

REPORT NUMBER: SPNCAP-CAL-19-005

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

**Ford Motor Co
2019 Ford F-250 Crew Cab
Four Door Truck**

NHTSA No: M20190206

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



June 18, 2019

FINAL REPORT

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

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

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: 
Vincent Paolini, Senior Test Engineer

Date: June 18, 2019

Approved by: 
Vanessa Hansen, Operations Manager

Date: June 18, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SPNCAP-CAL-19-005	2. Government Accession No.	3. Recipient's Catalog No.																												
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2019 Ford F-250 four door Crew Cab Truck NHTSA No.: M20190206		5. Report Date June 18, 2019																												
		6. Performing Organization Code CAL																												
7. Author(s) Vincent Paolini, Senior Test Engineer Vanessa Hansen, Operations Manager		8. Performing Organization Report No. CAL-DOT-2019-005																												
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operation P.O. Box 400 Buffalo, New York 14225		10. Work Unit No.																												
		11. Contract or Grant No. DTNH22-14-D-00352																												
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report, March 20, 2019 - June 18, 2019																												
		14. Sponsoring Agency Code NRM-110																												
15. Supplementary Notes																														
16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2019 Ford F-250 four door Truck 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 March 20, 2019. The impact velocity of the vehicle was 32.28 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 432 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>220.353</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>32.679</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>1887.687</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>20.590</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>20.862</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	220.353	Resultant Lower Spine Acceleration	G	82	32.679	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1887.687	Maximum Thoracic Rib Deflection	mm	38	20.590	Maximum Abdomen Rib Deflection	mm	45	20.862
Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)																													
	Units	Threshold	Result																											
Head Injury Criteria (HIC ₃₆)		1000	220.353																											
Resultant Lower Spine Acceleration	G	82	32.679																											
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1887.687																											
Maximum Thoracic Rib Deflection	mm	38	20.590																											
Maximum Abdomen Rib Deflection	mm	45	20.862																											
17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement <u>Copies of this report are available from:</u> National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
19. Security Class. (of this report) UNCLASSIFIED	20. Security Class. (of this page) UNCLASSIFIED	21. No. of Pages 123	22. Price																											

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1-1
2	Summary of Test Results	2-1
3	Occupant and Vehicle Information	3-1
 <u>Data Sheet</u>		 <u>Page</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data	3-6
3	Dummy Longitudinal Clearance Dimensions	3-9
4	Dummy Lateral Clearance Dimensions	3-10
5	Camera and instrumentation Data	3-11
6	Vehicle Accelerometer Data	3-12
7	Rigid Pole Load Cell Data	3-13
8	Post-Test Observations	3-14
9	Test Vehicle Profile Measurements	3-16
10	Test Vehicle Exterior Crush Measurements	3-17
11	Vehicle Damage Profile Distances	3-20
12	FMVSS No. 301 Static Rollover Results	3-21
13	Dummy / Vehicle Temperature and Humidity Stabilization Data	3-22
 <u>Appendix</u>		 <u>Page</u>
A	Photographs	A-1
B	Vehicle and Dummy Response Data Plots	B-1
C	Dummy Configuration and Performance Verification Data	C-1
D	Test Equipment and Instrumentation Calibration Data	D-1

SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2019 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 2019 Ford F-250 four door Truck. 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 2019 Ford F-250 four door Truck. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.28 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on March 20, 2019. 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	220.353
Resultant Lower Spine Acceleration	g	82	32.679
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1887.687
Maximum Thoracic Rib Deflection	mm	38*	20.590
Maximum Abdominal Rib Deflection	mm	45*	20.862

*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 31.7 ms
- Front Seat Track Y Acceleration, Exceeded calibration range at 51.2 ms

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: 2019 Ford F-250 four door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
Test Date: 3/20/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20190206
Model Year	2019
Make	Ford
Model	F-250
Body Style	Crew Cab
VIN	1FT7W2A6XKED82443
Body Color	Blue
Odometer Reading (km/mi)	38 miles
Engine Displacement (L)	6.2
Type / No. Cylinders	V8
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	-
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso / Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	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	-

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	12/18
Vehicle Type	Truck

GVWR (kg)	4536
GAWR Front (kg)	1792
GAWR Rear (kg)	2876

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	3	3	-	6	
Capacity Weight (VCW) (kg)				1741	(A)
DSC X 68.04 kg				408.24	(B)
Cargo Weight (RCLW) (kg)				136	(A-B)

VEHICLE SEAT TYPE

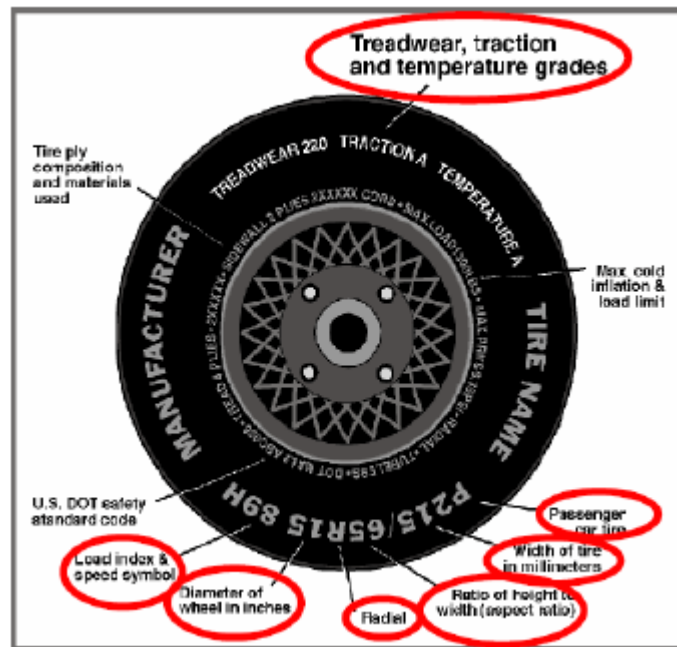
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle:	2019 Ford F-250 four door Truck
Test Program:	NCAP Side Pole Impact Test

NHTSA No.: M20190206
Test Date: 3/20/2019

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)	550	550
Cold Pressure (kPa)	420	520
Recommended Tire Size	LT275/65R18	LT275/65R18
Tire Size on Vehicle	LT275/65R18	LT275/65R18
Tire Manufacturer	Continental	Continental
Tire Model	Contitrac	Contitrac
Treadwear	N/A	N/A
Traction	N/A	N/A
Temperature Grades	N/A	N/A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 2 Polyamide	2 Polyester, 2 Steel, 2 Polyamide
Load Index/Speed Symbol	123/120S	123/120S
Tire Material	Rubber	Rubber
DOT Safety Code Left	A3B9 HOOR 4418	A3B9 HOOR 4418
DOT Safety Code Right	A3B9 HOOR 4418	A3B9 HOOR 4418

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

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	415	416	514	515
Tire Placard	kPa	420	420	520	520
Owner's Manual	kPa	420	420	520	520
As Tested	kPa	420	420	520	520

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	785	593		813	644		822	660	
Right	kg	778	592		794	676		801	650	
Ratio	%	57	43		55	45		55	45	
Totals	kg	1563	1185	2748	1607	1320	2927	1623	1310	2933

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2748	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2934	(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	-1.75	-1.60	-1.60	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-1.45	-1.40	-1.35	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	0.15	0.0	0.0	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	0.45	0.40	0.40	Yes
Vehicle CG (Aft of Front Axle)	mm	1751	1831	1814	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	+2.5	-3.5	+9.0	

* 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: 2019 Ford F-250 four door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
Test Date: 3/20/2019

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire	50
Ballast / Equipment Added	124

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: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019

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	Not Adjustable		
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	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
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: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

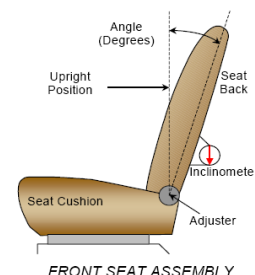
NHTSA No.: M20190206
 Test Date: 3/20/2019

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	254	38 (0-37)	0	0
Front Passenger Seat	254	38 (0-37)	0	0
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	50.6	N/A	-2.7	6
Front Passenger Seat	50.6	N/A	-2.0	6
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

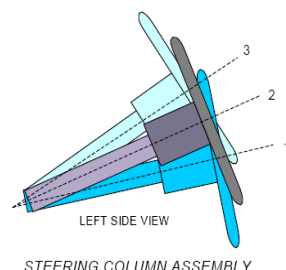
DATA SHEET NO. 2 ... (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019

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.

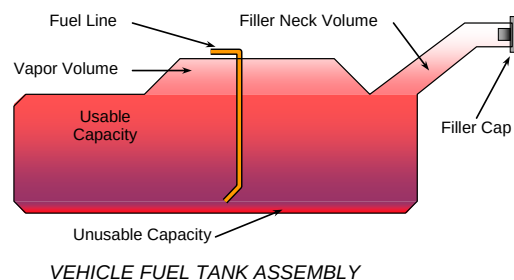


	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	20.5	
Geometric Center – Position 2	22.5	
Uppermost – Position 3	24.4	
Telescoping Steering Wheel Travel		40
Test Position	22.5	20

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	128.7
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	128.7
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	119.7
Actual Amount of Solvent Used in Test	119.7
1/3 of Usable Capacity	42.9

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

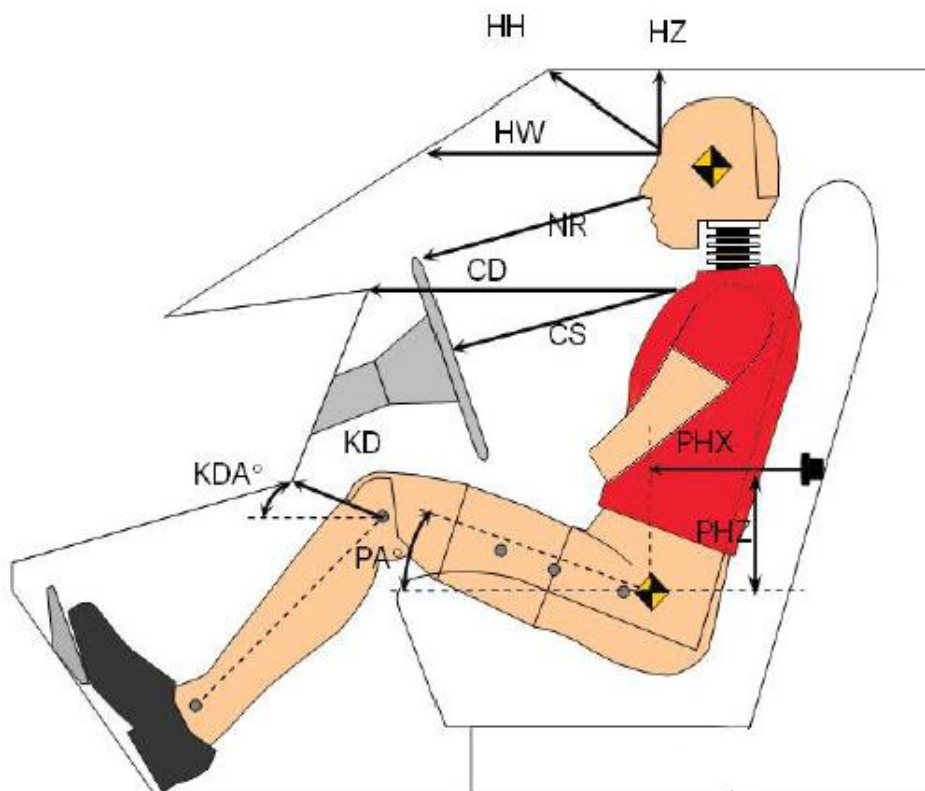


No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



Left Side View

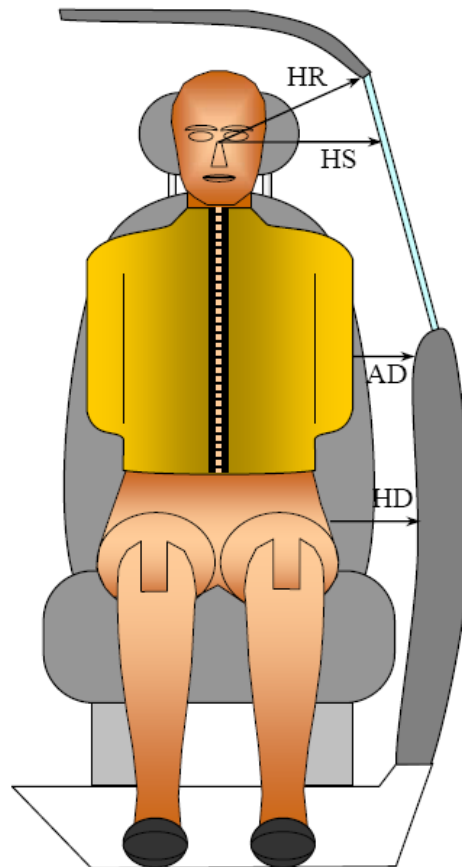
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	385	
HW	Head to Windshield	699	
HZ	Head to Roof Liner	270	
NR	Nose to Rim	262	
CD	Chest to Dash	481	
CS	Chest to Steering Wheel	215	
KD(L) / KDA(L)°	Left Knee to Dash	114	26.8
KD(R) / KDA(R)°	Right Knee to Dash	110	21.3
PAX°	Pelvic Tilt Angle (X-Axis)		20.6
PAY°	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	444	
PHZ	Hip Point to Striker (Z-Axis)	60	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



FRONT VIEW OF DUMMY

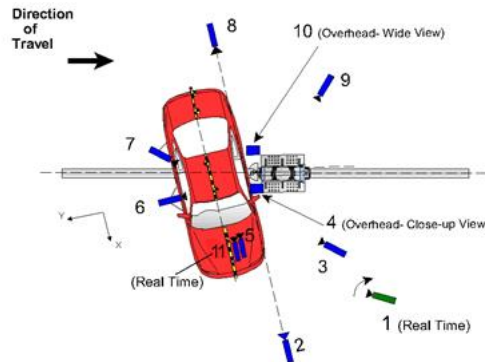
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	274
HS	Head to Side Window	mm	375
AD	Arm to Door	mm	168
HD	Hip Point to Door	mm	172

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



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	7808	0	-1526	28	1000
3	Impact side 45° - forward pole view	5480	-1353	-1428	24	1000
4	Overhead Close-up view of impact	0	0	-9370	24	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	-9868	0	-1479	28	1000
9	Impact side 45° - rearward pole view	-4249	-3507	-1441	24	1000
10	Overhead wide - view of impact	0	0	-9370	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.

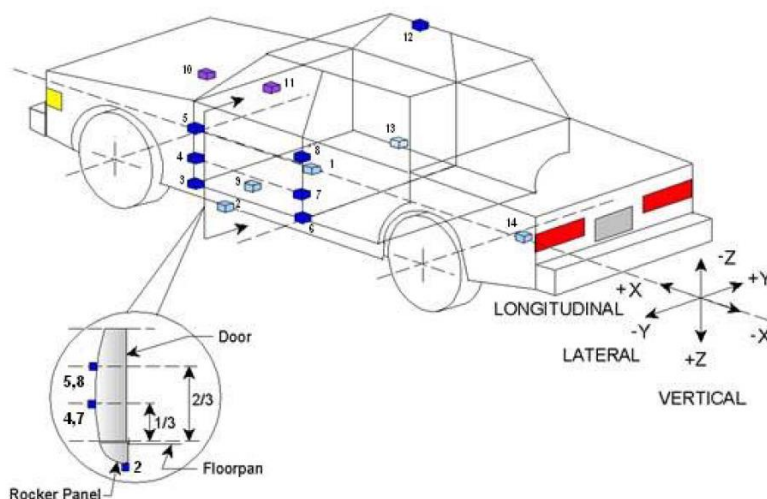
INSTRUMENTATION

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: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	4025	29	-299
2	Left Floor Sill	4022	-801	-76
3	A-Pillar Sill	4649	-773	-105
4	A-Pillar Low	4666	-771	-328
5	A-Pillar Mid	4678	-703	-855
6	B-Pillar Sill	3470	-735	-149
7	B-Pillar Low	3490	-764	-381
8	B-Pillar Mid	3480	-757	-755
9	Driver Seat Track	3683	-612	-139
10	Engine Top	5504	-78	-381
11	Firewall	4897	-270	-534
12	Right Roof	3583	624	-1382
13	Right Floor Sill	4018	791	-66
14	Rear Floorpan	826	-2	-289

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: 2019 Ford F-250 four door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
Test Date: 3/20/2019

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: 2019 Ford F-250 four door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
Test Date: 3/20/2019

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 & Head Restraint
Left Shoulder	Torso/Pelvis Airbag & Seat Back
Upper Torso	Seat Back
Lower Torso	Seat Back
Left Hip	Torso/Pelvis Airbag & Seatpan
Left Knee	Door panel

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: 2019 Ford F-250 four door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
Test Date: 3/20/2019

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks throughout windshield with separation near upper Roof and Driver A-Pillar areas.
Side Window Damage	Driver's window cracked throughout
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

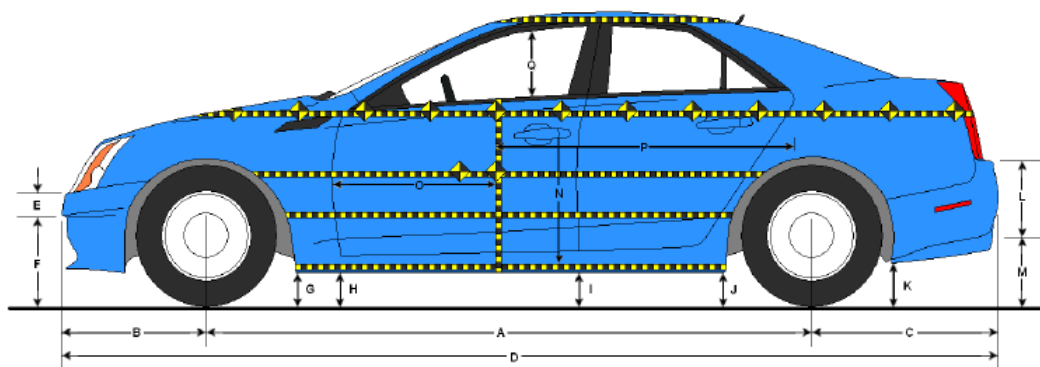
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1316
Actual Impact Point - Aft of Front Axle	mm		1321
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	-5
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.28
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.29

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

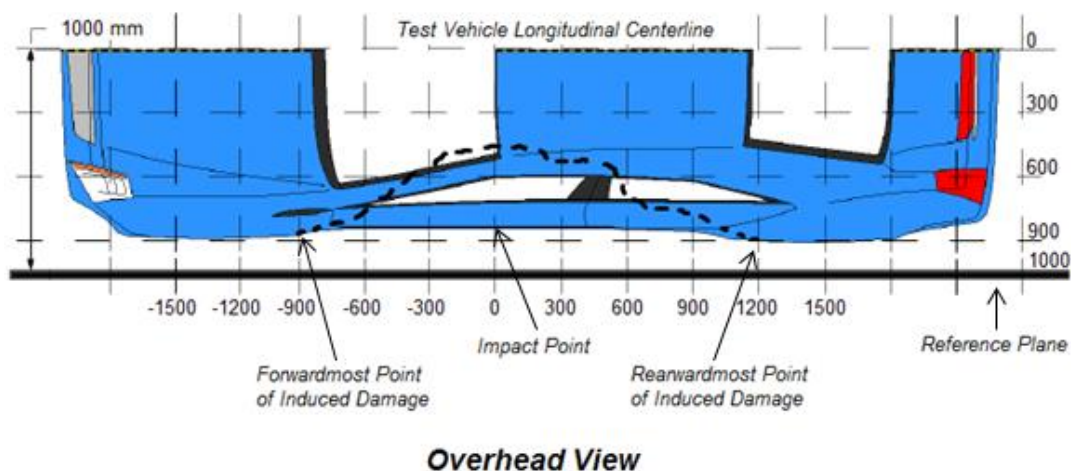
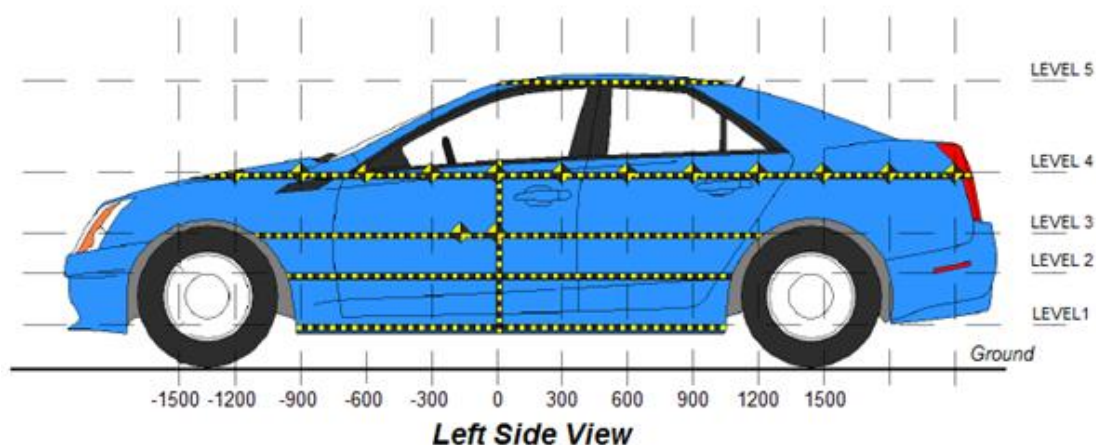
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	4061	3997	64
B	Front Axle to FSOV	974	1015	-41
C	Rear Axle to RSOV	1312	1307	5
D	Total Length at Centerline	6347	6318	29
E	Front Bumper Thickness	270	270	0
F	Front Bumper Bottom to Ground	375	390	-15
G	Sill Height at Front Wheel Well	434	430	4
H	Sill Height at Front Door Leading Edge	435	429	6
I	Sill Height at B-Pillar	460	448	12
J1	Sill Height at Rear Wheel Well	492	514	-22
J2	Pinch Weld Height at Rear Wheel Well	483	497	-14
K	Sill Height Aft of Rear Wheel Well	527	556	-29
L	Rear Bumper Thickness	227	227	0
M	Rear Bumper Bottom to Ground	511	535	-24
N	Sill Height to Bottom of Front Window Sill	864	866	-2
O	Front Door Leading Edge to Impact CL	696	561	135
P	Rear Door Trailing Edge to Impact CL	1533	1437	96
Q	Front Window Opening	484	500	-16
R	Right Side Length	6291	6270	21
S	Left Side Length	6289	6247	42
T	Vehicle Width at B-Pillars	2020	1969	51

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

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

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	596	420	150
2	Occupant Hip Point	mm	991	432	150
3	Mid - Door	mm	932	431	150
4	Window Sill	mm	1242	404	150
5	Window Top	mm	1935	57	450

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: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019

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				934					1003					-69	
-1200				946					1001					-55	
-1050				955					994					-39	
-900			1009	962				1004	984				5	-22	
-750		996	996	969			981	975	974			15	21	-5	
-600	977	997	996	972		900	953	947	950		77	44	49	22	
-450	979	1000	999	977		824	871	867	875		155	129	132	102	
-300	981	1003	1001	983		747	785	783	792		234	218	218	191	
-150	983	1005	1003	987		667	687	683	700		316	318	320	287	
0	984	1008	1006	991		569	588	586	597		415	420	420	394	
150	986	1010	1008	995		566	578	577	591		420	432	431	404	
300	987	1011	1009	998		684	693	691	701		303	318	318	297	
450	988	1013	1011	1000	710	798	820	818	825	653	190	193	193	175	57
600	987	1011	1009	1002	717	863	910	903	915	675	124	101	106	87	42
750	989	1010	1007	1002	722	875	918	910	923	686	114	92	97	79	36
900	990	1011	1008	1003	726	886	927	918	932	692	104	84	90	71	34
1050	991	1010	1007	1002	729	896	935	926	940	696	95	75	81	62	33
1200	992	1010	1007	1002	731	907	944	936	949	698	85	66	71	53	33
1350		1008	1006	991	732		952	948	949	698		56	58	42	34
1500			1005	998	700			956	964	665			49	34	35

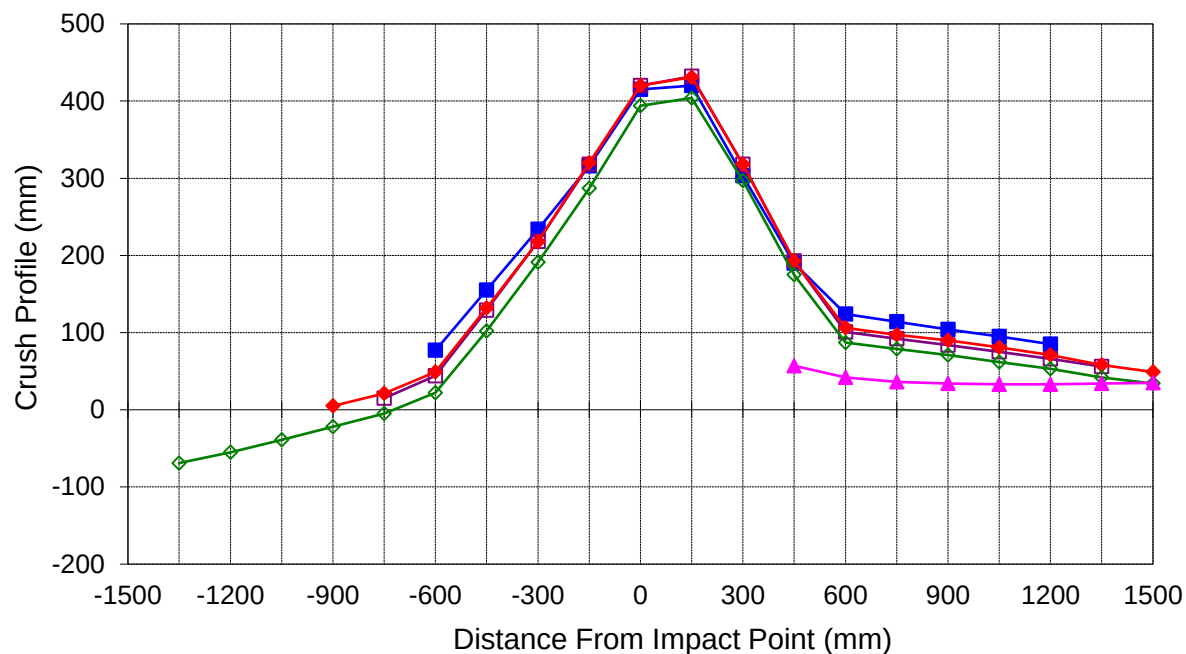
NOTE: Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is 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: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019

Vehicle Exterior Crush Measurements - Visual Representation



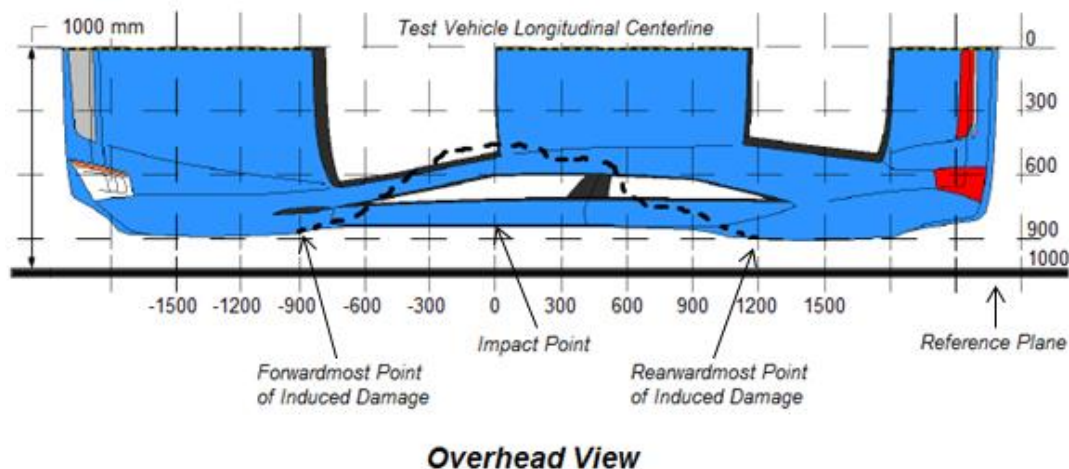
—■— LEVEL 1 Side Sill: 596 mm above ground	—■— LEVEL 2 H-Point: 991 mm above ground
—◆— LEVEL 3 Mid Door: 932 mm above ground	—◆— LEVEL 4 Window Sill: 1242 mm above ground
—▲— LEVEL 5 Window Top: 1935 mm above ground	

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

Test Vehicle: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019

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	-9	-4	5
2	-420	3	150	1	149
3	60	3	418	-7	425
4	540	3	131	-10	141
5	1020	3	76	-7	83
6	1500	3	44	-5	49

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

Test Vehicle: <u>2019 Ford F-250 four door Truck</u>	NHTSA No.: <u>M20190206</u>
Test Program: <u>NCAP Side MDB Impact Test</u>	Test Date: <u>3/20/2019</u>
Test Time: <u>10:11 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°	66	300	366
180° to 270°	64	300	364
270° to 360°	73	300	373

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

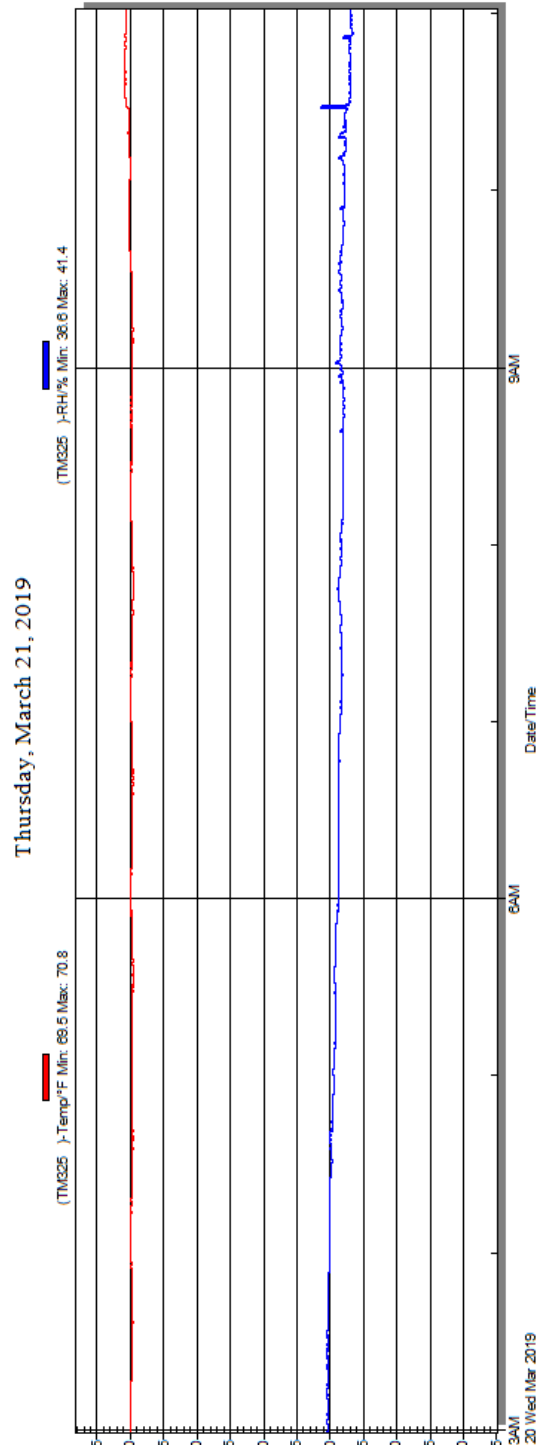
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2019 Ford F-250 four door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190206
 Test Date: 3/20/2019



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

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-4
2	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-4
3	Pre-Test Frontal View of Test Vehicle	A-5
4	Post-Test Frontal View of Test Vehicle	A-5
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
7	Pre-Test Left Side View of Test Vehicle	A-7
8	Post-Test Left Side View of Test Vehicle	A-7
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
11	Pre-Test Rear View of Test Vehicle	A-9
12	Post-Test Rear View of Test Vehicle	A-9
13	Pre-Test Right Side View of Test Vehicle	A-10
14	Post-Test Right Side View of Test Vehicle	A-10
15	Pre-Test Overhead View of Test Area	A-11
16	Post-Test Overhead View of Test Area	A-11
17	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-12
18	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-12
19	Pre-Test Close-Up View of Impact Point Target	A-13
20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-13
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-14
22	Post-Test Front Close-Up View of Dummy	A-14
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-15
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-15
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-16
26	Pre-Test Frontal View of Seat Back Prior to Dummy Positioning	A-16
27	Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint	A-17
28	Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning	A-17
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-18
30	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-18
31	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-19
32	Pre-Test Placement of Dummy's Feet	A-19
33	Pre-Test View of Belt Anchorage for Dummy	A-20
34	Pre-Test Left Side View of Steering Wheel	A-20
35	Pre-Test View of Disengaged Parking Brake	A-21

Fig.	Description	Page
36	Pre-Test View of Parking Brake	A-21
37	Pre-Test Close-Up Left Side View of Driver Seat Track	A-22
38	Pre-Test Close-Up Left Side View of Driver Seat Back	A-22
39	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-23
40	Pre-Test Dummy and Door Clearance View	A-23
41	Post-Test Dummy and Door Clearance View	A-24
42	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-24
43	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-25
44	Pre-Test Inner Door Panel View	A-25
45	Post-Test Inner Door Panel View Showing Dummy Contact Location	A-26
46	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-26
47	Post-Test Dummy Close-Up Head Contact with Side Airbag View	A-27
48	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-27
49	Post-Test Dummy Close-Up Torso Contact with Side Airbag View	A-28
50	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-28
51	Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View	A-29
52	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-29
53	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-30
54	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-30
55	Close-Up View of Vehicle's Certification Label	A-31
55a	Close-Up View of Reduced Load Capacity Label	A-31
56	Close-Up View of Vehicle's Tire Information Placard or Label	A-32
57	Pre-Test Pole Barrier Front View	A-32
58	Post-Test Pole Barrier Front View	A-33
59	Pre-Test Pole Barrier Side View	A-33
60	Post-Test Pole Barrier Side View	A-34
61	Pre-Test Ballast View	A-34
62	Post-Test Primary and Redundant Speed Trap Read-Out	A-35
63	FMVSS No. 301 Static Rollover 0 Degrees	A-35
64	FMVSS No. 301 Static Rollover 90 Degrees	A-36
65	FMVSS No. 301 Static Rollover 180 Degrees	A-36
66	FMVSS No. 301 Static Rollover 270 Degrees	A-37
67	FMVSS No. 301 Static Rollover 360 Degrees	A-37
68	Impact Event	A-38
69	Monroney Label	A-38
70	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-39
71	Post-Test View of Shattered Vehicle Inner Door Panel	A-39



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

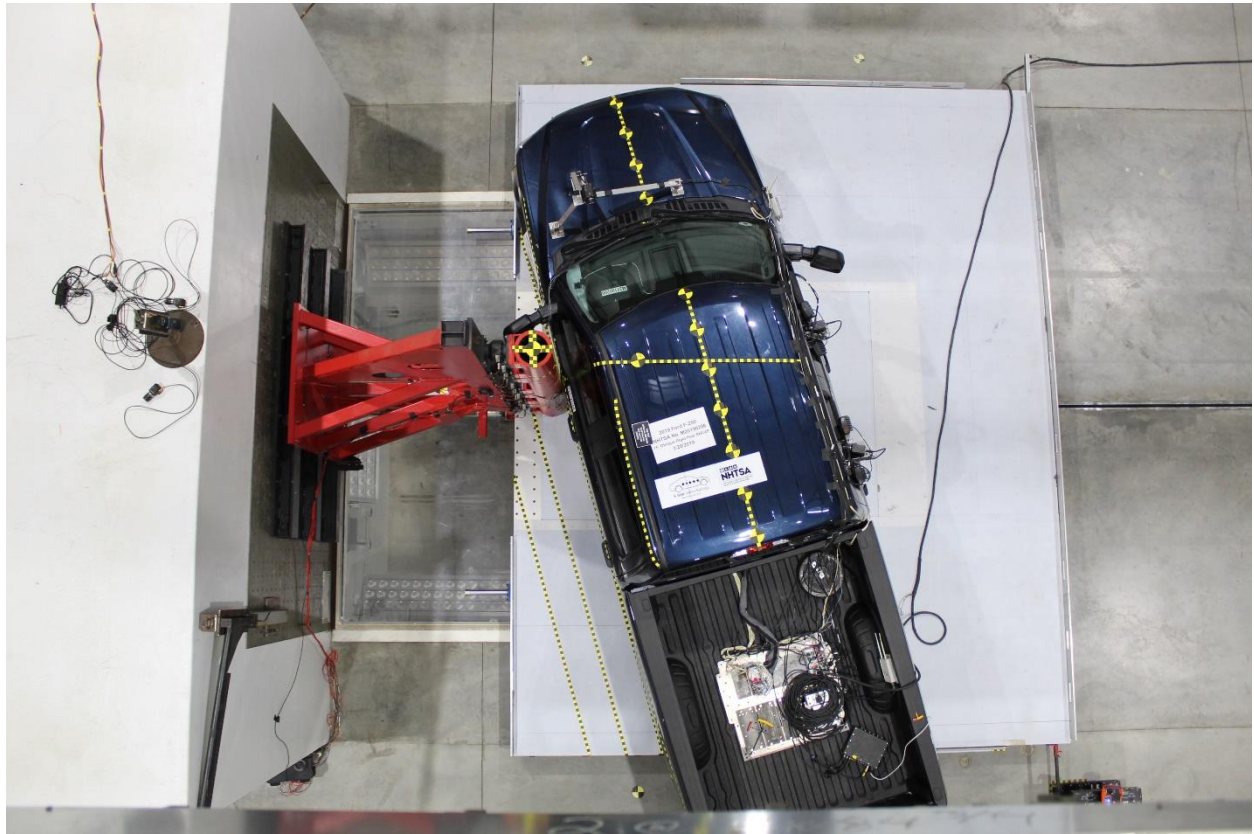


Figure A-15: Pre-Test Overhead View of Test Area

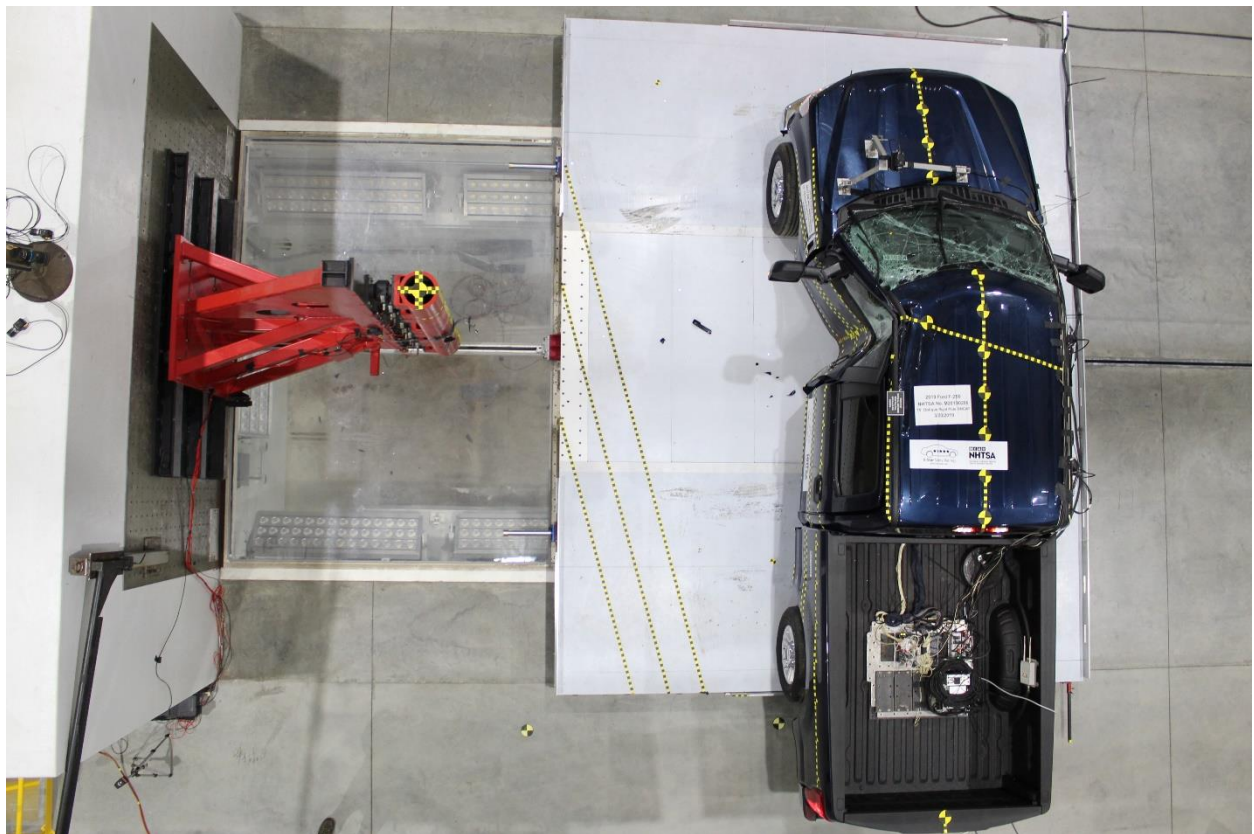


Figure A-16: Post-Test Overhead View of Test Area

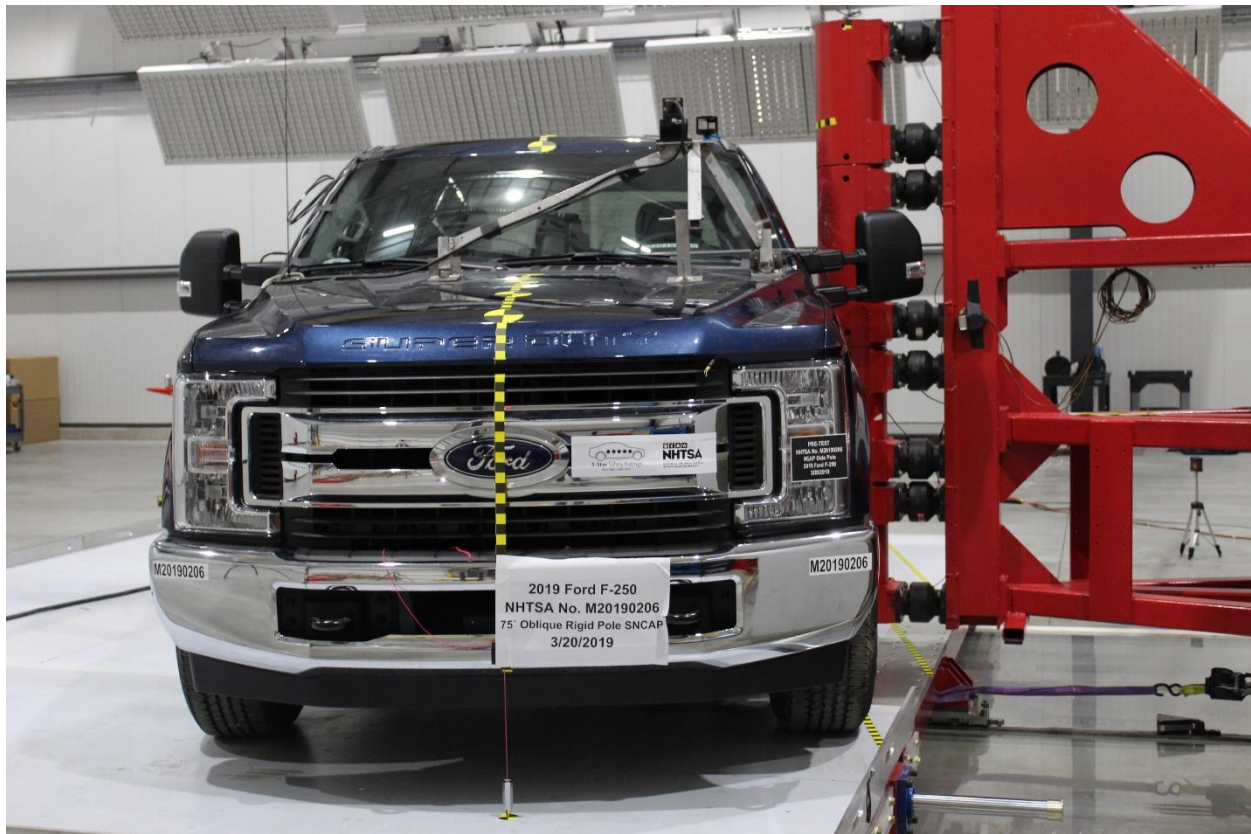


Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



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

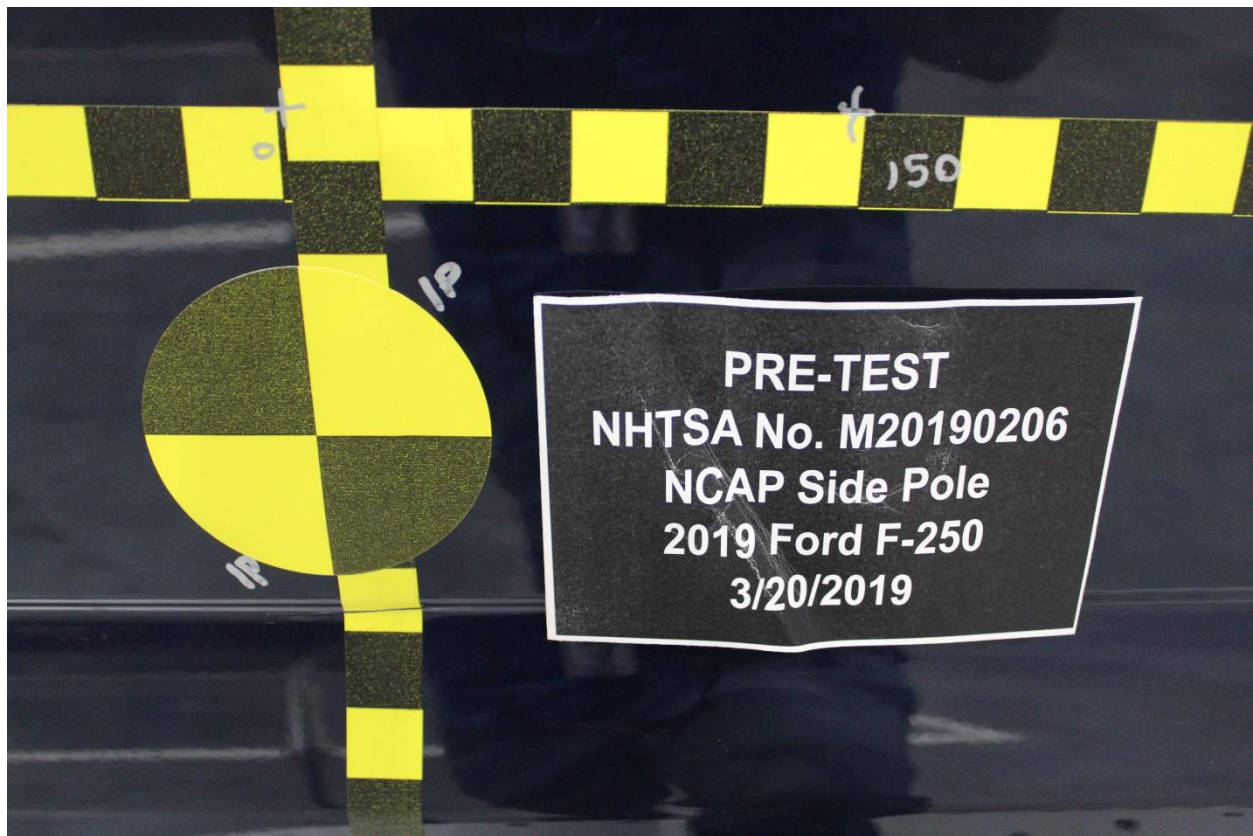


Figure A-19: Pre-Test Close-Up View of Impact Point Target



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

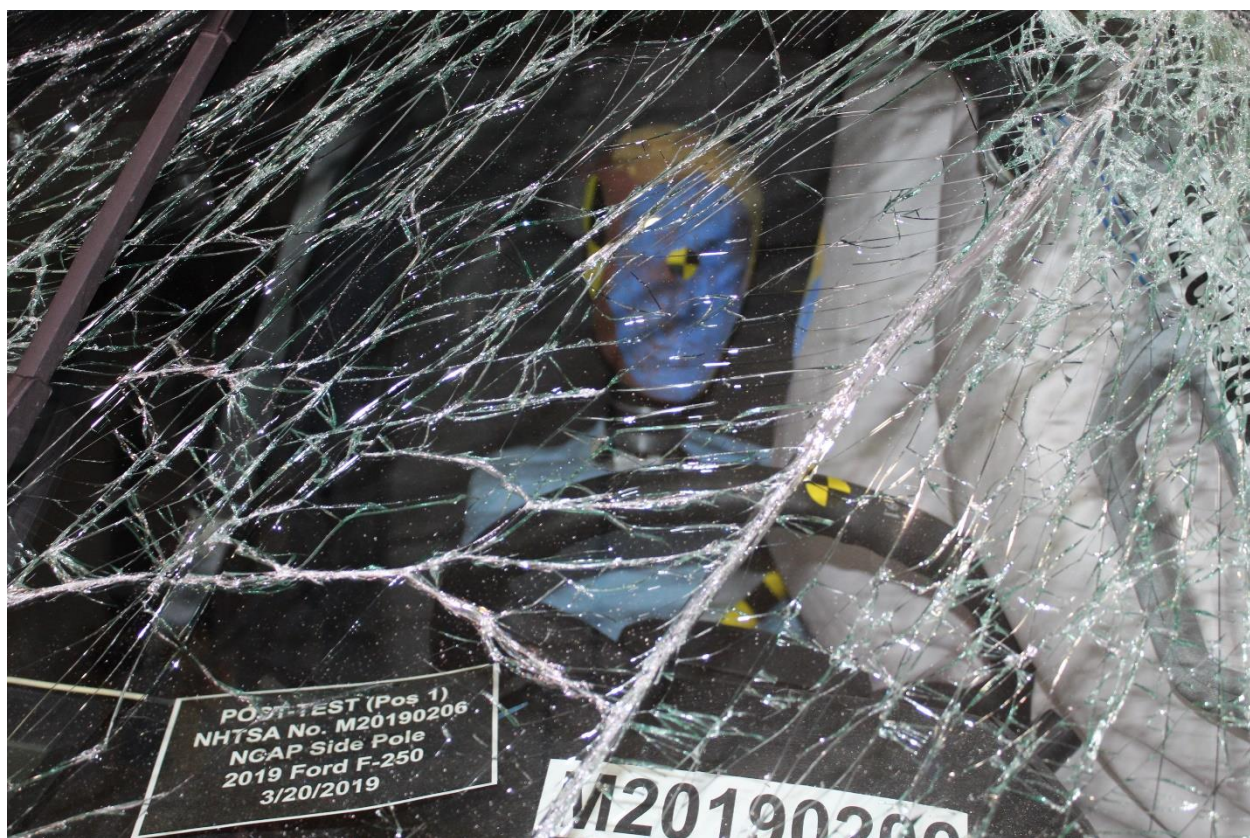


Figure A-22: Post-Test Front Close-Up View of Dummy



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

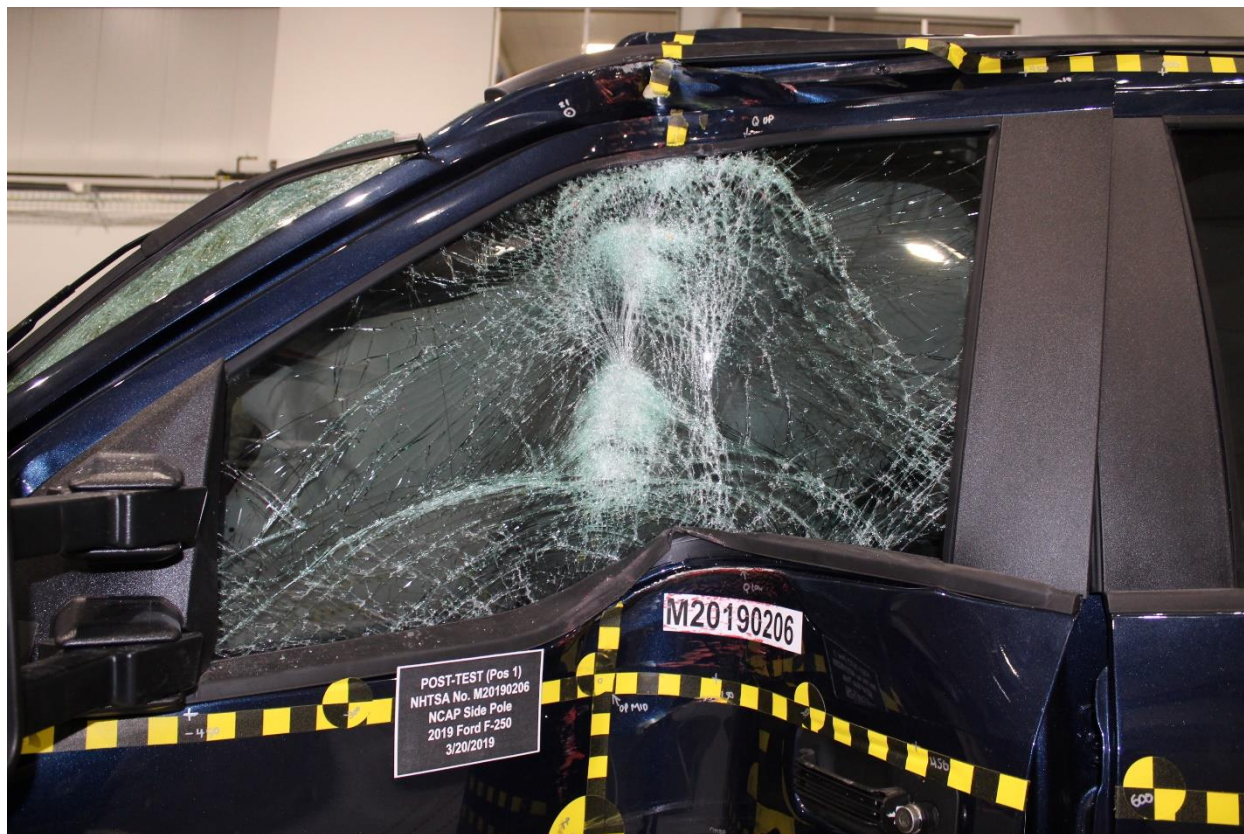


Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View



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

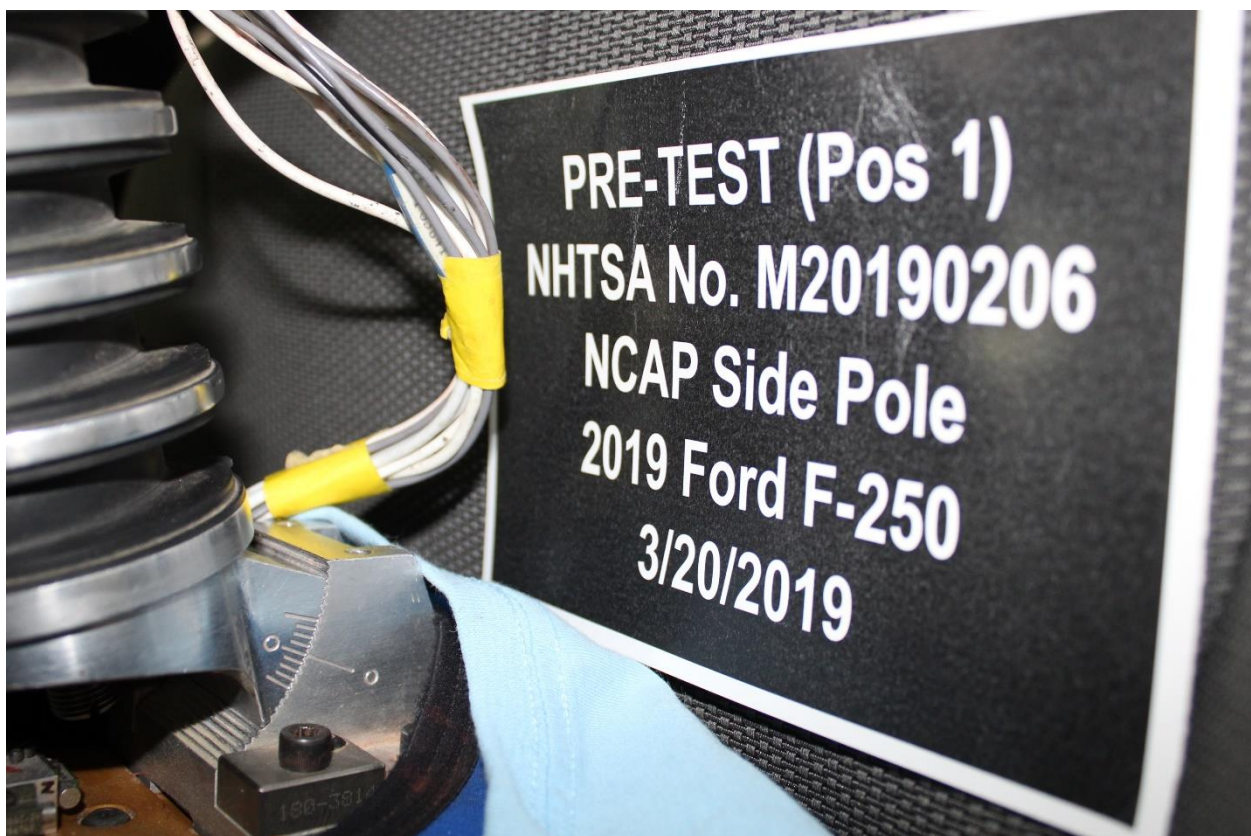


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



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

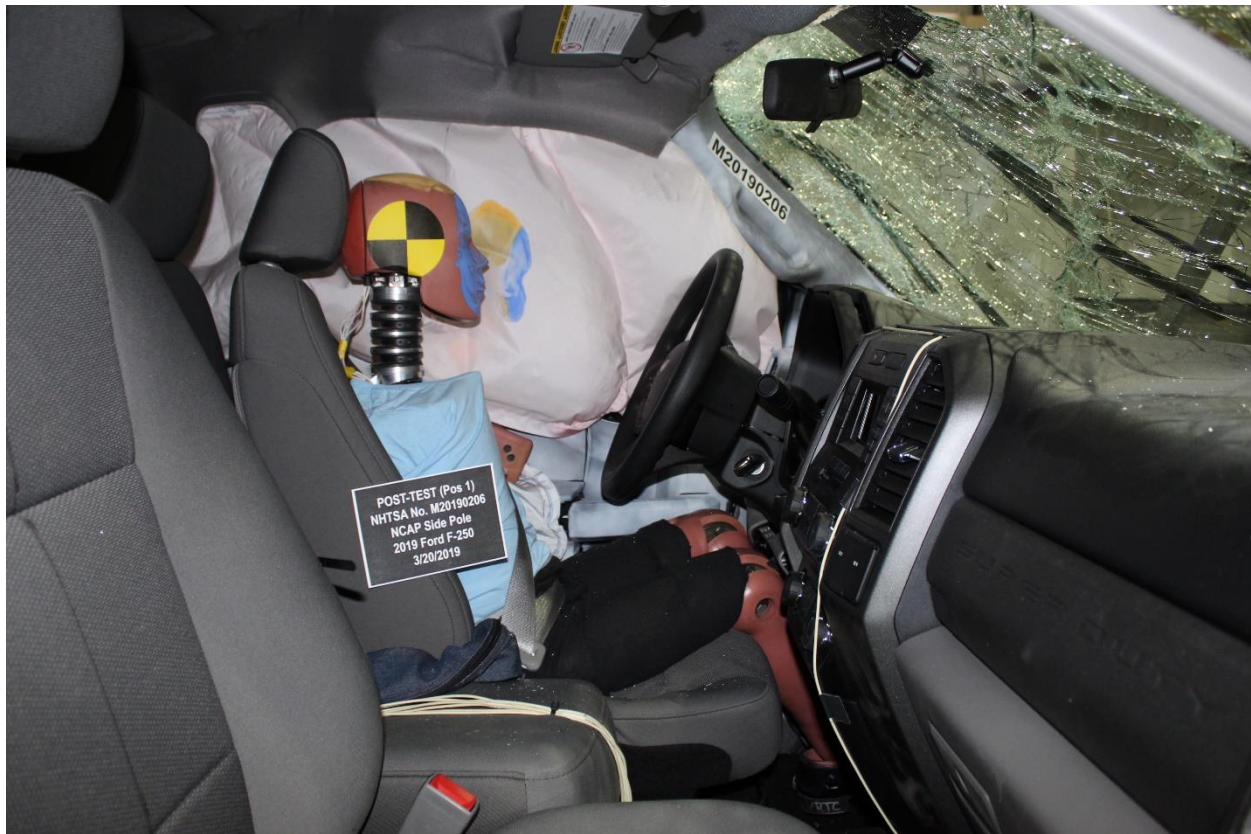


Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



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

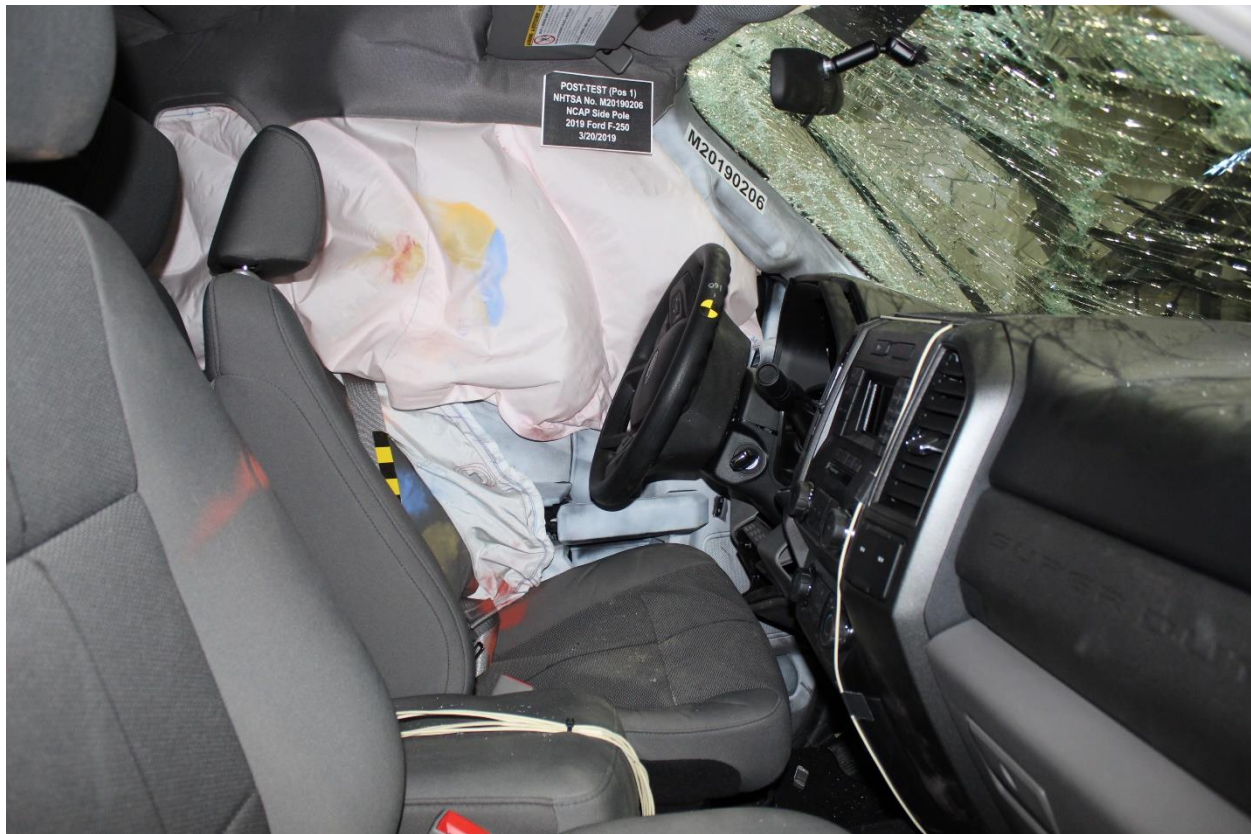


Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



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

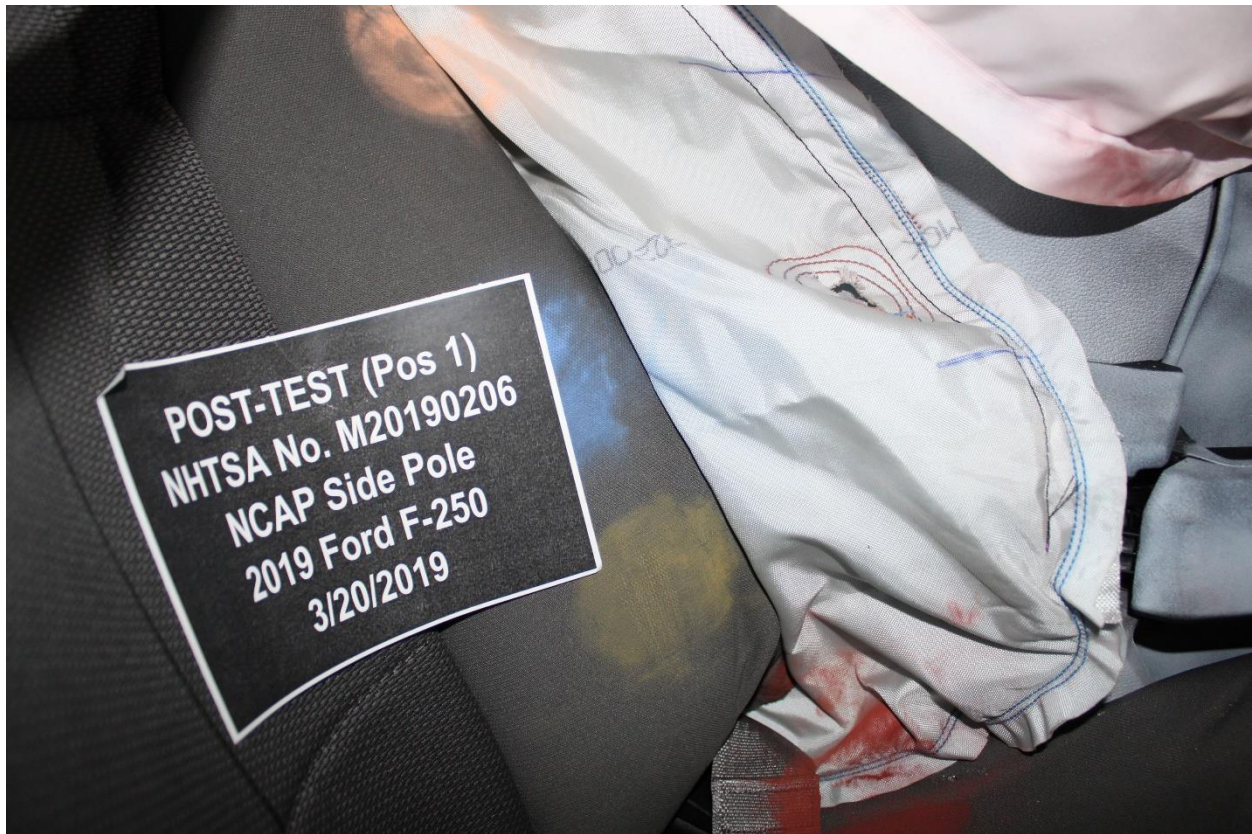


Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



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

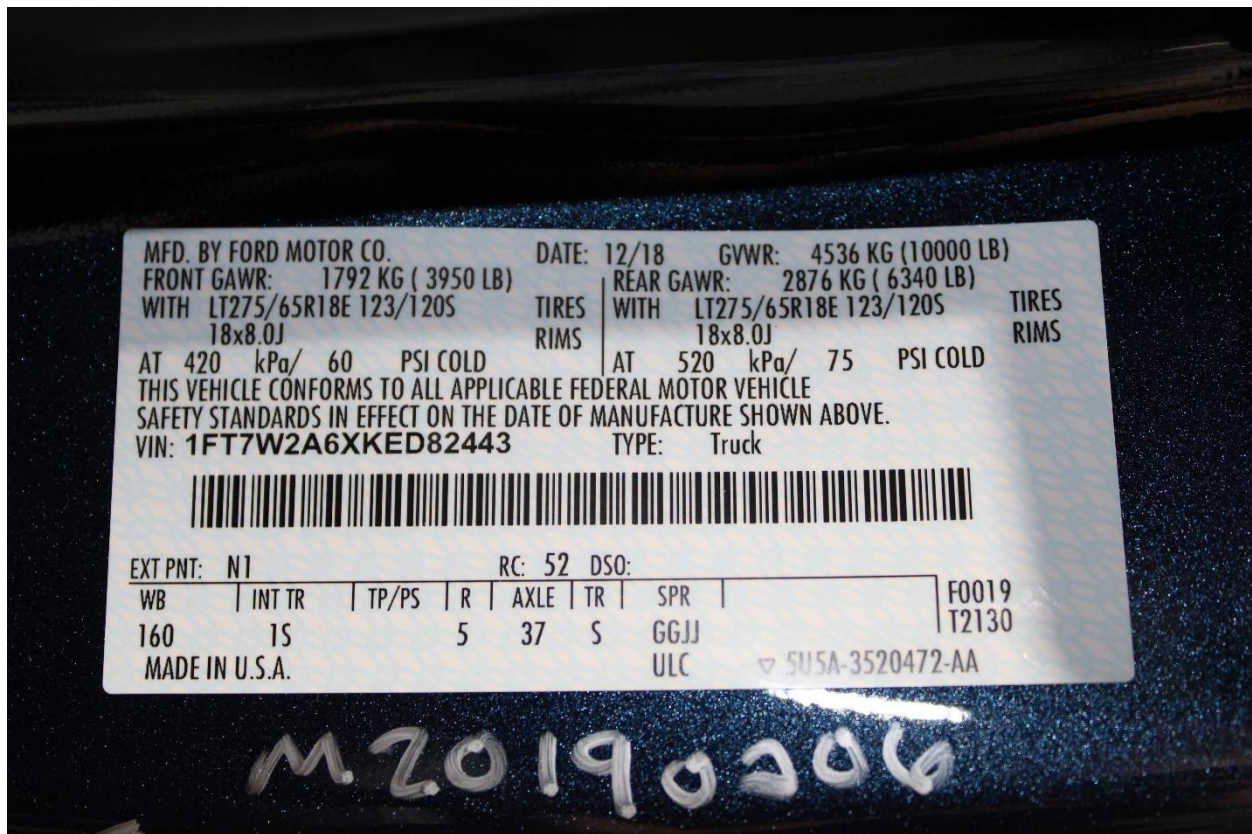


Figure A-55: Close-Up View of Vehicle's Certification Label

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

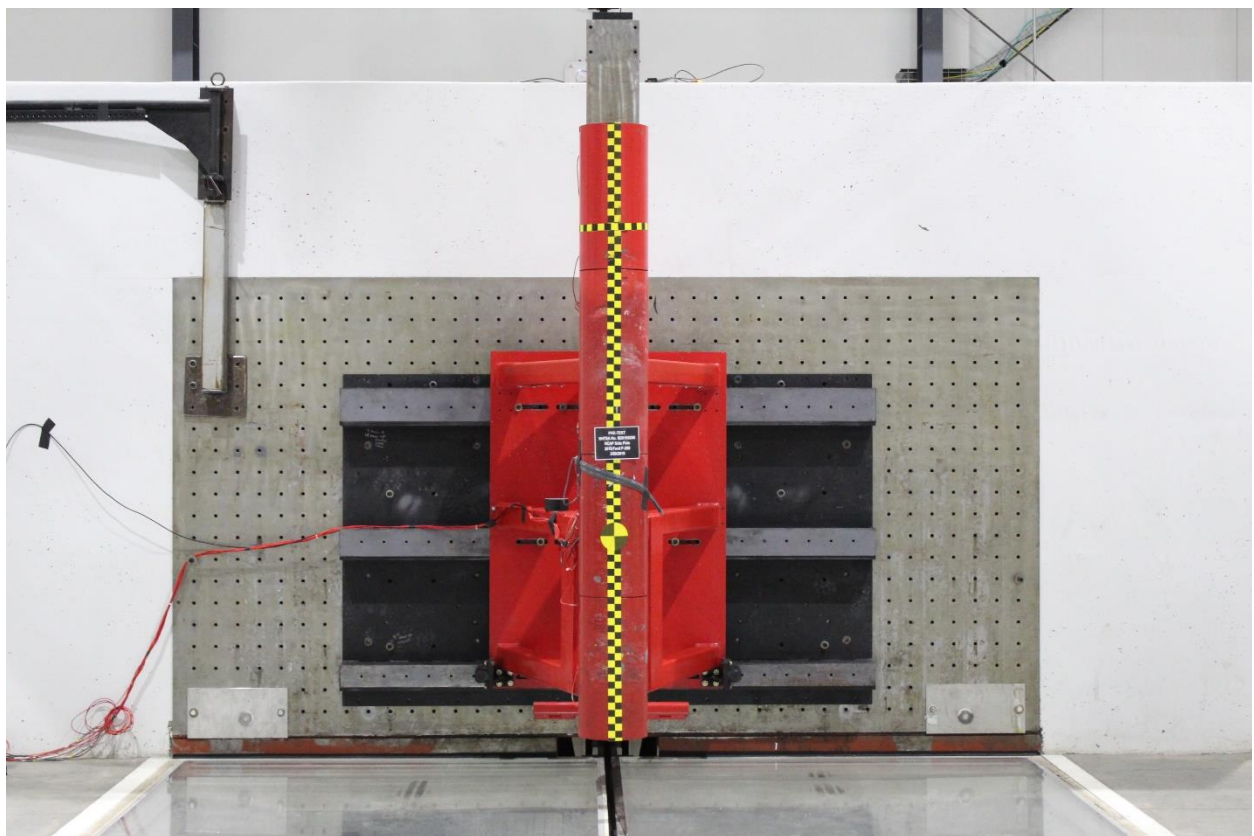


Figure A-57: Pre-Test Pole Barrier Front View

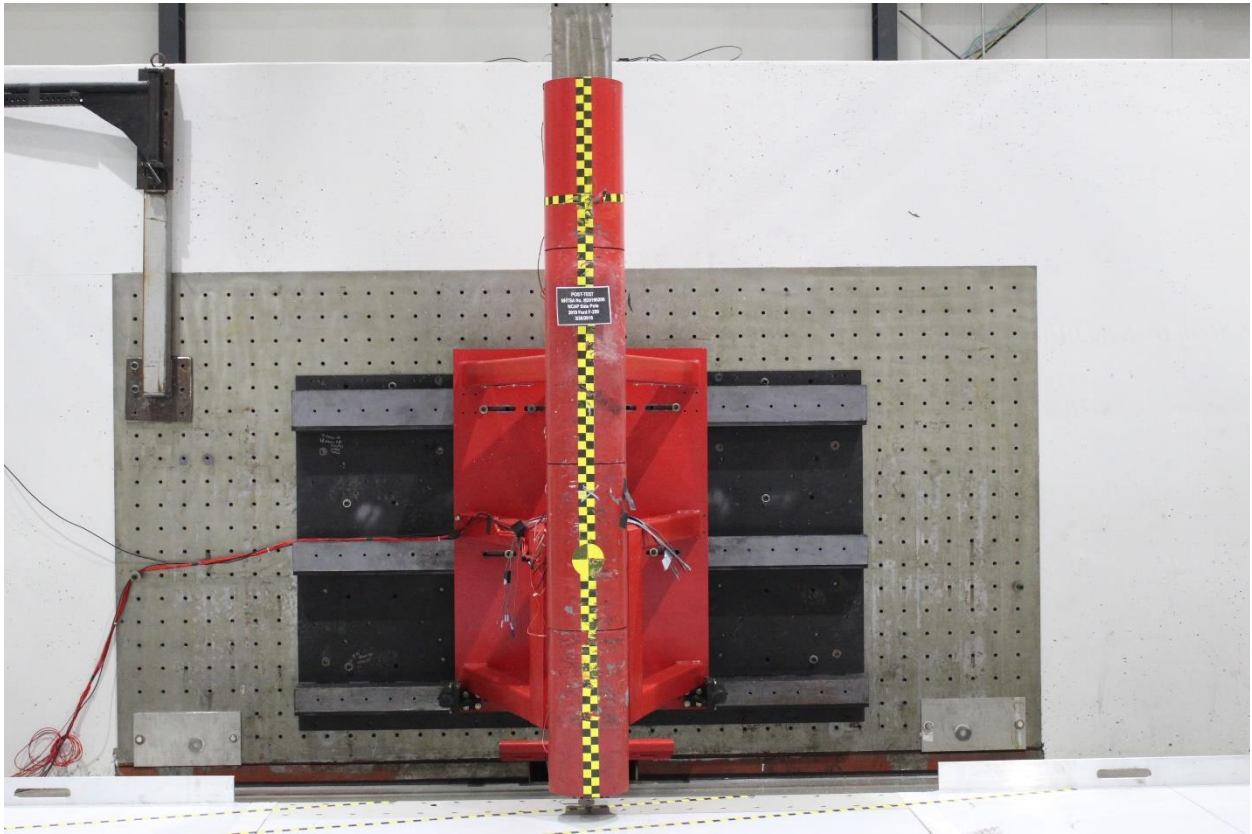


Figure A-58: Post-Test Pole Barrier Front View

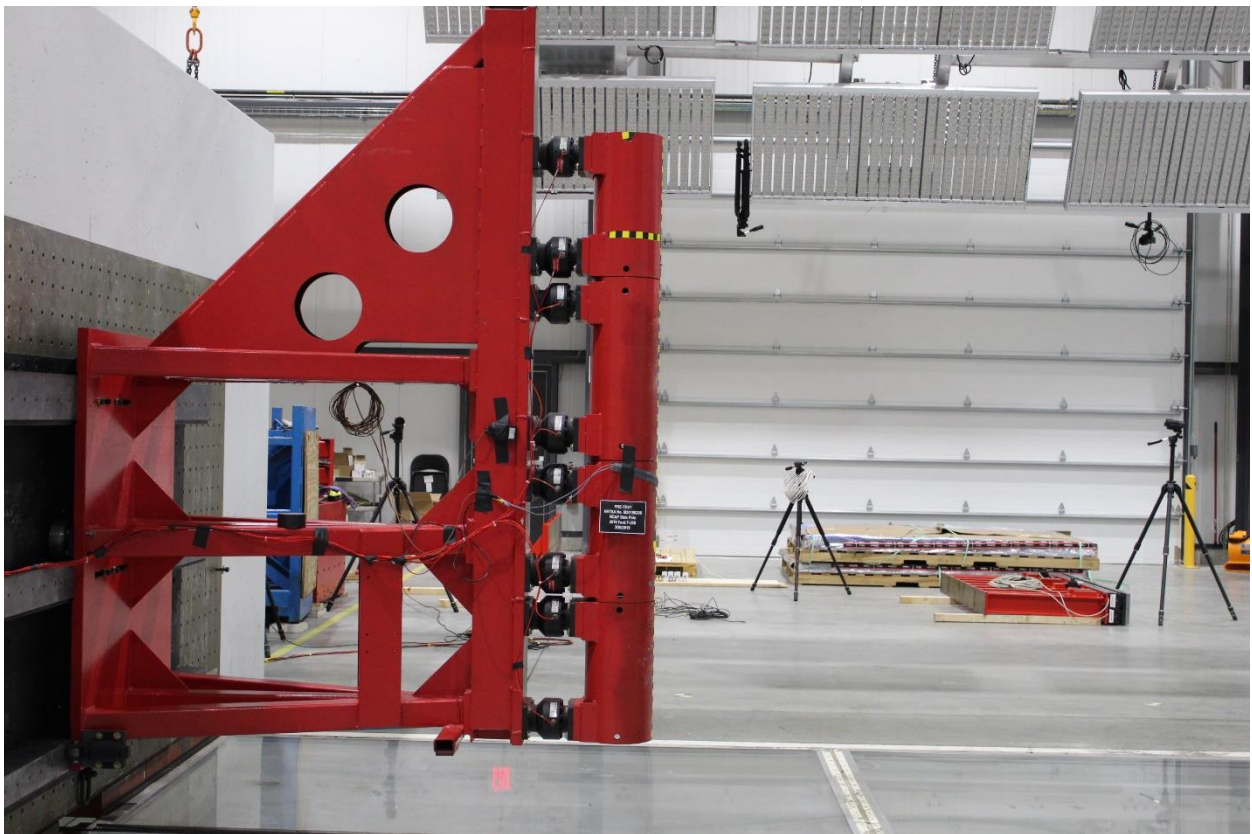


Figure A-59: Pre-Test Pole Barrier Side View

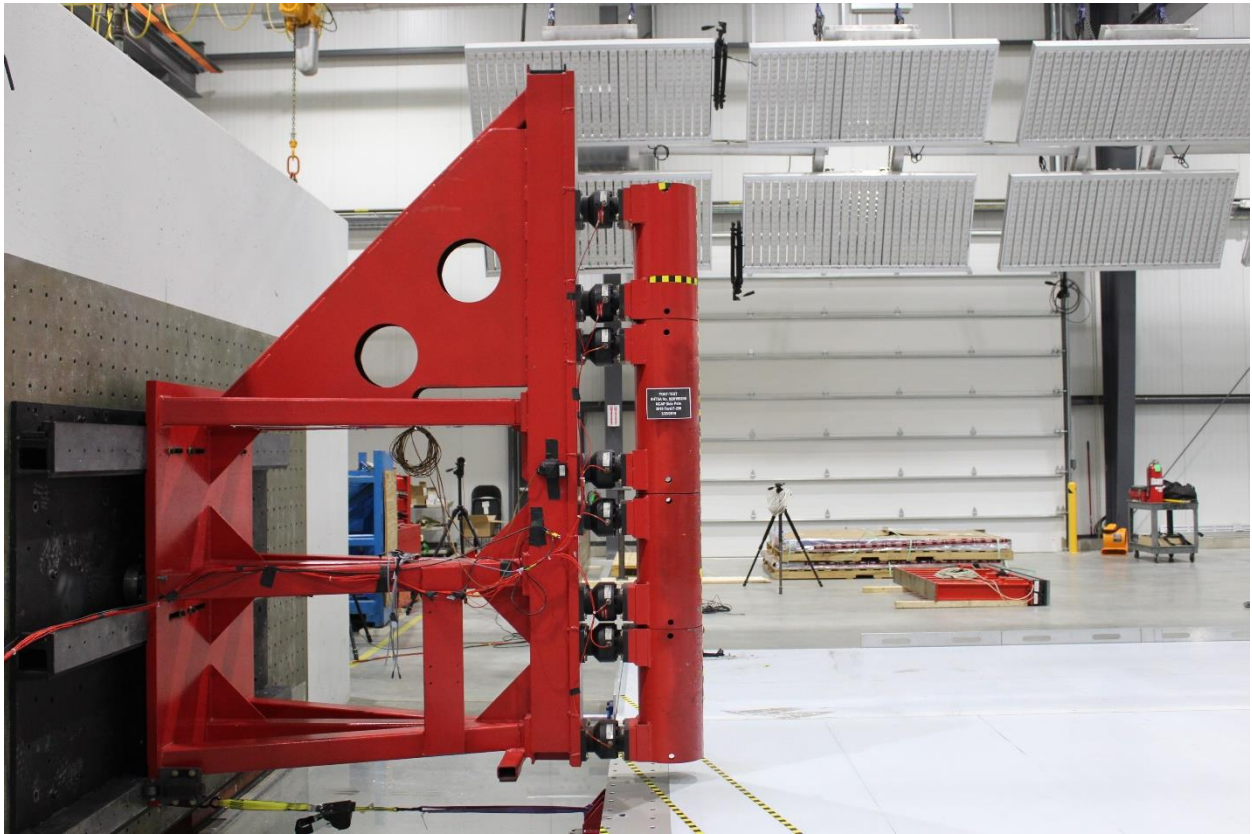


Figure A-60: Post-Test Pole Barrier Side View

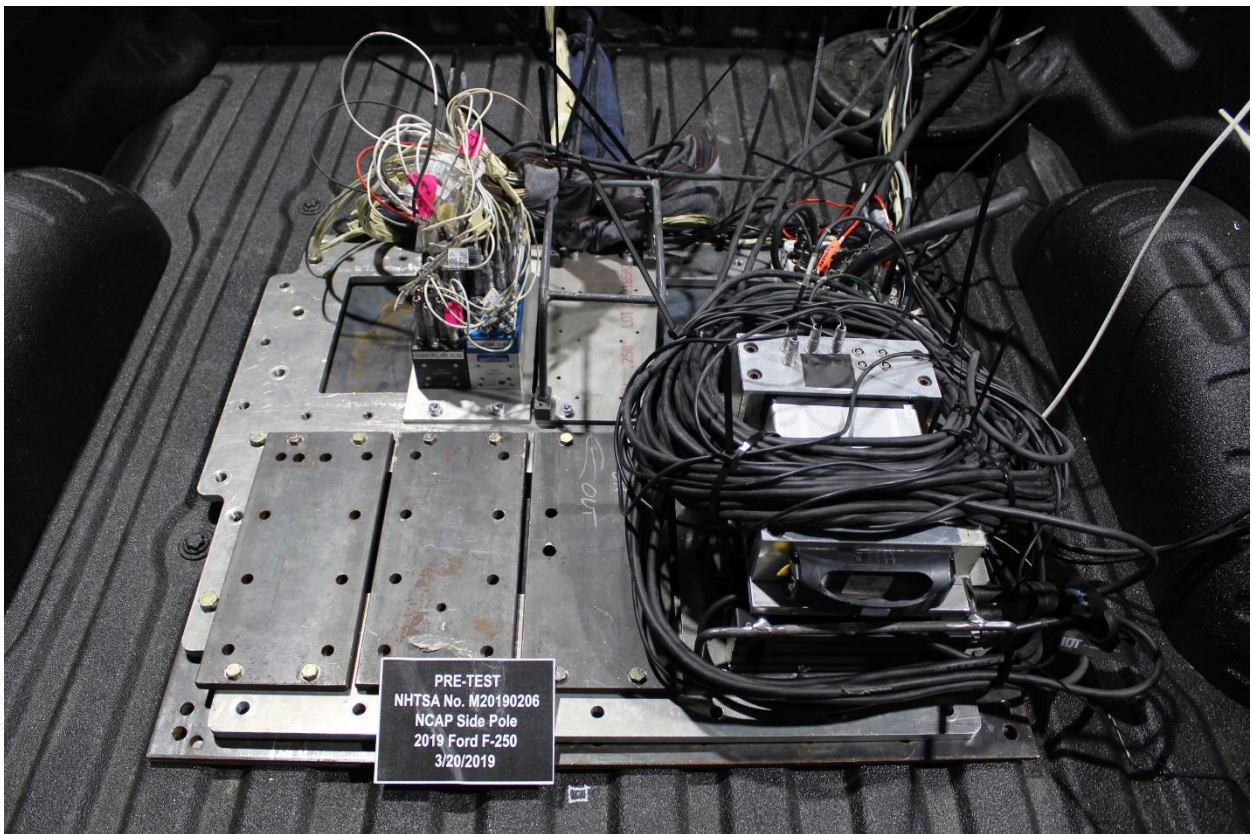


Figure A-61: Pre-Test Ballast View



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



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

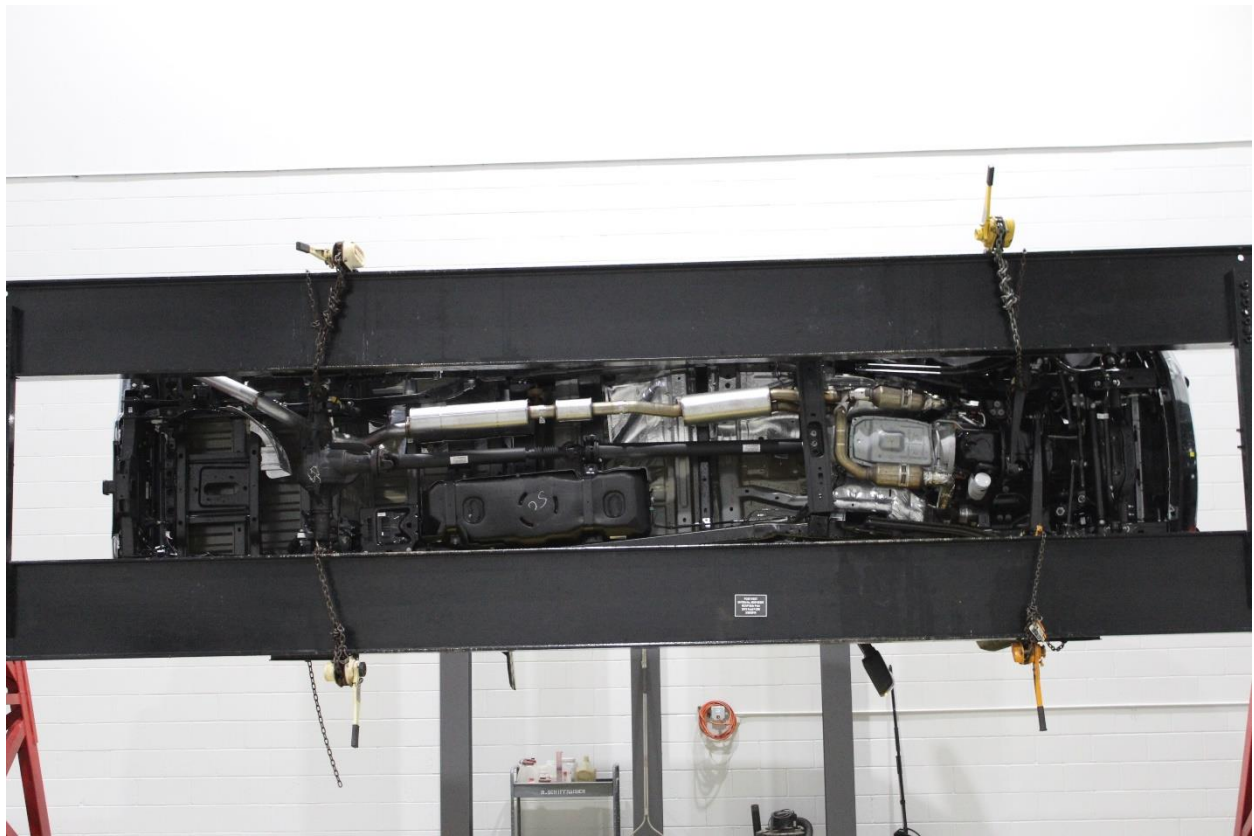


Figure A-64: FMVSS No. 301 Static Rollover 90 Degrees



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

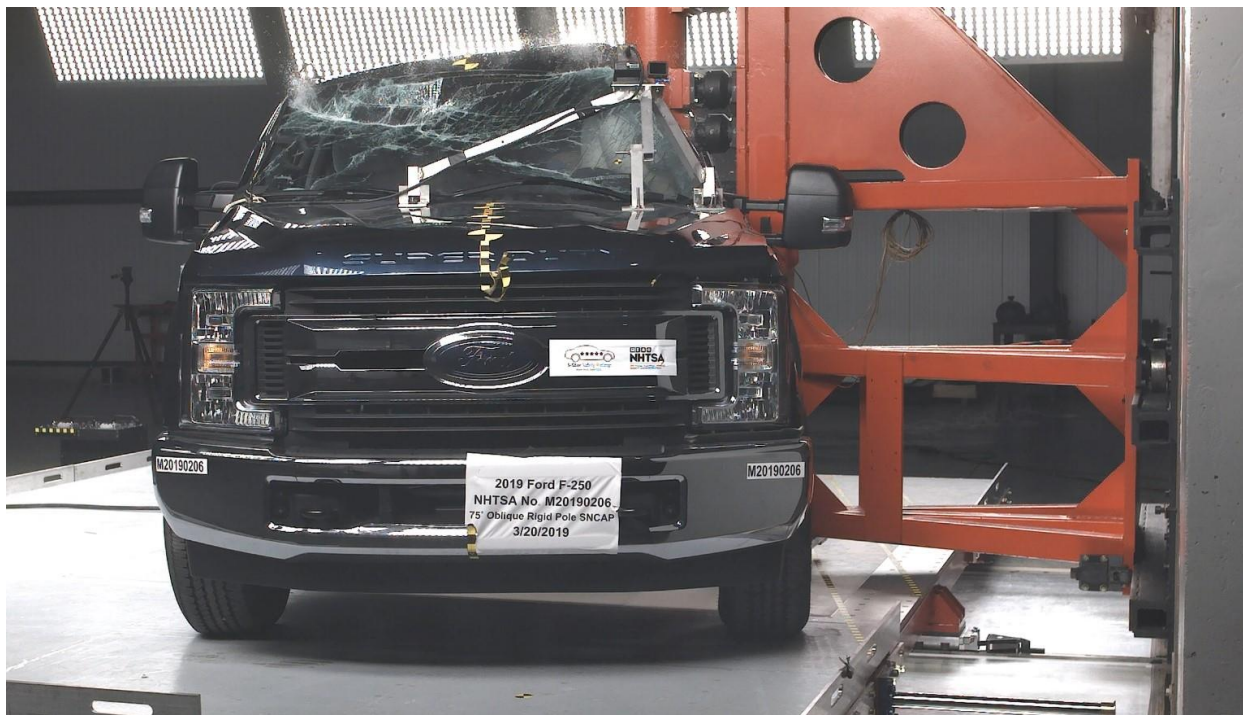


Figure A-68: Impact Event

Ford **Go Further** ford.com

VEHICLE DESCRIPTION

SUPER DUTY

2019 F250 SRW 4X2 CREW CAB
XL 150" WB STYLE SIDE
6.2L EFI V-8 ENGINE
6-SPEED AUTOMATIC TRANS G

EXTERIOR
BLUE JEANS METALLIC
INTERIOR
MEDIUM EARTH GRAY CLOTH

KEY **D82443**

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

EXTERIOR

- BOX RAIL/TAILOATE MOLDINGS
- DOOR HANDLES - BLACK
- HEADLAMPS, WIPER ACTIVATED
- LOOKING REMOVABLE TAILGATE
- PICKUP BOX, TIE DOWN HOOKS
- NA W/BOX DLT
- SPARE TIRE AND WHEEL LOCK
- NA W/BOX DLT
- TOW HOOKS
- TRAILER SWAY CONTROL

INTERIOR

- 60/40 REAR BENCH W/FUP-UP
- FUP-DOWN W/ HEAD RESTRAINT
- AIR COND. MANUAL FRONT
- DRIVER SEAT-MANUAL LUMBAR
- OUTSIDE TEMP DISPLAY
- PARTICULATE AIR FILTER
- VINYL SUN VISORS

FUNCTIONAL

- 4-WHEEL ANTI-LOCK DISC BRAKING SYSTEM
- HILL START ASSIST
- JEWEL EFFECT HEADLAMPS
- MYKEY
- REAR VIEW CAMERA
- NA W/BOX DLT
- TWIN I-BEAM INDEPENDENT FRT SUSPENSION W/STAB BAR

SAFETY/SECURITY

- ADVANCE TRAC WITH ESC
- AIRBAGS - SAFETY CANOPY
- BELT-MENDER CHIME
- DRIVER/PASSENGER AIR BAGS
- SECURE LOCKW ANTI-THIEF SYS
- SCS POST CRASH ALERT SYS

WARRANTY

- 3YR/36,000 BUMPER/BUMPER
- 5YR/60,000 POWERTRAIN
- 5YR/60,000 ROADSIDE ASSIST
- 5YR/100,000 DIESEL ENGINE

INCLUDED ON THIS VEHICLE

OPTIONAL EQUIPMENT/OTHER

PREFERRED EQUIPMENT PACK 800A
6-SPEED AUTOMATIC TRANS G
3.73 RATIO REGULAR AXLE
POWER EQUIPMENT GROUP
CARPET FLOORING AND MATS XL
STX APPEARANCE PACKAGE
LTZ76SRH SE BSW ALL SEASON CRUISE CONTROL
AM/FM STEREO MP3/CD/CLK
SILVER CAST ALUM WHEELS-18"
LYNCO VOICE ACTIVATED SYSTEMS
10000R GVWR PACKAGE
50 STATE EMISSIONS
BACKGLASS DEFROST
SPARE TIRE AND WHEEL
TELESCOPICT MIRR-PWRWHTD
JACK
CLOTH 420845 SEAT
PRIVACY GLASS

PRICE INFORMATION

BASE PRICE \$36,745.00
TOTAL OPTIONS/OTHER 3,280.00
TOTAL VEHICLE & OPTIONS/OTHER 40,025.00
DESTINATION & DELIVERY 1,495.00

SOLD TO Griffin Ford San Marcos
2951 IH 35 North
San Marcos TX 78666

SHIP TO JIMMIE TRUCKS (SOLD TO)

SHIP THROUGH

FINAL ASSEMBLY PLANT KENTUCKY

METHOD OF TRANS RAIL

ITEM C 52-G04X Q/T 2

TOTAL MSRP \$41,520.00

Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit www.ford.com/finance.

JIMMIE N RB 2X 930 004350 12 04 18

EPA DOT Fuel Economy and Environment

FUEL ECONOMY RATINGS NOT REQUIRED ON THIS VEHICLE

fuelconomygov
Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash Driver Passenger Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat Rear seat Not Rated
Based on the risk of injury in a side impact.

Rollover ★ ★ ★ ★
Based on the risk of rollover in a single-vehicle crash.

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

41 YEARS FORD F-SERIES
AMERICA'S BEST SELLING TRUCKS

FORD PROTECT
Insist on Ford Protect! The only extended service plan fully backed by Ford and honored at every Ford dealership in the U.S., Canada and Mexico. See your Ford dealer or visit www.FordProtect.com.

WARNING: Operating, servicing and maintaining a passenger vehicle, pickup truck, van, or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.P65Warnings.ca.gov/passenger-vehicle.

SCAN QR TEXT 1545004350 TO ACCESS

Map to Dealer
Vehicle Info
MSRP
Get Help
Find Dealer

Figure A-69: Monroney Label

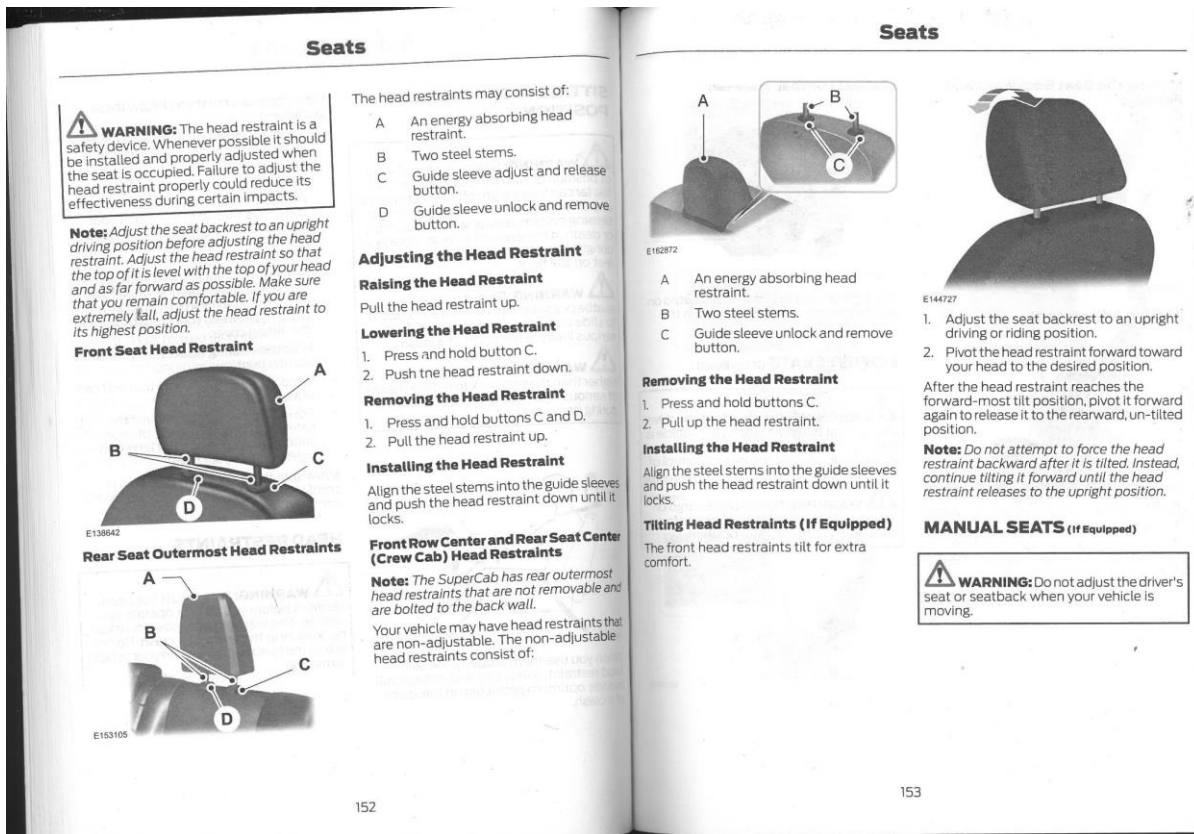


Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

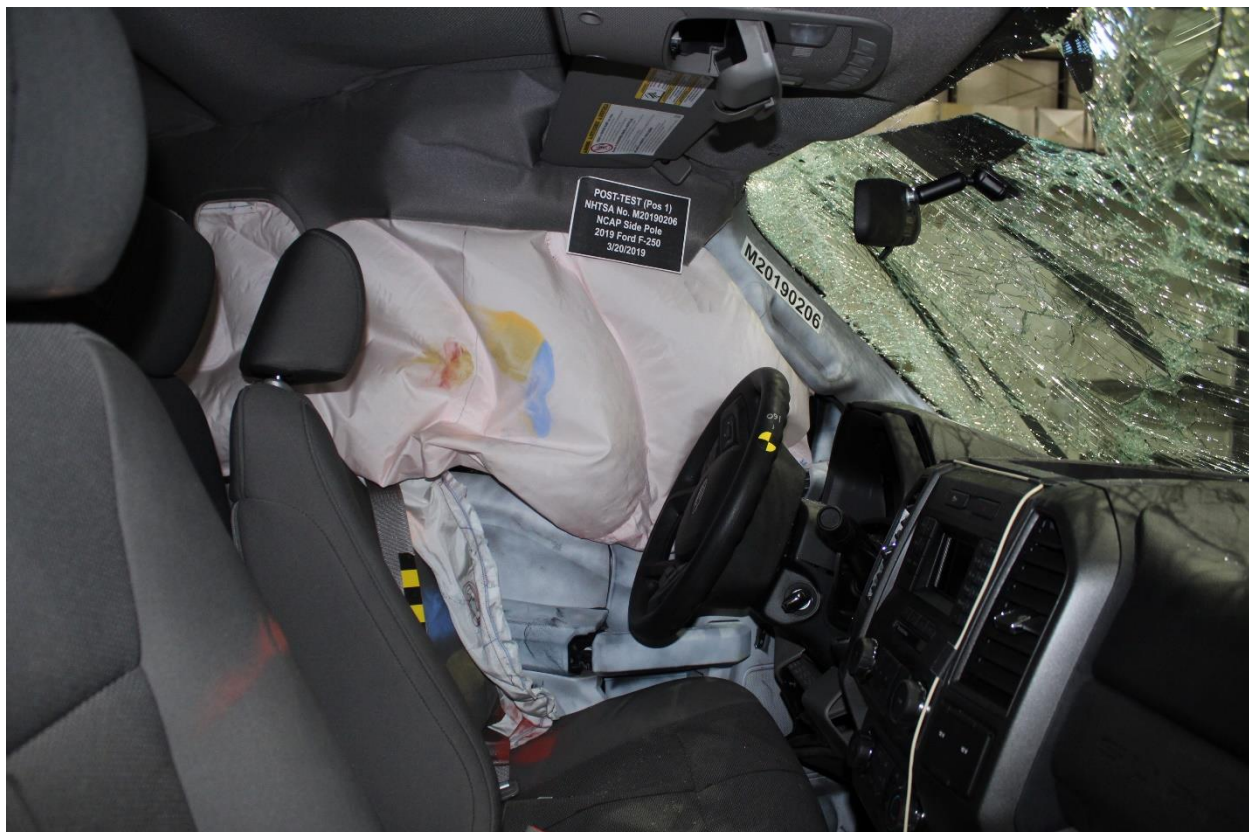


Figure A-71: Post-Test View of Shattered Vehicle Inner Door Panel (if applicable)

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.gov.

Additional Driver Dummy Instrumentation Data

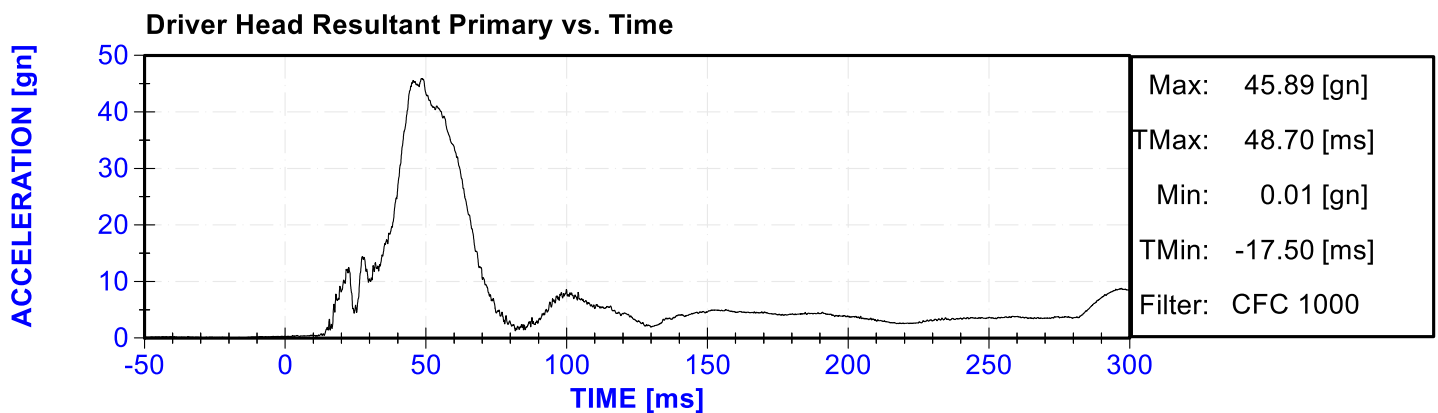
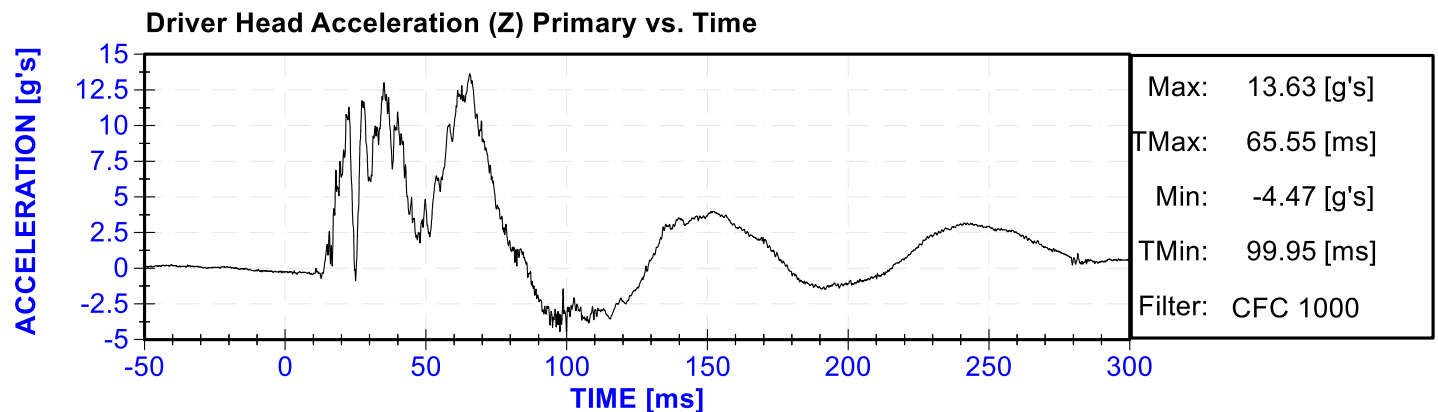
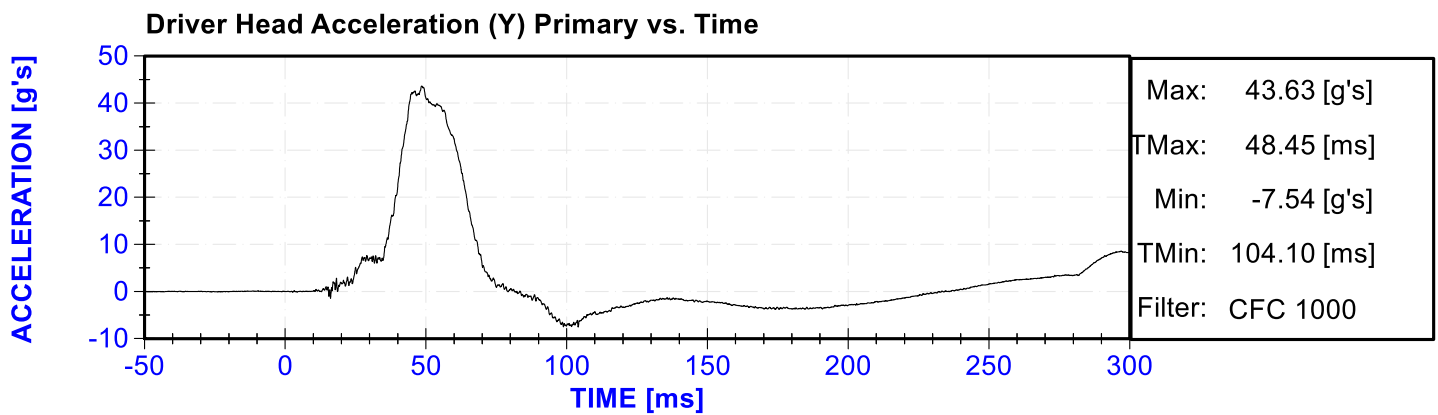
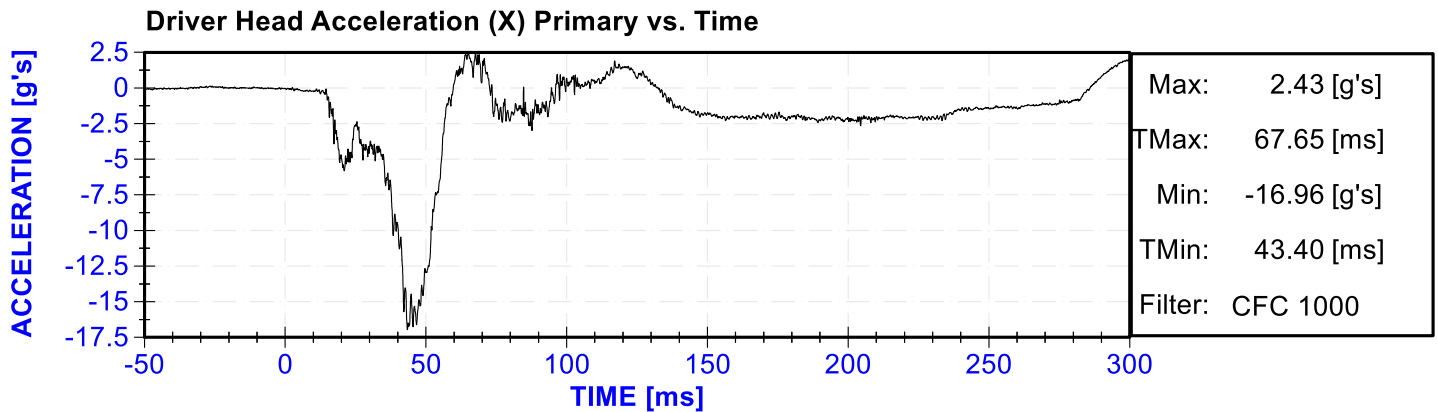
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

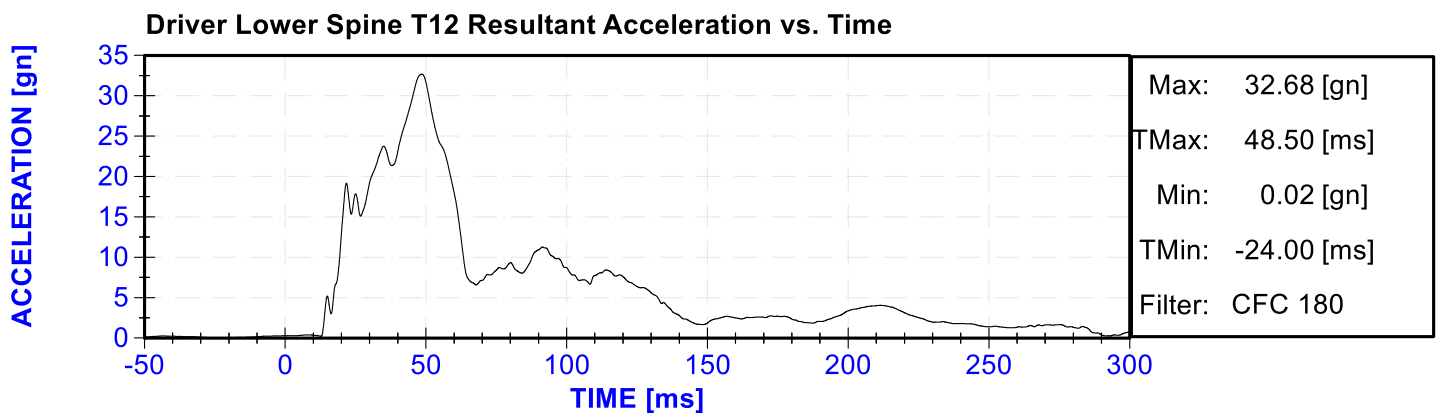
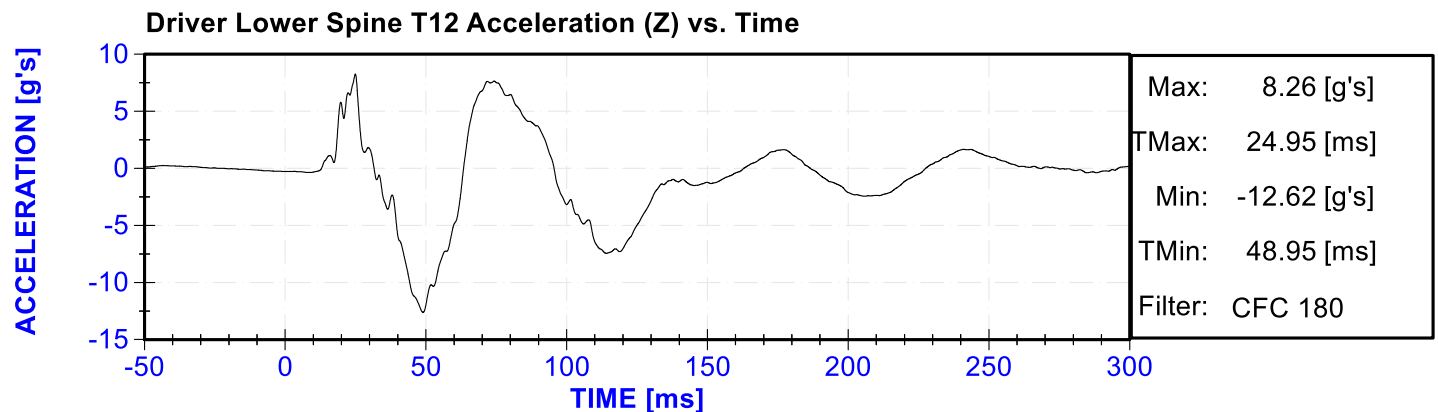
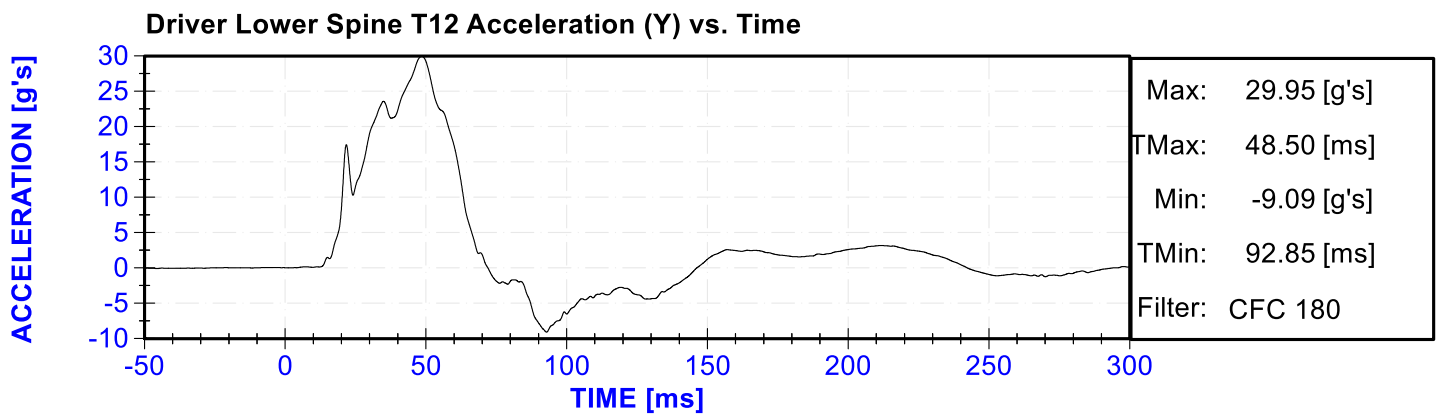
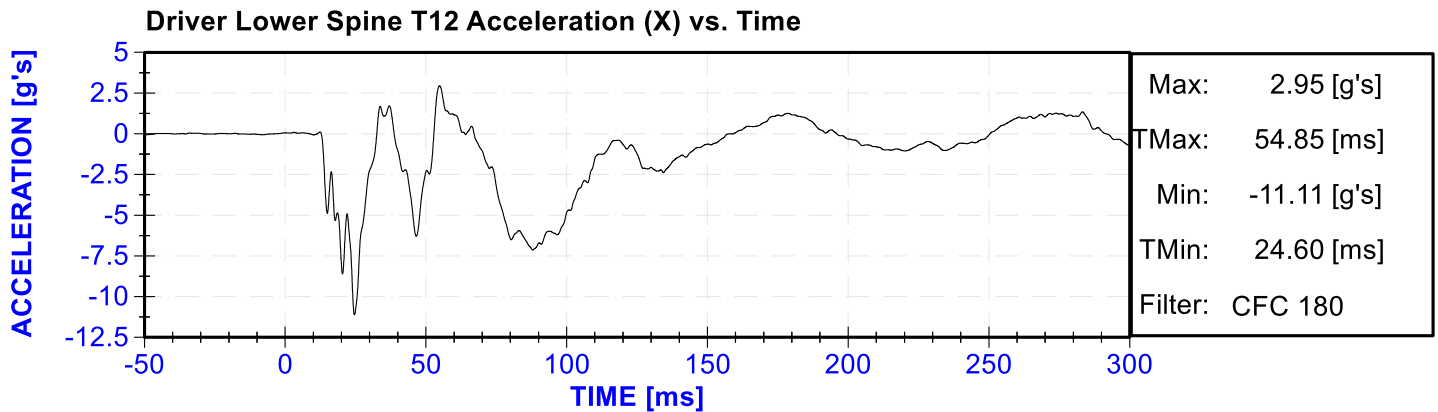
Vehicle Instrumentation Data

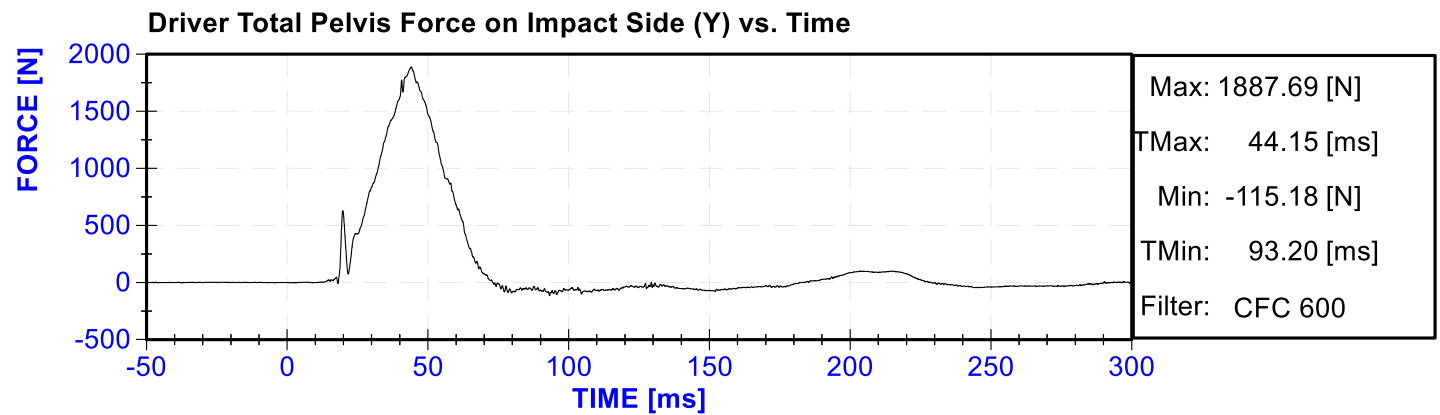
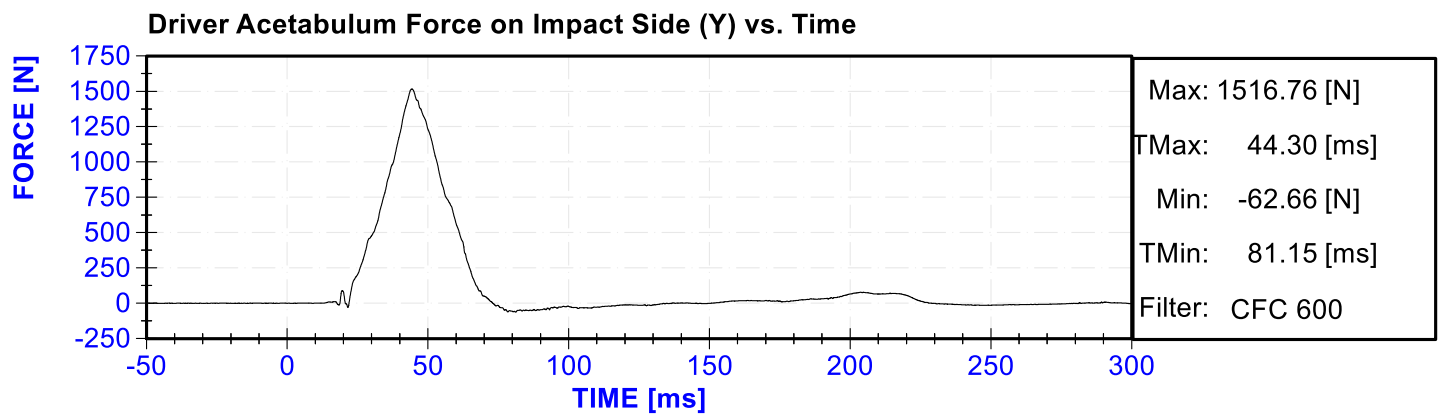
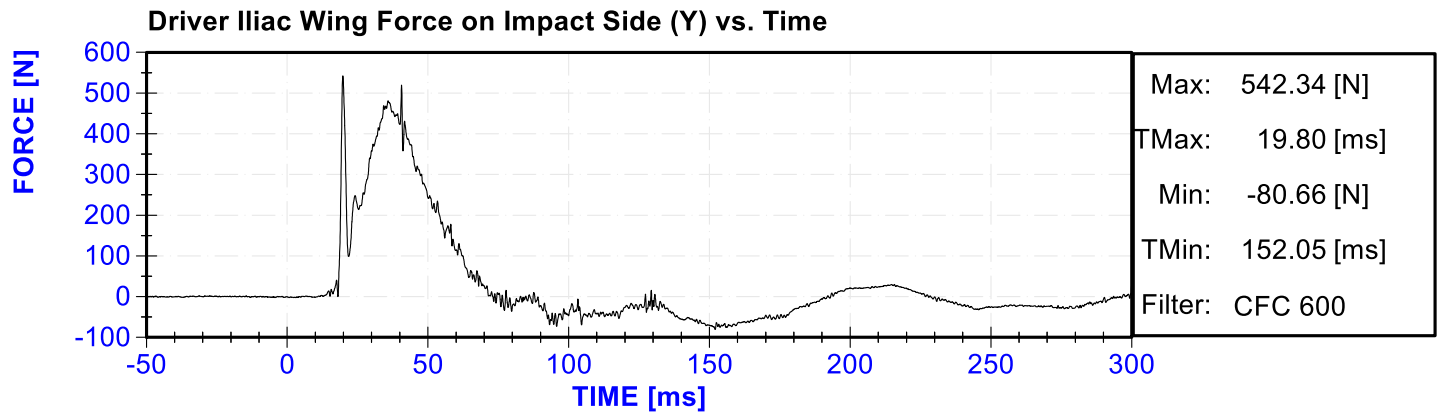
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration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

Pole Instrumentation Data

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







APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

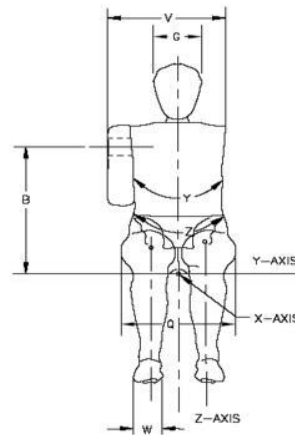
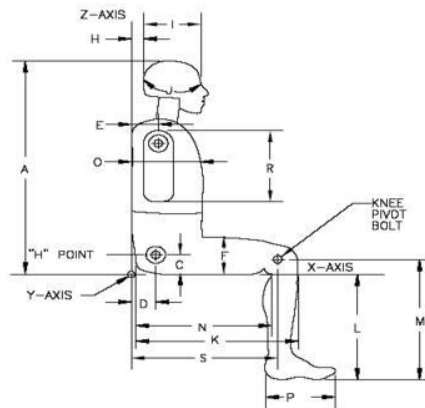


External Measurements - SID-IIs

Technician: K. Dutton

Date: 03/05/2019

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	446	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	206	Pass
P	Foot Length	216	232	221	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	486	Pass
V	Shoulder Width	341	357	344	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	781	Pass

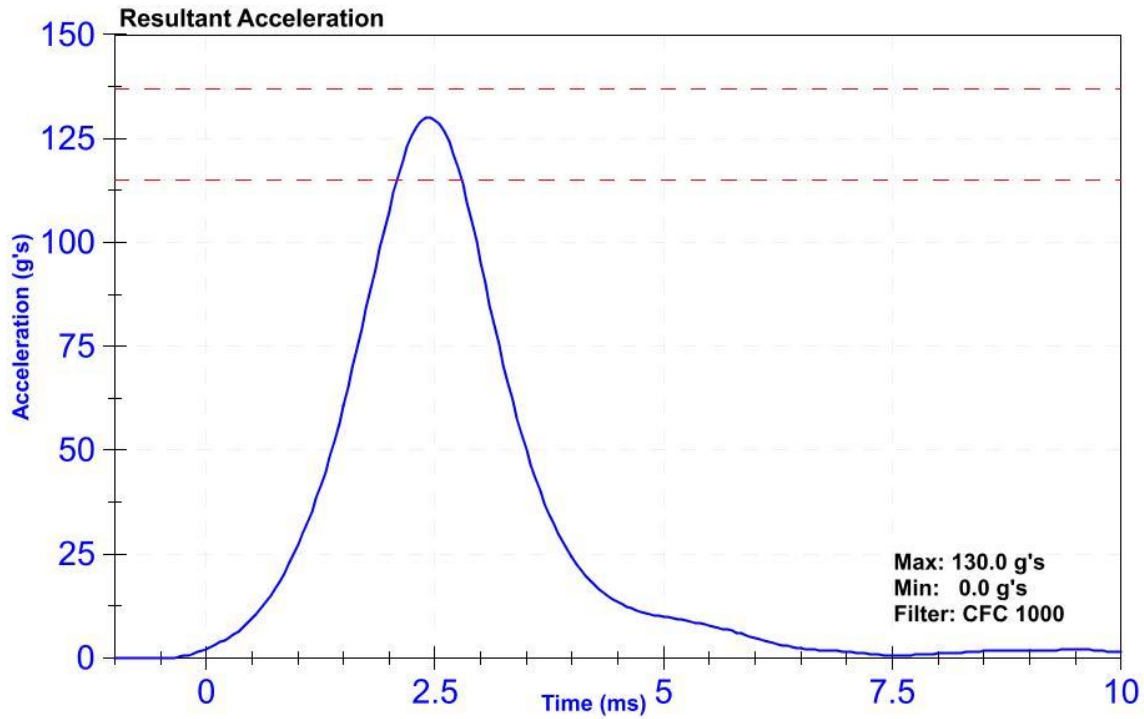
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

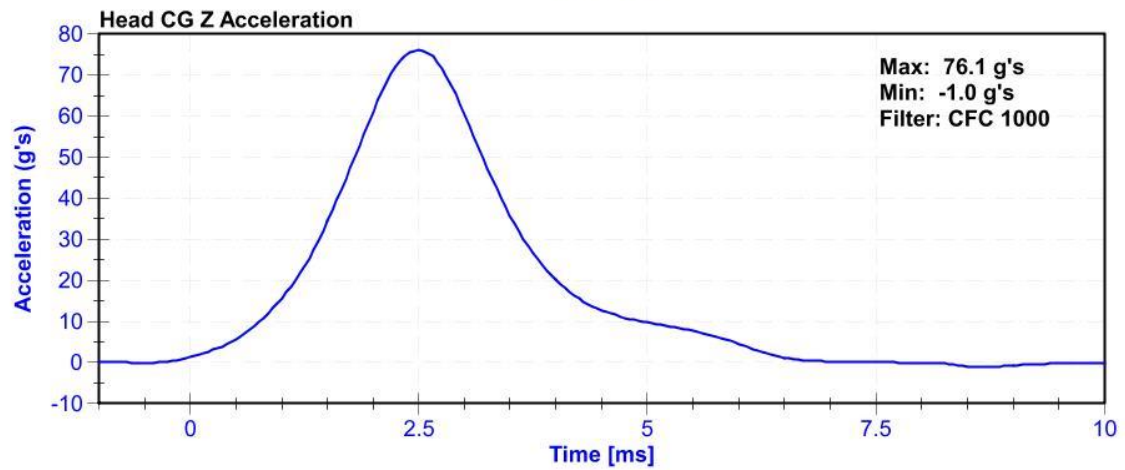
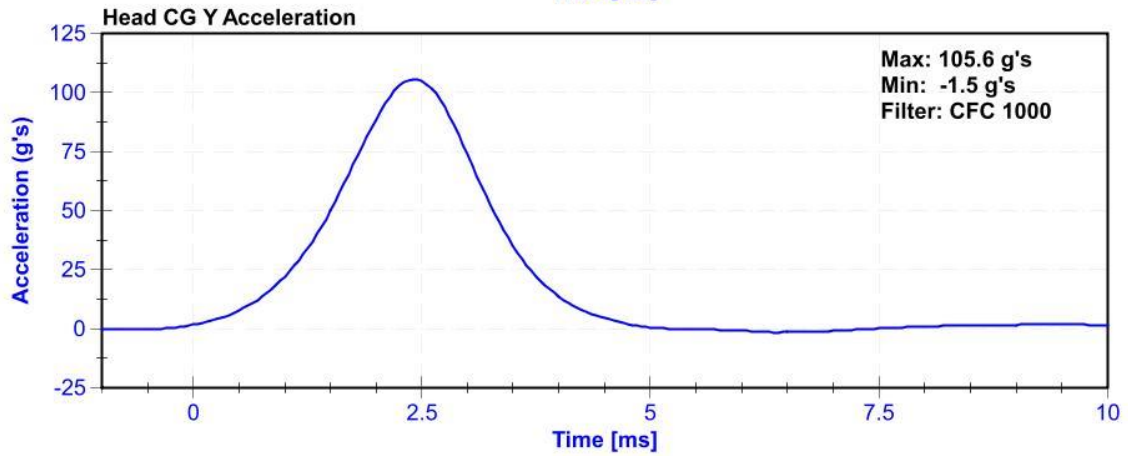
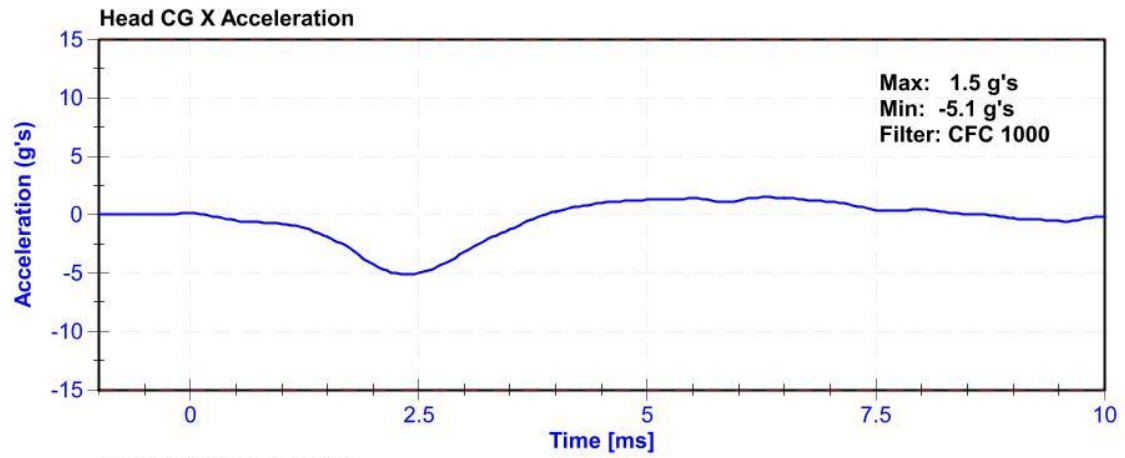
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	16.8	Pass
Resultant Acceleration	115	137	g's	130.0	Pass
Oscillation	0	15	%	1.6	Pass
Fore-Aft Acceleration	-15	15	g's	-5.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P74788	10/18/2018	4/18/2019
Y Accelerometer	ENDEVCO 7264CT	AC-P83432	10/18/2018	4/18/2019
Z Accelerometer	ENDEVCO 7264	AC-P83319	10/18/2018	4/18/2019





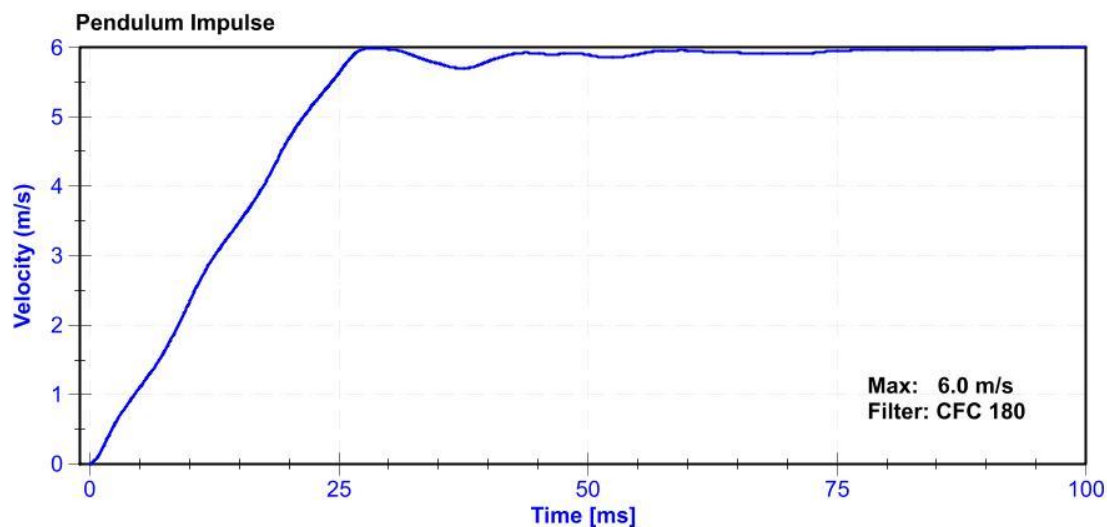
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

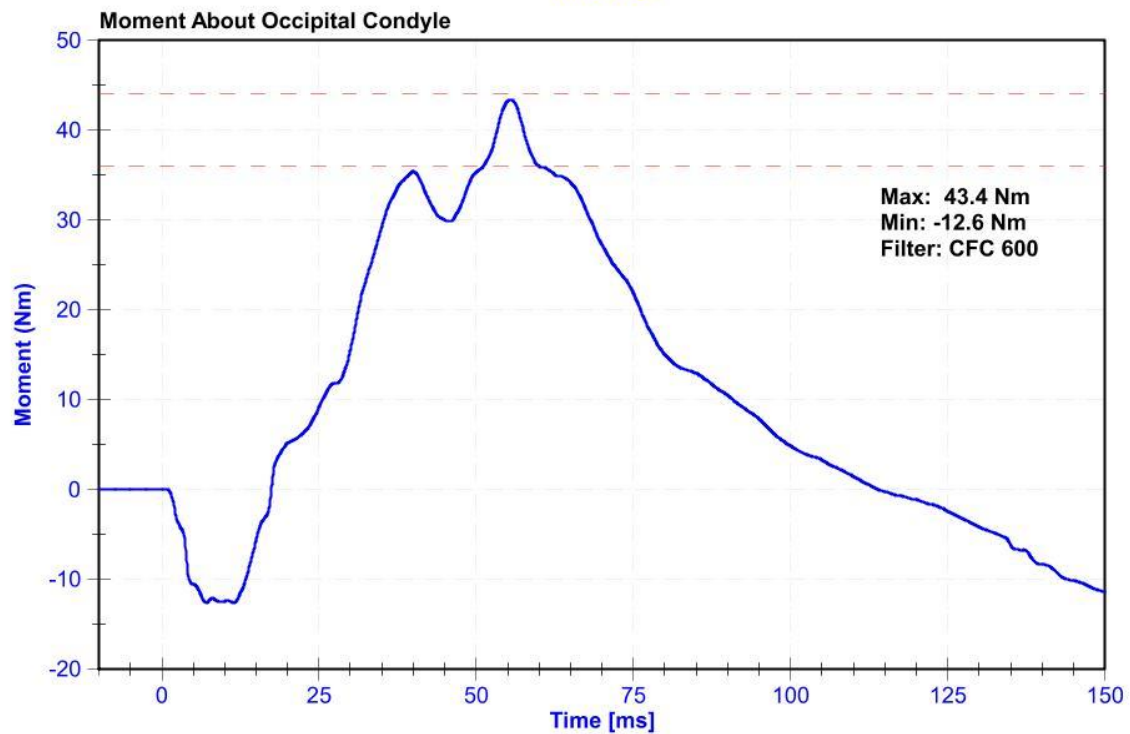
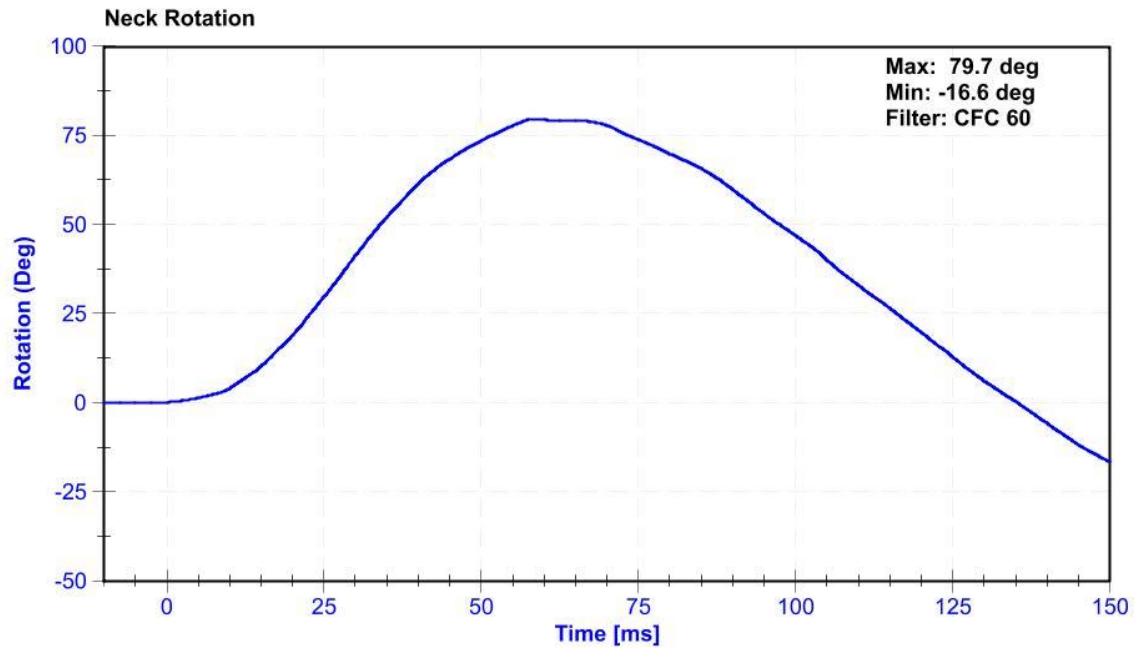
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	15.8	Pass
Velocity	5.51	5.63	m/s	5.514	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.33	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.49	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.69	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.63	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.00	Pass
Neck Rotation	71	81	deg	79.7	Pass
Time at Maximum Rotation	50	70	ms	58.6	Pass
Moment about the OC	36	44	Nm	43.4	Pass
Moment Decay to 0 Nm	102	126	ms	113.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/29/2019	1/29/2020
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/1/2018	11/1/2019
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/1/2018	11/1/2019
Upper Neck Load Cell	Denton 1716	LC-2018 FY	9/28/2018	9/28/2019





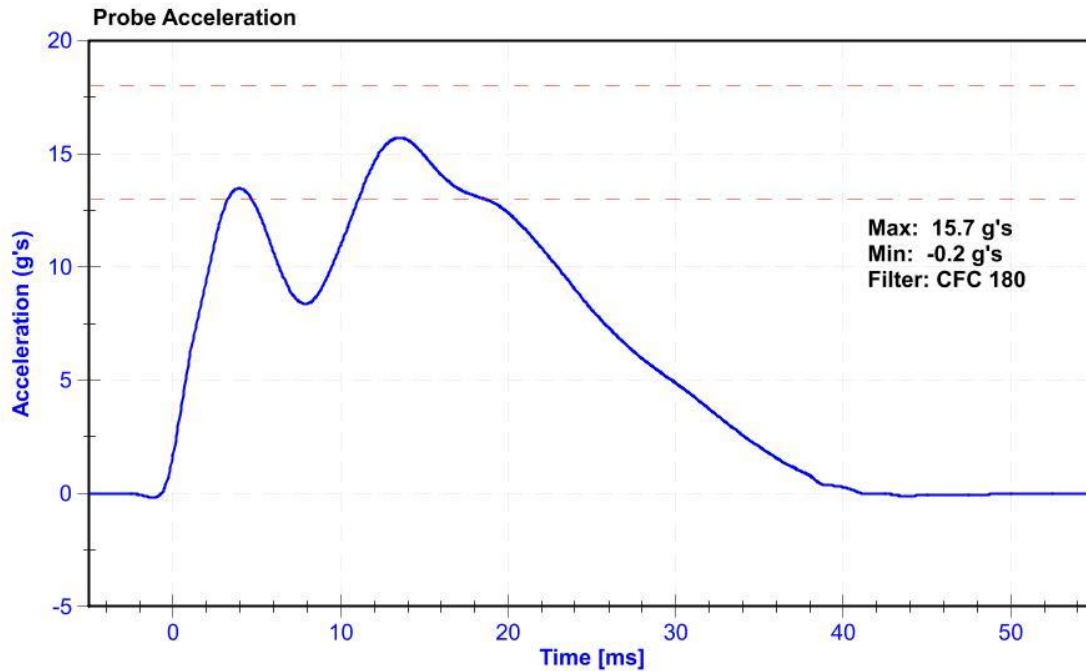
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

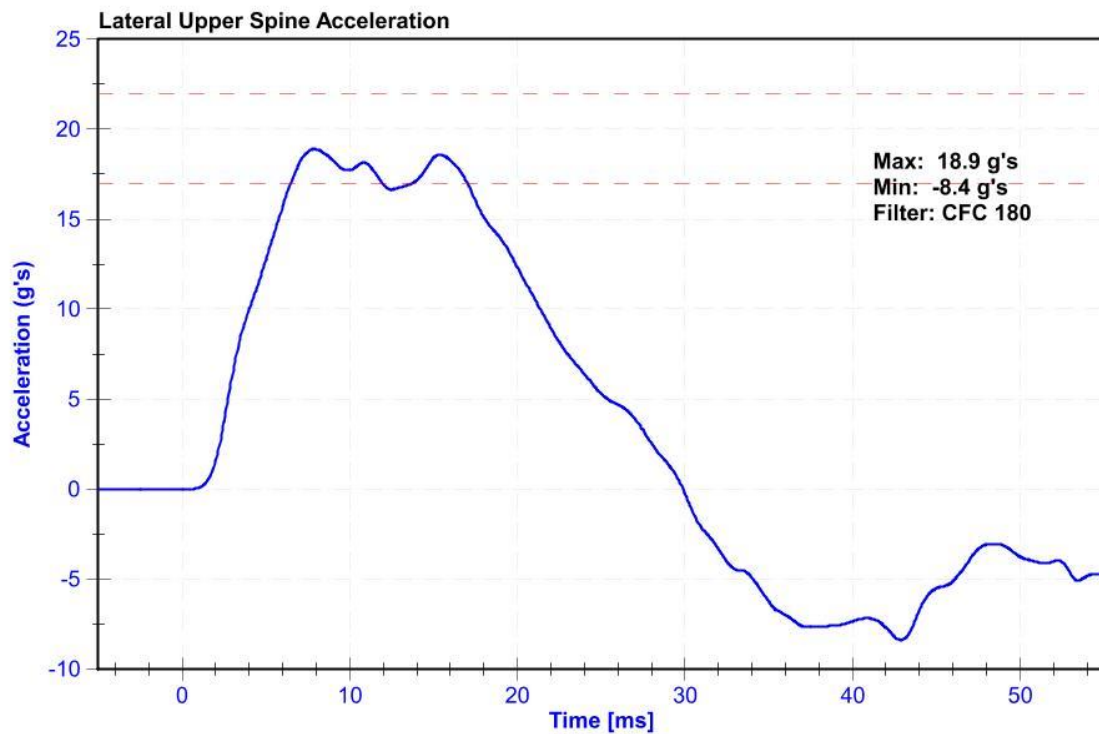
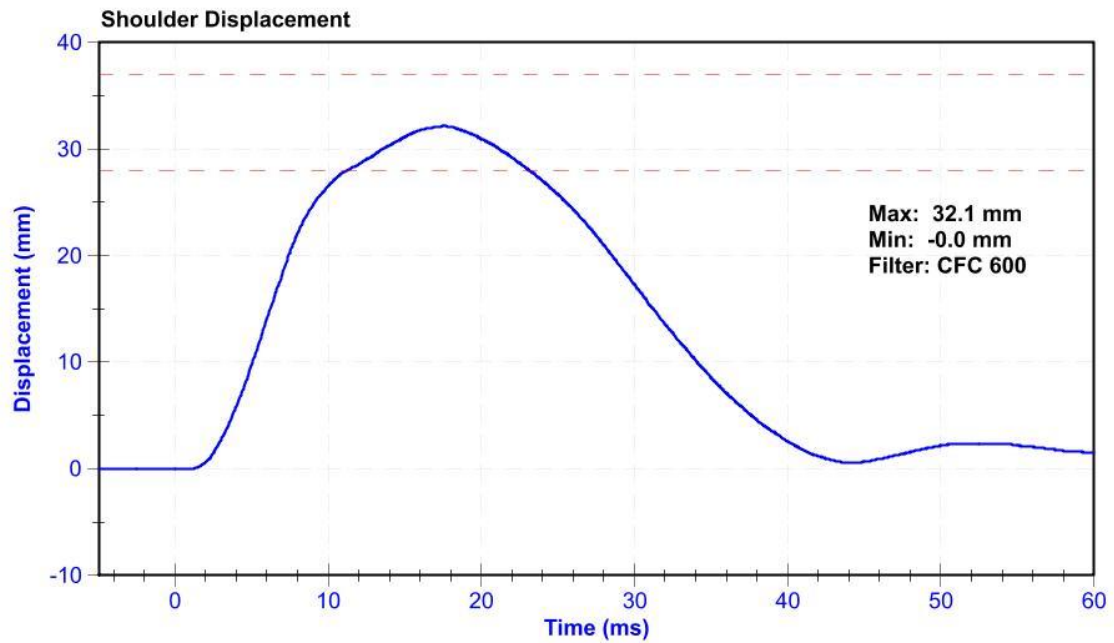
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	16.9	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	13	18	g's	15.7	Pass
Shoulder Deflection	28	37	mm	32.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	18.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019





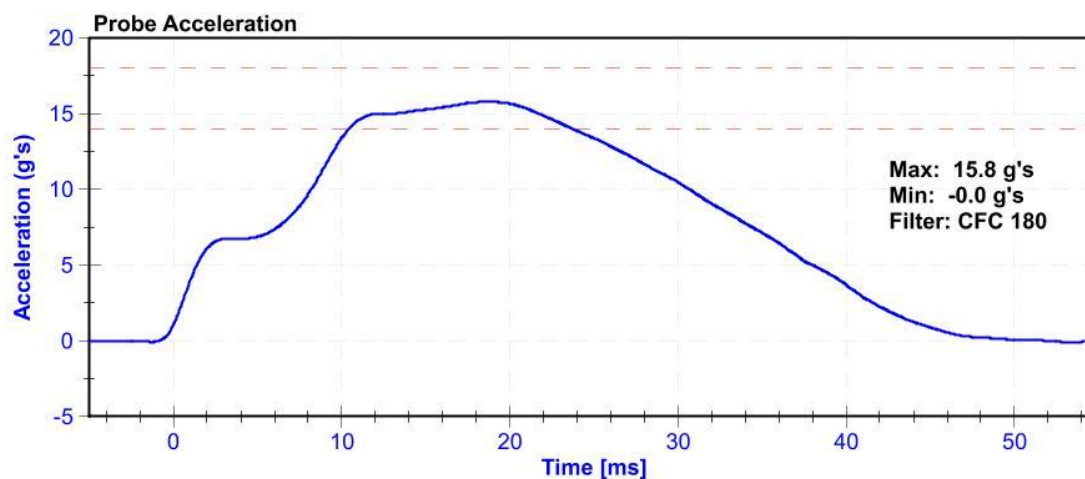
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG-8012	Laboratory Supervisor	K. Brogan

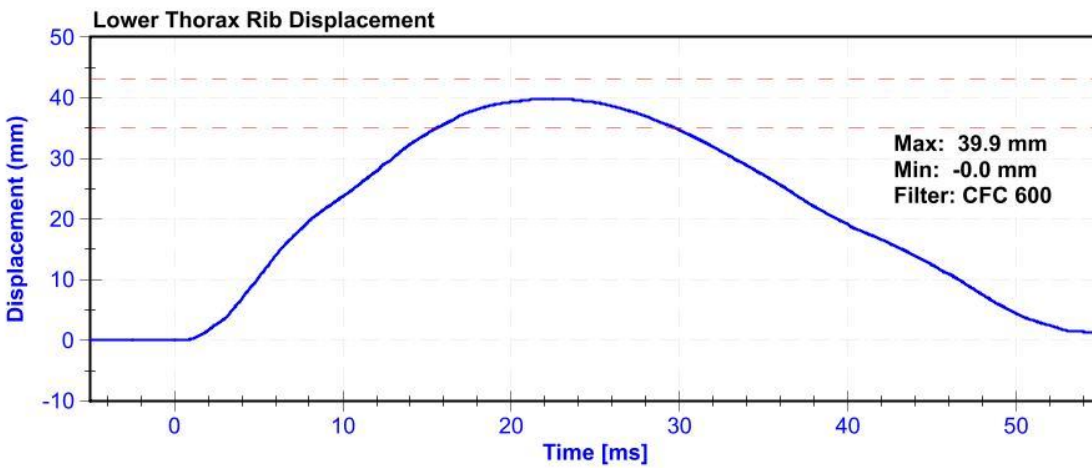
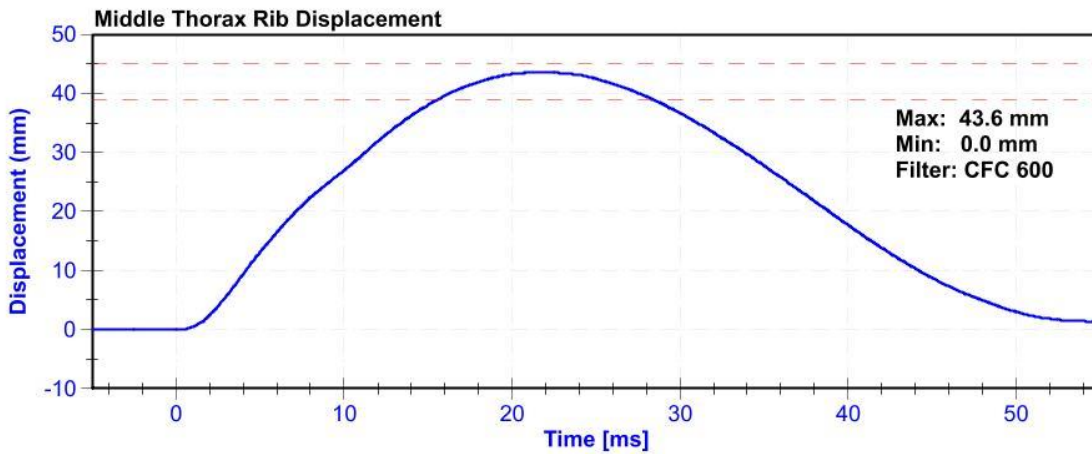
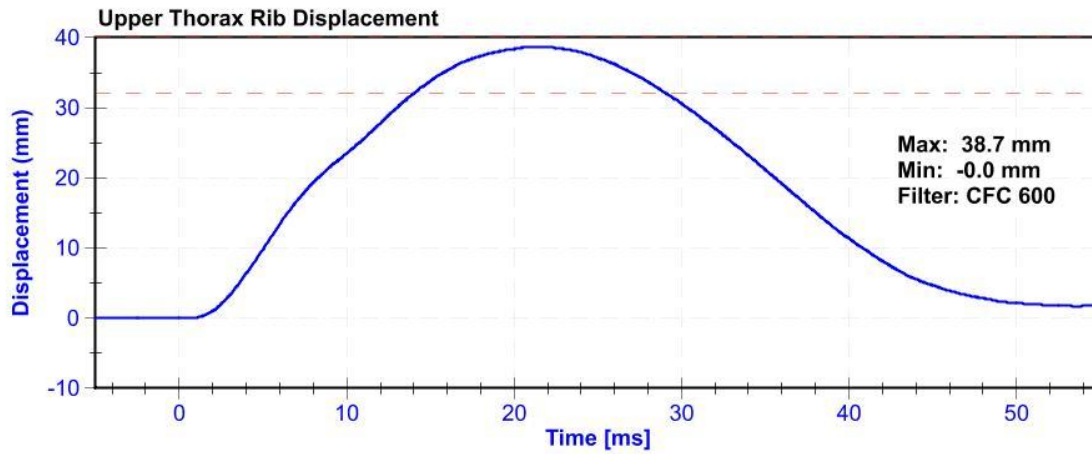
Results

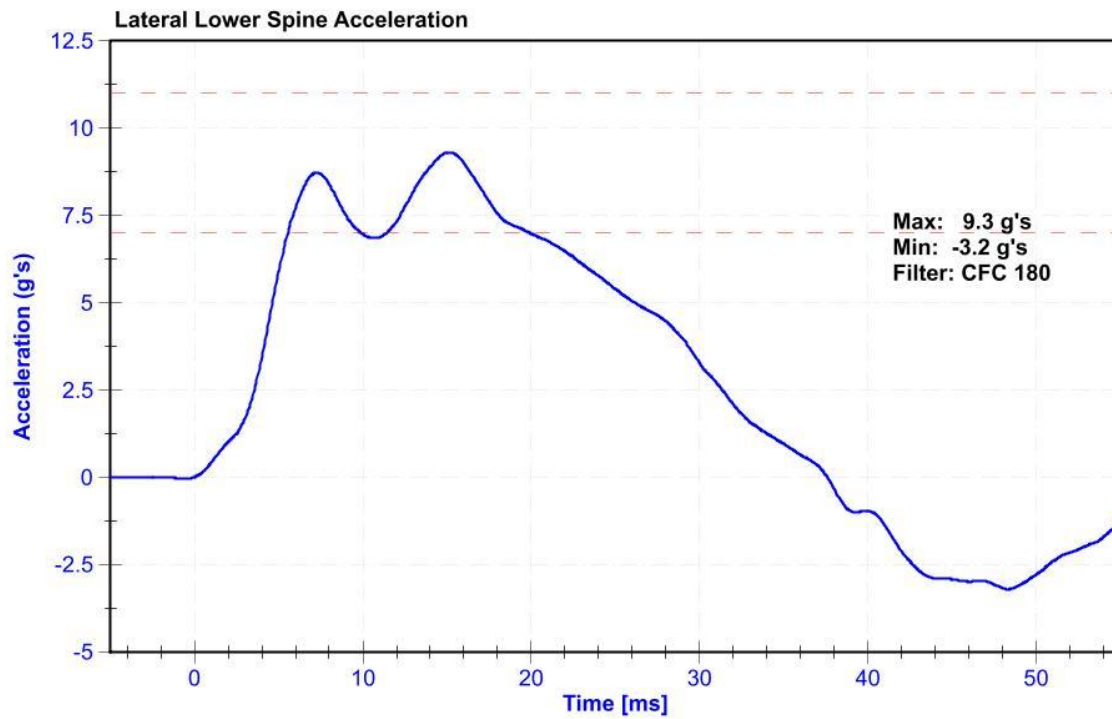
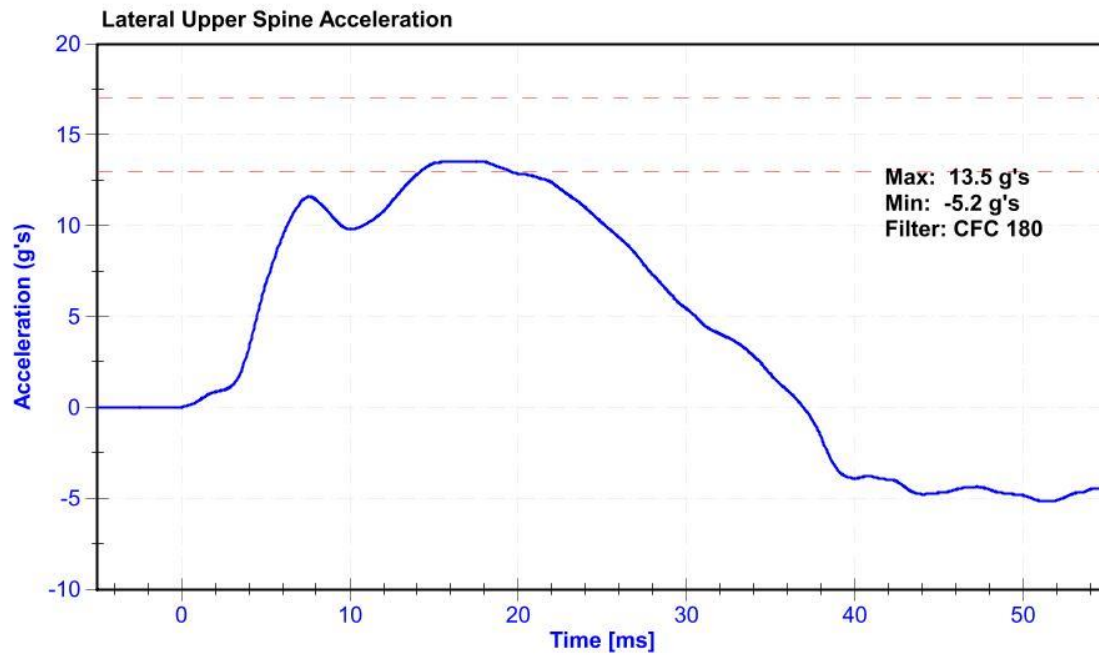
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	17.3	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	13.5	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.3	Pass
Upper Thorax Rib Deflection	32	40	mm	38.7	Pass
Middle Thorax Rib Deflection	39	45	mm	43.6	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 7264C	AC-P94667	11/1/2018	11/1/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/12/2018	10/12/2019
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/12/2018	10/12/2019







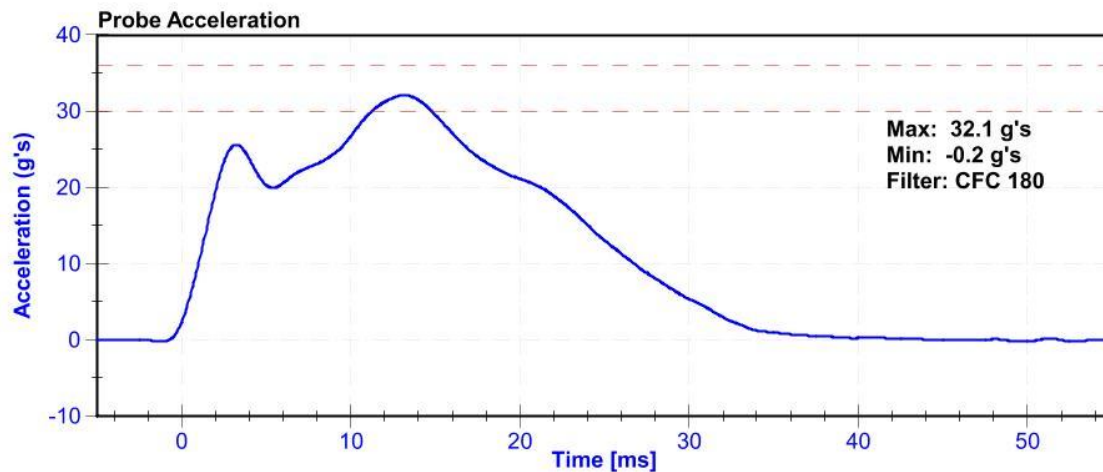
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

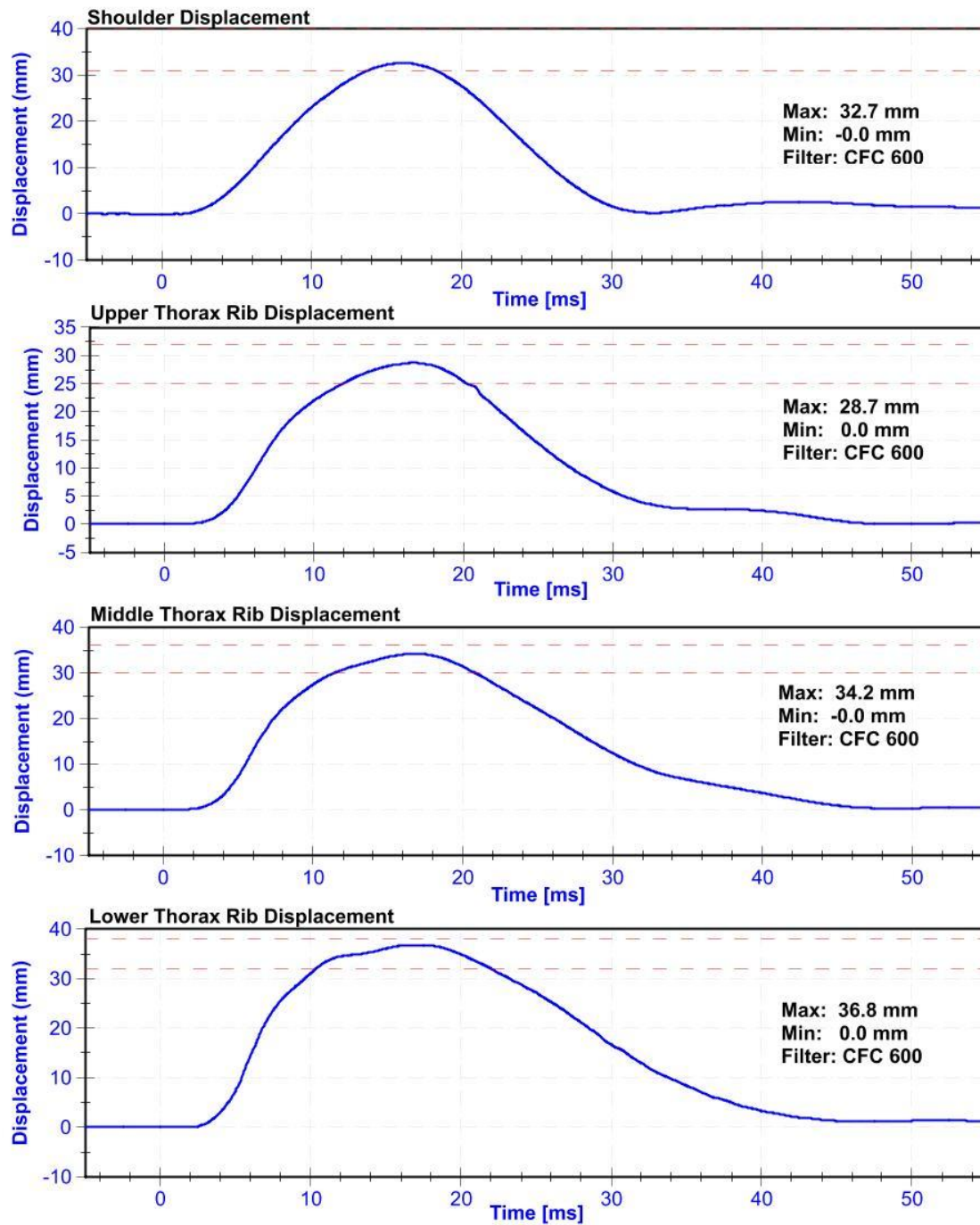
Results

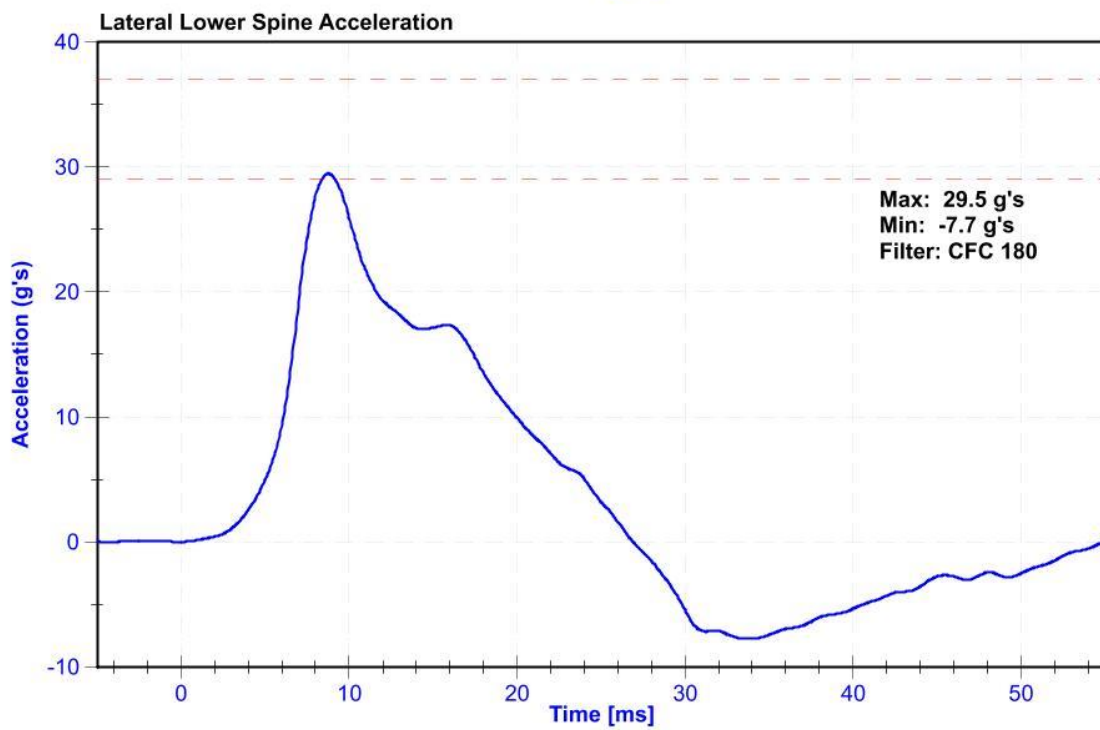
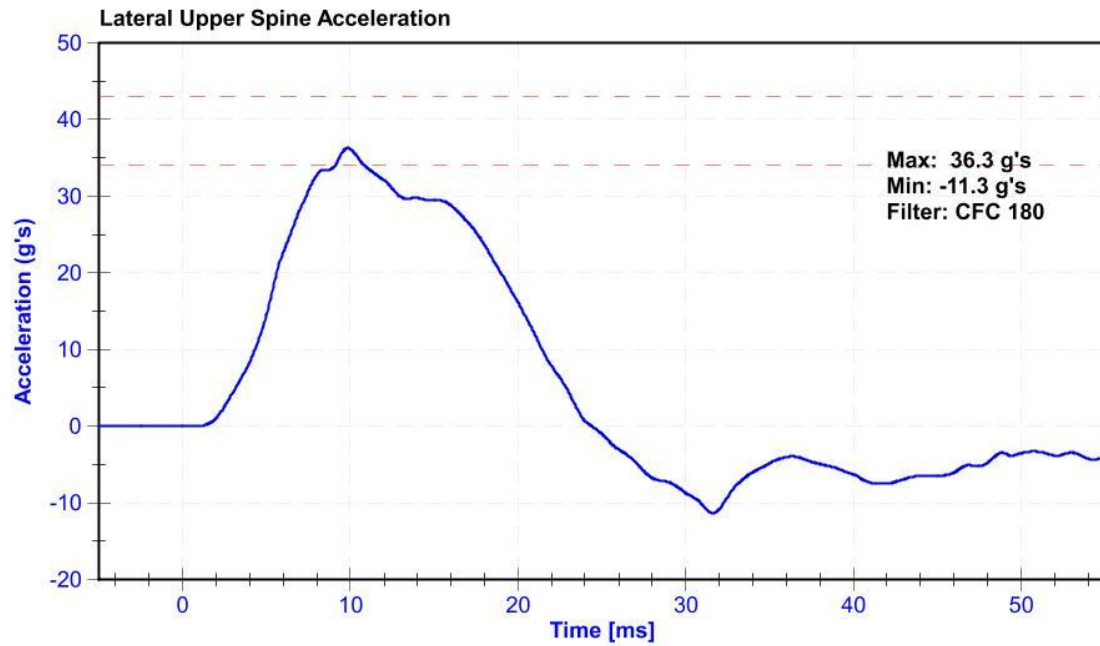
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	17.6	Pass
Velocity	6.6	6.8	m/s	6.61	Pass
Probe Acceleration after 5 ms	30	36	g's	32.1	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	29.5	Pass
Shoulder Deflection	31	40	mm	32.7	Pass
Upper Thorax Rib Deflection	25	32	mm	28.7	Pass
Mid Thorax Rib Deflection	30	36	mm	34.2	Pass
Lower Thorax Rib Deflection	32	38	mm	36.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Upper Spine T12 Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/12/2018	10/12/2019
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/12/2018	10/12/2019







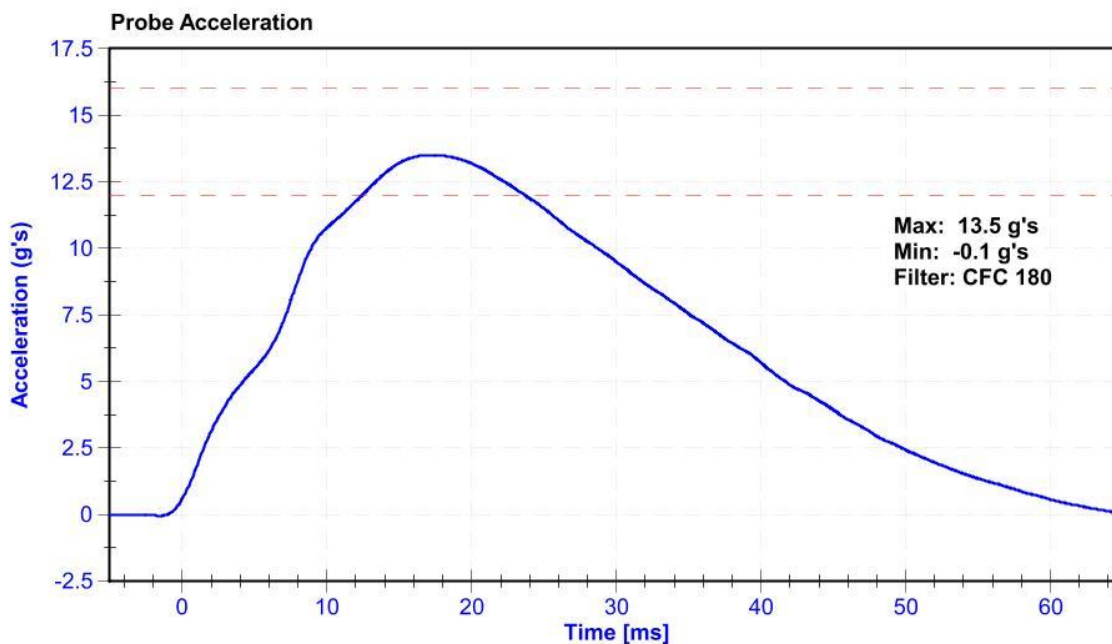
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

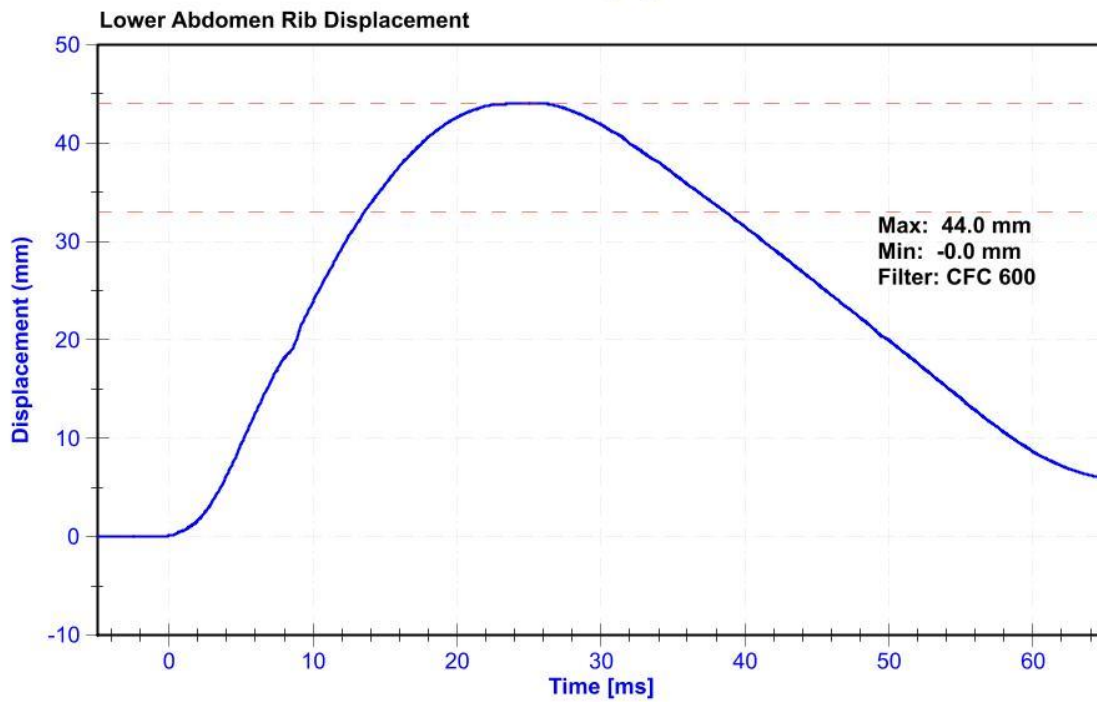
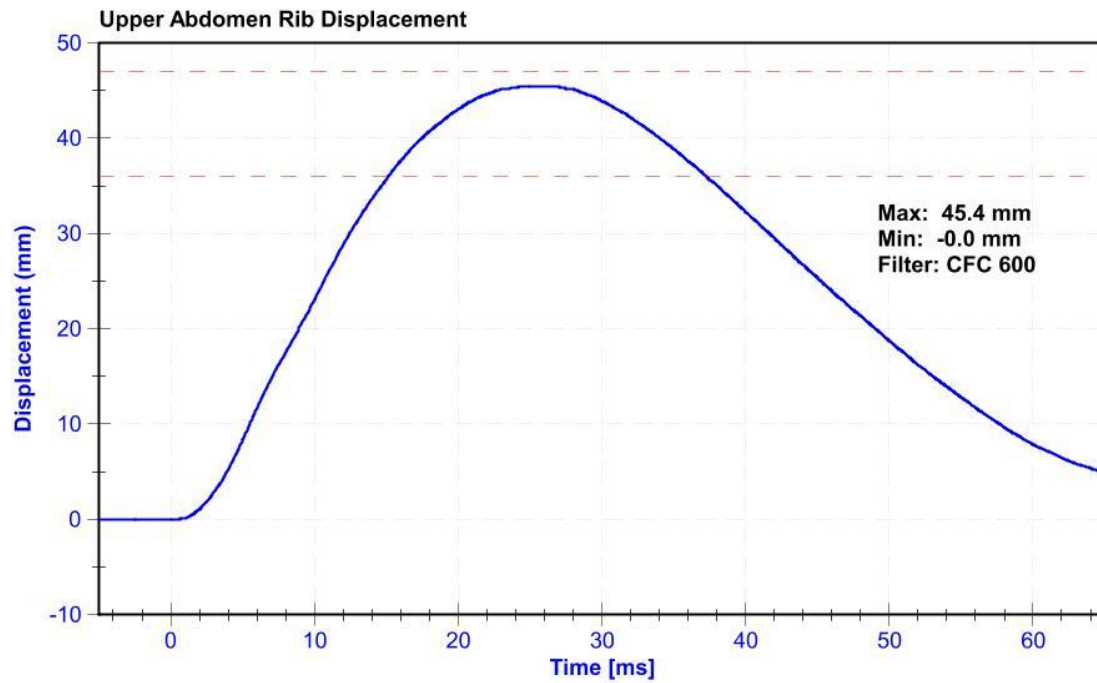
Results

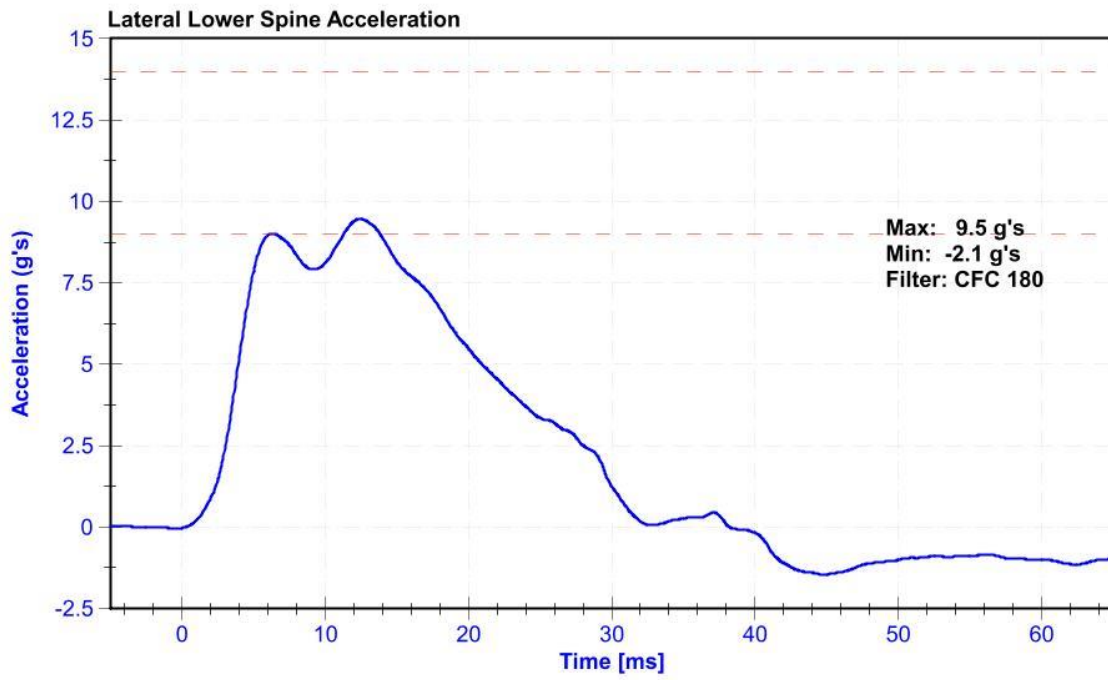
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	18.5	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	12	16	g's	13.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	45.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	44.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	10/11/2018	10/11/2019
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	10/12/2018	10/12/2019







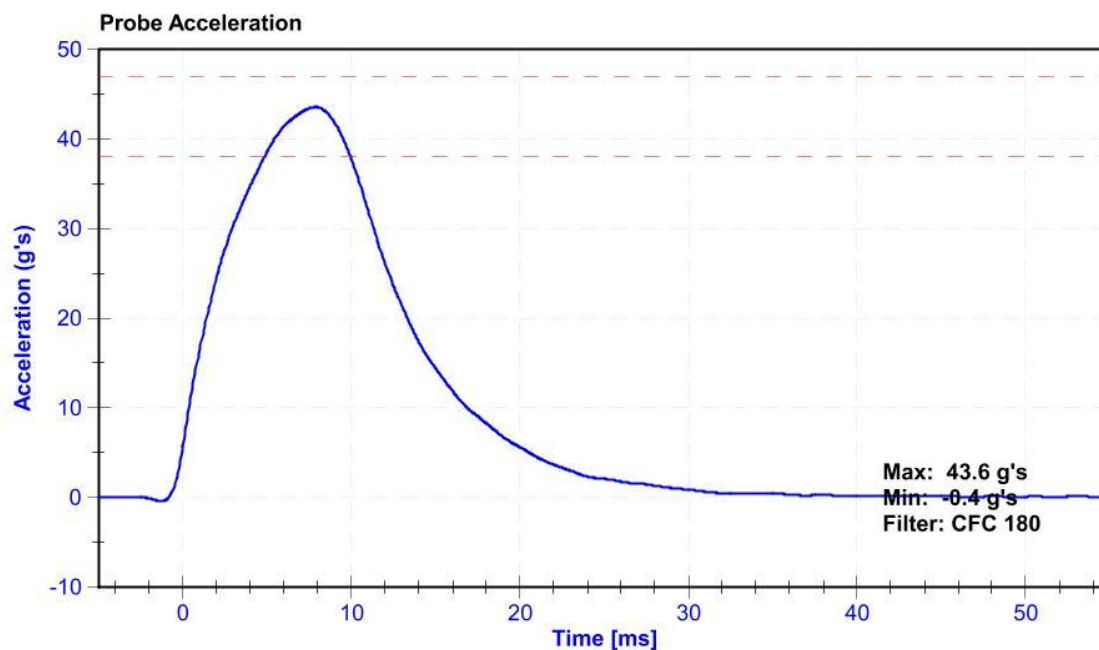
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

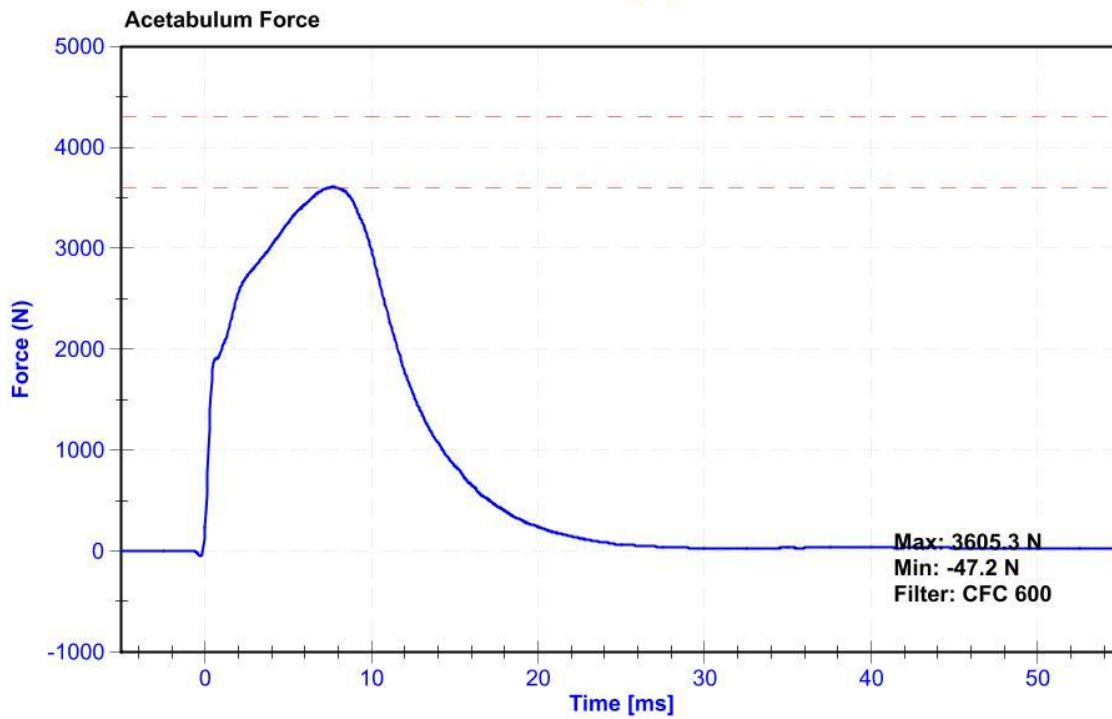
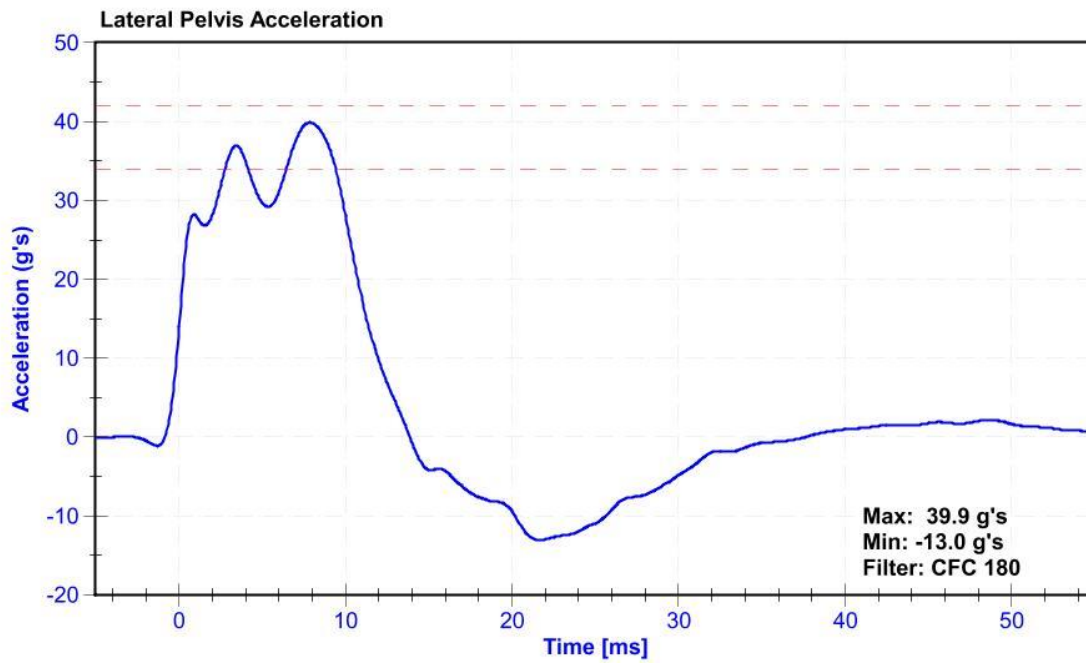
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	16.7	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	43.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.9	Pass
Acetabulum Force	3600	4300	N	3605.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/4/2018	6/4/2019
Certification Plug	Humanetics	11461	8/31/2016	N/A
Crash Test Plug	Humanetics	11960	2/2/2018	N/A







Crash Plug

3-5-19

SID-IIs Pelvis Plug Certification Test

Plug S/N 11960

Test Number 6174

Report Number 6191

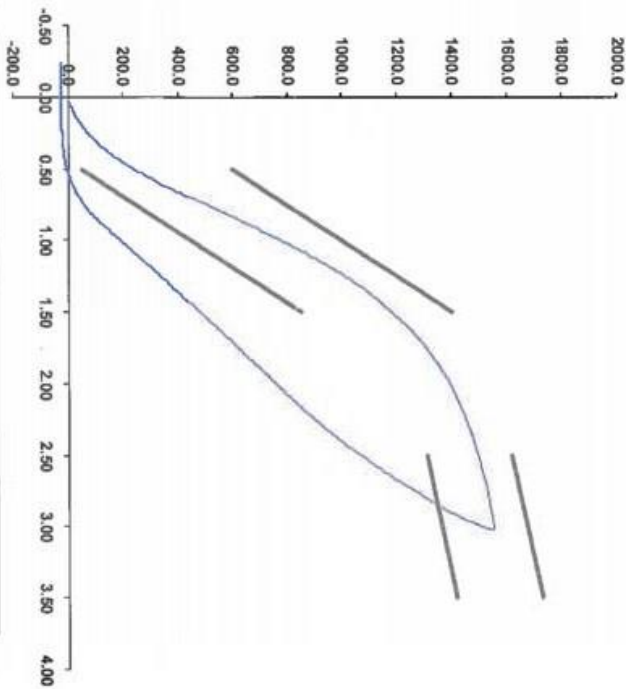
Test Date 2/2/2018 10:23:20 AM

Force (-N) vs Extension (-mm)

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	244.27	50.00
Force @ 1.5 mm (N)	1,178.31	890.00
Force @ 2.5 mm (N)	1,484.32	1,306.00
Force @ 3.0 mm (N)	1,552.46	1,361.00

Toasting Machine STM-20 5865542
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:



Operator

Part Number 180-4450

Template No 107 02-Feb-18
SACO Research

By: *VC*

Date: *2/2/18*

SACO Research 41736 Elm St. #401 Murietta, CA 92562 Tel 310-694-2082 FAX



Test 4
3-5-19

SID-11s Pelvis Plug Certification Test

Force (-N) vs Extension (-mm)

Plug S/N 11461

Test Number 2976

Report Number 2973

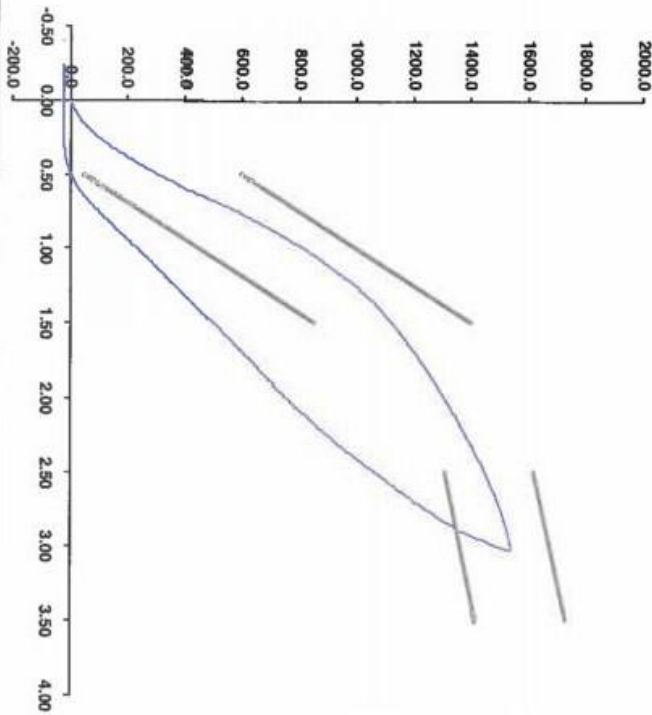
Test Date 8/31/2016 8:48:14 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	318.55	50.00
Force @ 1.5 mm (N)	1,121.94	850.00
Force @ 2.5 mm (N)	1,444.47	1,306.00
Force @ 3.0 mm (N)	1,534.56	1,361.00

Testing Machine STM-20 5965542
Load Cell S/N (T1240813), Units (LBS) 1000

Crosshead Speed (mm/min) or Rate 12.7
Extension or Position Measured by XHD-100 (XHD100)

Notes:



Operator DC

Part Number 180-4450

31-Aug-16

Template No 107
SACO Research

By:

Date: 8/31/16

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

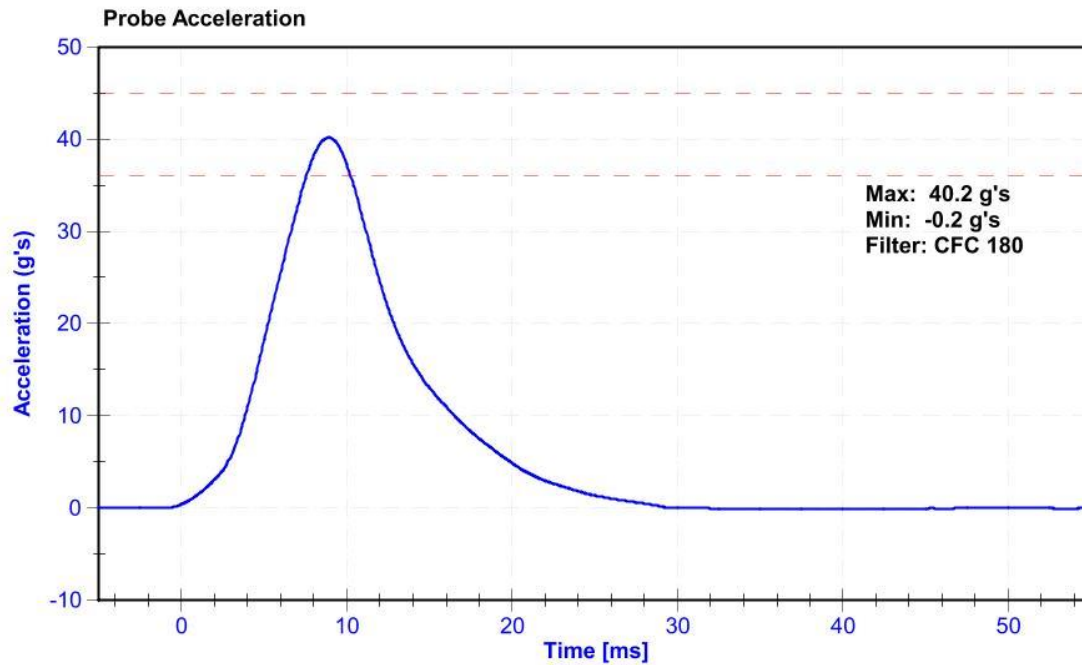
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K.Brogan

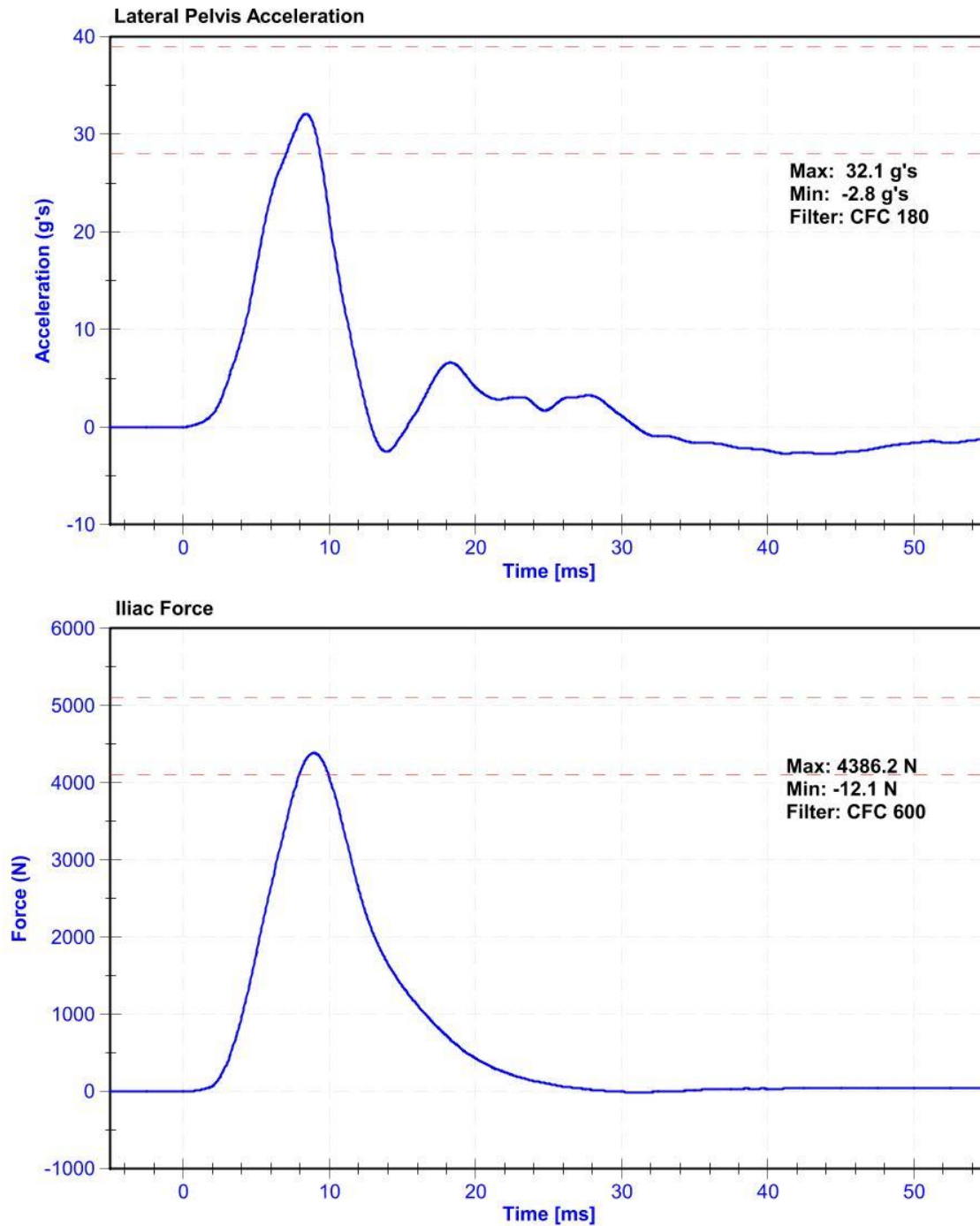
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	17.0	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	36	45	g's	40.2	Pass
Lateral Pelvis Acceleration	28	39	g's	32.1	Pass
Iliac Force	4100	5100	N	4386.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Iliac Load Cell	DENTON 3228J	LC-279Fy	10/4/2018	10/4/2019





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

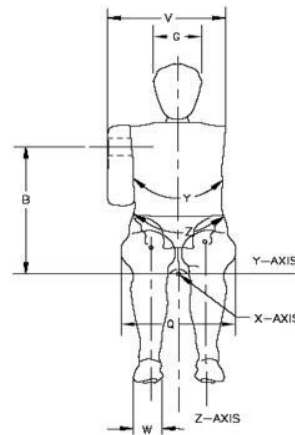
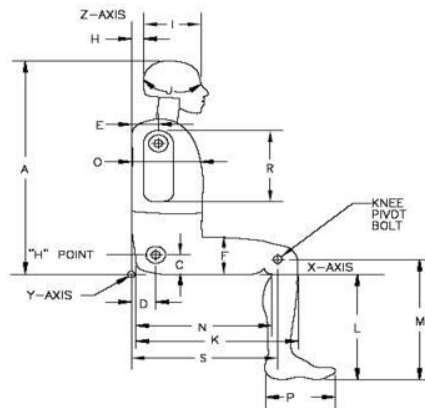


External Measurements - SID-IIs

Technician: K. Dutton

Date: 03/21/2019

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	779	Pass
B	Shoulder Pivot Height	437	453	446	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	126	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	531	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	206	Pass
P	Foot Length	216	232	223	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	486	Pass
V	Shoulder Width	341	357	344	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	781	Pass

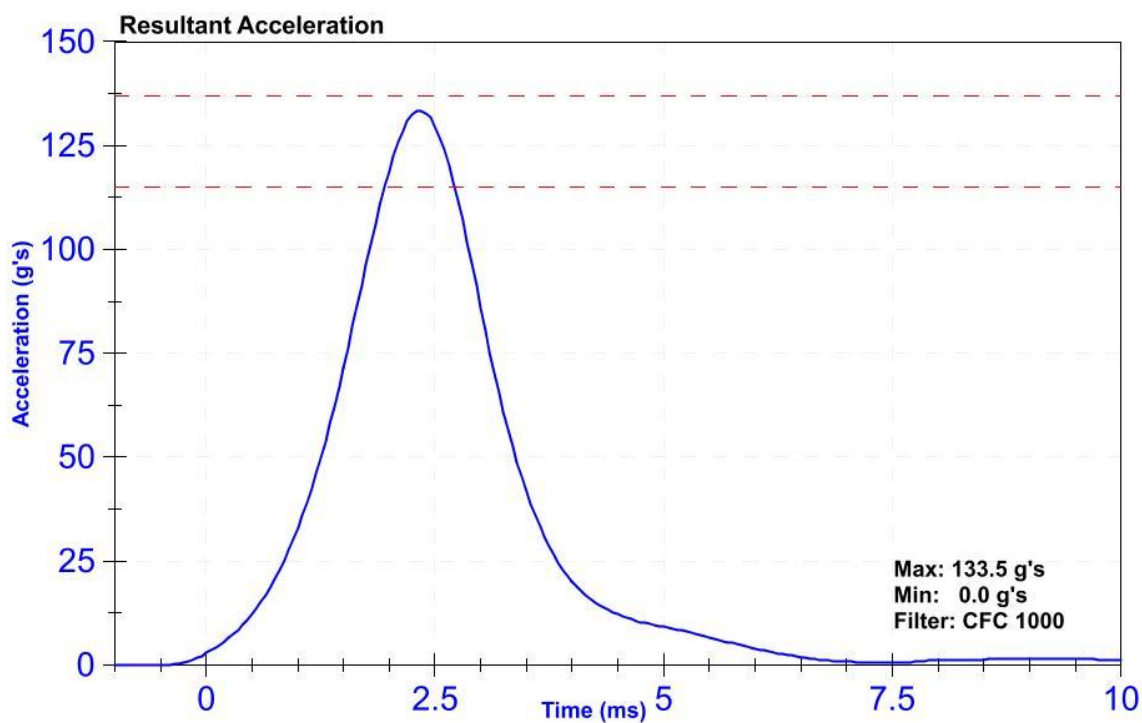
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

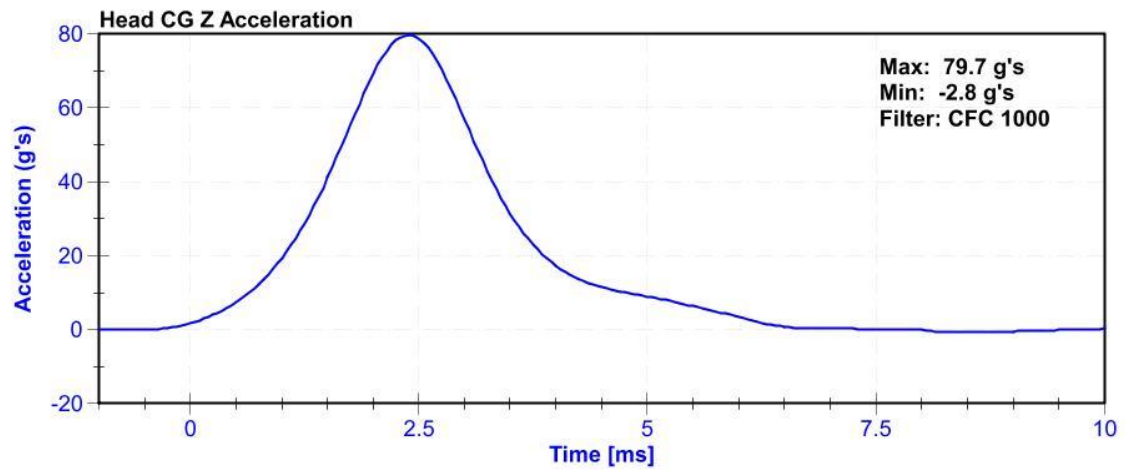
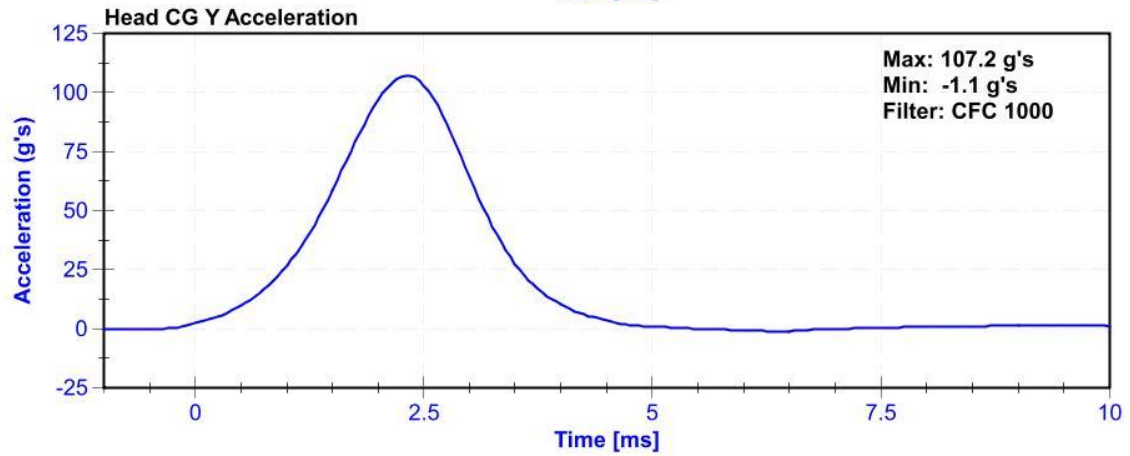
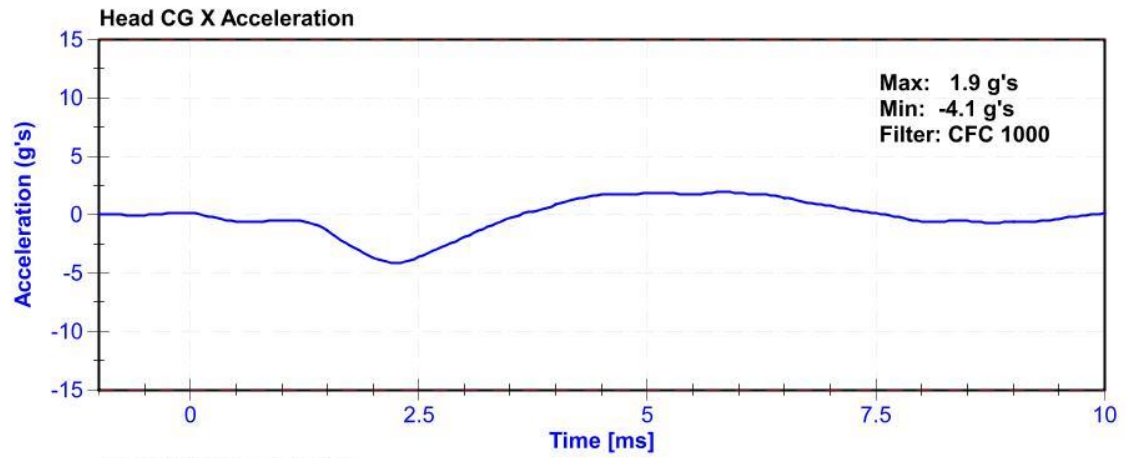
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	30.6	Pass
Resultant Acceleration	115	137	g's	133.5	Pass
Oscillation	0	15	%	2.2	Pass
Fore-Aft Acceleration	-15	15	g's	-4.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P74788	10/18/2018	4/18/2019
Y Accelerometer	ENDEVCO 7264CT	AC-P83432	10/18/2018	4/18/2019
Z Accelerometer	ENDEVCO 7264	AC-P83319	10/18/2018	4/18/2019





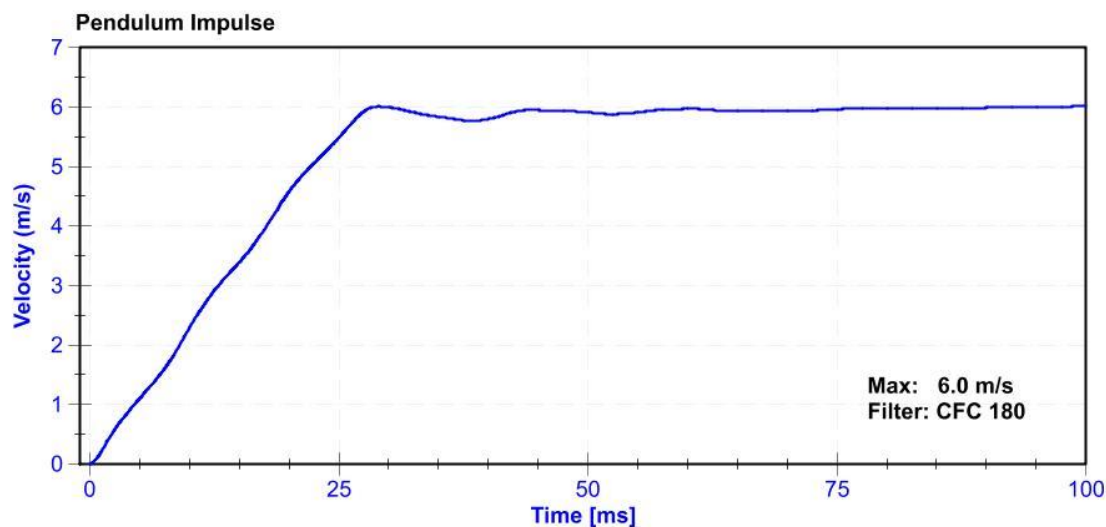
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

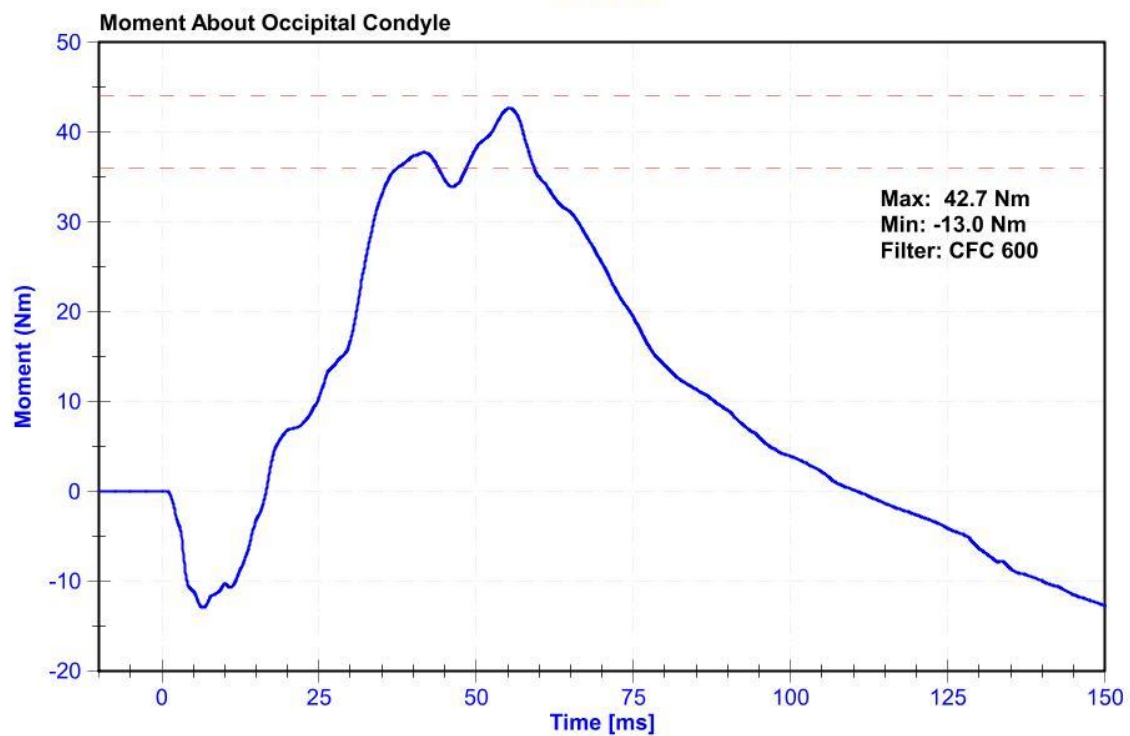
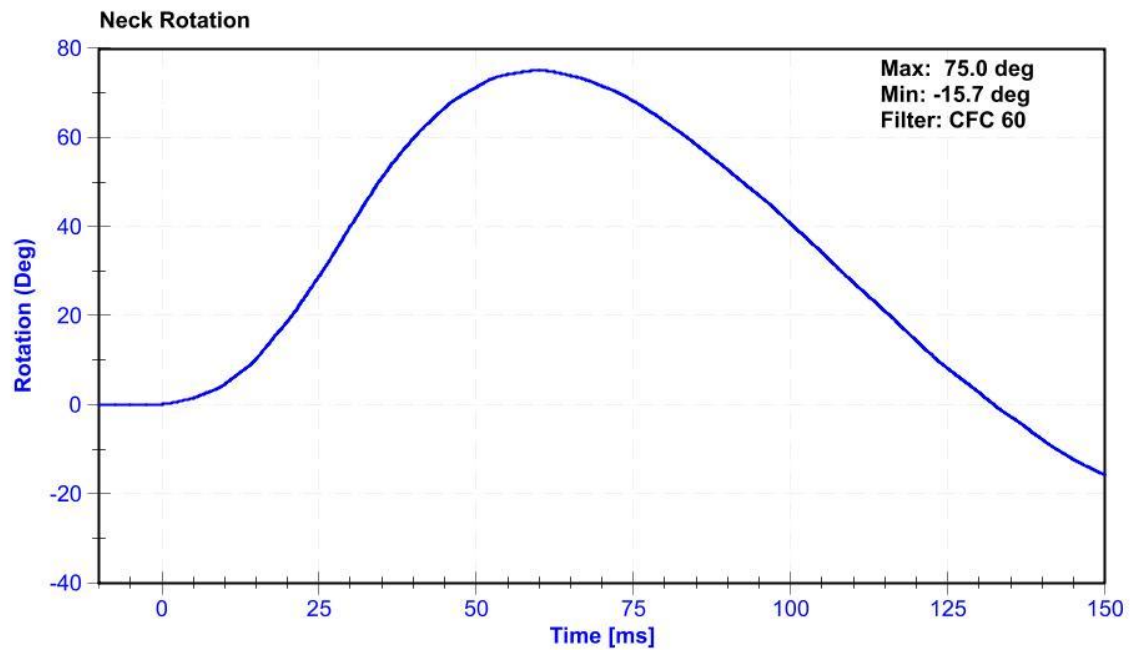
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	30.3	Pass
Velocity	5.51	5.63	m/s	5.514	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.29	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.39	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.58	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.48	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.01	Pass
Neck Rotation	71	81	deg	75.0	Pass
Time at Maximum Rotation	50	70	ms	59.9	Pass
Moment about the OC	36	44	Nm	42.7	Pass
Moment Decay to 0 Nm	102	126	ms	110.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/29/2019	1/29/2020
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/1/2018	11/1/2019
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/1/2018	11/1/2019
Upper Neck Load Cell	Denton 1716	LC-2018 FY	9/28/2018	9/28/2019





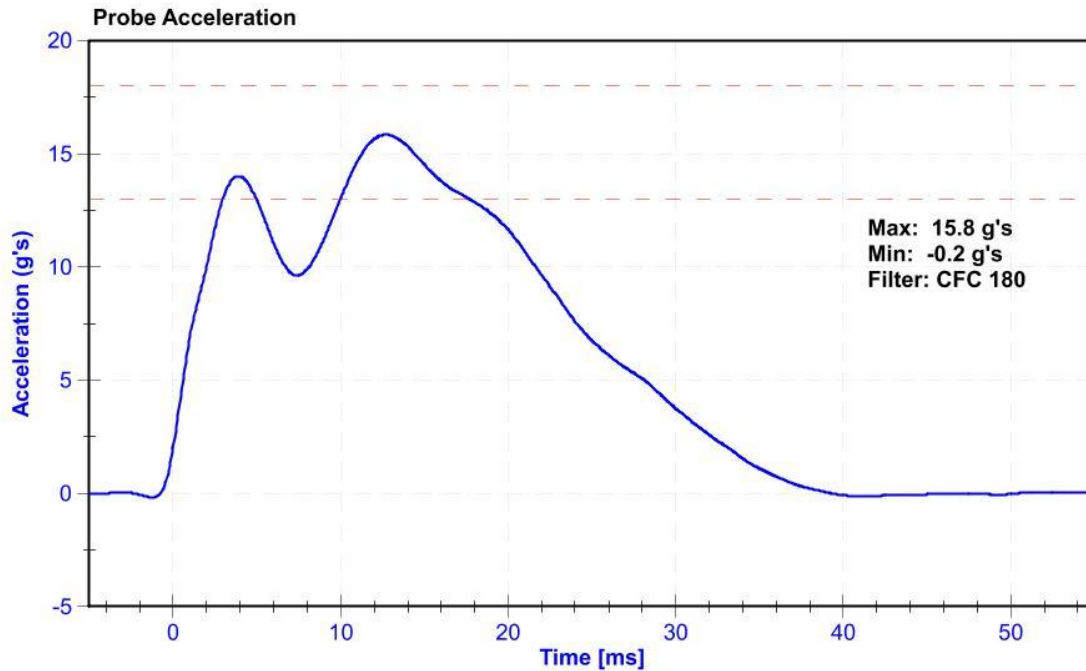
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

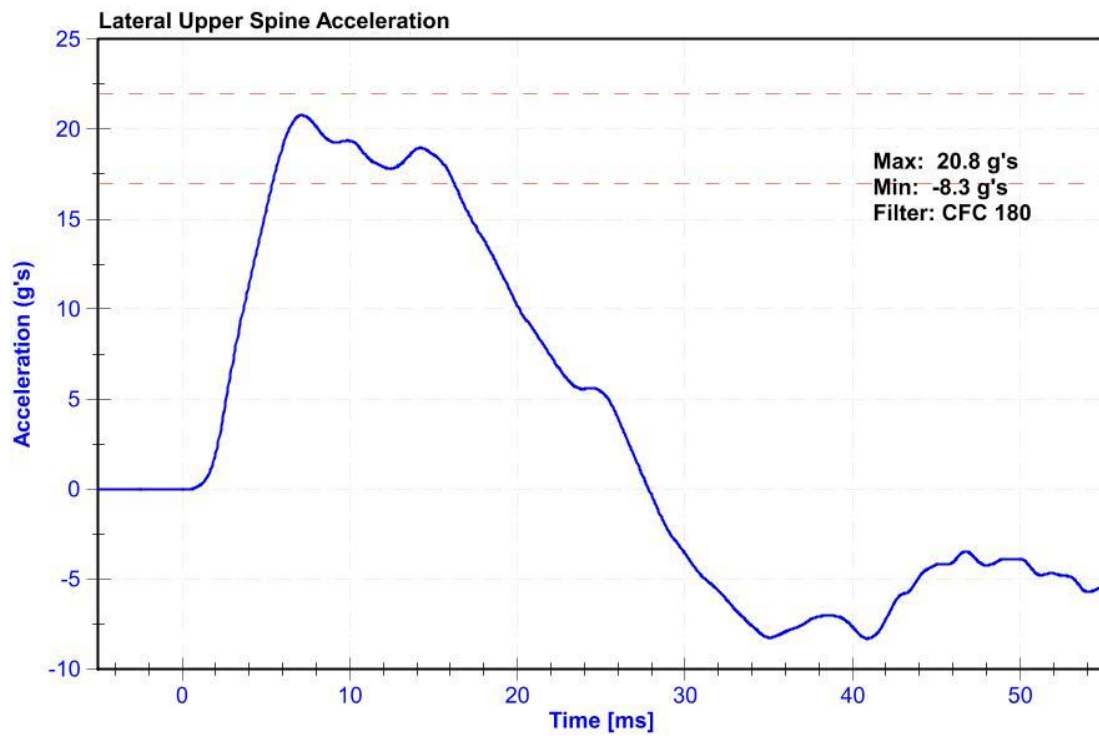
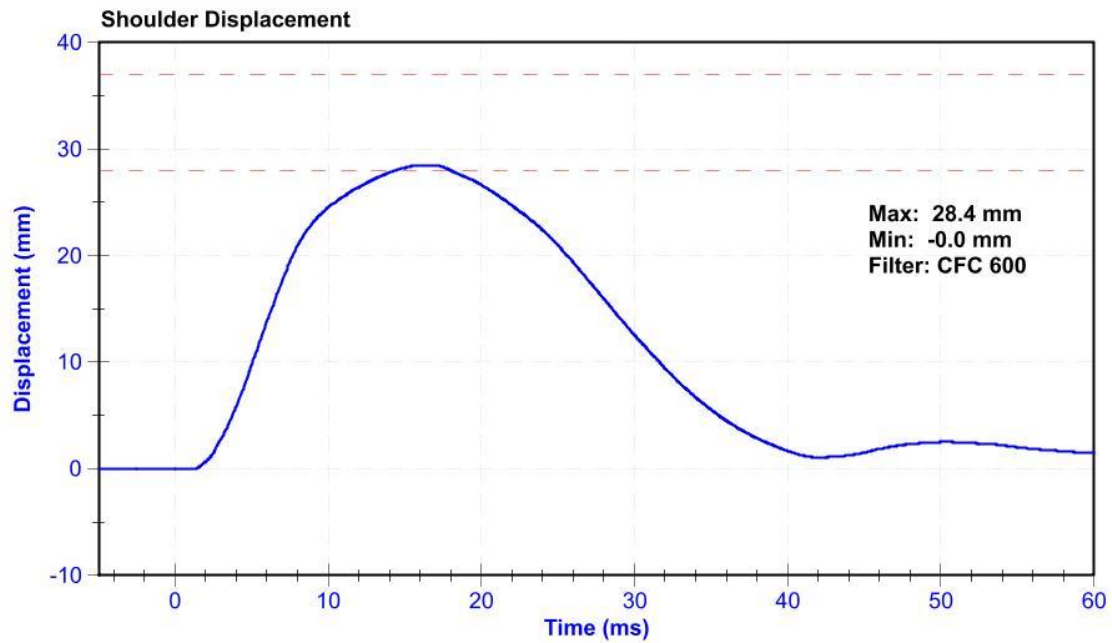
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	30.3	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	28.4	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 7264C	AC-P94667	11/1/2018	11/1/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019





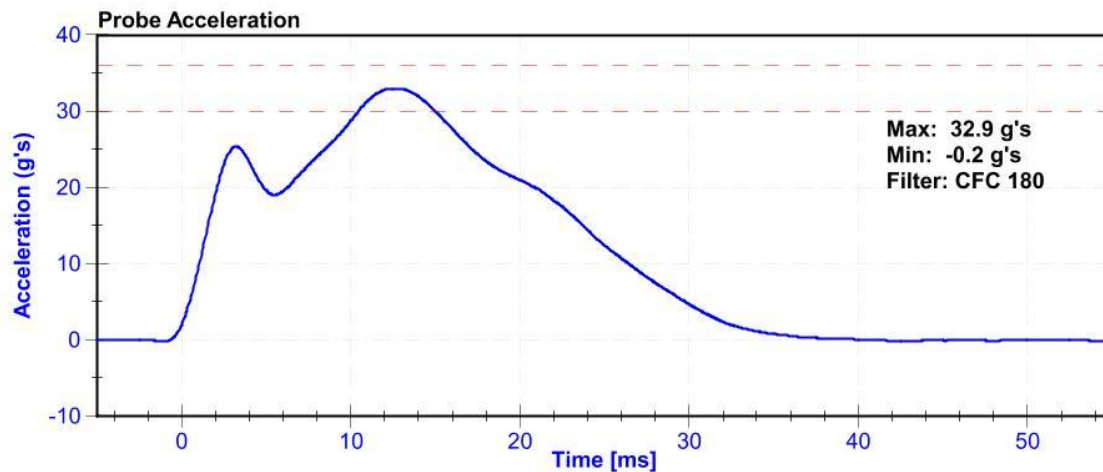
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

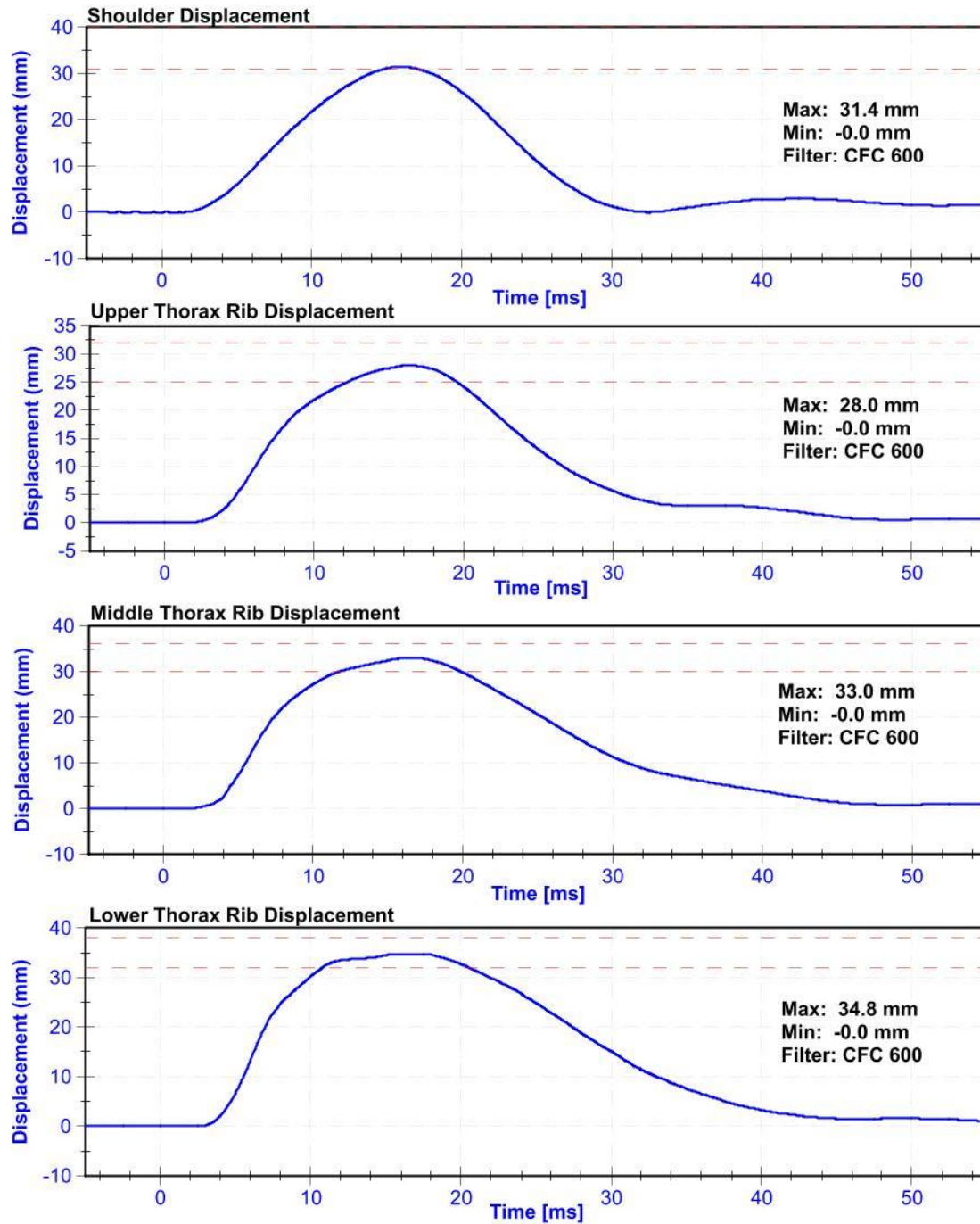
Results

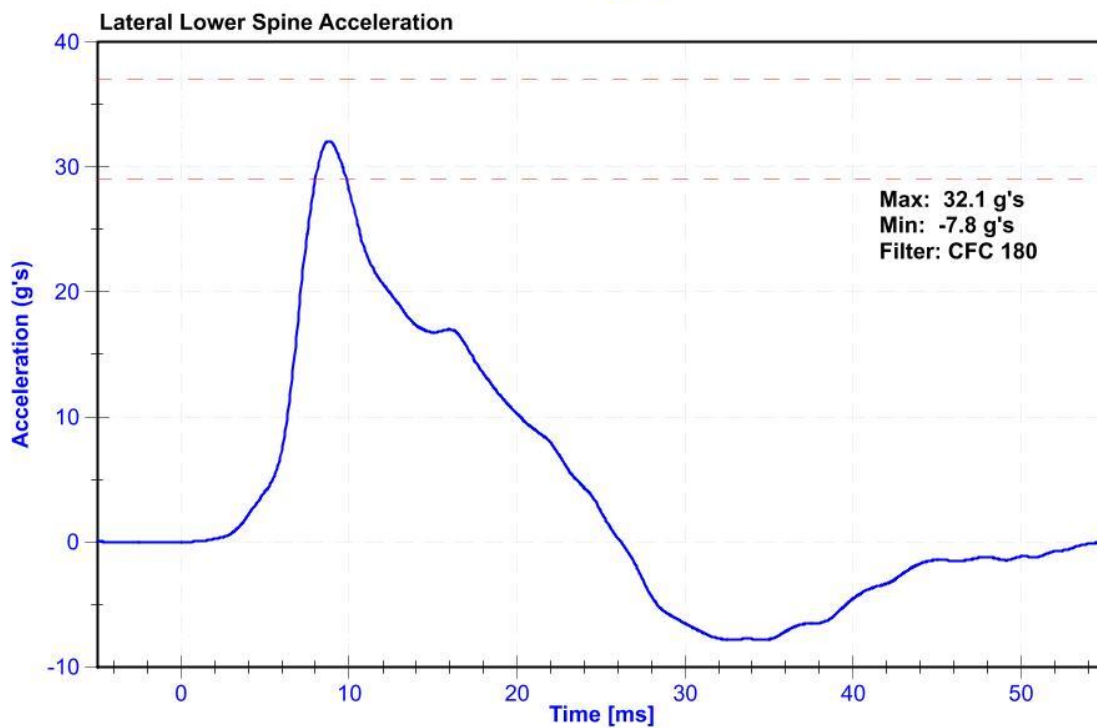
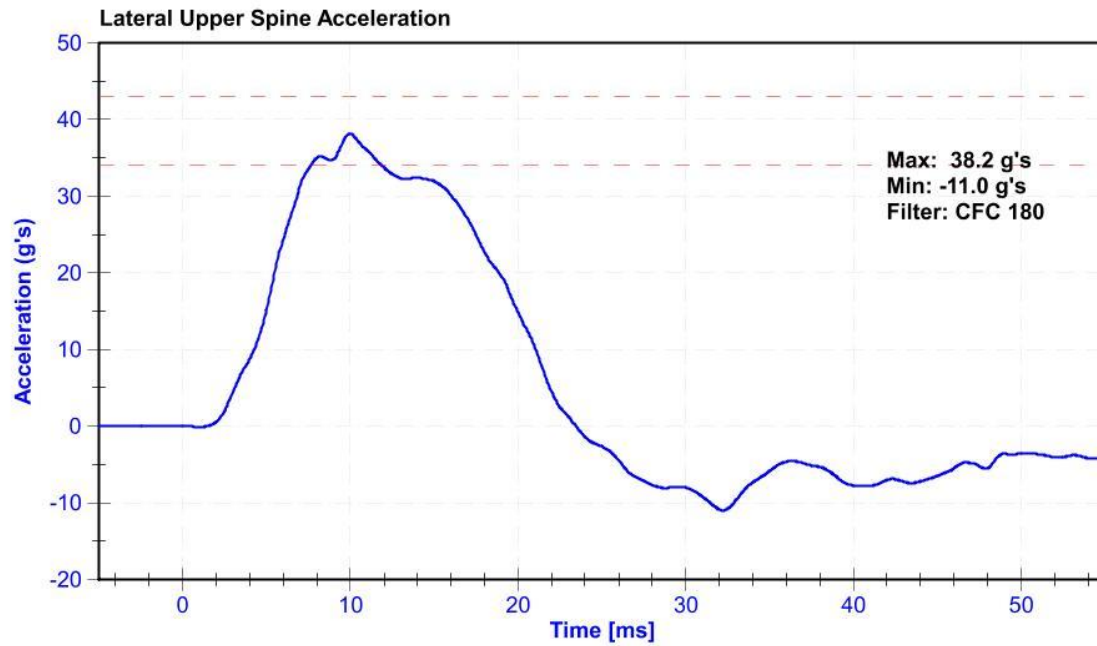
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	30.4	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration after 5 ms	30	36	g's	32.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.2	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.1	Pass
Shoulder Deflection	31	40	mm	31.4	Pass
Upper Thorax Rib Deflection	25	32	mm	28.0	Pass
Mid Thorax Rib Deflection	30	36	mm	33.0	Pass
Lower Thorax Rib Deflection	32	38	mm	34.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Upper Spine T12 Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/12/2018	10/12/2019
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/12/2018	10/12/2019







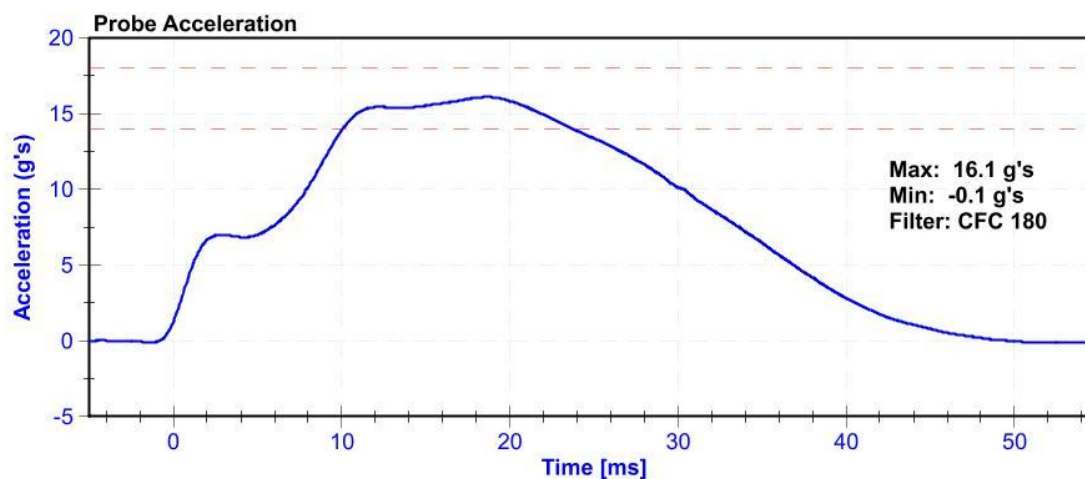
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

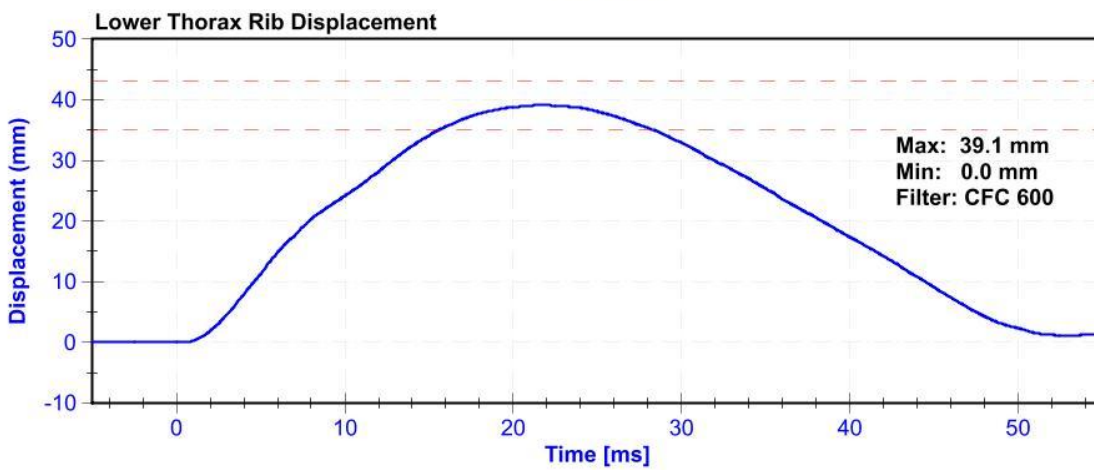
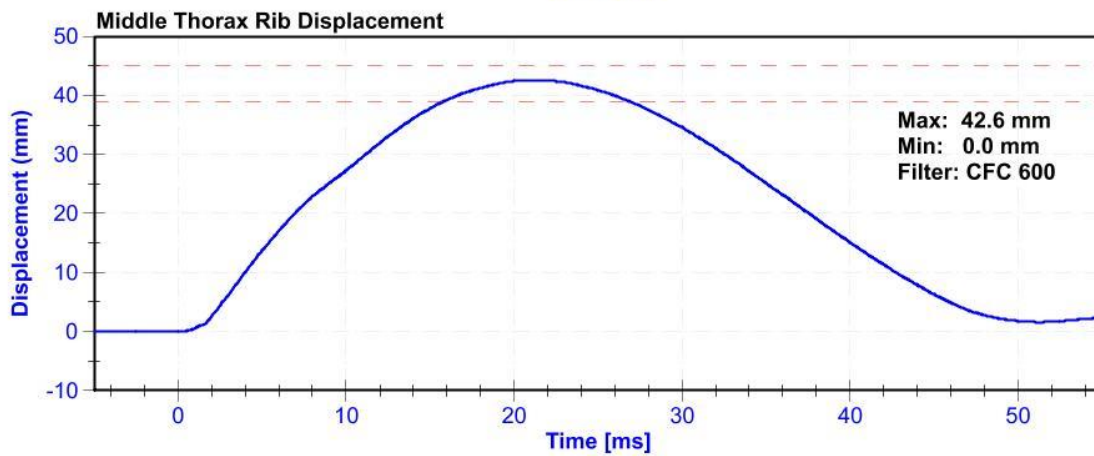
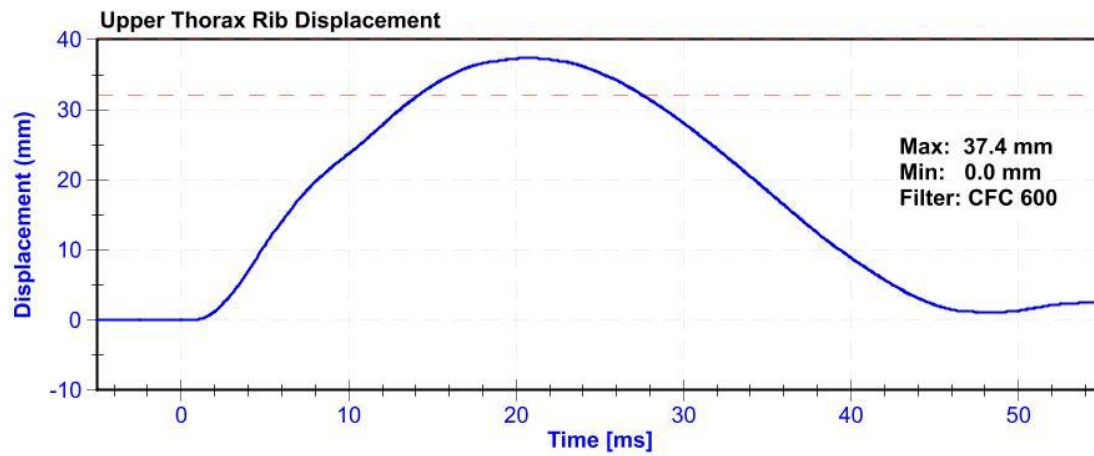
Results

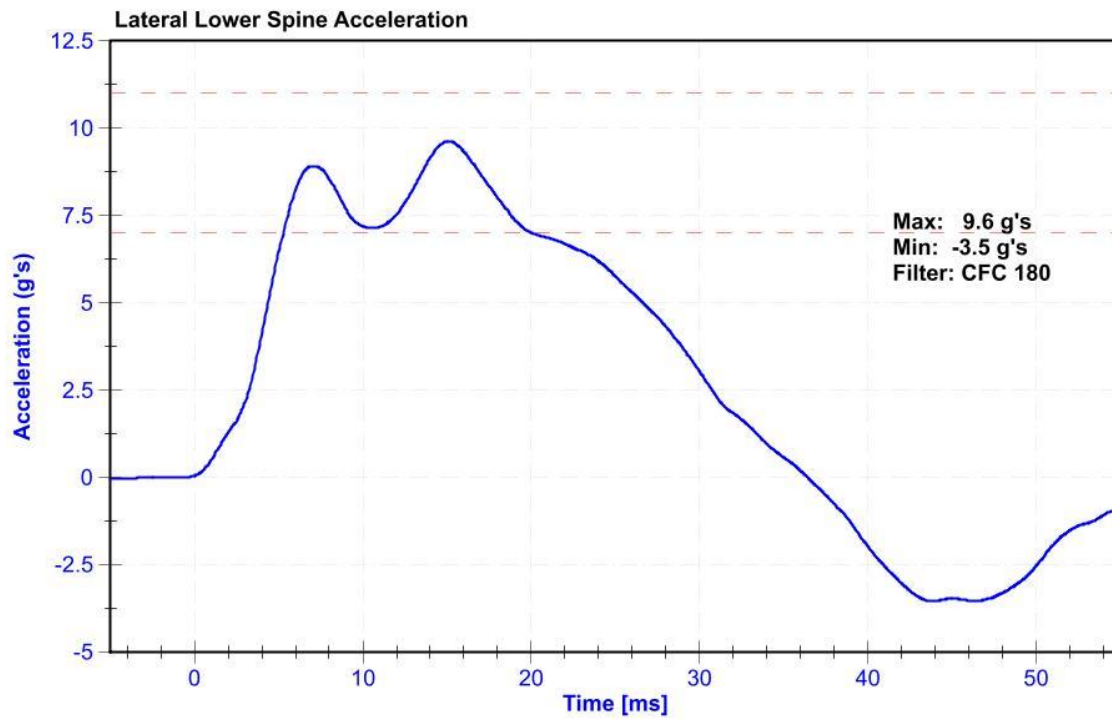
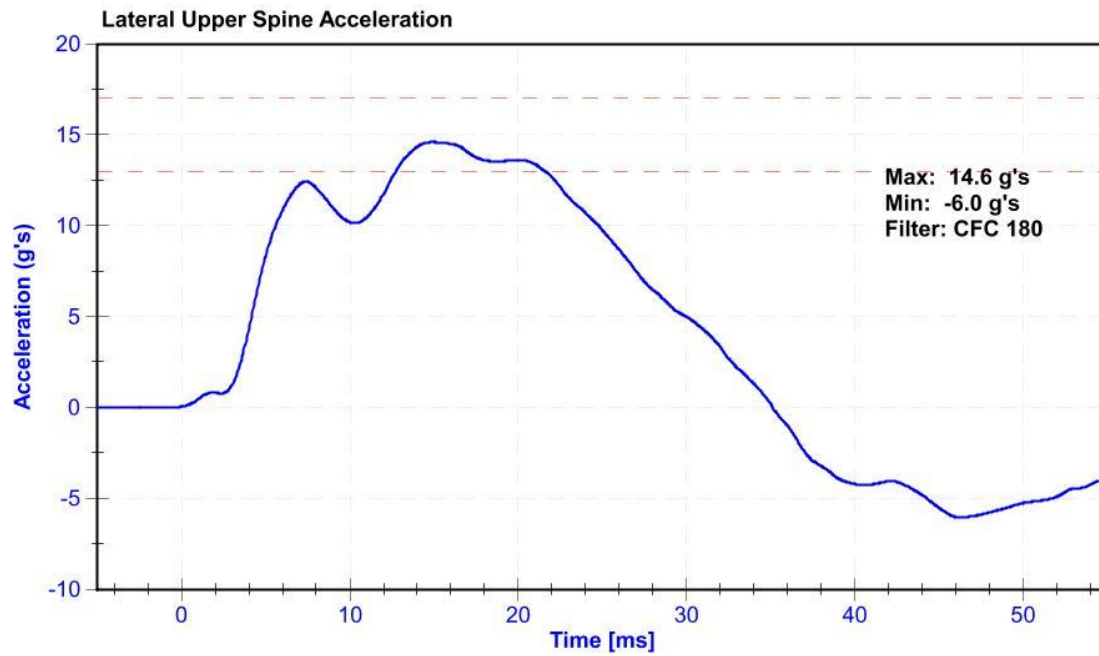
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	30.6	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.6	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.6	Pass
Upper Thorax Rib Deflection	32	40	mm	37.4	Pass
Middle Thorax Rib Deflection	39	45	mm	42.6	Pass
Lower Thorax Rib Deflection	35	43	mm	39.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/12/2018	10/12/2019
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/12/2018	10/12/2019







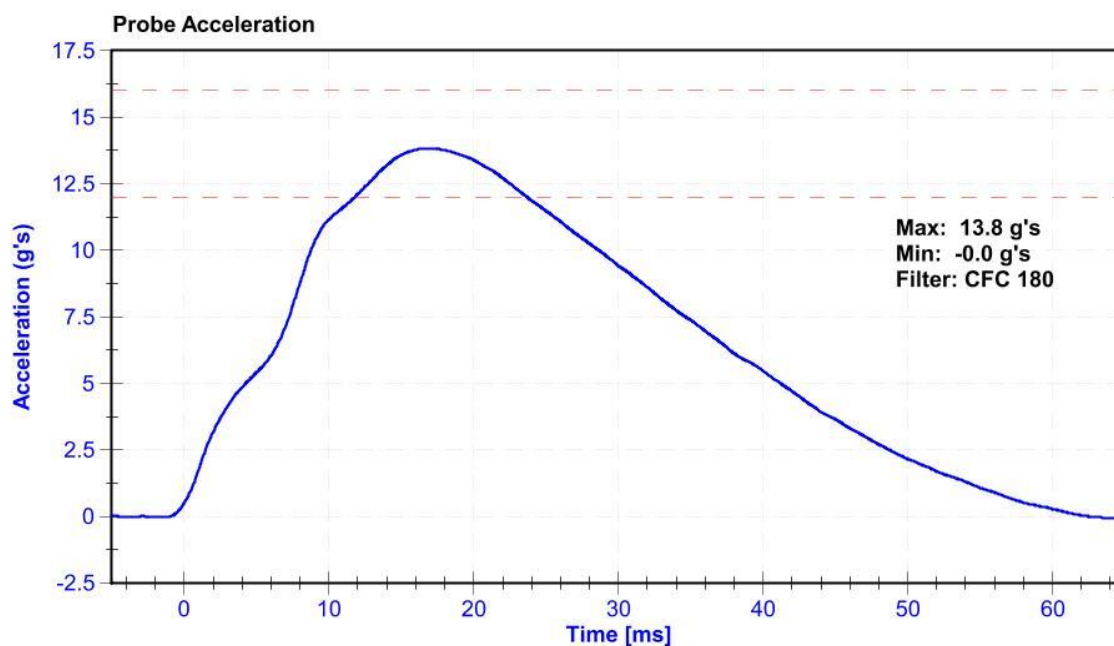
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

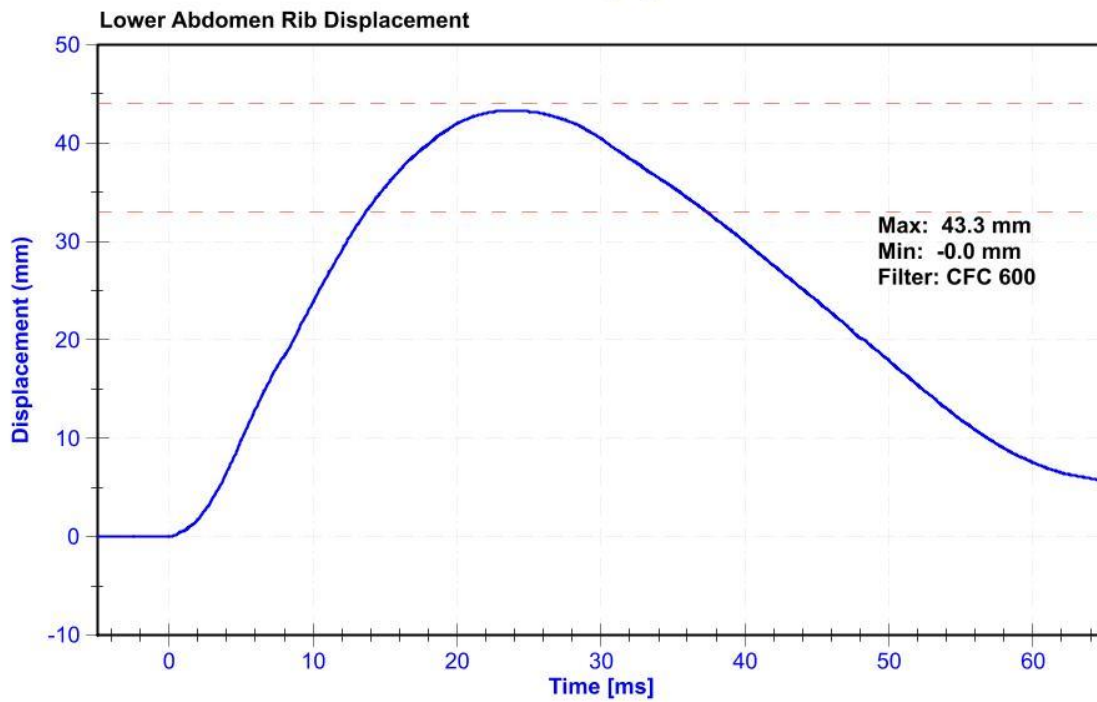
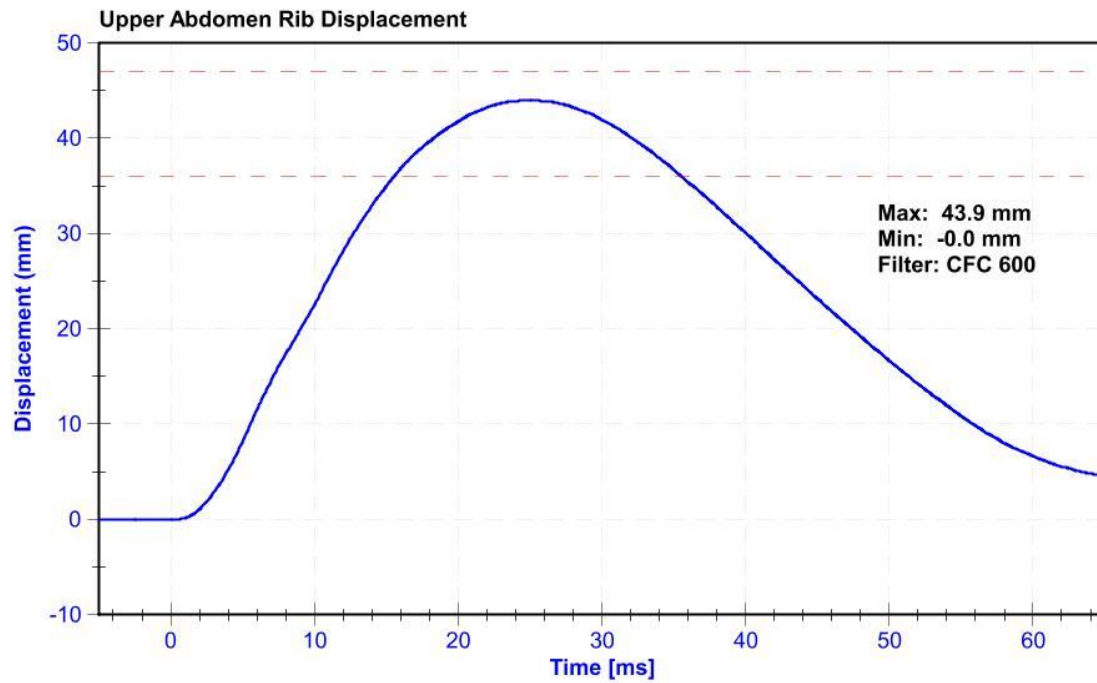
Results

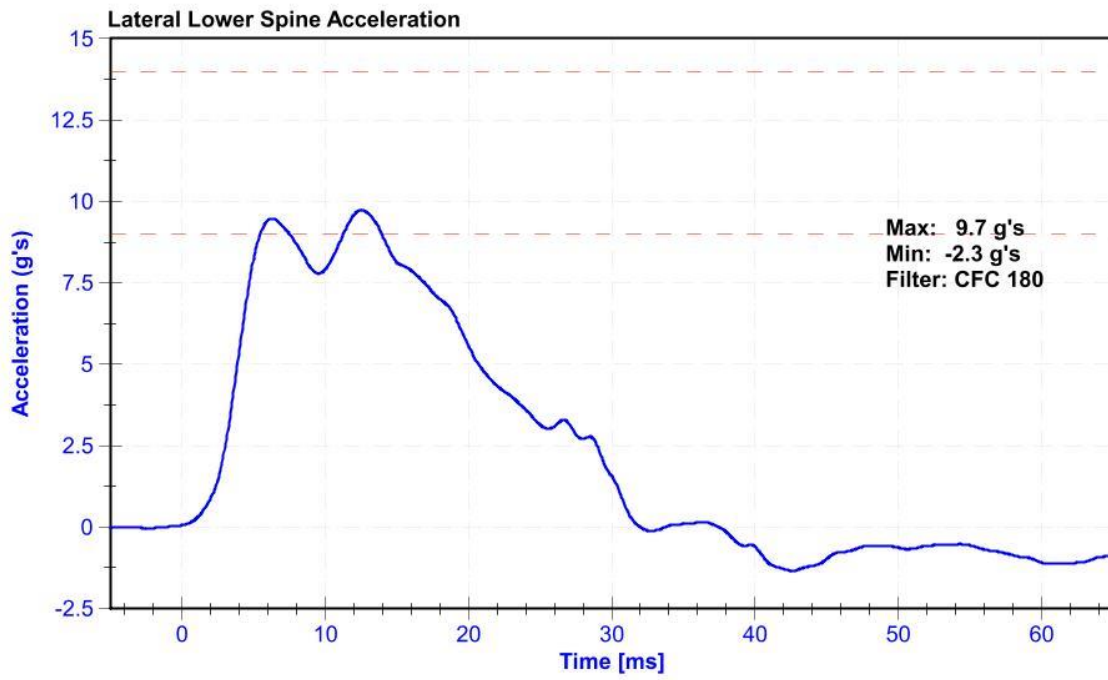
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	31.7	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	10/11/2018	10/11/2019
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	10/12/2018	10/12/2019







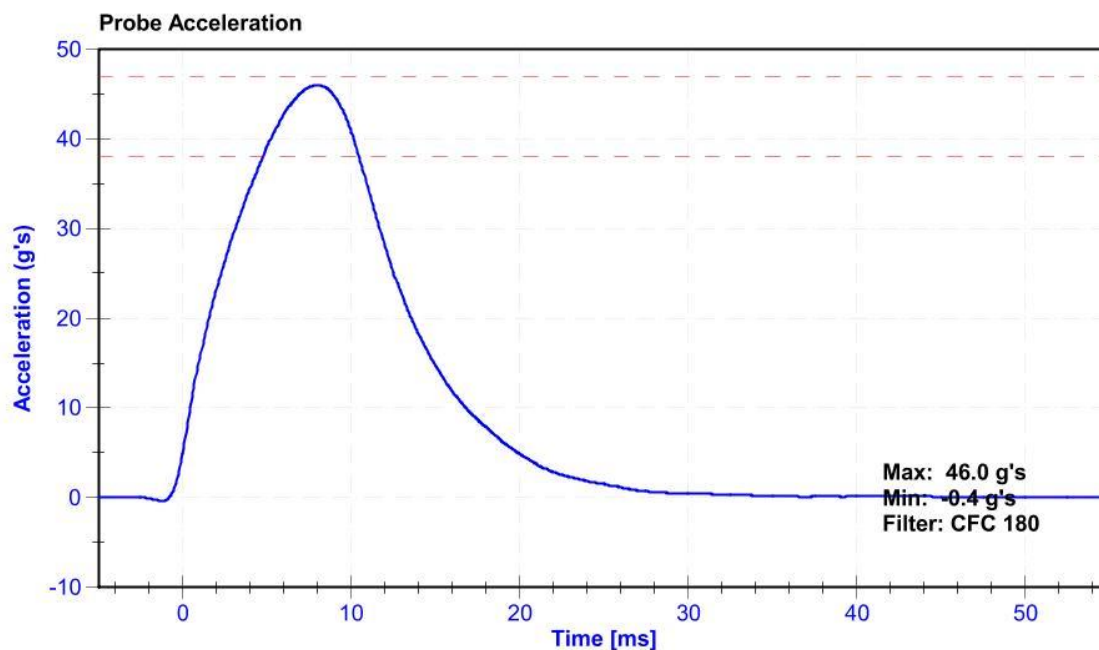
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

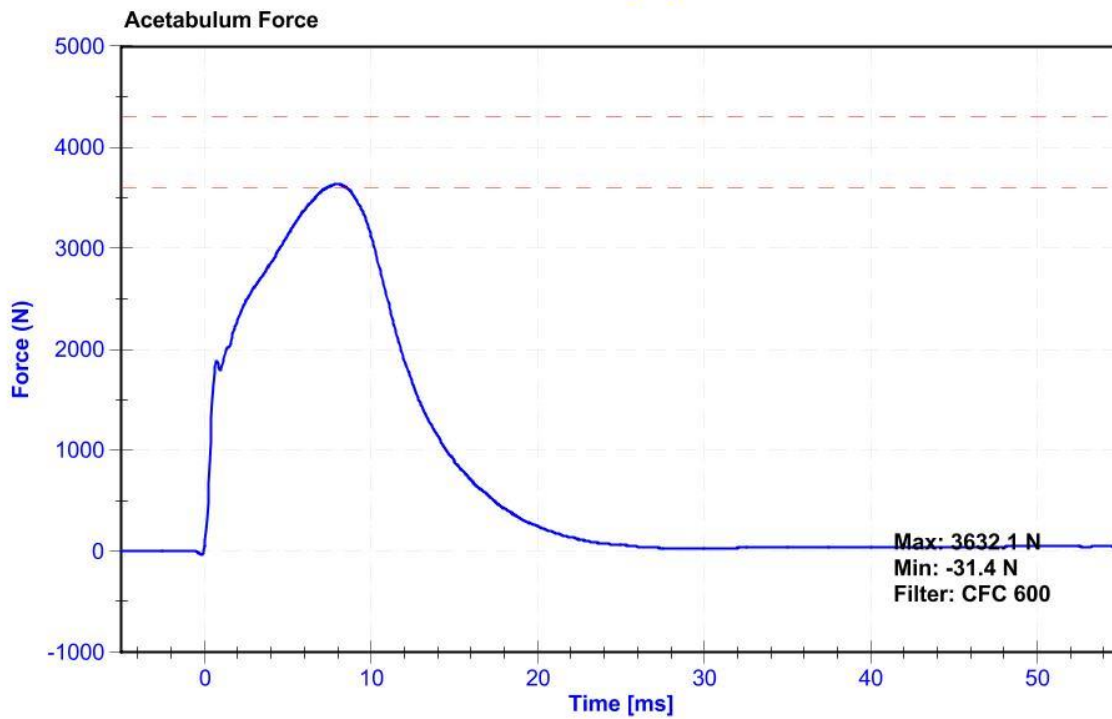
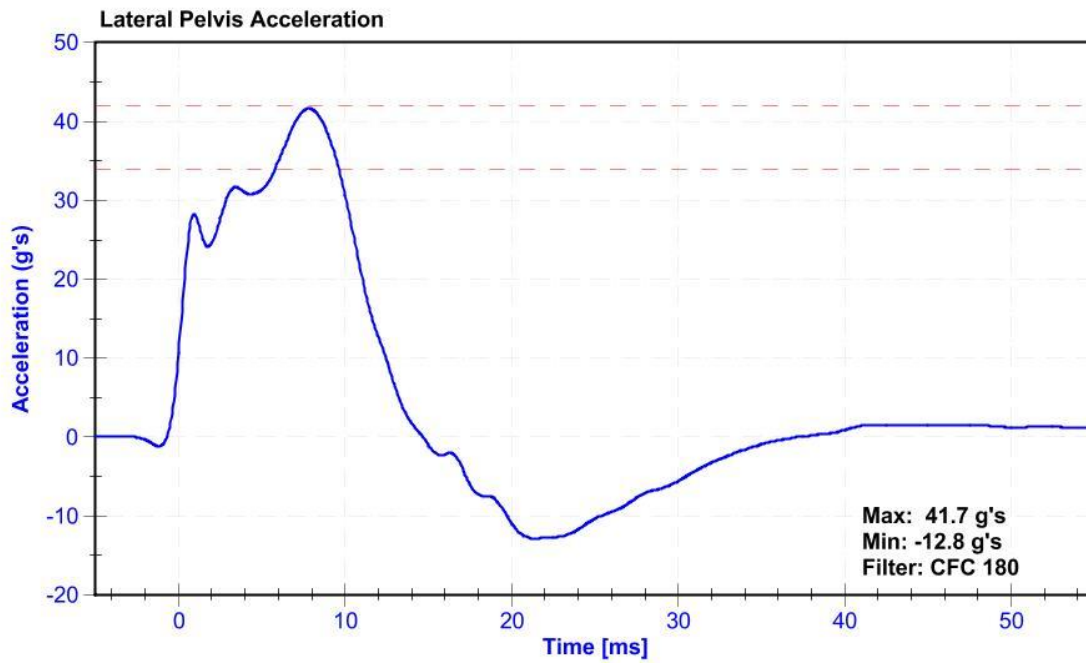
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	31	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration	38	47	g's	46.0	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.7	Pass
Acetabulum Force	3600	4300	N	3632.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/4/2018	6/4/2019
Certification Plug	Humanetics	12326	3/21/2018	N/A
Crash Test Plug	Humanetics	12278	3/15/2018	N/A







DES012 3/21/2019 Crash

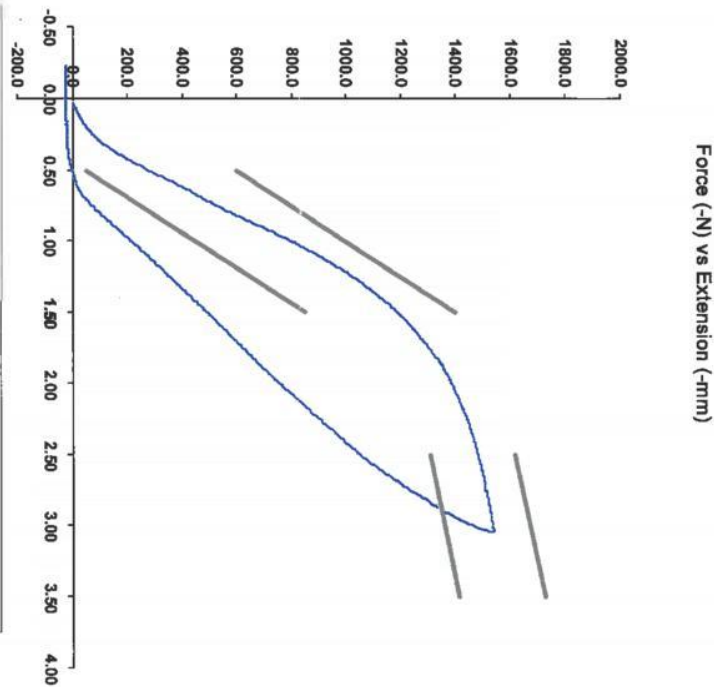
SID-IIs Pelvis Plug Certification Test

Plug S/N 12278
Test Number 6663
Report Number 6678
Test Date 3/15/2018 11:18:27 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	288.37	50.00
Force @ 1.5 mm (N)	1,192.13	850.00
Force @ 2.5 mm (N)	1,483.41	1,306.00
Force @ 3.0 mm (N)	1,538.88	1,361.00

Testing Machine STM-20 6965642	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:



Template No 107	15-Mar-18
SACO Research	
By: <u>DC</u> Date: <u>3/15/18</u>	
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX	
Operator	
Part Number 180-4450	



Ceta-DSS 12 3/21/19

SID-IIs Pelvis Plug Certification Test

Plug S/N 12326

Test Number 6711

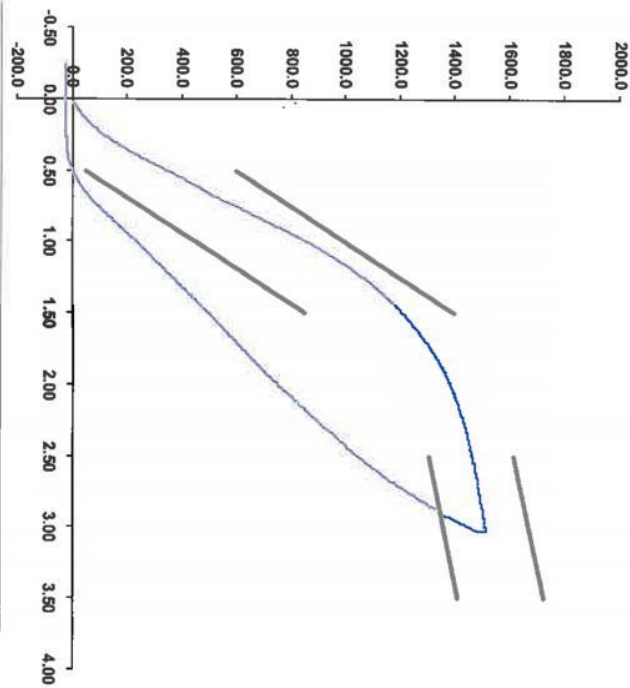
Report Number 6726

Test Date 3/21/2018 12:55:16 PM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50.00	600.00
Force @ 1.5 mm (N)	850.00	1,400.00
Force @ 2.5 mm (N)	1,305.00	1,618.00
Force @ 3.0 mm (N)	1,361.00	1,673.00

Testing Machine STM-20 6965542	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:



Operator

Part Number 180-4450

Template No 107 22-Mar-18
SACO Research

By: DC Date: 3/21/18
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

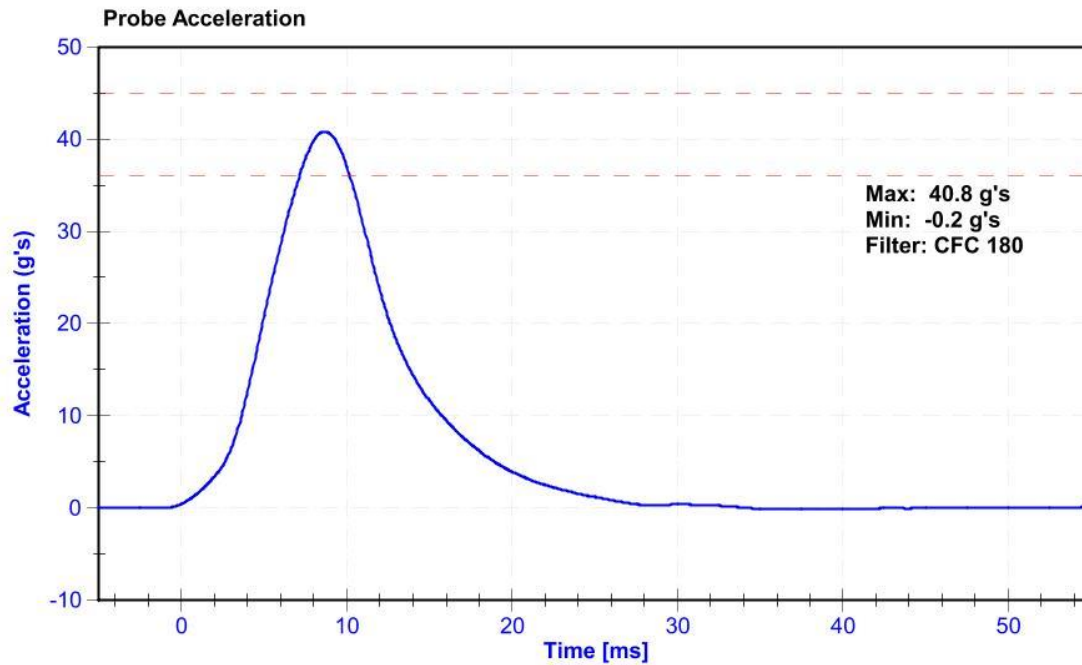
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K.Brogan

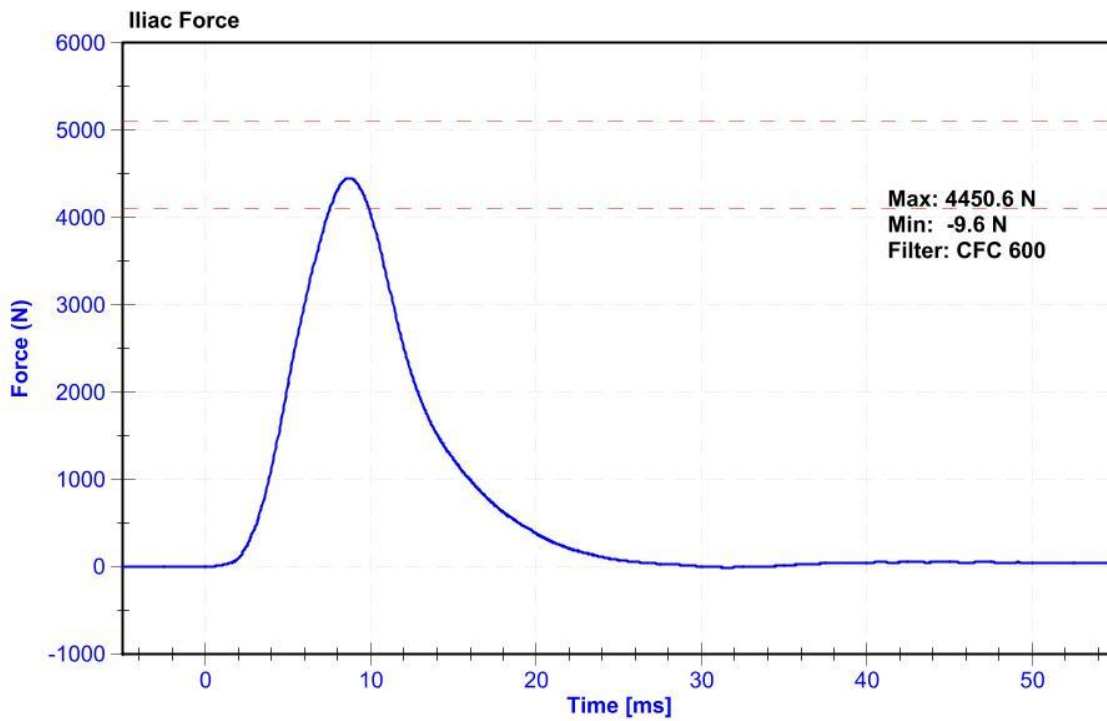
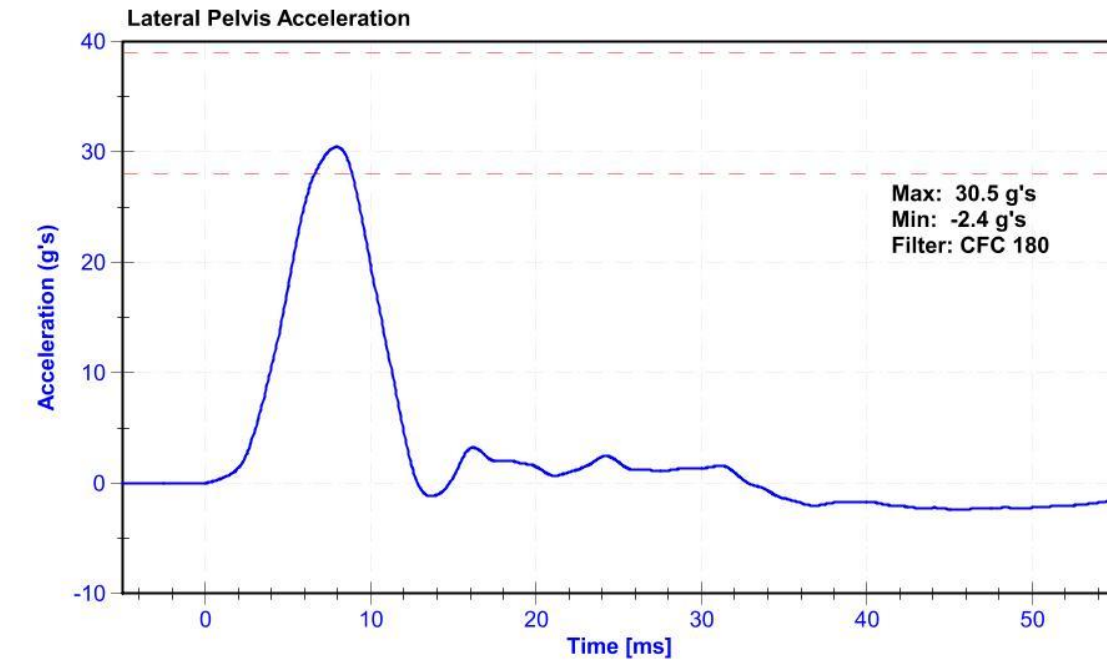
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	30.3	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	36	45	g's	40.8	Pass
Lateral Pelvis Acceleration	28	39	g's	30.5	Pass
Iliac Force	4100	5100	N	4450.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Iliac Load Cell	DENTON 3228J	LC-279Fy	10/4/2018	10/4/2019





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-P74788	ENDEVCO	10/18/2018
			Y	AC-P83432	ENDEVCO	10/18/2018
			Z	AC-P83319	ENDEVCO	10/18/2018
Head Accelerometers - Redundant			X	AC-P80334	ENDEVCO	10/18/2018
			Y	AC-P63841	ENDEVCO	1/21/2019
			Z	AC-P83322	ENDEVCO	10/18/2018
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-2165GFE	Servo	5/15/2018
		Middle	Y	DS-45 GFE	Servo	10/12/2018
		Lower	Y	DS-011GFE	Servo	10/12/2018
	Abdominal Rib	Upper	Y	DS-008GFE	Servo	10/11/2018
		Lower	Y	DS-1774GFE	Servo	10/12/2018
Lower Spine Accelerometers (T12)			X	AC-P45019	ENDEVCO	10/17/2018
			Y	AC-P51699	ENDEVCO	10/16/2018
			Z	AC-P51685	ENDEVCO	10/17/2018
Acetabulum Load Cell			Y	LC-4986Fy	Denton	6/4/2018
Lilac Wing Load Cell			Y	LC-279Fy	Denton	10/4/2018
Pelvis Plug (Struck Side)				11960	SACO	2/2/2018
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A250367	MSI 1201-1000	3/11/2019
Vehicle Center of Gravity	Y	AC-A250374	MSI 1201-1000	3/11/2019
Vehicle Center of Gravity	Z	AC-A255841	MSI 1201-1000	1/5/2019
Left Floor Sill	Y	AC-A279981	MSI 1201-1000	11/10/2018
A-Pillar Sill	Y	AC-A281007	MSI 1201-1000	11/26/2018
A-Pillar Low	Y	AC-A281005	MSI 1201-1000	11/26/2018
A-Pillar Mid	Y	AC-A281031	MSI 1201-1000	11/24/2018
B-Pillar Sill	Y	AC-A281041	MSI 1201-1000	11/23/2018
B-Pillar Low	Y	AC-A281455	MSI 1201-1000	11/24/2018
B-Pillar Mid	Y	AC-A281024	MSI 1201-1000	11/23/2018
Driver Seat	Y	AC-A281449	MSI 1201-1000	11/24/2018
Engine Top	X	AC-A280960	MSI 1201-1000	3/6/2019
Engine Top	Y	AC-A280900	MSI 1201-1000	2/28/2019
Firewall	Y	AC-A280925	MSI 1201-1000	11/22/2018
Right Roof	Y	AC-A281032	MSI 1201-1000	11/23/2018
Right Floor Sill	Y	AC-A281011	MSI 1201-1000	11/26/2018
Rear Floorpan	X	AC-A197058	MSI 1201-1000	1/17/2019
Rear Floorpan	Y	AC-A280377	MSI 1201-1000	3/6/2019

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18879	Interface 1220-FS	8/3/2018
Load Cell 2	LC-18852	Interface 1220-FS	8/3/2018
Load Cell 3	LC-46955	Interface 1220-FS	8/3/2018
Load Cell 4	LC-18882	Interface 1220-FS	8/3/2018
Load Cell 5	LC-18864	Interface 1220-FS	8/3/2018
Load Cell 6	LC-18847	Interface 1220-FS	8/3/2018
Load Cell 7	LC-62086	Interface 1220-FS	8/3/2018
Load Cell 8	LC-46962	Interface 1220-FS	8/3/2018