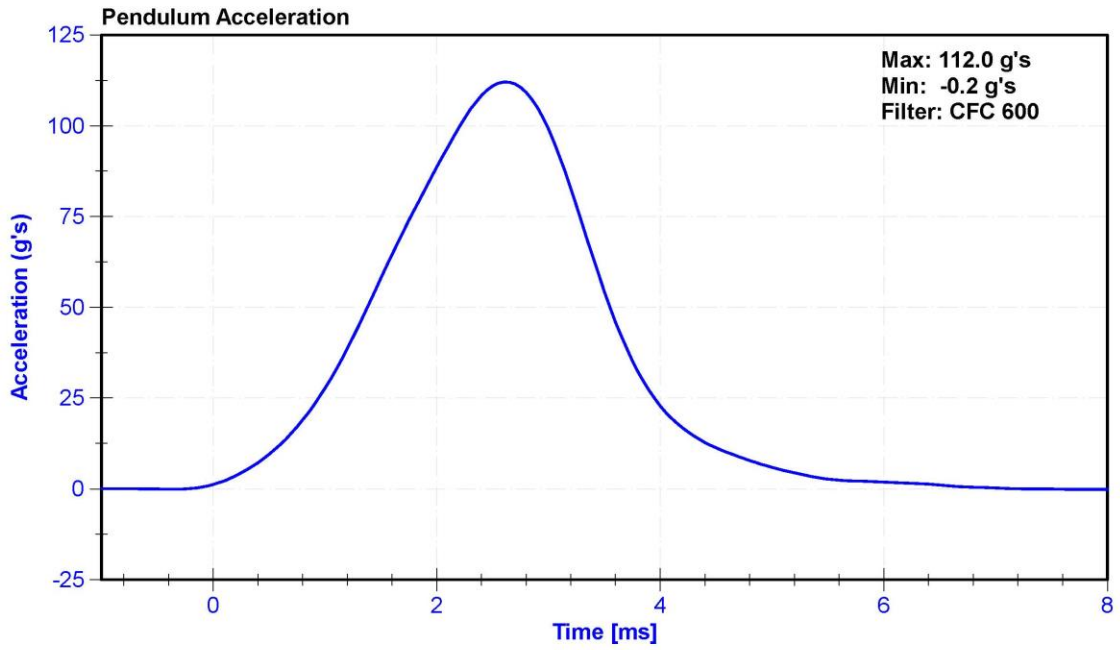
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22	Pass
Humidity	10	70	%	32.4	Pass
Velocity	2.07	2.13	m/s	2.080	Pass
Maximum Resistive Force	4720	5780	N	5421.5	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





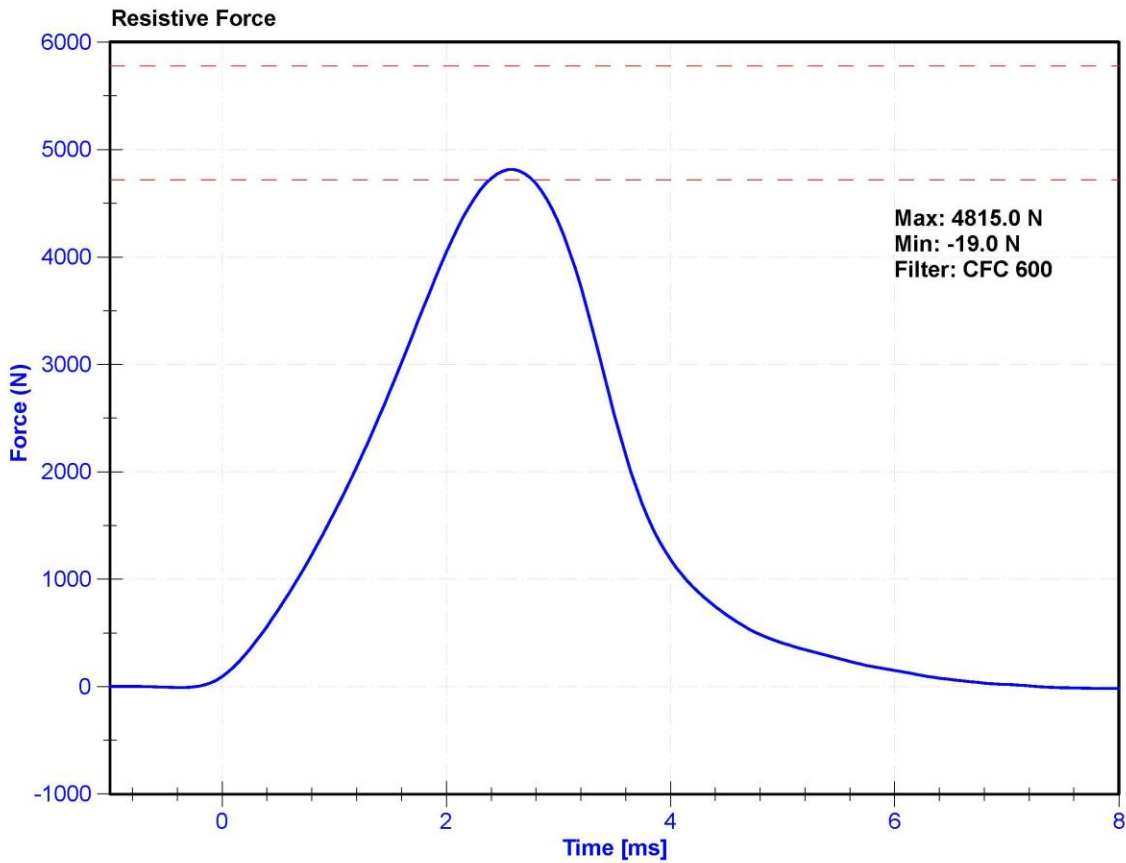
ATD Manufacturer	Humanetics	Test Technician	K. Dutton
ATD Serial Number	142	Laboratory Supervisor	K. Brogan

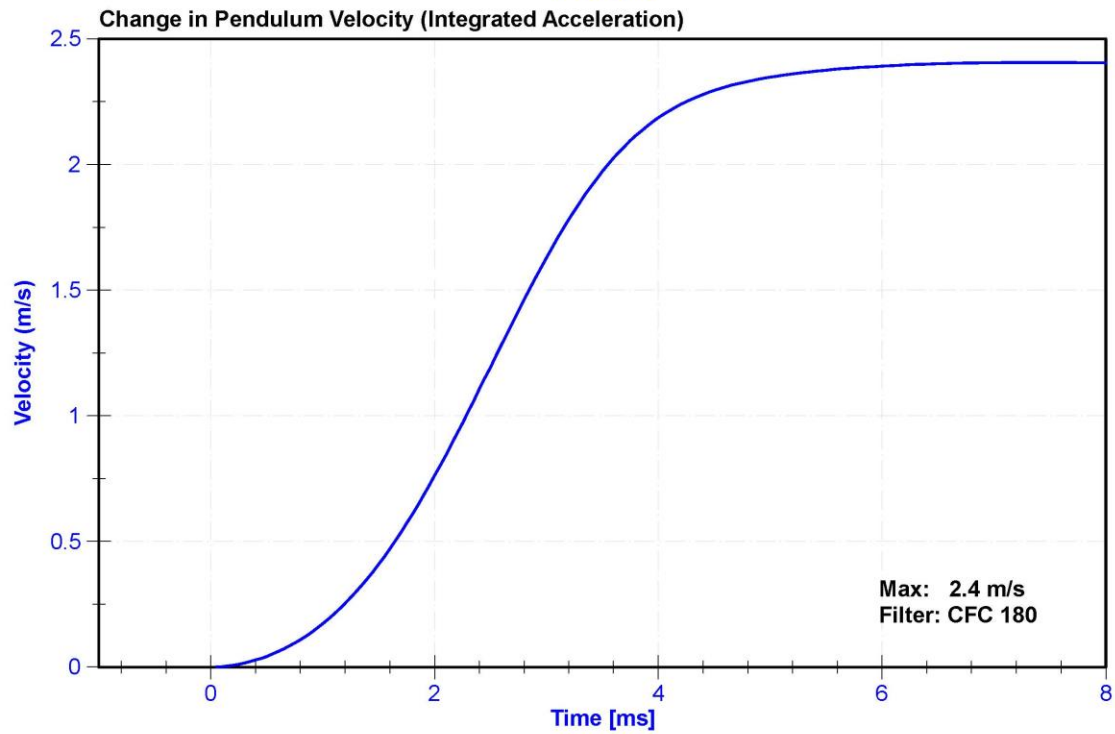
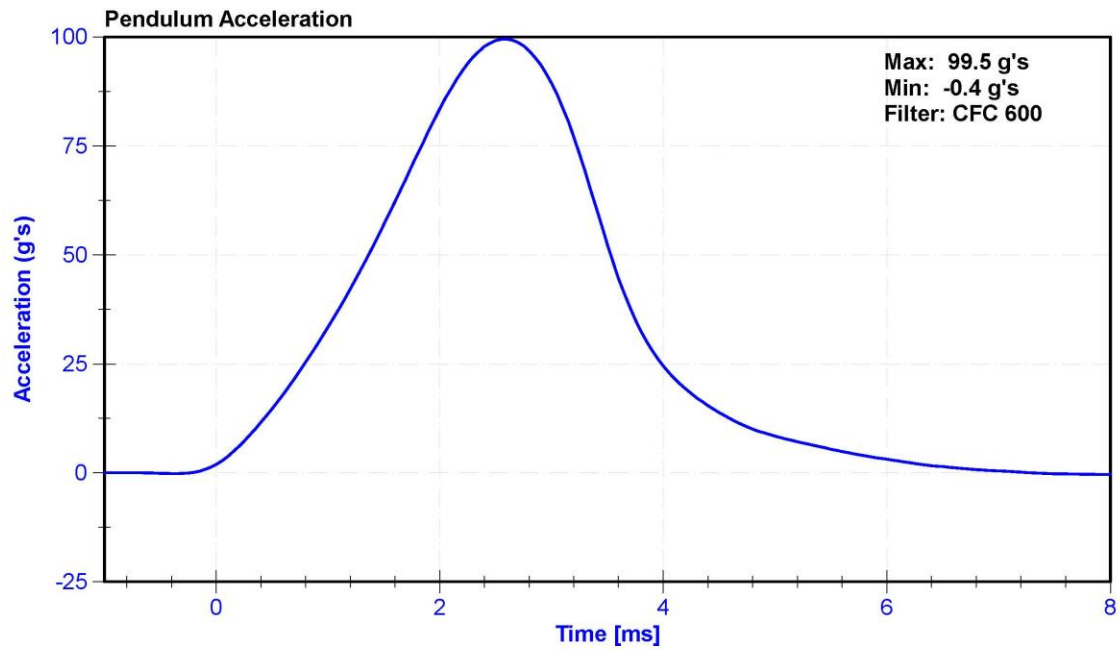
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22	Pass
Humidity	10	70	%	29.5	Pass
Velocity	2.07	2.13	m/s	2.118	Pass
Maximum Resistive Force	4720	5780	N	4815.0	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





**CALIBRATION TEST RESULTS**

**POST-TEST**

**HYBRID III 5<sup>TH</sup> PERCENTILE FEMALE - PASSENGER ATD**

**SERIAL NO: 139**

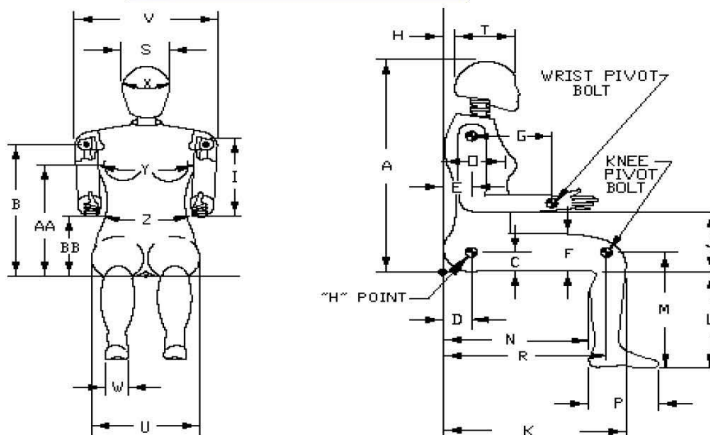


External Measurements - Hybrid 3 - 5th Female

Technician: K. Brogan

Date: 02/01/2018

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	147	Pass
E	Shoulder Pivot from Backline	69	84	76	Pass
F	Thigh Clearance	119	135	124	Pass
G	Back of Elbow to Wrist Pivot	244	259	251	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	289	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	398	Pass
N	Buttock Popliteal Length	414	439	424	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	225	Pass
R	Buttock To Knee Pivot Length	457	483	473	Pass
S	Head Breadth	137	147	141	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	308	Pass
V	Shoulder Breadth	351	366	362	Pass
W	Foot Breadth	79	94	86	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

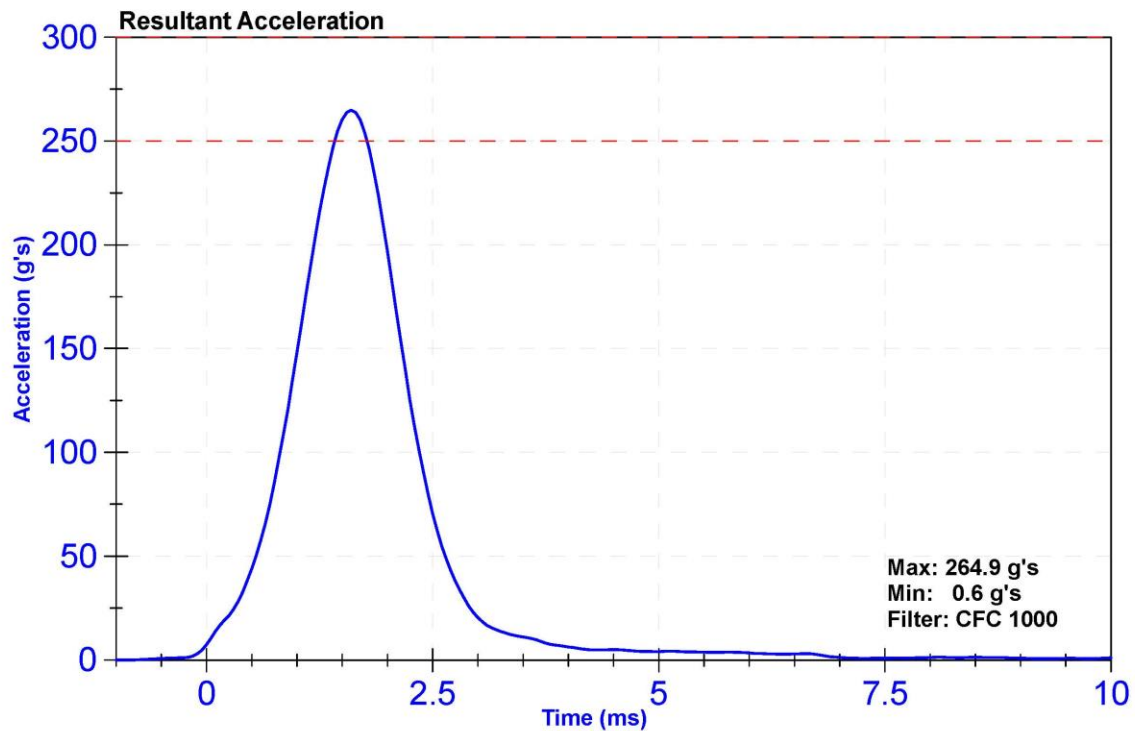
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

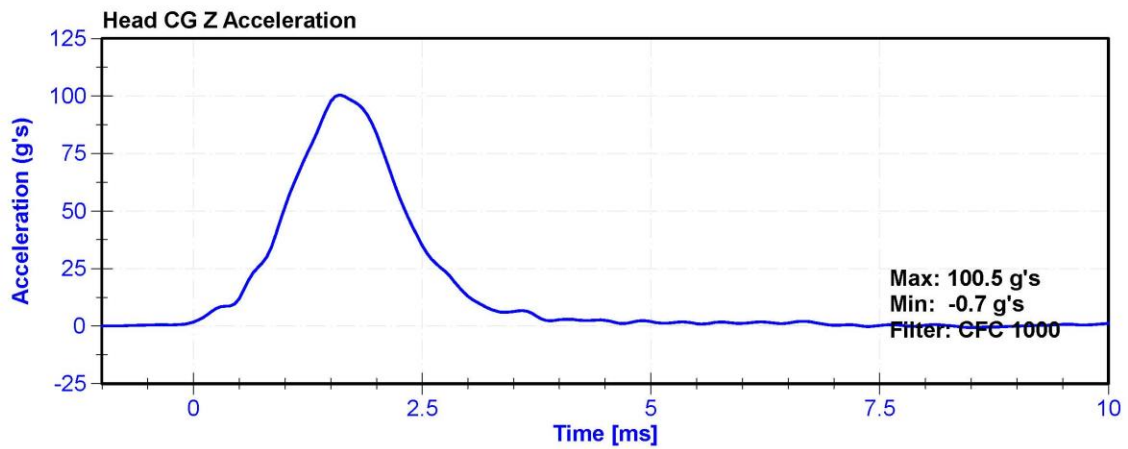
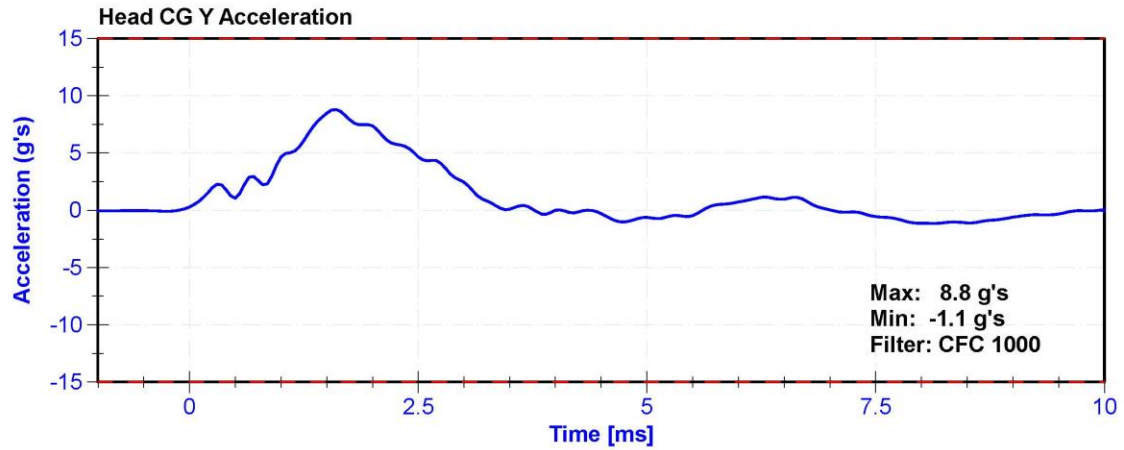
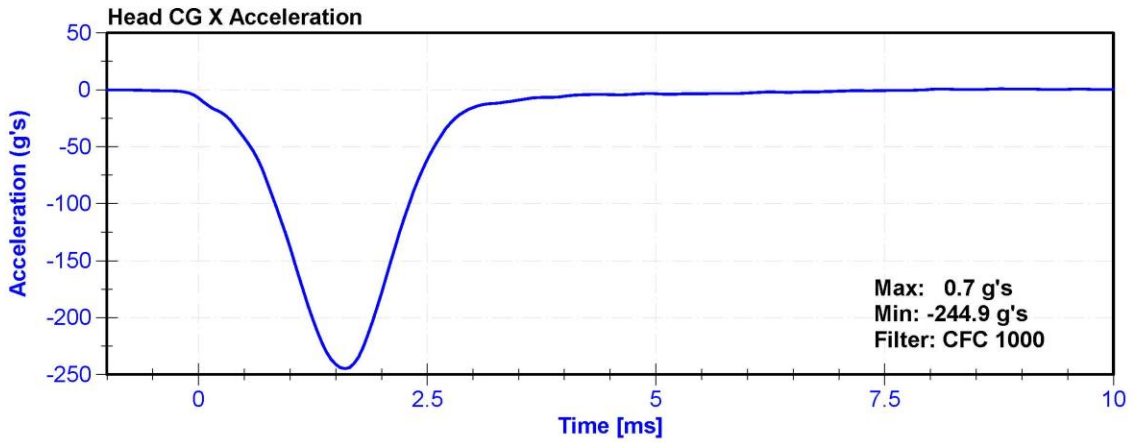
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.8	Pass
Humidity	10	70	%	29.3	Pass
Resultant Acceleration	250	300	g's	264.9	Pass
Oscillation	0	10	%	1.9	Pass
Lateral Acceleration	-15	15	g's	8.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P51303	10/15/2018	4/15/2019
Y Accelerometer	ENDEVCO 7264CT	AC-P49216	10/15/2018	4/15/2019
Z Accelerometer	ENDEVCO 7264	AC-P58868	10/15/2018	4/15/2019





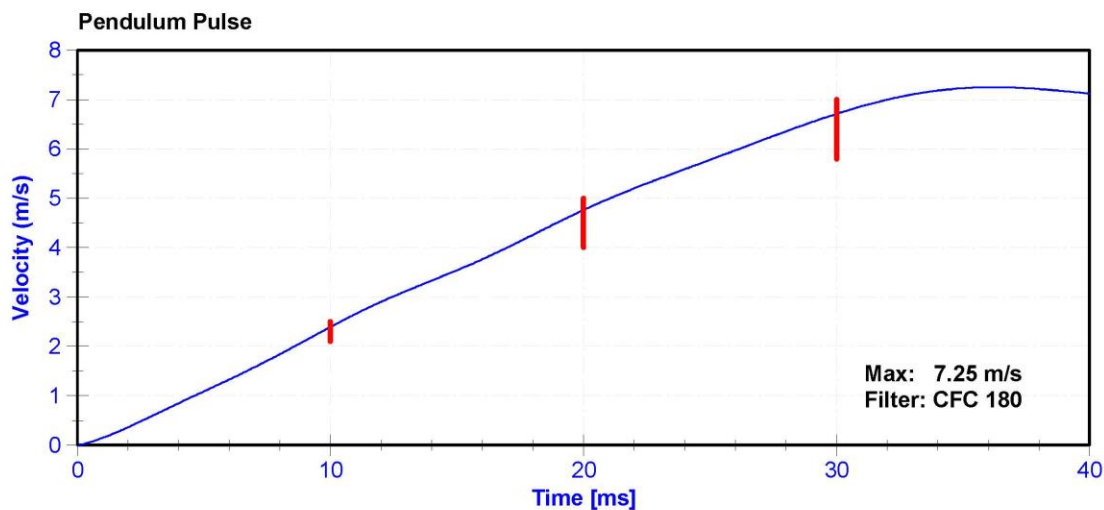
ATD Manufacturer	Denton	Test Technician	K. Dutton
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

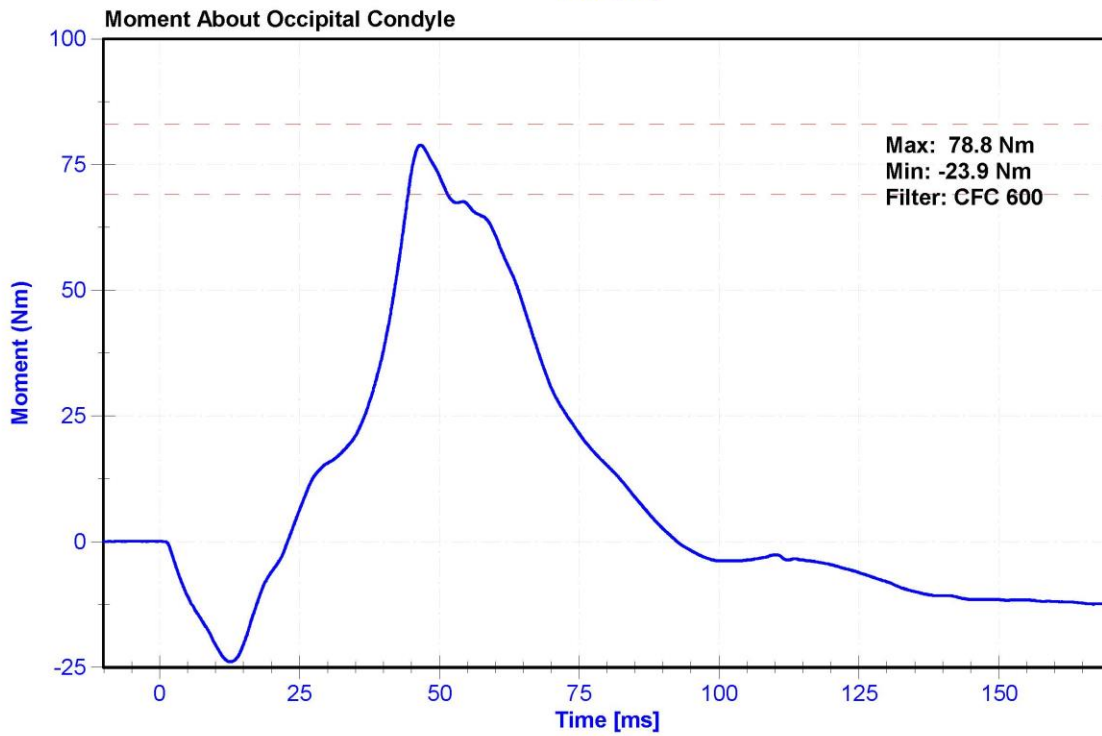
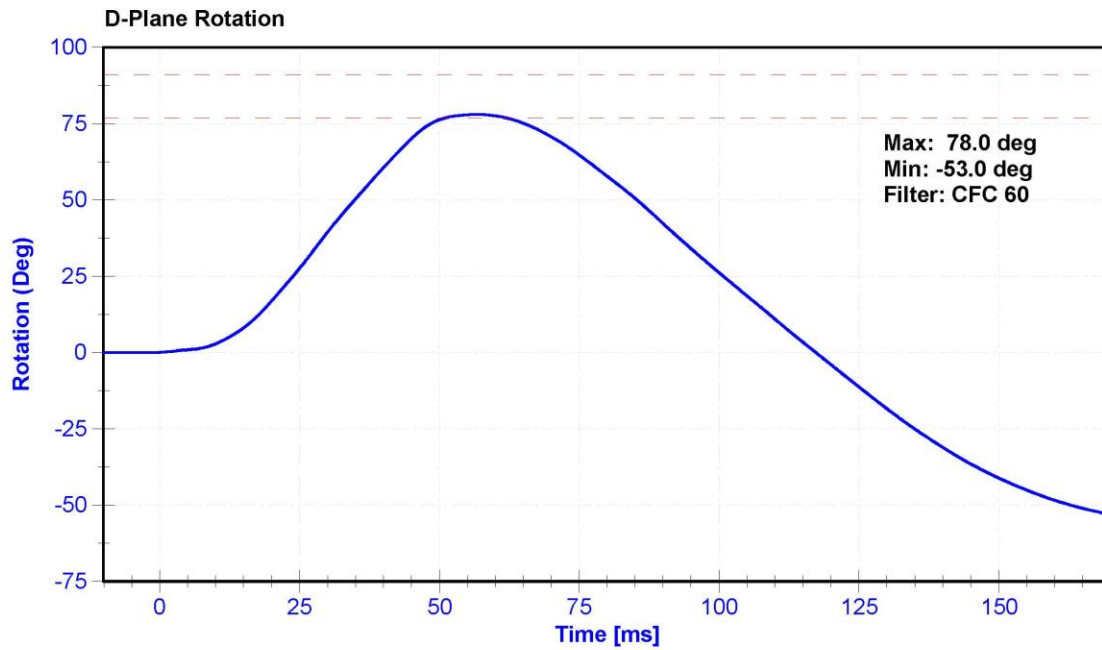
**Results**

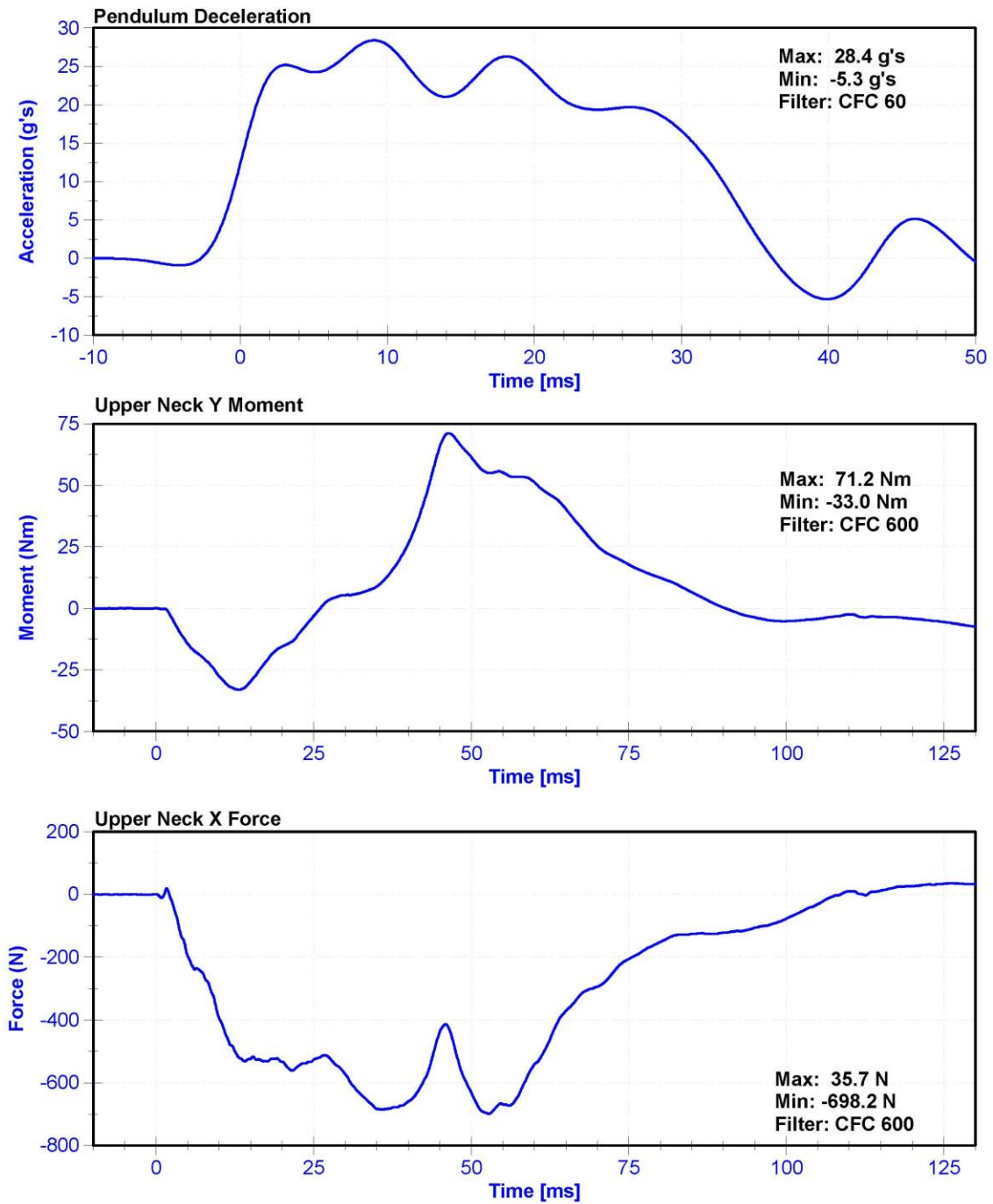
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	41.3	Pass
Velocity	6.89	7.13	m/s	7.037	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.39	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.76	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.71	Pass
Max D Plane Rotation	77	91	deg	78.0	Pass
Max Moment During Rotation Interval	69	83	Nm	78.8	Pass
Moment Decay to 10.0 Nm	80	100	ms	84.1	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	DENTON 1716A	LC-1591Fx	9/28/2018	9/28/2019







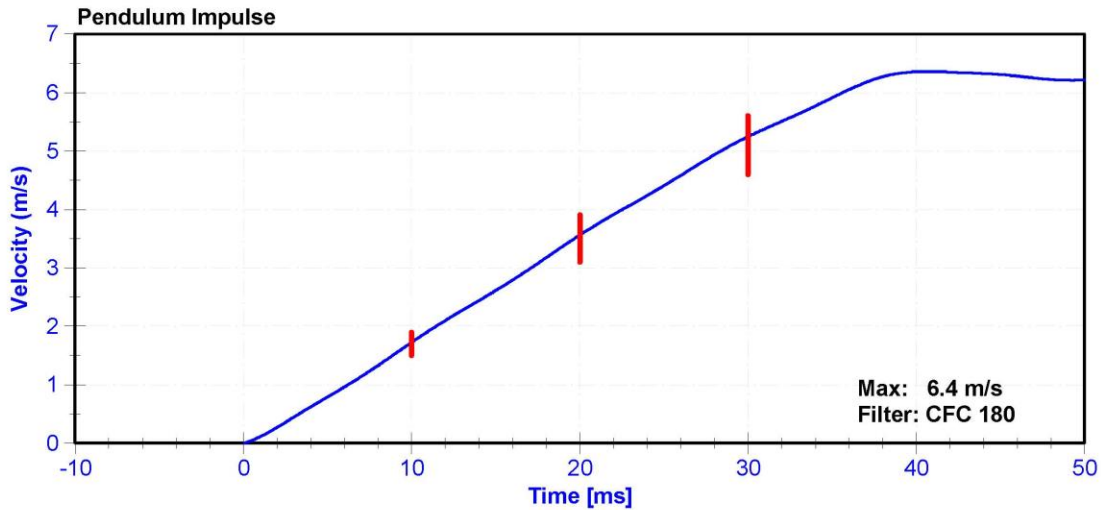
ATD Manufacturer	Denton	Test Technician	K. Dutton
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

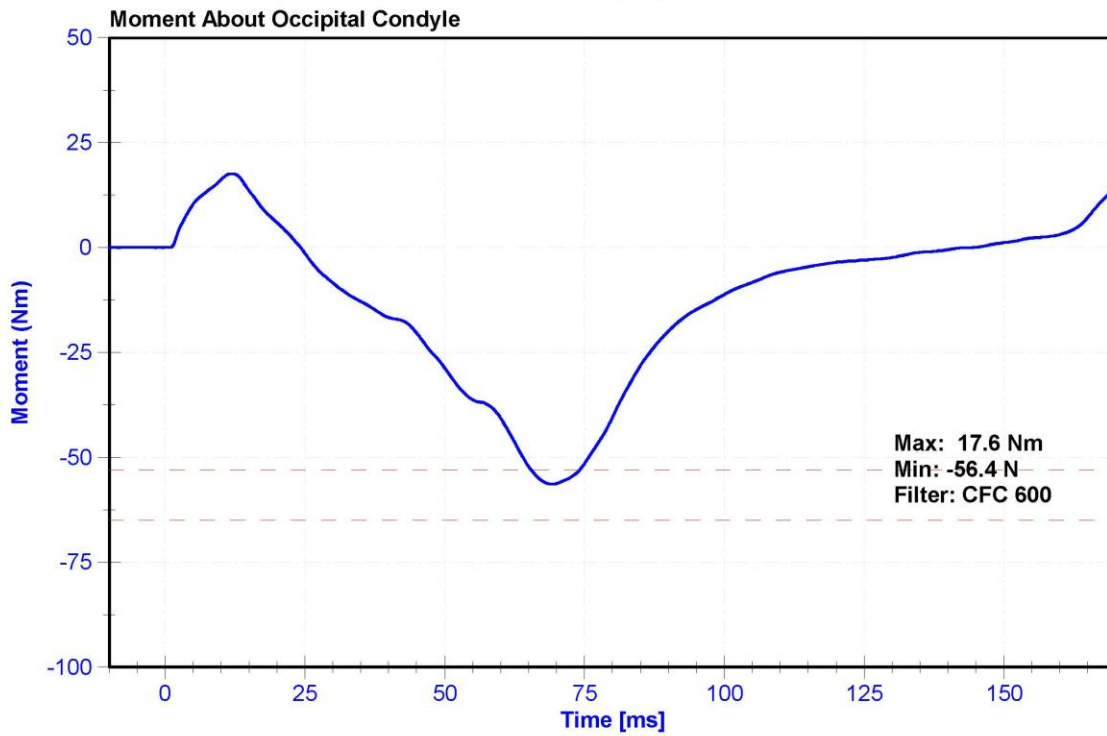
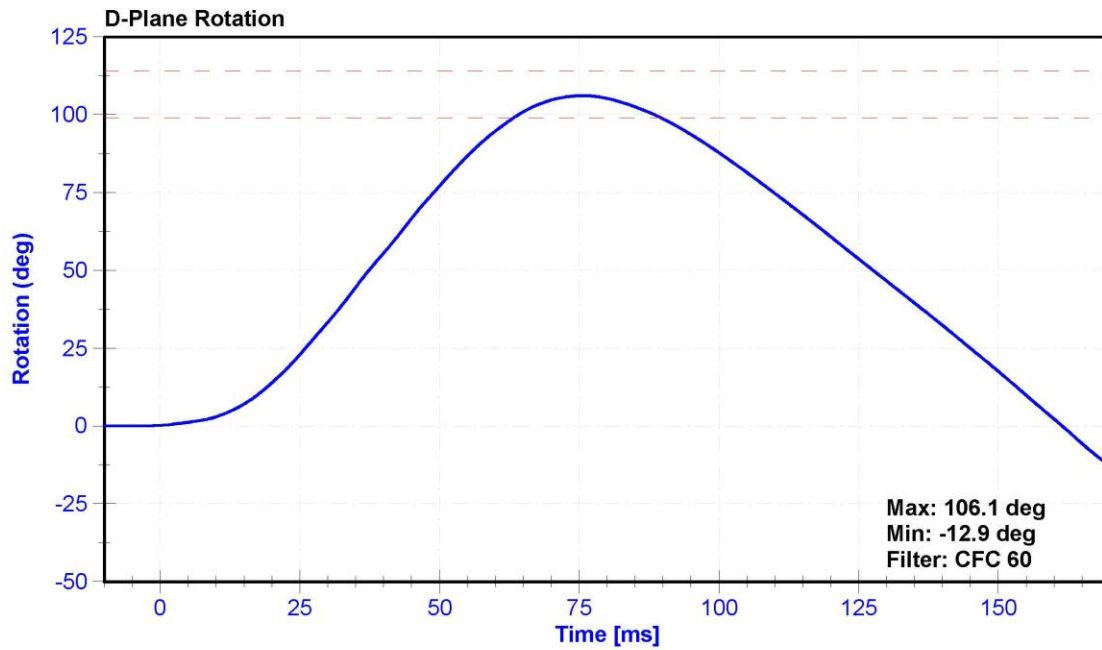
**Results**

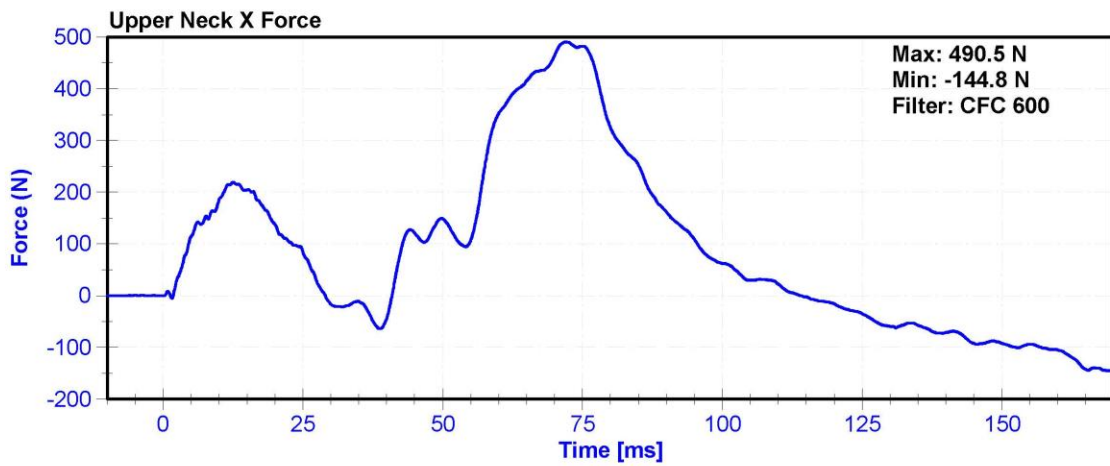
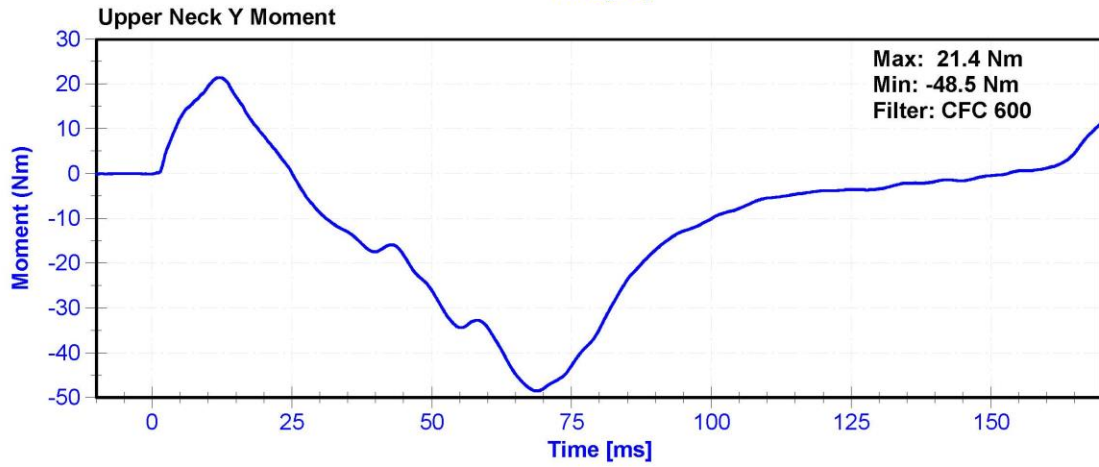
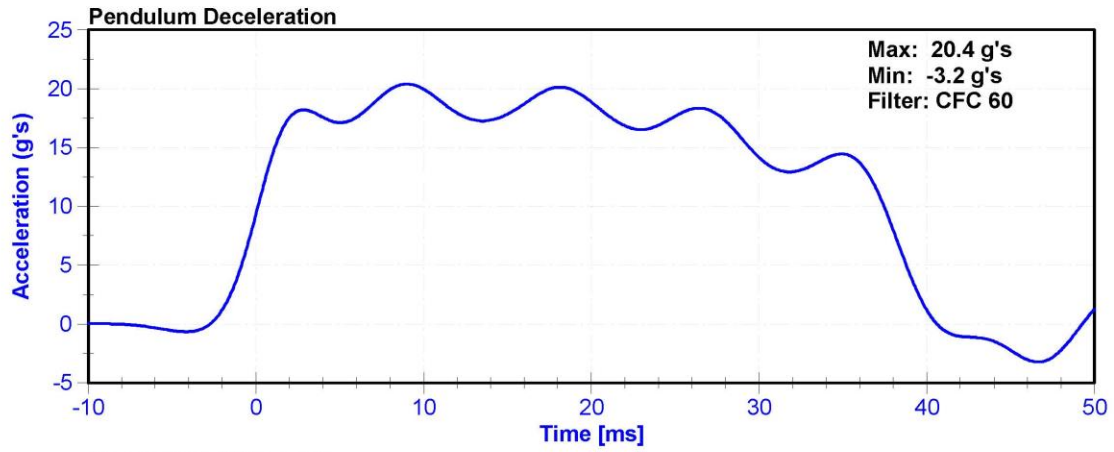
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	41.3	Pass
Velocity	5.95	6.19	m/s	6.158	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.73	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.56	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.25	Pass
D Plane Rotation	99	114	deg	106.1	Pass
Moment During Rotation Interval	-65	-53	Nm	-56.4	Pass
Moment Decay to -10Nm	94	114	ms	101.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/12/2018	10/12/2019
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/12/2018	10/12/2019
Upper Neck Load Cell	DENTON 1716A	LC-1591Fx	9/28/2018	9/28/2019







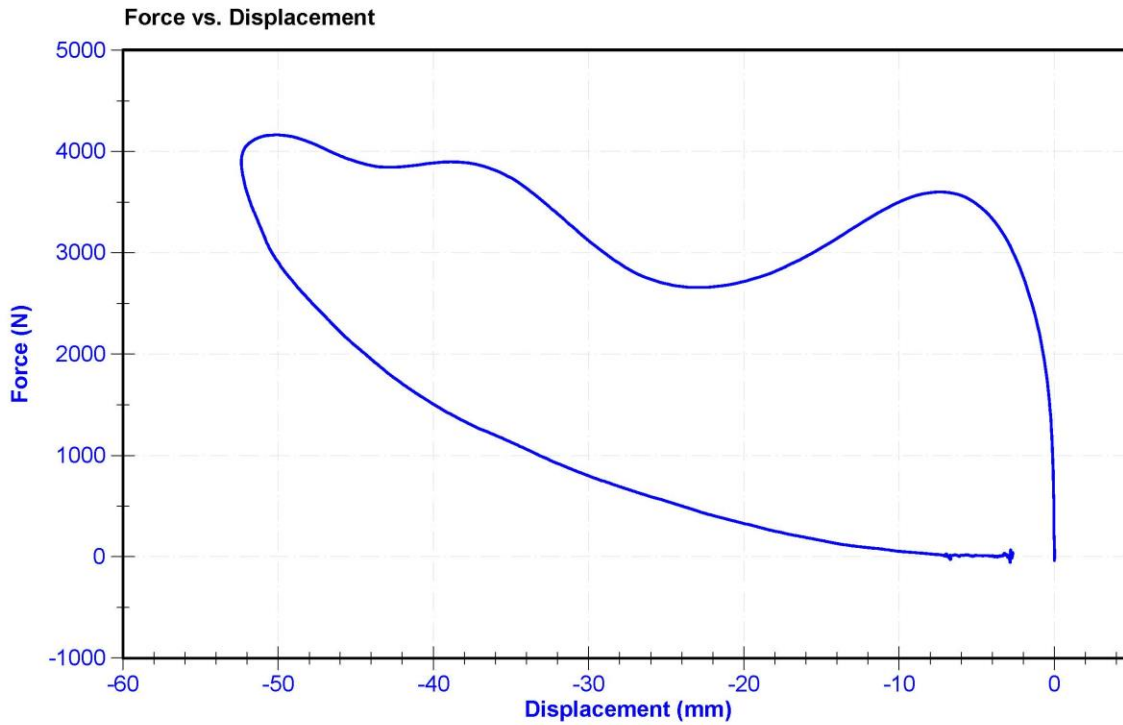
ATD Manufacturer	Denton	Test Technician	D. Reinhard
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

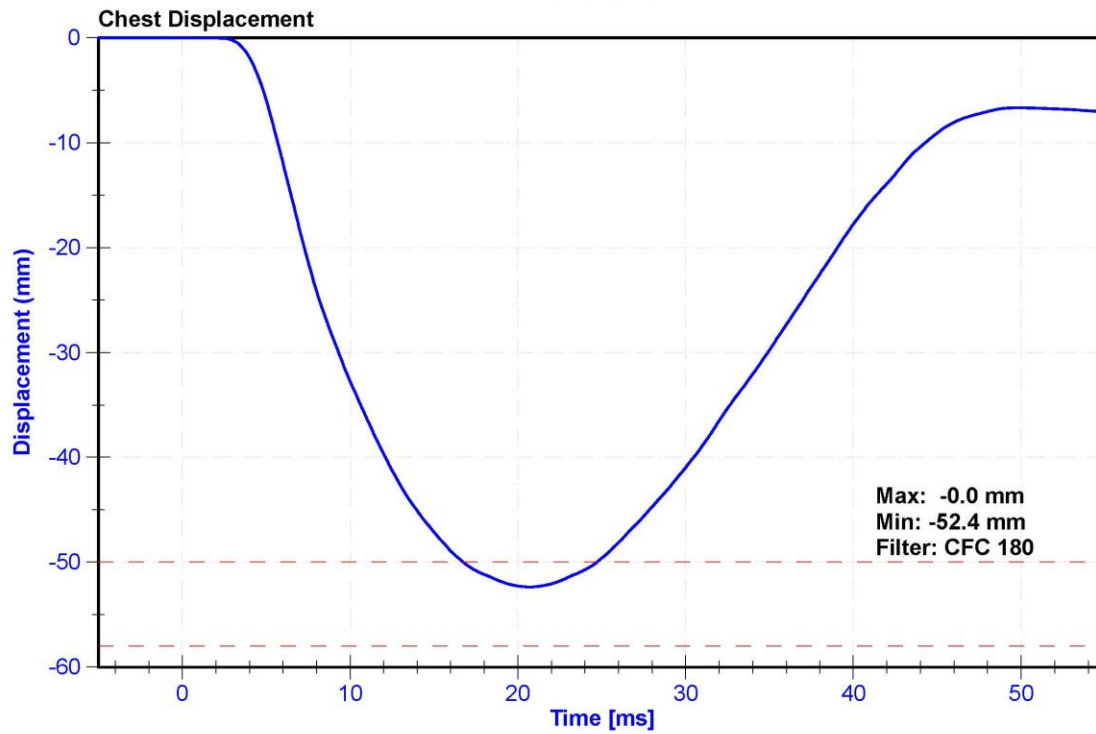
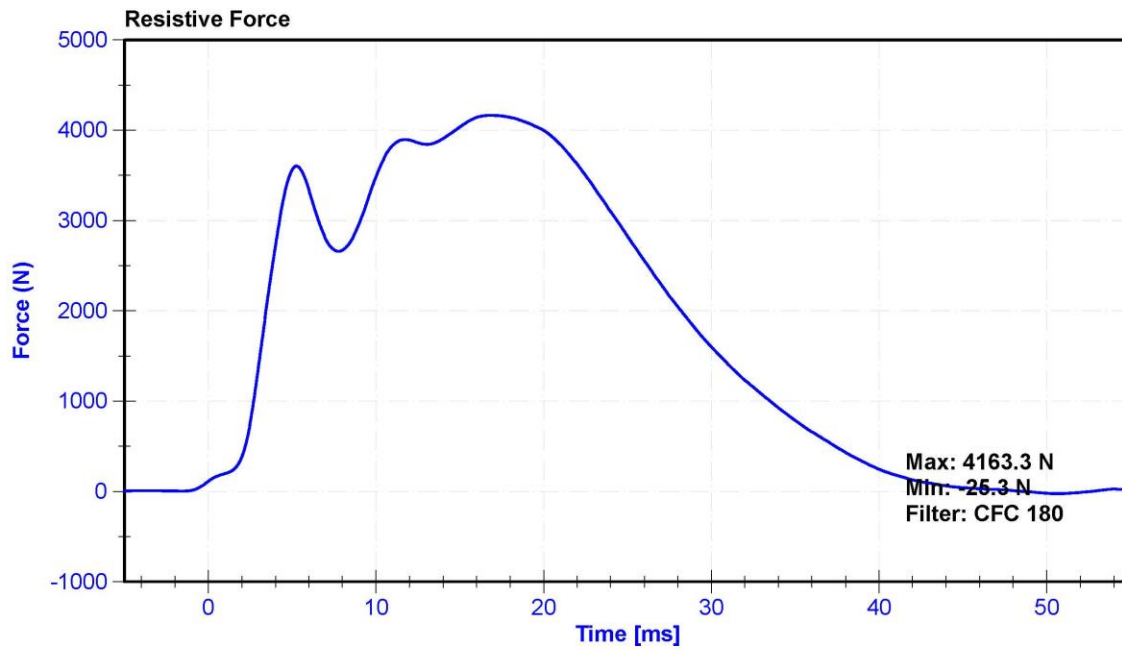
**Results**

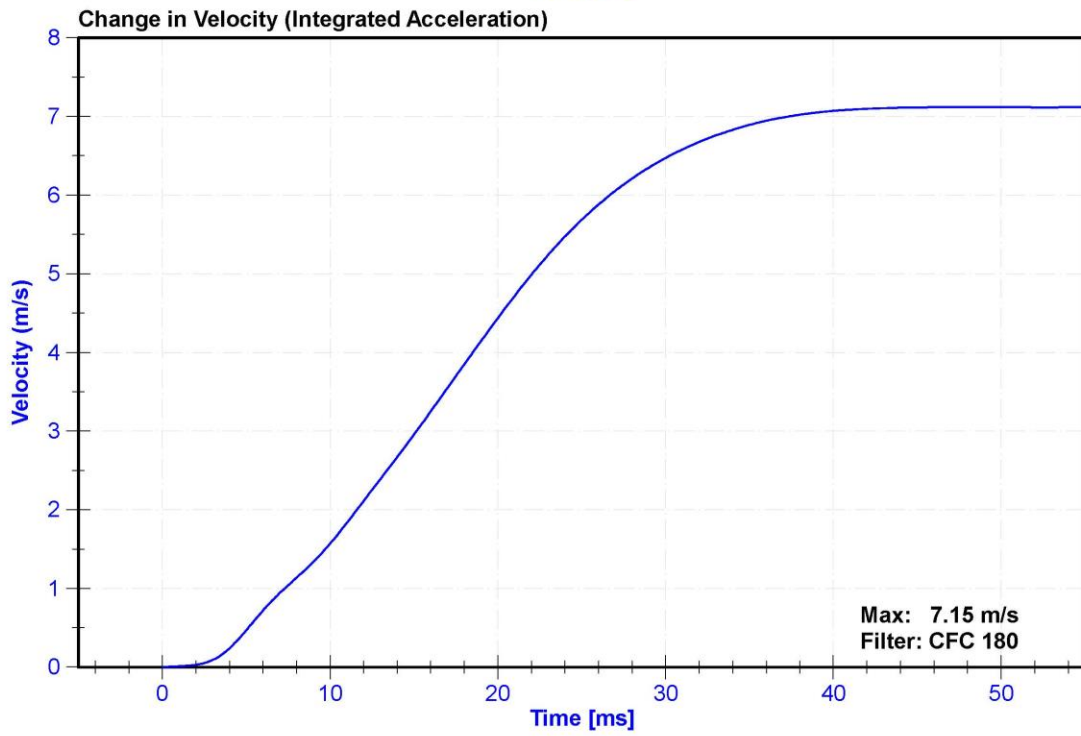
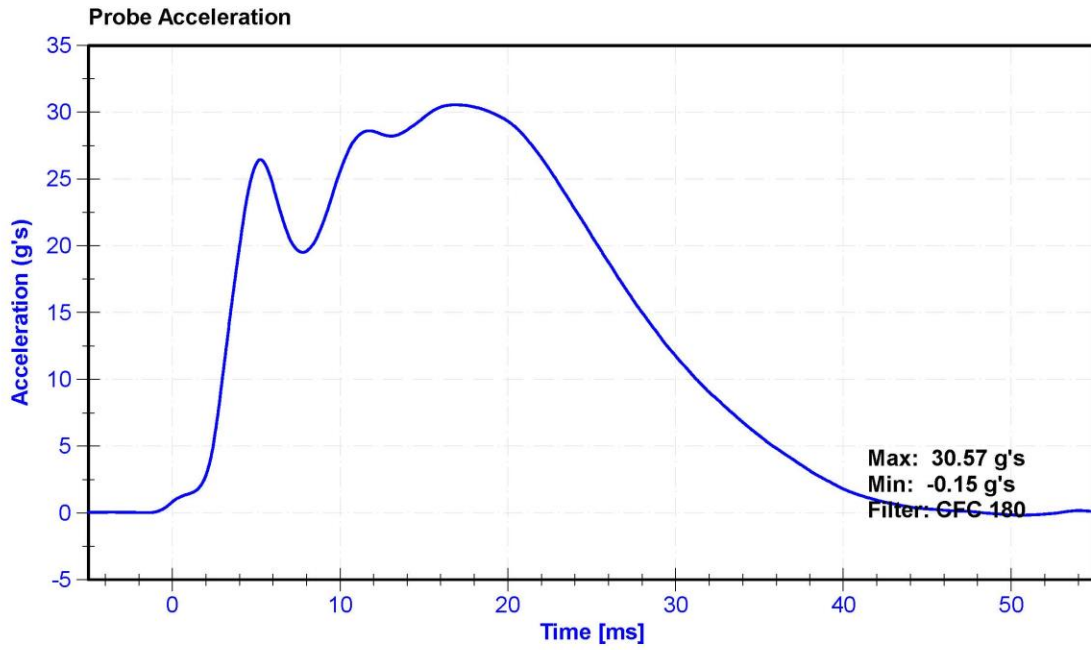
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	28.1	Pass
Velocity	6.59	6.83	m/s	6.804	Pass
Chest Deflection	-58	-50	mm	-52.4	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4163.3	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4162.6	Pass
Hysteresis	69	85	%	72.9	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	AC-P94667	11/1/2018	11/1/2019
Chest Potentiometer	SERVO 14CB1-2897	DS-288	10/22/2018	10/22/2019







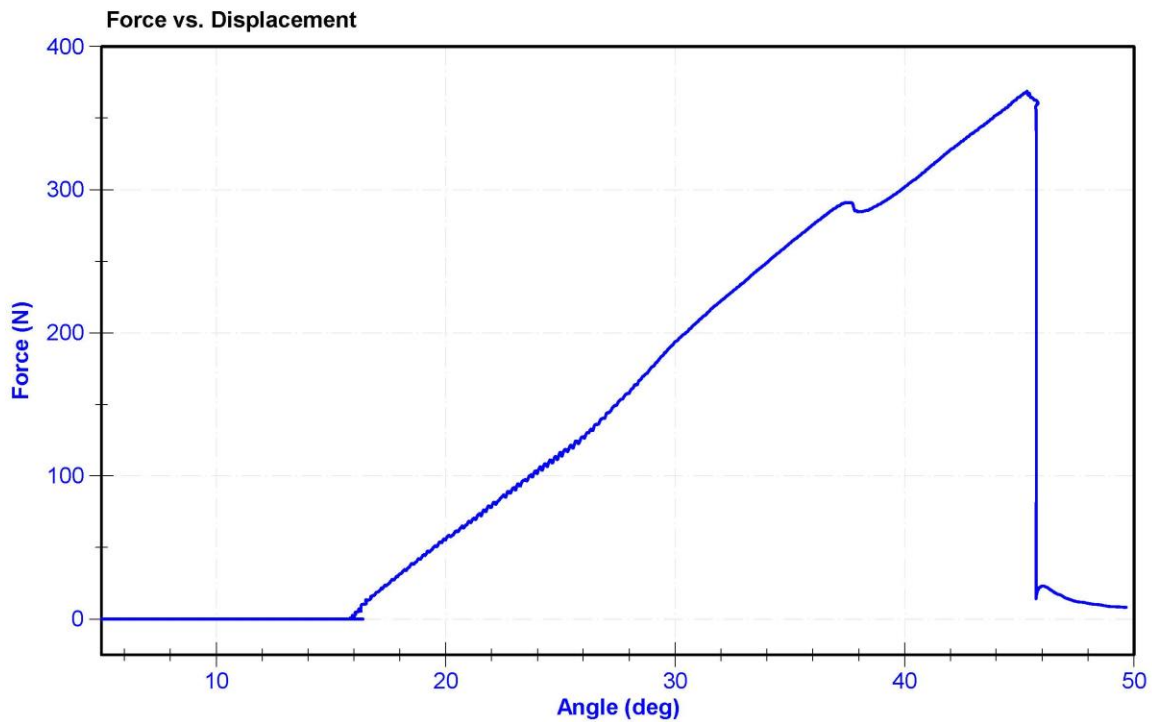
ATD Manufacturer	Denton	Test Technician	C.Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	22	Pass
Humidity	10	70	%	28	Pass
Initial Angle	0	20	deg	15.3	Pass
Force at 45 Degrees	320	390	N	368.8	Pass
Return Angle Relative to Initial	0	8	deg	1.5	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	10/25/2018	10/25/2019
Load Cell	Interface SML-200	LC-493319	10/25/2018	10/25/2019



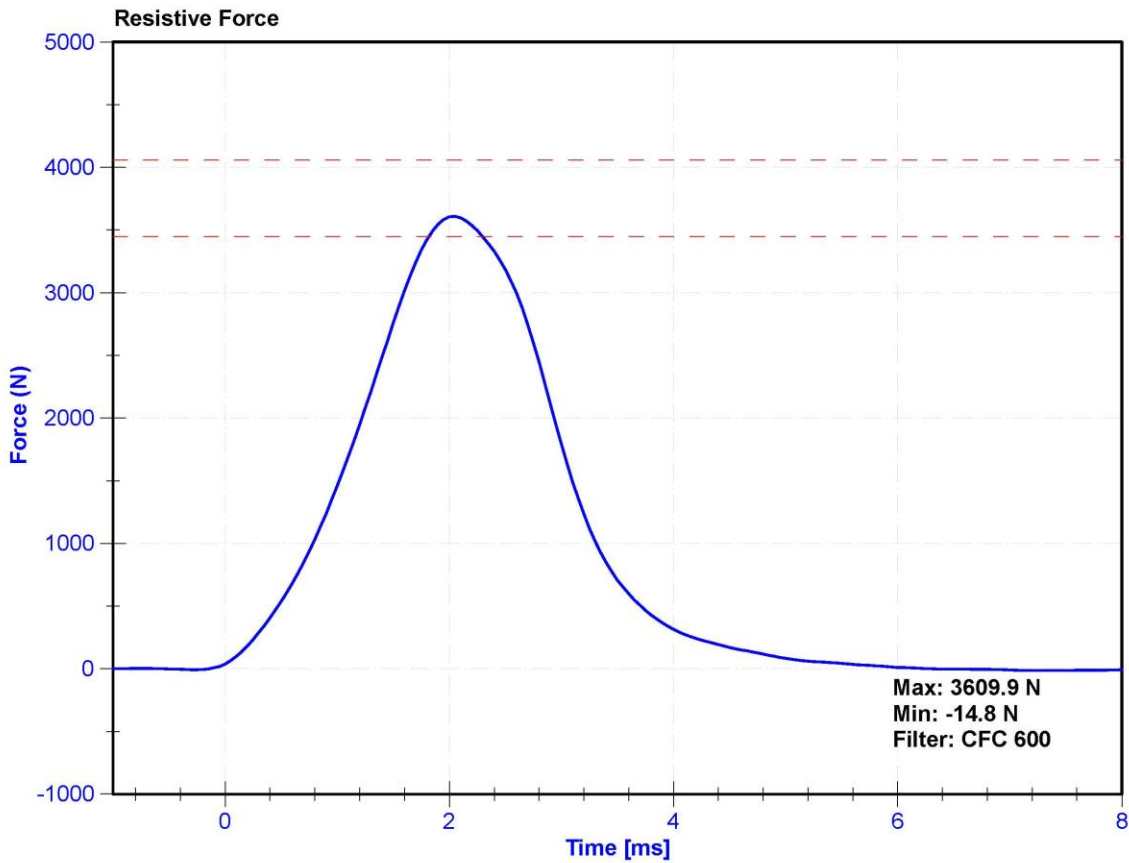
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	139	Laboratory Supervisor	K. Brogan

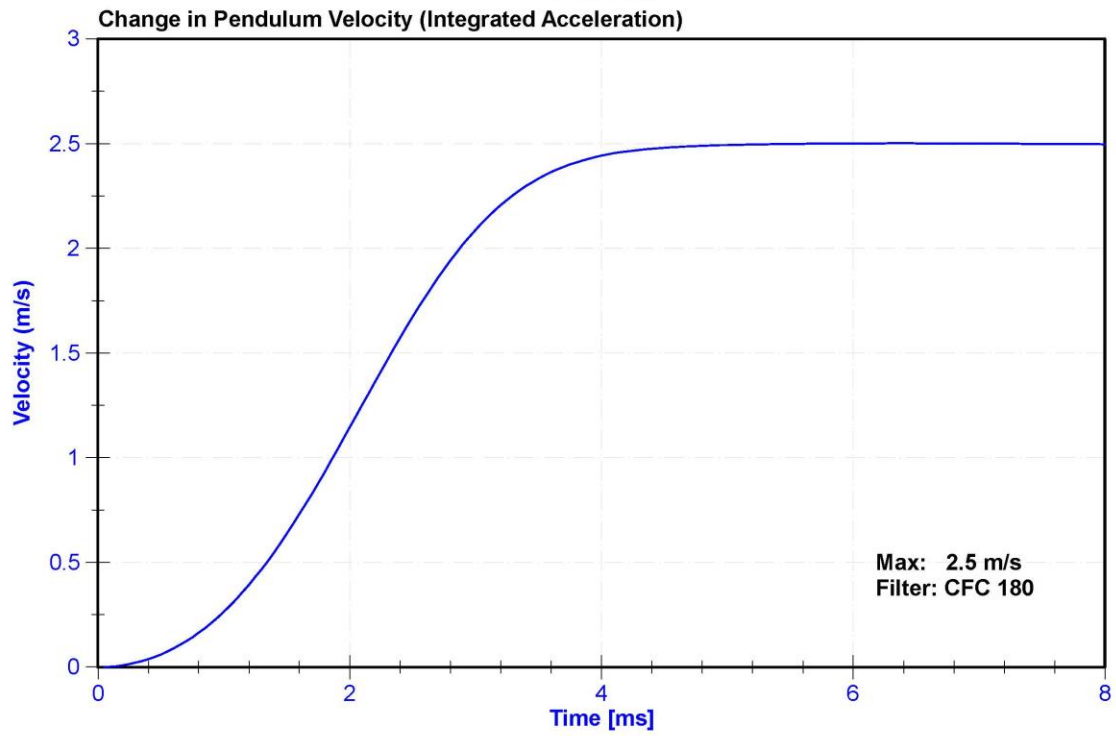
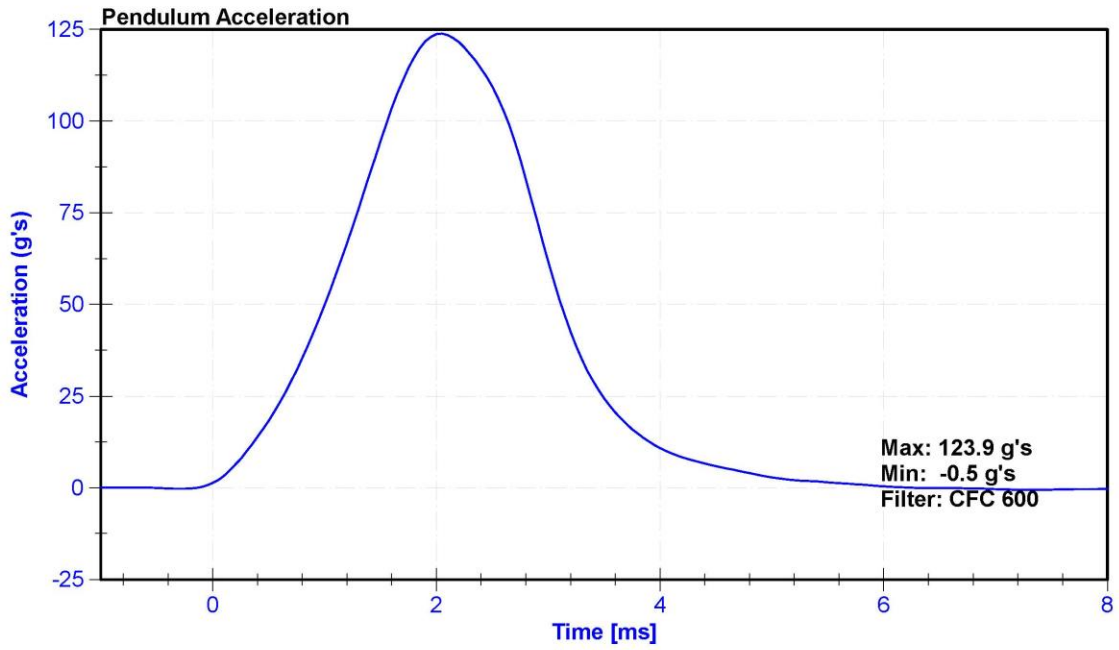
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.0	Pass
Humidity	10	70	%	33.3	Pass
Velocity	2.07	2.13	m/s	2.104	Pass
Resistive Force	3450	4060	N	3609.9	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019





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	22.0	Pass
Humidity	10	70	%	32.7	Pass
Velocity	2.07	2.13	m/s	2.101	Pass
Resistive Force	3450	4060	N	3902.4	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019

