

REPORT NUMBER: SPNCAP-CAL-17-001

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**Hyundai Motor Company
2017 Hyundai Elantra
Four Door Sedan**

NHTSA No: M20174201

**PREPARED BY:
CALSPAN CORPORATION
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August 30, 2016

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NRM-110
1200 NEW JERSEY AVE SE, ROOM W43-410
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-14-D-00352.

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Date: August 30, 2016

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Date: August 30, 2016

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SPNCAP-CAL-17-001	2. Government Accession No.	3. Recipient's Catalog No.																												
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2017 Hyundai Elantra four door sedan NHTSA No.: M20174201		5. Report Date August 30, 2016																												
		6. Performing Organization Code CAL																												
7. Author(s) Vanessa Hansen, Senior Test Engineer Edward Dutton, Operations Manager		8. Performing Organization Report No. CAL-DOT-2017-001																												
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operation P.O. Box 400 Buffalo, New York 14225		10. Work Unit No.																												
		11. Contract or Grant No. DTNH22-14-D-00352																												
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report, June 21, 2016 - August 30, 2016																												
		14. Sponsoring Agency Code NRM-110																												
15. Supplementary Notes																														
16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2017 Hyundai Elantra four door sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 21, 2016. The impact velocity of the vehicle was 32.40 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 280 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No. DG8012)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>307.822</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>36.879</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3067.887</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>28.892</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>28.381</td> </tr> </tbody> </table> The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.				Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	307.822	Resultant Lower Spine Acceleration	G	82	36.879	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3067.887	Maximum Thoracic Rib Deflection	mm	38	28.892	Maximum Abdomen Rib Deflection	mm	45	28.381
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
19. Security Class. (of this report) UNCLASSIFIED	20. Security Class. (of this page) UNCLASSIFIED	21. No. of Pages 124	22. Price																											

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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2017 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2017 Hyundai Elantra four door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2017 Hyundai Elantra four door sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.40 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 21, 2016. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated October 2015. Camera locations and other pertinent camera information are included on page 3-11 in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

- Head CG tri-axial accelerometers

- Thorax upper, middle, and lower rib displacement potentiometers

- Abdomen upper and lower rib displacement potentiometers

- Lower spine tri-axial accelerometers

- Iliac load cell

- Acetabulum load cell

Appendix B contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D identifies all serial numbers, manufacturers, and calibration dates for test equipment, dummy sensors, potentiometers, and load cells used to collect data during the test.

Injury readings for the SID-IIs dummy were recorded as follows:

INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	307.822
Resultant Lower Spine Acceleration	g	82	36.879
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3067.887
Maximum Thoracic Rib Deflection	mm	38*	28.892
Maximum Abdominal Rib Deflection	mm	45*	28.381

*Proposed IARV

Supplemental restraint information was recorded as follows:

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- None

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

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, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and instrumentation Data

Data Sheet No. 6 – Vehicle Accelerometer Data

Data Sheet No. 7 – Rigid Pole Load Cell Data

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – Test Vehicle Profile Measurements

Data Sheet No. 10 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 – Vehicle Damage Profile Distances

Data Sheet No. 12 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 13 – Dummy / Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20174201
Model Year	2017
Make	Hyundai
Model	Elantra
Body Style	Four door sedan
VIN	KMHD74LFXHU114625
Body Color	Silver
Odometer Reading (km/mi)	27.4 km / 17 mi
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	--
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso / Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head / Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso / Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	-

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company	GVWR (kg)	1780
Date of Manufacture	FEB/13/16	GAWR Front (kg)	990
Vehicle Type	Passenger	GAWR Rear (kg)	910

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	-	5	
Capacity Weight (VCW) (kg)				385	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				44.8	(A-B)

VEHICLE SEAT TYPE

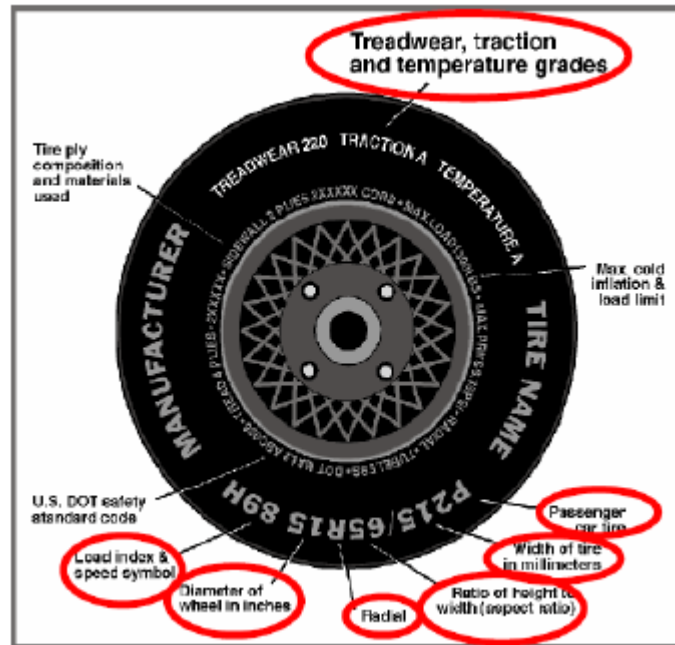
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat		X			X		
Third Row seat							

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

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

Collected for year, make, model, & VIN, all items circled in red, tire manufacturer and tire name.



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	P195/65R15	P195/65R15
Tire Size on Vehicle	P195/65R15	P195/65R15
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadwear	540	540
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester	2 Steel, 1 Polyester
Load Index/Speed Symbol	91T	91T
Tire Material	Rubber	Rubber
DOT Safety Code Left	5MDH1BH0216	5MDH1BH
DOT Safety Code Right	5MDH1BH	5MDH1BH

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

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	352	355	355	353
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	428	229		430	270		446	277	
Right	kg	368	266		402	273		373	291	
Ratio	%	62	38		61	39		59	41	
Totals	kg	796	495	1291	832	543	1375	819	568	1387

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1291	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	44.12	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1379.92	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range
 (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)? ☒ Yes ☐ No

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	-0.3	-0.5	-0.6	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.7	-1.1	-1.2	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	0.3	-0.3	-0.3	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	0.2	-0.3	-0.3	Yes
Vehicle CG (Aft of Front Axle)	mm	1035	1066	1106	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	14	14	34	

* ND = Nose Down (-), NU = Nose Up (+)

** LD = Left Down (-), LU = Left Up (+)

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for Meets Requirement

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

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	4
Spare Tire	11
Jack	2
Hub Caps	1
Tail Light	1
Passenger Windows	5
Rear Bumper Beam	3
Rear Hatch	12
Bumper Cover	7
Ballast / Equipment Added	0

Test Height – Adjustable Suspension Setting, if Applicable	N/A
--	-----

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

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	16.2	13.3	14.75
Front Passenger Seat	16.3	13.5	14.9
Front Center Seat	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	14.75	34	Max	50	60	70
			Mid	25	35	45
			Min	0	10	20
Front Passenger Seat	14.9	35	Max	50	60	70
			Mid	25	35	45
			Min	0	10	20
Front Center Seat	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

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

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

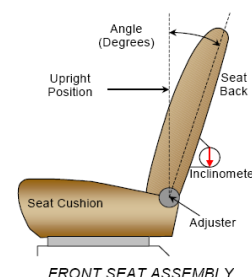
NHTSA No.: M20174201
 Test Date: 6/21/2016

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	38 (0-37)	0	0
Front Passenger Seat	240	38 (0-37)	0	0
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back are set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	-12.4 to +45.4	N/A	-4.4	N/A
Front Passenger Seat	-11.7 to +48.4	N/A	-3.9	N/A
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. Zero is defined as the uppermost detent

Seat	Total # of Positions	Placed in Position #
Driver Seat	3 (0 – 2)	0 - Uppermost

HEAD RESTRAINT ADJUSTMENT

The driver's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	6 (0 – 5)	5 – Lowest

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

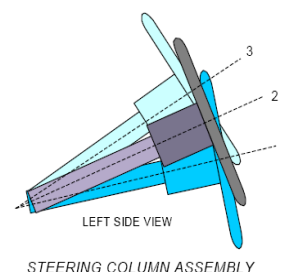
Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

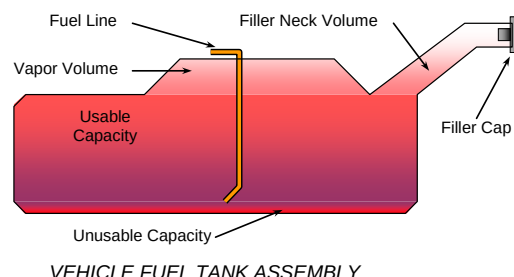
		Degrees	Fore / Aft Position (mm)
Lowermost	– Position 1	20.3	
Geometric Center	– Position 2	22.9	
Uppermost	– Position 3	25.5	
Telescoping Steering Wheel Travel			50
Test Position		22.9	25



FUEL PUMP

Describe the fuel pump type, details about how it operates, and the location of the fuel filler neck.

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.



FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of "Standard Tank" - see Form No. 1	53
Usable Capacity of "Optional Tank" - see Form No. 1	
Usable Capacity of "Standard Tank" - see Owner's Manual	53
Usable Capacity of "Optional Tank" - see Owner's Manual	
93% of Usable Capacity	49.29
Actual Amount of Solvent Used in Test	49.29
1/3 of Usable Capacity	17.66

Is the Actual Amount of Solvent Used in the test equal to 93% $\pm$ 1% of the Usable Capacity stated in Form No. 1?



Yes

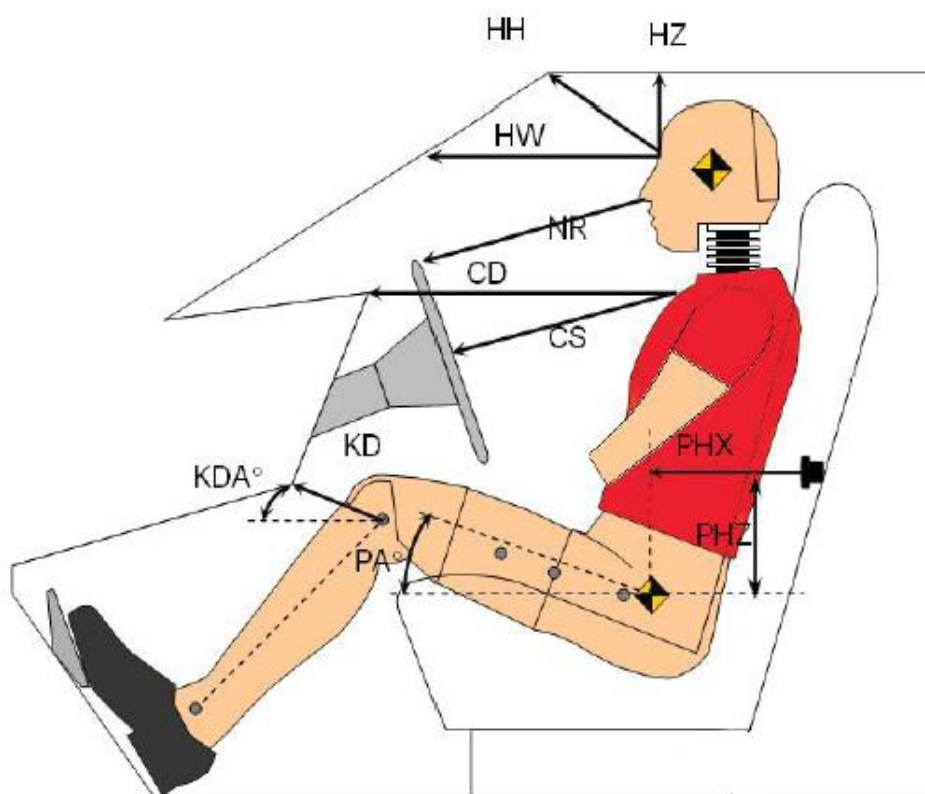


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DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016



Left Side View

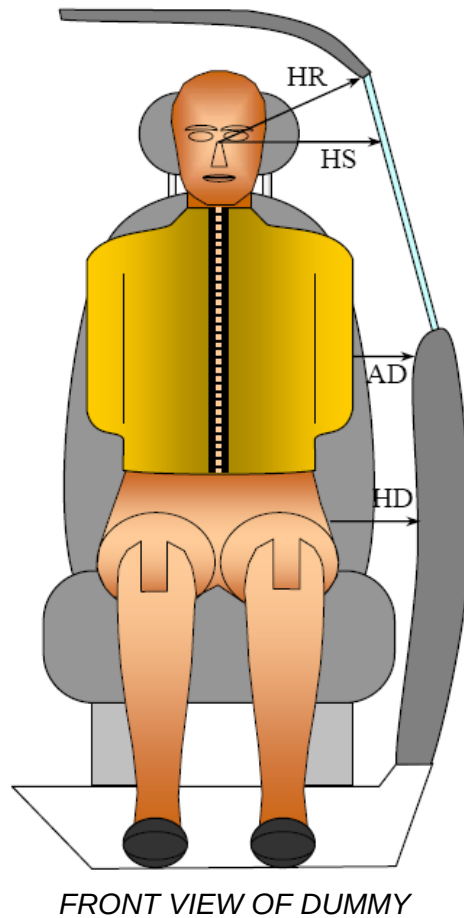
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	292	
HW	Head to Windshield	658	
HZ	Head to Roof Liner	205	
NR	Nose to Rim	263	
CD	Chest to Dash	441	
CS	Chest to Steering Wheel	211	
KD(L) / KDA(L)°	Left Knee to Dash	150	31
KD(R) / KDA(R)°	Right Knee to Dash	143	36.1
PAX°	Pelvic Tilt Angle (X-Axis)		20.5
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	300	
PHZ	Hip Point to Striker (Z-Axis)	214	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2017 Hyundai Elantra four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
Test Date: 6/21/2016



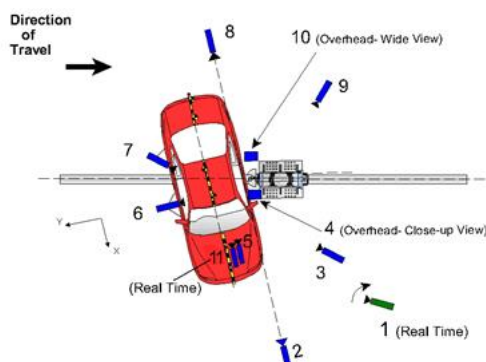
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	245
HS	Head to Side Window	mm	360
AD	Arm to Door	mm	163
HD	Hip Point to Door	mm	172

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	60
2	Front ground level - impact view	6908	0	-1100	24	1000
3	Impact side 45° - forward pole view	4348	-2265	-1707	24	1000
4	Overhead Close-up view of impact	0	0	-5203	28	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-7269	0	-1100	24	1000
9	Impact side 45° - rearward pole view	-2157	-4039	-1721	24	1000
10	Overhead wide - view of impact	-80	305	-5203	14	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	60

Notes: Reference - From Point of Impact for X and Y; from Ground for Z
 +X = Forward of vehicle, +Y = Right of vehicle, +Z = Down
 * All measurements accurate to ± 6 mm. Vehicle is at a 75° angle to the rigid pole.

Comments: All cameras operated as intended.

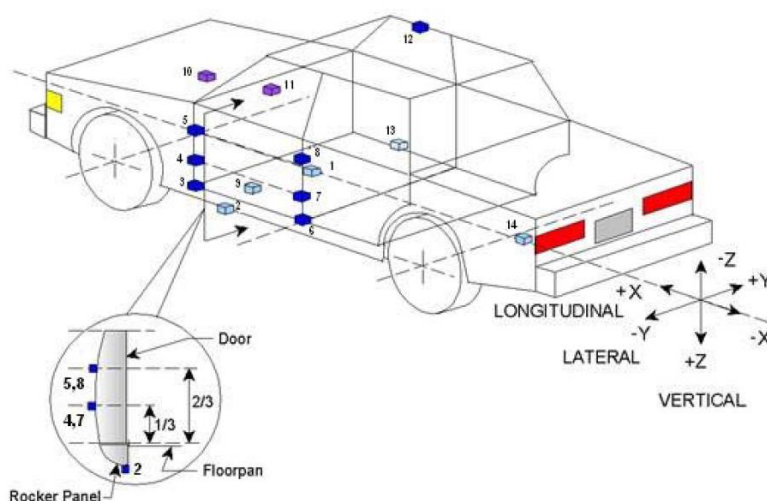
INSTRUMENTATION

Description	Number of Channels
Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	42

DATA SHEET NO. 6 VEHICLE ACCELEROMETER DATA

Test Vehicle: 2017 Hyundai Elantra four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
Test Date: 6/21/2016



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2547	56	25
2	Left Floor Sill	2828	-657	-139
3	A-Pillar Sill	3161	-623	-124
4	A-Pillar Low	3208	-633	110
5	A-Pillar Mid	3194	-616	548
6	B-Pillar Sill	2103	-657	-114
7	B-Pillar Low	2166	-666	97
8	B-Pillar Mid	2140	-670	323
9	Driver Seat Track	2310	-563	-151
10	Engine Top	3718	92	341
11	Firewall	3469	-7	288
12	Right Roof	2149	513	996
13	Right Floor Sill	2736	674	-140
14	Rear Floorpan	1163	44	77

Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2017 Hyundai Elantra four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
Test Date: 6/21/2016

POLE BARRIER



RIGID POLE LOAD CELL LOCATIONS

ID	Units	Height From Ground
1	mm	200
2	mm	590
3	mm	750
4	mm	1075
5	mm	1260
6	mm	1740
7	mm	1920
8	mm	2300

**DATA SHEET NO. 8
POST-TEST OBSERVATIONS**

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag
Left Shoulder	Torso/Pelvis Airbag
Upper Torso	Seatback
Lower Torso	Seatback
Left Hip	Torso/Pelvis Airbag
Left Knee	None

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Width of Opening at Striker (mm)	0	0	0	0	0

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

DATA SHEET NO. 8 ... (CONTINUED)
POST-TEST OBSERVATIONS

Test Vehicle: 2017 Hyundai Elantra four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
Test Date: 6/21/2016

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar, B-Pillar & C-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks throughout with separation along driver's A-Pillar
Side Window Damage	Driver's window shattered
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

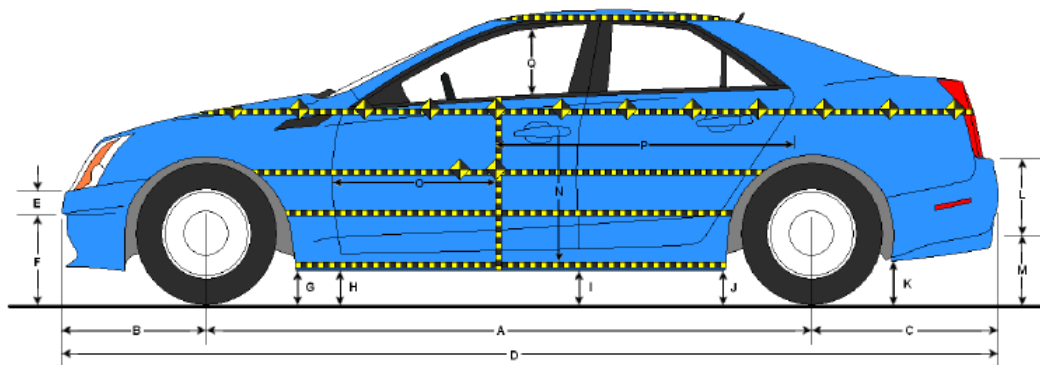
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1113
Actual Impact Point - Aft of Front Axle	mm		1107
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	+6
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.40
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.42

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2017 Hyundai Elantra four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
Test Date: 6/21/2016



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

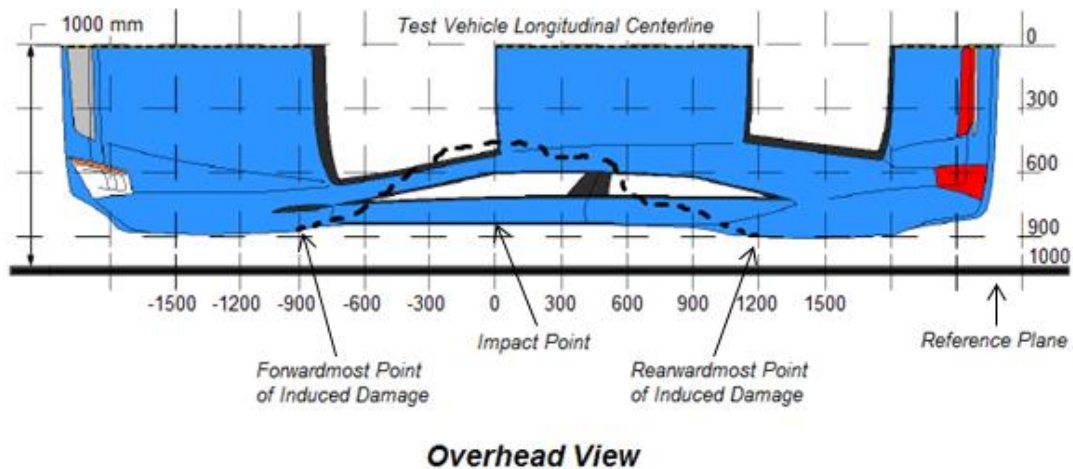
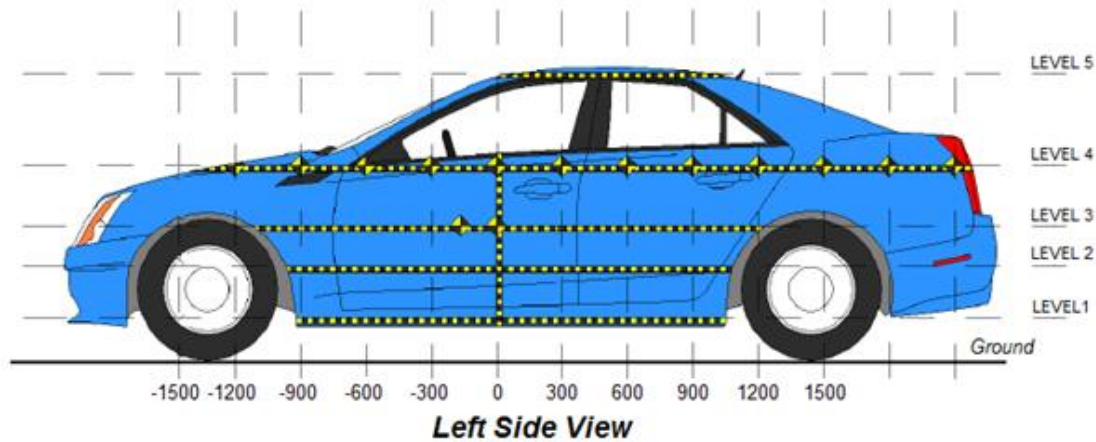
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2700	2680	20
B	Front Axle to FSOV	882	888	-6
C	Rear Axle to RSOV	991	984	7
D	Total Length at Centerline	4574	4552	21
E	Front Bumper Thickness	120	120	0
F	Front Bumper Bottom to Ground	395	397	-2
G	Sill Height at Front Wheel Well	170	178	-8
H	Sill Height at Front Door Leading Edge	178	178	0
I	Sill Height at B-Pillar	186	200	-14
J1	Sill Height at Rear Wheel Well	185	185	0
J2	Pinch Weld Height at Rear Wheel Well	163	168	-5
K	Sill Height Aft of Rear Wheel Well	456	452	4
L	Rear Bumper Thickness	355	355	0
M	Rear Bumper Bottom to Ground	289	284	5
N	Sill Height to Bottom of Front Window Sill	791	799	-8
O	Front Door Leading Edge to Impact CL	653	608	45
P	Rear Door Trailing Edge to Impact CL	1500	1456	44
Q	Front Window Opening	353	328	26
R	Right Side Length	4458	4463	-5
S	Left Side Length	4449	4435	14
T	Vehicle Width at B-Pillars	1776	1695	81

* All measurements in mm with tolerance of $\pm 3\text{mm}$

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	222	224	0
2	Occupant Hip Point	mm	546	268	0
3	Mid - Door	mm	624	280	0
4	Window Sill	mm	926	239	0
5	Window Top	mm	1359	85	0

NOTE: The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 10 ... (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

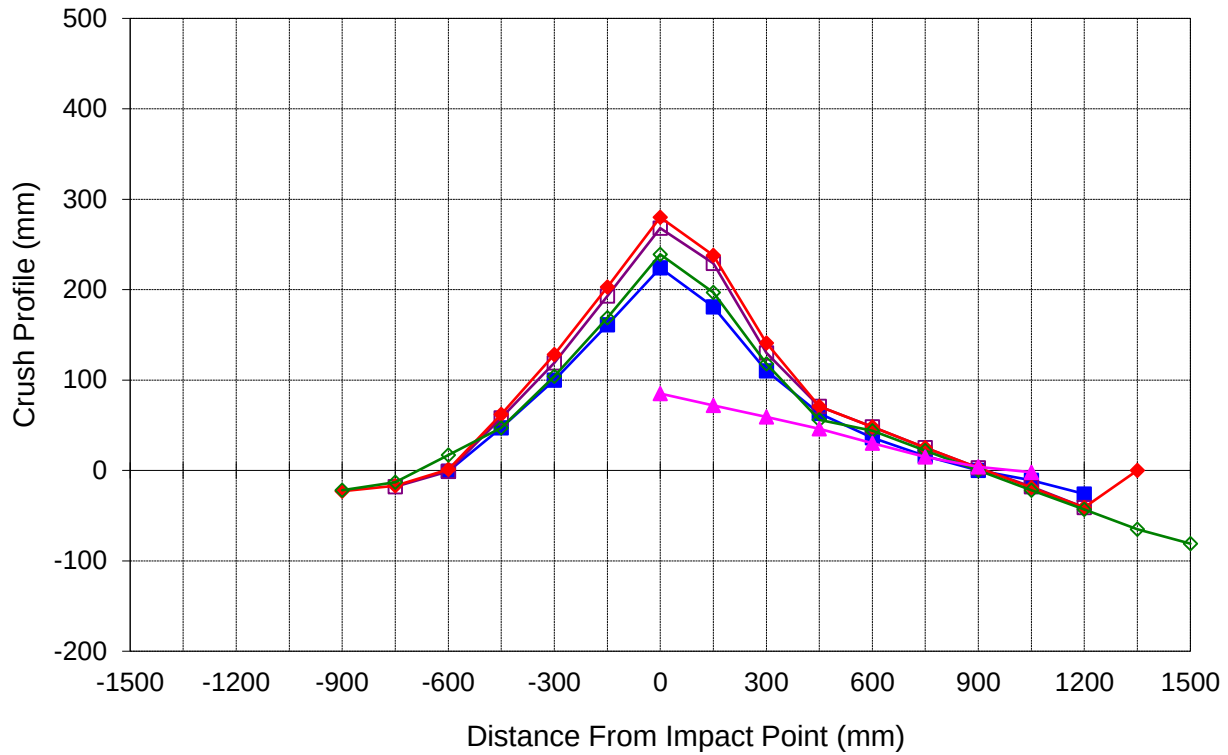
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900			891	750				914	772				-23	-22	
-750		890	887	775			908	904	788			-18	-17	-13	
-600	859	882	883	786		860	883	882	769		-1	-1	1	17	
-450	856	882	883	794		809	824	821	747		47	58	62	47	
-300	855	882	884	807		755	763	756	703		100	119	128	104	
-150	856	882	886	819		695	689	683	650		161	193	203	169	
0	855	882	887	827	592	631	614	607	588	507	224	268	280	239	85
150	855	882	887	833	615	674	653	649	636	543	181	229	238	197	72
300	854	882	888	838	621	744	752	747	720	562	110	130	141	118	59
450	853	880	886	843	623	790	809	815	787	577	63	71	71	56	46
600	852	879	885	841	624	816	831	837	797	594	36	48	48	44	30
750	851	877	883	841	621	835	852	858	819	606	16	25	25	22	15
900	849	875	881	840	615	849	872	878	840	611	0	3	3	0	4
1050	851	876	880	839	598	862	894	899	861	600	-11	-18	-19	-22	-2
1200	864	887	885	837		890	928	926	880		-26	-41	-41	-43	
1350			892	831				892	896				0	-65	
1500				826					907					-81	

NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

DATA SHEET NO. 10 ... (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016



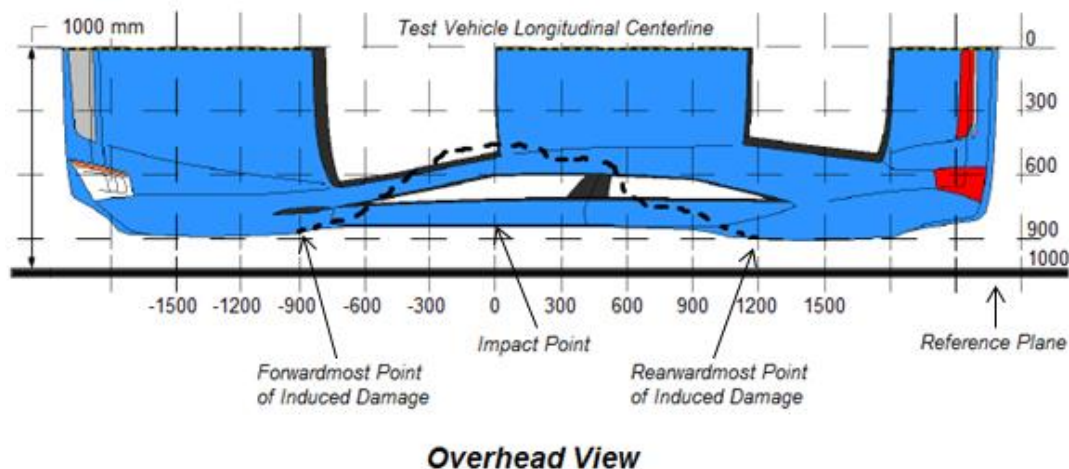
Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 11 VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016

For guidance regarding damage profile distance measurements, please refer to the latest version of the *NHTSA Test Reference Guide, Volume 1: Vehicle Tests*.



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-900	3	86	109	-23
2	-480	3	167	117	50
3	-60	3	363	113	250
4	360	3	226	113	113
5	780	3	138	117	21
6	1200	3	74	115	-41

DATA SHEET NO. 12
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: <u>2017 Hyundai Elantra four door sedan</u>	NHTSA No.: <u>M20174201</u>
Test Program: <u>NCAP Side MDB Impact Test</u>	Test Date: <u>6/21/2016</u>
Test Time: <u>10:55 AM</u>	Temperature: <u>21° C</u>

- 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 Details: No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	72	300	372
90° to 180°	66	300	366
180° to 270°	62	300	362
270° to 360°	67	300	367

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

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

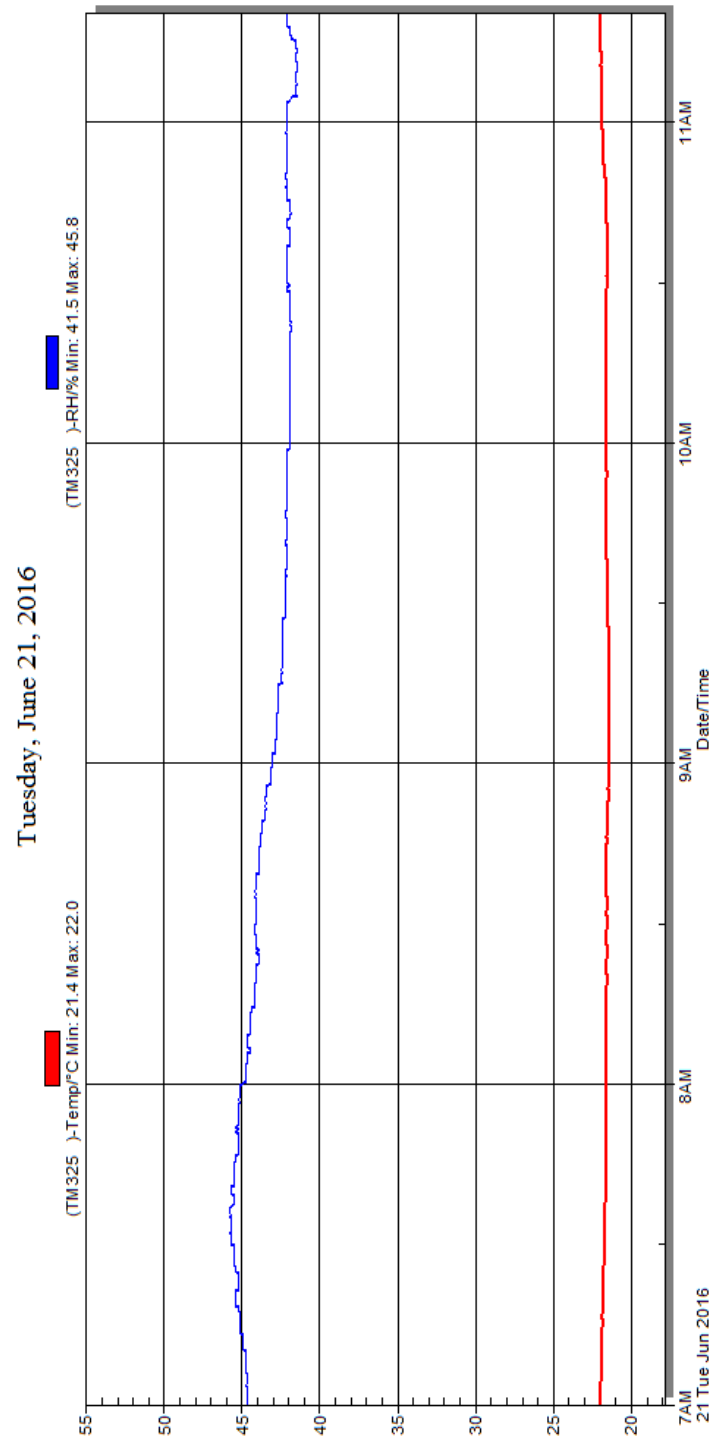
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	No Spillage Occurred
90° to 180°	No Spillage Occurred
180° to 270°	No Spillage Occurred
270° to 360°	No Spillage Occurred

DATA SHEET NO. 13
DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2017 Hyundai Elantra four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20174201
 Test Date: 6/21/2016



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

APPENDIX A
PHOTOGRAPHS

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Figure A-1: As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



Figure A-2: As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-3: Pre-Test Frontal View of Test Vehicle

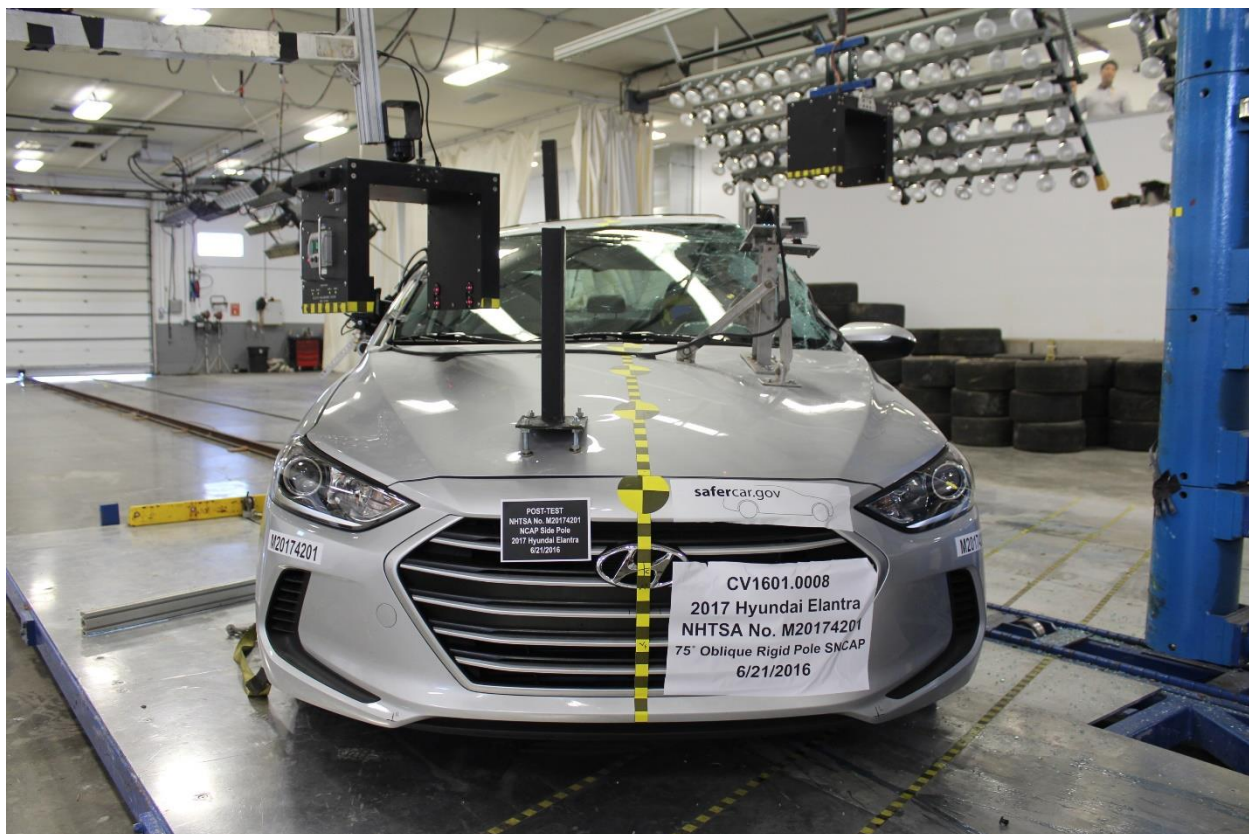


Figure A-4: Post-Test Frontal View of Test Vehicle



Figure A-5: Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-6: Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-7: Pre-Test Left Side View of Test Vehicle



Figure A-8: Post-Test Left Side View of Test Vehicle



Figure A-9: Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-10: Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



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

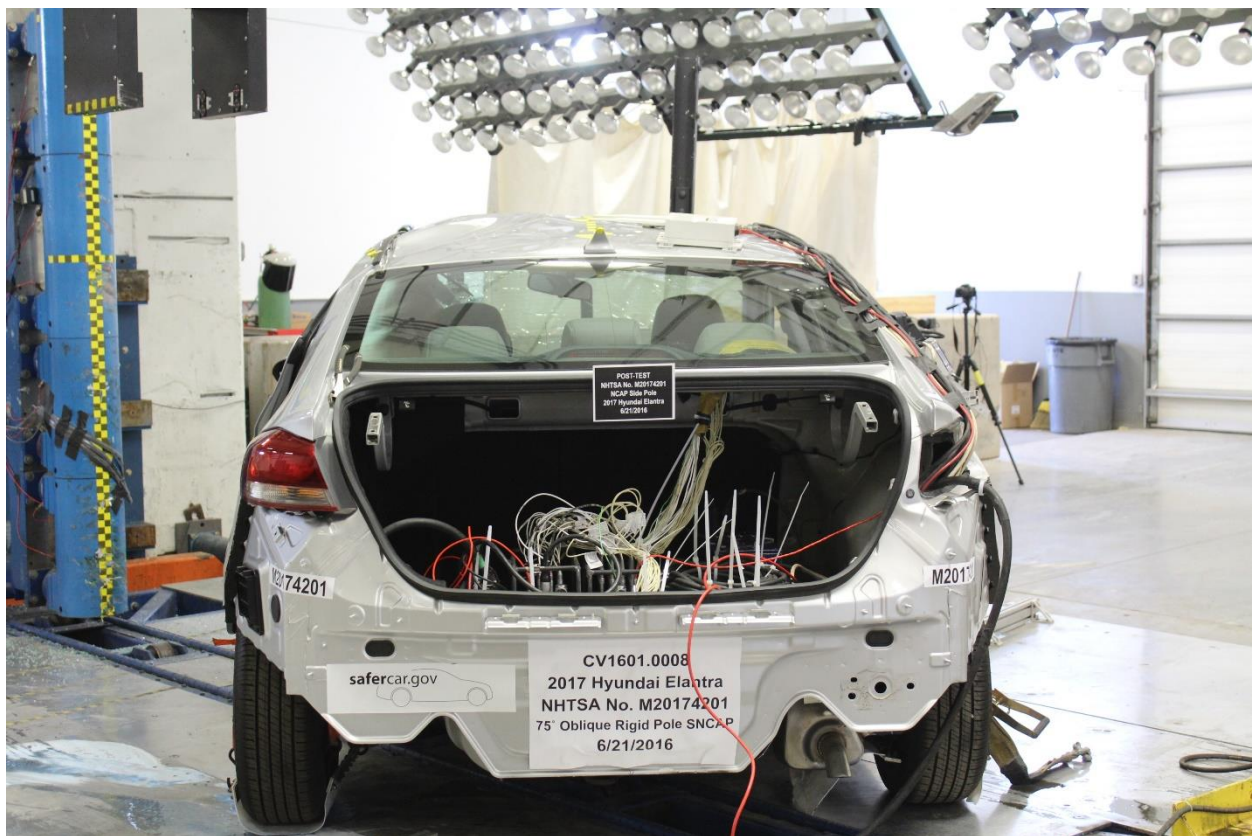


Figure A-12: Post-Test Rear View of Test Vehicle



Figure A-13: Pre-Test Right Side View of Test Vehicle



Figure A-14: Post-Test Right Side View of Test Vehicle



Figure A-15: Pre-Test Overhead View of Test Area

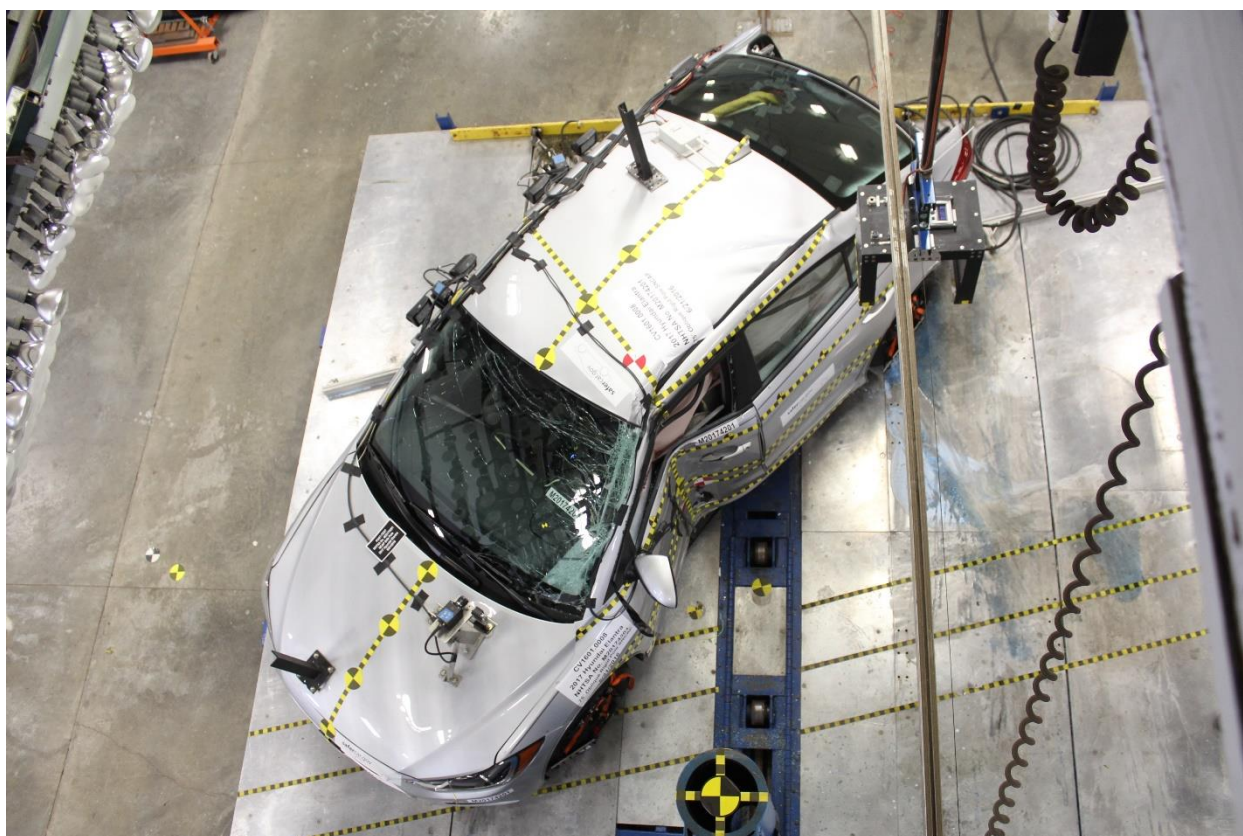


Figure A-16: Post-Test Overhead View of Test Area

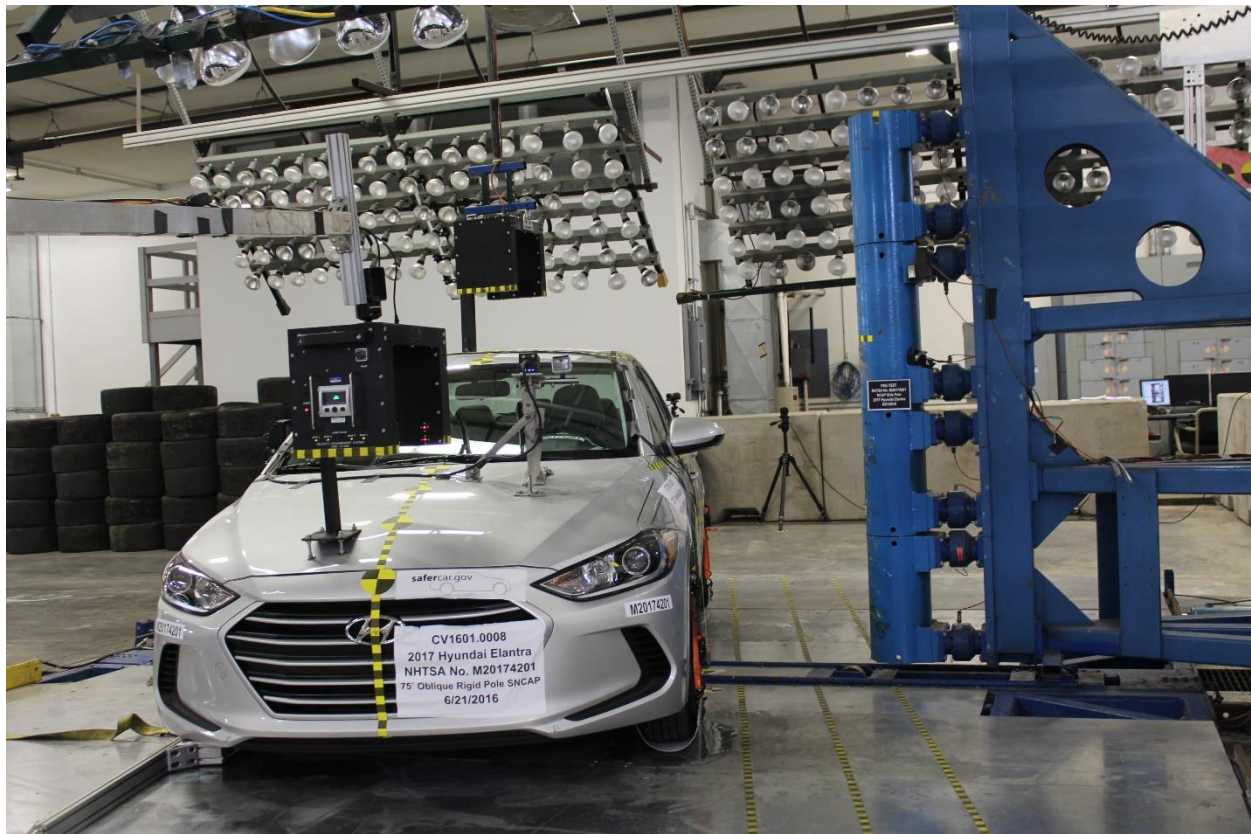


Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

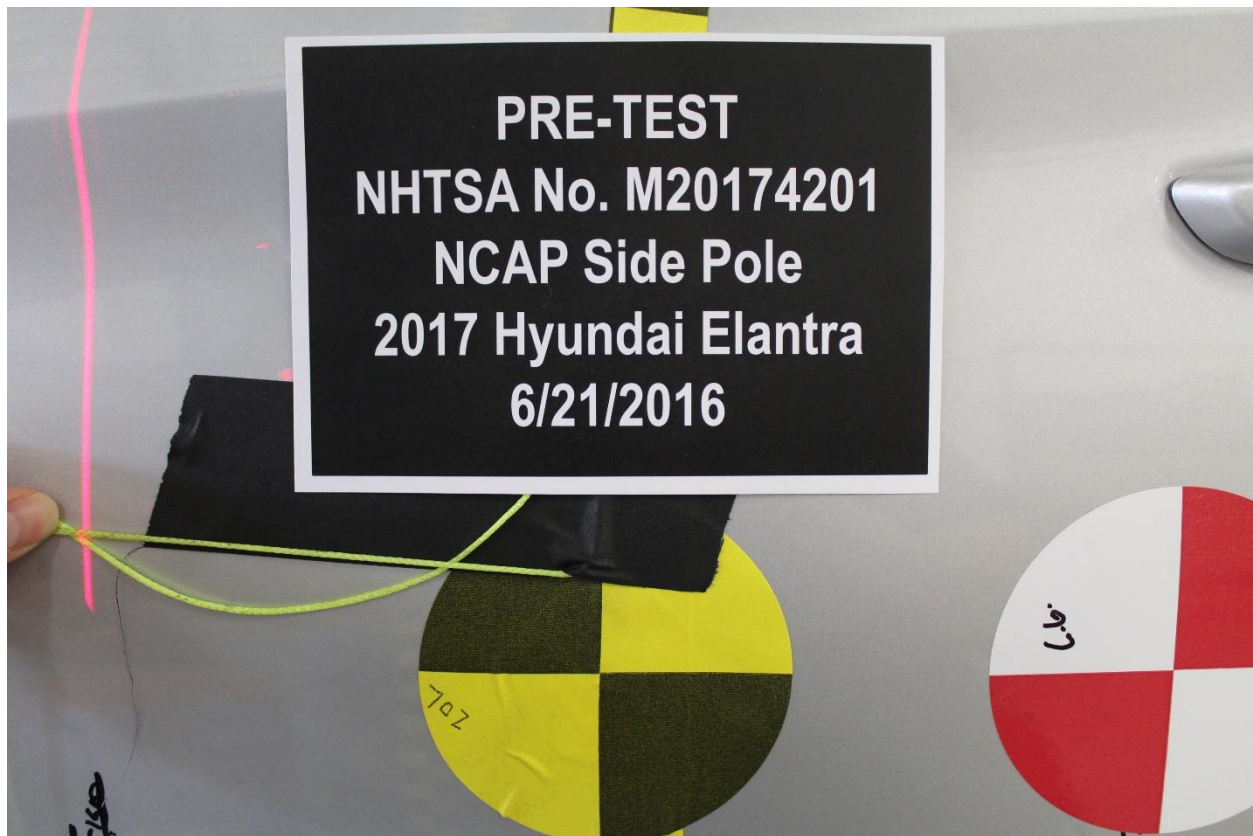


Figure A-19: Pre-Test Close-Up View of Impact Point Target



Figure A-20: Post-Test Close-Up View of Impact Point Target Showing Impact Location

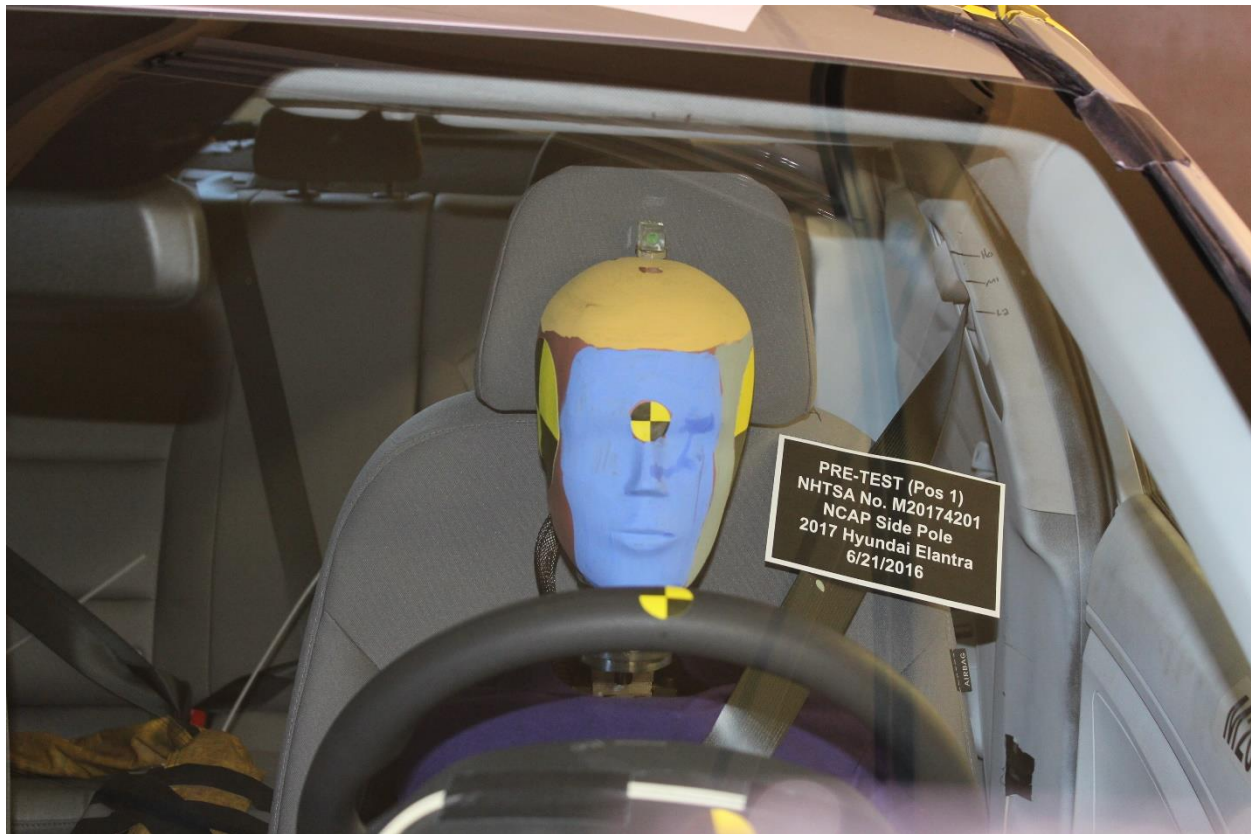


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest



Figure A-22: Post-Test Front Close-Up View of Dummy



Figure A-23: Pre-Test Left Side View of Dummy Showing Belt and Chalking



Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning

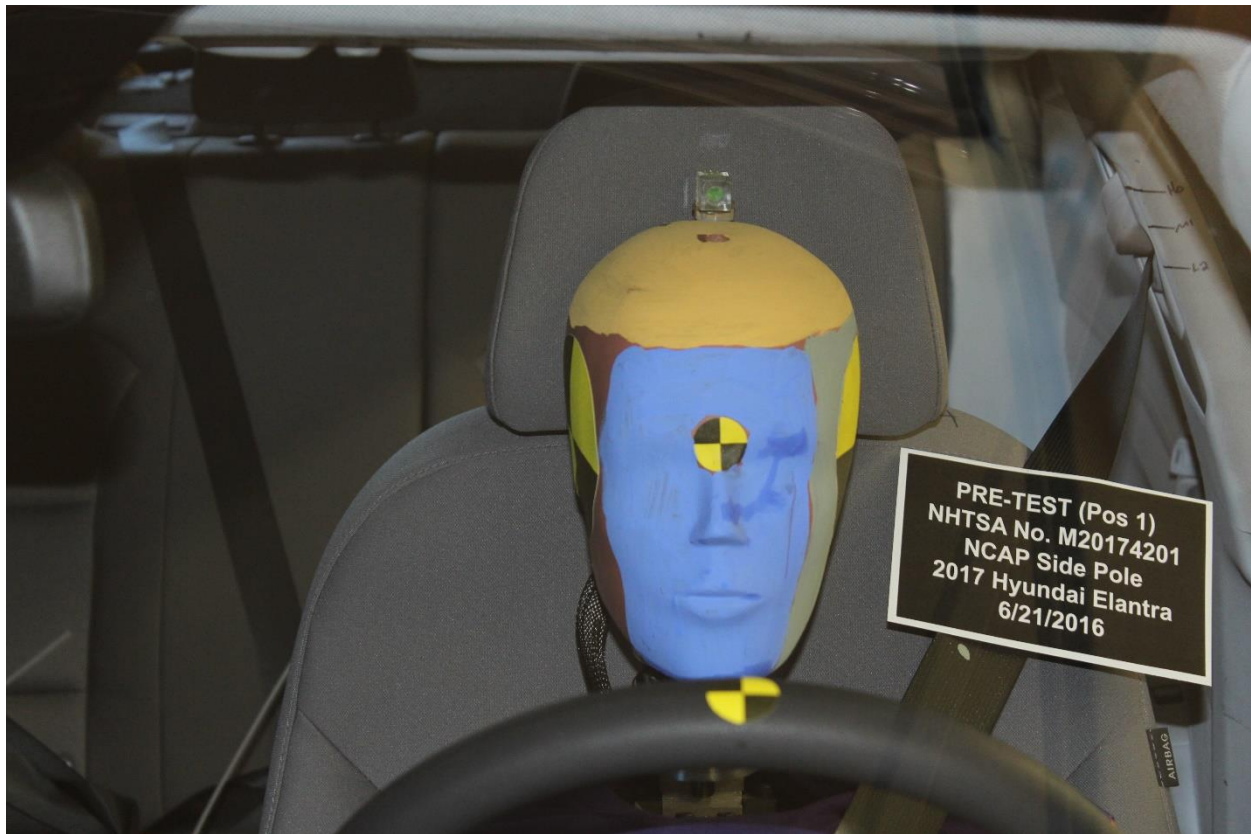


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan



Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Figure A-32: Pre-Test Placement of Dummy's Feet



Figure A-33: Pre-Test View of Belt Anchorage for Dummy

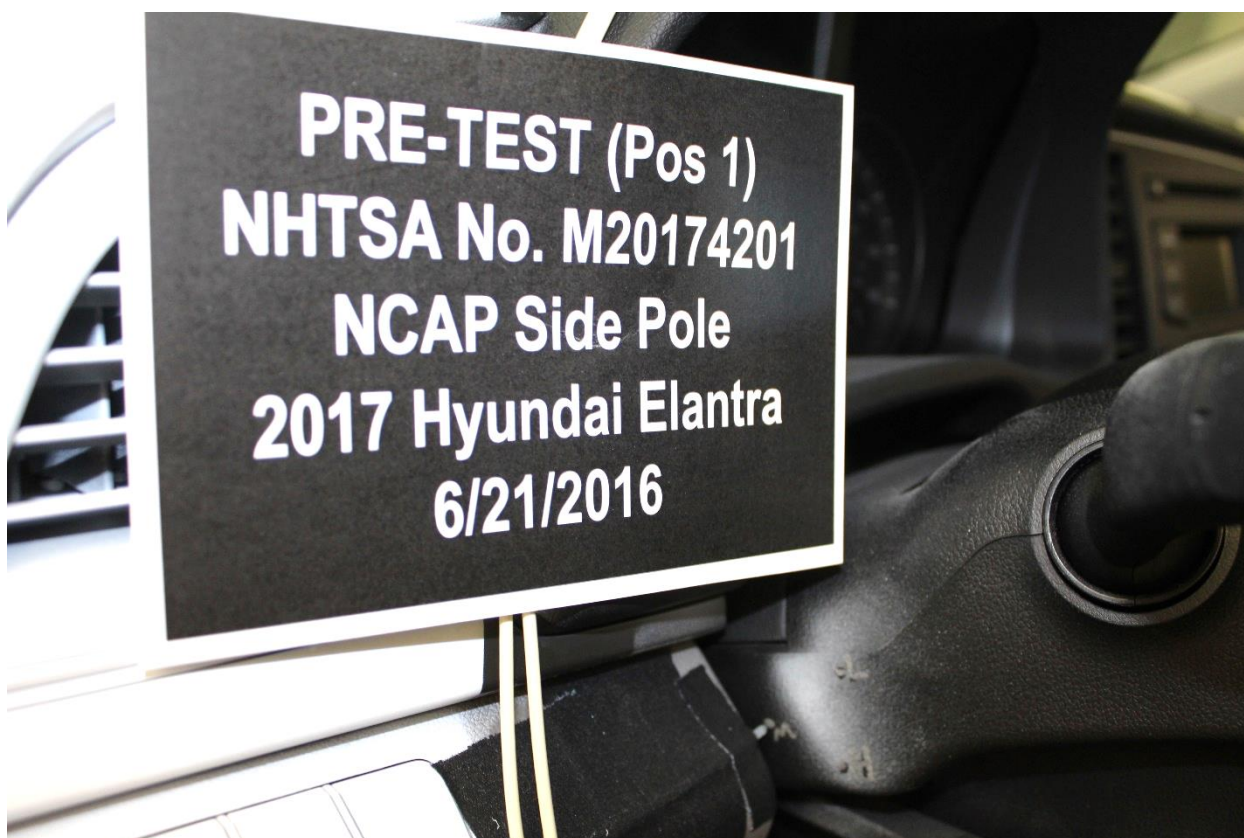


Figure A-34: Pre-Test Left Side View of Steering Wheel



Figure A-35: Pre-Test View of Disengaged Parking Brake



Figure A-36: Pre-Test View of Parking Brake



Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Track

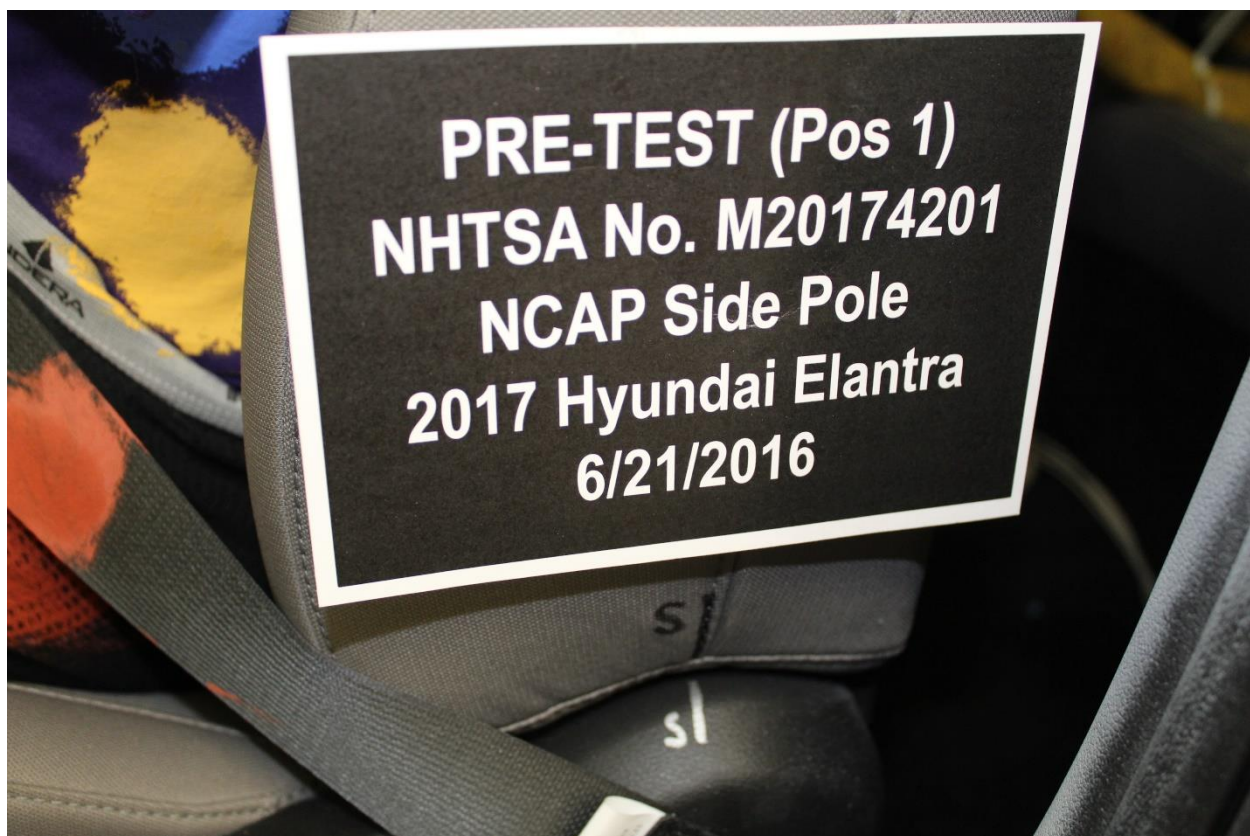


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



Figure A-39: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-40: Pre-Test Dummy and Door Clearance View



Figure A-41: Post-Test Dummy and Door Clearance View

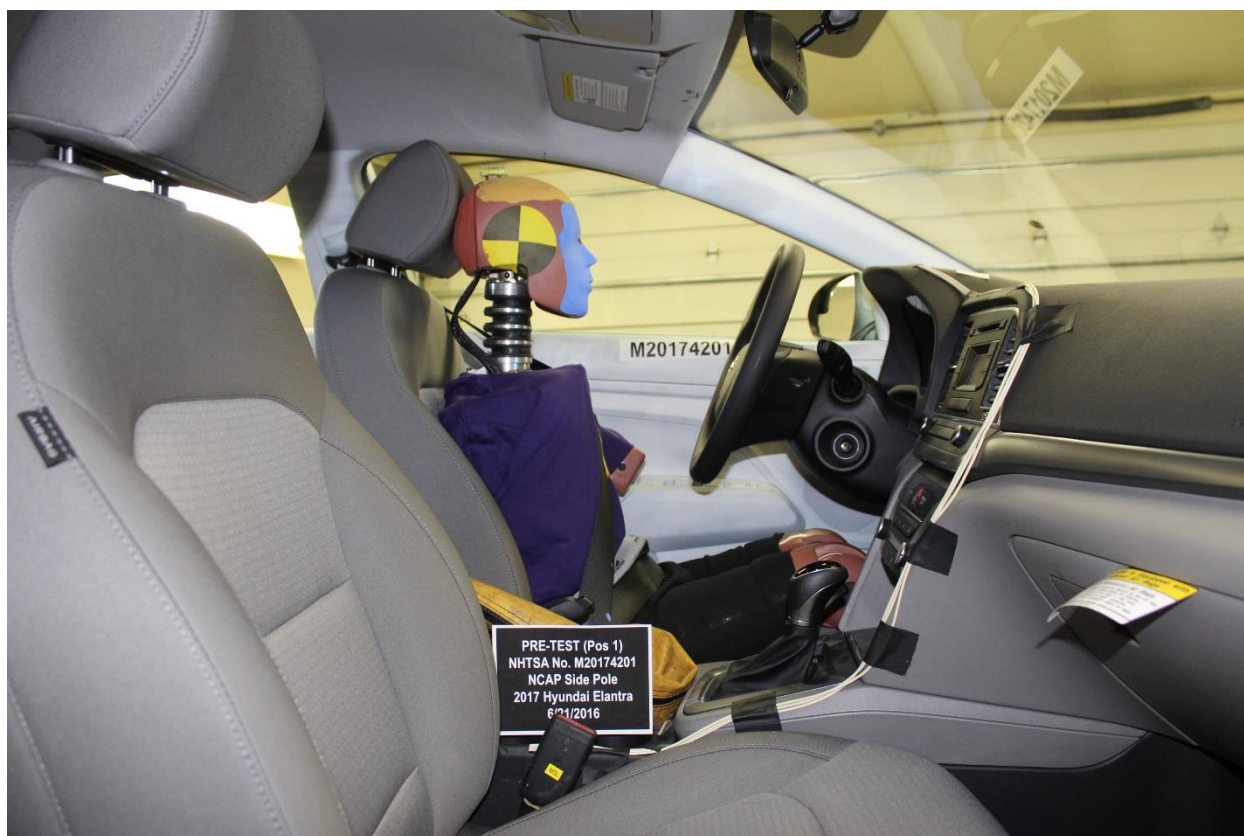


Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment

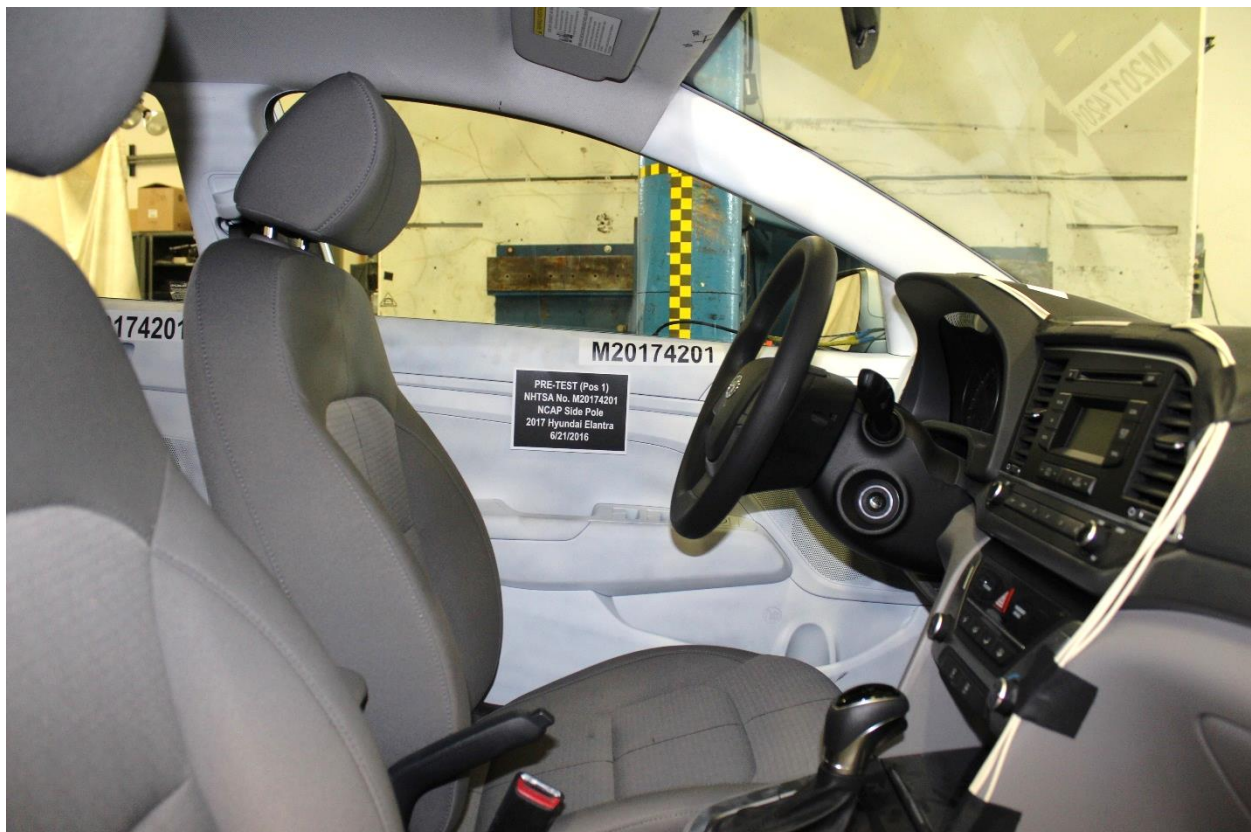


Figure A-44: Pre-Test Inner Door Panel View



Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



Figure A-46: Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View

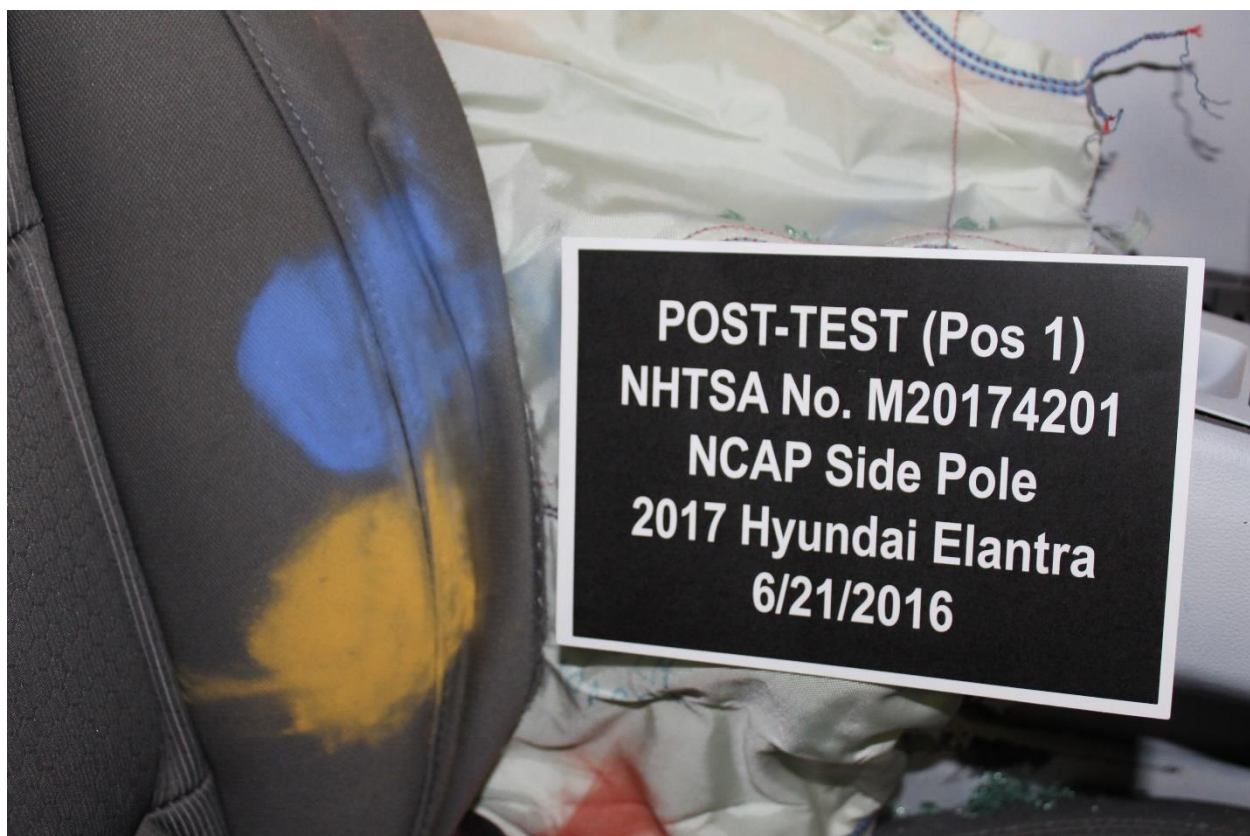


Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View

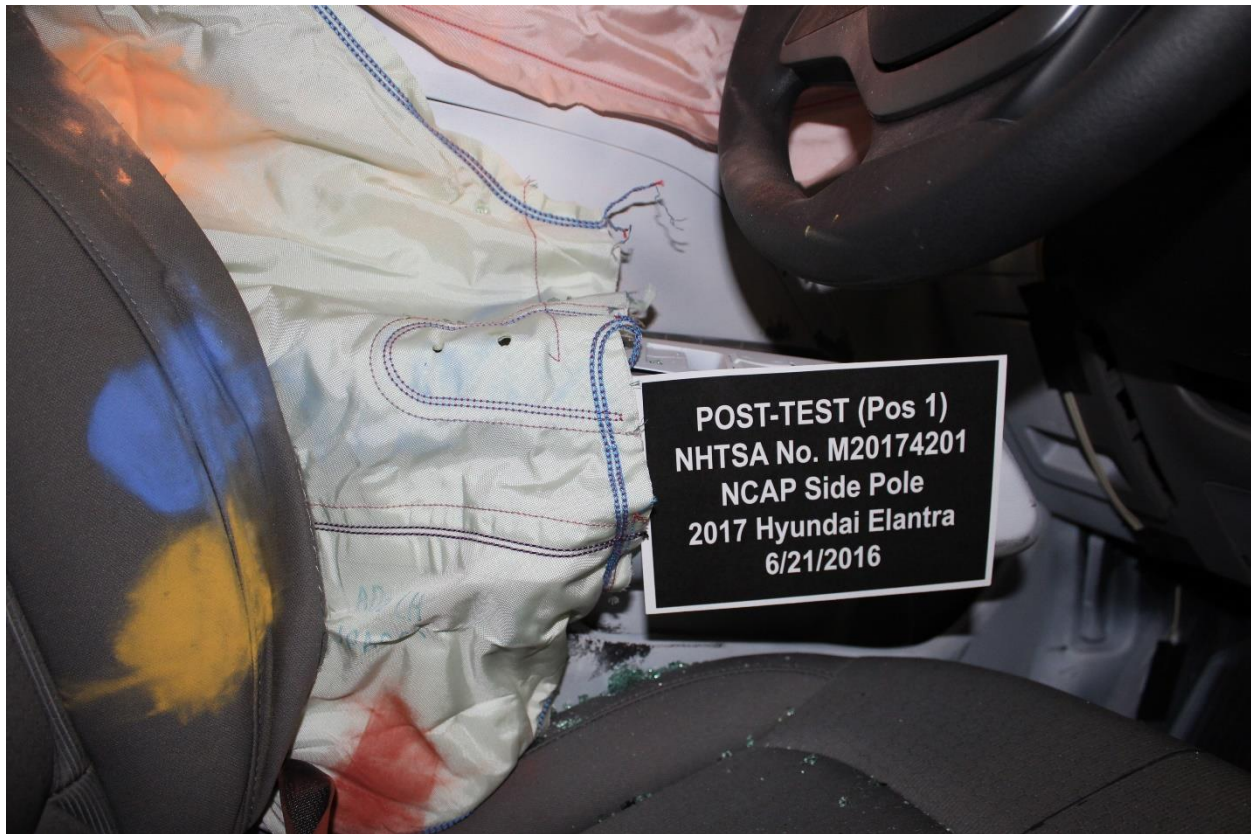


Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



Figure A-50: Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Figure A-51: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View

Photo Not Applicable

Figure A-52: Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Figure A-53: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

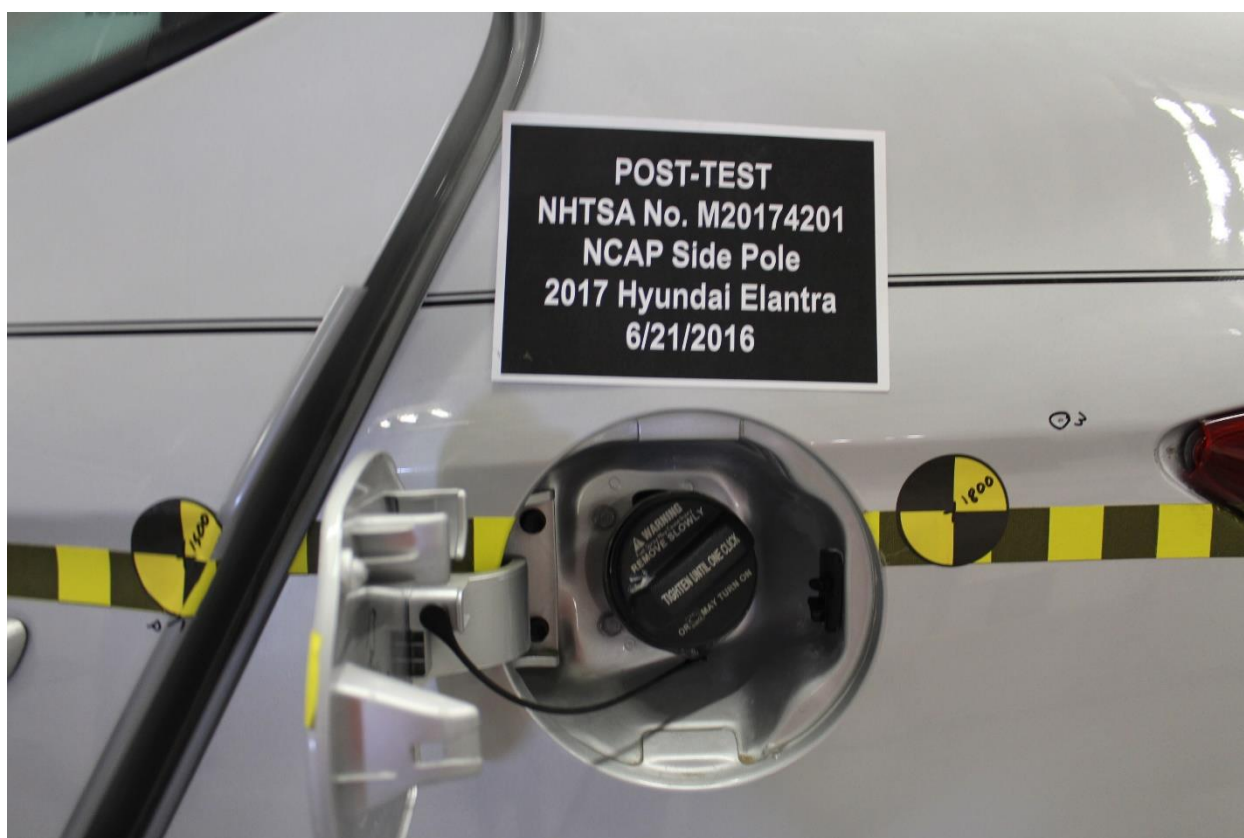


Figure A-54: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

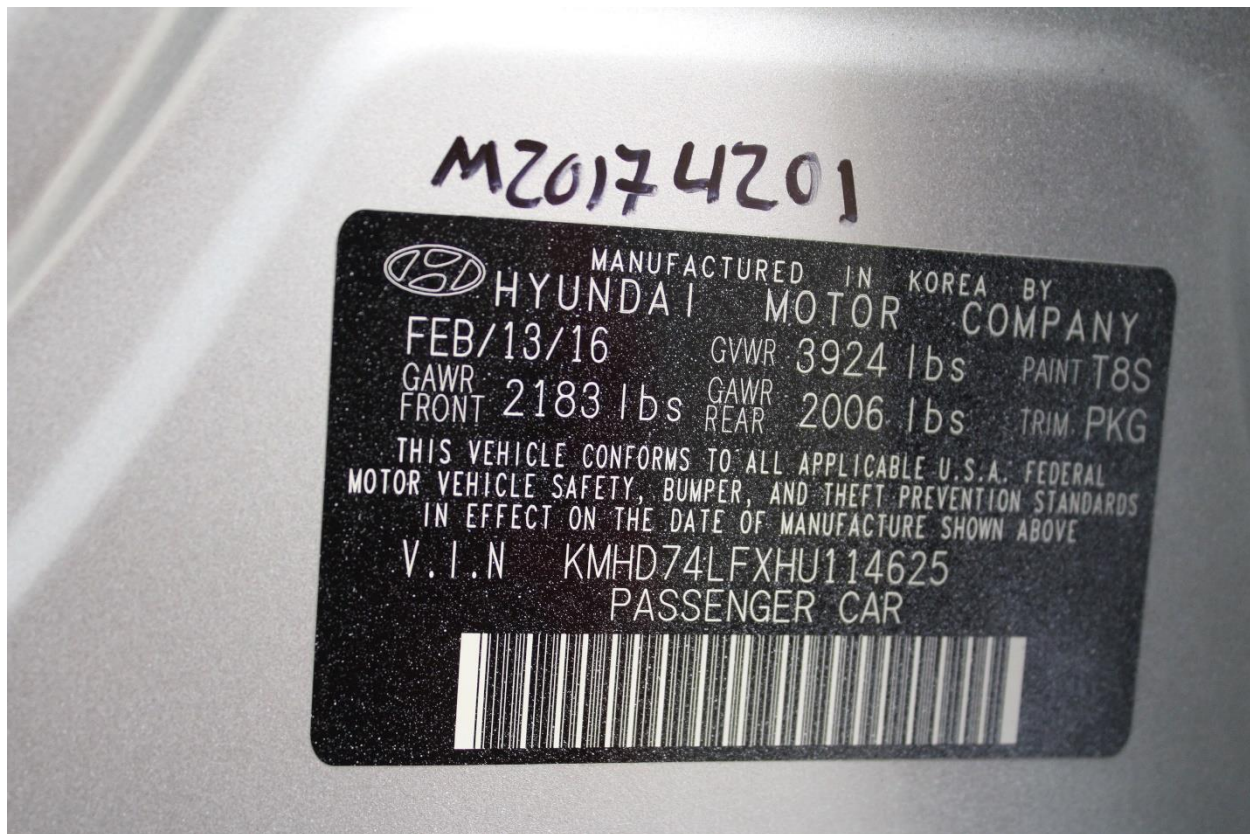


Figure A-55: Close-Up View of Vehicle's Certification Label



Figure A-55a: Close-Up View of Reduced Load Capacity Label



Figure A-56: Close-Up View of Vehicle's Tire Information Placard or Label



Figure A-57: Pre-Test Pole Barrier Front View

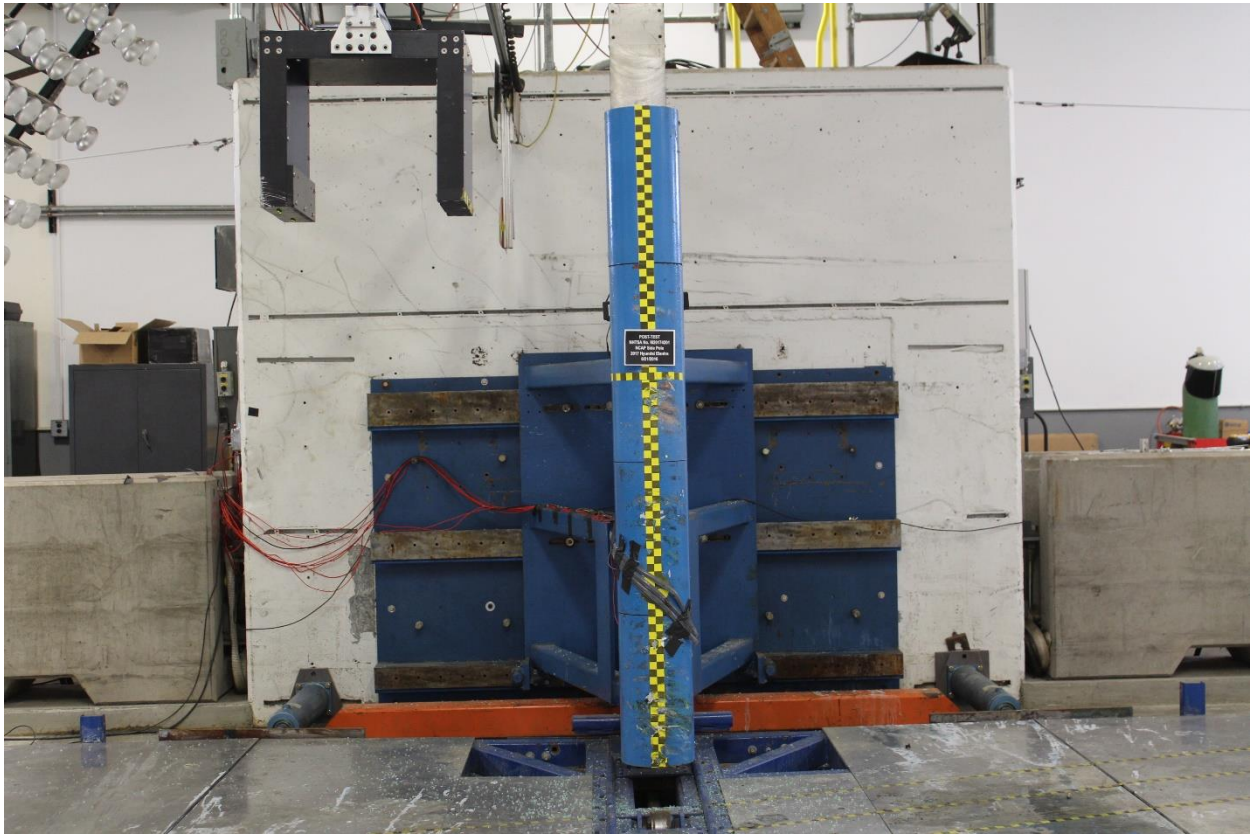


Figure A-58: Post-Test Pole Barrier Front View



Figure A-59: Pre-Test Pole Barrier Side View

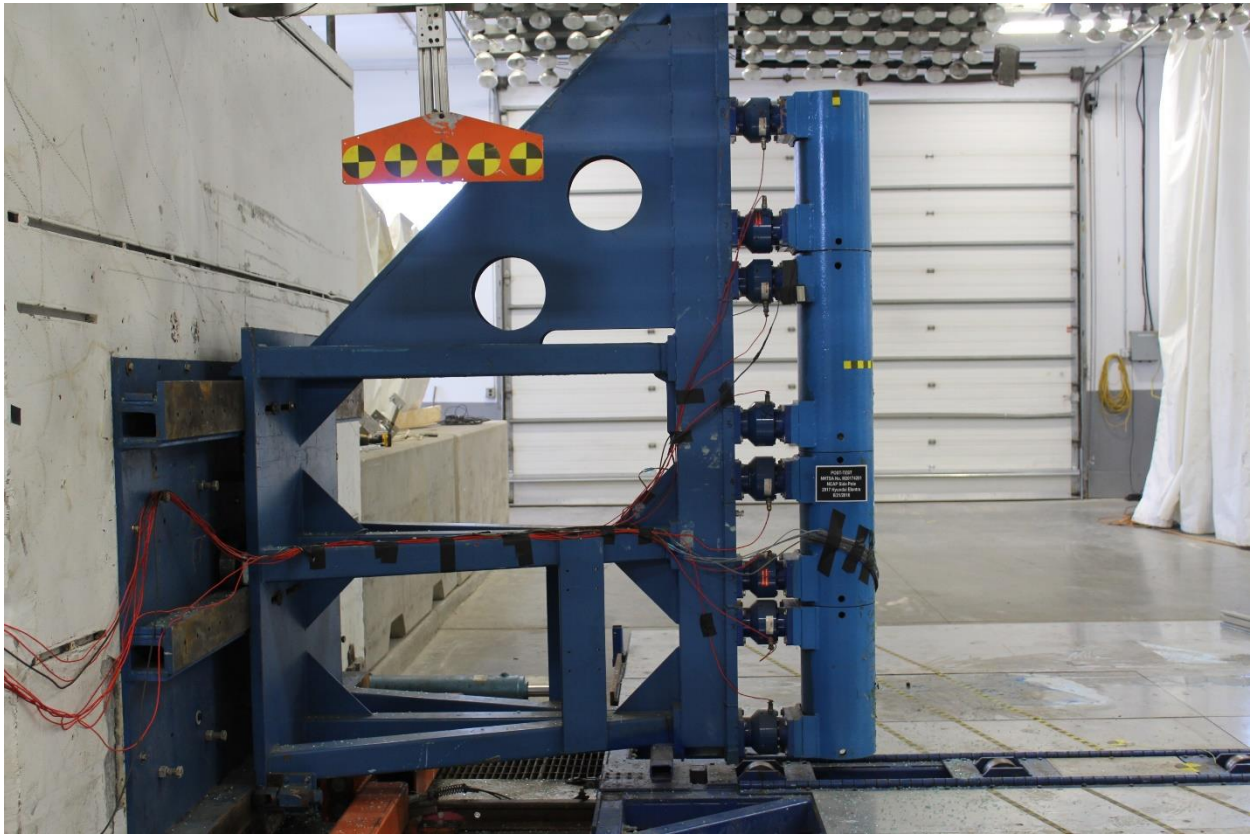


Figure A-60: Post-Test Pole Barrier Side View



Figure A-61: Pre-Test Ballast View



Figure A-62: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-63: FMVSS No. 301 Static Rollover 0 Degrees



Figure A-64: FMVSS No. 301 Static Rollover 90 Degrees

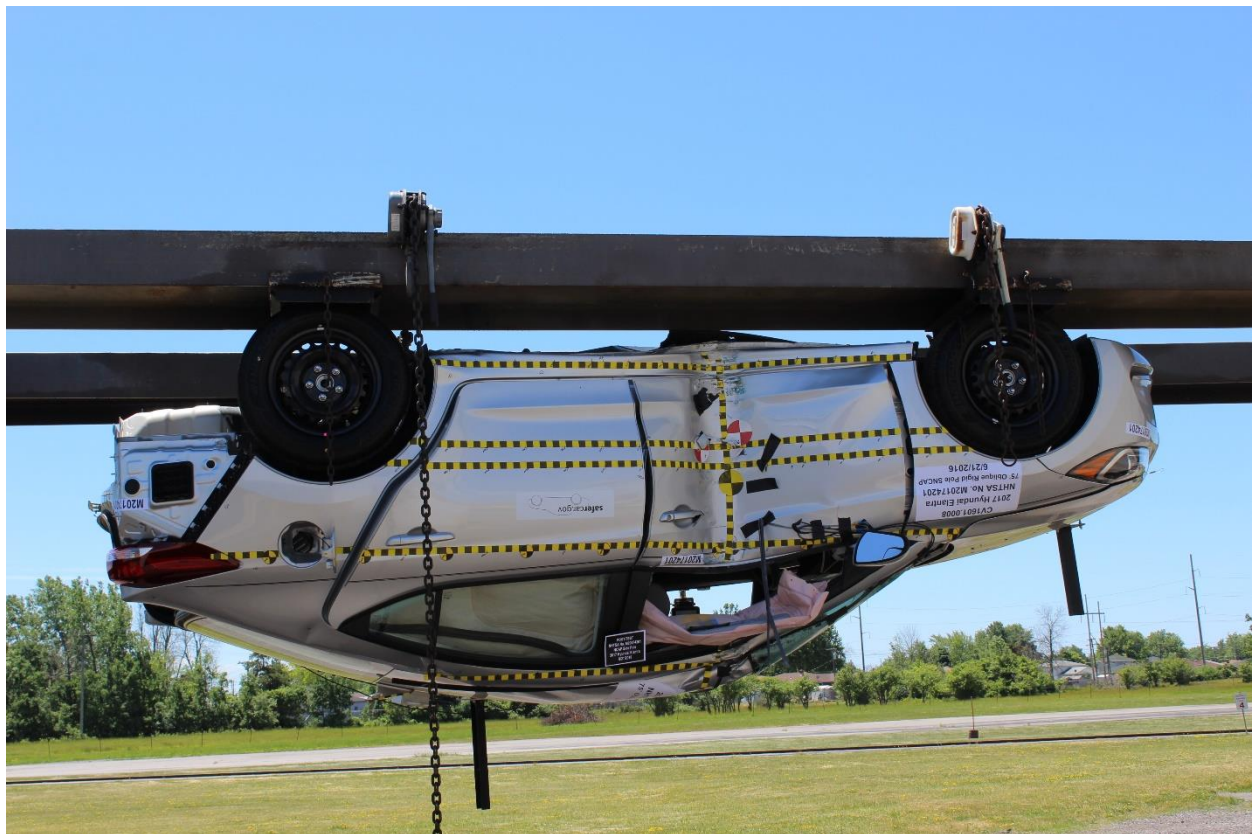


Figure A-65: FMVSS No. 301 Static Rollover 180 Degrees



Figure A-66: FMVSS No. 301 Static Rollover 270 Degrees



Figure A-67: FMVSS No. 301 Static Rollover 360 Degrees

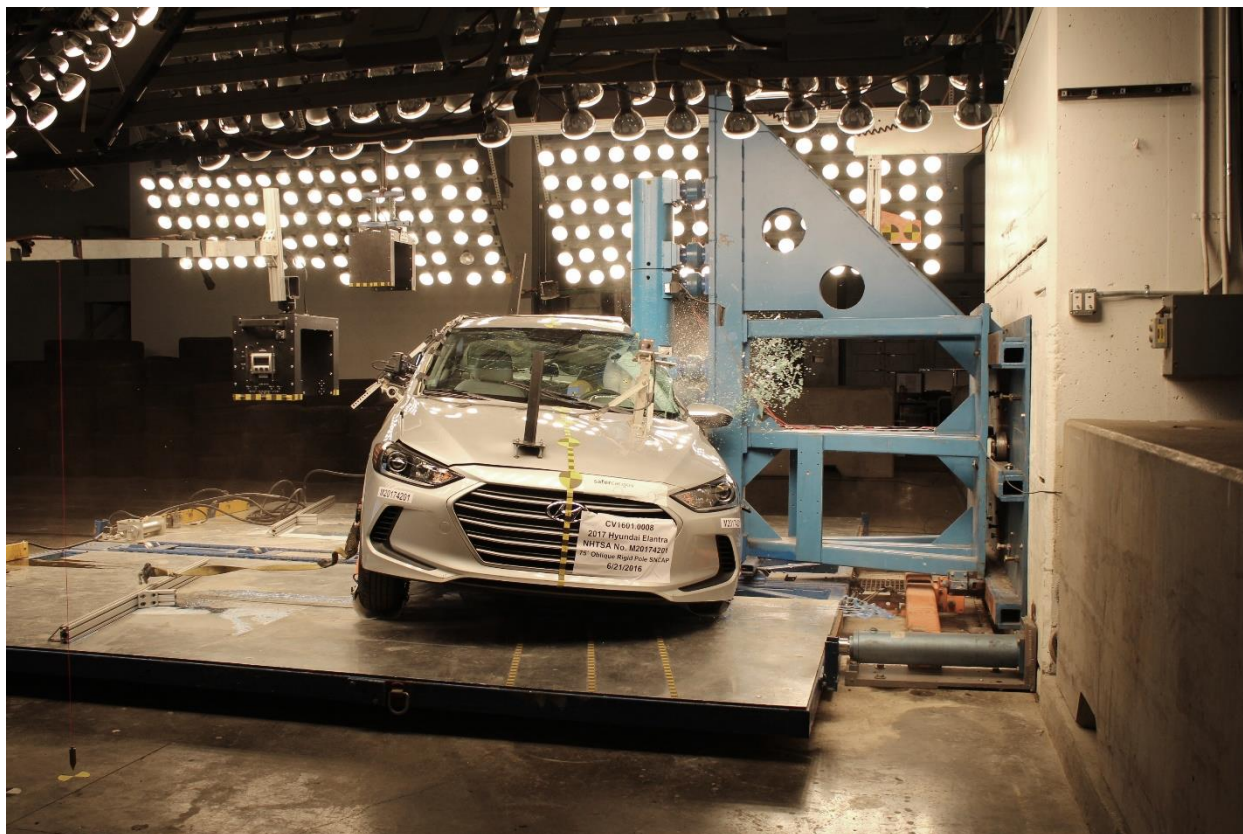


Figure A-68: Impact Event

HYUNDAI 2017 ELANTRA SE

SOLD TO: IL007 SHIPPED TO: IL007
ROSEN HYUNDAI
711 S RANDALL ROAD
AUBURN, IL 62422

VIN: KMHD74LF0H4U114825
MODEL: 48403F45
ENGINE: G4NH/GU750048
PT: SYMPHONY AIR SILVER
EXTERIOR COLOR: GRAY/GRAY
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 12 lbs / 5 kgs
EMISSIONS: This vehicle is certified to meet emission requirements in all 50 states.

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

STANDARD FEATURES:
AMERICA'S BEST WARRANTY
5-year/60,000-mile New Vehicle Warranty*
10-year/100,000-mile Powertrain Warranty*
7-year/100,000-mile Anti-rust/perforation Warranty*
5-year/100,000-mile Roadside Assistance
*Limitations apply, see dealer for details.

ADVANCED SAFETY TECHNOLOGY:
Electronic Stability Control (ESC) w/ Traction Control
ABS w/ Electronic Brake Force Distribution & Brake Assist
Vehicle Stability Management (VSM)
Front, Front Side Impact & Side Curtain Airbags
Driver's Knee Airbag & Driver's Blind Spot Mirror

POWERTRAIN TECHNOLOGY:
2.0L 147 HP, 152 lbs-ft Torque, DOHC 4-Cylinder
Dual Continuous Variable Valve Timing
6-Speed Automatic Transmission w/ SHIFTRONIC®
Drive Mode Select (Normal / Sport / Eco)

EXTERIOR:
18-inch Steel Wheels with 185/65 R15 Tires
Projector headlights w/ Daytime Running Lights
Dual Bodyside Door Handles & Mirrors

COMFORT & CONVENIENCE:
AM/FM/CD/MP3 Audio System w/ 6 Speakers
Six-speaker Radio w/ HD Radio (not available in AK & HI)
iPod/USB & Auxiliary Input Jacks
Air Conditioning w/ Cabin Air Filter
Map Lights w/ Sunglass Holder
3.5-inch Segment LCD Cluster Display
Trip Computer & External Temperature Display
Tilt and Telescopic Steering Wheel
Driver & Passenger Seat Height Adjustment
Center Armrest w/ Flip-up Storage Compartment
Center Console Mounted Rear Cupholders
Power Windows and Door Locks
6-speaker Surround Sound System
Remote Keyless Entry w/ Alarm
Temporary Compact Spare Tire
Full Tank of Gas

Manufacturer's Suggested Retail Price: \$18,150.00

ADDED FEATURES:
"Cargobay" Floor Mats \$125.00
"Cargobay" Tray \$100.00
"First Aid Kit" \$30.00

Intend Freight & Handling: \$335.00
Total Price: \$19,240.00

ALL-NEW 2017 ELANTRA
STYLE THAT RAISES THE BAR

EPA Fuel Economy and Environment Gasoline Vehicle

Fuel Economy
33 MPG combined city/hwy
29 city
38 highway
3.0 gallons per 100 miles

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

Annual fuel cost \$1,100

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)
1 8 10 Best 1 7 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 26 MPG and costs \$7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at 1.2-1.5 per gallon. EPA's is miles per gallon (tailpipe only). Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov
Calculate personalized estimates and compare vehicles

STANDARD OR CODE

PART CONTENT INFORMATION
FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT:
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 97 %

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: ULSAN, KOREA
COUNTRY OF ORIGIN: KOREA
ENGINE: KOREA
TRANSMISSION: KOREA

65 A 00576M0RNI 16

Figure A-69: Monroney Label

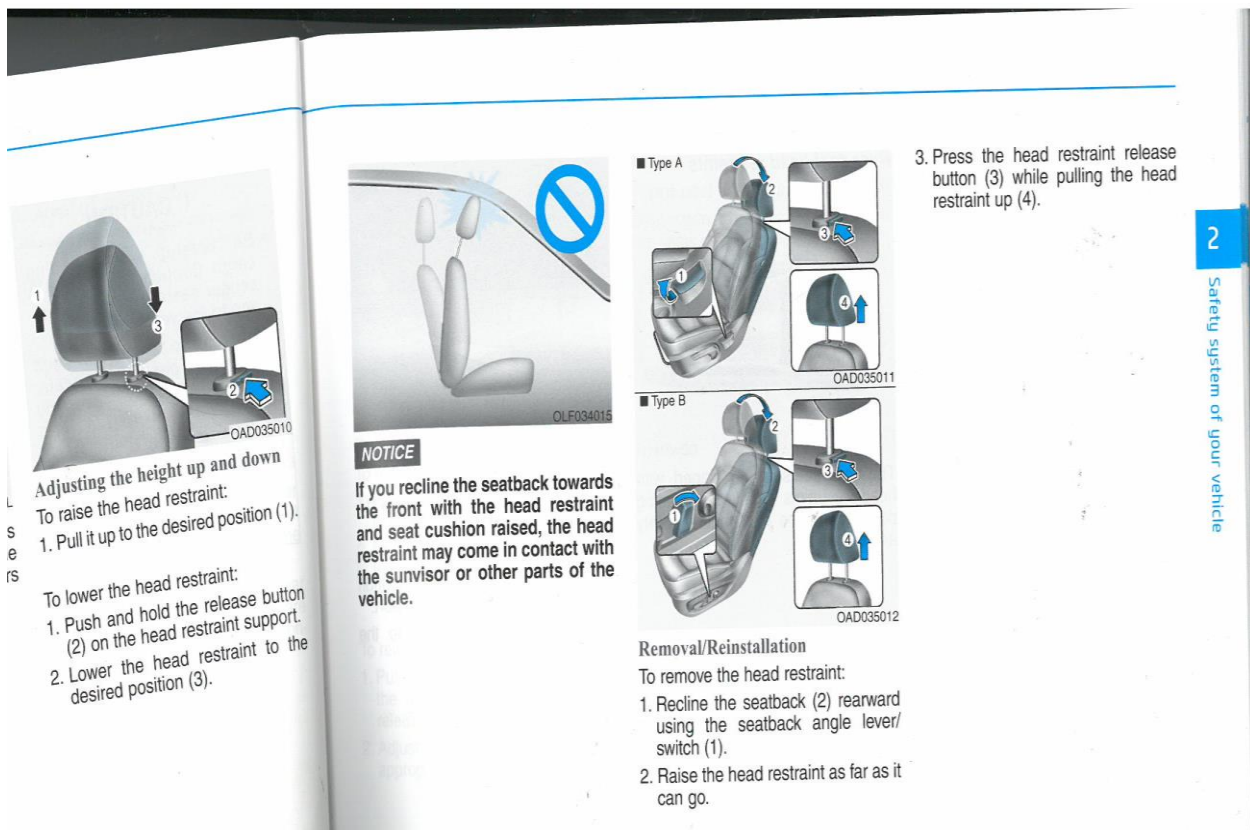


Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



Figure A-71: Post-Test View of Shattered Vehicle Inner Door Panel (if applicable)

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver Dummy Instrumentation Plots

Fig.	Description	Page
1	Driver Head Acceleration (X) Primary vs. Time	B-4
2	Driver Head Acceleration (Y) Primary vs. Time	B-4
3	Driver Head Acceleration (Z) Primary vs. Time	B-4
4	Driver Head Resultant Acceleration Primary vs. Time	B-4
5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-5
6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-5
7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-5
8	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-5
9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-6
10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-6
11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-6

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov.

Additional Driver Dummy Instrumentation Data

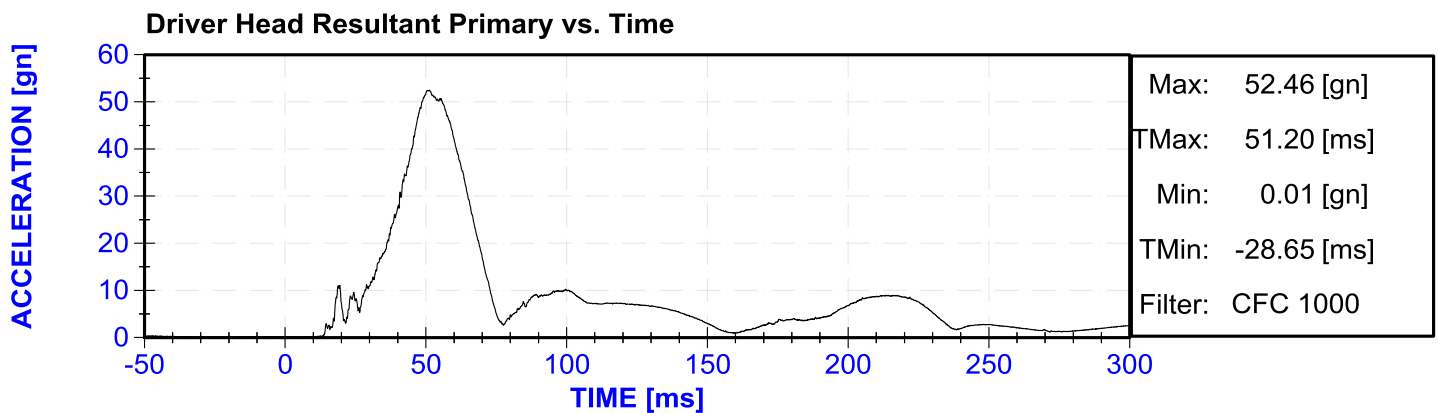
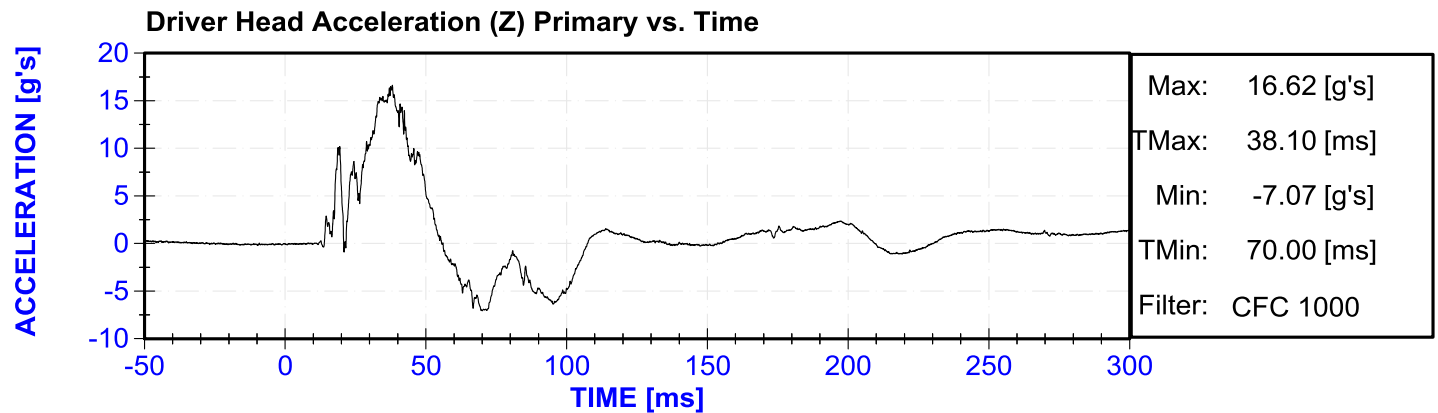
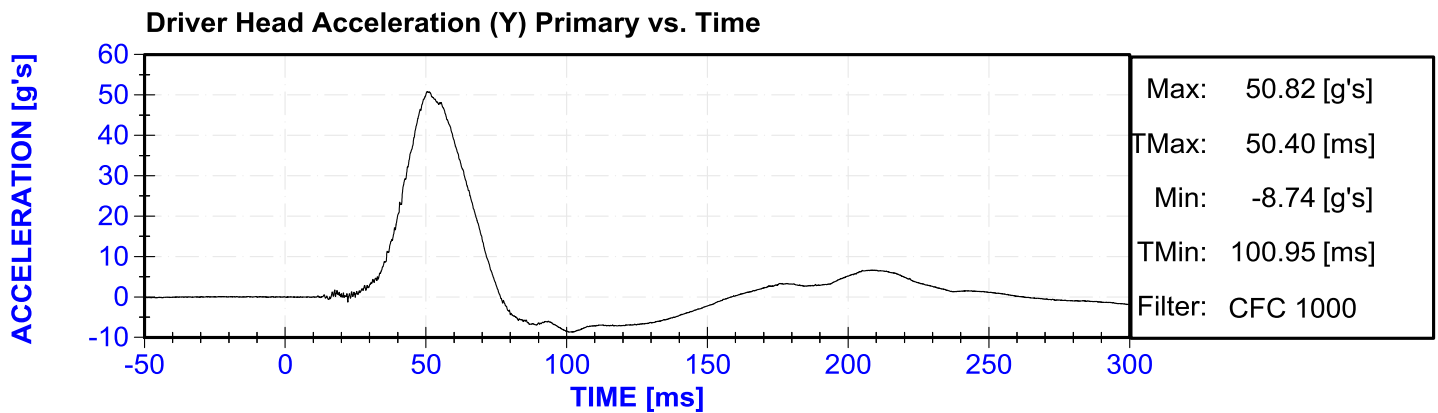
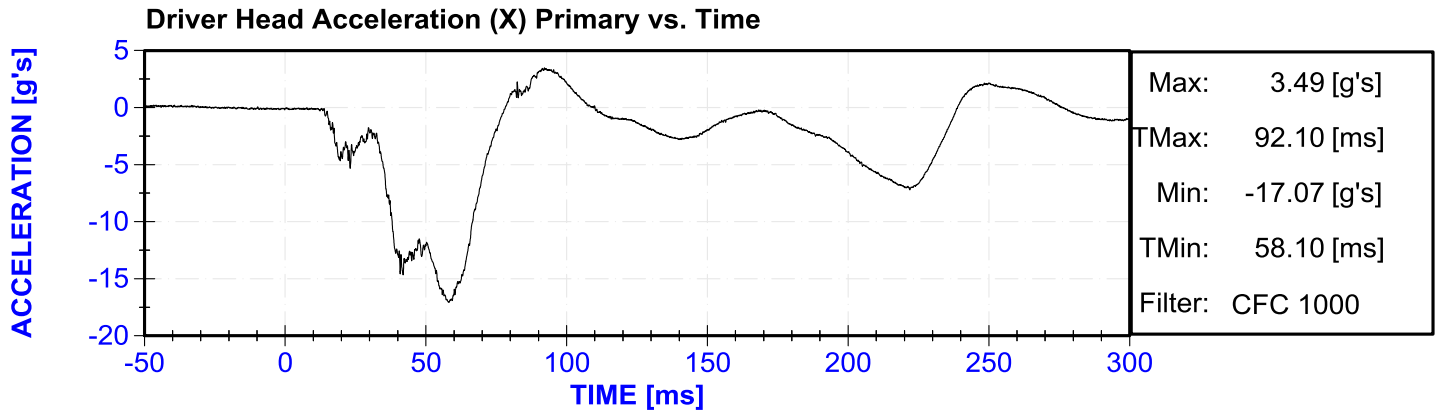
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)

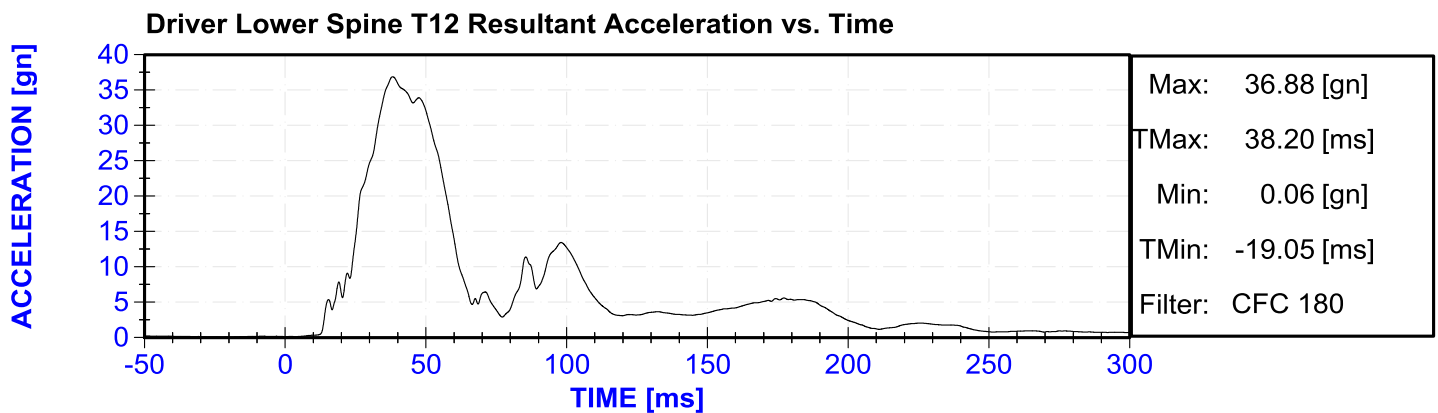
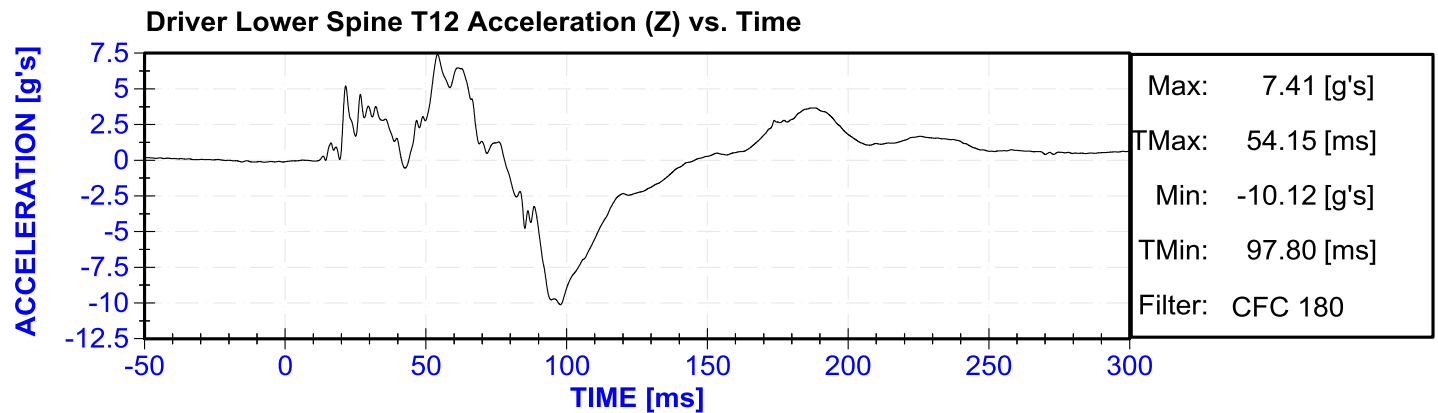
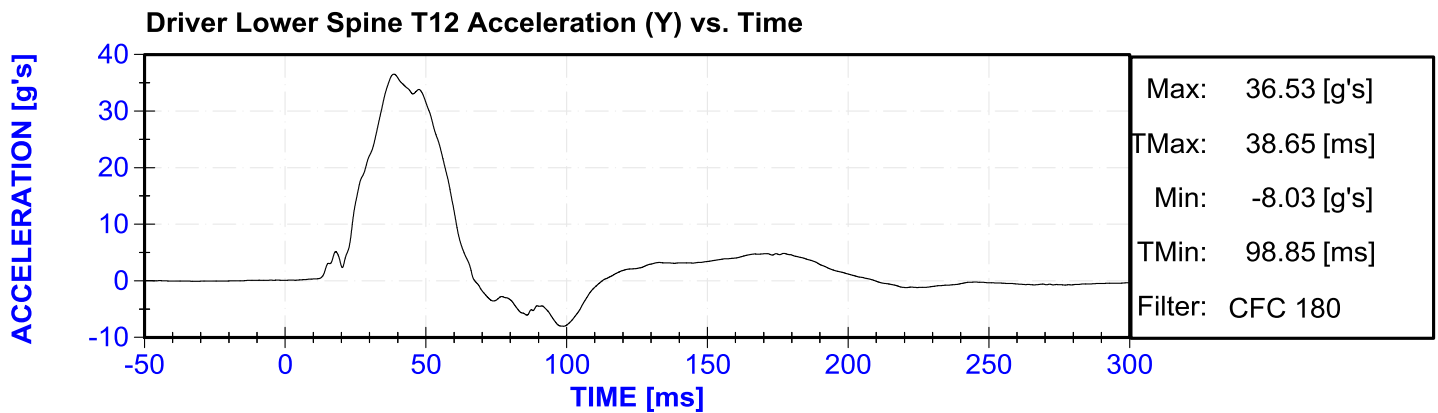
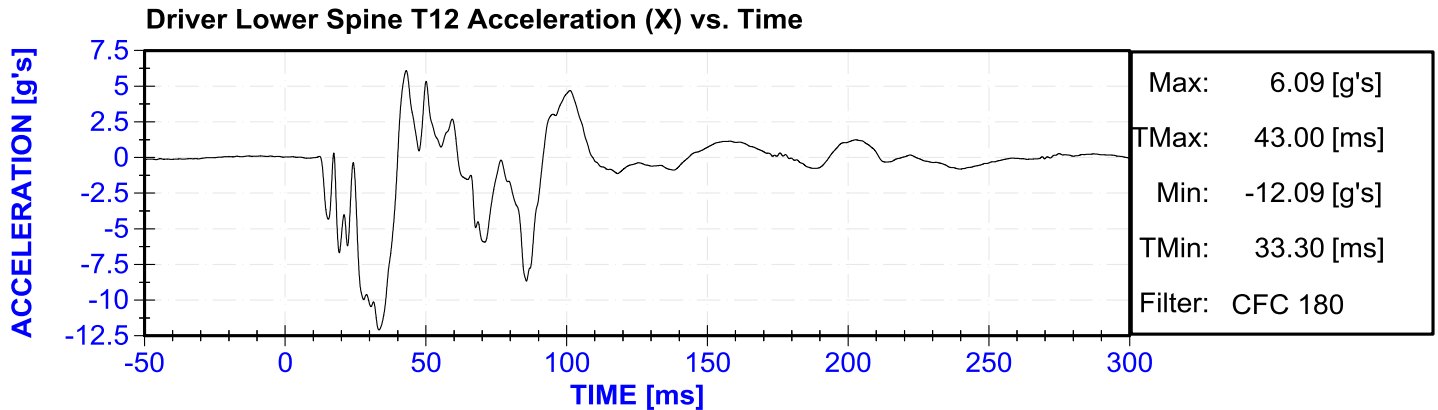
Vehicle Instrumentation Data

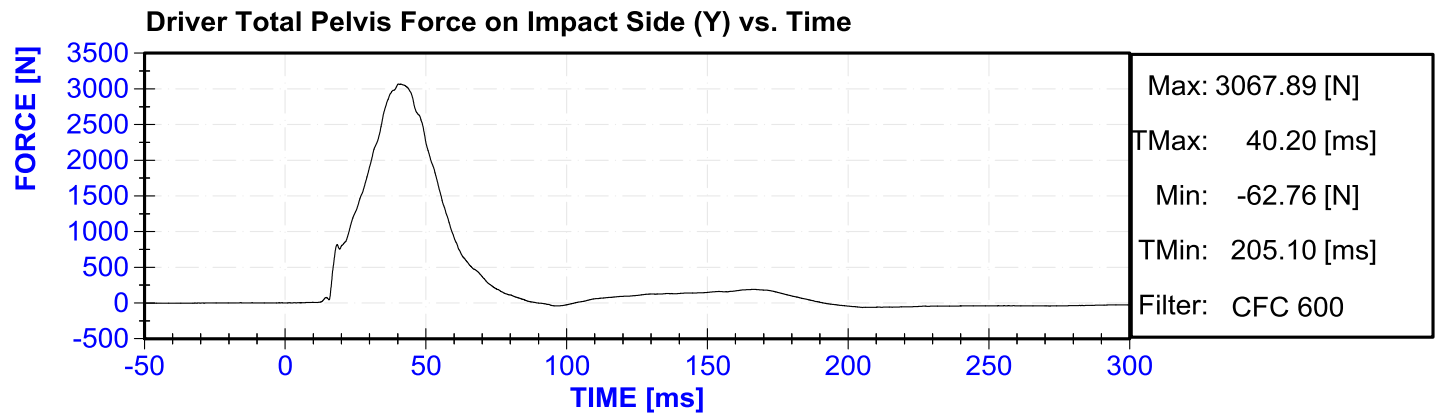
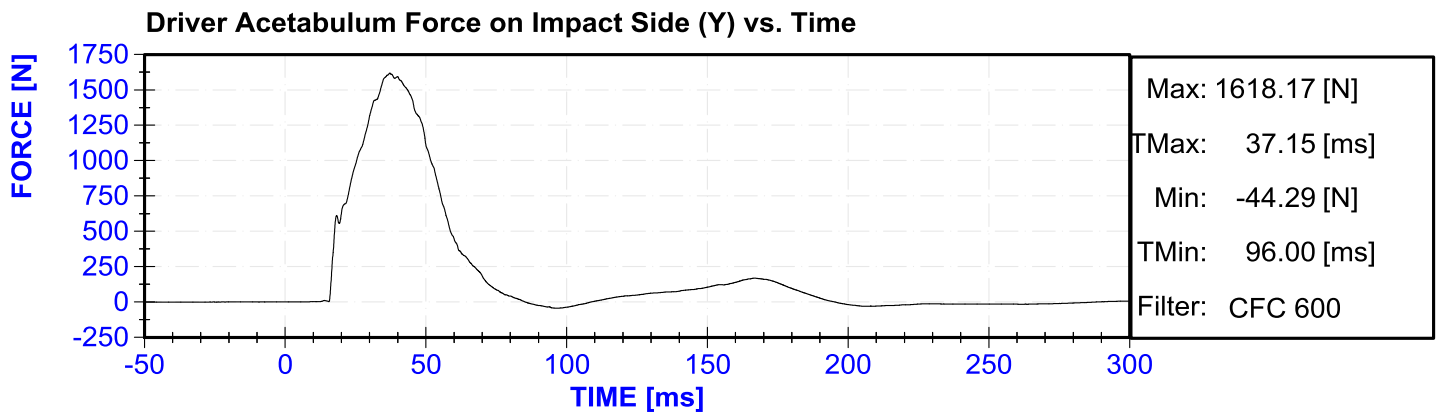
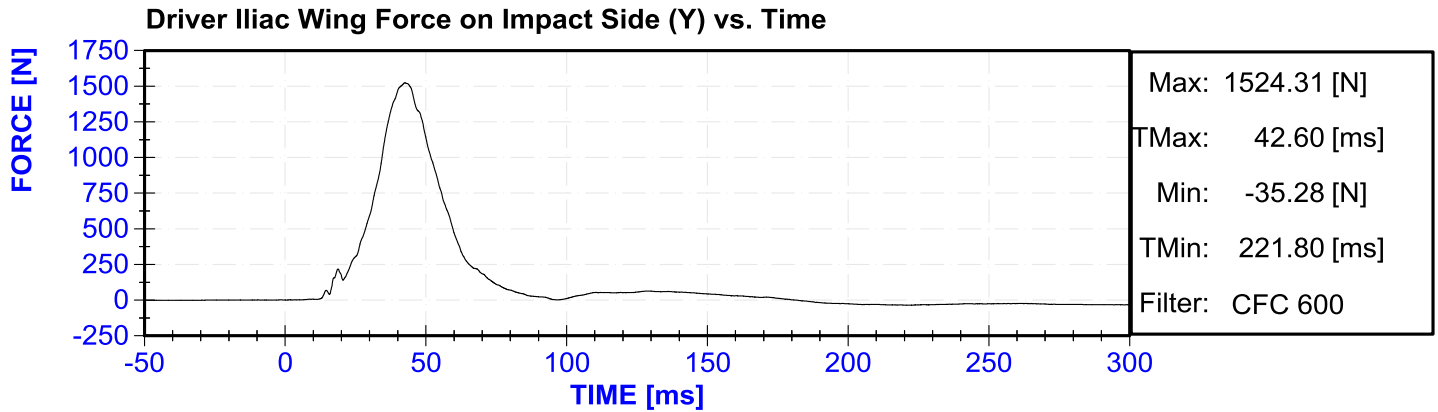
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)







APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

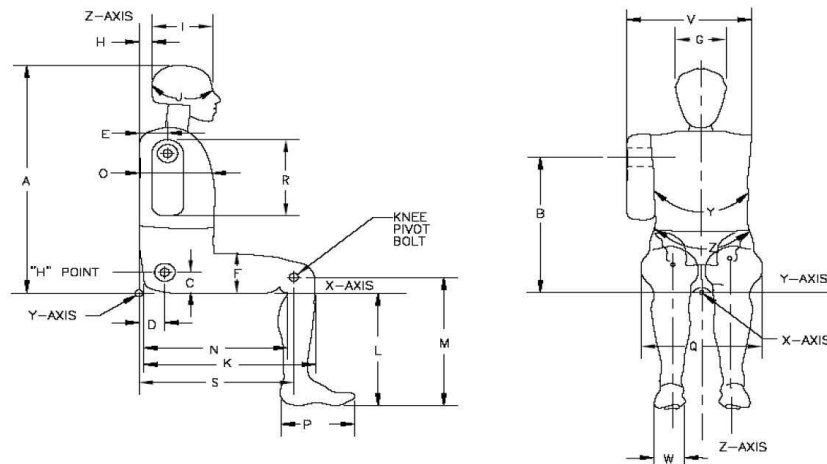


External Measurements - SID-IIs

Technician: M. Geesey

Date: 6/20/2016

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	128	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	350	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	481	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	861	Pass
Z	Waist Circumference	761	791	770	Pass

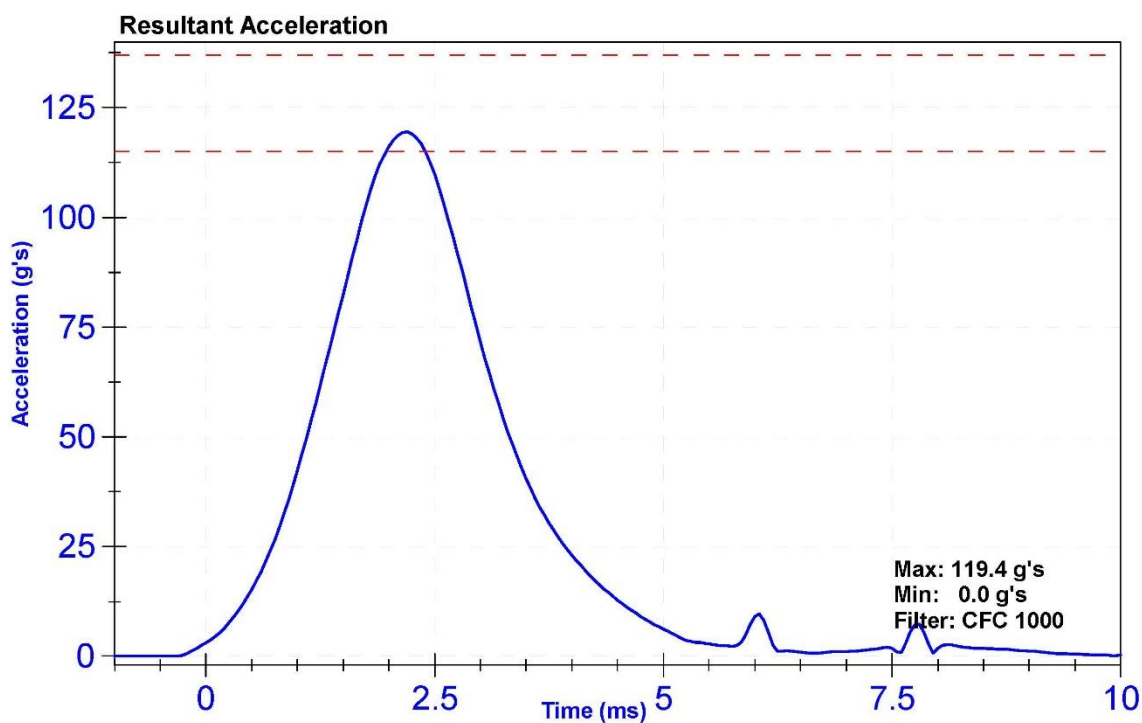
ATD Manufacturer	First Technology	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

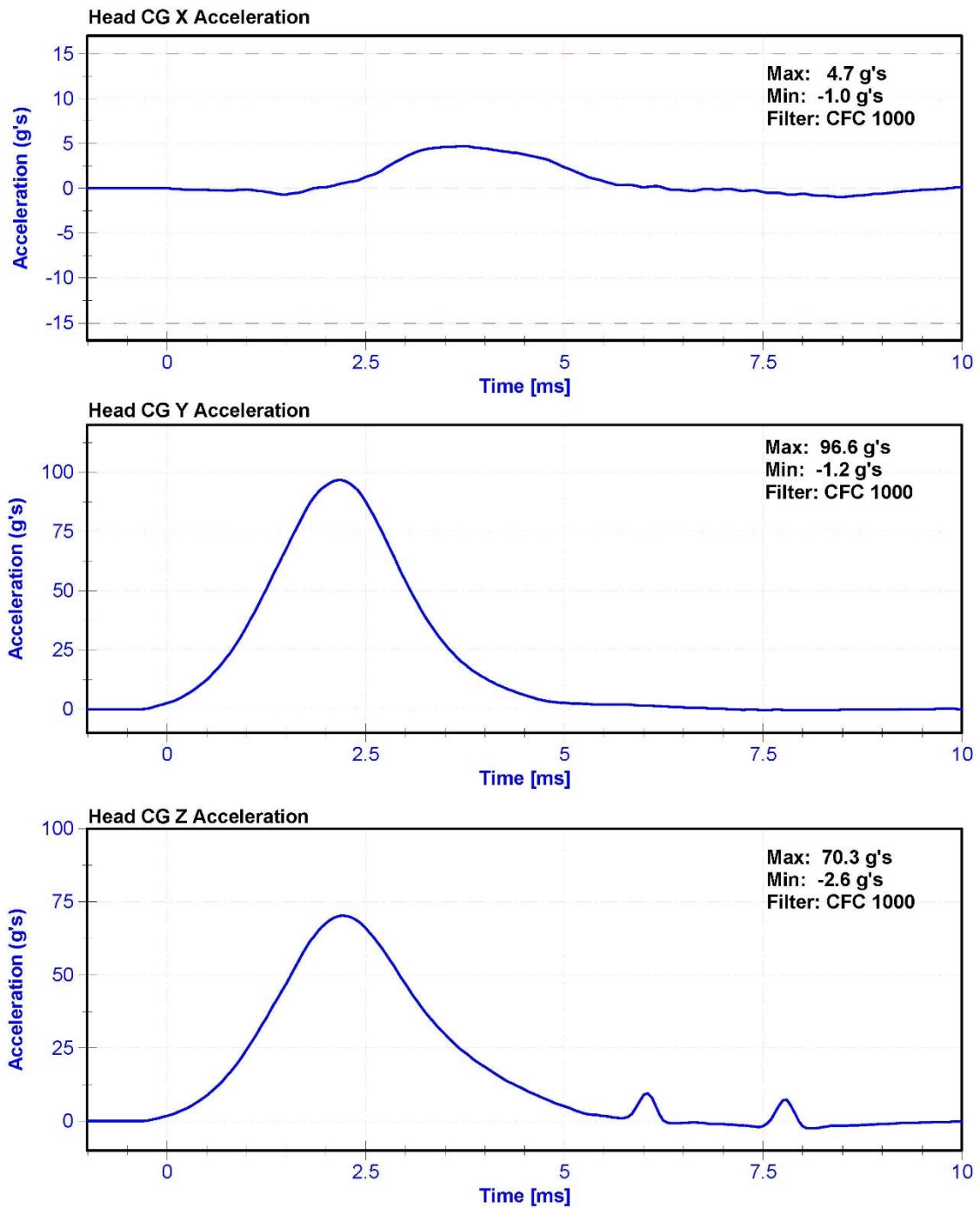
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	52	Pass
Resultant Acceleration	115	137	g's	119.4	Pass
Oscillation	0	15	%	8.0	Pass
Fore-Aft Acceleration	-15	15	g's	4.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	3/28/2016	9/26/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	3/28/2016	9/26/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	3/28/2016	9/26/2016





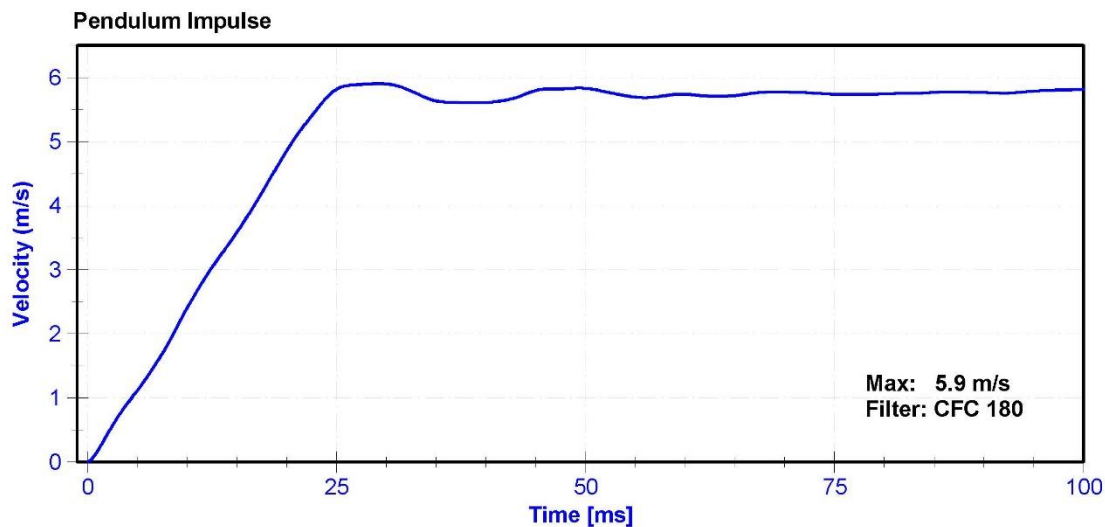
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

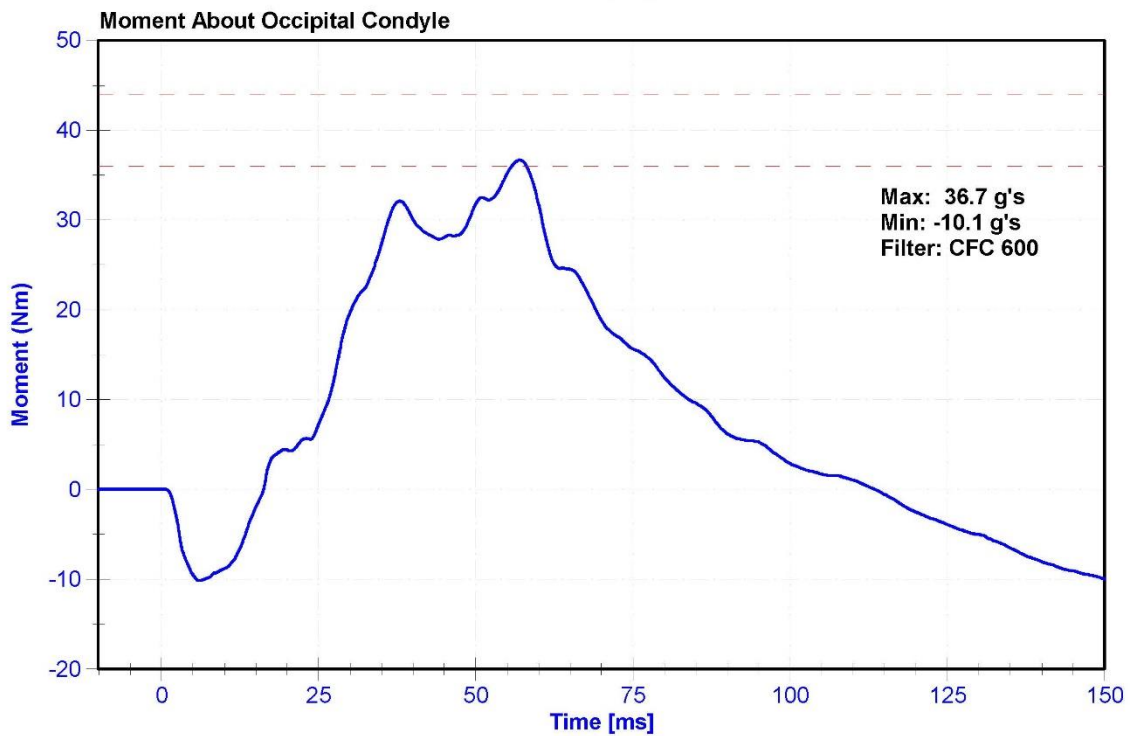
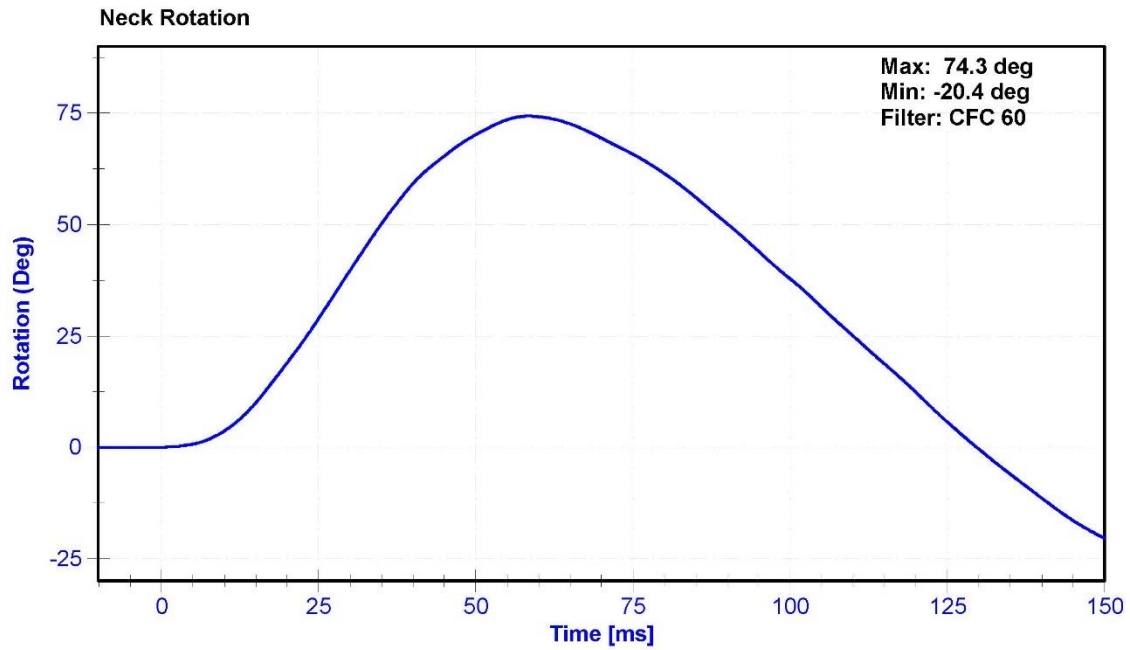
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	44.2	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.40	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.59	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.86	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.82	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.90	Pass
Neck Rotation	71	81	deg	74.3	Pass
Time at Maximum Rotation	50	70	ms	58.4	Pass
Moment about the OC	36	44	Nm	36.7	Pass
Moment Decay to 0 Nm	102	126	ms	113.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	9/24/2015	9/23/2016
Condyle Potentiometer	Denton 78051-342	DS-185Pend	9/25/2015	9/24/2016
Upper Neck Load Cell	Denton 1716A	LC-798Fy	5/24/2016	5/24/2017





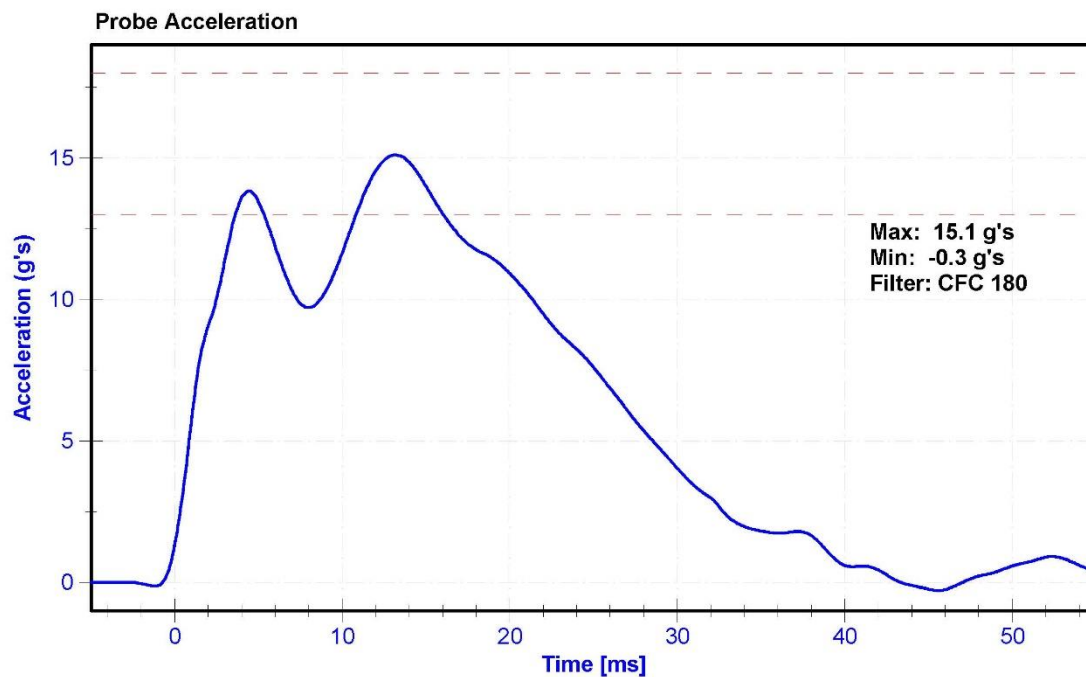
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

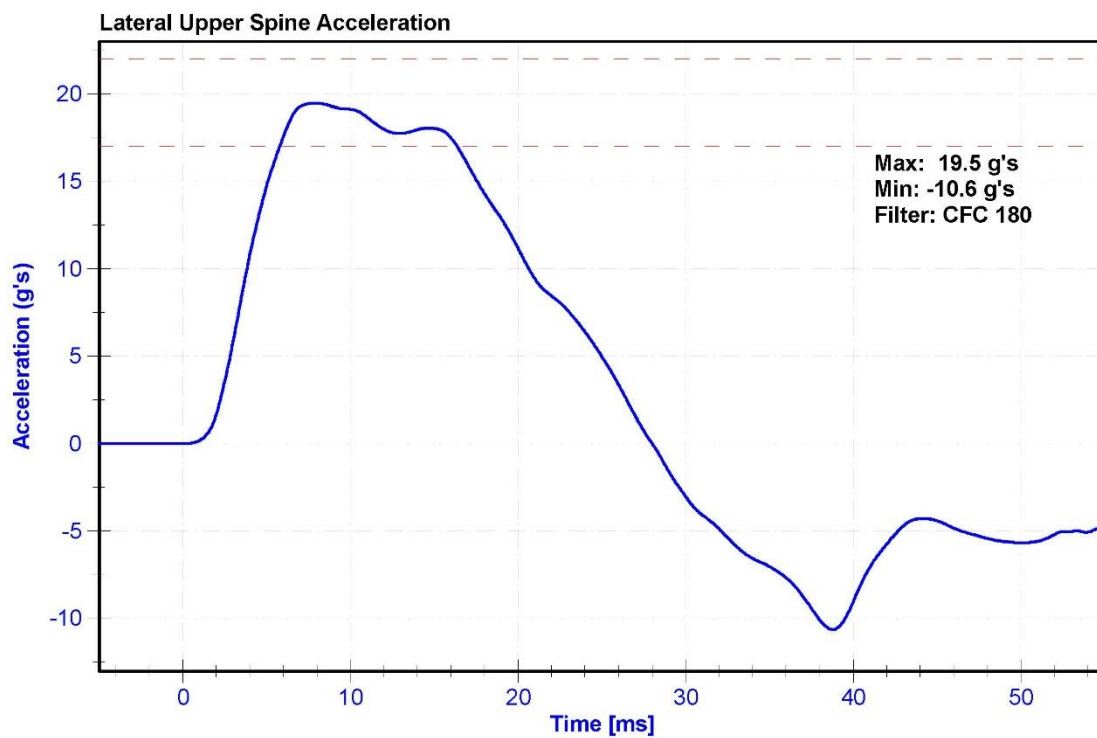
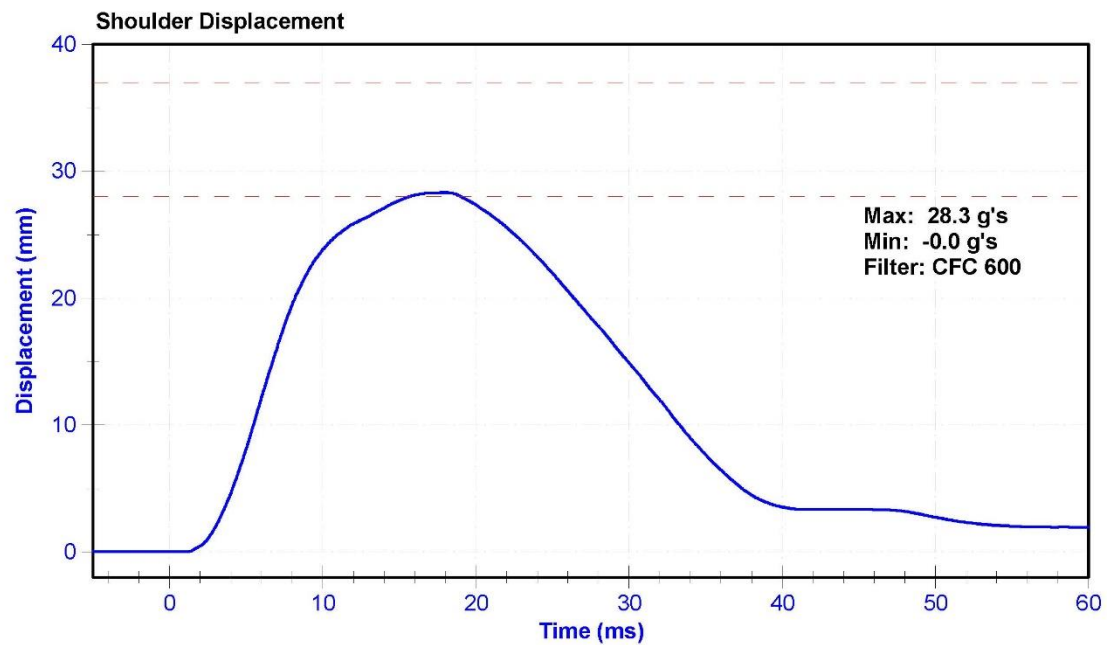
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.2	Pass
Humidity	10	70	%	41.2	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	13	18	g's	15.1	Pass
Shoulder Deflection	28	37	mm	28.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/21/2016





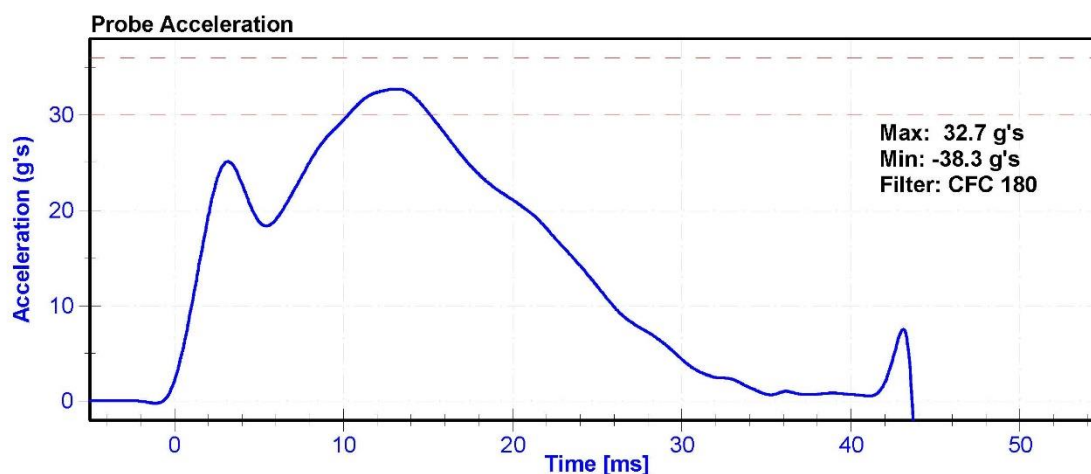
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

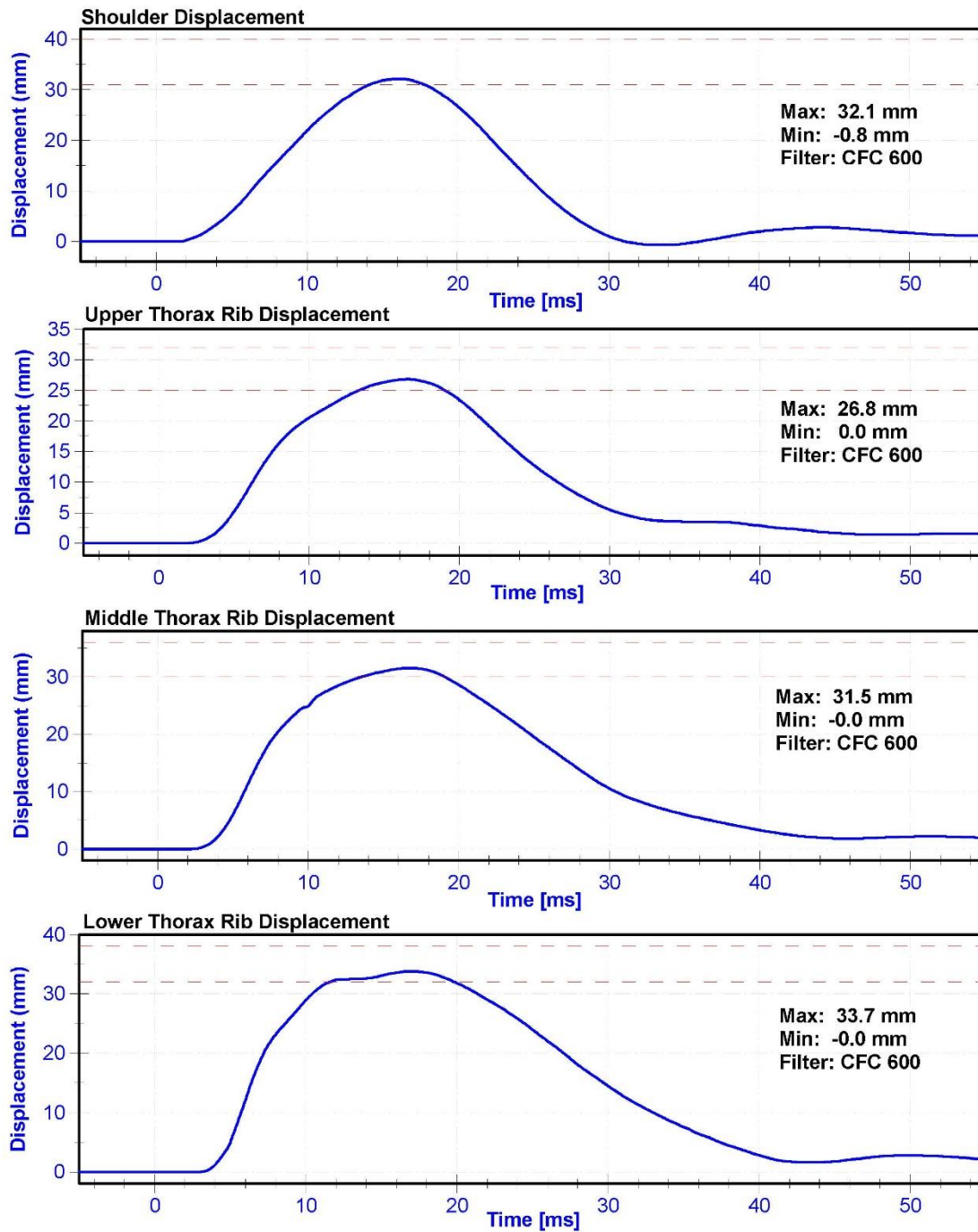
Results

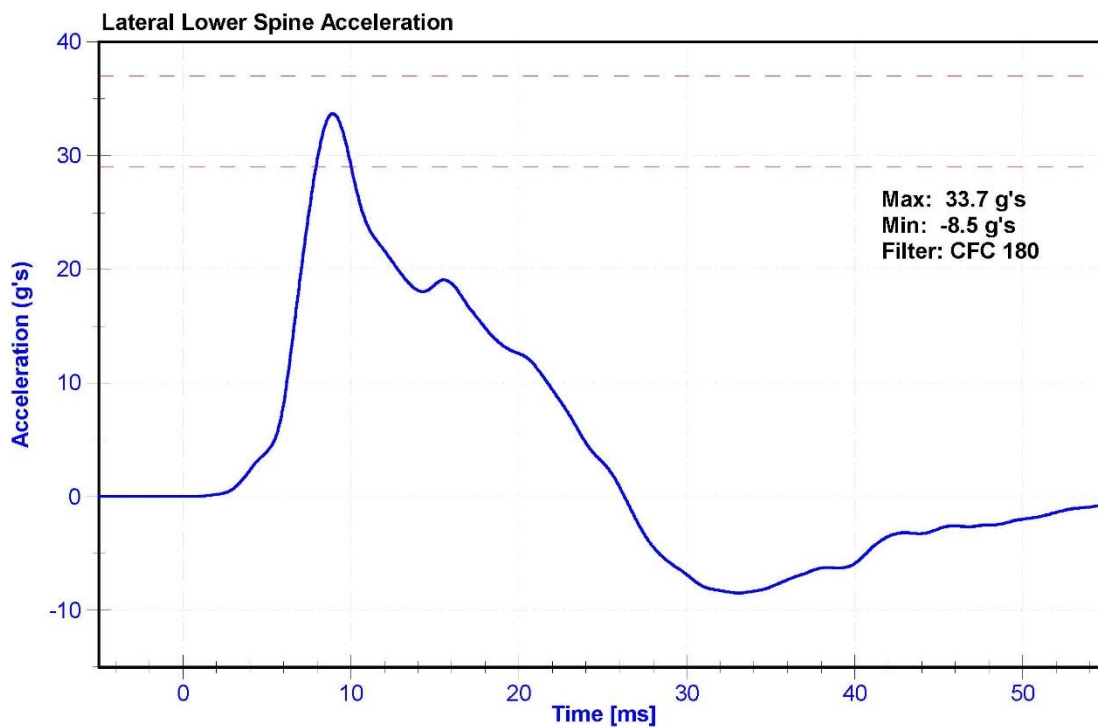
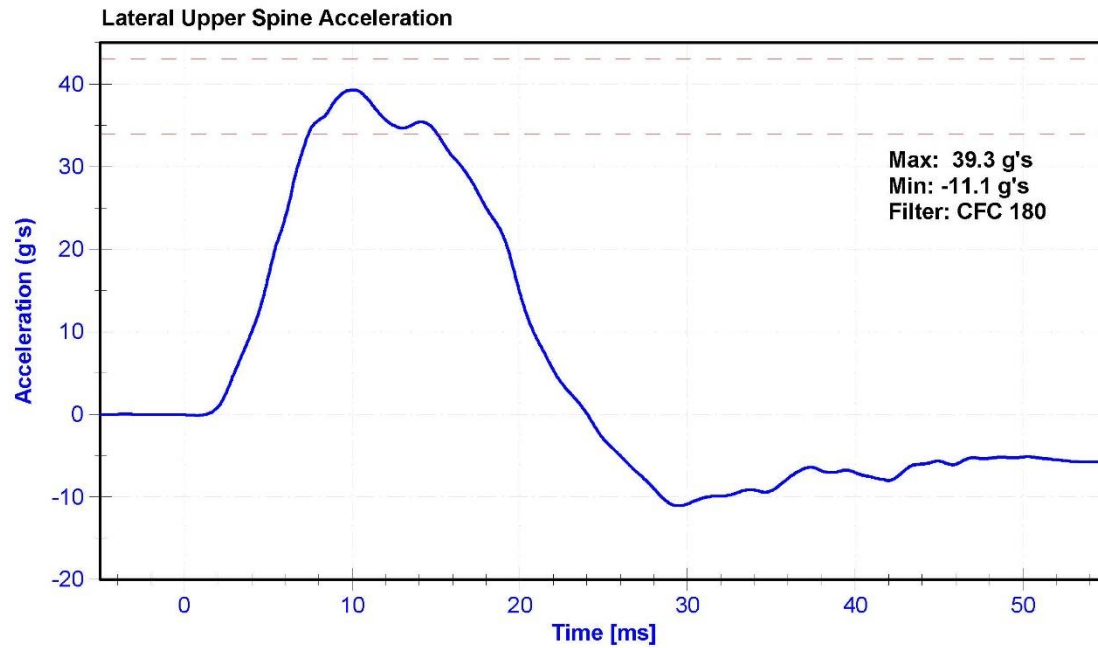
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.2	Pass
Humidity	10	70	%	38.3	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	32.7	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.7	Pass
Shoulder Deflection	31	40	mm	32.1	Pass
Upper Thorax Rib Deflection	25	32	mm	26.8	Pass
Mid Thorax Rib Deflection	30	36	mm	31.5	Pass
Lower Thorax Rib Deflection	32	38	mm	33.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/21/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	3/28/2016	9/26/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016







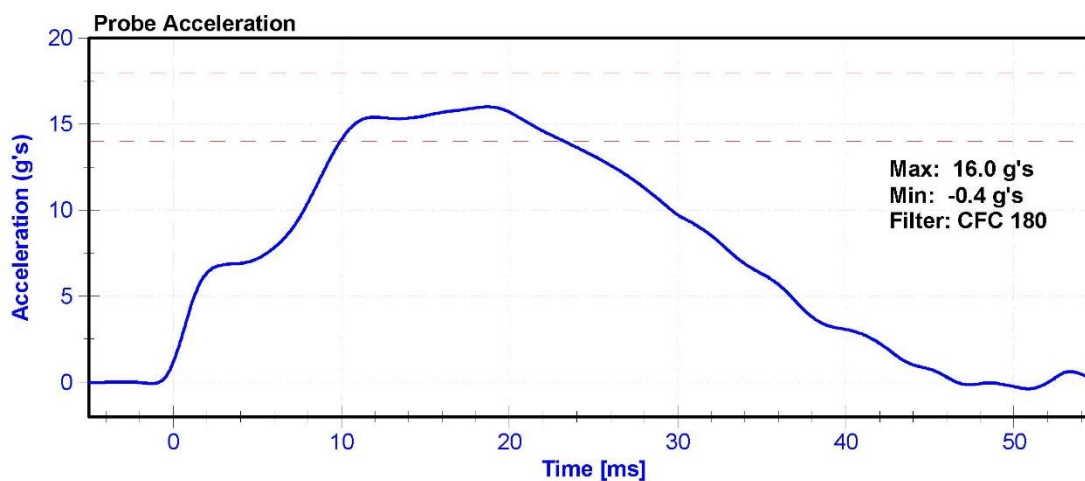
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

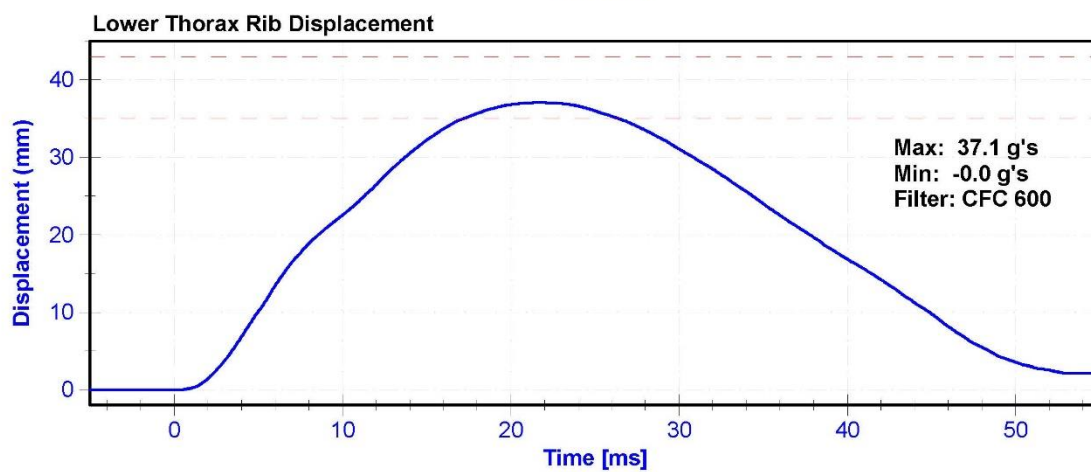
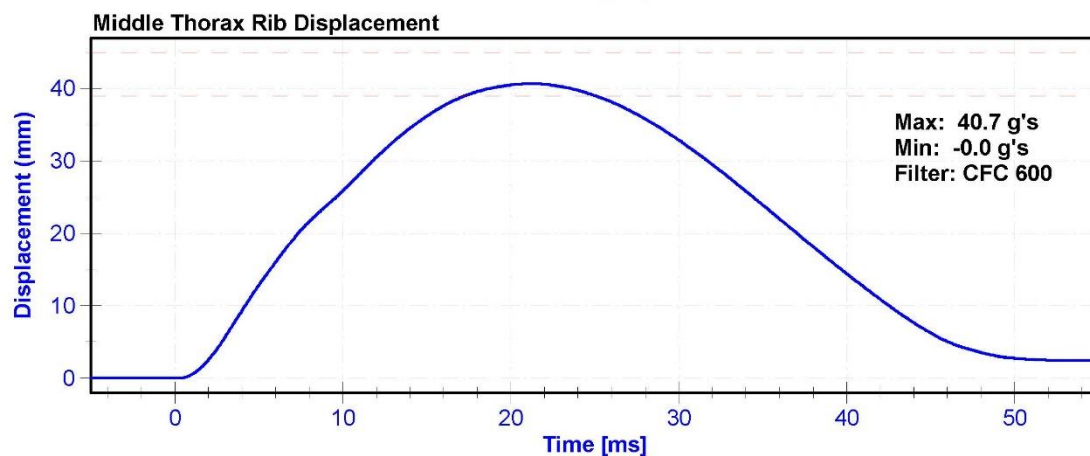
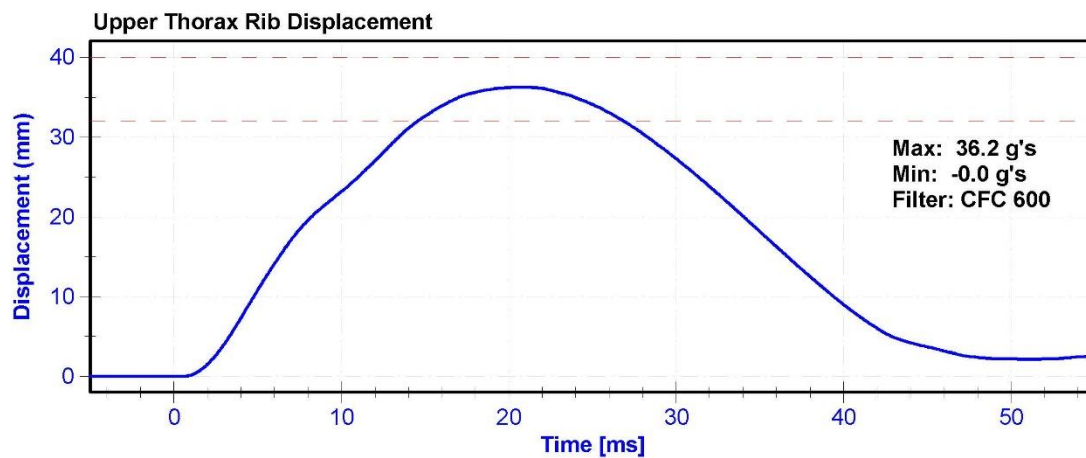
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	35.9	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	14	18	g's	16.0	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.6	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.0	Pass
Upper Thorax Rib Deflection	32	40	mm	36.2	Pass
Middle Thorax Rib Deflection	39	45	mm	40.7	Pass
Lower Thorax Rib Deflection	35	43	mm	37.1	Pass

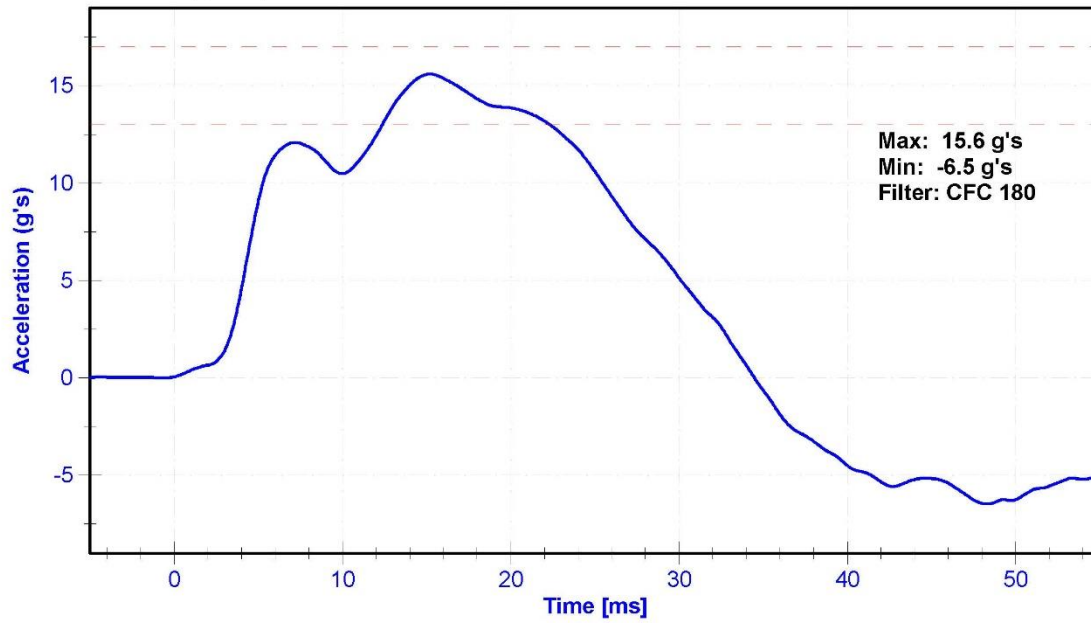
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/21/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	3/28/2016	9/26/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

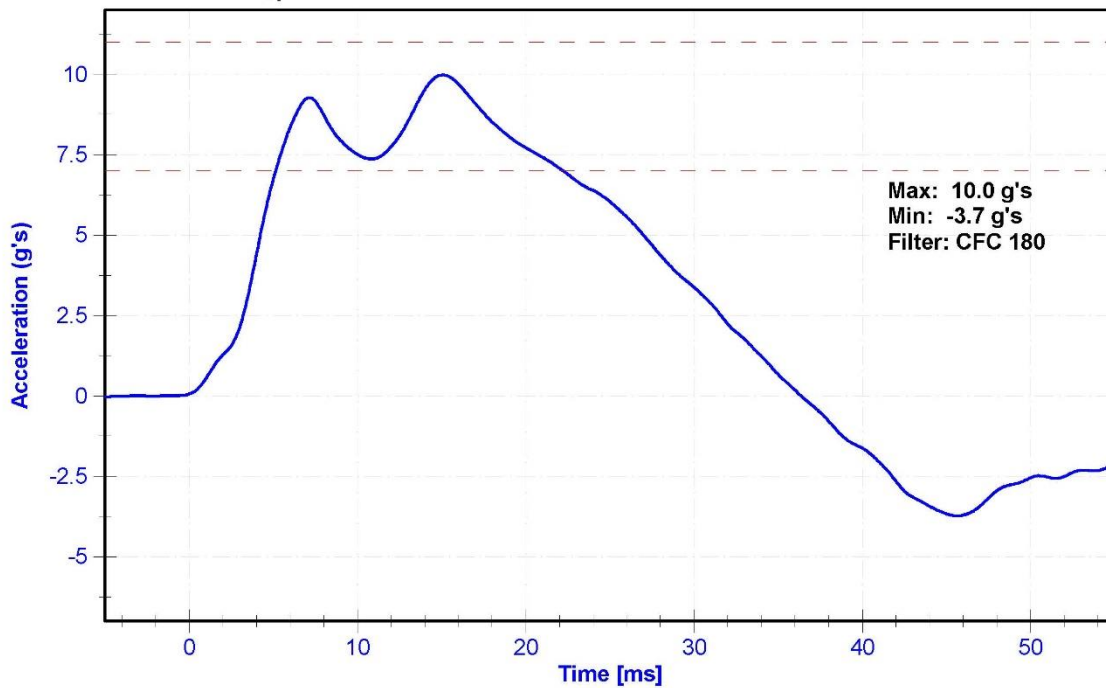




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



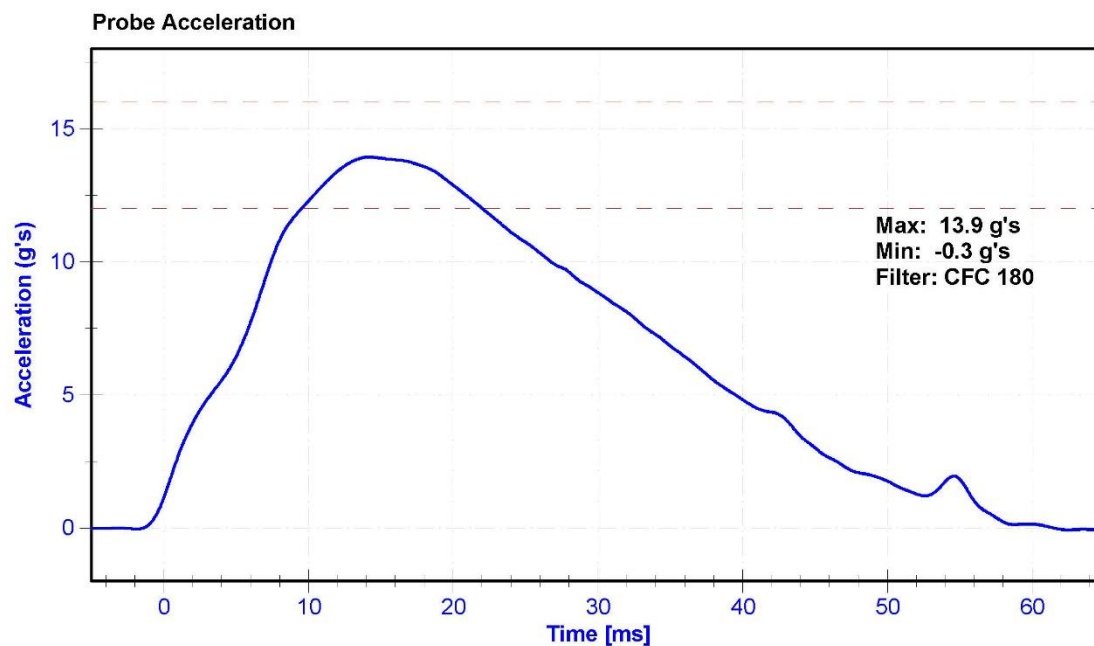
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

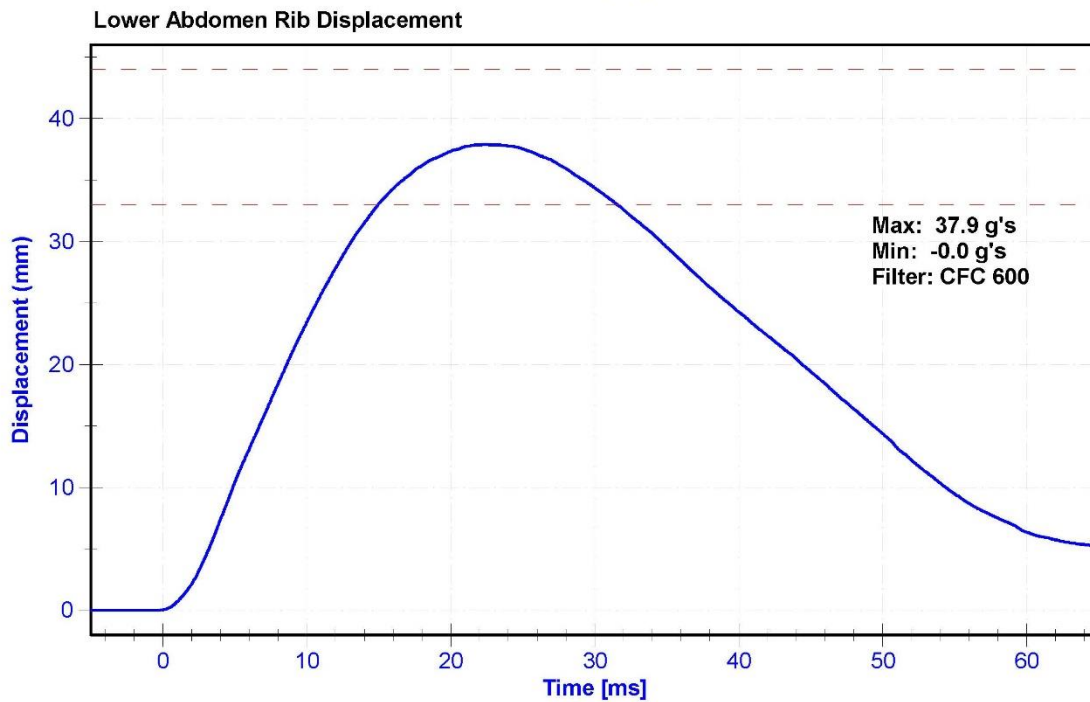
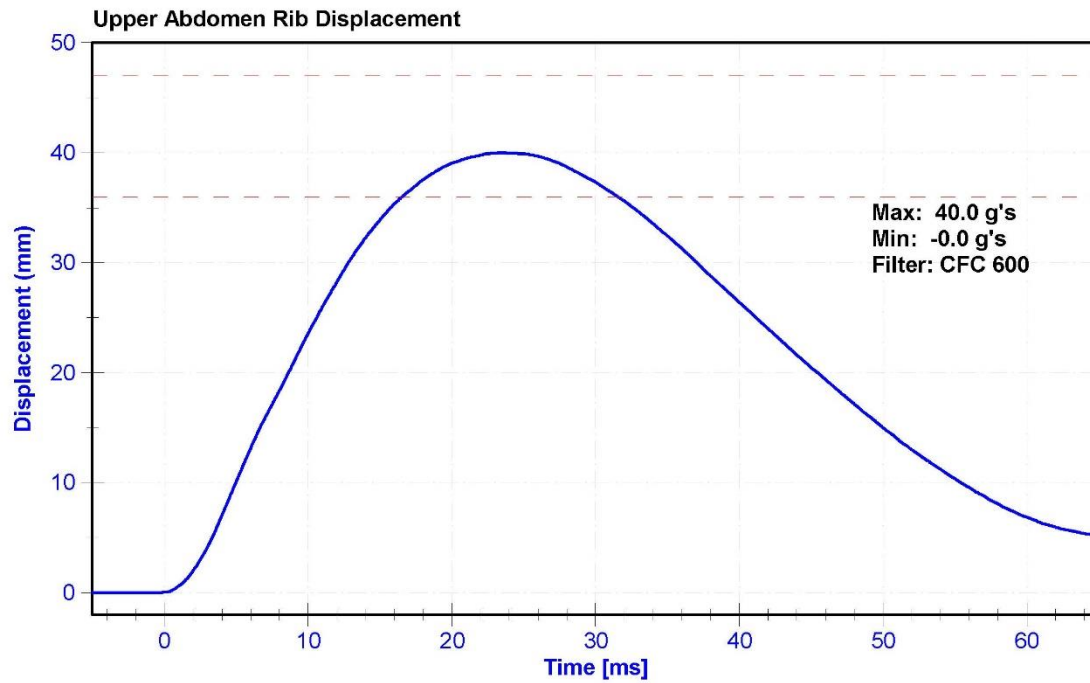
Results

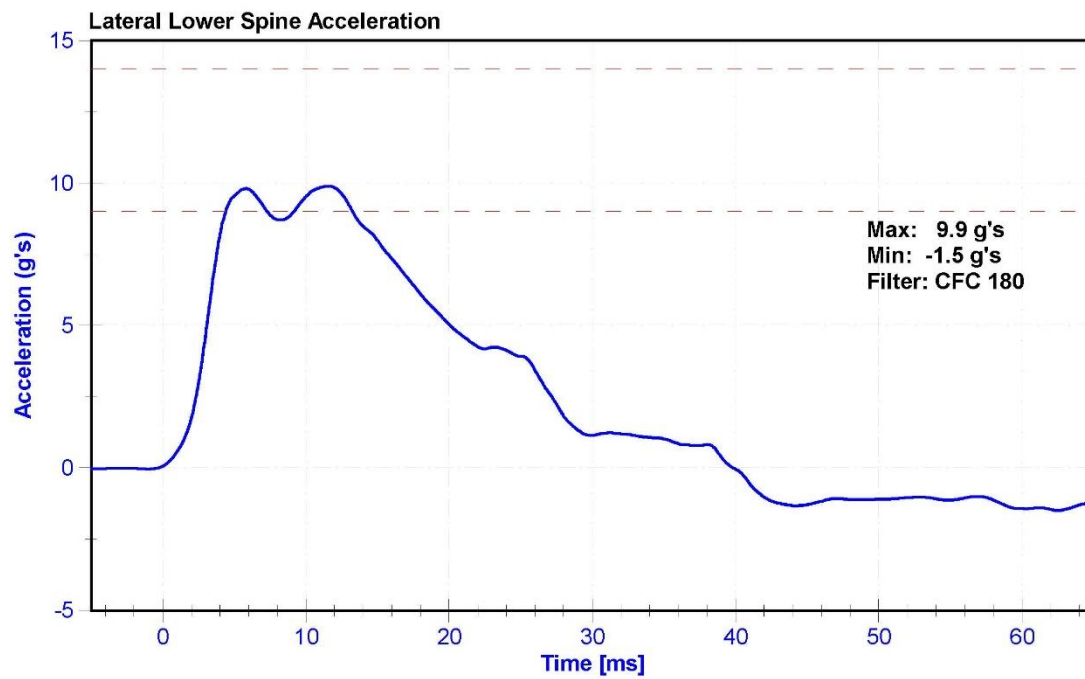
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	41.8	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	12	16	g's	13.9	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.9	Pass
Upper Abdomen Rib Deflection	36	47	mm	40.0	Pass
Lower Abdomen Rib Deflection	33	44	mm	37.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	3/28/2016	9/26/2016
Upper Abdomen Rib Potentiometer	Servo 08TC1-3787	DS-015GFE	9/24/2015	9/23/2016
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/24/2015	9/23/2016







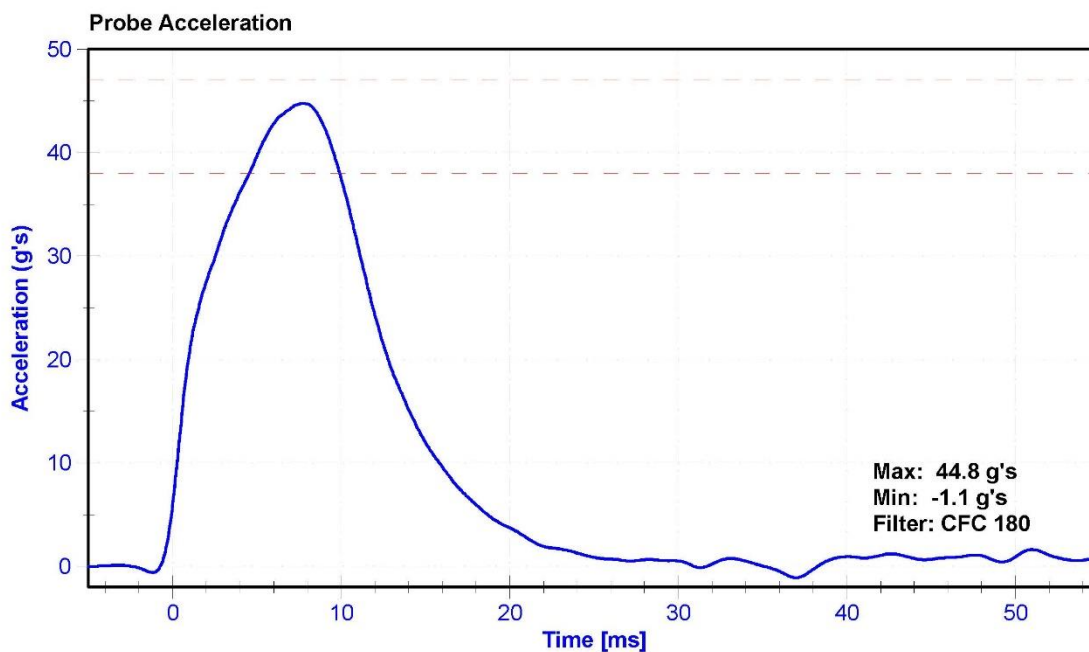
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

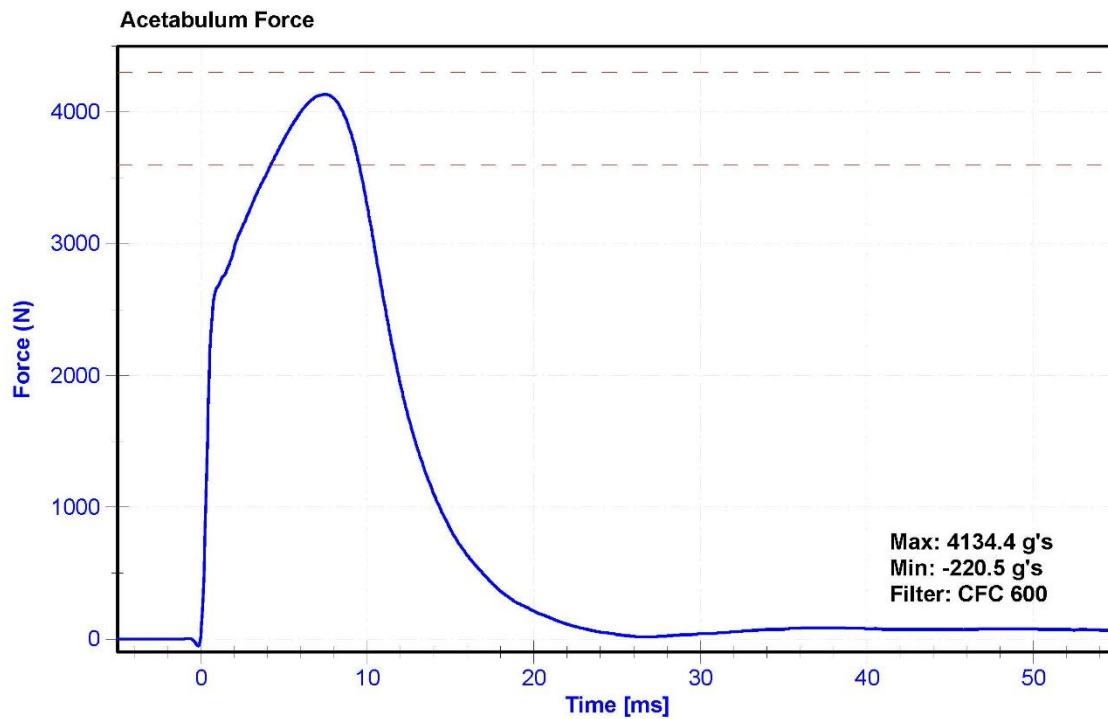
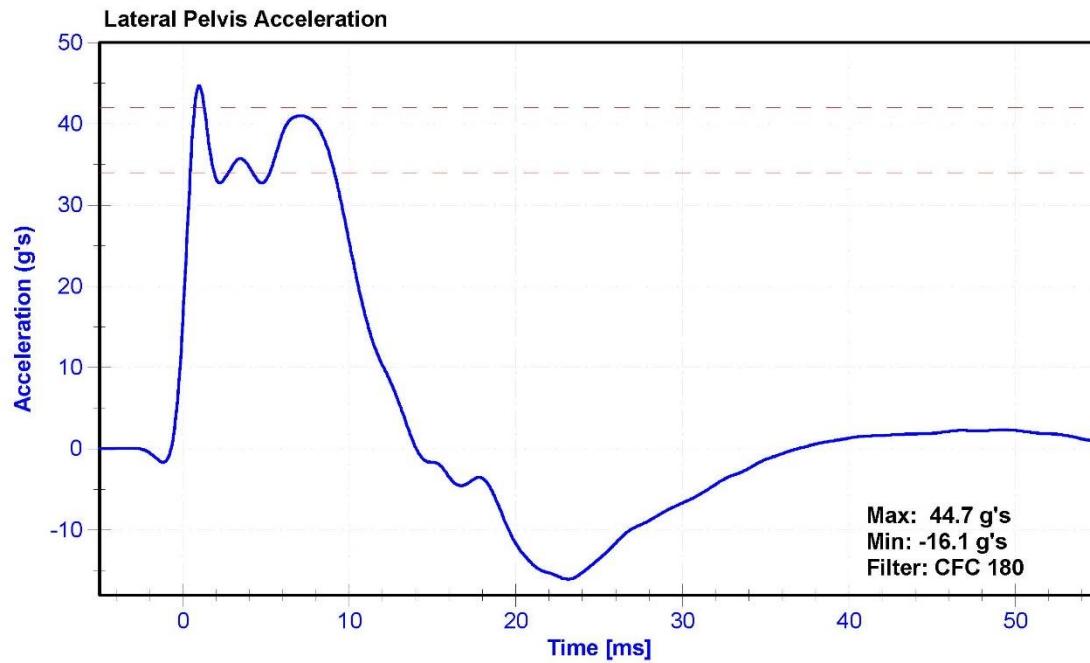
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	36.1	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration	38	47	g's	44.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.0	Pass
Acetabulum Force	3600	4300	N	4134.4	Pass

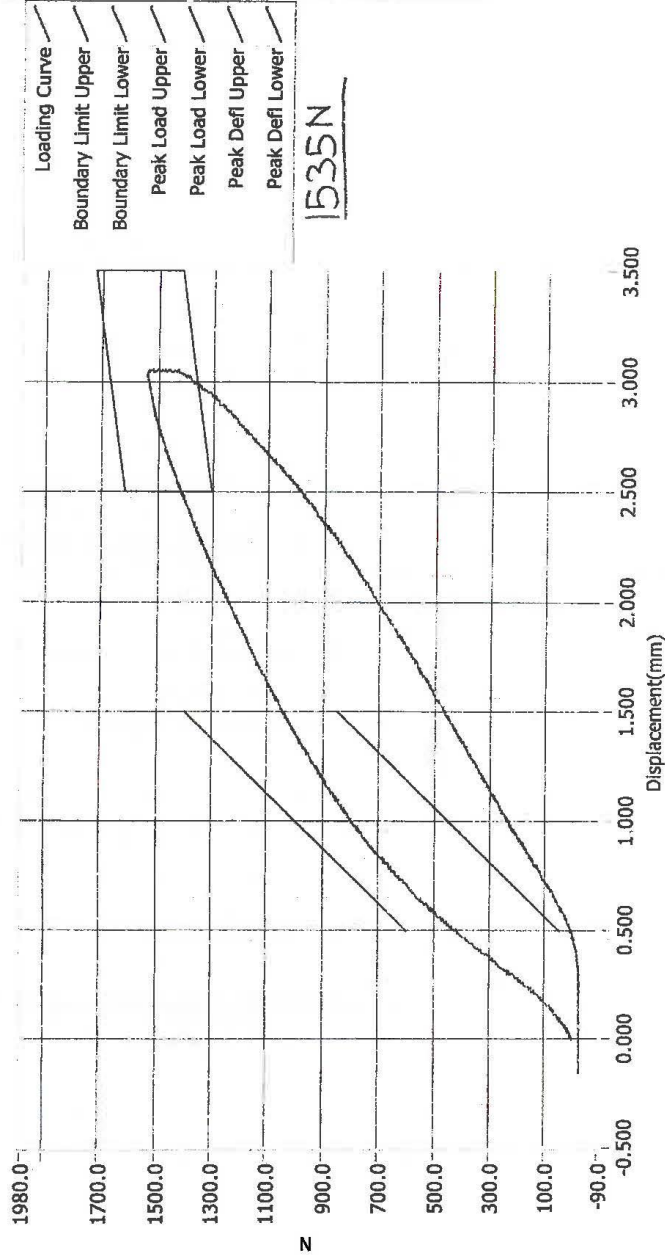
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	2/4/2016	8/4/2016
Acetabulum Load Cell	Denton 3249J	LC-267Fy	5/24/2016	5/24/2017
Certification Plug	Humanetics	70796	12/13/13	N/A
Crash Test Plug	Humanetics	80700	11/20/14	N/A





Resultant Data - SIDIIs Plug Compression

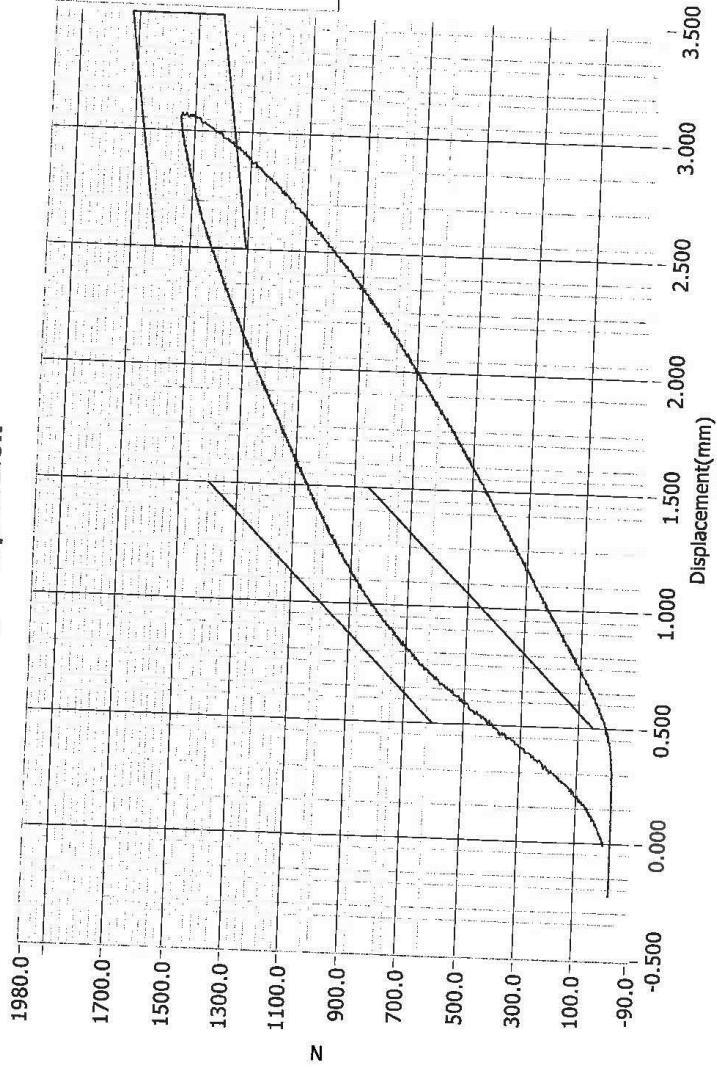


ATD Calibration Lab
CERTIFICATION

Test ID	Part Serial Number	Test Date	Test Time
	70796	12/13/2013	4:21 PM
Cert ID	ATD Serial Number	ATD Type	SIDIIs
	N/A		

Current Date : 12/13/2013 Current Time : 16:22:14

Resultant Data - SIDIIs Plug Compression



Loading Curve	——
Boundary Limit Upper	----
Boundary Limit Lower	----
Peak Load Upper	----
Peak Load Lower	----
Peak Defl Upper	----
Peak Defl Lower	----

1541N

ATD Calibration Lab

CRASH

Test ID	Part Serial Number	Test Date	Test Time
	80700	11/20/2014	9:24 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 11/20/2014

Current Time : 21:26:42

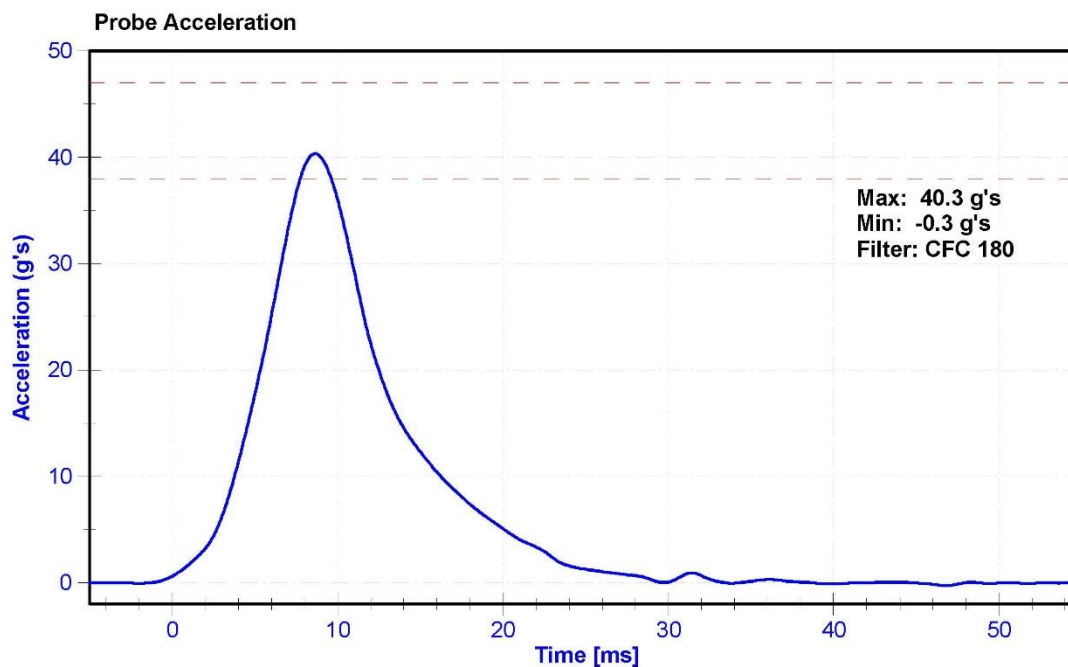
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

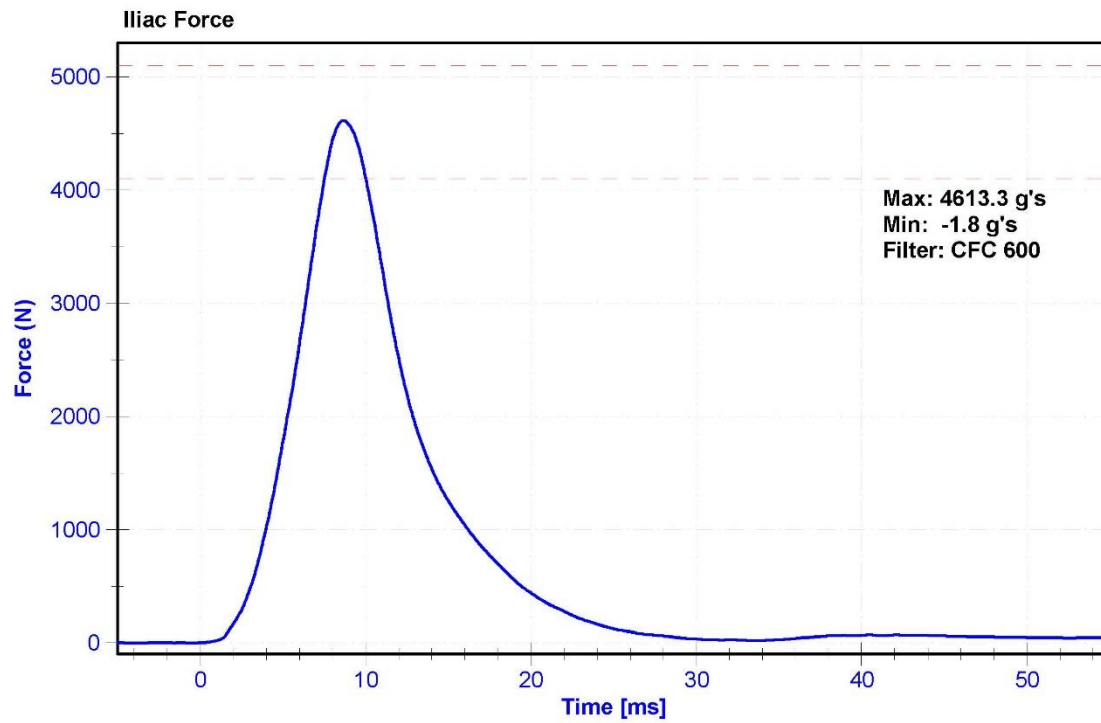
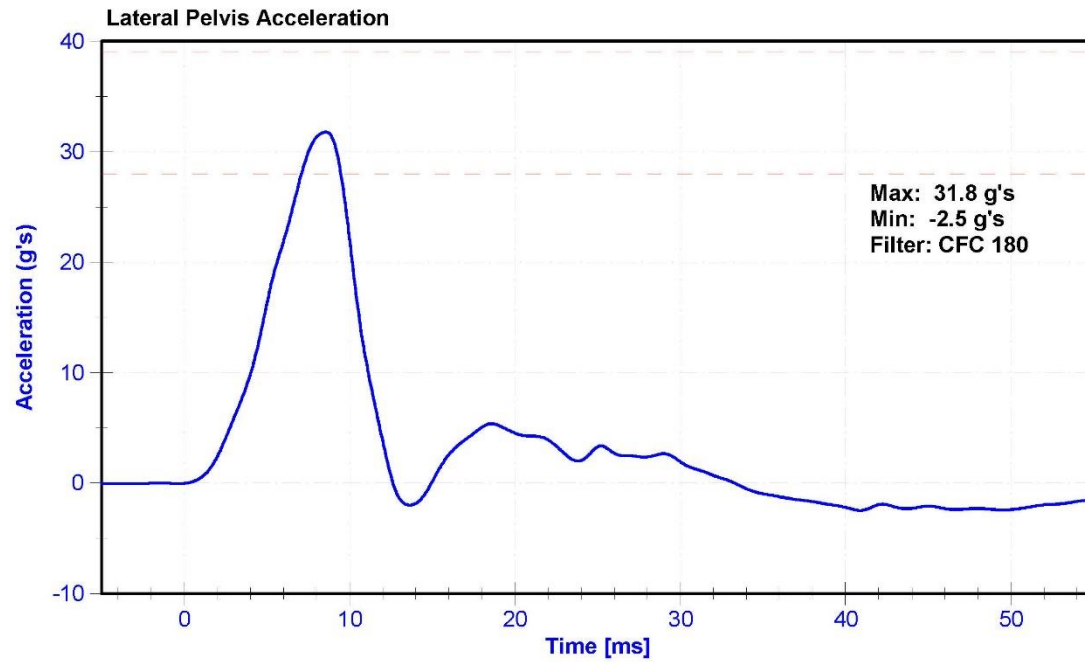
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	44.8	Pass
Velocity	4.2	4.4	m/s	4.25	Pass
Probe Acceleration	36	45	g's	40.3	Pass
Lateral Pelvis Acceleration	28	39	g's	31.8	Pass
Iliac Force	4100	5100	N	4613.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	2/4/2016	8/4/2016
Iliac Load Cell	DENTON 3228J	LC-281Fy	5/24/2016	5/24/2017





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

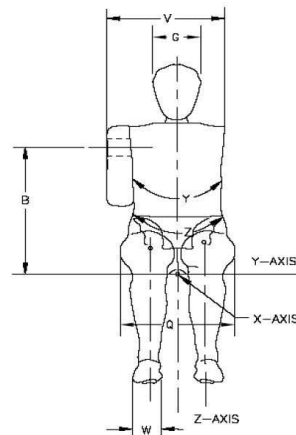
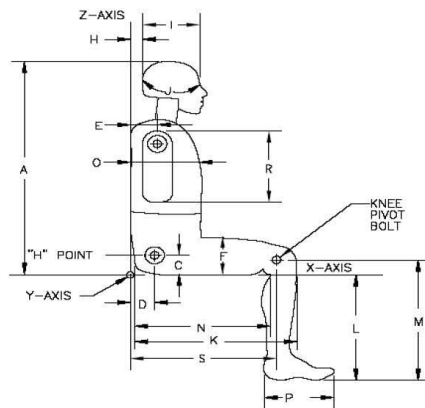


External Measurements - SID-IIs

Technician: Ian Dunkle

Date: 6/23/2016

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	128	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	350	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	481	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	861	Pass
Z	Waist Circumference	761	791	770	Pass

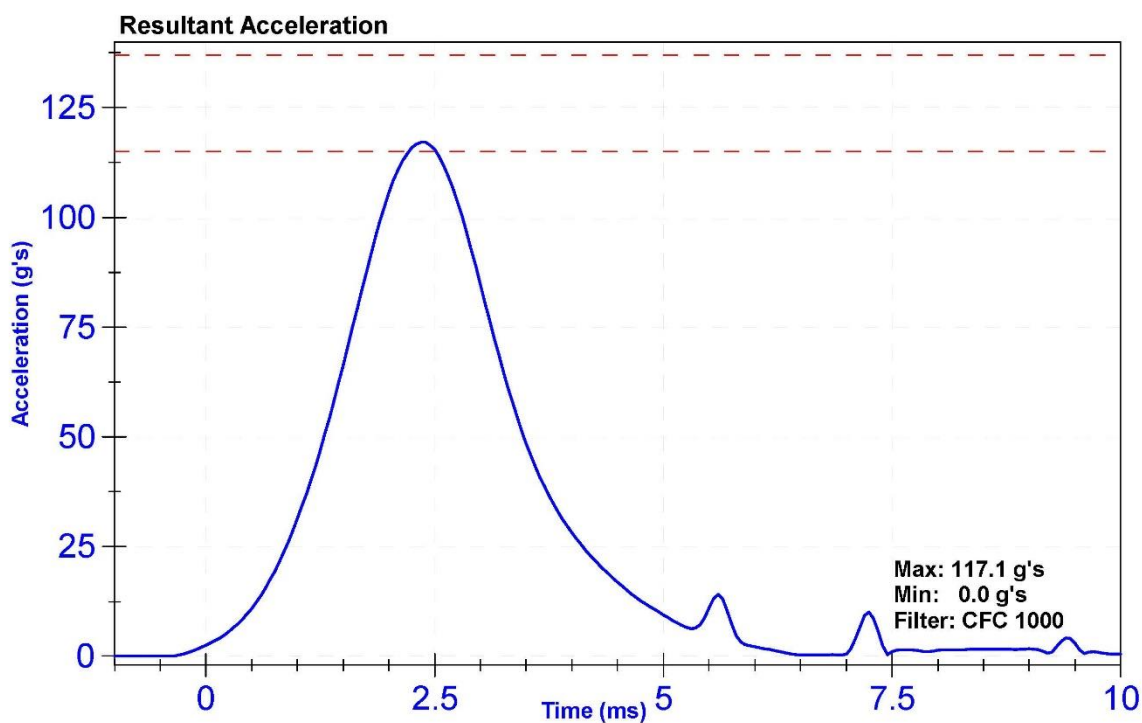
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

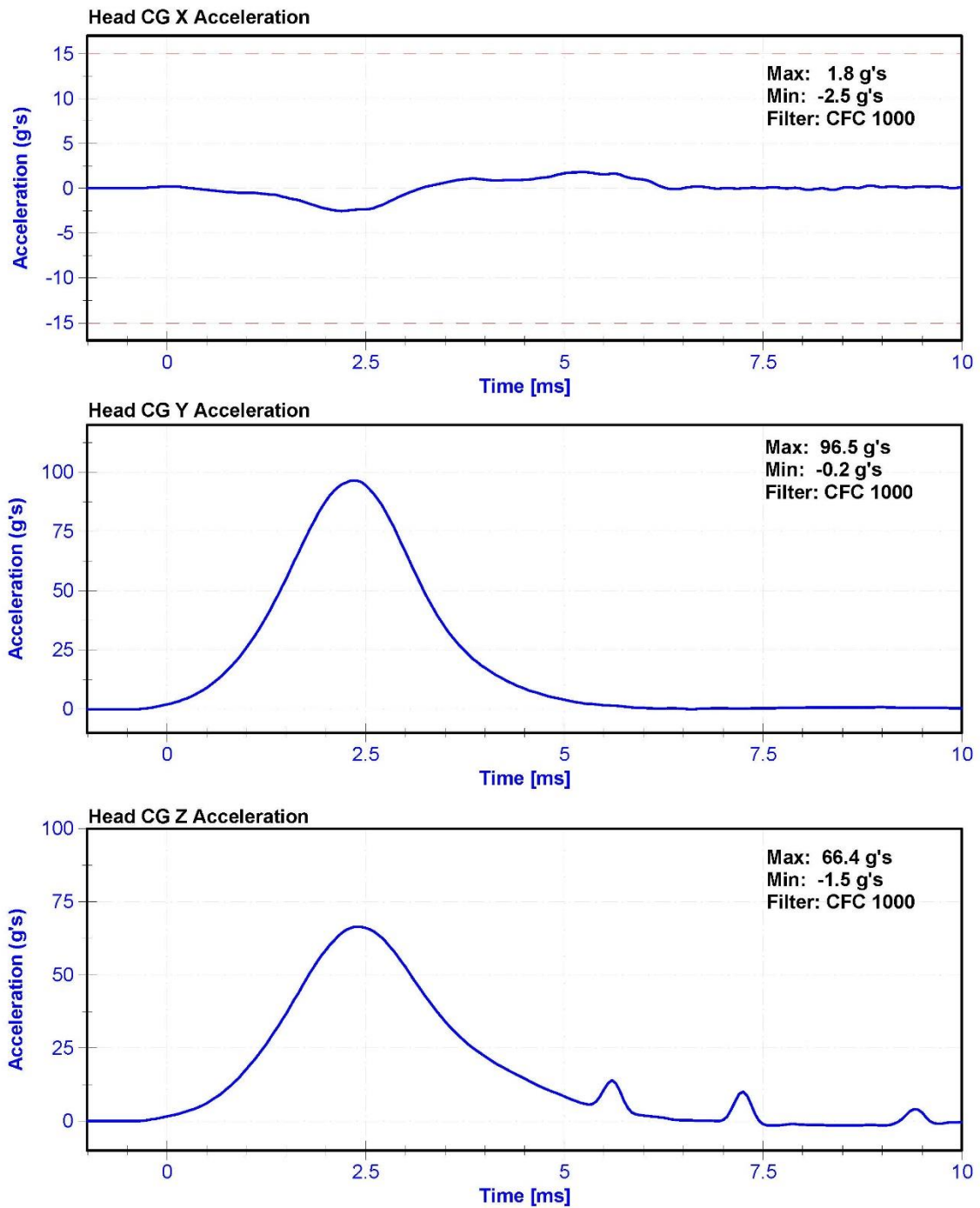
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	40.1	Pass
Resultant Acceleration	115	137	g's	117.1	Pass
Oscillation	0	15	%	12.	Pass
Fore-Aft Acceleration	-15	15	g's	-2.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	3/28/2016	9/26/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	3/28/2016	9/26/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	3/28/2016	9/26/2016





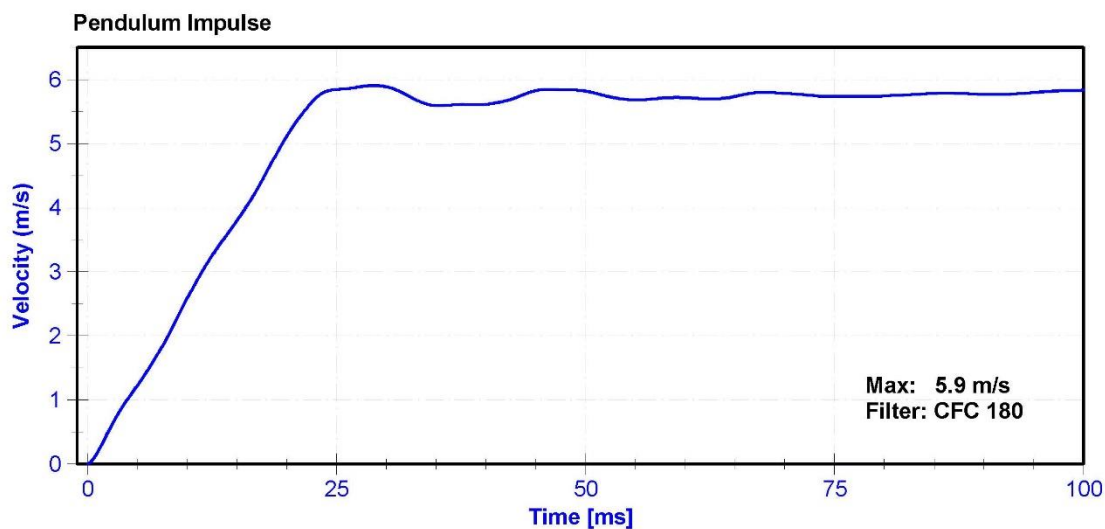
ATD Manufacturer	FTSS	Test Technician	I.Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

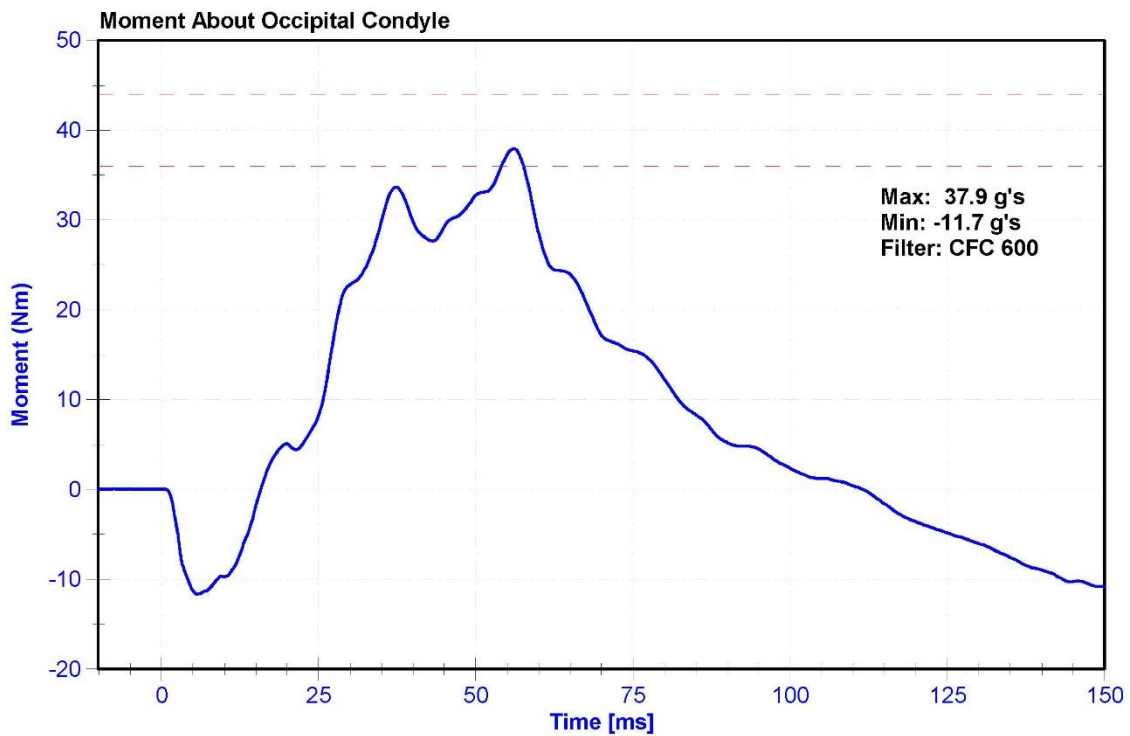
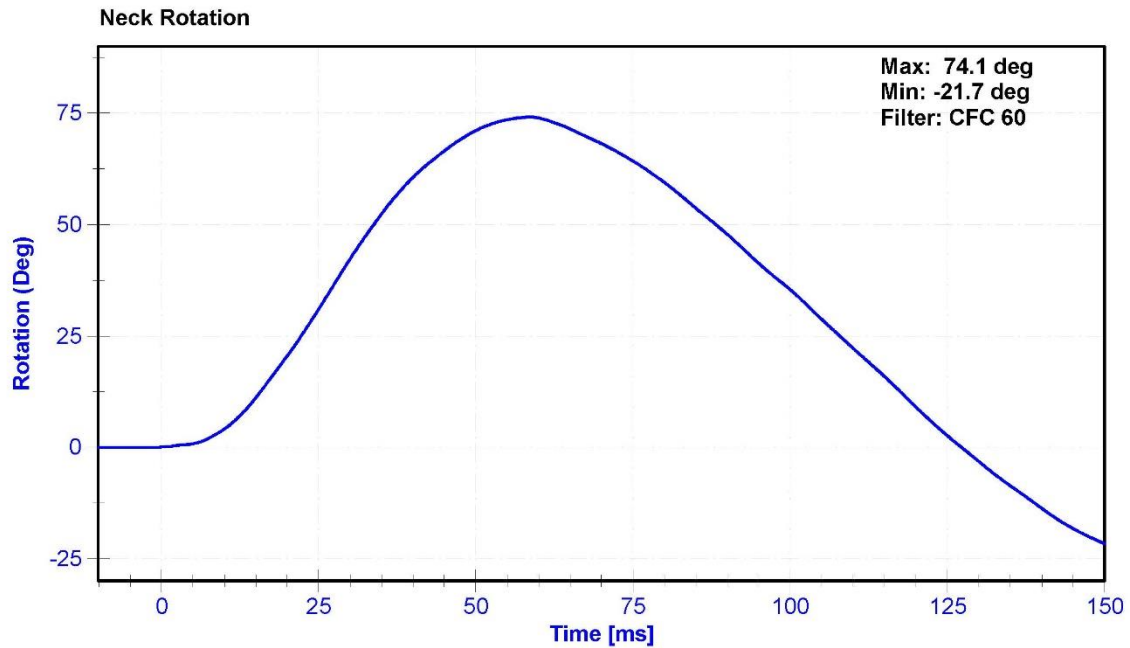
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	48.6	Pass
Velocity	5.51	5.63	m/s	5.620	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.58	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.80	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	5.12	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.84	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.91	Pass
Neck Rotation	71	81	deg	74.1	Pass
Time at Maximum Rotation	50	70	ms	58.6	Pass
Moment about the OC	36	44	Nm	37.9	Pass
Moment Decay to 0 Nm	102	126	ms	111.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	9/24/2015	9/23/2016
Condyle Potentiometer	Denton 78051-342	DS-185Pend	9/25/2015	9/24/2016
Upper Neck Load Cell	Denton 1716A	LC-798Fy	5/24/2016	5/24/2017





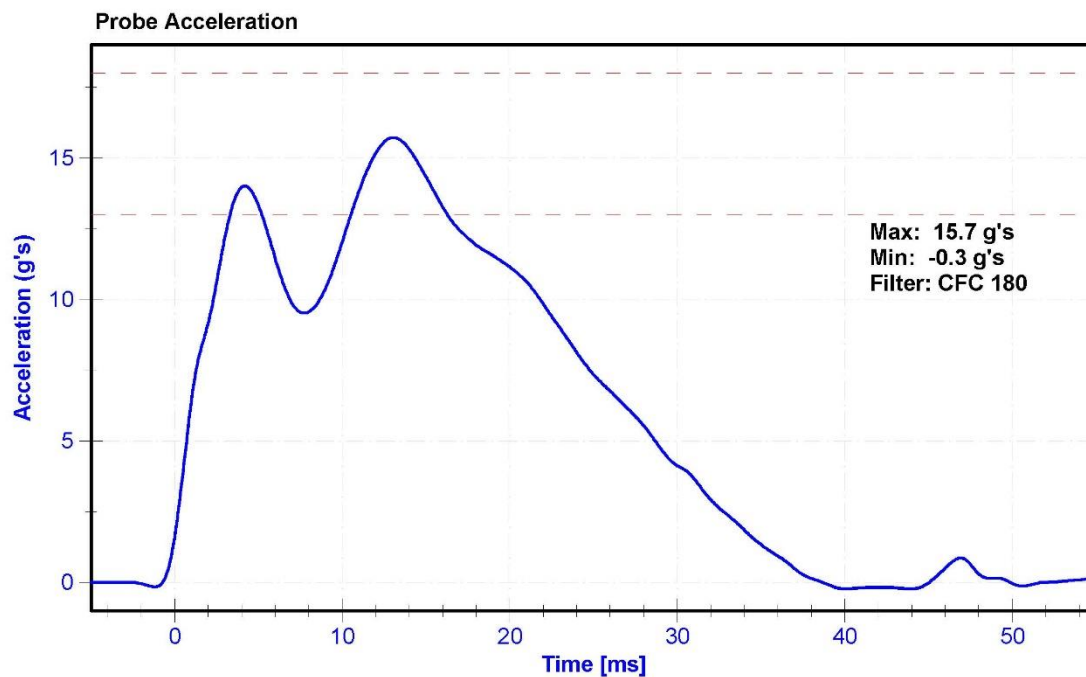
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

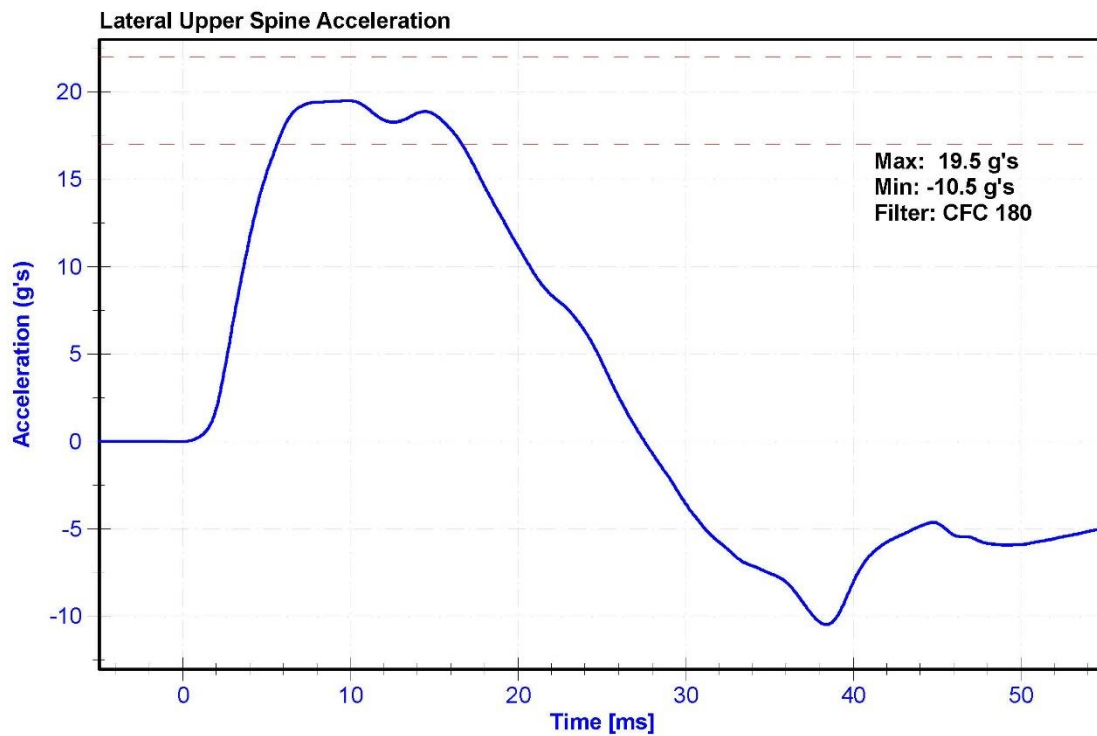
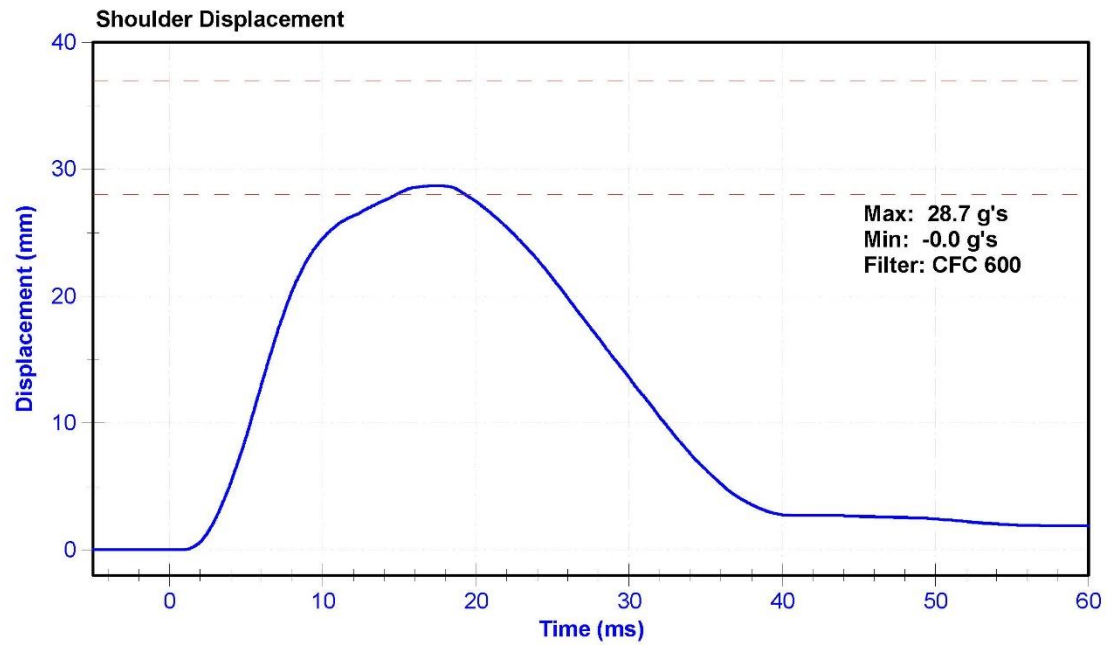
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	34.8	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	15.7	Pass
Shoulder Deflection	28	37	mm	28.7	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/21/2016





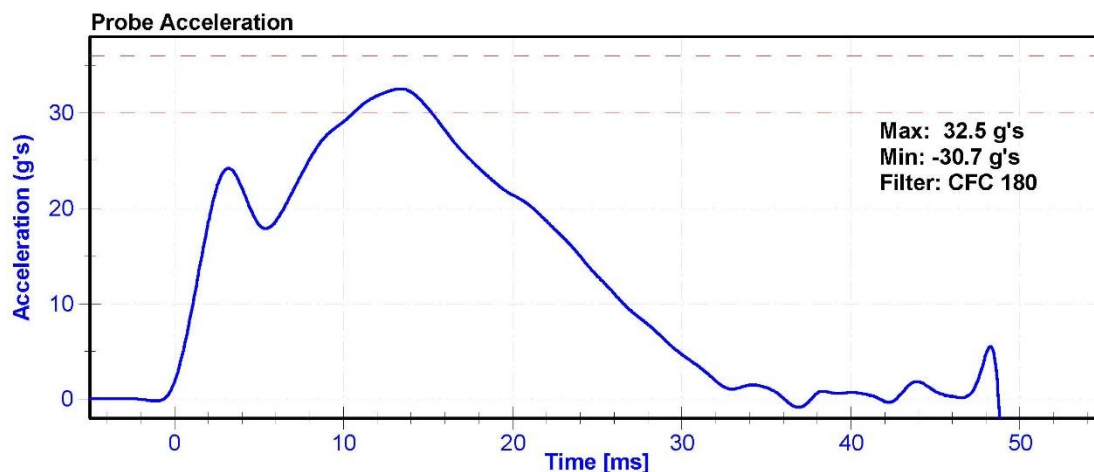
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

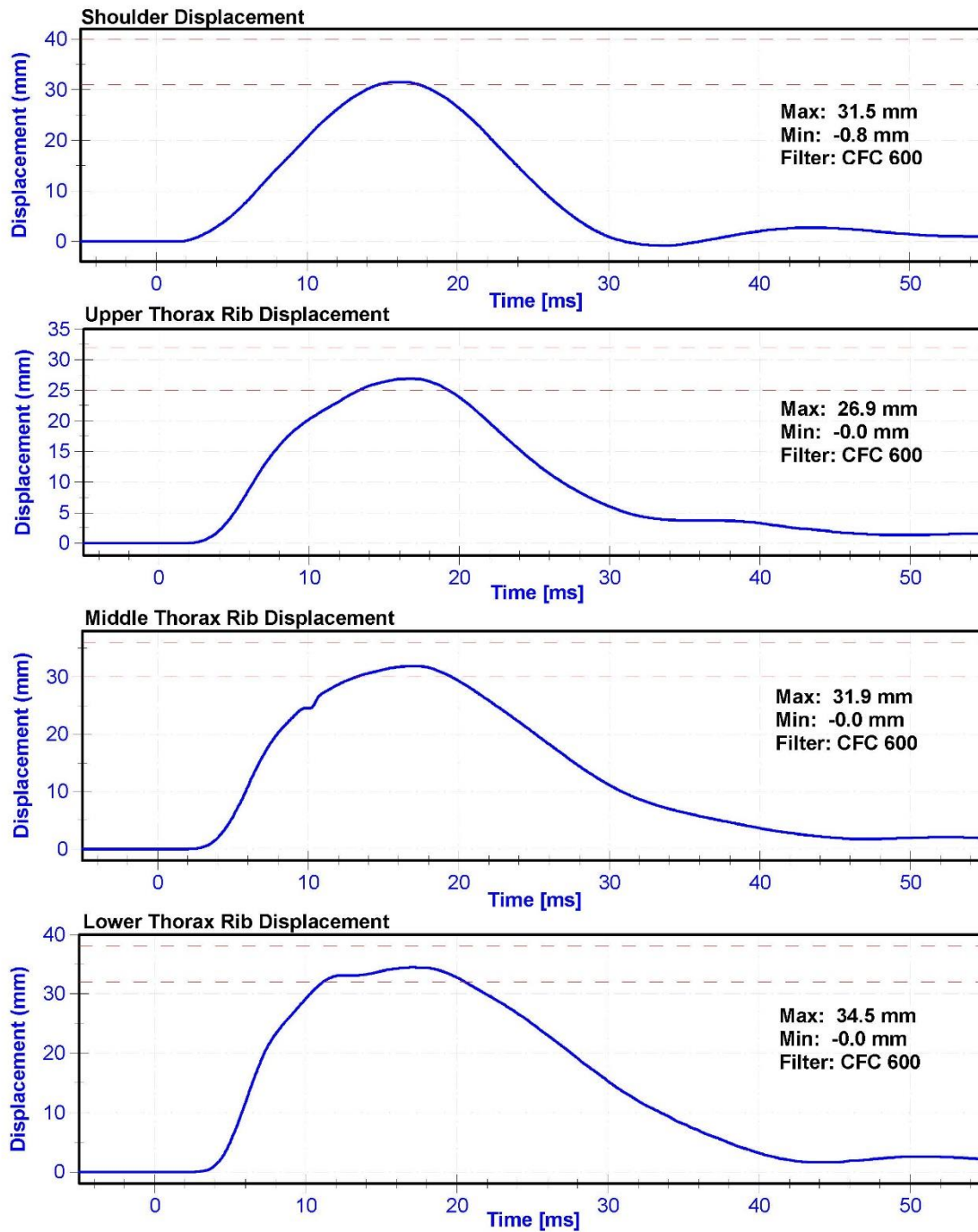
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	41.8	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	32.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.8	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.6	Pass
Shoulder Deflection	31	40	mm	31.5	Pass
Upper Thorax Rib Deflection	25	32	mm	26.9	Pass
Mid Thorax Rib Deflection	30	36	mm	31.9	Pass
Lower Thorax Rib Deflection	32	38	mm	34.5	Pass

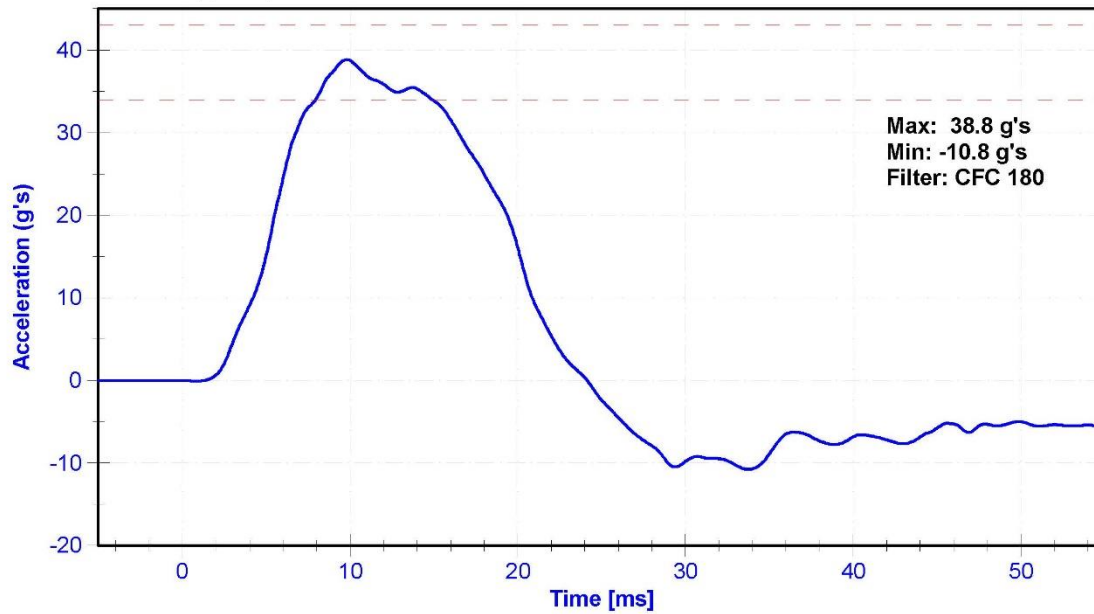
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/21/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	3/28/2016	9/26/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

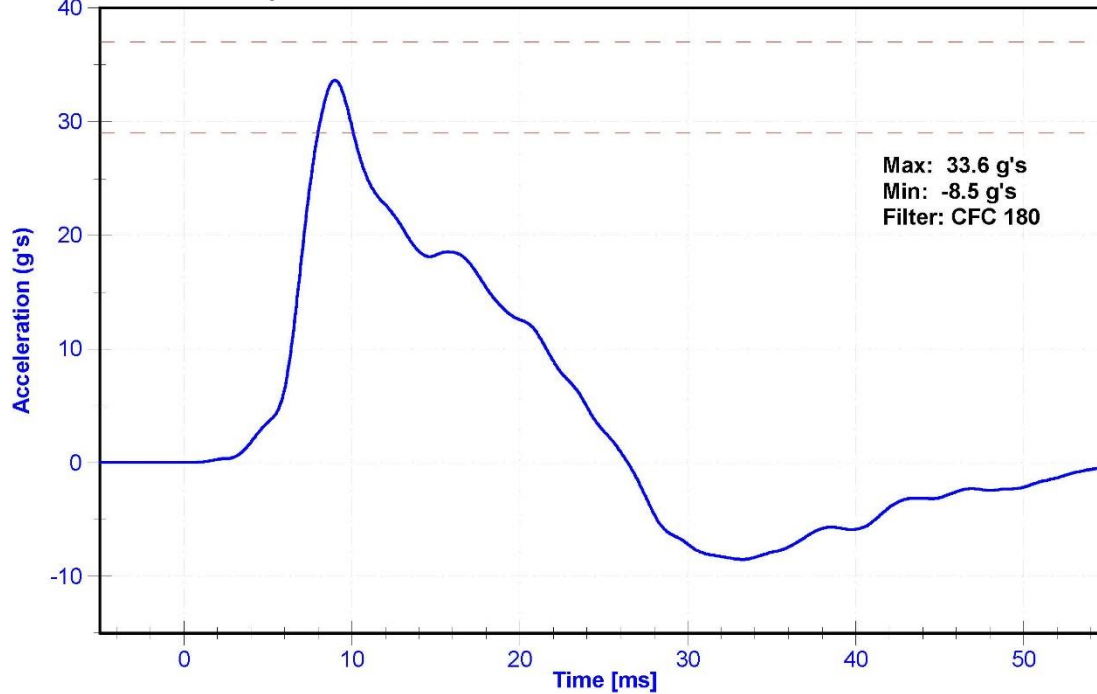




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



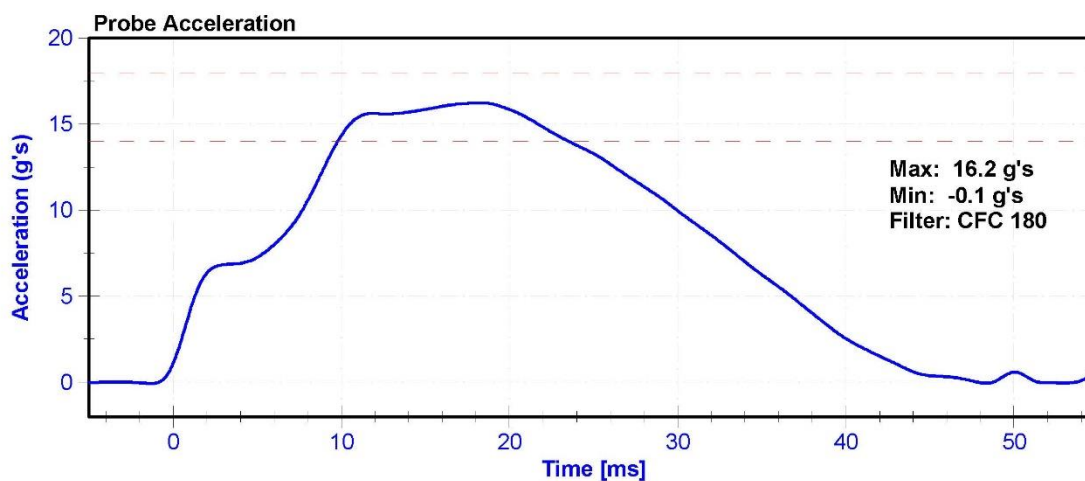
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

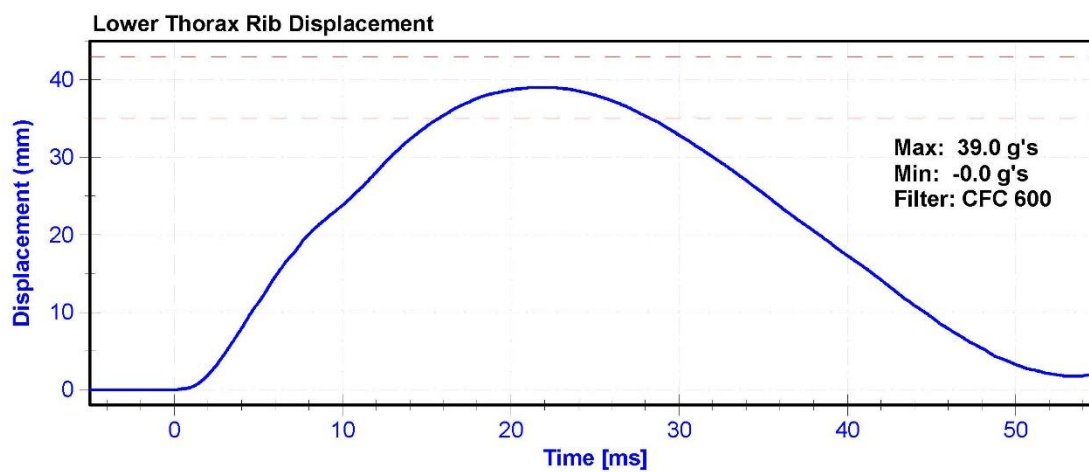
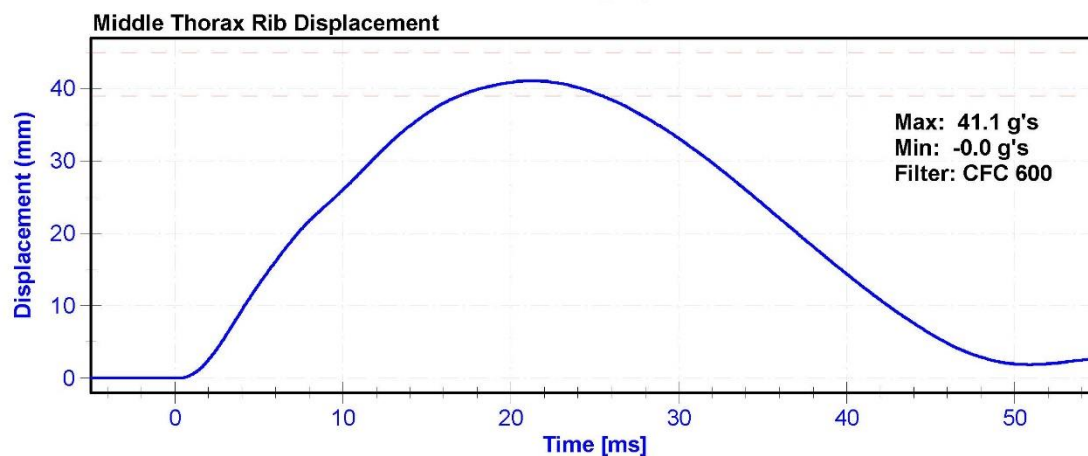
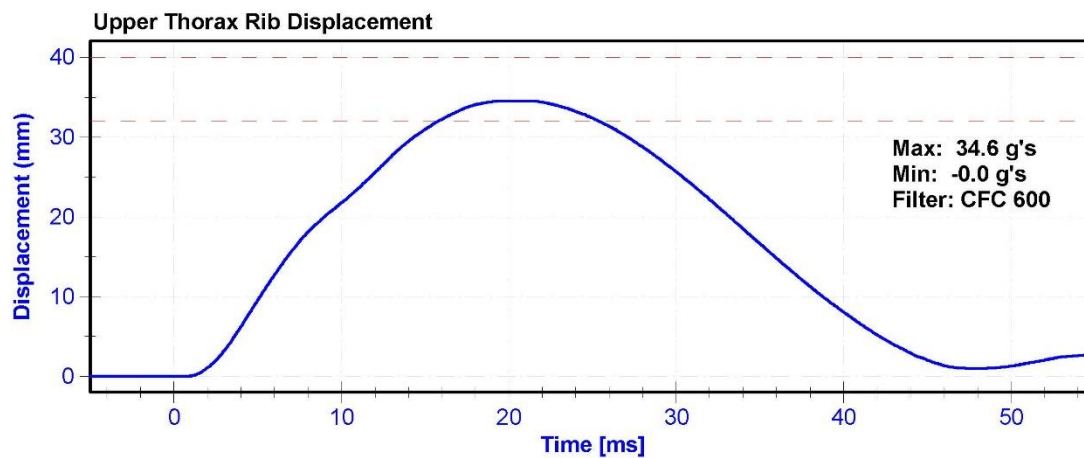
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	49.8	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.0	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.1	Pass
Upper Thorax Rib Deflection	32	40	mm	34.6	Pass
Middle Thorax Rib Deflection	39	45	mm	41.1	Pass
Lower Thorax Rib Deflection	35	43	mm	39.0	Pass

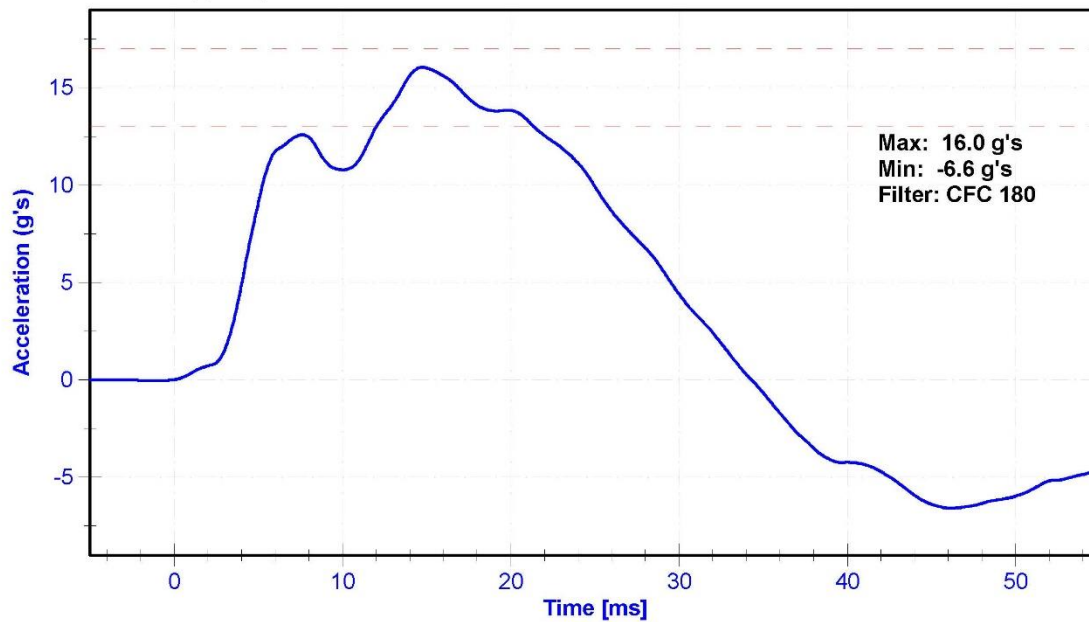
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/21/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	3/28/2016	9/26/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

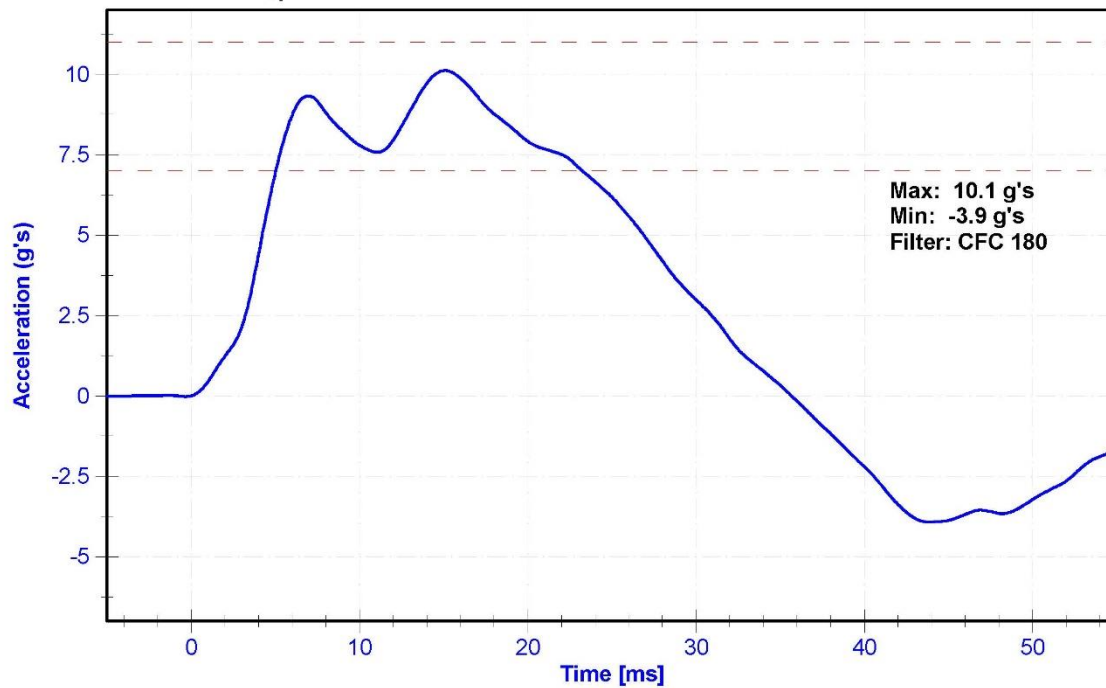




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



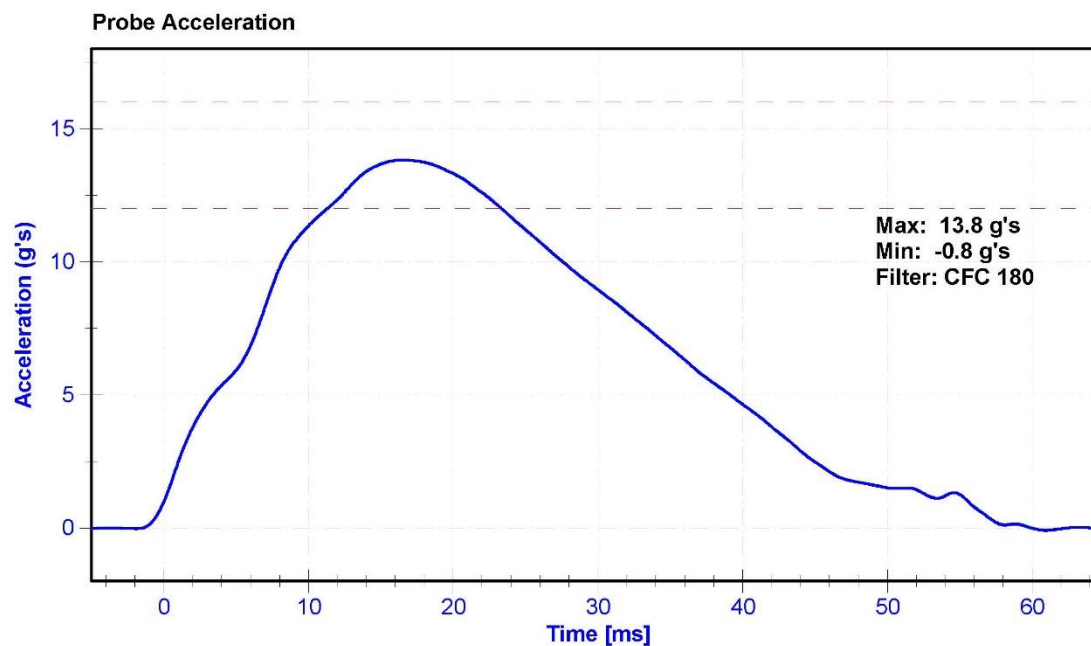
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

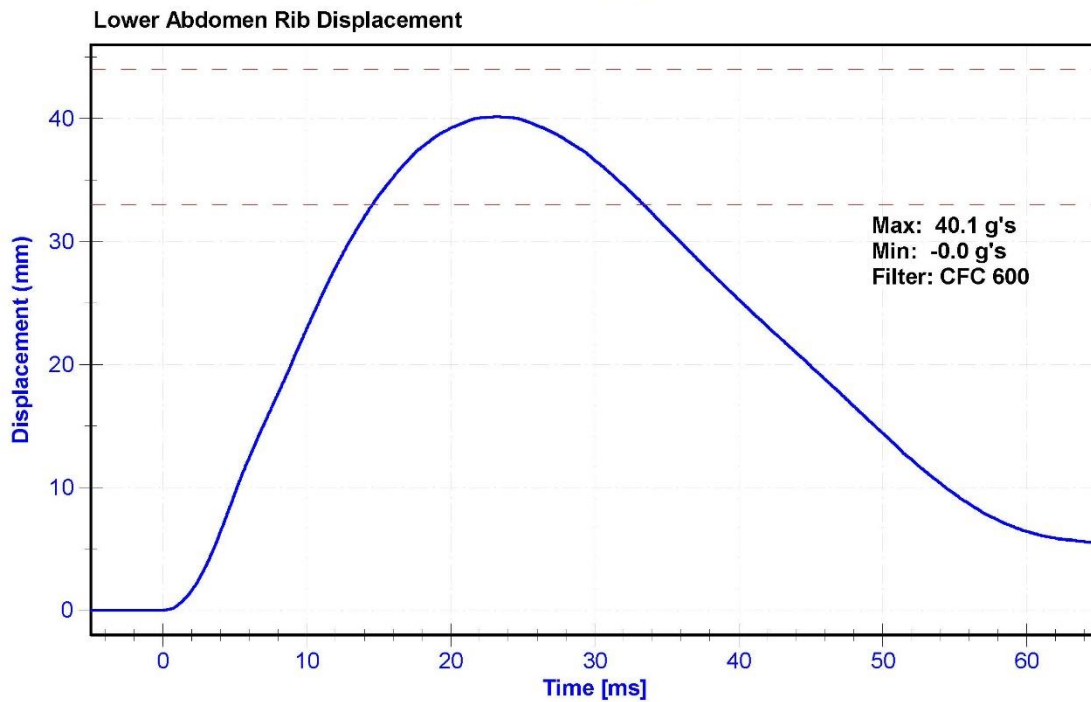
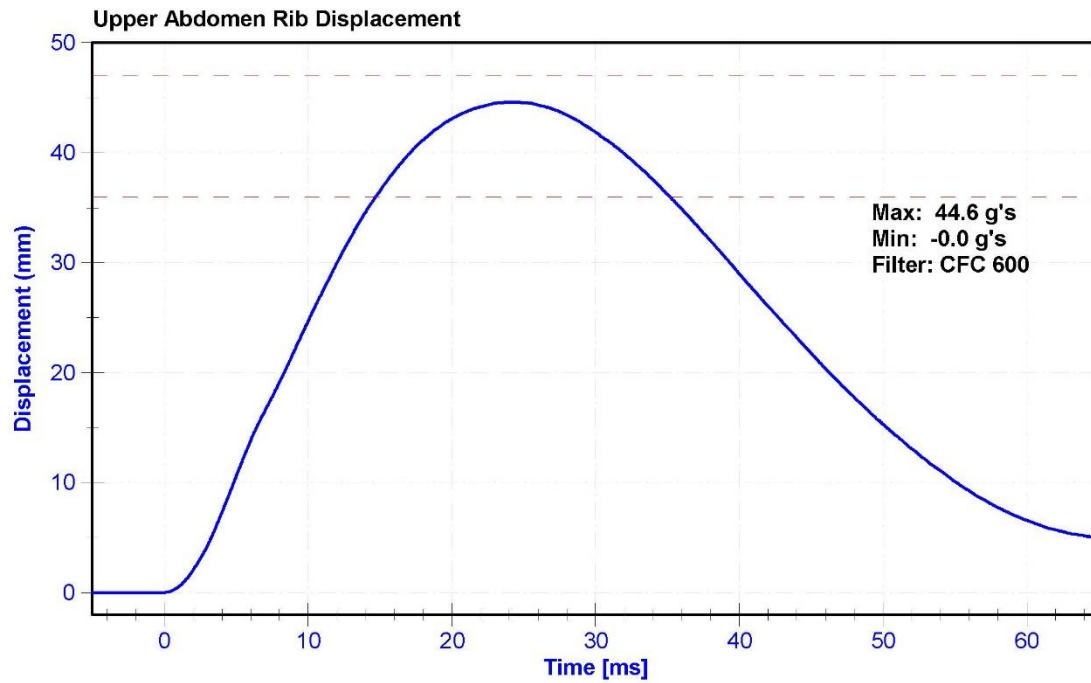
Results

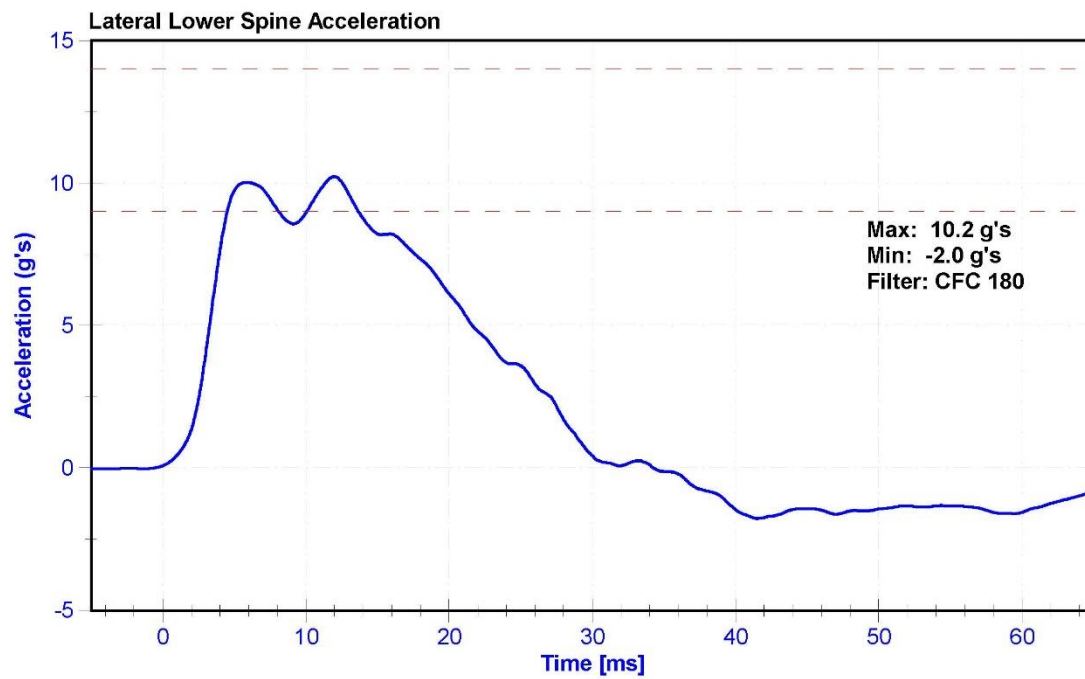
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	42.1	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.2	Pass
Upper Abdomen Rib Deflection	36	47	mm	44.6	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	3/28/2016	9/26/2016
Upper Abdomen Rib Potentiometer	Servo 08TC1-3787	DS-015GFE	9/24/2015	9/23/2016
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/24/2015	9/23/2016







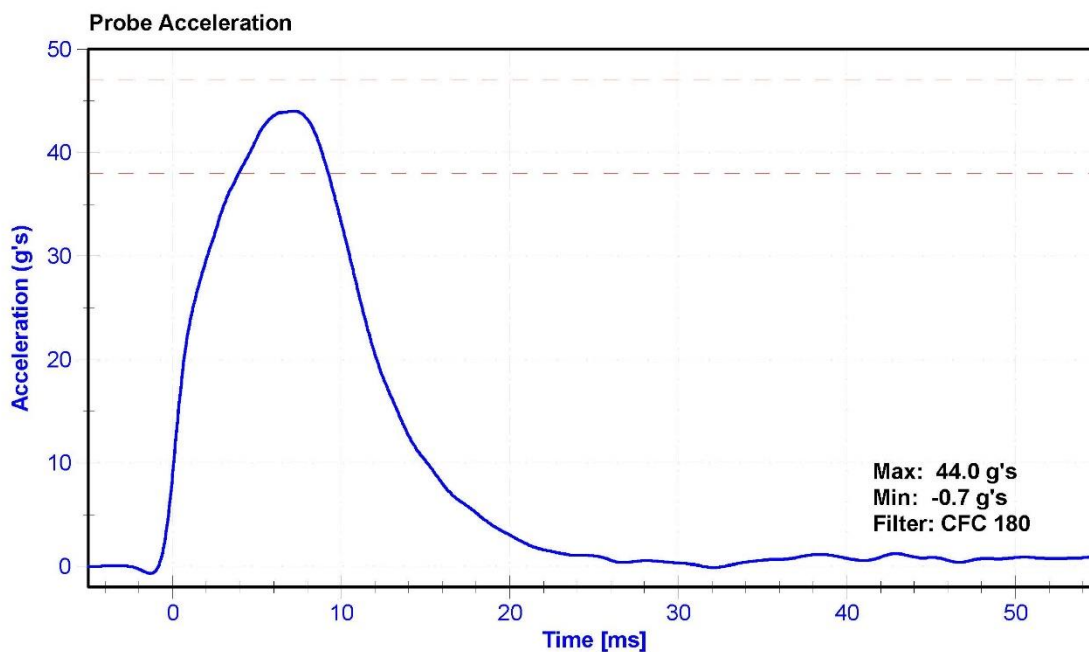
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

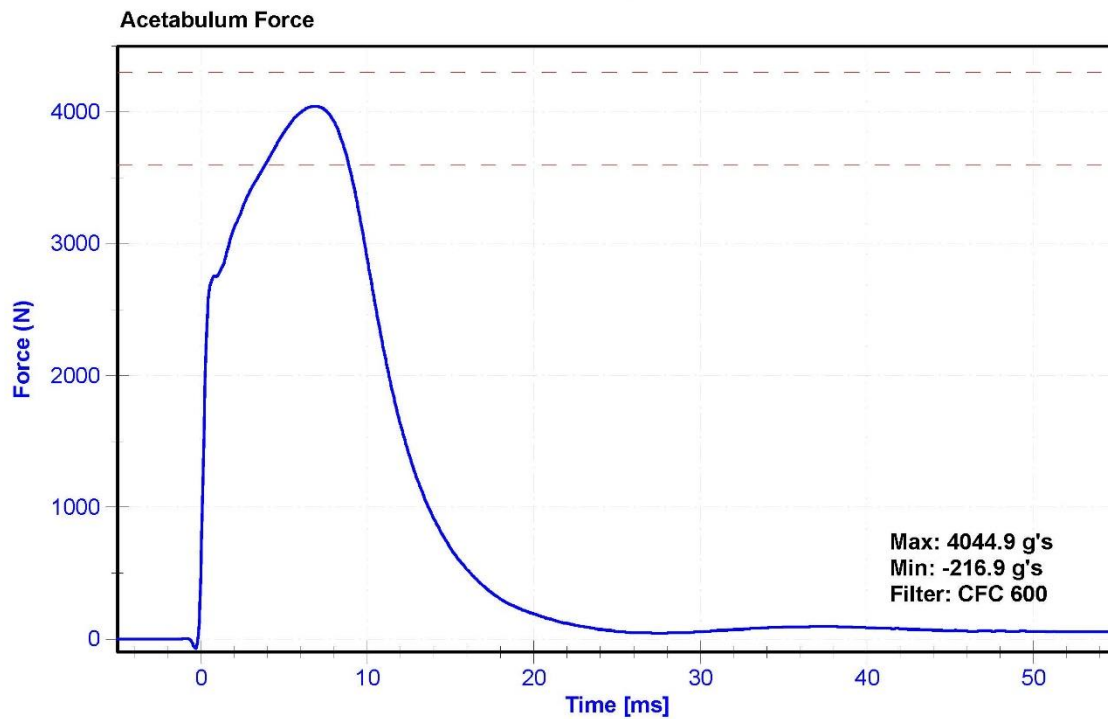
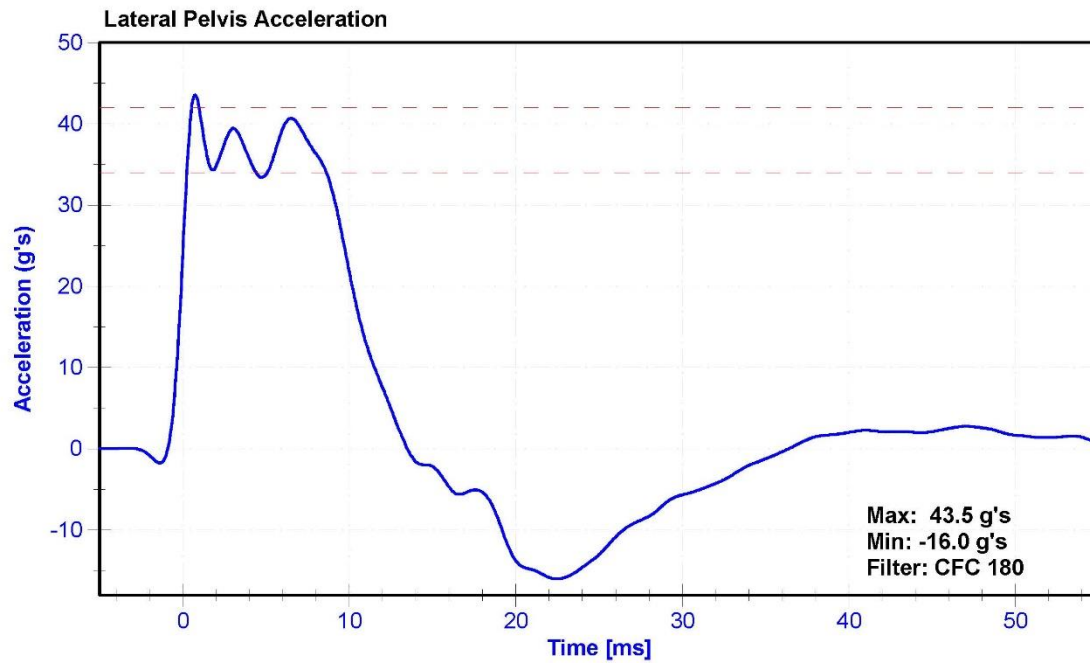
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	42.7	Pass
Velocity	6.6	6.8	m/s	6.60	Pass
Probe Acceleration	38	47	g's	44.0	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.7	Pass
Acetabulum Force	3600	4300	N	4044.9	Pass

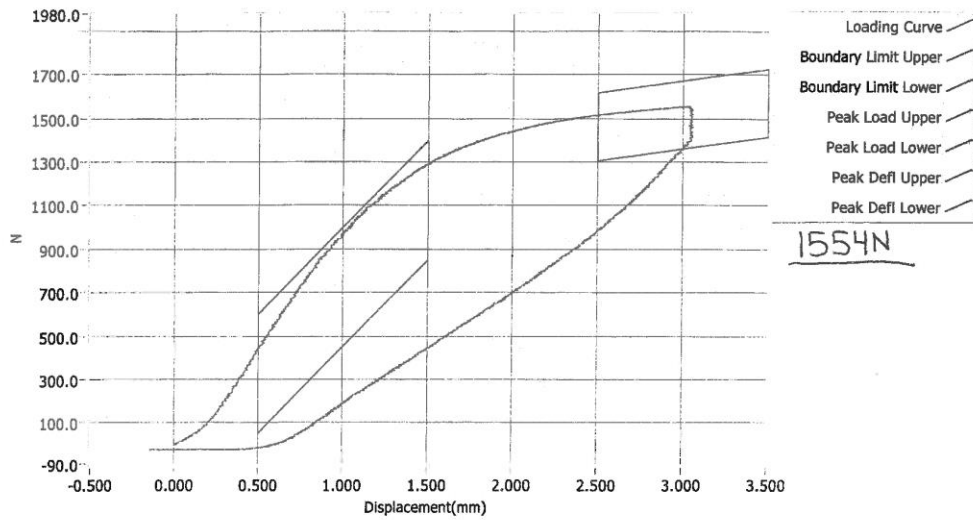
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	2/4/2016	8/4/2016
Acetabulum Load Cell	Denton 3249J	LC-267Fy	5/24/2016	5/24/2017
Certification Plug	Humanetics	70802	12/13/2013	N/A
Crash Test Plug	Humanetics	79591	11/05/2014	N/A





Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

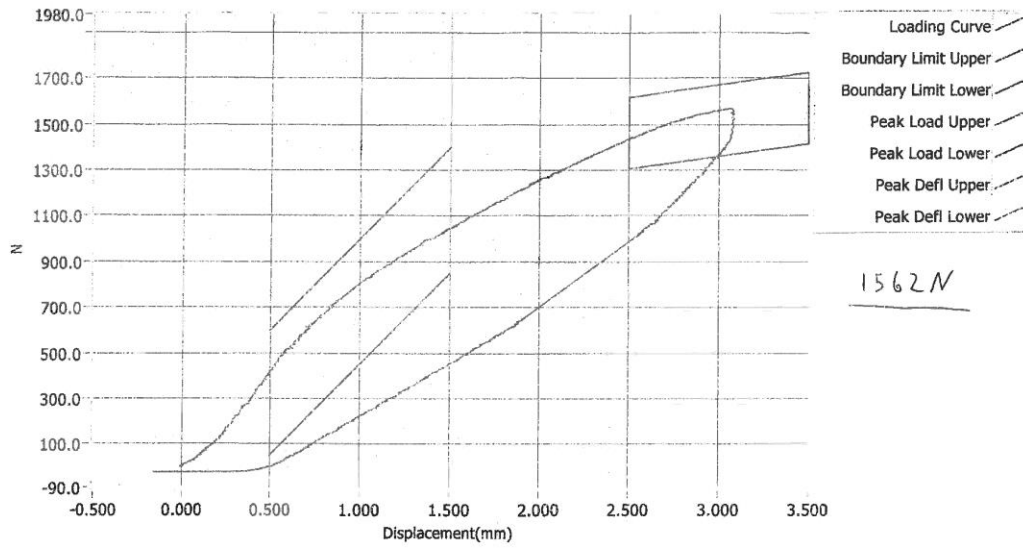
Test ID	Part Serial Number	Test Date	Test Time
	70802	12/13/2013	4:33 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/13/2013

Current Time : 16:33:36

Certification

Resultant Data - SIDIIs Plug Compression



1562 N

ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	79591	11/5/2014	9:24 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 11/5/2014

Current Time : 21:27:26

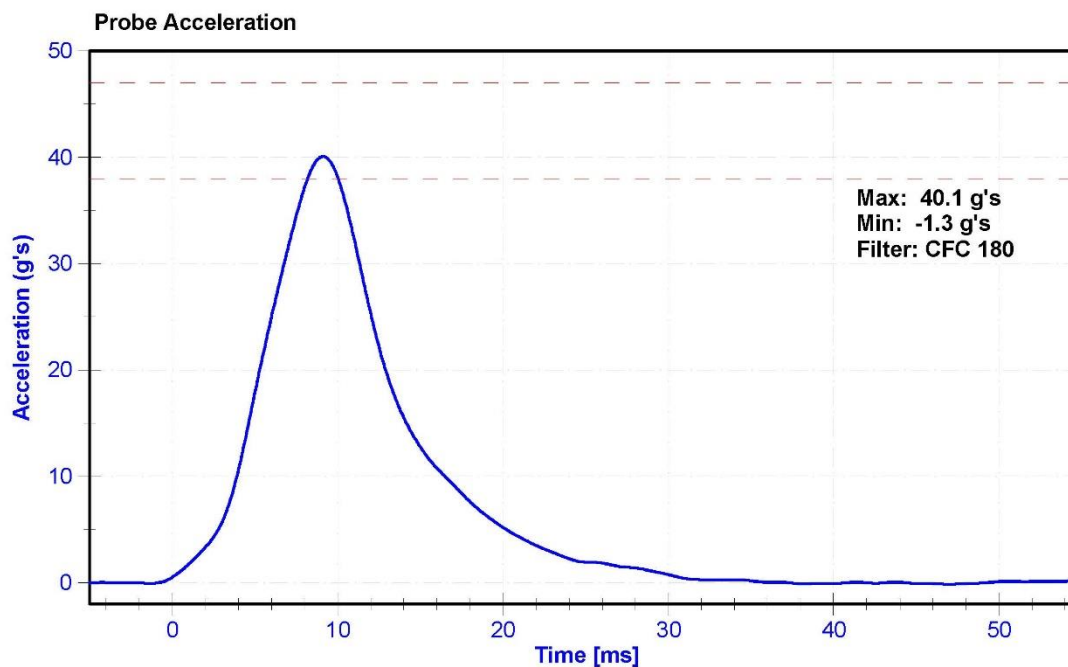
ATD Manufacturer	FTSS	Test Technician	I. Dunkle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

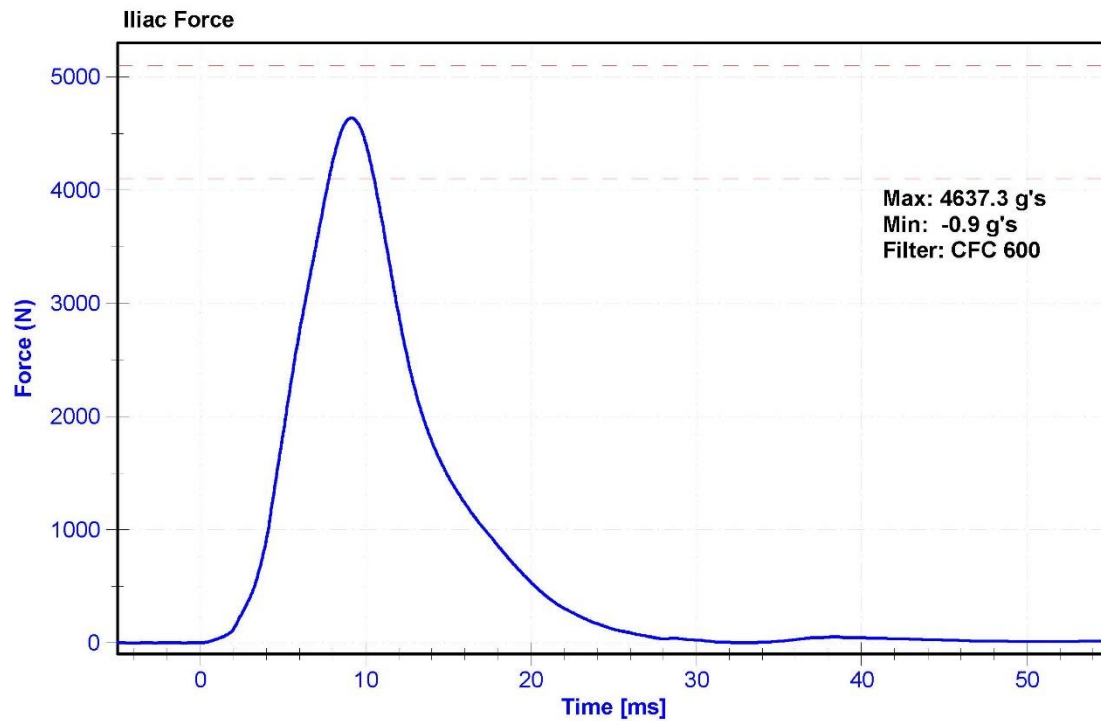
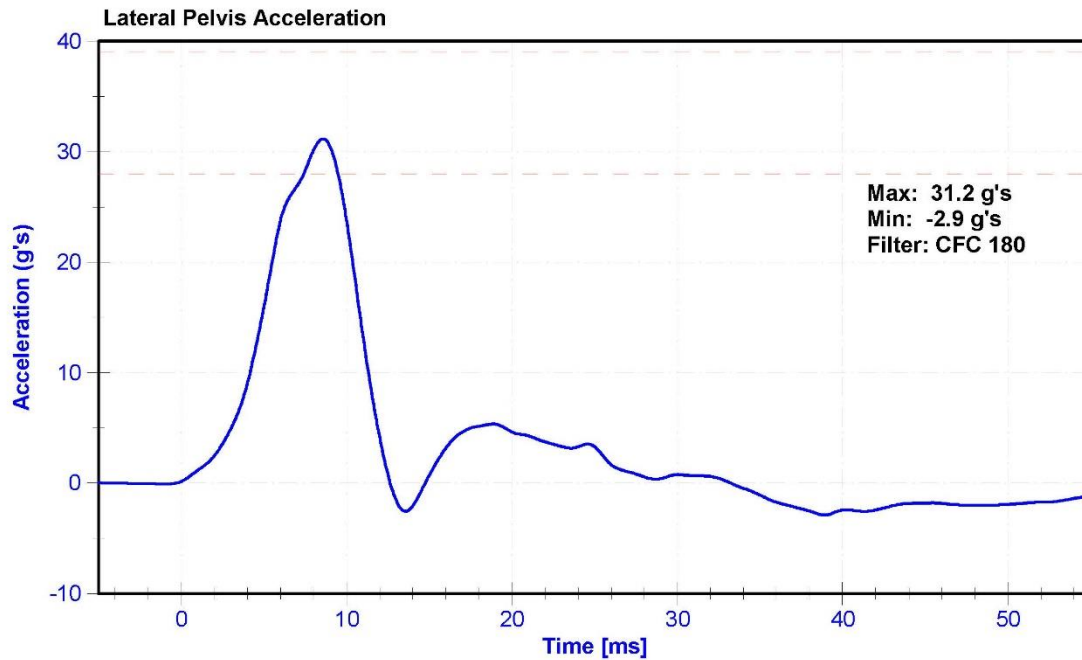
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	48.5	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	36	45	g's	40.1	Pass
Lateral Pelvis Acceleration	28	39	g's	31.2	Pass
Iliac Force	4100	5100	N	4637.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	2/4/2016	8/4/2016
Iliac Load Cell	DENTON 3228J	LC-281Fy	5/24/2016	5/24/2017





APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N: DG8012			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	AC-P51685	ENDEVCO	3/28/2016
			Y	AC-P51682	ENDEVCO	3/28/2016
			Z	AC-P51699	ENDEVCO	3/28/2016
Head Accelerometers - Redundant			X	AC-P51701	ENDEVCO	3/28/2016
			Y	AC-P45019	ENDEVCO	3/28/2016
			Z	AC-P51690	ENDEVCO	3/28/2016
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-808GFE	SERVO	9/24/2015
		Middle	Y	DS-1514GFE	SERVO	9/24/2015
		Lower	Y	DS-011GFE	SERVO	9/24/2015
	Abdominal Rib	Upper	Y	DS-015GFE	SERVO	9/24/2015
		Lower	Y	DS-1774GFE	SERVO	9/24/2015
Lower Spine Accelerometers (T12)			X	AC-P74788	ENDEVCO	3/23/2016
			Y	AC-P83319	ENDEVCO	3/28/2016
			Z	AC-P83432	ENDEVCO	3/23/2016
Acetabulum Load Cell			Y	LC-267Fy	DENTON	5/24/2016
Lilac Wing Load Cell			Y	LC-281Fy	DENTON	5/24/2016
Pelvis Plug (Struck Side)				79591	Humanetics	11/5/2014
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A197046	MSI 1201-1000	5/13/2016
Vehicle Center of Gravity	Y	AC-A197043	MSI 1201-1000	5/13/2016
Vehicle Center of Gravity	Z	AC-A197056	MSI 1201-1000	5/13/2016
Left Floor Sill	Y	AC-A197045	MSI 1201-1000	5/17/2016
A-Pillar Sill	Y	AC-A196990	MSI 1201-1000	5/17/2016
A-Pillar Low	Y	AC-A197012	MSI 1201-1000	5/17/2016
A-Pillar Mid	Y	AC-A196989	MSI 1201-1000	5/17/2016
B-Pillar Sill	Y	AC-A192198	MSI 1201-1000	5/13/2016
B-Pillar Low	Y	AC-A197031	MSI 1201-1000	5/13/2016
B-Pillar Mid	Y	AC-A197044	MSI 1201-1000	5/13/2016
Driver Seat	Y	AC-A197050	MSI 1201-1000	5/13/2016
Engine Top	X	AC-A196995	MSI 1201-1000	5/17/2016
Engine Top	Y	AC-A197032	MSI 1201-1000	5/17/2016
Firewall	Y	AC-A197028	MSI 1201-1000	5/13/2016
Right Roof	Y	AC-A197060	MSI 1201-1000	5/13/2016
Right Floor Sill	Y	AC-A197037	MSI 1201-1000	5/13/2016
Rear Floorpan	X	AC-A197042	MSI 1201-1000	5/13/2016
Rear Floorpan	Y	AC-A192201	MSI 1201-1000	5/13/2016

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18879	INTERFACE	8/4/2015
Load Cell 2	LC-18852	INTERFACE	8/4/2015
Load Cell 3	LC-46955	INTERFACE	8/4/2015
Load Cell 4	LC-18882	INTERFACE	8/4/2015
Load Cell 5	LC-18864	INTERFACE	8/4/2015
Load Cell 6	LC-18847	INTERFACE	8/4/2015
Load Cell 7	LC-62086	INTERFACE	8/4/2015
Load Cell 8	LC-46962	INTERFACE	8/4/2015