REPORT NUMBER: SPNCAP-CAL-21-007

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

Ford Motor Co.
2021 Ford F-250 Super Duty Crew Cab
Truck

NHTSA No: M20210213

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

August 18, 2021

FINAL REPORT

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

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

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Prepared by: Matthew Pronko _____ Date: August 18, 2021
Matthew Pronko, Test Engineer

Approved by: Vanessa Hansen _____ Date: August 18, 2021
Vanessa Hansen, Engineering Manager

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. SideNCAPPole-CAL-21-007	***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 2021 Ford F-250 Super Duty Crew Cab Truck NHTSA No.: M20210213		***5. Report Date*** August 18, 2021 ***6. Performing Organization Code*** CAL
7. Author(s) Matthew Pronko, Test Engineer Vanessa Hansen, Engineering Manager		***8. Performing Organization Report No.*** CAL-DOT-2021-007
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-100) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report, May 7, 2021 - August 18, 2021 ***14. Sponsoring Agency Code*** NRM-100
15. *Supplementary Notes*		

16. Abstract

A 32.20 km/h (20 mph), 75˚ oblique impact Side NCAP Test was conducted on the subject 2021 Ford F-250 Super Duty Crew Cab 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 May 7, 2021.

The impact velocity of the vehicle was 32.09 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 490 mm located at level 1. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)		
	Units	Threshold	Result
Head Injury Criteria (HIC_{36})		1000	229.538
Resultant Lower Spine Acceleration	G	82	37.647
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2227.196
Maximum Thoracic Rib Deflection	mm	38	19.738
Maximum Abdomen Rib Deflection	mm	45	18.044

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.

17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, 1200 New Jersey Ave. SE Washington, D.C. 20590

19. Security Class. (of this report)	***20. Security Class. (of this page)***	***21. No. of Pages***	***22. Price***
UNCLASSIFIED	UNCLASSIFIED	128	

Form DOT F1700.7 (8-72)

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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2021 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 2021 Ford F-250 Super Duty Crew Cab Truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2021 Ford F-250 Super Duty Crew Cab Truck. The subject vehicle was towed into the rigid pole at an angle of 75^{o} and a velocity of 32.09 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 7, 2021. 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 March 2020. The side impact event was documented by 11 cameras. 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	229.538
Resultant Lower Spine Acceleration	g	82	37.647
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2227.196
Maximum Thoracic Rib Deflection	mm	38*	19.738
Maximum Abdominal Rib Deflection	mm	45*	18.044

*****Proposed IARV

Supplemental restraint information was recorded as follows:

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- 11HEADCG00S2AVXP3,Driver Head Angular Rate X,Questionable data throughout
- 11HEADCG00S2AVYP3,Driver Head Angular Rate Y,Questionable data throughout
- 11HEADCG00S2AVZP3,Driver Head Angular Rate Z,Questionable data throughout
- 11TRRI01LES2DSYP2,Driver Upper Thorax Rib Y Displacement,Questionable Data between 34ms and 61ms
- 10SILBLEFR00ACYP3,Left Front Sill Y,Questionable data after 35ms
- 10BPILLELO03ACYP,Left Middle B-Pillar Y,Questionable Data Throughout

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: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20210213
Model Year	2021
Make	Ford
Model	F-250 Super Duty
Body Style	Crew Cab Truck
VIN	1FT7W2A68MEC46282
Body Color	Silver
Odometer Reading (km/mi)	13 mi
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	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
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	11/20
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	N/A	6	
Capacity Weight (VCW) (kg)				1731	(A)
DSC X 68.04 kg				408.24	(B)
Cargo Weight (RCLW) (kg)				136	(A-B)

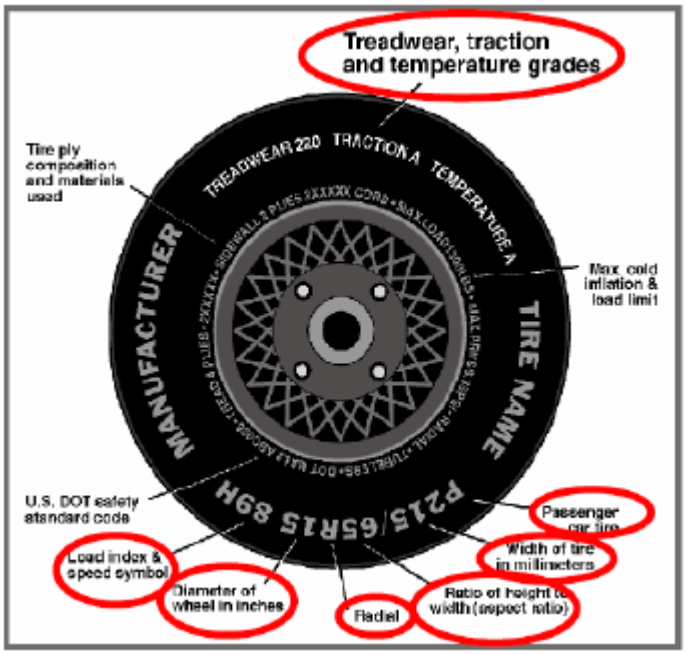
VEHICLE SEAT TYPE

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:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

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	LT275/65R18E	LT275/65R18E
Tire Size on Vehicle	LT275/65R18E	LT275/65R18E
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 Steel, 2 Polyamide	2 Polyester, 2 Steel, 2 Polyamide
Tire Plies Body	2 Polyester	2 Polyester
Load Index/Speed Symbol	123/120 S	123/120 S
Tire Material	Rubber	Rubber
DOT Safety Code Left	A3B9H00R4520	A3B9H00R4520
DOT Safety Code Right	A3B9H00R4520	A3B9H00R4520

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

Test Vehicle: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	401	415	498	495
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	780	589		787	662		788	661	
Right	kg	774	600		814	659		801	678	
Ratio	%	56.7	43.7		54.8	45.2		54.3	45.7	
Totals	kg	1554	1189	2743	1601	1321	2922	1589	1339	2928

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2743	(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	2929	(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)? [X] **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	-1.50	-1.50	-1.70	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-1.20	-1.1	-0.90	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	0.00	-0.15	-0.25	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	+0.10	-0.20	-0.30	Yes
Vehicle CG (Aft of Front Axle)	mm	1761	1836	1858	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	-2	-7	-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:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare tire tools	2
Ballast / Equipment Added	99

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

Test Surface Markings

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	1033
Aft 25 mm target	1034

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

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

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 (º)		
	Max	Min	Mid
Driver Seat	Not Adjustable		
Front Passenger Seat	Not Adjustable		
Front Center Seat	Fixed	Fixed	Fixed
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) (º)	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	Fixed	Fixed	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

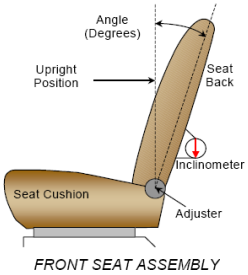
Test Vehicle: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021

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	Fixed	Fixed	Fixed	Fixed
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.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	50.3	30	5.6	4
Front Passenger Seat	50.3	30	5.6	4
Front Center Seat	Fixed	Fixed	Fixed	Fixed
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BELT ANCHORAGE ADJUSTMENT

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

Seat	Total # of Positions	Placed in Position #
Driver Seat	4 (0-3)	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	2 (0-1)	Lowermost

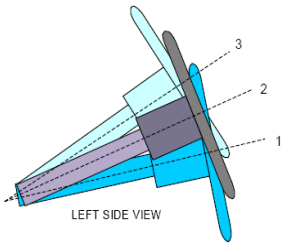
DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

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	19.1	
Geometric Center – Position 2	21.4	
Uppermost – Position 3	22.6	
Telescoping Steering Wheel Travel		45
Test Position	21.4	22.5

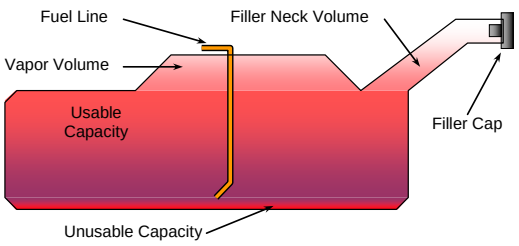


STEERING COLUMN ASSEMBLY

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.



VEHICLE FUEL TANK ASSEMBLY

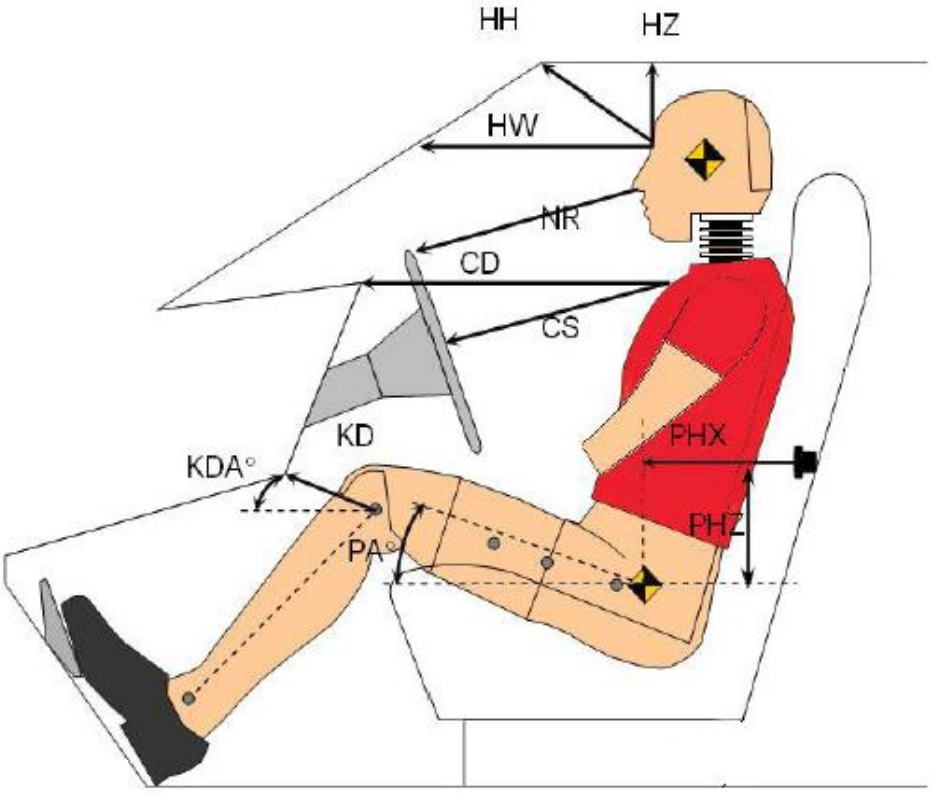
FUEL TANK CAPACITY DATA

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			42.47

Is the Actual Amount of Solvent Used in the test equal to 93% ±1% of the Usable Capacity stated in Form No. 1? [X] Yes [ ] No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021



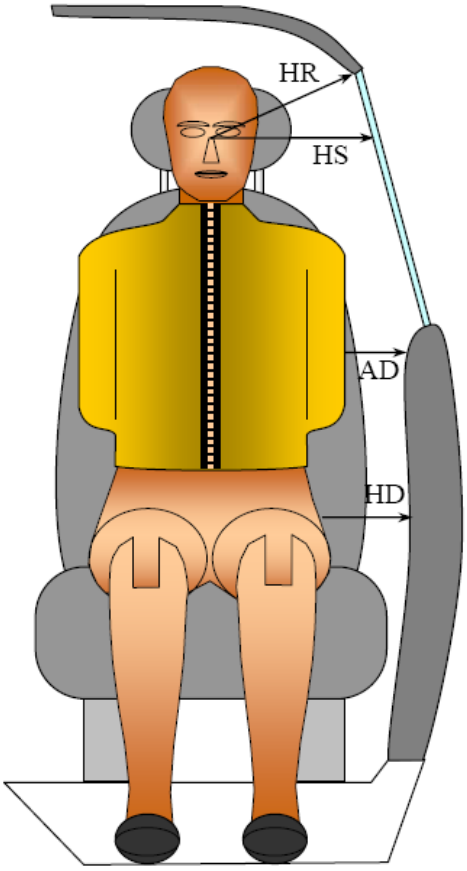
Left Side View

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (◦)
HH	Head to Header	347	
HW	Head to Windshield	644	
HZ	Head to Roof Liner	256	
NR	Nose to Rim	224	
CD	Chest to Dash	455	
CS	Chest to Steering Wheel	185	
KD(L) / KDA(L)◦	Left Knee to Dash	95	20.8
KD(R) / KDA(R)◦	Right Knee to Dash	71	34.8
PAX◦	Pelvic Tilt Angle (X-Axis)		21.2
PAY◦	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	455	
PHZ	Hip Point to Striker (Z-Axis)	65	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021



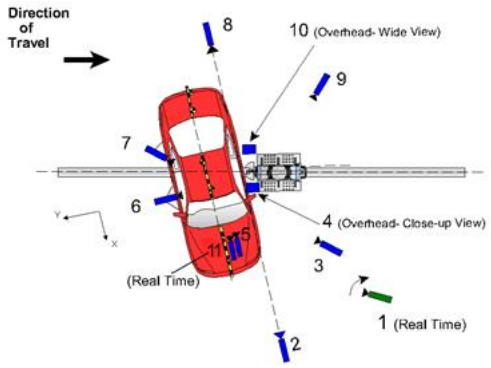
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No.DG8012)
HR	Head To Side Header	mm	265
HS	Head to Side Window	mm	375
AD	Arm to Door	mm	174
HD	Hip Point to Door	mm	175

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Ford F-250 Super Duty Crew Cab Truck NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test Test Date: 5/7/2021



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	7206	0	-1852	28	1000
3	Impact side 45º - forward pole view	5900	-1023	-1800	24	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	-9623	0	-1774	28	1000
9	Impact side 45º - rearward pole view	-6599	-4532	-1412	24	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 75º angle to the rigid pole.*

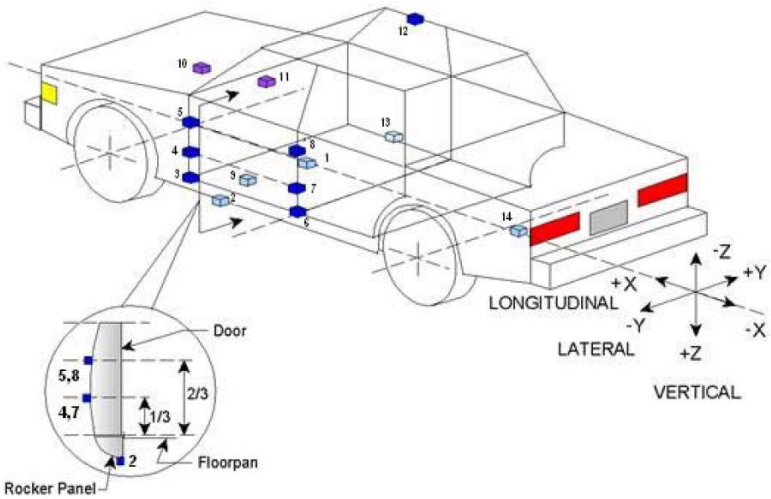
Comments: All cameras operated as intended.

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:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3989	12	-297
2	Left Floor Sill	4449	-807	-78
3	A-Pillar Sill	4718	-778	-222
4	A-Pillar Low	4682	-774	-391
5	A-Pillar Mid	4662	-739	-924
6	B-Pillar Sill	3493	-734	-205
7	B-Pillar Low	3504	-765	-425
8	B-Pillar Mid	3495	-758	-839
9	Driver Seat Track	3983	-658	-235
10	Engine Top	5275	10	-619
11	Firewall	5171	335	-764
12	Right Roof	3954	735	-1376
13	Right Floor Sill	4445	797	-70
14	Rear Floorpan	1364	-1	-337

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:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

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: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag & Headrest
Left Shoulder	Curtain Airbag & Torso/Pelvis Airbag
Upper Torso	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback & Torso/Pelvis Airbag
Left Hip	Seatpan & Torso/Pelvis Airbag
Left Knee	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:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	Minor sill separation of approximately 310mm
Windshield Damage	Cracks throughout
Side Window Damage	Driver 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	Yes		
Knee Airbag	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

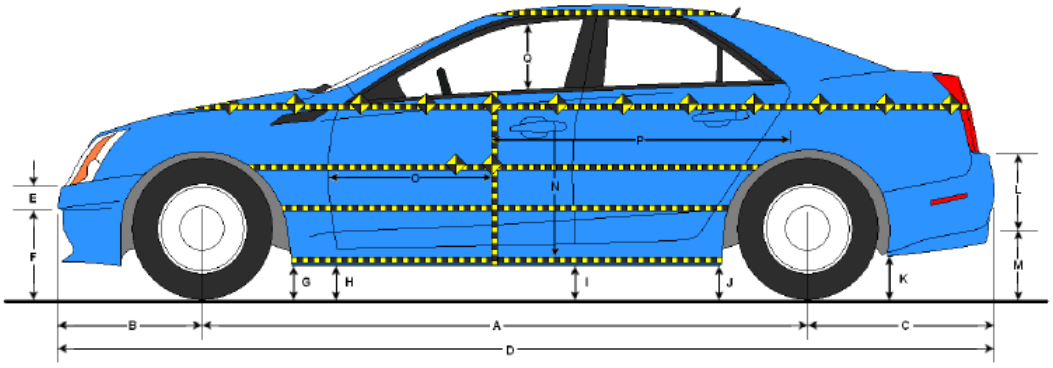
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter		Units	Tolerance	Value
Vertical Impact Ref Line	- Aft of Front Axle, Intended Impact Pt	mm		1286
Actual Impact Point	- Aft of Front Axle	mm		1291
Horizontal Offset (+ forward / - rearward)		mm	+/- 38 *	-5
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion		deg	75 +/- 3	75
Trap No. 1 Velocity	- Primary	kph	31.4 to 33.0	32.09
Trap No. 2 Velocity	- Redundant	kph	31.4 to 33.0	32.09

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021



LEFT SIDE VIEW

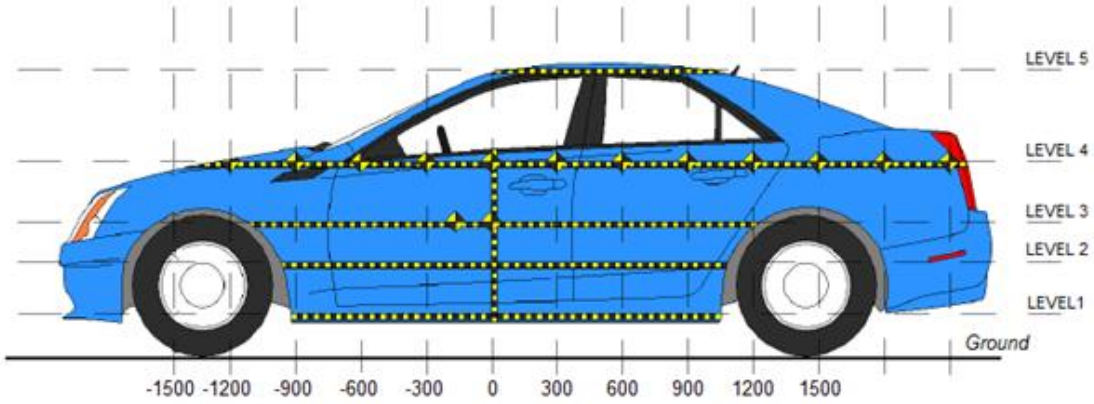
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	4062	4018	44
B	Front Axle to FSOV	976	1005	-29
C	Rear Axle to RSOV	1325	1298	27
D	Total Length at Centerline	6362	6321	41
E	Front Bumper Thickness	224	224	0
F	Front Bumper Bottom to Ground	374	390	-16
G	Sill Height at Front Wheel Well	440	435	5
H	Sill Height at Front Door Leading Edge	473	460	13
I	Sill Height at B-Pillar	502	486	16
J1	Sill Height at Rear Wheel Well	506	522	-16
J2	Pinch Weld Height at Rear Wheel Well	373	370	3
K	Sill Height Aft of Rear Wheel Well	530	558	-28
L	Rear Bumper Thickness	228	228	0
M	Rear Bumper Bottom to Ground	527	511	16
N	Sill Height to Bottom of Front Window Sill	867	866	1
O	Front Door Leading Edge to Impact CL	637	499	138
P	Rear Door Trailing Edge to Impact CL	1591	1483	108
Q	Front Window Opening	463	471	-8
R	Right Side Length	6298	6274	24
S	Left Side Length	6298	6259	39
T	Vehicle Width at B-Pillars	2026	1985	41
U	Front Wheel Track Width	4062	4018	44
V	Rear Wheel Track Width	976	1005	-29

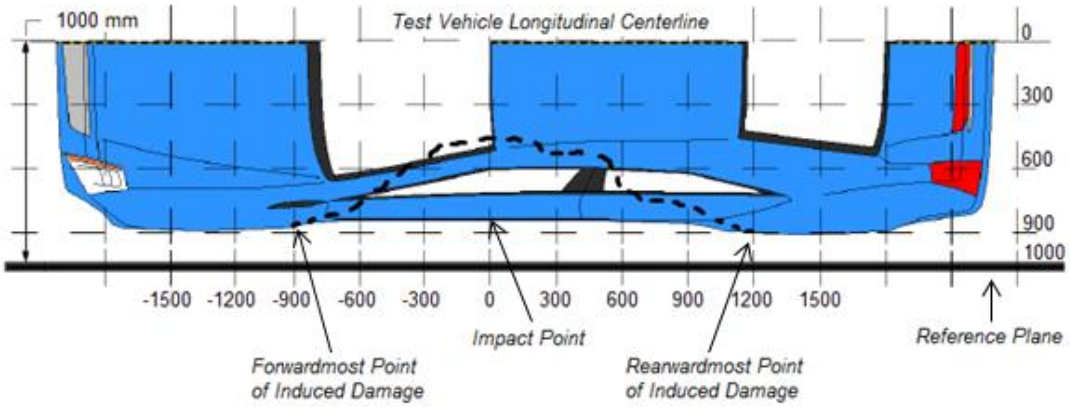
* All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021



Left Side View



Overhead View

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	548	490	150
2	Occupant Hip Point	mm	998	467	150
3	Mid - Door	mm	909	471	150
4	Window Sill	mm	1237	426	150
5	Window Top	mm	1888	97	150

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

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

Test Vehicle: 2021 Ford F-250 Super Duty Crew Cab Truck
NHTSA No.: M20210213
Test Program: NCAP Side Pole Impact Test
Test Date: 5/7/2021

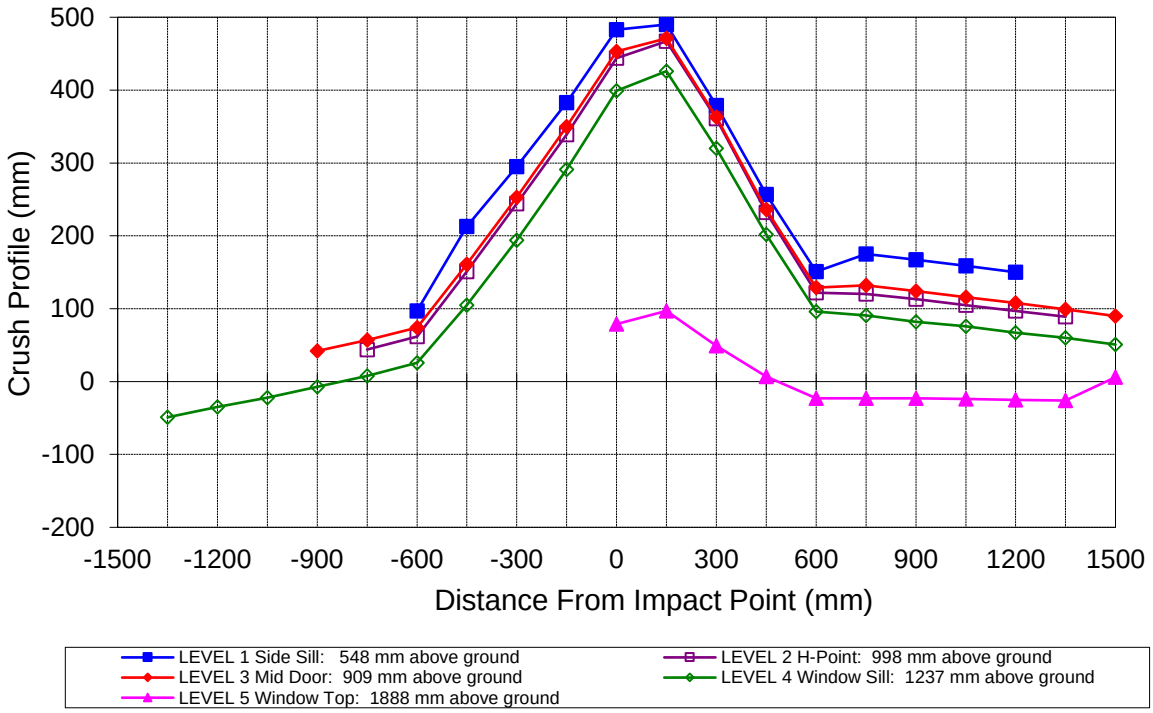
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350				941					990					-49	
-1200				952					987					-35	
-1050				960					982					-22	
-900			1019	968				977	975				42	-7	
-750		1004	1003	974			960	946	966			44	57	8	
-600	981	1001	999	978		884	939	925	952		97	62	74	26	
-450	982	1003	1001	980		769	852	840	875		213	151	161	105	
-300	985	1005	1003	985		690	761	750	791		295	244	253	194	
-150	988	1007	1005	989		605	668	655	698		383	339	350	291	
0	990	1009	1006	992	725	507	565	553	593	646	483	444	453	399	79
150	991	1010	1007	995	733	501	543	536	569	636	490	467	471	426	97
300	992	1012	1008	998	735	613	651	645	678	686	379	361	363	320	49
450	991	1012	1009	1000	739	734	780	773	798	732	257	232	236	202	7
600	990	1012	1009	1002	742	839	890	880	906	765	151	122	129	96	-23
750	988	1010	1006	1002	744	813	890	874	911	767	175	120	132	91	-23
900	987	1010	1005	1001	745	820	897	881	919	768	167	113	124	82	-23
1050	986	1009	1004	1001	746	827	904	888	925	770	159	105	116	76	-24
1200	984	1008	1004	1000	748	834	911	896	933	773	150	97	108	67	-25
1350		1007	1003	993	750		918	904	933	776		89	99	60	-26
1500			1002	995	752			912	944	746			90	51	6

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:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

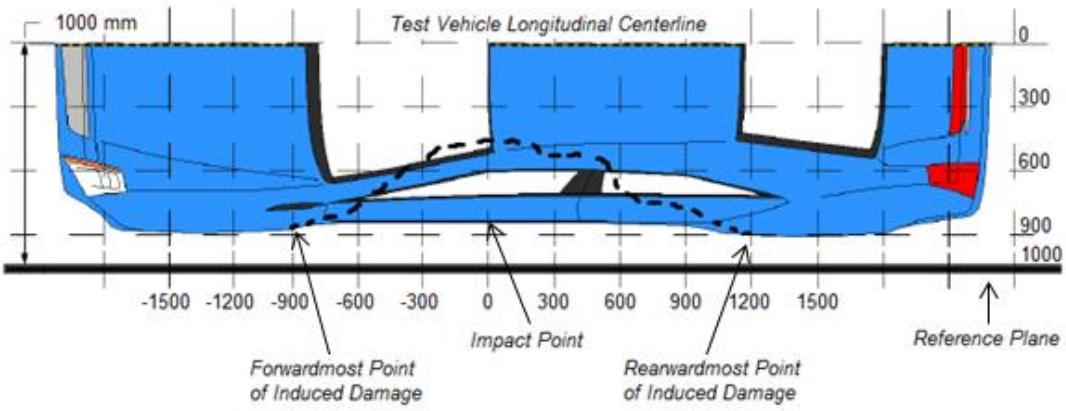


Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021

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



Overhead View

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-900	3	23	-19	42
2	-420	3	178	-1	179
3	60	3	454	-6	460
4	540	3	163	-9	172
5	1020	3	113	-4	117
6	1500	3	88	-2	90

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

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/7/2021
Test Time:	8:59 AM	Temperature:	21° C

A. From impact until vehicle motion ceases: (Maximum allowable is 1 oz.) — 0 oz.

B. For the 5-minute period after motion ceases: (Maximum allowable is 5 oz.) — 0 oz.

C. For the following 25 minutes: (Maximum allowable is 1 oz./minute) — 0 oz.

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°	67	300	367
90° to 180°	65	300	365
180° to 270°	68	300	368
270° to 360°	69	300	369

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

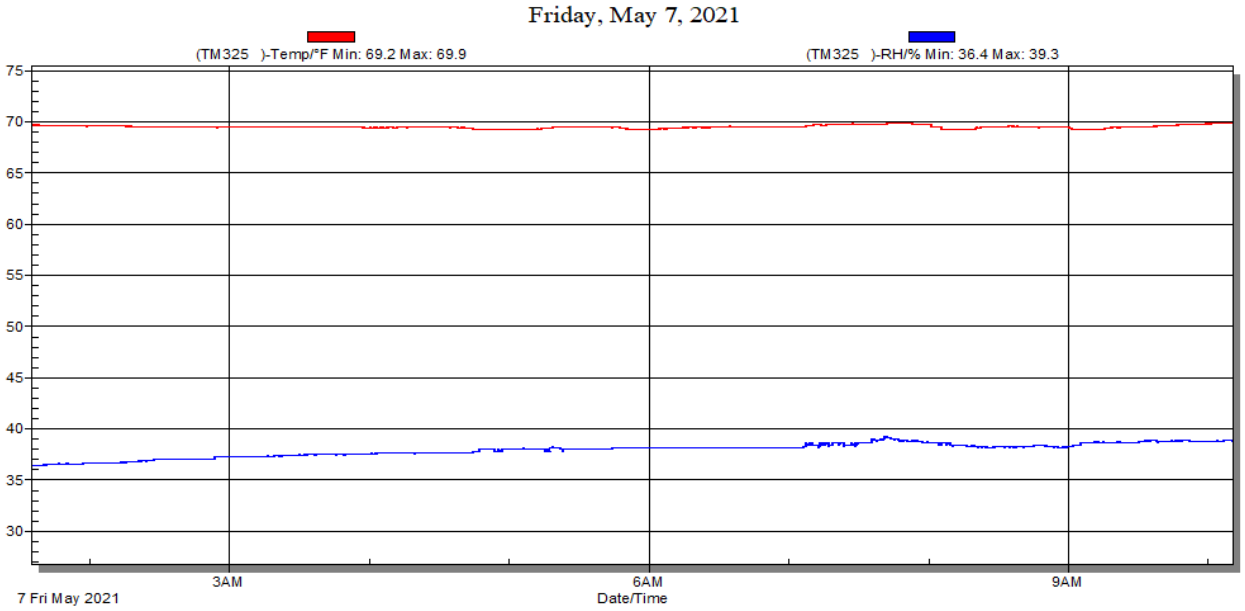
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle:	2021 Ford F-250 Super Duty Crew Cab Truck	NHTSA No.:	M20210213
Test Program:	NCAP Side Pole Impact Test	Test Date:	5/7/2021



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure A-1: As Delivered Right Front ¾ View of Test Vehicle

Figure A-2: As Delivered Left Rear ¾ 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 ¾ View of Test Vehicle

Figure A-6: Post-Test Left Front ¾ 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 ¾ View of Test Vehicle

Figure A-10: Post-Test Left Rear ¾ 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

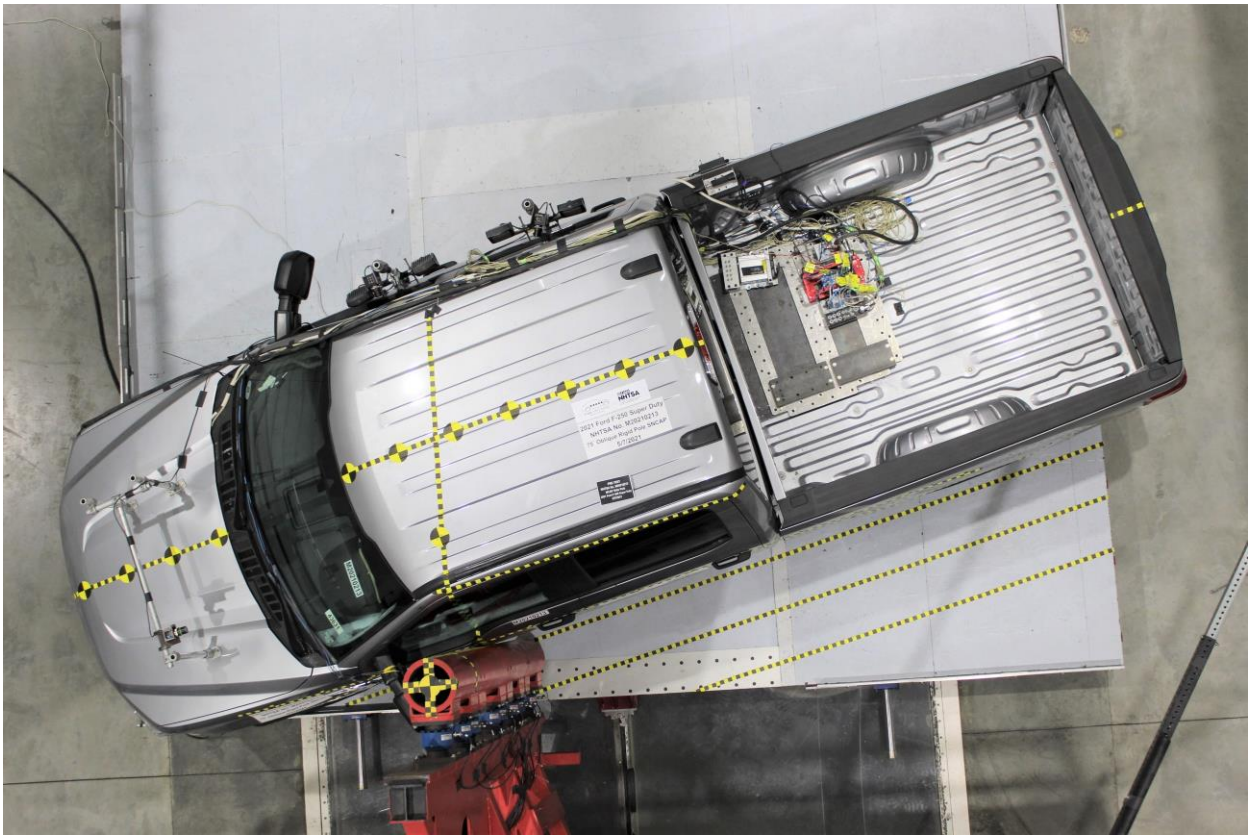


Figure A-15: Pre-Test Overhead View of Test Area

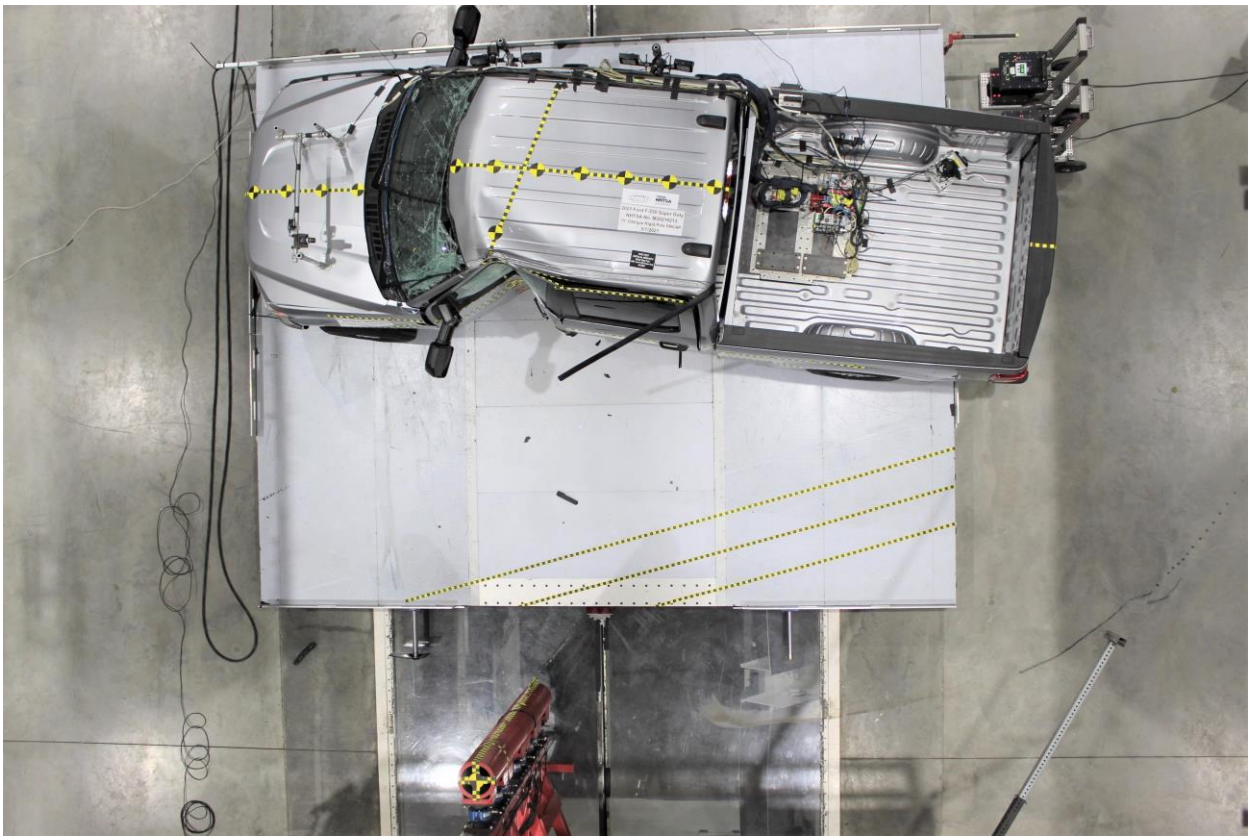


Figure A-16: Post-Test Overhead View of Test Area

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

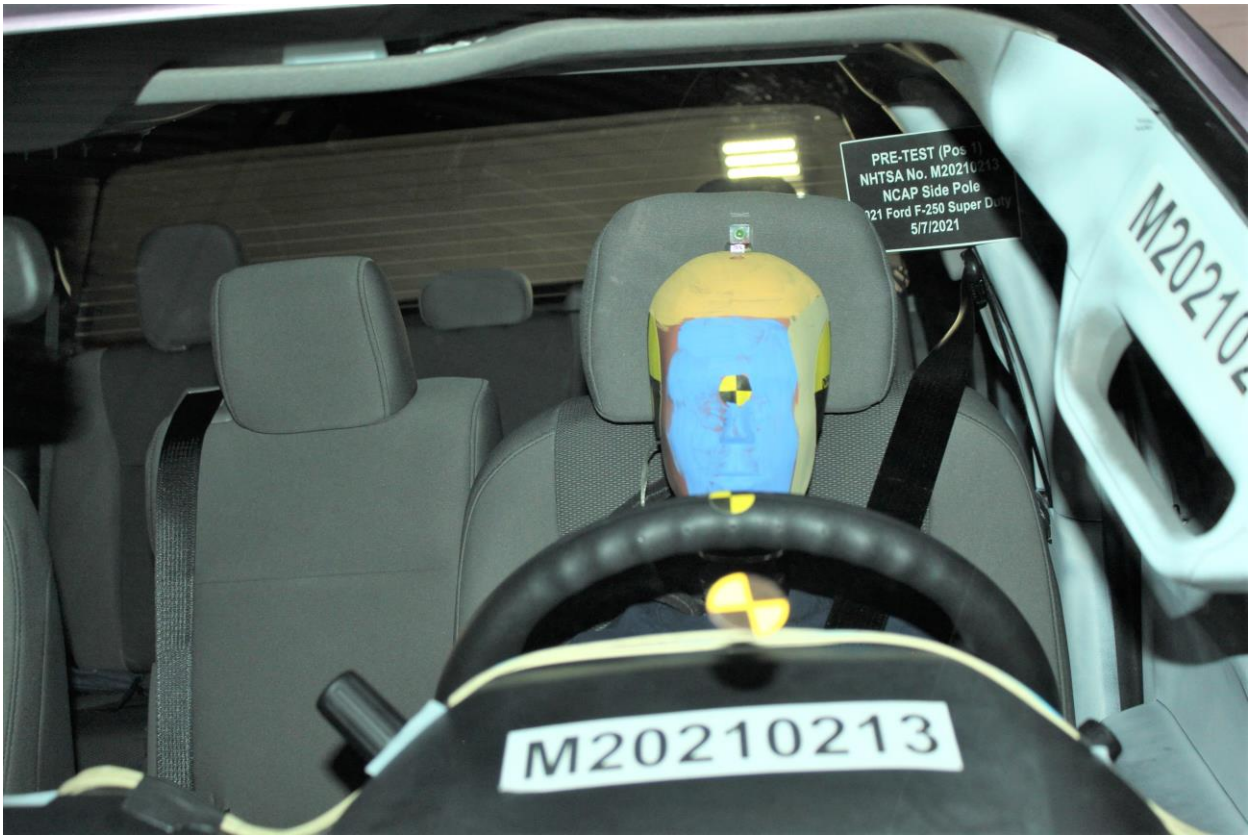


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest

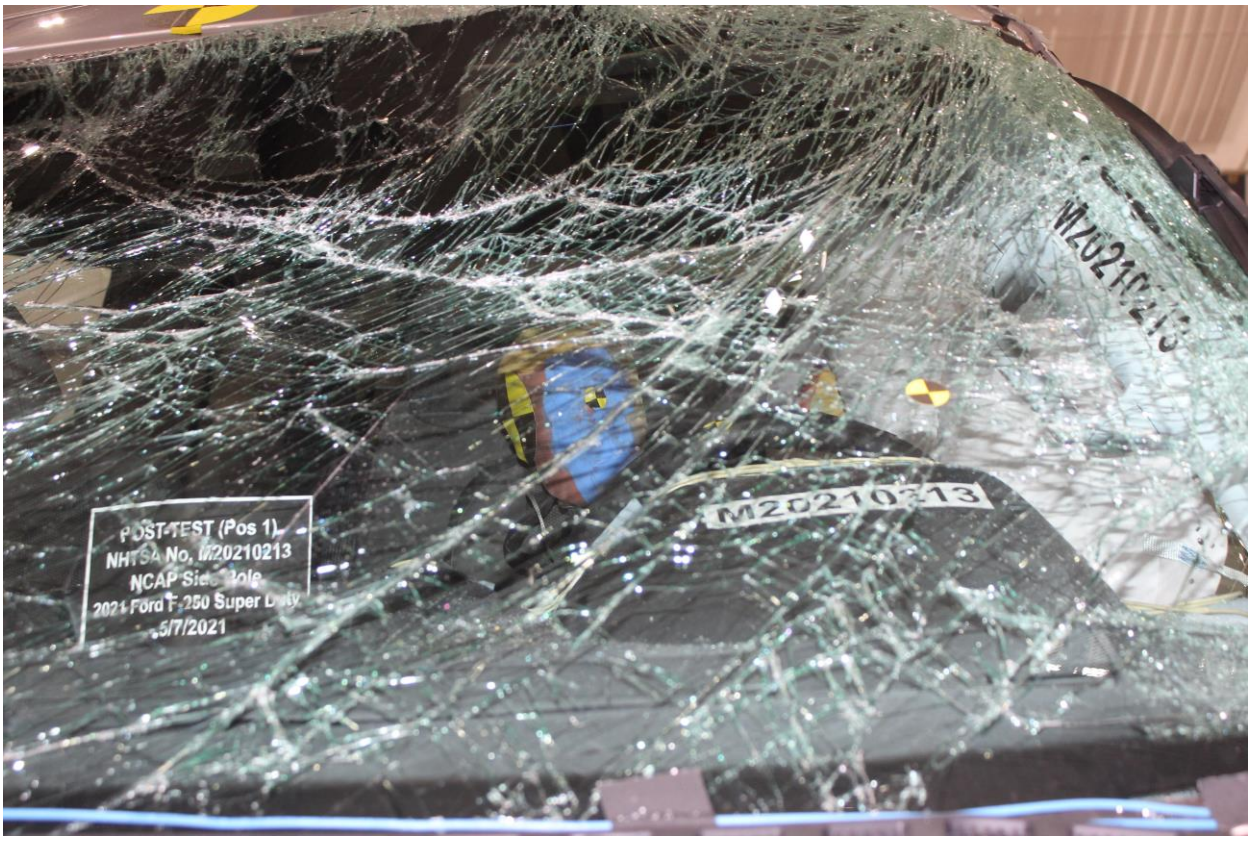


Figure A-22: Post-Test Front Close-Up View of Dummy

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

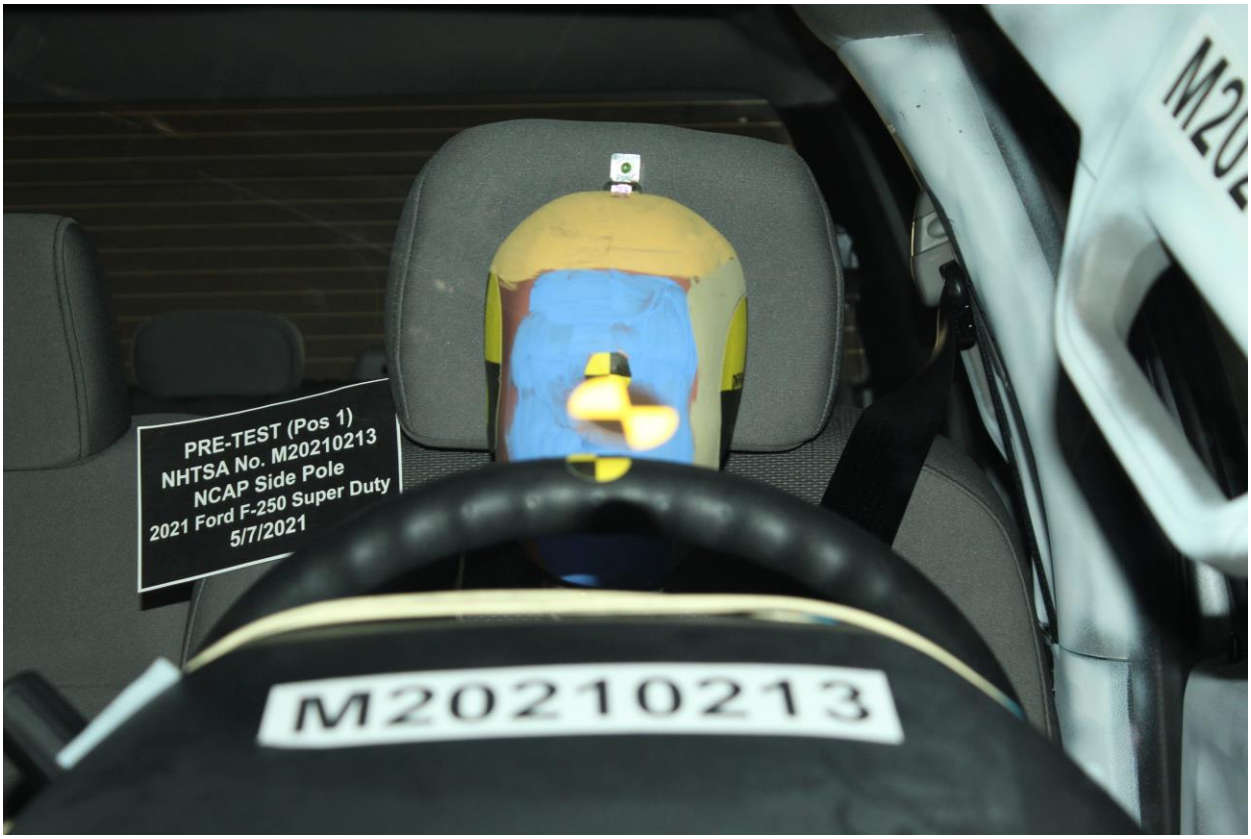


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint

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

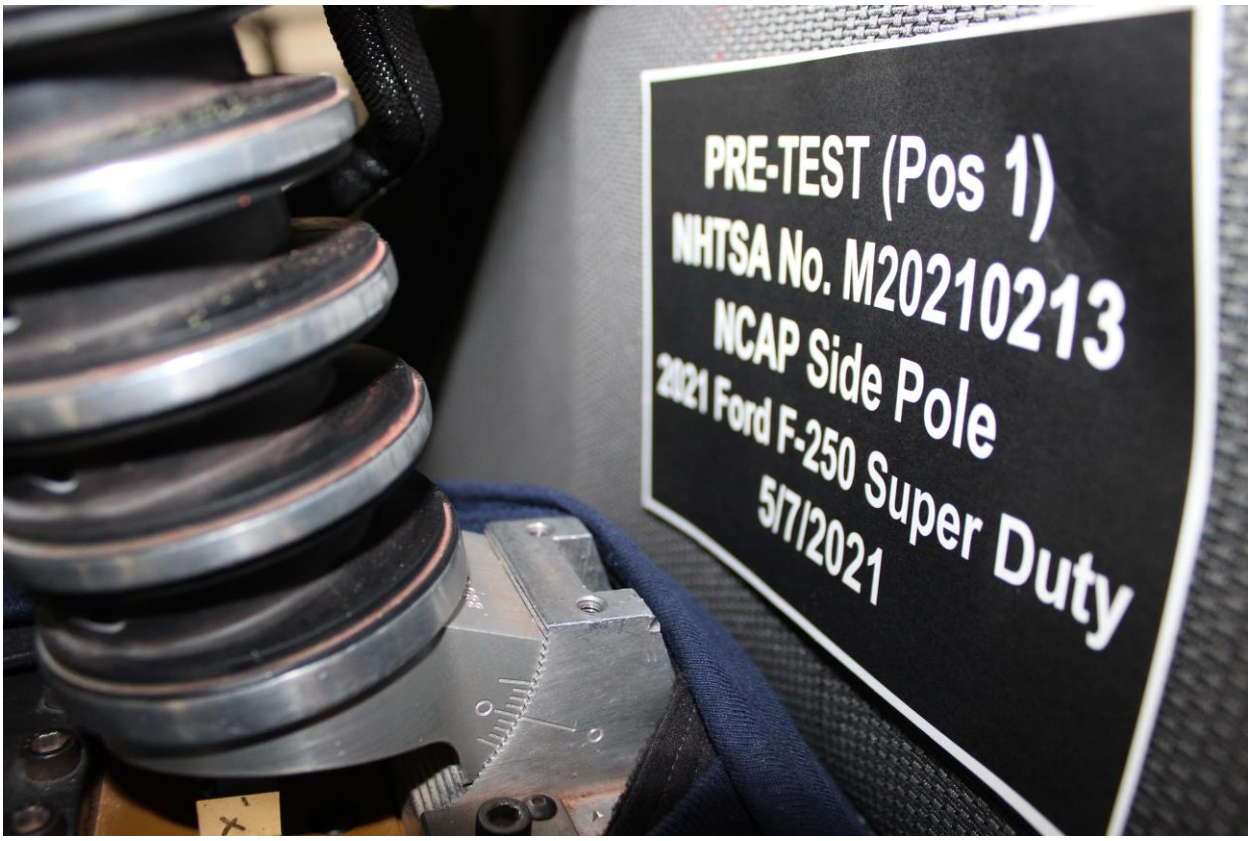


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket

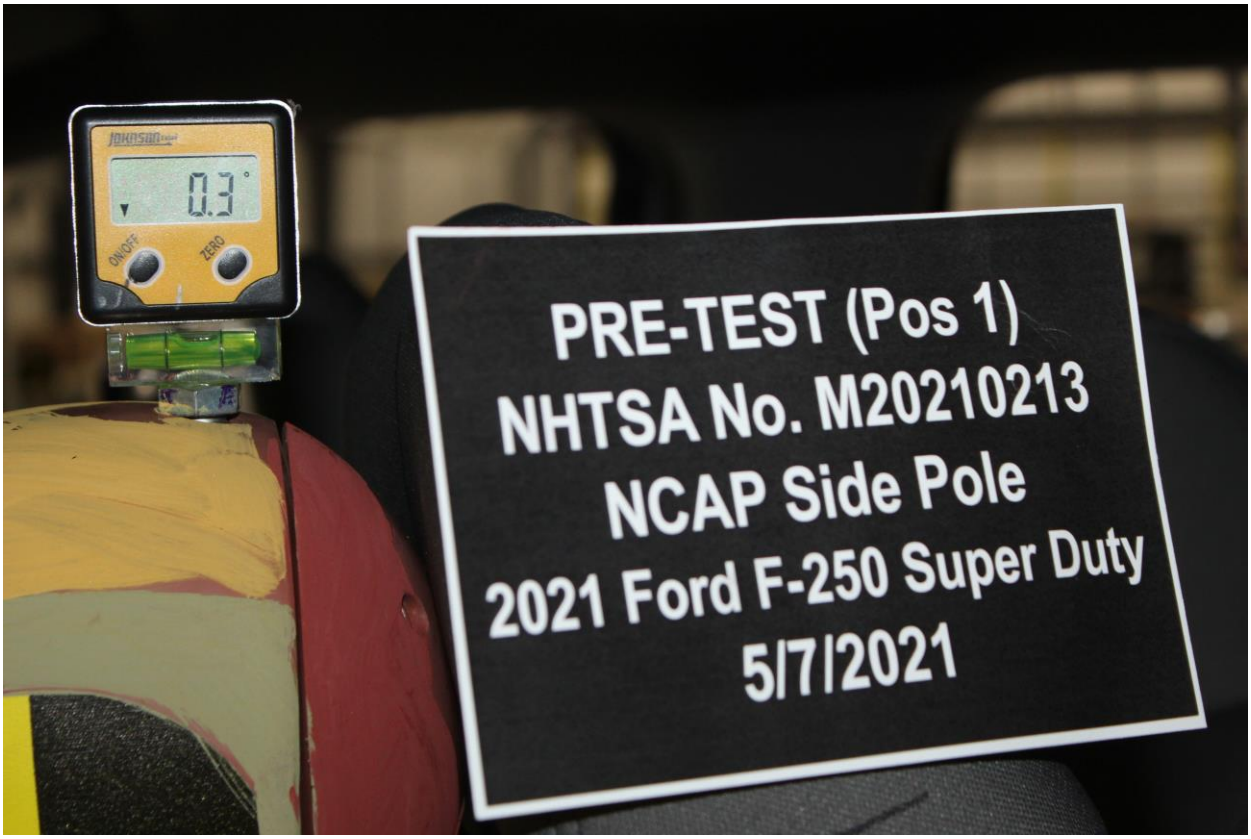


Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level

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

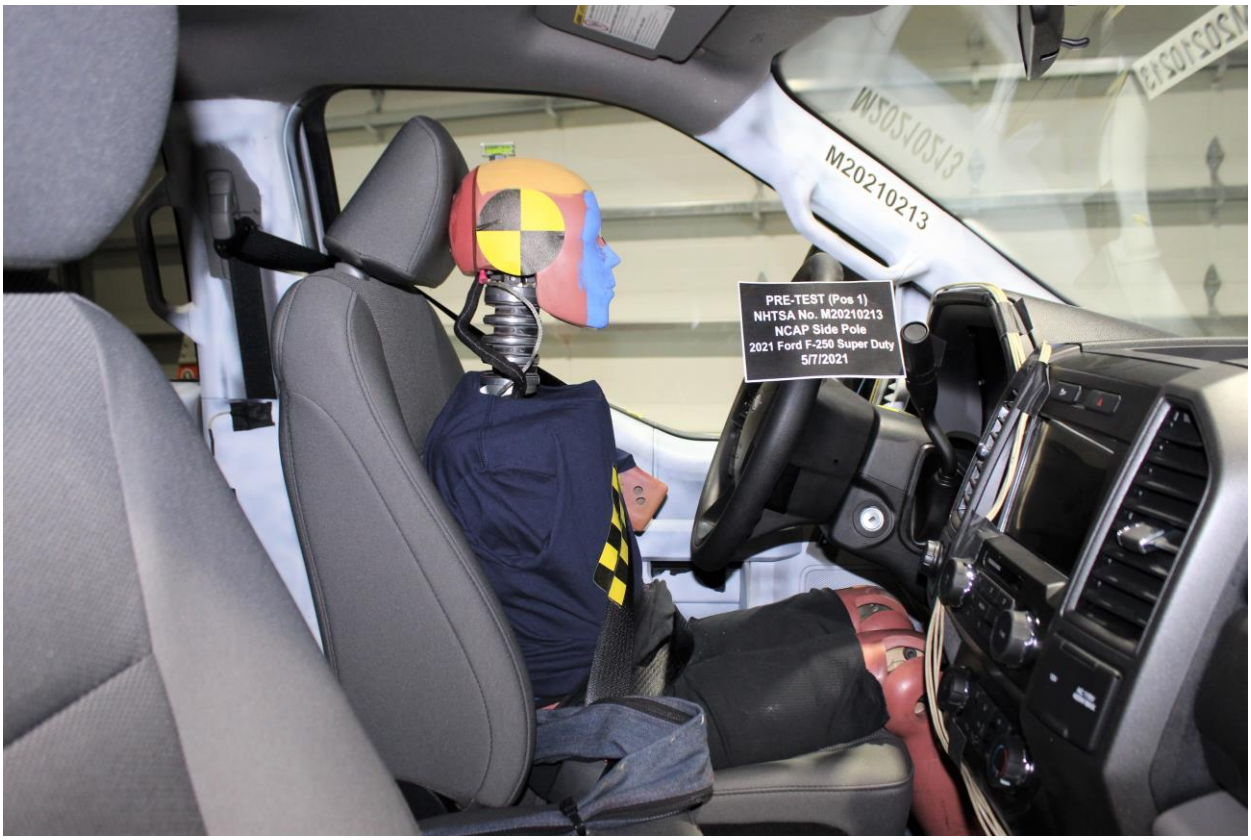


Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment

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

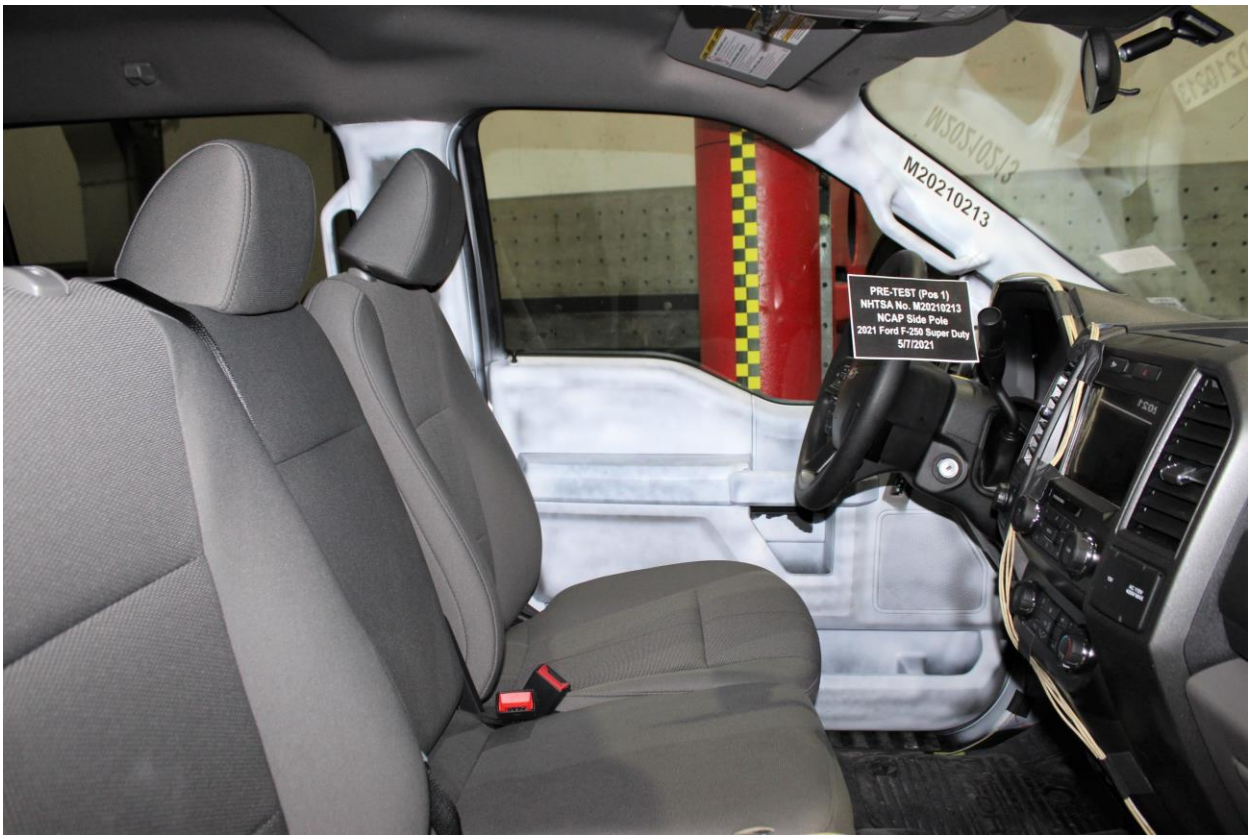


Figure A-44: Pre-Test Inner Door Panel View

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 Right Side View of Dummy and Rear Seat of Occupant Compartment

Figure A-54: Post-Test Inner Rear Passenger Torso Air Bag Deployment View

Figure A-55: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-56: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-57: Close-Up View of Vehicle's Certification Label

Figure A-58: Close-Up View of Vehicle's Tire Information Placard or Label

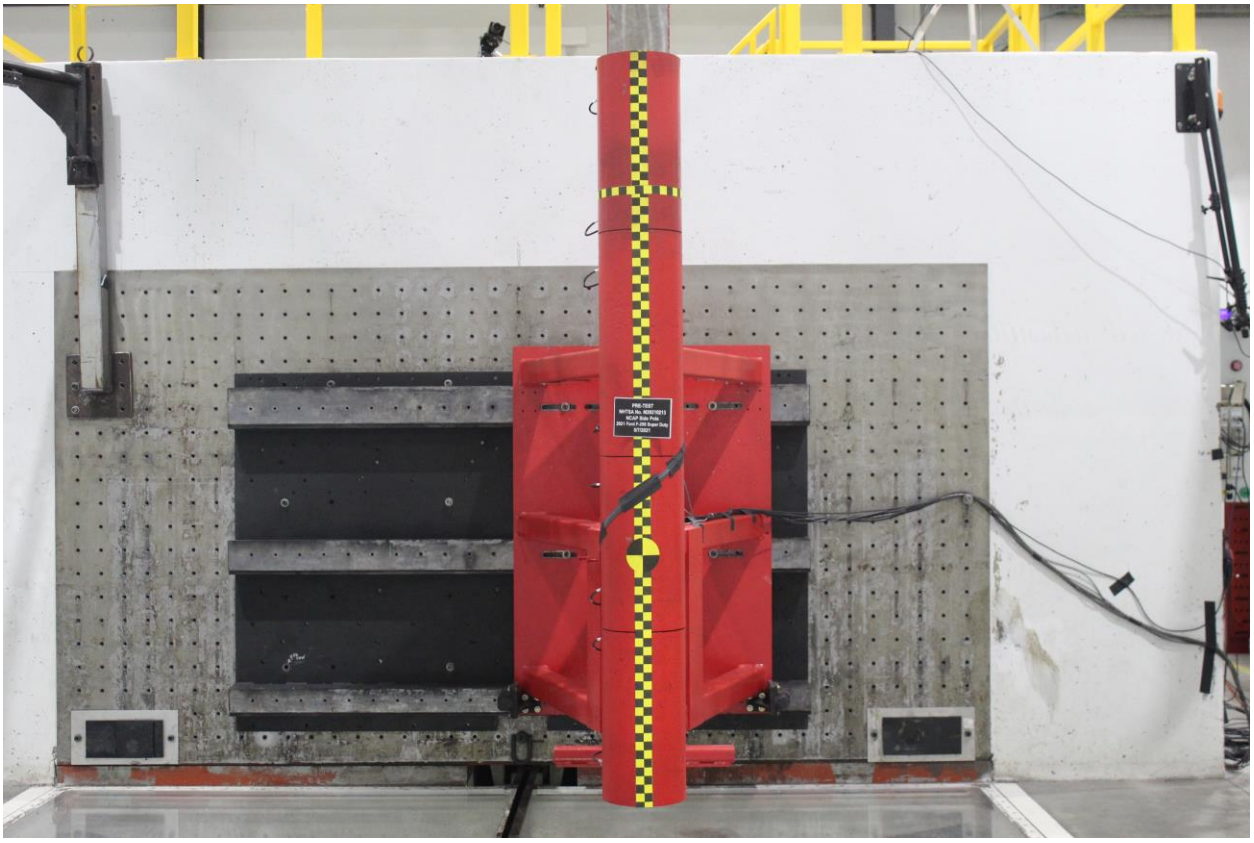


Figure A-59: Pre-Test Pole Barrier Front View

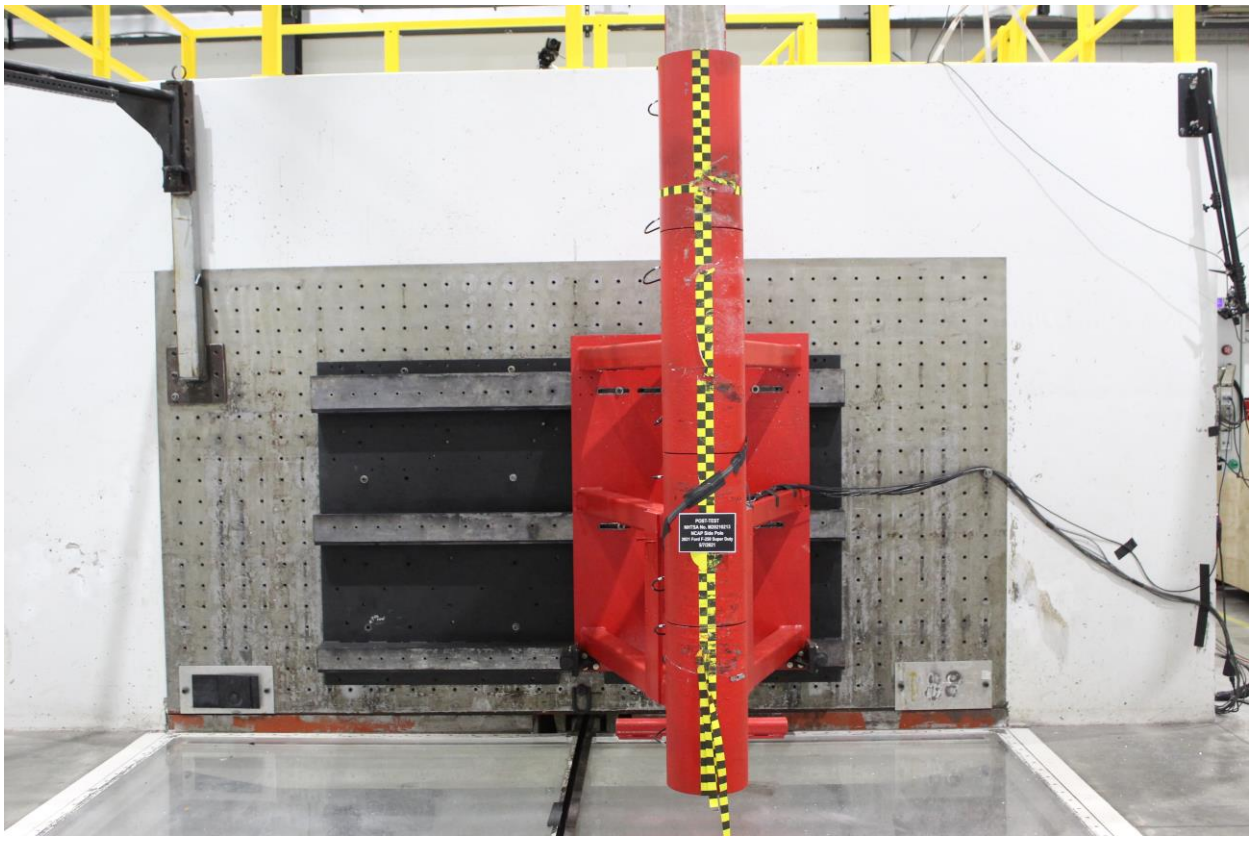


Figure A-60: Post-Test Pole Barrier Front View

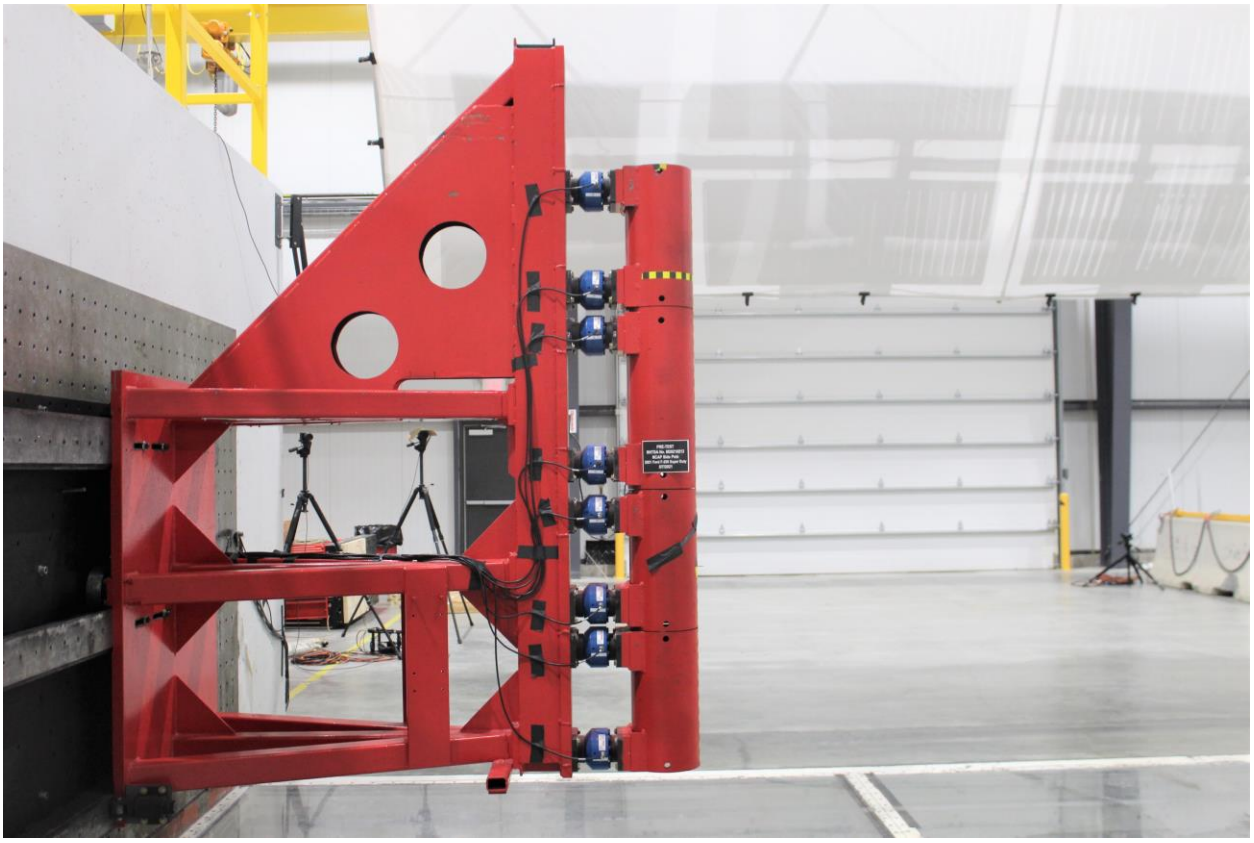


Figure A-61: Pre-Test Pole Barrier Side View

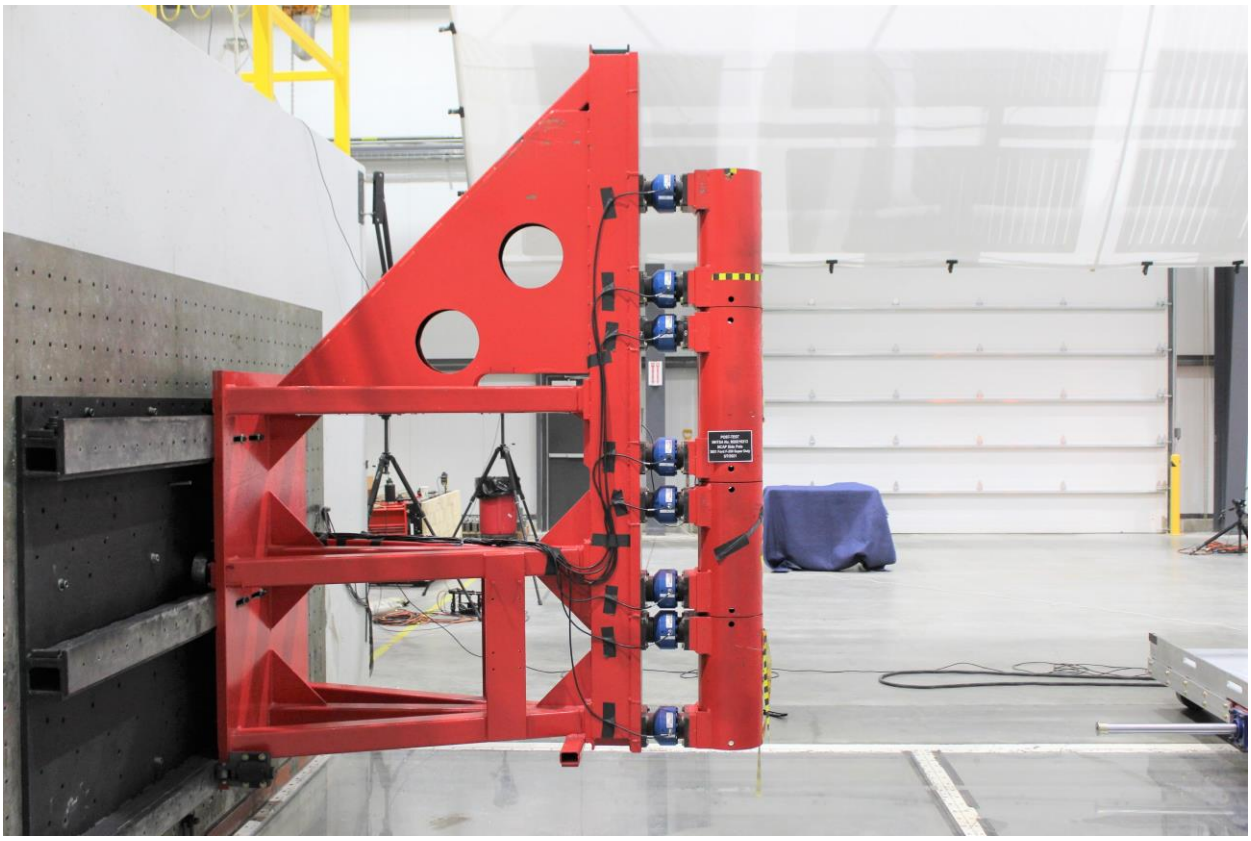


Figure A-62: Post-Test Pole Barrier Side View

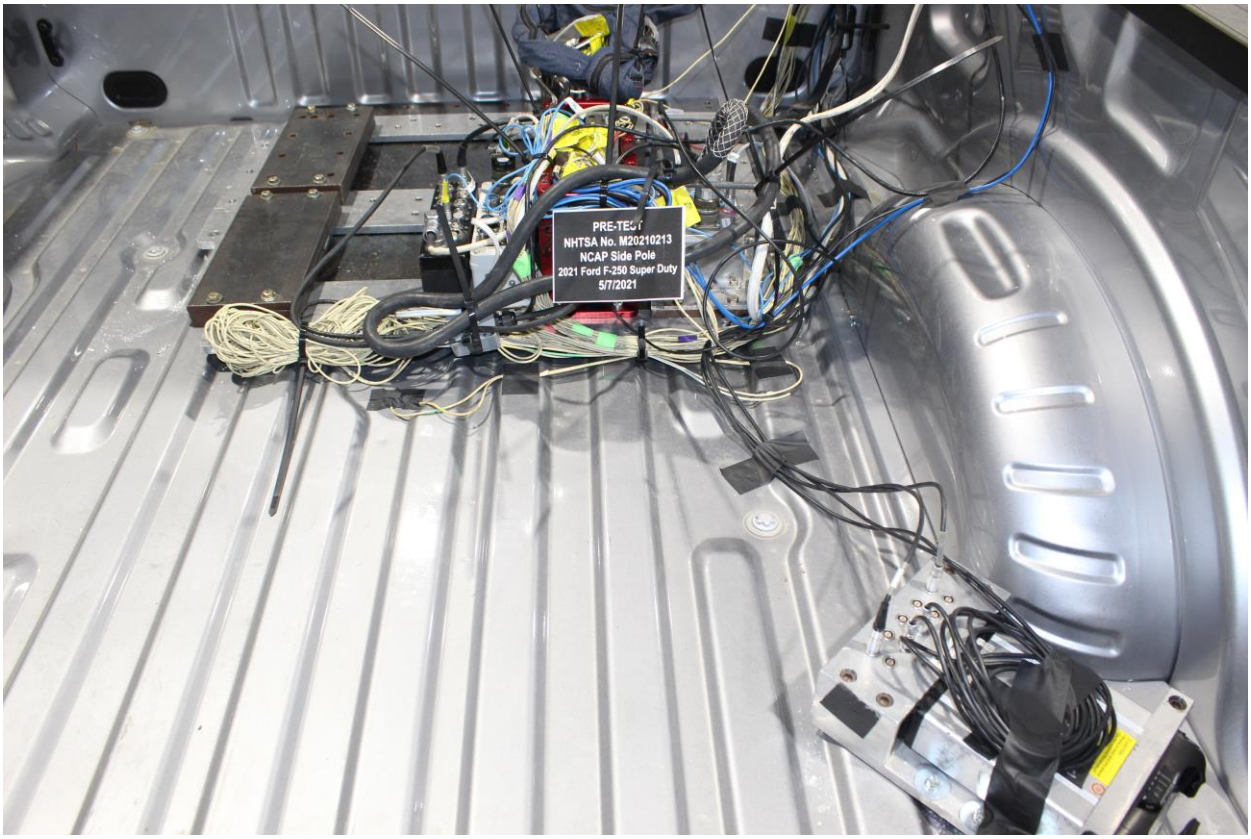


Figure A-63: Pre-Test Ballast View

Figure A-64: Post-Test Primary and Redundant Speed Trap Read-Out

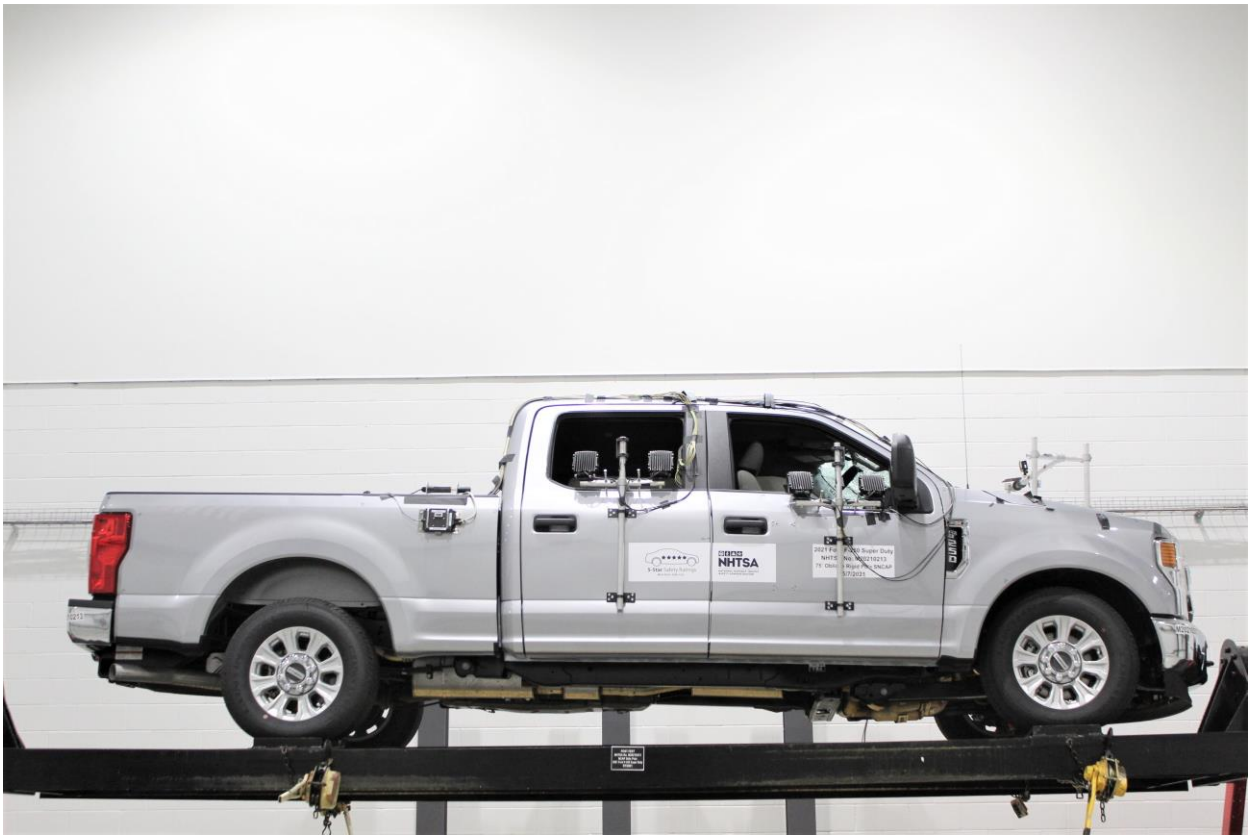


Figure A-65: FMVSS No. 301 Static Rollover 0 Degrees

Figure A-66: FMVSS No. 301 Static Rollover 90 Degrees

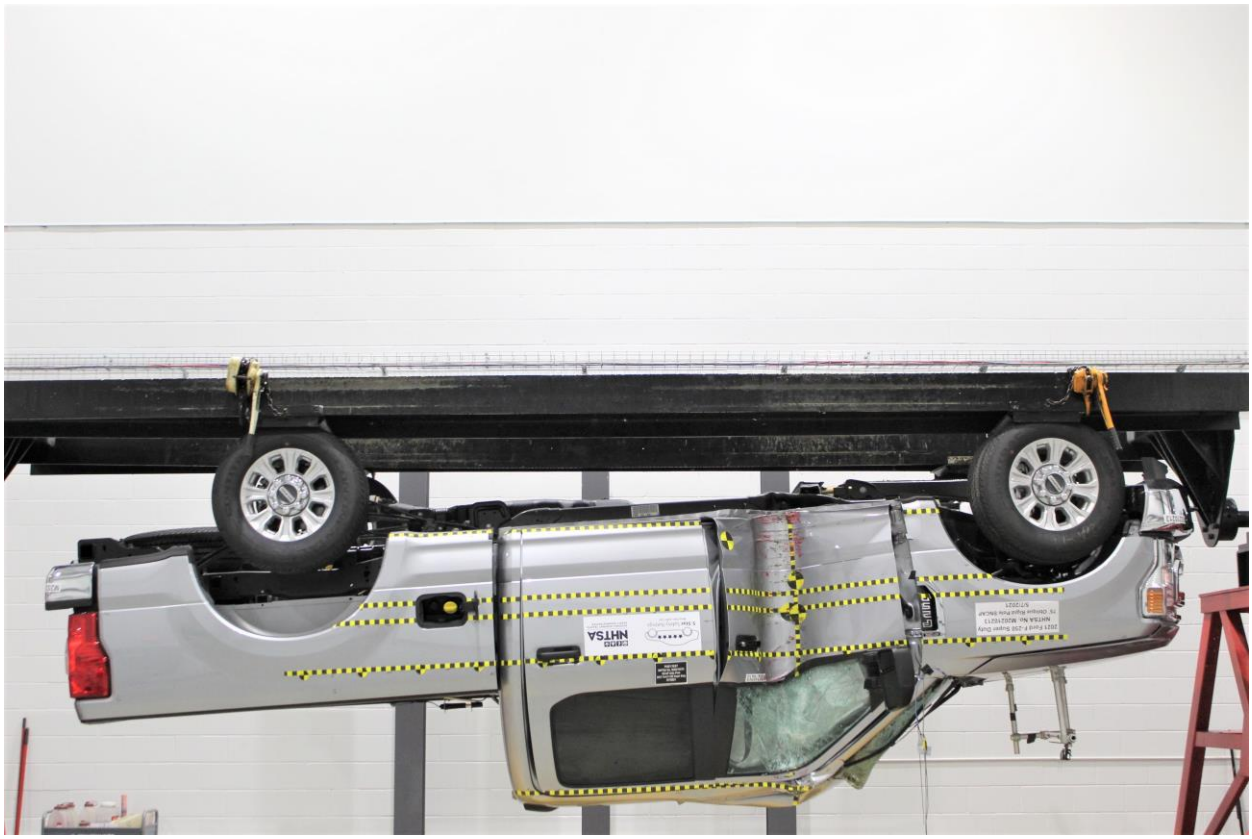


Figure A-67: FMVSS No. 301 Static Rollover 180 Degrees

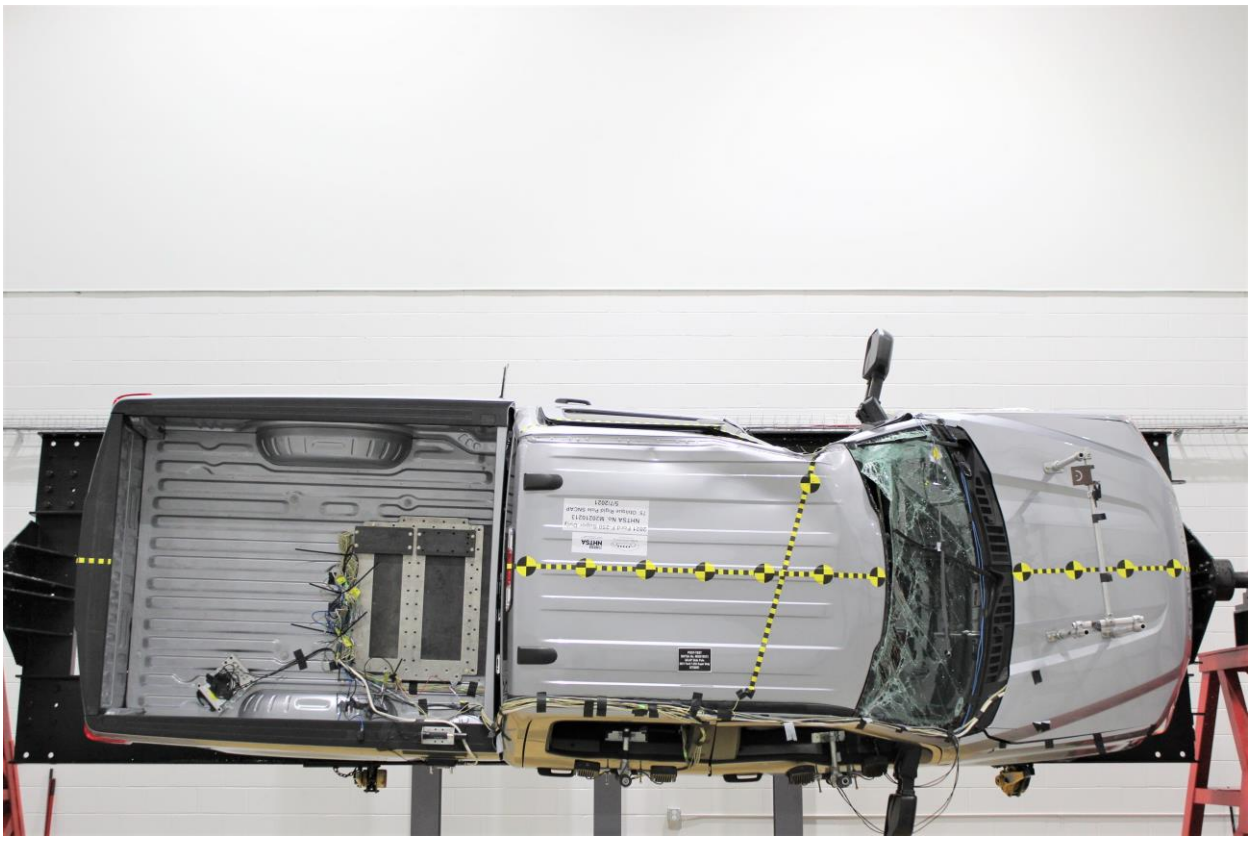


Figure A-68: FMVSS No. 301 Static Rollover 270 Degrees

Figure A-69: FMVSS No. 301 Static Rollover 360 Degrees

Figure A-70: Impact Event

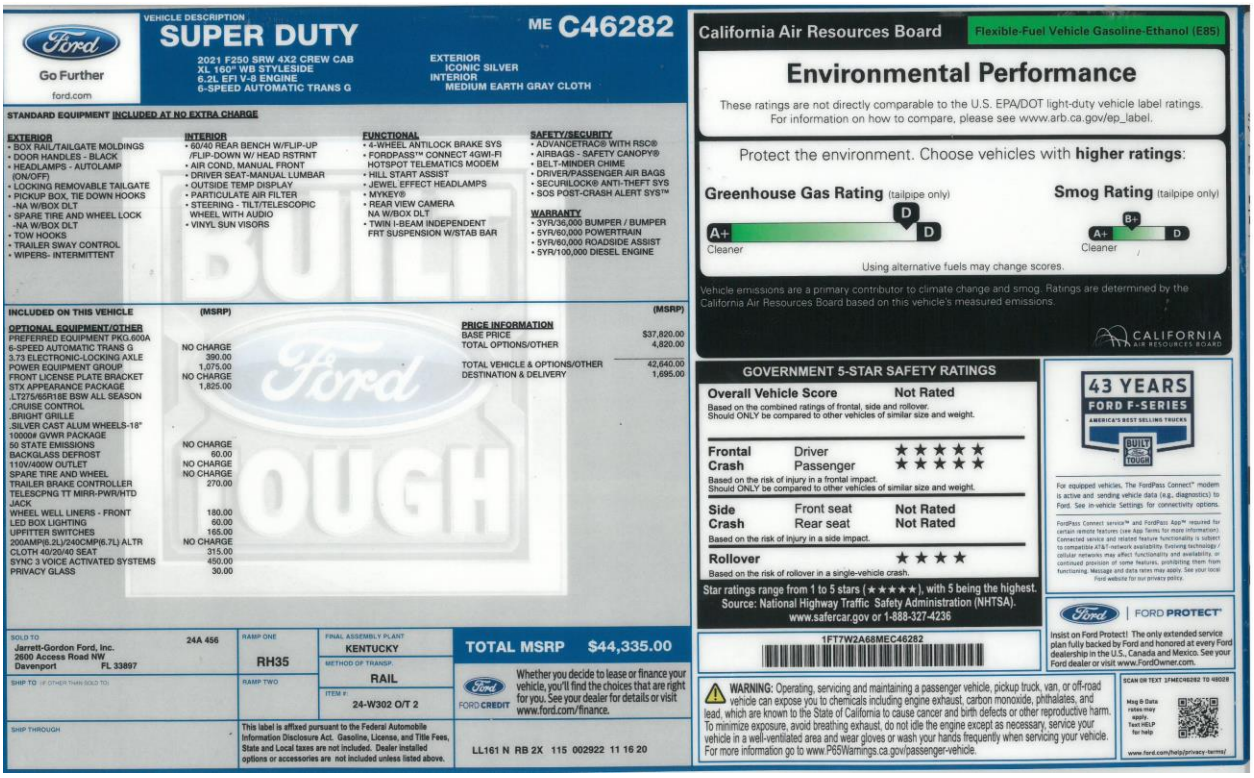


Figure A-71: Monroney Label

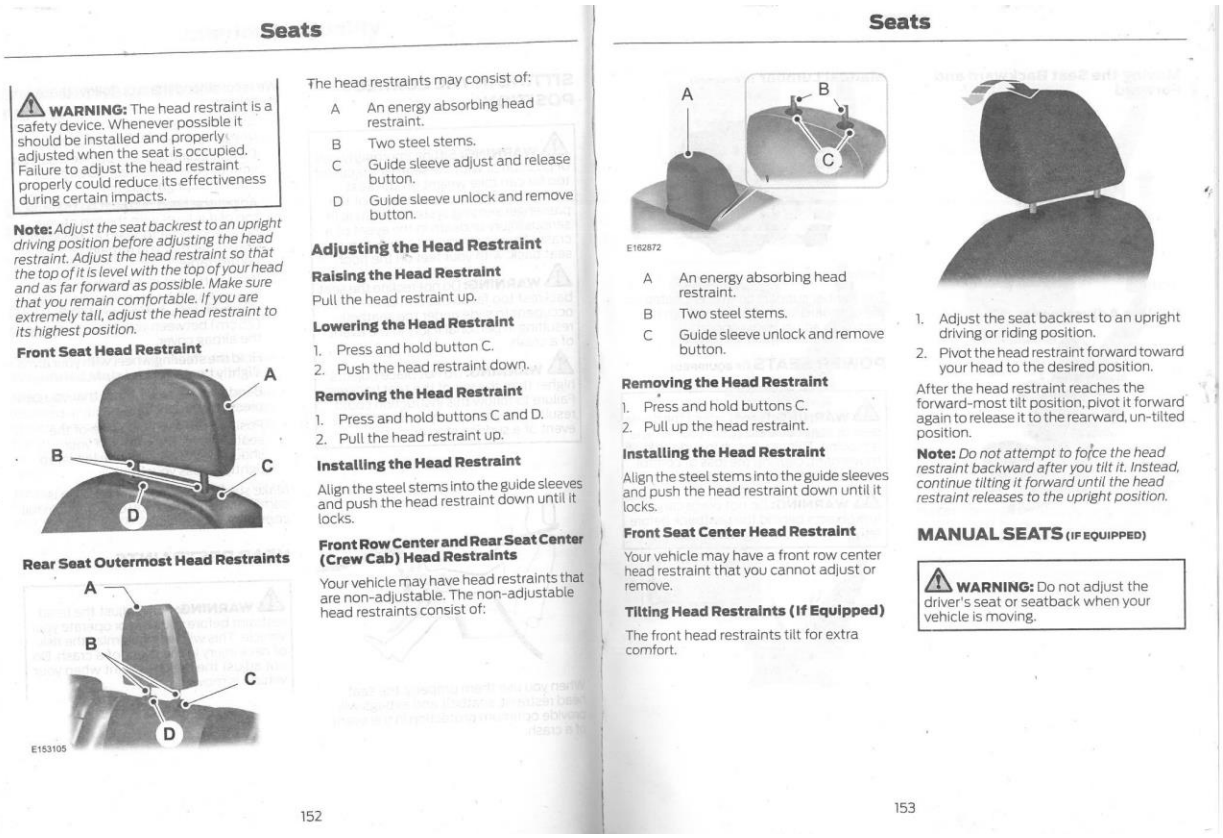


Figure A-72: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Figure A-73: Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver Dummy Instrumentation Plots

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)

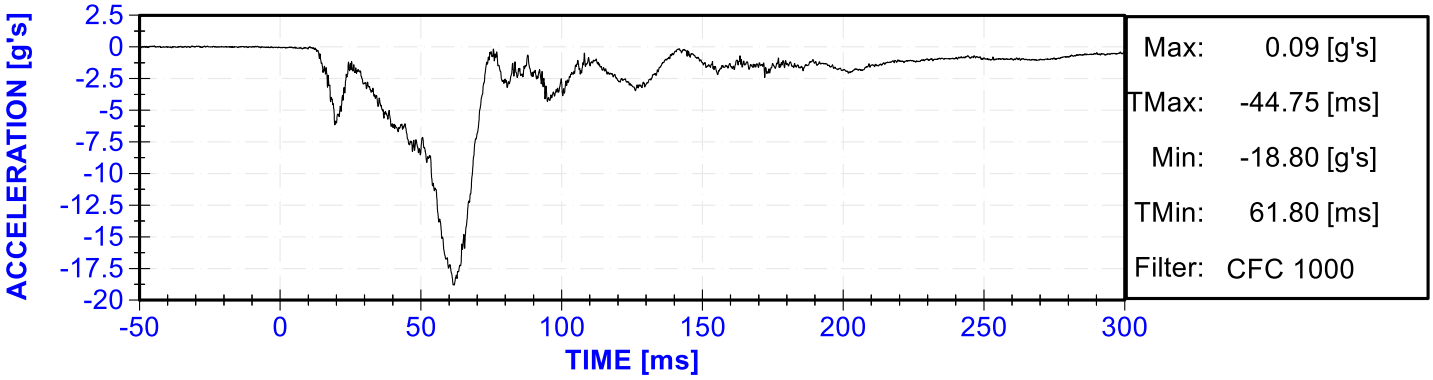
Vehicle Instrumentation Data

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)

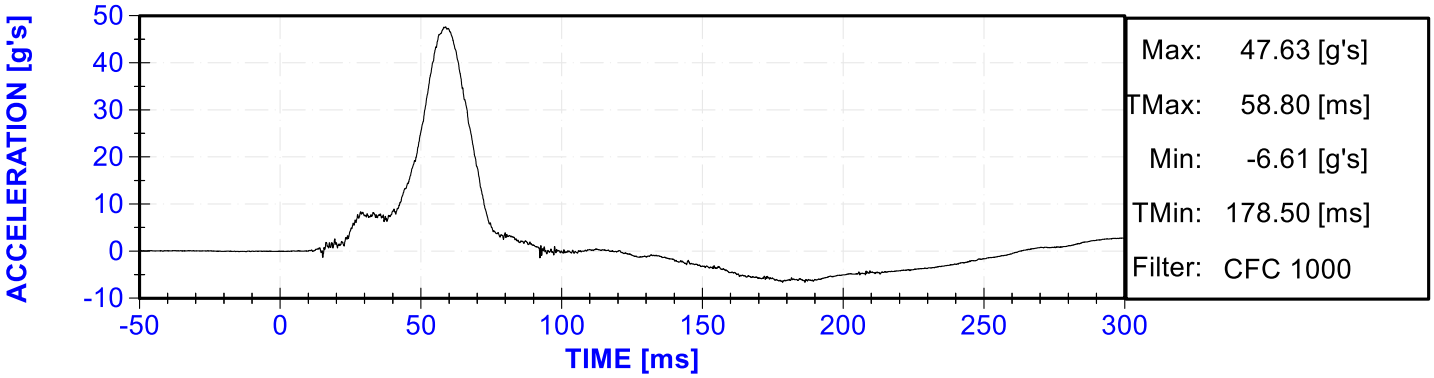
Pole Instrumentation Data

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)

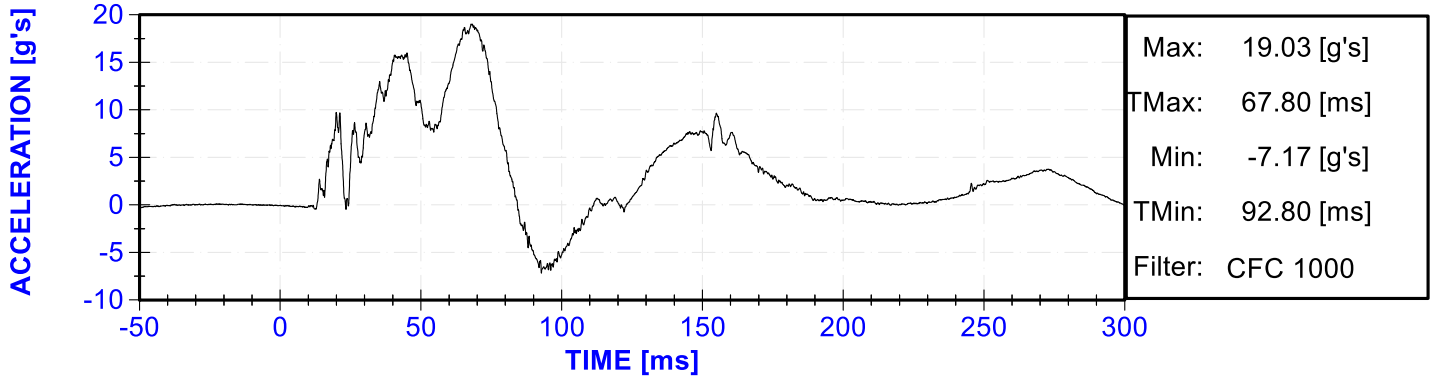
Driver Head Acceleration (X) Primary vs. Time



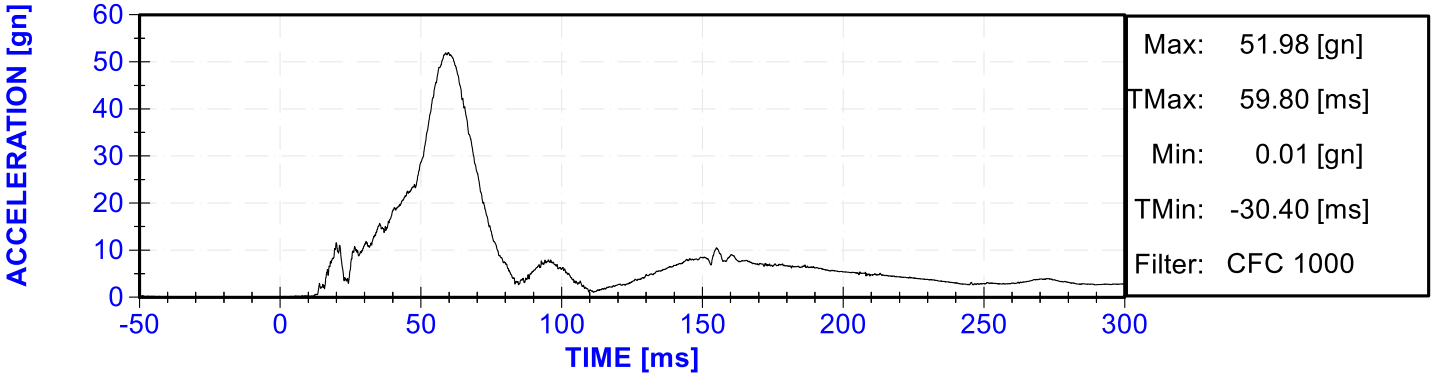
Driver Head Acceleration (Y) Primary vs. Time

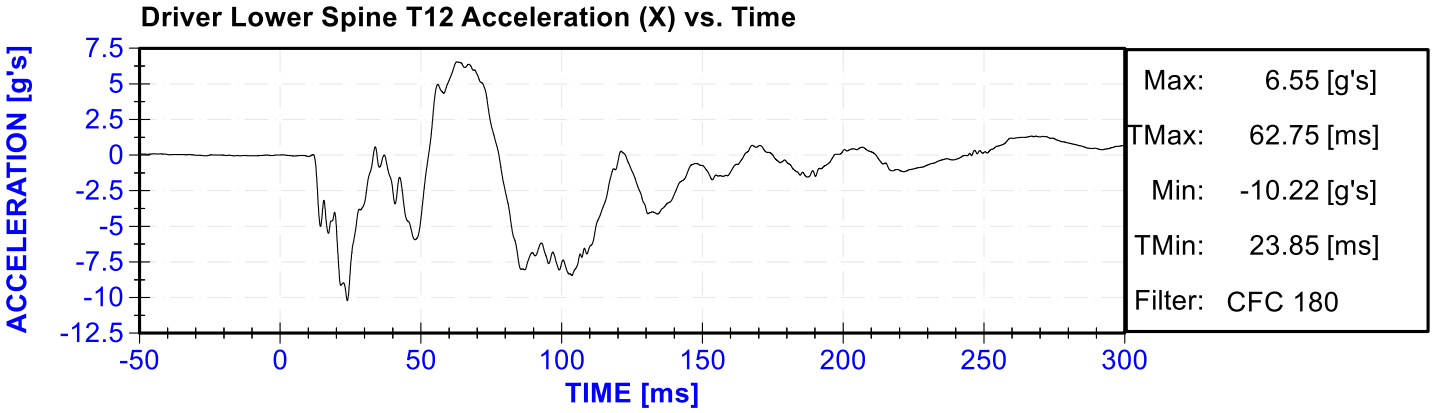


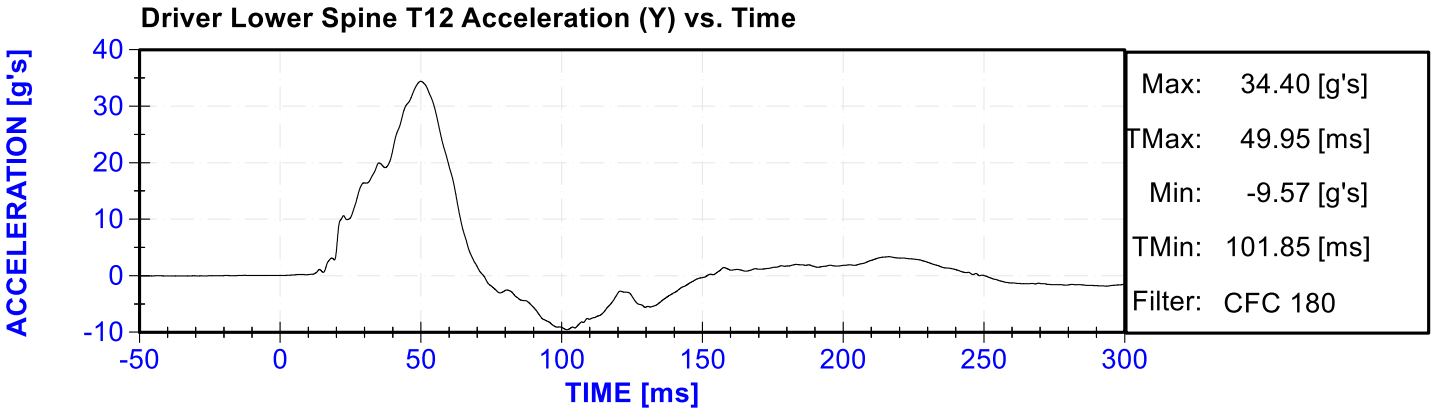
Driver Head Acceleration (Z) Primary vs. Time

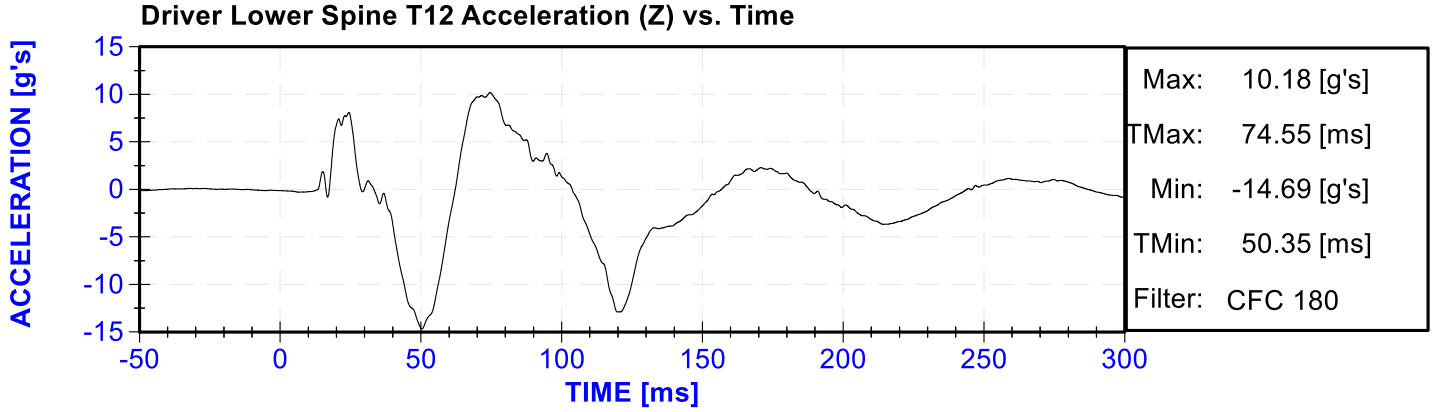


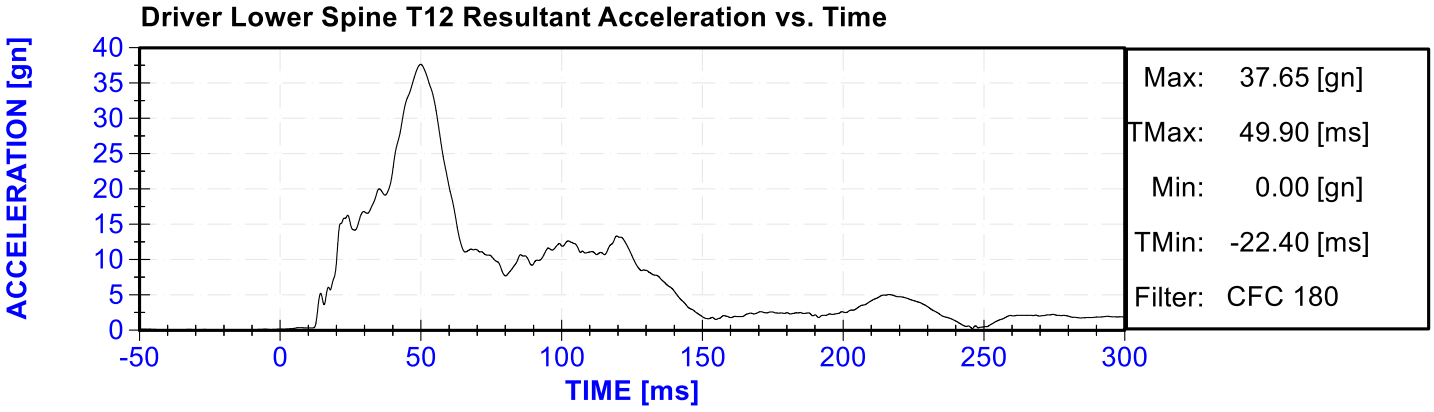
Driver Head Resultant Primary vs. Time



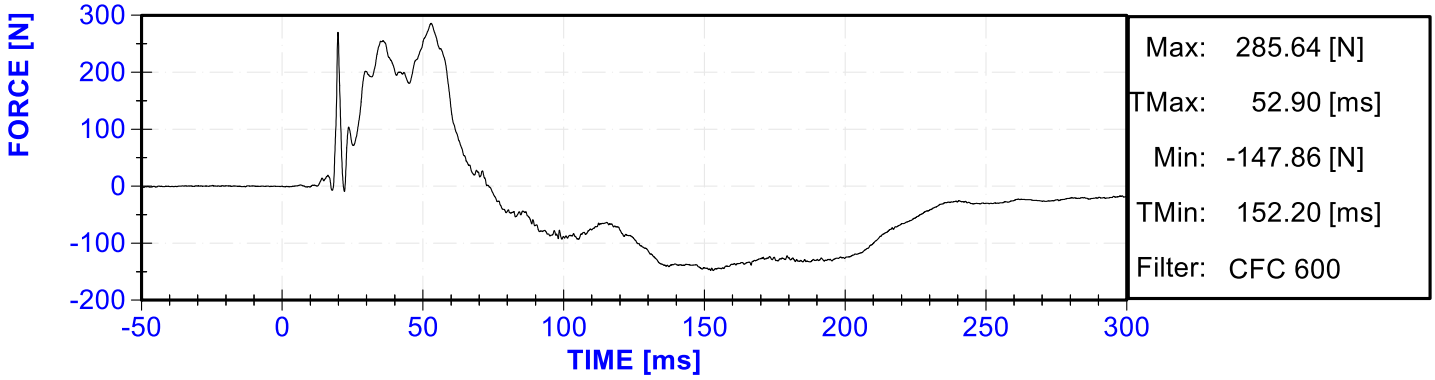

Driver Lower Spine T12 Acceleration (X) vs. Time
ACCELERATION [g's]
7.5
5
2.5
0
-2.5
-5
-7.5
-10
-12.5
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 6.55 [g's]
TMax: 62.75 [ms]
Min: -10.22 [g's]
TMin: 23.85 [ms]
Filter: CFC 180


Driver Lower Spine T12 Acceleration (Y) vs. Time
ACCELERATION [g's]
40
30
20
10
0
-10
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 34.40 [g's]
TMax: 49.95 [ms]
Min: -9.57 [g's]
TMin: 101.85 [ms]
Filter: CFC 180

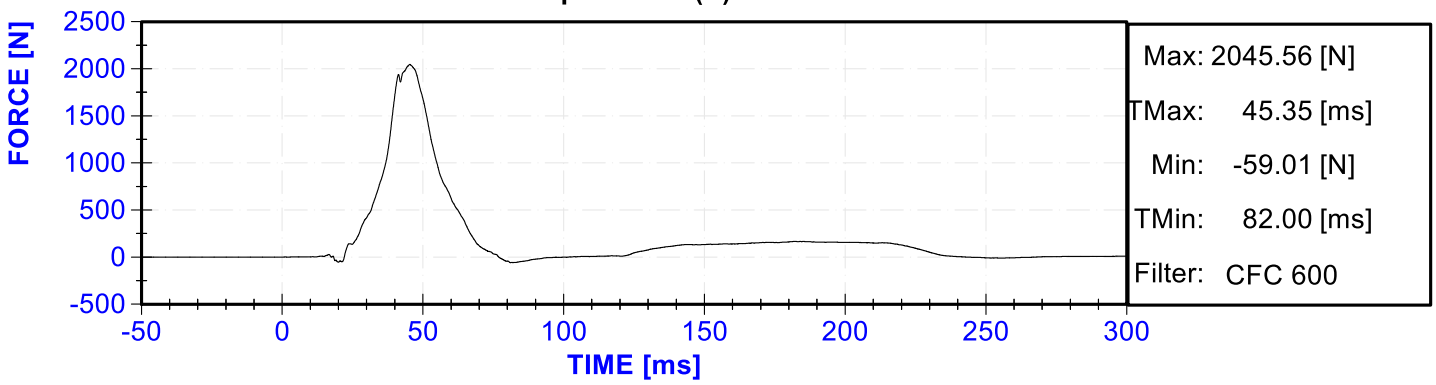

Driver Lower Spine T12 Acceleration (Z) vs. Time
ACCELERATION [g's]
15
10
5
0
-5
-10
-15
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 10.18 [g's]
TMax: 74.55 [ms]
Min: -14.69 [g's]
TMin: 50.35 [ms]
Filter: CFC 180


Driver Lower Spine T12 Resultant Acceleration vs. Time
ACCELERATION [gn]
40
35
30
25
20
15
10
5
0
-50
0
50
100
150
200
250
300
TIME [ms]
Max: 37.65 [gn]
TMax: 49.90 [ms]
Min: 0.00 [gn]
TMin: -22.40 [ms]
Filter: CFC 180

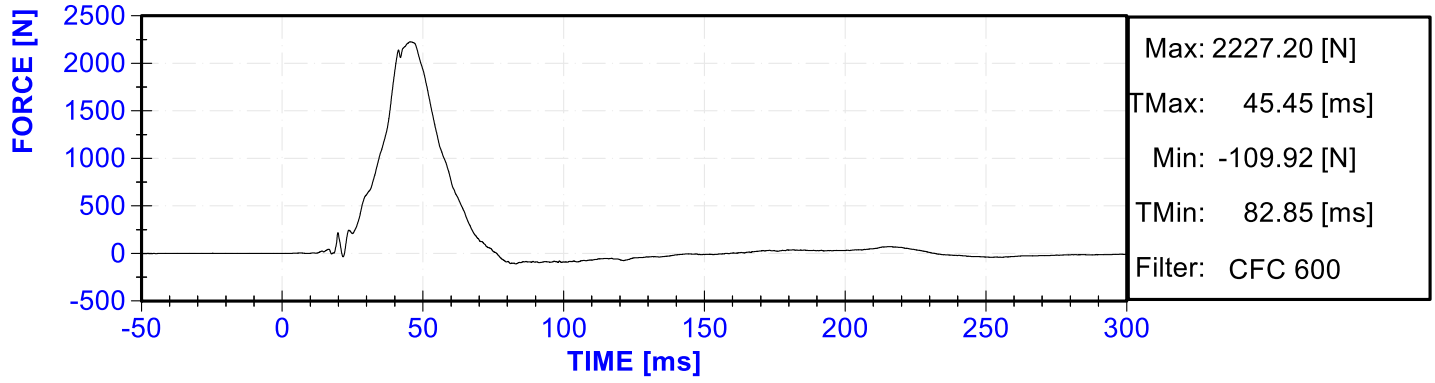
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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

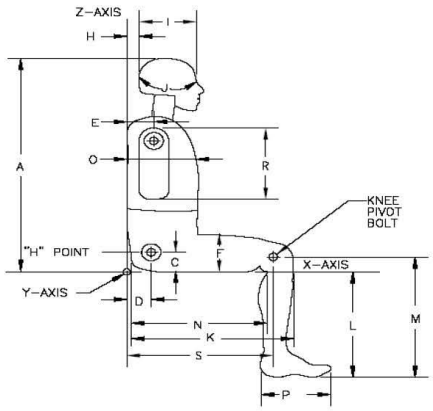
SERIAL NO: DG8012

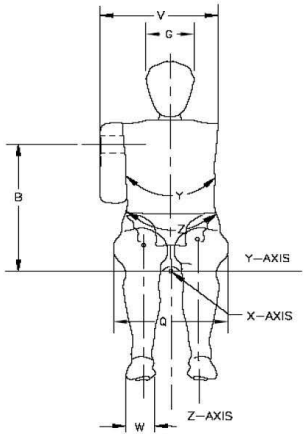
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J.Pericak Date: 05/05/2021

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	144	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	130	Pass
G	Head Breadth	140	148	142	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	536	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	435	Pass
O	Chest Depth w/o jacket	195	211	208	Pass
P	Foot Length	216	232	225	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	321	Pass
R	Arm Length	249	259	255	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	784	Pass

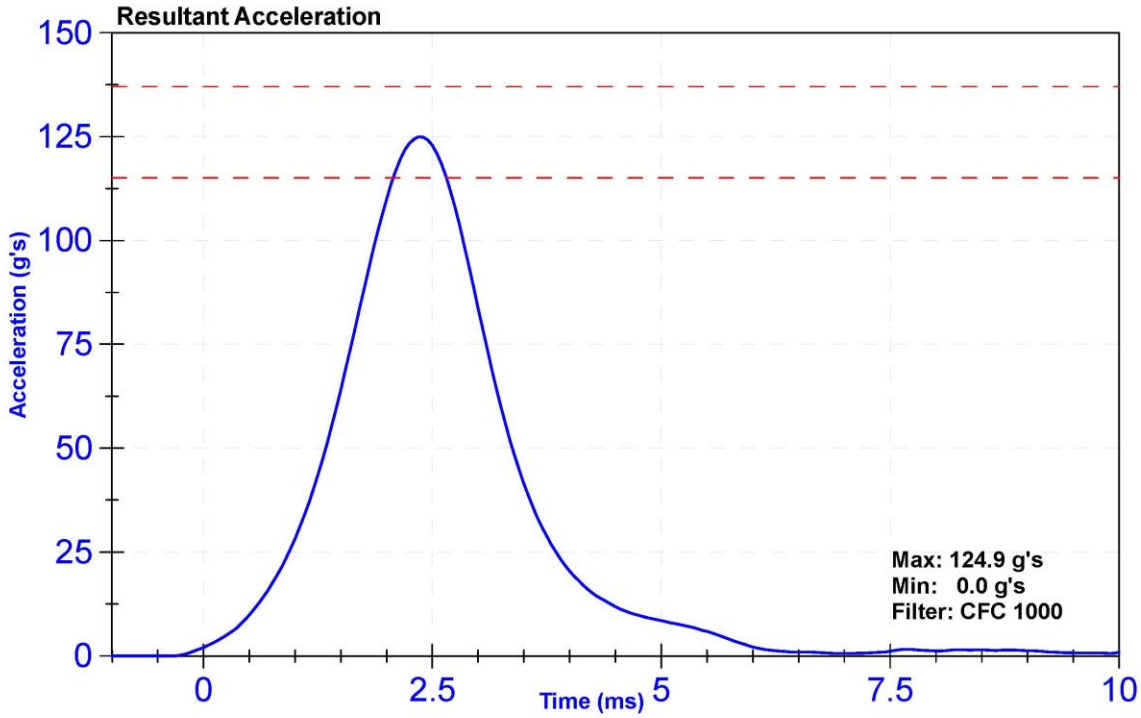
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

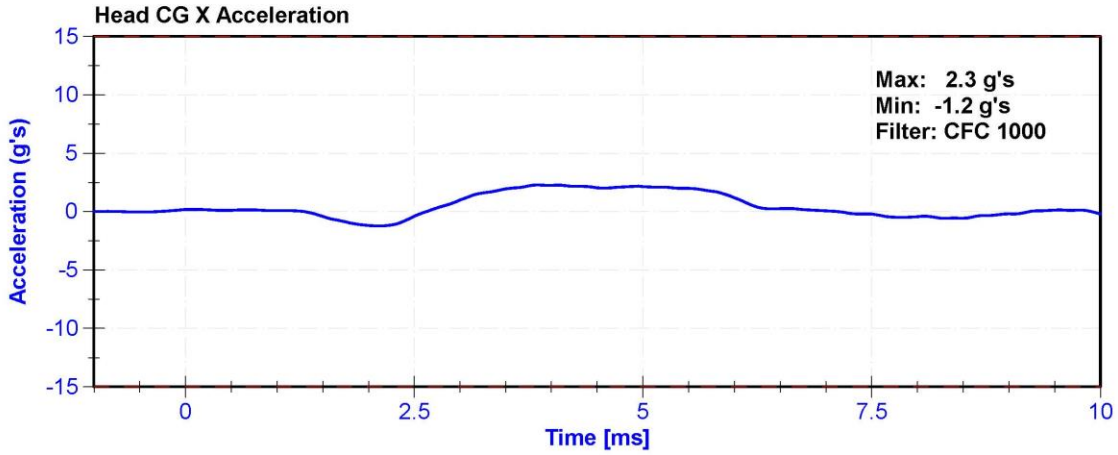
Results

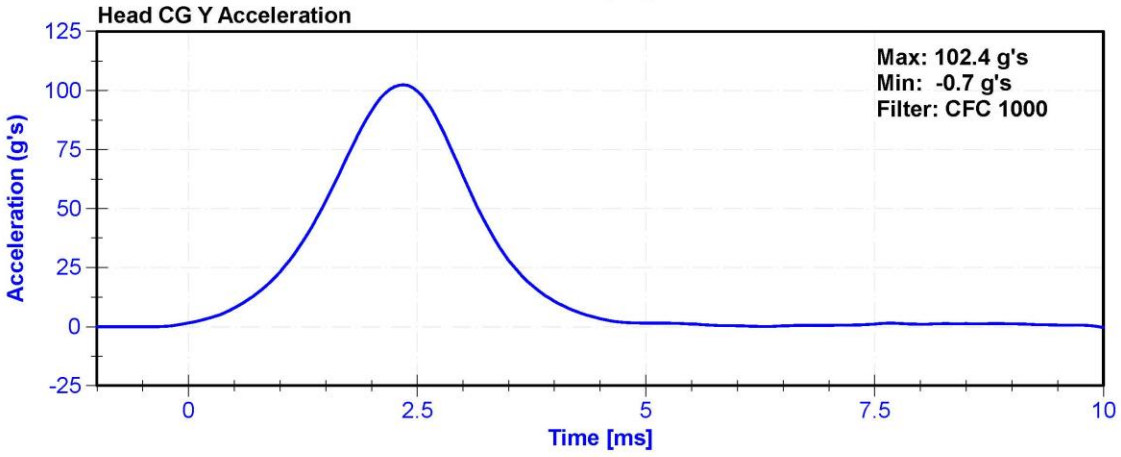
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	38	Pass
Resultant Acceleration	115	137	g's	124.9	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	2.3	Pass

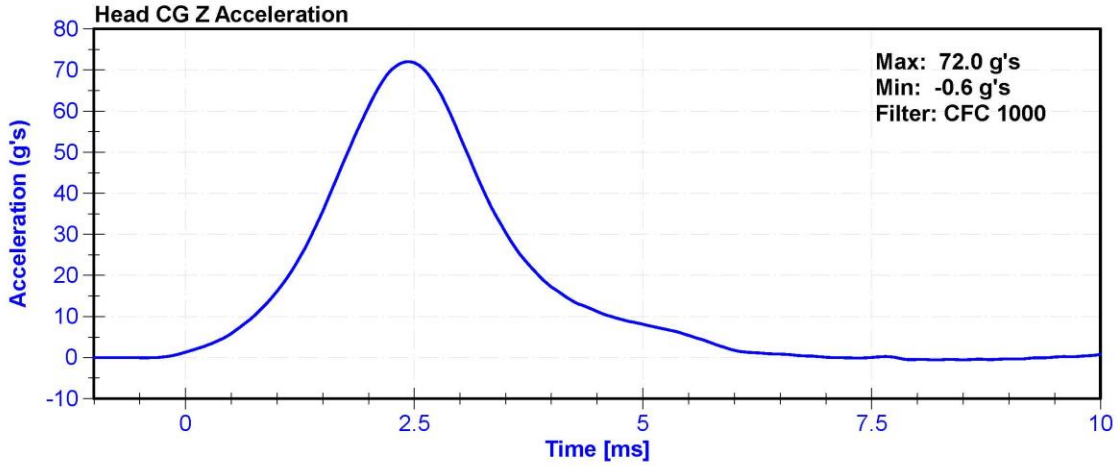
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P74788	5/4/2021	11/2/2021
Y Accelerometer	ENDEVCO 7264CT	AC-P83432	5/4/2021	11/2/2021
Z Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2021	11/2/2021




Head CG X Acceleration
Max: 2.3 g's
Min: -1.2 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 102.4 g's
Min: -0.7 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 72.0 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

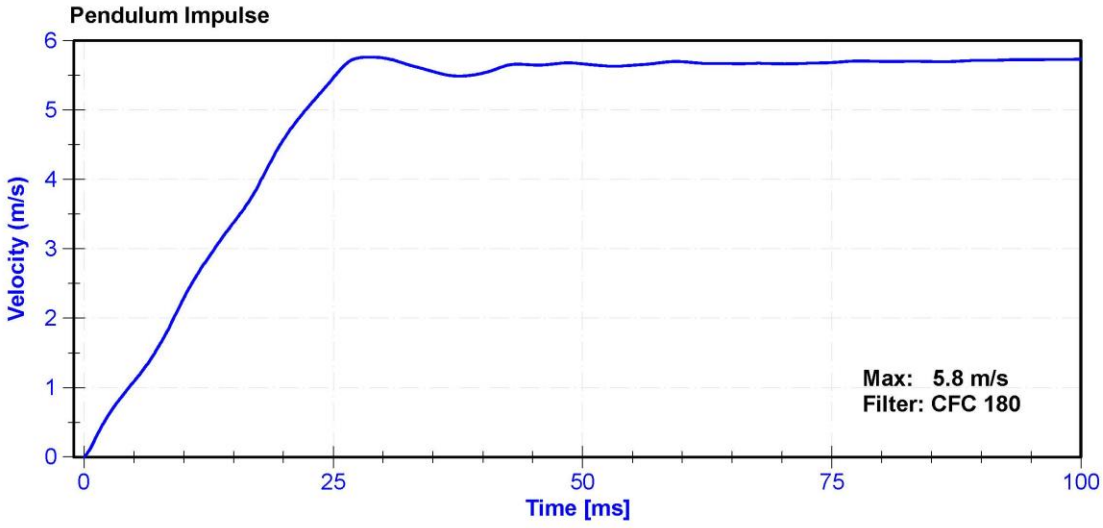
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

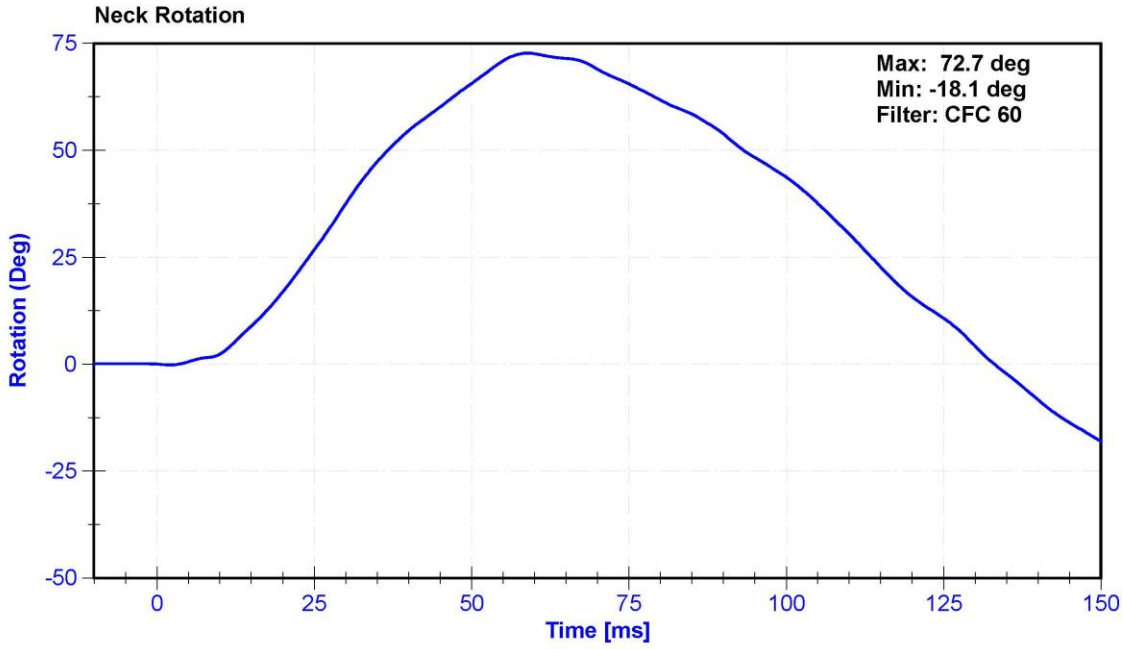
Results

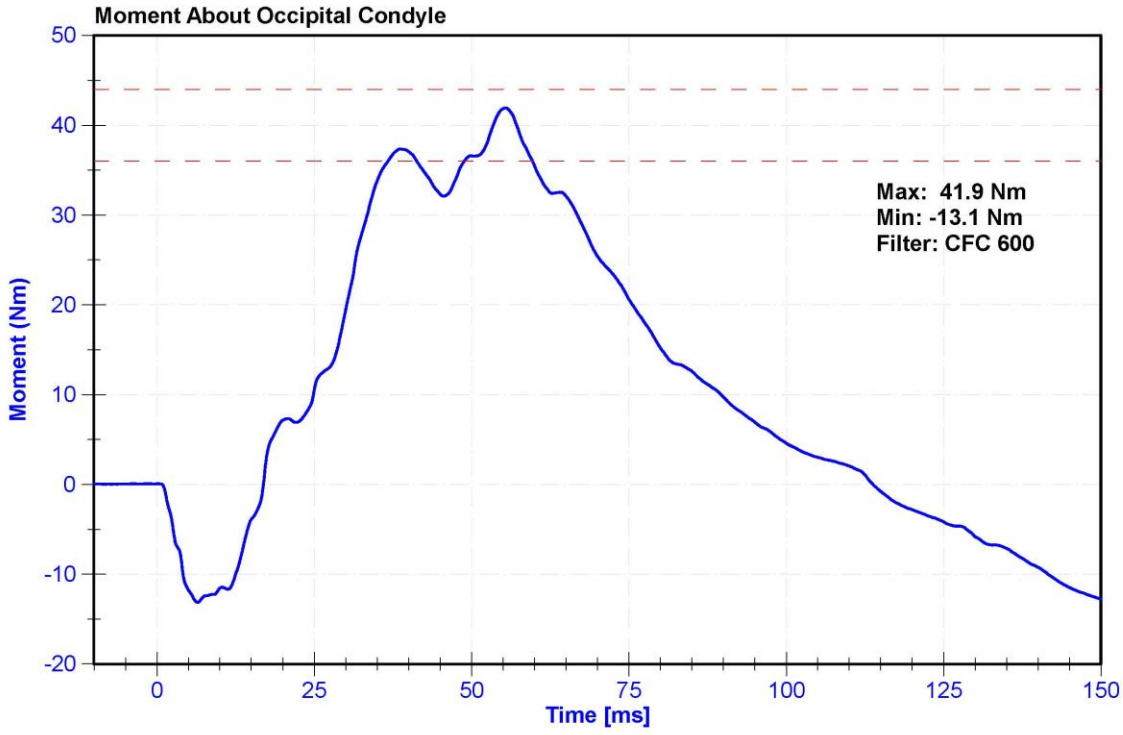
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	45.6	Pass
Velocity	5.51	5.63	m/s	5.537	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.29	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.38	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.57	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.46	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.76	Pass
Neck Rotation	71	81	deg	72.7	Pass
Time at Maximum Rotation	50	70	ms	58.9	Pass
Moment about the OC	36	44	Nm	41.9	Pass
Moment Decay to 0 Nm	102	126	ms	113.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/6/2020	11/6/2021
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/6/2020	11/6/2021
Upper Neck Load Cell	Denton 1716AJ	17162187-FY	8/12/2020	8/12/2021




Neck Rotation
Max: 72.7 deg
Min: -18.1 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 41.9 Nm
Min: -13.1 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

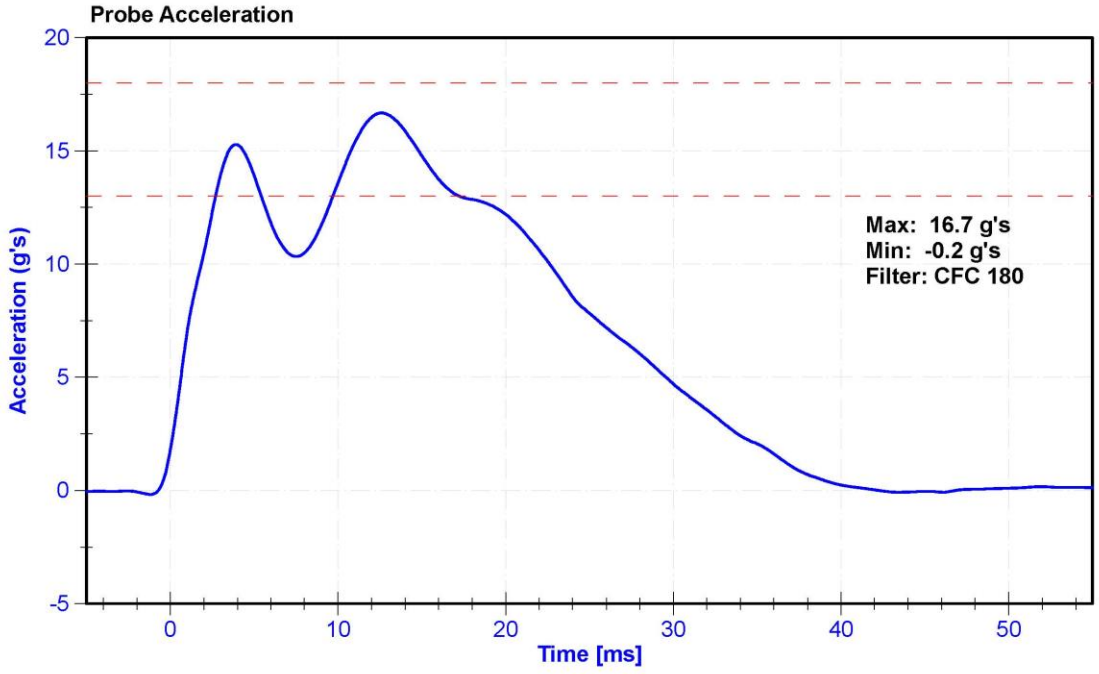
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

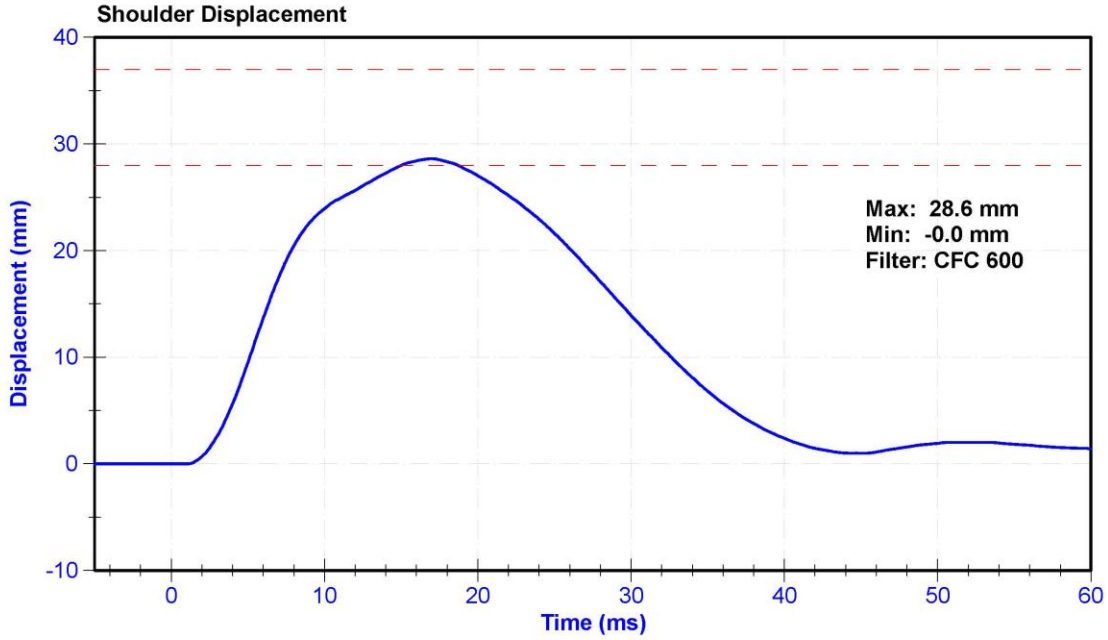
Results

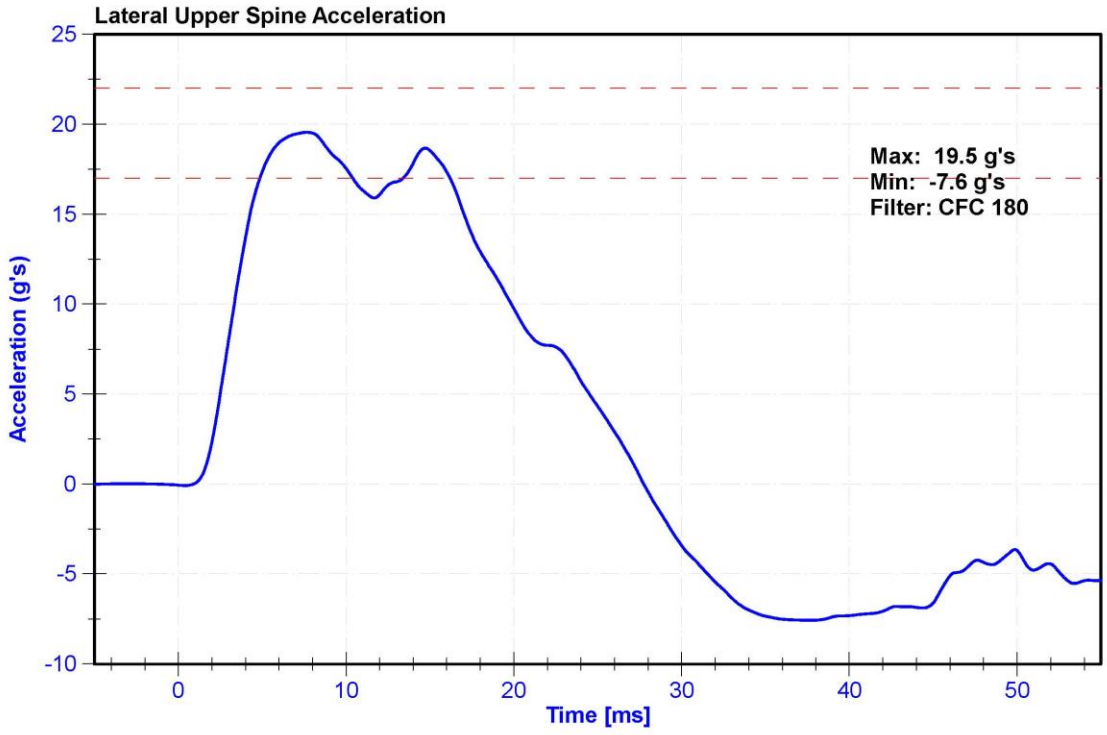
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	32	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	16.7	Pass
Shoulder Deflection	28	37	mm	28.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Shoulder Potentiometer	Servo 08TC1-3745	DS-1304GFE	5/4/2021	11/2/2021
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	5/4/2021	11/2/2021




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.6 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.5 g's
Min: -7.6 g's
Filter: CFC 180

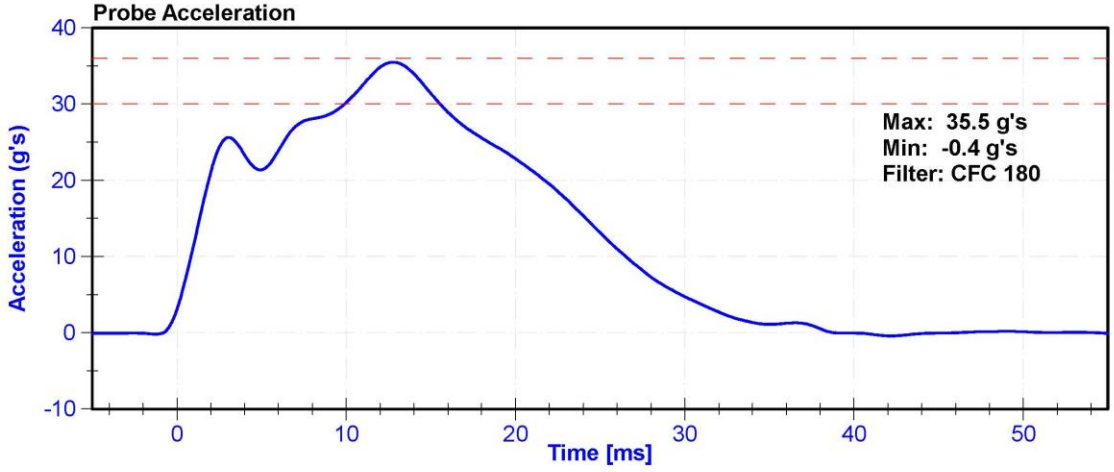
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

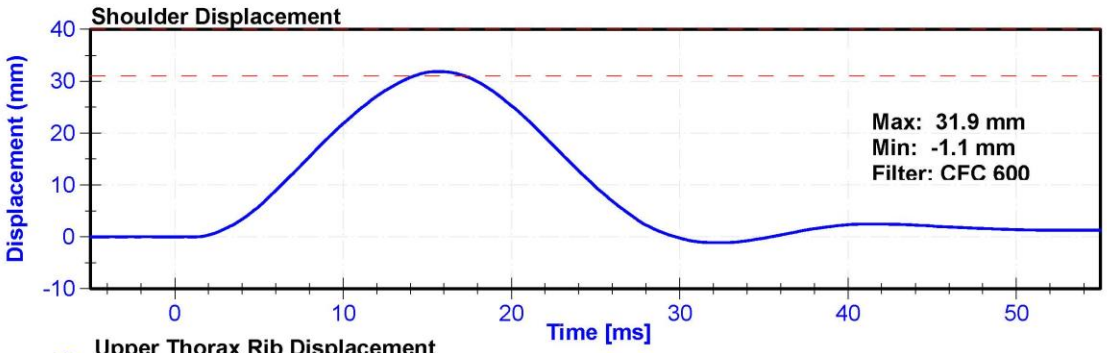
Results

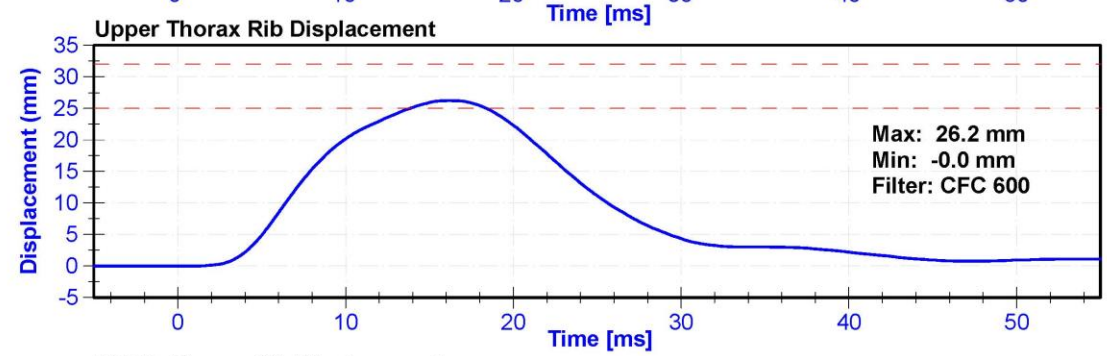
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29.0	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration after 5 ms	30	36	g's	35.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.4	Pass
Shoulder Deflection	31	40	mm	31.9	Pass
Upper Thorax Rib Deflection	25	32	mm	26.2	Pass
Mid Thorax Rib Deflection	30	36	mm	31.3	Pass
Lower Thorax Rib Deflection	32	38	mm	34.5	Pass

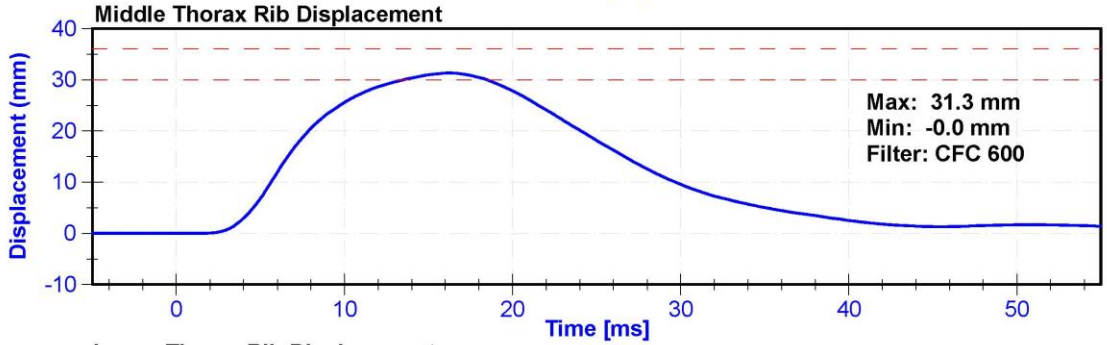
Transducer Calibrations

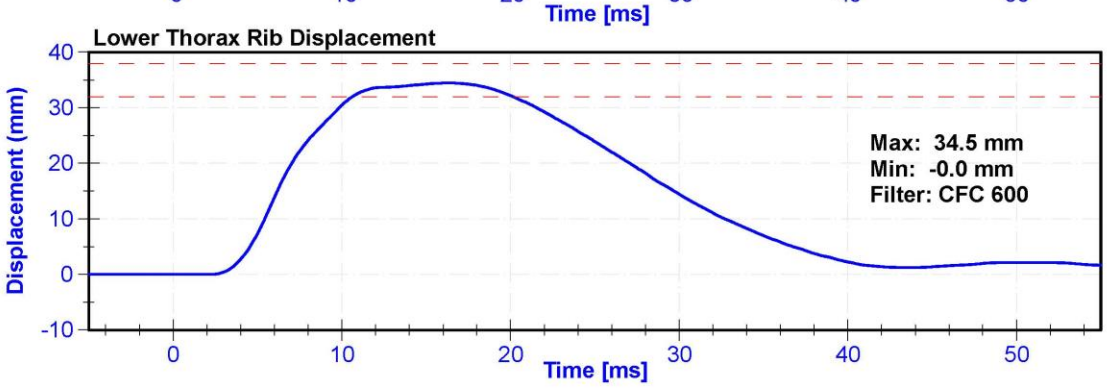
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	5/4/2021	11/2/2021
Upper Spine T12 Y Accelerometer	ENDEVCO 7264C	AC-P51327	5/4/2021	11/2/2021
Shoulder Potentiometer	Servo 08TC1-3745	DS-1304GFE	5/4/2021	11/2/2021
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/4/2021	11/2/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	5/4/2021	11/2/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	5/4/2021	11/2/2021

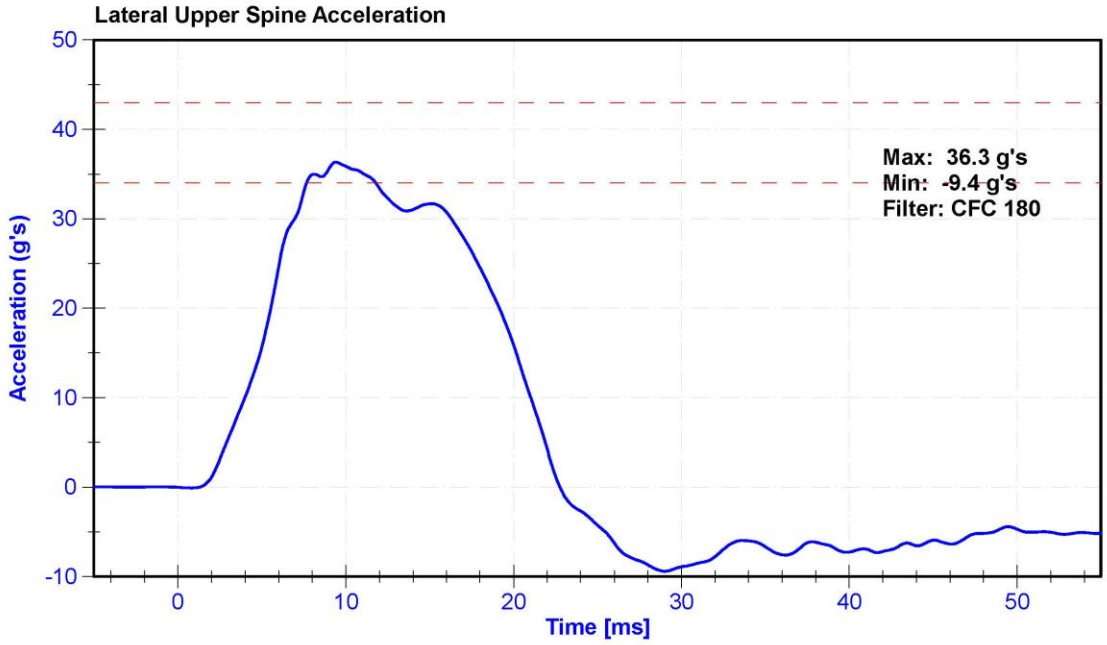


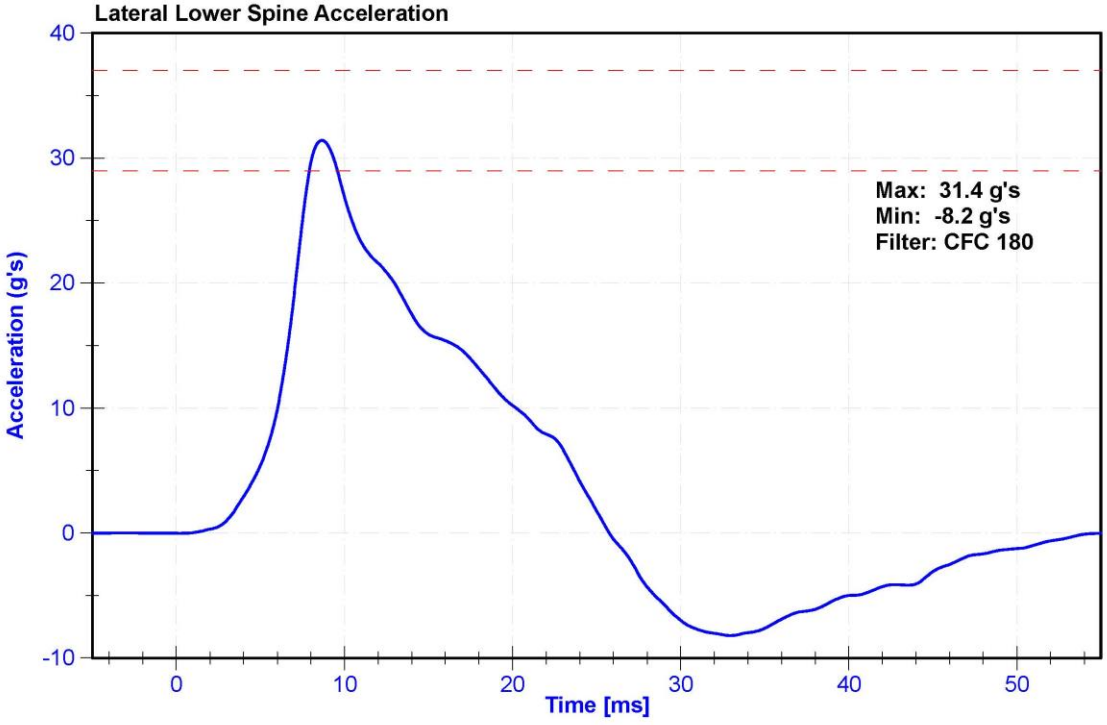

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.9 mm
Min: -1.1 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.2 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.3 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.5 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 36.3 g's
Min: -9.4 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 31.4 g's
Min: -8.2 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

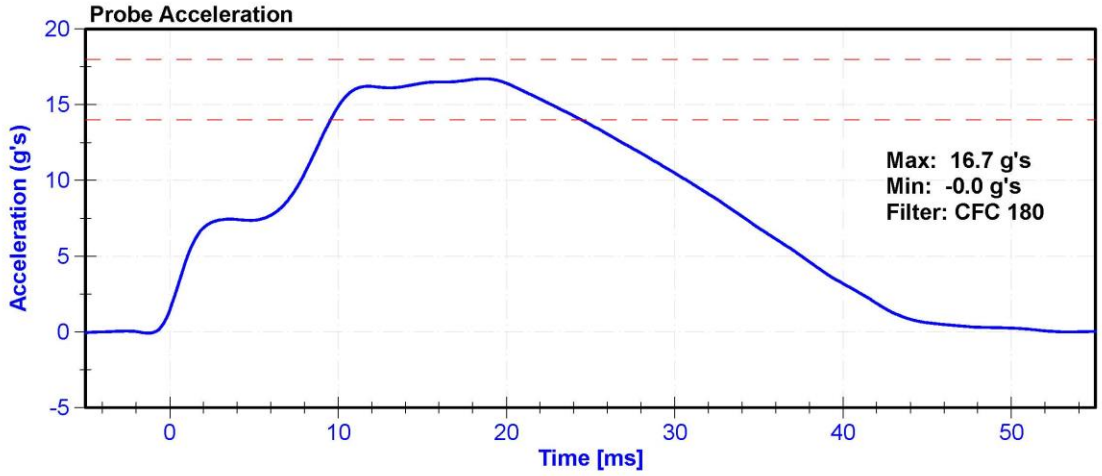
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

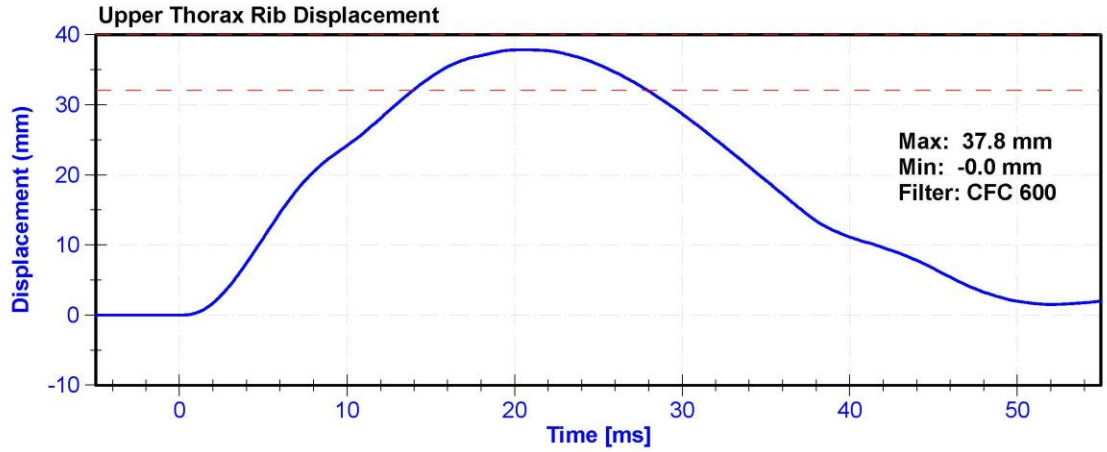
Results

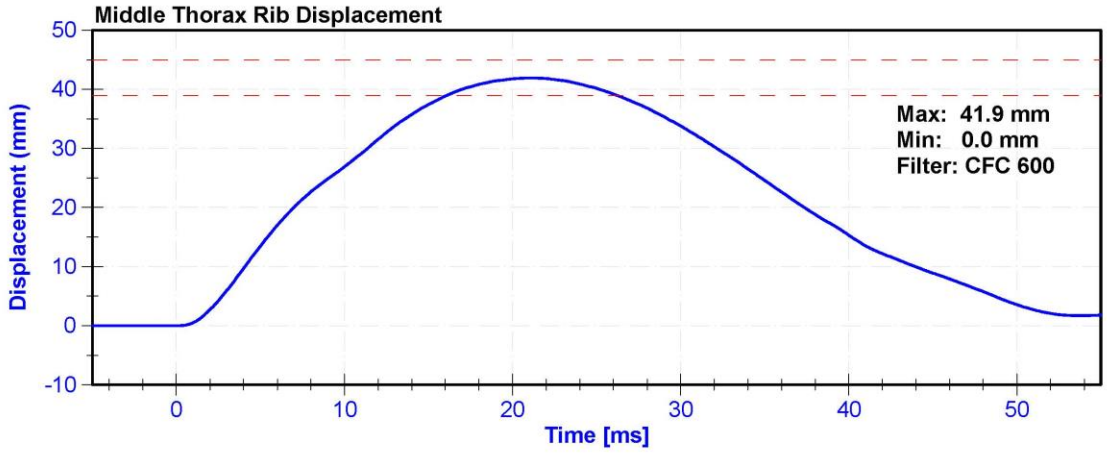
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	32	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	14	18	g's	16.7	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.9	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.1	Pass
Upper Thorax Rib Deflection	32	40	mm	37.8	Pass
Middle Thorax Rib Deflection	39	45	mm	41.9	Pass
Lower Thorax Rib Deflection	35	43	mm	39.1	Pass

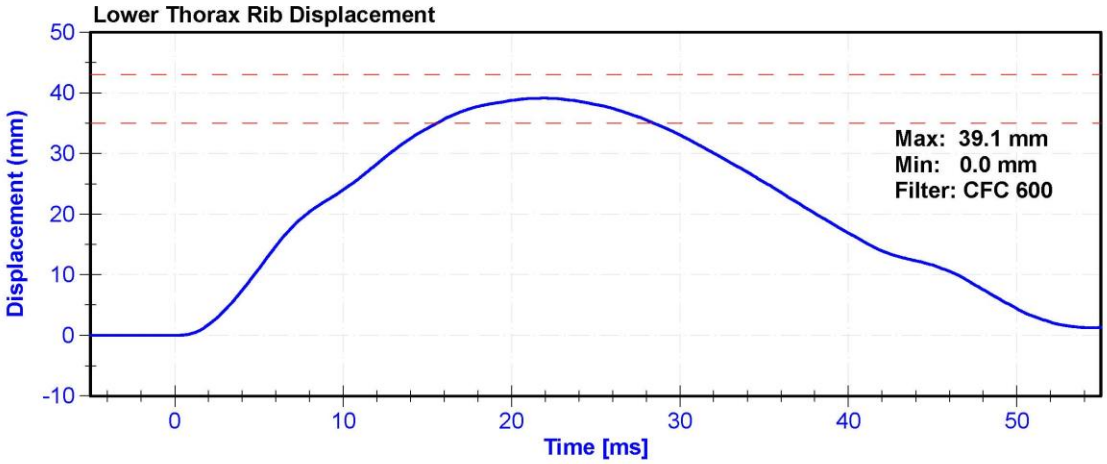
Transducer Calibrations

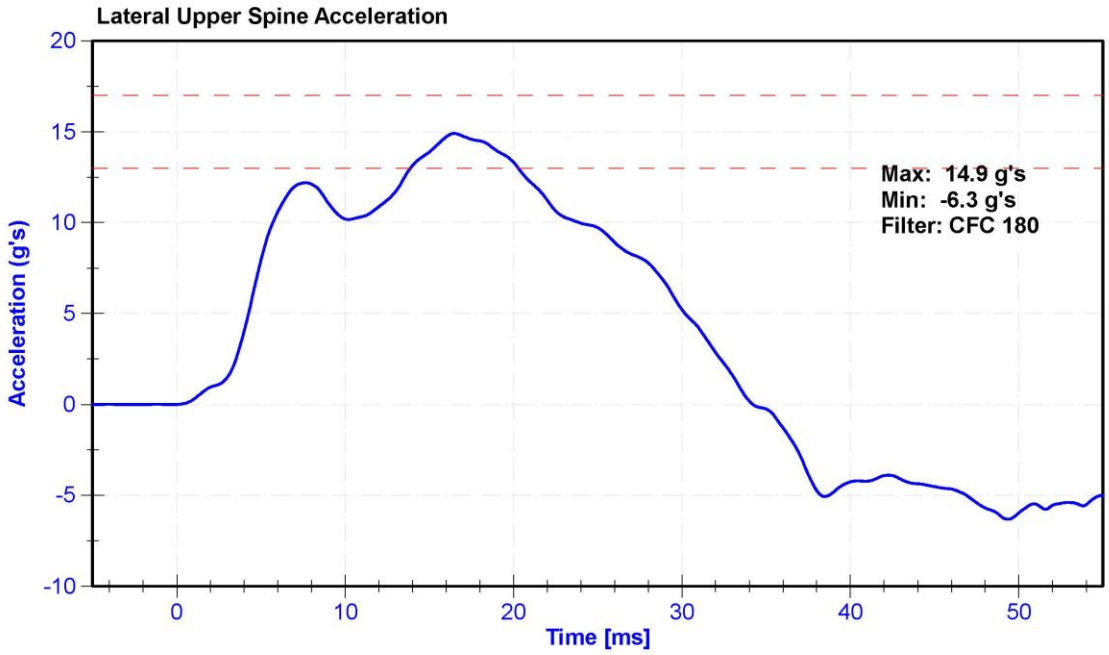
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Upper Spine Y Accelerometer	ENDEVCO 7264C	AC-P64148	5/4/2021	11/2/2021
Lower Spine Y Accelerometer	ENDEVCO 7264C	AC-P51327	5/4/2021	11/2/2021
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/4/2021	11/2/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	5/4/2021	11/2/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	5/4/2021	11/2/2021

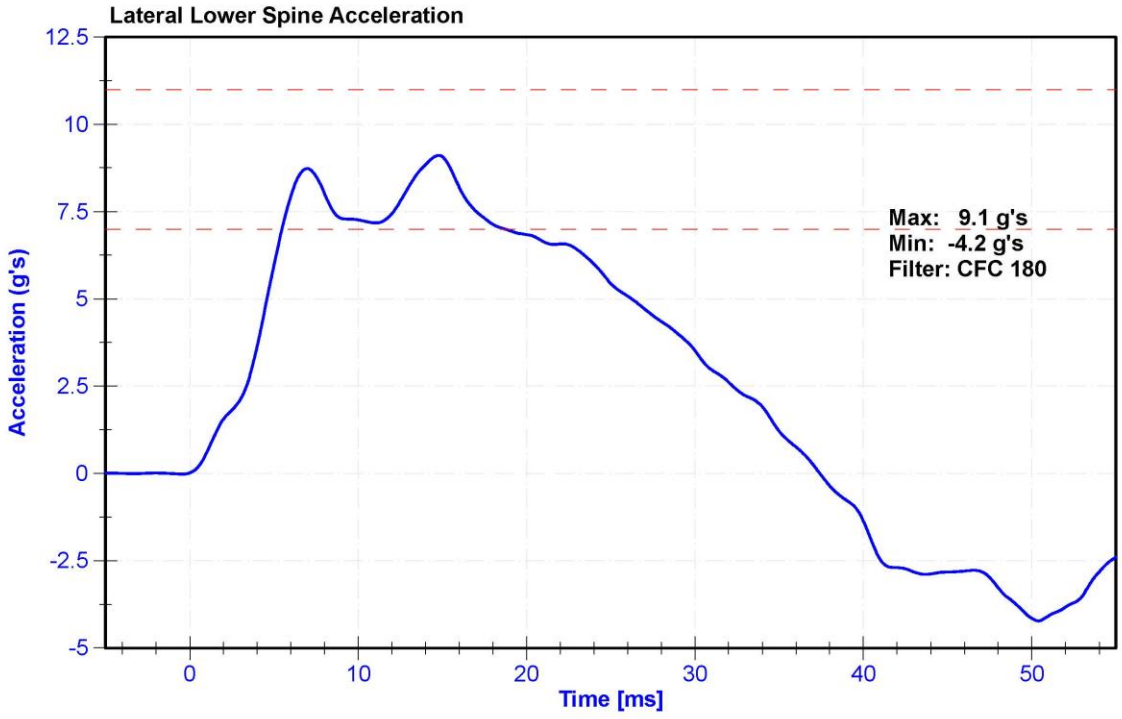



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.8 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.9 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 14.9 g's
Min: -6.3 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 9.1 g's
Min: -4.2 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

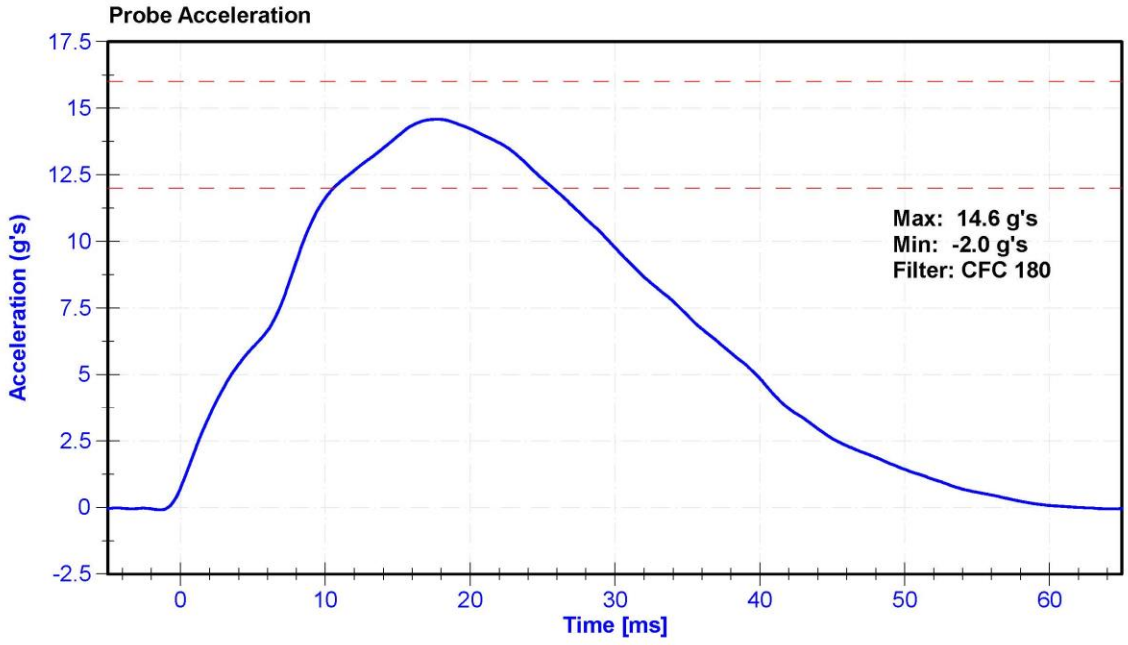
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

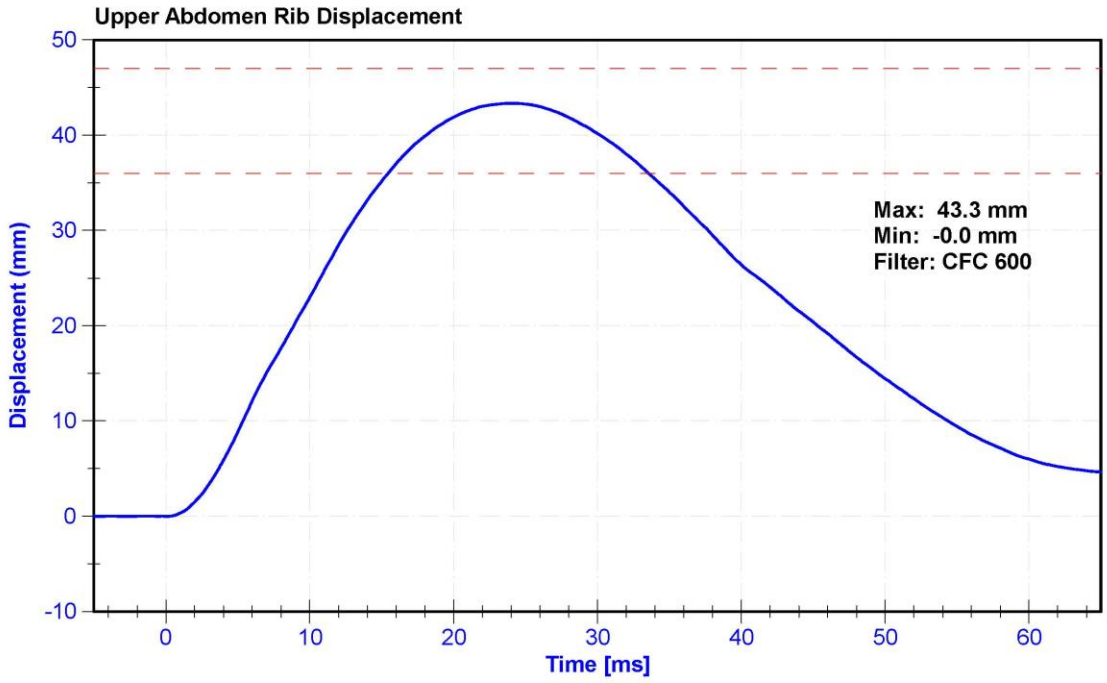
Results

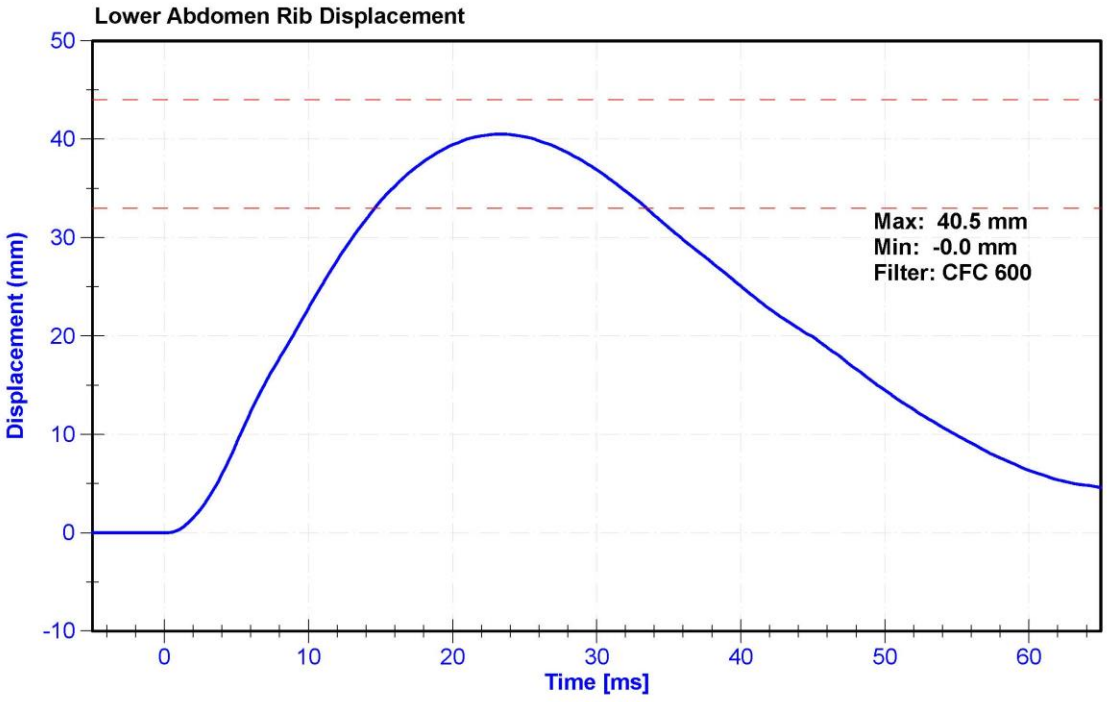
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	32.0	Pass
Velocity	4.2	4.4	m/s	4.26	Pass
Probe Acceleration	12	16	g's	14.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.0	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.3	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.5	Pass

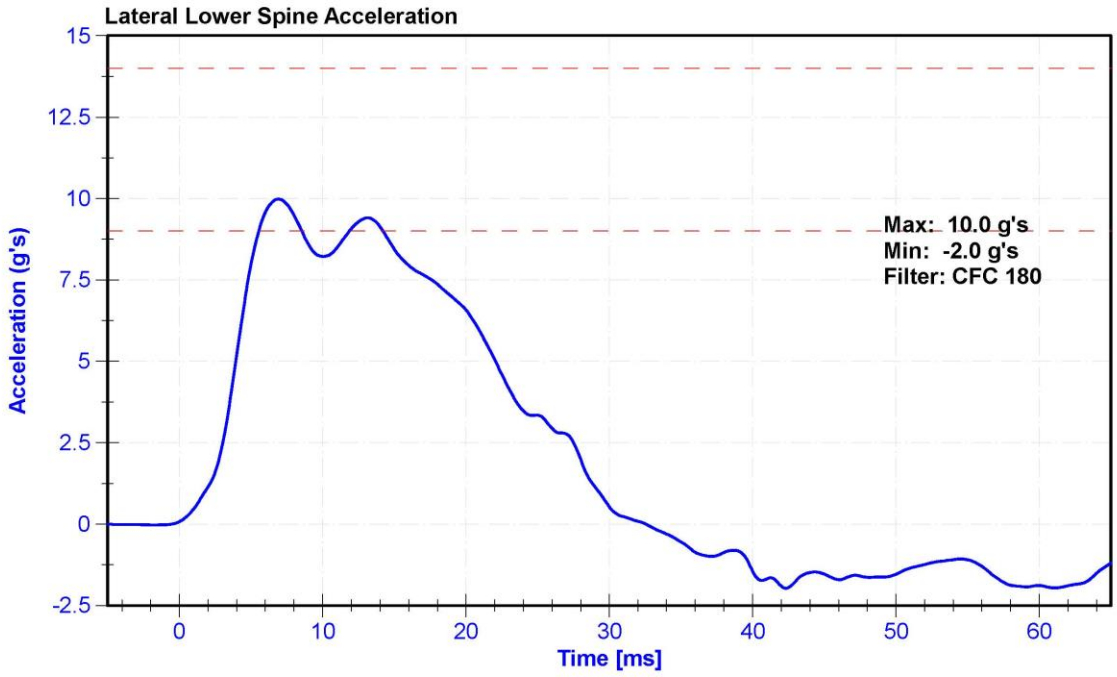
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Lower Spine Y Accelerometer	ENDEVCO 7264C	AC-P51327	5/4/2021	11/2/2021
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	5/4/2021	11/2/2021
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-1199GFE	11/24/2020	5/25/2021




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.3 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.5 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 10.0 g's
Min: -2.0 g's
Filter: CFC 180

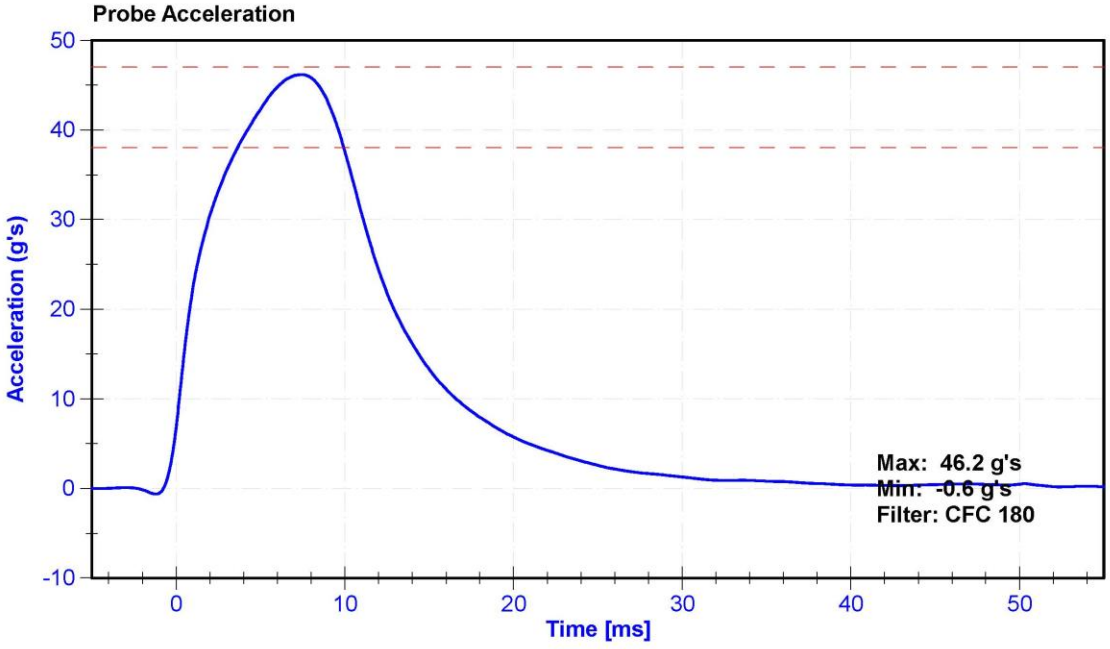
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

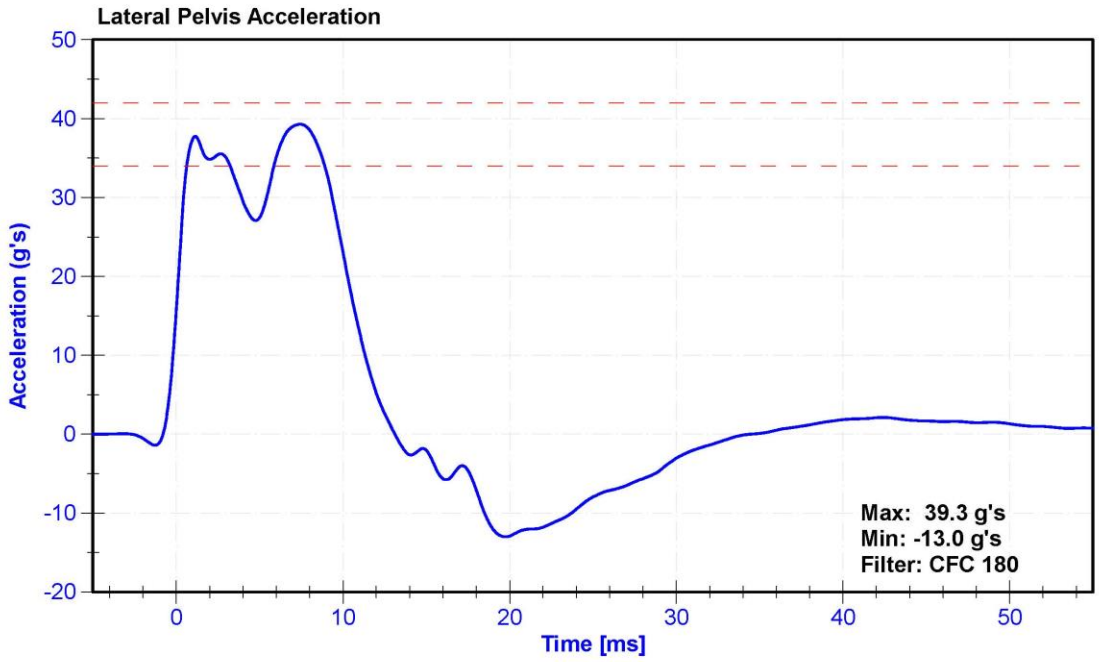
Results

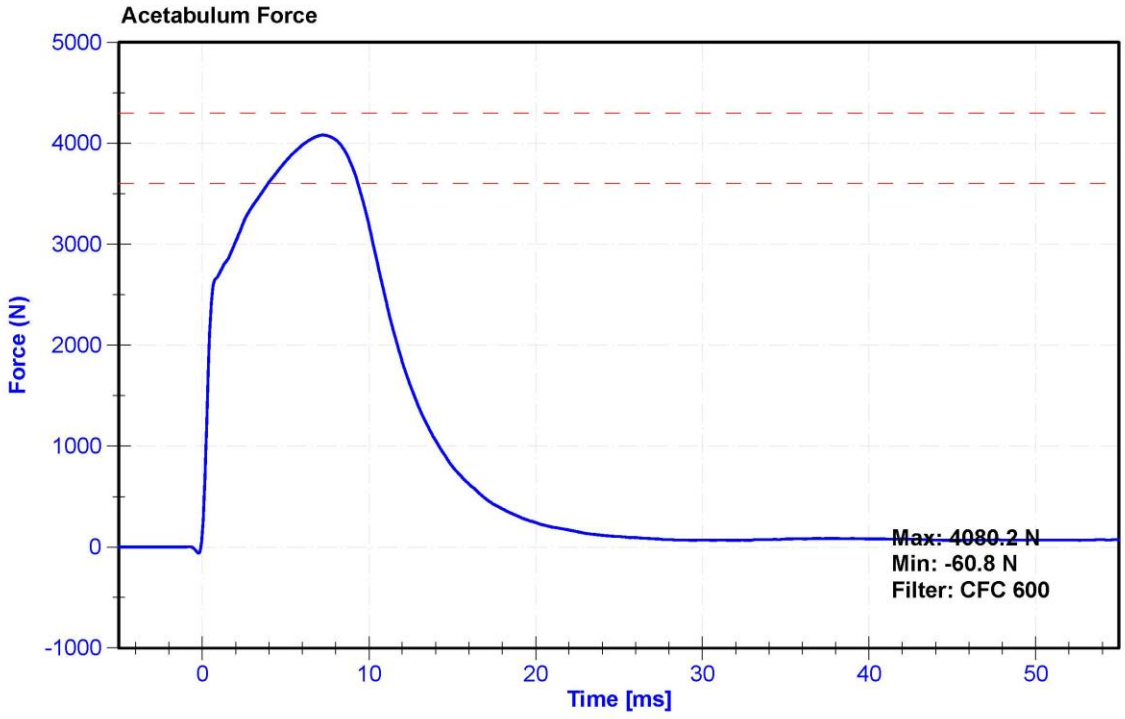
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	42	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	46.2	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.3	Pass
Acetabulum Force	3600	4300	N	4080.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Pelvis Y Accelerometer	ENDEVCO 7264C-2K	AC-P51875	5/4/2021	11/2/2021
Acetabulum Load Cell	Denton 3249J	LC-267Fy	11/23/2020	11/23/2021
Certification Plug	SACO	14024	5/22/2020	N/A
Crash Test Plug	SACO	13091	7/30/2019	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 39.3 g's
Min: -13.0 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4080.2 N
Min: -60.8 N
Filter: CFC 600

SACO RESEARCH

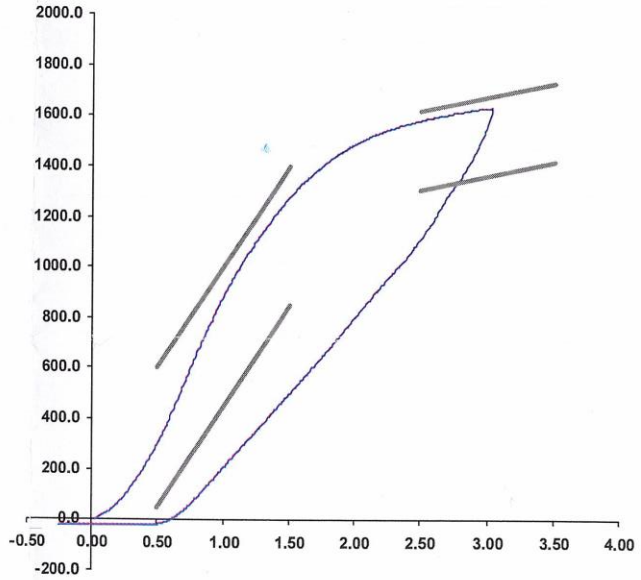
CRASH CAL4701 D68012

SID-IIs Pelvis Plug Certification Test

Plug S/N 13091
Test Number 10411
Report Number 10446
Test Date 7/30/2019 4:40:49 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	305.57	50.00	600.00
Force @ 1.5 mm (N)	1,278.36	850.00	1,400.00
Force @ 2.5 mm (N)	1,582.92	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,632.59	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 30-Jul-19
SACO Research

By : DC Date : 7/30/2019

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

SACO RESEARCH

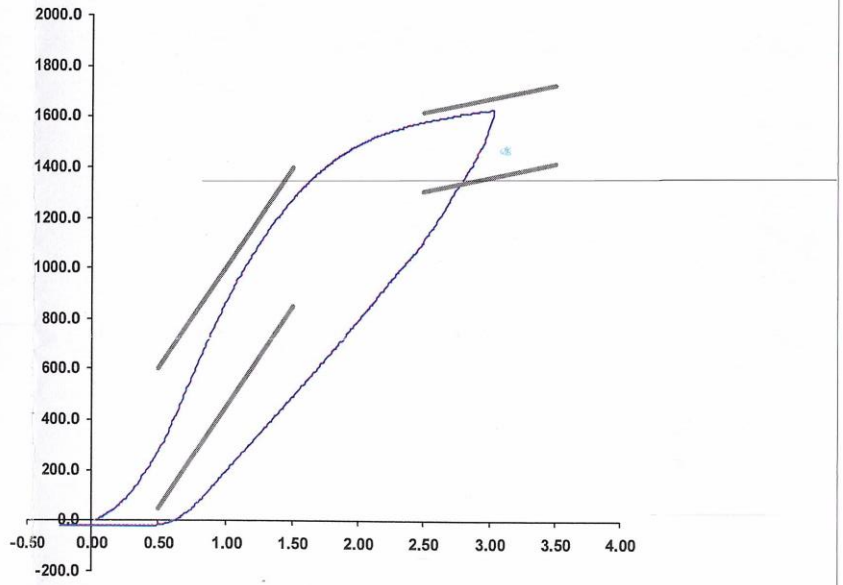
CRASH NON-IMPACT (AL470)
068012

SID-IIs Pelvis Plug Certification Test

Plug S/N 13082
Test Number 10402
Report Number 10437
Test Date 7/30/2019 4:25:43 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	289.86	50.00	600.00
Force @ 1.5 mm (N)	1,277.73	850.00	1,400.00
Force @ 2.5 mm (N)	1,581.67	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,628.04	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 30-Jul-19
SACO Research

By : DC Date : 7/30/2019

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

SACO RESEARCH

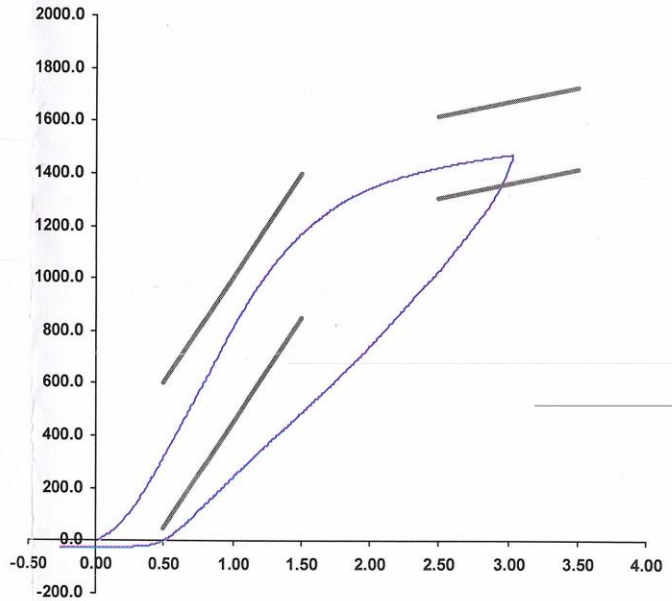
Cert 1
068012
5/6/2021

SID-IIs Pelvis Plug Certification Test

Plug S/N 14189
Test Number 14227
Report Number 14272
Test Date 6/28/2020 1:18:00 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	317.51	50.00	600.00
Force @ 1.5 mm (N)	1,173.30	850.00	1,400.00
Force @ 2.5 mm (N)	1,423.14	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,470.75	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 28-Jun-20
SACO Research

By : DC Date : 6-28-2020

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

SACO RESEARCH

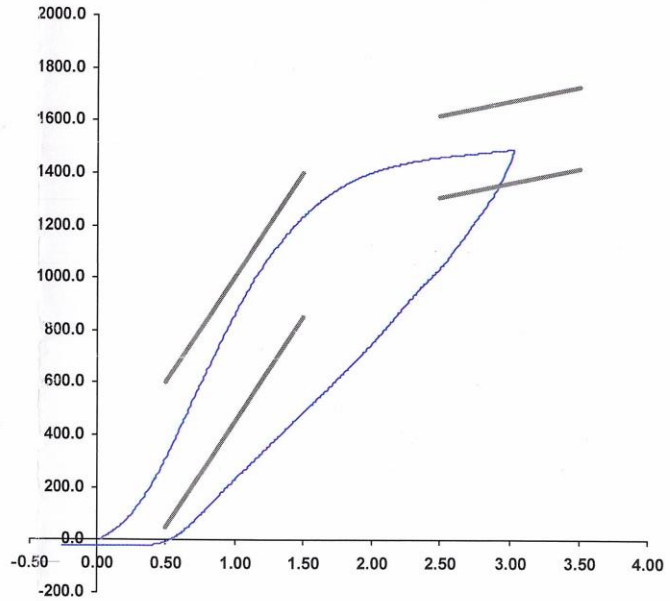
Cert 2
D68012
5-6-21

SID-IIs Pelvis Plug Certification Test

Plug S/N 13999
Test Number 13473
Report Number 13518
Test Date 5/22/2020 10:58:00 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	316.36	50.00	600.00
Force @ 1.5 mm (N)	1,233.69	850.00	1,400.00
Force @ 2.5 mm (N)	1,461.09	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,491.00	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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-May-20
SACO Research

By : DC Date : 5-22-2020

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

SACO RESEARCH

CERT 3

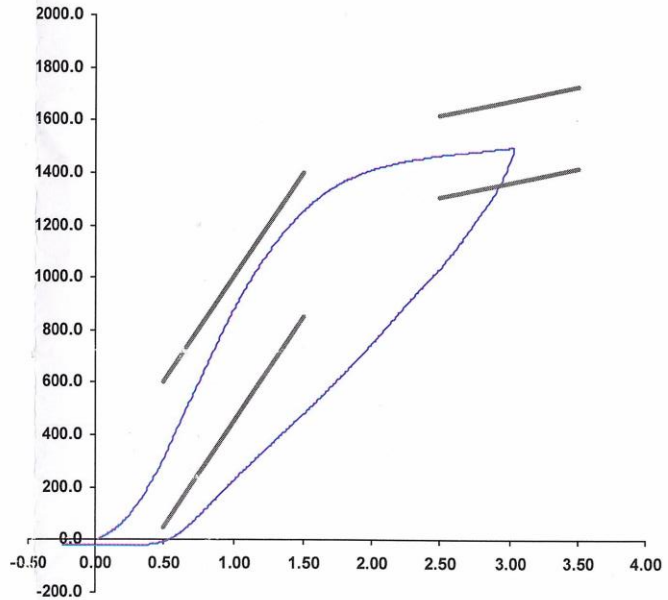
SID-IIs Pelvis Plug Certification Test

✔ PASS

Plug S/N 14024
Test Number 13498
Report Number 13543
Test Date 5/22/2020 12:47:12 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	318.19	50.00	600.00
Force @ 1.5 mm (N)	1,254.17	850.00	1,400.00
Force @ 2.5 mm (N)	1,465.78	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,494.83	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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-May-20
SACO Research

By : DC Date : 5-22-2020

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

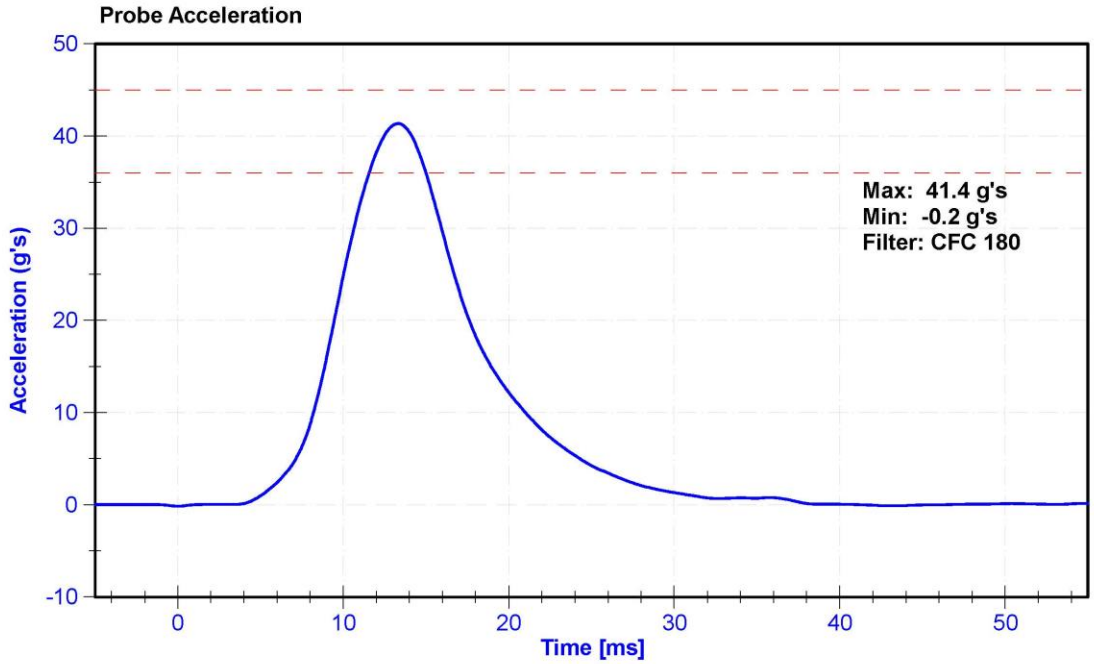
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

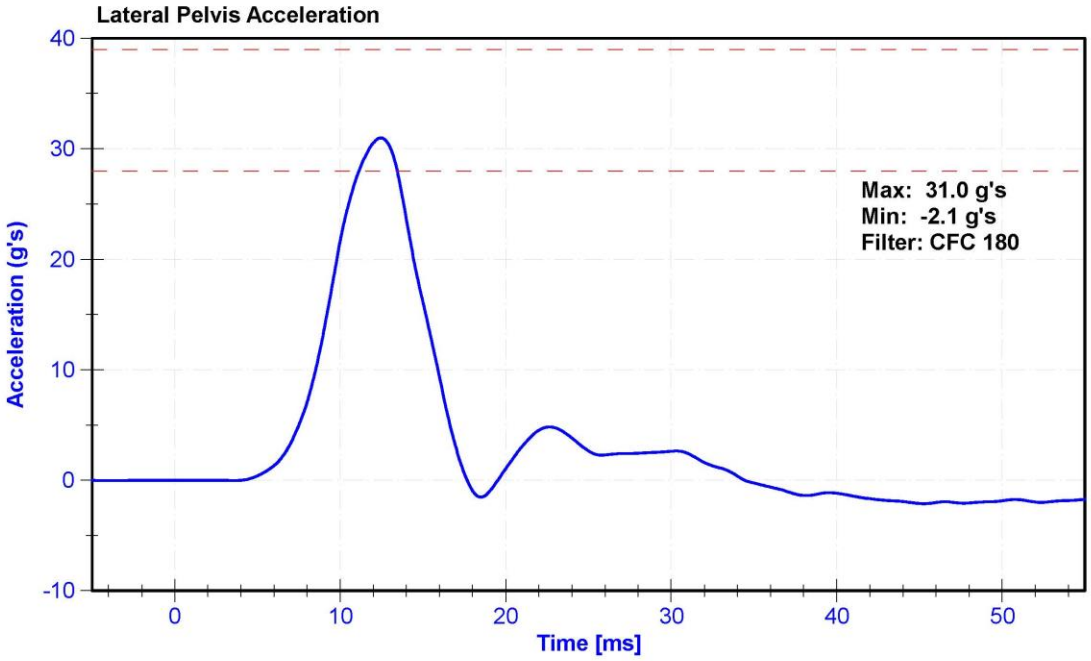
Results

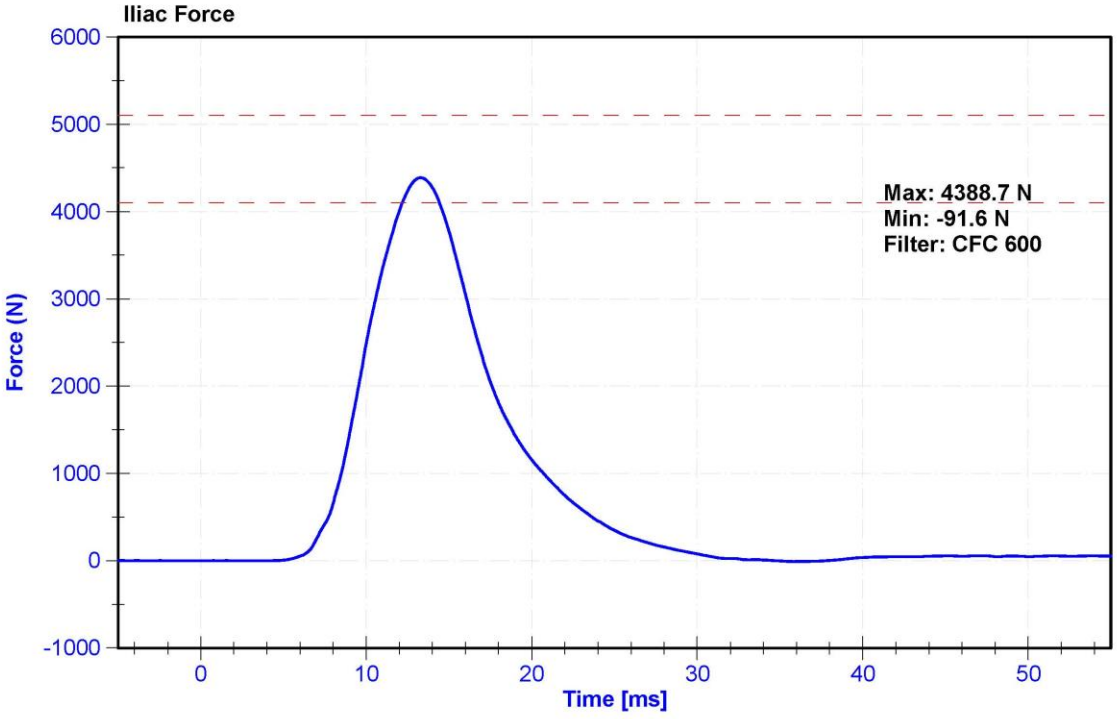
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	42.0	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	41.4	Pass
Lateral Pelvis Acceleration	28	39	g's	31.0	Pass
Iliac Force	4100	5100	N	4388.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51875	5/4/2021	11/2/2021
Iliac Load Cell	DENTON 3228J	LC-290Fy	11/16/2020	11/16/2021




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 31.0 g's
Min: -2.1 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4388.7 N
Min: -91.6 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

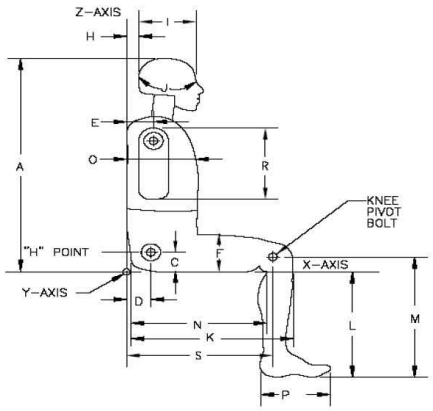
SERIAL NO: DG8012

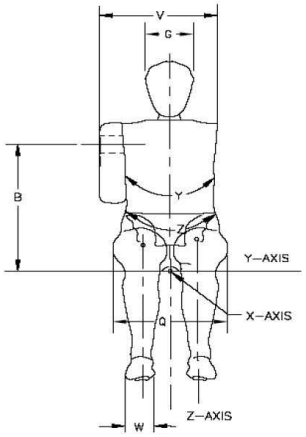
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J.Pericak Date: 05/13/2021

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	144	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	130	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	536	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	435	Pass
O	Chest Depth w/o jacket	195	211	209	Pass
P	Foot Length	216	232	225	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	321	Pass
R	Arm Length	249	259	255	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	784	Pass

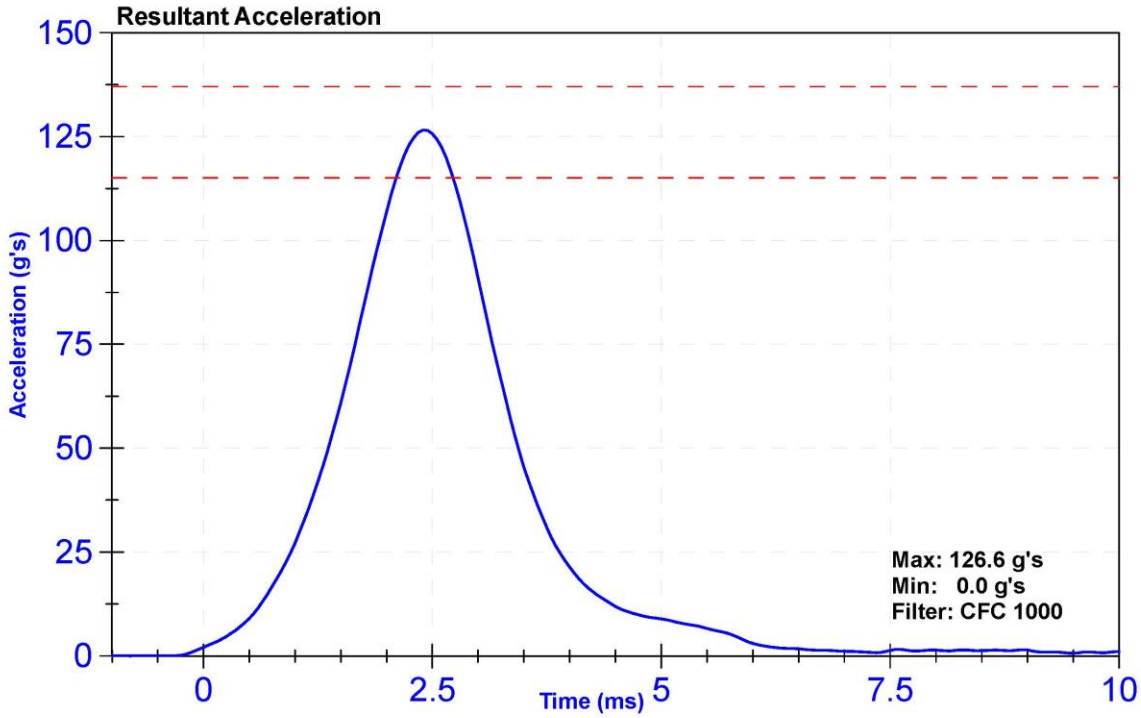
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

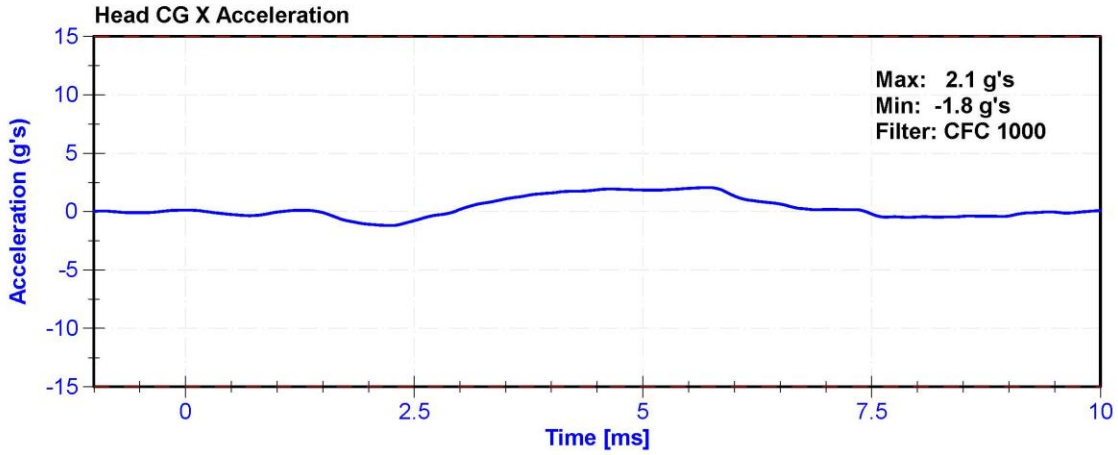
Results

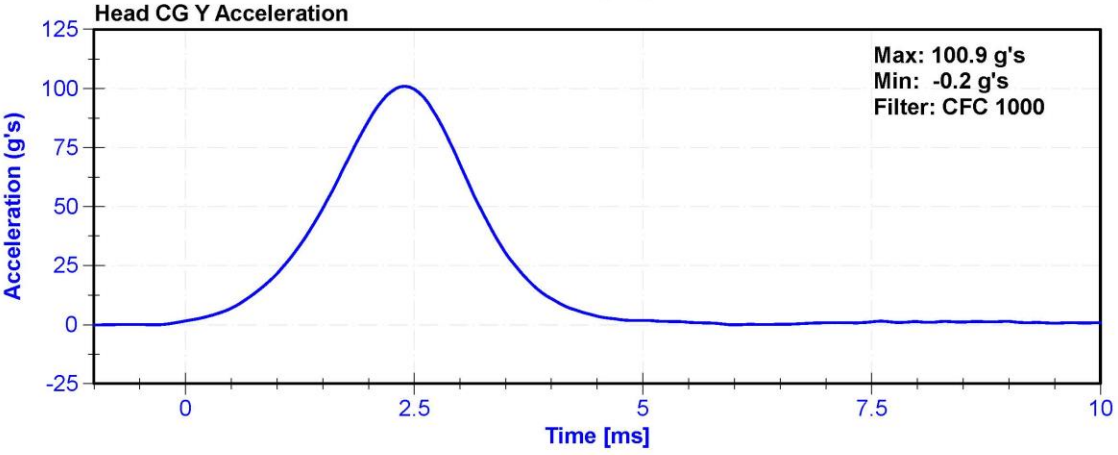
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	37.8	Pass
Resultant Acceleration	115	137	g's	126.6	Pass
Oscillation	0	15	%	1.5	Pass
Fore-Aft Acceleration	-15	15	g's	2.1	Pass

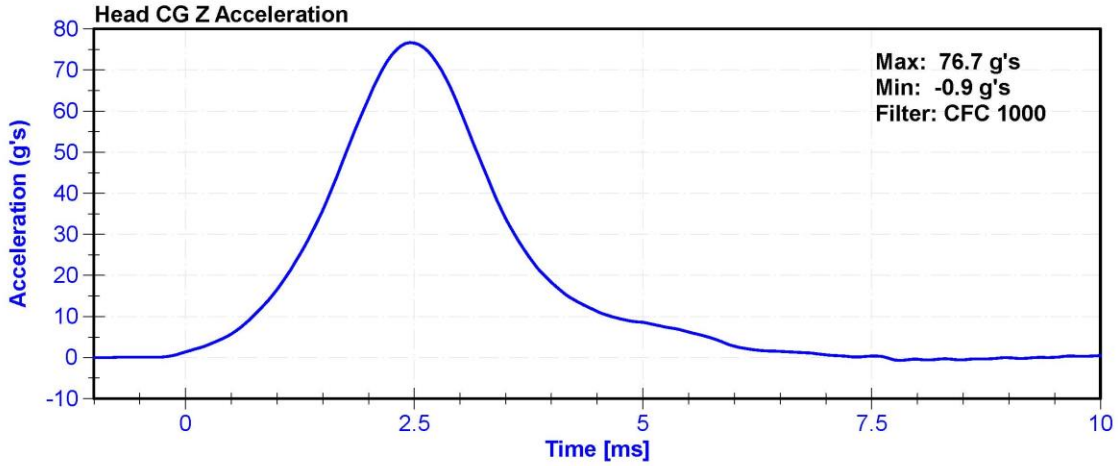
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P74788	5/4/2021	11/2/2021
Y Accelerometer	ENDEVCO 7264CT	AC-P83432	5/4/2021	11/2/2021
Z Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2021	11/2/2021




Head CG X Acceleration
Max: 2.1 g's
Min: -1.8 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 100.9 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 76.7 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

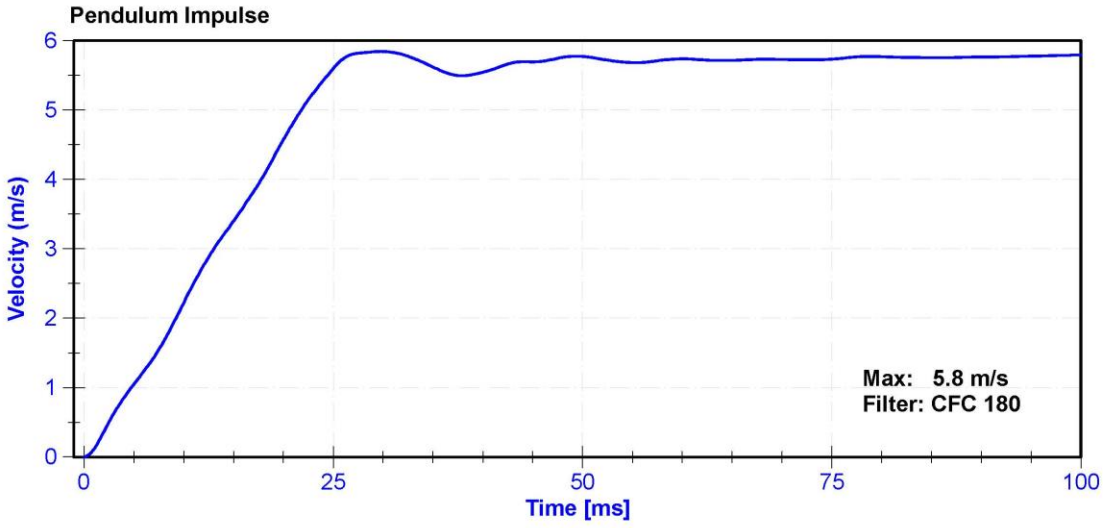
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

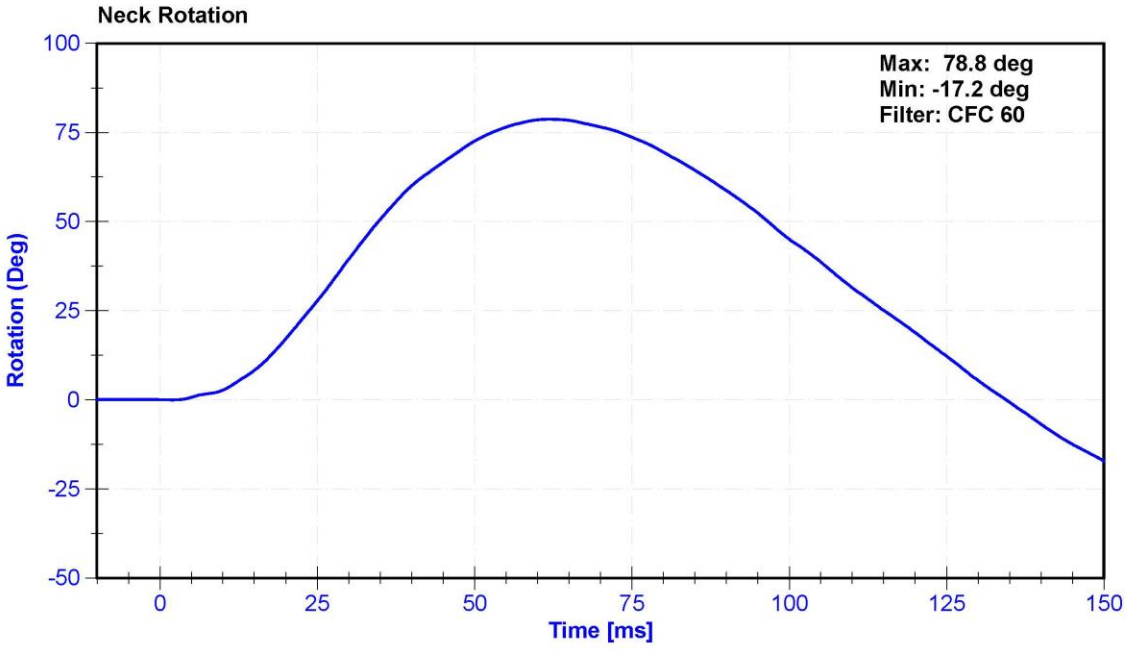
Results

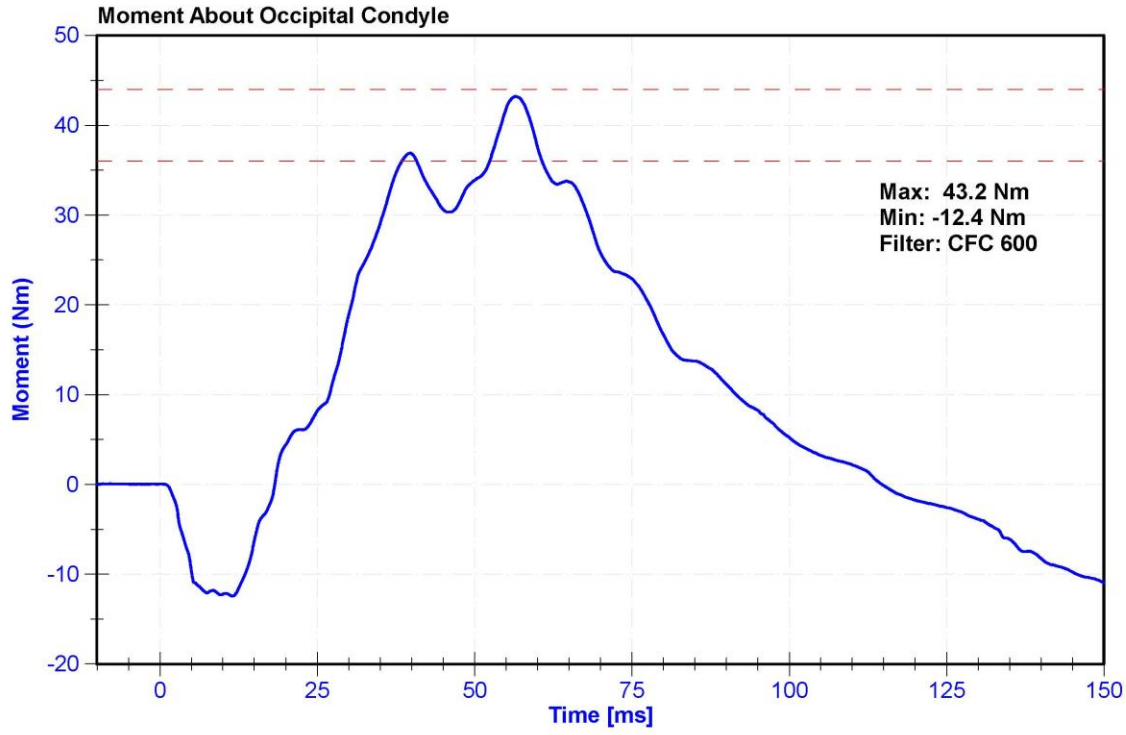
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	37.8	Pass
Velocity	5.51	5.63	m/s	5.563	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.22	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.40	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.57	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.59	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.84	Pass
Neck Rotation	71	81	deg	78.8	Pass
Time at Maximum Rotation	50	70	ms	61.8	Pass
Moment about the OC	36	44	Nm	43.2	Pass
Moment Decay to 0 Nm	102	126	ms	114.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/6/2020	11/6/2021
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/6/2020	11/6/2021
Upper Neck Load Cell	Denton 1716AJ	17162187-FY	8/12/2020	8/12/2021




Neck Rotation
Max: 78.8 deg
Min: -17.2 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 43.2 Nm
Min: -12.4 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

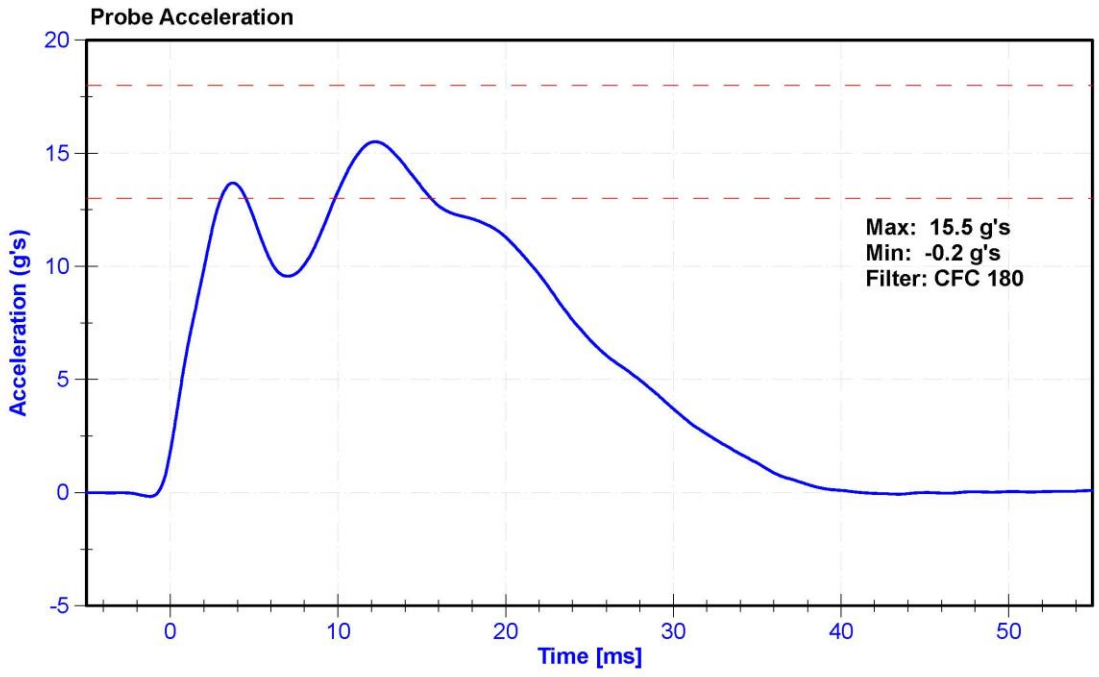
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

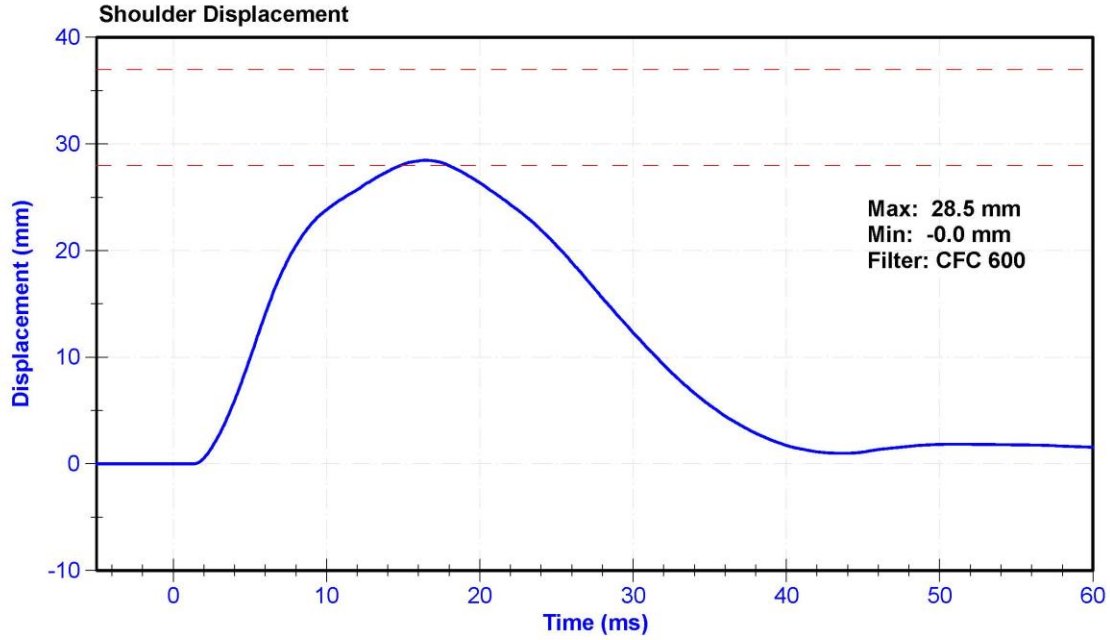
Results

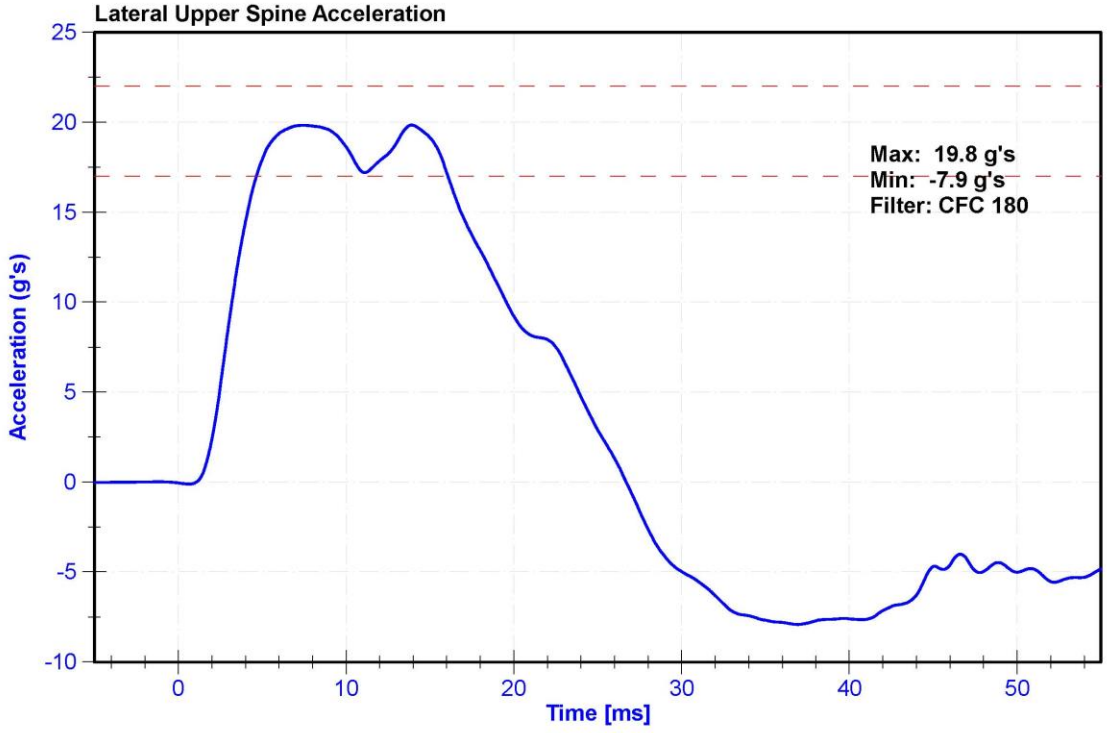
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	15.5	Pass
Shoulder Deflection	28	37	mm	28.5	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Shoulder Potentiometer	Servo 08TC1-3621	DS-1304GFE	5/4/2021	11/2/2021
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	5/4/2021	11/2/2021




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.5 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.8 g's
Min: -7.9 g's
Filter: CFC 180

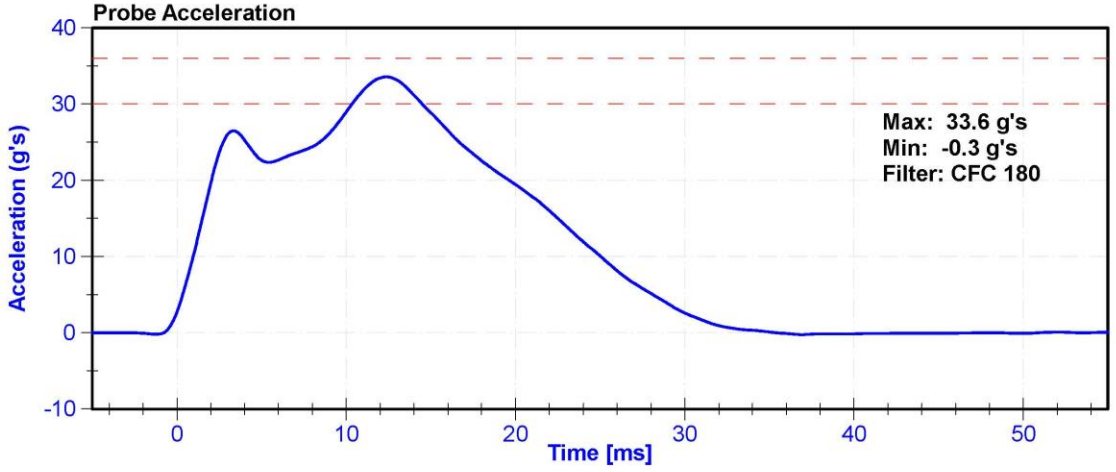
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG-8012	Laboratory Supervisor	K. Brogan

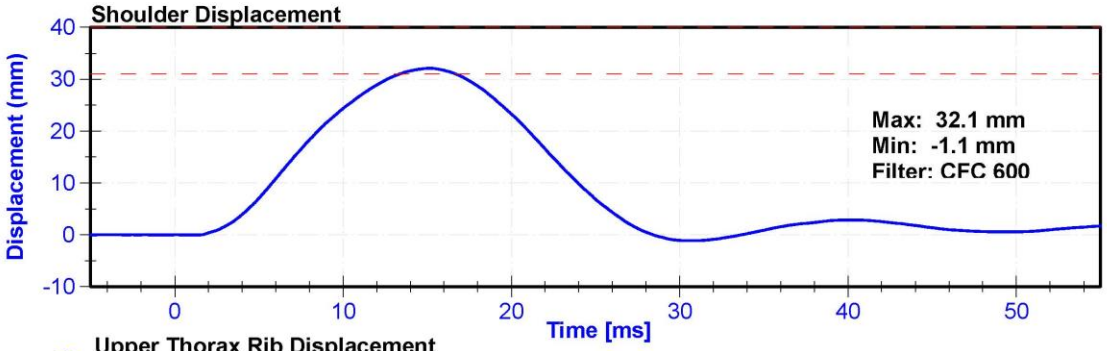
Results

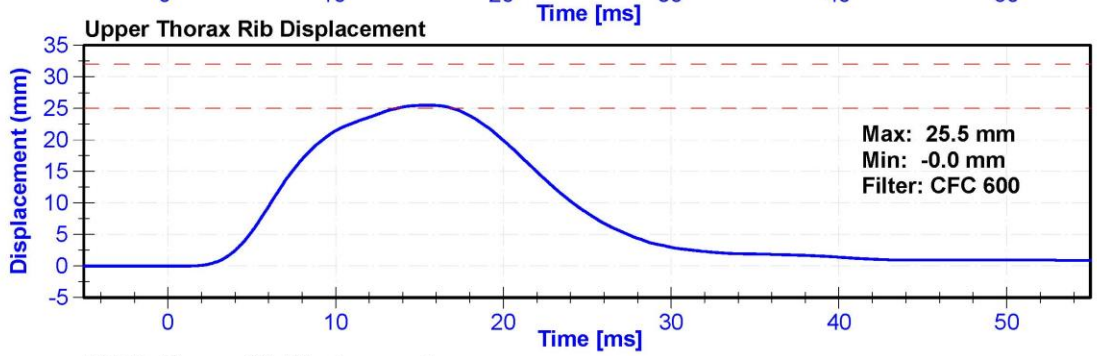
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	35.0	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	33.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.9	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.0	Pass
Shoulder Deflection	31	40	mm	32.1	Pass
Upper Thorax Rib Deflection	25	32	mm	25.5	Pass
Mid Thorax Rib Deflection	30	36	mm	33.1	Pass
Lower Thorax Rib Deflection	32	38	mm	32.1	Pass

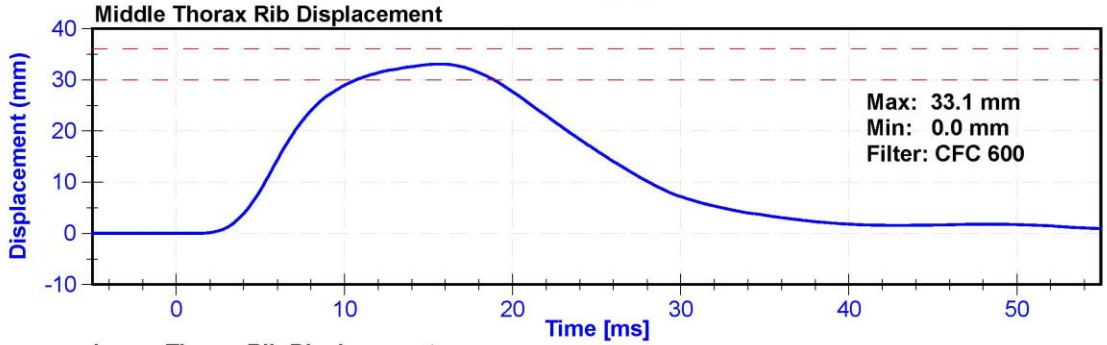
Transducer Calibrations

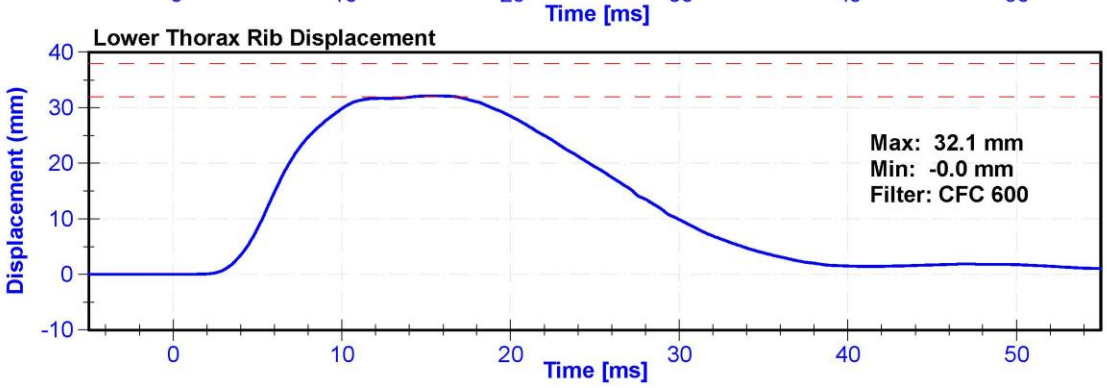
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	5/4/2021	11/2/2021
Upper Spine T12 Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51327	5/4/2021	11/2/2021
Shoulder Potentiometer	Servo 08TC1-3621	DS-1304GFE	5/4/2021	11/2/2021
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/4/2021	11/2/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	5/4/2021	11/2/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	5/4/2021	11/2/2021

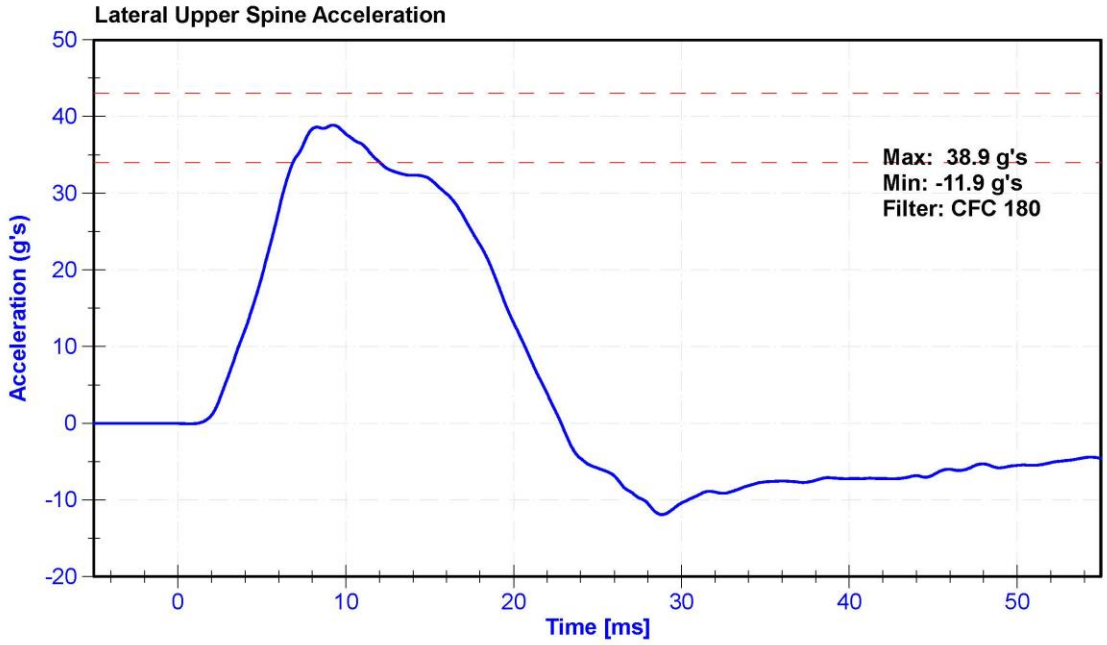


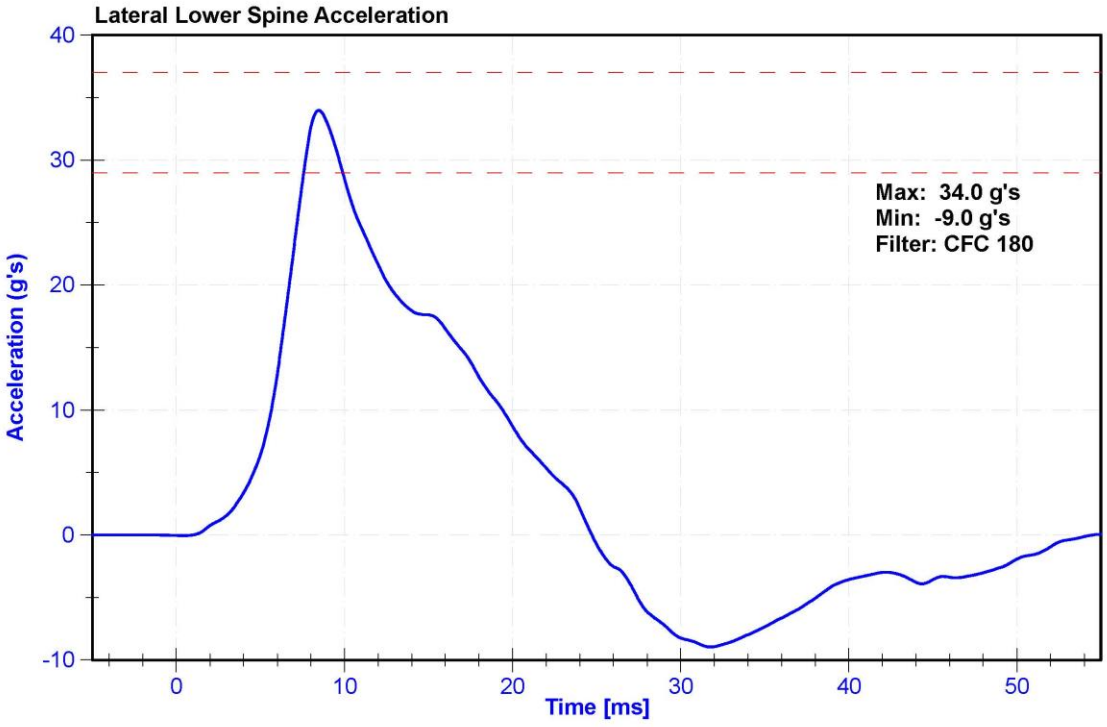

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 32.1 mm
Min: -1.1 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 25.5 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.1 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 38.9 g's
Min: -11.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 34.0 g's
Min: -9.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

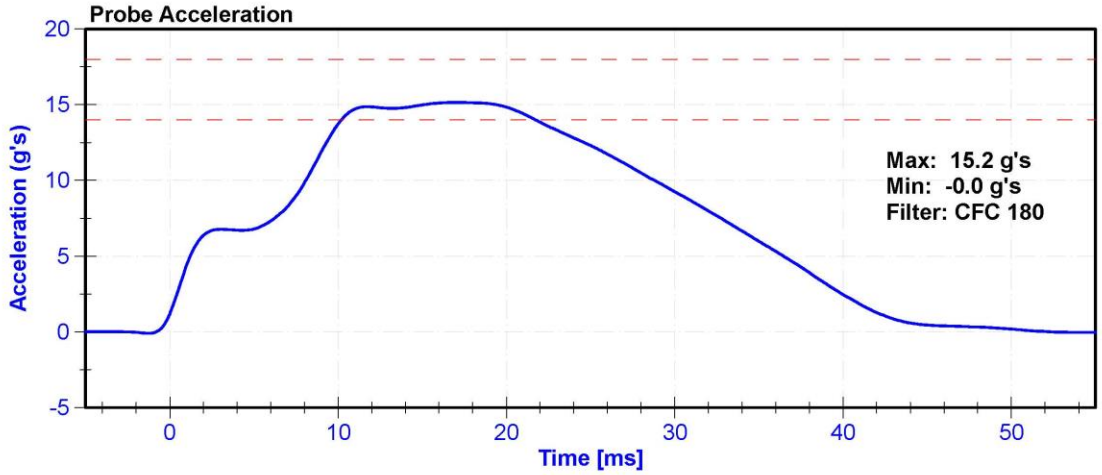
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG-8012	Laboratory Supervisor	K. Brogan

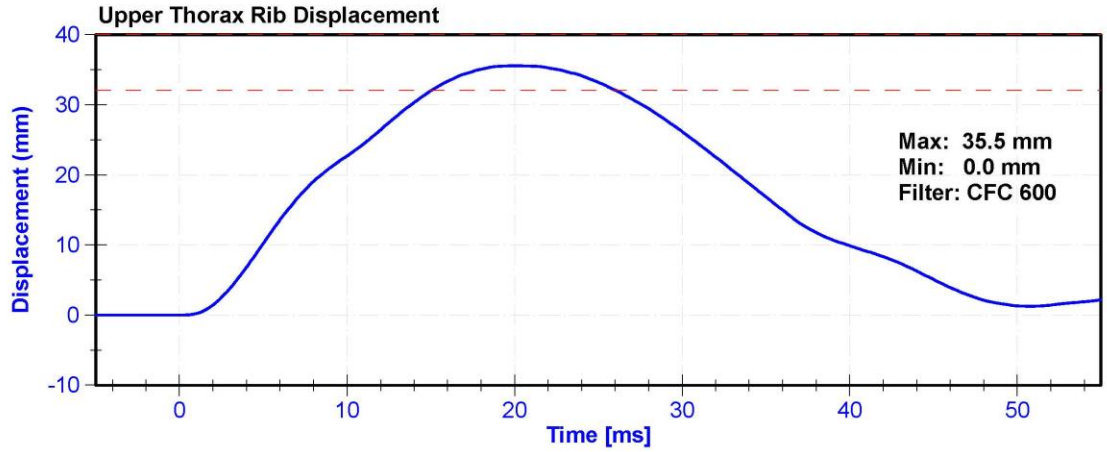
Results

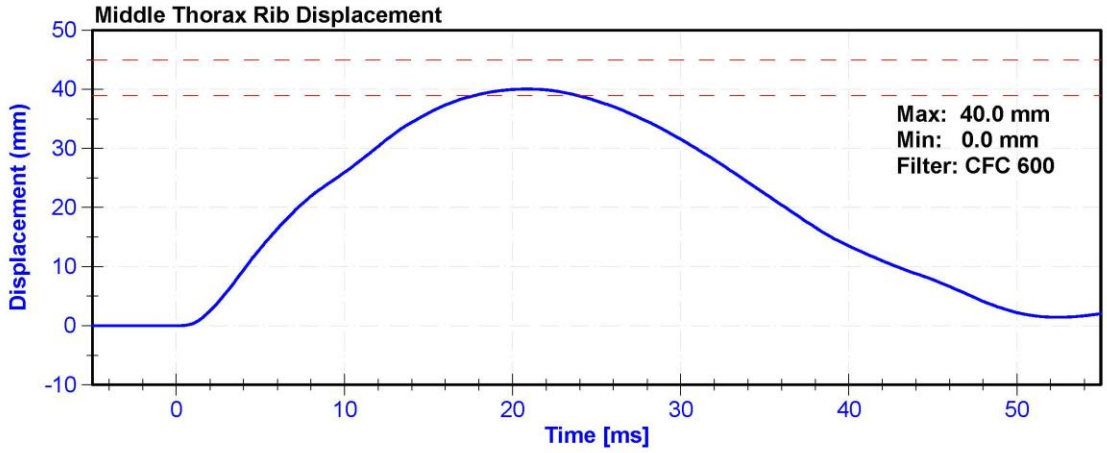
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	32	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	14	18	g's	15.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.3	Pass
Upper Thorax Rib Deflection	32	40	mm	35.5	Pass
Middle Thorax Rib Deflection	39	45	mm	40.0	Pass
Lower Thorax Rib Deflection	35	43	mm	37.8	Pass

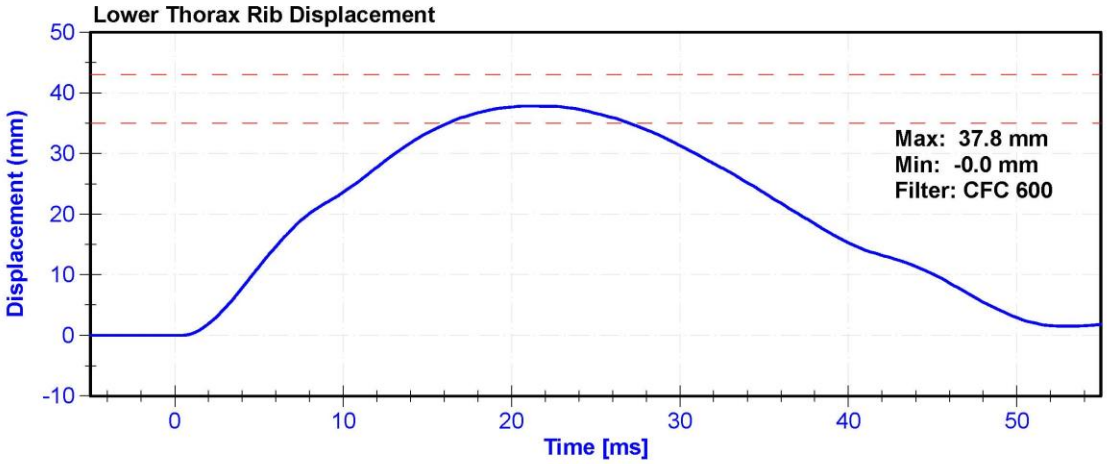
Transducer Calibrations

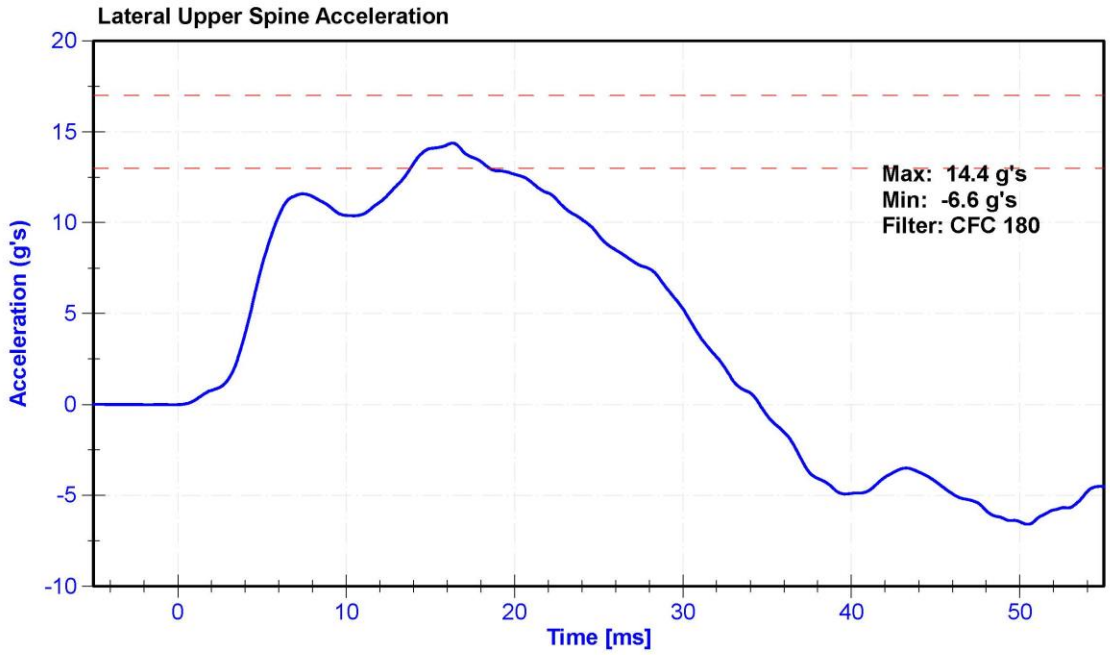
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	5/4/2021	11/2/2021
Lower Spine Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51327	5/4/2021	11/2/2021
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/4/2021	11/2/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	5/4/2021	11/2/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	5/4/2021	11/2/2021

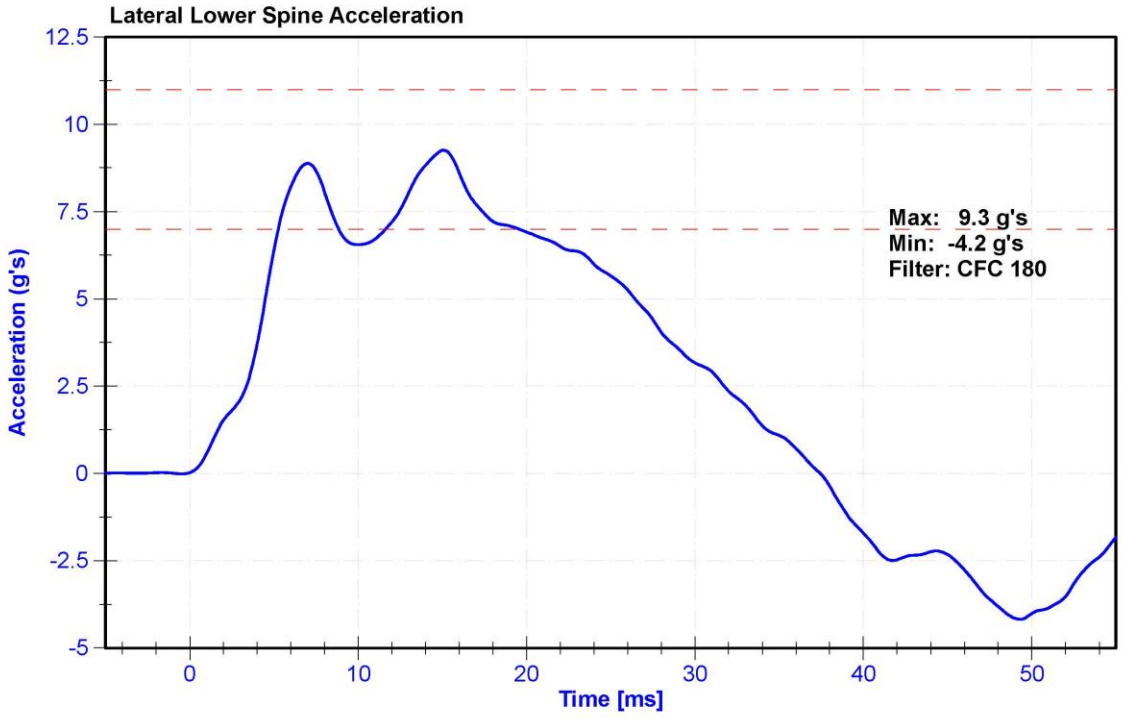



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.5 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.0 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.8 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 14.4 g's
Min: -6.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 9.3 g's
Min: -4.2 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

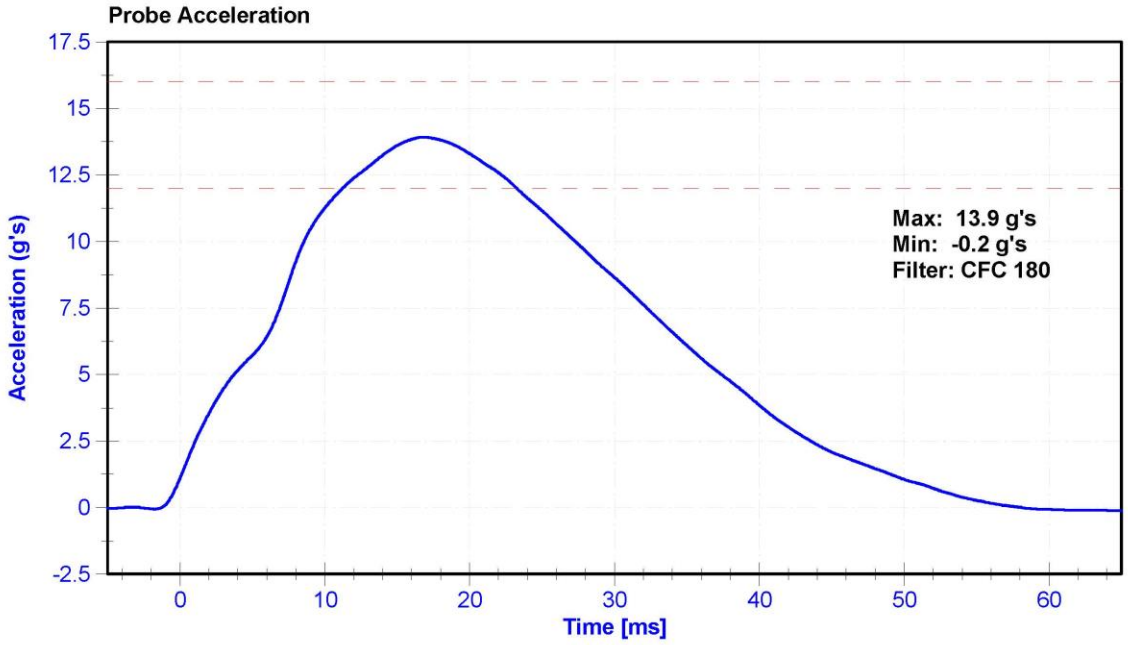
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

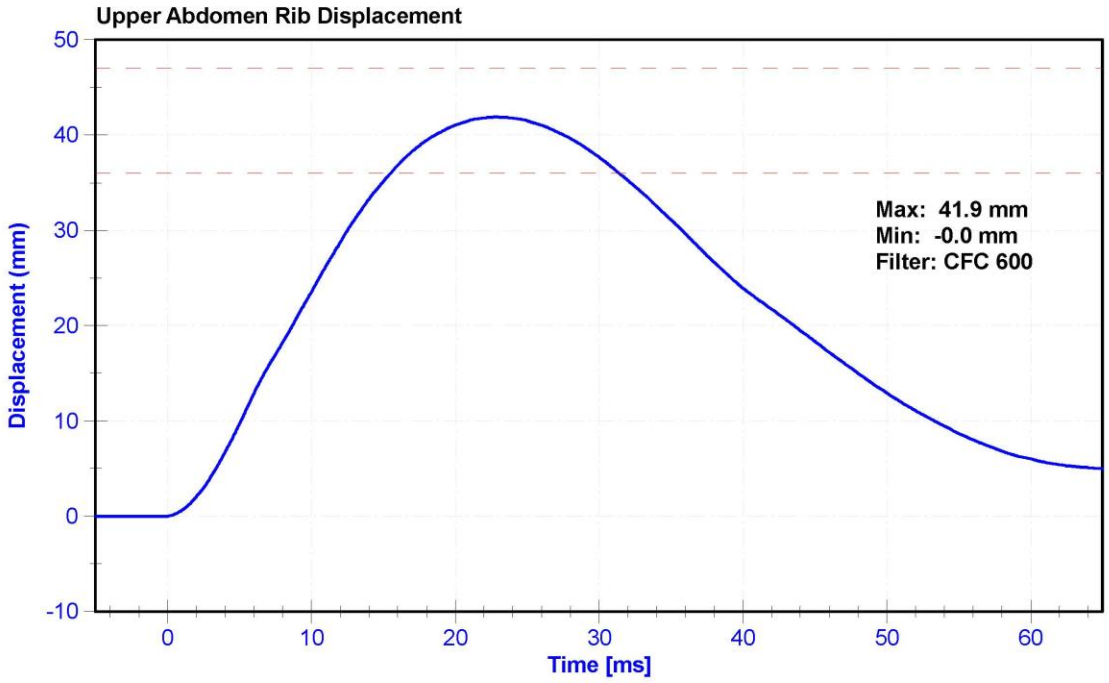
Results

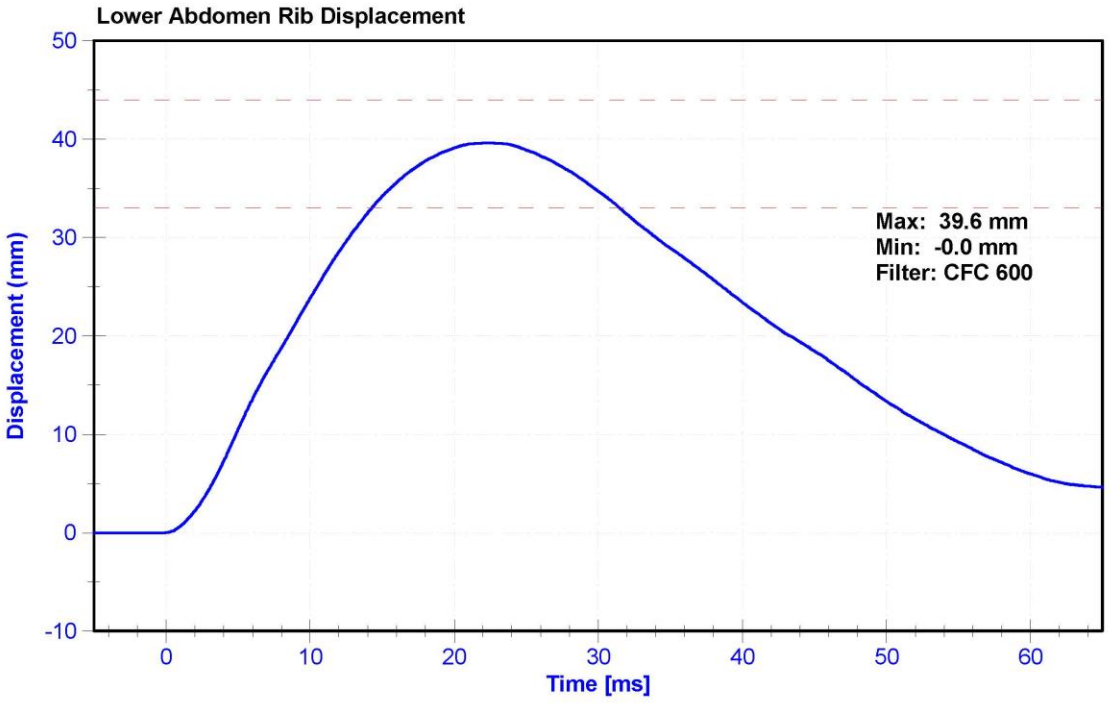
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	35.0	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	12	16	g's	13.9	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.6	Pass

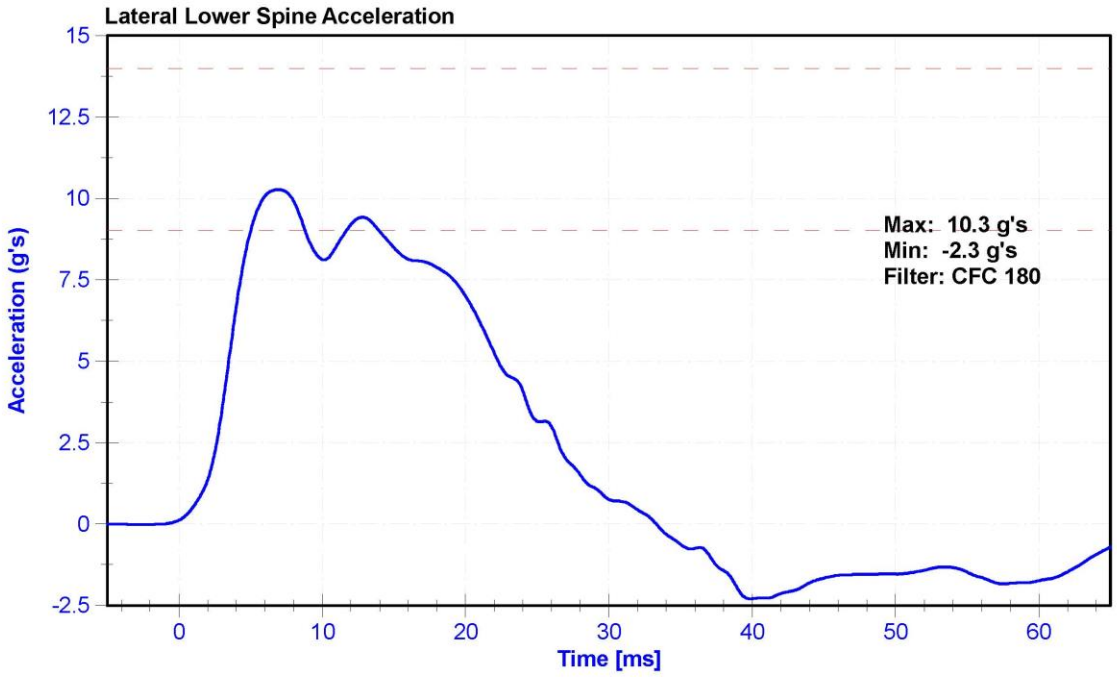
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Lower Spine Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51327	5/4/2021	11/2/2021
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	5/4/2021	11/2/2021
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-1199GFE	5/5/2021	11/3/2021




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.9 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.6 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 10.3 g's
Min: -2.3 g's
Filter: CFC 180

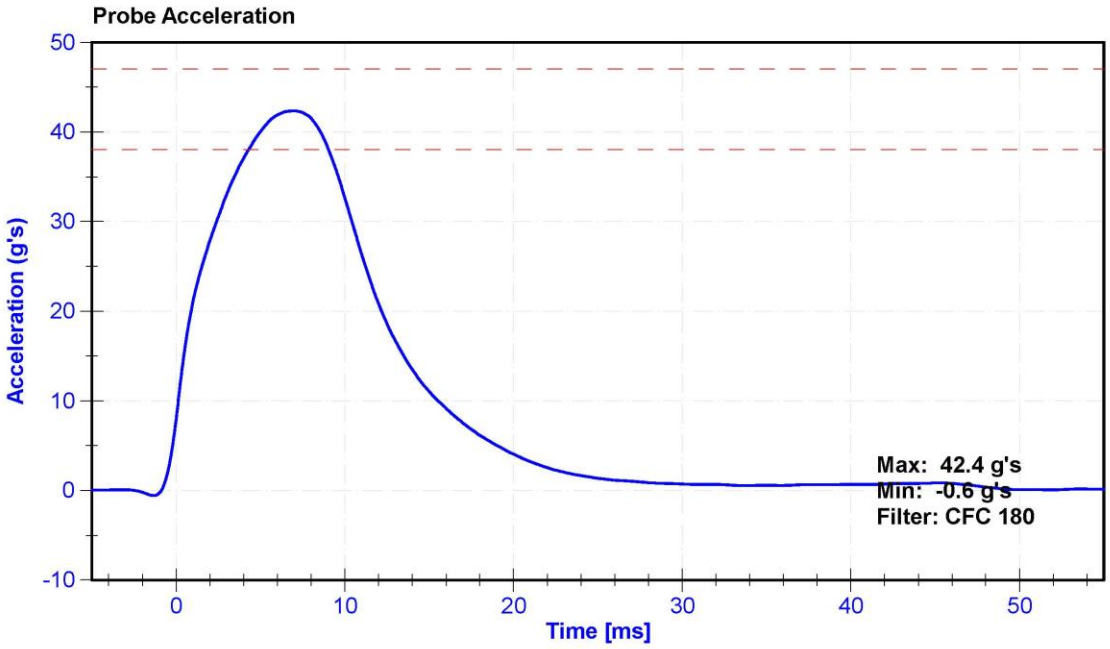
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

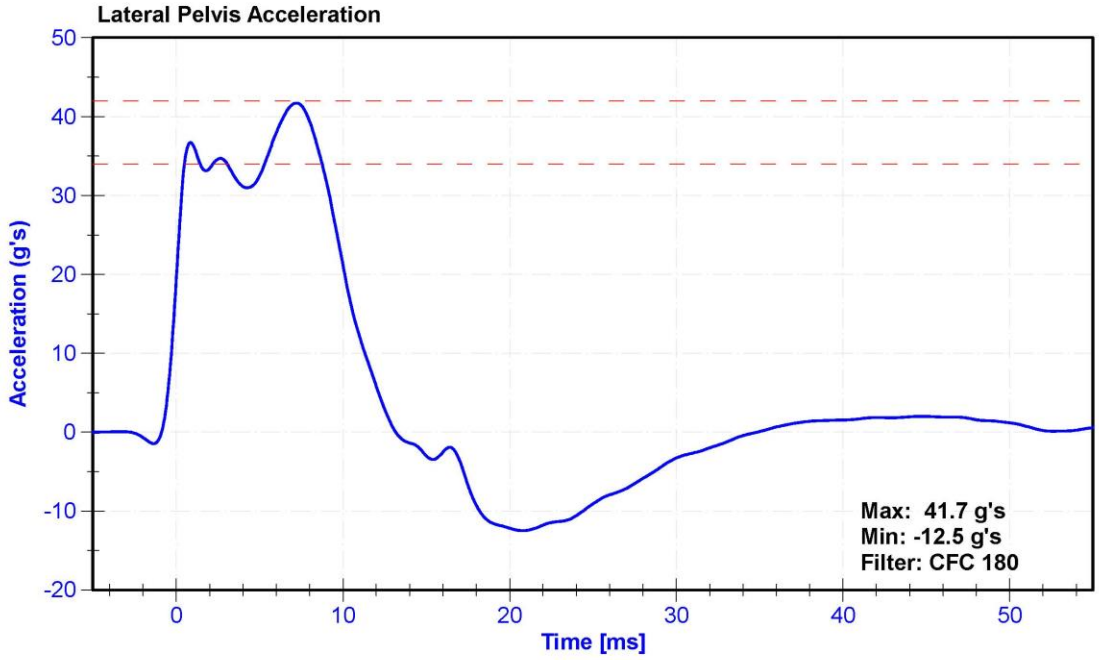
Results

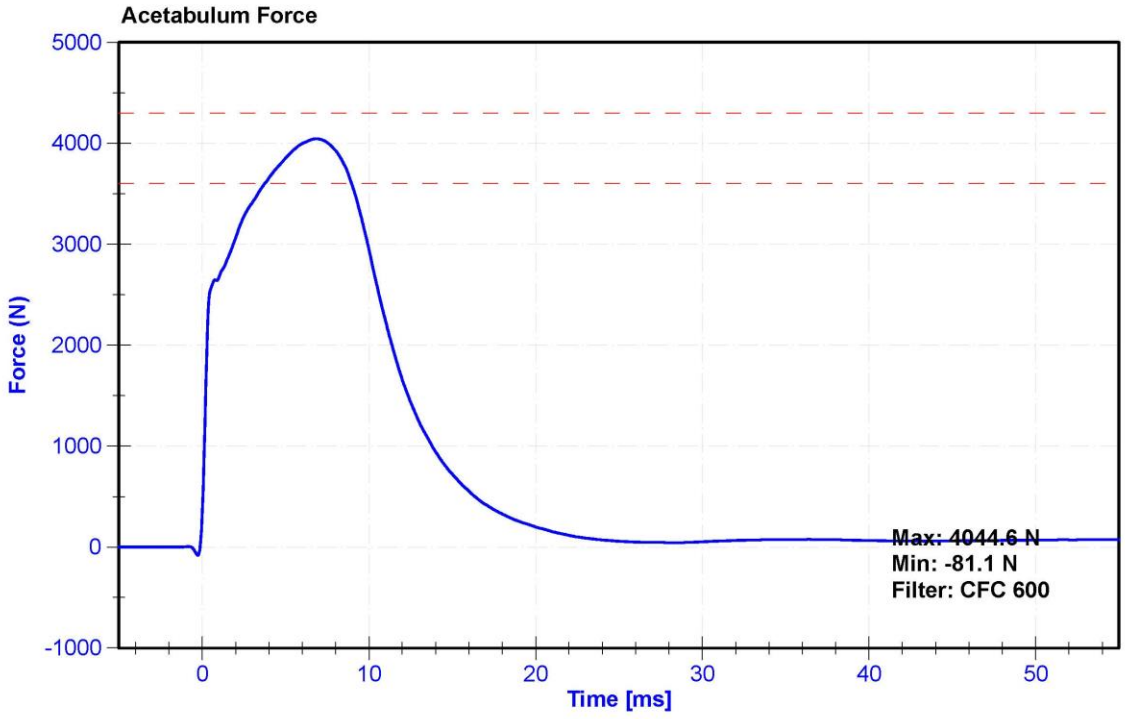
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	42	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration	38	47	g's	42.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.7	Pass
Acetabulum Force	3600	4300	N	4044.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51875	5/4/2021	11/2/2021
Acetabulum Load Cell	Denton 3249J	LC-267Fy	11/23/2020	11/23/2021
Certification Plug	Humanetics	13931	5/20/2020	N/A
Crash Test Plug	Humanetics	13866	5/20/2020	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 41.7 g's
Min: -12.5 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4044.6 N
Min: -81.1 N
Filter: CFC 600

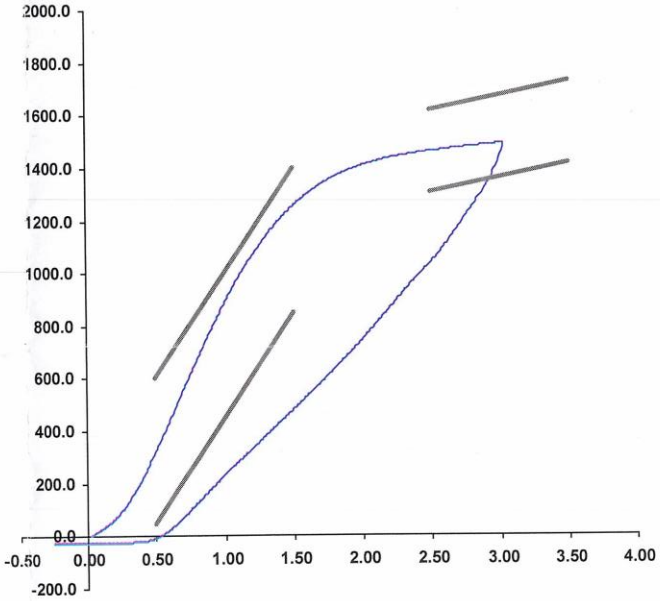
8012
Crash
5/14/21

SID-IIs Pelvis Plug Certification Test

Plug S/N 13866
Test Number 13340
Report Number 13385
Test Date 5/20/2020 6:45:58 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	332.10	50.00	600.00
Force @ 1.5 mm (N)	1,258.60	850.00	1,400.00
Force @ 2.5 mm (N)	1,461.88	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,491.21	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000
Preload Value (-N) 22.24
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 20-May-20
SACO Research

By : DC Date : 5/20/2020

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

SACO RESEARCH

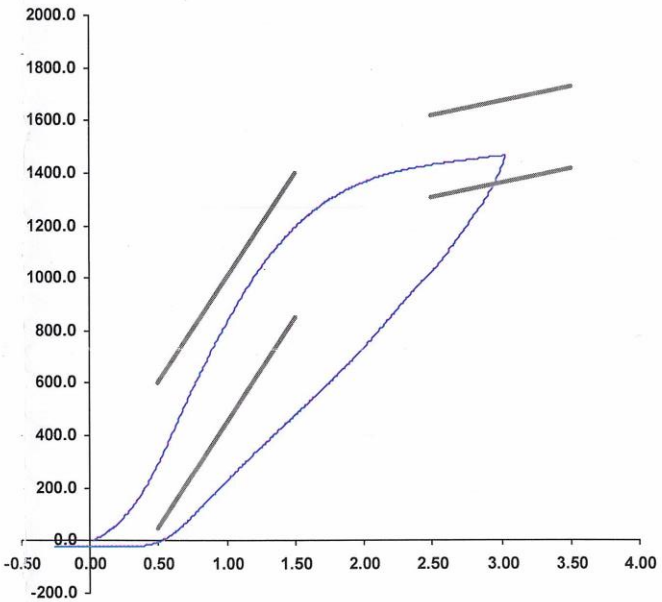
8012
Cert
5/14/21

SID-IIs Pelvis Plug Certification Test

Plug S/N 13931
Test Number 13405
Report Number 13450
Test Date 5/20/2020 10:02:13 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	296.64	50.00	600.00
Force @ 1.5 mm (N)	1,198.34	850.00	1,400.00
Force @ 2.5 mm (N)	1,431.28	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,465.39	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 20-May-20
SACO Research

By : DC Date : 5/20/2020

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

SACO RESEARCH

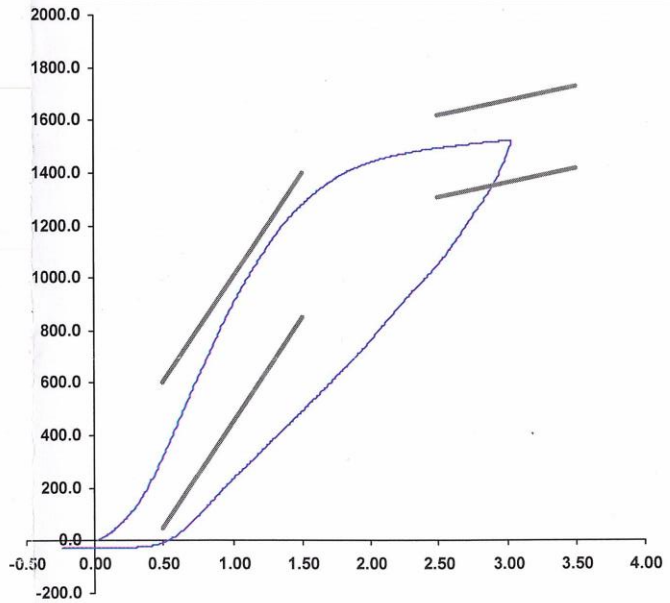
8012
5/14/21
Non Impact

SID-IIs Pelvis Plug Certification Test

Plug S/N 14087
Test Number 13561
Report Number 13606
Test Date 5/25/2020 12:06:22 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	329.47	50.00	600.00
Force @ 1.5 mm (N)	1,276.70	850.00	1,400.00
Force @ 2.5 mm (N)	1,492.91	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,521.42	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator 14061

Part Number 180-4450

Template No 107 25-May-20
SACO Research

By : DC Date : 5-25-2020

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

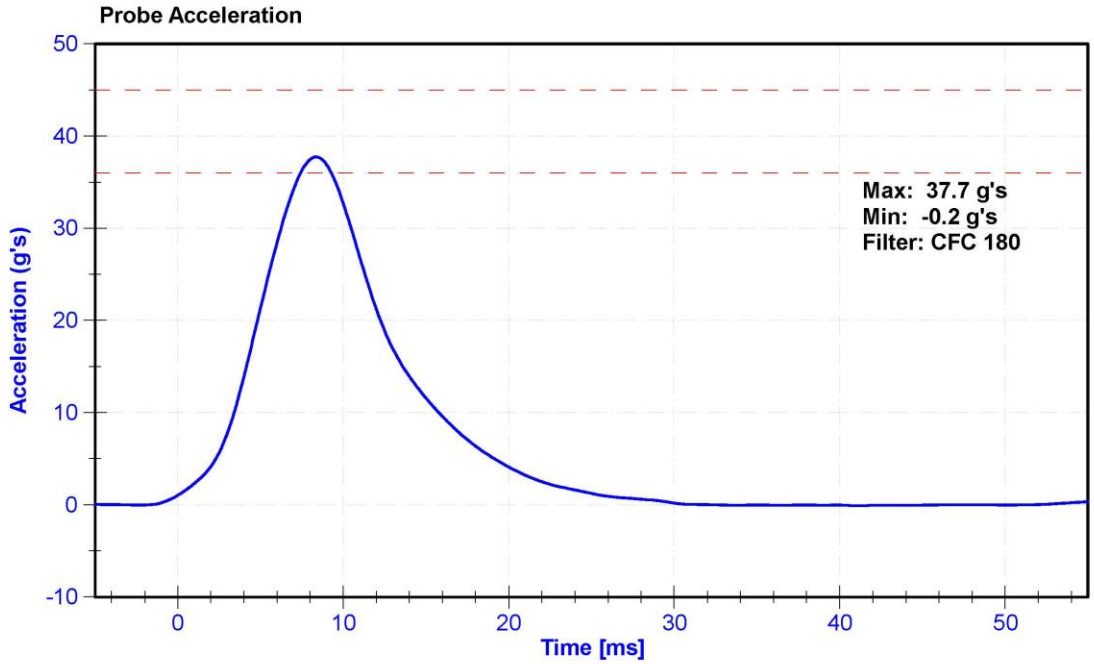
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

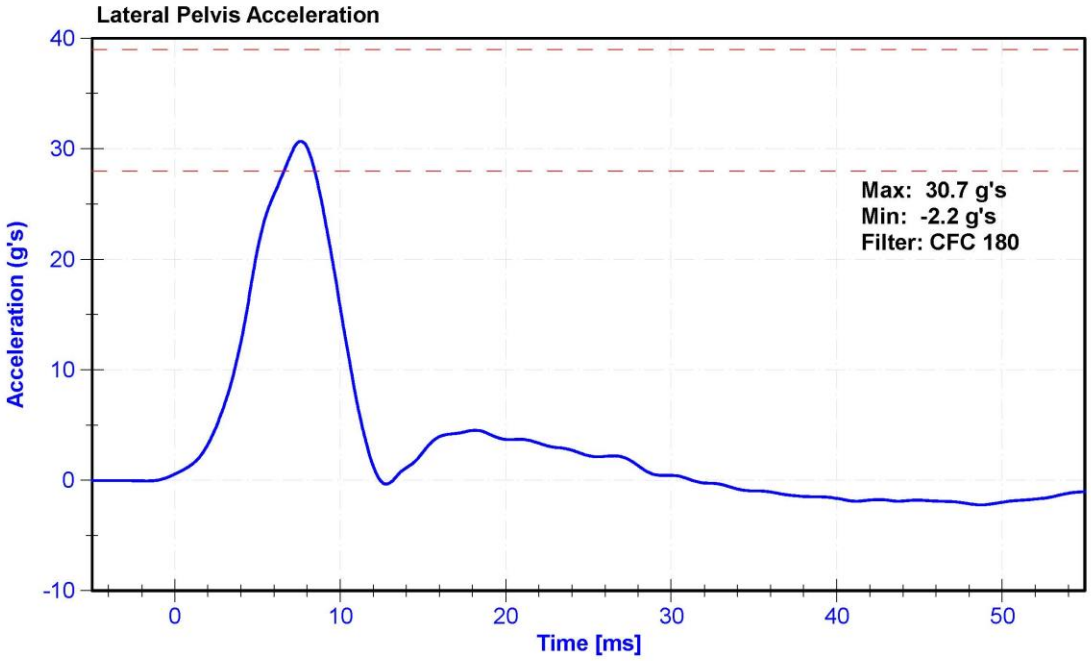
Results

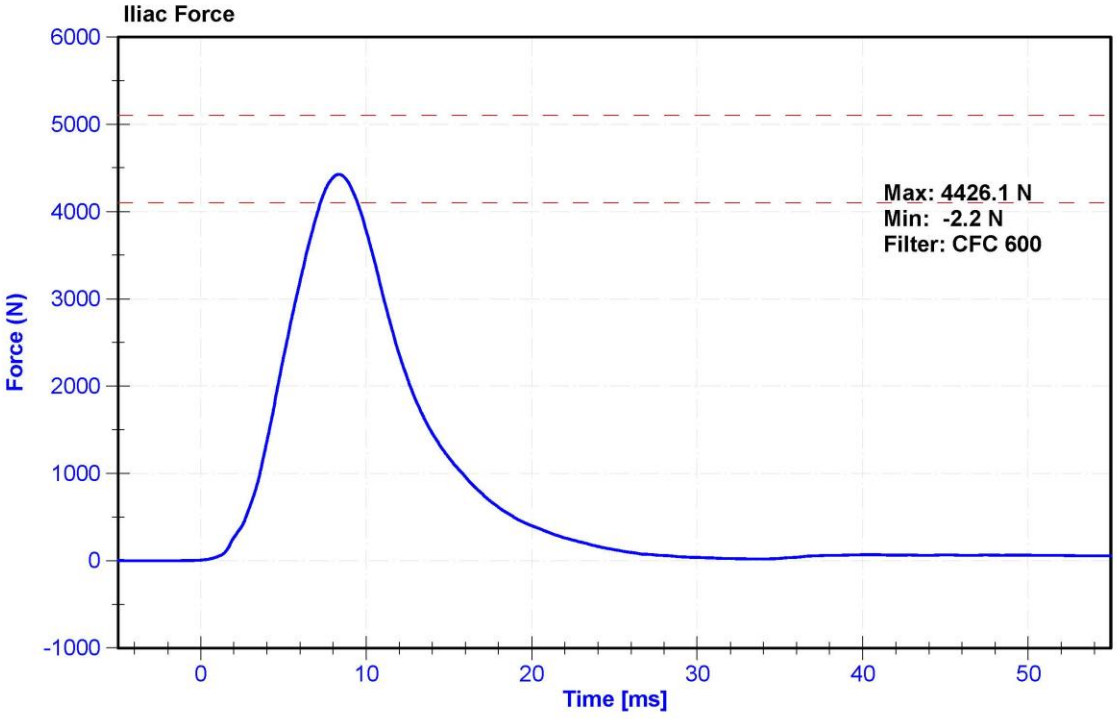
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	34.0	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	36	45	g's	37.7	Pass
Lateral Pelvis Acceleration	28	39	g's	30.7	Pass
Iliac Force	4100	5100	N	4426.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51875	5/4/2021	11/2/2021
Iliac Load Cell	DENTON 3228J	LC-290Fy	11/16/2020	11/16/2021




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 30.7 g's
Min: -2.2 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4426.1 N
Min: -2.2 N
Filter: CFC 600

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	5/4/2021
			Y	AC-P83432	ENDEVCO	5/4/2021
			Z	AC-P83319	ENDEVCO	5/4/2021
Head Accelerometers - Redundant			X	AC-P80334	ENDEVCO	5/4/2021
			Y	AC-P52155	ENDEVCO	5/4/2021
			Z	AC-P83322	ENDEVCO	5/4/2021
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-2165GFE	Servo	5/4/2021
		Middle	Y	DS-45 GFE	Servo	5/4/2021
		Lower	Y	DS-011GFE	Servo	5/4/2021
	Abdominal Rib	Upper	Y	DS-008GFE	Servo	5/4/2021
		Lower	Y	DS-1199GFE	Servo	11/24/2020
Lower Spine Accelerometers (T12)			X	AC-P71272	ENDEVCO	5/4/2021
			Y	AC-P51327	ENDEVCO	5/4/2021
			Z	AC-P52067	ENDEVCO	5/4/2021
Acetabulum Load Cell			Y	LC-267Fy	DENTON	11/23/2020
Lilac Wing Load Cell			Y	LC-290Fy	DENTON	11/16/2020
Pelvis Plug (Struck Side)				13091	SACO	7/30/2019
Pelvis Plug (Non-Struck Side)				13082	SACO	7/30/2019

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	1201-1000_A250353	Measurement Specialties	4/2/2021
Vehicle Center of Gravity	Y	1201-1000_A250359	Measurement Specialties	4/2/2021
Vehicle Center of Gravity	Z	1201-1000_A279970	Measurement Specialties	12/3/2020
Left Floor Sill	Y	1201-1000_A280018	Measurement Specialties	2/17/2021
A-Pillar Sill	Y	1201-1000_A284248	Measurement Specialties	3/10/2021
A-Pillar Low	Y	1201-1000_A315122	Measurement Specialties	4/26/2021
A-Pillar Mid	Y	1201-1000_A281036	Measurement Specialties	3/8/2021
B-Pillar Sill	Y	1201-1000_A280391	Measurement Specialties	3/12/2021
B-Pillar Low	Y	1201-1000_A350985	Measurement Specialties	2/18/2021
B-Pillar Mid	Y	1201-1000_A217541	Measurement Specialties	2/11/2021
Driver Seat	Y	1201-1000_A280853	Measurement Specialties	2/11/2021
Engine Top	X	1201-1000_A350921	Measurement Specialties	4/16/2021
Engine Top	Y	1201-1000_A352378	Measurement Specialties	4/16/2021
Firewall	Y	1201-1000_A255852	Measurement Specialties	2/26/2021
Right Roof	Y	1201-1000_A315864	Measurement Specialties	3/8/2021
Right Floor Sill	Y	1201-1000_A335457	Measurement Specialties	3/30/2021
Rear Floorpan	X	1201-1000_A284224	Measurement Specialties	3/31/2021
Rear Floorpan	Y	1201-1000_A284337	Measurement Specialties	3/31/2021

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	1220AF-1057559-F0	Interface 1220AF	9/2/2020
Load Cell 2	1220AF-1117006-F0	Interface 1220AF	9/2/2020
Load Cell 3	1220AF-1117025-F0	Interface 1220AF	9/2/2020
Load Cell 4	1220AF-1117019-F0	Interface 1220AF	9/2/2020
Load Cell 5	1220AF-1117011-F0	Interface 1220AF	9/2/2020
Load Cell 6	1220AF-1117017-F0	Interface 1220AF	9/2/2020
Load Cell 7	1220AF-1117035-F0	Interface 1220AF	9/2/2020
Load Cell 8	1220AF-1117023-F0	Interface 1220AF	9/2/2020