

REPORT NUMBER: SPNCAP-CAL-16-002

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

**Volvo Car Corporation
2016 Volvo S60i
Four Door Sedan**

NHTSA No: O20165900

**PREPARED BY:
CALSPAN CORPORATION
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January 14, 2016

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Date: January 14, 2016

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Date: January 14, 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: _____

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16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2016 Volvo S60i 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 November 23, 2015. The impact velocity of the vehicle was 32.64 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 384 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. 300)</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>251.291</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>32.971</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3139.969</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>18.729</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>21.697</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. 300)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	251.291	Resultant Lower Spine Acceleration	G	82	32.971	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3139.969	Maximum Thoracic Rib Deflection	mm	38	18.729	Maximum Abdomen Rib Deflection	mm	45	21.697
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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																												
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2016 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 2016 Volvo S60i 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 2016 Volvo S60i four door sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.64 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on November 23, 2015. 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	251.291
Resultant Lower Spine Acceleration	g	82	32.971
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3139.969
Maximum Thoracic Rib Deflection	mm	38*	18.729
Maximum Abdominal Rib Deflection	mm	45*	21.697

*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	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	No
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- Left Front Sill Y Acceleration, Questionable data after 51.4ms

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: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20165900
Model Year	2016
Make	Volvo
Model	S60i
Body Style	Four Door Sedan
VIN	LYV402FM7GB087884
Body Color	Silver
Odometer Reading (km/mi)	35.4 km / 22 mi
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	8-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
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	No
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	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	-

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Volvo Car Corporation
Date of Manufacture	05/15
Vehicle Type	Passenger

GVWR (kg)	2118
GAWR Front (kg)	1150
GAWR Rear (kg)	1009

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Capacity Weight (VCW) (kg)				455
DSC X 68.04 kg				340.2
Cargo Weight (RCLW) (kg)				114.8

(A)

(B)

(A-B)

VEHICLE SEAT TYPE

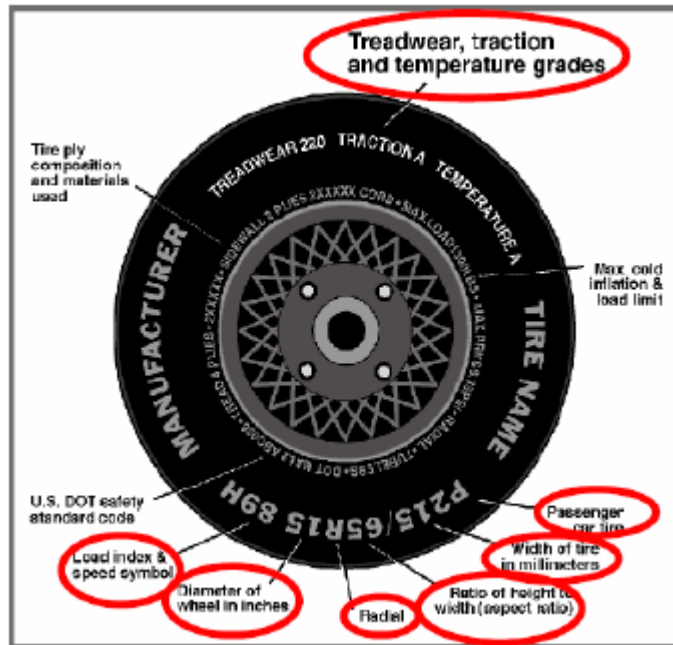
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X						X
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

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)	340	340
Cold Pressure (kPa)	260	260
Recommended Tire Size	P235/40R19	P235/40R19
Tire Size on Vehicle	P235/40R19	P235/40R19
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Cinturato P7	Cinturato P7
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	96V	96V
Tire Material	Rubber	Rubber
DOT Safety Code Left	93FCR2444914	93FCR2444914
DOT Safety Code Right	93FCR2444914	93FCR2444914

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

Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	260	260	260	260
Tire Placard	kPa	260	260	260	260
Owner's Manual	kPa	260	260	260	260
As Tested	kPa	260	260	260	260

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	530	316		561	368		535	405	
Right	kg	508	328		502	410		519	388	
Ratio	%	61.7%	38.3%		58%	42%		57.1%	42.9%	
Totals	kg	1038	644	1682	1063	778	1841	1054	793	1847

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1682	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50.8	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	114.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1847.6	(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	-0.1	0.2	0.7	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.5	-0.4	-0.2	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	0.1	0.0	-0.1	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.3	-0.3	-0.3	Yes
Vehicle CG (Aft of Front Axle)	mm	1093	1207	1402	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	5	7	14	

* 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: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Tail light	1
Trunk Carpeting	10
Pump Kit & Jack	4
Passenger Side Windows	8
Ballast / Equipment Added	59

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: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

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	23.9	12.7	18.3
Front Passenger Seat	23.5	12.5	18.0
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	18.3	59	Max	57	70	85
			Mid	30	44	59
			Min	0	14	29
Front Passenger Seat	18	54	Max	56	68	80
			Mid	28	40	54
			Min	0	11	23
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: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

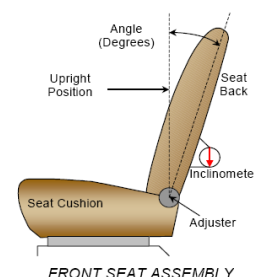
NHTSA No.: O20165900
 Test Date: 11/23/2015

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	255	N/A	0	N/A
Front Passenger Seat	222	N/A	0	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 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	-11.7 to 61	N/A	9.8	N/A
Front Passenger Seat	-7.5 to 64	N/A	9.8	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	4 (0 – 3)	1

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	FIXED	FIXED

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

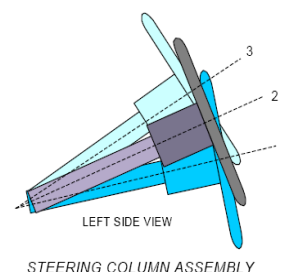
Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

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.

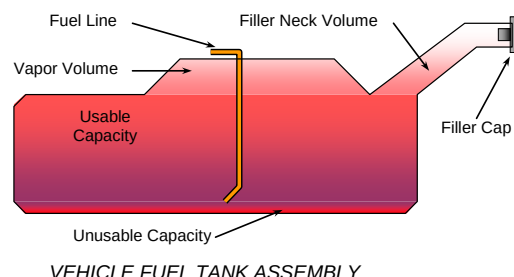
	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	21.4	
Geometric Center – Position 2	24.4	
Uppermost – Position 3	27.4	
Telescoping Steering Wheel Travel		50
Test Position	24.4	25



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 right side of the vehicle.
The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of "Standard Tank" - see Form No. 1	67.5
Usable Capacity of "Optional Tank" - see Form No. 1	
Usable Capacity of "Standard Tank" - see Owner's Manual	67.5
Usable Capacity of "Optional Tank" - see Owner's Manual	
93% of Usable Capacity	62.8
Actual Amount of Solvent Used in Test	62.8
1/3 of Usable Capacity	22.5

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

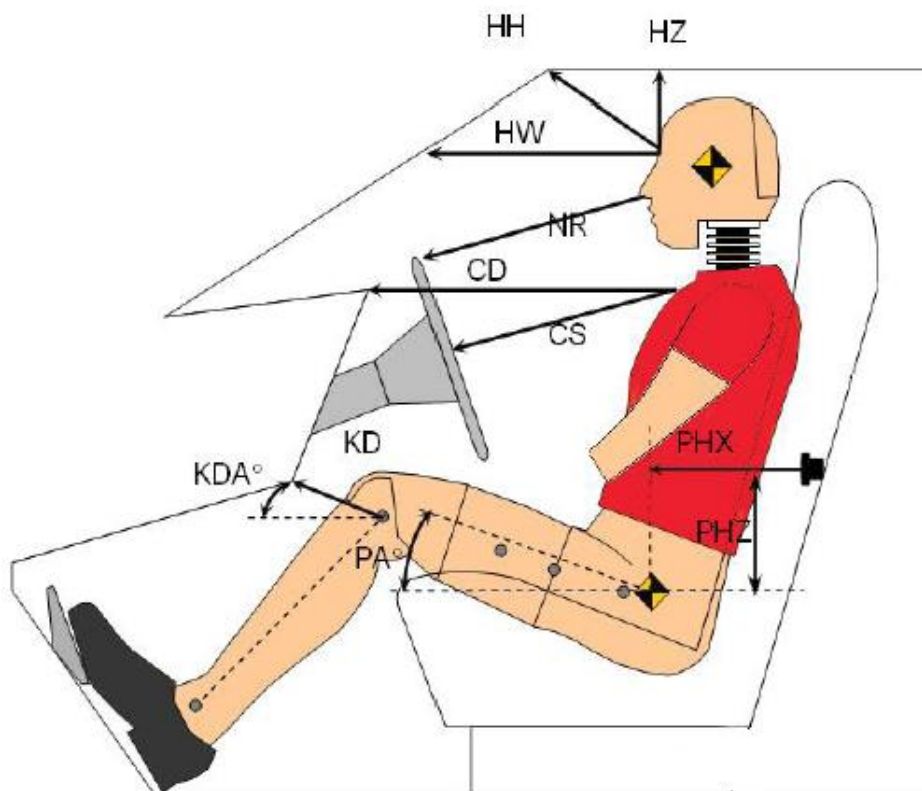


No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015



Left Side View

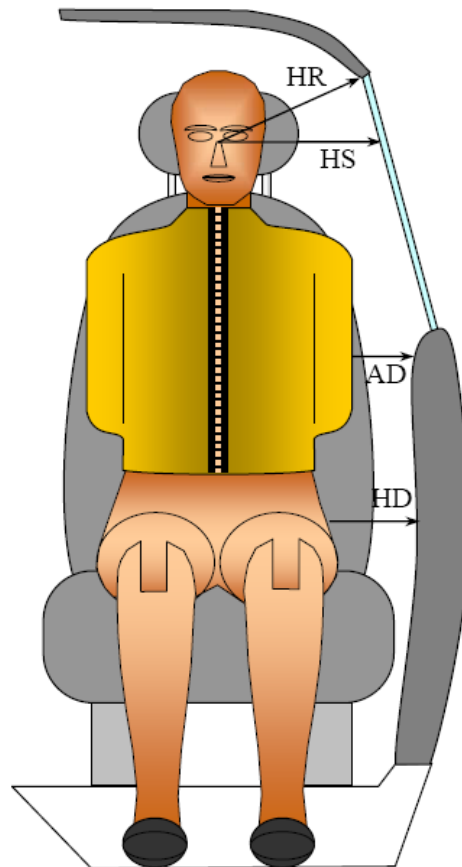
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	233	
HW	Head to Windshield	527	
HZ	Head to Roof Liner	149	
NR	Nose to Rim	209	
CD	Chest to Dash	412	
CS	Chest to Steering Wheel	142	
KD(L) / KDA(L)°	Left Knee to Dash	98	34.8
KD(R) / KDA(R)°	Right Knee to Dash	88	36.2
PAX°	Pelvic Tilt Angle (X-Axis)		20.0
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	316	
PHZ	Hip Point to Striker (Z-Axis)	58	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015



FRONT VIEW OF DUMMY

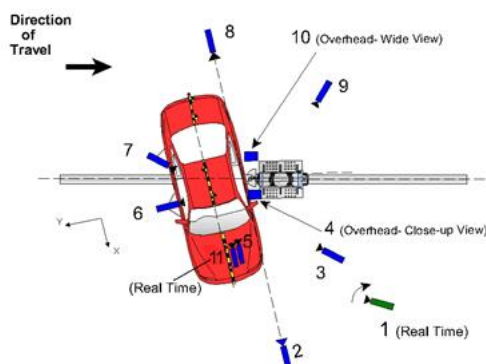
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	207
HS	Head to Side Window	mm	365
AD	Arm to Door	mm	177
HD	Hip Point to Door	mm	173

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015



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	6588	0	1172	24	1000
3	Impact side 45° - forward pole view	4156	-2211	-1656	24	1000
4	Overhead Close-up view of impact	0	0	-5203	20	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	-6585	0	1184	24	1000
9	Impact side 45° - rearward pole view	-2330	-4134	-1688	24	1000
10	Overhead wide - view of impact	-75	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: Real time camera malfunctioned during the test.

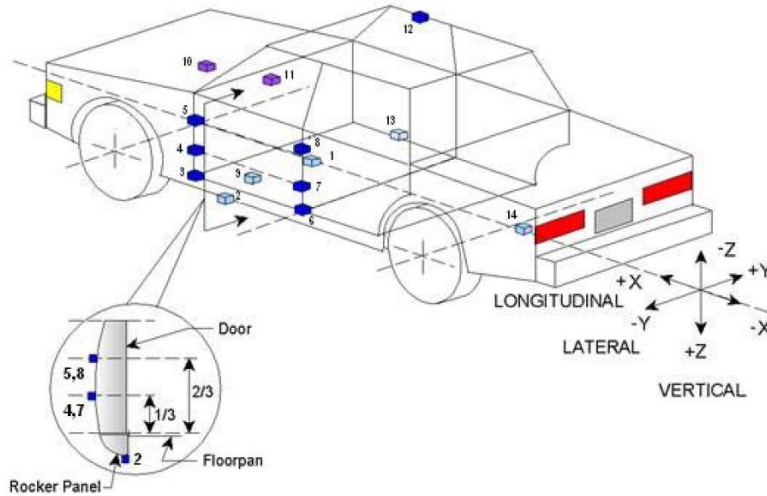
INSTRUMENTATION

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: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2861	9	61
2	Left Floor Sill	2822	-718	-122
3	A-Pillar Sill	3183	-688	-149
4	A-Pillar Low	3224	-690	84
5	A-Pillar Mid	3174	-678	518
6	B-Pillar Sill	2182	-695	277
7	B-Pillar Low	2226	-694	28
8	B-Pillar Mid	2186	-701	-137
9	Driver Seat Track	2305	-563	-167
10	Engine Top	3997	283	322
11	Firewall	3706	-5	383
12	Right Roof	2232	571	957
13	Right Floor Sill	2811	722	-117
14	Rear Floorpan	1069	-5	13

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: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015

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: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015

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 & Headrest
Left Shoulder	Seatback
Upper Torso	Seatback
Lower Torso	Seatback
Left Hip	Torso/Pelvis Airbag & Seatpan
Left Knee	Driver's Door

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	0	0	0	0	0
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: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar and B-Pillar buckled inward.
Sill Separation	Bent inwards where pole impacted
Windshield Damage	Shattered throughout with separation along Driver A-Pillar
Side Window Damage	Driver window shattered during impact event
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	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	No
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		1131
Actual Impact Point - Aft of Front Axle	mm		1128
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	3
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	32.64
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.67

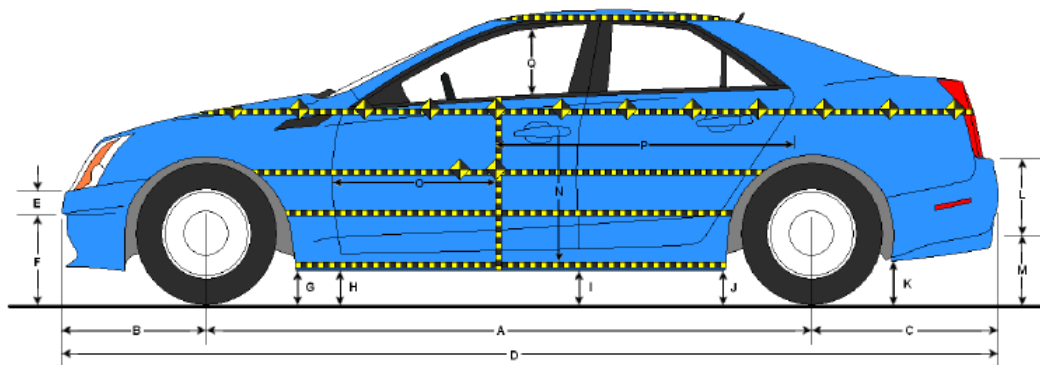
* Of Intended Impact Point

** Speed Determined from video analysis

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Volvo S60i four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
Test Date: 11/23/2015



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

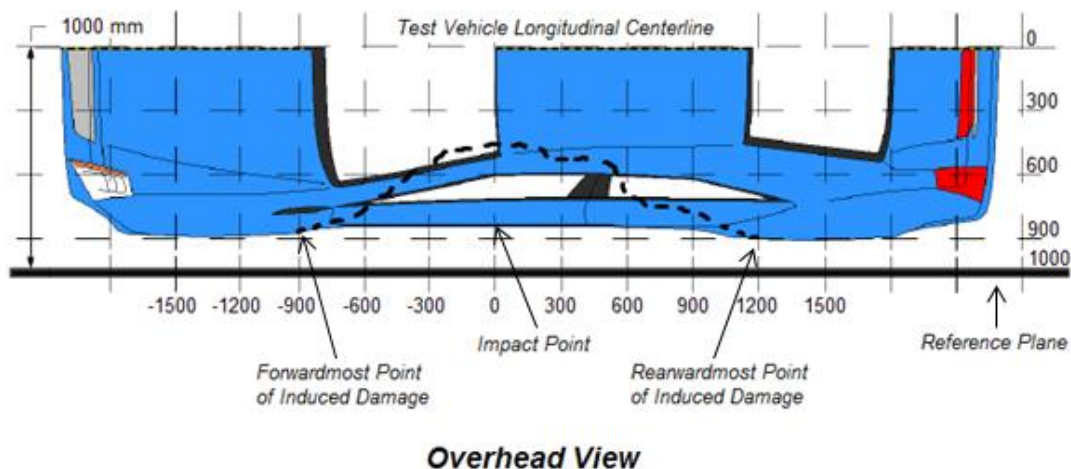
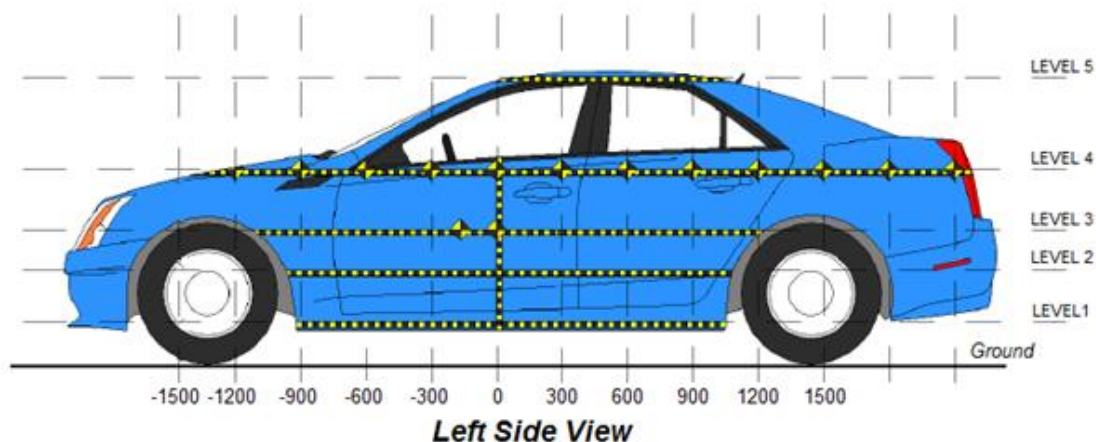
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2856	2784	72
B	Front Axle to FSOV	946	985	-39
C	Rear Axle to RSOV	914	906	8
D	Total Length at Centerline	4717	4675	42
E	Front Bumper Thickness	80	80	0
F	Front Bumper Bottom to Ground	423	446	-23
G	Sill Height at Front Wheel Well	170	157	13
H	Sill Height at Front Door Leading Edge	171	103	68
I	Sill Height at B-Pillar	195	176	19
J1	Sill Height at Rear Wheel Well	183	171	12
J2	Pinch Weld Height at Rear Wheel Well	192	197	-5
K	Sill Height Aft of Rear Wheel Well	255	247	8
L	Rear Bumper Thickness	205	205	0
M	Rear Bumper Bottom to Ground	395	376	19
N	Sill Height to Bottom of Front Window Sill	719	720	-1
O	Front Door Leading Edge to Impact CL	618	523	95
P	Rear Door Trailing Edge to Impact CL	1539	1441	98
Q	Front Window Opening	378	371	7
R	Right Side Length	4611	4613	-3
S	Left Side Length	4611	4543	68
T	Vehicle Width at B-Pillars	1822	1659	163

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

DATA SHEET NO. 10 **TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	256	349	0
2	Occupant Hip Point	mm	603	380	150
3	Mid - Door	mm	669	384	150
4	Window Sill	mm	924	340	150
5	Window Top	mm	1408	120	150

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: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

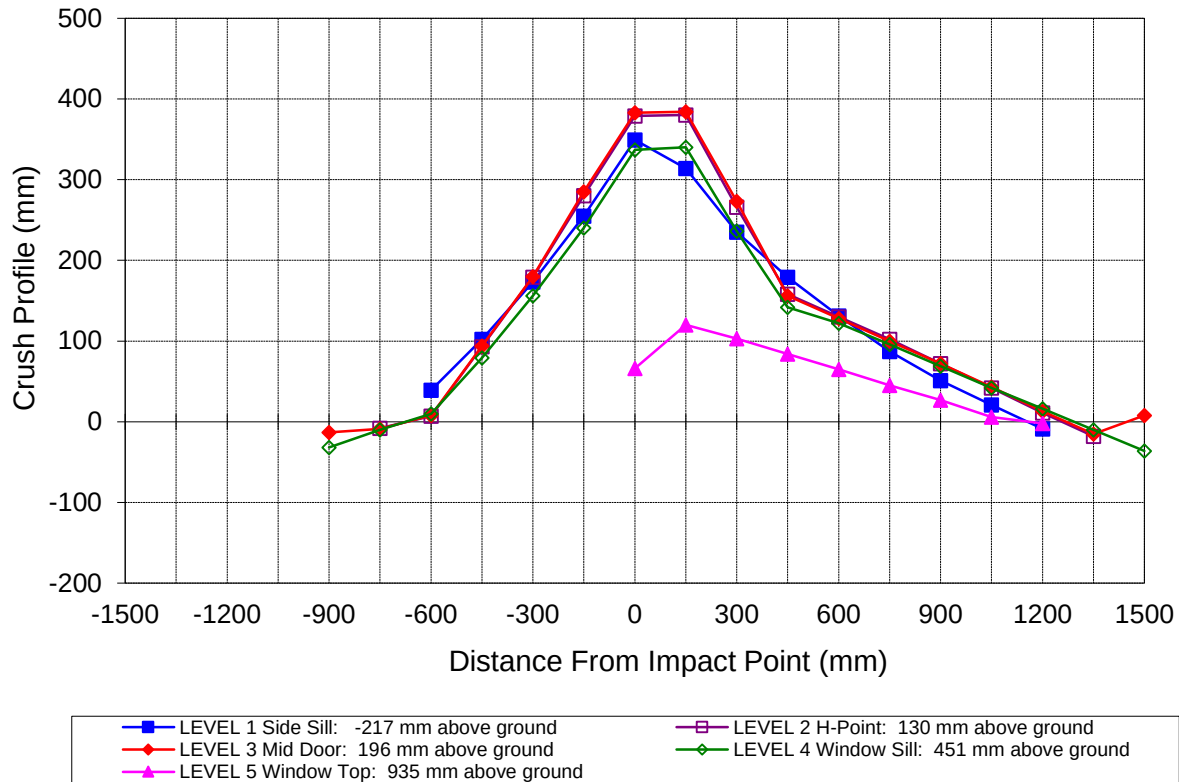
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900			918	812				931	844				-13	-32	
-750		913	910	824			921	919	834			-8	-9	-10	
-600	869	905	904	834		830	898	896	824		39	7	8	10	
-450	871	905	905	843		769	812	811	764		102	93	94	79	
-300	872	908	909	852		699	729	729	696		173	179	180	156	
-150	872	910	912	860		617	630	627	620		255	280	285	240	
0	873	911	914	868	477	524	532	531	531	411	349	379	383	337	66
150	873	912	914	875	589	559	532	530	535	469	314	380	384	340	120
300	872	911	914	879	608	637	645	641	643	505	235	266	273	236	103
450	871	909	912	883	609	692	751	756	741	525	179	158	156	142	84
600	870	905	908	884	609	739	775	780	762	544	131	130	128	122	65
750	868	901	904	884	608	781	799	804	788	563	87	102	100	96	45
900	866	896	900	883	604	815	824	828	814	577	51	72	72	69	27
1050	865	894	897	880	585	844	852	854	838	579	21	42	43	42	6
1200	862	895	897	880	446	871	884	884	864	448	-9	11	13	16	-2
1350		901	901	879			919	916	889			-18	-15	-10	
1500			909	875				901	911				8	-36	

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: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015



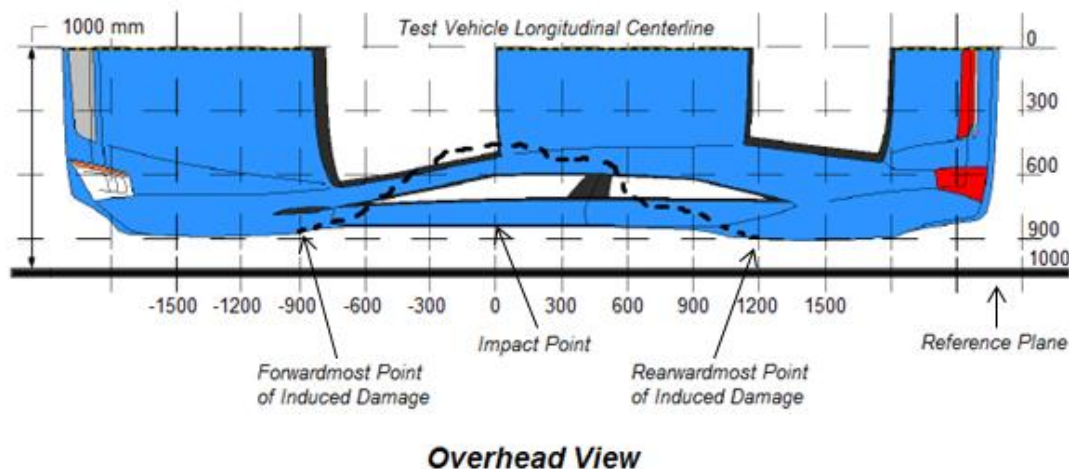
Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 11 **VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015

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	69	82	-13
2	-420	3	205	94	111
3	60	3	469	86	383
4	540	3	230	90	140
5	1020	3	151	102	49
6	1500	3	99	91	8

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

Test Vehicle:	<u>2016 Volvo S60i four door sedan</u>	NHTSA No.:	<u>O20165900</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>11/23/2015</u>
Test Time:	<u>12:48 PM</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°	65	300	365
180° to 270°	63	300	363
270° to 360°	68	300	368

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

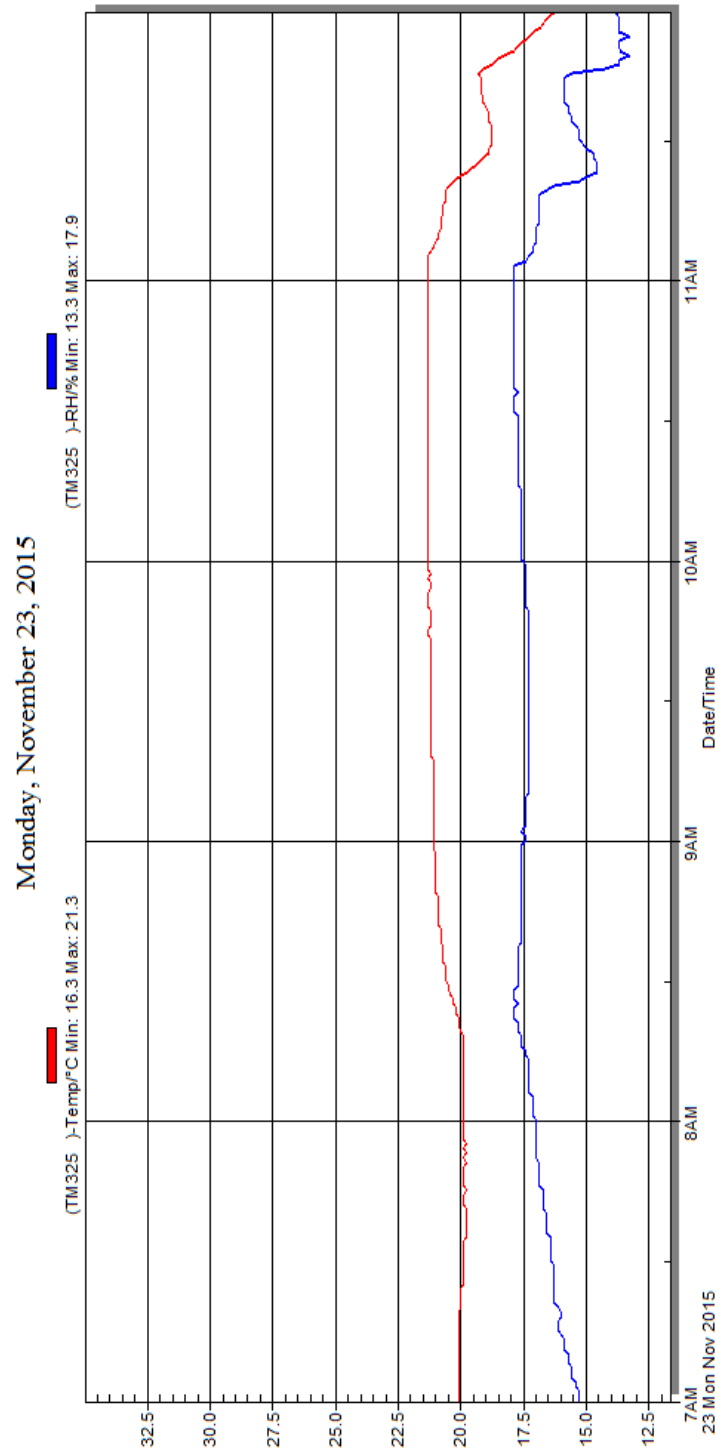
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2016 Volvo S60i four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20165900
 Test Date: 11/23/2015



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

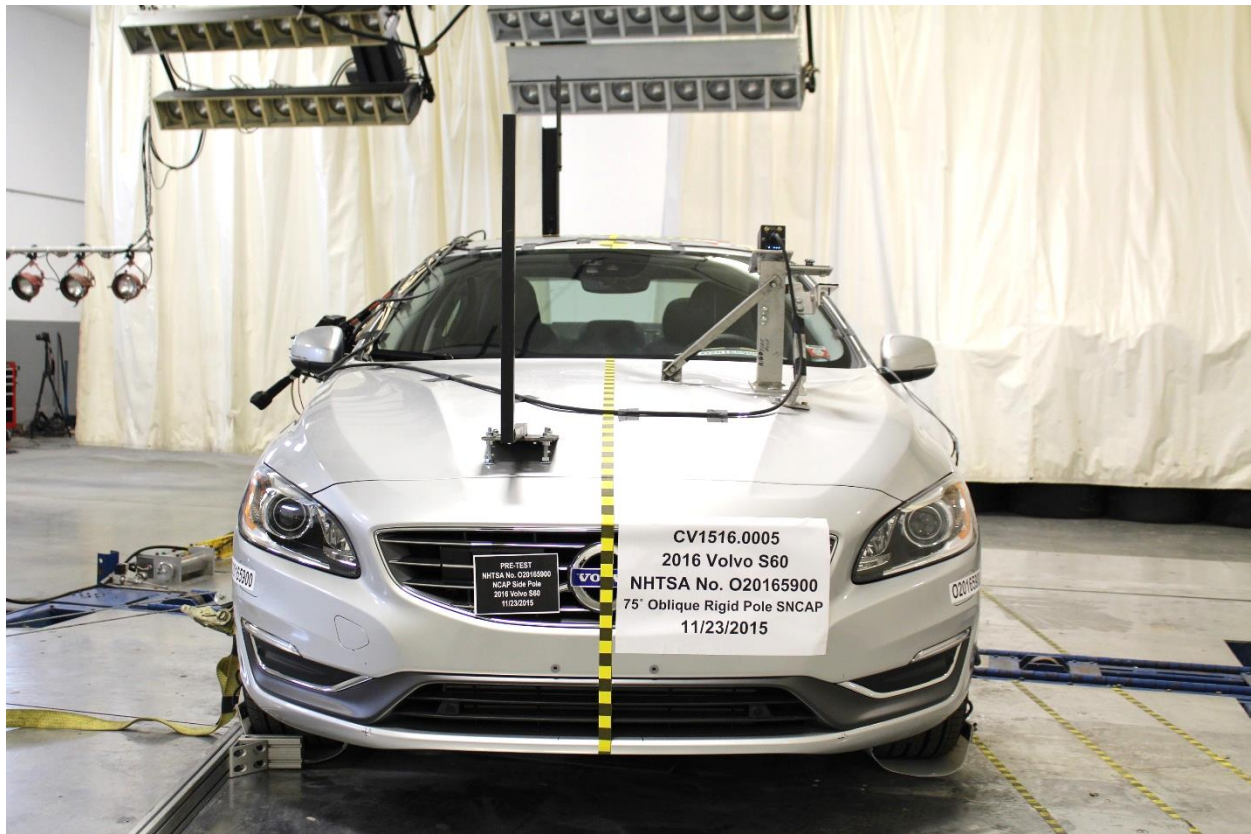


Figure A-3: Pre-Test Frontal View of Test Vehicle



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



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

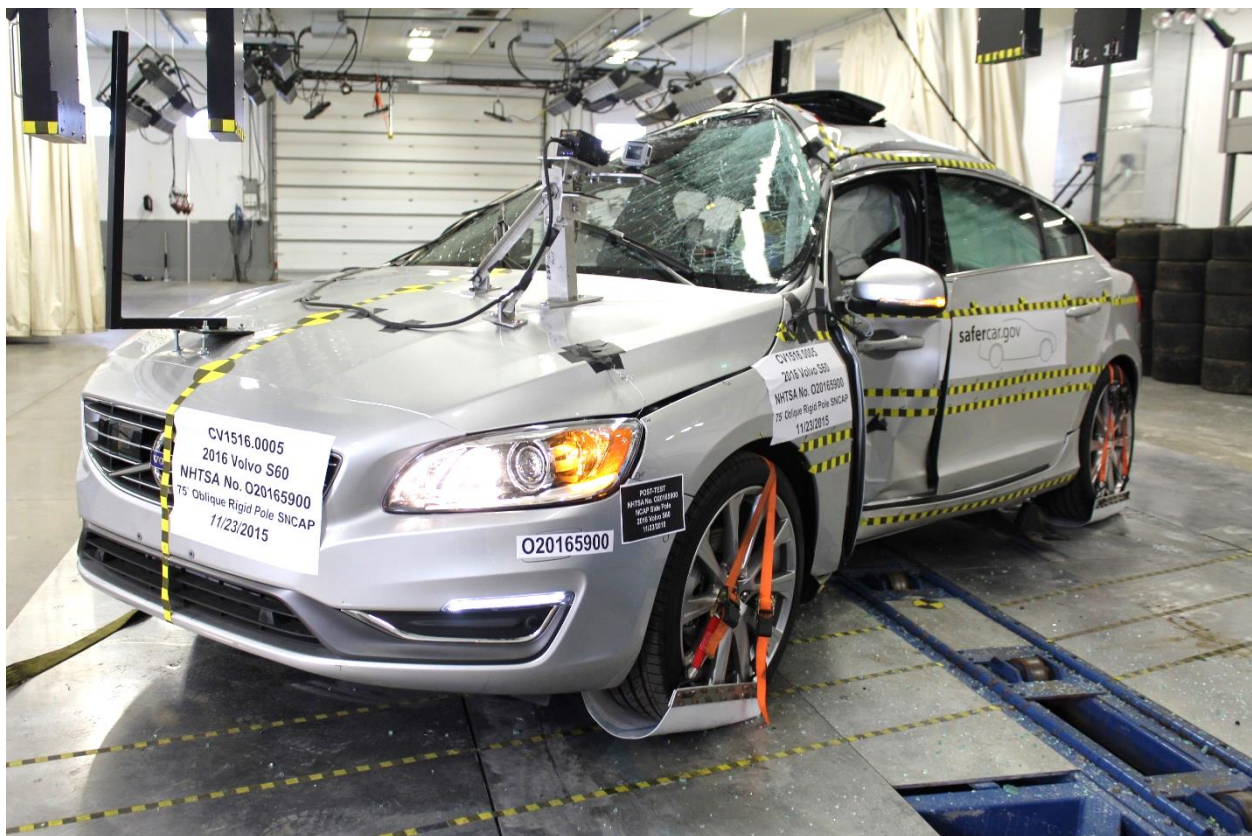


Figure A-6: Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



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

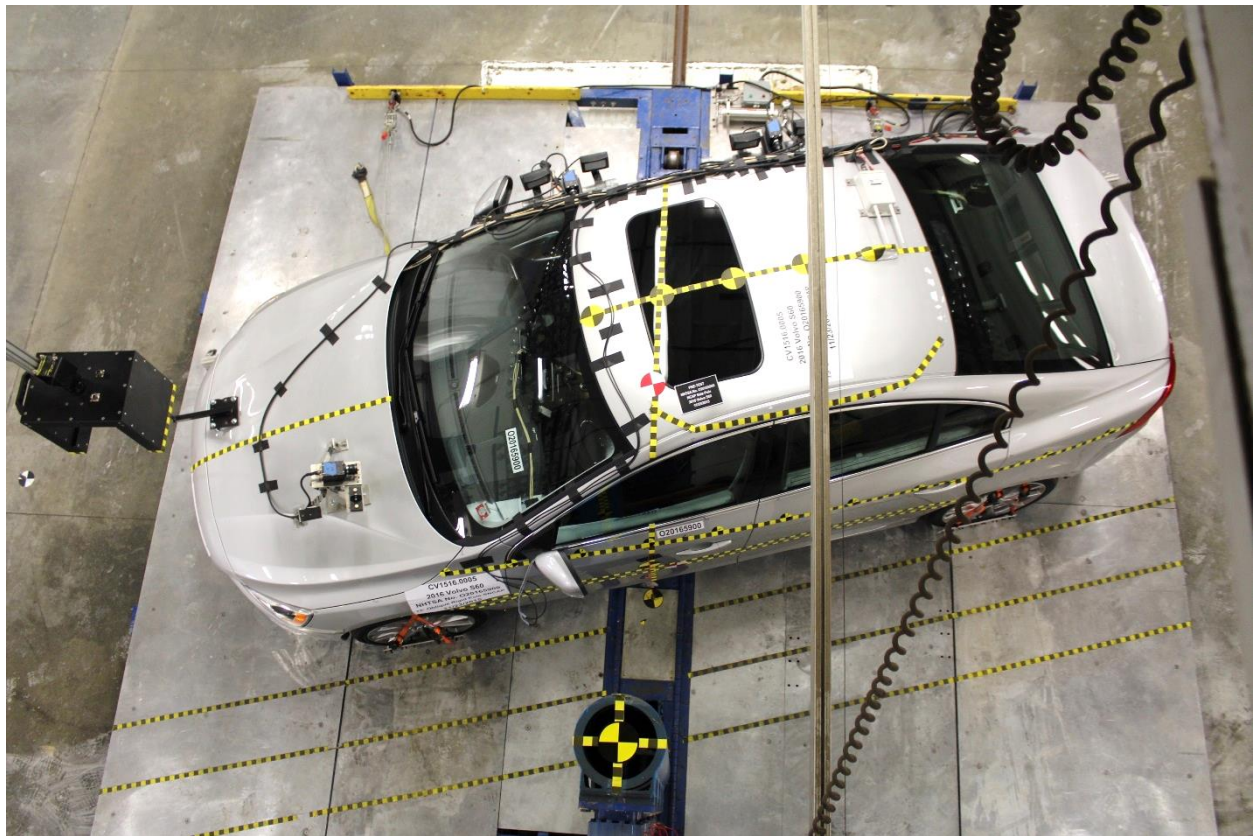


Figure A-15: Pre-Test Overhead View of Test Area

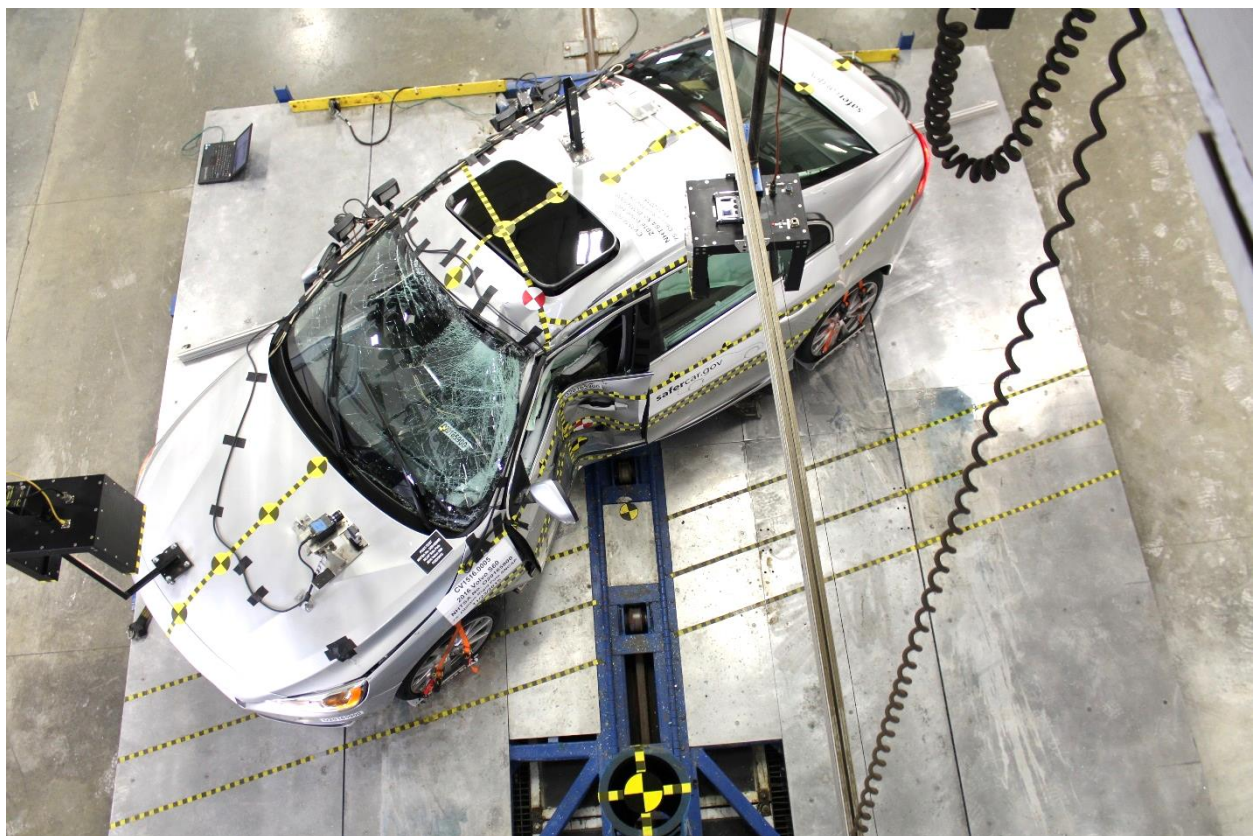


Figure A-16: Post-Test Overhead View of Test Area



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

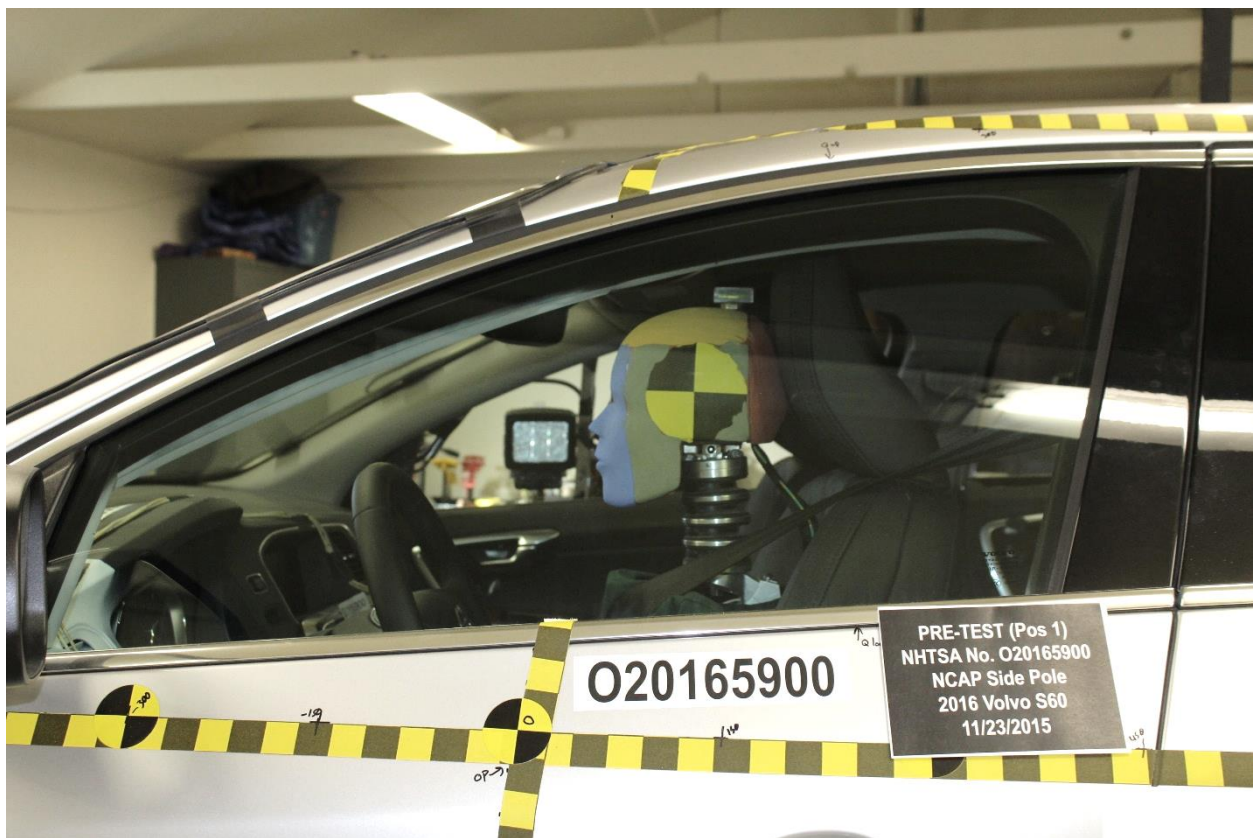


Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



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

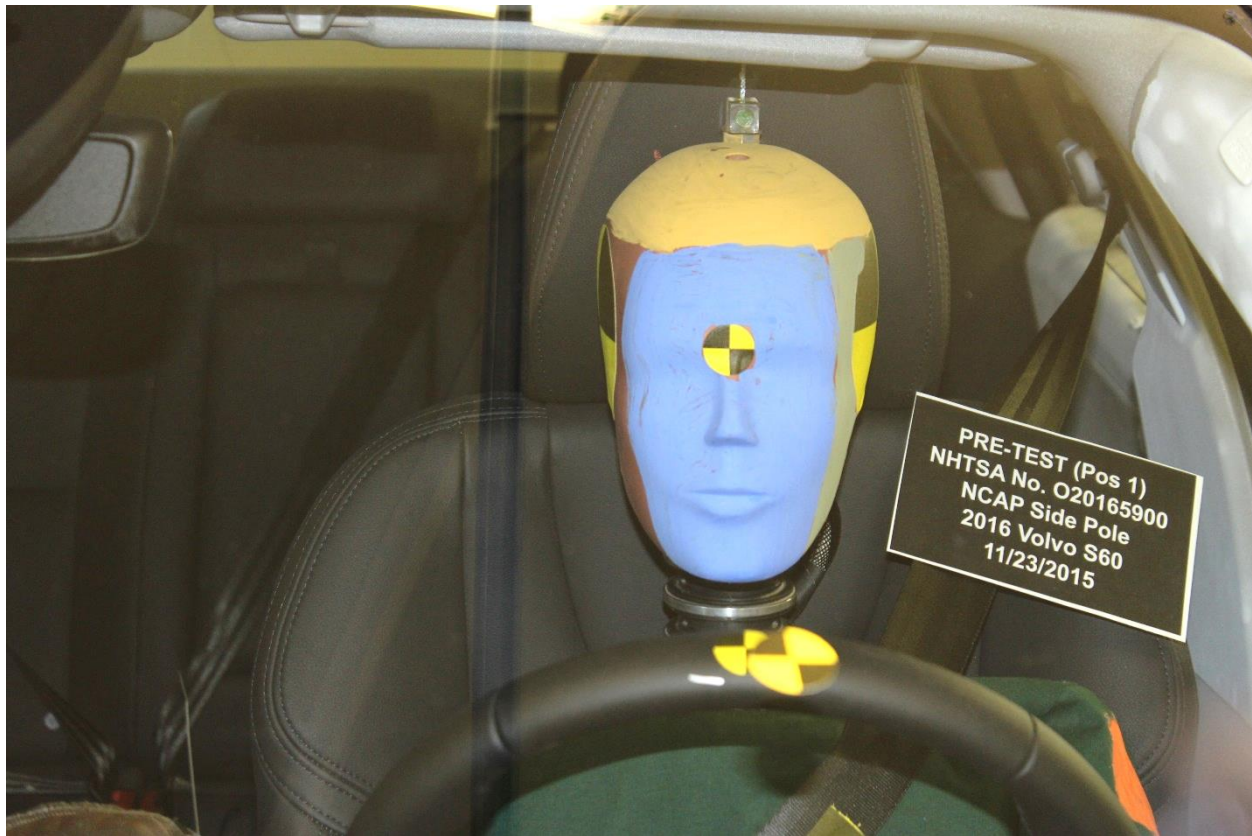


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



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

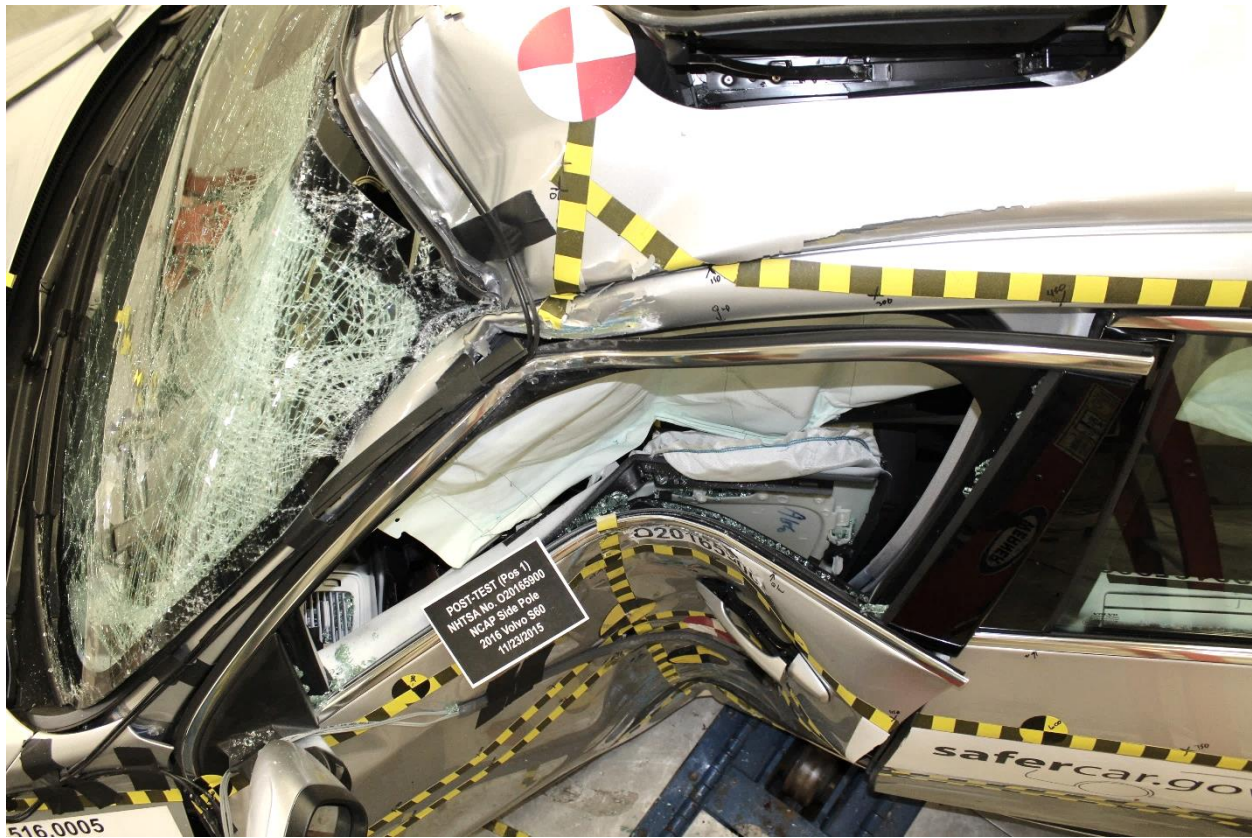


Figure A-41: Post-Test Dummy and Door Clearance View



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

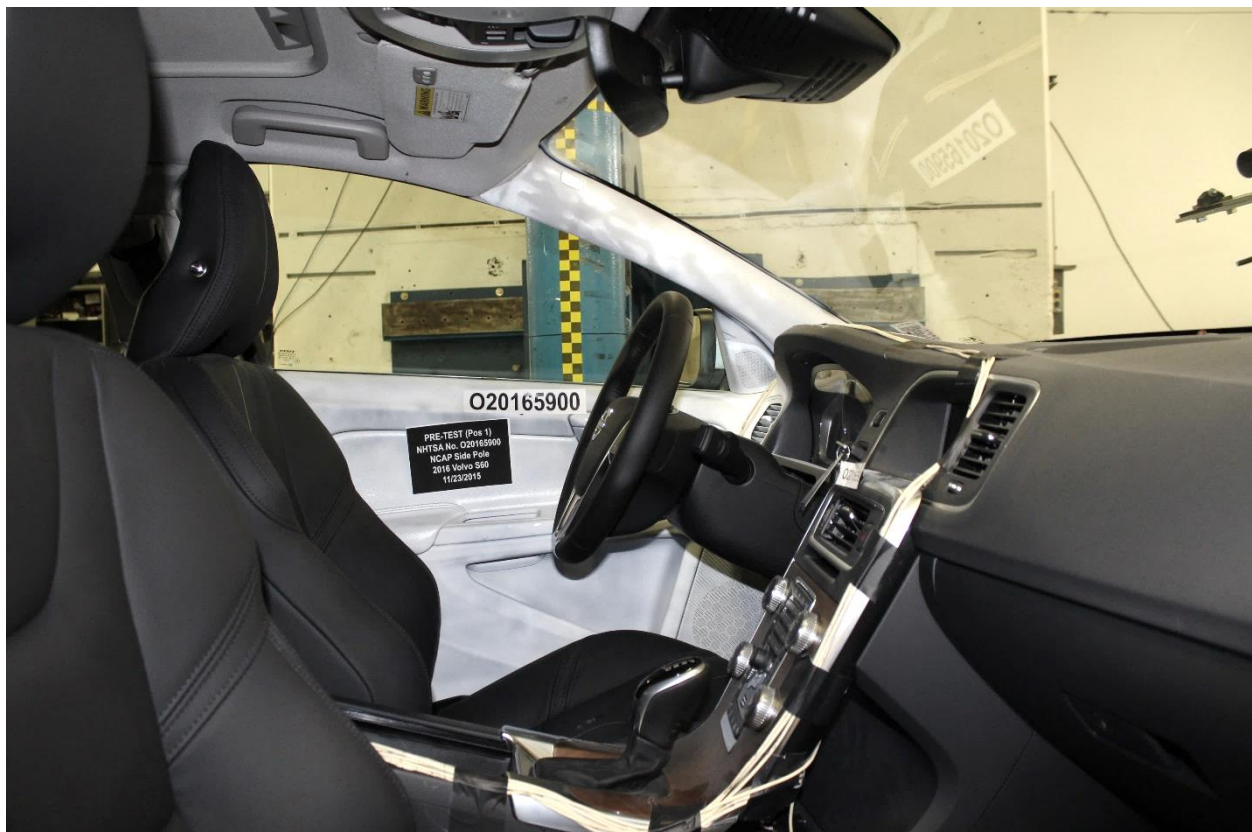


Figure A-44: Pre-Test Inner Door Panel View

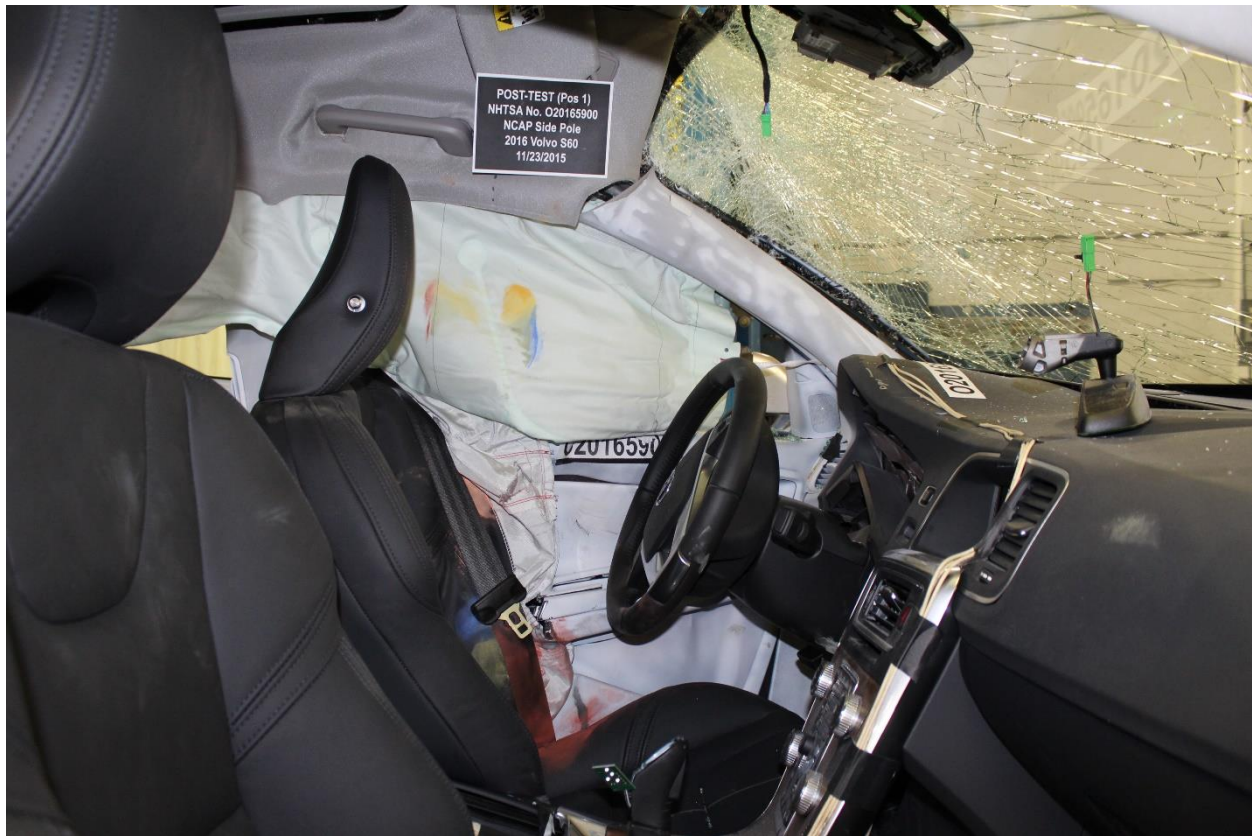


Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



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

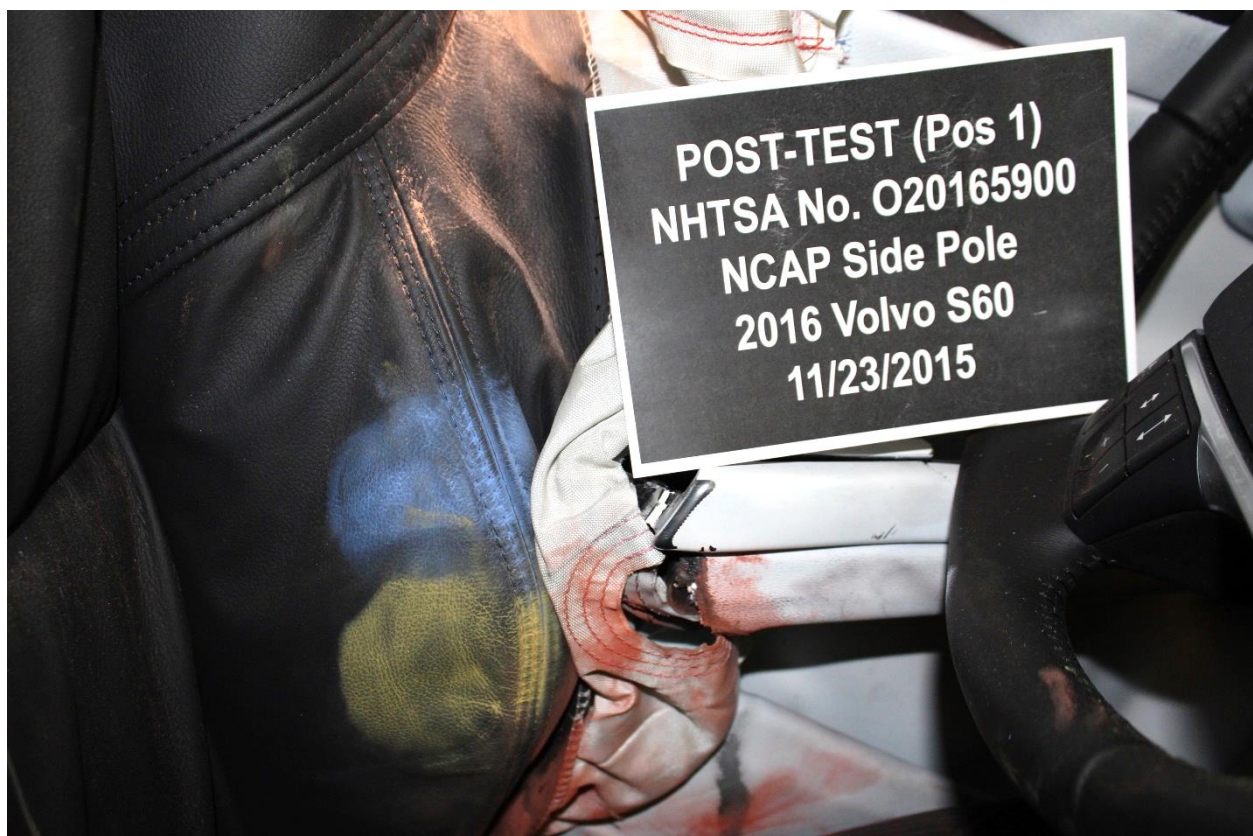


Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



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



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

Photo Not Applicable

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

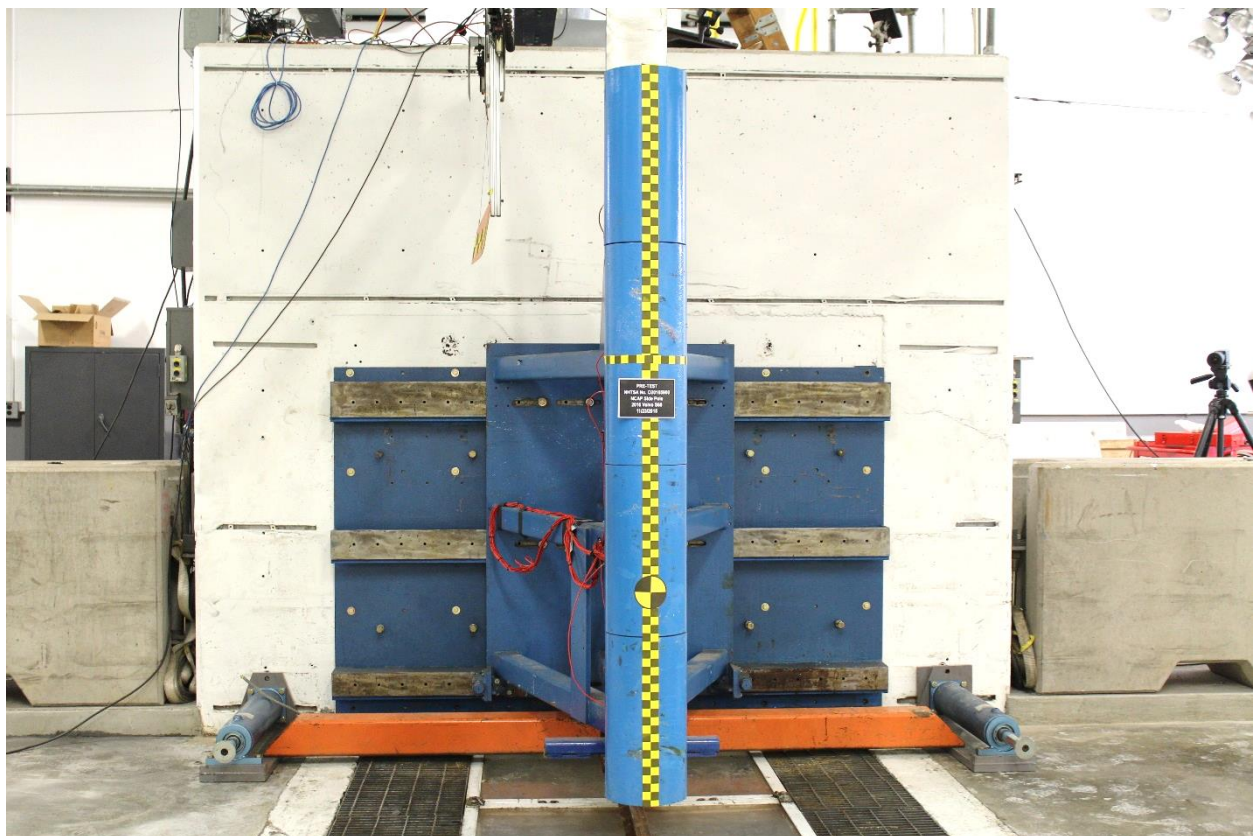


Figure A-57: Pre-Test Pole Barrier Front View

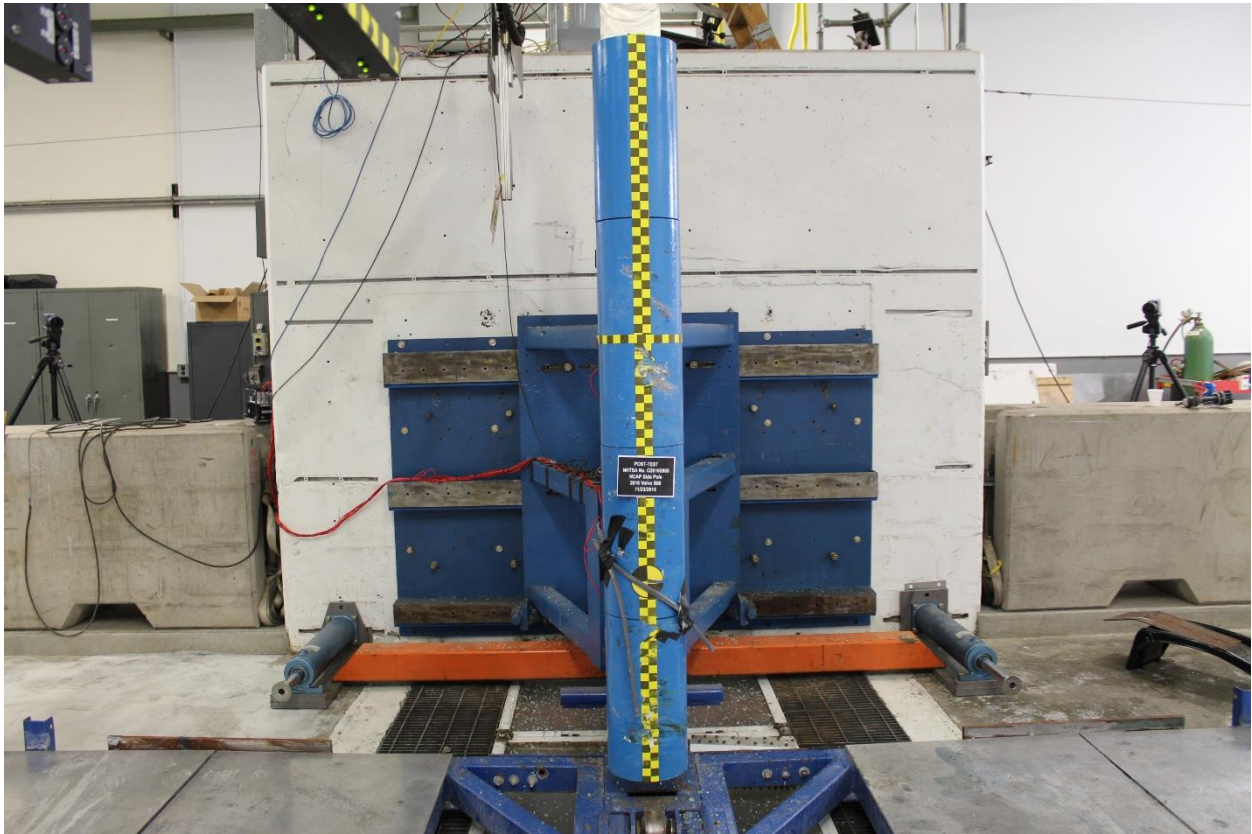


Figure A-58: Post-Test Pole Barrier Front View



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

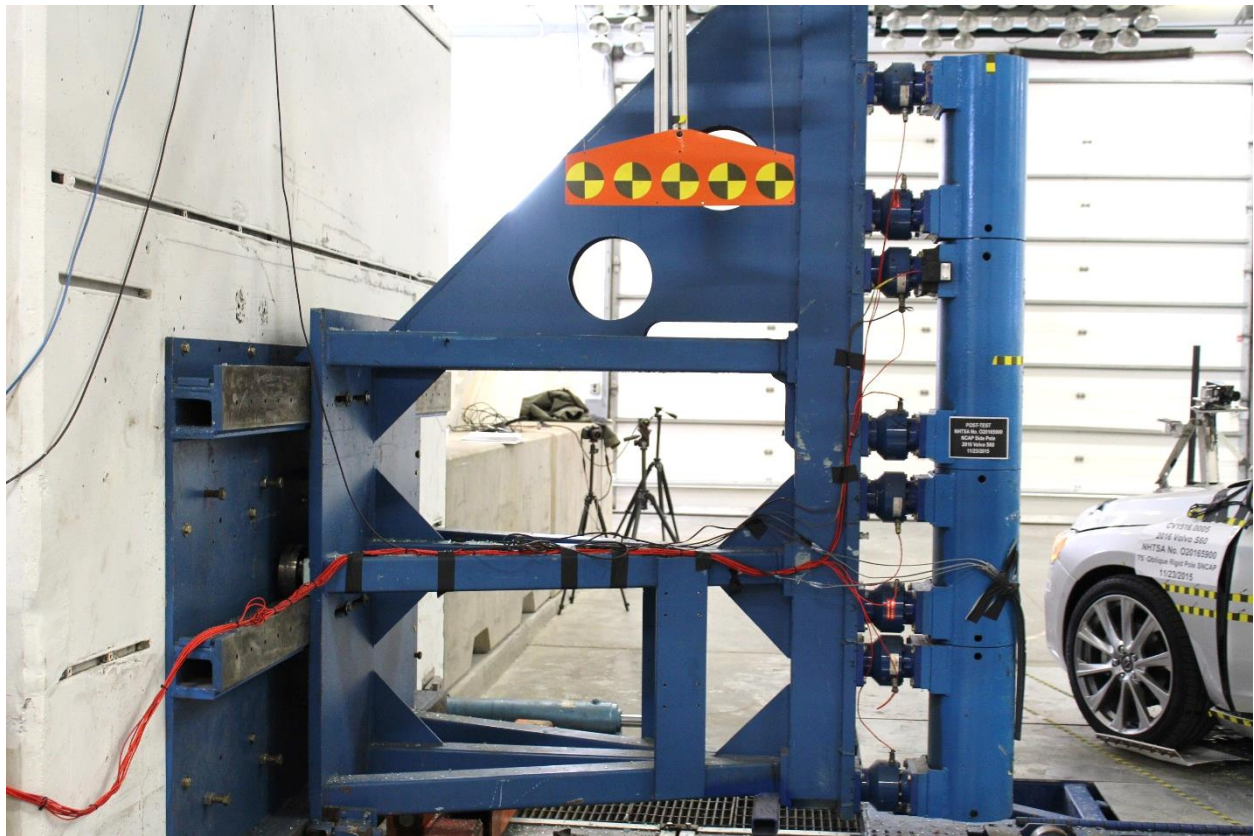


Figure A-60: Post-Test Pole Barrier Side View

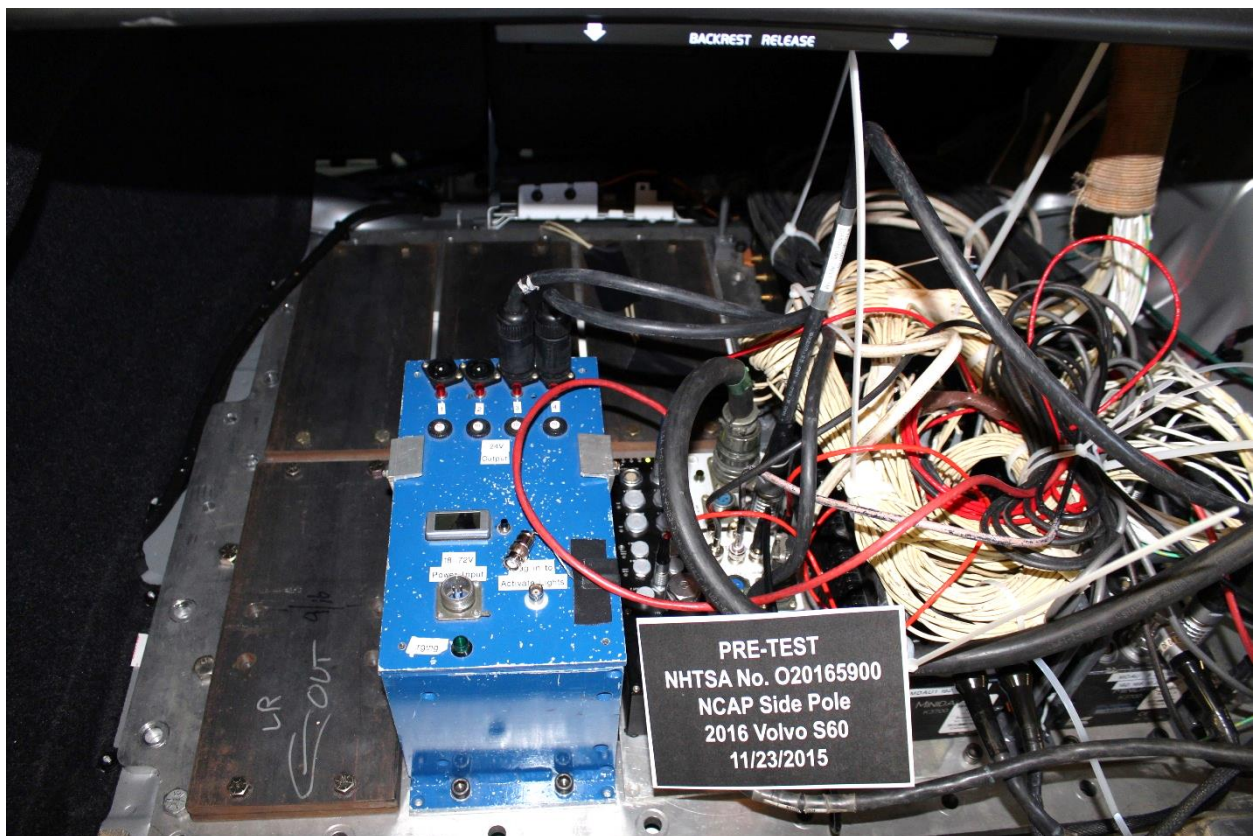


Figure A-61: Pre-Test Ballast View



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

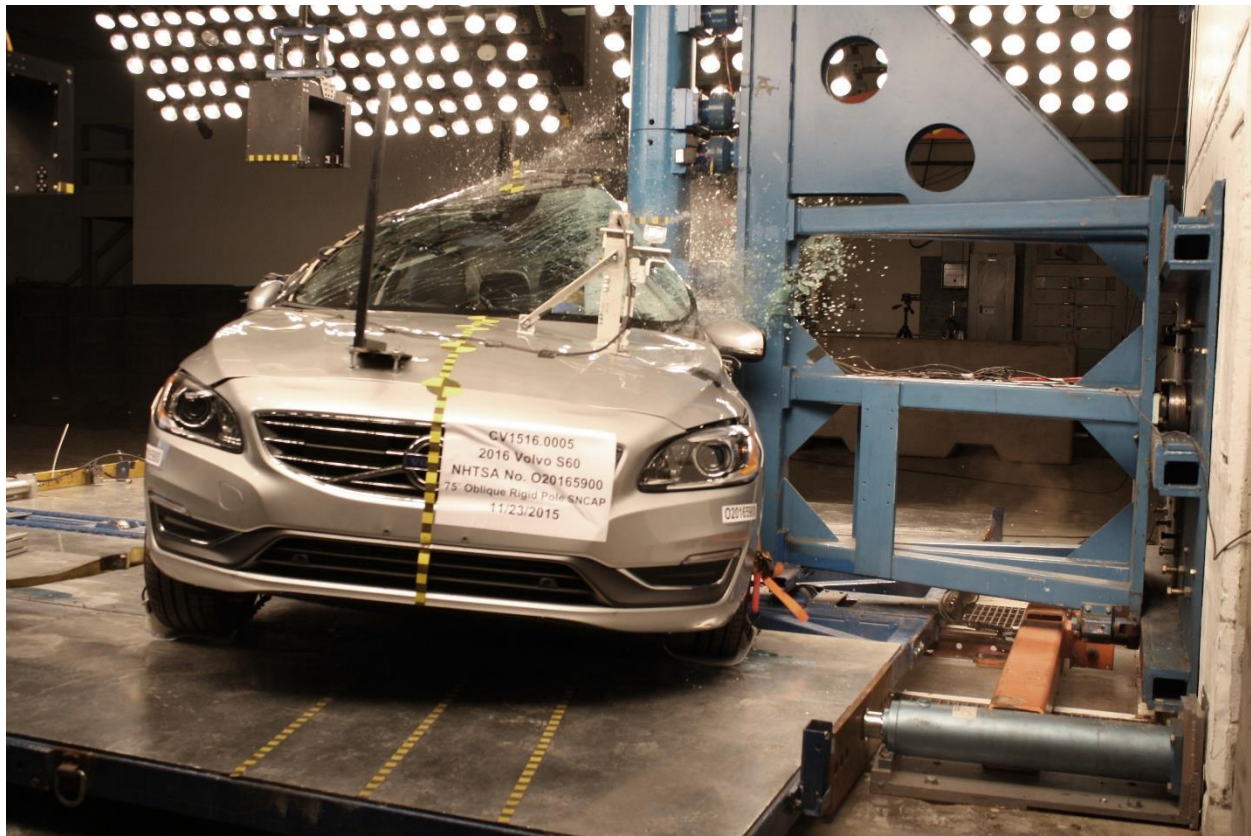


Figure A-68: Impact Event

2016 Volvo

S60 T5 INSCRIPTION FWD

PERFORMANCE

2.0L Turbo-Charged, Direct Injected Alloy Engine
240 HP @ 5500 RPM and 258 lb-ft Torque @ 1500 RPM
8-Speed Geartronic Auto Trans w/ Auto Quick Shift
Start / Stop Engine Technology
Front McPherson Strut & Rear Multi-Link Suspension
Torque Vectoring Control w/ Advanced Stability Control
Corner Traction Control through Torque Vectoring
Electronic Power Steering Personalization
Electronic Brake Distribution & Assistance
18" Alloy Wheels w/ All-Season Tires

AUDIO & TECHNOLOGY

Sensus Navigation with 7-inch Color LCD Monitor
165W High Performance Audio System w/ 8 Speakers
In-Dash Single CD w/ RDS & MP3 Capability
HD Radio / USB & AUX Inputs
Bluetooth Hands Free w/ Audio Streaming
SRS iUS Radio w/ Month Complementary Subscription
Sensus Connect w/ 3-Month Complementary Subscription
with Unlimited Data and In-Car Wi-Fi Hotspot
Volvo On-Call w/ 3-Month Complementary Subscription
10 Year Emergency Crash Notification
Smart Phone Apps Incl. Engine Remote Start

SAFETY & SECURITY

City Safety - Low Speed Collision Avoidance System
Unibody High Strength Steel Safety Cage
Five 3-Point Safety Belts w/ Pretensioners
Front Safety Belts w/ Height Adj. & Force Limiters
Inflatable Curtain (IC) Head Impact Protection
Side Impact Protection System (SIPS) w/ Driver &
Front Passenger Dual Chamber Side Impact Airbags
Driver & Front Passenger Dual Stage Supplemental
Restraint System (AEB)
Whiplash Protection System (WHIPS) in Driver &
Front Passenger Seats / 3 Padded Head Restraints
Security System w/ Back-Up Battery for Siren
Child Safety Locks in Rear Doors
Tire Pressure Monitoring System (TPMS)
LED Daytime Running Lights
Electronic Stability Control (ESC)

LUXURY

Power Glass Moonroof
Leather Upholstery (Seating Surfaces)
9-Way Power Front Seats w/ Driver's 3-Position Memory
Front Sport Seats with Power Lumbar Support
Keyless Entry & Drive w/ Safe Approach Lighting
Electronic Ignition with Push Button Start & Stop
Adaptive Digital TFT Display
Leather Wrapped Tilt & Telescopic Steering Wheel
Electronic Parking Brake
Dual Zone Electronic Climate Control
Auto-Dimming Inside Rear View Mirror
Heated Tow Restraint, Outer Rearview Mirror w/ Mem.
60/40 Folding Rear Seat w/ Center Armrest Press-Thru
Power Foldable Rear Seat Headrests
Rain-Sensing Windshield Wipers
Power Rear Sunshade / Reflect, Rear F-Stop Sunshades
Rear Park Assist Alert w/ 3-Blind Spot Camera
Inscription - Four Letters

AUTHORIZED RETAILER

NORTHTOWN VOLVO 3710
8125 MAIN ST
WILLIAMSVILLE, NY 14221

WARRANTY

48 Month/50,000 Mile Limited Warranty Coverage
144 Month Corrosion Protection "Unlimited Mileage"
Refer to Warranty Info Book for Specific Limitations.

MAINTENANCE

Complimentary Factory Scheduled Maintenance for the
First 3 Years or 36,000 Miles

ACCESSORIES

Enhance the driving pleasure with Volvo accessories.
Enrich the styling, integrate technology, boost
performance, or simply carry more cargo - from
function to fun, there's something for everyone.

To view full accessory product line -
Scan the Smartphone QR code
or visit www.volvocarsusa.com/accessories

JOIN THE CONVERSATION

See what our fans are saying about #Volvo on Twitter
and join in!

Have a question?
Feel free to ask us on Twitter @VolvoCarsUS
Scan the Smartphone QR code

PRICING

IMPORTER'S SUGGESTED LIST PRICE P.O.E.: \$38,700.00
3,000.00

PLATINUM

Harman Kardon Premium Sound System
Active Dual Xenon Headlights w/ Washers
Convenience Package
Keyless Drive
HomeLink® Integrated Garage Door Opener
Grocery Bag Holder
Power Retractable Exterior Mirrors
Technology Package
Adaptive Cruise Control with Queue Assist
Collision Warning with Full Auto Brake
Pedestrian/Cyclist Detection w/ Auto Brake
Distance Alert
Driver Alert Control
Lane Keeping Aid
Road Sign Information
Active High Beam
Auto Dimming Rearview Mirror

Park Assist Pilot with BLIS Package 1,425.00
Blind Spot Information System (BLIS)
Park Assist Pilot

Metallic Paint 560.00
Heated Front Seats 500.00
19" PORTA Silver Wheel 750.00
Destination Charge 940.00
Total Suggested Retail Price: \$45,875.00

Fuel Economy and Environment

Fuel Economy

29 MPG
Combined city/hwy

25 MPG
city

37 MPG
highway

3.4 gallons per 100 miles

Compact Car range from 14 to 116 MPG.
The best vehicle rates 119 MPG.

You save \$1,250
in fuel costs
over 5 years
compared to the
average new vehicle.

Annual Fuel Cost
\$1,550

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

1 **7** **10** **1** **5** **10**
Best

This vehicle emits 206 grams CO2 per mile. The best emits 9 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions. Learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 20 MPG and costs \$1,550 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. MPGe 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

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS
CARLINE: VOLVO SERIES

U.S./CANADIAN PARTS
CONTENT: 1%

MAJOR SOURCES OF
FOREIGN PARTS CONTENT:
CHINA: 60%
JAPAN: 10%

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
CHENGDU, CHINA

COUNTRY OF ORIGIN:
ENGINE PARTS:
CHINA

TRANSMISSION PARTS:
JAPAN

GOVERNMENT 5-STAR SAFETY RATINGS

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

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest
Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

VEHICLE IDENTIFICATION
Type & Chassis: 138 987884
Model Year: 2016
Color: 711 Bright Silver M
VIN: LYV402FM7GB087884

Port of Importation: Newark, NJ
Delivered by: Truck
DELIVERY ADDRESS
NORTHTOWN VOLVO 3710
8125 MAIN ST
WILLIAMSVILLE, NY 14221

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

LYV402FM7GB087884

Figure A-69: Monroney Label

Photo Not Applicable

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



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

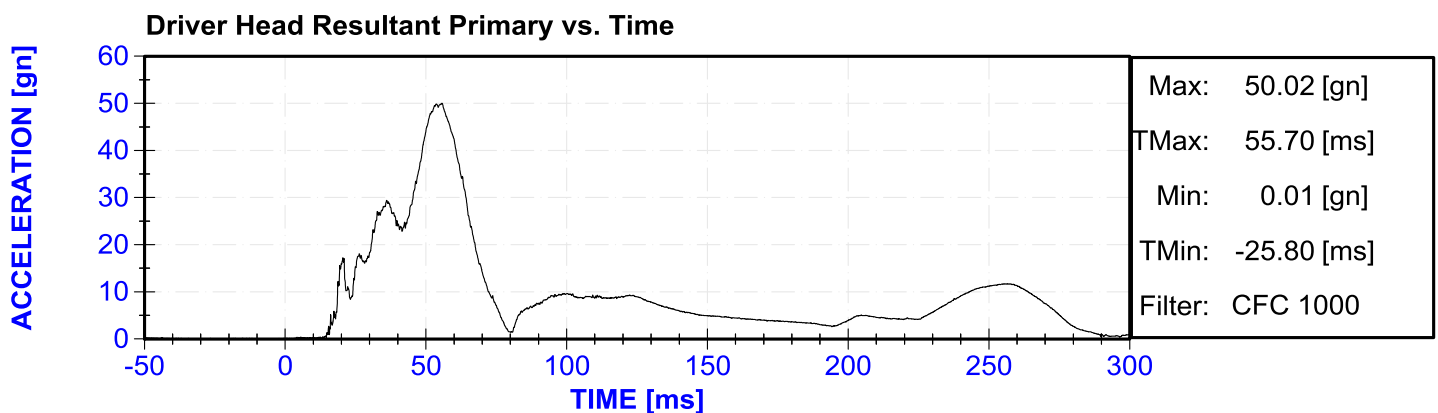
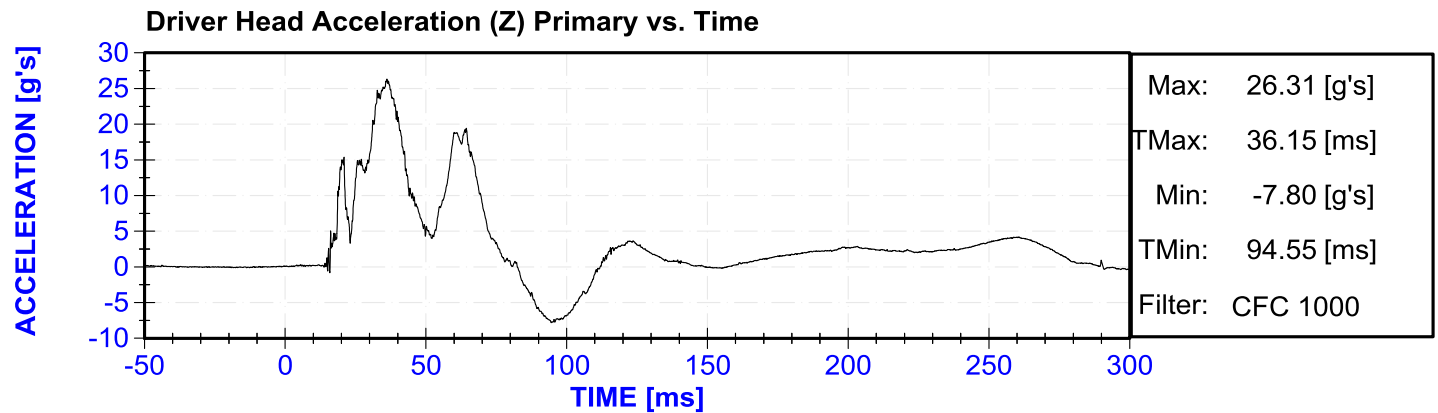
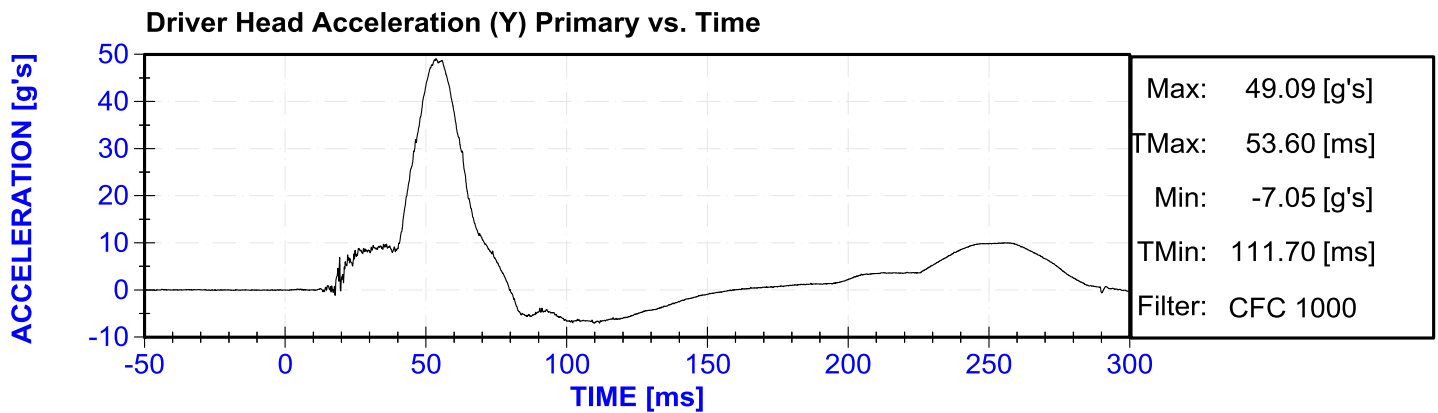
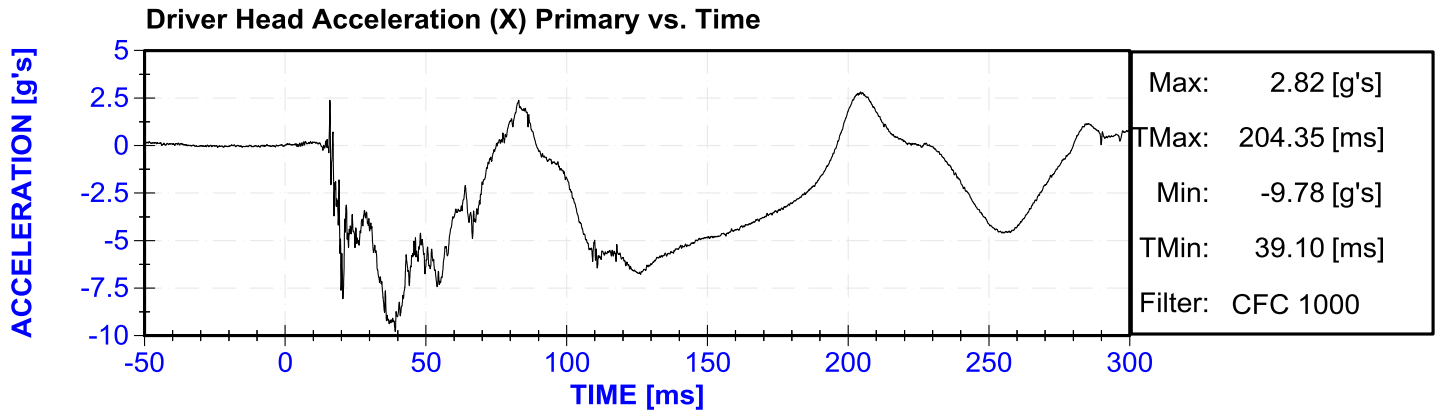
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

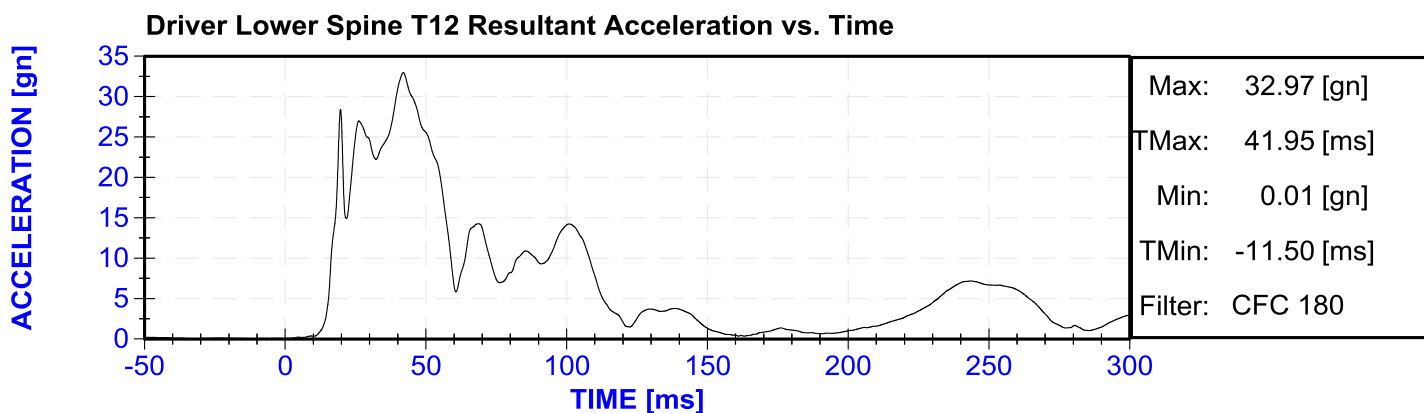
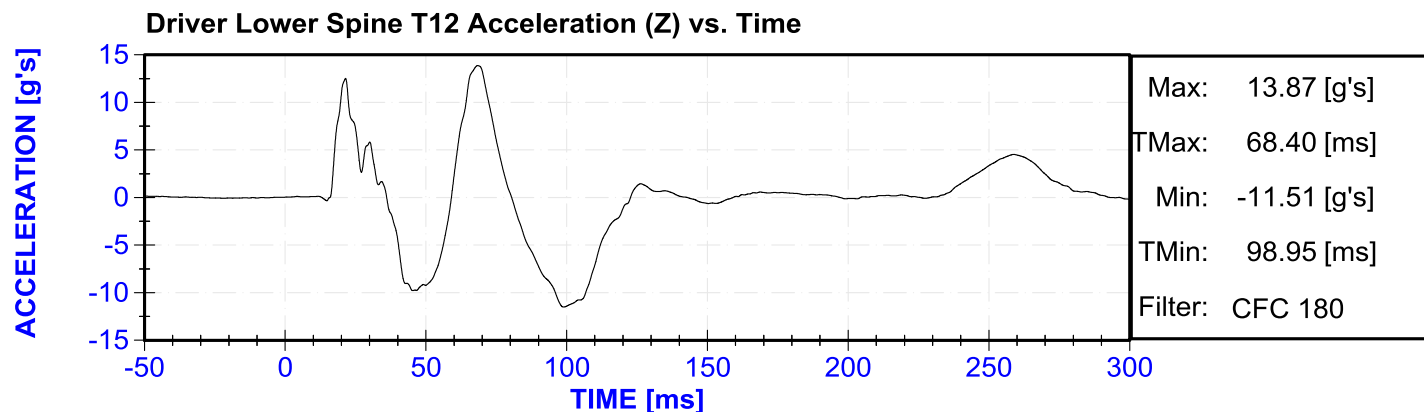
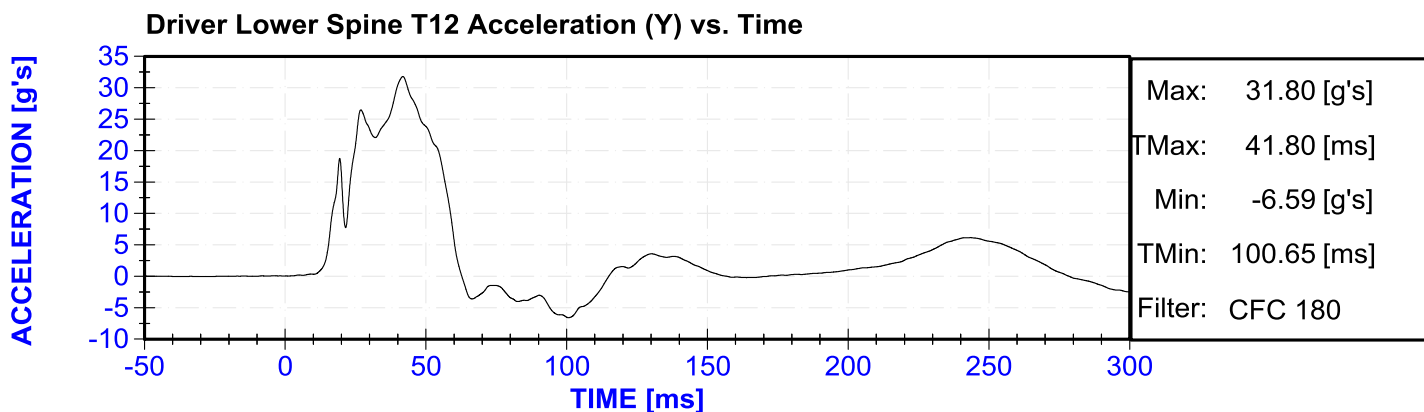
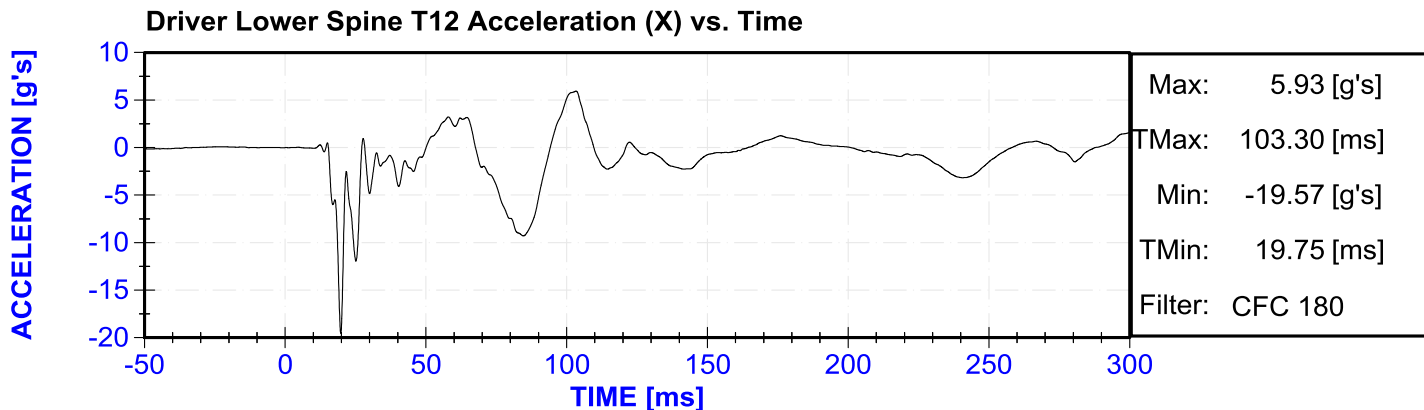
Vehicle Instrumentation Data

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)

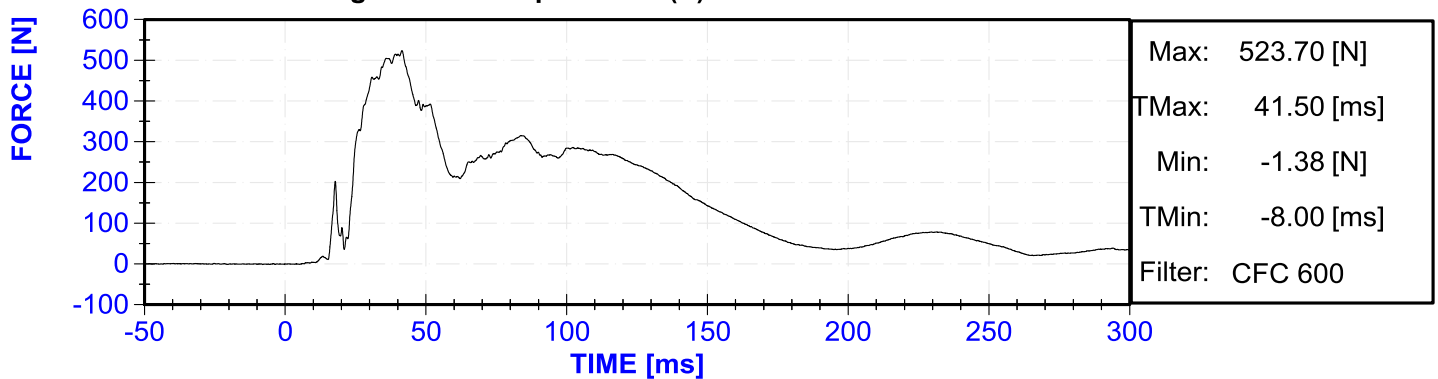
Pole Instrumentation Data

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)

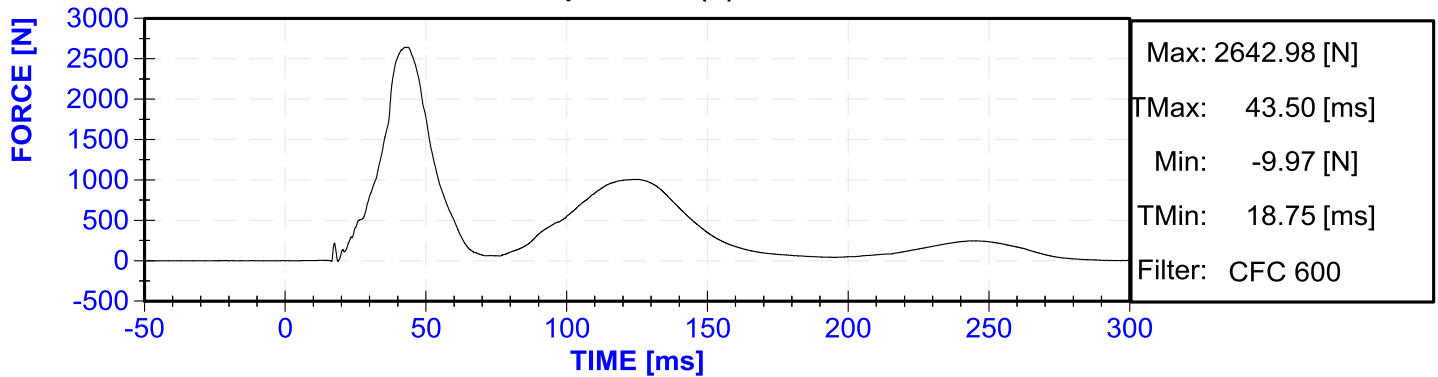




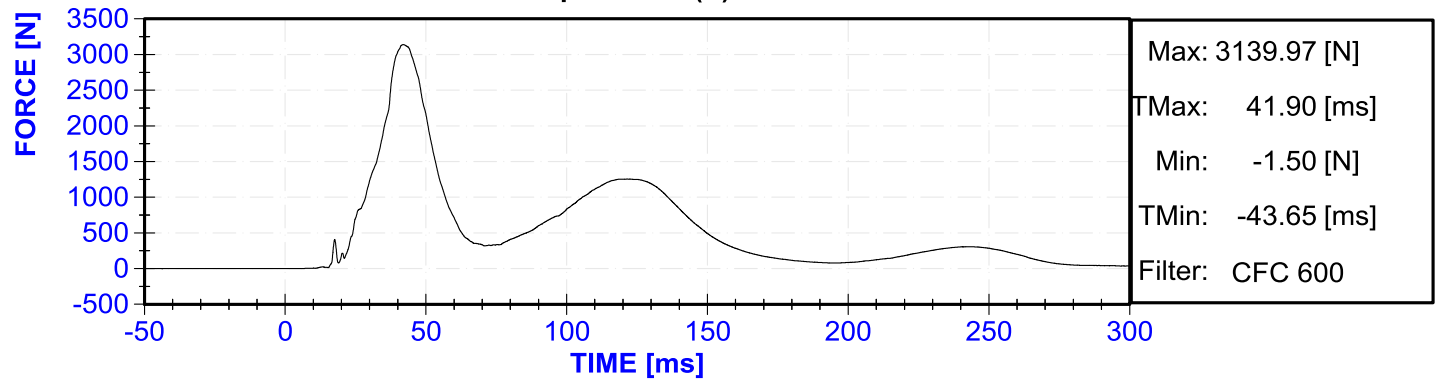
Driver Iliac Wing Force on Impact Side (Y) vs. Time



Driver Acetabulum Force on Impact Side (Y) vs. Time



Driver Total Pelvis Force on Impact Side (Y) vs. Time



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)

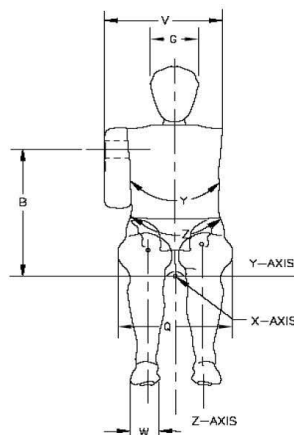
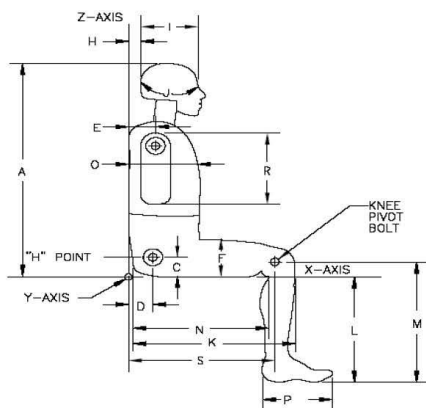


External Measurements - SID-IIs

Technician: **M. Geesey**

Date: **11/11/2015**

Dummy Serial Number: **DG8012**



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	145	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	528	Pass
L	Popliteal Height	343	369	350	Pass
M	Knee Pivot to floor height	392	409	399	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	205	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	480	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	861	Pass
Z	Waist Circumference	761	791	767	Pass

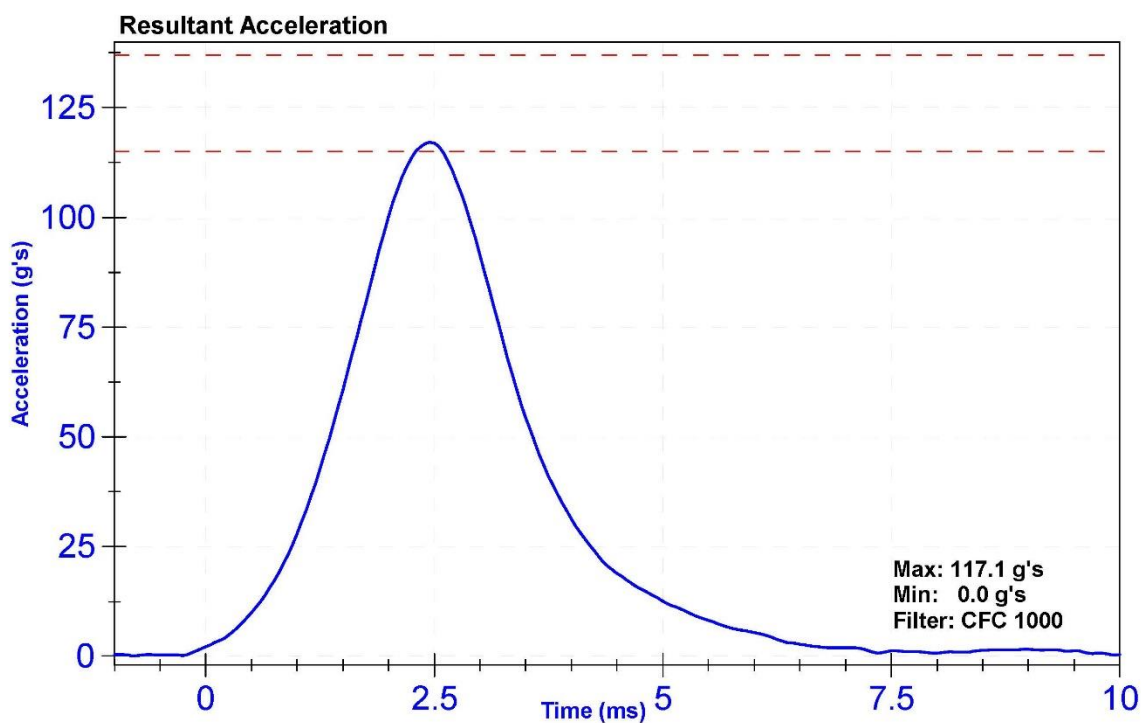
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

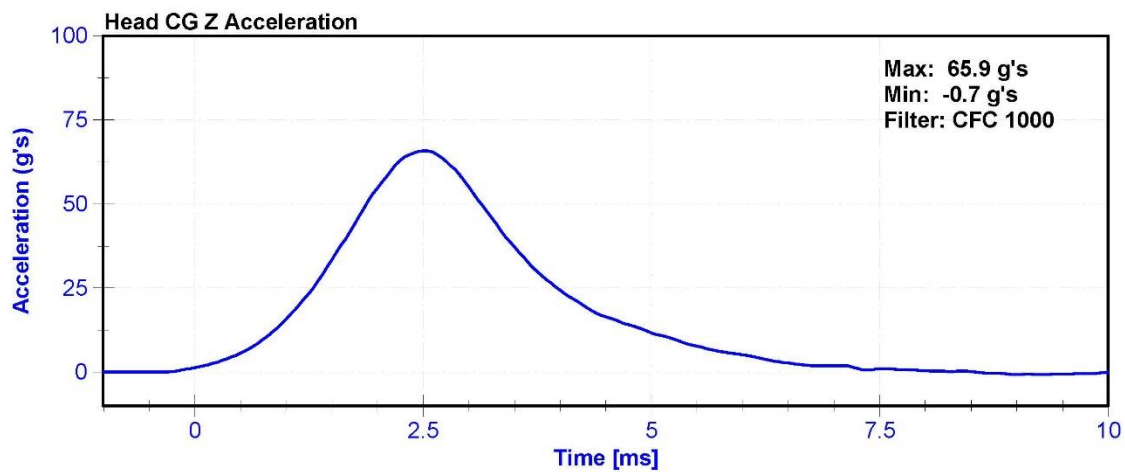
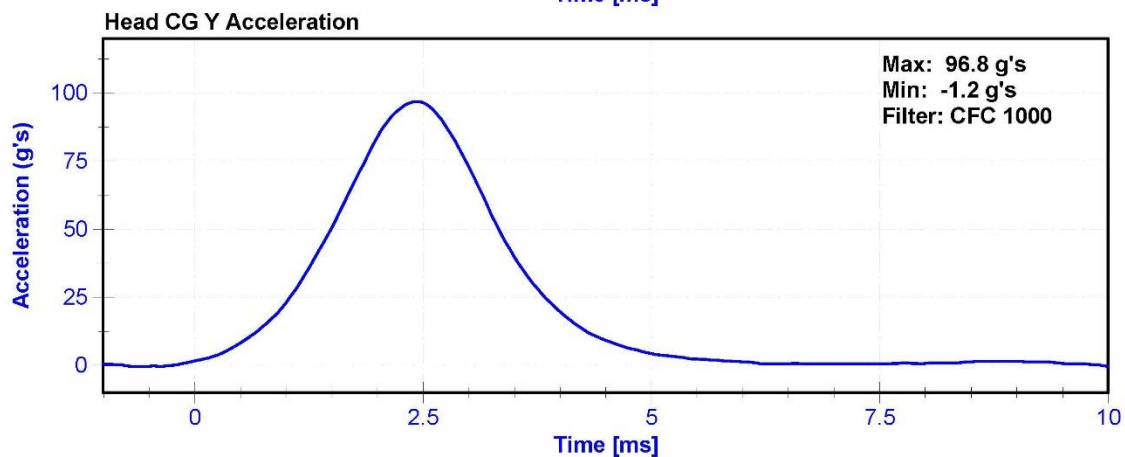
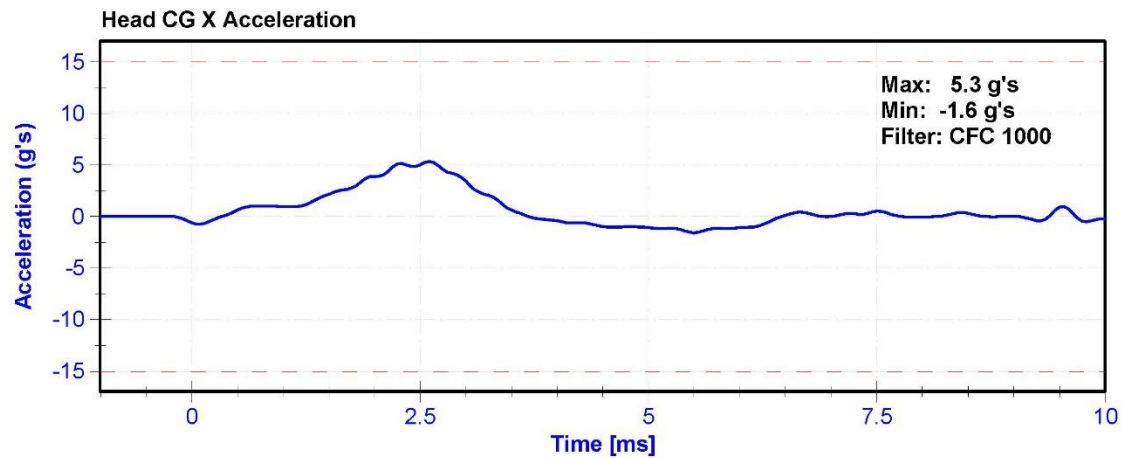
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	30.7	Pass
Resultant Acceleration	115	137	g's	117.1	Pass
Oscillation	0	15	%	1.7	Pass
Fore-Aft Acceleration	-15	15	g's	5.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	5/22/2015	11/20/2015
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	5/22/2015	11/20/2015
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	5/22/2015	11/20/2015





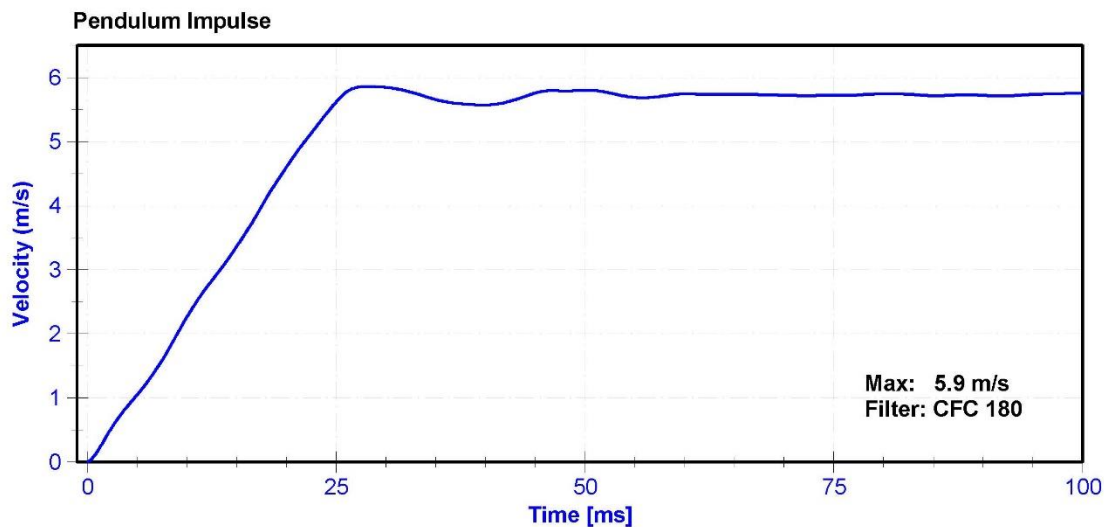
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ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

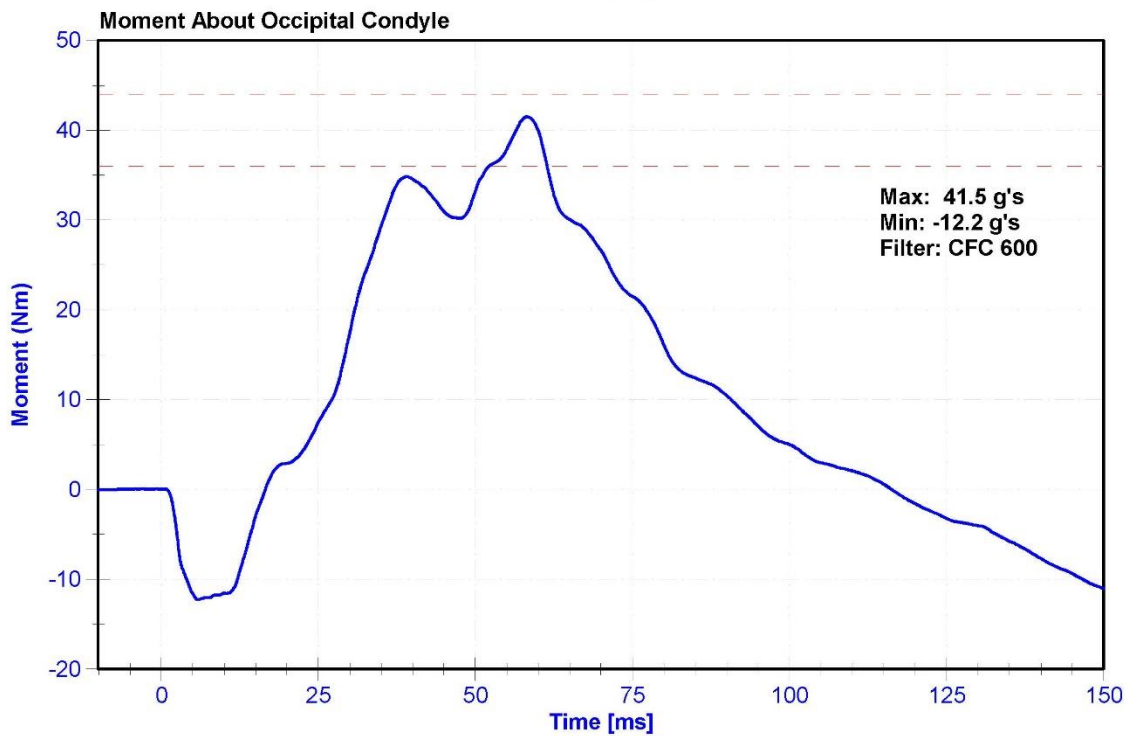
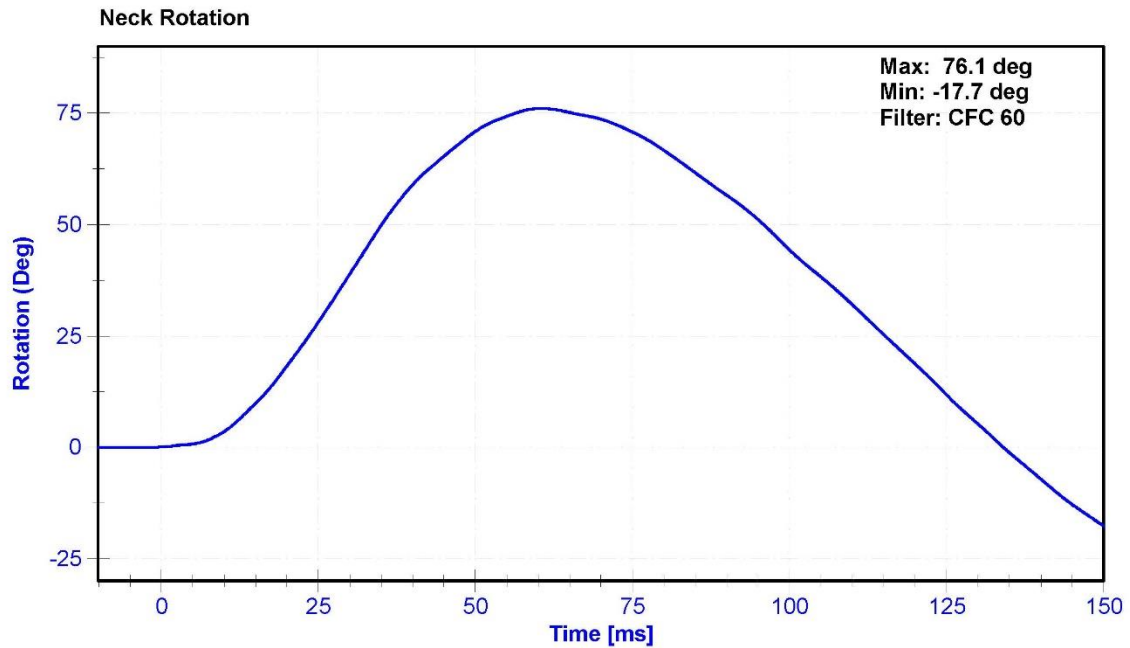
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	29.6	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.26	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.36	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.60	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.62	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.86	Pass
Neck Rotation	71	81	deg	76.1	Pass
Time at Maximum Rotation	50	70	ms	60.4	Pass
Moment about the OC	36	44	Nm	41.5	Pass
Moment Decay to 0 Nm	102	126	ms	116.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
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	5/9/2015	5/8/2016





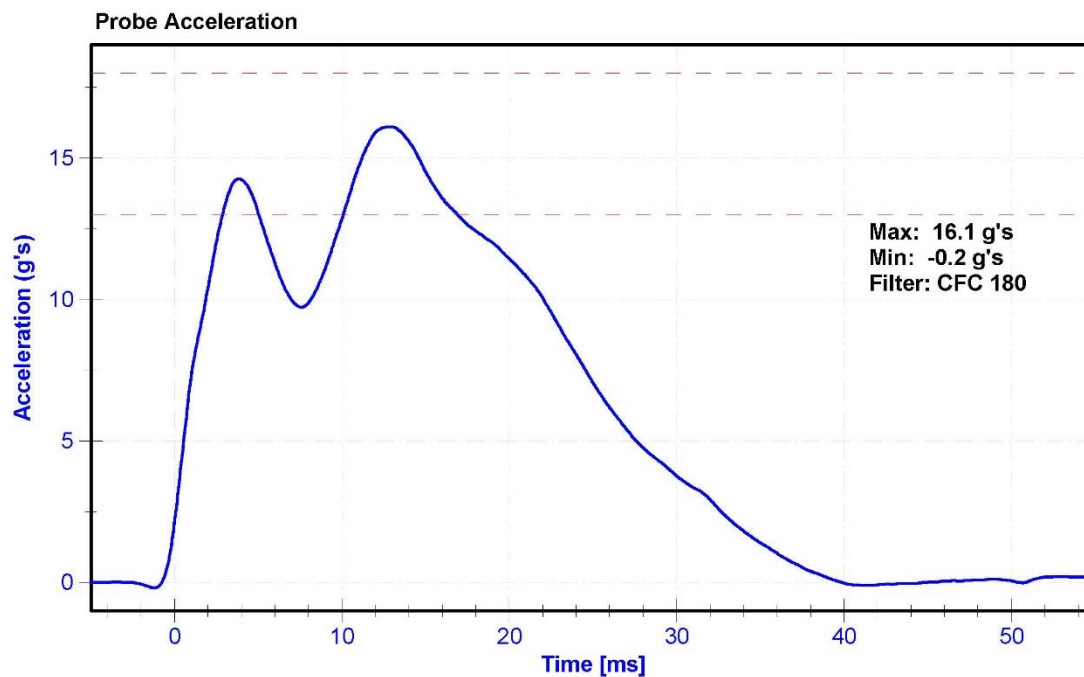
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

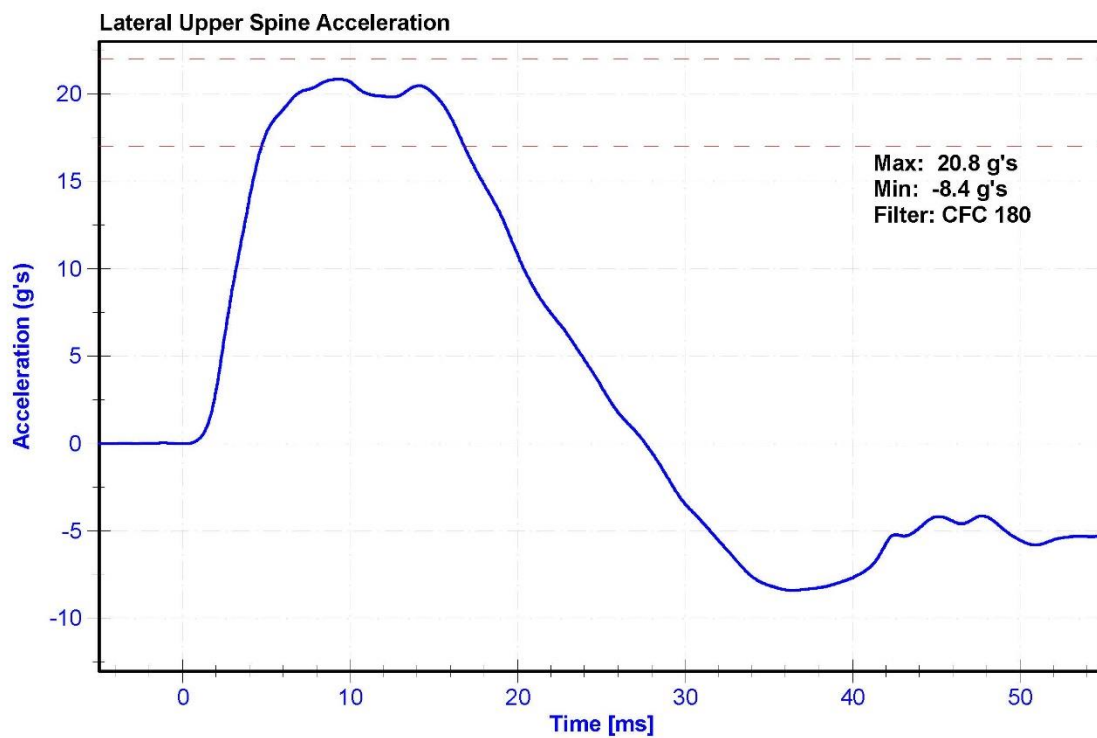
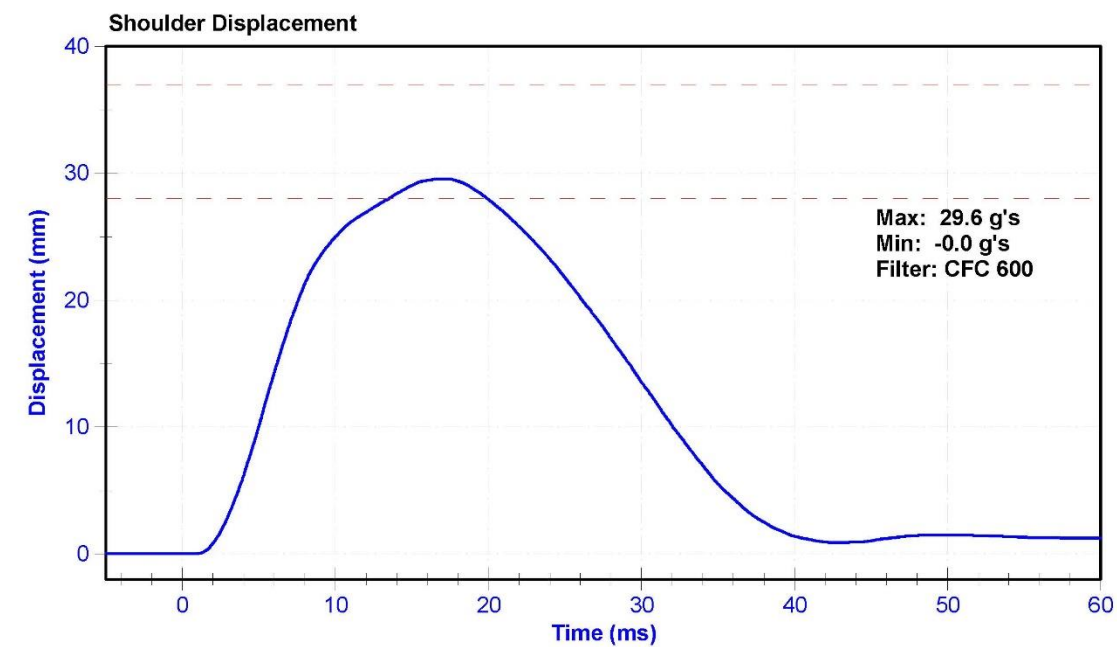
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	44.7	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	13	18	g's	16.1	Pass
Shoulder Deflection	28	37	mm	29.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	8/3/2015	2/1/2016





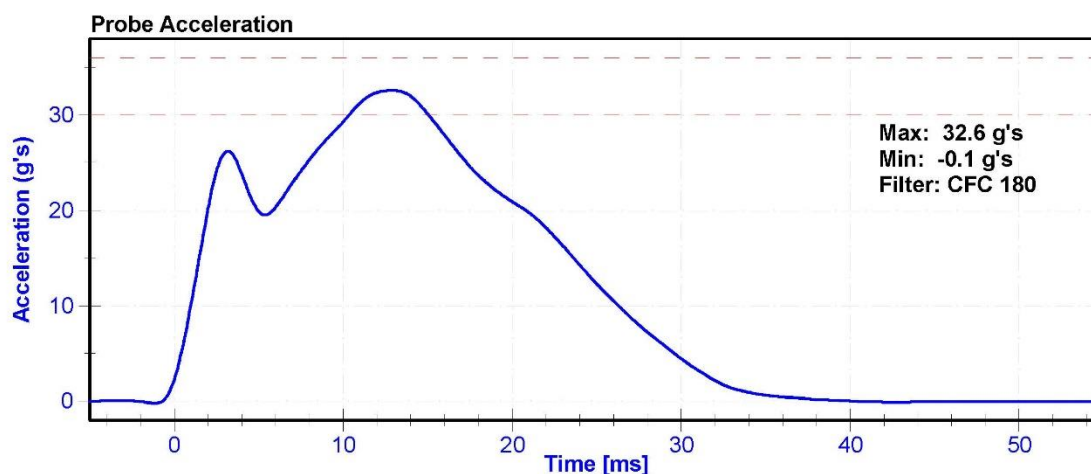
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ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

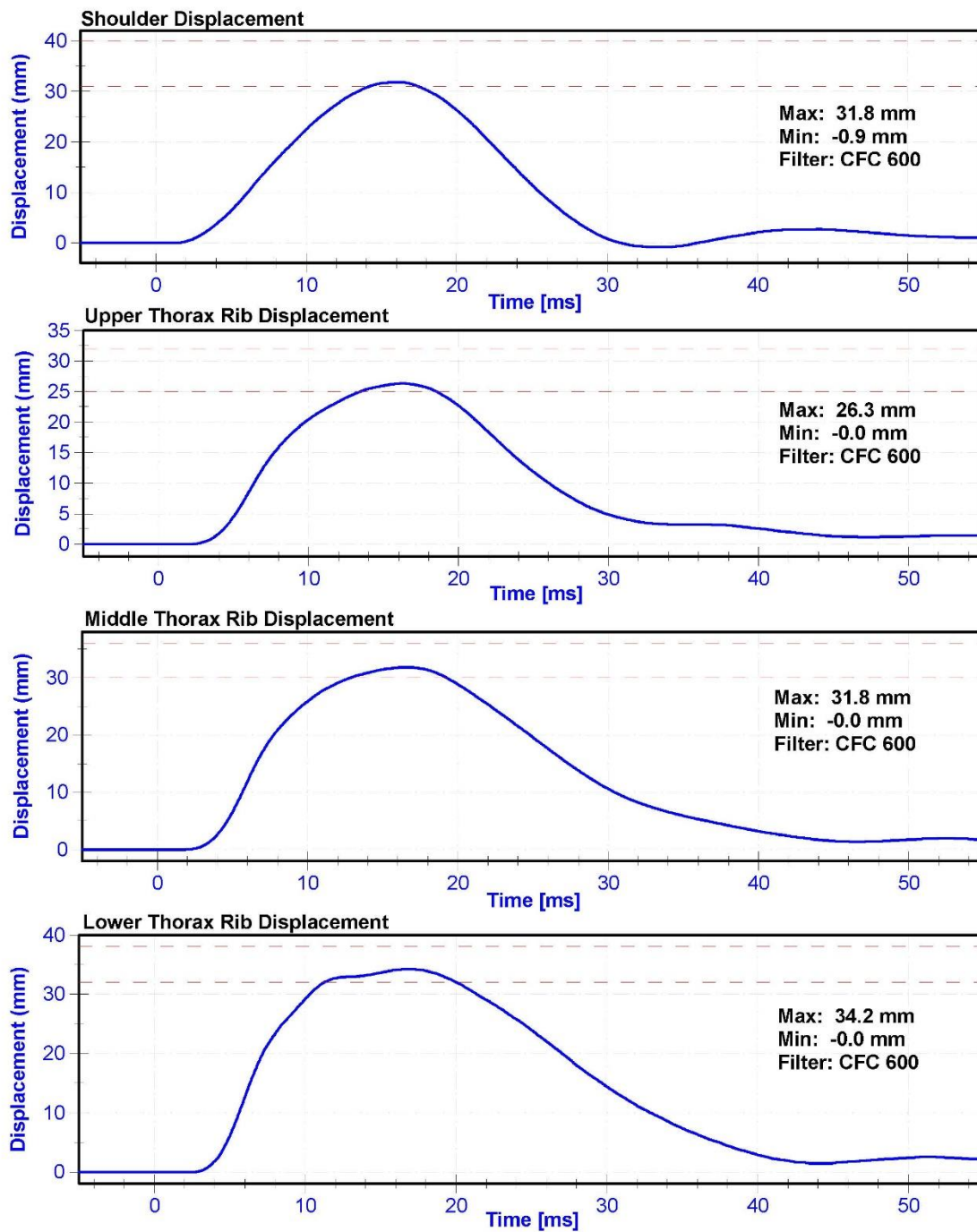
Results

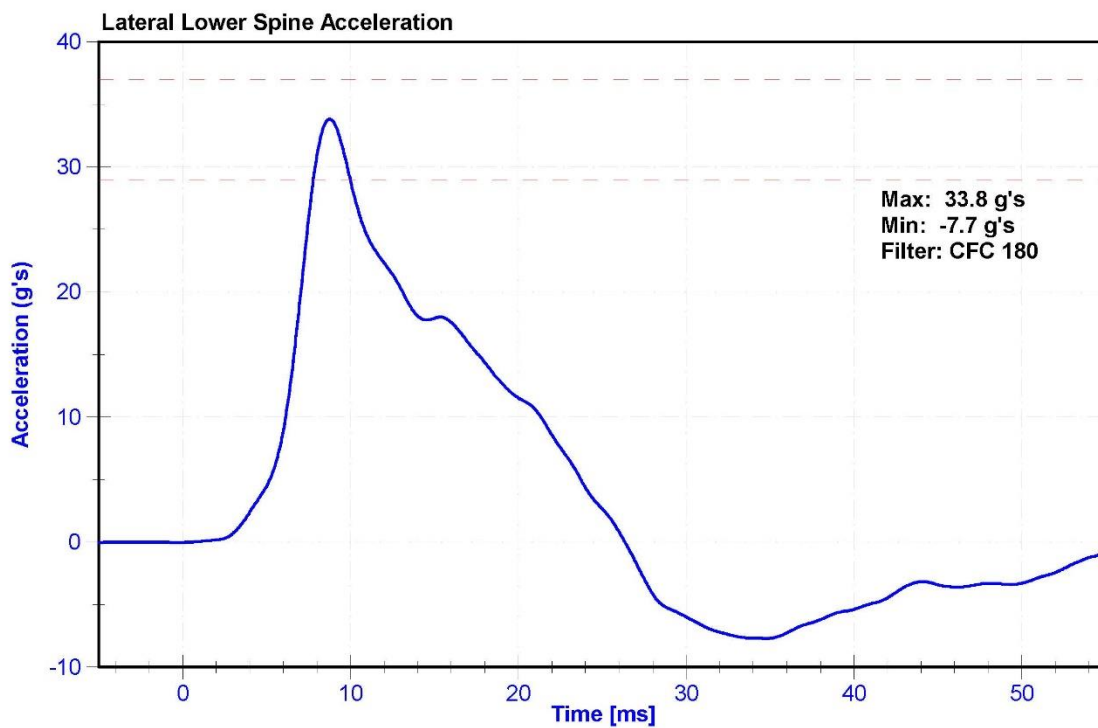
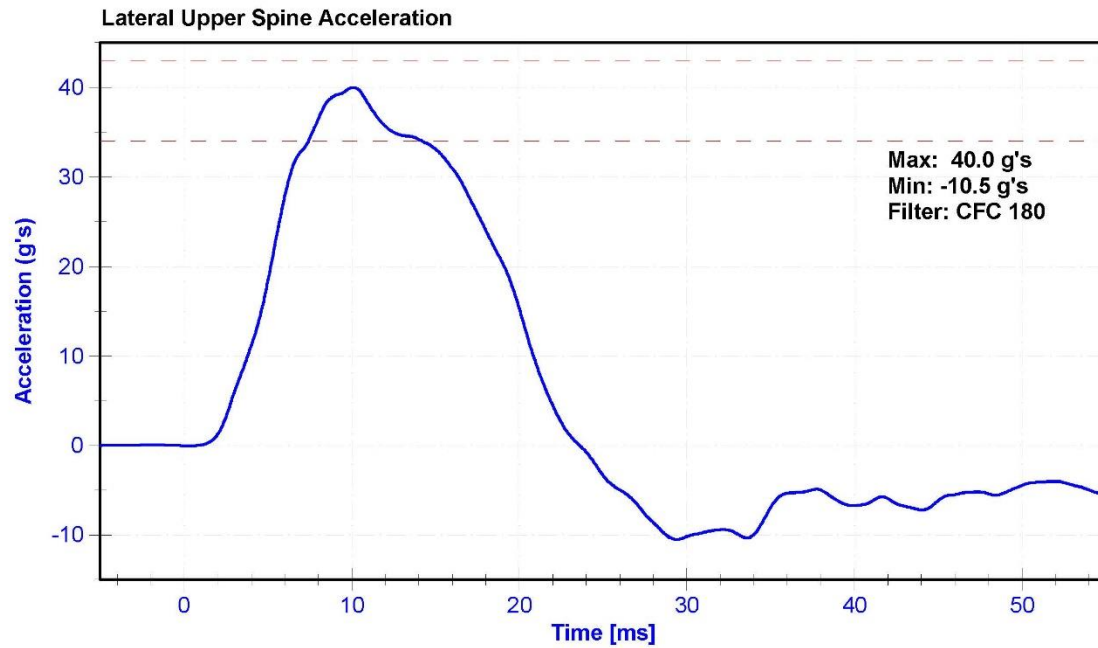
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	44.5	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration after 5 ms	30	36	g's	32.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	40.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.8	Pass
Shoulder Deflection	31	40	mm	31.8	Pass
Upper Thorax Rib Deflection	25	32	mm	26.3	Pass
Mid Thorax Rib Deflection	30	36	mm	31.8	Pass
Lower Thorax Rib Deflection	32	38	mm	34.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P51875	8/3/2015	2/1/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
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







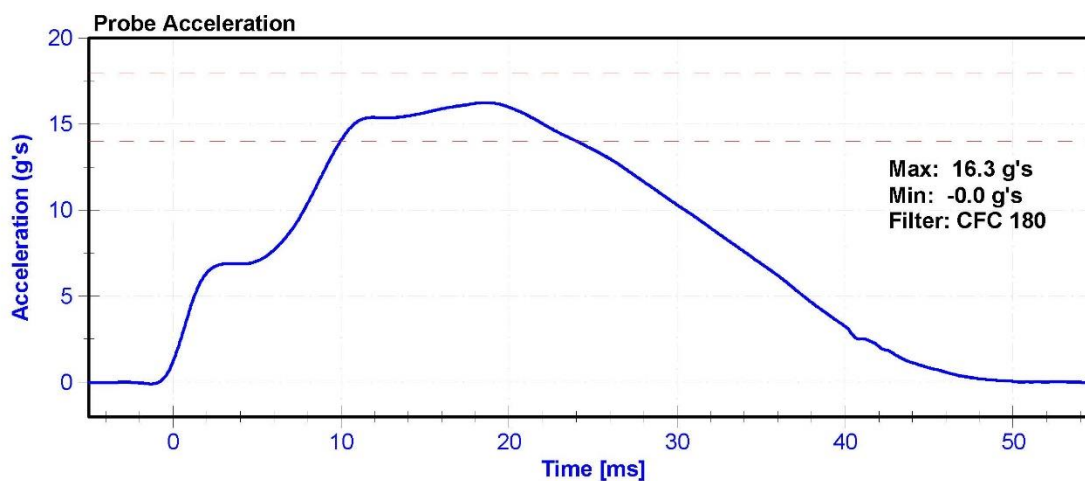
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

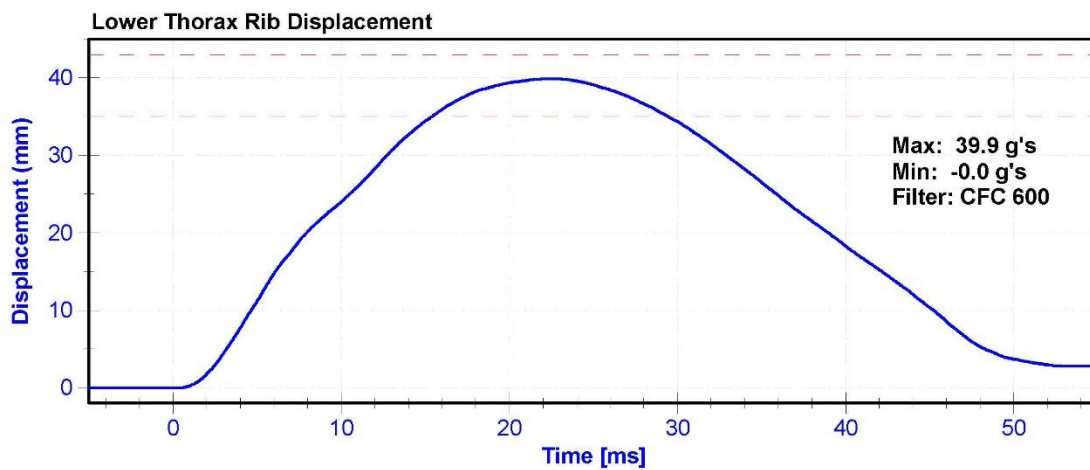
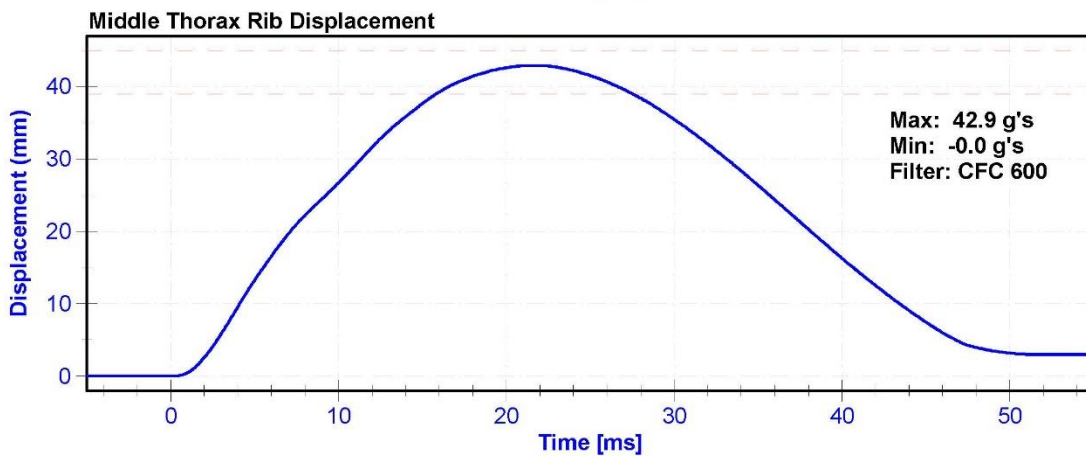
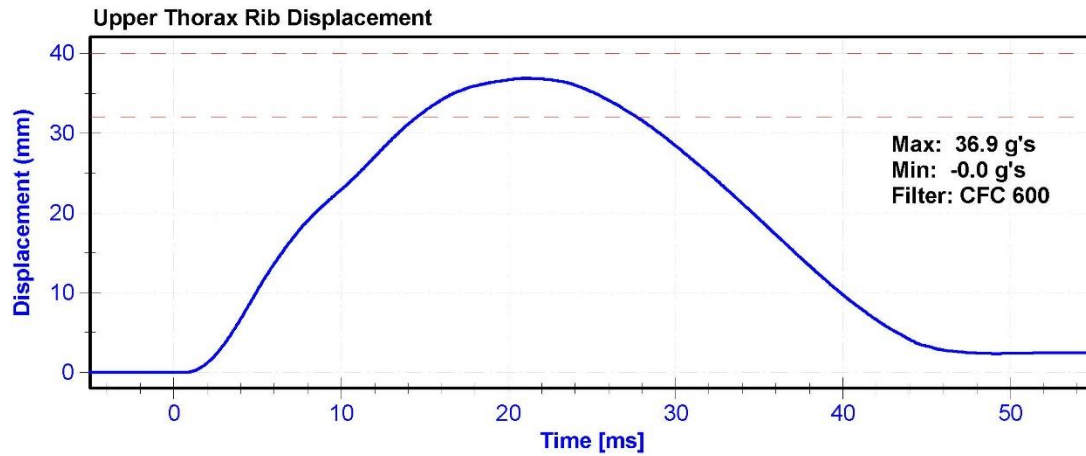
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	45.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	36.9	Pass
Middle Thorax Rib Deflection	39	45	mm	42.9	Pass
Lower Thorax Rib Deflection	35	43	mm	39.9	Pass

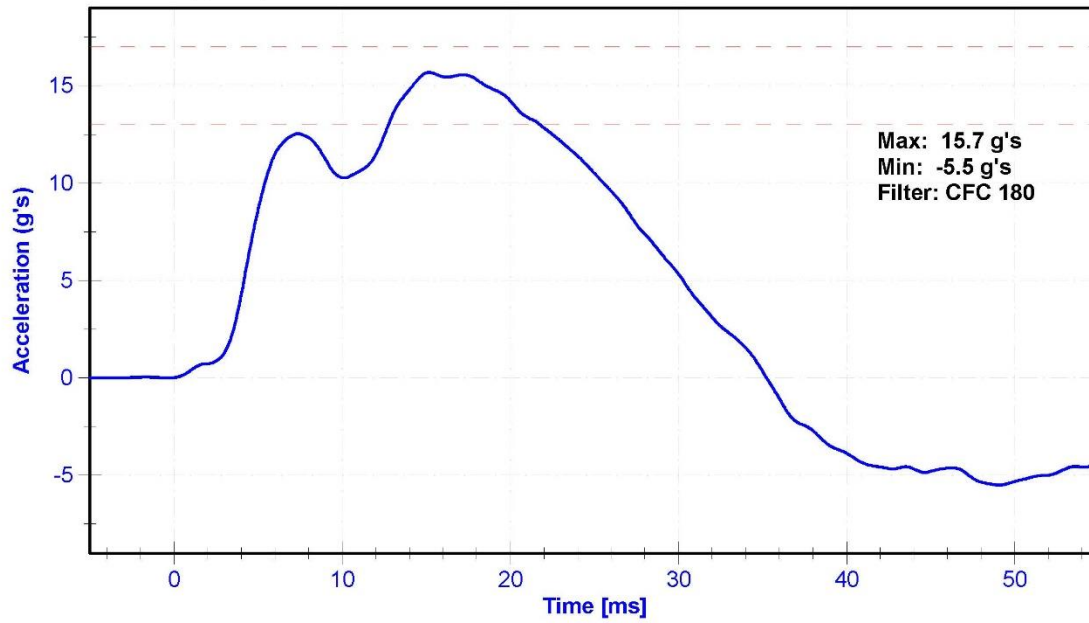
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	8/3/2015	2/1/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
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

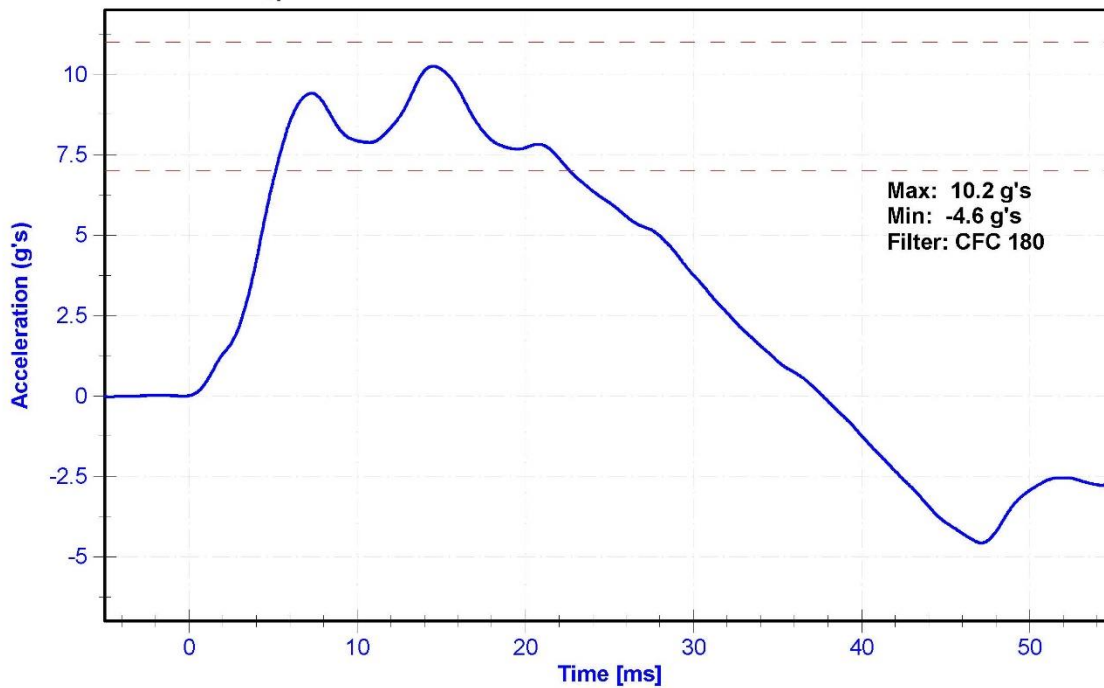




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



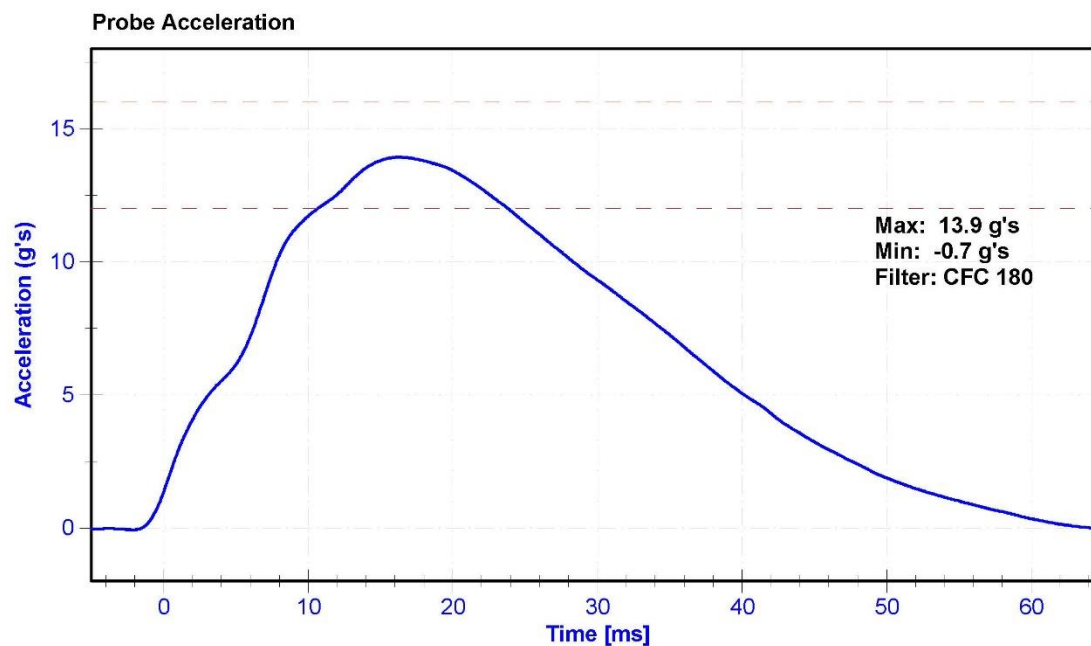
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

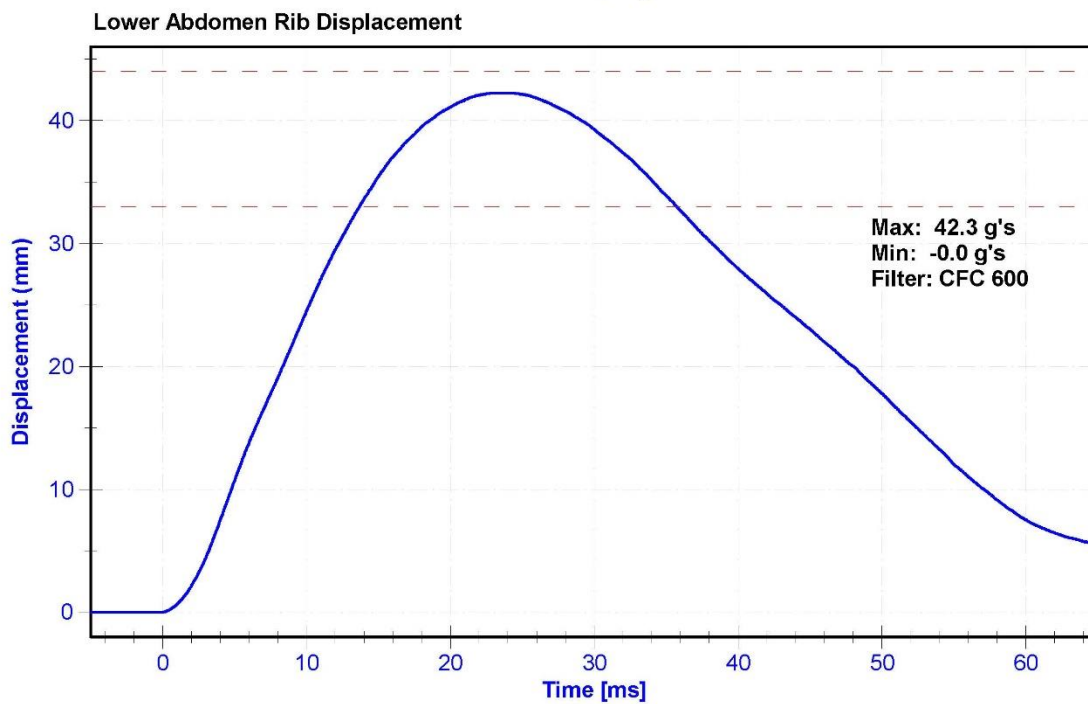
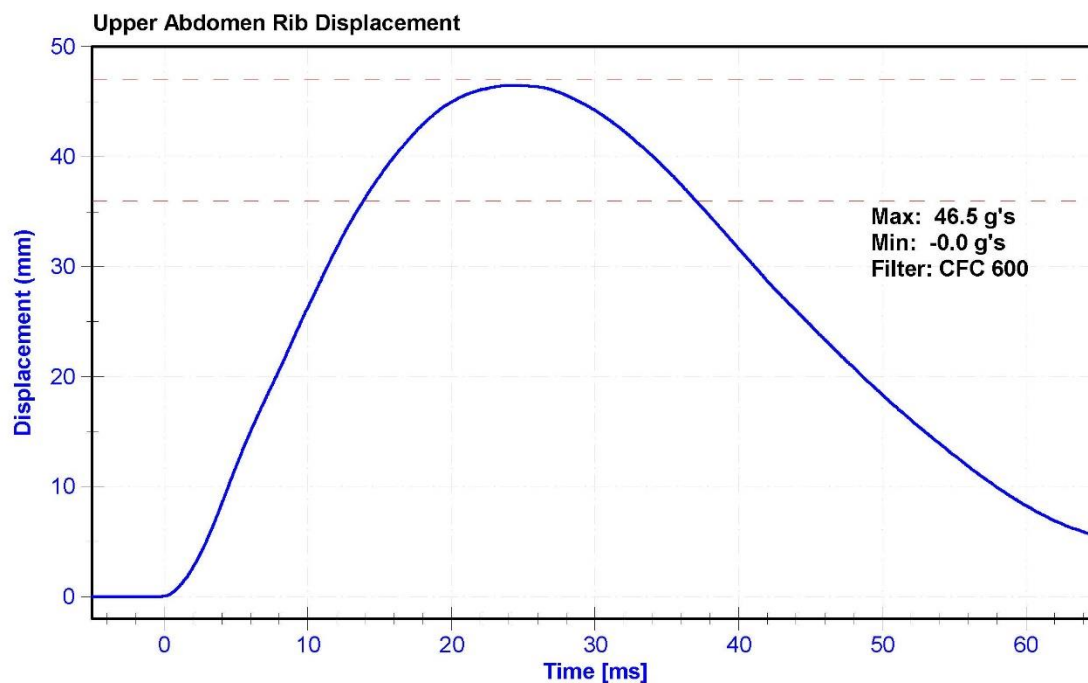
Results

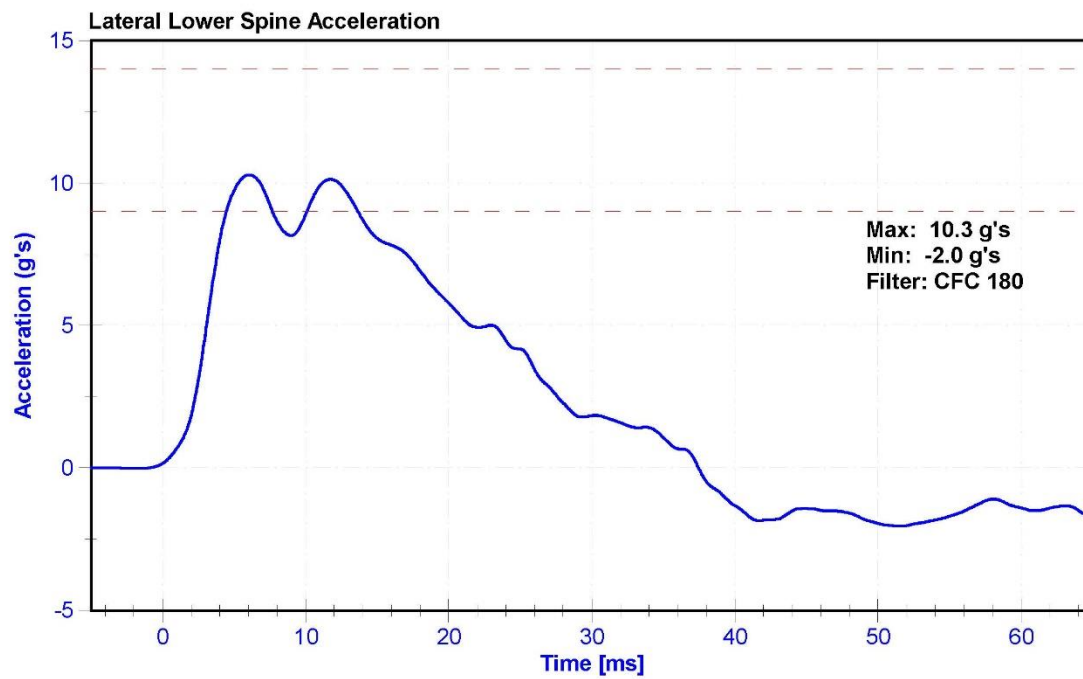
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	44.2	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	12	16	g's	13.9	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	46.5	Pass
Lower Abdomen Rib Deflection	33	44	mm	42.3	Pass

Transducer Calibrations

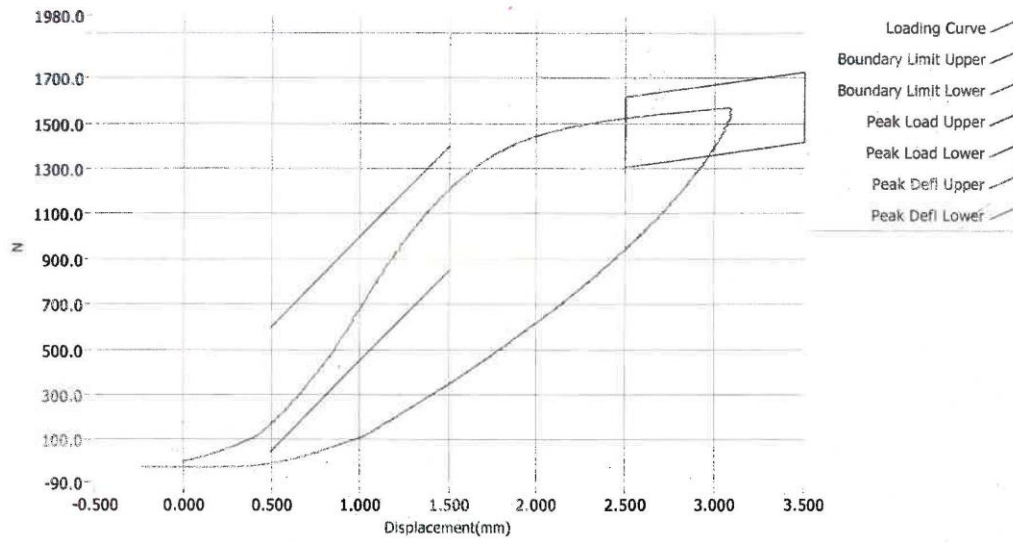
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
Upper Abdomen Rib Potentiometer	Servo 08TC1-3787	DS-015GFE	9/24/2015	9/23/2016
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/24/2015	9/23/2016







Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

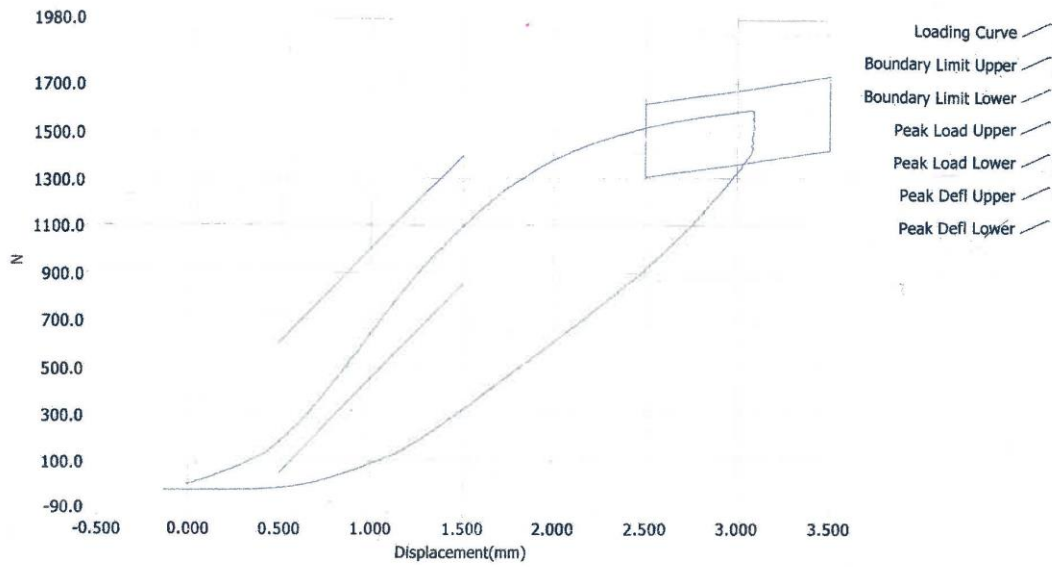
CERTIFICATION
11/11/15 MKG

Test ID	Part Serial Number	Test Date	Test Time
49012		12/7/2011	12:38 AM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/7/2011

Current Time : 00:39:07

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	46467	9/22/2011	8:52 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

CRASH
11/11/15 MKG

Current Date : 9/22/2011

Current Time : 20:54:05

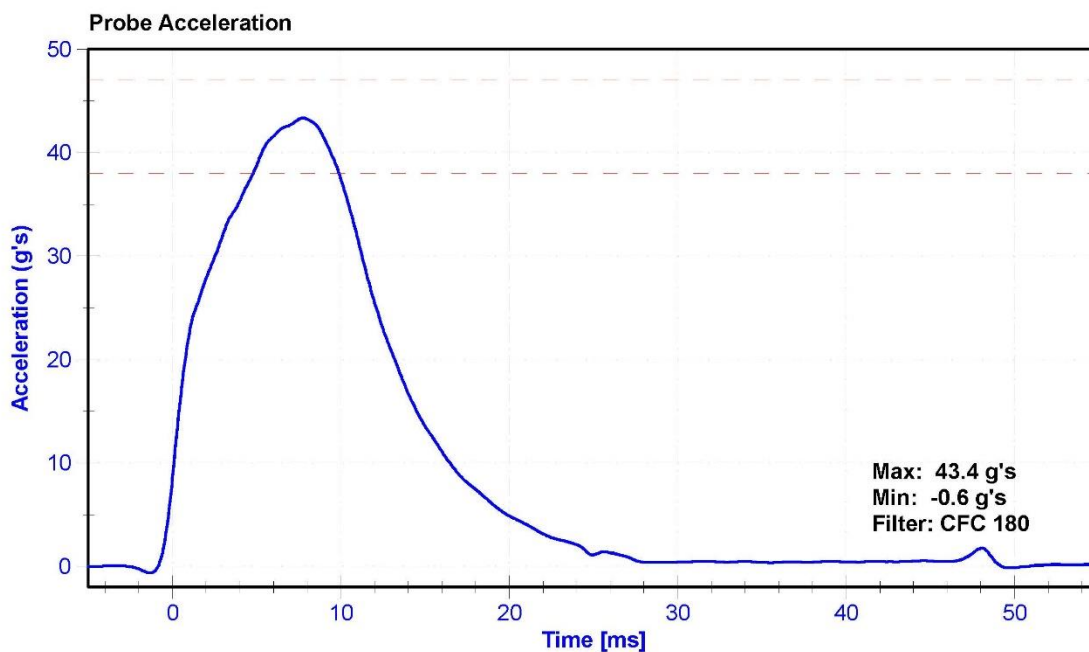
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

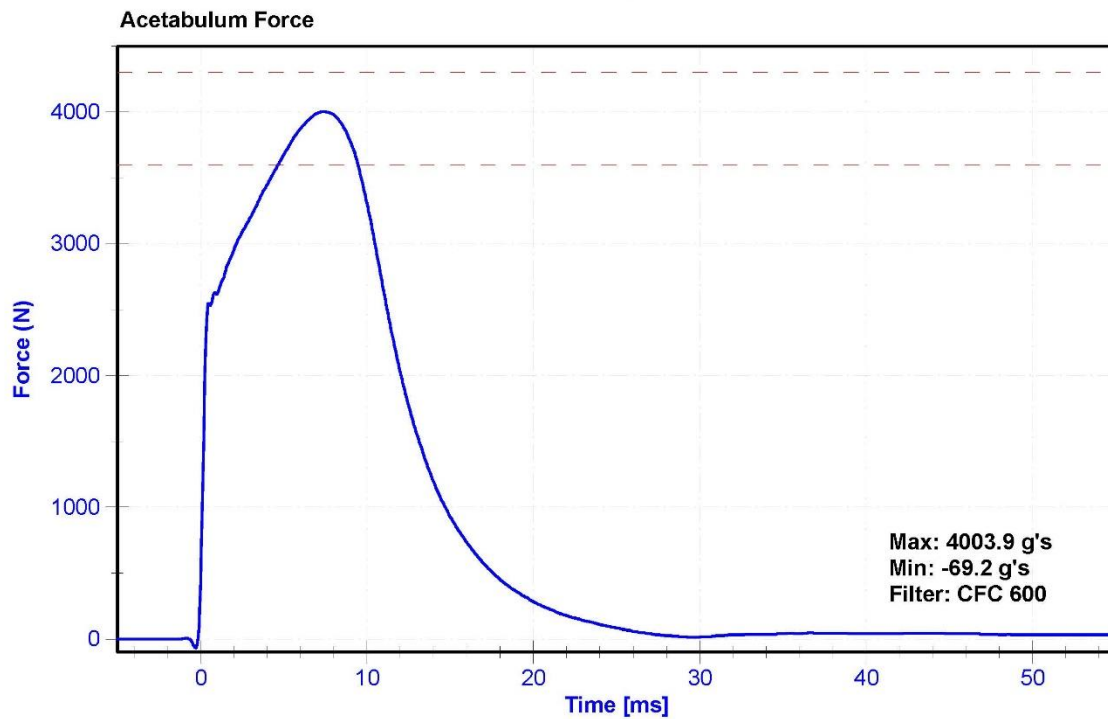
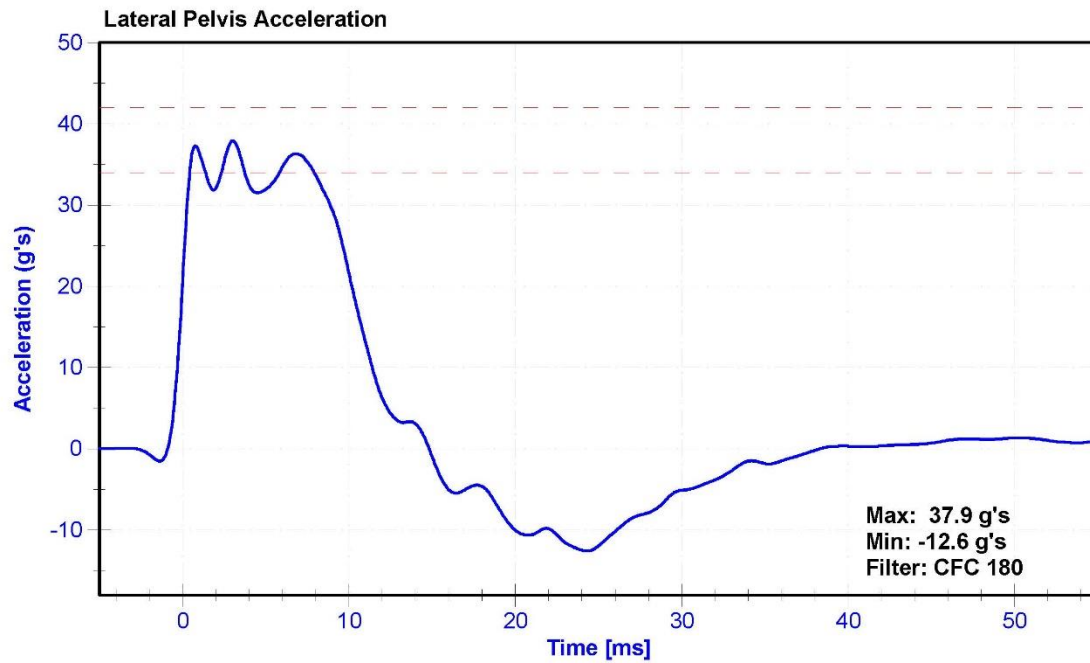
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	46.7	Pass
Velocity	6.6	6.8	m/s	6.60	Pass
Probe Acceleration	38	47	g's	43.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	36.3	Pass
Acetabulum Force	3,600	4,300	N	4003.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	8/3/2015	2/1/2016
Acetabulum Load Cell	Denton 3249J	LC-267Fy	6/30/2015	6/29/2016
Certification Plug	Humanetics	49012	12/07/2011	N/A
Crash Test Plug	Humanetics	46467	09/22/2011	N/A





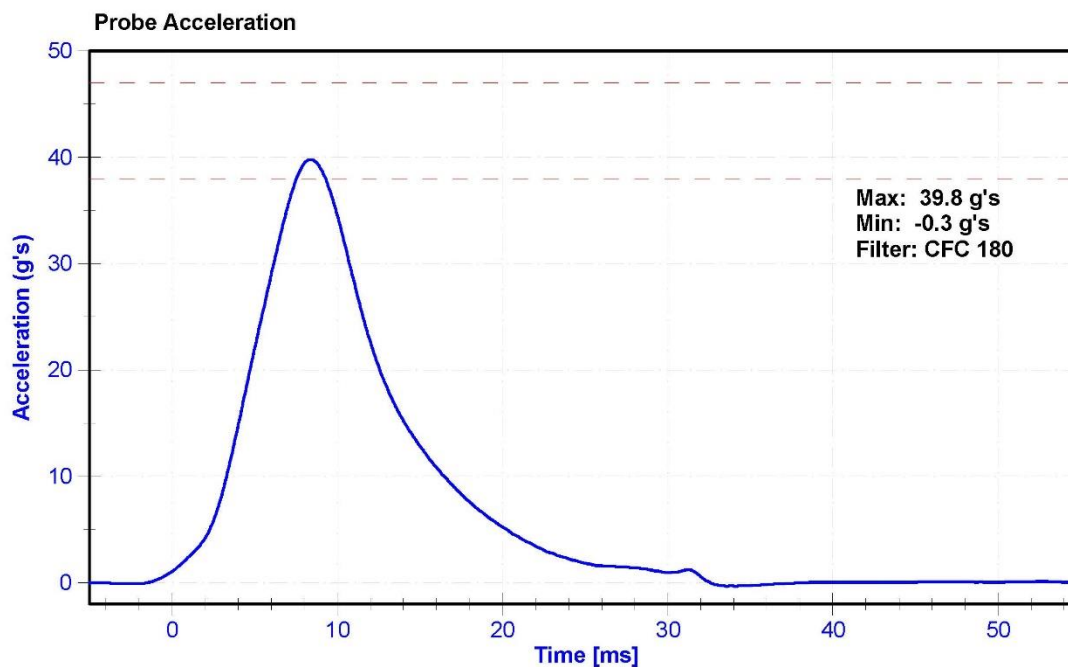
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

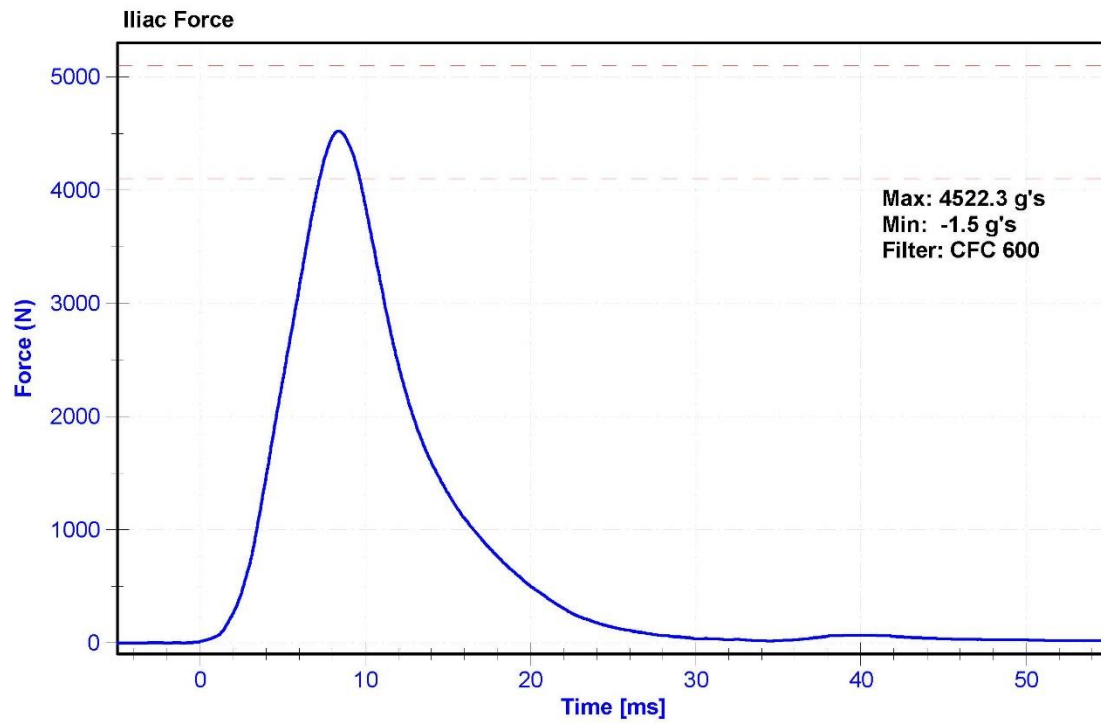
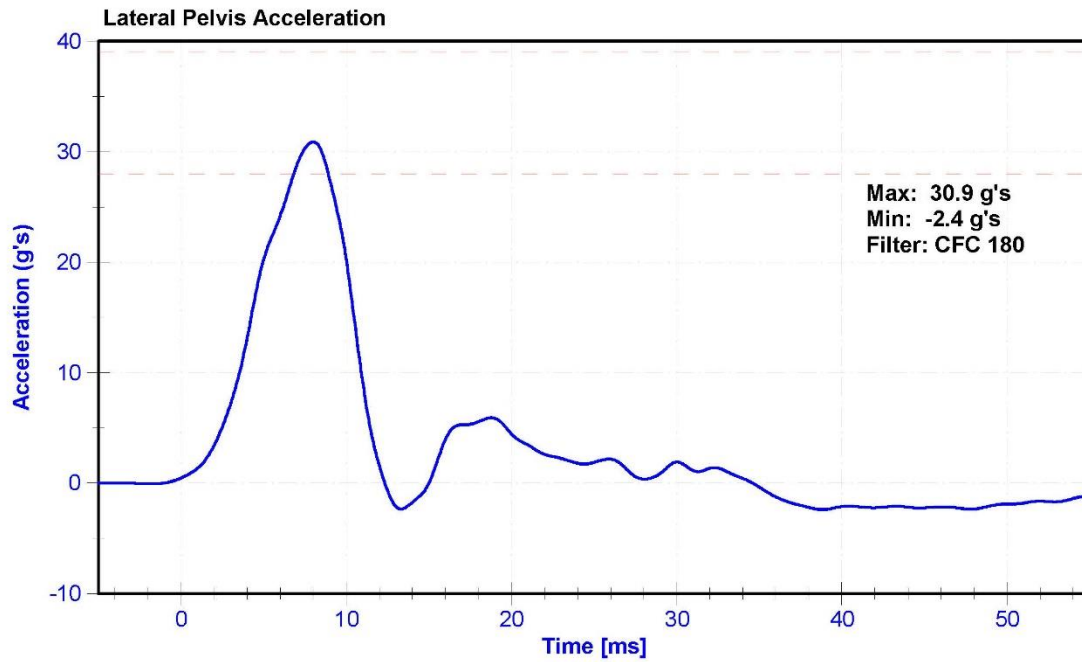
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	47.0	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	36	45	g's	39.8	Pass
Lateral Pelvis Acceleration	28	39	g's	30.9	Pass
Iliac Force	4,100	5,100	N	4522.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	8/3/2015	2/1/2016
Iliac Load Cell	DENTON 3228J	LC-281Fy	6/30/2015	6/29/2016





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

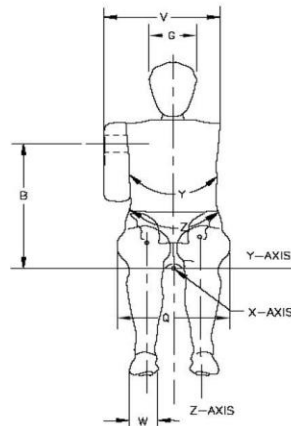
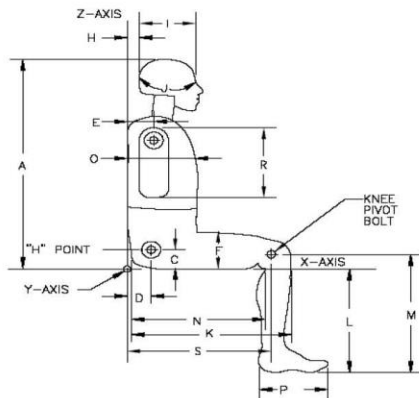


External Measurements - SID-IIs

Technician: M. Goehle

Date: 12/1/2015

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	777	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	145	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	528	Pass
L	Popliteal Height	343	369	350	Pass
M	Knee Pivot to floor height	392	409	399	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	205	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	483	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	864	Pass
Z	Waist Circumference	761	791	770	Pass

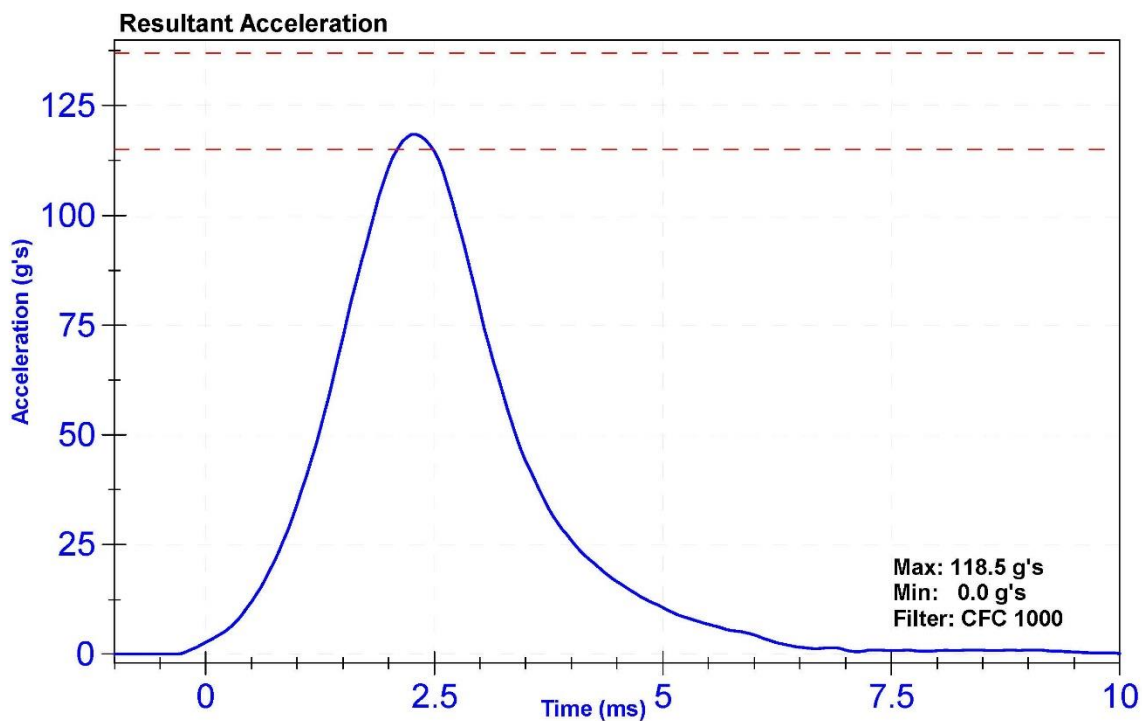
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

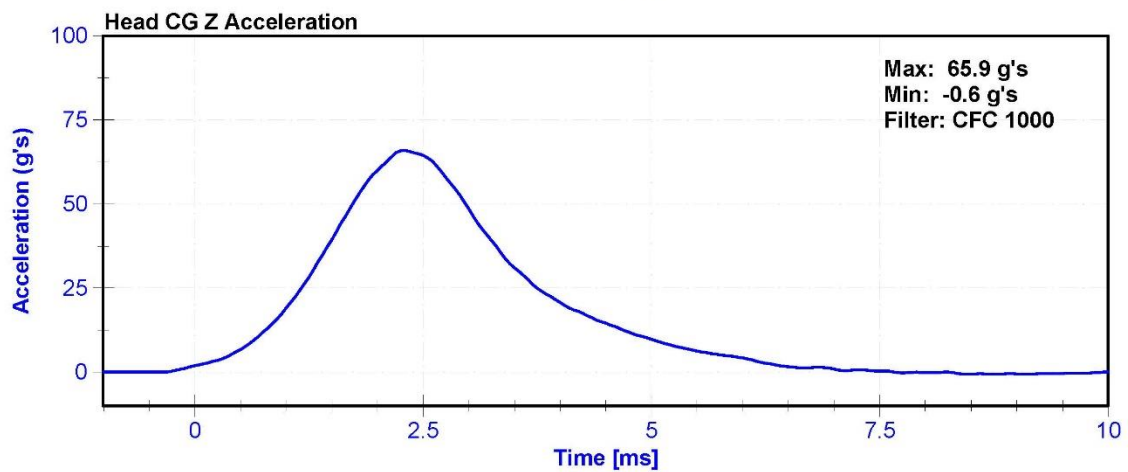
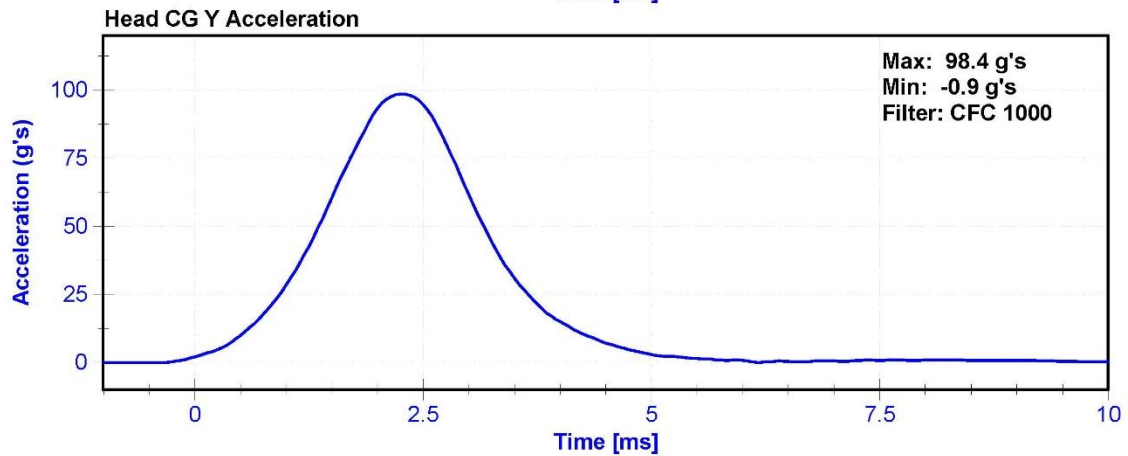
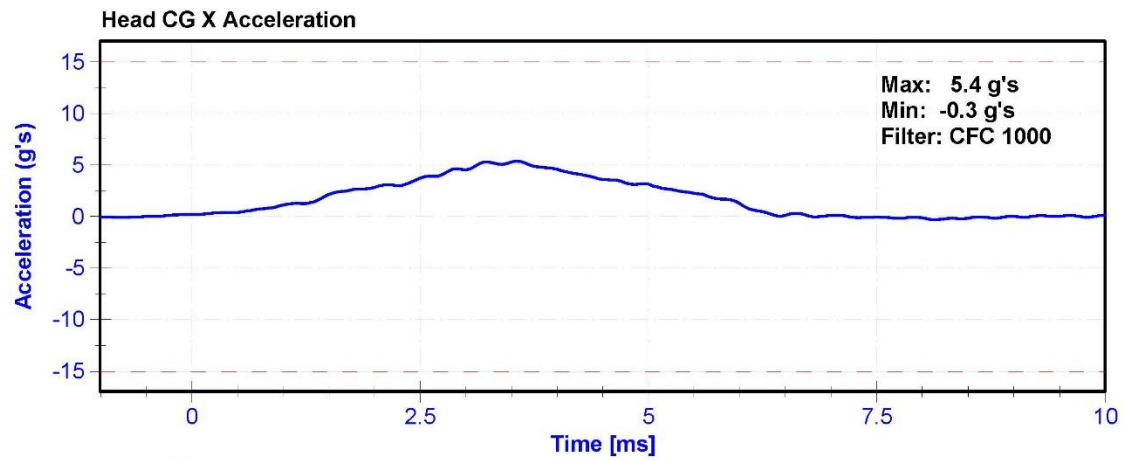
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	29.3	Pass
Resultant Acceleration	115	137	g's	118.5	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	5.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	11/12/2015	5/12/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	11/12/2015	5/12/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	11/12/2015	5/12/2016





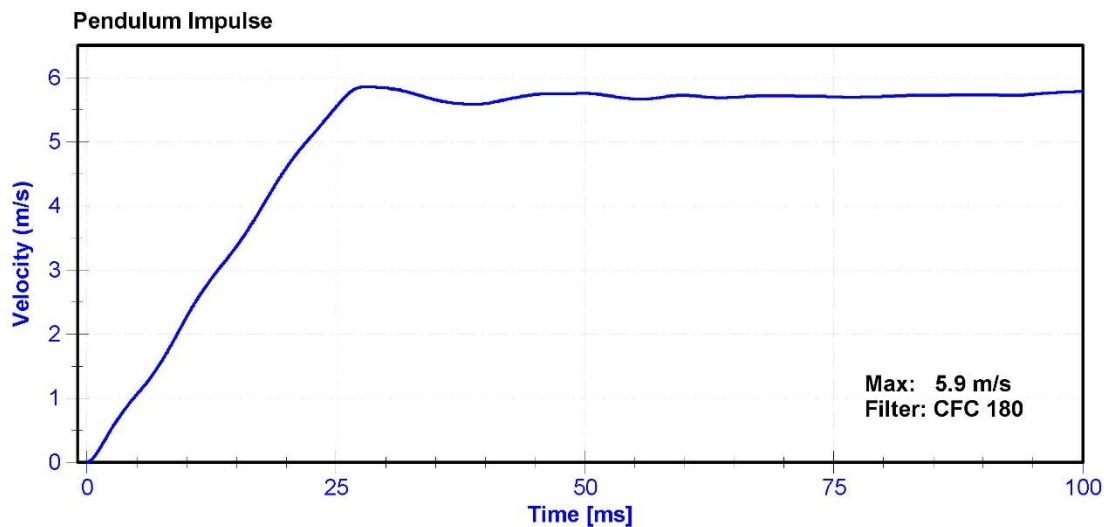
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

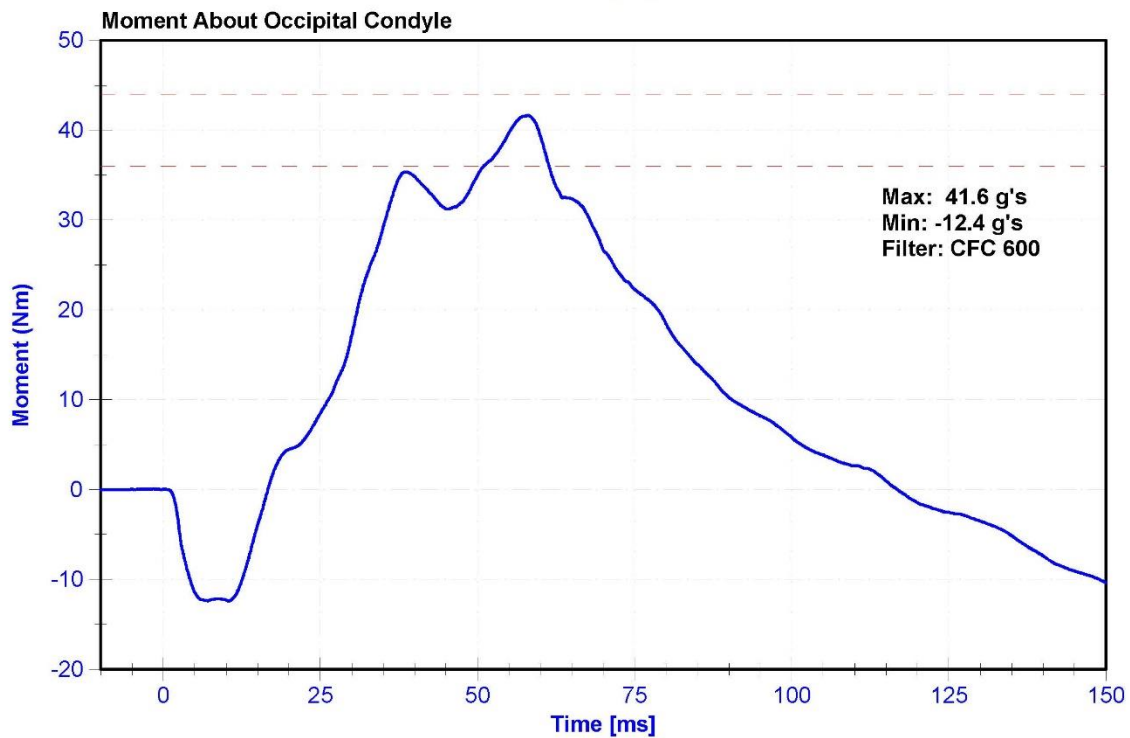
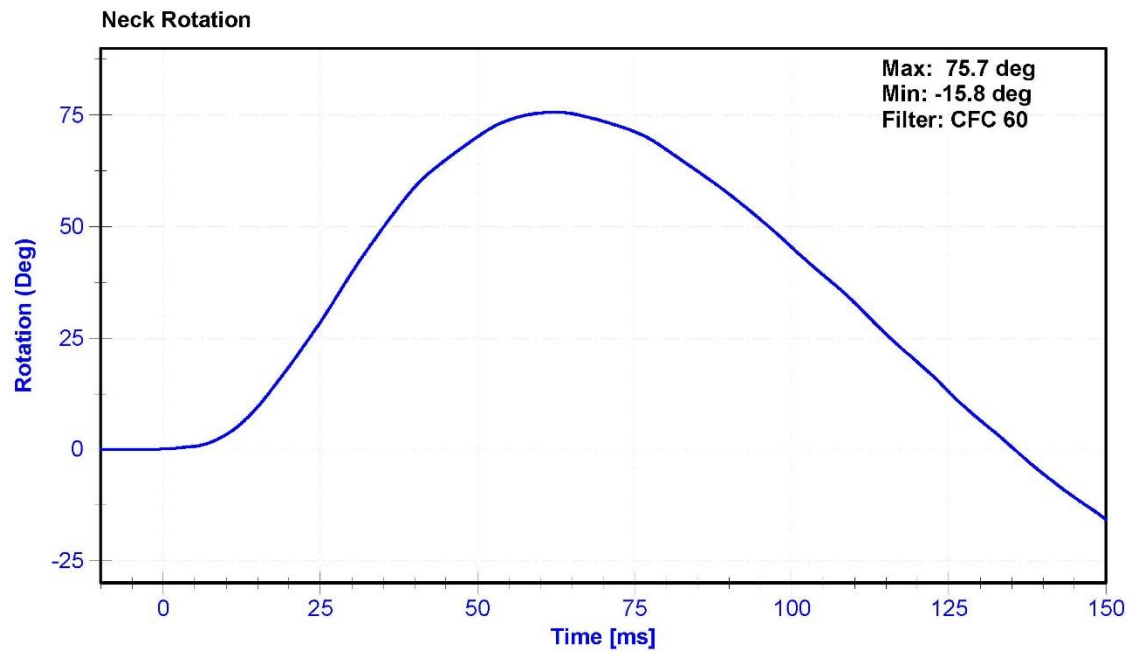
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	31.5	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.27	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.37	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.60	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.54	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.86	Pass
Neck Rotation	71	81	deg	75.7	Pass
Time at Maximum Rotation	50	70	ms	62.4	Pass
Moment about the OC	36	44	Nm	41.6	Pass
Moment Decay to 0 Nm	102	126	ms	116.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
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-1916Fy	6/29/2015	6/28/2016





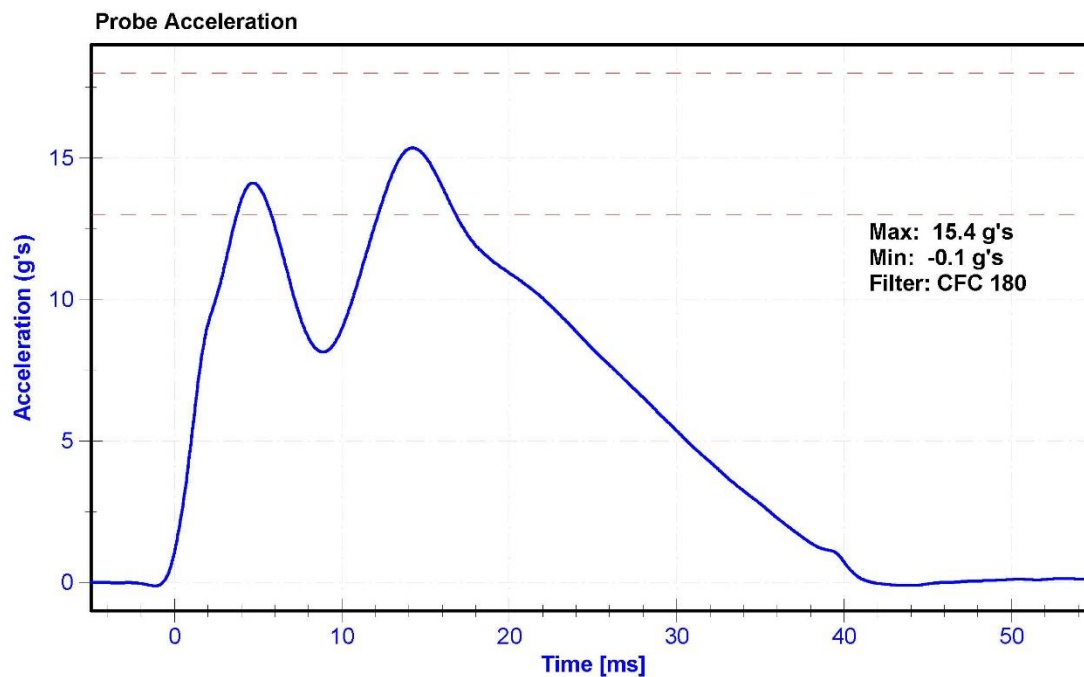
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	DG8012	Laboratory Supervisor	M.Goehle

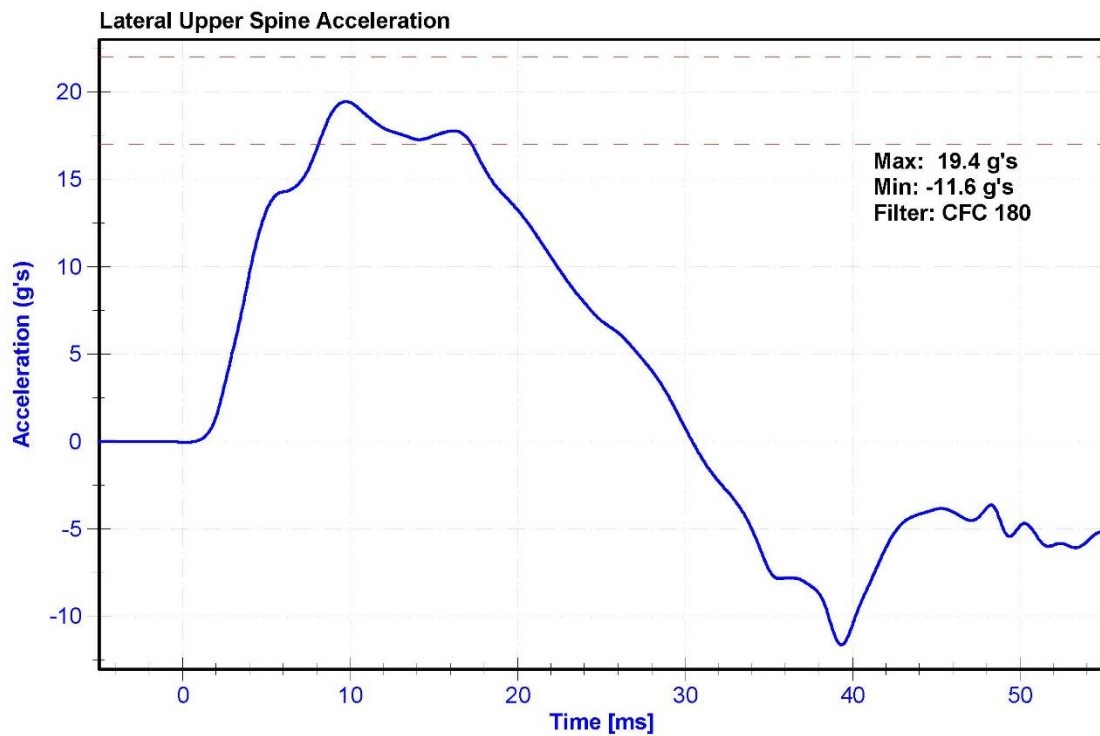
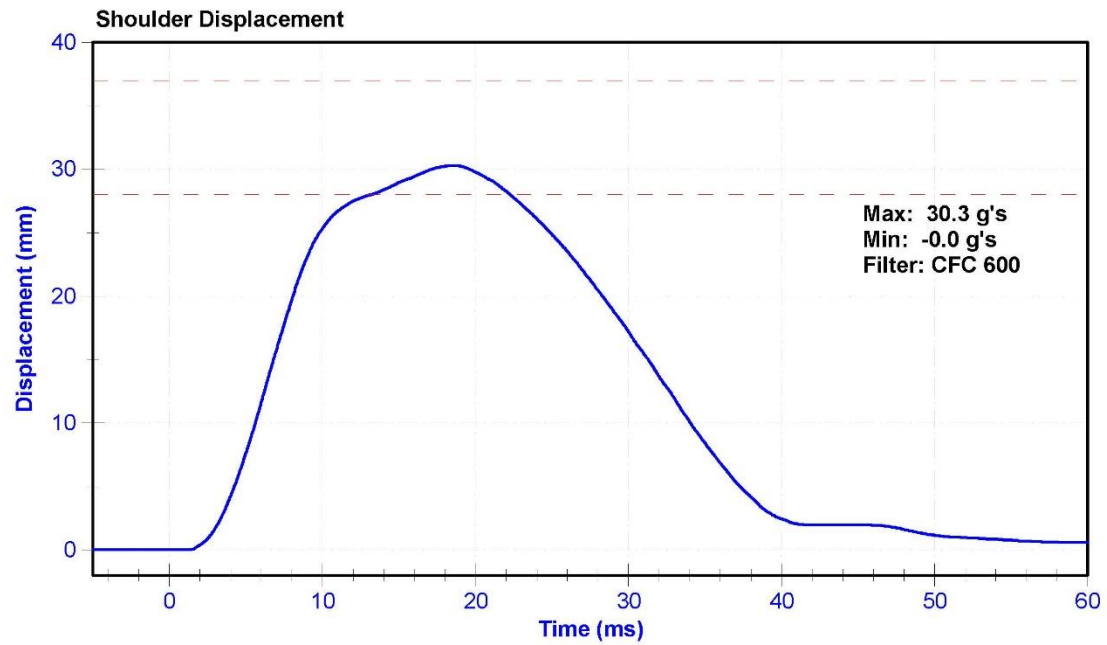
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40.7	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	13	18	g's	15.4	Pass
Shoulder Deflection	28	37	mm	30.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	8/3/2015	2/1/2016





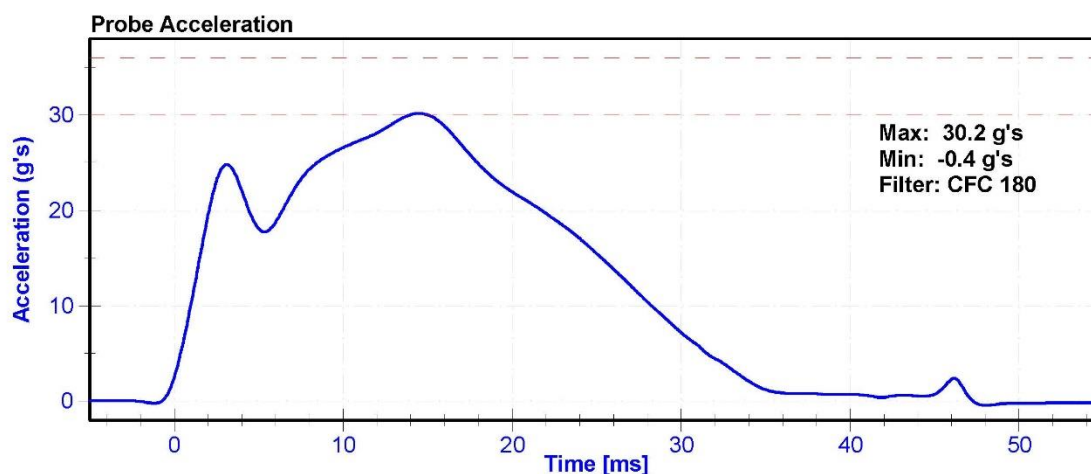
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	DG8012	Laboratory Supervisor	M.Goehle

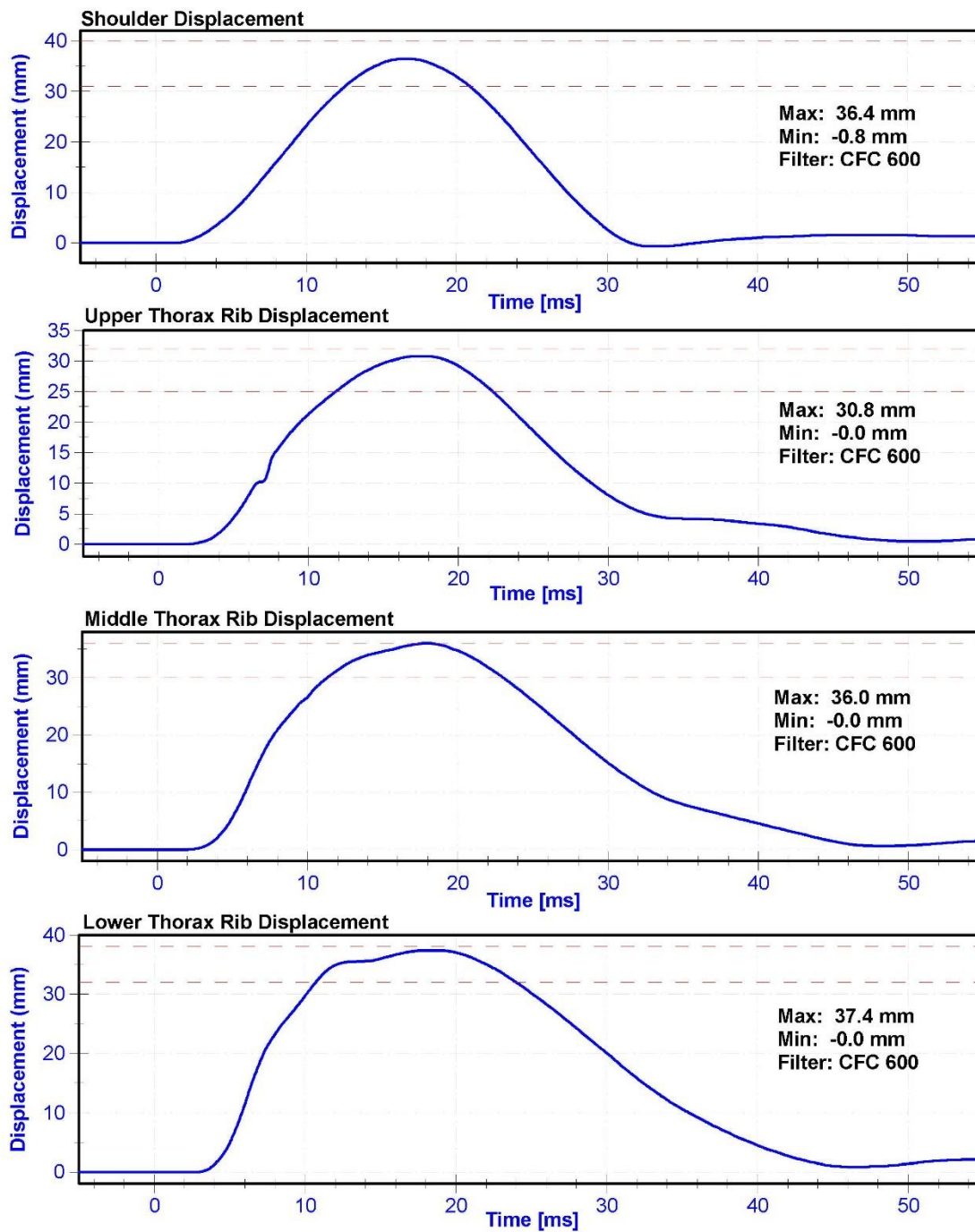
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	39.6	Pass
Velocity	6.6	6.8	m/s	6.71	Pass
Probe Acceleration after 5 ms	30	36	g's	30.2	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	30.1	Pass
Shoulder Deflection	31	40	mm	36.4	Pass
Upper Thorax Rib Deflection	25	32	mm	30.8	Pass
Mid Thorax Rib Deflection	30	36	mm	36.0	Pass
Lower Thorax Rib Deflection	32	38	mm	37.4	Pass

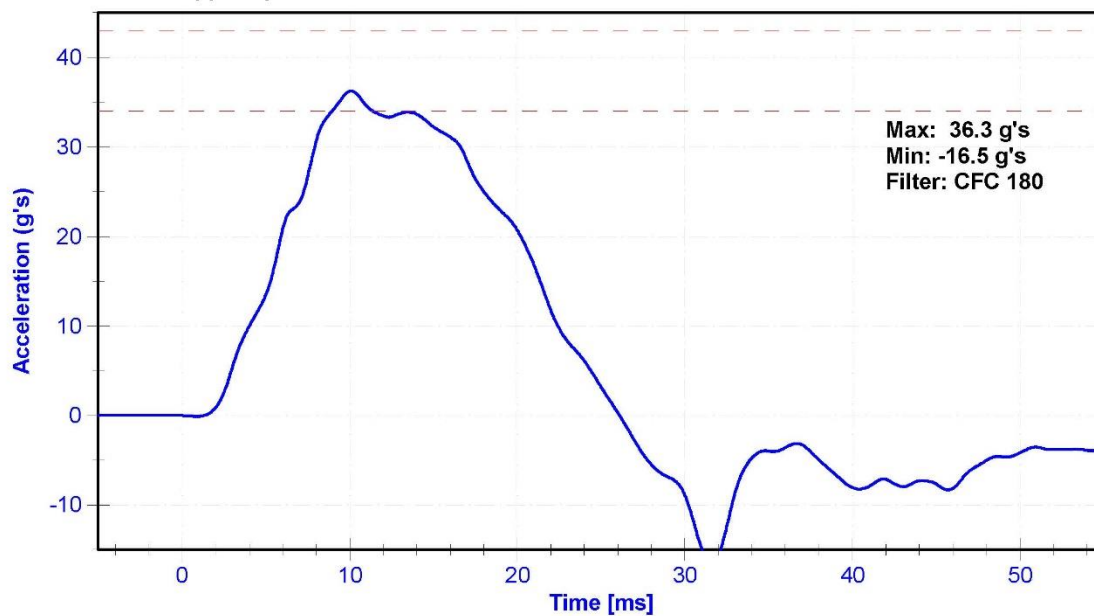
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P51875	8/3/2015	2/1/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
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

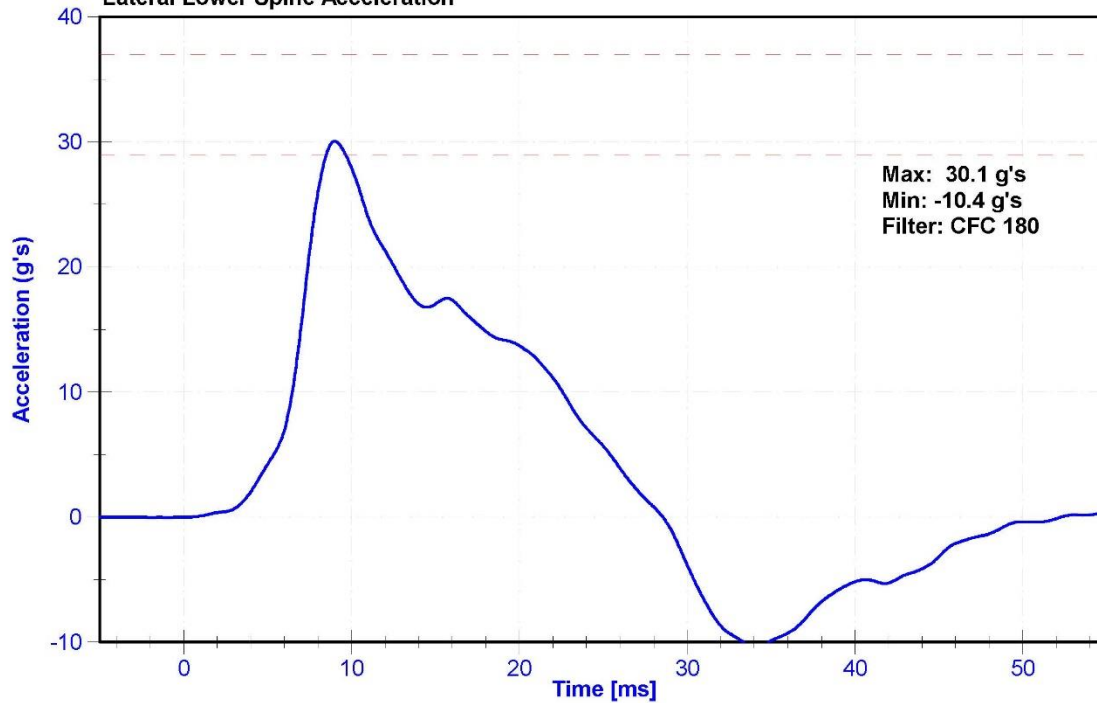




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



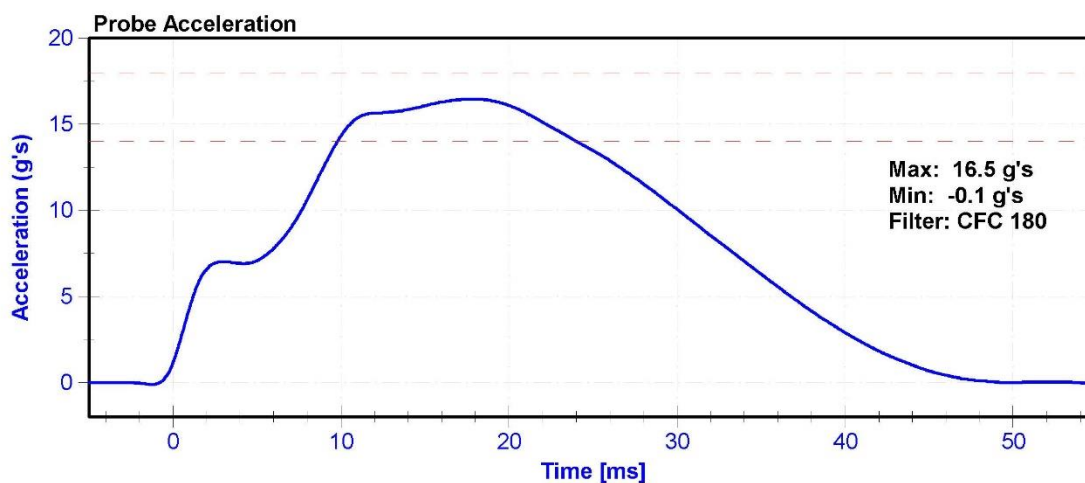
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	DG8012	Laboratory Supervisor	M.Goehle

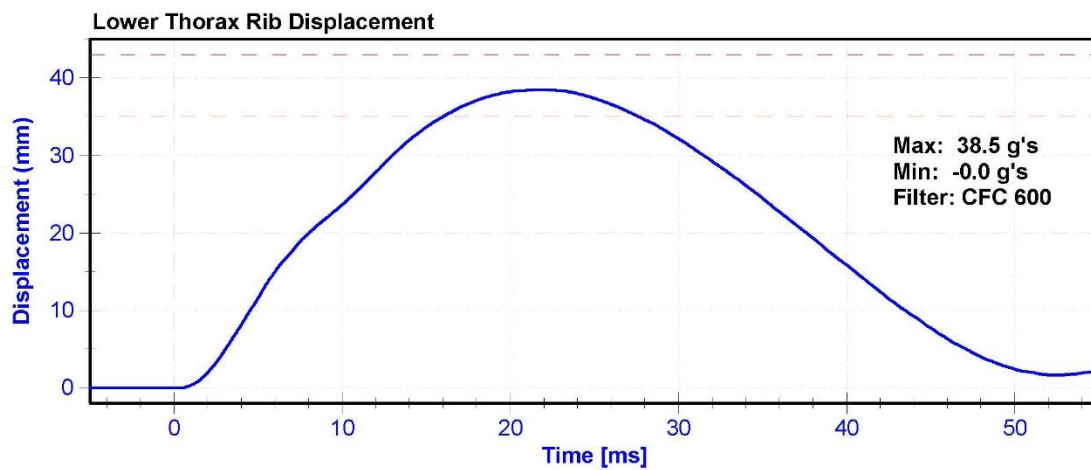
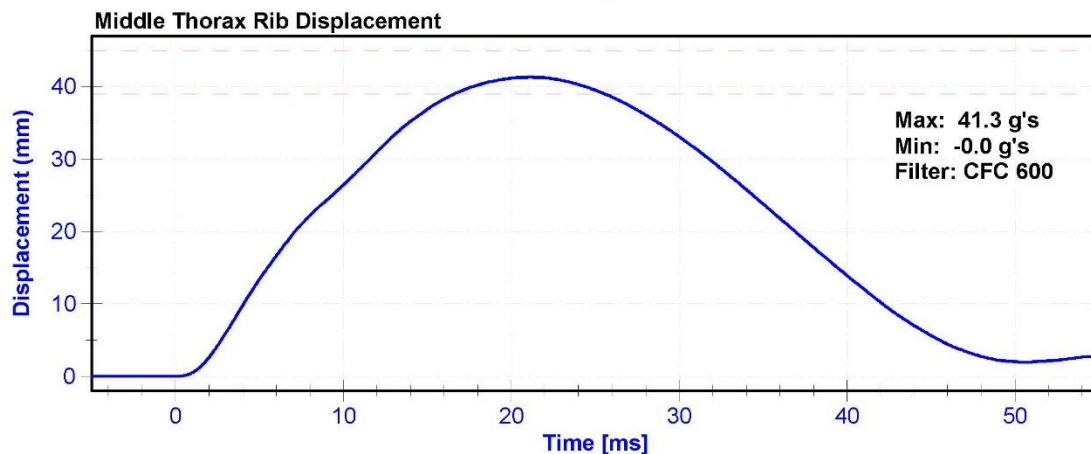
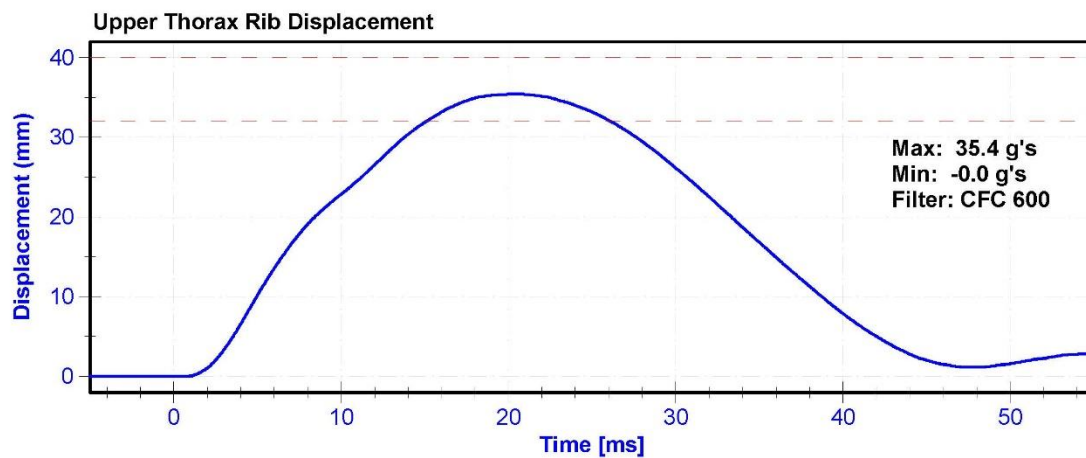
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	38.8	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	14	18	g's	16.5	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.1	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.6	Pass
Upper Thorax Rib Deflection	32	40	mm	35.4	Pass
Middle Thorax Rib Deflection	39	45	mm	41.3	Pass
Lower Thorax Rib Deflection	35	43	mm	38.5	Pass

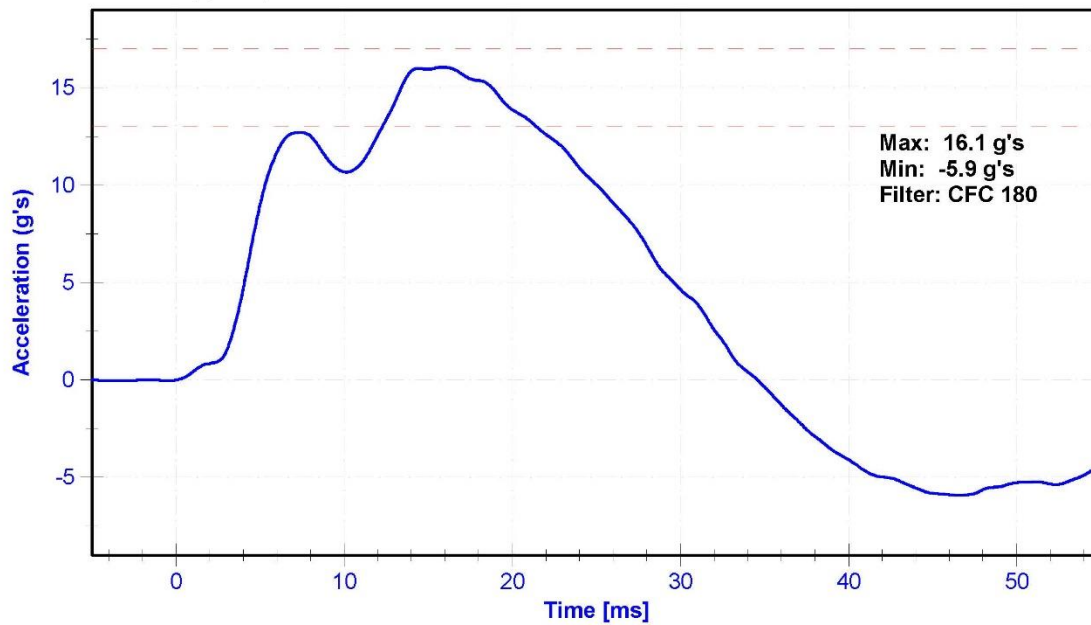
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	8/3/2015	2/1/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
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

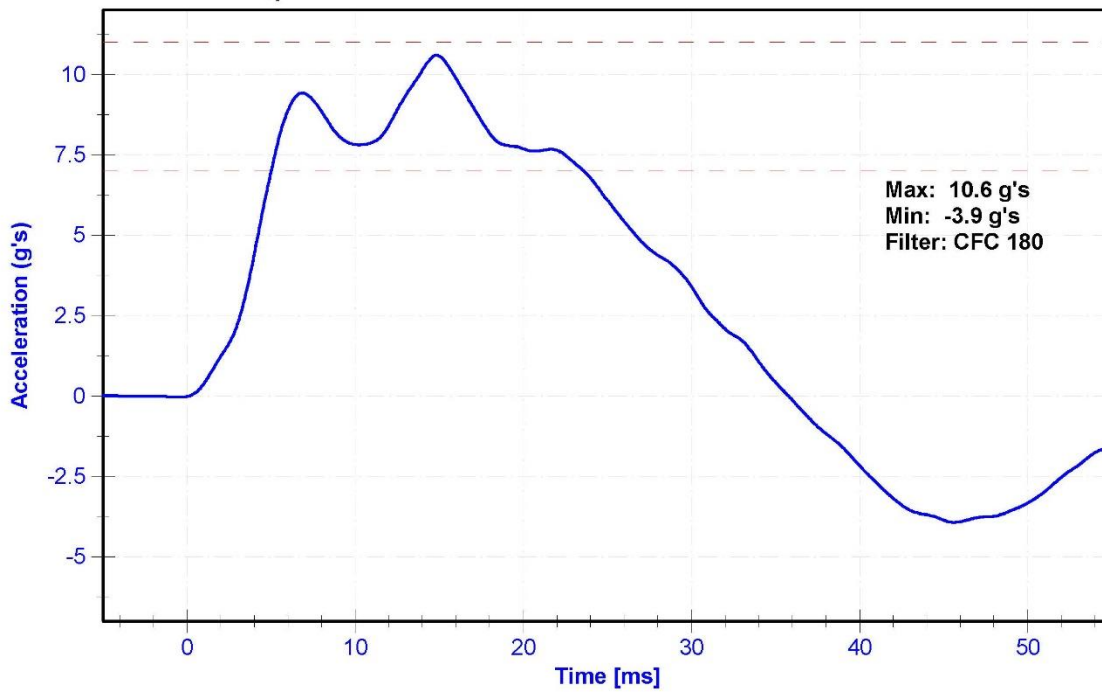




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



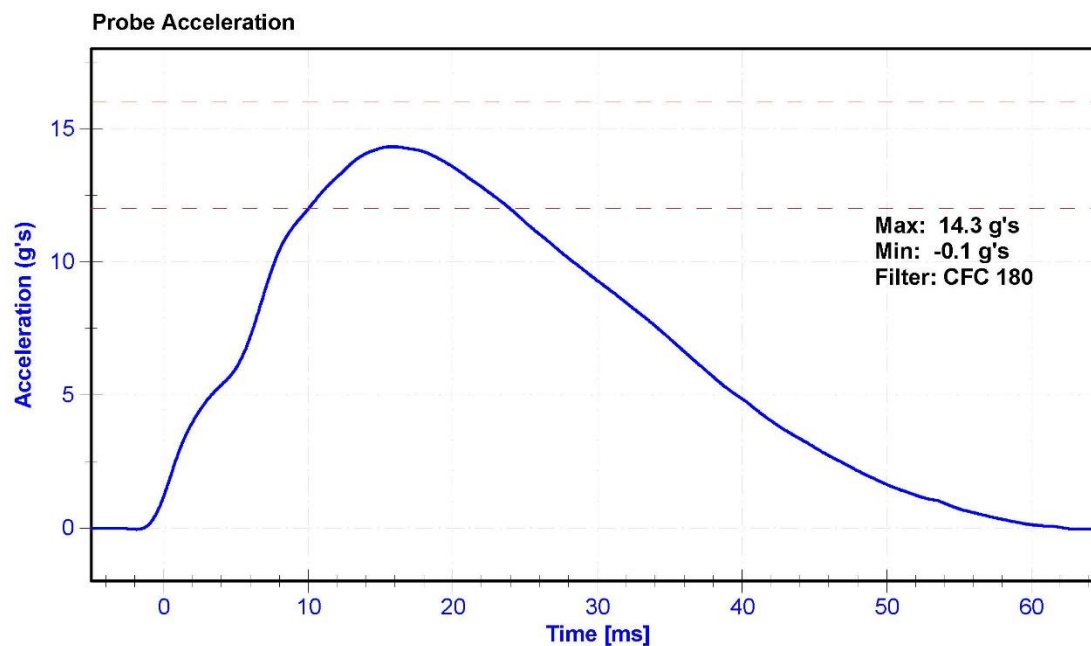
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	303	Laboratory Supervisor	M.Goehle

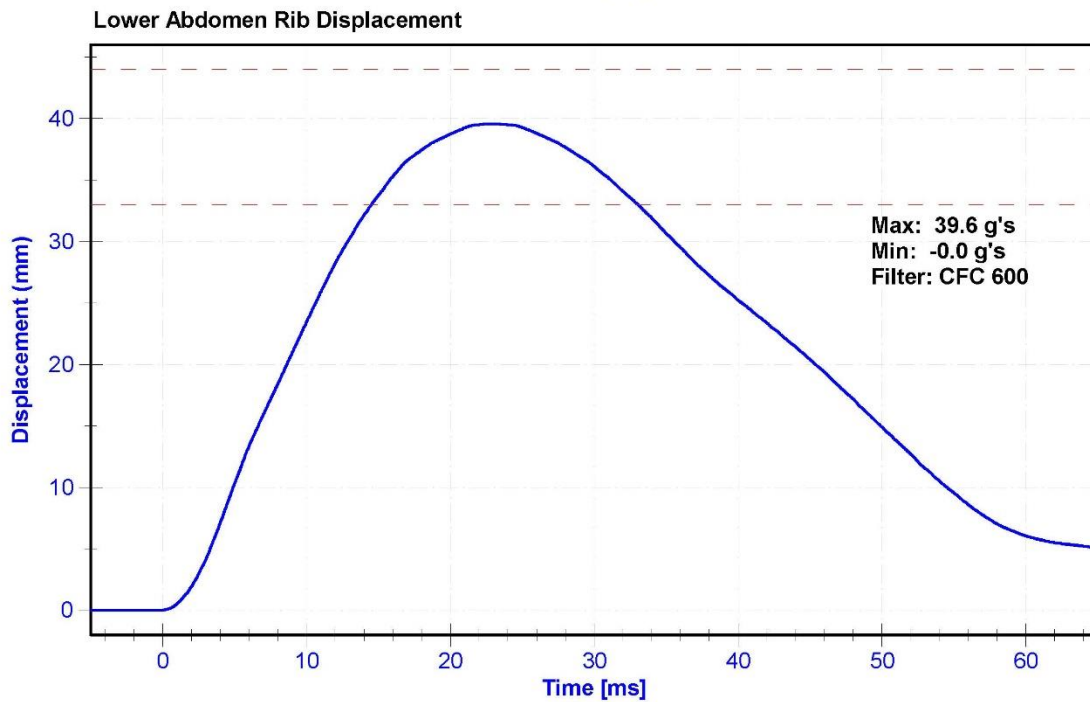
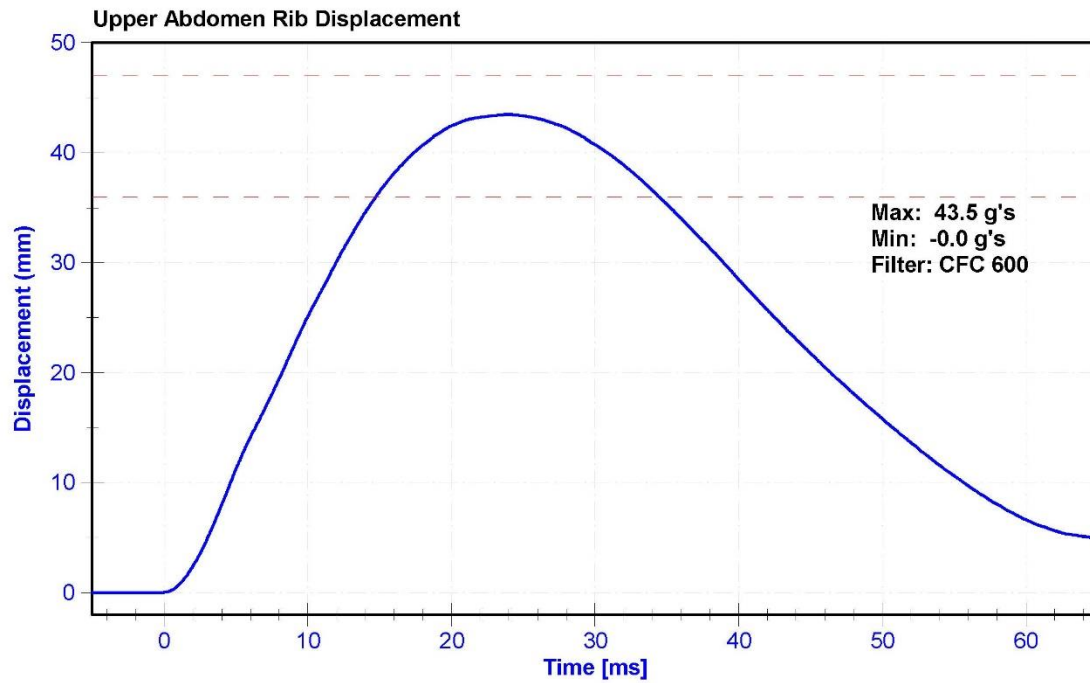
Results

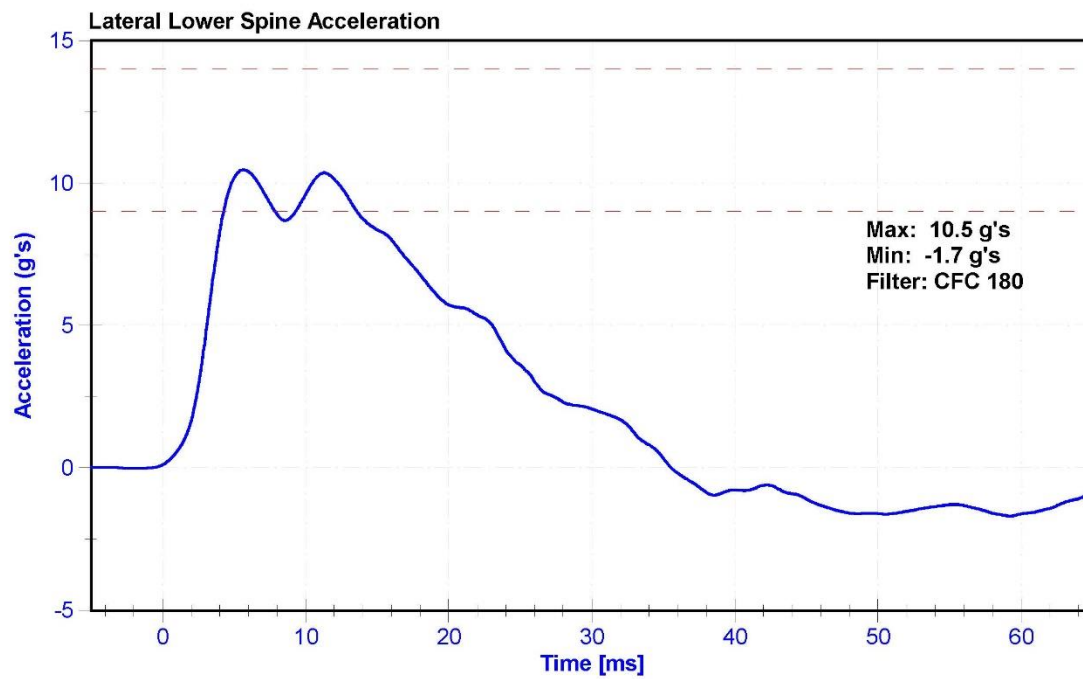
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	36.9	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	12	16	g's	14.3	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.5	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.6	Pass

Transducer Calibrations

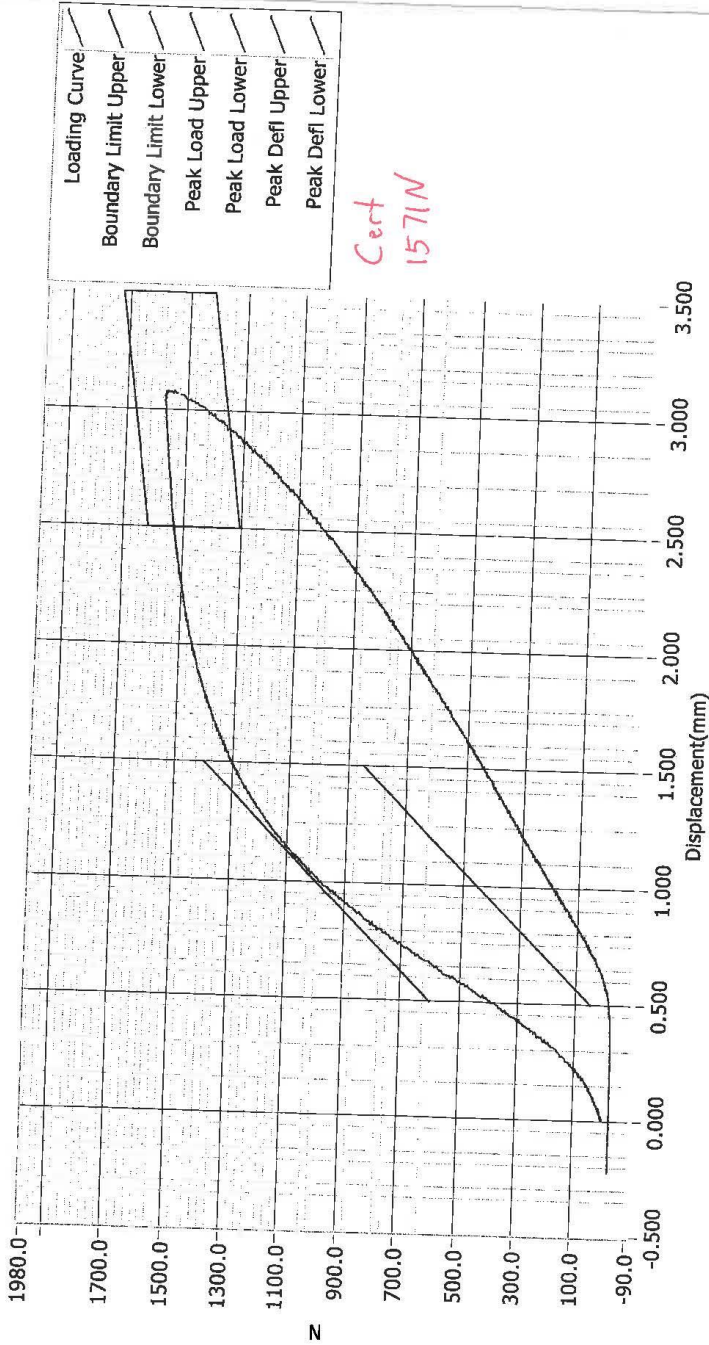
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
Upper Abdomen Rib Potentiometer	Servo 08TC1-3787	DS-015GFE	9/24/2015	9/23/2016
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/24/2015	9/23/2016







Resultant Data - SIDIIs Plug Compression

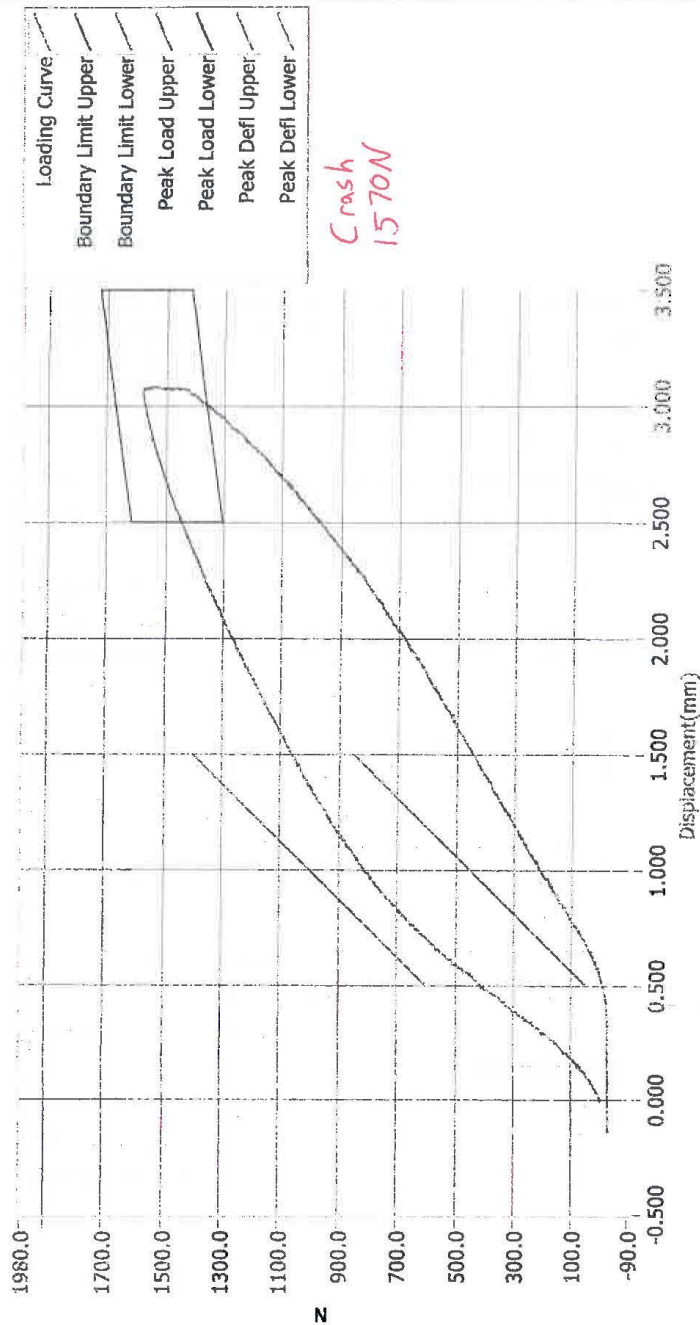


ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
	80697	11/20/2014	9:10 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIs	

Current Date : 11/20/2014 Current Time : 21:14:44

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	79622	11/5/2014	10:53 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 11/5/2014 Current Time : 22:55:42

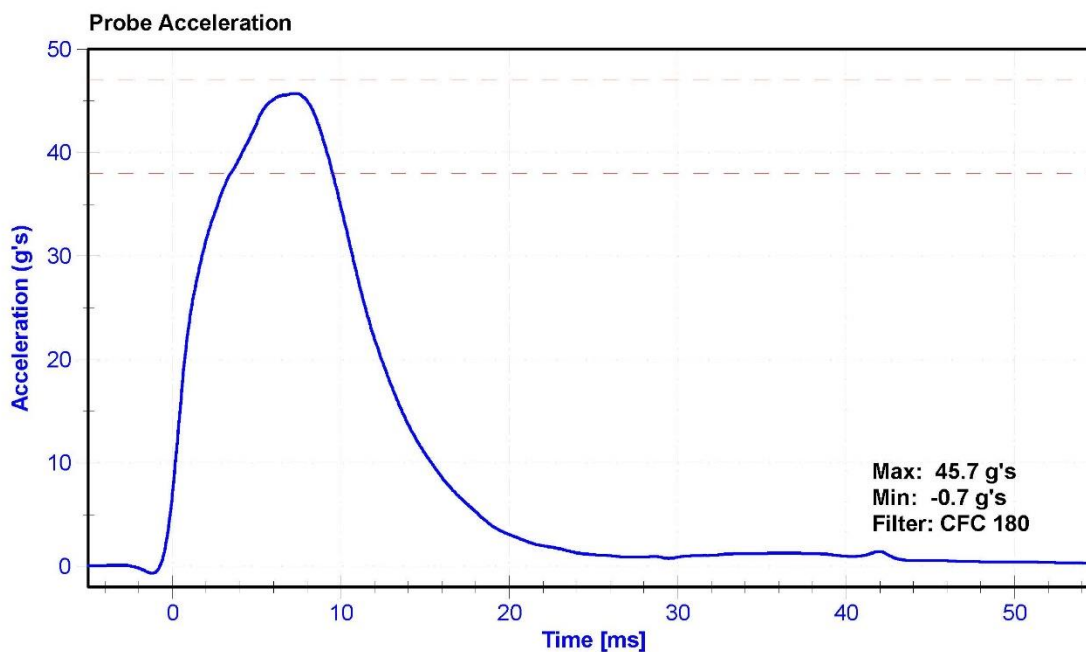
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

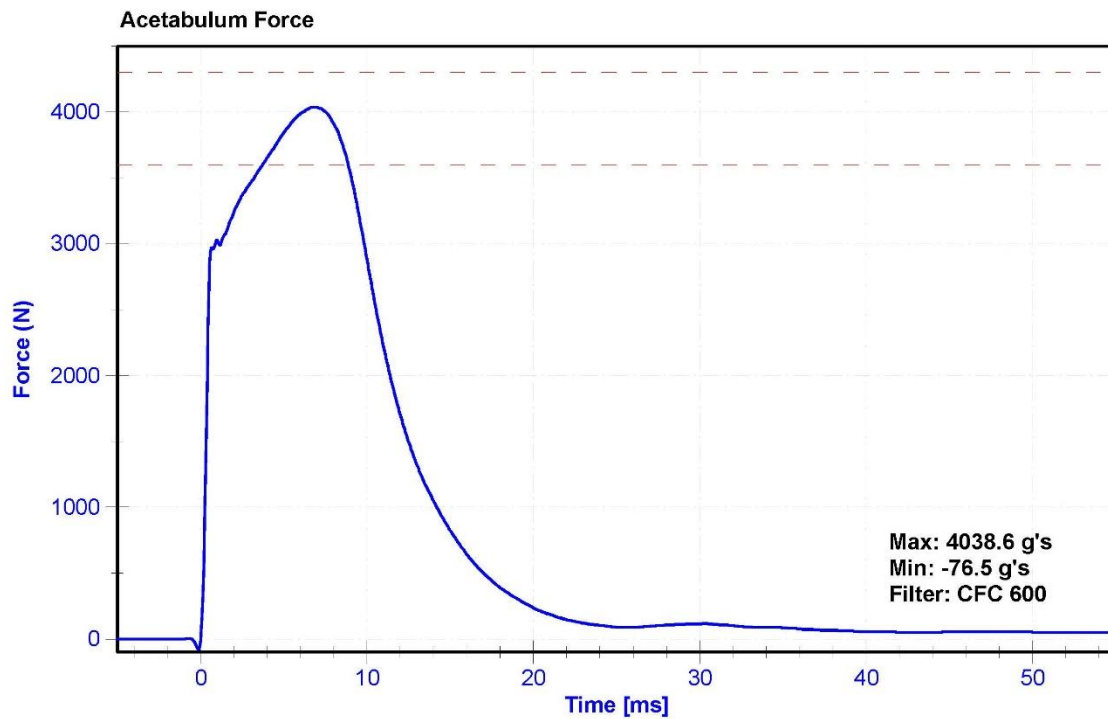
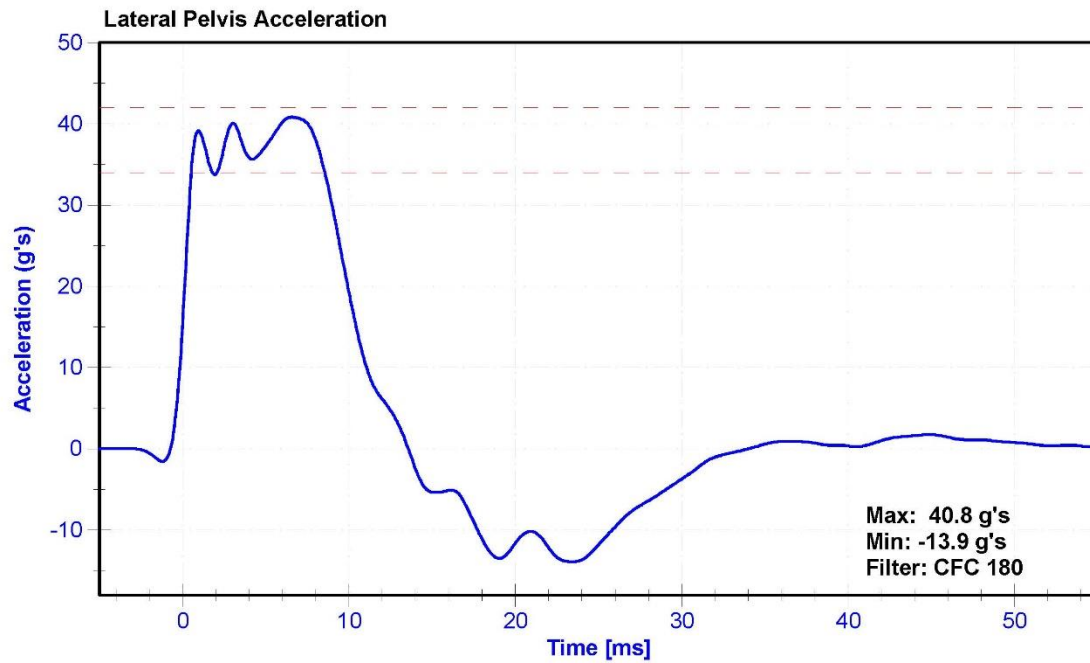
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	41	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration	38	47	g's	45.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.8	Pass
Acetabulum Force	3,600	4,300	N	4038.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	8/3/2015	2/1/2016
Acetabulum Load Cell	Denton 3249J	LC-267Fy	6/30/2015	6/29/2016
Certification Plug	Humanetics	80697	11/20/14	N/A
Crash Test Plug	Humanetics	79622	11/05/14	N/A





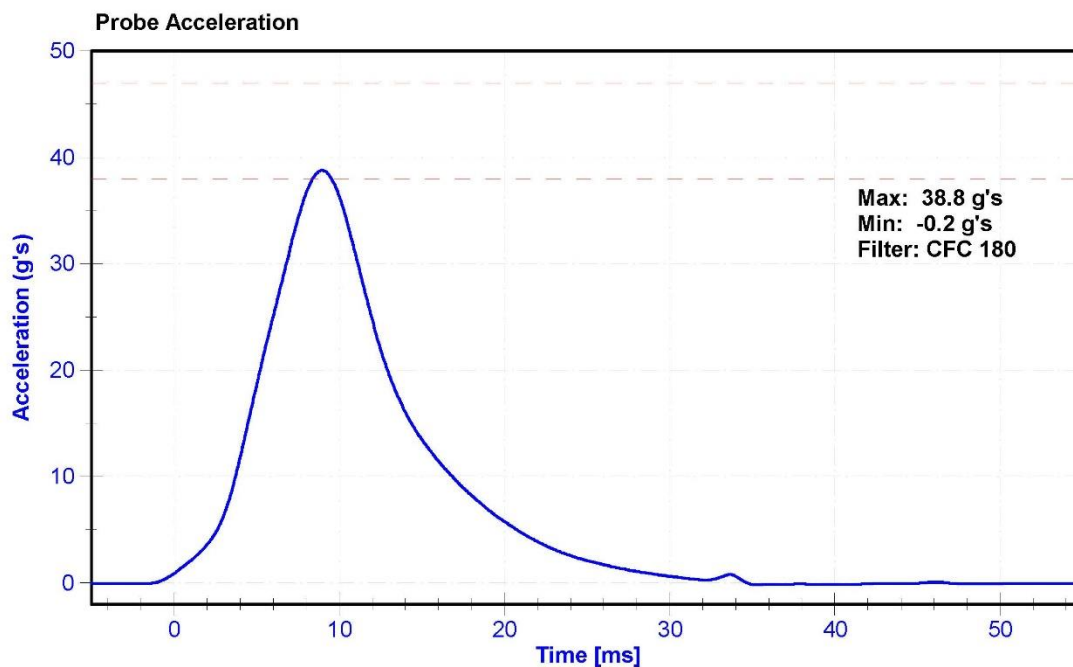
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	DG8012	Laboratory Supervisor	M.Goehle

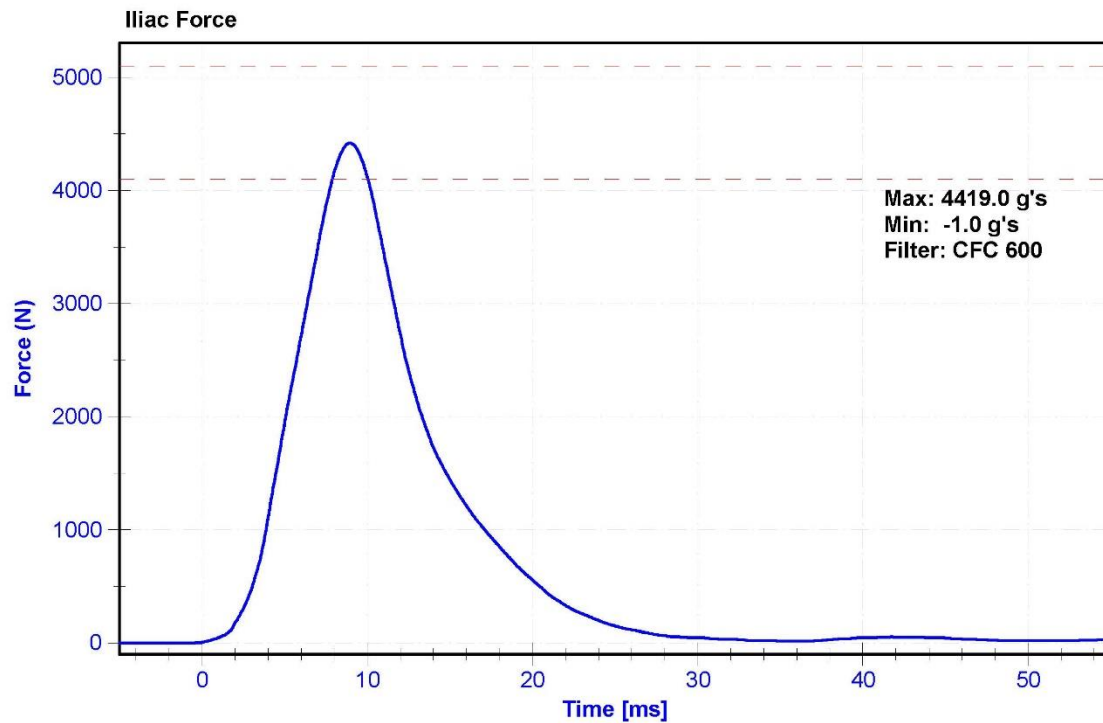
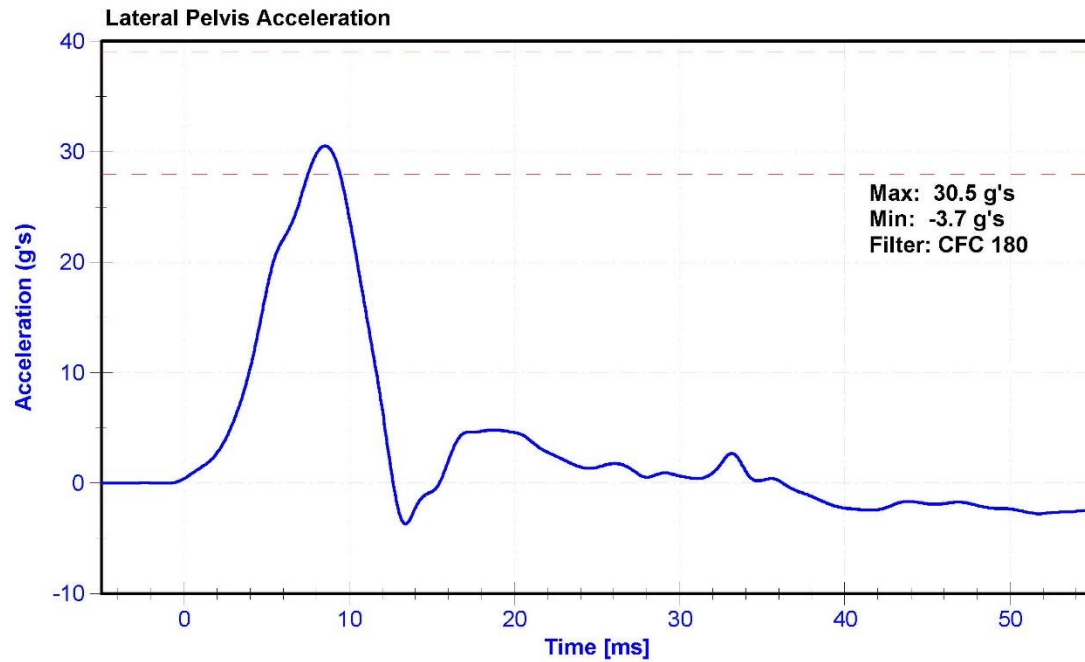
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	41.2	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	36	45	g's	38.8	Pass
Lateral Pelvis Acceleration	28	39	g's	30.5	Pass
Iliac Force	4,100	5,100	N	4419.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	8/13/2015	2/11/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	8/3/2015	2/1/2016
Iliac Load Cell	DENTON 3228J	LC-281Fy	6/30/2015	6/29/2016





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	11/12/2015
			Y	AC-P51682	ENDEVCO	11/12/2015
			Z	AC-P51699	ENDEVCO	11/12/2015
Head Accelerometers - Redundant			X	AC-P51701	ENDEVCO	11/12/2015
			Y	AC-P45019	ENDEVCO	11/12/2015
			Z	AC-P51690	ENDEVCO	11/12/2015
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	9/23/2015
			Y	AC-P83319	ENDEVCO	9/23/2015
			Z	AC-P83432	ENDEVCO	9/23/2015
Acetabulum Load Cell			Y	LC-267Fy	DENTON	6/30/2015
Lilac Wing Load Cell			Y	LC-281Fy	DENTON	6/30/2015
Pelvis Plug (Struck Side)				46467	HUMANETICS	9/22/2011
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A156940	MSI 1201	10/19/2015
Vehicle Center of Gravity	Y	AC-A127659	MSI 1201	10/8/2015
Vehicle Center of Gravity	Z	AC-A156914	MSI 1201	10/19/2015
Left Floor Sill	Y	AC-A156951	MSI 1201	10/8/2015
A-Pillar Sill	Y	AC-A112918	MSI 1201	10/14/2015
A-Pillar Low	Y	AC-A156932	MSI 1201	10/19/2015
A-Pillar Mid	Y	AC-A156924	MSI 1201	10/19/2015
B-Pillar Sill	Y	AC-A156923	MSI 1201	10/8/2015
B-Pillar Low	Y	AC-A156917	MSI 1201	10/8/2015
B-Pillar Mid	Y	AC-A156939	MSI 1201	10/8/2015
Driver Seat	Y	AC-A120631	MSI 1201	10/29/2015
Engine Top	X	AC-A156925	MSI 1201	10/7/2015
Engine Top	Y	AC-A081458	MSI 1201	10/7/2015
Firewall	Y	AC-A126816	MSI 1201	10/7/2015
Right Roof	Y	AC-A156915	MSI 1201	10/8/2015
Right Floor Sill	Y	AC-A127662	MSI 1201	9/17/2015
Rear Floorpan	X	AC-A156944	MSI 1201	10/9/2015
Rear Floorpan	Y	AC-A156949	MSI 1201	10/9/2015

Table 3 – Pole Instrumentation

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