

REPORT NUMBER: SPNCAP-CAL-18-006

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

**Ford Motor Co.
2018 Ford Expedition
SUV**

NHTSA No: M20180204

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



June 15, 2018

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**

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Prepared by: Vanessa Hansen
Vanessa Hansen, Senior Test Engineer

Date: June 15, 2018

Approved by: Edward Dutton
Edward Dutton, Operations Manager
Transportation Test Operations

Date: June 15, 2018

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 2018 Ford Expedition SUV 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 May 17, 2018. The impact velocity of the vehicle was 32.70 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 338 mm located at level 2. 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>133.995</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>46.504</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>2533.098</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>20.491</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>17.082</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	133.995	Resultant Lower Spine Acceleration	G	82	46.504	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2533.098	Maximum Thoracic Rib Deflection	mm	38	20.491	Maximum Abdomen Rib Deflection	mm	45	17.082
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2018 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 2018 Ford Expedition SUV. 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 2018 Ford Expedition SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.70 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 17, 2018. 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	133.995
Resultant Lower Spine Acceleration	g	82	46.504
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2533.098
Maximum Thoracic Rib Deflection	mm	38*	20.491
Maximum Abdominal Rib Deflection	mm	45*	17.082

*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	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- Left Front Sill Y Acceleration, Exceeded calibration range at 33.9ms

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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20180204
Model Year	2018
Make	Ford
Model	Expedition
Body Style	SUV
VIN	1FMJU1HT2JEA27021
Body Color	Silver
Odometer Reading (km/mi)	6.7 miles
Engine Displacement (L)	3.5
Type / No. Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	10-Speed
Overdrive	Yes
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	Yes
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	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Co.
Date of Manufacture	02/18
Vehicle Type	MPV

GVWR (kg)	3266
GAWR Front (kg)	1440
GAWR Rear (kg)	1905

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	3	8
Capacity Weight (VCW) (kg)				785
DSC X 68.04 kg				544.32
Cargo Weight (RCLW) (kg)				136

(A)

(B)

(A-B)

VEHICLE SEAT TYPE

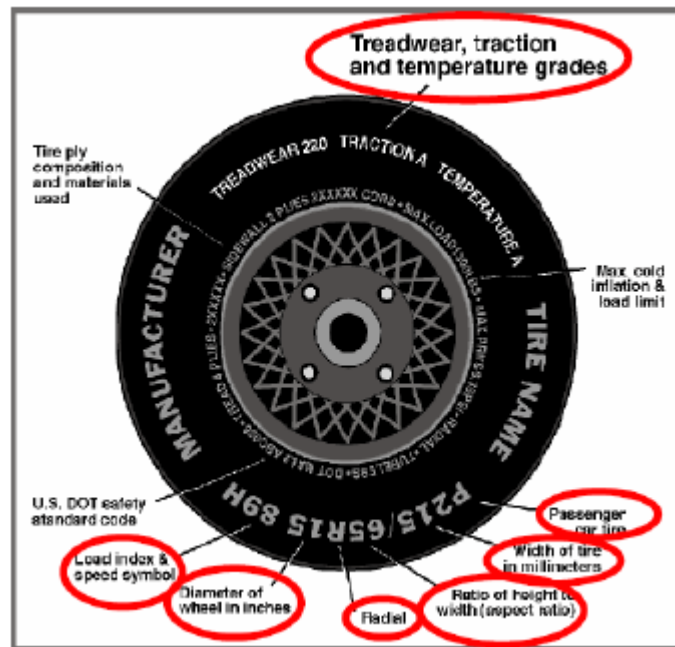
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X			X	
Third Row seat		X			X		

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

Test Vehicle: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018

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)	240	240
Recommended Tire Size	275/65R18	275/65R18
Tire Size on Vehicle	275/65R18	275/65R18
Tire Manufacturer	Hankook	Hankook
Tire Model	DynaPro HT	DynaPro HT
Treadwear	700	700
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	116H	116H
Tire Material	Rubber	Rubber
DOT Safety Code Left	J7HUHUH4717	J7HUHUH4717
DOT Safety Code Right	J7HUHUH4718	J7HUHUH4717

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

Test Vehicle: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	230	245	270	230
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	602	610		619	697		627	702	
Right	kg	579	647		587	716		582	718	
Ratio	%	48	52		46	54		46	54	
Totals	kg	1181	1257	2438	1206	1413	2619	1209	1420	2629

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2438	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	52.6	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2626.6	(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	-1.2	-1.1	-1.0	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-1.35	-1.1	-1.0	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.1	-0.1	-0.15	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	+0.1	+0.1	+0.1	Yes
Vehicle CG (Aft of Front Axle)	mm	1601	1675	1677	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	5	4	9	

* 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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	13
Spare Tire	31
Jack	7
Tail Light	1
Passenger Windows and door parts	12
Ballast / Equipment Added	93

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: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018

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	19.8	11.1	15.45
Front Passenger Seat	Not Adjustable		
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	15.45	27	Max	40	43	47
			Mid	20	23	27
			Min	0	3	7
Front Passenger Seat	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
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: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

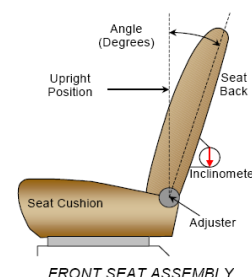
NHTSA No.: M20180204
 Test Date: 5/17/2018

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	255	N/A	0	N/A
Front Passenger Seat	255	38 (0-37)	0	0
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	160	17	160	16
Non-Struck Side Rear Seat	160	17	160	16
Rear Center Seat	16	17	160	16

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	50.5	N/A	2.4	N/A
Front Passenger Seat	50	N/A	2.4	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

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	3	Lowest

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

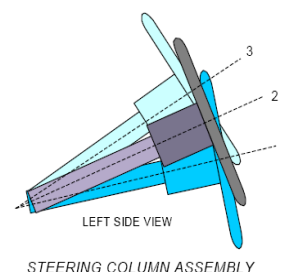
Test Vehicle: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018

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.

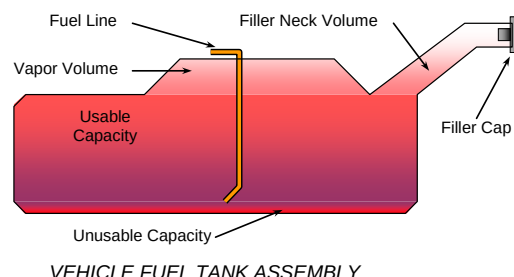
		Degrees	Fore / Aft Position (mm)
Lowermost	– Position 1	20	
Geometric Center	– Position 2	21.75	
Uppermost	– Position 3	23.5	
Telescoping Steering Wheel Travel			40
Test Position		21.8	20



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	94.6
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	94.6
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	87.97
Actual Amount of Solvent Used in Test	87.97
1/3 of Usable Capacity	31.5

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

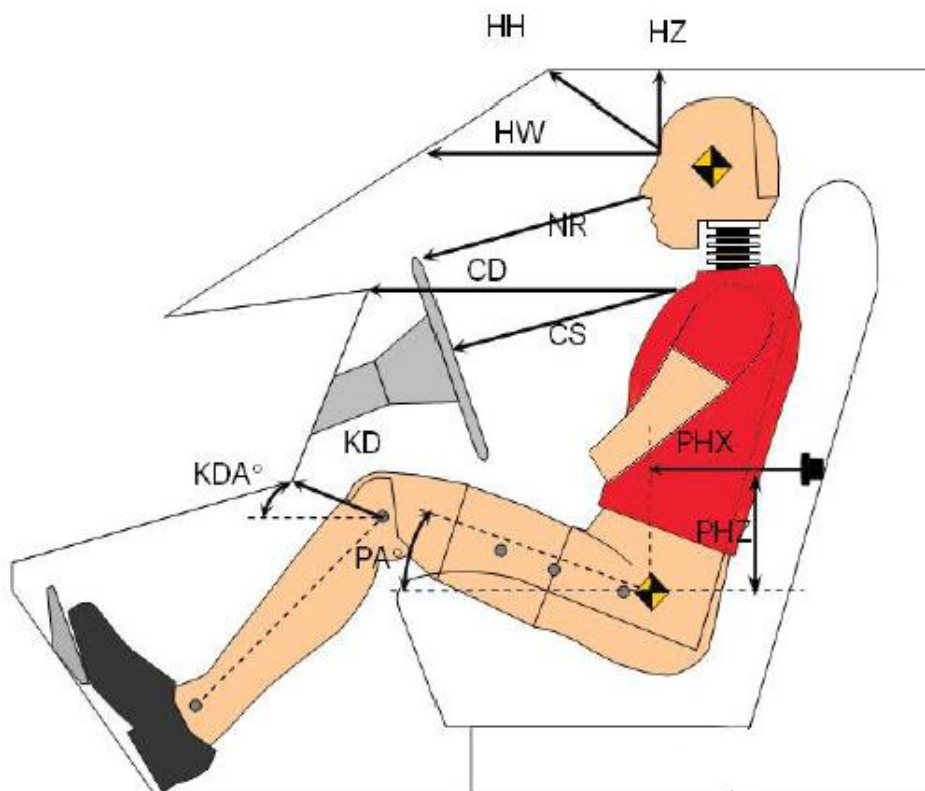


No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018



Left Side View

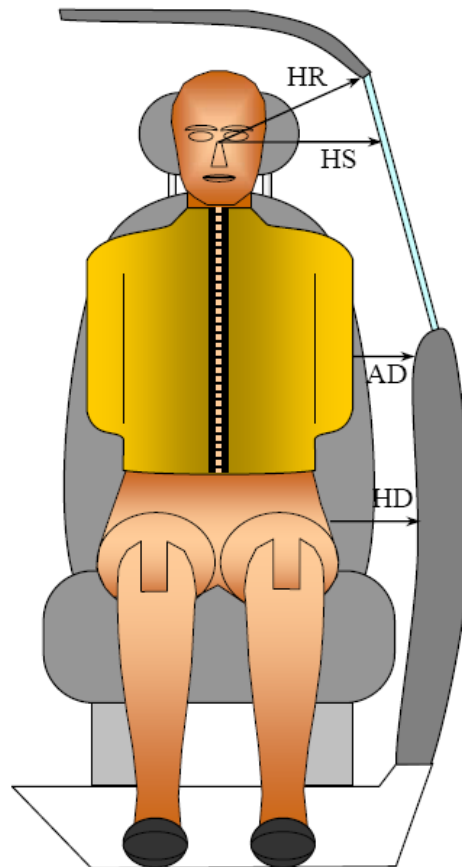
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	416	
HW	Head to Windshield	771	
HZ	Head to Roof Liner	303	
NR	Nose to Rim	281	
CD	Chest to Dash	506	
CS	Chest to Steering Wheel	237	
KD(L) / KDA(L)°	Left Knee to Dash	129	28.2
KD(R) / KDA(R)°	Right Knee to Dash	118	14.9
PAX°	Pelvic Tilt Angle (X-Axis)		20.6
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	380	
PHZ	Hip Point to Striker (Z-Axis)	78	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018



FRONT VIEW OF DUMMY

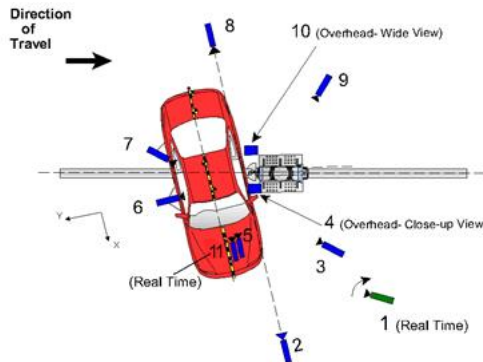
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	299
HS	Head to Side Window	mm	405
AD	Arm to Door	mm	180
HD	Hip Point to Door	mm	189

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018



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	8118	0	-1445	24	1000
3	Impact side 45° - forward pole view	4658	-1585	-1831	28	1000
4	Overhead Close-up view of impact	0	0	-9375	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	-9697	0	-1393	24	1000
9	Impact side 45° - rearward pole view	-2992	-3551	-1931	28	1000
10	Overhead wide - view of impact	0	0	-9375	12.5	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.

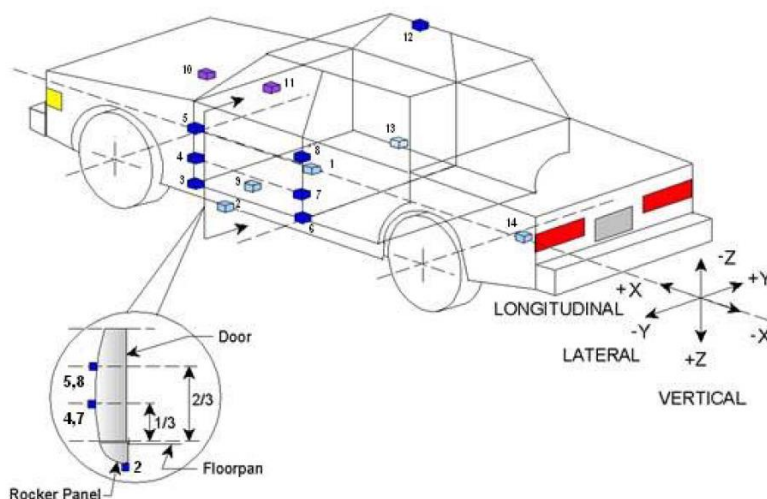
INSTRUMENTATION

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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3070	5	-477
2	Left Floor Sill	3275	-730	-34
3	A-Pillar Sill	3638	-763	-66
4	A-Pillar Low	3655	-779	-329
5	A-Pillar Mid	3671	-711	-835
6	B-Pillar Sill	2551	-750	-125
7	B-Pillar Low	2564	-764	-375
8	B-Pillar Mid	2559	-769	-613
9	Driver Seat Track	2795	-645	-151
10	Engine Top	4304	93	-562
11	Firewall	4151	56	-697
12	Right Roof	2604	705	-1340
13	Right Floor Sill	3281	743	-29
14	Rear Floorpan	1413	64	-128

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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018

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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag & Headrest
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag & Headrest
Left Shoulder	Seatback & Torso/Pelvis Airbag
Upper Torso	Seatback
Lower Torso	Seatback
Left Hip	Seatpan & Torso/Pelvis Airbag
Left Knee	Seatpan and Driver 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	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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks throughout with separation along driver A-Pillar
Side Window Damage	Driver 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	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	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

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

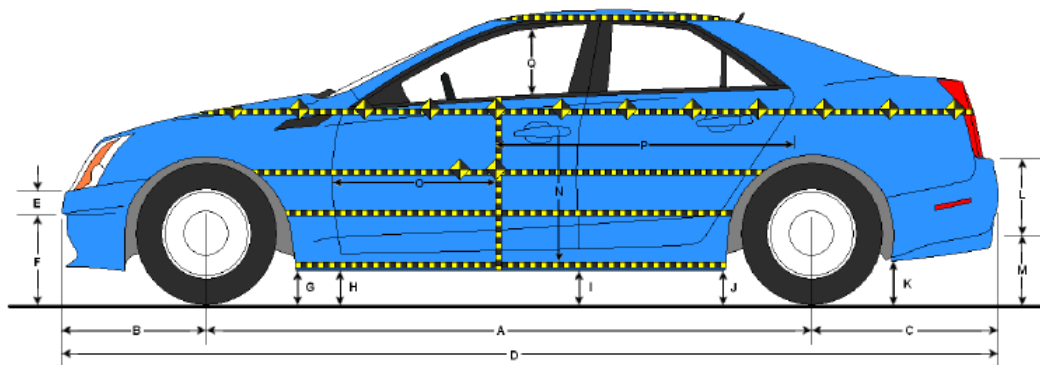
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1300
Actual Impact Point - Aft of Front Axle	mm		1300
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	0
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.70
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.66

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

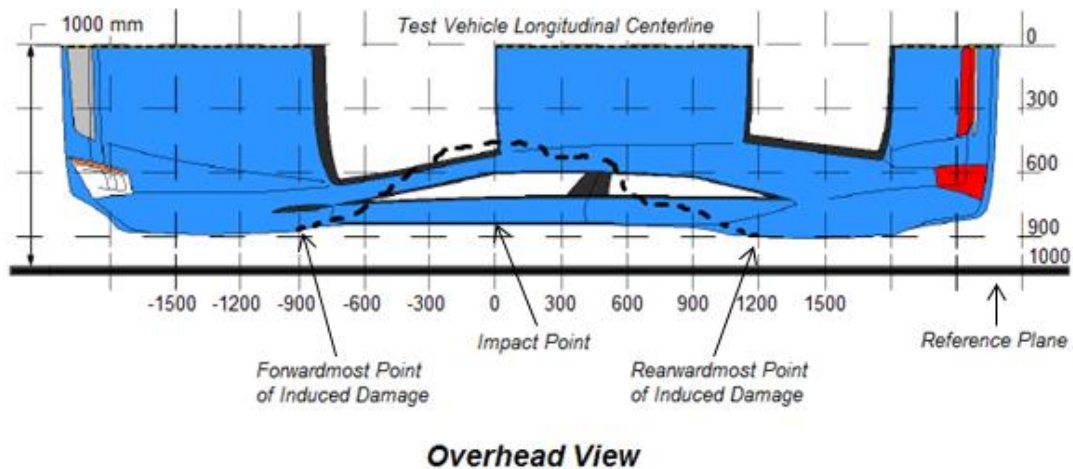
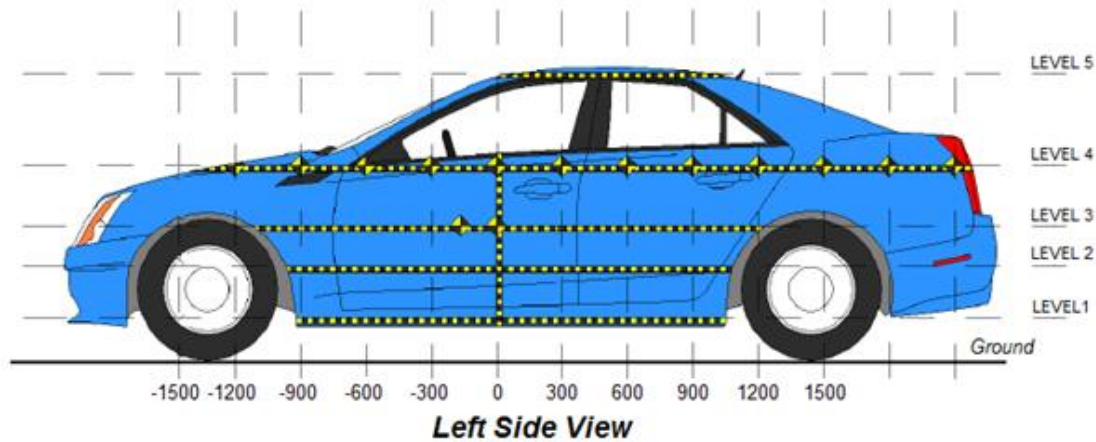
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	3105	3068	37
B	Front Axle to FSOV	977	1004	-27
C	Rear Axle to RSOV	1266	1238	28
D	Total Length at Centerline	5348	5309	39
E	Front Bumper Thickness	430	430	0
F	Front Bumper Bottom to Ground	358	370	-12
G	Sill Height at Front Wheel Well	346	345	1
H	Sill Height at Front Door Leading Edge	378	373	5
I	Sill Height at B-Pillar	322	335	-13
J1	Sill Height at Rear Wheel Well	323	356	-33
J2	Pinch Weld Height at Rear Wheel Well	397	419	-22
K	Sill Height Aft of Rear Wheel Well	398	413	-15
L	Rear Bumper Thickness	245	245	0
M	Rear Bumper Bottom to Ground	473	465	8
N	Sill Height to Bottom of Front Window Sill	879	879	0
O	Front Door Leading Edge to Impact CL	676	590	86
P	Rear Door Trailing Edge to Impact CL	1649	1590	59
Q	Front Window Opening	502	501	1
R	Right Side Length	5253	5240	13
S	Left Side Length	5255	5202	53
T	Vehicle Width at B-Pillars	2031	2035	-4

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

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	454	305	0
2	Occupant Hip Point	mm	916	338	0
3	Mid - Door	mm	845	336	0
4	Window Sill	mm	1256	274	0
5	Window Top	mm	1795	106	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: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

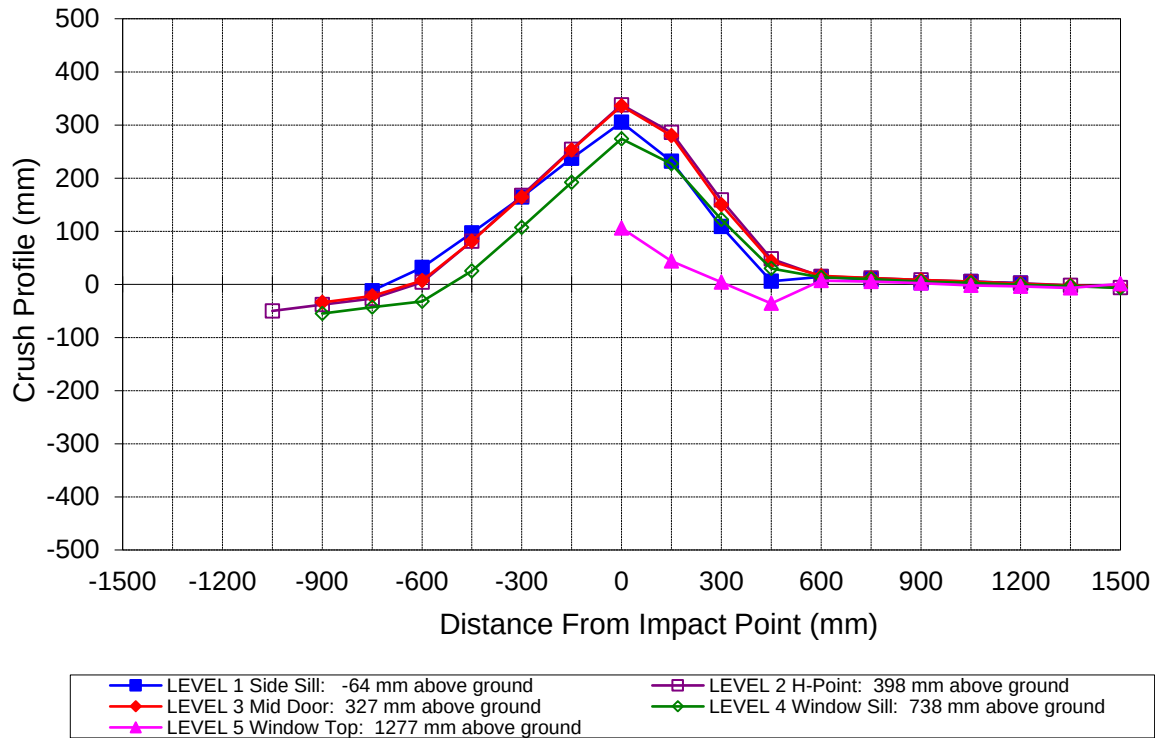
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050		1008					1058					-50			
-900		1005	1010	910			1043	1044	965			-38	-34	-55	
-750	969	1004	1004	924		981	1031	1026	967		-12	-27	-22	-43	
-600	968	1005	1003	932		936	1001	996	964		32	4	7	-32	
-450	968	1007	1003	939		871	926	922	914		97	81	81	25	
-300	969	1009	1005	945		805	842	841	838		164	167	164	107	
-150	970	1010	1006	950		733	756	753	758		237	254	253	192	
0	971	1011	1007	954	749	666	673	671	680	643	305	338	336	274	106
150	970	1012	1008	957	748	738	726	728	730	704	232	286	280	227	44
300	969	1013	1008	960	749	860	854	858	838	745	109	159	150	122	4
450	967	1014	1009	962	751	961	966	966	932	787	6	48	43	30	-36
600	965	1013	1009	963	751	951	998	993	950	744	14	15	16	13	7
750	963	1012	1007	965	752	954	1000	995	955	747	9	12	12	10	5
900	961	1010	1005	965	752	958	1002	997	960	750	3	8	8	5	2
1050	959	1009	1004	966	751	954	1004	999	963	753	5	5	5	3	-2
1200	957	1007	1004	965	750	955	1005	1003	966	754	2	2	1	-1	-4
1350		1009	1011	964	749		1011	1013	967	756		-2	-2	-3	-7
1500		1016	1013	961	750		1022	1018	968	749		-6	-5	-7	1

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: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018



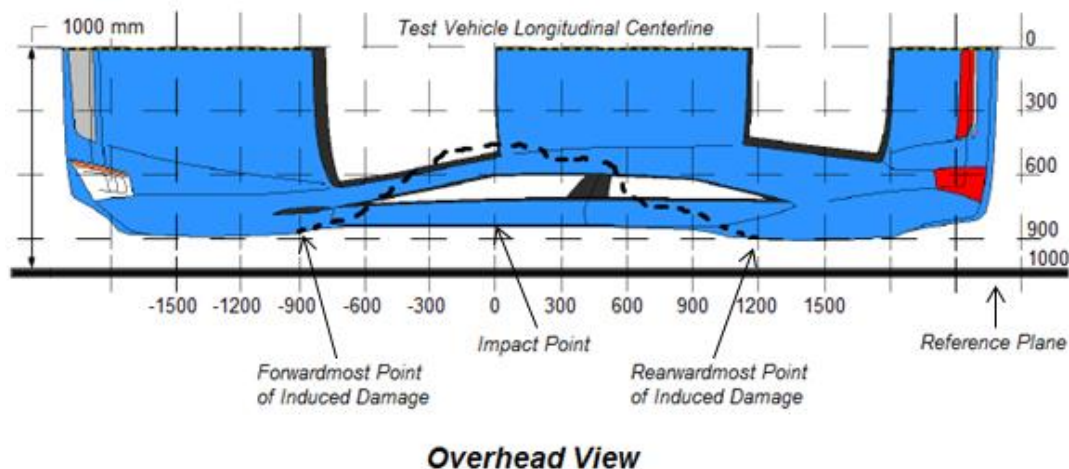
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2018 Ford Expedition SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
 Test Date: 5/17/2018

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	-44	-10	-34
2	-420	3	94	-3	97
3	60	3	306	-7	313
4	540	3	18	-9	27
5	1020	3	1	-4	5
6	1500	3	-18	-13	-5

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

Test Vehicle: <u>2018 Ford Expedition SUV</u>	NHTSA No.: <u>M20180204</u>
Test Program: <u>NCAP Side MDB Impact Test</u>	Test Date: <u>5/17/2018</u>
Test Time: <u>10:29 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°	68	300	368
90° to 180°	69	300	369
180° to 270°	64	300	364
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

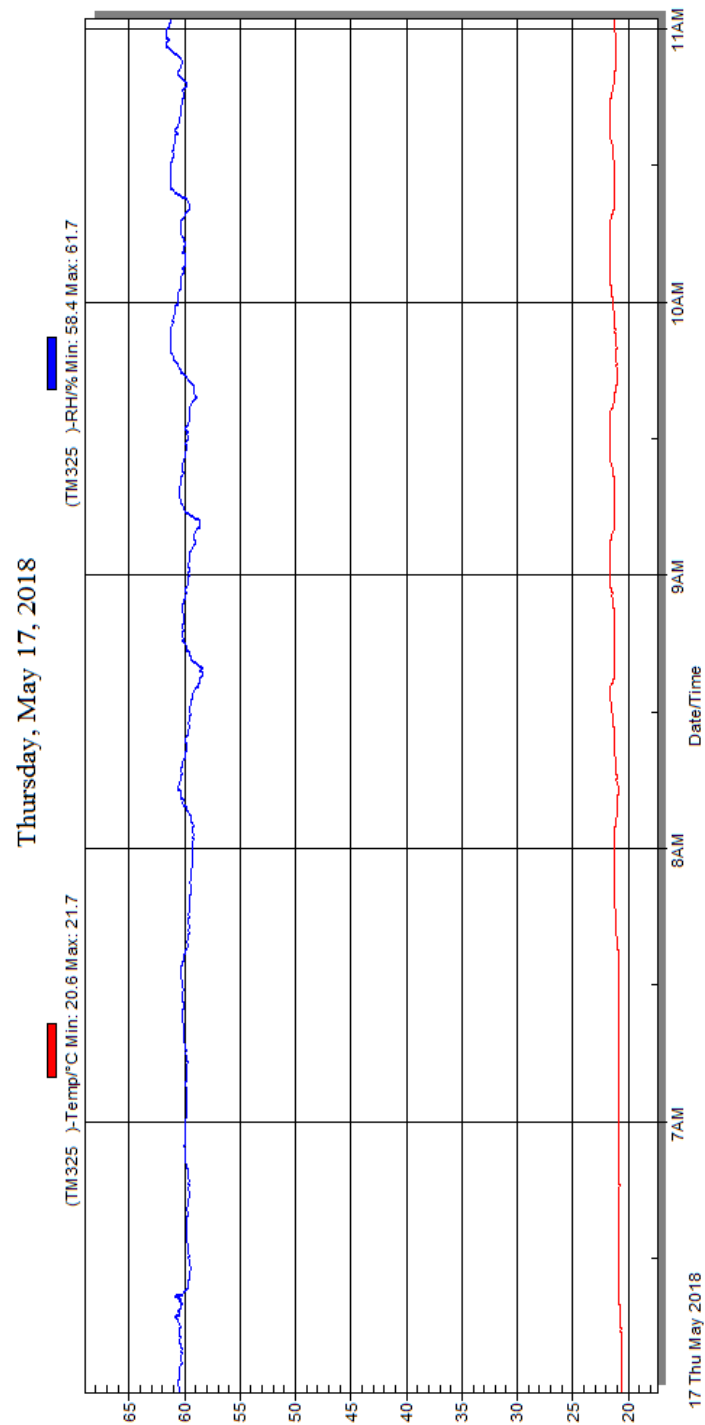
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2018 Ford Expedition SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20180204
Test Date: 5/17/2018



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

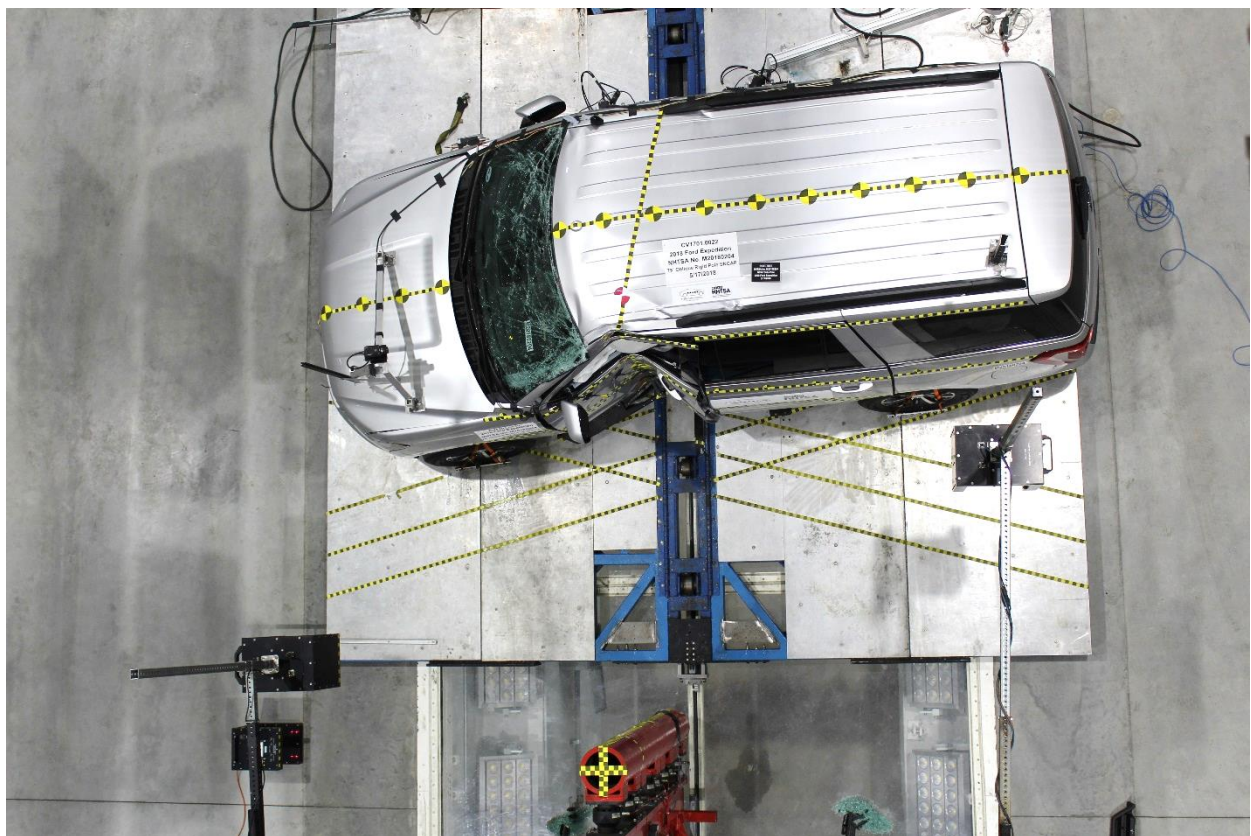


Figure A-16: Post-Test Overhead View of Test Area



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

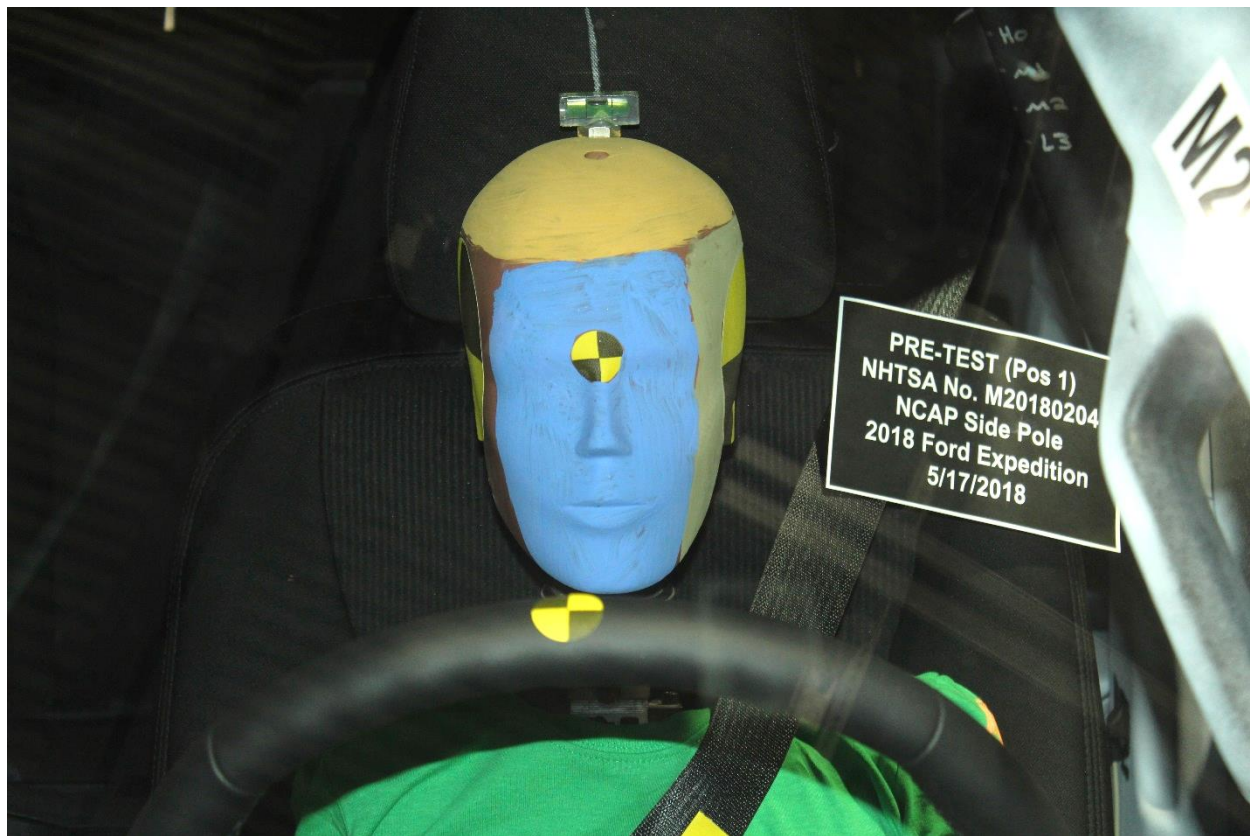


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint

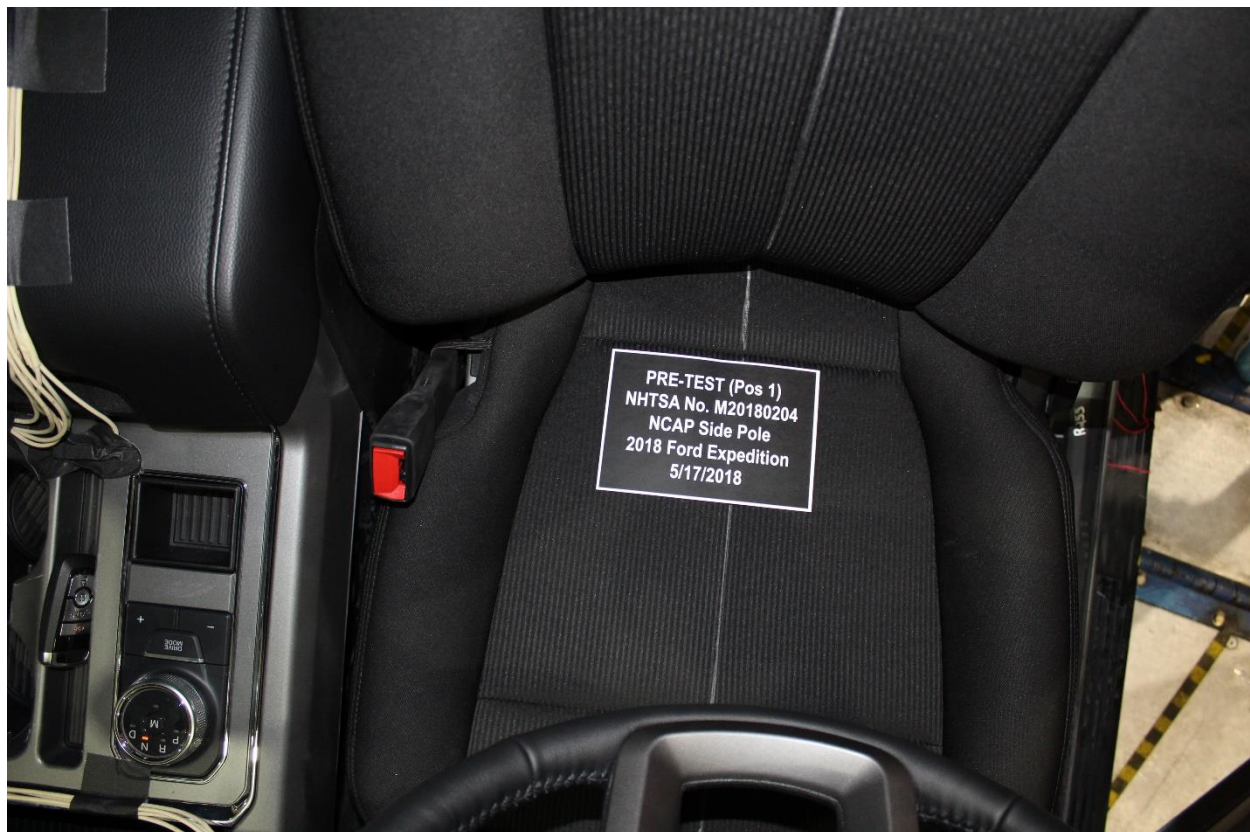


Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



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

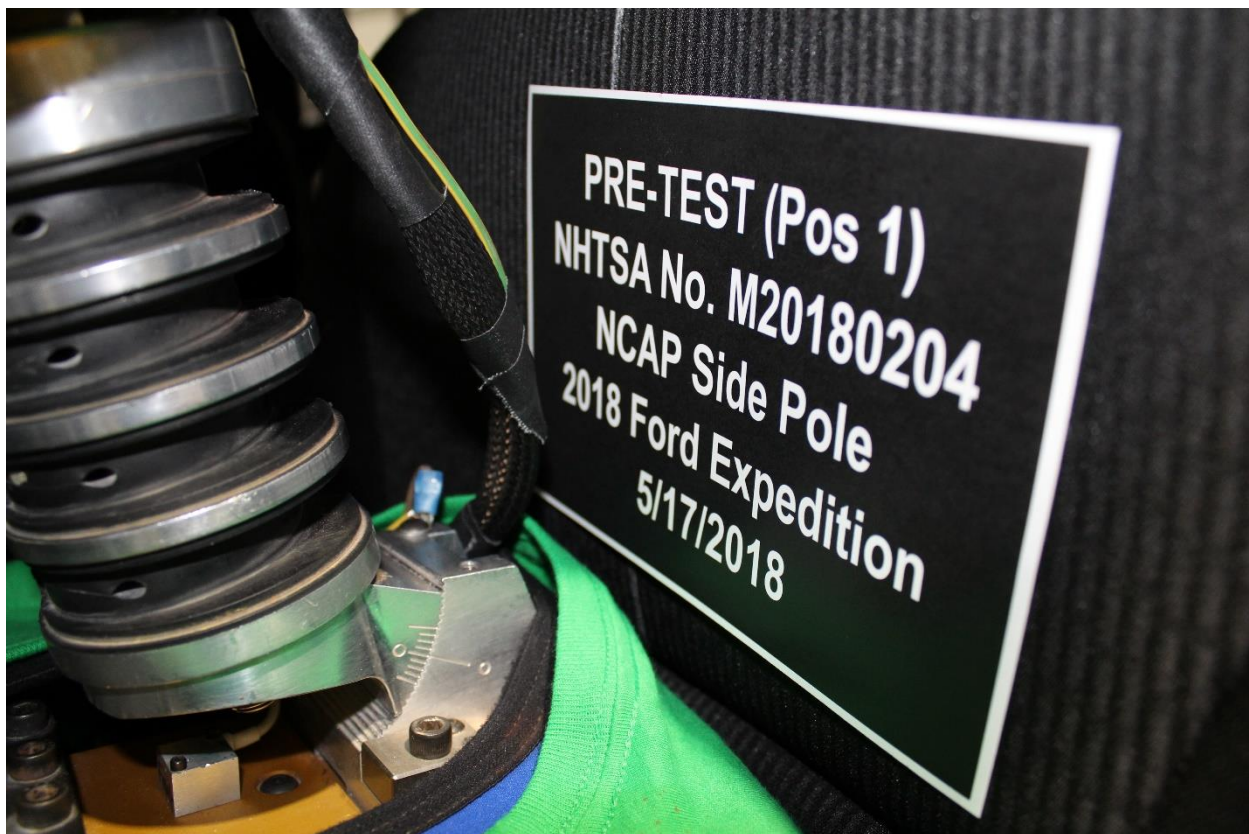


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket

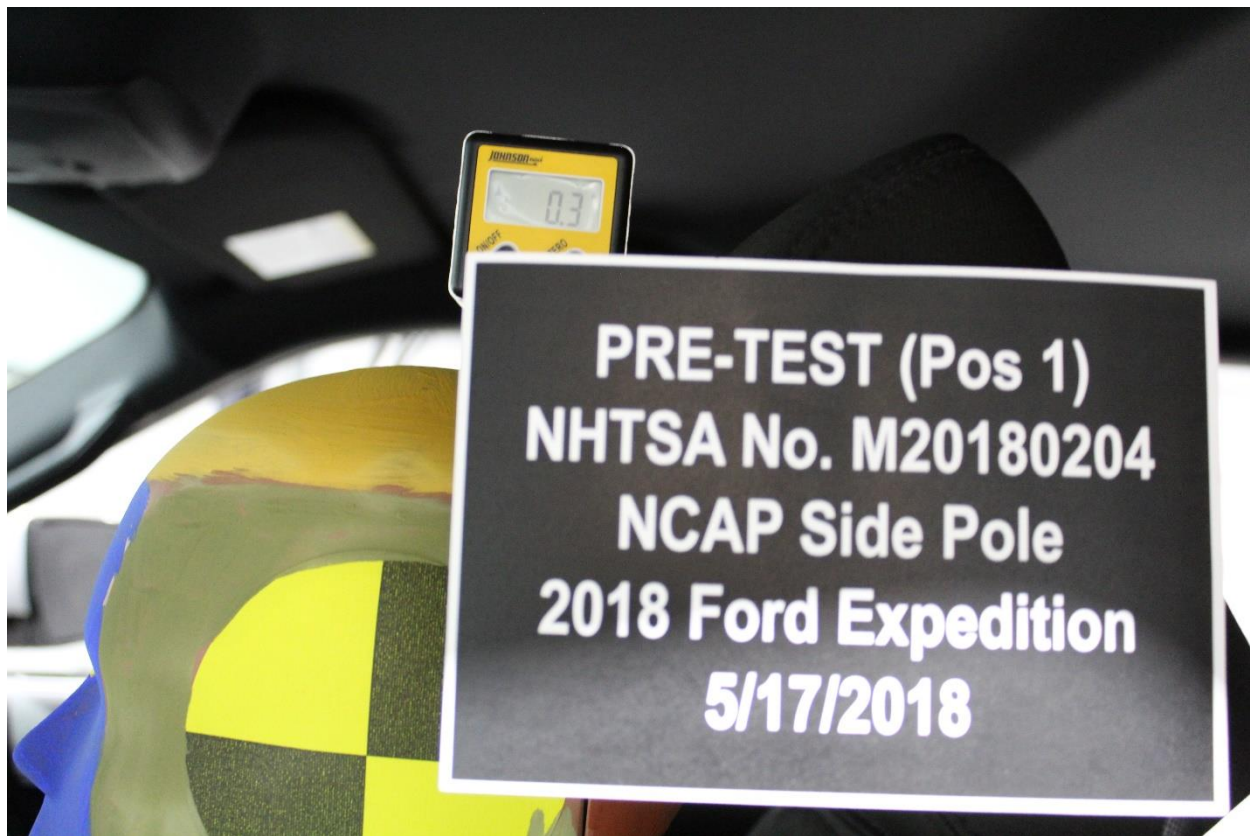


Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



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

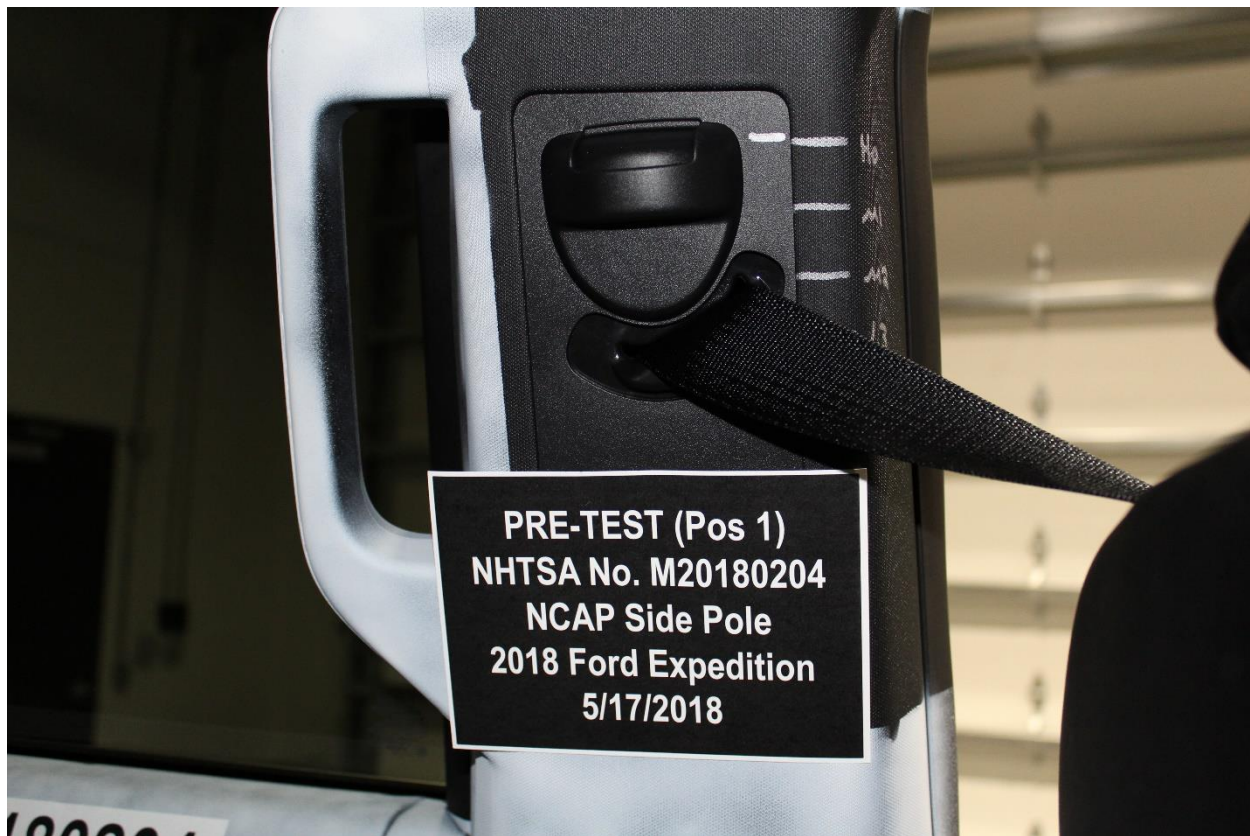


Figure A-33: Pre-Test View of Belt Anchorage for Dummy



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

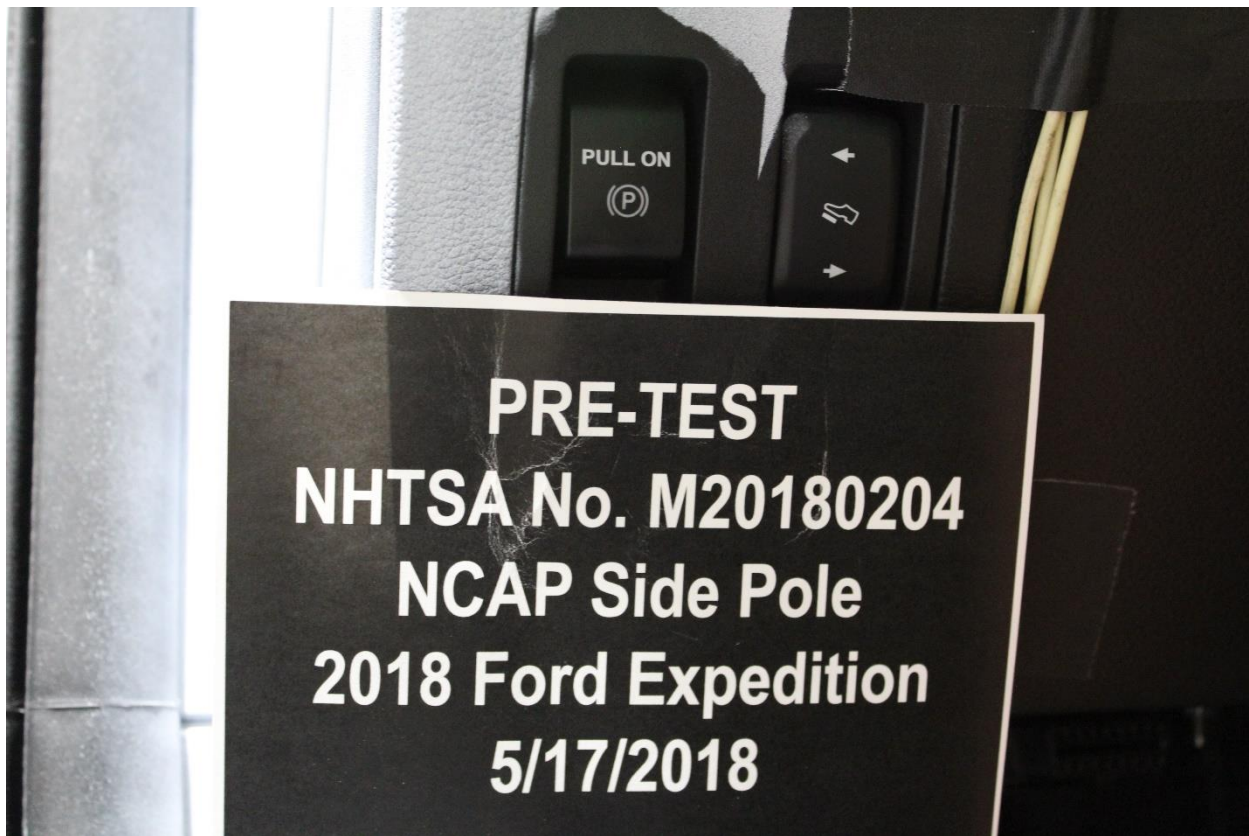


Figure A-35: Pre-Test View of Disengaged Parking Brake



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

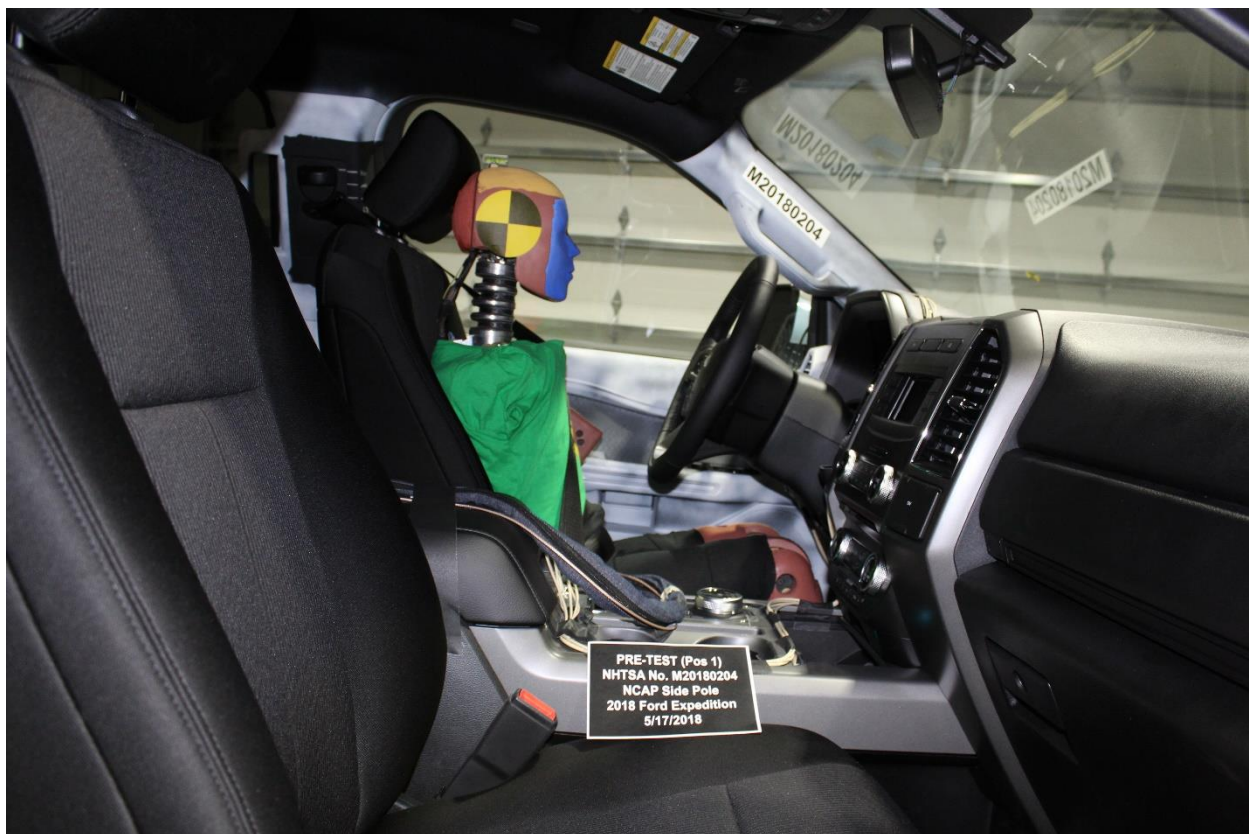


Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



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

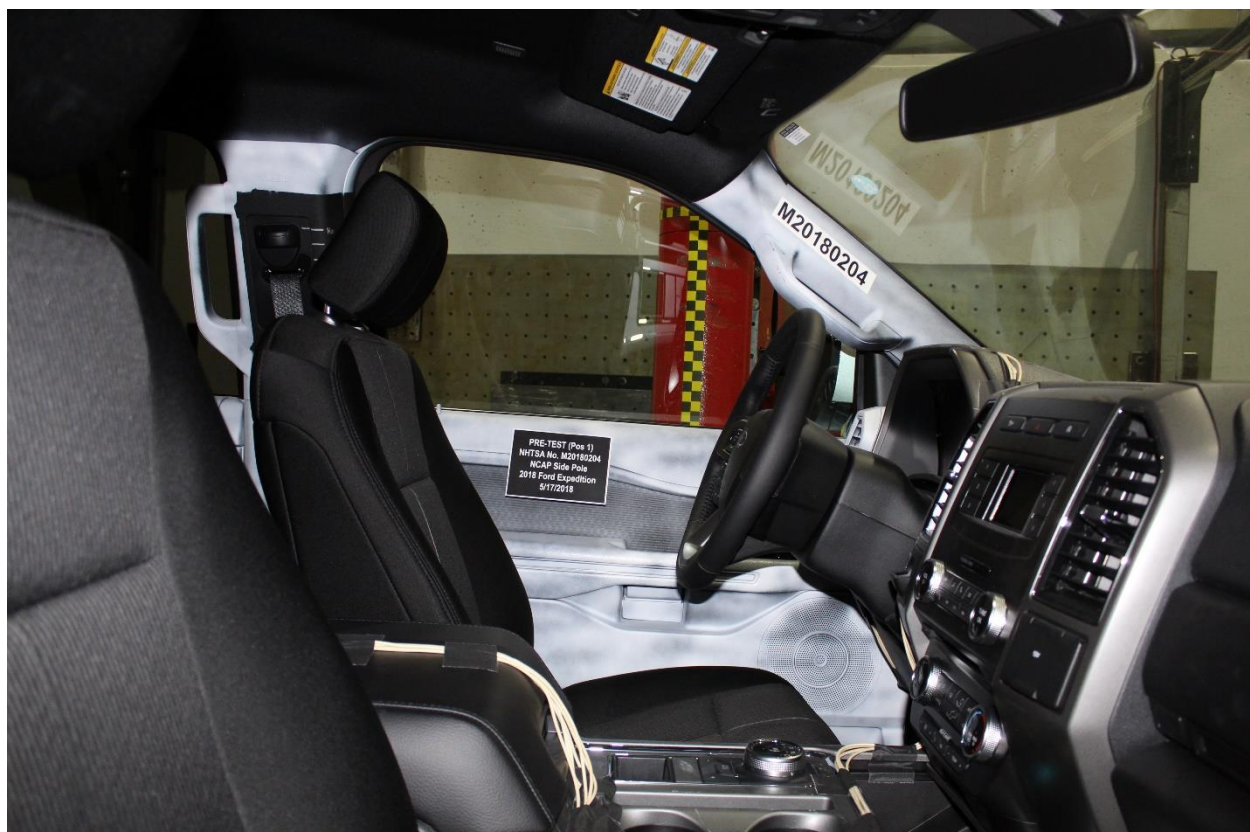


Figure A-44: Pre-Test Inner Door Panel View



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

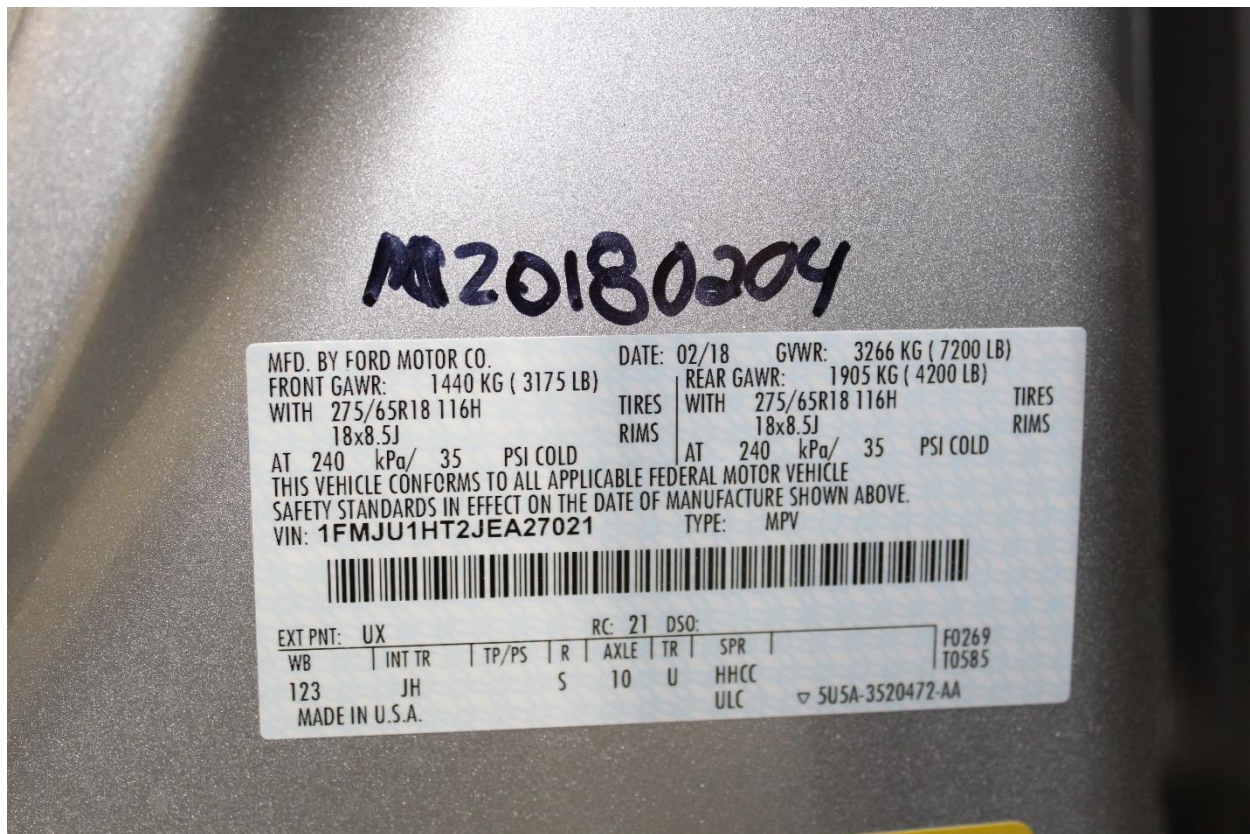


Figure A-55: Close-Up View of Vehicle's Certification Label

Photo Not Applicable

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

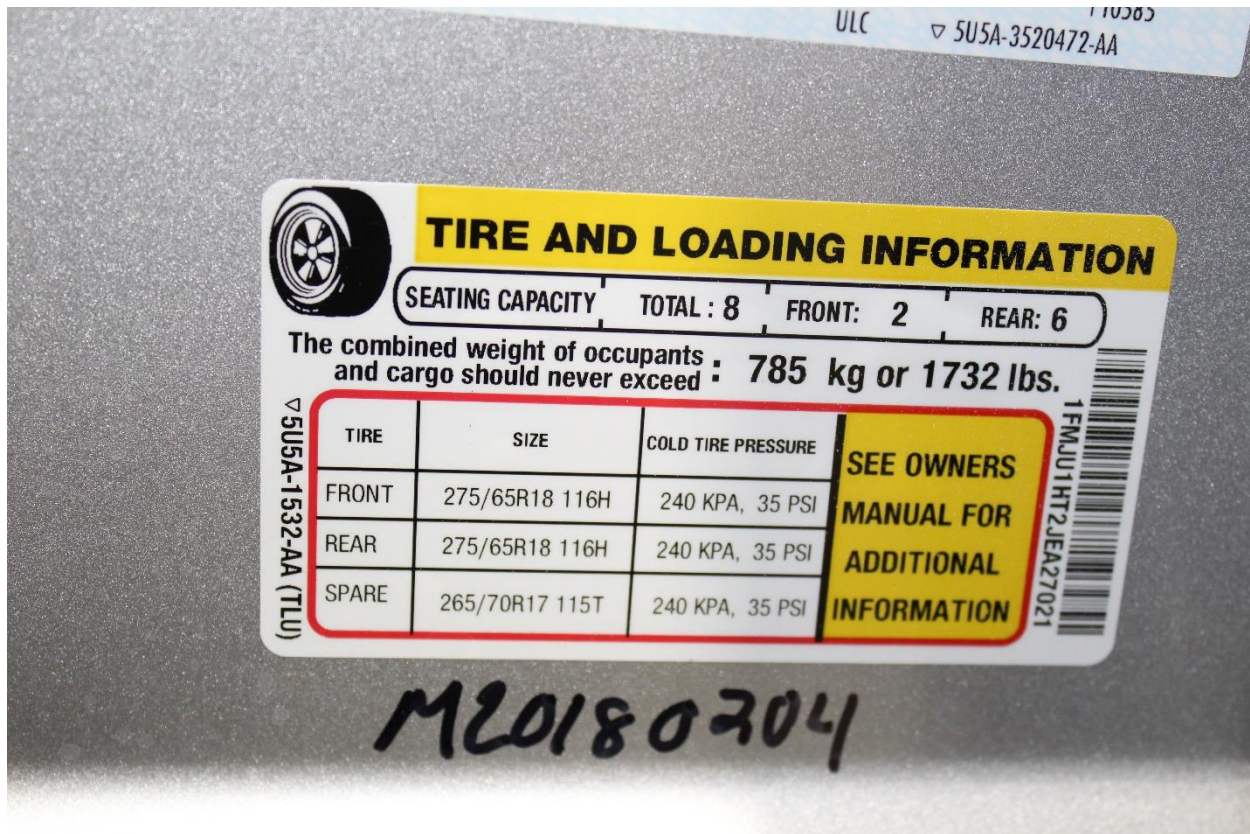


Figure A-56: Close-Up View of Vehicle's Tire Information Placard or Label



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

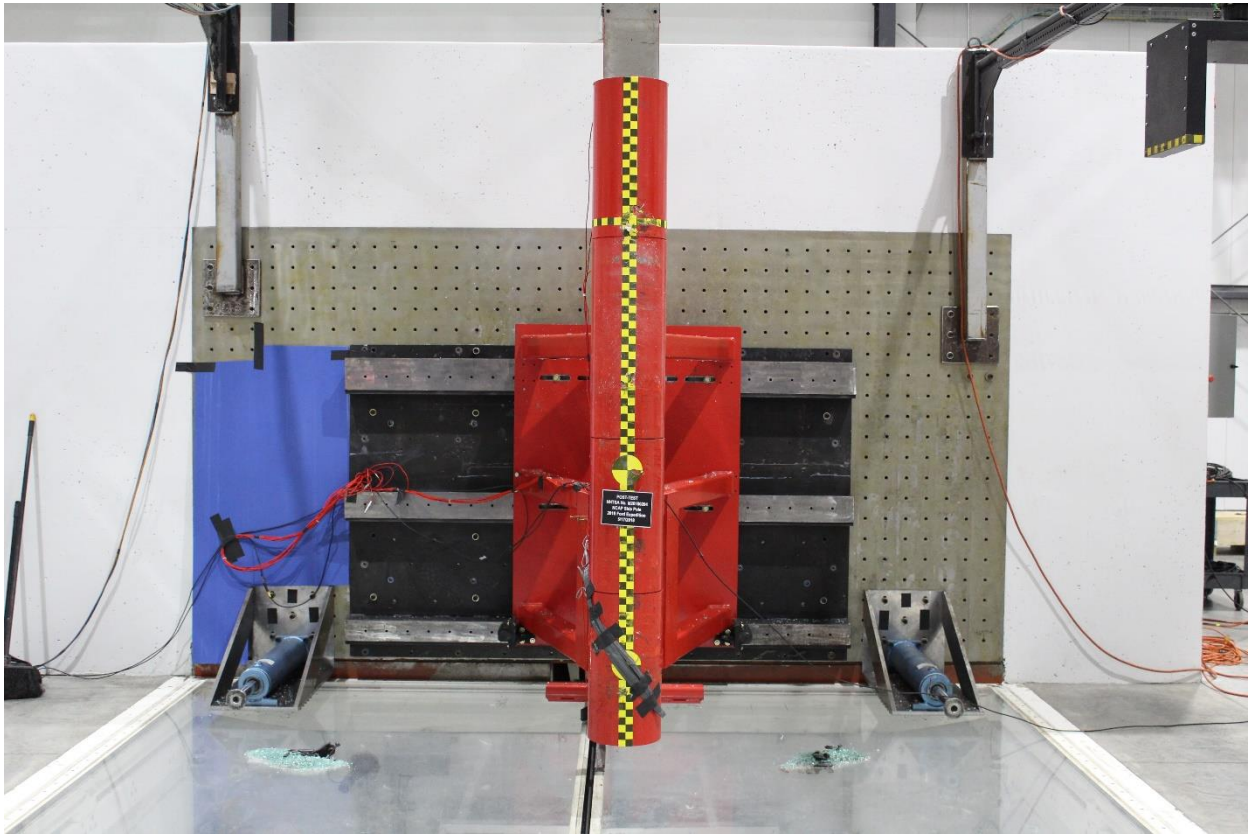


Figure A-58: Post-Test Pole Barrier Front View

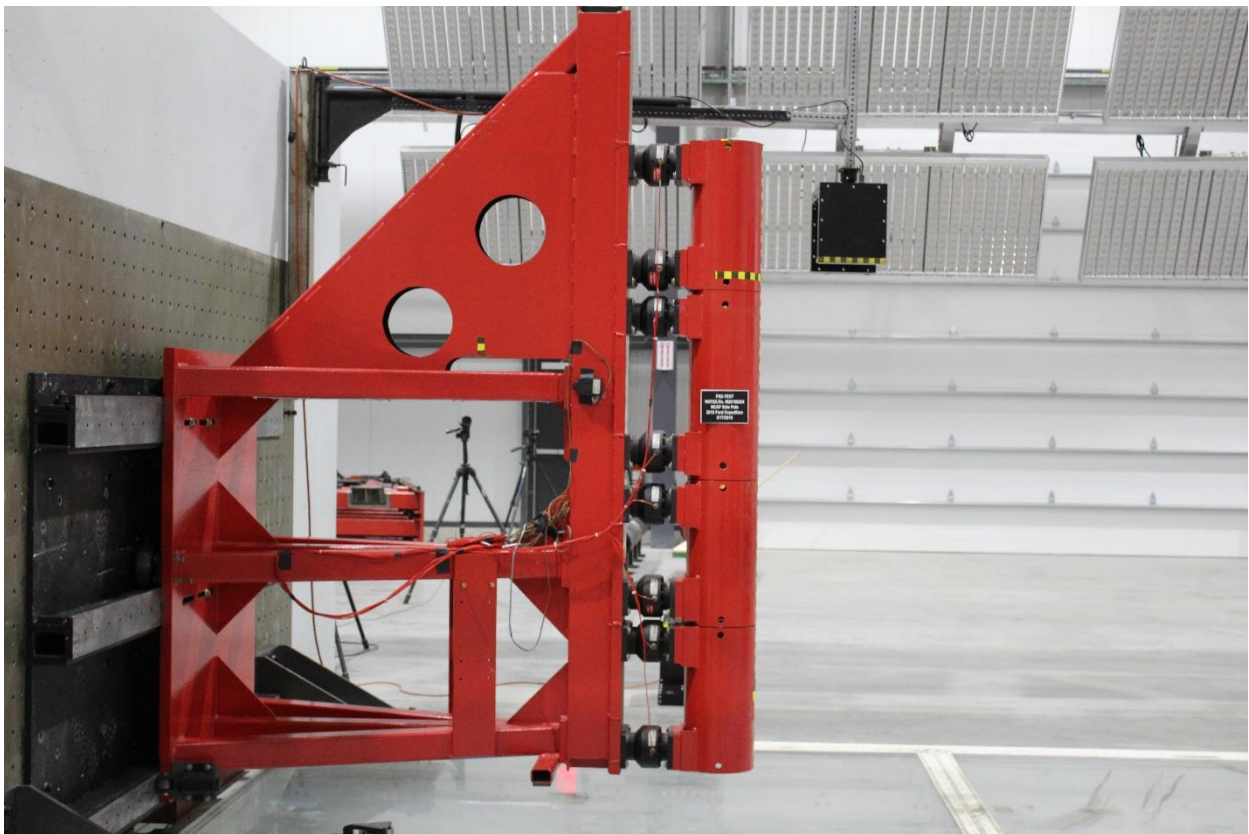


Figure A-59: Pre-Test Pole Barrier Side View

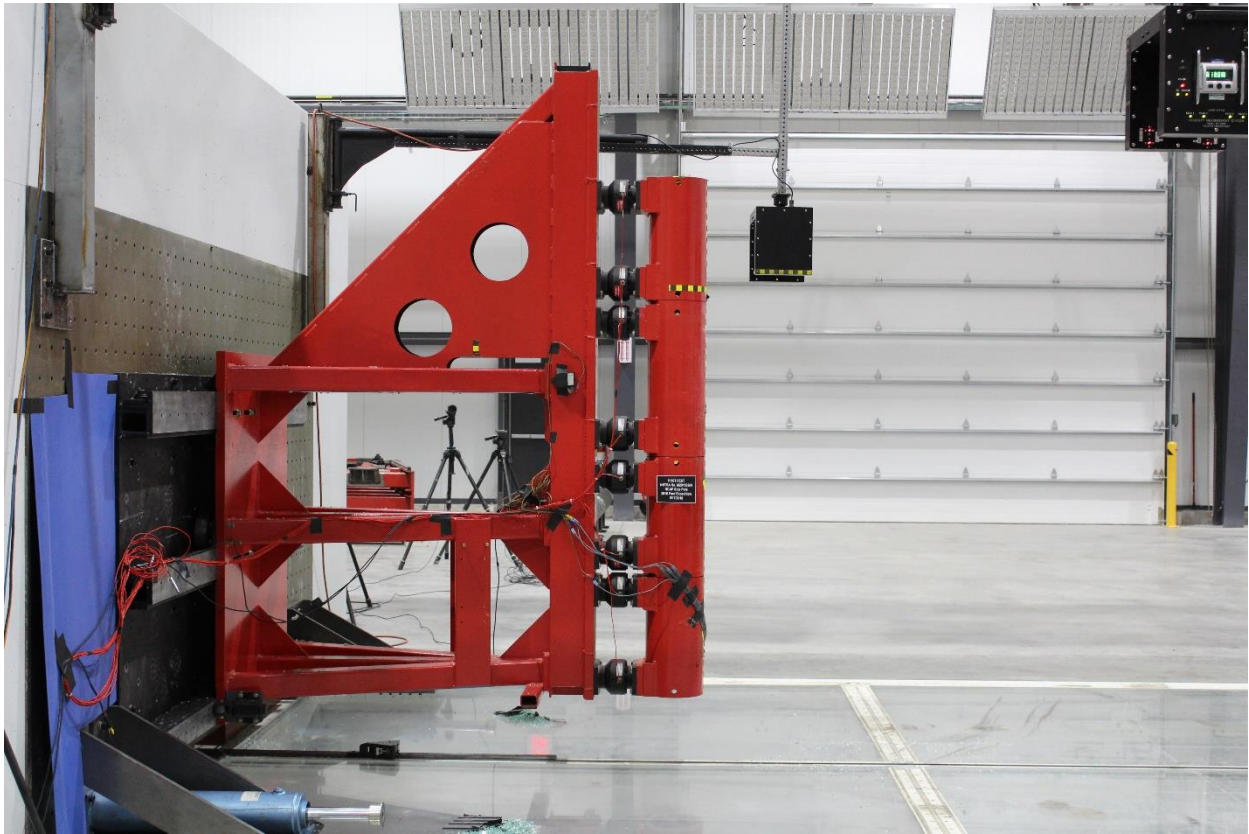


Figure A-60: Post-Test Pole Barrier Side View

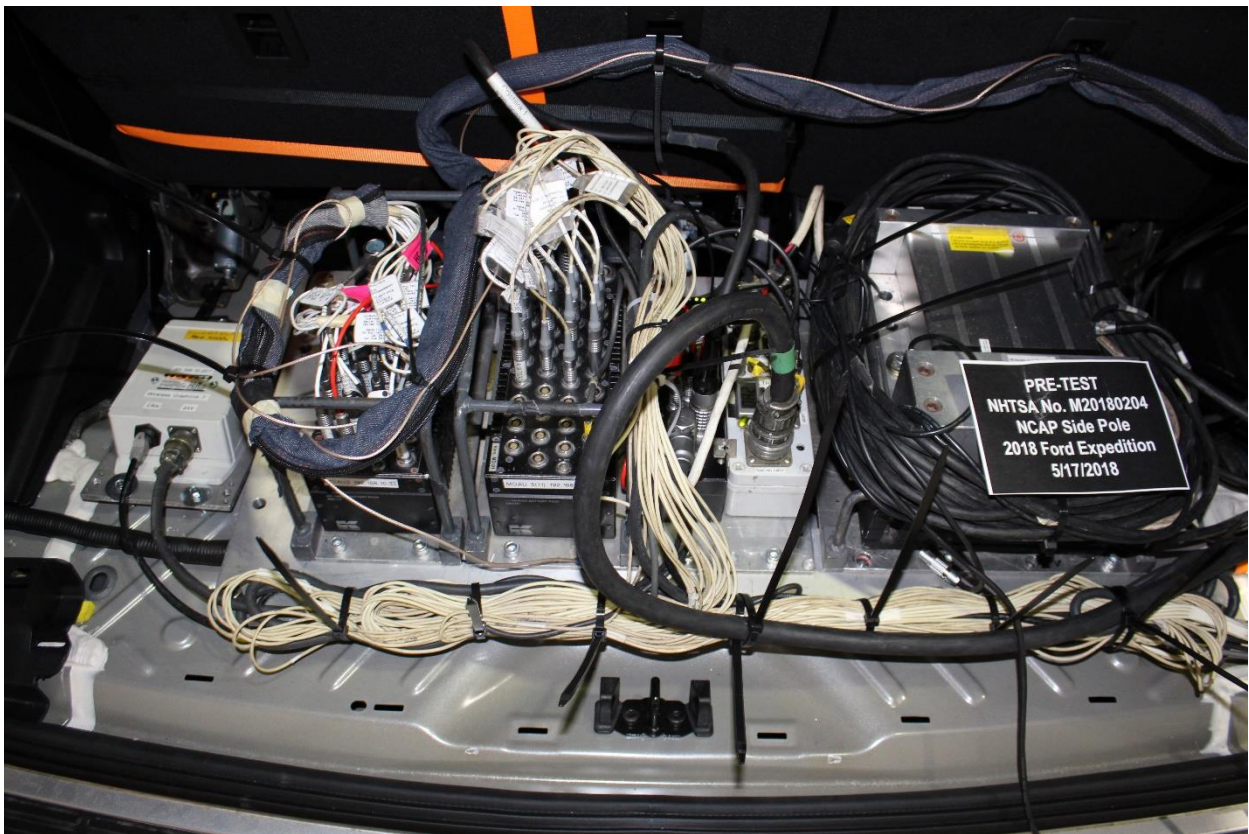


Figure A-61: Pre-Test Ballast View



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

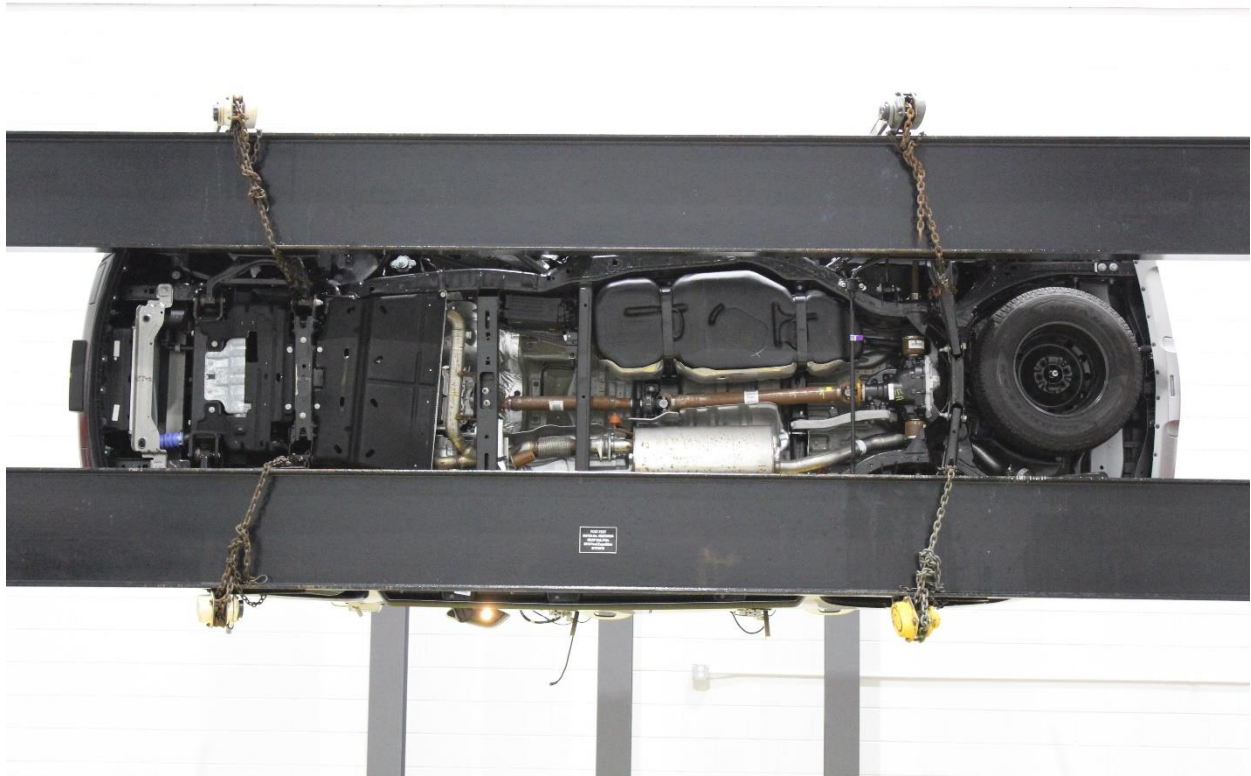


Figure A-66: FMVSS No. 301 Static Rollover 270 Degrees



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



Figure A-68: Impact Event

VEHICLE DESCRIPTION		JE A27021		EPA DOT Fuel Economy and Environment		Gasoline Vehicle									
EXPEDITION 2018 EXPEDITION XLT 4X2 XLT 8-PASSENGER 3.5L ECOBOOST V6 ENGINE 10SPD AUTO TRANS W/SLT/SHIFT		EXTERIOR INGO SILVER METALLIC INTERIOR EBONY CLOTH BUCKET		Fuel Economy 20 MPG combined city/hwy 17 city 24 highway 5.0 gallons per 100 miles		You spend \$2,250 more in fuel costs over 5 years compared to the average new vehicle.									
STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE				Annual fuel cost \$1,800 Fuel Economy & Greenhouse Gas Rating (EPA only) Smog Rating (EPA only)											
EXTERIOR • EASY FUEL CAPLESS FILLER • FOG LAMPS • GRILLE - 5 BAR CHROME • HEADLAMPS - AUTO HALOGEN • HEADLAMPS - WIPER ACTIVATED • INTEGRATED BLIND SPOT MIRR • LIFTGATE W/ LIFTGLASS • MIRRORS - MAN-FOLD DUAL PWR • HEATED W/ APPROACH LAMP • PRIVACY GLASS - REAR DOORS • REAR WIPER/WASHER/DEFROST • ROOF RACK SIDE RAILS • RUNNING BOARDS • WINDSHIELD WIPER DE-ICER				INTERIOR • 1 TOUCH UP/DOWN DR/PASS WIN • 2ND ROW BENCH SEAT • 3RD ROW 80/20 SPLIT BENCH • CARGO BIN • CENTER CONSOLE W/ARMREST • CLOTH BUCKET FRONT SEATS • DUAL ILLUM VIS VANITY MIRR • LEATHER WRAPPED STR WHEEL • W/CRUISE AND AUDIO CONTR • MANUAL A/C, SINGLE ZONE • PEDALS - POWER ADJUSTABLE • POWER DRIV SEAT - 6-WAY • ROTARY GEAR SHIFT DIAL • SMART CHARGING USB PORT(3) • TILT/TELESCOPE STR COLUMN				FUNCTIONAL • 4.2" LCD CTR STACK SCREEN • AM/FM/SINGLE CD/MP3/6SPKR • AUTO START STOP TECH • BRAKES, 4-WHEEL DISC/ABS • CARGO PROTECTOR • CLASS IV TRAILER TOW PKG • FRONT/REAR INO SUSPENSION • HILL START ASSIST • POWER STEERING W/EPAS • PUSH-BUTTON START • REAR VIEW CAMERA • REVERSE SENSING SYSTEM • SELECTSHIFT • SIRIUSXM® - SVC N/A AKAH • SYNC® WITH APPLE/AND				SAFETY/SECURITY • ADVANCETRAC WITH RSC • AIRBAGS - DUAL STAGE FRONT • AIRBAGS - SAFETY CANOPY • SIDE CURTAIN • AIRBAGS - SIDE IMPACT • PRE-PASS SENSING SYSTEM • INDIV TIRE PRESS MONIT SYS • LATCH CHILD SAFETY SYSTEM • PERIMETER ALARM • SECURILOCK PASS ANTI THEFT • SOS POST CRASH ALERT SYS			
INCLUDED ON THIS VEHICLE EQUIPMENT GROUP 200A 18" MACH ALUM WHL W/PTND PKTS 273/65R18 ABS BW THRS 50 STATE EMISSIONS CARGO MAT-REVERSIBLE FRONT LICENSE PLATE BRACKET				PRICE INFORMATION BASE PRICE \$51,695.00 TOTAL OPTIONS/OTHER 40.00 TOTAL VEHICLE & OPTIONS/OTHER \$51,735.00 DESTINATION & DELIVERY 1,195.00 TOTAL MSRP \$52,930.00				GOVERNMENT 5-STAR SAFETY RATINGS Overall Vehicle Score Not Rated Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight. Frontal Crash Driver Not Rated, Passenger Not Rated Side Crash Front seat Not Rated, Rear seat Not Rated Rollover Not Rated 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							
SOLD TO: O.C. Welch Ford Lincoln, Inc. 4020 Independence Boulevard Hardeeville SC 29527		21C 246 RAMP ONE RA4F		DEALER NO. 21C 246		TOTAL MSRP \$52,930.00									
SHIP TO (IF VEHICLE IS SOLD TO) O.C. Welch Ford Lincoln, Inc. 4020 Independence Boulevard Hardeeville SC 29527		RAMP TWO FINAL ASSEMBLY PLANT KENTUCKY		ITEM #: 21-5002 Q/T 2		This label is affixed pursuant to the Federal Automobile Information Disclosure Act. Gasoline, License, and Title Fees, State and Local taxes are not included. Dealer installed options or accessories are not included unless listed above.									
SHIP THROUGH RAIL		METHOD OF TRANS. RAIL		J8021 N RB 2X 820 000935 02 02 18		Ford FORD PROTECT FORD CREDIT									

Figure A-69: Monroney Label

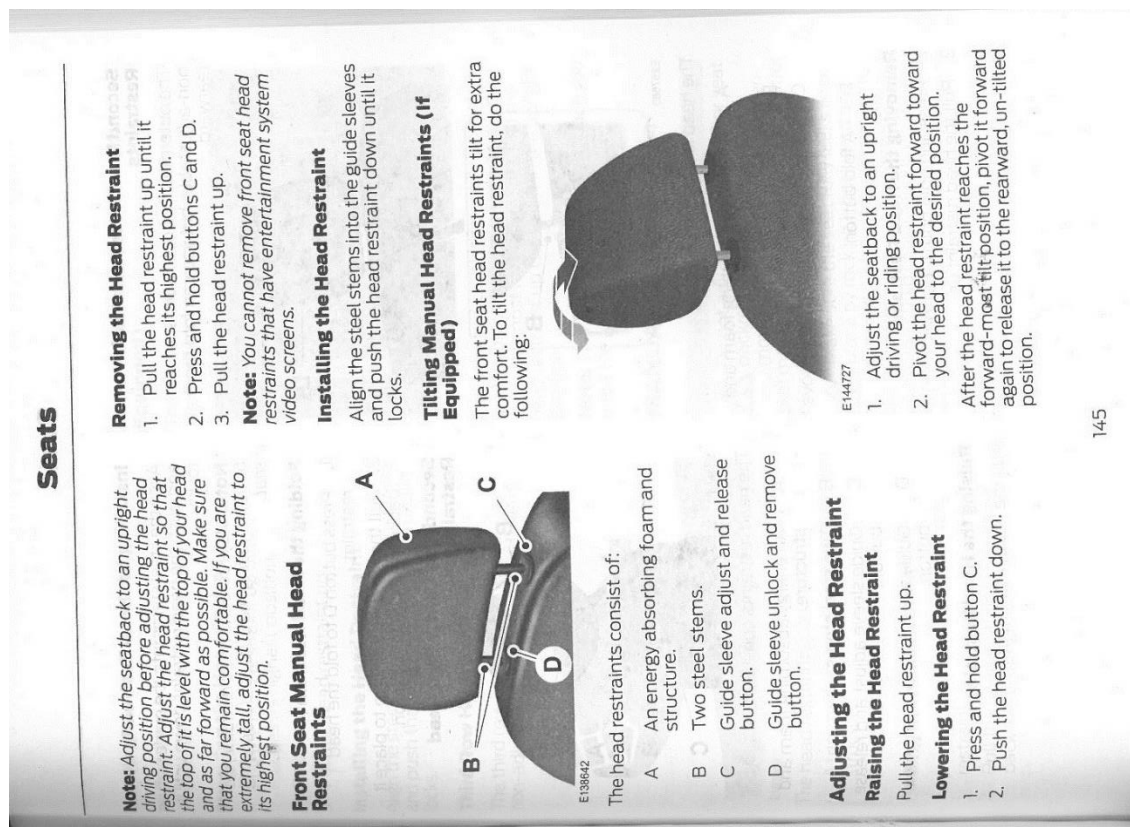


Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



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

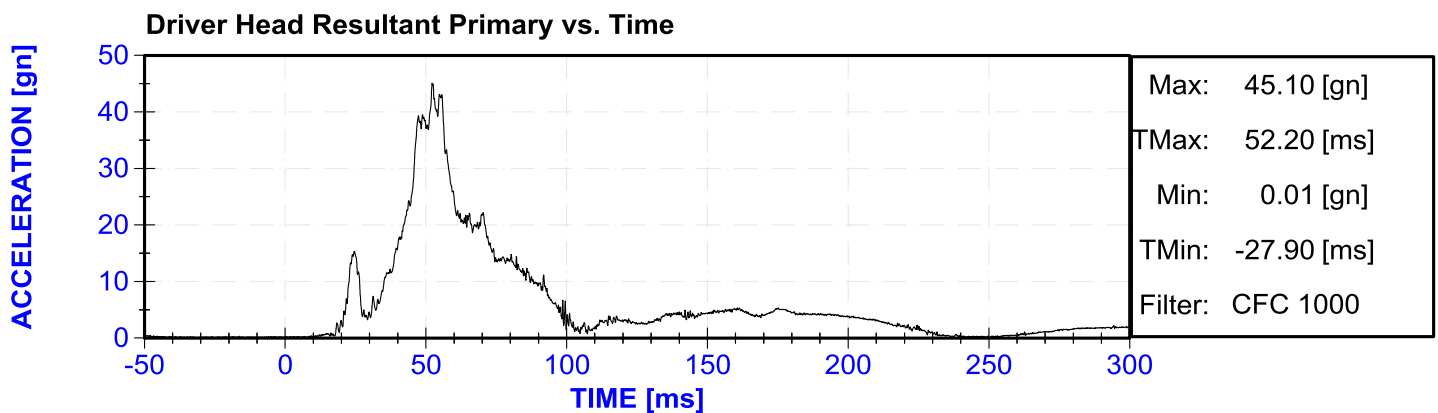
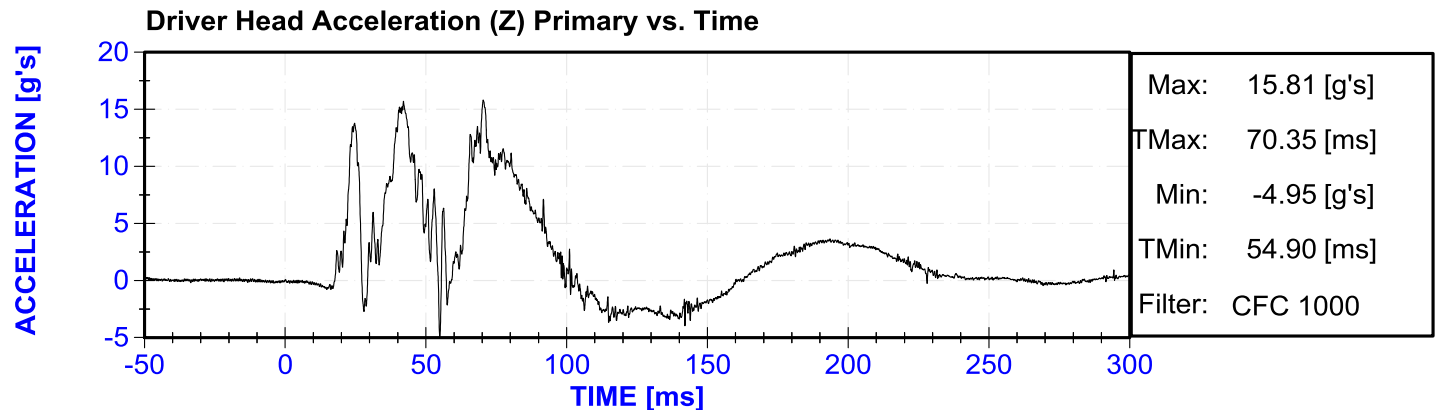
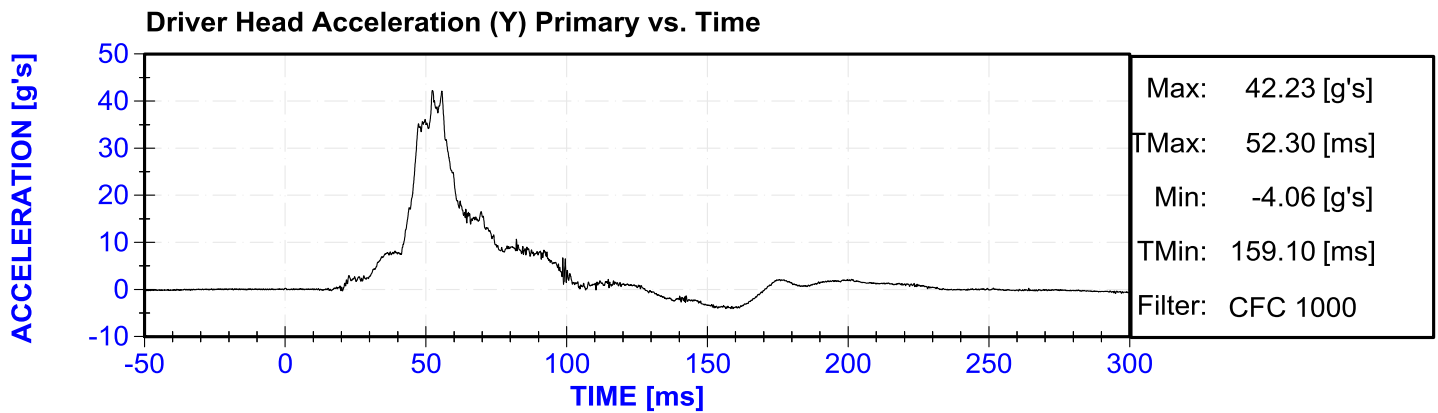
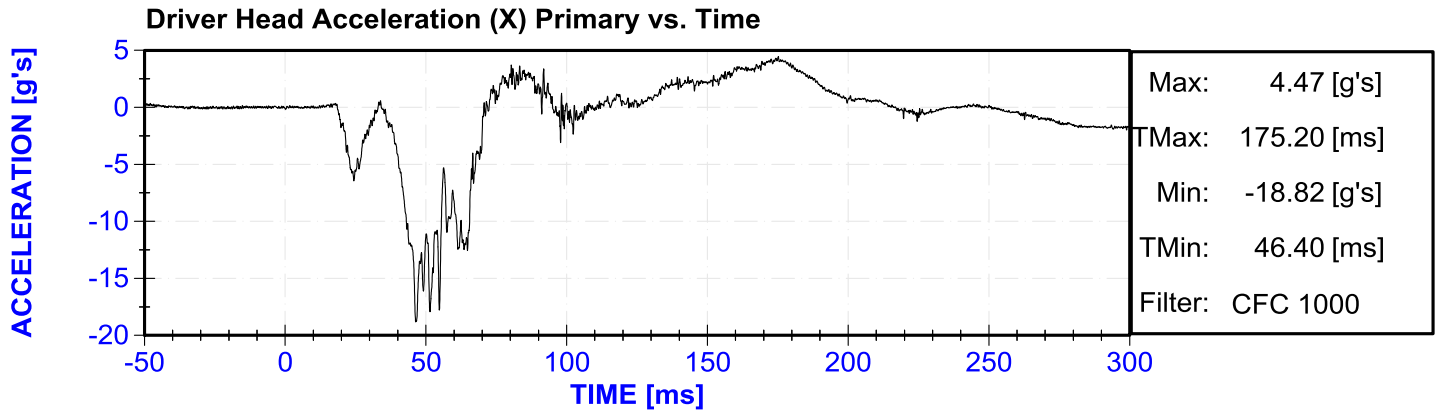
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

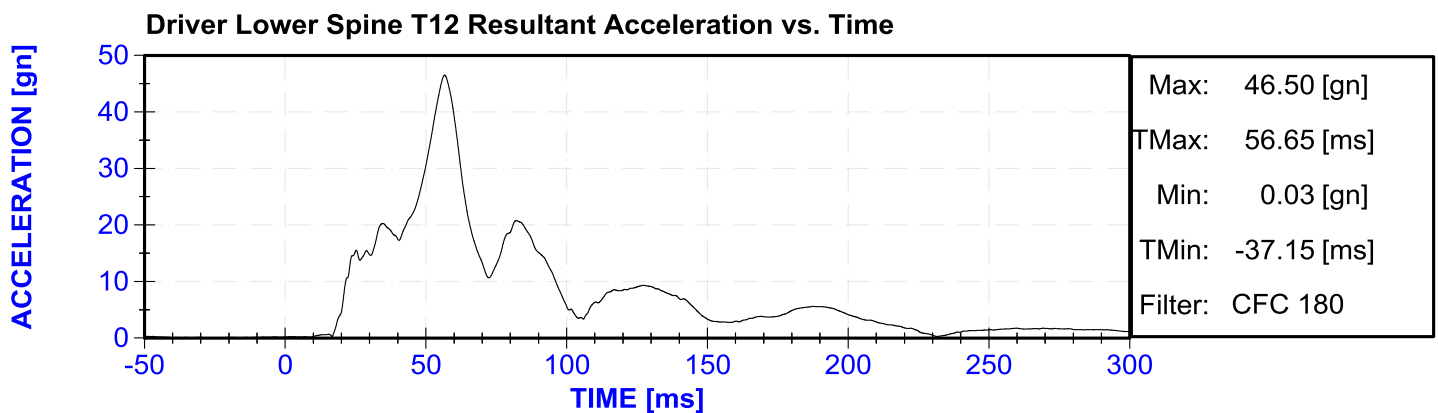
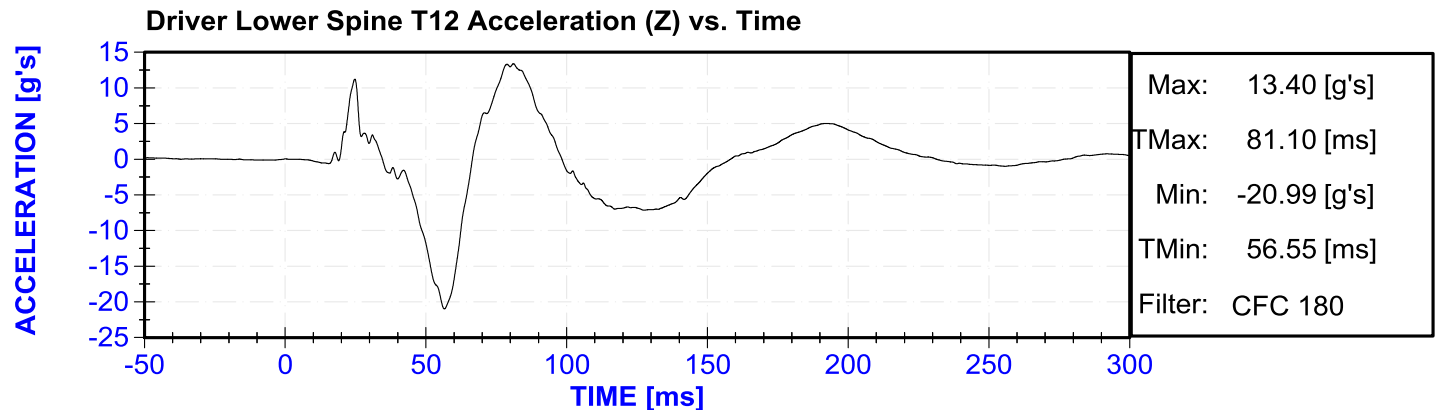
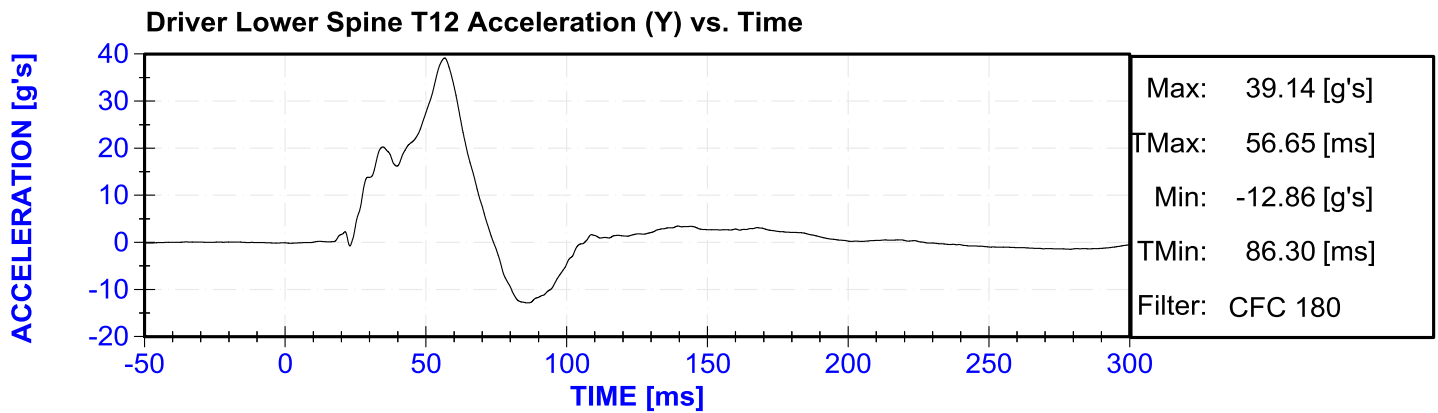
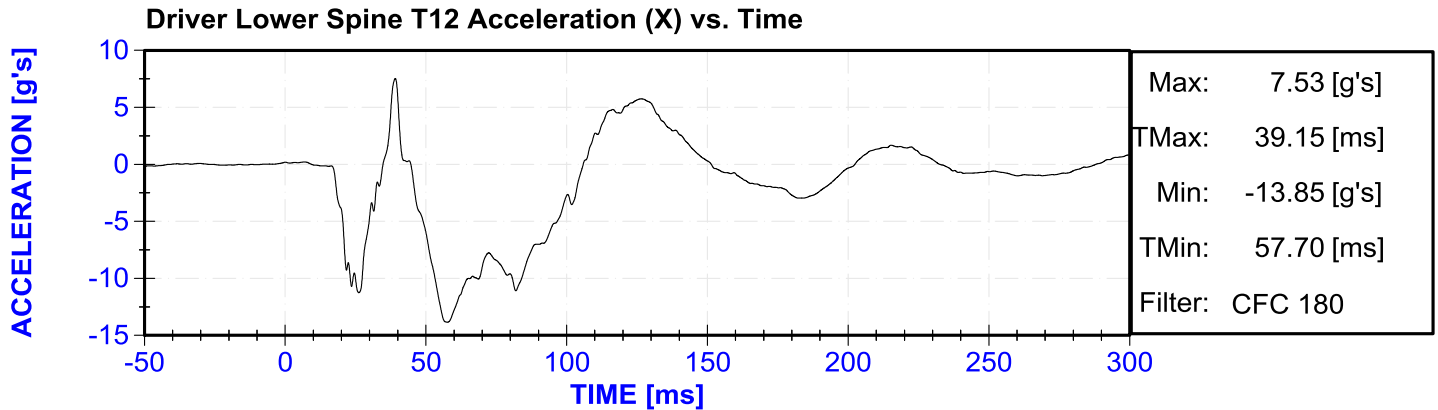
Vehicle Instrumentation Data

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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)

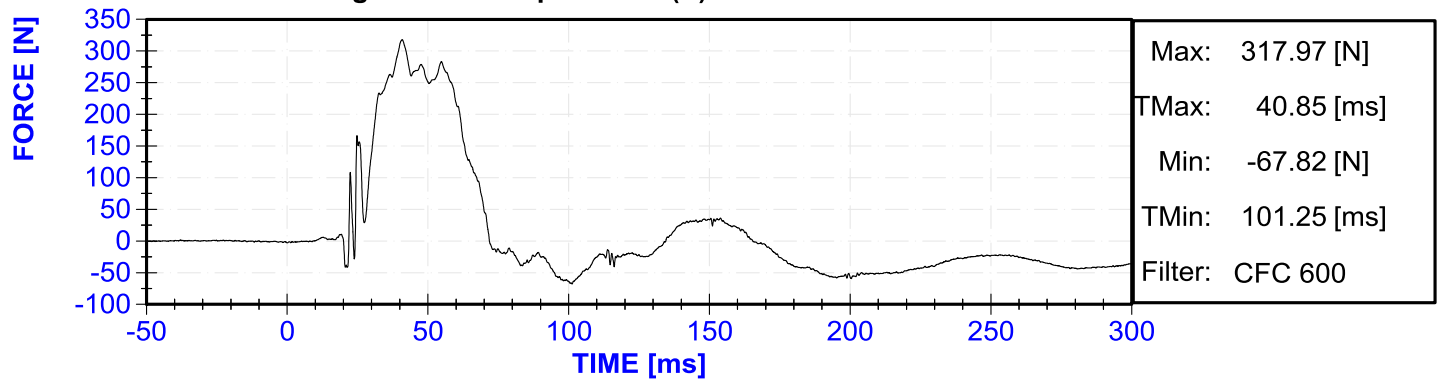
Pole Instrumentation Data

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)

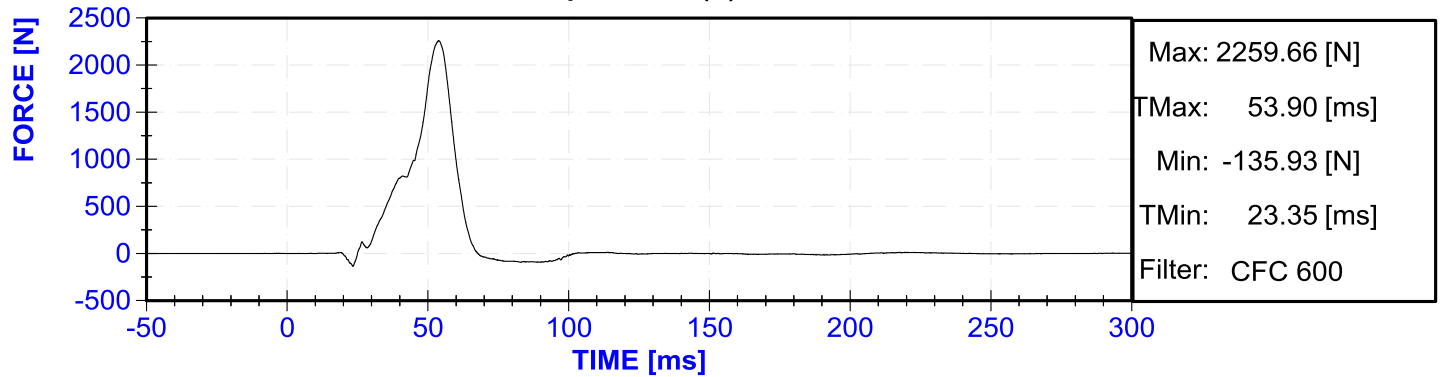




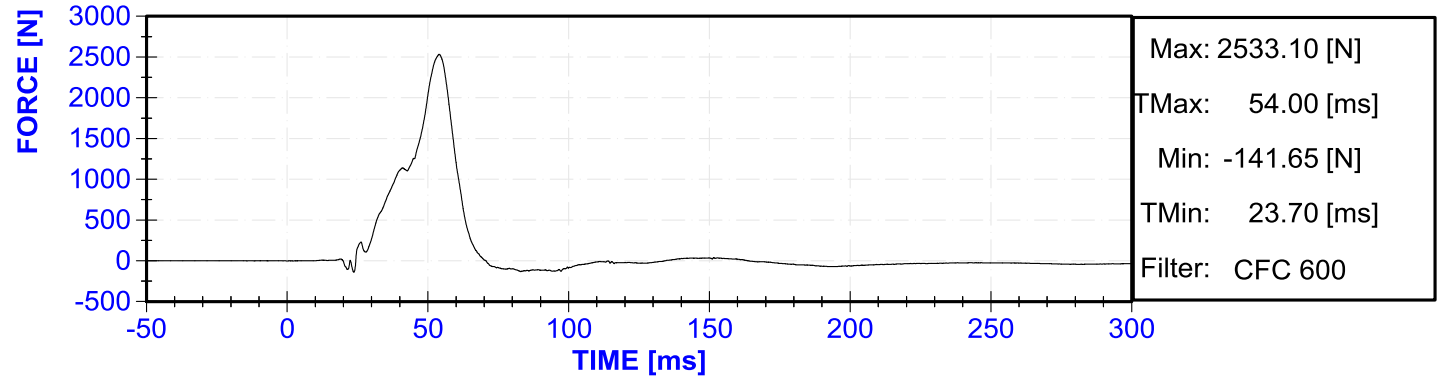
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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)

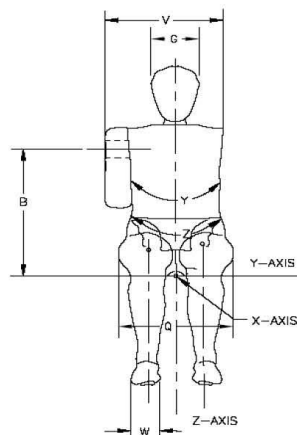
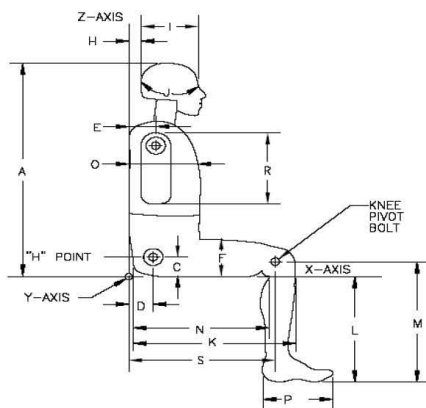


External Measurements - SID-IIs

Technician: K. Brogan

Date: 5/11/2018

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	145	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	129	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	353	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	206	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	349	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	864	Pass
Z	Waist Circumference	761	791	771	Pass

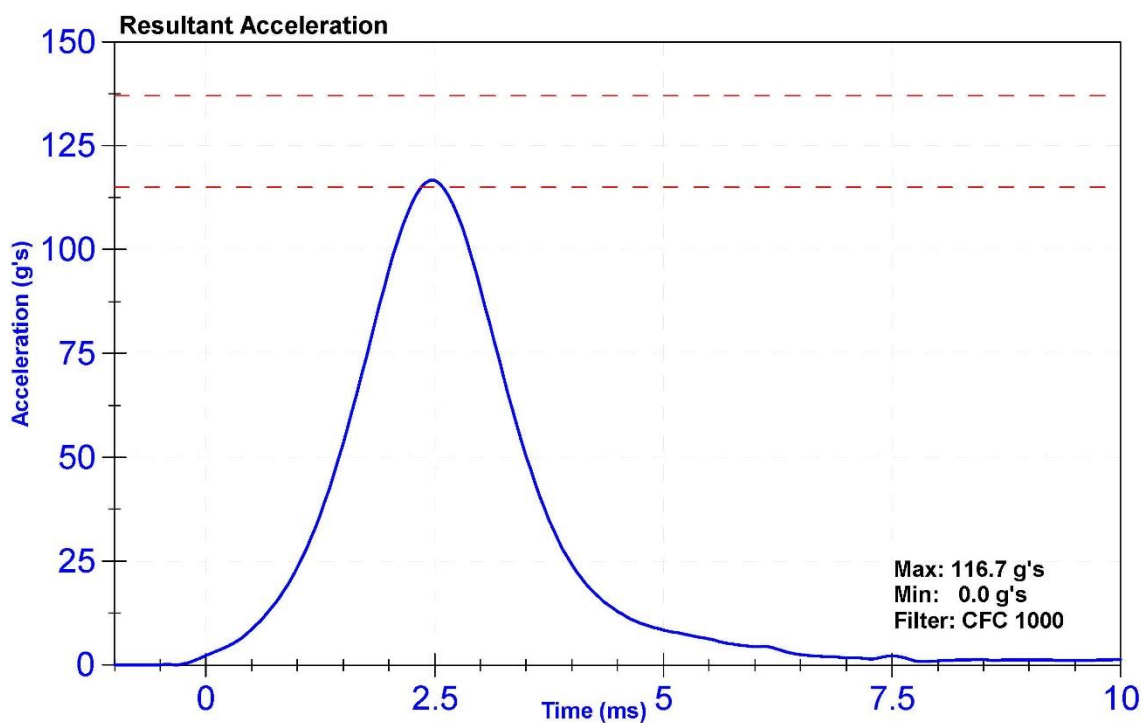
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ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

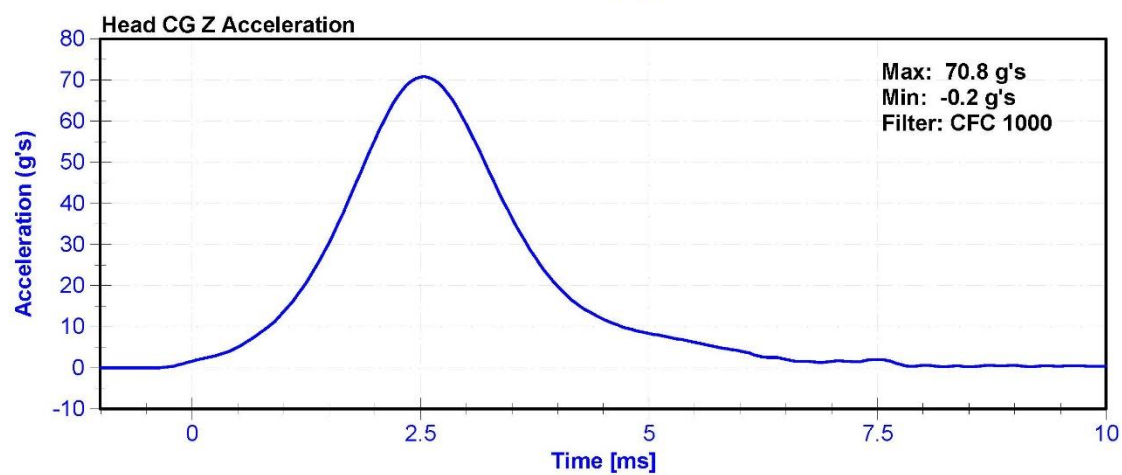
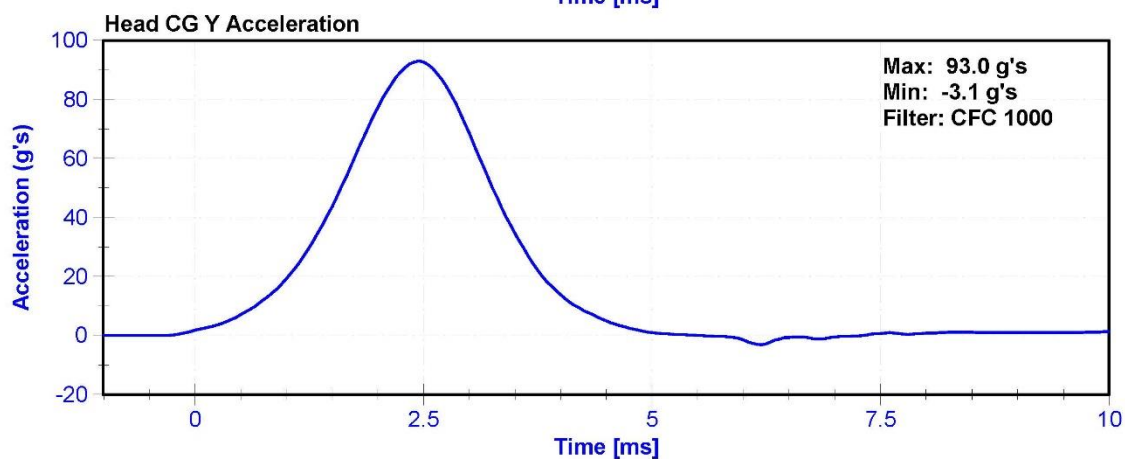
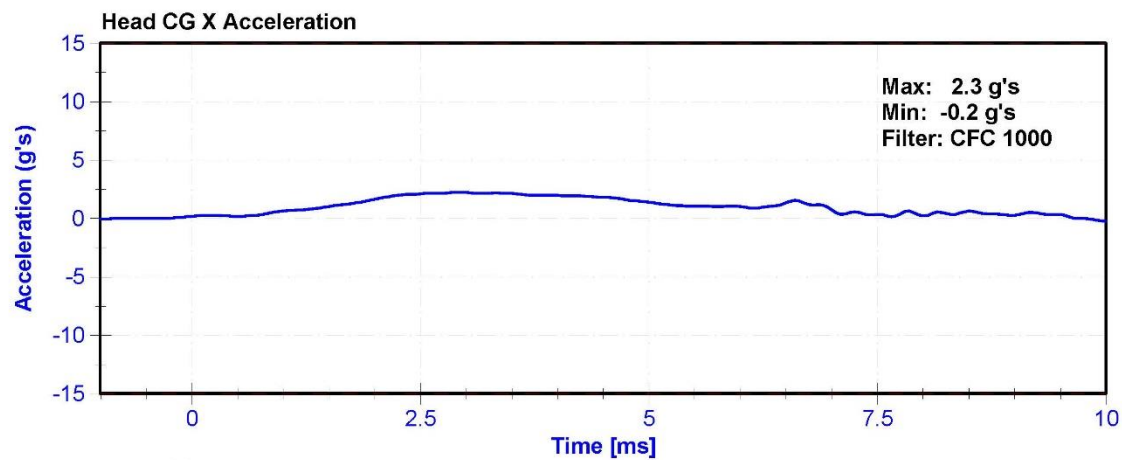
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	54.1	Pass
Resultant Acceleration	115	137	g's	116.7	Pass
Oscillation	0	15	%	3.8	Pass
Fore-Aft Acceleration	-15	15	g's	2.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	5/4/2018	11/2/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	5/4/2018	11/2/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	5/4/2018	11/2/2018





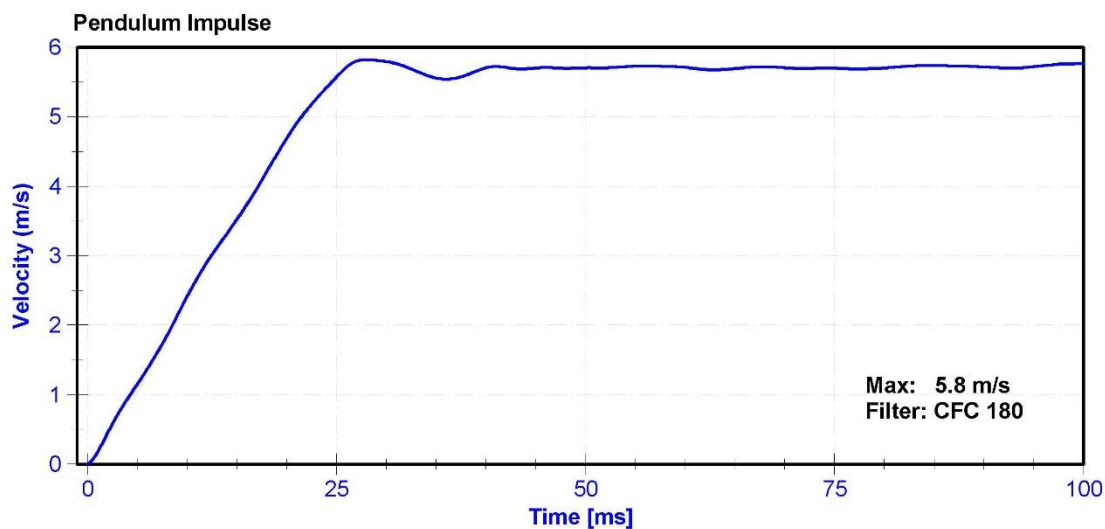
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ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

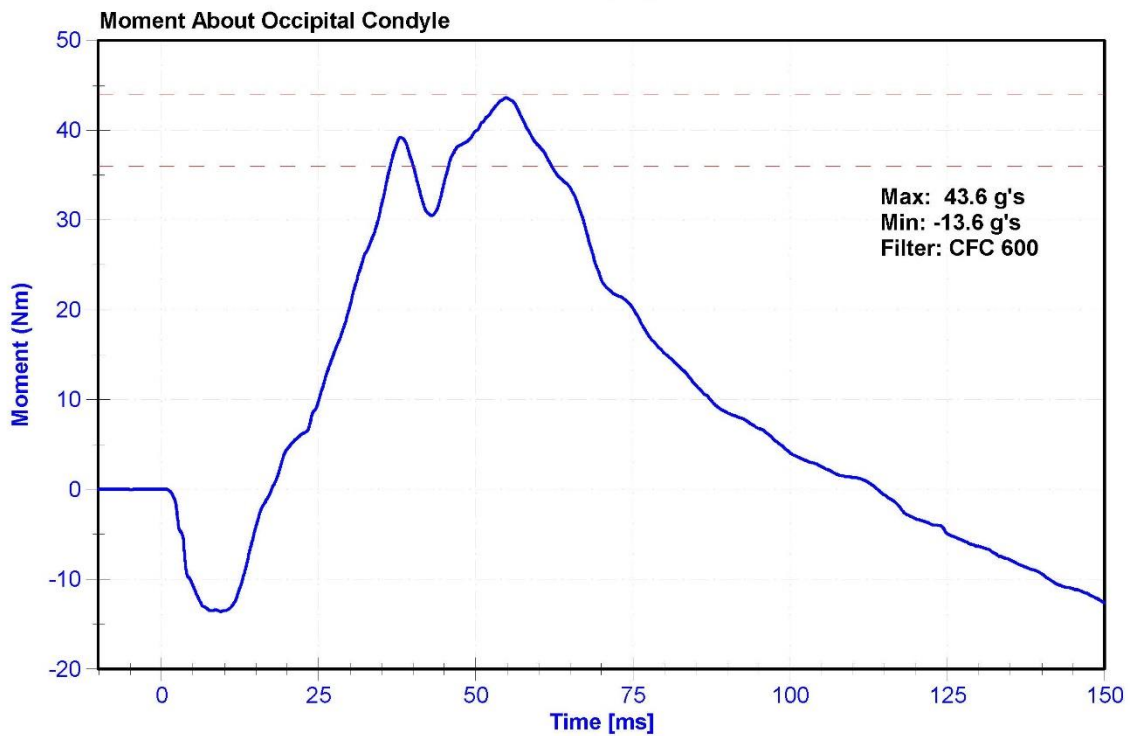
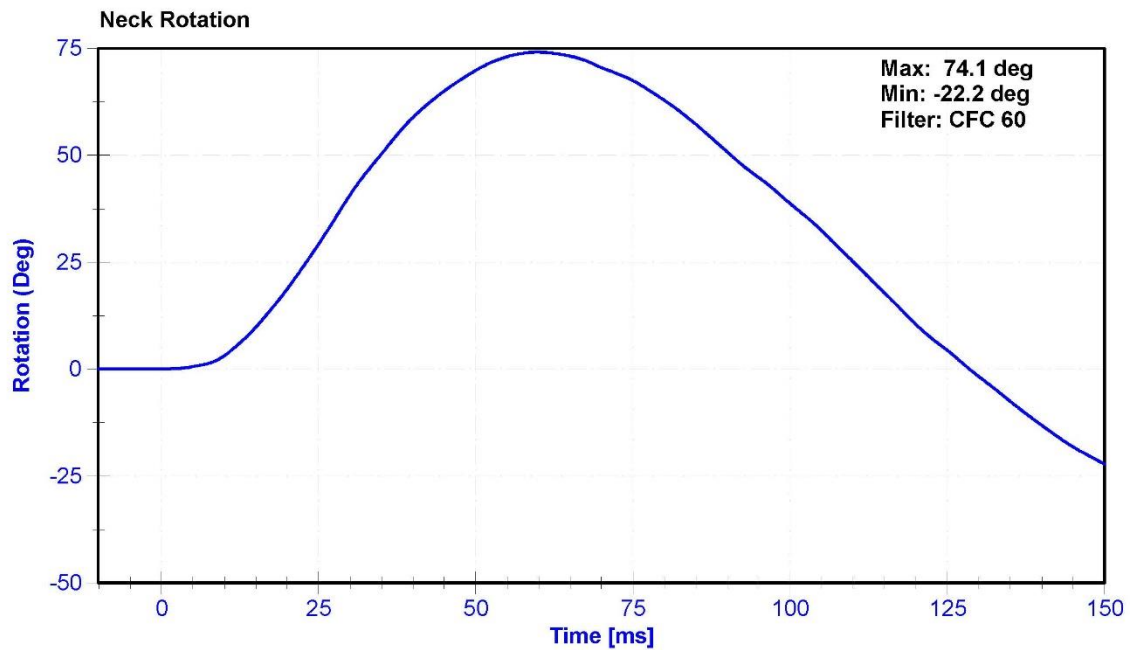
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	36.7	Pass
Velocity	5.51	5.63	m/s	5.546	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.41	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.53	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.69	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.58	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.82	Pass
Neck Rotation	71	81	deg	74.1	Pass
Time at Maximum Rotation	50	70	ms	59.8	Pass
Moment about the OC	36	44	Nm	43.6	Pass
Moment Decay to 0 Nm	102	126	ms	114.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	10/27/2017	10/27/2018
Condyle Potentiometer	Denton 78051-342	DS-185Pend	10/27/2017	10/27/2018
Upper Neck Load Cell	Denton 1716	LC-1872 FY	7/26/2017	7/26/2018





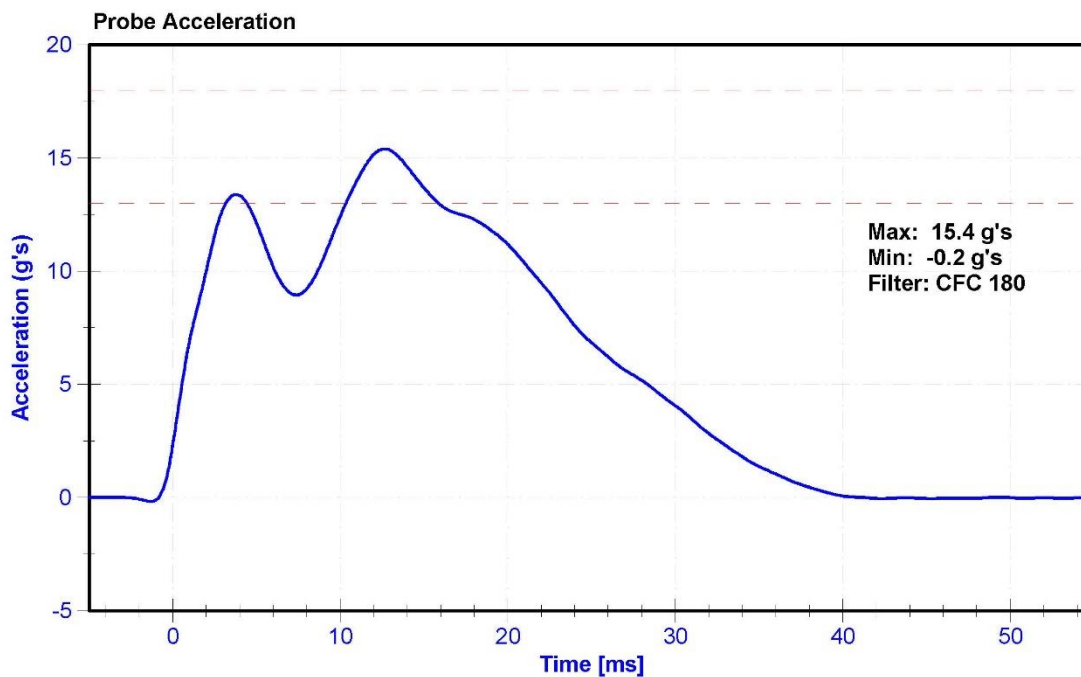
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

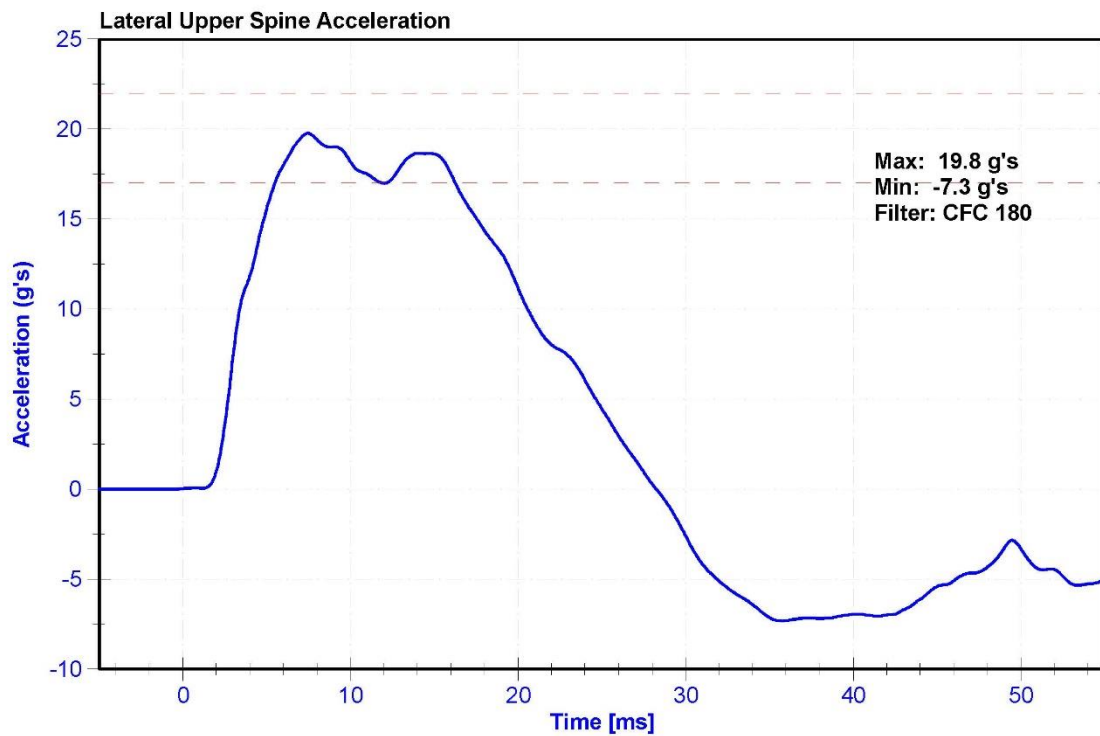
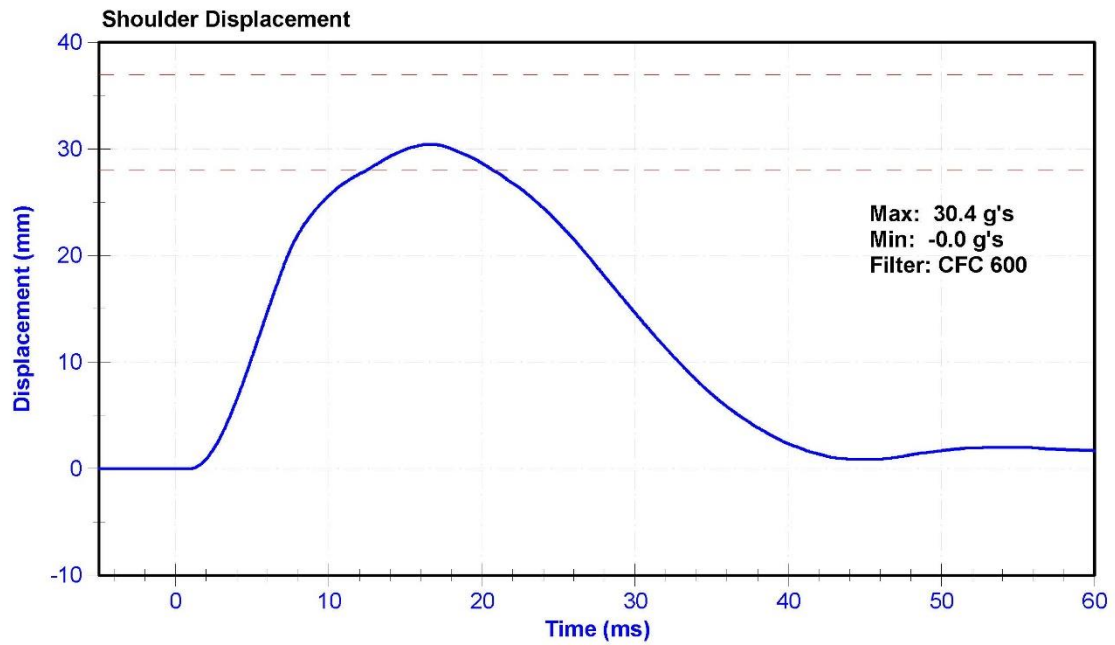
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	35.7	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	13	18	g's	15.4	Pass
Shoulder Deflection	28	37	mm	30.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018





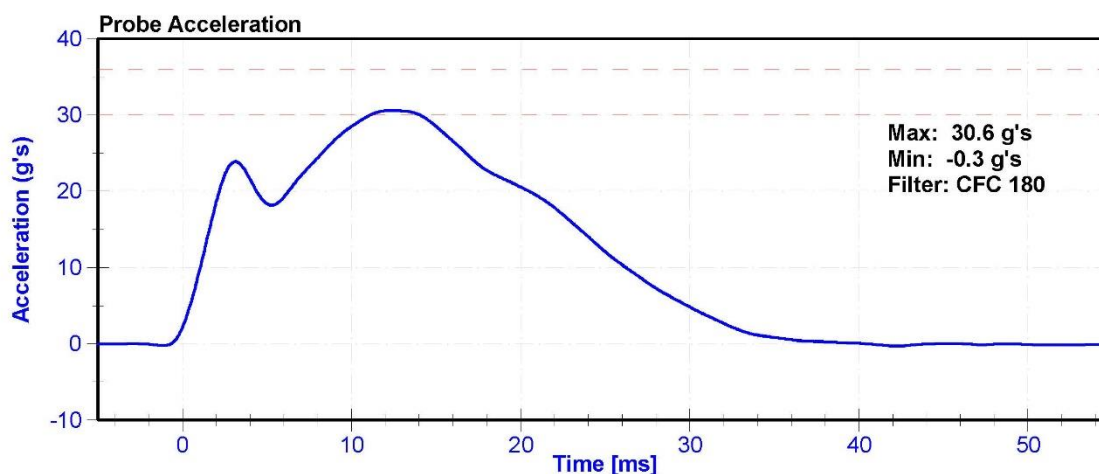
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

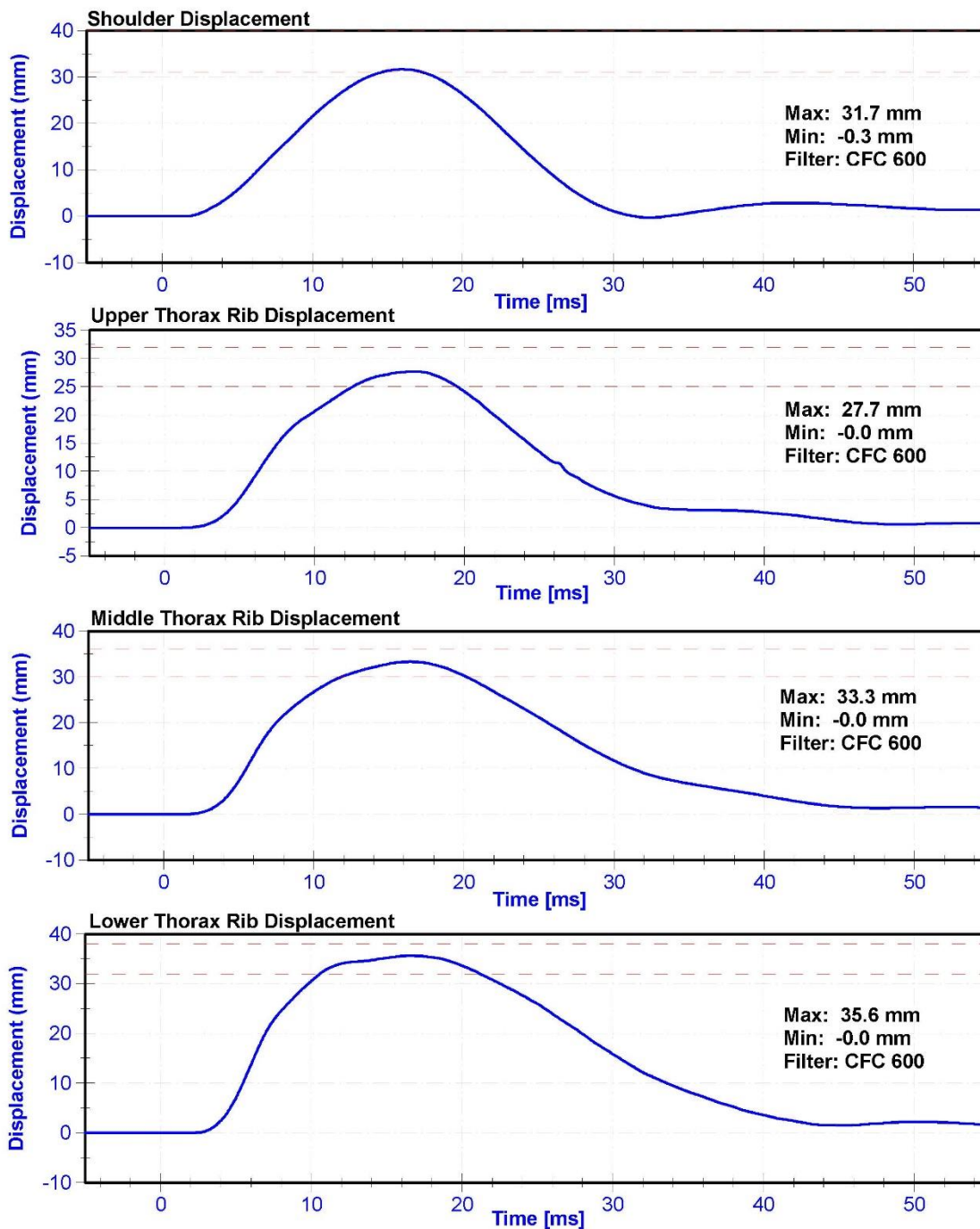
Results

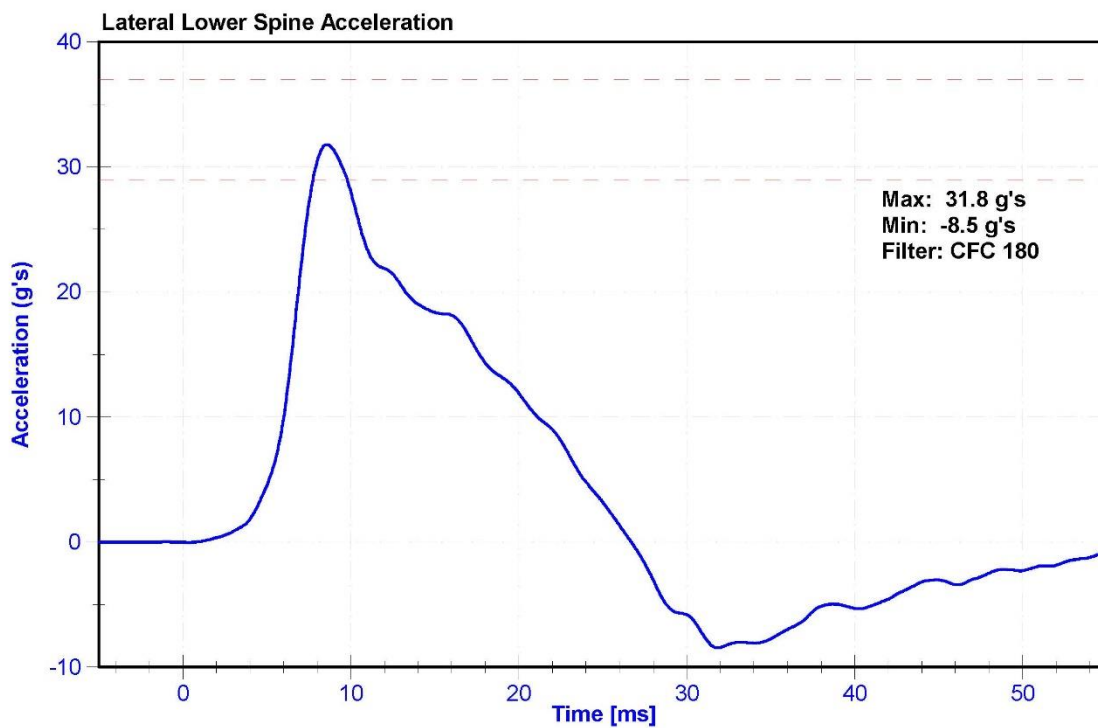
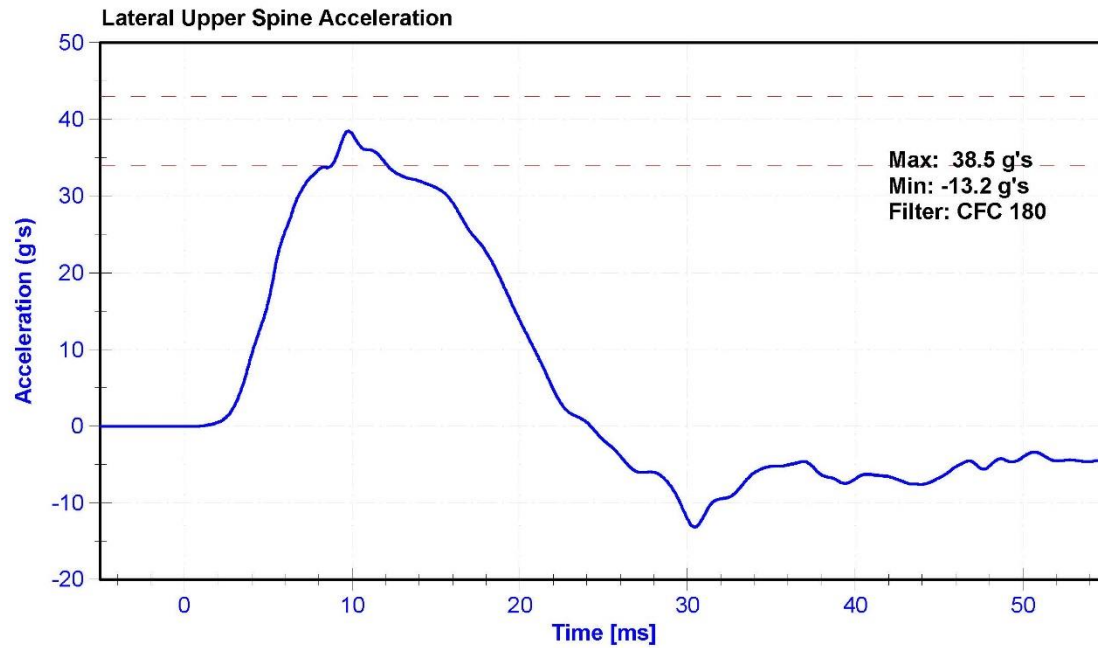
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	54.5	Pass
Velocity	6.6	6.8	m/s	6.77	Pass
Probe Acceleration after 5 ms	30	36	g's	30.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.8	Pass
Shoulder Deflection	31	40	mm	31.7	Pass
Upper Thorax Rib Deflection	25	32	mm	27.7	Pass
Mid Thorax Rib Deflection	30	36	mm	33.3	Pass
Lower Thorax Rib Deflection	32	38	mm	35.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







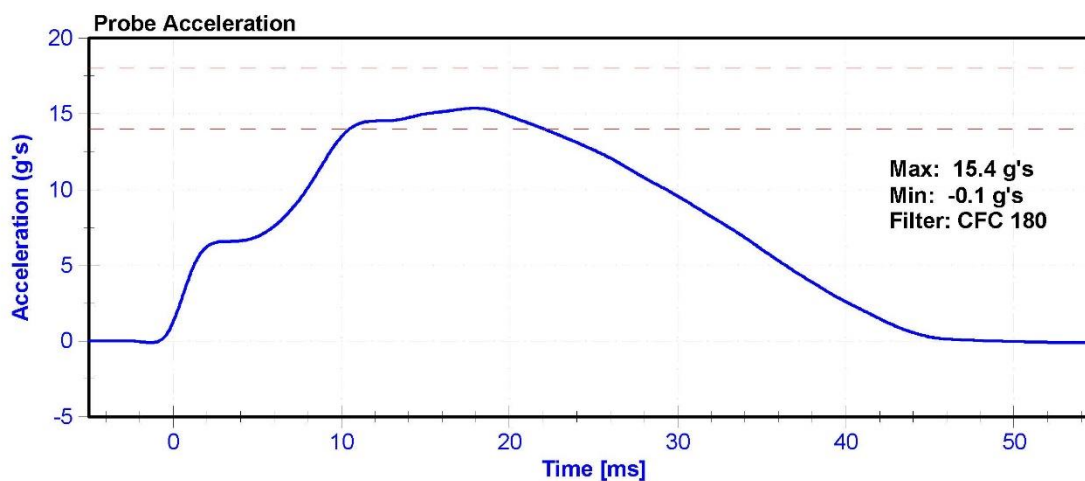
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

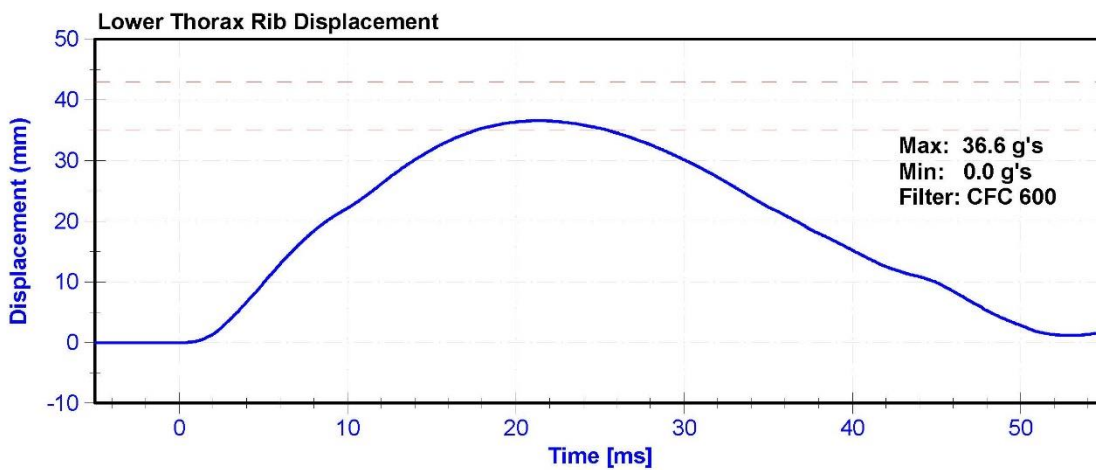
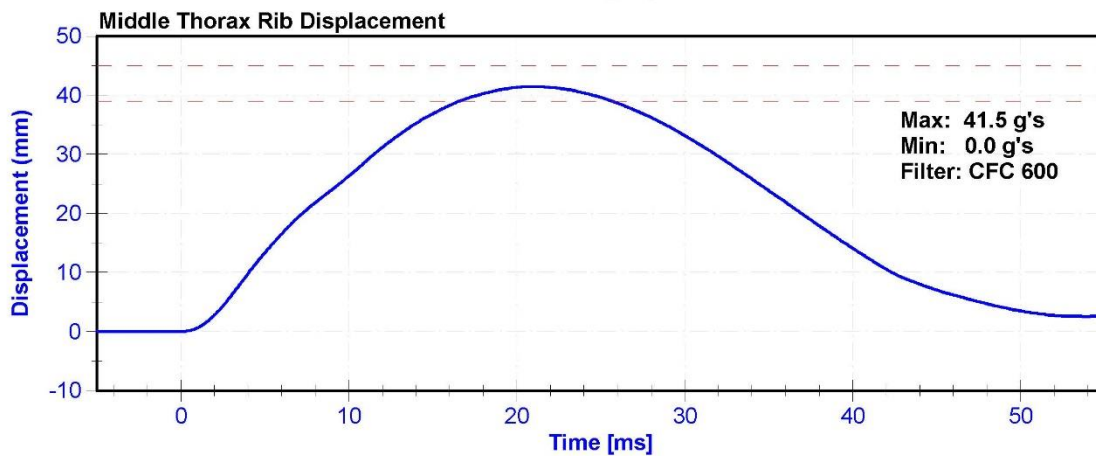
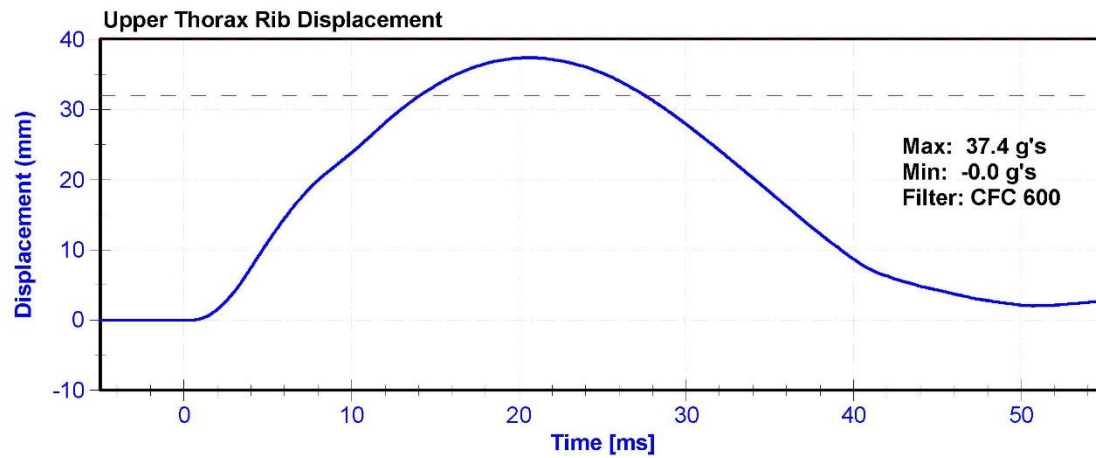
Results

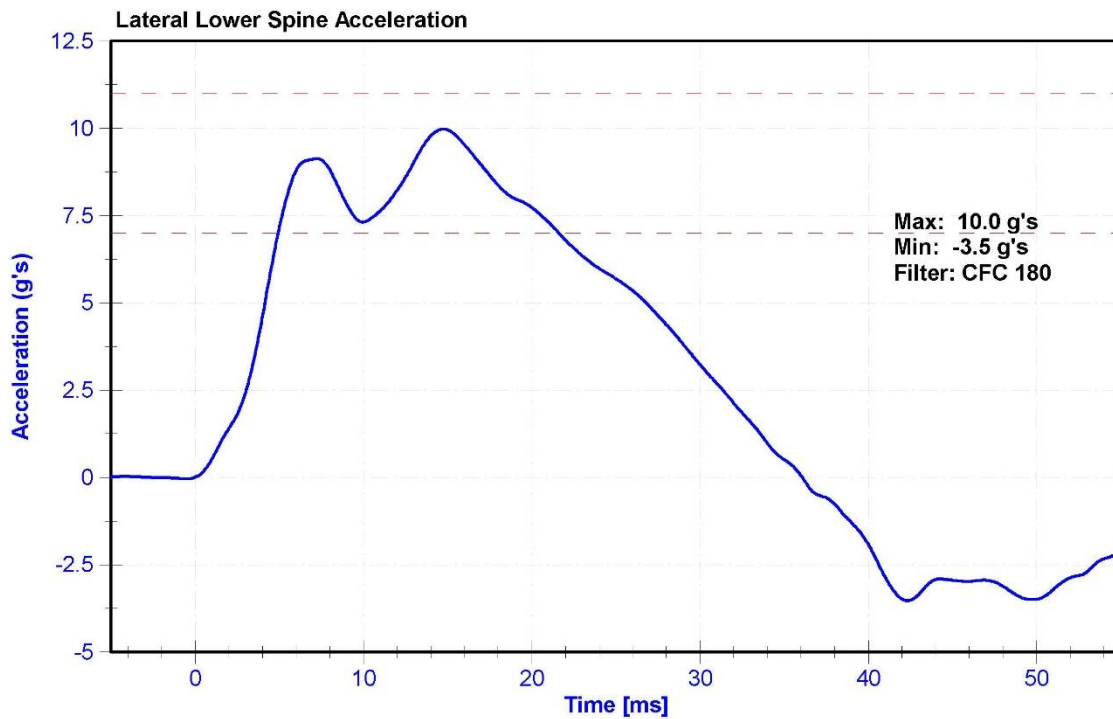
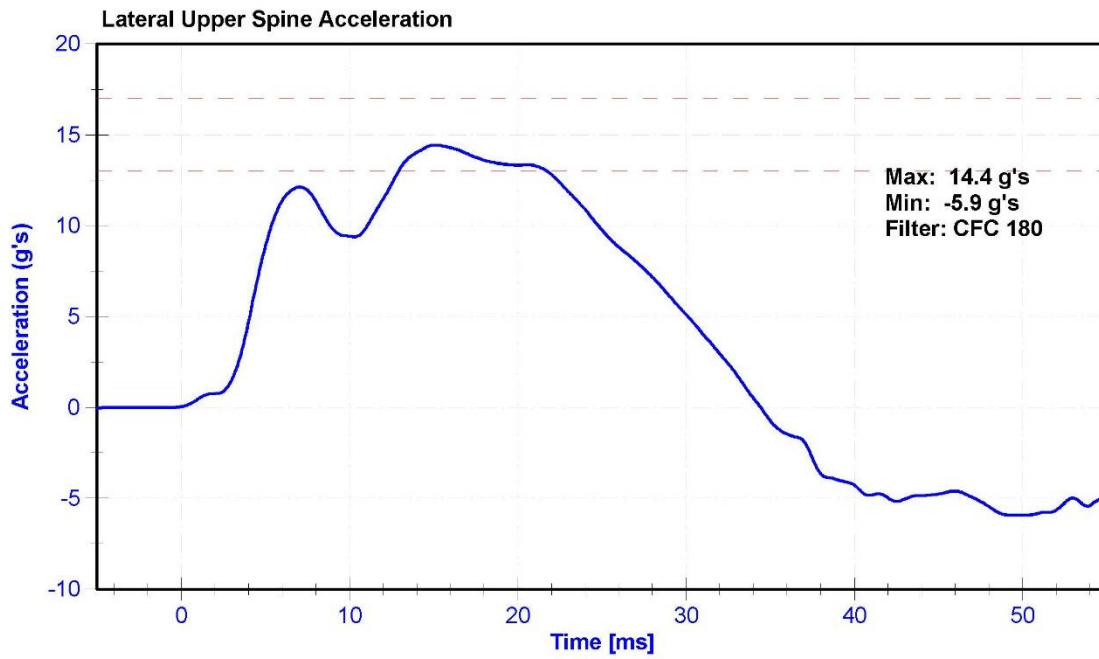
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	59	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.4	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.0	Pass
Upper Thorax Rib Deflection	32	40	mm	37.4	Pass
Middle Thorax Rib Deflection	39	45	mm	41.5	Pass
Lower Thorax Rib Deflection	35	43	mm	36.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







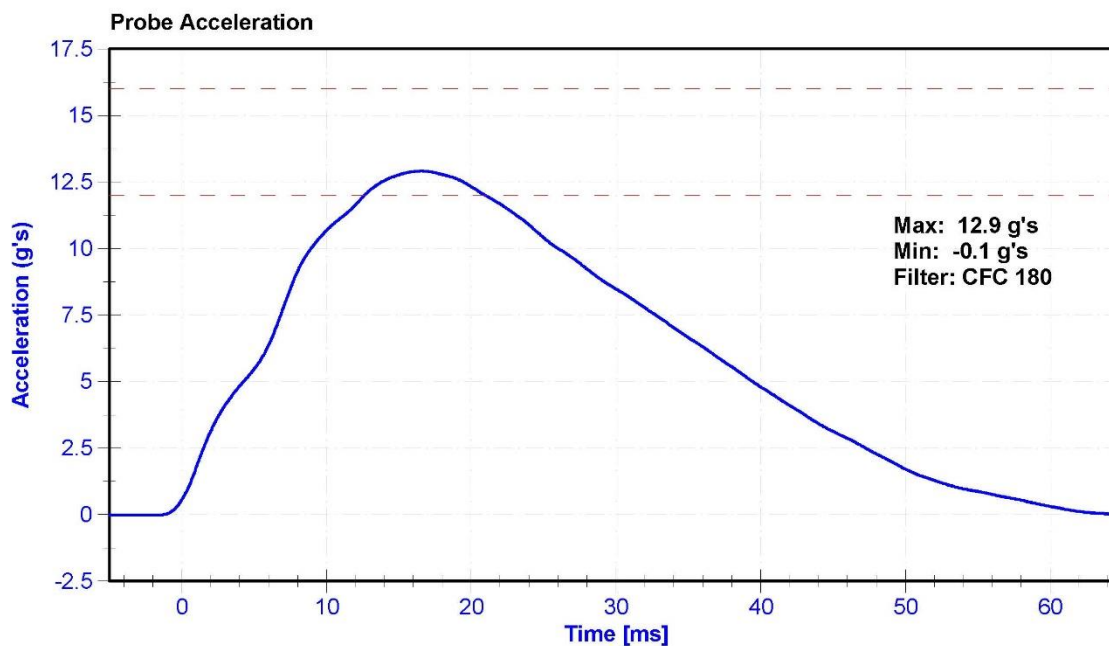
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

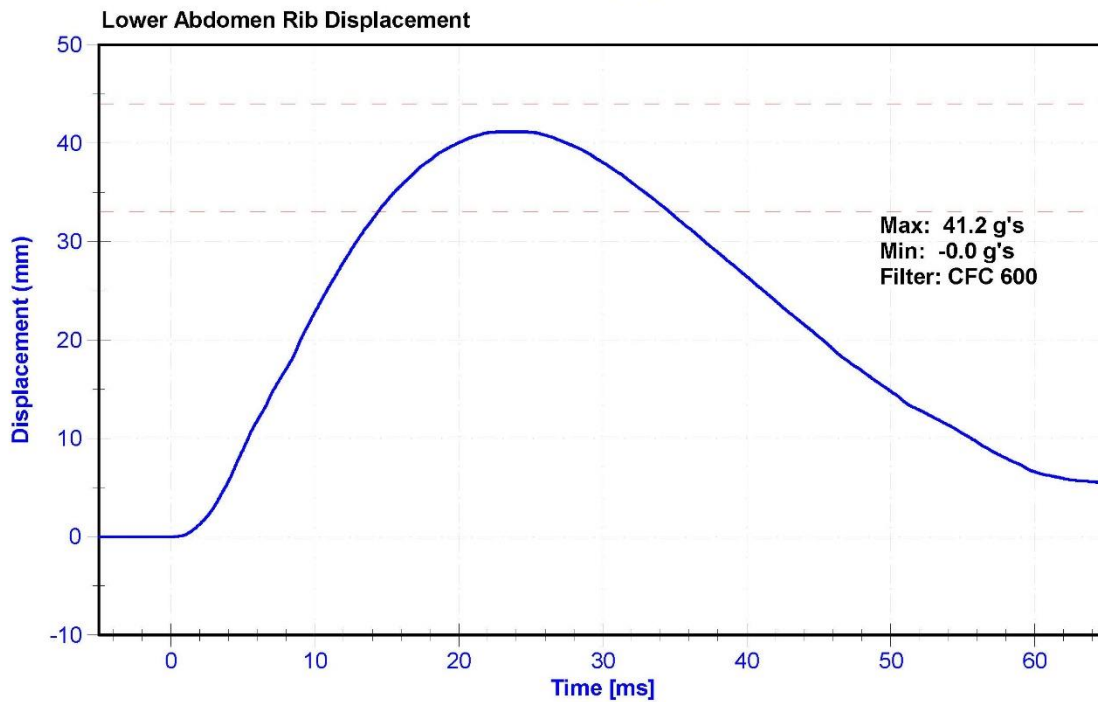
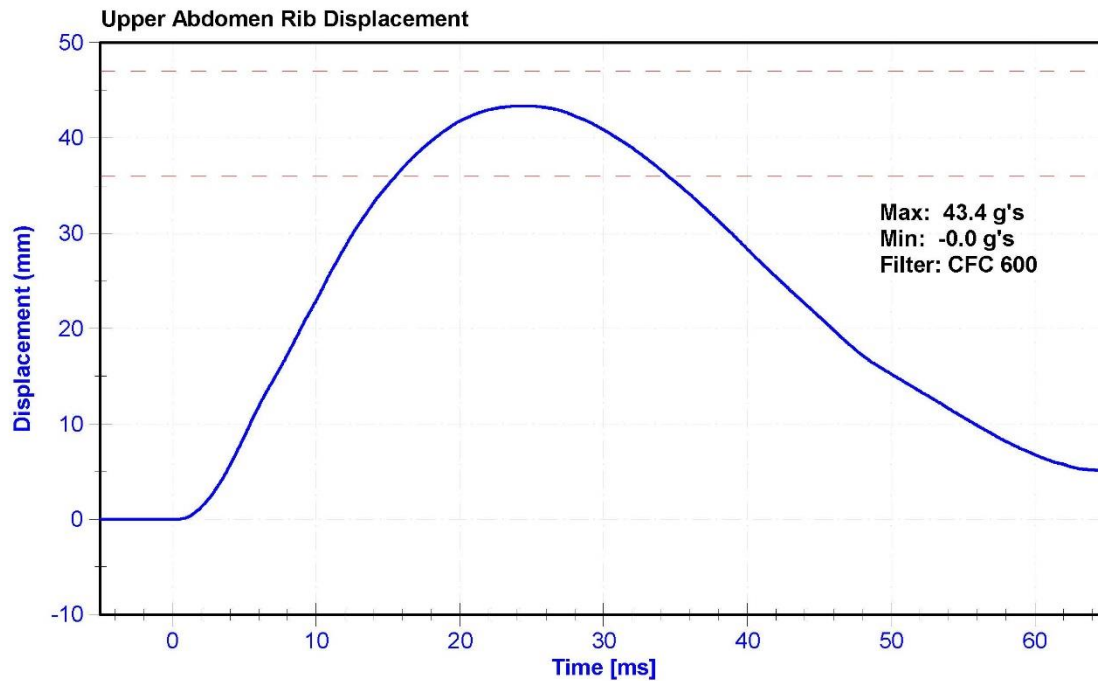
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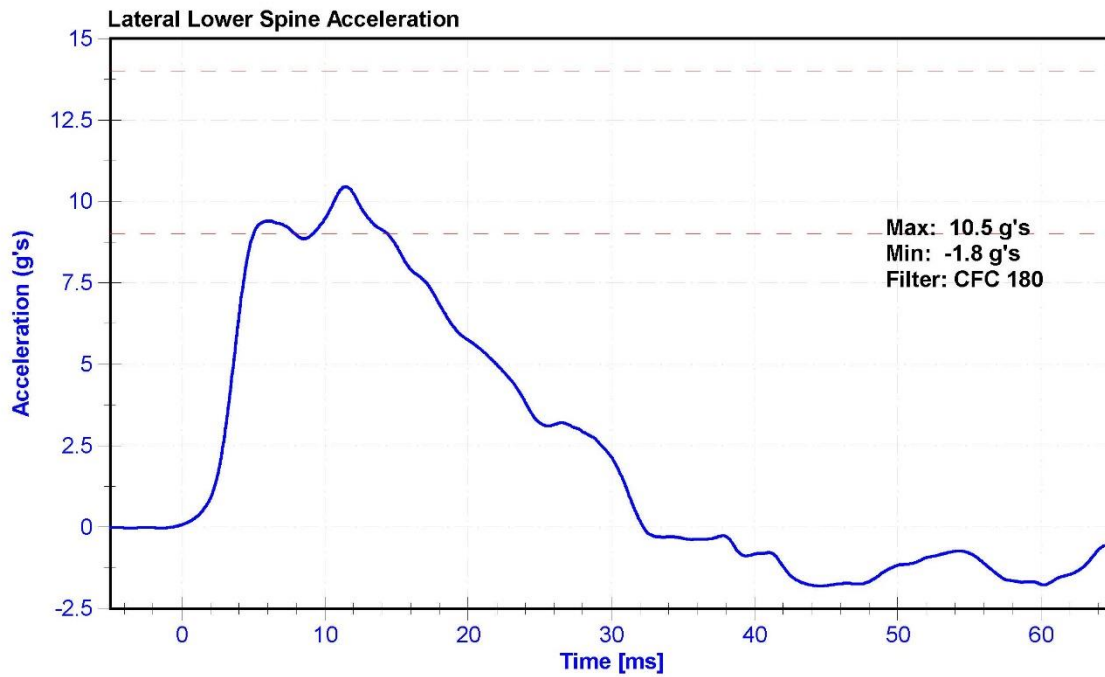
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	58.2	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	12.9	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	9/27/2017	9/27/2018
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/27/2017	9/27/2018







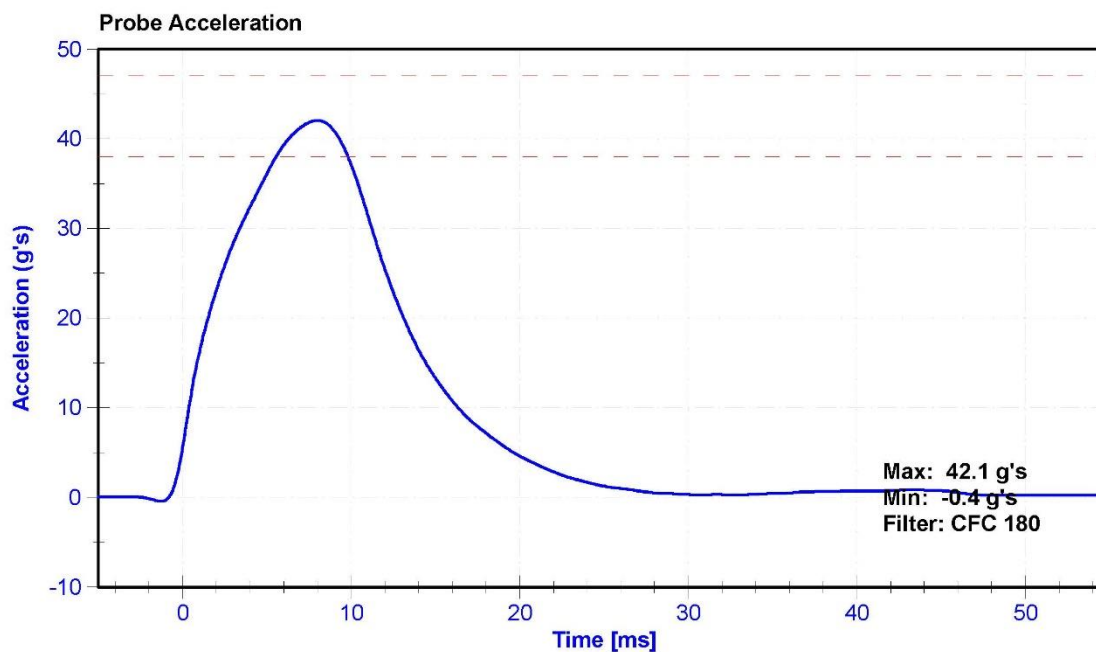
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

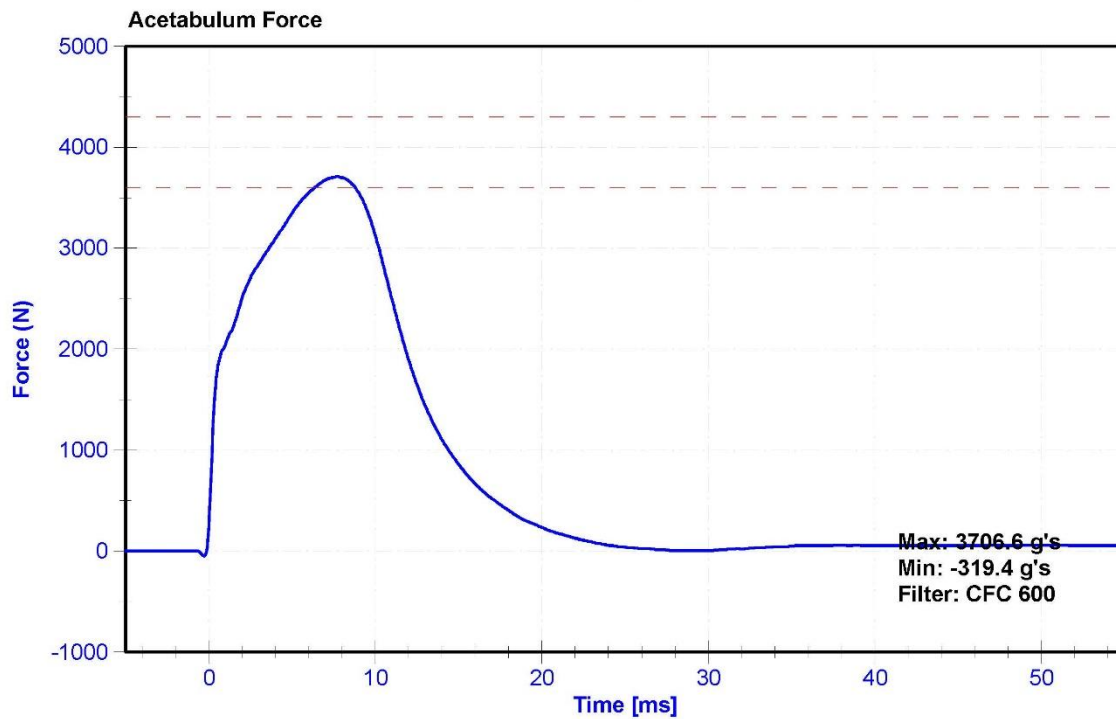
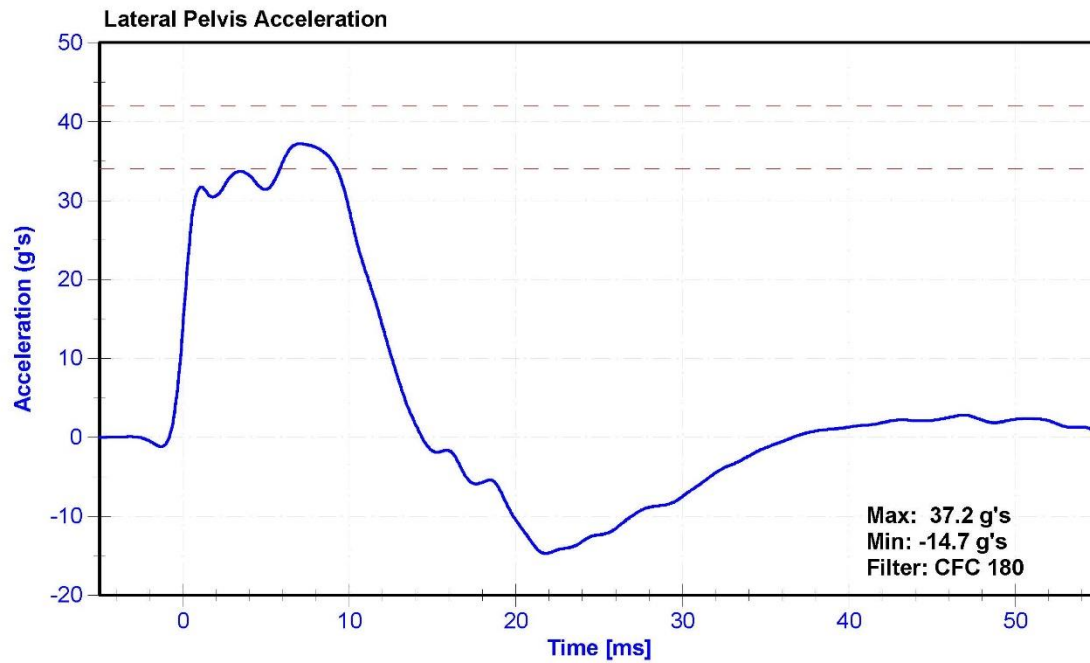
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	28.4	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration	38	47	g's	42.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	37.2	Pass
Acetabulum Force	3600	4300	N	3706.6	Pass

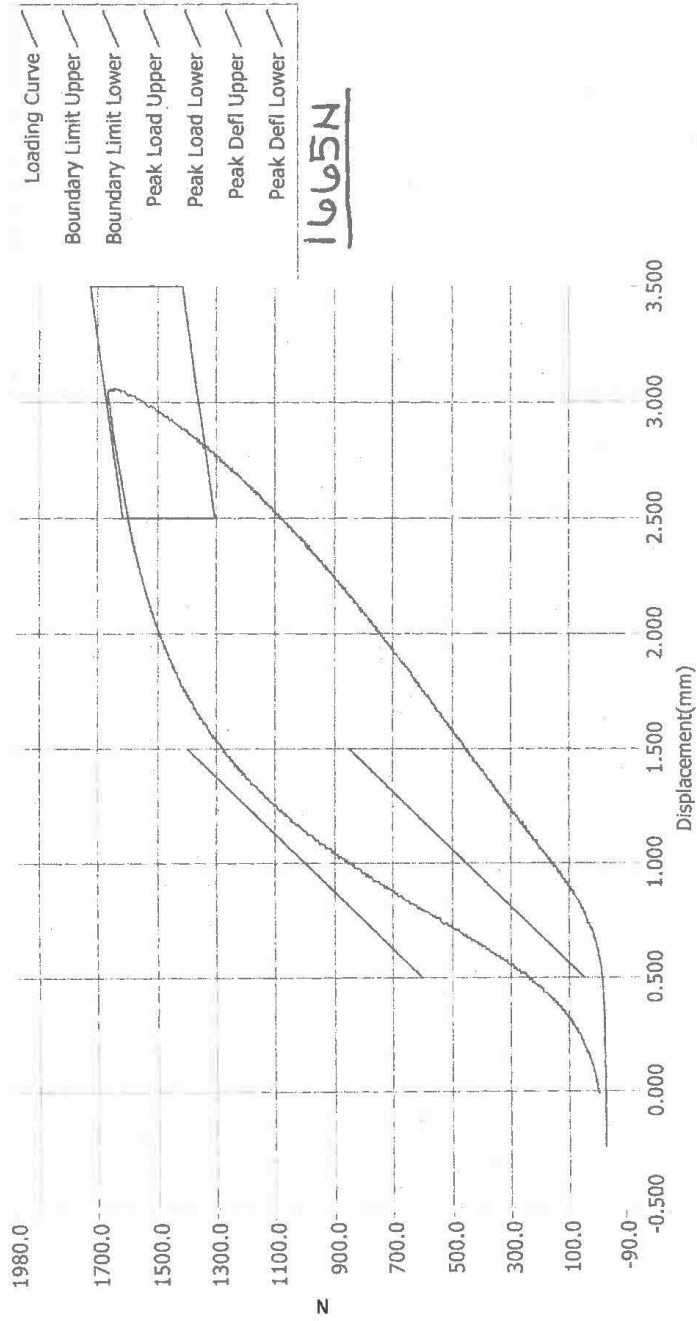
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Acetabulum Load Cell	Denton 3249J	LC-267Fy	6/6/2017	6/6/2018
Certification Plug	Humanetics	63224	1/23/2019	N/A
Crash Test Plug	Humanetics	63211	01/23/2013	N/A





Resultant Data - SIDIIs Plug Compression

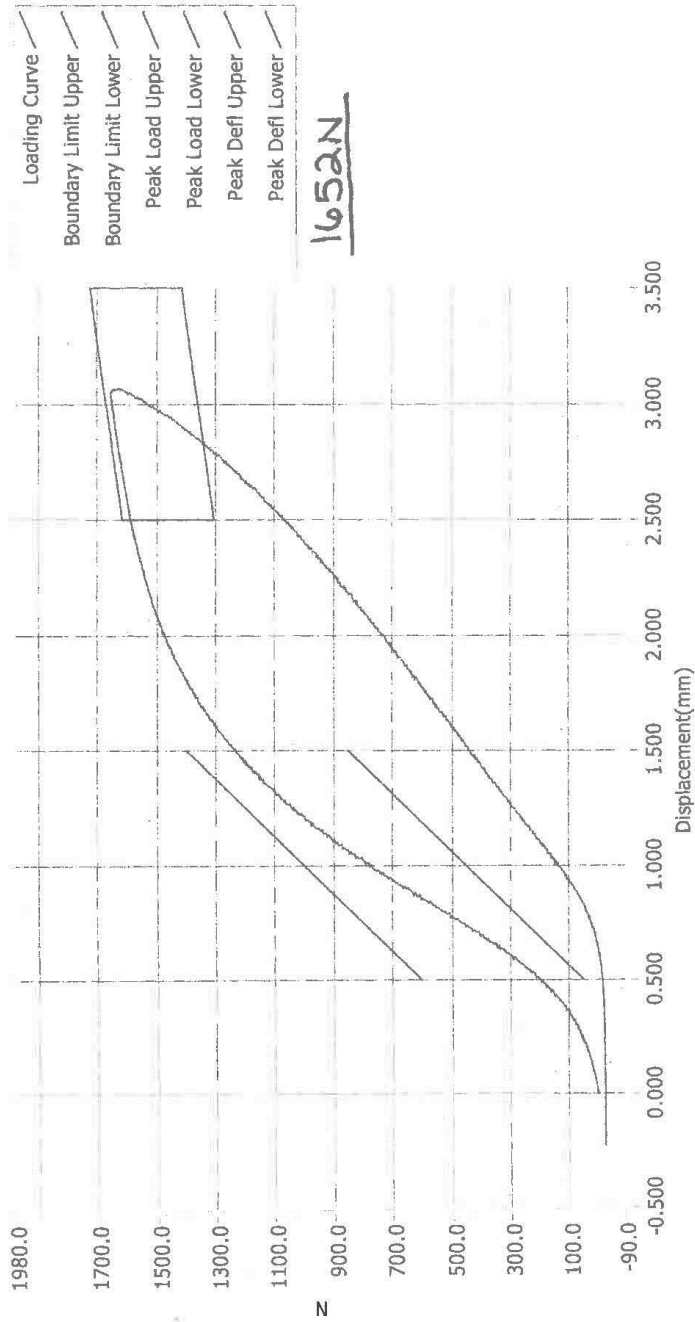


ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	63224	1/23/2013	9:01 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/23/2013 Current Time : 21:01:40

Resultant Data - SIDIIs Plug Compression



1652N

ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	63211	1/23/2013	8:43 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/23/2013 Current Time : 20:44:16

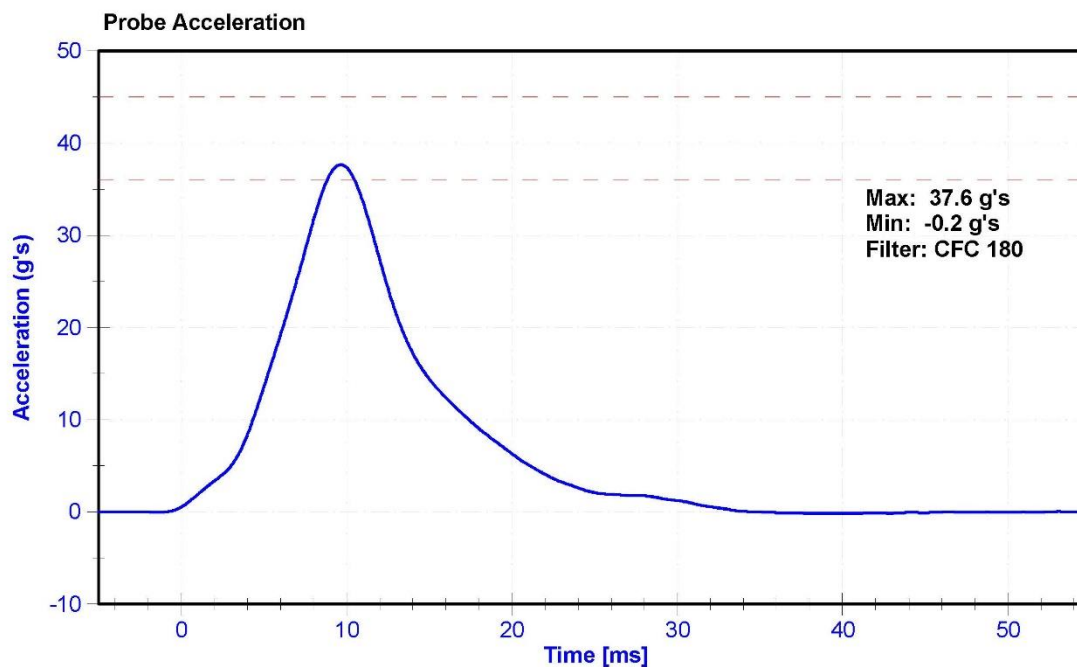
ATD Manufacturer	FTSS	Test Technician	D. Rinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

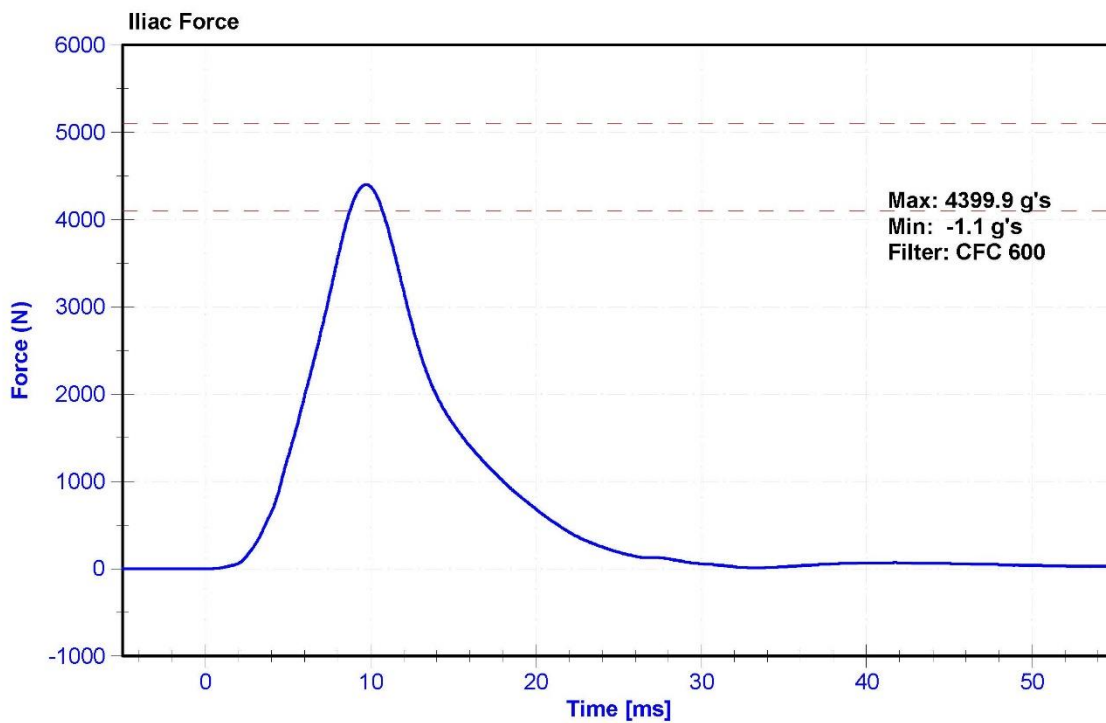
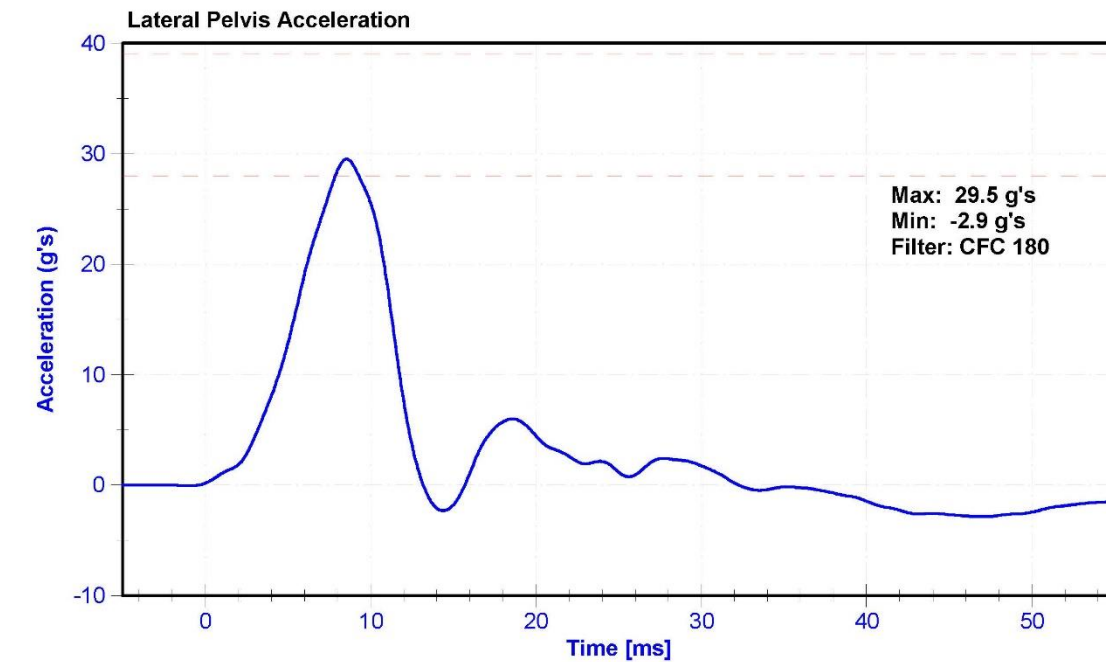
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	27.7	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	36	45	g's	37.6	Pass
Lateral Pelvis Acceleration	28	39	g's	29.5	Pass
Iliac Force	4100	5100	N	4399.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Iliac Load Cell	DENTON 3228J	LC-281Fy	6/6/2017	6/6/2018





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

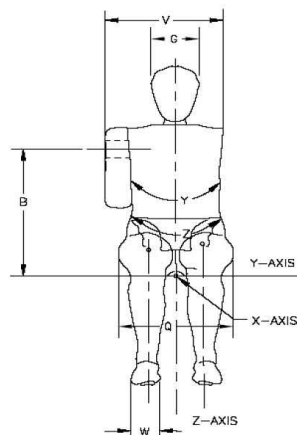
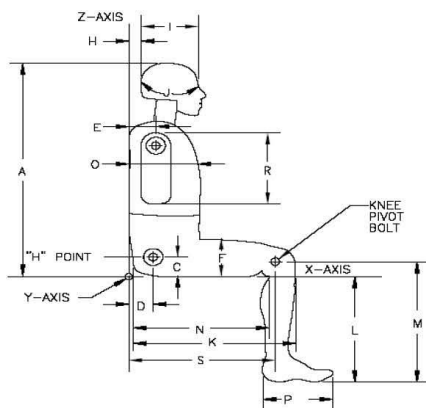


External Measurements - SID-IIs

Technician: K. Brogan

Date: 5/21/2018

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	444	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	129	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	353	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	318	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	864	Pass
Z	Waist Circumference	761	791	771	Pass

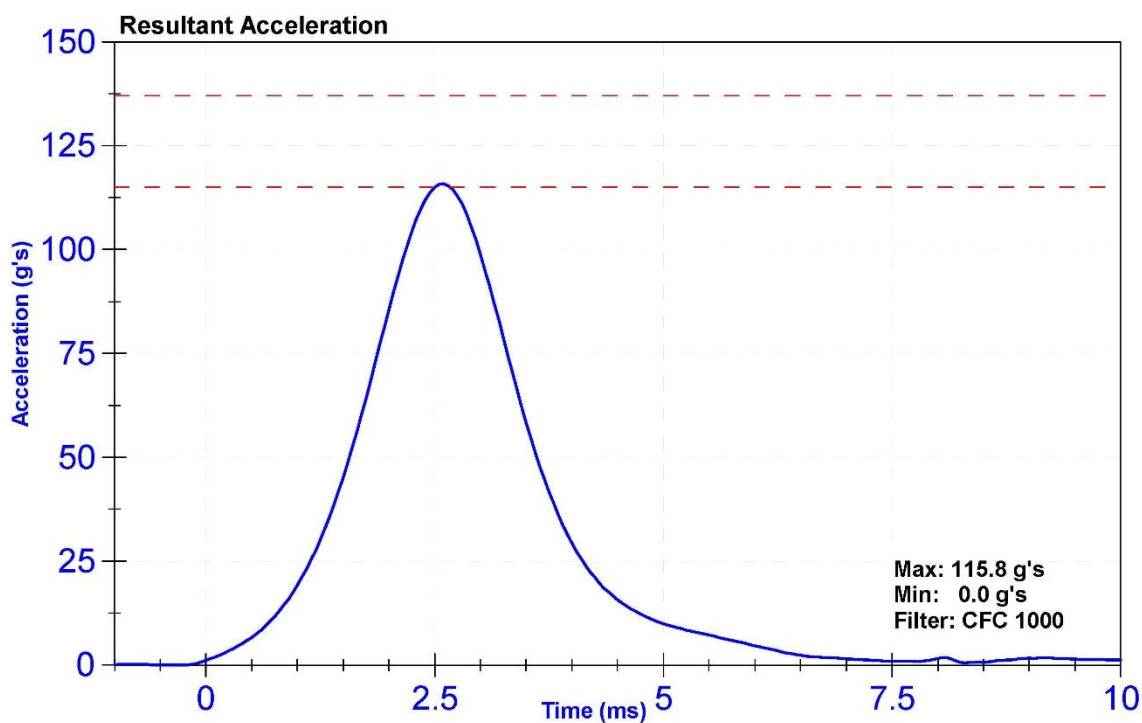
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

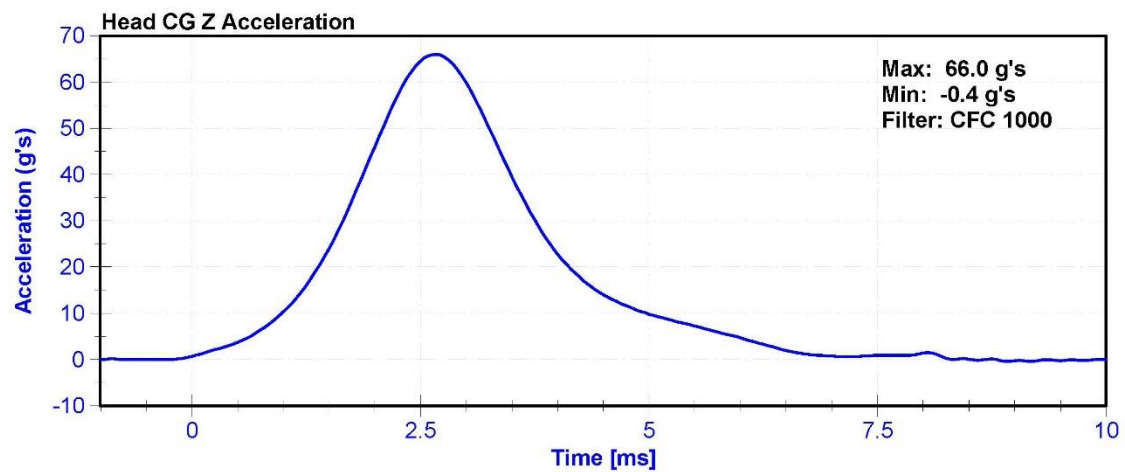
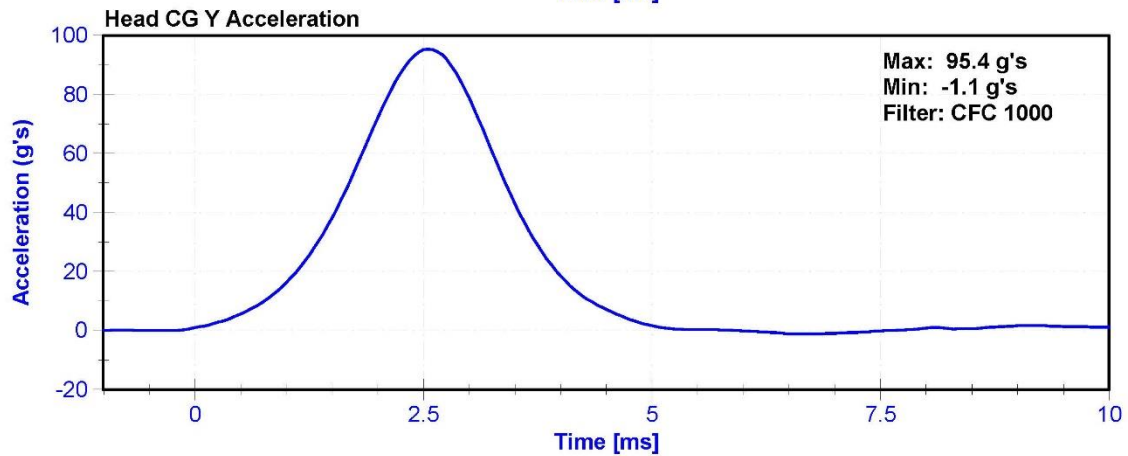
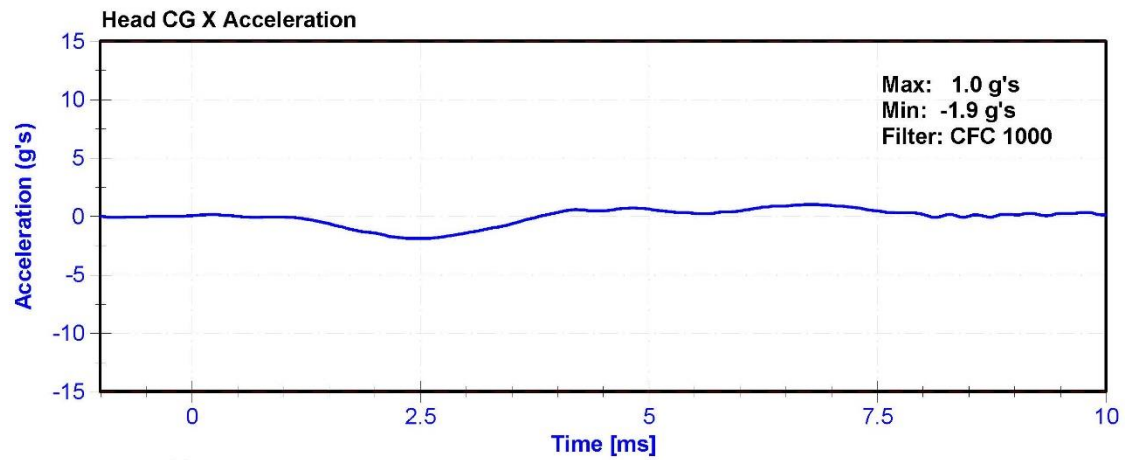
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	37.7	Pass
Resultant Acceleration	115	137	g's	115.8	Pass
Oscillation	0	15	%	1.5	Pass
Fore-Aft Acceleration	-15	15	g's	-1.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	5/4/2018	11/2/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	5/4/2018	11/2/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	5/4/2018	11/2/2018





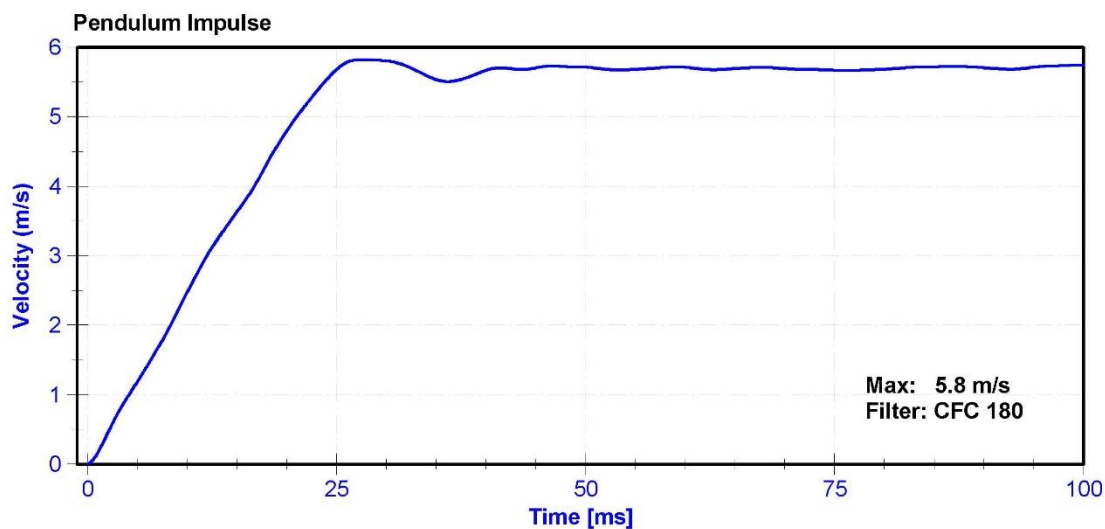
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

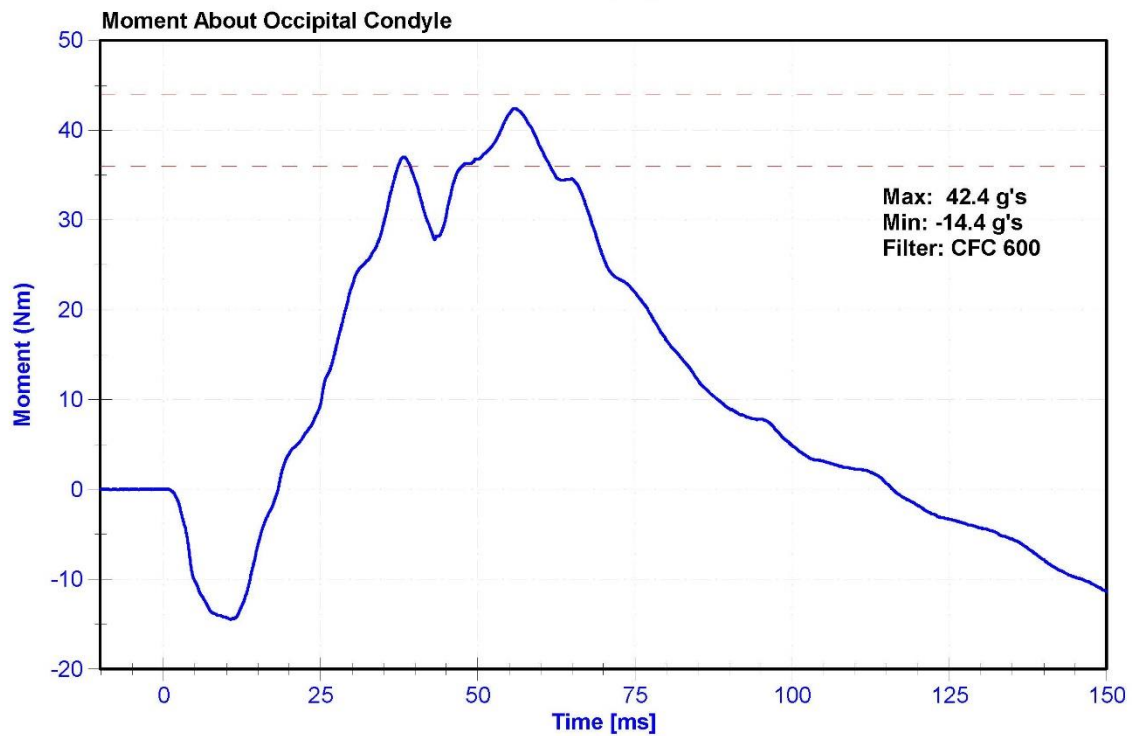
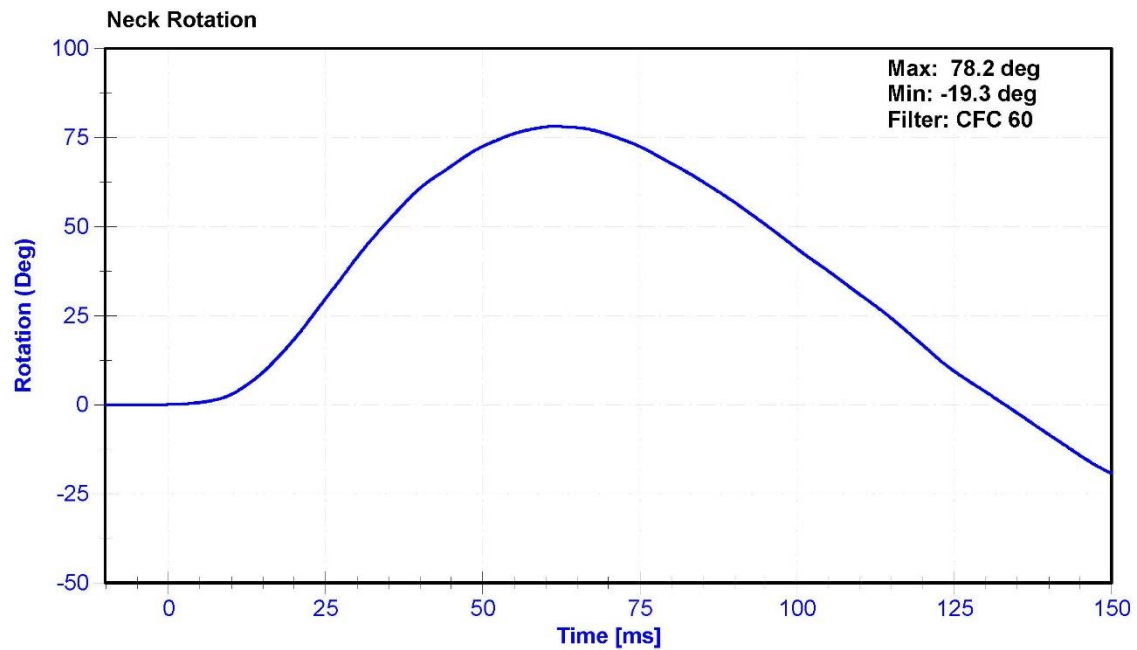
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	39.2	Pass
Velocity	5.51	5.63	m/s	5.546	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.47	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.63	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.80	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.68	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.82	Pass
Neck Rotation	71	81	deg	78.2	Pass
Time at Maximum Rotation	50	70	ms	61.3	Pass
Moment about the OC	36	44	Nm	42.4	Pass
Moment Decay to 0 Nm	102	126	ms	116.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	10/27/2017	10/27/2018
Condyle Potentiometer	Denton 78051-342	DS-185Pend	10/27/2017	10/27/2018
Upper Neck Load Cell	Denton 1716	LC-1872 FY	7/26/2017	7/26/2018





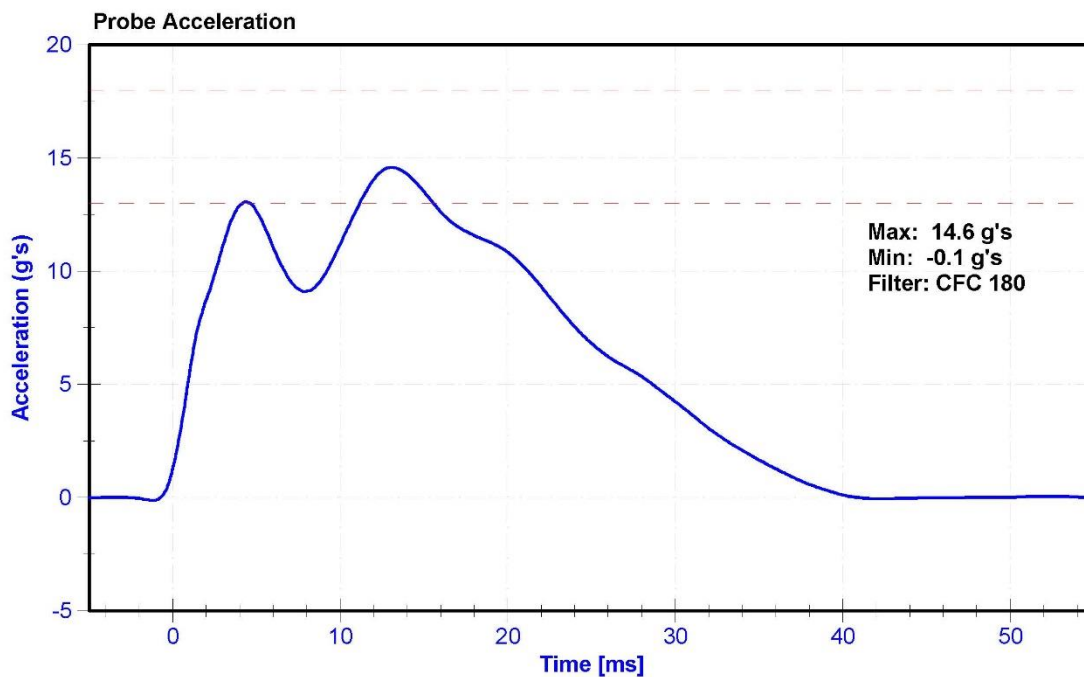
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

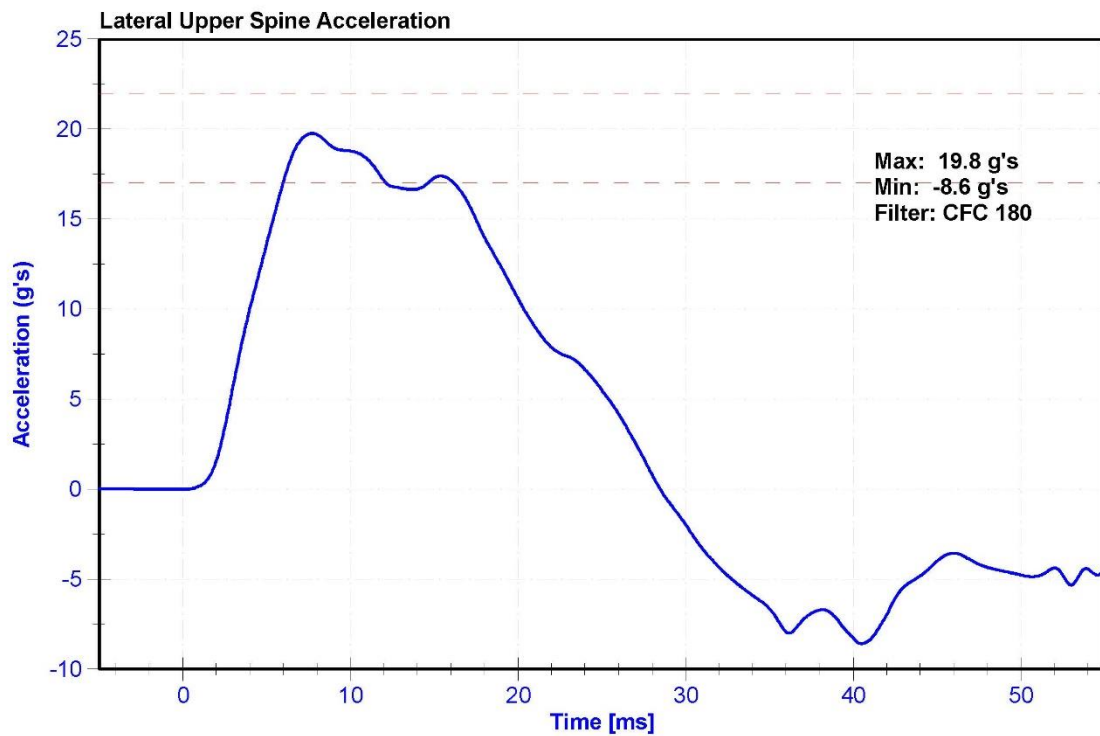
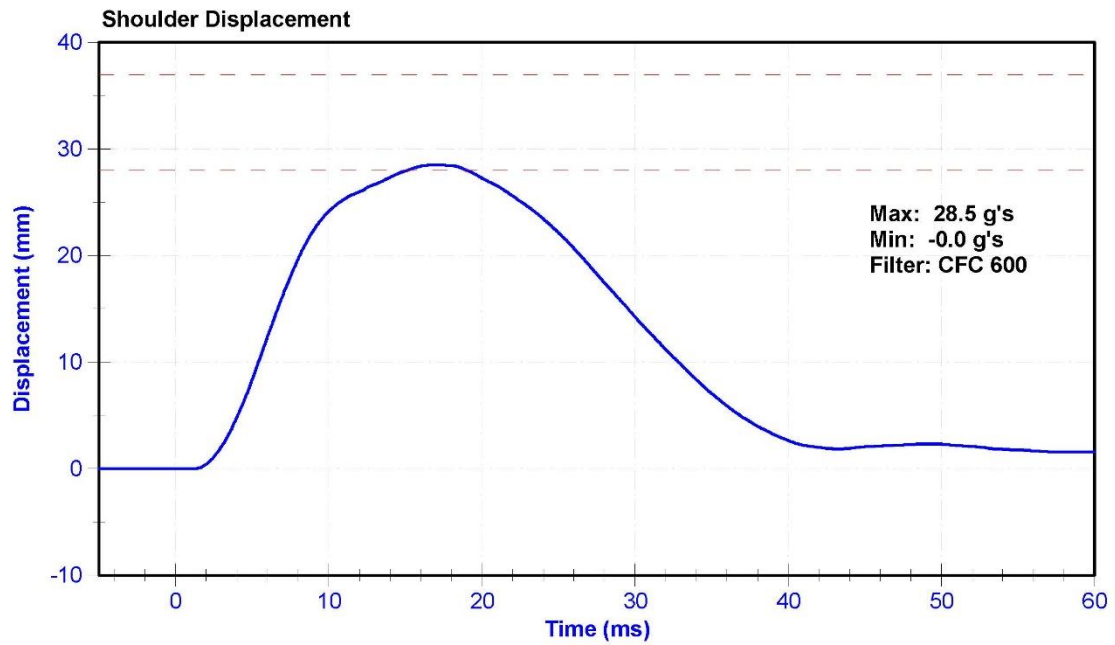
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	34.2	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	14.6	Pass
Shoulder Deflection	28	37	mm	28.5	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018





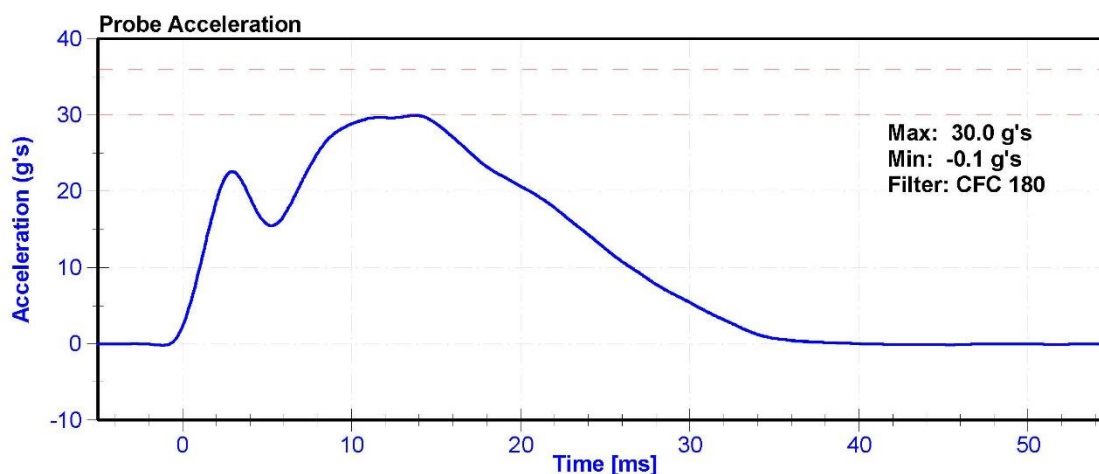
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

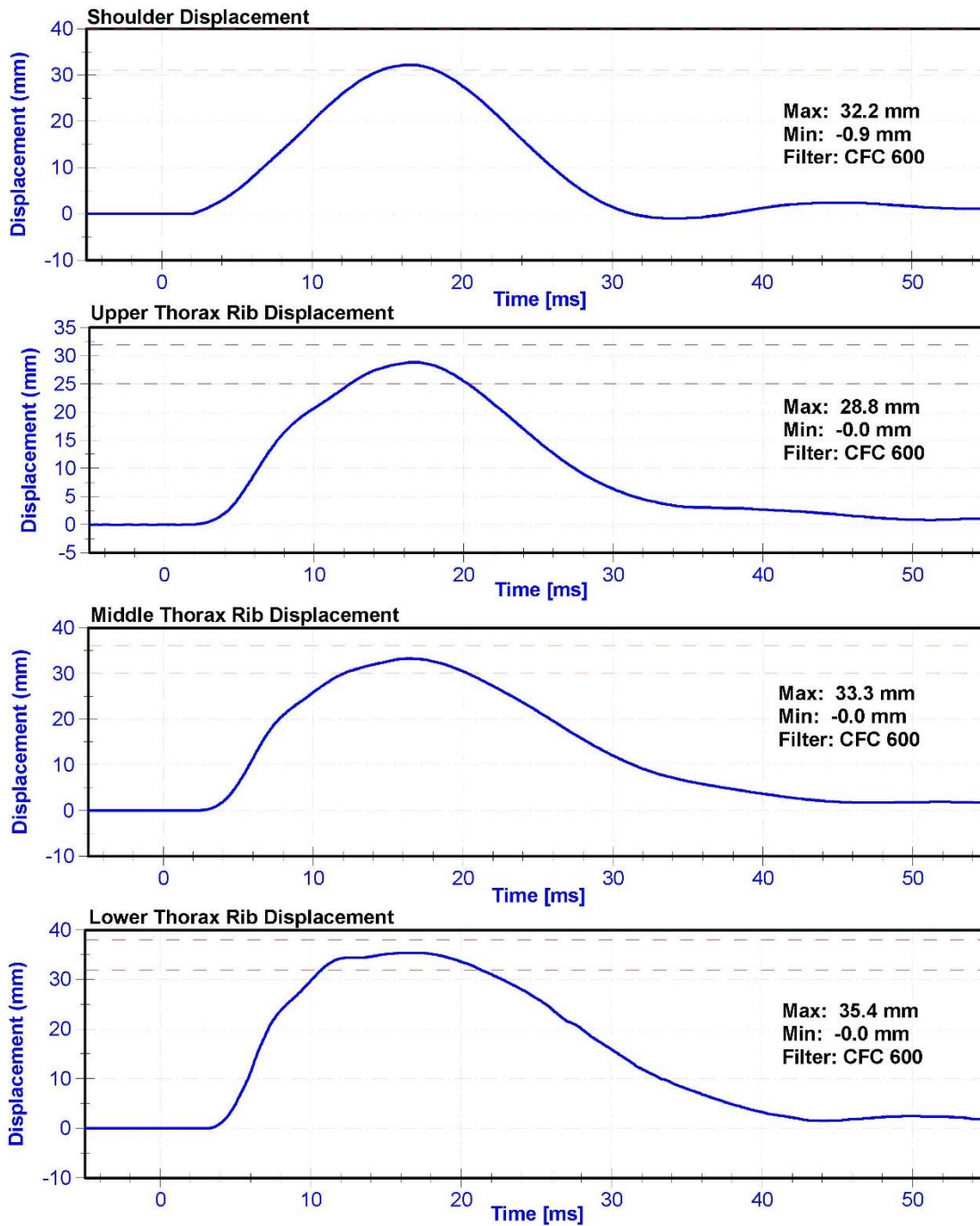
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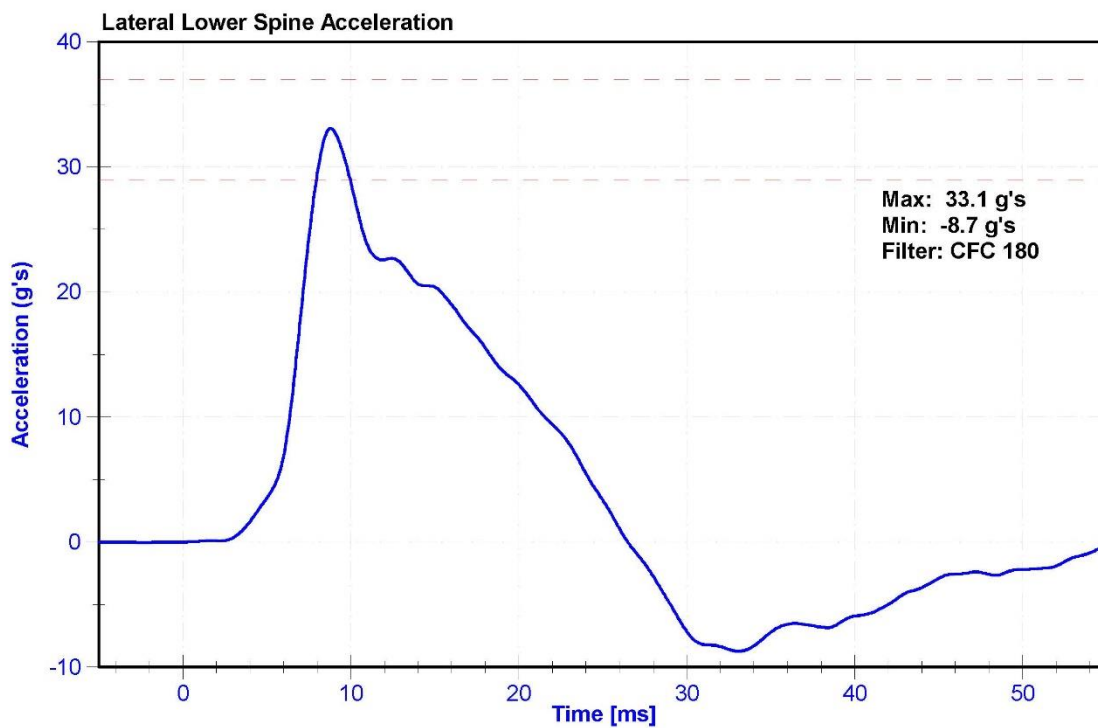
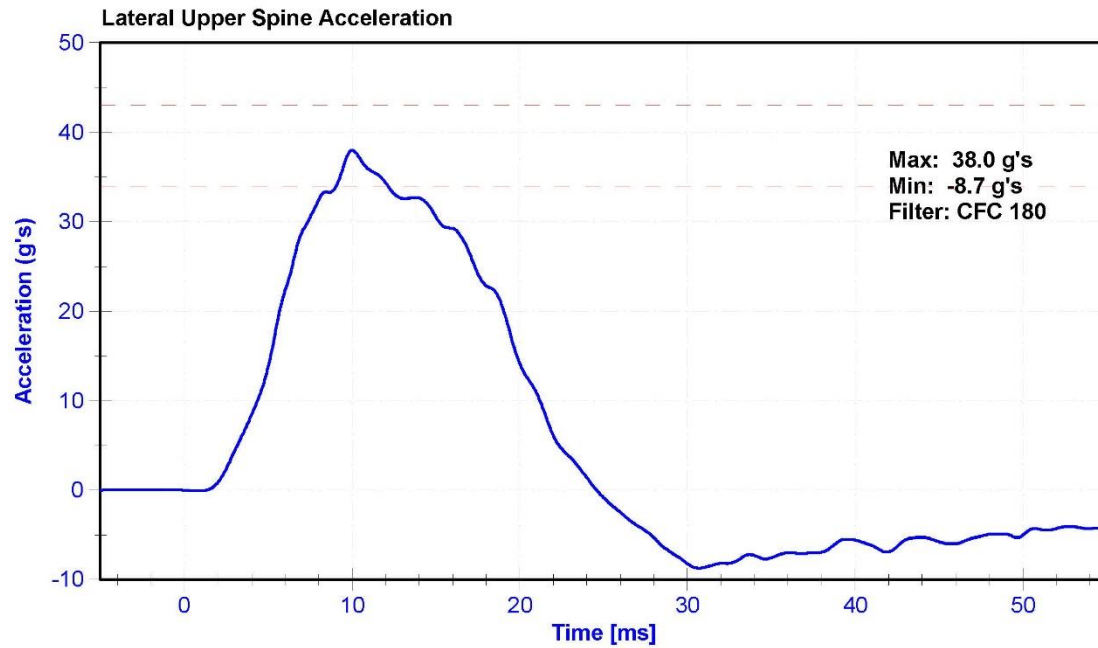
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	37.8	Pass
Velocity	6.6	6.8	m/s	6.80	Pass
Probe Acceleration after 5 ms	30	36	g's	30.0	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.1	Pass
Shoulder Deflection	31	40	mm	32.2	Pass
Upper Thorax Rib Deflection	25	32	mm	28.8	Pass
Mid Thorax Rib Deflection	30	36	mm	33.3	Pass
Lower Thorax Rib Deflection	32	38	mm	35.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







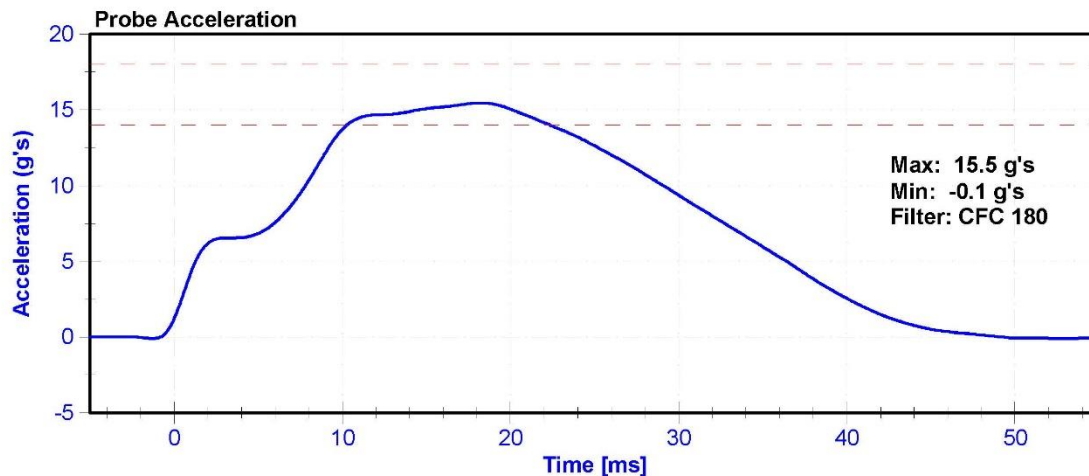
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

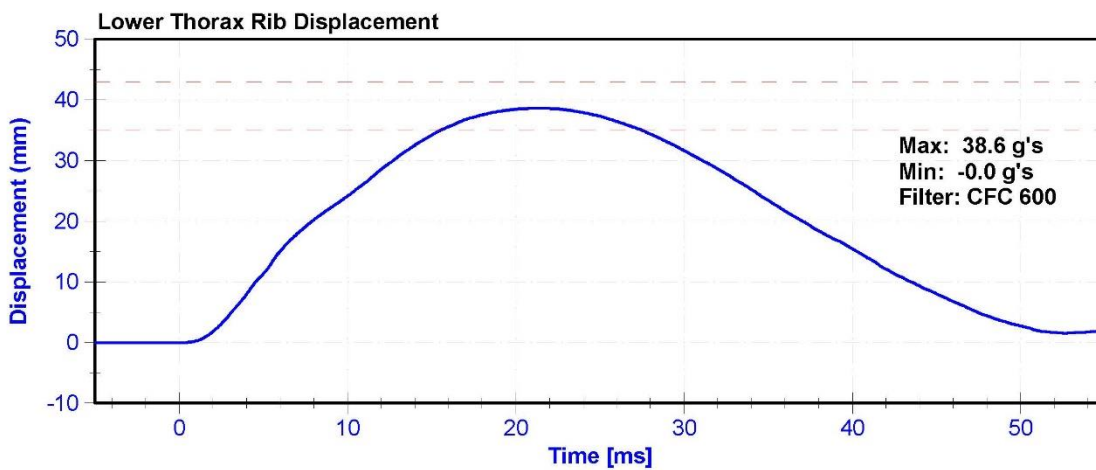
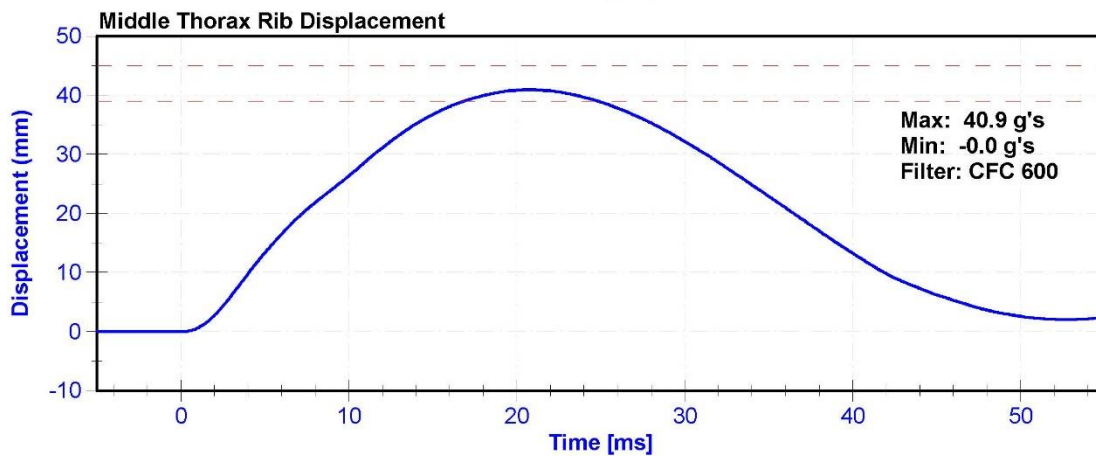
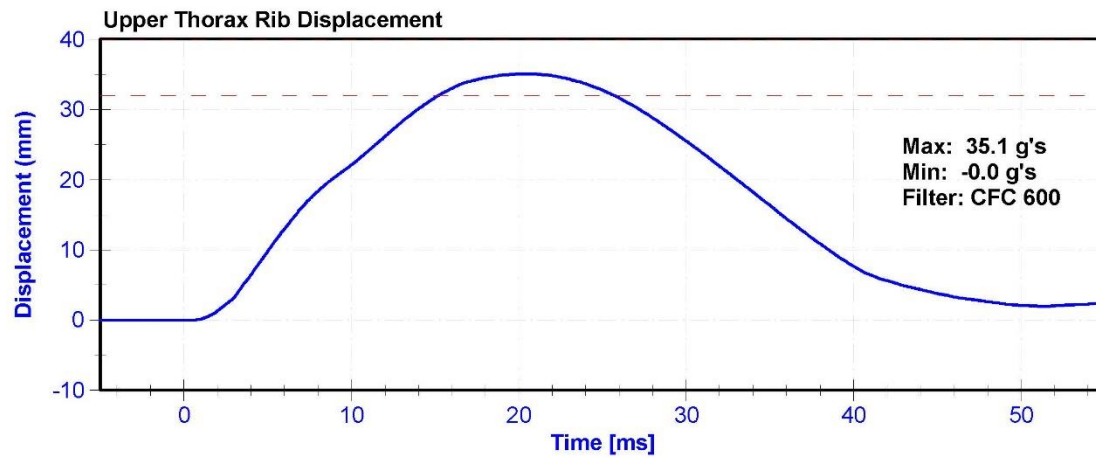
Results

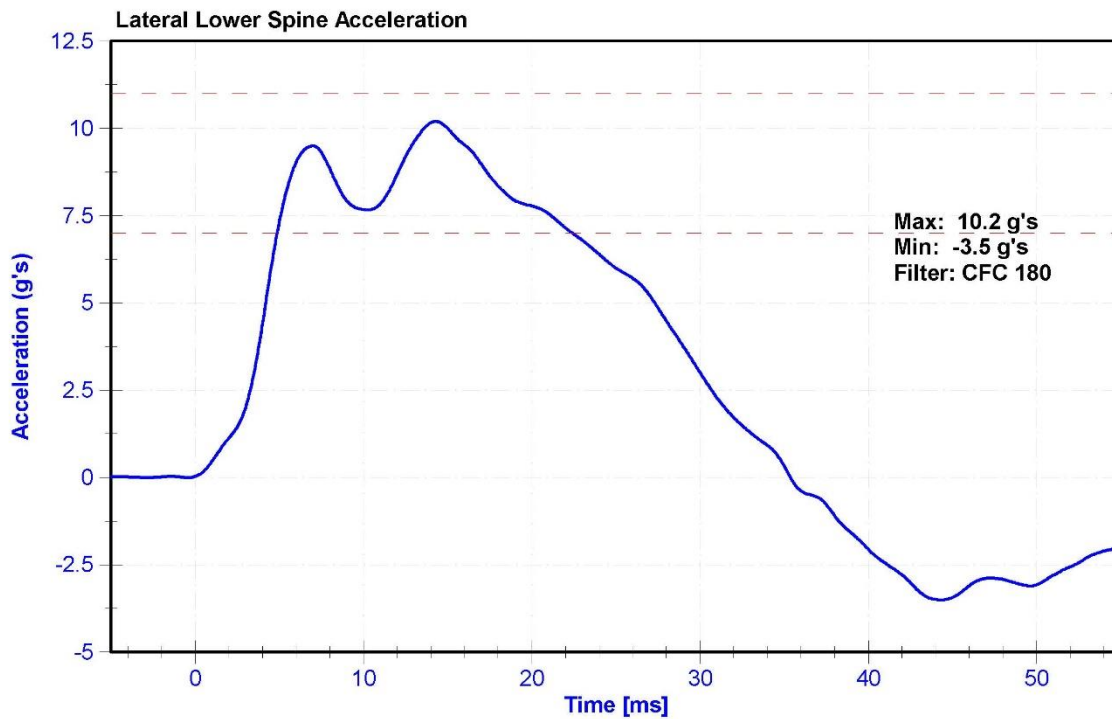
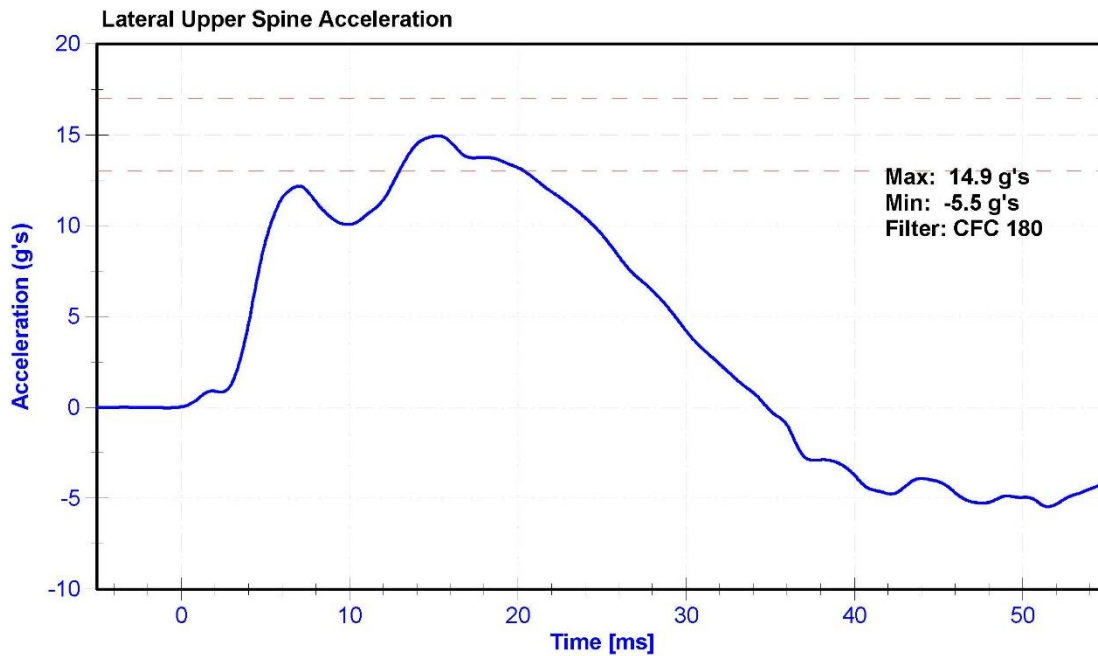
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	38.7	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.5	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.9	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	35.1	Pass
Middle Thorax Rib Deflection	39	45	mm	40.9	Pass
Lower Thorax Rib Deflection	35	43	mm	38.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







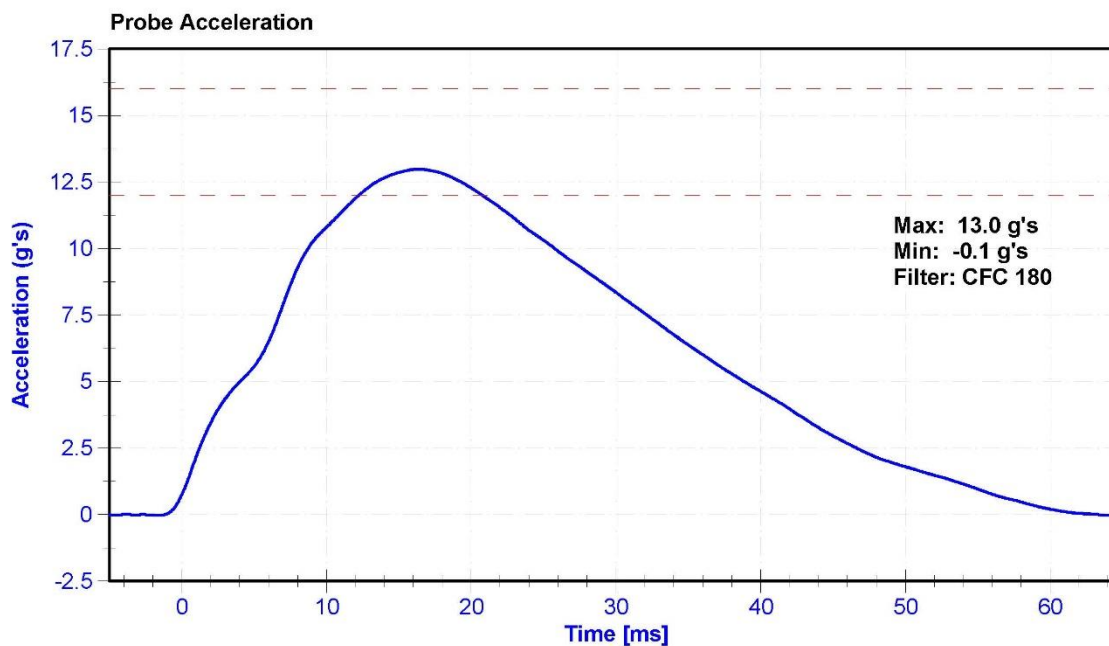
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

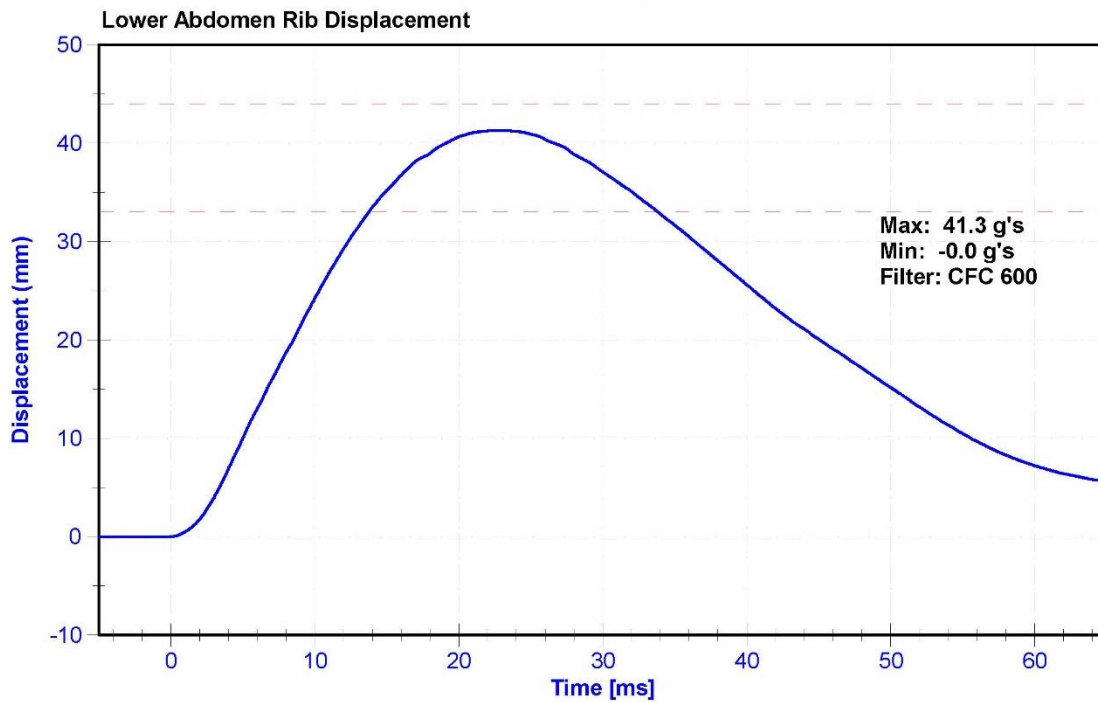
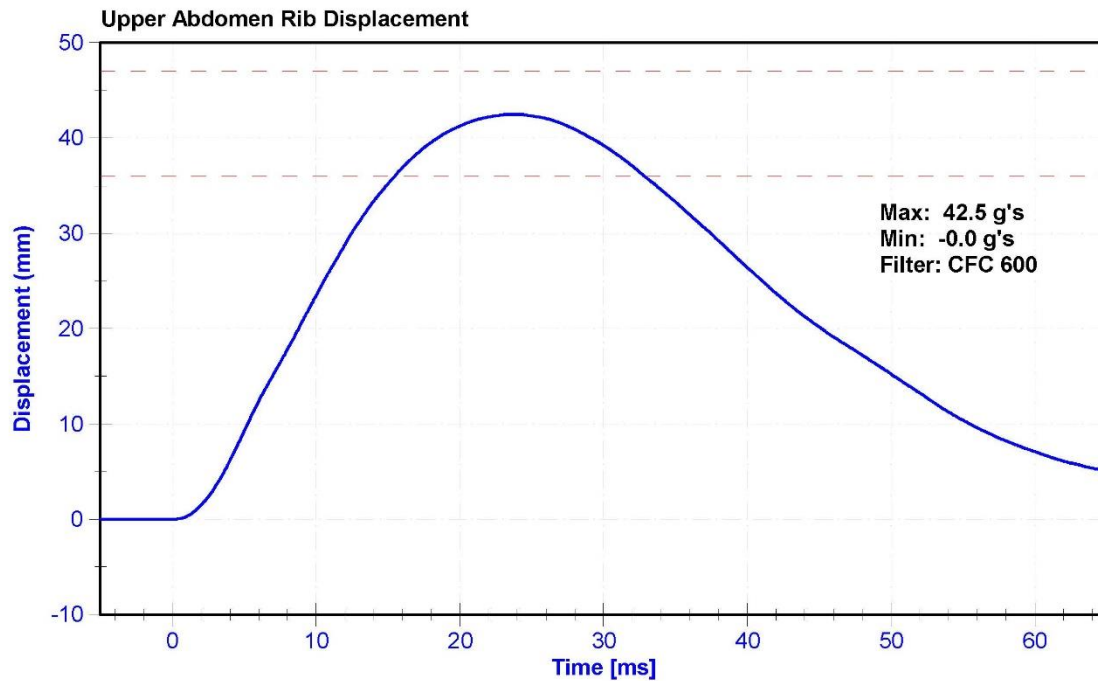
Results

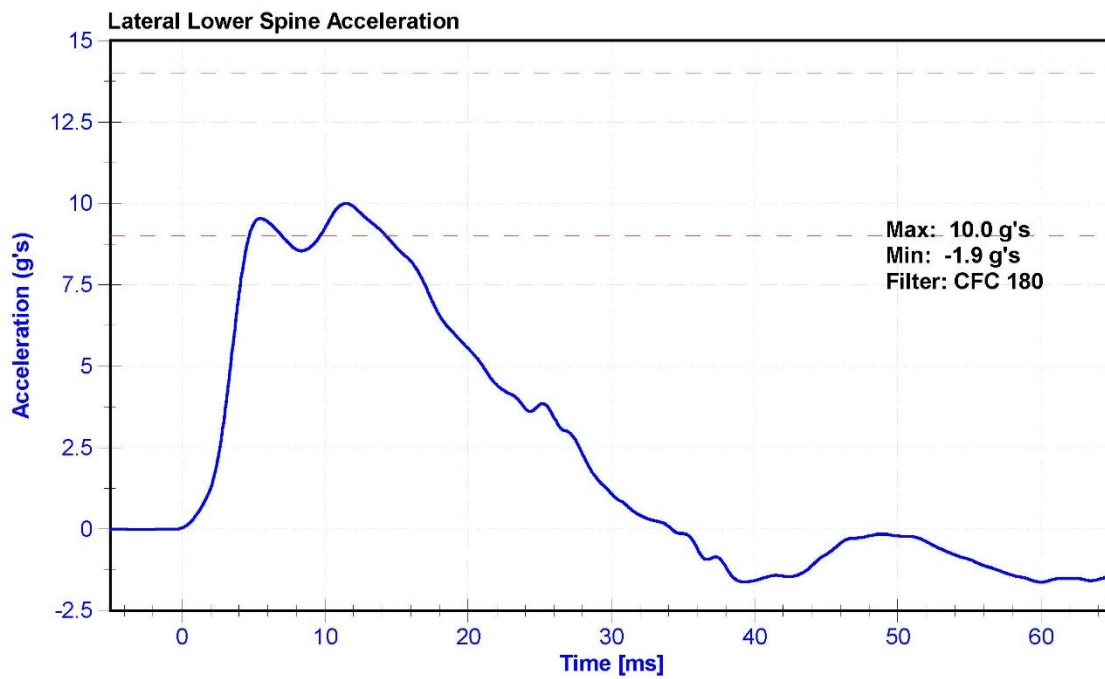
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	34.8	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	13.0	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.0	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.5	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	9/27/2017	9/27/2018
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/27/2017	9/27/2018







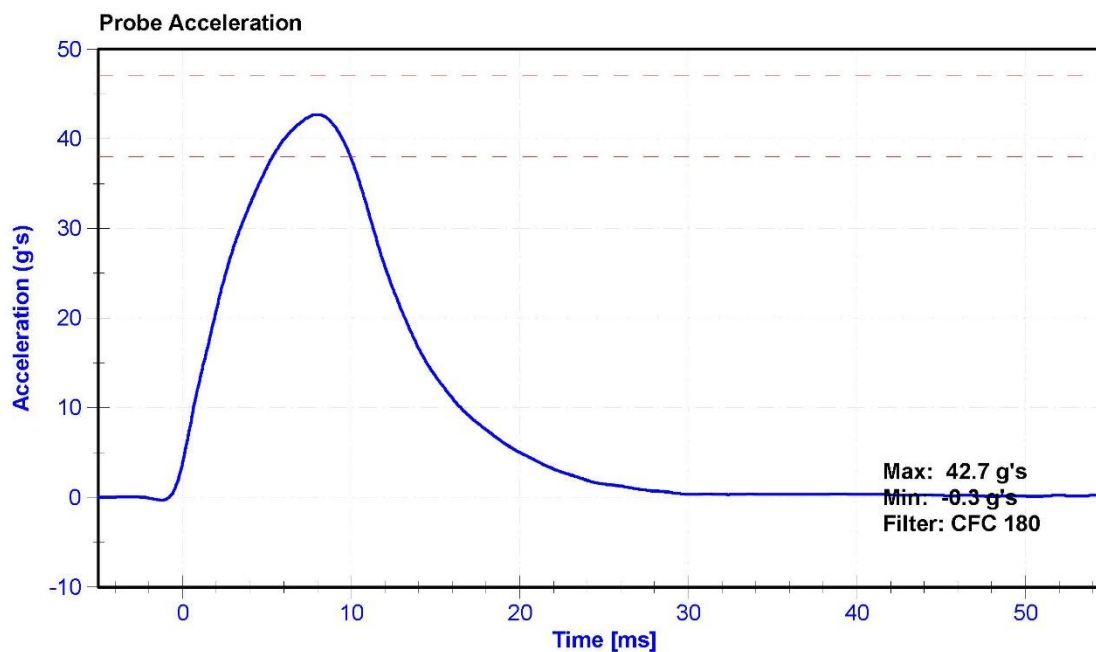
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

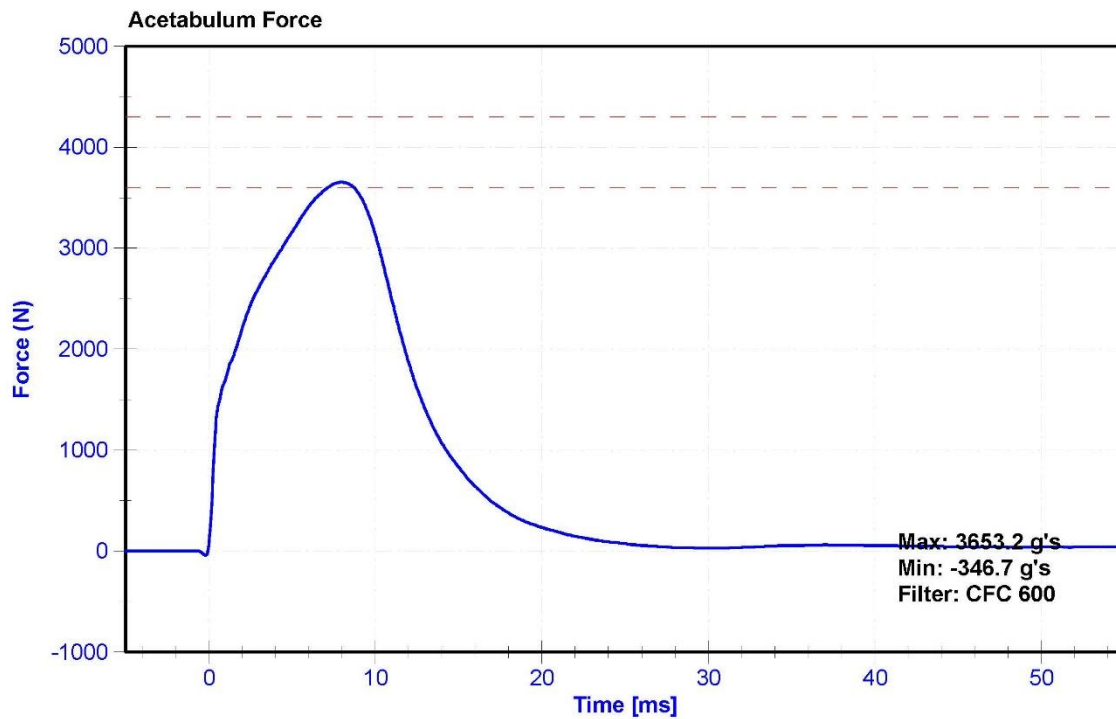
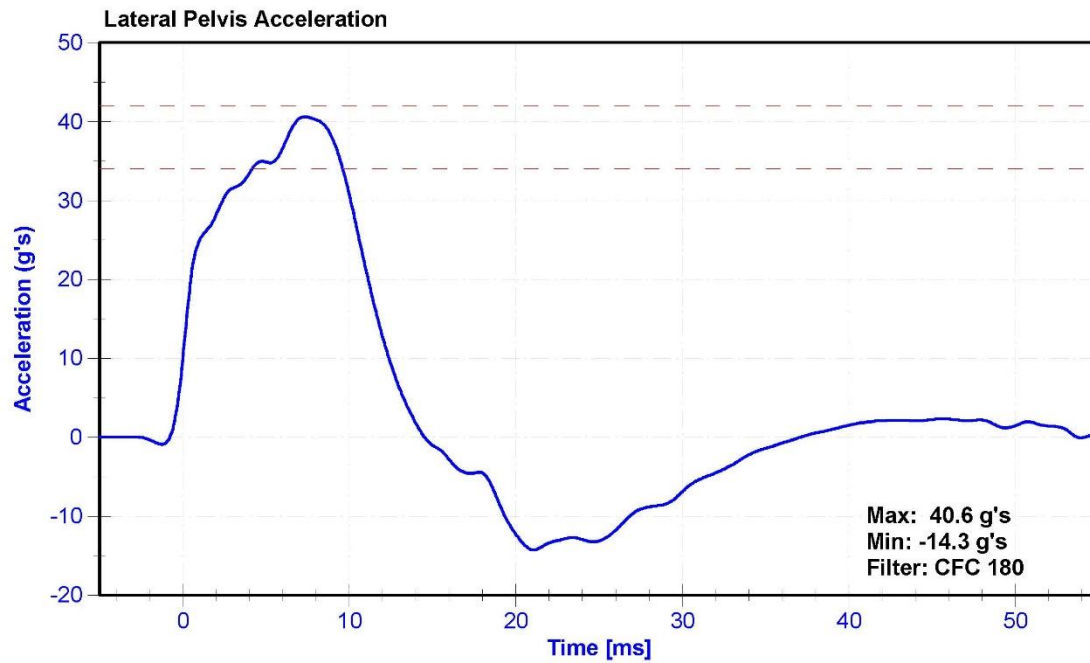
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	33.4	Pass
Velocity	6.6	6.8	m/s	6.64	Pass
Probe Acceleration	38	47	g's	42.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.6	Pass
Acetabulum Force	3600	4300	N	3653.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Acetabulum Load Cell	Denton 3249J	LC-267Fy	6/6/2017	6/6/2018
Certification Plug	SACO	11949	01/02/2018	N/A
Crash Test Plug	SACO	11947	02/01/2018	N/A







SID-IIs Pelvis Plug Certification Test

Plug S/N 11947

Test Number 6135

Report Number 6152

Test Date 2/1/2018 10:00:10 AM

Crash

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	259.14	50.00 600.00
Force @ 1.5 mm (N)	1,178.55	850.00 1,400.00
Force @ 2.5 mm (N)	1,471.02	1,306.00 1,818.00
Force @ 3.0 mm (N)	1,529.35	1,361.00 1,673.00

Testing Machine STM-20 5965542

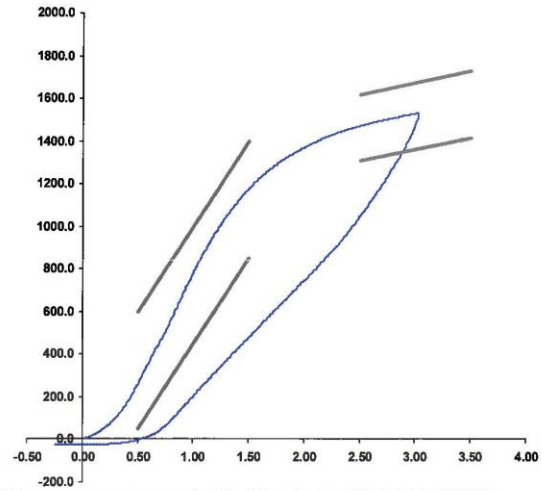
Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107

01-Feb-18

SACO Research

By : DC Date : 2/1/18

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



SID-IIs Pelvis Plug Certification Test

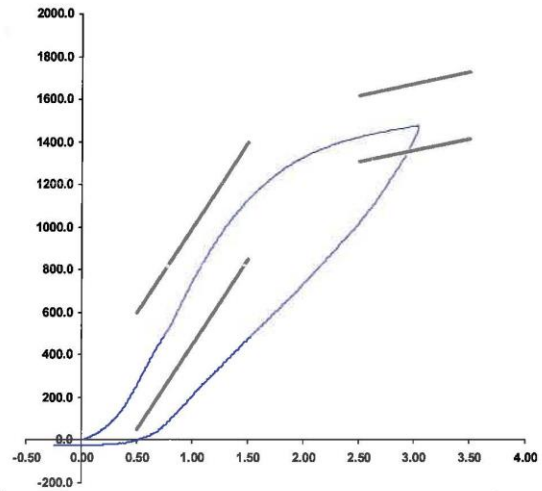
Plug S/N 12267
 Test Number 6652
 Report Number 6667
 Test Date 3/15/2018 10:58:11 AM

Cert

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	256.81	50.00	600.00
Force @ 1.5 mm (N)	1,133.30	850.00	1,400.00
Force @ 2.5 mm (N)	1,423.44	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,474.03	1,361.00	1,673.00

Testing Machine STM-20 5965542
 Load Cell S/N (F1360947), Units (LBS) 1000
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)
 Notes:

Force (-N) vs Extension (-mm)



Operator
 Part Number 180-4450

Template No 107 15-Mar-18
 SACO Research

By: DC Date: 3/15/18
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

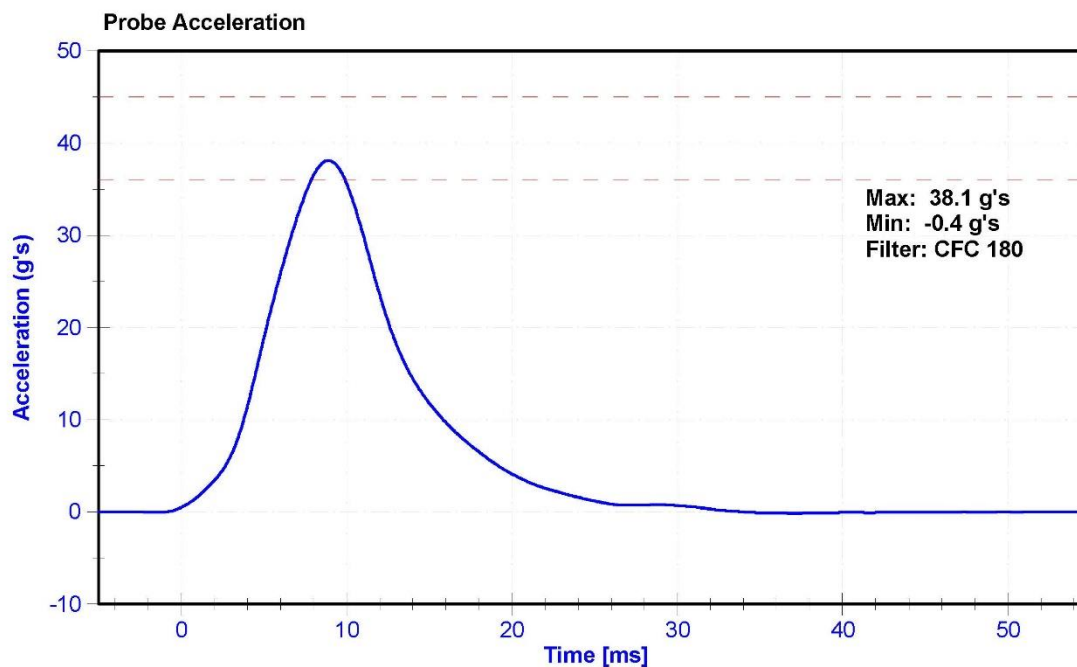
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

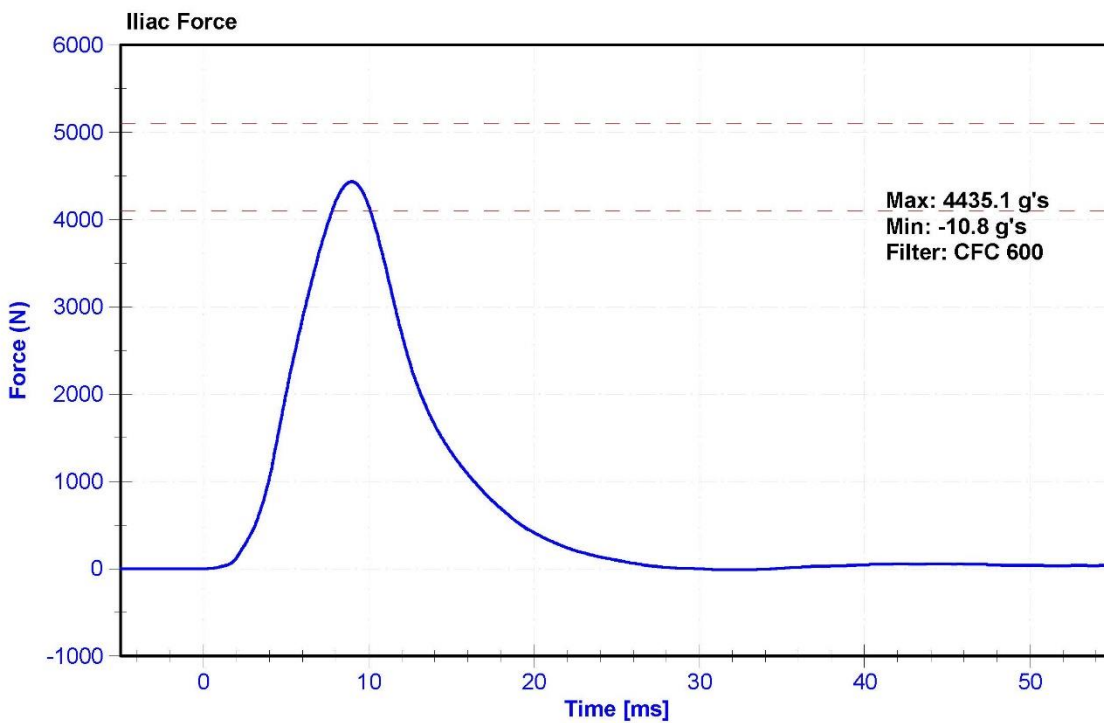
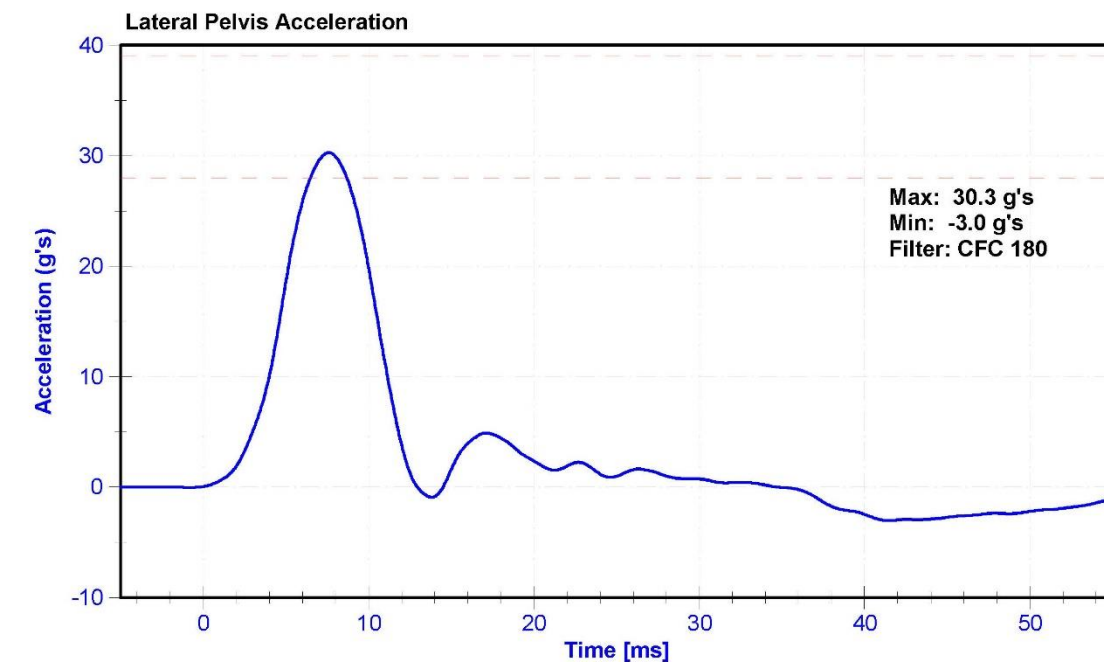
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	39.4	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	36	45	g's	38.1	Pass
Lateral Pelvis Acceleration	28	39	g's	30.3	Pass
Iliac Force	4100	5100	N	4435.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Iliac Load Cell	DENTON 3228J	LC-281Fy	6/6/2017	6/6/2018





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	5/4/2018
			Y	AC-P51682	ENDEVCO	5/4/2018
			Z	AC-P51699	ENDEVCO	5/4/2018
Head Accelerometers - Redundant			X	AC-P51701	ENDEVCO	5/4/2018
			Y	AC-P45019	ENDEVCO	5/4/2018
			Z	AC-P51690	ENDEVCO	5/4/2018
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-2165GFE	Servo	5/15/2018
		Middle	Y	DS-45 GFE	Servo	12/11/2017
		Lower	Y	DS-011GFE	Servo	9/27/2017
	Abdominal Rib	Upper	Y	DS-008GFE	Servo	9/27/2017
		Lower	Y	DS-1774GFE	Servo	9/27/2017
Lower Spine Accelerometers (T12)			X	AC-P74788	ENDEVCO	5/4/2018
			Y	AC-P83319	ENDEVCO	5/4/2018
			Z	AC-P83432	ENDEVCO	5/4/2018
Acetabulum Load Cell			Y	LC-267Fy	Denton	6/6/2017
Lilac Wing Load Cell			Y	LC-281Fy	Denton	6/6/2017
Pelvis Plug (Struck Side)				11947	SACO	2/1/2018
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A250377	MSI 1201-1000	1/29/2018
Vehicle Center of Gravity	Y	AC-A250387	MSI 1201-1000	1/29/2018
Vehicle Center of Gravity	Z	AC-A250379	MSI 1201-1000	1/29/2018
Left Floor Sill	Y	AC-A184937	MSI 1201-1000	3/8/2018
A-Pillar Sill	Y	AC-A250339	MSI 1201-1006	1/17/2018
A-Pillar Low	Y	AC-A250356	MSI 1201-1004	1/17/2018
A-Pillar Mid	Y	AC-A250382	MSI 1201-1005	1/17/2018
B-Pillar Sill	Y	AC-A250353	MSI 1201-1000	1/29/2018
B-Pillar Low	Y	AC-A250368	MSI 1201-1000	1/29/2018
B-Pillar Mid	Y	AC-A250354	MSI 1201-1000	1/29/2018
Driver Seat	Y	AC-A250361	MSI 1201-1000	1/29/2018
Engine Top	X	AC-A197007	MSI 1201-1000	4/2/2018
Engine Top	Y	AC-A250380	MSI 1201-1002	1/17/2018
Firewall	Y	AC-A192193	MSI 1201-1002	4/2/2018
Right Roof	Y	AC-A247195	MSI 1201-1000	4/2/2018
Right Floor Sill	Y	AC-A222643	MSI 1201-1000	2/2/2018
Rear Floorpan	X	AC-A197030	MSI 1201-1000	4/2/2018
Rear Floorpan	Y	AC-A217558	MSI 1201-1000	3/27/2018

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18879	Interface 1220-FS	6/19/2017
Load Cell 2	LC-18852	Interface 1220-FS	6/19/2017
Load Cell 3	LC-46955	Interface 1220-FS	6/19/2017
Load Cell 4	LC-18882	Interface 1220-FS	6/19/2017
Load Cell 5	LC-18864	Interface 1220-FS	6/19/2017
Load Cell 6	LC-18847	Interface 1220-FS	6/19/2017
Load Cell 7	LC-62086	Interface 1220-FS	6/19/2017
Load Cell 8	LC-46962	Interface 1220-FS	6/19/2017