REPORT NUMBER: SINCAP-CAL-21-004

NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST

Mercedes-Benz AG Stuttgart
2021 Mercedes C300
Four Door Sedan

NHTSA No: M20214301

PREPARED BY:
CALSPAN CORPORATION
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May 10, 2021

FINAL REPORT

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

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

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Prepared by: Matthew Pronko Date: May 10, 2021
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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SINCAP-CAL-21-004	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2021 Mercedes C300 four door sedan NHTSA No.: M20214301		***5. Report Date*** May 10, 2021 ***6. Performing Organization Code*** CAL
Matthew Pronko, Test Engineer Vanessa Hansen, Operations Program Manager		***8. Performing Organization Report No.*** CAL-DOT-2021-004
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations 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 5, 2021 - May 10, 2021 ***14. Sponsoring Agency Code*** NRM-110

15. *Supplementary Notes*

16. Abstract

A 55/28, (61.90kph / 38.5 mph), 90^0 Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2021 Mercedes C300 four door sedan in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 5, 2021.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.97 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The target vehicle's maximum post-test static crush was 155 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	164.553
Maximum Thoracic Rib Deflection	mm	44	27.571
Total Abdominal Force	N	2500	677.569
Pubic Symphysis Force	N	6000	1351.491

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	212.301
Lower Spine Resultant Acceleration	G	82	47.659
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3725.516
Maximum Thoracic Rib Deflection	mm	38*	19.580
Maximum Abdominal Rib Deflection	mm	45*	13.407

* *Proposed IARV*

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 MDB ES-2re SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, 1200 New Jersey Ave. SE Washington, D.C. 20590

19. Security Class. (of this report)	***20. Security Class. (of this page)***	***21. No. of Pages***	***22. Price***
UNCLASSIFIED	UNCLASSIFIED	195	

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2021 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2021 Mercedes C300 four door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A 2021 Mercedes C300 four door sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.97 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan Corporation's Transportation Test Operations Center in Buffalo, New York on February 5, 2021. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated March 2020. The side impact event was documented by 9 high-speed and 2 real-time cameras. Camera locations are included in this report.

The Dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen forward, middle, and rear y-axis load cells
Lower spine (T12) tri-axial accelerometers
Public symphysis y-axis load cell

PASSENGER ATD (SID-IIs)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen upper rib and lower rib y-axis displacement potentiometers
Lower spine (T12) tri-axial accelerometers
Acetabulum and iliac wing y-axis load cells

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in APPENDIX C of this report. Appendix D of this report contains the test equipment and instrumentation calibration data.

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	164.553
Maximum Thorax Rib Deflection	mm	44	27.571
Combined Abdominal Force	N	2500	677.569
Pubic Symphysis Force	N	6000	1351.491

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	212.301
Lower Spine (T12) Resultant Acceleration	G	82	47.659
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3725.516
Maximum Thoracic Rib Deflection	mm	38*	19.580
Maximum Abdominal Rib Deflection	mm	45*	13.407

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Air bag	Yes	No		
Knee Air bag	Yes	No		
Side Air bag 1 - Curtain	Yes	Yes	Yes	Yes
Side Air bag 2 – Torso/Pelvis Air bag	Yes	Yes	No	N/A
Side Air bag 3 – Torso Air bag	No	N/A	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	No
Seat Belt Load Limiter	Yes	Yes	Yes	No
Other				

GENERAL COMMENTS:

1. P1 serial number – F034
2. P4 serial number – 300

Data Anomalies:

The following channel was questionable for

- Left Lower A-Pillar Y, Exceeded calibration range at 4.7 ms
- Left Lower B-Pillar Y, Exceeded calibration range and saturated at 8.7 ms
- Left Mid B-Pillar Y, Exceeded calibration range and saturated at 9.2 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel System 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 – Test Vehicle Accelerometer Locations

Data Sheet No. 7 – MDB Accelerometer Locations

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – MDB Summary of Results

Data Sheet No. 10 – Test Vehicle Profile Measurements

Data Sheet No. 11 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 12 – MDB Exterior Static Crush Measurements

Data Sheet No. 13 – Vehicle and MDB Damage Profile Distances

Data Sheet No. 14 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 15 – Dummy/Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Mercedes C300 four door sedan NHTSA No.: M20214301
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2021

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20214301
Model Year	2021
Make	Mercedes
Model	C300
Body Style	Four Door Sedan
VIN	W1KWF8DB0MR613651
Body Color	Silver
Odometer Reading (km/mi)	7 Miles
Engine Displacement (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	9-Speed
Overdrive	Yes
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof/T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
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	N/A
Driver Front Air bag	Yes
Driver Curtain Air bag	Yes
Driver Head/Torso Air bag	No
Driver Torso Air bag	No
Driver Torso/Pelvis Air bag	Yes
Driver Pelvis Air bag	No
Driver Knee Air bag	Yes
Rear Pass. Curtain Air bag	Yes
Rear Pass. Head/Torso Air bag	No
Rear Pass. Torso Air bag	Yes
Rear Pass. Torso/Pelvis Air bag	No
Rear Pass. Pelvis Air bag	No
Driver Seat Belt Pretensioners	Yes
Rear Pass. Seat Belt Pretensioners	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Mercedes-Benz AG Stuttgart
Date of Manufacture	10/20
Vehicle Type	Passenger Car

GVWR (kg)	2090
GAWR Front (kg)	1010
GAWR Rear (kg)	1100

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)				444	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				103.8	(A-B)

VEHICLE SEAT TYPE

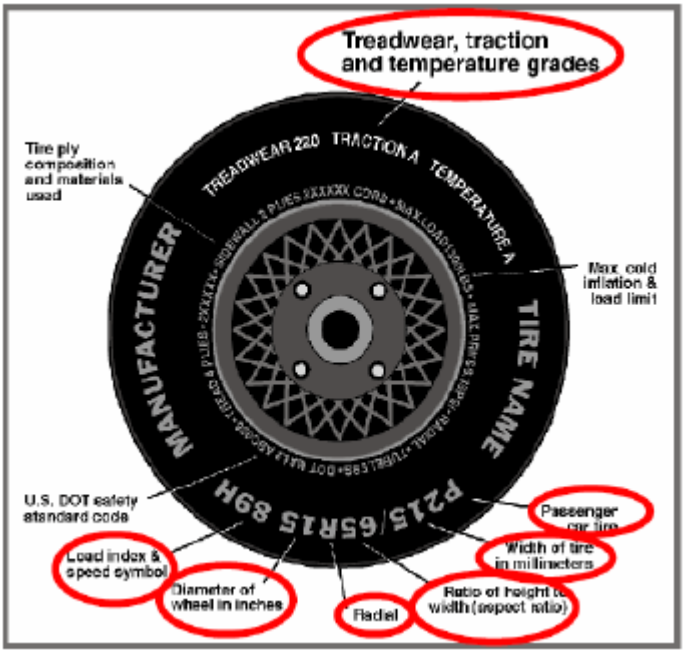
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X						X
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

VEHICLE TIRE INFORMATION

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



TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	280	320
Recommended Tire Size	225/50R17	225/50R17
Tire Size on Vehicle	225/50R17	225/50R17
Tire Manufacturer	Continental	Continental
Tire Model	ContiproContact SSR	ContiproContact SSR
Treadwear	400	400
Traction	AA	AA
Temperature Grade	A	A
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	1 Rayon, 2 Steel, 1 Polyamide	1 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	94H	94H
Tire Material	Rubber	Rubber
DOT Safety Code Left	LM40WB932920	LM40WB932920
DOT Safety Code Right	LM40WB932920	LM40WB932920

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

Test Vehicle: 2021 Mercedes C300 four door sedan
NHTSA No.: M20214301
Test Program: NCAP Side MDB Impact Test
Test Date: 2/5/2021

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	242	290	298
Tire Placard	kPa	280	280	320	320
Owner's Manual	kPa	280	280	320	320
As Tested	kPa	280	280	320	320

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	207	207	207	207

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	417	374		468	455		452	485	
Right	kg	426	370		465	422		429	453	
Ratio	%	53.0	47.0		52	48		48.0	52.0	
Totals	kg	843	744	1587	933	877	1810	881	938	1819

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1587	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	103.8	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1817.8	(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	Fully Loaded	As Tested	Meets Requirement**
LF	mm	696	688	Yes
RF	mm	700	690	Yes
RR	mm	699	689	Yes
LR	mm	694	687	Yes
Vehicle CG (Aft of Front Axle)	mm	1463	1375	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	23	16	

**** The "As Tested" vehicle attitude measurements must be equal to or within ± 10mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirements".*

Test height adjustable suspension setting, if applicable: N/A

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	6
Tail Light	1
Ballast / Equipment Added	39.3

TEST SURFACE MARKINGS

	Distance from 63° Impact Angle Line (mm)
Fore 25 mm target	890
Aft 25 mm target	890
Pre-Impact Angle Line	236

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	2955	1555
C	2955	3555
D	0	3000

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	19.4	11.7	15.6
Front Passenger Seat	21.6	12.1	16.9
Front Center Seat*	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed

**if applicable*

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	15.6	14	Max	65	81	79
			Mid	32	47	54
			Min	0	14	28
Front Passenger Seat	16.9	15	Max	75	90	103
			Mid	38	52	67
			Min	0	15	30
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	-	-	-

**if applicable*

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

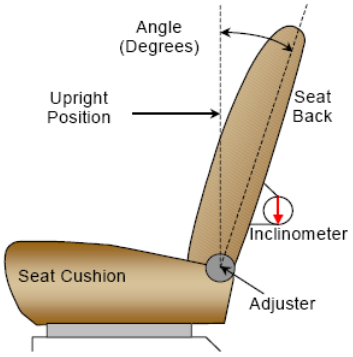
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	257	N/A	129	N/A
Front Passenger Seat	262	N/A	131	N/A
Front Center Seat*	-	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. 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 seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	50	Power	9.0	Power
Front Passenger Seat	50	Power	9.0	Power
Front Center Seat*	-	-	-	-
Struck Side Rear Seat w/ Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

**if applicable*

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. For this test zero is defined as the uppermost position.

	Total # of Positions	Placed in Position #
Driver Seat	5 (0-4)	0
Rear Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

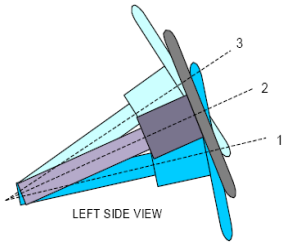
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	Infinite (Power)	Full Up / Full Forward
Rear Seat	5 (0-4)	Lowermost

STEERING COLUMN ADJUSTMENT

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

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	19.2	
Geometric Center – Position 2	21.3	
Uppermost – Position 3	23.4	
Telescoping Steering Wheel Travel		55
Test Position	21.3	28

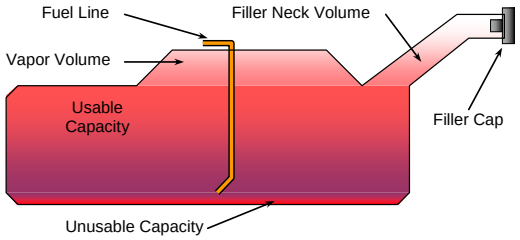


STEERING COLUMN ASSEMBLY

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 right side of the vehicle. The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

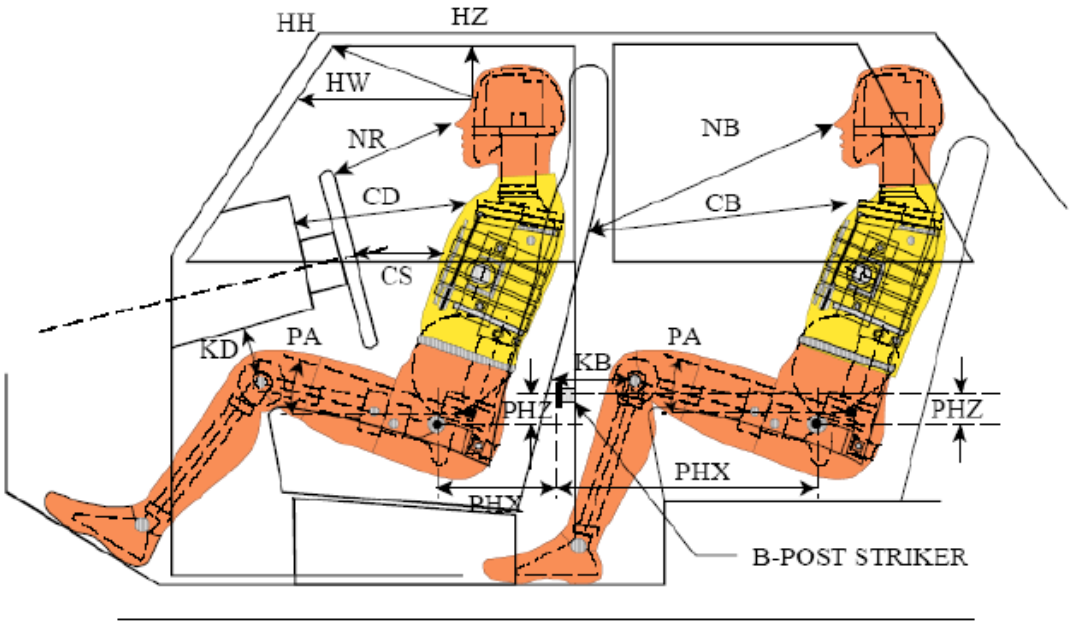
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	65.9
Usable Capacity of "Optional Tank" (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	65.9
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	61.3
Actual Amount of Solvent Used in Test	61.3
1/3 of Usable Capacity	22

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

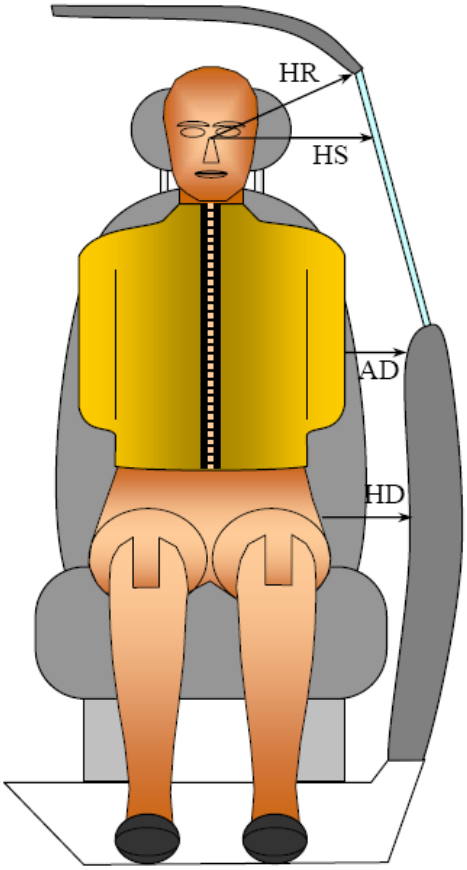
LEFT SIDE VIEW

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver (Serial No. F034)		Passenger (Serial No.300)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	415			
HW		Header to Windshield	675			
HZ	HZ	Head to Roof Liner	172		210	
NR	NB	Nose to Rim/Seat Back	476		440	
CD	CB	Chest to Dash/Seat Back	577		456	
CS		Chest to Steering Wheel	380			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	235	27.4	233	4.8
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	220	23.2	228	2.3
PAX°	PAX°	Pelvic Tilt Angle X		22.1		18.2
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (X-Axis)	112		123	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	239		215	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



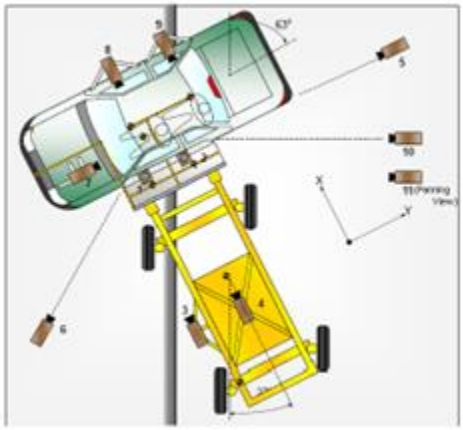
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F034)	Passenger (Serial No. 300)
HR	Head to Side Header	mm	188	232
HS	Head to Side Window	mm	312	380
AD	Arm to Door	mm	92	168
HD	Hip Point to Door	mm	138	180

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Mercedes C300 four door sedan NHTSA No.: M20214301
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2021



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	-261	0	-8139	12.5	1000
2	Overhead Close-up	0	0	-8139	24	1000
3	Left Impact Point (MDB)				25	1000
4	Side Overall (MDB)				8	1000
5	Rear	0	7303	-1464	28	1000
6	Left Front	-2362	-6391	-1436	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	60
11	Real-time In run				Zoom	60

Notes: *Reference: Impact Point projected to Ground*
+X = To Front of MDB, +Y = To Right of MDB, +Z = Down
**All measurements accurate to ± 6 mm.*

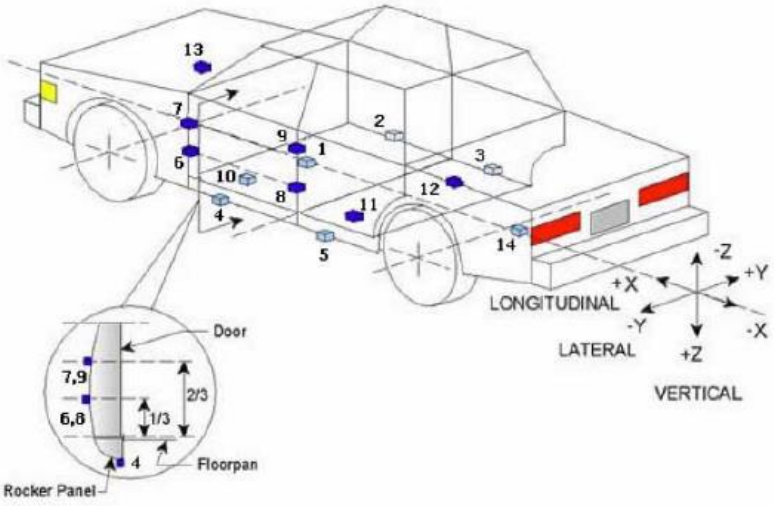
If applicable, explain why camera(s) did not operate as intended: All cameras operated normally

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	7
Total	62

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



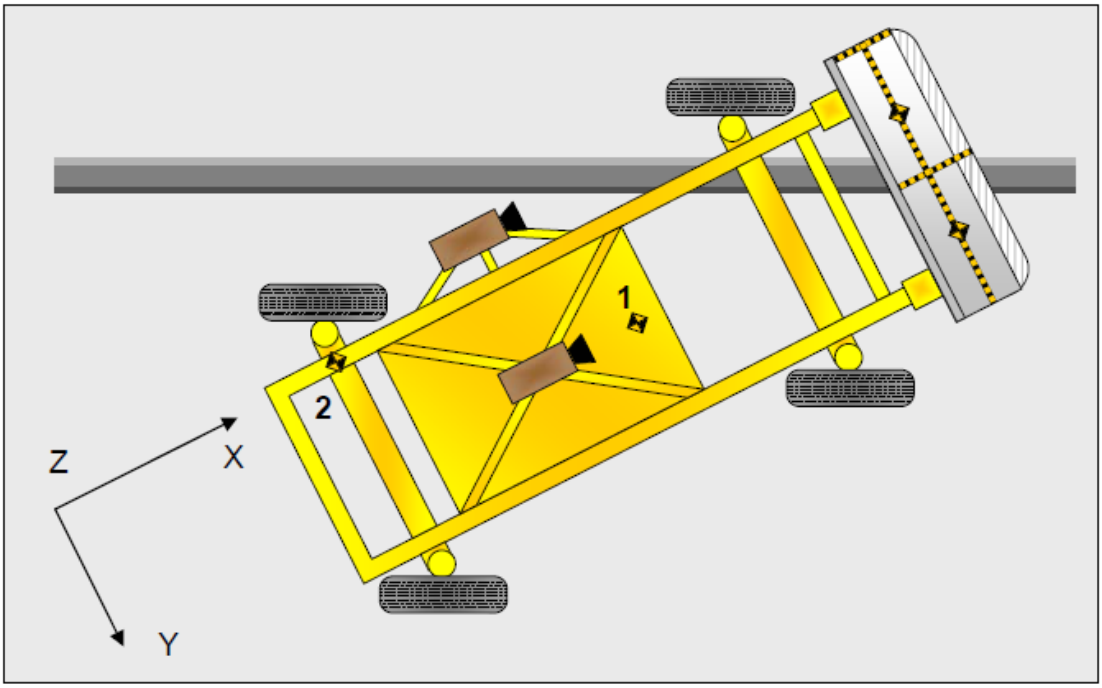
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2006	-2	199
2	Right Sill at Front Seat	2702	679	256
3	Right Sill at Rear Seat	1882	679	256
4	Left Sill at Front Door	2744	-698	309
5	Left Sill at Rear Door	1865	-696	320
6	A-Post Lower	3168	-682	49
7	A-Post Middle	3076	-649	-357
8	B-Post Lower	2151	-693	18
9	B-Post Middle	2116	-676	-226
10	Front Seat Track	2339	-577	332
11	Rear Seat Structure	1799	-599	310
12	Rt. Rear Occ. Compartment	2011	380	401
13	Engine Block	4064	-25	-220
14	Rear Above Axle	843	-5	107

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	1859	0	-330
2	MDB Rear	386	-660	-660

Reference: X – Face of MDB (+ forward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ down)

Width between left and right contact switches (mm): 1475

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag & Side Header	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Head Rest	Curtain Airbag, Center Headrest
Left Shoulder	Torso/Pelvis Airbag, Driver Door	Torso Airbag, Seatback
Upper Torso	Torso/Pelvis Airbag, Seat Back	Seat Back
Lower Torso	Torso/Pelvis Airbag, Seat Back	Seat Back
Left Hip	Torso/Pelvis Airbag, Driver Door, Seatpan	Left Rear Passenger Door, Seat Back, Seatpan
Left Knee	Driver Door	Right Rear Passenger Door

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar & C-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Rear Passenger Window Shattered
Other Notable Effects	None

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

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Air bag	Yes	No		
Knee Air bag	Yes	No		
Side Air bag 1 - Curtain	Yes	Yes	Yes	Yes
Side Air bag 2 - Torso/Pelvis Air bag	Yes	Yes	No	N/A
Side Air bag 3 – Torso Air bag	No	N/A	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	No
Seat Belt Load Limiter	Yes	Yes	Yes	No
Other				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2838
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		479
Actual Impact Point (Aft of Frontal Axle)	mm		486
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	-7
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	0

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1,250
Overall Length Including Honeycomb Frame	4,120
Wheelbase of Framework Carriage	2,600
CG Location of Front Axle	1,120

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	392.5	297.5	690.0
Right	kg	386.0	291.5	677.5
Ratio	%	57.4%	42.6%	100.0%
Totals	kg	778.5	589.0	1367.5

SPEED AND ANGLE AT IMPACT DATA

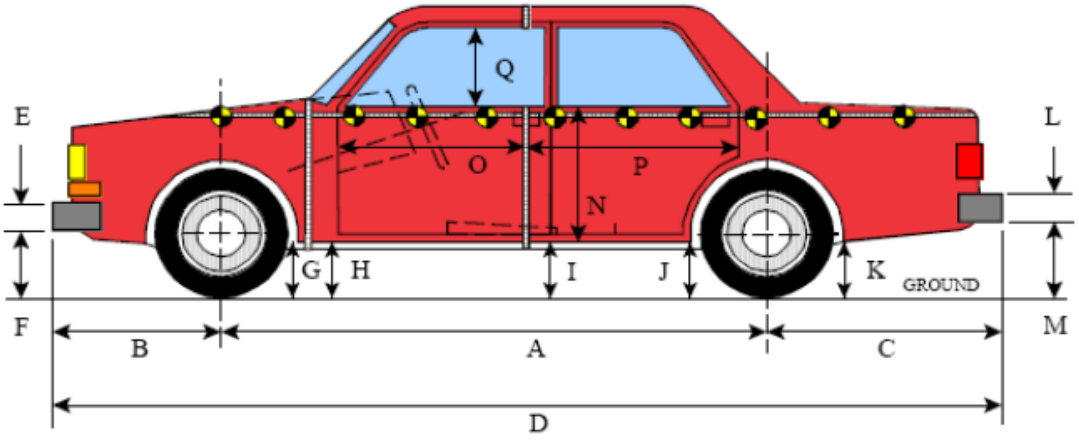
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	61.97
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	61.92
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	400	Right	262
B	Top of Bumper	533	400	Right	181
C	Mid-Level	686	800	Left	175
D	Top of Stack	813	800	Left	187

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



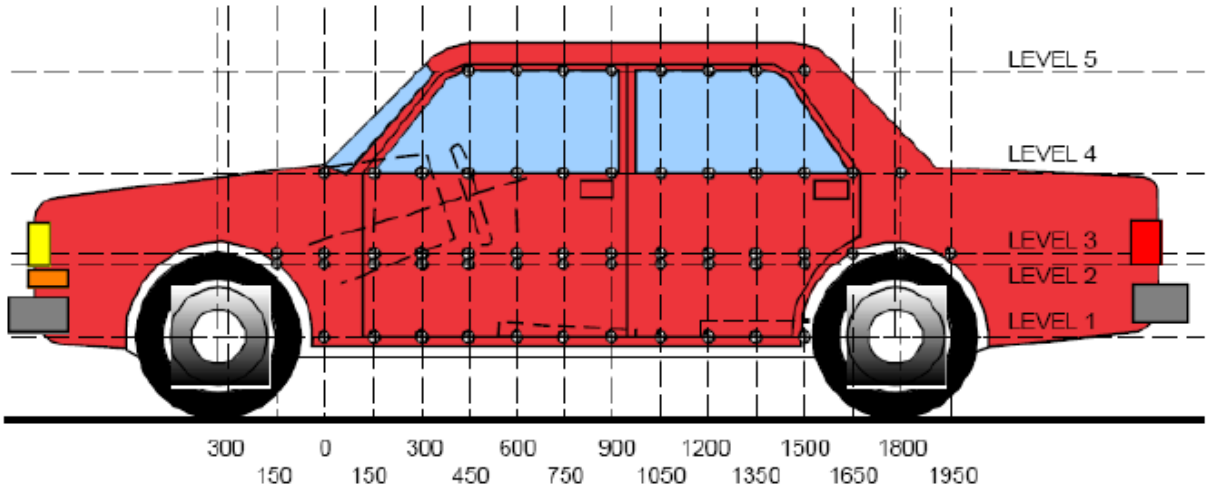
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2838	2833	-5
B	Front Axle to FSOV	789	799	10
C	Rear Axle to RSOV	1056	1057	1
D	Total Length at Centerline	4684	4689	5
E	Front Bumper Thickness	254	254	0
F	Front Bumper Bottom to Ground	201	205	4
G	Sill Height at Front Wheel Well	162	172	10
H	Sill Height at Front Door Leading Edge	160	170	10
I	Sill Height at B Pillar	173	168	-5
J1	Sill Height at Rear Wheel Well	160	161	1
J2	Pinch Weld Height at Rear Wheel Well	164	159	-5
K	Sill Height Aft of Rear Wheel Well	200	205	5
L	Rear Bumper Thickness	250	250	0
M	Rear Bumper Bottom to Ground	363	367	4
N	Sill Height to Window Bottom of Front Window Sill	704	707	3
O	Front Door Leading Edge to Impact CL	613	609	-4
P	Rear Door Trailing Edge to Impact CL	1481	1437	-44
Q	Front Window Opening	419	408	-11
R	Right Side Length	4578	4579	1
S	Left Side Length	4578	4577	-1
T	Maximum Vehicle Width	1797	1718	-79
U	Front Wheel Track Width	1561	1560	-1
V	Rear Wheel Track Width	1545	1545	0

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	257	14	900
2	Driver Hip Point	mm	507	122	1650
3	Mid-Door	mm	646	155	900
4	Window Sill	mm	926	130	1650
5	Window Top	mm	1389	4	1350

*window top level bent outward from original position

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. 11 … (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Mercedes C300 four door sedan NHTSA No.: M20214301
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2021

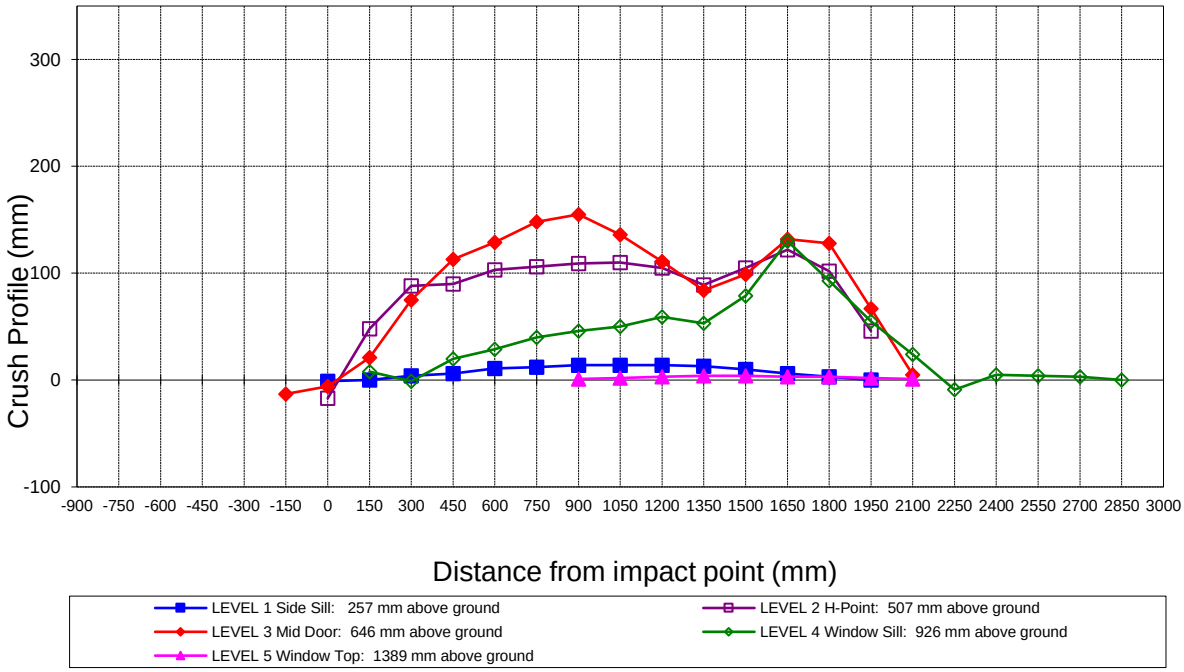
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150			908					921					-13		
0	867	898	898			868	915	904			-1	-17	-6		
150	861	891	899	786		861	843	878	778		0	48	21	8	
300	863	893	902	805		859	805	827	806		4	88	75	-1	
450	863	894	904	819		857	804	791	799		6	90	113	20	
600	864	895	906	830		853	792	777	801		11	103	129	29	
750	860	896	907	839		848	790	759	799		12	106	148	40	
900	859	896	908	848	587	845	787	753	802	586	14	109	155	46	1
1050	857	895	907	852	587	843	785	771	802	585	14	110	136	50	2
1200	856	894	905	846	586	842	789	794	787	583	14	105	111	59	3
1350	855	892	902	857	583	842	803	818	804	579	13	89	84	53	4
1500	853	889	899	856	579	843	784	800	777	575	10	105	99	79	4
1650	852	887	894	853	574	846	765	762	723	571	6	122	132	130	3
1800	851	885	890	853	568	848	783	762	760	565	3	102	128	93	3
1950	853	885	887	854	557	853	839	820	799	555		46	67	55	2
2100			894	842	544			889	818	543			5	24	1
2250				854					863					-9	
2400				849					844					5	
2550				842					838					4	
2700				830					827					3	
2850				811					811						
3000															

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 test based on an estimated impact point.

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

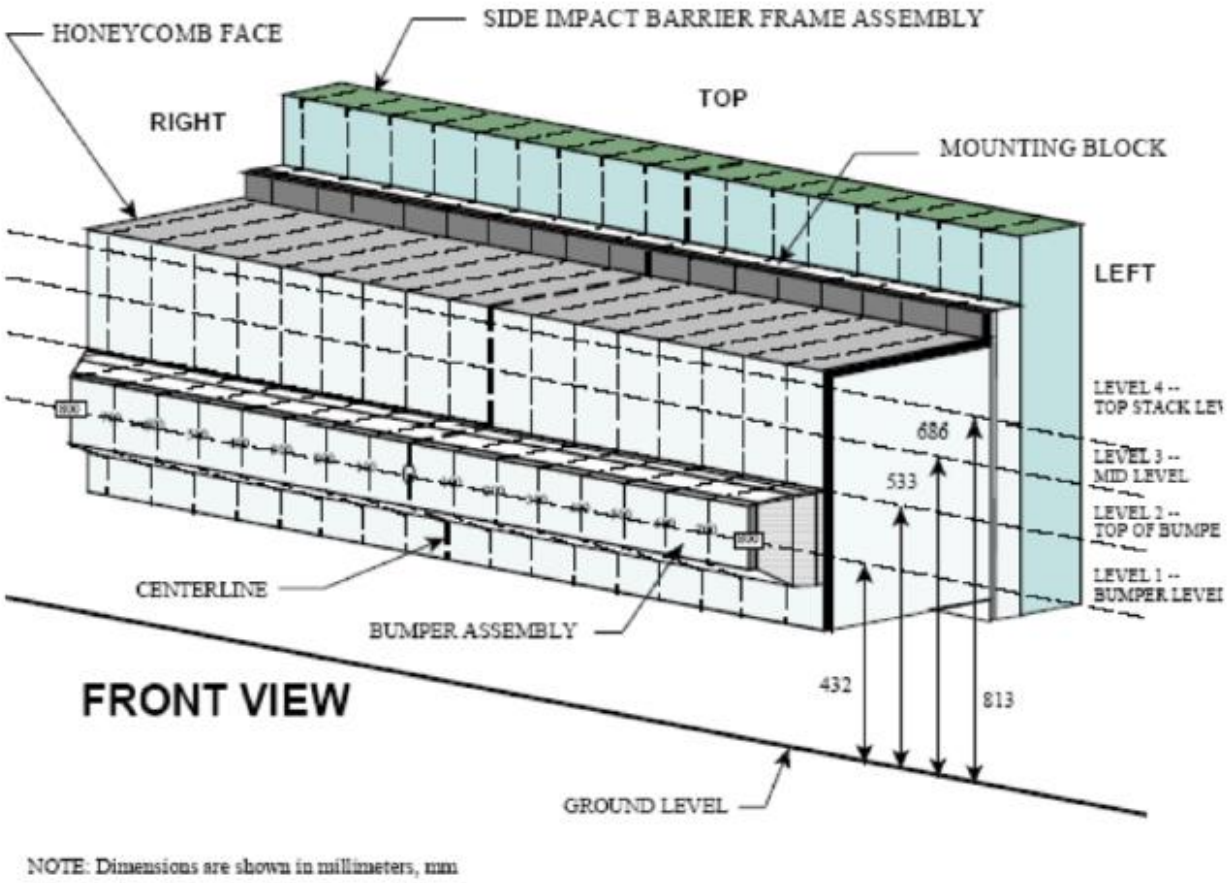
Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



NOTE: Dimensions are shown in millimeters, mm

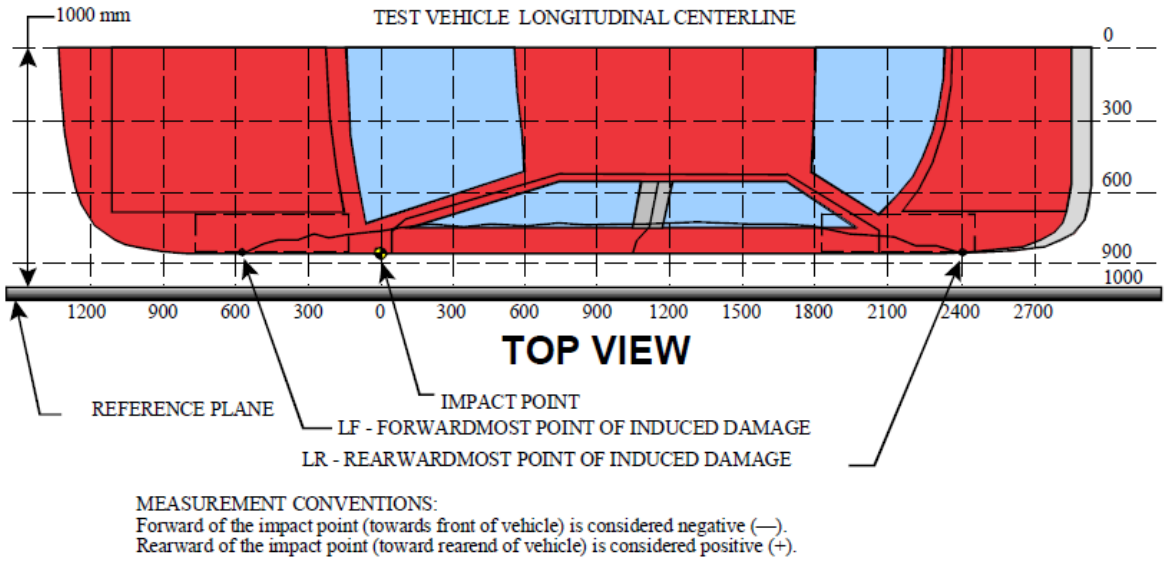
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	239	234	239	251	262	242	230	224	220	220	222	224	225	228	235	240	236
2	164	168	172	180	181	161	153	146	144	142	144	147	149	151	152	157	164
3	91	78	96	122	150	137	103	78	66	60	58	61	72	89	128	168	175
4	77	63	77	114	141	123	96	85	79	74	82	95	97	114	135	168	187

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021

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



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-150	3	79	92	-13
2	300	3	173	98	75
3	750	3	241	93	148
4	1200	3	206	95	111
5	1650	3	238	106	132
6	2100	3	111	106	5

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)*
1	800 mm left of center	1	236
2	480 mm left of center	1	227
3	160 mm left of center	1	221
4	160 mm right of center	1	228
5	480 mm right of center	1	253
6	800 mm right of center	1	239

DATA SHEET NO. 14
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021
Test Time:	10:23 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°	68	300	368
90° to 180°	70	300	370
180° to 270°	62	300	362
270° to 360°	68	300	368

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

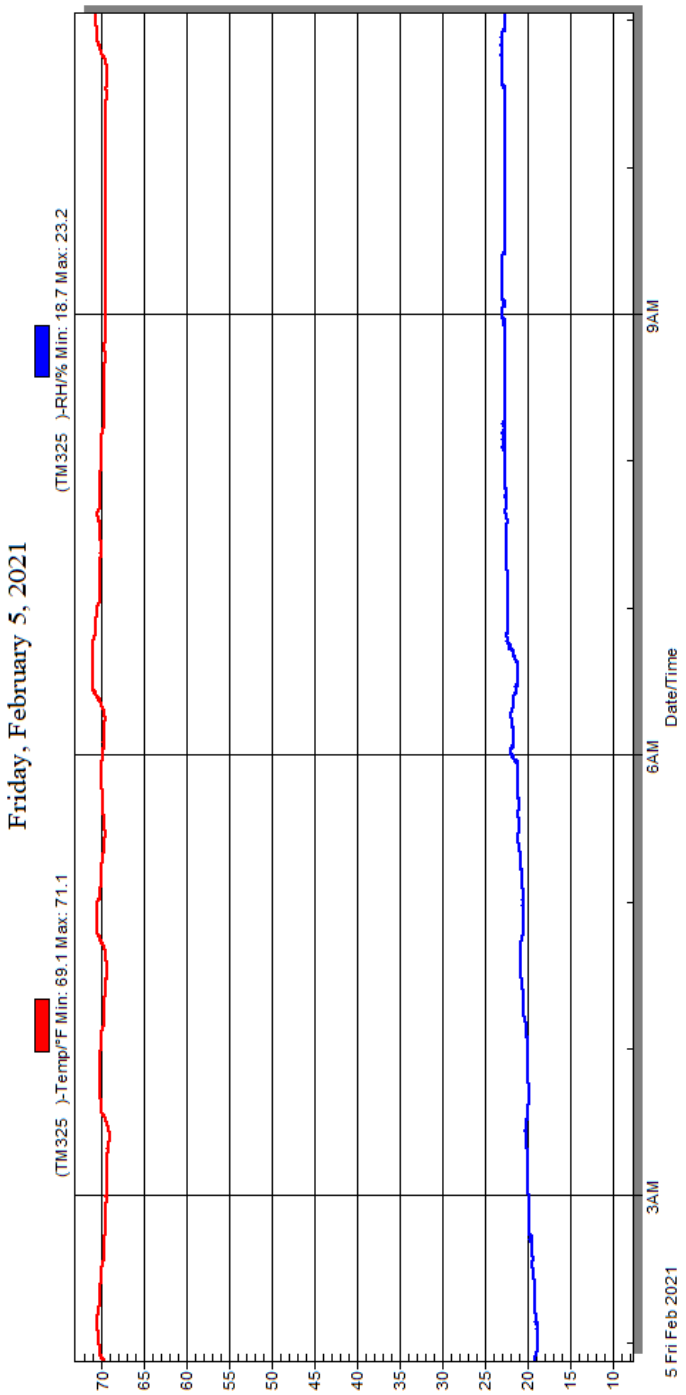
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2021 Mercedes C300 four door sedan	NHTSA No.:	M20214301
Test Program:	NCAP Side MDB Impact Test	Test Date:	2/5/2021



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

APPENDIX A

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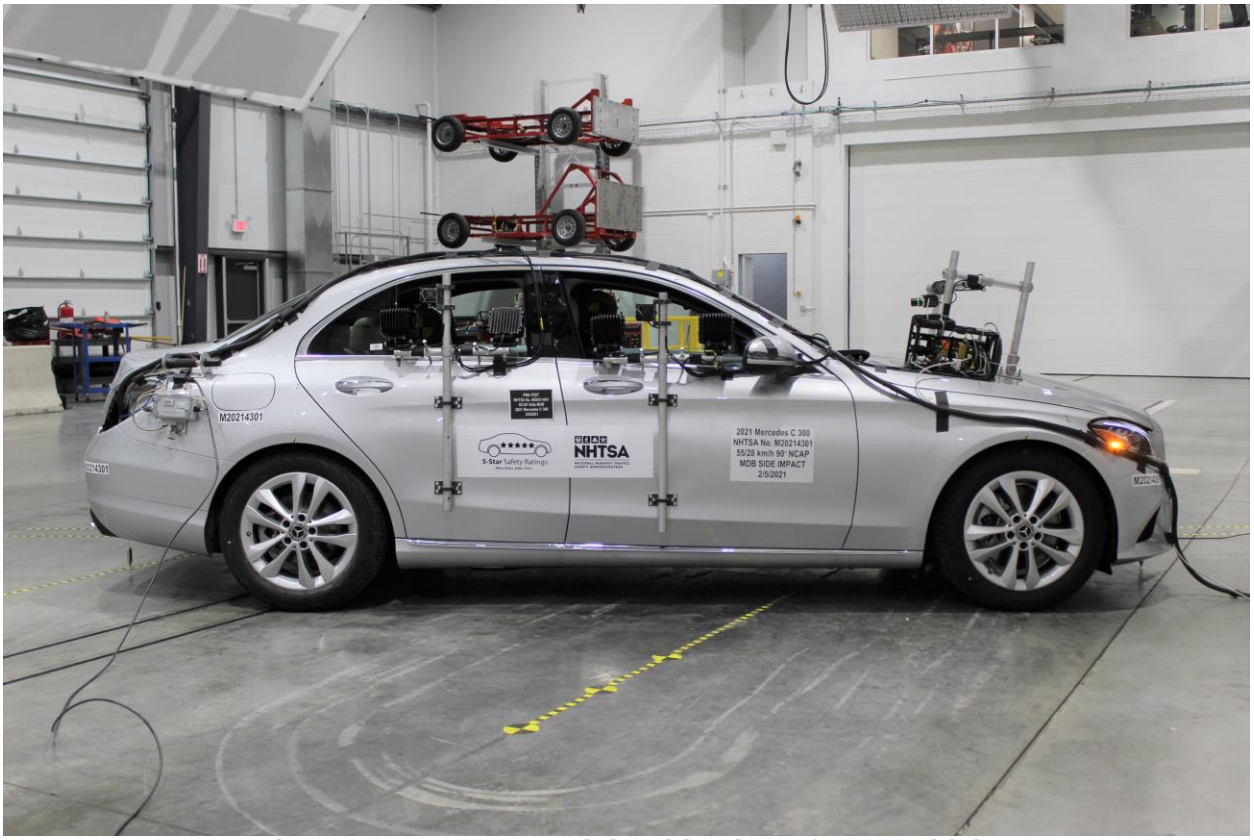

Figure A-13: Pre-Test Right Side View of Test Vehicle

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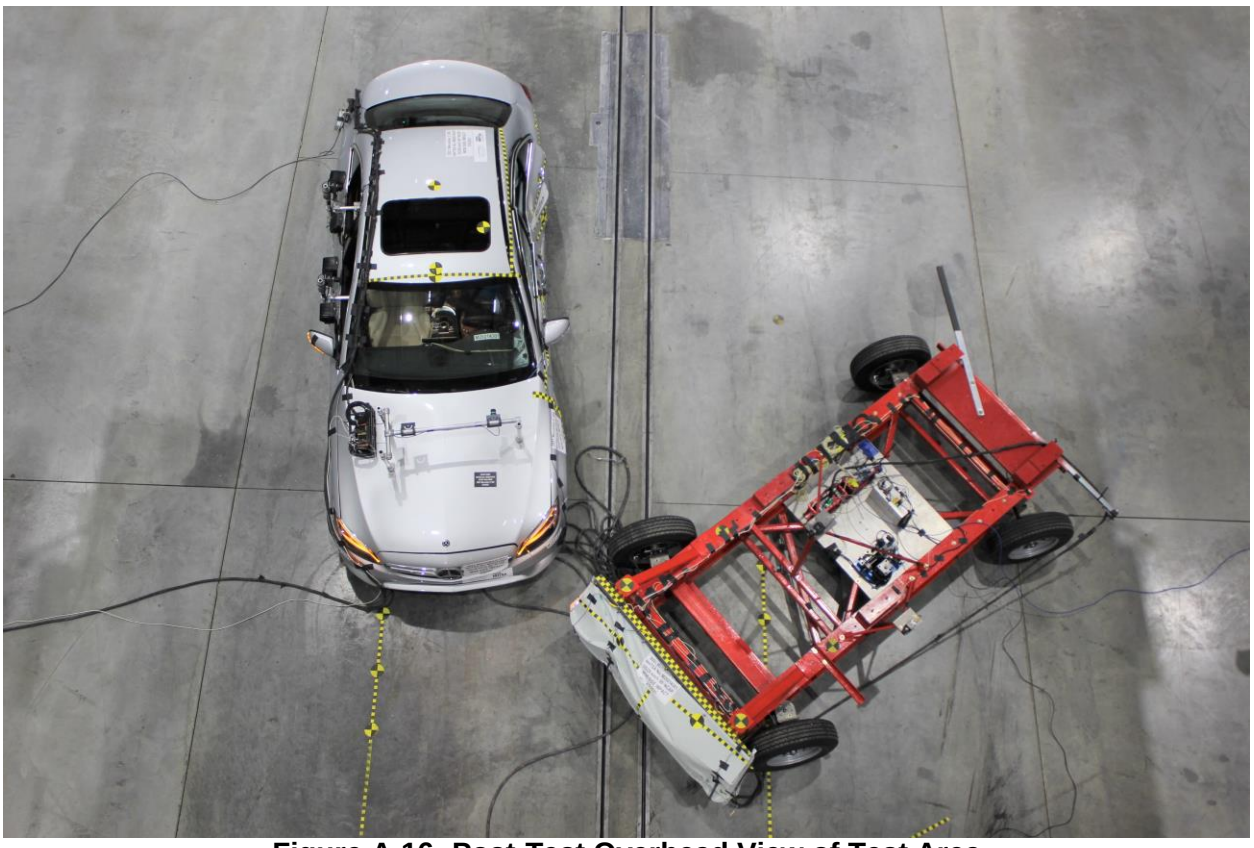

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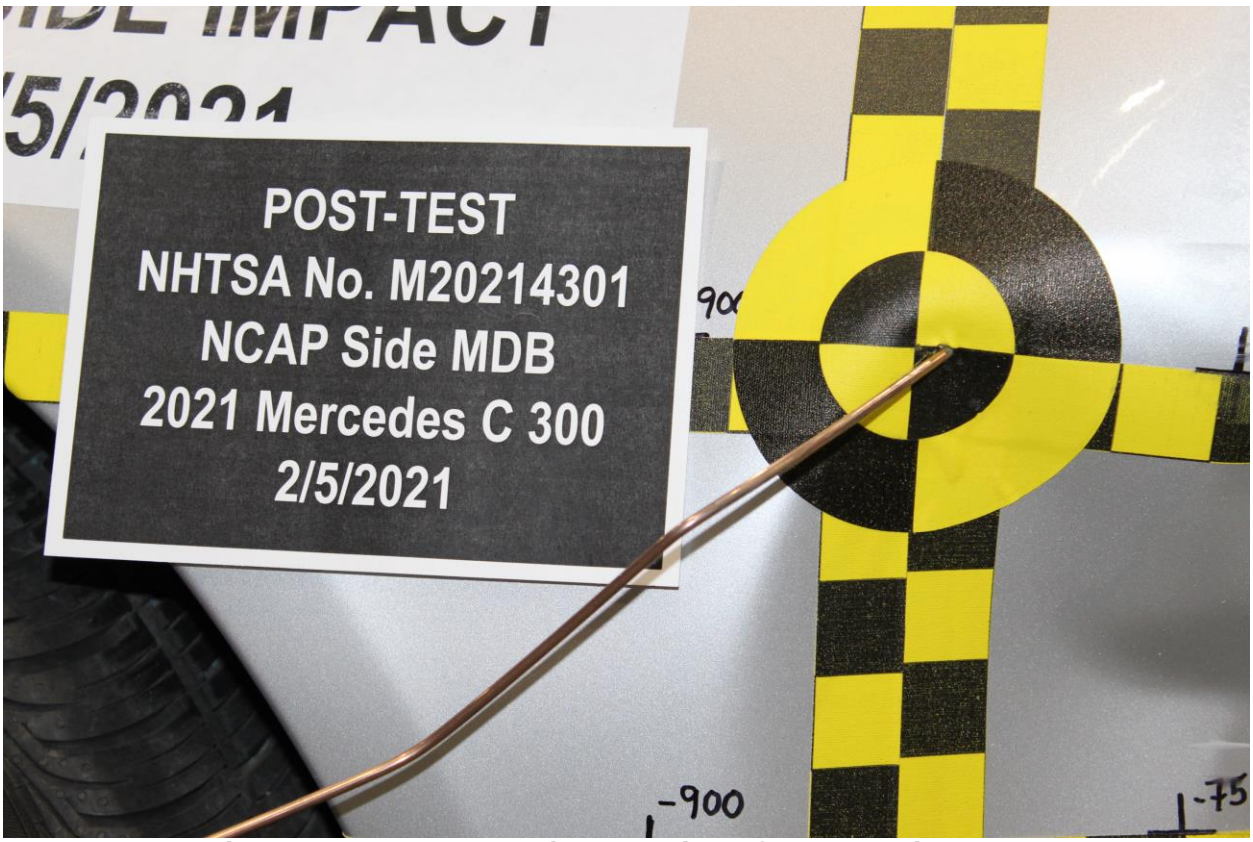
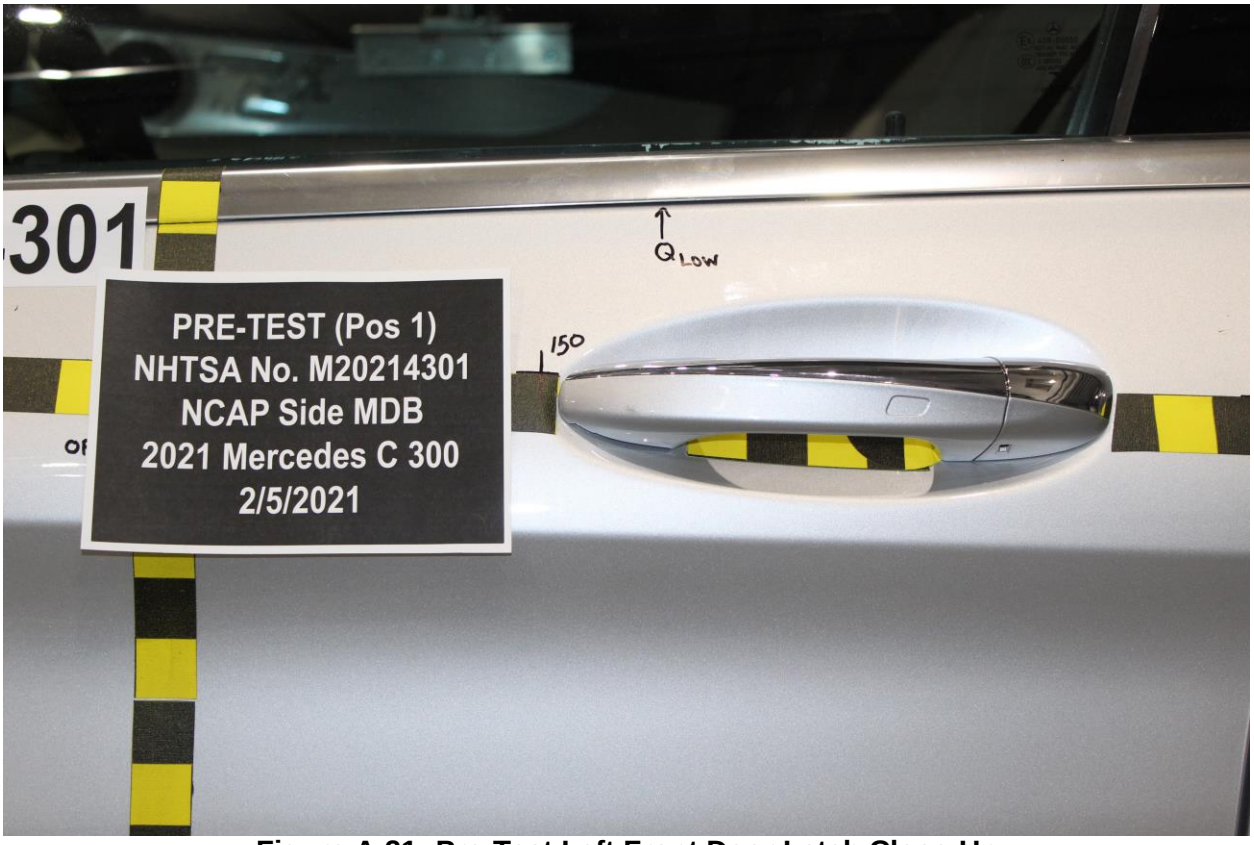


Figure A-20: Post-Test Close-up View of Impact Point Target



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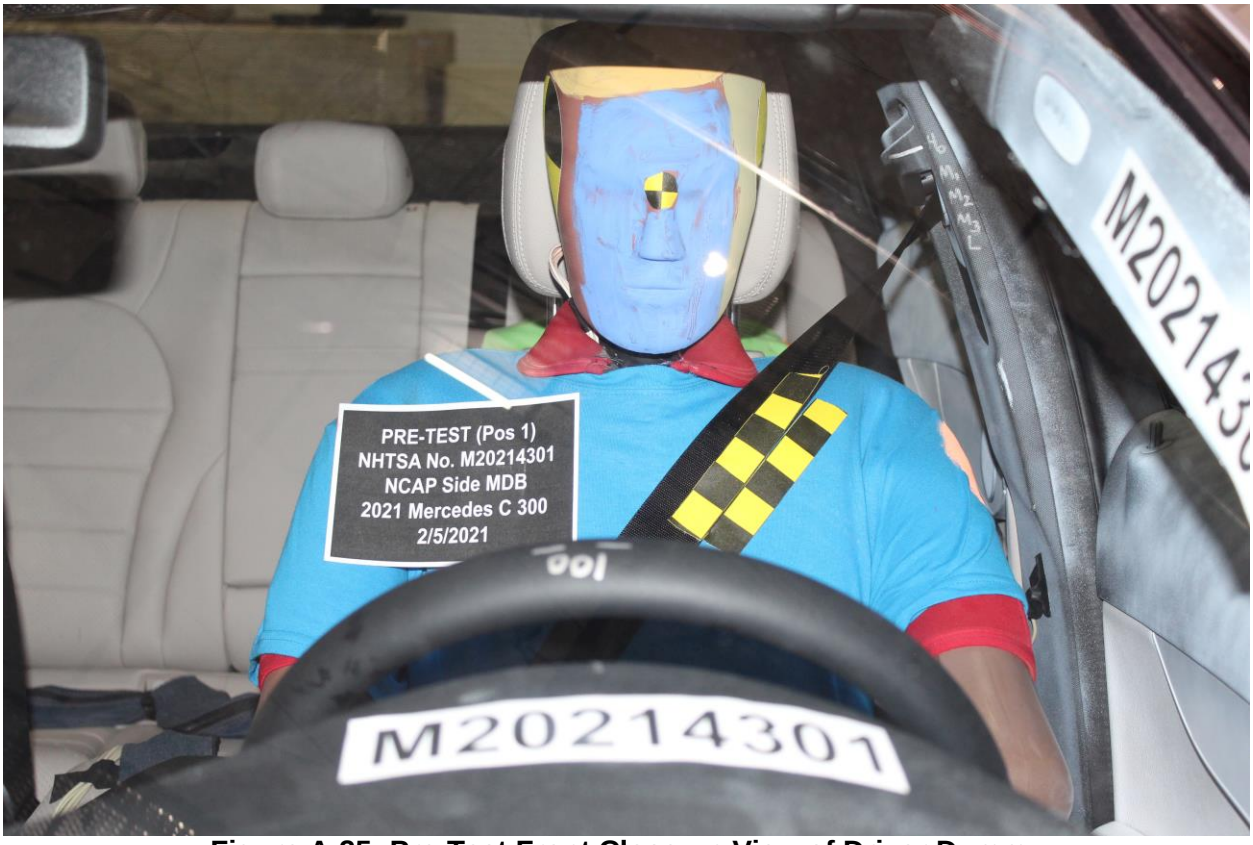

Figure A-25: Pre-Test Front Close-up View of Driver Dummy

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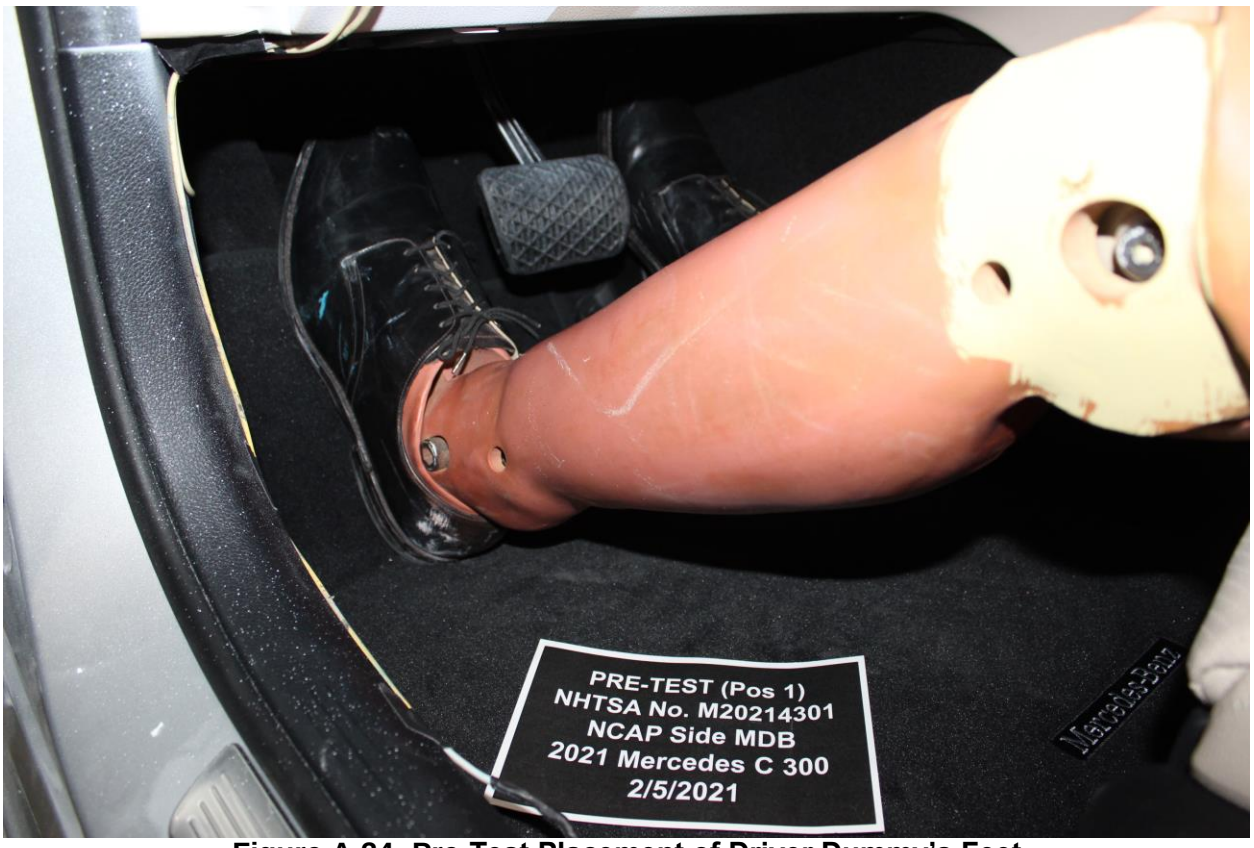

Figure A-34: Pre-Test Placement of Driver Dummy's Feet

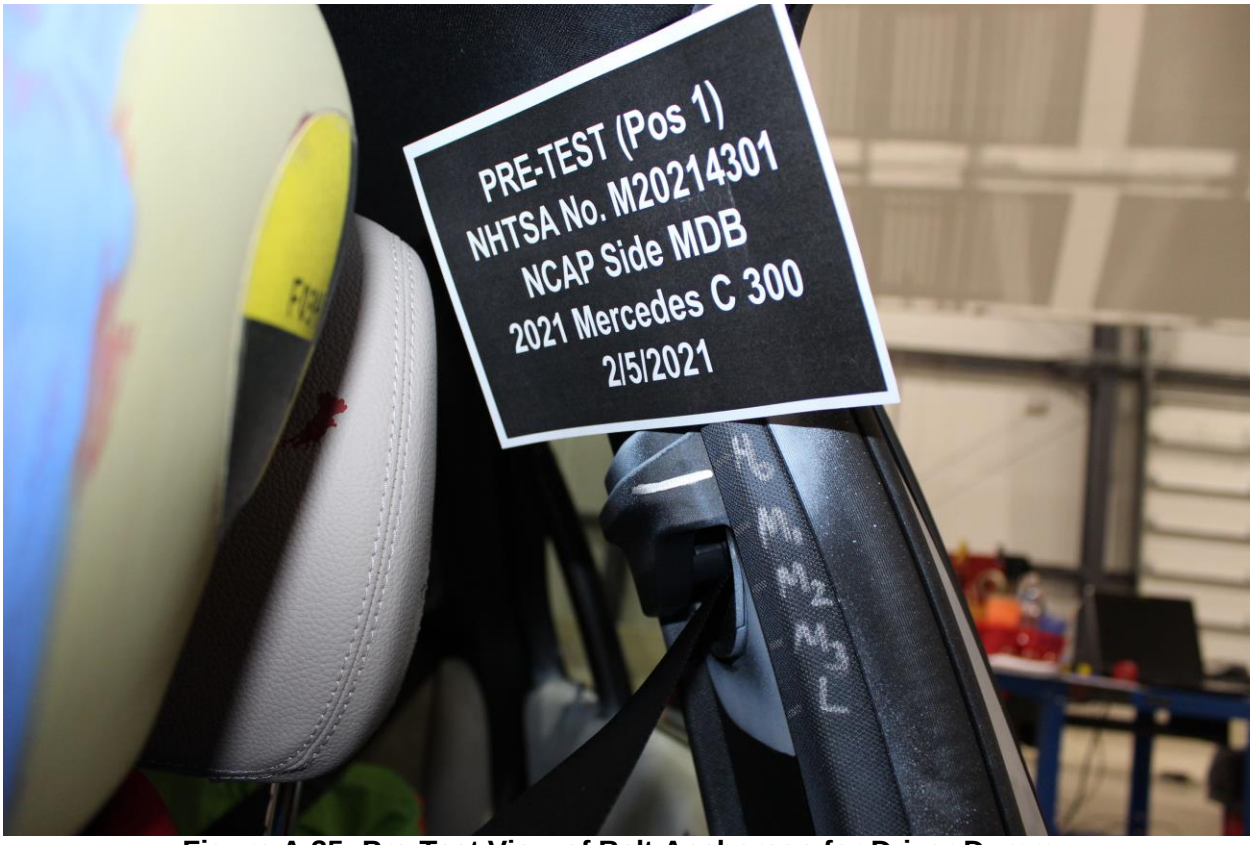

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Figure A-50: Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View

Figure A-51: Post-Test Driver Dummy Close-Up Torso Contact with Side Air bag View

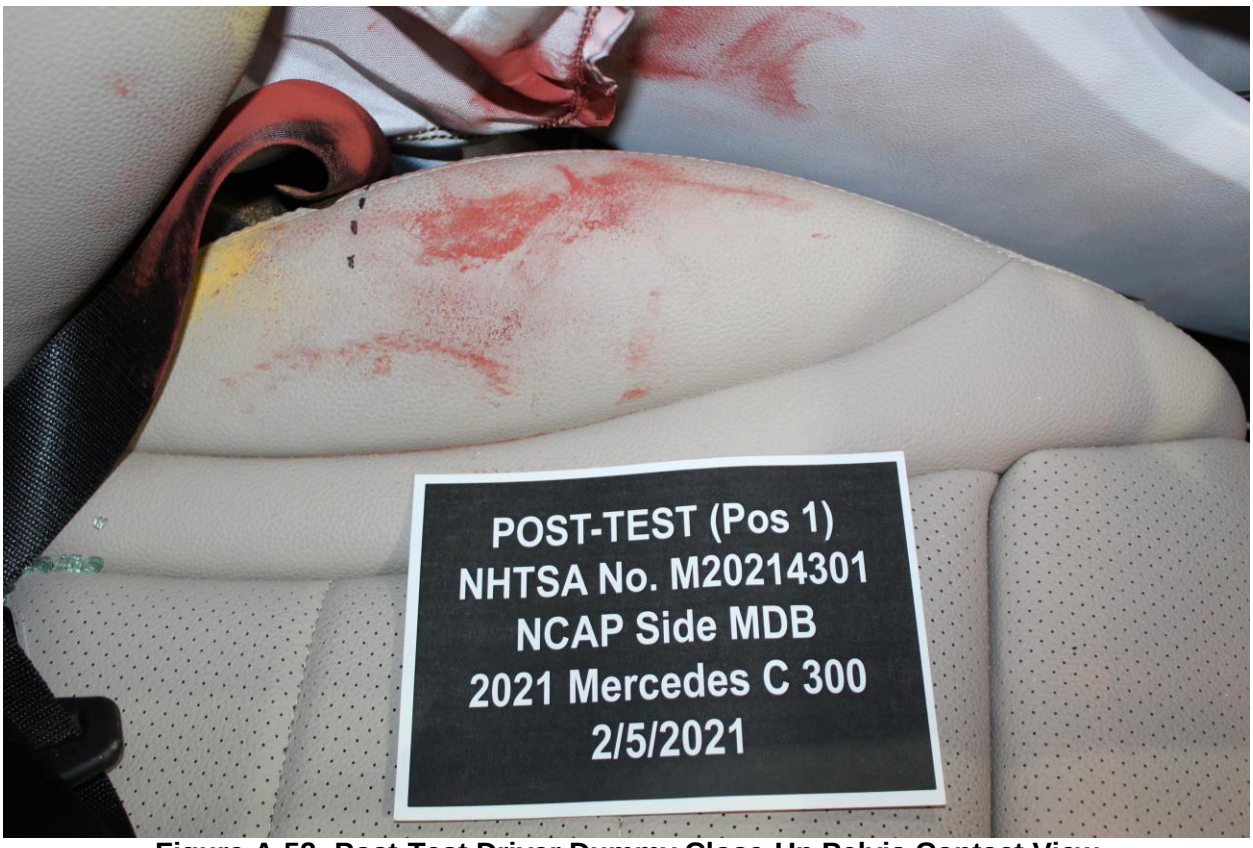

Figure A-52: Post-Test Driver Dummy Close-Up Pelvis Contact View

Figure A-53: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Air bag View

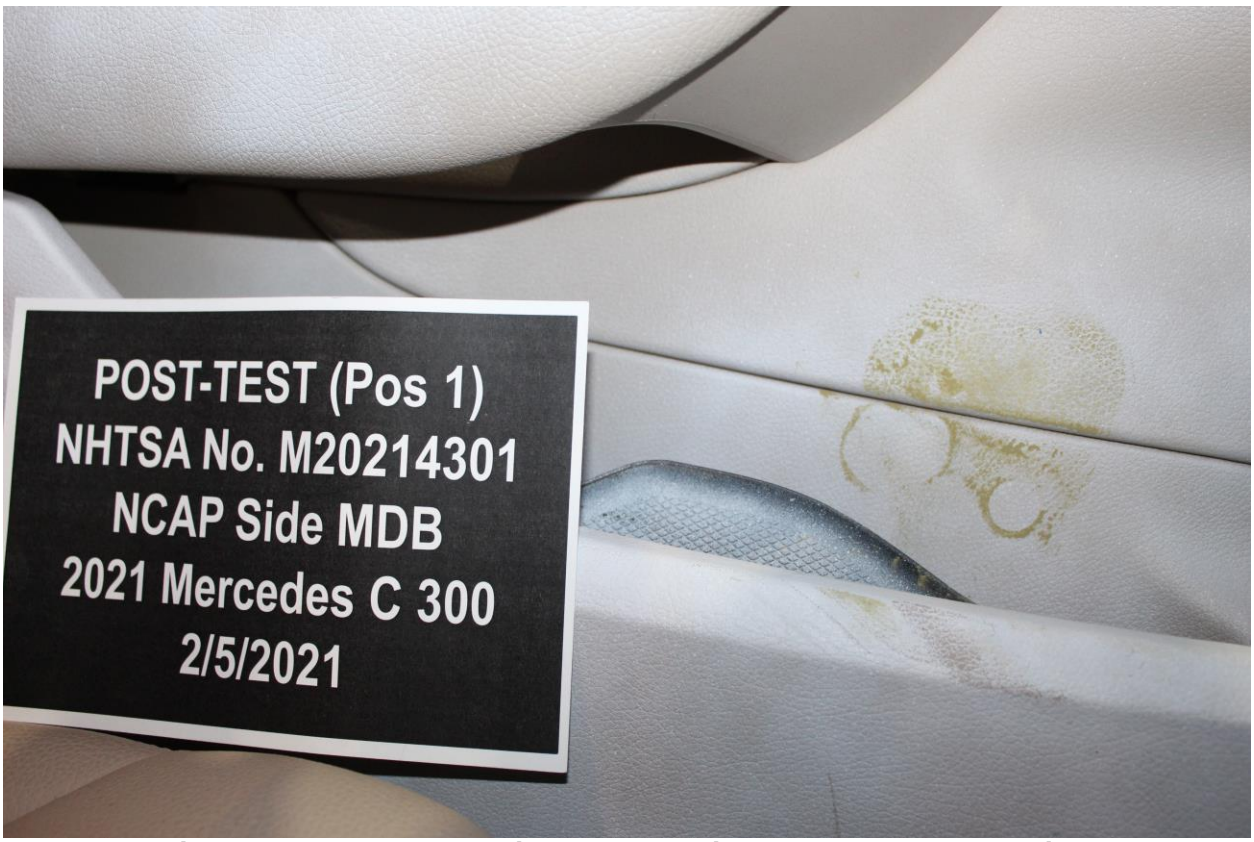

Figure A-54: Post-Test Driver Dummy Close-Up Knee Contact View

Figure A-55: Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking

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Figure A-57: Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

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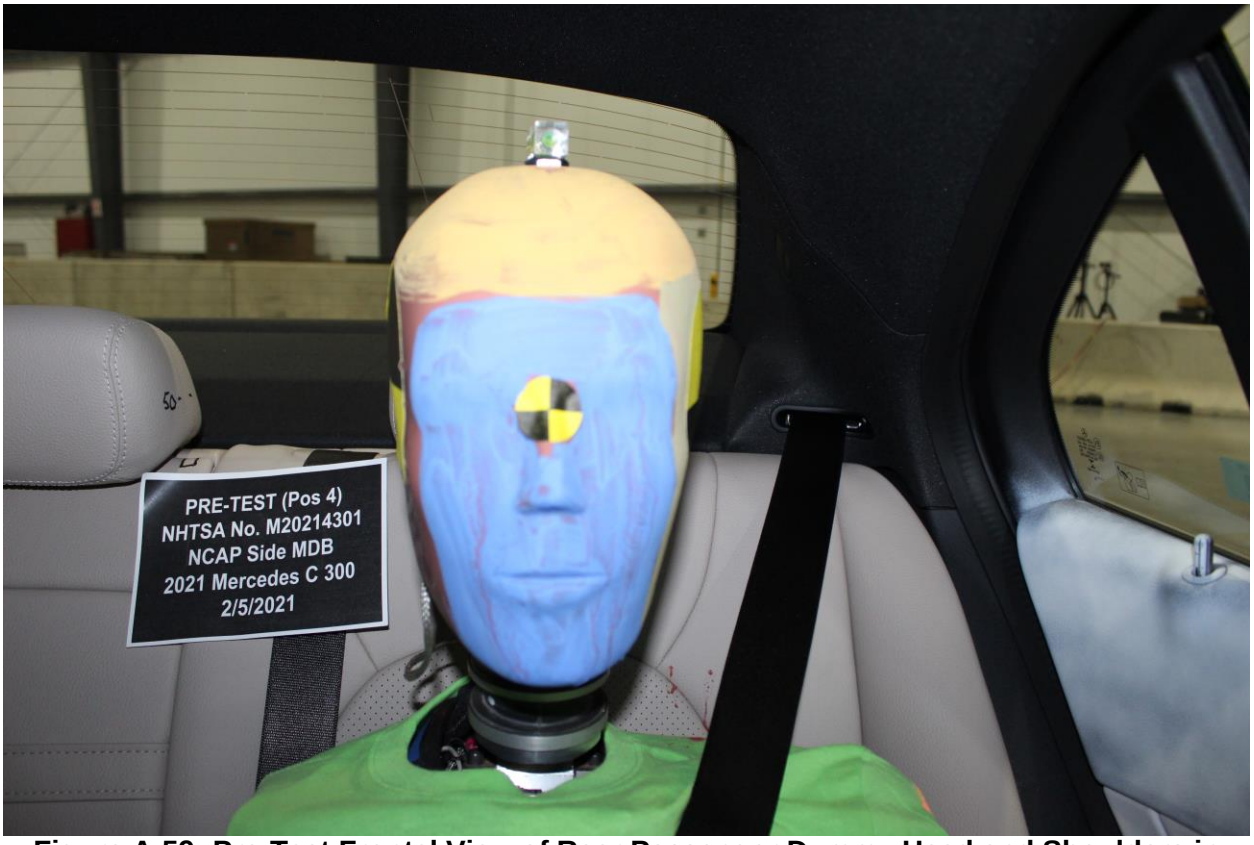

Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

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Figure A-79: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

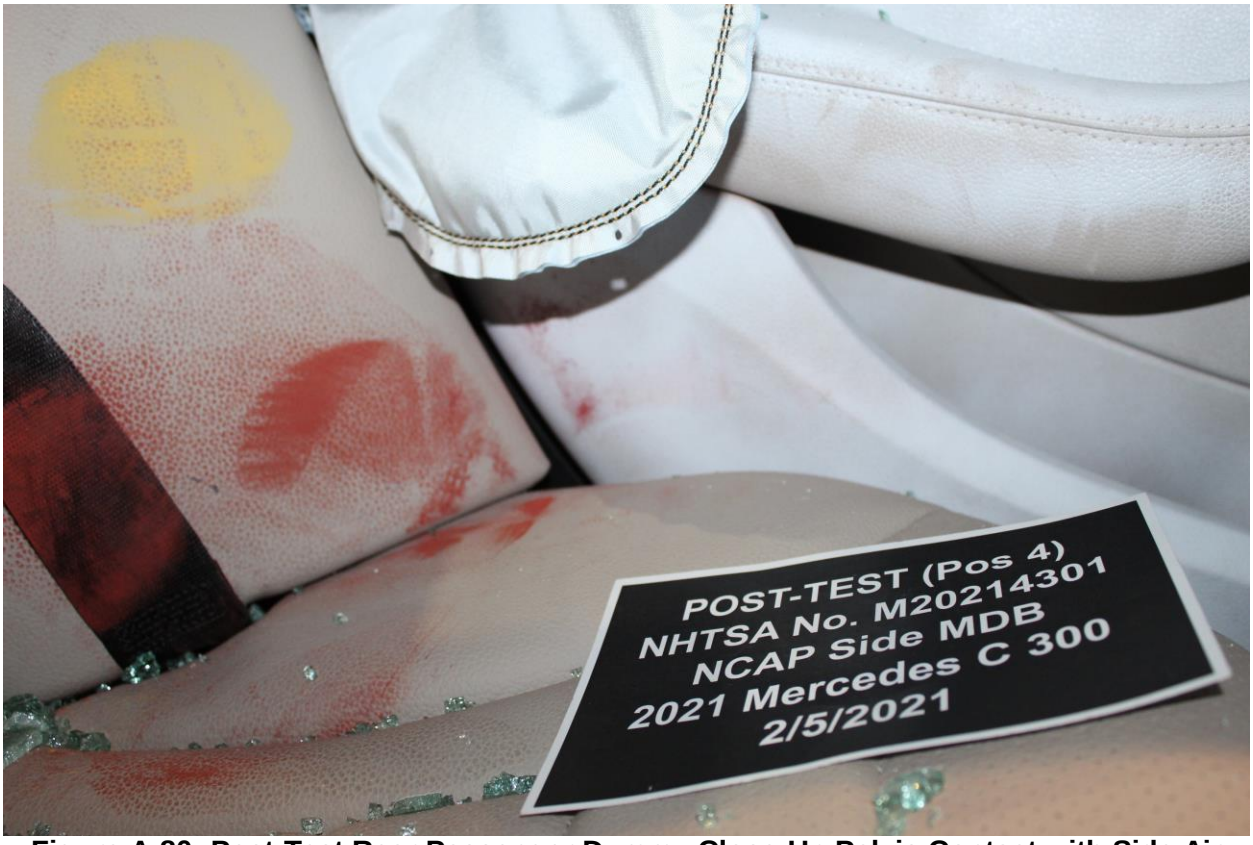

Figure A-80: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Air bag View

Figure A-81: Post-Test Rear Passenger Dummy Close-Up Knee Contact View

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Figure A-85: Post-Test Front View of MDB Impactor Face

Figure A-86: Pre-Test Top View of MDB Impactor Face

Figure A-87: Post-Test Top View of MDB Impactor Face

Figure A-88: Pre-Test Left Side View of MDB Impactor Face

Figure A-89: Post-Test Left Side View of MDB Impactor Face

Figure A-90: Pre-Test Right Side View of MDB Impactor Face

Figure A-91: Post-Test Right Side View of MDB Impactor Face

Figure A-92: Close-Up View of Vehicle's Certification Label

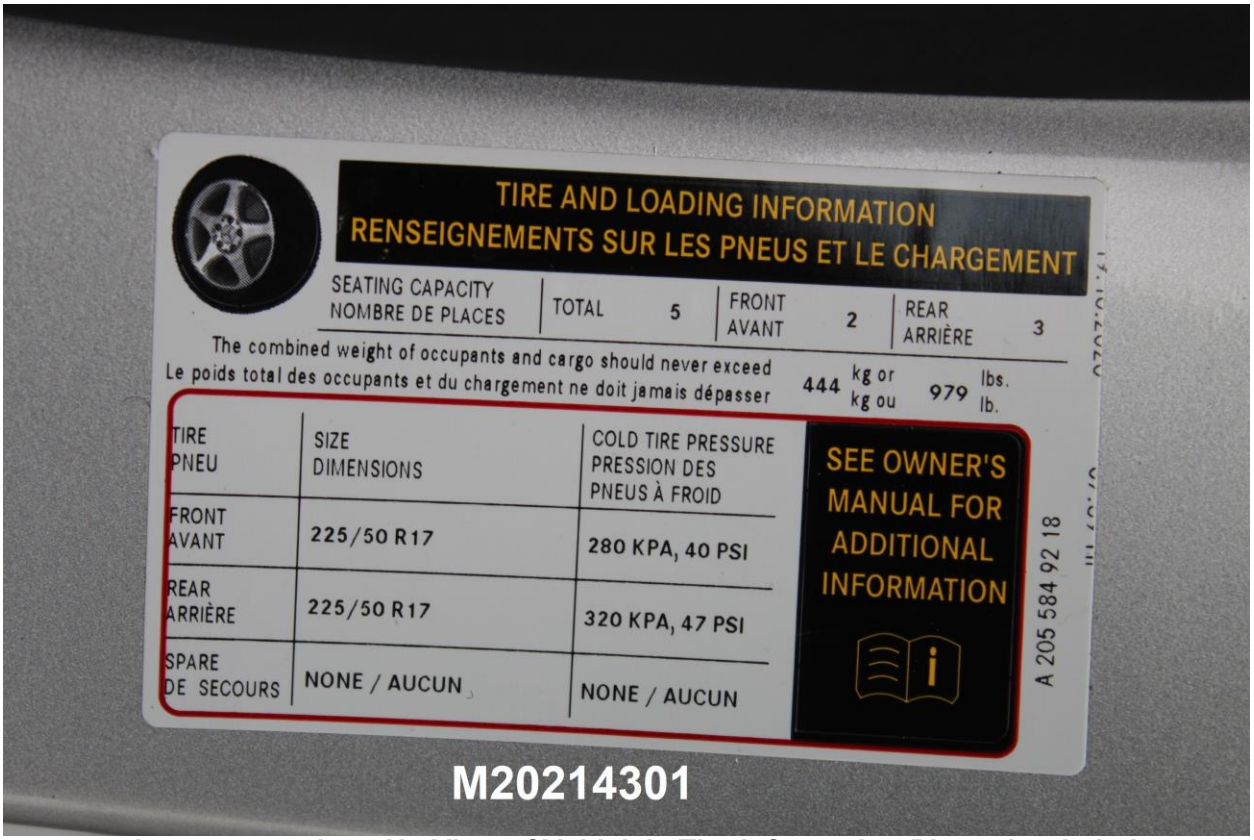

Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

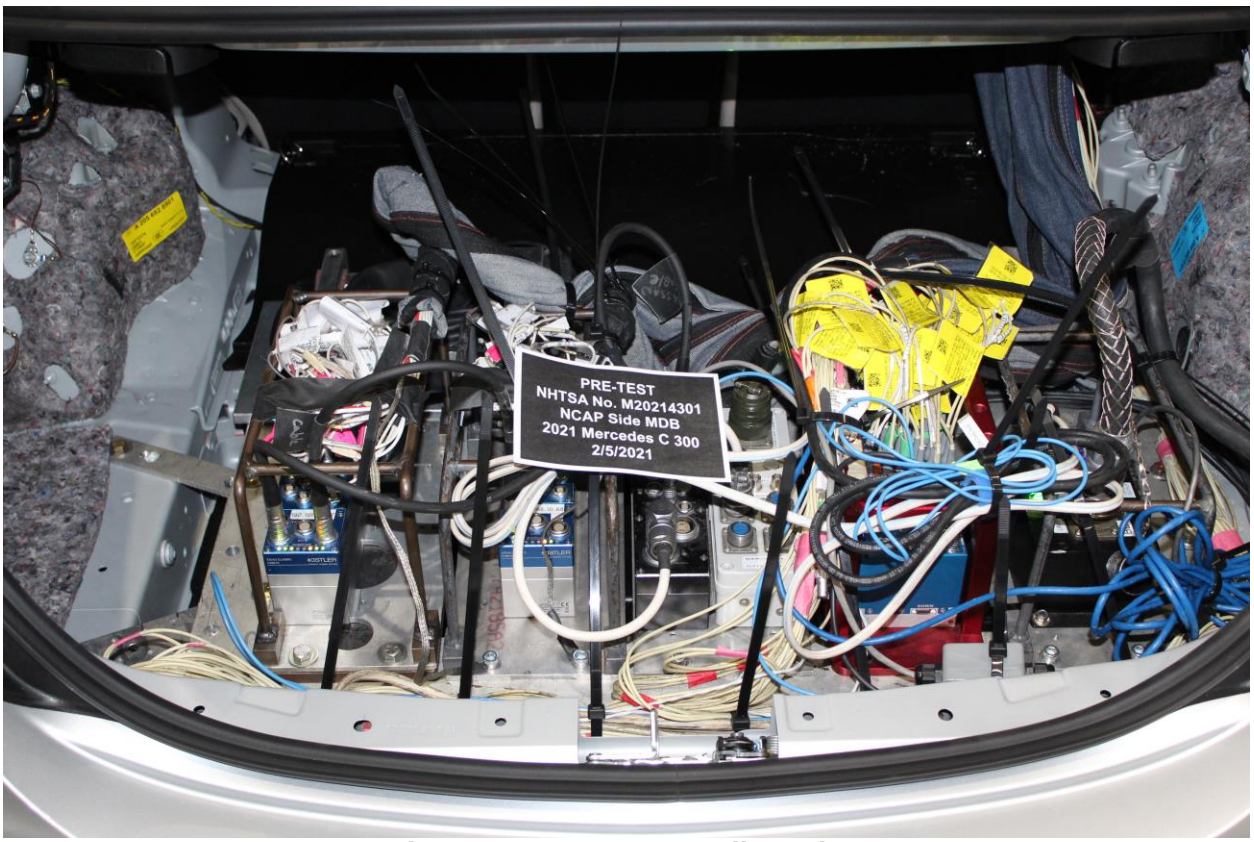

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Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees

Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

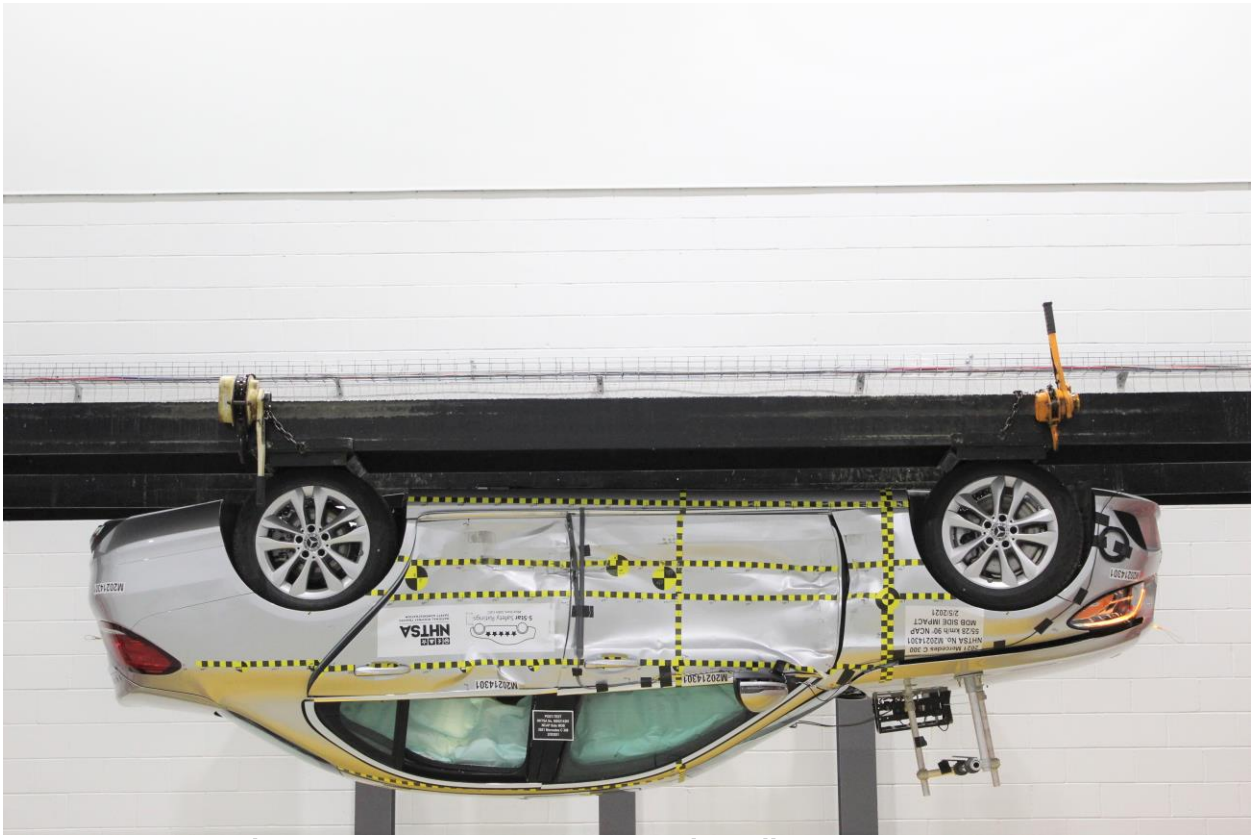


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

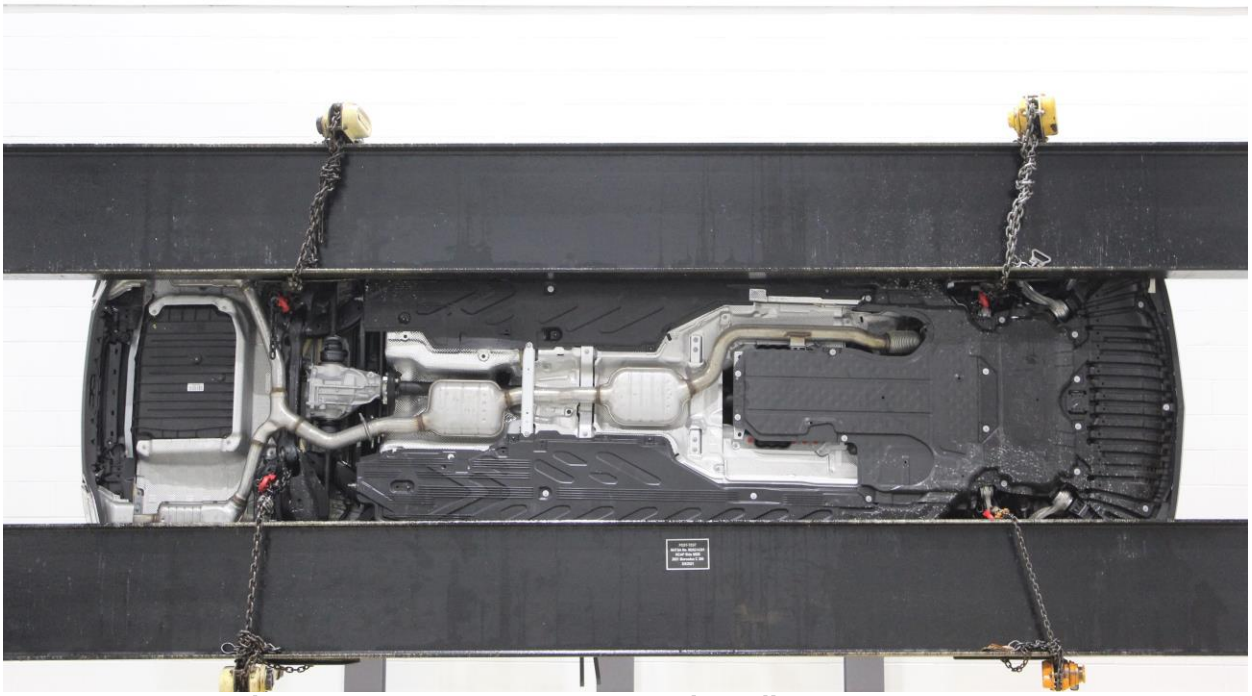
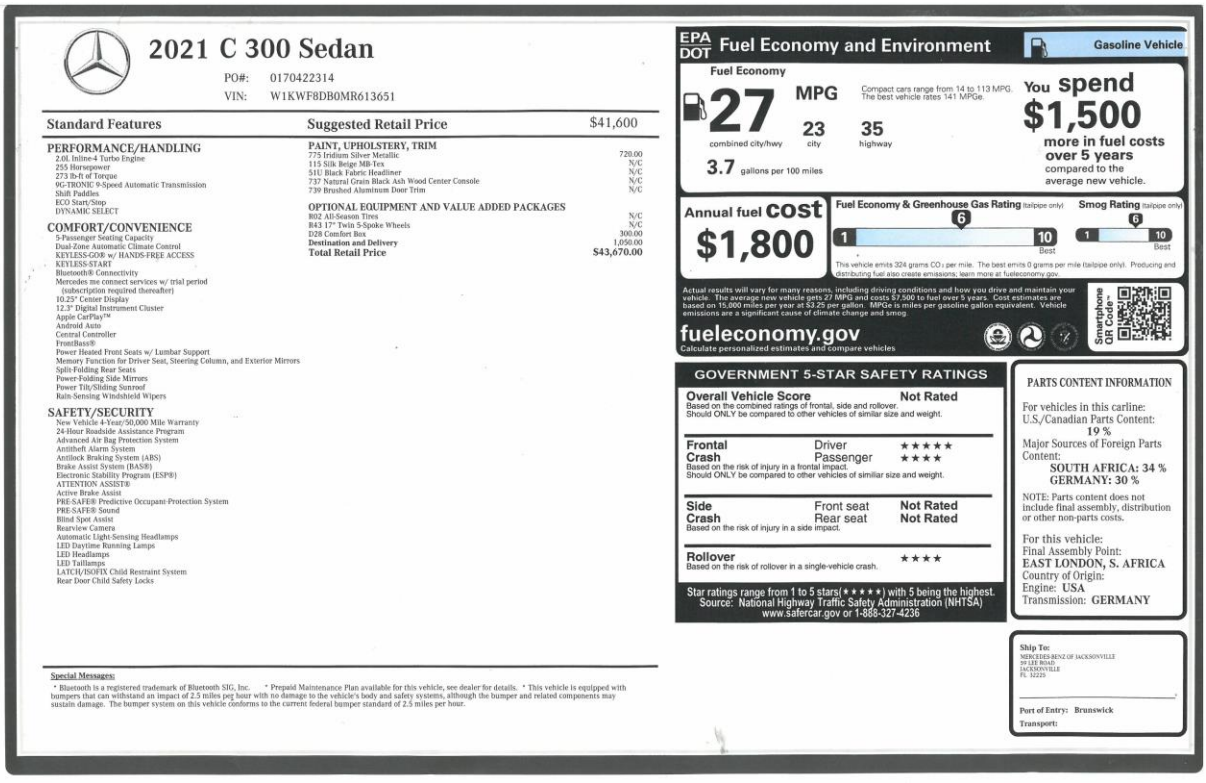


Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees

Figure A-101: Impact Event



2021 C 300 Sedan

PO#: 0170422314

VIN: W1KWF8DB0MR613651

Standard Features — **Suggested Retail Price** $41,600

PERFORMANCE/HANDLING
2.0L Inline-4 Turbo Engine
255 Horsepower
273 lb-ft of Torque
9G-TRONIC 9-Speed Automatic Transmission
Shift Paddles
ECO Start/Stop
DYNAMIC SELECT

COMFORT/CONVENIENCE
5-Passenger Seating Capacity
Dual-Zone Automatic Climate Control
KEYLESS-GO® w/ HANDS-FREE ACCESS
KEYLESS-START
Bluetooth® Connectivity
Mercedes me connect services w/ trial period (subscription required thereafter)
10.25" Center Display
12.3" Digital Instrument Cluster
Apple CarPlay™
Android Auto
Central Controller
FrontBass®
Power Heated Front Seats w/ Lumbar Support
Memory Function for Driver Seat, Steering Column, and Exterior Mirrors
Split-Folding Rear Seats
Power-Folding Side Mirrors
Power Tilt/Sliding Sunroof
Rain-Sensing Windshield Wipers

SAFETY/SECURITY
New Vehicle 4-Year/50,000 Mile Warranty
24-Hour Roadside Assistance Program
Advanced Air Bag Protection System
Antitheft Alarm System
Antilock Braking System (ABS)
Brake Assist System (BAS®)
Electronic Stability Program (ESP®)
ATTENTION ASSIST®
Active Brake Assist
PRE-SAFE® Predictive Occupant-Protection System
PRE-SAFE® Sound
Blind Spot Assist
Rearview Camera
Automatic Light-Sensing Headlamps
LED Daytime Running Lamps
LED Headlamps
LED Taillamps
LATCH/ISOFIX Child Restraint System
Rear Door Child Safety Locks

PAINT, UPHOLSTERY, TRIM

775 Iridium Silver Metallic	720.00
115 Silk Beige MB-Tex	N/C
51U Black Fabric Headliner	N/C
737 Natural Grain Black Ash Wood Center Console	N/C
739 Brushed Aluminum Door Trim	N/C

OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES

802 All-Season Tires	N/C
843 17" Twin 5-Spoke Wheels	N/C
D28 Comfort Box	300.00
Destination and Delivery	1,050.00
Total Retail Price	**$43,670.00**

Special Messages:

* Bluetooth is a registered trademark of Bluetooth SIG, Inc. * Prepaid Maintenance Plan available for this vehicle, see dealer for details. * This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **27** MPG combined city/hwy — 23 city — 35 highway — 3.7 gallons per 100 miles

Compact cars range from 14 to 113 MPG. The best vehicle rates 141 MPGe.

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

Annual fuel cost **$1,800**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 6 (1 Worst – 10 Best)

Smog Rating (tailpipe only): 6 (1 Worst – 10 Best)

This vehicle emits 324 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 $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.25 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

GOVERNMENT 5-STAR SAFETY RATINGS

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

Frontal Crash — Driver ★★★★★ — Passenger ★★★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similiar size and weight.

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

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

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

PARTS CONTENT INFORMATION

For vehicles in this carline:
U.S./Canadian Parts Content: **19 %**
Major Sources of Foreign Parts Content:
SOUTH AFRICA: 34 %
GERMANY: 30 %
NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

For this vehicle:
Final Assembly Point: **EAST LONDON, S. AFRICA**
Country of Origin:
Engine: **USA**
Transmission: **GERMANY**

Ship To:
MERCEDES-BENZ OF JACKSONVILLE
59 LEE ROAD
JACKSONVILLE
FL 32225

Port of Entry: **Brunswick**
Transport:

Figure A-102: Monroney Label

WARNING Risk of injury due to head restraints which are not installed or are adjusted incorrectly

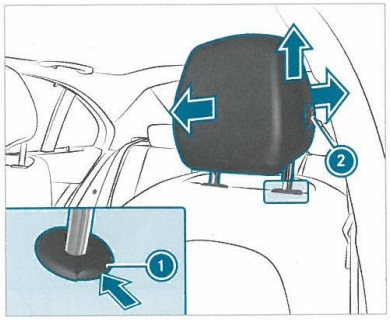
If head restraints are not installed or are adjusted incorrectly, the head restraints cannot provide protection as intended.

There is an increased risk of injury in the head and neck area, e.g. in the event of an accident or when braking.

- Always drive with the head restraints installed.
- Before driving off, make sure for every vehicle occupant that the center of the head restraint supports the back of the head at about eye level.

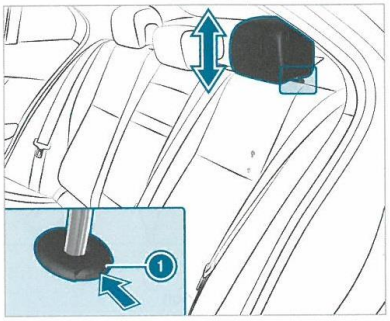
Do not interchange the head restraints of the front and rear seats. Otherwise, you will not be able to adjust the height and angle of the head restraints correctly.

Adjust the head restraint fore-and-aft position so that it is as close as possible to the back of your head.



- **To raise:** pull the head restraint up.
- **To lower:** press release knob (1) in the direction of the arrow and push the head restraint down.
- **To move forwards:** pull the head restraint forwards.
- **To move backwards:** press and hold release knob (2).
- Push the head restraint backwards and let go of release knob (2).

Adjusting the head restraints of the rear seats mechanically

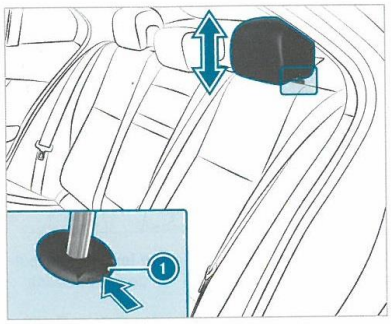


- **To raise:** pull the head restraint up.
- **To lower:** press the release knob (1) in the direction of the arrow and push the head restraint down.

Figure A-103: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Installing/removing the rear seat head restraints

Removing



- Release the rear seat backrest and fold it forwards slightly (→ page 108).
- Pull the head restraint upwards as far as it will go.
- Push release knob (1) in the direction of the arrow and pull out the head restraint.

Installing

- Insert the head restraint such that the notches on the bar are on the left when viewed in the direction of travel.
- Push the head restraint down until it engages.
- Fold the rear seat backrest back until it engages.

Configuring the seat settings

Multimedia system:

→ ⌂ ▸▸ Comfort ▸▸ Seat Comfort

- Select a seat.

Adjusting the backrest side bolsters

- Select Side Bolsters.
- Adjust the air cushions.

Adjusting the seat contour in the lumbar region of the seat backrest (lumbar)

- Select Lumbar.
- Adjust the air cushions.

Selecting the massage program for the front seats

Multimedia system:

→ Vehicle ▸▸ Seats

- Select Driver's Seat or Passenger.
- Select Massage.
- Select a massage program.
  The massage program runs for approximately 9 to 15 minutes, depending on the setting.
- **To set the massage intensity:** switch High Intensity on ☑ or off ☐.

Resetting seat adjustments

Multimedia system:

→ Vehicle ▸▸ Seats ▸▸ Reset

- Select Yes or No.

Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual-Rear Restraints Not Adjustable

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

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1	Driver Head Acceleration (X) Primary vs. Time	B-5
2	Driver Head Acceleration (Y) Primary vs. Time	B-5
3	Driver Head Acceleration (Z) Primary vs. Time	B-5
4	Driver Head Resultant Acceleration Primary vs. Time	B-5
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-6
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-6
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-6
8	Driver Thorax Rib Deflection Maximum vs. Time	B-6
9	Driver Anterior Abdominal Force (Y) vs. Time	B-7
10	Driver Middle Abdominal Force (Y) vs. Time	B-7
11	Driver Posterior Abdominal Force (Y) vs. Time	B-7
12	Driver Total Abdominal Force (Y) vs. Time	B-7
13	Driver Pubic Symphysis Force (Y) vs. Time	B-8
14	Passenger Head Acceleration (X) vs. Time Primary	B-8
15	Passenger Head Acceleration (Y) vs. Time Primary	B-8
16	Passenger Head Acceleration (Z) vs. Time Primary	B-8
17	Passenger Head Resultant Acceleration Primary vs. Time	B-9
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-9
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-9
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-9
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-10
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-10
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-10
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-10

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 & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

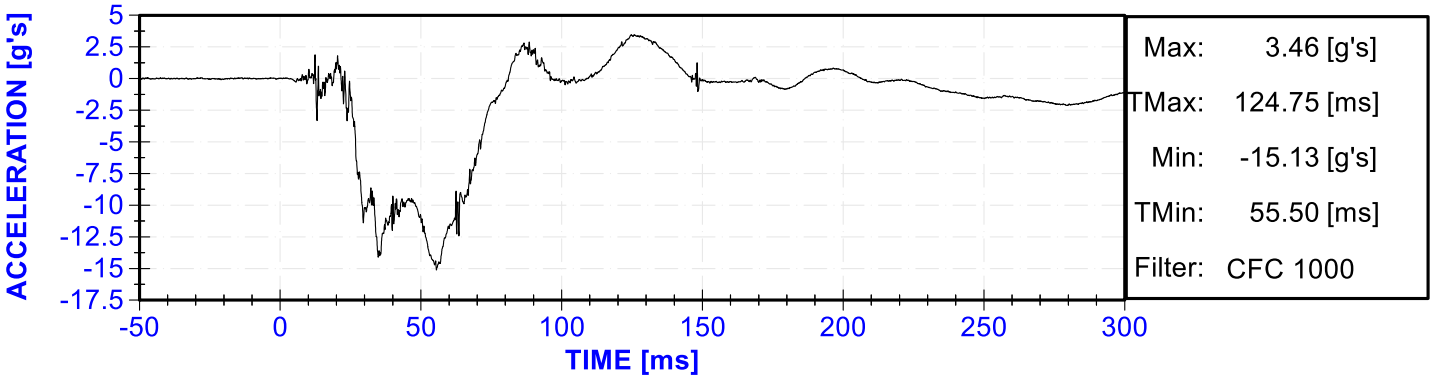
Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Structure Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

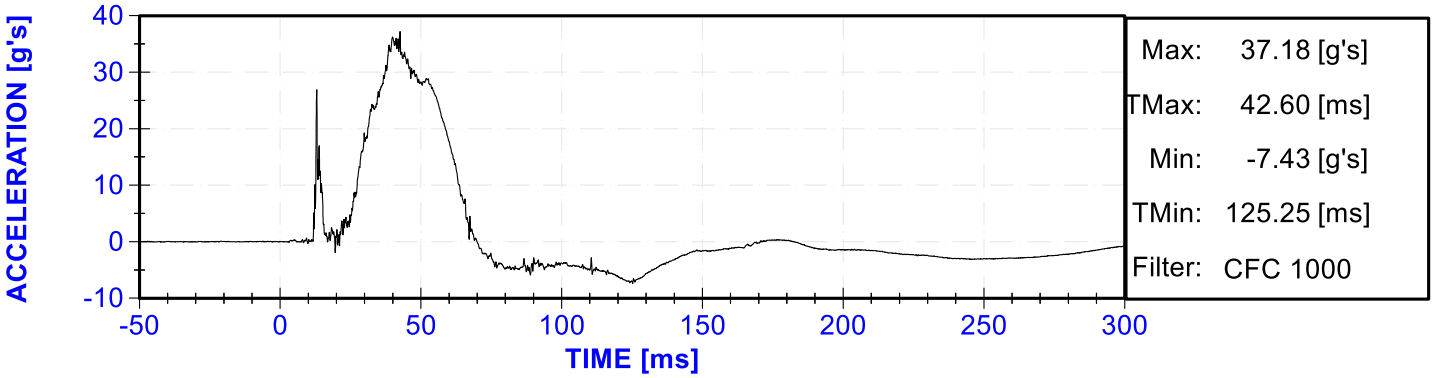
MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

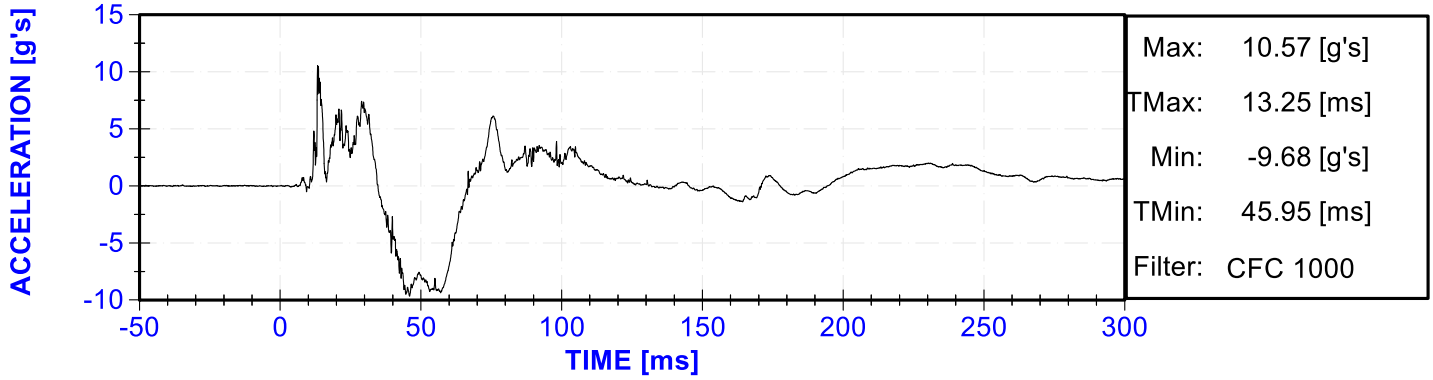
Driver Head Acceleration (X) Primary vs. Time



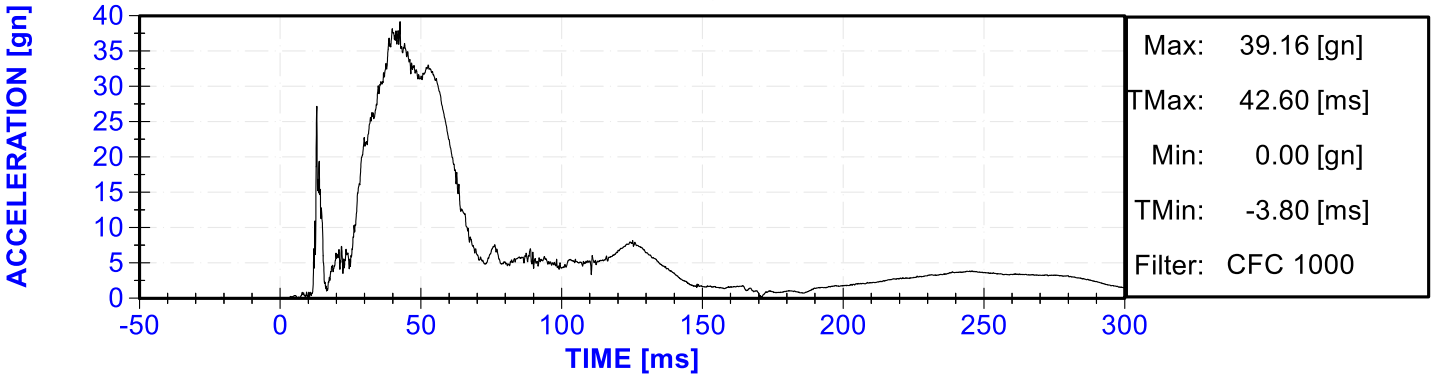
Driver Head Acceleration (Y) Primary vs. Time



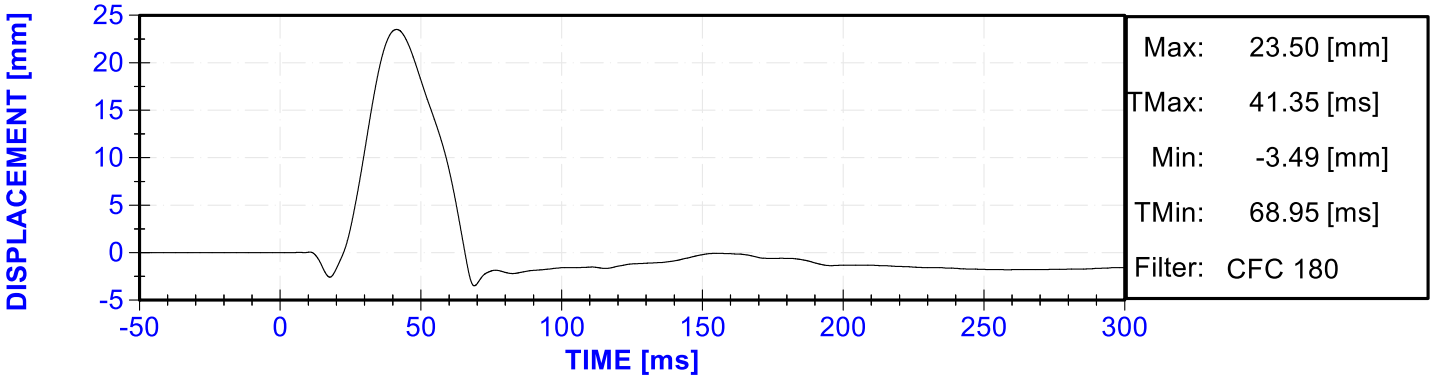
Driver Head Acceleration (Z) Primary vs. Time



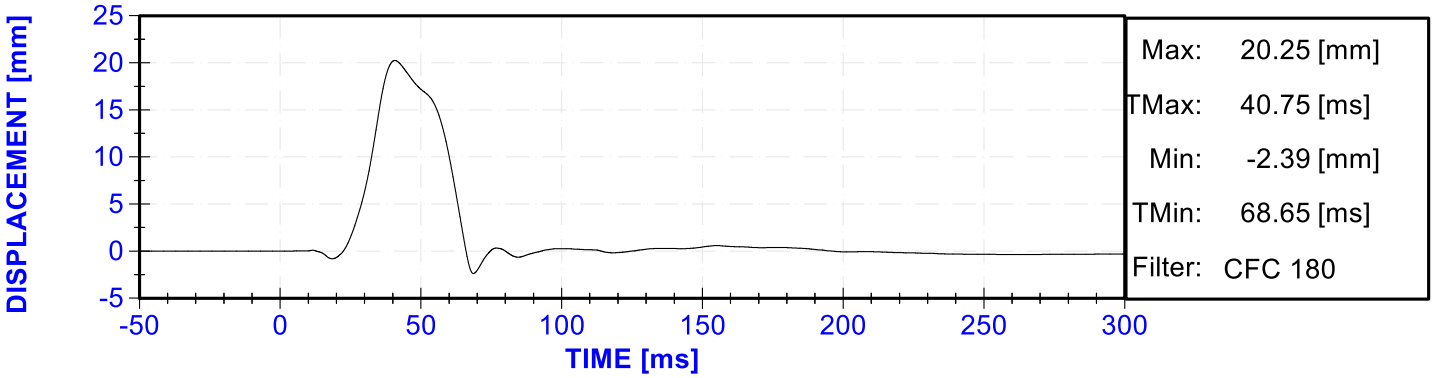
Driver Head Resultant Acceleration Primary vs. Time



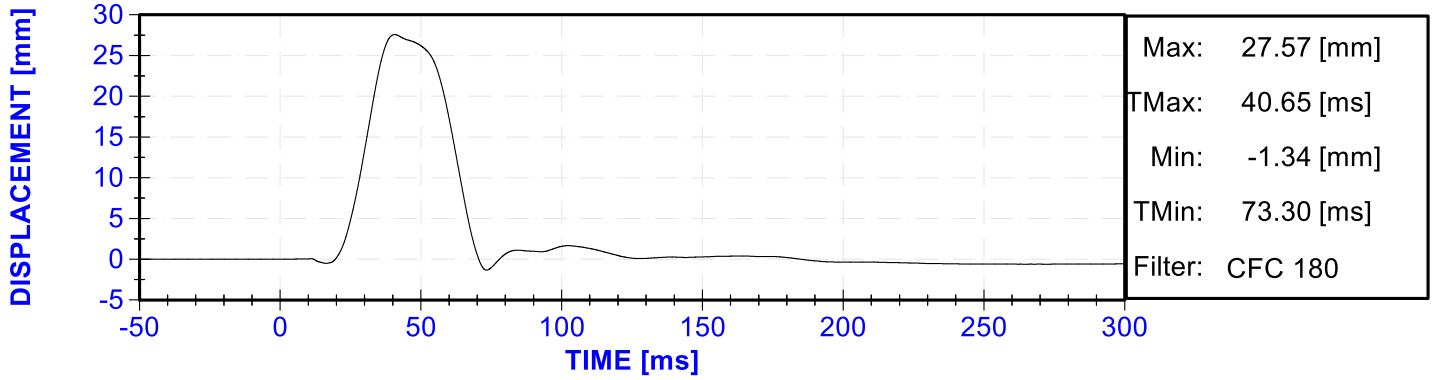
Driver Upper Thorax Rib Deflection (Y) vs. Time



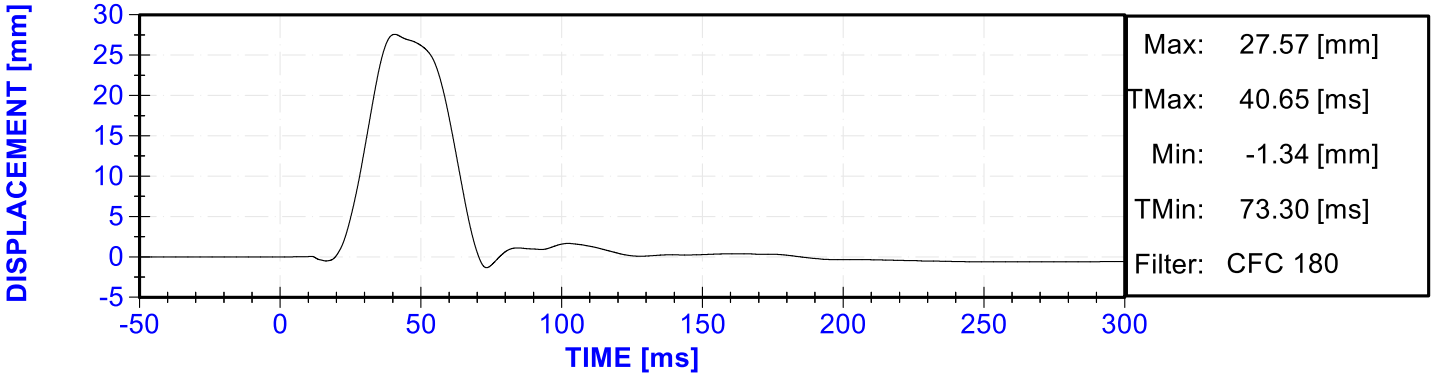
Driver Middle Thorax Rib Deflection (Y) vs. Time



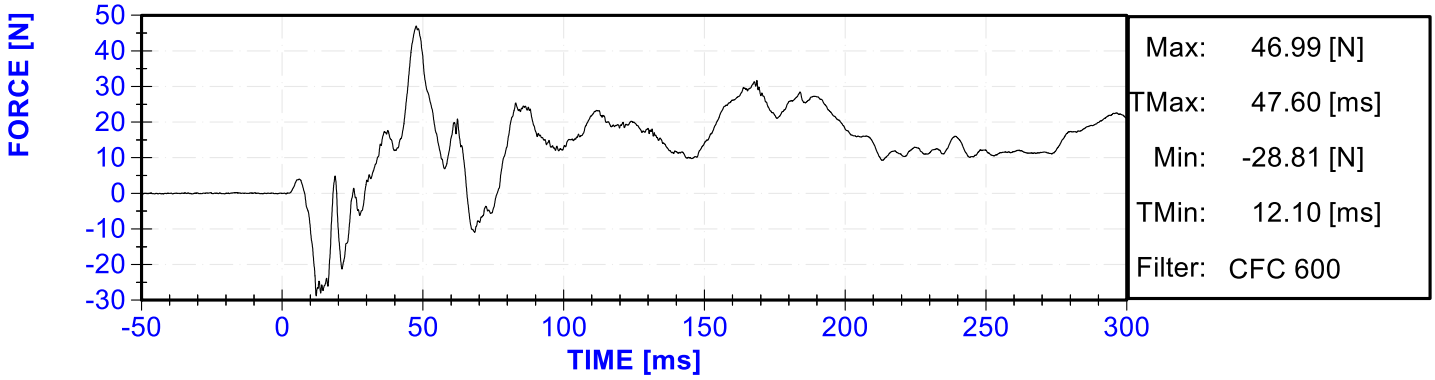
Driver Lower Thorax Rib Deflection (Y) vs. Time



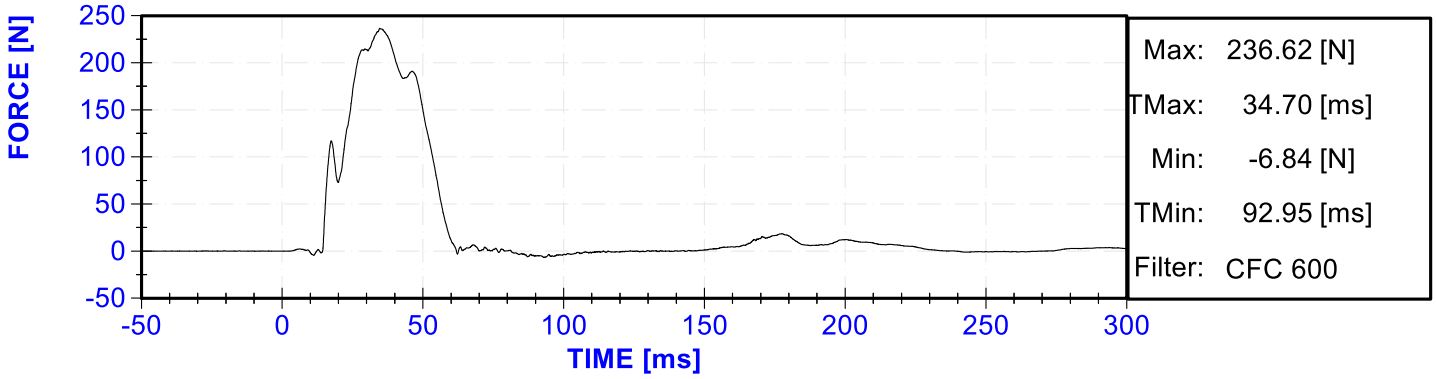
Driver Thorax Rib Deflection Maximum vs. Time



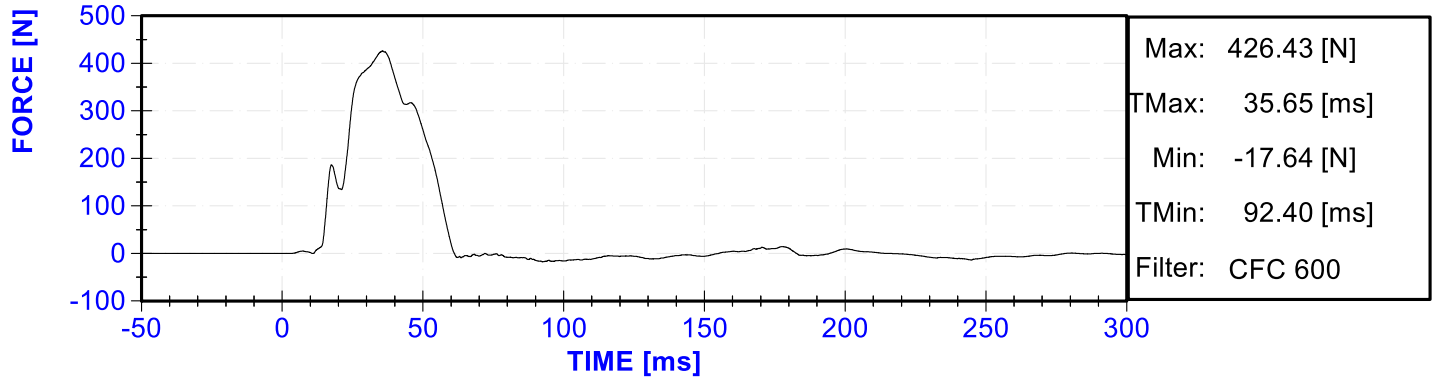
Driver Anterior Abdominal Force (Y) vs. Time



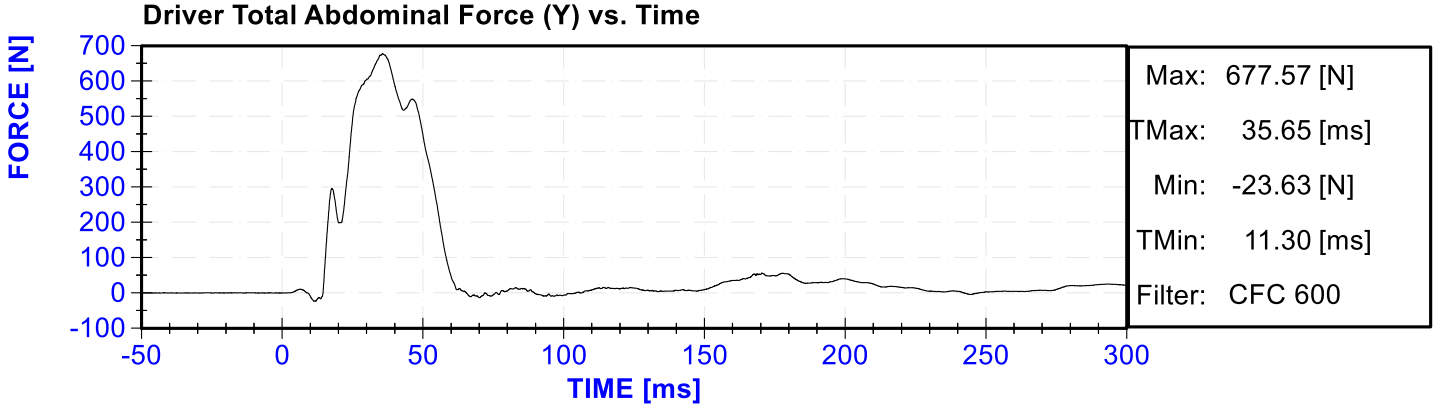
Driver Middle Abdominal Force (Y) vs. Time



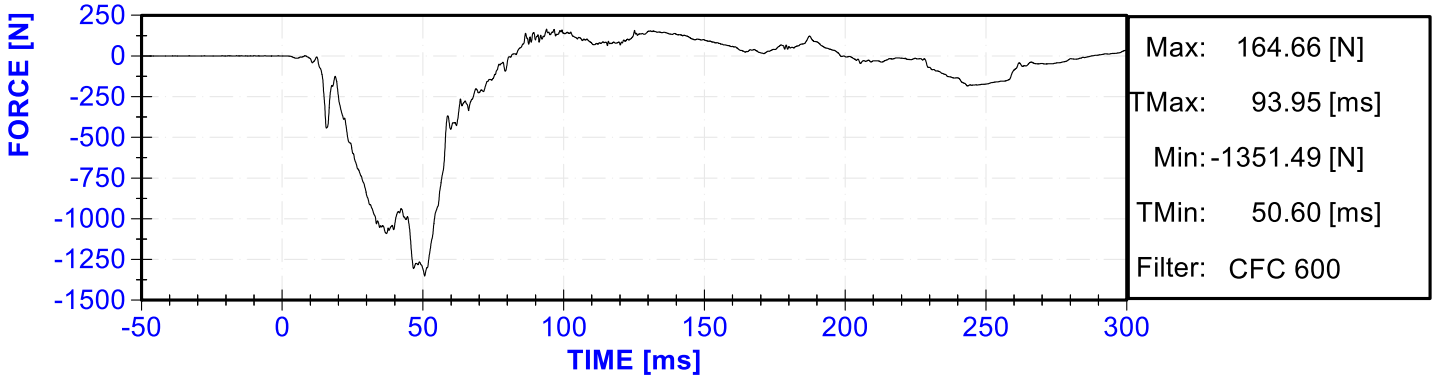
Driver Posterior Abdominal Force (Y) vs. Time



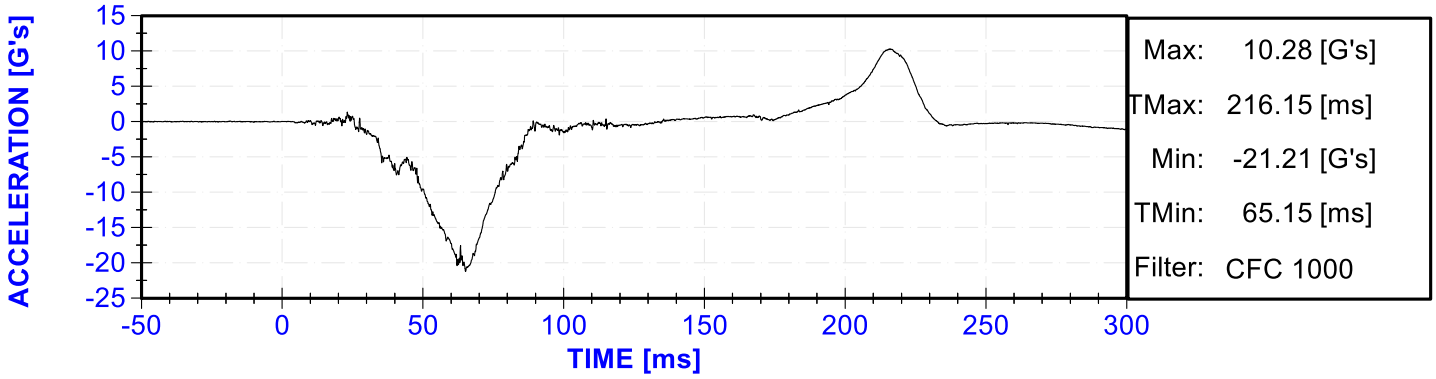
Driver Total Abdominal Force (Y) vs. Time



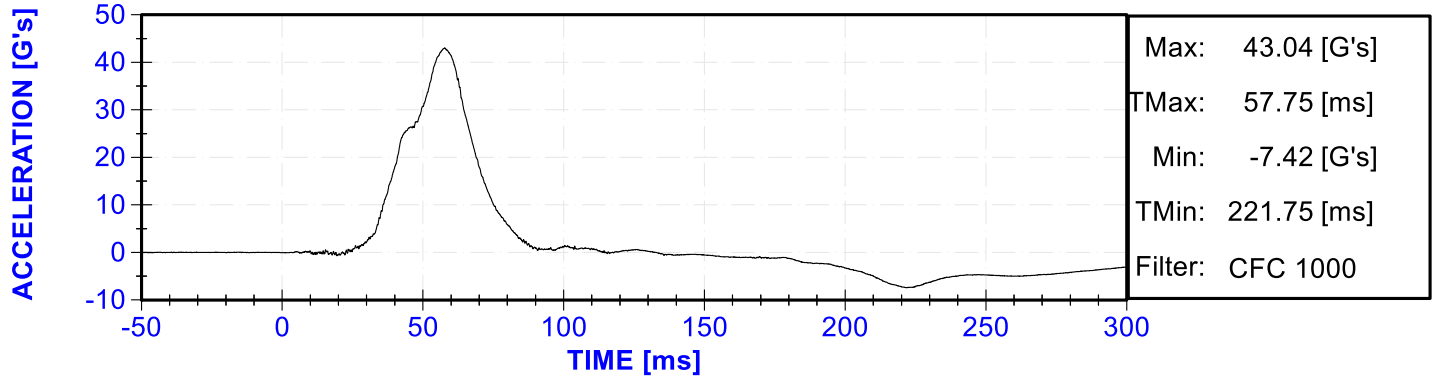
Driver Pubic Symphysis Force (Y) vs. Time



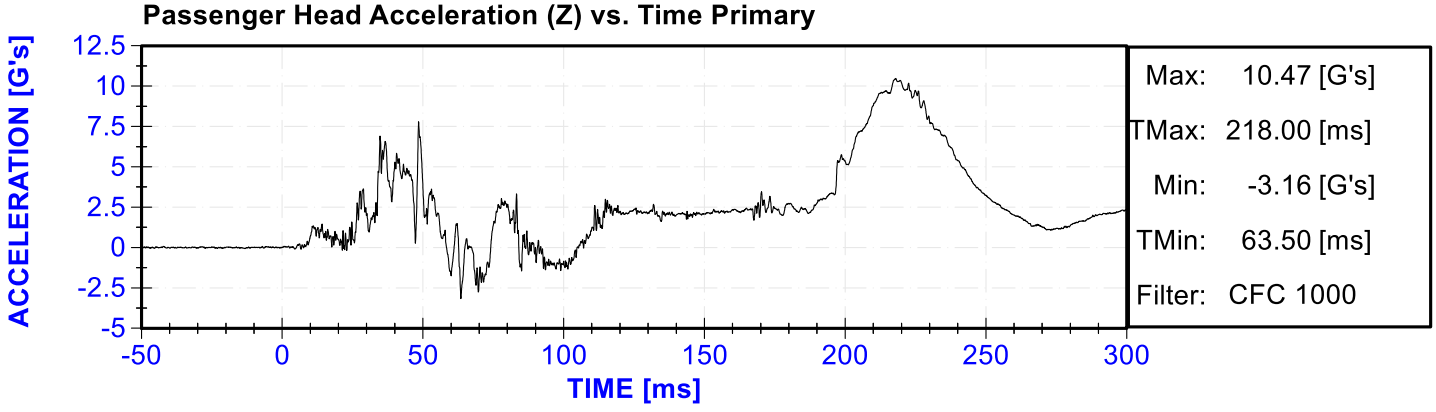
Passenger Head Acceleration (X) vs. Time Primary



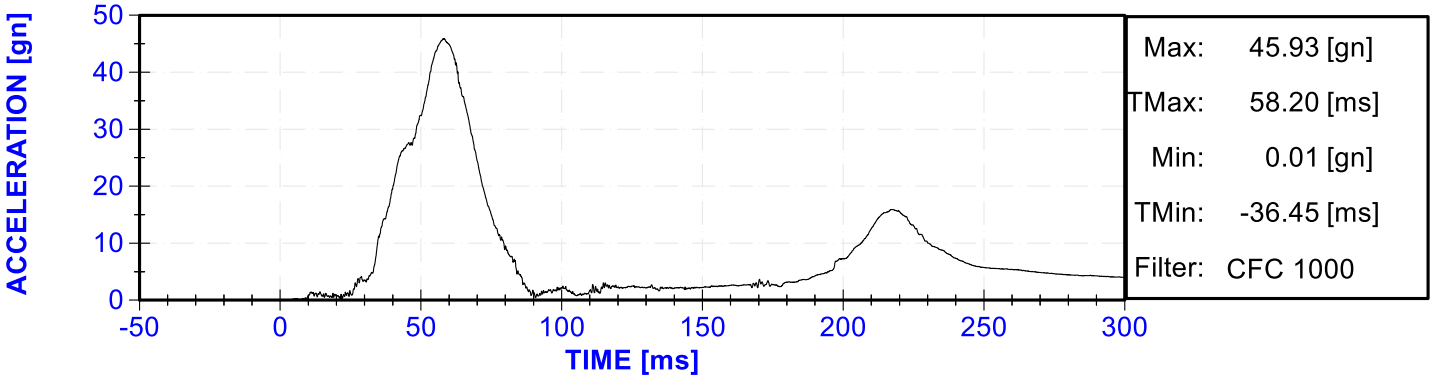
Passenger Head Acceleration (Y) vs. Time Primary



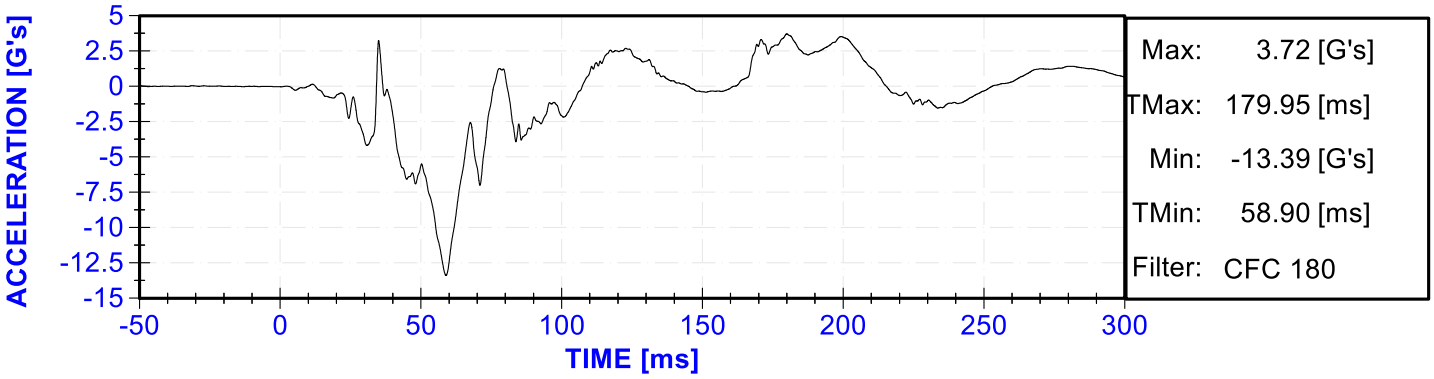
Passenger Head Acceleration (Z) vs. Time Primary



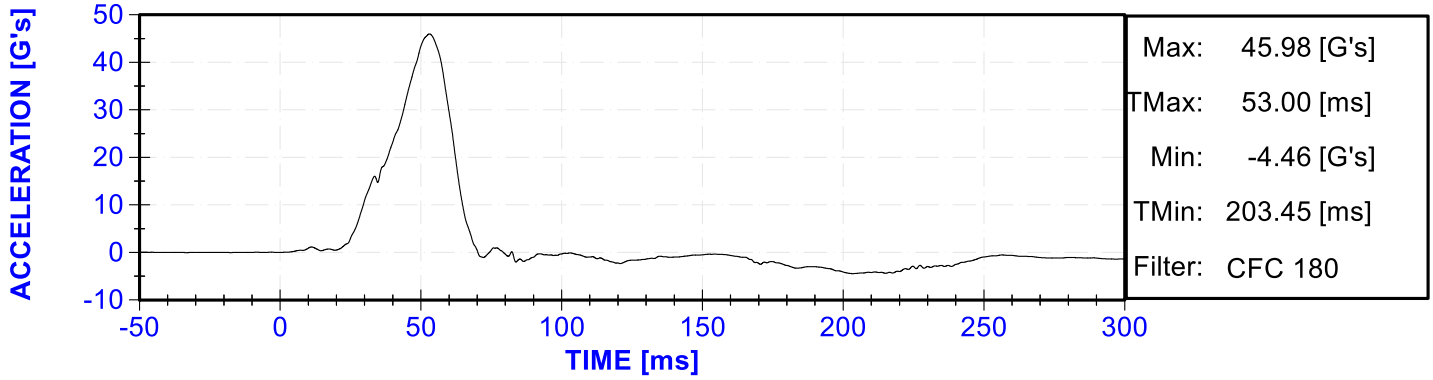
Passenger Head Resultant Acceleration Primary vs. Time



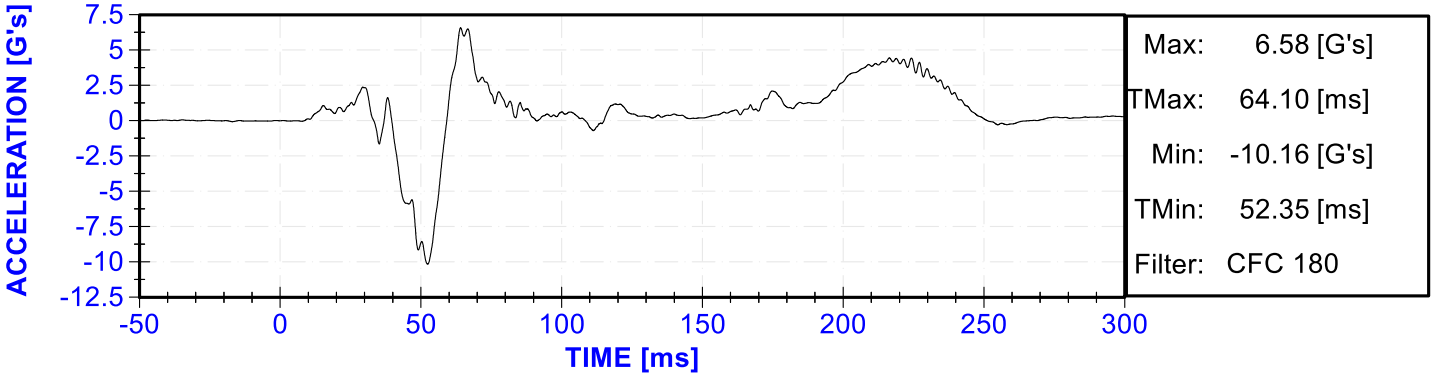
Passenger Lower Spine T12 Acceleration (X) vs. Time



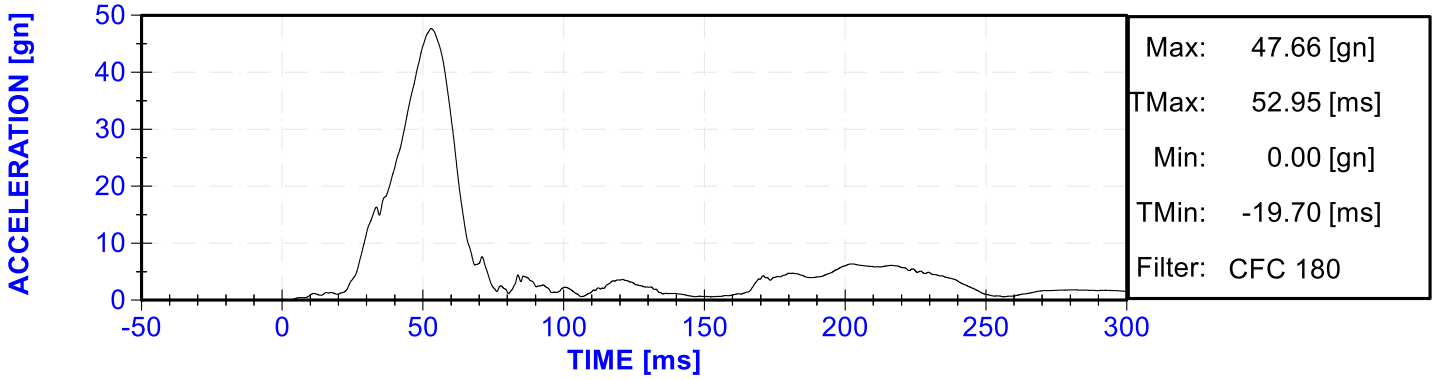
Passenger Lower Spine T12 Acceleration (Y) vs. Time



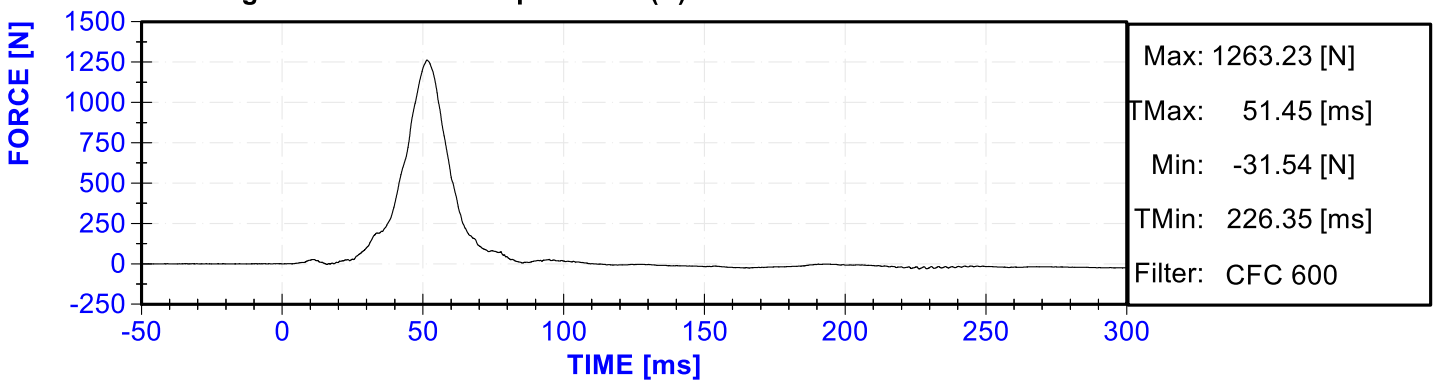
Passenger Lower Spine T12 Acceleration (Z) vs. Time



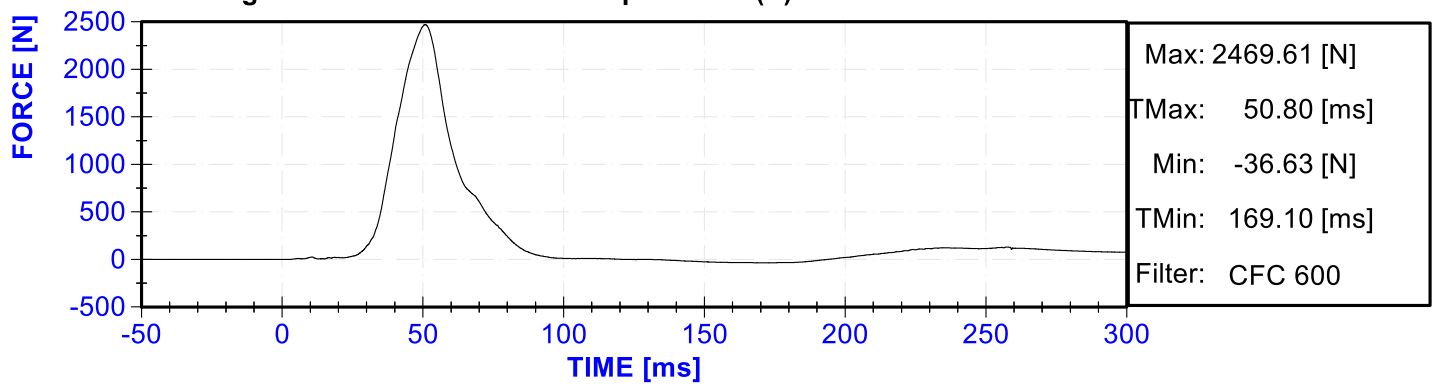
Passenger Lower Spine T12 Resultant Acceleration vs. Time



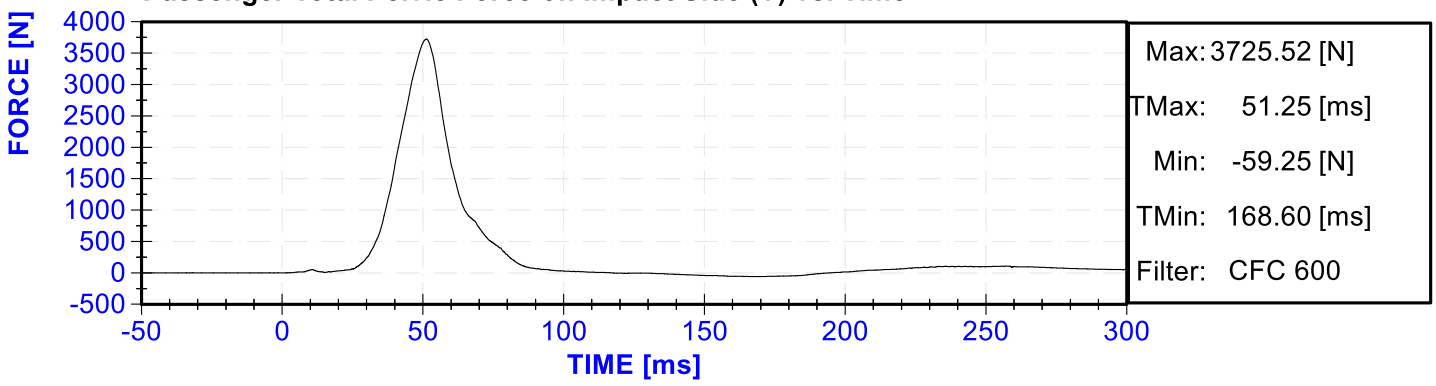
Passenger Iliac Force on Impact Side (Y) vs. Time



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



Passenger Total Pelvic Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

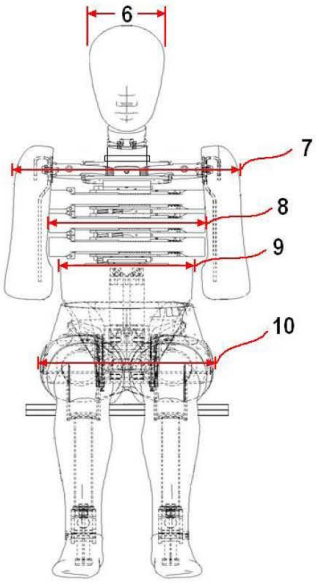
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

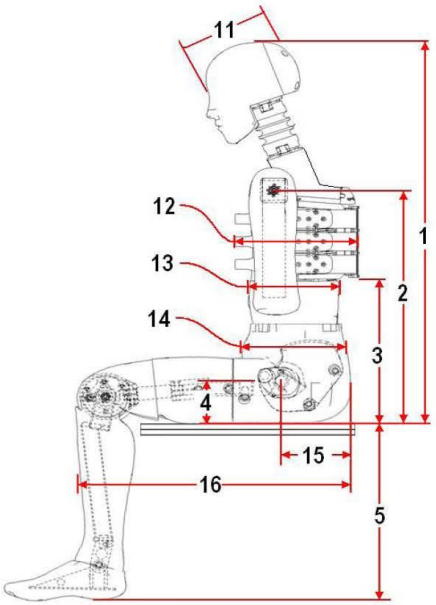
External Measurements - EuroSID-2re

Technician: K. Brogan Date: 1/15/2021

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	914	Pass
2	Seat to Shoulder Joint	558	572	569	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	425	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	473	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	285	Pass
10	Pelvis Lap Width	359	373	367	Pass
11	Head Depth	196	206	203	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	156	Pass
16	Back of Buttocks to Front Knee	597	615	609	Pass

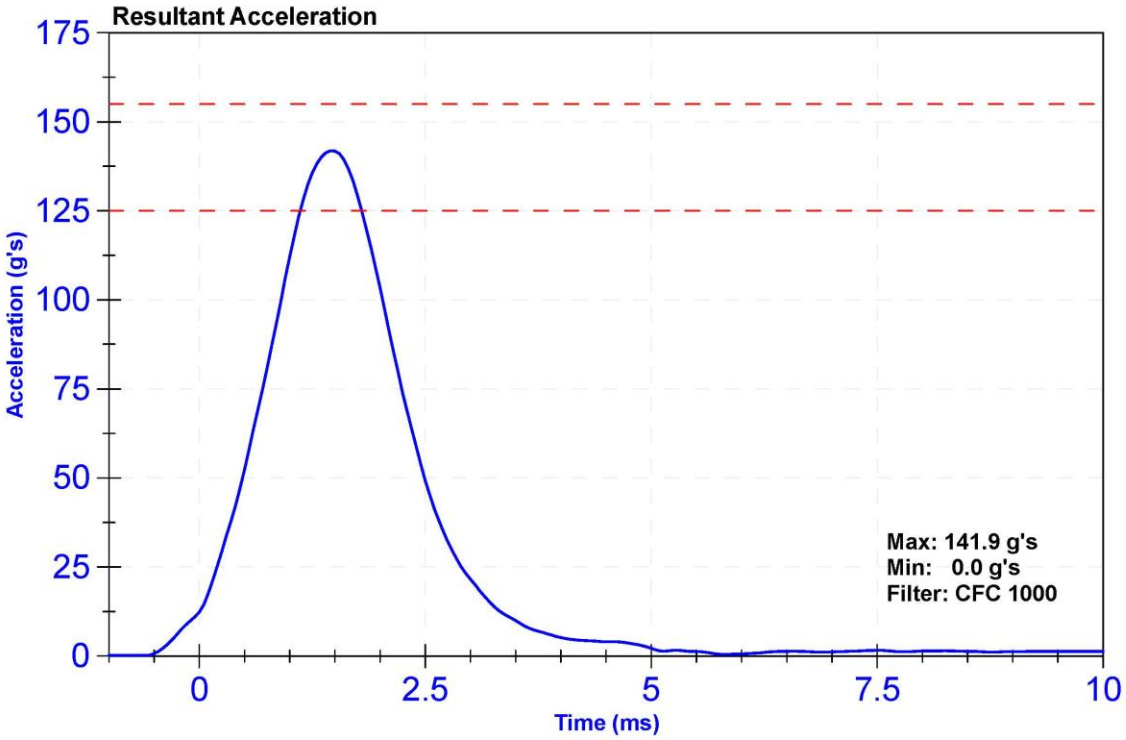
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

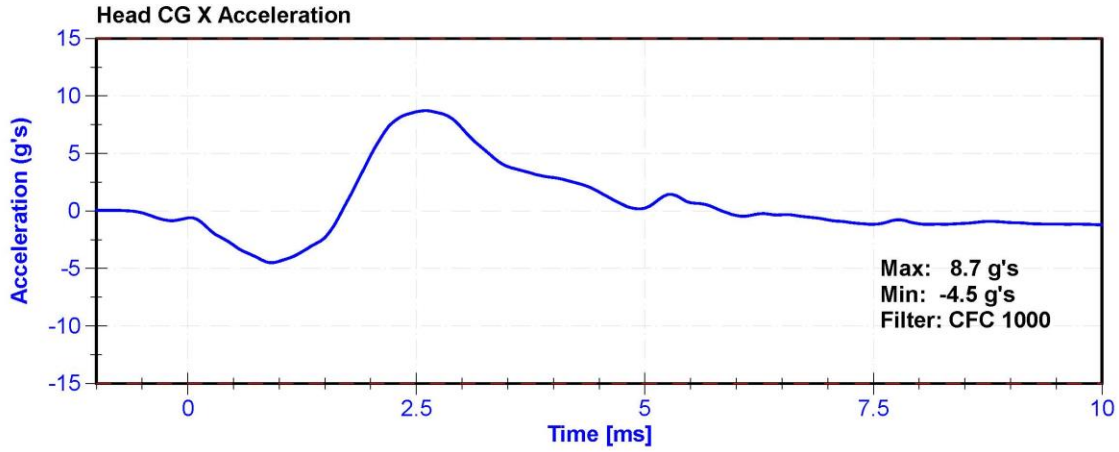
Results

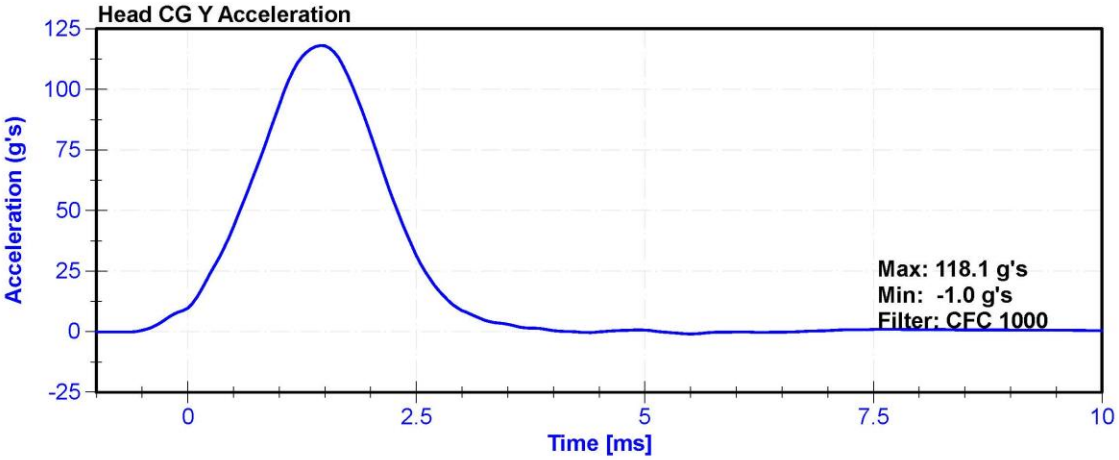
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	21	Pass
Resultant Acceleration	125	155	g's	141.9	Pass
Oscillation	0	15	%	1.12	Pass
Fore-Aft Acceleration	-15	15	g's	8.7	Pass

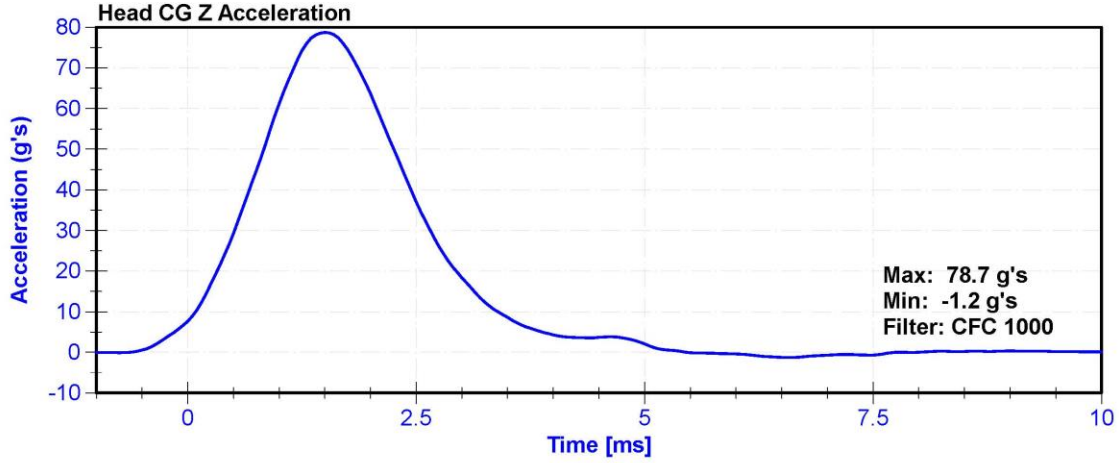
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264C	P51884	9/22/2020	3/23/2021
Y Accelerometer	Endevco 7264C	P73161	9/22/2020	3/23/2021
Z Accelerometer	Endevco 7264C	P79588	9/22/2020	3/23/2021




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 8.7 g's
Min: -4.5 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 118.1 g's
Min: -1.0 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]
Max: 78.7 g's
Min: -1.2 g's
Filter: CFC 1000

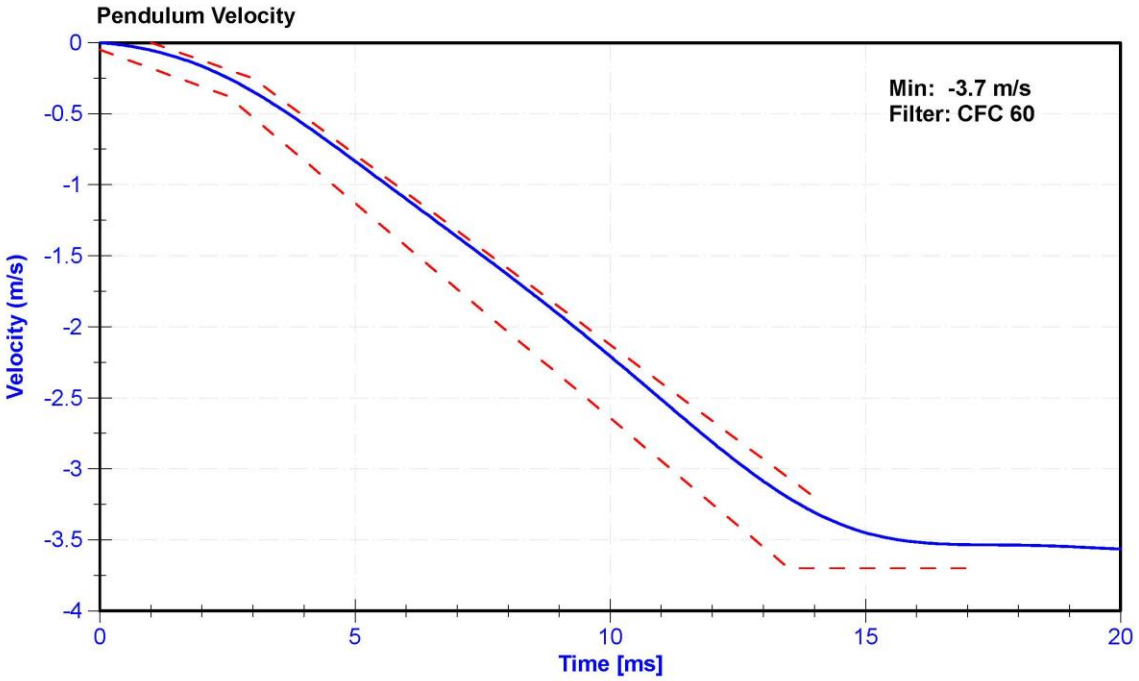
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

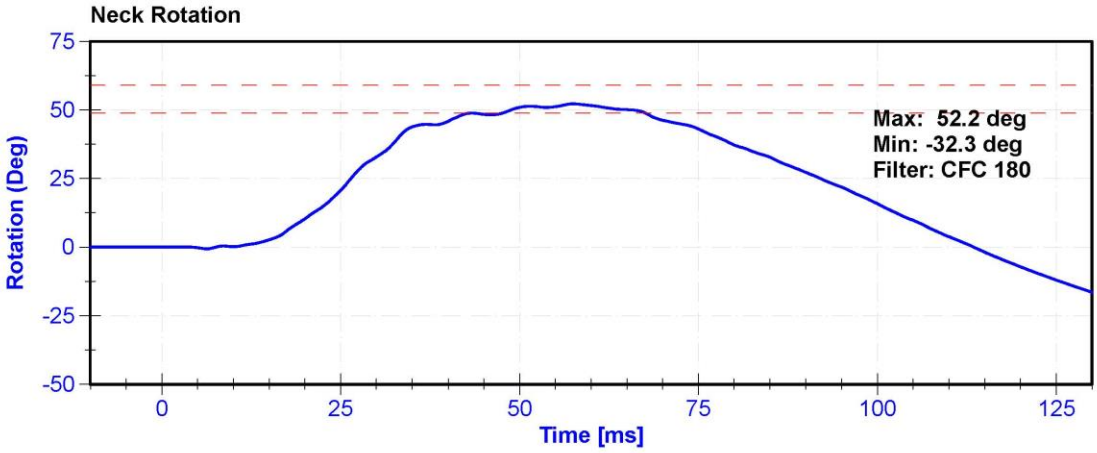
Results

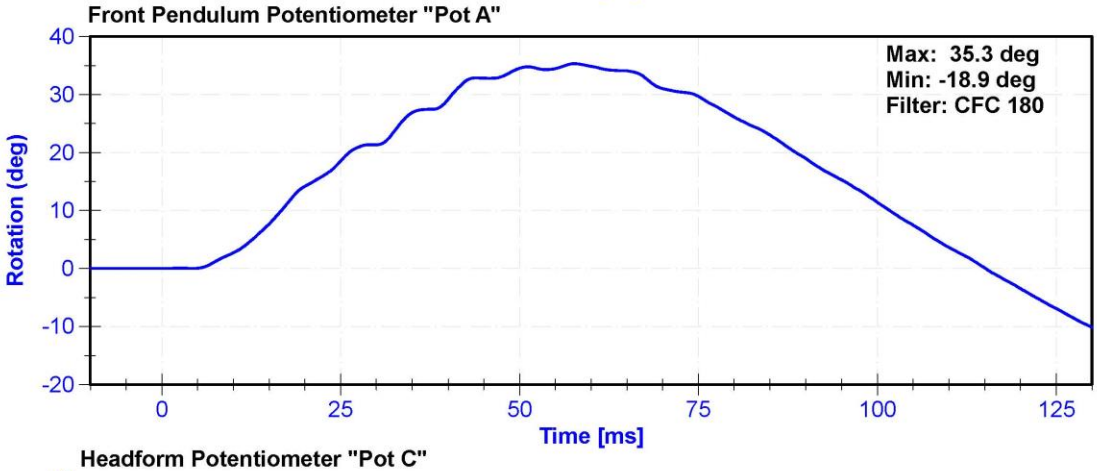
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	23.2	Pass
Velocity	3.3	3.5	m/s	3.38	Pass
Lateral Neck Rotation	49	59	deg	52.2	Pass
Time at Maximum Rotation	54	66	ms	57.4	Pass
Time of Rotation Decay from Maximum	53	88	ms	56.1	Pass

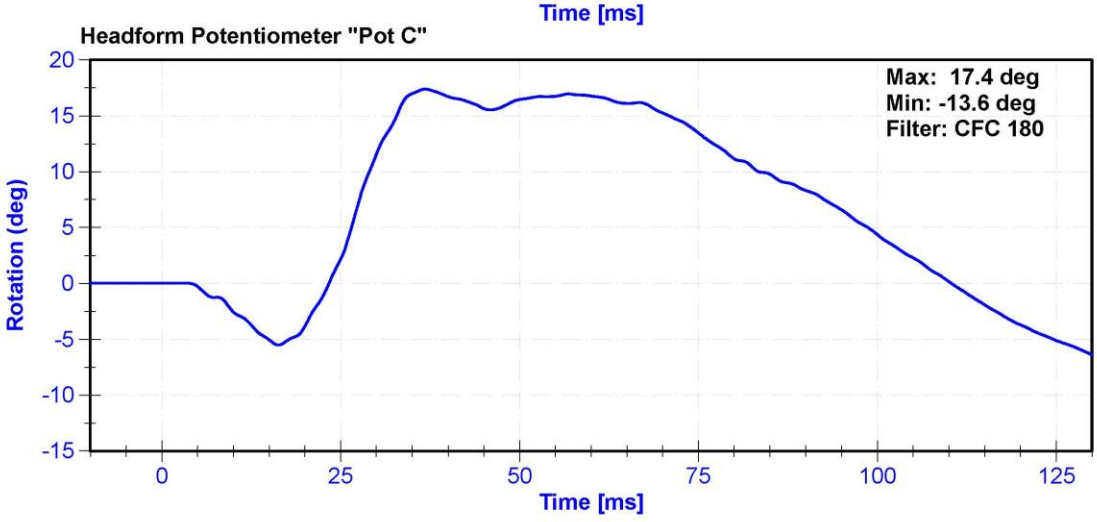
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503	2/5/2021	2/5/2022
Front Pendulum Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Headform Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 52.2 deg
Min: -32.3 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 35.3 deg
Min: -18.9 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 17.4 deg
Min: -13.6 deg
Filter: CFC 180

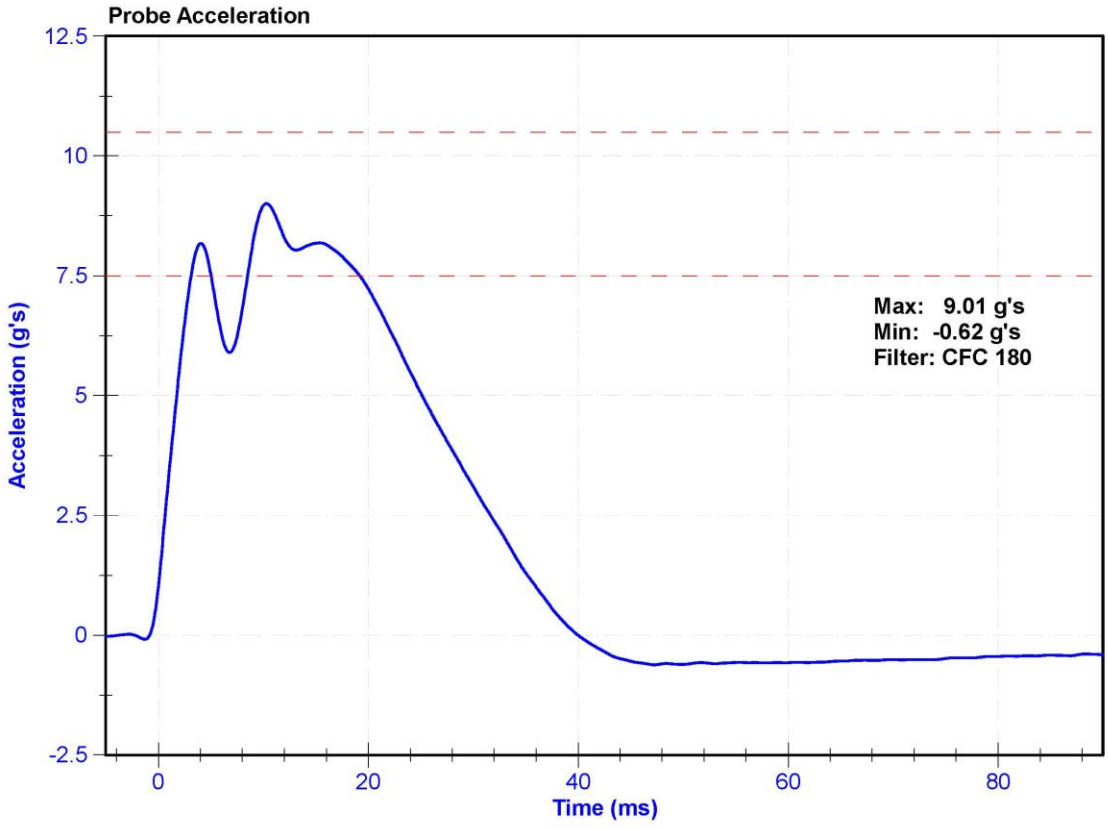
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	25.0	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	7.5	10.5	g's	9.01	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022



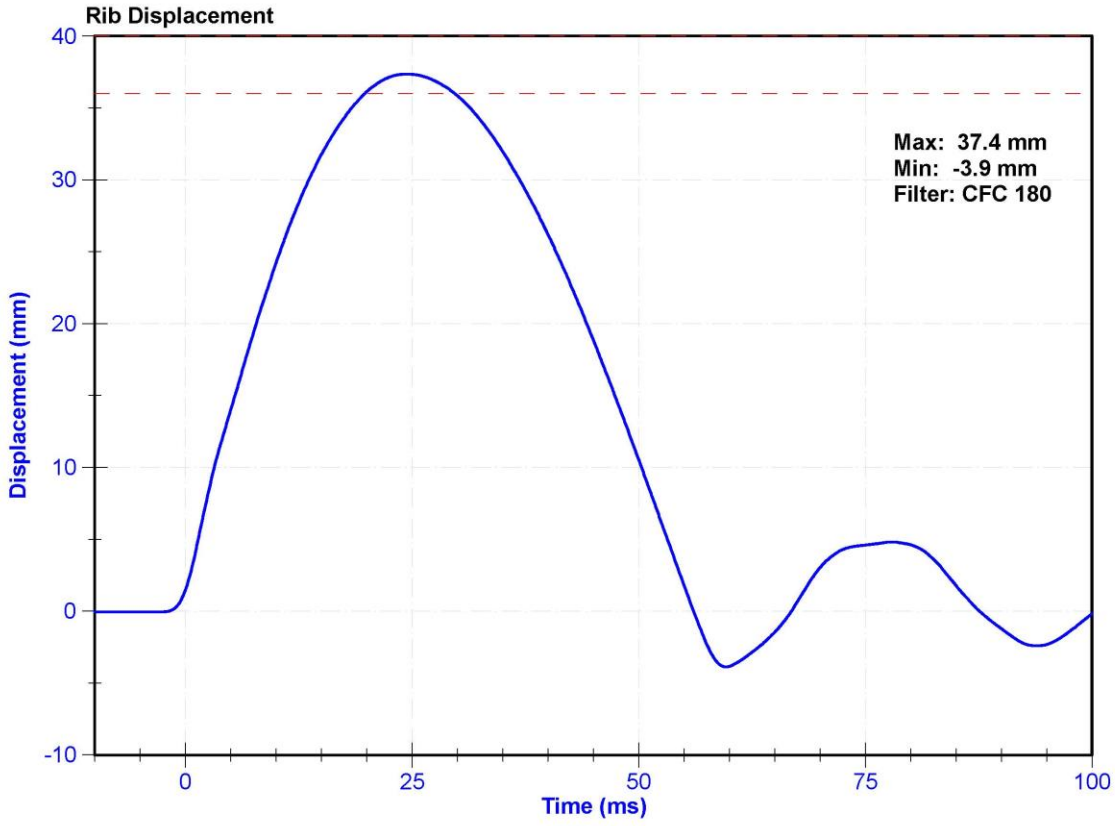
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/8/2020	4/8/2021



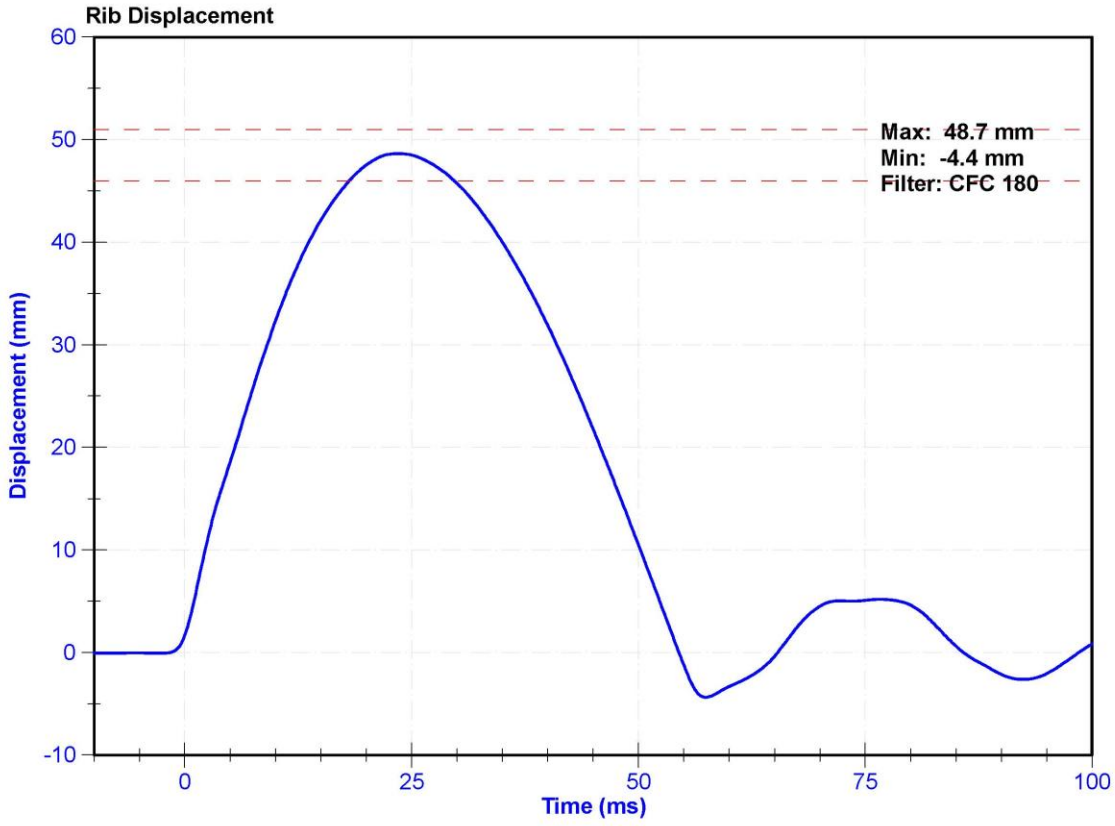
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.6	Pass
Humidity	10	70	%	21.7	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/8/2020	4/8/2021



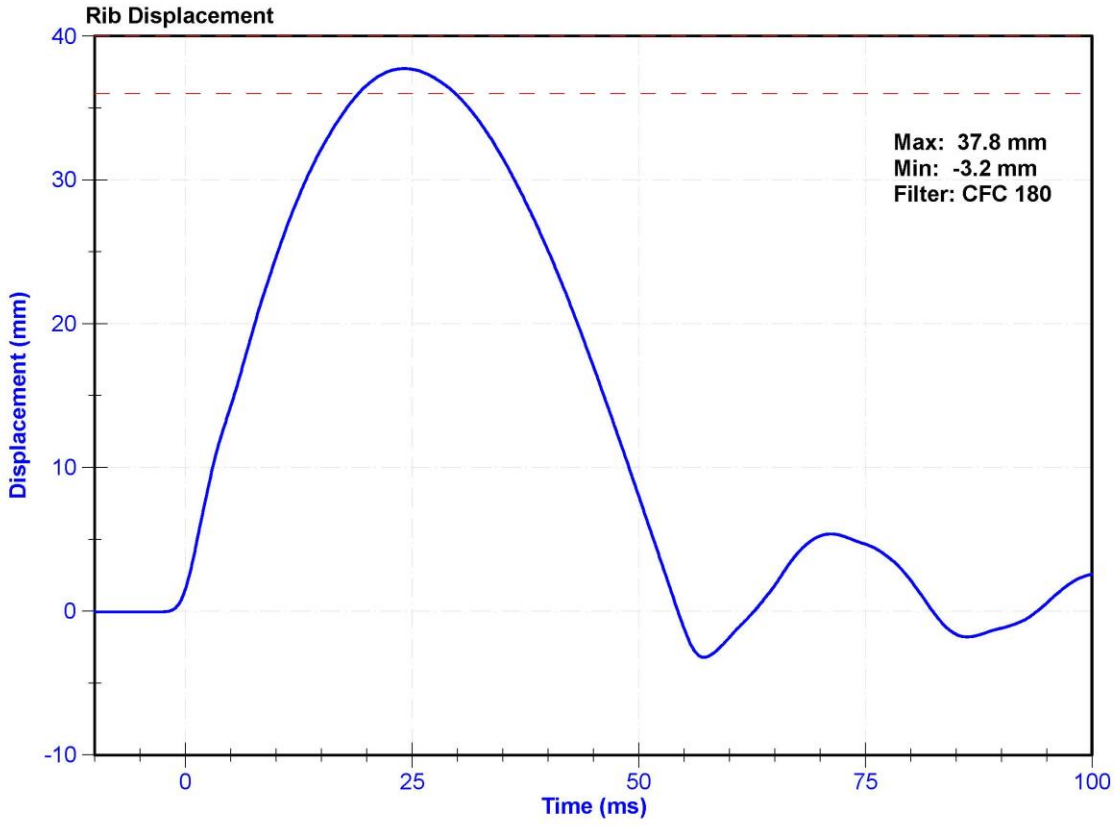
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	36	40	mm	37.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/8/2020	4/8/2021



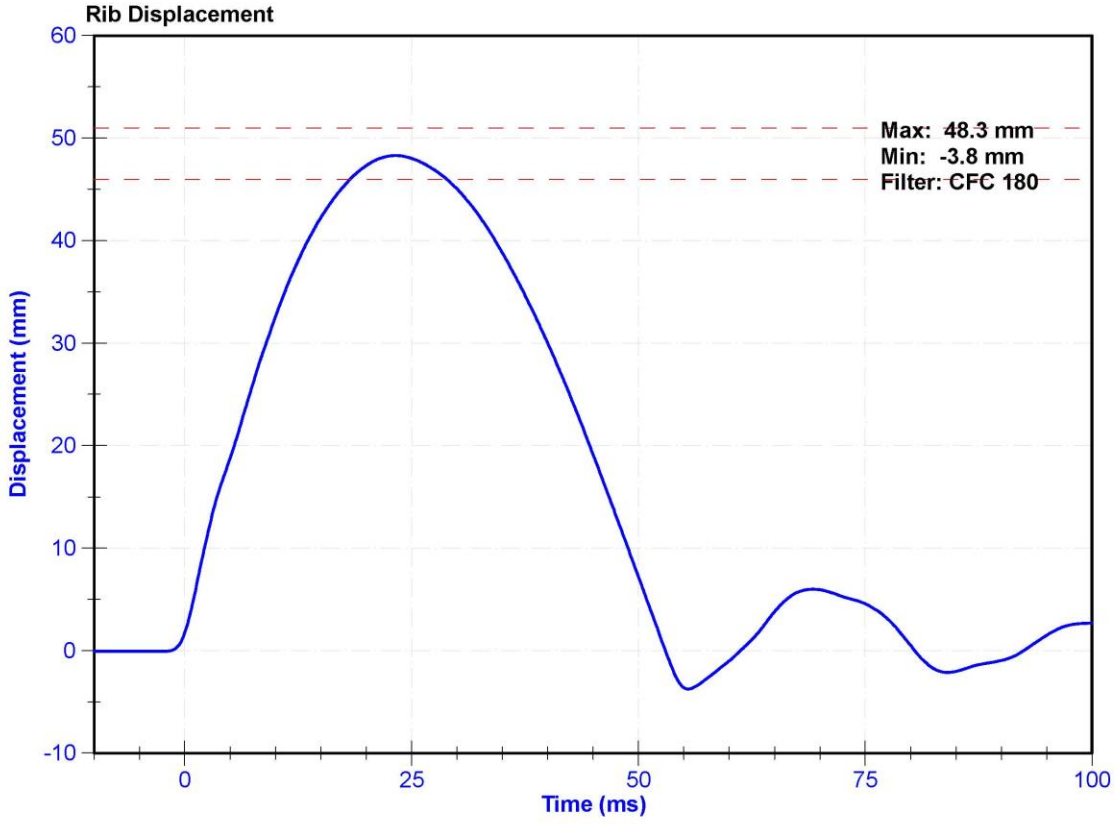
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	22.1	Pass
Rib Displacement	46	51	mm	48.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/8/2020	4/8/2021



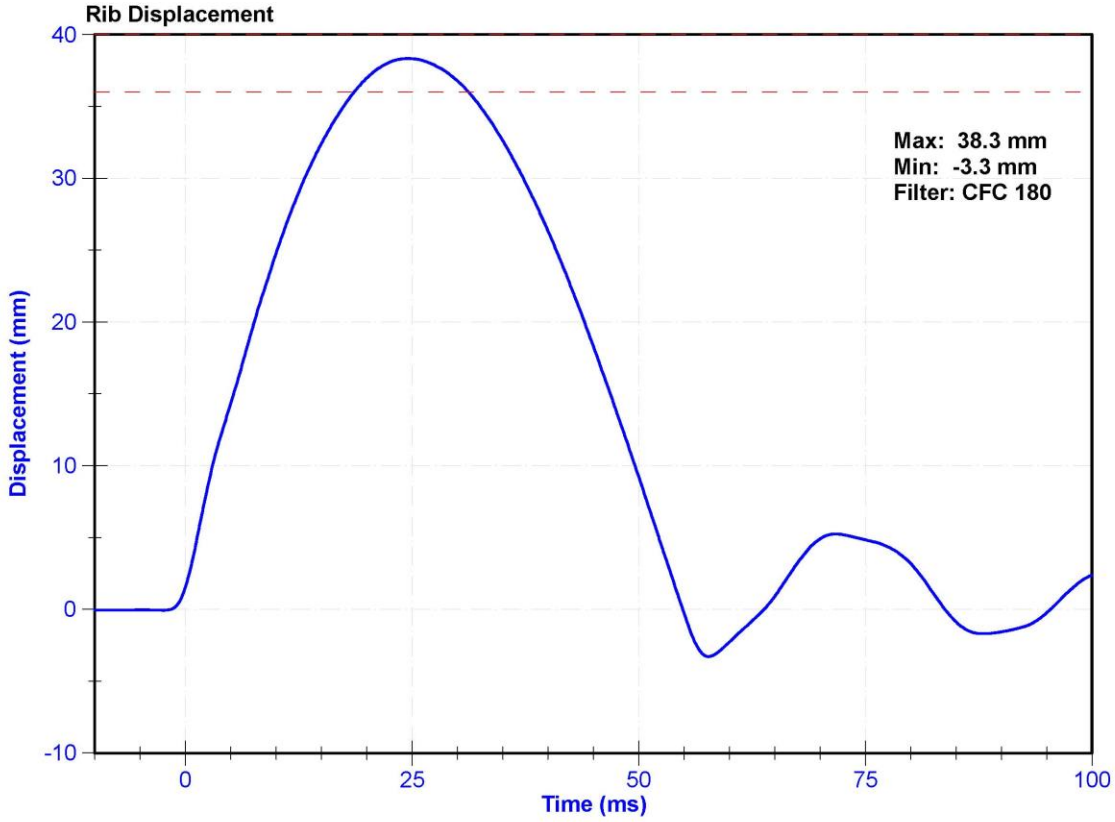
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	36	40	mm	38.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/8/2020	4/8/2021



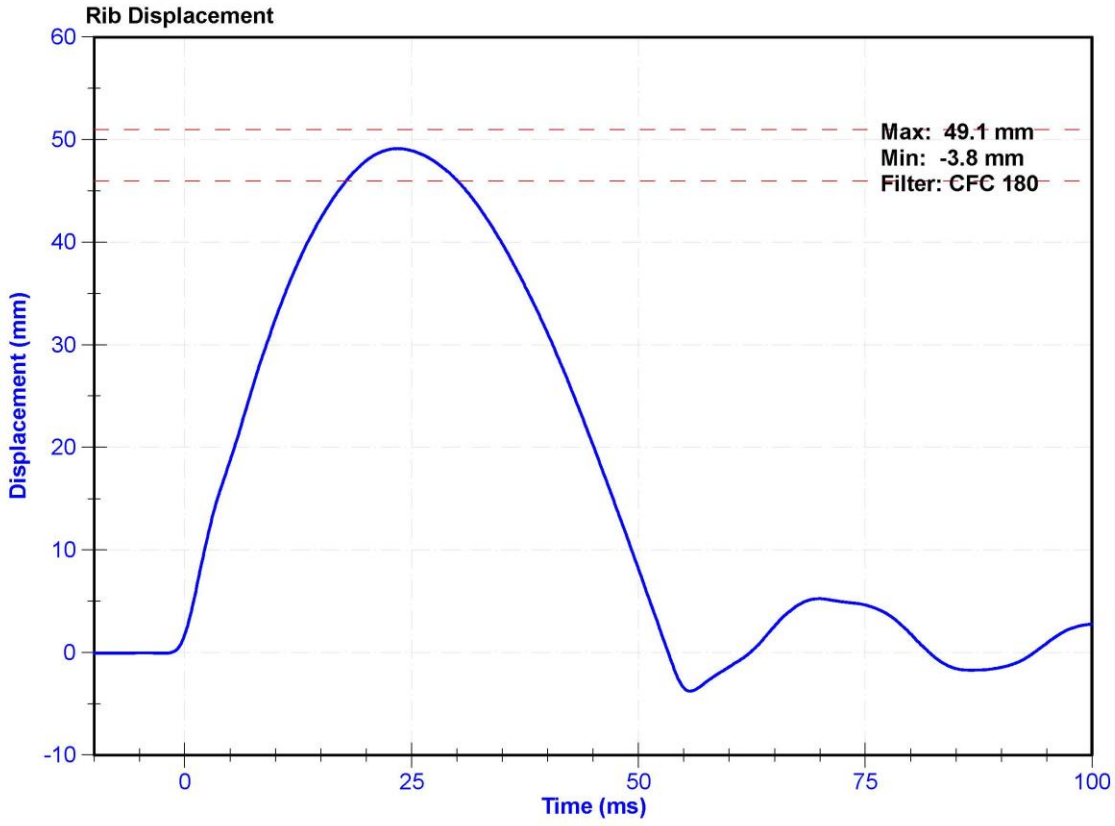
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/8/2020	4/8/2021



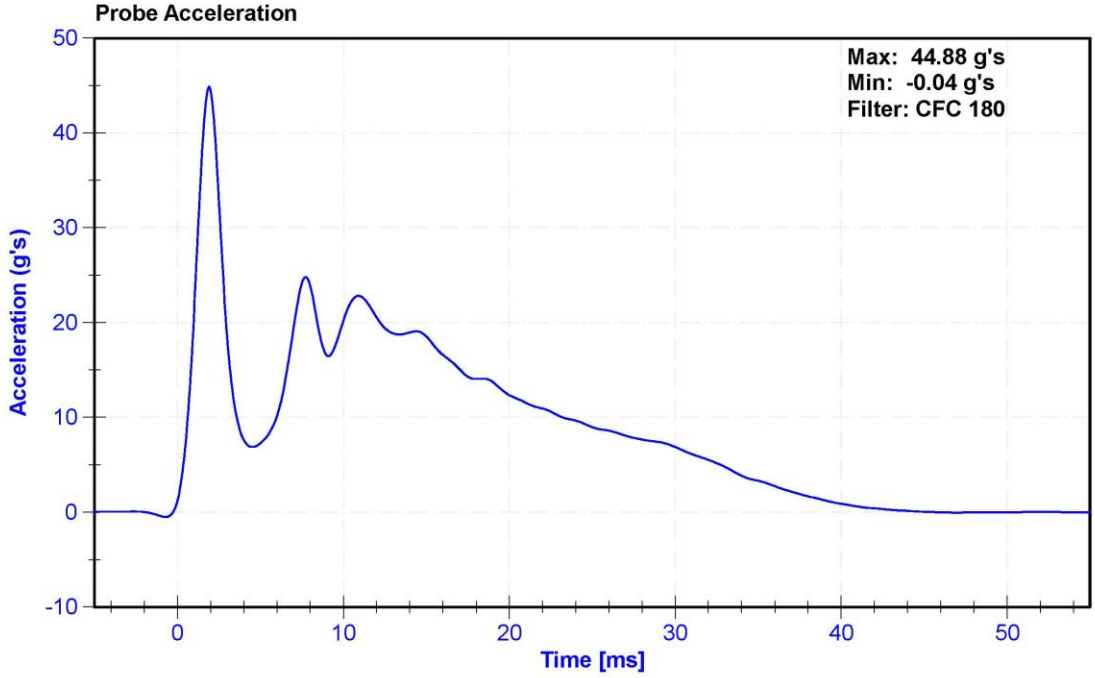
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

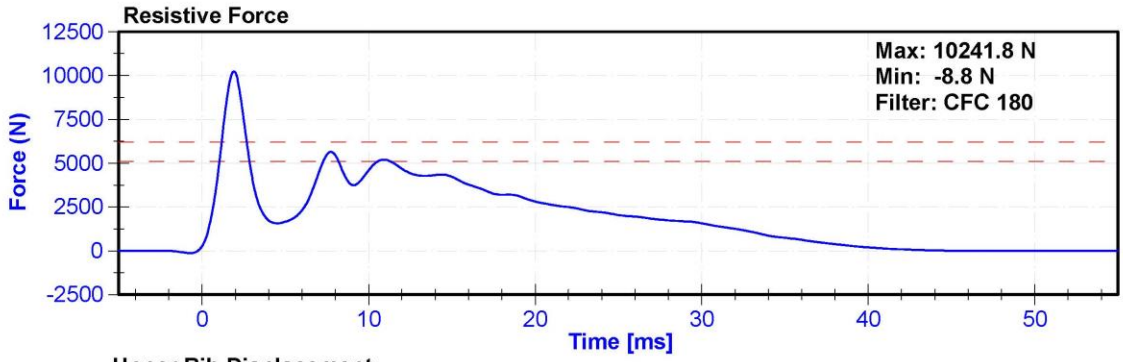
Results

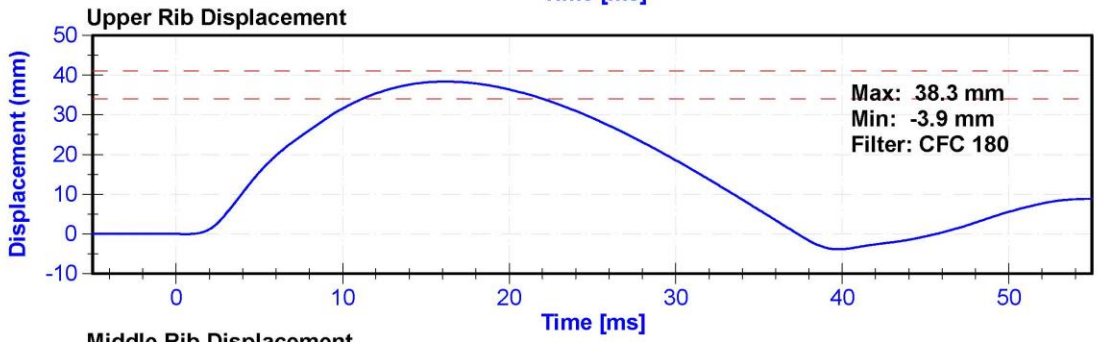
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26.0	Pass
Velocity	5.4	5.6	m/s	5.44	Pass
Resistive Force after 6ms	5100	6200	N	5651.6	Pass
Upper Thorax Rib Deflection	34	41	mm	38.3	Pass
Mid Thorax Rib Deflection	37	45	mm	42.0	Pass
Lower Thorax Rib Deflection	37	44	mm	41.7	Pass

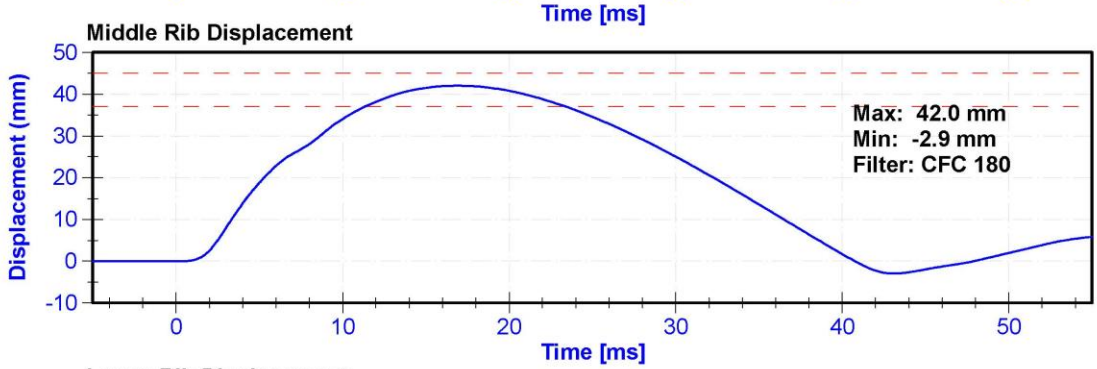
Transducer Calibrations

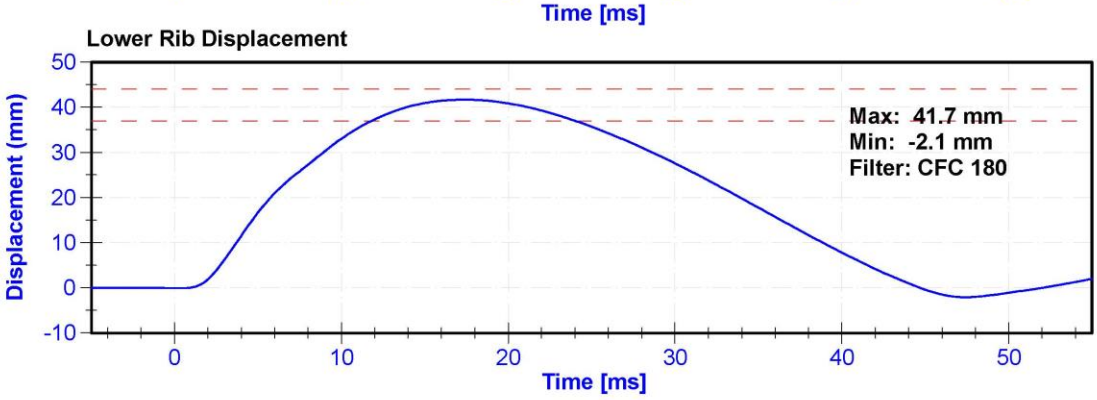
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/8/2020	4/8/2021
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/8/2020	4/8/2021
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/8/2020	4/8/2021




Resistive Force
Force (N)
Time [ms]
Max: 10241.8 N
Min: -8.8 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.3 mm
Min: -3.9 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.0 mm
Min: -2.9 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.7 mm
Min: -2.1 mm
Filter: CFC 180

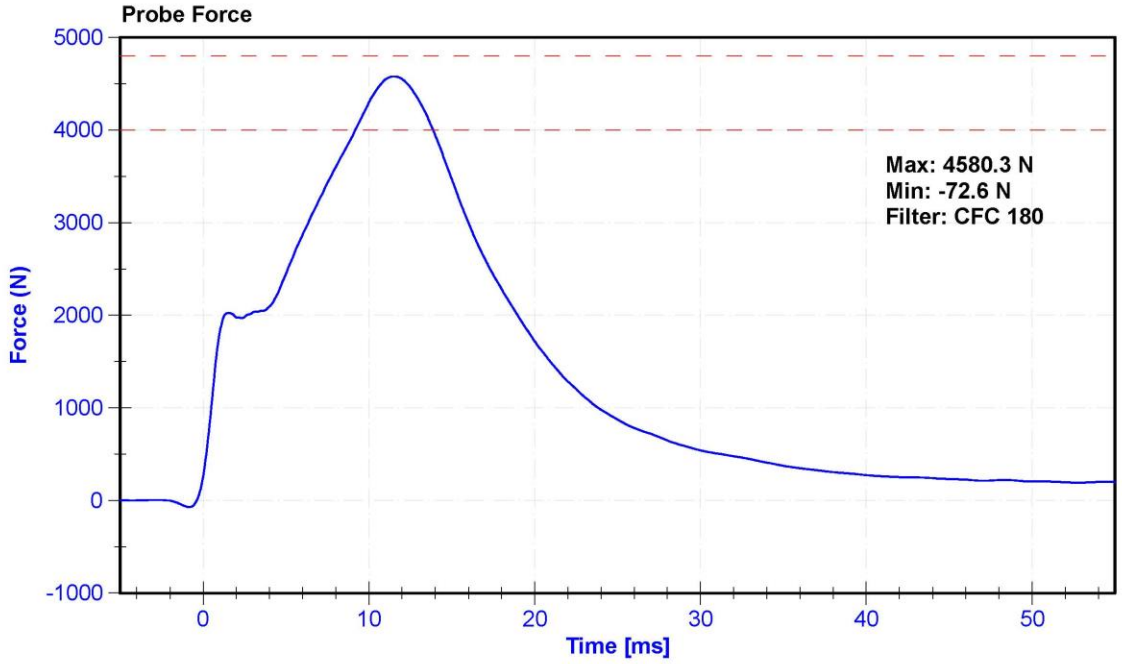
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K.Brogan

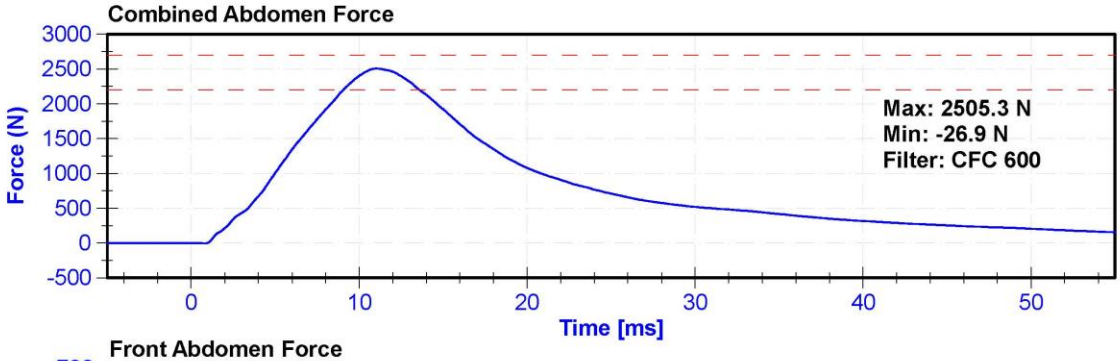
Results

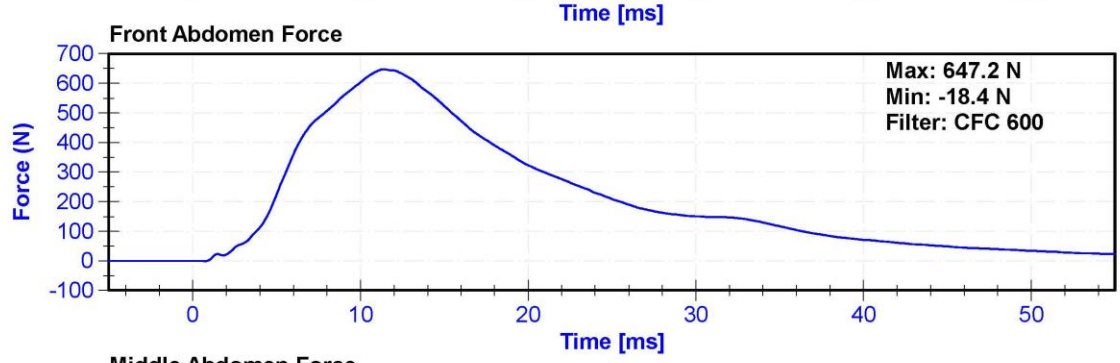
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26	Pass
Velocity	3.9	4.1	m/s	4.09	Pass
Combined Abdomen Force	2200	2700	N	2505.3	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.05	Pass
Resistive Probe Force	4000	4800	N	4580.3	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.50	Pass

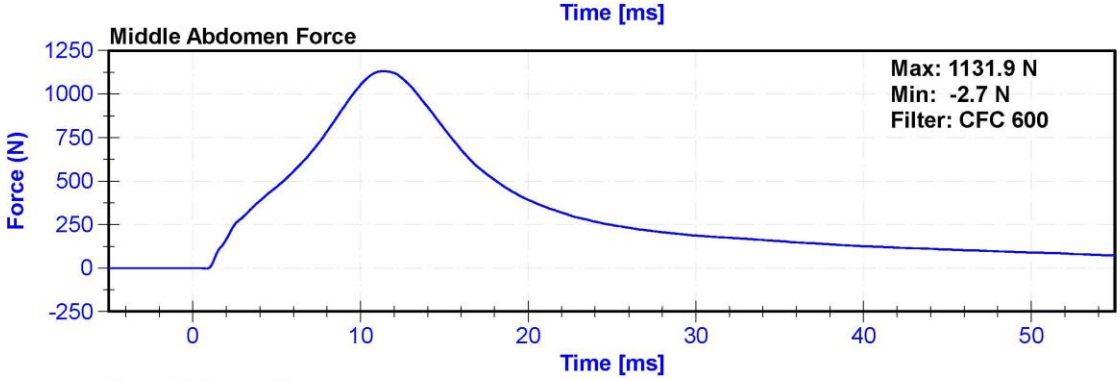
Transducer Calibrations

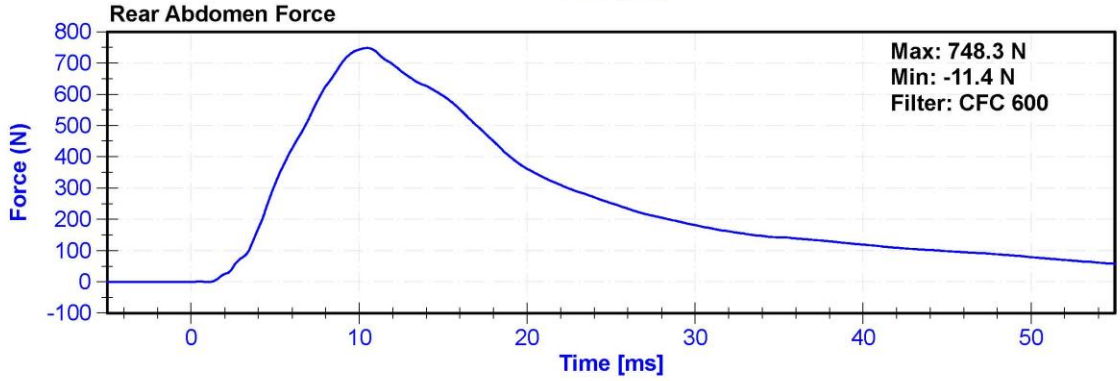
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Front Abdomen Load Cell	DENTON 2631J	LC-1524	3/19/2020	3/19/2021
Middle Abdomen Load Cell	DENTON 2631J	LC-1523	3/19/2020	3/19/2021
Rear Abdomen Load Cell	DENTON 2631J	LC-1530	3/19/2020	3/19/2021




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2505.3 N
Min: -26.9 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 647.2 N
Min: -18.4 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1131.9 N
Min: -2.7 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 748.3 N
Min: -11.4 N
Filter: CFC 600

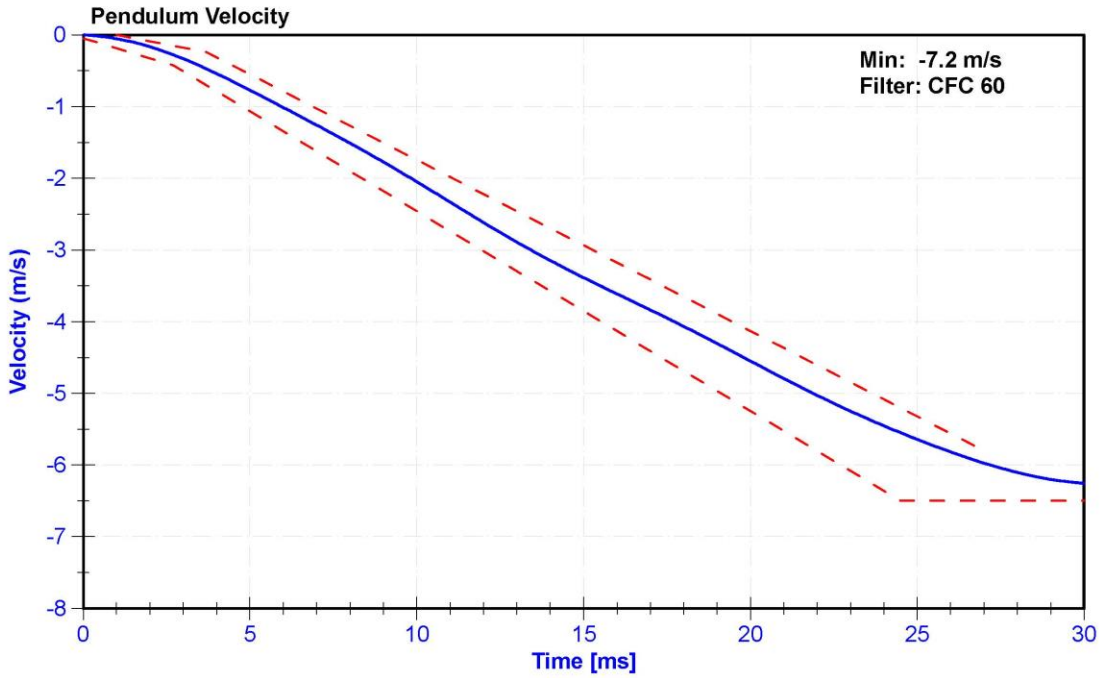
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

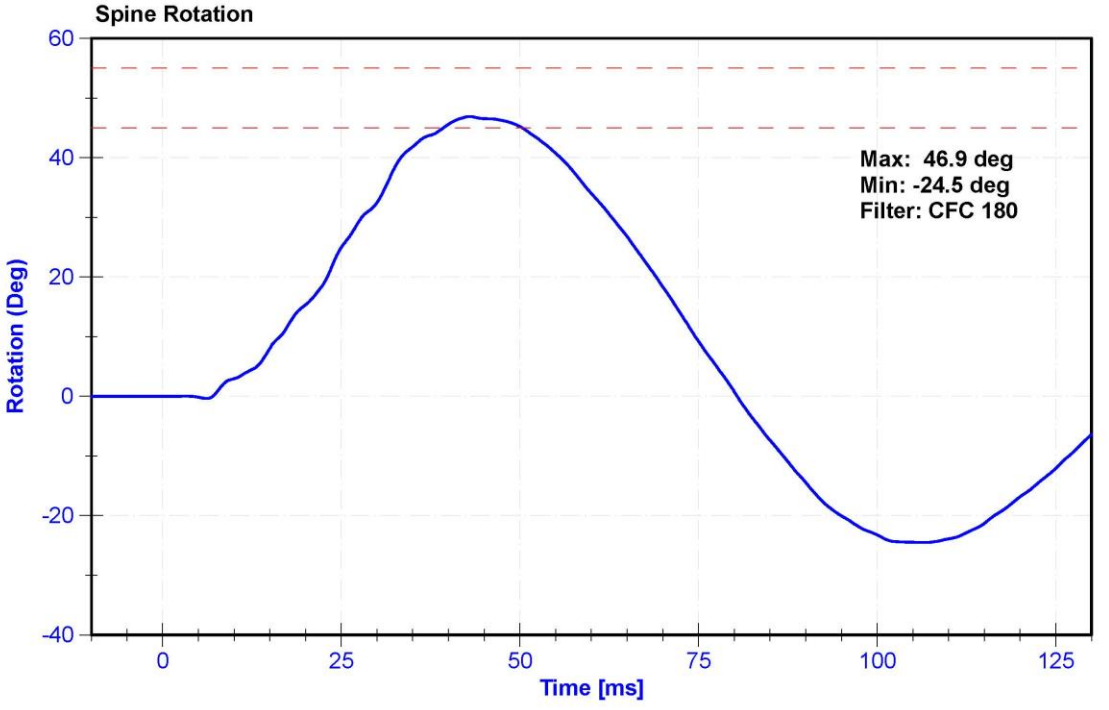
Results

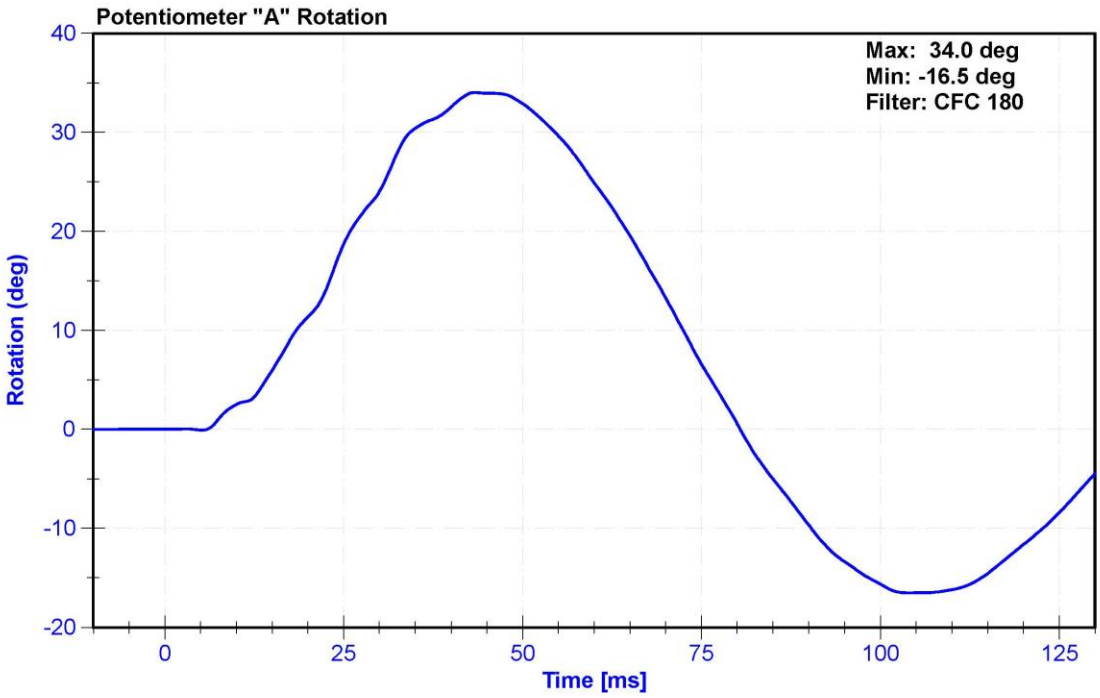
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.9	Pass
Humidity	10	70	%	22.3	Pass
Velocity	5.95	6.15	m/s	6.046	Pass
Lateral Spine Rotation	45	55	deg	46.9	Pass
Time at Maximum Rotation	39	53	ms	43.0	Pass
Time of Decay to Zero Degrees	37	57	ms	37.4	Pass
Pulse within Corridor?	-	-	-		

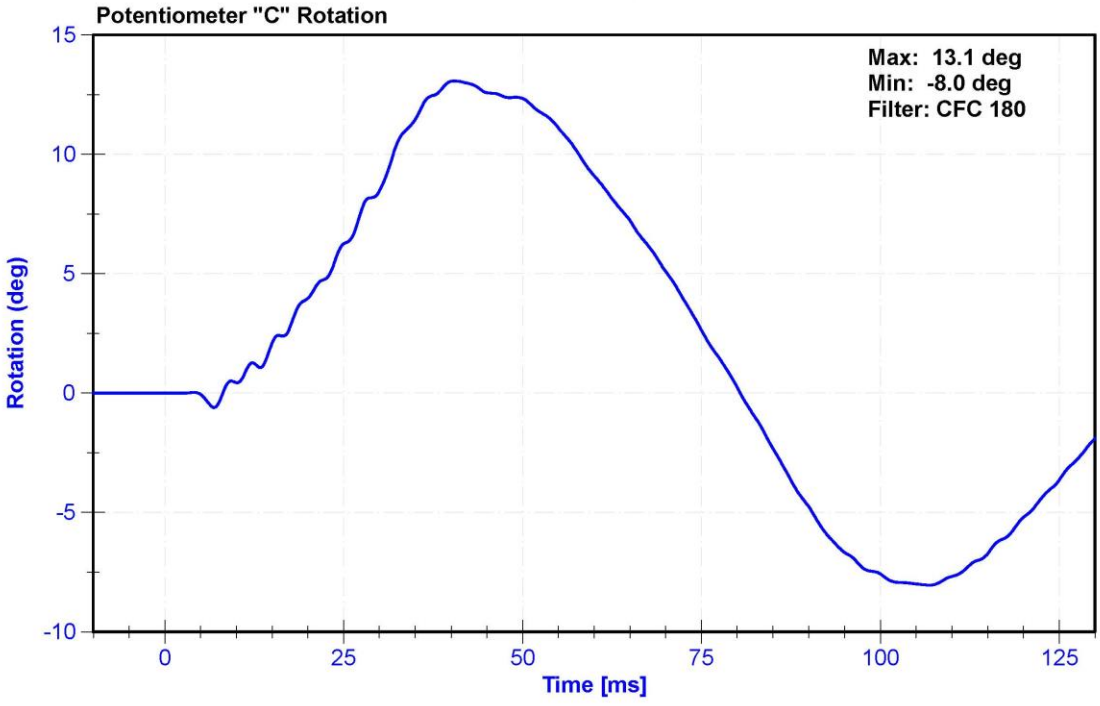
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum "A" Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Condyle "B" Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021


Pendulum Velocity
Min: -7.2 m/s
Filter: CFC 60
Velocity (m/s)
0
-1
-2
-3
-4
-5
-6
-7
-8
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 46.9 deg
Min: -24.5 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 34.0 deg
Min: -16.5 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 13.1 deg
Min: -8.0 deg
Filter: CFC 180
Rotation (deg)
15
10
5
0
-5
-10
0
25
50
75
100
125
Time [ms]

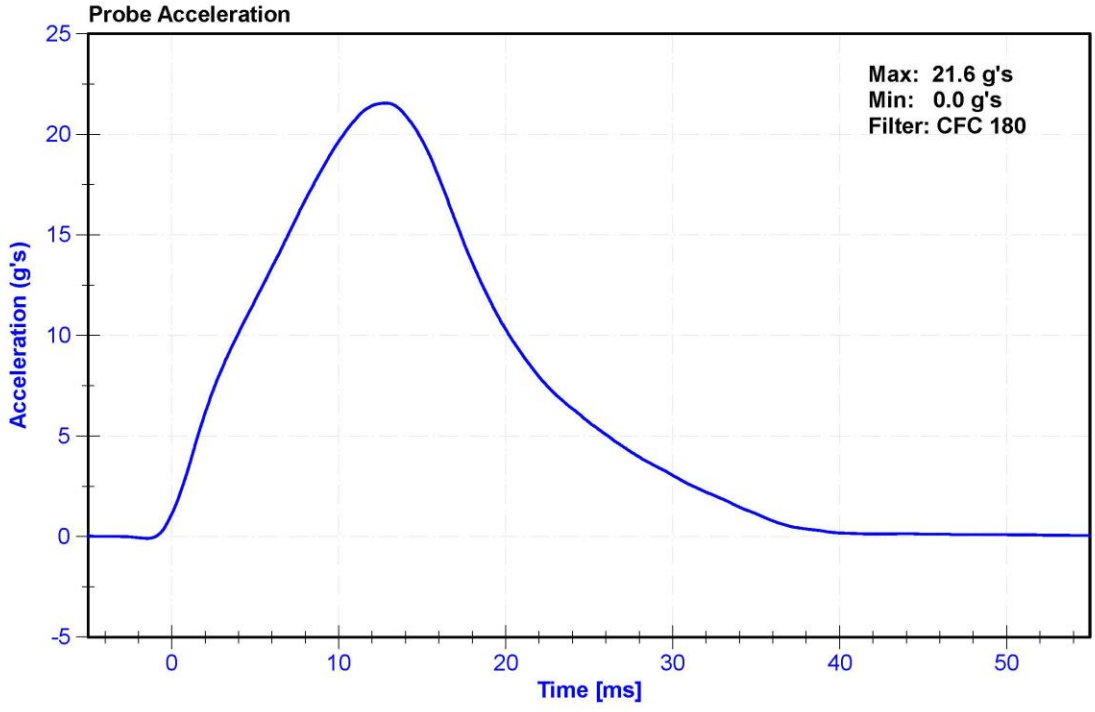
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

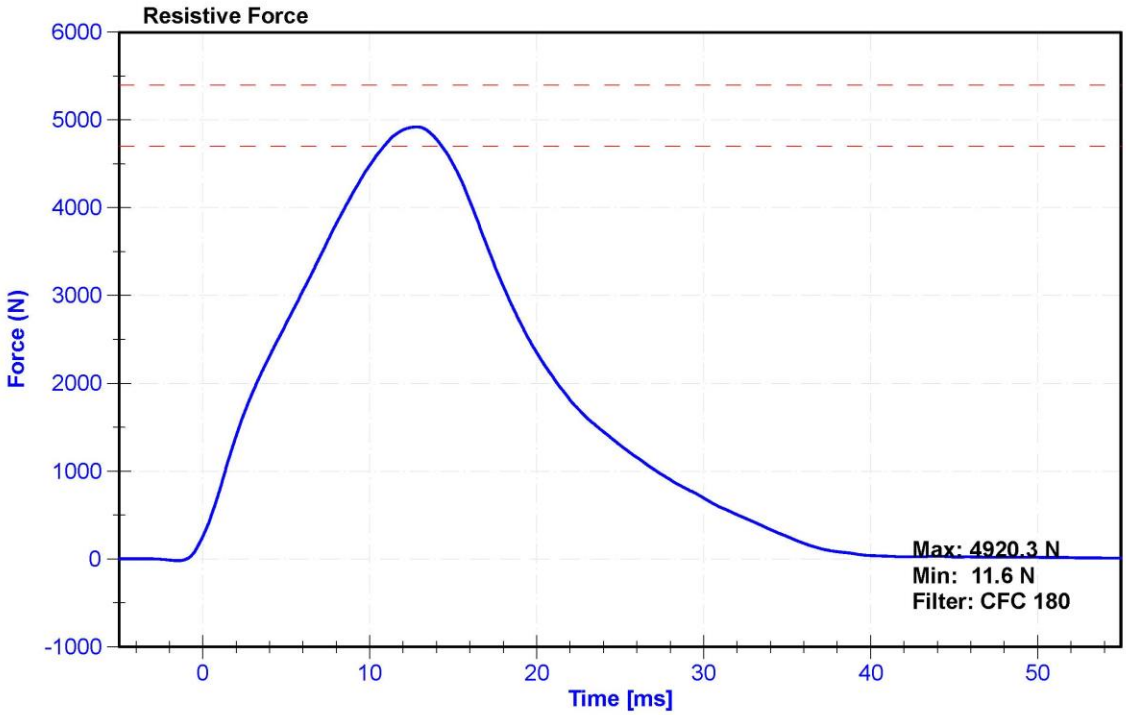
Results

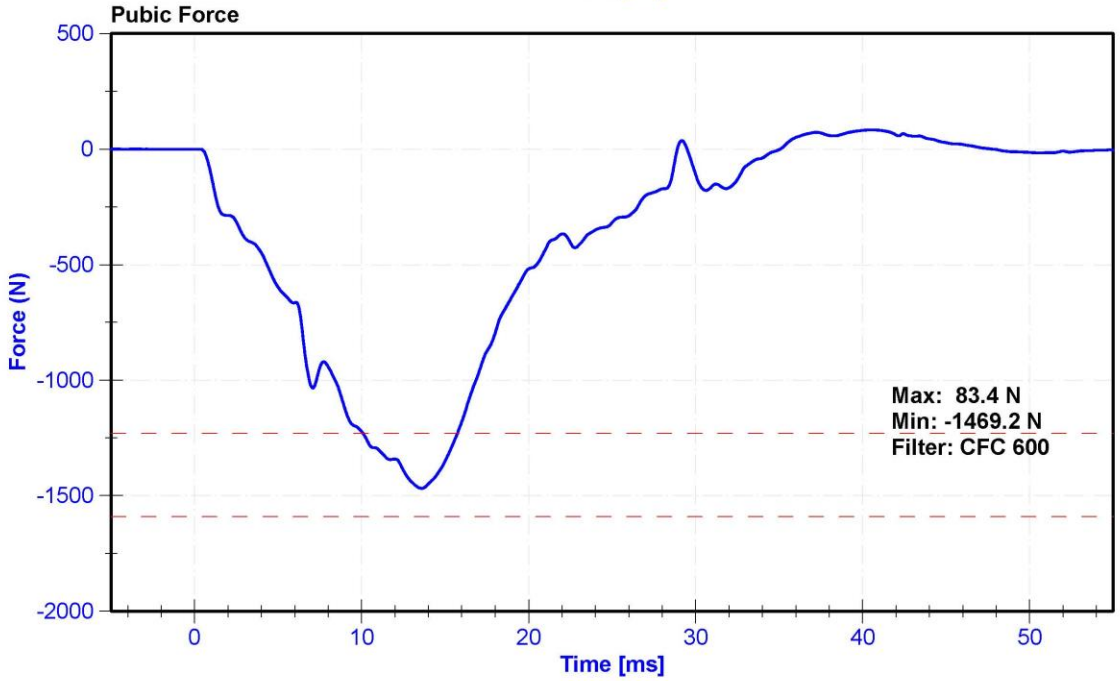
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26.0	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Resistive Force	4700	5400	N	4920.3	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.80	Pass
Pubic Force	-1590	-1230	N	-1469.2	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.60	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Pubic Load Cell	Denton 3096JFL	30960459GFE	3/19/2020	3/19/2021




Resistive Force
Force (N)
Time [ms]
Max: 4920.3 N
Min: 11.6 N
Filter: CFC 180


Pubic Force
Force (N)
Time [ms]
Max: 83.4 N
Min: -1469.2 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

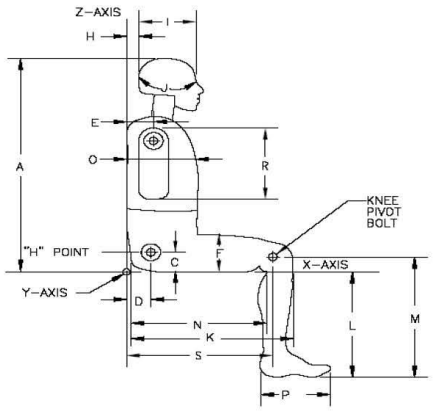
SERIAL No: 300

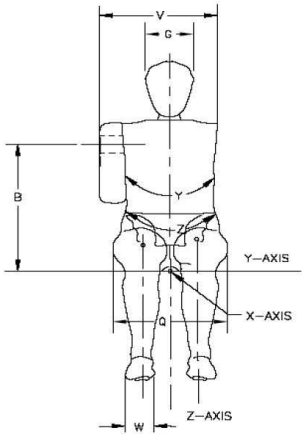
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Dutton Date: 01/15/2021

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	440	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	187	Pass
J	Head Circumference	541	551	544	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	361	Pass
M	Knee Pivot to floor height	392	409	398	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	208	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	484	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	83	Pass
Y	Chest Circumference w/jacket	851	881	875	Pass
Z	Waist Circumference	761	791	773	Pass

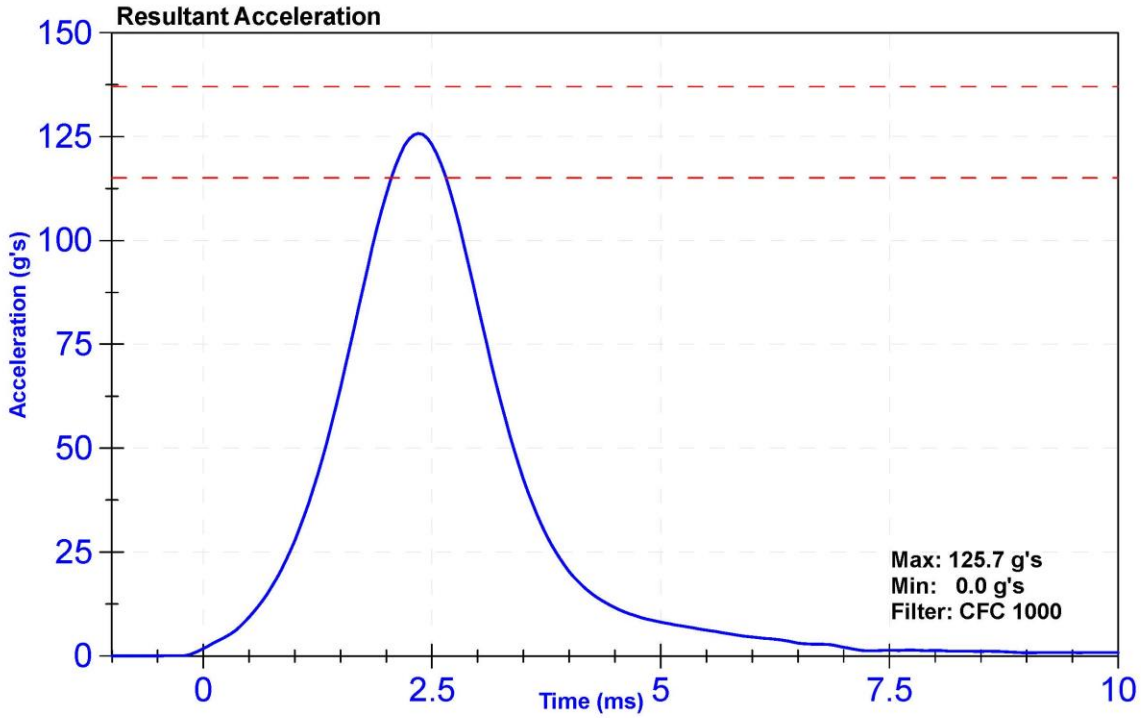
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

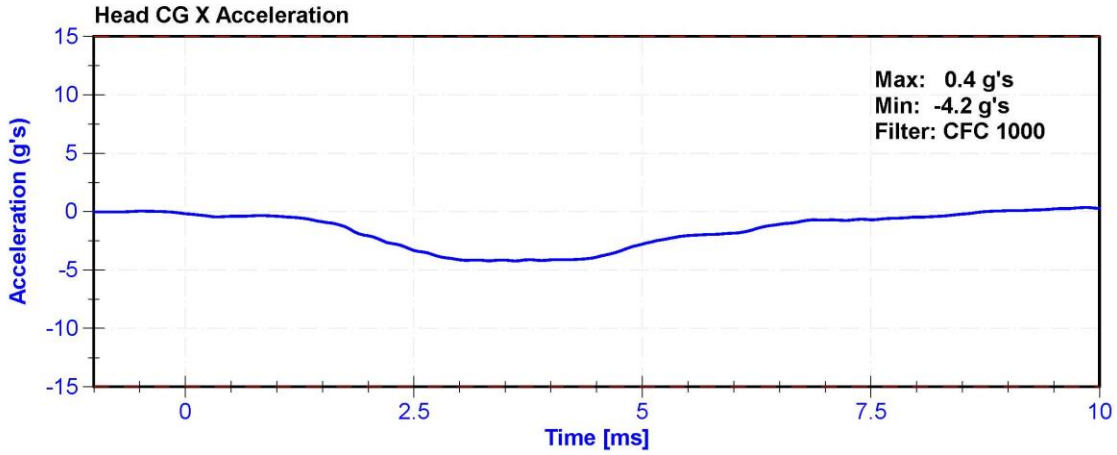
Results

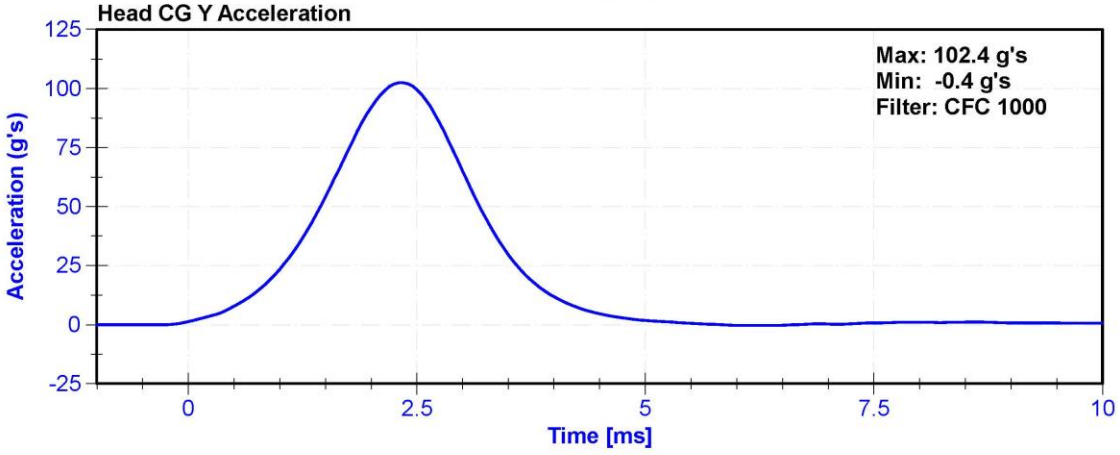
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Resultant Acceleration	115	137	g's	125.7	Pass
Oscillation	0	15	%	1.1	Pass
Fore-Aft Acceleration	-15	15	g's	-4.2	Pass

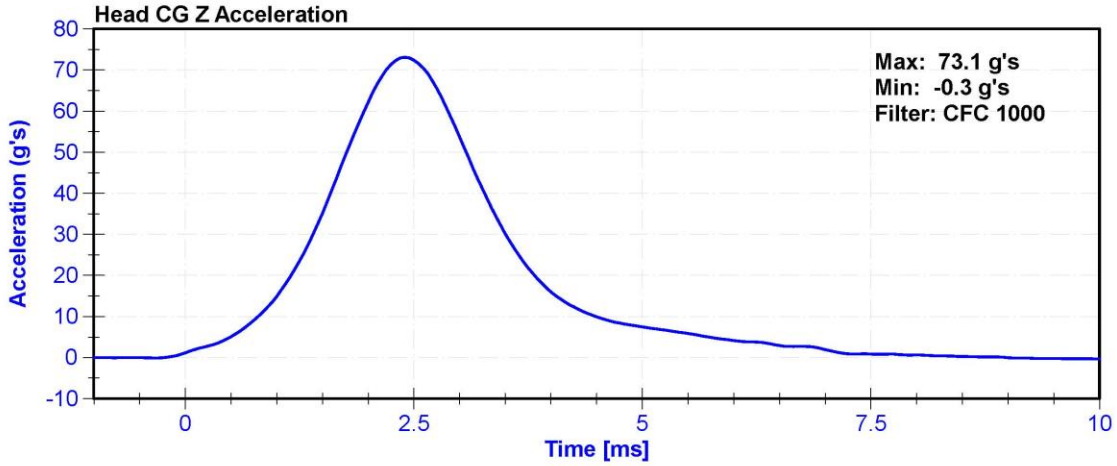
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	11/10/2020	5/11/2021
Y Accelerometer	ENDEVCO 7264	AC-P79189	11/10/2020	5/11/2021
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	11/10/2020	5/11/2021




Head CG X Acceleration
Max: 0.4 g's
Min: -4.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 102.4 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 73.1 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

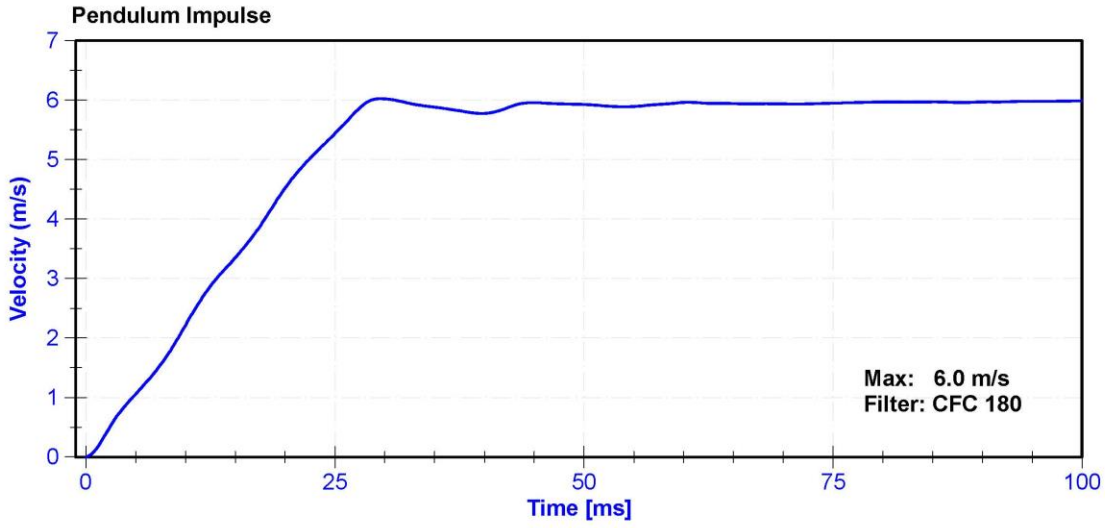
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

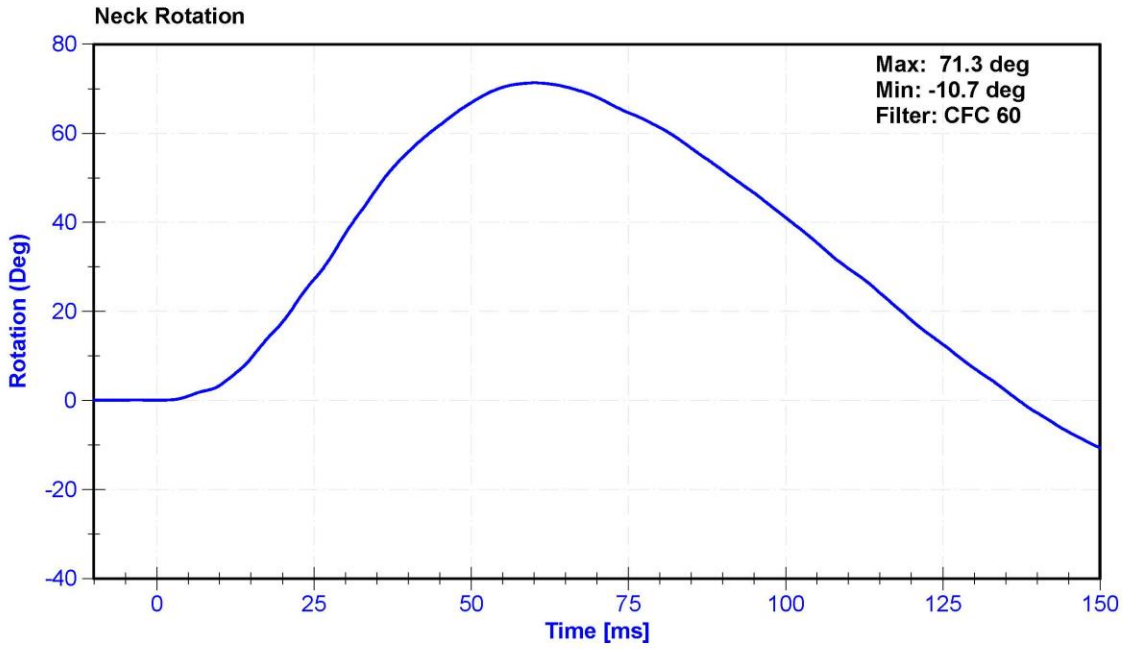
Results

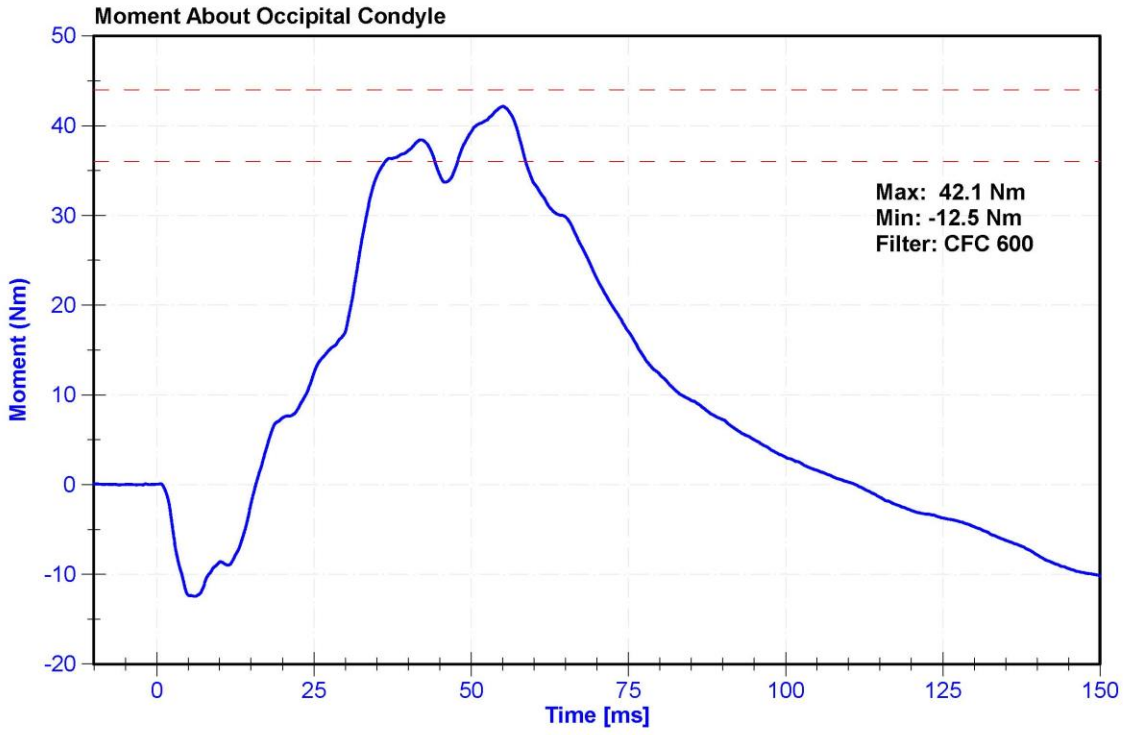
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	5.51	5.63	m/s	5.549	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.22	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.35	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.52	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.44	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.02	Pass
Neck Rotation	71	81	deg	71.3	Pass
Time at Maximum Rotation	50	70	ms	60.1	Pass
Moment about the OC	36	44	Nm	42.1	Pass
Moment Decay to 0 Nm	102	126	ms	111.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/6/2020	2/5/2021
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/6/2020	11/6/2021
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/6/2020	11/6/2021
Upper Neck Load Cell	Denton 1716	17162019 FY	3/18/2020	3/18/2021




Neck Rotation
Max: 71.3 deg
Min: -10.7 deg
Filter: CFC 60
Rotation (Deg)
80
60
40
20
0
-20
-40
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.1 Nm
Min: -12.5 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

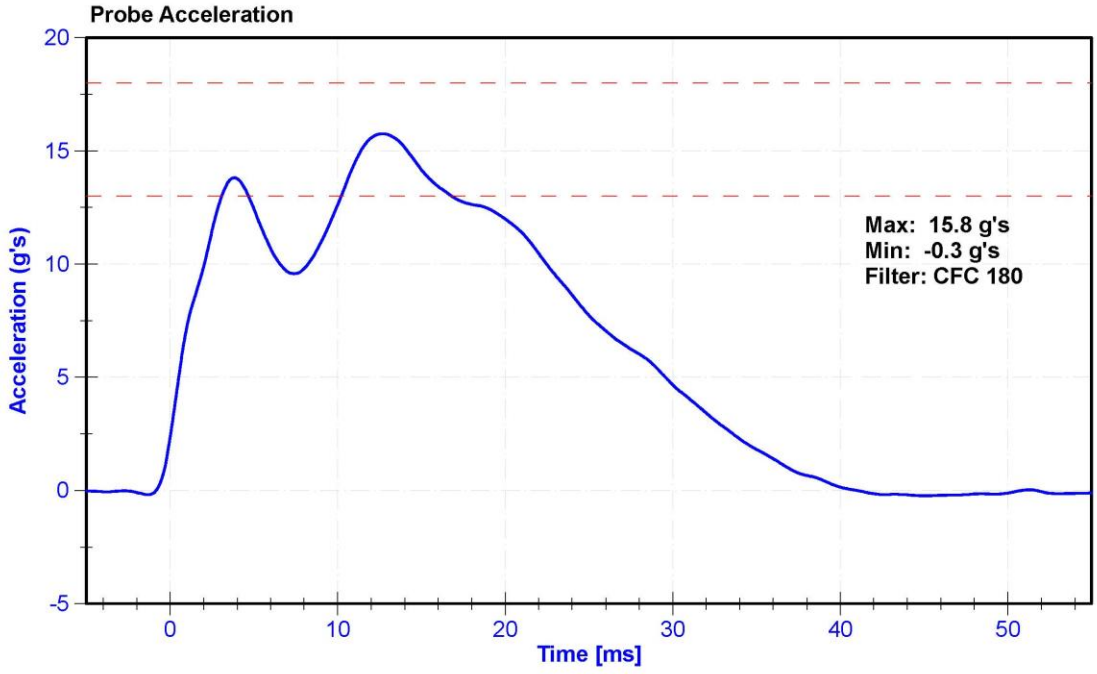
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

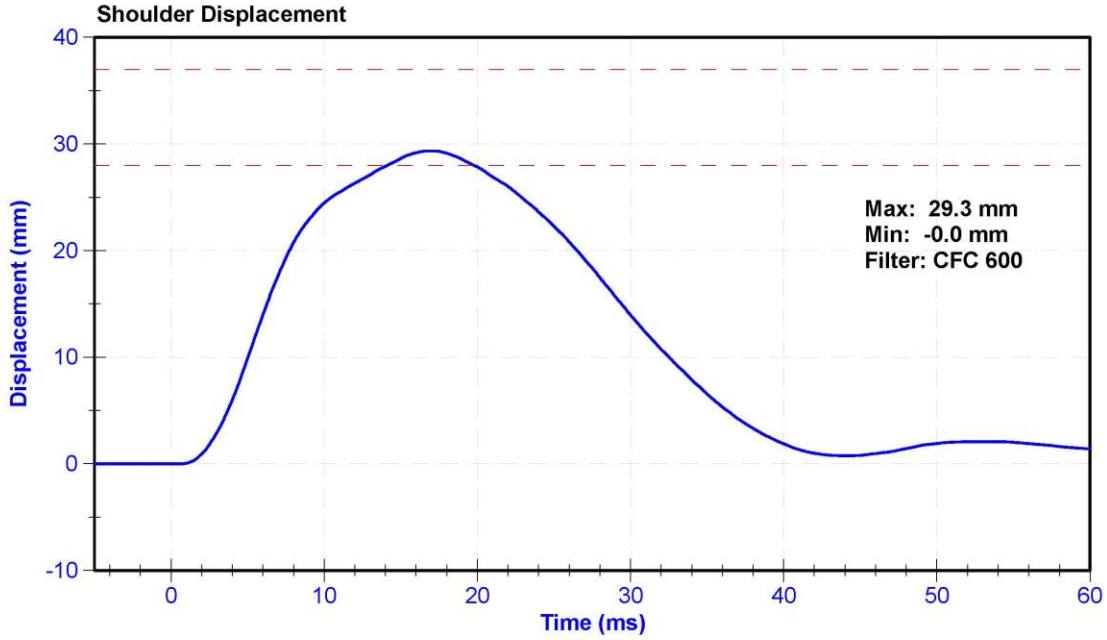
Results

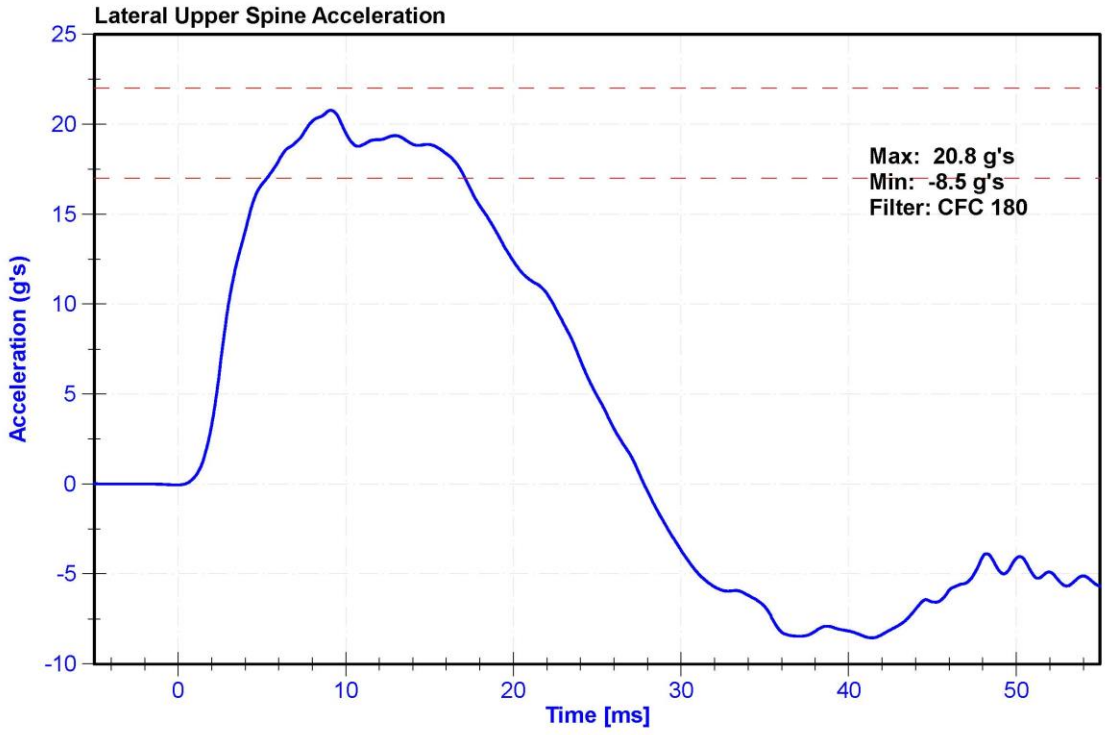
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	29.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	11/10/2020	5/11/2021
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P71281	11/9/2020	5/10/2021




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.3 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.8 g's
Min: -8.5 g's
Filter: CFC 180

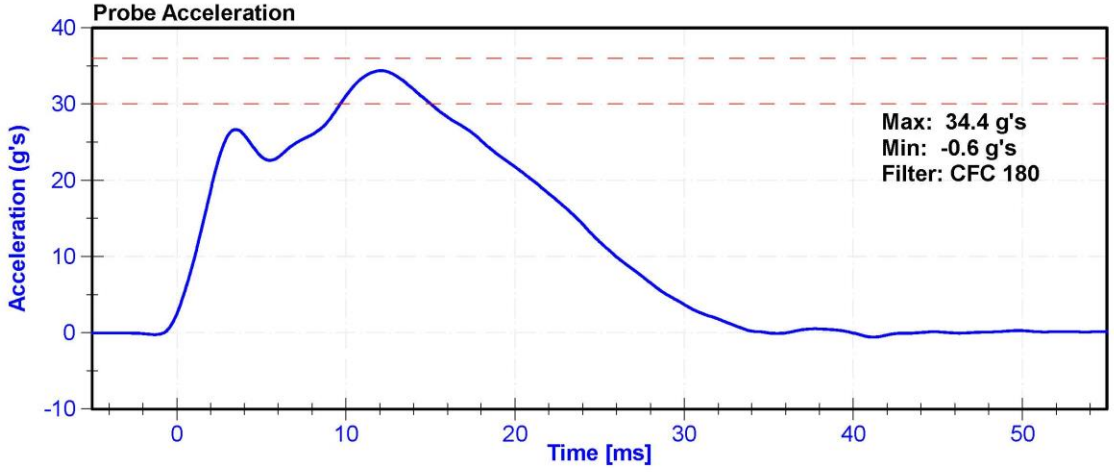
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

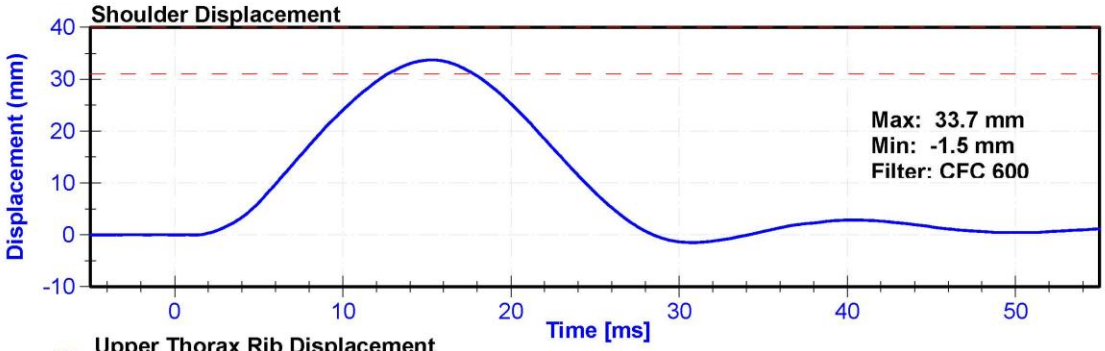
Results

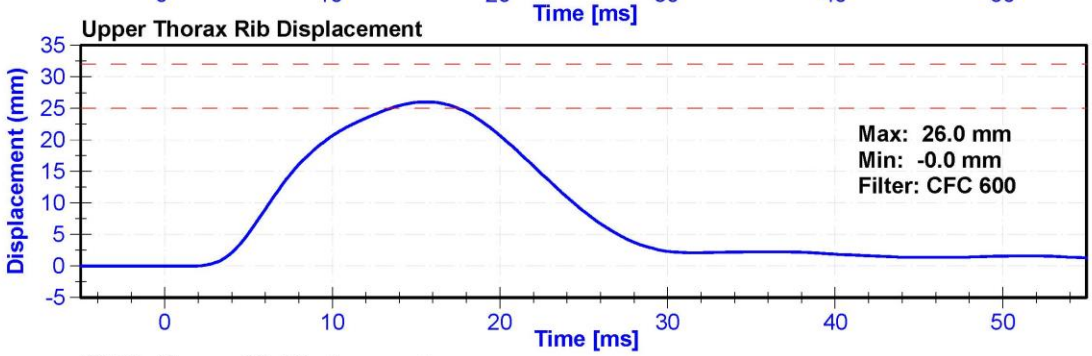
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29.0	Pass
Velocity	6.6	6.8	m/s	6.71	Pass
Probe Acceleration after 5 ms	30	36	g's	34.4	Pass
Lateral Upper Spine Acceleration	34	43	g's	41.2	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.4	Pass
Shoulder Deflection	31	40	mm	33.7	Pass
Upper Thorax Rib Deflection	25	32	mm	26.0	Pass
Mid Thorax Rib Deflection	30	36	mm	30.9	Pass
Lower Thorax Rib Deflection	32	38	mm	32.7	Pass

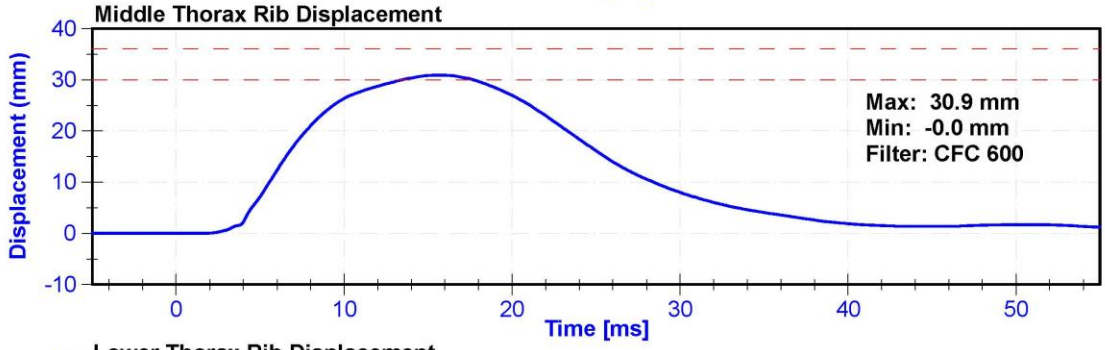
Transducer Calibrations

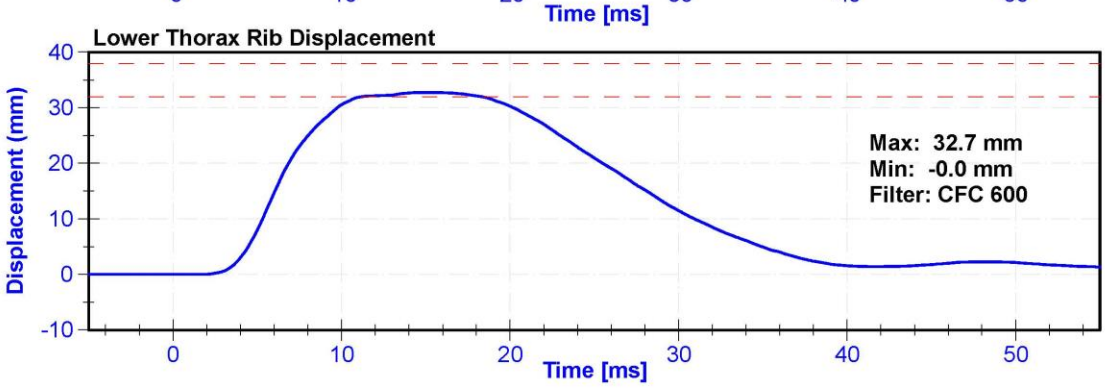
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P71281	11/9/2020	5/10/2021
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	11/9/2020	5/10/2021
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	11/10/2020	5/11/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	11/10/2020	5/11/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	11/10/2020	5/11/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	11/9/2020	5/10/2021

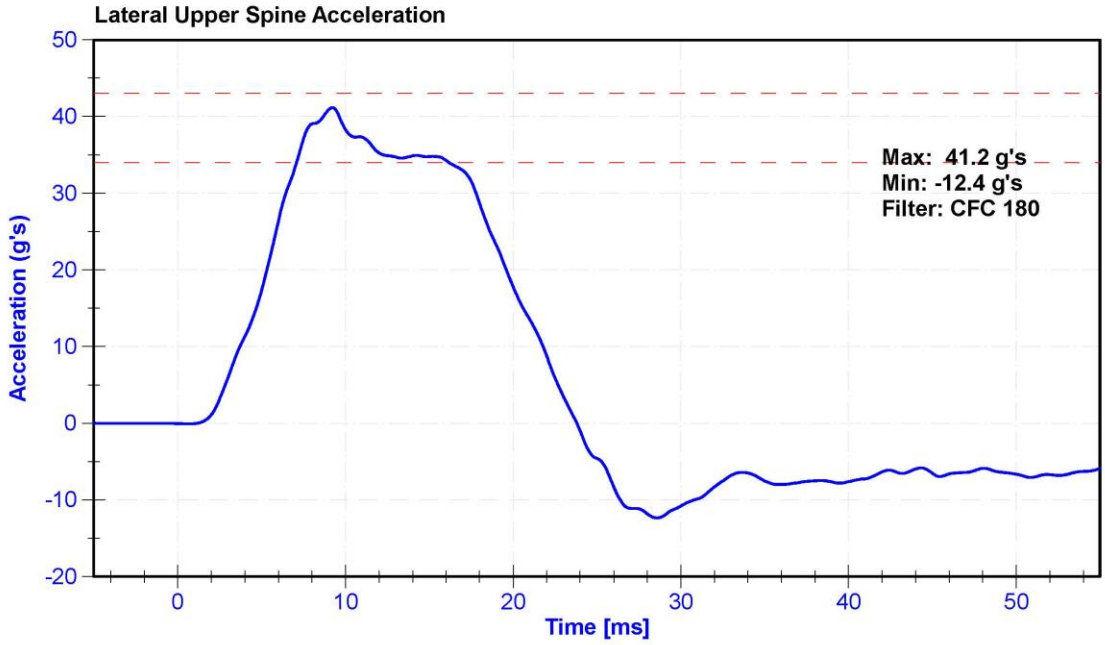


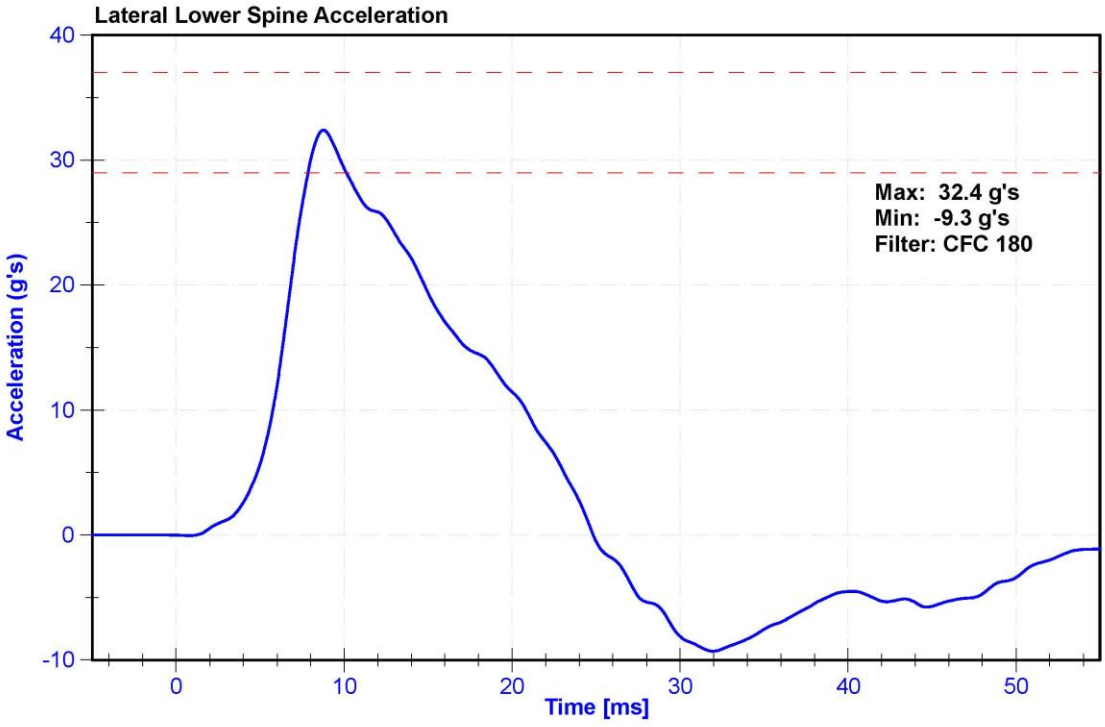

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.7 mm
Min: -1.5 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.0 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.9 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.7 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 41.2 g's
Min: -12.4 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: 32.4 g's
Min: -9.3 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

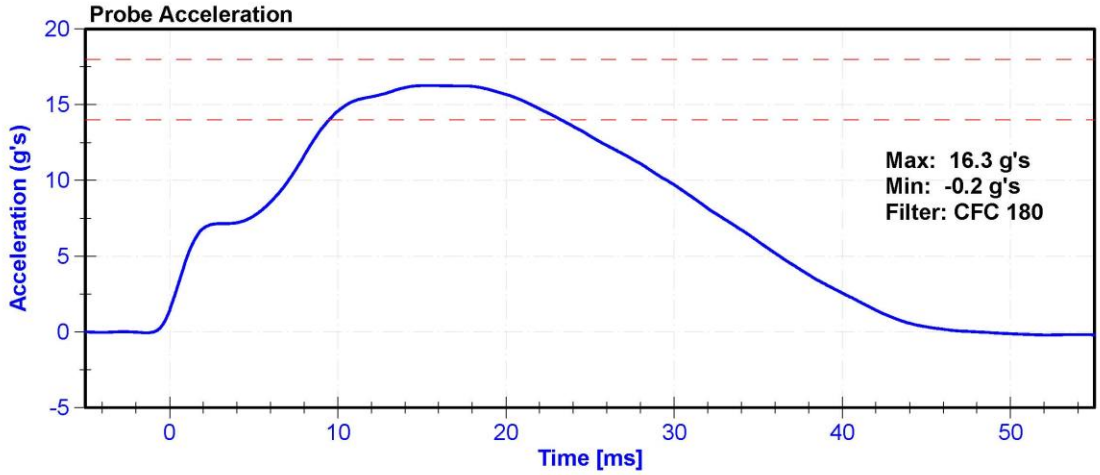
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

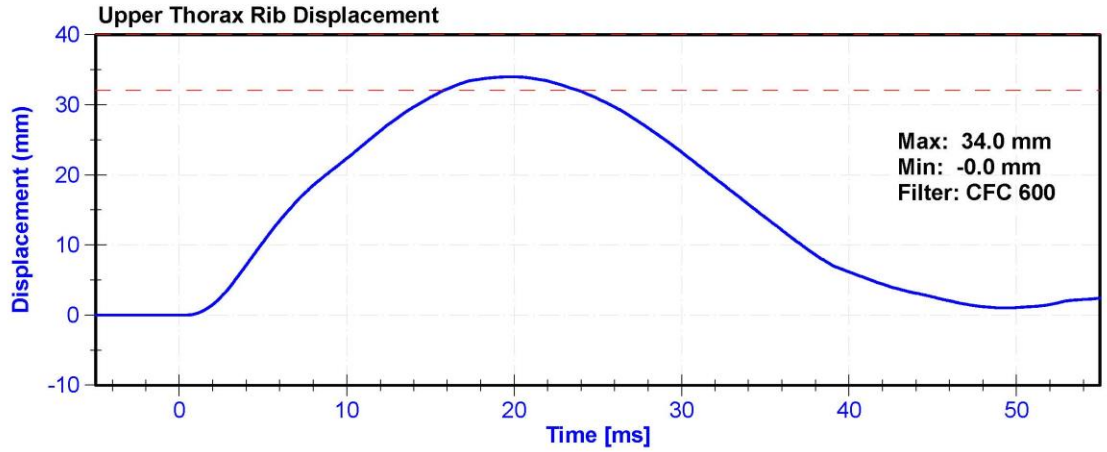
Results

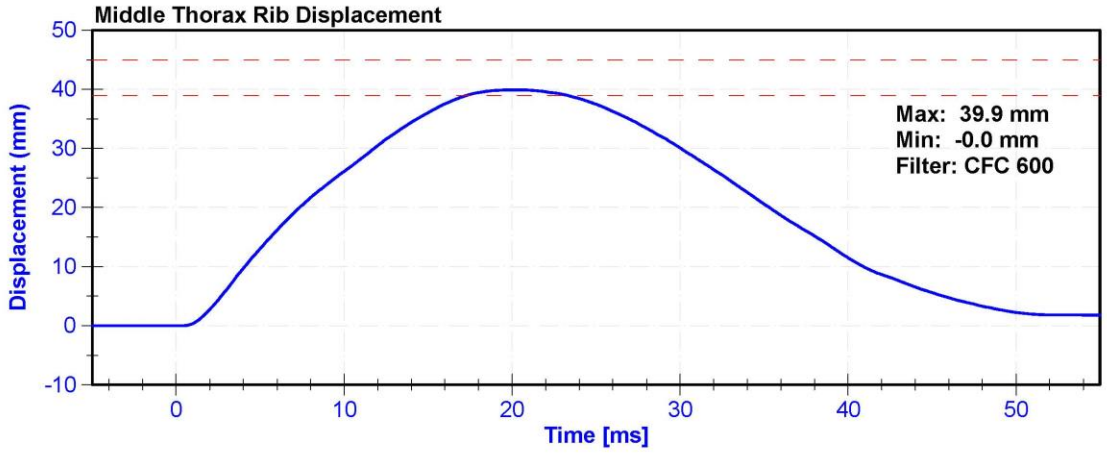
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	14	18	g's	16.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.8	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.7	Pass
Upper Thorax Rib Deflection	32	40	mm	34.0	Pass
Middle Thorax Rib Deflection	39	45	mm	39.9	Pass
Lower Thorax Rib Deflection	35	43	mm	36.8	Pass

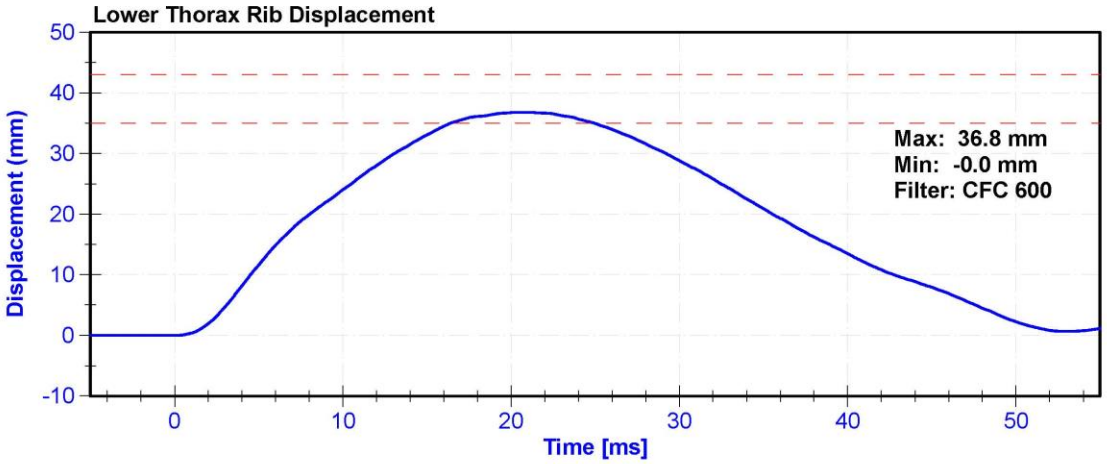
Transducer Calibrations

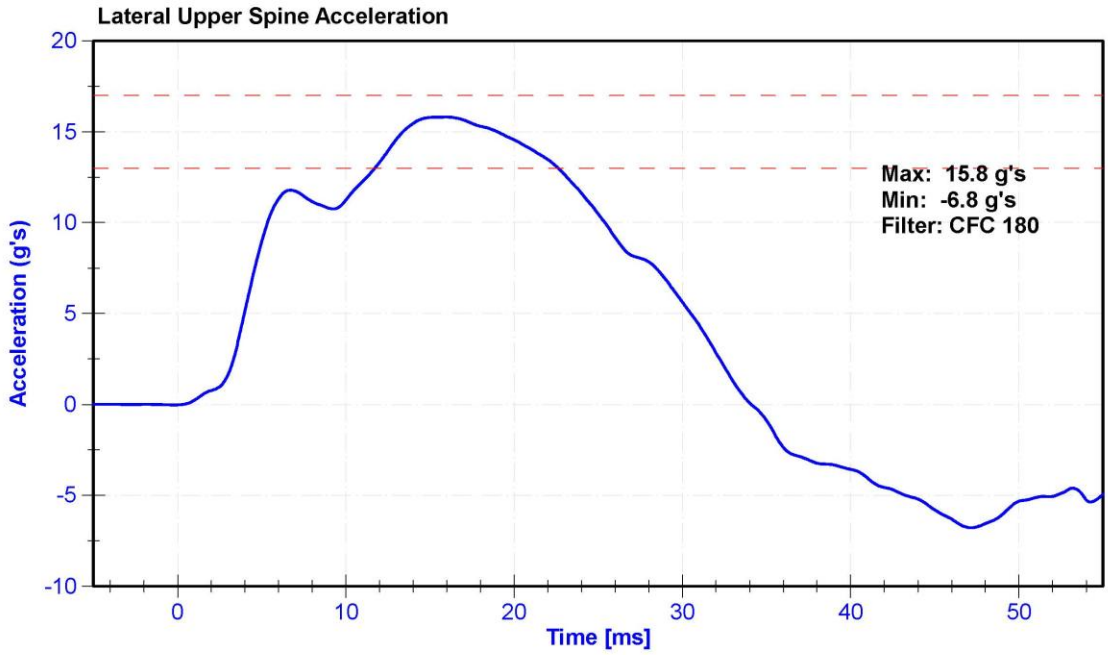
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P71281	11/9/2020	5/10/2021
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	11/9/2020	5/10/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	11/10/2020	5/11/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	11/10/2020	5/11/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	11/9/2020	5/10/2021

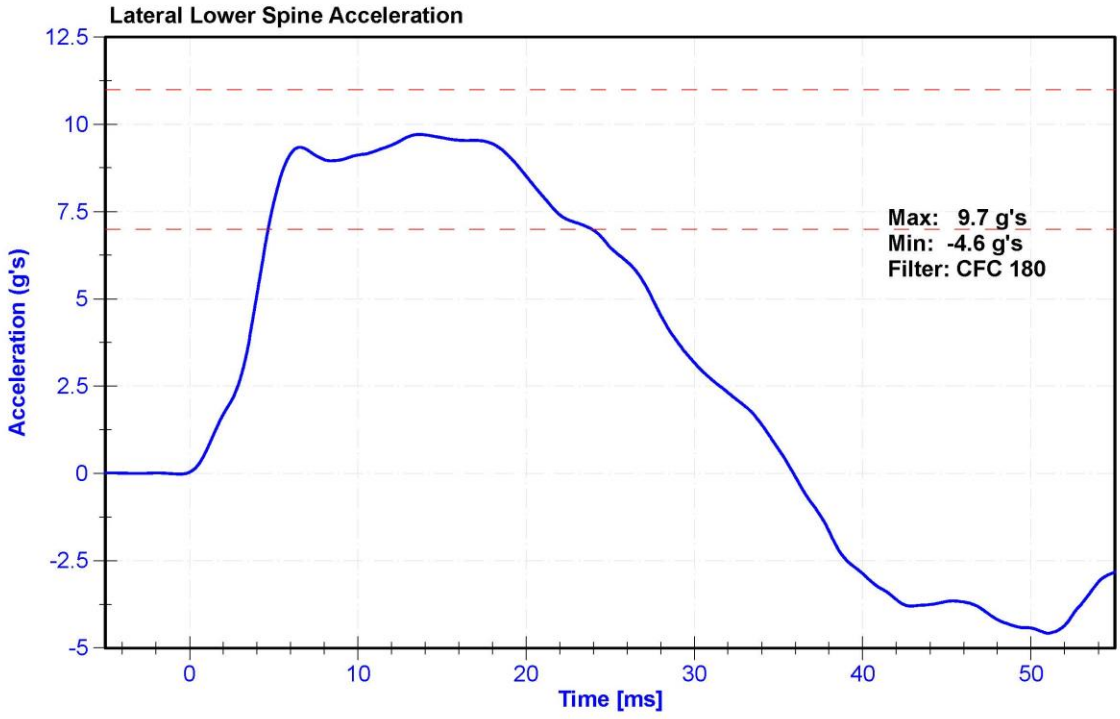



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.0 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.9 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.8 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.8 g's
Min: -6.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.7 g's
Min: -4.6 g's
Filter: CFC 180

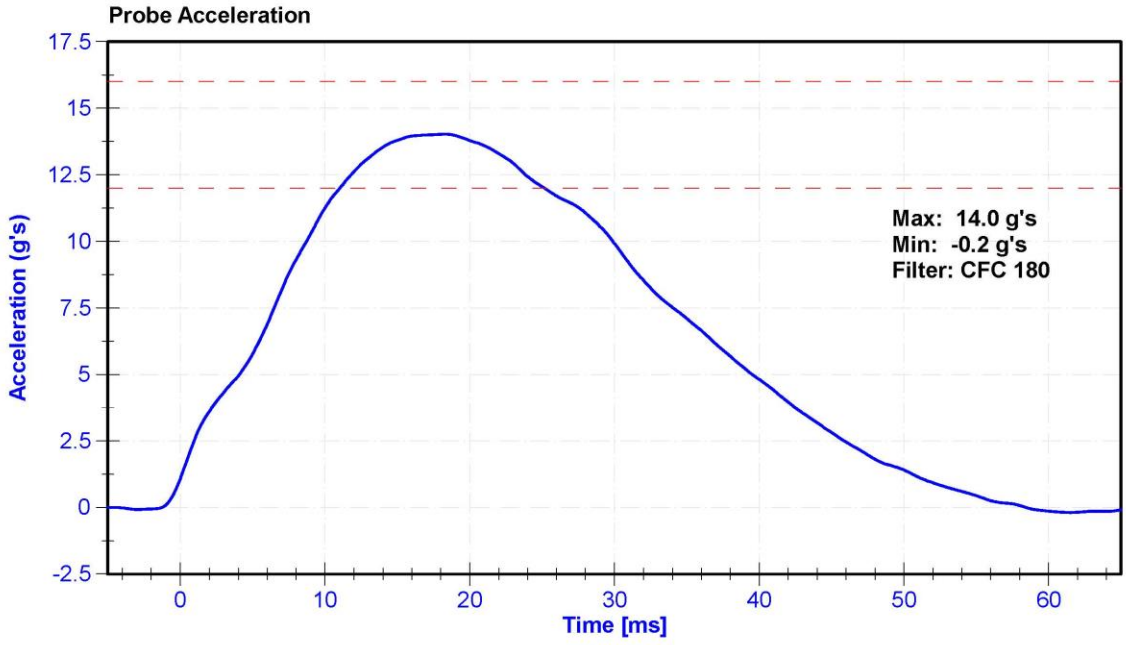
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

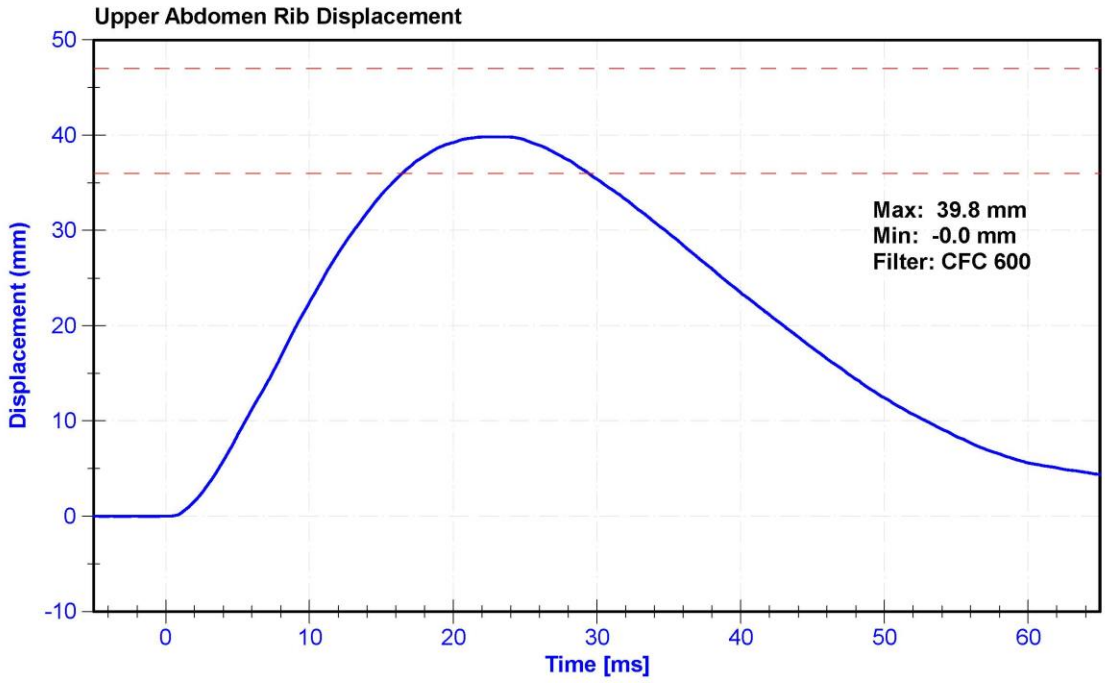
Results

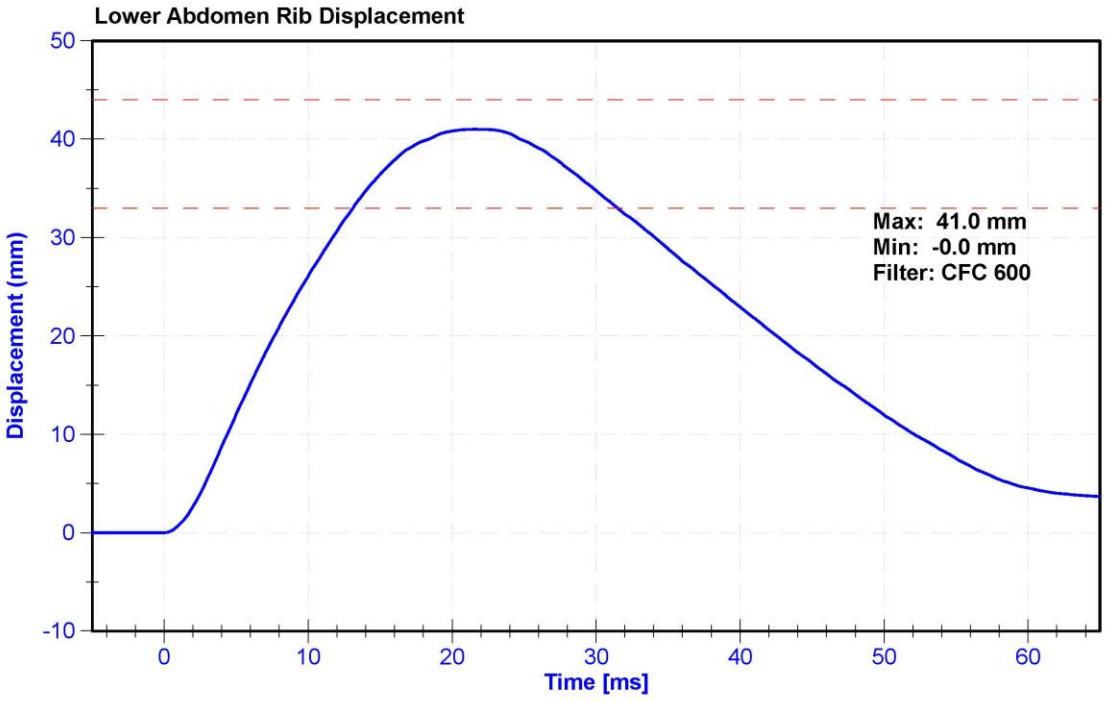
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29.0	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	12	16	g's	14.0	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.4	Pass
Upper Abdomen Rib Deflection	36	47	mm	39.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.0	Pass

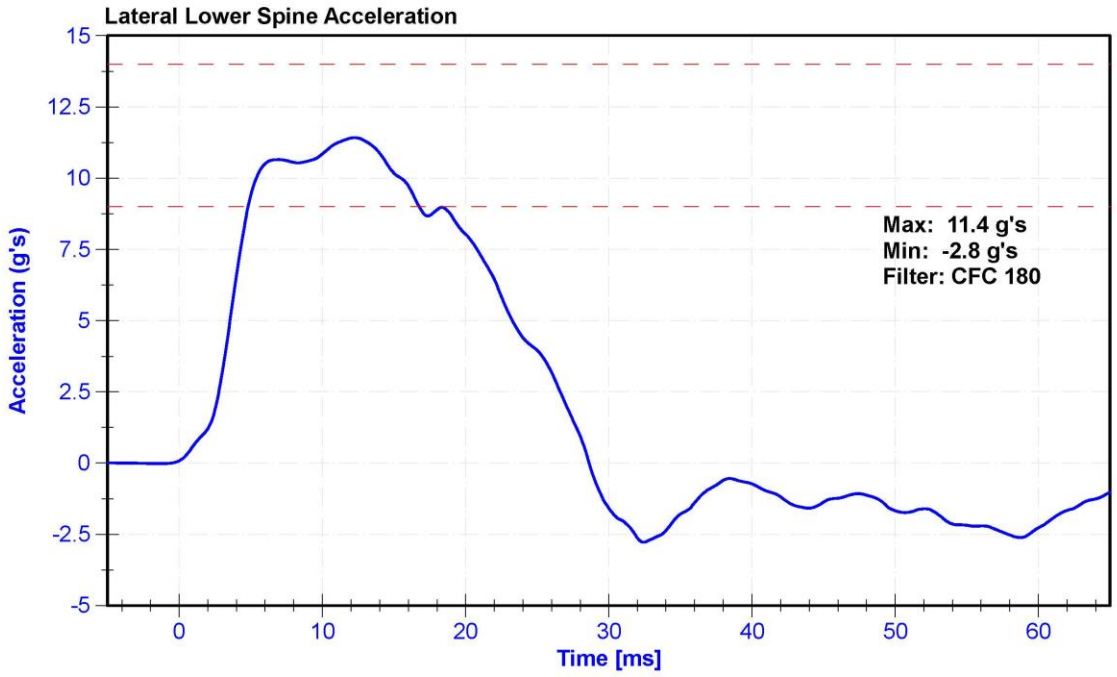
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	11/9/2020	5/10/2021
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	11/10/2020	5/11/2021
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	11/10/2020	5/11/2021




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.8 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.0 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
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.4 g's
Min: -2.8 g's
Filter: CFC 180

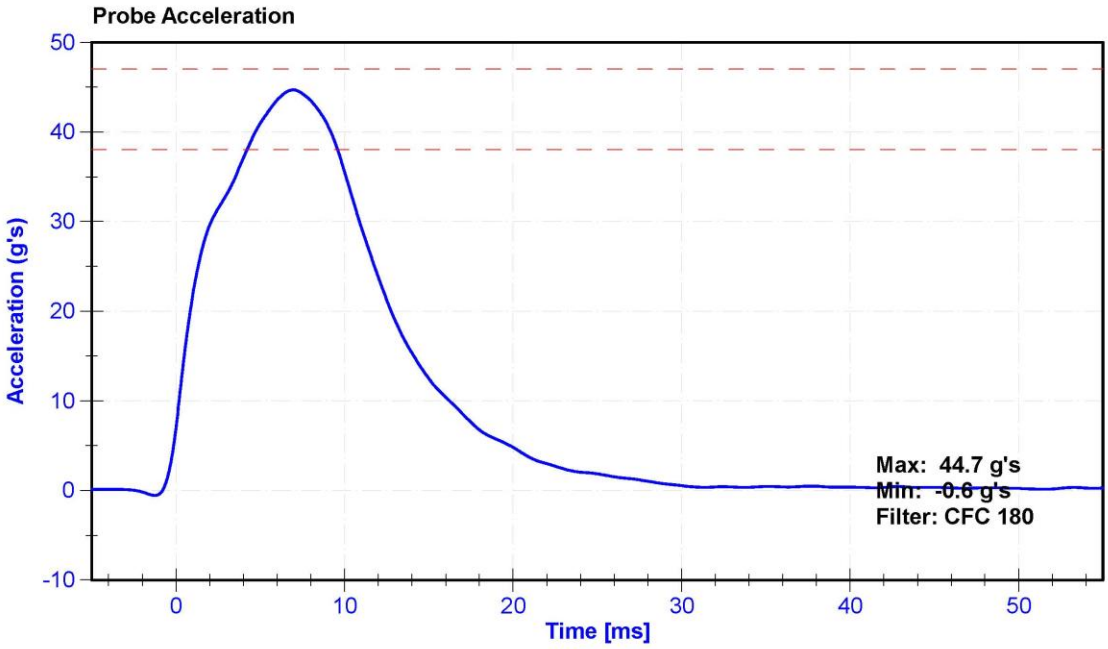
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

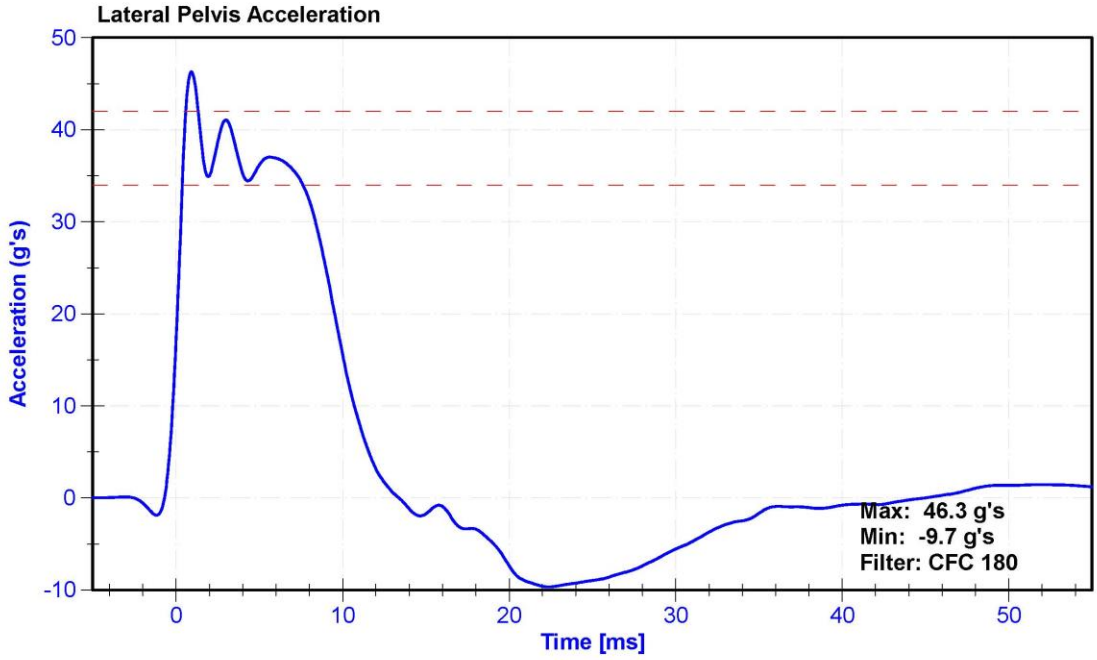
Results

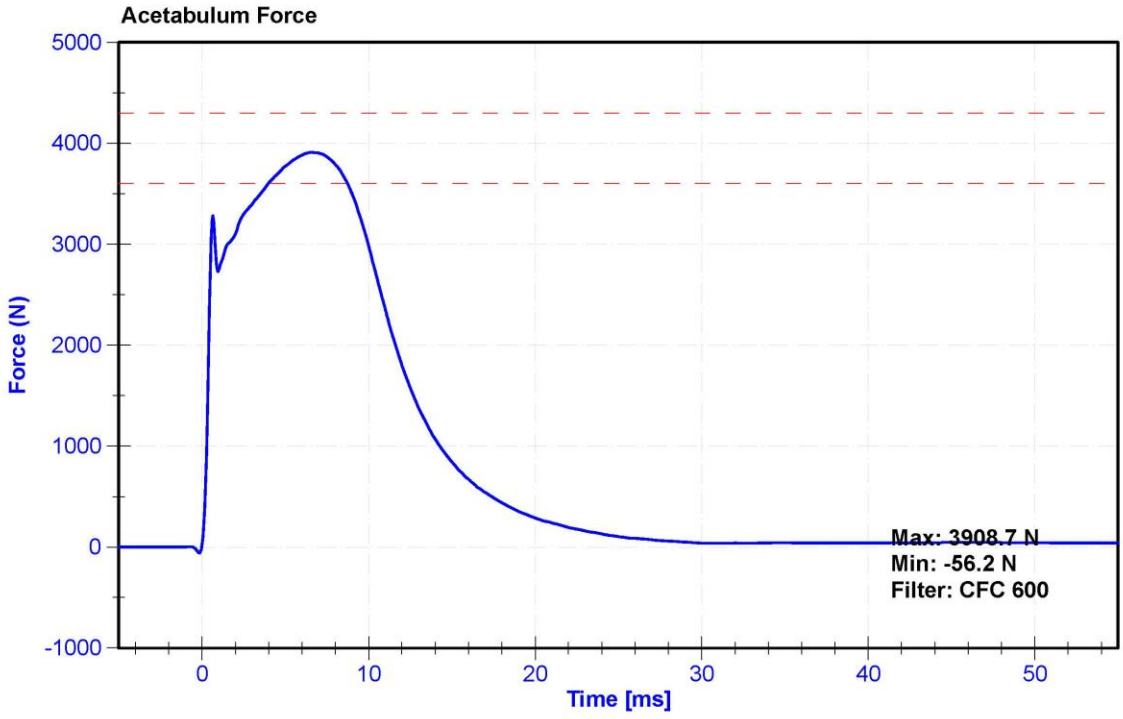
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration	38	47	g's	44.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	36.9	Pass
Acetabulum Force	3600	4300	N	3908.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Pelvis Y Accelerometer	ENDEVCO 7264C	AC-P51731	11/9/2020	5/10/2021
Acetabulum Load Cell	Denton IF-520	LC-236Fy	3/18/2020	3/18/2021
Certification Plug	SACO	13968	5/22/2020	N/A
Crash Test Plug	SACO	13933	5/20/2020	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 46.3 g's
Min: -9.7 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: 3908.7 N
Min: -56.2 N
Filter: CFC 600

SACO RESEARCH

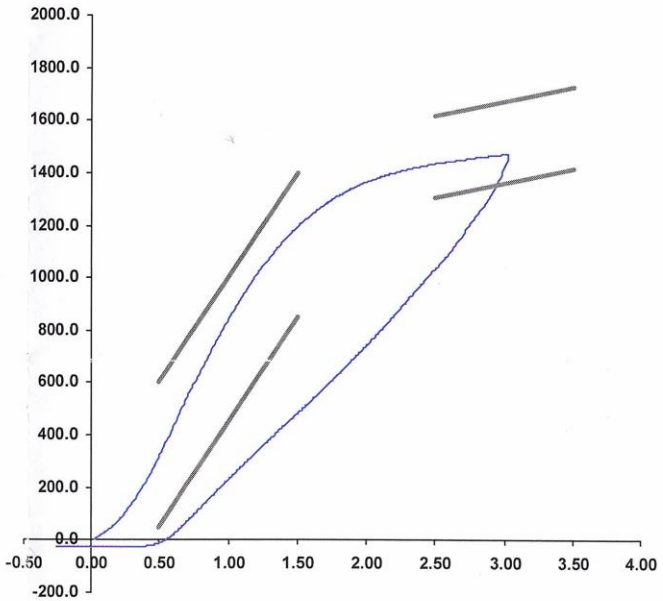
300
Cert 1
1/15/2021

SID-IIs Pelvis Plug Certification Test

Plug S/N 13968
Test Number 13442
Report Number 13487
Test Date 5/22/2020 9:05:49 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	330.66	50.00	600.00
Force @ 1.5 mm (N)	1,198.19	850.00	1,400.00
Force @ 2.5 mm (N)	1,437.28	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,473.96	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 22-May-20
SACO Research

By : DC Date : 5-22-2020

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

300
Non-Impact Crash
1/15/2021

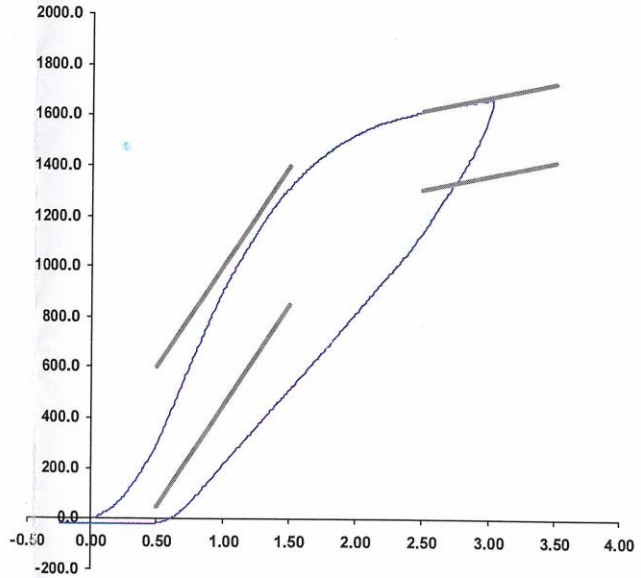
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13018
Test Number 10337
Report Number 10372
Test Date 7/30/2019 12:36:22 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	308.73	50.00	600.00
Force @ 1.5 mm (N)	1,319.07	850.00	1,400.00
Force @ 2.5 mm (N)	1,617.90	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,662.87	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 30-Jul-19
SACO Research

By : DC Date : 7/30/2019

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

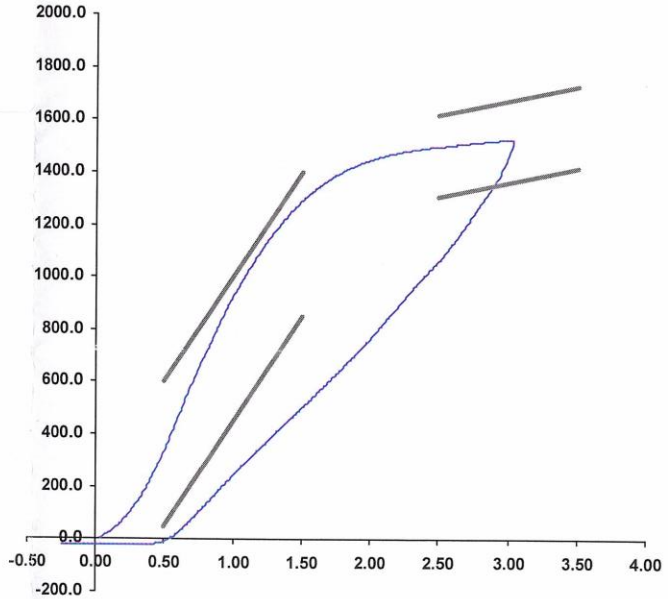
300
Crash
1/15/2021 SV

SID-IIs Pelvis Plug Certification Test

Plug S/N 13933
Test Number 13407
Report Number 13452
Test Date 5/20/2020 10:04:59 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	339.26	50.00	600.00
Force @ 1.5 mm (N)	1,294.73	850.00	1,400.00
Force @ 2.5 mm (N)	1,499.29	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,528.29	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 20-May-20
SACO Research

By : DC Date : 5/20/2020

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

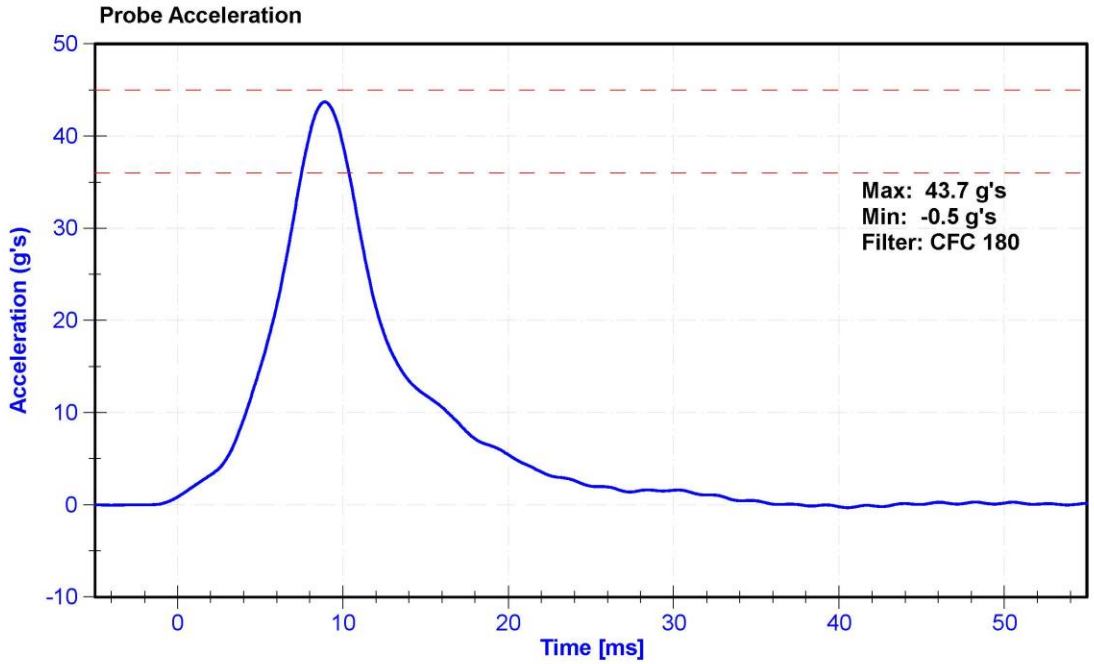
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	S. Vacanti

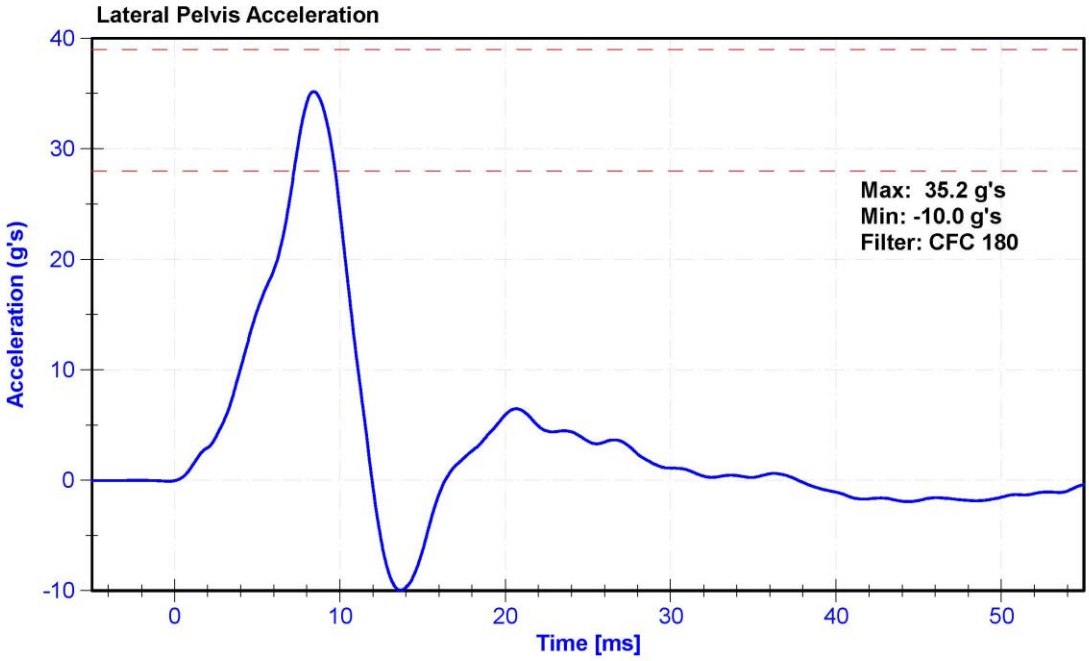
Results

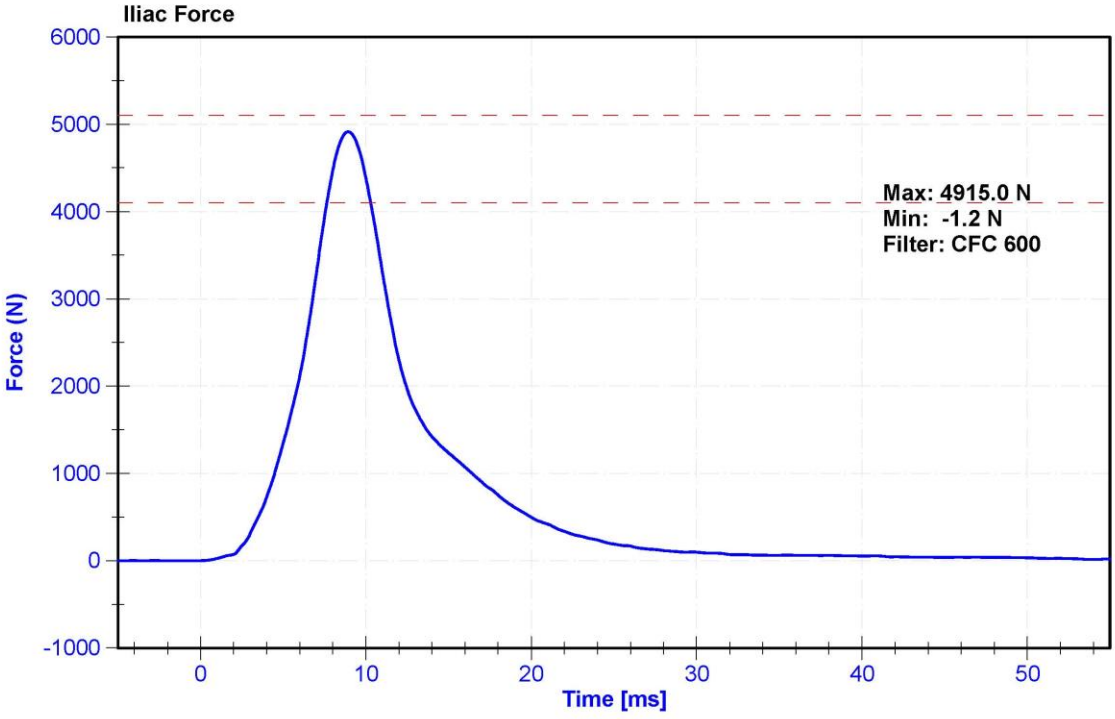
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29.0	Pass
Velocity	4.2	4.4	m/s	4.26	Pass
Probe Acceleration	36	45	g's	43.7	Pass
Lateral Pelvis Acceleration	28	39	g's	35.2	Pass
Iliac Force	4100	5100	N	4915.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	MSI 64C-2000	A286228	1/29/2020	1/28/2021
Pelvis Y Accelerometer	ENDEVCO 7264C	AC-P51731	11/9/2020	5/10/2021
Iliac Load Cell	DENTON 3228J	LC-279Fy	11/23/2020	11/23/2021




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 35.2 g's
Min: -10.0 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4915.0 N
Min: -1.2 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

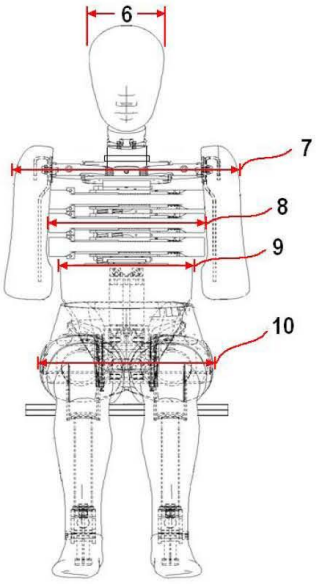
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

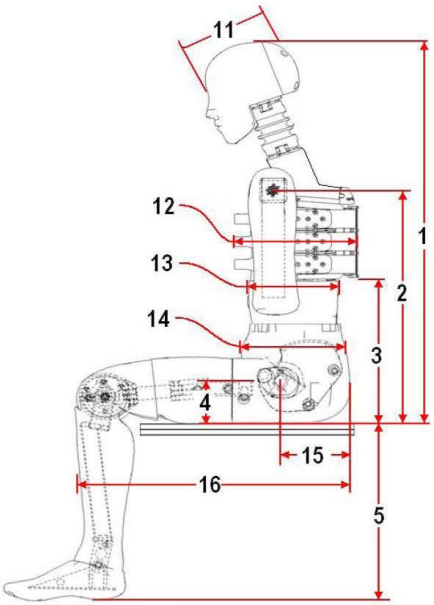
External Measurements - EuroSID-2re

Technician: K. Dutton Date: 2/5/2021

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	914	Pass
2	Seat to Shoulder Joint	558	572	569	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	425	Pass
6	Head Width	152	158	154	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	285	Pass
10	Pelvis Lap Width	359	373	367	Pass
11	Head Depth	196	206	202	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	156	Pass
16	Back of Buttocks to Front Knee	597	615	609	Pass

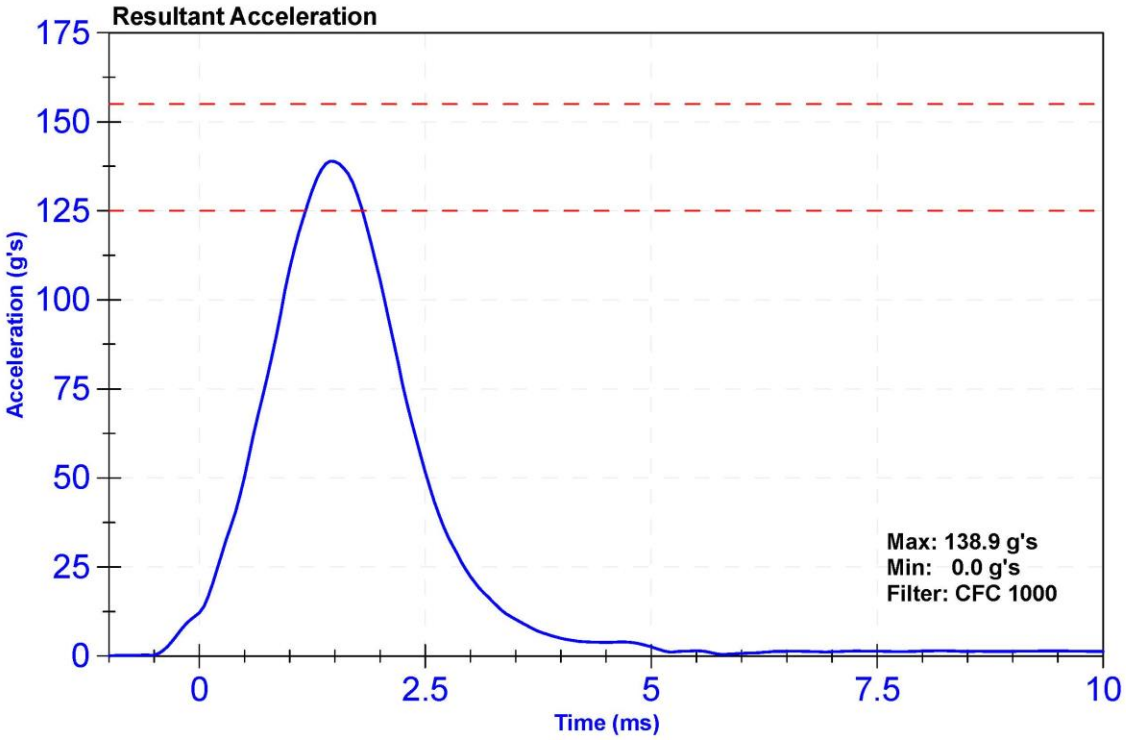
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

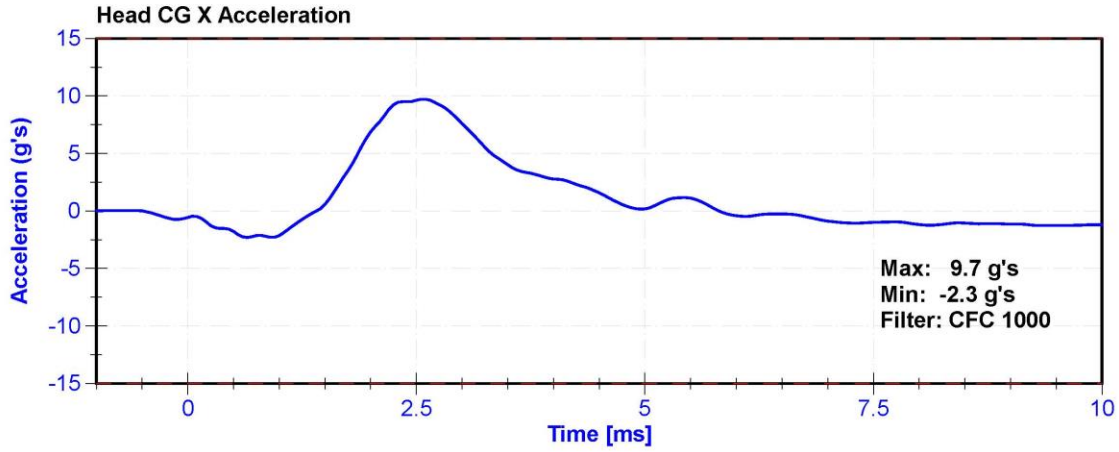
Results

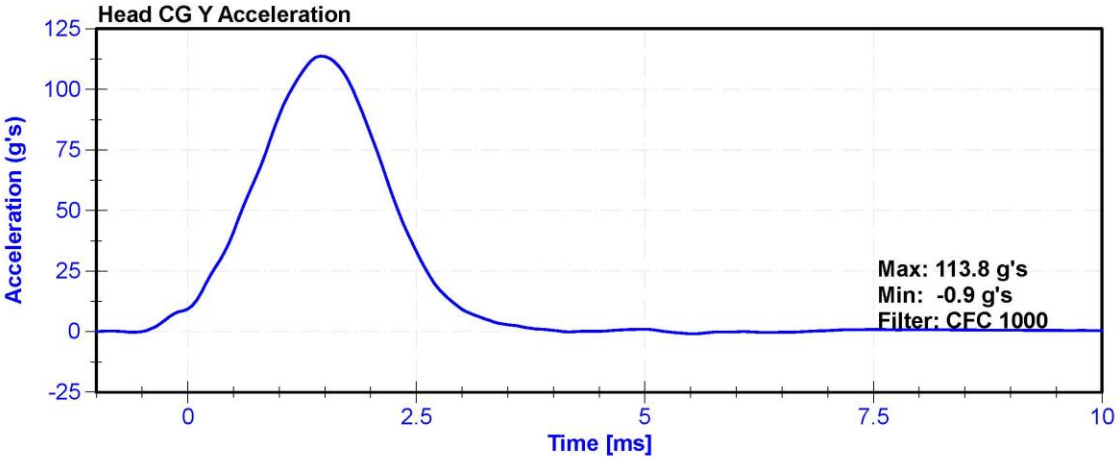
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	22	Pass
Resultant Acceleration	125	155	g's	138.9	Pass
Oscillation	0	15	%	2.86	Pass
Fore-Aft Acceleration	-15	15	g's	9.7	Pass

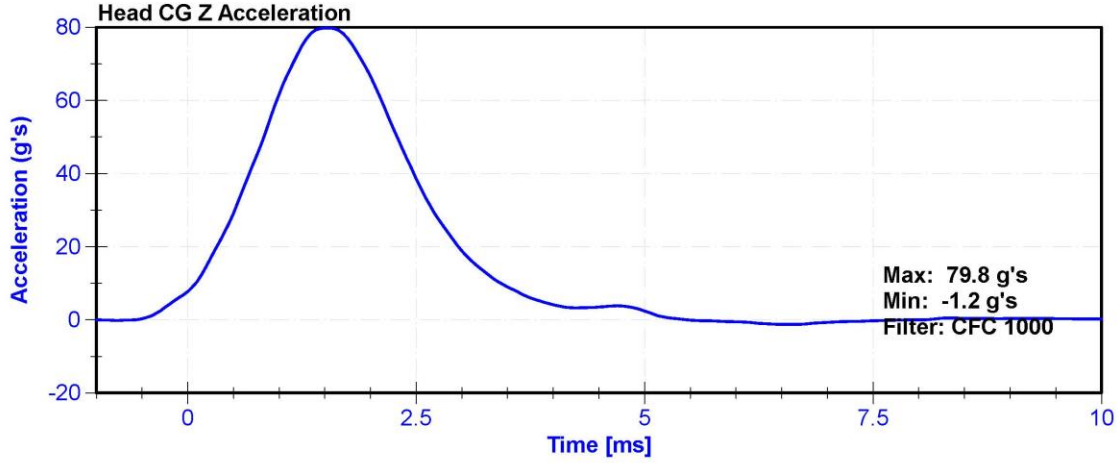
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco 7264C	P51884	9/22/2020	3/23/2021
Y Accelerometer	Endevco 7264C	P73161	9/22/2020	3/23/2021
Z Accelerometer	Endevco 7264C	P79588	9/22/2020	3/23/2021




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 9.7 g's
Min: -2.3 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 113.8 g's
Min: -0.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]
Max: 79.8 g's
Min: -1.2 g's
Filter: CFC 1000

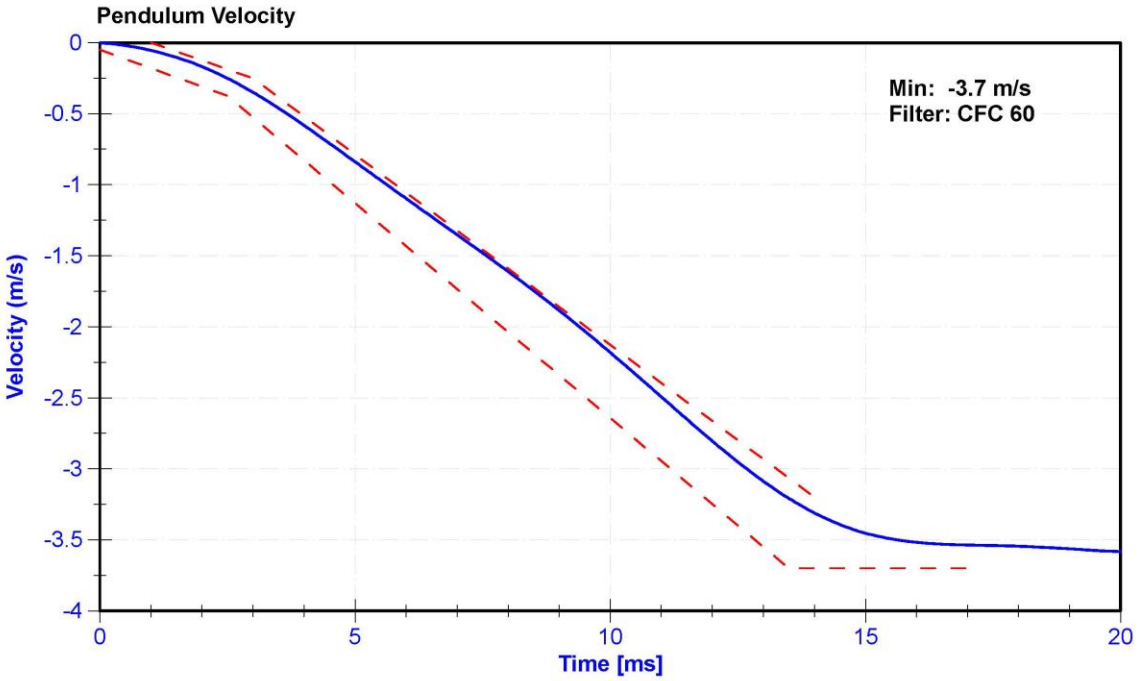
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

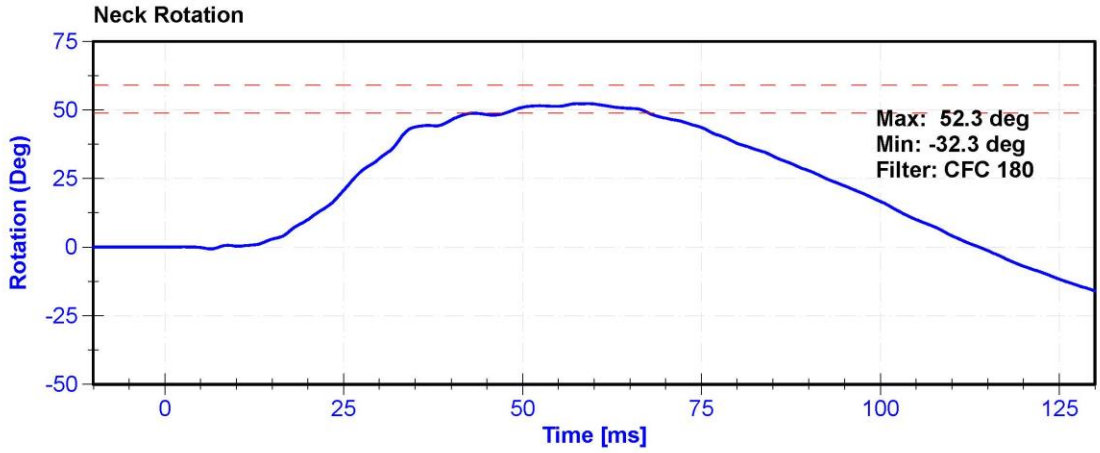
Results

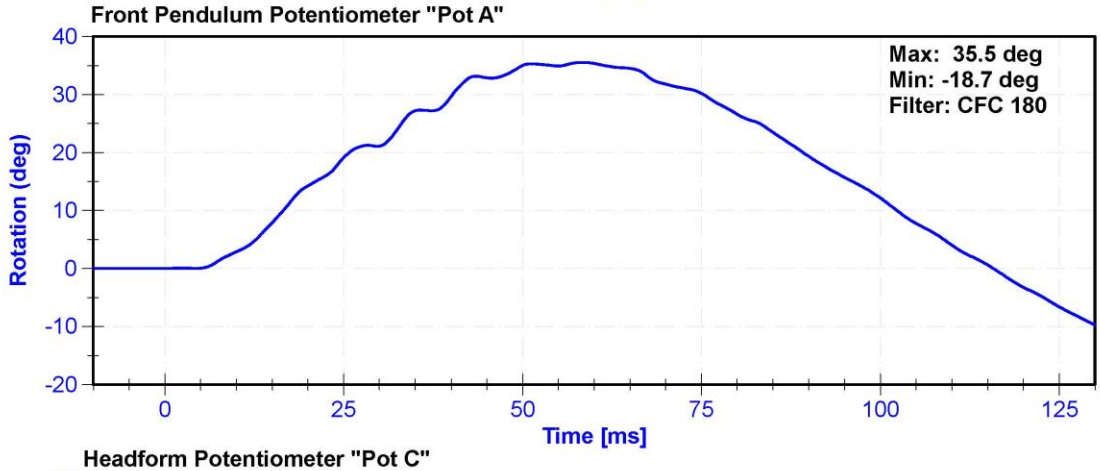
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	23.2	Pass
Velocity	3.3	3.5	m/s	3.38	Pass
Lateral Neck Rotation	49	59	deg	52.3	Pass
Time at Maximum Rotation	54	66	ms	59.2	Pass
Time of Rotation Decay from Maximum	53	88	ms	54.7	Pass

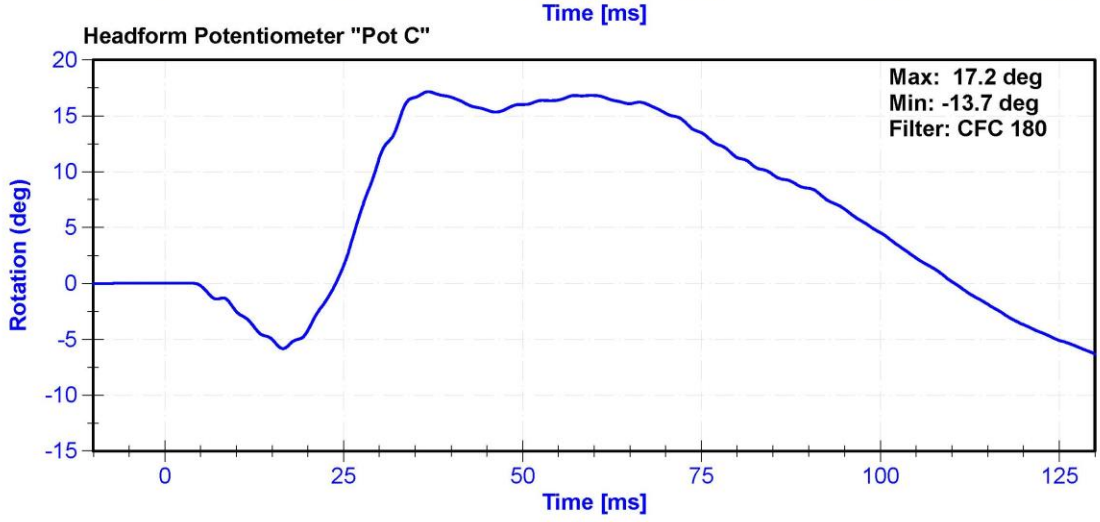
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CTAC-C16503 Striker		2/5/2021	2/5/2022
Front Pendulum Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Headform Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 52.3 deg
Min: -32.3 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 35.5 deg
Min: -18.7 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 17.2 deg
Min: -13.7 deg
Filter: CFC 180

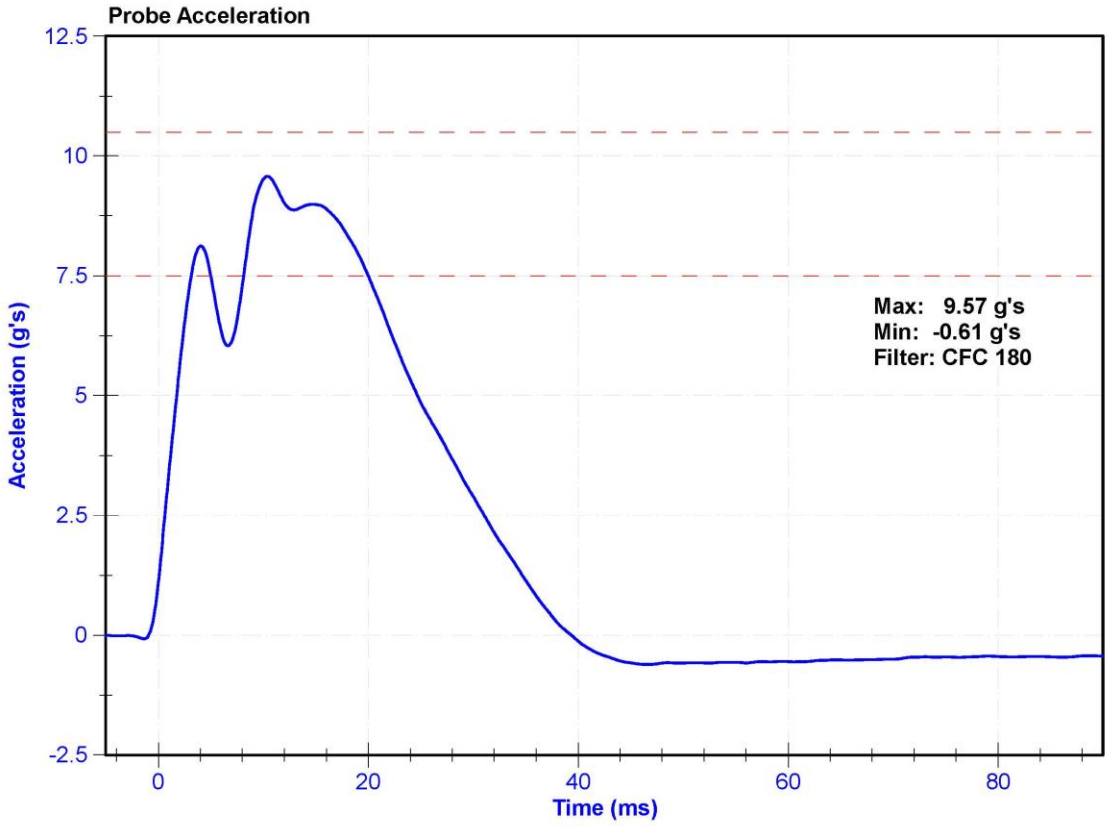
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	24.0	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	7.5	10.5	g's	9.57	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022



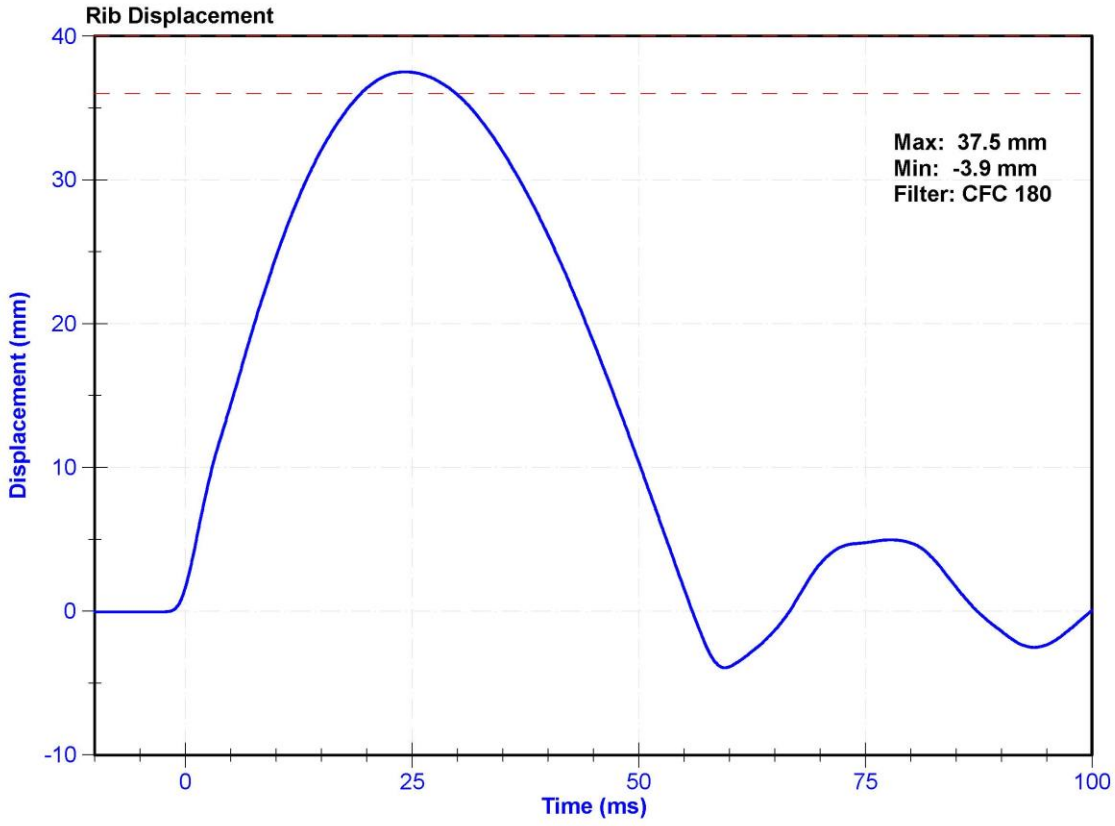
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/8/2020	4/8/2021



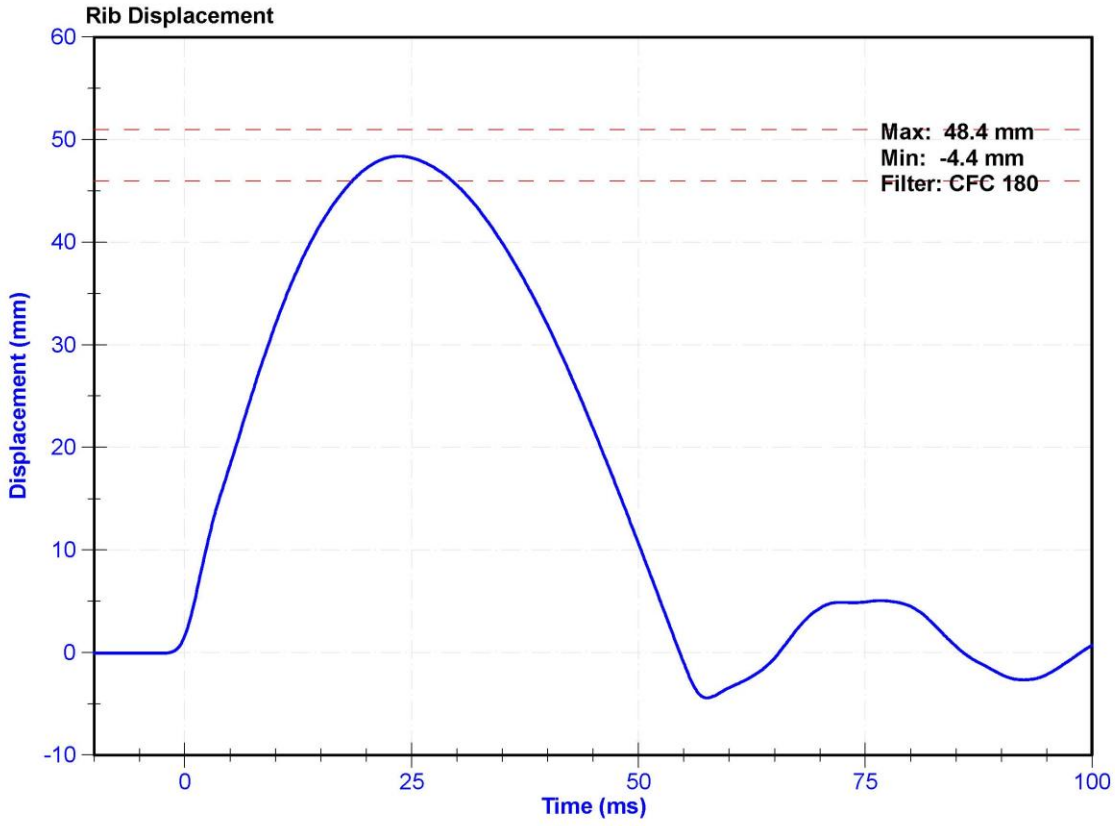
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.6	Pass
Humidity	10	70	%	21.7	Pass
Rib Displacement	46	51	mm	48.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/8/2020	4/8/2021



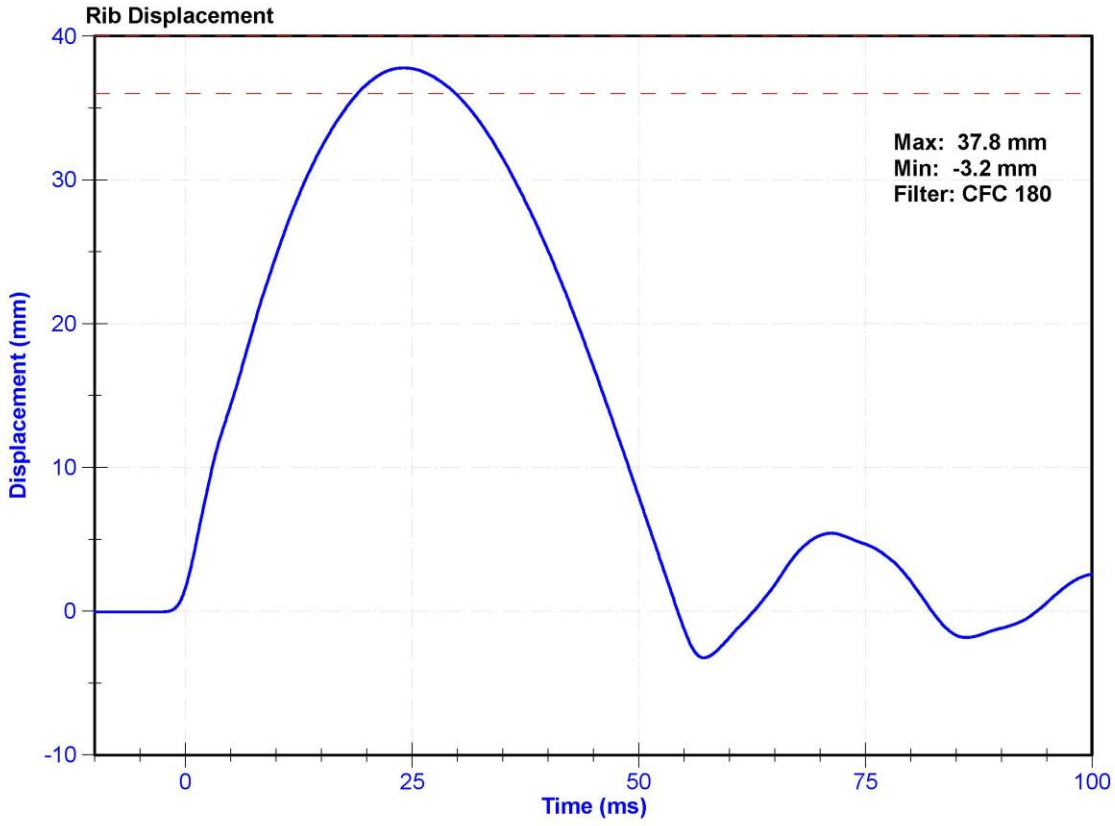
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	36	40	mm	37.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/8/2020	4/8/2021



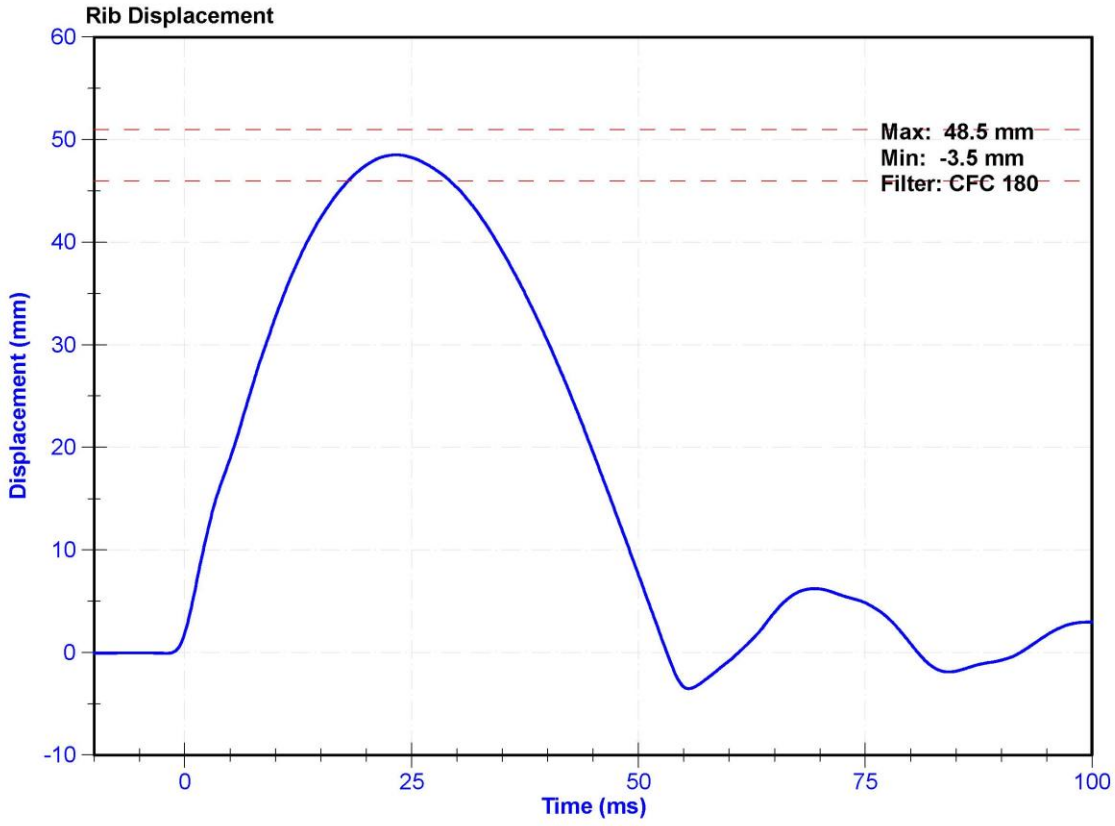
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/8/2020	4/8/2021



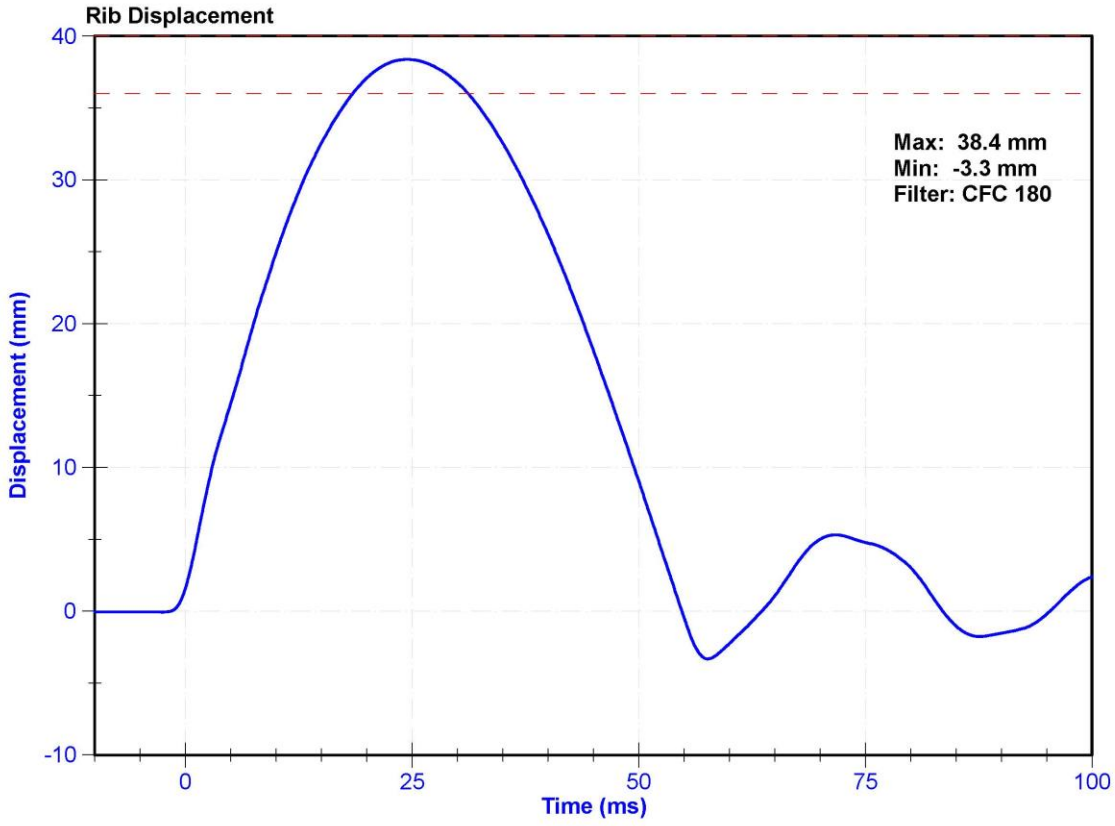
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	36	40	mm	38.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/8/2020	4/8/2021



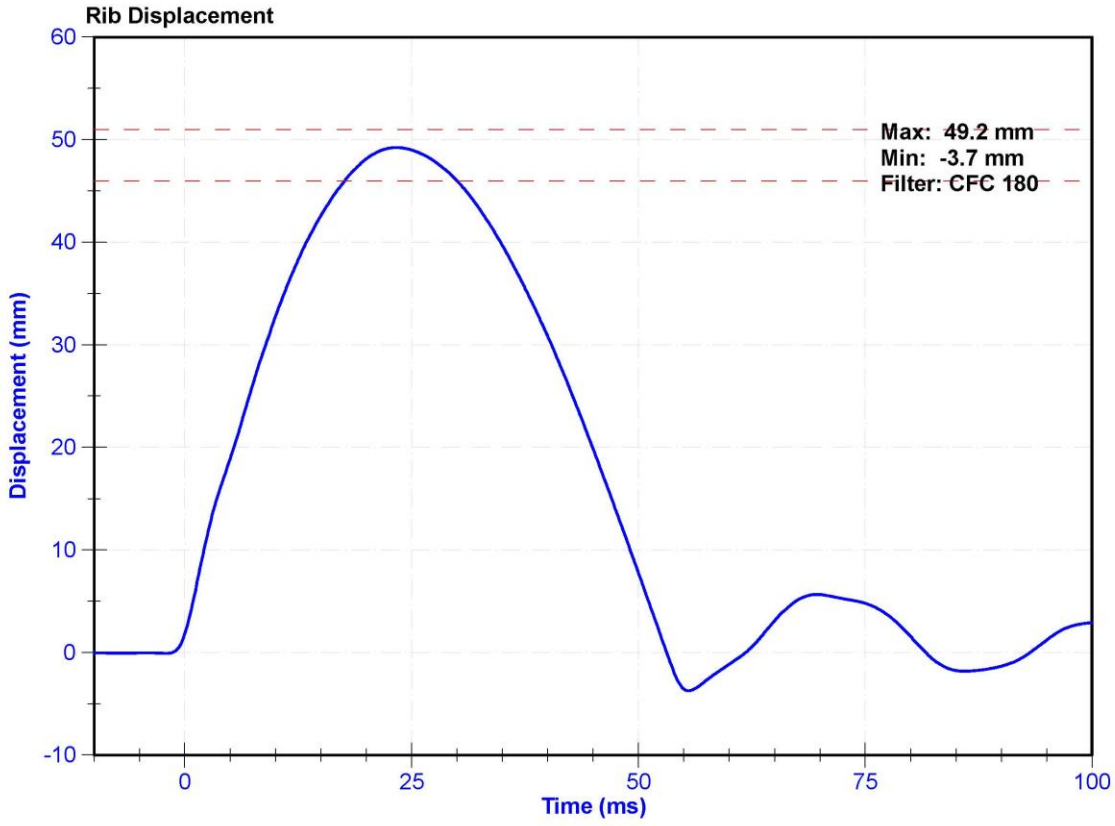
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	23.4	Pass
Rib Displacement	46	51	mm	49.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/8/2020	4/8/2021



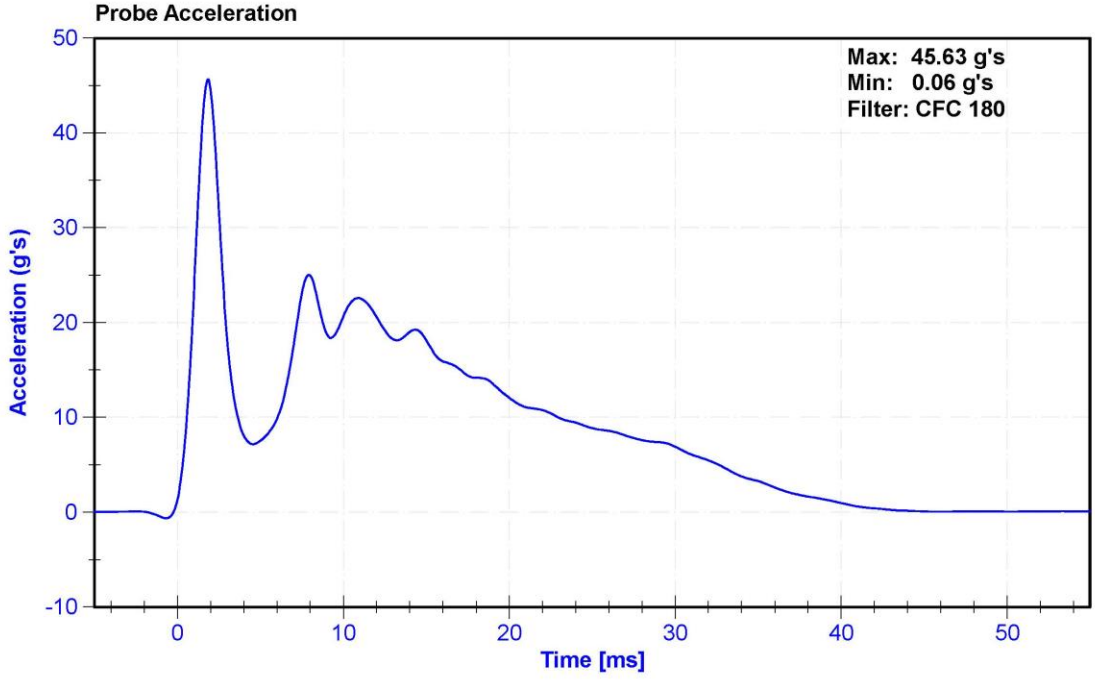
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

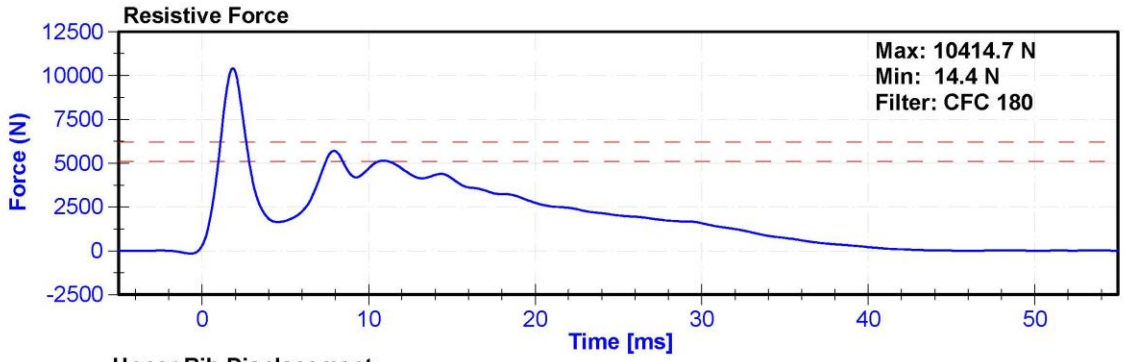
Results

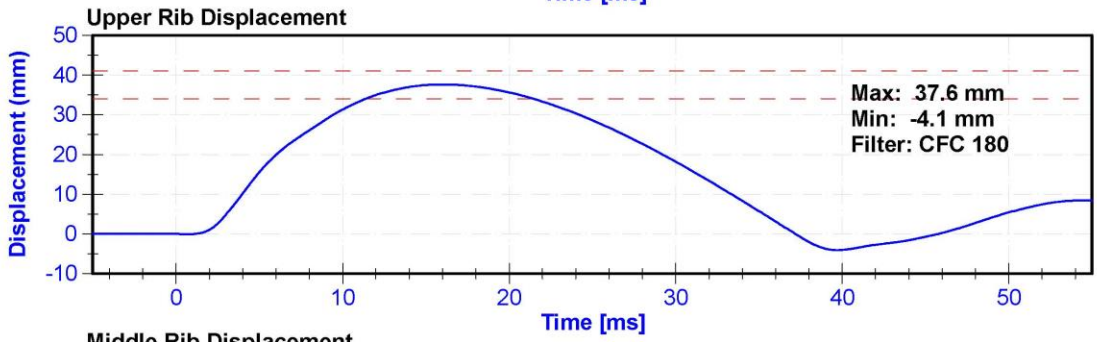
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26.0	Pass
Velocity	5.4	5.6	m/s	5.44	Pass
Resistive Force after 6ms	5100	6200	N	5711.5	Pass
Upper Thorax Rib Deflection	34	41	mm	37.6	Pass
Mid Thorax Rib Deflection	37	45	mm	41.9	Pass
Lower Thorax Rib Deflection	37	44	mm	41.2	Pass

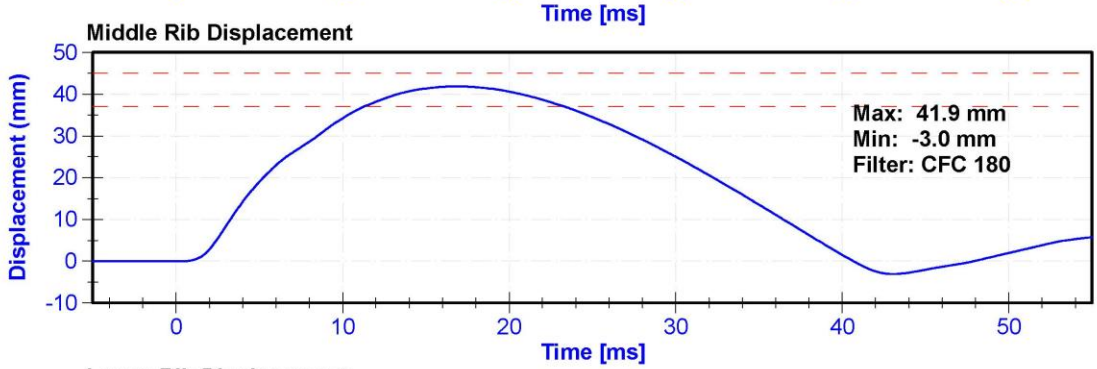
Transducer Calibrations

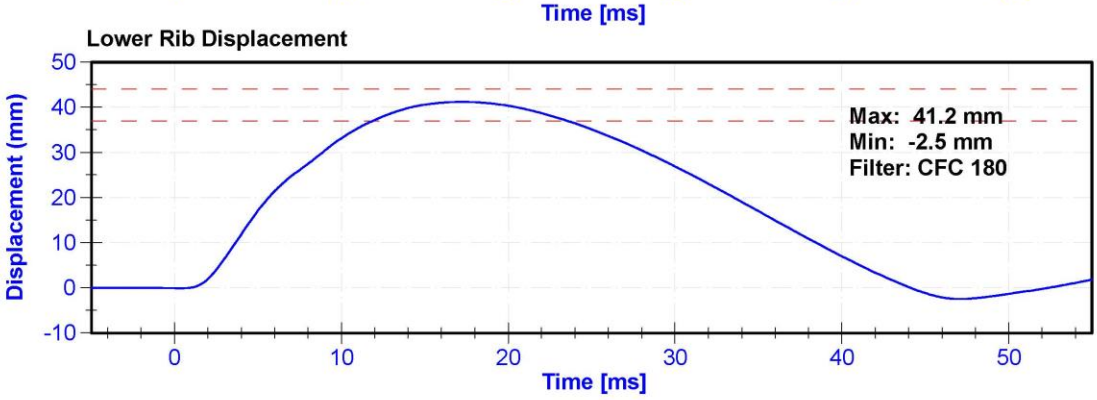
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/8/2020	4/8/2021
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/8/2020	4/8/2021
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/8/2020	4/8/2021




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]
Max: 10414.7 N
Min: 14.4 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 37.6 mm
Min: -4.1 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 41.9 mm
Min: -3.0 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 41.2 mm
Min: -2.5 mm
Filter: CFC 180

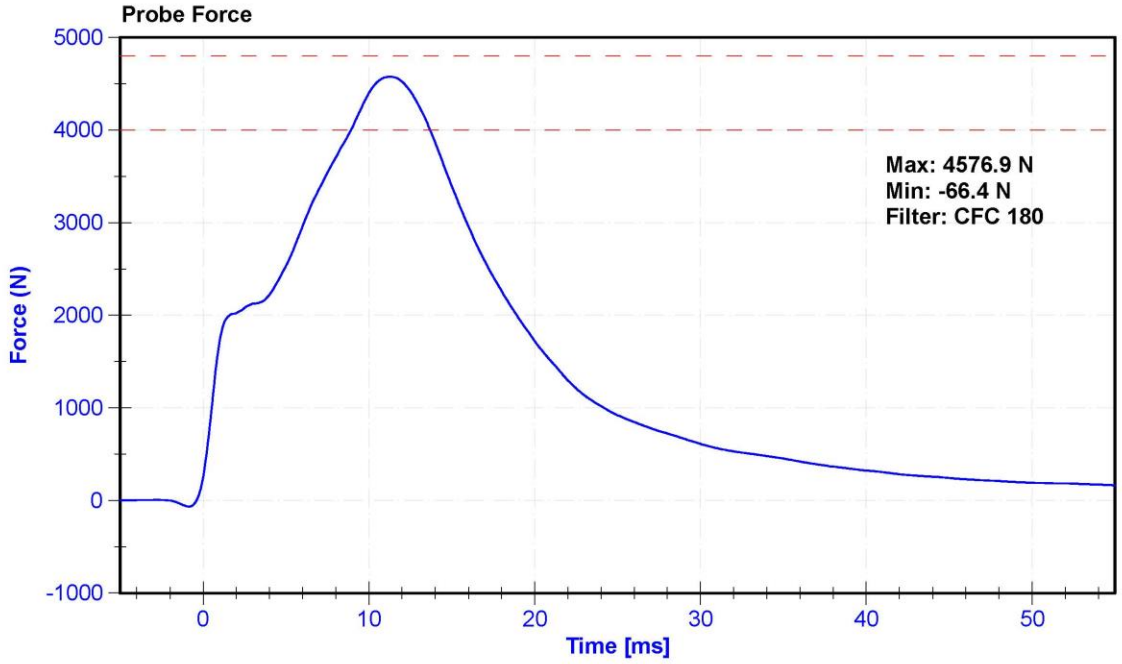
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	FO34	Laboratory Supervisor	K.Brogan

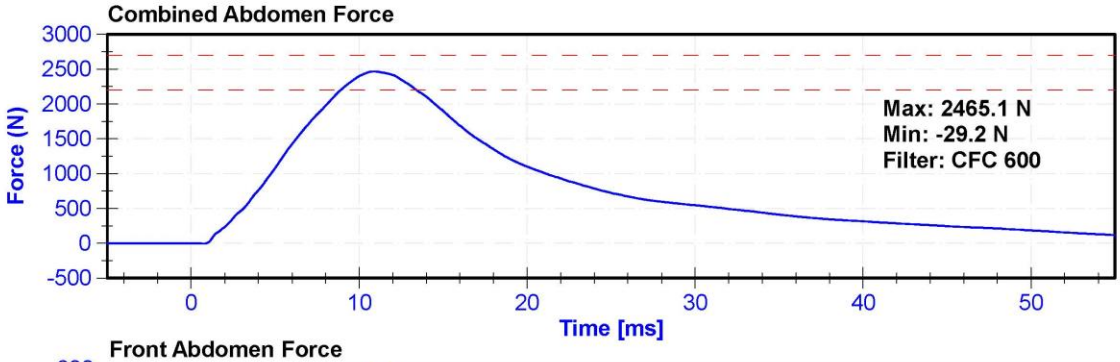
Results

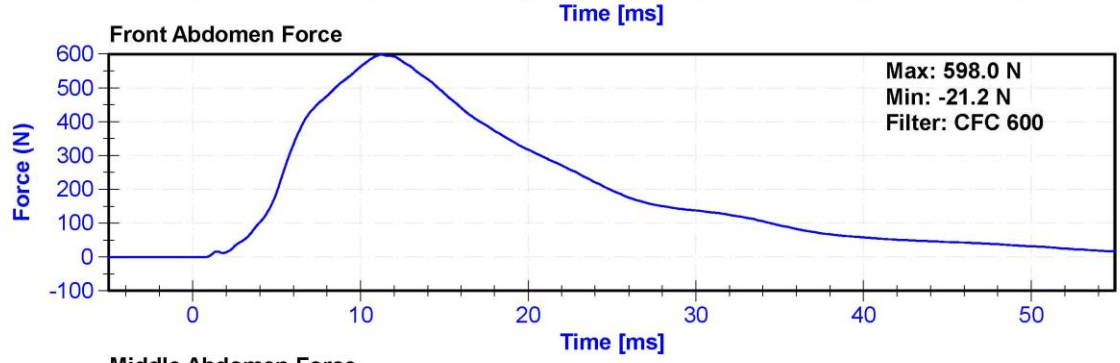
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26	Pass
Velocity	3.9	4.1	m/s	4.09	Pass
Combined Abdomen Force	2200	2700	N	2465.1	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.85	Pass
Resistive Probe Force	4000	4800	N	4576.9	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.25	Pass

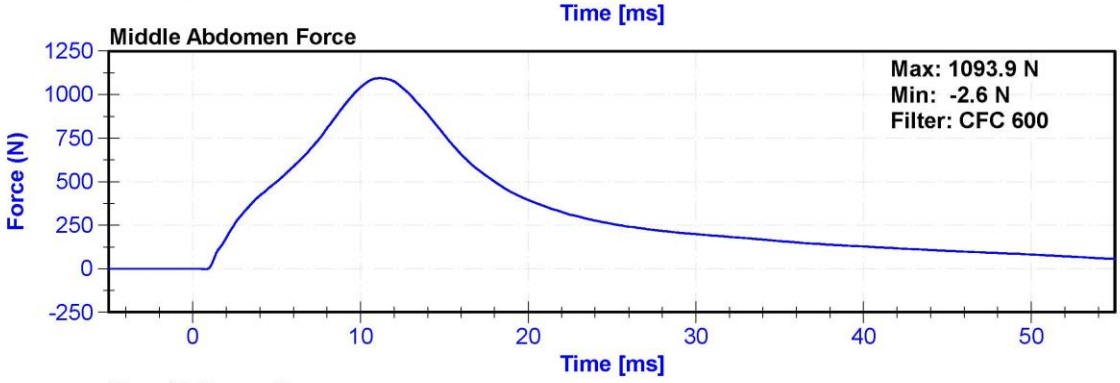
Transducer Calibrations

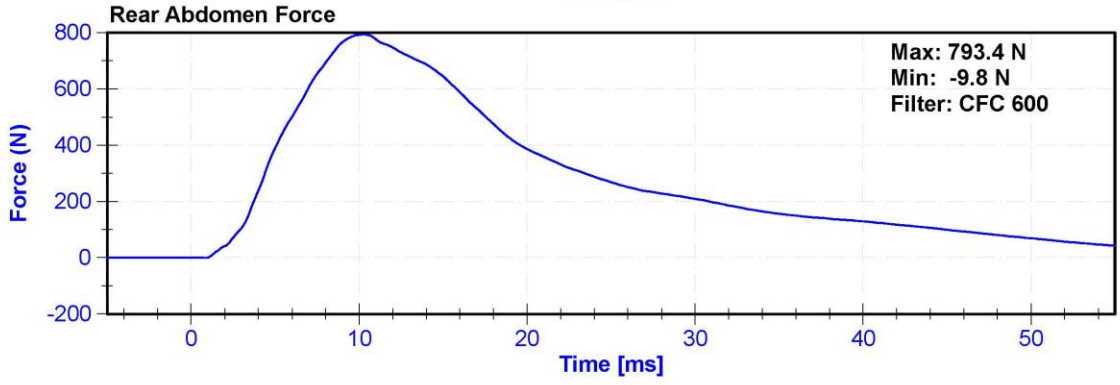
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Front Abdomen Load Cell	DENTON 2631J	LC-1524	3/19/2020	3/19/2021
Middle Abdomen Load Cell	DENTON 2631J	LC-1523	3/19/2020	3/19/2021
Rear Abdomen Load Cell	DENTON 2631J	LC-1530	3/19/2020	3/19/2021




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2465.1 N
Min: -29.2 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 598.0 N
Min: -21.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1093.9 N
Min: -2.6 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 793.4 N
Min: -9.8 N
Filter: CFC 600

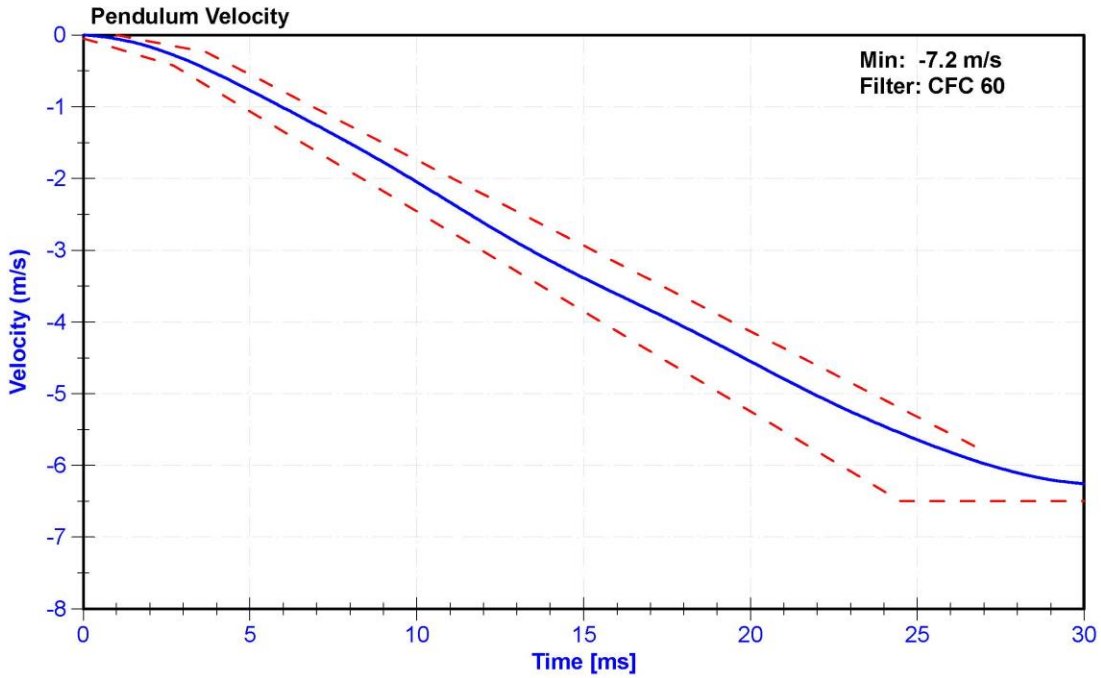
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

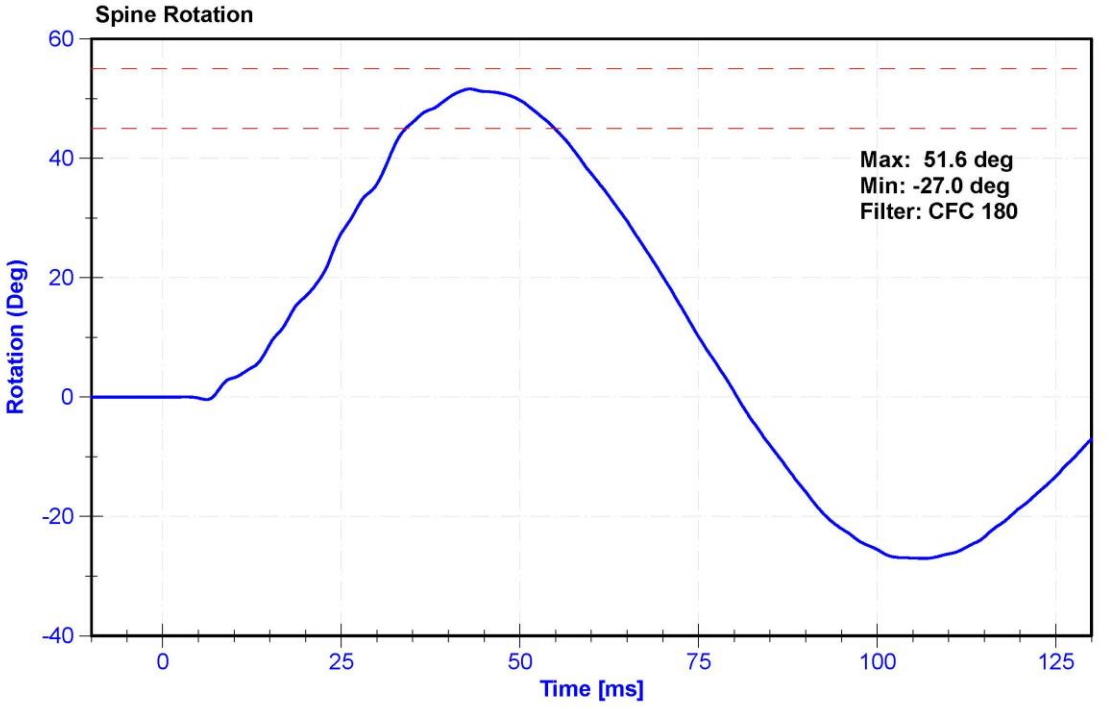
Results

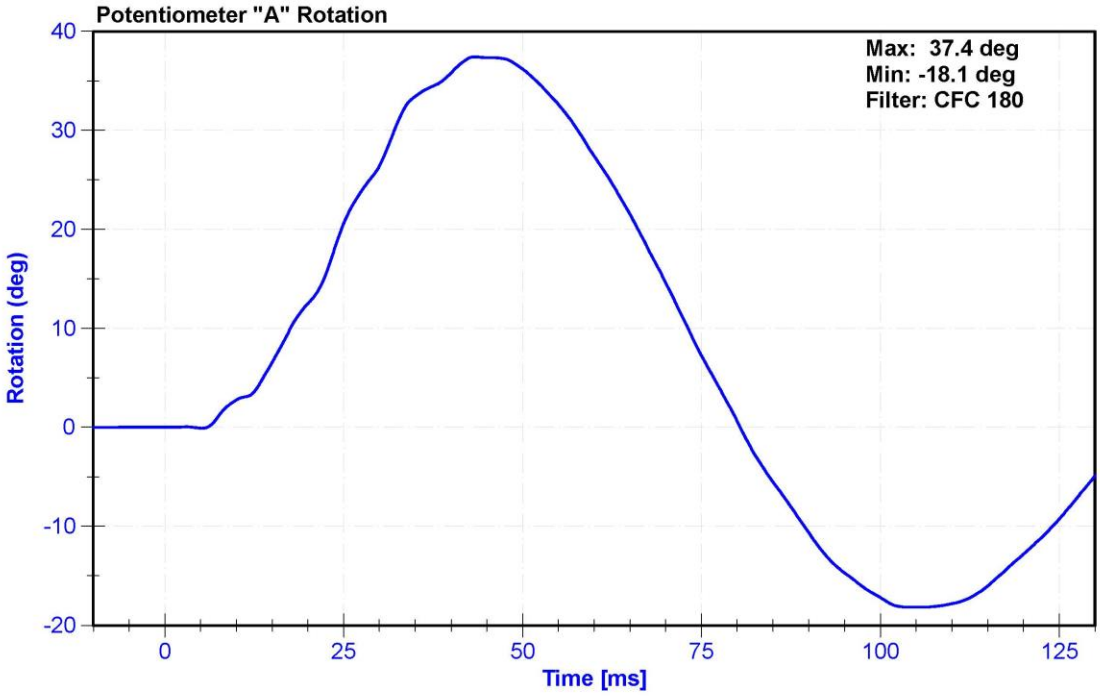
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	21.9	Pass
Velocity	5.95	6.15	m/s	6.046	Pass
Lateral Spine Rotation	45	55	deg	51.6	Pass
Time at Maximum Rotation	39	53	ms	43.0	Pass
Time of Decay to Zero Degrees	37	57	ms	37.4	Pass
Pulse within Corridor?	-	-	-		

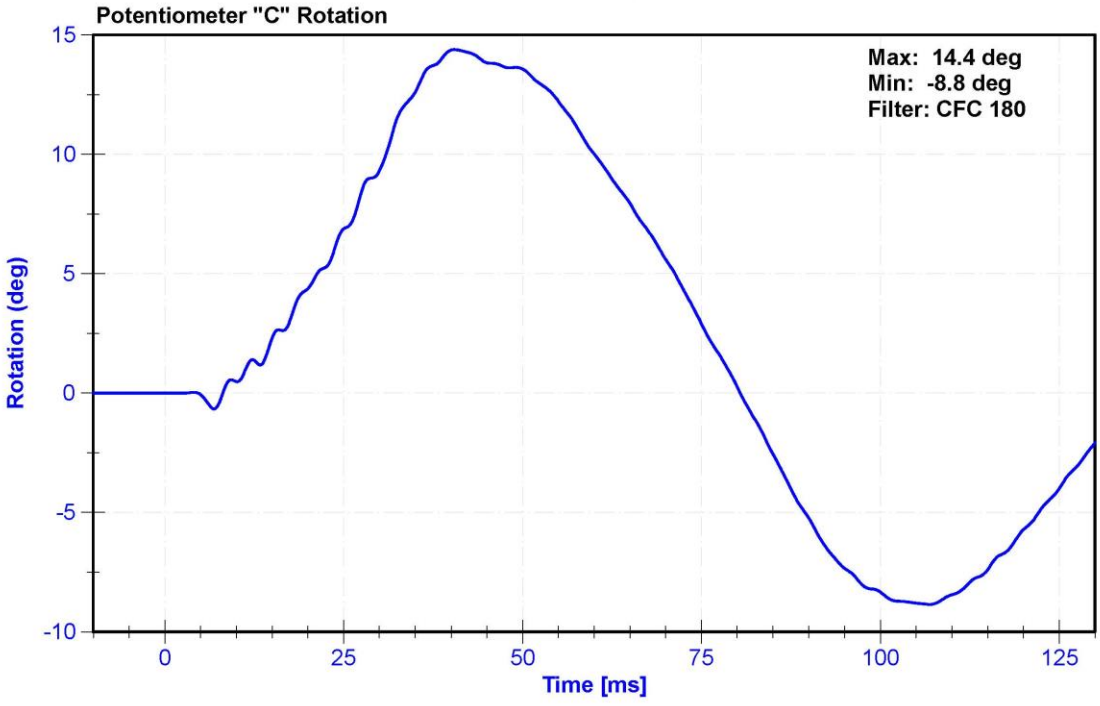
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum "A" Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Condyle "B" Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021


Pendulum Velocity
Min: -7.2 m/s
Filter: CFC 60
Velocity (m/s)
0
-1
-2
-3
-4
-5
-6
-7
-8
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 51.6 deg
Min: -27.0 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 37.4 deg
Min: -18.1 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 14.4 deg
Min: -8.8 deg
Filter: CFC 180
Rotation (deg)
15
10
5
0
-5
-10
0
25
50
75
100
125
Time [ms]

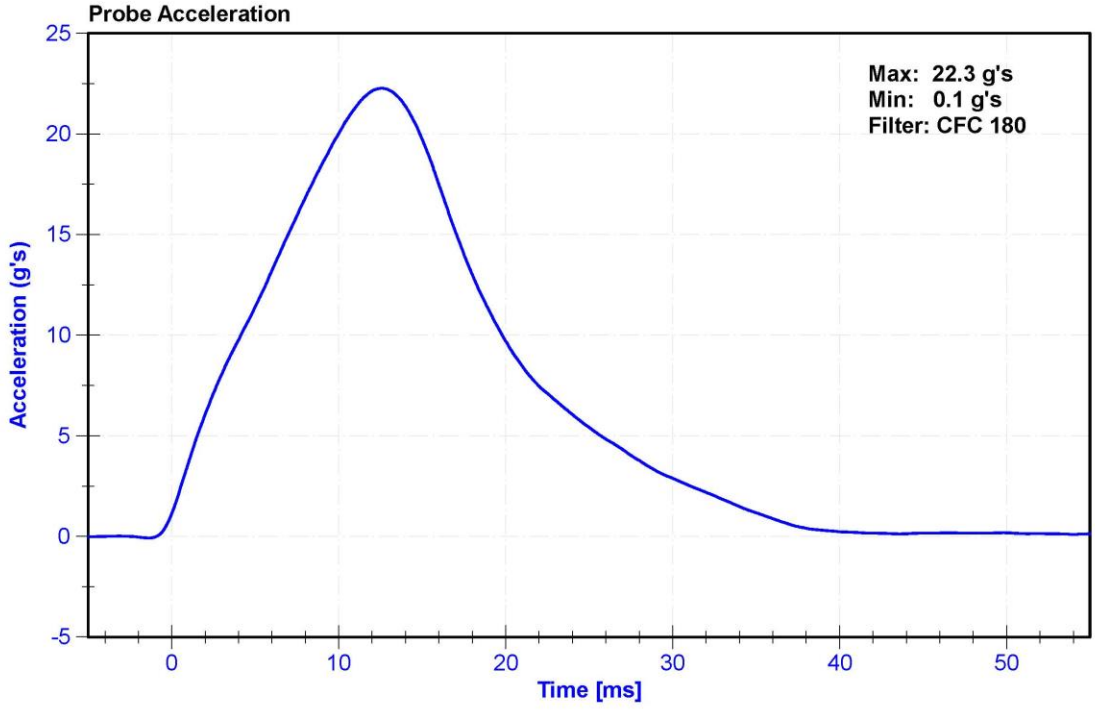
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

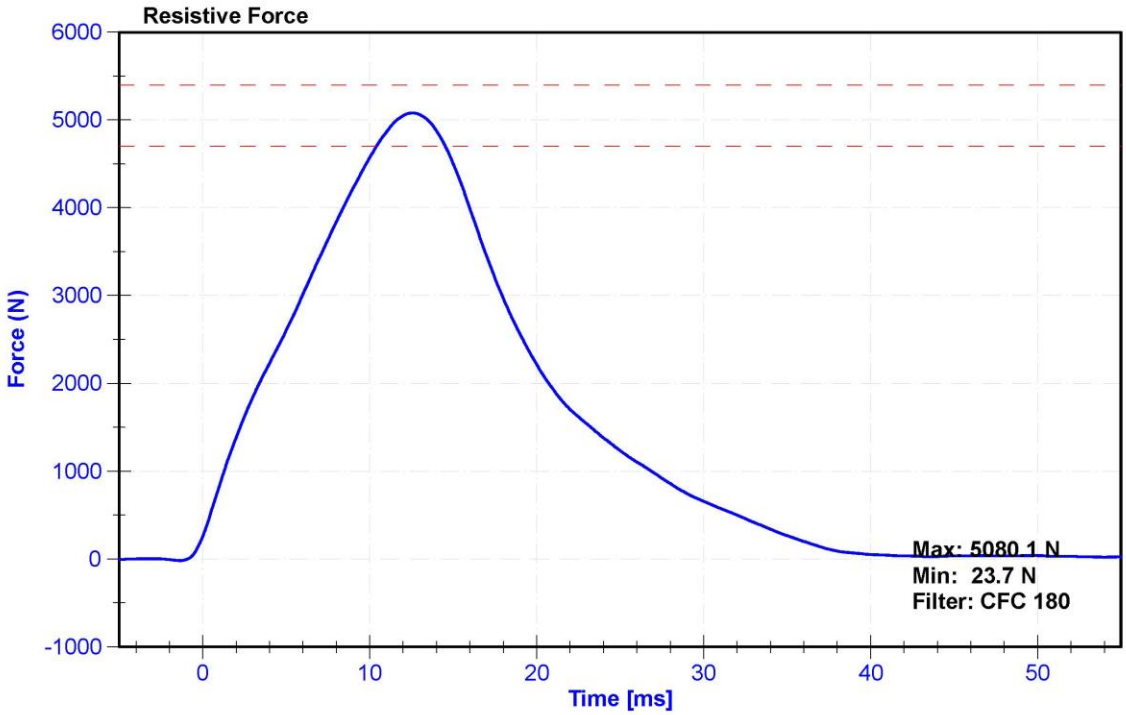
Results

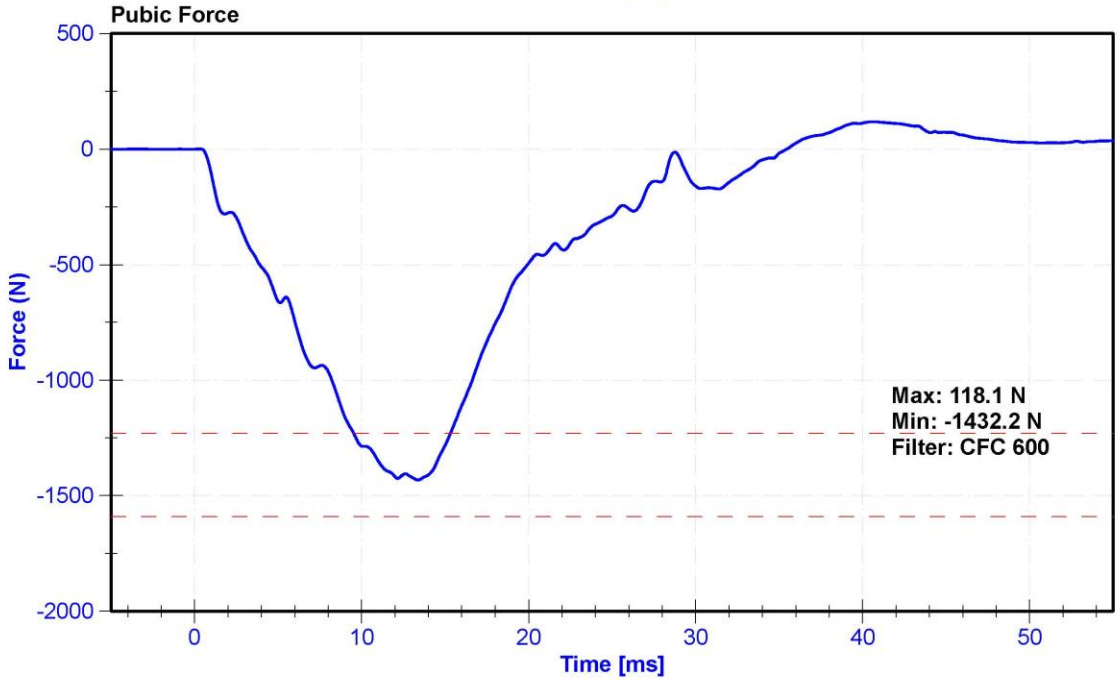
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26.0	Pass
Velocity	4.2	4.4	m/s	4.38	Pass
Resistive Force	4700	5400	N	5080.1	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.55	Pass
Pubic Force	-1590	-1230	N	-1432.2	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.40	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C2	T25885	2/2/2021	2/2/2022
Pubic Load Cell	Denton 3096JFL	30960459GFE	3/19/2020	3/19/2021




Resistive Force
Force (N)
Time [ms]
Max: 5080.1 N
Min: 23.7 N
Filter: CFC 180


Pubic Force
Force (N)
Time [ms]
Max: 118.1 N
Min: -1432.2 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

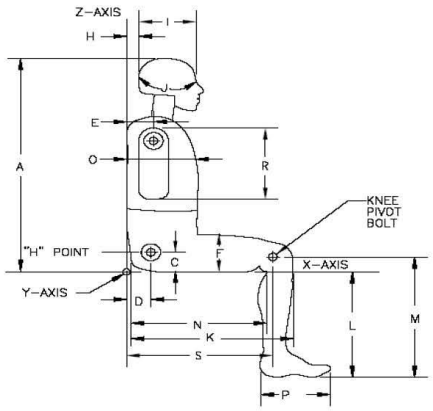
SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

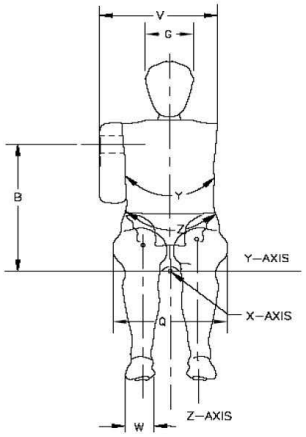
SERIAL No: 300

External Measurements - SID-IIs

Technician: K. Brogan Date: 02/05/2021

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	186	Pass
J	Head Circumference	541	551	544	Pass
K	Buttock to Knee Length	514	540	532	Pass
L	Popliteal Height	343	369	361	Pass
M	Knee Pivot to floor height	392	409	398	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	208	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	484	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	83	Pass
Y	Chest Circumference w/jacket	851	881	875	Pass
Z	Waist Circumference	761	791	773	Pass

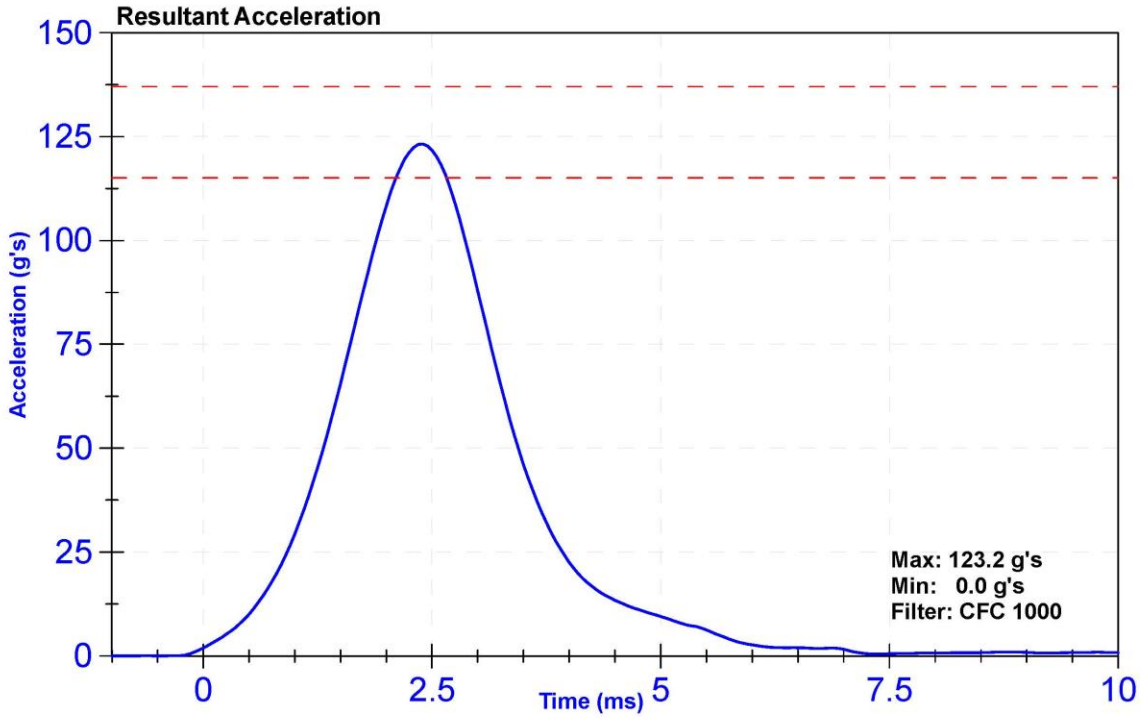
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

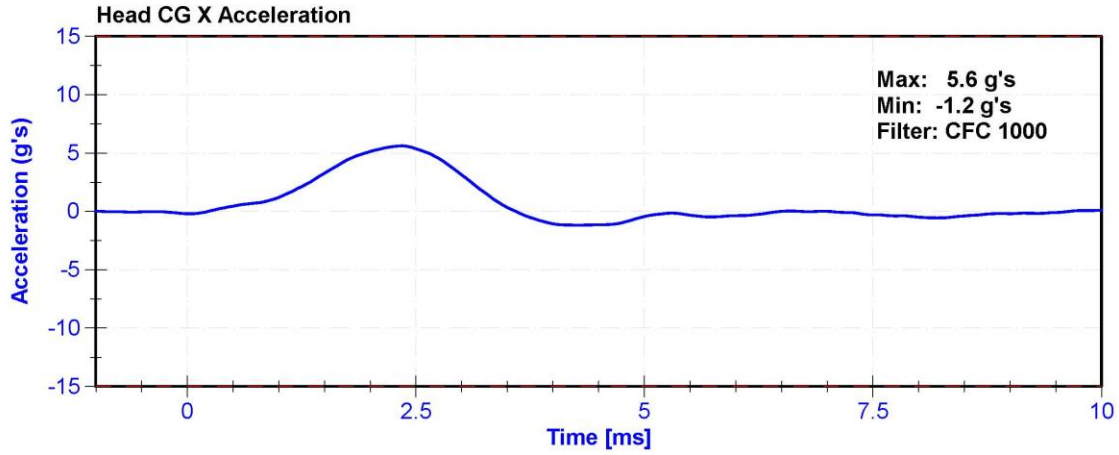
Results

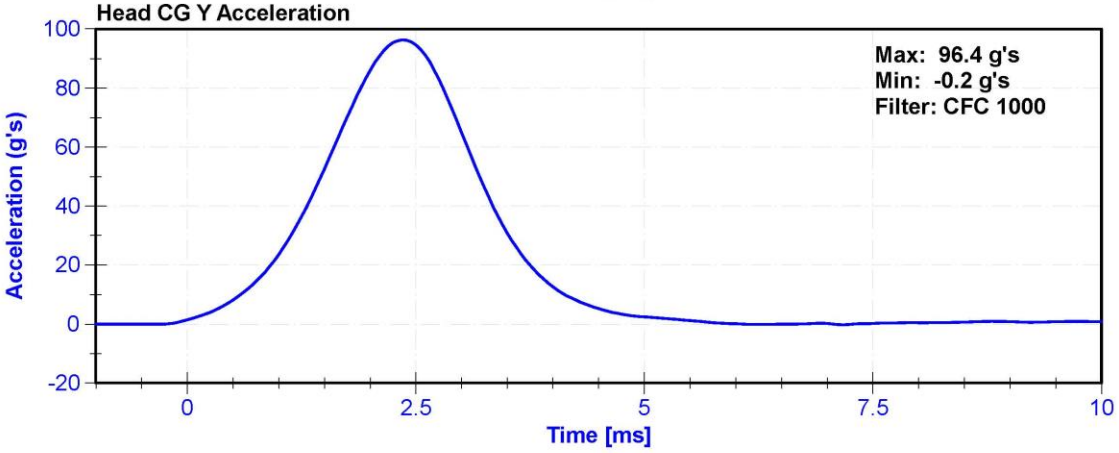
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	23.2	Pass
Resultant Acceleration	115	137	g's	123.2	Pass
Oscillation	0	15	%	1.6	Pass
Fore-Aft Acceleration	-15	15	g's	5.6	Pass

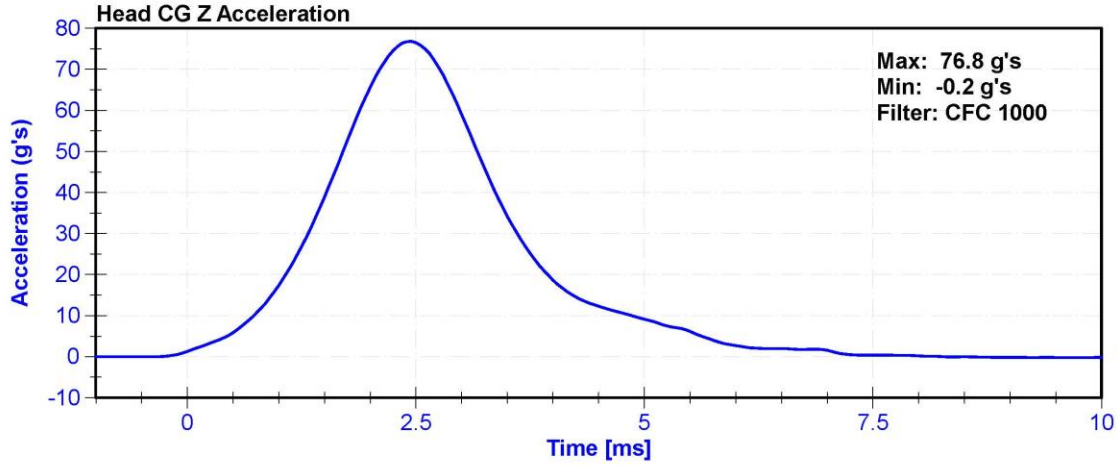
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	11/10/2020	5/11/2021
Y Accelerometer	ENDEVCO 7264	AC-P79189	11/10/2020	5/11/2021
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	11/10/2020	5/11/2021




Head CG X Acceleration
Max: 5.6 g's
Min: -1.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 96.4 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 76.8 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

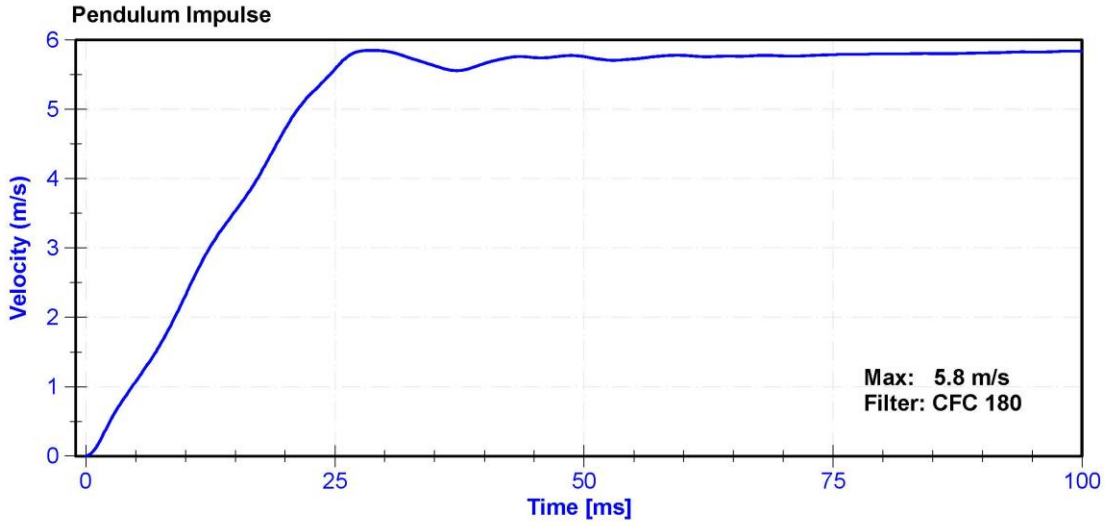
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

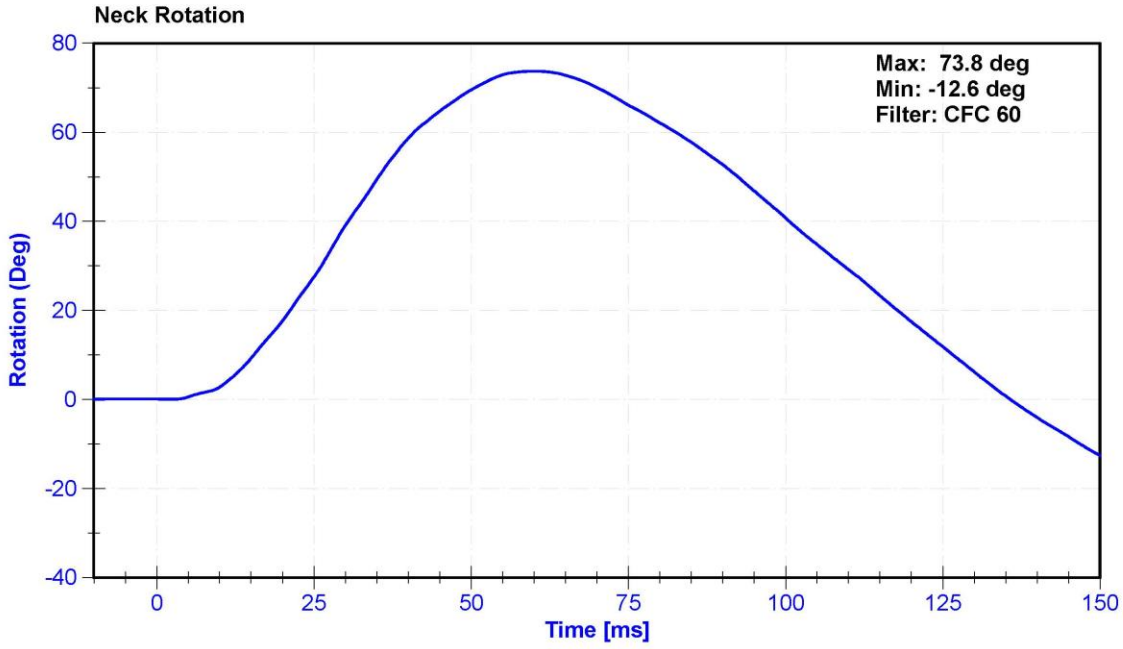
Results

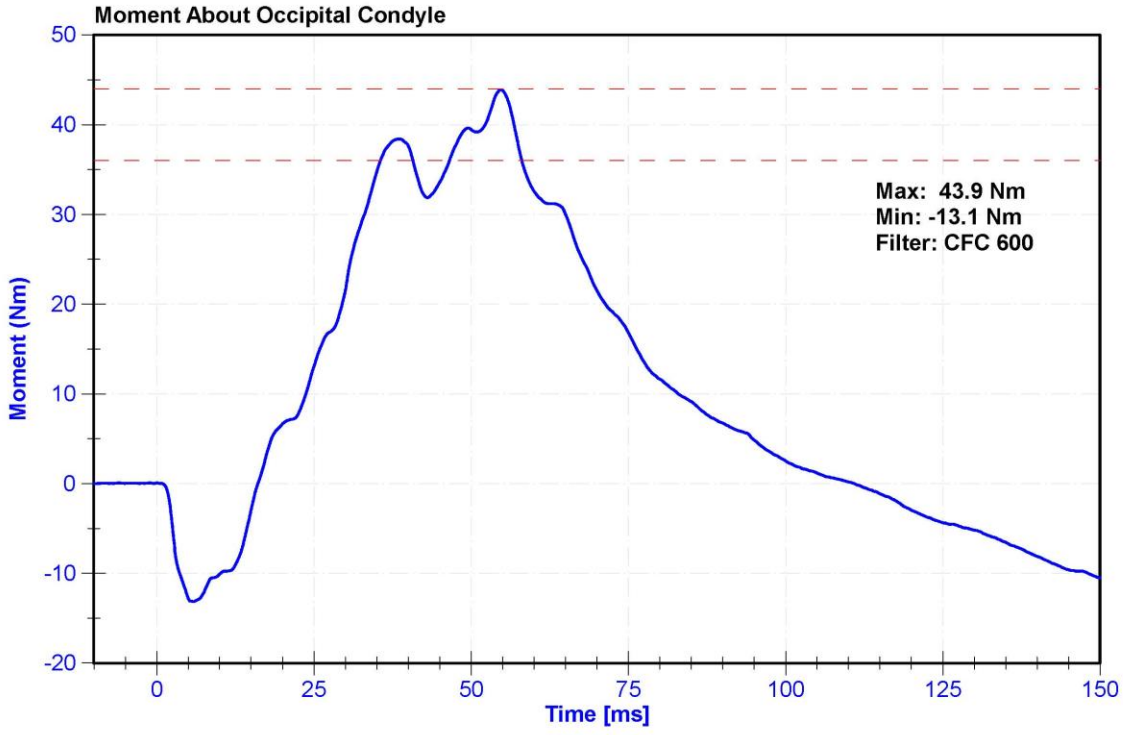
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.8	Pass
Humidity	10	70	%	22.3	Pass
Velocity	5.51	5.63	m/s	5.584	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.32	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.53	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.71	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	5.85	Pass
Neck Rotation	71	81	deg	73.8	Pass
Time at Maximum Rotation	50	70	ms	60.0	Pass
Moment about the OC	36	44	Nm	43.9	Pass
Moment Decay to 0 Nm	102	126	ms	110.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/6/2020	11/6/2021
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/6/2020	11/6/2021
Upper Neck Load Cell	Denton 1716	17162019 FY	3/18/2020	3/18/2021




Neck Rotation
Max: 73.8 deg
Min: -12.6 deg
Filter: CFC 60
Rotation (Deg)
80
60
40
20
0
-20
-40
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 43.9 Nm
Min: -13.1 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

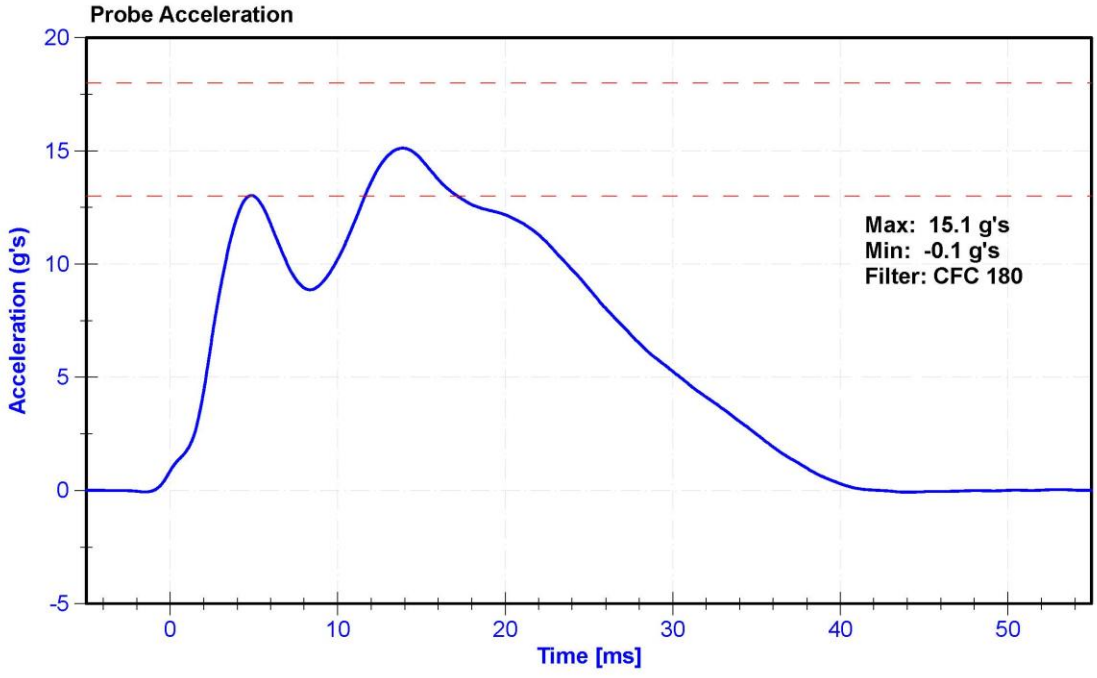
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

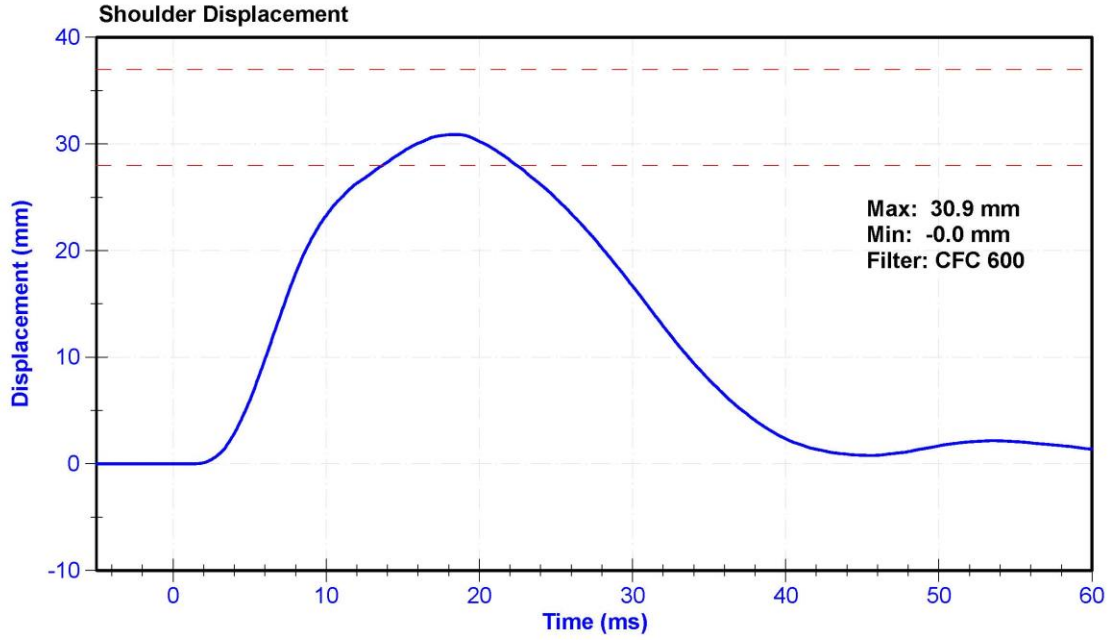
Results

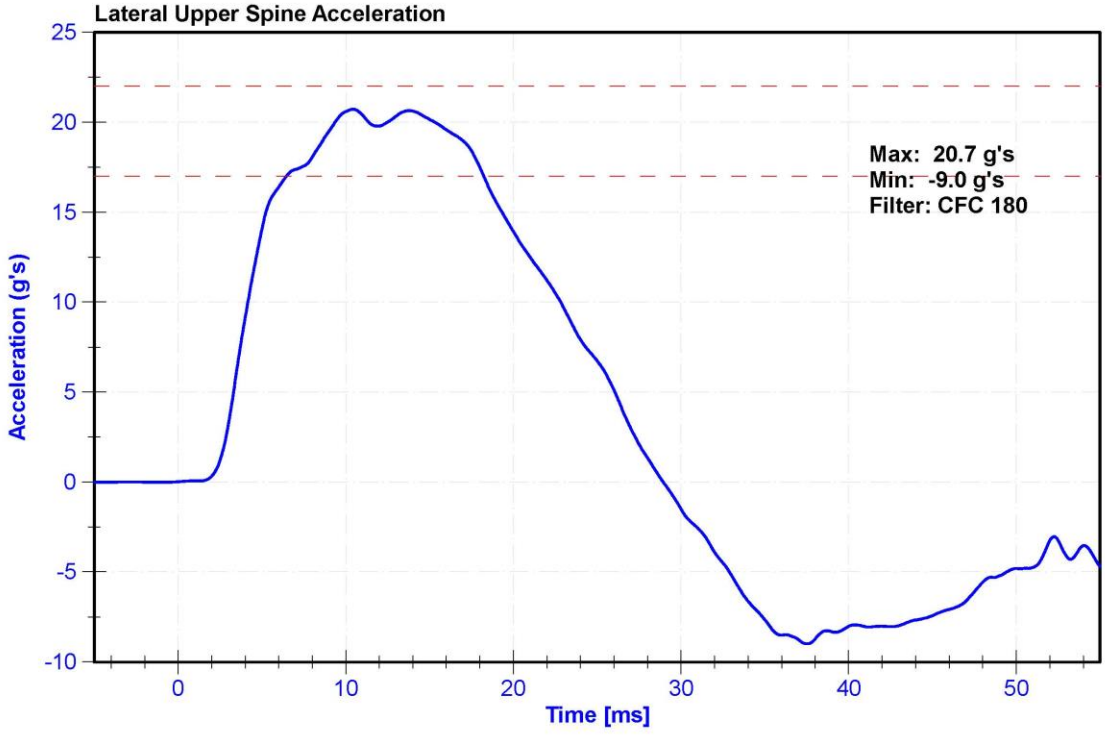
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	15.1	Pass
Shoulder Deflection	28	37	mm	30.9	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	11/10/2020	5/11/2021
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P71281	11/9/2020	5/10/2021




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 30.9 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.7 g's
Min: -9.0 g's
Filter: CFC 180

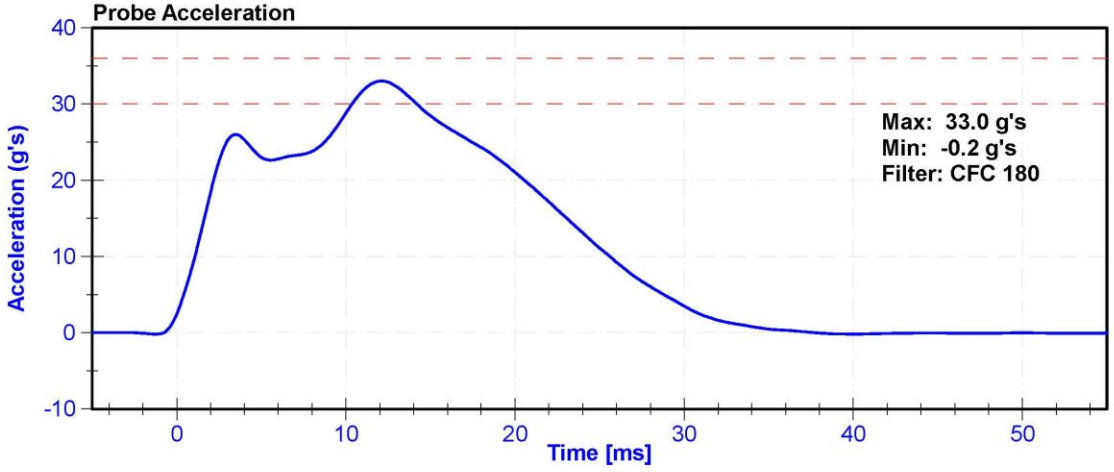
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

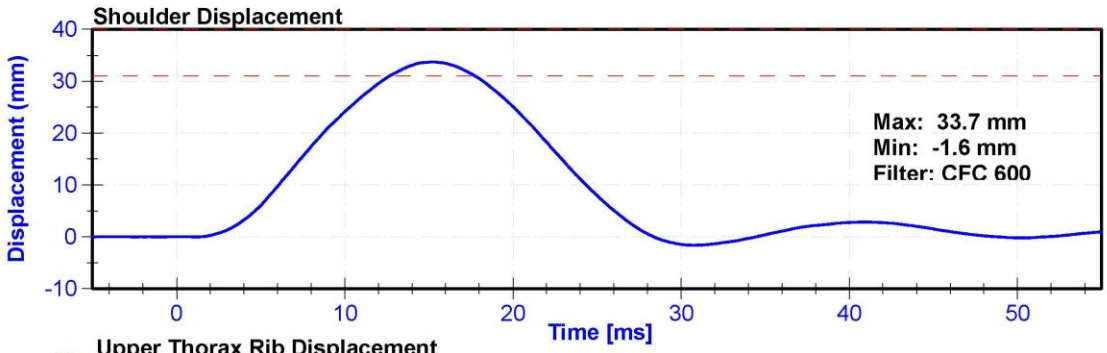
Results

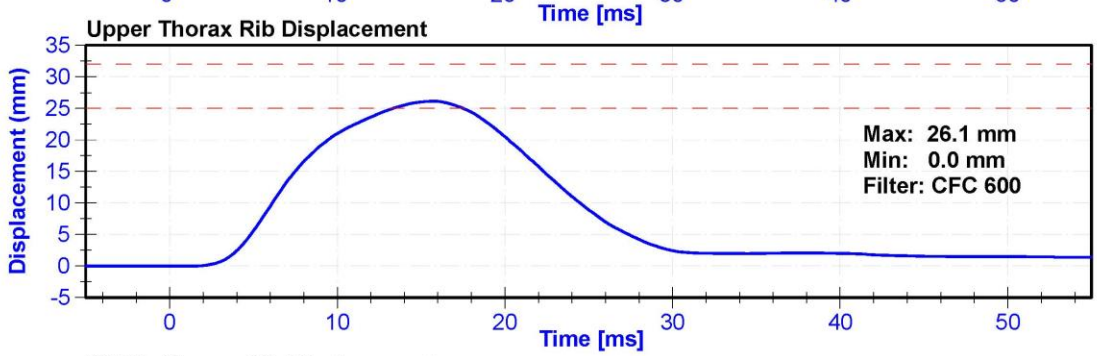
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	24.0	Pass
Velocity	6.6	6.8	m/s	6.74	Pass
Probe Acceleration after 5 ms	30	36	g's	33.0	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.9	Pass
Shoulder Deflection	31	40	mm	33.7	Pass
Upper Thorax Rib Deflection	25	32	mm	26.1	Pass
Mid Thorax Rib Deflection	30	36	mm	31.5	Pass
Lower Thorax Rib Deflection	32	38	mm	33.5	Pass

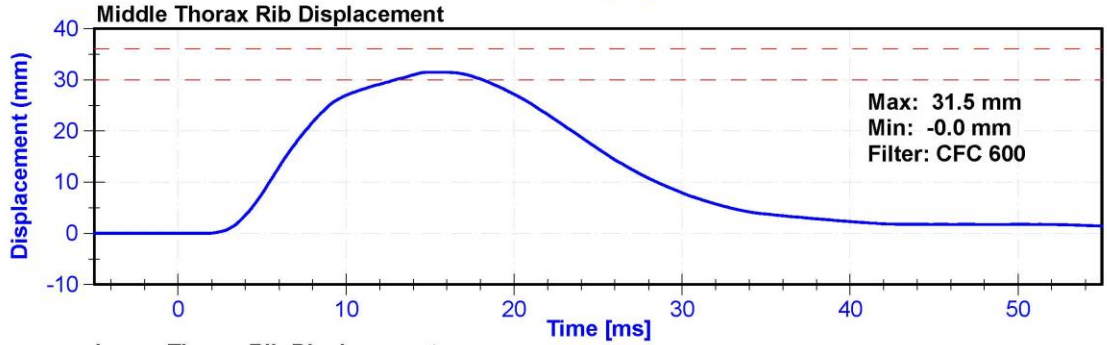
Transducer Calibrations

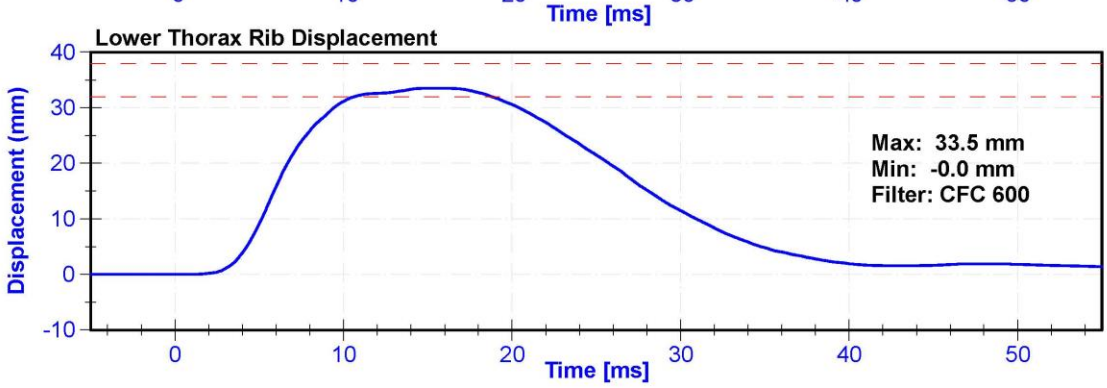
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P71281	11/9/2020	5/10/2021
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	11/9/2020	5/10/2021
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	11/10/2020	5/11/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	11/10/2020	5/11/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	11/10/2020	5/11/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	11/9/2020	5/10/2021

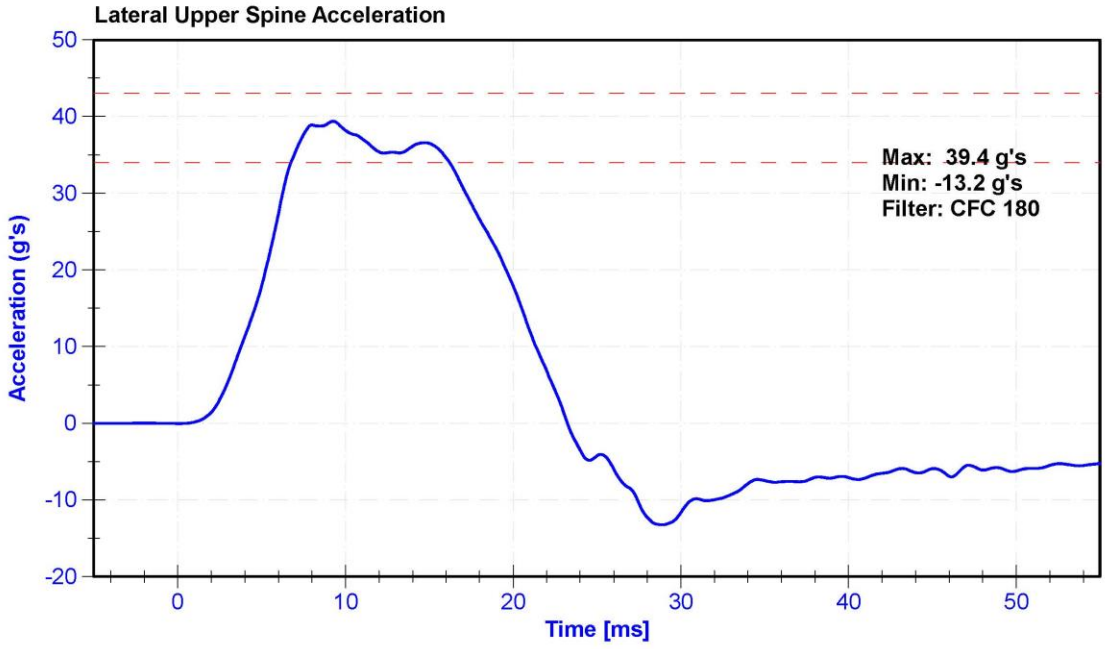


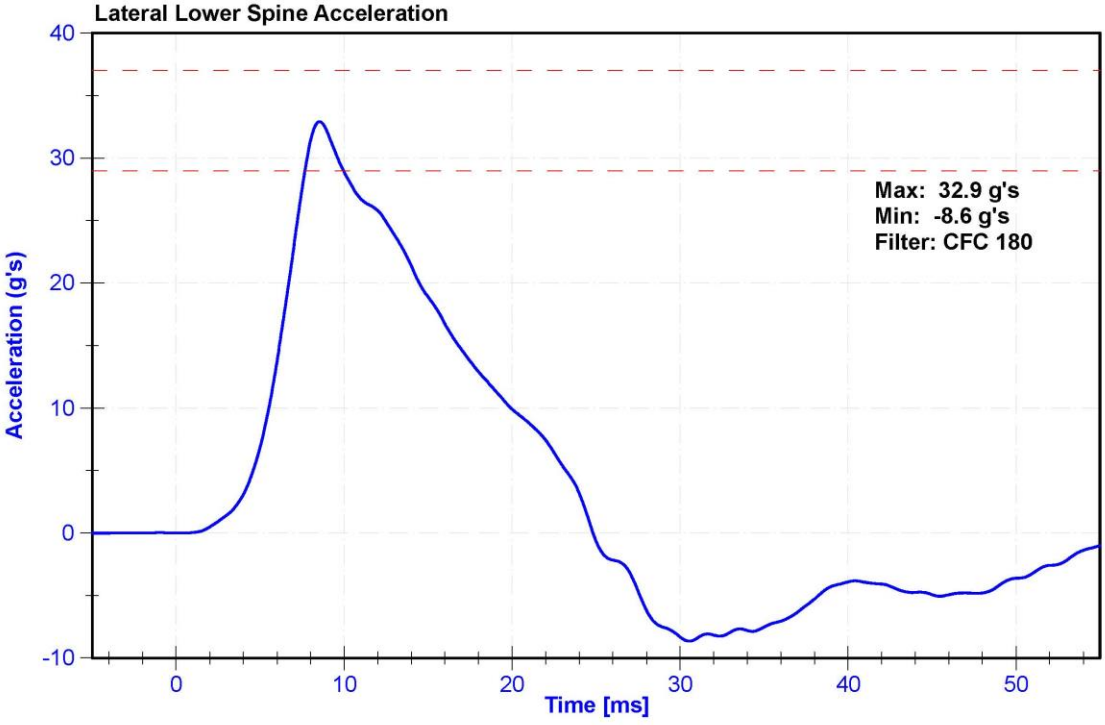

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.7 mm
Min: -1.6 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.1 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.5 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.5 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 39.4 g's
Min: -13.2 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]


Lateral Lower Spine Acceleration
Max: 32.9 g's
Min: -8.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]

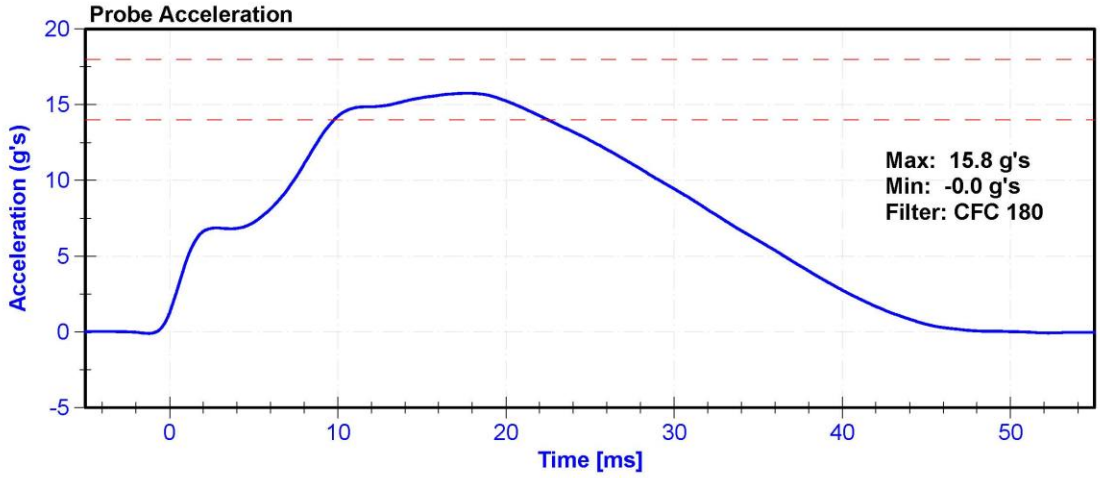
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

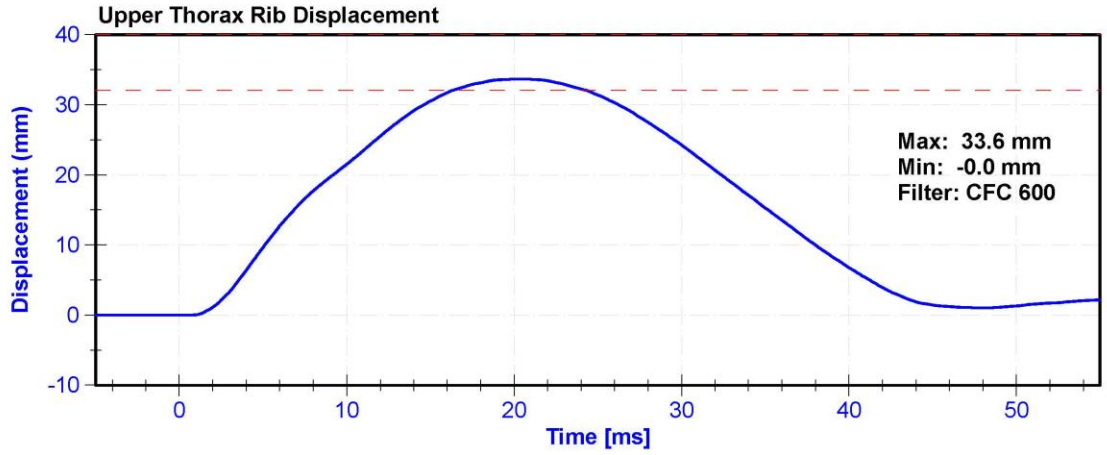
Results

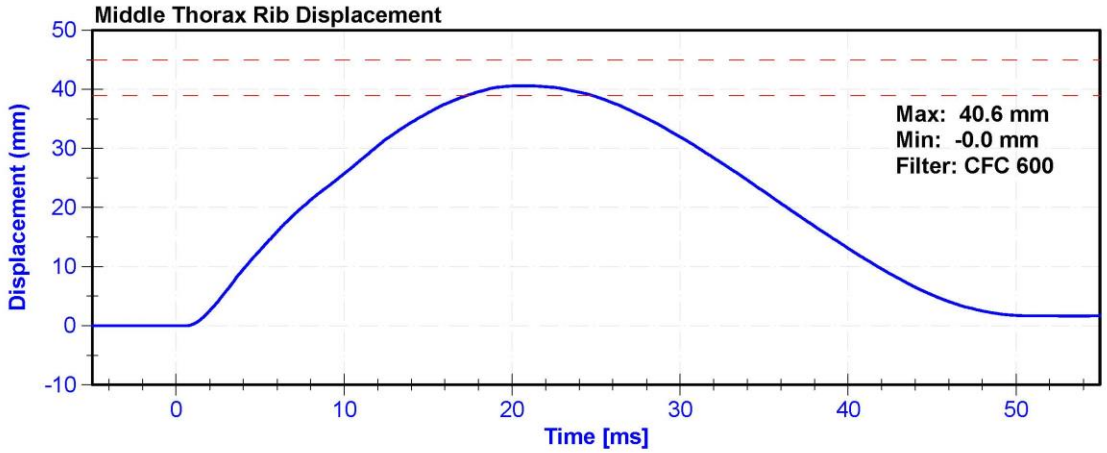
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	24	Pass
Velocity	4.2	4.4	m/s	4.38	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.0	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.1	Pass
Upper Thorax Rib Deflection	32	40	mm	33.6	Pass
Middle Thorax Rib Deflection	39	45	mm	40.6	Pass
Lower Thorax Rib Deflection	35	43	mm	38.4	Pass

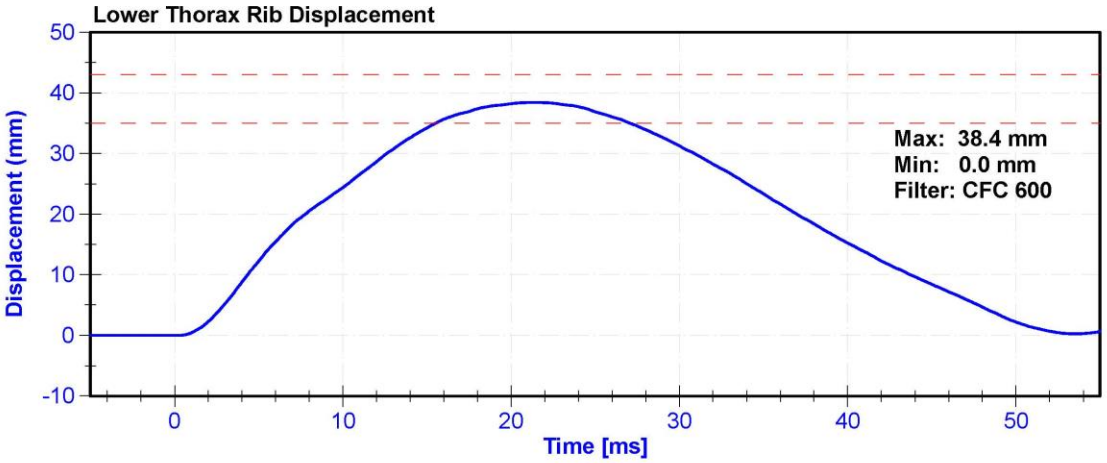
Transducer Calibrations

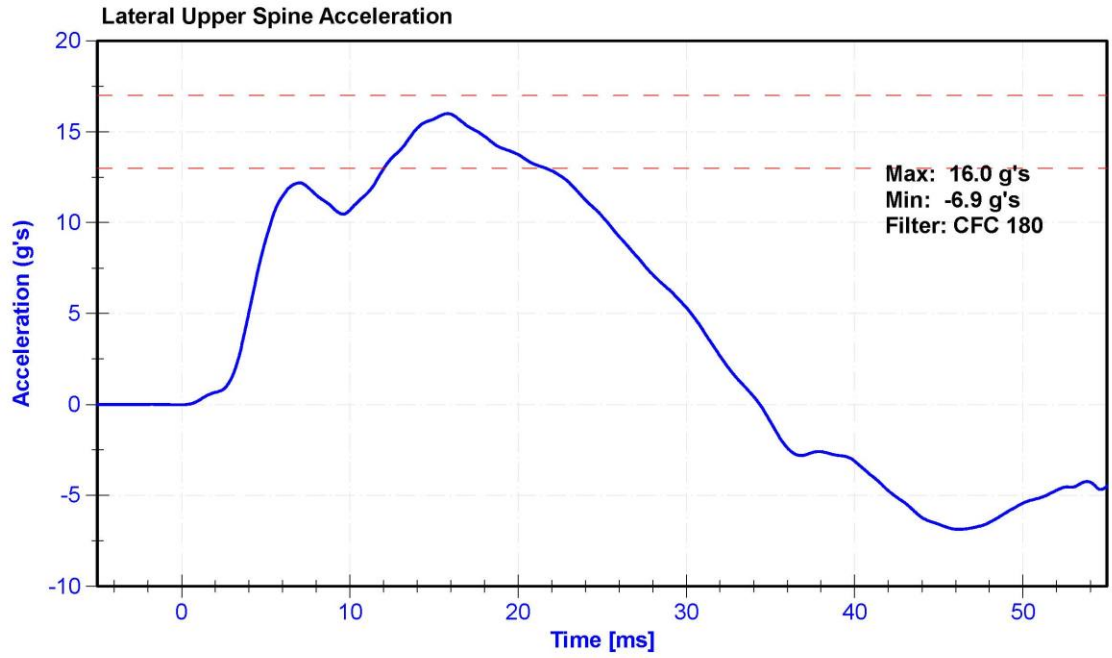
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P71281	11/9/2020	5/10/2021
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	11/9/2020	5/10/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	11/10/2020	5/11/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	11/10/2020	5/11/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	11/9/2020	5/10/2021

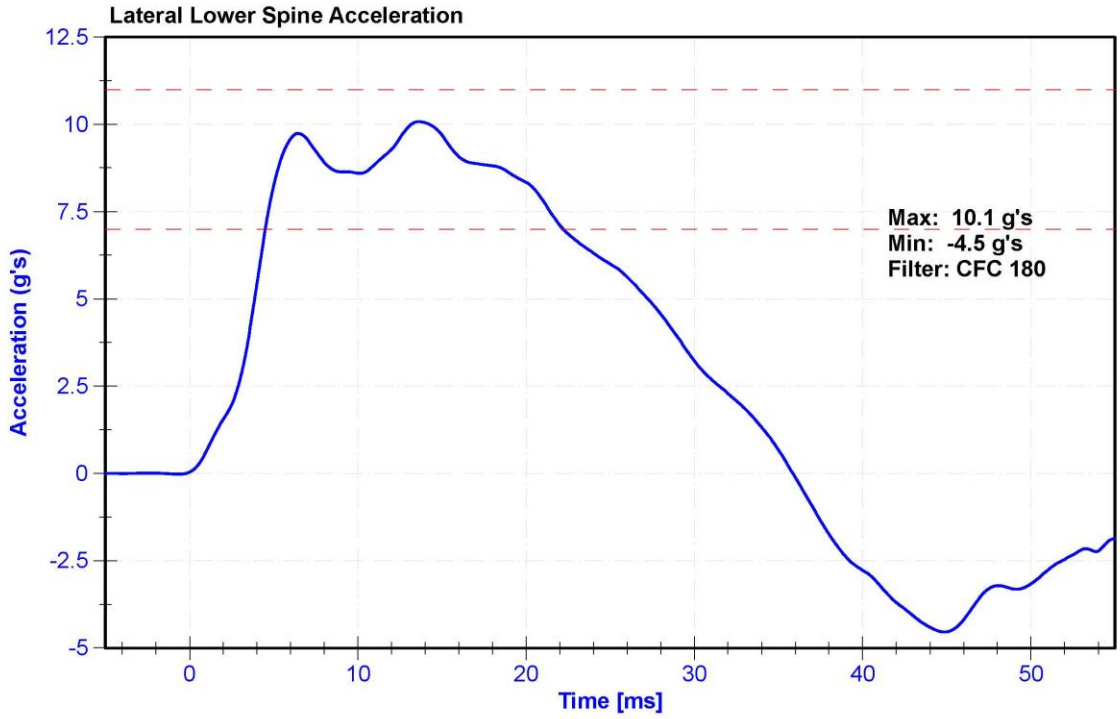



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.6 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.6 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 16.0 g's
Min: -6.9 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 10.1 g's
Min: -4.5 g's
Filter: CFC 180

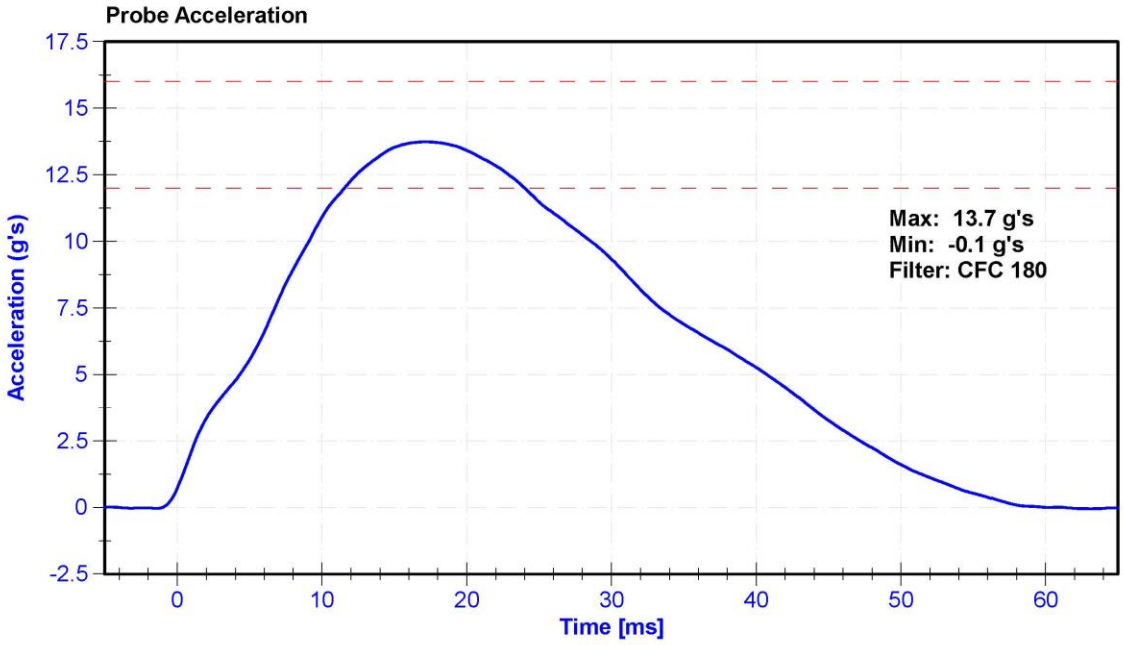
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

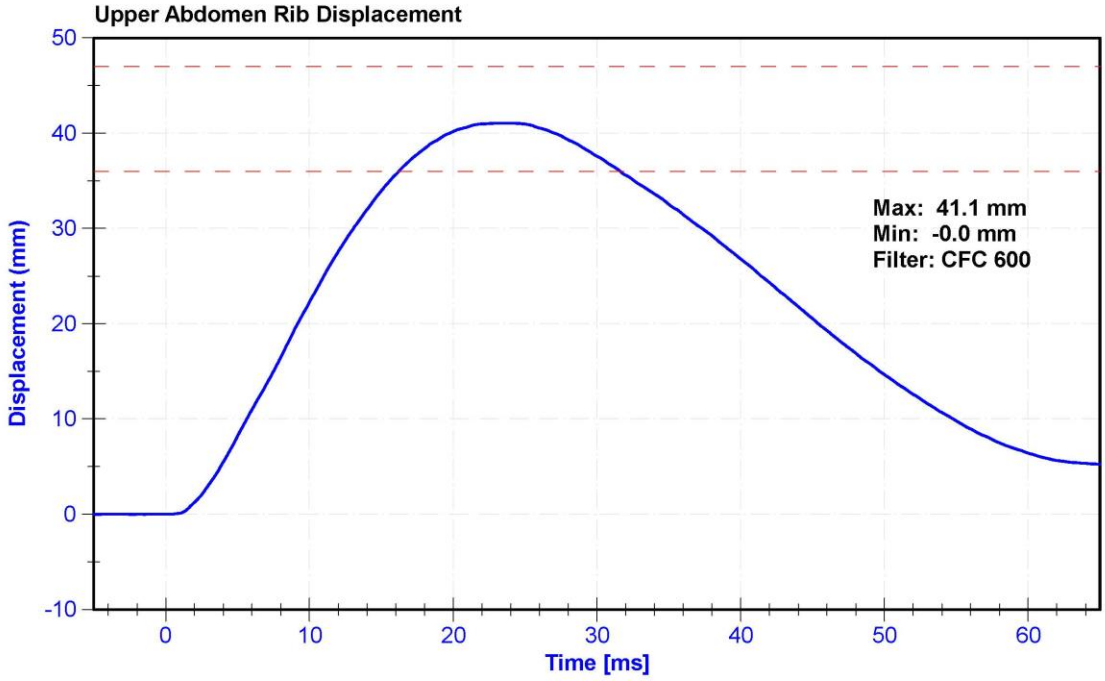
Results

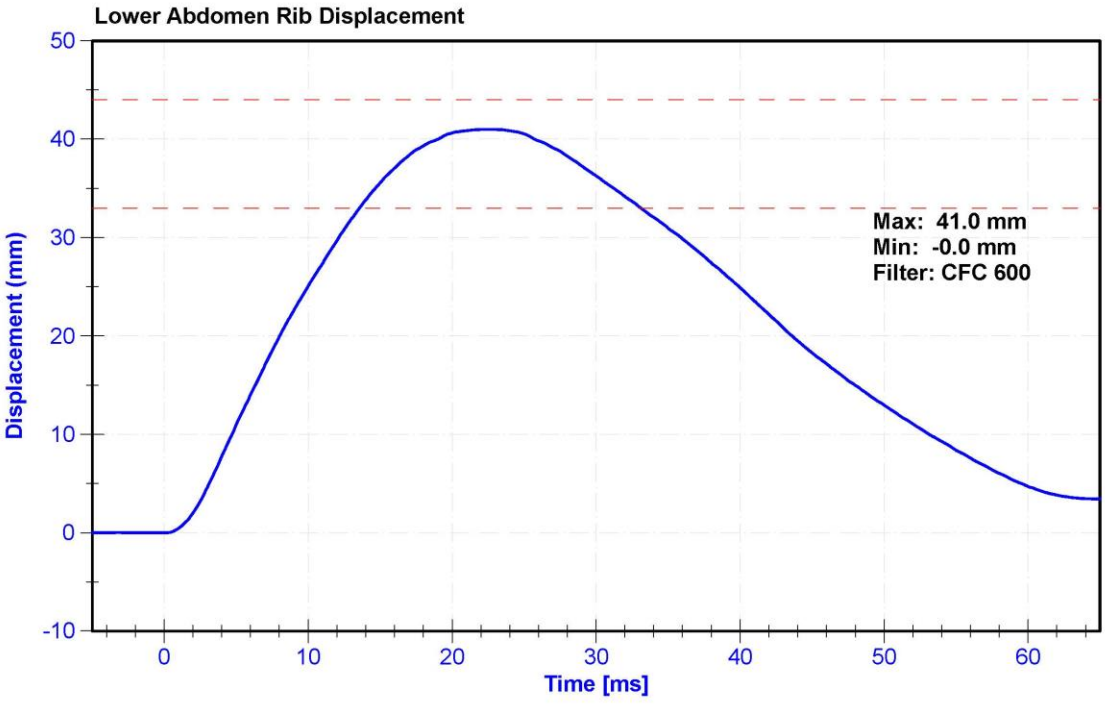
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26.0	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	12	16	g's	13.7	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.1	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.0	Pass

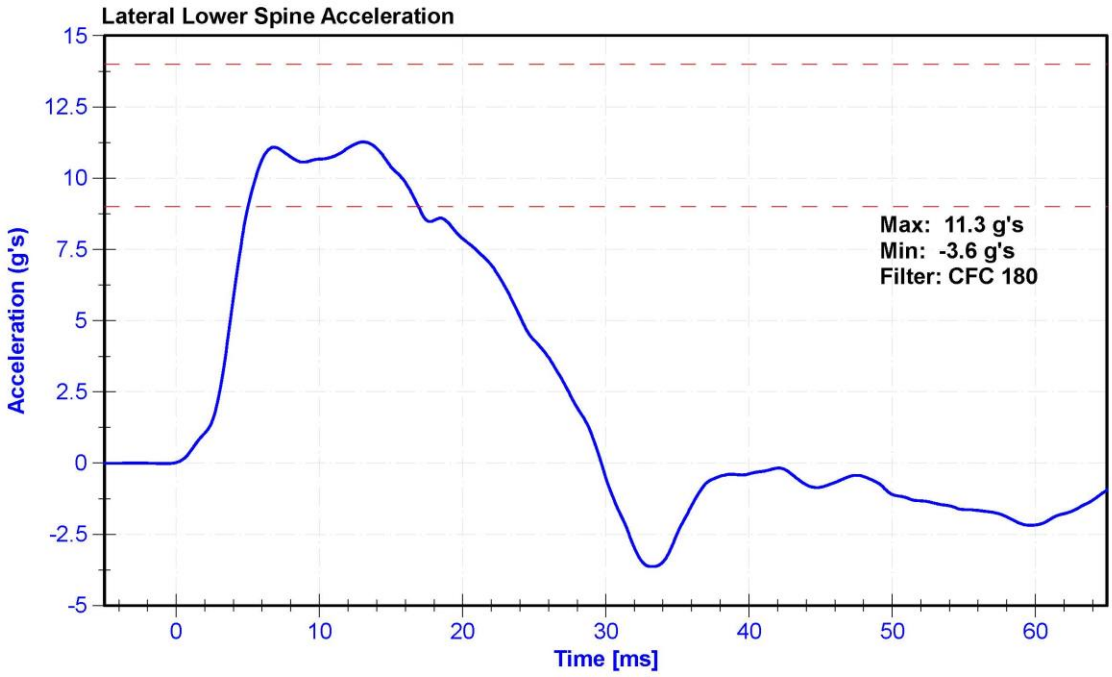
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	11/9/2020	5/10/2021
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	11/10/2020	5/11/2021
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	11/10/2020	5/11/2021




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.1 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.0 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
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.3 g's
Min: -3.6 g's
Filter: CFC 180

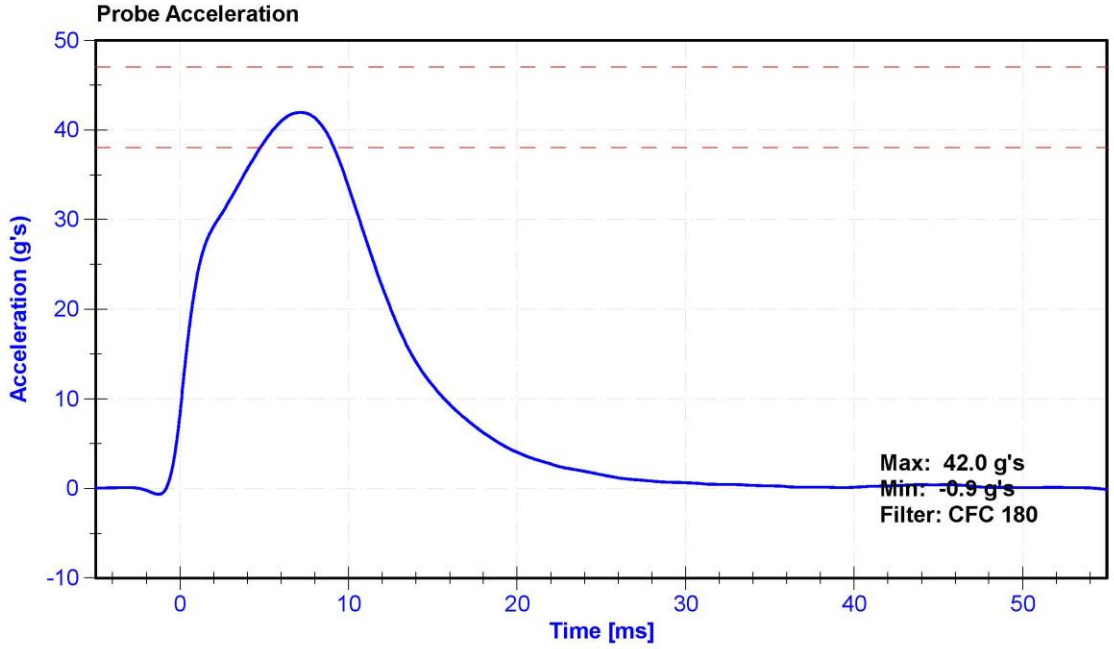
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

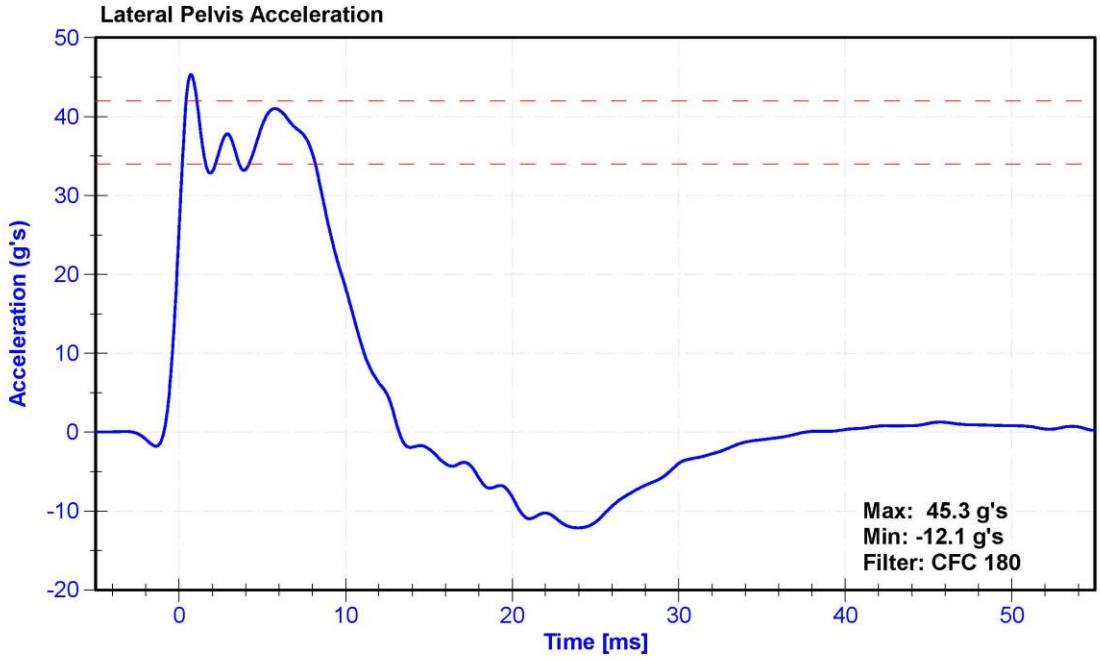
Results

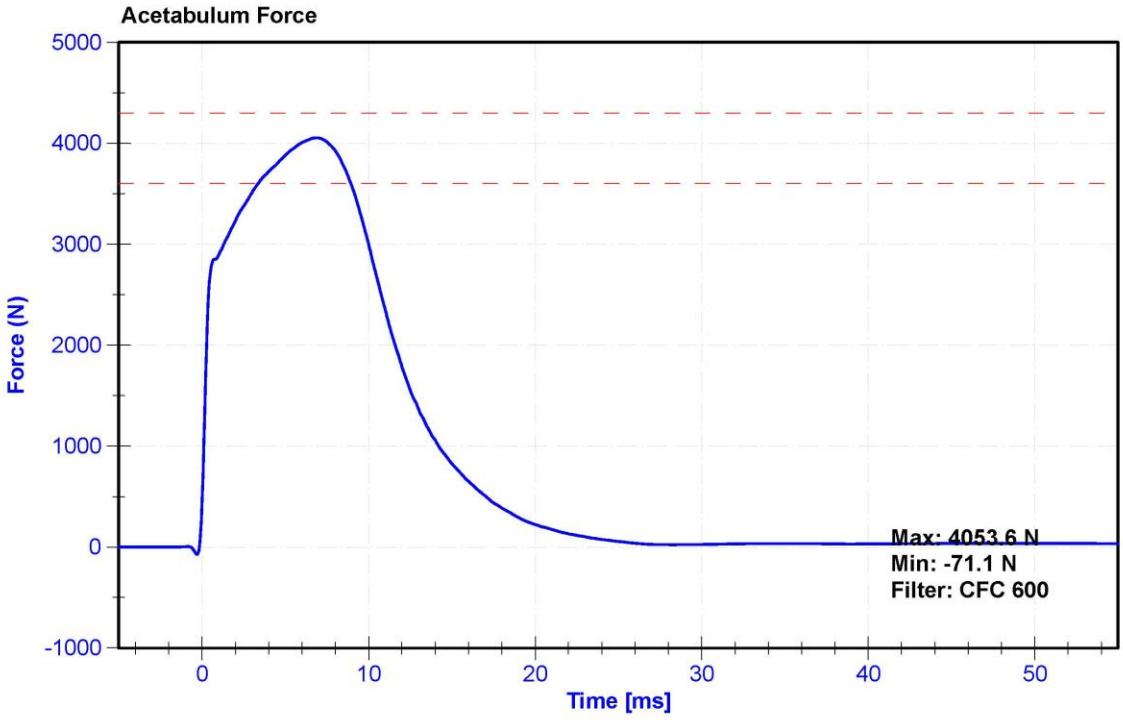
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	26	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration	38	47	g's	42.0	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.8	Pass
Acetabulum Force	3600	4300	N	4053.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Pelvis Y Accelerometer	ENDEVCO 7264C	AC-P51731	11/9/2020	5/10/2021
Acetabulum Load Cell	Denton IF-520	LC-236Fy	3/18/2020	3/18/2021
Certification Plug	Humanetics	14133	6/28/2020	N/A
Crash Test Plug	Humanetics	13696	9/26/2019	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 45.3 g's
Min: -12.1 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: 4053.6 N
Min: -71.1 N
Filter: CFC 600

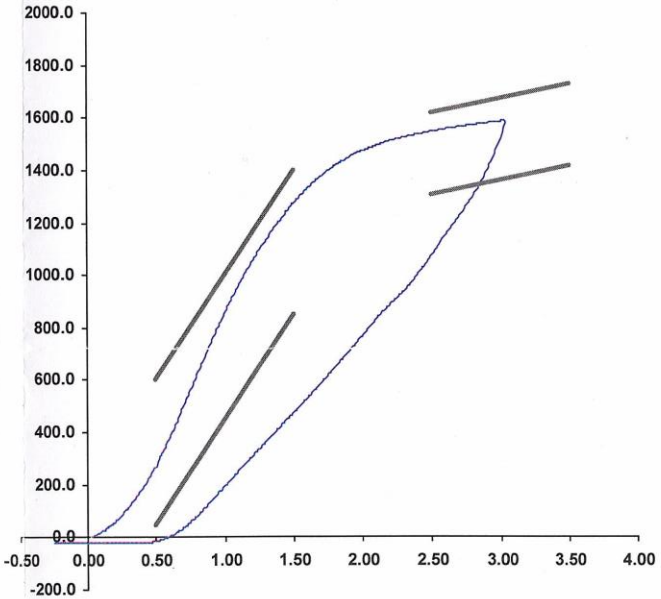
Crash
2/11

SID-IIs Pelvis Plug Certification Test

Plug S/N 13699
Test Number 11347
Report Number 11385
Test Date 9/26/2019 1:57:14 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	288.78	50.00	600.00
Force @ 1.5 mm (N)	1,283.32	850.00	1,400.00
Force @ 2.5 mm (N)	1,549.33	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,587.92	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 Rat 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator

Part Number 180-4450

Template No 107 26-Sep-19
SACO Research

By : DC Date : 9/26/2019

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

2/5/21 300/21 Crash

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13696
Test Number 11344
Report Number 11382
Test Date 9/26/2019 1:52:28 PM

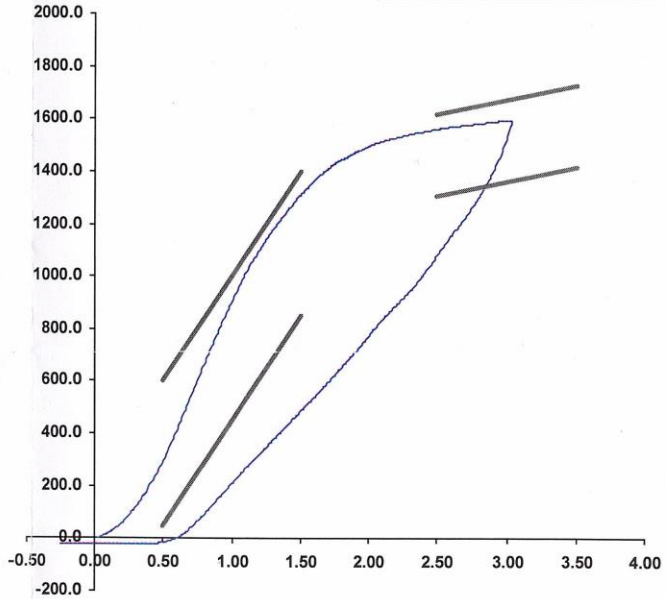
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	304.67	50.00	600.00
Force @ 1.5 mm (N)	1,316.82	850.00	1,400.00
Force @ 2.5 mm (N)	1,563.70	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,597.56	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 26-Sep-19
SACO Research

By : DC Date : 9/26/2019

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

2/4/21
300 cont'l

SID-IIs Pelvis Plug Certification Test

Plug S/N 14133
Test Number 14171
Report Number 14216
Test Date 6/28/2020 11:41:27 AM

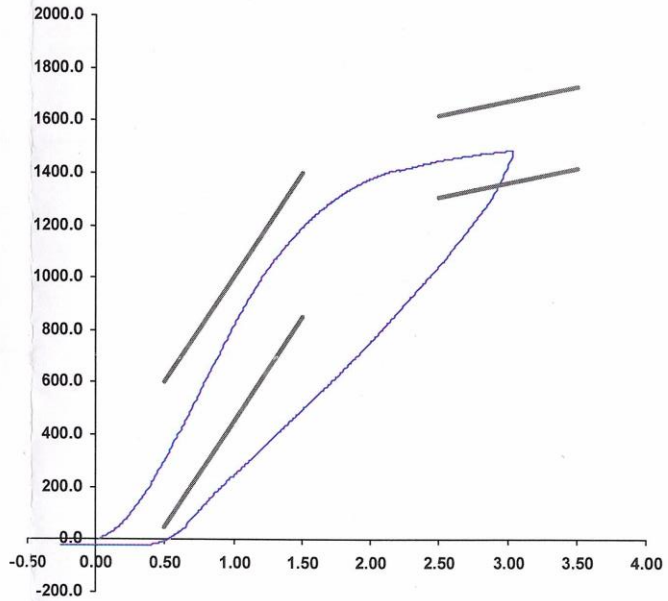
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	303.85	50.00	600.00
Force @ 1.5 mm (N)	1,190.11	850.00	1,400.00
Force @ 2.5 mm (N)	1,446.50	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,485.46	1,361.00	1,673.00

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:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 28-Jun-20
SACO Research

By : DG Date : 6-28-2020

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

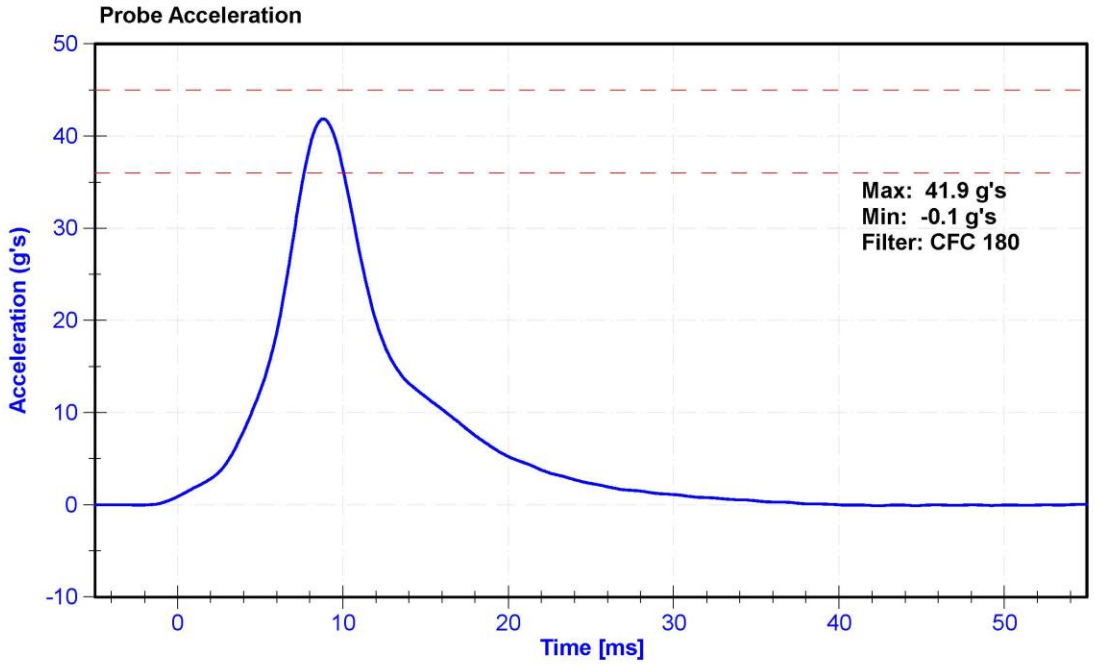
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	D.Reinhard

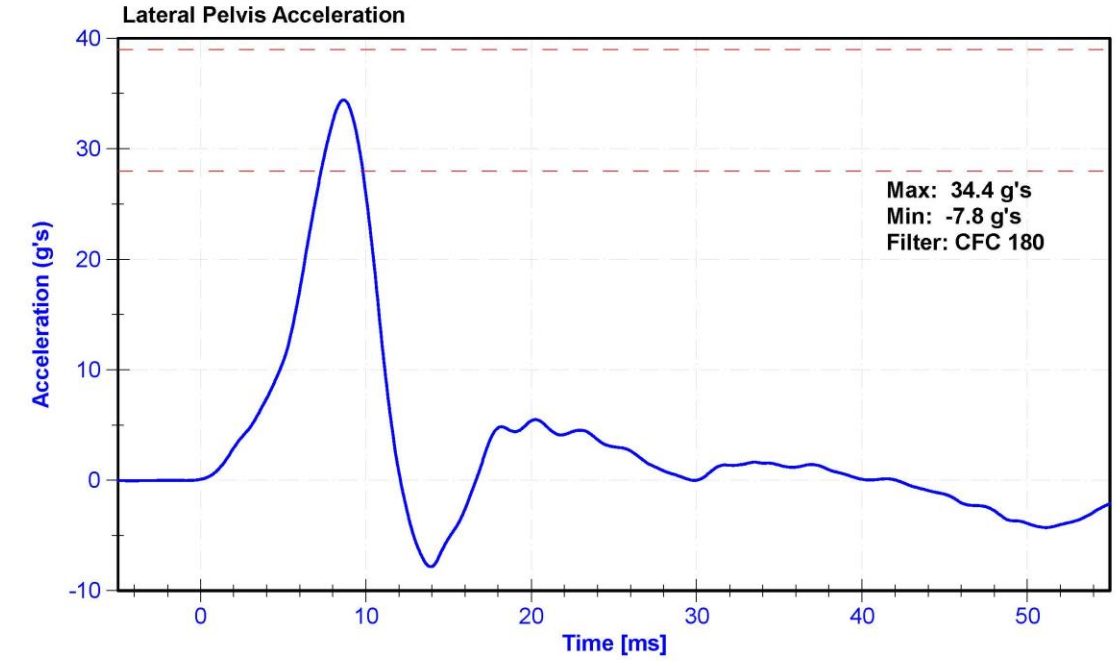
Results

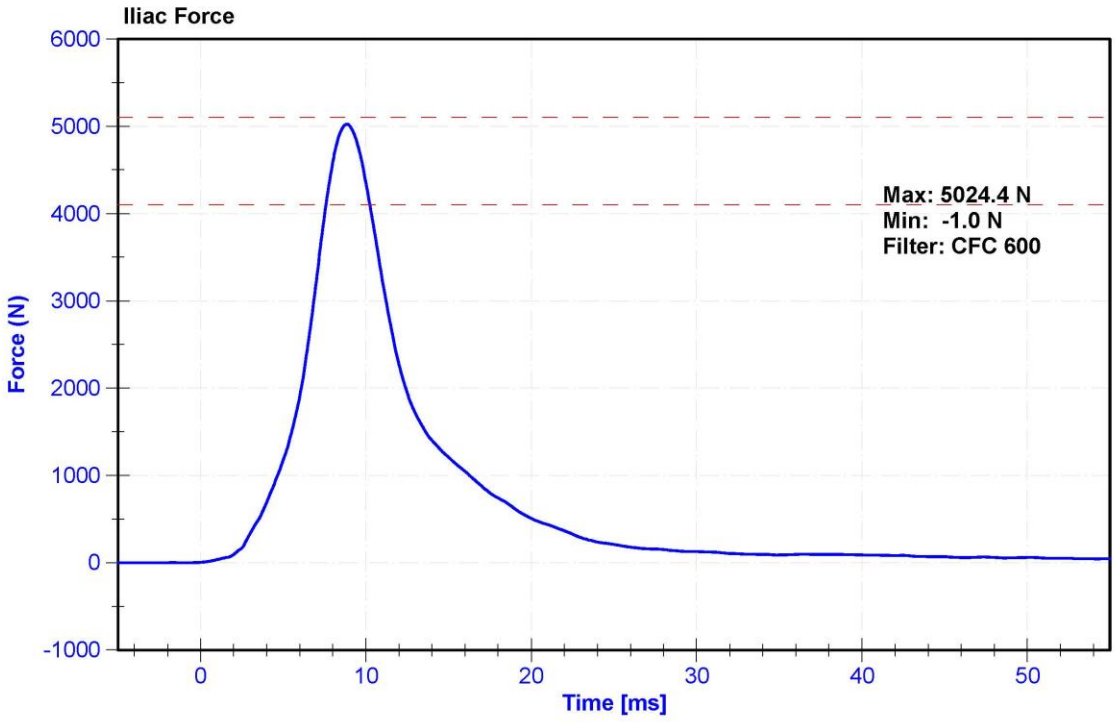
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	25.0	Pass
Velocity	4.2	4.4	m/s	4.26	Pass
Probe Acceleration	36	45	g's	41.9	Pass
Lateral Pelvis Acceleration	28	39	g's	34.4	Pass
Iliac Force	4100	5100	N	5024.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C	T25885	2/2/2021	2/2/2022
Pelvis Y Accelerometer	ENDEVCO 7264C	AC-P51731	11/9/2020	5/10/2021
Iliac Load Cell	DENTON 3228J	LC-279Fy	11/23/2020	11/23/2021




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 34.4 g's
Min: -7.8 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 5024.4 N
Min: -1.0 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: F034		
			Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers	Primary	X	P51884	Endevco	9/22/2020
		Y	P73161	Endevco	9/22/2020
		Z	P79588	Endevco	9/22/2020
	Redundant	X	P74963	Endevco	9/22/2020
		Y	P58864	Endevco	9/22/2020
		Z	AC-P52030	Endevco	11/13/2020
Thorax Rib Displacement Potentiometers	Upper	Y	DS-183GFE	Honeywell	10/8/2020
	Middle	Y	DS-184GFE	Honeywell	10/8/2020
	Lower	Y	DS-182GFE	Honeywell	10/8/2020
Abdomen Load Cells	Forward	Y	LC-1524	Denton	3/19/2020
	Middle	Y	LC-1523	Denton	3/19/2020
	Rear	Y	LC-1530	Denton	3/19/2020
Lower Spine Accelerometers (T12)		X	P52981	Endevco	9/22/2020
		Y	P82183	Endevco	9/18/2020
		Z	P51986	Endevco	9/22/2020
Pubic Symphysis Load Cell		Y	30960459GFE	Denton	3/19/2020

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	AC-P59018	ENDEVCO	11/10/2020
			Y	AC-P79189	ENDEVCO	11/10/2020
			Z	AC-P58777	ENDEVCO	11/10/2020
		Redundant	X	AC-P68057	ENDEVCO	11/10/2020
			Y	AC-P58986	ENDEVCO	11/10/2020
			Z	AC-P52025	ENDEVCO	11/10/2020
Displacement Potentiometers	Thoracic Rib	Upper	Y	DS-451GFE	Servo	11/10/2020
		Middle	Y	DS-040GFE	Servo	11/10/2020
		Lower	Y	DS-1156GFE	Servo	11/9/2020
	Abdominal Rib	Upper	Y	DS-308GFE	Servo	11/10/2020
		Lower	Y	DS-307GFE	Servo	11/10/2020
Lower Spine Accelerometers (T12)			X	AC-P64003	ENDEVCO	11/9/2020
			Y	AC-P64147	ENDEVCO	11/9/2020
			Z	AC-P58786	ENDEVCO	11/9/2020
Acetabulum Load Cell			Y	LC-236Fy	DENTON	3/18/2020
Iliac Wing Load Cell			Y	LC-279Fy	DENTON	11/23/2020
Pelvis Plug (struck side)				13407	SACO	5/20/2020
Pelvis Plug (non-struck side)				13018	SACO	7/30/2019

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	1201-1000_A374278	Measurement Specialties	12/1/2020
	Vehicle Center of Gravity	Y	1201-1000_A374285	Measurement Specialties	12/1/2020
	Vehicle Center of Gravity	Z	1201-1000_A374292	Measurement Specialties	12/1/2020
2	Right Sill at Front Seat	X	1201-1000_A372808	Measurement Specialties	11/19/2020
	Right Sill at Front Seat	Y	1201-1000_A372815	Measurement Specialties	11/19/2020
	Right Sill at Front Seat	Z	1201-1000_A372817	Measurement Specialties	11/19/2020
3	Right Sill at Rear Seat	X	1201-1000_A372842	Measurement Specialties	11/20/2020
	Right Sill at Rear Seat	Y	1201-1000_A372843	Measurement Specialties	11/20/2020
	Right Sill at Rear Seat	Z	1201-1000_A372859	Measurement Specialties	11/20/2020
4	Left Sill at Front Door	Y	1201-1000_A315901	Measurement Specialties	1/18/2021
5	Left Sill at Rear Door	Y	1201-1000_A280391	Measurement Specialties	9/1/2020
6	Left A-Post Lower	Y	1201-1000_A351017	Measurement Specialties	12/5/2020
7	Left A-Post Middle	Y	1201-1000_A315760	Measurement Specialties	1/18/2021
8	Left B-Post Lower	Y	1201-1000_A222645	Measurement Specialties	10/10/2020
9	Left B-Post Middle	Y	1201-1000_A280852	Measurement Specialties	10/3/2020
10	Front Seat Track	Y	1201-1000_A315970	Measurement Specialties	10/10/2020
11	Rear Seat Track or Structure	Y	1201-1000_A280993	Measurement Specialties	10/10/2020
12	Right Rear Occ. Compartment	Y	1201-1000_A315124	Measurement Specialties	10/10/2020
13	Engine Block	X	1201-1000_A290922	Measurement Specialties	10/5/2020
	Engine Block	Y	1201-1000_A300208	Measurement Specialties	10/5/2020
14	Rear Floorpan Above Axle	X	1201-1000_A250364	Measurement Specialties	1/18/2021
	Rear Floorpan Above Axle	Y	1201-1000_A255841	Measurement Specialties	1/18/2021
	Rear Floorpan Above Axle	Z	1201-1000_A335453	Measurement Specialties	1/18/2021

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	1201-1000_A315181	Measurement Specialties	10/6/2020
MDB Center of Gravity	Y	1201-1000_A315931	Measurement Specialties	10/7/2020
MDB Center of Gravity	Z	1201-1000_A315085	Measurement Specialties	10/6/2020
Left Frame at Rear Axle Centerline	X	1201-1000_A315983	Measurement Specialties	10/5/2020