

REPORT NUMBER: SPNCAP-CAL-20-005

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

**Volkswagen Group of America
2020 Volkswagen Passat
Four Door Sedan**

NHTSA No: M20205804

**PREPARED BY:
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November 23, 2020

FINAL REPORT

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

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Date: November 23, 2020

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Date: November 23, 2020

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

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16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2020 Volkswagen Passat four door sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on March 2, 2020. The impact velocity of the vehicle was 32.39 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 375 mm located at level 3. The test vehicle's occupant performance data is as follows:																														
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No. DG8012)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>359.322</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>49.017</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3203.590</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>19.015</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>25.071</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	359.322	Resultant Lower Spine Acceleration	G	82	49.017	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3203.590	Maximum Thoracic Rib Deflection	mm	38	19.015	Maximum Abdomen Rib Deflection	mm	45	25.071
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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																												
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2020 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 2020 Volkswagen Passat four door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2020 Volkswagen Passat four door sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.39 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on March 2, 2020. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

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

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

Head CG tri-axial accelerometers

Thorax upper, middle, and lower rib displacement potentiometers

Abdomen upper and lower rib displacement potentiometers

Lower spine tri-axial accelerometers

Iliac load cell

Acetabulum load cell

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

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

INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	359.322
Resultant Lower Spine Acceleration	g	82	49.017
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3203.590
Maximum Thoracic Rib Deflection	mm	38*	19.015
Maximum Abdominal Rib Deflection	mm	45*	25.071

*Proposed IARV

Supplemental restraint information was recorded as follows:

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- Left Sill B-Pillar Y Acceleration, Exceeded calibration range and saturated at 18.2 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 – General Test and Vehicle Parameter Data

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and instrumentation Data

Data Sheet No. 6 – Vehicle Accelerometer Data

Data Sheet No. 7 – Rigid Pole Load Cell Data

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – Test Vehicle Profile Measurements

Data Sheet No. 10 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 – Vehicle Damage Profile Distances

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

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

**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20205804
Model Year	2020
Make	Volkswagen
Model	Passat
Body Style	Four Door Sedan
VIN	1VWAA7A31LC008708
Body Color	Gray
Odometer Reading (km/mi)	9 miles
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen Group of America
Date of Manufacture	01/2020
Vehicle Type	Passenger Car

GVWR (kg)	2010
GAWR Front (kg)	1060
GAWR Rear (kg)	1000

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total		
Designated Seating Capacity (DSC)	2	3	-	5		
Capacity Weight (VCW) (kg)					420	(A)
DSC X 68.04 kg					340.2	(B)
Cargo Weight (RCLW) (kg)					79.8	(A-B)

VEHICLE SEAT TYPE

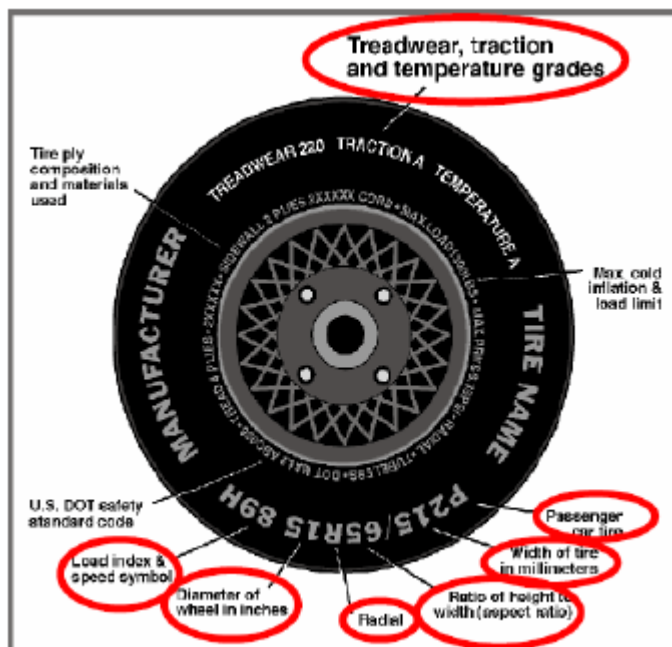
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	215/55R17	215/55R17
Tire Size on Vehicle	215/55R17	215/55R17
Tire Manufacturer	Continental	Continental
Tire Model	ProContact	ProContact
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	94H	94H
Tire Material	Rubber	Rubber
DOT Safety Code Left	VY3RWCRK4419	VY3RWCRK4419
DOT Safety Code Right	VY3RWCRK4419	VY3RWCRK4419

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

Test Vehicle: 2020 Volkswagen Passat four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
Test Date: 3/2/2020

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	351	356	352	354
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	439	312		454	360		453	373	
Right	kg	454	299		466	347		455	353	
Ratio	%	59.4	40.6		56.5	43.5		55.6	44.4	
Totals	kg	893	611	1504	920	707	1627	908	726	1634

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1504	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	79.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1633.8	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	-0.45	-0.15	-0.15	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-1.25	-1.05	-0.90	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.25	-0.30	-0.35	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	+0.25	+0.20	+0.15	Yes
Vehicle CG (Aft of Front Axle)	mm	1138	1218	1245	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	1	1	8	

* 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: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	7.5
Spare Tire	14
Jack	2.5
Right Rear Window and Regulator	4
Ballast / Equipment Added	58

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

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

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	14.8	10.6	12.7
Front Passenger Seat	18.6	13.9	16.3
Front Center Seat	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	12.7	26	Max	-	-	-
			Mid	12	18	26
			Min	-	-	-
Front Passenger Seat	16.3	18	Max	-	-	-
			Mid	6	12	18
			Min	-	-	-
Front Center Seat	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

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

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

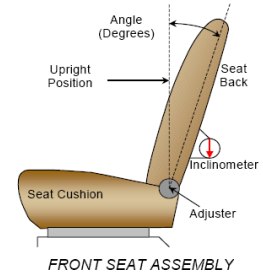
NHTSA No.: M20205804
 Test Date: 3/2/2020

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	251	38 (0-37)	0	0
Front Passenger Seat	170	26 (0-25)	0	0
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	72.6	N/A	2.1	6
Front Passenger Seat	49.8	N/A	2.1	6
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BELT ANCHORAGE ADJUSTMENT

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

Seat	Total # of Positions	Placed in Position #
Driver Seat	4 (0-3)	Uppermost

HEAD RESTRAINT ADJUSTMENT

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

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

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

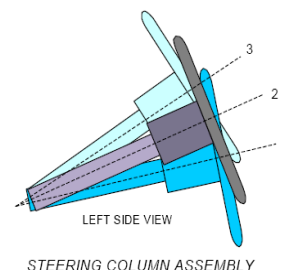
Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

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.

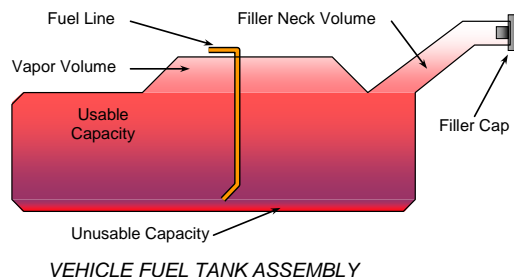
		Degrees	Fore / Aft Position (mm)
Lowermost	– Position 1	22.2	
Geometric Center	– Position 2	24.7	
Uppermost	– Position 3	27.2	
Telescoping Steering Wheel Travel			55
Test Position		24.7	22.5



FUEL PUMP

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

The vehicle is equipped with an electric fuel pump.
The fuel filler neck is on the right side of the vehicle.
The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of "Standard Tank" - see Form No. 1	70
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	70
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	65.1
Actual Amount of Solvent Used in Test	65.1
1/3 of Usable Capacity	23.3

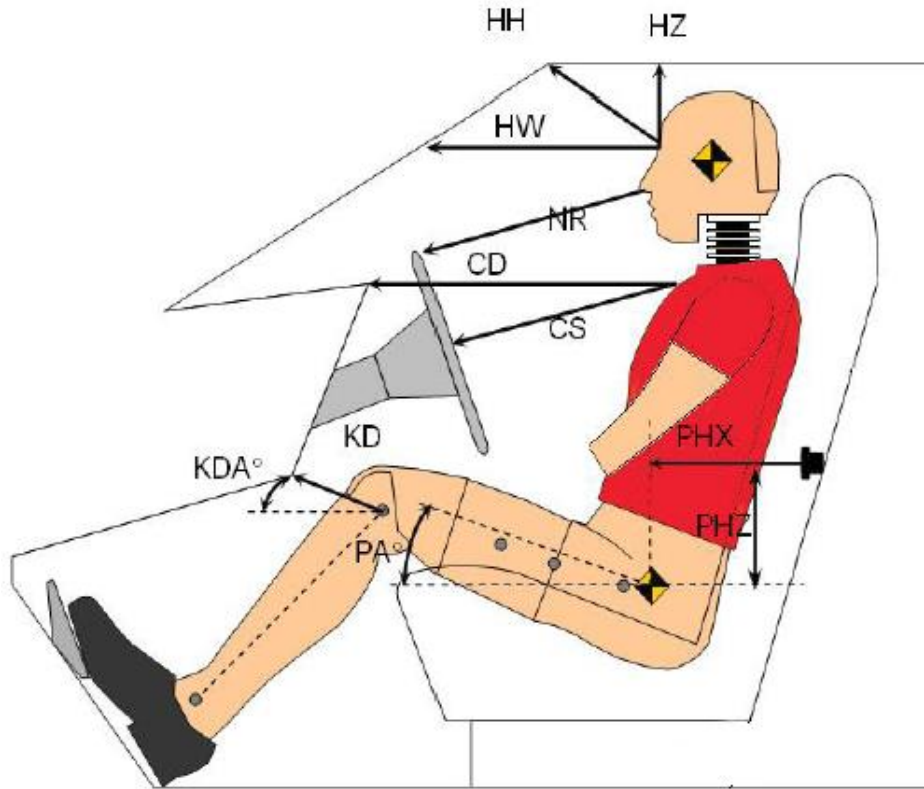
Is the Actual Amount of Solvent Used in the test equal to 93% ±1% of the Usable Capacity stated in Form No. 1?

Yes No

**DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020



Left Side View

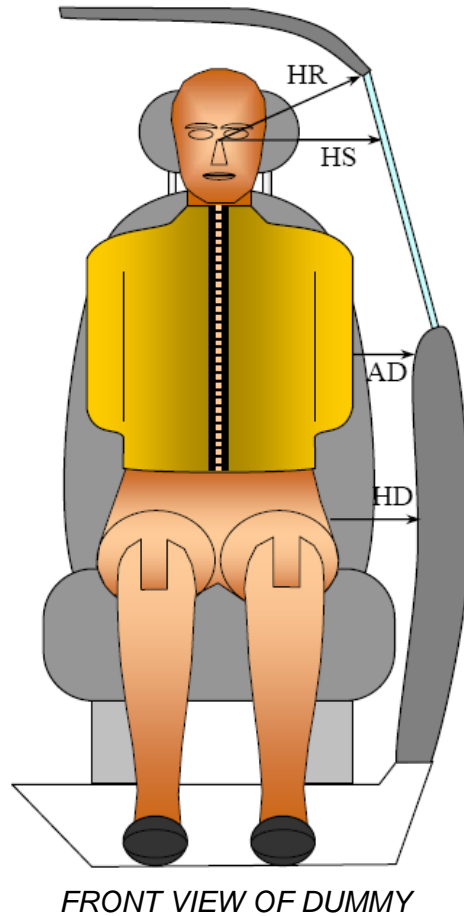
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	285	
HW	Head to Windshield	599	
HZ	Head to Roof Liner	188	
NR	Nose to Rim	275	
CD	Chest to Dash	453	
CS	Chest to Steering Wheel	243	
KD(L) / KDA(L)°	Left Knee to Dash	170	32.8
KD(R) / KDA(R)°	Right Knee to Dash	179	30.5
PAX°	Pelvic Tilt Angle (X-Axis)		21.4
PAY°	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	340	
PHZ	Hip Point to Striker (Z-Axis)	192	

**DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020



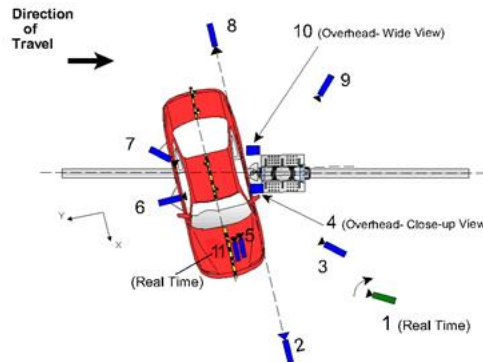
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	243
HS	Head to Side Window	mm	378
AD	Arm to Door	mm	168
HD	Hip Point to Door	mm	172

**DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020



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	6681	0	-1431	28	1000
3	Impact side 45° - forward pole view	5291	-1140	-1436	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	-7315	0	-1527	28	1000
9	Impact side 45° - rearward pole view	-4226	-3512	-1431	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 75° angle to the rigid pole.

Comments: All cameras operated as intended.

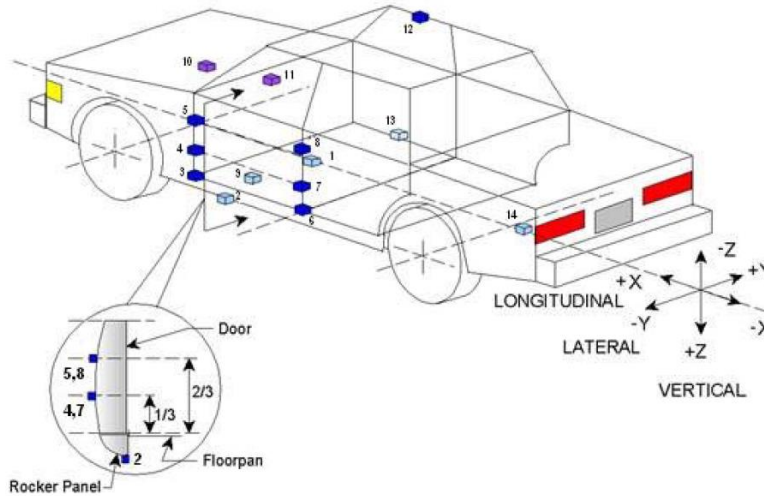
INSTRUMENTATION

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

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2020 Volkswagen Passat four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
Test Date: 3/2/2020



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2753	19	12
2	Left Floor Sill	3159	-673	121
3	A-Pillar Sill	3480	-648	78
4	A-Pillar Low	3512	-654	-141
5	A-Pillar Mid	3345	-654	-560
6	B-Pillar Sill	3366	-363	154
7	B-Pillar Low	3278	-446	109
8	B-Pillar Mid	3196	-473	-276
9	Driver Seat Track	3160	-448	-488
10	Engine Top	4066	82	-332
11	Firewall	3735	281	-199
12	Right Roof	2429	597	-942
13	Right Floor Sill	3140	667	125
14	Rear Floorpan	984	-19	-29

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: 2020 Volkswagen Passat four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
Test Date: 3/2/2020

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: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag & Headrest
Left Side of Head	Curtain Airbag
Back of Head	Headrest & Curtain Airbag
Left Shoulder	Torso/Pelvis Airbag, & Curtain Airbag & Seatback
Upper Torso	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback & Torso/Pelvis Airbag
Left Hip	Torso/Pelvis Airbag, Seat Pan, & Driver Door
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: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Buckling at B-Pillar and C-Pillar
Sill Separation	None
Windshield Damage	Cracked throughout. Separation along Driver A-Pillar & Roof.
Side Window Damage	Driver window shattered during impact
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

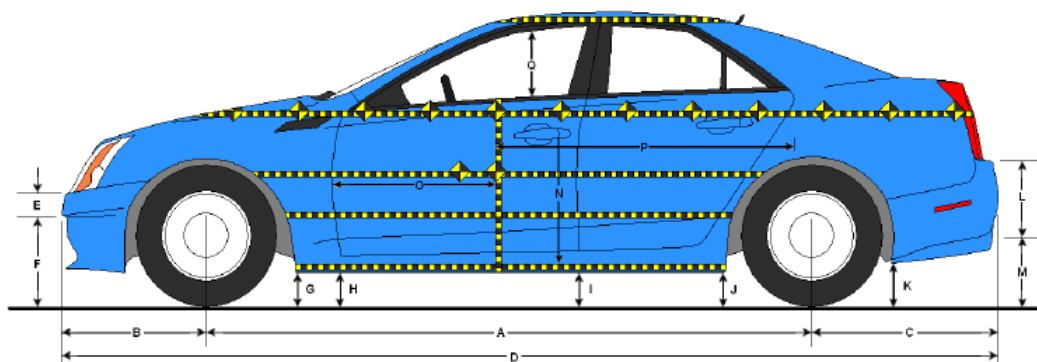
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1111
Actual Impact Point - Aft of Front Axle	mm		1114
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	-3
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.39
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.39

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Volkswagen Passat four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
Test Date: 3/2/2020



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

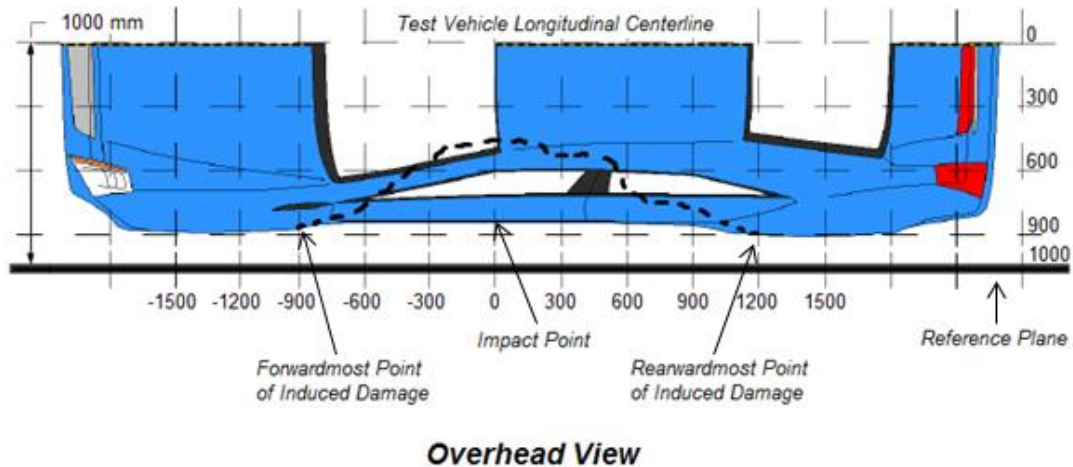
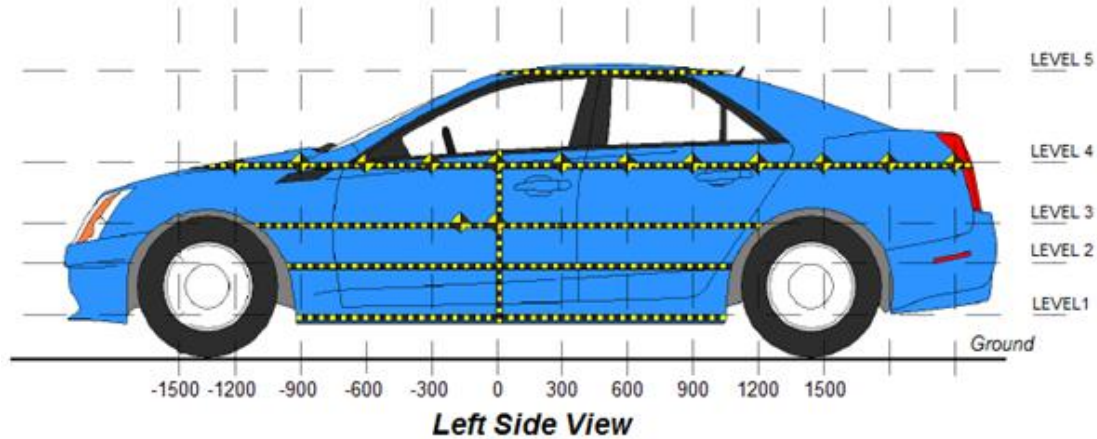
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2802	2716	86
B	Front Axle to FSOV	963	998	-35
C	Rear Axle to RSOV	1153	1158	-5
D	Total Length at Centerline	4918	4872	46
E	Front Bumper Thickness	235	235	0
F	Front Bumper Bottom to Ground	252	286	-34
G	Sill Height at Front Wheel Well	189	191	-2
H	Sill Height at Front Door Leading Edge	189	192	-3
I	Sill Height at B-Pillar	198	165	33
J1	Sill Height at Rear Wheel Well	209	228	-19
J2	Pinch Weld Height at Rear Wheel Well	194	220	-26
K	Sill Height Aft of Rear Wheel Well	231	238	-7
L	Rear Bumper Thickness	215	215	0
M	Rear Bumper Bottom to Ground	392	379	13
N	Sill Height to Bottom of Front Window Sill	697	699	-2
O	Front Door Leading Edge to Impact CL	642	526	116
P	Rear Door Trailing Edge to Impact CL	1518	1449	69
Q	Front Window Opening	379	377	2
R	Right Side Length	4827	4813	14
S	Left Side Length	4827	4742	85
T	Vehicle Width at B-Pillars	1794	1659	135

* All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	318	355	0
2	Occupant Hip Point	mm	548	368	0
3	Mid - Door	mm	641	375	0
4	Window Sill	mm	940	341	0
5	Window Top	mm	1400	99	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: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

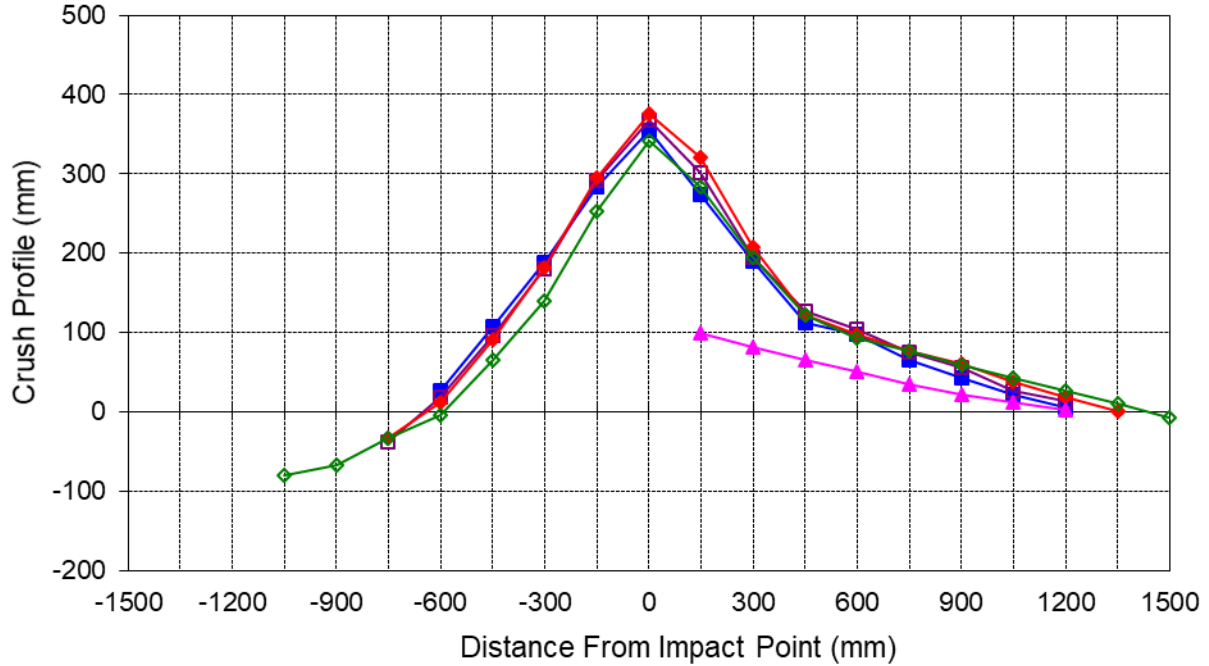
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050				777					857					-80	
-900				793					861					-68	
-750		906	910	805			944	943	838			-38	-33	-33	
-600	880	898	901	813		853	880	889	817		27	18	12	-4	
-450	879	894	899	824		771	798	808	758		108	96	91	66	
-300	878	893	899	839		690	713	717	700		188	180	182	139	
-150	879	893	899	852		595	602	604	600		284	291	295	252	
0	878	893	899	857		523	525	524	516		355	368	375	341	
150	878	893	899	856	606	604	591	579	572	507	274	302	320	284	99
300	876	892	898	857	616	686	697	690	662	534	190	195	208	195	82
450	875	890	897	857	617	763	763	775	735	551	112	127	122	122	66
600	871	888	894	857	615	773	784	796	764	565	98	104	98	93	50
750	868	884	890	856	612	803	809	813	780	577	65	75	77	76	35
900	865	882	887	854	608	823	826	827	795	587	42	56	60	59	21
1050	863	882	886	852	602	842	856	849	809	590	21	26	37	43	12
1200	864	888	890	852	586	859	874	871	826	584	5	14	19	26	2
1350			899	854				899	844				0	10	
1500				857					864					-7	

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: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020



■ LEVEL 1 Side Sill: 318 mm above ground	□ LEVEL 2 H-Point: 548 mm above ground
● LEVEL 3 Mid Door: 641 mm above ground	◆ LEVEL 4 Window Sill: 940 mm above ground
▲ LEVEL 5 Window Top: 1400 mm above ground	

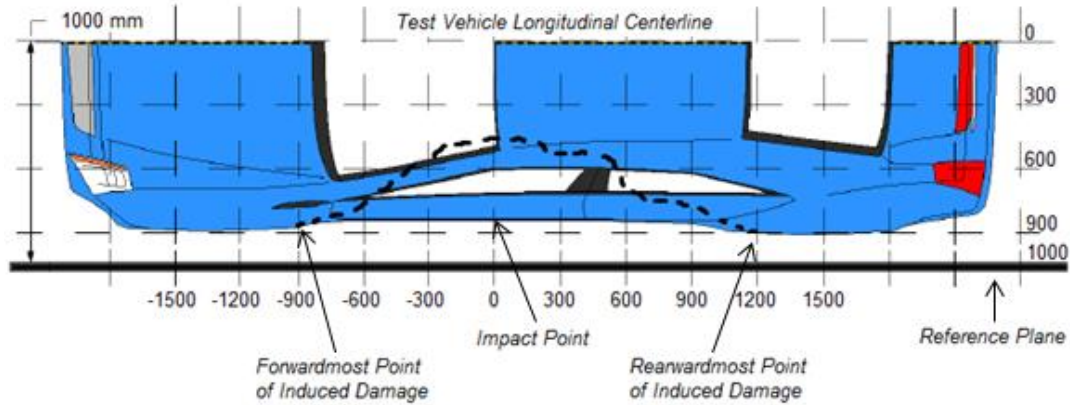
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020

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	-750	3	57	90	-33
2	-360	3	247	101	146
3	30	3	465	101	364
4	420	3	242	103	139
5	810	3	181	111	70
6	1200	3	129	110	19

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

Test Vehicle:	<u>2020 Volkswagen Passat four door sedan</u>	NHTSA No.:	<u>M20205804</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>3/2/2020</u>
Test Time:	<u>9:27 AM</u>	Temperature:	<u>21° C</u>

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 oz.)
- B. For the 5-minute period after motion ceases: 0 oz.
(Maximum allowable is 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable is 1 oz./minute)
- D. Spillage Details: No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	70	300	370
90° to 180°	69	300	369
180° to 270°	70	300	370
270° to 360°	70	300	370

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

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

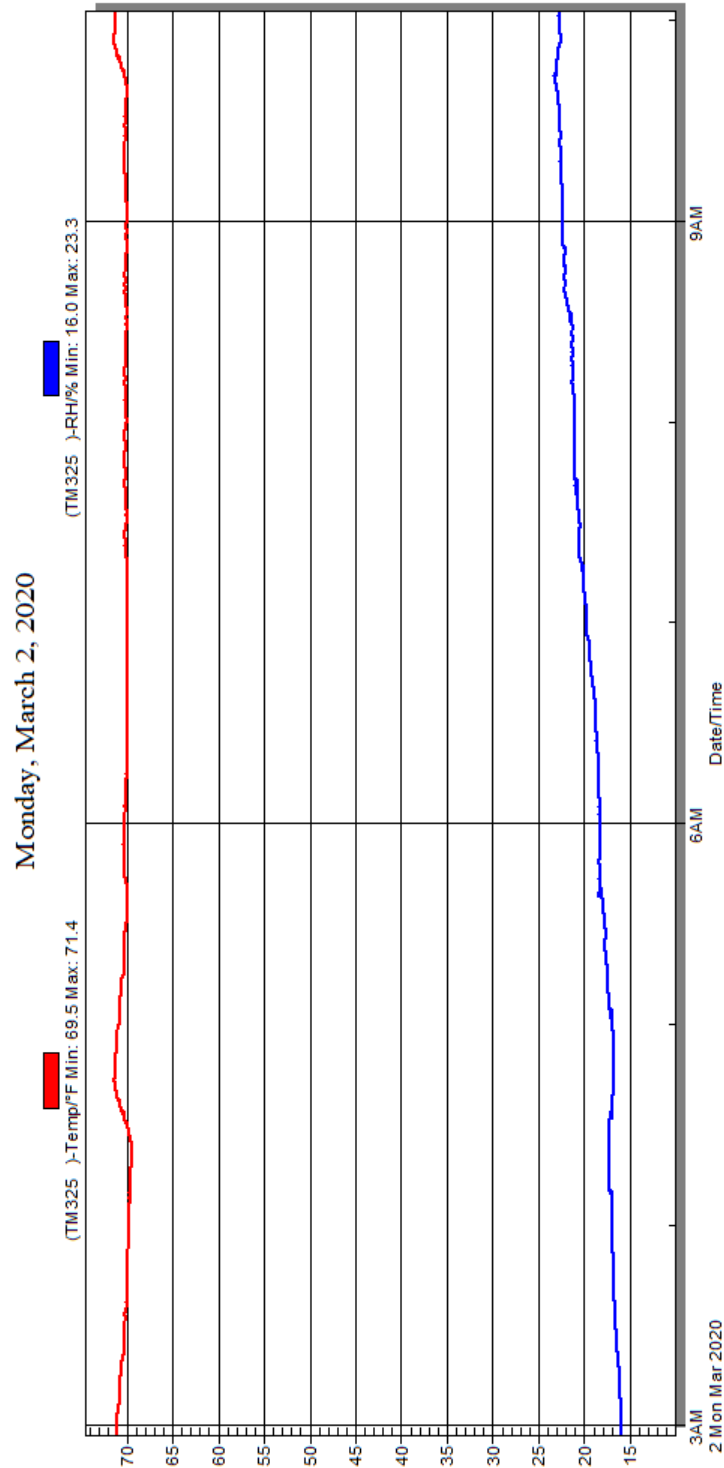
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2020 Volkswagen Passat four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205804
 Test Date: 3/2/2020



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

APPENDIX A
PHOTOGRAPHS

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M20205804

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



M20205804

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



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

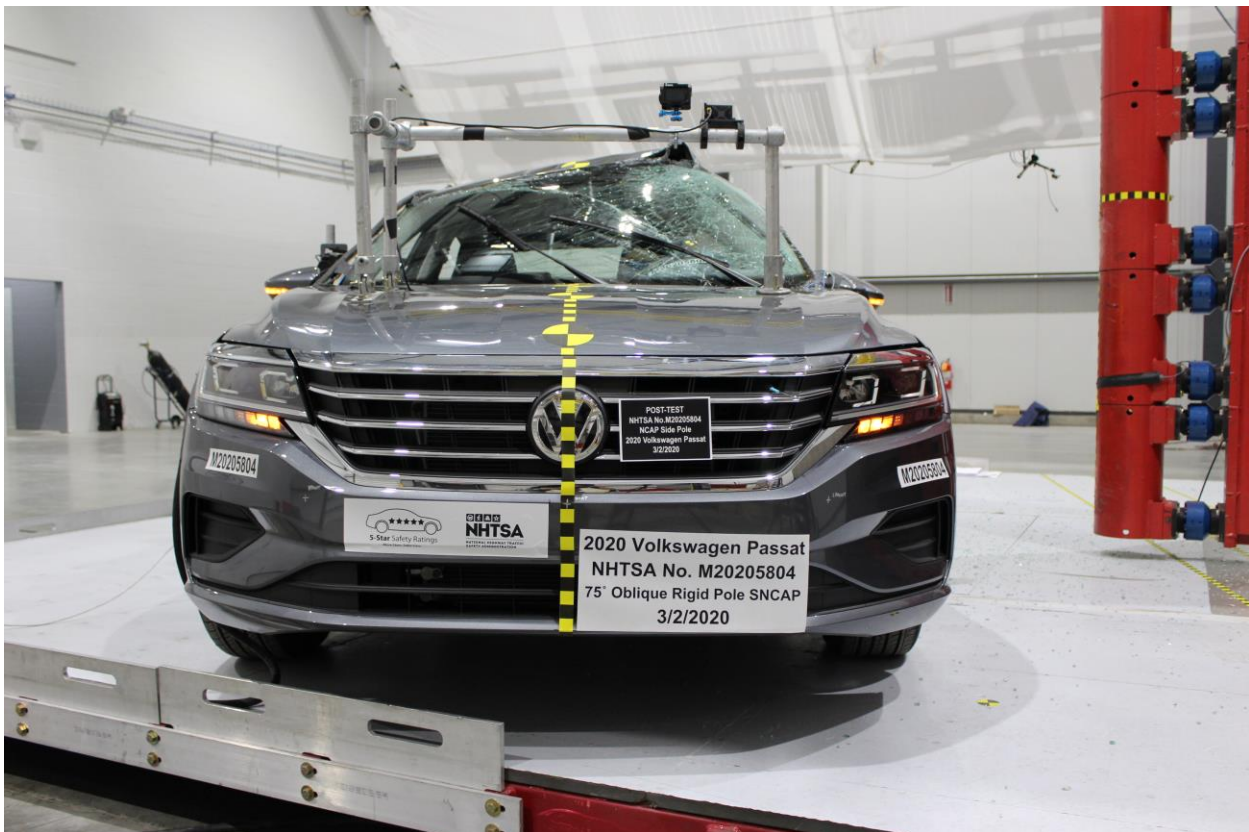


Figure A-4: Post-Test Frontal View of Test Vehicle



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



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

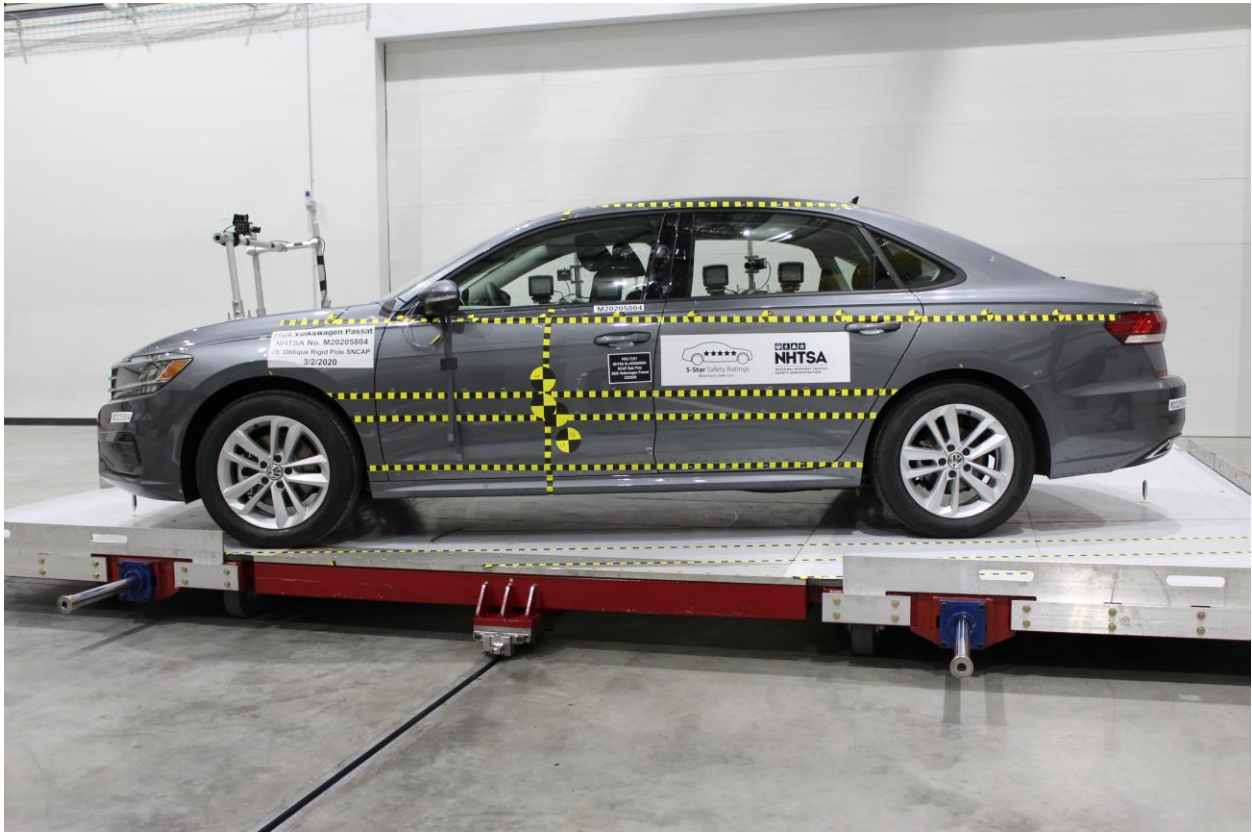


Figure A-7: Pre-Test Left Side View of Test Vehicle

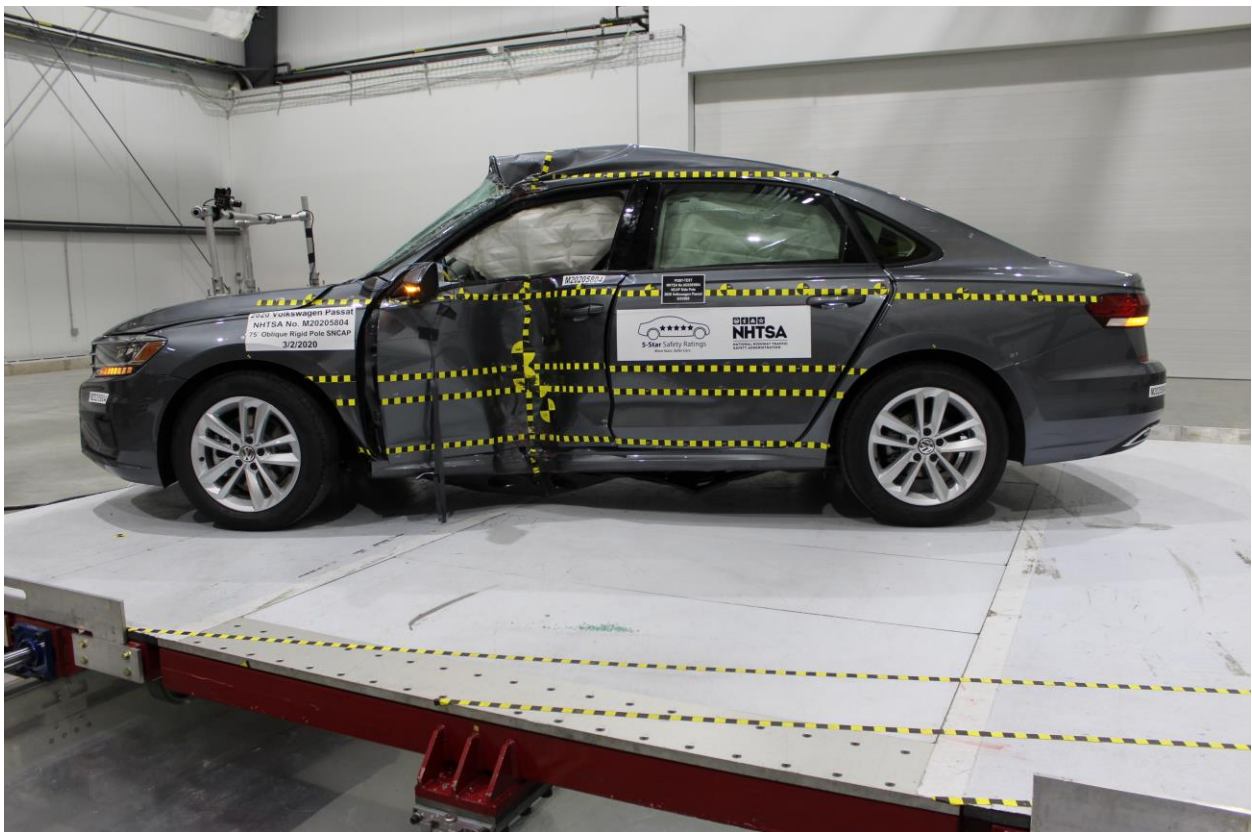


Figure A-8: Post-Test Left Side View of Test Vehicle



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



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



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



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



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

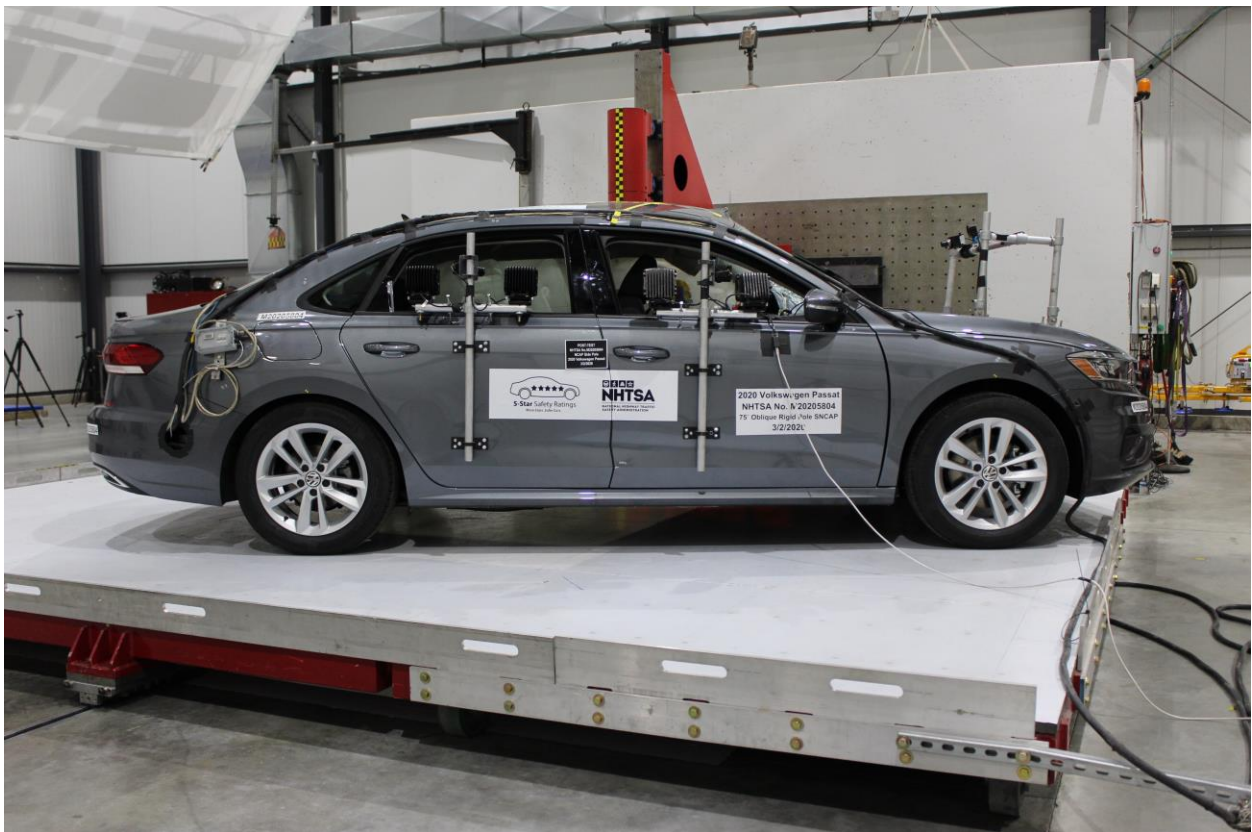


Figure A-14: Post-Test Right Side View of Test Vehicle



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

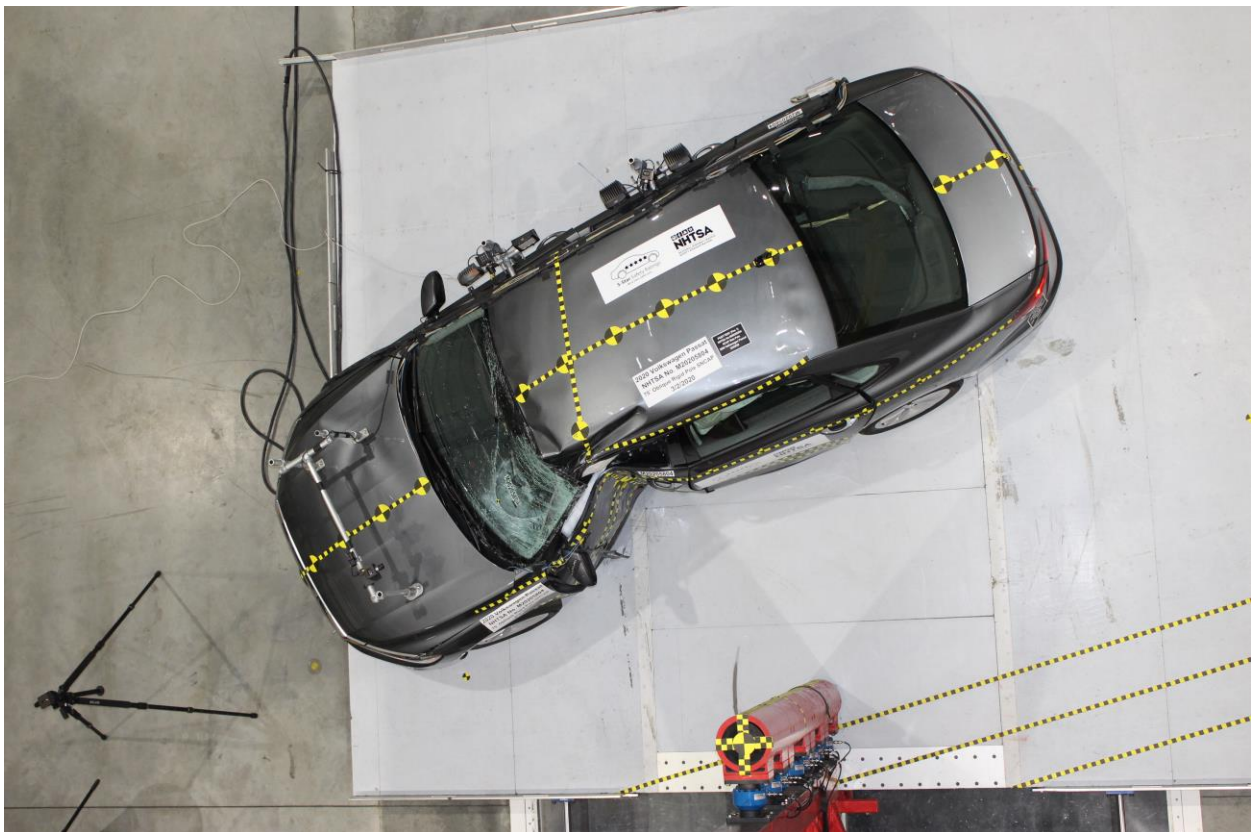


Figure A-16: Post-Test Overhead View of Test Area



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



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



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



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



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



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



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



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



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



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



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



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



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

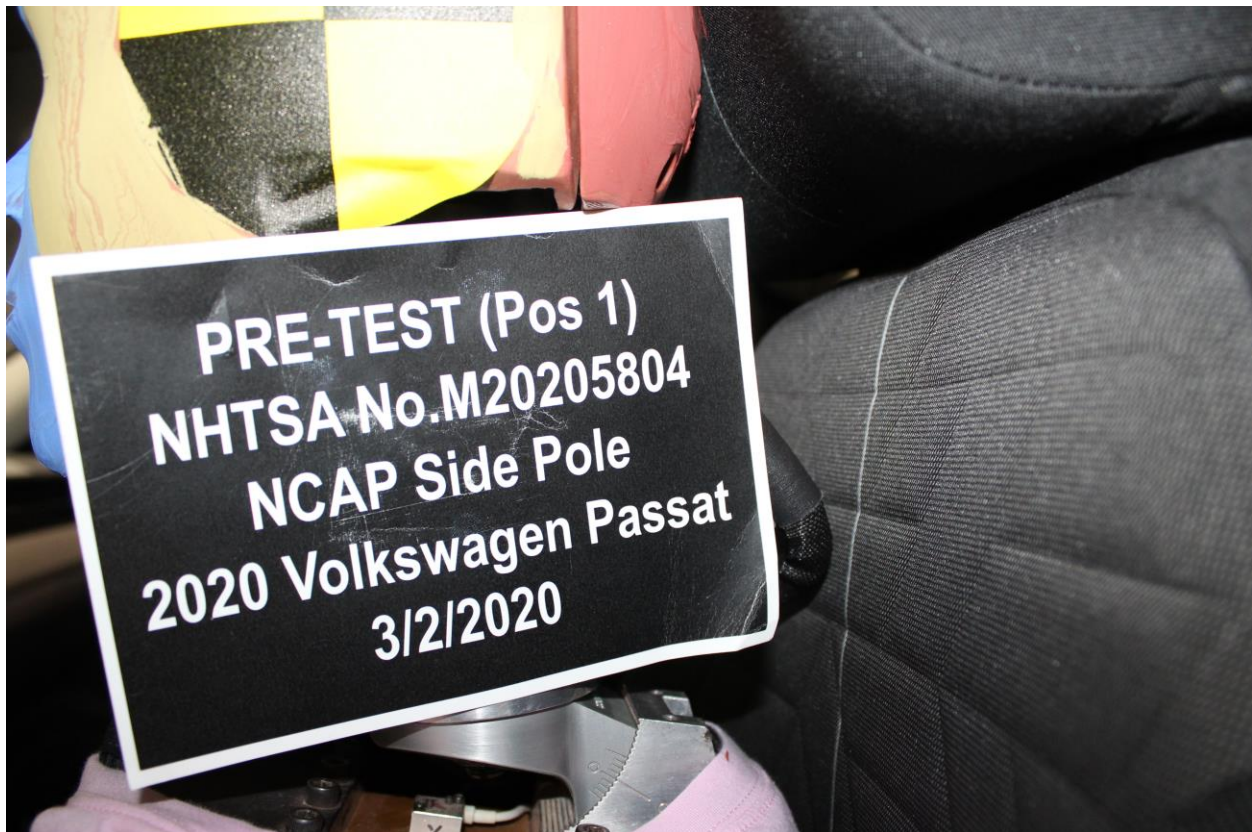


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



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



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



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



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



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



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



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

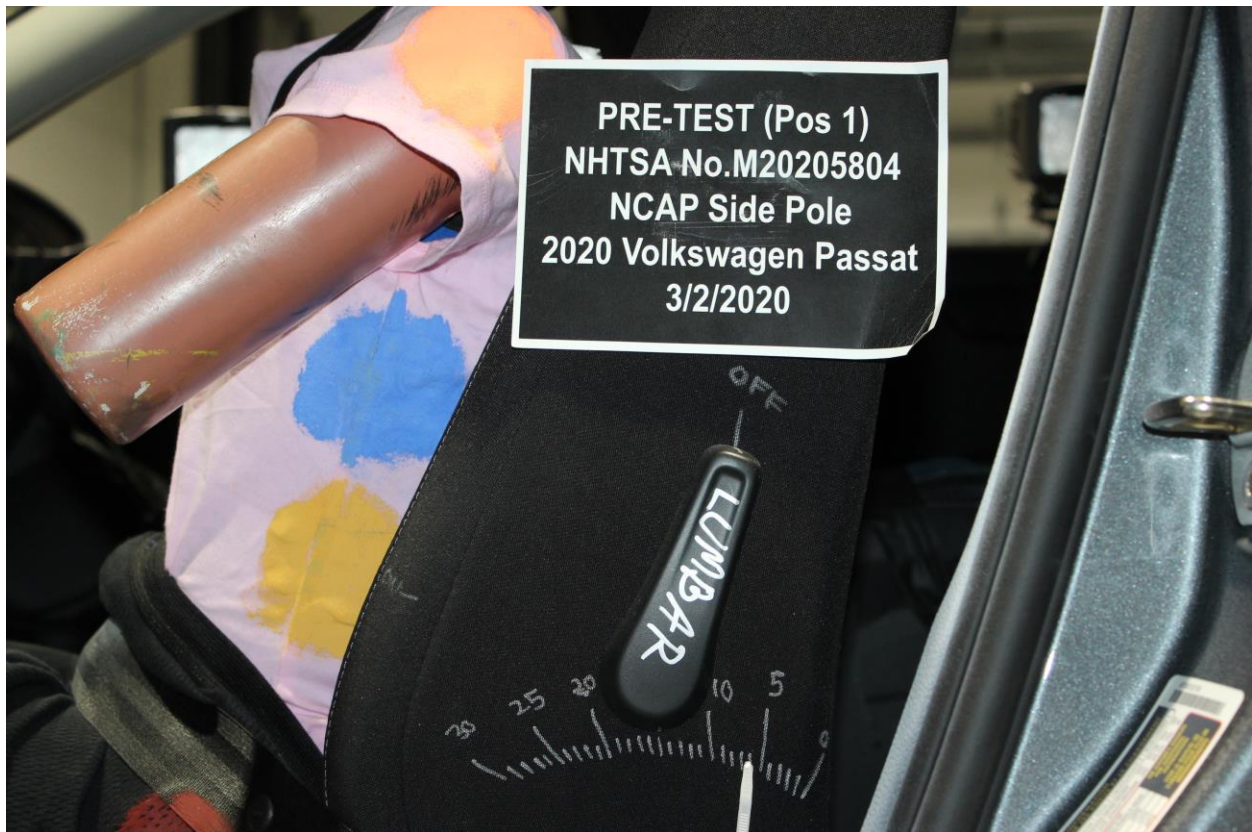


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



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

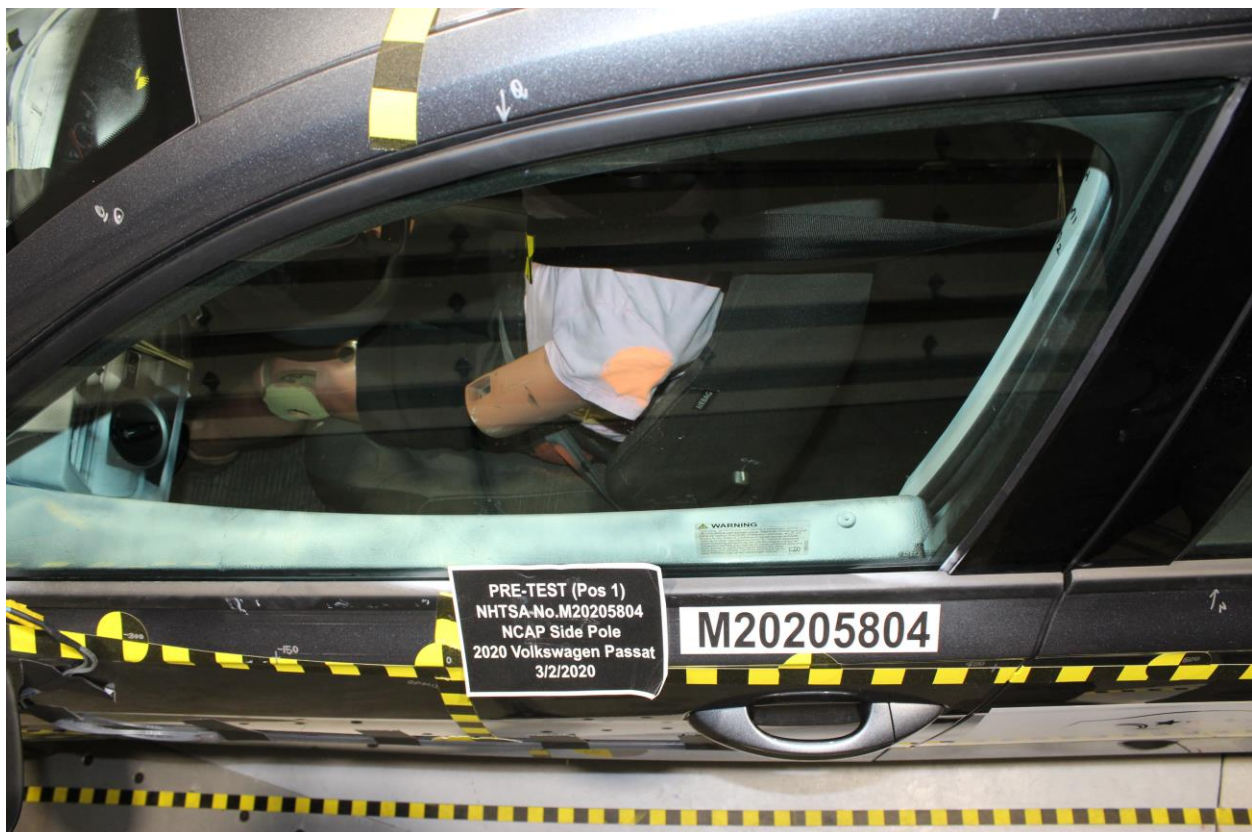


Figure A-40: Pre-Test Dummy and Door Clearance View



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



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



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

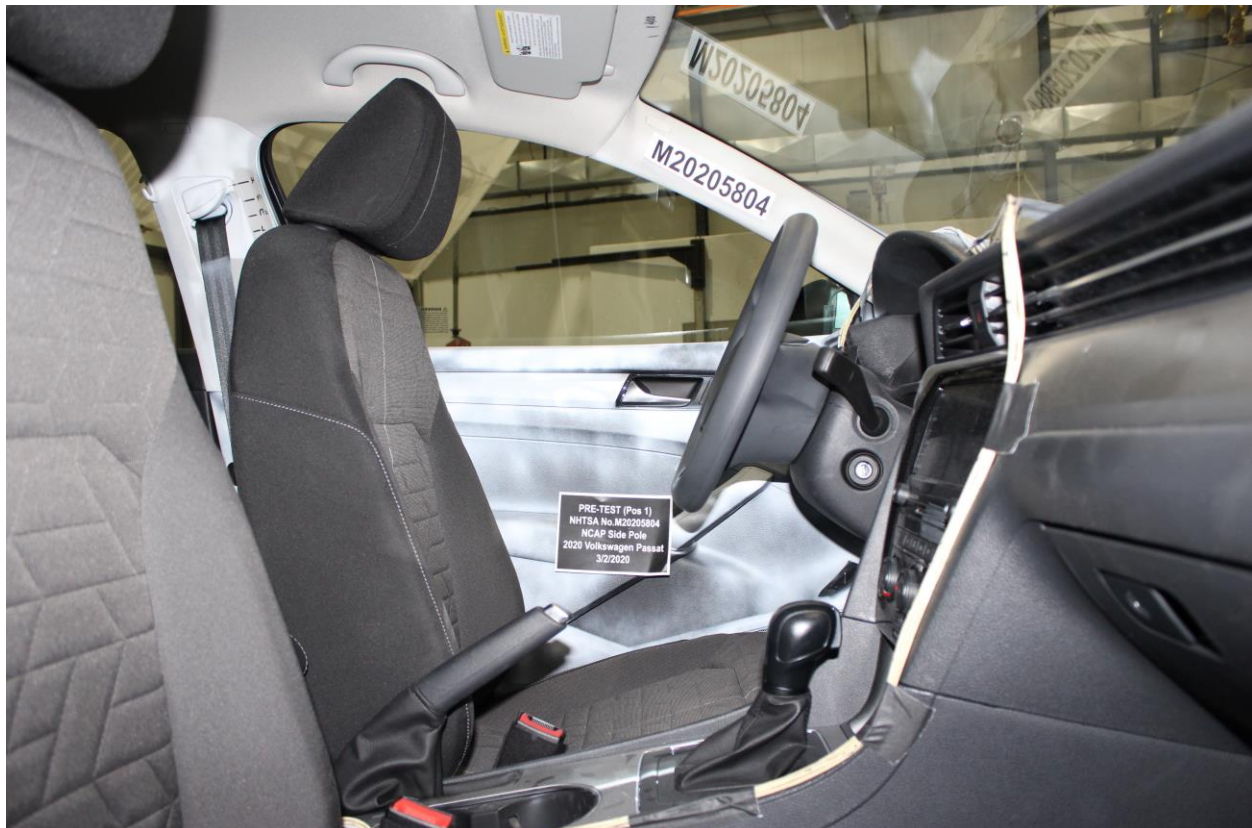


Figure A-44: Pre-Test Inner Door Panel View



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



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



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

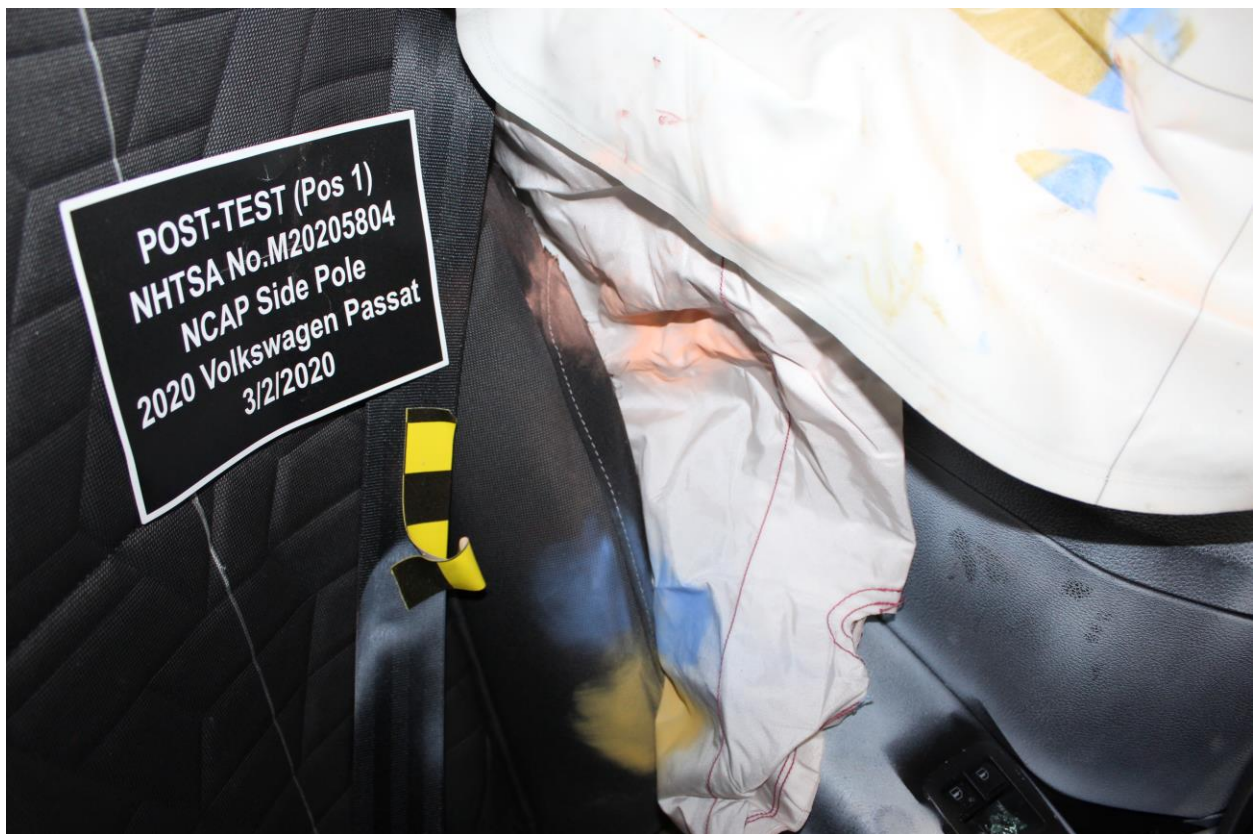


Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



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



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



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



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



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



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

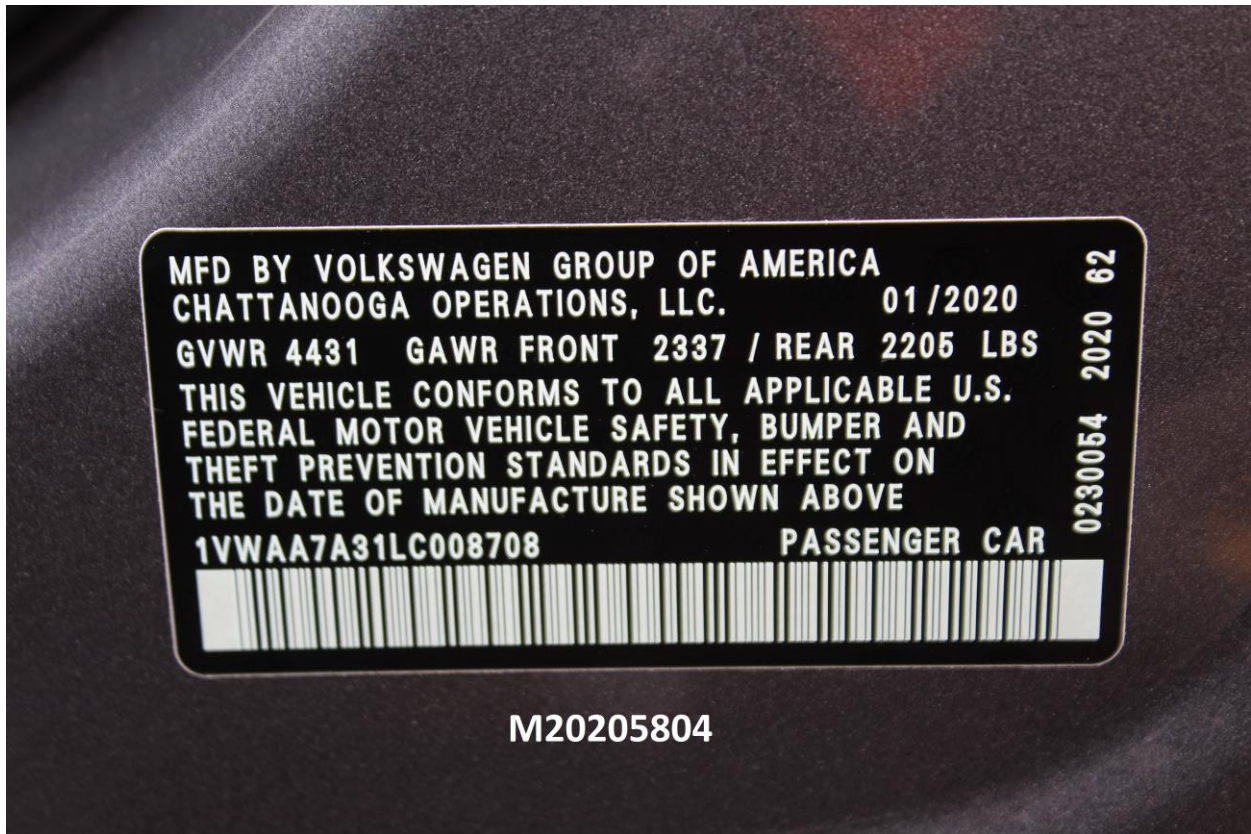


Figure A-55: Close-Up View of Vehicle's Certification Label

Photo Not Applicable

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

M20205804



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

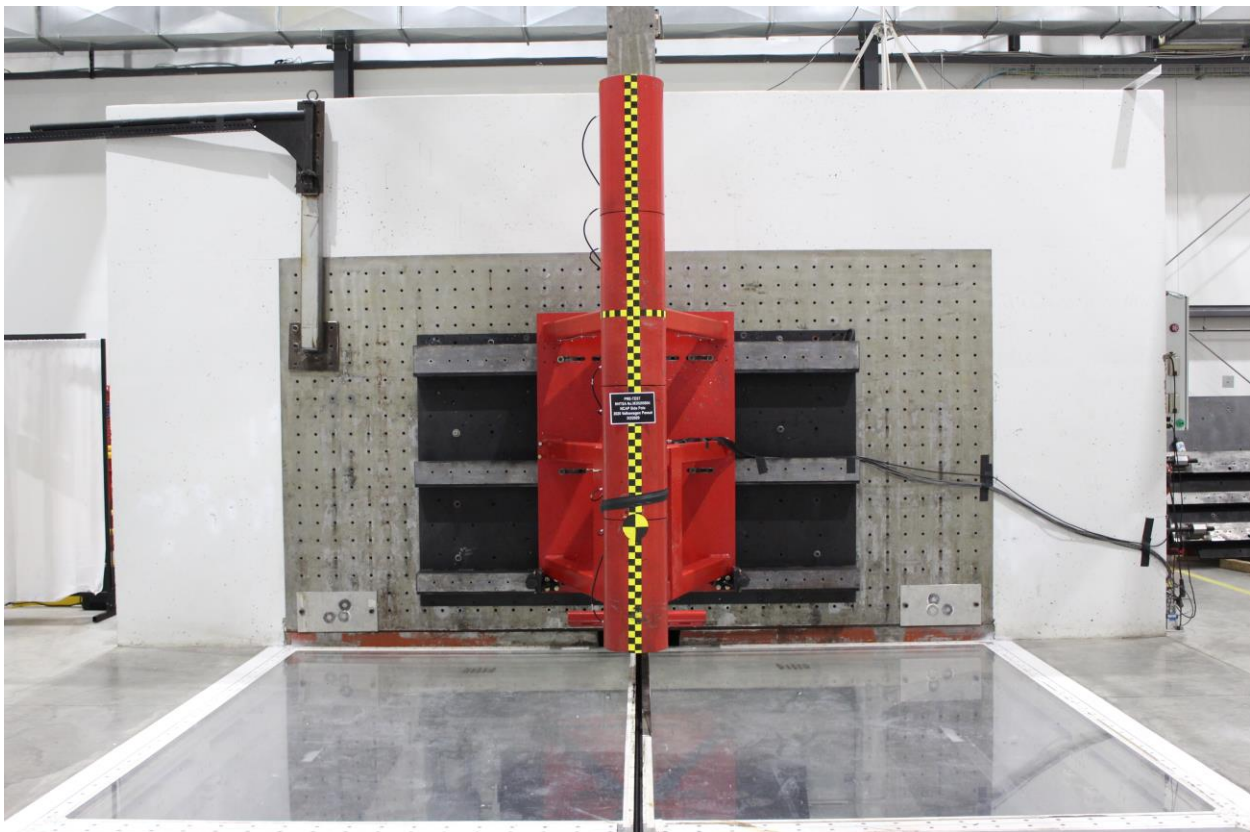


Figure A-57: Pre-Test Pole Barrier Front View

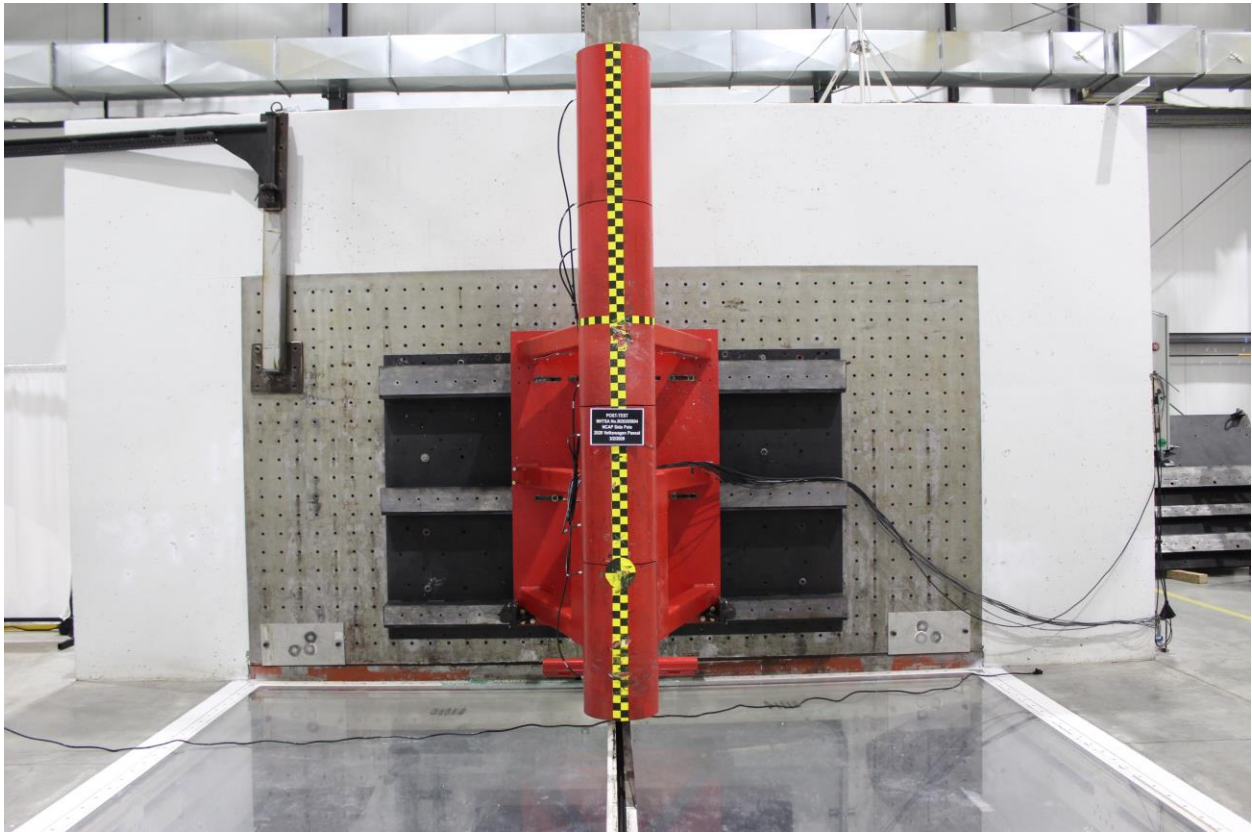


Figure A-58: Post-Test Pole Barrier Front View

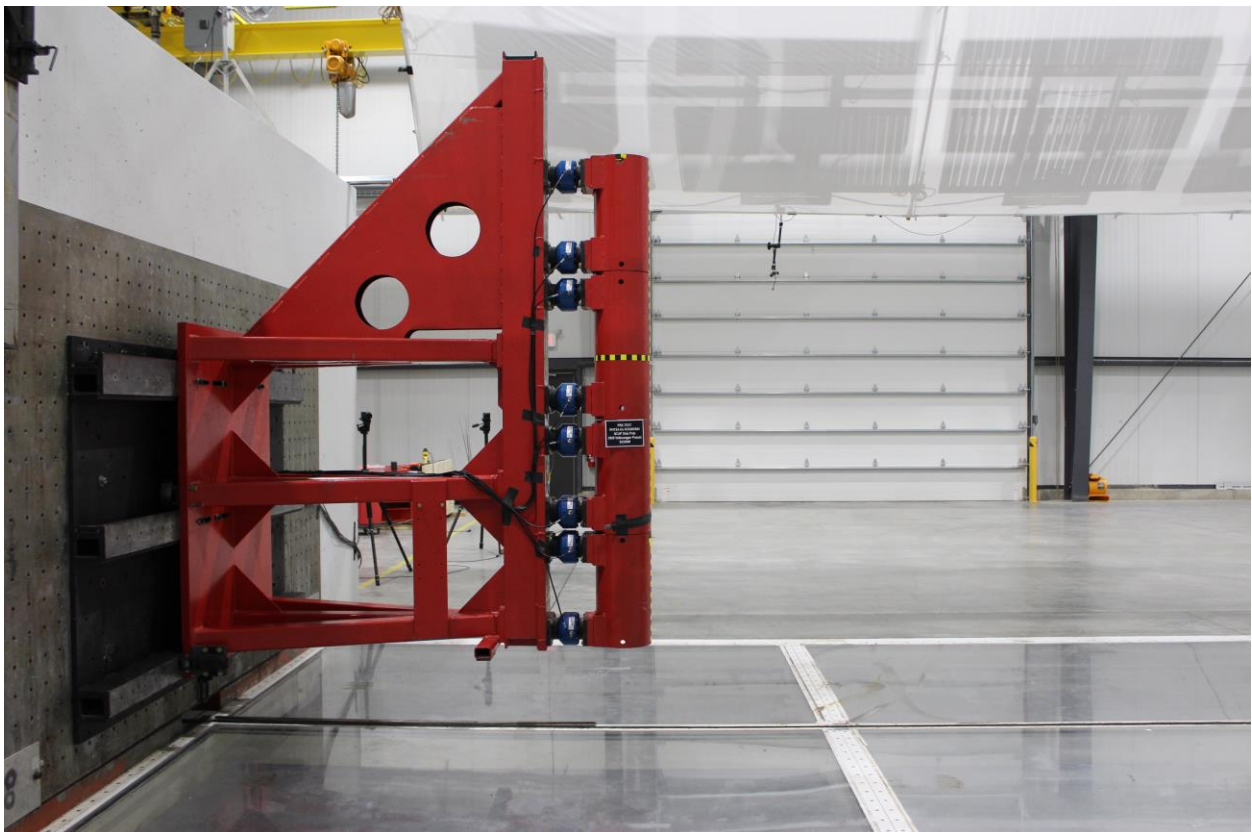


Figure A-59: Pre-Test Pole Barrier Side View

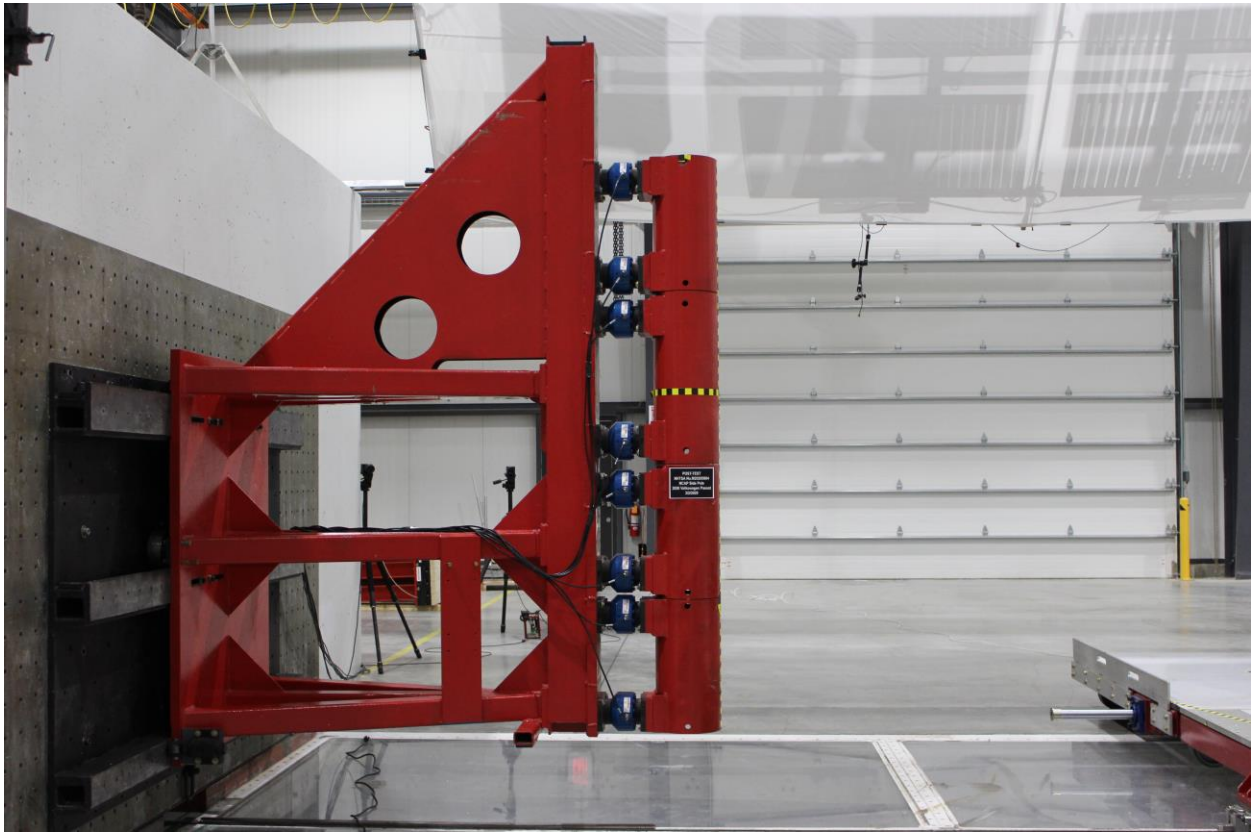


Figure A-60: Post-Test Pole Barrier Side View

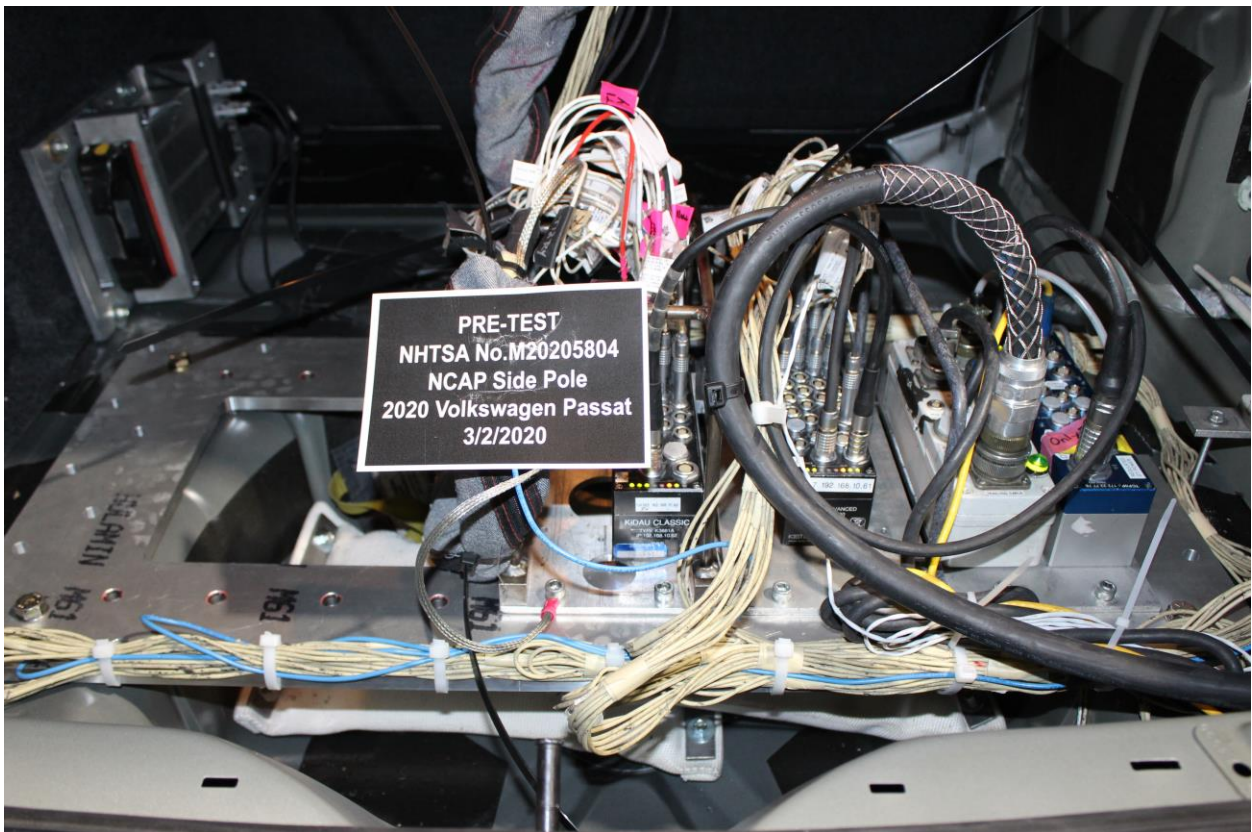


Figure A-61: Pre-Test Ballast View



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

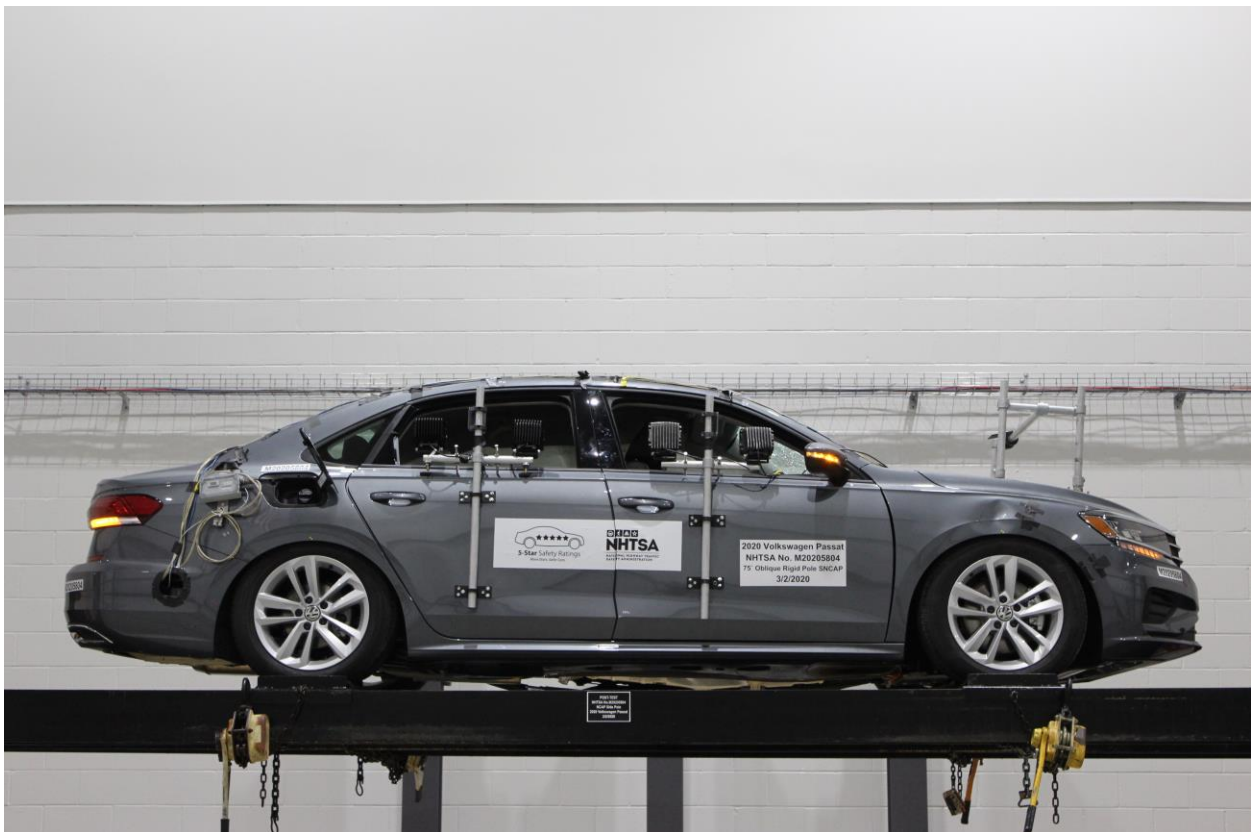


Figure A-63: FMVSS No. 301 Static Rollover 0 Degrees



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

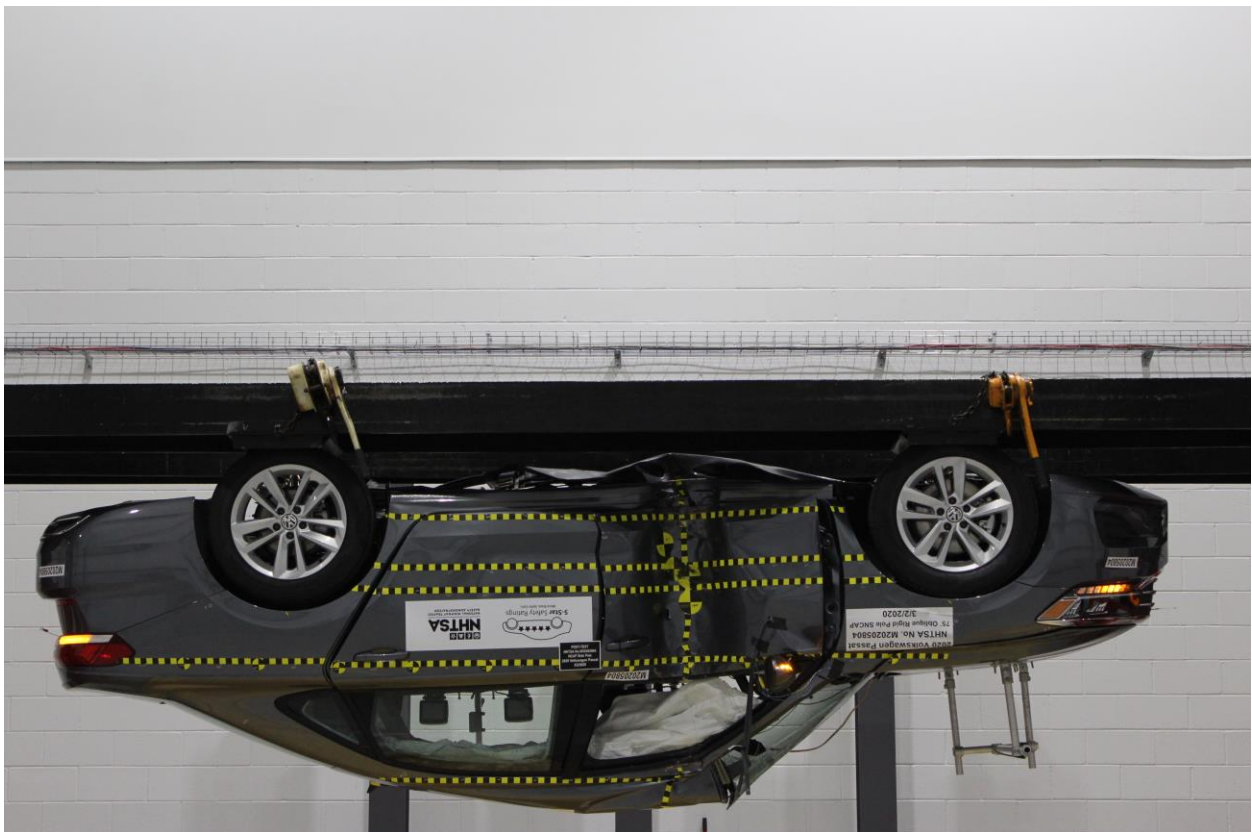


Figure A-65: FMVSS No. 301 Static Rollover 180 Degrees

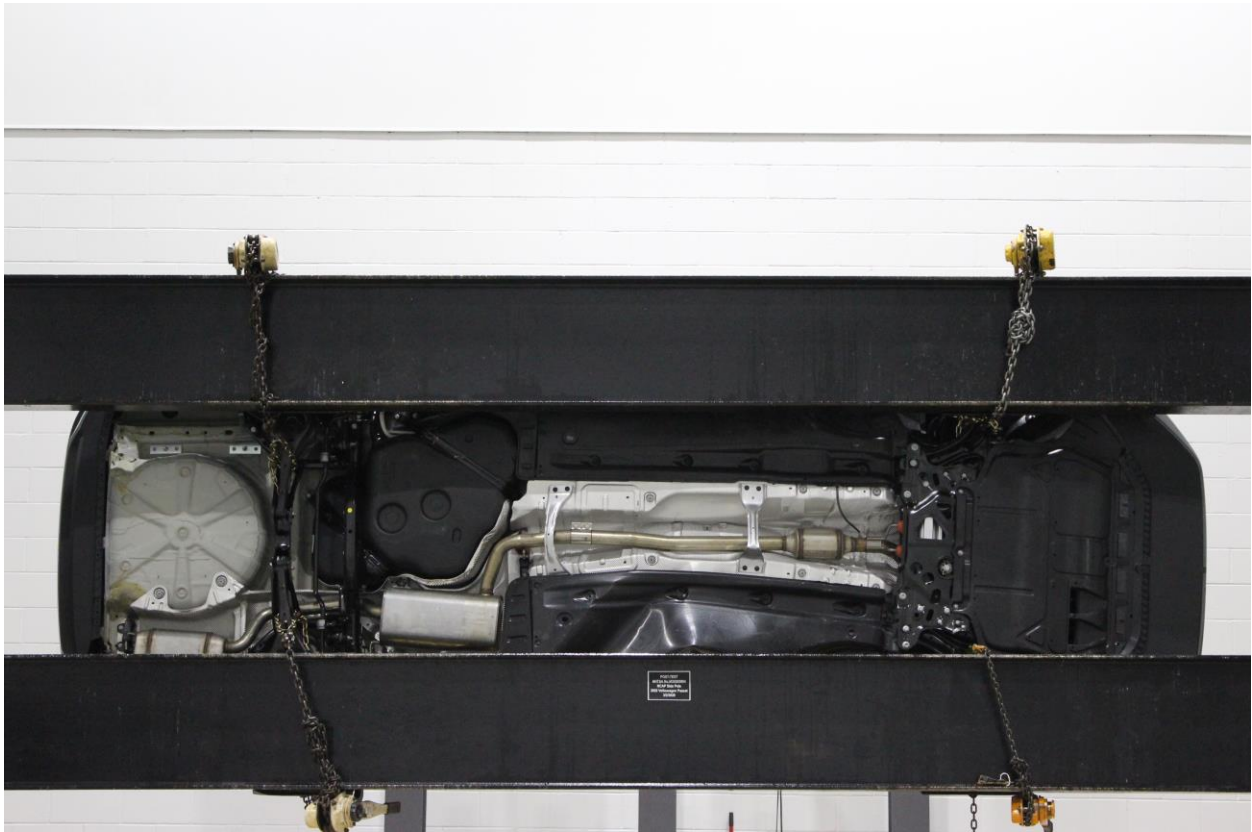


Figure A-66: FMVSS No. 301 Static Rollover 270 Degrees



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



Figure A-68: Impact Event

EPA DOT Fuel Economy and Environment Gasoline Vehicle		2020 Passat 2.0T S Platinum Gray Metallic Exterior Titan Black Cloth Interior 6-speed Automatic w/ Tiptronic®			
Fuel Economy 27 MPG combined city/hwy 23 city 34 highway 3.7 gallons per 100 miles Mid-Size Cars range from 12 to 136 MPG. The best vehicle rates 136 MPG.		You save \$0 in fuel costs over 5 years compared to the average new vehicle.		STANDARD FEATURES (unless replaced by packages or options) PERFORMANCE - 2.0L TSI® 16-valve DOHC turbocharged 4-cylinder engine w/ direct fuel injection - Front-wheel drive - Four-wheel independent suspension - Electro-mechanical power steering w/ variable assistance SAFETY FEATURES - 3-point safety belts, all seating positions - Advanced Airbag Protection System w/ 6 airbags - Anti-lock Braking System (ABS) w/ disc brakes - Anti-Slip Regulation (ASR); Engine Brake Assist (EBA) - Electronic Brake-pressure Distribution (EBD); Hydraulic Brake Assist (HBA) - Electronic Stability Control (ESC); Electronic Differential Lock (EDL) - Intelligent Crash Response System (ICRS); Automatic Post-Collision Braking System - Lower Anchors & Tethers for Children (LATCH) - Rear View Camera System - Tire Pressure Monitoring System (TPMS)	WARRANTY INFORMATION - Volkswagen New Vehicle Limited Warranty* - 4 years/50,000 miles (whichever occurs first)* - Includes coverage for powertrain components* - Limited Warranty against Corrosion Perforation: 7 years/100,000 miles (whichever occurs first)* *See owner's literature or dealer for important details and limitations.
Annual fuel cost \$1,500 Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.70 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.		Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only) 1 6 10 7 10 Best Best This vehicle emits 230 grams of CO ₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.		CAREFREE SCHEDULED MAINTENANCE - 2 years/20,000 miles (whichever occurs first)* *See owner's literature or dealer for important details and limitations.	
GOVERNMENT 5-STAR SAFETY RATINGS Overall Vehicle Score Not Rated Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		PARTS CONTENT INFORMATION For vehicles in this carline: U.S./CANADIAN PARTS CONTENT: 44% Major sources of foreign parts content: MEXICO 24% JAPAN 16% Note: parts content does not include final assembly, distribution or other non-parts costs. For this vehicle: Final assembly point: CHATTANOOGA TN, U.S.A. Country of origin: MEXICO ENGINE: MEXICO TRANSMISSION: JAPAN		24-HOUR ROADSIDE ASSISTANCE - 3 years/50,000 miles (whichever occurs first), for towing, jump starts, tire changes, out-of-fuel & lock-out.* Services provided by third party supplier. *See owner's literature or dealer for important details and limitations.	
Frontal Crash Driver Not Rated Passenger Not Rated Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		TECHNOLOGY & CONVENIENCE - Forward Collision Warning & Autonomous Emergency Braking (Front Assist) - Blind Spot Monitor & Rear Traffic Alert - Power door locks & trunk release w/ remote featuring panic button - Anti-theft engine immobilizer - Composition Media: touchscreen AM/FM/HD Radio™ w/ USB input, voice control & SiriusXM Satellite Radio (w/ limited time trial subscription) - 6-speaker sound system - Bluetooth® connectivity (for compatible devices) - VW App-Connect® (Smartphone Integration & Interface) - Cruise control - Color multi-function display (MFD) w/ trip computer		Manufacturer's Suggested Retail Price: \$22,995.00 PACKAGES & OPTIONS Platinum Gray Metallic Exterior No Charge Titan Black Cloth Interior No Charge Monitor Mats® (set of 4) & Heavy Duty Trunk Liner w/ VW CarGo Blocks \$235.00 Roadside Assistance Kit \$85.00 6-speed Automatic w/ Tiptronic® No Charge	
Side Crash Front Seat Not Rated Rear Seat Not Rated Based on the risk of injury in a side impact.		Interior - Manual climate control - 3-spoke steering wheel, multi-function - Tilt and telescoping adjustable steering column - Front seats: 6-way manual (includes height adjustment) - Rear seat: 3-passenger, 60/40 split-folding w/ center armrest - Cloth seating surfaces - Center console w/ cup holders, armrest & storage - Lockable glove compartment - Dual front reading lights		Destination Charge \$920.00 Total Suggested Vehicle Price: \$24,235.00 Fuel, license, title fees, taxes and dealer-installed accessories are not included.	
Rollover ★★★ Based on the risk of rollover in a single-vehicle crash. Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA). www.safercar.gov or 1-888-327-4236		VIN: 1YWAAT331C08798 Part of Entry: US DIRECT SHIPMENT		Ready to make this your new ride? Apply now with Volkswagen Credit! Volkswagen Credit	
SOLD TO: 408158 MAGUIRE VOLKSWAGEN 370 ELMIRA RD. THACA, NY 14850		SHIP TO: 408158 MAGUIRE VOLKSWAGEN 370 ELMIRA RD. THACA, NY 14850			

Figure A-69: Monroney Label

Removing and installing the head restraints

□ Please read the introductory information and heed the Warnings and Notice ▲ and ○ on page 75.

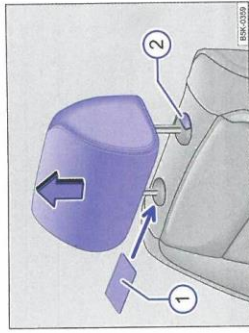


Fig. 72 Front head restraints: removing.

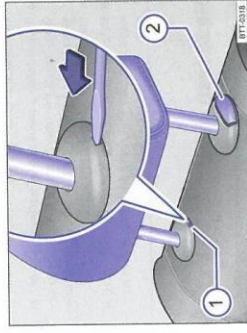


Fig. 73 Rear head restraint: removing.

Removing the front head restraints

- If necessary, adjust the seat backrest so that the head restraint can be removed.
- Slide the head restraint all the way upward → ▲ in Introduction on page 75.
- To unlock, insert a flat object, e.g. a plastic card → fig. 72 ① between the backrest cover and the head restraint guide pin cap.
- Pull the head restraint all the way out while pressing the button → fig. 72 ② fully.

Installing the front head restraints

- If necessary, adjust the seat backrest so that the head restraint can be installed.

Adjusting the head restraints

□ Please read the introductory information and heed the Warnings and Notice ▲ and ○ on page 75.

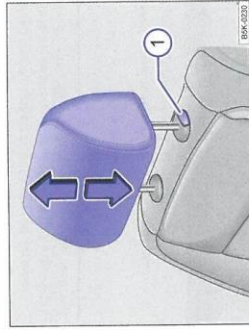


Fig. 70 Front head restraint: adjusting.

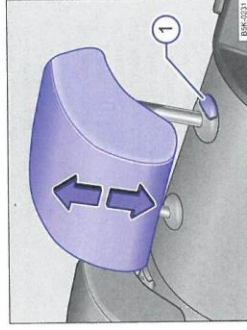


Fig. 71 Rear head restraint: adjusting.

Adjusting the height of the head restraints

- Slide the head restraint upward or downward in the direction of the arrow and when pressing the → fig. 70 ① or → fig. 71 ① button → ▲ in Introduction on page 75.
- The head restraint must lock securely into place.

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



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

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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

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

Additional Driver Dummy Instrumentation Data

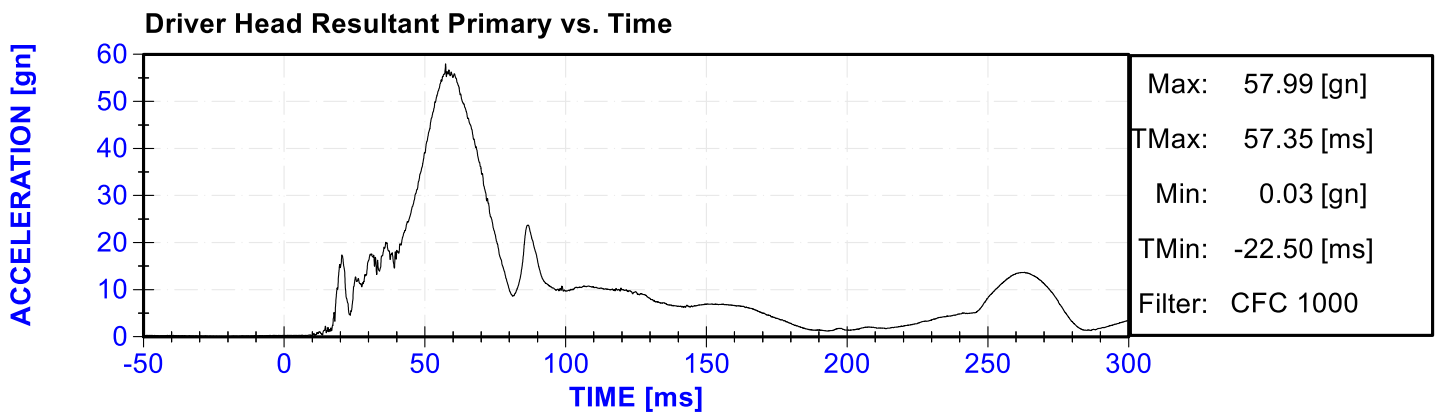
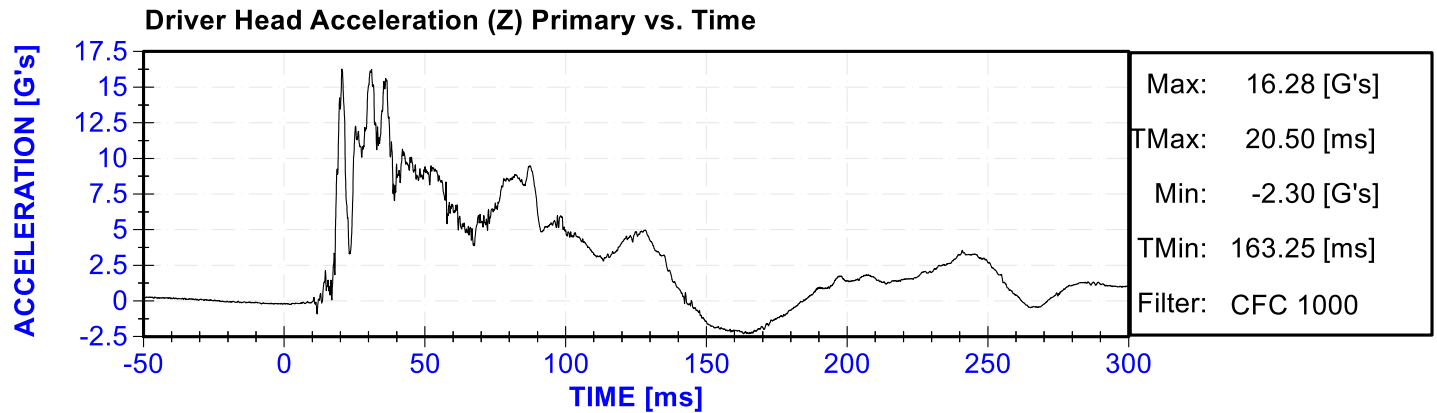
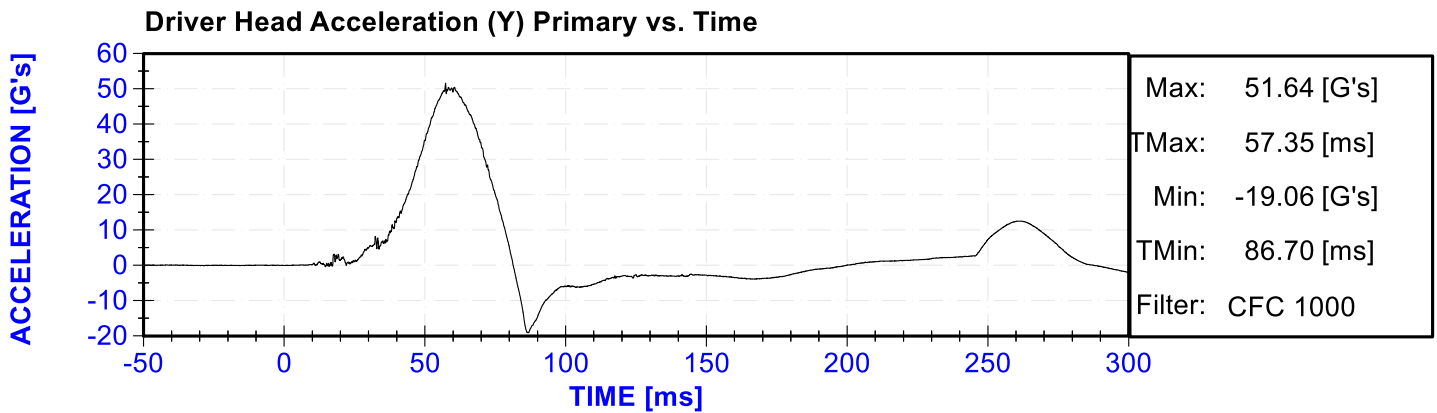
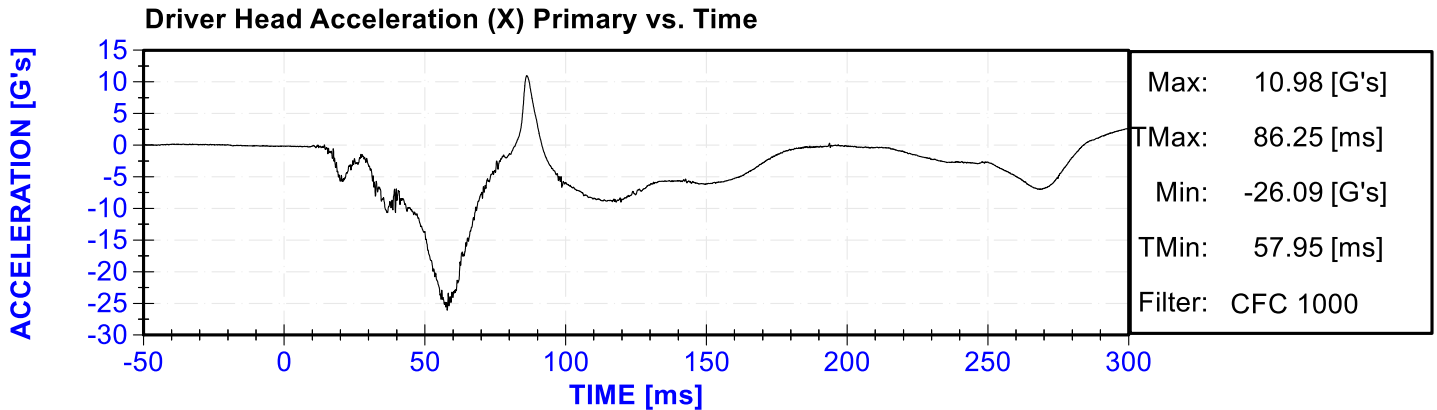
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

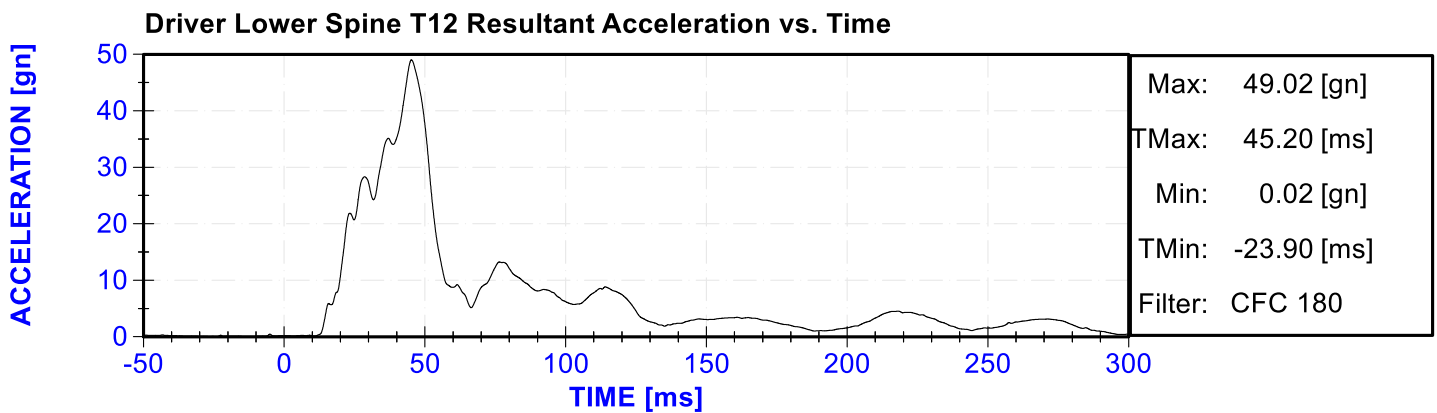
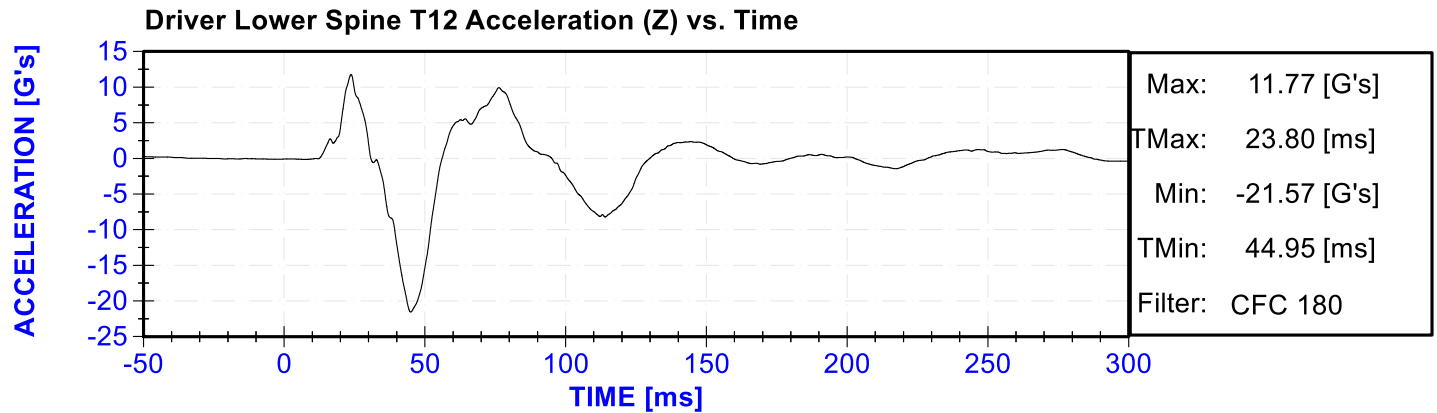
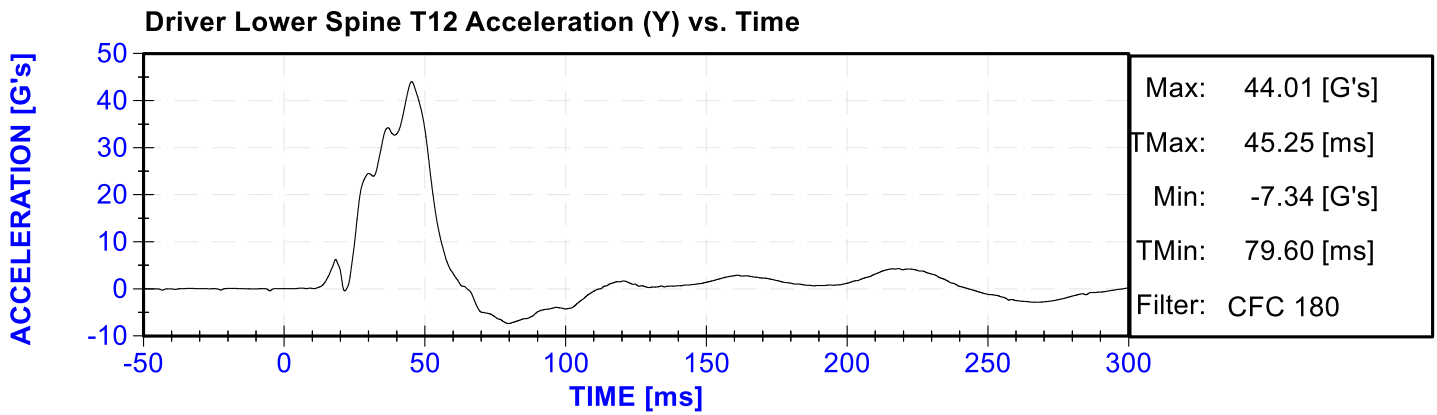
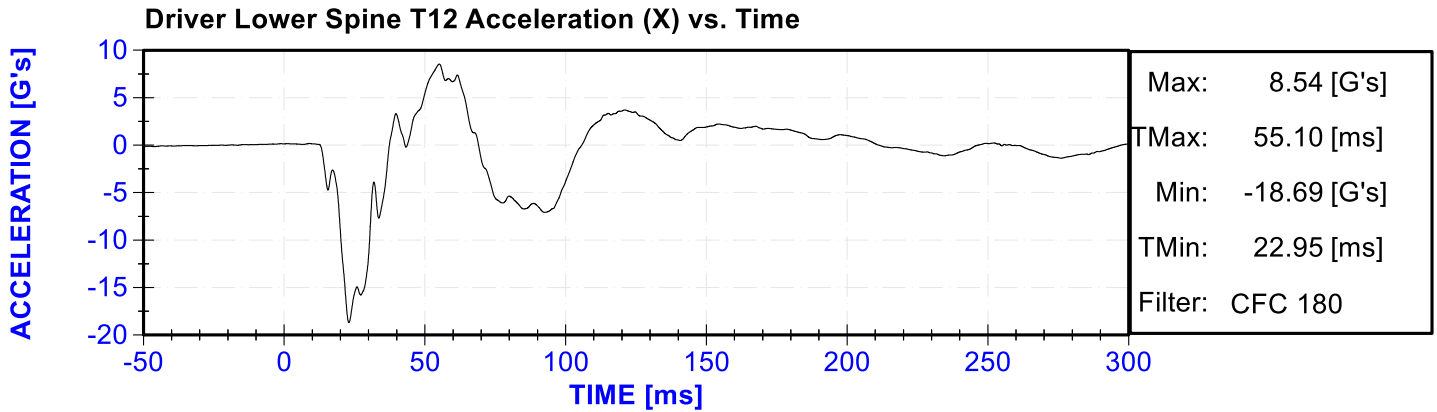
Vehicle Instrumentation Data

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

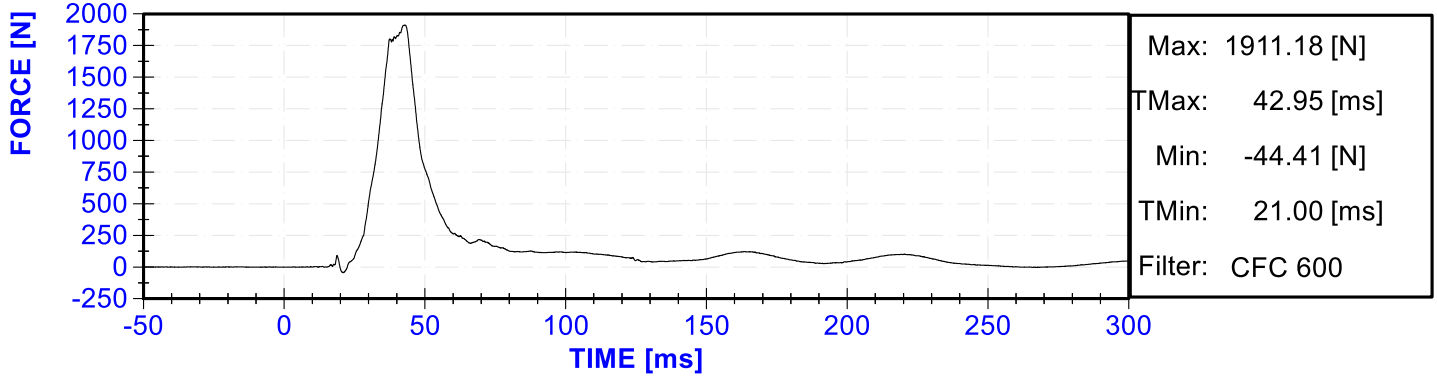
Pole Instrumentation Data

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

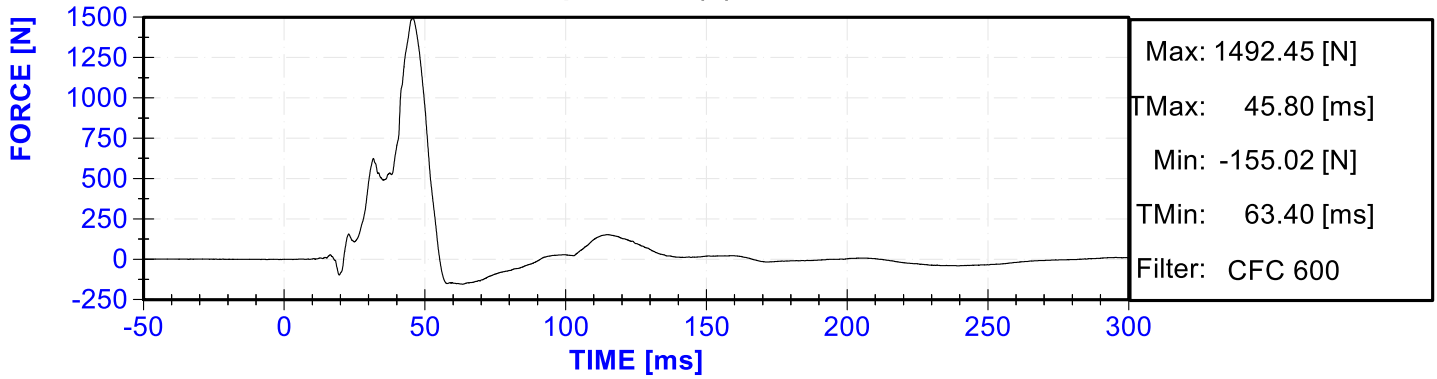




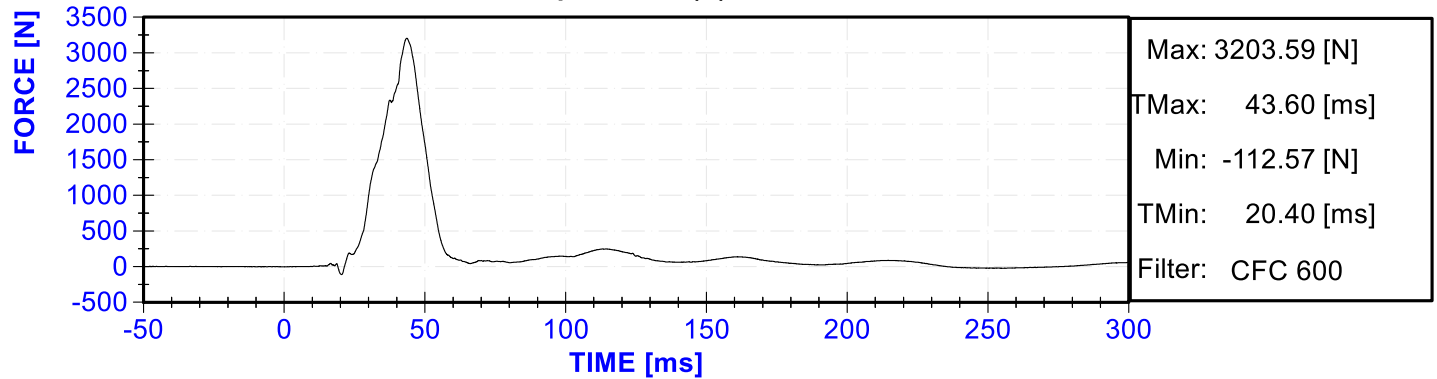
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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



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



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

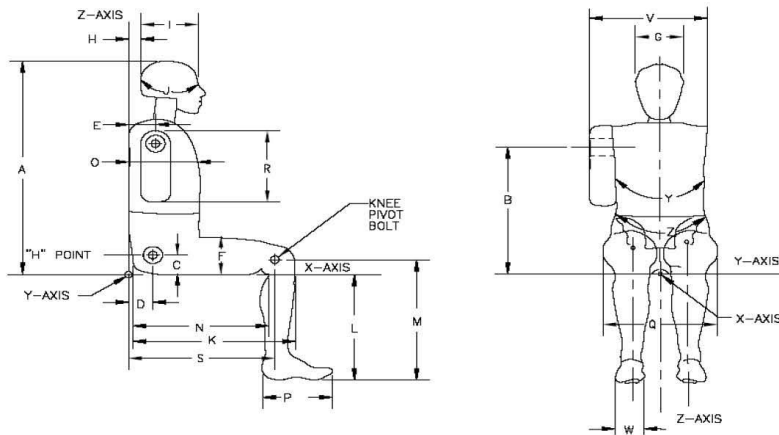


External Measurements - SID-IIs

Technician: K. Dutton

Date: 02/10/2020

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	779	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	224	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	255	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	345	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	781	Pass

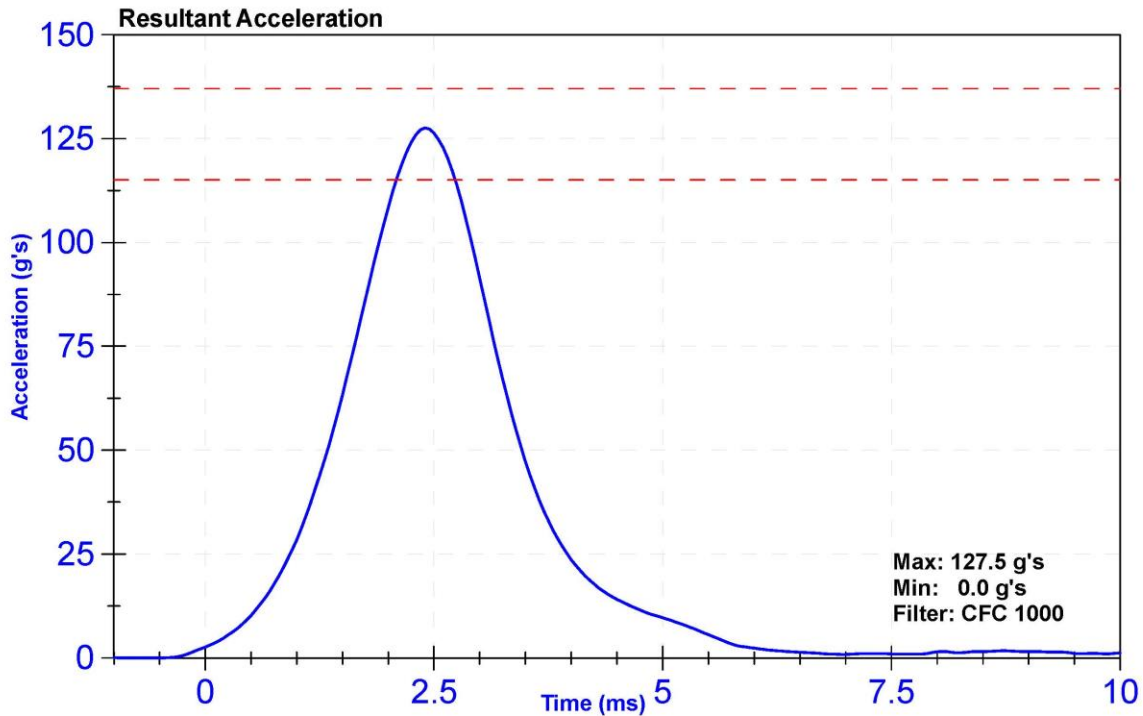
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

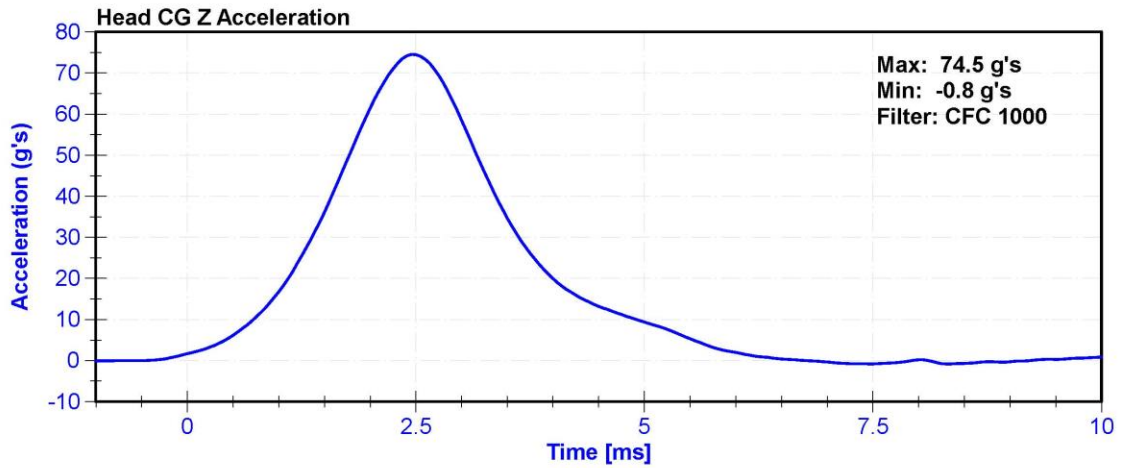
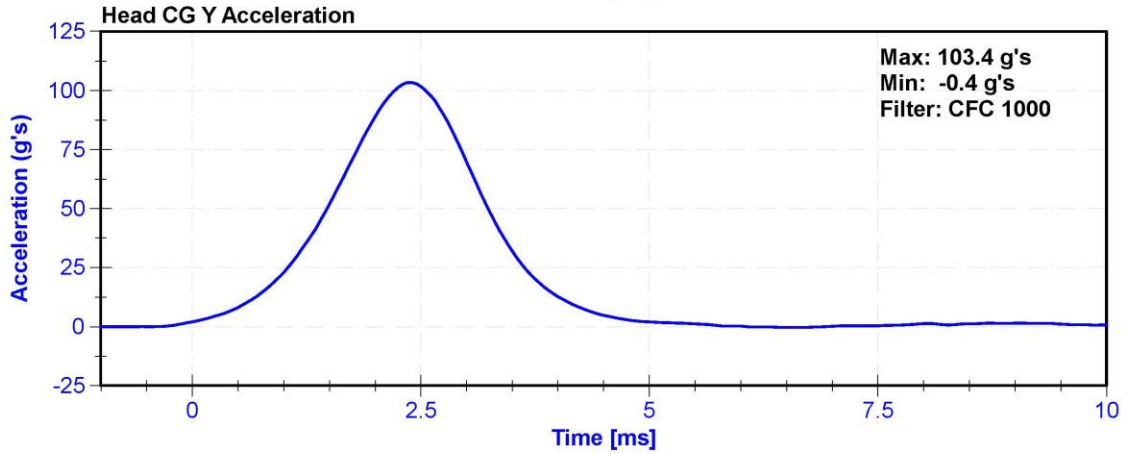
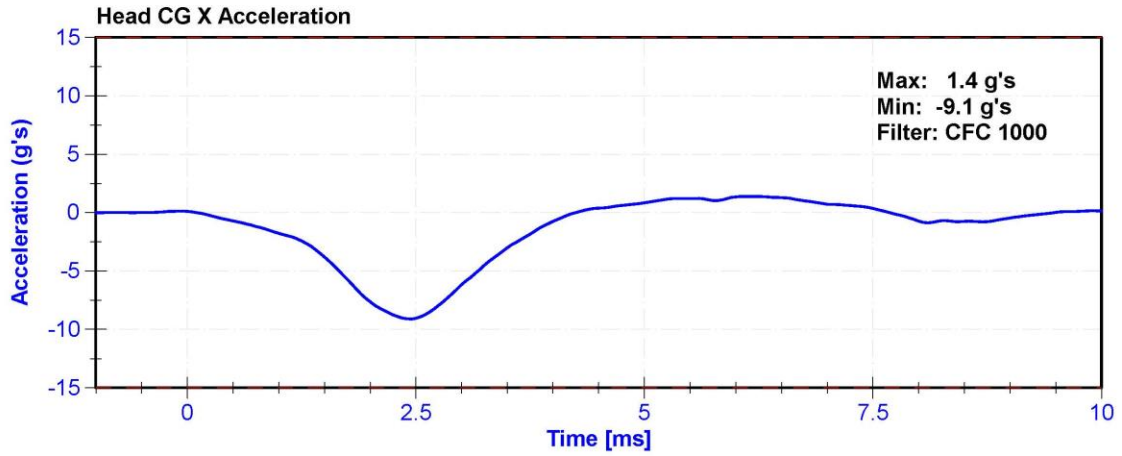
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	23.3	Pass
Resultant Acceleration	115	137	g's	127.5	Pass
Oscillation	0	15	%	1.3	Pass
Fore-Aft Acceleration	-15	15	g's	-9.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P74788	10/28/2019	4/27/2020
Y Accelerometer	ENDEVCO 7264CT	AC-P83432	10/28/2019	4/27/2020
Z Accelerometer	ENDEVCO 7264	AC-P83319	10/28/2019	4/27/2020





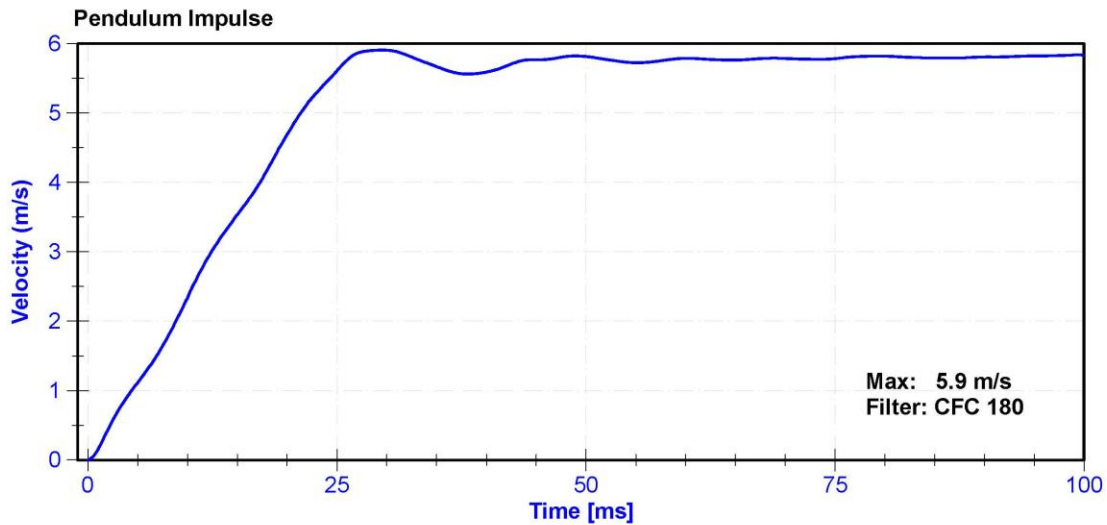
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

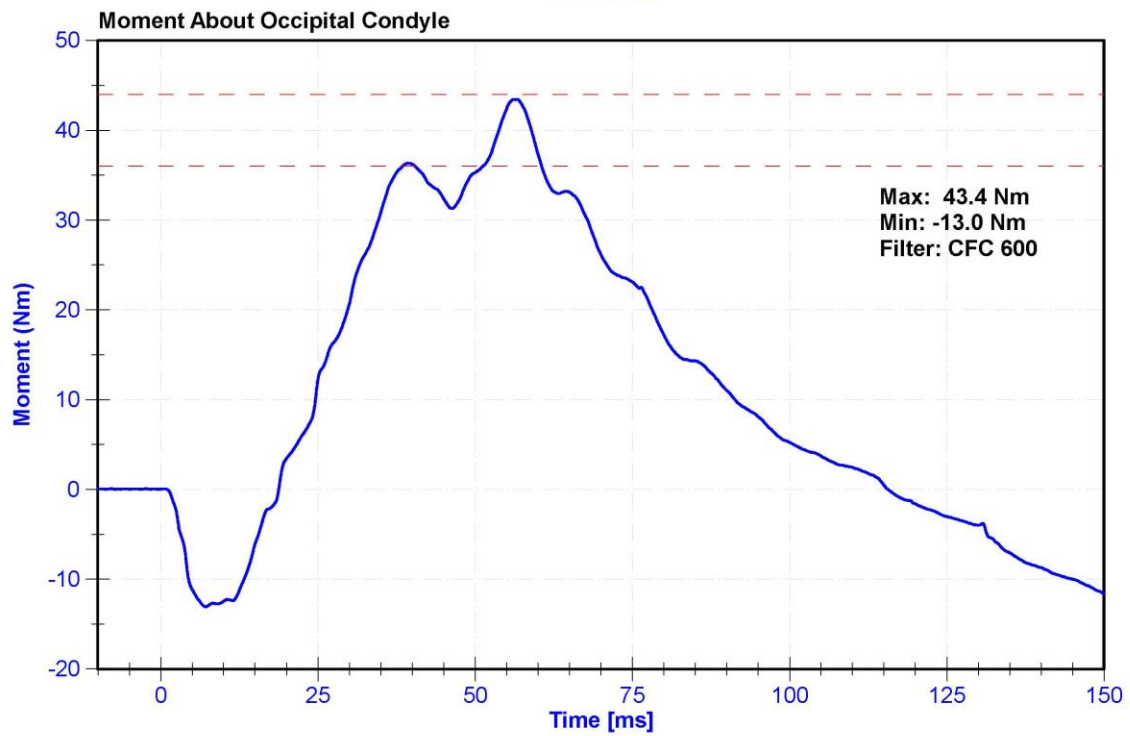
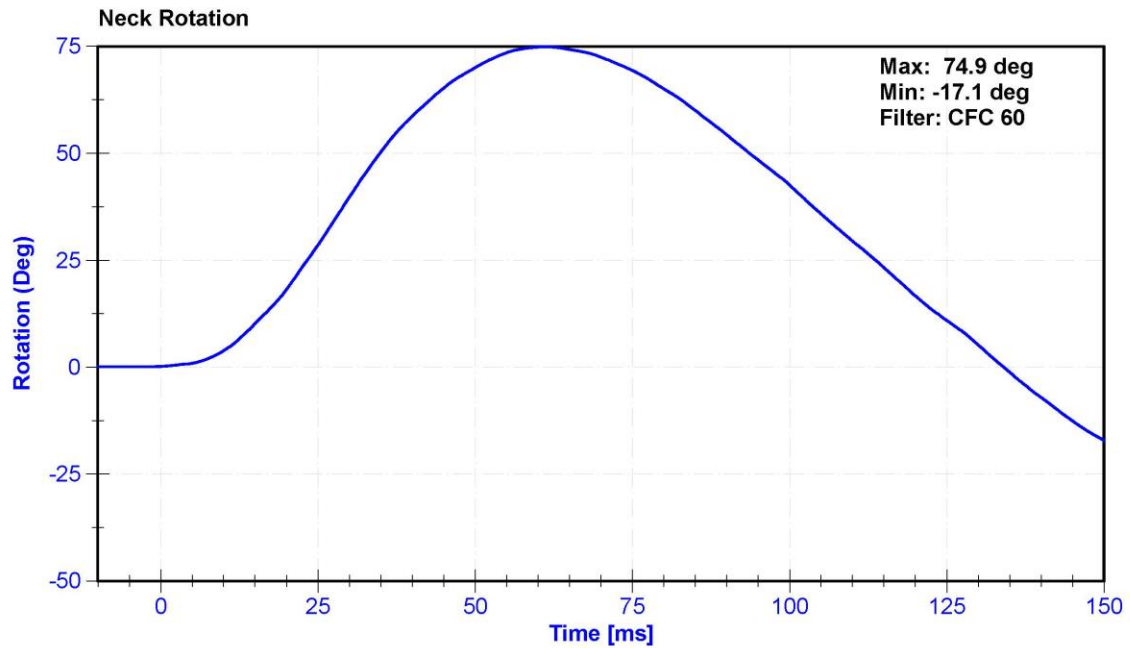
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	35.3	Pass
Velocity	5.51	5.63	m/s	5.549	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.34	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.53	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.69	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.60	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.90	Pass
Neck Rotation	71	81	deg	74.9	Pass
Time at Maximum Rotation	50	70	ms	61.2	Pass
Moment about the OC	36	44	Nm	43.4	Pass
Moment Decay to 0 Nm	102	126	ms	115.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5M9 Pend	1/30/2020	1/29/2021
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/4/2019	11/3/2020
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/4/2019	11/3/2020
Upper Neck Load Cell	Denton 1716A	LC-2192Fy	6/20/2019	6/19/2020





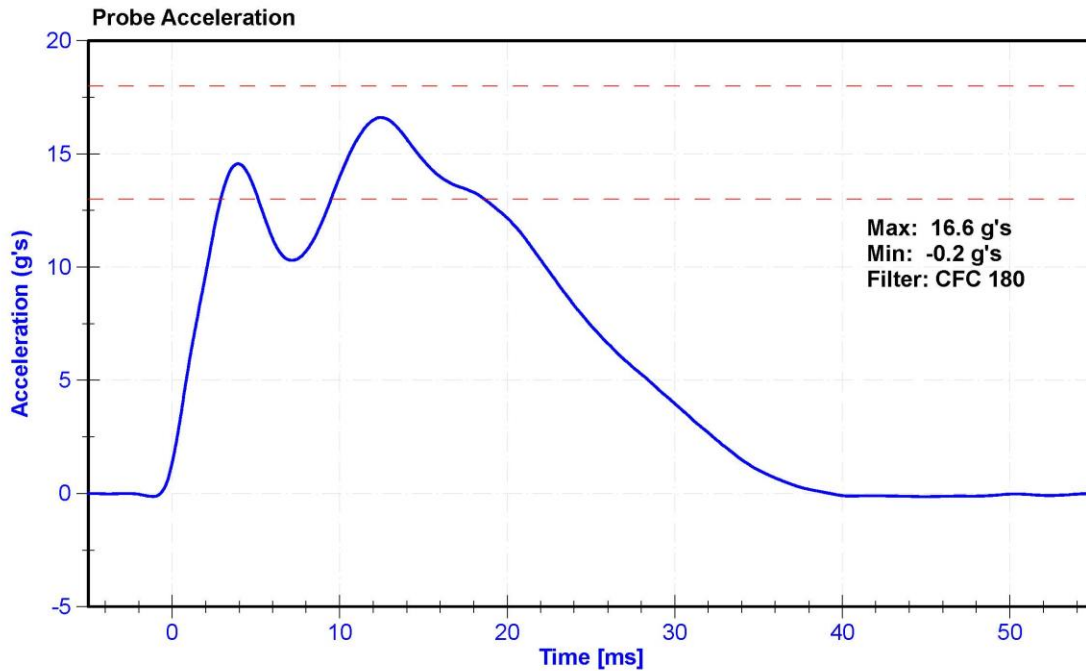
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

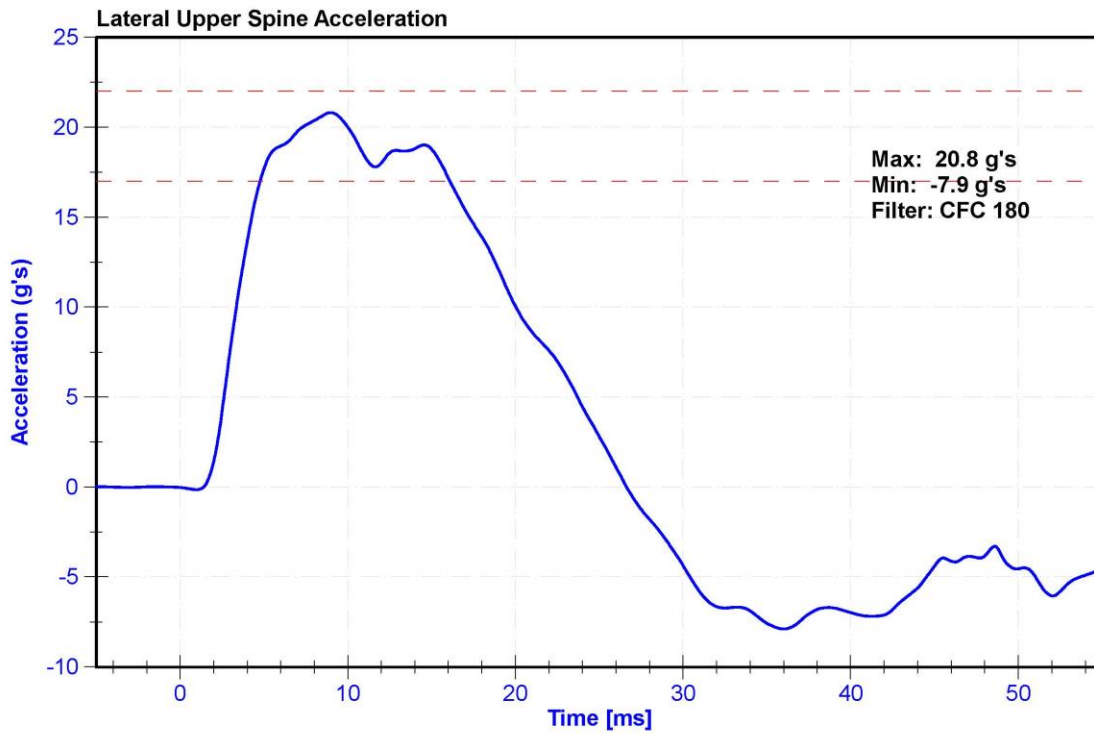
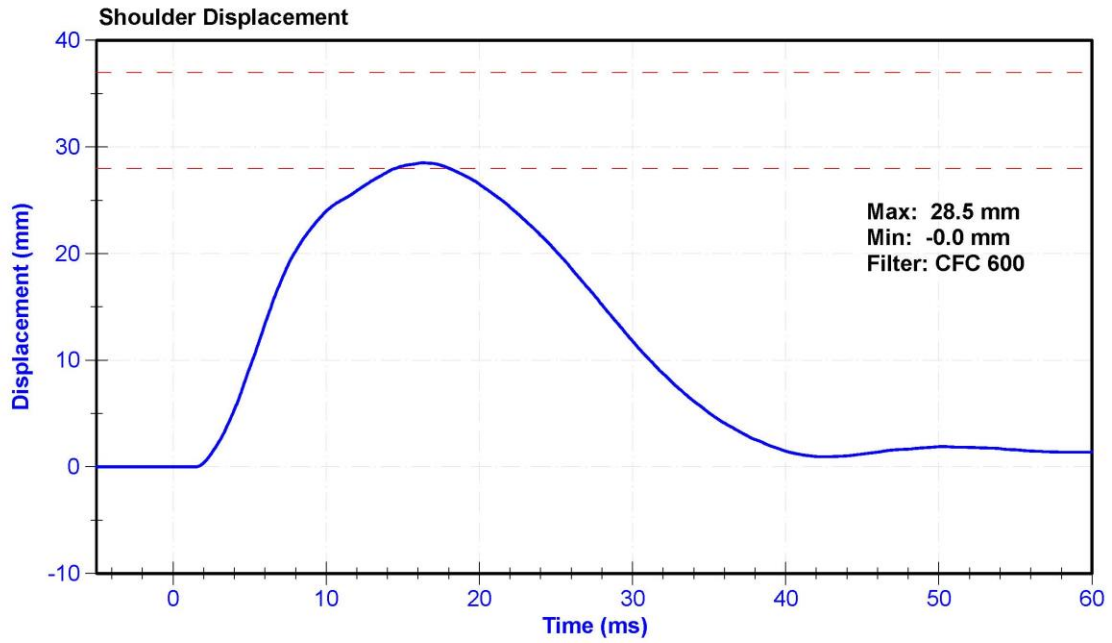
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	13	18	g's	16.6	Pass
Shoulder Deflection	28	37	mm	28.5	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/28/2019	4/27/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/28/2019	4/27/2020





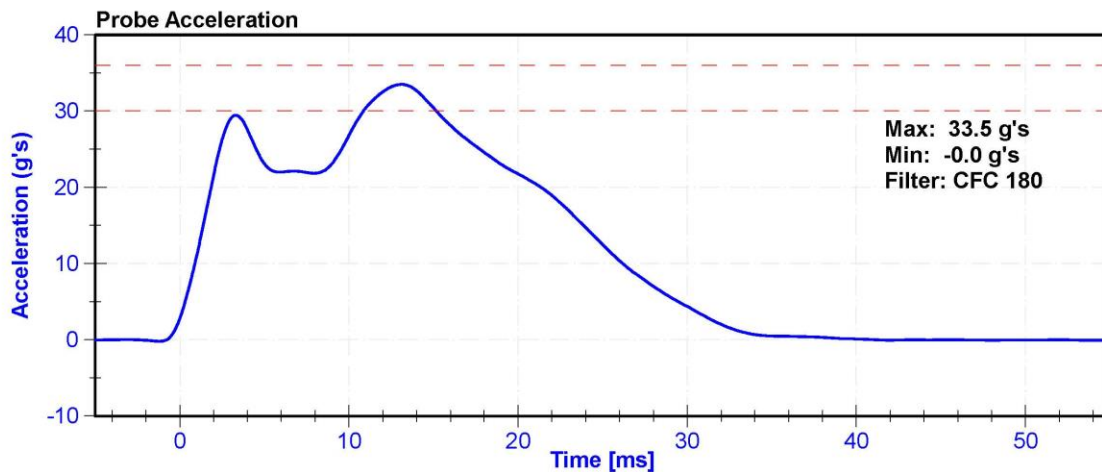
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

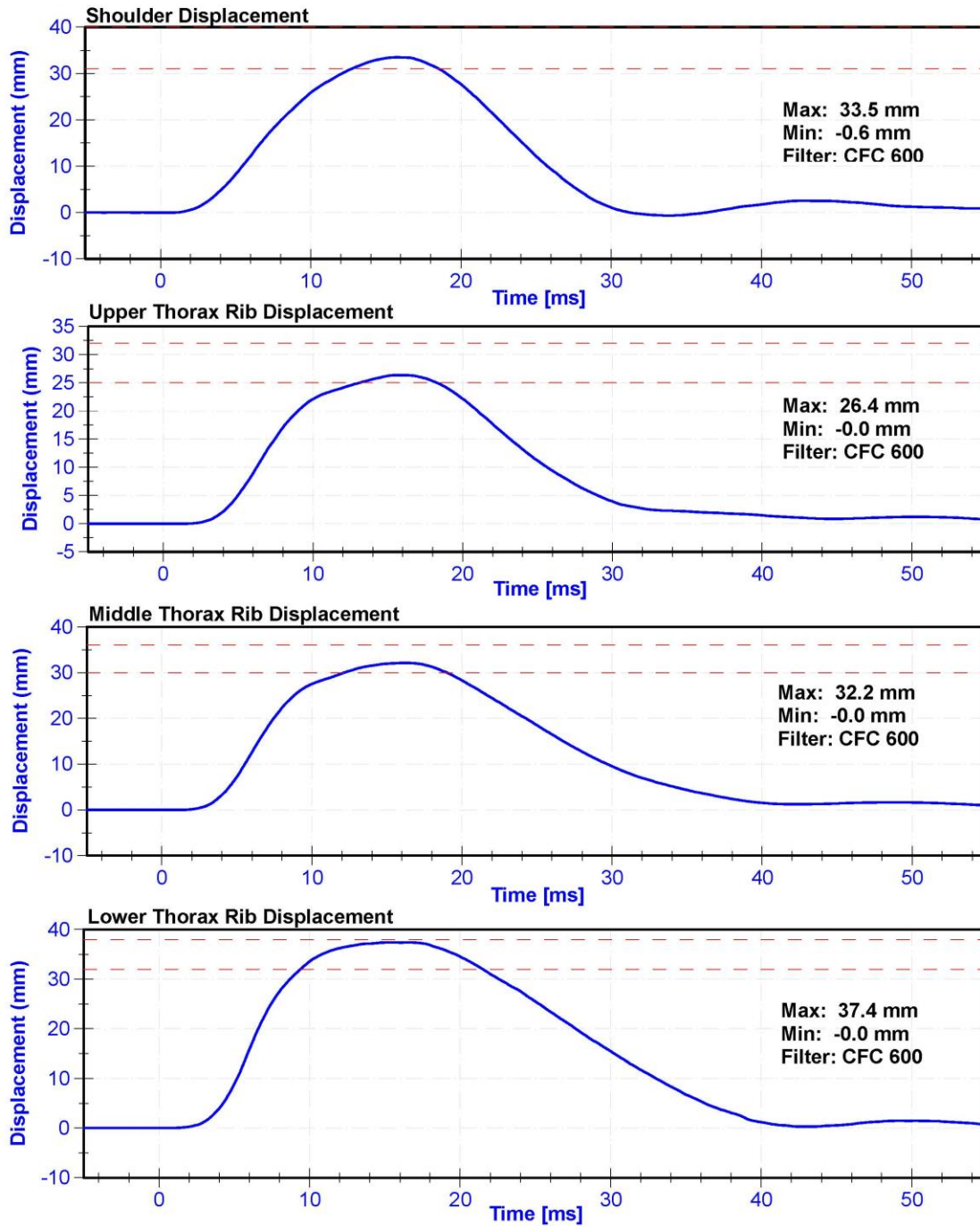
Results

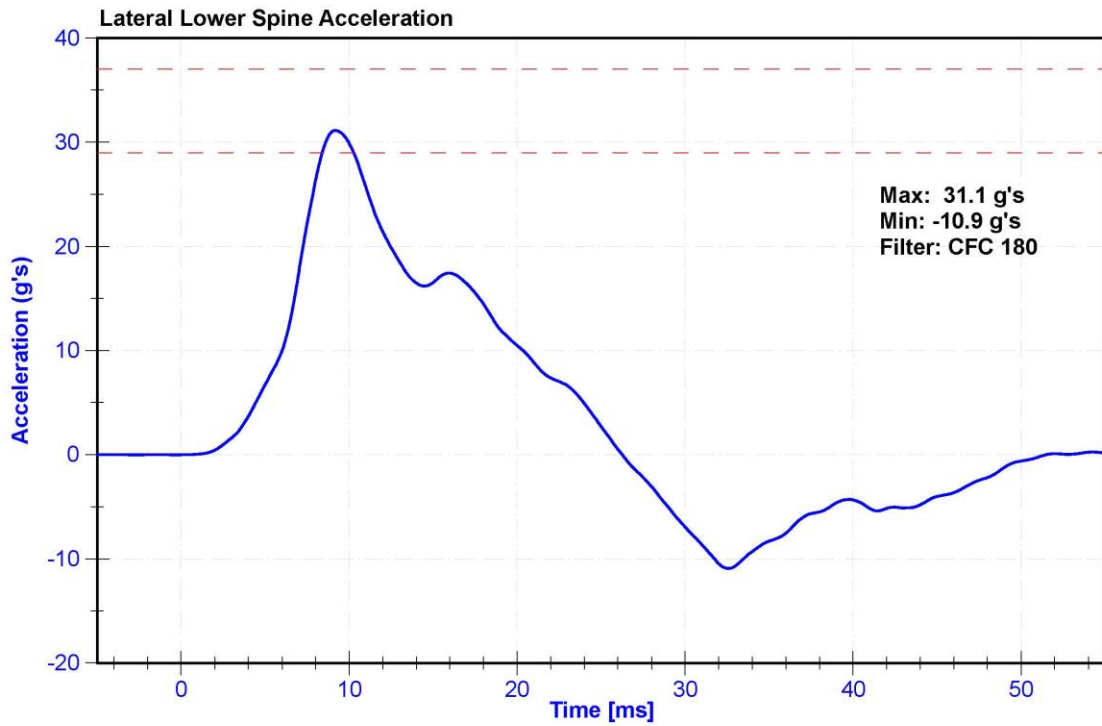
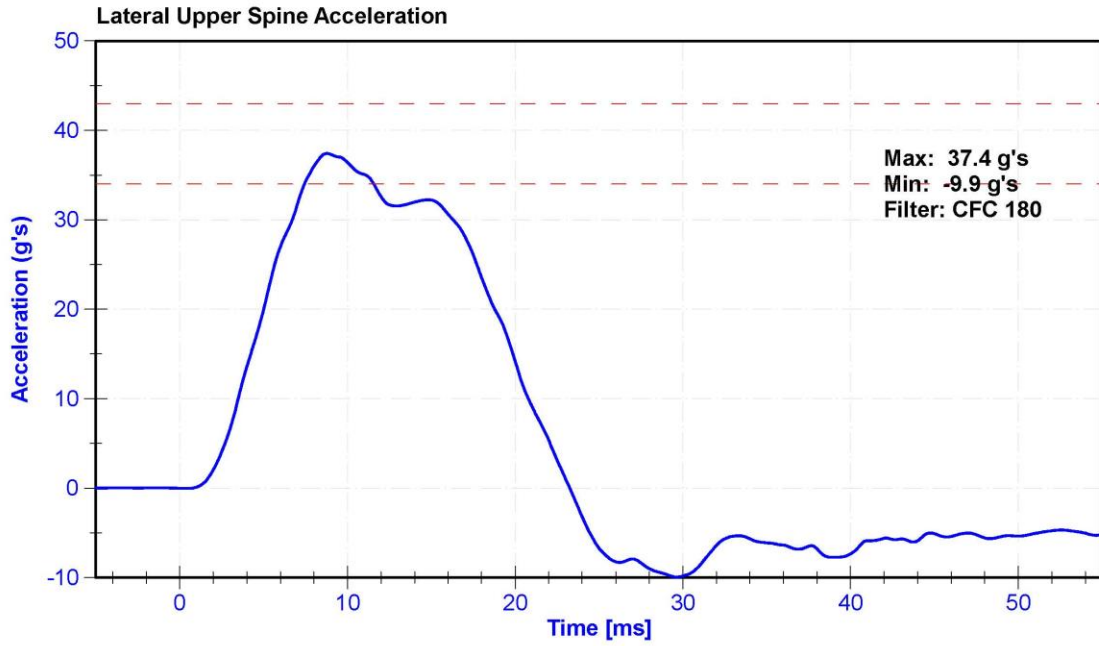
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	29.0	Pass
Velocity	6.6	6.8	m/s	6.77	Pass
Probe Acceleration after 5 ms	30	36	g's	33.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.1	Pass
Shoulder Deflection	31	40	mm	33.5	Pass
Upper Thorax Rib Deflection	25	32	mm	26.4	Pass
Mid Thorax Rib Deflection	30	36	mm	32.2	Pass
Lower Thorax Rib Deflection	32	38	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/28/2019	4/27/2020
Upper Spine T12 Y Accelerometer	ENDEVCO 7264CT	AC-P51327	9/30/2019	3/31/2020
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/28/2019	4/27/2020
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	10/28/2019	4/27/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/28/2019	4/27/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/28/2019	4/27/2020







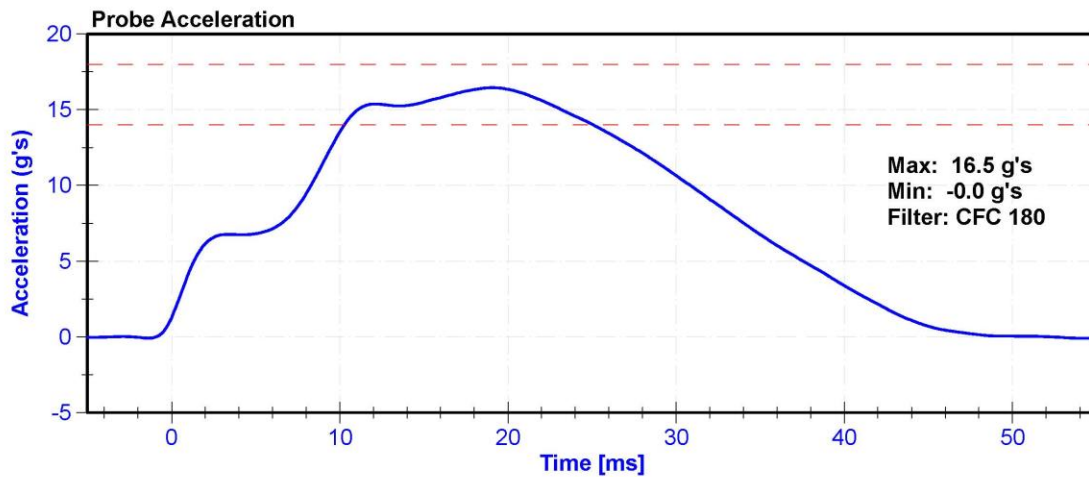
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

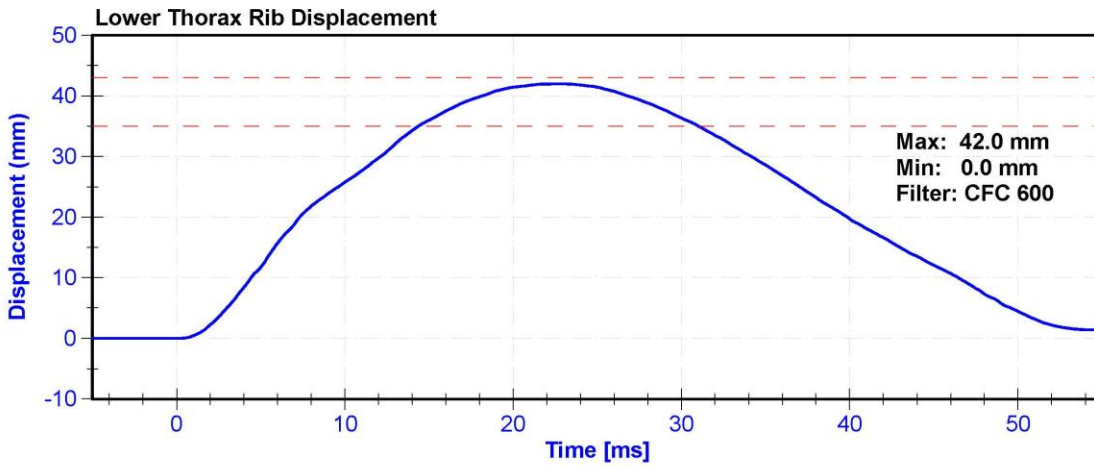
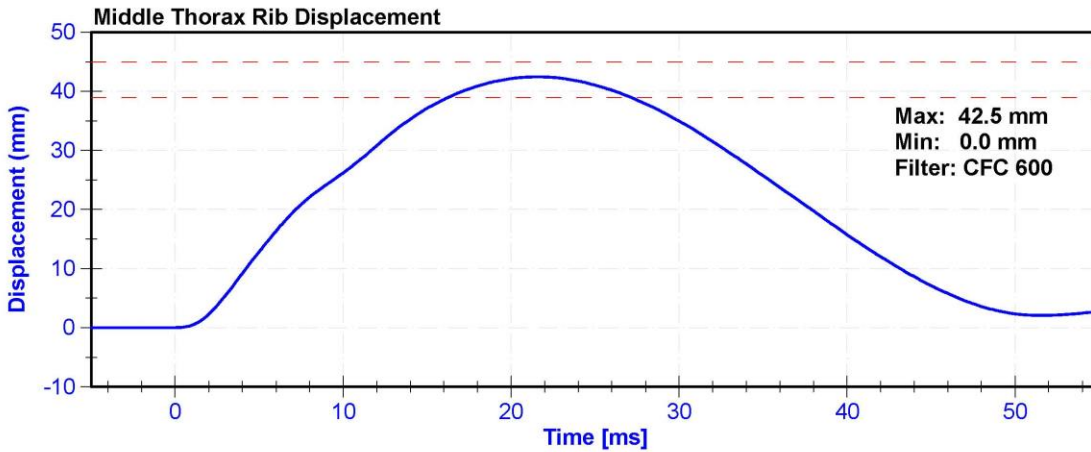
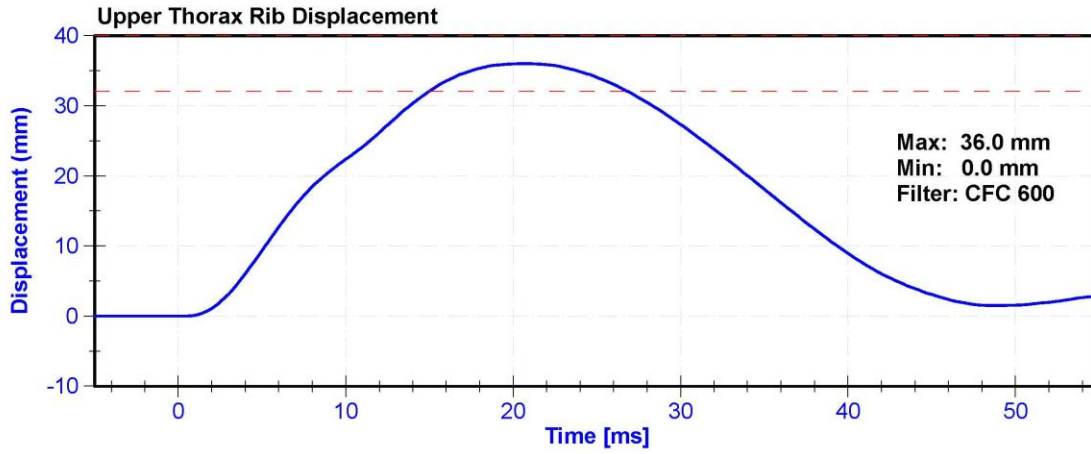
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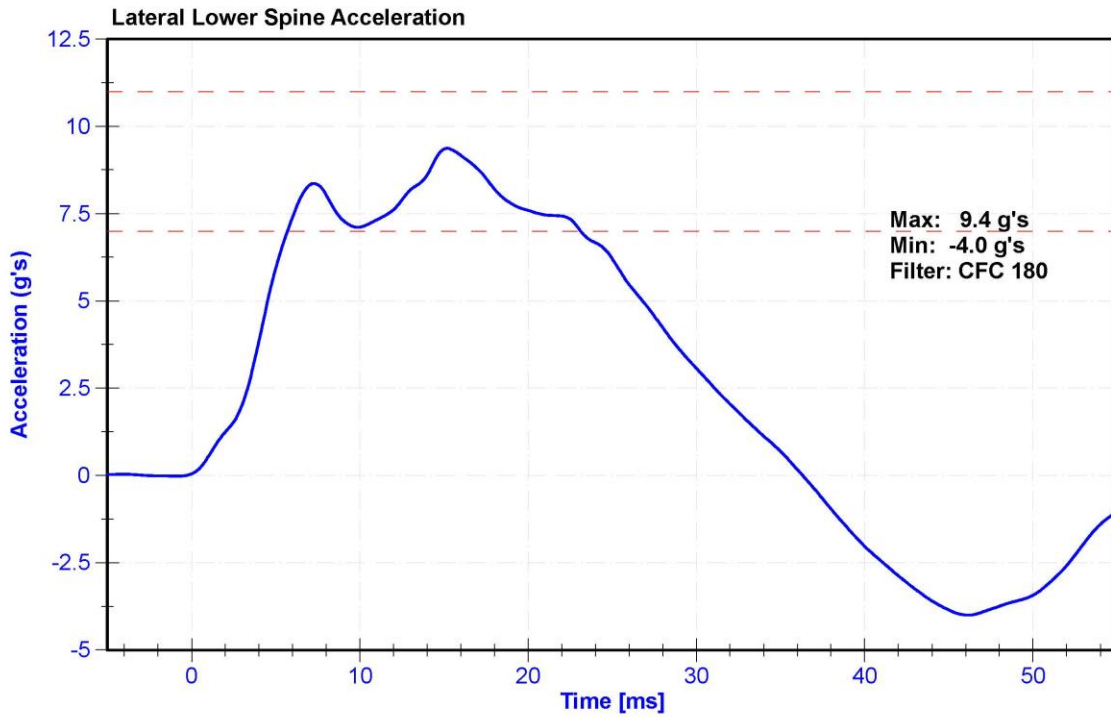
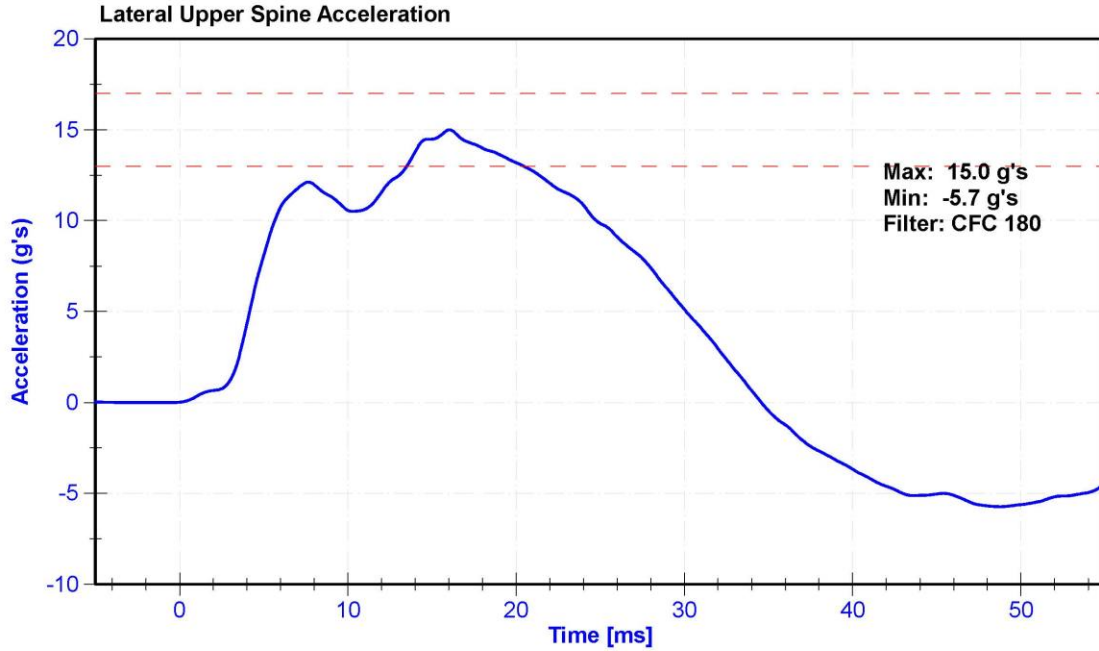
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	16.5	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.0	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.4	Pass
Upper Thorax Rib Deflection	32	40	mm	36.0	Pass
Middle Thorax Rib Deflection	39	45	mm	42.5	Pass
Lower Thorax Rib Deflection	35	43	mm	42.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/28/2019	4/27/2020
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51327	9/30/2019	3/31/2020
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	10/28/2019	4/27/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/28/2019	4/27/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/28/2019	4/27/2020







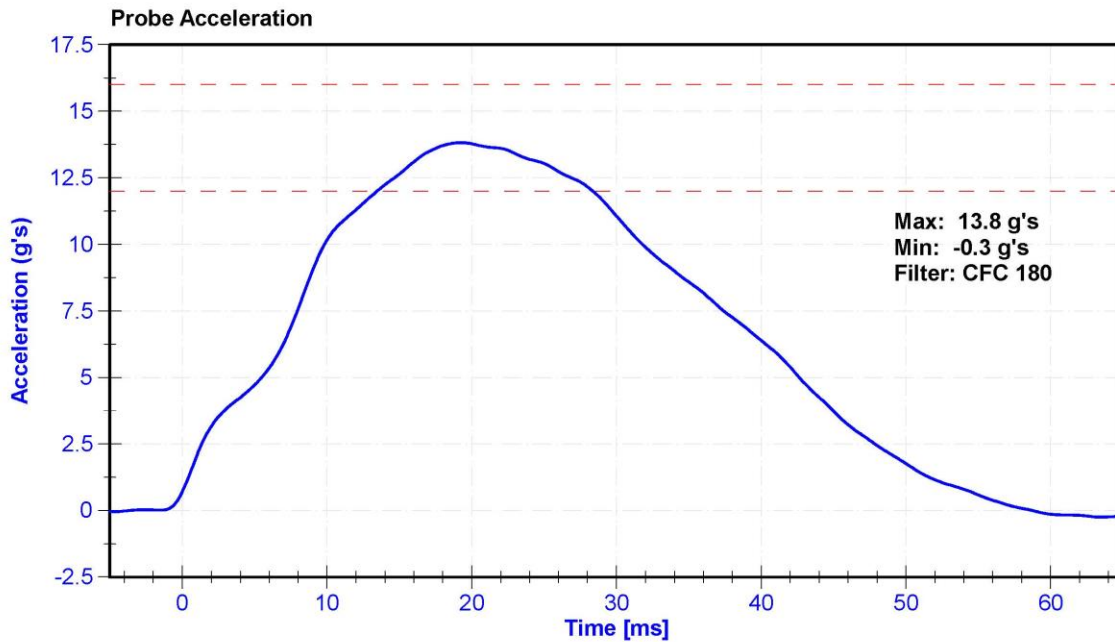
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

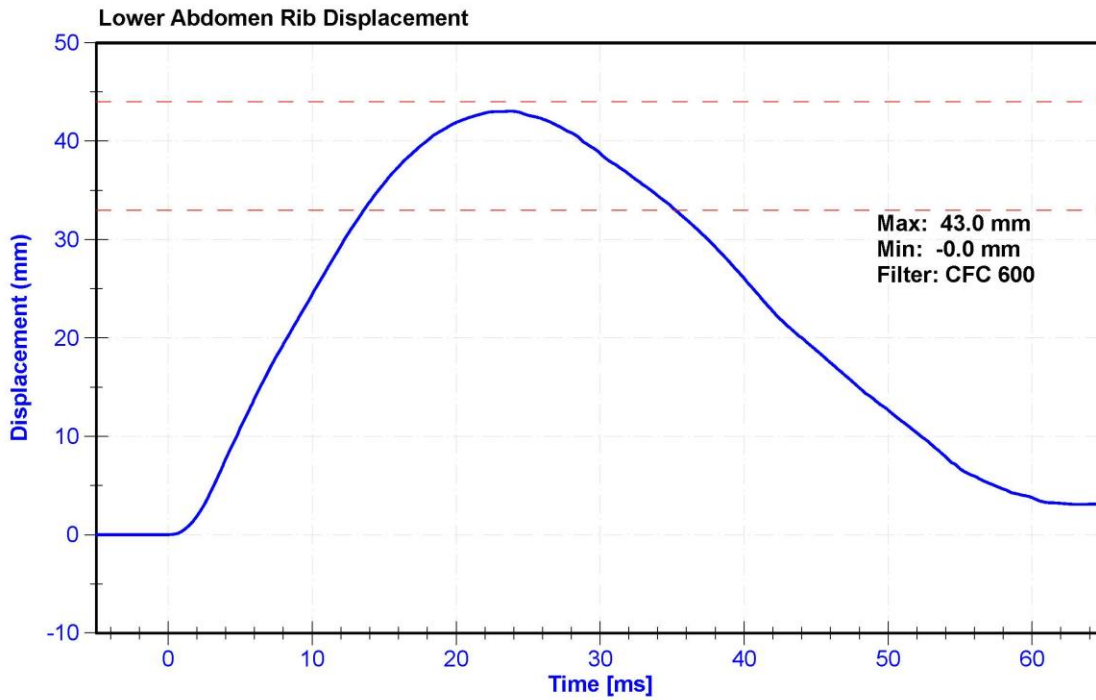
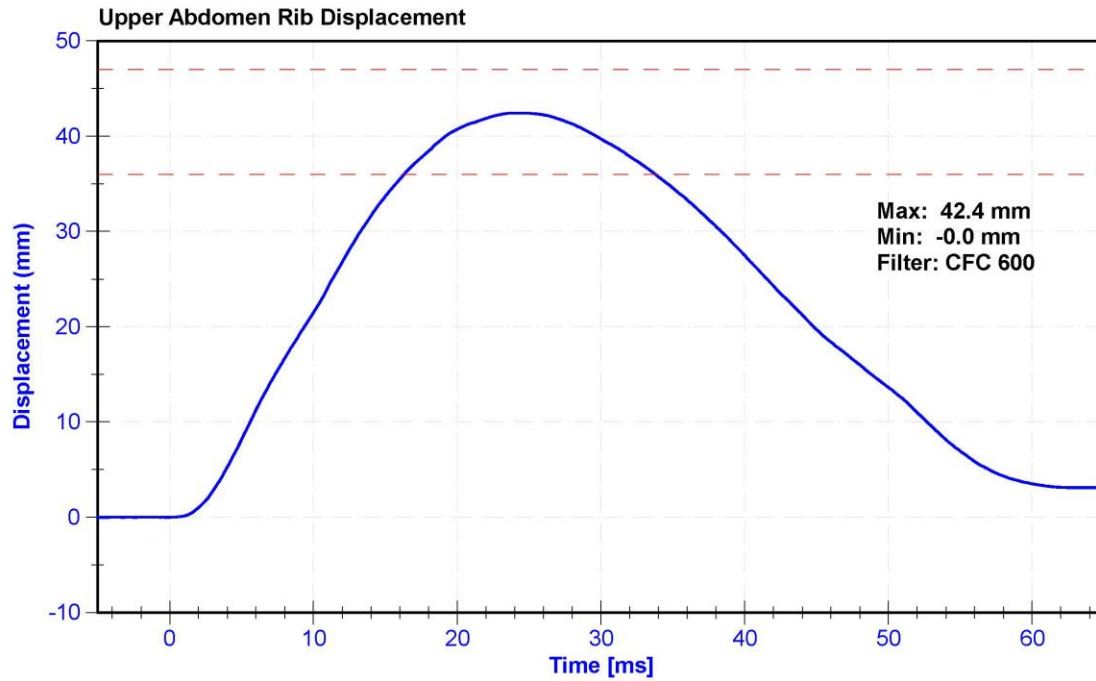
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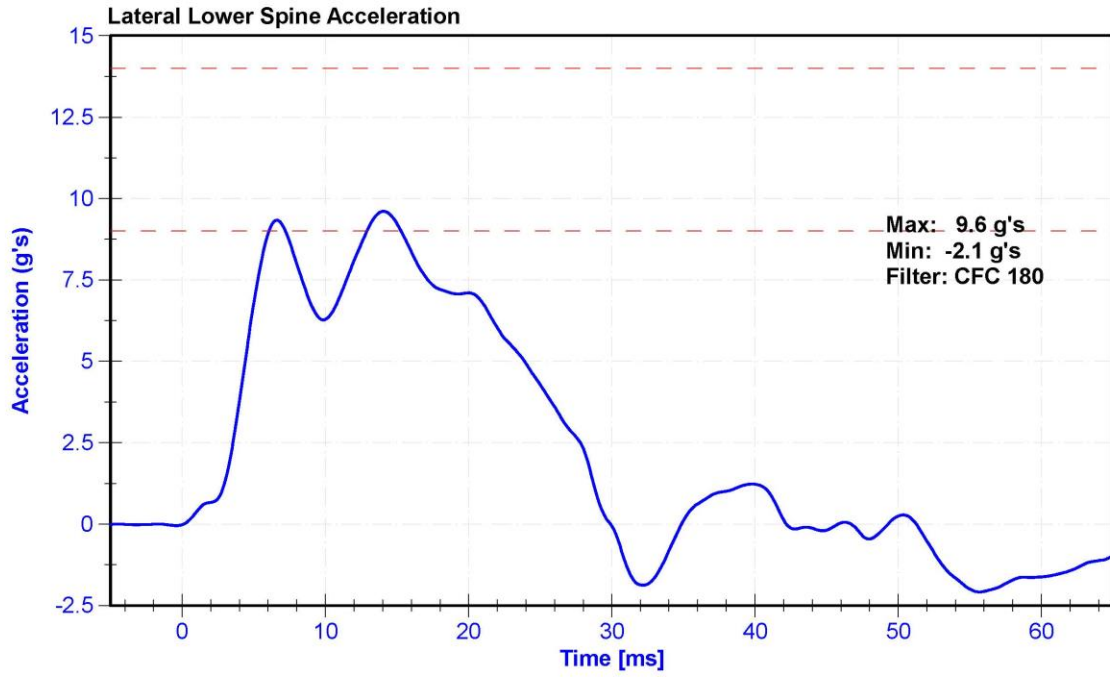
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	29.0	Pass
Velocity	4.2	4.4	m/s	4.21	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.6	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51327	9/30/2019	3/31/2020
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	10/28/2019	4/27/2020
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	10/28/2019	4/27/2020







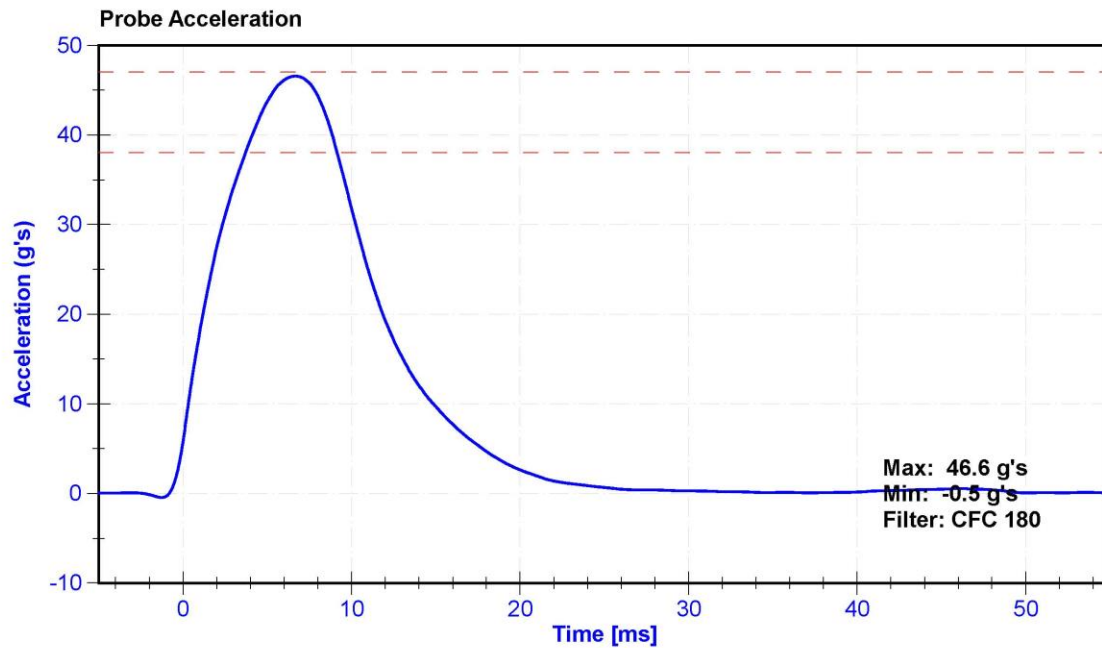
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

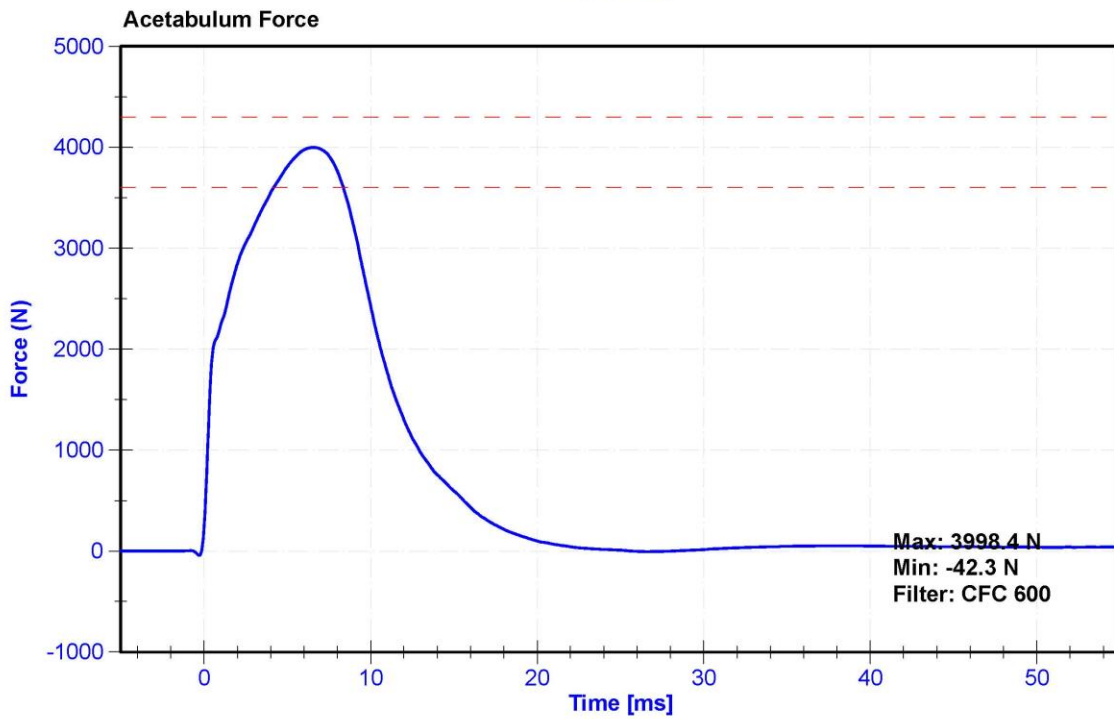
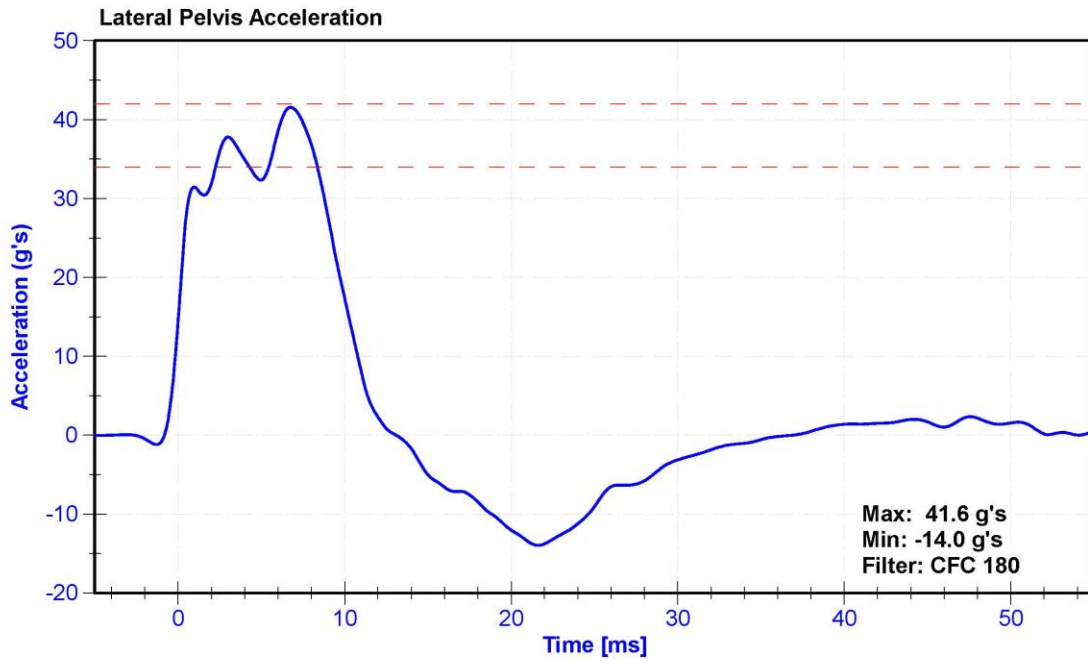
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	29	Pass
Velocity	6.6	6.8	m/s	6.60	Pass
Probe Acceleration	38	47	g's	46.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.6	Pass
Acetabulum Force	3600	4300	N	3998.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/28/2019	4/27/2020
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/14/2019	6/13/2020
Certification Plug	SACO	12576	10/3/2018	N/A
Crash Test Plug	SACO	12782	1/17/2019	N/A





*Desolda
Cesta 21/10/20*



SID-Its Pelvis Plug Certification Test

Plug S/N 12576

Test Number 7506

Report Number 7521

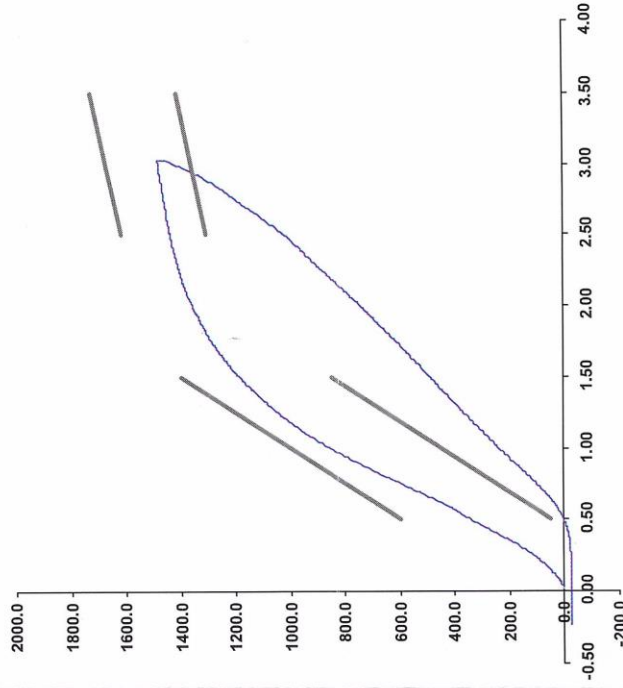
Test Date 10/3/2018 8:55:27 AM

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator
 Part Number 180-4450

Template No 107
 SACO Research

By: *DC* Date: *10/3/18*
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



SID-IIs Pelvis Plug Certification Test

Plug S/N 12782

Test Number 8114

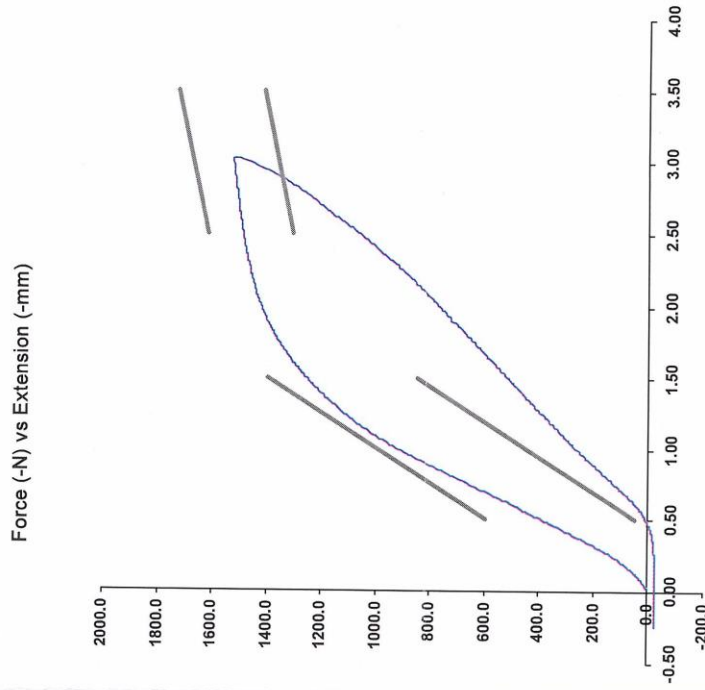
Report Number 8144

Test Date 1/17/2019 9:47:26 AM

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

Testing Machine STM-20 5965542
 Load Cell S/N (F1360947), 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 17-Jan-19
 SACO Research

By: DC Date: 1/17/2019

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

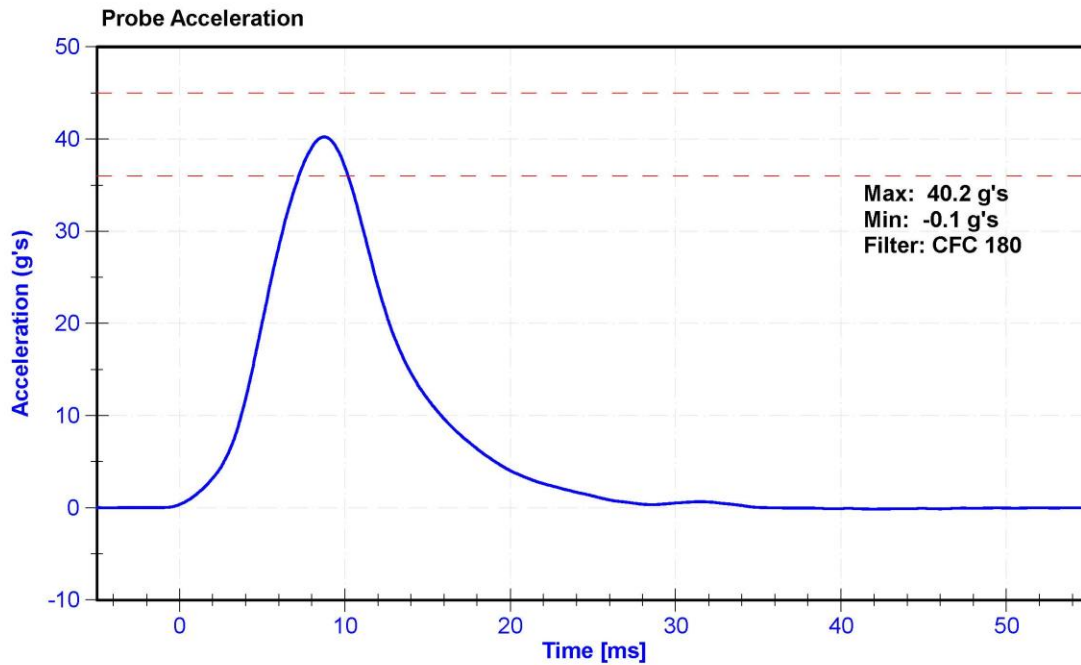
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

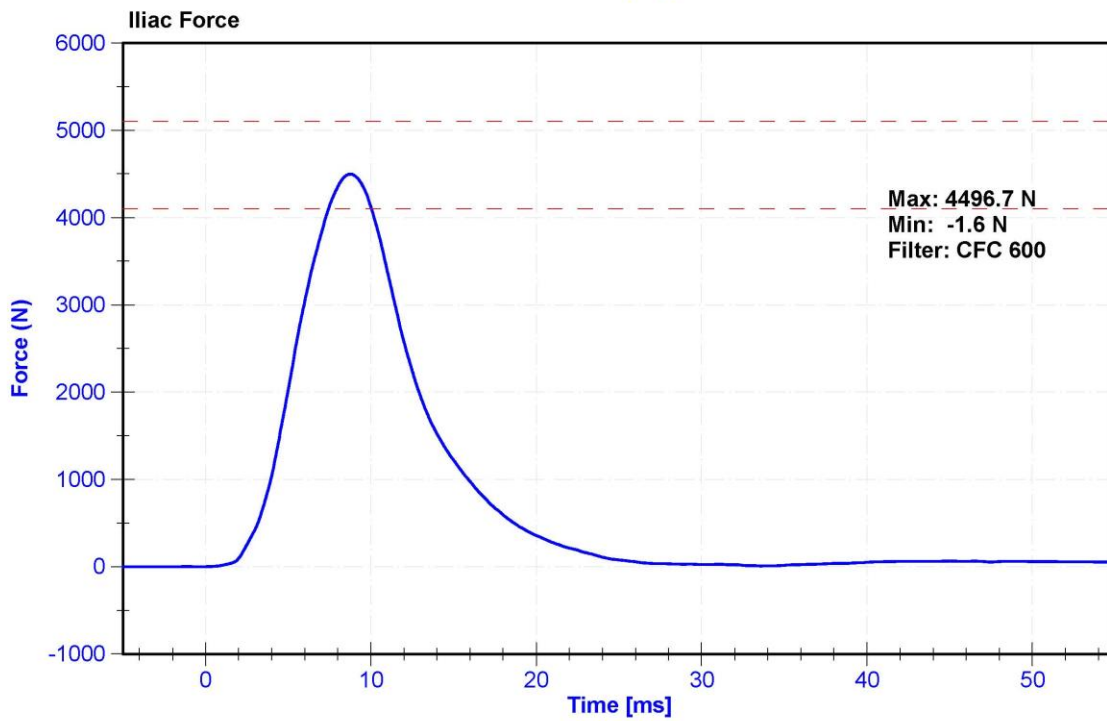
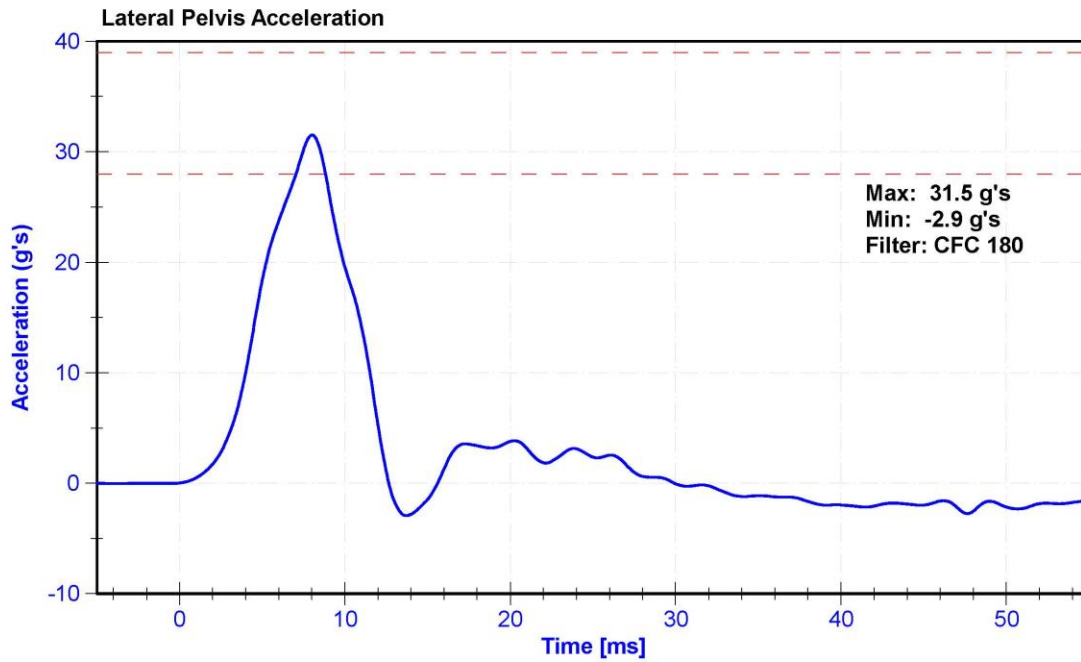
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	16.3	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	40.2	Pass
Lateral Pelvis Acceleration	28	39	g's	31.5	Pass
Iliac Force	4100	5100	N	4496.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/28/2019	4/27/2020
Iliac Load Cell	DENTON 3228J	LC-290Fy	9/25/2019	9/24/2020





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

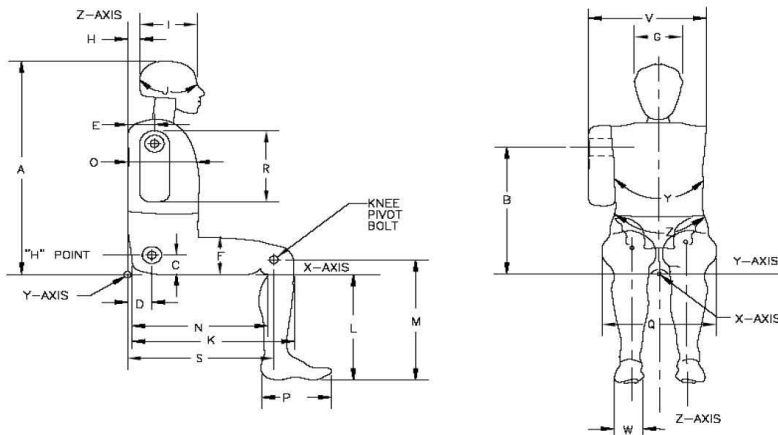


External Measurements - SID-IIs

Technician: K. Dutton

Date: 03/03/2020

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	779	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	224	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	255	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	345	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	781	Pass

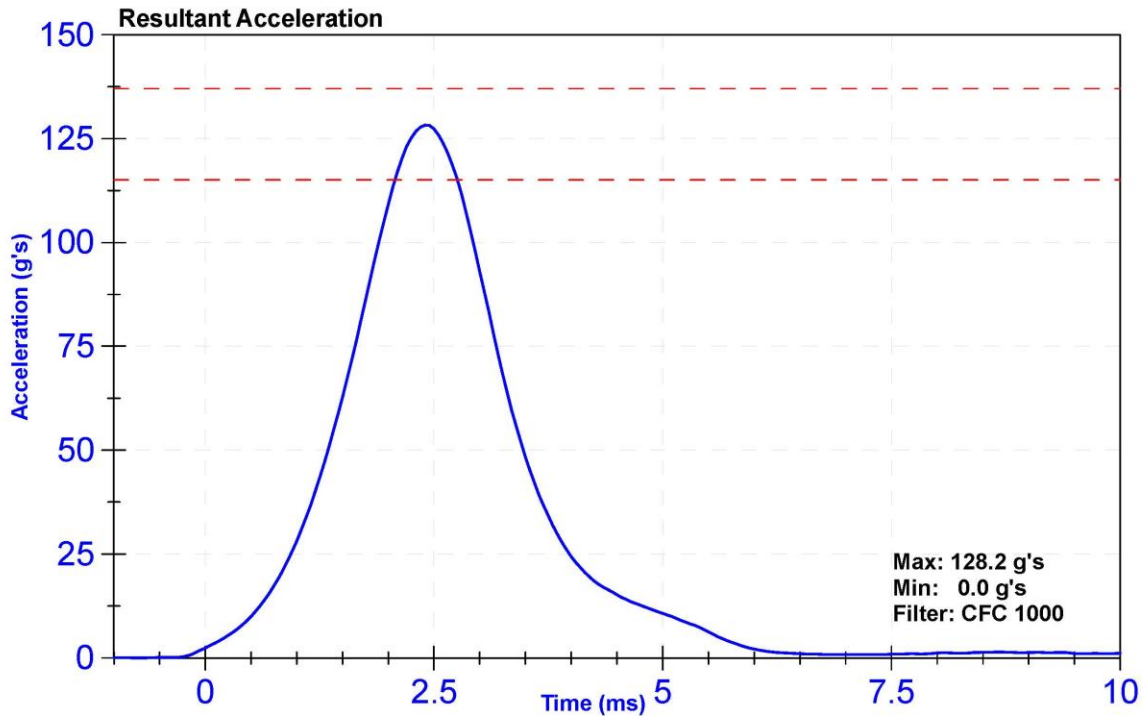
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

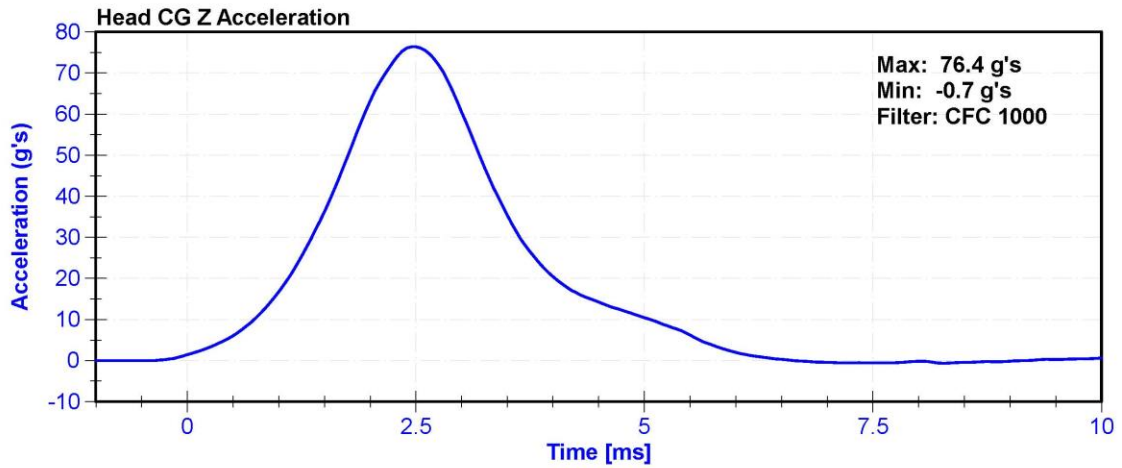
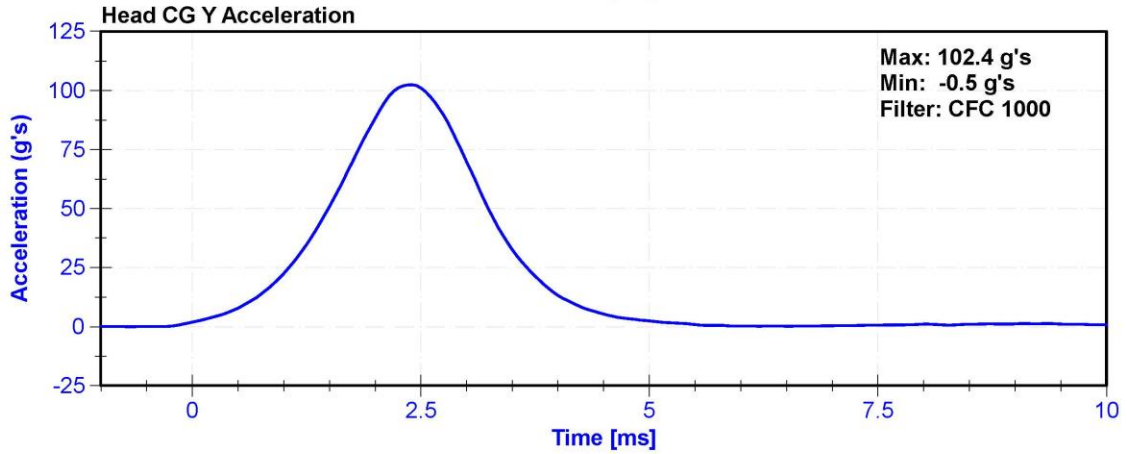
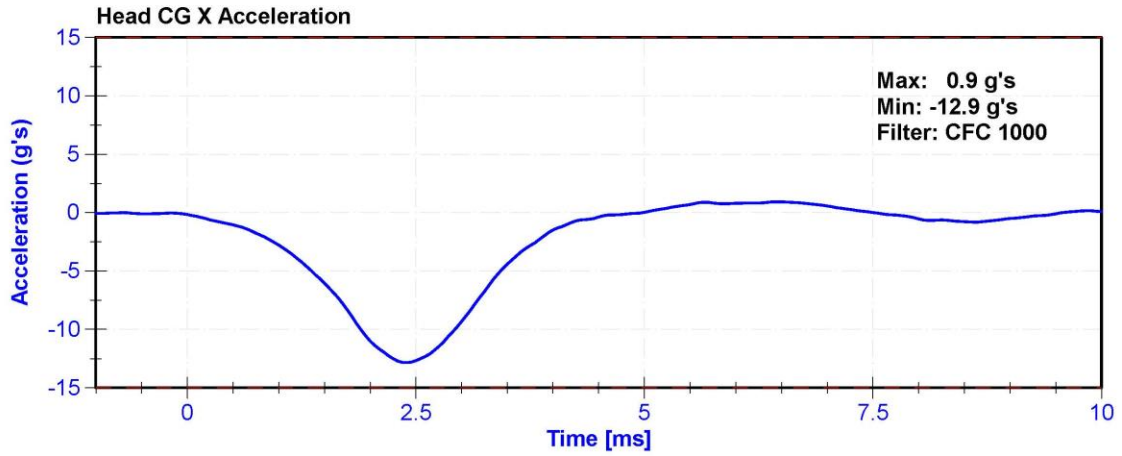
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	30.4	Pass
Resultant Acceleration	115	137	g's	128.2	Pass
Oscillation	0	15	%	1.1	Pass
Fore-Aft Acceleration	-15	15	g's	-12.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P74788	10/28/2019	4/27/2020
Y Accelerometer	ENDEVCO 7264CT	AC-P83432	10/28/2019	4/27/2020
Z Accelerometer	ENDEVCO 7264	AC-P83319	10/28/2019	4/27/2020





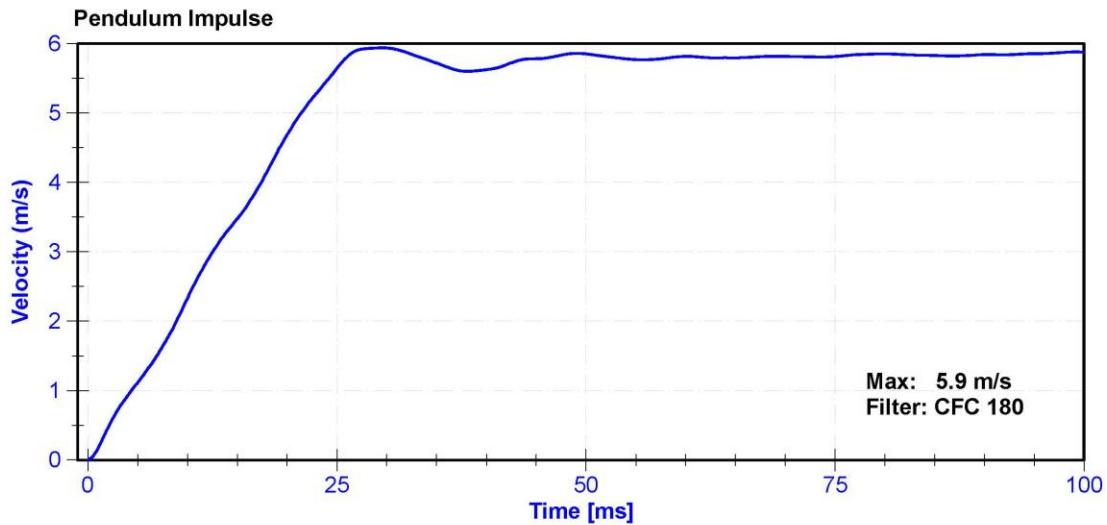
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

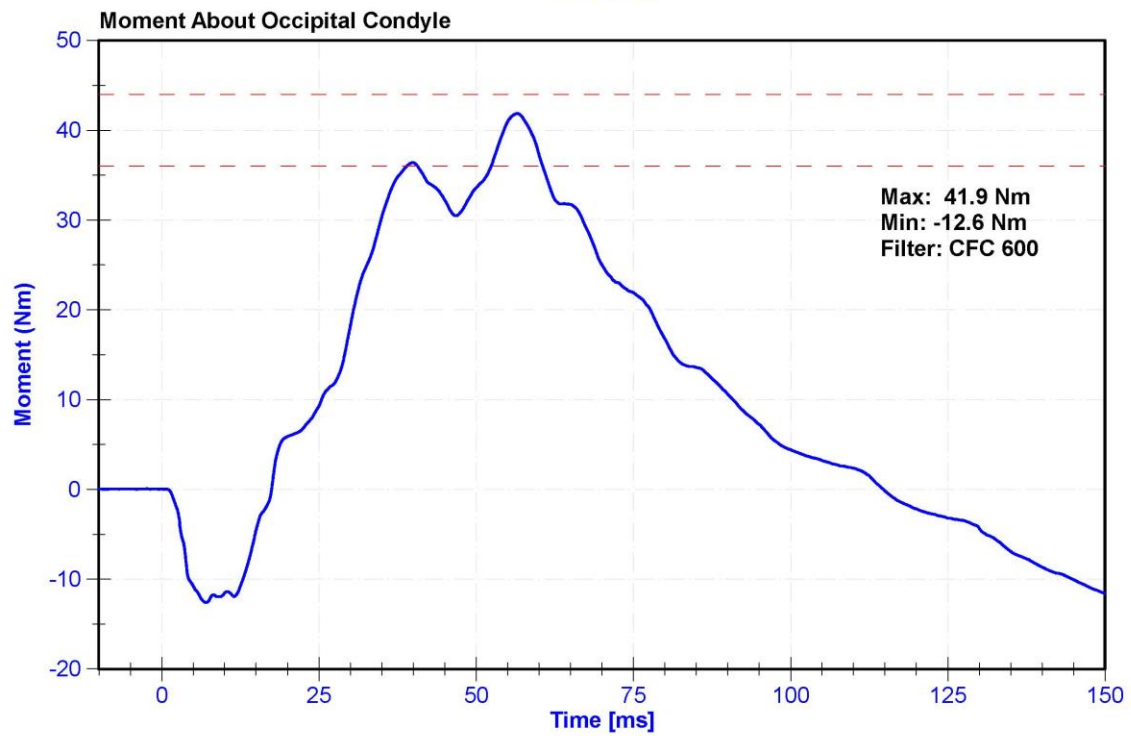
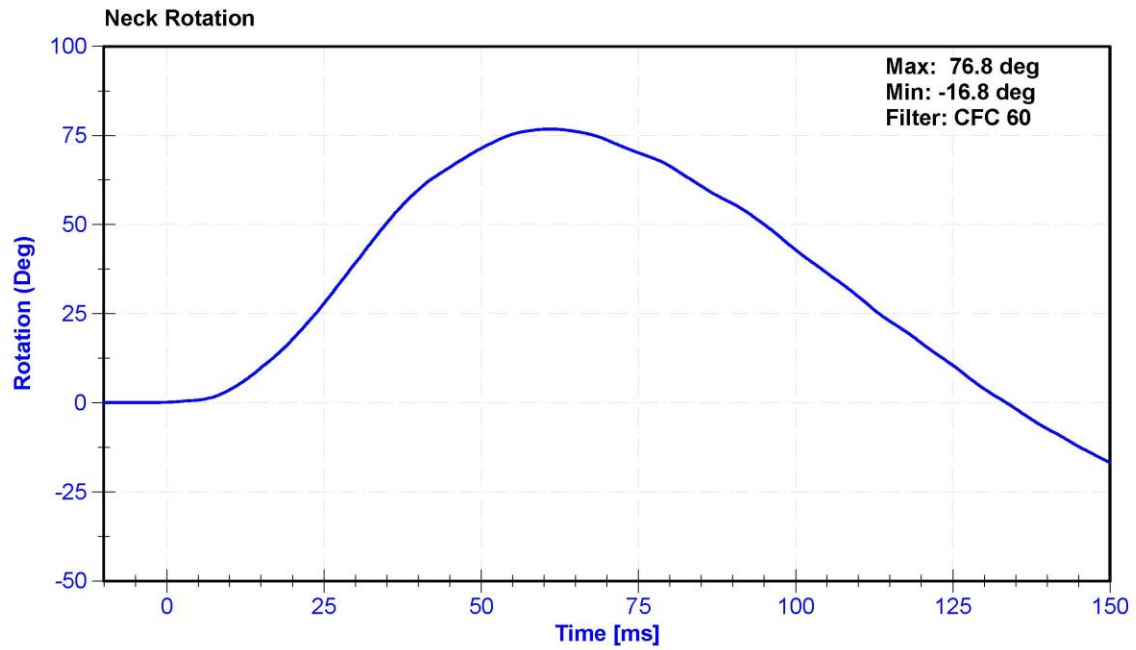
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	30	Pass
Velocity	5.51	5.63	m/s	5.514	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.33	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.47	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.68	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.64	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.94	Pass
Neck Rotation	71	81	deg	76.8	Pass
Time at Maximum Rotation	50	70	ms	60.9	Pass
Moment about the OC	36	44	Nm	41.9	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-AH5M9 Pend	1/30/2020	1/29/2021
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/4/2019	11/3/2020
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/4/2019	11/3/2020
Upper Neck Load Cell	Denton 1716A	LC-2192Fy	6/20/2019	6/19/2020





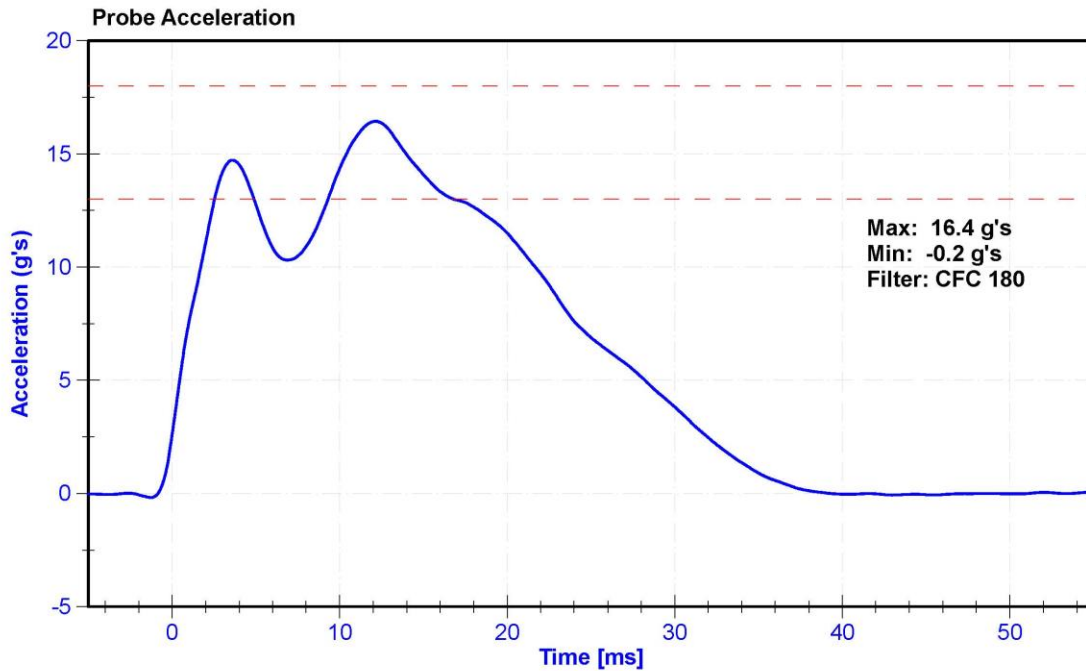
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

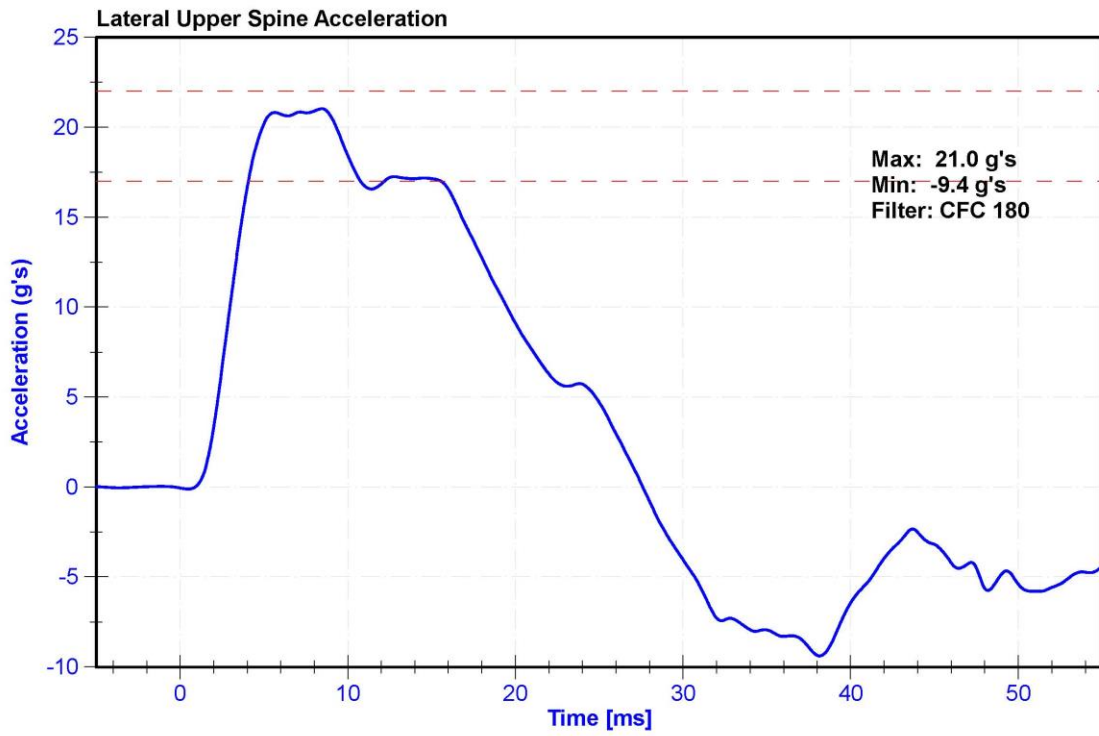
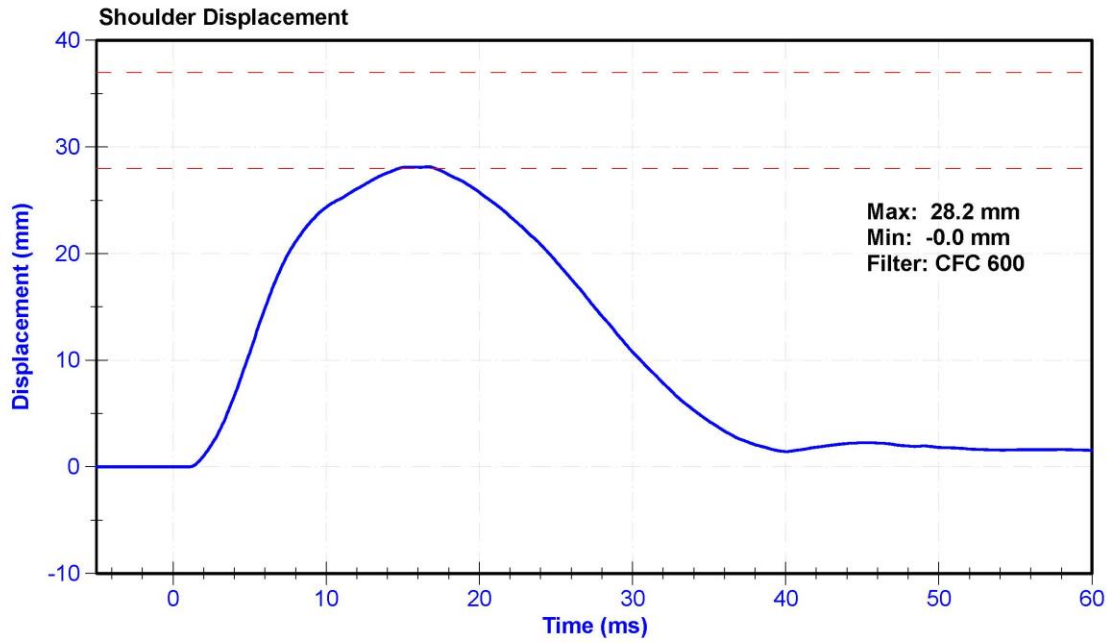
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	39	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	13	18	g's	16.4	Pass
Shoulder Deflection	28	37	mm	28.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	21.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/28/2019	4/27/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/28/2019	4/27/2020





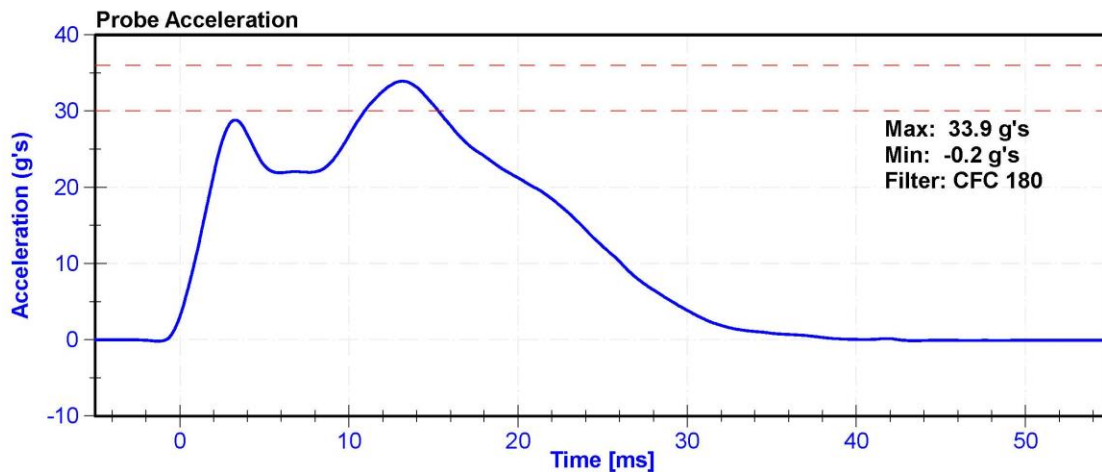
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

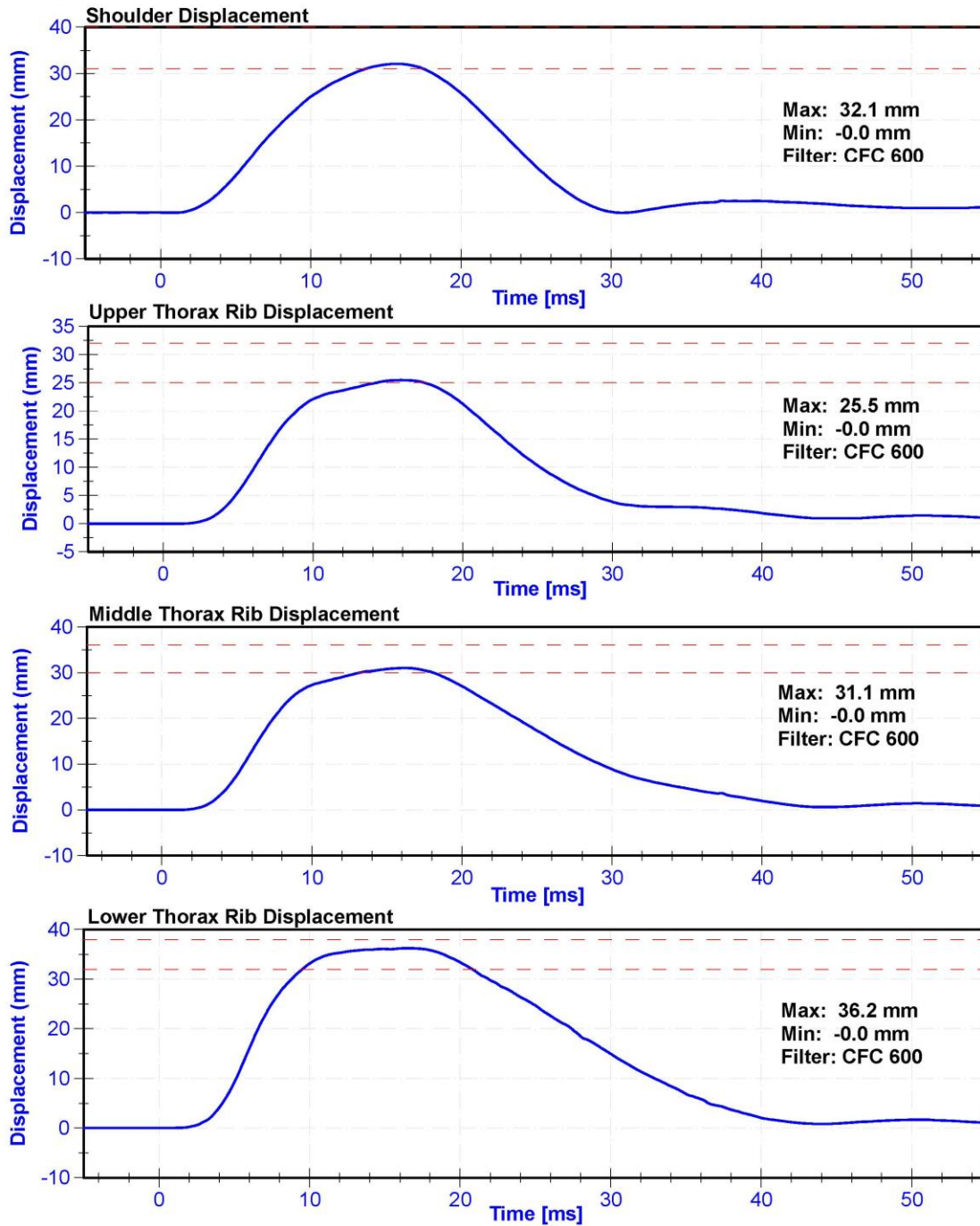
Results

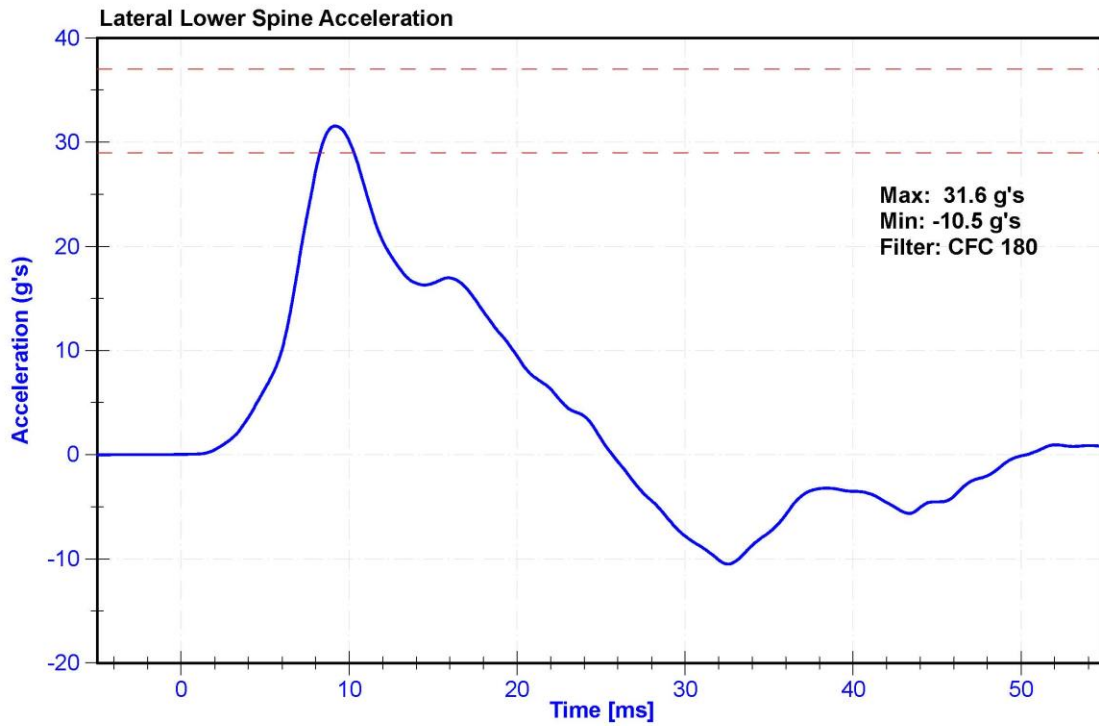
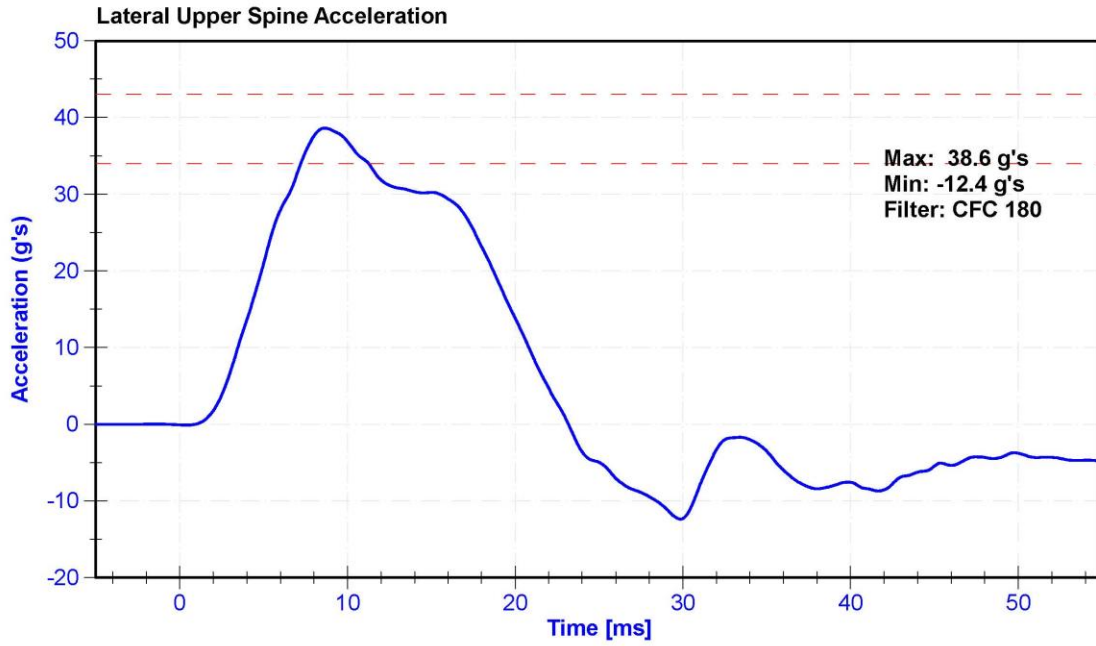
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	30.0	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	33.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.6	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.6	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	31.1	Pass
Lower Thorax Rib Deflection	32	38	mm	36.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/28/2019	4/27/2020
Upper Spine T12 Y Accelerometer	ENDEVCO 7264CT	AC-P51327	9/30/2019	3/31/2020
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/28/2019	4/27/2020
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	10/28/2019	4/27/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/28/2019	4/27/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/28/2019	4/27/2020







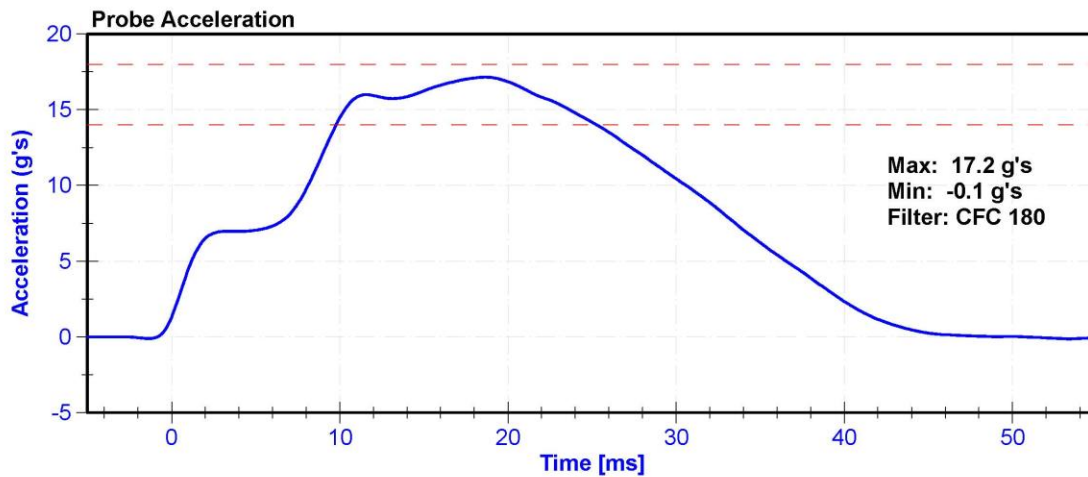
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

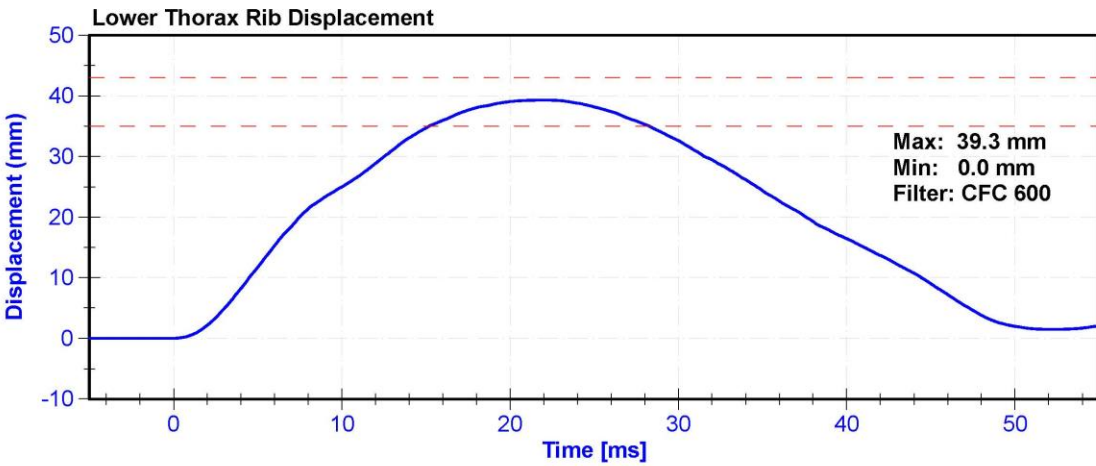
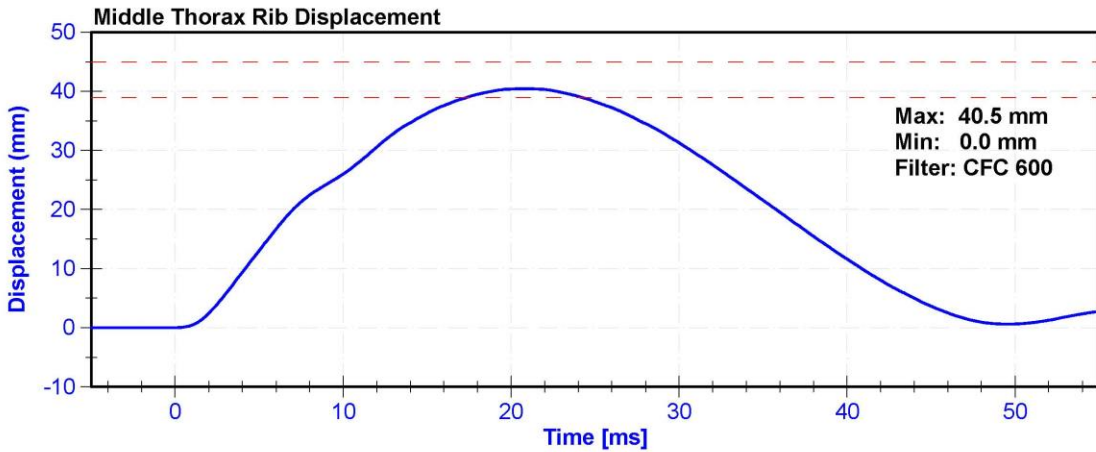
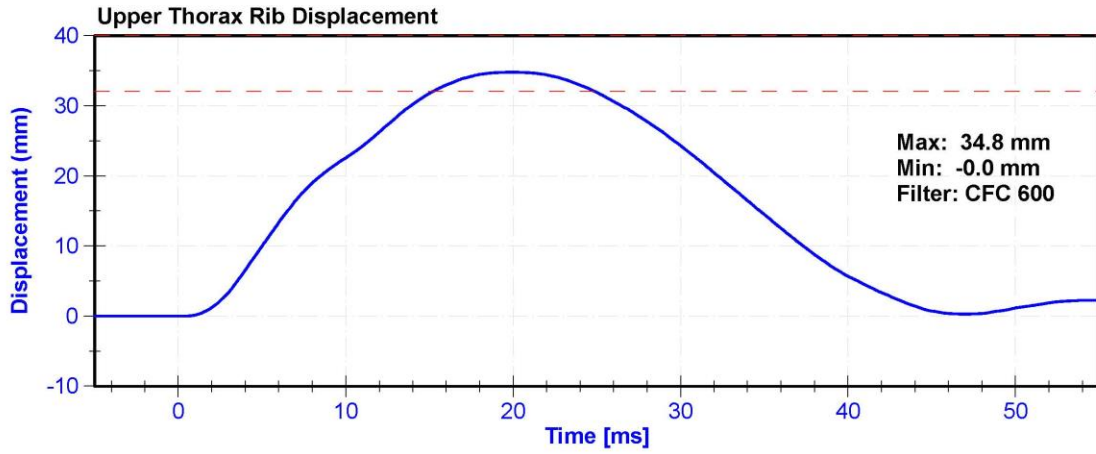
Results

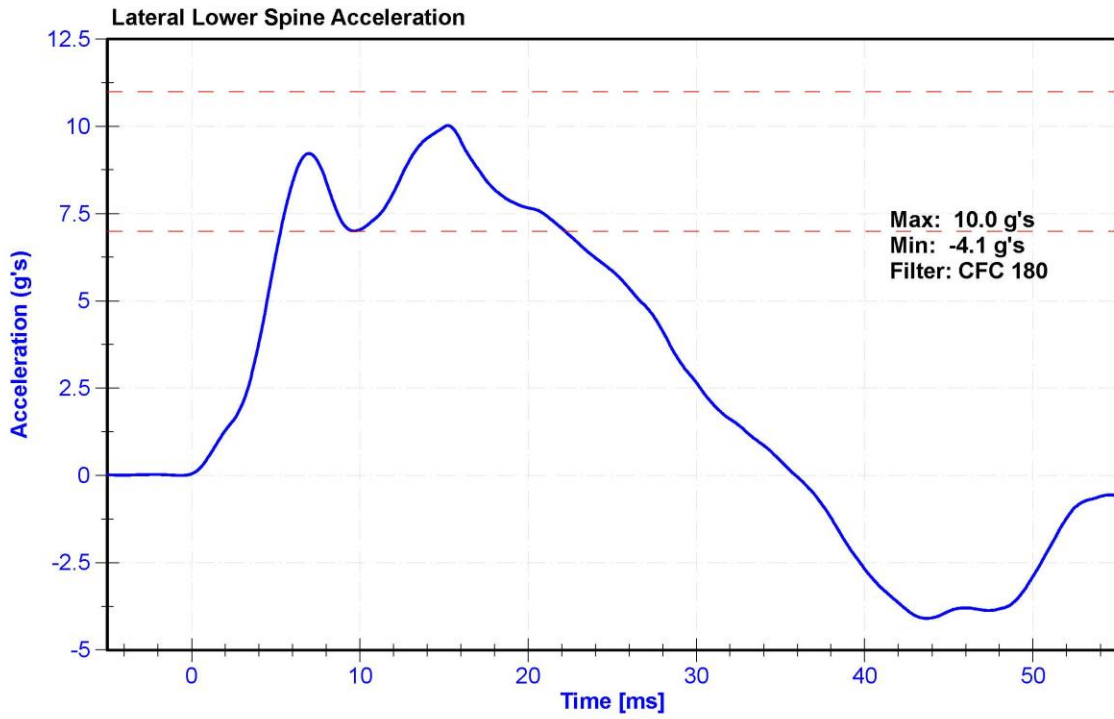
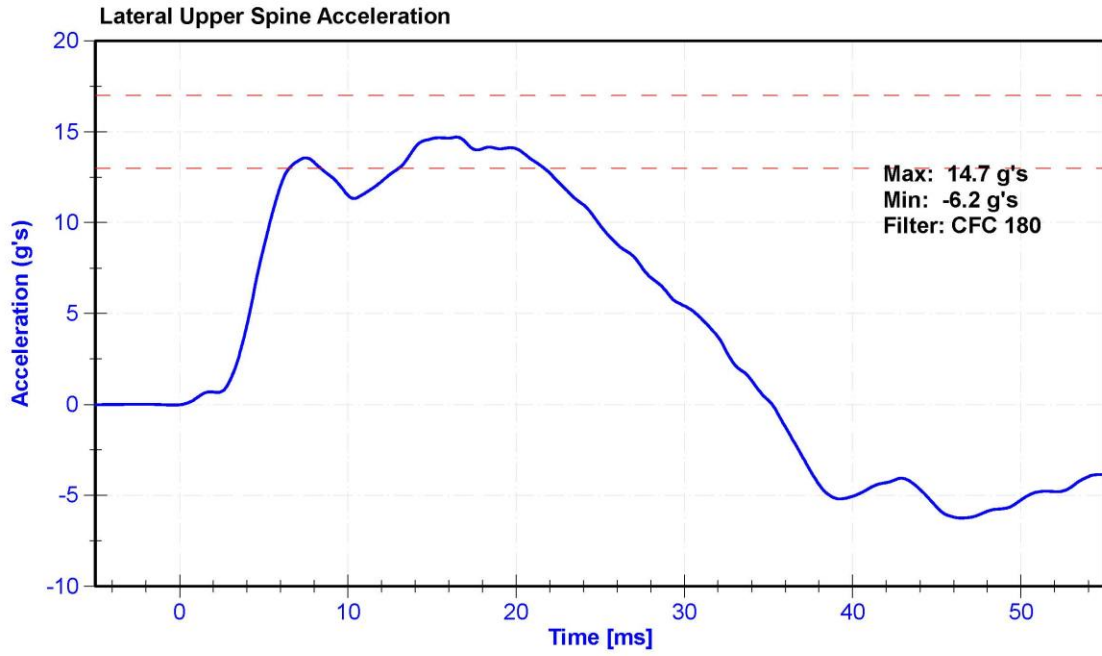
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	30	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	14	18	g's	17.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.0	Pass
Upper Thorax Rib Deflection	32	40	mm	34.8	Pass
Middle Thorax Rib Deflection	39	45	mm	40.5	Pass
Lower Thorax Rib Deflection	35	43	mm	39.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/28/2019	4/27/2020
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51327	9/30/2019	3/31/2020
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	10/28/2019	4/27/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/28/2019	4/27/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/28/2019	4/27/2020







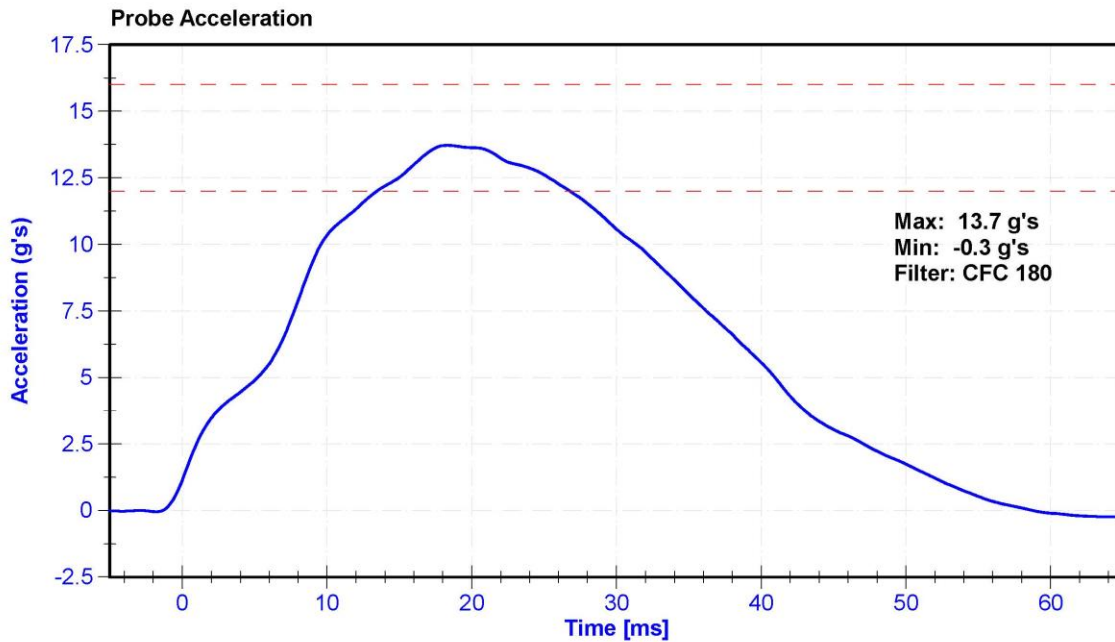
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

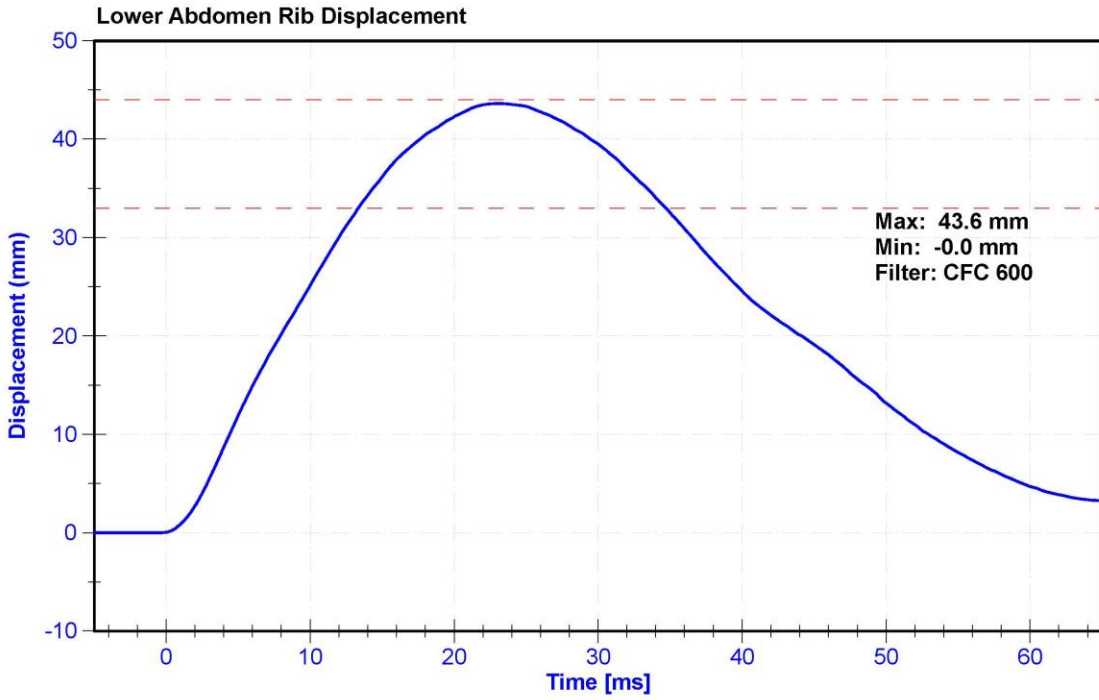
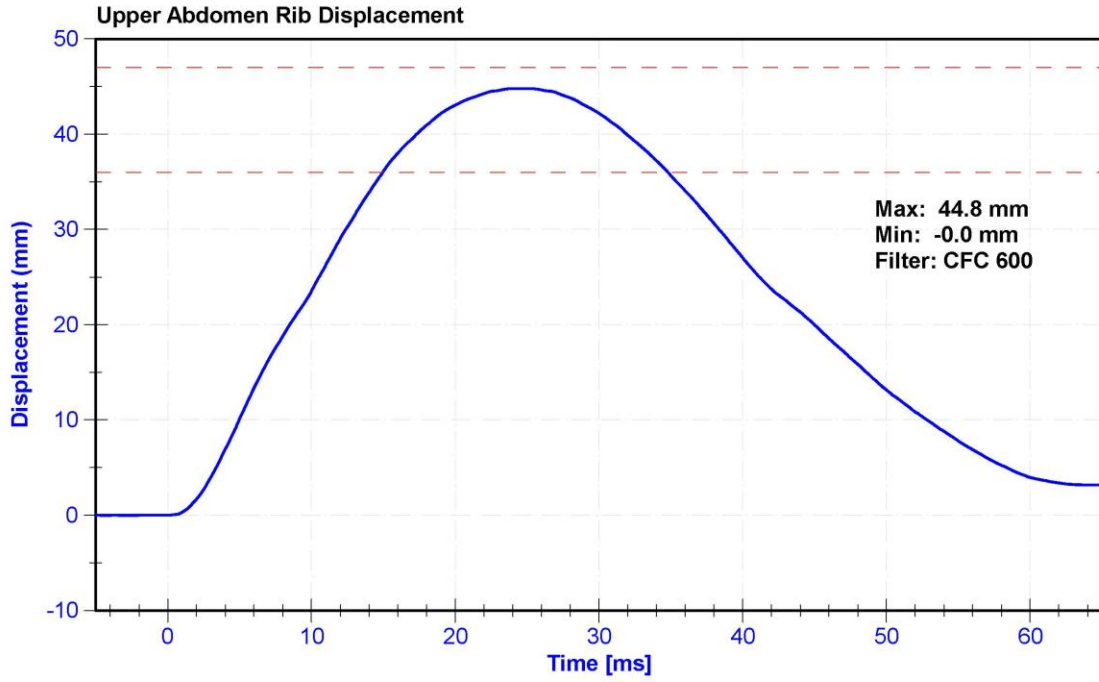
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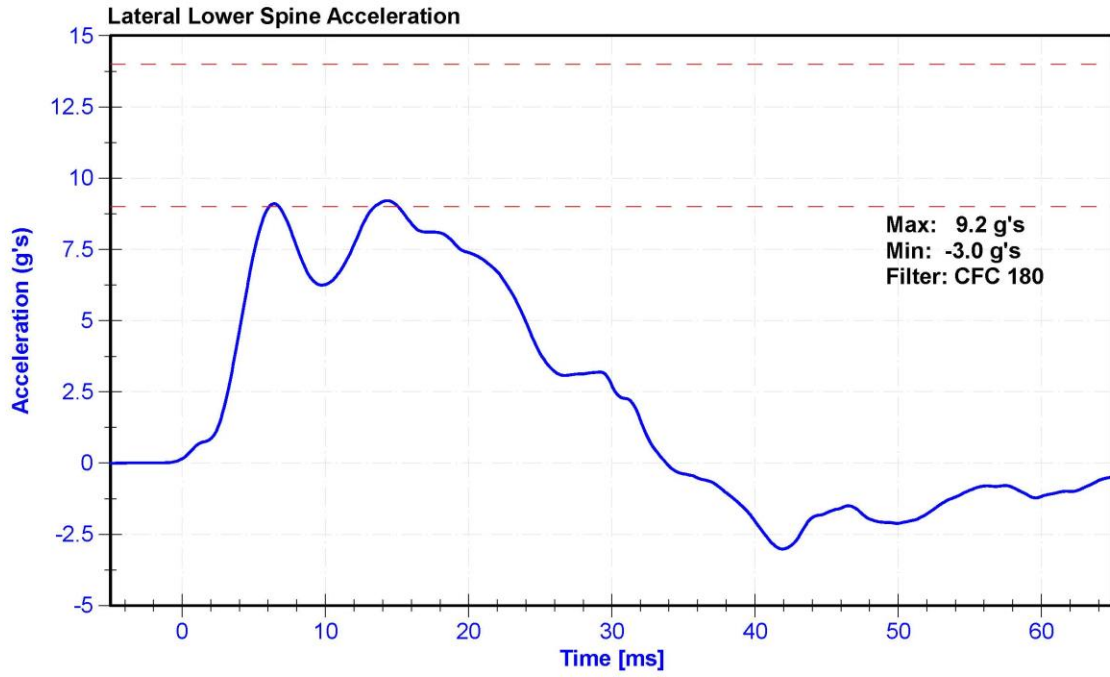
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	30.0	Pass
Velocity	4.2	4.4	m/s	4.22	Pass
Probe Acceleration	12	16	g's	13.7	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.2	Pass
Upper Abdomen Rib Deflection	36	47	mm	44.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51327	9/30/2019	3/31/2020
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	10/28/2019	4/27/2020
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	10/28/2019	4/27/2020







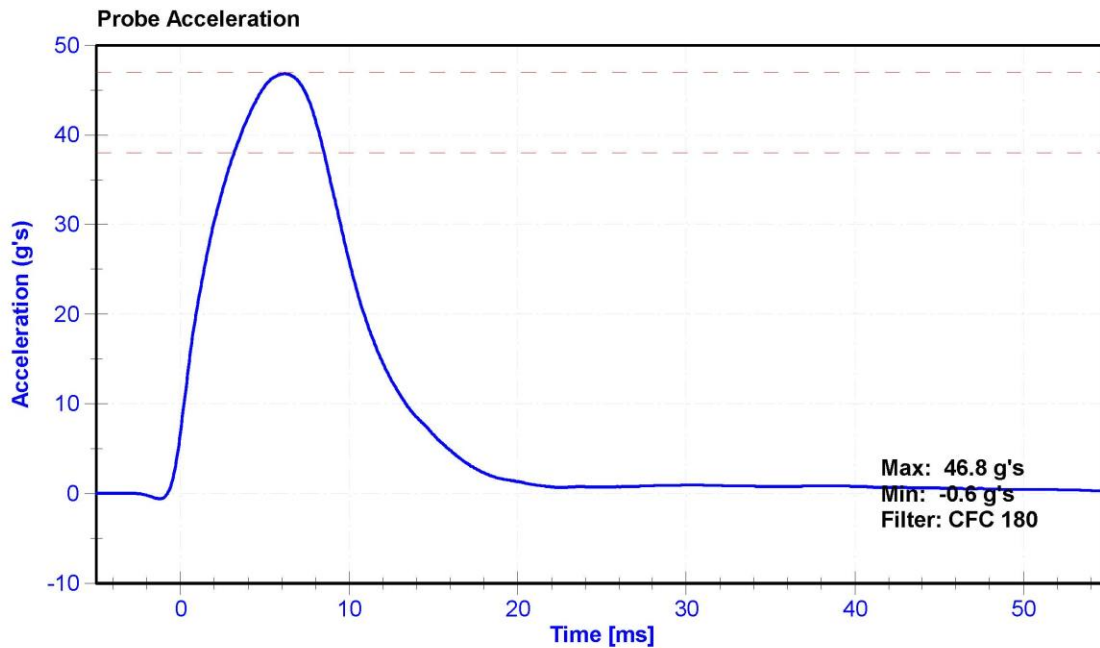
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

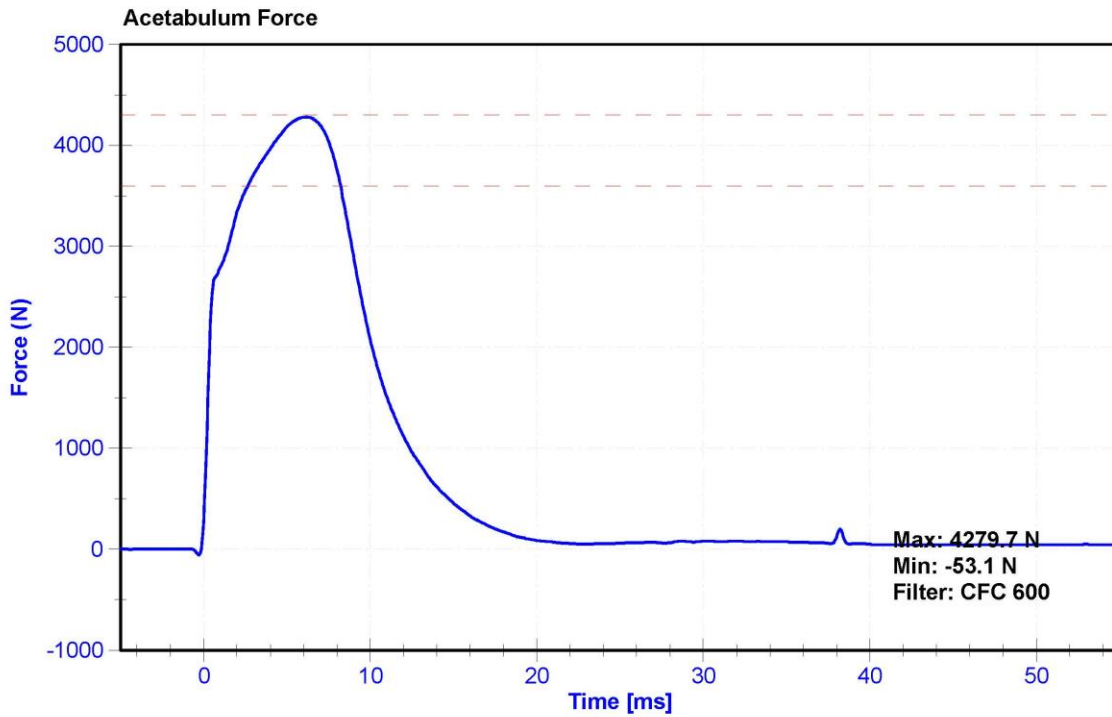
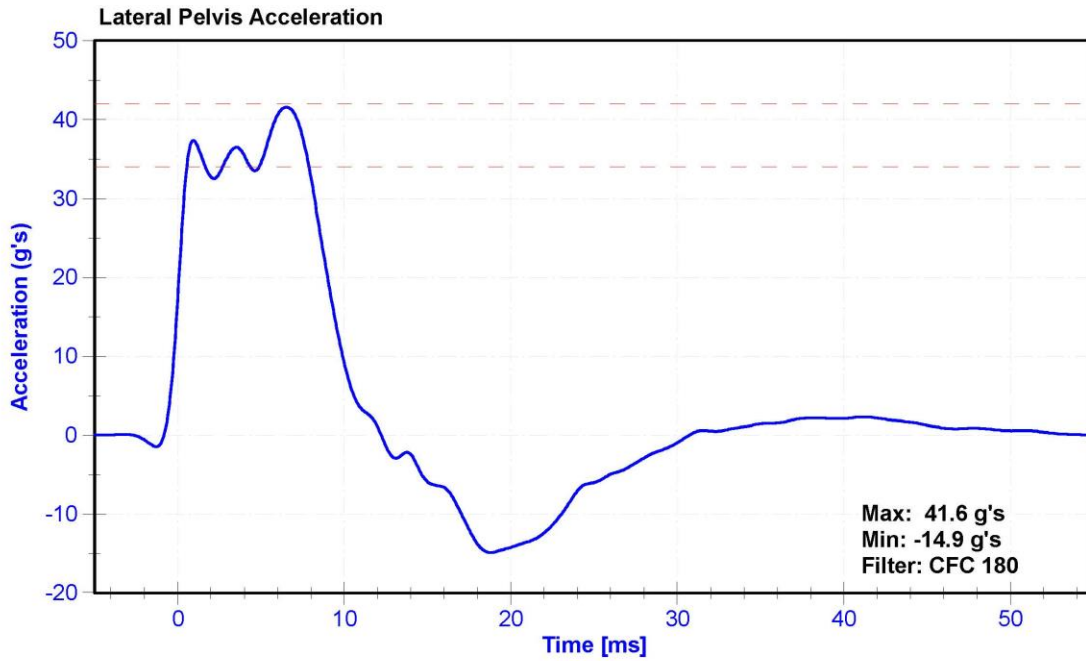
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	29	Pass
Velocity	6.6	6.8	m/s	6.61	Pass
Probe Acceleration	38	47	g's	46.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.6	Pass
Acetabulum Force	3600	4300	N	4279.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/28/2019	4/27/2020
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/14/2019	6/13/2020
Certification Plug	SACO	12586	10-3-2018	N/A
Crash Test Plug	SACO	12789	1-17-2019	N/A







SID-11s Pelvis Plug Certification Test

Plug S/N 12586

Test Number 7516

Report Number 7531

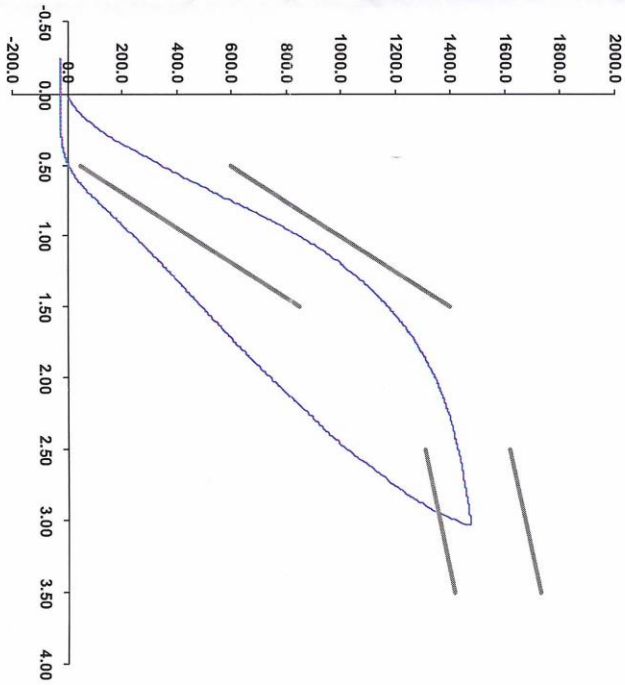
Test Date 10/3/2018 10:22:22 AM

cert / DGSAIR

Force (-N) vs Extension (-mm)

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

Testing Machine STM-20 596542
 Load Cell S/N (F1360947), Units (LBS) 1000
 Crosshead Speed (mm/min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)



Notes:

Operator

Part Number 180-4450

Template No 107 03-Oct-18
 SACO Research

By: *DC* Date: *10/3/18*
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



Crash

D68012

SID-IIs Pelvis Plug Certification Test

Plug S/N 12789

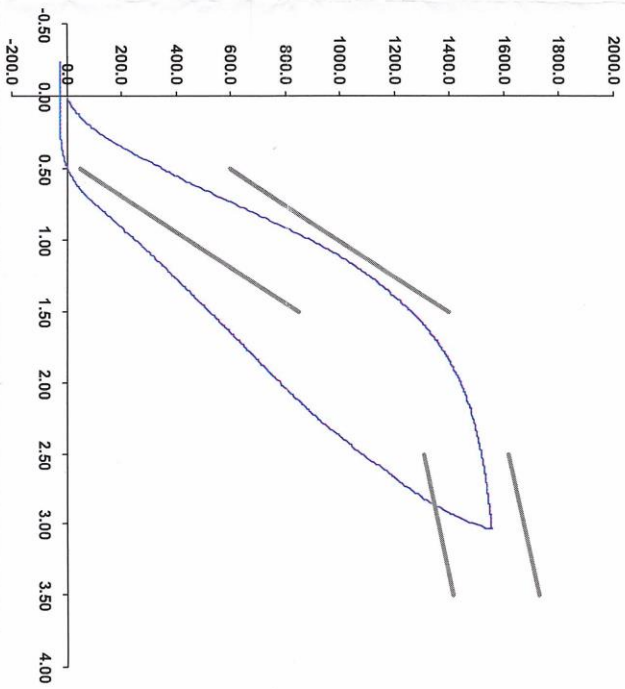
Test Number 8121

Report Number 8151

Test Date 1/17/2019 12:42:15 PM

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

Testing Machine STM-20 5965542
 Load Cell S/N (F1360947), 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 17-Jan-19
 SACO Research

By: *DC* Date: *1/17/2019*
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

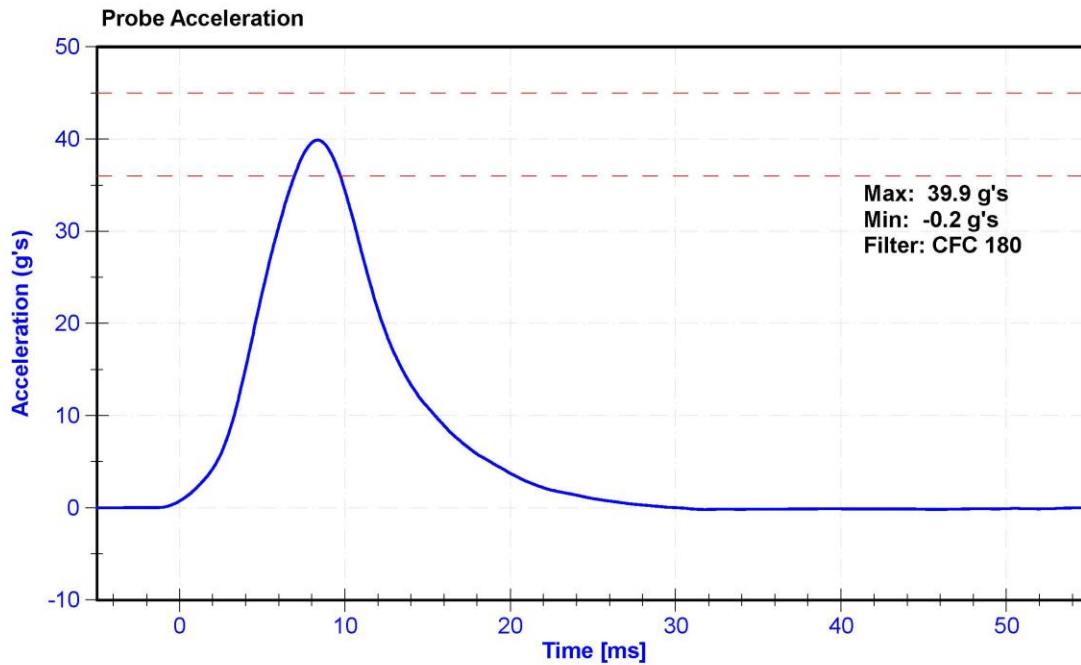
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

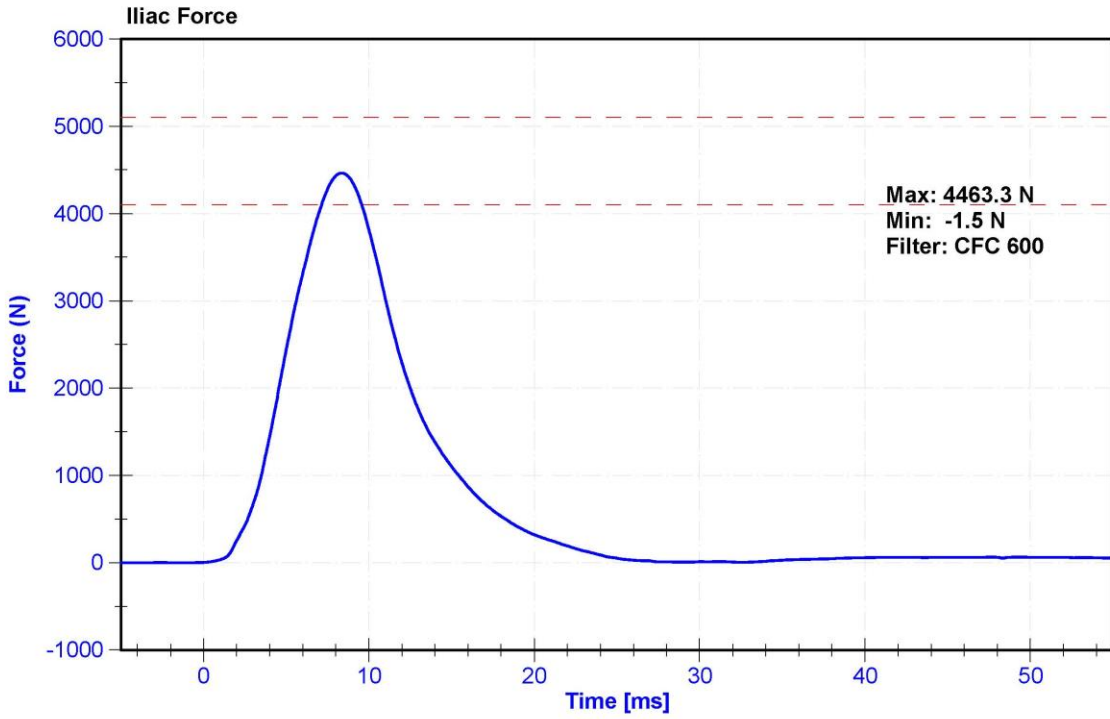
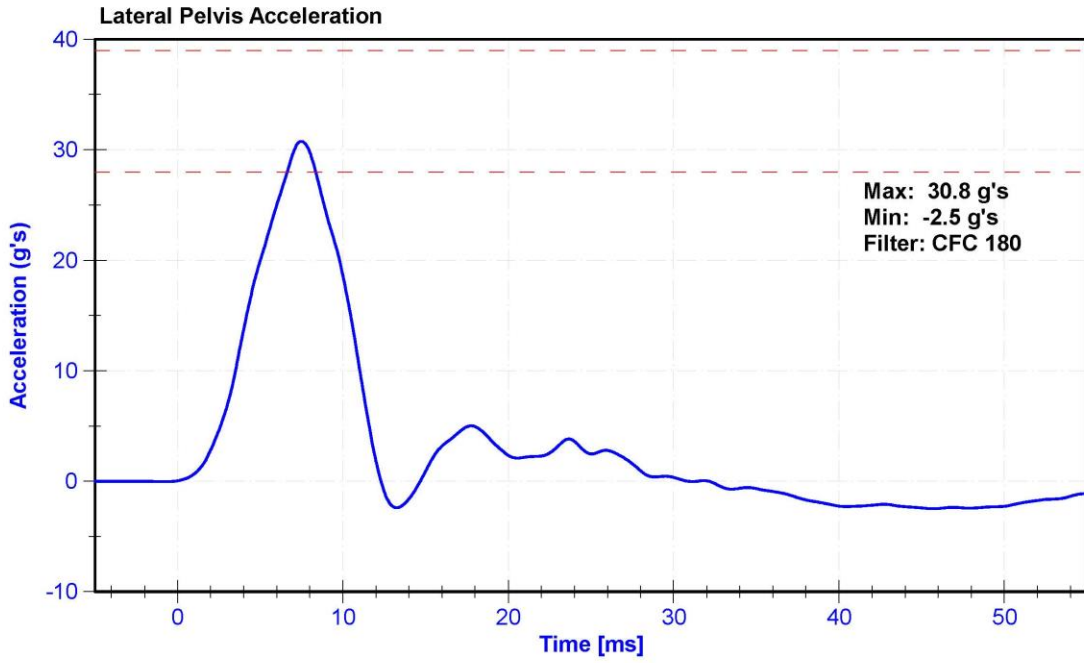
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	33.0	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	39.9	Pass
Lateral Pelvis Acceleration	28	39	g's	30.8	Pass
Iliac Force	4100	5100	N	4463.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	7/29/2020
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/28/2019	4/27/2020
Iliac Load Cell	DENTON 3228J	LC-290Fy	9/25/2019	9/24/2020





APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: DG8012		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		X	AC-P74788	ENDEVCO	10/28/2019	
		Y	AC-P83432	ENDEVCO	10/28/2019	
		Z	AC-P83319	ENDEVCO	10/28/2019	
Head Accelerometers - Redundant		X	AC-P80334	ENDEVCO	10/28/2019	
		Y	AC-P63841	ENDEVCO	10/28/2019	
		Z	AC-P83322	ENDEVCO	10/28/2019	
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-2165GFE	Servo	10/28/2019
		Middle	Y	DS-45 GFE	Servo	10/28/2019
		Lower	Y	DS-011GFE	Servo	10/28/2019
	Abdominal Rib	Upper	Y	DS-008GFE	Servo	10/28/2019
		Lower	Y	DS-1774GFE	Servo	10/28/2019
Lower Spine Accelerometers (T12)		X	AC-P52040	ENDEVCO	9/30/2019	
		Y	AC-P51327	ENDEVCO	9/30/2019	
		Z	AC-P52067	ENDEVCO	9/30/2019	
Acetabulum Load Cell		Y	LC-4986Fy	Denton	6/14/2019	
Lilac Wing Load Cell		Y	LC-290Fy	Denton	9/25/2019	
Pelvis Plug (Struck Side)			12782	SACO	1/17/2019	
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A250376	MSI	1/14/2020
Vehicle Center of Gravity	Y	AC-A262061	MSI	1/14/2020
Vehicle Center of Gravity	Z	AC-A281024	MSI	1/14/2020
Left Floor Sill	Y	AC-A280348	MSI	11/12/2019
A-Pillar Sill	Y	AC-A254667	MSI	12/19/2019
A-Pillar Low	Y	AC-A250384	MSI	12/17/2019
A-Pillar Mid	Y	AC-A189585	MSI	11/27/2019
B-Pillar Sill	Y	AC-A280890	MSI	2/20/2020
B-Pillar Low	Y	AC-A217572	MSI	2/20/2020
B-Pillar Mid	Y	AC-A279987	MSI	2/20/2020
Driver Seat	Y	AC-A255887	MSI	12/2/2019
Engine Top	X	AC-A254658	MSI	1/10/2020
Engine Top	Y	AC-A262051	MSI	1/10/2020
Firewall	Y	AC-A280997	MSI	1/27/2020
Right Roof	Y	AC-A280317	MSI	12/16/2019
Right Floor Sill	Y	AC-A255861	MSI	1/27/2020
Rear Floorpan	X	AC-A280371	MSI	11/12/2019
Rear Floorpan	Y	AC-A280983	MSI	1/28/2020

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC_1117012	Interface	10/16/2019
Load Cell 2	LC_1117020	Interface	10/25/2019
Load Cell 3	LC_1117025	Interface	10/25/2019
Load Cell 4	LC_1117019	Interface	10/25/2019
Load Cell 5	LC_1117011	Interface	10/25/2019
Load Cell 6	LC_1117017	Interface	10/25/2019
Load Cell 7	LC_1117035	Interface	10/25/2019
Load Cell 8	LC_1117006	Interface	10/7/2019