REPORT NUMBER: SPNCAP-CAL-19-003

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

KIA Motors Mexico S.A. de C.V.
2019 KIA Forte
Four Door Sedan

NHTSA No: M20194207

PREPARED BY:
CALSPAN CORPORATION
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May 10, 2019

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Prepared by: _____ Date: May 10, 2019
Vincent Paolini, Senior Test Engineer

Approved by: Vanessa Hansen Date: May 10, 2019
Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2019 KIA Forte four door sedan NHTSA No.: M20194207		***5. Report Date*** May 10, 2019 ***6. Performing Organization Code*** CAL
7. Author(s) Vincent Paolini, Senior Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2019-003
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operation P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** DTNH22-14-D-00352
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report, February 19, 2019 - May 10, 2019 ***14. Sponsoring Agency Code*** NRM-110
15. *Supplementary Notes*		

16. Abstract

A 32.20 km/h (20 mph), 75˚ oblique impact Side NCAP Test was conducted on the subject 2019 KIA Forte 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 February 19, 2019.

The impact velocity of the vehicle was 32.21 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 299 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)		
	Units	Threshold	Result
Head Injury Criteria (HIC_{36})		1000	367.489
Resultant Lower Spine Acceleration	G	82	37.813
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3337.368
Maximum Thoracic Rib Deflection	mm	38	26.381
Maximum Abdomen Rib Deflection	mm	45	25.794

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, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833

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Form DOT F1700.7 (8-72)

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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2019 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2019 KIA Forte 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 2019 KIA Forte four door sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.21 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 19, 2019. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

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

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

Head CG tri-axial accelerometers
Thorax upper, middle, and lower rib displacement potentiometers
Abdomen upper and lower rib displacement potentiometers
Lower spine tri-axial accelerometers
Iliac load cell
Acetabulum load cell

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

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

INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	367.489
Resultant Lower Spine Acceleration	g	82	37.813
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3337.368
Maximum Thoracic Rib Deflection	mm	38*	26.381
Maximum Abdominal Rib Deflection	mm	45*	25.794

*****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 at 15.7 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and instrumentation Data

Data Sheet No. 6 – Vehicle Accelerometer Data

Data Sheet No. 7 – Rigid Pole Load Cell Data

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – Test Vehicle Profile Measurements

Data Sheet No. 10 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 – Vehicle Damage Profile Distances

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

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

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20194207
Model Year	2019
Make	KIA
Model	Forte
Body Style	Four Door Sedan
VIN	3KPF24AD4KE061942
Body Color	Blue
Odometer Reading (km/mi)	164 miles
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	IVT
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	No

Does owner's manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA Motors Mexico S.A. de C.V.
Date of Manufacture	11/18
Vehicle Type	Passenger Car

GVWR (kg)	1720
GAWR Front (kg)	990
GAWR Rear (kg)	950

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	N/A	5	
Capacity Weight (VCW) (kg)				385	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				44.8	(A-B)

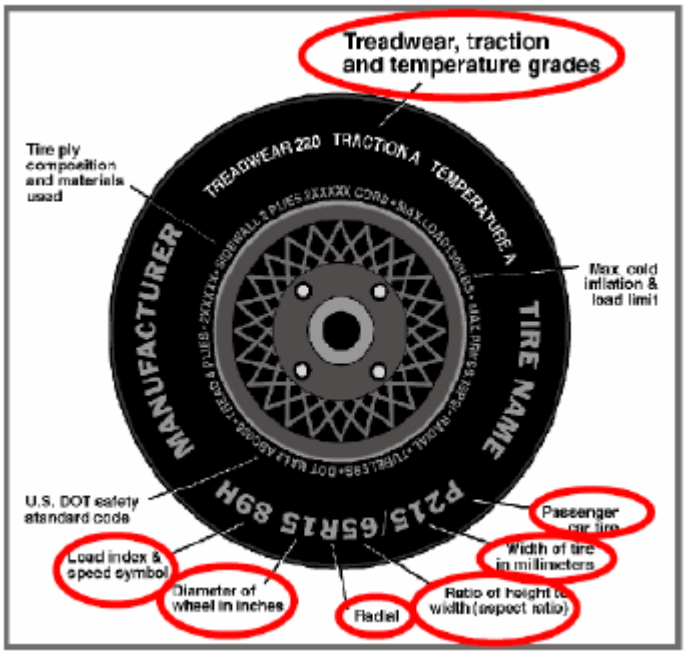
VEHICLE SEAT TYPE

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:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	205/55R16	205/55R16
Tire Size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus	Solus
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Left	000LMY14318	000LMY14318
DOT Safety Code Right	000LMY14318	000LMY14318

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

Test Vehicle: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	220	230	220
Tire Placard	kPa	230	230	230	230
Owner's Manual	kPa	230	230	230	230
As Tested	kPa	230	230	230	230

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	397	245		414	279		419	282	
Right	kg	395	231		402	260		401	261	
Ratio	%	62	38		60	40		60	40	
Totals	kg	792	476	1268	816	539	1355	820	543	1363

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1268	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1362.8	(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)? [X] **Yes** [ ] **No**

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	-0.35	-0.5	-1.20	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	0.20	-0.50	-1.10	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.45	-0.95	-1.10	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.9	-1.00	-1.00	Yes
Vehicle CG (Aft of Front Axle)	mm	1014	1074	1076	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	10	18	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:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	5
Air Pump Kit	1
Tail Lights	2
Passenger Windows and door parts	5
Bumper Cover & Beam	10
Non-Struck side Windows	5
Ballast / Equipment Added	0

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

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

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (º)		
	Max	Min	Mid
Driver Seat	17.5	14.9	16.2
Front Passenger Seat	17.3	14.5	15.9
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) (º)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	16.2	35	Max	-	-	-
			Mid	15	25	35
			Min	-	-	-
Front Passenger Seat	15.9	35	Max	-	-	-
			Mid	15	25	35
			Min	-	-	-
Front Center Seat	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

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

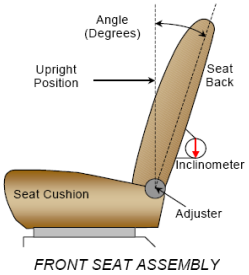
Test Vehicle: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	38 (0-37)	0	0
Front Passenger Seat	240	38 (0-37)	0	0
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BACK ANGLE ADJUSTMENT

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



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	61.7	N/A	-6.0	N/A
Front Passenger Seat	62.5	N/A	-6.0	N/A
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BELT ANCHORAGE ADJUSTMENT

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

Seat	Total # of Positions	Placed in Position #
Driver Seat	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	6	Lowest

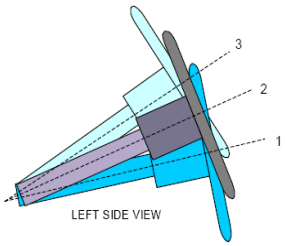
DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	20.2	
Geometric Center – Position 2	22.8	
Uppermost – Position 3	25.4	
Telescoping Steering Wheel Travel		50
Test Position	22.8	25

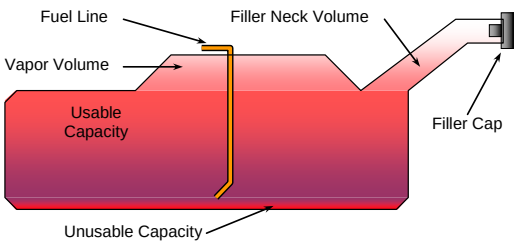


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is equipped with an electric fuel pump.
The fuel filler neck is on the left side of the vehicle.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY DATA

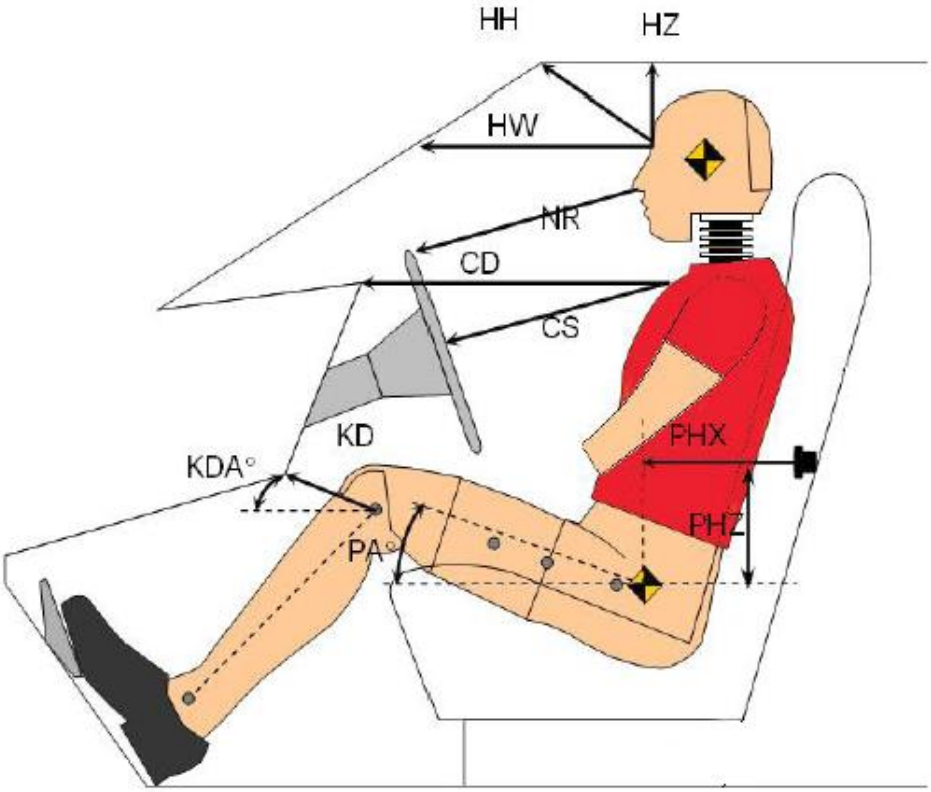
Description			Liters
Usable Capacity of “Standard Tank”	-	see Form No. 1	53.0
Usable Capacity of “Optional Tank”	-	see Form No. 1	N/A
Usable Capacity of “Standard Tank”	-	see Owner’s Manual	53.0
Usable Capacity of “Optional Tank”	-	see Owner’s Manual	N/A
93% of Usable Capacity			49.3
Actual Amount of Solvent Used in Test			49.3
1/3 of Usable Capacity			17.7

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

[X] Yes [ ] No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019



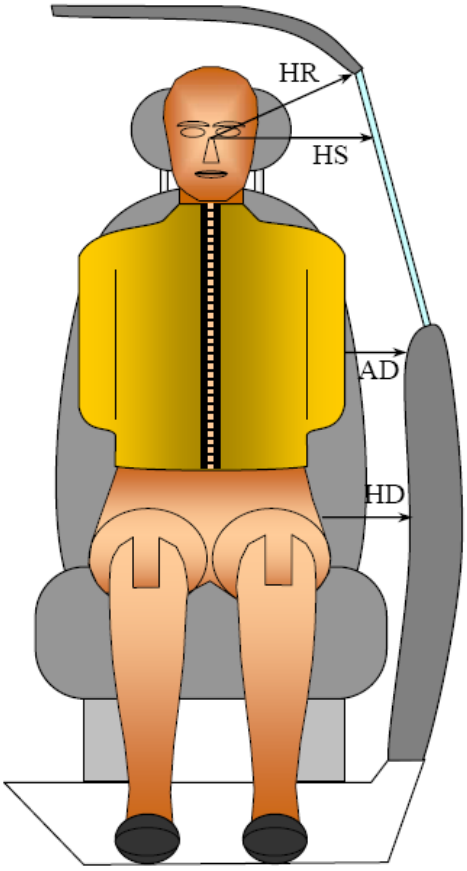
Left Side View

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (◦)
HH	Head to Header	274	
HW	Head to Windshield	616	
HZ	Head to Roof Liner	197	
NR	Nose to Rim	243	
CD	Chest to Dash	435	
CS	Chest to Steering Wheel	194	
KD(L) / KDA(L)◦	Left Knee to Dash	160	40.5
KD(R) / KDA(R)◦	Right Knee to Dash	143	40.4
PAX◦	Pelvic Tilt Angle (X-Axis)		19.8
PAY◦	Pelvic Tilt Angle (Y-Axis)		0.6
PHX	Hip Point to Striker (X-Axis)	307	
PHZ	Hip Point to Striker (Z-Axis)	260	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019



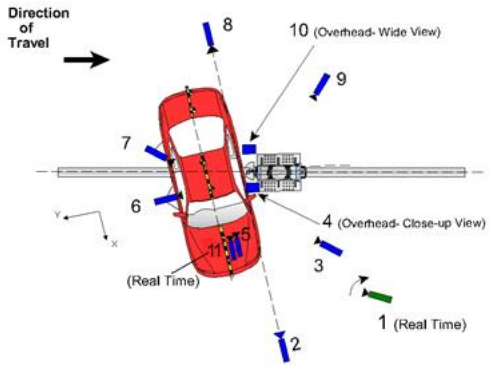
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	269
HS	Head to Side Window	mm	344
AD	Arm to Door	mm	159
HD	Hip Point to Door	mm	176

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	60
2	Front ground level - impact view	6404	0	-1444	28	1000
3	Impact side 45º - forward pole view	4658	-1262	-1293	24	1000
4	Overhead Close-up view of impact	0	0	-9370	24	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-7872	0	-1445	28	1000
9	Impact side 45º - rearward pole view	-3435	-3454	-1299	24	1000
10	Overhead wide - view of impact	0	0	-9370	12.5	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	60

Notes: *Reference - From Point of Impact for X and Y; from Ground for Z*
+X = Forward of vehicle, +Y = Right of vehicle, +Z = Down
** All measurements accurate to ± 6 mm.* *Vehicle is at a 75º angle to the rigid pole.*

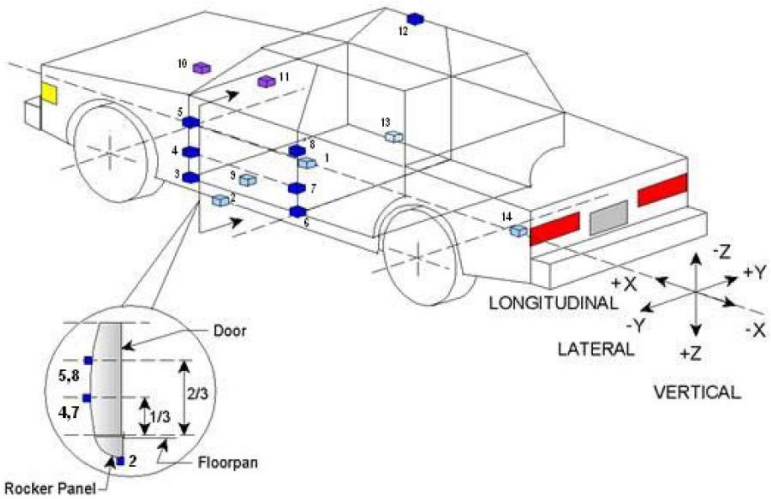
Comments: All cameras operated as intended.

INSTRUMENTATION

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

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2597	46	168
2	Left Floor Sill	2912	-669	342
3	A-Pillar Sill	3189	-654	237
4	A-Pillar Low	3257	-640	100
5	A-Pillar Mid	3186	-620	-370
6	B-Pillar Sill	2242	-674	308
7	B-Pillar Low	2168	-660	-8
8	B-Pillar Mid	2136	-657	-268
9	Driver Seat Track	2250	-554	346
10	Engine Top	3916	216	-209
11	Firewall	3515	-39	-97
12	Right Roof	2063	497	-799
13	Right Floor Sill	2826	667	342
14	Rear Floorpan	1157	-66	121

Reference: *X – Rear surface of vehicle (+ forward)*
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

POLE BARRIER

RIGID POLE LOAD CELL LOCATIONS

ID	Units	Height From Ground
1	mm	200
2	mm	590
3	mm	750
4	mm	1075
5	mm	1260
6	mm	1740
7	mm	1920
8	mm	2300

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Air bag
Top of Head	Curtain Air bag
Left Side of Head	Curtain Air bag
Back of Head	Head restraint & Curtain Air bag
Left Shoulder	Torso/Pelvis Air bag & Seat back
Upper Torso	Torso/Pelvis Air bag & Seat back
Lower Torso	Torso/Pelvis Air bag & Seat back
Left Hip	Torso/Pelvis Air Bag
Left Knee	Driver side Door Panel

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

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

Test Vehicle: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar buckled
Sill Separation	None
Windshield Damage	Cracks throughout and separation along driver A-Pillar
Side Window Damage	Driver's 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				

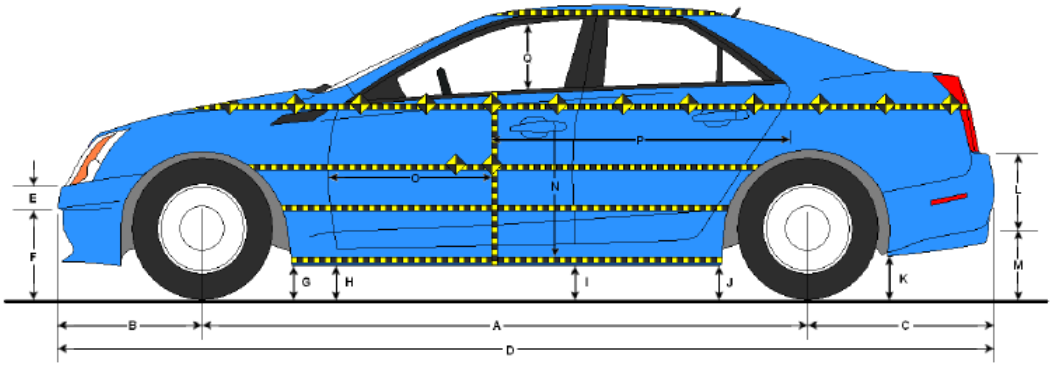
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter		Units	Tolerance	Value
Vertical Impact Ref Line	- Aft of Front Axle, Intended Impact Pt	mm		1120
Actual Impact Point	- Aft of Front Axle	mm		1120
Horizontal Offset (+ forward / - rearward)		mm	+/- 38 *	0
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion		deg	75 +/- 3	75.0
Trap No. 1 Velocity	- Primary	kph	31.4 to 33.0	32.21
Trap No. 2 Velocity	- Redundant	kph	31.4 to 33.0	32.24

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019



LEFT SIDE VIEW

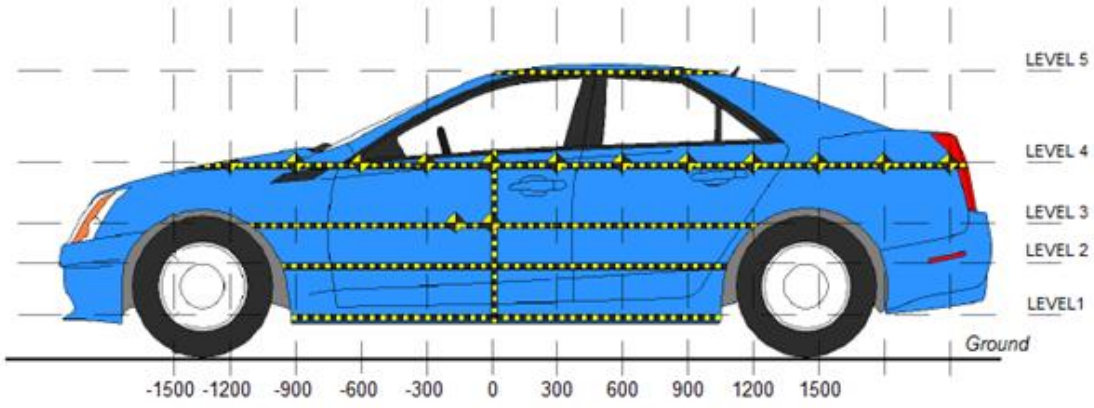
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2700	2660	40
B	Front Axle to FSOV	899	918	-19
C	Rear Axle to RSOV	1039	1035	4
D	Total Length at Centerline	4638	4614	24
E	Front Bumper Thickness	110	110	0
F	Front Bumper Bottom to Ground	403	422	-19
G	Sill Height at Front Wheel Well	174	173	1
H	Sill Height at Front Door Leading Edge	158	156	2
I	Sill Height at B-Pillar	165	168	-3
J1	Sill Height at Rear Wheel Well	173	196	-23
J2	Pinch Weld Height at Rear Wheel Well	158	175	-17
K	Sill Height Aft of Rear Wheel Well	400	405	-5
L	Rear Bumper Thickness	100	100	0
M	Rear Bumper Bottom to Ground	455	470	-15
N	Sill Height to Bottom of Front Window Sill	795	791	4
O	Front Door Leading Edge to Impact CL	709	652	57
P	Rear Door Trailing Edge to Impact CL	1420	1377	43
Q	Front Window Opening	370	351	19
R	Right Side Length	4550	4553	-3
S	Left Side Length	4548	4511	37
T	Vehicle Width at B-Pillars	1770	1685	85

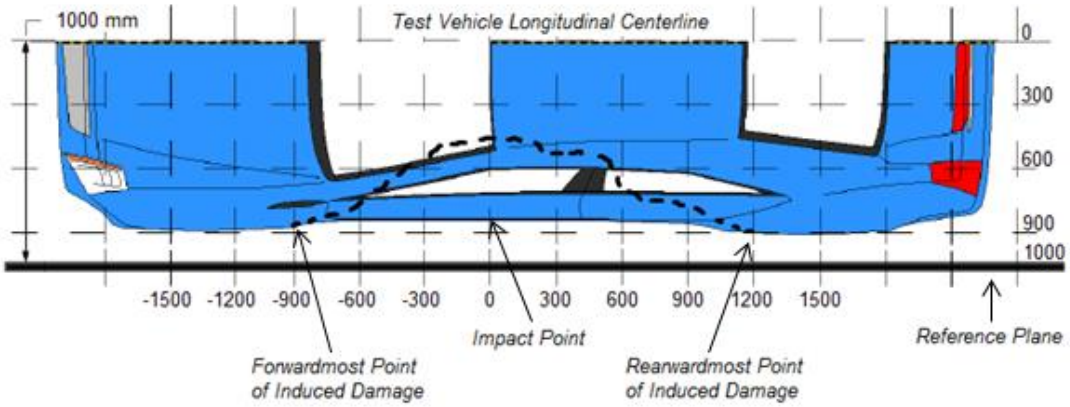
* All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019



Left Side View



Overhead View

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	256	255	0
2	Occupant Hip Point	mm	519	277	0
3	Mid - Door	mm	659	299	0
4	Window Sill	mm	931	257	0
5	Window Top	mm	1374	82	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: 2019 KIA Forte four door sedan NHTSA No.: M20194207
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2019

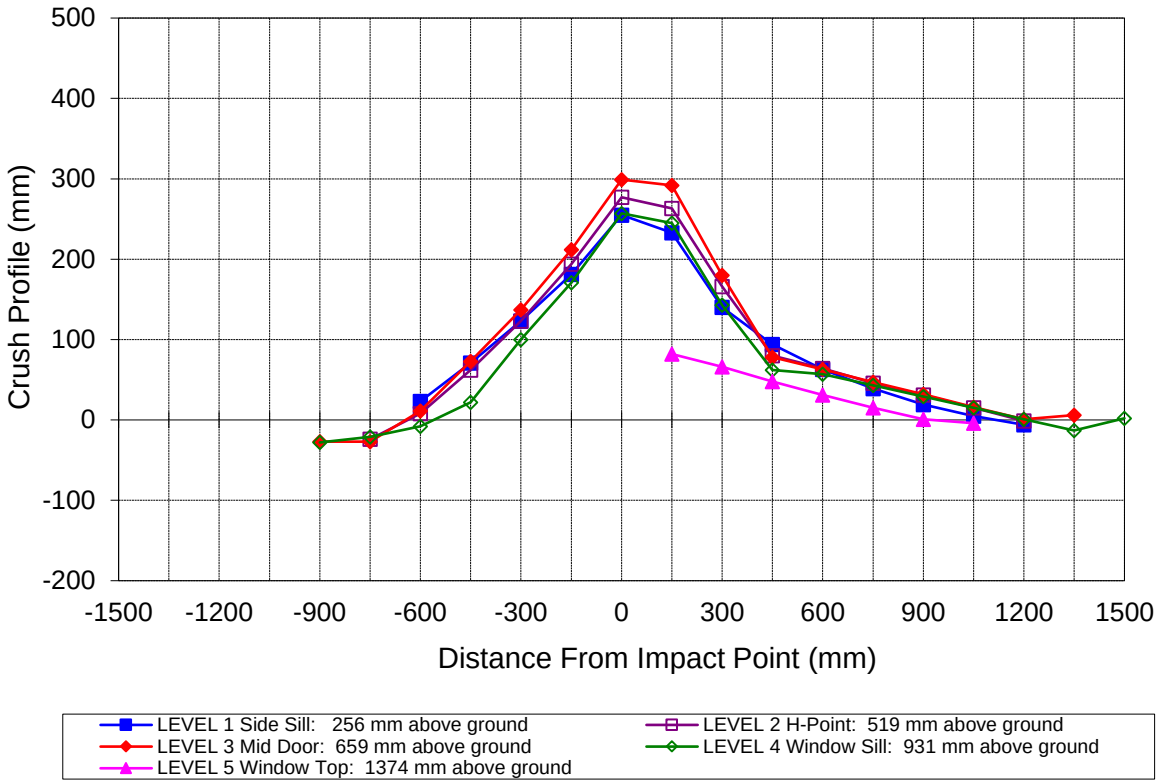
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900			892	754				919	782				-27	-28	
-750		887	886	776			911	913	797			-24	-27	-21	
-600	851	876	886	785		828	868	875	793		23	8	11	-8	
-450	852	875	889	797		781	813	816	775		71	62	73	22	
-300	856	875	890	810		733	752	753	710		123	123	137	100	
-150	856	875	890	819		675	681	678	648		181	194	212	171	
0	856	874	890	830		601	597	591	573		255	277	299	257	
150	855	873	888	836	599	622	610	596	591	517	233	263	292	245	82
300	853	872	886	842	607	713	706	706	699	541	140	166	180	143	66
450	850	869	882	842	608	756	789	804	780	560	94	80	78	62	48
600	848	869	878	841	606	785	805	815	784	575	63	64	63	57	31
750	846	869	874	839	602	807	823	827	796	587	39	46	47	43	15
900	845	872	872	838	594	826	841	840	809	593	19	31	32	29	1
1050	851	877	872	835	576	846	862	856	820	580	5	15	16	15	-4
1200	862	884	881	832		868	885	880	831		-6	-1	1	1	
1350			892	828				886	841				6	-13	
1500				822					820					2	

NOTE: *Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.*

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

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

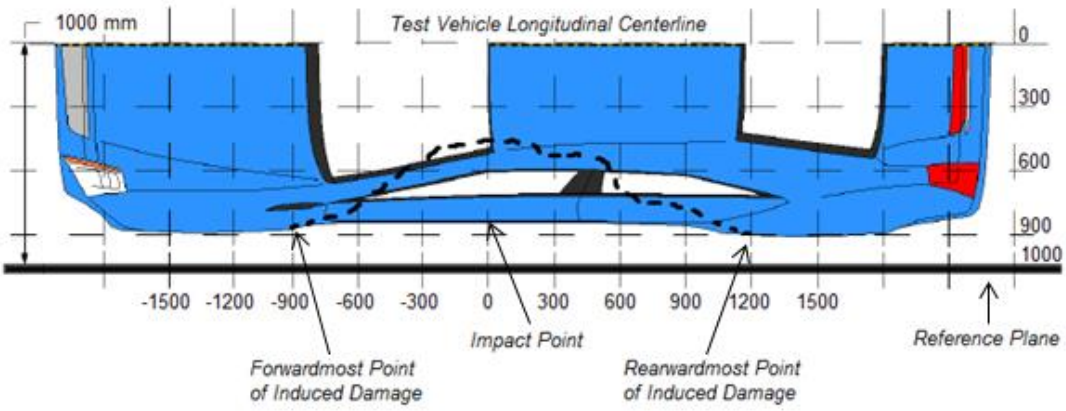


Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019

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	81	108	-27
2	-450	3	184	111	73
3	0	3	409	110	299
4	450	3	196	118	78
5	900	3	160	128	32
6	1350	3	114	108	6

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

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/19/2019
Test Time:	9:43 AM	Temperature:	21° C

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

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

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

D. Spillage Details: — No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA

ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	76	300	376
90° to 180°	75	300	375
180° to 270°	67	300	367
270° to 360°	78	300	378

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

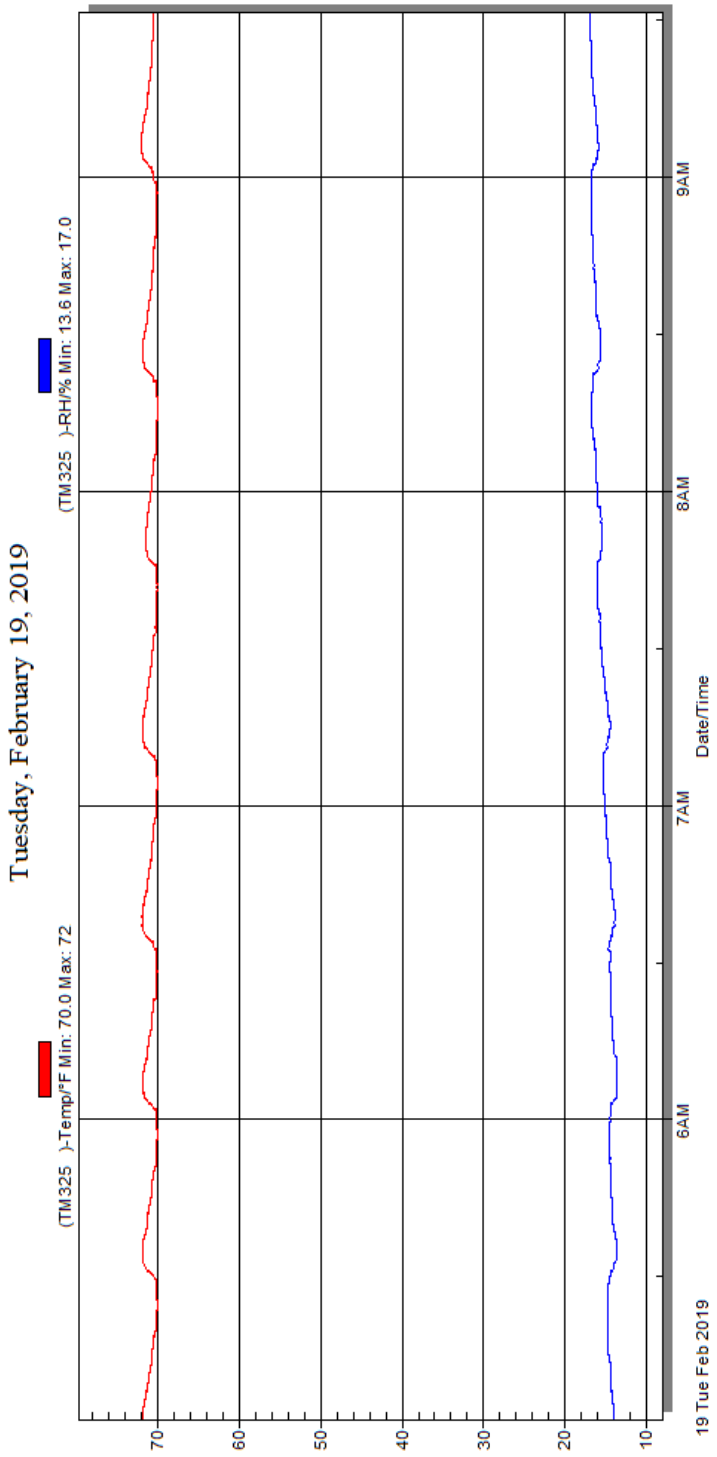
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle:	2019 KIA Forte four door sedan	NHTSA No.:	M20194207
Test Program:	NCAP Side Pole Impact Test	Test Date:	2/19/2019



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

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

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

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

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

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

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

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

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

Figure A-9: Pre-Test Left Rear ¾ View of Test Vehicle

Figure A-10: Post-Test Left Rear ¾ View of Test Vehicle

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

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

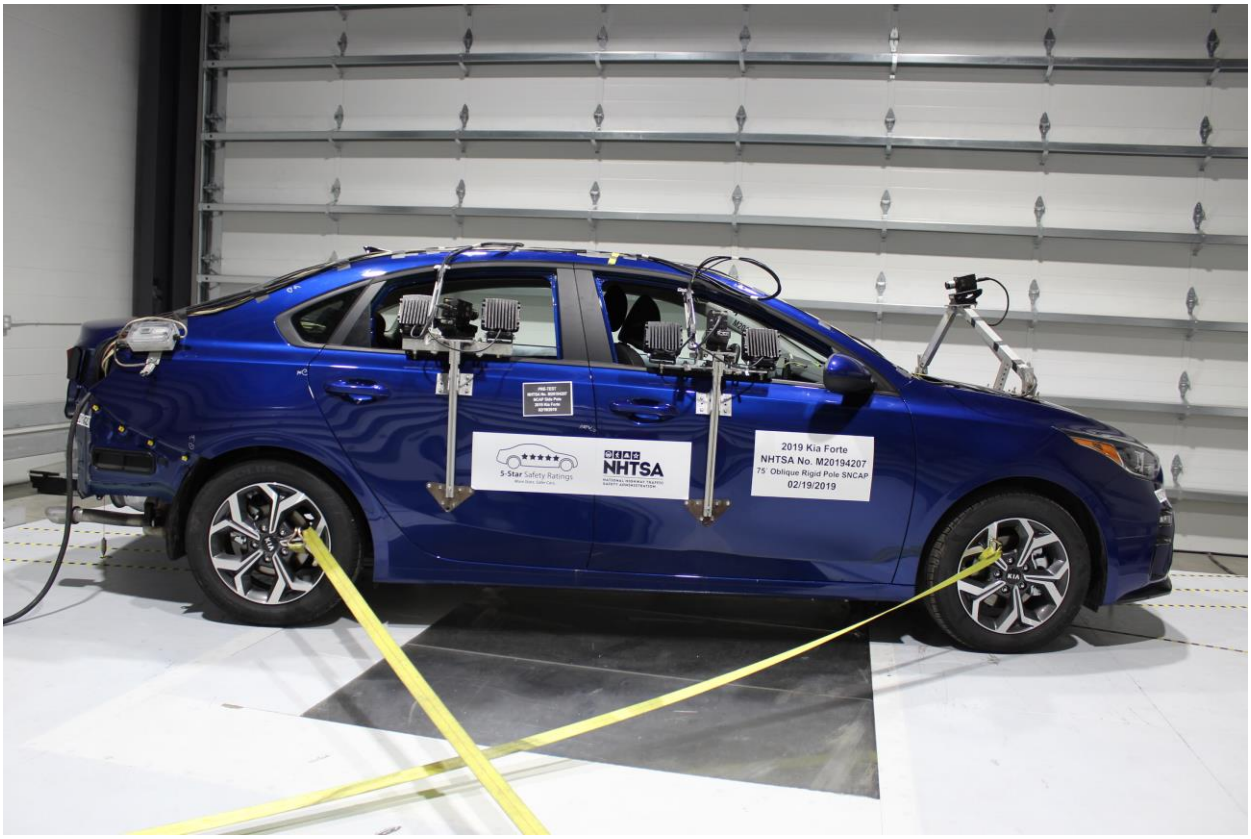


Figure A-13: Pre-Test Right Side View of Test Vehicle

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

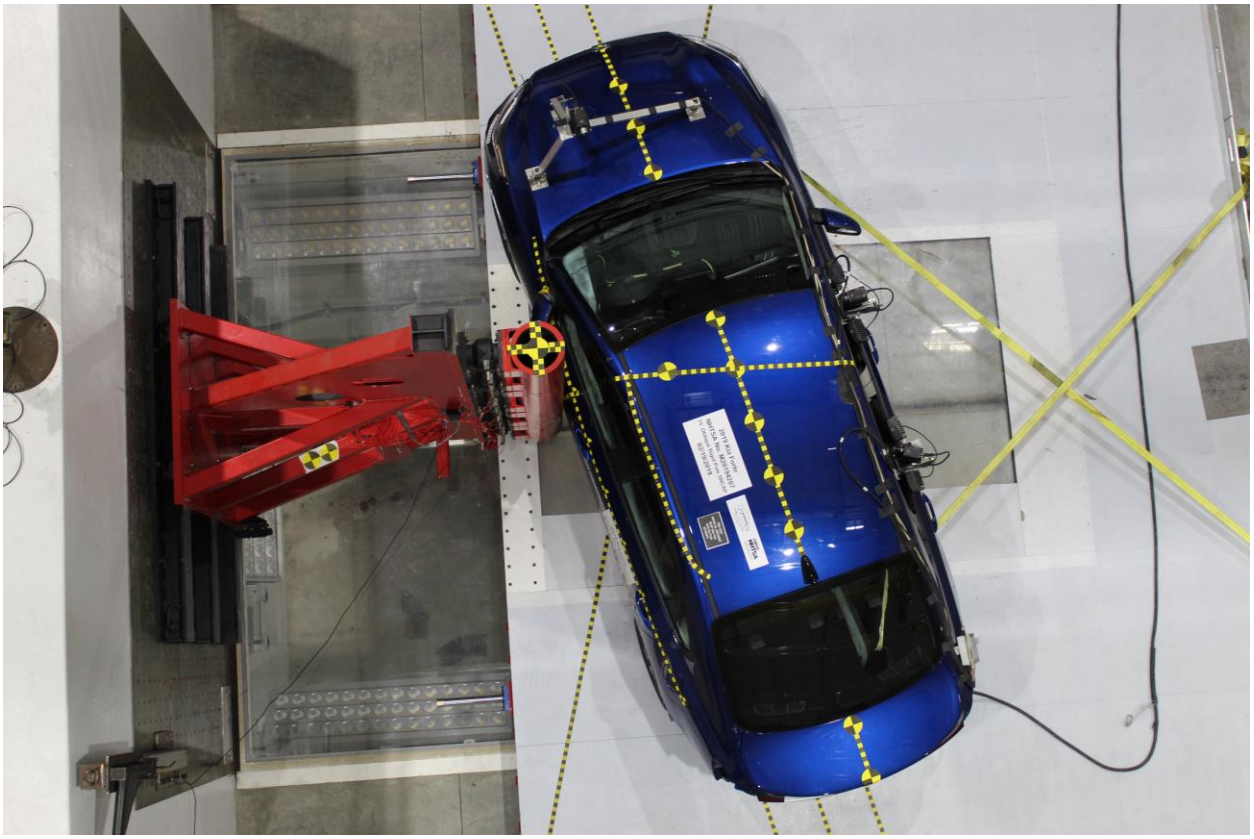


Figure A-15: Pre-Test Overhead View of Test Area

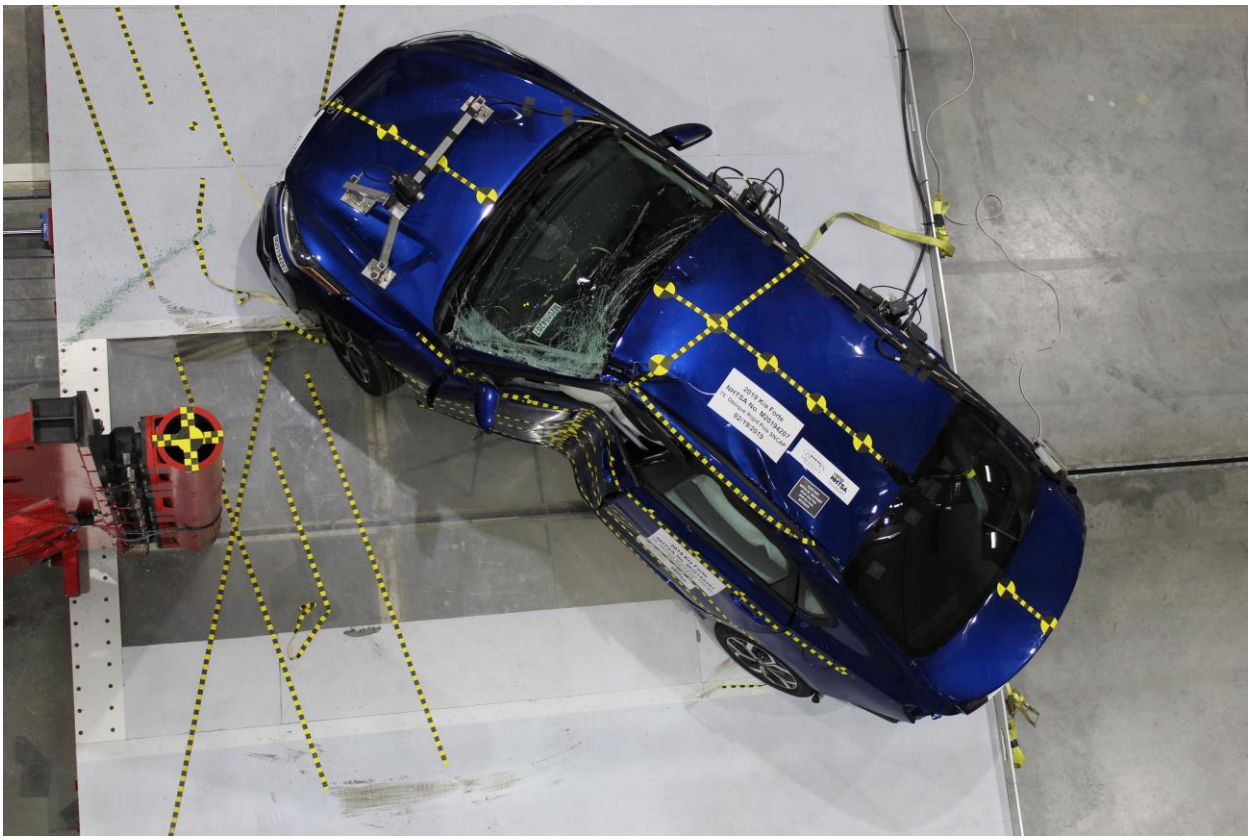


Figure A-16: Post-Test Overhead View of Test Area

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

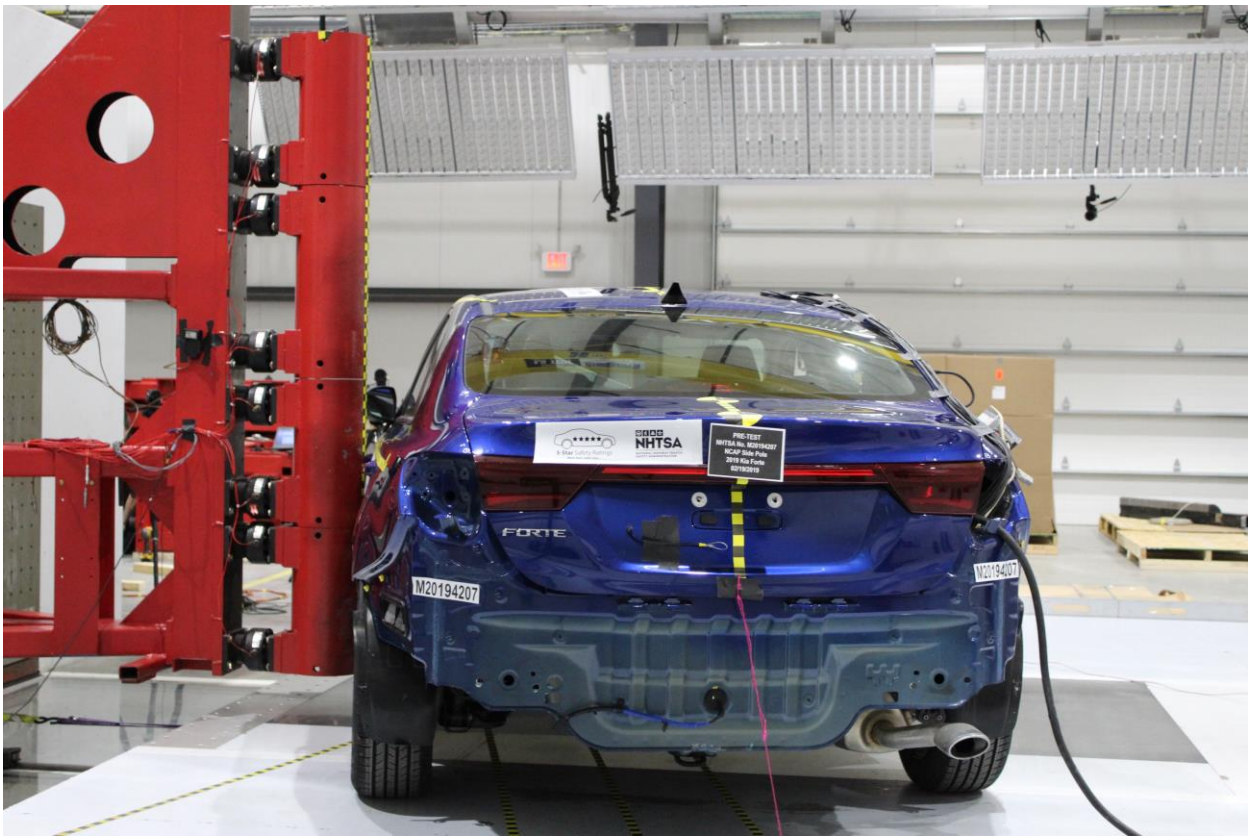


Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

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

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

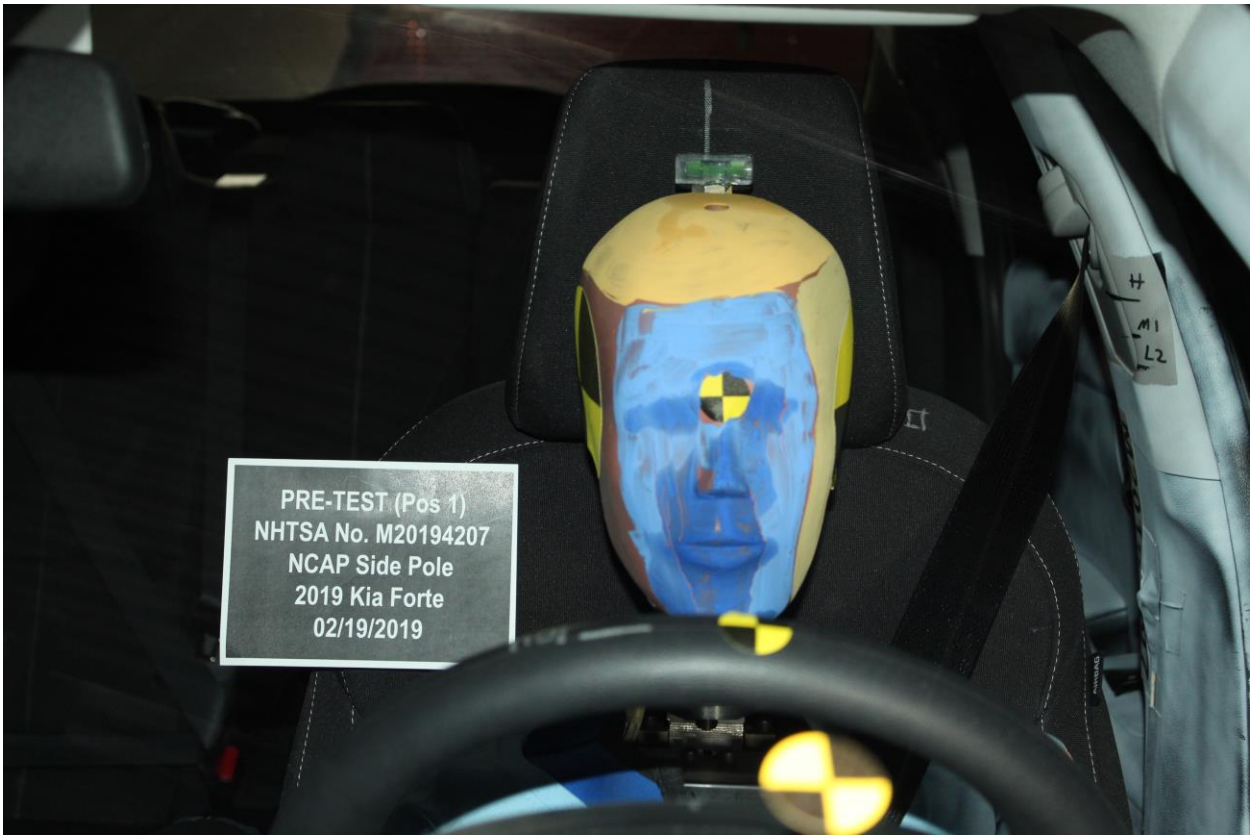


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest

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

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

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

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

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

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

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

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

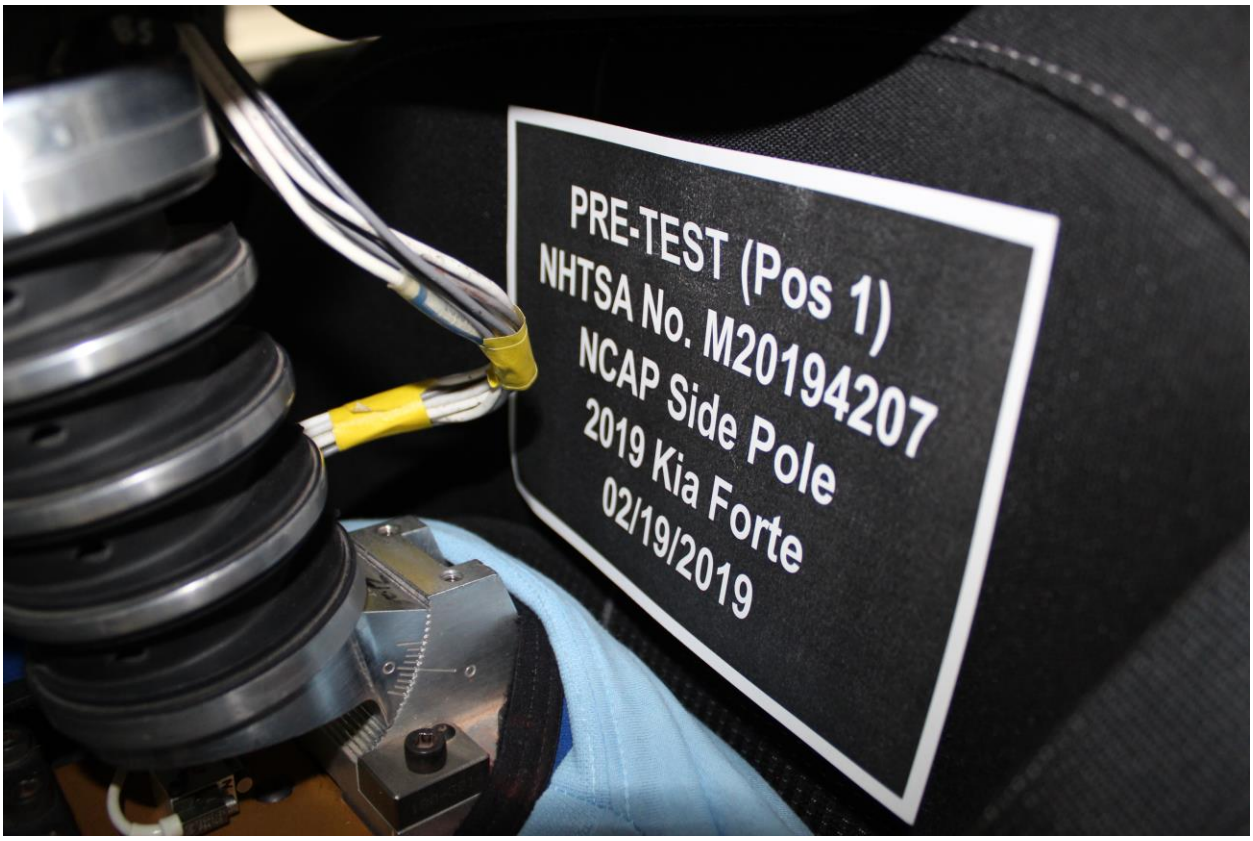


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket

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

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

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

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

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

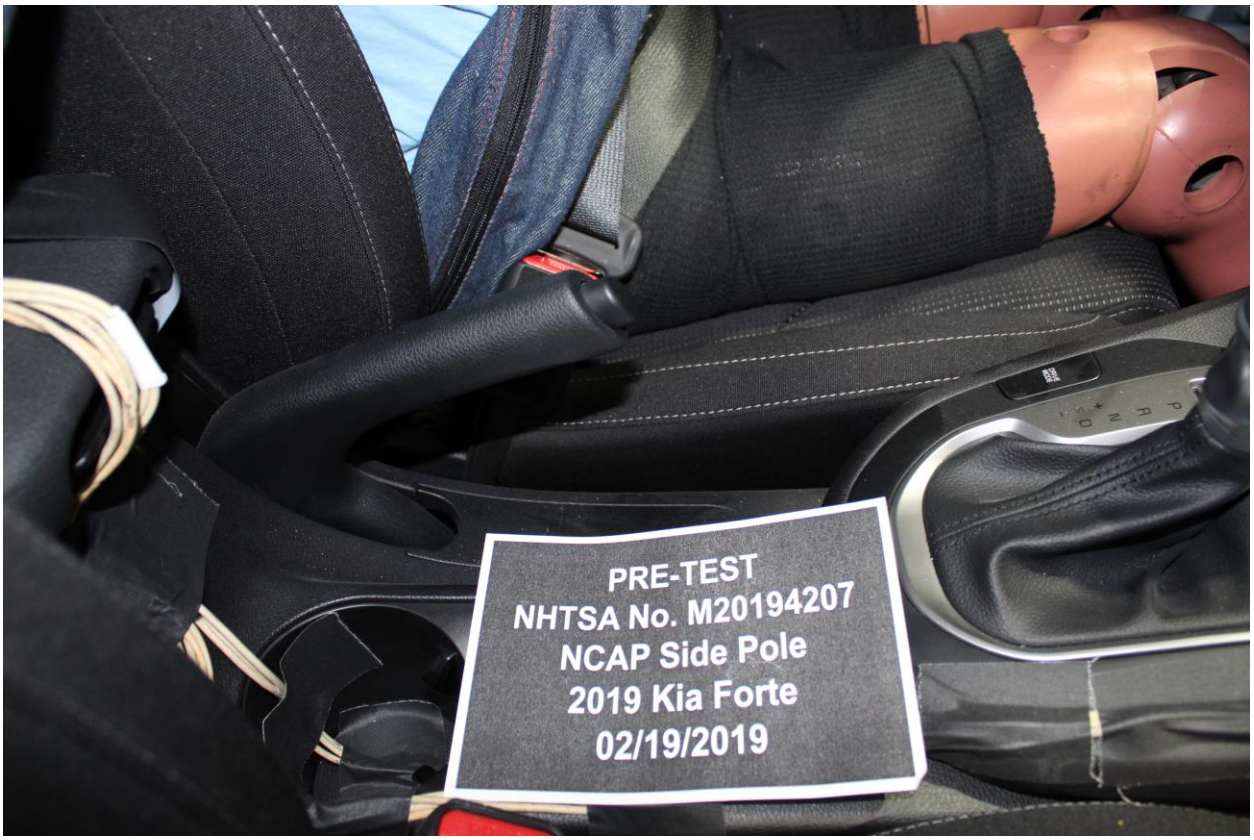


Figure A-36: Pre-Test View of Parking Brake

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

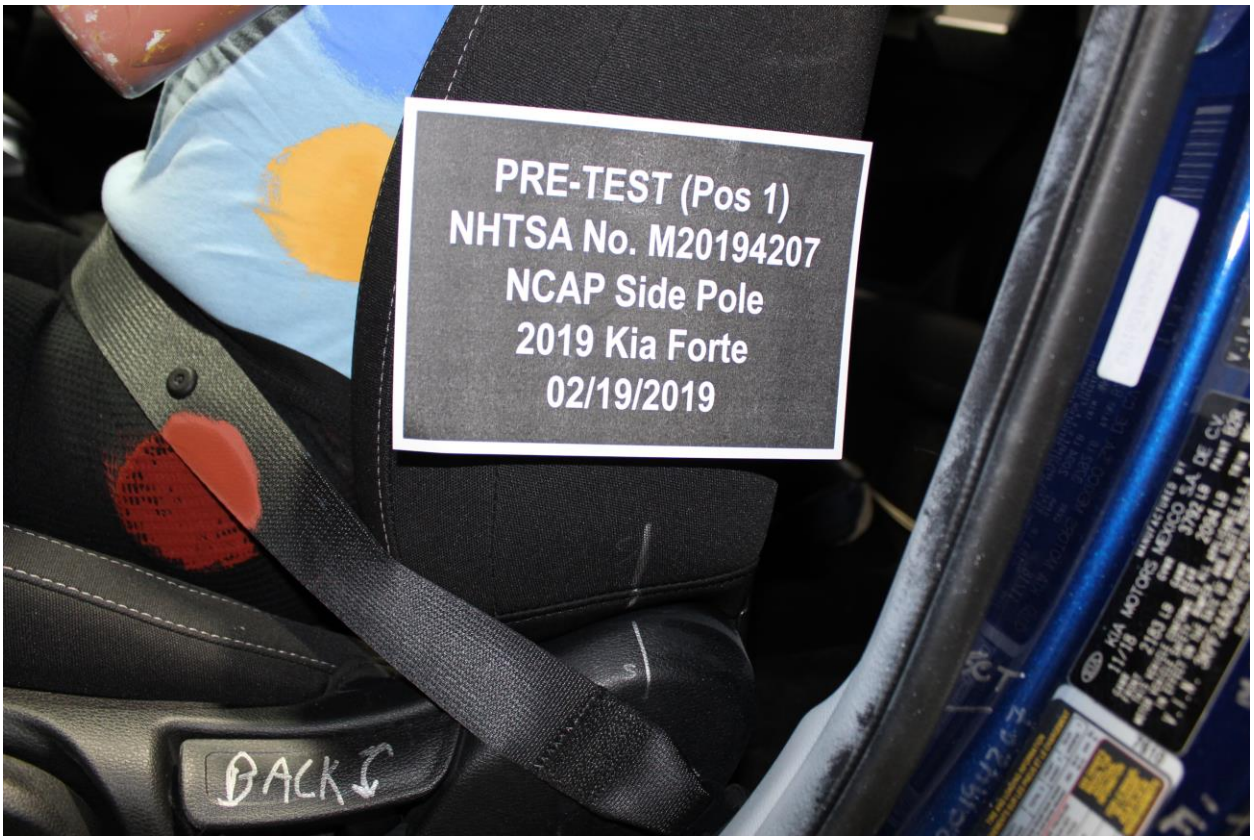


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back

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

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

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

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

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

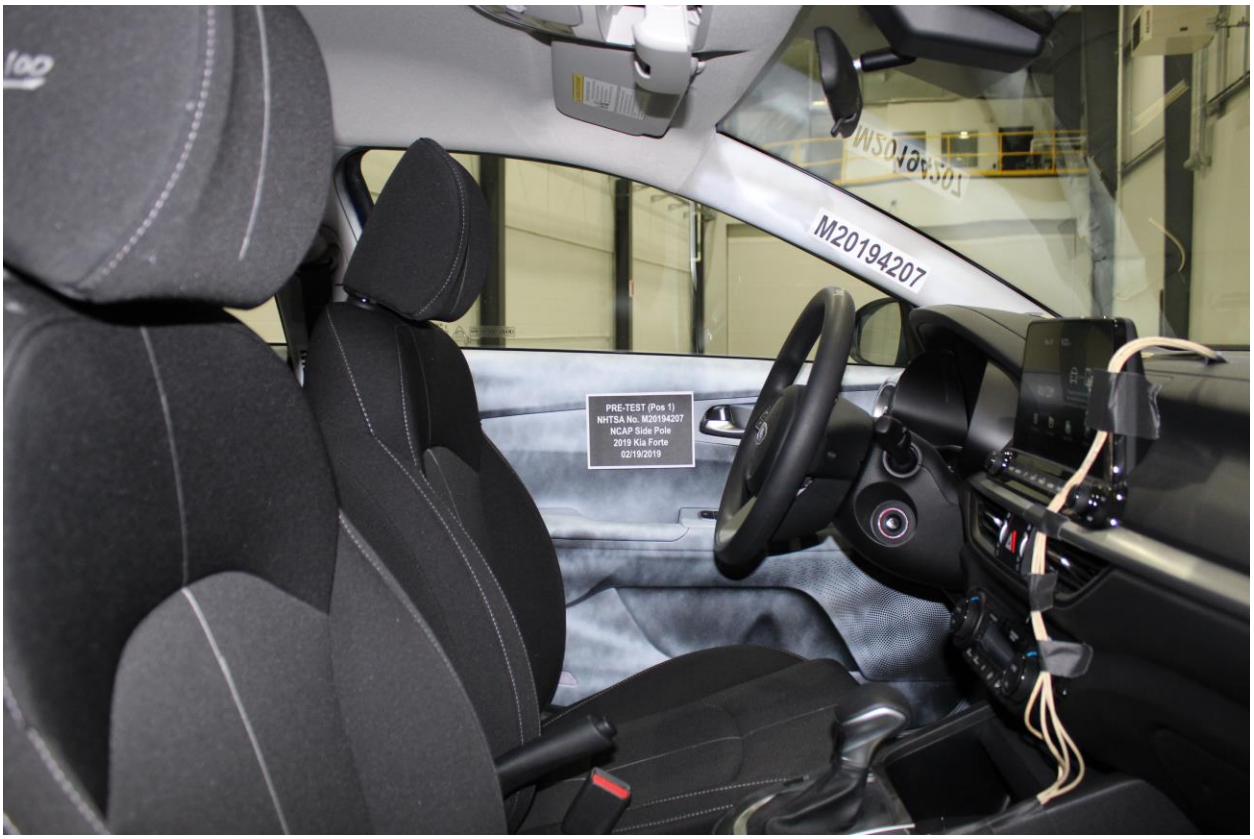


Figure A-44: Pre-Test Inner Door Panel View

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

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

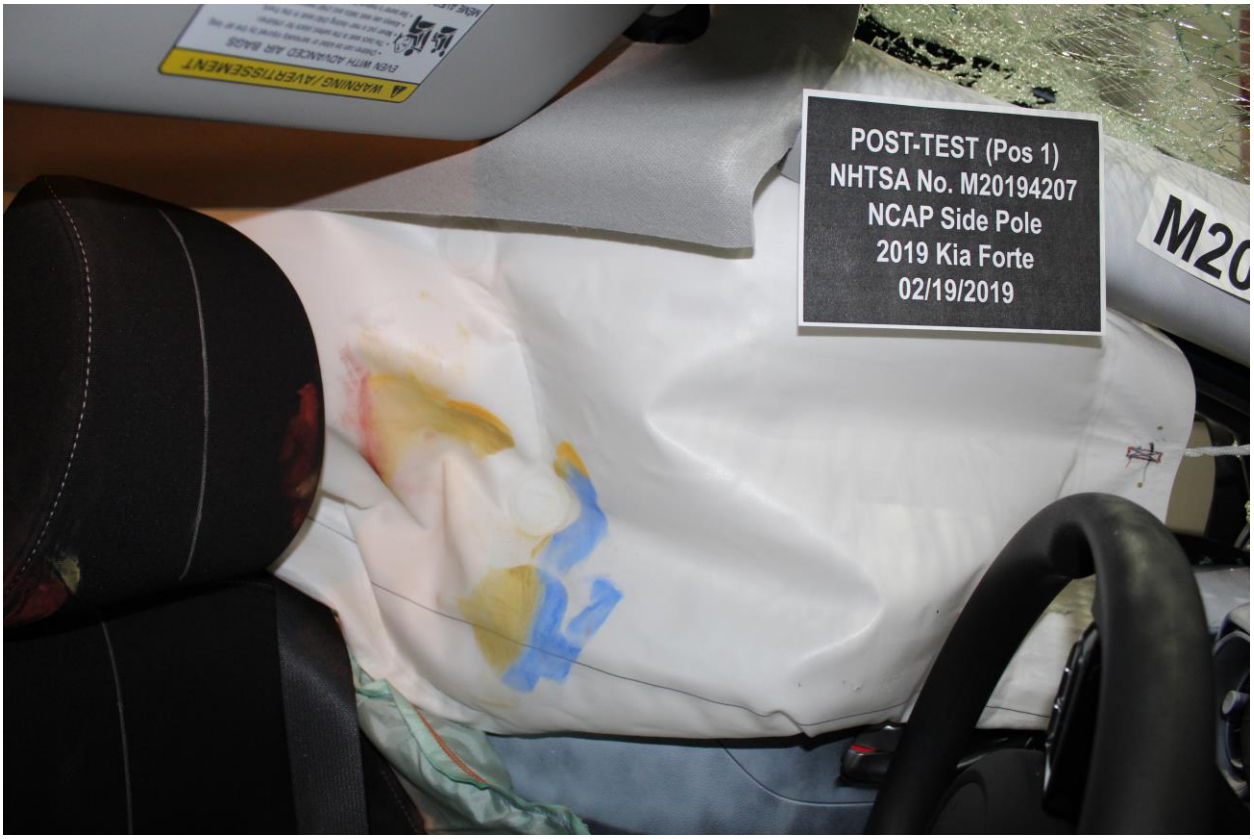


Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View

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

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

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

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

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

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

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

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

Photo Not Applicable

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

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

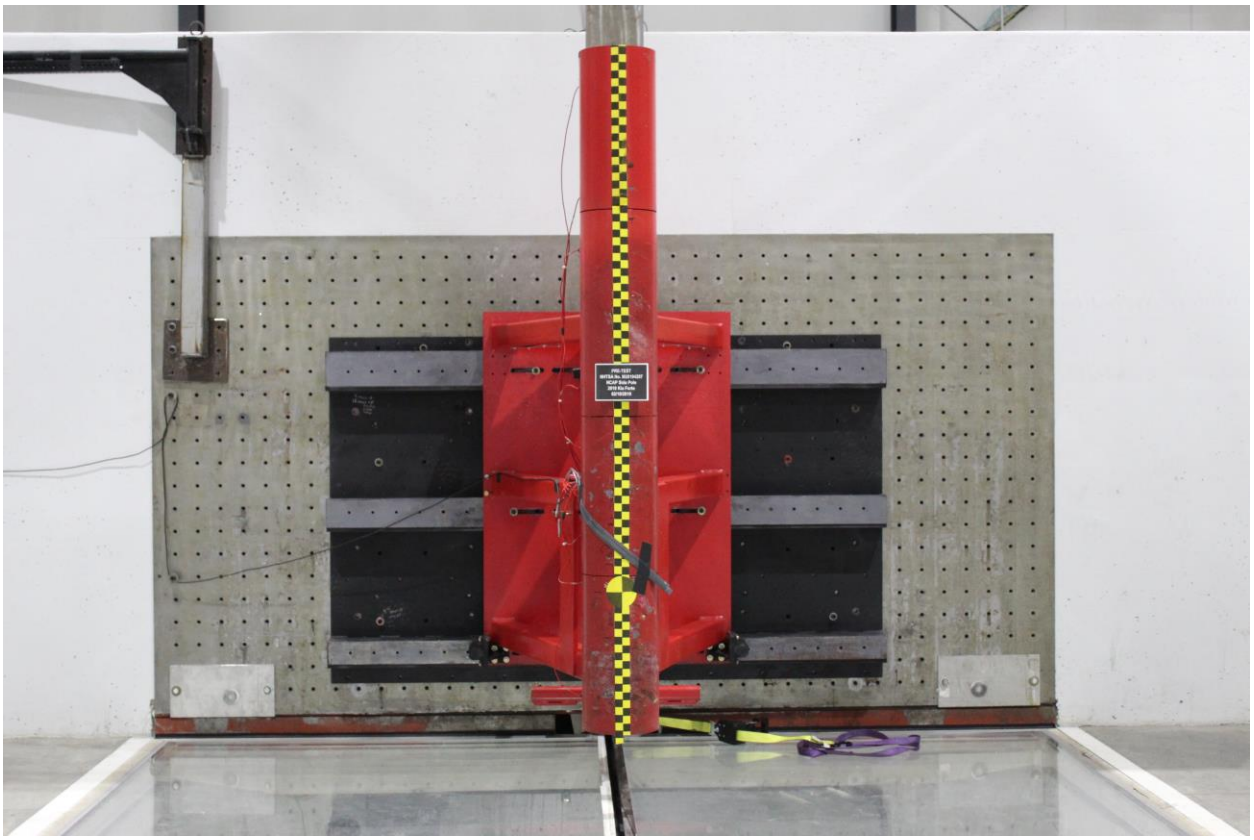


Figure A-57: Pre-Test Pole Barrier Front View

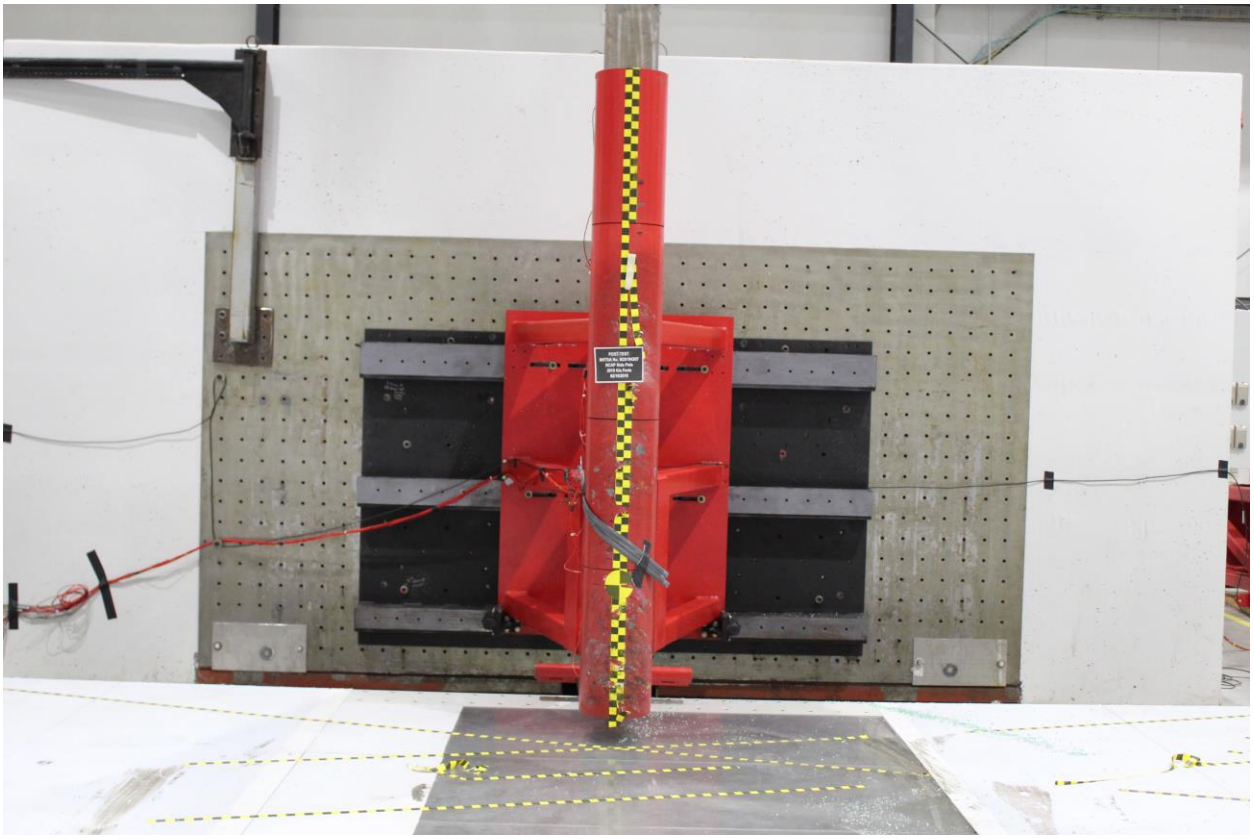


Figure A-58: Post-Test Pole Barrier Front View

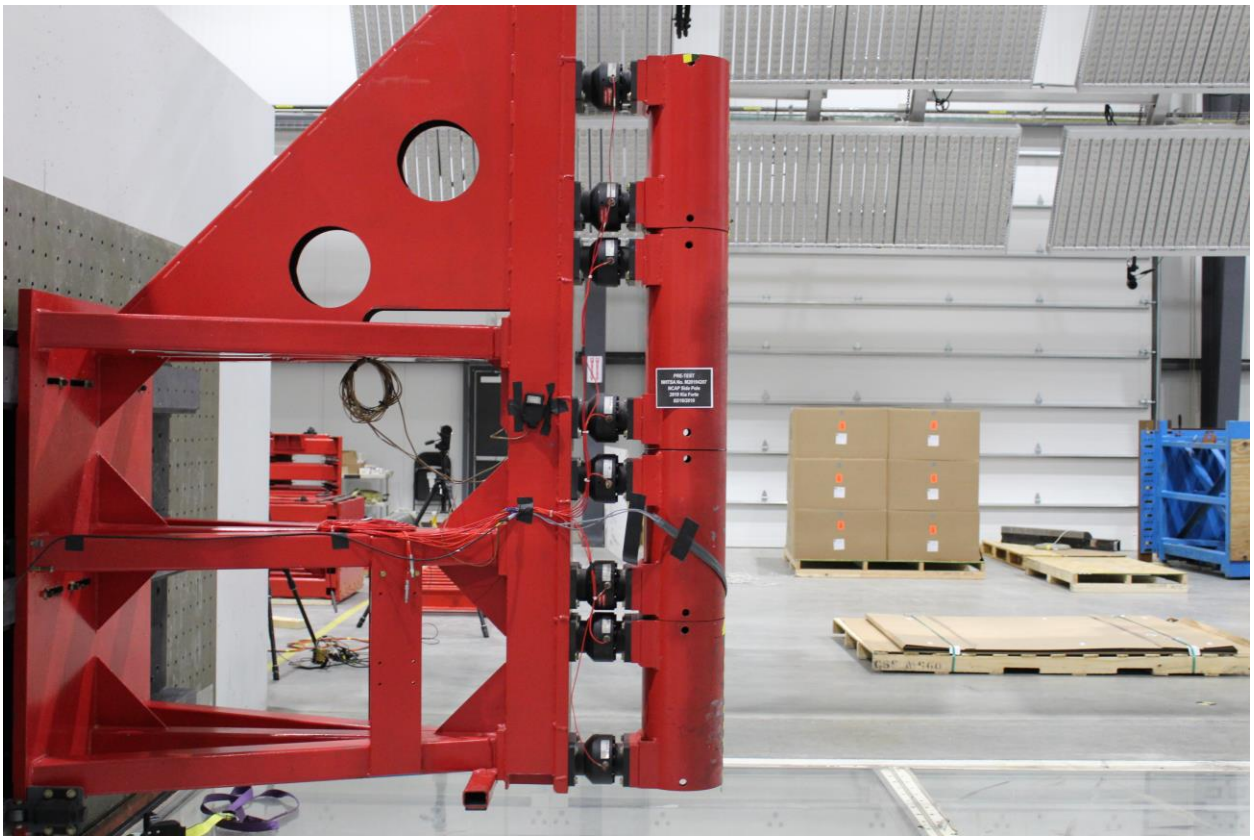


Figure A-59: Pre-Test Pole Barrier Side View

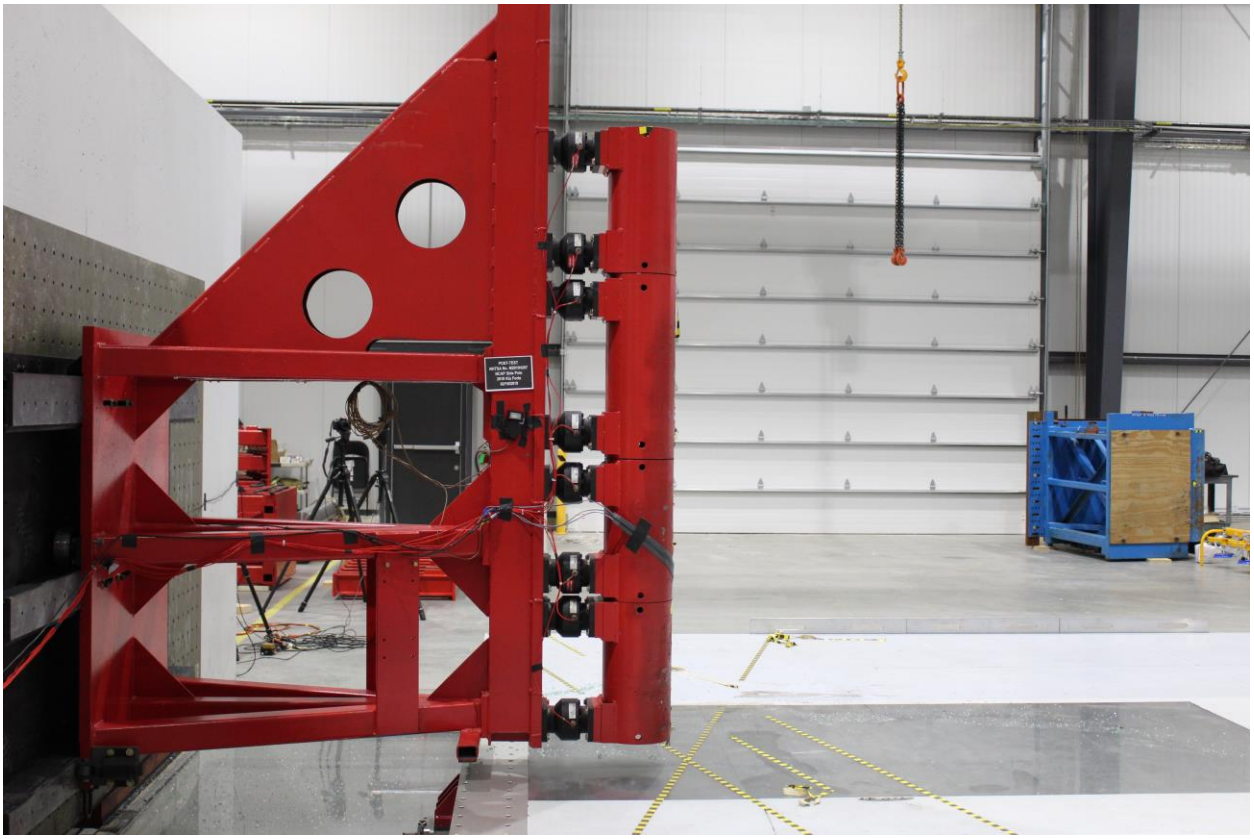


Figure A-60: Post-Test Pole Barrier Side View

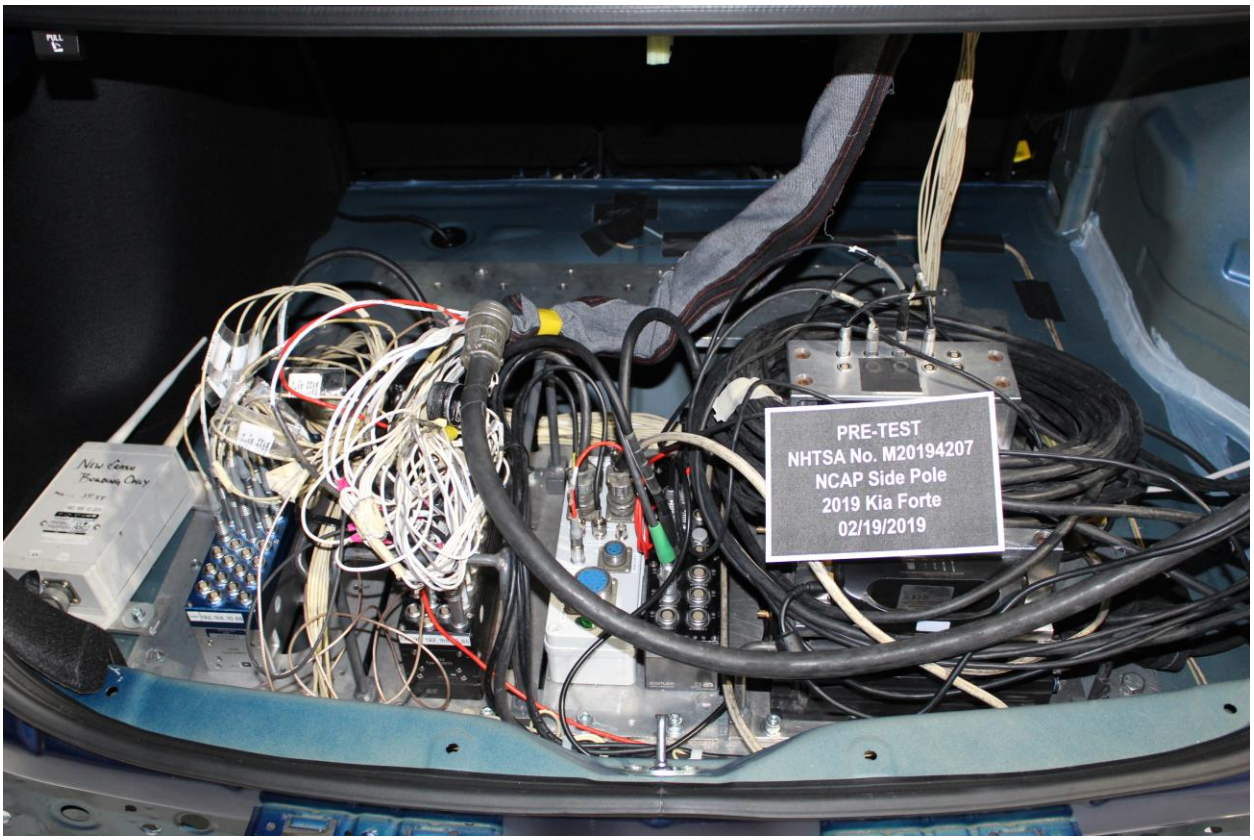


Figure A-61: Pre-Test Ballast View

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

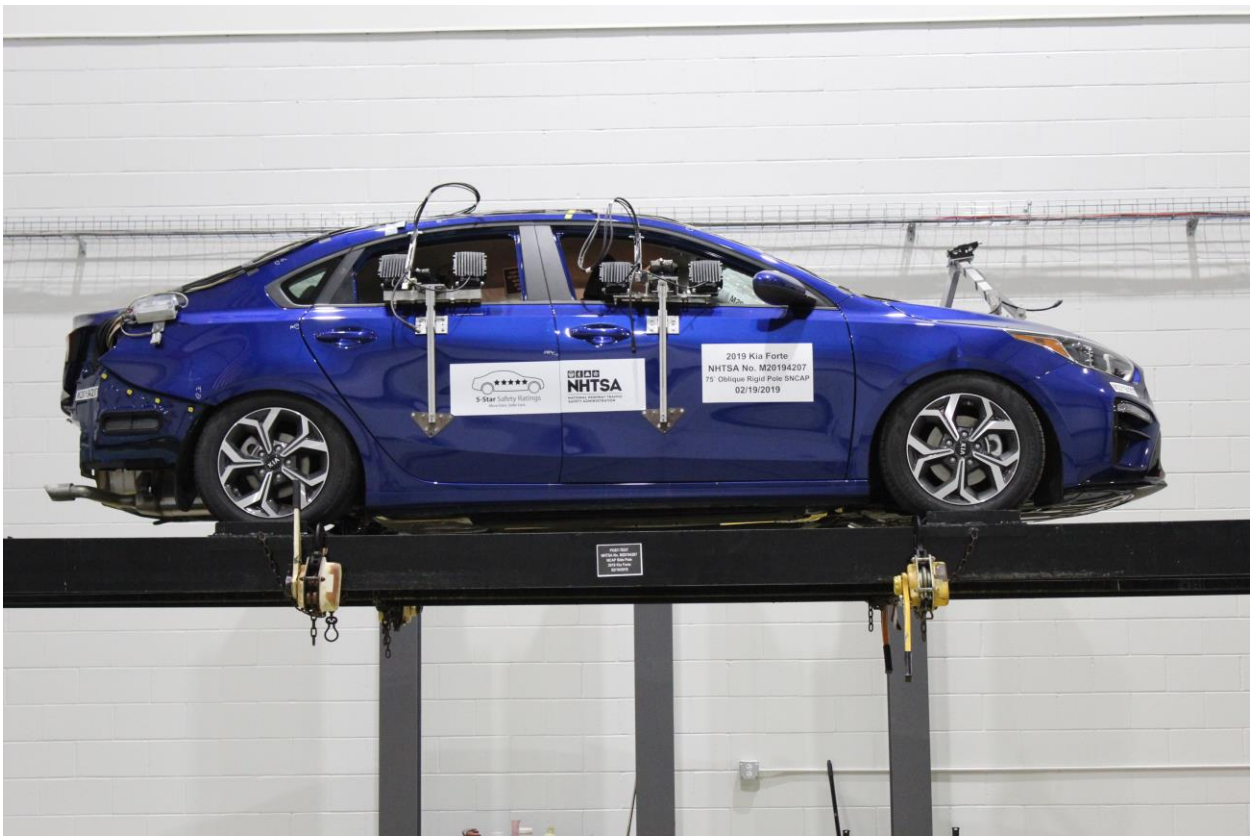


Figure A-63: FMVSS No. 301 Static Rollover 0 Degrees

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

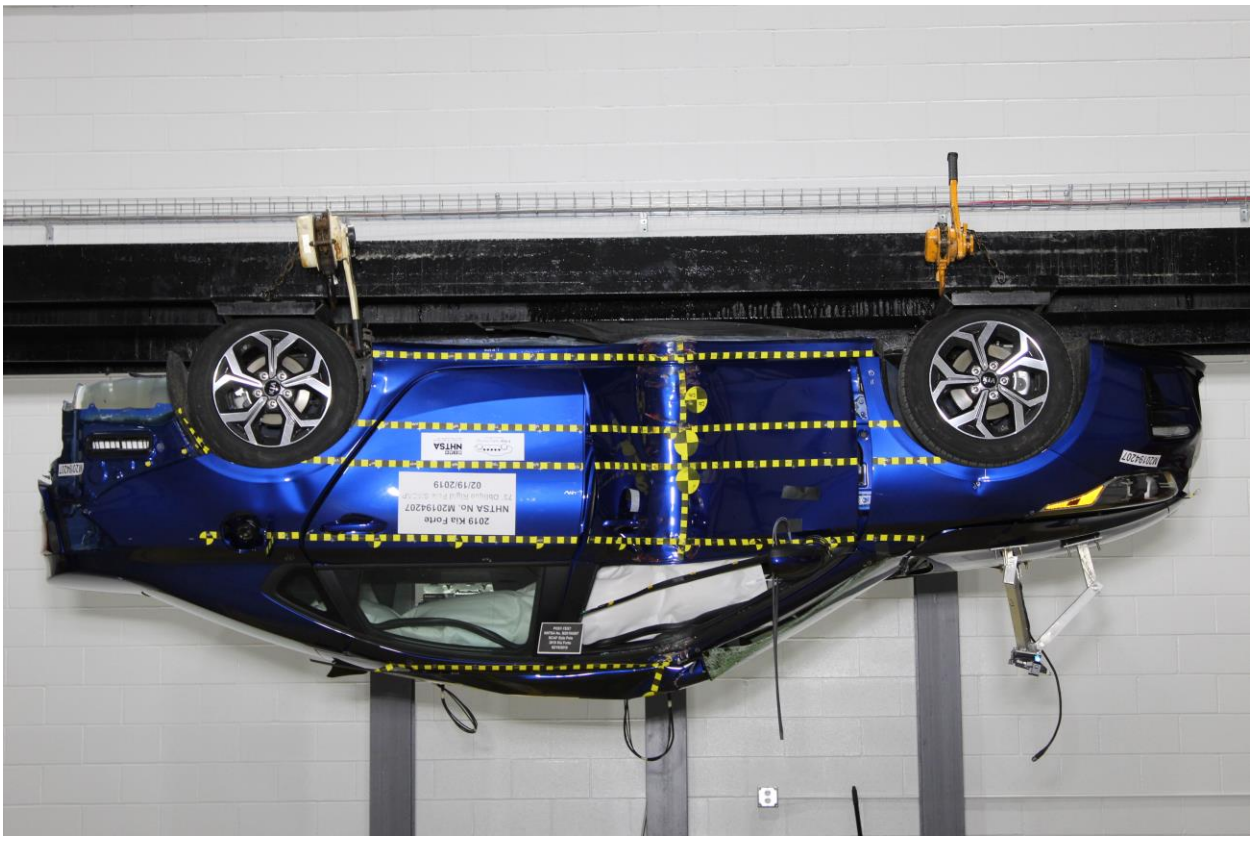


Figure A-65: FMVSS No. 301 Static Rollover 180 Degrees

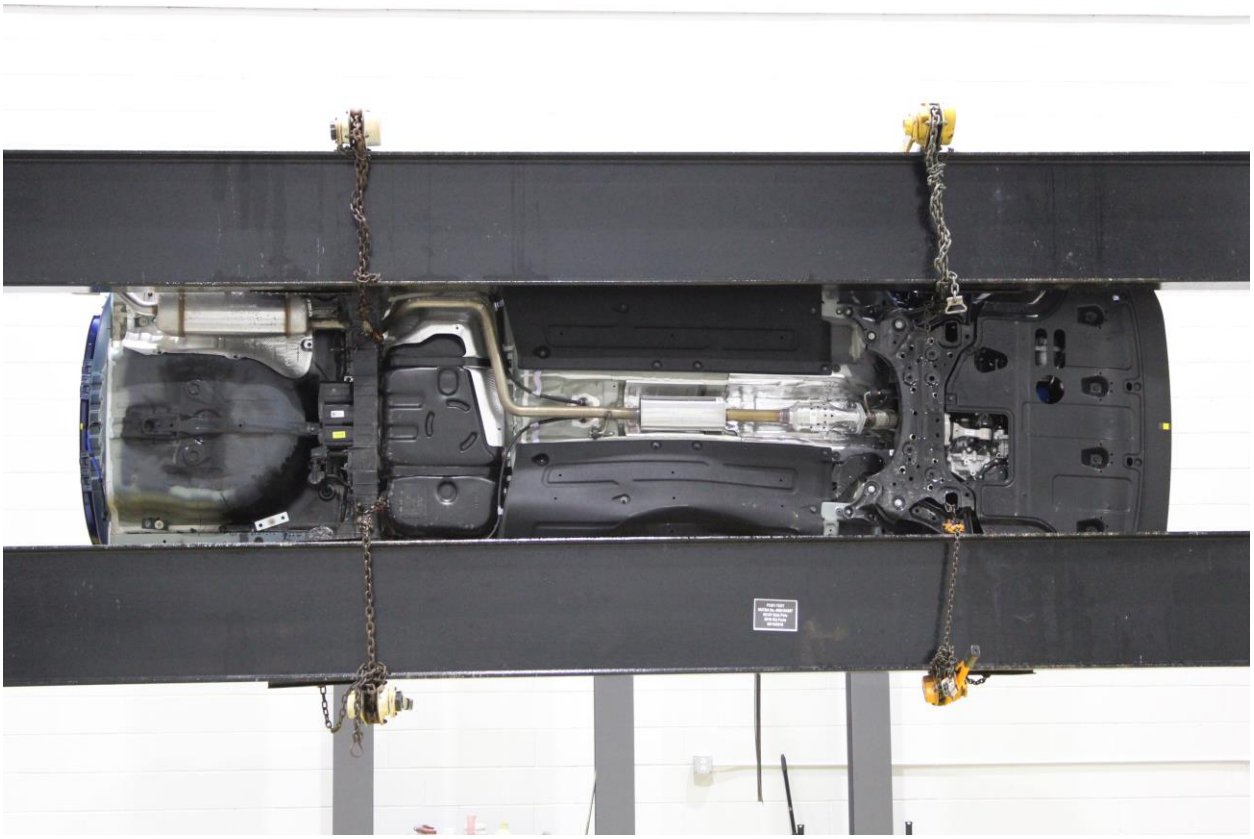


Figure A-66: FMVSS No. 301 Static Rollover 270 Degrees

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

Figure A-68: Impact Event

2019 FORTE LXS

MODEL/OPT.CODE: C3422 / 010
EXTERIOR COLOR: DEEP SEA BLUE
INTERIOR COLOR: BLACK
VEHICLE ID NUMBER: 3KPF24AD4KE061942
PORT OF ENTRY: PHILADELPHIA

Sold To: NY096
Maguire Kia
370 ELMIRA ROAD
ITHACA NY 14850

Ship To: NY096

"Highest Ranked Brand in Initial Quality, 4 Years in a Row" Mass Market, 2018
For J.D. Power 2018 award information, go to jdpower.com/awards

KIA

STANDARD FEATURES

MECHANICAL
2.0L Multi-Port Injection (MPI) 4-Cyl Engine
Intelligent Variable Transmission (IVT)
Drive Mode Select (DMS)
16" Alloy Wheels

SAFETY
Dual Front Advanced Airbags
Dual Front Seat-Mounted Side Airbags
Full-Length Side Curtain Airbags
Lower Anchors and Tethers for Children (LATCH)
Anti-Lock Braking System (ABS)
Traction Control System (TCS)
Electronic Stability Control (ESC)
Vehicle Stability Management (VSM)
Hill-start Assist Control (HAC)
Tire Pressure Monitoring System (TPMS)

INTERIOR, COMFORT & CONVENIENCE
Dual-Zone Automatic Climate Control
Power Windows, Door Locks & Outside Mirrors
UVO play, which includes:
- AM/FM/MP3 w/ 8" Touchscreen & Rear Camera
- Android Auto & Apple CarPlay Smartphone Integration
USB / Auxiliary Input Jack and 12 Volt Outlet
Bluetooth® Wireless Technology
Multi-Adjustable Front Seats
60/40 Split Folding Rear Seats
Remote Keyless Entry
Tilt & Telescopic Steering Column
Steering Wheel Controls (Bluetooth/Audio/Cruise)
Driver Attention Warning (DAW)
Forward Collision-Avoidance Assist-Car (FCA-Car)
Forward Collision Warning (FCW)
Lane Departure Warning (LDW)
Lane Keeping Assist-Line (LKA-L)

EXTERIOR
Auto-On / Off Projection Headlights
Daytime Running Lights

WARRANTY
10 Year/100,000 Mile Limited Powertrain Warranty
5 Year/60,000 Mile Limited Basic Warranty
5 Year/60,000 Mile Roadside Assistance

MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 19,090.00
ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features) Carpeted Floor Mats	$125.00
MSRP INCLUDING OPTIONS	$ 19,215.00
INLAND FREIGHT AND HANDLING	$ 895.00
TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 20,110.00

TOTAL ADDITIONAL WEIGHT: 7.0

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **34** MPG combined city/hwy (30 city, 40 highway)
2.9 gallons per 100 miles
MIDSIZE CARS range from 14 to 136 MPG. The best vehicle rates 136 MPGe.

You save **$1,500** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$1,100**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 8 (1 – 10, Best)
Smog Rating (tailpipe only): 7 (1 – 10, Best)
This vehicle emits 267 grams 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.

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 $7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $ 2.55 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone Link Code

GOVERNMENT 5-STAR SAFETY RATINGS

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

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

Side — Front seat: Not Rated; Rear seat: Not Rated
Crash
Star ratings based on the risk of injury in a side impact.

Rollover: Not Rated
Star ratings 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

Manufacturer's suggested retail price includes Manufacturer's recommended pre-delivery service. License and title fees, state and local taxes and other dealer installed options and accessories are not included in the manufacturer's suggested retail price.

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 2 %

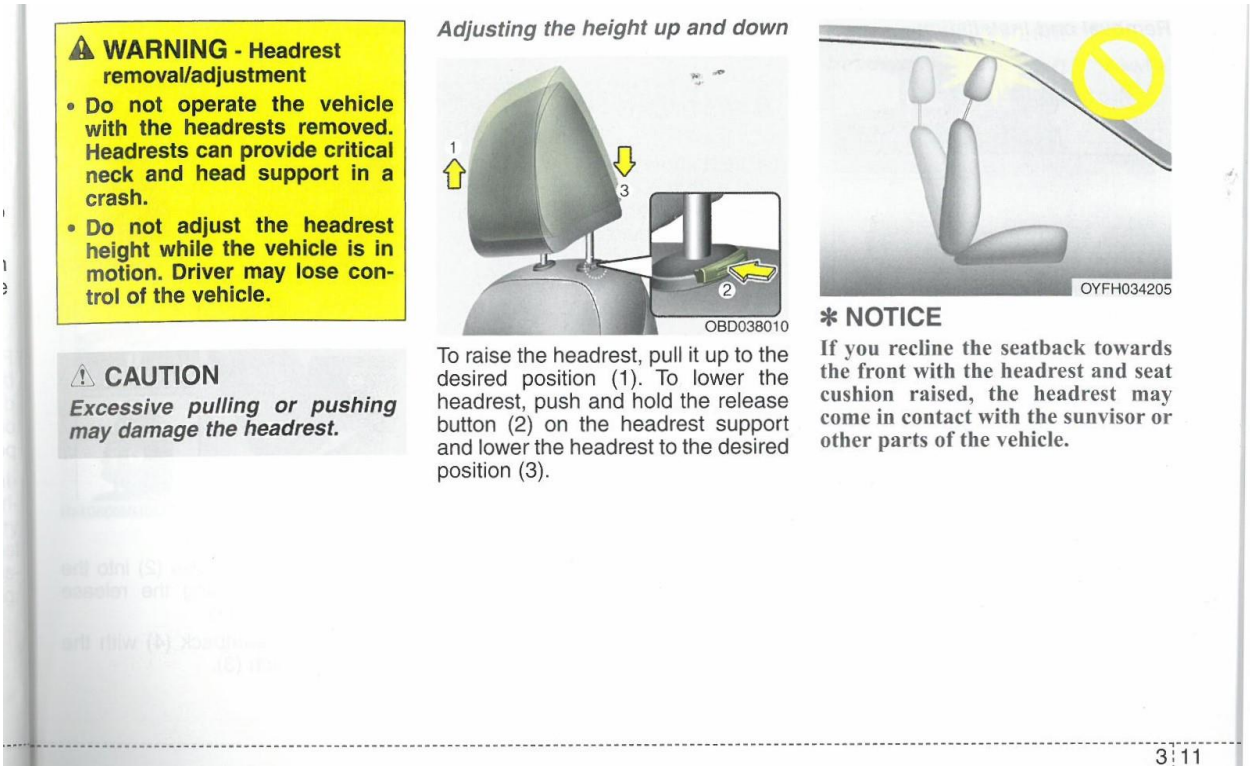
MAJOR SOURCES OF FOREIGN PARTS:
MEXICO: 55%
KOREA: 43%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE FINAL ASSEMBLY POINT:
PESQUERIA, NL, MEXICO

COUNTRY OF ORIGIN
ENGINE: MEXICO
TRANSMISSION: MEXICO

Figure A-69: Monroney Label



⚠ WARNING - Headrest removal/adjustment

- **Do not operate the vehicle with the headrests removed. Headrests can provide critical neck and head support in a crash.**
- **Do not adjust the headrest height while the vehicle is in motion. Driver may lose control of the vehicle.**

⚠ CAUTION

Excessive pulling or pushing may damage the headrest.

Adjusting the height up and down

To raise the headrest, pull it up to the desired position (1). To lower the headrest, push and hold the release button (2) on the headrest support and lower the headrest to the desired position (3).

✻ NOTICE

If you recline the seatback towards the front with the headrest and seat cushion raised, the headrest may come in contact with the sunvisor or other parts of the vehicle.

3 11

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

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

Additional Driver Dummy Instrumentation Data

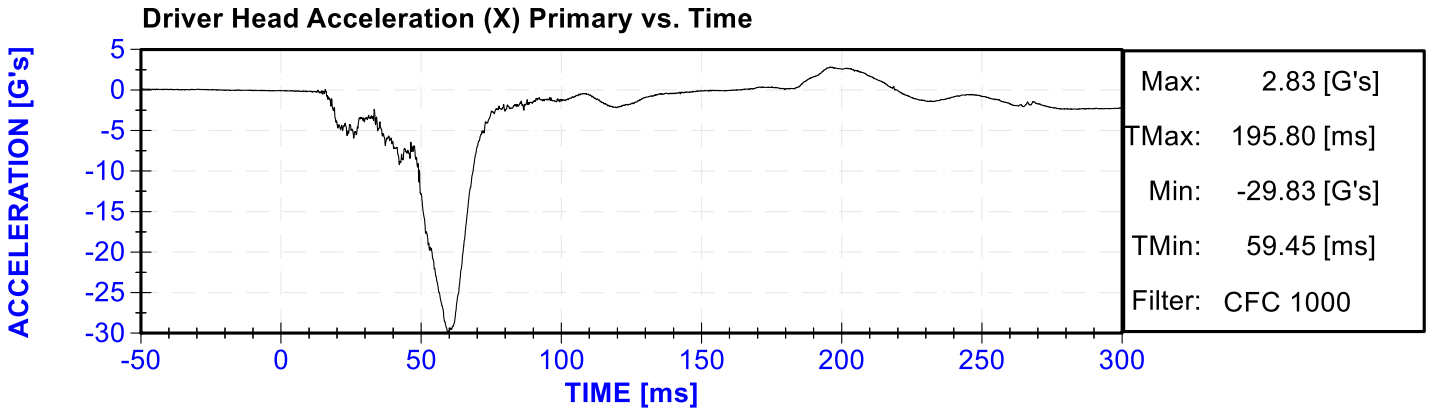
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

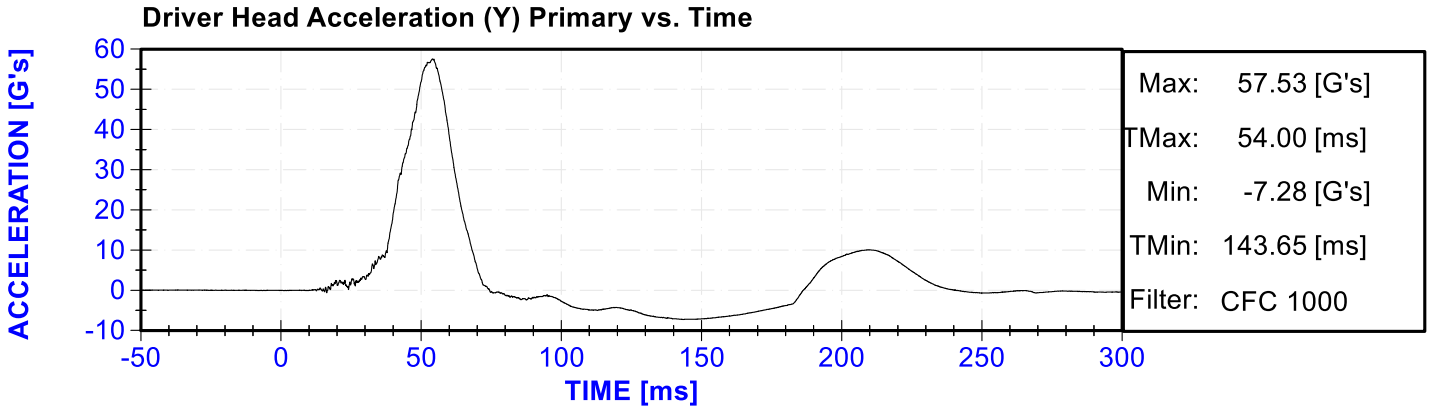
Vehicle Instrumentation Data

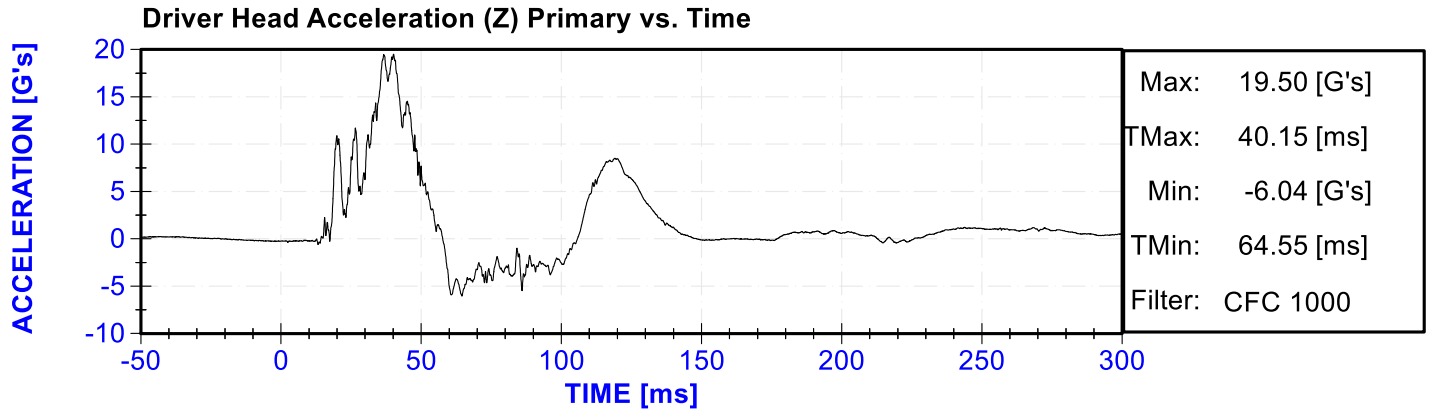
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration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

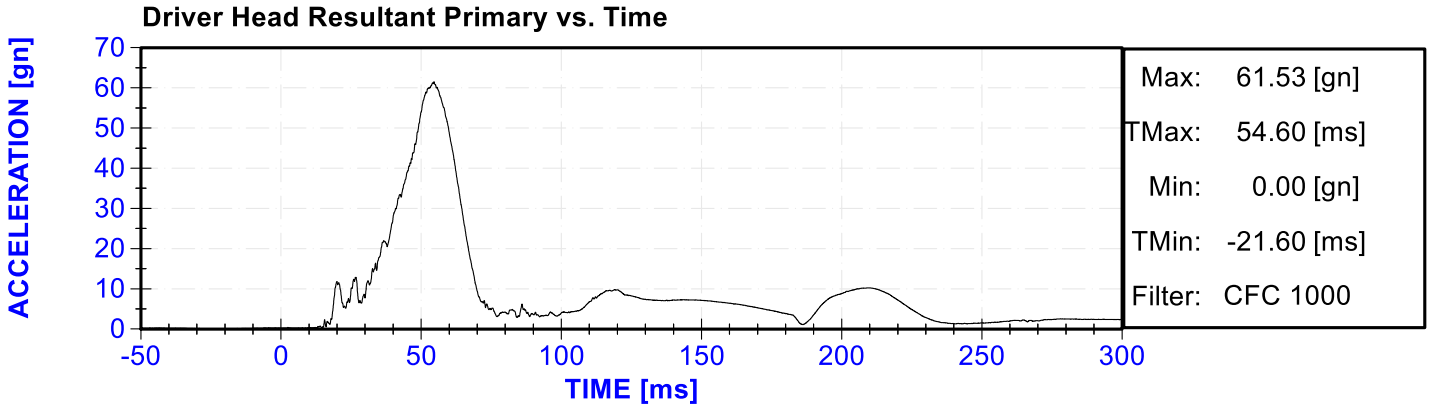
Pole Instrumentation Data

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

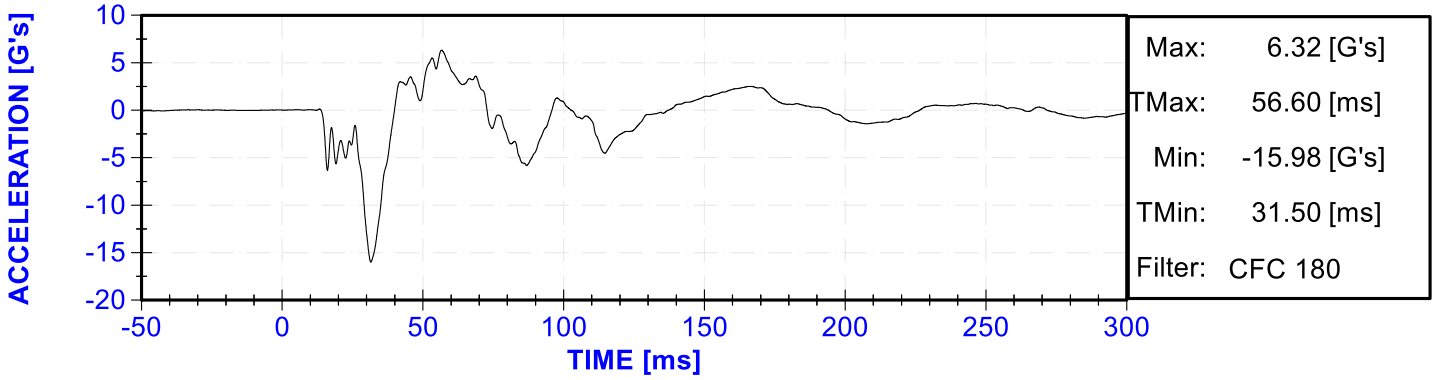

Driver Head Acceleration (X) Primary vs. Time
ACCELERATION [G's]
TIME [ms]
Max: 2.83 [G's]
TMax: 195.80 [ms]
Min: -29.83 [G's]
TMin: 59.45 [ms]
Filter: CFC 1000


Driver Head Acceleration (Y) Primary vs. Time
ACCELERATION [G's]
TIME [ms]
Max: 57.53 [G's]
TMax: 54.00 [ms]
Min: -7.28 [G's]
TMin: 143.65 [ms]
Filter: CFC 1000

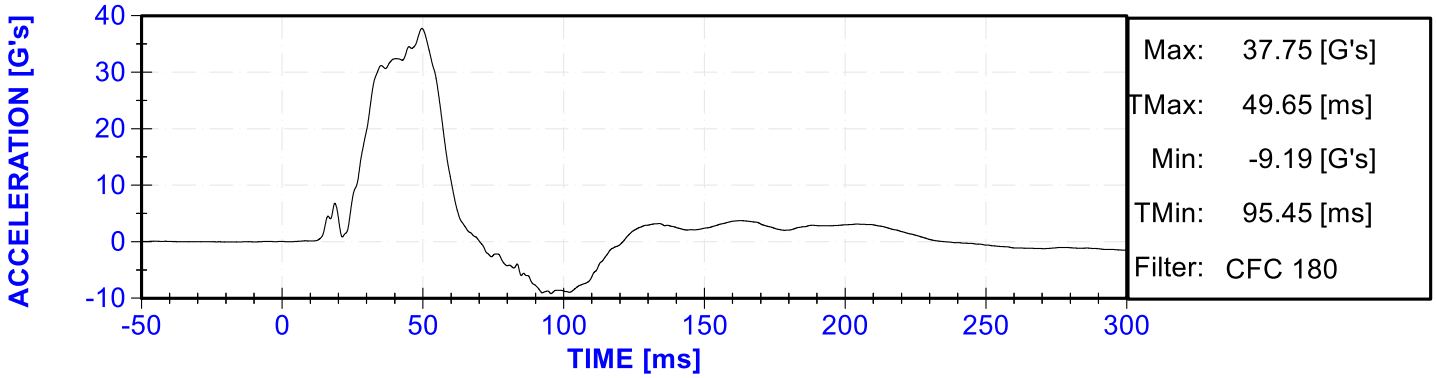

Driver Head Acceleration (Z) Primary vs. Time
ACCELERATION [G's]
TIME [ms]
Max: 19.50 [G's]
TMax: 40.15 [ms]
Min: -6.04 [G's]
TMin: 64.55 [ms]
Filter: CFC 1000


Driver Head Resultant Primary vs. Time
ACCELERATION [gn]
TIME [ms]
Max: 61.53 [gn]
TMax: 54.60 [ms]
Min: 0.00 [gn]
TMin: -21.60 [ms]
Filter: CFC 1000

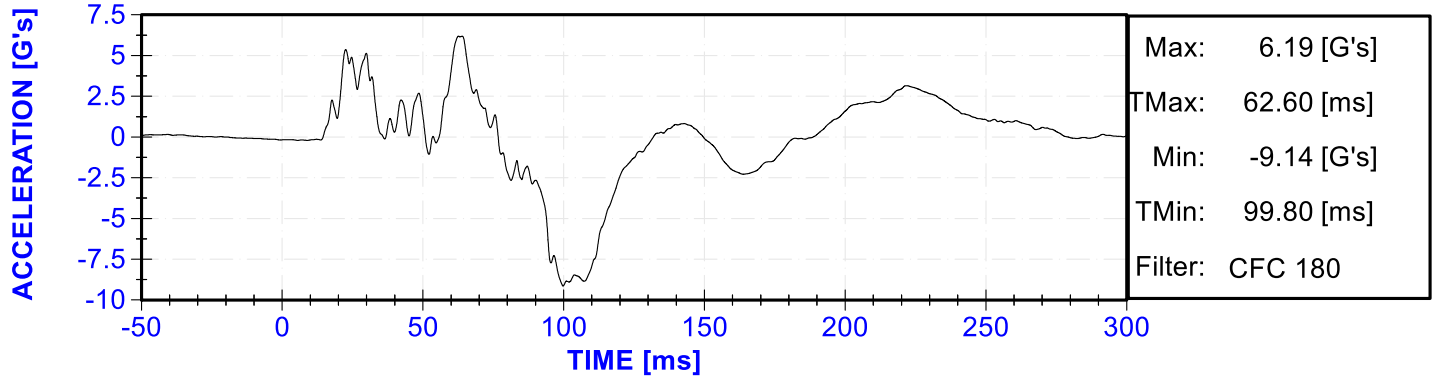
Driver Lower Spine T12 Acceleration (X) vs. Time



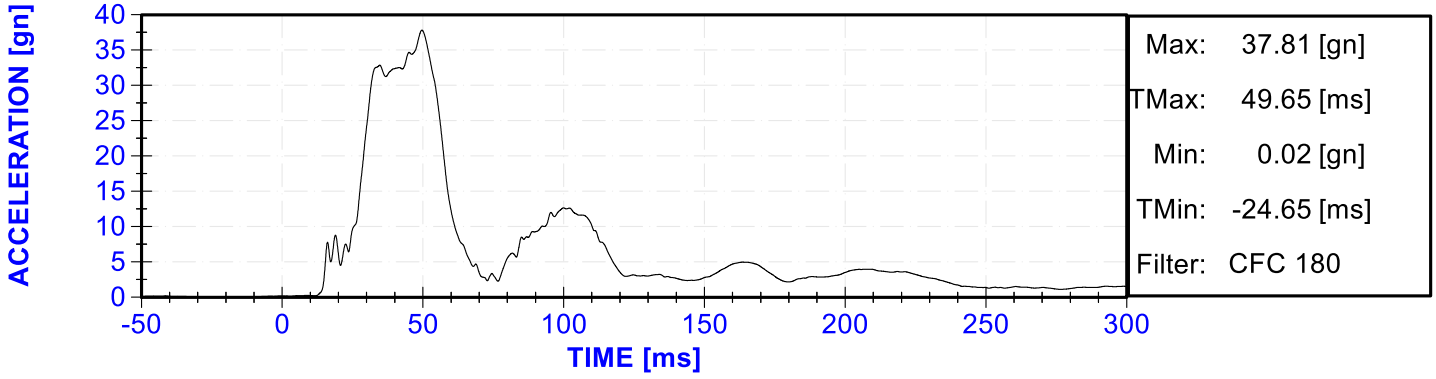
Driver Lower Spine T12 Acceleration (Y) vs. Time



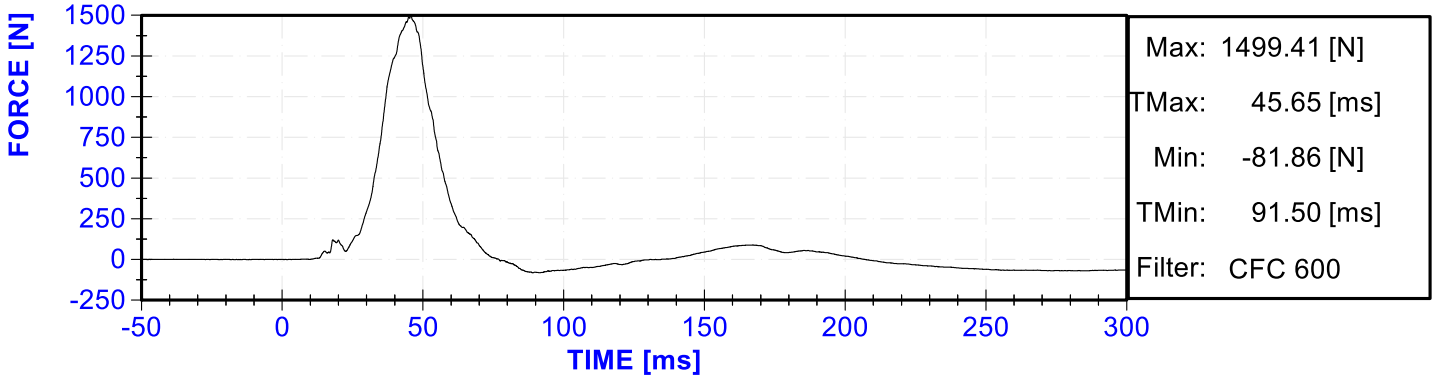
Driver Lower Spine T12 Acceleration (Z) vs. Time



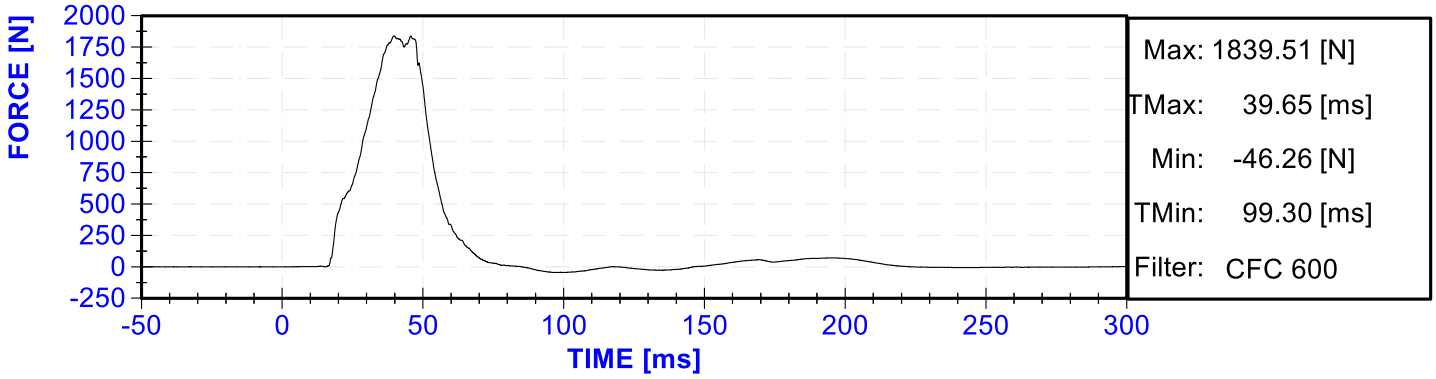
Driver Lower Spine T12 Resultant Acceleration vs. Time



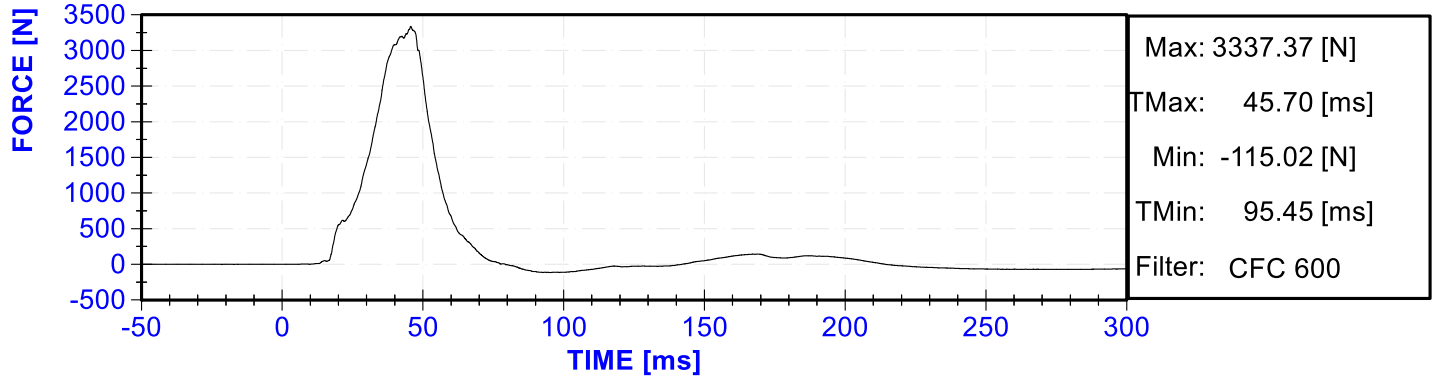
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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

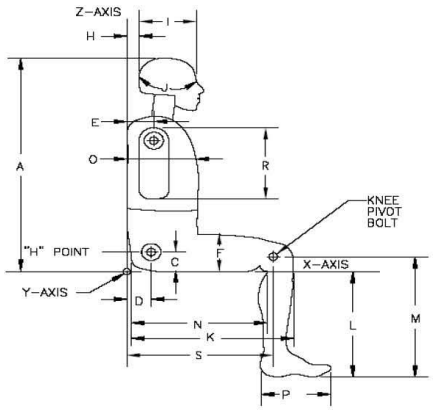
SERIAL NO: DG8012

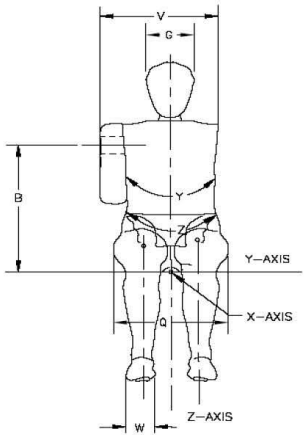
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Dutton Date: 01/31/2019

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	449	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	105	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	531	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	344	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	780	Pass

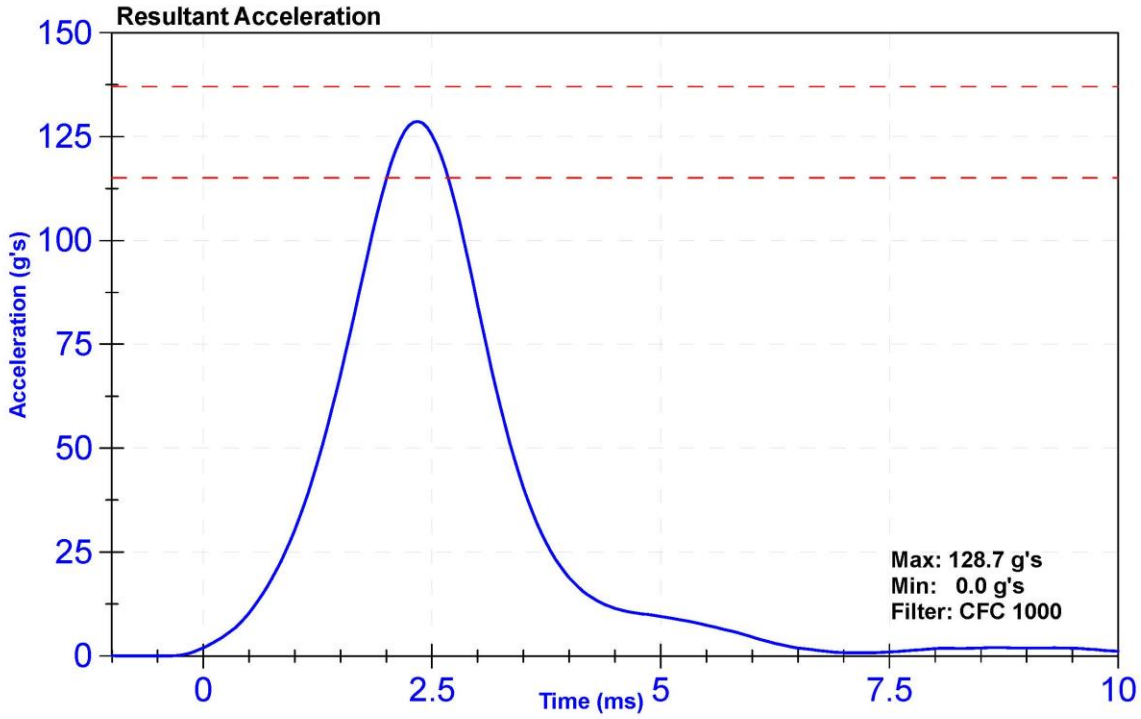
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

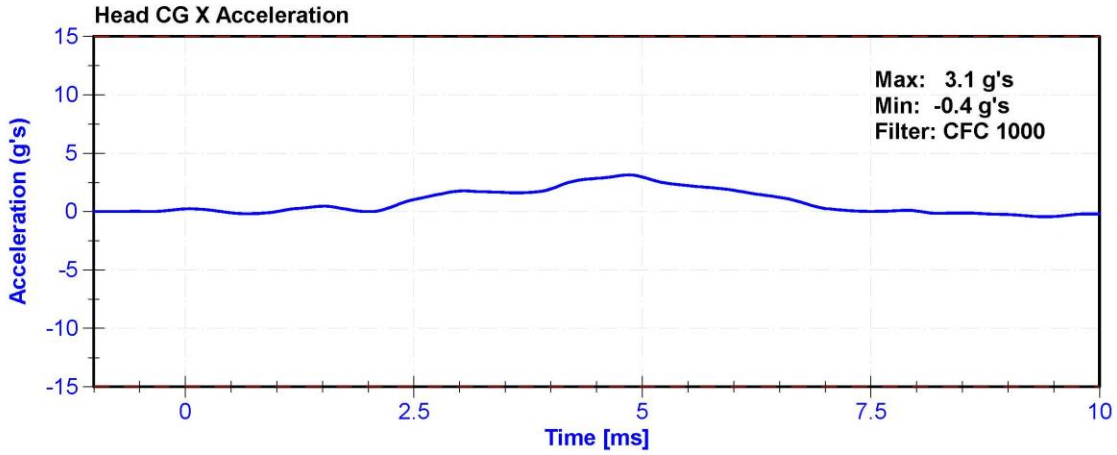
Results

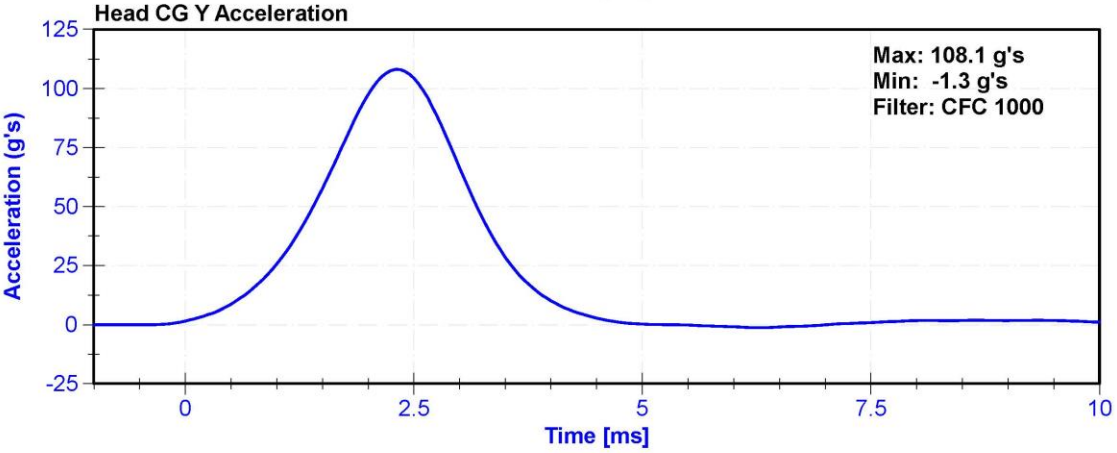
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	37.9	Pass
Resultant Acceleration	115	137	g's	128.7	Pass
Oscillation	0	15	%	1.6	Pass
Fore-Aft Acceleration	-15	15	g's	3.1	Pass

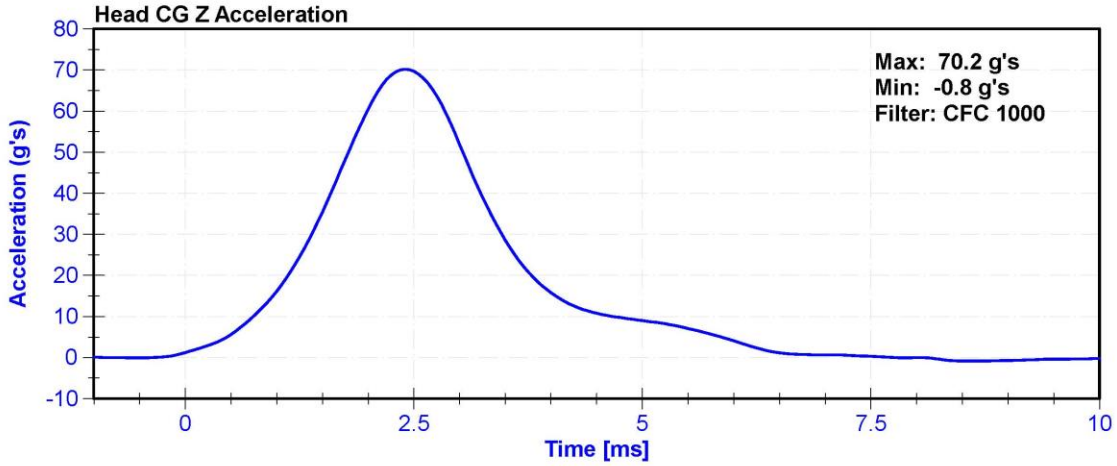
Transducer Calibrations

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




Head CG X Acceleration
Max: 3.1 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 108.1 g's
Min: -1.3 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 70.2 g's
Min: -0.8 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

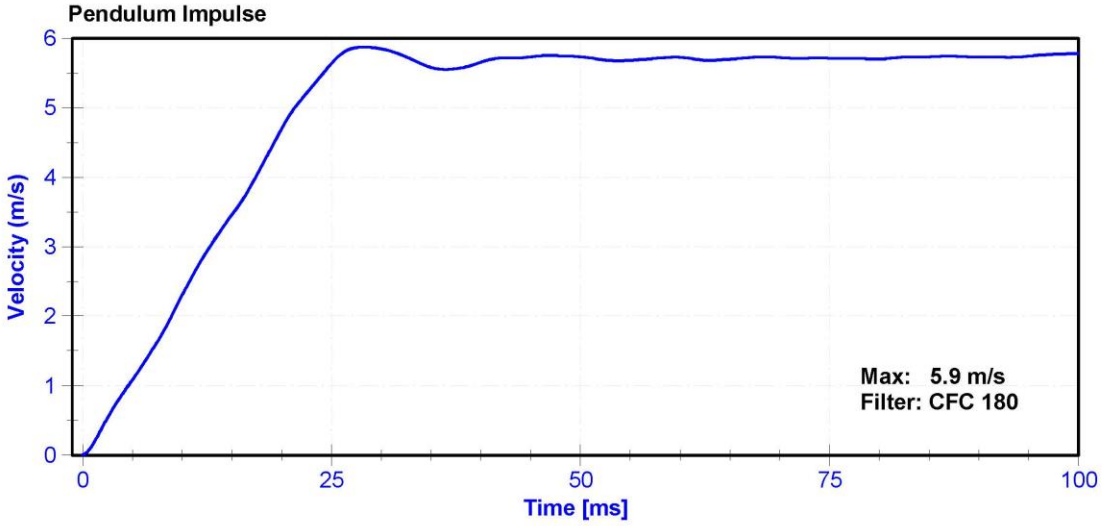
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

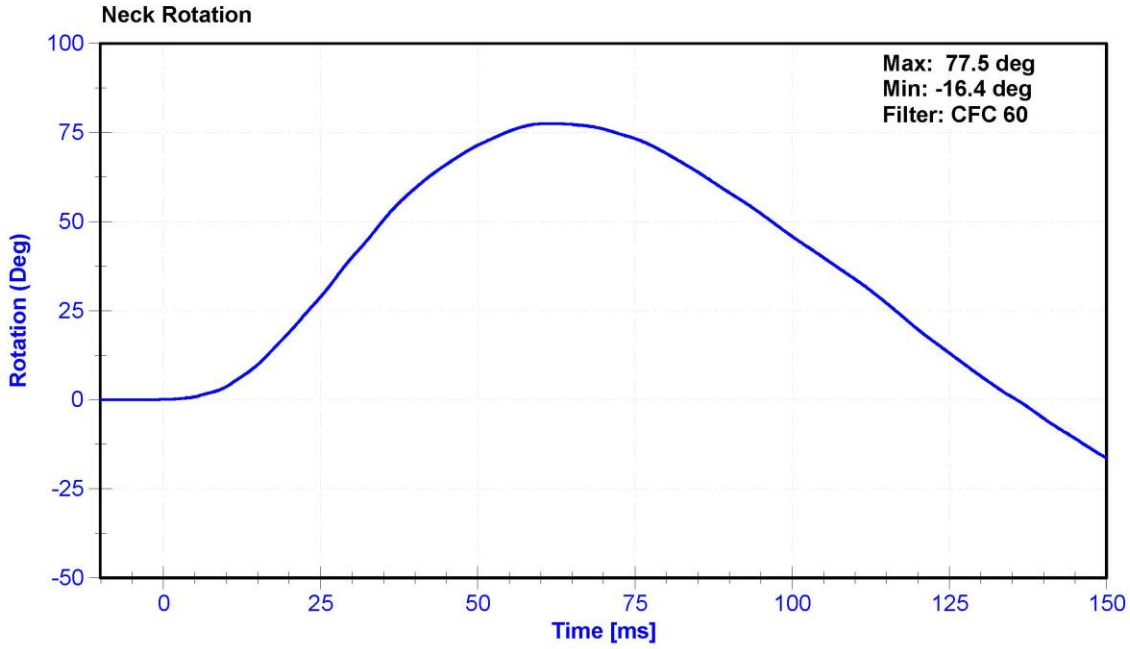
Results

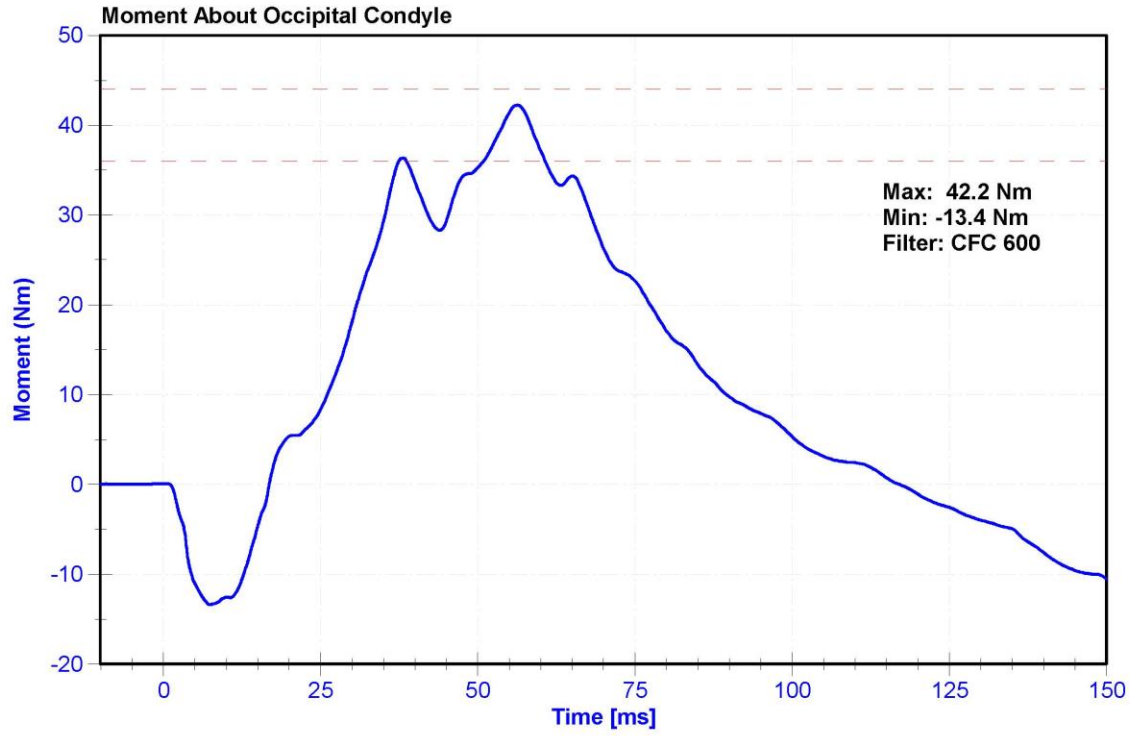
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	39.7	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.30	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.46	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.70	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	5.88	Pass
Neck Rotation	71	81	deg	77.5	Pass
Time at Maximum Rotation	50	70	ms	61.7	Pass
Moment about the OC	36	44	Nm	42.2	Pass
Moment Decay to 0 Nm	102	126	ms	117.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/1/2018	11/1/2019
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/1/2018	11/1/2019
Upper Neck Load Cell	Denton 1716	LC-2018 FY	9/28/2018	9/28/2019




Neck Rotation
Max: 77.5 deg
Min: -16.4 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.2 Nm
Min: -13.4 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

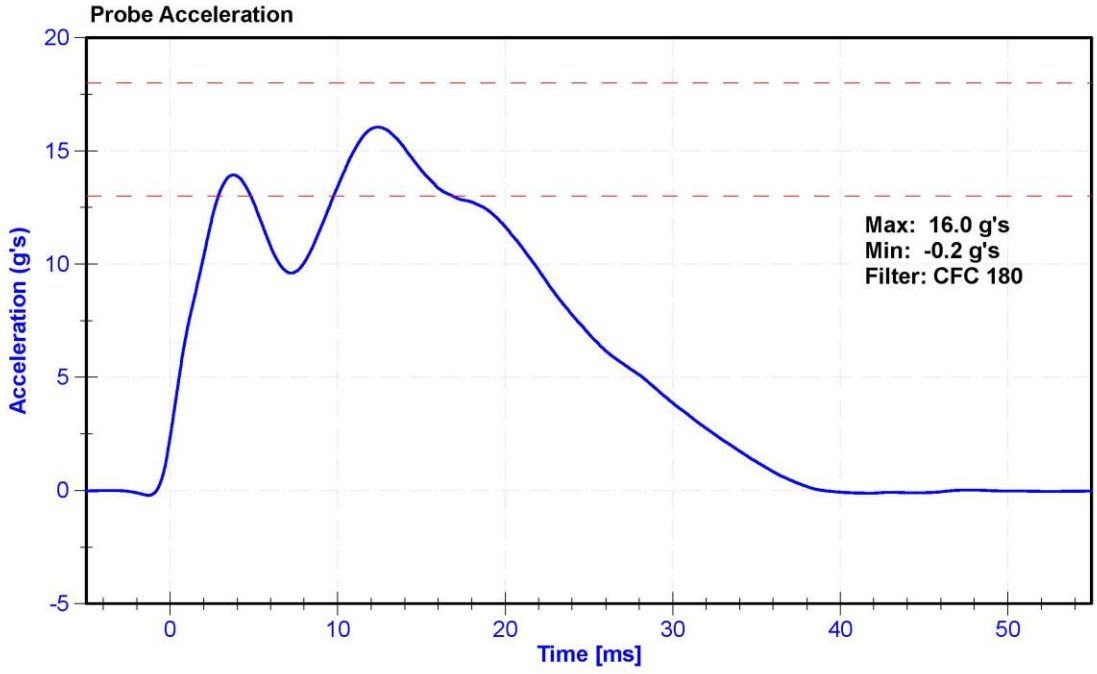
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

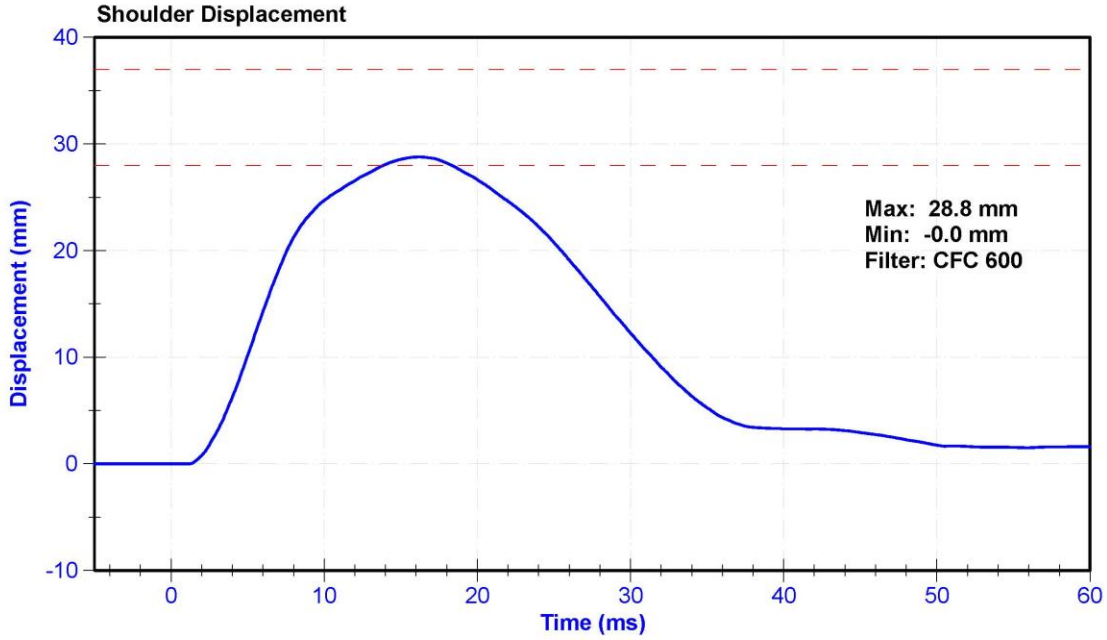
Results

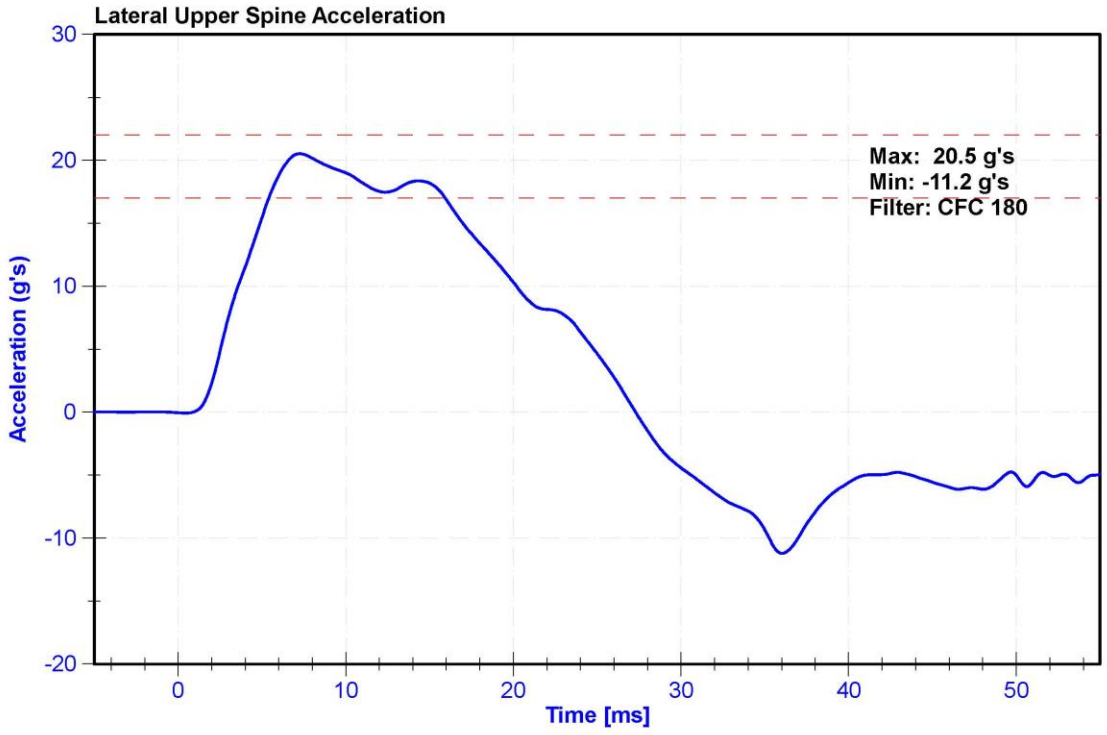
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	38.5	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	13	18	g's	16.0	Pass
Shoulder Deflection	28	37	mm	28.8	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C-2KTZ-2-360MAC7	AC-P94667	11/1/2018	11/1/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.8 mm
Min: -0.0 mm
Filter: CFC 600
40
30
20
10
0
-10
0
10
20
30
40
50
60


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.5 g's
Min: -11.2 g's
Filter: CFC 180
30
20
10
0
-10
-20
0
10
20
30
40
50

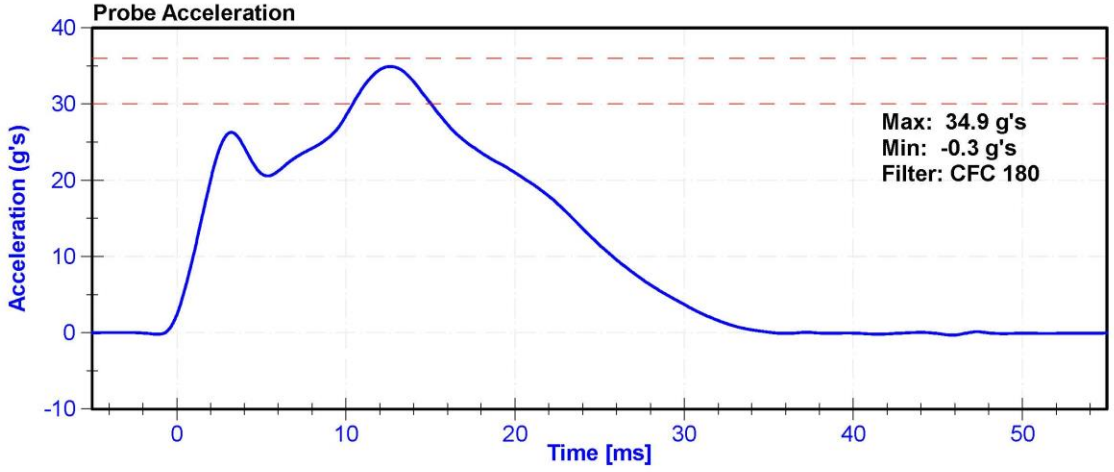
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

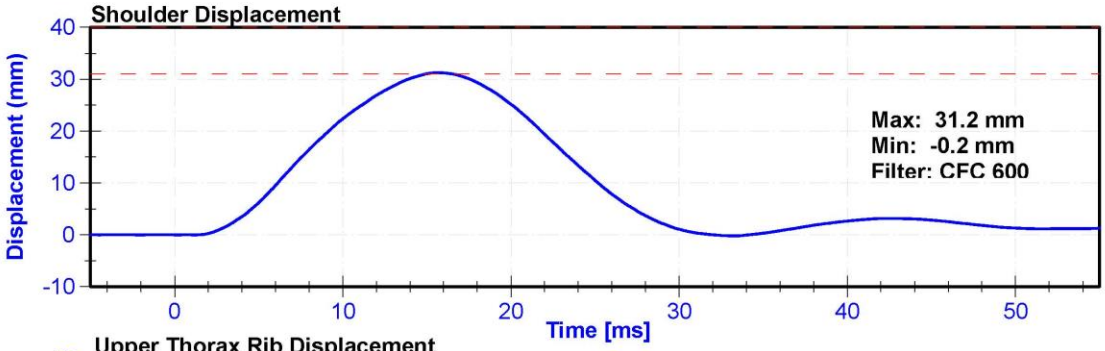
Results

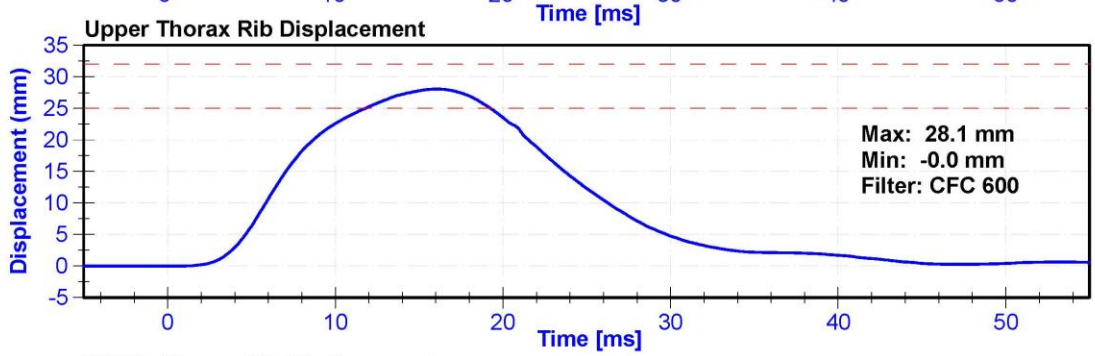
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	36.6	Pass
Velocity	6.6	6.8	m/s	6.77	Pass
Probe Acceleration after 5 ms	30	36	g's	34.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.3	Pass
Shoulder Deflection	31	40	mm	31.2	Pass
Upper Thorax Rib Deflection	25	32	mm	28.1	Pass
Mid Thorax Rib Deflection	30	36	mm	33.7	Pass
Lower Thorax Rib Deflection	32	38	mm	36.2	Pass

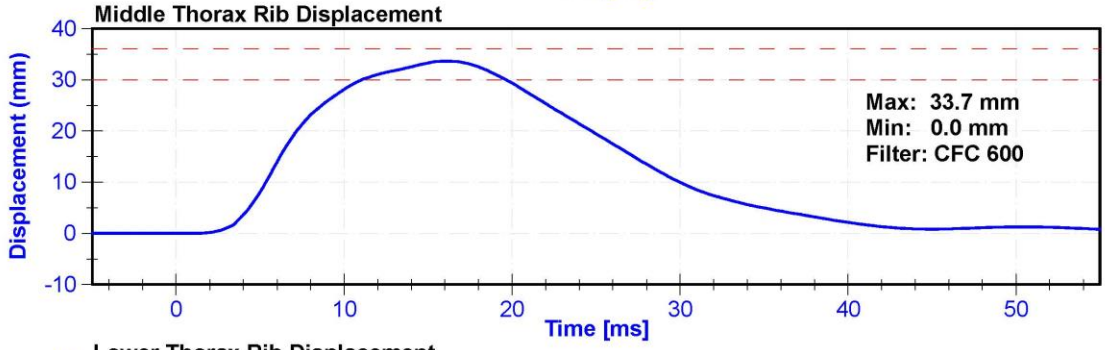
Transducer Calibrations

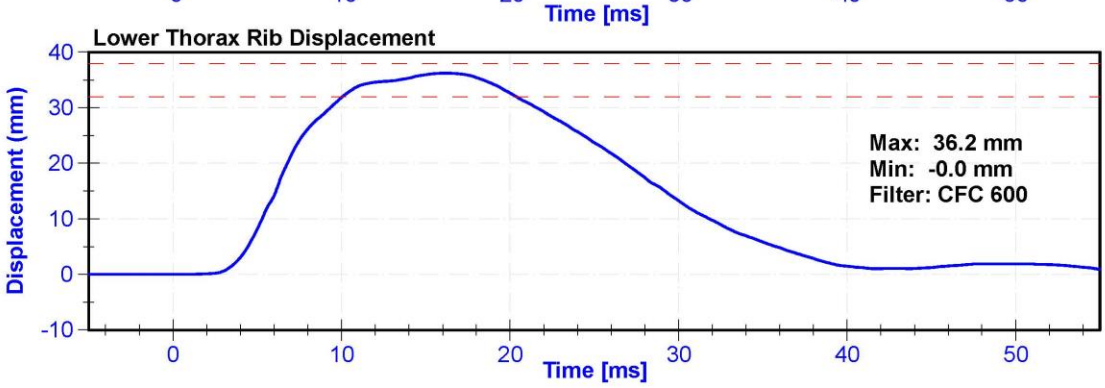
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Upper Spine T12 Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Shoulder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

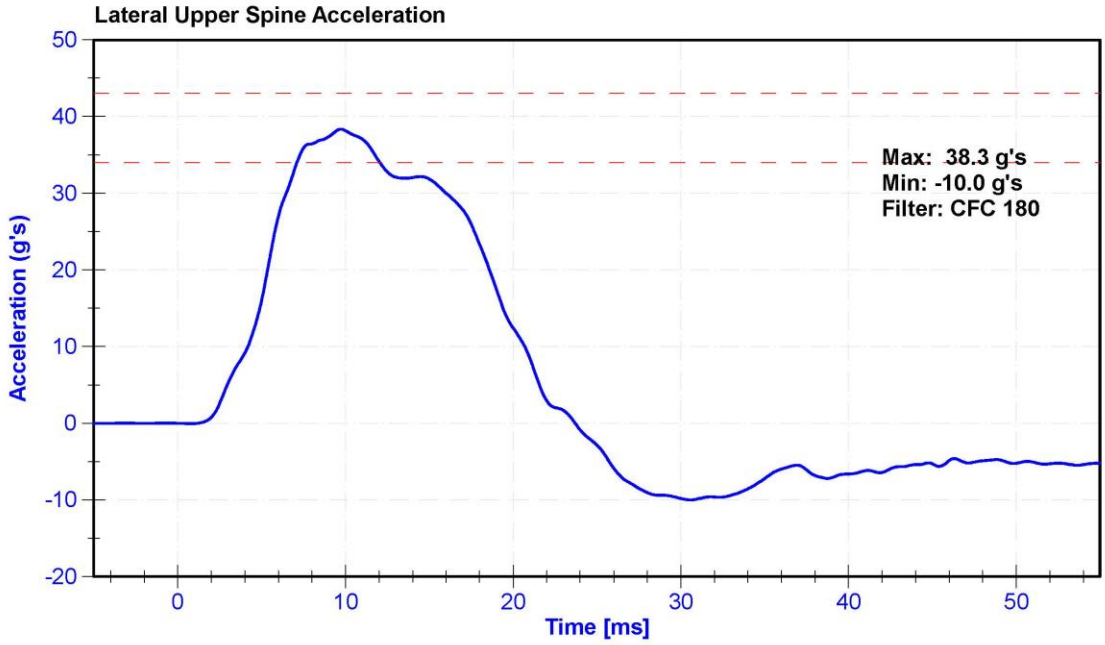


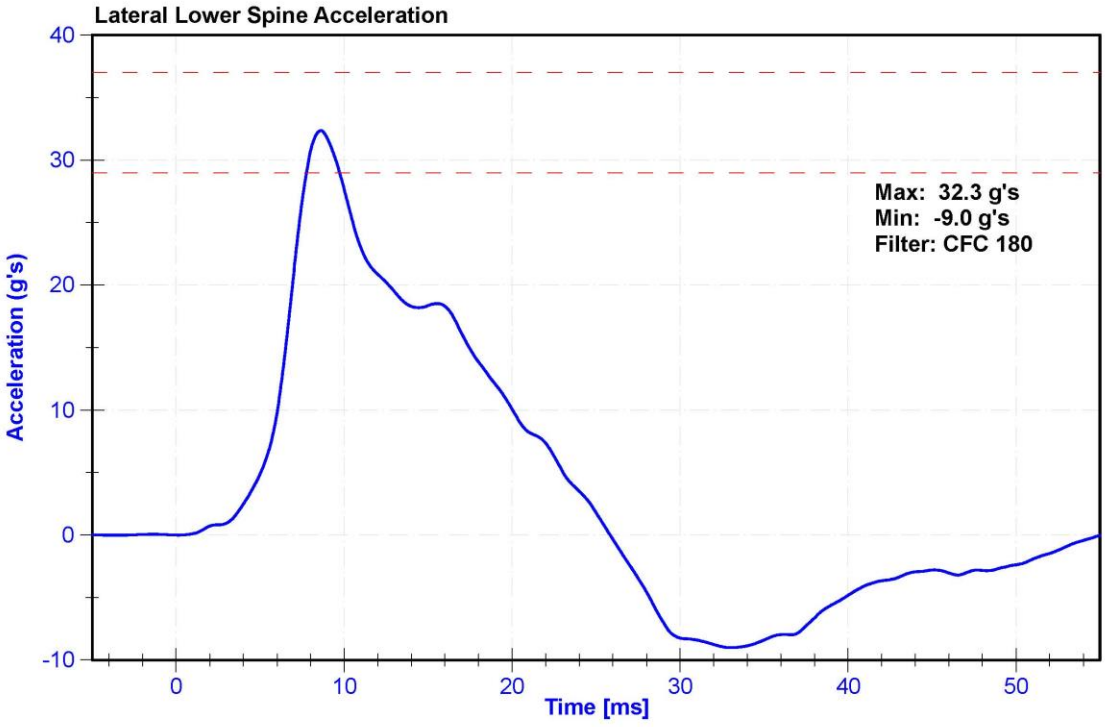

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.2 mm
Min: -0.2 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 28.1 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.7 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 38.3 g's
Min: -10.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 32.3 g's
Min: -9.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

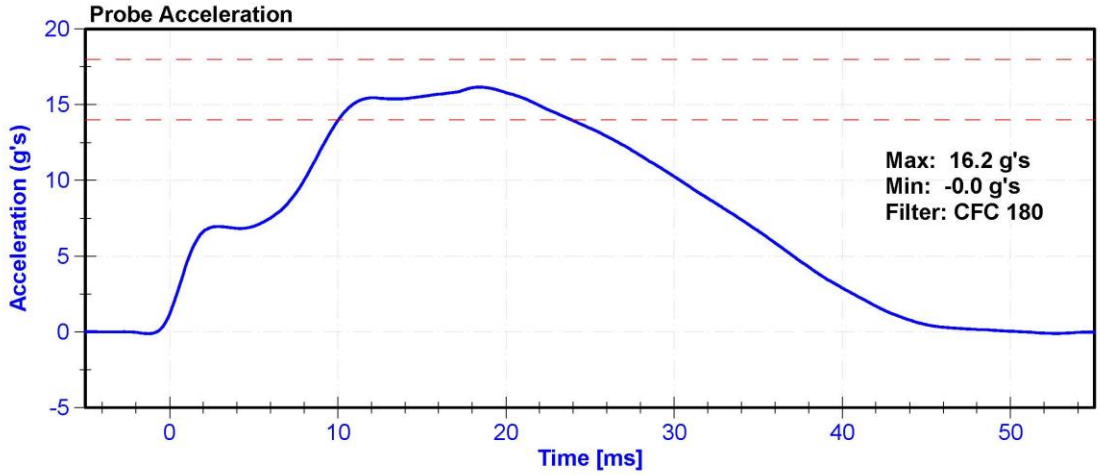
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

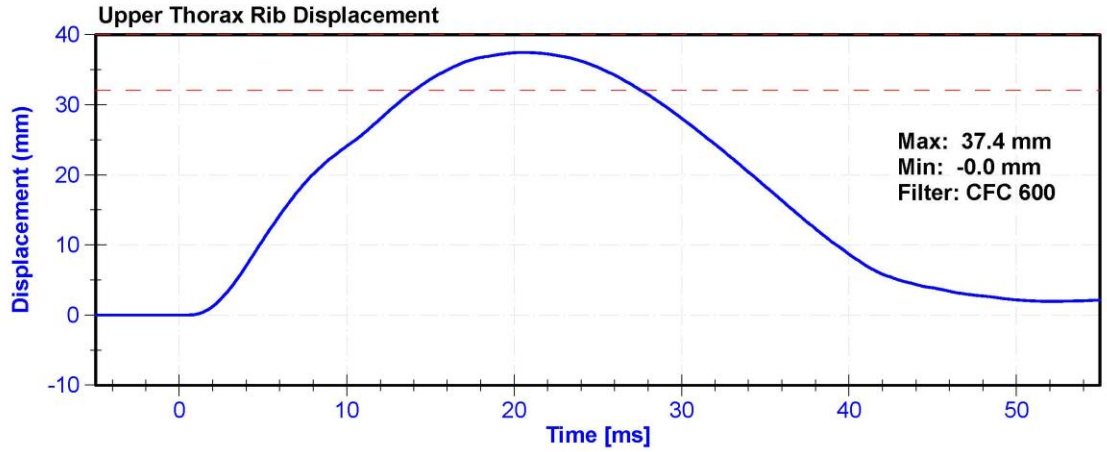
Results

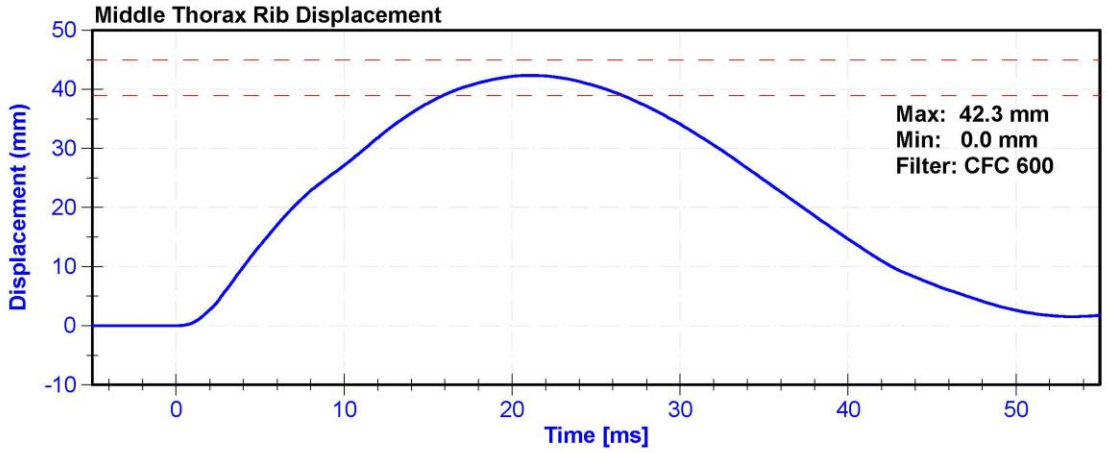
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	36.5	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.8	Pass
Upper Thorax Rib Deflection	32	40	mm	37.4	Pass
Middle Thorax Rib Deflection	39	45	mm	42.3	Pass
Lower Thorax Rib Deflection	35	43	mm	38.8	Pass

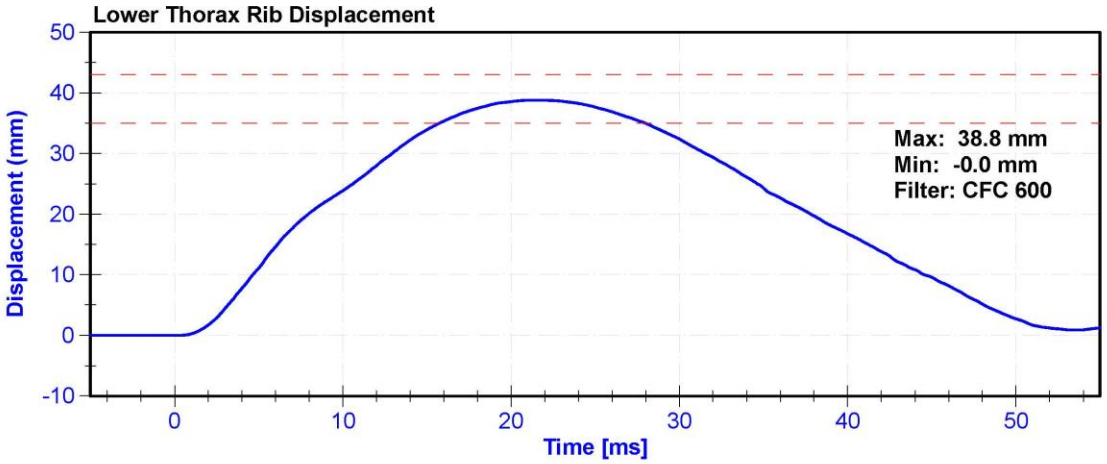
Transducer Calibrations

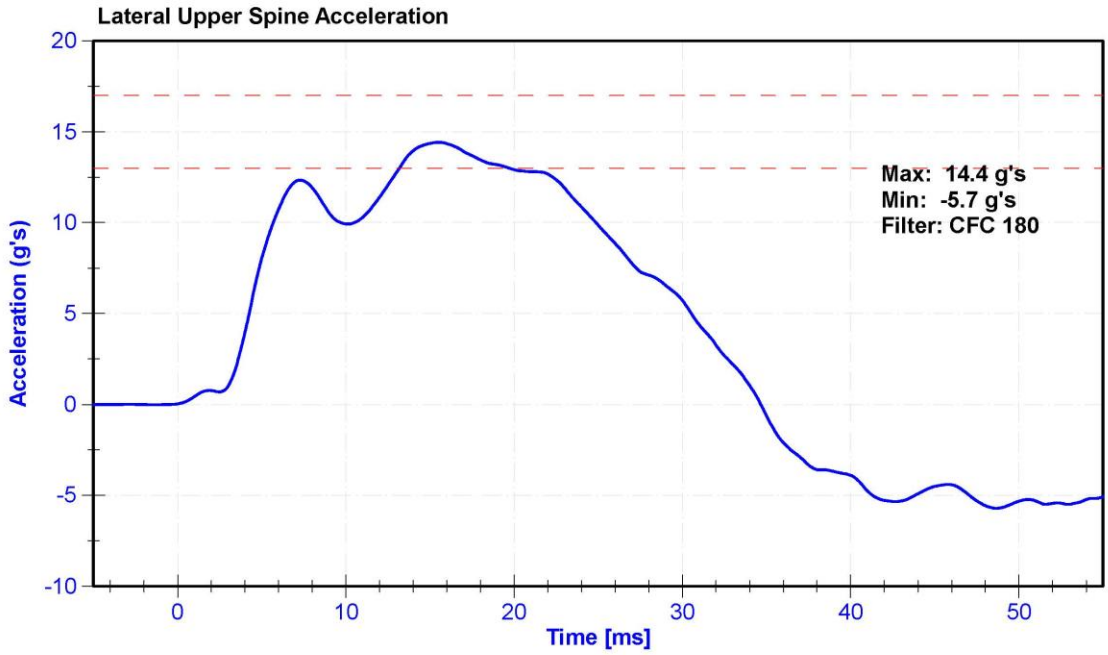
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Thorax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

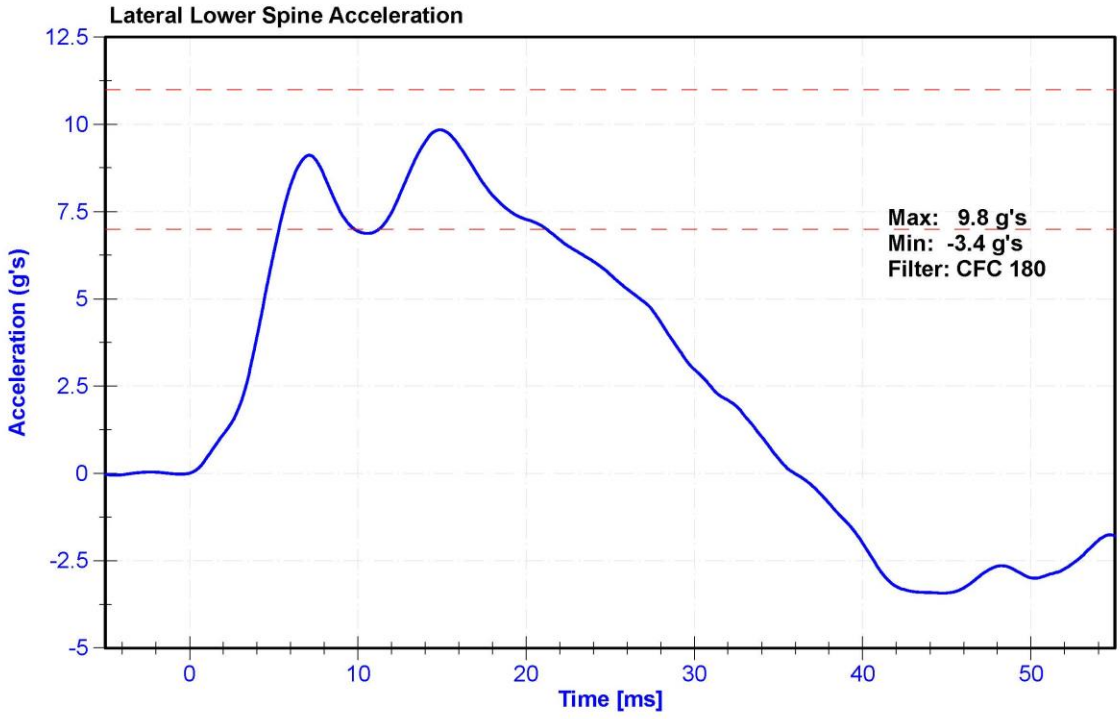



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.4 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.3 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.8 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 14.4 g's
Min: -5.7 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 9.8 g's
Min: -3.4 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

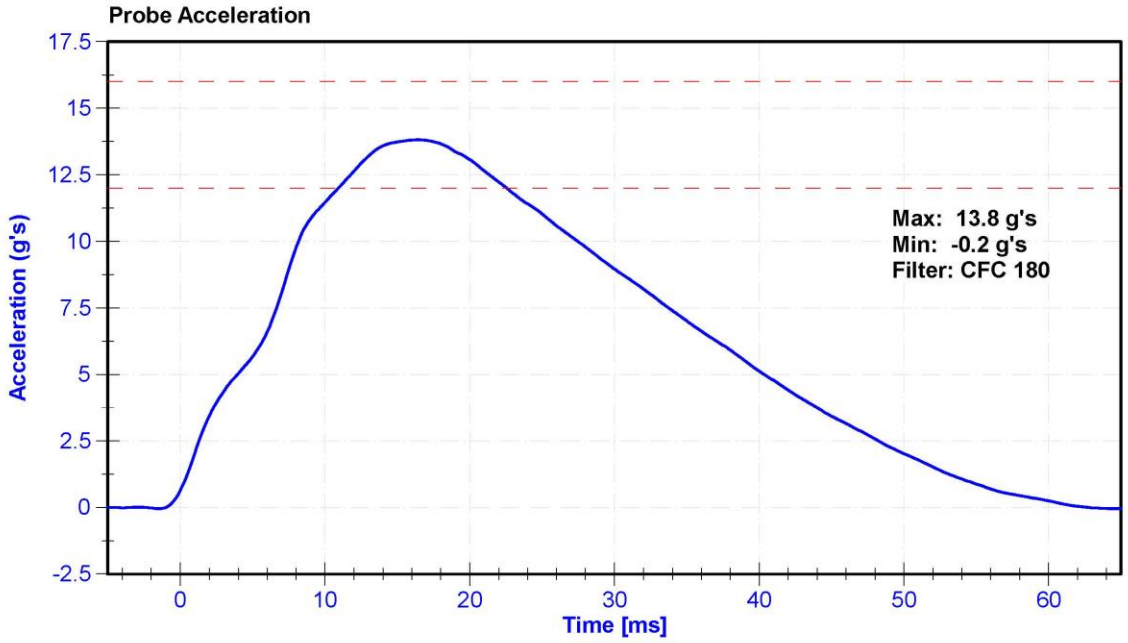
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

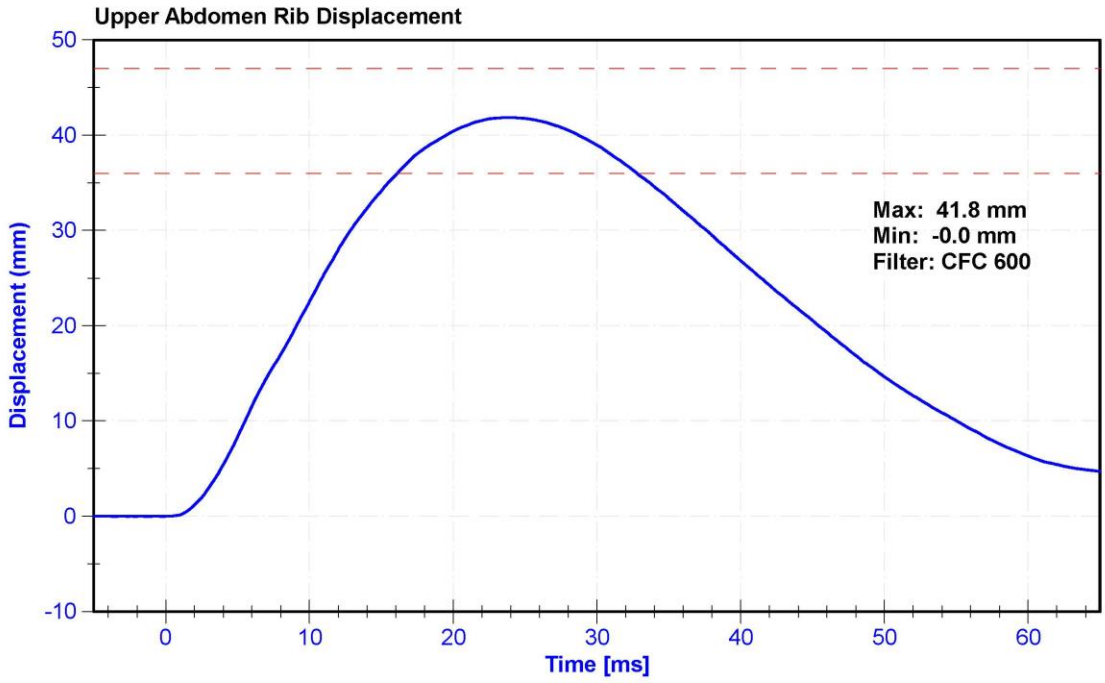
Results

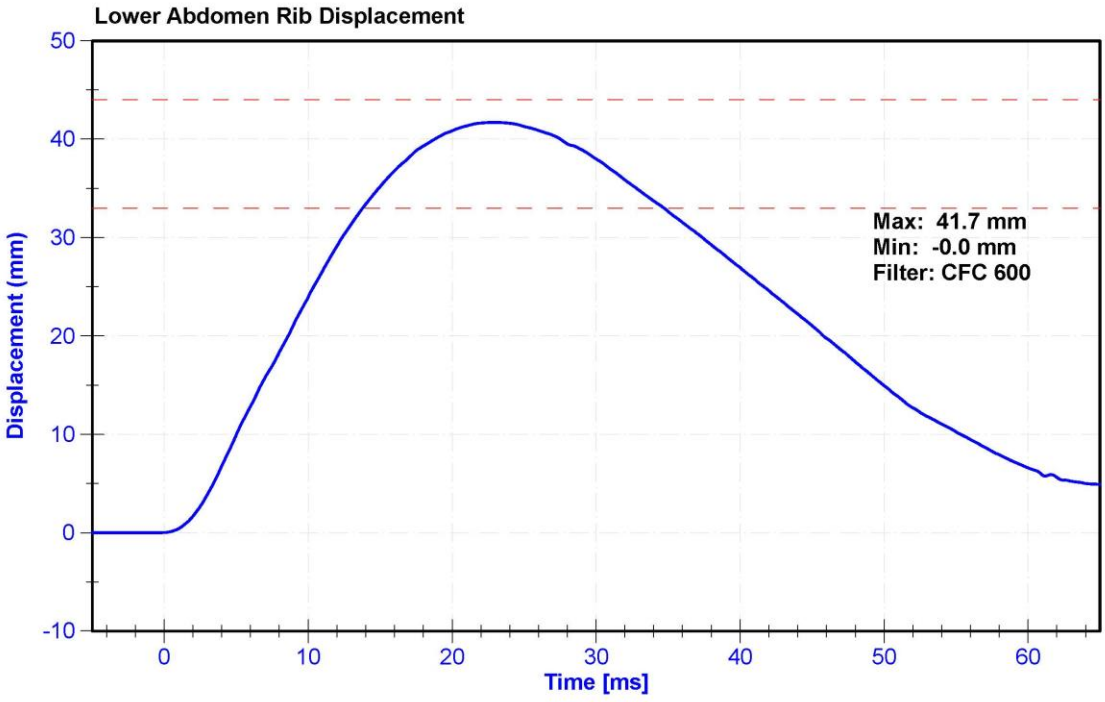
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	34.8	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.8	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.7	Pass

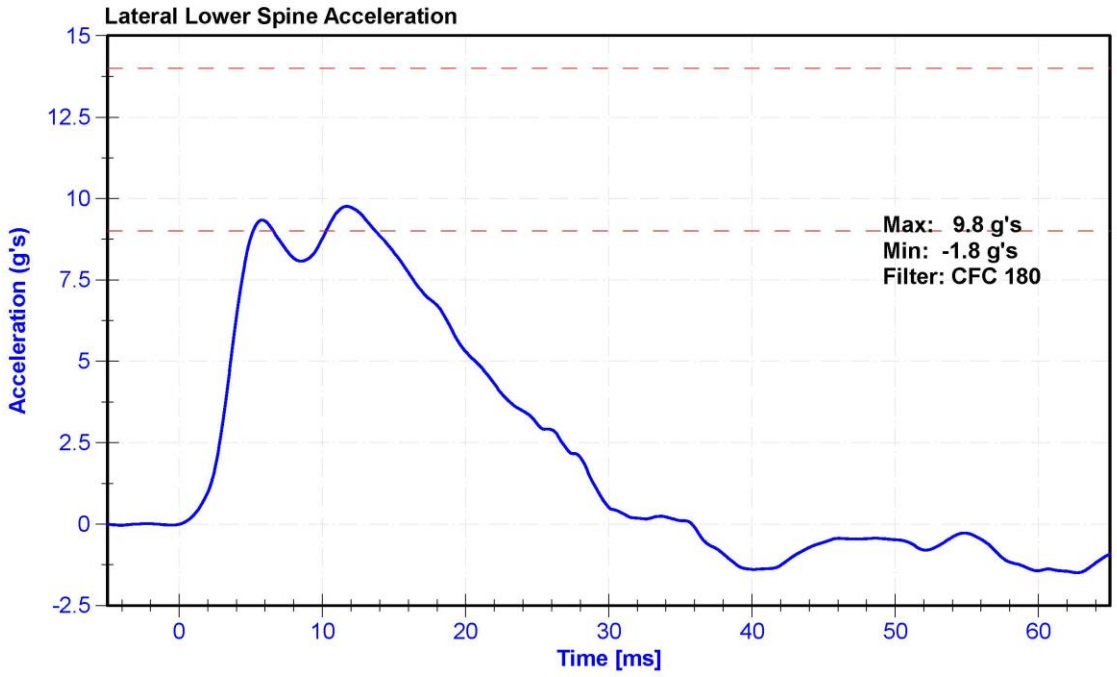
Transducer Calibrations

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




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.8 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.7 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 9.8 g's
Min: -1.8 g's
Filter: CFC 180

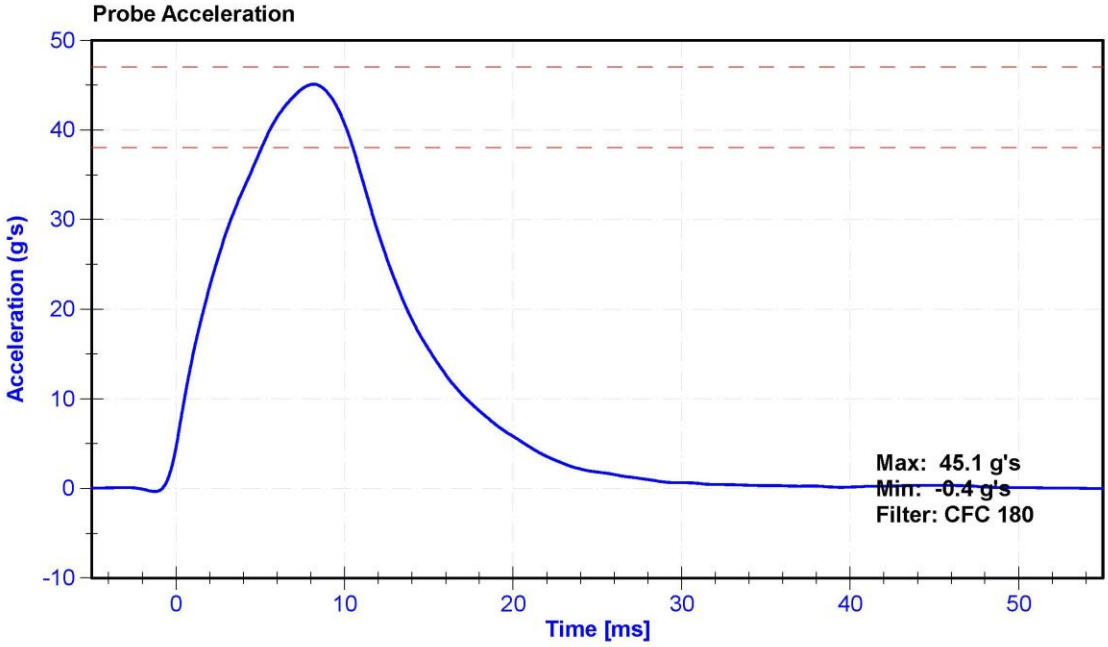
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

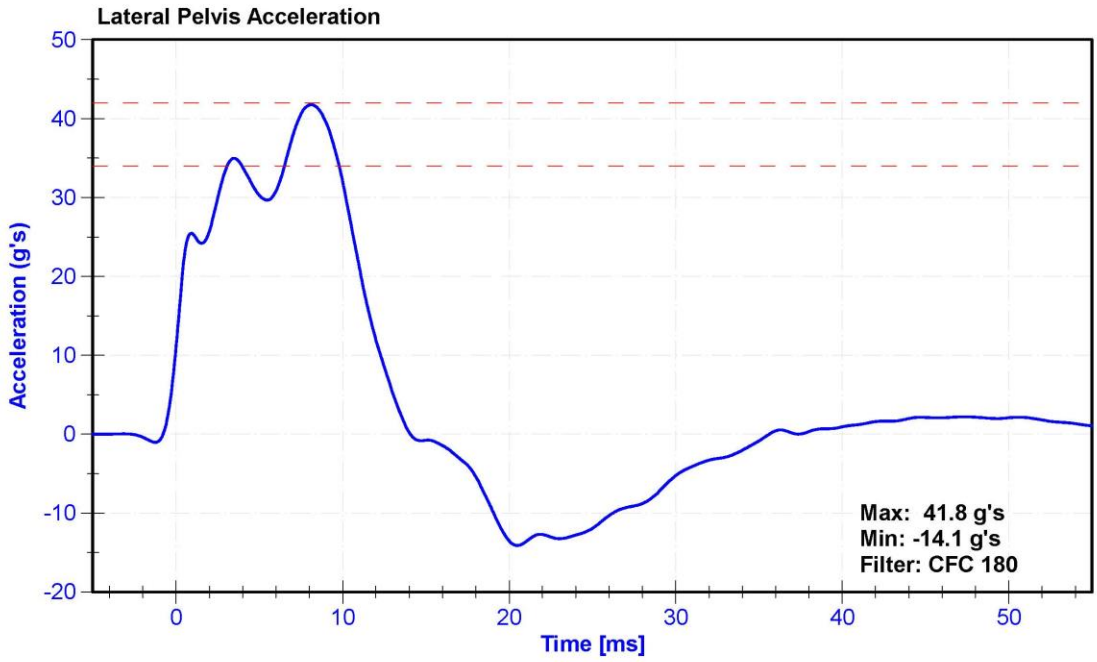
Results

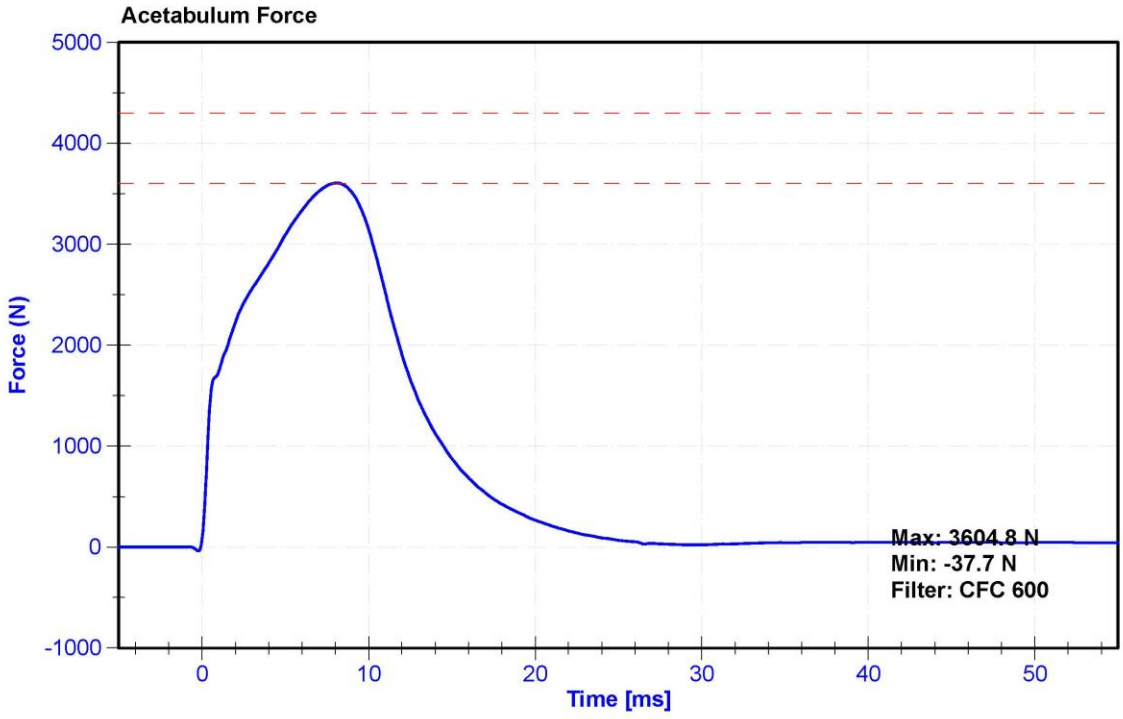
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22	Pass
Humidity	10	70	%	28.1	Pass
Velocity	6.6	6.8	m/s	6.64	Pass
Probe Acceleration	38	47	g's	45.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.8	Pass
Acetabulum Force	3600	4300	N	3604.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco 7264C	AC-P94667	11/1/2018	11/1/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/4/2018	6/4/2019
Certification Plug	Humanetics	11950	2/1/2018	N/A
Crash Test Plug	Humanetics	11418	8/29/2016	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 41.8 g's
Min: -14.1 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3604.8 N
Min: -37.7 N
Filter: CFC 600

DG8012 Crash 2/5/19

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 11418
Test Number 2887
Report Number 2884
Test Date 8/29/2016 11:08:05 AM

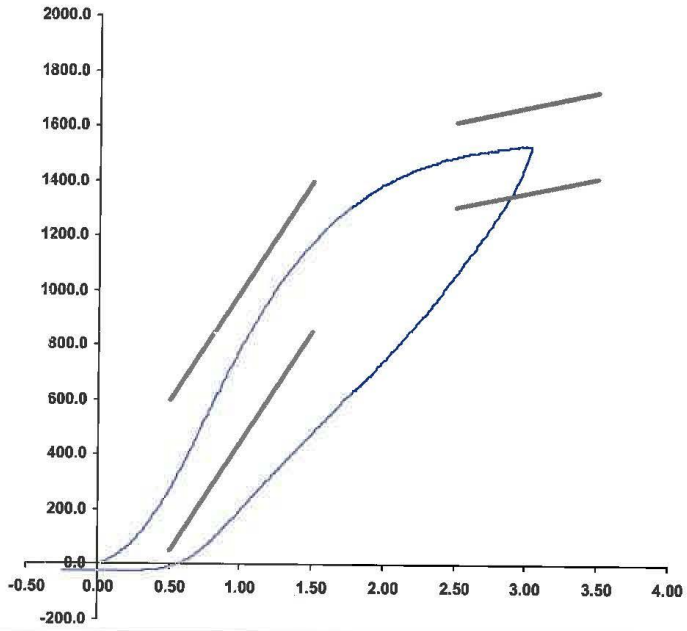
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	272.90	50.00	600.00
Force @ 1.5 mm (N)	1,177.71	850.00	1,400.00
Force @ 2.5 mm (N)	1,490.72	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,532.12	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (TI240813), 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 DC

Part Number 180-4450

Template No 107 29-Aug-16
SACO Research

By : DC Date : 8/29/16

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

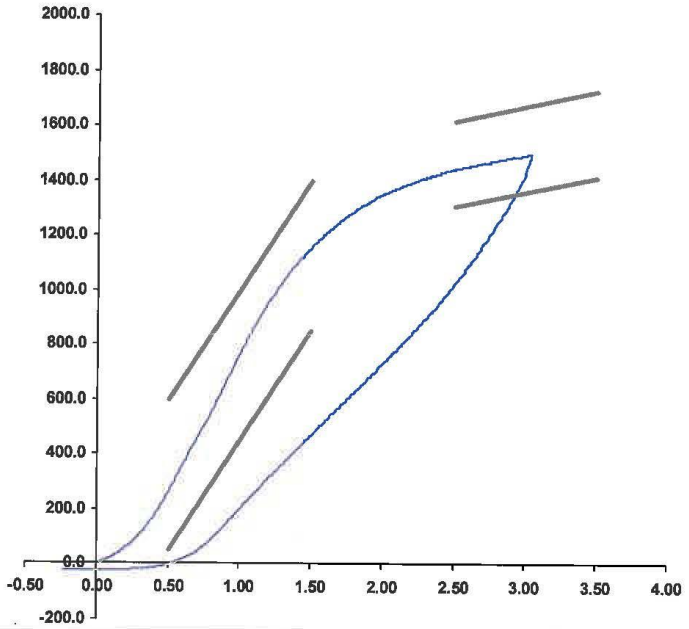
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 11950
Test Number 6138
Report Number 6155
Test Date 2/1/2018 10:03:38 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	257.91	50.00	600.00
Force @ 1.5 mm (N)	1,163.41	850.00	1,400.00
Force @ 2.5 mm (N)	1,444.14	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,496.02	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 01-Feb-18
SACO Research

By : JC Date : 2/1/18

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

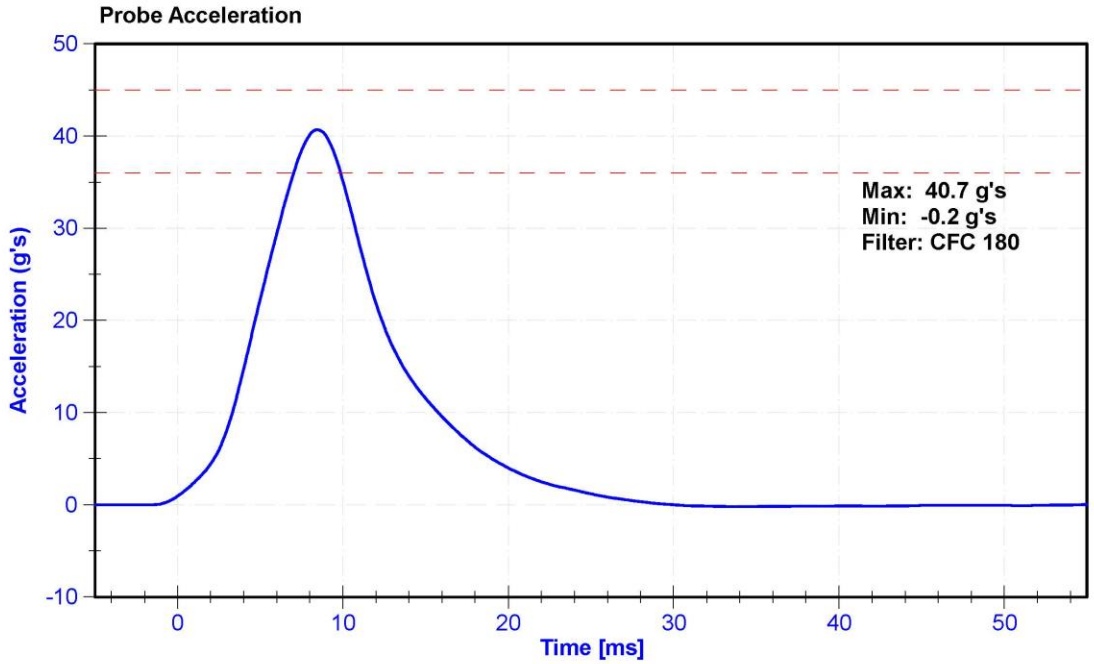
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K.Brogan

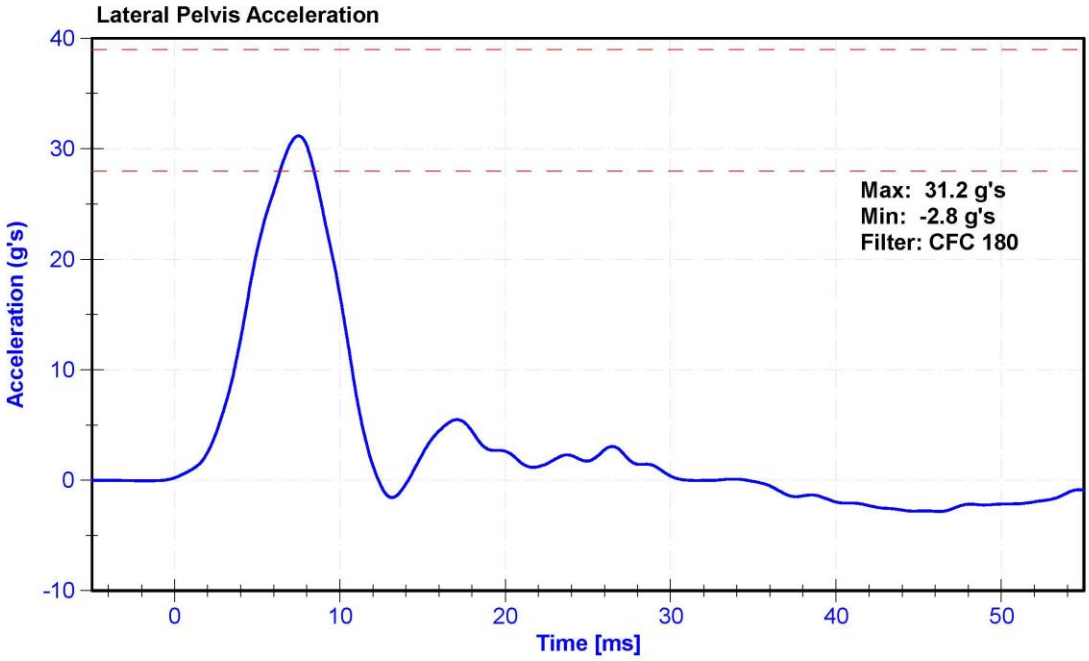
Results

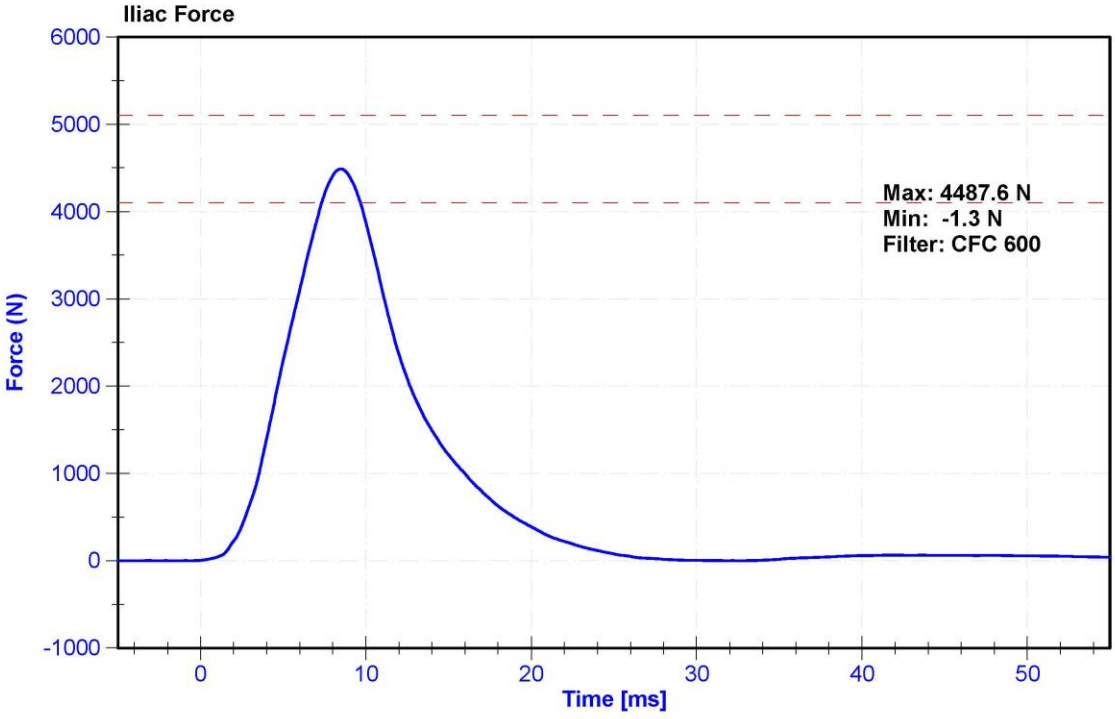
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	28.6	Pass
Velocity	4.2	4.4	m/s	4.38	Pass
Probe Acceleration	36	45	g's	40.7	Pass
Lateral Pelvis Acceleration	28	39	g's	31.2	Pass
Iliac Force	4100	5100	N	4487.6	Pass

Transducer Calibrations

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




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 31.2 g's
Min: -2.8 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4487.6 N
Min: -1.3 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

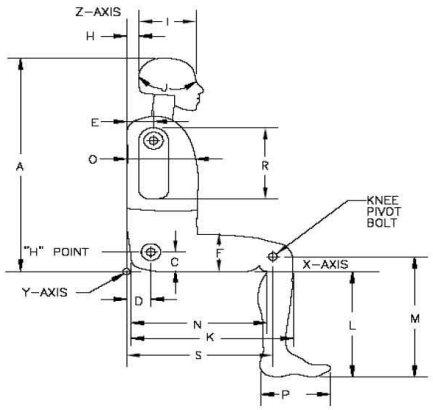
SERIAL NO: DG8012

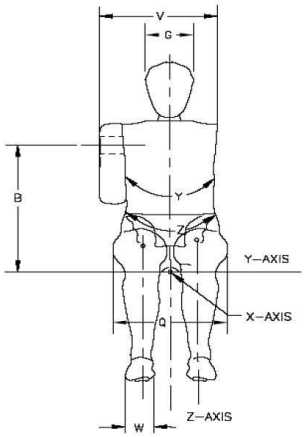
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Dutton Date: 02/20/2019

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	449	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	207	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	344	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	781	Pass

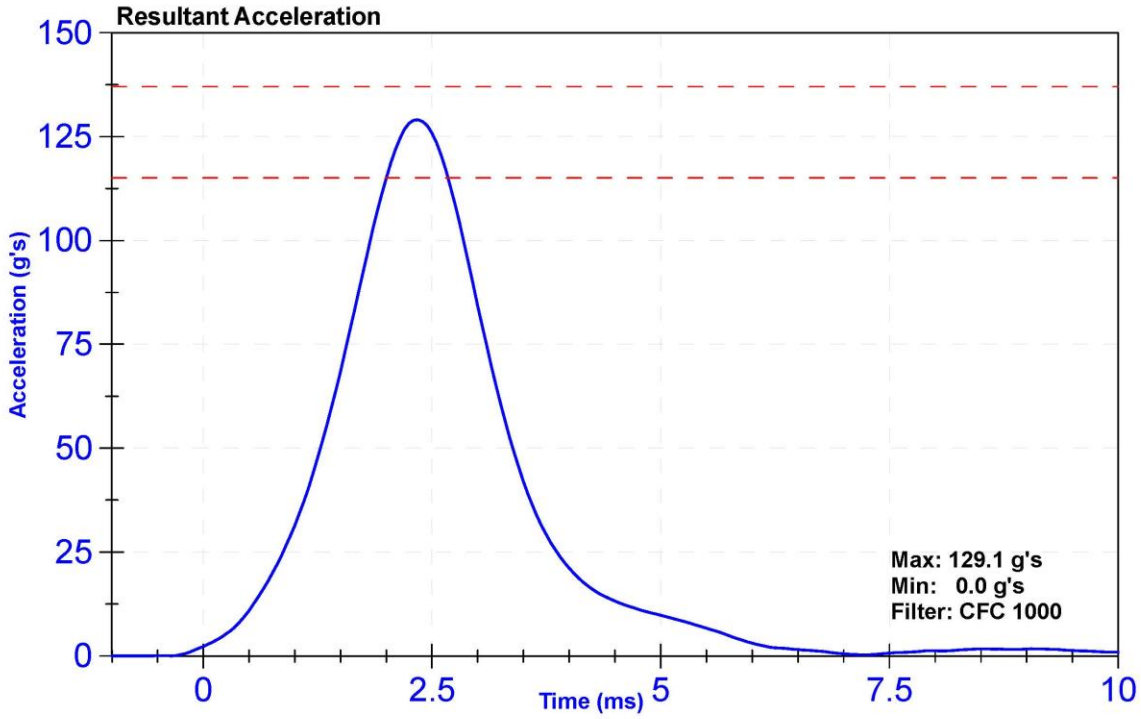
ATD Manufacturer	FTSS	Test Technician	K. Dutton
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

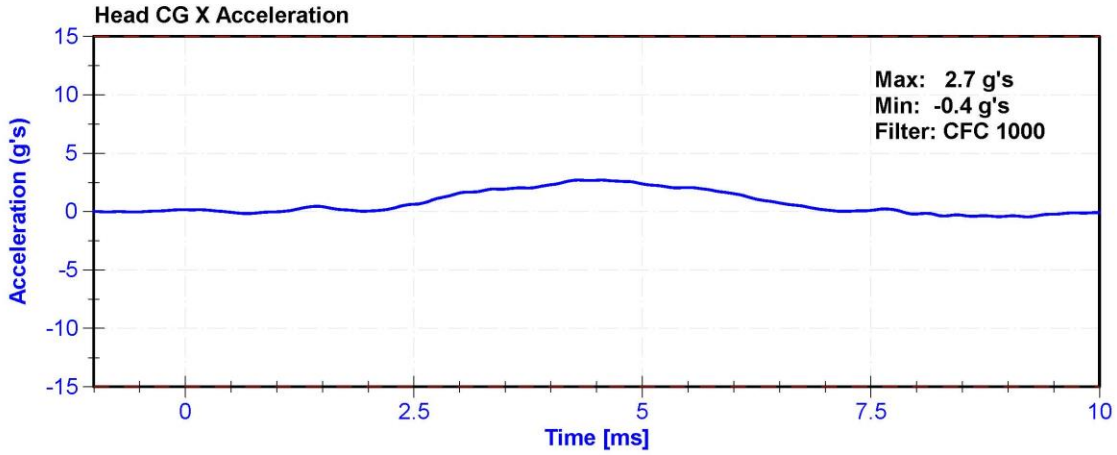
Results

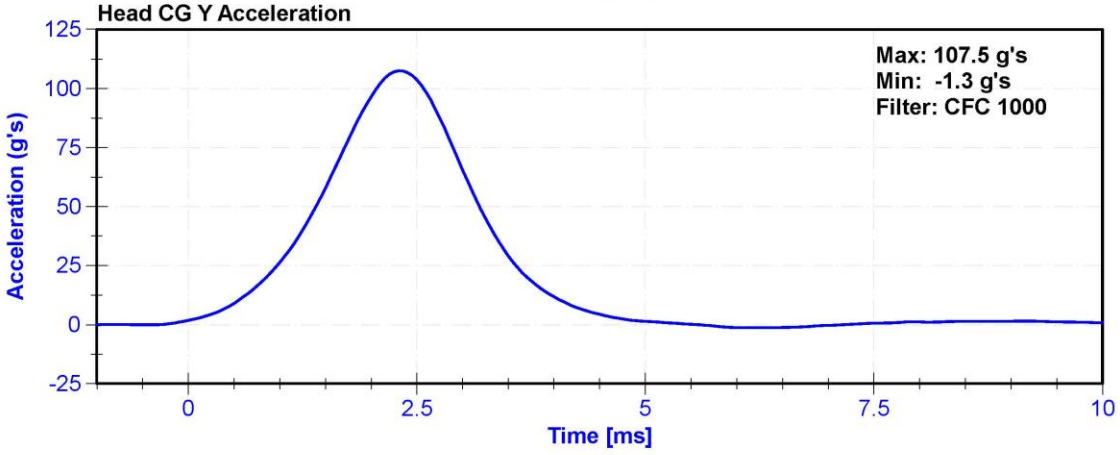
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	19	Pass
Resultant Acceleration	115	137	g's	129.1	Pass
Oscillation	0	15	%	1.3	Pass
Fore-Aft Acceleration	-15	15	g's	2.7	Pass

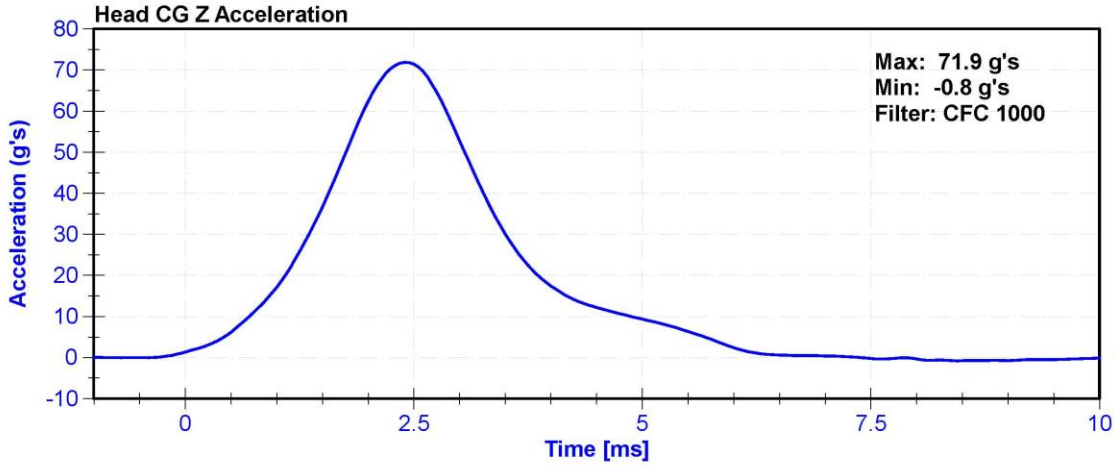
Transducer Calibrations

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




Head CG X Acceleration
Max: 2.7 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 107.5 g's
Min: -1.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 71.9 g's
Min: -0.8 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

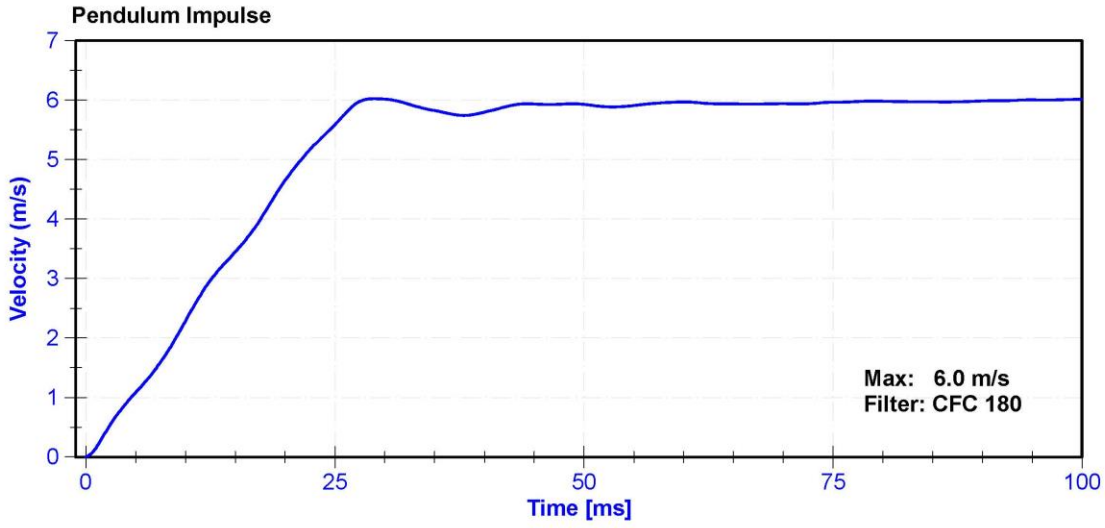
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

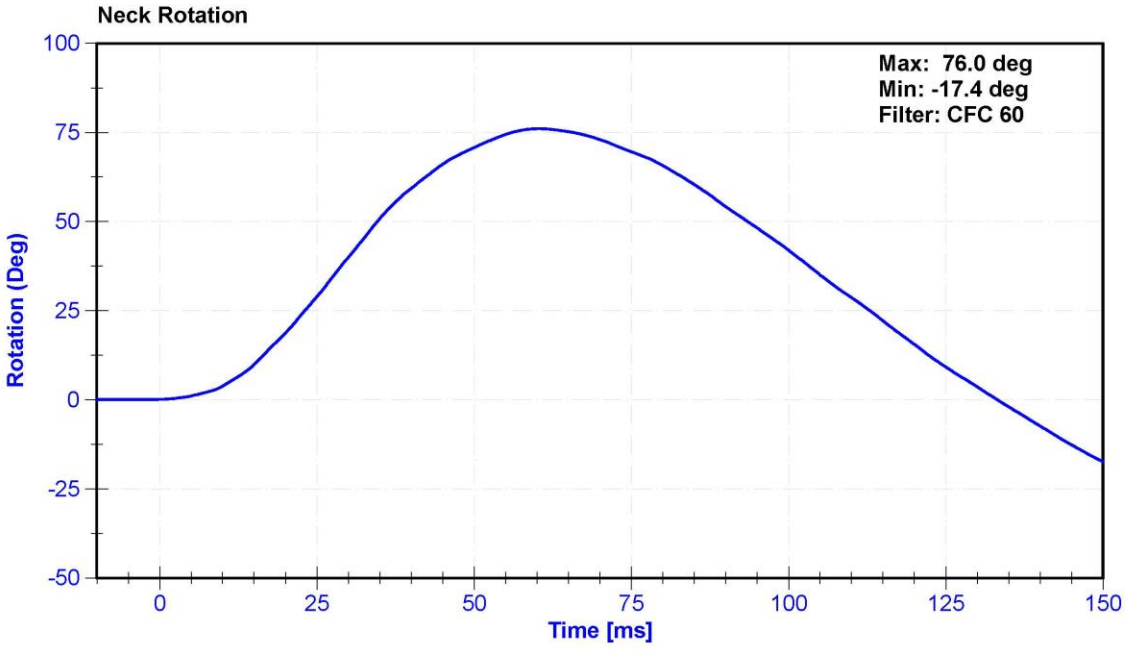
Results

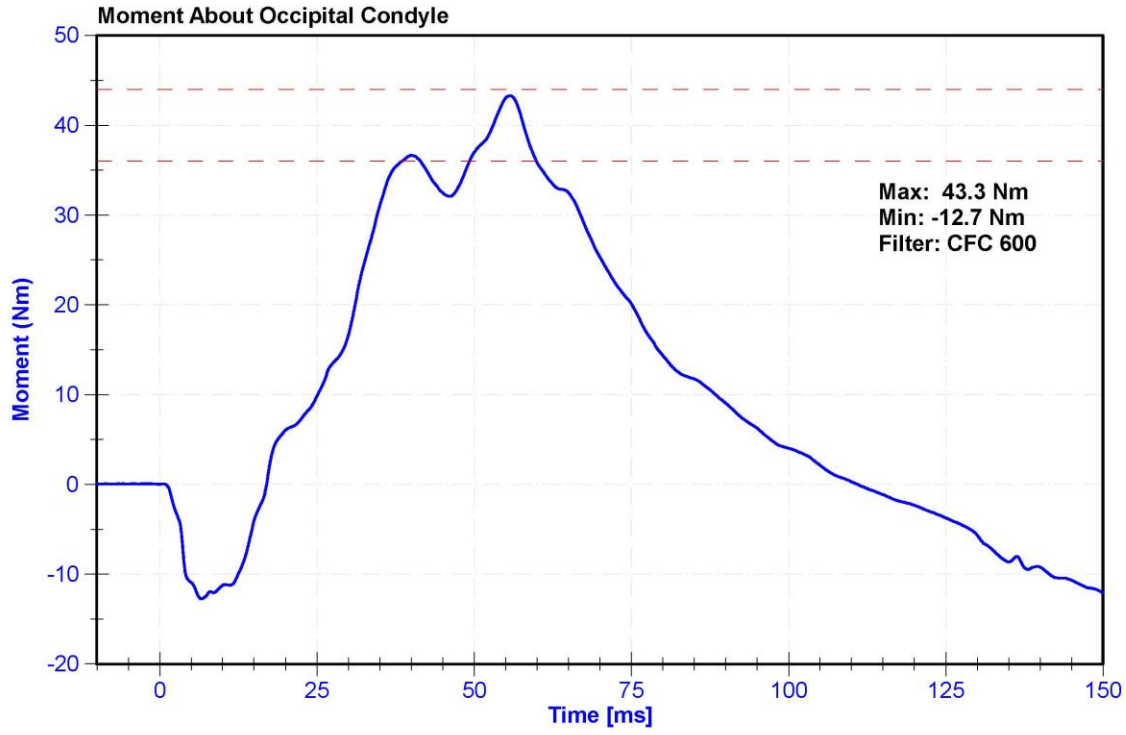
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	17.5	Pass
Velocity	5.51	5.63	m/s	5.514	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.29	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.45	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.65	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.58	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.02	Pass
Neck Rotation	71	81	deg	76.0	Pass
Time at Maximum Rotation	50	70	ms	60.3	Pass
Moment about the OC	36	44	Nm	43.3	Pass
Moment Decay to 0 Nm	102	126	ms	111.0	Pass

Transducer Calibrations

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




Neck Rotation
Max: 76.0 deg
Min: -17.4 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 43.3 Nm
Min: -12.7 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

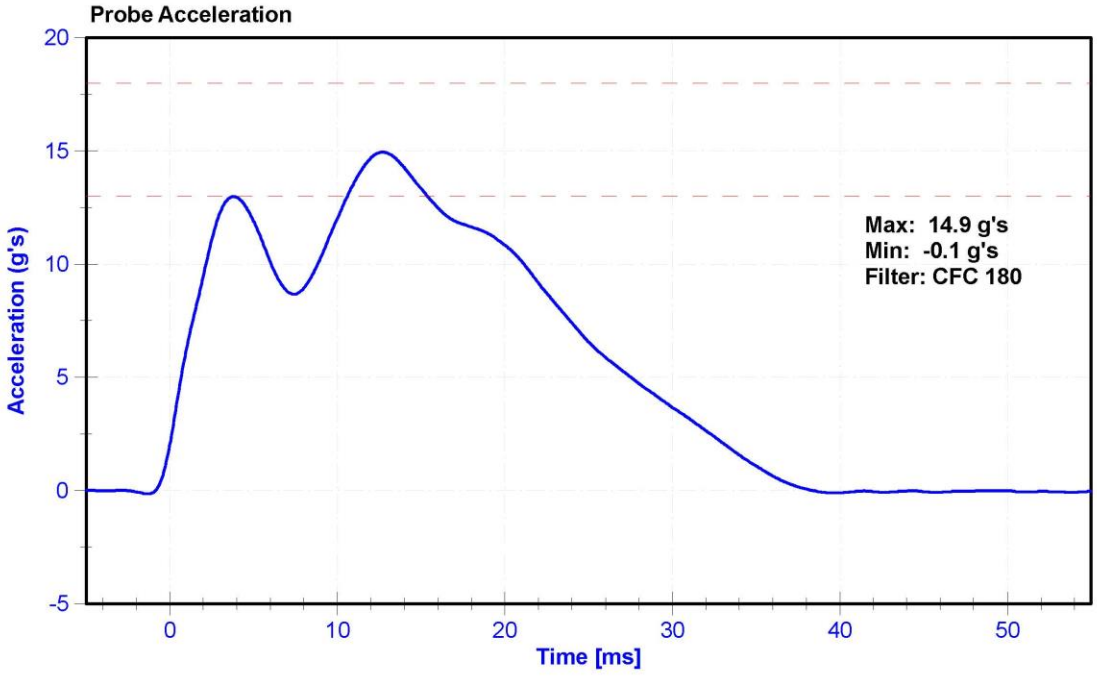
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

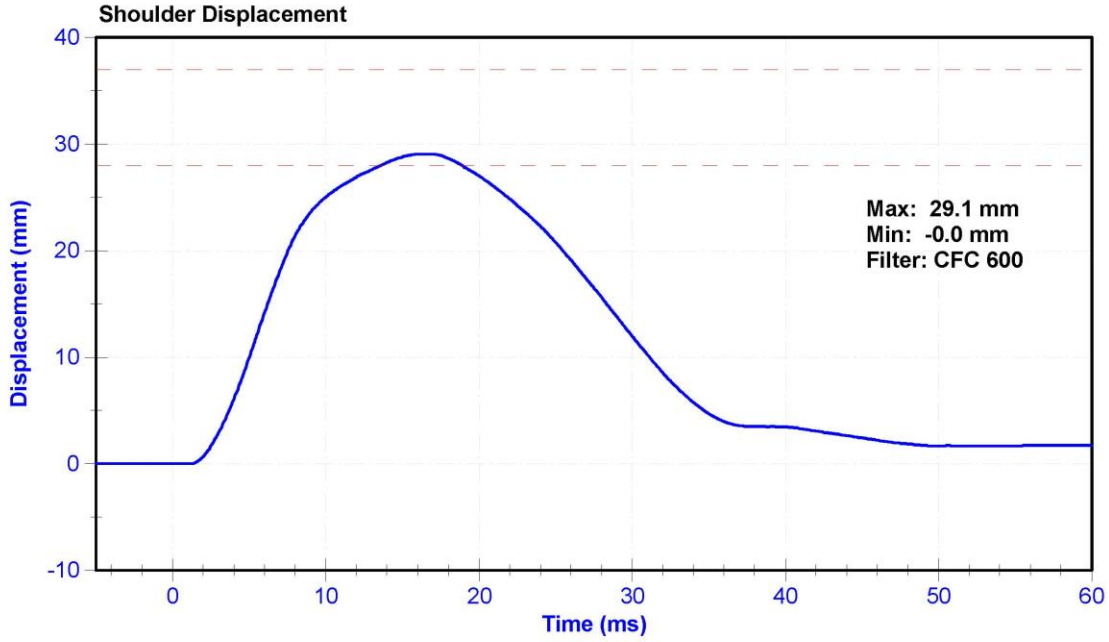
Results

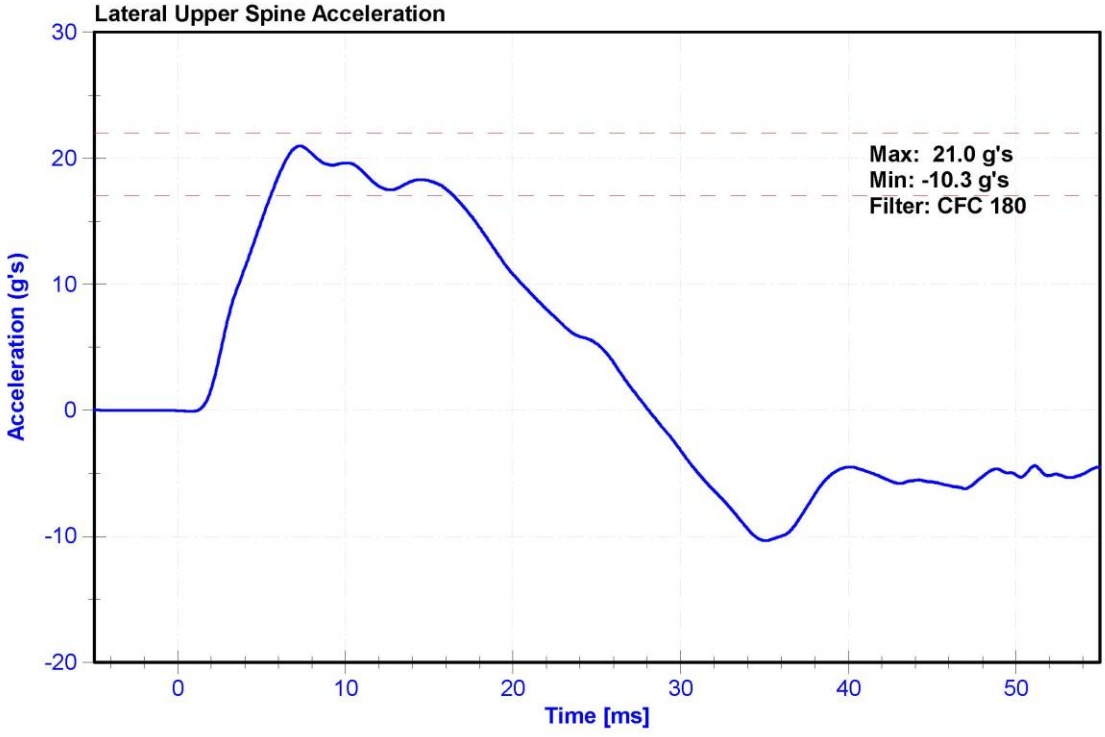
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22	Pass
Humidity	10	70	%	23	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	13	18	g's	14.9	Pass
Shoulder Deflection	28	37	mm	29.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	21.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.1 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 21.0 g's
Min: -10.3 g's
Filter: CFC 180

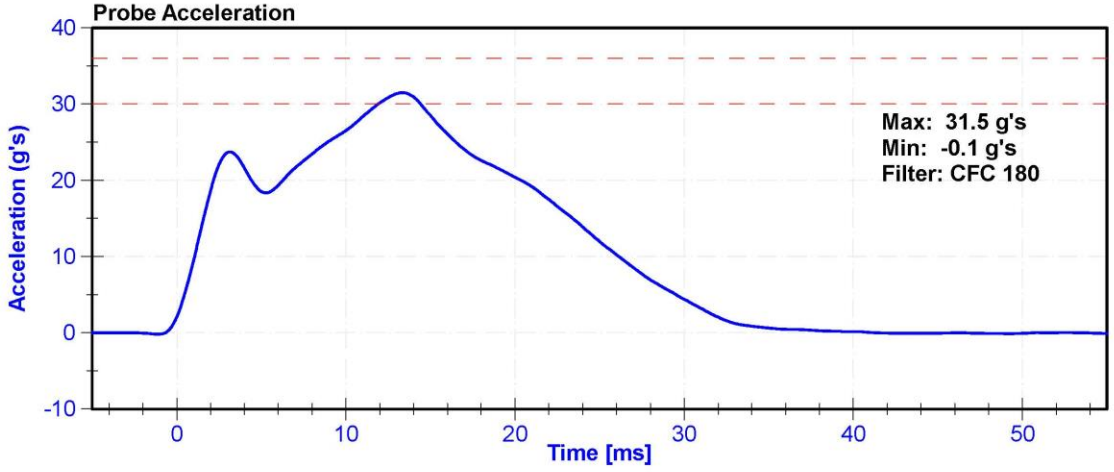
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

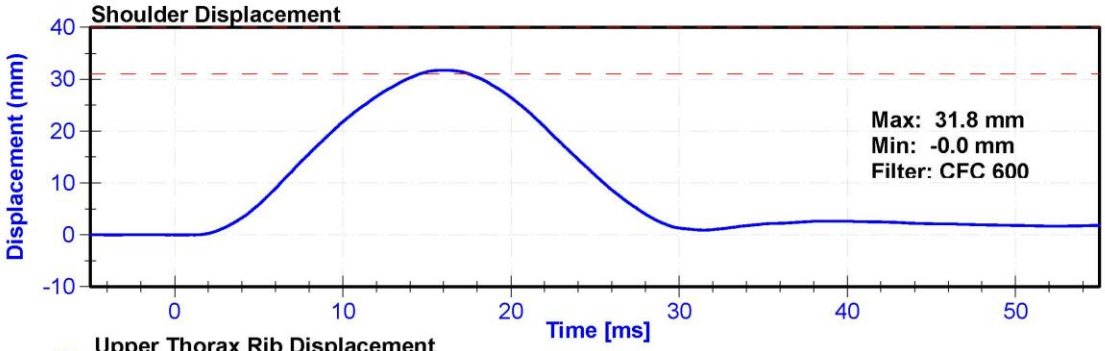
Results

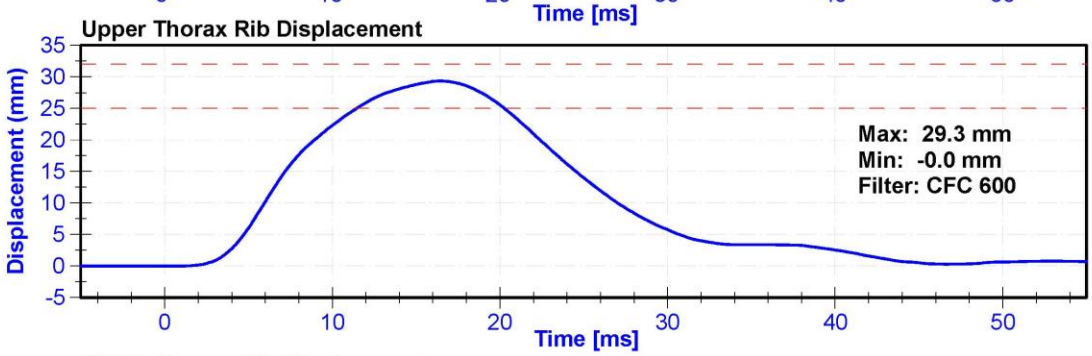
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	36.6	Pass
Velocity	6.6	6.8	m/s	6.76	Pass
Probe Acceleration after 5 ms	30	36	g's	31.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.2	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.5	Pass
Shoulder Deflection	31	40	mm	31.8	Pass
Upper Thorax Rib Deflection	25	32	mm	29.3	Pass
Mid Thorax Rib Deflection	30	36	mm	34.9	Pass
Lower Thorax Rib Deflection	32	38	mm	37.3	Pass

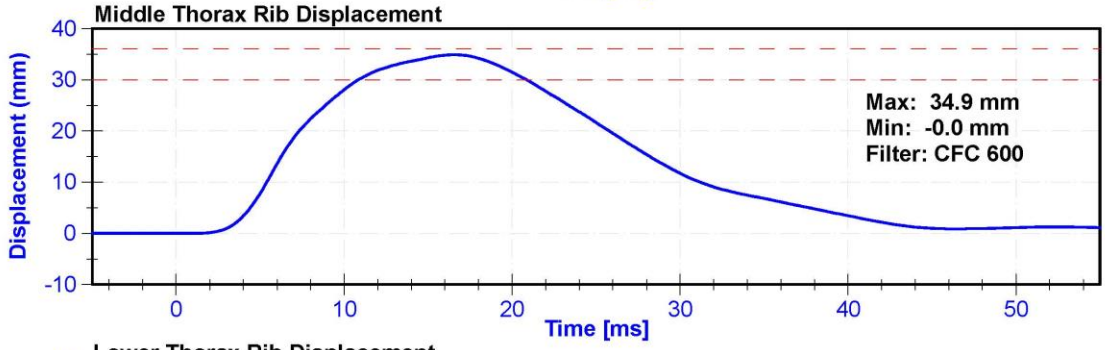
Transducer Calibrations

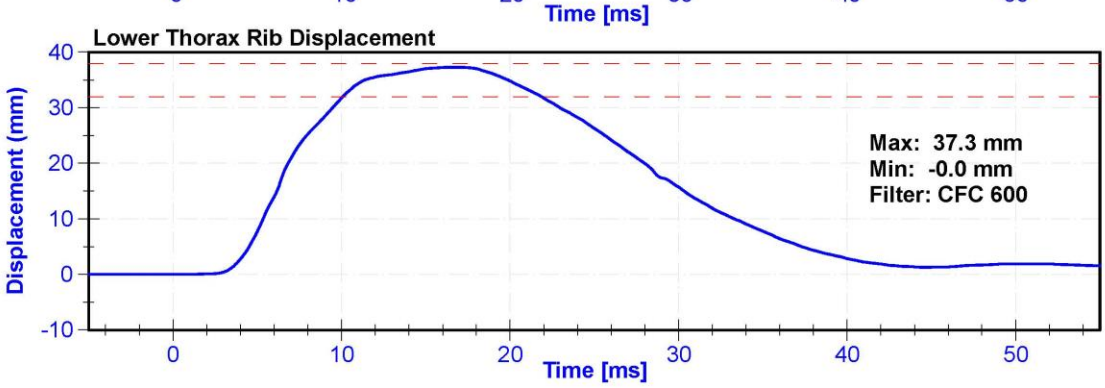
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Upper Spine T12 Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	10/11/2018	10/11/2019
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/12/2018	10/12/2019
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/12/2018	10/12/2019

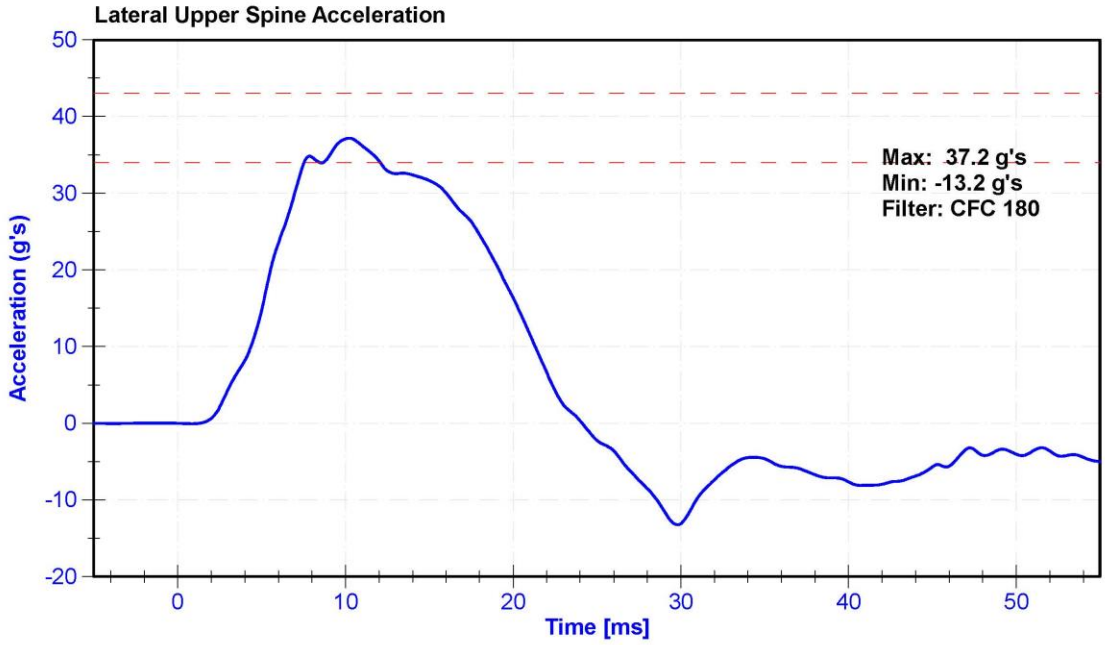


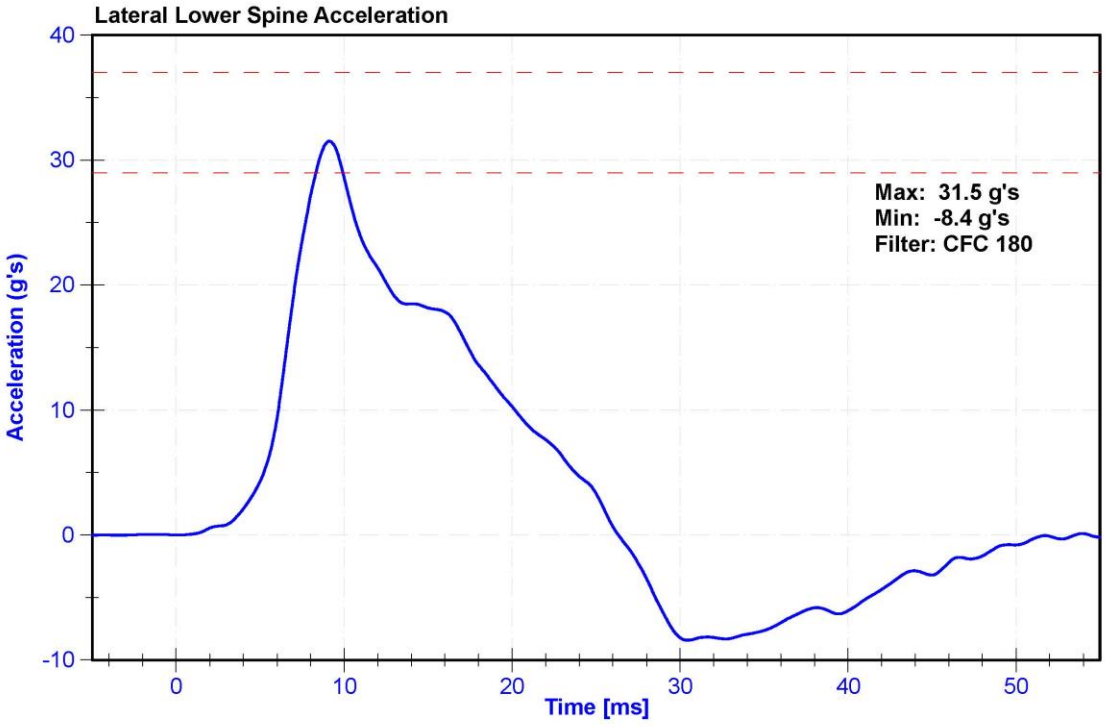

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.8 mm
Min: -0.0 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 29.3 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.9 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.3 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 37.2 g's
Min: -13.2 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 31.5 g's
Min: -8.4 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

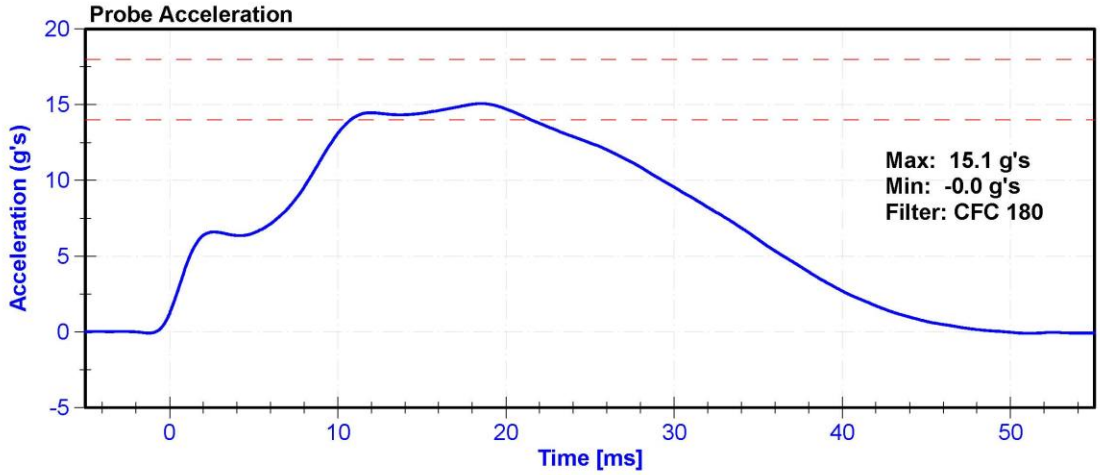
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

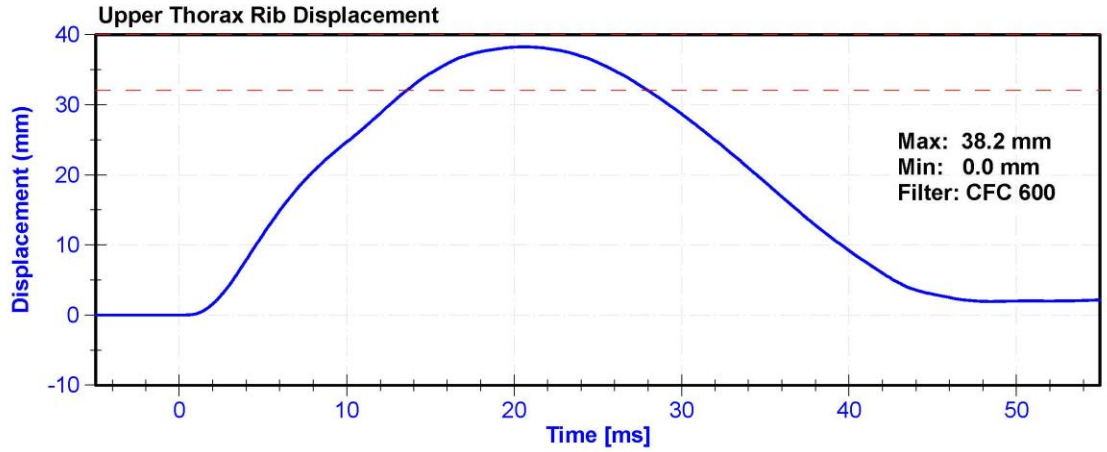
Results

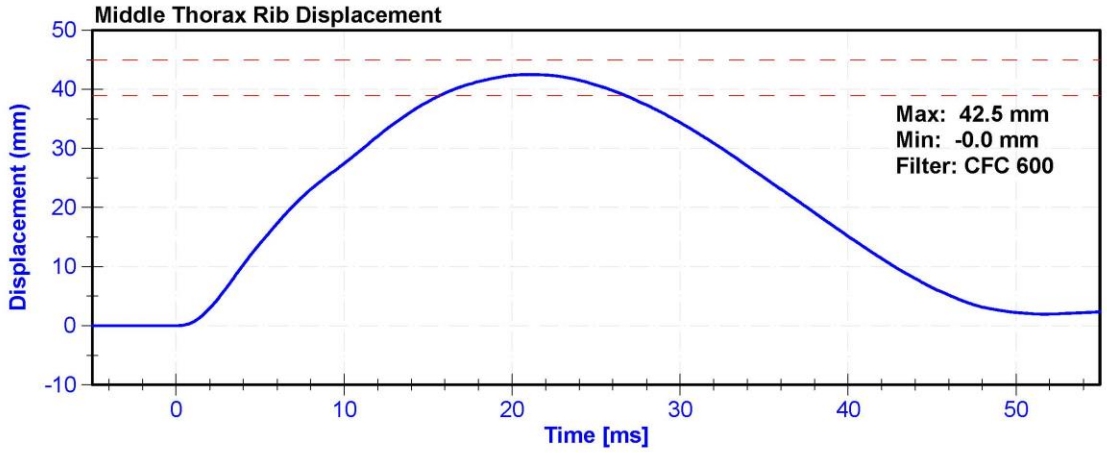
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	17.3	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.1	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.7	Pass
Upper Thorax Rib Deflection	32	40	mm	38.2	Pass
Middle Thorax Rib Deflection	39	45	mm	42.5	Pass
Lower Thorax Rib Deflection	35	43	mm	38.1	Pass

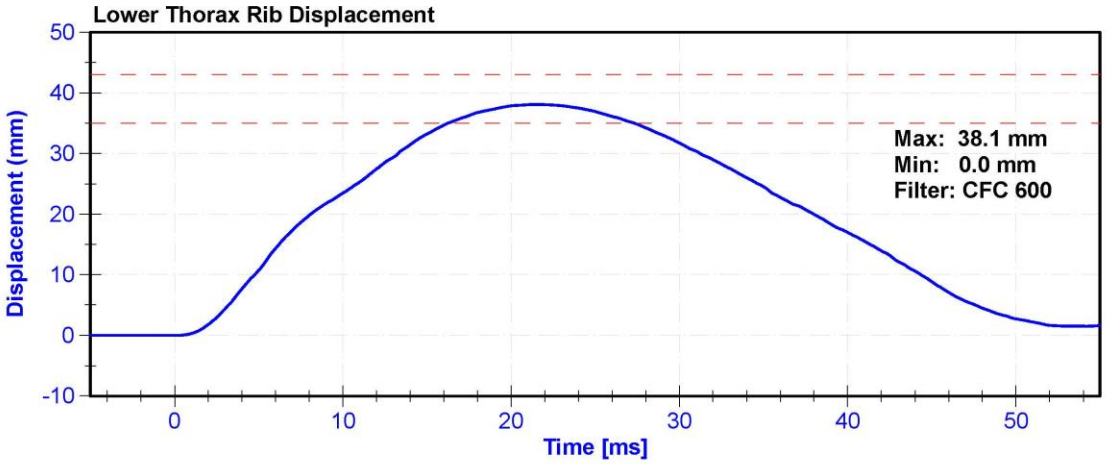
Transducer Calibrations

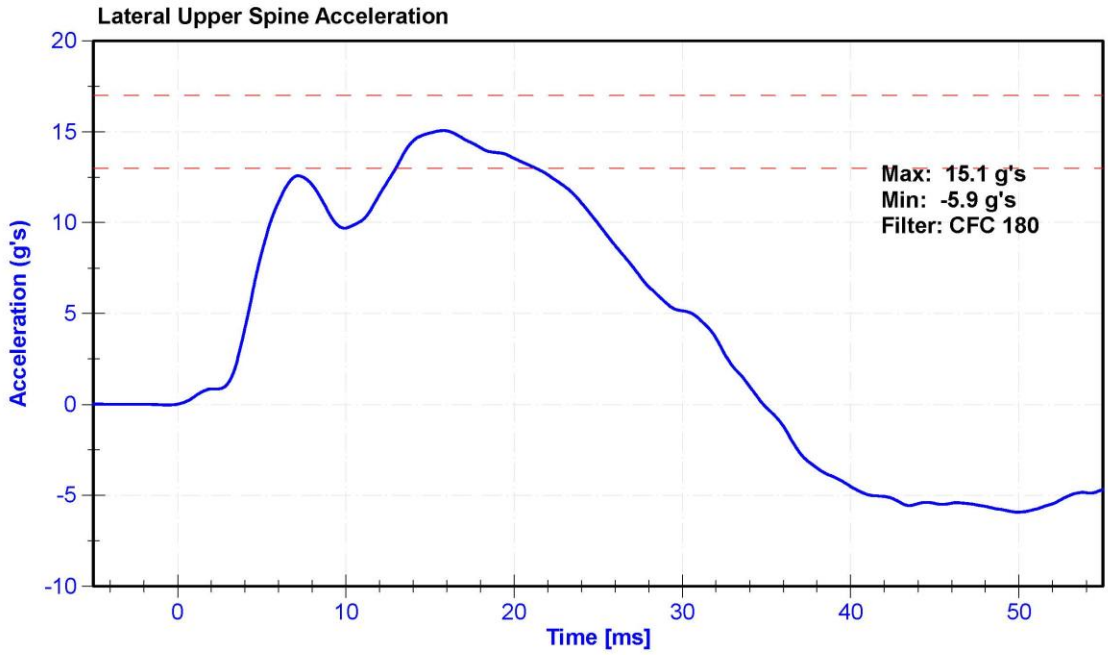
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P64148	10/23/2018	4/23/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	10/12/2018	10/12/2019
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	10/12/2018	10/12/2019

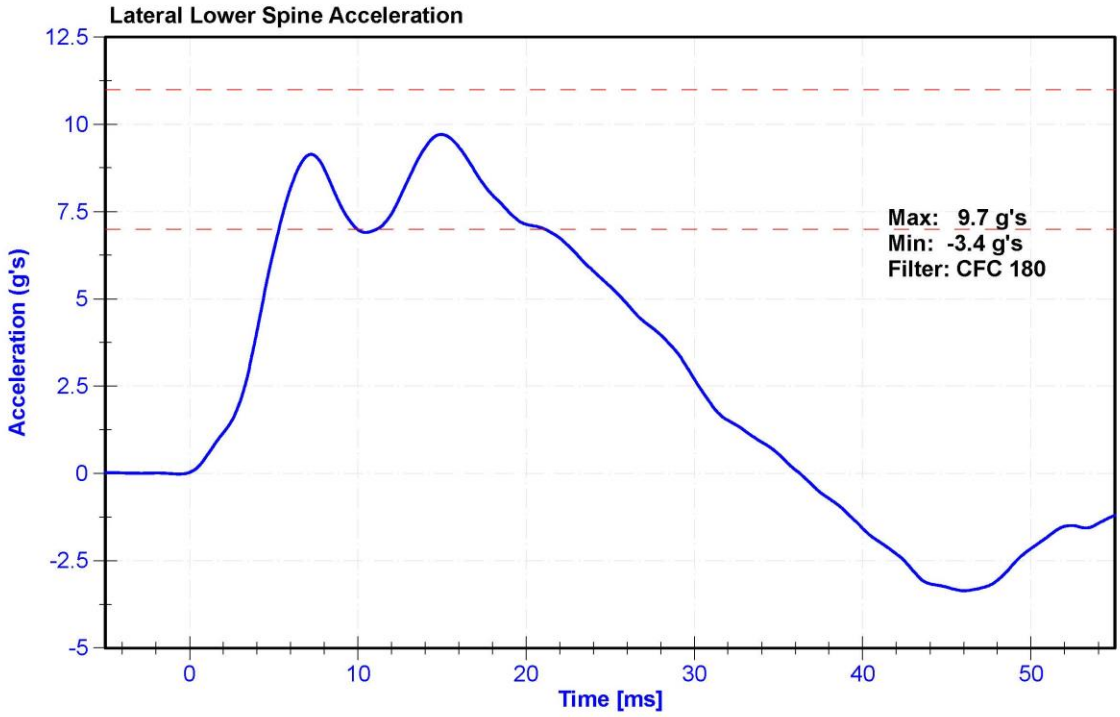



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.2 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.5 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 15.1 g's
Min: -5.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 9.7 g's
Min: -3.4 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

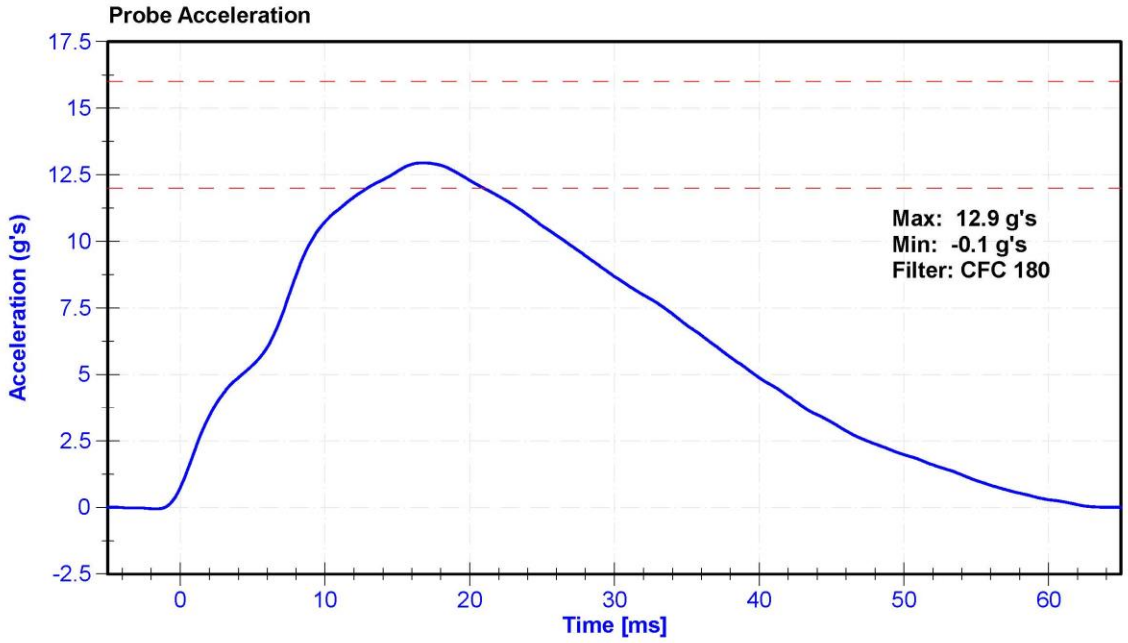
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

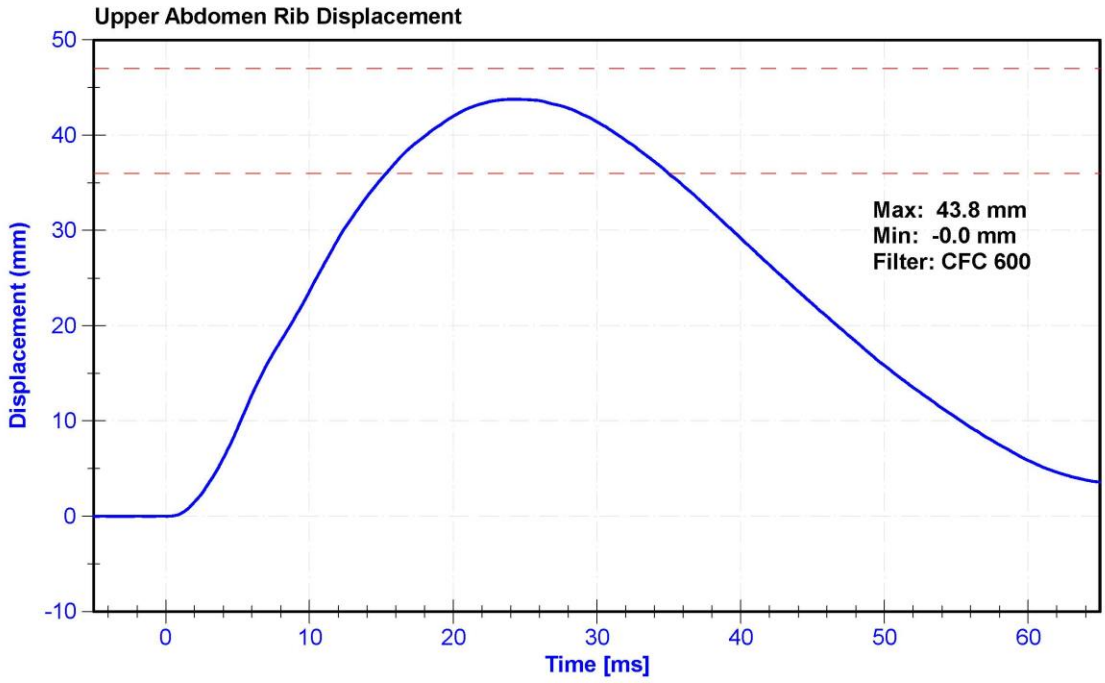
Results

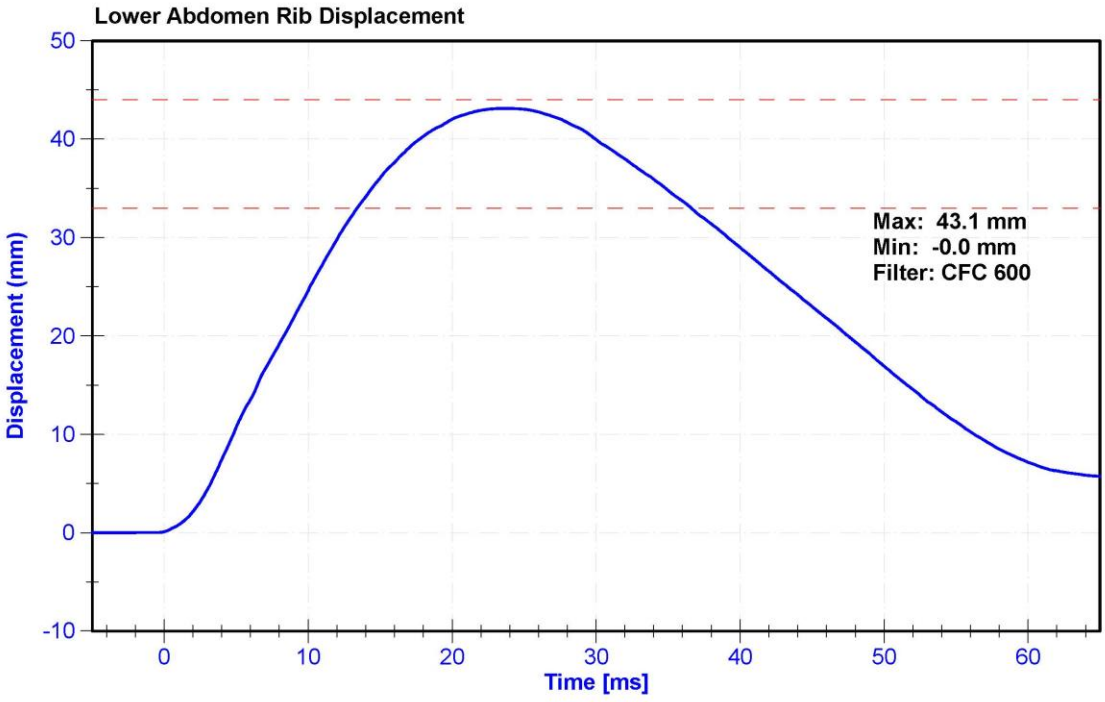
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	34.8	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	12	16	g's	12.9	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.4	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.1	Pass

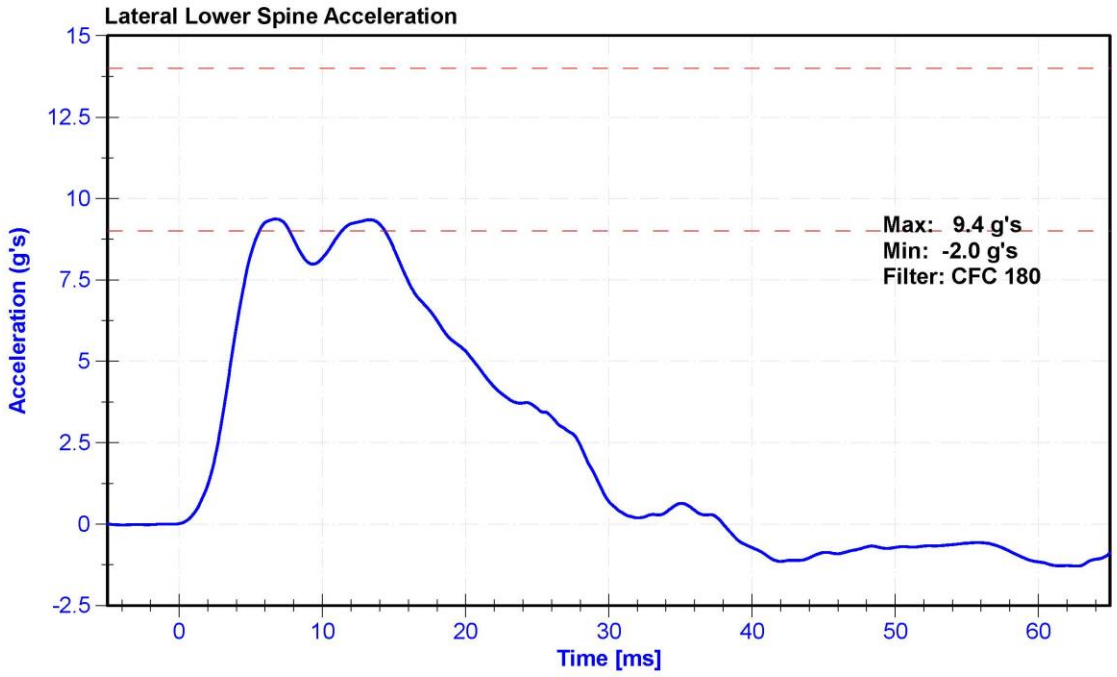
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019
Lower Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51699	10/16/2018	4/16/2019
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	10/11/2018	10/11/2019
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	10/12/2018	10/12/2019




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.8 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.1 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 9.4 g's
Min: -2.0 g's
Filter: CFC 180

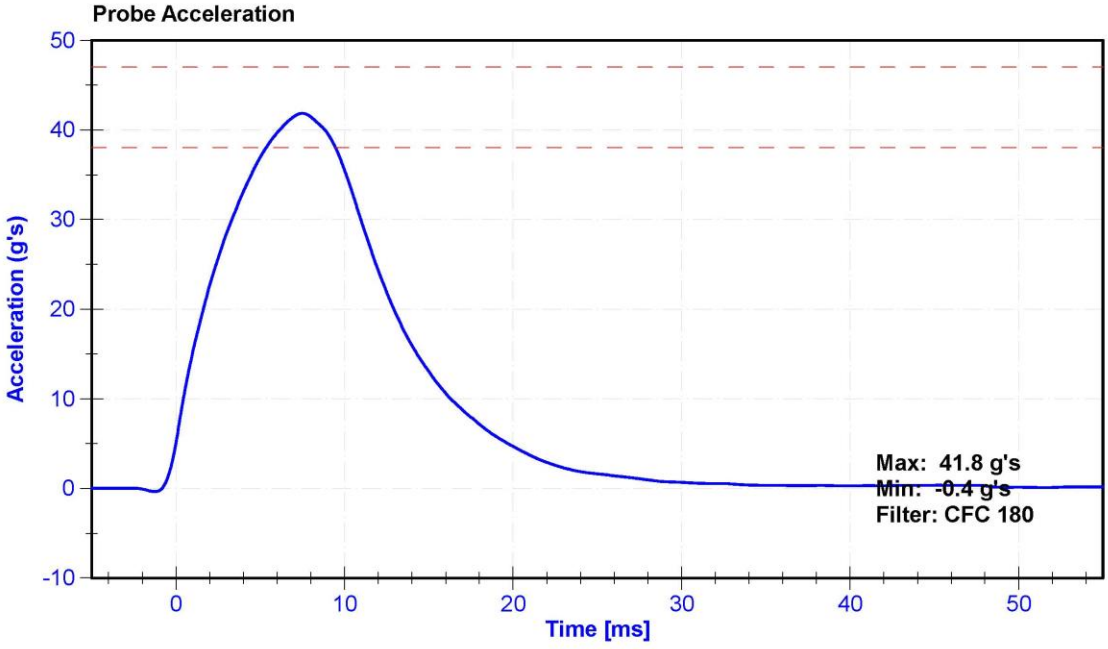
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

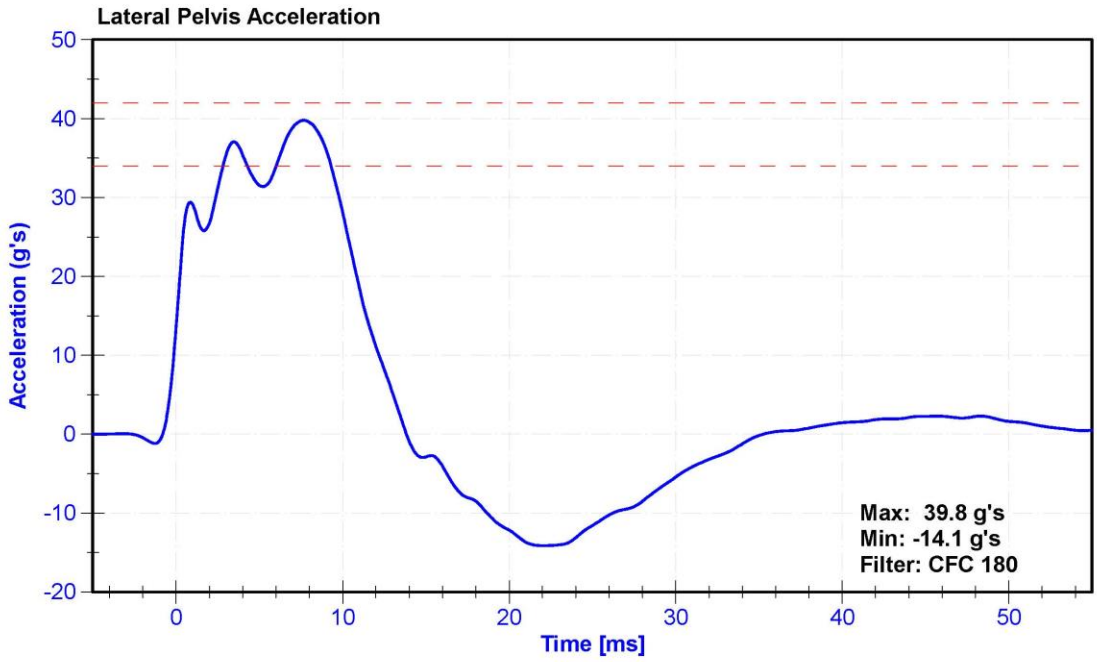
Results

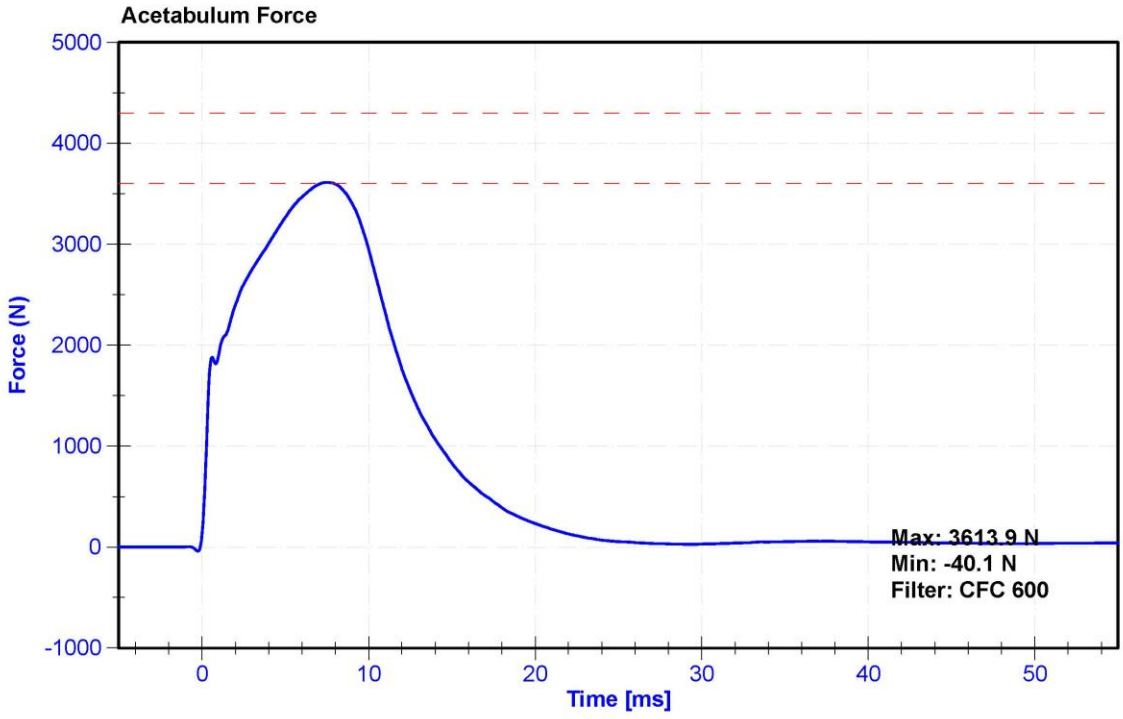
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	17.7	Pass
Velocity	6.6	6.8	m/s	6.61	Pass
Probe Acceleration	38	47	g's	41.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.8	Pass
Acetabulum Force	3600	4300	N	3613.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/4/2018	6/4/2019
Certification Plug	SACO	11820	1/23/2018	N/A
Crash Test Plug	SACO	11420	8/29/2016	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 39.8 g's
Min: -14.1 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3613.9 N
Min: -40.1 N
Filter: CFC 600

DG8012 Crash 2/20/19

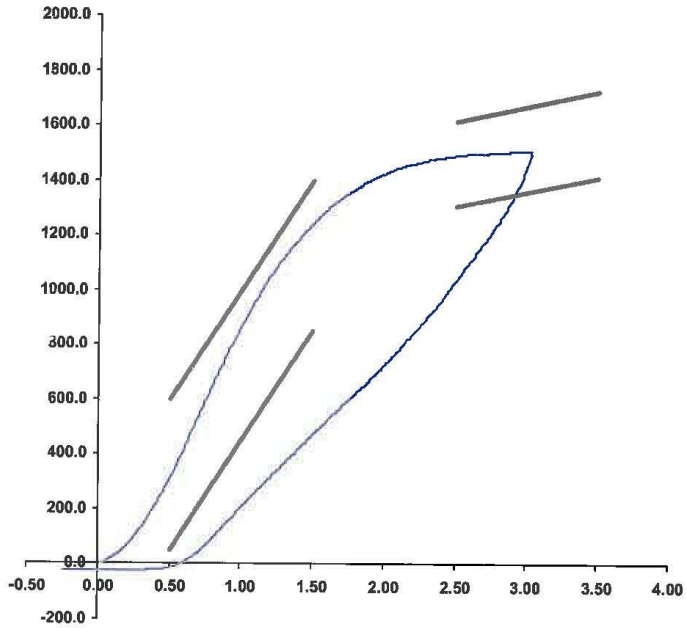
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 11420
Test Number 2889
Report Number 2886
Test Date 8/29/2016 11:10:32 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	312.28	50.00	600.00
Force @ 1.5 mm (N)	1,244.03	850.00	1,400.00
Force @ 2.5 mm (N)	1,491.99	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,511.33	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (TI240813), Units (LBS) 1000

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

Notes:

Operator DC

Part Number 180-4450

Template No 107 29-Aug-16
SACO Research

By : DC Date : 8/29/16

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

DG8012 Cert Plug 2/20/19

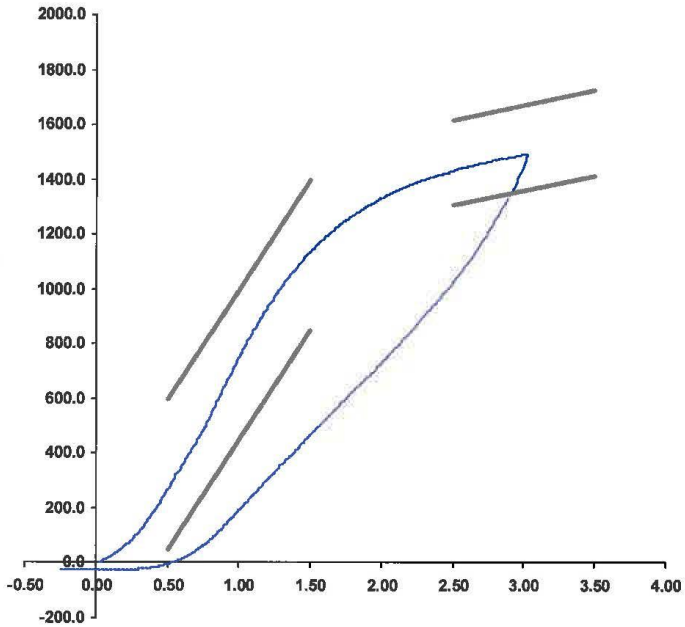
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 11820
Test Number 5930
Report Number 5946
Test Date 1/23/2018 7:53:01 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	268.54	50.00	600.00
Force @ 1.5 mm (N)	1,138.48	850.00	1,400.00
Force @ 2.5 mm (N)	1,432.22	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,492.76	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000
Preload Value (-N) 22.24
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator

Part Number 180-4450

Template No 107 23-Jan-18
SACO Research

By : DC Date : 1/23/18

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

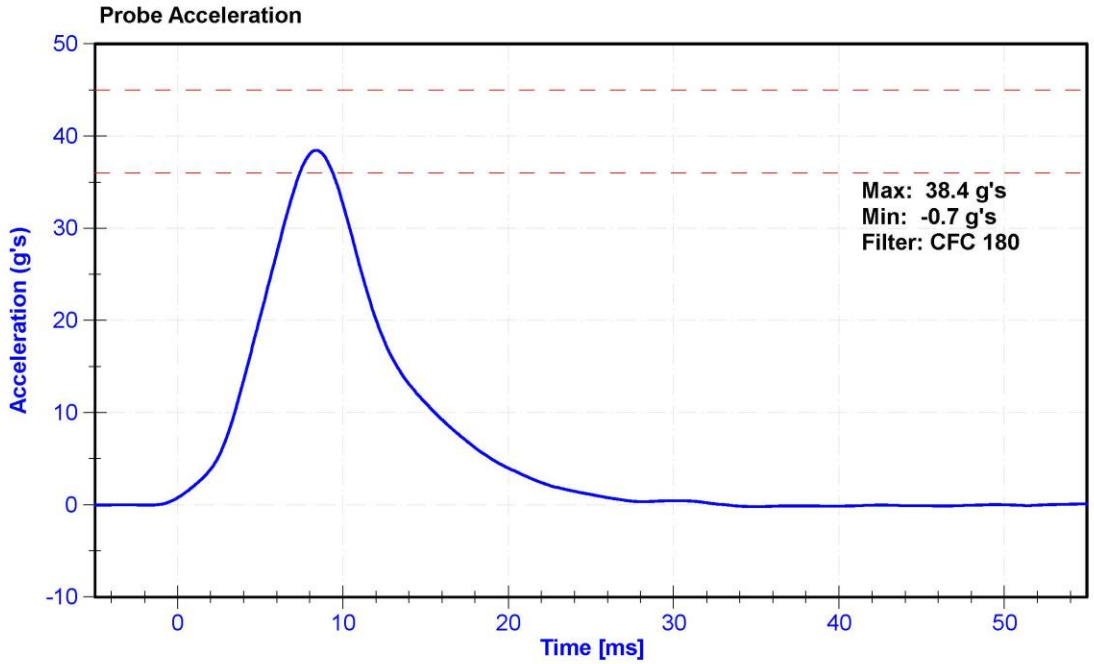
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K.Brogan

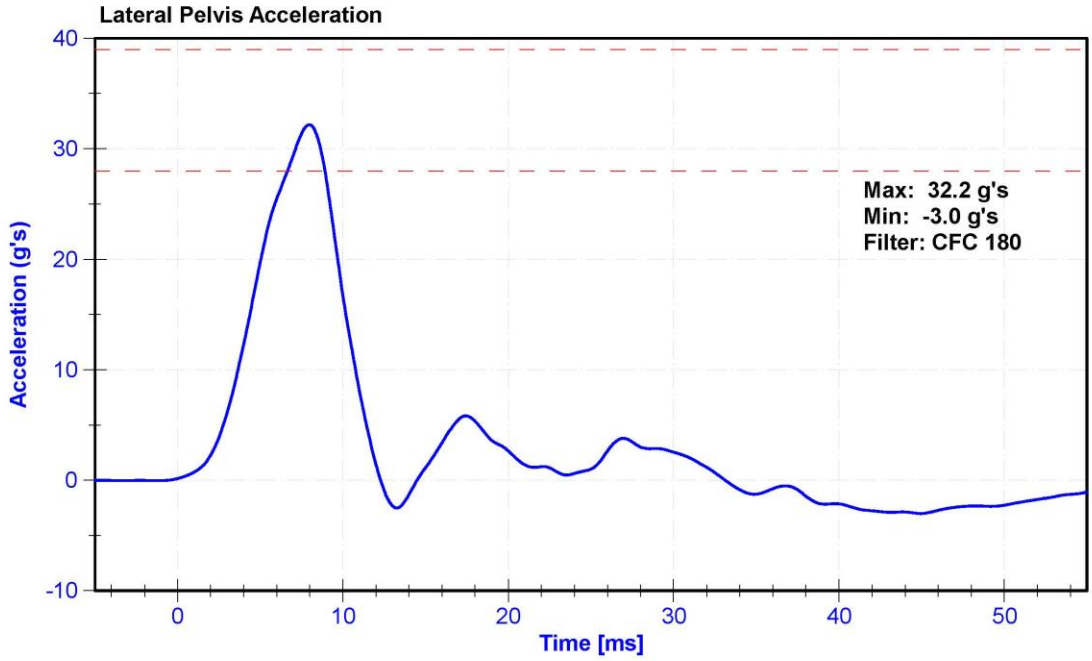
Results

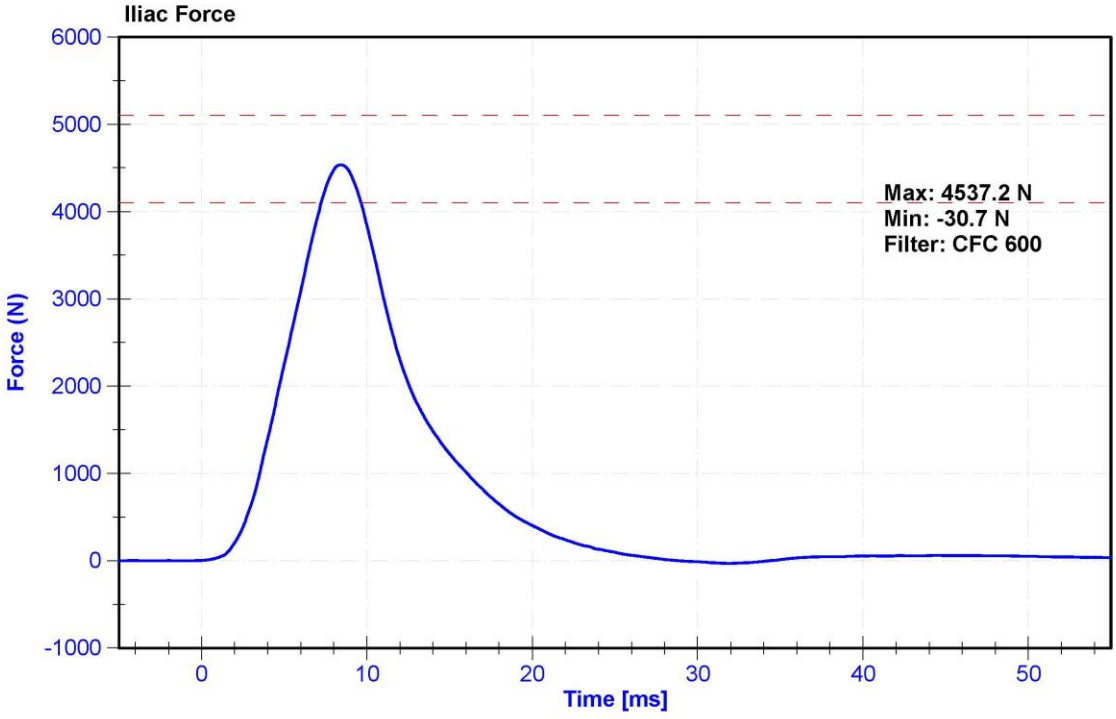
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22.0	Pass
Humidity	10	70	%	19.4	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	36	45	g's	38.4	Pass
Lateral Pelvis Acceleration	28	39	g's	32.2	Pass
Iliac Force	4100	5100	N	4537.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23904	11/1/2018	5/2/2019
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	10/17/2018	4/17/2019
Iliac Load Cell	DENTON 3228J	LC-279Fy	10/4/2018	10/4/2019




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 32.2 g's
Min: -3.0 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4537.2 N
Min: -30.7 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: DG8012		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	AC-P74788	ENDEVCO	10/18/2018
			Y	AC-P83432	ENDEVCO	10/18/2018
			Z	AC-P83319	ENDEVCO	10/18/2018
Head Accelerometers - Redundant			X	AC-P80334	ENDEVCO	10/18/2018
			Y	AC-P63841	ENDEVCO	1/21/2019
			Z	AC-P83322	ENDEVCO	10/18/2018
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-2165GFE	Servo	5/15/2018
		Middle	Y	DS-45 GFE	Servo	10/12/2018
		Lower	Y	DS-011GFE	Servo	10/12/2018
	Abdominal Rib	Upper	Y	DS-008GFE	Servo	10/11/2018
		Lower	Y	DS-1774GFE	Servo	10/12/2018
Lower Spine Accelerometers (T12)			X	AC-P45019	ENDEVCO	10/17/2018
			Y	AC-P51699	ENDEVCO	10/16/2018
			Z	AC-P51685	ENDEVCO	10/17/2018
Acetabulum Load Cell			Y	LC-4986Fy	DENTON	6/4/2018
Lilac Wing Load Cell			Y	LC-279Fy	DENTON	10/4/2018
Pelvis Plug (Struck Side)				11418	SACO	8/29/2016
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A196998	MSI 1201-1000	10/3/2018
Vehicle Center of Gravity	Y	AC-A254657	MSI 1201-1000	10/3/2018
Vehicle Center of Gravity	Z	AC-A255848	MSI 1201-1000	3/23/2018
Left Floor Sill	Y	AC-A196605	MSI 1201-1000	11/30/2018
A-Pillar Sill	Y	AC-A192223	MSI 1201-1000	11/20/2018
A-Pillar Low	Y	AC-A196603	MSI 1201-1000	10/11/2018
A-Pillar Mid	Y	AC-A197003	MSI 1201-1000	1/17/2019
B-Pillar Sill	Y	AC-A250352	MSI 1201-1000	1/5/2019
B-Pillar Low	Y	AC-A262055	MSI 1201-1000	11/16/2018
B-Pillar Mid	Y	AC-A196997	MSI 1201-1000	11/26/2018
Driver Seat	Y	AC-A262046	MSI 1201-1000	1/17/2019
Engine Top	X	AC-A255991	MSI 1201-1000	10/3/2018
Engine Top	Y	AC-A262058	MSI 1201-1000	10/3/2018
Firewall	Y	AC-A250381	MSI 1201-1000	1/17/2019
Right Roof	Y	AC-A250378	MSI 1201-1016	8/24/2018
Right Floor Sill	Y	AC-A280904	MSI 1201-1000	11/21/2018
Rear Floorpan	X	AC-A197016	MSI 1201-1000	12/28/2018
Rear Floorpan	Y	AC-A222649	MSI 1201-1000	11/1/2018

Table 3 – Pole Instrumentation

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