

REPORT NUMBER: NCAP-CAL-15-005

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

**General Motors LLC
2015 Chevrolet Colorado
Pick Up / Extended Cab**

NHTSA No: M20150112

**PREPARED BY:
CALSPAN CORPORATION
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April 9, 2015

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: _____

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16. Abstract A 56.30 km/h (35 mph), NCAP Frontal Impact Test was conducted on a 2015 Chevrolet Colorado Extended Cab Pick Up 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 4, 2015. The impact velocity of the vehicle was 56.81 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 408 mm at the vehicles centerline. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (Serial No. 1046)</th> <th colspan="2">Passenger ATD (Serial No. 139)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>210.399</td> <td>700</td> <td>308.841</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-24.126</td> <td>52</td> <td>-14.604</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.287</td> <td>1</td> <td>0.449</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1277.159</td> <td>2,620</td> <td>1332.329</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-410.040</td> <td>2,520</td> <td>-199.994</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-1341.063</td> <td>6,805</td> <td>-172.995</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-1185.312</td> <td>6,805</td> <td>-142.702</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD (Serial No. 1046)		Passenger ATD (Serial No. 139)		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	210.399	700	308.841	Maximum Chest Compression	mm	63	-24.126	52	-14.604	Nij		1	0.287	1	0.449	Neck Tension	N	4,170	1277.159	2,620	1332.329	Neck Compression	N	4,000	-410.040	2,520	-199.994	Left Femur Force	N	10,008	-1341.063	6,805	-172.995	Right Femur Force	N	10,008	-1185.312	6,805	-142.702
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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 August 2013.

SUMMARY

A ridged fixed barrier was impacted by a 2015 Chevrolet Colorado Extended Cab Pick Up at a velocity of 56.81 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 4, 2015. 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, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the 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. 1046) 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 408 mm at the vehicles centerline. 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 knee bolster.

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

The occupant data is summarized below.

ATD Position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	210.399	0.287	1277.159	-410.040	41.910	-24.126	-1341.063	-1185.312
Passenger (5 th)	308.841	0.449	1332.329	-199.994	44.632	-14.604	-172.995	-142.702

GENERAL COMMENTS:

1. P1 (Driver) serial number - 1046
2. P2 (Passenger) serial number - 139

Data Anomalies:

- Barrier Load Cell B7 Fx - Failed
- Barrier Load Cell B3 Fx - Failed

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: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20150112	Traction Control System (TCS)	Yes
Model Year	2015	Power Steering	Yes
Make	Chevrolet	Power Window Auto-Reverse	No
Model	Colorado	Driver Frontal Airbag	Yes
Body Style	Pick Up / Extended Cab	Driver Curtain Airbag	Yes
VIN	1GCHTAEA5F1158421	Driver Head/Torso Airbag	No
Body Color	Red	Driver Torso Airbag	No
Odometer Reading (km /mi)	315.4 km / 196 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.5	Driver Pelvis Airbag	No
Type / No. Cylinders	I4	Driver Knee Airbag	No
Engine Placement	Inline	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	6-Speed	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	All Wheel Drive	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof / T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	Yes	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	-

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC	GVWR (kg)	2540
Date of Manufacture	12/14	GAWR Front (kg)	1315
		GAWR Rear (kg)	1497

VEHICLE SEATING AND WEIGHT CAPACITY DATA

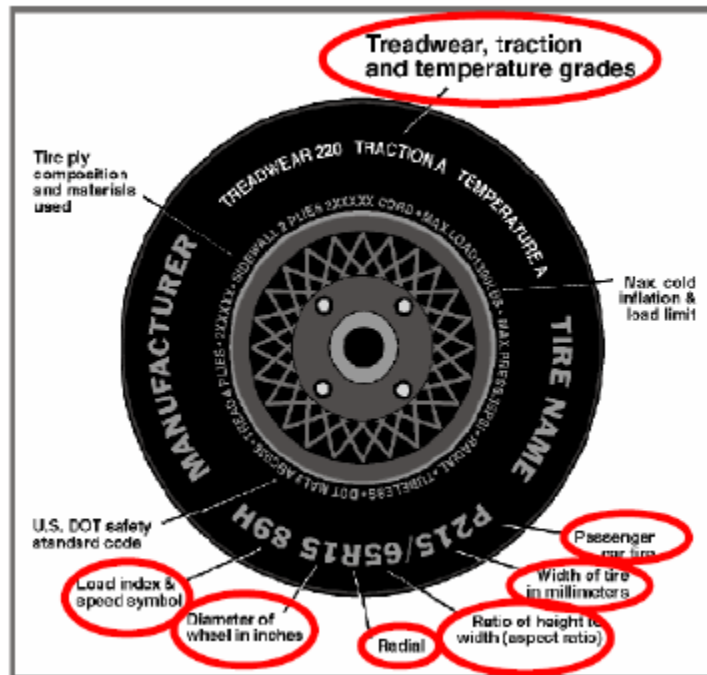
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	-	
Number of Occupants	2	2	-	4
Capacity Wt. (VCW) (kg)				649
Cargo Wt. (RCLW) (kg)				136

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	P265/70R16	P265/70R16
Tire Size on Vehicle	P265/70R16	P265/70R16
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Wrangler	Wrangler
Treadwear	680	680
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index / Speed Symbol	112T	112T
Tire Material	Rubber	Rubber
DOT Safety Code Left	PJC2JY1R4814	PJC2JY1R4814
DOT Safety Code Right	PJC2JY1R4814	PJC2JY1R4814

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	581	406		618	512	
Right	kg	524	388		555	489	
Ratio	%	58%	42%		54%	46%	
Totals	kg	1105	794	1899	1173	1001	2174

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1899	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	147	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2182	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	899	910	938	959	1364
As Tested	mm	894	907	907	922	1502
Post-Test	mm	848	865	895	908	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	3263
Total Vehicle Length at Left Side	mm	5335
Total Vehicle Length at Centerline	mm	5396
Total Vehicle Length at Right Side	mm	5339
Weight of Ballast in Cargo Area	kg	68
Weight of Vehicle Components Removed	kg	0
Amount of Stoddard Solvent in Fuel Tank	L	74.4

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

None.

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	5396
2	Total Width	1763
3*	Bumper Top Height	524
4*	Bumper Bottom Height	418
5*	Longitudinal Member Top Height	563
6	Distance Between Longitudinal Members	833
7	Longitudinal Member Width	71
8*	Engine Top Height	1073
9*	Engine Bottom Height	265
10	Engine and Gearbox Width	351
11	Front Bumper-Engine Distance	708
12*	Front Shock Absorber Fixing Height	796
13*	Bonnet Leading Edge Height	1049
14	Front Shock Absorber Fixing Width	823
15	Front Bumper – Front Axle Distance	950
16	Front Axle – A Pillar Distance	555
17	A-Pillar – B-Pillar Distance	1140
18	B-Pillar – Rear Axle Distance	1565
19	B-Pillar – C-Pillar Distance	544
20*	Roof Sill Bottom Height	1703
21*	Roof Sill Top Height	1728
22*	Floor Sill Bottom Height	525
23*	Floor Sill Top Height	565

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

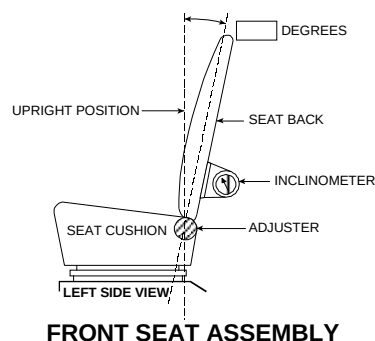
DATA SHEET NO. 2 SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

NOMINAL DESIGN RIDING POSITION

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



Seating Position	Degrees
Driver Seat Back Angle	2.4
Passenger Seat Back Angle	5.7

SEAT FORE / AFT POSITIONS

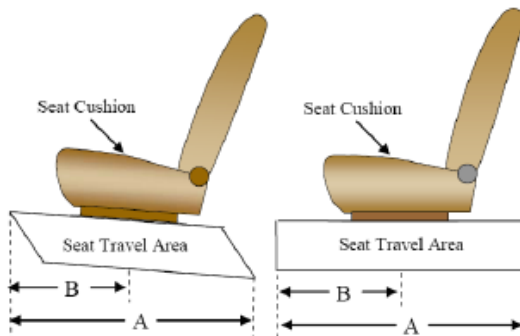
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	304	152
Passenger Seat	47	0

SEAT BELT UPPER ANCHORAGE

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

Seating Position	Total # of Positions	Placed in Position #
Driver Seat	4	0 - Uppermost
Passenger Seat	4	0 - Uppermost



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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

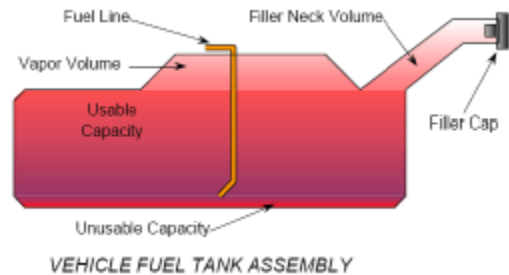
NHTSA No.: M20150112
 Test Date: 2/4/2015

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	80
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	73.6 – 75.2
Actual Amount of Solvent Used	74.4
1/3 of Usable Capacity	26.7

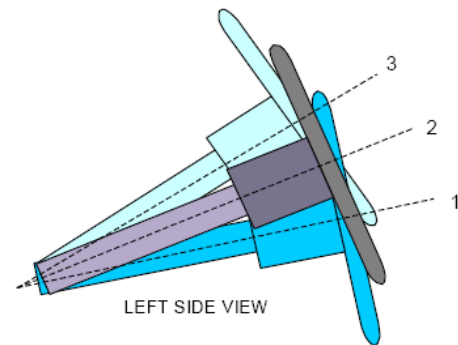
FUEL PUMP

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



STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

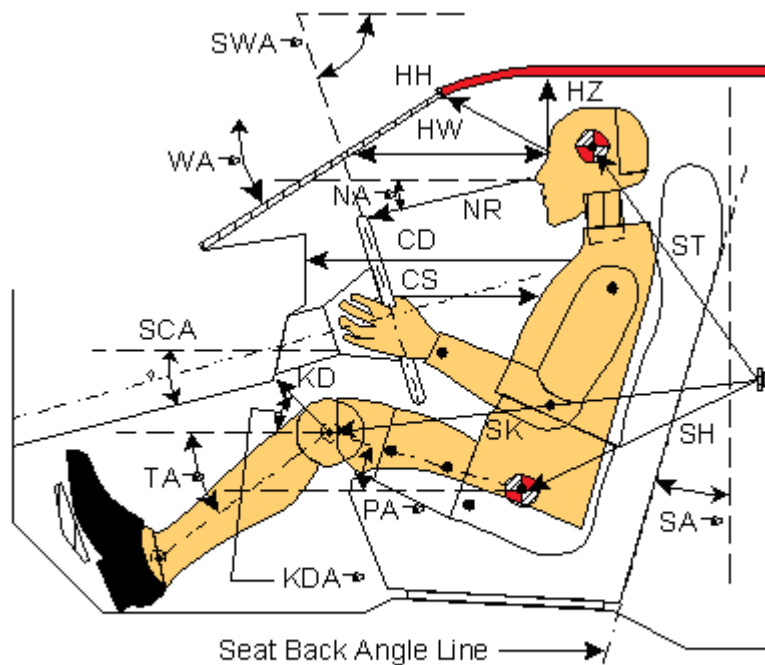
STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	20.7	
Geometric center position No. 2	22.3	
Uppermost position No. 3	23.9	
Telescoping Steering Wheel Travel		N/A
Test Position	22.3	N/A

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



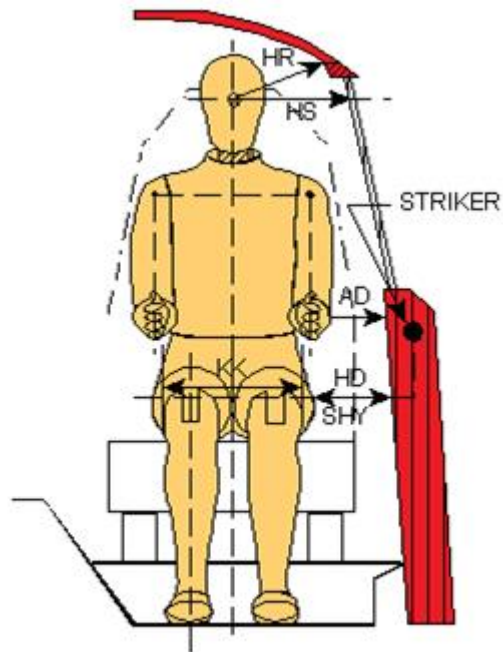
Left Side View

Code	Measurement Description	Driver (SN: 1046)		Passenger (SN: 139)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		32		
SWA°	Steering Wheel Angle		22		
SCA°	Steering Column Angle		68		
SA°	Seat Back Angle (on headrest post)		3.4		5.4
HZ	Head to Roof (Z)	267	90	275	90
HH	Head to Header	482	23	393	39.4
HW	Head to Windshield	755	0	707	0
NR	Nose to Rim	445	7.8	506	25.2
CD	Chest to Dash	591		463	
CS	Chest to Steering Hub	369	0		
RA	Rim to Abdomen	241	0		
KDL	Left Knee to Dash	206	27.3	138	39.1
KDR	Right Knee to Dash	190	27.8	140	34.8
PA°	Pelvic Angle		23.5		19.9
TA°	Tibia Angle		-29.1		-36.9
SK	Striker to Knee	572	-1.8	682	-4.0
ST	Striker to Head	523	-87.9	518	-66.6
SH	Striker to H-Point	240	-37.6	368	-17.2

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



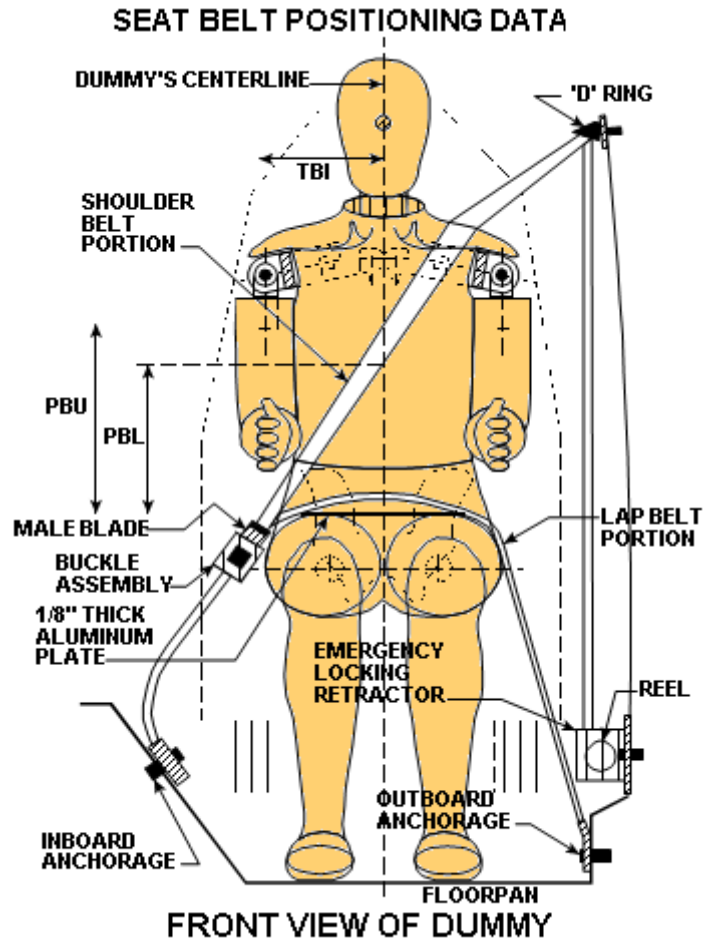
Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	145	94
HD	H-Point to Door	144	173
HR	Head to Side Header	247	269
HS	Head to Side Window	365	375
KK	Knee to Knee	320	165
SHY	Striker to H-Point (Y Direction)	250	260
AA	Ankle to Ankle	318	165

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	350	325
PBL — Top surface of reference to belt lower edge	mm	285	255

BELT LENGTH DATA

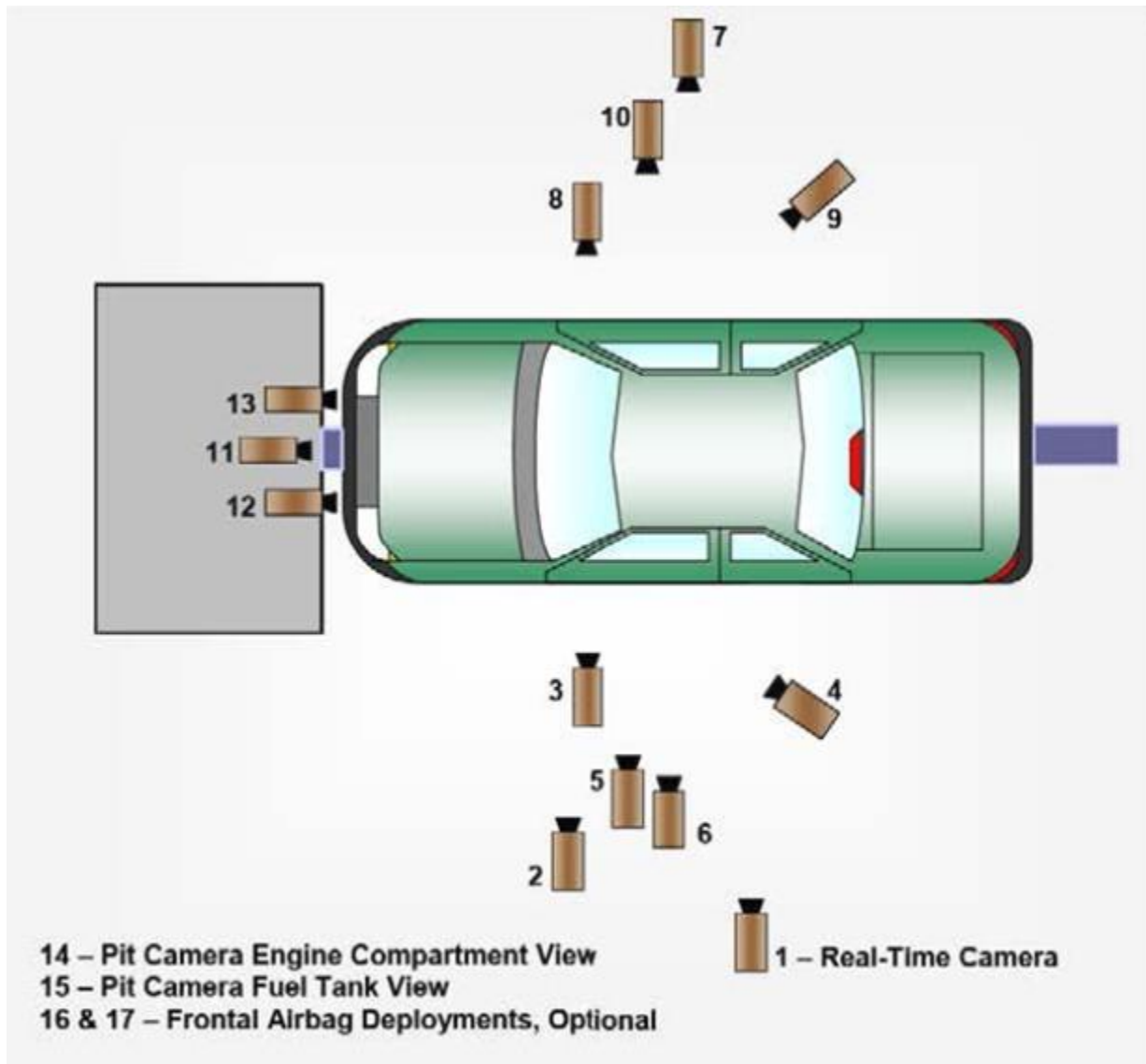
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	840	910
Lap Belt Length as measured on ATD	mm	510	590
Remainder of belt on reel	mm	900	800
Total belt length for continuous webbing systems	mm	2250	2300

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

CAMERA POSITIONS FOR FRONTAL IMPACTS



Top View

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

CAMERA LOCATIONS

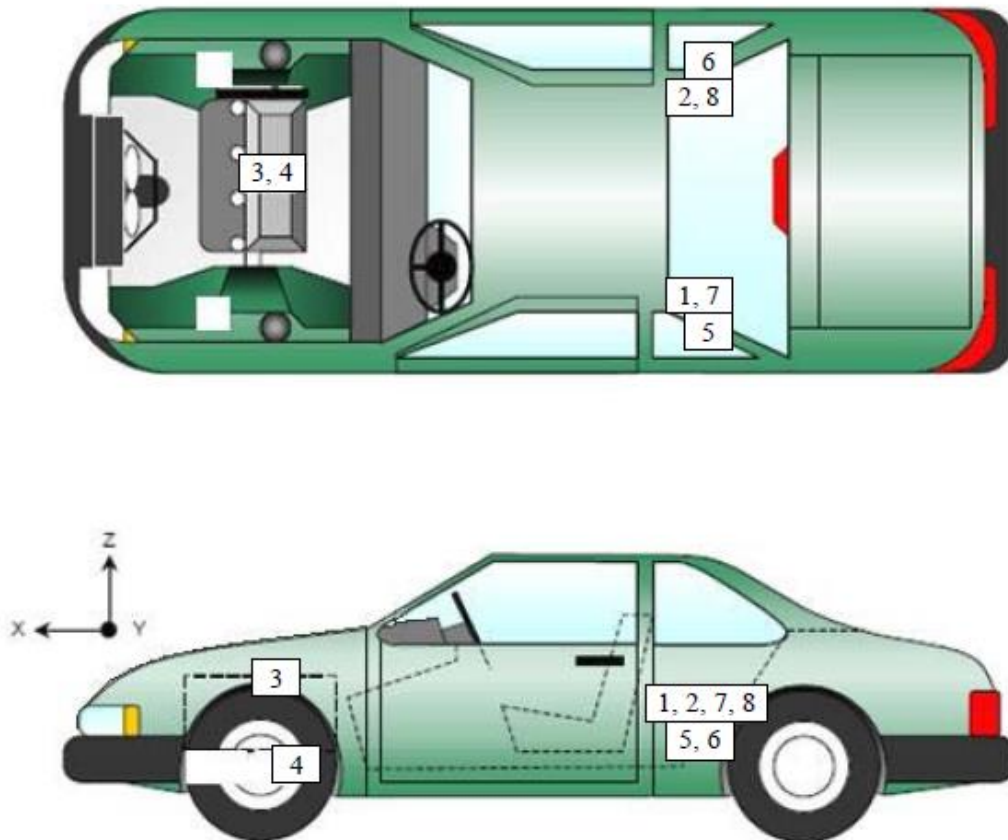
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-	Zoom	60
2	Driver Close-Up	-1976	-8295	-1574	50	1000
3	Left Front Half	-982	-9542	-1603	50	1000
4	Left Angle	-2732	-3273	-2359	24	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	-2179	9376	-1190	24	1000
8	Passenger Close-Up	-1396	7420	-1504	50	1000
9	Right Front Half	-1059	7458	-1208	28	1000
10	Right Angle	-2739	3209	-2415	24	1000
11	Windshield	954	0	-3505	20	1000
12	Driver Windshield	395	-600	-2051	25	1000
13	Passenger Windshield	395	600	-2051	25	1000
14	Pit Front	-967	0	2041	12.5	1000
15	Pit Rear	-2047	0	2050	12.5	1000
16	Onboard Driver Airbag (Optional)				12.5	1000
17	Onboard Passenger Airbag (Optional)				12.5	1000

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

DATA SHEET NO. 7 **VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	2691	-610	-24
2	Right Rear Accelerometer – X Direction	2647	627	-35
3	Engine Top X	4501	-8	-547
4	Engine Bottom X	4551	-113	275
5	Left Rear Accelerometer – Z Direction	2663	627	-34
6	Right Rear Accelerometer – Z Direction	2668	609	-25
7	Left Rear Accelerometer – X Direction Redundant	2691	-610	-24
8	Right Rear Accelerometer – X Direction Redundant	2647	627	-35

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

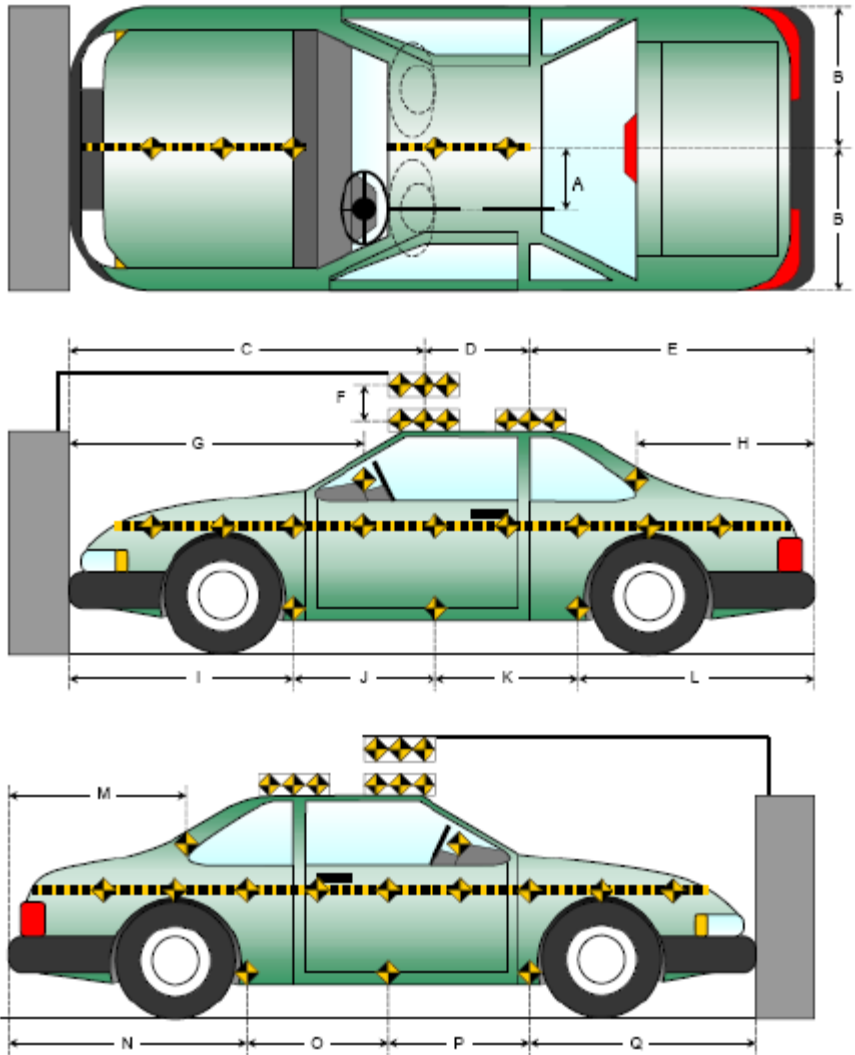
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

Item	Value
A	362
B	881
C	2302
D	611
E	2484
F	150
G	1843
H	2207
I	1438
J	1117
K	1137
L	1704
M	2209
N	1702
O	1133
P	1127
Q	1434

All units in millimeters



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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

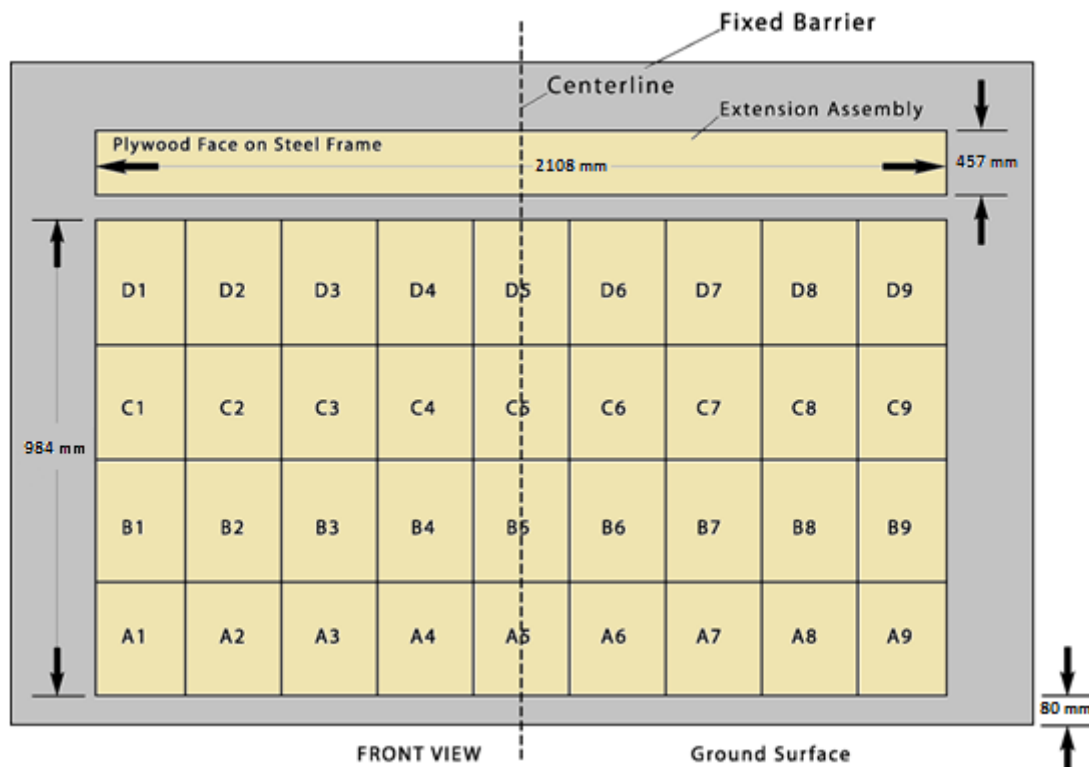


Figure 1 - Load Cell Locations on a 36-Load Cell Barrier with Plywood Height Extension*

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

INSTRUMENTATION

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

CAMERA COVERAGE

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

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	P572E 50 th Male / 1046	P5720 5 th Female / 139
Head Contact	Front Airbag & Headrest	Front Airbag & Headrest
Upper Torso Contact	Front Airbag	Front Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

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	None
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	298
Center	mm	258
Right Side	mm	338
Average	mm	298

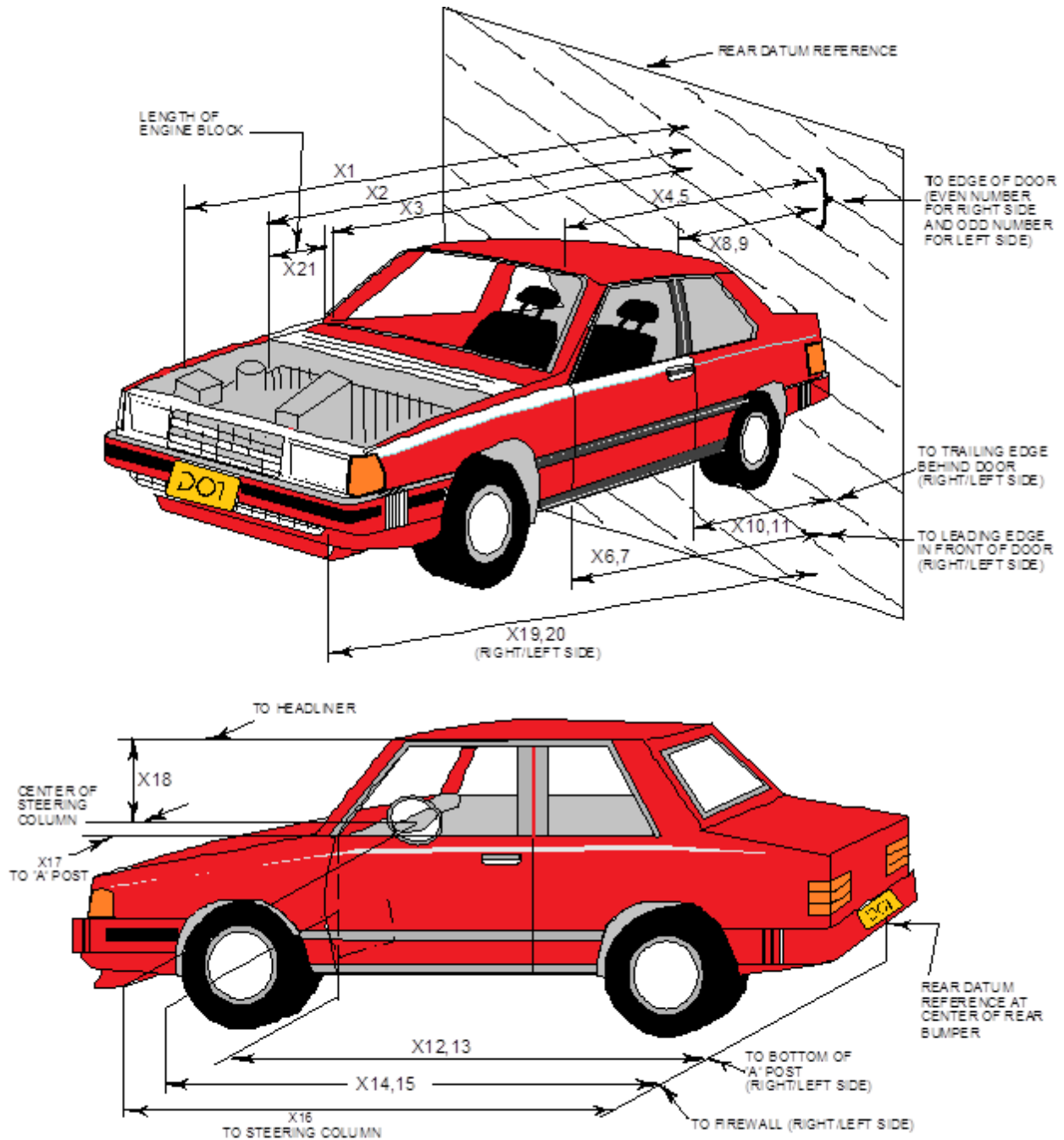
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	5396	4988	-408
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4689	4531	-158
3	RSOV to Firewall	4250	4229	-20
4	RSOV to Upper Leading Edge of Right Door	3891	3870	-21
5	RSOV to Upper Leading Edge of Left Door	3892	3875	-18
6	RSOV to Lower Leading Edge of Right Door	3829	3839	10
7	RSOV to Lower Leading Edge of Left Door	3829	3844	15
8	RSOV to Upper Trailing Edge of Right Door	2751	2730	-21
9	RSOV to Upper Trailing Edge of Left Door	2752	2732	-20
10	RSOV to Lower Trailing Edge of Right Door	2730	2741	11
11	RSOV to Lower Trailing Edge of Left Door	2731	2747	16
12	RSOV to Bottom of "A" Post of Right Side	3918	3877	-42
13	RSOV to Bottom of "A" Post of Left Side	3919	3885	-34
14	RSOV to Firewall, Right Side	4188	4167	-21
15	RSOV to Firewall, Left Side	4191	4172	-19
16	RSOV to Steering Column	3409	3455	46
17	Center of Steering Column to "A" Post	294	289	-5
18	Center of Steering Column to Headliner	436	431	-5
19	RSOV to Right Side of Front Bumper	5347	4939	-408
20	RSOV to Left Side of Front Bumper	5342	5003	-339
21	Length of Engine Block	467	467	0
RD	RSOV to Right Side of Dash Panel	3610	3591	-19
CD	RSOV to Center of Dash Panel	3583	3560	-23
LD	RSOV to Left Side of Dash Panel	3610	3592	-18

*UR= Unrecoverable data point
 All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

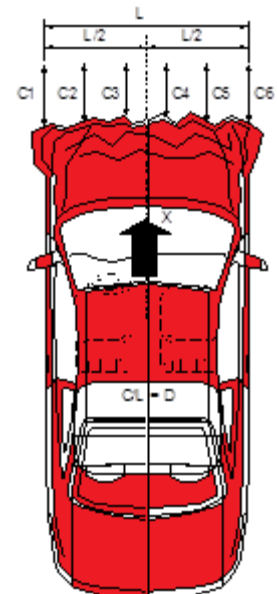
VEHICLE INFORMATION

VIN: 1GCHTAEA5F1158421
Vehicle Size Category: Truck

Wheelbase (mm): 3263
Test Weight (kg): 2,174

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): 56.81
Velocity Change (km/h): 56.81
Time of Separation (ms): 156



CRUSH PROFILE

Collision Deformation Classification: 12FDEW02
Midpoint of Damage: Vehicle Centerline
Damage Region Length (mm): 1387
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	5192	4955	237
C2	Crush Zone 2 at Left Side	mm	5360	5011	349
C3	Crush Zone 3 at Left Side	mm	5370	4999	371
C4	Crush Zone 4 at Right Side	mm	5365	4976	389
C5	Crush Zone 5 at Right Side	mm	5356	4960	396
C6	Crush Zone 6 at Right Side	mm	5185	4945	240
L	C1 to C6	mm	1387	1388	1

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

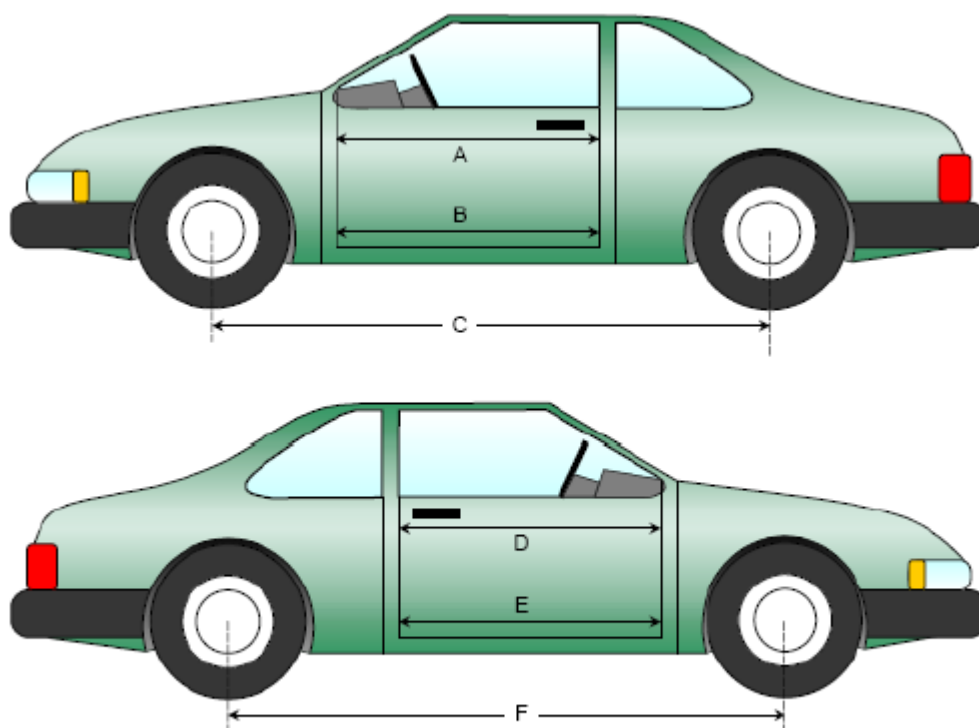
NHTSA No.: M20150112
 Test Date: 2/4/2015

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	989	985	-4
B	Left Side Lower	mm	937	934	-3
D	Right Side Upper	mm	988	985	-3
E	Right Side Lower	mm	939	937	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3263	3177	-86
F	Right Side Wheelbase	mm	3263	3177	-86



Left & Right Side Views

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

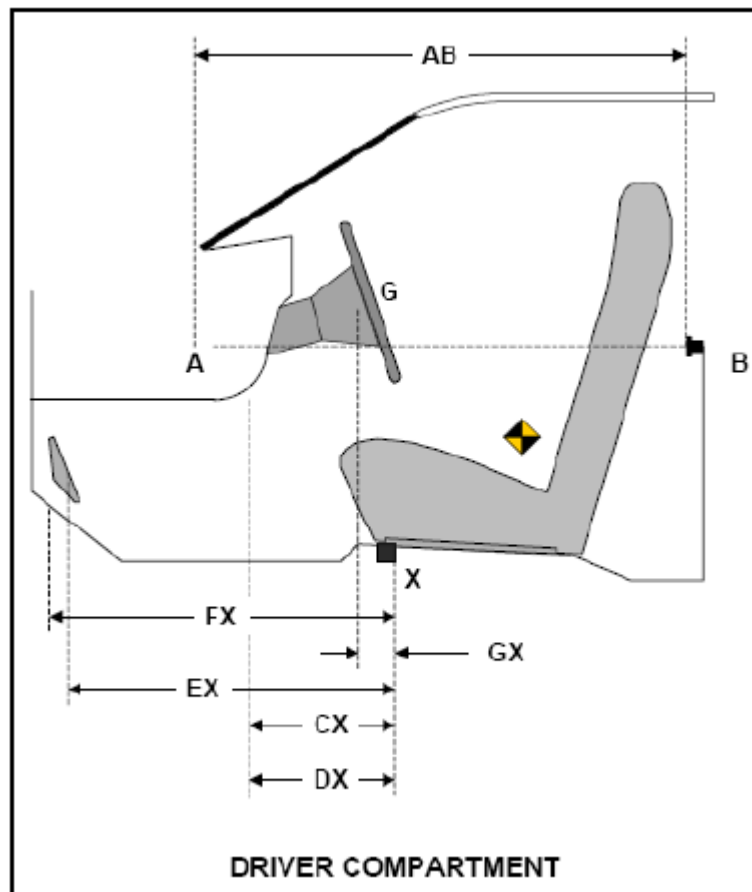
Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	772	771	-1
CX	Left Knee Bolster to X	mm	305	291	-14
DX	Right Knee Bolster to X	mm	302	283	-19
EX	Brake Pedal to X	mm	554	581	27
FX	Foot Rest to X	mm	674	673	-1
GX	Center of Steering Column Wheel Hub to X	mm	86	128	42

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015

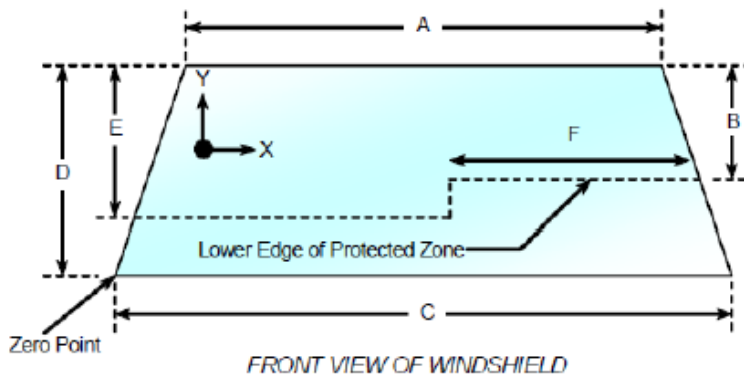
Windshield Mounting Details: A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2110	2110	100%
Right Side	2110	2110	100%
Total	4220	4220	100%



Item	Units	Value
A	mm	1210
B	mm	448
C	mm	1410
D	mm	800
E	mm	473
F	mm	510

AREAS OF PROTECTED ZONE FAILURES

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

X	Y

X	Y

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

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
Test Date: 2/4/2015

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21 ° C

Test Time: 12:25 PM

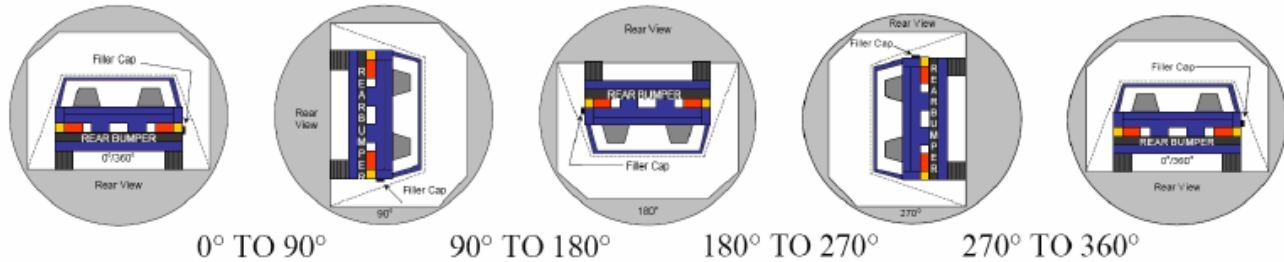
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- 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: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



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°	69	300	369
90° to 180°	65	300	365
180° to 270°	63	300	363
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

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

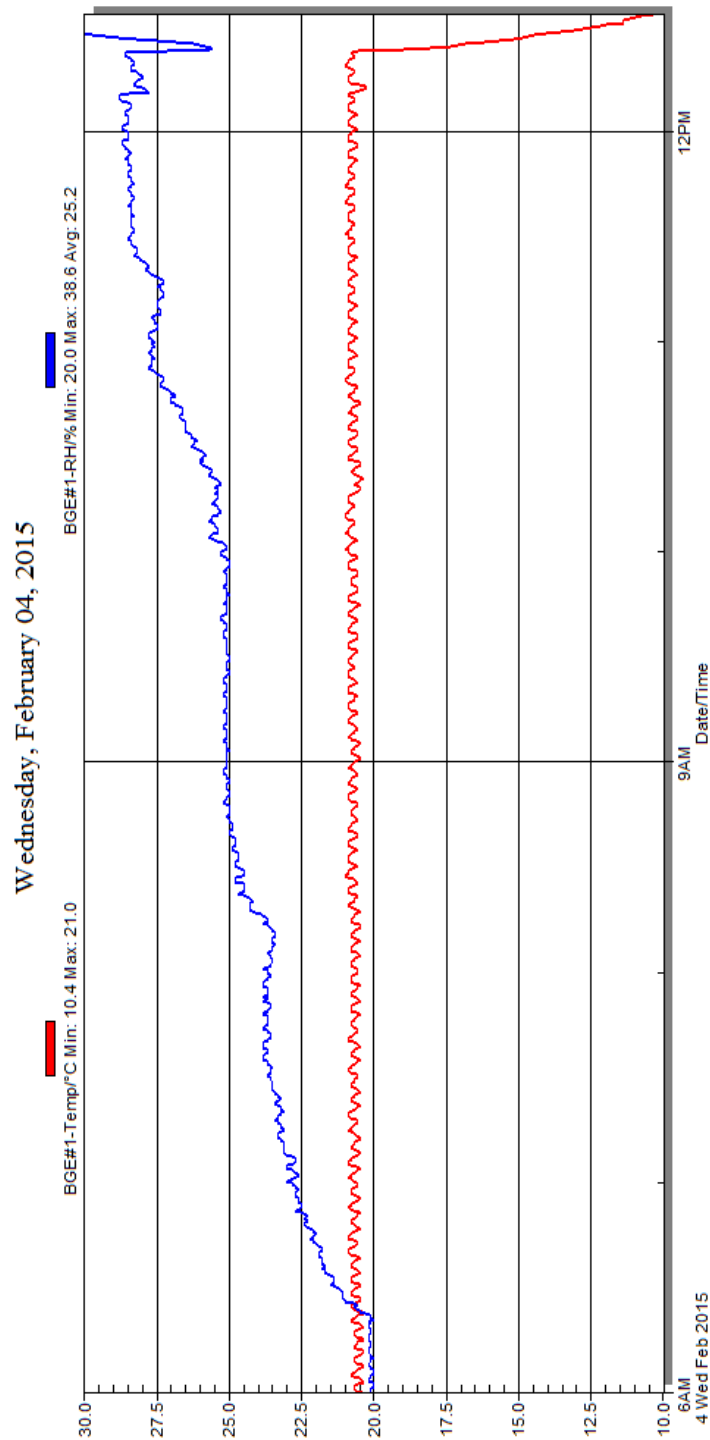
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2015 Chevrolet Colorado Extended Cab Pick Up
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150112
 Test Date: 2/4/2015



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

APPENDIX A
PHOTOGRAPHS

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Fig.	Description	Page
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41	Pre-Test Driver's Side Knee Bolster	A-25
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48	Pre-Test View of the Steering Wheel	A-28
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74	Vehicle at 180° on Static Rollover Device	A-41
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¹**NOTE:** *The underbody views should include the following vehicle components: fuel pump, fuel lines, sender unit, fuel tank filler pipe and any other visible system components.*

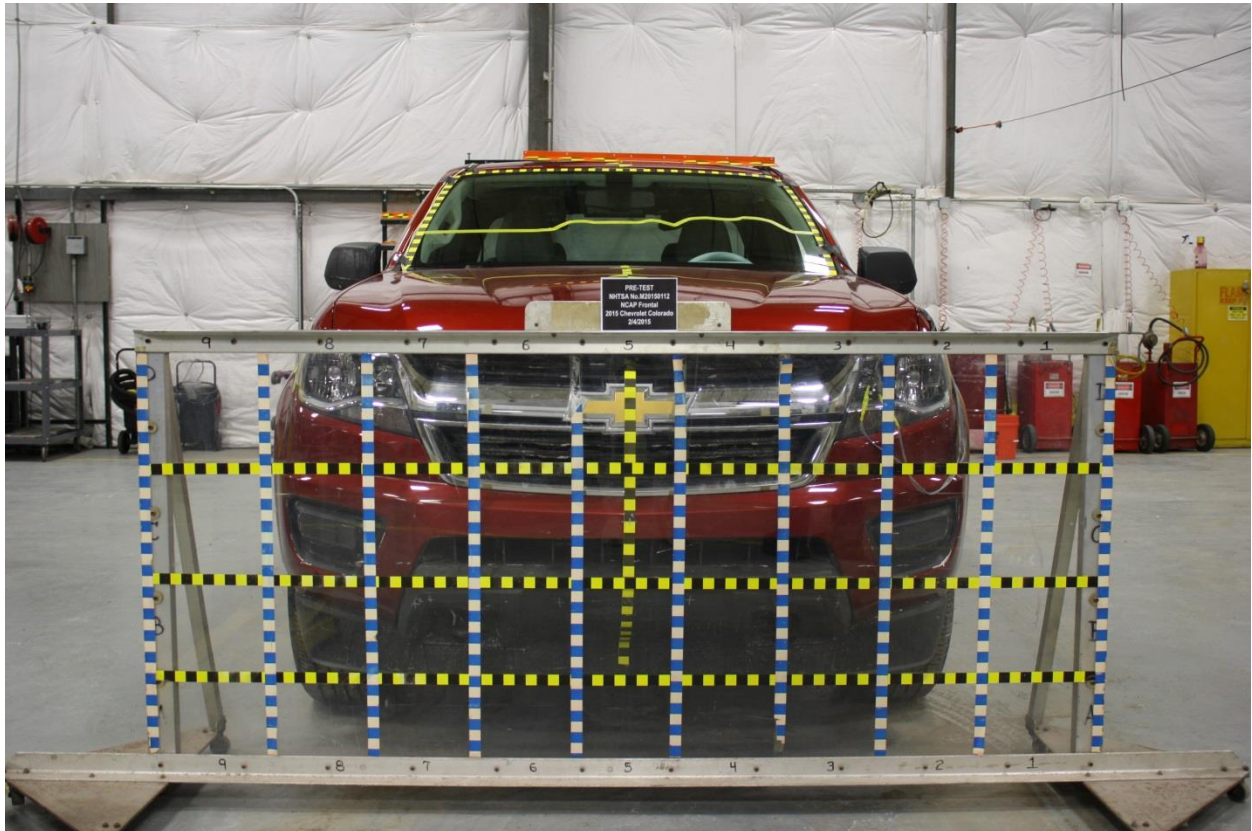


Figure A-1: Load Cell Location



Figure A-2: Load Cell Wall

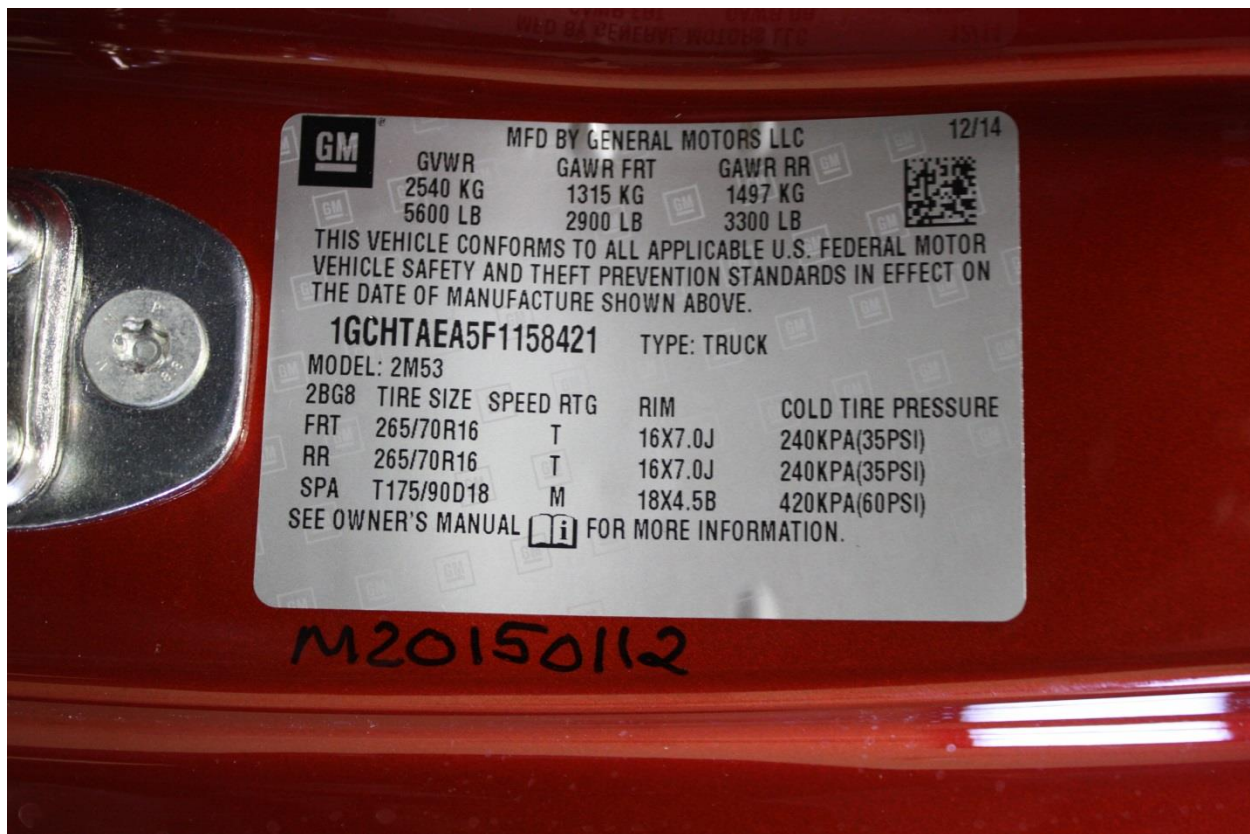


Figure A-3: Manufacturer's Label



Figure A-4: Tire Placard



Figure A-5: 2015 Chevrolet Colorado Frontal As Delivered



Figure A-6: Left Rear 3-4 View, As Received



Figure A-7: Pre-Test Front View of Test Vehicle

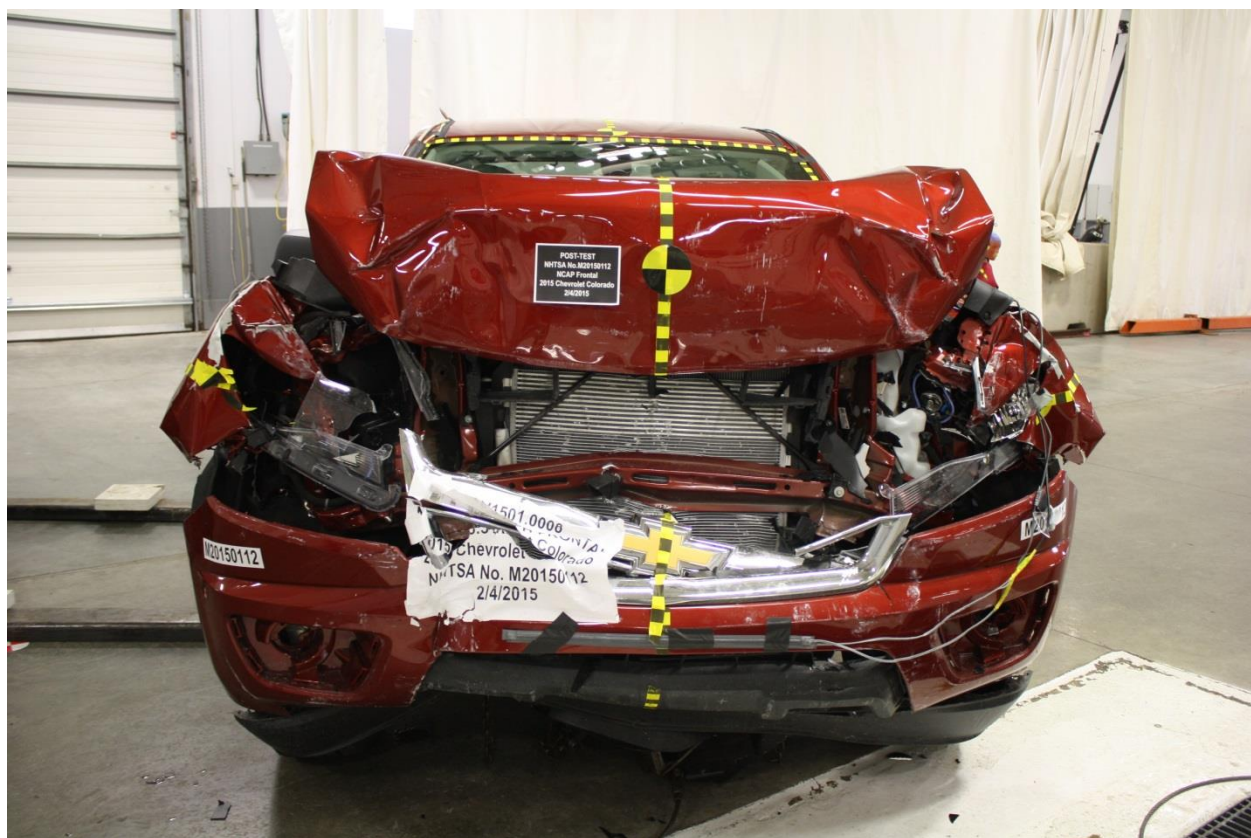


Figure A-8: Post-Test Front View of Test Vehicle



Figure A-9: Pre-Test Left View of Test Vehicle



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



Figure A-11: Pre-Test Right View of Test Vehicle



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



Figure A-13: Pre-Test Right Front 3-4 View

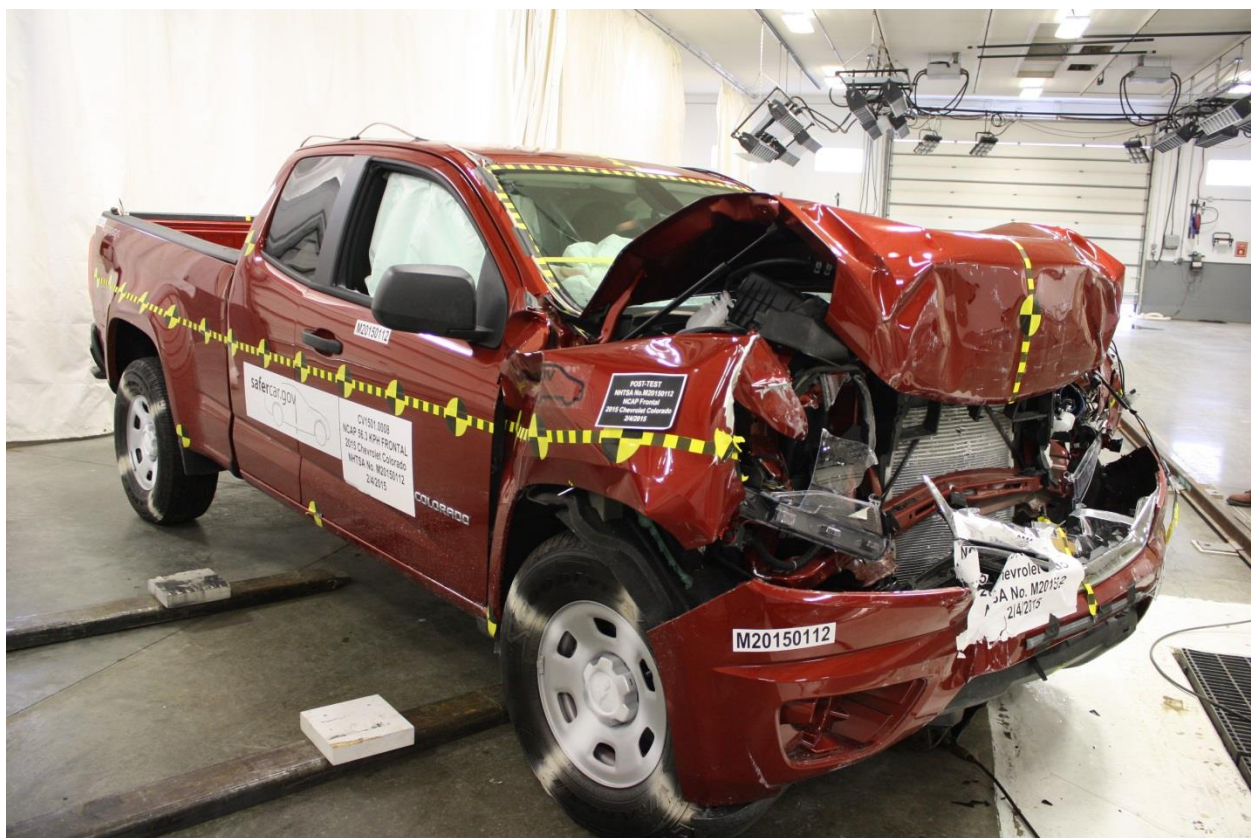


Figure A-14: Post-Test Right Front 3-4 View



Figure A-15: Pre-Test Left Rear 3-4 View



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



Figure A-17: Pre-Test Windshield View



Figure A-18: Post-Test Windshield View



Figure A-19: Pre-Test Engine Compartment View



Figure A-20: Post-Test Engine Compartment View



Figure A-21: Pre-Test Fuel Filler Cap View



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



Figure A-23: Pre-Test Front Underbody View



Figure A-24: Post-Test Front Underbody View

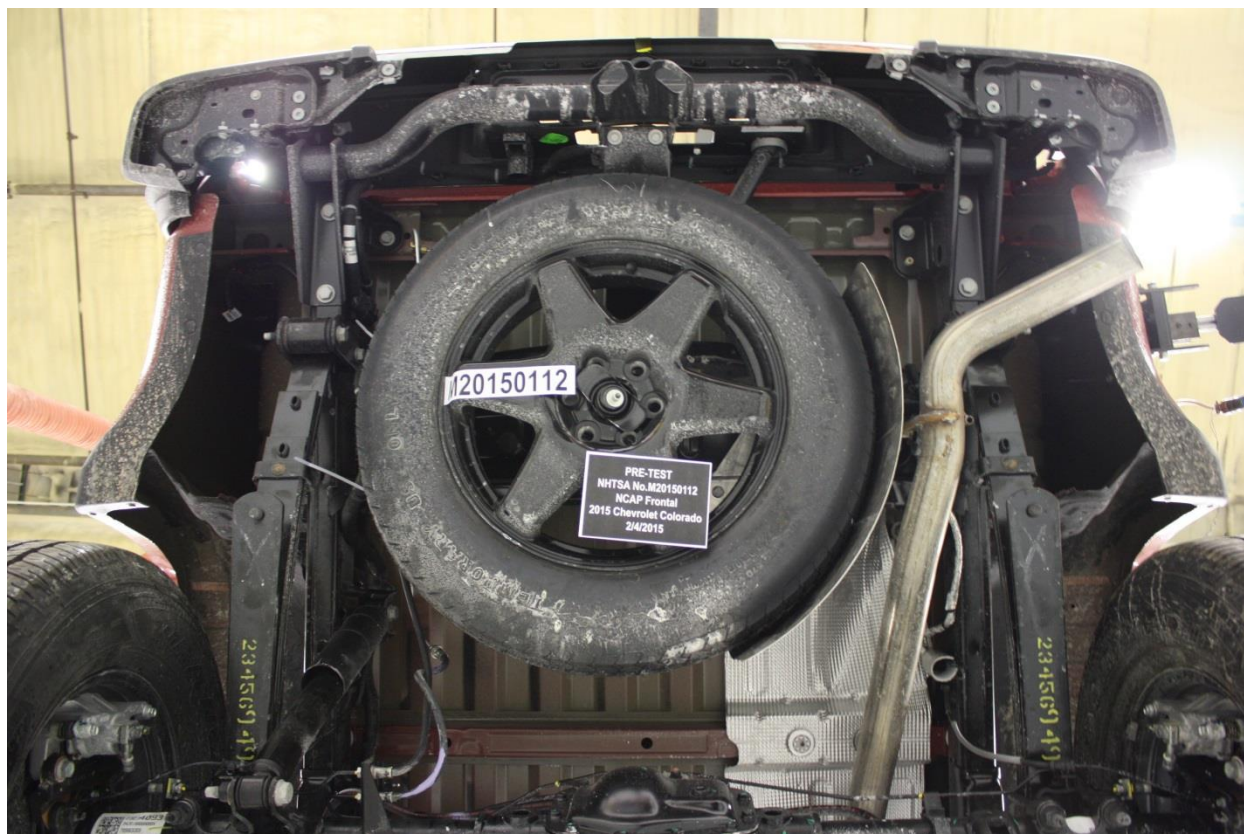


Figure A-25: Pre-Test Rear Underbody View

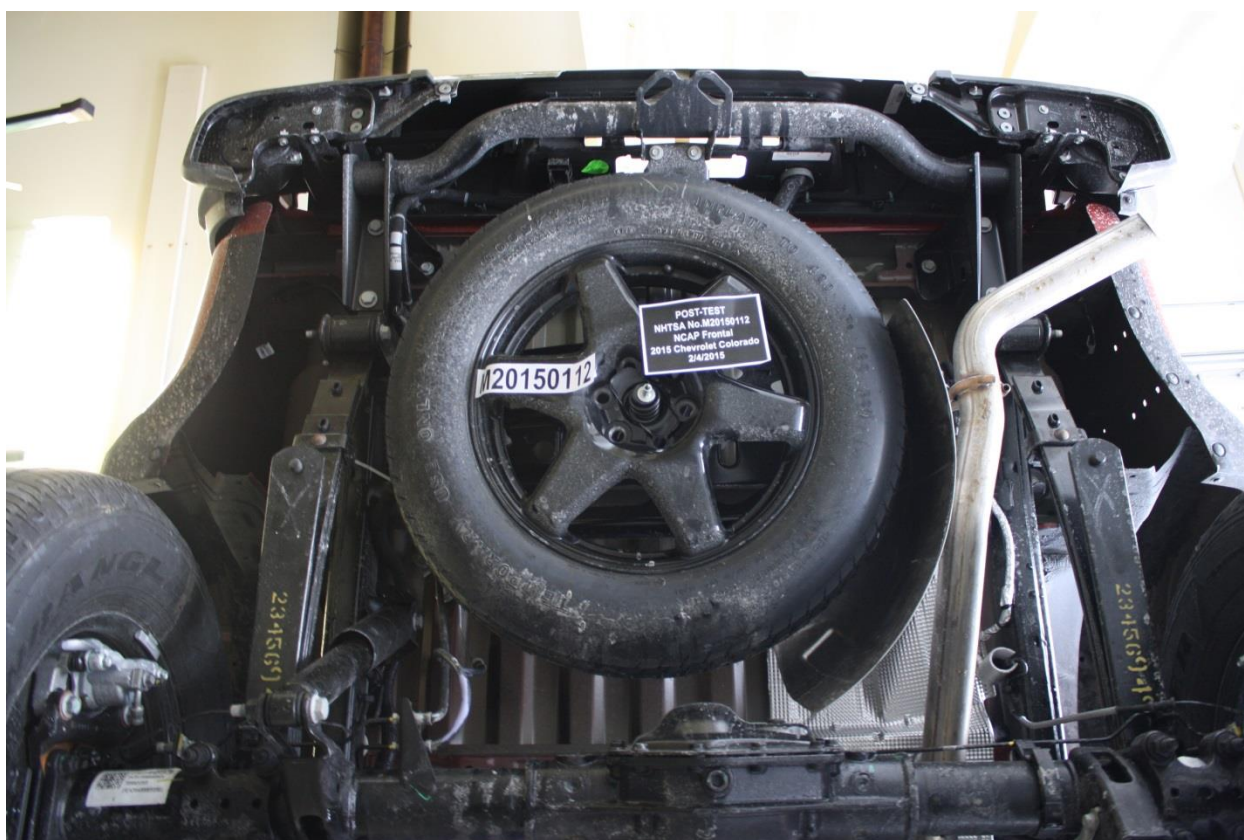


Figure A-26: Post-Test Rear Underbody View

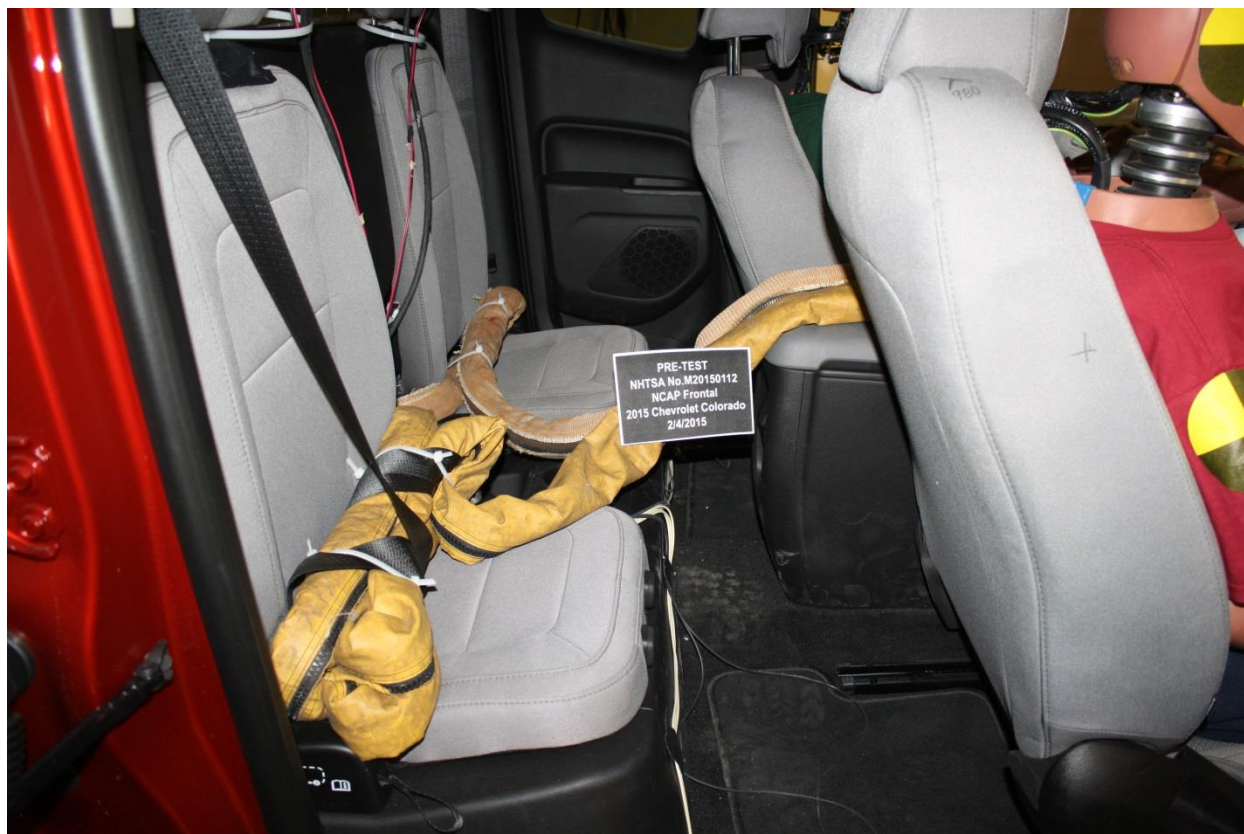


Figure A-27: Pre-Test Dummy Cable Routing

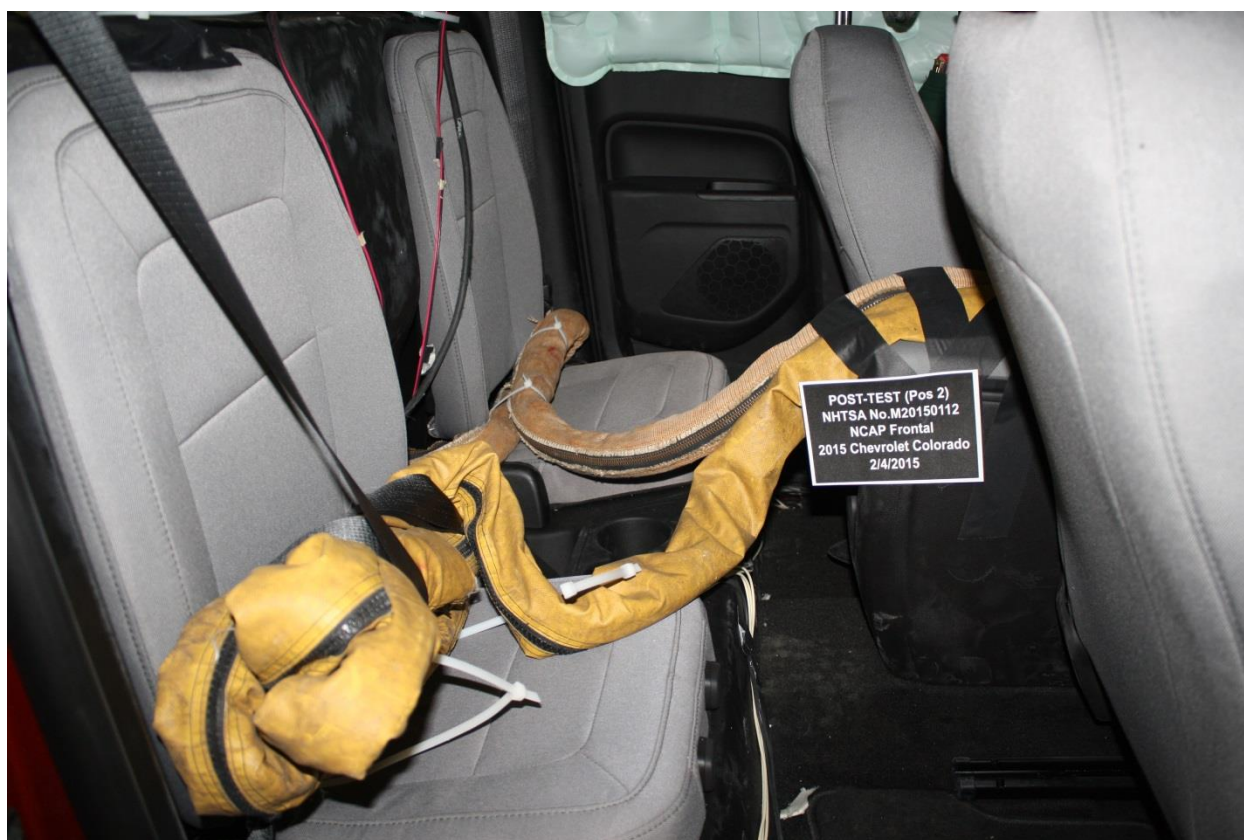


Figure A-28: Post-Test Dummy Cable Routing

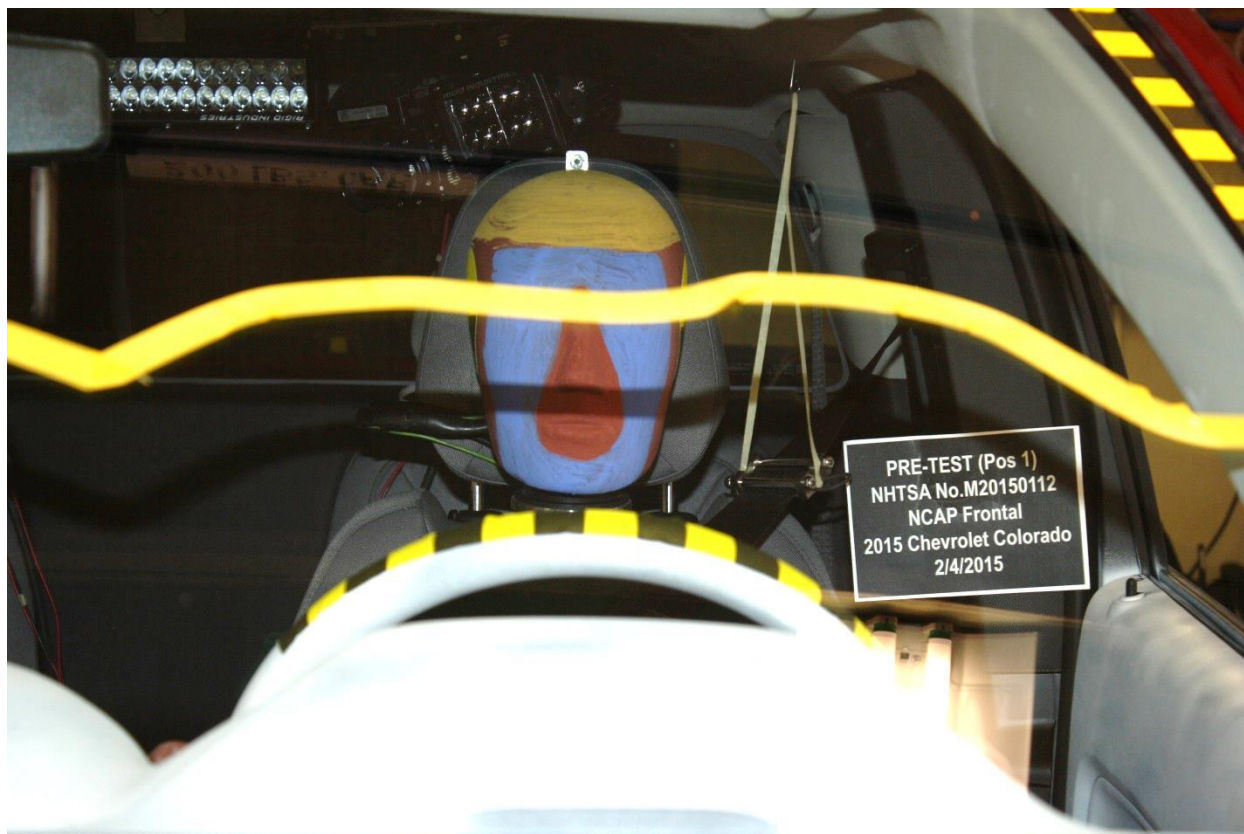


Figure A-29: Pre-Test Driver Dummy Front View



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



Figure A-31: Pre-Test Driver Dummy Window View



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



Figure A-33: Pre-Test Driver Dummy and Vehicle Interior View



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



Figure A-35: Pre-Test Driver's Seat Fore-Aft Markings



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



Figure A-37: Pre-Test View of Belt Anchorage for Driver Dummy



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

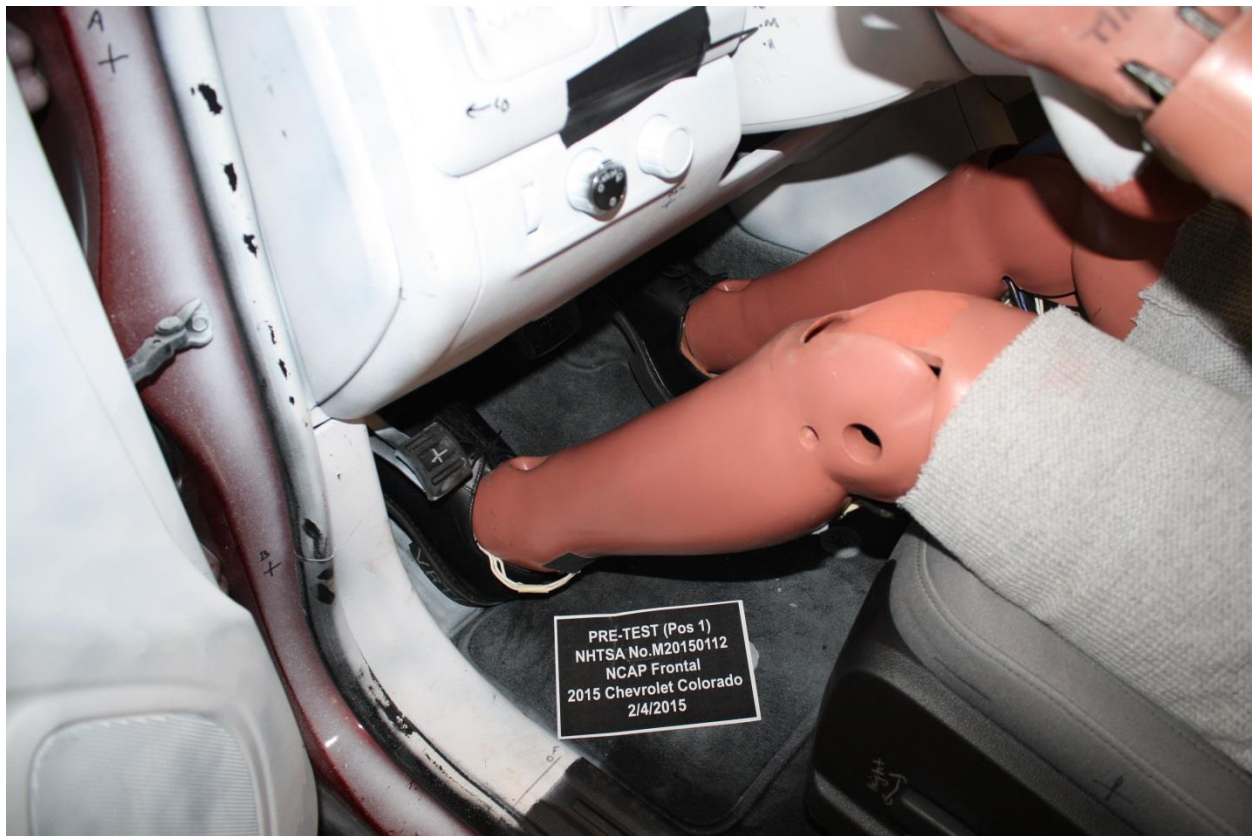


Figure A-39: Pre-Test Driver Dummy Feet



Figure A-40: Post-Test Driver Dummy Feet



Figure A-41: Pre-Test Driver's Side Knee Bolster



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



Figure A-43: Pre-Test Driver's Side Floorpan



Figure A-44: Post-Test Driver's Side Floorpan



Figure A-45: Post-Test Driver Dummy Face



Figure A-46: Post-Test Driver Dummy Contact With Airbag



Figure A-47: Post-Test Driver Dummy Contact With Headrest



Figure A-48: Pre-Test View of the Steering Wheel



Figure A-49: Post-Test View of the Steering Wheel



Figure A-50: Pre-Test Passenger Dummy Front View



Figure A-51: Post-Test Passenger Dummy Front View



Figure A-52: Pre-Test Passenger Dummy Window View



Figure A-53: Post-Test Passenger Dummy Window View



Figure A-54: Pre-Test Passenger Dummy and Vehicle Interior View



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



Figure A-56: Pre-Test Passenger's Seat Fore-Aft Markings



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



Figure A-58: Pre-Test View of Belt Anchorage for Passenger Dummy



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

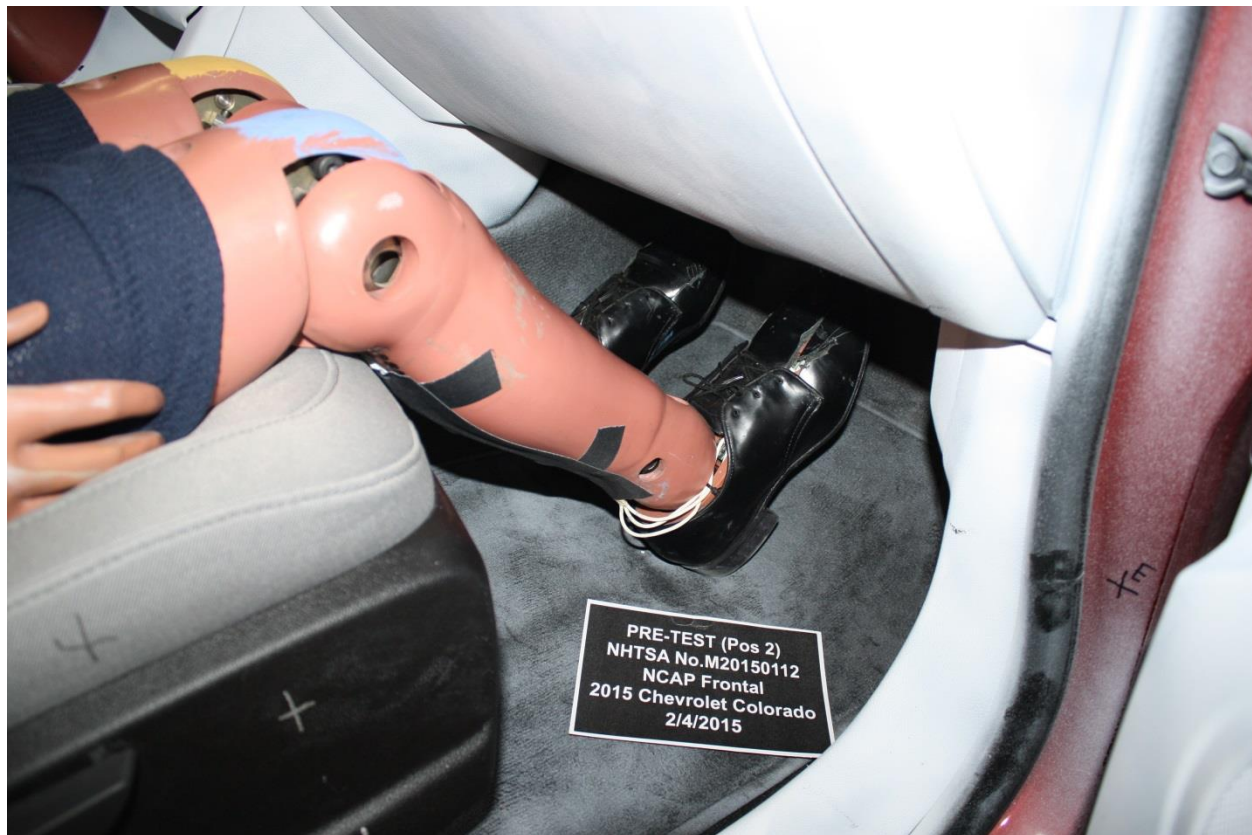


Figure A-60: Pre-Test Passenger Dummy Feet



Figure A-61: Post-Test Passenger Dummy Feet

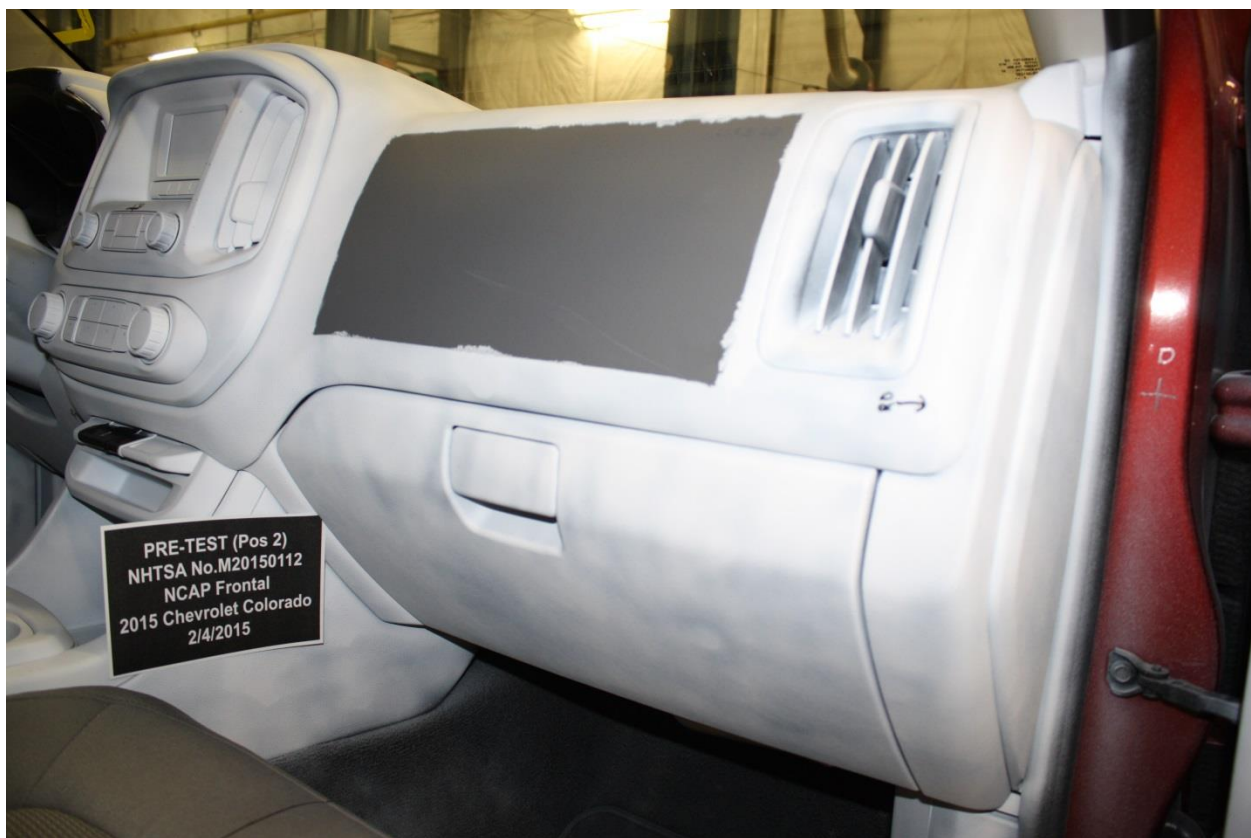


Figure A-62: Pre-Test Passenger's Side Knee Bolster



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



Figure A-64: Pre-Test Passenger's Side Floorpan



Figure A-65: Post-Test Passenger's Side Floorpan



Figure A-66: Post-Test Passenger Dummy Face



Figure A-67: Post-Test Passenger Dummy Contact With Airbag

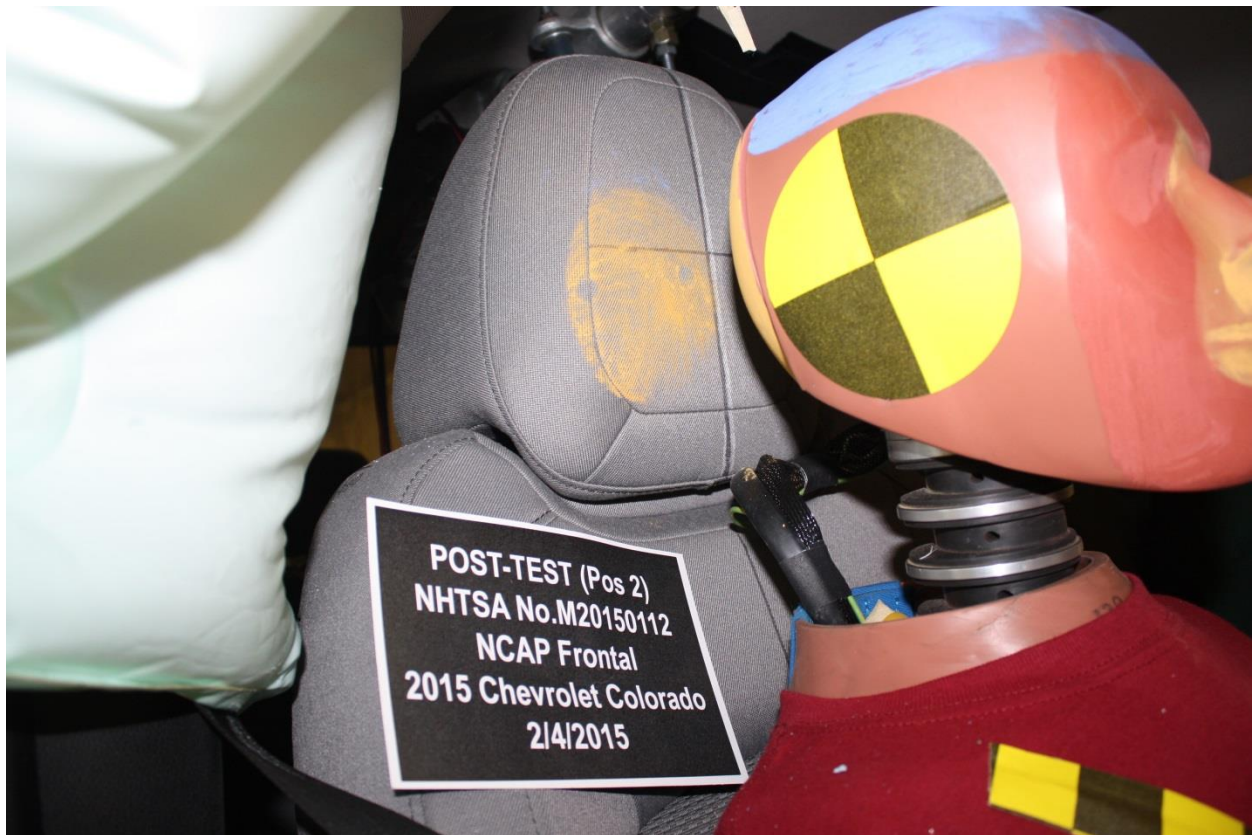


Figure A-68: Post-Test Passenger Dummy Contact With Headrest

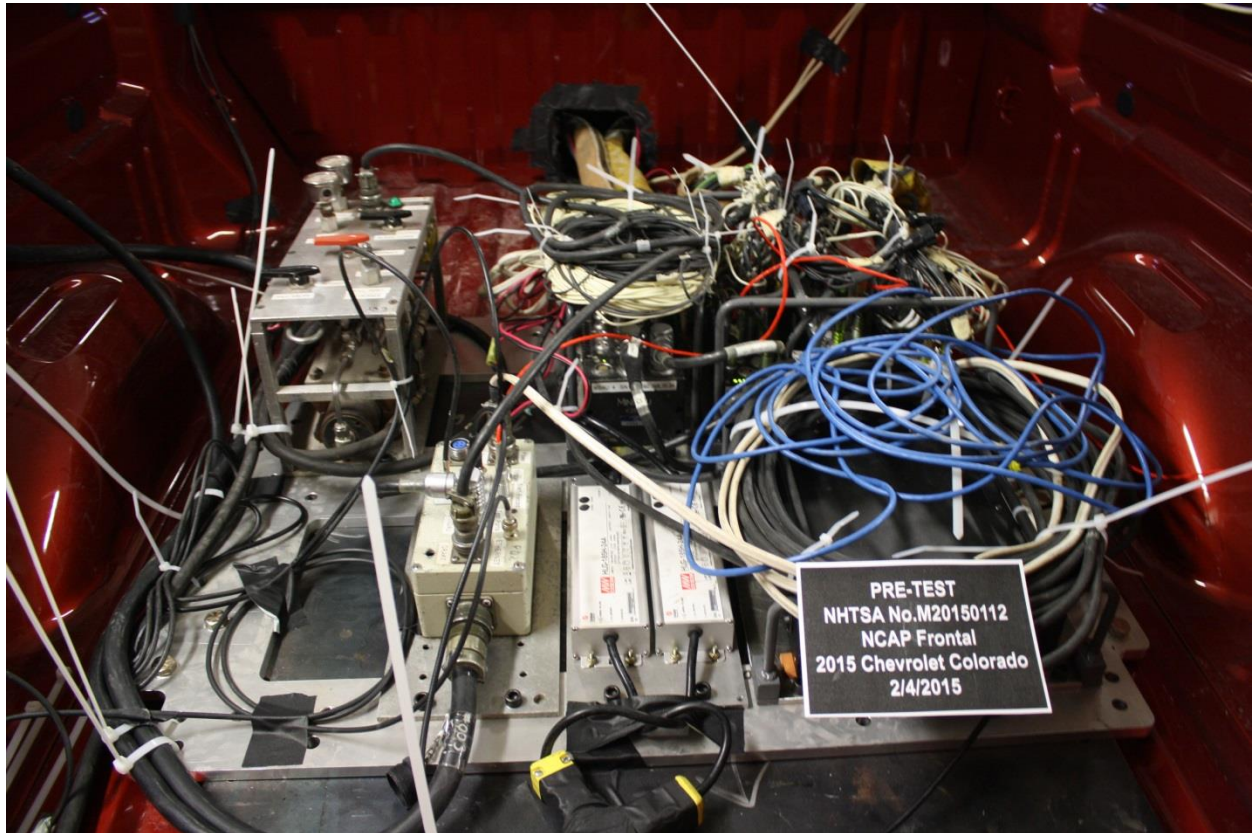


Figure A-69: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-70: Post-Test Stoddard Solvent Spillage Location View, If Required



Figure A-71: Post-Test Speed Trap Read-Out



Figure A-72: Vehicle at 0° on Static Rollover Device



Figure A-73: Vehicle at 90° on Static Rollover Device



Figure A-74: Vehicle at 180° on Static Rollover Device



Figure A-75: Vehicle at 270° on Static Rollover Device



Figure A-76: Vehicle at 360° on Static Rollover Device



Figure A-77: 2015 Chevrolet Colorado Frontal Impact Event

**2015 COLORADO 4WD WT
EXT CAB**

**EXTERIOR: RED ROCK METALLIC
INTERIOR: JET BLACK / DARK ASH**

**ENGINE: 2.5L I4, DI, DOHC,
TRANSMISSION: 6-SPD AUTOMATIC**

STANDARD EQUIPMENT

ITEMS LISTED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

- CHEVROLET COMPLETE CARE
- SEE WWW.CHEVY.COM OR DEALER FOR TERMS, DETAILS & LIMITS
- 2 YR / 24,000 MILE SCHEDULED MAINTENANCE
- OIL & FILTER CHANGE
- 4-WHEEL TIRE ROTATION
- 27 POINT INSPECTION
- 3 YR/36,000 MILES BUMPER-TO-BUMPER WARRANTY
- 5 YR/100,000 MILES POWERTRAIN LIMITED WARRANTY
- ROADSIDE ASSISTANCE
- COURTESY TRANSPORTATION

MECHANICAL

- ENGINE: 2.5L I4, DI, DOHC, VVT
- TRANSMISSION: 6-SPD AUTOMATIC
- TRANS CASE: ELECTRIC, 2-SPD

SAFETY & SECURITY

- REAR VISION CAMERA
- AIRBAGS: DRIVER & RT. FRONT PASS - FRONT/SIDE-IMPACT, OUTBOARD FRT & REAR SEAT
- SIDE HEAD CURTAIN
- STABILITRAK-STABILITY CONTROL
- SYSTEM W/ TRACTION CONTROL
- BRAKES, 4-WHEEL ANTILOCK, 4 WHEEL DISC W/ DURALIFE ROTORS

EXTERIOR

- TAIL GATE, LOCKING
- CORNERSTEP, REAR BUMPER
- MIRRORS, OUTSIDE REMOTE WITH MANUAL FOLDING
- HEADLAMPS, HALOGEN
- RECOVERY HOOPS, FRONT
- WHEELS, 16" ULTRA SILVER METALLIC STEEL
- TIRES, ALL-SEASON, BLACKWALL
- COMPACT SPARE WHEEL/TIRE

INTERIOR

- SEAT ADJUST, DRIVER 4-WAY PWR
- SEATS, DUAL REAR W/ UNDERSEAT STORAGE
- SEATS, FRONT BUCKET
- POWER WINDOW W/ EXPRESS DRIVER UP/DOWN
- COLOR KEVED CARPET
- AIR CONDITIONING
- MIRROR, MANUAL INSIDE RR VIEW
- VISORS, DRIVER & FRONT PASS.
- W/ PASSENGER VANITY MIRROR
- CLOTH FRONT & REAR SEATS

CONNECTIVITY FEATURES

- AUDIO SYSTEM, W/ 4.2" DIAGONAL COLOR SCREEN
- USB PORT

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE \$26,885.00

Visit us at www.chevy.com

(OPTIONAL EQUIPMENT INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN))

DIFFERENTIAL, LOCKING REAR	325.00
FULLY AUTOMATIC	
CHEVROLET MYLINK AUDIO SYSTEM	275.00
4.2" DIAGONAL COLOR DISPLAY	
6 MTH ONSTAR(R) DIRECTIONS & CONNECTIONS W/ AUTOMATIC CRASH RESPONSE & TURN-BY-TURN NAV PLUS 5-YEAR ONSTAR BASIC PLAN (OMITS SAFETY, SECURITY & NAV) (SEE ONSTAR.COM) & ONSTAR(R) 4G LTE W-FIR) HOTSPOT W/ 3GB/3MO DATA TRIAL	
TOTAL OPTIONS	\$600.00
TOTAL VEHICLE & OPTIONS	\$27,485.00
DESTINATION CHARGE	875.00
TOTAL VEHICLE PRICE*	\$28,360.00

EPA DOT Fuel Economy and Environment

Fuel Economy

21 **19** **25** MPG
combined city/hwy city highway

4.8 gallons per 100 miles

Annual fuel cost \$2,500

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

1 **5** **10** Best

This vehicle emits 422 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions. Learn more at fuelconomy.gov.

Smog Rating (tailpipe only)

1 **6** **10** Best

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$11,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.50 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
Calculate personalized estimates and compare vehicles.

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 66%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 17%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: WENTZVILLE, MO U.S.A.
COUNTRY OF ORIGIN: ENGINE: UNITED STATES
TRANSMISSION: UNITED STATES

© 2015 General Motors LLC
VIN: 1G1TAEAF158421
DEALER TO WHOM DELIVERED
ROBERT GREEN CHEVROLET
PO BOX 8002
ROCK HILL, NY 12775-8002

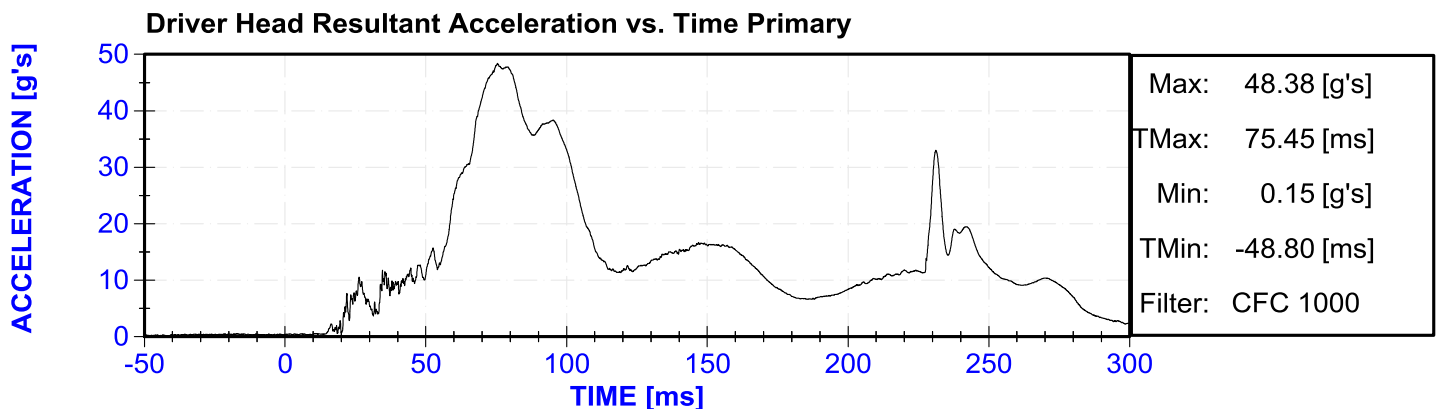
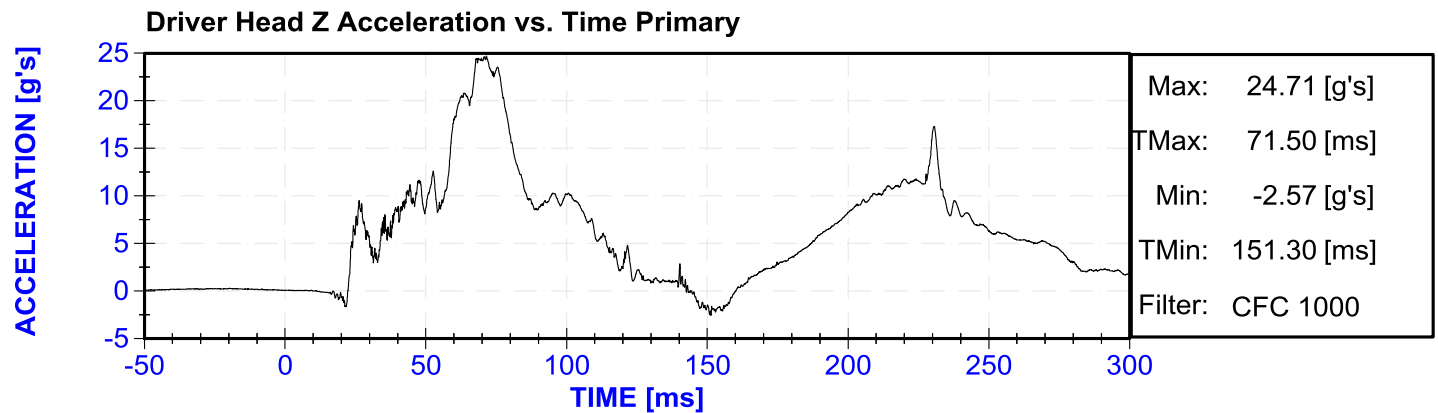
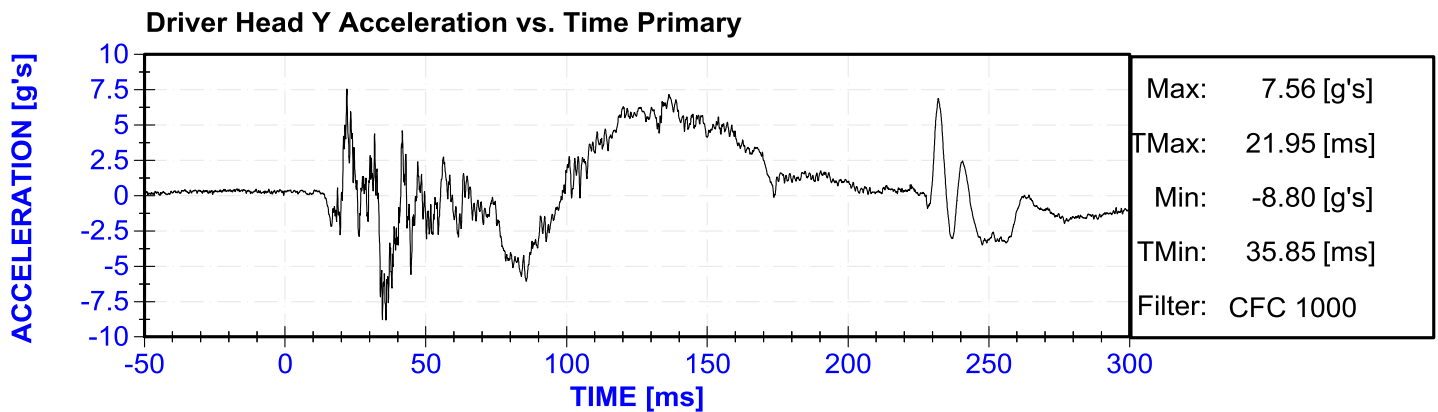
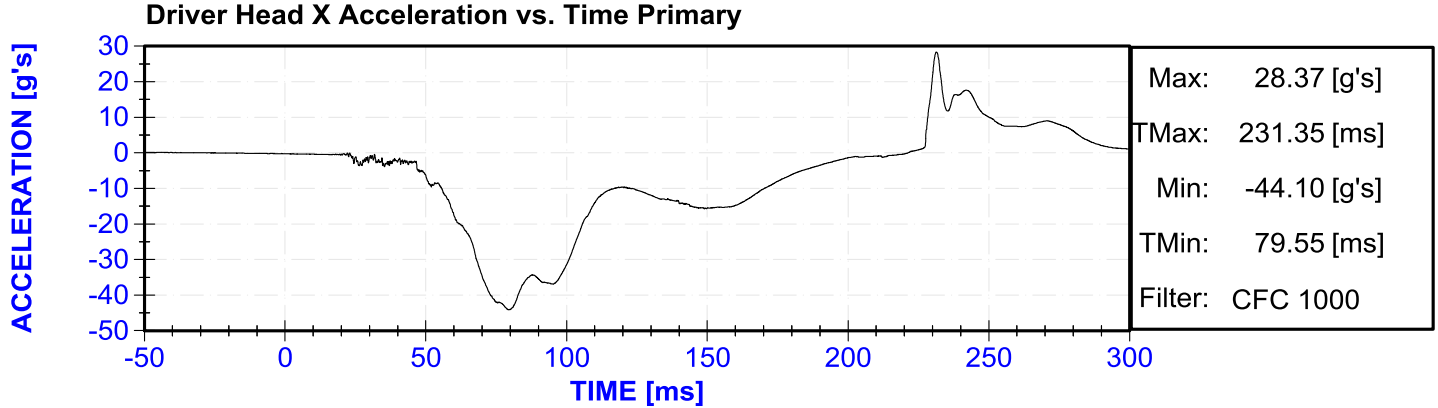
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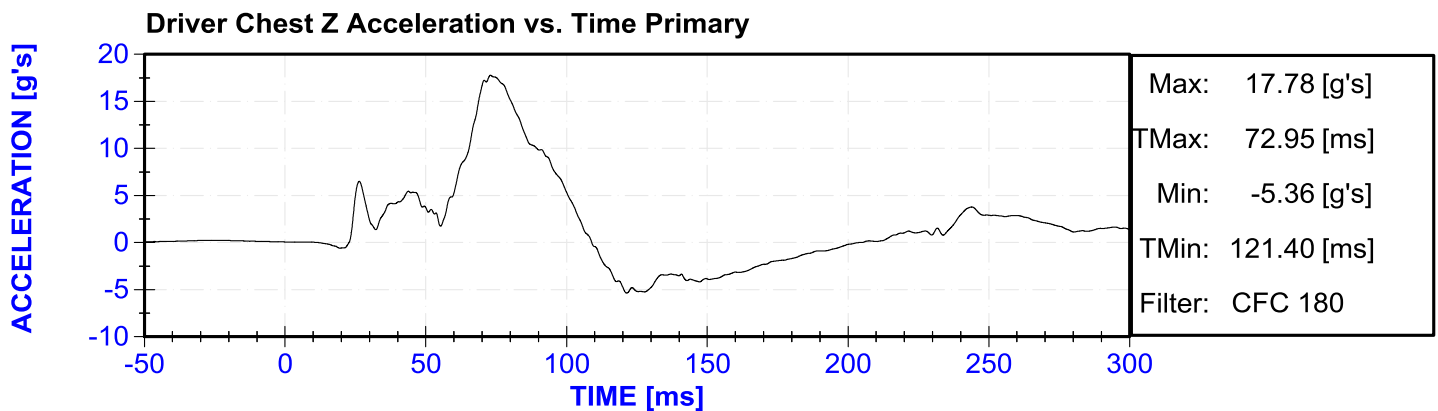
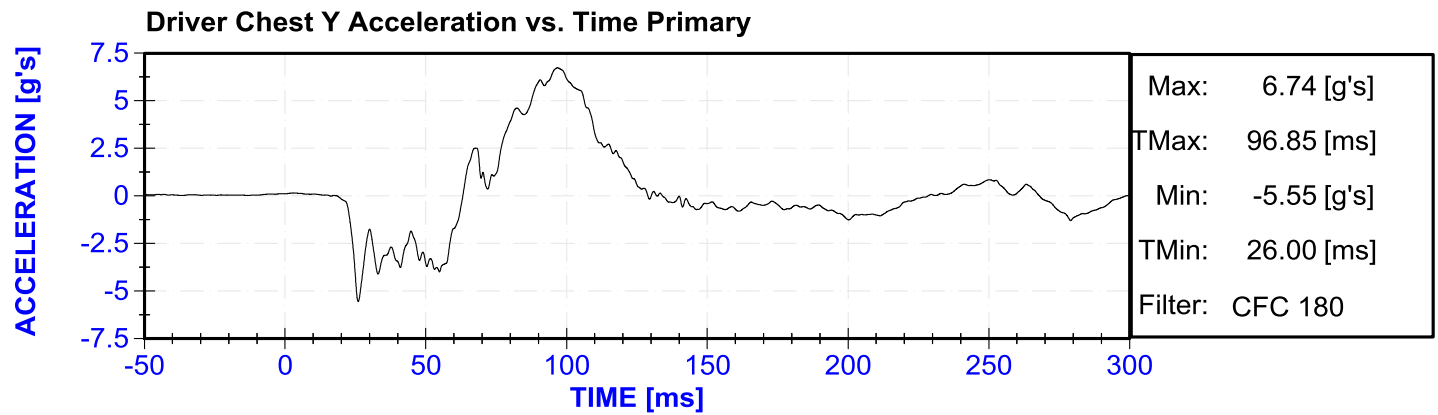
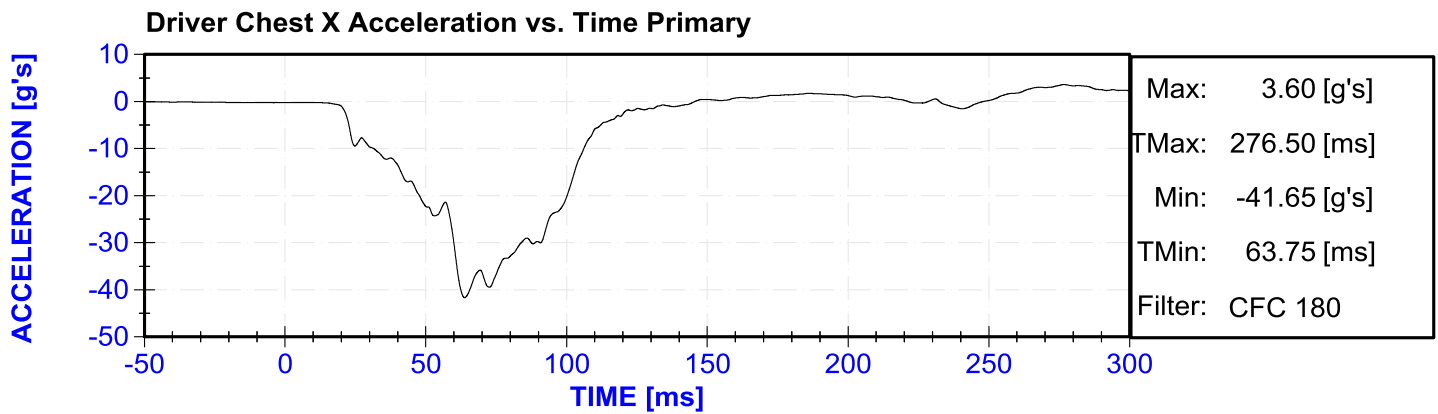
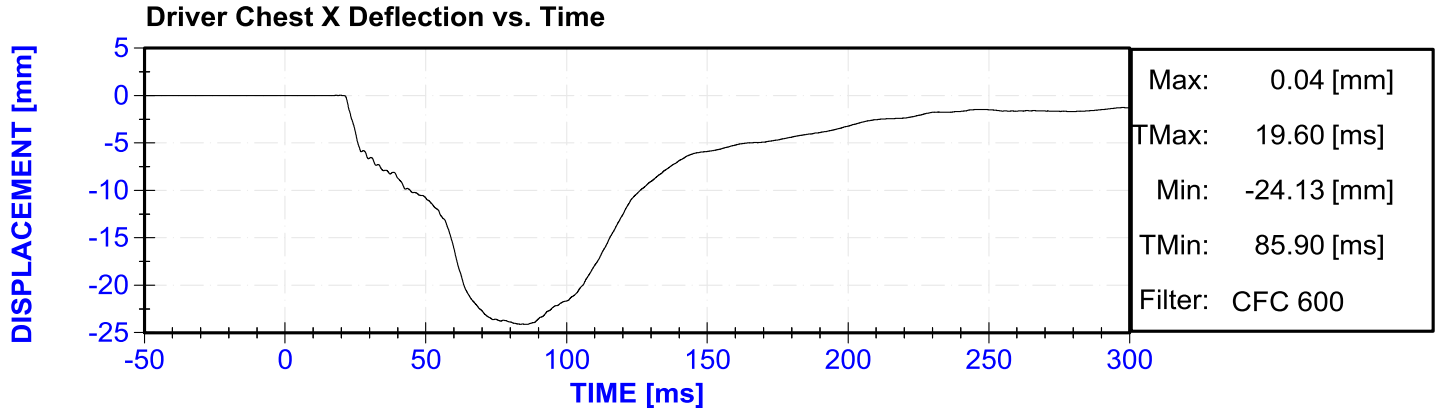
Figure A-78: Monroney Label Photograph

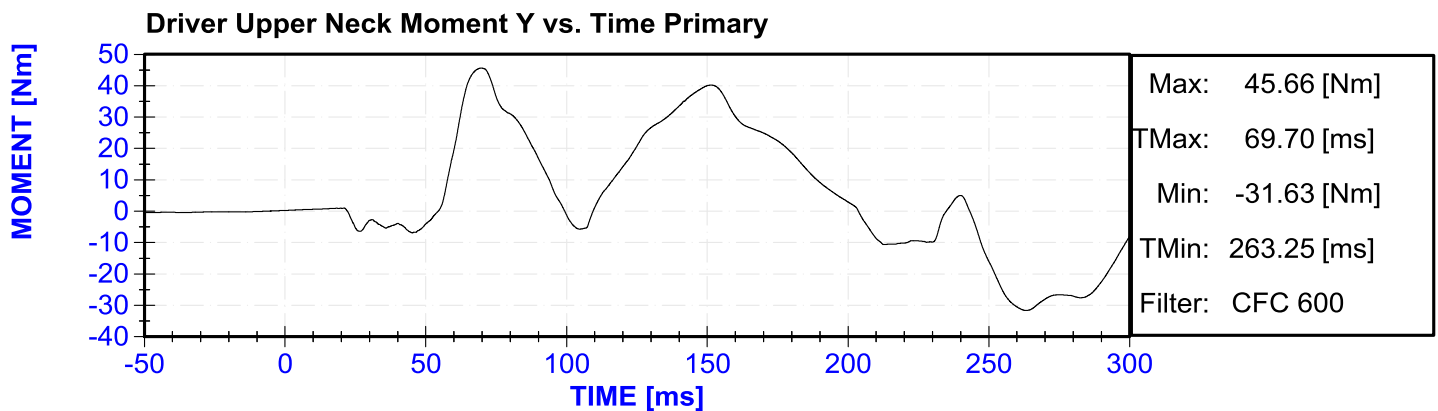
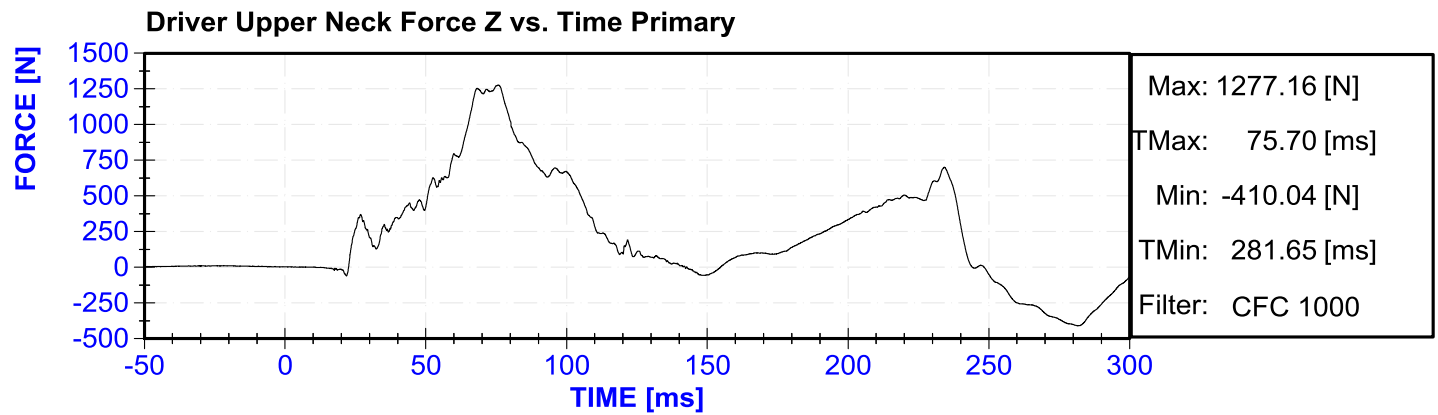
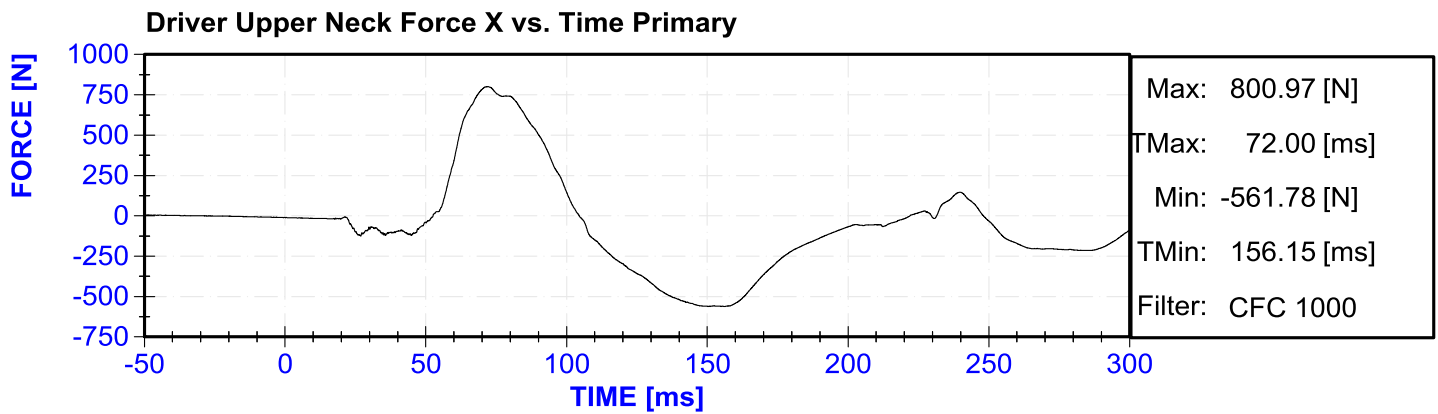
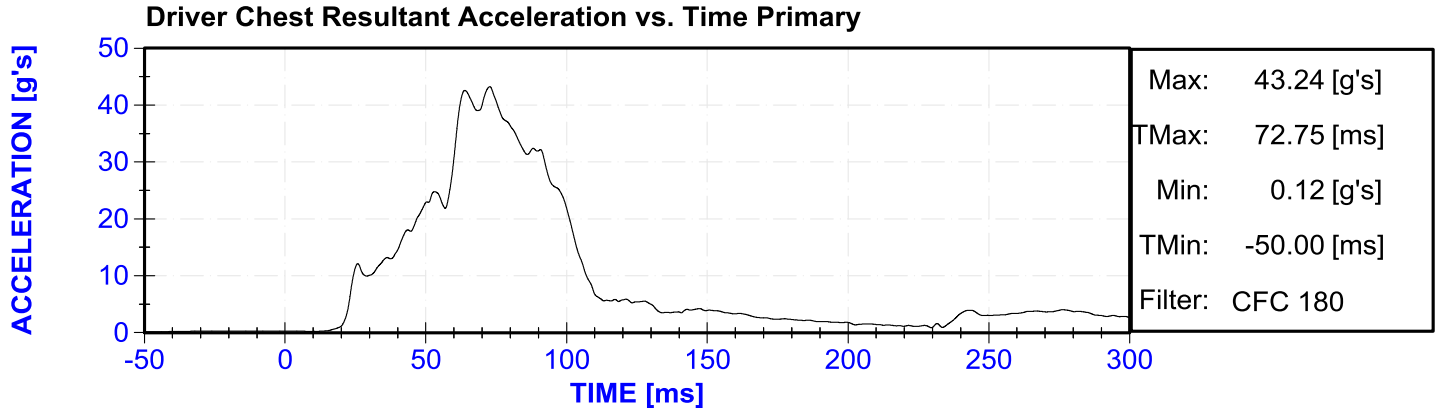
APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

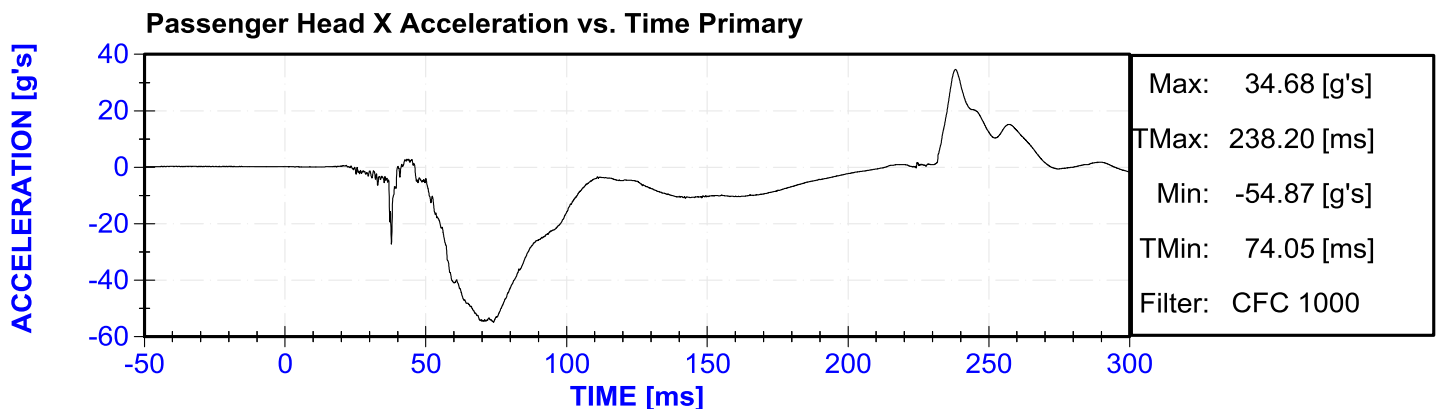
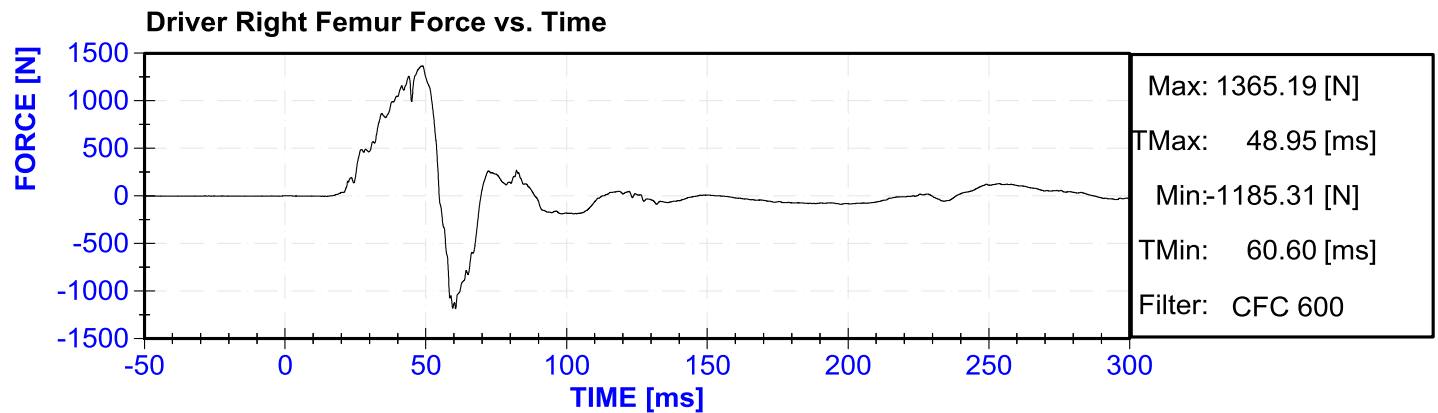
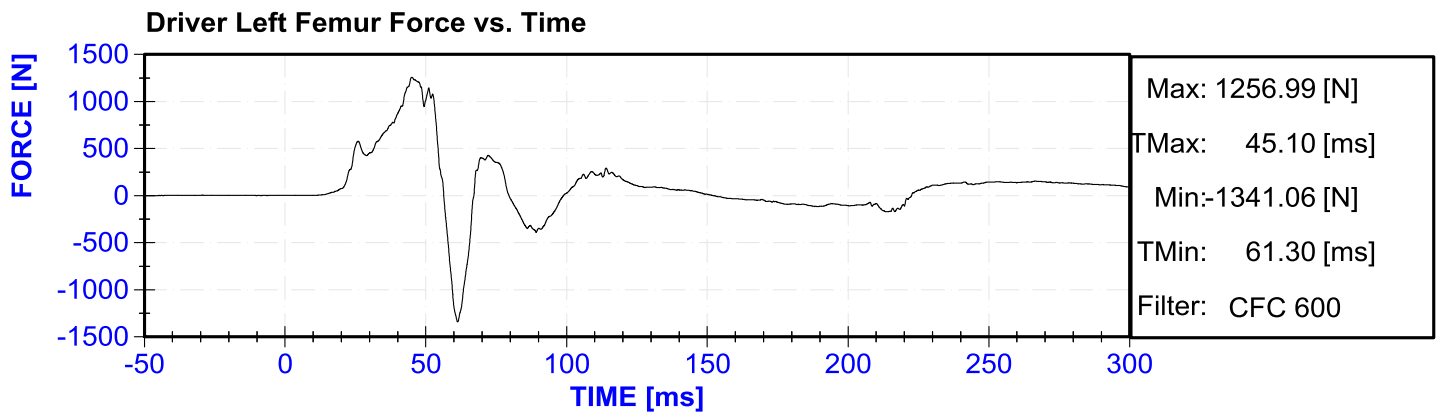
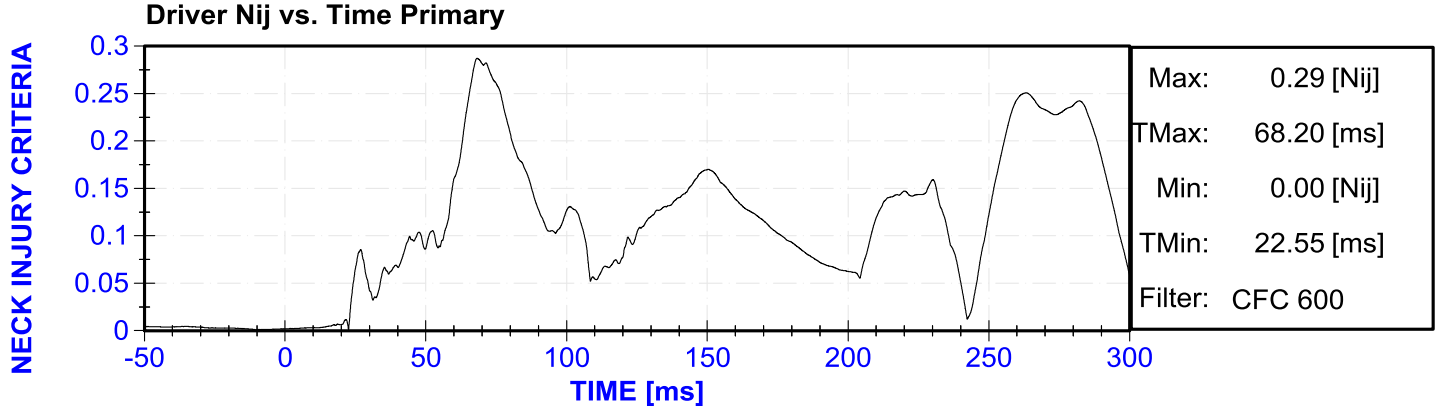
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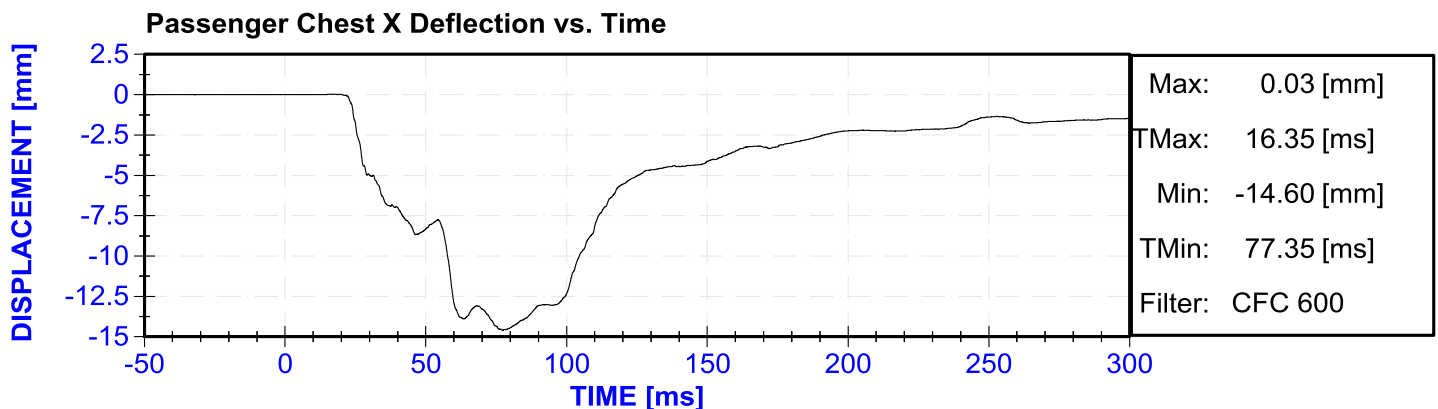
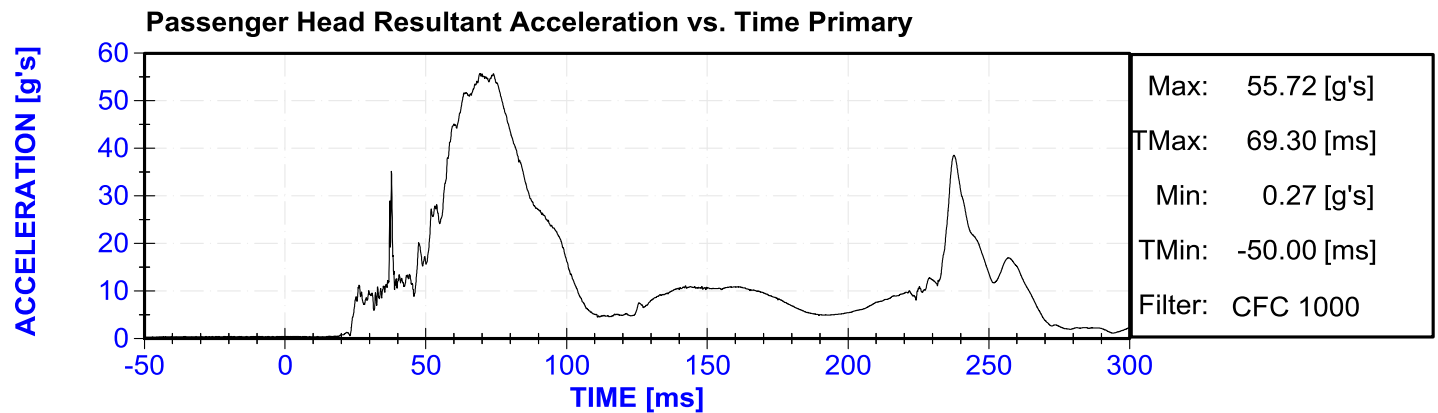
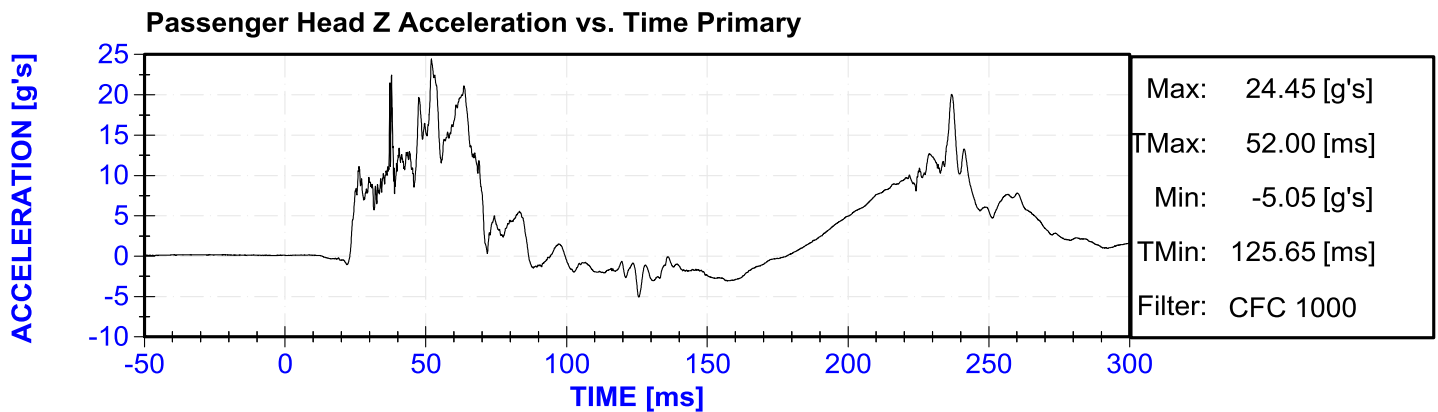
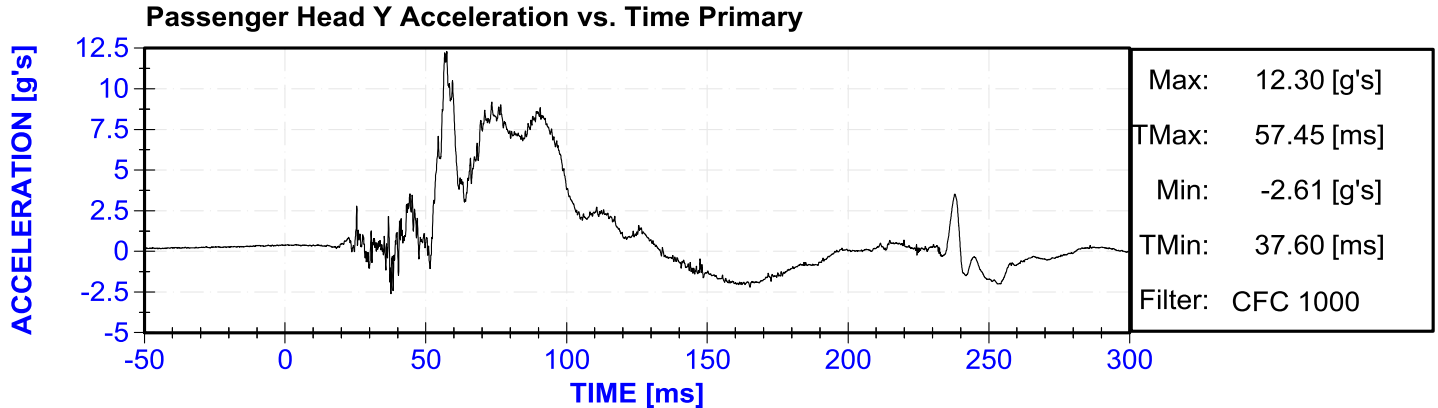
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Plot 2	Driver Head Y Acceleration vs. Time Primary	B-3
Plot 3	Driver Head Z Acceleration vs. Time Primary	B-3
Plot 4	Driver Head Resultant Acceleration vs. Time Primary	B-3
Plot 5	Driver Chest X Deflection vs. Time	B-4
Plot 6	Driver Chest X Acceleration 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

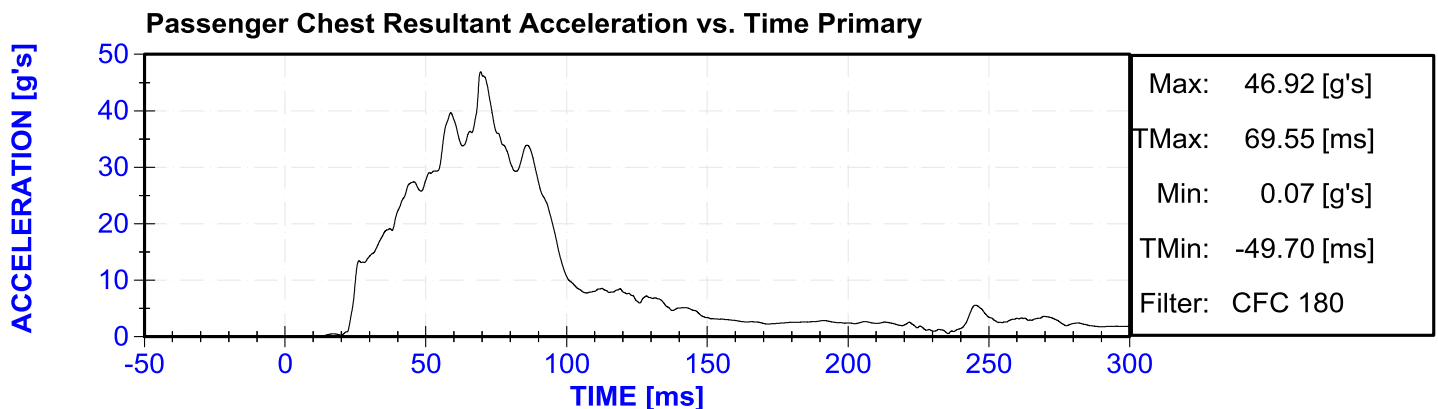
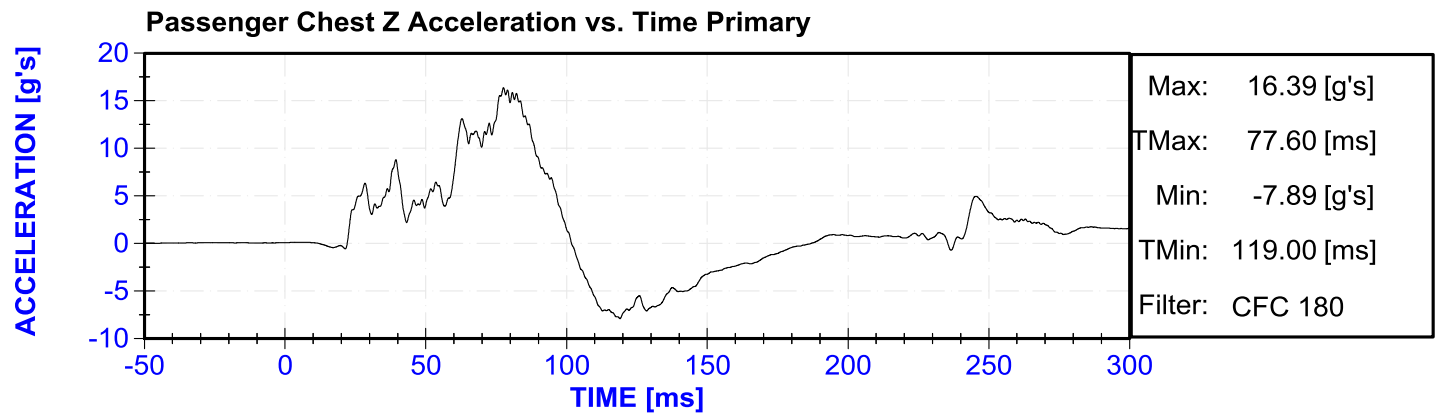
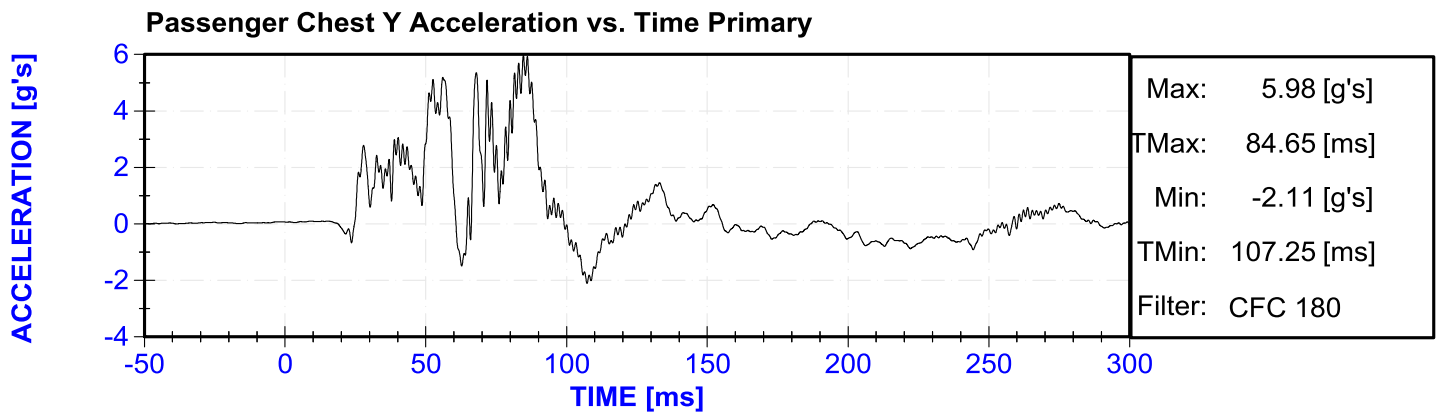
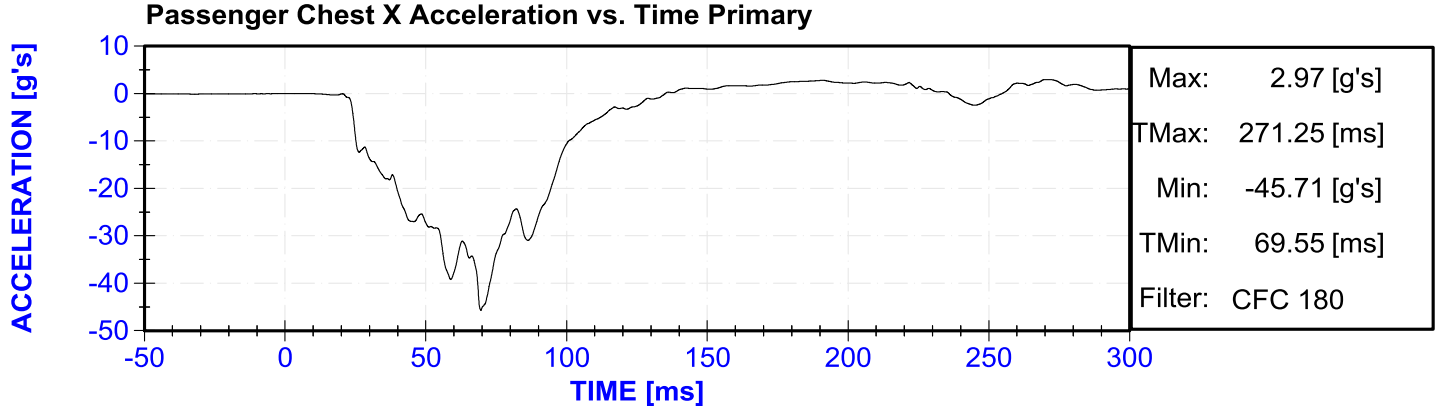


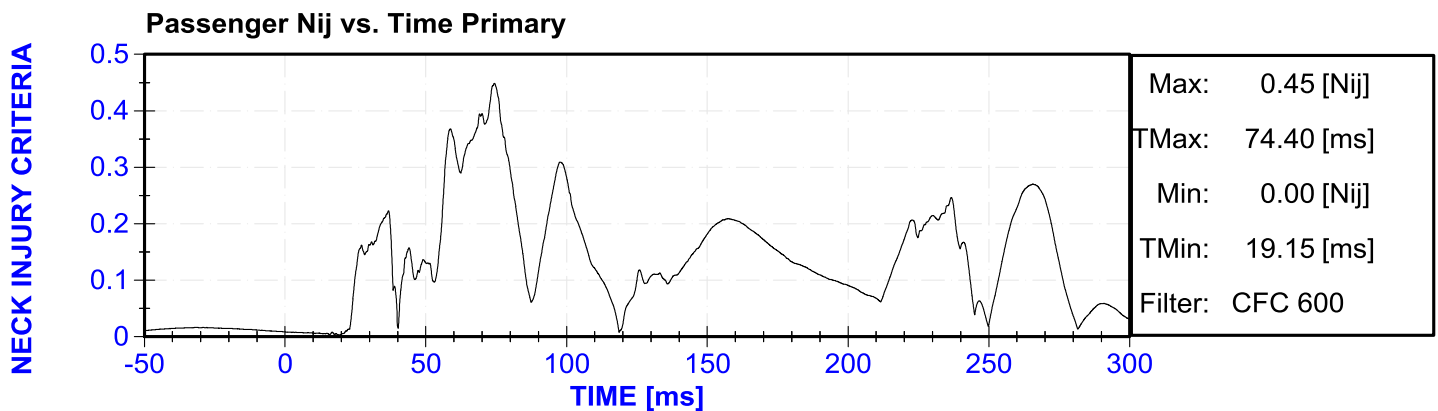
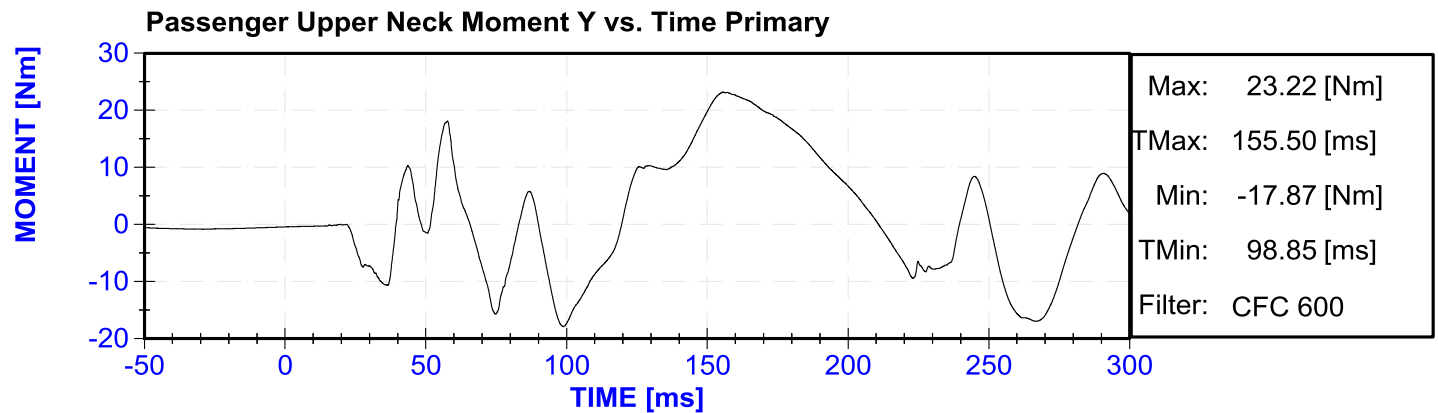
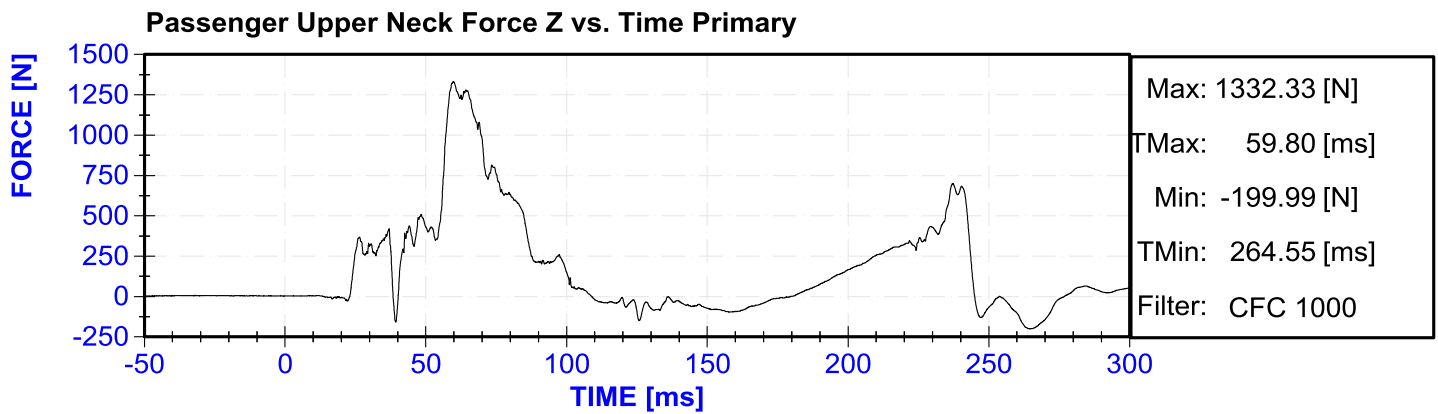
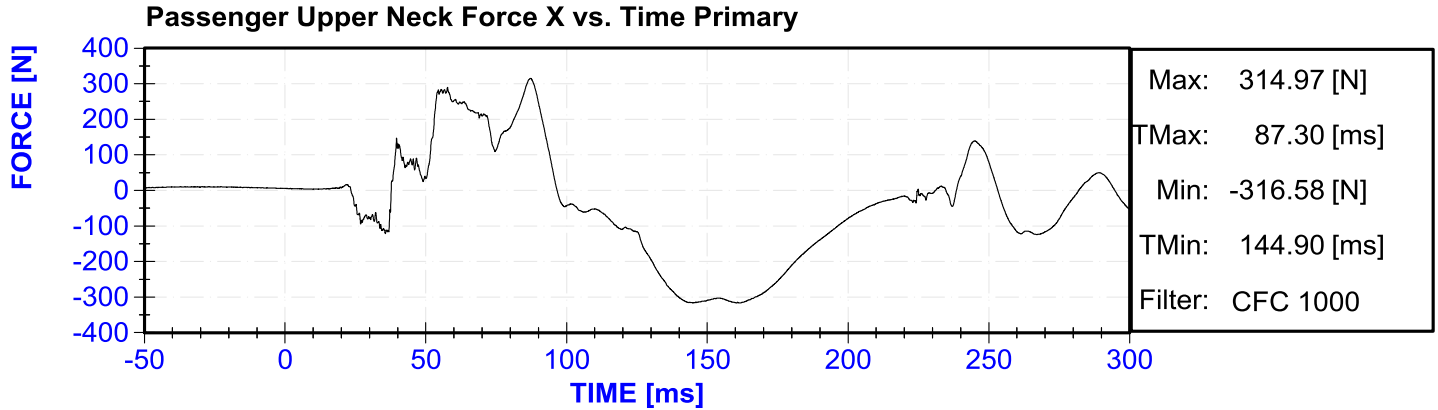




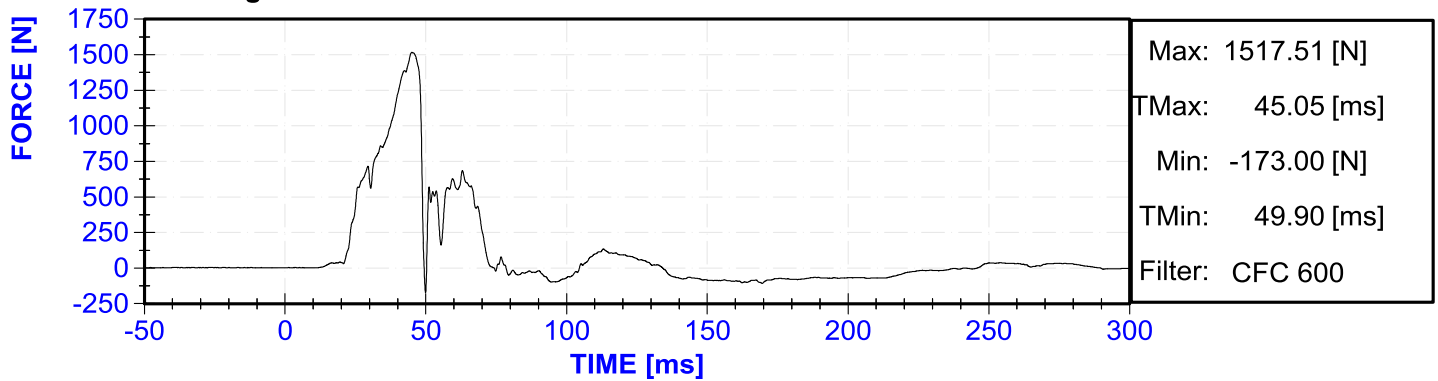




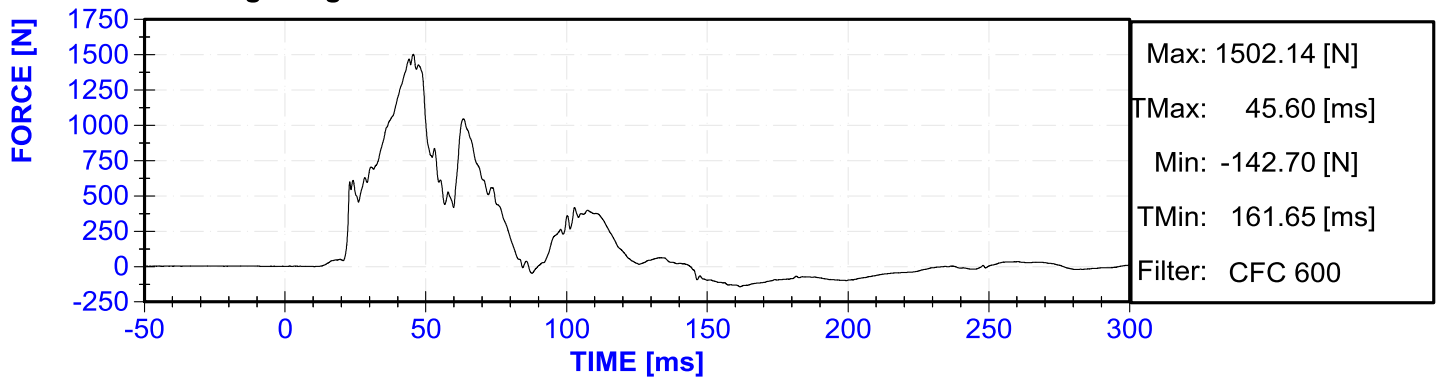




Passenger Left Femur Force vs. Time



Passenger Right Femur Force vs. Time



APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 1046

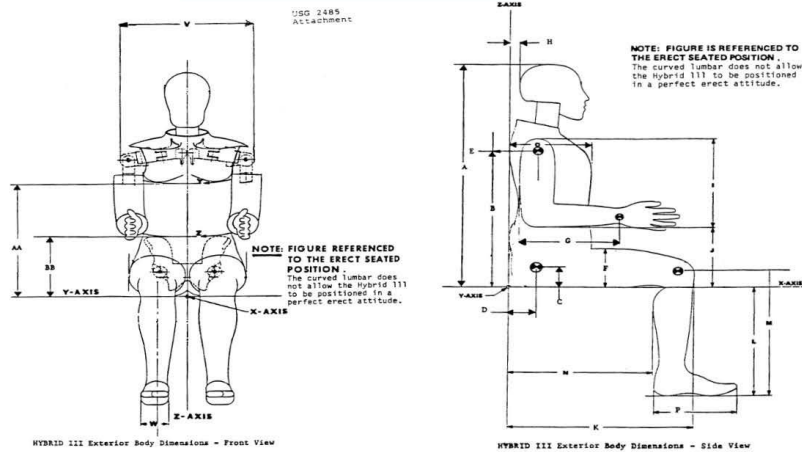


External Measurements - Hybrid 3 - 50th Male

Technician: **M. Geesey**

Date: **2/3/2015**

Dummy Serial Number: **1046**



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.9	Pass
B	Shoulder Pivot Height	19.9	20.5	20.0	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.9	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.3	Pass
J	Elbow Rest Height	7.5	8.3	7.9	Pass
K	Buttock to Knee Length	22.8	23.8	23.4	Pass
L	Popliteal Height	16.9	17.9	17.4	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	8.7	Pass
P	Foot Length (right)	9.9	10.5	10.1	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.8	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.7	Pass
Z	Waist Circumference	32.9	34.1	33.9	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

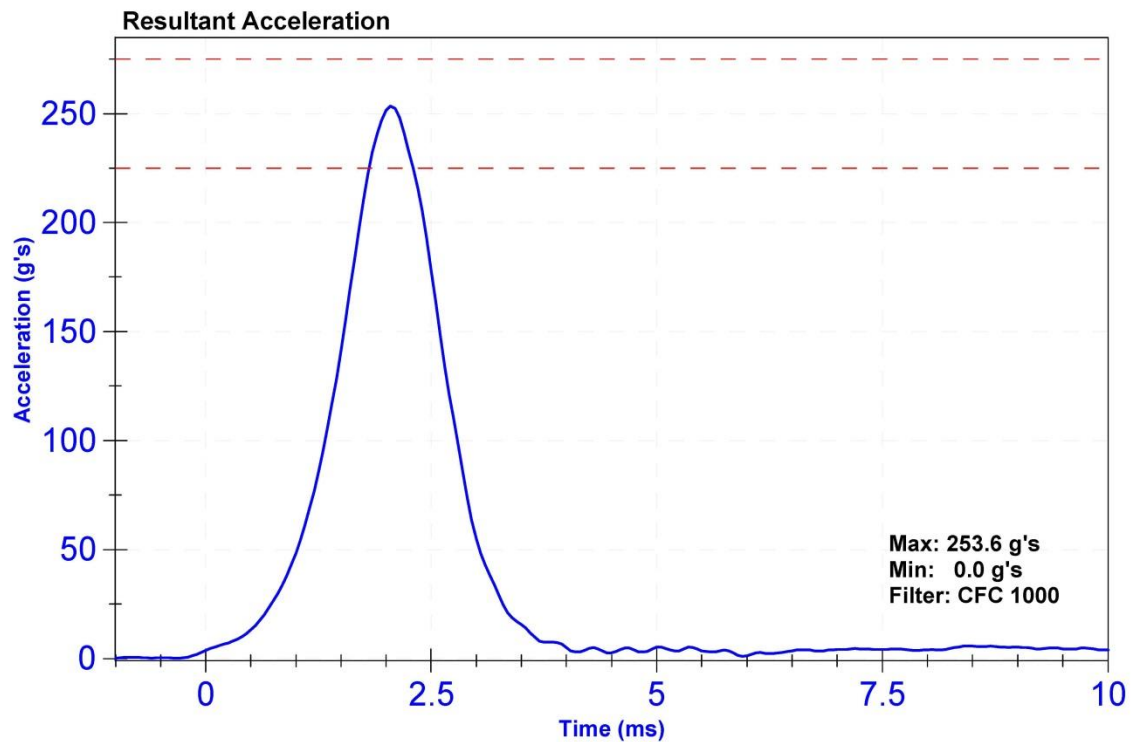
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

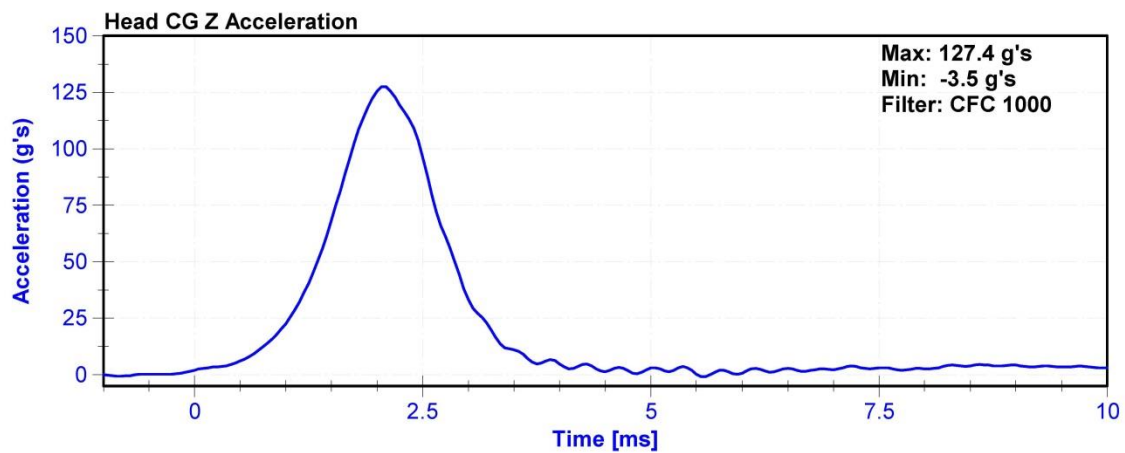
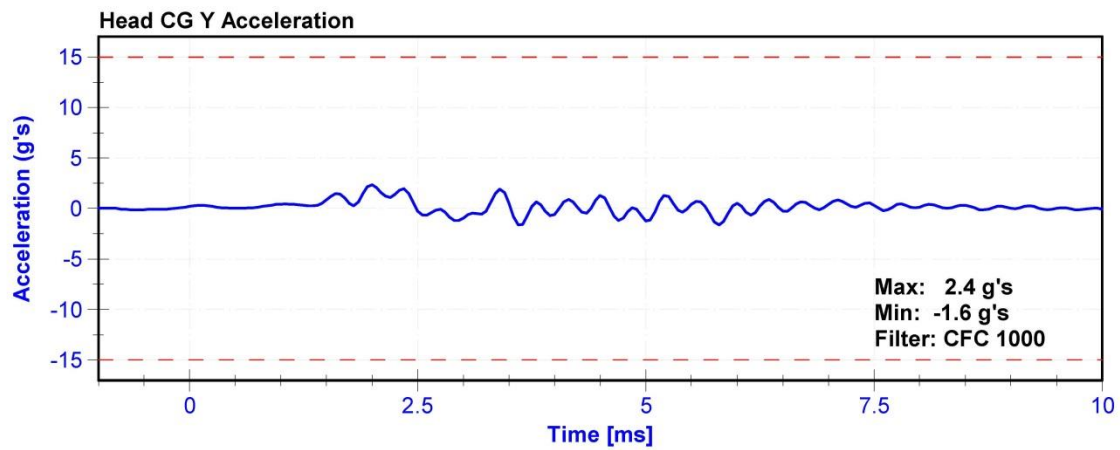
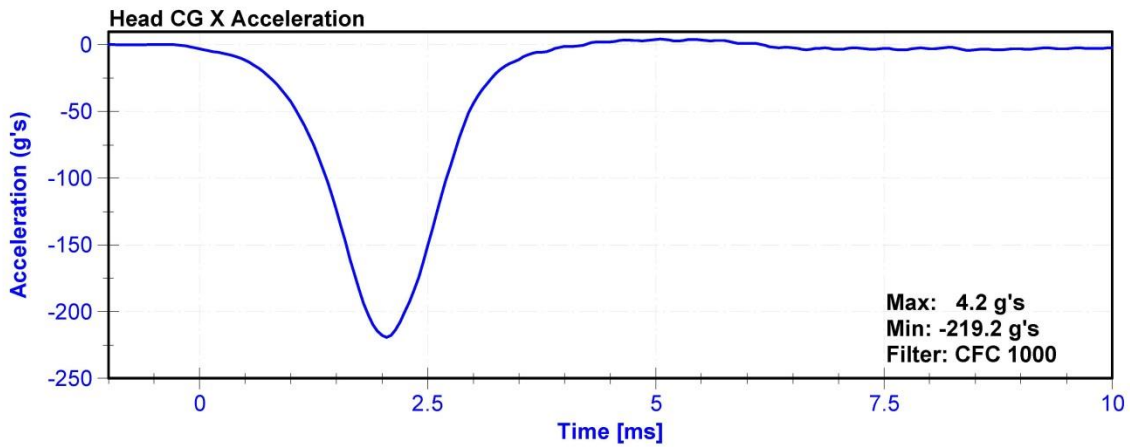
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.6	Pass
Humidity	10	70	%	16.2	Pass
Resultant Acceleration	225	275	g's	253.6	Pass
Oscillation	0	10	%	2.9	Pass
Lateral Acceleration	-15	15	g's	2.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58871	12/19/2014	6/19/2015
Y Accelerometer	ENDEVCO 7264	AC-P12359	12/19/2014	6/19/2015
Z Accelerometer	ENDEVCO 7264CT	AC-P52133	12/19/2014	6/19/2015





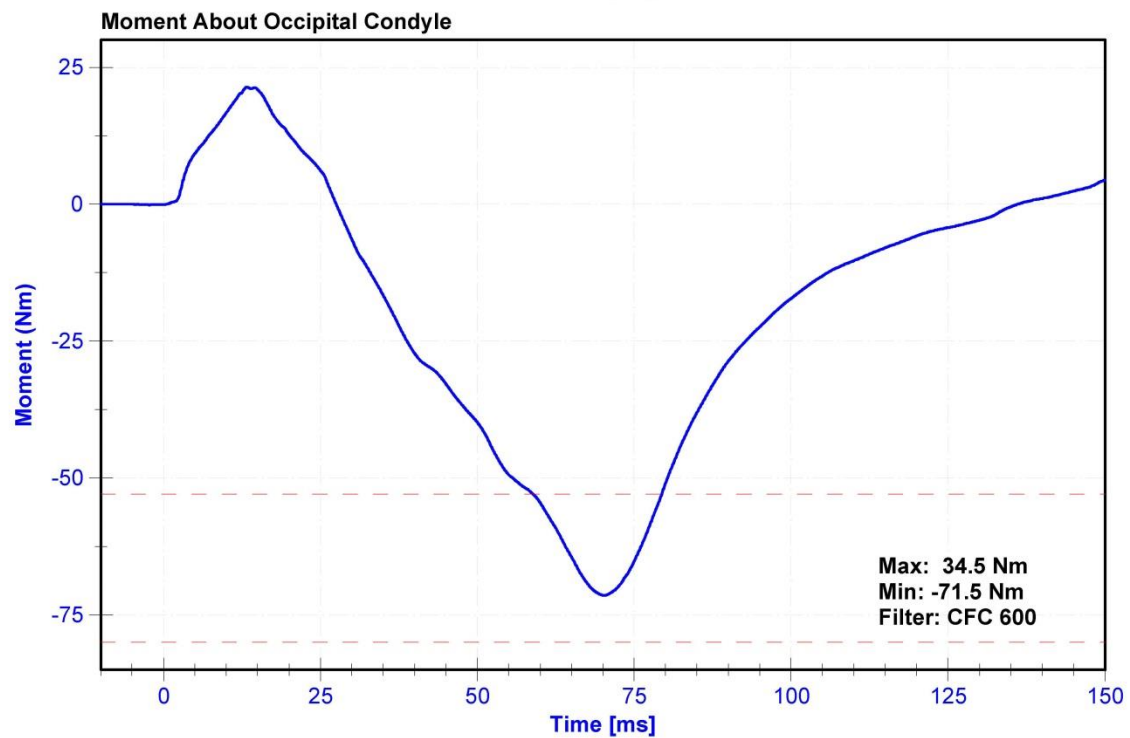
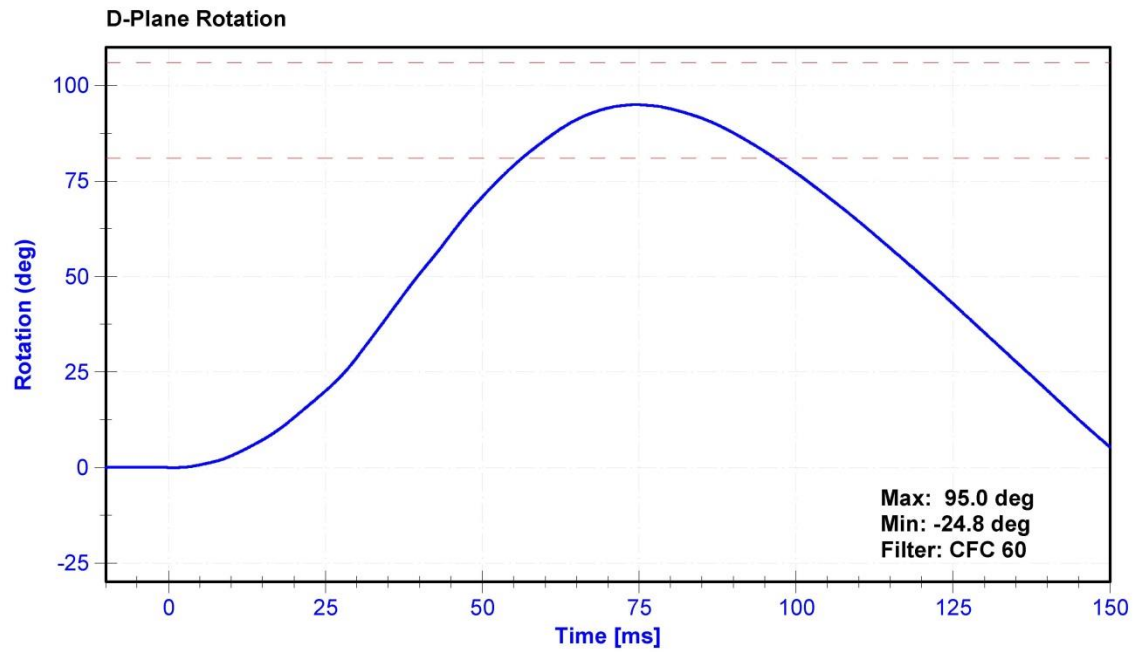
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

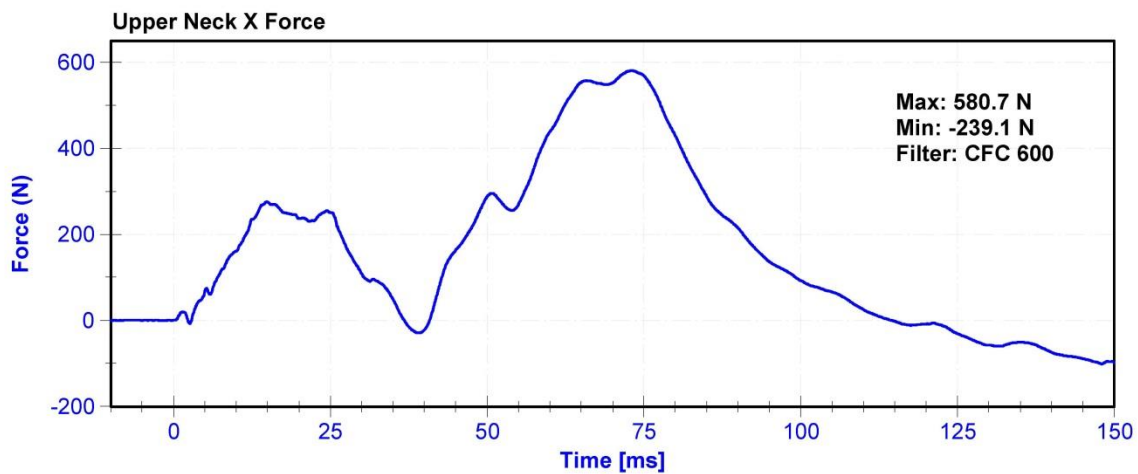
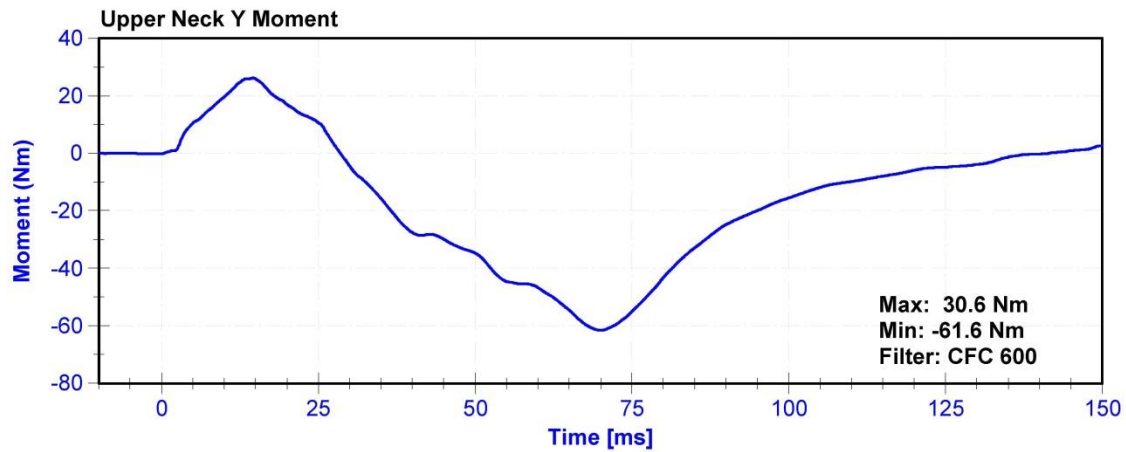
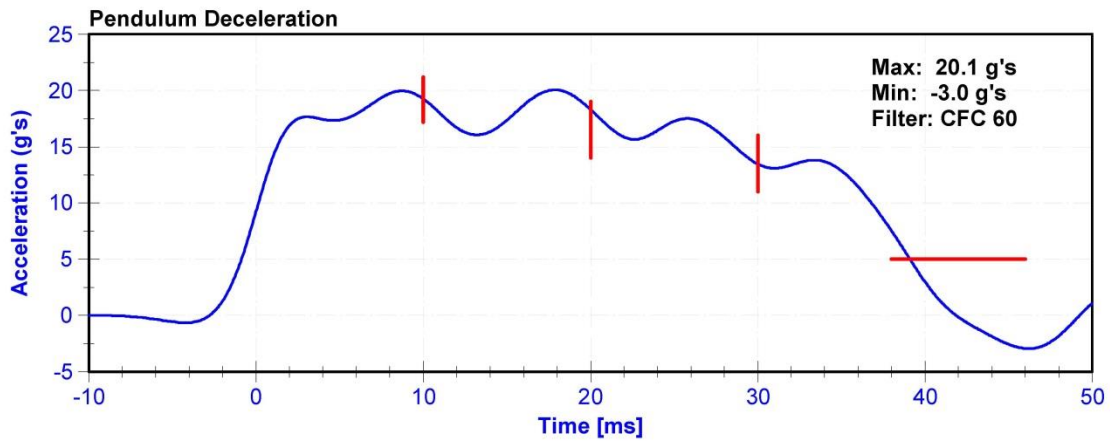
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	14.6	Pass
Velocity	5.94	6.19	m/s	6.025	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.27	Pass
Pendulum Deceleration at 20ms	14	19	g's	18.32	Pass
Pendulum Deceleration at 30ms	11	16	g's	13.47	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	20.06	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	39.1	Pass
D Plane Rotation	81	106	deg	95.0	Pass
Time at Maximum Rotation	72	82	ms	74.4	Pass
Rotation Decay to Zero	147	174	ms	154.3	Pass
Moment About Occipital Condyle	-80	-52.9	Nm	-71.5	Pass
Time at Minimum Moment	65	79	ms	70.2	Pass
Moment Decay to Zero	120	148	ms	136.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015





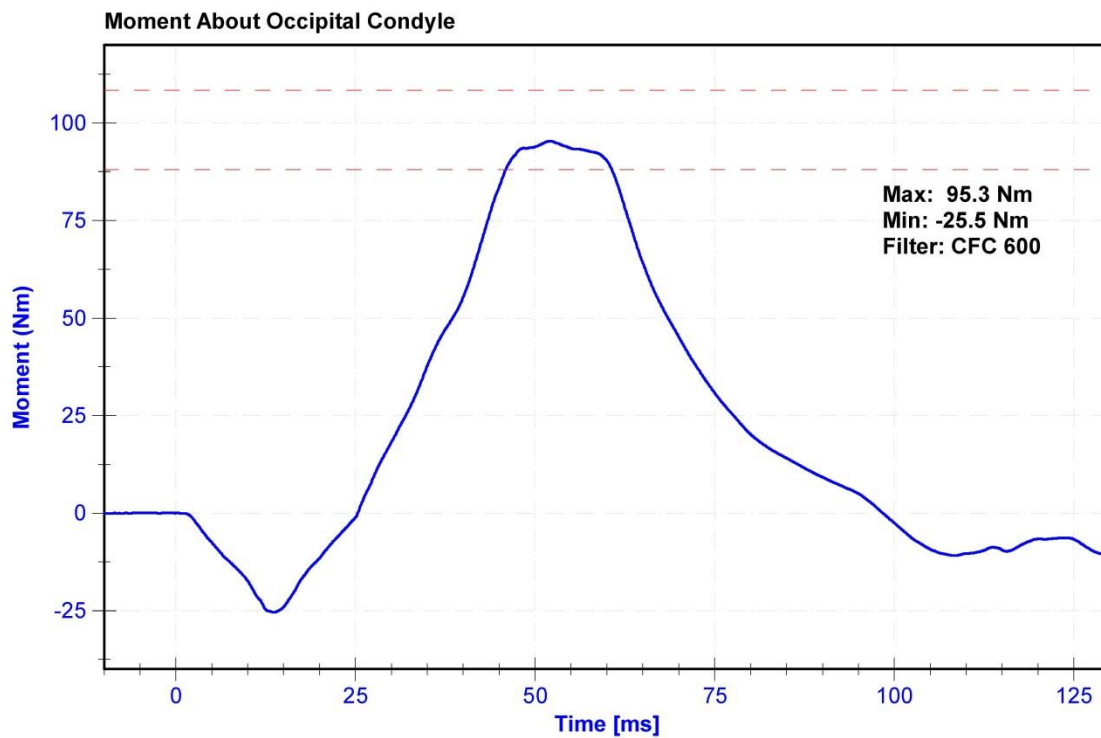
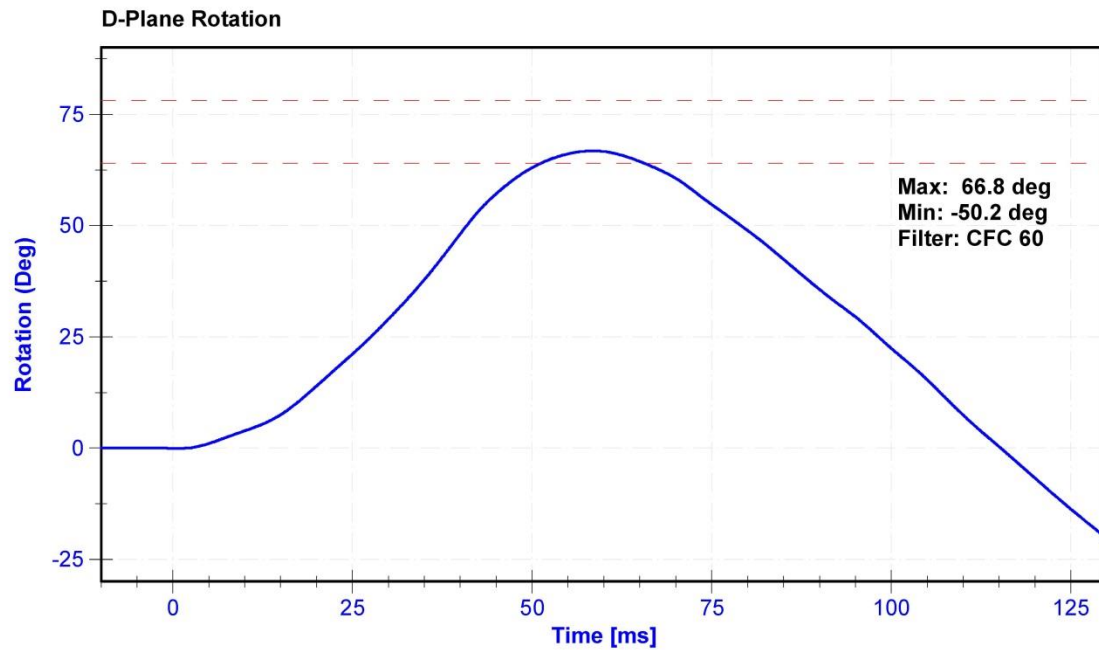
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

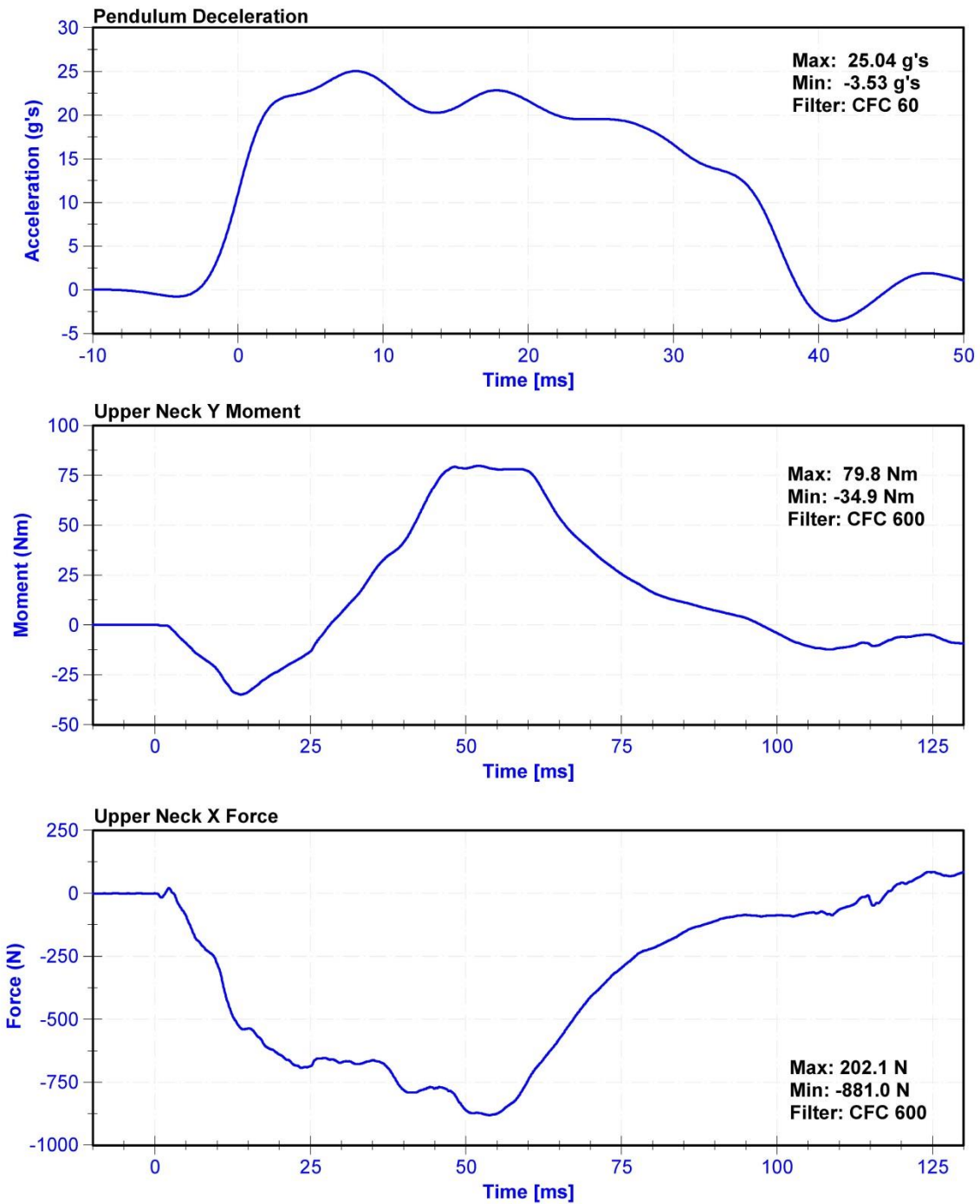
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	14.7	Pass
Velocity	6.89	7.13	m/s	6.921	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	23.72	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	21.62	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.64	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	25.0	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	37.3	Pass
D Plane Rotation	64	78	deg	66.8	Pass
Time at Maximum Rotation	57	64	ms	58.4	Pass
Rotation Decay to Zero	113	127	ms	115.2	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	95.30	Pass
Time at Maximum Moment	47	58	ms	52.1	Pass
Moment Decay to Zero	97	107	ms	98.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015





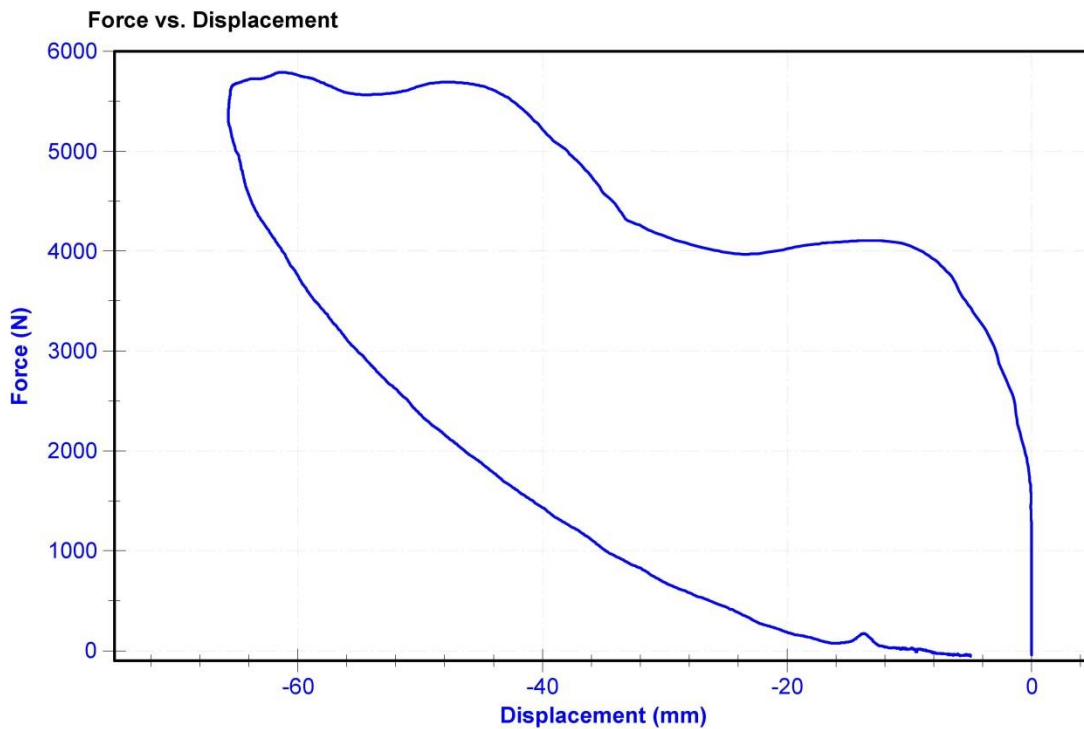
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

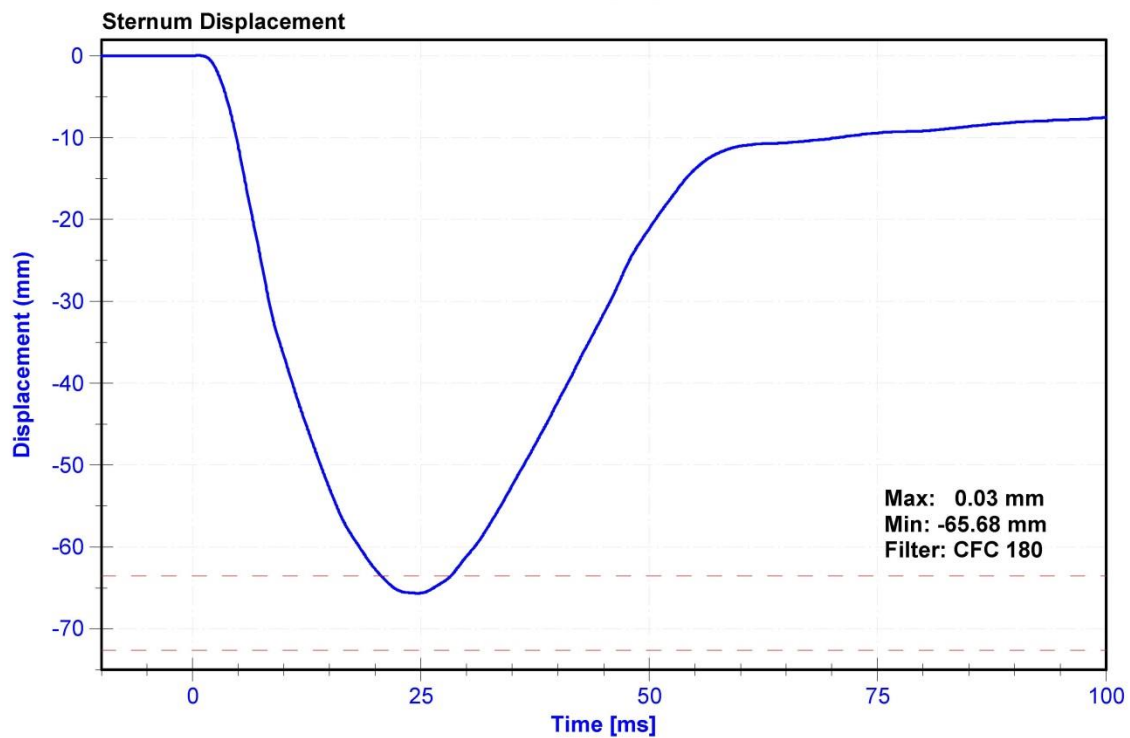
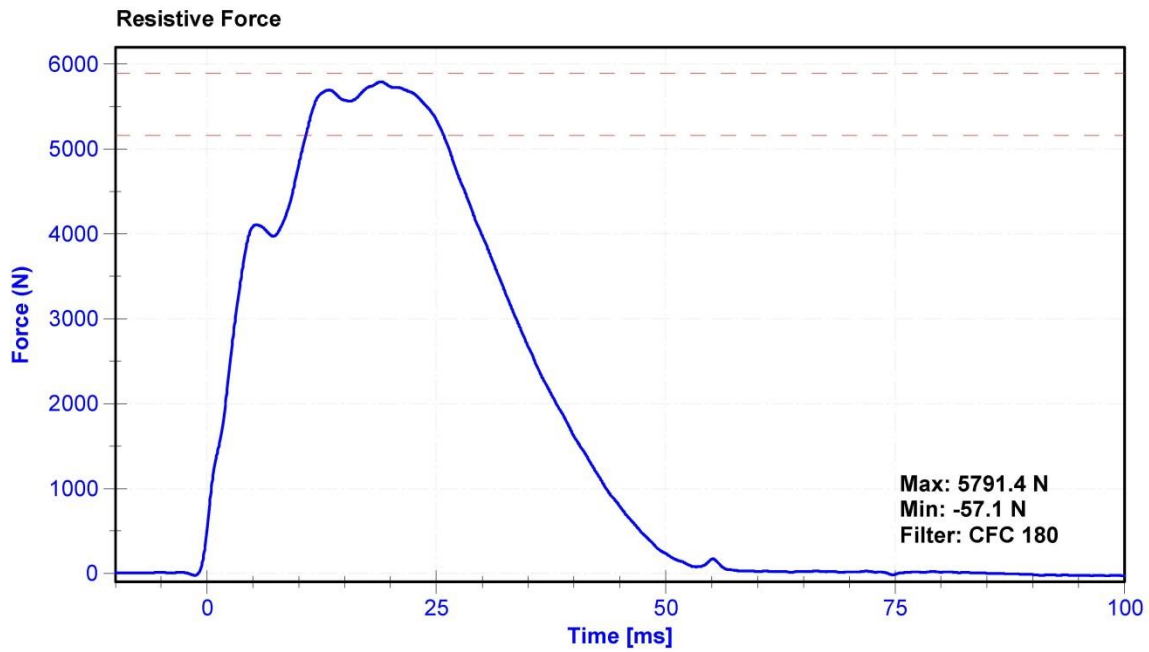
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	15.7	Pass
Velocity	6.59	6.83	m/s	6.79	Pass
Chest Displacement	-72.6	-63.5	mm	-65.68	Pass
Resistive Force	5,160	5,894	N	5791.4	Pass
Hysteresis	69	85	%	70.7	Pass

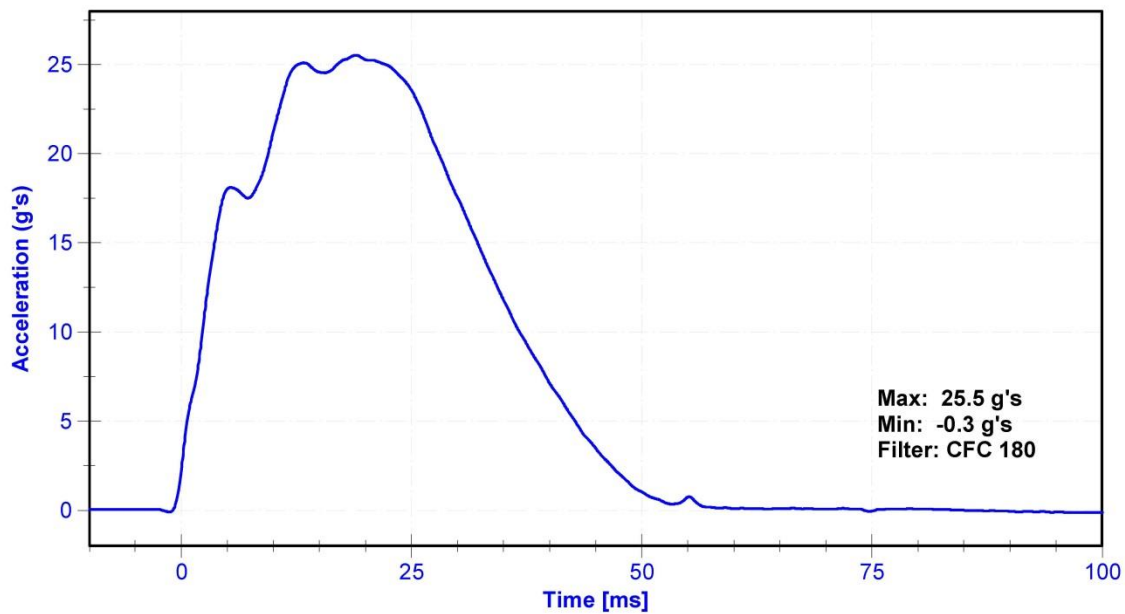
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015
Chest Potentiometer	Servo 14CB1-2897	DS-1046	7/31/2014	7/31/2015

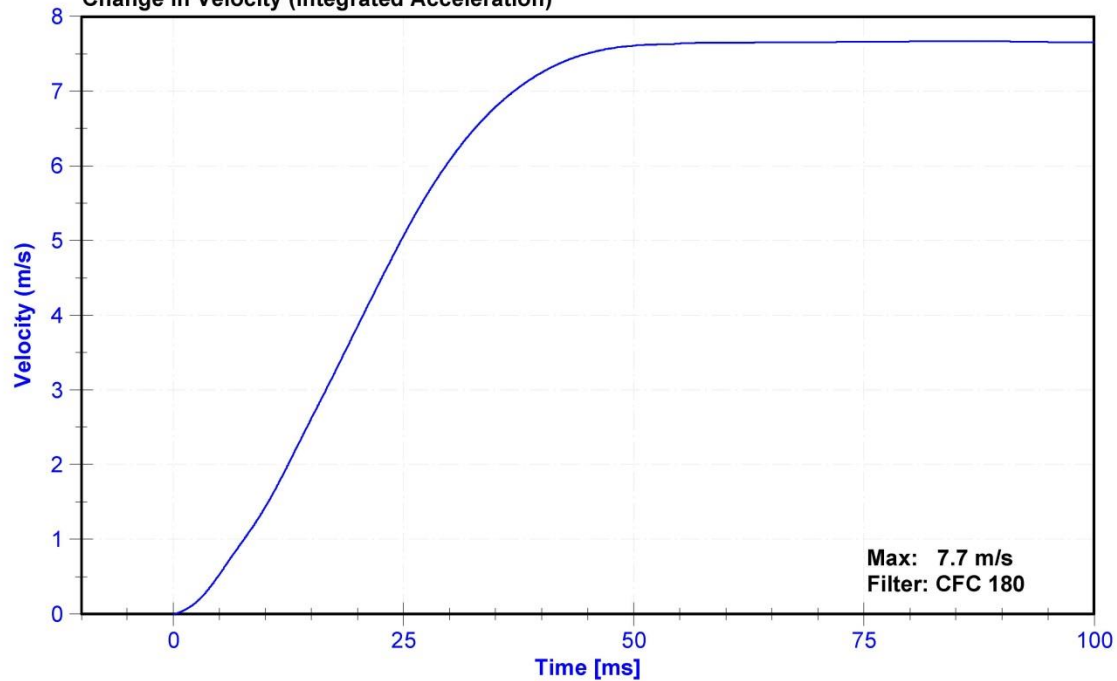




Probe Acceleration



Change in Velocity (Integrated Acceleration)



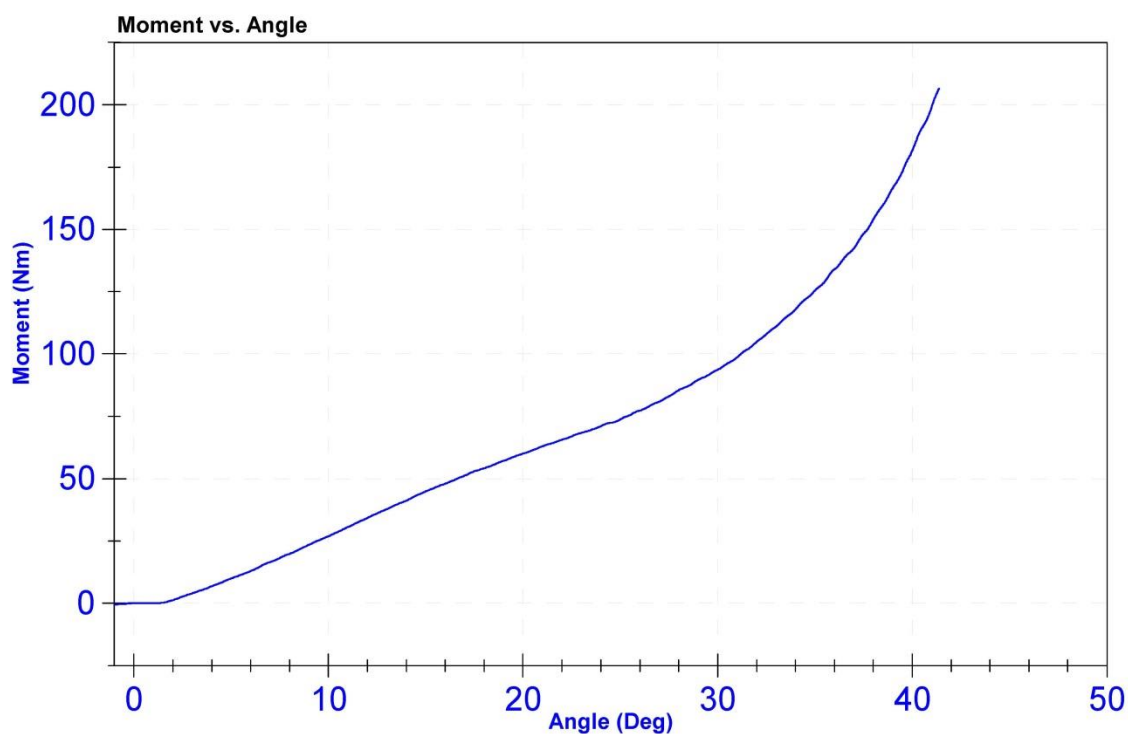
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.6	Pass
Humidity	10	70	%	16.4	Pass
Average Velocity	5	10	deg/s	5.8	Pass
Angle at 203Nm	40	50	deg	41.2	Pass
Moment at 30 degrees	0	94.9	Nm	93.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



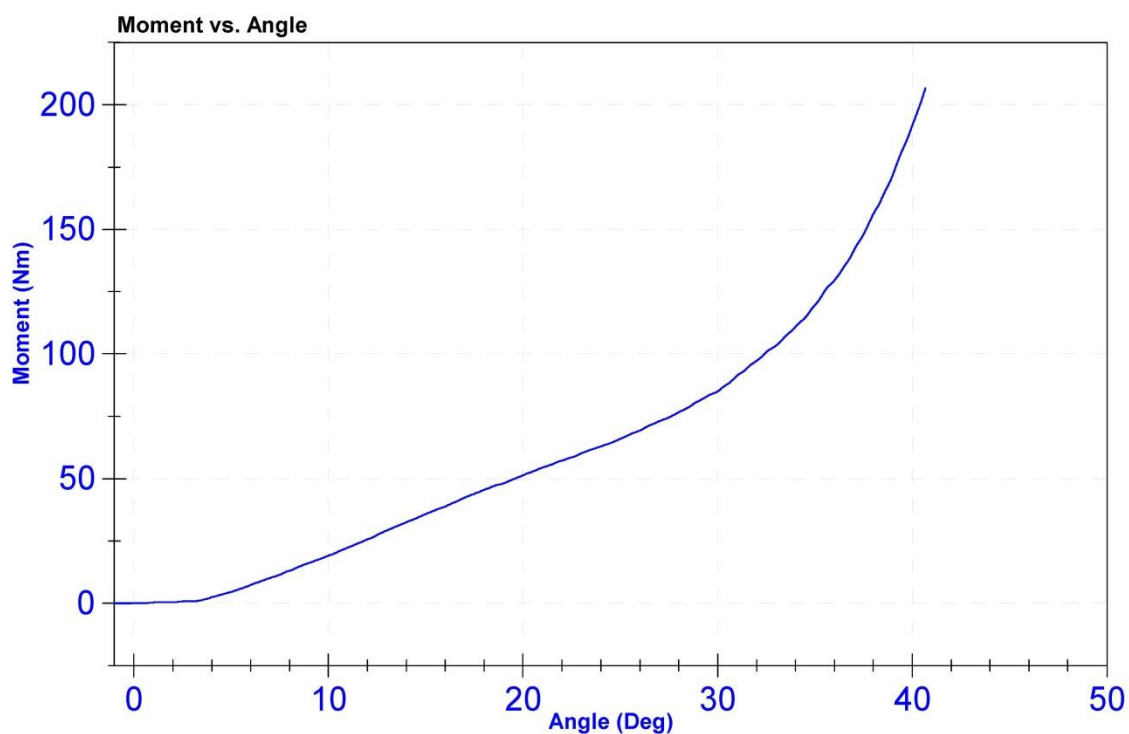
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.6	Pass
Humidity	10	70	%	16.4	Pass
Average Velocity	5	10	deg/s	6.0	Pass
Angle at 203Nm	40	50	deg	40.5	Pass
Moment at 30 degrees	0	94.9	Nm	85.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



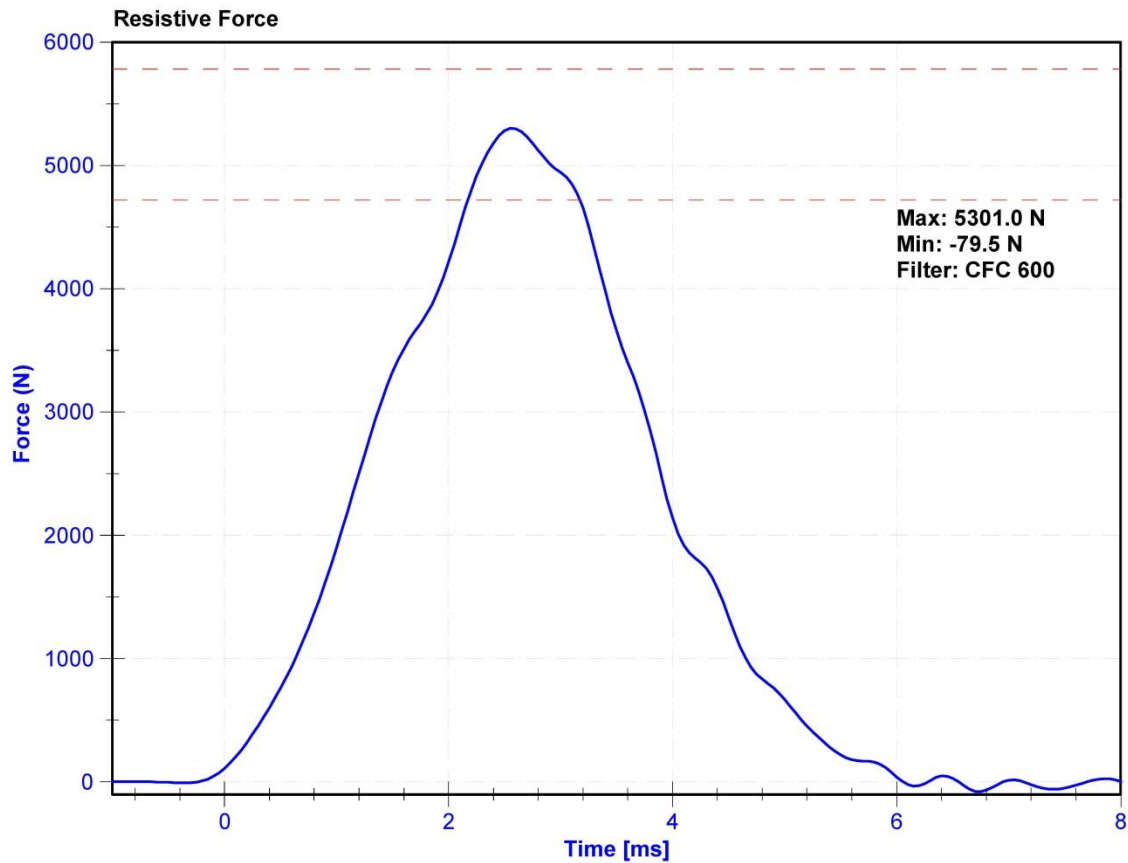
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ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

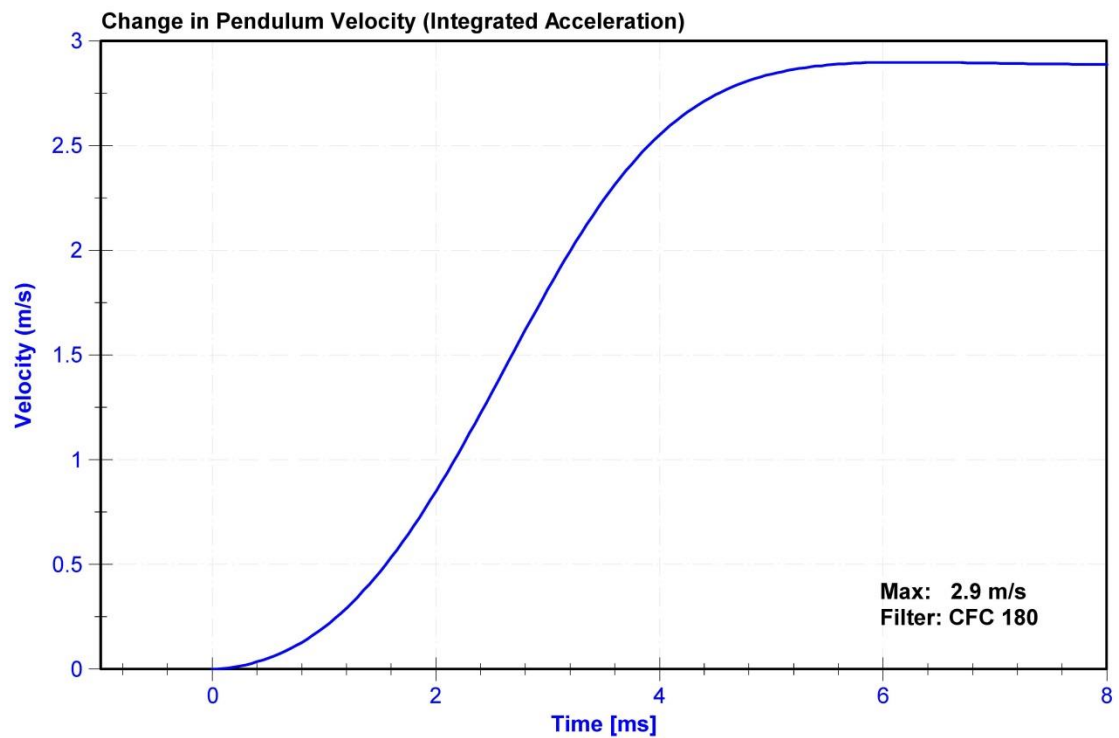
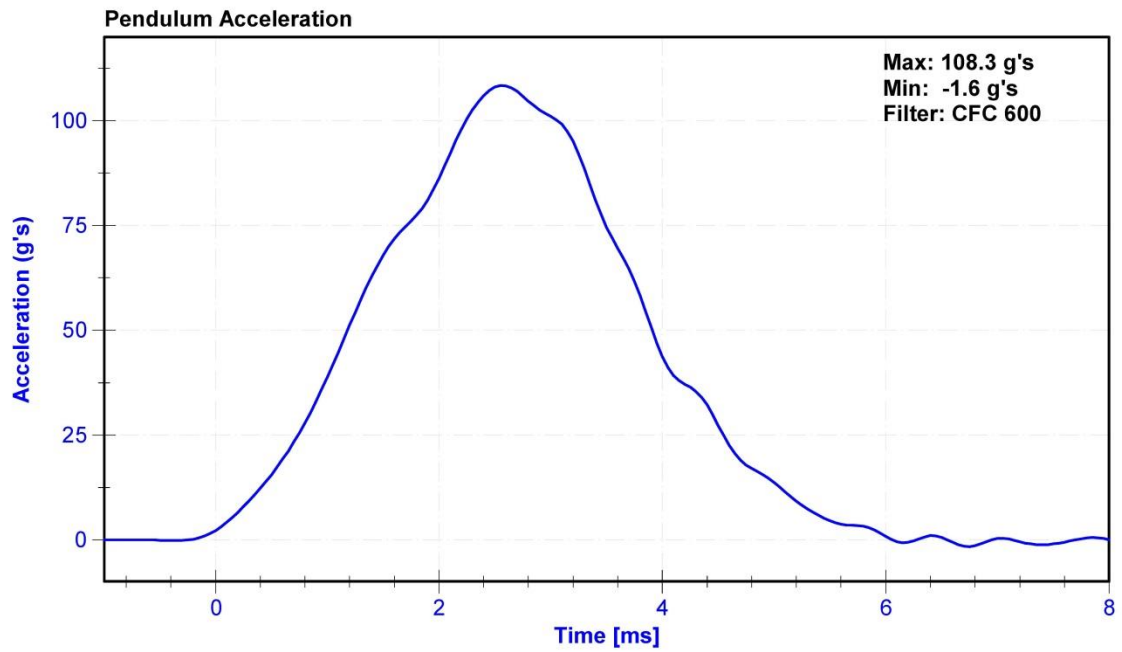
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.6	Pass
Humidity	10	70	%	16.7	Pass
Velocity	2.07	2.13	m/s	2.098	Pass
Resistive Force	4,720	5,780	N	5301.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015





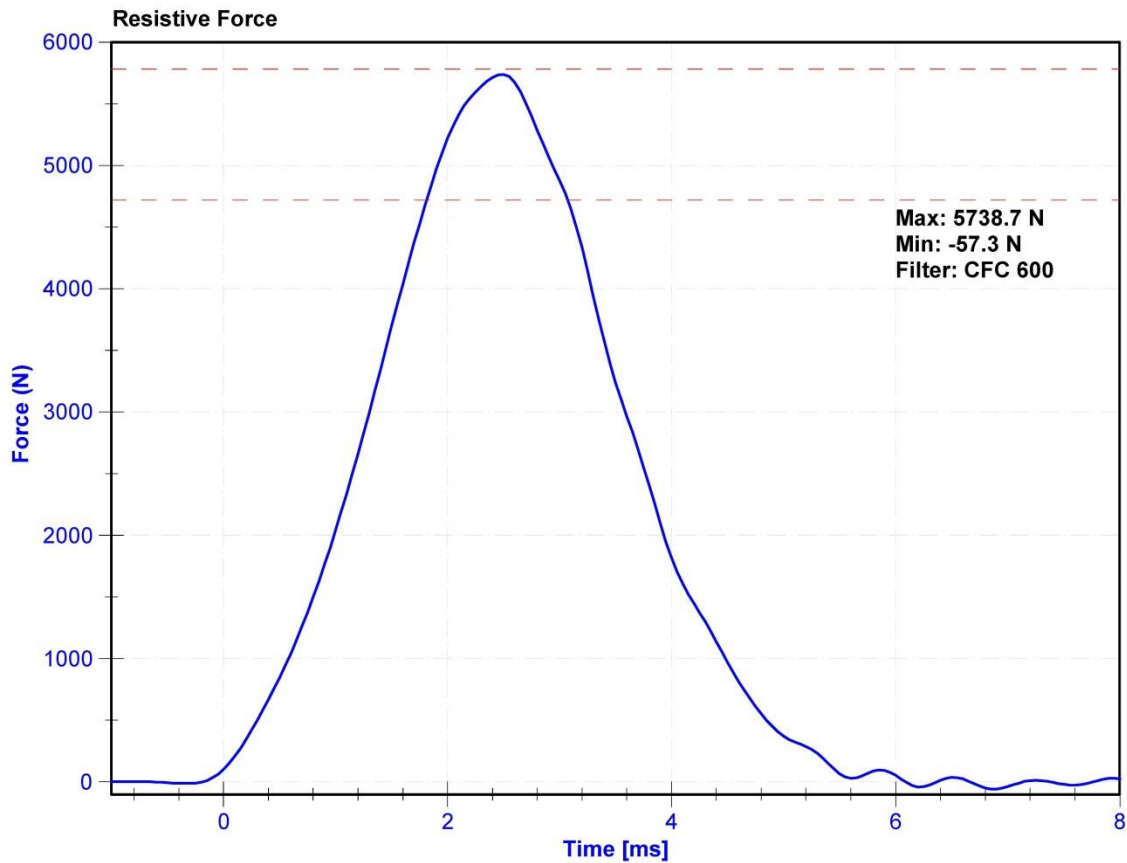
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

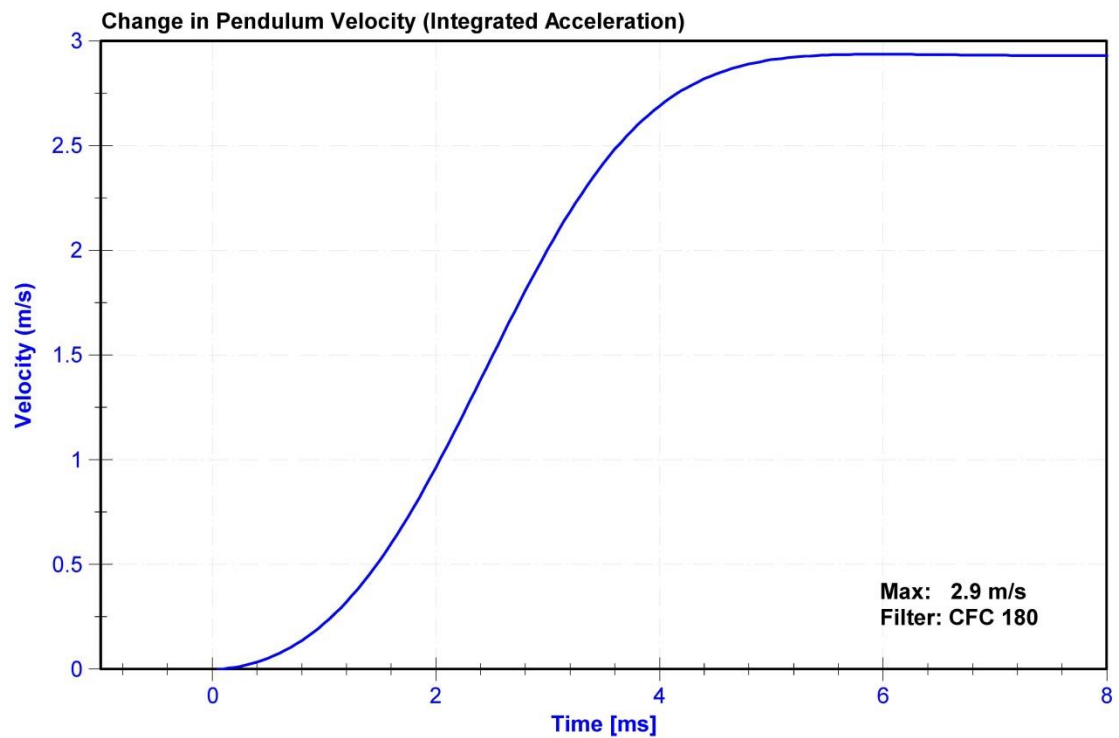
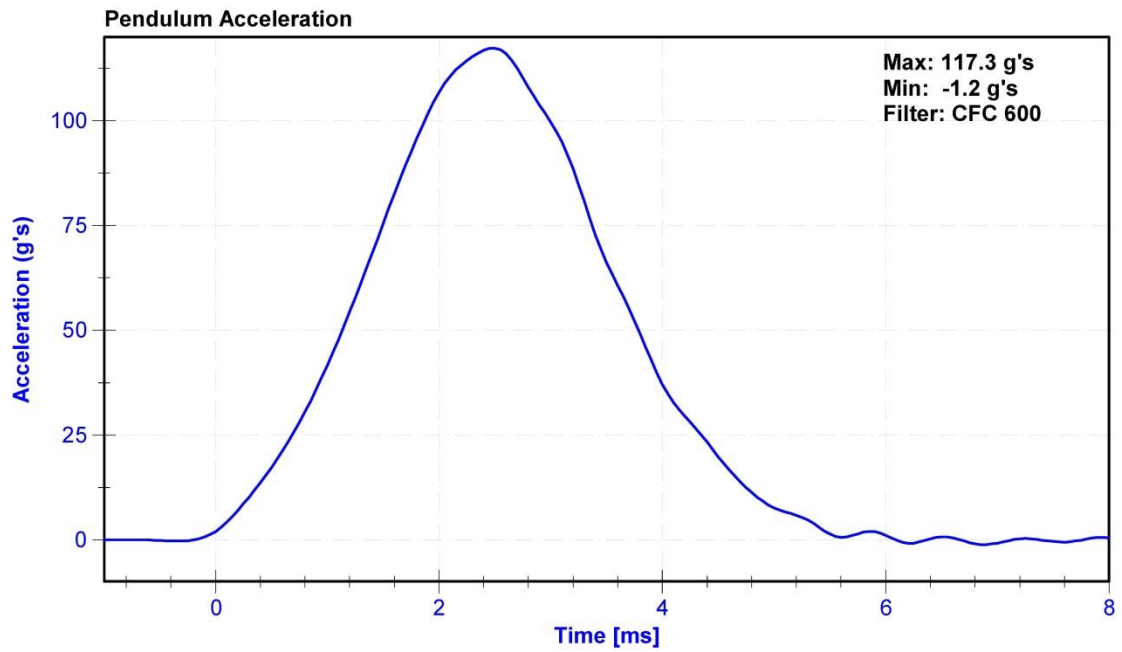
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.6	Pass
Humidity	10	70	%	16.7	Pass
Velocity	2.07	2.13	m/s	2.098	Pass
Resistive Force	4,720	5,780	N	5738.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015





CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL NO: 139

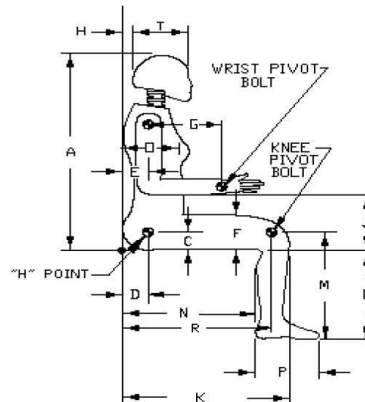
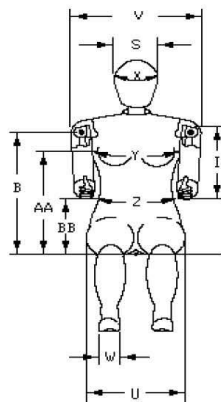


External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey

Date: 2/3/2015

Dummy Serial Number: 139



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	788	Pass
B	Shoulder Pivot Height	432	457	446	Pass
C	H-Point Height	81	86	84	Pass
D	H-Point from Backline	145	150	146	Pass
E	Shoulder Pivot from Backline	69	84	75	Pass
F	Thigh Clearance	119	135	124	Pass
G	Back of Elbow to Wrist Pivot	244	259	248	Pass
H	Head Back to Backline	43	48	44	Pass
I	Shoulder to Elbow Length	277	297	293	Pass
J	Elbow Rest Height	183	203	187	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	362	Pass
M	Knee Pivot Height	394	419	398	Pass
N	Buttock Popliteal Length	414	439	423	Pass
O	Chest Depth without Jacket	175	191	183	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	472	Pass
S	Head Breadth	137	437	140	Pass
T	Head Depth	178	188	181	Pass
U	Hip Breadth	300	315	303	Pass
V	Shoulder Breadth	351	366	361	Pass
W	Foot Breadth	79	94	82	Pass
X	Head Circumference	528	549	536	Pass
Y	Chest Circumference with Jacket	851	881	852	Pass
Z	Waist Circumference	460	790	771	Pass
AA	Reference Location (Chest Circumference)	333	358	357	Pass
BB	Reference Location (Waist Circumference)	160	170	170	Pass

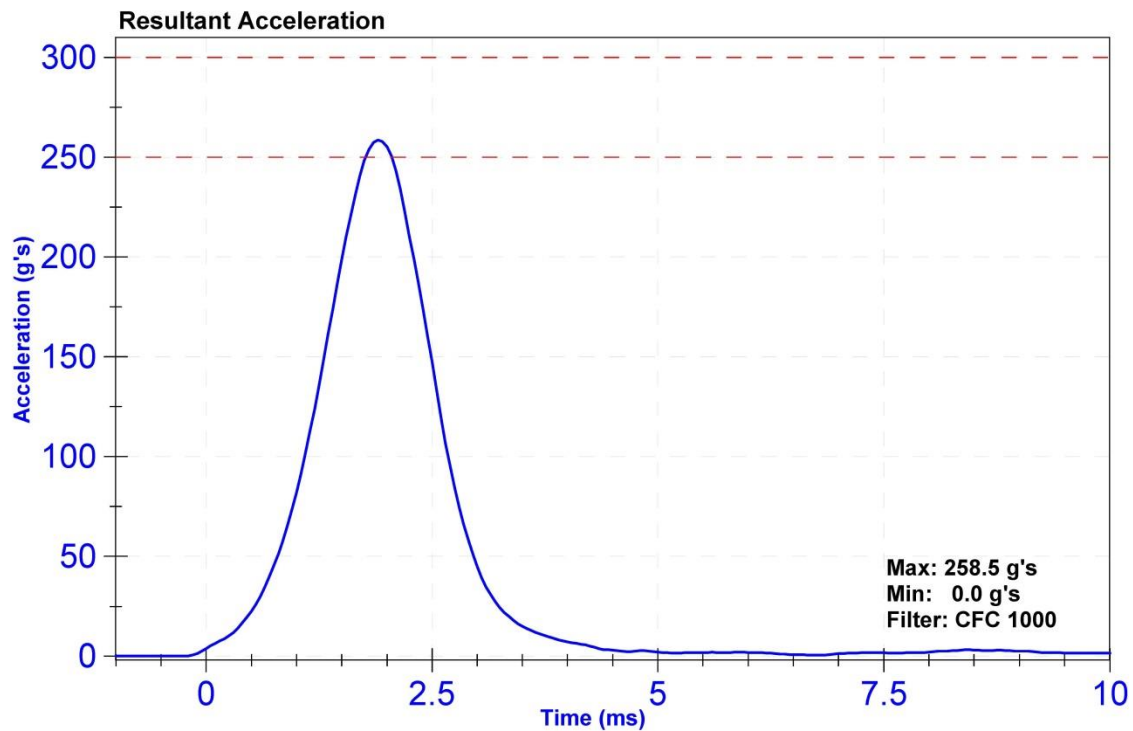
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

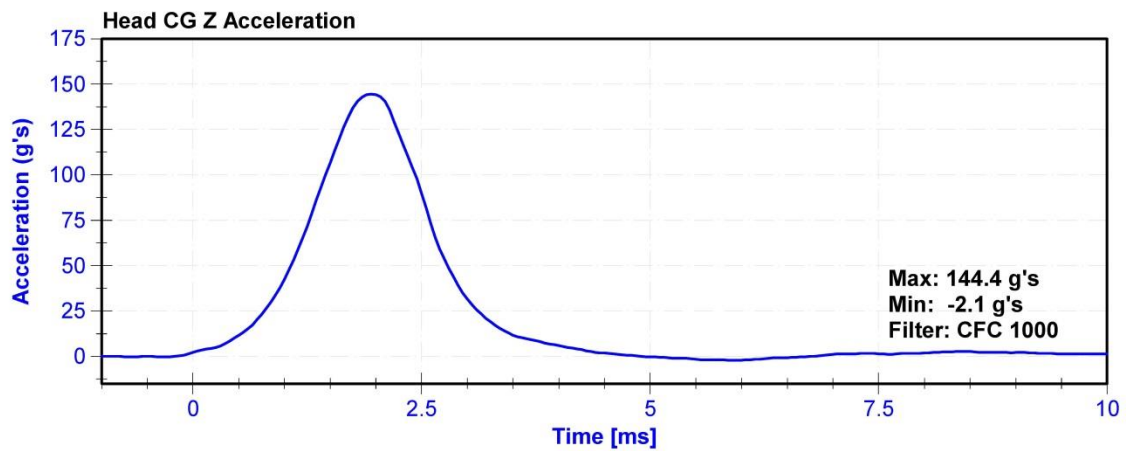
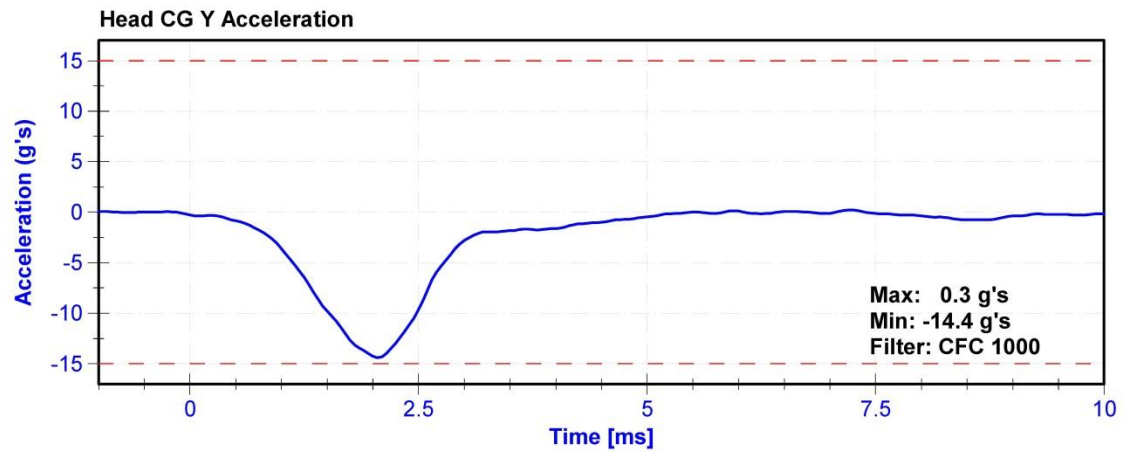
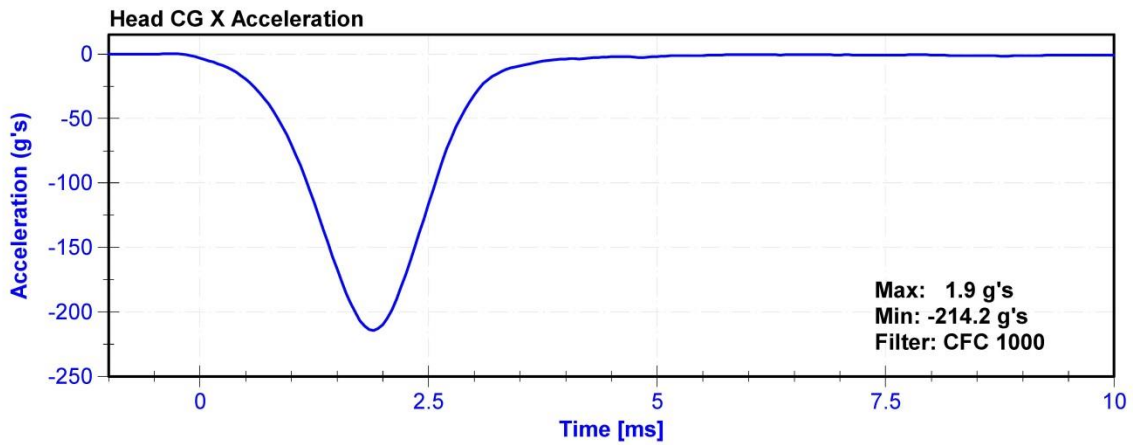
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.2	Pass
Humidity	10	70	%	14.5	Pass
Resultant Acceleration	250	300	g's	258.5	Pass
Oscillation	0	10	%	1.2	Pass
Lateral Acceleration	-15	15	g's	-14.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P52054	8/26/2014	2/24/2015
Y Accelerometer	ENDEVCO 7264	AC-P52007	8/26/2014	2/24/2015
Z Accelerometer	ENDEVCO 7264	AC-P51298	8/26/2014	2/24/2015





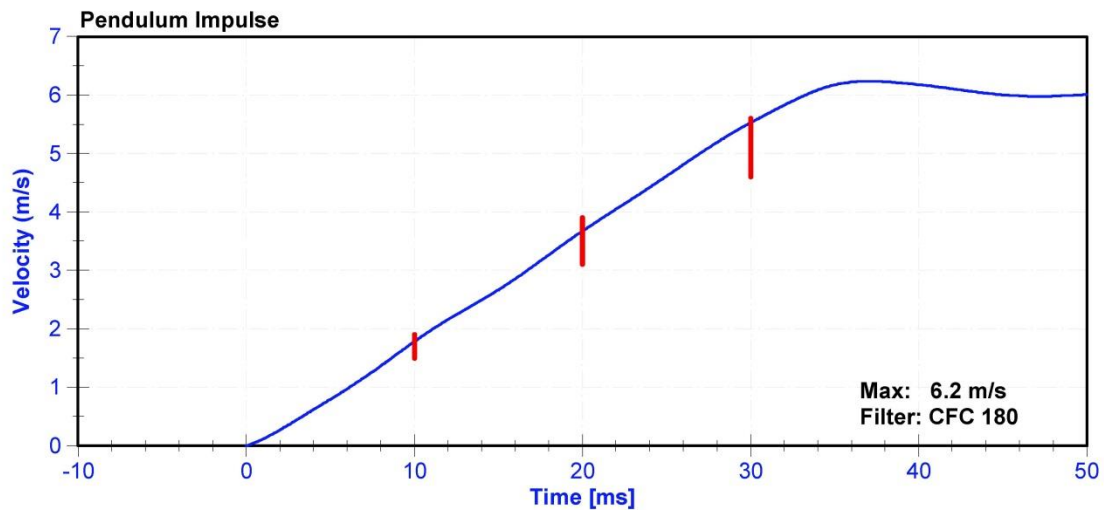
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

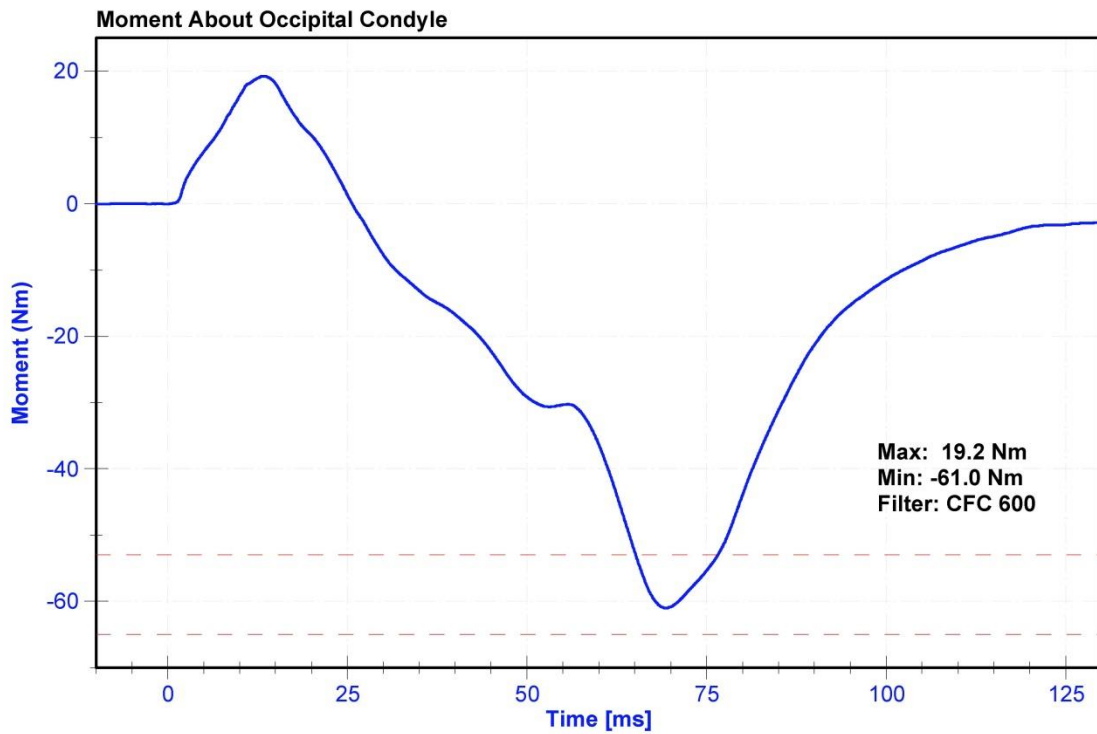
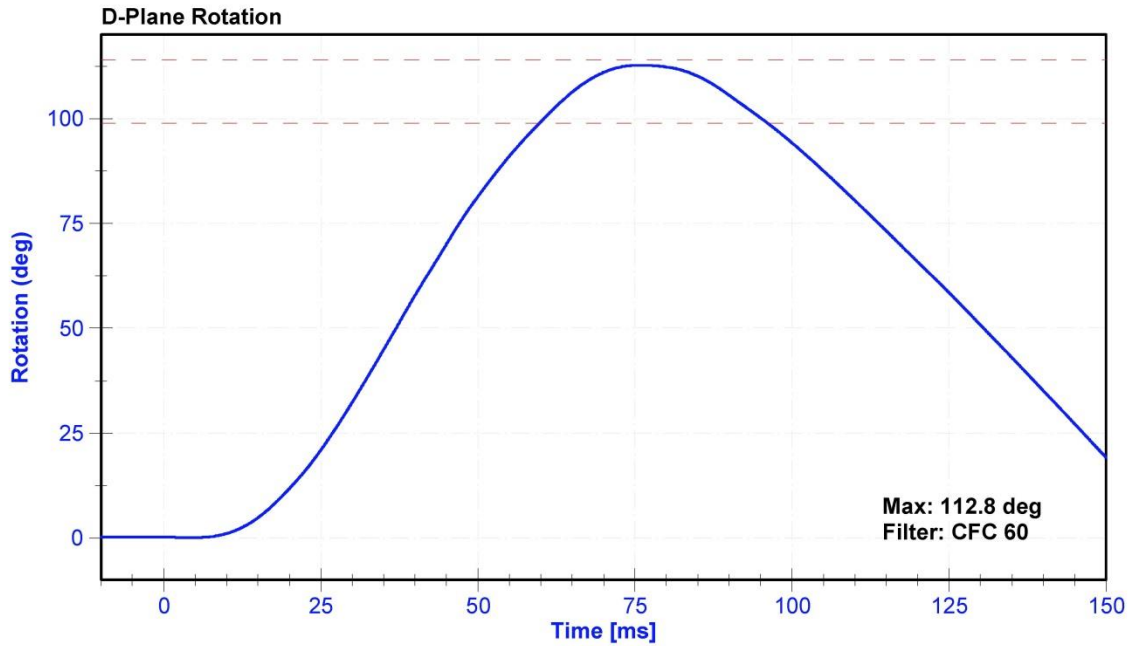
Results

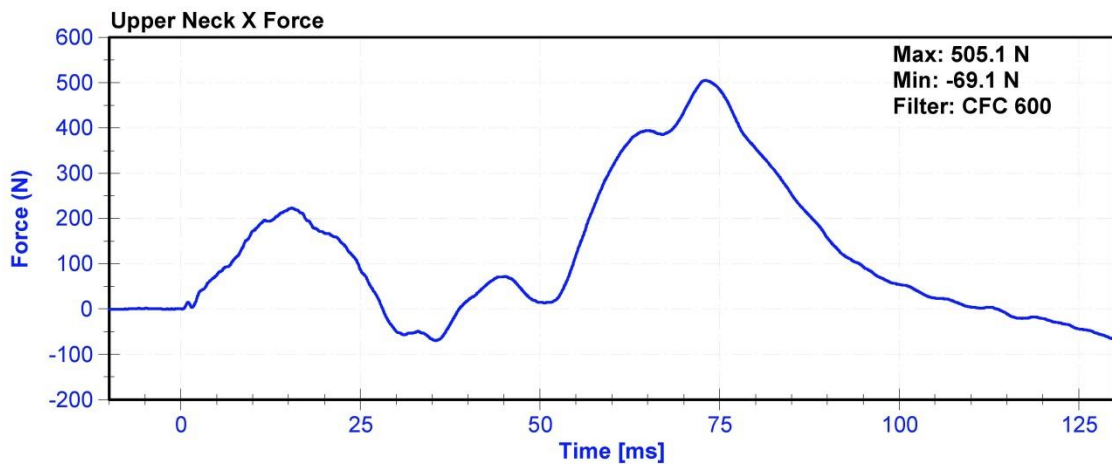
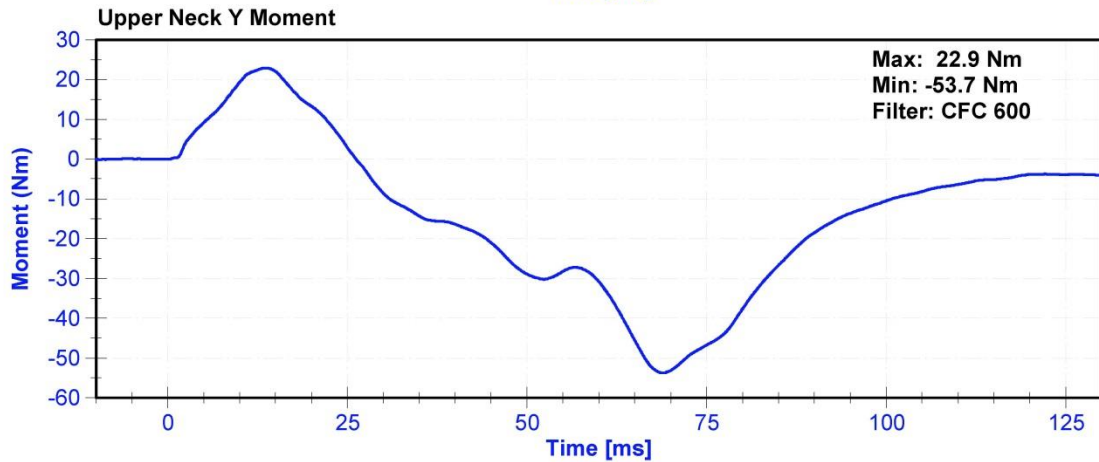
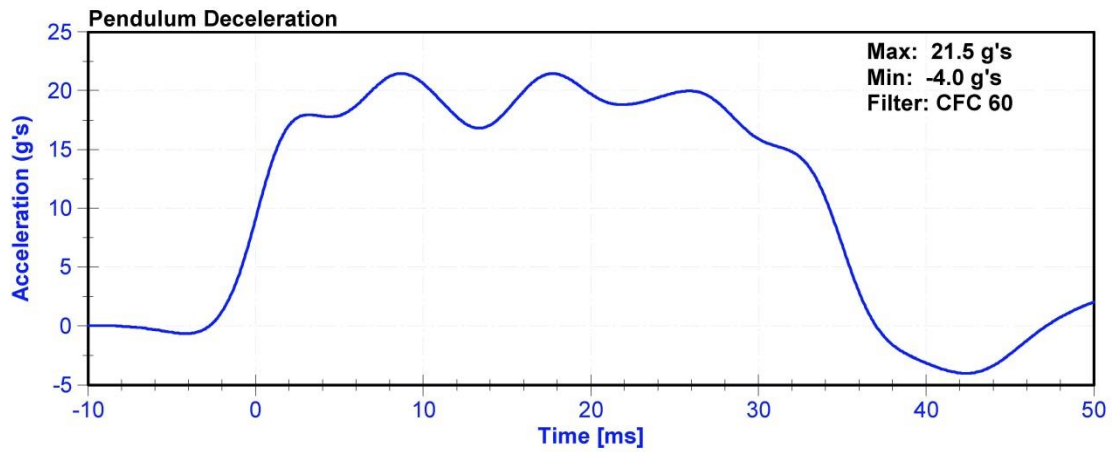
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	16.4	Pass
Velocity	5.96	6.19	m/s	5.98	Pass
Pendulum Impulse at 10ms	1.5	1.9	G's	1.78	Pass
Pendulum Impulse at 20ms	3.1	3.9	G's	3.67	Pass
Pendulum Impulse at 30ms	4.6	5.6	G's	5.52	Pass
D Plane Rotation	99	114	deg	112.8	Pass
Moment During Rotation Interval	-65	-53	Nm	-61.0	Pass
Moment Decay to -10Nm	94	114	ms	102.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015







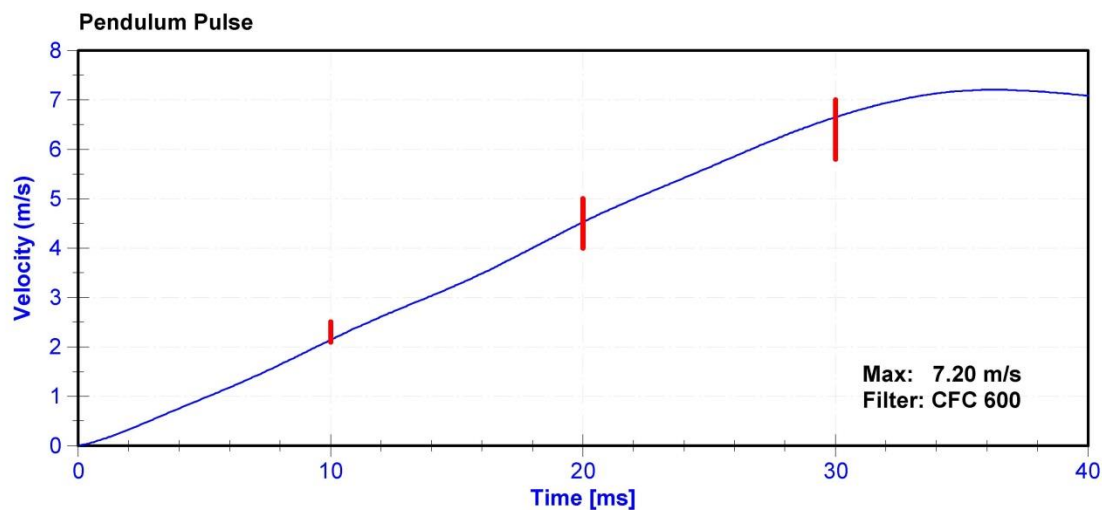
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

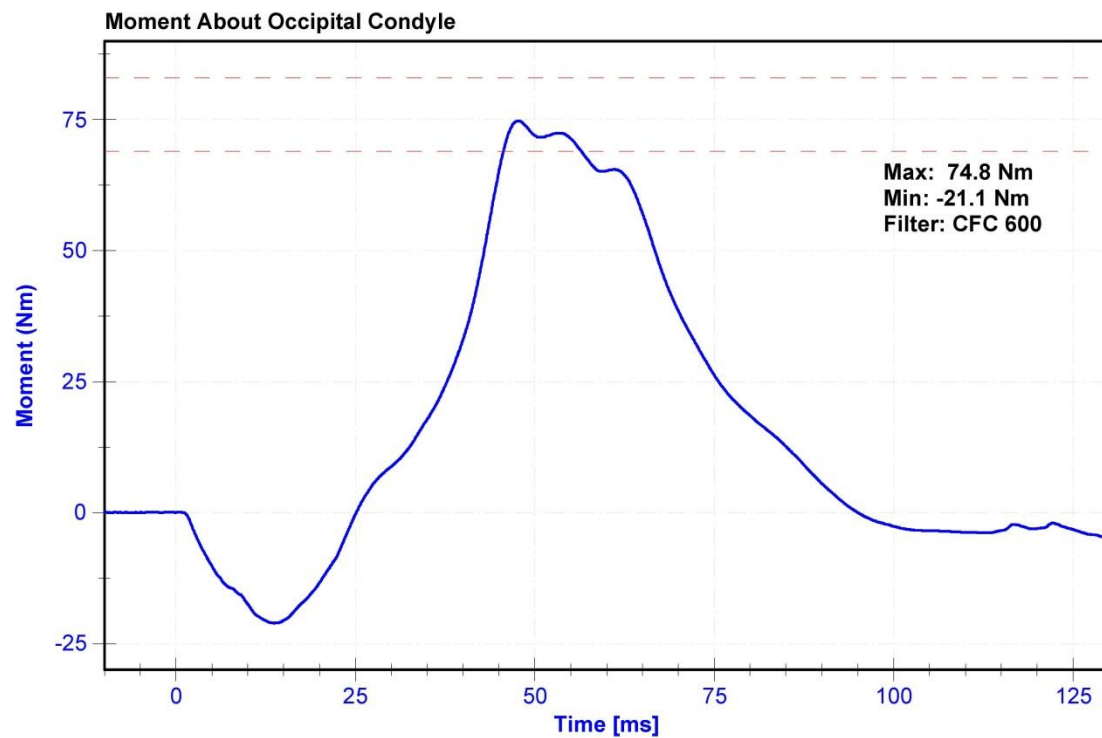
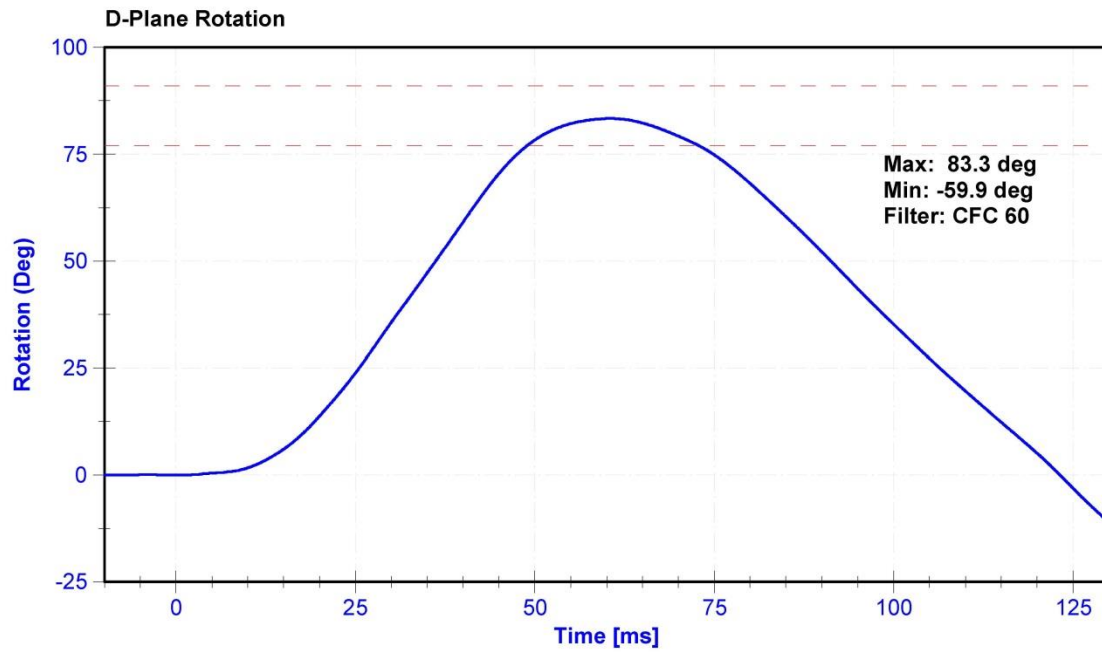
Results

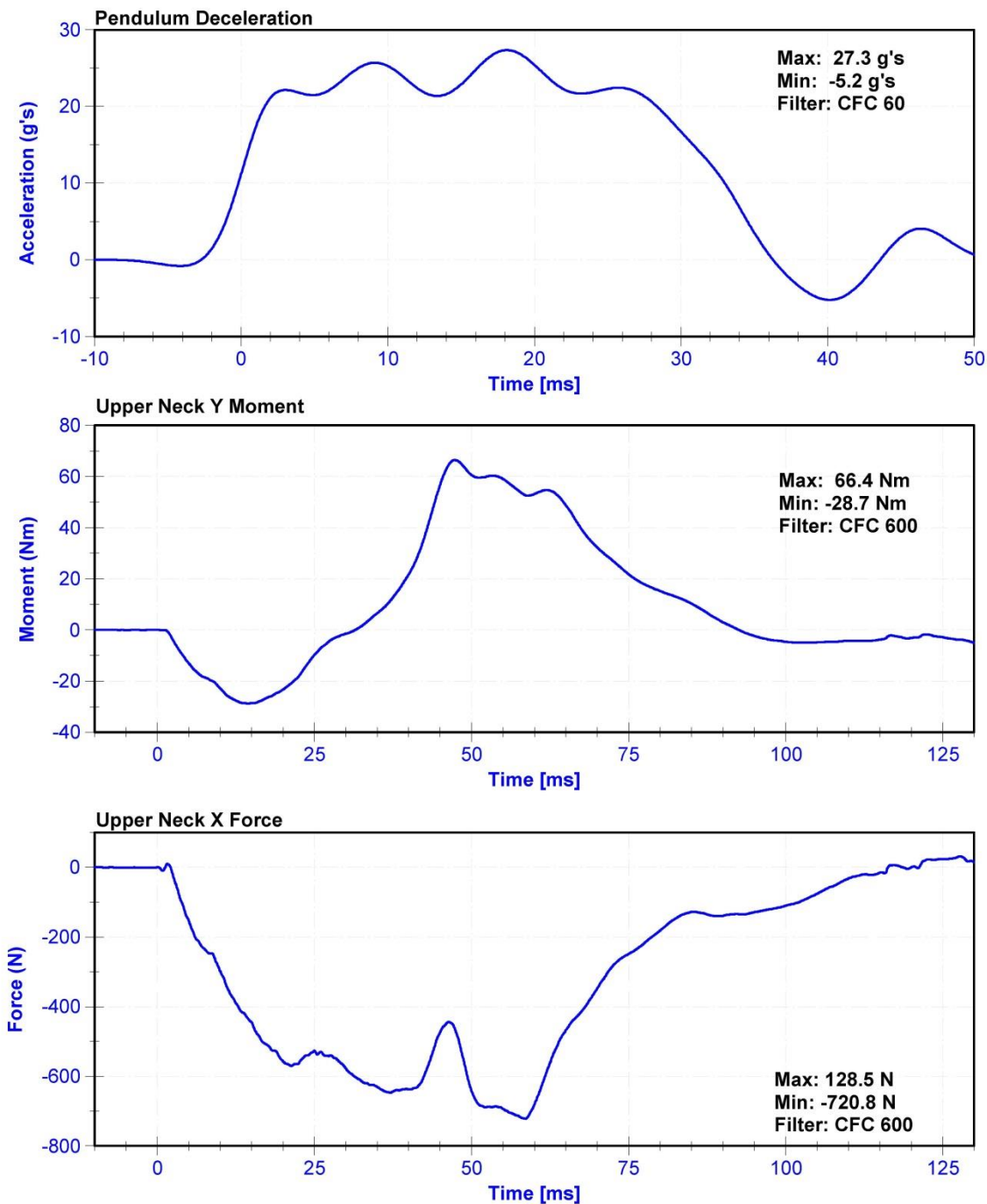
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	15.1	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.14	Pass
Pendulum Impulse at 20ms	4	5	m/s	4.53	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.65	Pass
D Plane Rotation	77	91	deg	83.3	Pass
Moment During Rotation Interval	69	83	Nm	74.8	Pass
Moment Decay to 10.0 Nm	80	100	ms	86.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015







ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

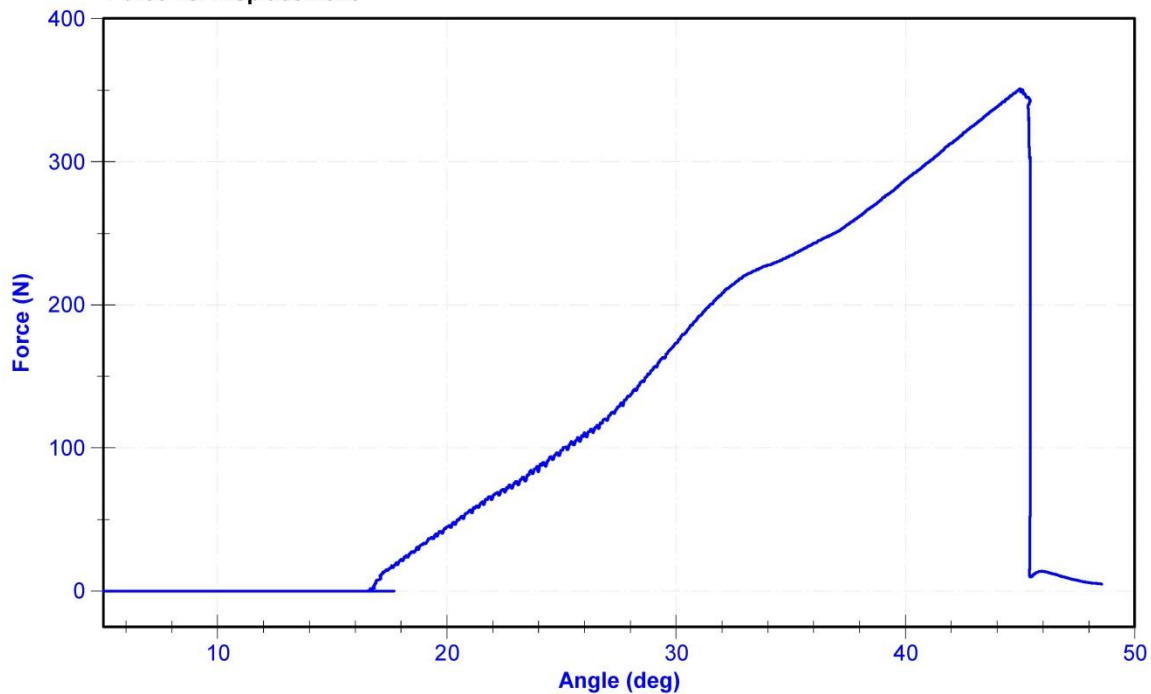
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.7	Pass
Humidity	10	70	%	14.6	Pass
Initial Angle	0	20	deg	16.4	Pass
Force at 45 Degrees	320	390	N	349.6	Pass
Return Angle	0	8	deg	7.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	8/1/2014	8/1/2015
Load Cell	Interface SML-200	LC-493319	8/13/2014	8/13/2015

Force vs. Displacement



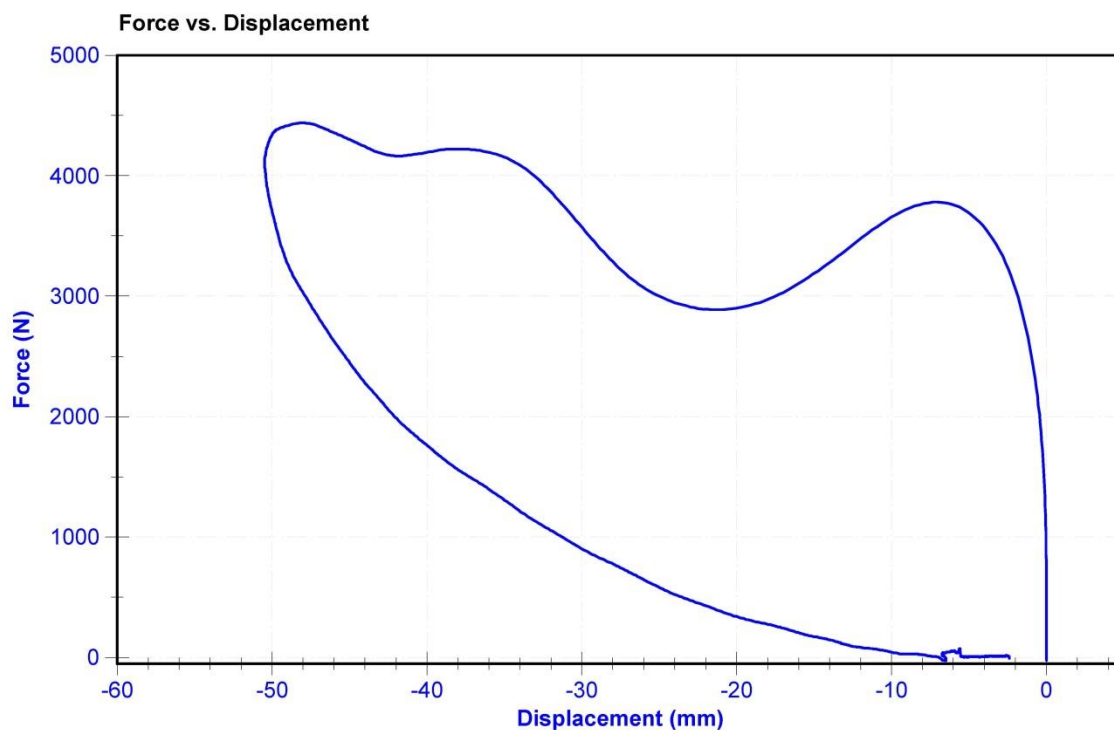
ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

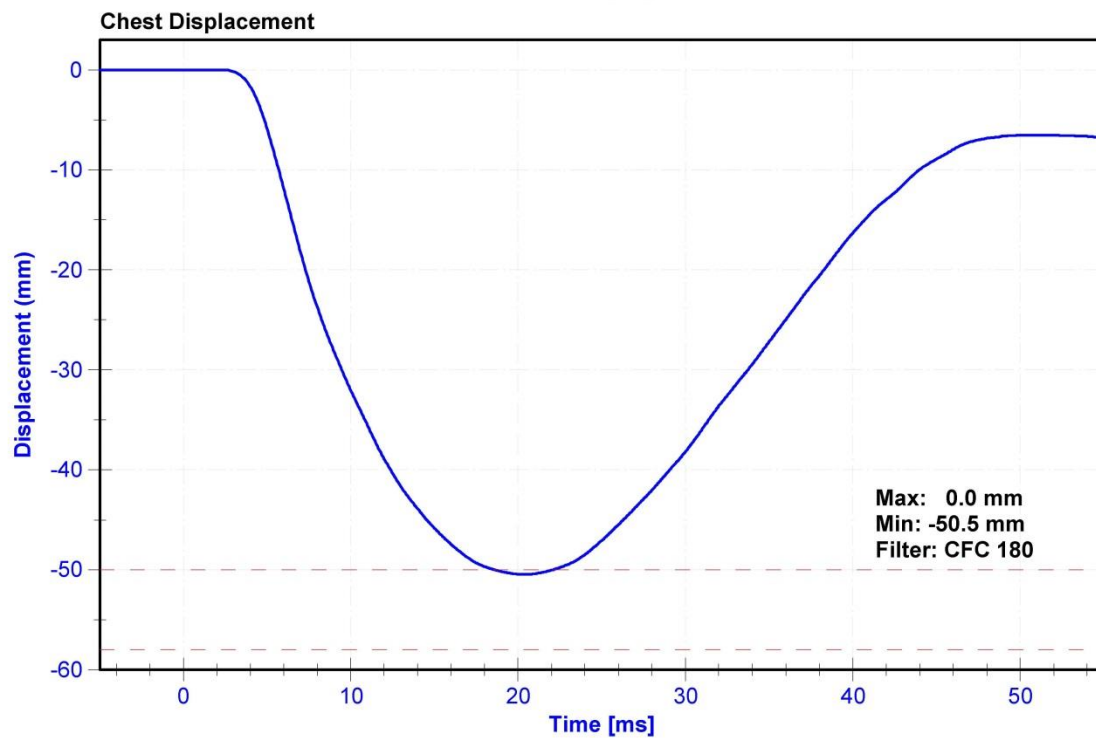
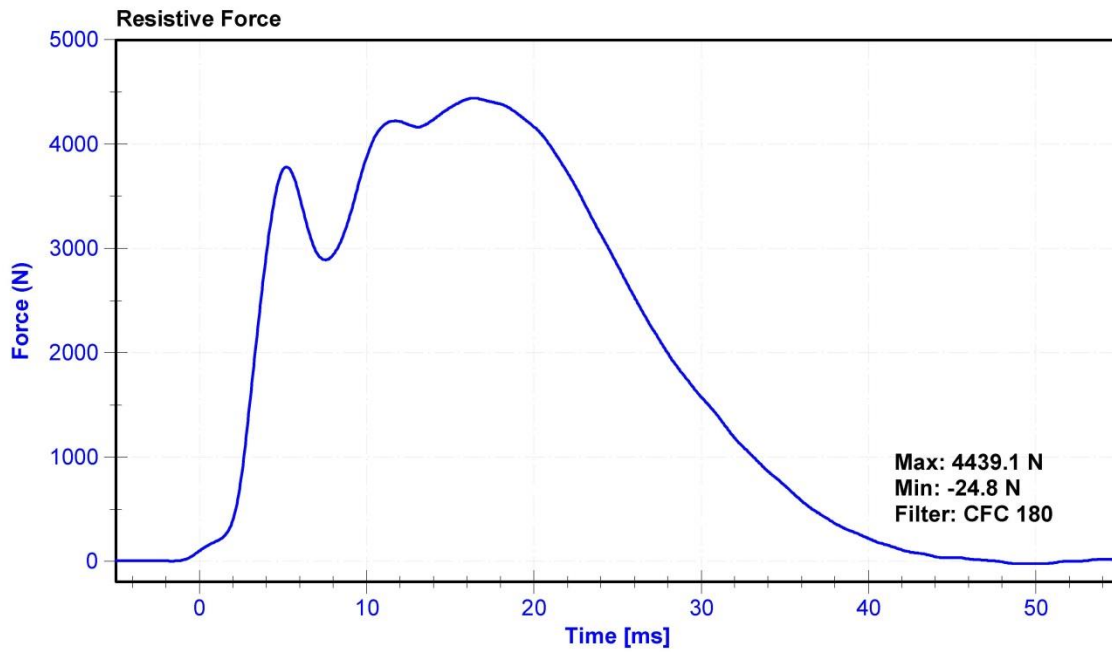
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	13.6	Pass
Velocity	6.59	6.83	m/s	6.76	Pass
Chest Displacement	-58	-50	mm	-50.5	Pass
Force During Displacement Interval	3,900	4,400	N	4338.1	Pass
Force During -18 to 50mm Displacement	0	4,600	N	4439.1	Pass
Hysteresis	69	85	%	73.7	Pass

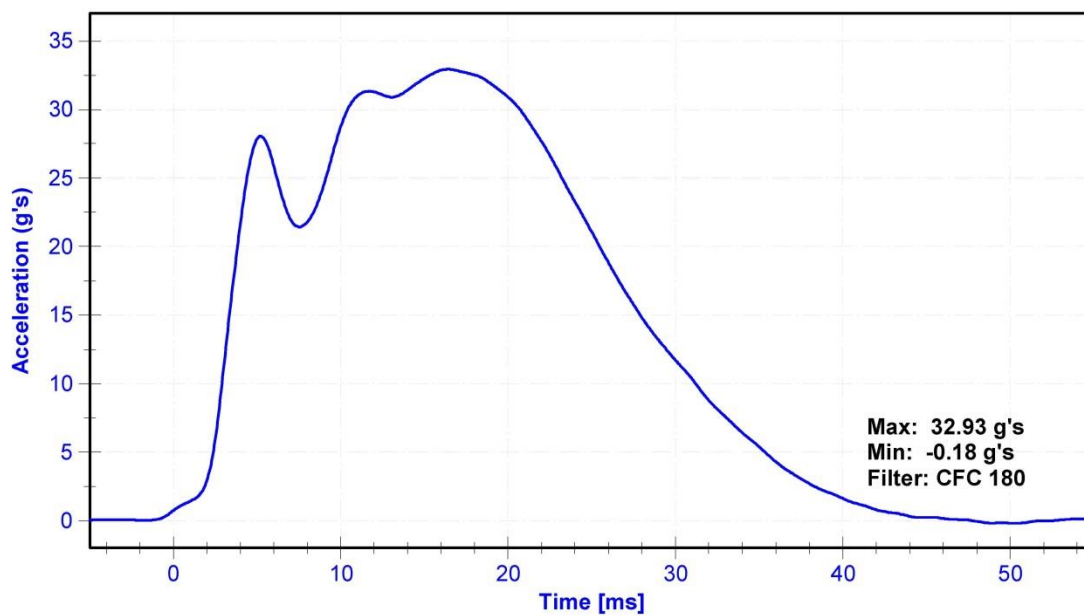
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015
Chest Potentiometer	Servo 14CBI-3615	DS-139	7/31/2014	7/31/2015

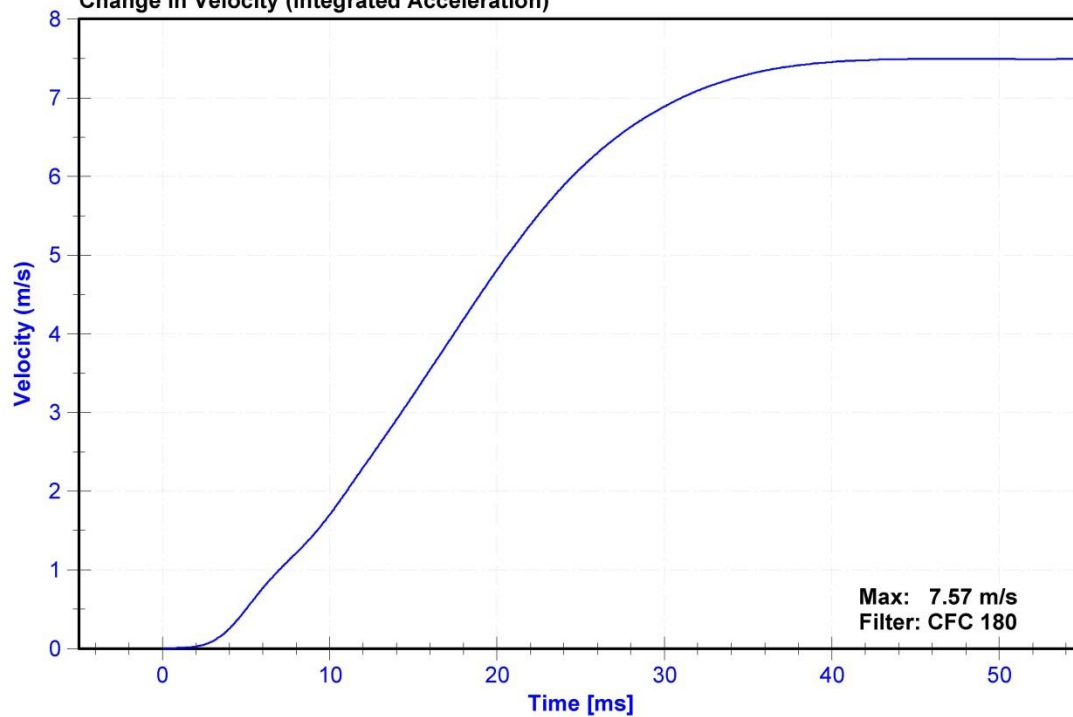




Probe Acceleration



Change in Velocity (Integrated Acceleration)



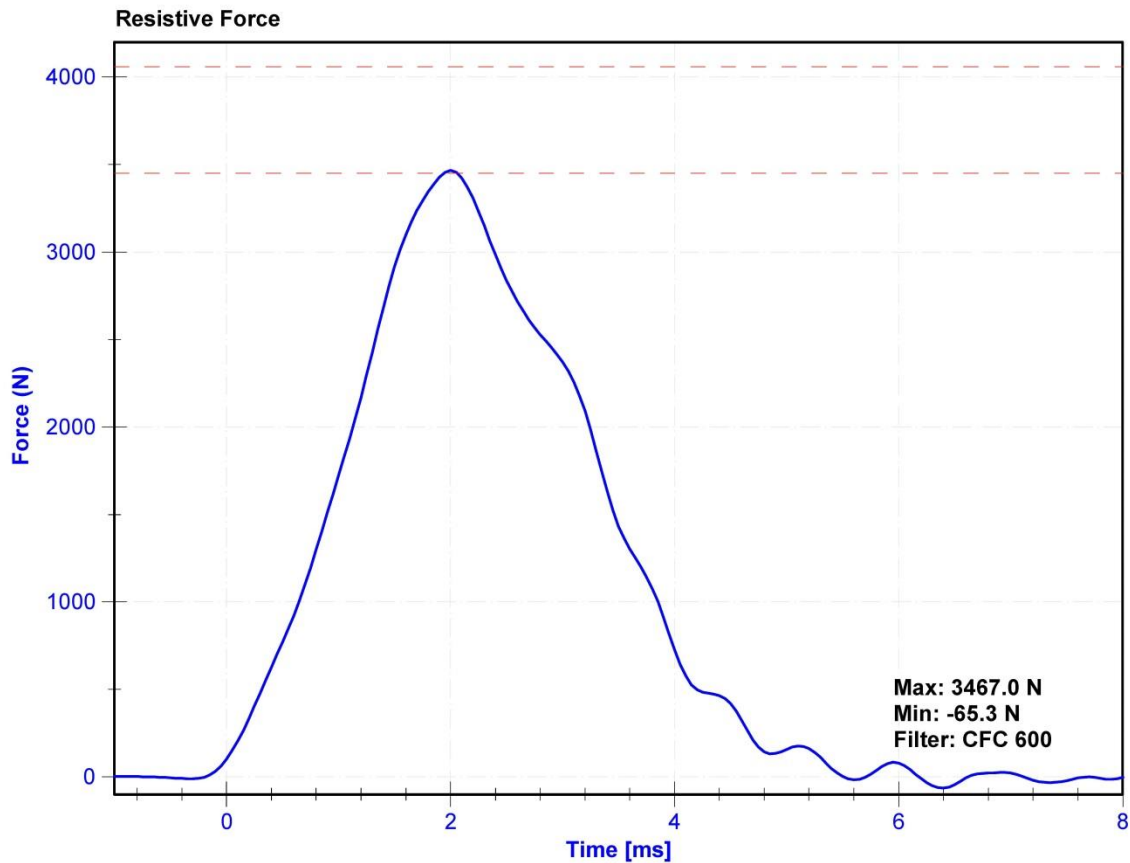
ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

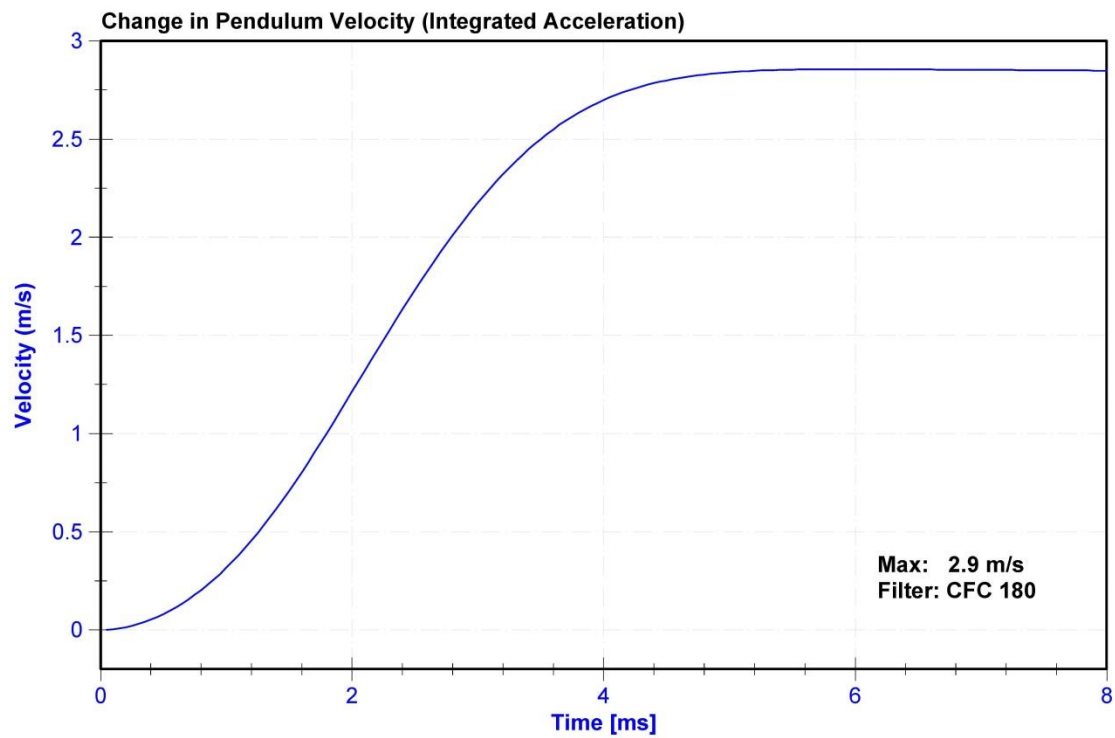
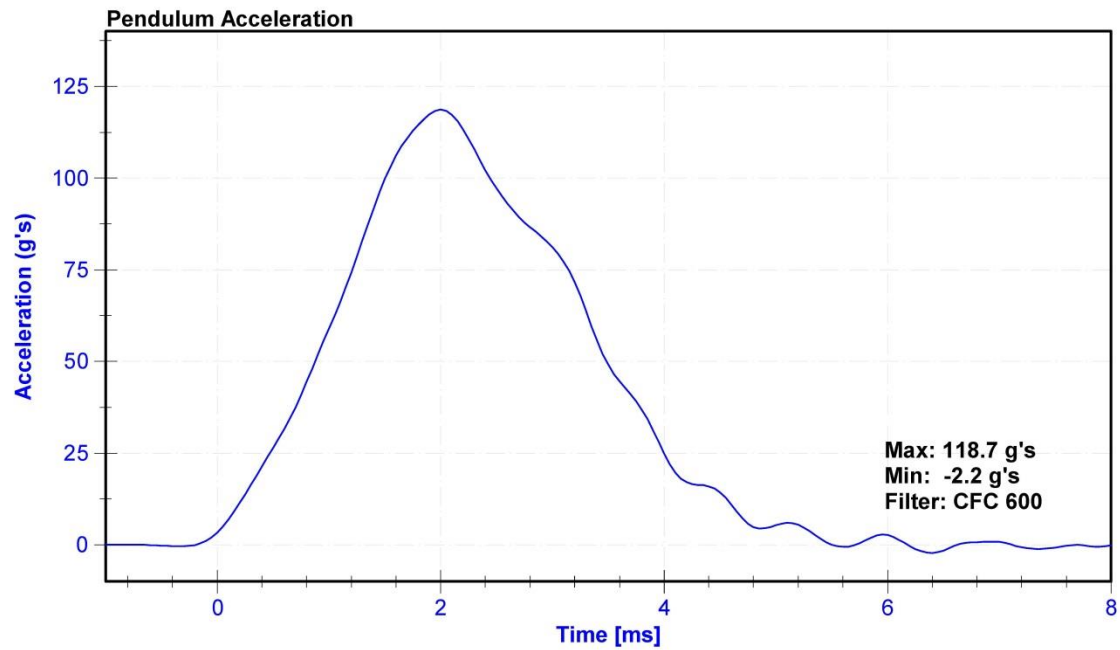
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	16.6	Pass
Velocity	2.07	2.13	m/s	2.106	Pass
Resistive Force	3,450	4,060	N	3467.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015





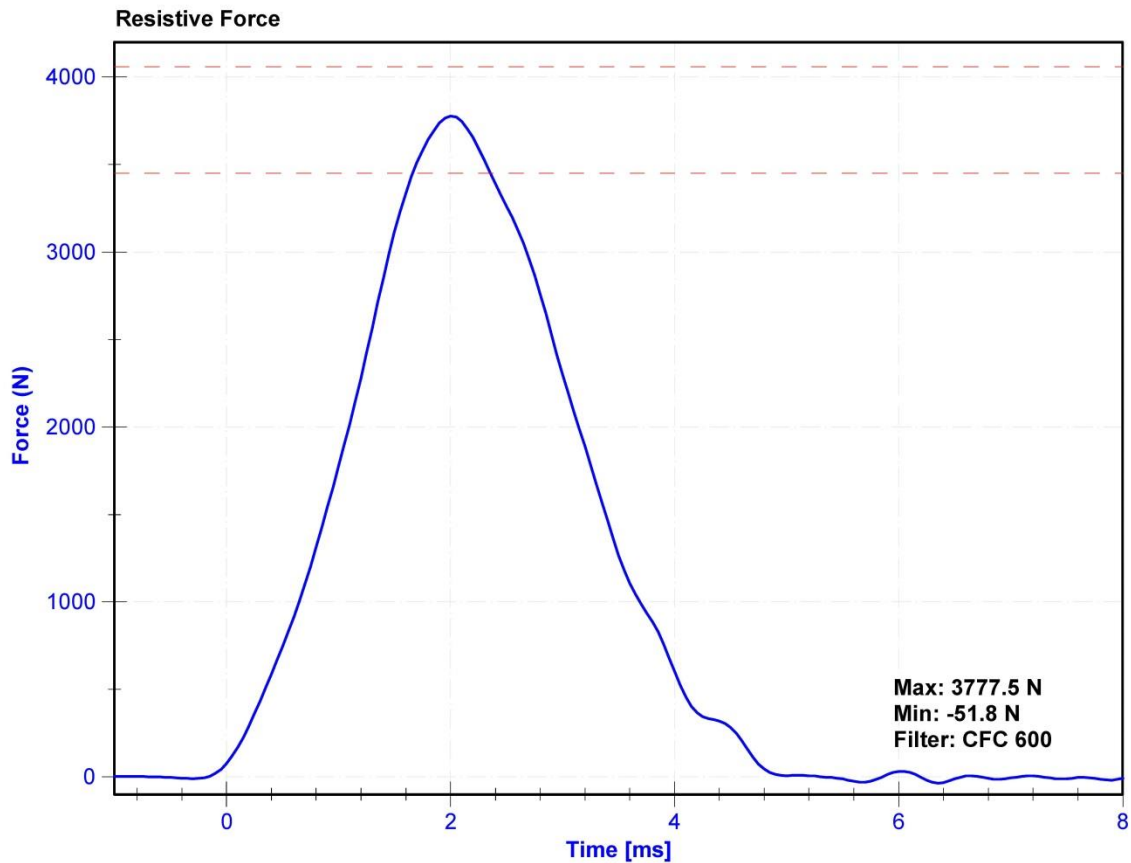
ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

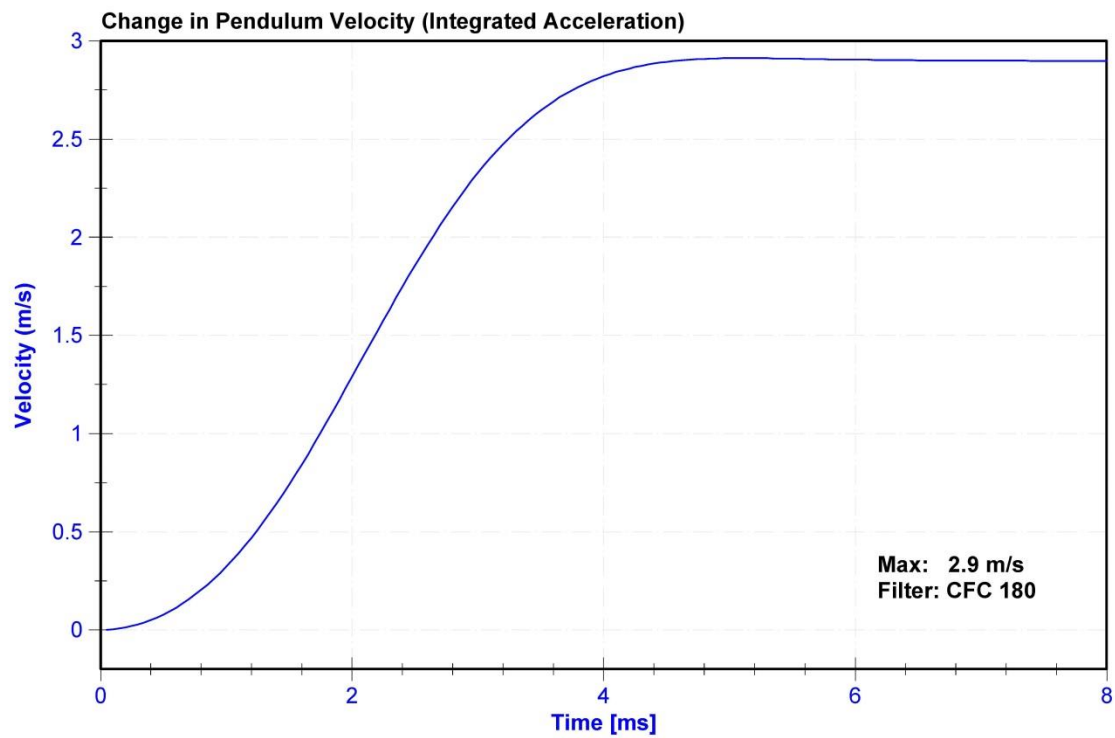
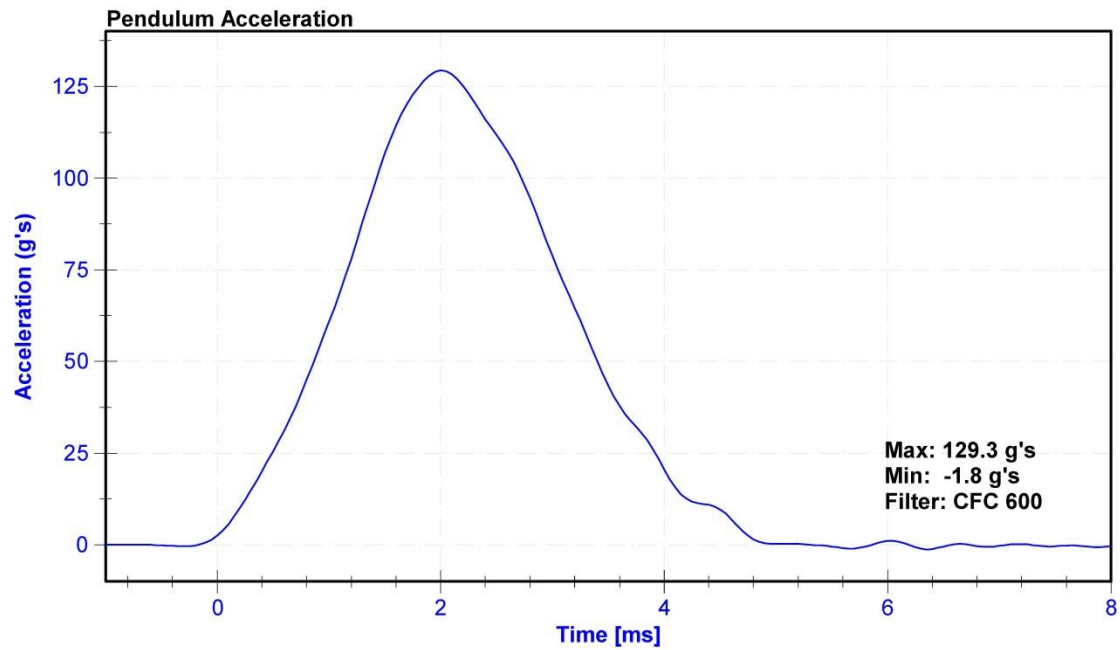
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.9	Pass
Humidity	10	70	%	16.6	Pass
Velocity	2.07	2.13	m/s	2.105	Pass
Resistive Force	3,450	4,060	N	3777.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 1046

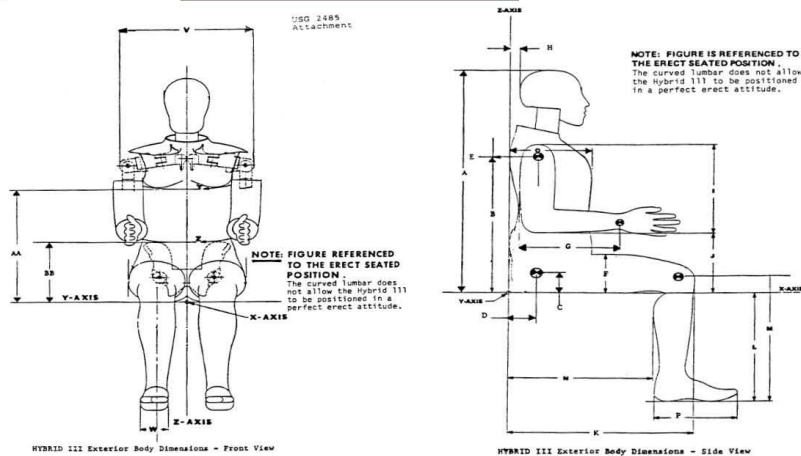


External Measurements - Hybrid 3 - 50th Male

Technician: M.Hartung

Date: 2/5/2015

Dummy Serial Number: 1046



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.9	Pass
B	Shoulder Pivot Height	19.9	20.5	20.1	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.6	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.4	Pass
J	Elbow Rest Height	7.5	8.3	7.9	Pass
K	Buttock to Knee Length	22.8	23.8	23.3	Pass
L	Popliteal Height	16.9	17.9	17.6	Pass
M	Knee Pivot Height	19.1	19.7	19.4	Pass
N	Buttock Popliteal Length	17.8	18.8	18.1	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.1	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.7	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.8	Pass
Z	Waist Circumference	32.9	34.1	33.8	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

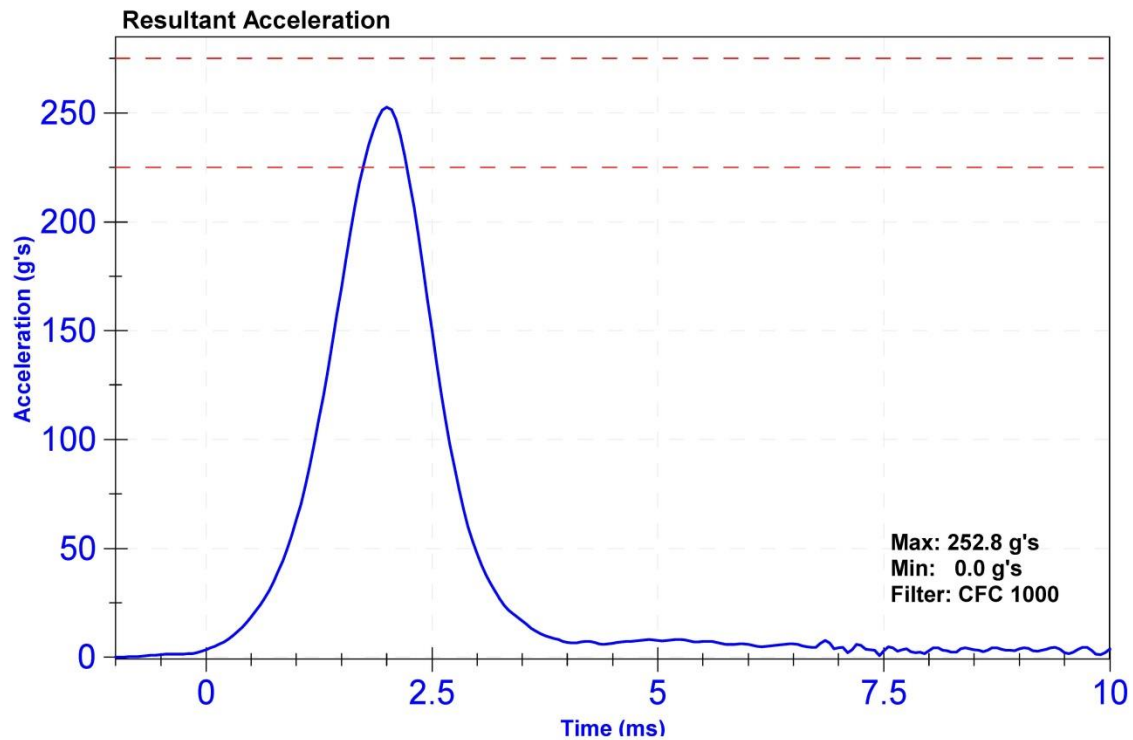
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

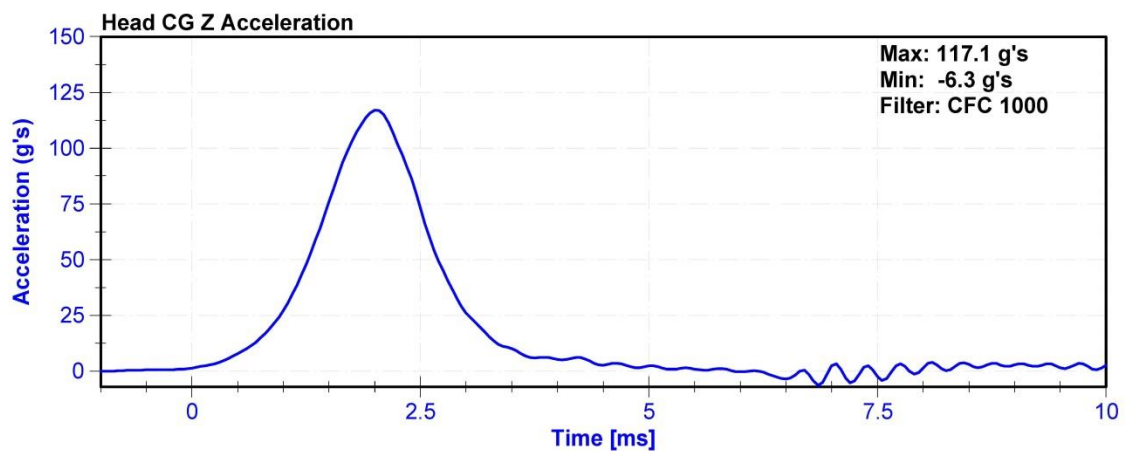
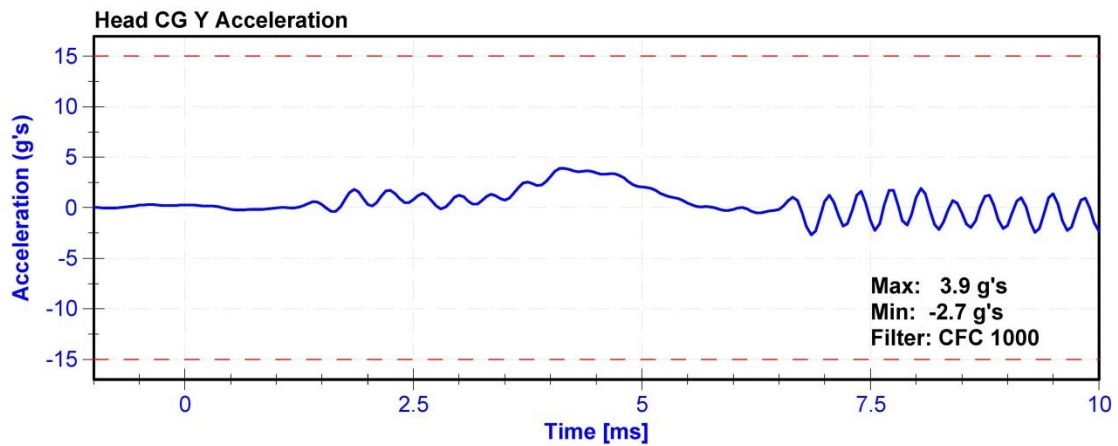
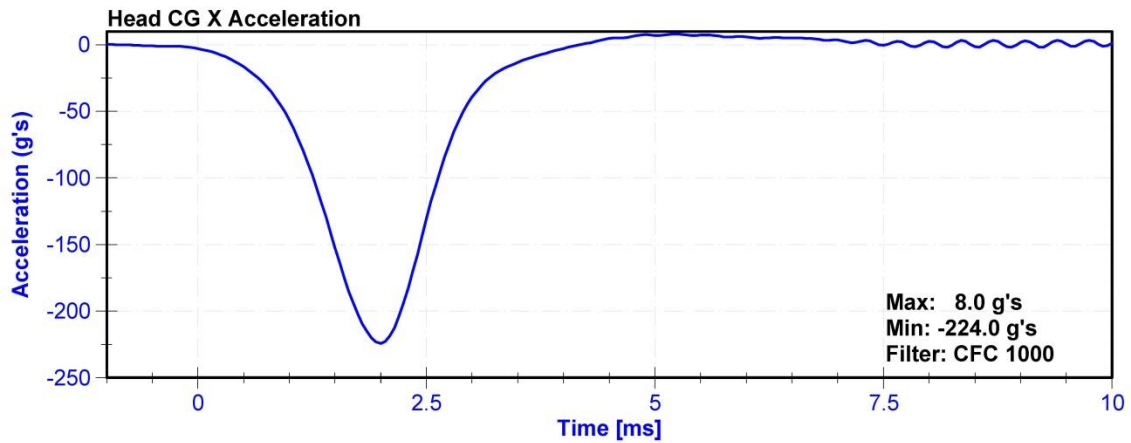
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	C	21.4	Pass
Humidity	10	70	%	13.3	Pass
Resultant Acceleration	225	275	g's	252.8	Pass
Oscillation	0	10	%	3.2	Pass
Lateral Acceleration	-15	15	g's	3.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58871	12/19/2014	6/19/2015
Y Accelerometer	ENDEVCO 7264	AC-P12359	12/19/2014	6/19/2015
Z Accelerometer	ENDEVCO 7264CT	AC-P52133	12/19/2014	6/19/2015





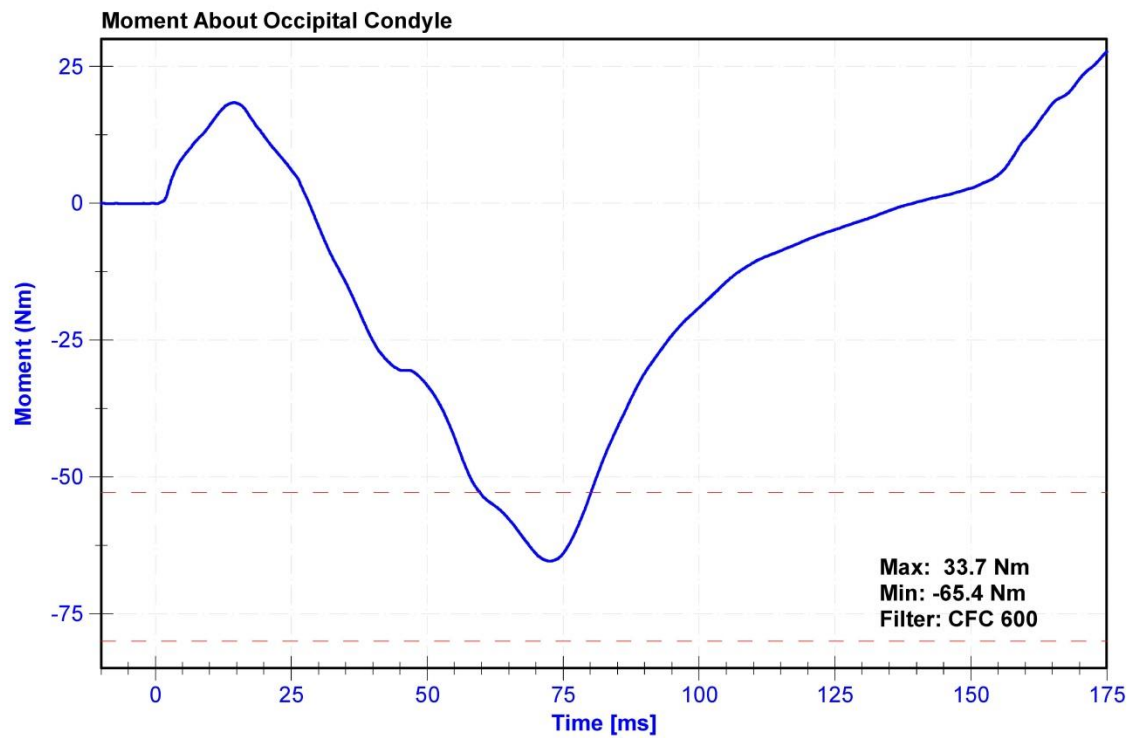
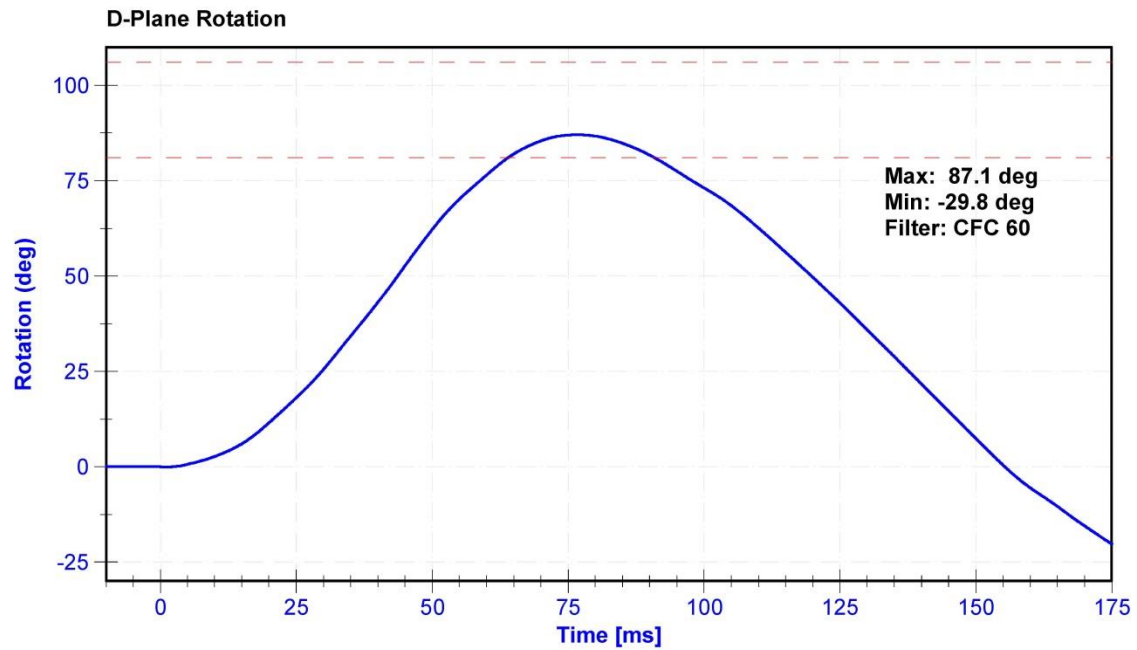
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

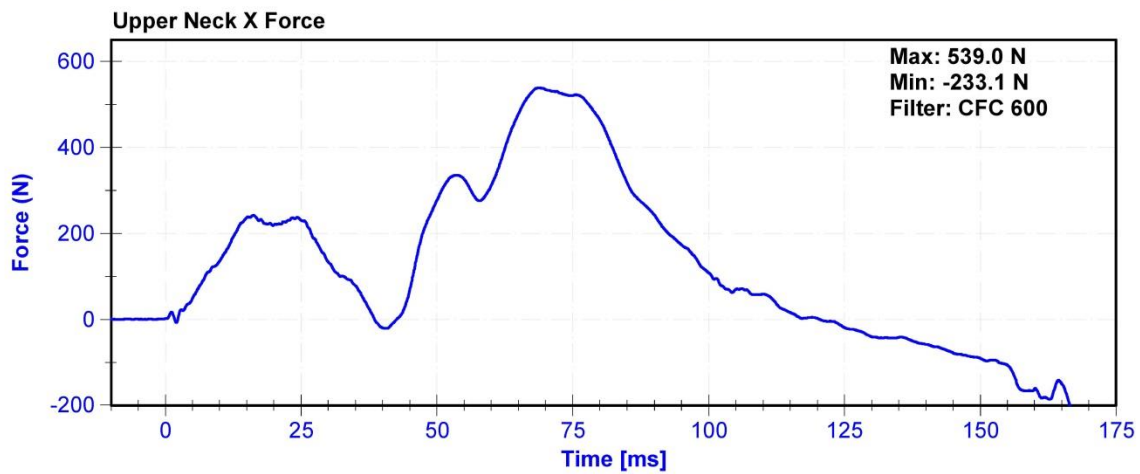
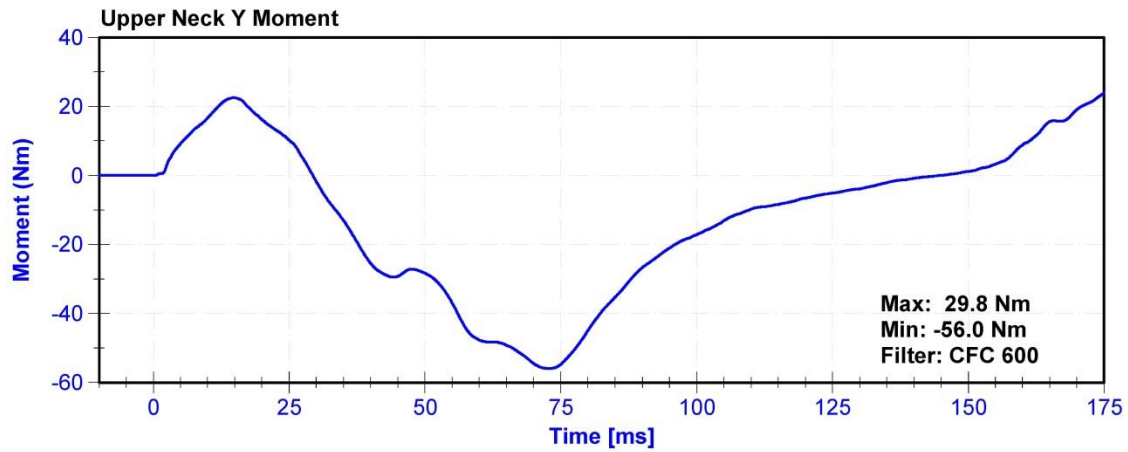
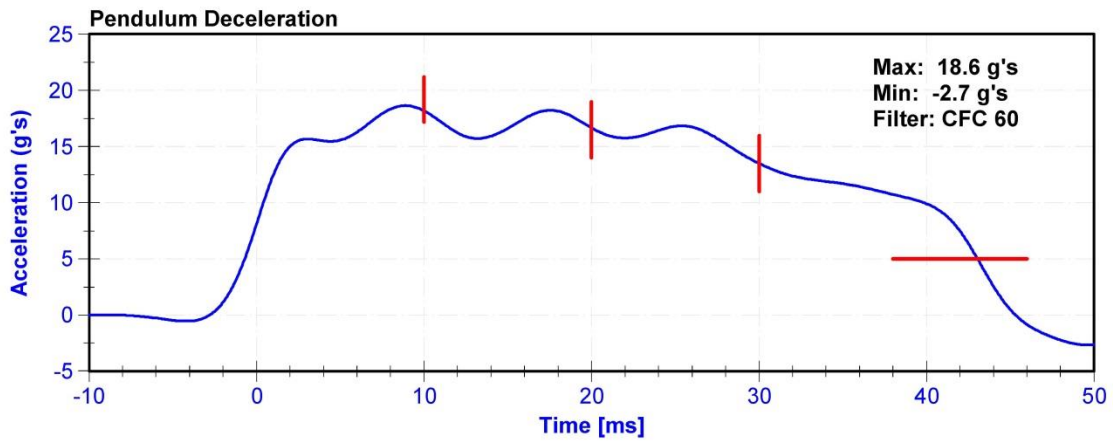
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	13.5	Pass
Velocity	5.94	6.19	m/s	6.025	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	18.18	Pass
Pendulum Deceleration at 20ms	14	19	g's	16.7	Pass
Pendulum Deceleration at 30ms	11	16	g's	13.5	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	18.6	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	43.1	Pass
D Plane Rotation	81	106	deg	87.1	Pass
Time at Maximum Rotation	72	82	ms	76.7	Pass
Rotation Decay to Zero	147	174	ms	155.4	Pass
Moment About Occipital Condyle	-80	-52.9	Nm	-65.38	Pass
Time at Minimum Moment	65	79	ms	72.3	Pass
Moment Decay to Zero	120	148	ms	139.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015





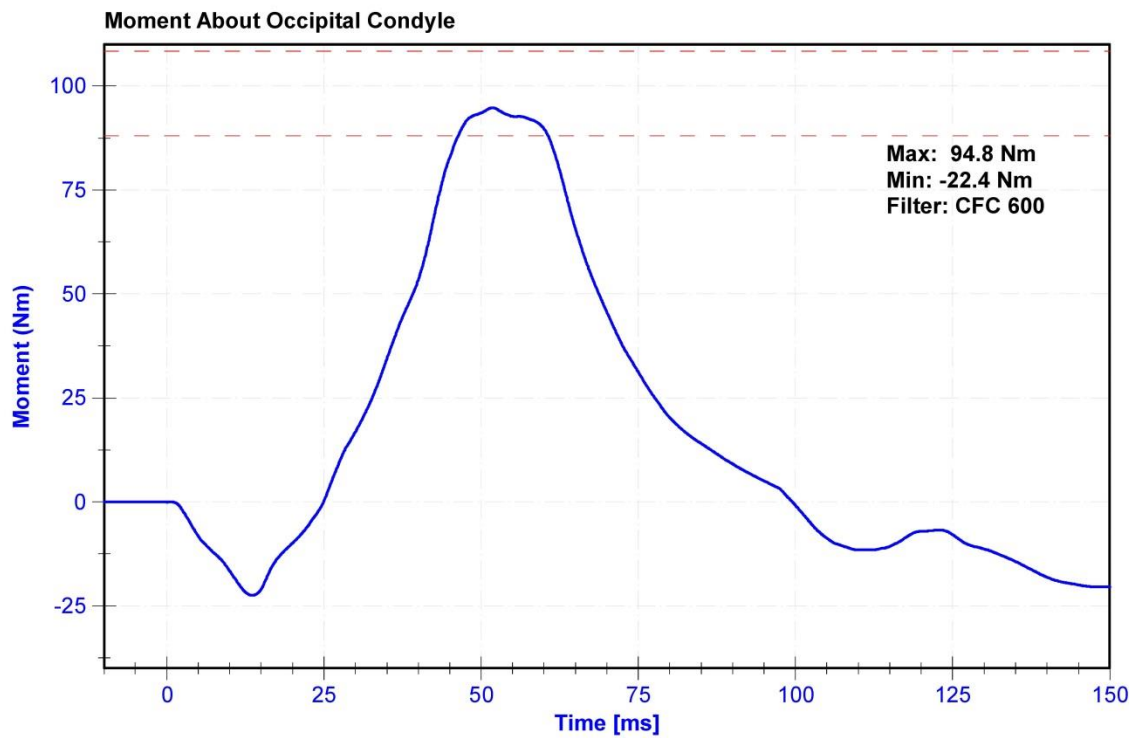
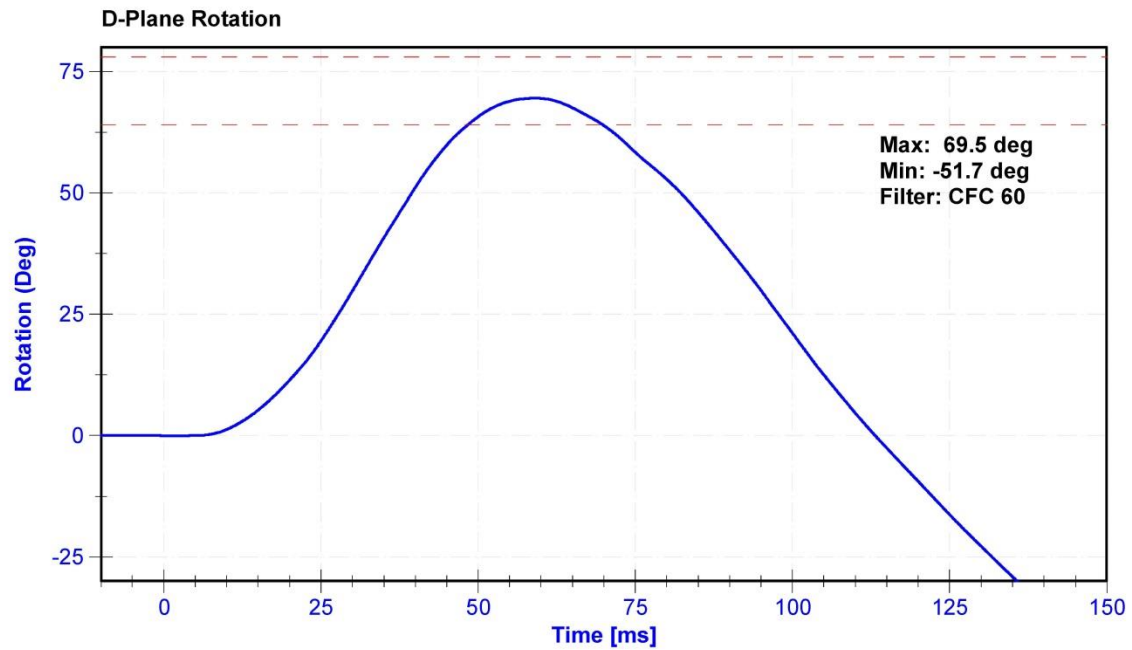
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

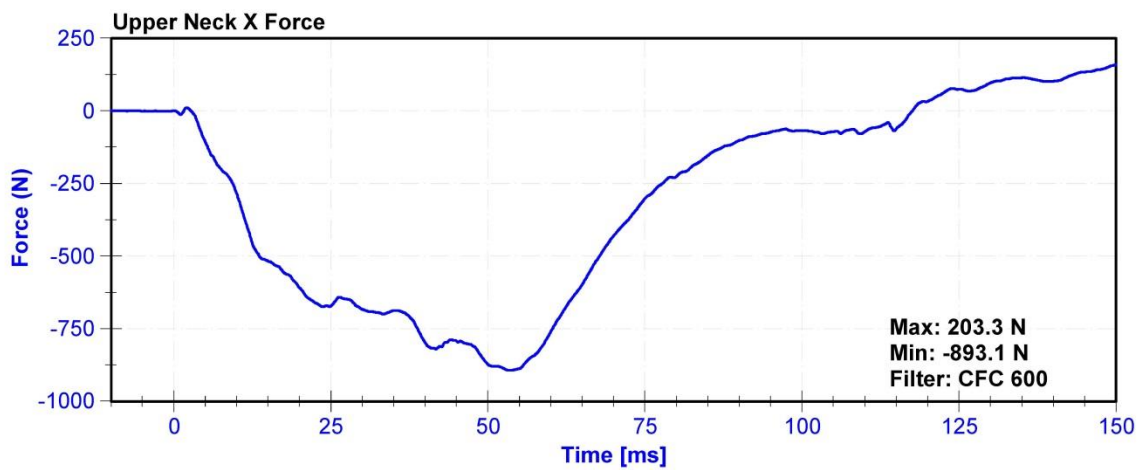
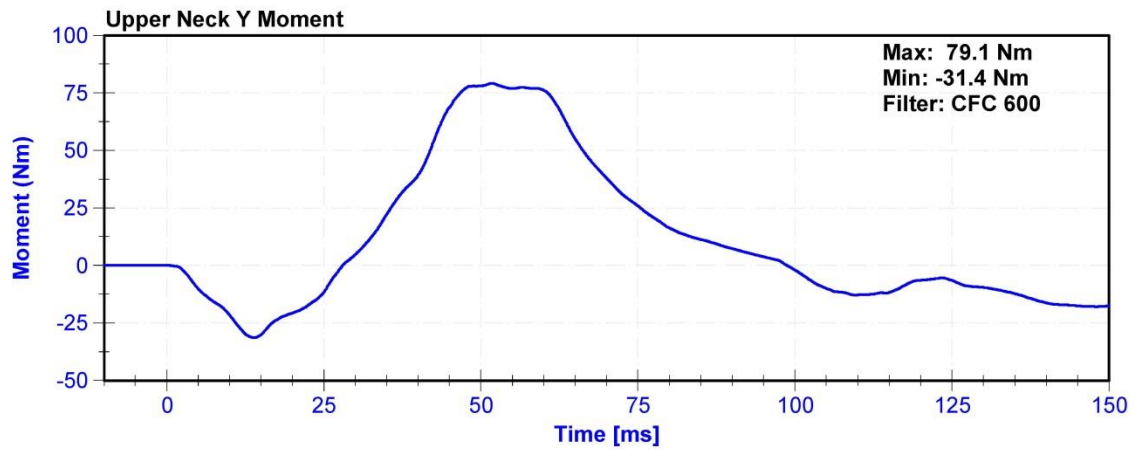
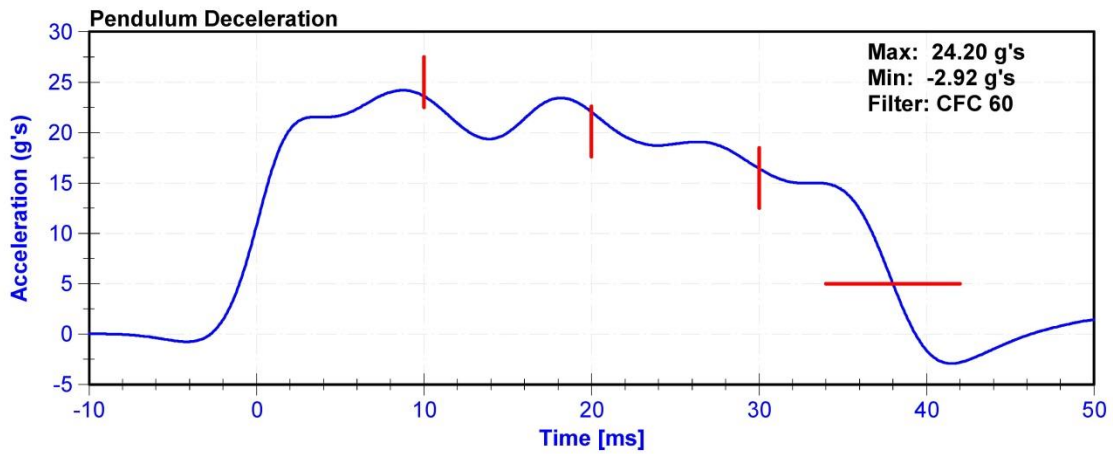
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	14.1	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	23.61	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	22.05	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.43	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	24.2	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	38.0	Pass
D Plane Rotation	64	78	deg	69.5	Pass
Time at Maximum Rotation	57	64	ms	59.0	Pass
Rotation Decay to Zero	113	127	ms	113.2	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	94.78	Pass
Time at Maximum Moment	47	58	ms	51.8	Pass
Moment Decay to Zero	97	107	ms	99.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015





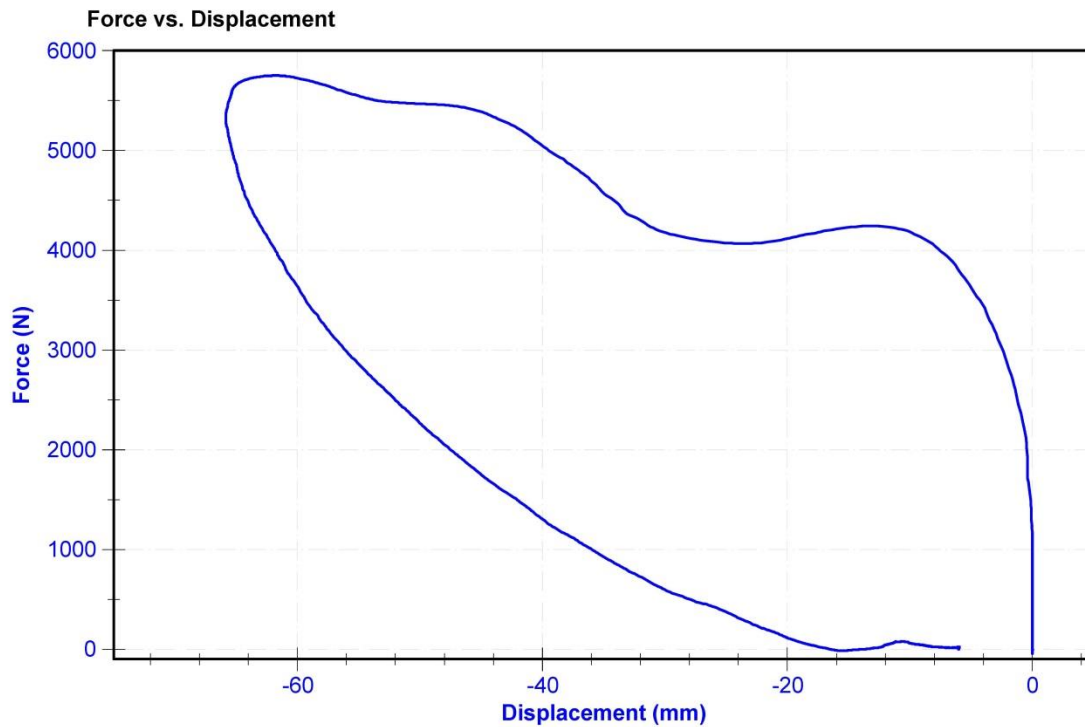
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

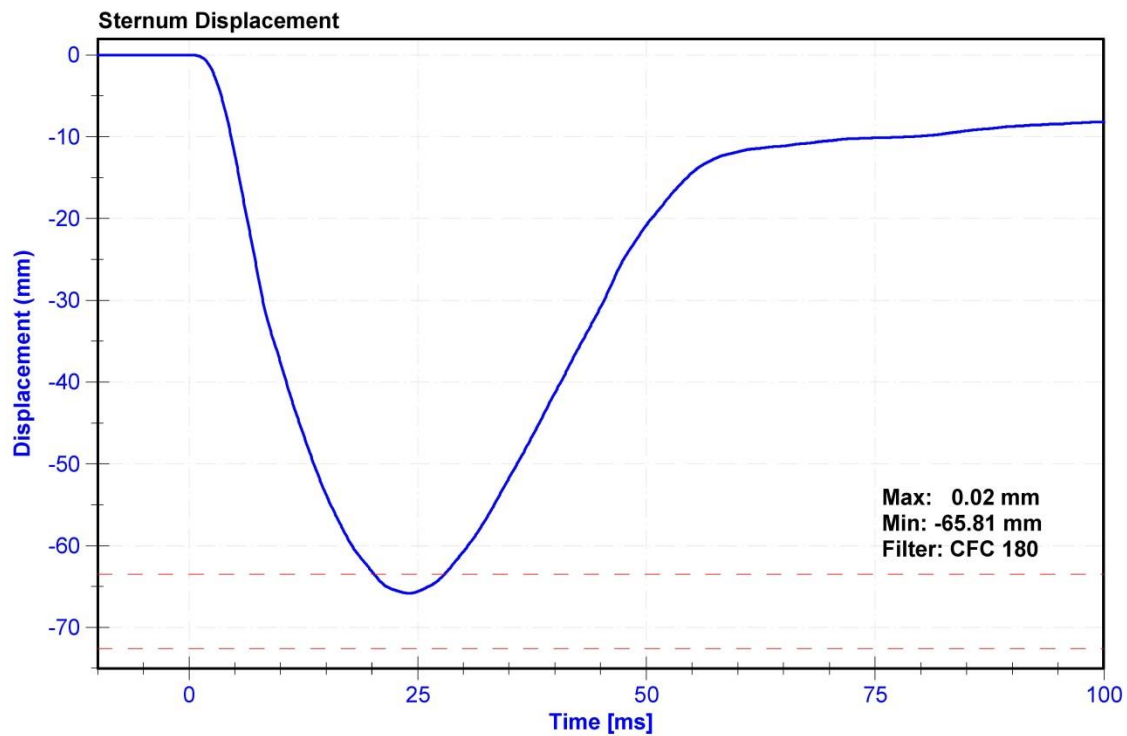
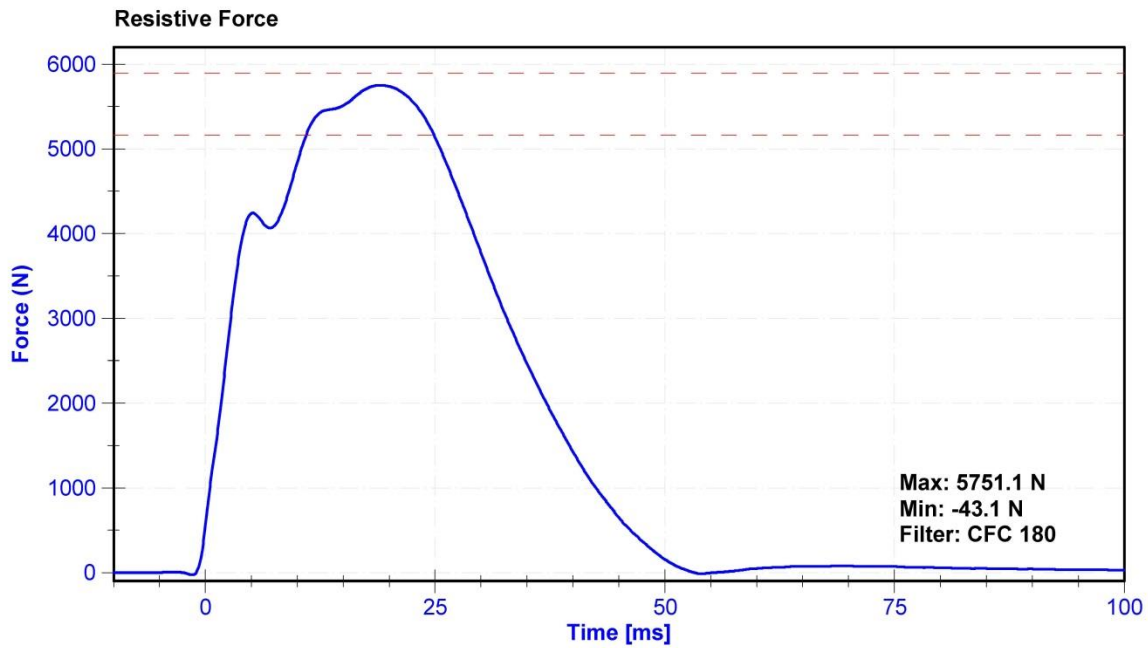
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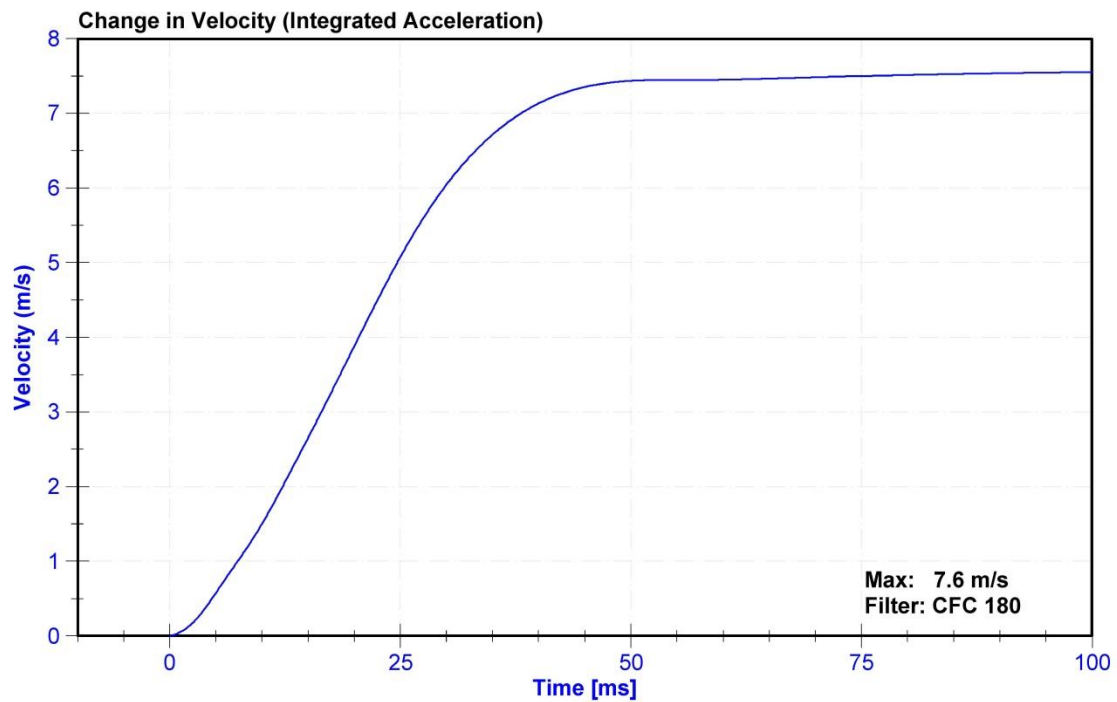
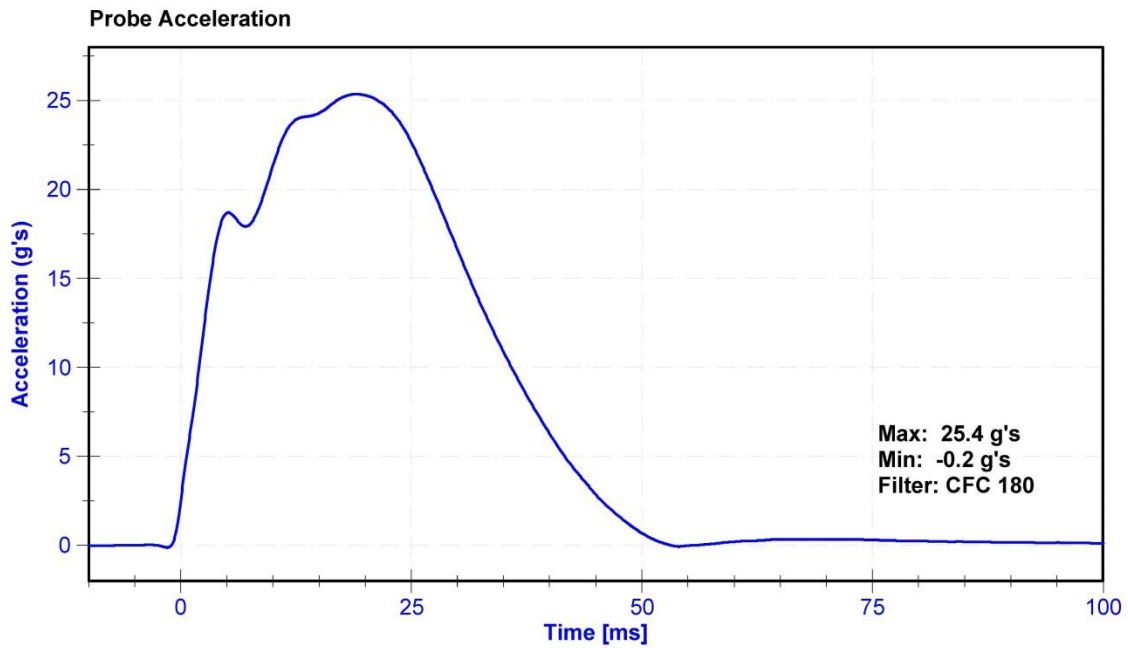
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	15.1	Pass
Velocity	6.59	6.83	m/s	6.82	Pass
Chest Displacement	-72.6	-63.5	mm	-65.81	Pass
Resistive Force	5,160	5,894	N	5751.1	Pass
Hysteresis	69	85	%	72.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015
Chest Potentiometer	Servo 14CB1-2897	DS-1046	7/31/2014	7/31/2015







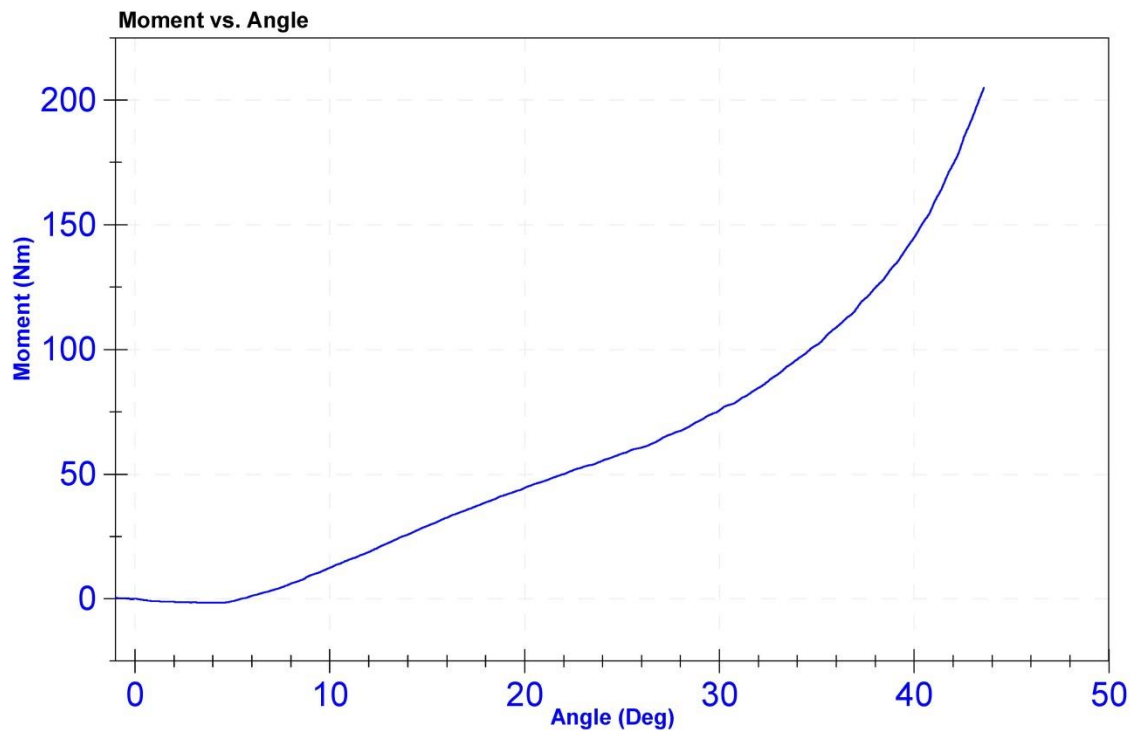
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	23.4	Pass
Humidity	10	70	%	14.6	Pass
Average Velocity	5	10	deg/s	5.9	Pass
Angle at 203Nm	40	50	deg	43.5	Pass
Moment at 30 degrees	0	94.9	Nm	75.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



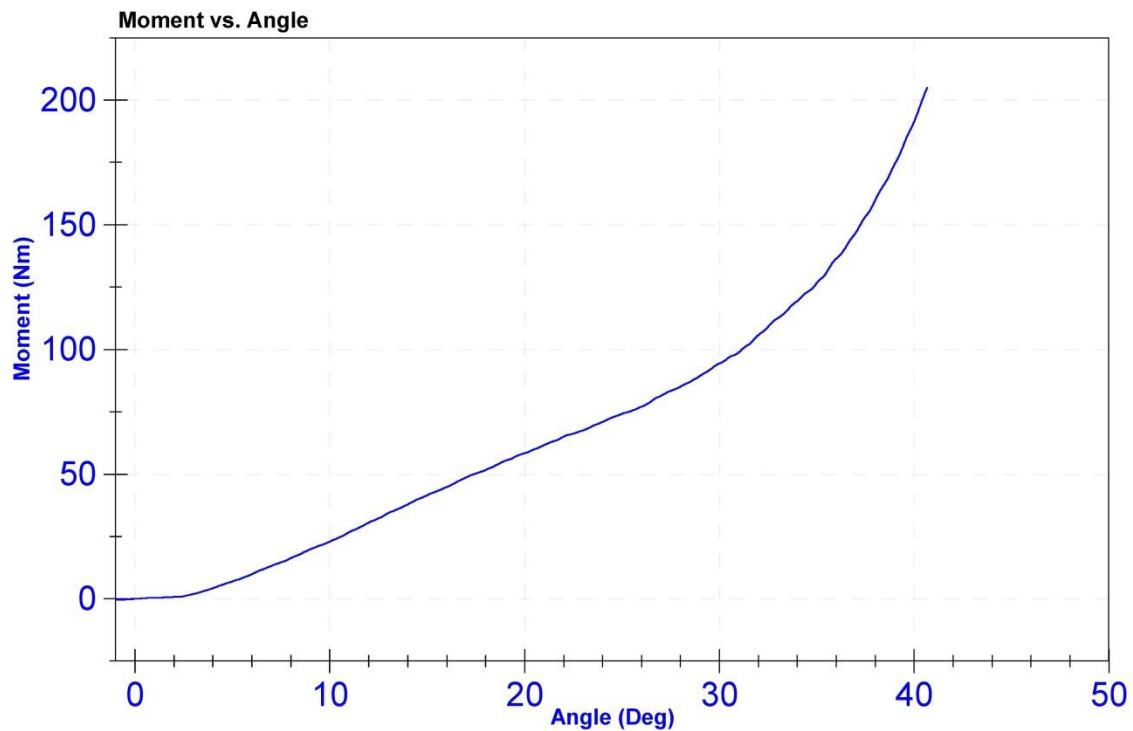
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	14.4	Pass
Average Velocity	5	10	deg/s	5.8	Pass
Angle at 203Nm	40	50	deg	40.6	Pass
Moment at 30 degrees	0	94.9	Nm	94.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



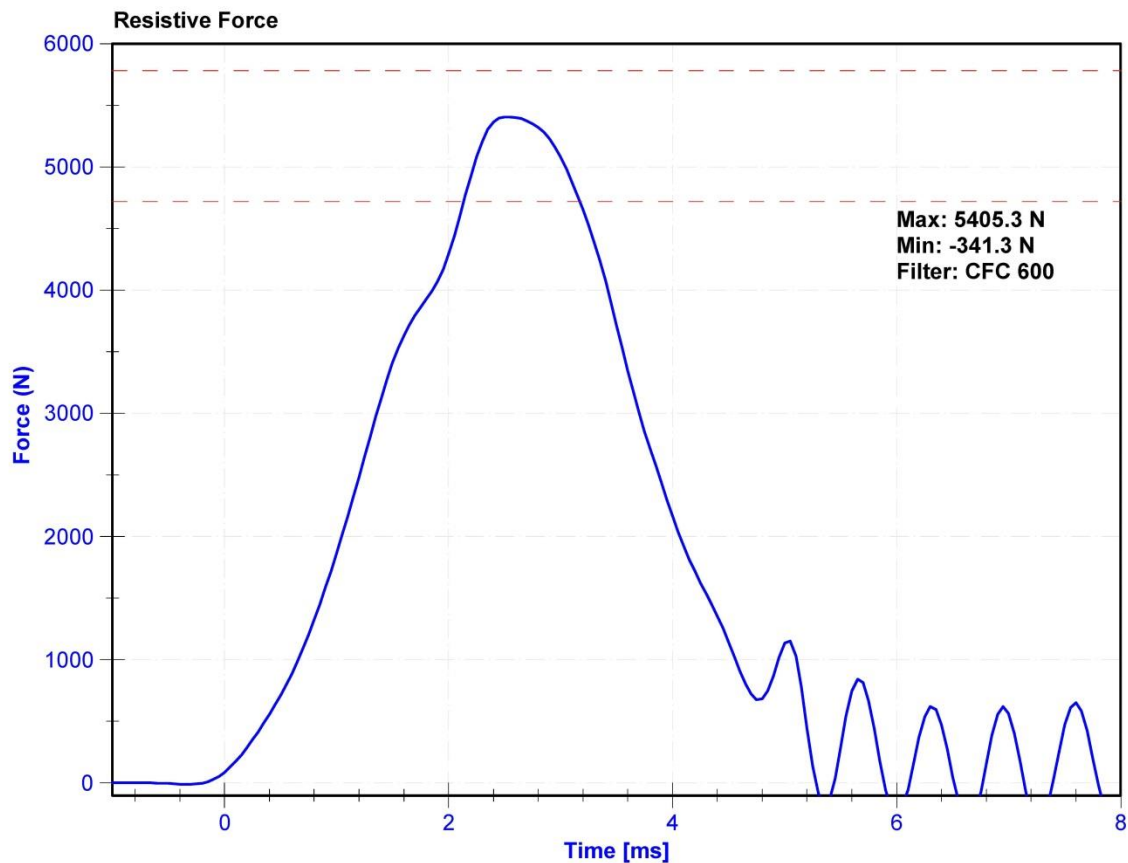
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

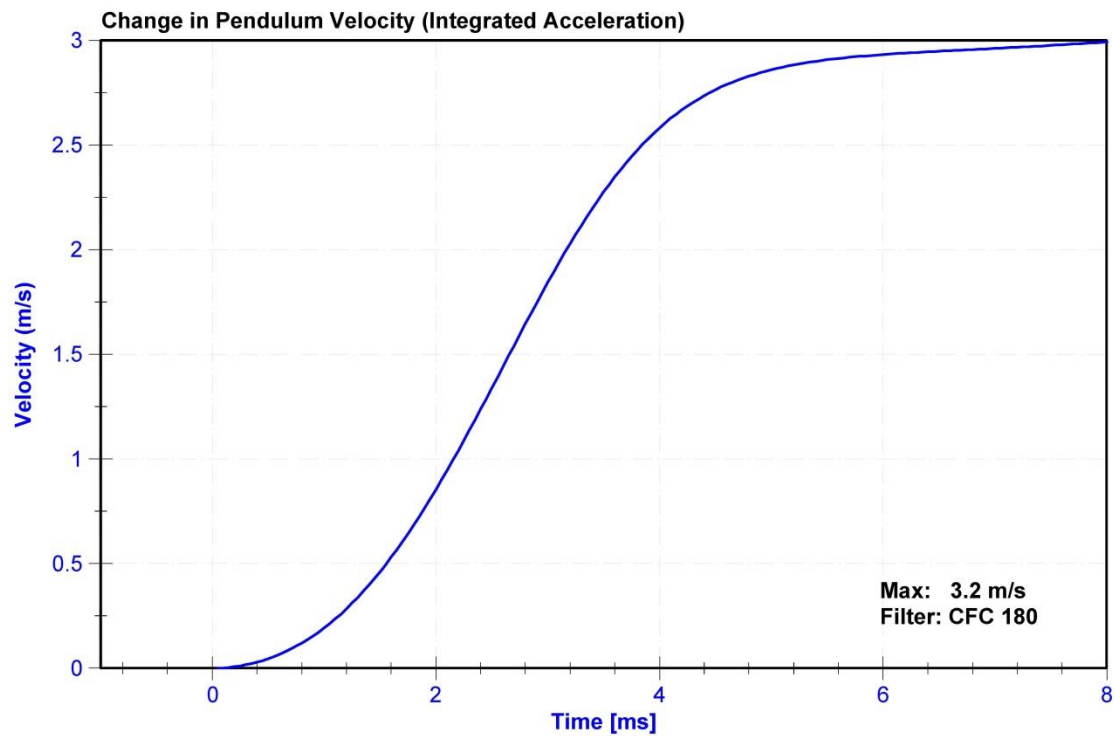
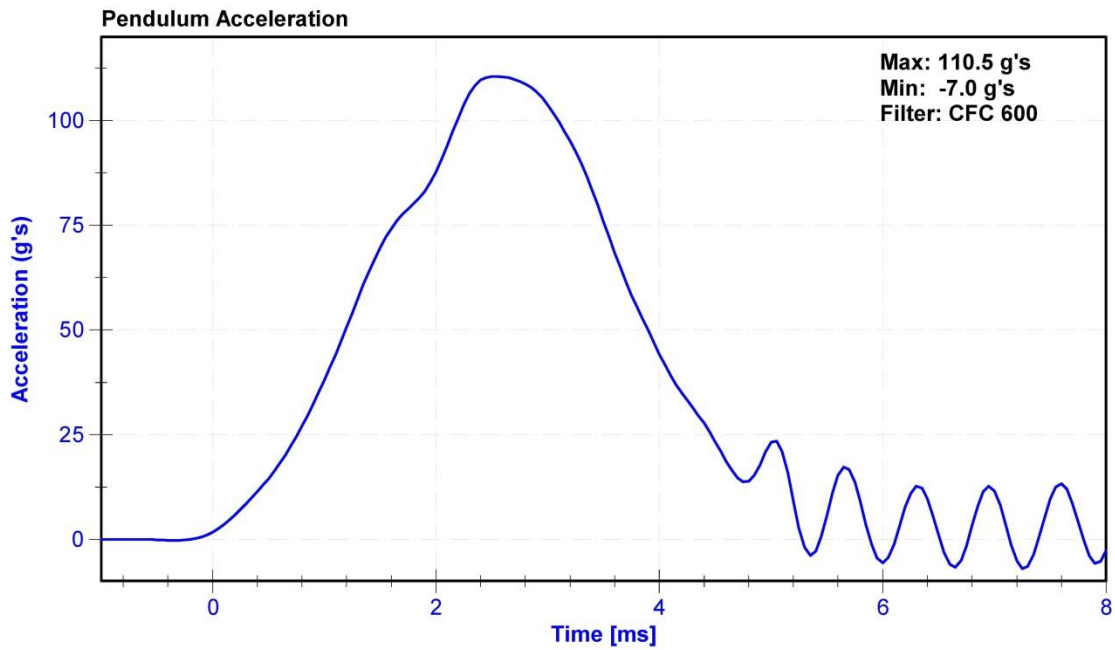
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	15.2	Pass
Velocity	2.07	2.13	m/s	2.085	Pass
Resistive Force	4,720	5,780	N	5405.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015





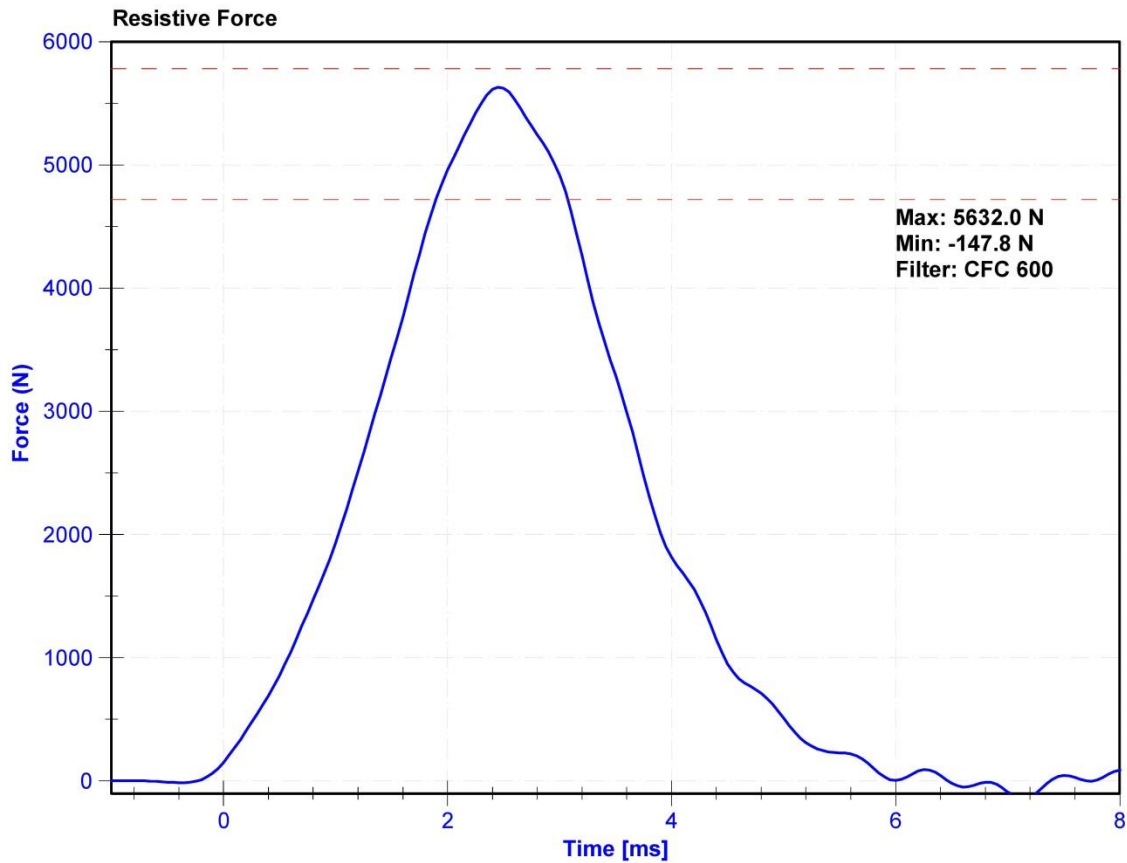
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

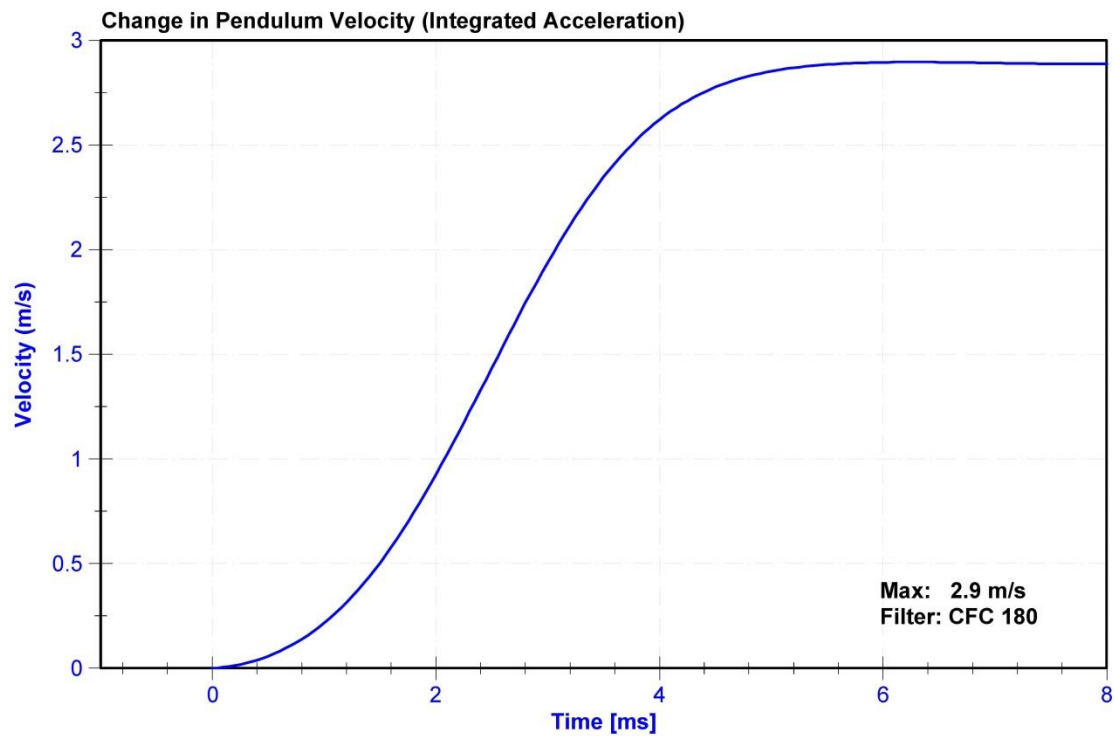
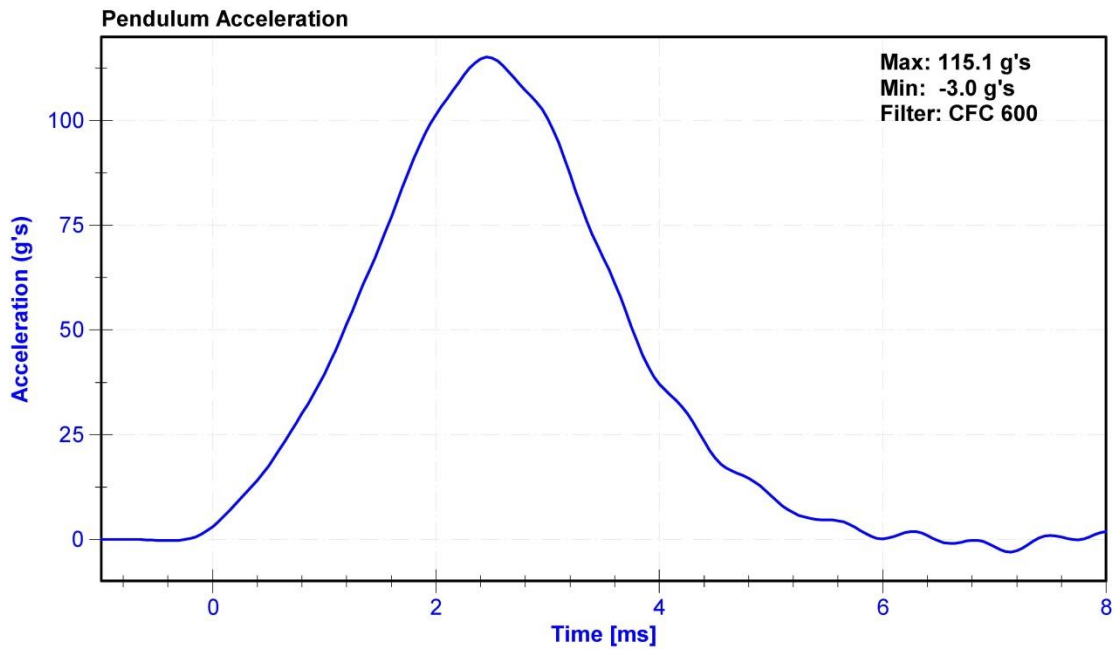
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21	Pass
Humidity	10	70	%	16.8	Pass
Velocity	2.07	2.13	m/s	2.076	Pass
Resistive Force	4,720	5,780	N	5632.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL NO: 139

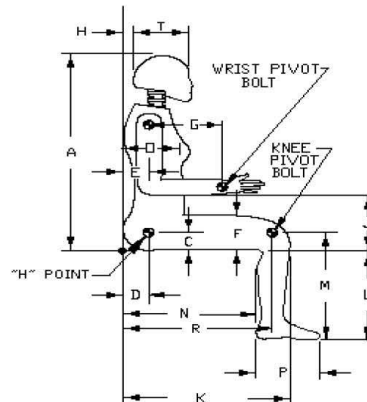
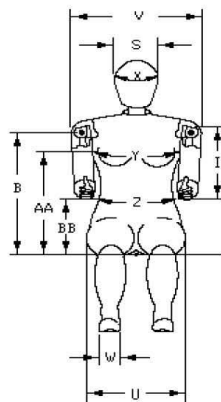


External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey

Date: 2/5/2015

Dummy Serial Number: 139



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	788	Pass
B	Shoulder Pivot Height	432	457	445	Pass
C	H-Point Height	81	86	85	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	75	Pass
F	Thigh Clearance	119	135	123	Pass
G	Back of Elbow to Wrist Pivot	244	259	249	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	290	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	362	Pass
M	Knee Pivot Height	394	419	399	Pass
N	Buttock Popliteal Length	414	439	424	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	470	Pass
S	Head Breadth	137	437	143	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	302	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	84	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	356	Pass
BB	Reference Location (Waist Circumference)	160	170	170	Pass

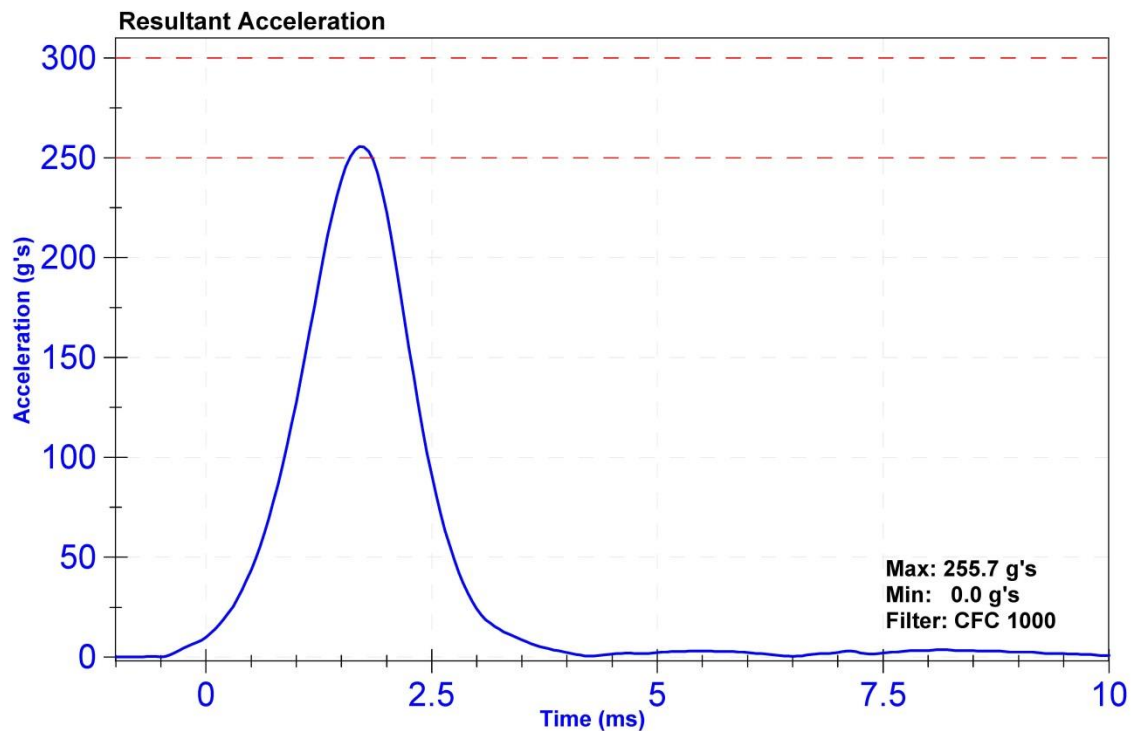
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

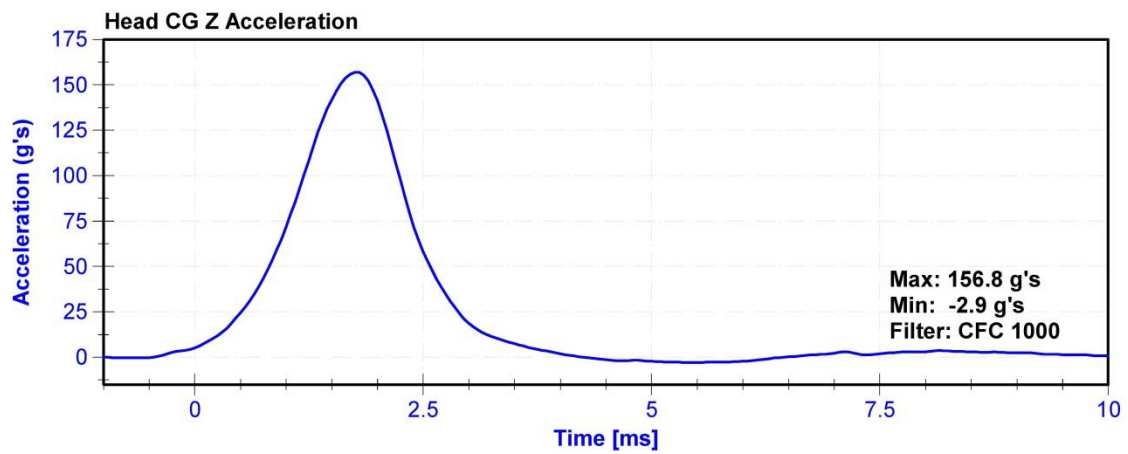
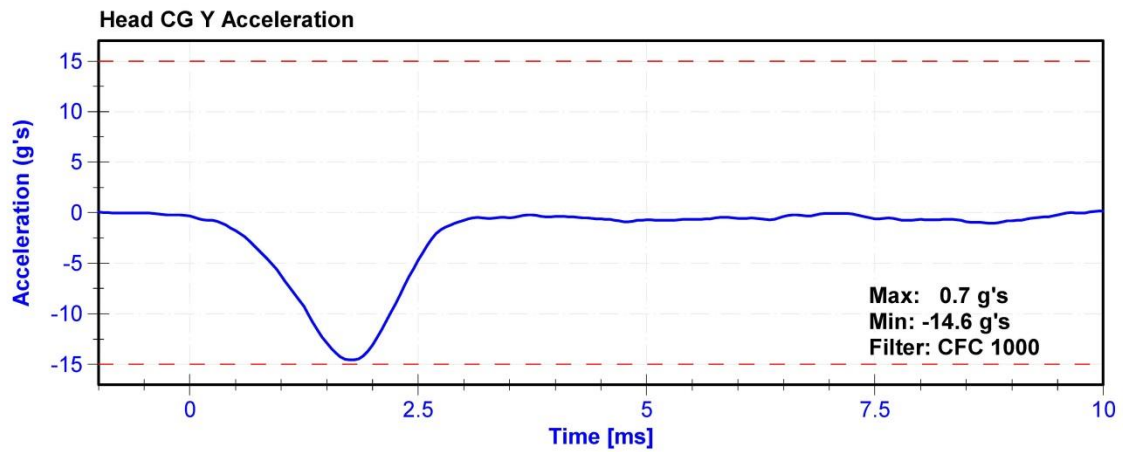
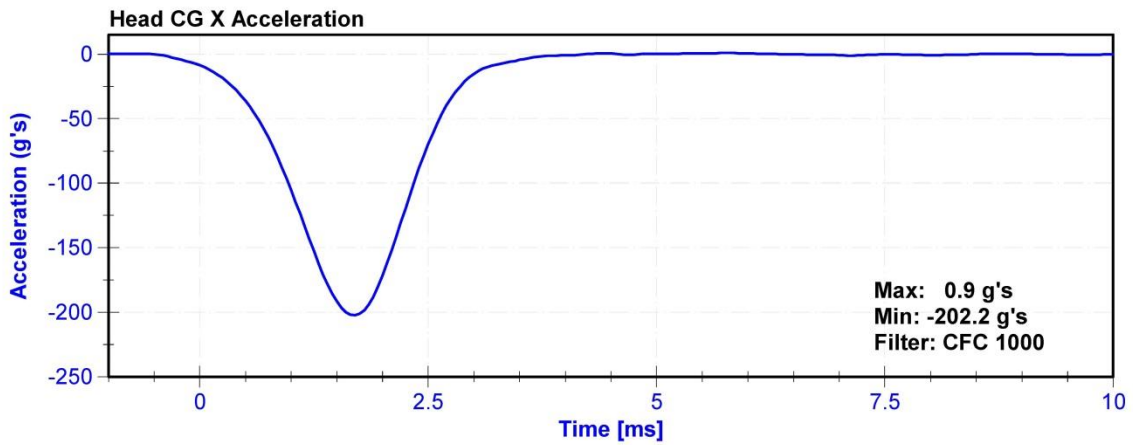
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	14.0	Pass
Resultant Acceleration	250	300	g's	255.7	Pass
Oscillation	0	10	%	1.5	Pass
Lateral Acceleration	-15	15	g's	-14.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P52054	8/26/2014	2/24/2015
Y Accelerometer	ENDEVCO 7264	AC-P52007	8/26/2014	2/24/2015
Z Accelerometer	ENDEVCO 7264	AC-P51298	8/26/2014	2/24/2015





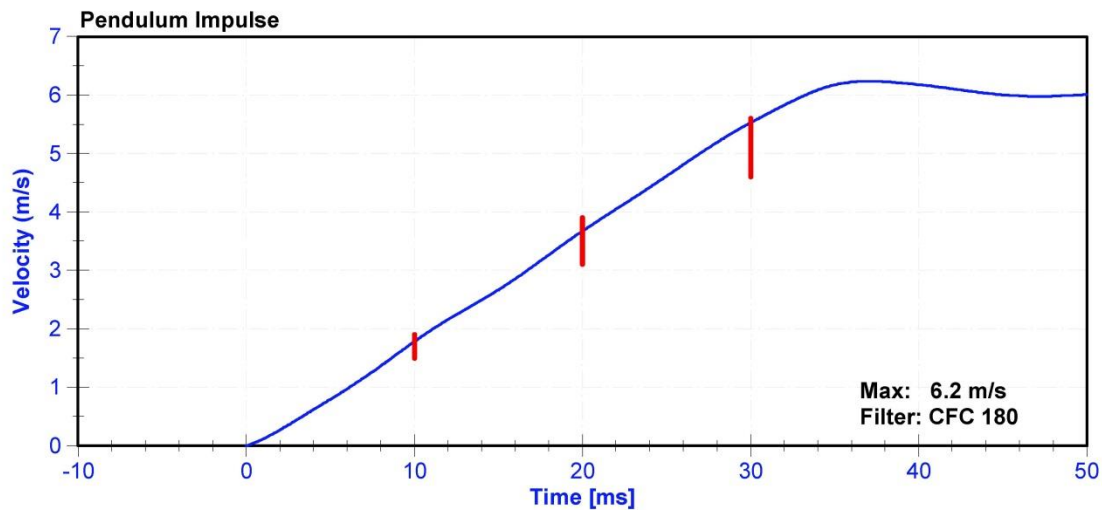
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

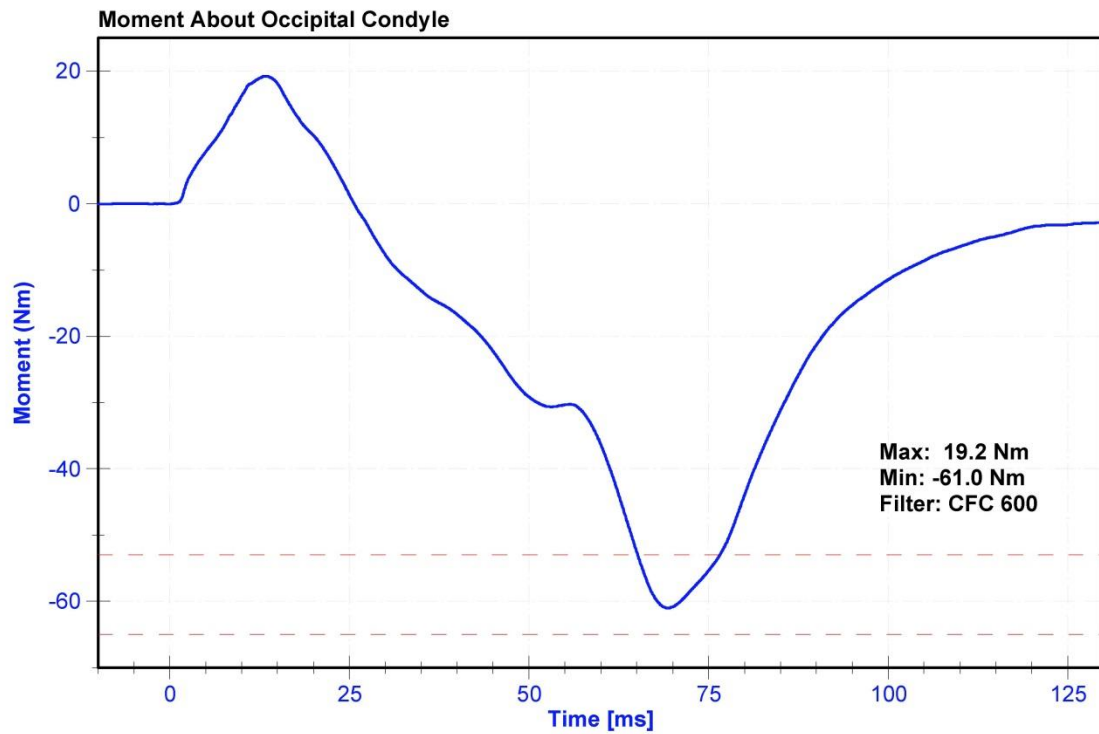
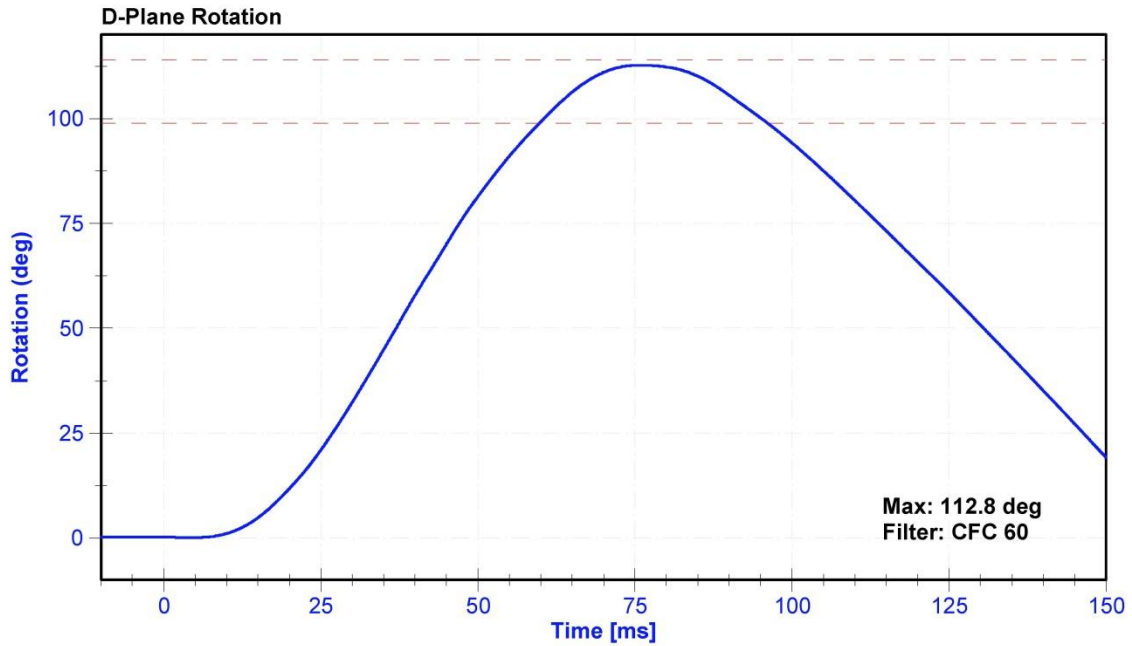
Results

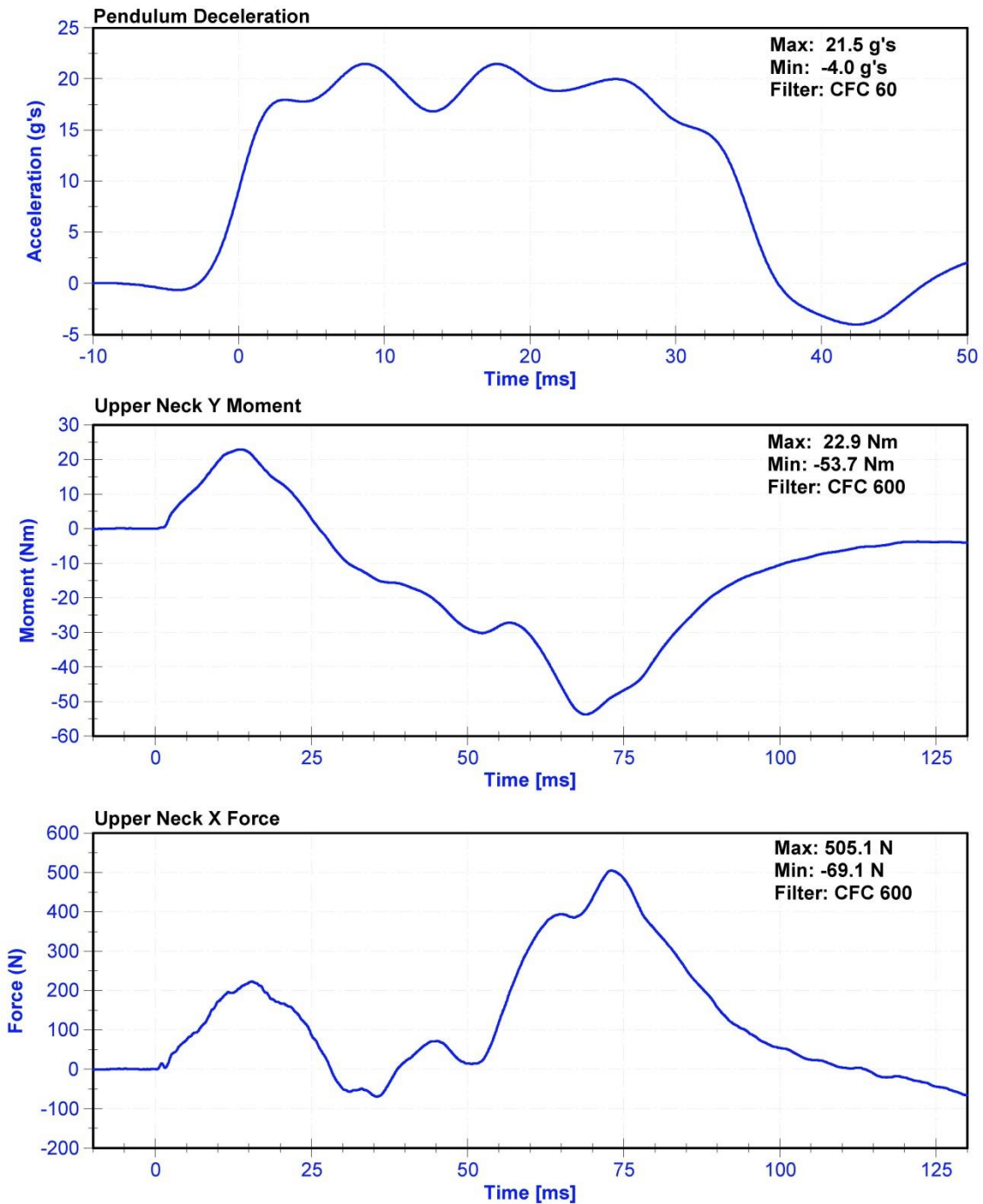
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	16.4	Pass
Velocity	5.96	6.19	m/s	5.98	Pass
Pendulum Impulse at 10ms	1.5	1.9	G's	1.78	Pass
Pendulum Impulse at 20ms	3.1	3.9	G's	3.67	Pass
Pendulum Impulse at 30ms	4.6	5.6	G's	5.52	Pass
D Plane Rotation	99	114	deg	112.8	Pass
Moment During Rotation Interval	-65	-53	Nm	-61.0	Pass
Moment Decay to -10Nm	94	114	ms	102.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015







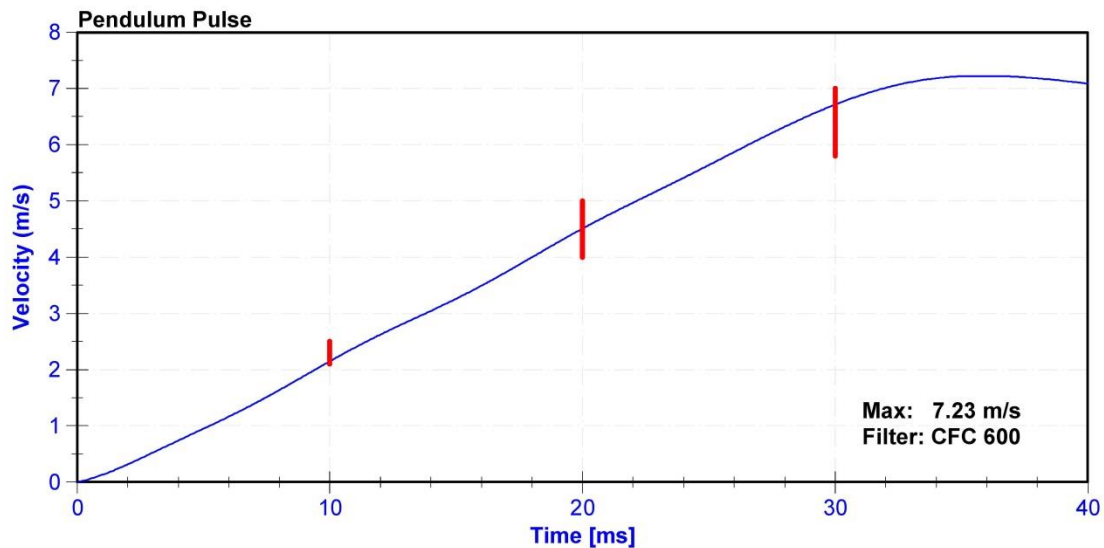
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

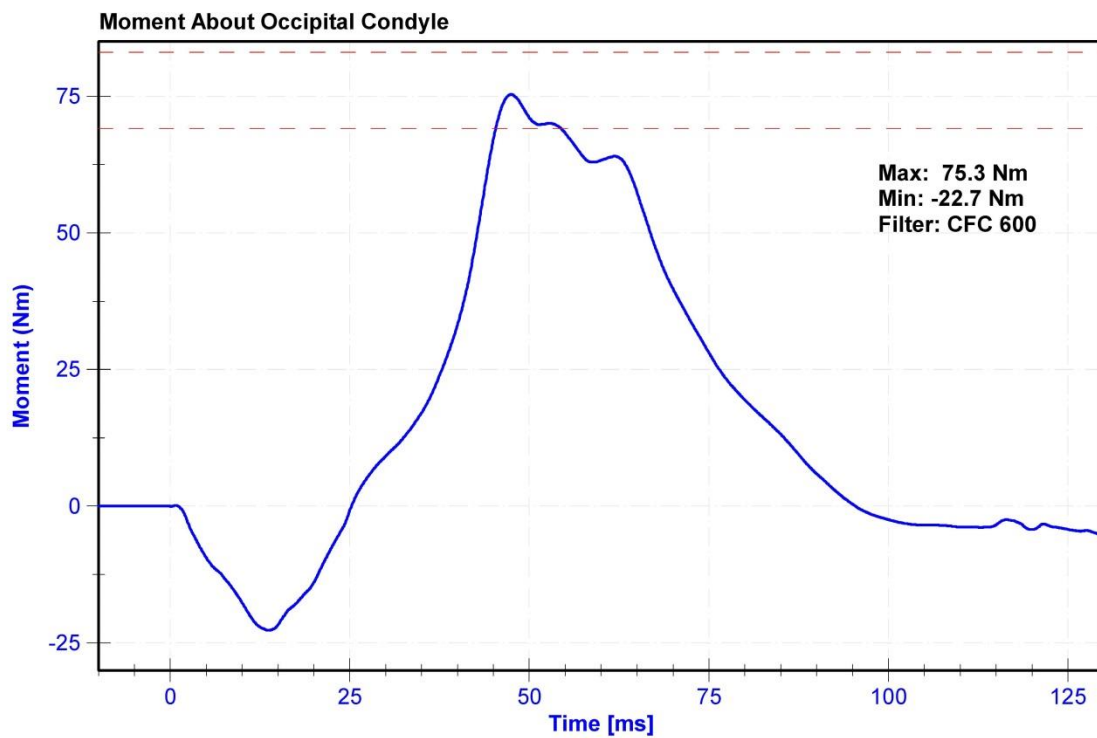
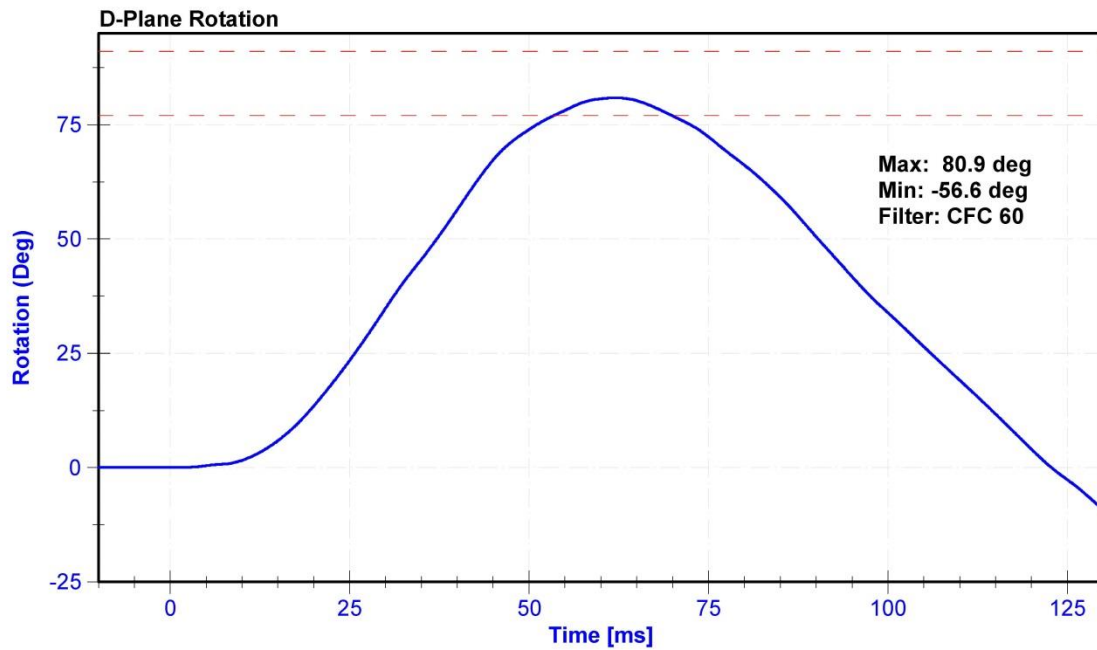
Results

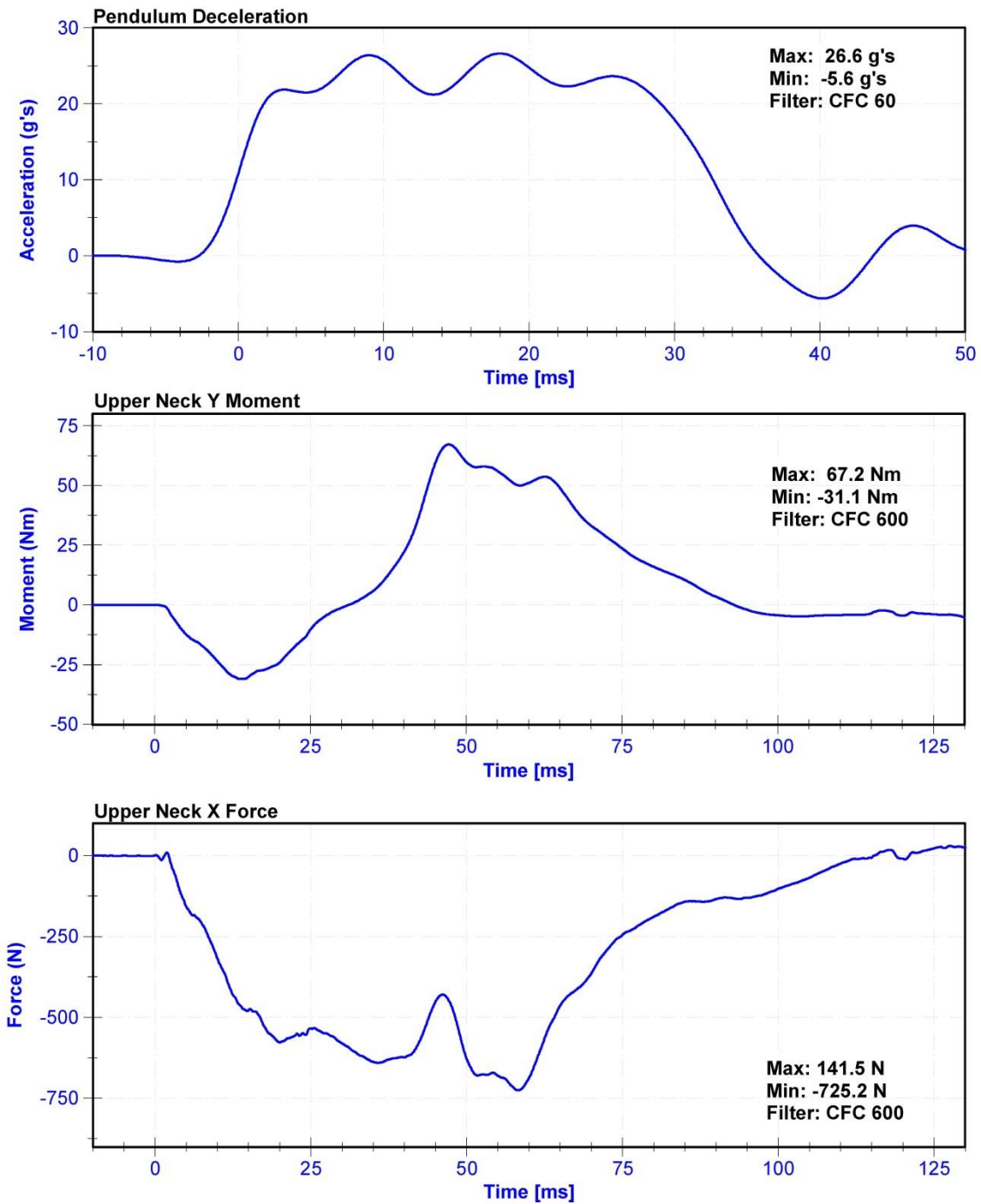
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	14.9	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.15	Pass
Pendulum Impulse at 20ms	4	5	m/s	4.51	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.71	Pass
D Plane Rotation	77	91	deg	80.9	Pass
Moment During Rotation Interval	69	83	Nm	75.3	Pass
Moment Decay to 10.0 Nm	80	100	ms	87.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015







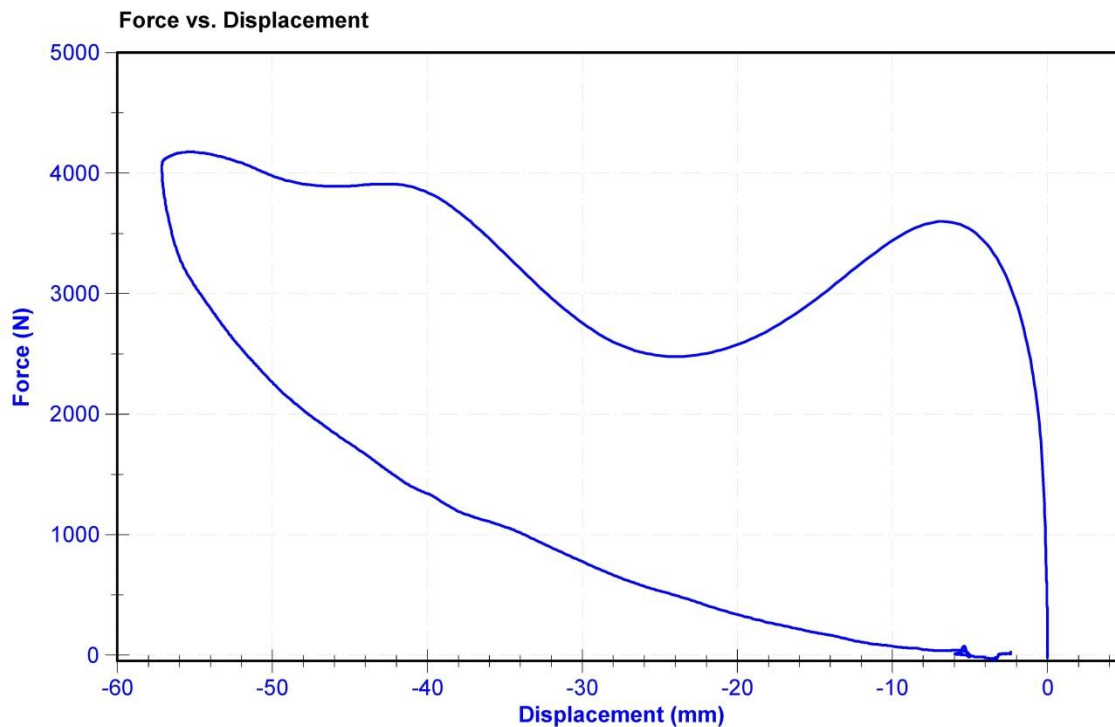
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

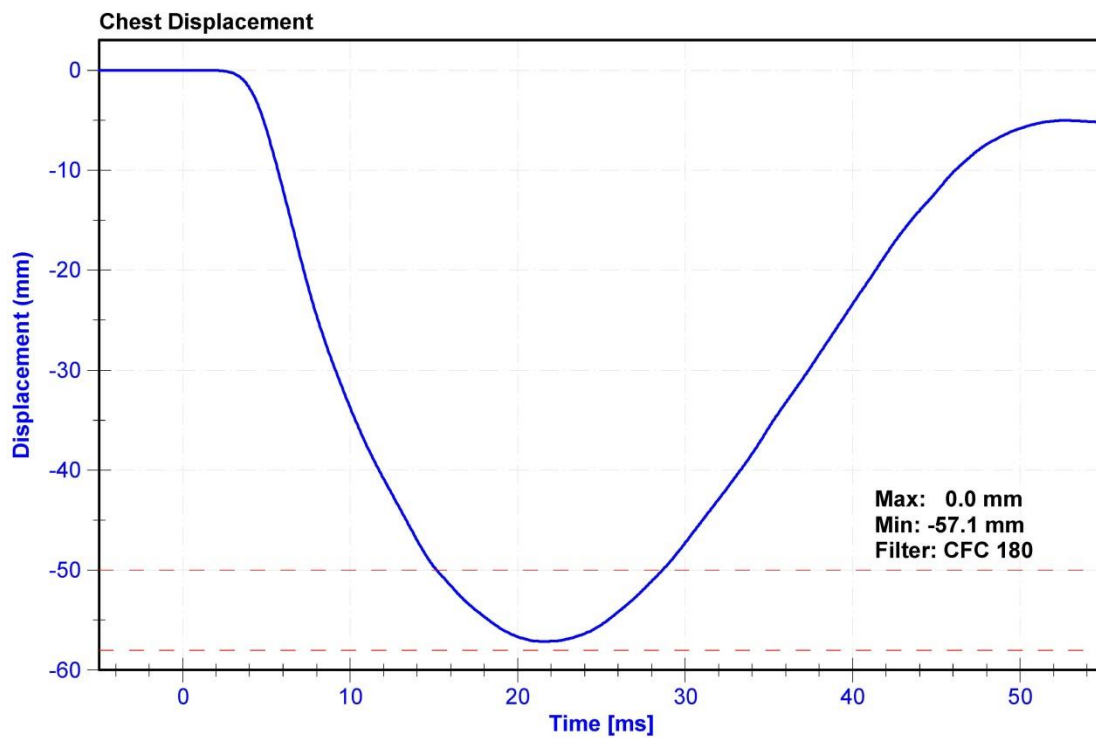
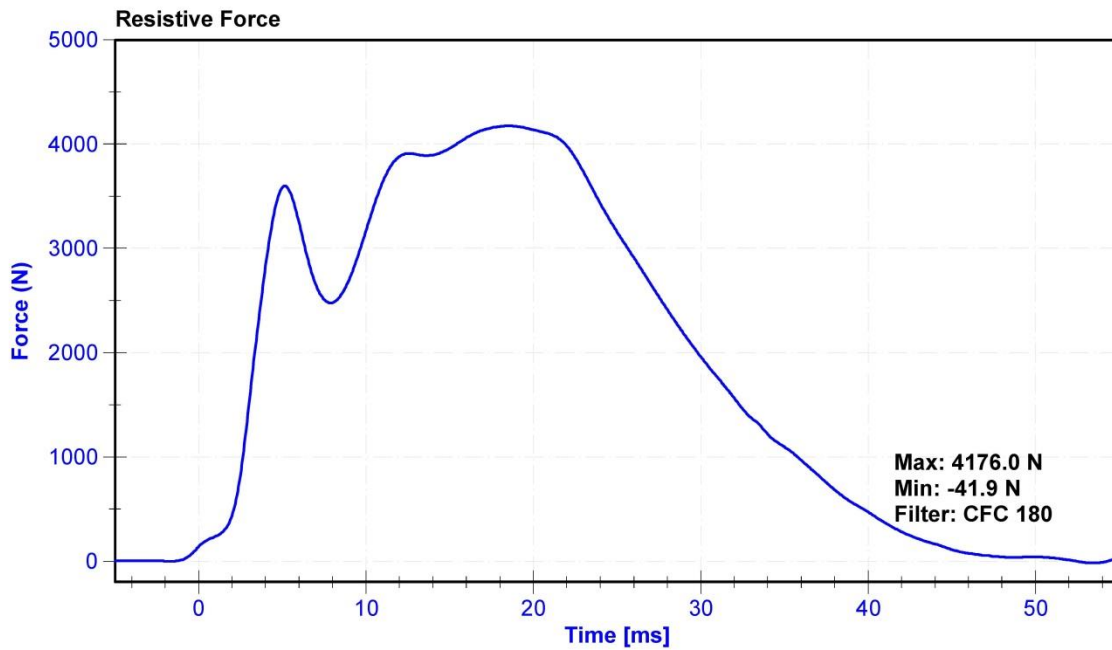
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	13.3	Pass
Velocity	6.59	6.83	m/s	6.76	Pass
Chest Displacement	-58	-50	mm	-57.1	Pass
Force During Displacement Interval	3,900	4,400	N	4176.0	Pass
Force During -18 to 50mm Displacement	0	4,600	N	3974.0	Pass
Hysteresis	69	85	%	70.3	Pass

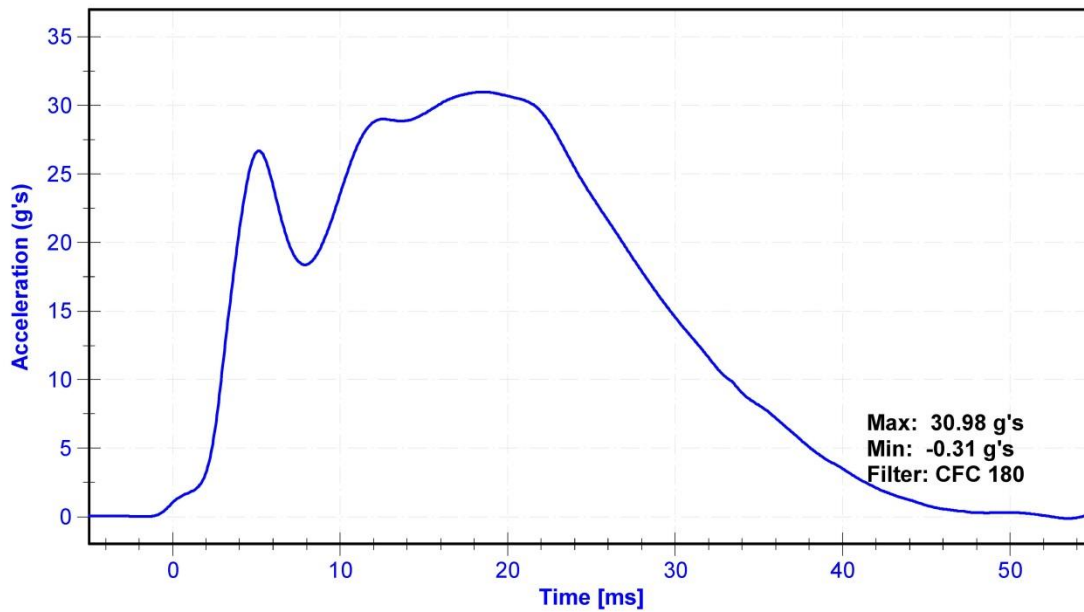
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015
Chest Potentiometer	Servo 14CBI-3615	DS-139	7/31/2014	7/31/2015

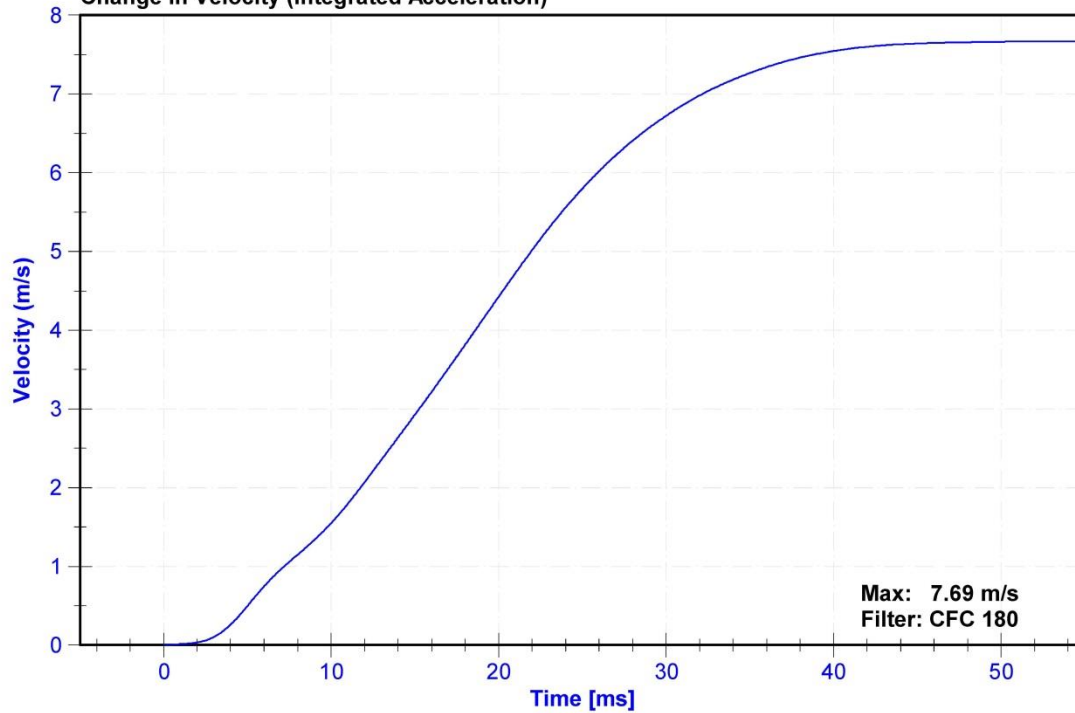




Probe Acceleration



Change in Velocity (Integrated Acceleration)



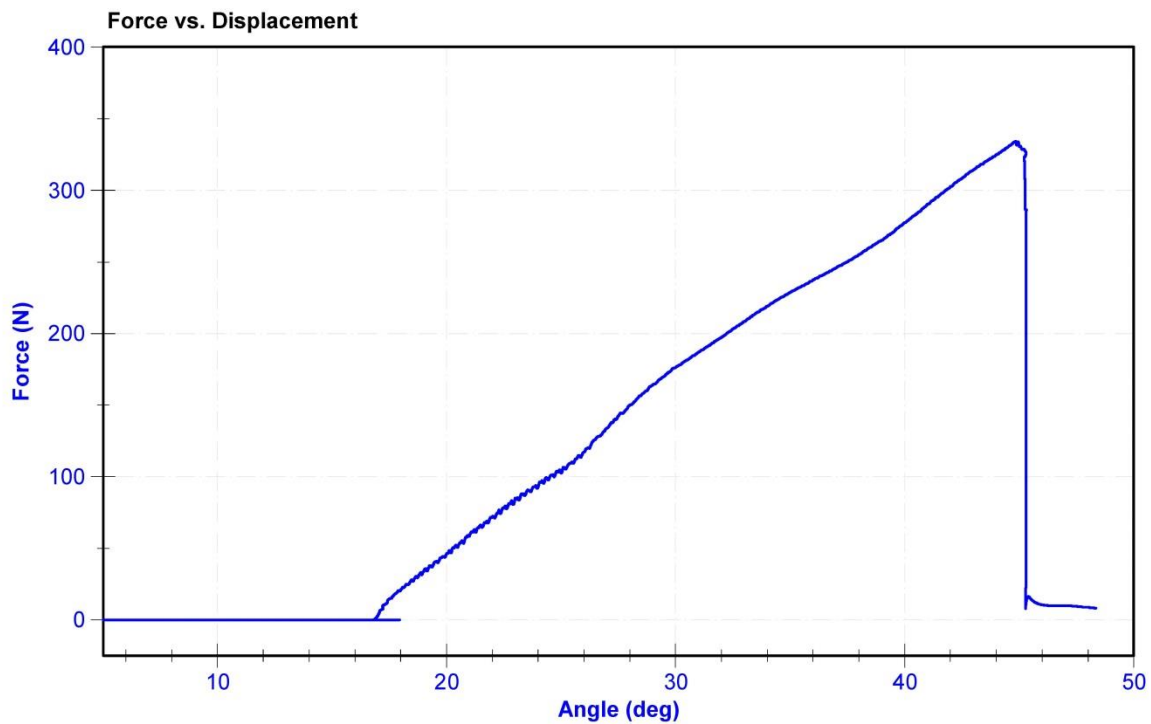
ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.9	Pass
Humidity	10	70	%	14.8	Pass
Initial Angle	0	20	deg	16.6	Pass
Force at 45 Degrees	320	390	N	331.8	Pass
Return Angle	0	8	deg	6.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	8/1/2014	8/1/2015
Load Cell	Interface SML-200	LC-493319	8/13/2014	8/13/2015



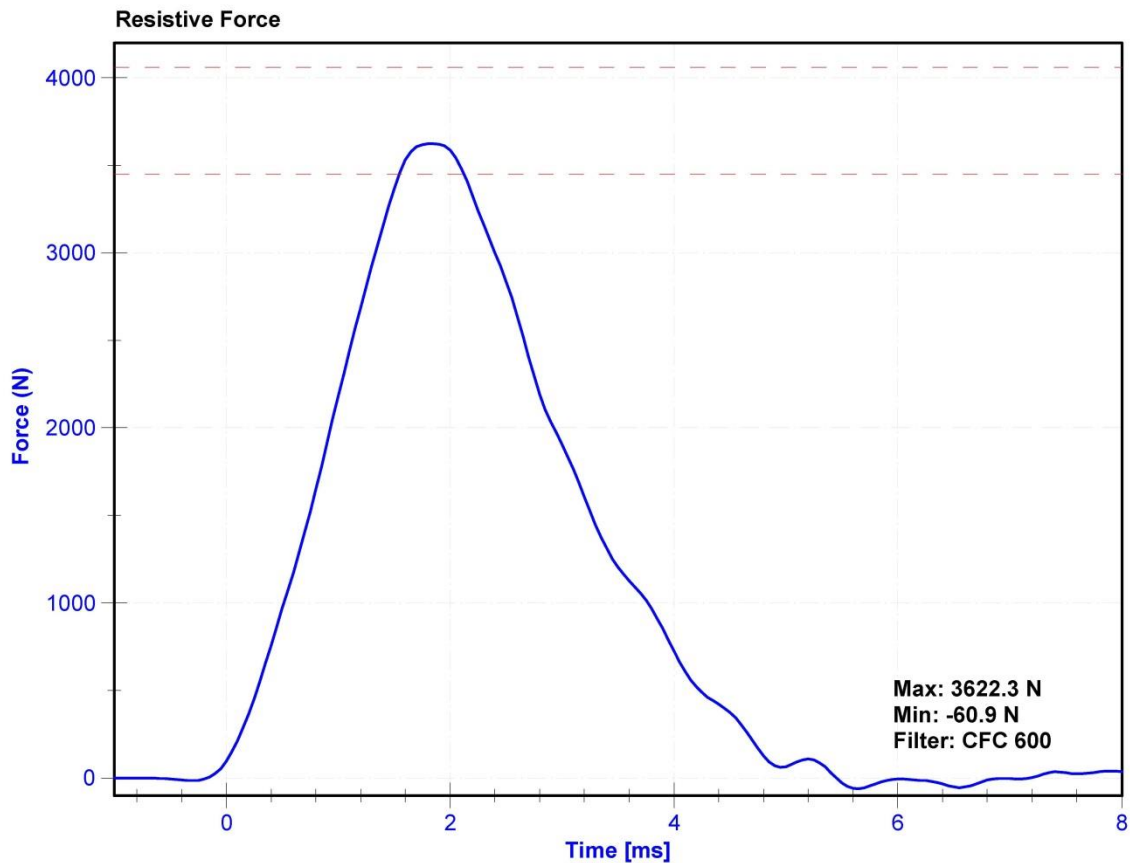
ATD Manufacturer	Left	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

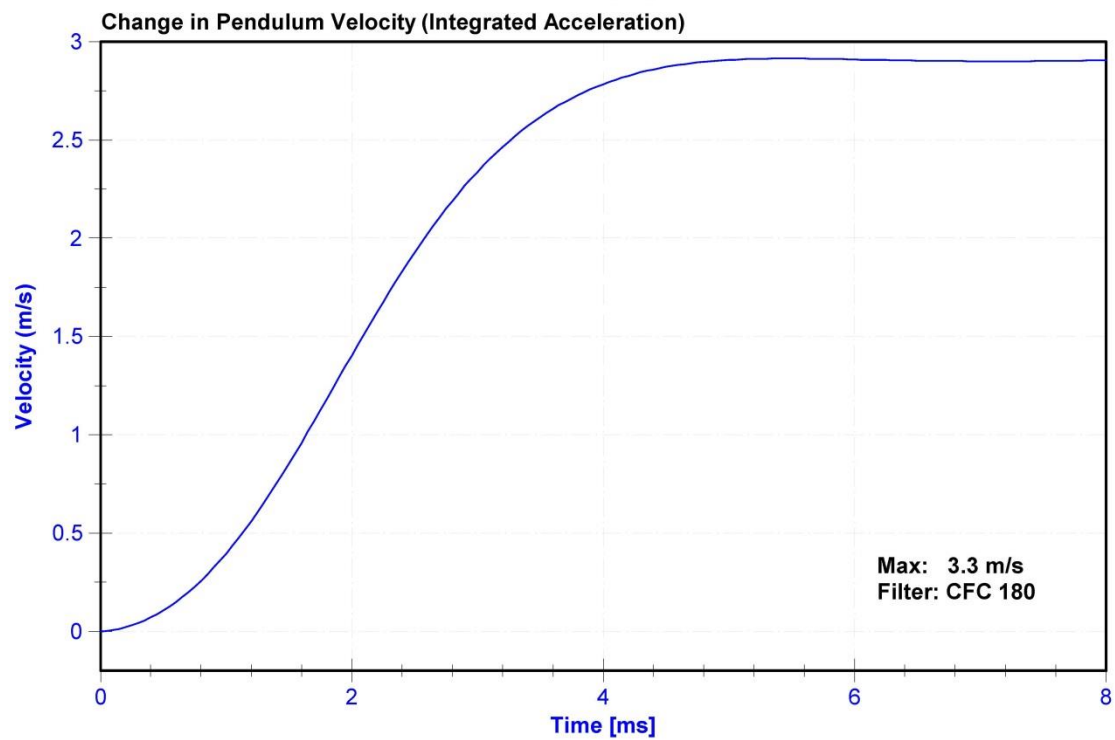
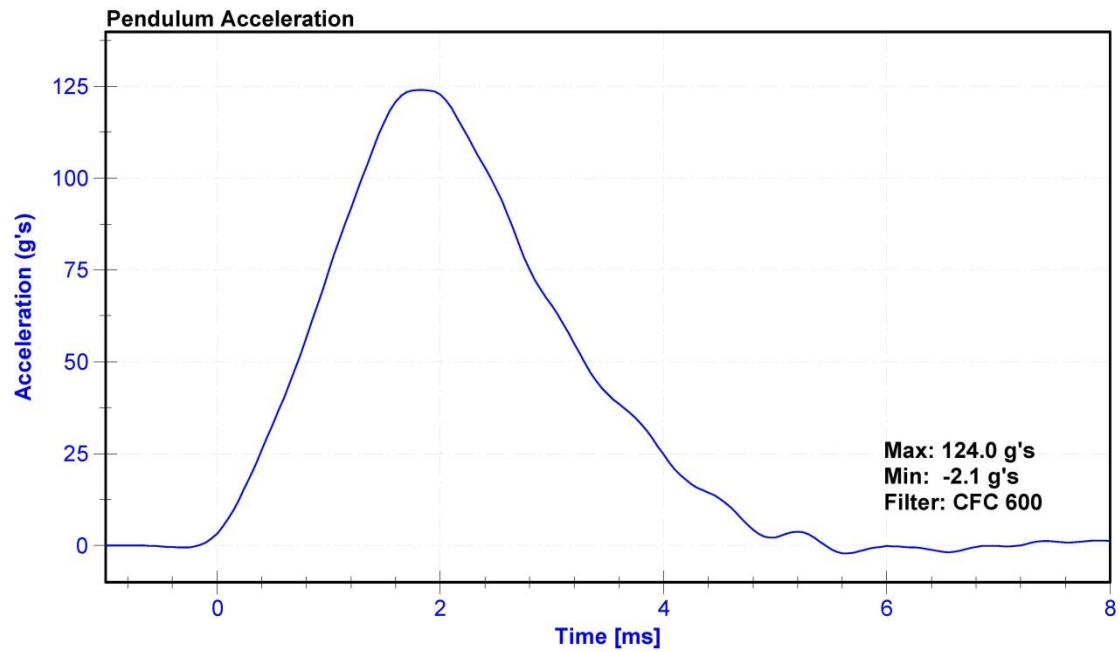
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.3	Pass
Humidity	10	70	%	14.3	Pass
Velocity	2.07	2.13	m/s	2.099	Pass
Resistive Force	3,450	4,060	N	3622.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015





ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.3	Pass
Humidity	10	70	%	14.3	Pass
Velocity	2.07	2.13	m/s	2.099	Pass
Resistive Force	3,450	4,060	N	3720.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015

