

REPORT NUMBER: SPNCAP-CAL-20-012

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

**Toyota Motor Manufacturing, Texas, INC.
2020 Toyota Tacoma Extended Cab
Truck**

NHTSA No: M20205104

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



August 28, 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: August 28, 2020

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Date: August 28, 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 32.28 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2020 Toyota Tacoma Extended Cab Truck in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 27, 2020. The impact velocity of the vehicle was 32.28 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 368 mm located at level 2. The test vehicle's occupant performance data is as follows:																														
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No. 300)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>339.130</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>59.672</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>4616.223</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>33.085</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>40.464</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (SID-IIs) (Serial No. 300)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	339.130	Resultant Lower Spine Acceleration	G	82	59.672	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4616.223	Maximum Thoracic Rib Deflection	mm	38	33.085	Maximum Abdomen Rib Deflection	mm	45	40.464
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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 Toyota Tacoma Extended Cab Truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2020 Toyota Tacoma Extended Cab Truck. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.28 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 27, 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	339.130
Resultant Lower Spine Acceleration	g	82	59.672
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4616.223
Maximum Thoracic Rib Deflection	mm	38*	33.085
Maximum Abdominal Rib Deflection	mm	45*	40.464

*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	Yes	No		
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 – 300

Data Anomalies:

- Left Sill A-Pillar Y Acceleration, Exceeded calibration range and saturated at 62.4 ms
- Front Seat Track Y Acceleration, Exceeded calibration range at 46.1 ms
- Left Middle B-Pillar Y Acceleration, Questionable spike at 32ms

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 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20205104
Model Year	2020
Make	Toyota
Model	Tacoma
Body Style	Truck
VIN	5TFRX5GN8LX167588
Body Color	Silver
Odometer Reading (km/mi)	13 miles
Engine Displacement (L)	2.7
Type / No. Cylinders	I4
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Texas, INC.
Date of Manufacture	09/19
Vehicle Type	Truck

GVWR (kg)	2540
GAWR Front (kg)	1335
GAWR Rear (kg)	1490

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	2	N/A	4
Capacity Weight (VCW) (kg)				676*
DSC X 68.04 kg				272.16
Cargo Weight (RCLW) (kg)				136

(A)
(B)
(A-B)

*Load reduction of 4Kg

VEHICLE SEAT TYPE

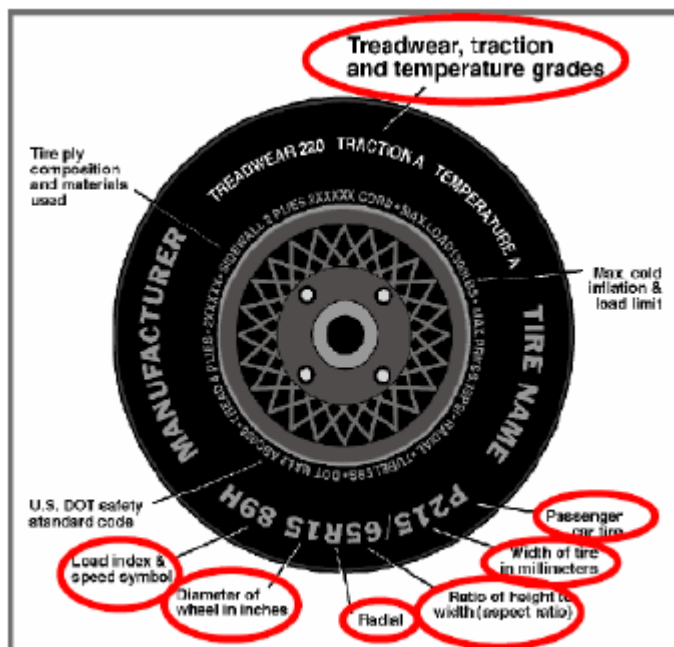
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X						X
Rear or Second Row Seat			X			X	
Third Row seat							

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

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)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P245/75R16	P245/75R16
Tire Size on Vehicle	P245/75R16	P245/75R16
Tire Manufacturer	Firestone	Firestone
Tire Model	Destination	Destination
Treadwear	520	520
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	109S	109S
Tire Material	Rubber	Rubber
DOT Safety Code Left	8X70DE33019	8X70DE33019
DOT Safety Code Right	8X70DE33019	8X70DE33019

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
Test Date: 5/27/2020

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	219	219	219	220
Tire Placard	kPa	220	220	220	220
Owner's Manual	kPa	220	220	220	220
As Tested	kPa	220	220	220	220

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	509	398		521	476		538	478	
Right	kg	487	396		497	476		489	472	
Ratio	%	55.6	44.4		51.7	48.3		51.9	48.1	
Totals	kg	996	794	1790	1018	952	1970	1027	950	1977

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1790	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1976	(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	-0.80	-0.40	-0.25	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.95	-0.50	-0.50	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.35	-0.35	-0.35	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.35	-0.40	-0.50	Yes
Vehicle CG (Aft of Front Axle)	mm	1443	1572	1563	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	11	10	22	

* 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 Toyota Tacoma Extended Cab Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
Test Date: 5/27/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Nothing was removed	0
Ballast / Equipment Added	26.6

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 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

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	Not Adjustable		
Front Passenger Seat	Not Adjustable		
Front Center Seat	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Front Passenger Seat	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Front Center Seat	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

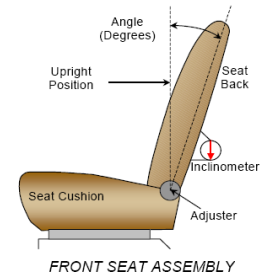
NHTSA No.: M20205104
 Test Date: 5/27/2020

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	17 (0-16)	0	0
Front Passenger Seat	240	17 (0-16)	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	52.4	N/A	-5.0	1
Front Passenger Seat	52.3	N/A	-5.6	1
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)	0

HEAD RESTRAINT ADJUSTMENT

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

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

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

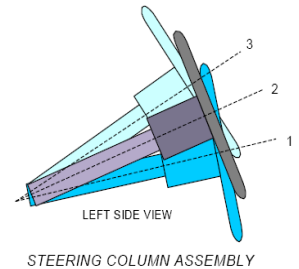
Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

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.

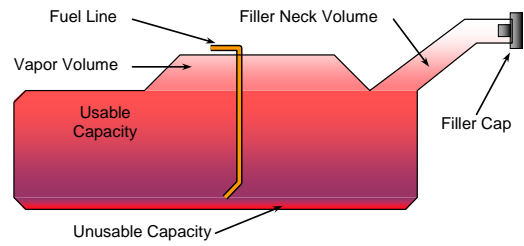
	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	23.3	
Geometric Center – Position 2	24.9	
Uppermost – Position 3	26.5	
Telescoping Steering Wheel Travel		22
Test Position	24.9	11



FUEL PUMP

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

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



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of "Standard Tank" - see Form No. 1	79.9
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	80
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	74.4
Actual Amount of Solvent Used in Test	74.4
1/3 of Usable Capacity	26.4

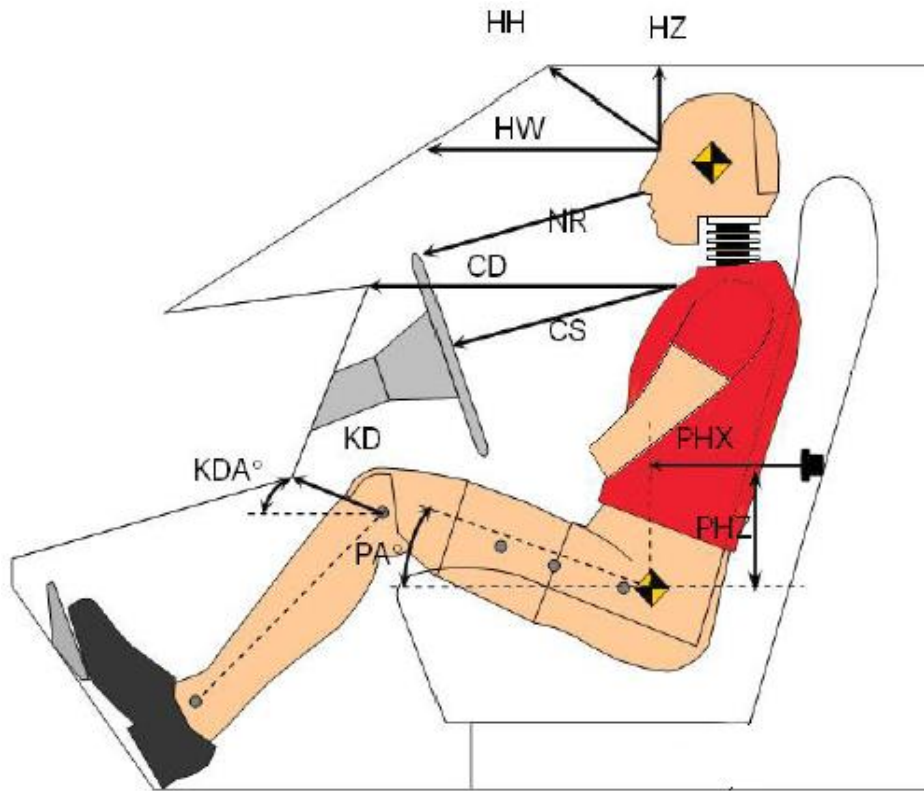
Is the Actual Amount of Solvent Used in the test equal to 93% ±1% of the Usable Capacity stated in Form No. 1?

Yes No

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020



Left Side View

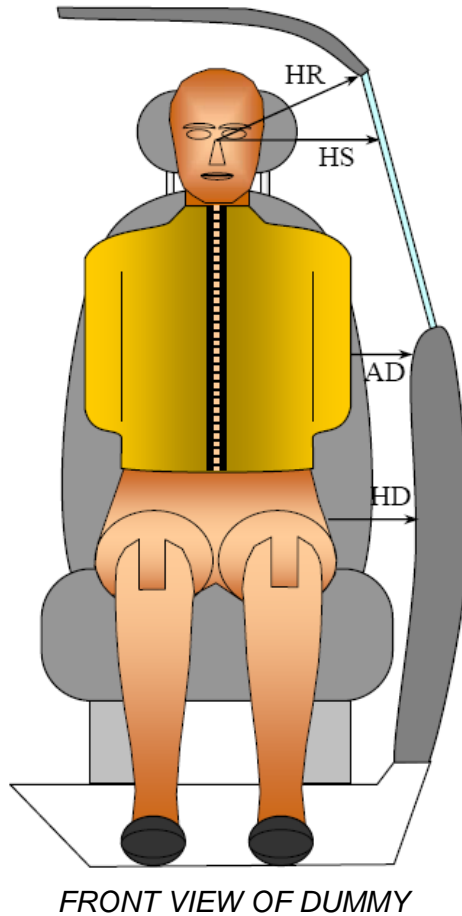
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. 300)	
		Length (mm)	Angle (°)
HH	Head to Header	289	
HW	Head to Windshield	548	
HZ	Head to Roof Liner	230	
NR	Nose to Rim	275	
CD	Chest to Dash	439	
CS	Chest to Steering Wheel	222	
KD(L) / KDA(L)°	Left Knee to Dash	125	31.2
KD(R) / KDA(R)°	Right Knee to Dash	133	26.3
PAX°	Pelvic Tilt Angle (X-Axis)		19.3
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	328	
PHZ	Hip Point to Striker (Z-Axis)	146	

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020



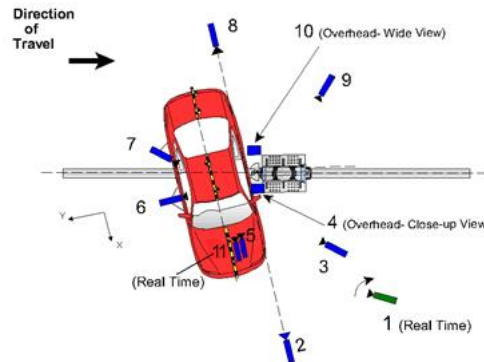
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. 300)
HR	Head To Side Header	mm	272
HS	Head to Side Window	mm	385
AD	Arm to Door	mm	169
HD	Hip Point to Door	mm	185

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
Test Date: 5/27/2020



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	7763	0	-1656	28	1000
3	Impact side 45° - forward pole view	4857	-1416	-1635	24	1000
4	Overhead Close-up view of impact	0	0	-9375	50	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	-8724	0	-1643	28	1000
9	Impact side 45° - rearward pole view	-4628	-4346	-1606	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.

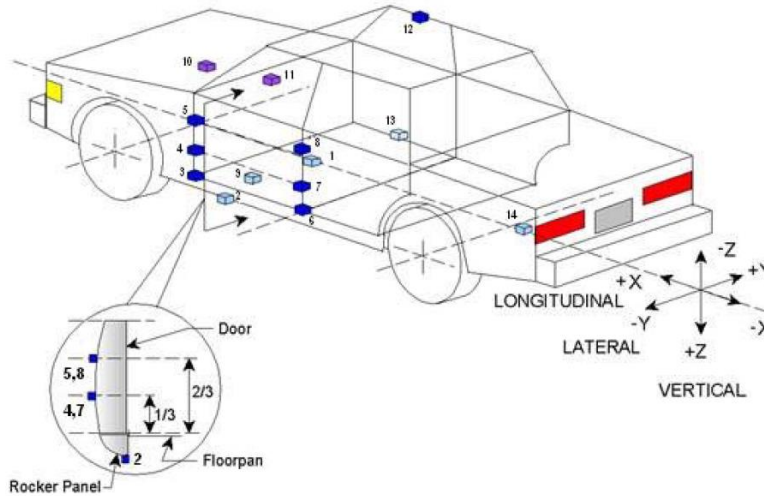
INSTRUMENTATION

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 Toyota Tacoma Extended Cab Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
Test Date: 5/27/2020



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3278	35	-297
2	Left Floor Sill	3412	-714	-48
3	A-Pillar Sill	3854	-671	-87
4	A-Pillar Low	3877	-670	-283
5	A-Pillar Mid	3750	-670	-768
6	B-Pillar Sill	2816	-703	-83
7	B-Pillar Low	2841	-698	-381
8	B-Pillar Mid	2824	-673	-793
9	Driver Seat Track	2921	-558	-67
10	Engine Top	4650	65	-518
11	Firewall	4156	454	-584
12	Right Roof	2851	589	-1206
13	Right Floor Sill	3388	705	-44
14	Rear Floorpan	1268	3	-296

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 Toyota Tacoma Extended Cab Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
Test Date: 5/27/2020

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 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Headrest
Left Shoulder	Seatback, Torso/Pelvis Airbag
Upper Torso	Seatback
Lower Torso	Seatback
Left Hip	Seat Pan, Torso/Pelvis Airbag
Left Knee	Driver Door

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Width of Opening at Striker (mm)	0	0	0	0	0

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

**DATA SHEET NO. 8 ... (CONTINUED)
POST-TEST OBSERVATIONS**

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks Throughout
Side Window Damage	Driver Window Shattered
Other Notable Effects	Truck bed shifted during event a substantial amount

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
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

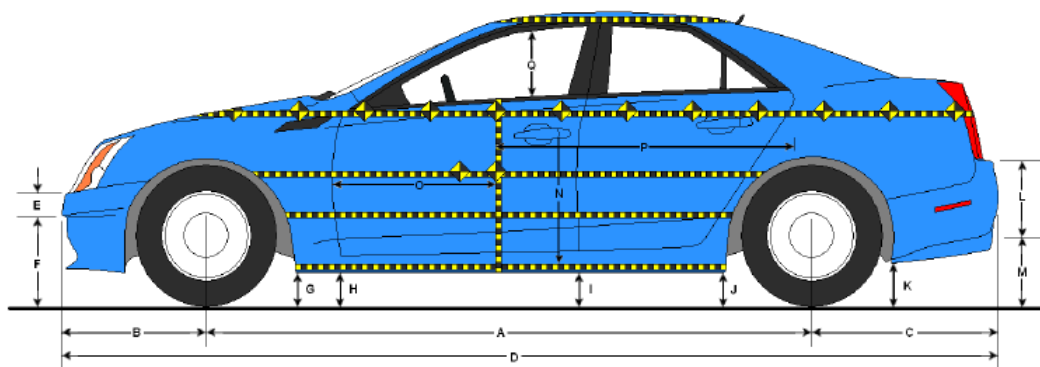
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1178
Actual Impact Point - Aft of Front Axle	mm		1181
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	-3
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.28
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.29

* Of Intended Impact Point

**DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

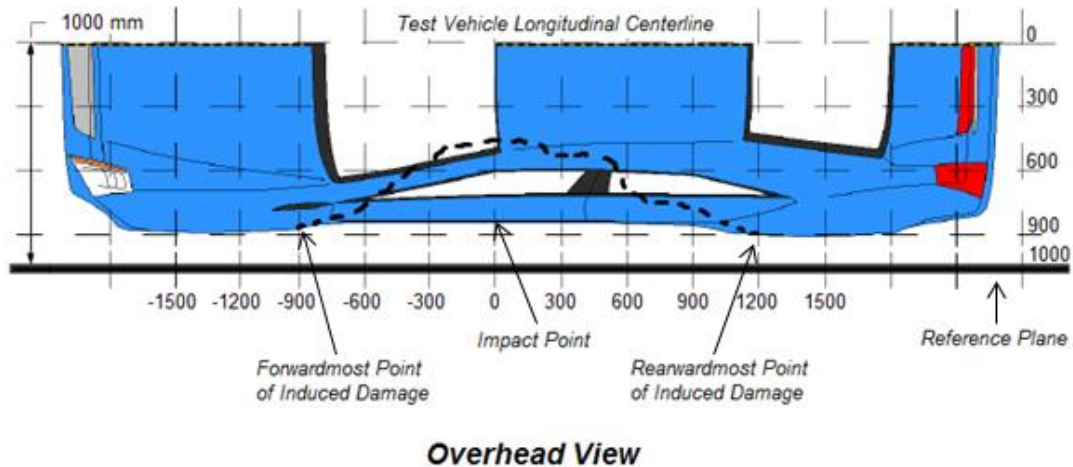
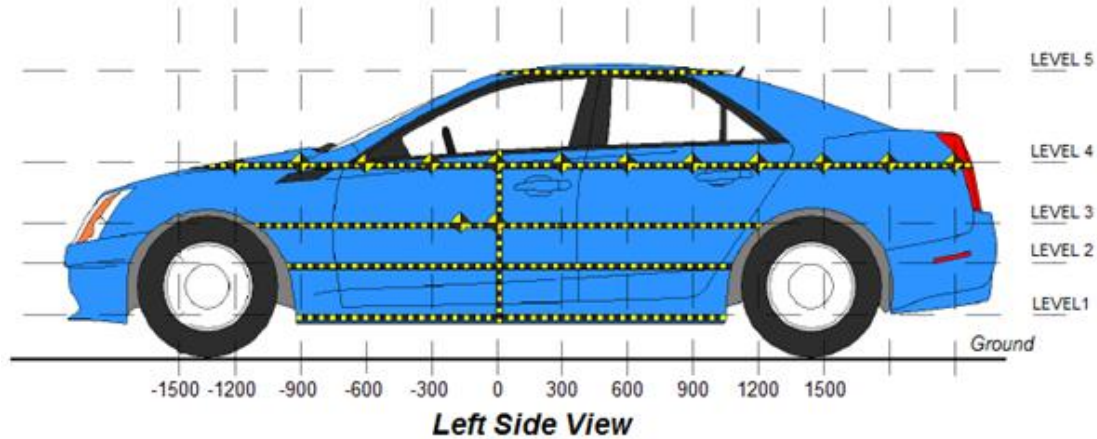
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	3253	3230	23
B	Front Axle to FSOV	924	964	-40
C	Rear Axle to RSOV	1204	1152	52
D	Total Length at Centerline	5380	5346	34
E	Front Bumper Thickness	110	110	0
F	Front Bumper Bottom to Ground	514	528	-14
G	Sill Height at Front Wheel Well	430	431	-1
H	Sill Height at Front Door Leading Edge	419	430	-11
I	Sill Height at B-Pillar	425	418	7
J1	Sill Height at Rear Wheel Well	345	450	-105
J2	Pinch Weld Height at Rear Wheel Well	424	351	73
K	Sill Height Aft of Rear Wheel Well	490	559	-69
L	Rear Bumper Thickness	200	200	0
M	Rear Bumper Bottom to Ground	489	510	-21
N	Sill Height to Bottom of Front Window Sill	757	756	1
O	Front Door Leading Edge to Impact CL	629	544	85
P	Rear Door Trailing Edge to Impact CL	1112	1030	82
Q	Front Window Opening	460	469	-9
R	Right Side Length	5354	5317	37
S	Left Side Length	5354	5315	39
T	Vehicle Width at B-Pillars	1805	1659	146

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

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	496	343	0
2	Occupant Hip Point	mm	834	368	0
3	Mid - Door	mm	898	367	0
4	Window Sill	mm	1208	291	0
5	Window Top	mm	1698	94	0

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

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

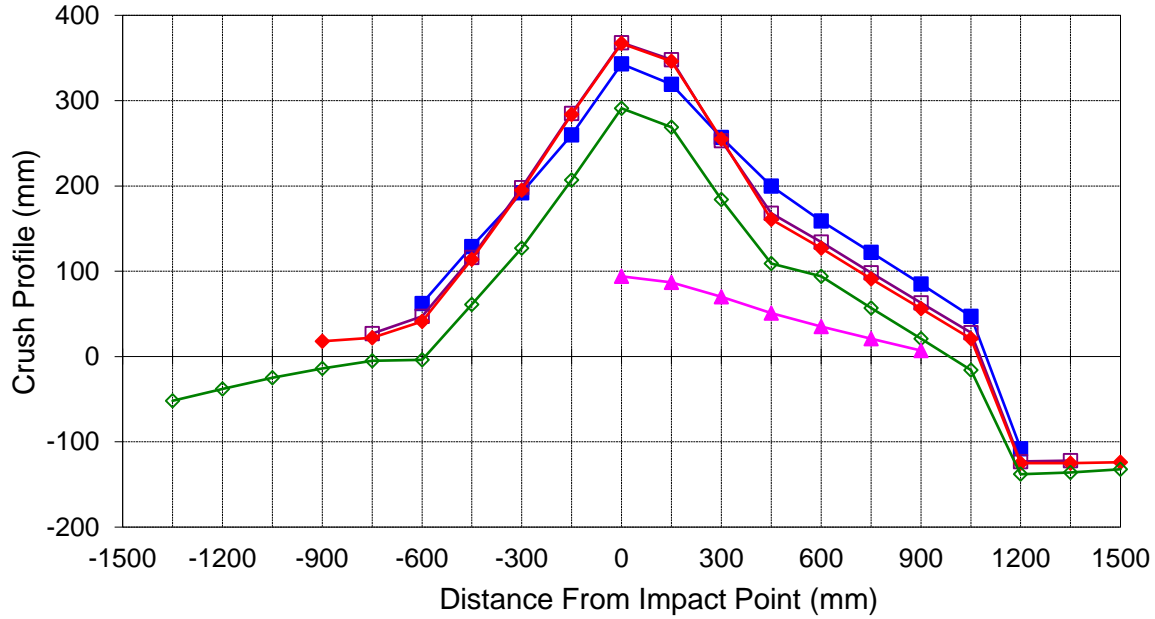
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350				795					847					-52	
-1200				806					844					-38	
-1050				815					840					-25	
-900			957	822				939	836				18	-14	
-750		952	935	827			925	913	832			27	22	-5	
-600	880	919	914	831		818	872	873	835		62	47	41	-4	
-450	841	899	898	835		712	783	784	774		129	116	114	61	
-300	844	896	898	838		652	698	703	711		192	198	195	127	
-150	845	897	899	840		585	612	615	633		260	285	284	207	
0	845	897	900	842	627	502	529	533	551	533	343	368	367	291	94
150	846	898	900	845	644	527	550	554	576	557	319	348	346	269	87
300	848	899	901	850	650	591	646	646	666	580	257	253	255	184	70
450	848	901	903	852	653	648	733	742	743	602	200	168	161	109	51
600	847	900	902	857	655	688	766	775	763	620	159	134	127	94	35
750	846	898	901	858	654	724	800	810	801	633	122	98	91	57	21
900	844	896	899	858	649	759	833	843	837	642	85	63	56	21	7
1050	837	892	895	854		790	864	874	870		47	28	21	-16	
1200	807	873	877	839		915	996	1002	977		-108	-123	-125	-138	
1350		874	876	836			996	1001	972			-122	-125	-136	
1500			890	836				1014	968				-124	-132	

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 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020



LEVEL 1 Side Sill: 496 mm above ground	LEVEL 2 H-Point: 834 mm above ground
LEVEL 3 Mid Door: 898 mm above ground	LEVEL 4 Window Sill: 1208 mm above ground
LEVEL 5 Window Top: 1698 mm above ground	

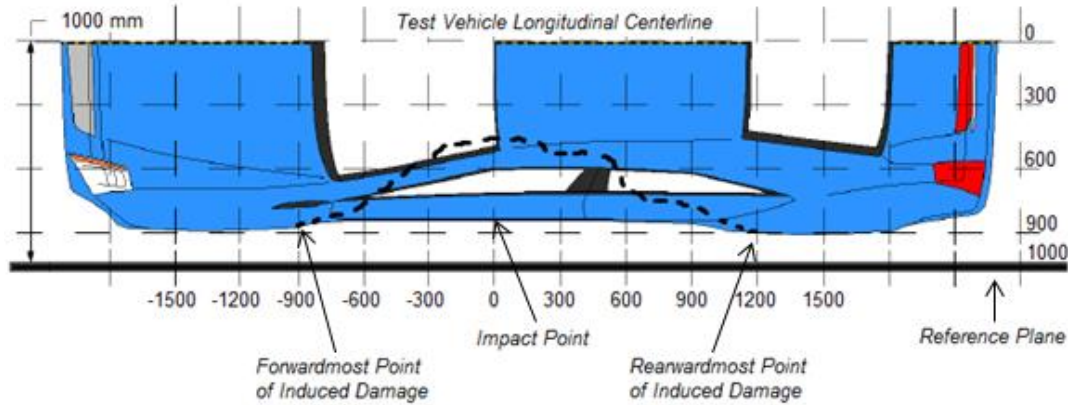
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2020 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020

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	-900	3	61	43	18
2	-420	3	232	102	130
3	60	3	459	100	359
4	540	3	238	98	140
5	1020	3	132	104	28
6	1500	3	-14	110	-124

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

Test Vehicle:	<u>2020 Toyota Tacoma Extended Cab Truck</u>	NHTSA No.:	<u>M20205104</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>5/27/2020</u>
Test Time:	<u>9:20 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°	71	300	371
90° to 180°	68	300	368
180° to 270°	68	300	368
270° to 360°	69	300	369

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

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

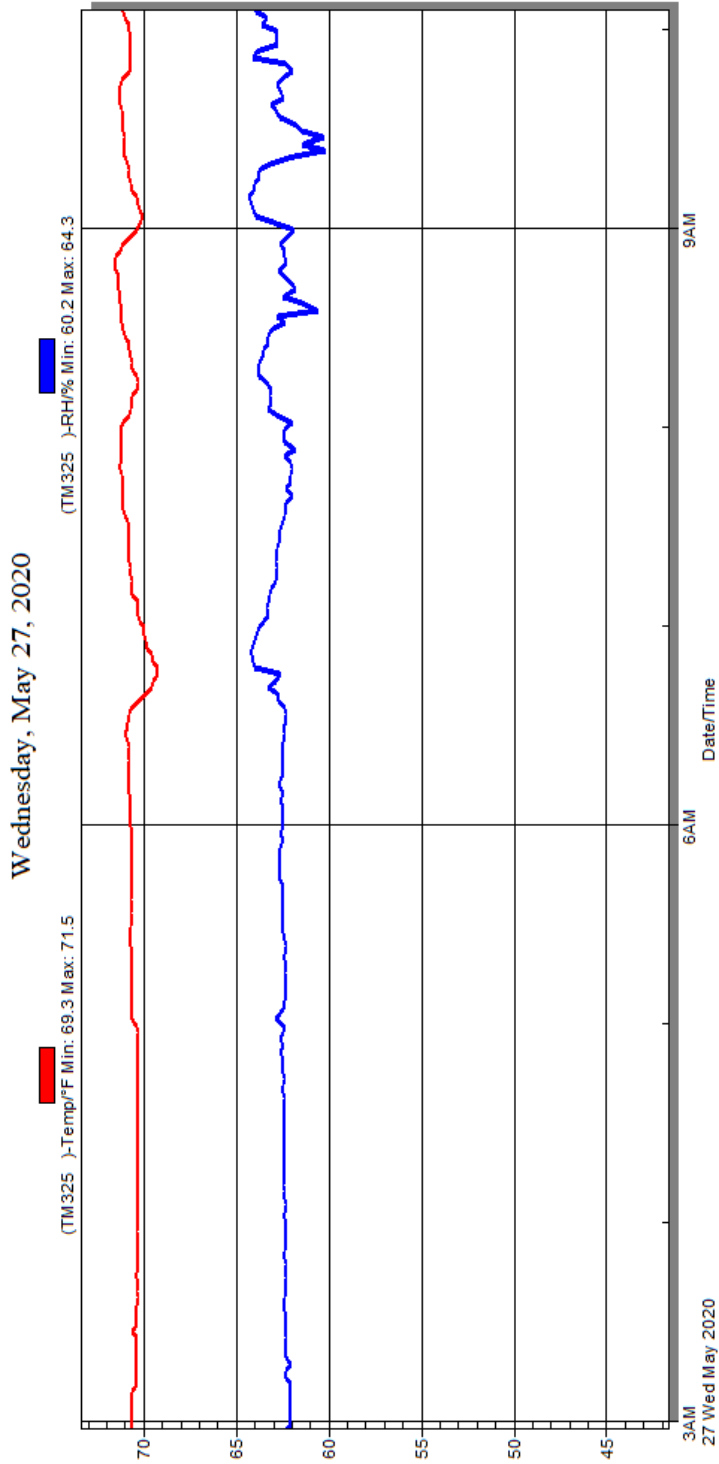
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 Toyota Tacoma Extended Cab Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20205104
 Test Date: 5/27/2020



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

APPENDIX A
PHOTOGRAPHS

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M20205104

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



M20205104

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

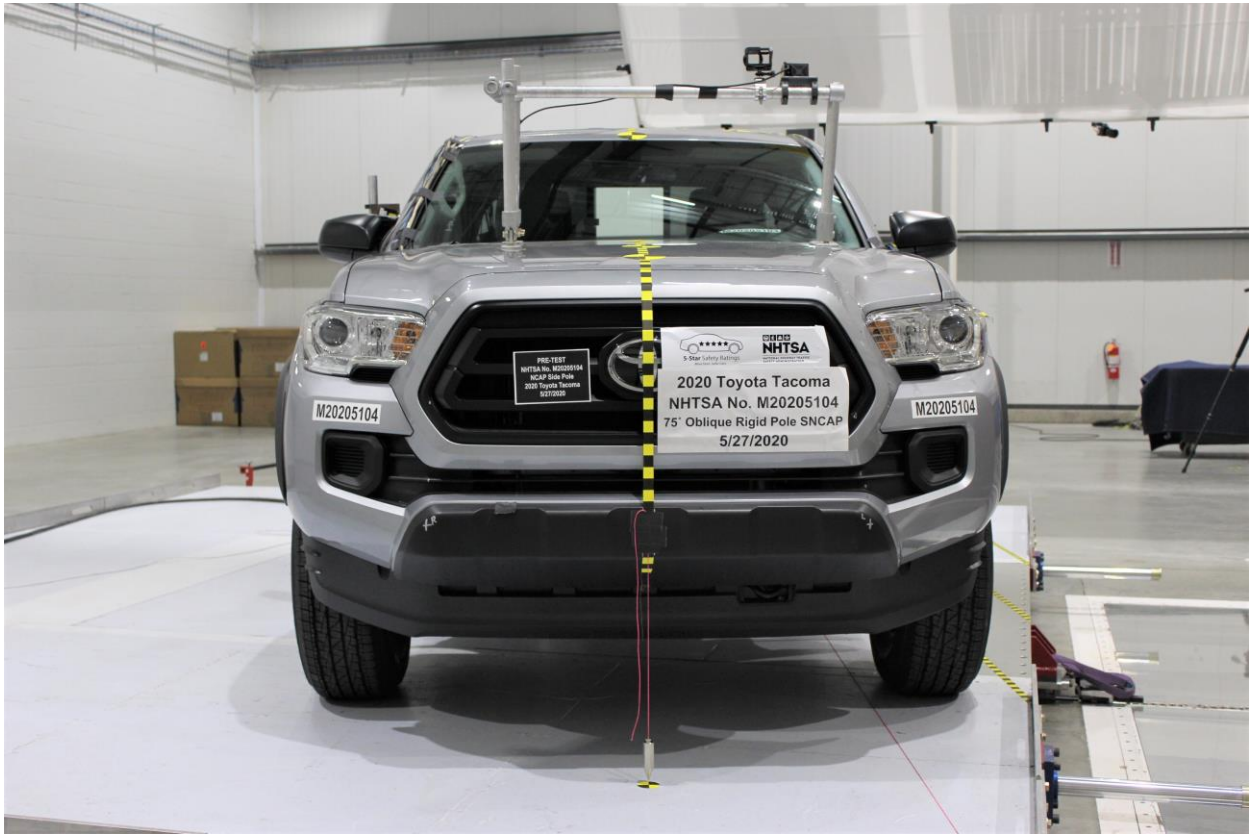


Figure A-3: Pre-Test Frontal View of Test Vehicle

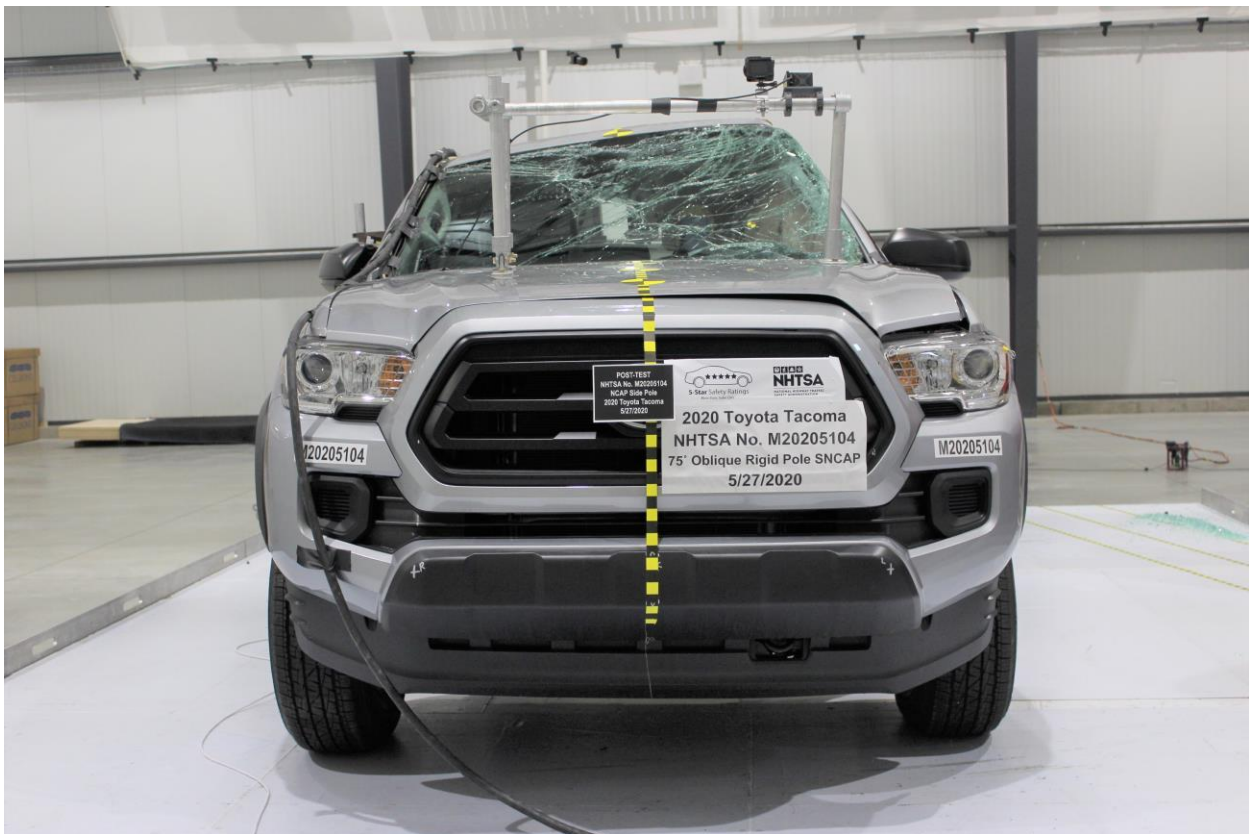


Figure A-4: Post-Test Frontal View of Test Vehicle



Figure A-5: Pre-Test Left Front ¾ View of Test Vehicle



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



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

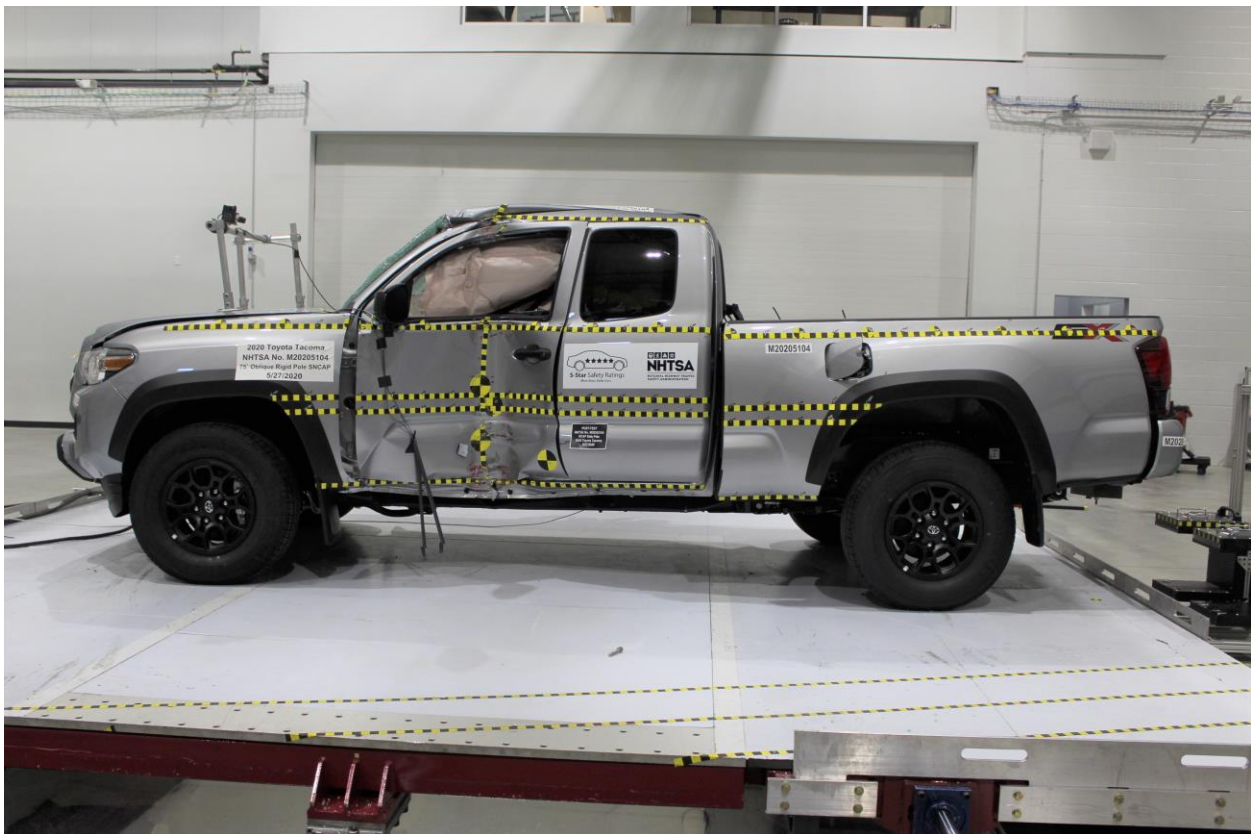


Figure A-8: Post-Test Left Side View of Test Vehicle



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

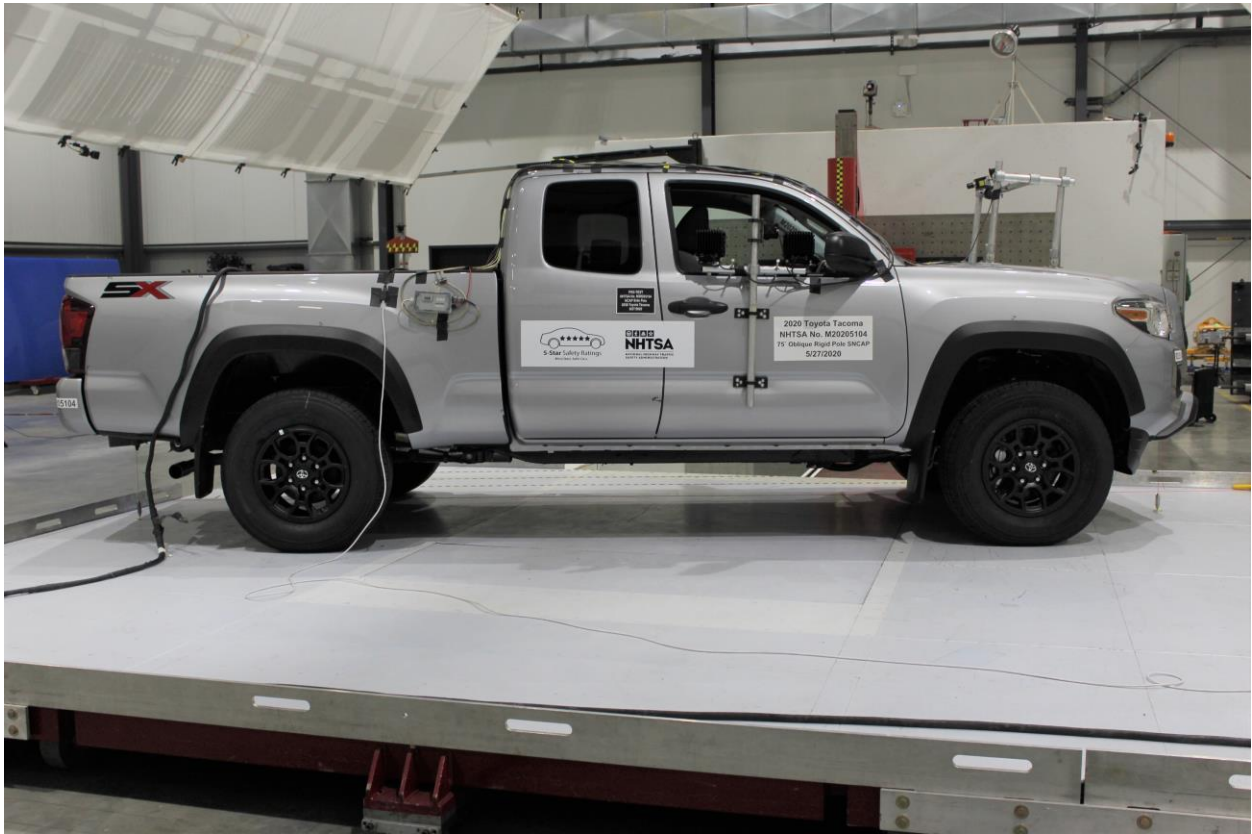


Figure A-13: Pre-Test Right Side View of Test Vehicle



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

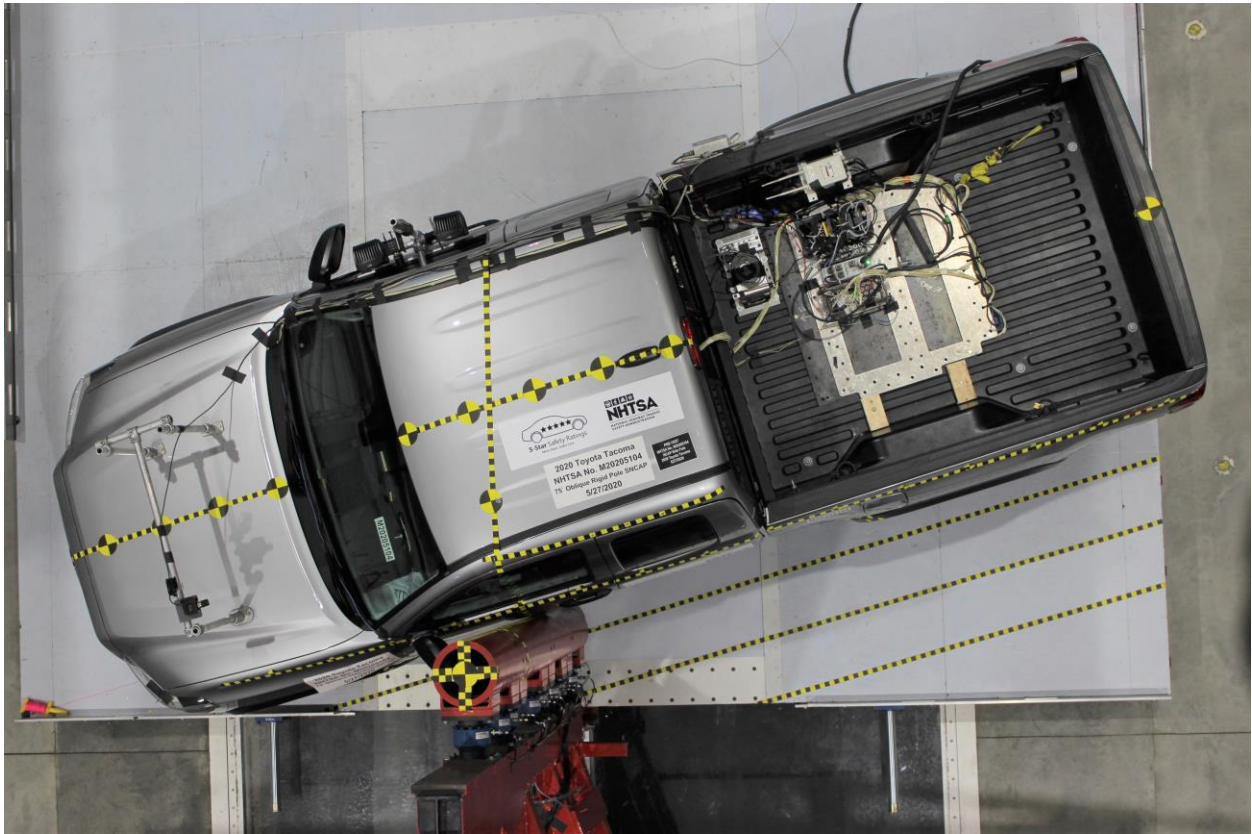


Figure A-15: Pre-Test Overhead View of Test Area

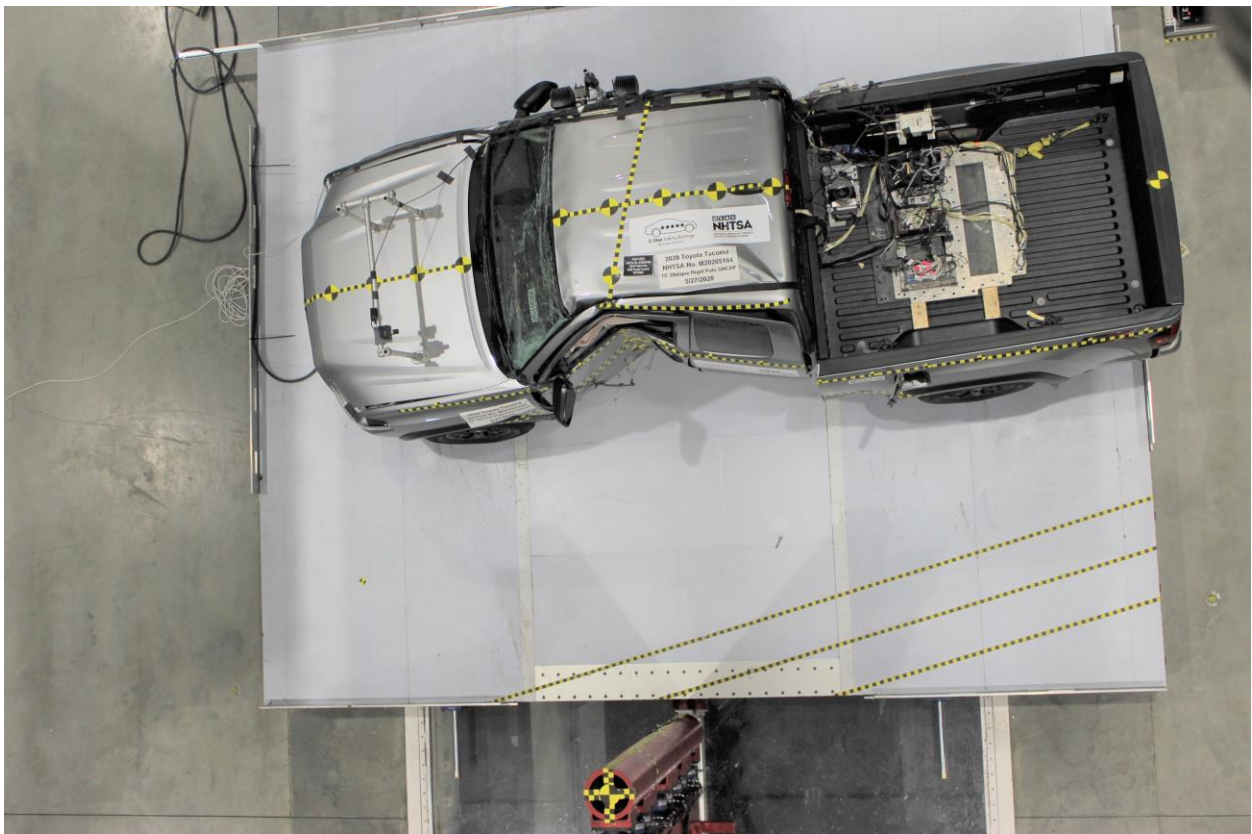


Figure A-16: Post-Test Overhead View of Test Area



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

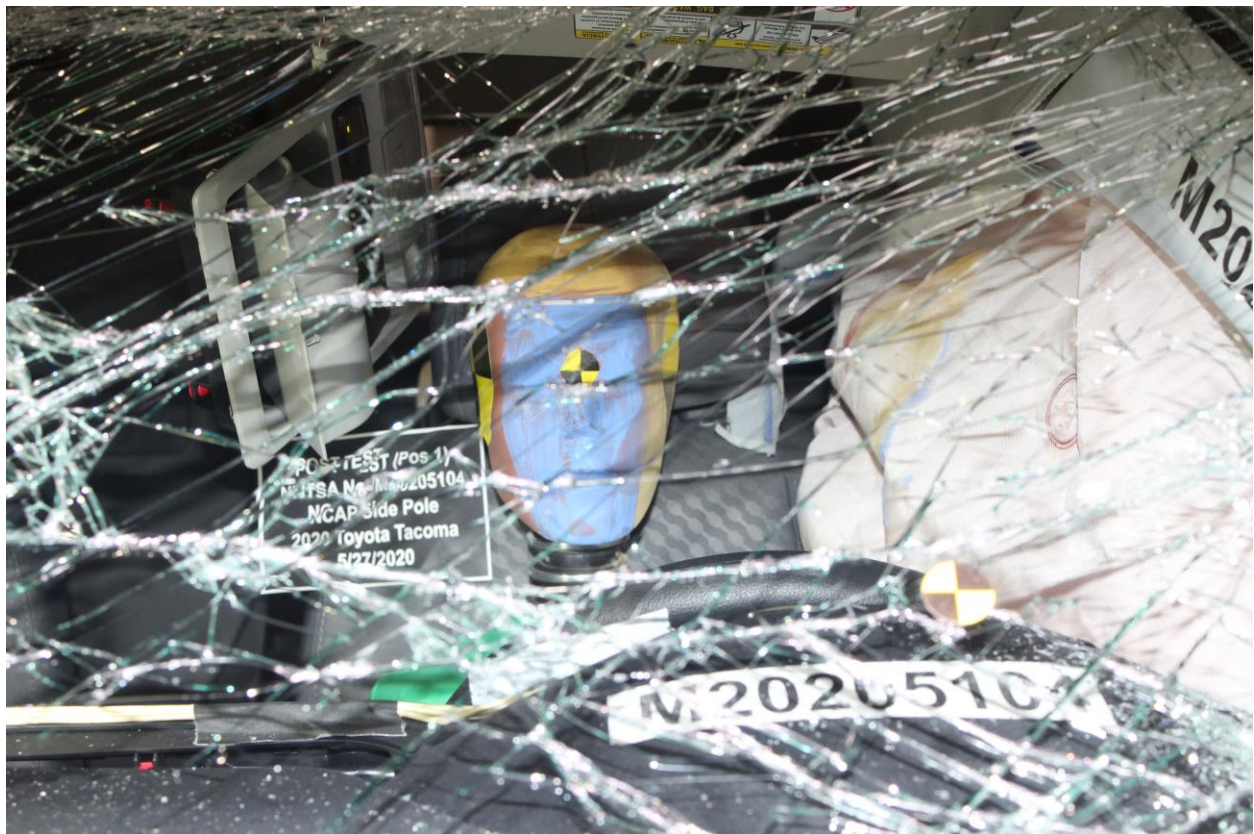


Figure A-22: Post-Test Front Close-Up View of Dummy



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

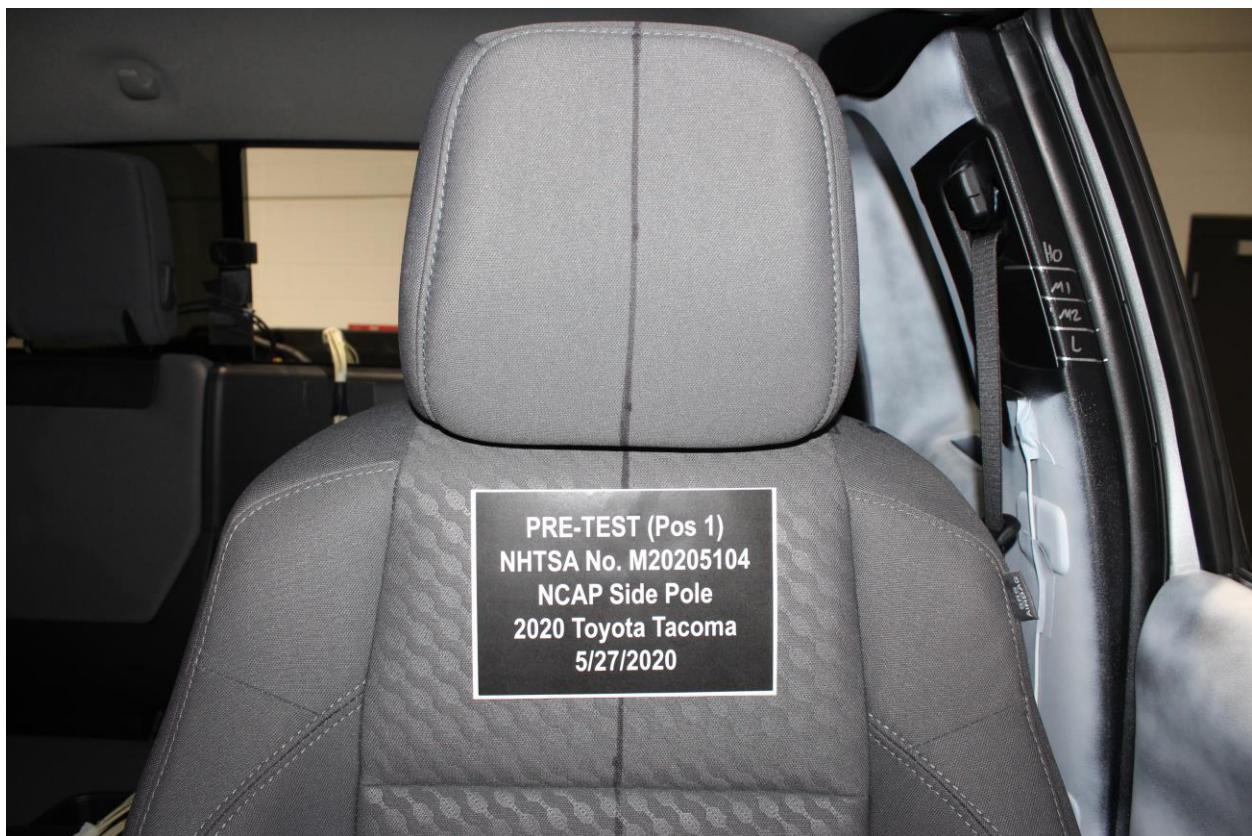


Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning

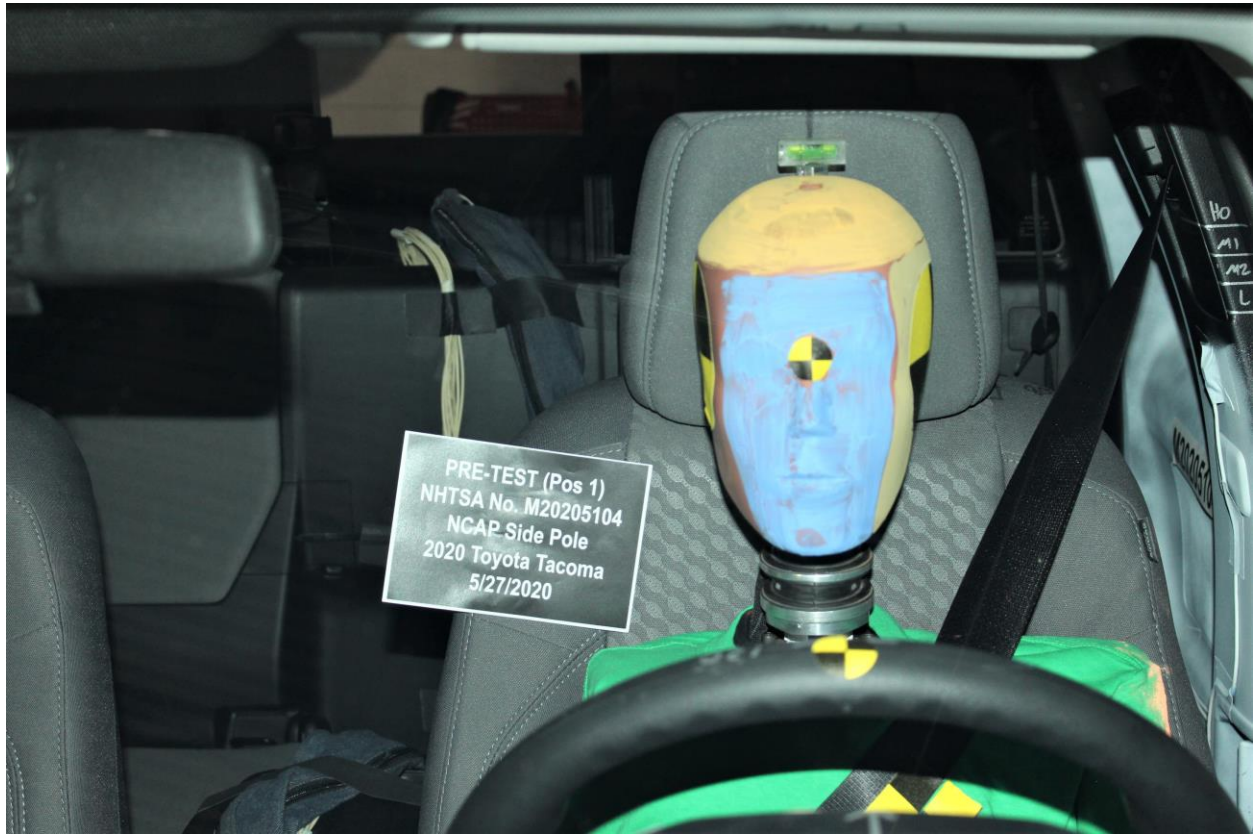


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



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

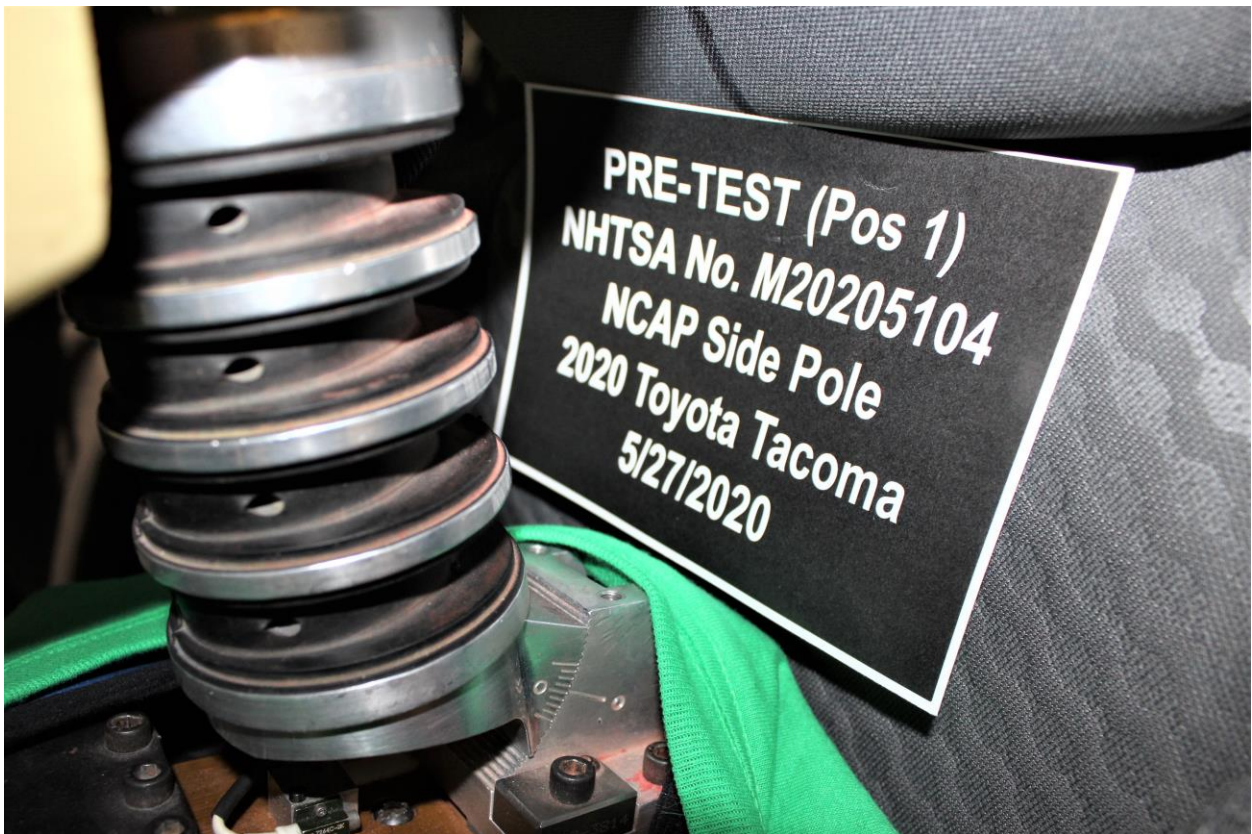


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



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

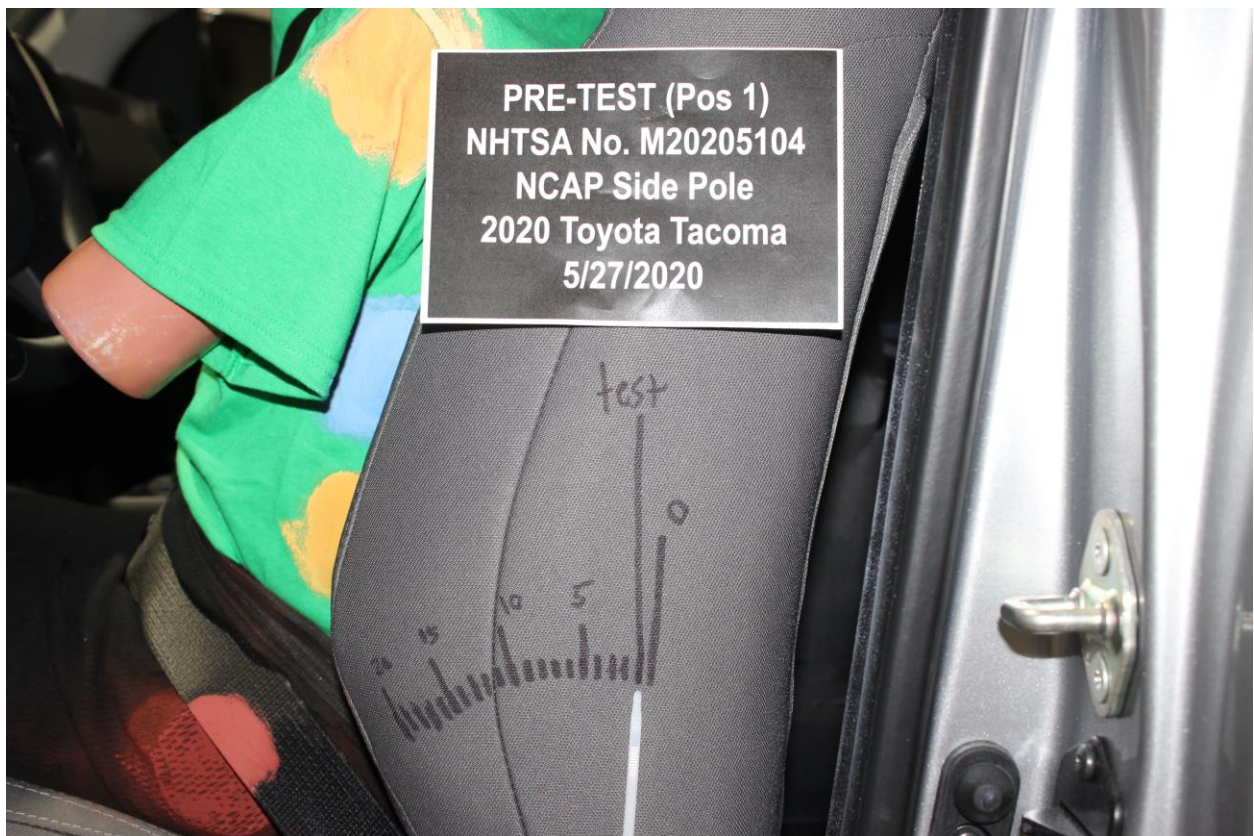


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



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



M20205104

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



M20205104

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

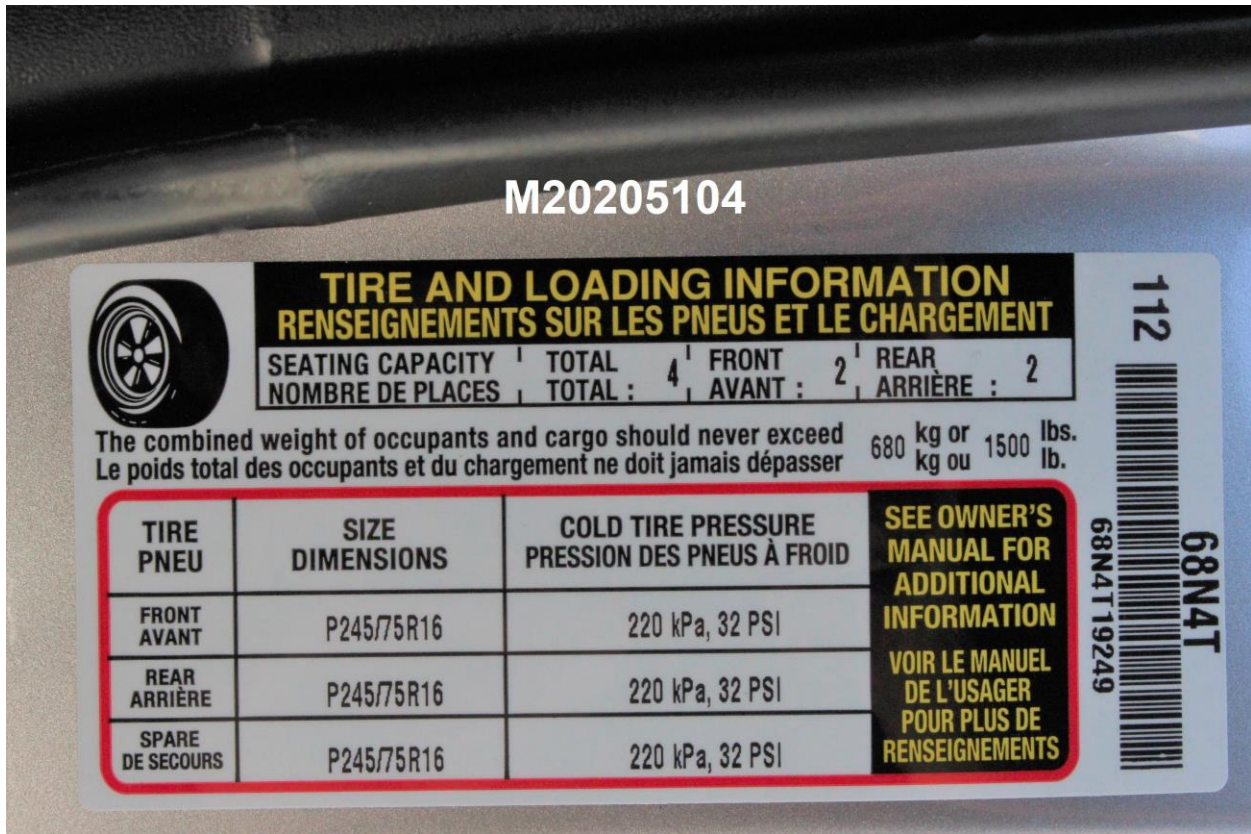


Figure A-56: Close-Up View of Vehicle's Tire Information Placard or Label

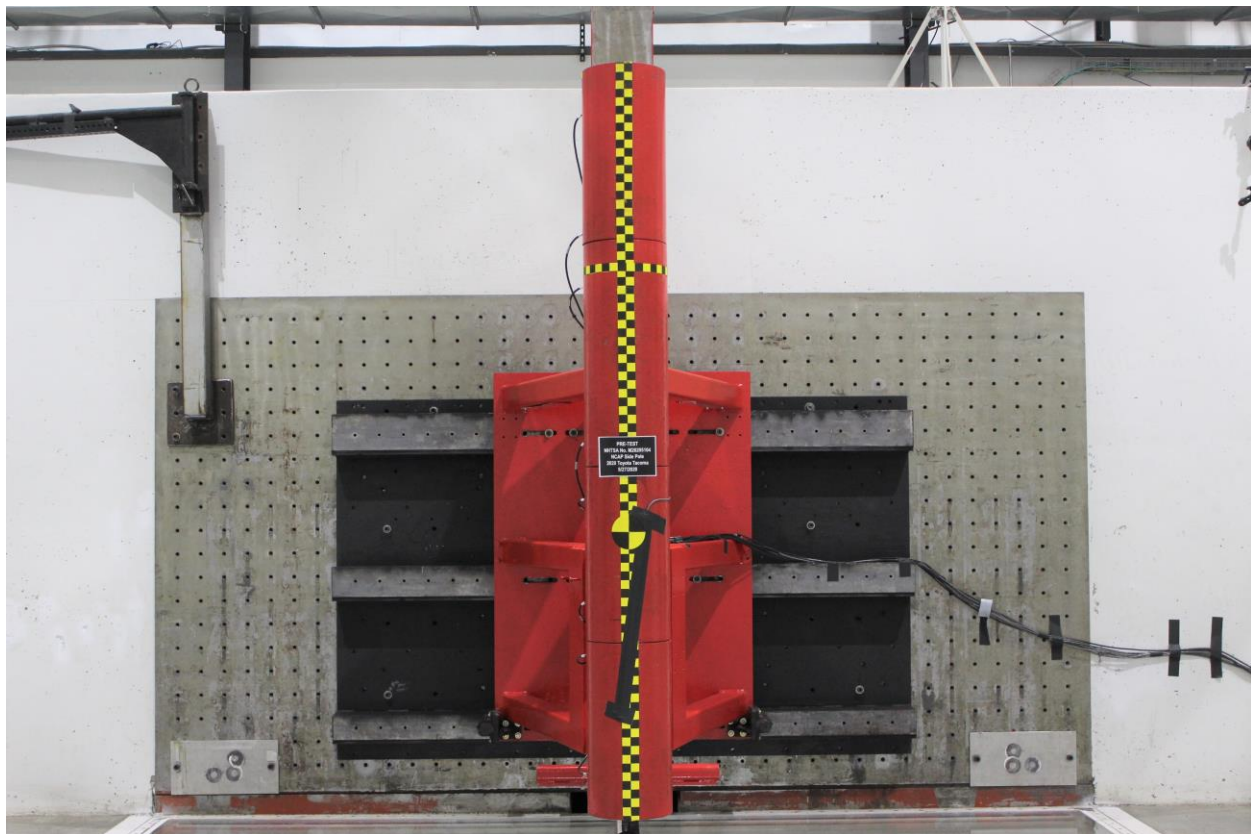


Figure A-57: Pre-Test Pole Barrier Front View

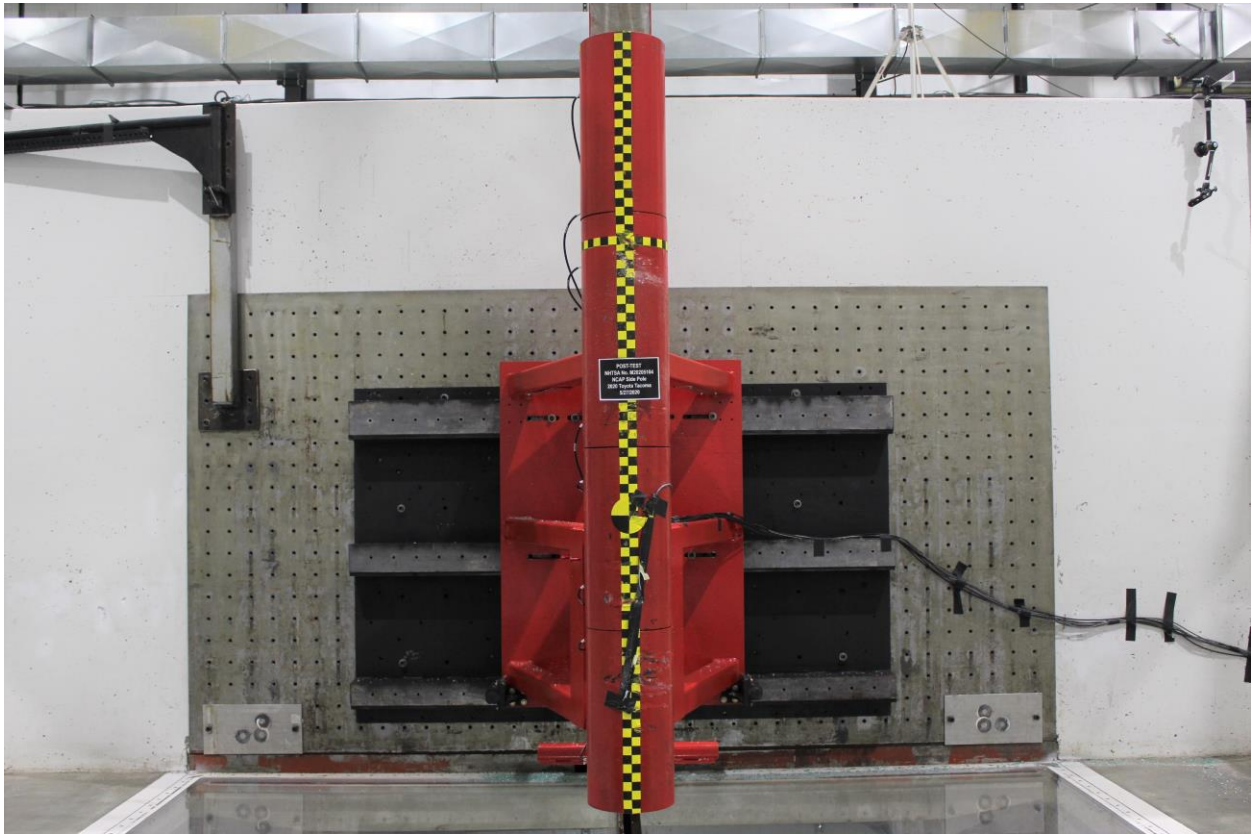


Figure A-58: Post-Test Pole Barrier Front View

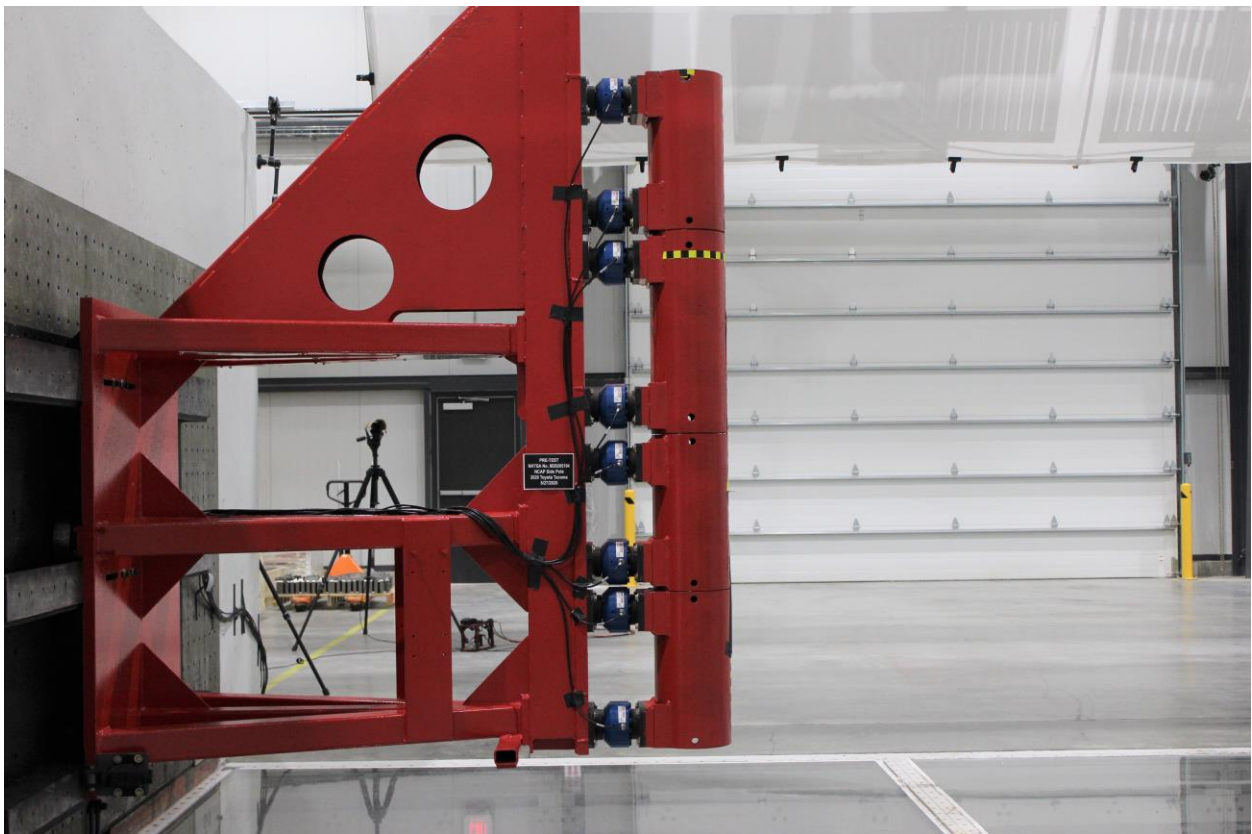


Figure A-59: Pre-Test Pole Barrier Side View

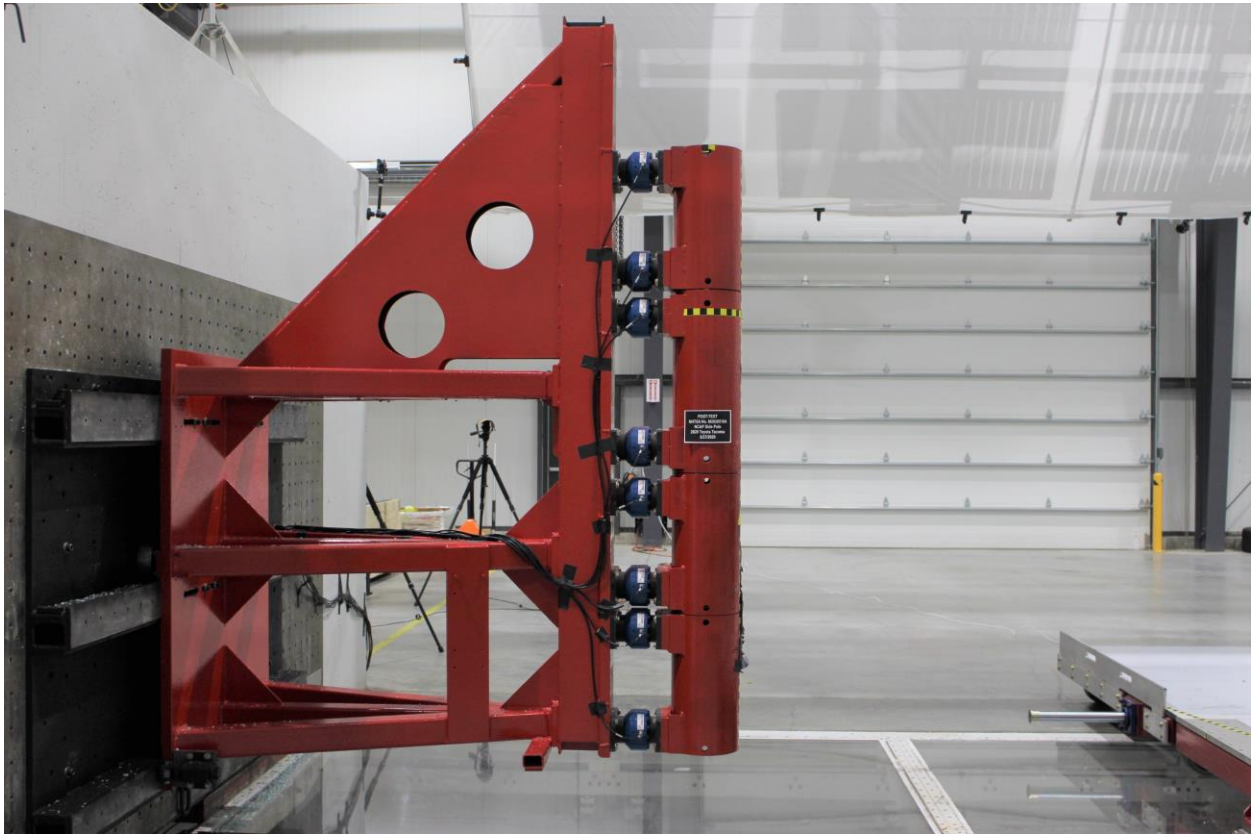


Figure A-60: Post-Test Pole Barrier Side View

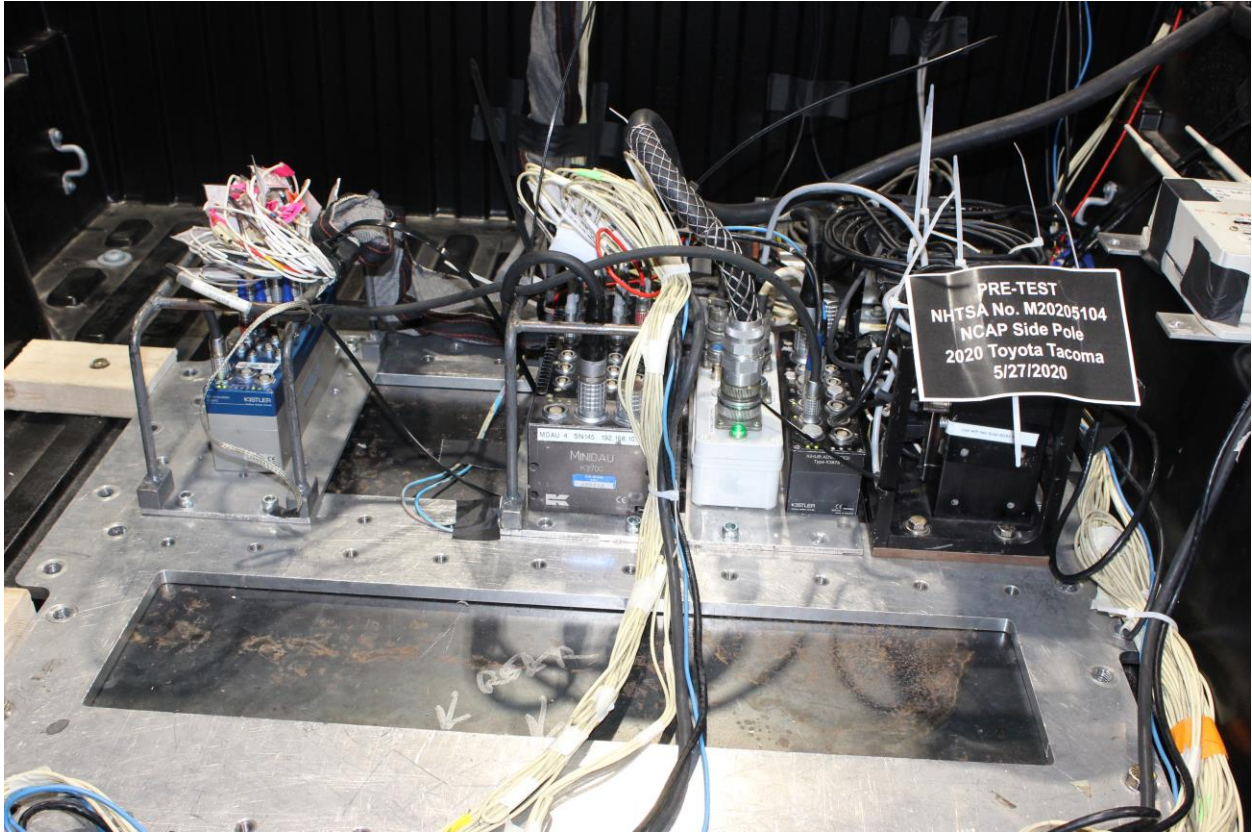


Figure A-61: Pre-Test Ballast View



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



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

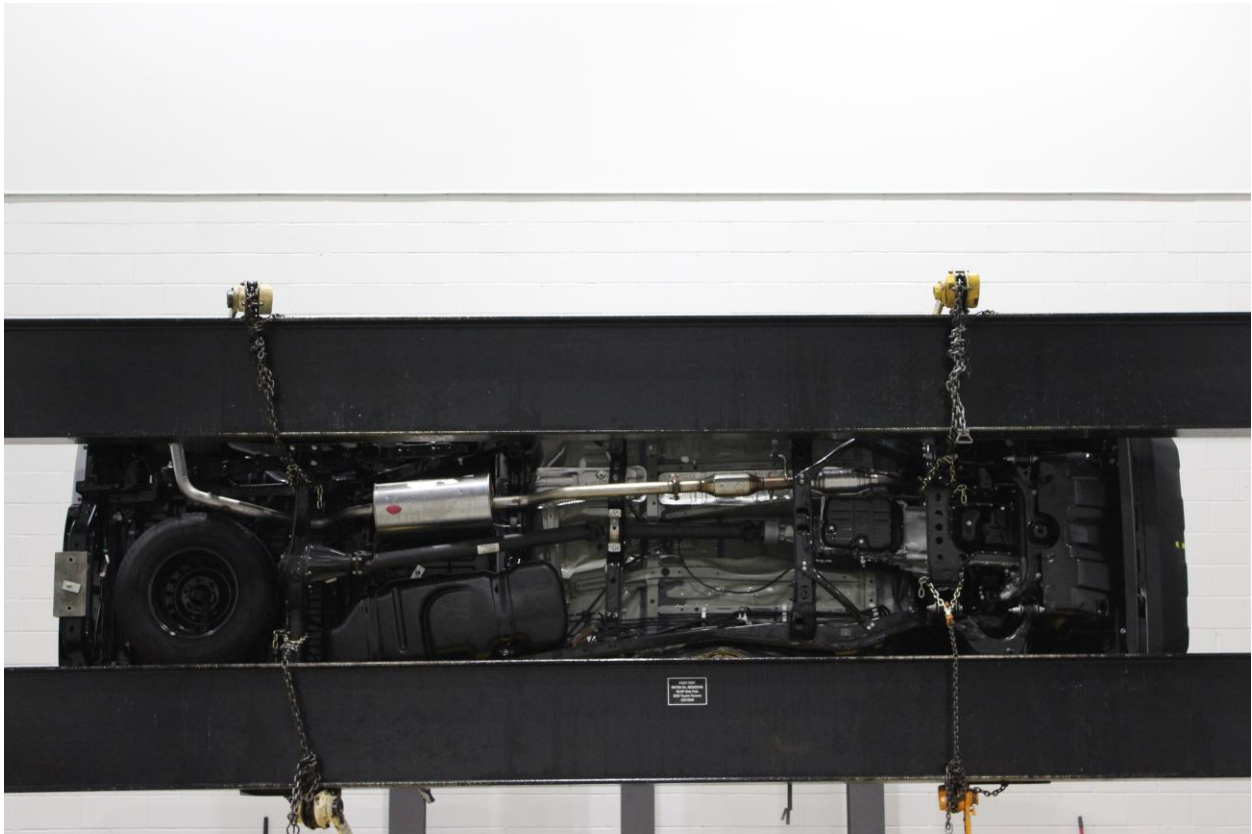


Figure A-64: FMVSS No. 301 Static Rollover 90 Degrees

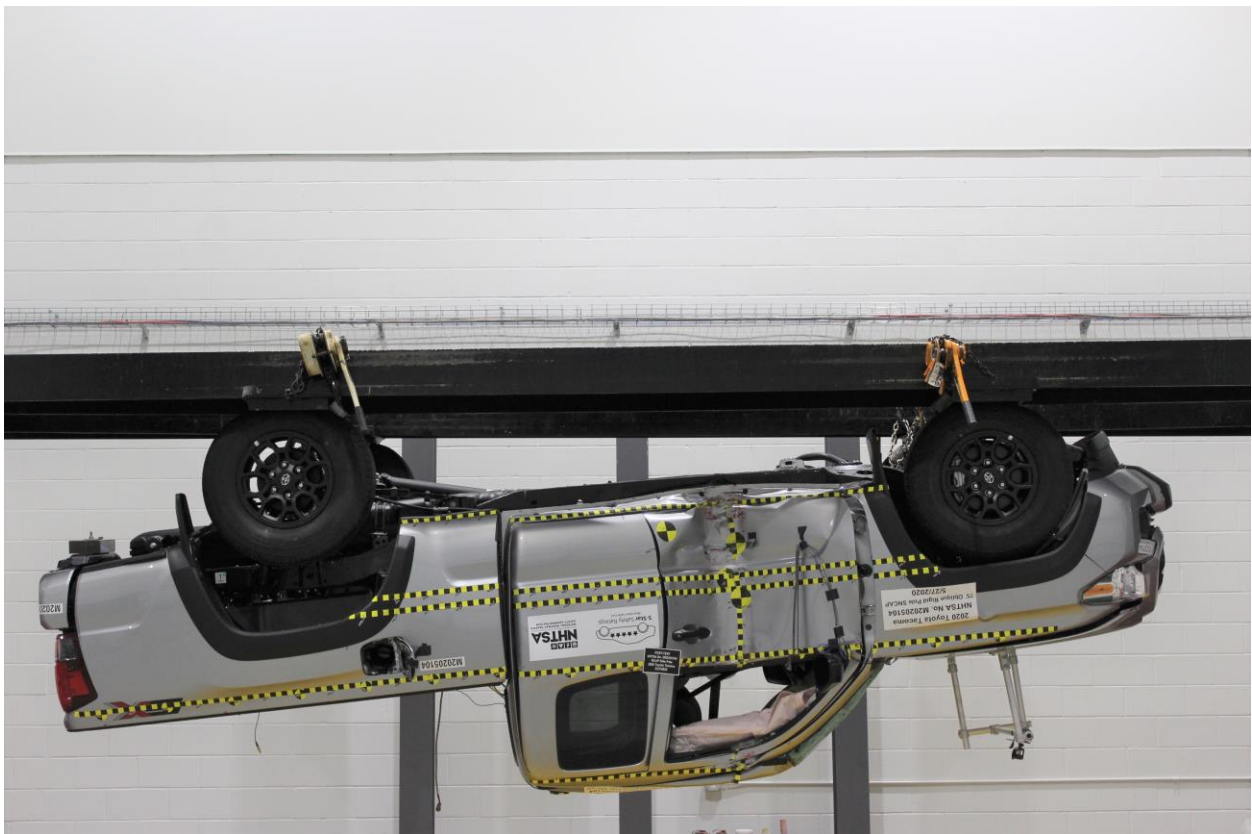


Figure A-65: FMVSS No. 301 Static Rollover 180 Degrees



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



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



Figure A-68: Impact Event

TOYOTA Let's Go Places		STANDARD EQUIPMENT MECHANICAL & PERFORMANCE 2.7L D4CH 18V 4Cyl Engine w/Qual VVTi 198hp @ 5200rpm/180 lb-ft @ 3800rpm 6-Spd Automatic Transmission - Automatic Limited-Slip Differential		MANUFACTURER'S SUGGESTED RETAIL PRICE \$28,050.00 OPTIONAL EQUIPMENT FE 20 State Emissions 715.00 SX SX Package Includes 18" Black Alloy Wheels, Black Overfenders, Black Mirror Caps and Black Door Handles 248.00 ZT All-Weather Fir Liner/Door Sill Protector 129.00 MF Mudguards	
DESC: TACOMA SR 4X2 ACCESS CAB VIN: 5TFRX5GN8LX167588 YR/MDL: 2020/7162A CLR: SILVER SKY METALLIC/FB14 (01D6/14) FINAL ASSEMBLY POINT: SAN ANTONIO, TEXAS, U.S.A.		SAFETY & CONVENIENCE - Toyota Safety Sense P: Pre-Collision Sys w/Pre-brake, Detection, Dynamic Radar Cruise Control, Lane Departure Alert - Automatic High Beams - Star Safety System: Vehicle Stability Control, Traction Control, Anti-Lock Brake System with EBD, Brake Assist and Smart Stop Technology - Dr & Fr Pass Advanced Airbag System - Seat-Integrated Side & Side Curtain Airbags		EXTERIOR - 16" Styled Steel Wheels - Intermittent Wipers INTERIOR - Fabric Trim Seats w/Dr Lumbar Support - Audio: 7" Touch Screen, 6 Speakers, Hands-Free Bluetooth Phone/Music, USB Media Port, USB Charge-Ports, SiriusXM w/3-Month All Access Trial - Android Auto & Apple CarPlay Compatible - Connected Services: Safety Connect with 1-year Trial, Wi-Fi Connect with up to 2 GB within 3-mo Trial - Rear Backup Camera ***Full Tank of Gas***	
GOVERNMENT 5-STAR SAFETY RATINGS Overall Vehicle Score Not Rated Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		FRONTAL CRASH Driver Not Rated Passenger Not Rated Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		DELIVERY PROCESSING AND HANDLING FEE 1,120.00	
Side Crash Front seat Not Rated Rear seat Not Rated Based on the risk of injury in a side impact.		ROLLOVER ★★★★★ Based on the risk of rollover in a single-vehicle crash.		TOTAL \$28,262.00	
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		EPA DOT Fuel Economy and Environment Gasoline Vehicle		Annual fuel cost \$1,950 Fuel Economy & Greenhouse Gas Rating (outside US) Smog Rating (outside US)	
Fuel Economy 21 MPG (combined city/hwy) 20 city 23 highway 4.8 gallons per 100 miles Small Pickup: 17 to 23 MPG (based on vehicle size) 138 MPG		You spend \$2,250 more in fuel costs over 5 years compared to the average new vehicle		Smog Rating 5 (Best)	
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 \$1,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.70 per gallon. EPA's 11 cents per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.		This vehicle emits 403 grams CO2 per mile, the best in its class. (11.1 grams per mile (outside US)) Producing and transporting this vehicle emits 138 grams CO2 per mile. (3.5 grams per mile (outside US))		The New Vehicle Limited Warranty provides 3-year/36,000-mile basic coverage. Seven-year/100,000-mile powertrain coverage. And 5-year/100,000-mile bumper-to-bumper coverage. See Warranty and Maintenance Guide for details. An adverse service contract may be available for the vehicle. Ask dealer for details.	
fuel economy.gov Calculate personalized estimates and compare vehicles		SmogRating.com QR code		Delivered by Truck to: ED MARTIN TOYOTA 9205 E 141 STREET NOBLESVILLE IN46060	

Figure A-69: Monroney Label

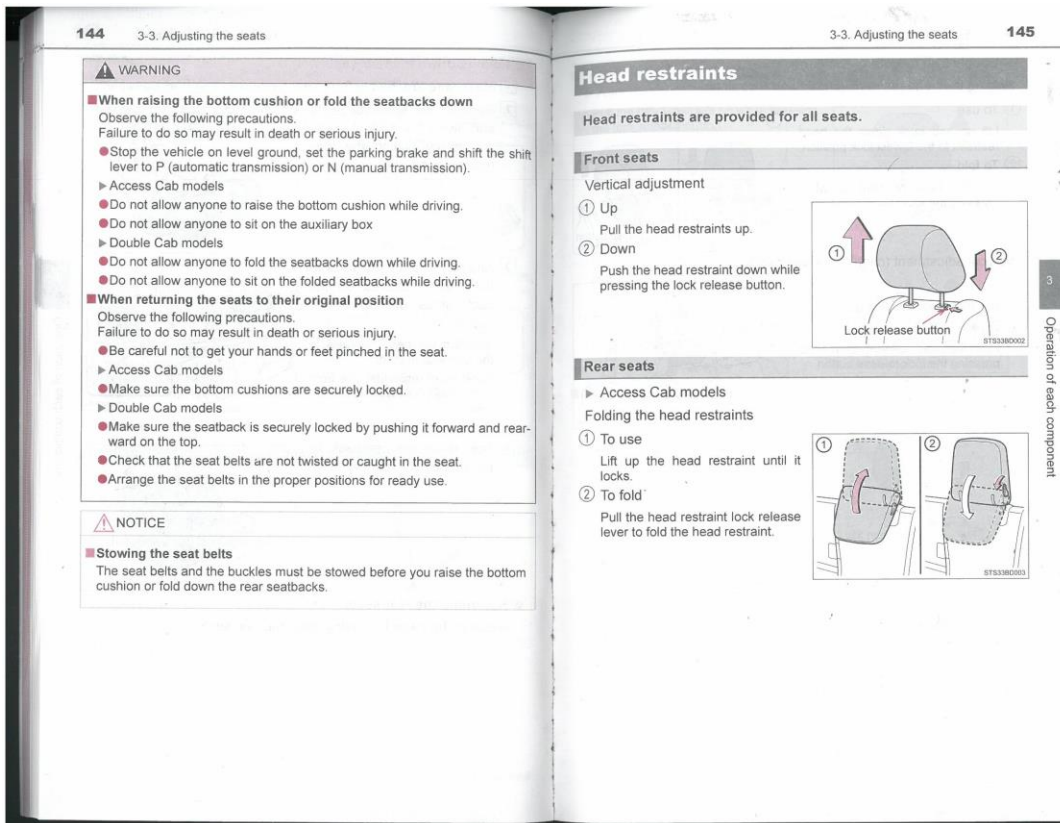


Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

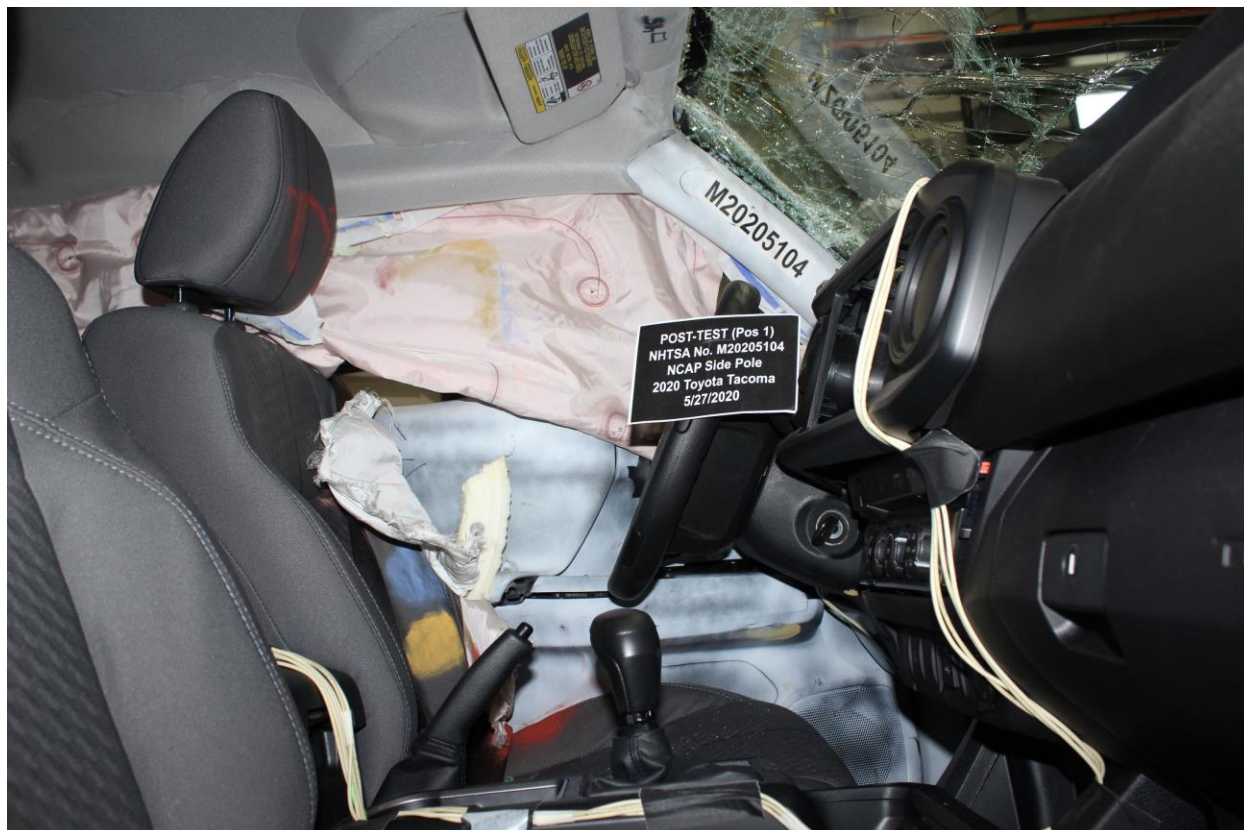


Figure A-71: Post-Test View of Shattered Vehicle Inner Door Panel (if applicable)

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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

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

Additional Driver Dummy Instrumentation Data

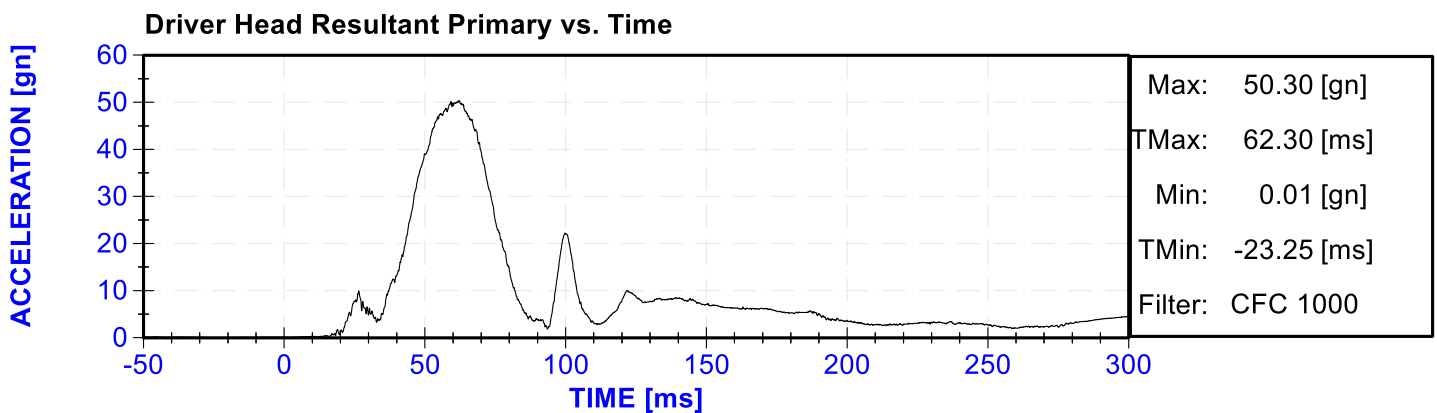
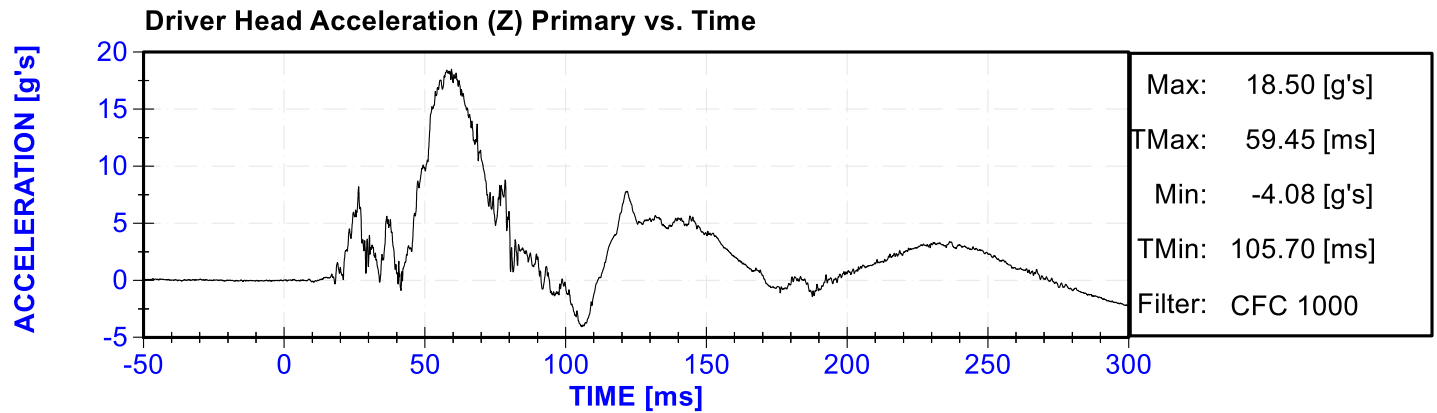
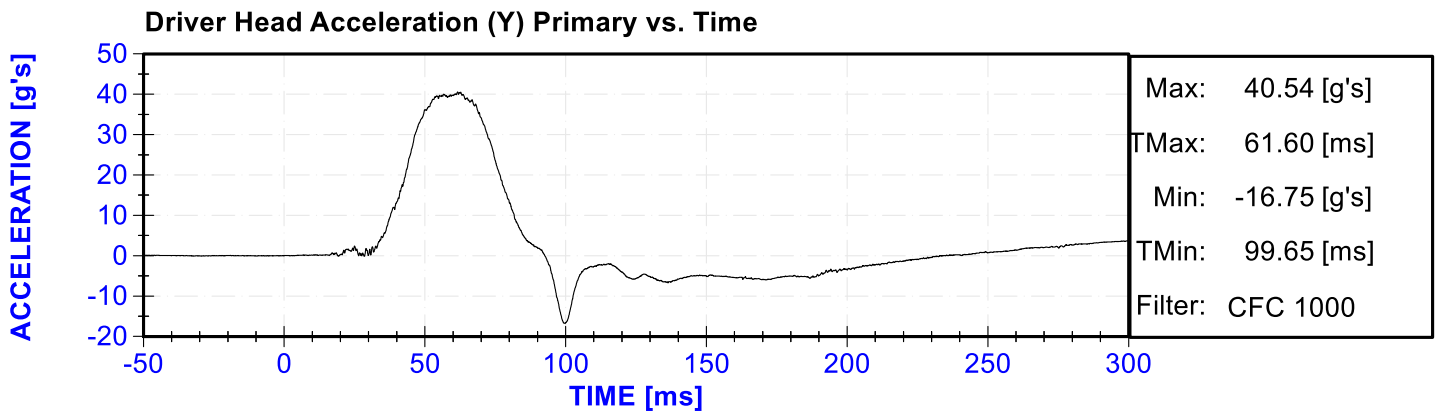
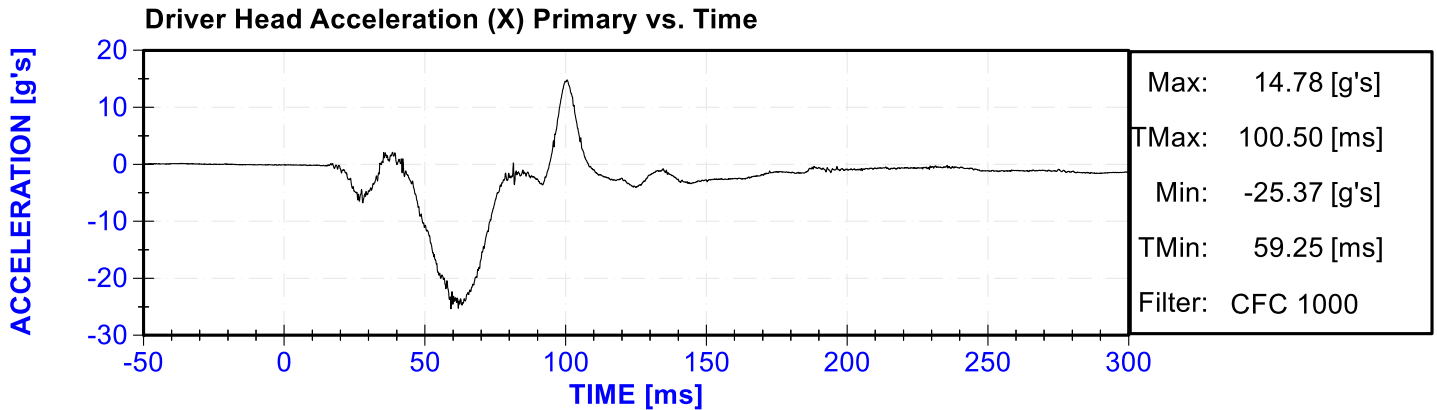
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

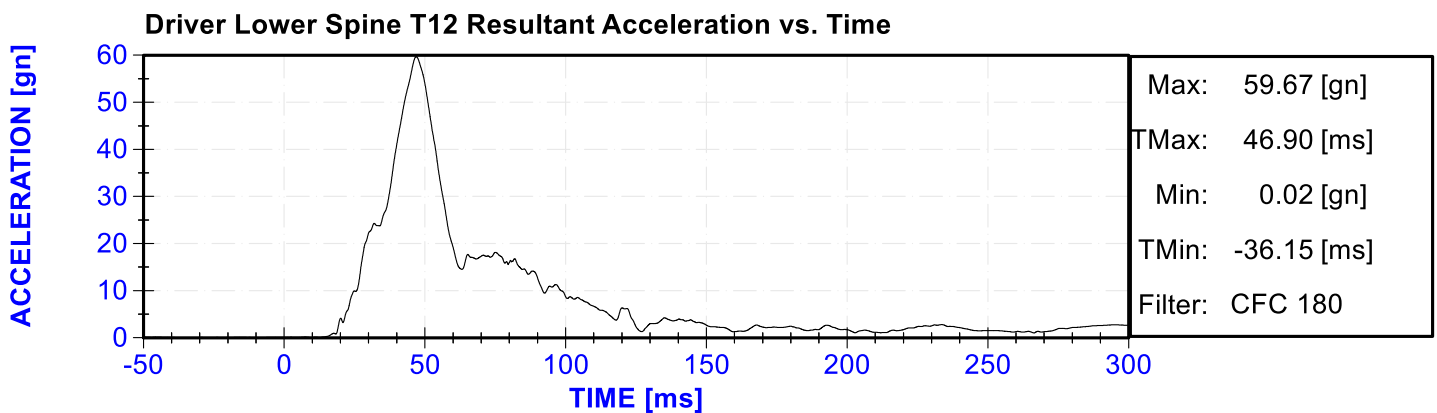
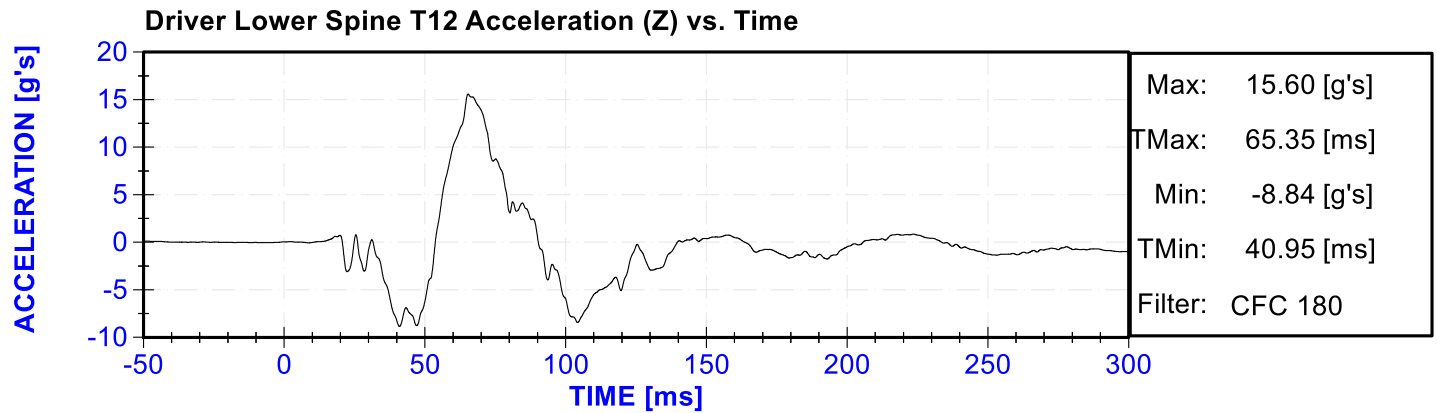
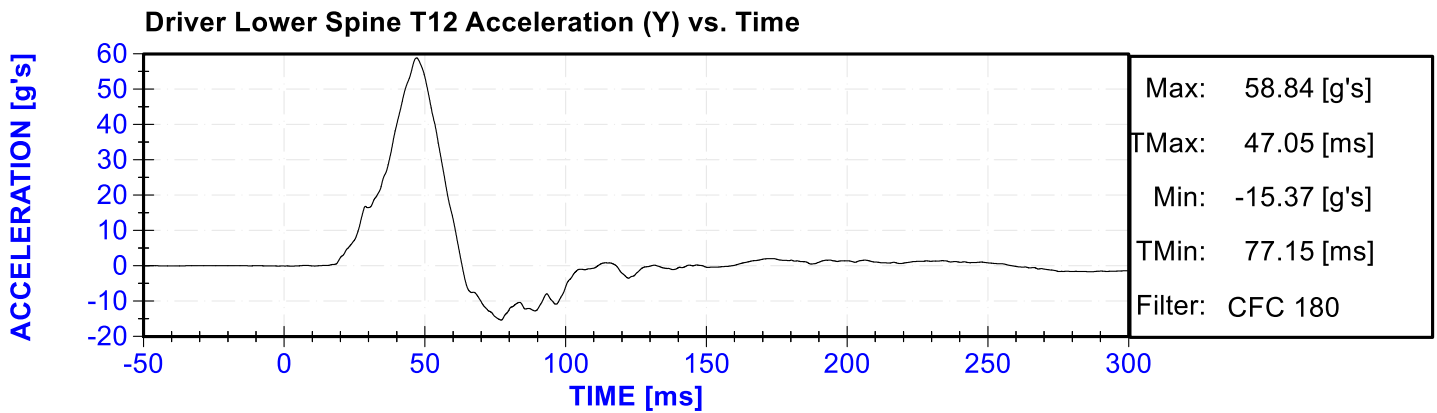
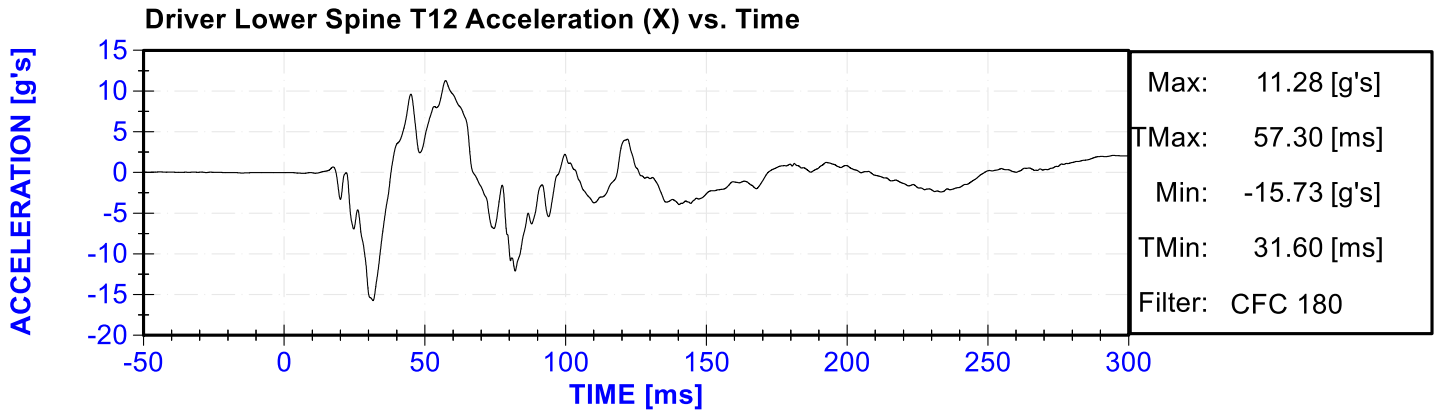
Vehicle Instrumentation Data

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

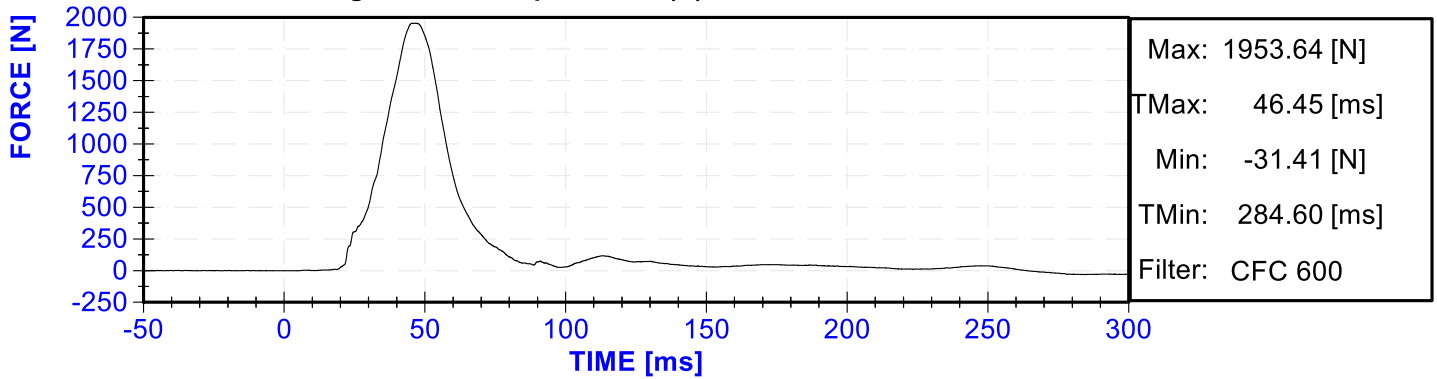
Pole Instrumentation Data

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

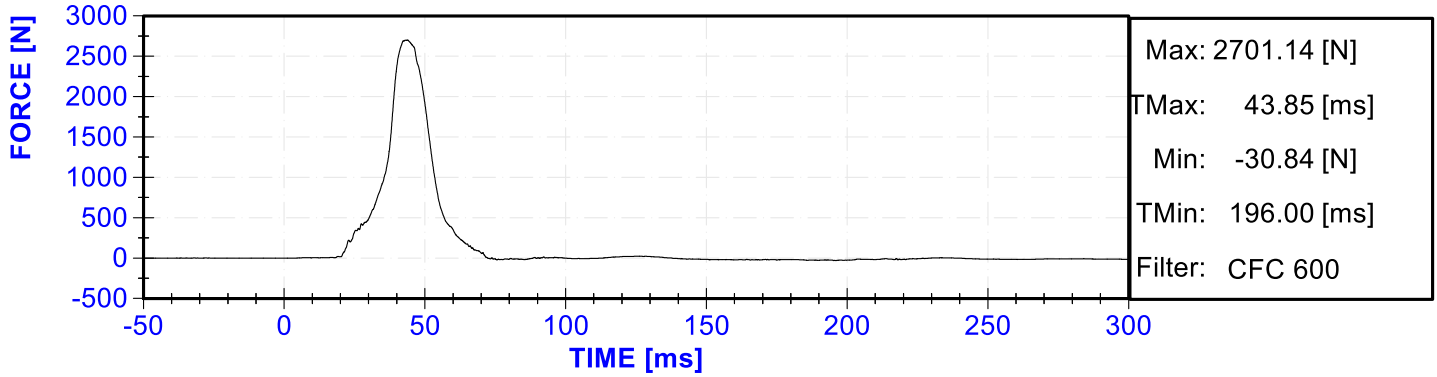




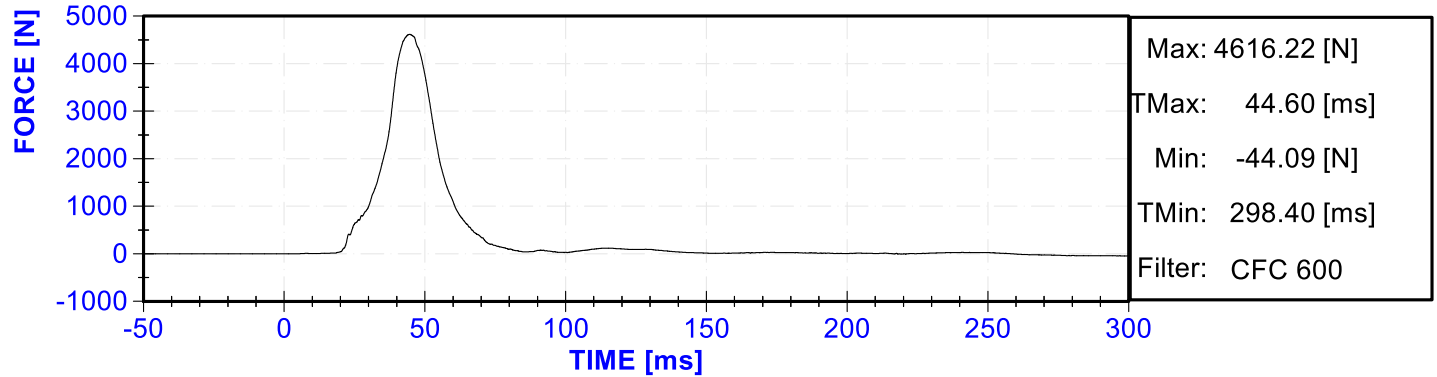
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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: 300

(CONFIGURED FOR LEFT SIDE IMPACT)

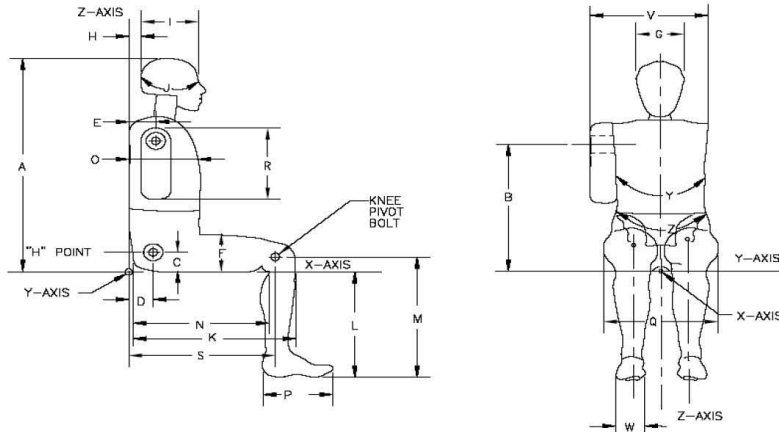


External Measurements - SID-IIs

Technician: K. Dutton

Date: 05/19/2020

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	450	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	186	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	360	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	206	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	772	Pass

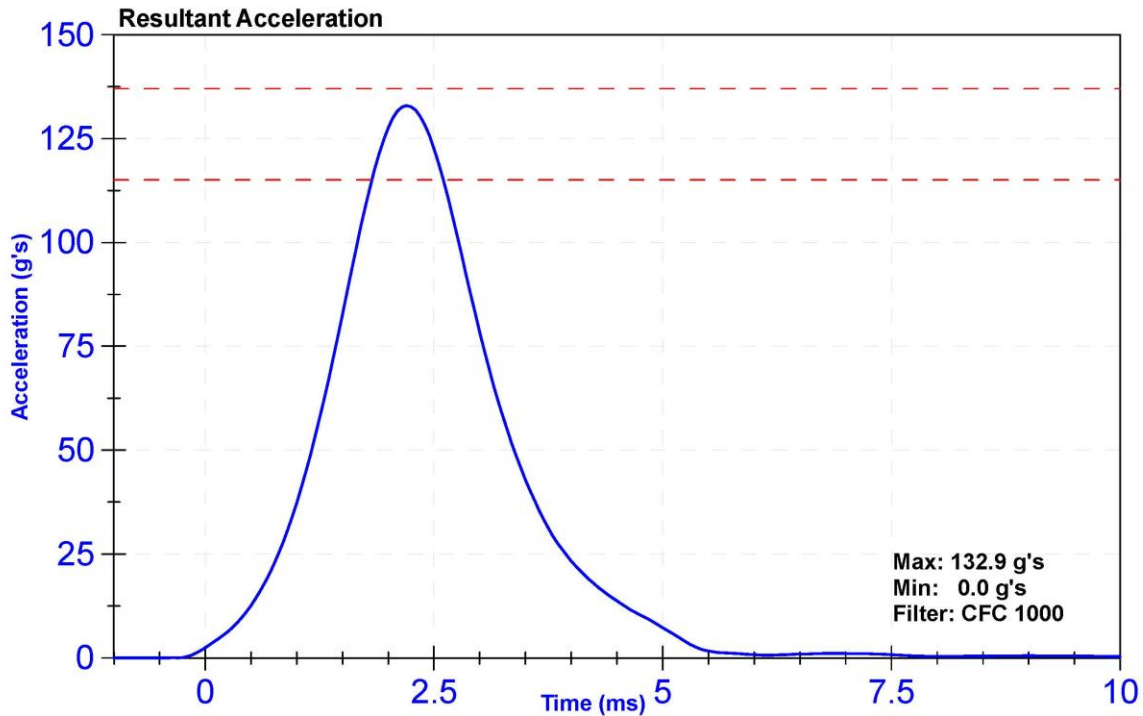
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

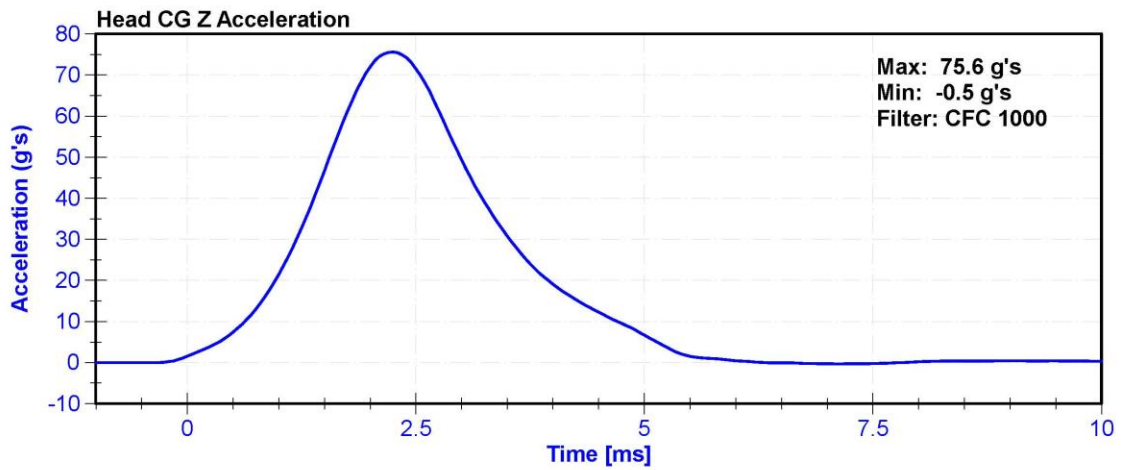
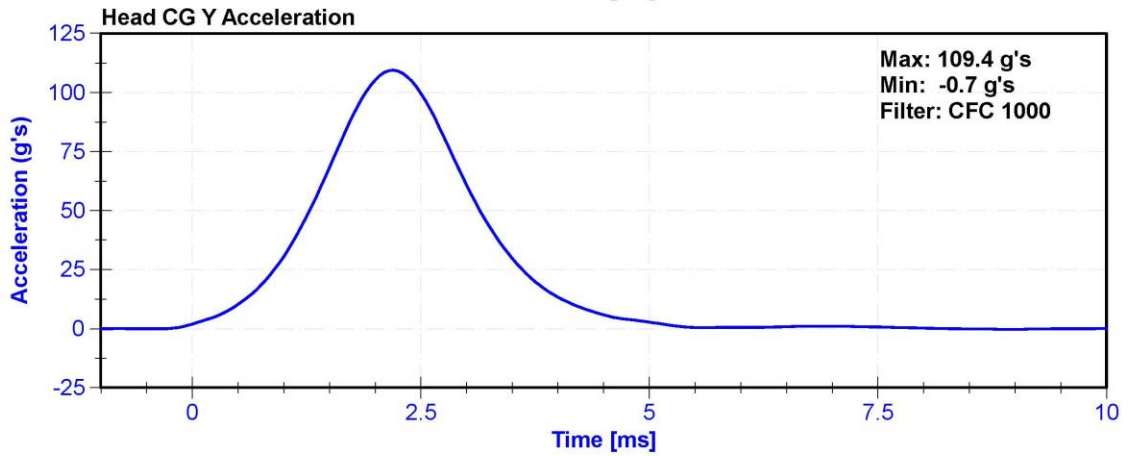
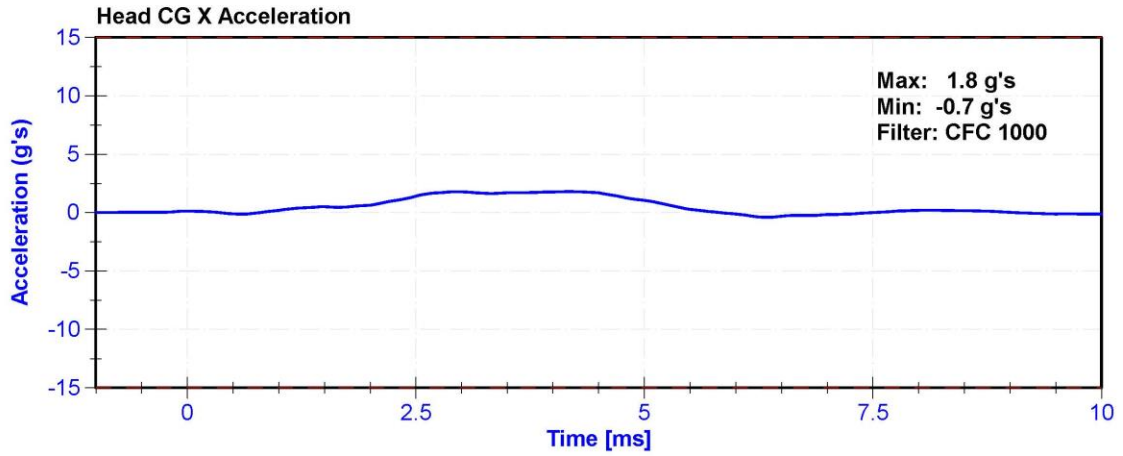
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	53.2	Pass
Resultant Acceleration	115	137	g's	132.9	Pass
Oscillation	0	15	%	0.8	Pass
Fore-Aft Acceleration	-15	15	g's	1.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	4/20/2020	10/19/2020
Y Accelerometer	ENDEVCO 7264	AC-P79189	4/20/2020	10/19/2020
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	4/20/2020	10/19/2020





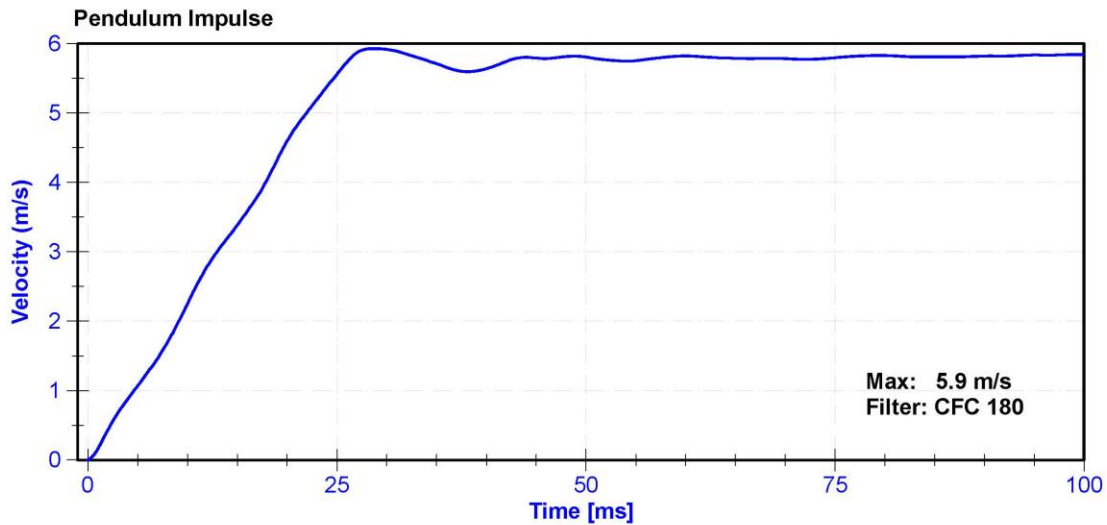
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

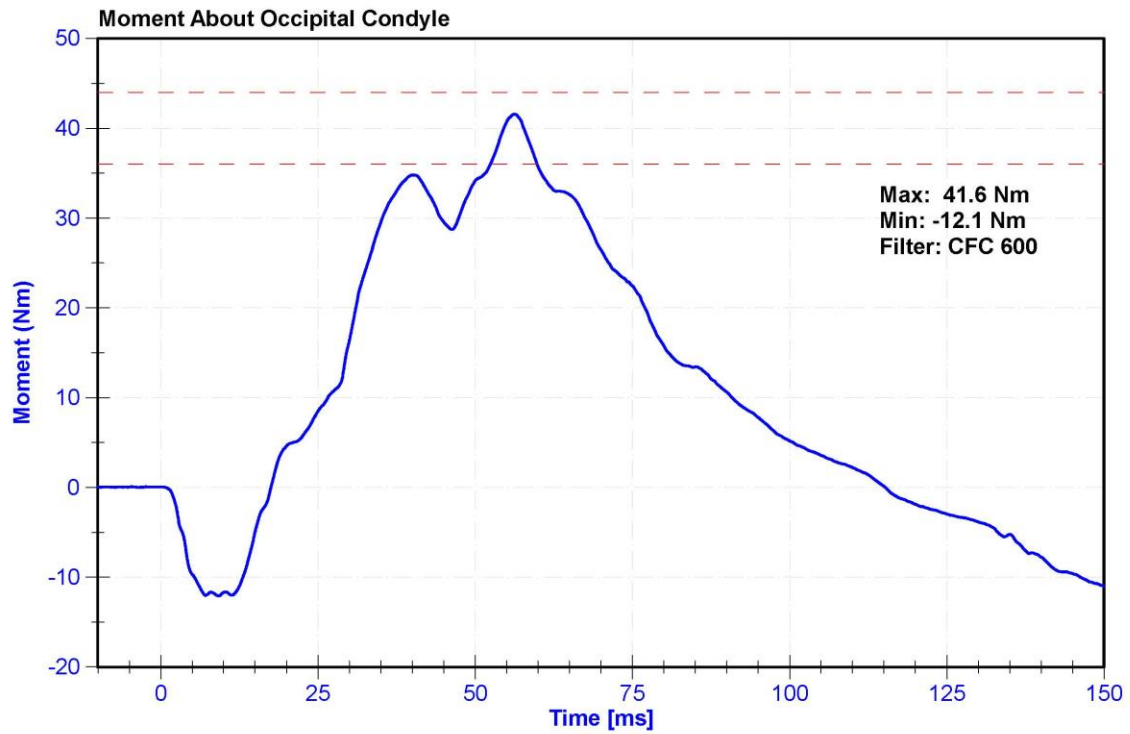
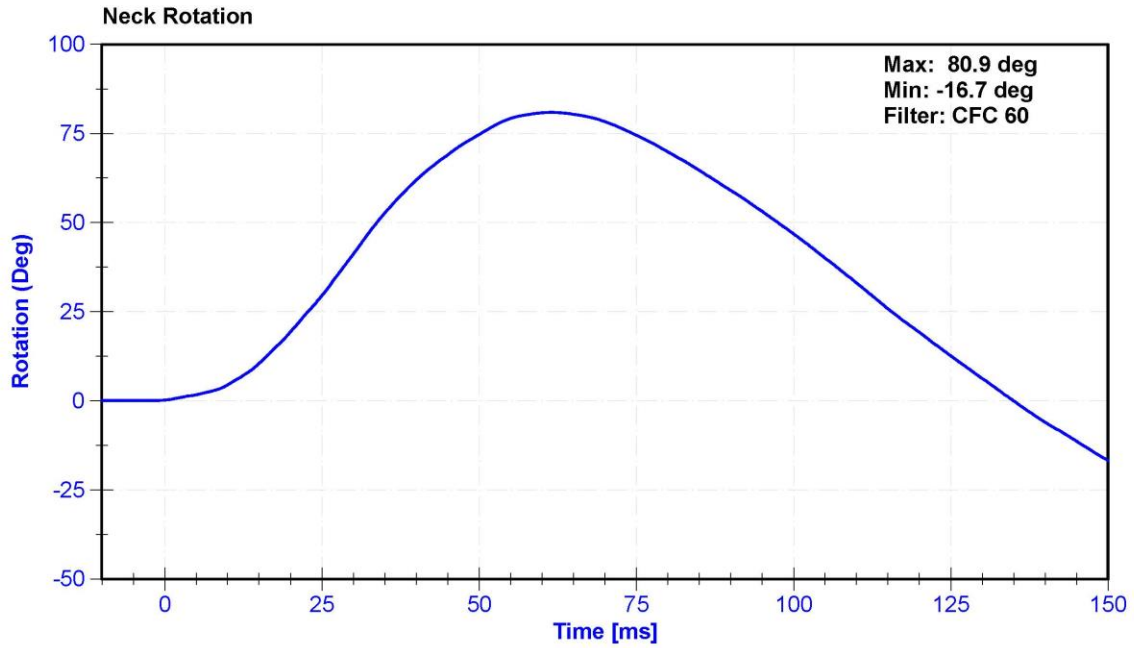
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	52.7	Pass
Velocity	5.51	5.63	m/s	5.549	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.25	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.38	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.59	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.56	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.92	Pass
Neck Rotation	71	81	deg	80.9	Pass
Time at Maximum Rotation	50	70	ms	61.5	Pass
Moment about the OC	36	44	Nm	41.6	Pass
Moment Decay to 0 Nm	102	126	ms	115.3	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





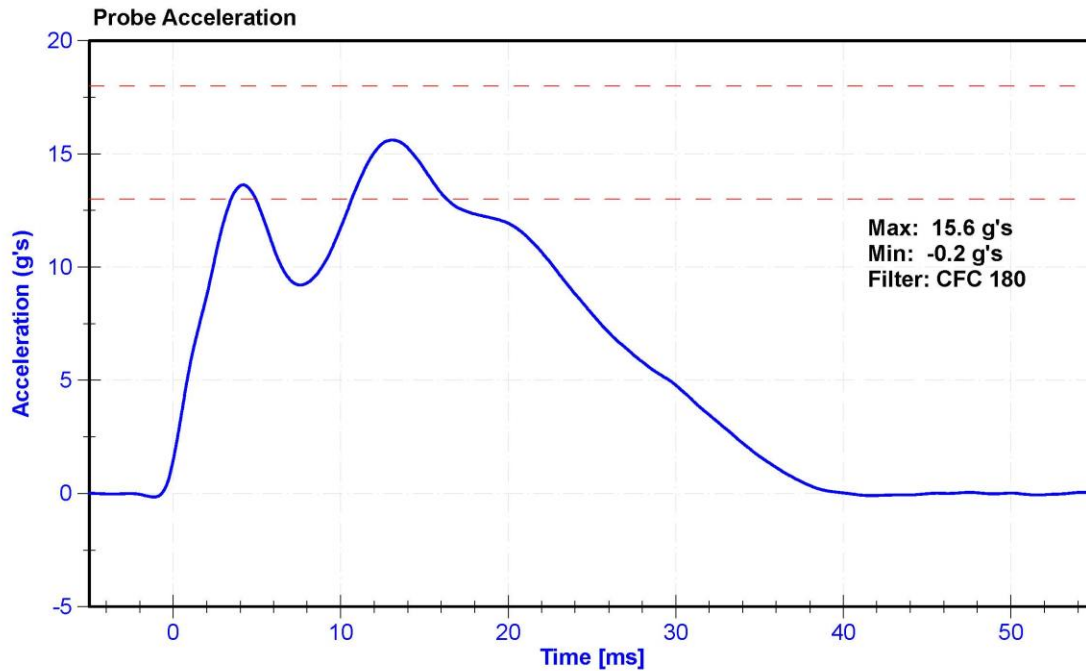
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

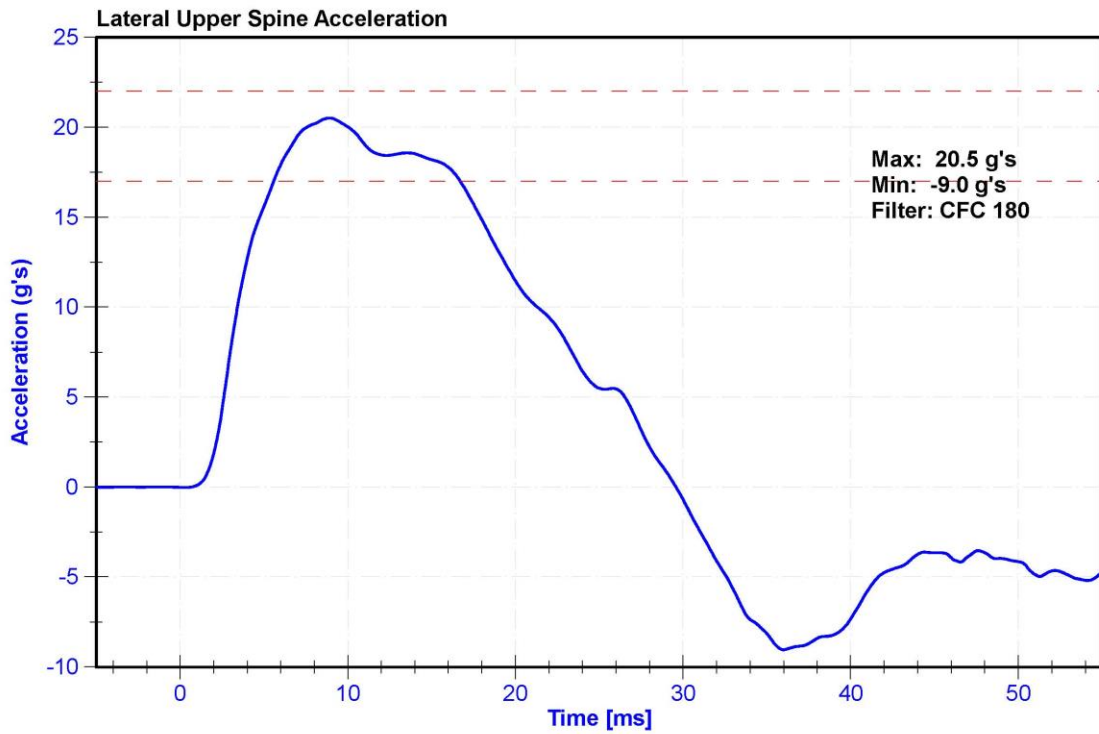
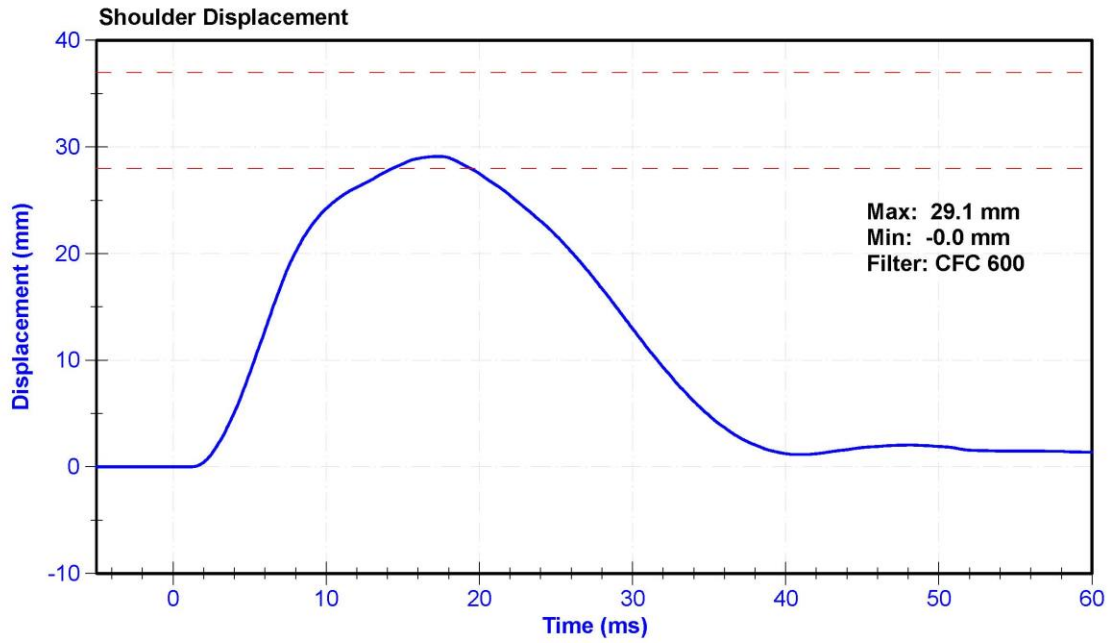
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	29.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.5	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 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020





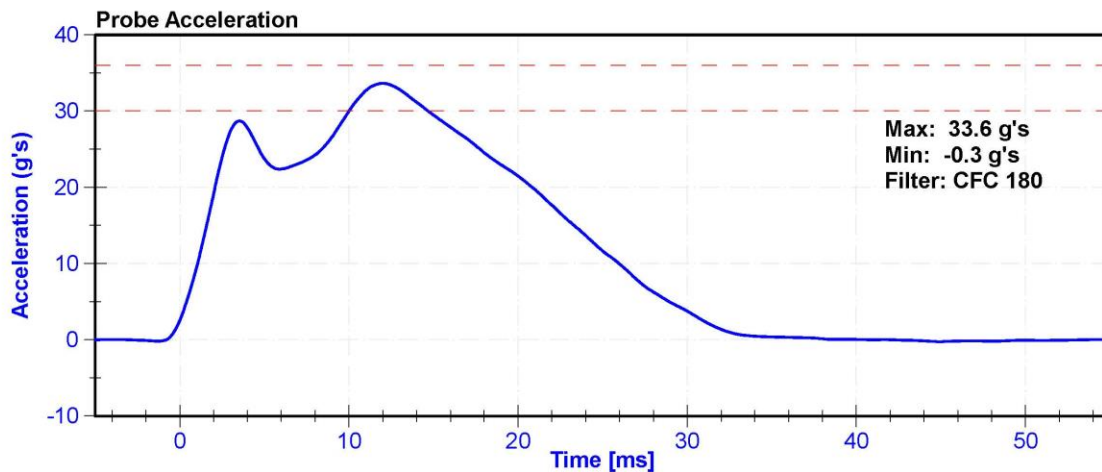
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

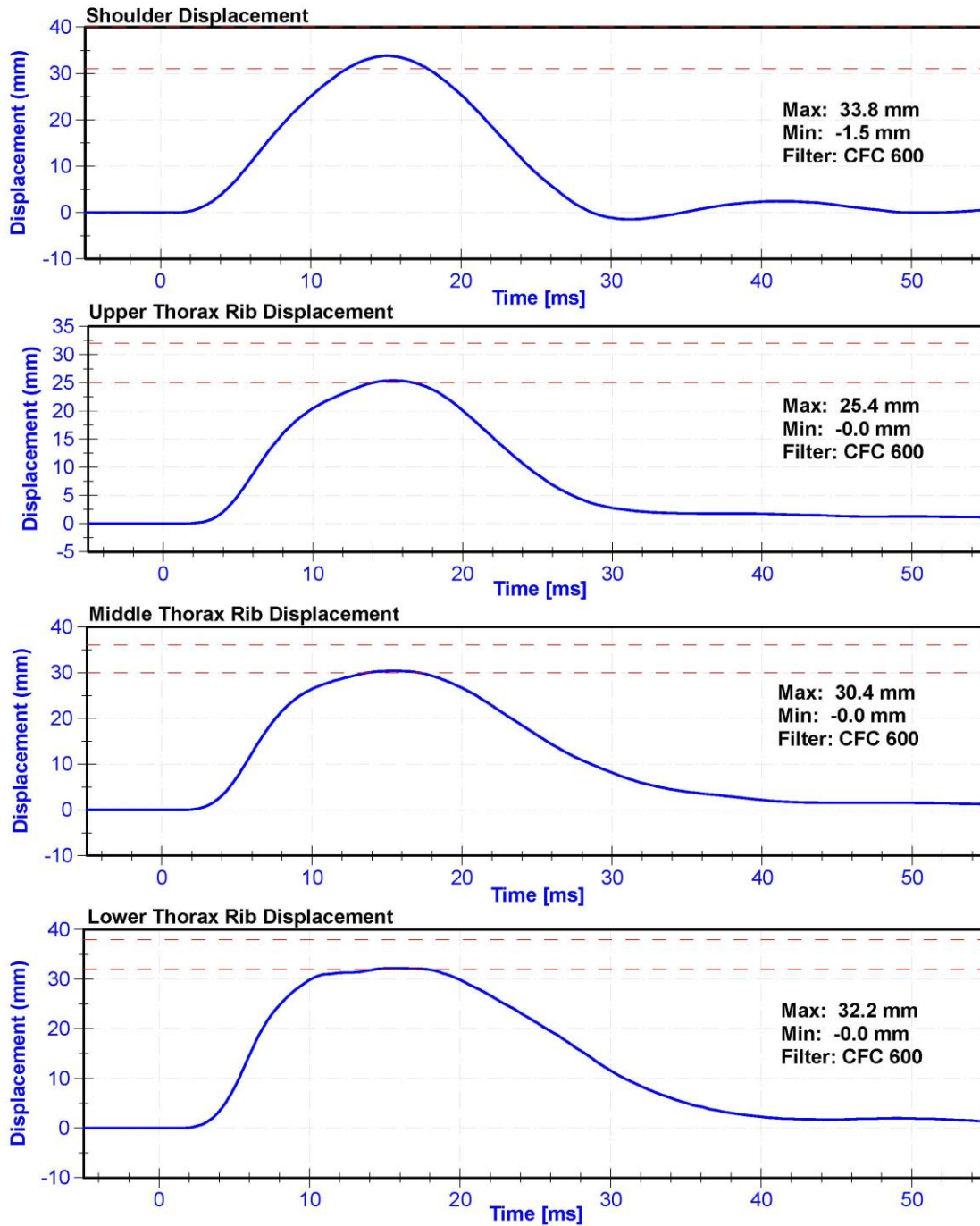
Results

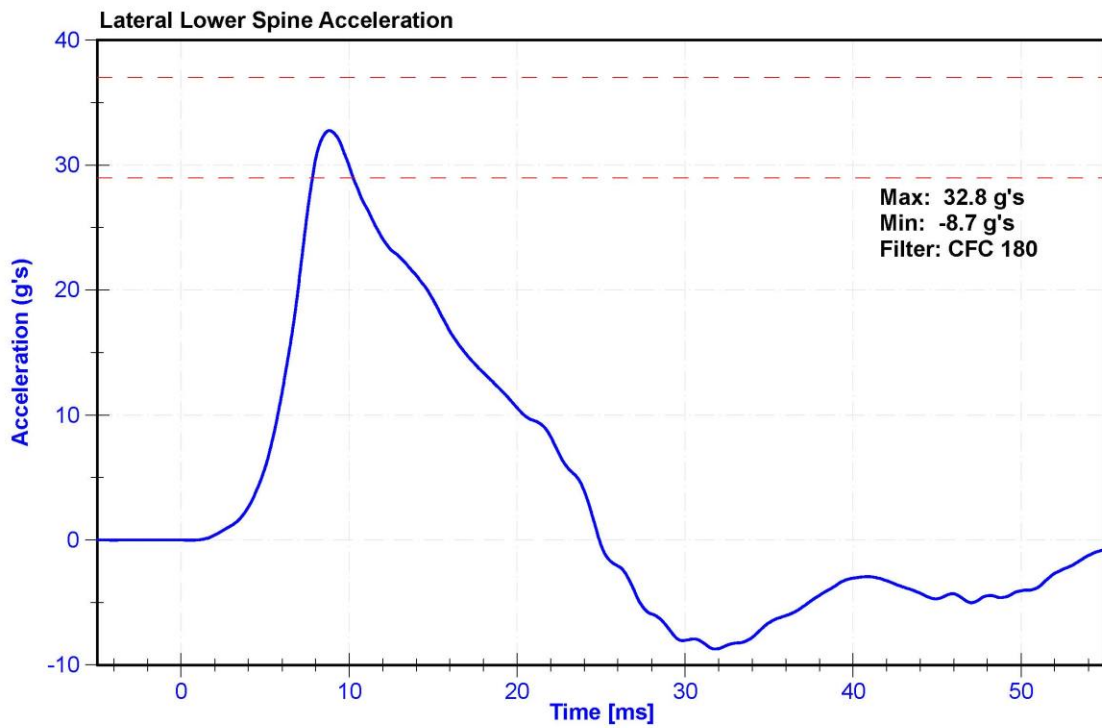
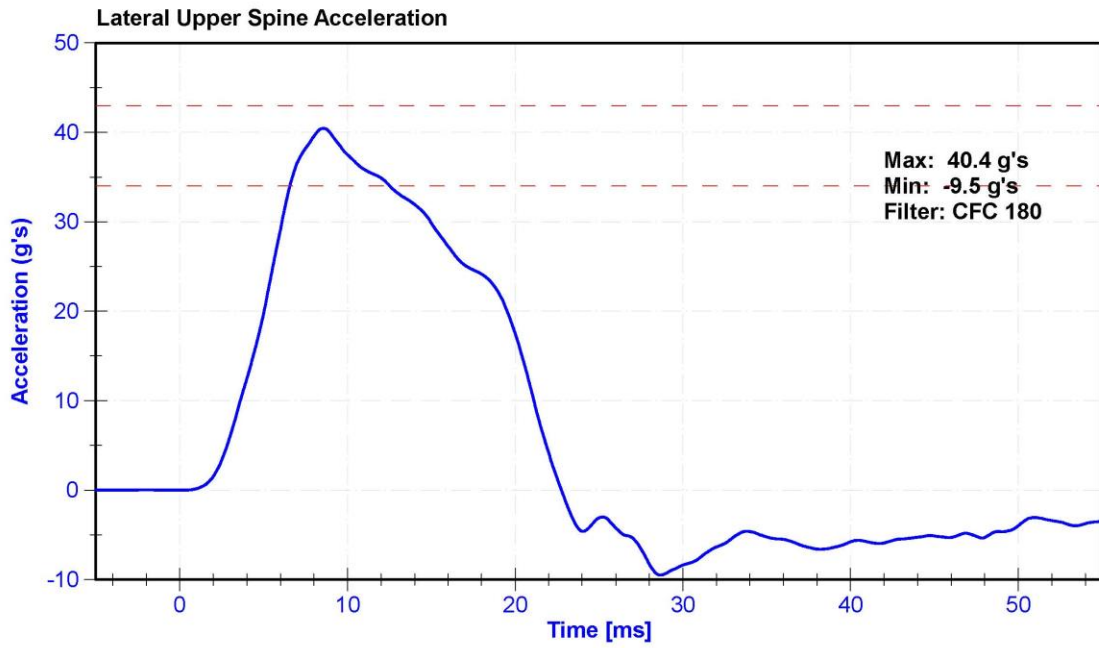
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	34.0	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	33.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	40.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.8	Pass
Shoulder Deflection	31	40	mm	33.8	Pass
Upper Thorax Rib Deflection	25	32	mm	25.4	Pass
Mid Thorax Rib Deflection	30	36	mm	30.4	Pass
Lower Thorax Rib Deflection	32	38	mm	32.2	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	P17283	4/21/2020	10/20/2020
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020







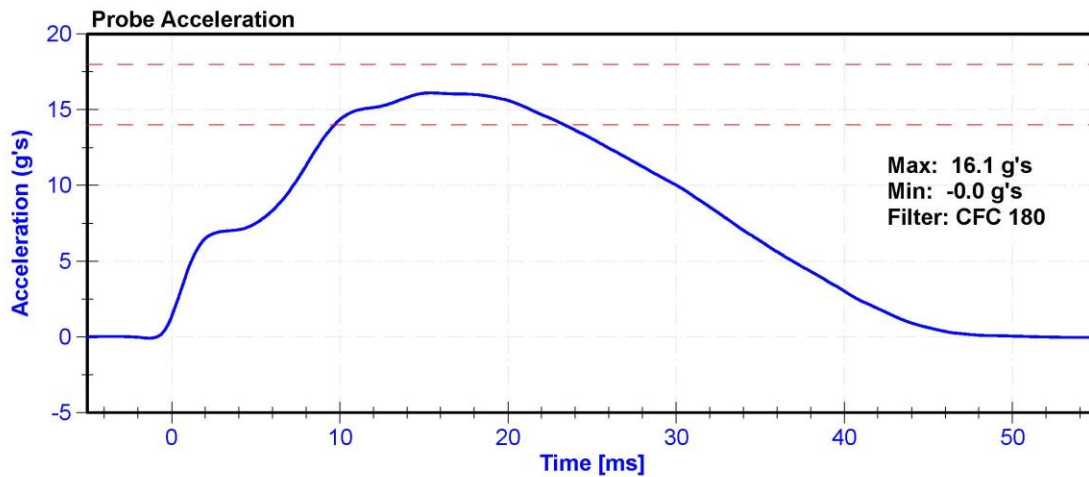
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

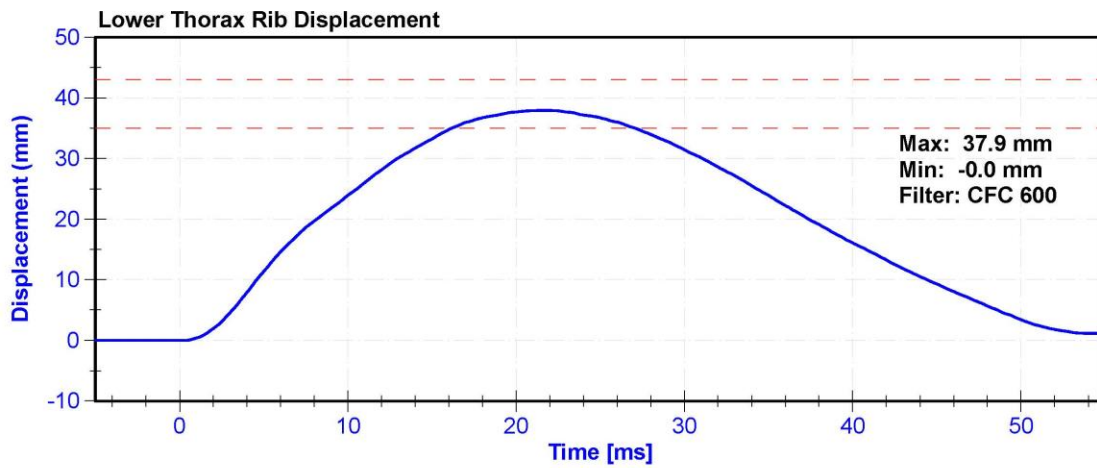
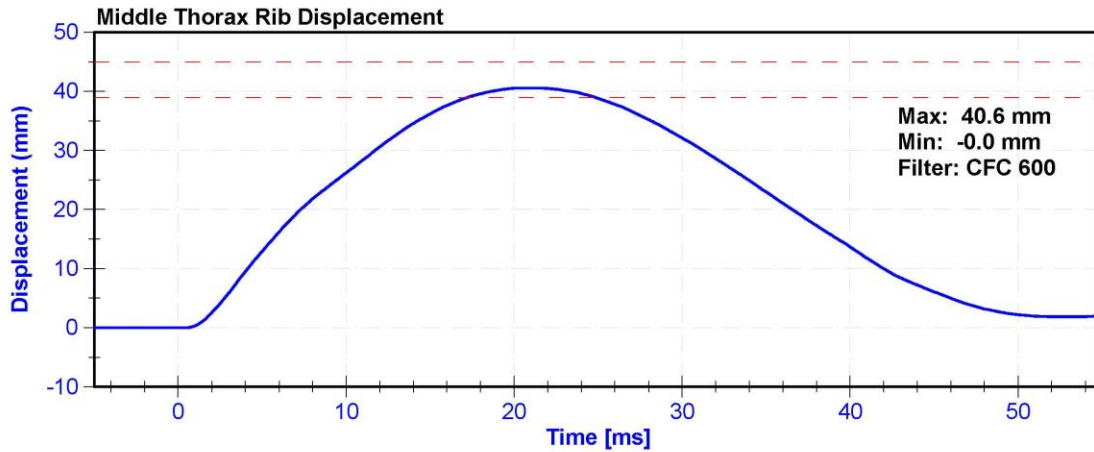
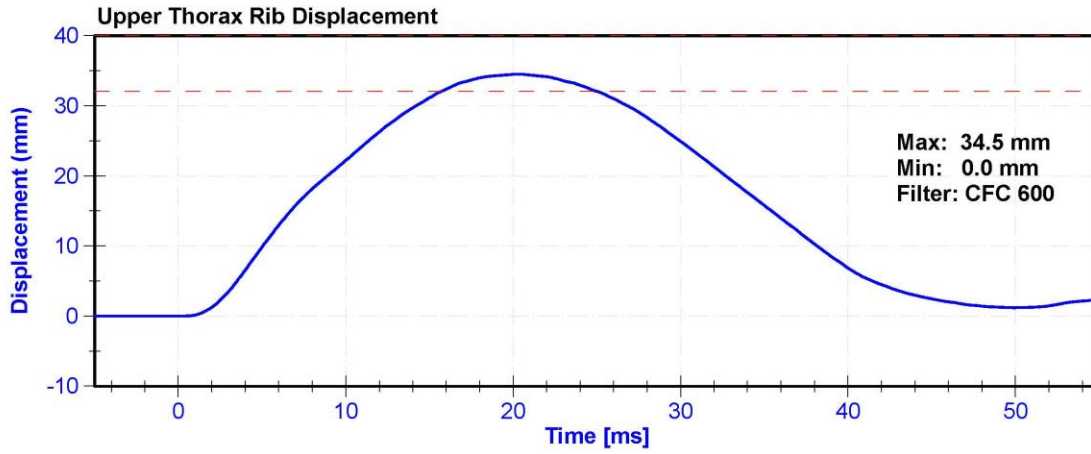
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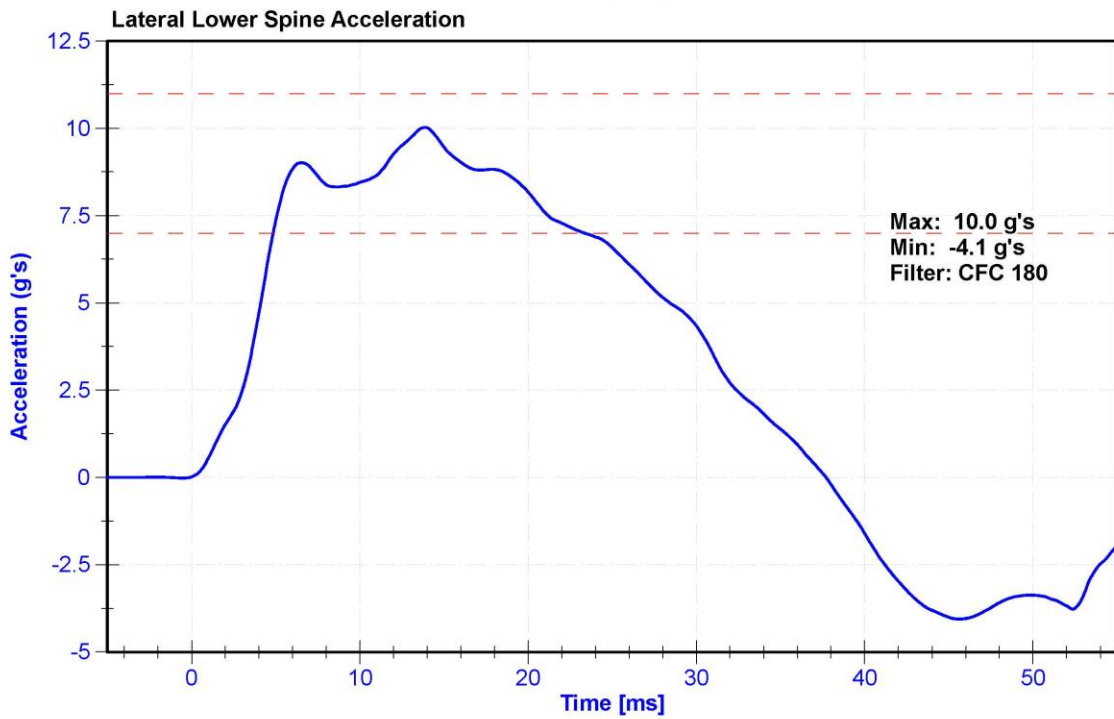
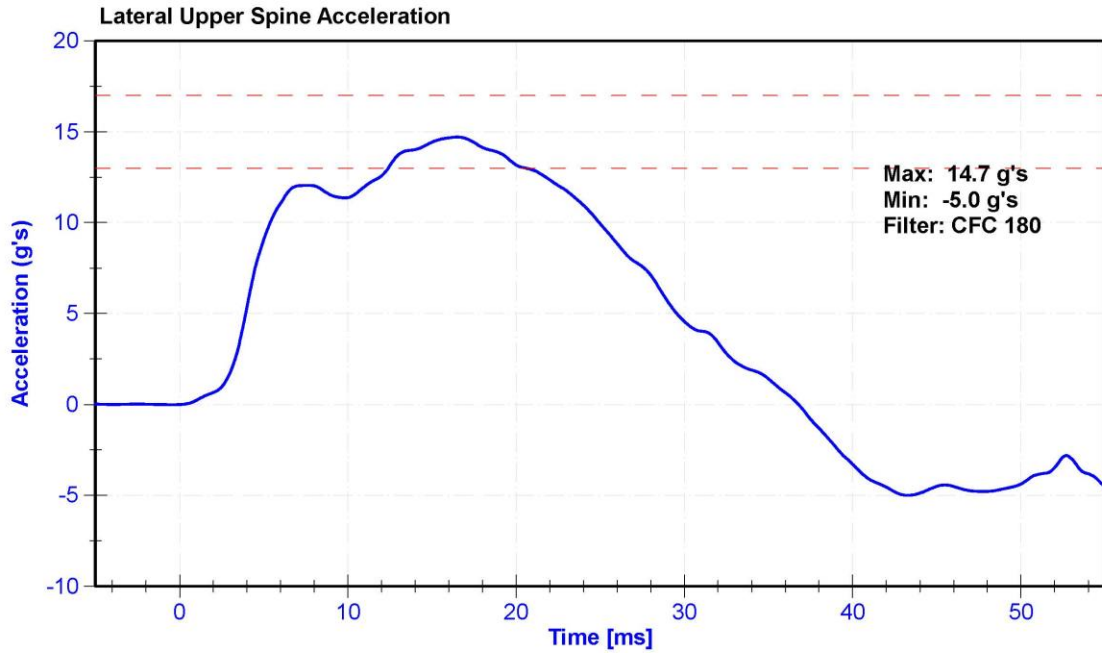
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	35.7	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.0	Pass
Upper Thorax Rib Deflection	32	40	mm	34.5	Pass
Middle Thorax Rib Deflection	39	45	mm	40.6	Pass
Lower Thorax Rib Deflection	35	43	mm	37.9	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	P17283	4/21/2020	10/20/2020
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020







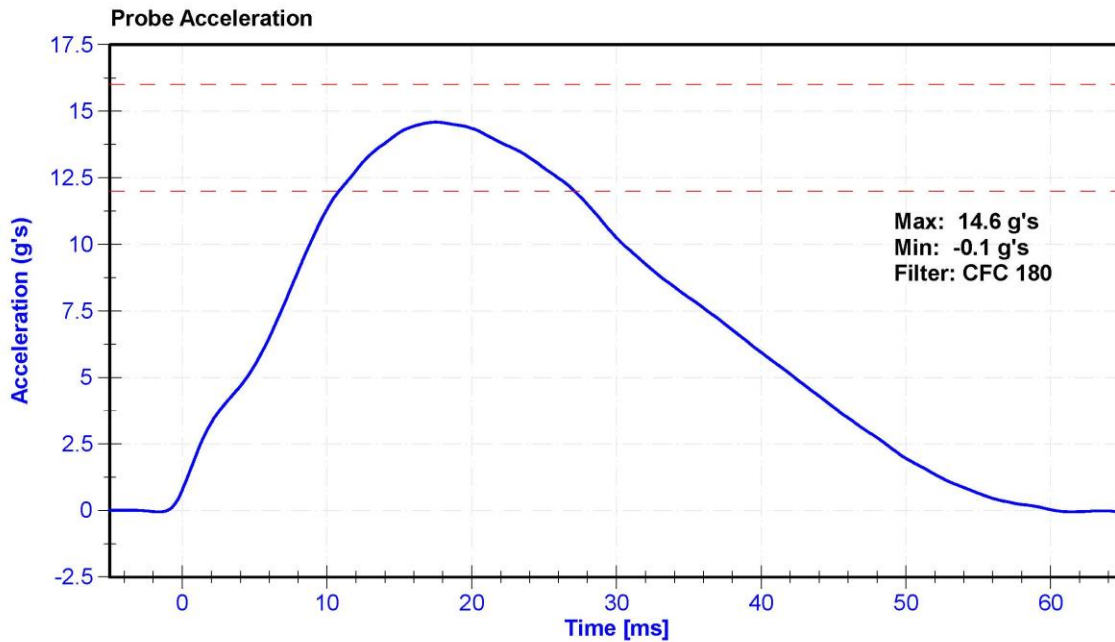
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

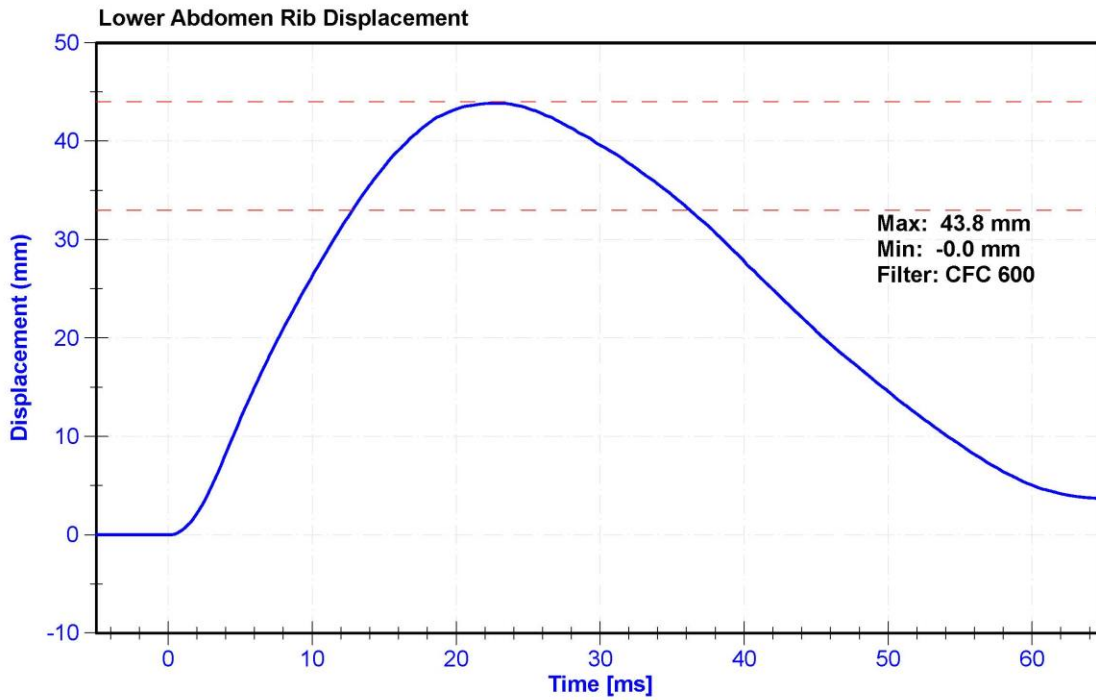
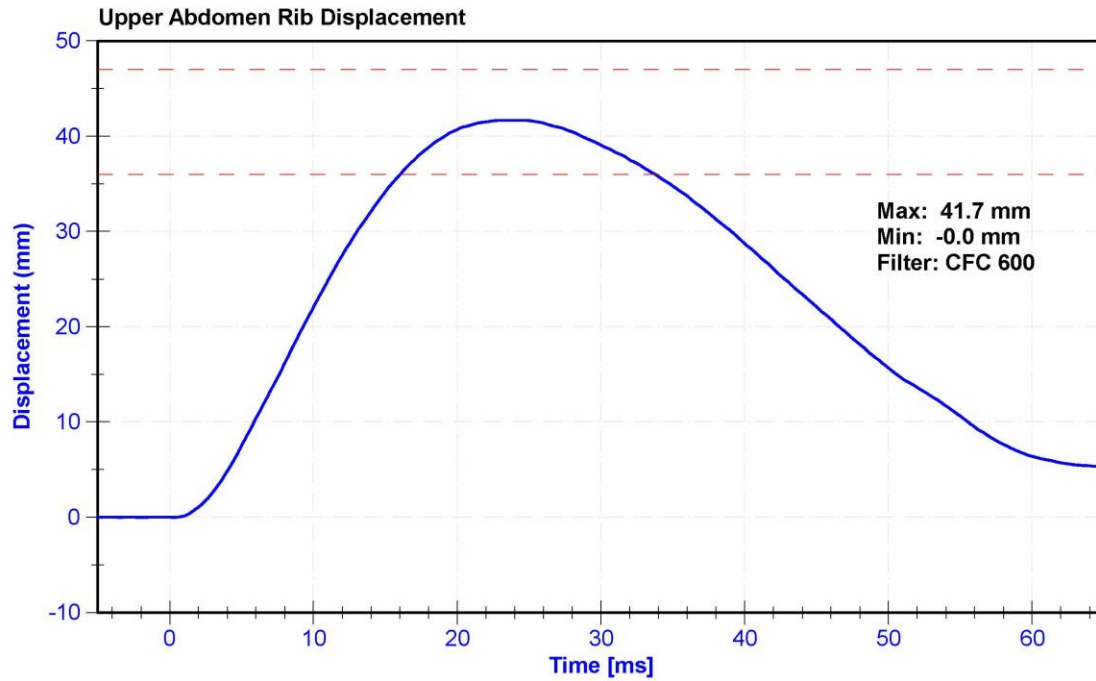
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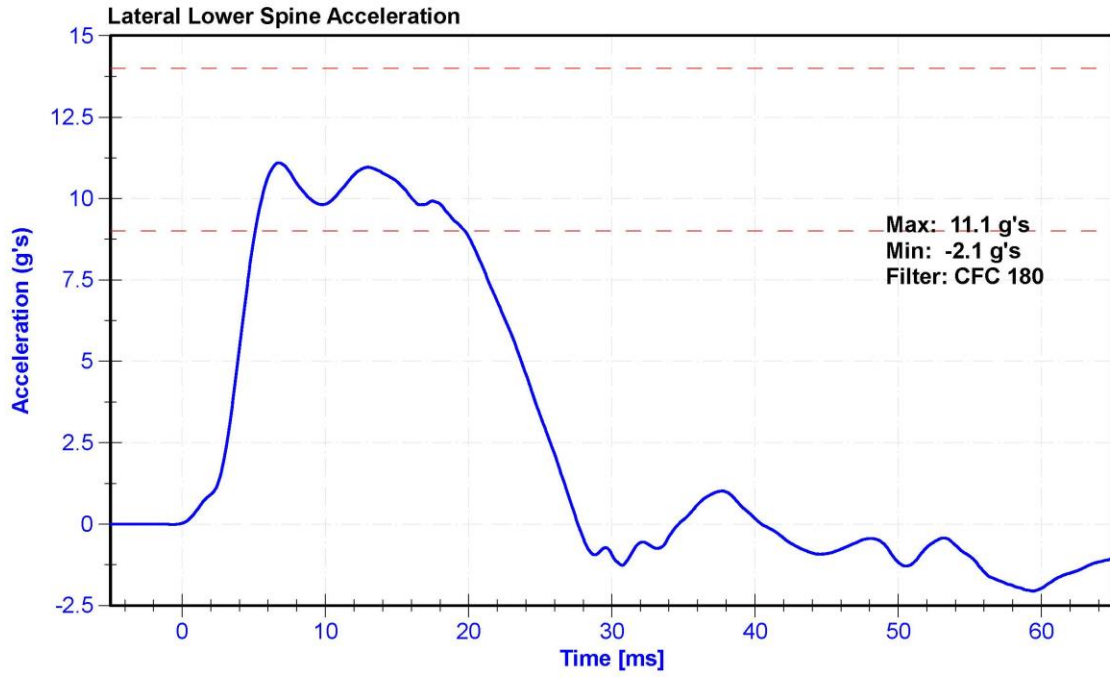
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	12	16	g's	14.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.1	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.7	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.8	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 7264	AC-P64147	4/20/2020	10/19/2020
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	4/30/2020	10/29/2020
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	4/30/2020	10/29/2020







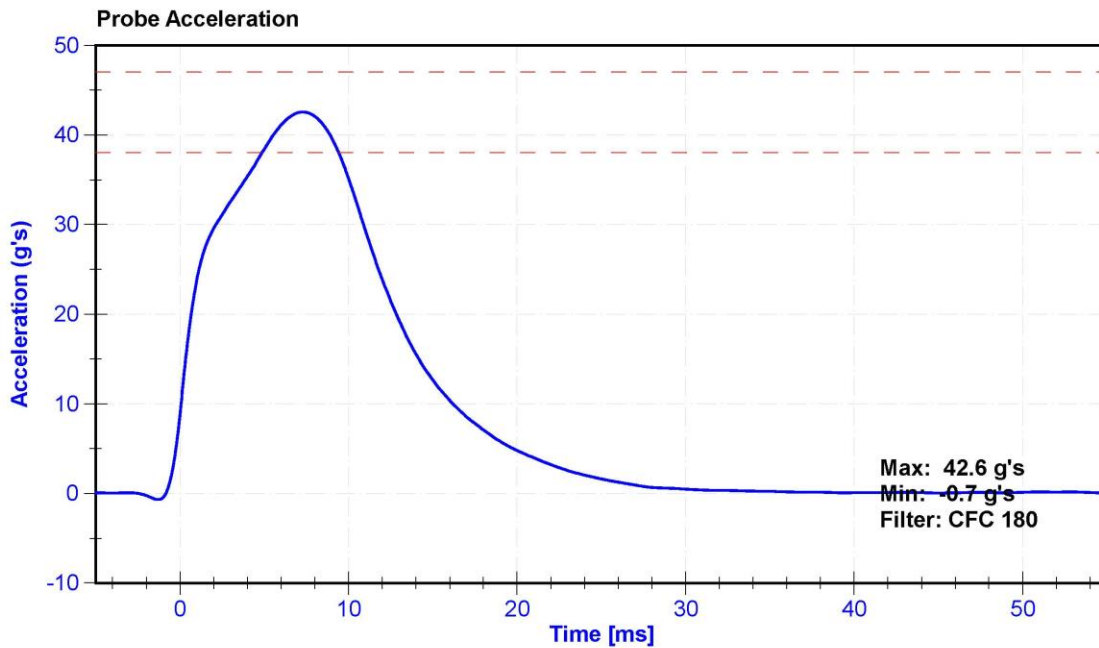
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

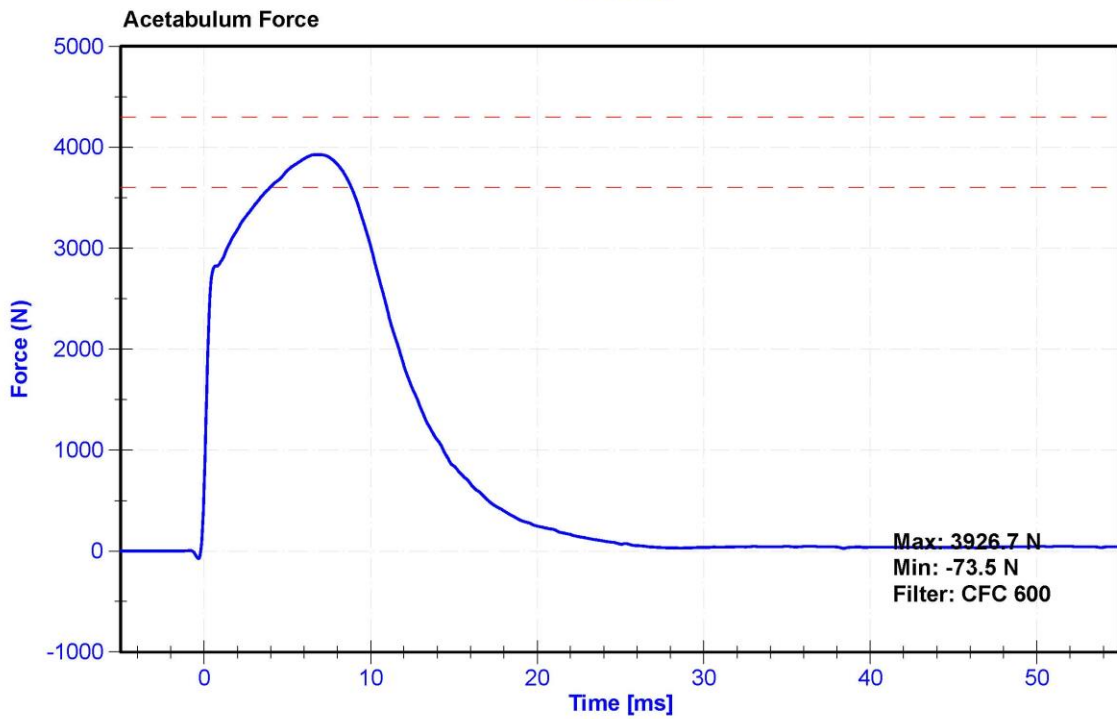
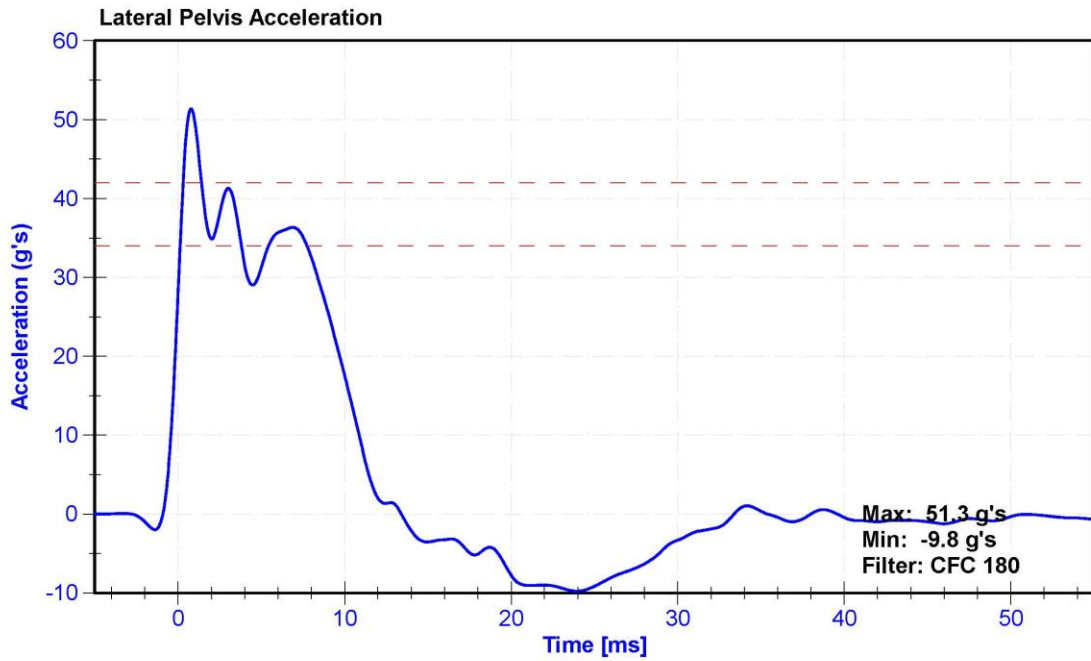
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	37.7	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	42.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	36.3	Pass
Acetabulum Force	3600	4300	N	3926.7	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-P51731	4/20/2020	10/19/2020
Acetabulum Load Cell	Denton 3249J	LC-276Fy	9/24/2019	9/23/2020
Certification Plug	SACO	13191	8/8/2019	N/A
Crash Test Plug	SACO	13195	8/8/2019	N/A







300
Crash
5/20/2020

SID-Its Pelvis Plug Certification Test

Plug S/N 13195

Test Number 10590

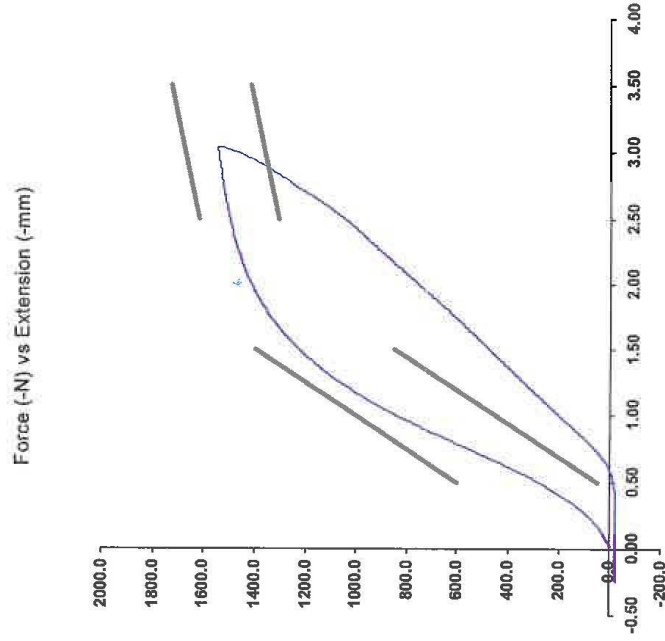
Report Number 10625

Test Date 8/8/2019 12:52:11 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
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator 131
 Part Number 180-4450

Template No 107 08-Aug-19
 SACO Research

By: DC Date: 8/8/2019

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

66-389
Cert



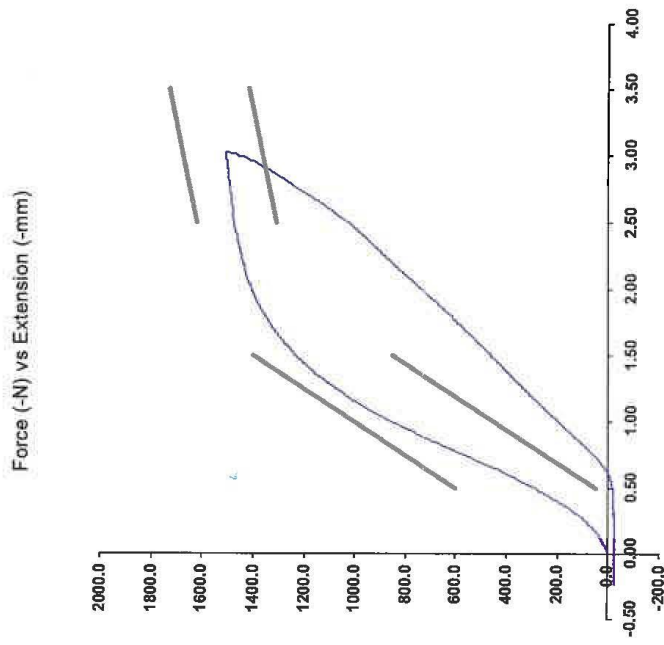
SID-Its Pelvis Plug Certification Test

Plug S/N 13191
 Test Number 10586
 Report Number 10621
 Test Date 8/8/2019 11:40:07 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 (F1860947), Units (LBS) 1000
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator 131
 Part Number 180-4450

Template No 107 06-Aug-18
 SACO Research

By: *DC* Date: 8/8/2019
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

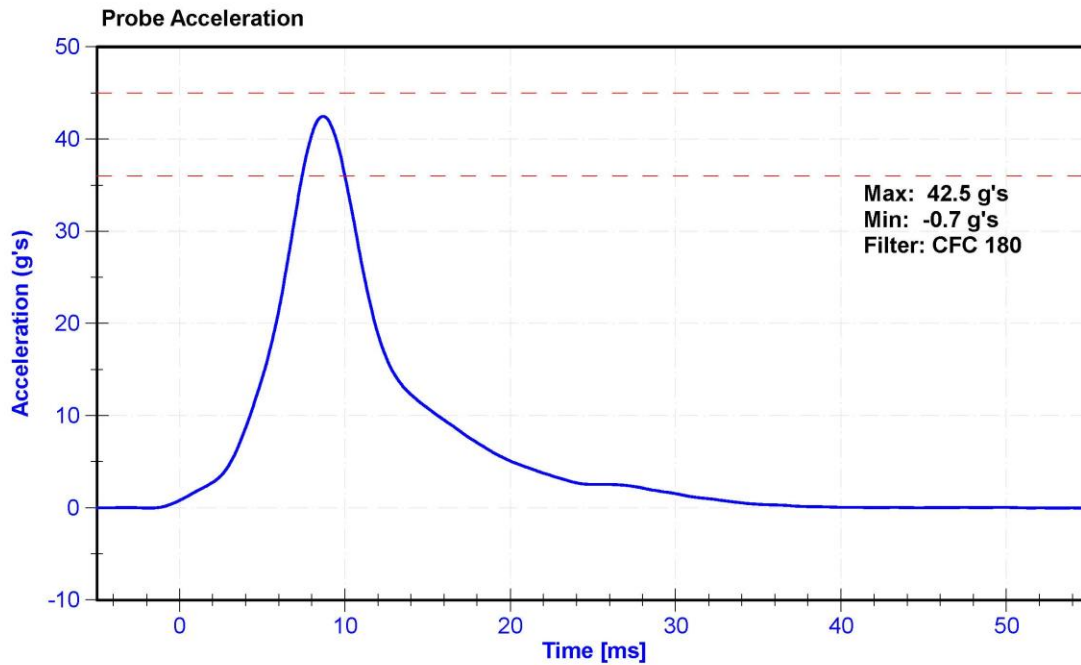
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	D.Reinhard

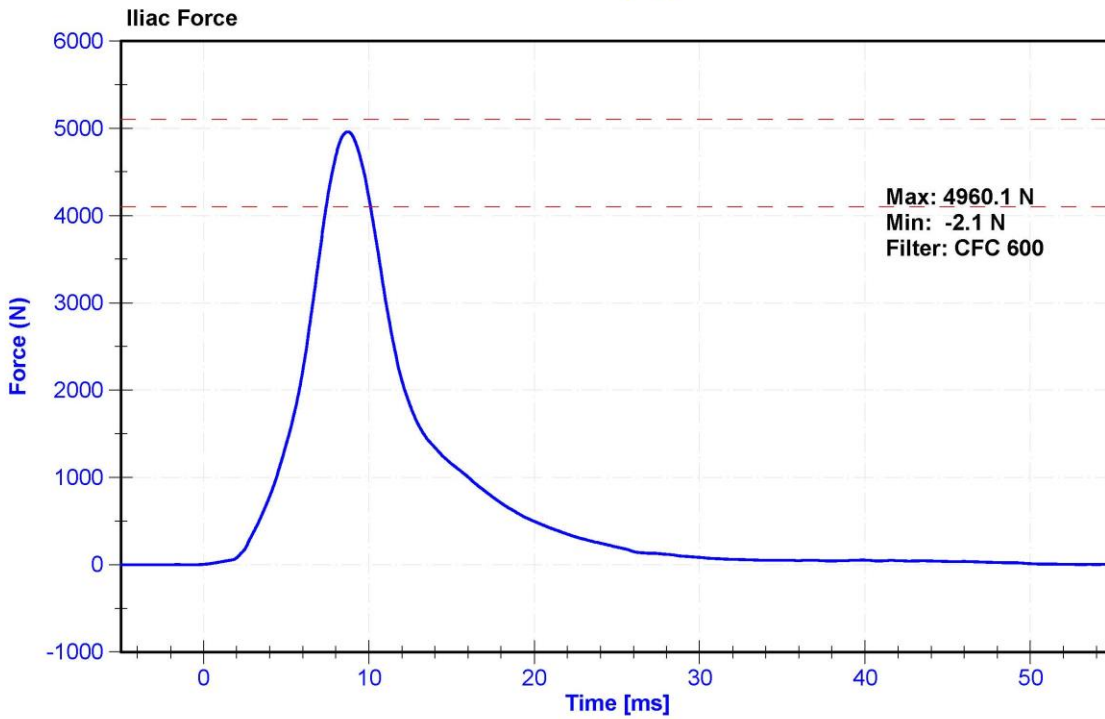
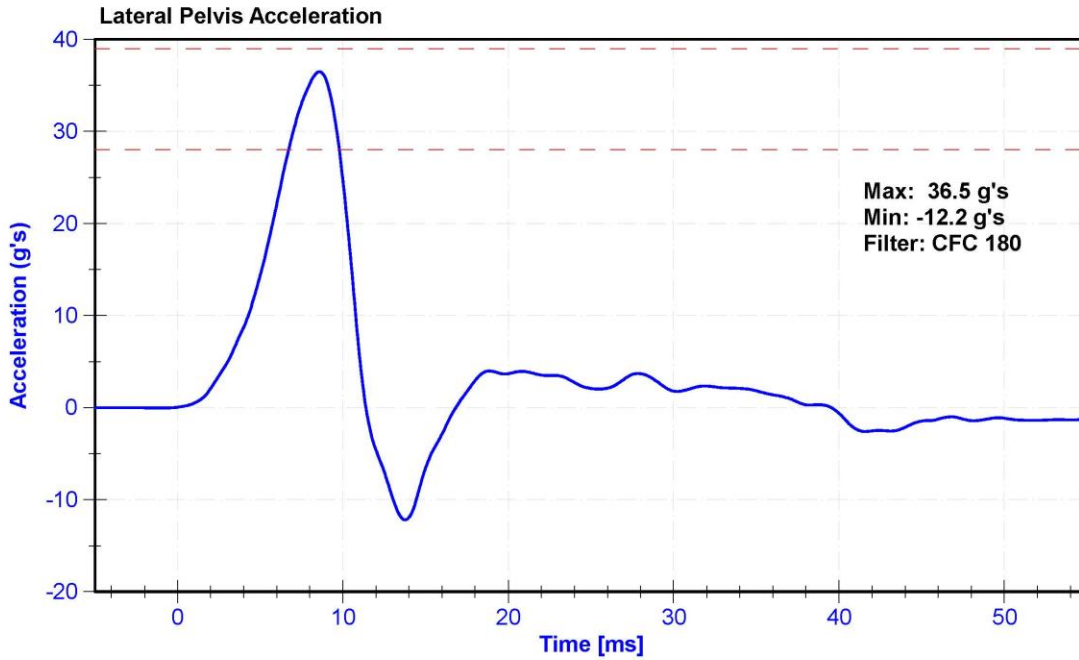
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	36.0	Pass
Velocity	4.2	4.4	m/s	4.20	Pass
Probe Acceleration	36	45	g's	42.5	Pass
Lateral Pelvis Acceleration	28	39	g's	36.5	Pass
Iliac Force	4100	5100	N	4960.1	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-P51731	4/20/2020	10/19/2020
Iliac Load Cell	DENTON 3228J	LC-280Fy	6/20/2019	6/19/2020





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: 300

(CONFIGURED FOR LEFT SIDE IMPACT)

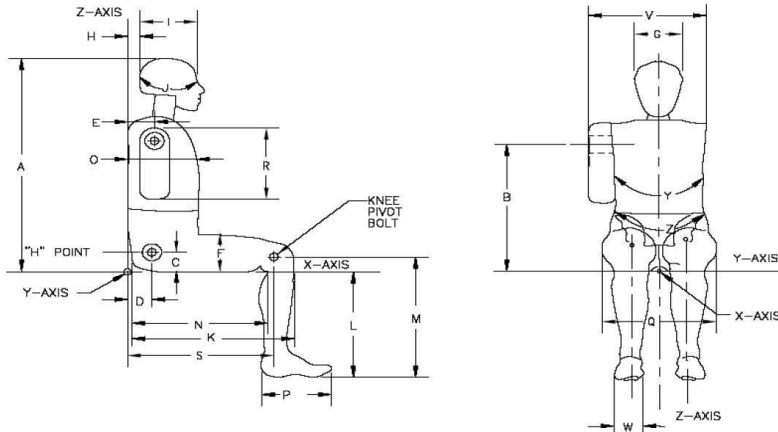


External Measurements - SID-IIs

Technician: K. Dutton

Date: 05/27/2020

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	449	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	187	Pass
J	Head Circumference	541	551	544	Pass
K	Buttock to Knee Length	514	540	533	Pass
L	Popliteal Height	343	369	361	Pass
M	Knee Pivot to floor height	392	409	401	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	484	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	83	Pass
Y	Chest Circumference w/jacket	851	881	875	Pass
Z	Waist Circumference	761	791	773	Pass

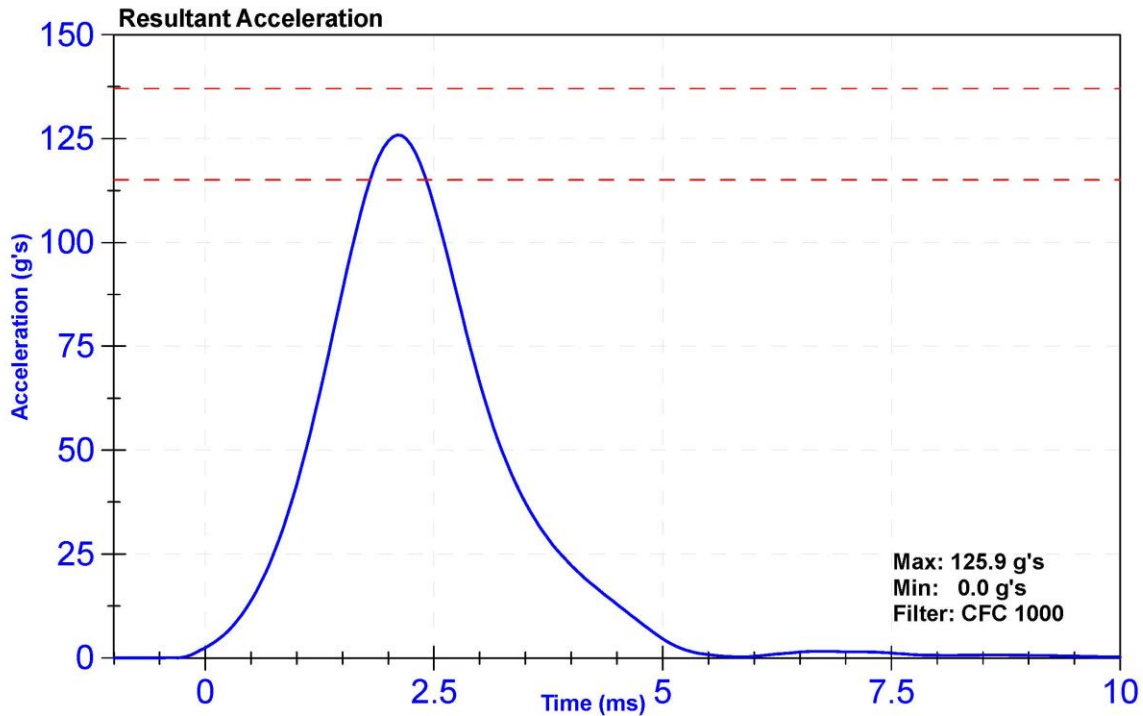
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

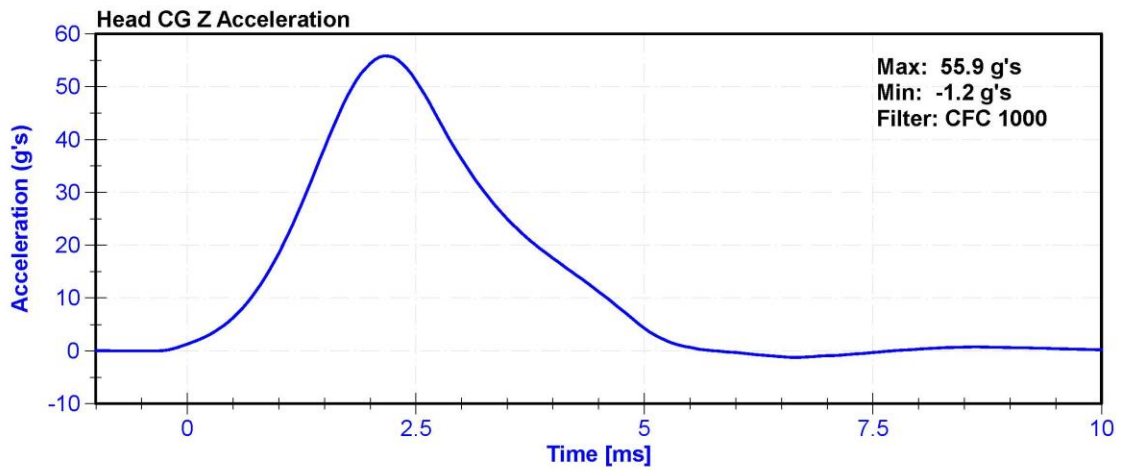
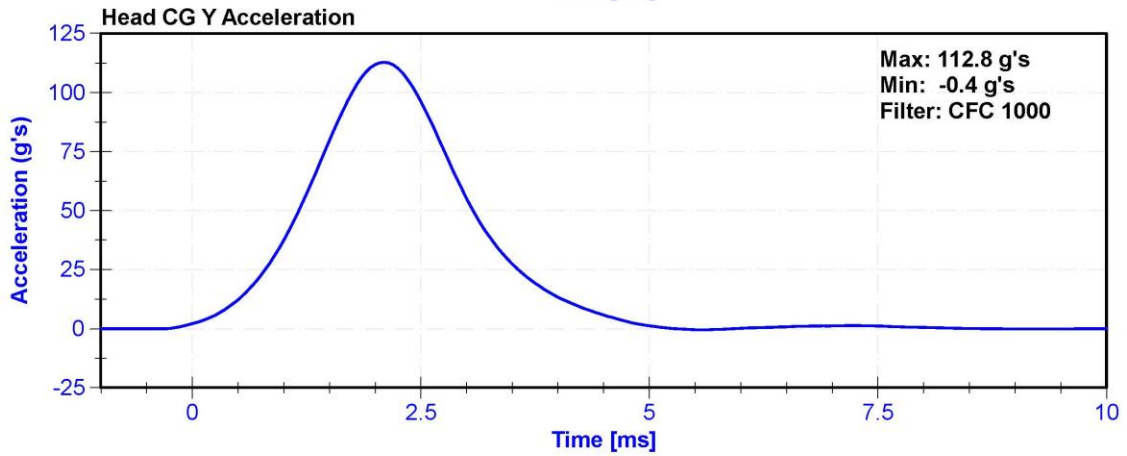
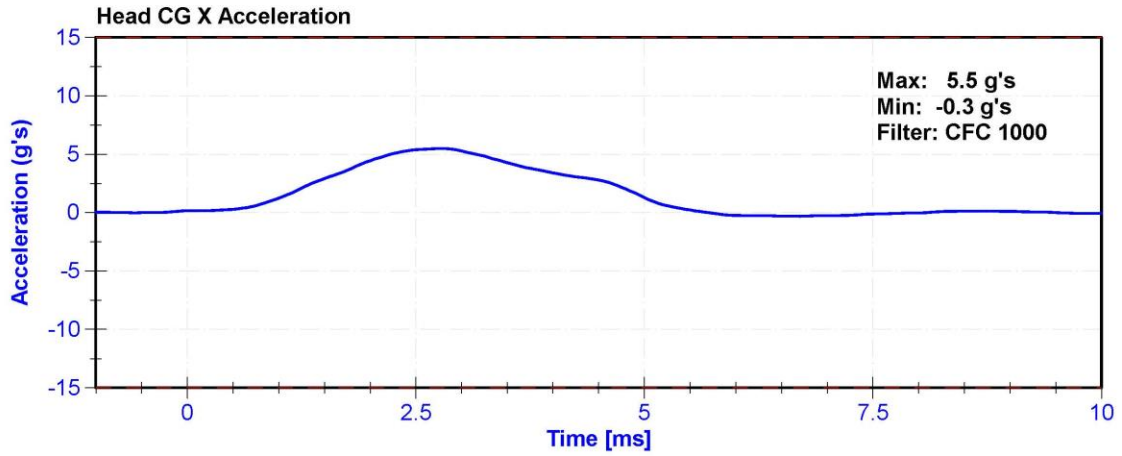
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	63.3	Pass
Resultant Acceleration	115	137	g's	125.9	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	5.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	4/20/2020	10/19/2020
Y Accelerometer	ENDEVCO 7264	AC-P79189	4/20/2020	10/19/2020
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	4/20/2020	10/19/2020





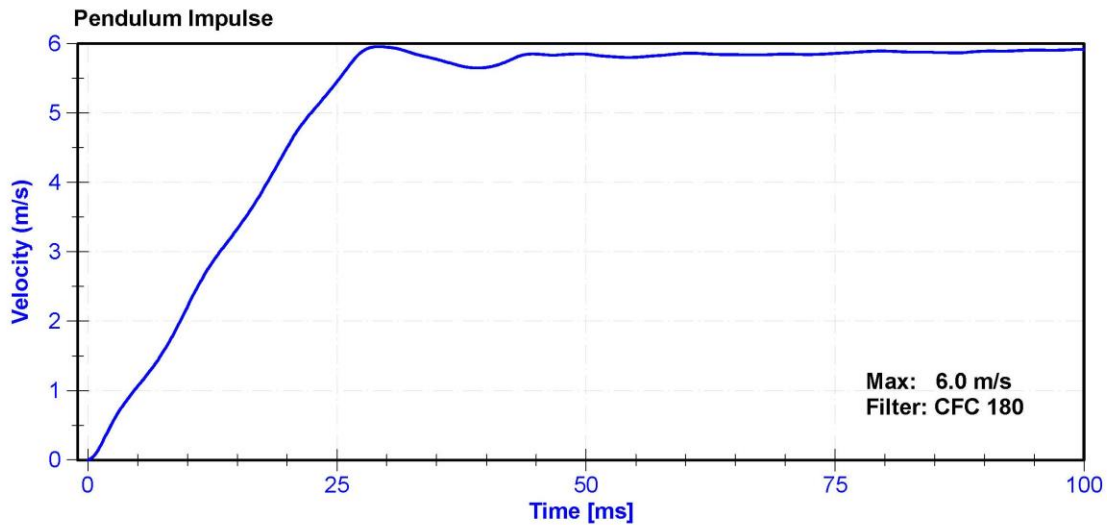
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

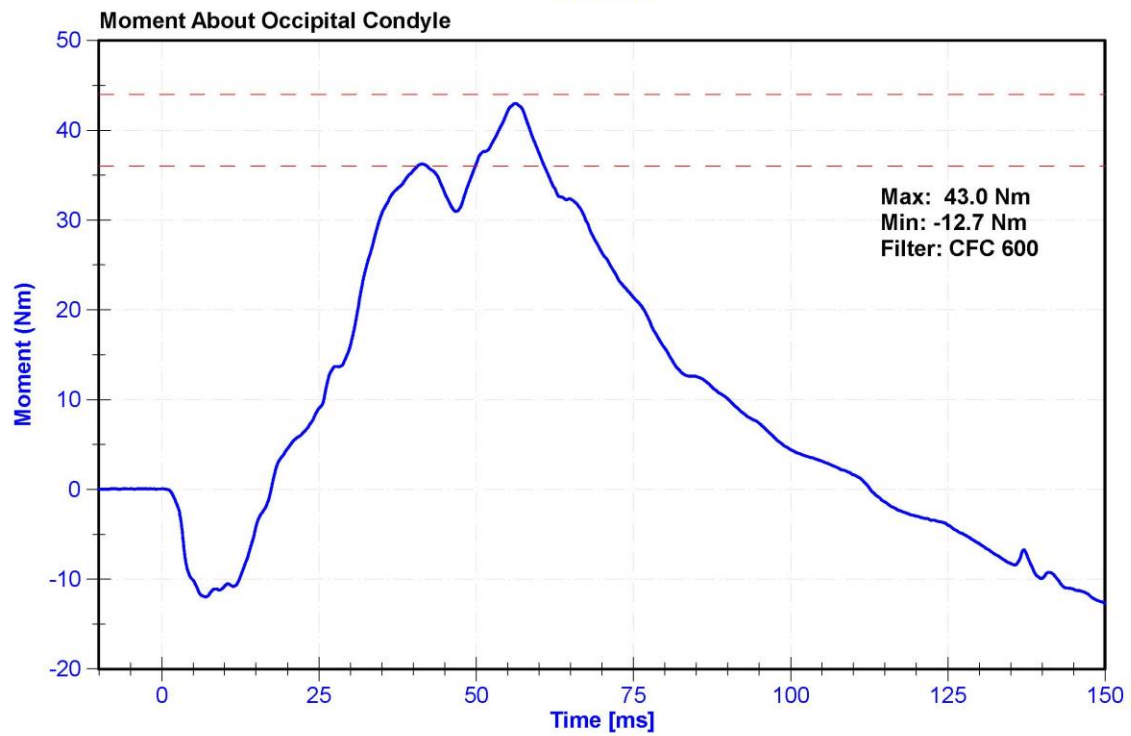
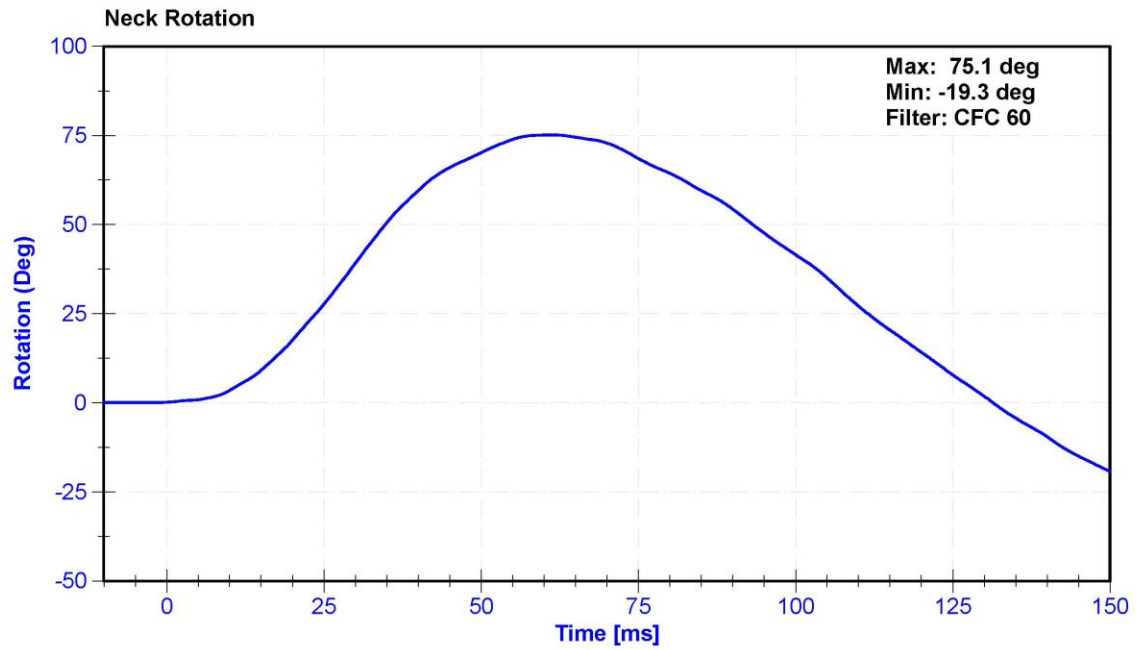
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	64.2	Pass
Velocity	5.51	5.63	m/s	5.549	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.21	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.33	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.50	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.45	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.95	Pass
Neck Rotation	71	81	deg	75.1	Pass
Time at Maximum Rotation	50	70	ms	61.2	Pass
Moment about the OC	36	44	Nm	43.0	Pass
Moment Decay to 0 Nm	102	126	ms	112.7	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





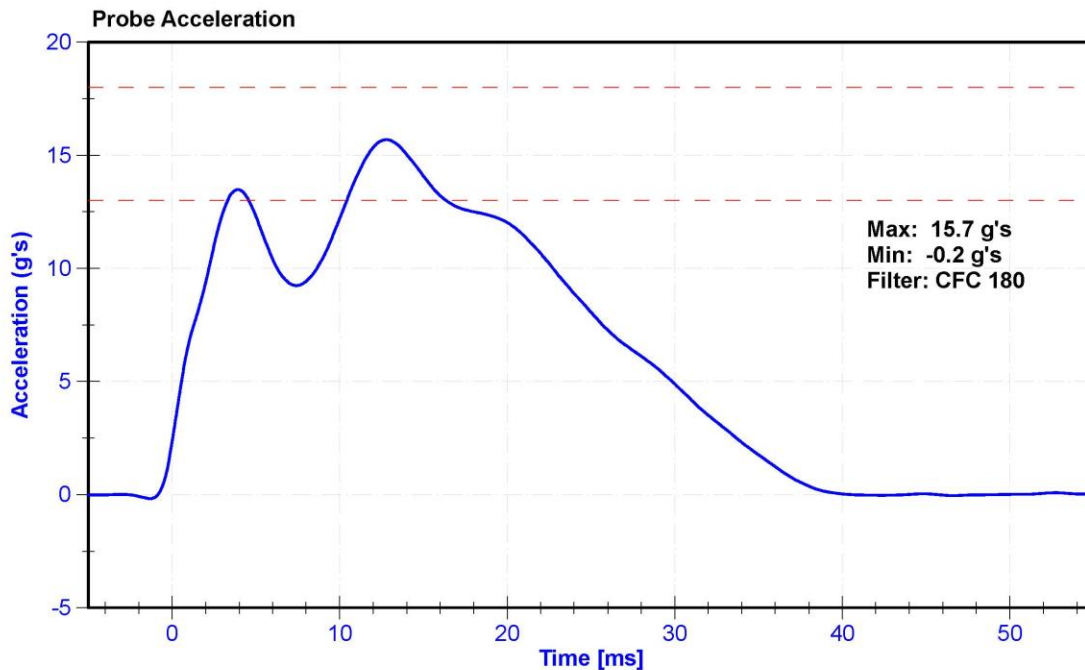
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

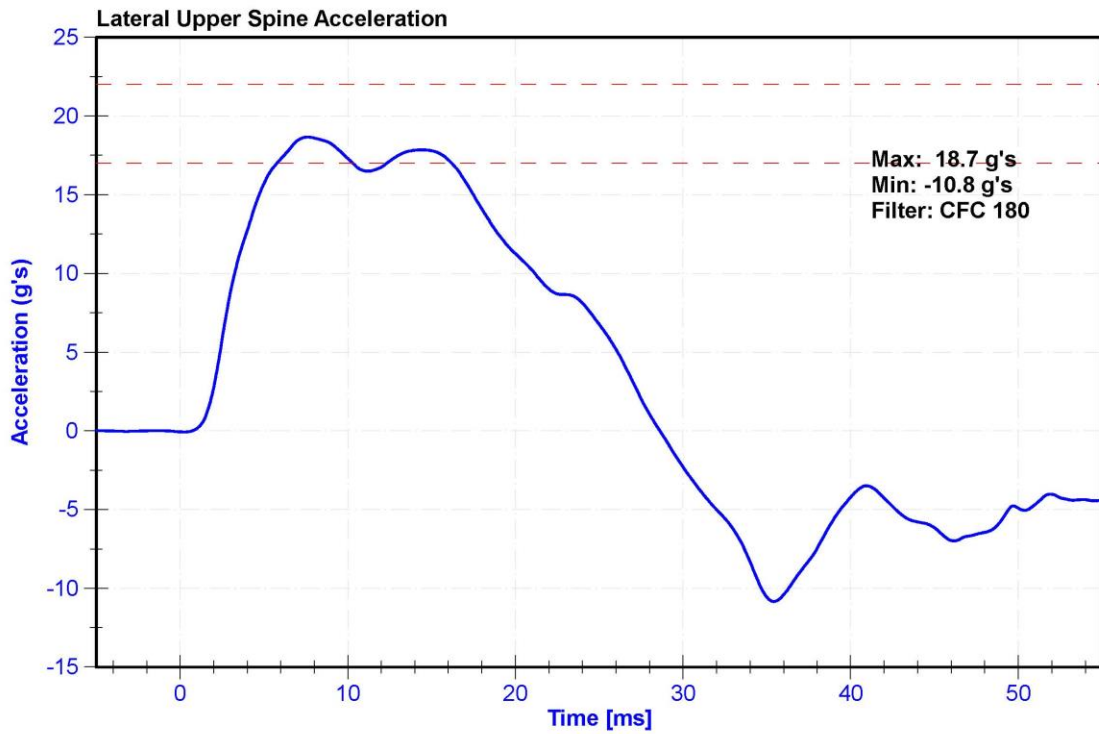
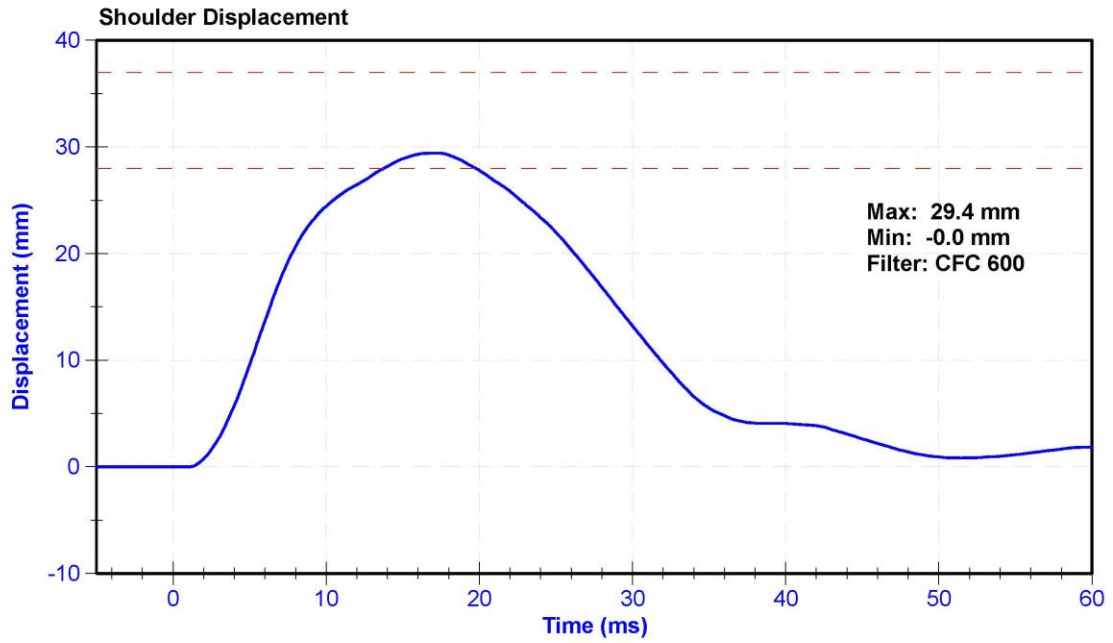
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	13	18	g's	15.7	Pass
Shoulder Deflection	28	37	mm	29.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	18.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Spine Y Accelerometer	ENDEVCO 7264CT	P17283	4/21/2020	10/20/2020





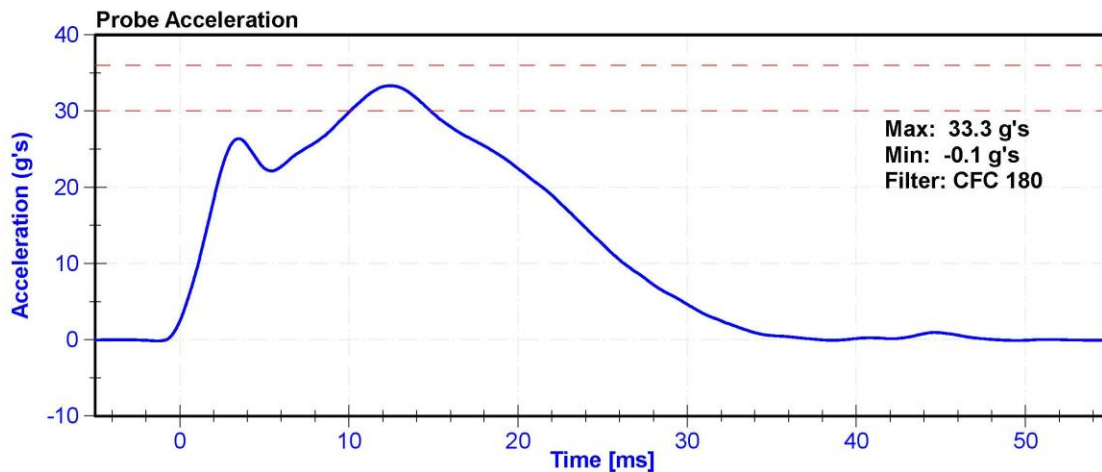
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

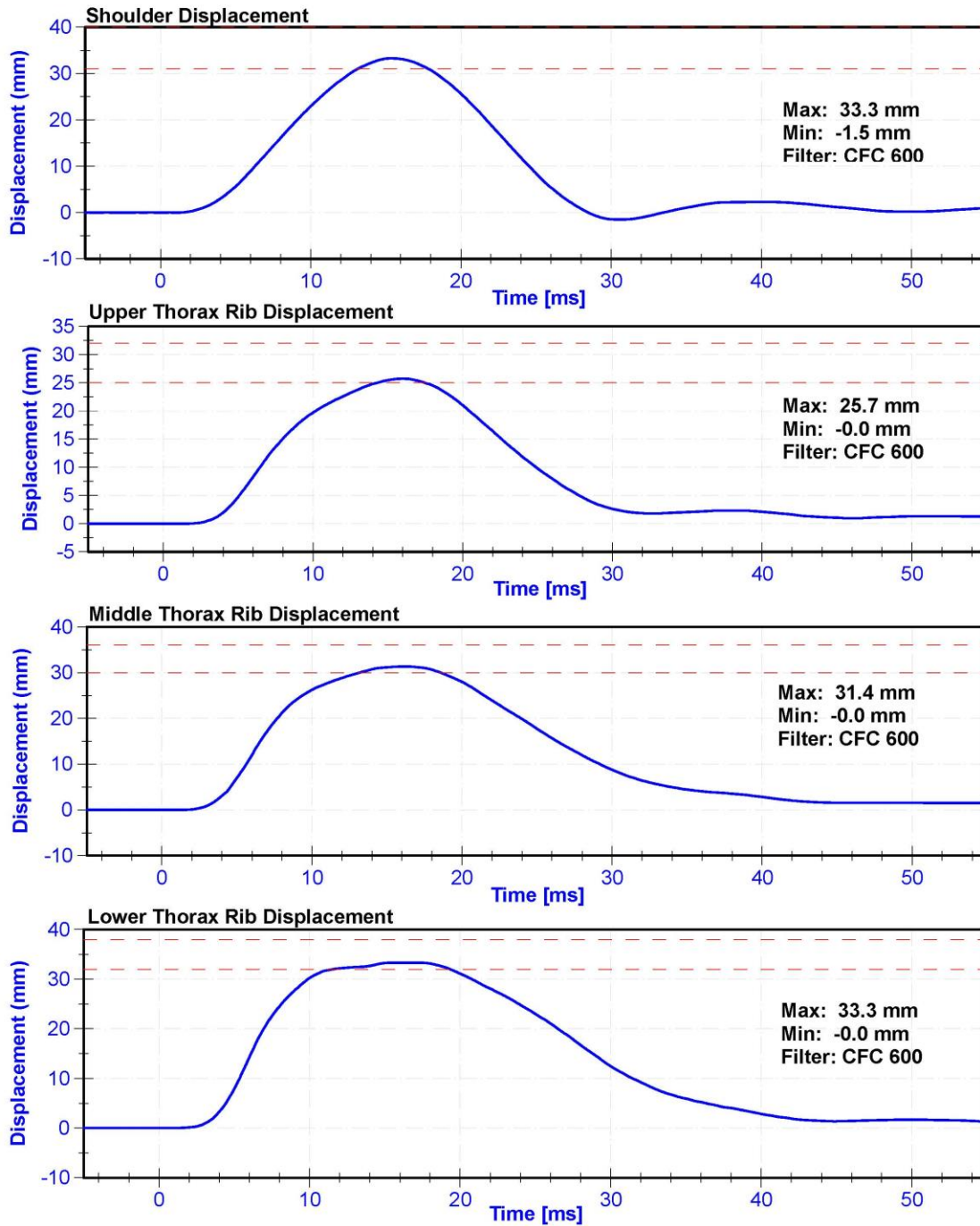
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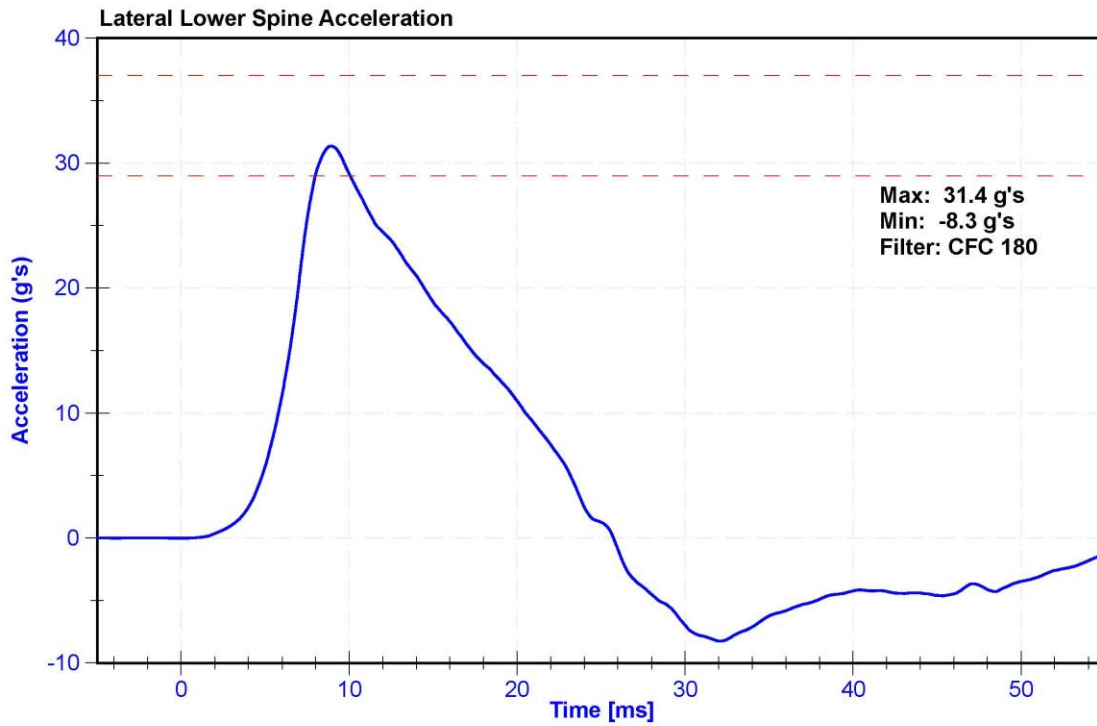
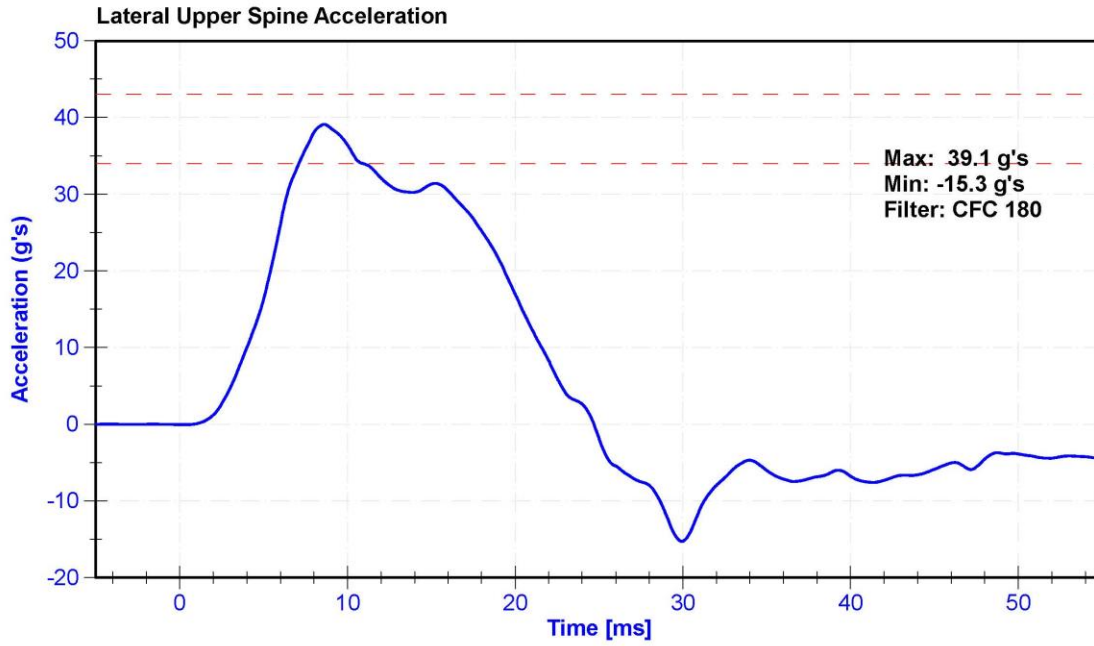
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	30.0	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration after 5 ms	30	36	g's	33.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.4	Pass
Shoulder Deflection	31	40	mm	33.3	Pass
Upper Thorax Rib Deflection	25	32	mm	25.7	Pass
Mid Thorax Rib Deflection	30	36	mm	31.4	Pass
Lower Thorax Rib Deflection	32	38	mm	33.3	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	P17283	4/21/2020	10/20/2020
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	4/30/2020	10/29/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020







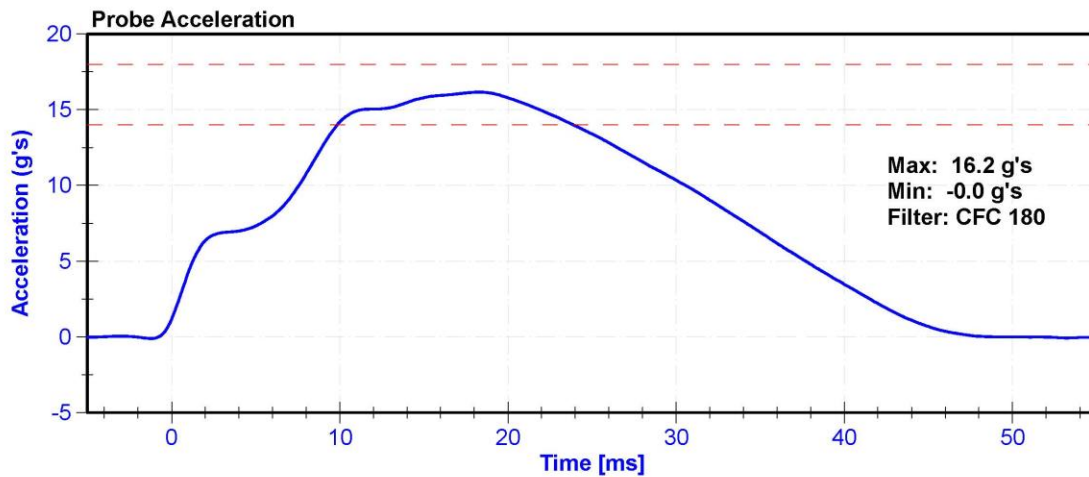
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

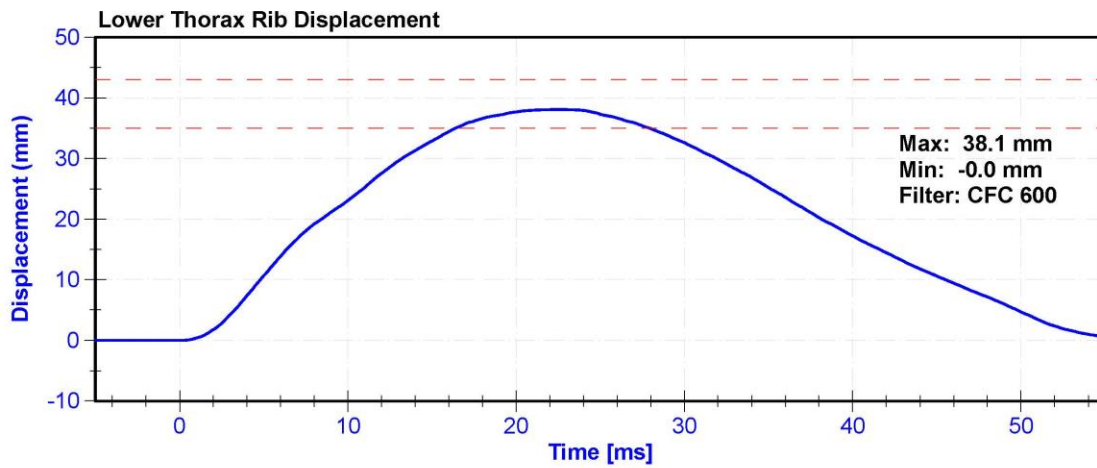
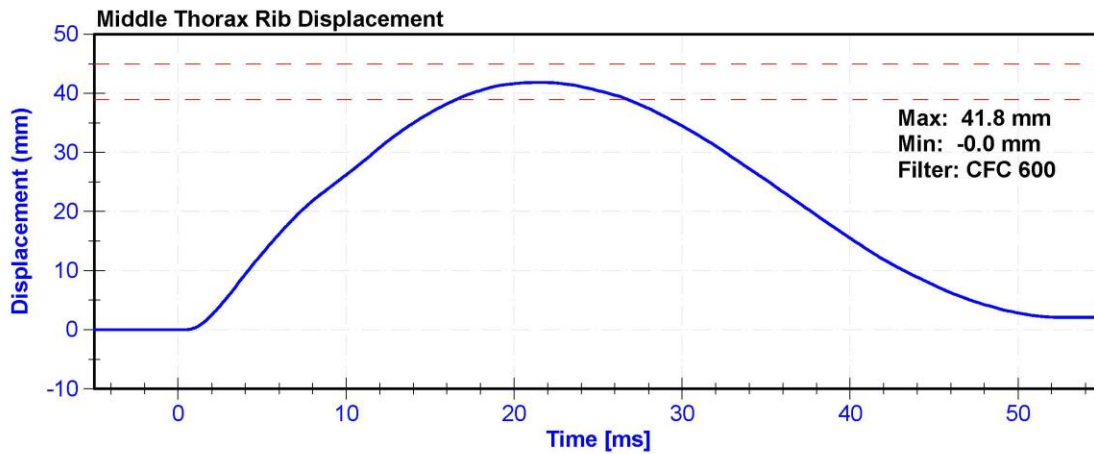
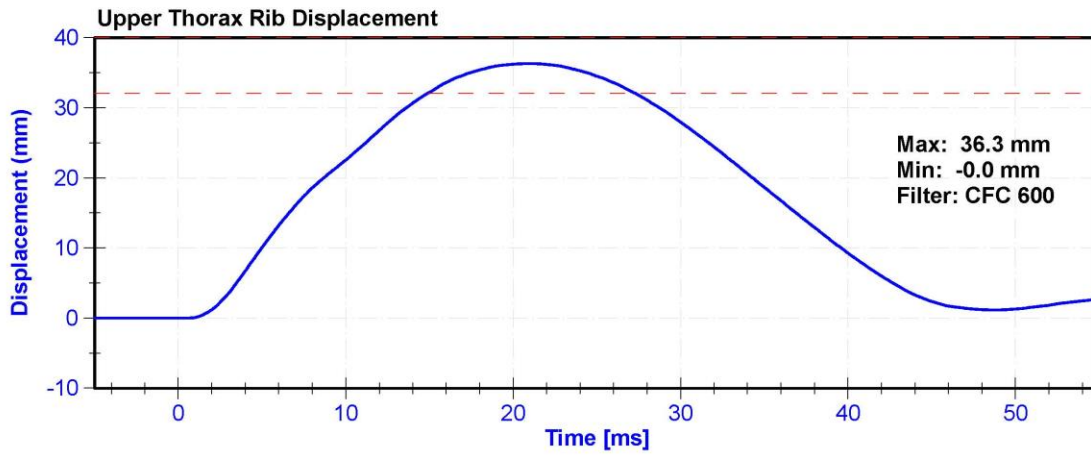
Results

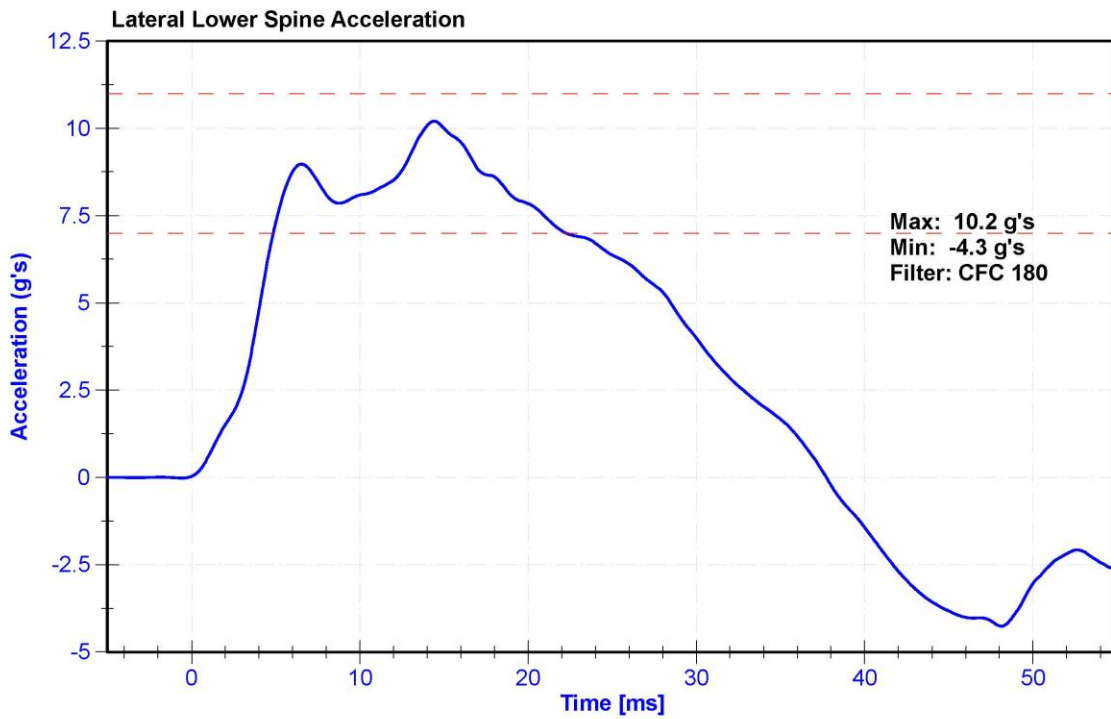
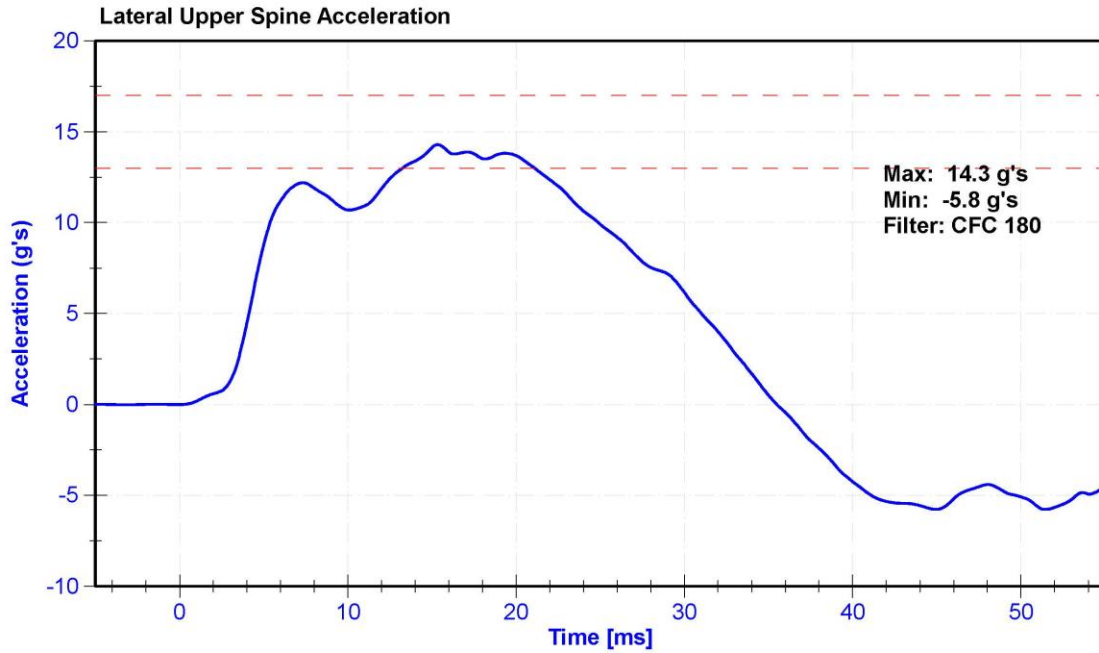
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	35.7	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.3	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	36.3	Pass
Middle Thorax Rib Deflection	39	45	mm	41.8	Pass
Lower Thorax Rib Deflection	35	43	mm	38.1	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	P17283	4/21/2020	10/20/2020
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	4/20/2020	10/19/2020
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	4/30/2020	10/29/2020
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	4/30/2020	10/29/2020
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	4/30/2020	10/29/2020







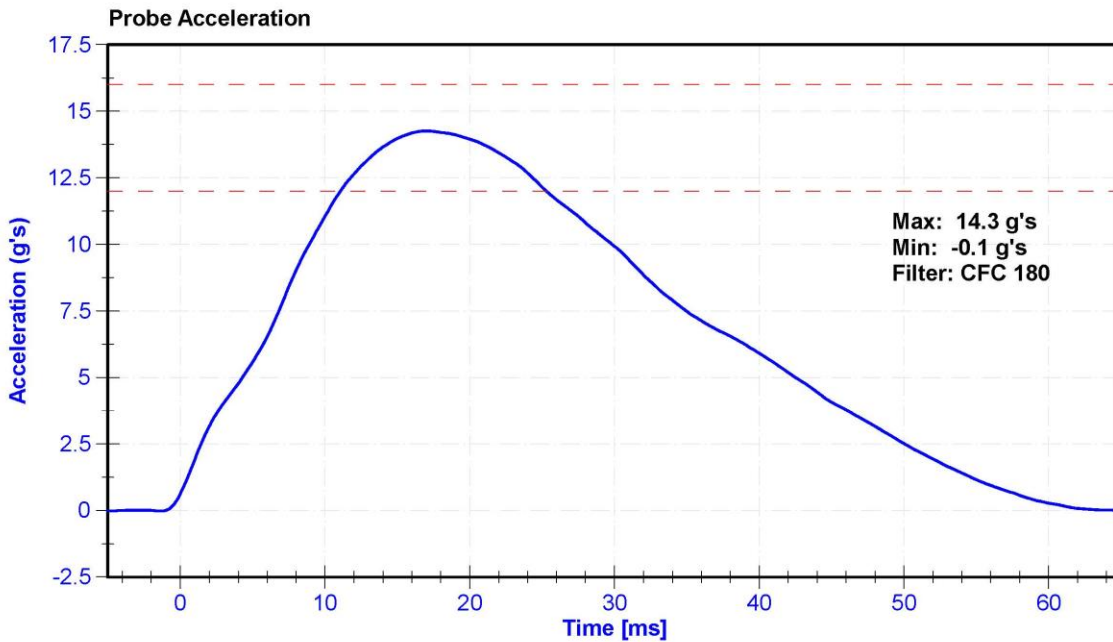
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

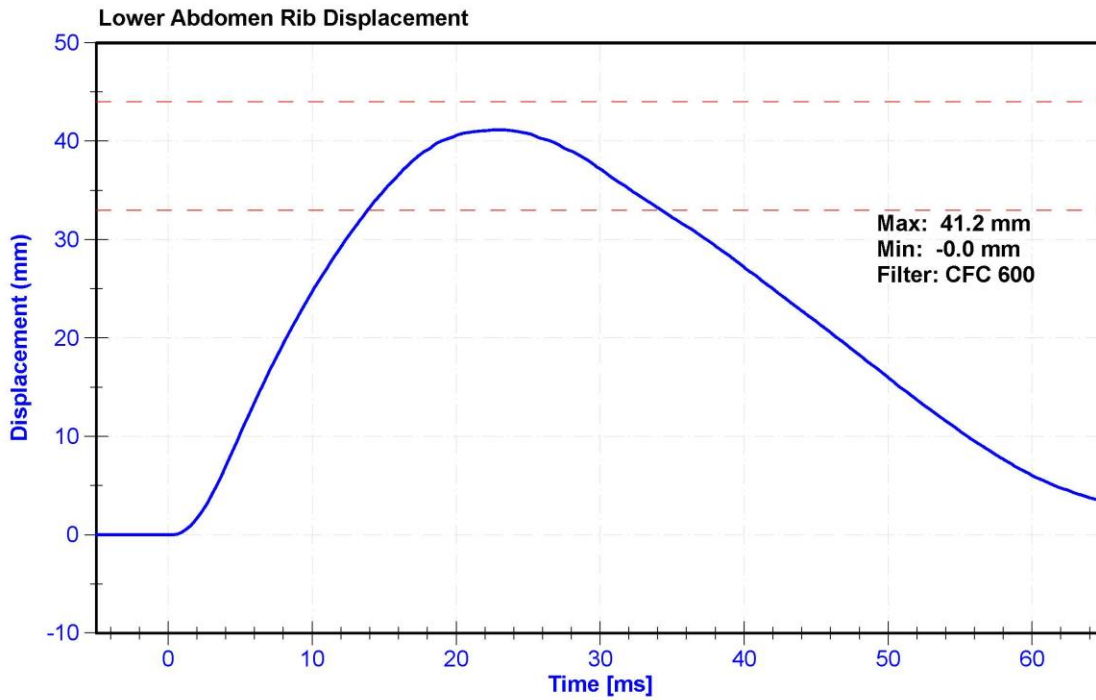
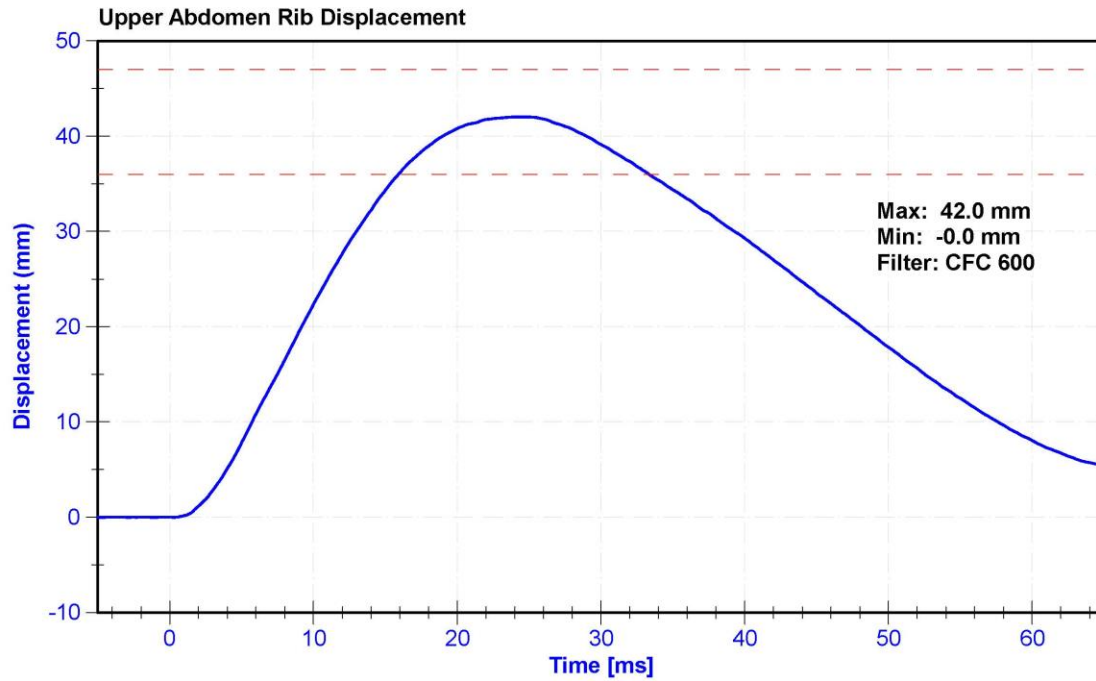
Results

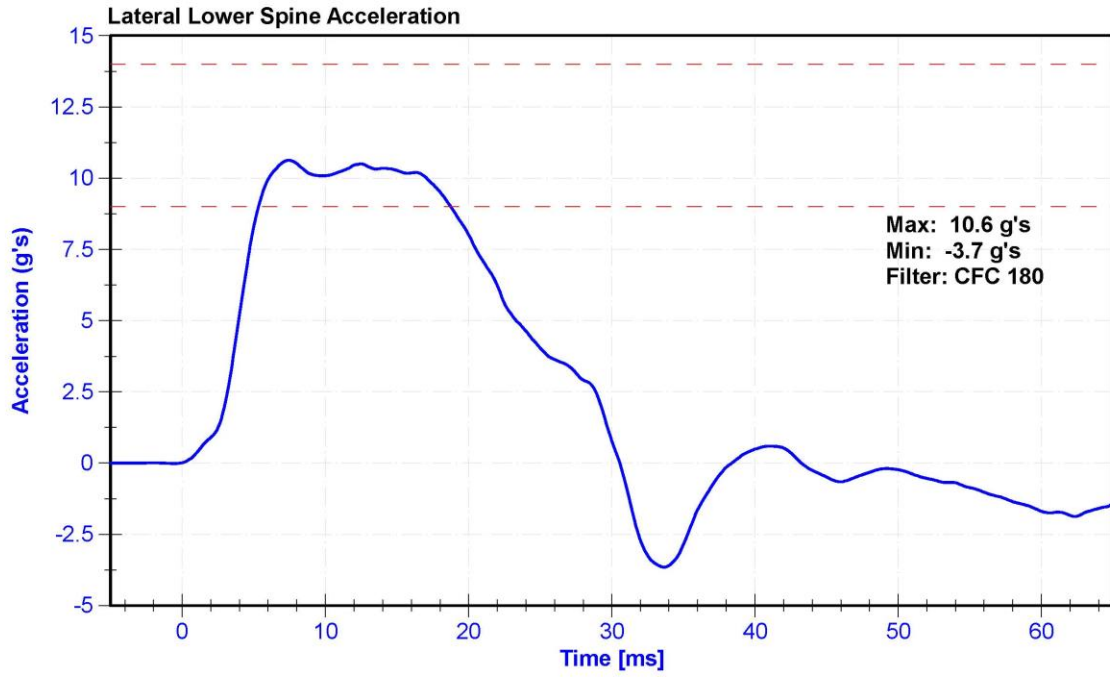
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.3	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.6	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.0	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.2	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 7264	AC-P64147	4/20/2020	10/19/2020
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	4/30/2020	10/29/2020
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	4/30/2020	10/29/2020







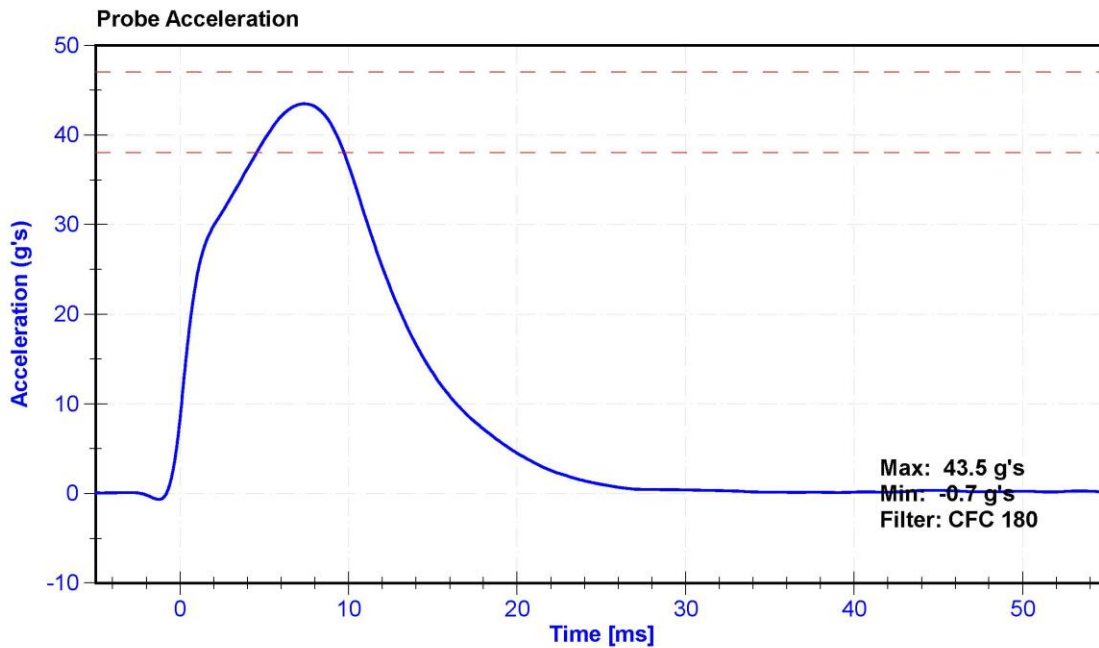
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

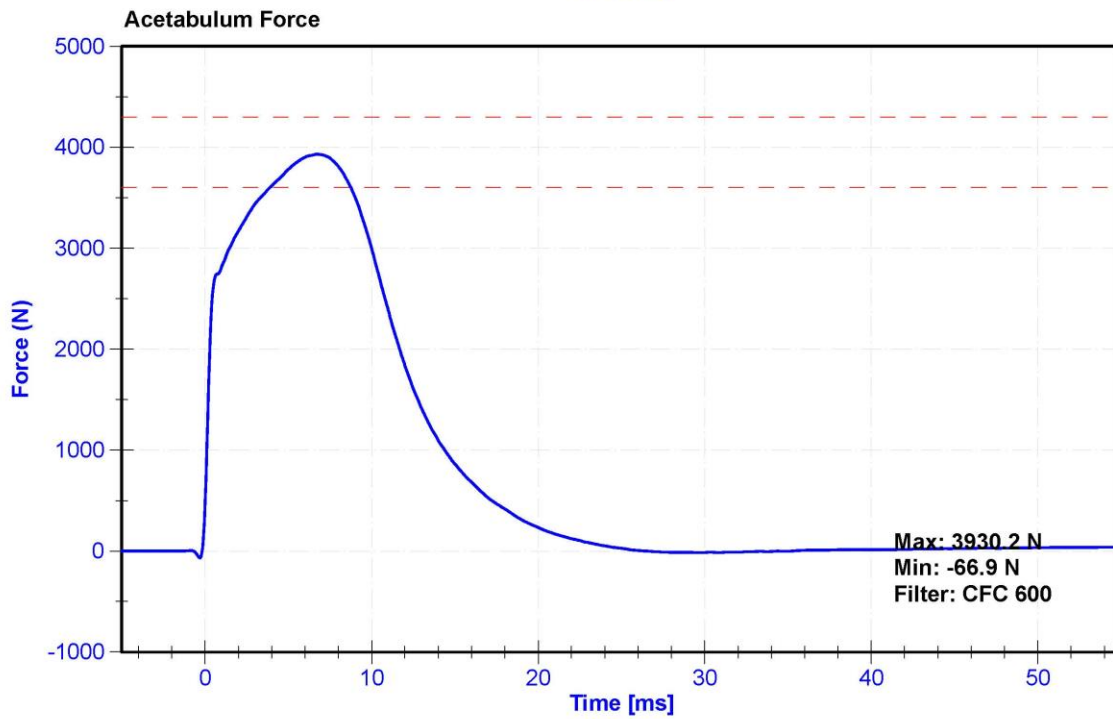
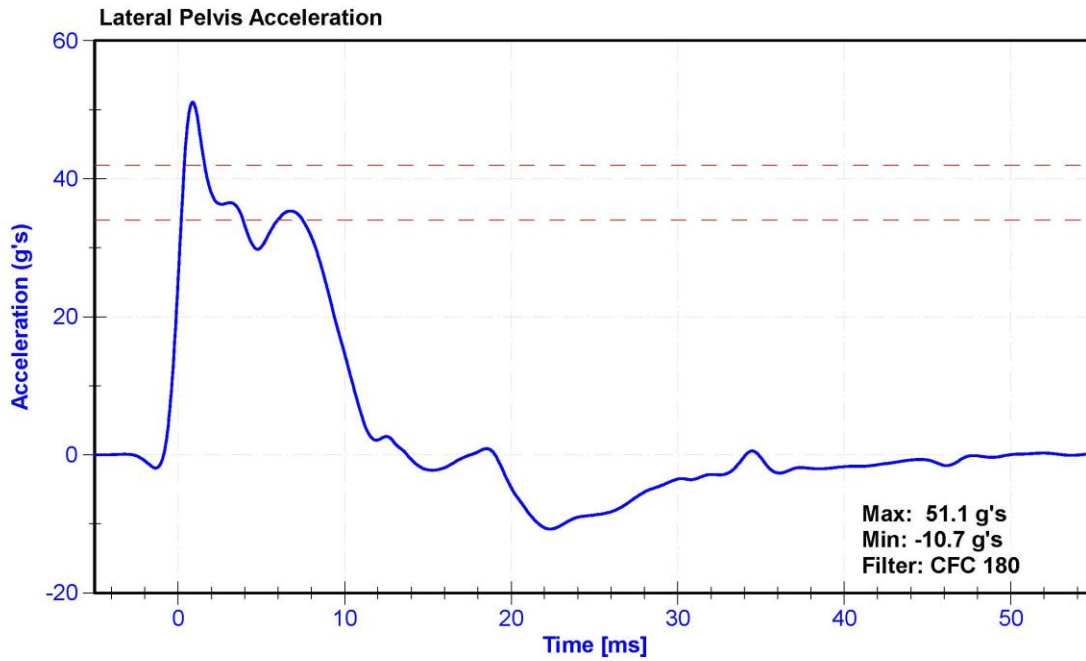
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	32	Pass
Velocity	6.6	6.8	m/s	6.61	Pass
Probe Acceleration	38	47	g's	43.5	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	35.3	Pass
Acetabulum Force	3600	4300	N	3930.2	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 7264C-2K-TZ2	AC-P51731	4/20/2020	10/19/2020
Acetabulum Load Cell	Denton 3249J	LC-276Fy	9/24/2019	9/23/2020
Certification Plug	SACO	13217	8/8/2019	N/A
Crash Test Plug	SACO	13278	8/12/2019	N/A







SID-Its Pelvis Plug Certification Test

Plug S/N 13217
Test Number 10612
Report Number 10647
Test Date 8/8/2019 1:30:03 PM

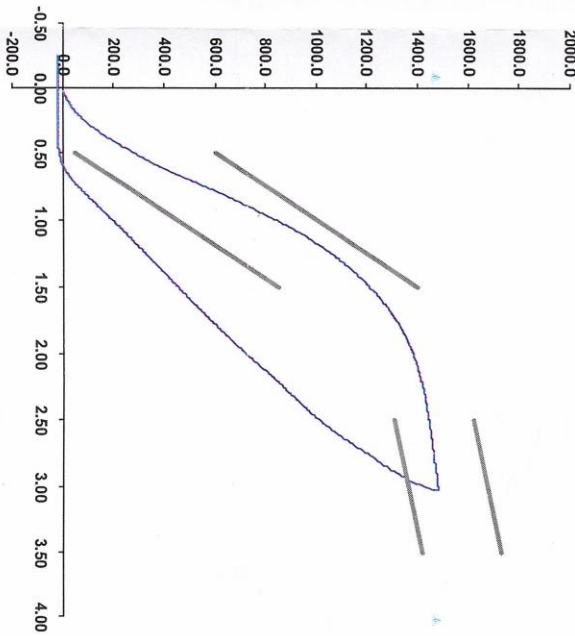
300 cert
5/27/2020

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

Testing Machine STM-20 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 08-Aug-19
SACO Research

By: DC Date: 8/8/2019
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



SID-11s Pelvis Plug Certification Test

Plug S/N 13278
Test Number 10701
Report Number 10738
Test Date 8/12/2019 10:36:53 AM

300 Cash 1
5/27/2020

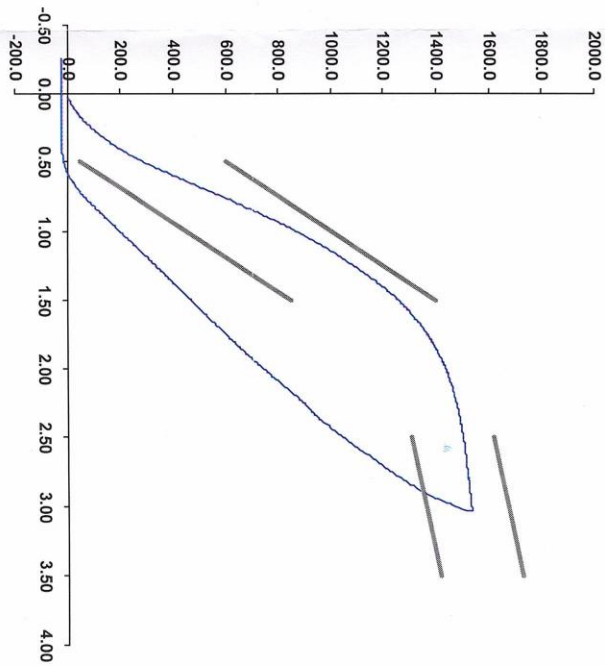
Force (-N) vs Extension (-mm)

- Force @ 0.5 mm (N)
- Force @ 1.5 mm (N)
- Force @ 2.5 mm (N)
- Force @ 3.0 mm (N)

Test Results	Spec Min	Spec Max
292.80	50.00	600.00
1,260.26	850.00	1,400.00
1,503.46	1,306.00	1,618.00
1,535.37	1,361.00	1,673.00

Testing Machine STM-20 596554;
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 12-Aug-19

SACO Research

By: DC Date: 8/12/2019
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

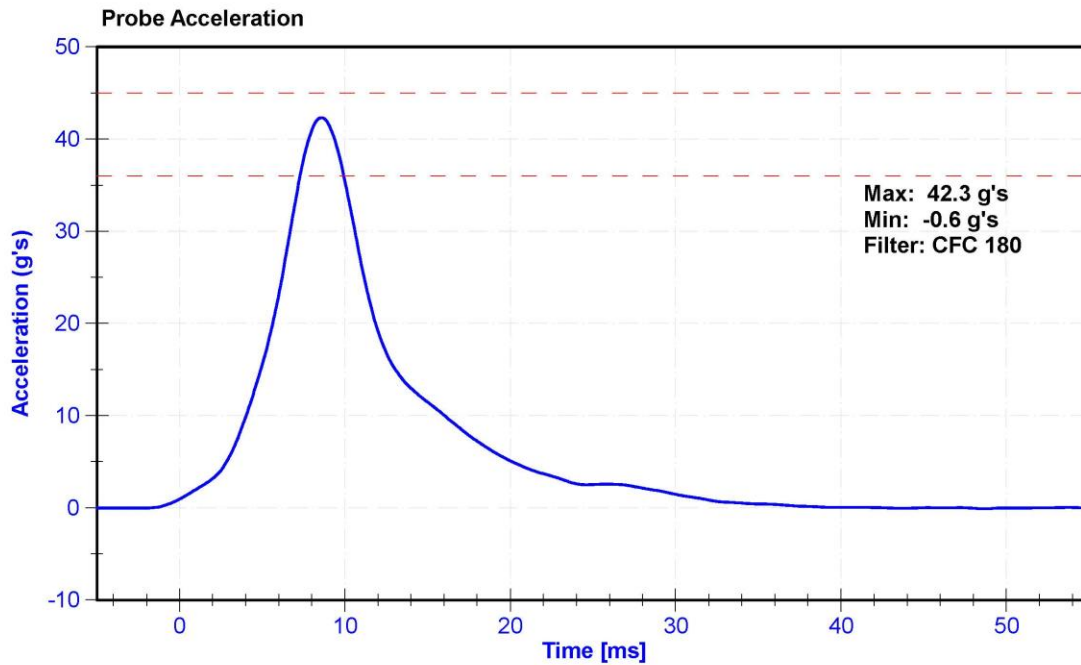
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

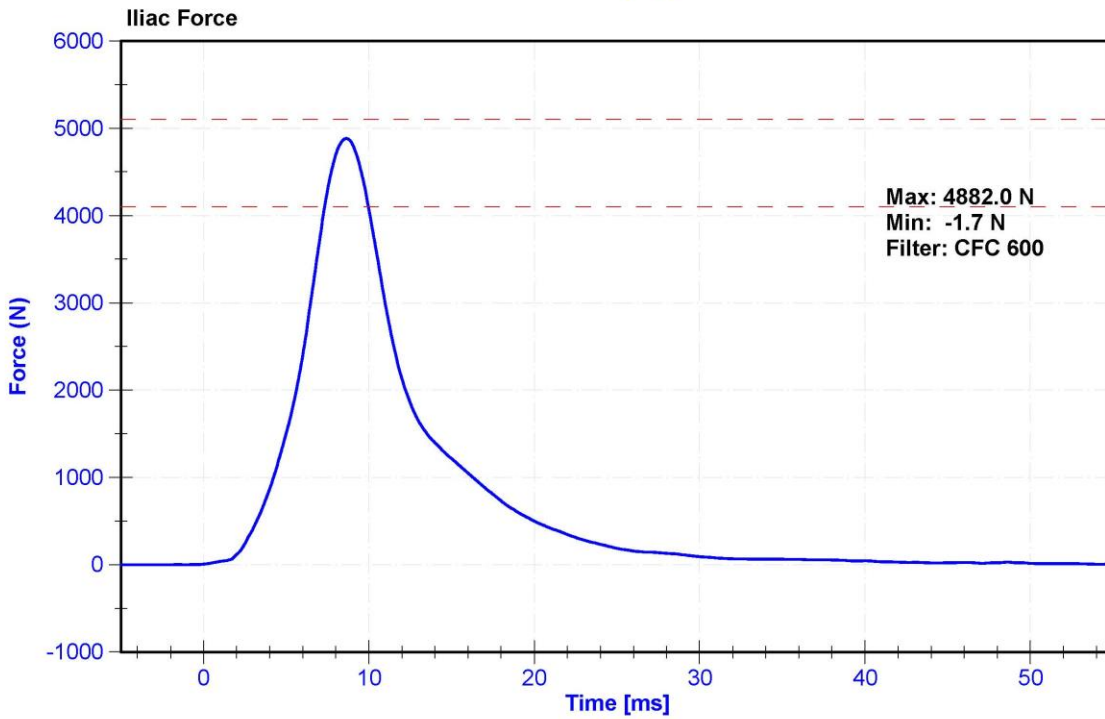
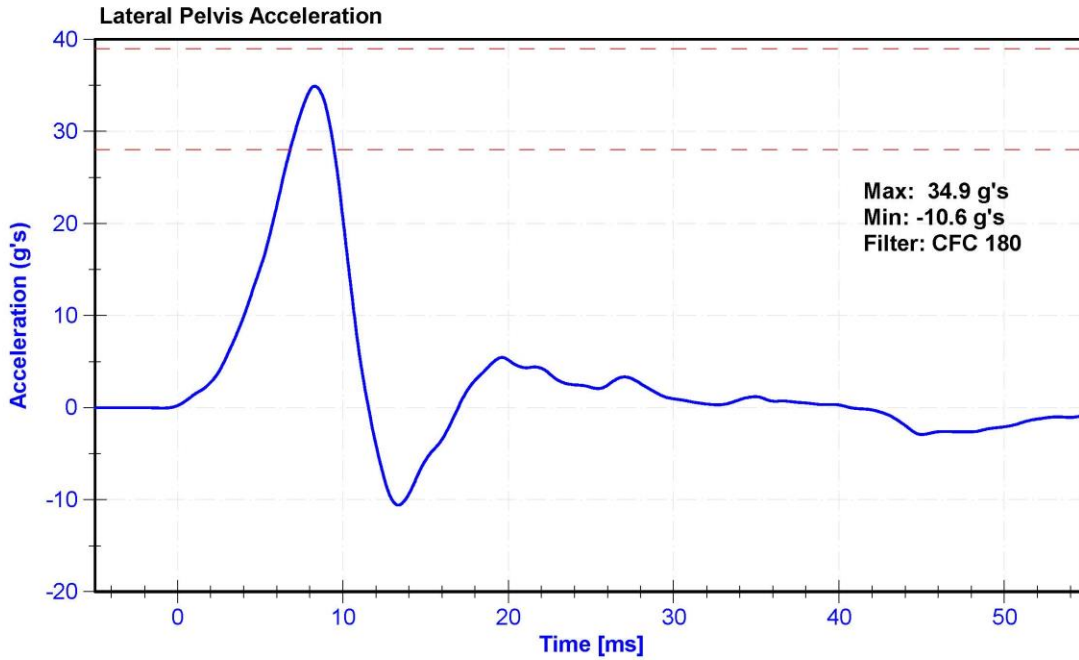
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	32.0	Pass
Velocity	4.2	4.4	m/s	4.23	Pass
Probe Acceleration	36	45	g's	42.3	Pass
Lateral Pelvis Acceleration	28	39	g's	34.9	Pass
Iliac Force	4100	5100	N	4882.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Pelvis Y Accelerometer	Endevco 7264C-2K-TZ2	AC-P51731	4/20/2020	10/19/2020
Iliac Load Cell	DENTON 3228J	LC-280Fy	6/20/2019	6/19/2020





APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		X	AC-P59018	ENDEVCO	4/20/2020	
		Y	AC-P79189	ENDEVCO	4/20/2020	
		Z	AC-P58777	ENDEVCO	4/20/2020	
Head Accelerometers - Redundant		X	AC-P68057	ENDEVCO	4/20/2020	
		Y	AC-P58986	ENDEVCO	4/20/2020	
		Z	AC-P52025	ENDEVCO	4/20/2020	
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-451GFE	Servo	4/30/2020
		Middle	Y	DS-040GFE	Servo	4/30/2020
		Lower	Y	DS-1156GFE	Servo	4/30/2020
	Abdominal Rib	Upper	Y	DS-308GFE	Servo	4/30/2020
		Lower	Y	DS-307GFE	Servo	4/30/2020
Lower Spine Accelerometers (T12)		X	AC-P64003	ENDEVCO	4/20/2020	
		Y	AC-P64147	ENDEVCO	4/20/2020	
		Z	AC-P58786	ENDEVCO	4/20/2020	
Acetabulum Load Cell		Y	LC-276Fy	Denton	9/24/2019	
Lilac Wing Load Cell		Y	LC-280Fy	Denton	6/20/2019	
Pelvis Plug (Struck Side)			-	-	-	
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A315085	MSI	3/16/2020
Vehicle Center of Gravity	Y	A315181	MSI	3/16/2020
Vehicle Center of Gravity	Z	A315931	MSI	3/16/2020
Left Floor Sill	Y	A315958	MSI	3/16/2020
A-Pillar Sill	Y	AC-A280342	MSI	4/2/2020
A-Pillar Low	Y	A315822	MSI	3/18/2020
A-Pillar Mid	Y	AC-A280389	MSI	2/20/2020
B-Pillar Sill	Y	AC-A280187	MSI	4/2/2020
B-Pillar Low	Y	A315082	MSI	3/26/2020
B-Pillar Mid	Y	AC-A279980	MSI	3/24/2020
Driver Seat	Y	A315956	MSI	2/5/2020
Engine Top	X	A315863	MSI	4/1/2020
Engine Top	Y	A315095	MSI	3/31/2020
Firewall	Y	A315818	MSI	3/18/2020
Right Roof	Y	A315886	MSI	3/18/2020
Right Floor Sill	Y	A315902	MSI	3/5/2020
Rear Floorpan	X	AC-A281006	MSI	3/25/2020
Rear Floorpan	Y	AC-A281042	MSI	3/25/2020

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	1220AF-1117012-F0	Interface	10/16/2019
Load Cell 2	1220AF-1117023-F0	Interface	10/25/2019
Load Cell 3	1220AF-1117025-F0	Interface	10/25/2019
Load Cell 4	1220AF-1117019-F0	Interface	10/25/2019
Load Cell 5	1220AF-1117011-F0	Interface	10/25/2019
Load Cell 6	1220AF-1117017-F0	Interface	10/25/2019
Load Cell 7	1220AF-1117035-F0	Interface	10/25/2019
Load Cell 8	1220AF-1117006-F0	Interface	10/7/2019