

REPORT NUMBER: SINCAP-CAL-23-006

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

**Mazda Motor Manufacturing De Mexico S.A. De C.V.
2023 Mazda CX-30
5 Door SUV**

NHTSA No: O20235401

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



February 8, 2024

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
WASHINGTON, D.C. 20590**

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Prepared by: Alexander Rudniski Date: February 8, 2024
Alexander Rudniski, Test Engineer

Approved by: Vanessa Hansen Date: February 8, 2024
Vanessa Hansen, Operations Program Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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		6. Performing Organization Code CAL																												
Alexander Rudniski, Test Engineer Vanessa Hansen, Operations Program Manager		8. Performing Organization Report No. CAL-DOT-2023-006																												
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		10. Work Unit No.																												
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		14. Sponsoring Agency Code NRM-110																												
15. Supplementary Notes																														
16. Abstract A 55/28, (61.90kph / 38.5 mph), 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2023 Mazda CX-30 SUV 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 April 13, 2023. The impact velocity of the Moving Deformable Barrier (MDB) was 61.92 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 153 mm located at level 2 and 3. The test vehicle's occupant performance data is as follows:																														
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<p>* Proposed IARV</p> <p>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.</p>																														
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, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590																												
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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1-1
2	Summary of Test Results	2-1
3	Occupant and Vehicle Information	3-1
 <u>Data Sheet</u>		 <u>Page</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	3-6
3	Dummy Longitudinal Clearance Dimensions	3-10
4	Dummy Lateral Clearance Dimensions	3-11
5	Camera and Instrumentation Data	3-12
6	Test Vehicle Accelerometer Locations	3-13
7	MDB Accelerometer Locations	3-14
8	Post-Test Observations	3-15
9	MDB Summary of Results	3-17
10	Test Vehicle Profile Measurements	3-18
11	Test Vehicle Exterior Crush Measurements	3-19
12	MDB Exterior Static Crush Measurements	3-22
13	Vehicle and MDB Damage Profile Distances	3-23
14	FMVSS No. 301 Static Rollover Results	3-24
15	Dummy/Vehicle Temperature and Humidity Stabilization Data	3-25
 <u>Appendix</u>		 <u>Page</u>
A	Photographs	A-1
B	Vehicle and Dummy Response Data Plots	B-1
C	Dummy Configuration and Performance Verification Data	C-1
D	Test Equipment and Instrumentation Calibration Data	D-1

SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2023 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2023 Mazda CX-30 SUV. 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 2023 Mazda CX-30 SUV 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 61.92 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 April 13, 2023. 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	59.972
Maximum Thorax Rib Deflection	mm	44	19.484
Combined Abdominal Force	N	2500	1024.876
Lower Spine (T12) Resultant Acceleration	G	82*	25.251
Pubic Symphysis Force	N	6000	1062.073

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	121.113
Lower Spine (T12) Resultant Acceleration	G	82	33.015
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2772.385
Maximum Thoracic Rib Deflection	mm	38*	13.857
Maximum Abdominal Rib Deflection	mm	45*	14.083

*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	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

GENERAL COMMENTS:

1. P1 serial number – F033
2. P4 serial number – DG8012

Data Anomalies:

The following channel was questionable for

- Left Rear Sill Y Acceleration, Exceeded calibration range at 8.2 ms
- Left B-Pillar Lower Y Acceleration, Exceeded calibration range at 10.9 ms 15.3 ms
- Left B-Pillar Middle Y Acceleration, Exceeded calibration range and saturated at 9.7 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel 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: 2023 Mazda CX-30 SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
Test Date: 04/13/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20235401	Traction Control System (TCS)	Yes
Model Year	2023	Auto-Leveling System	No
Make	Mazda	Automatic Door Locks (ADL)	Yes
Model	CX-30	Power Window Auto-Reverse	No
Body Style	SUV	Other Optional Feature	No
VIN	3MVDMBAM9PM519699	Driver Front Air bag	Yes
Body Color	Jet Black MICA	Driver Curtain Air bag	Yes
Odometer Reading (km/mi)	146 miles	Driver Head/Torso Air bag	No
Engine Displacement (L)	2.5	Driver Torso Air bag	No
Type/No. Cylinders	14	Driver Torso/Pelvis Air bag	Yes
Engine Placement	Transverse	Driver Pelvis Air bag	No
Transmission Type	Automatic	Driver Knee Air bag	Yes
Transmission Speeds	6-Speed	Rear Pass. Curtain Air bag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Air bag	No
Final Drive	All Wheel Drive	Rear Pass. Torso Air bag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Air bag	Yes
Sunroof/T-Top	No	Rear Pass. Pelvis Air bag	No
Running Boards	No	Driver Seat Belt Pretensioners	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioners	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	No

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Mazda Motor Manufacturing DE Mexico S.A. DE C.V	GVWR (kg)	1987
Date of Manufacture	12/22	GAWR Front (kg)	1068
Vehicle Type	MPV	GAWR Rear (kg)	940

VEHICLE SEATING AND WEIGHT CAPACITY DATA

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

VEHICLE SEAT TYPE

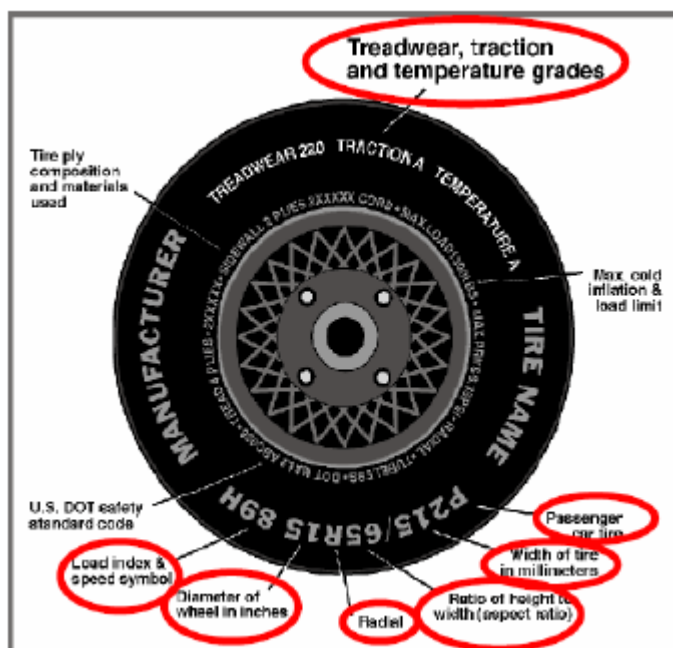
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle: 2023 Mazda CX-30 SUV NHTSA No.: O20235401
 Test Program: NCAP Side MDB Impact Test Test Date: 04/13/2023

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)	250	250
Recommended Tire Size	215/65R16	215/65R16
Tire Size on Vehicle	215/65R16	215/65R16
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Turanza EL440	Turanza EL440
Treadwear	480	480
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	98H	98H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1V66VJB114822	1V66VJB114822
DOT Safety Code Right	1V66VJB114822	1V66VJB114722

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

Test Vehicle: 2023 Mazda CX-30 SUV NHTSA No.: O20235401
 Test Program: NCAP Side MDB Impact Test Test Date: 04/13/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	296	291	291	295
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

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	445	306	1490	500	352	1654	485	384	1662
Right	kg	459	280		453	349		472	321	
Ratio	%	60.6	39.3		57.6	42.3		57.5	42.4	
Totals	kg	904	586	1490	953	701	1654	957	705	1662

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1490	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Target Vehicle Test Weight (TVTWW)	kg	1661.8	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement**
LF	mm	879	882	Yes
RF	mm	883	877	Yes
RR	mm	921	915	Yes
LR	mm	911	916	Yes
Vehicle CG (Aft of Front Axle)	mm	1125	1124	
Vehicle CG (Left+)/Right(-) from Longitudinal Centerline)	mm	36	24	

*** 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:	2023 Mazda CX-30 SUV	NHTSA No.:	O20235401
Test Program:	NCAP Side MDB Impact Test	Test Date:	04/13/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	14
Spare Tire	14
Jack	3
Tail Light	1
Right Rear Passenger Window	2
Ballast / Equipment Added	11

TEST SURFACE MARKINGS

	Distance from 63° Impact Angle Line (mm)
Fore 25 mm target	884
Aft 25 mm target	883
Pre-Impact Angle Line	235

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	2955	1555
C	2955	3355
D	0	3000

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

Test Vehicle: 2023 Mazda CX-30 SUV NHTSA No.: O20235401
 Test Program: NCAP Side MDB Impact Test Test Date: 04/13/2023

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	16.75	8.8	12.8
Front Passenger Seat	Not Adjustable		
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	12.8	11	Max	55	66	80
			Mid	28	39	53
			Min	0	11	25
Front Passenger Seat	Not Adjustable		Max			
			Mid			
			Min			
Front Center Seat*			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:	2023 Mazda CX-30 SUV	NHTSA No.:	O20235401
Test Program:	NCAP Side MDB Impact Test	Test Date:	04/13/2023

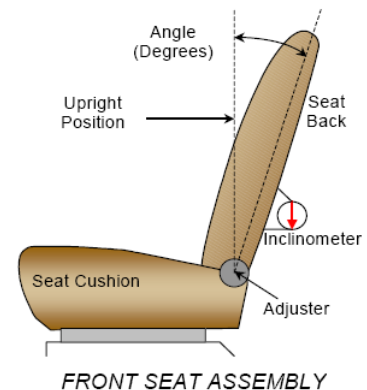
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	256	33 (0-32)	128	16
Front Passenger Seat	256	33 (0-32)	128	16
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.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	63	30 (0-29)	+5.9	5
Front Passenger Seat	63	30 (0-29)	+5.9	5
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: 2023 Mazda CX-30 SUV NHTSA No.: O20235401
 Test Program: NCAP Side MDB Impact Test Test Date: 04/13/2023

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	4 (0-3)	0
Rear Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

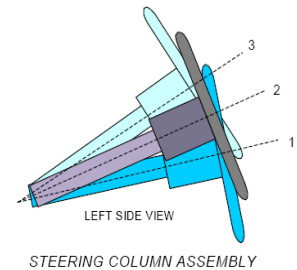
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

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

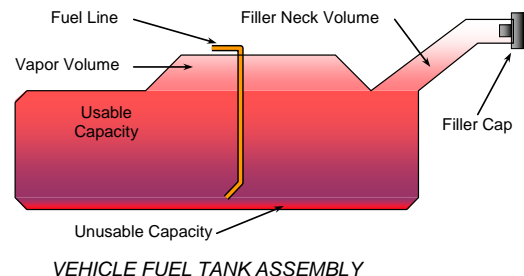
	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	22.1	
Geometric Center – Position 2	24.7	
Uppermost – Position 3	27.2	
Telescoping Steering Wheel Travel		70
Test Position	24.7	35



FUEL PUMP

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

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



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

Test Vehicle: 2023 Mazda CX-30 SUV NHTSA No.: O20235401
Test Program: NCAP Side MDB Impact Test Test Date: 04/13/2023

FUEL TANK CAPACITY

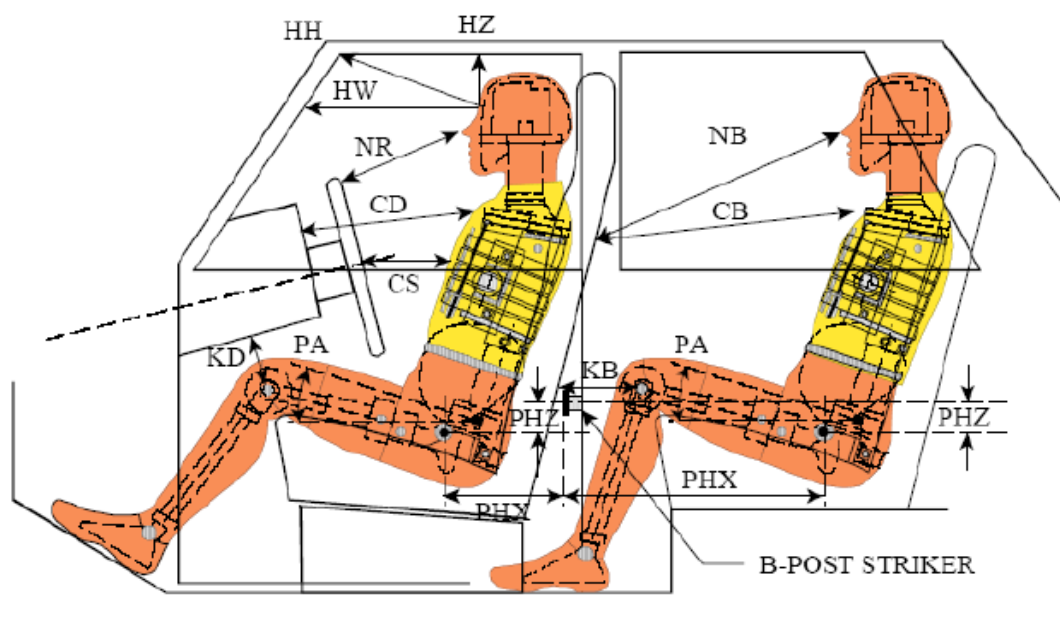
	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	47.5
Usable Capacity of "Optional Tank" (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	48.0
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	44.2
Actual Amount of Solvent Used in Test	44.4
1/3 of Usable Capacity	15.8

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

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

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



LEFT SIDE VIEW

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

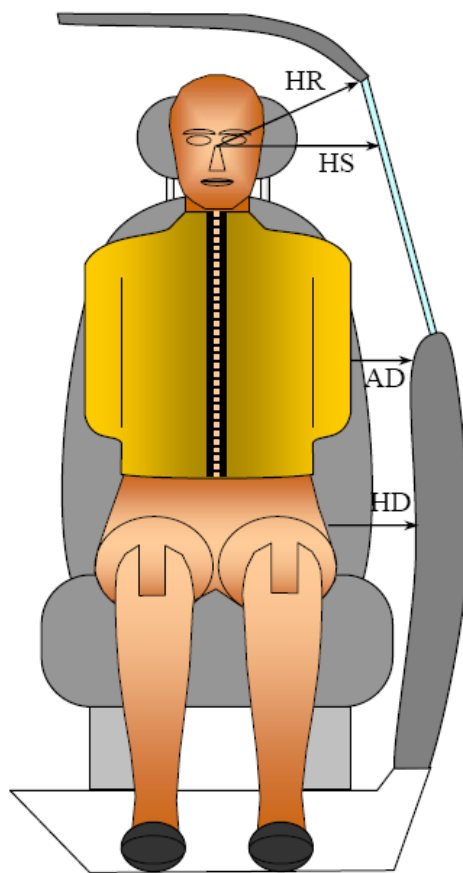
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Passenger (Serial No. DG8012)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	398			
HW		Header to Windshield	654			
HZ	HZ	Head to Roof Liner	192		283	
NR	NB	Nose to Rim/Seat Back	474		436	
CD	CB	Chest to Dash/Seat Back	616		449	
CS		Chest to Steering Wheel	406			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	181	26.5	210	12.9
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	171	24.7	209	15.0
PAX°	PAX°	Pelvic Tilt Angle X		26.0		21.5
	PAY°	Pelvic Tilt Angle Y				0.3
PHX	PHX	Hip Point to Striker (X-Axis)	171		322	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	206		365	

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

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



FRONT VIEW OF DUMMY

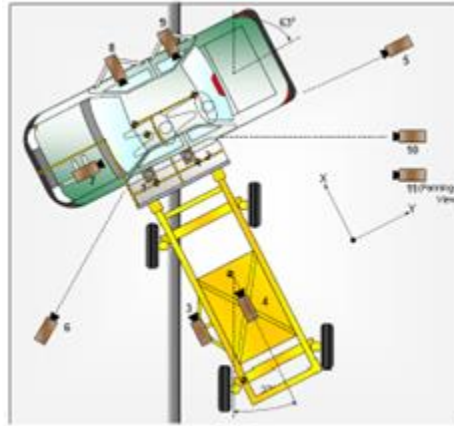
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Passenger (Serial No. DG8012)
HR	Head to Side Header	mm	193	230
HS	Head to Side Window	mm	319	332
AD	Arm to Door	mm	83	117
HD	Hip Point to Door	mm	166	174

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

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	0	0	-8121	12.5	1000
2	Overhead Close-up	0	0	-8121	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	9279	-1362	28	1000
6	Left Front	-3078	-6266	-1556	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	30
11	Real-time In run				Zoom	30

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.

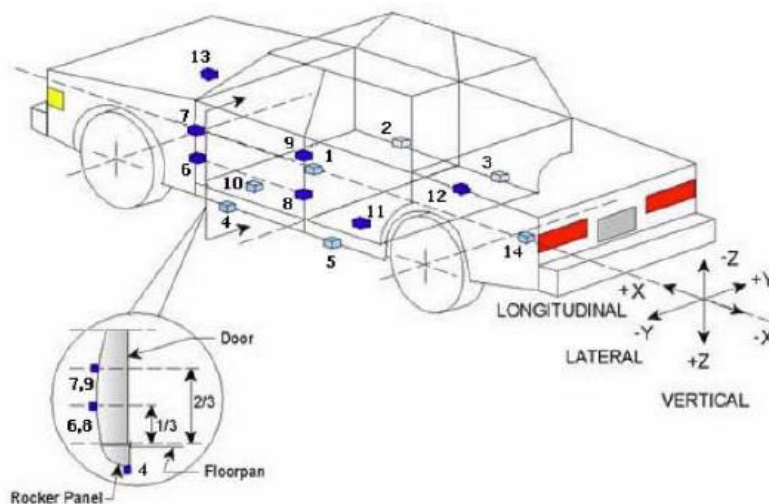
If applicable, explain why camera(s) did not operate as intended: All cameras operated normally

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:	2023 Mazda CX-30 SUV	NHTSA No.:	O20235401
Test Program:	NCAP Side MDB Impact Test	Test Date:	04/13/2023



TEST VEHICLE ACCELEROMETER LOCATIONS

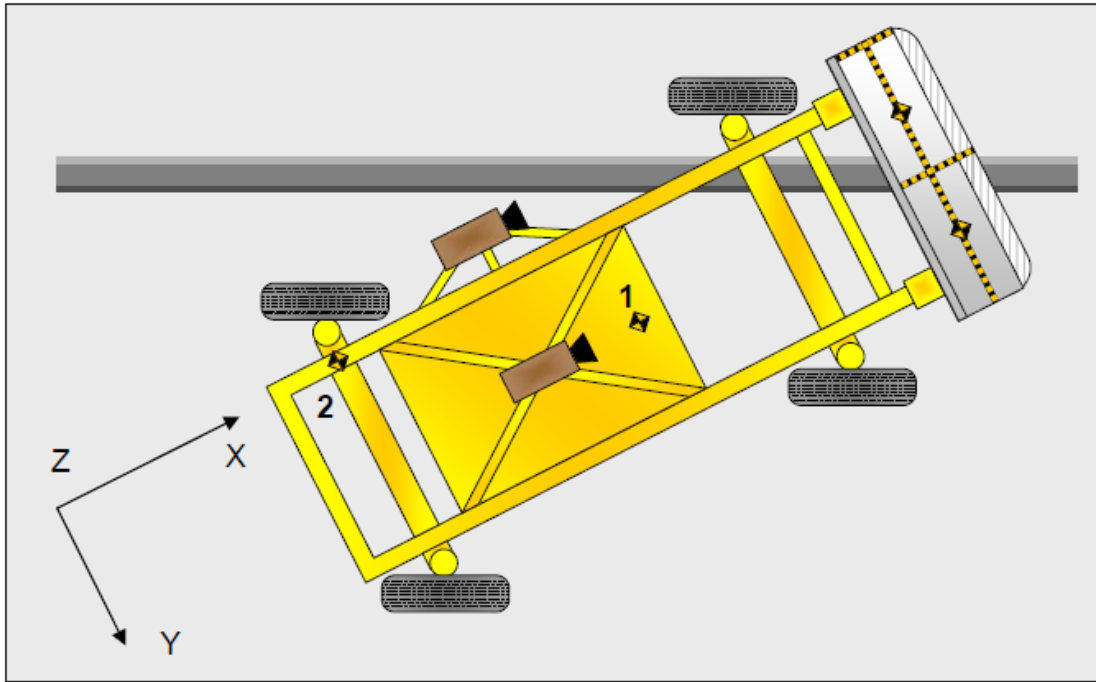
No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2018	4	16
2	Right Sill at Front Seat	2460	677	175
3	Right Sill at Rear Seat	1653	679	162
4	Left Sill at Front Door	2448	-678	175
5	Left Sill at Rear Door	1681	-678	171
6	A-Post Lower	2984	-612	9
7	A-Post Middle	2819	-637	-499
8	B-Post Lower	1878	-687	-12
9	B-Post Middle	1803	-661	-446
10	Front Seat Track	2169	-549	226
11	Rear Seat Structure	1488	-633	124
12	Rt. Rear Occ. Compartment	1847	366	329
13	Engine Block	3555	141	-306
14	Rear Above Axle	1057	5	26

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: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



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):

1495

**DATA SHEET NO. 8
POST-TEST OBSERVATIONS**

Test Vehicle:	<u>2023 Mazda CX-30 SUV</u>	NHTSA No.:	<u>O20235401</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>04/13/2023</u>

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	None
Top of Head	Side Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag & Side Headliner	Curtain Airbag
Back of Head	Side Headliner, Curtain Airbag & Headrest	Curtain Airbag & Headrest
Left Shoulder	Curtain Airbag	Seatback & Torso/Pelvis Airbag
Upper Torso	Seatback & Torso/Pelvis Airbag	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback & Torso/Pelvis Airbag	Seatback & Torso/Pelvis Airbag
Left Hip	Seat Pan & Torso/Pelvis Airbag	Seat Pan & Torso/Pelvis Airbag
Left Knee	Driver Door	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

*Tailgate opened during impact but is still operational.

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	None
Other Notable Effects	None

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

Test Vehicle:	<u>2023 Mazda CX-30 SUV</u>	NHTSA No.:	<u>O20235401</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>04/13/2023</u>

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	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other	N/A	N/A	N/A	N/A

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2651
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		386
Actual Impact Point (Aft of Frontal Axle)	mm		379
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+7
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	+3

**DATA SHEET NO. 9
MDB SUMMARY OF RESULTS**

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Frame	4120
Wheelbase of Framework Carriage	2591
CG Location of Front Axle	1122

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	396	291.5	687.5
Right	kg	377.5	301	678.5
Ratio	%	56.6	43.4	100
Totals	kg	773.5	592.5	1366

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	61.92
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	61.77
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
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

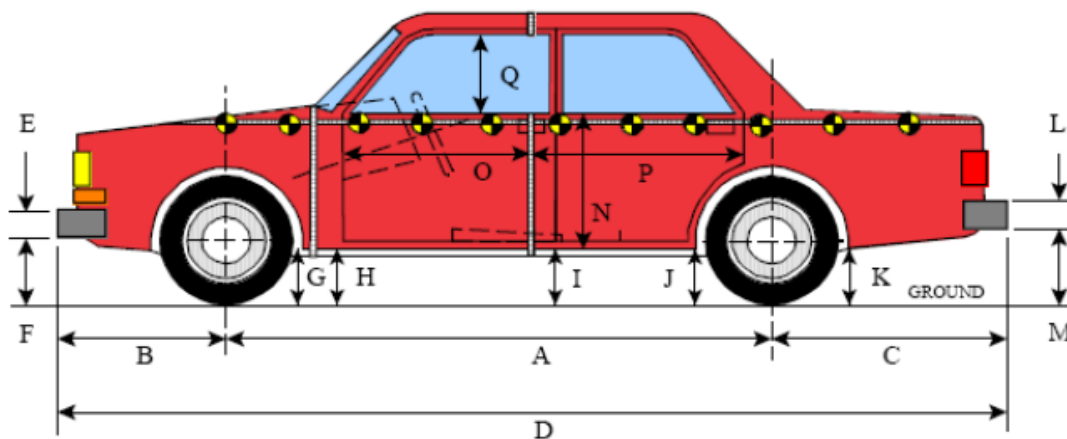
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	218
B	Top of Bumper	533	800	Left	144
C	Mid-Level	686	800	Left	143
D	Top of Stack	813	800	Left	173

**DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



LEFT SIDE VIEW

All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

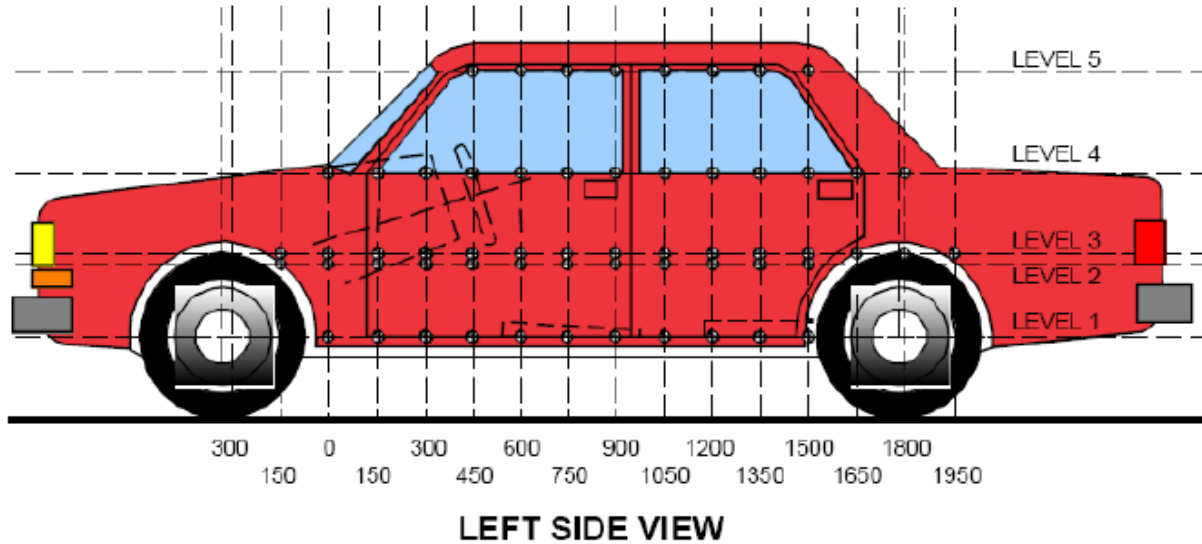
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Change
A	Wheelbase	2651	2665	14
B	Front Axle to FSOV	908	904	-4
C	Rear Axle to RSOV	826	815	-11
D	Total Length at Centerline	4386	4384	-2
E	Front Bumper Thickness	165	165	0
F	Front Bumper Bottom to Ground	317	311	-6
G	Sill Height at Front Wheel Well	231	237	6
H	Sill Height at Front Door Leading Edge	235	345	110
I	Sill Height at B Pillar	235	238	3
J1	Sill Height at Rear Wheel Well	242	252	10
J2	Pinch Weld Height at Rear Wheel Well	219	220	1
K	Sill Height Aft of Rear Wheel Well	285	285	0
L	Rear Bumper Thickness	185	185	0
M	Rear Bumper Bottom to Ground	429	436	7
N	Sill Height to Window Bottom of Front Window Sill	823	816	-7
O	Front Door Leading Edge to Impact CL	691	688	-3
P	Rear Door Trailing Edge to Impact CL	1377	1356	-21
Q	Front Window Opening	381	418	37
R	Right Side Length	4297	4300	3
S	Left Side Length	4298	4296	-2
T	Maximum Vehicle Width	1794	1710	-84
U	Front Wheel Track Width	1551	1570	19
V	Rear Wheel Track Width	1558	1559	1

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	316	28	900
2	Driver Hip Point	mm	593	153	450
3	Mid-Door	mm	794	153	1650
4	Window Sill	mm	1047	71	1650
5	Window Top	mm	1472	4	1800

*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: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

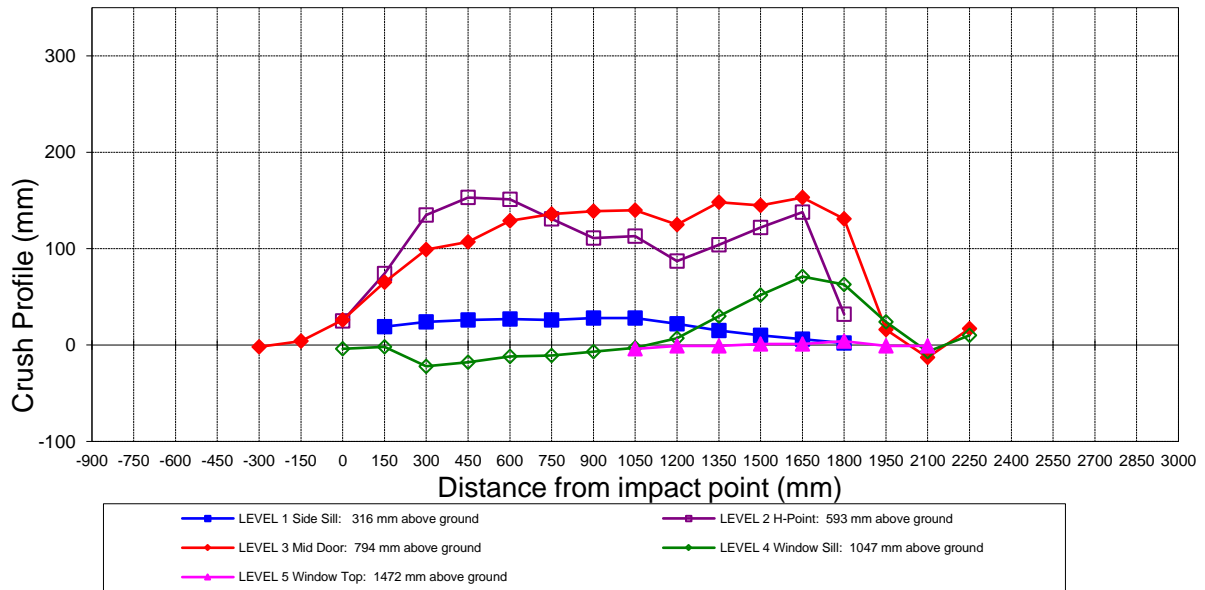
	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300			897					899					-2		
-150			895					891					4		
0		901	901	785			876	870	789			25	31	-4	
150	888	902	888	806		869	828	823	808		19	74	65	-2	
300	885	901	882	816		861	766	783	838		24	135	99	-22	
450	883	899	878	809		857	746	771	827		26	153	107	-18	
600	879	896	875	830		852	745	746	842		27	151	129	-12	
750	875	893	874	835		849	762	738	846		26	131	136	-11	
900	872	890	874	839		844	779	735	846		28	111	139	-7	
1050	868	887	876	841	611	840	774	736	844	615	28	113	140	-3	-4
1200	865	885	879	844	618	843	798	754	837	619	22	87	125	7	-1
1350	862	883	882	842	617	847	779	734	812	618	15	104	148	30	-1
1500	864	885	886	841	614	854	763	741	789	613	10	122	145	52	1
1650	867	892	892	838	609	861	754	739	767	608	6	138	153	71	1
1800	871	895	901	838	602	869	863	770	775	598	2	32	131	63	4
1950			900	839	588			884	815	589			16	24	-1
2100			899	844	559			912	851	560			-13	-7	-1
2250			899	847				882	837				17	10	
2400															
2550															
2700															
2850															
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: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023

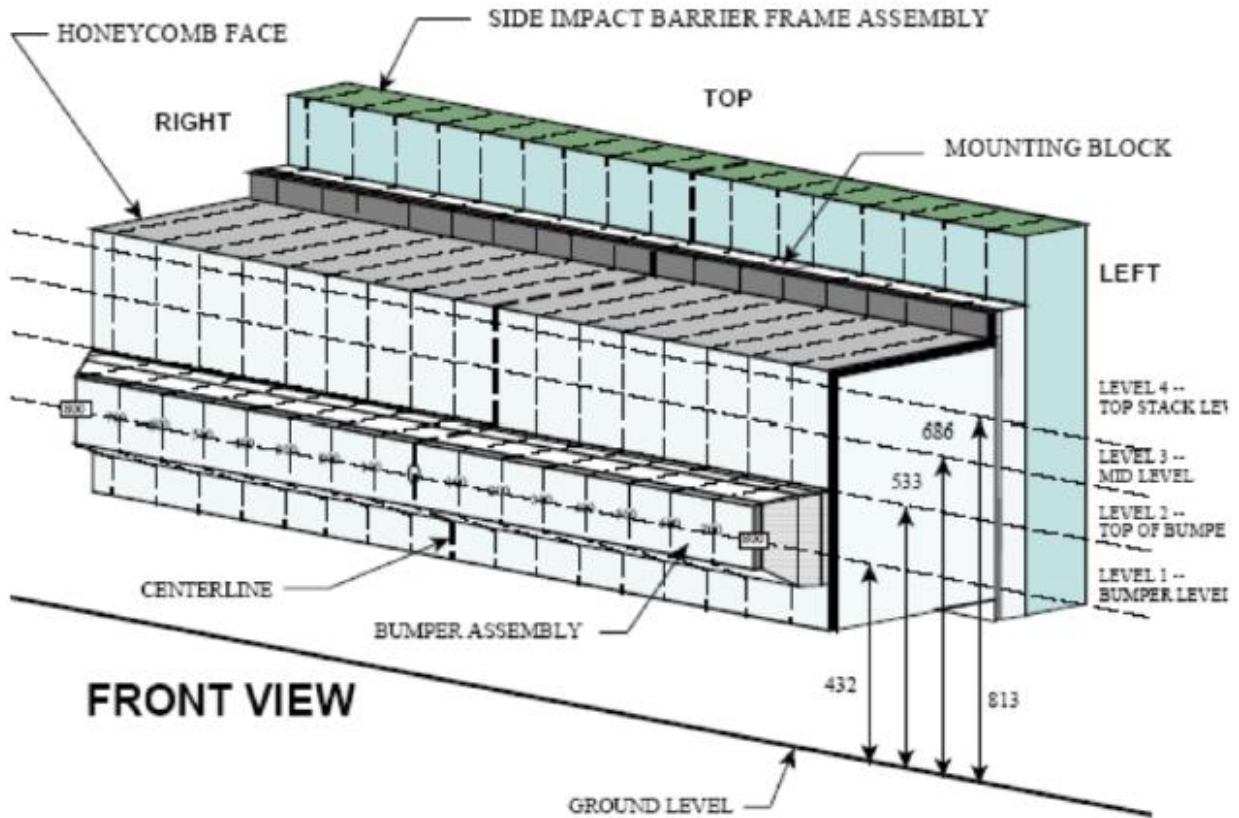


Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023



NOTE: Dimensions are shown in millimeters, mm

DEFORMABLE BARRIER STATIC CRUSH

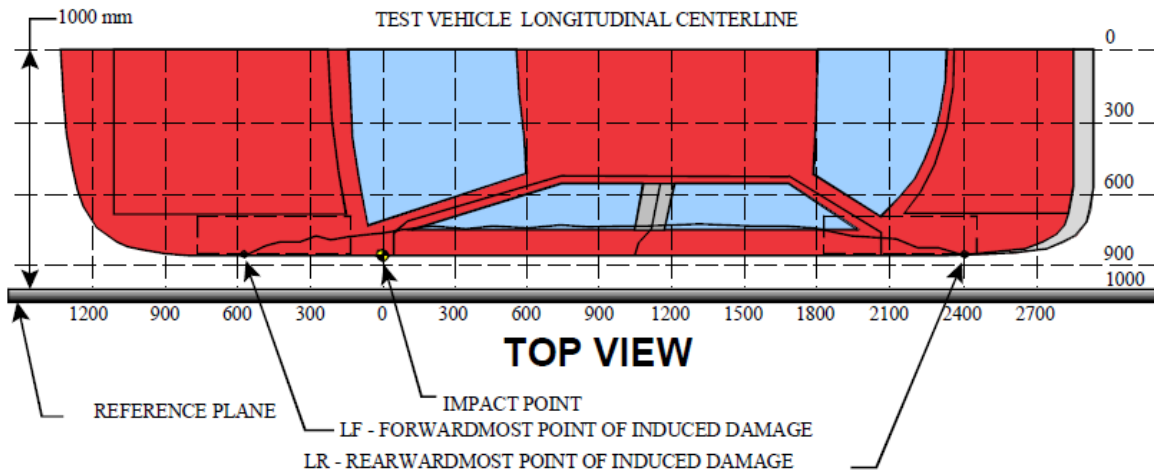
Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		0	100	200	300	400	500	600	700
1	218	211	210	210	210	209	209	208	207	207	206	205	205	205	208	217	215
2	112	111	111	110	109	111	108	105	106	102	103	101	102	104	112	126	144
3	92	62	46	43	52	81	58	37	34	32	35	41	48	55	67	90	143
4	64	42	35	32	44	66	75	45	49	51	59	62	68	81	99	136	173

**DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES**

Test Vehicle: 2023 Mazda CX-30 SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20235401
 Test Date: 04/13/2023

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	-300	3	101	103	-2
2	210	3	193	114	79
3	720	3	260	126	134
4	1230	3	250	120	130
5	1740	3	242	103	139
6	2250	3	118	101	17

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	290	505	-215
2	480 mm left of center	1	309	514	-205
3	160 mm left of center	1	308	514	-206
4	160 mm right of center	1	305	513	-208
5	480 mm right of center	1	303	513	-210
6	800 mm right of center	1	283	501	-218

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

Test Vehicle: 2023 Mazda CX-30 SUV NHTSA No.: O20235401
 Test Program: NCAP Side MDB Impact Test Test Date: 04/13/2023

Test Time: 9:37 AM Temperature: 21°C

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

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	68	300	368
90° to 180°	63	300	363
180° to 270°	62	300	362
270° to 360°	66	300	366

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

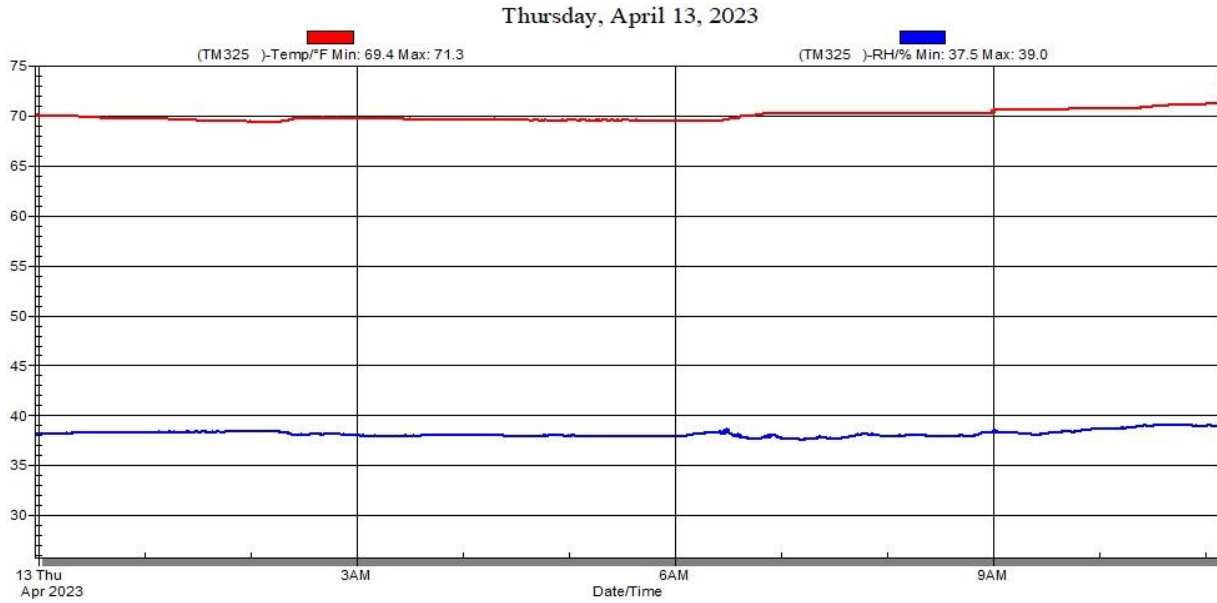
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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:	<u>2023 Mazda CX-30 SUV</u>	NHTSA No.:	<u>O20235401</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>04/13/2023</u>



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

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	As-Delivered Right Front 3/4 View of Test Vehicle	A-5
2	As-Delivered Left Rear 3/4 View of Test Vehicle	A-5
3	Pre-Test Frontal View of Test Vehicle	A-6
4	Post-Test Frontal View of Test Vehicle	A-6
5	Pre-Test Left Front 3/4 View of Test Vehicle	A-7
6	Post-Test Left Front 3/4 View of Test Vehicle	A-7
7	Pre-Test Left Side View of Test Vehicle	A-8
8	Post-Test Left Side View of Test Vehicle	A-8
9	Pre-Test Left Rear 3/4 View of Test Vehicle	A-9
10	Post-Test Left Rear 3/4 View of Test Vehicle	A-9
11	Pre-Test Rear View of Test Vehicle	A-10
12	Post-Test Rear Side View of Test Vehicle	A-10
13	Pre-Test Right Side View of Test Vehicle	A-11
14	Post-Test Right Side View of Test Vehicle	A-11
15	Pre-Test Overhead View of Test Area	A-12
16	Post-Test Overhead View of Test Area	A-12
17	Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle	A-13
18	Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle	A-13
19	Pre-Test Close-Up View of Impact Point Target	A-14
20	Post-Test Close-up View of Impact Point Target	A-14
21	Pre-Test Left Front Door Latch Close-Up	A-15
22	Post-Test Left Front Door Latch Close-Up	A-15
23	Pre-Test Left Rear Door Latch Close-Up	A-16
24	Post-Test Left Rear Door Latch Close-Up	A-16
25	Pre-Test Front Close-up View of Driver Dummy	A-17
26	Post-Test Front Close-up View of Driver Dummy	A-17
27	Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking	A-18
28	Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-18
29	Post-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-19
30	Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning	A-19
31	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-20
32	Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning	A-20
33	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-21
34	Pre-Test Placement of Driver Dummy's Feet	A-21

Fig.	Description	Page
35	Pre-Test View of Belt Anchorage for Driver Dummy	A-22
36	Pre-Test Left Side View of Steering Wheel	A-22
37	View of Disengaged Parking Brake	A-23
38	Pre-Test View of Parking Brake	A-23
39	Pre-Test Close-Up Left Side View of Driver Seat Track	A-24
40	Pre-Test Close-Up Left Side View of Driver Seat Back	A-24
41	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-25
42	Pre-Test Driver Dummy and Door Clearance View	A-25
43	Post-Test Driver Dummy and Door Clearance View	A-26
44	Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-26
45	Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-27
46	Pre-Test Driver Inner Door Panel View	A-27
47	Post-Test Driver Inner Door Panel View	A-28
48	Post-Test Driver Dummy Close-Up Head Contact with Vehicle View	A-28
49	Post-Test Driver Dummy Close-Up Head Contact with Side Air bag View	A-29
50	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View	A-29
51	Post-Test Driver Dummy Close-Up Torso Contact with Side Air bag View	A-30
52	Post-Test Driver Dummy Close-Up Pelvis Contact View	A-30
53	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Air bag View	A-31
54	Post-Test Driver Dummy Close-Up Knee Contact View	A-31
55	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking	A-32
56	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-32
57	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-33
58	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-33
59	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-34
60	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-34
61	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-35
62	Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket	A-35
63	Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level	A-36
64	Pre-Test Placement of Rear Passenger Dummy's Feet	A-36
65	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-37
66	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-37
67	Pre-test Close-Up Left Side View of Rear Passenger Seat Back	A-38
68	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint	A-38

Fig.	Description	Page
69	Pre-Test Rear Passenger Dummy and Door Clearance View	A-39
70	Post-Test Rear Passenger Dummy and Door Clearance View	A-39
71	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-40
72	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-40
73	Pre-Test Rear Passenger Inner Door Panel View	A-41
74	Post-Test Rear Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations	A-41
75	Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View	A-42
76	Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air bag View	A-42
77	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-43
78	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Air bag View	A-43
79	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View	A-44
80	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Air bag View	A-44
81	Post-Test Rear Passenger Dummy Close-Up Knee Contact View	A-45
82	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-45
83	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-46
84	Pre-Test Front View of MDB Impactor Face	A-46
85	Post-Test Front View of MDB Impactor Face	A-47
86	Pre-Test Top View of MDB Impactor Face	A-47
87	Post-Test Top View of MDB Impactor Face	A-48
88	Pre-Test Left Side View of MDB Impactor Face	A-48
89	Post-Test Left Side View of MDB Impactor Face	A-49
90	Pre-Test Right Side View of MDB Impactor Face	A-49
91	Post-Test Right Side View of MDB Impactor Face	A-50
92	Close-Up View of Vehicle's Certification Label	A-50
93	Close-Up View of Vehicle's Tire Information Placard or Label	A-51
94	Pre-Test Ballast View	A-51
95	Post-Test Primary and Redundant Speed Trap Read-Out	A-52
96	FMVSS No. 301 Static Rollover 0 Degrees	A-52
97	FMVSS No. 301 Static Rollover 90 Degrees	A-53
98	FMVSS No. 301 Static Rollover 180 Degrees	A-53
99	FMVSS No. 301 Static Rollover 270 Degrees	A-54
100	FMVSS No. 301 Static Rollover 360 Degrees	A-54
101	Impact Event	A-55
102	Monroney Label	A-55
103	Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-56
104	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-56



O20235401

Figure A-1: As-Delivered Right Front 3/4 View of Test Vehicle



O20235401

Figure A-2: As-Delivered Left Rear 3/4 View of Test Vehicle



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



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



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



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



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



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



Figure A-9: Pre-Test Left Rear 3/4 View of Test Vehicle



Figure A-10: Post-Test Left Rear 3/4 View of Test Vehicle



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



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



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



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

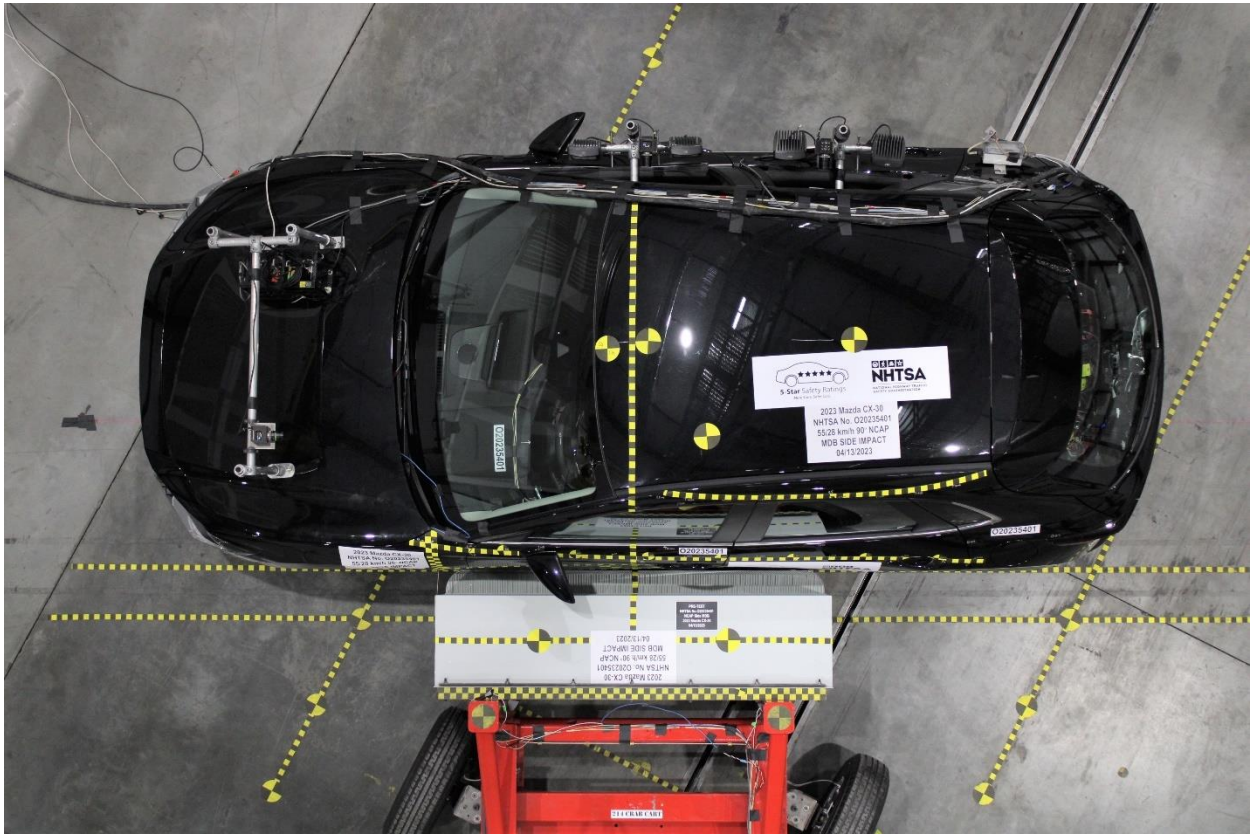


Figure A-15: Pre-Test Overhead View of the Test Area

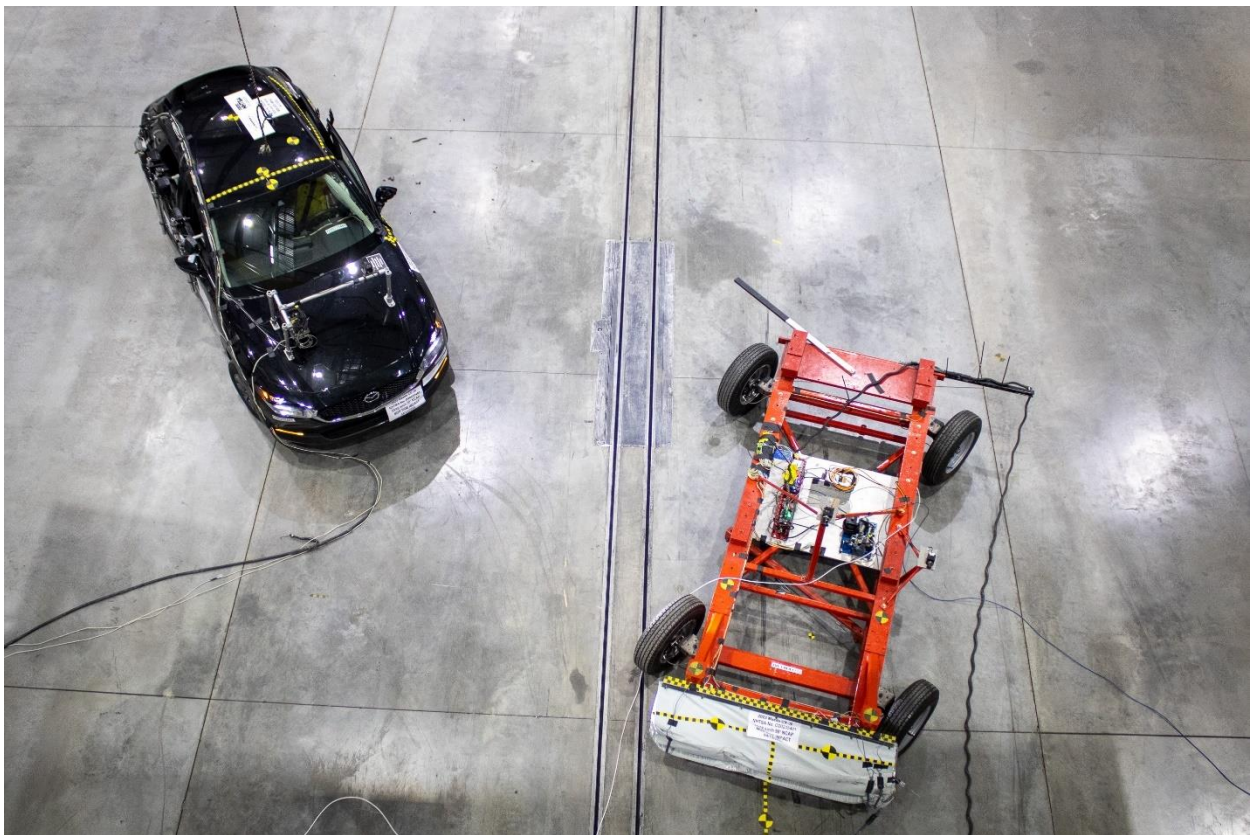


Figure A-16: Post-Test Overhead View of Test Area



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



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



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



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



Figure A-21: Pre-Test Left Front Door Latch Close-Up



Figure A-22: Post-Test Left Front Door Latch Close-Up

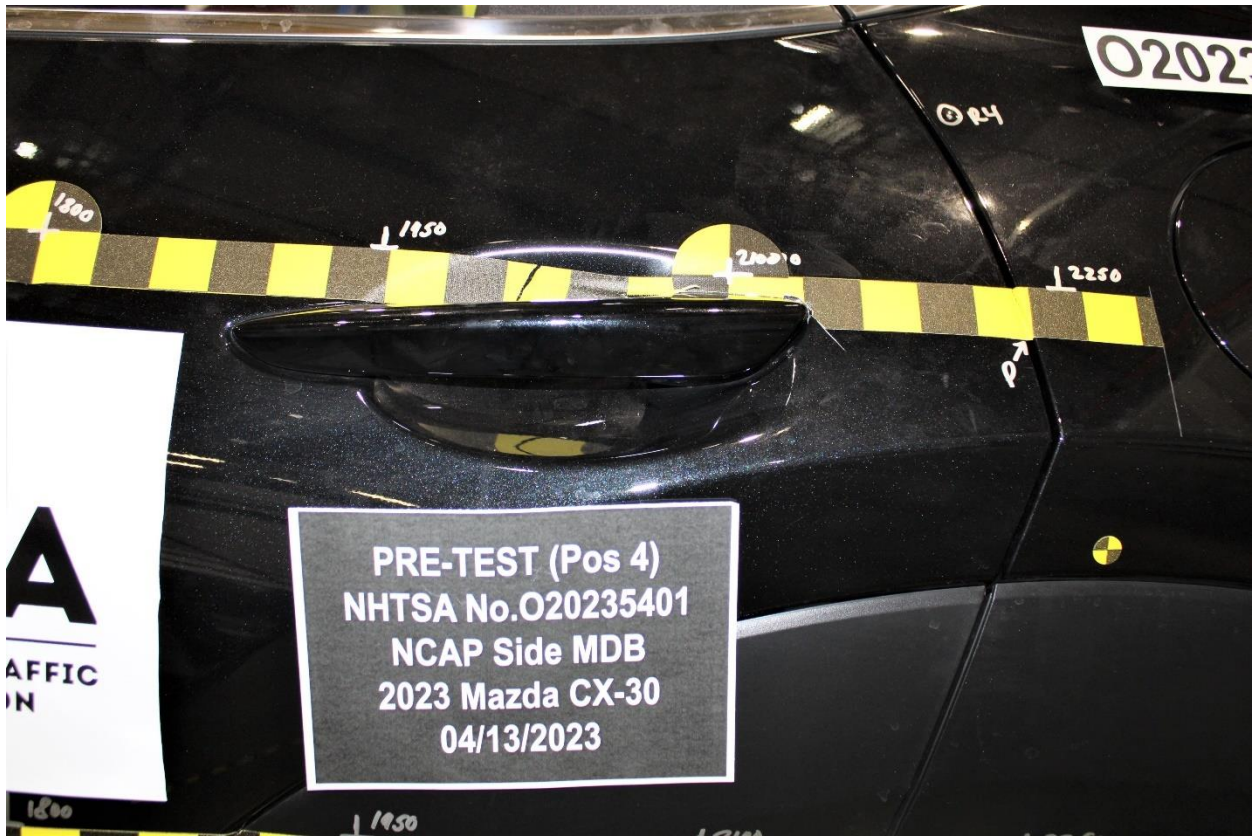


Figure A-23: Pre-Test Left Rear Door Latch Close-Up



Figure A-24: Post-Test Left Rear Door Latch Close-Up



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



Figure A-26: Post-Test Front Close-up View of Driver Dummy



Figure A-27: Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking



Figure A-28: Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



Figure A-29: Post-Test Left Side View of Driver Dummy Shoulder and Door Top View



Figure A-30: Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



Figure A-32: Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning



Figure A-33: Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



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



Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy



Figure A-36: Pre-Test Left Side View of Steering Wheel



Figure A-37: View of Disengaged Parking Brake



Figure A-38: Pre-Test View of Parking Brake



Figure A-39: Pre-Test Close-Up Left Side View of Driver Seat Track



Figure A-40: Pre-Test Close-Up Left Side View of Driver Seat Back

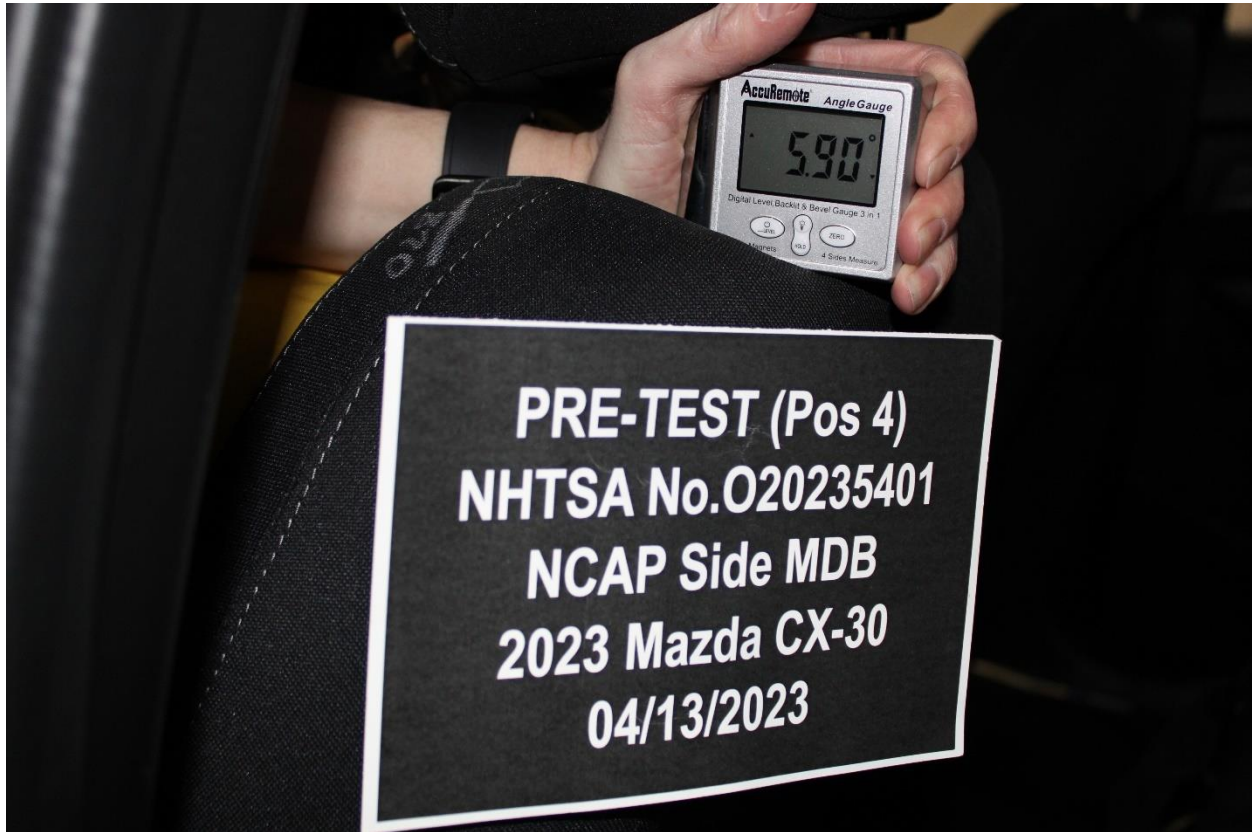


Figure A-41: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-42: Pre-Test Driver Dummy and Door Clearance View



Figure A-43: Post-Test Driver Dummy and Door Clearance View



Figure A-44: Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Figure A-45: Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Figure A-46: Pre-Test Driver Inner Door Panel View



Figure A-47: Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations



Figure A-48: Post-Test Driver Dummy Close-Up Head Contact with Vehicle View



Figure A-49: Post-Test Driver Dummy Close-Up Head Contact with Side Air bag View



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



Figure A-56: Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



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



Figure A-58: Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



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



Figure A-60: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Figure A-61: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

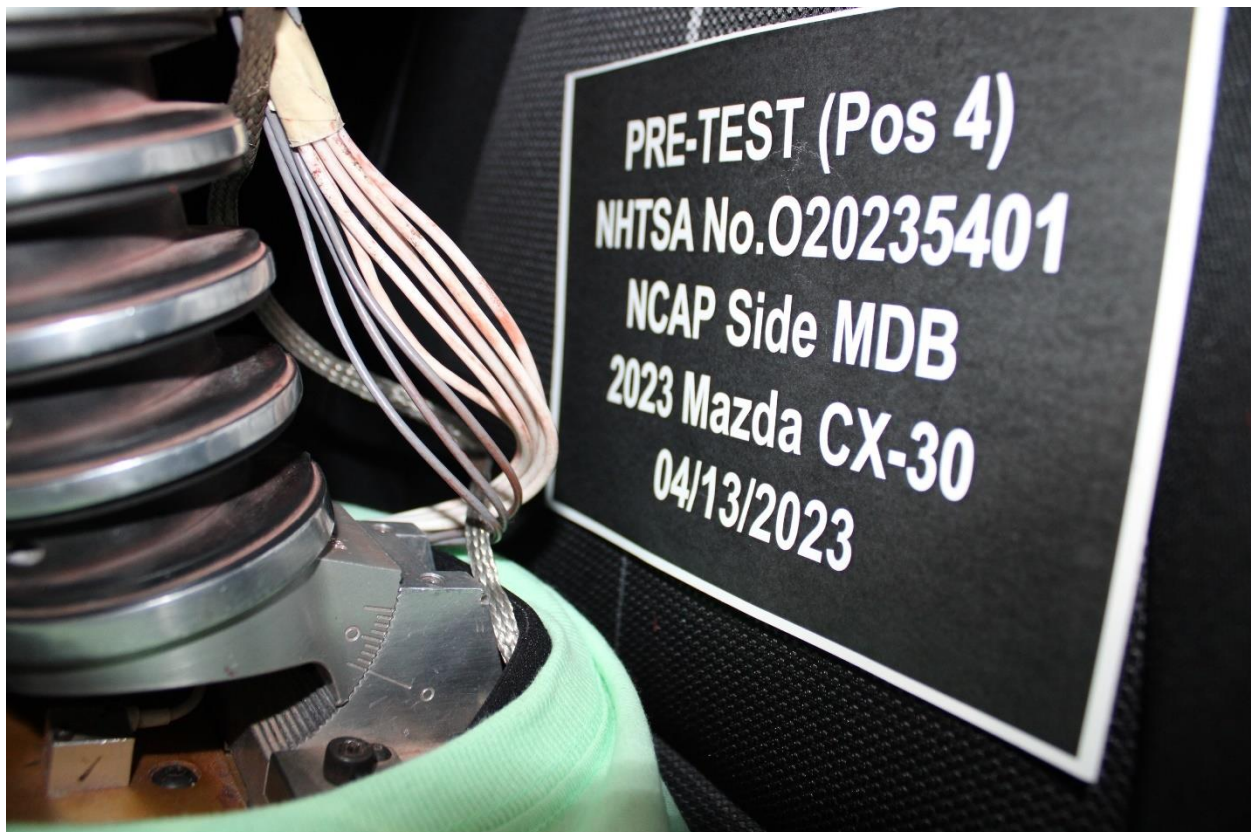


Figure A-62: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket



Figure A-63: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



Figure A-64: Pre-Test Placement of Rear Passenger Dummy's Feet



Figure A-65: Pre-Test View of Belt Anchorage for Rear Passenger Dummy

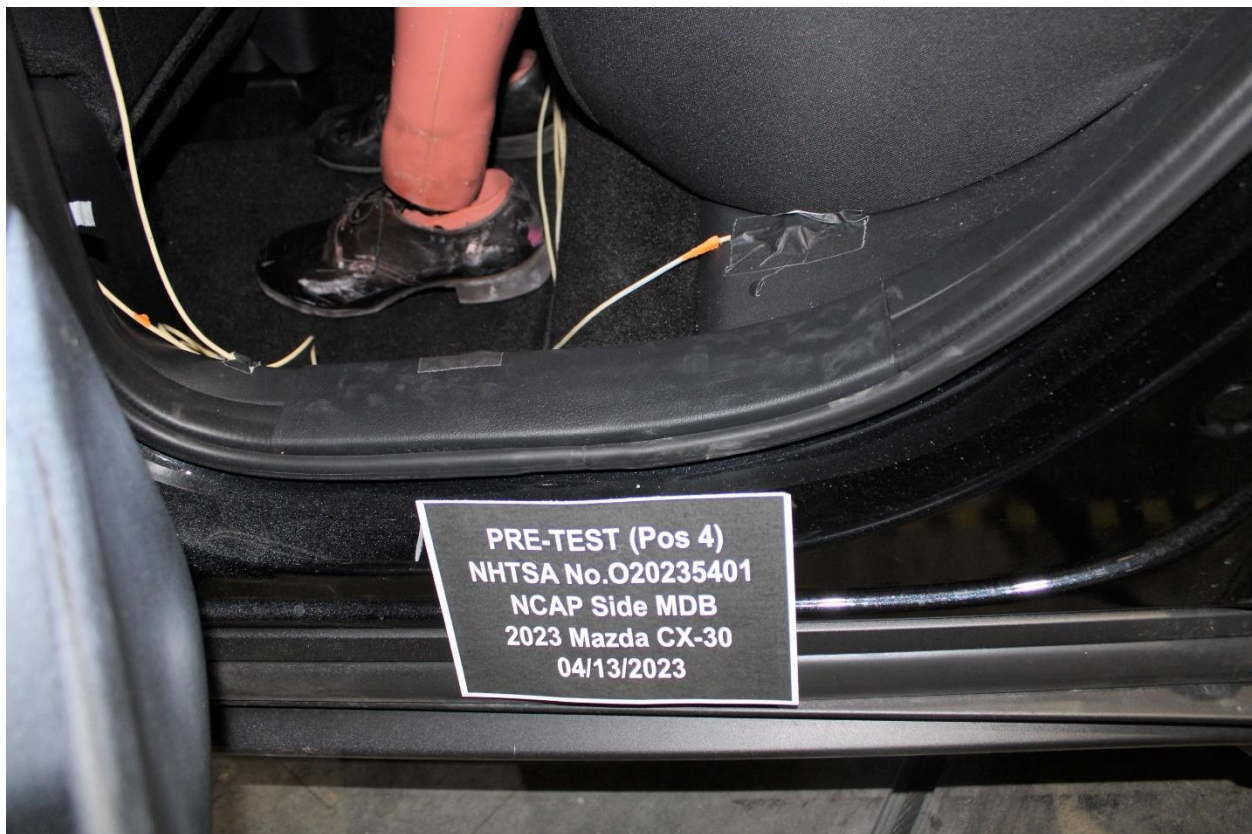


Figure A-66: Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



Figure A-67: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



Figure A-69: Pre-Test Rear Passenger Dummy and Door Clearance View



Figure A-70: Post-Test Rear Passenger Dummy and Door Clearance View



Figure A-71: Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-72: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-73: Pre-Test Rear Passenger Inner Door Panel View



Figure A-74: Post-Test Rear Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations



Figure A-75: Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View



Figure A-76: Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air bag View



Figure A-77: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-78: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Air bag View



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



Figure A-82: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-83: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

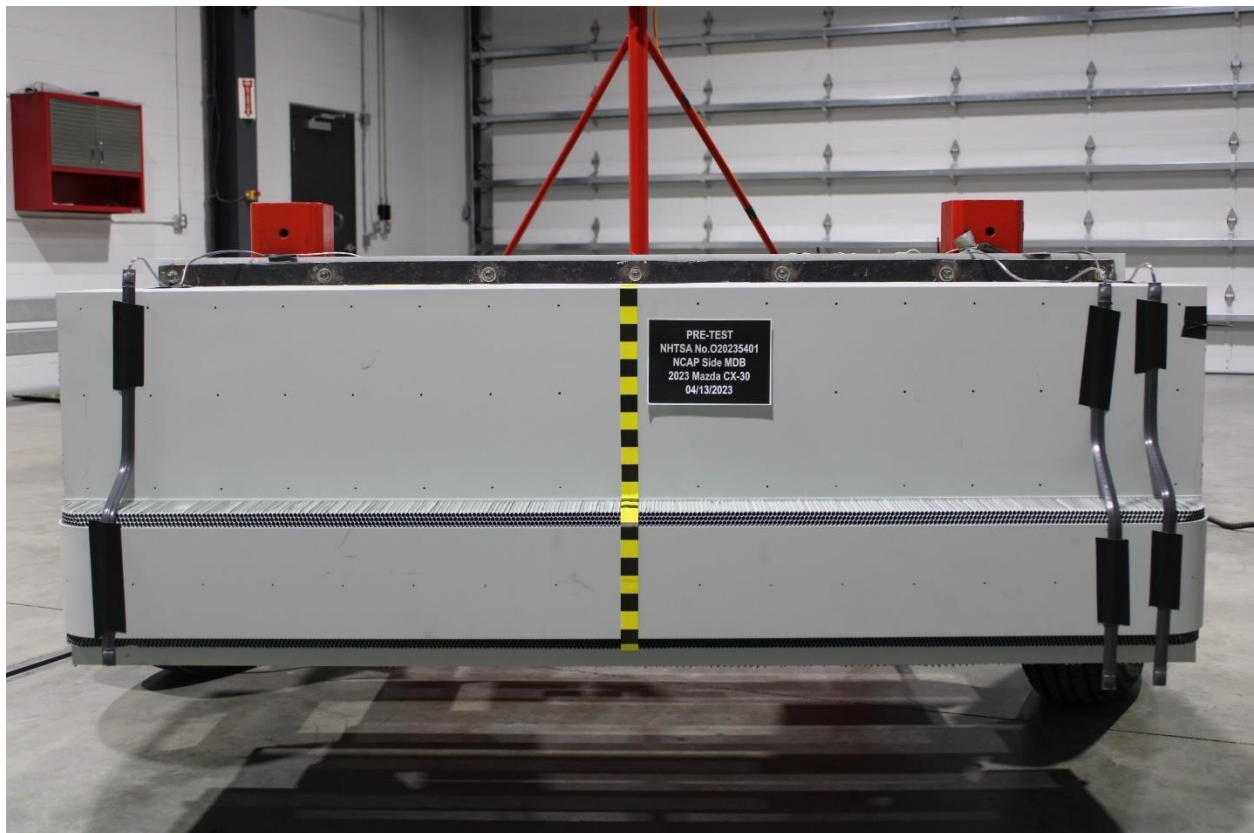


Figure A-84: Pre-Test Front View of MDB Impactor Face



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

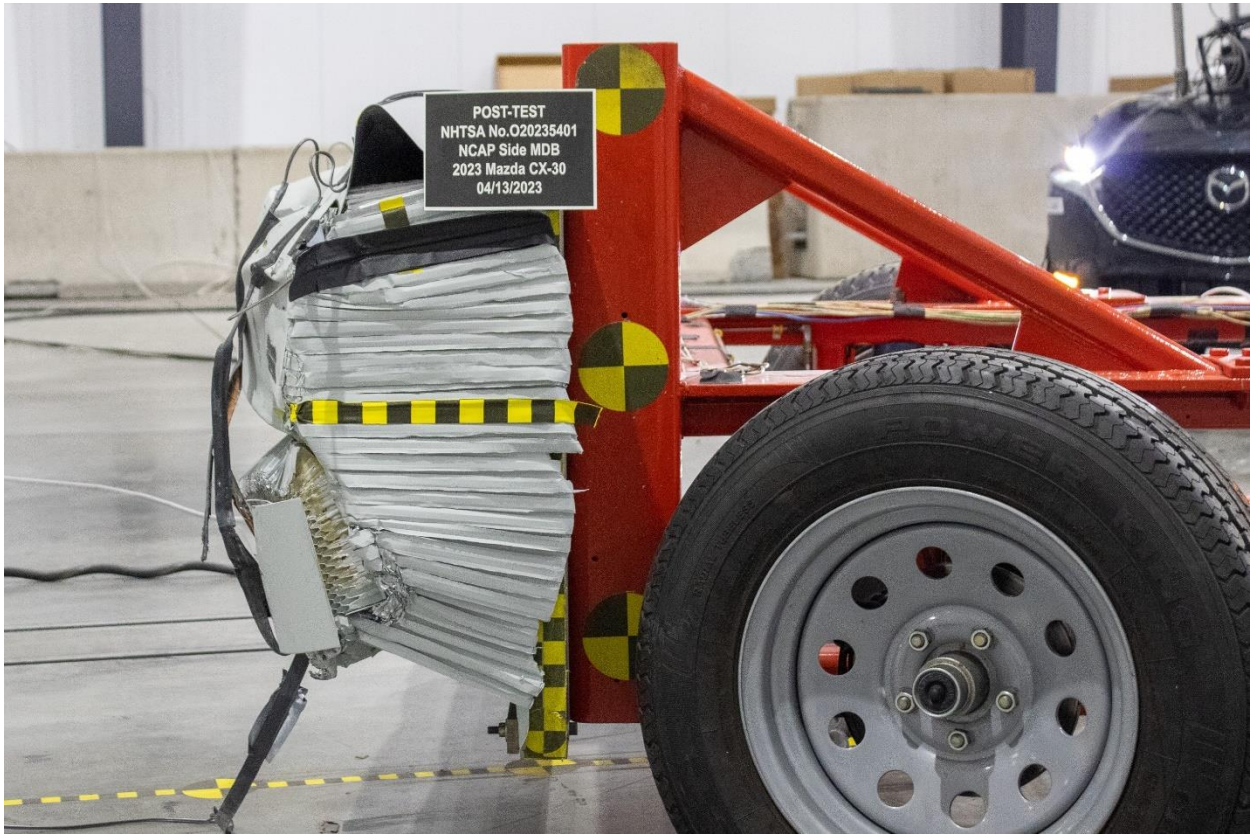


Figure A-89: Post-Test Left Side View of MDB Impactor Face



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



Figure A-94: Pre-Test Ballast View



Figure A-95: Post-Test Primary and Redundant Speed Trap Read-Out



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

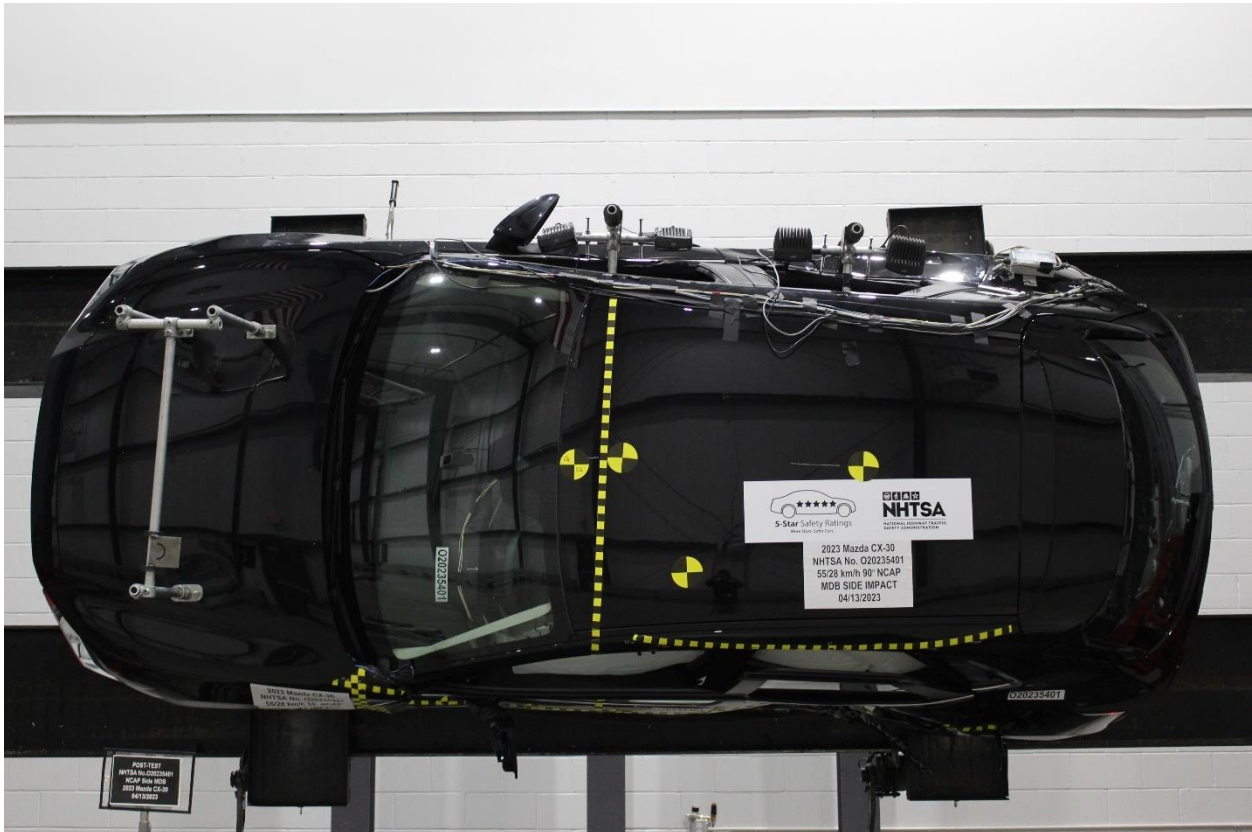


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees



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

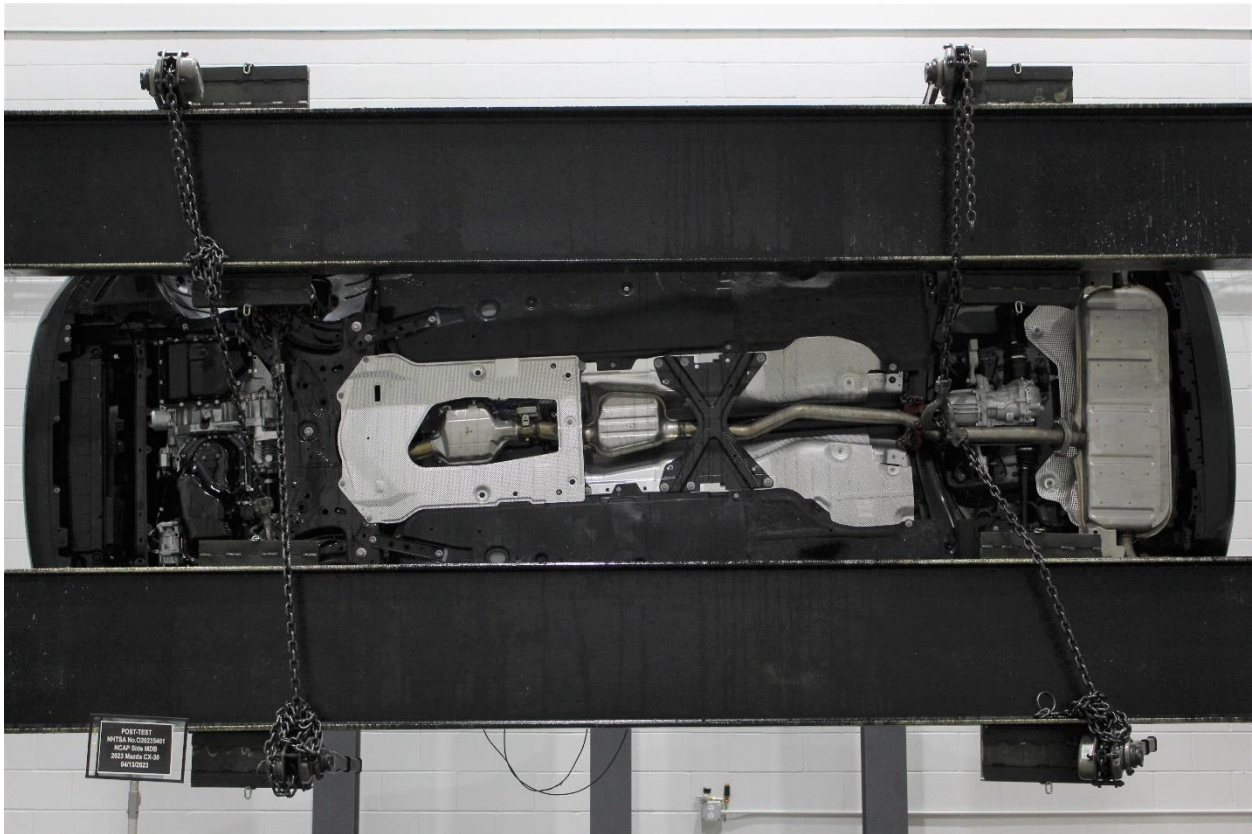


Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees



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



Figure A-101: Impact Event

Fuel Economy and Environment

29 MPG
combined city/hwy

26 MPG
city

33 MPG
highway

3.4 gallons per 100 miles

You save \$250
in fuel costs
over 5 years
compared to the
average new vehicle.

Annual fuel COST \$1,550

Fuel Economy & Greenhouse Gas Rating 6

Smog Rating 7

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.35 per gallon. MSRP is in miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
Calculate personalized estimates and compare vehicles

2023 Mazda CX-30

Model: CX-30 2.5 S AWD
Exterior Color: JET BLACK MICA
Interior Color: BLACK / BLACK

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES

- SKYACTIV-G 2.5L DOHC 4-CYL ENGINE
- SKYACTIV-DRIVE 80PD SPORT MODE AT
- 191 HORSEPOWER
- 186 LB-FT TORQUE

EXTERIOR FEATURES

- 18-INCH ALLOY WHEELS
- 21.985 R19 ALL-SEASON TIRES
- LED HEADLIGHTS & TAILLIGHTS
- LED DAYTIME RUNNING LIGHTS

INTERIOR FEATURES

- CLOTH-TRIMMED SEATS
- AIR CONDITIONING
- POWER WINDOWS/DOOR LOCKS
- REMOTE KEYLESS ENTRY
- 60/40 SPLIT FOLD-DOWN REAR SEAT
- PUSH BUTTON START
- ELECTRONIC PARKING BRAKE
- REARVIEW CAMERA

SAFETY AND SECURITY FEATURES

- 90M/30K MILE WARRANTY & 30MO/50K MI BUMPER-TO-BUMPER WARRANTY
- ANTI-THEFT ENGINE IMMOLIZER
- HIGH BEAM CONTROL
- DRIVER ATTENTION ALERT
- LANE DEPARTURE WARNING SYSTEM
- LANE KEEP ASSIST
- MAZDA RADAR CRUISE CONTROL WITH STOP & GO

4 WHEEL DISC BRAKES

- ELECTRIC POWER ASSISTED STEERING
- G-VECTORING CONTROL PLUS
- I-ACTIV AWD
- AUTO ON/OFF HEADLIGHTS
- RAIN-SENSING WINDSHIELD WIPERS
- DUAL POWER SIDE MIRRORS
- BLACK REAR ROOF SPOILER
- 8" COLOR CENTER DISPLAY
- MULTI-FUNCTION COMMANDER CONTROL
- MAZDA CONNECTED SERVICES
- AM/FM 8-SPEAKER AUDIO
- ANDROID AUTO™ / APPLE CARPLAY™
- HD RADIO & 2 USB INPUTS
- BLUETOOTH® HANDS-FREE PHONE/AUDIO
- CARPETED FLOOR MATS
- ABS WITH EBD AND BRAKE ASSIST
- DYNAMIC STABILITY CONTROL
- TRACTION CONTROL SYSTEM
- ADVANCED DUAL FRONT AIR BAGS
- DRY & PASS KNEE AIR BAGS
- FRONT & REAR SIDE IMPACT AIR BAGS
- FRONT & REAR SIDE AIR CURTAINS
- SMART BRAKE SUPPORT WITH PEDESTRIAN DETECTION
- TIRE PRESSURE MONITORING SYSTEM

MSRP \$22,950

OPTIONAL EQUIPMENT

CGM	CARGO MAT	\$100
COT	CARGO TRAY	\$116
Total Vehicle and Options		\$23,166
Delivery, Processing and Handling Fee		\$1,276
Total MSRP		\$24,440

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	★★★★★
Side Crash	Front seat	Not Rated
	Rear seat	Not Rated
Rollover		★★★★★

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

SOLD TO: 61449
FRANK BOUCHER MAZDA RACINE
9601 WASHINGTON AVENUE
RACINE, WI 53409

SHIP TO: 61449 DY
FRANK BOUCHER MAZDA RACINE
9601 WASHINGTON AVENUE
RACINE, WI 53409

3MVDMBA09PM519699
CMB-553A-DLHENA-PS-PS-20221219

MazdaUSA.com

Figure A-102: Monroney Label

Head Restraints

▼ Head Restraints

Your vehicle is equipped with head restraints on all outboard seats and the rear center seat. The head restraints are intended to help protect you and the passengers from neck injury.

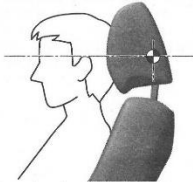
⚠ WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly adjusted:

Driving with the head restraints adjusted too low or removed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

▼ Height Adjustment

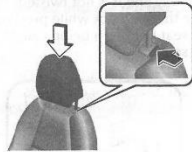
Adjust the head restraint so that the center is even with the top of the passenger's ears.



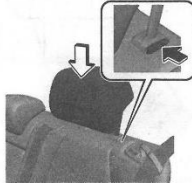
To raise a head restraint, pull it up to the desired position.
To lower the head restraint, press the stop-catch release, then push the head restraint down.

2-16

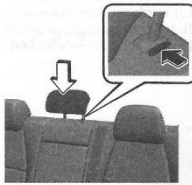
Front seats



Rear outboard seats



Rear center seat



▼ Removal/Installation

To remove the head restraint, pull it up while pressing the stop-catch.

To install the head restraint, insert the legs into the holes while pressing the stop-catch.

⚠ WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly installed:

Driving with the head restraints not installed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

After installing a head restraint, try lifting it to make sure that it does not pull out:

Driving with an unsecured head restraint is dangerous as the effectiveness of the head restraint will be compromised which could cause it to unexpectedly detach from the seat.

⚠ CAUTION

▶ When installing a head restraint, make sure that it is installed correctly with the front of the head restraint facing forward. If the head restraint is installed incorrectly, it could detach from the seat during a collision and result in injury.

▶ The head restraints on each of the front and rear seats are specialized to each seat. Do not switch around the head restraint positions. If a head restraint is not installed to its correct seat position, the effectiveness of the head restraint during a collision will be compromised which could cause injury.

2-17

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

Head Restraints

▼ Head Restraints

Your vehicle is equipped with head restraints on all outboard seats and the rear center seat. The head restraints are intended to help protect you and the passengers from neck injury.

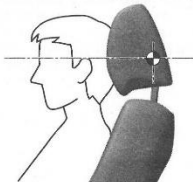
⚠ WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly adjusted:

Driving with the head restraints adjusted too low or removed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

▼ Height Adjustment

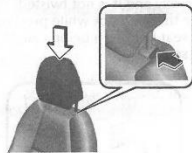
Adjust the head restraint so that the center is even with the top of the passenger's ears.



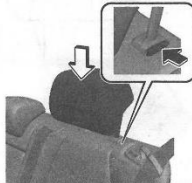
To raise a head restraint, pull it up to the desired position.
To lower the head restraint, press the stop-catch release, then push the head restraint down.

2-16

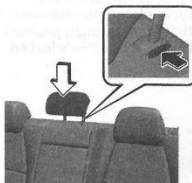
Front seats



Rear outboard seats



Rear center seat



▼ Removal/Installation

To remove the head restraint, pull it up while pressing the stop-catch.

To install the head restraint, insert the legs into the holes while pressing the stop-catch.

⚠ WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly installed:

Driving with the head restraints not installed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

After installing a head restraint, try lifting it to make sure that it does not pull out:

Driving with an unsecured head restraint is dangerous as the effectiveness of the head restraint will be compromised which could cause it to unexpectedly detach from the seat.

⚠ CAUTION

▶ When installing a head restraint, make sure that it is installed correctly with the front of the head restraint facing forward. If the head restraint is installed incorrectly, it could detach from the seat during a collision and result in injury.

▶ The head restraints on each of the front and rear seats are specialized to each seat. Do not switch around the head restraint positions. If a head restraint is not installed to its correct seat position, the effectiveness of the head restraint during a collision will be compromised which could cause injury.

2-17

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

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

Driver Dummy Instrumentation Plots

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

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)

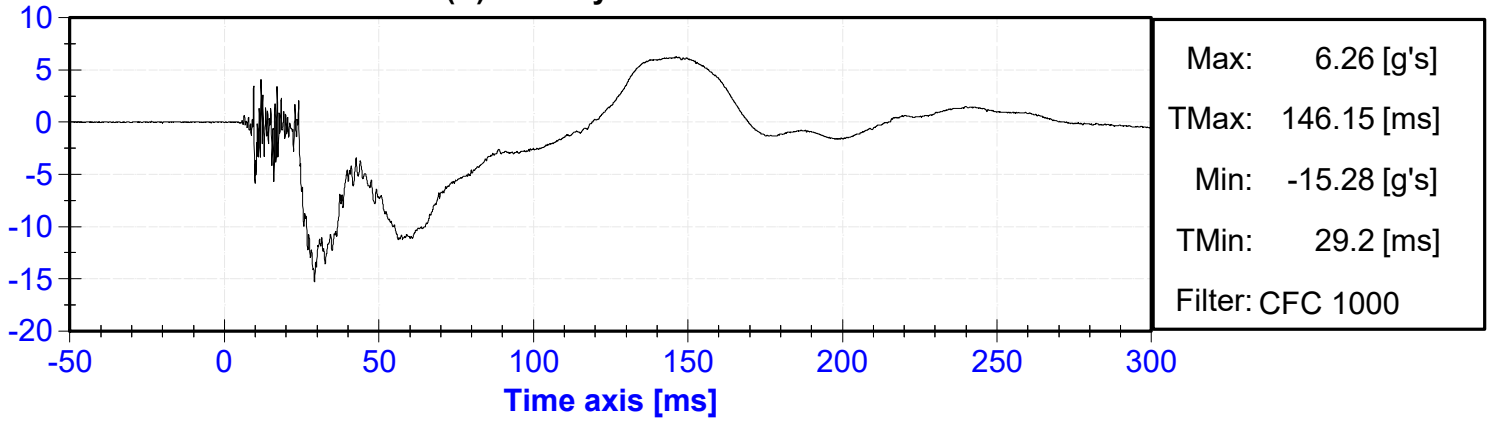
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

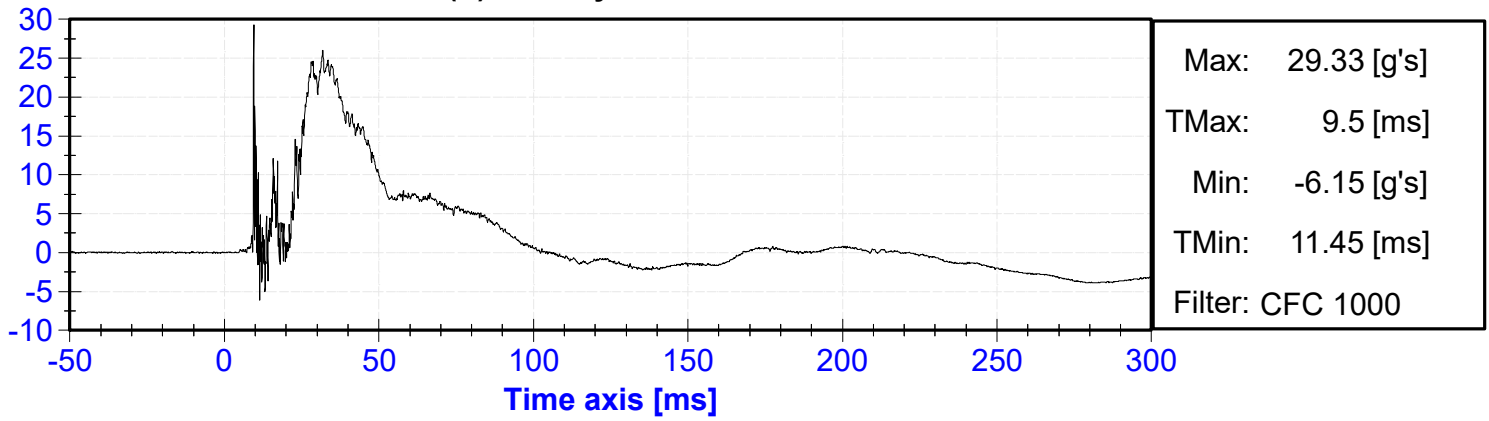
Left MDB Contact Switch

Right MDB Contact Switch

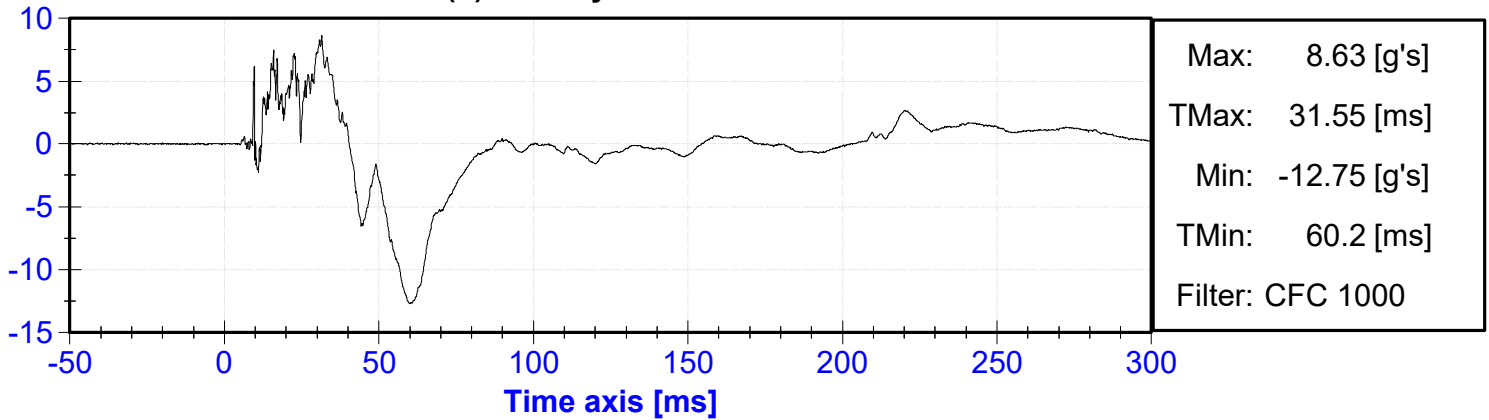
Driver Head Acceleration (X) Primary vs. Time



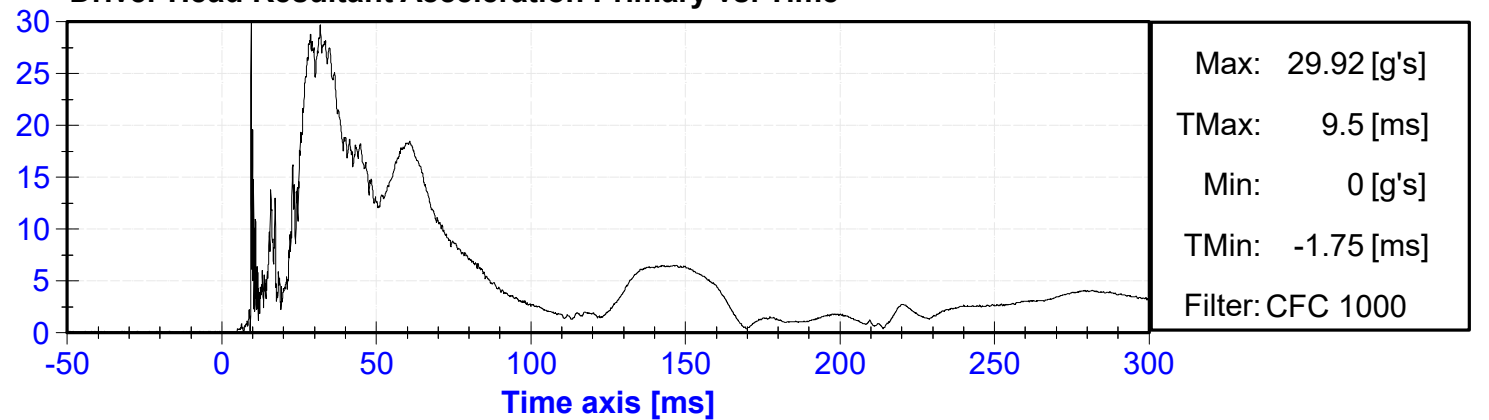
Driver Head Acceleration (Y) Primary vs. Time



Driver Head Acceleration (Z) Primary vs. Time

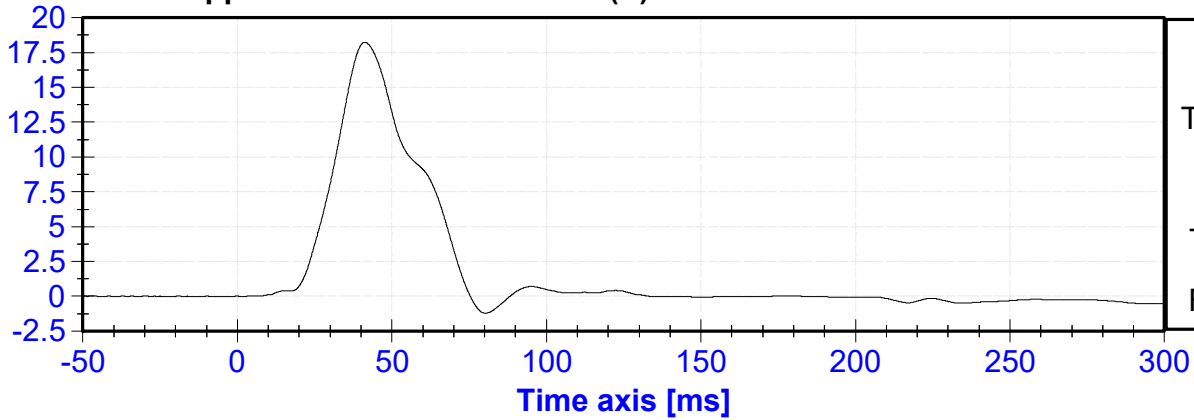


Driver Head Resultant Acceleration Primary vs. Time

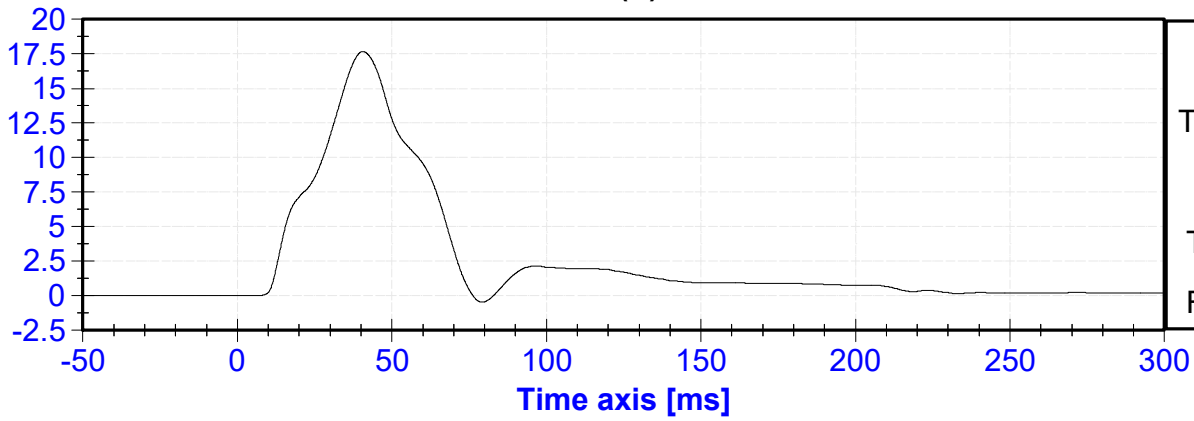


Driver Upper Thorax Rib Deflection (Y) vs. Time

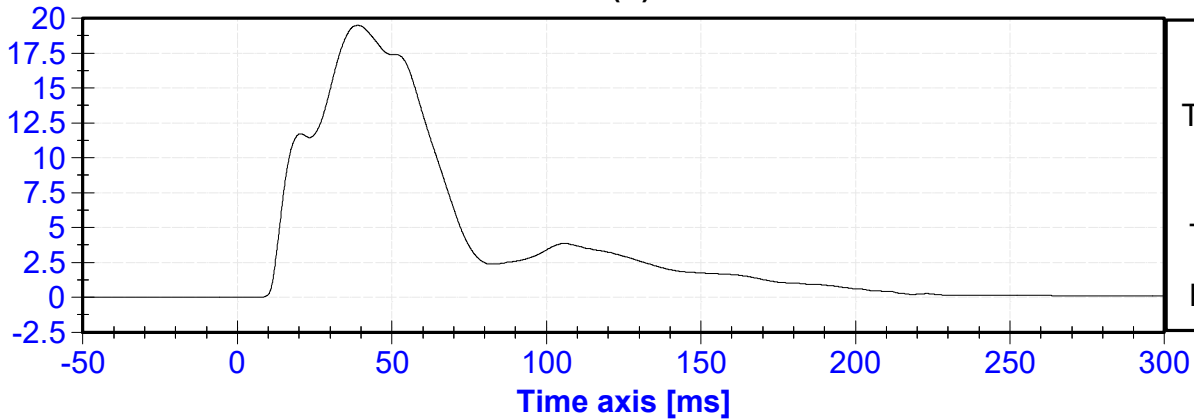
DISPLACEMENT [mm]

**Driver Middle Thorax Rib Deflection (Y) vs. Time**

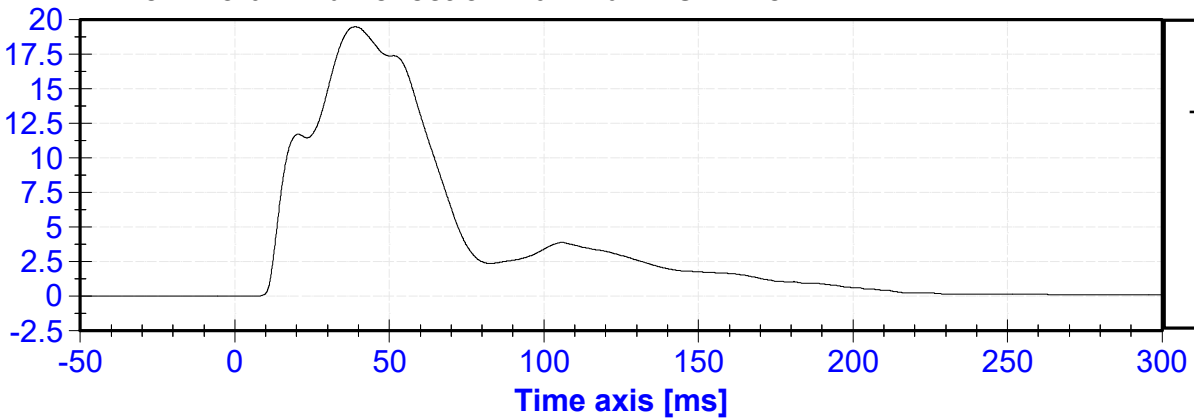
DISPLACEMENT [mm]

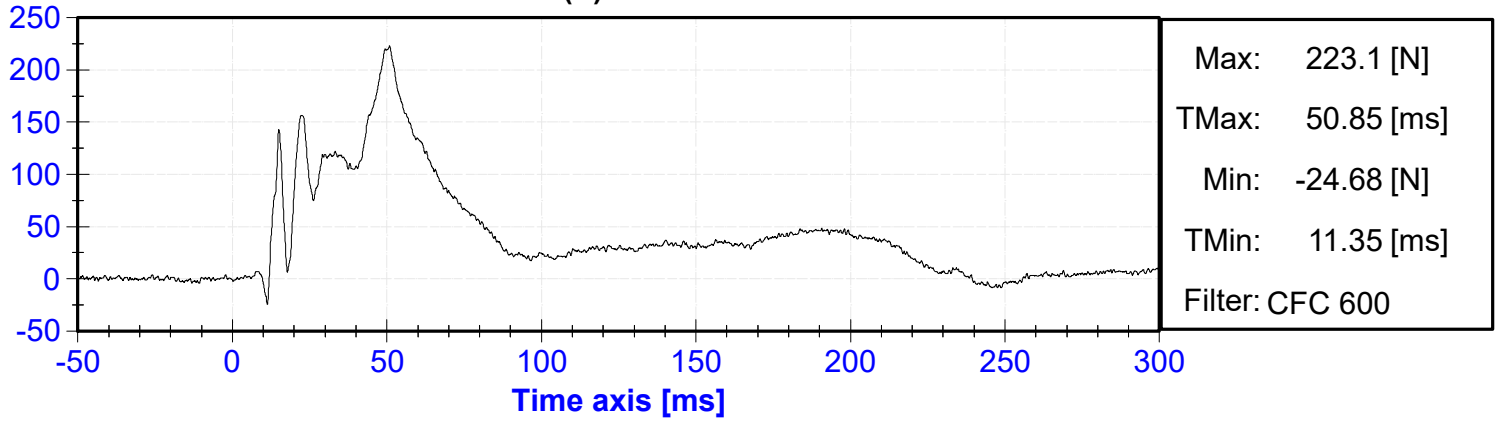
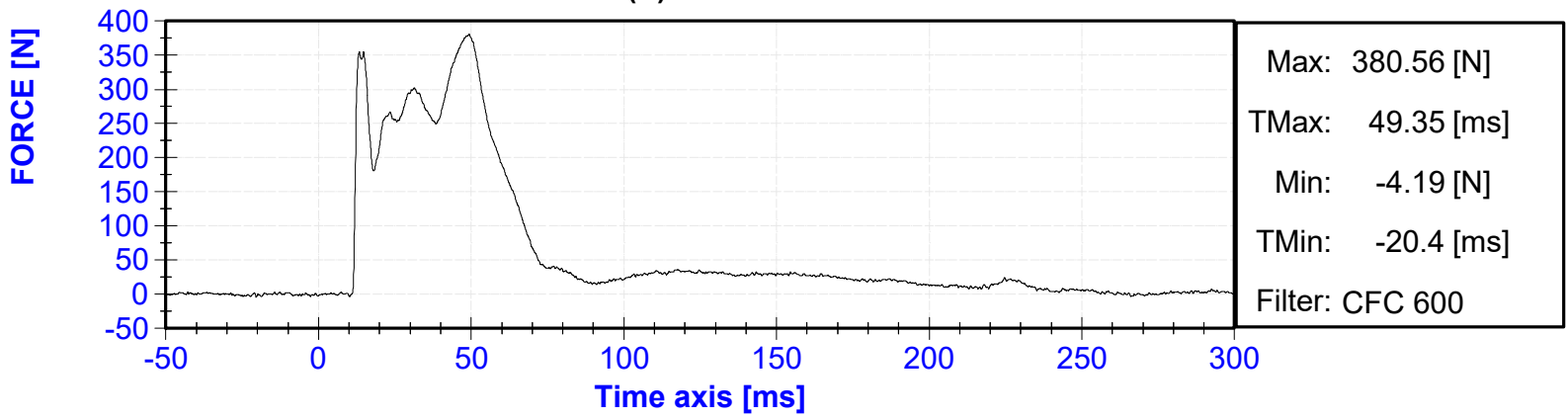
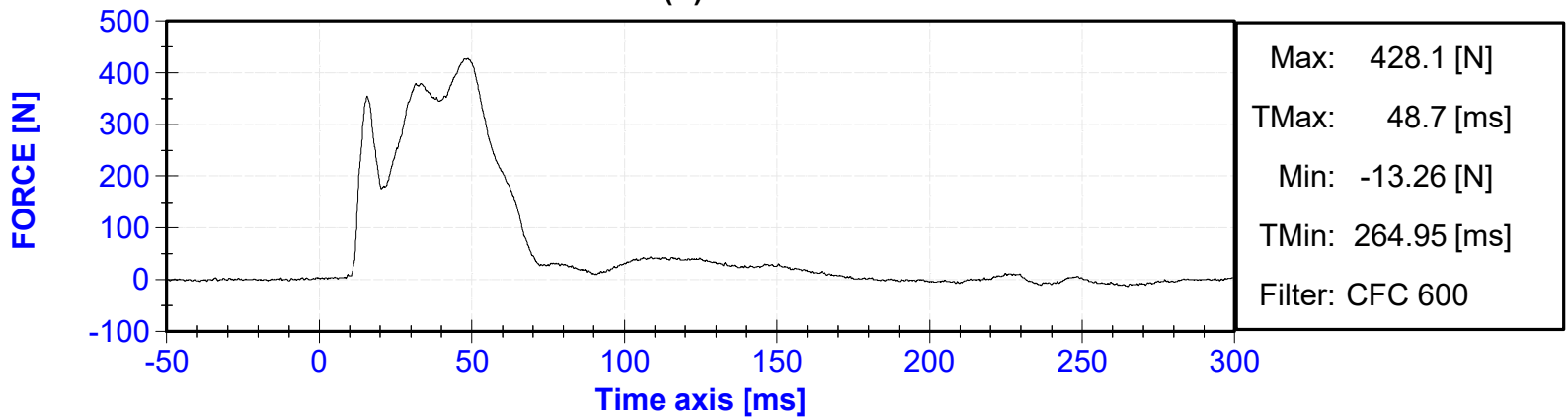
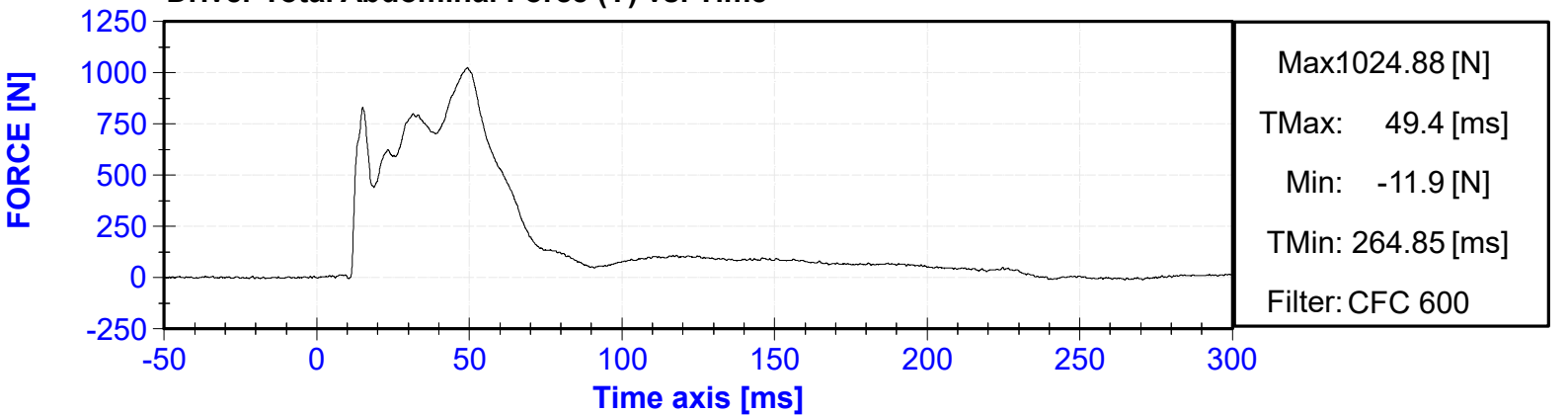
**Driver Lower Thorax Rib Deflection (Y) vs. Time**

DISPLACEMENT [mm]

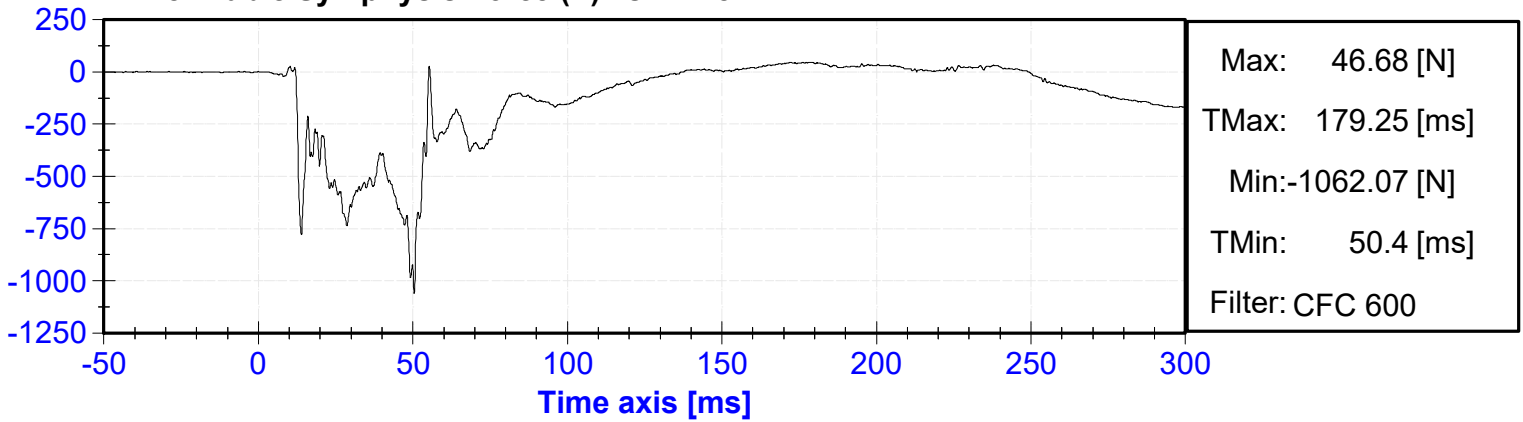
**Driver Thorax Rib Deflection Maximum vs. Time**

DISPLACEMENT [mm]

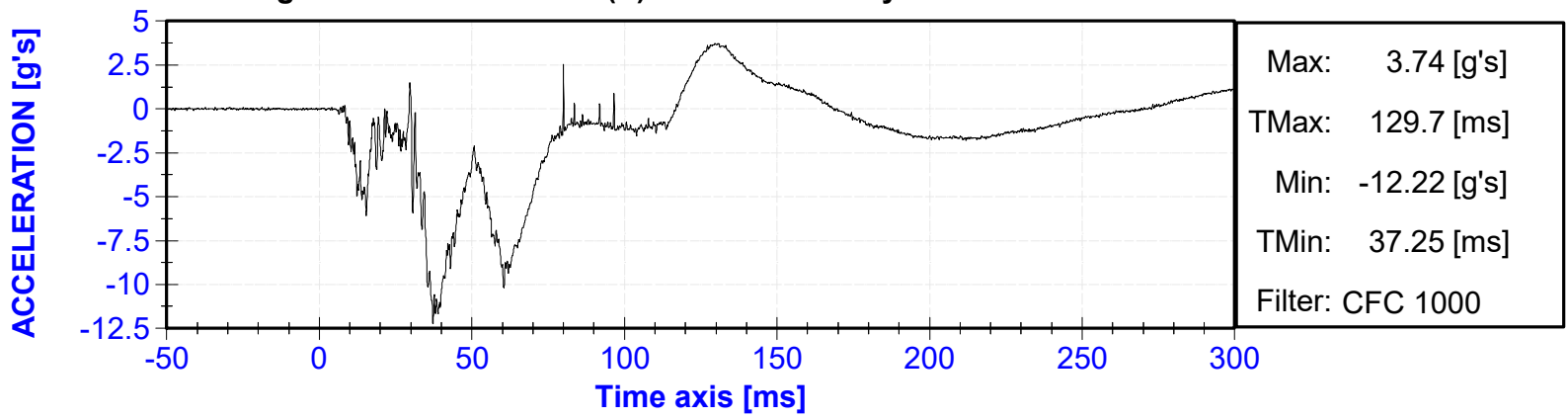


Driver Anterior Abdominal Force (Y) vs. Time**Driver Middle Abdominal Force (Y) vs. Time****Driver Posterior Abdominal Force (Y) vs. Time****Driver Total Abdominal Force (Y) vs. Time**

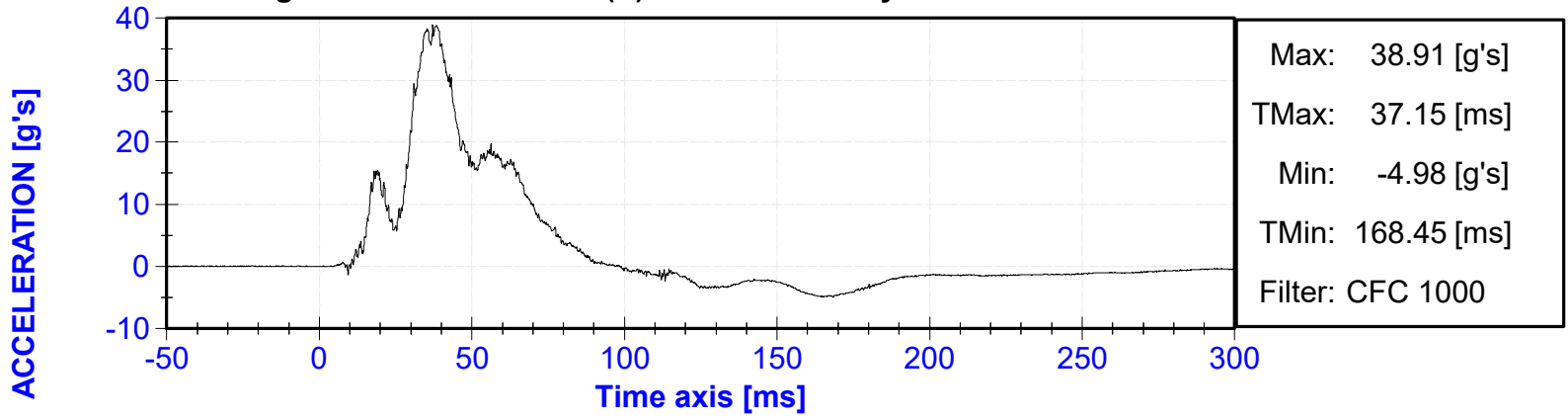
Driver Pubic Symphysis Force (Y) vs. Time



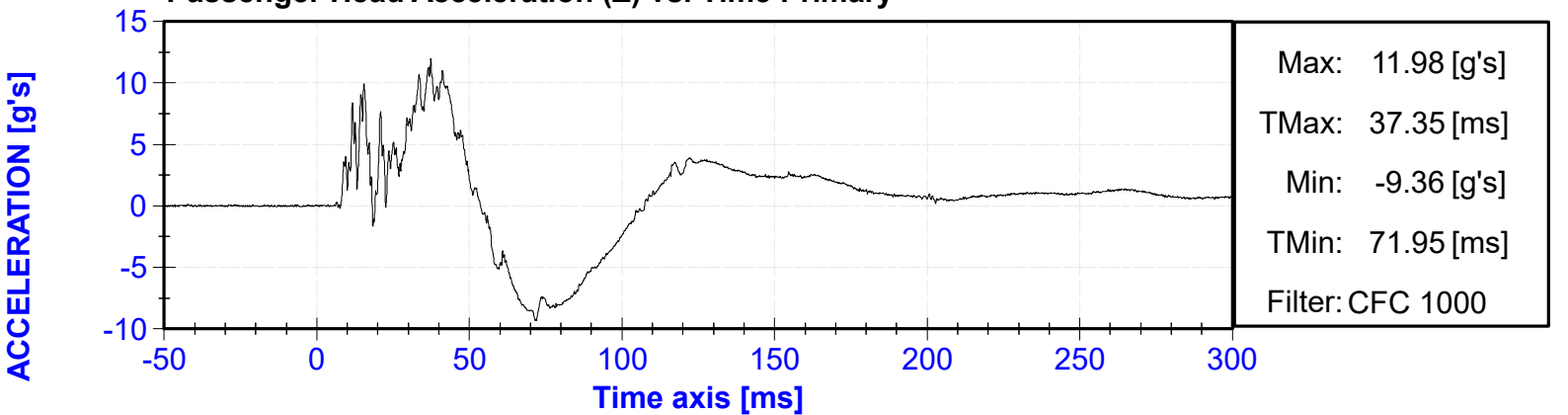
Passenger Head Acceleration (X) vs. Time Primary



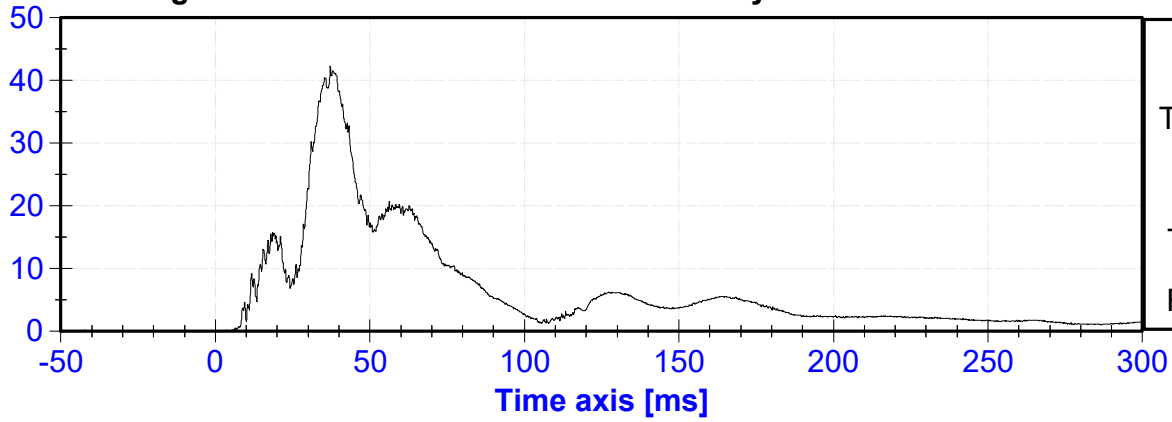
Passenger Head Acceleration (Y) vs. Time Primary



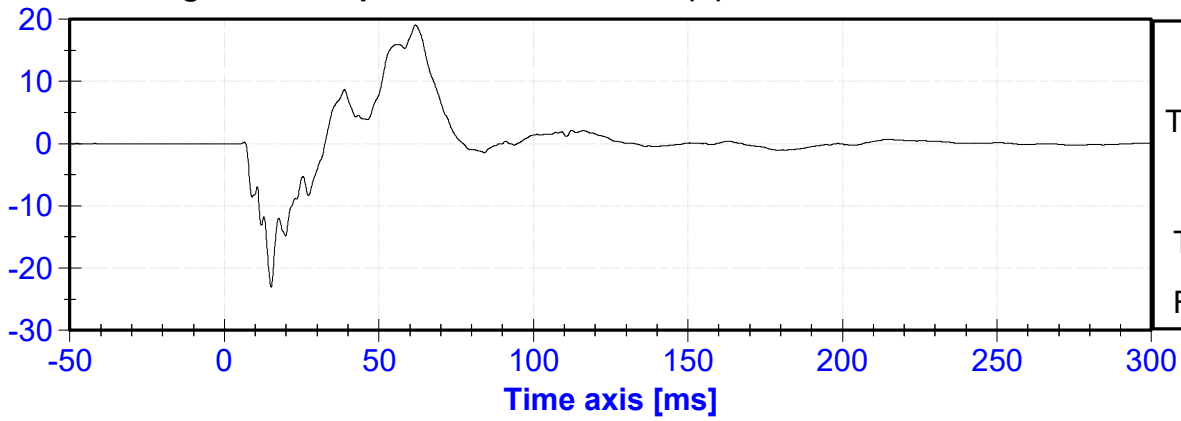
Passenger Head Acceleration (Z) vs. Time Primary



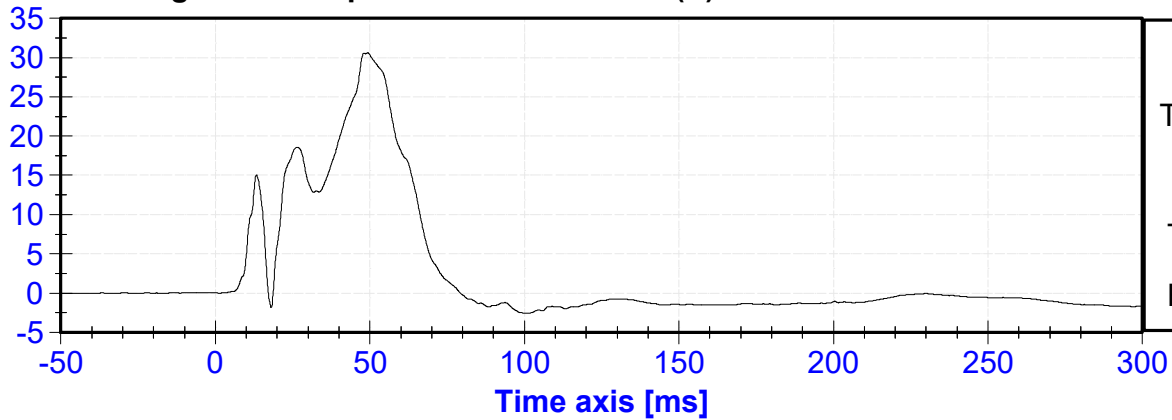
Passenger Head Resultant Acceleration Primary vs. Time



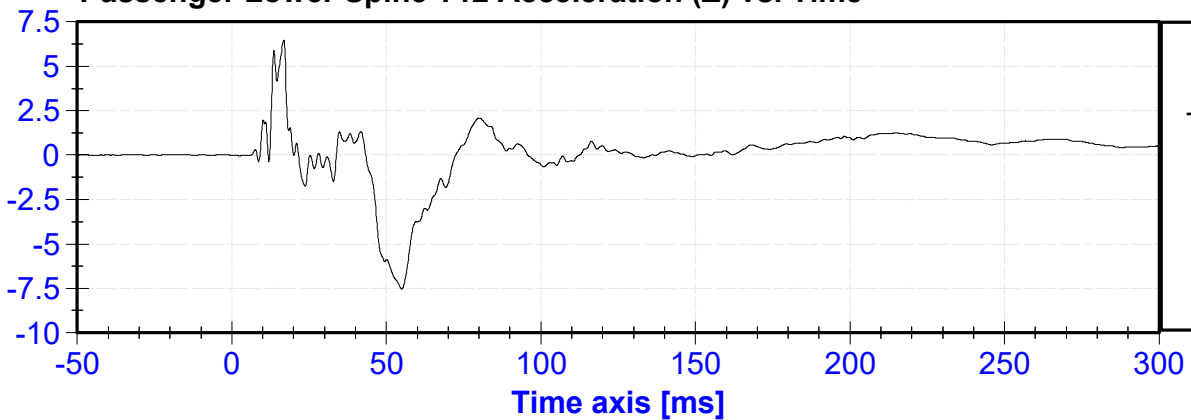
Passenger Lower Spine T12 Acceleration (X) vs. Time



Passenger Lower Spine T12 Acceleration (Y) vs. Time

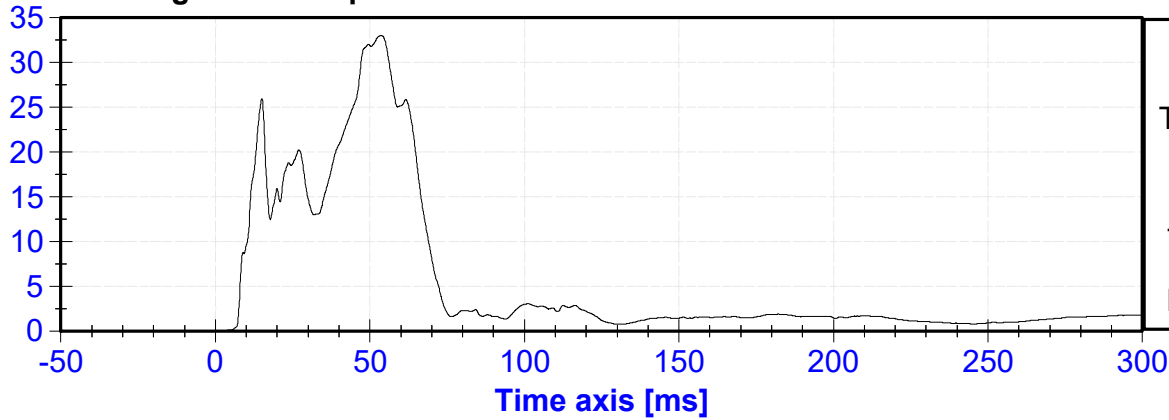


Passenger Lower Spine T12 Acceleration (Z) vs. Time



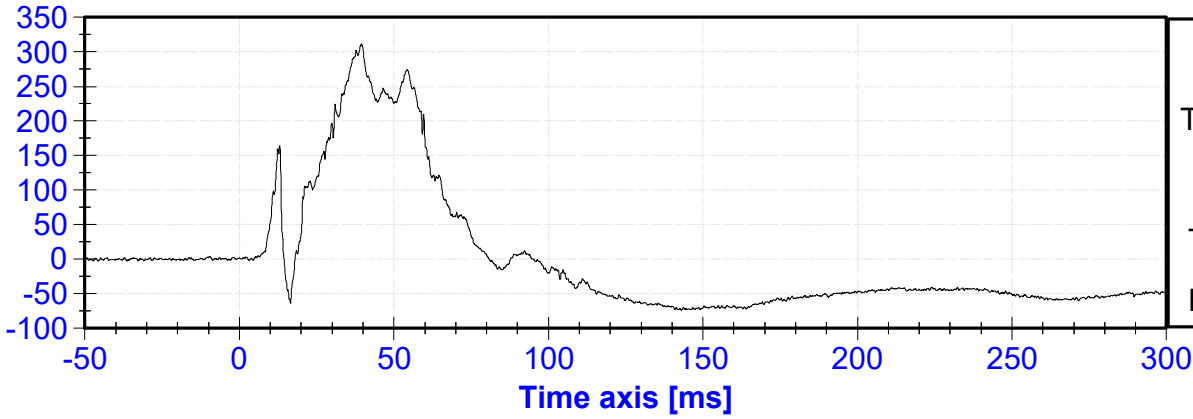
Passenger Lower Spine T12 Resultant Acceleration vs. Time

ACCELERATION [g's]



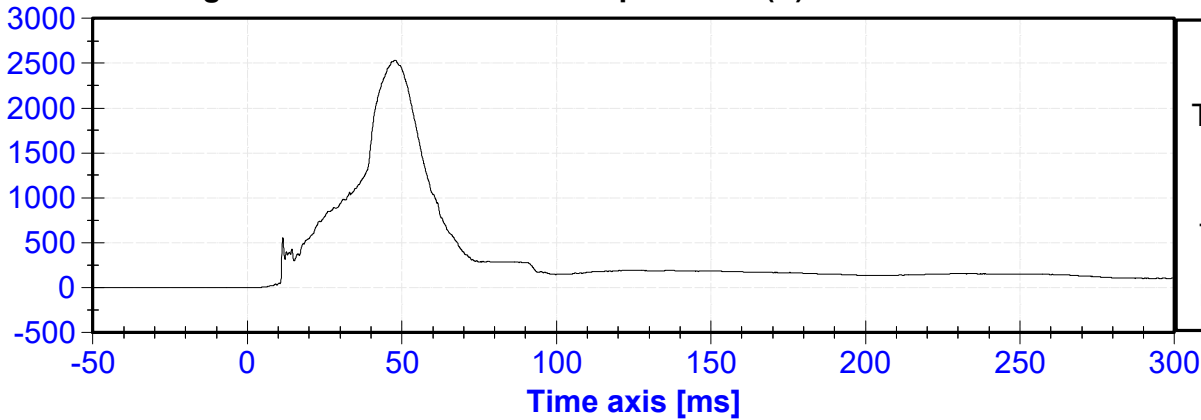
Passenger Iliac Force on Impact Side (Y) vs. Time

FORCE [N]



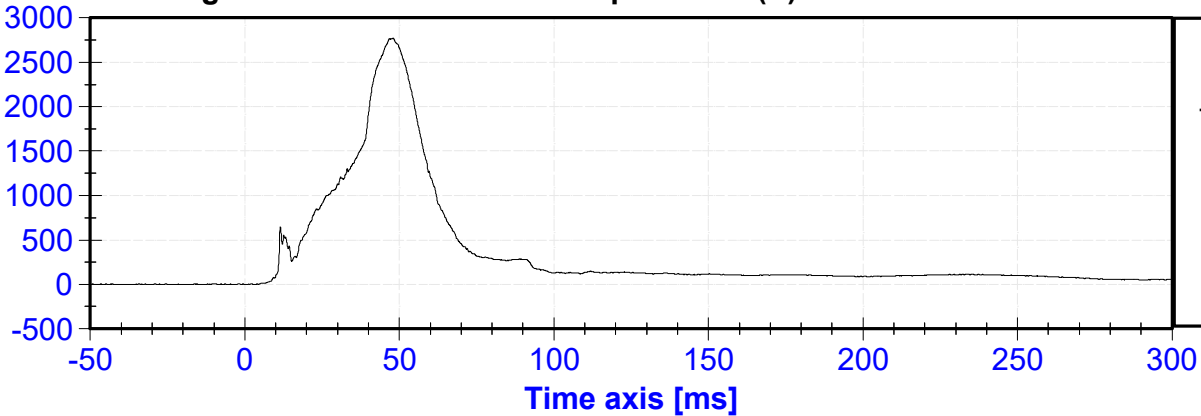
Passenger Acetabulum Force on Impact Side (Y) vs. Time

FORCE [N]



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

FORCE [N]



APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

SERIAL NO: F033

(CONFIGURED FOR LEFT SIDE IMPACT)

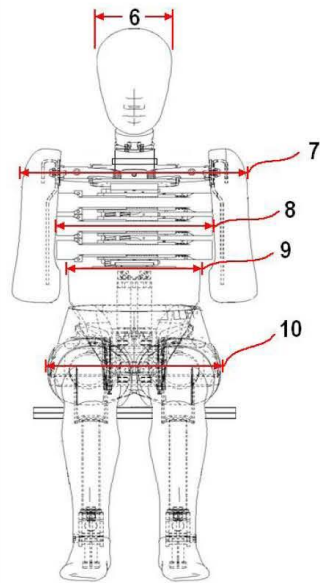


External Measurements - EuroSID-2re

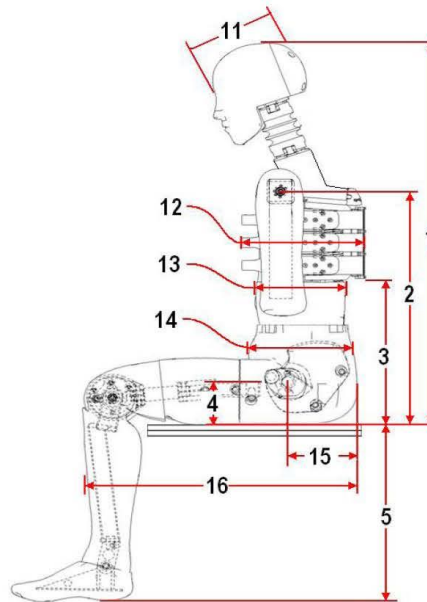
Technician: K. Brogan

Date: 02/27/2023

Dummy Serial Number: F033



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	913	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	354	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	422	Pass
6	Head Width	152	158	157	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	369	Pass
11	Head Depth	196	206	201	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	610	Pass

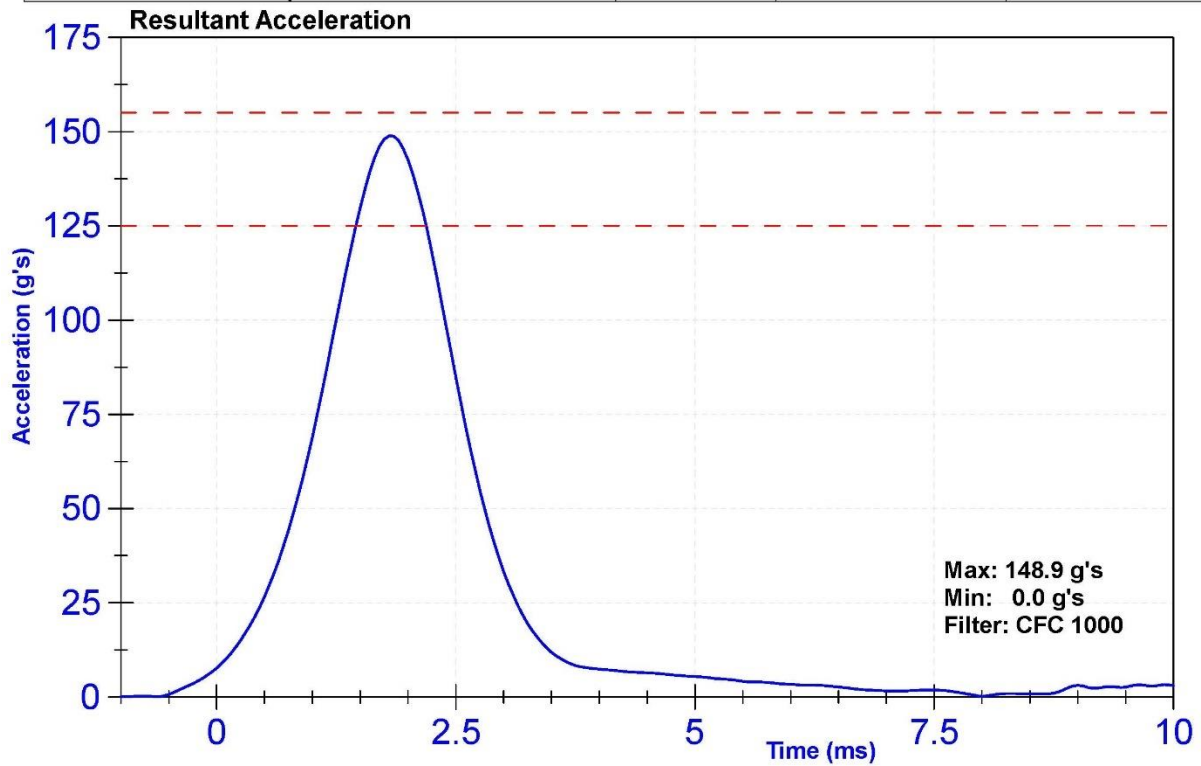
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

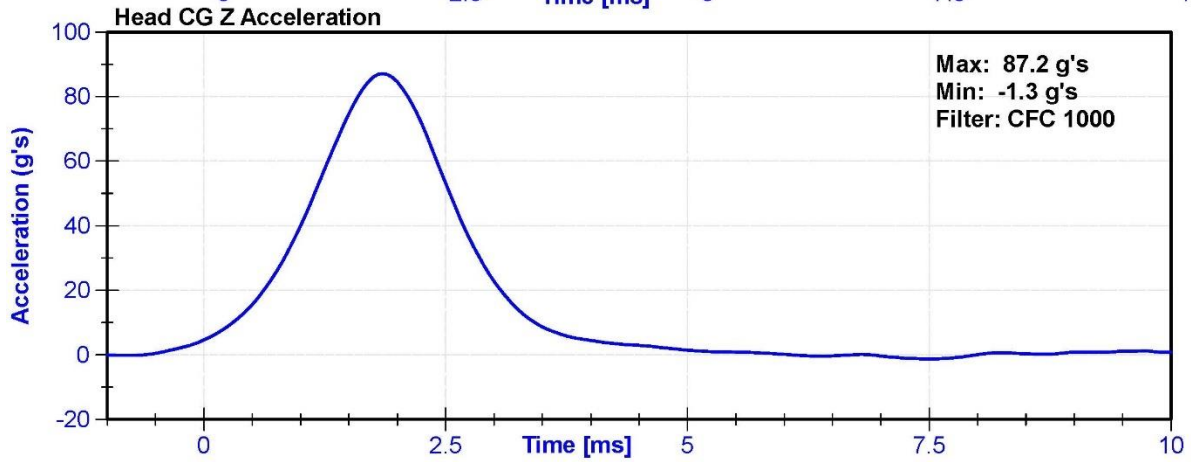
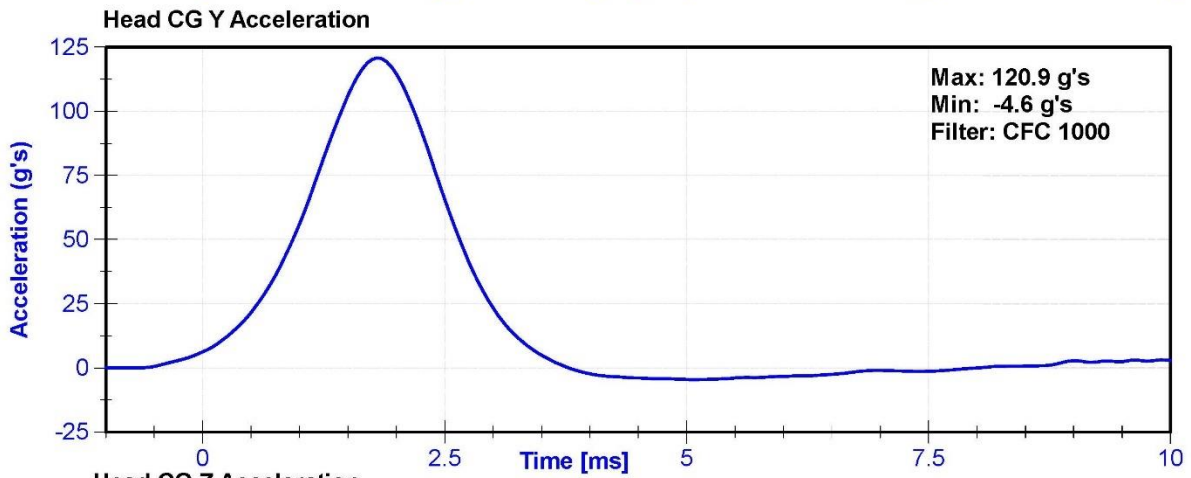
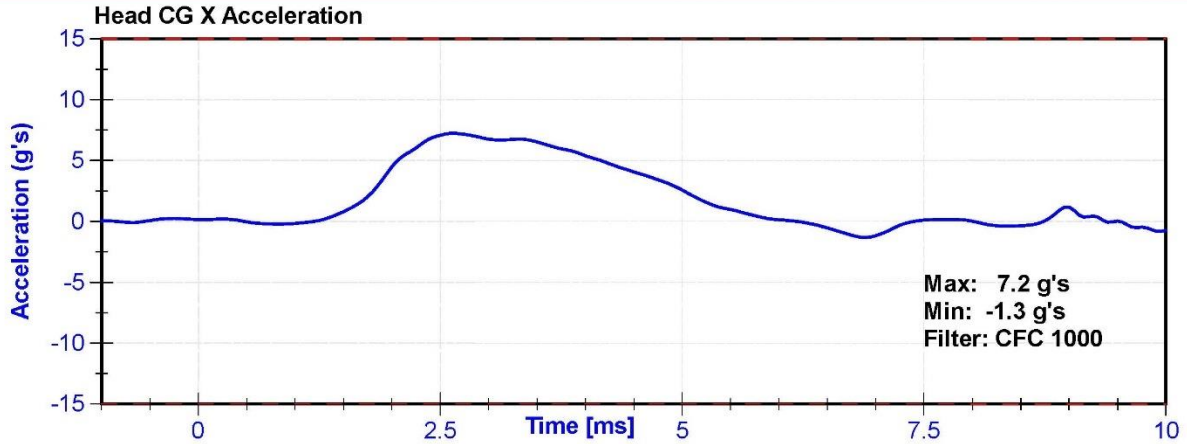
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	30.5	Pass
Resultant Acceleration	125	155	g's	148.9	Pass
Oscillation	0	15	%	2.20	Pass
Fore-Aft Acceleration	-15	15	g's	7.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	1/17/2023	7/16/2023
Y Accelerometer	Endevco	P49216	1/17/2023	7/16/2023
Z Accelerometer	Endevco	P51303	1/17/2023	7/16/2023





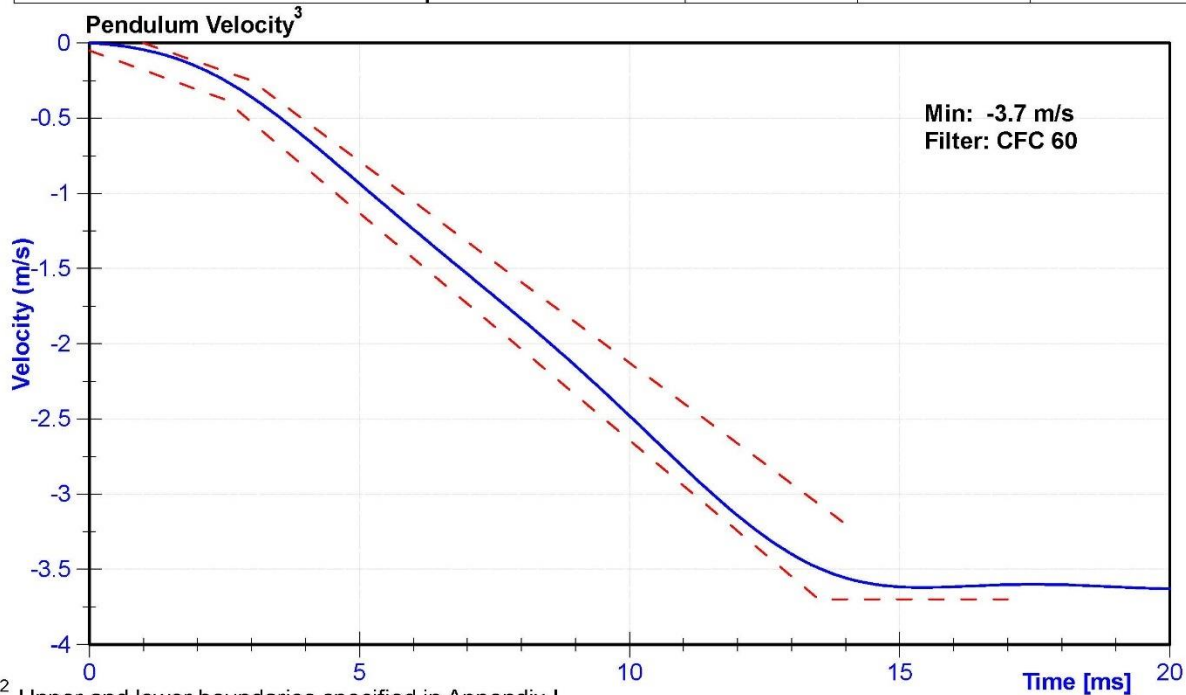
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

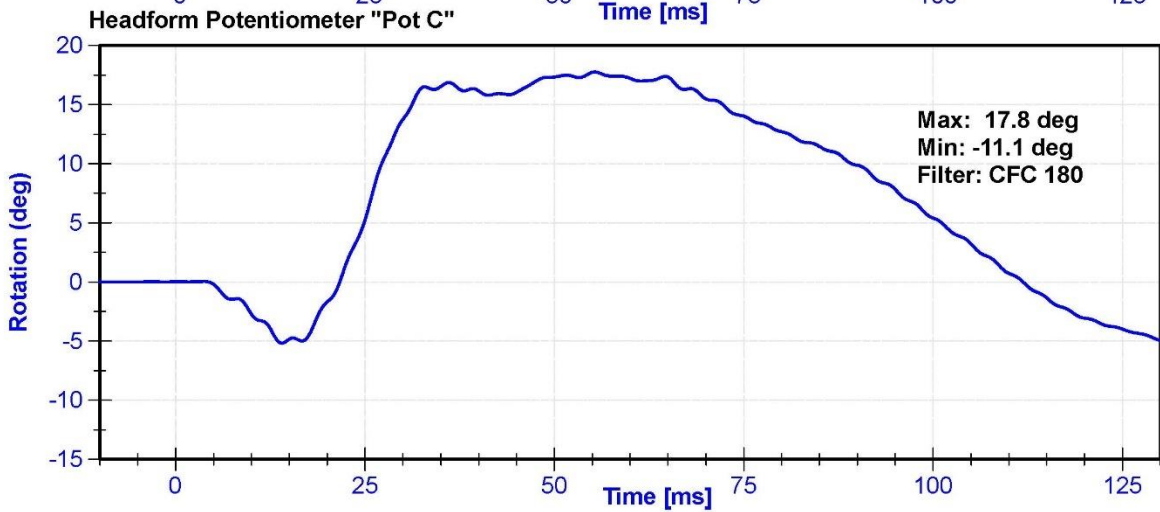
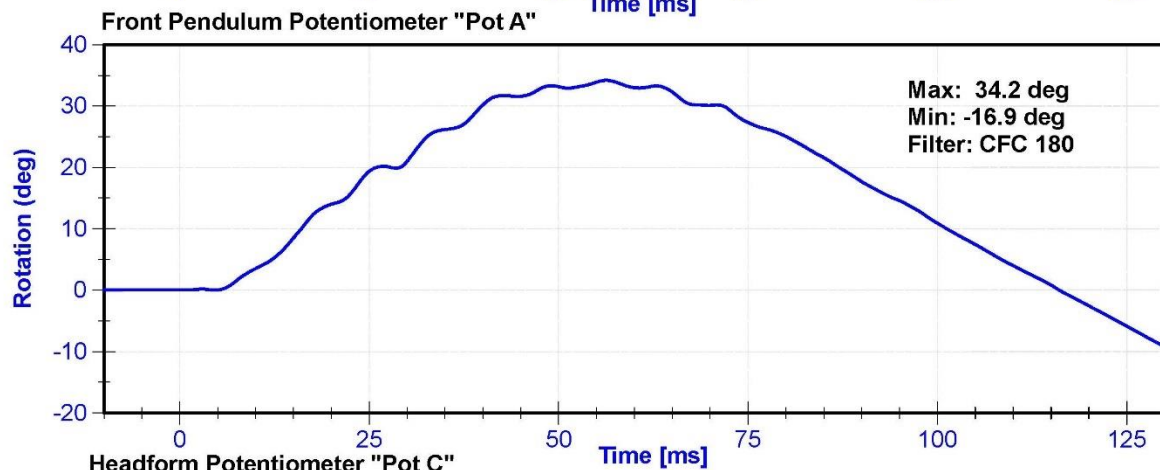
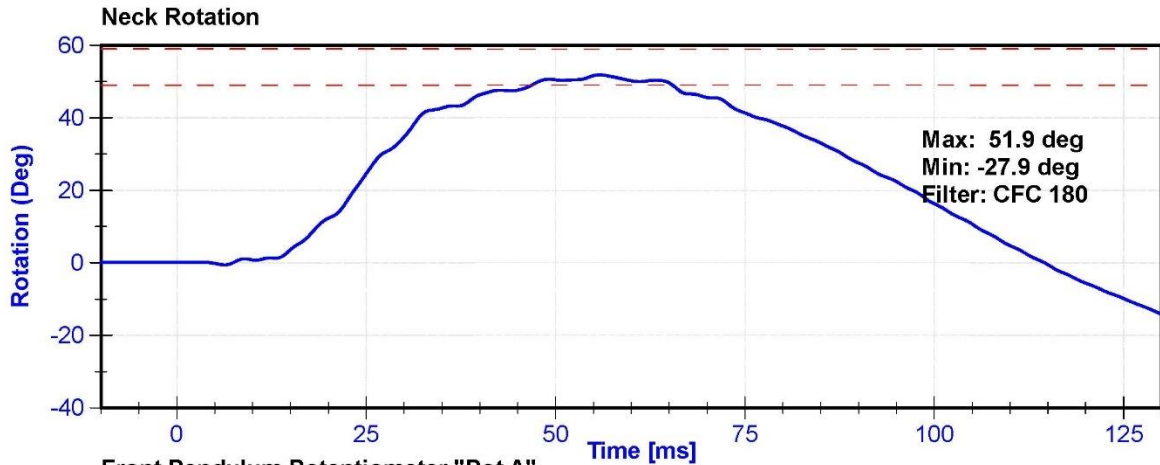
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.2	Pass
Velocity	3.3	3.5	m/s	3.42	Pass
Lateral Neck Rotation	49	59	deg	51.9	Pass
Time at Maximum Rotation	54	66	ms	55.8	Pass
Time of Rotation Decay from Maximum	53	88	ms	58.8	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



^{1,2} Upper and lower boundaries specified in Appendix I



Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

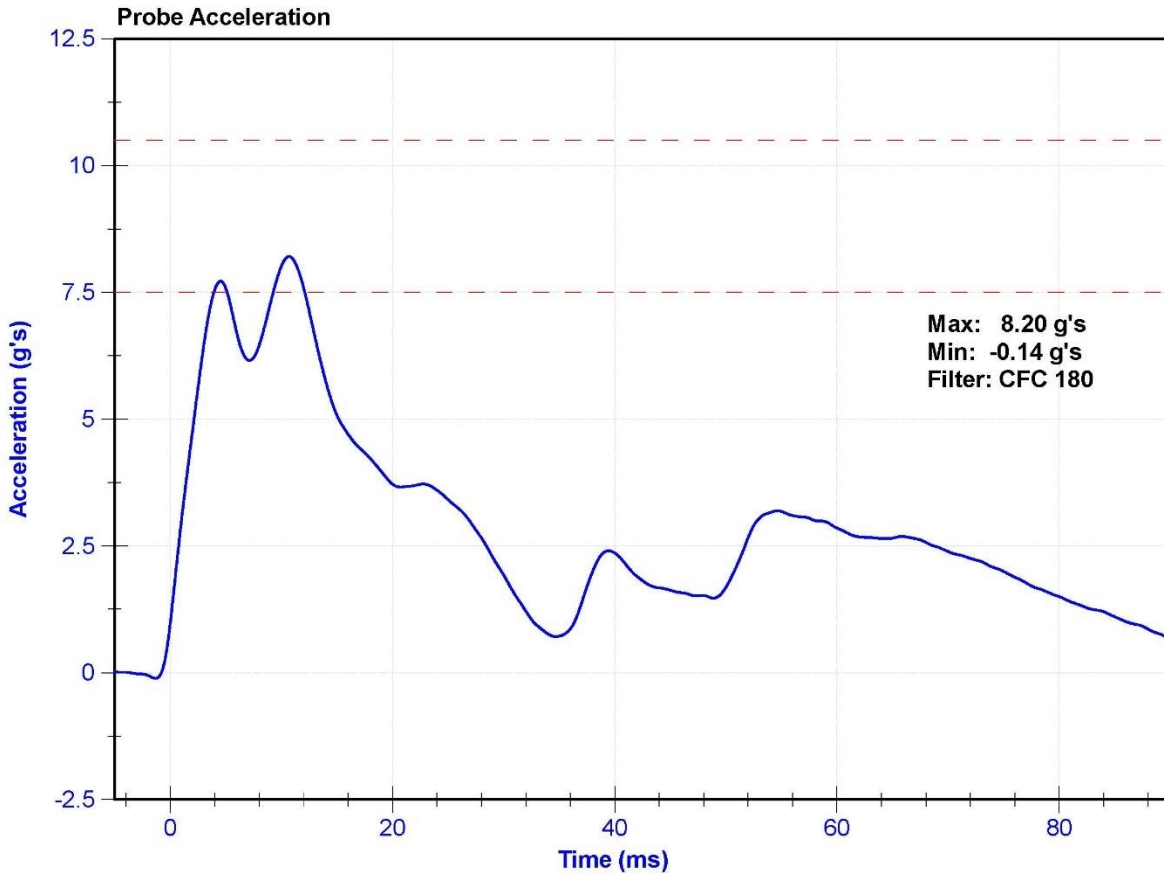
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	7.5	10.5	g's	8.20	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023



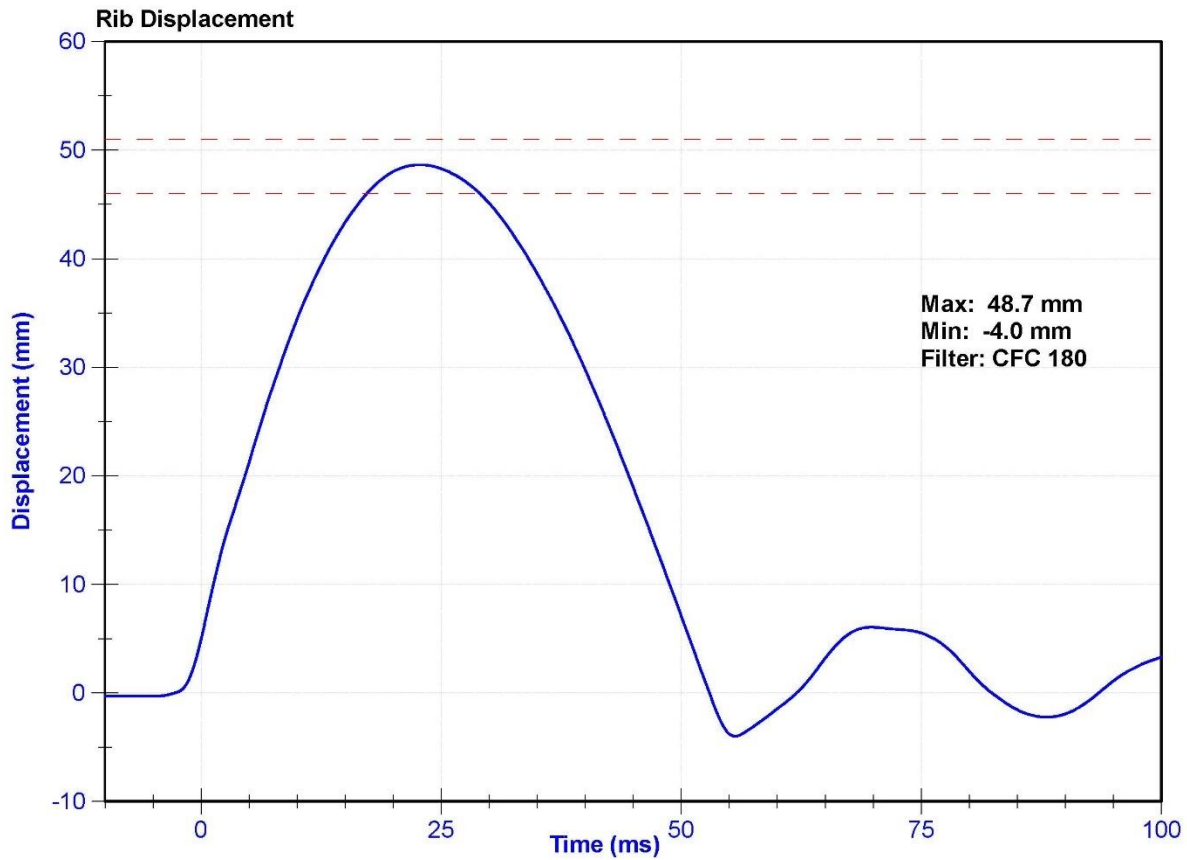
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



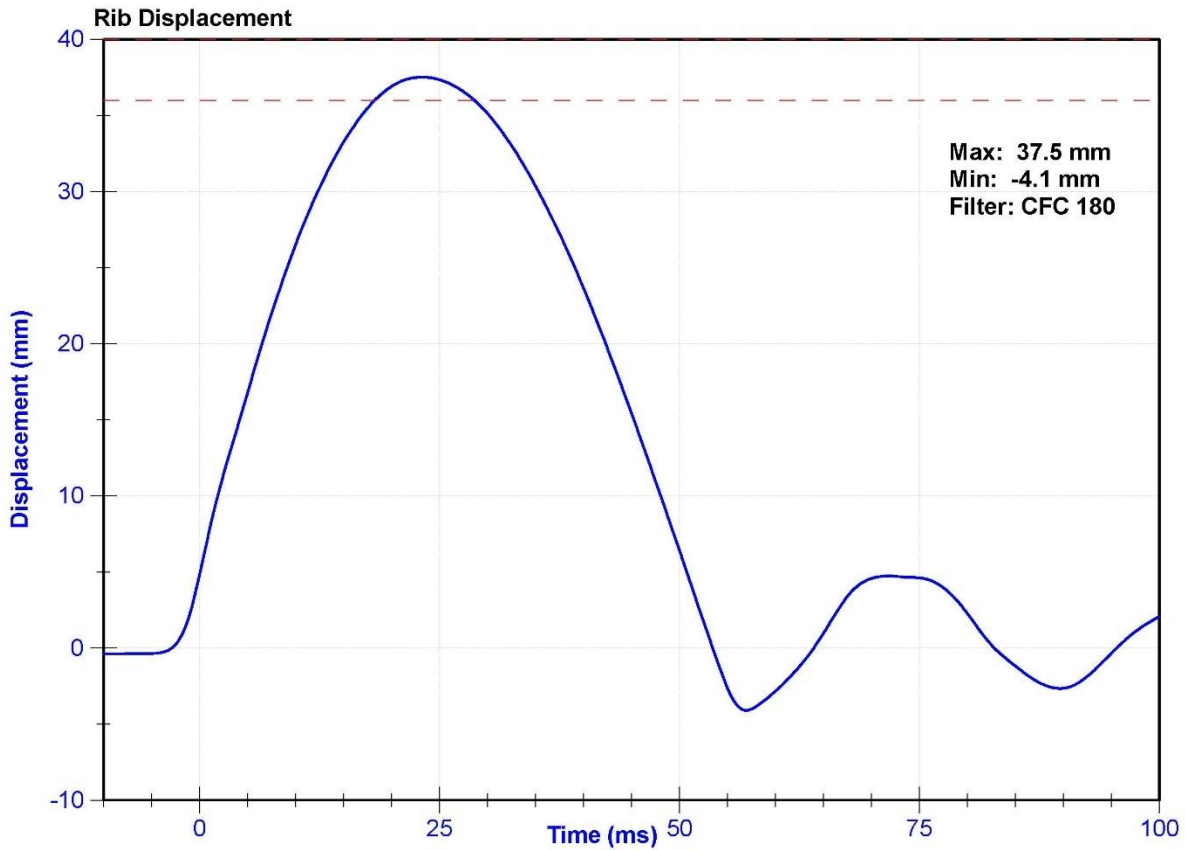
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	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	179GFE	1/17/2023	7/18/2023



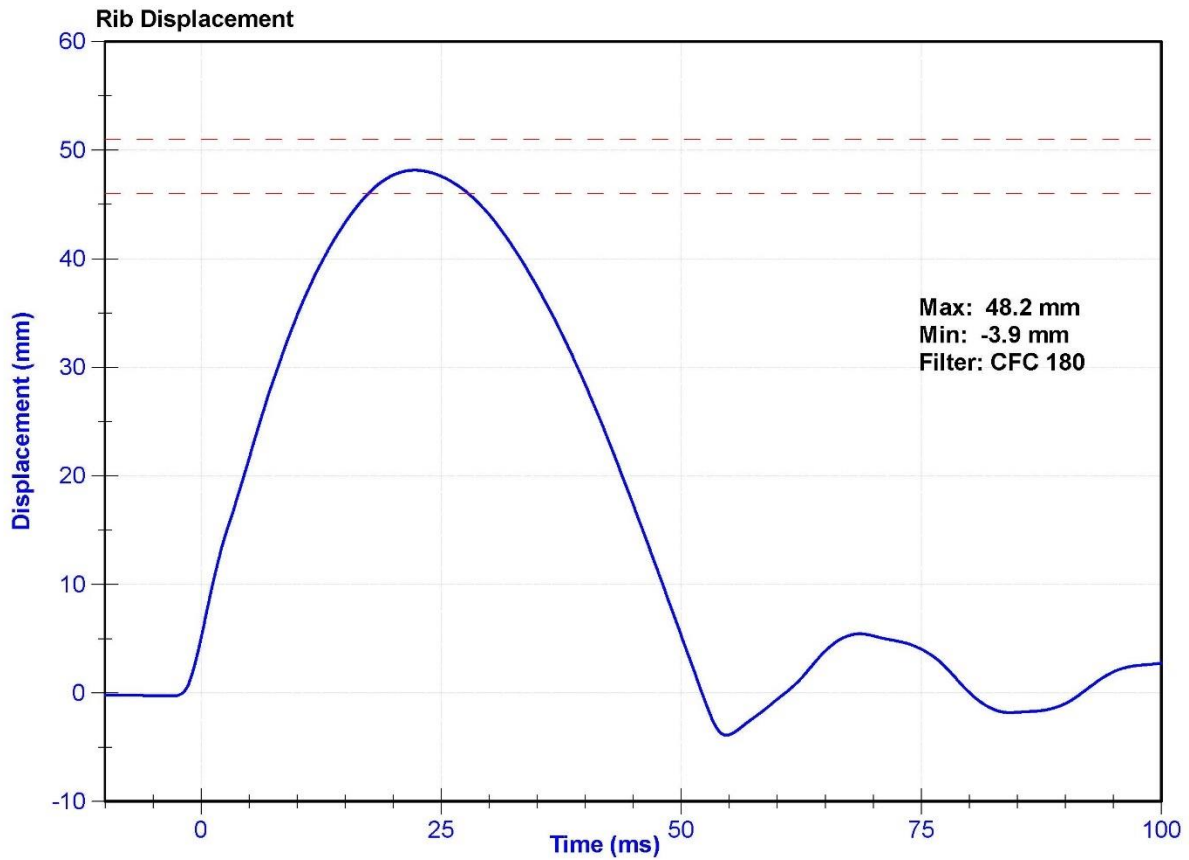
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	46	51	mm	48.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



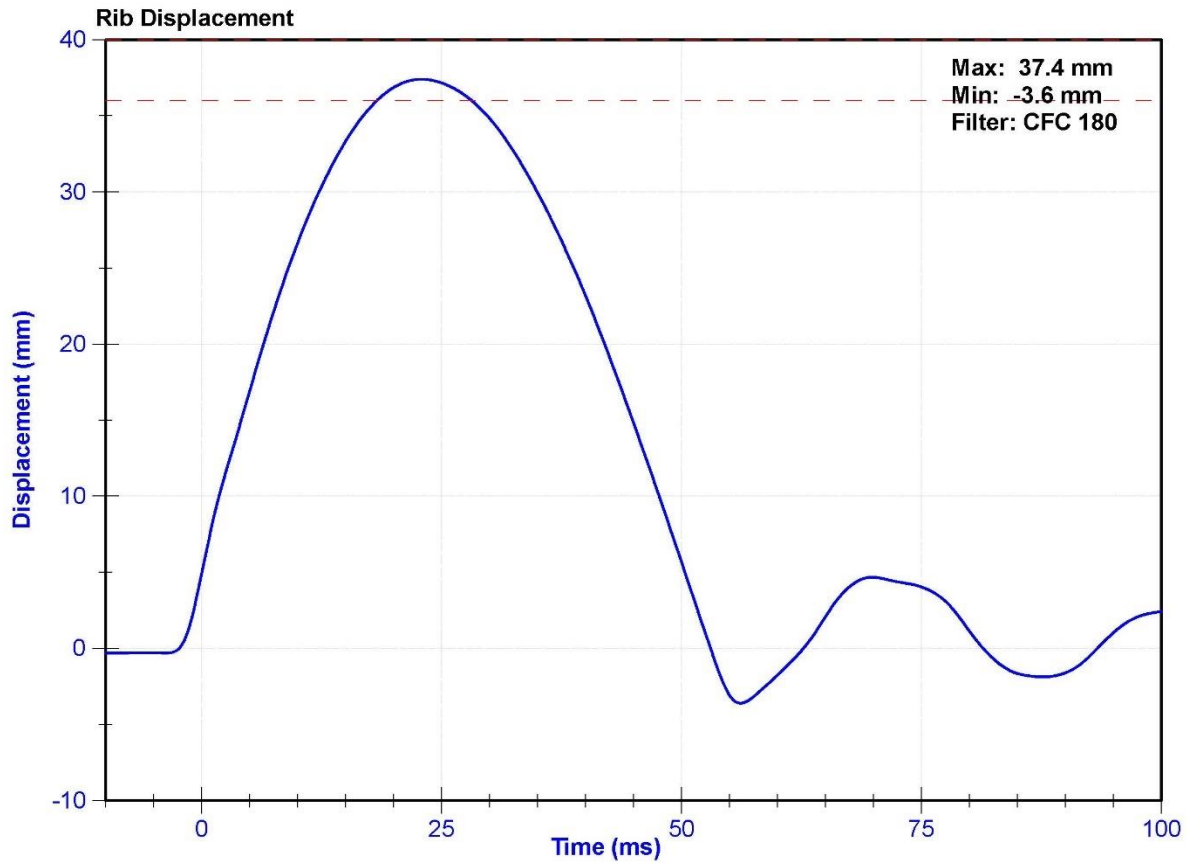
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	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	185GFE	1/17/2023	7/18/2023



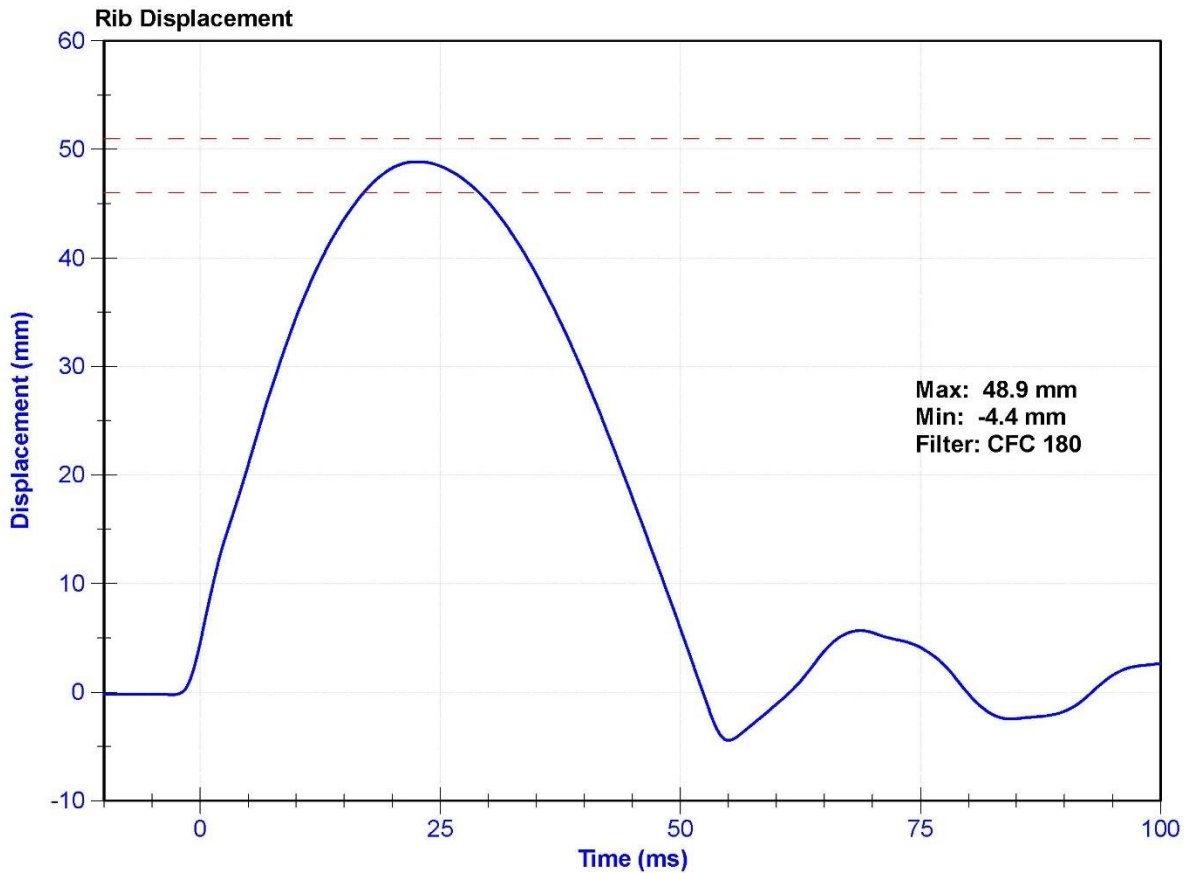
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	46	51	mm	48.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



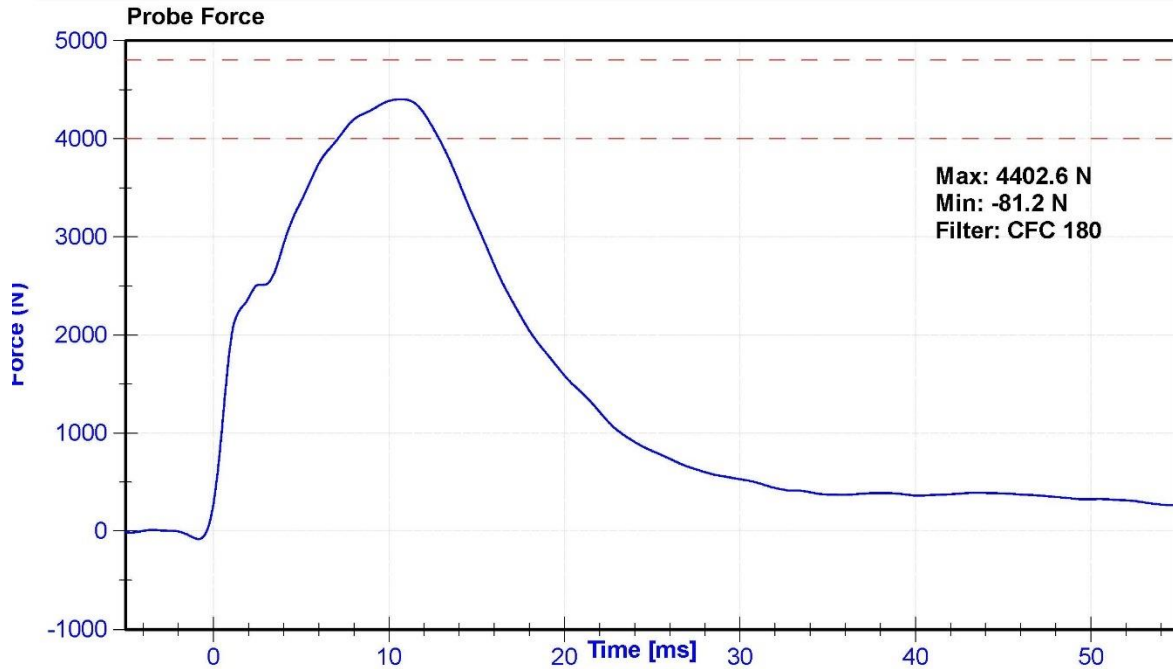
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

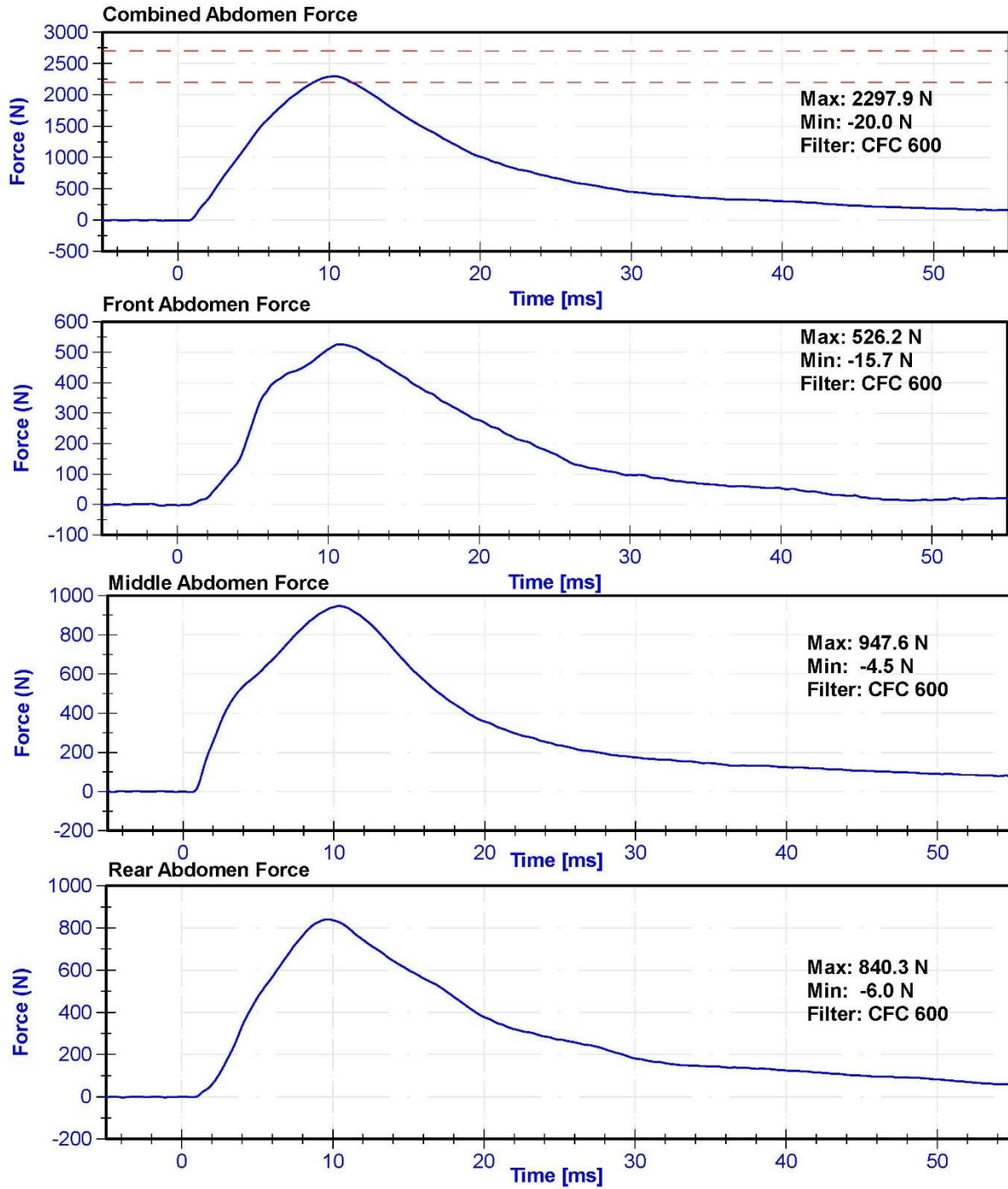
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	3.9	4.1	m/s	3.96	Pass
Combined Abdomen Force	2200	2700	N	2297.9	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.40	Pass
Resistive Probe Force	4000	4800	N	4402.6	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.70	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023





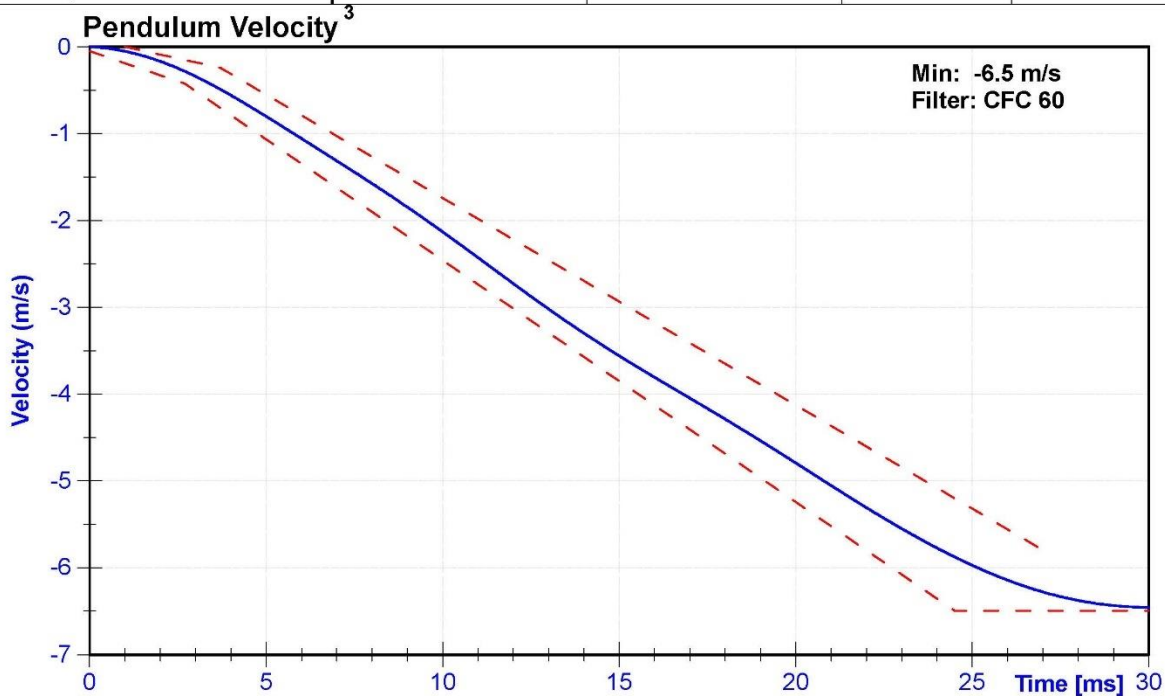
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

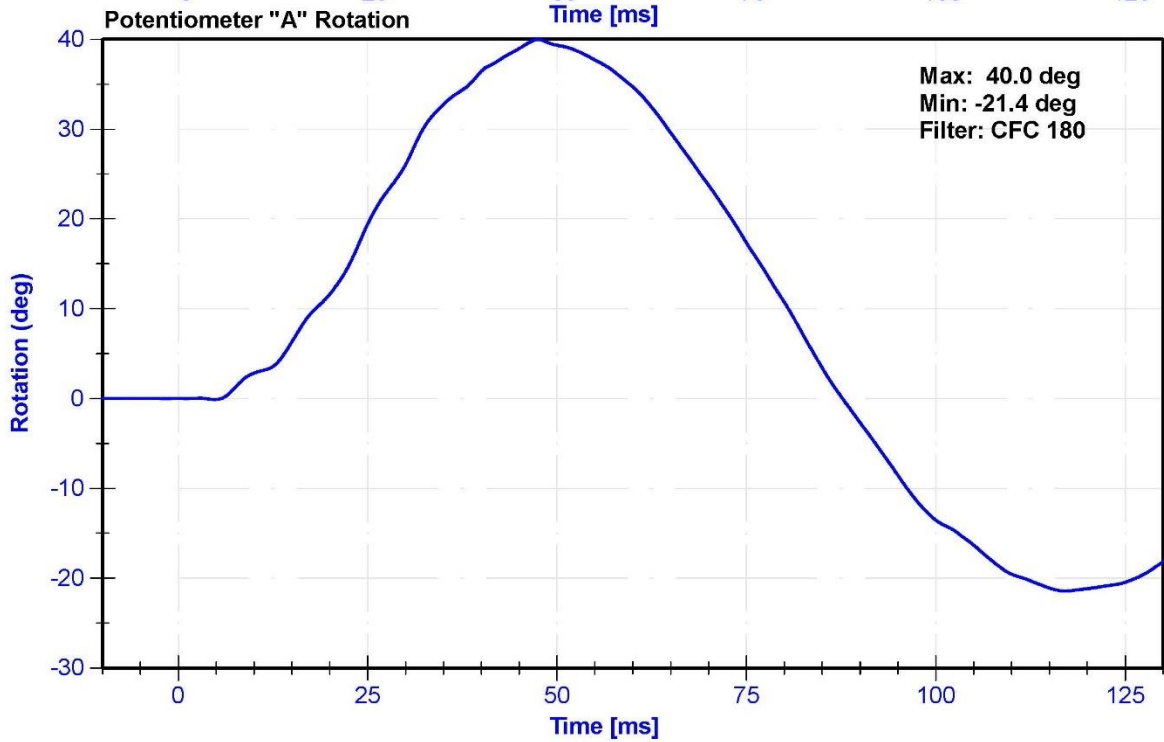
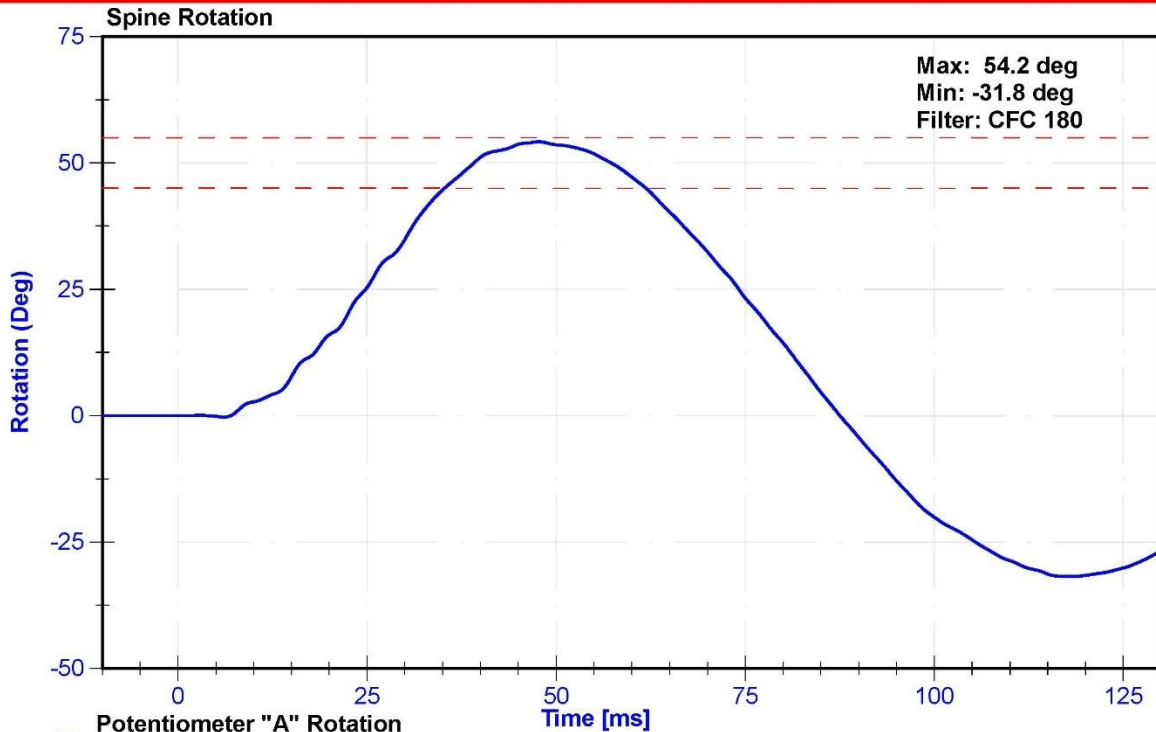
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.2	Pass
Velocity	5.95	6.15	m/s	6.046	Pass
Lateral Spine Rotation	45	55	deg	54.2	Pass
Time at Maximum Rotation	39	53	ms	47.7	Pass
Time of Decay to Zero Degrees	37	57	ms	39.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

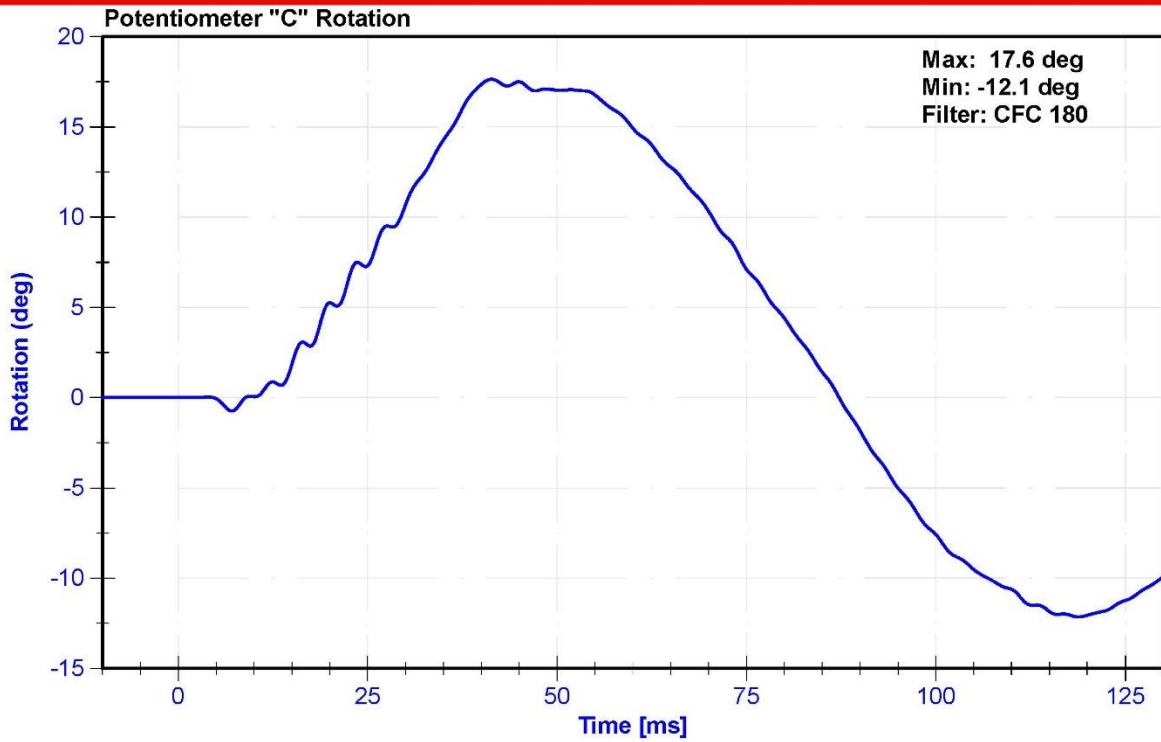
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



^{1,2} Upper and lower boundaries specified in Appendix I





Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.5
		30.0	-6.5

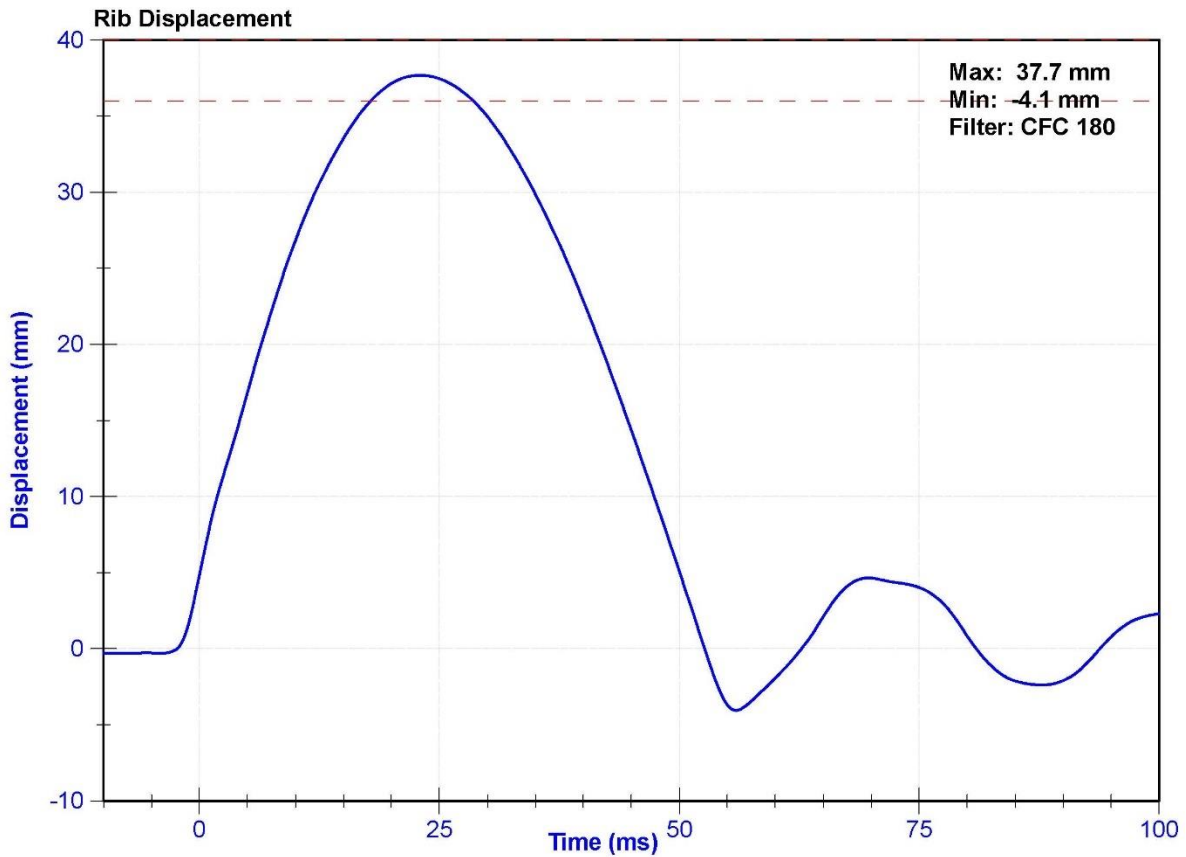
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	36	40	mm	37.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



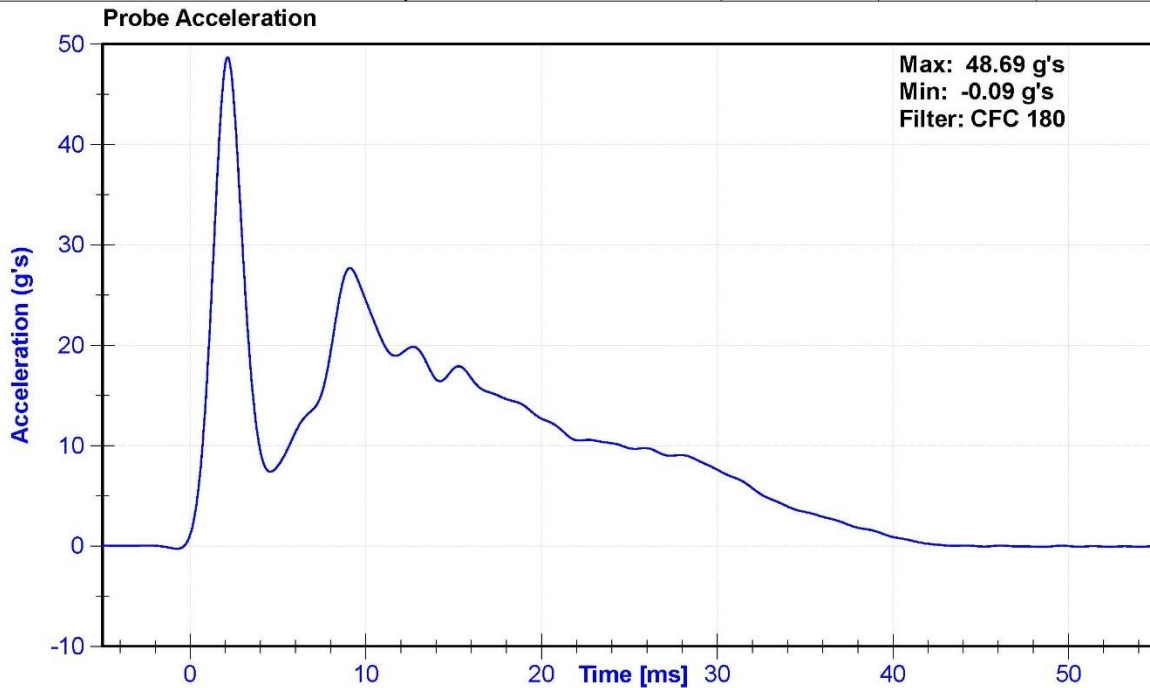
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

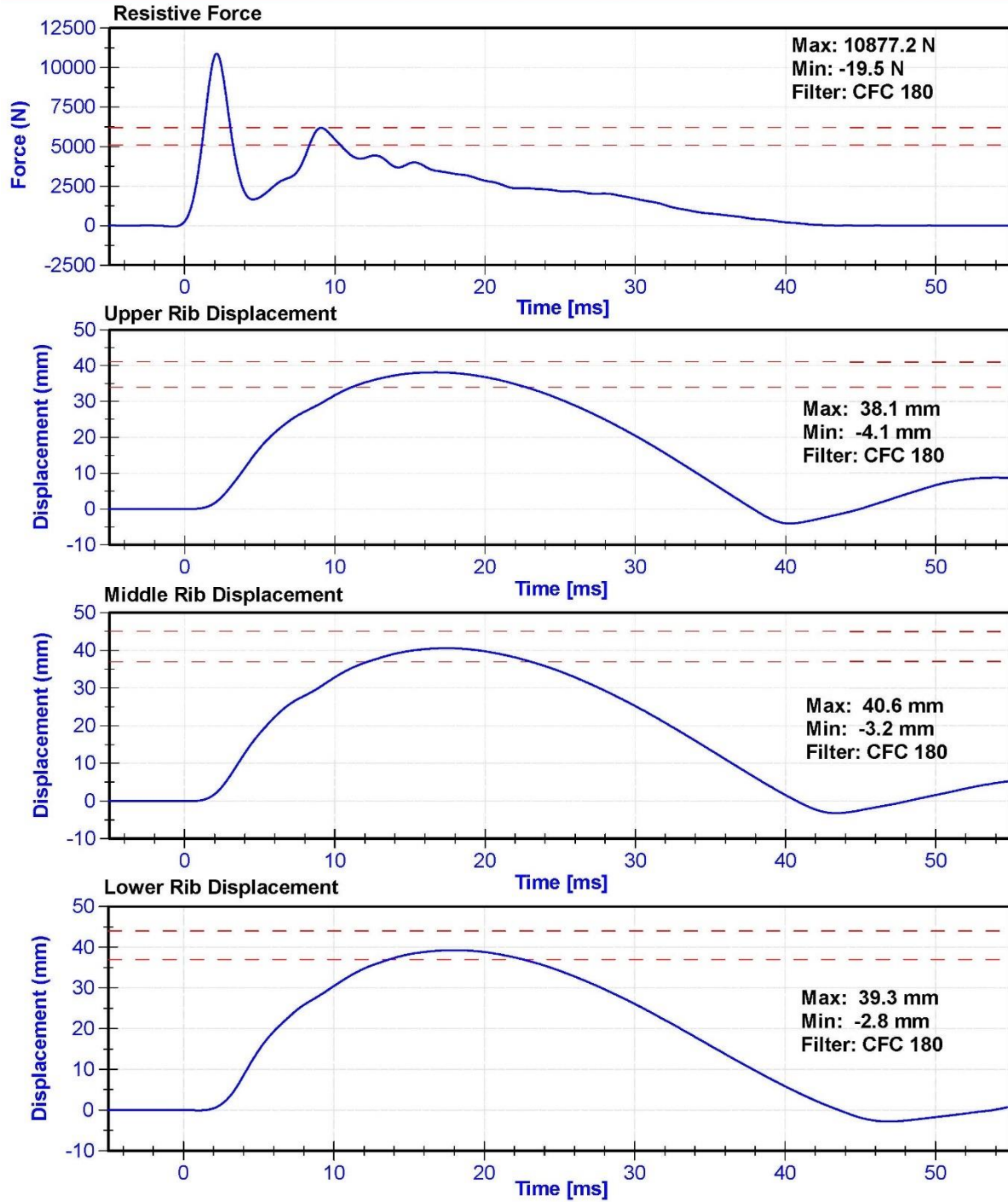
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	6185.9	Pass
Upper Thorax Rib Deflection	34	41	mm	38.1	Pass
Mid Thorax Rib Deflection	37	45	mm	40.6	Pass
Lower Thorax Rib Deflection	37	44	mm	39.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Thorax Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023
Lower Thorax Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023





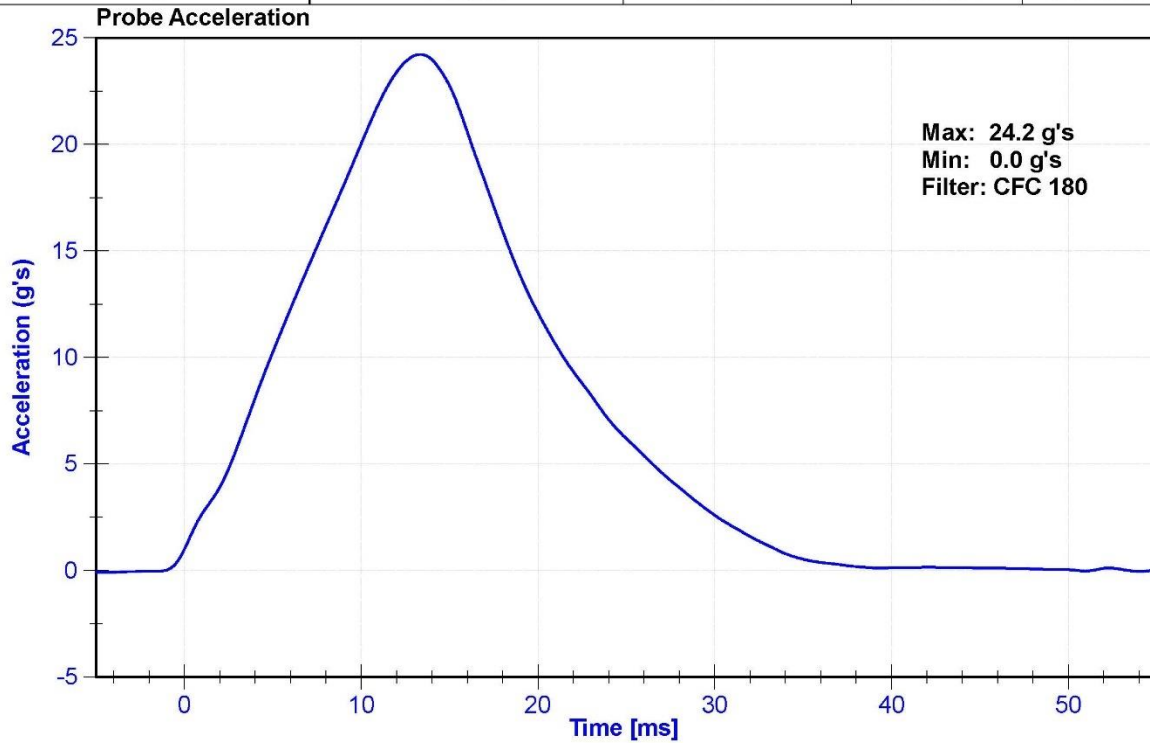
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ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

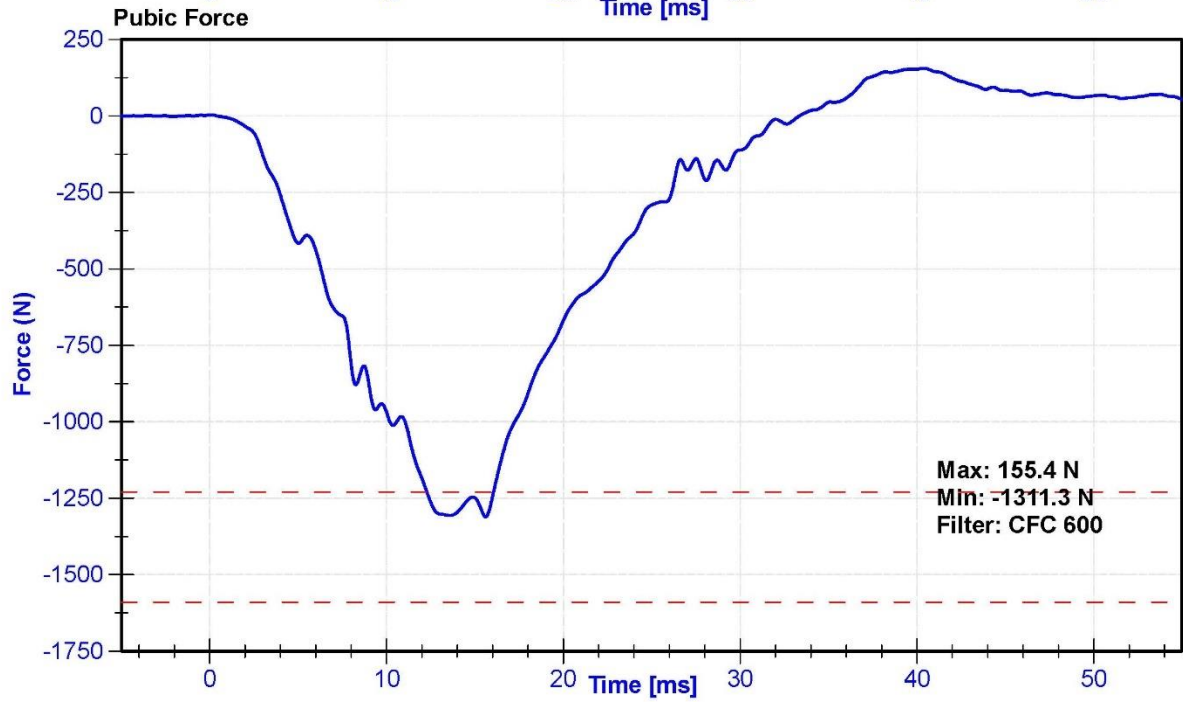
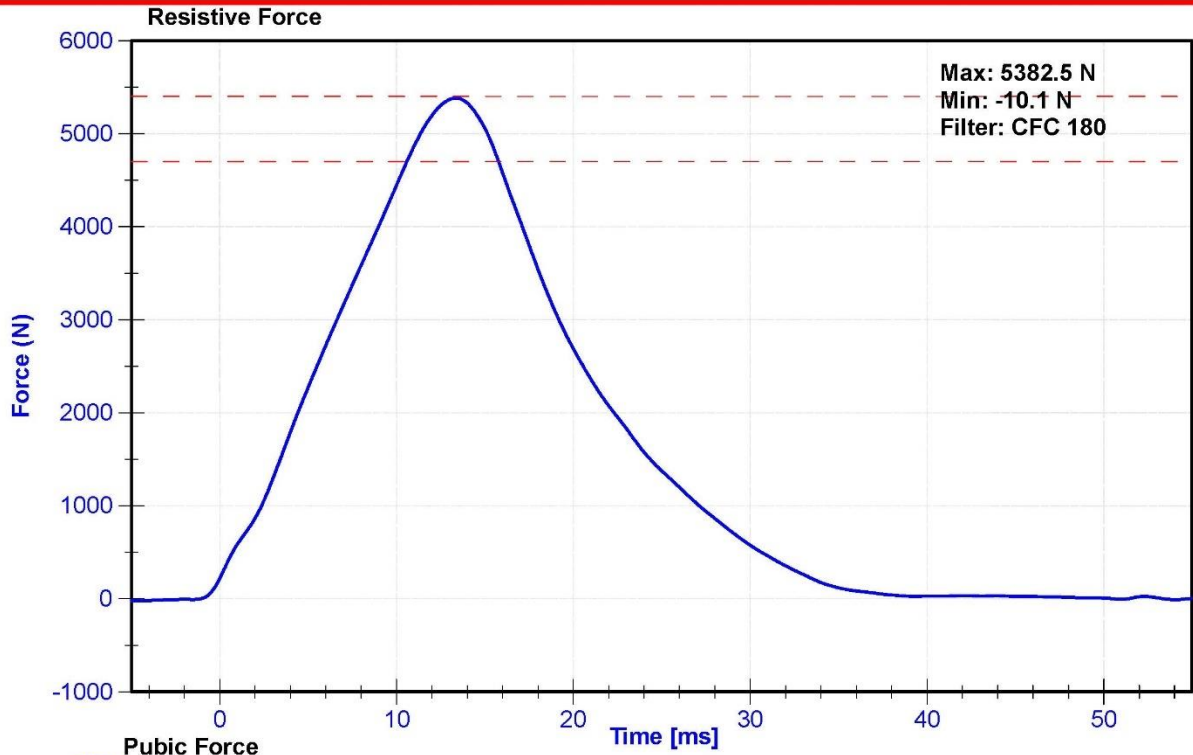
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Resistive Force	4700	5400	N	5382.5	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.35	Pass
Pubic Force	-1590	-1230	N	-1311.3	Pass
Time at Peak Pubic Force	12.2	17.0	ms	15.60	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Pubic Load Cell	Denton	459-FY	6/14/2022	6/14/2023





CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL No: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

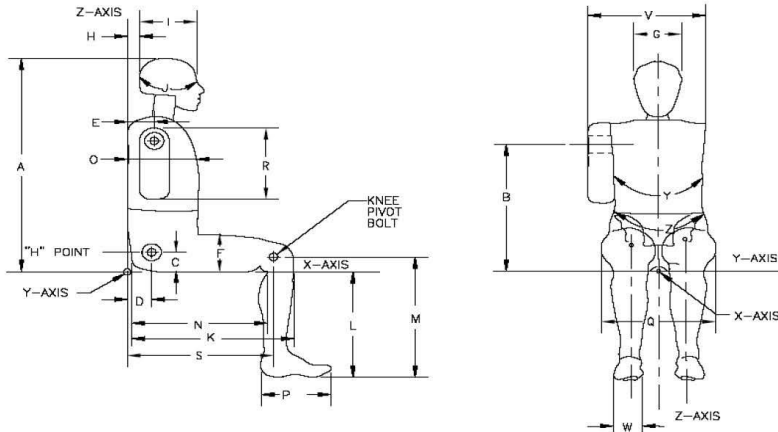


External Measurements - SID-IIs

Technician: K. Brogan

Date: 03/01/2023

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	783	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	82	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	401	Pass
N	Buttock Popliteal Length	416	442	431	Pass
O	Chest Depth w/o jacket	195	211	200	Pass
P	Foot Length	216	232	226	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	251	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	872	Pass
Z	Waist Circumference	761	791	777	Pass

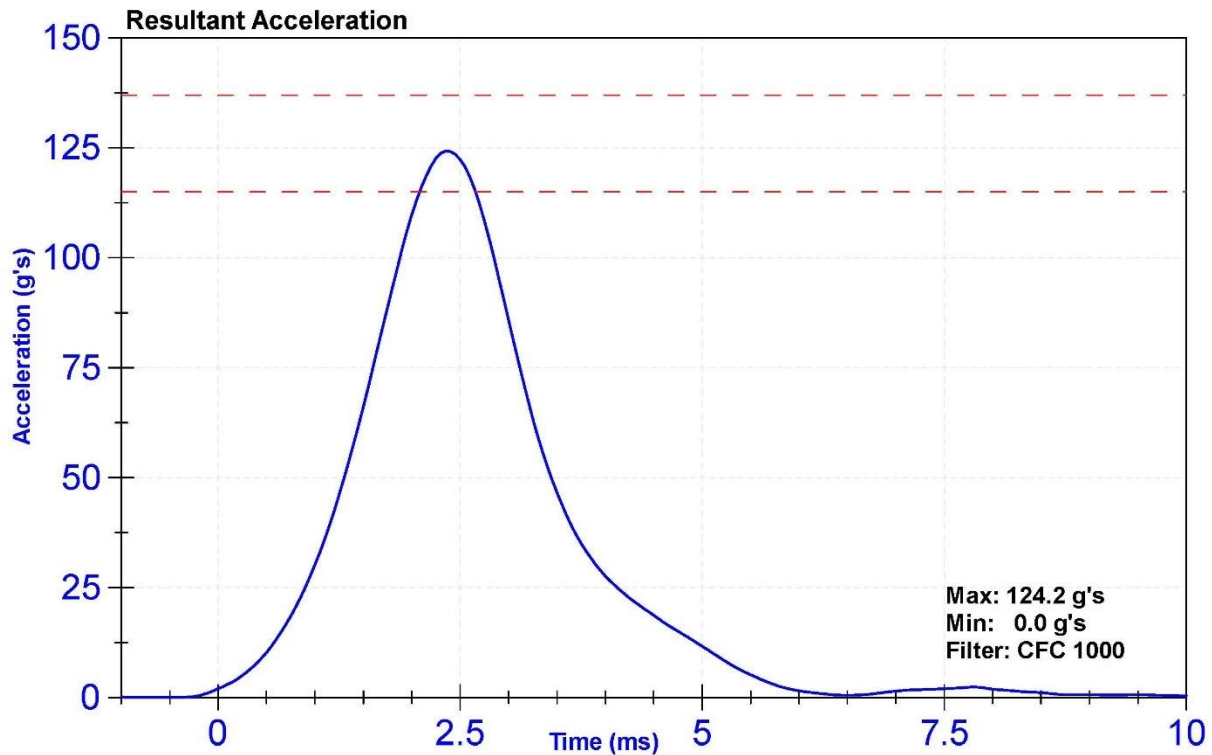
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

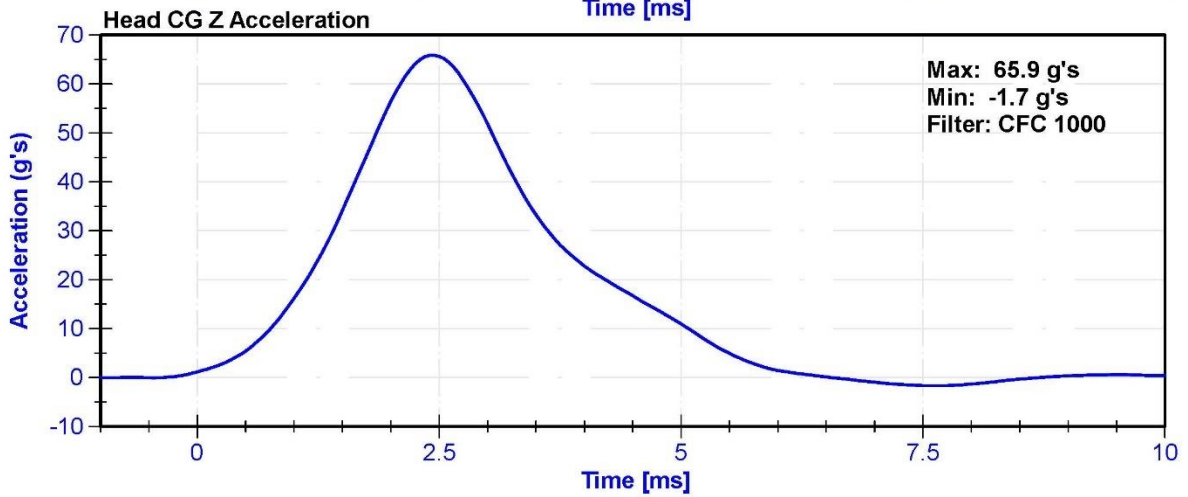
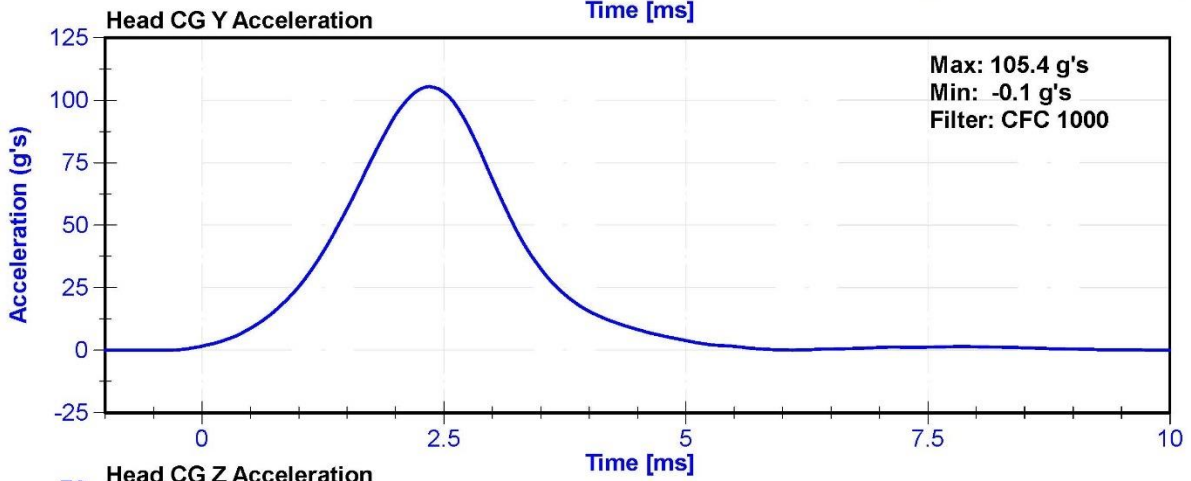
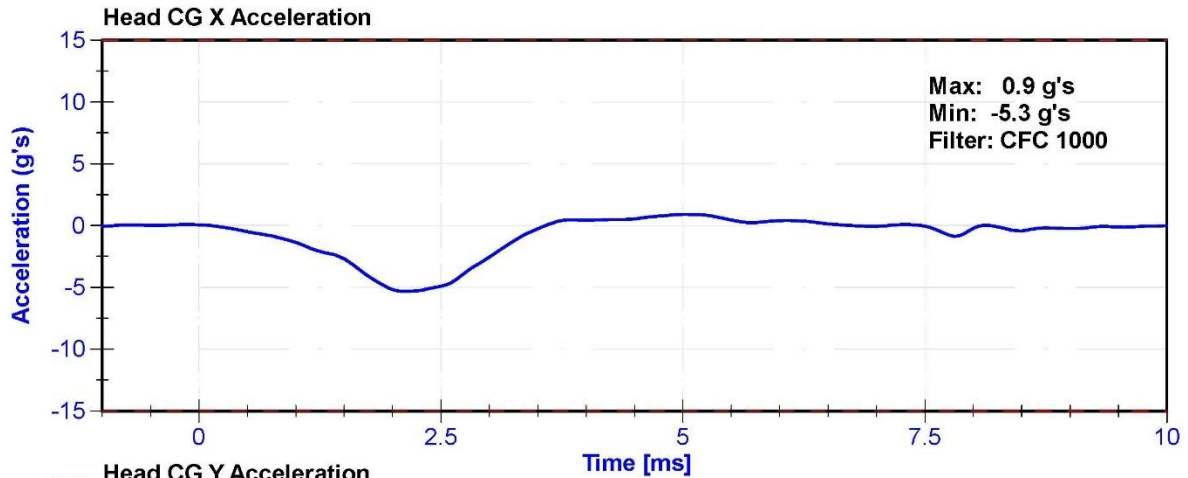
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	25.5	Pass
Resultant Acceleration	115	137	g's	124.2	Pass
Oscillation	0	15	%	1.8	Pass
Fore-Aft Acceleration	-15	15	g's	-5.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P74788	12/12/2022	6/10/2023
Y Accelerometer	Endevco	P51668	12/12/2022	6/10/2023
Z Accelerometer	Endevco	P83319	12/12/2022	6/10/2023





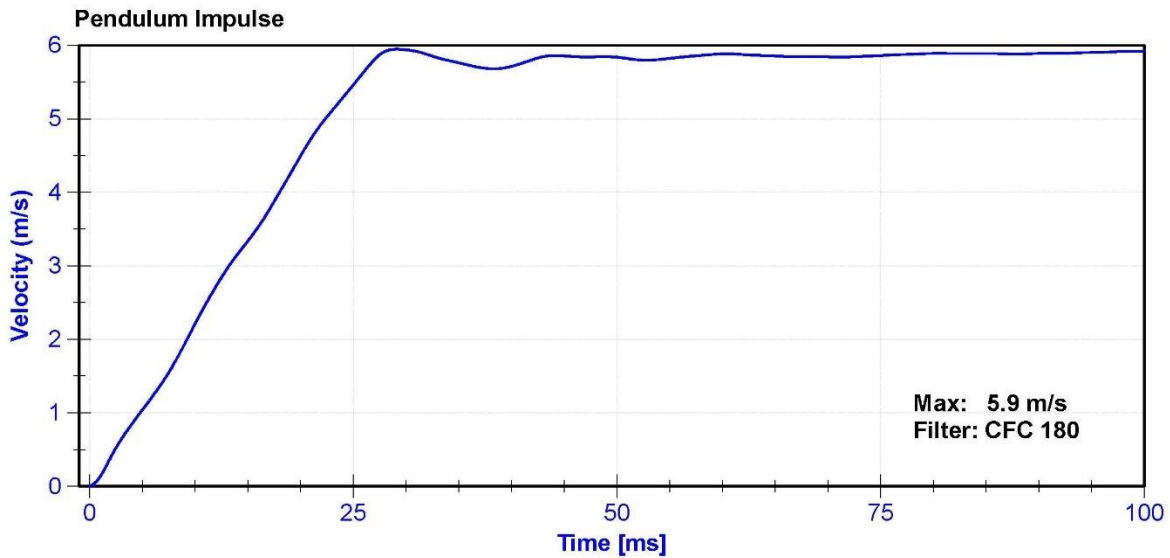
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

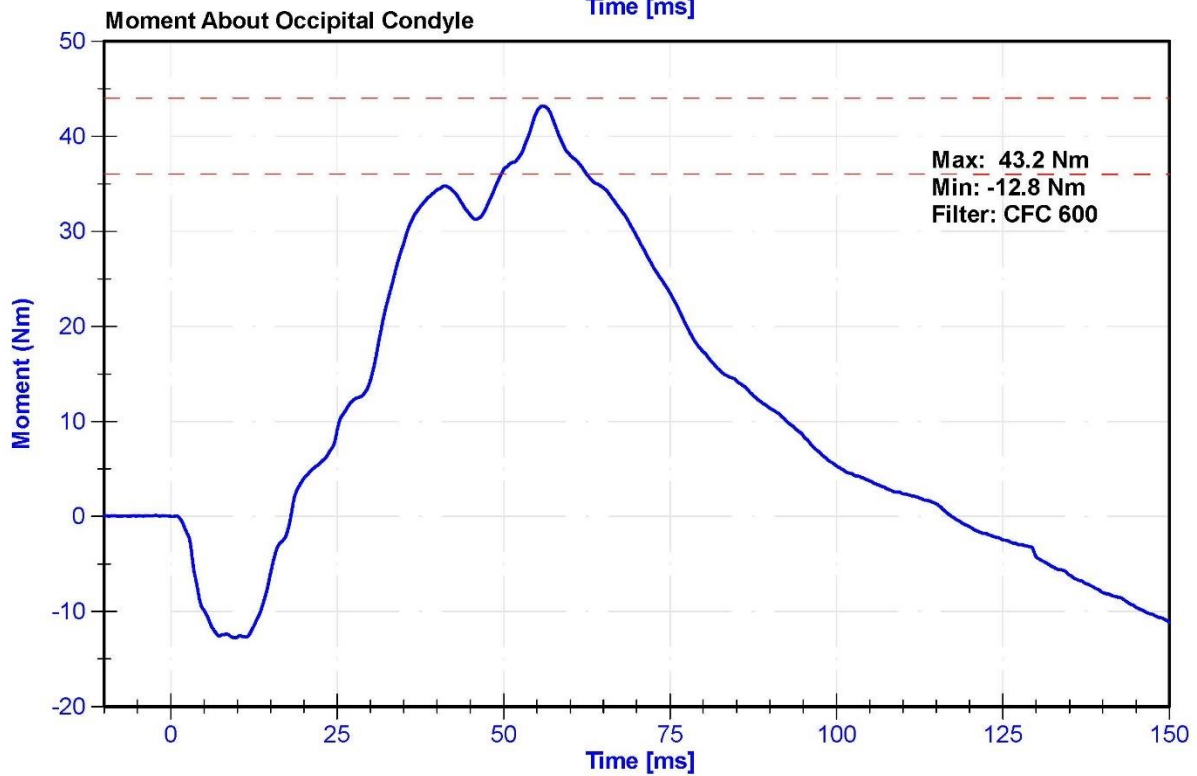
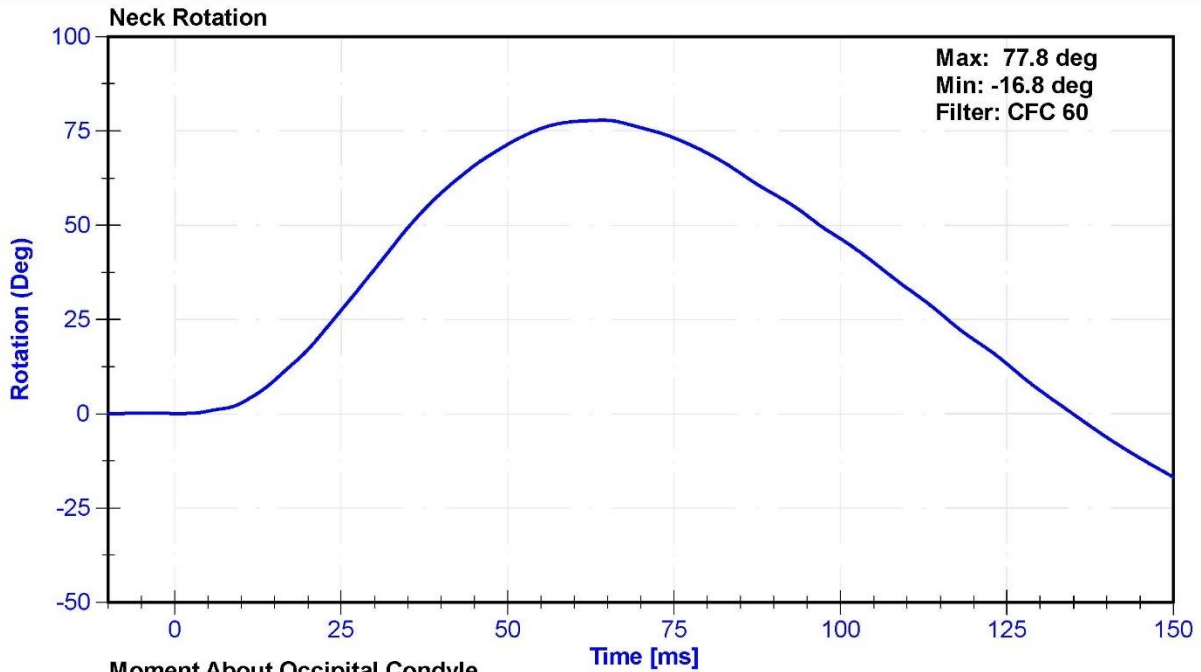
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	25.5	Pass
Velocity	5.51	5.63	m/s	5.567	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.22	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.34	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.50	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.46	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.95	Pass
Neck Rotation	71	81	deg	77.8	Pass
Time at Maximum Rotation	50	70	ms	64.3	Pass
Moment about the OC	36	44	Nm	43.2	Pass
Moment Decay to 0 Nm	102	126	ms	117.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023





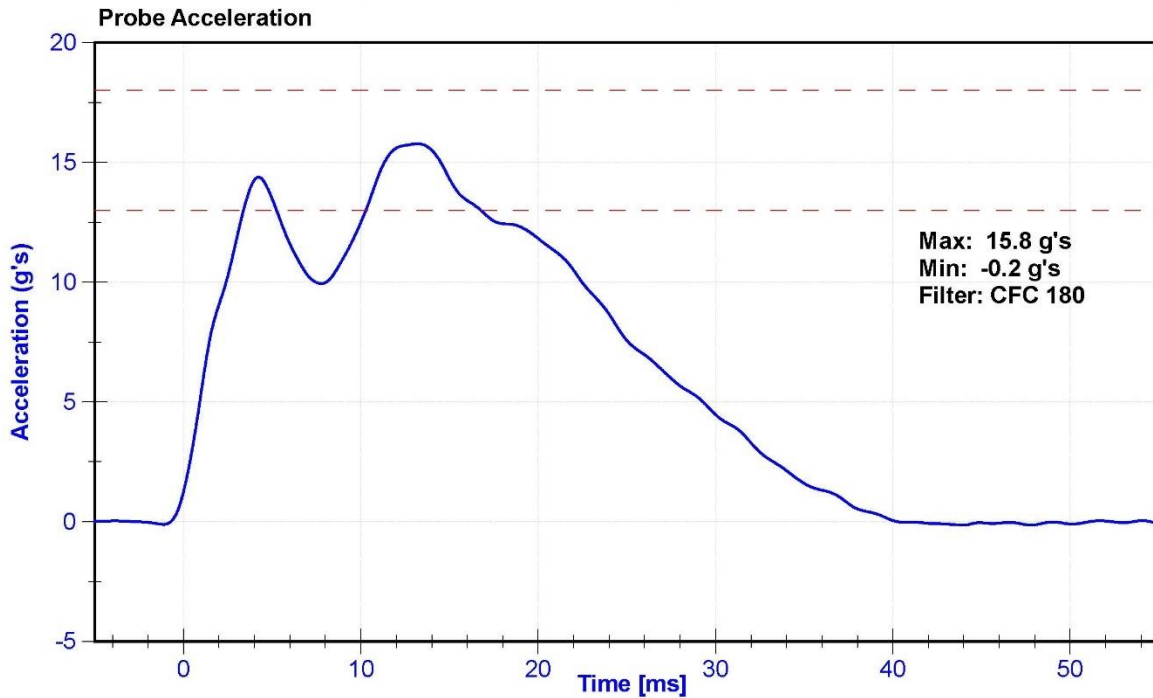
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

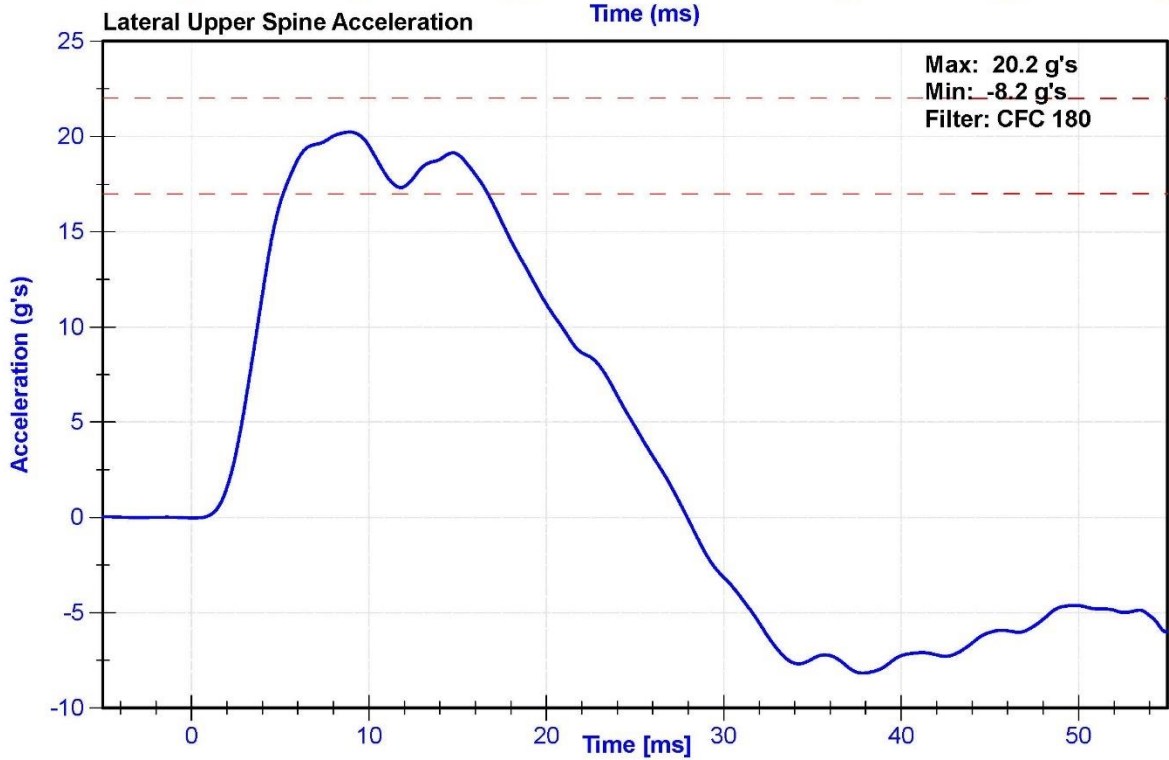
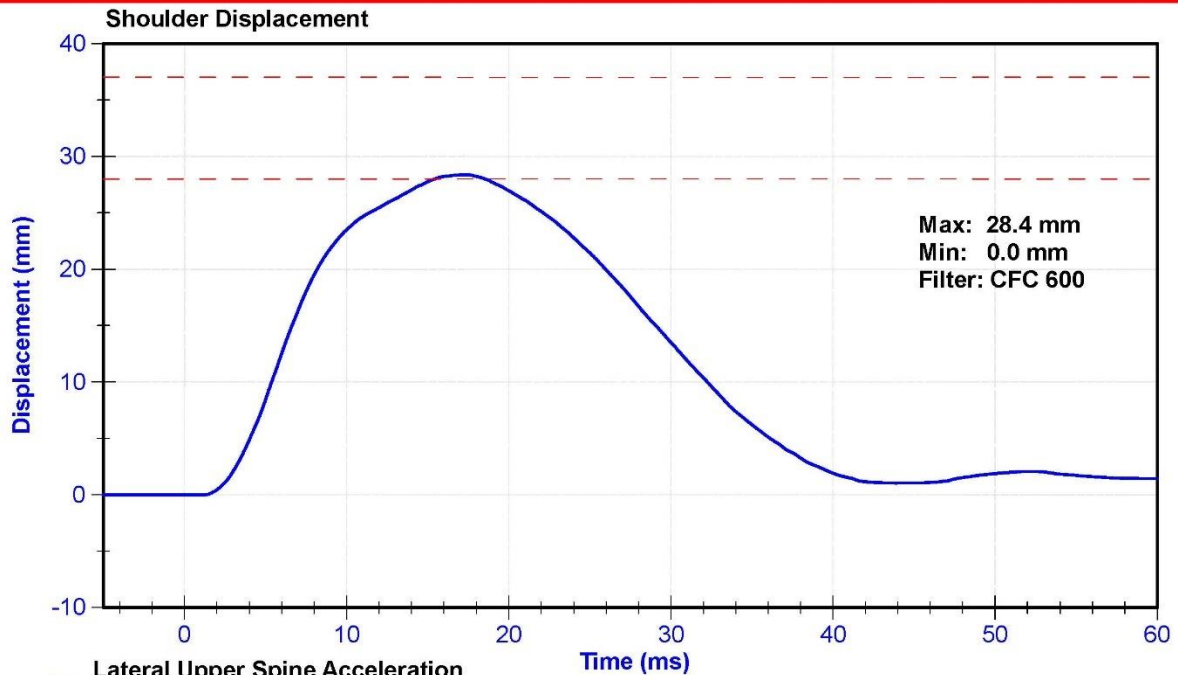
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	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	28.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023





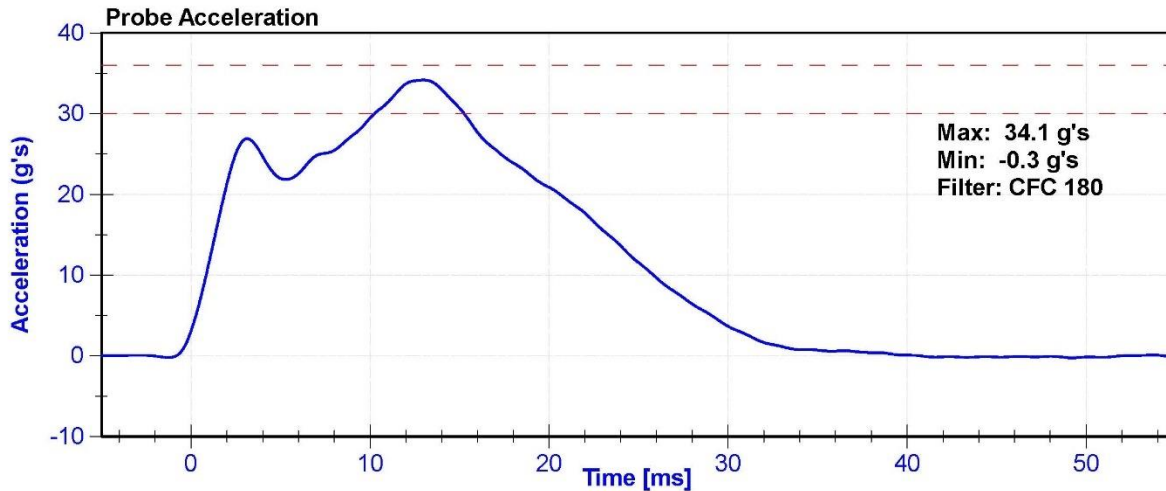
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ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

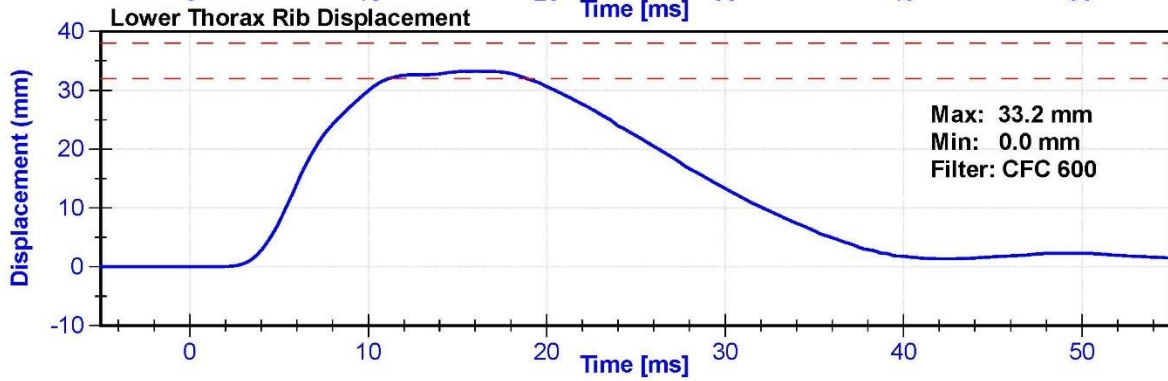
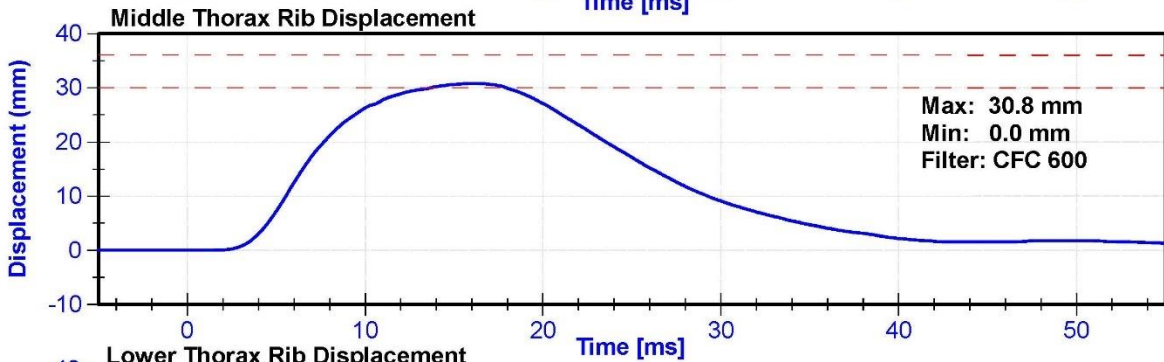
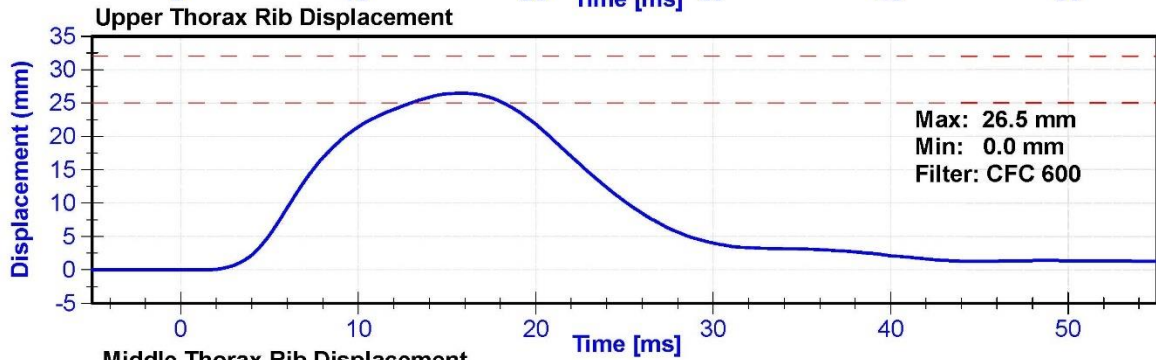
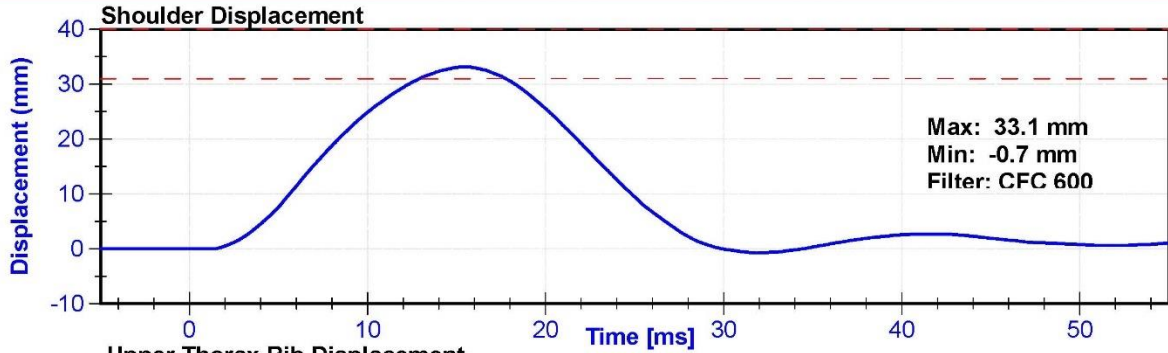
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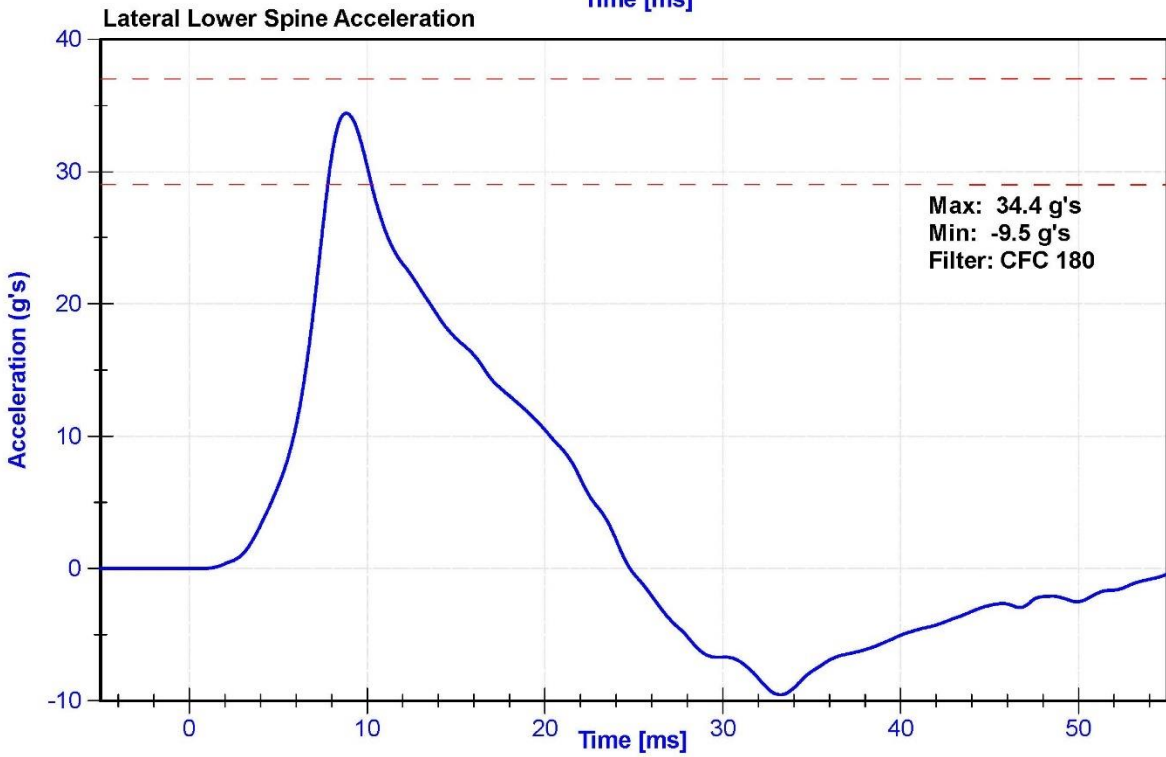
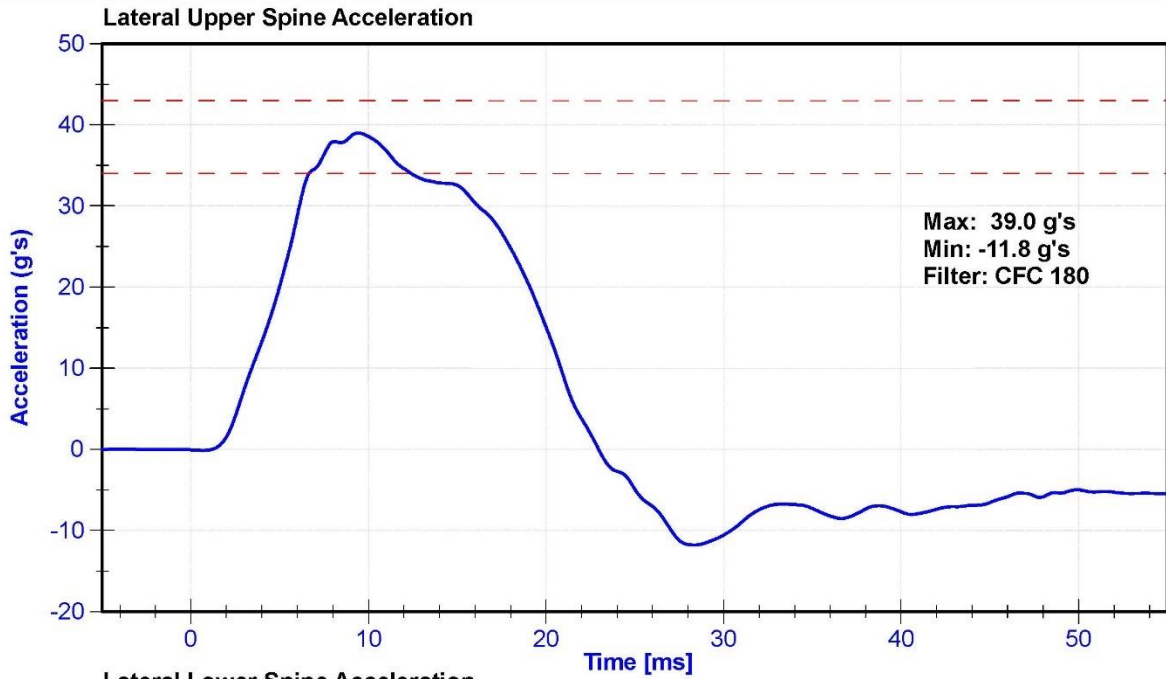
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	Pass
Velocity	6.6	6.8	m/s	6.72	Pass
Probe Acceleration after 5 ms	30	36	g's	34.1	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.4	Pass
Shoulder Deflection	31	40	mm	33.1	Pass
Upper Thorax Rib Deflection	25	32	mm	26.5	Pass
Mid Thorax Rib Deflection	30	36	mm	30.8	Pass
Lower Thorax Rib Deflection	32	38	mm	33.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Spine T1 Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Upper Spine T12 Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023







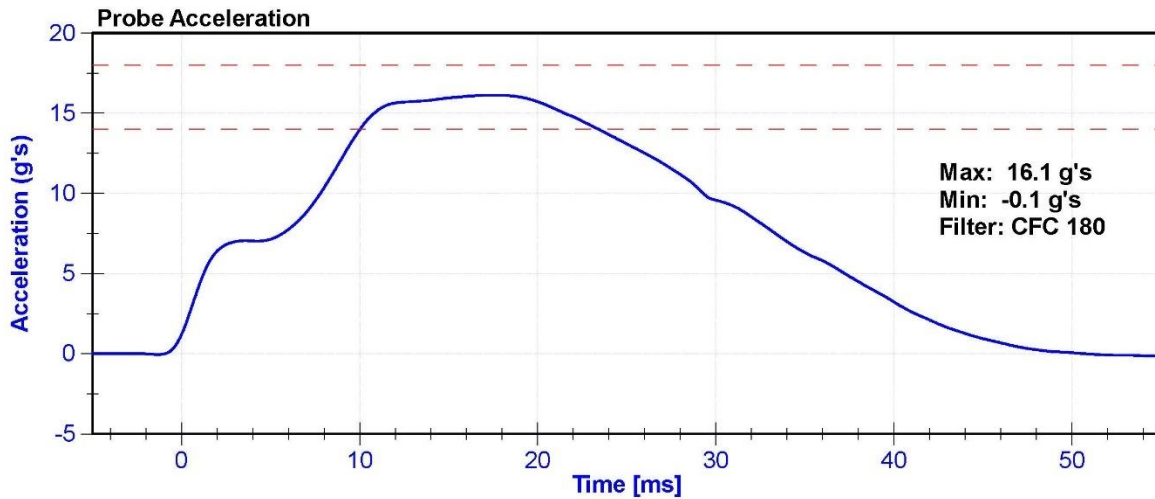
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

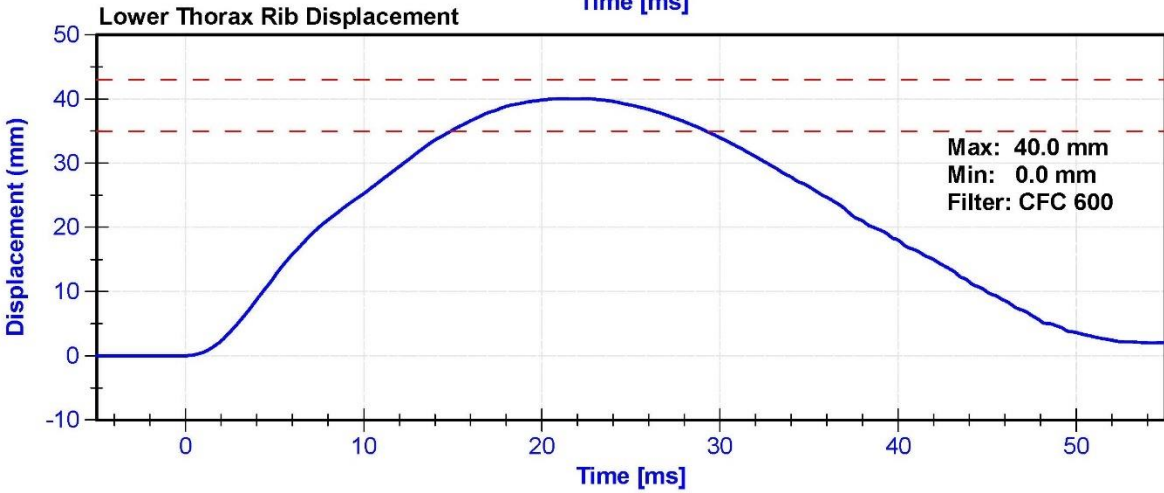
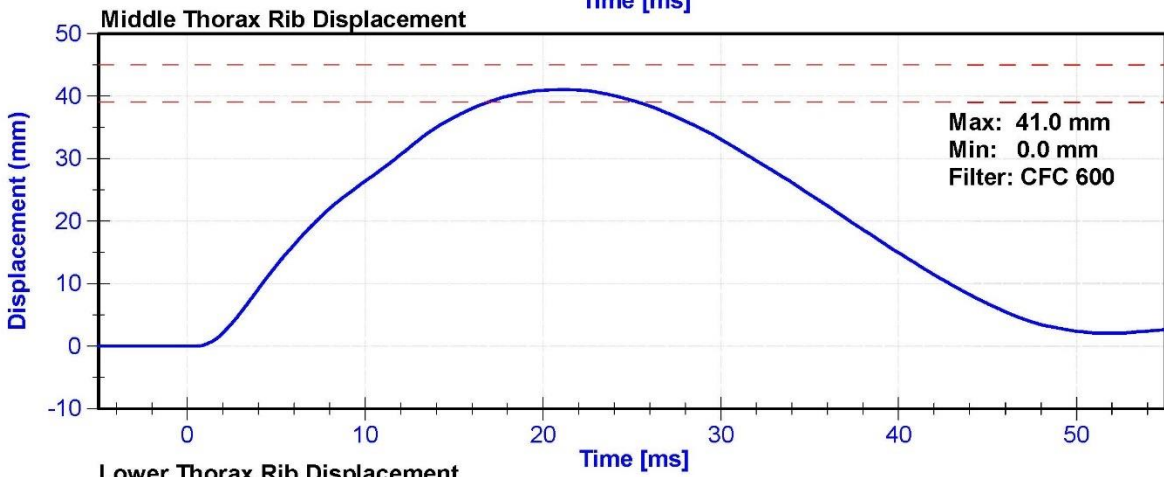
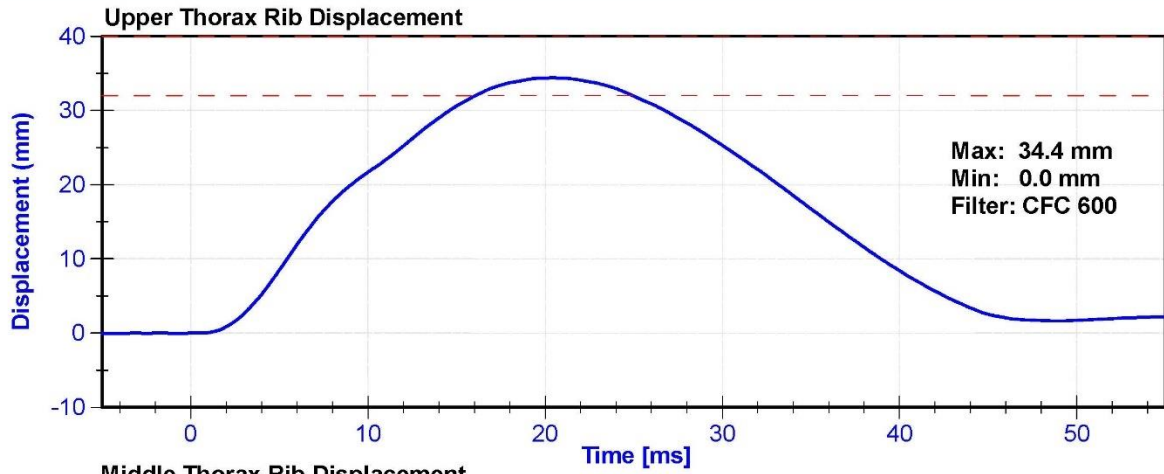
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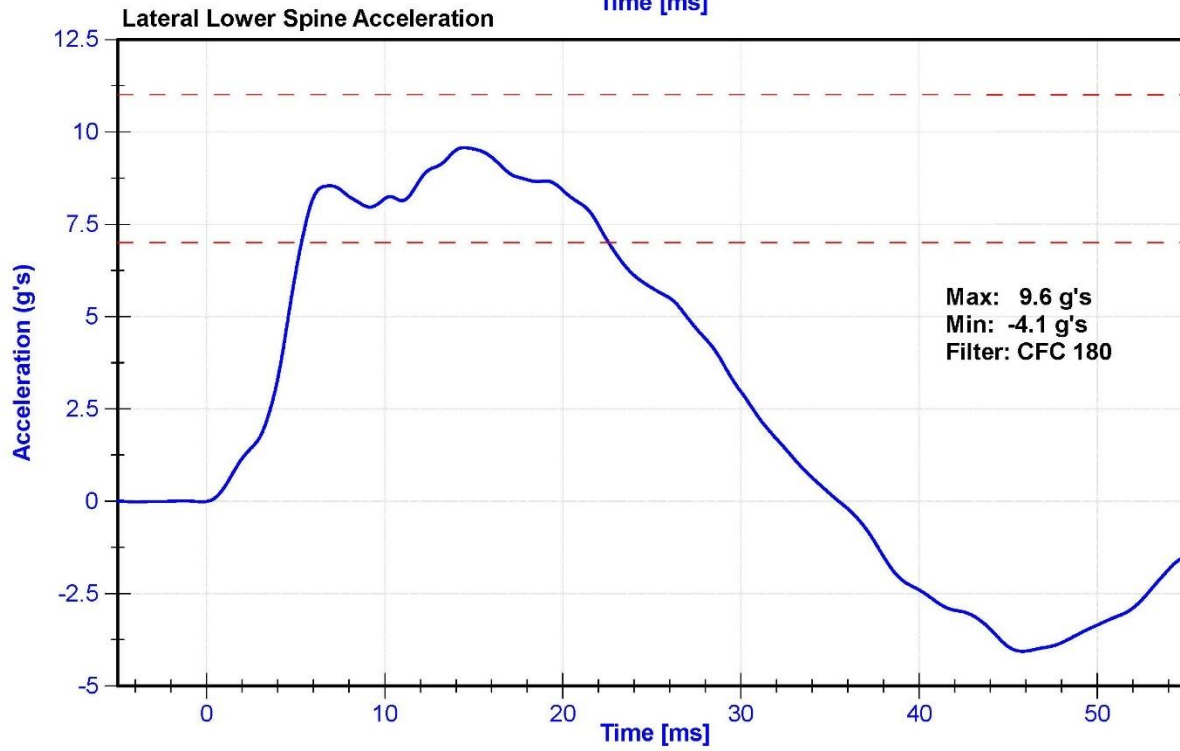
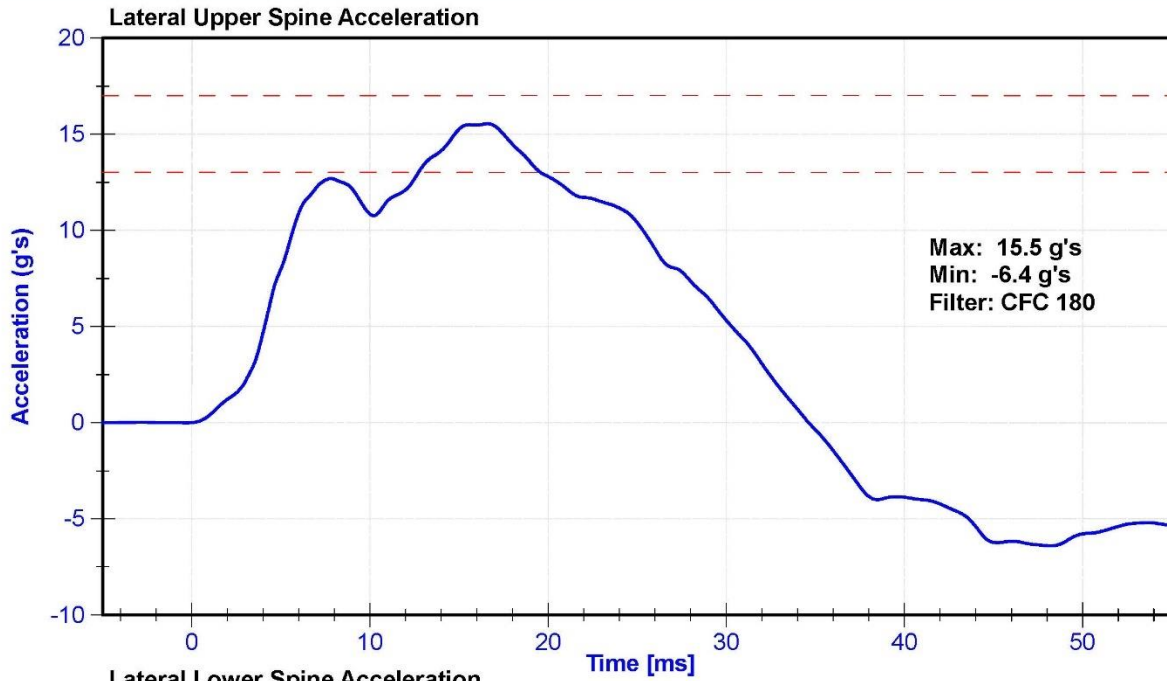
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.5	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.6	Pass
Upper Thorax Rib Deflection	32	40	mm	34.4	Pass
Middle Thorax Rib Deflection	39	45	mm	41.0	Pass
Lower Thorax Rib Deflection	35	43	mm	40.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023







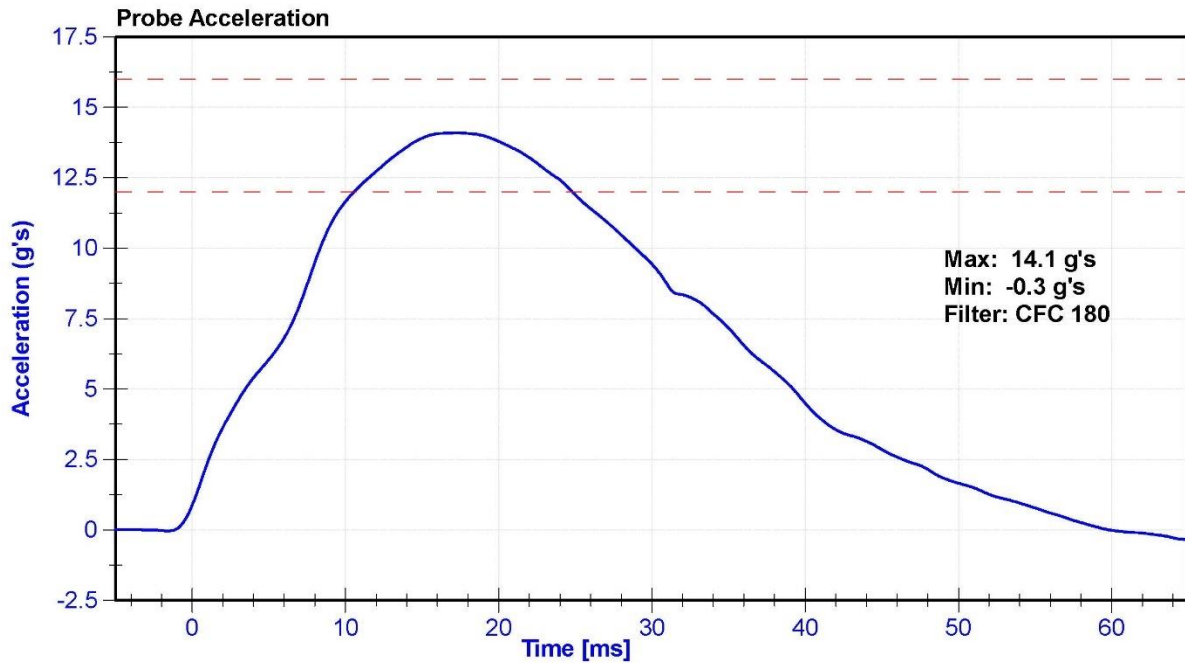
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

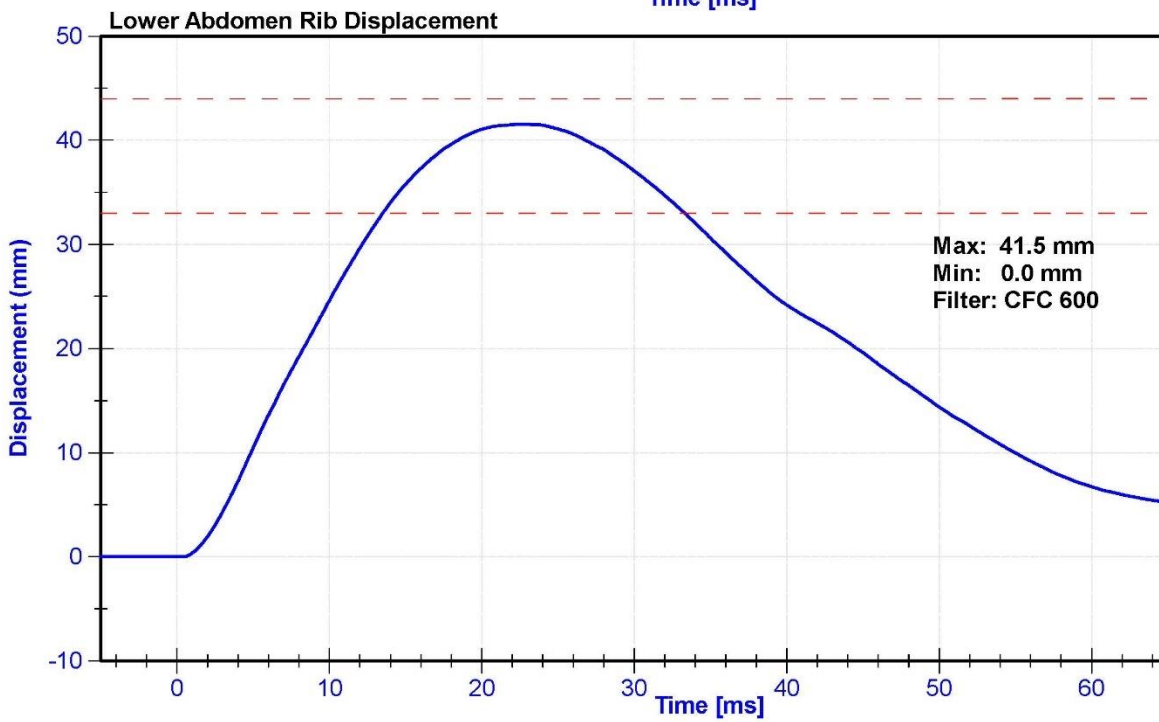
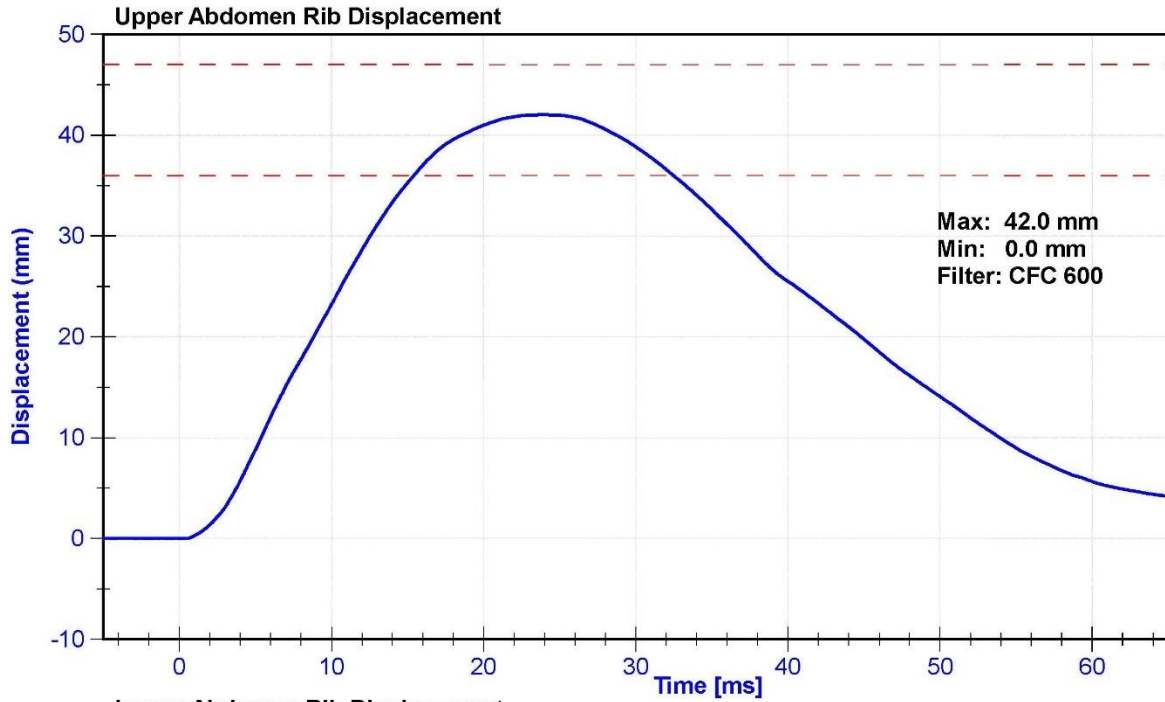
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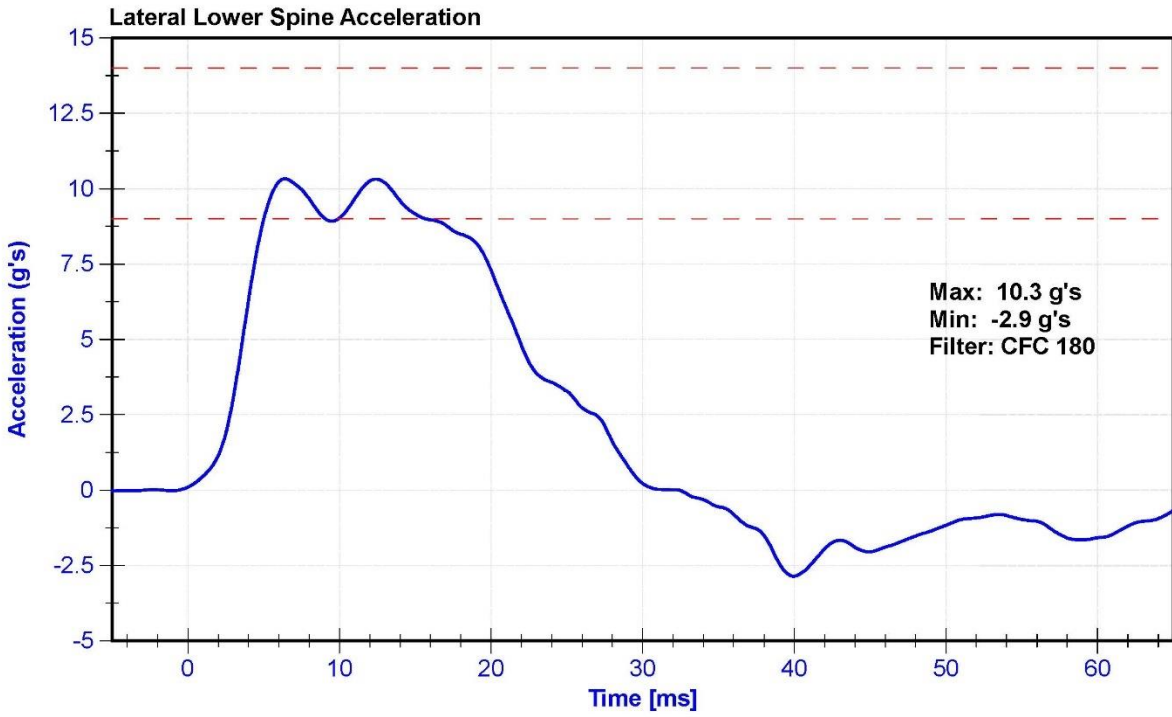
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	12	16	g's	14.1	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.0	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Abdomen Rib Potentiometer	Servo	008GFE	12/13/2022	6/13/2023
Lower Abdomen Rib Potentiometer	Servo	041 GFE	12/13/2022	6/13/2023







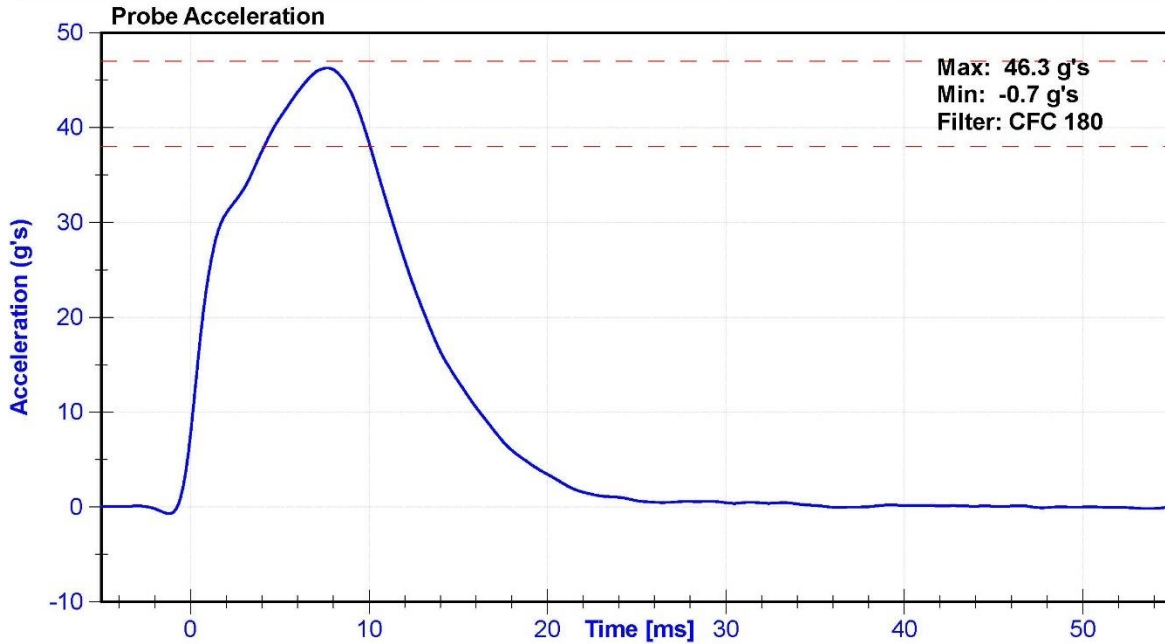
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

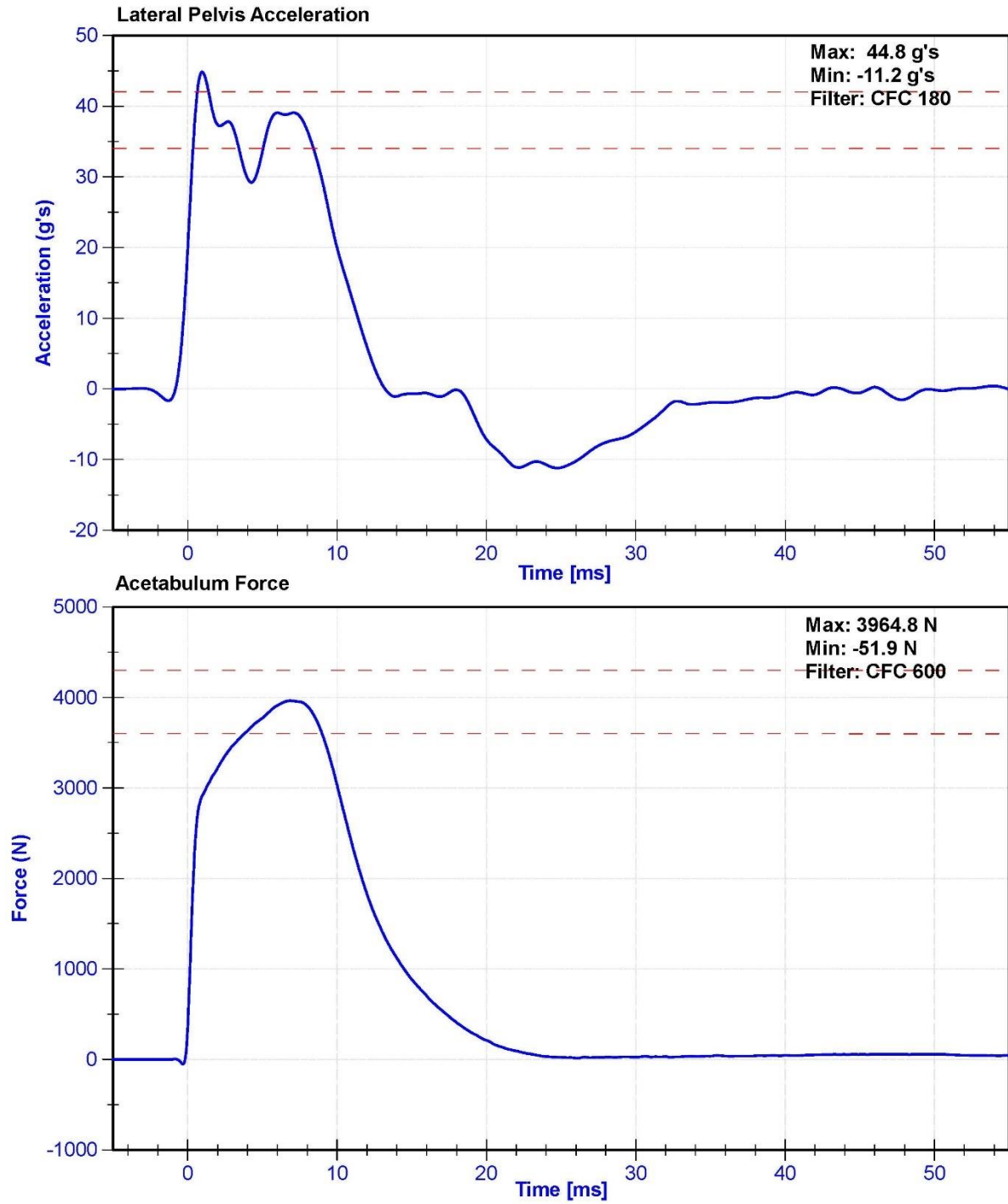
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	Pass
Velocity	6.6	6.8	m/s	6.73	Pass
Probe Acceleration	38	47	g's	46.3	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.1	Pass
Acetabulum Force	3600	4300	N	3964.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A





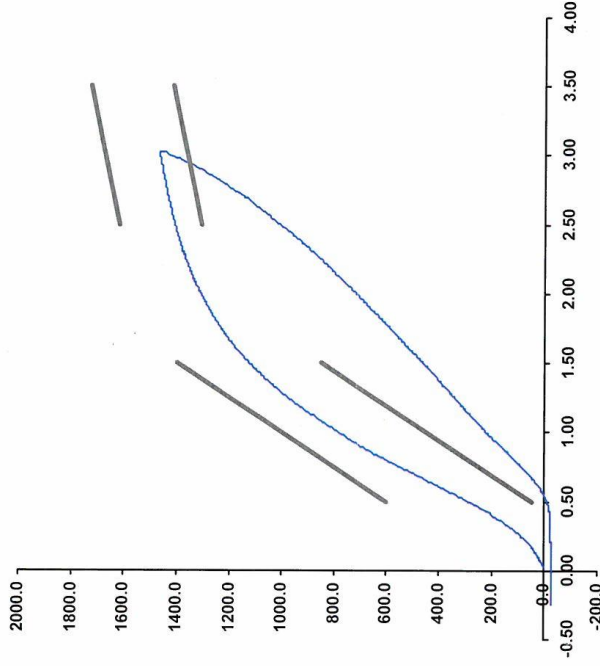


CEPRT
PG8012
3/1/2023

SID-Ils Pelvis Plug Certification Test

Force (-N) vs Extension (-mm)

Plug S/N 15223
Test Number 17974
Report Number 18023
Test Date 3/10/2021 12:37:55 PM



Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

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

Notes:

Operator _____
Part Number 180-4450

Template No 107 10-Mar-21
SACO Research

By: *DU* Date: *3/10/2021*
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



Impact
DC 8012
3/1/2023

SID-Ils Pelvis Plug Certification Test

Plug S/N 15452

Test Number 20113

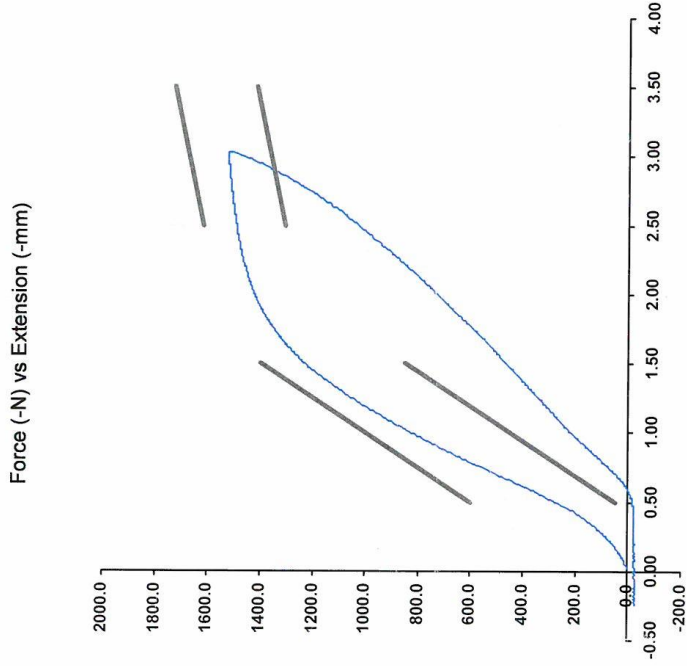
Report Number 20167

Test Date 9/9/2021 10:51:21 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

Testing Machine STM-20 5965542
 Load Cell S/N (F1360947), Units (LBS) 1000
 Preload Value (-N) 22.24
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator _____
 Part Number 180-4450

Template No 107 09-Sep-21
 SACO Research

By: *De* Date: *9/9/2021*
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 Fax



*Non Impact
DC8012 3/1/2023*

SID-IIs Pelvis Plug Certification Test

Plug S/N 15465

Test Number 20184

Report Number 20238

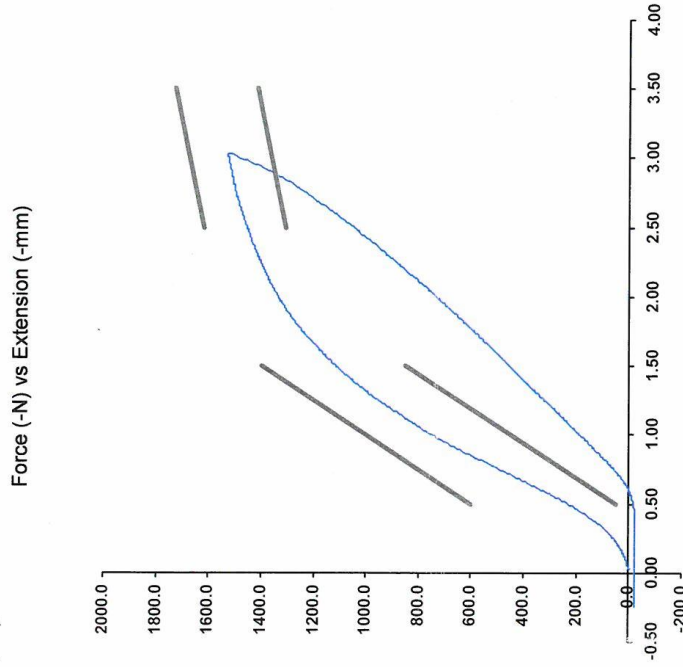
Test Date 9/22/2021 8:01:26 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000

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

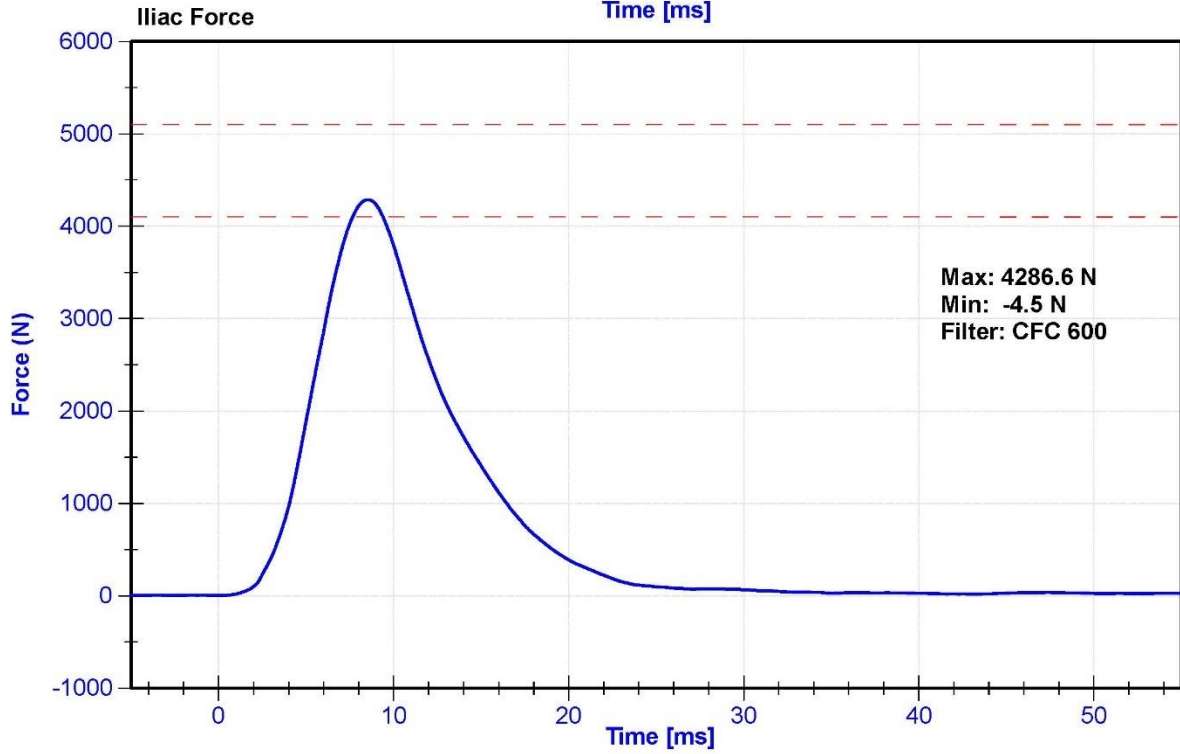
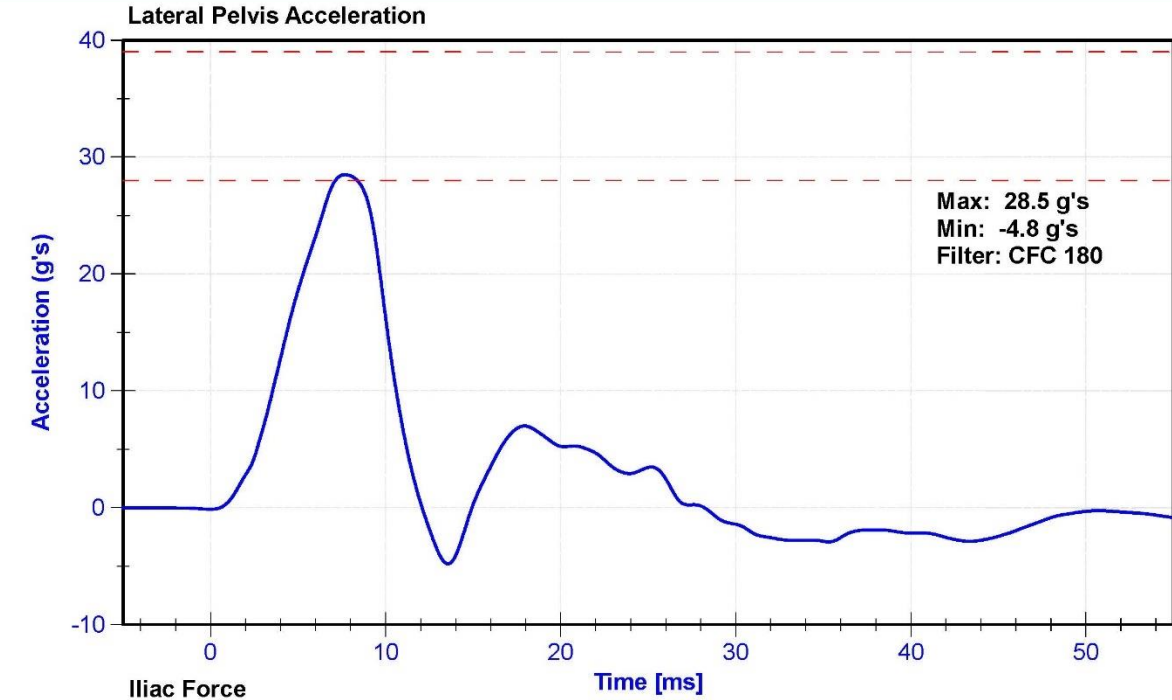
Notes:



Operator _____ Part Number 180-4450

Template No 107 22-Sep-21
SACO Research

By: *DC* Date: *9/22/2021*
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

SERIAL NO: F033

(CONFIGURED FOR LEFT SIDE IMPACT)

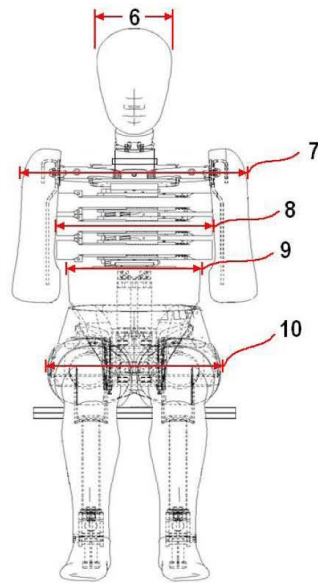


External Measurements - EuroSID-2re

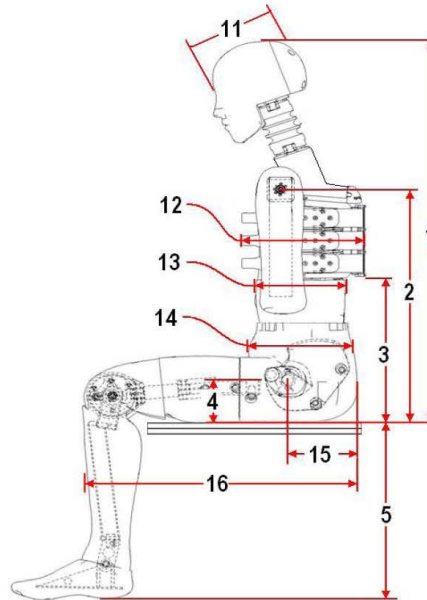
Technician: K. Brogan

Date: 04/14/2023

Dummy Serial Number: F033



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	912	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	353	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	422	Pass
6	Head Width	152	158	157	Pass
7	Shoulder/Arm Width	461	479	471	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	201	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

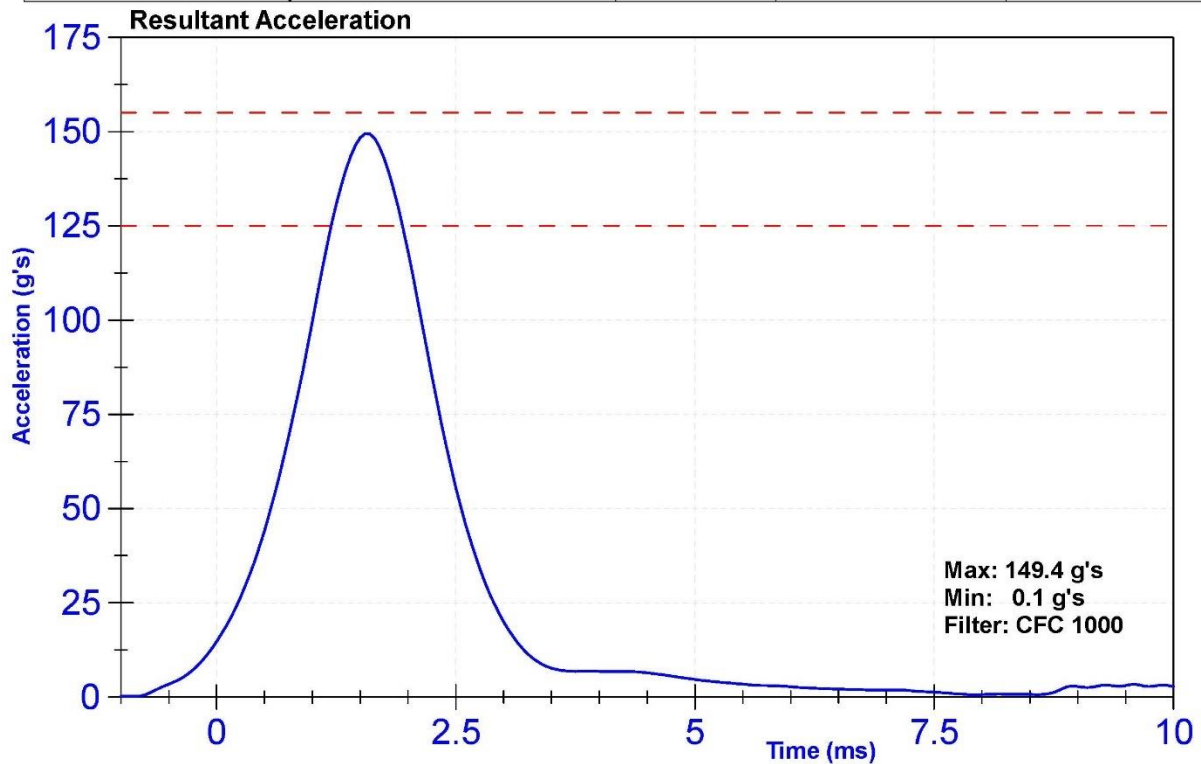
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

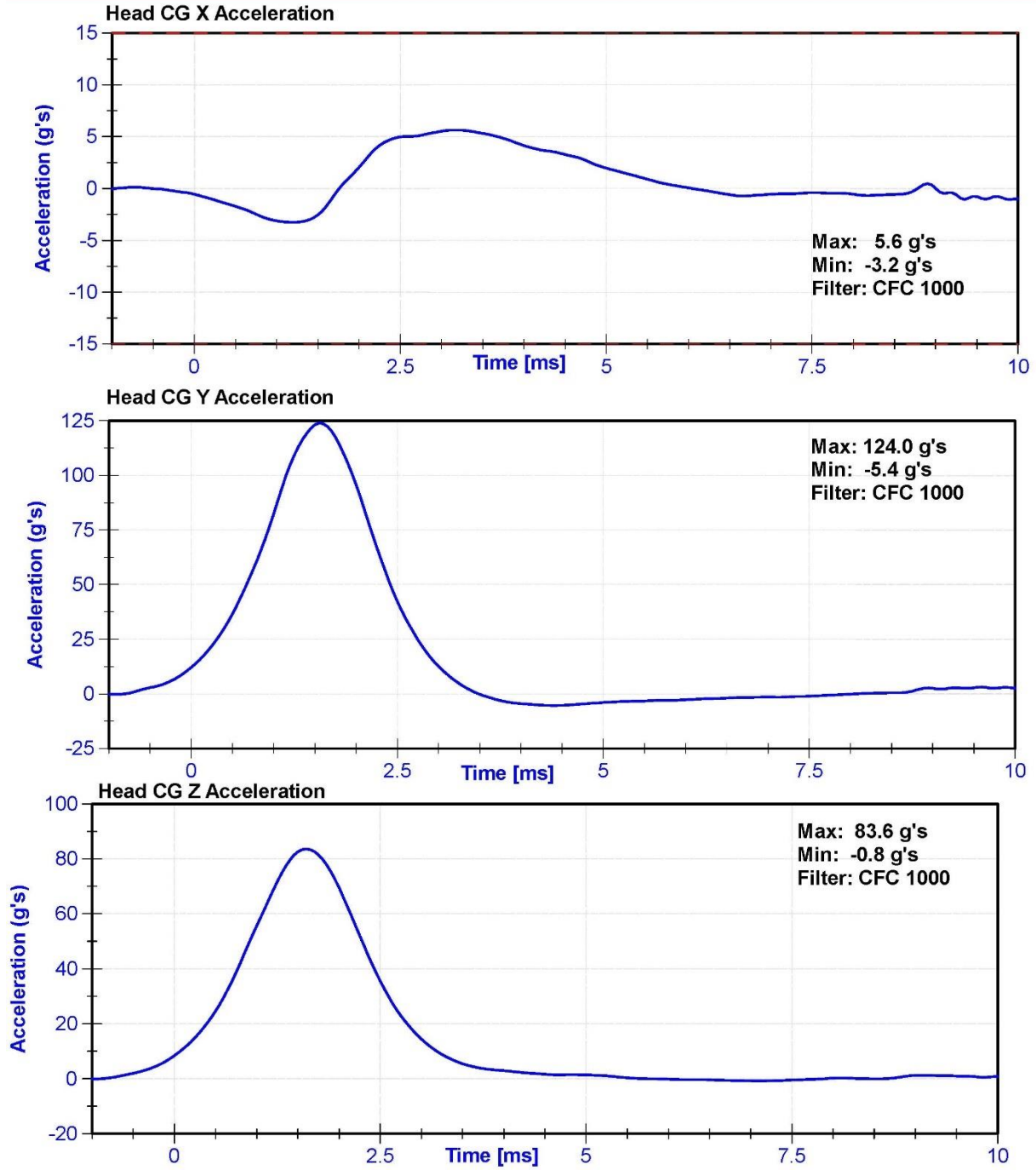
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Resultant Acceleration	125	155	g's	149.4	Pass
Oscillation	0	15	%	4.59	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	P63861	1/17/2023	7/16/2023
Y Accelerometer	Endevco	P49216	1/17/2023	7/16/2023
Z Accelerometer	Endevco	P51303	1/17/2023	7/16/2023





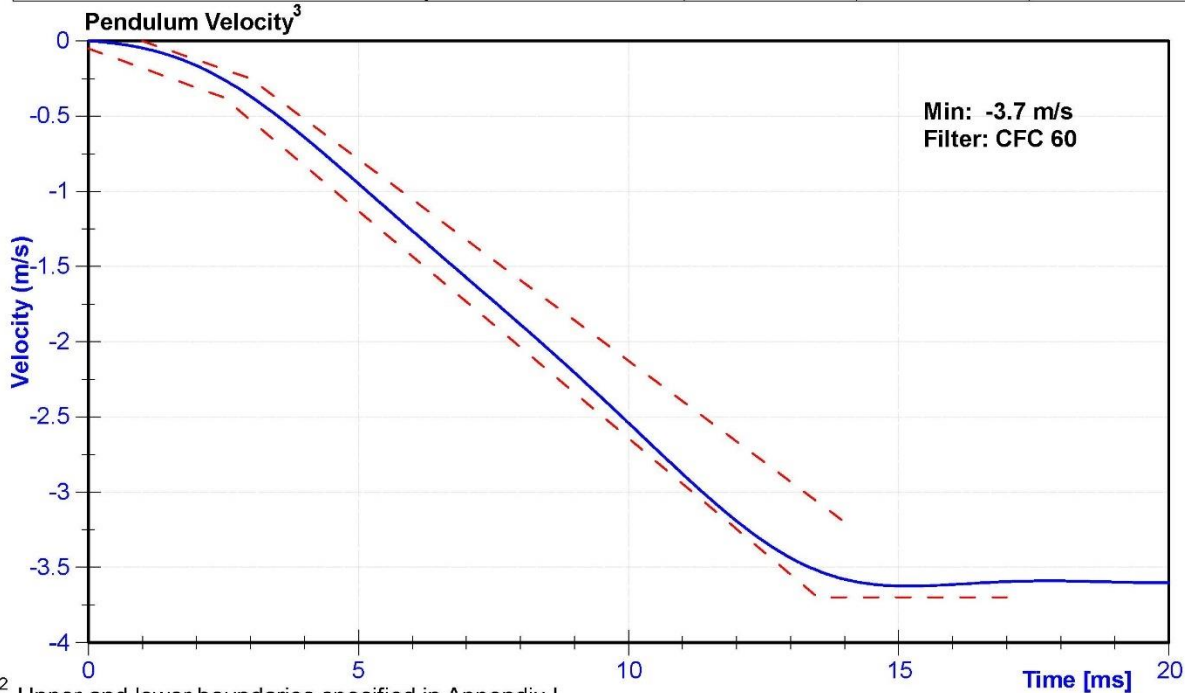
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

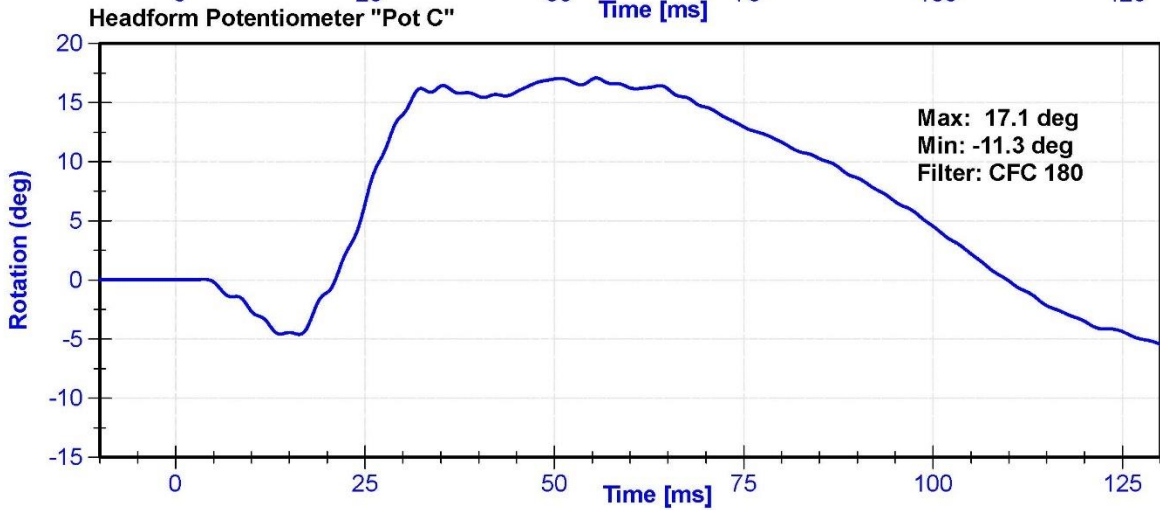
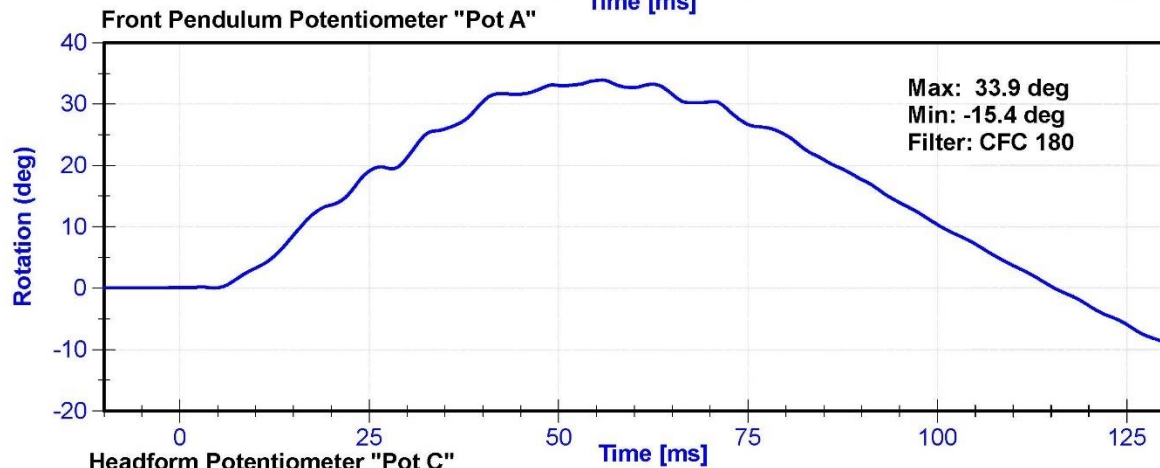
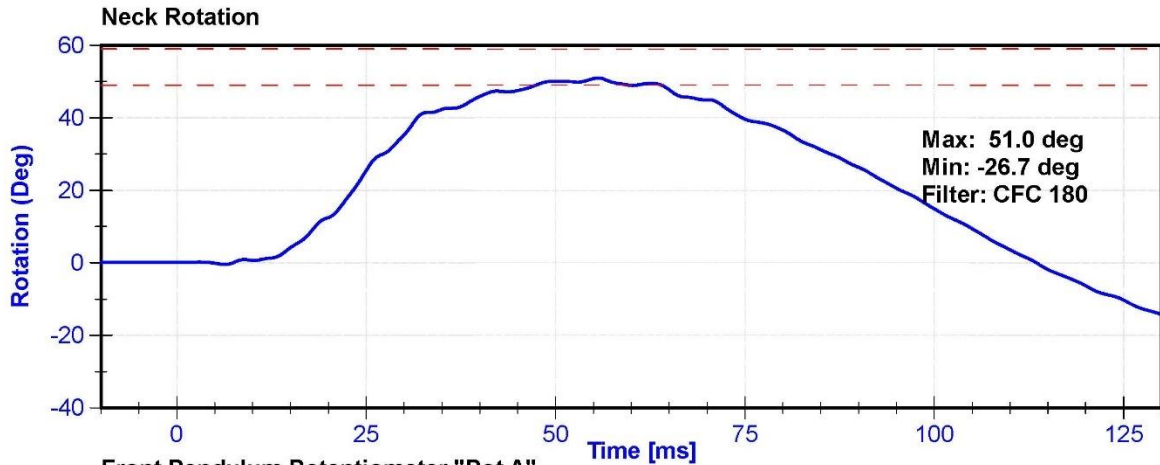
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29.2	Pass
Velocity	3.3	3.5	m/s	3.43	Pass
Lateral Neck Rotation	49	59	deg	51.0	Pass
Time at Maximum Rotation	54	66	ms	55.6	Pass
Time of Rotation Decay from Maximum	53	88	ms	57.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



^{1,2} Upper and lower boundaries specified in Appendix I



Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

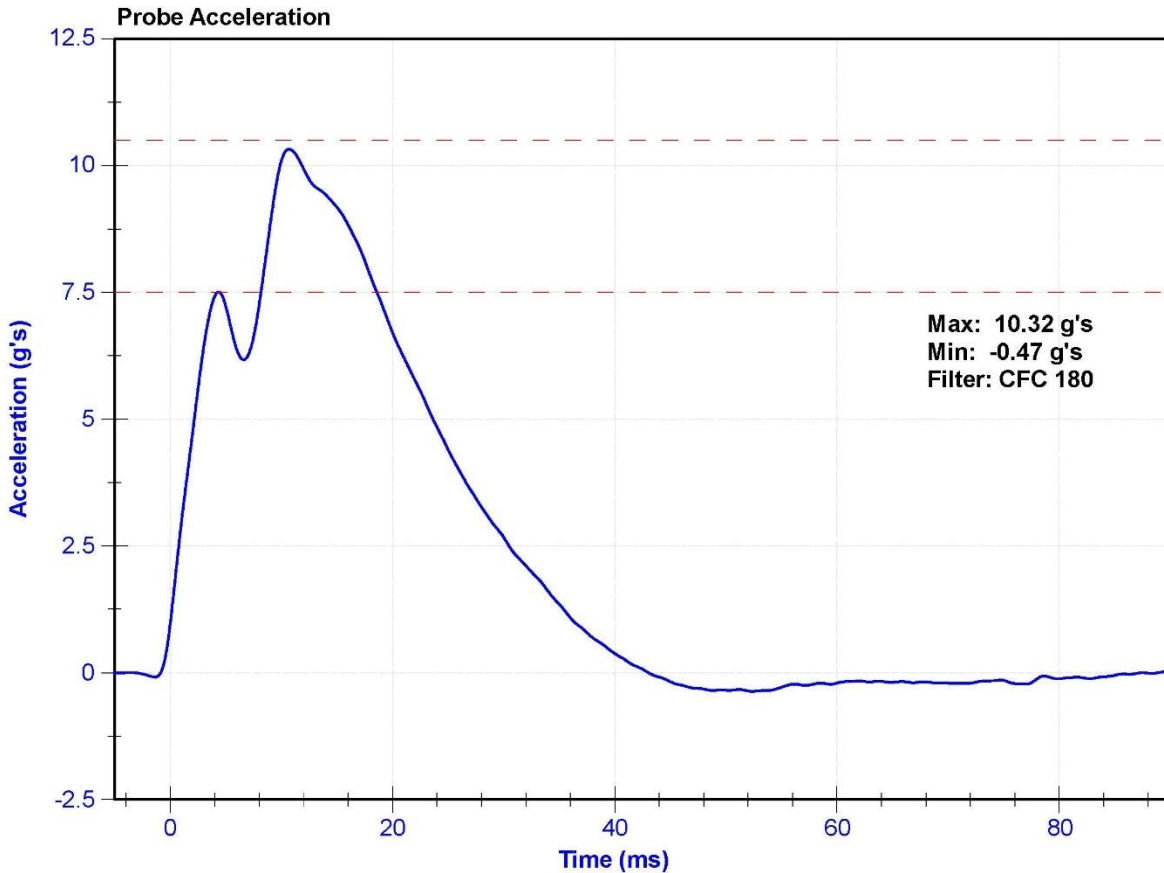
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	7.5	10.5	g's	10.32	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023



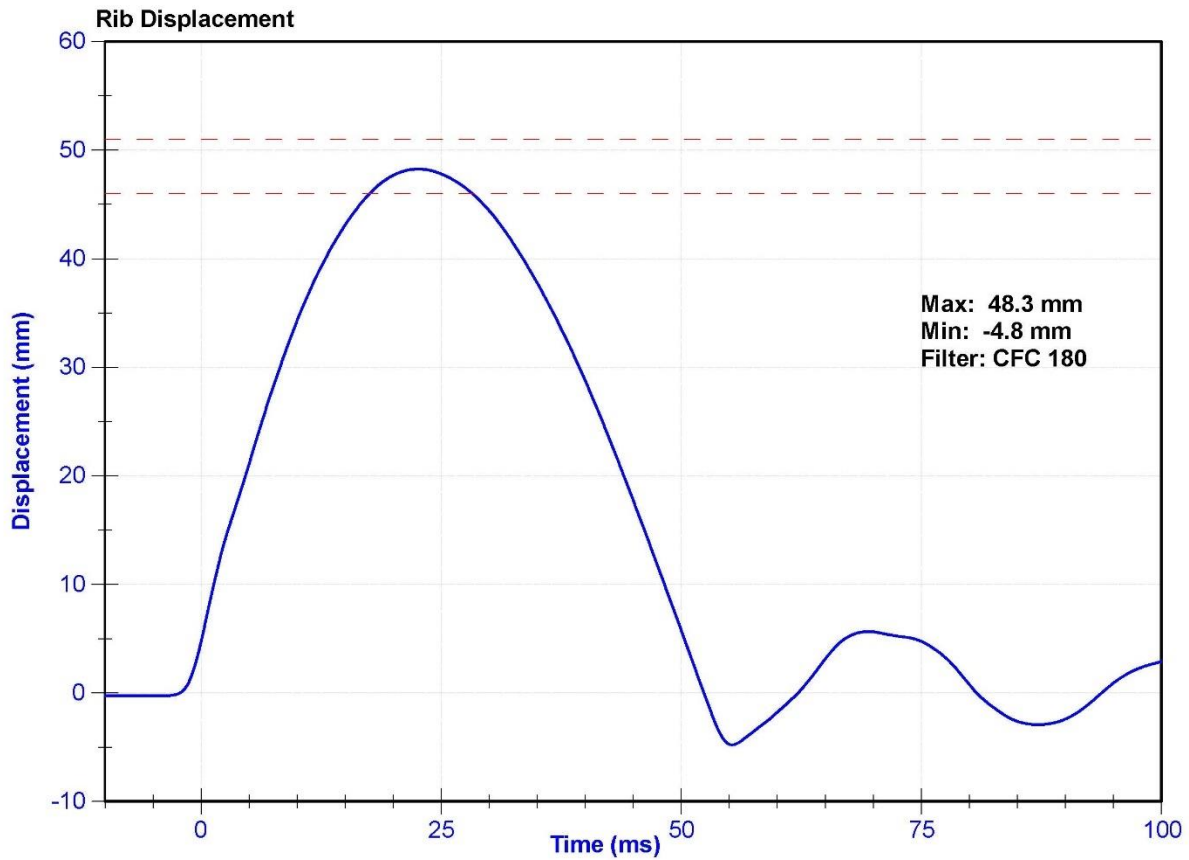
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Rib Displacement	46	51	mm	48.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



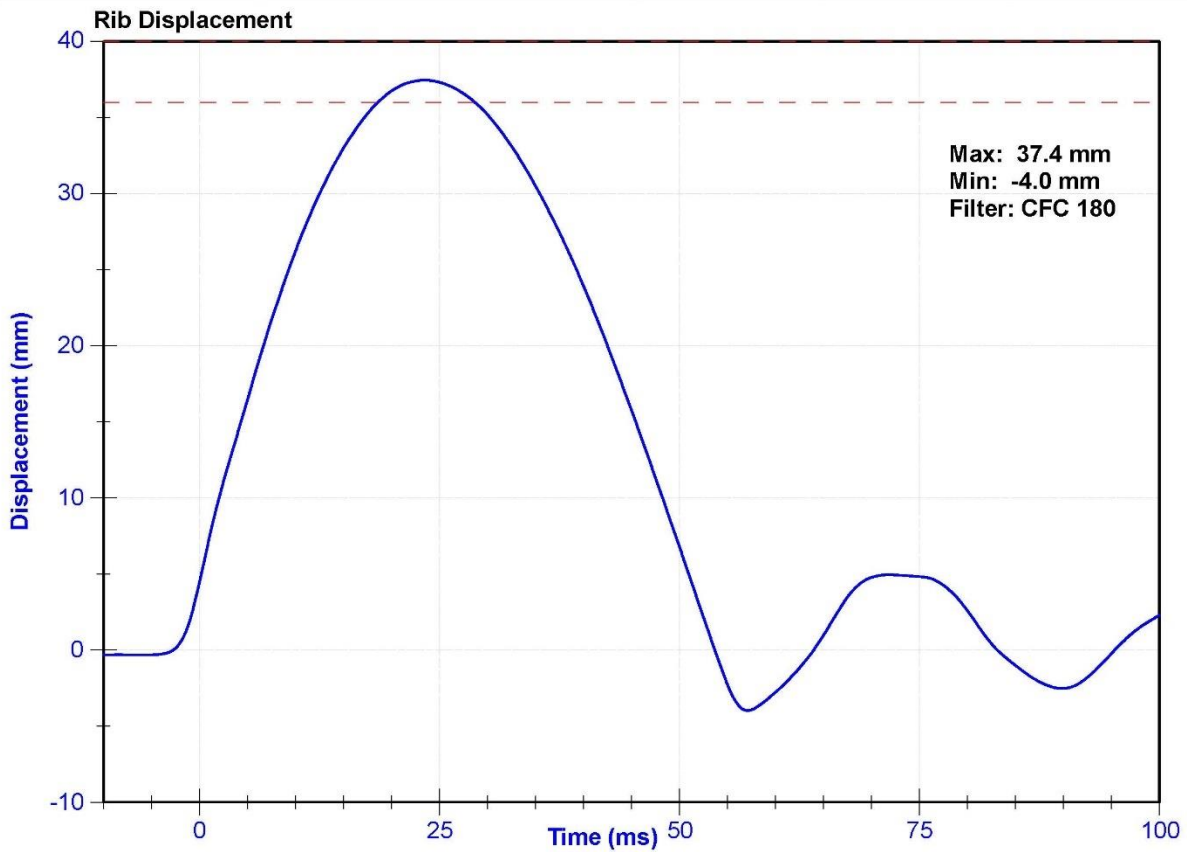
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



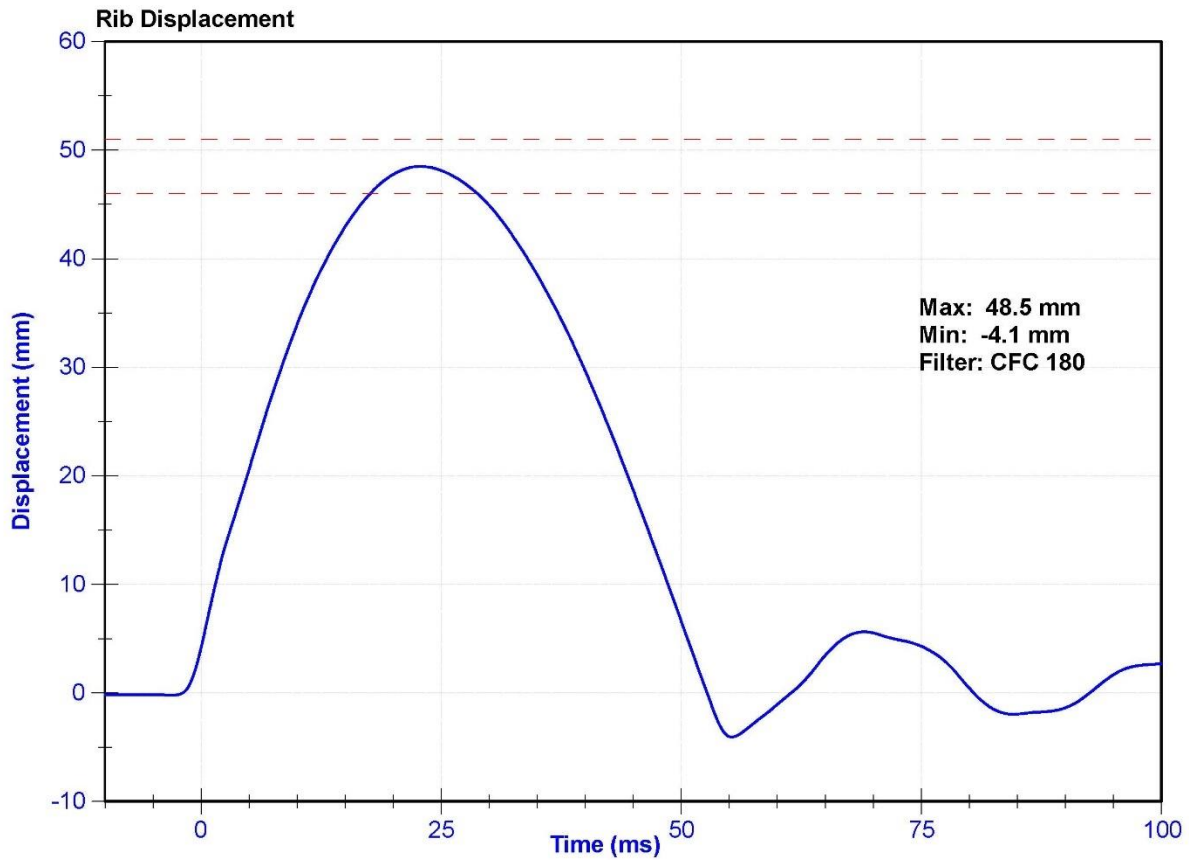
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



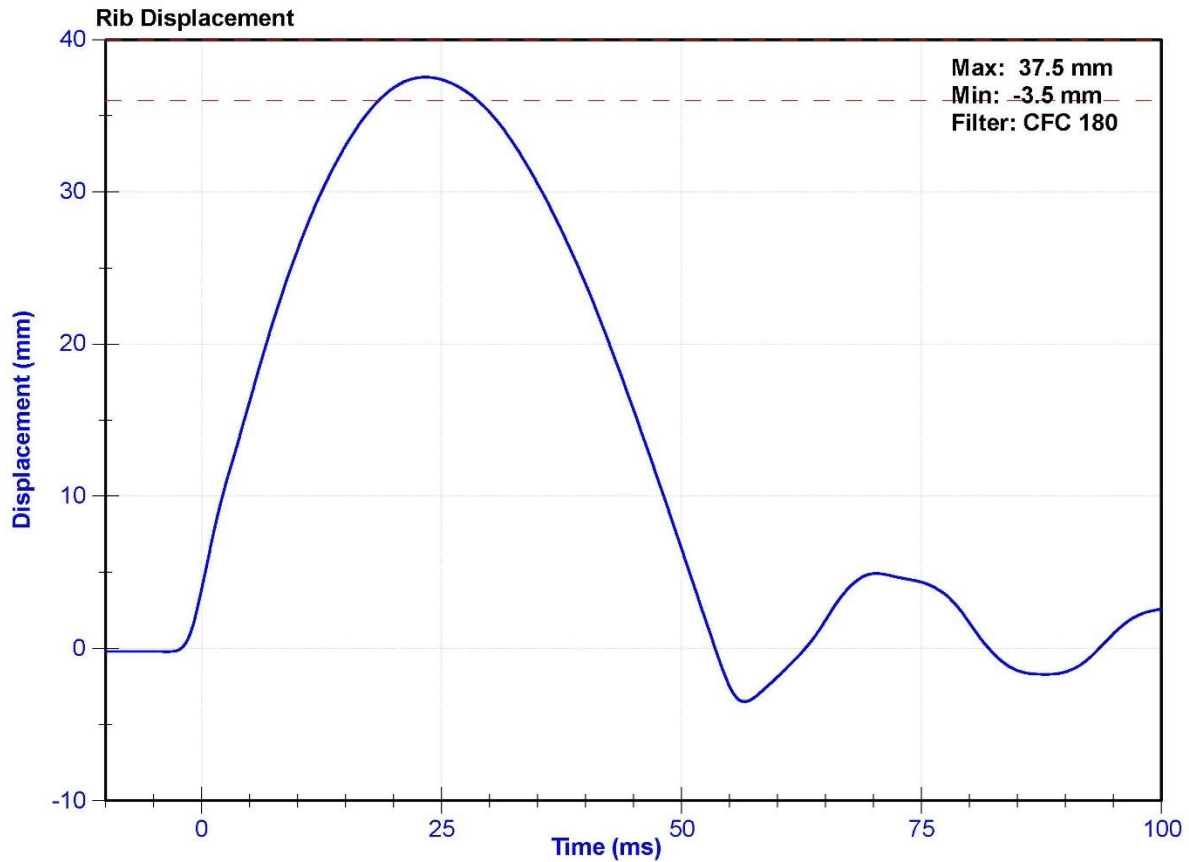
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



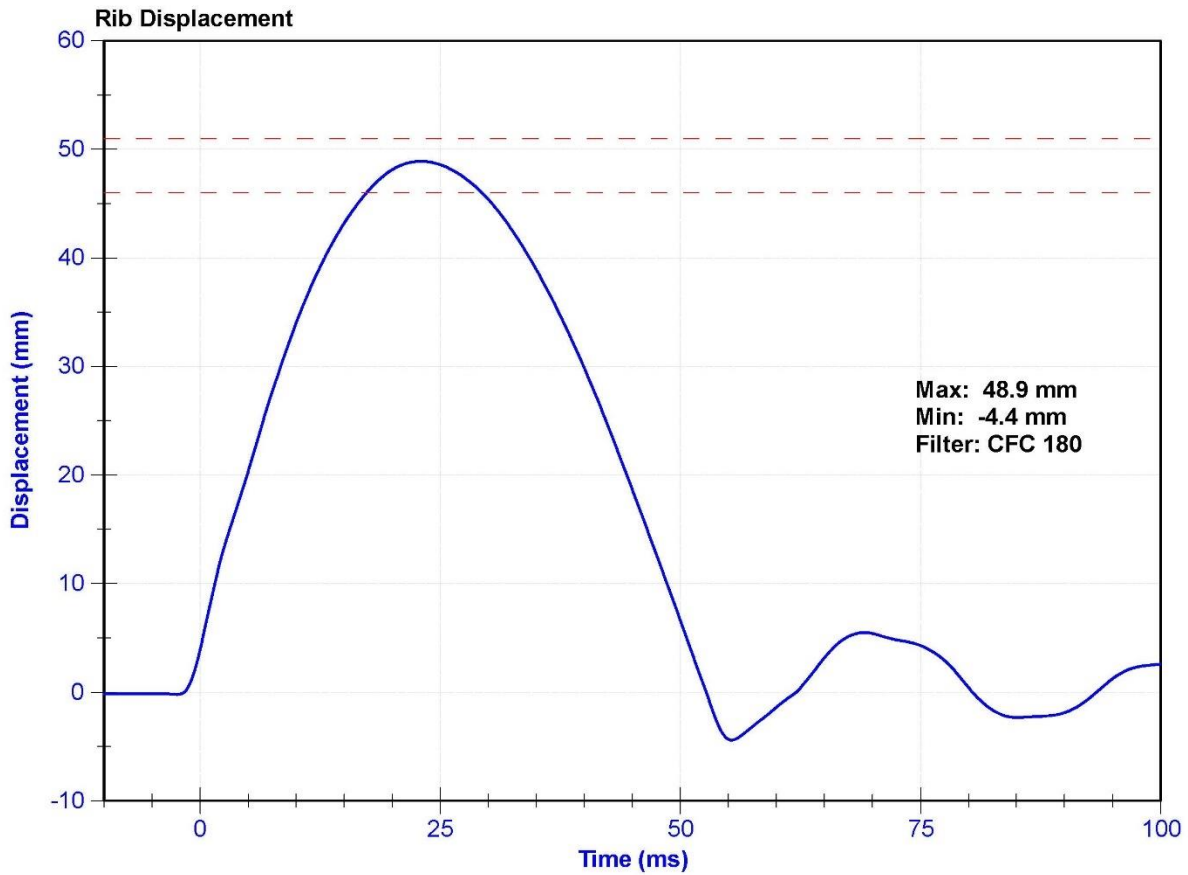
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Rib Displacement	46	51	mm	48.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



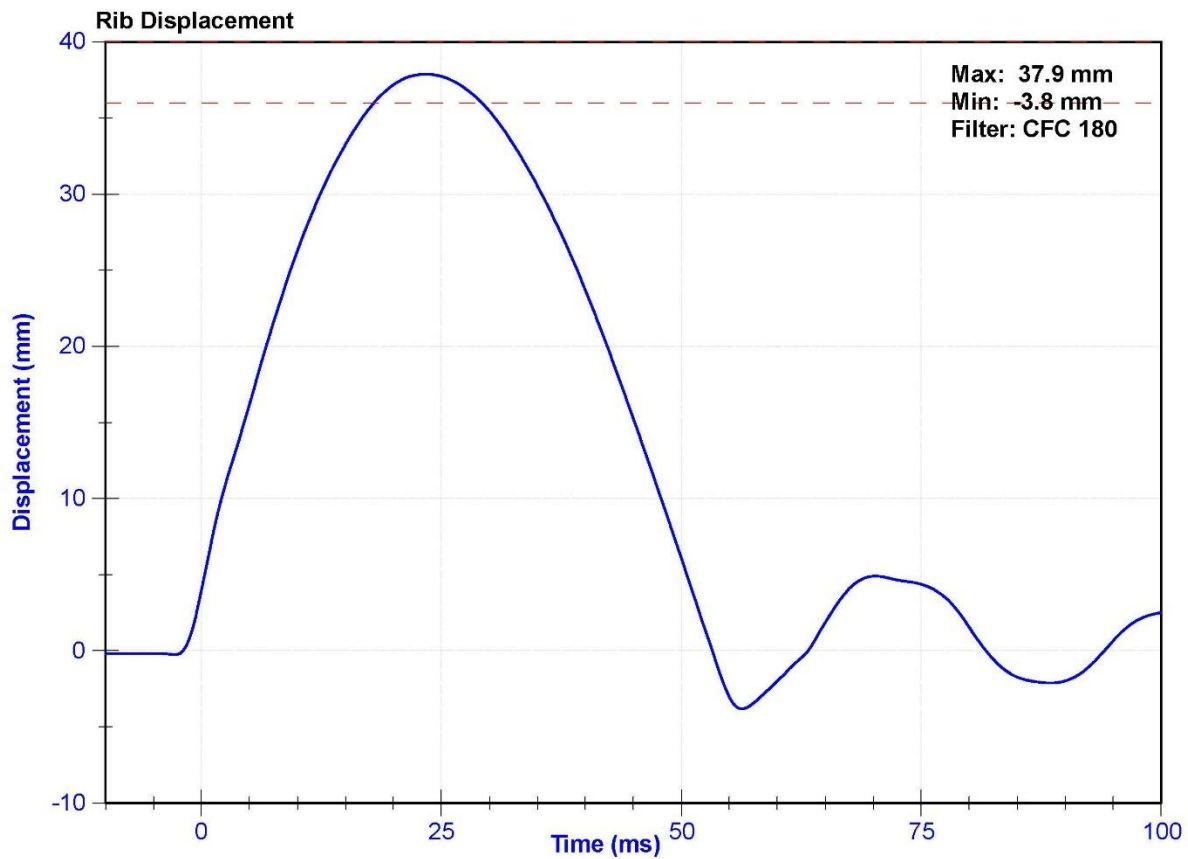
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



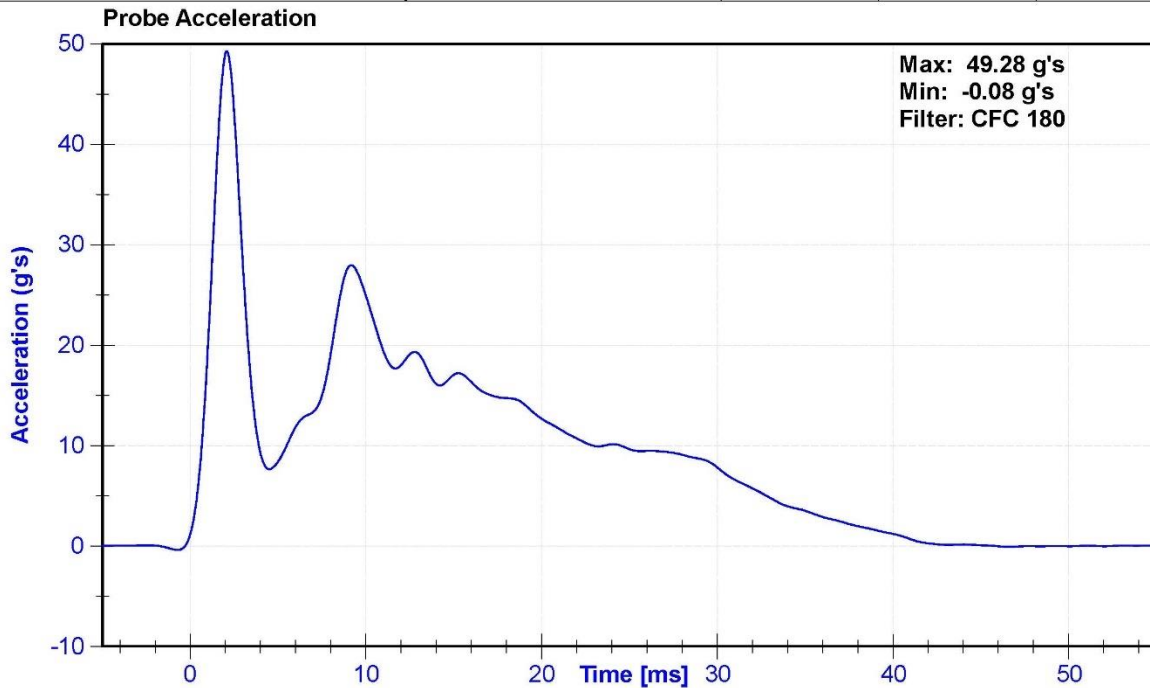
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

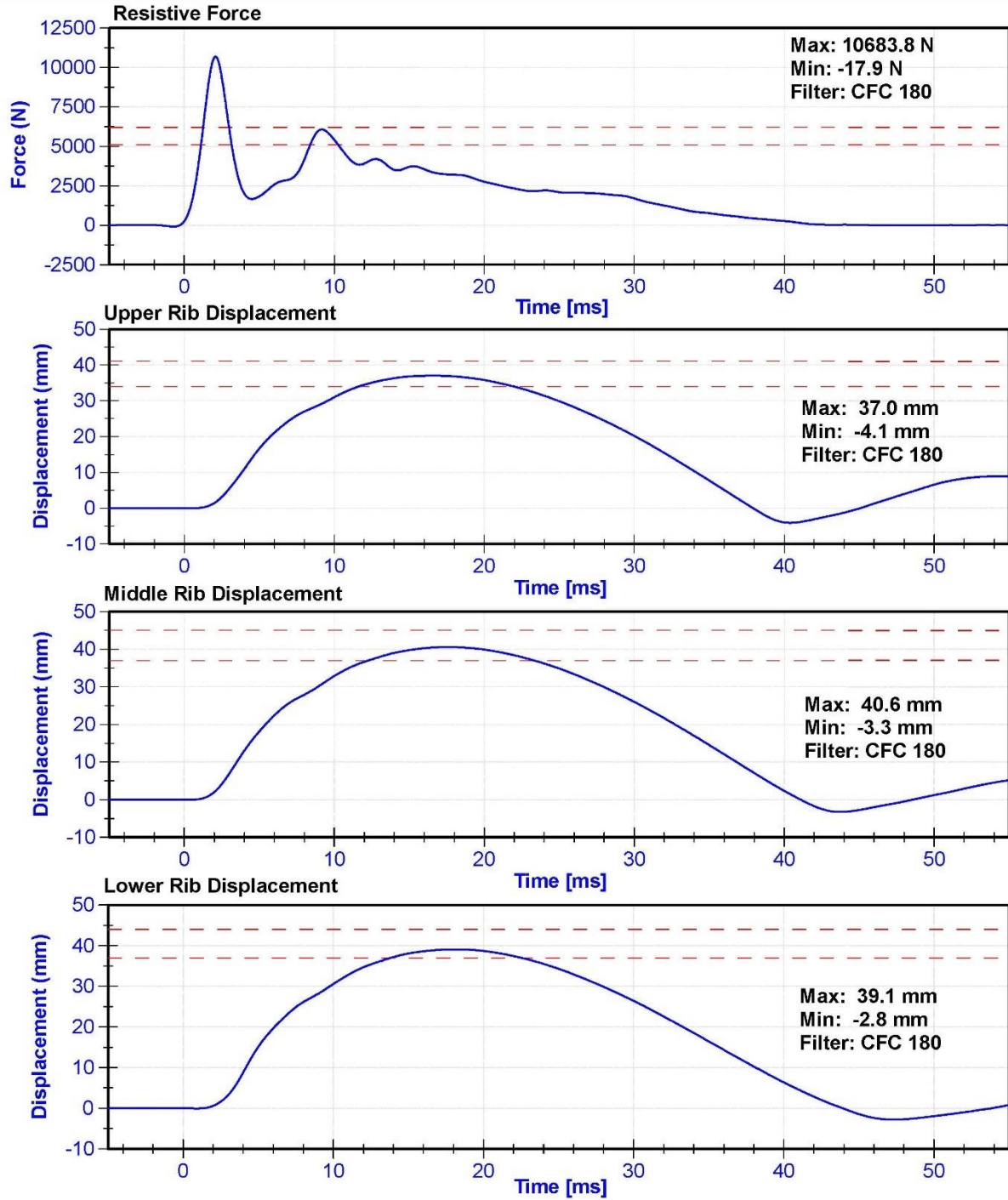
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	6068.6	Pass
Upper Thorax Rib Deflection	34	41	mm	37.0	Pass
Mid Thorax Rib Deflection	37	45	mm	40.6	Pass
Lower Thorax Rib Deflection	37	44	mm	39.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Thorax Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023
Lower Thorax Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023





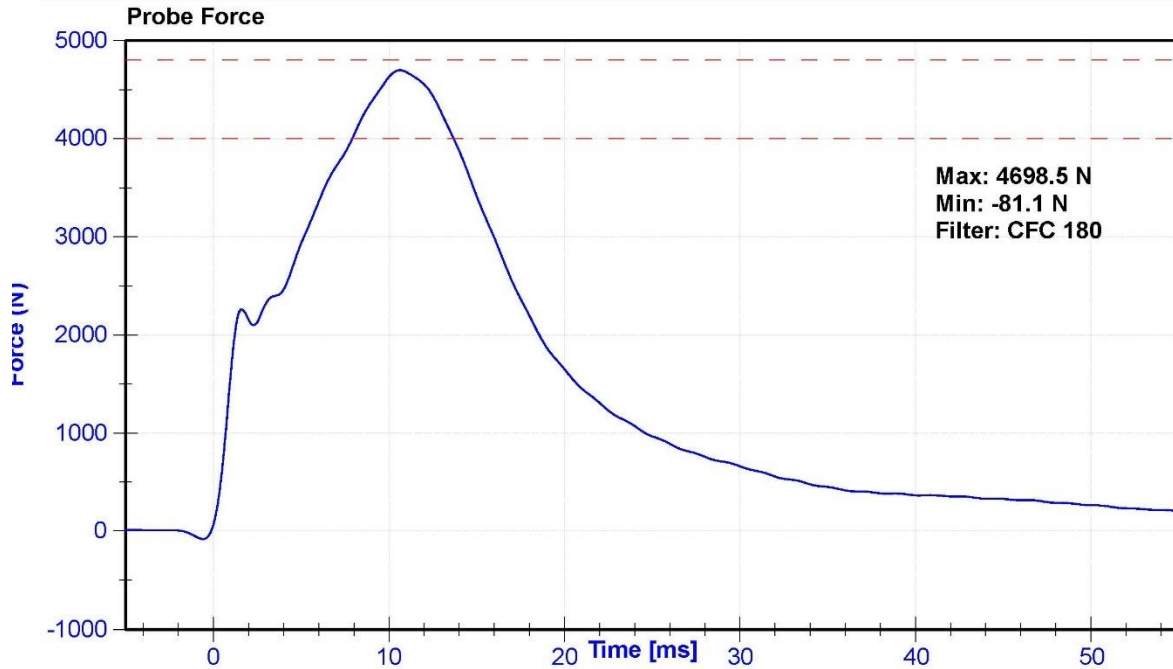
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

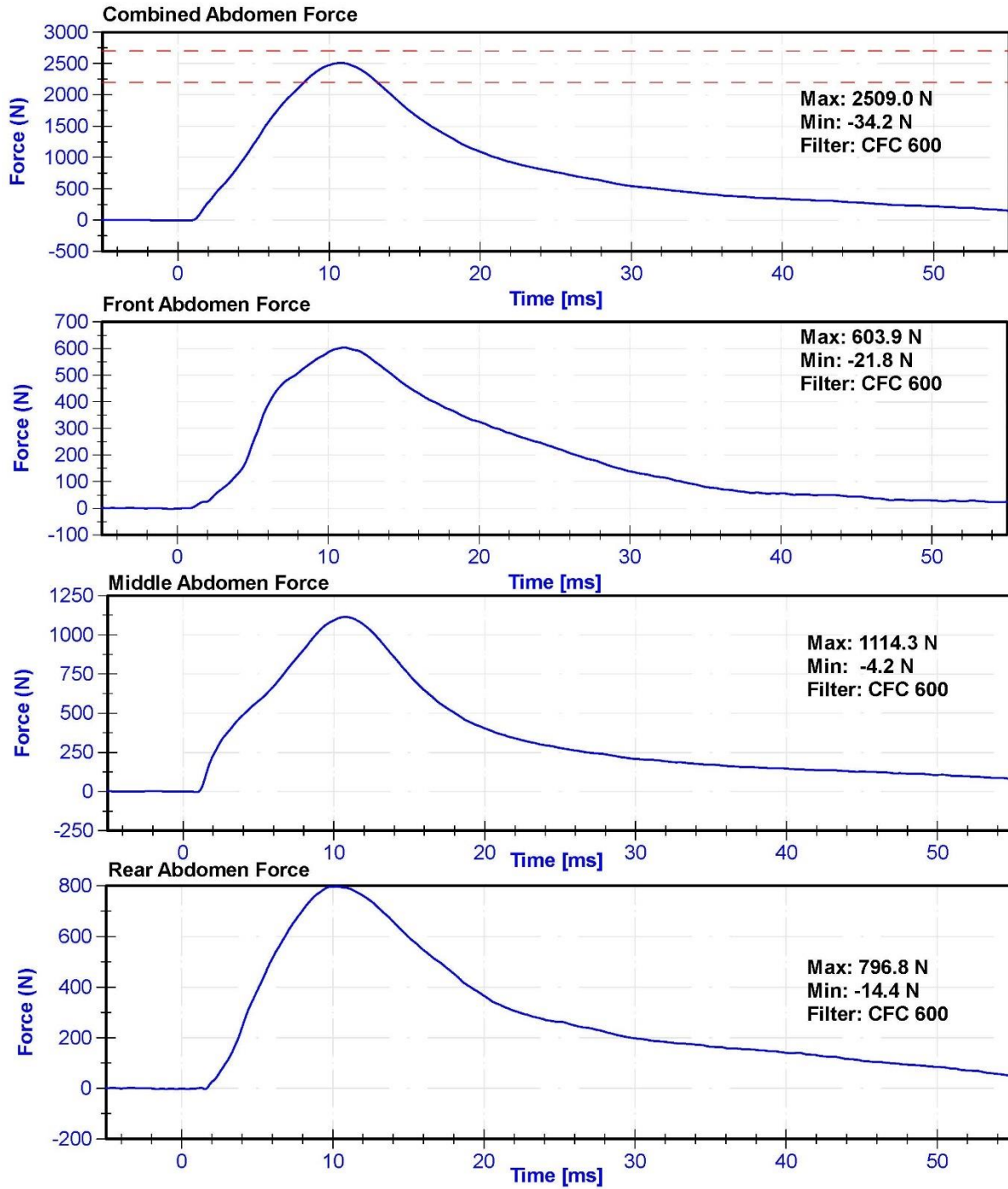
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	3.9	4.1	m/s	4.04	Pass
Combined Abdomen Force	2200	2700	N	2509.0	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.80	Pass
Resistive Probe Force	4000	4800	N	4698.5	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.65	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023





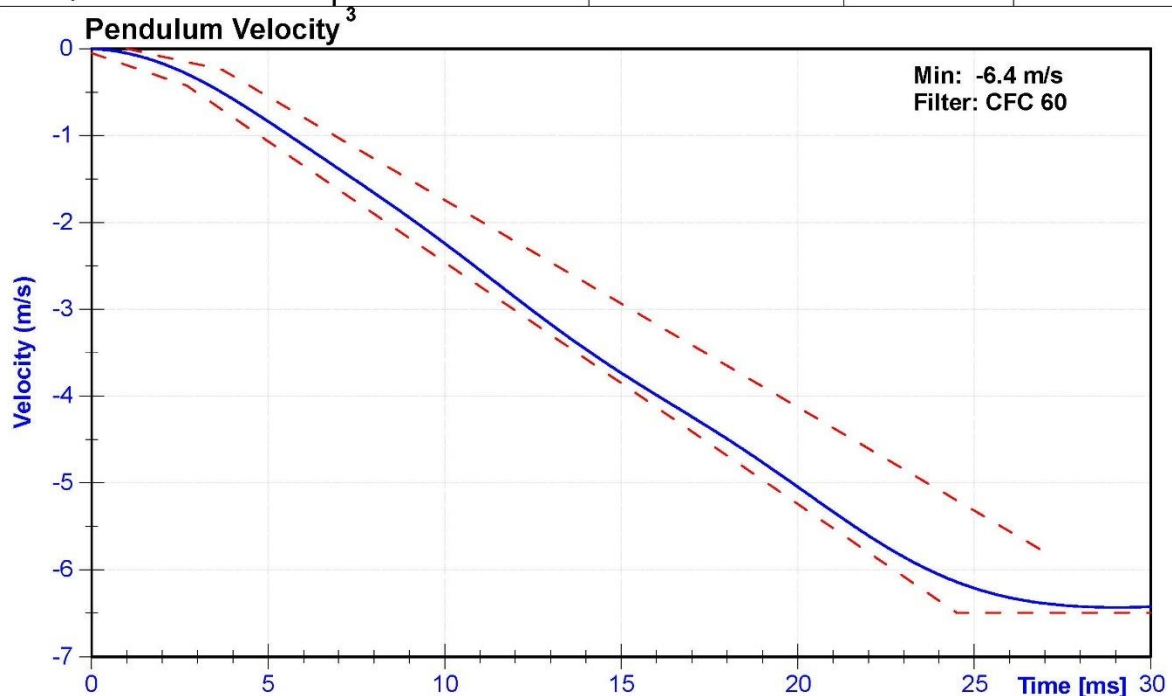
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

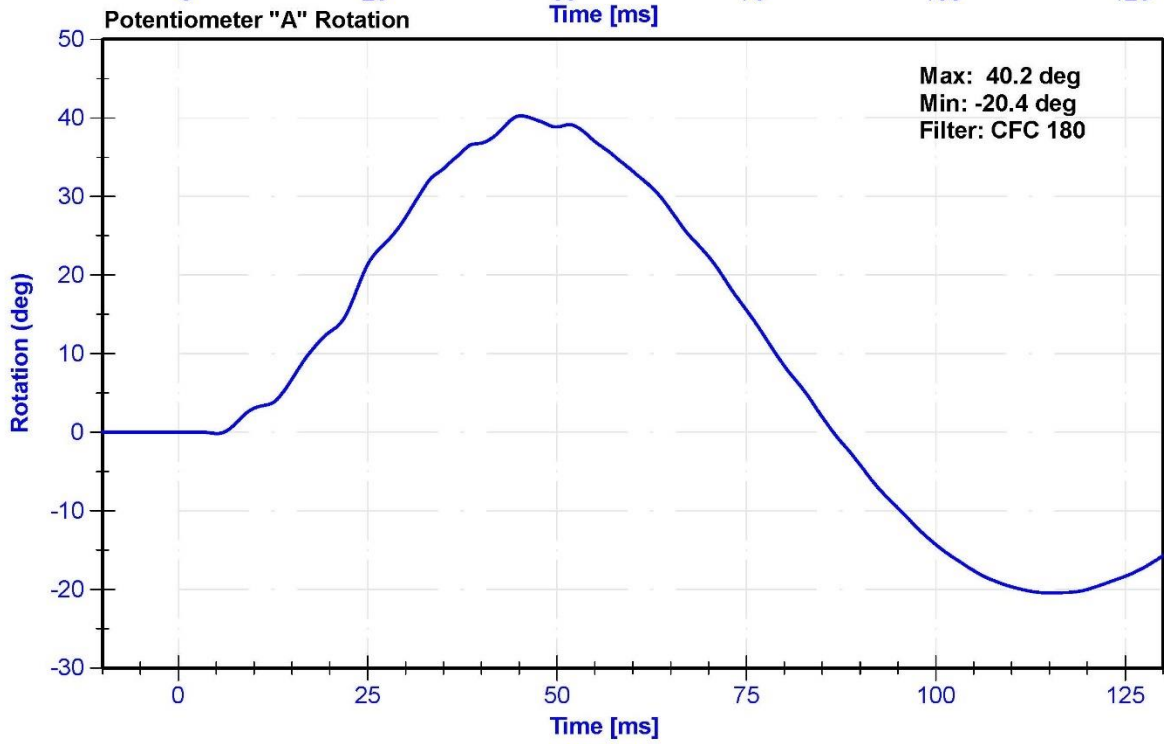
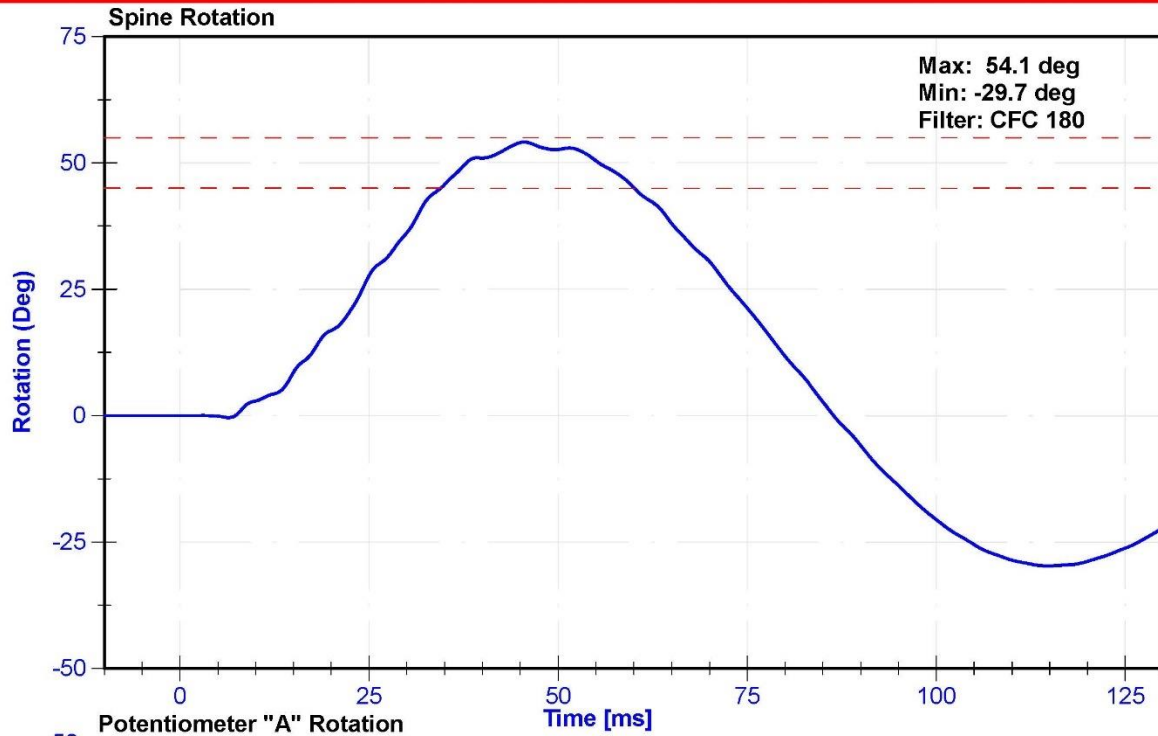
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29.2	Pass
Velocity	5.95	6.15	m/s	6.081	Pass
Lateral Spine Rotation	45	55	deg	54.1	Pass
Time at Maximum Rotation	39	53	ms	45.5	Pass
Time of Decay to Zero Degrees	37	57	ms	40.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

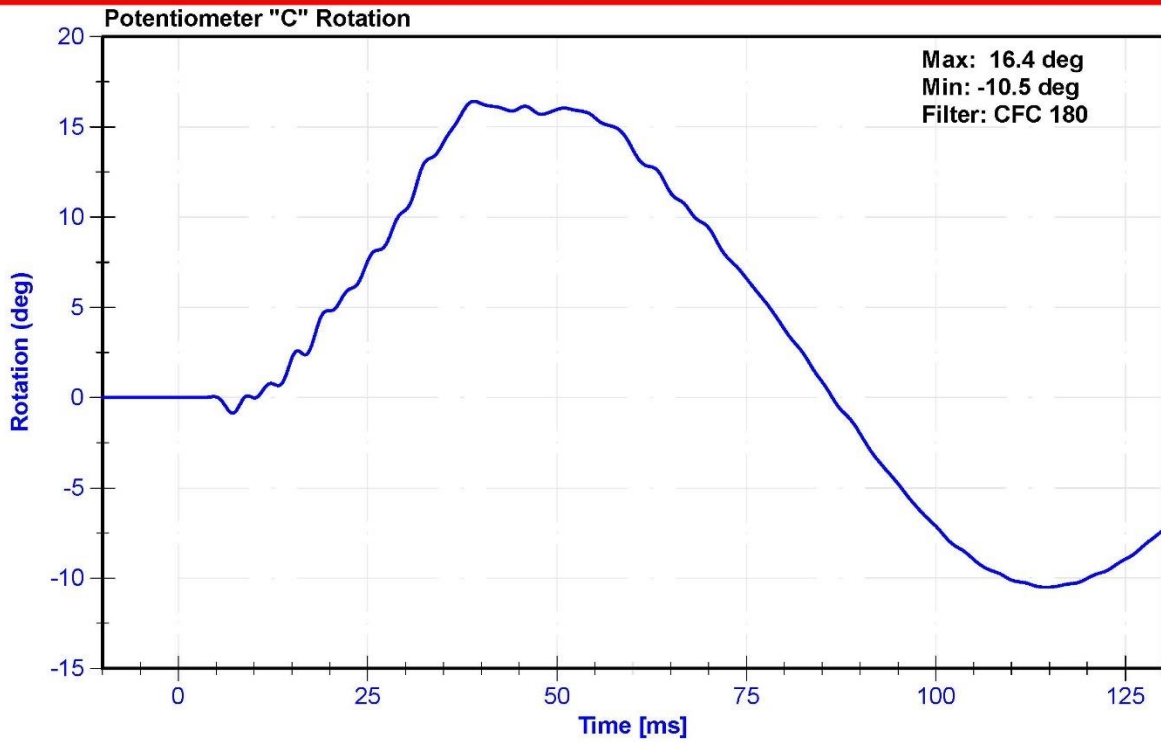
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



^{1,2} Upper and lower boundaries specified in Appendix I





Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.5
		30.0	-6.5

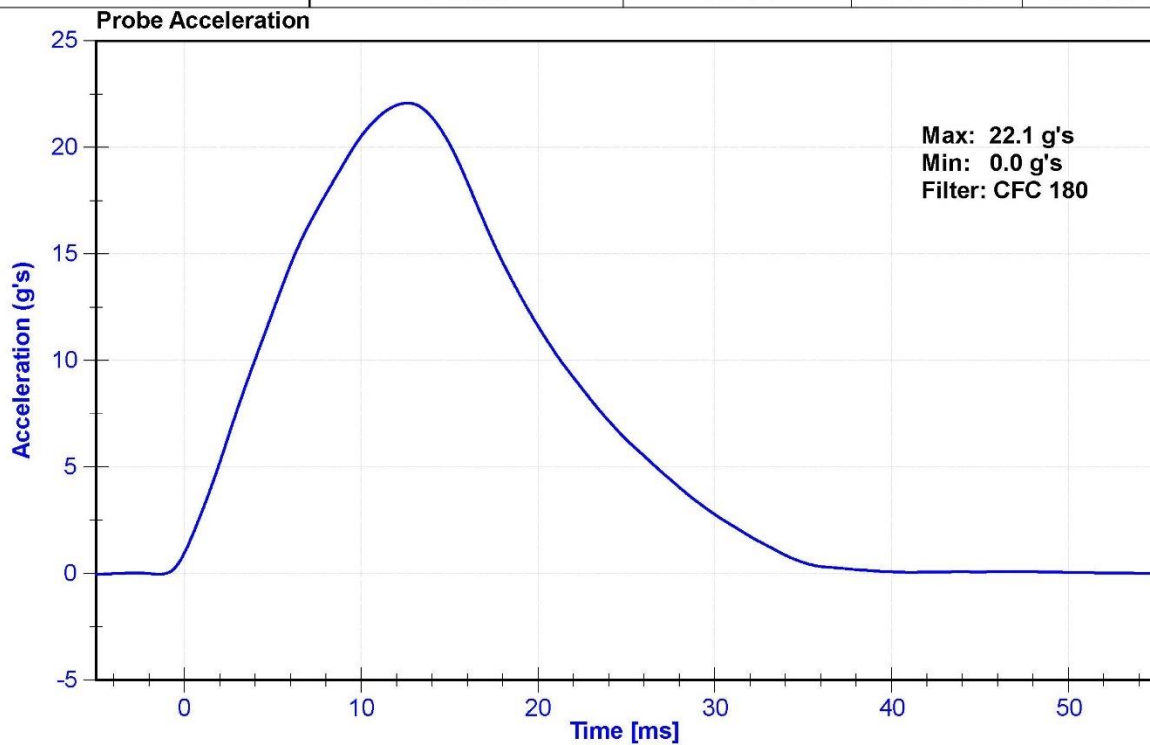
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

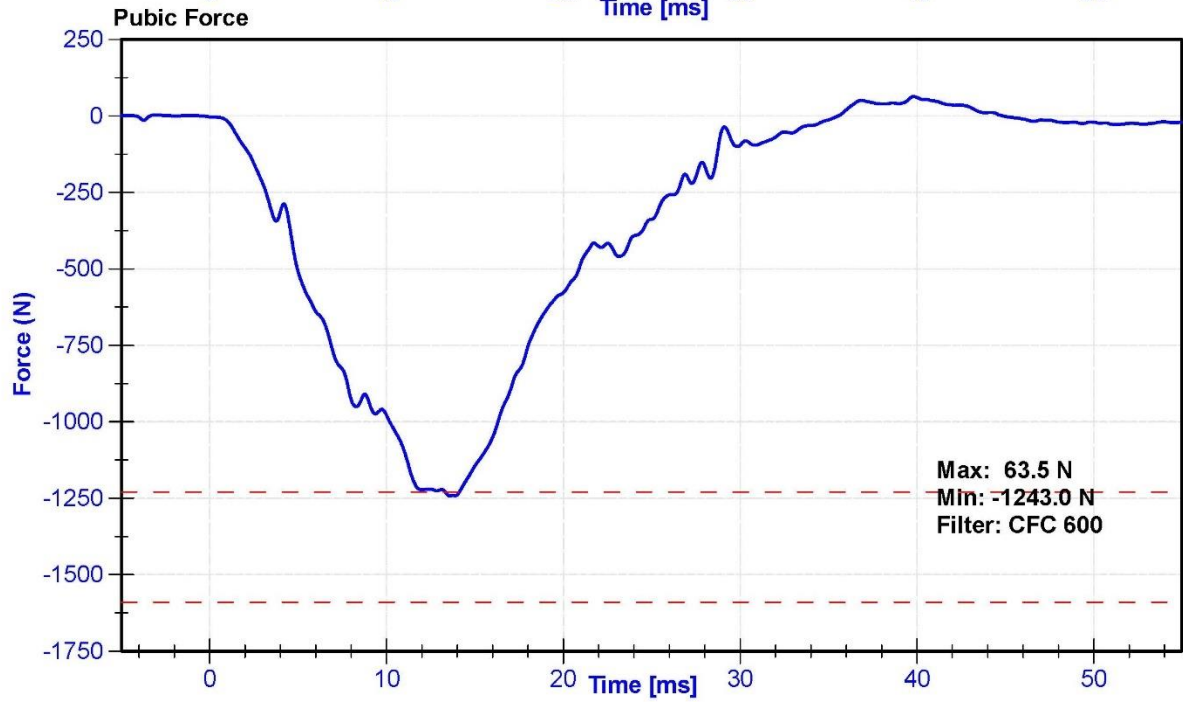
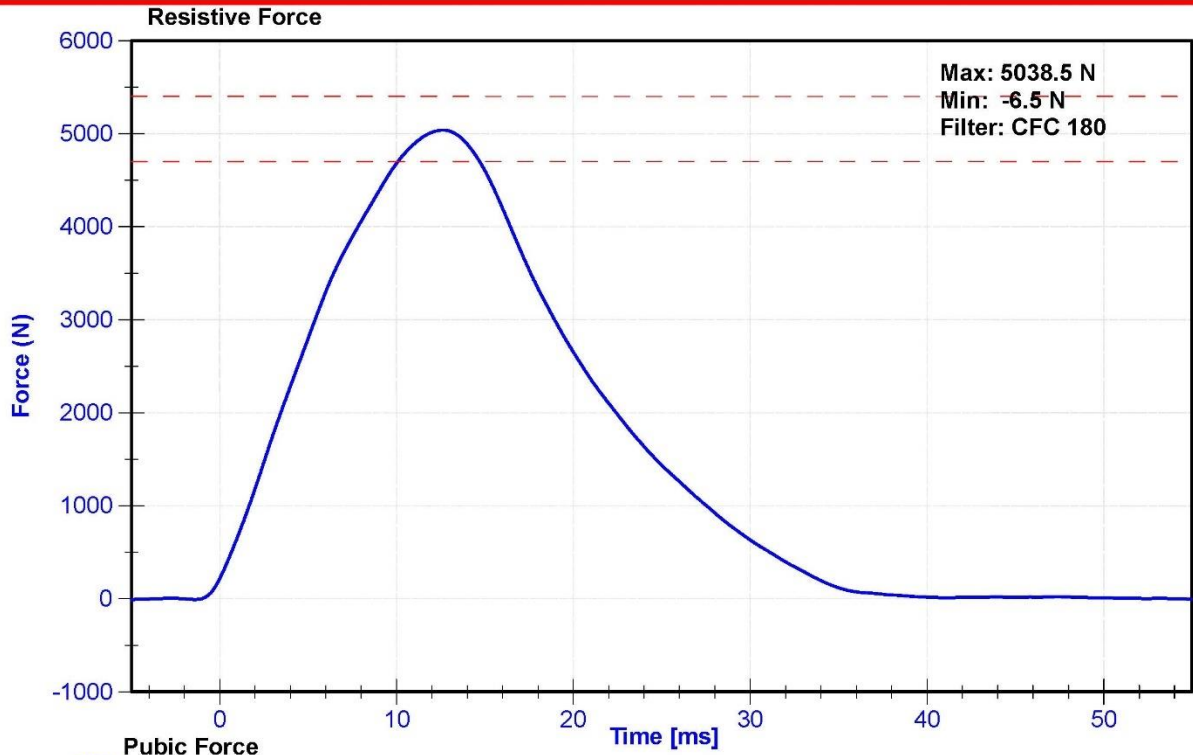
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Resistive Force	4700	5400	N	5038.5	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.65	Pass
Pubic Force	-1590	-1230	N	-1243.0	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.55	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Pubic Load Cell	Denton	459-FY	6/14/2022	6/14/2023





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL No: DG8012

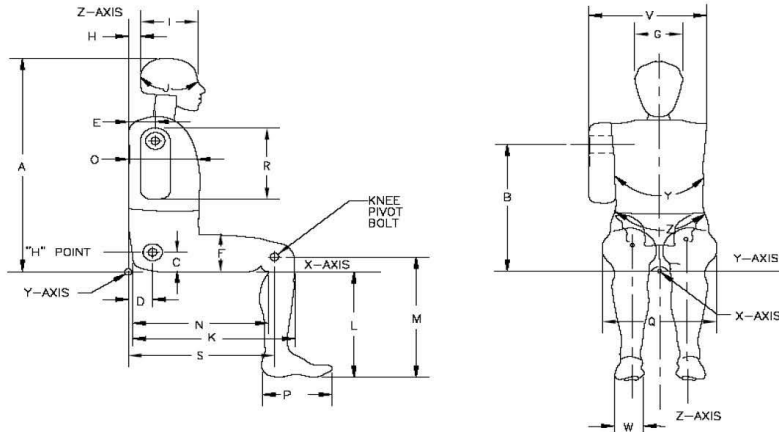


External Measurements - SID-IIs

Technician: K. Brogan

Date: 04/14/2023

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	82	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	142	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	527	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	401	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	200	Pass
P	Foot Length	216	232	226	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	872	Pass
Z	Waist Circumference	761	791	778	Pass

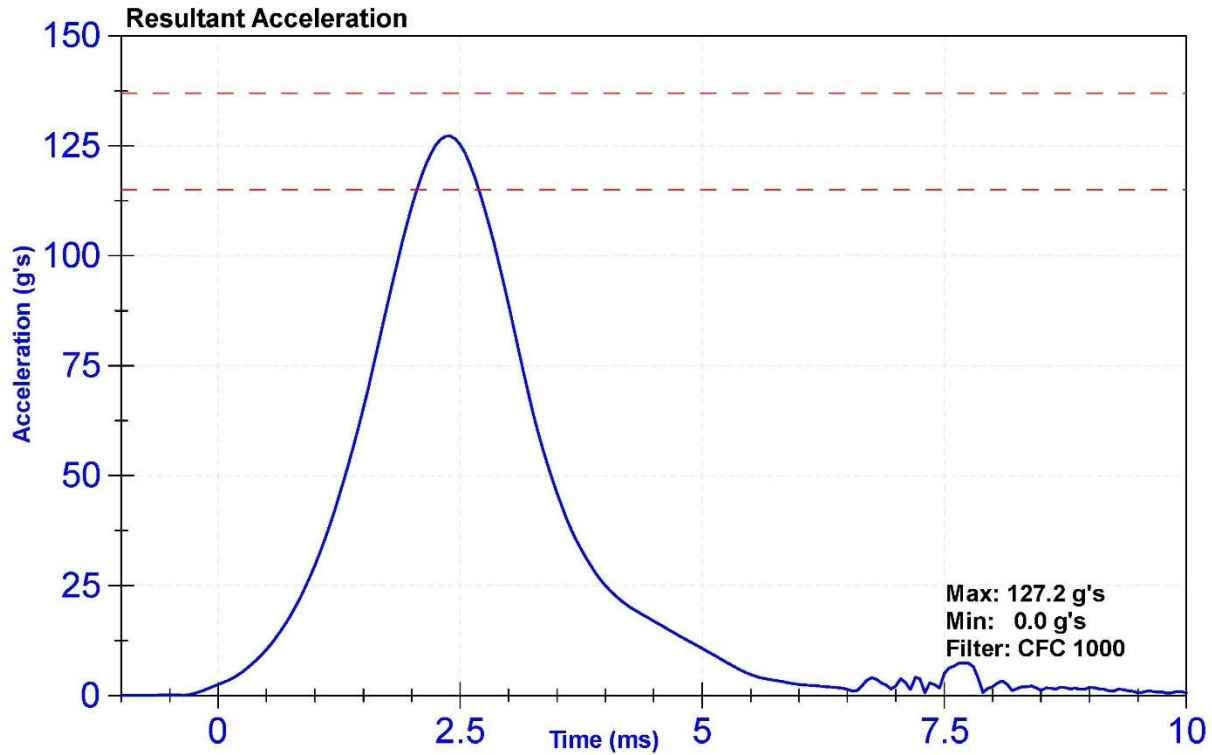
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

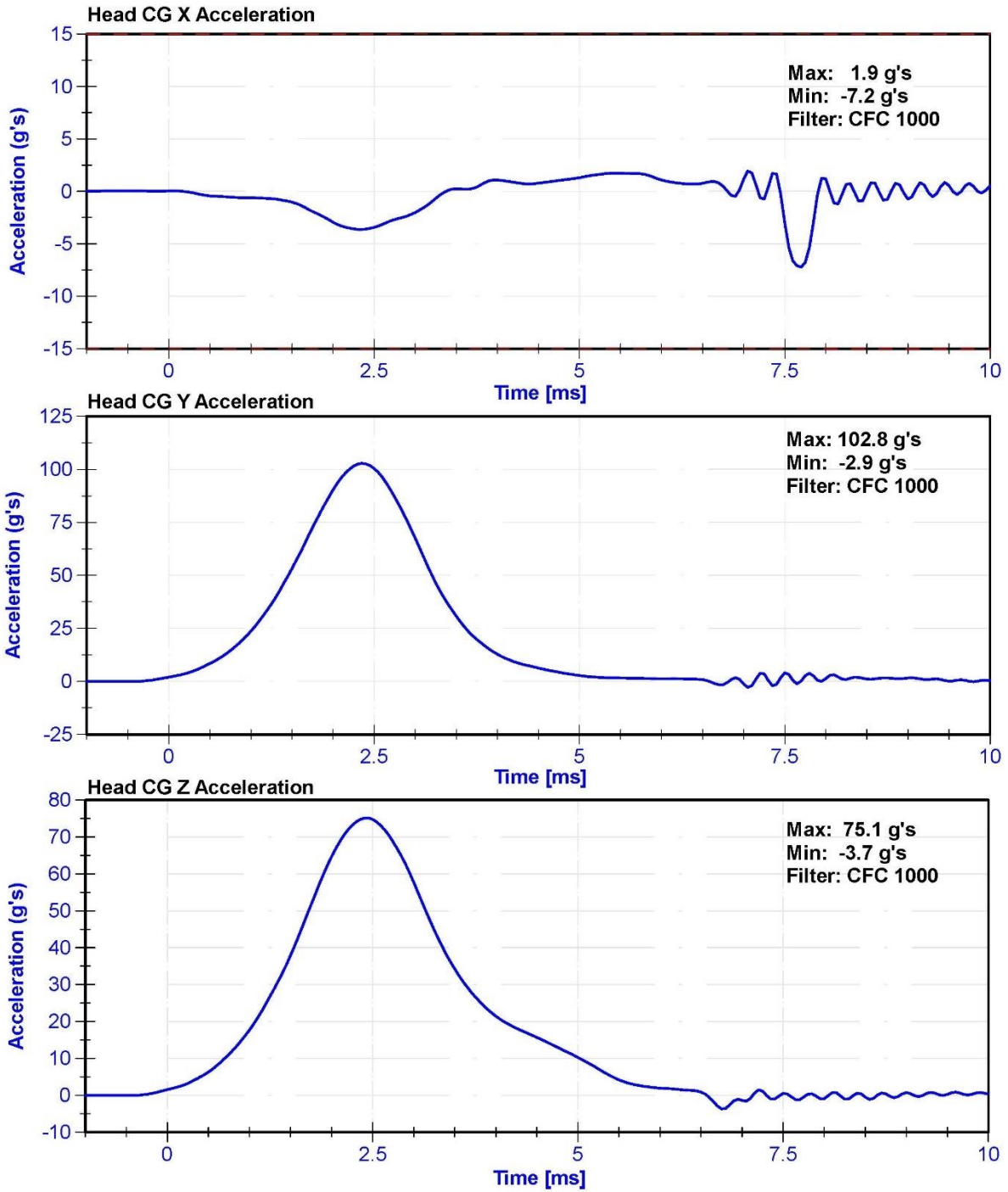
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Resultant Acceleration	115	137	g's	127.2	Pass
Oscillation	0	15	%	5.7	Pass
Fore-Aft Acceleration	-15	15	g's	-7.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P74788	12/12/2022	6/10/2023
Y Accelerometer	Endevco	P51668	12/12/2022	6/10/2023
Z Accelerometer	Endevco	P83319	12/12/2022	6/10/2023





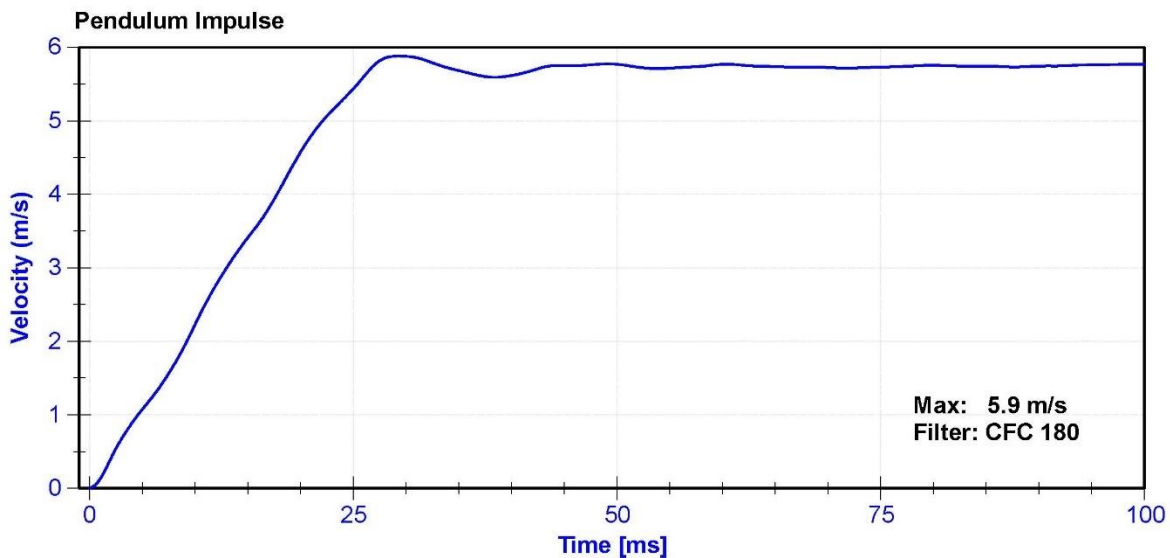
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

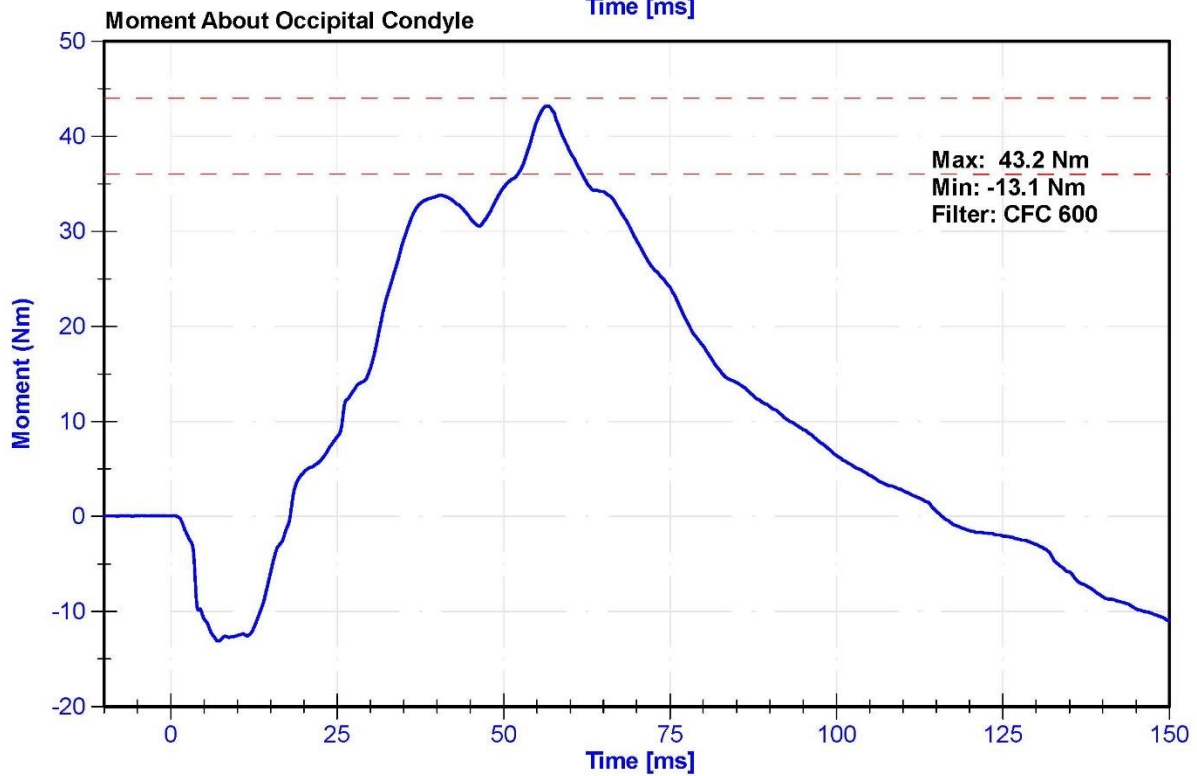
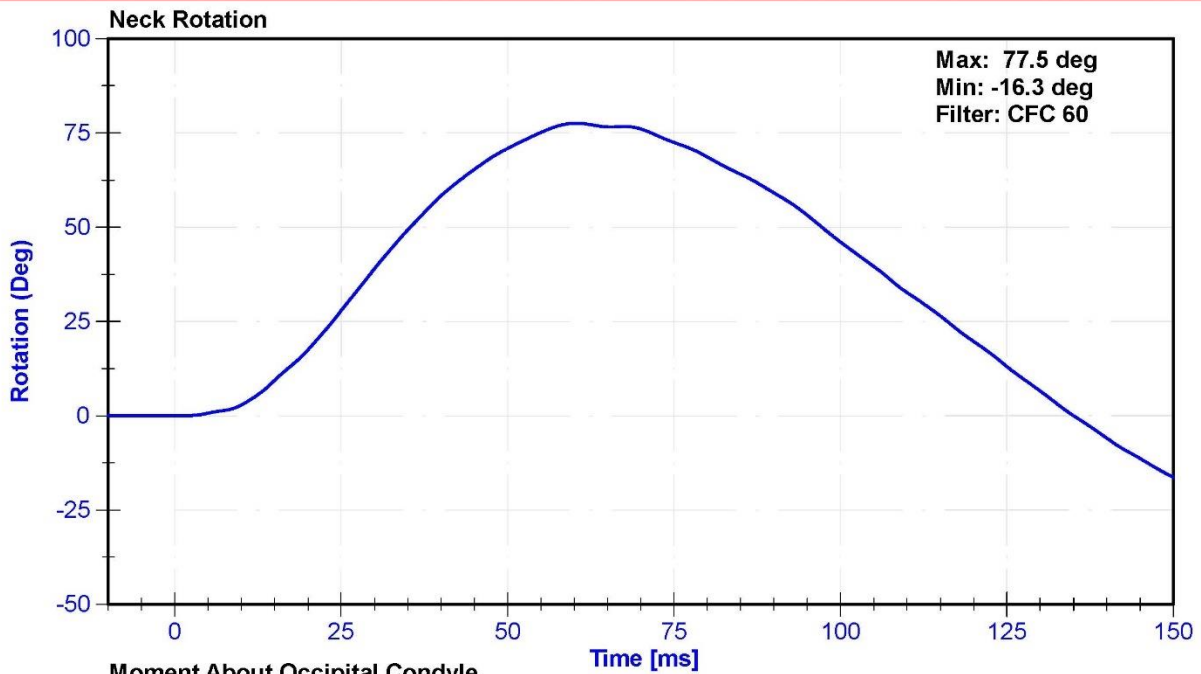
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	36.5	Pass
Velocity	5.51	5.63	m/s	5.542	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.23	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.41	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.58	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	5.88	Pass
Neck Rotation	71	81	deg	77.5	Pass
Time at Maximum Rotation	50	70	ms	60.3	Pass
Moment about the OC	36	44	Nm	43.2	Pass
Moment Decay to 0 Nm	102	126	ms	115.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023





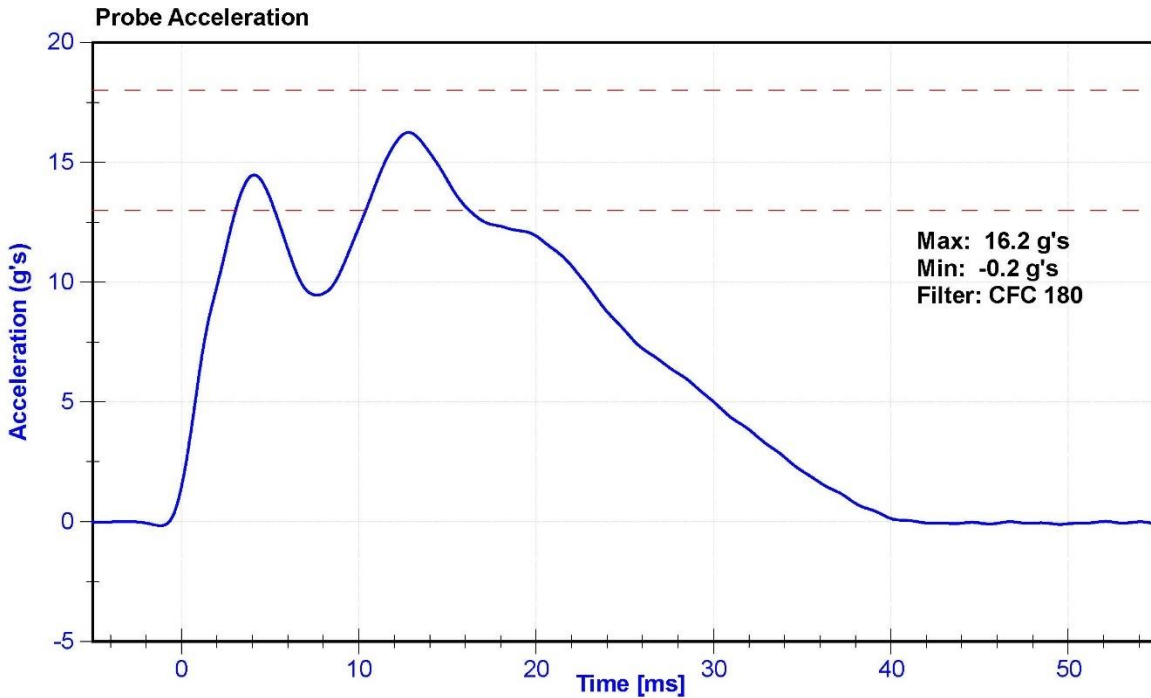
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

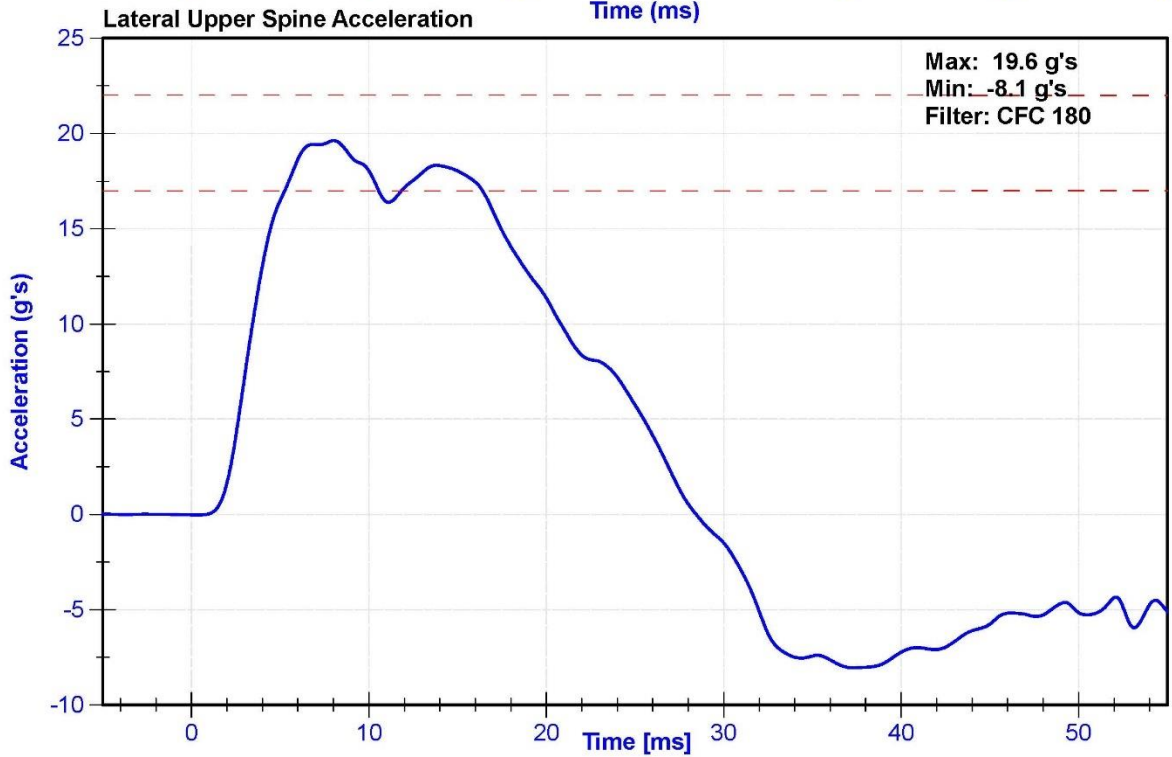
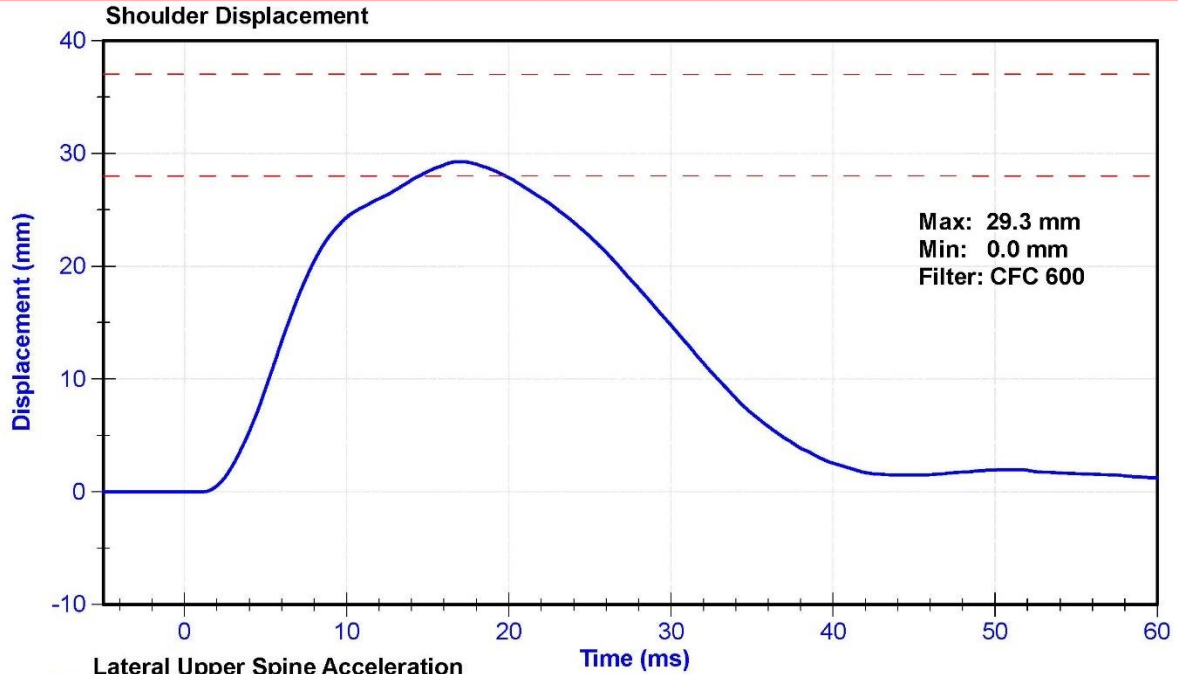
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	35.0	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	16.2	Pass
Shoulder Deflection	28	37	mm	29.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023





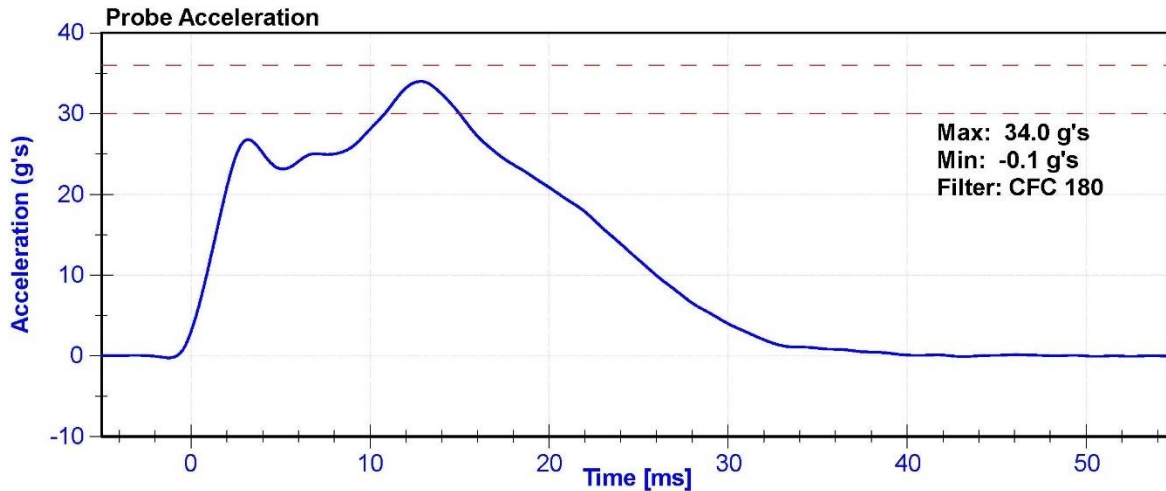
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

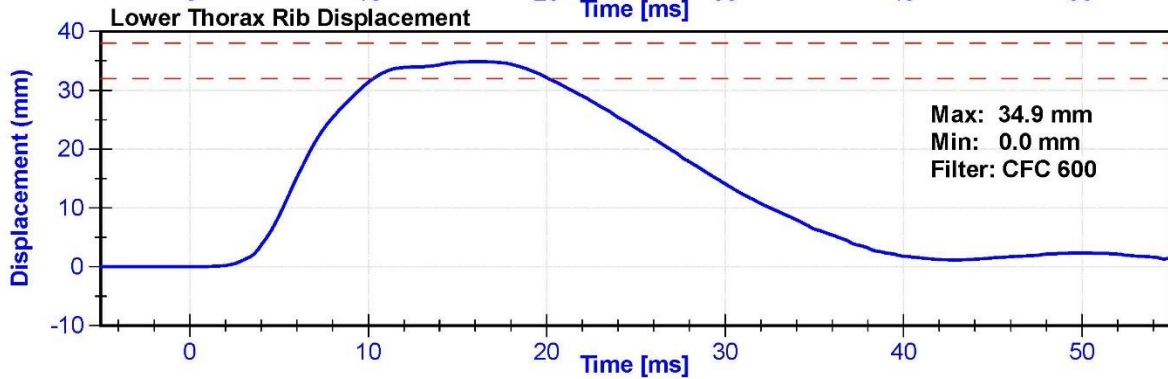
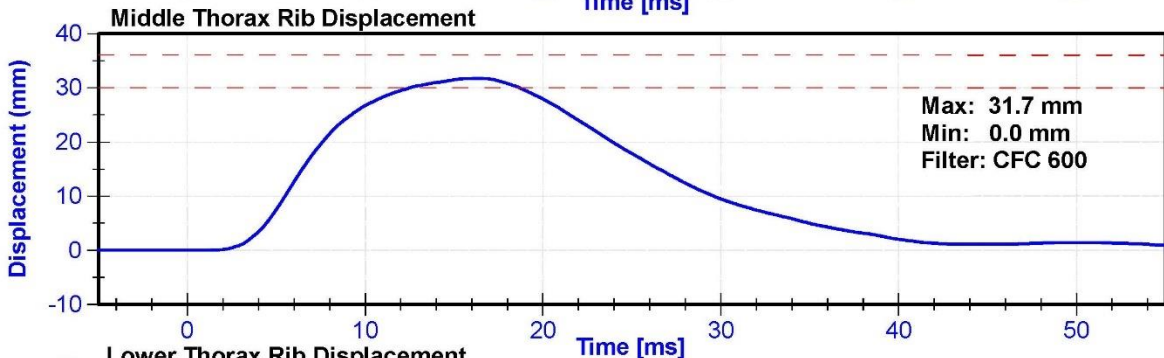
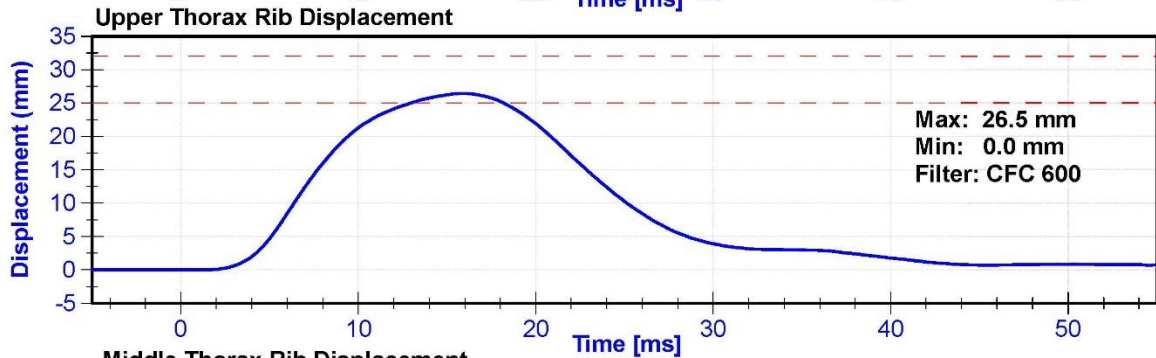
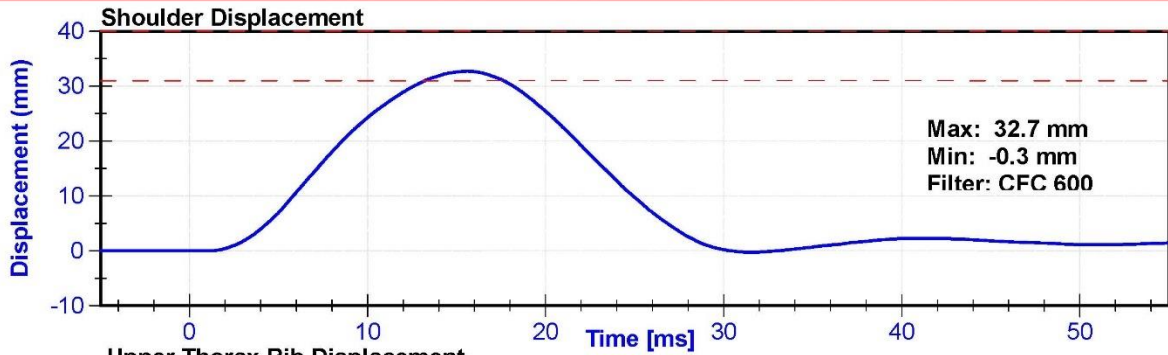
Results

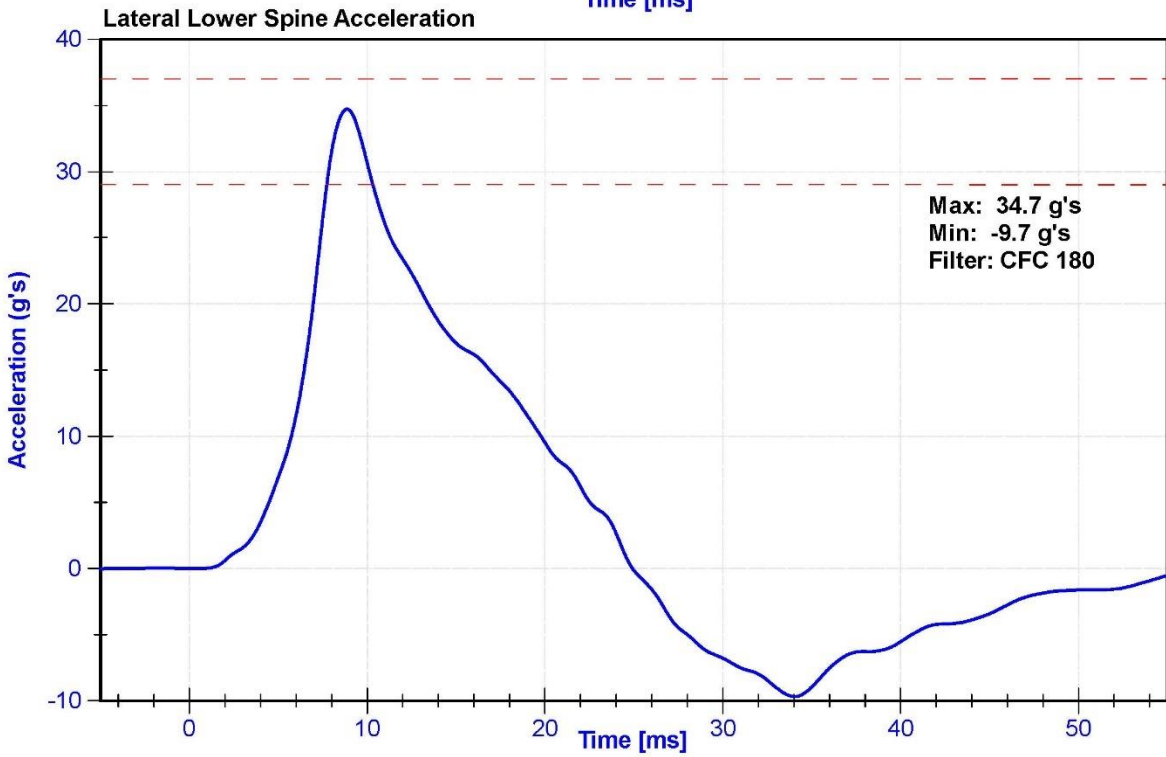
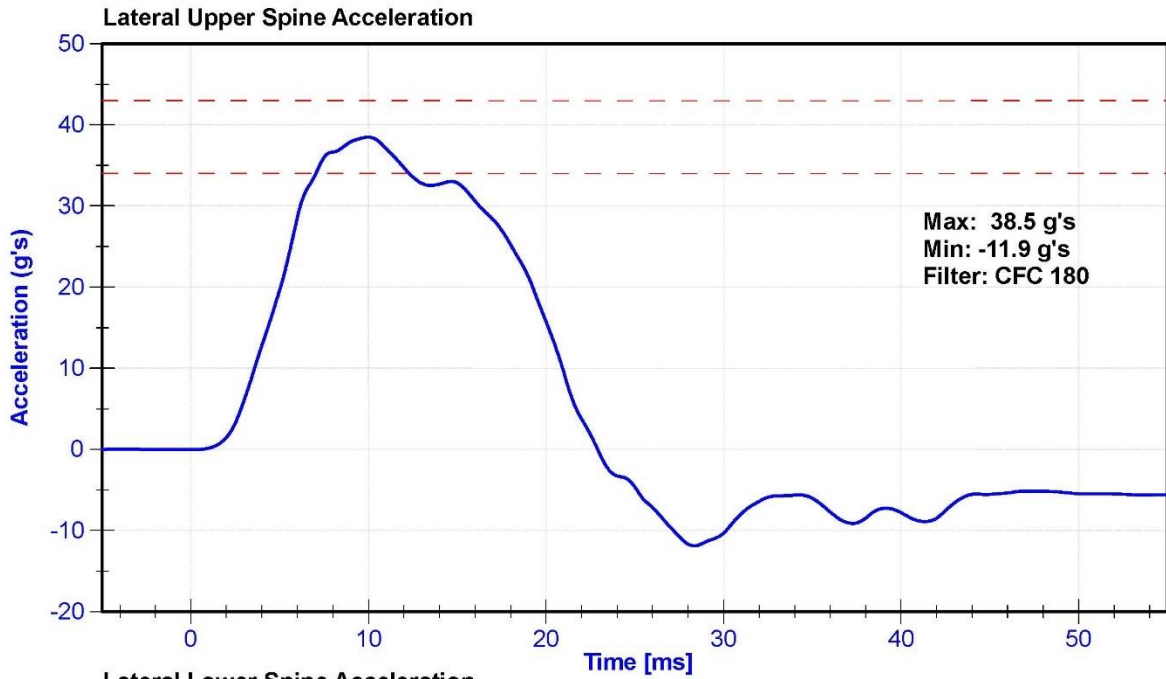
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.2	Pass
Humidity	10	70	%	35.0	Pass
Velocity	6.6	6.8	m/s	6.69	Pass
Probe Acceleration after 5 ms	30	36	g's	34.0	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.7	Pass
Shoulder Deflection	31	40	mm	32.7	Pass
Upper Thorax Rib Deflection	25	32	mm	26.5	Pass
Mid Thorax Rib Deflection	30	36	mm	31.7	Pass
Lower Thorax Rib Deflection	32	38	mm	34.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Upper Spine T12 Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023







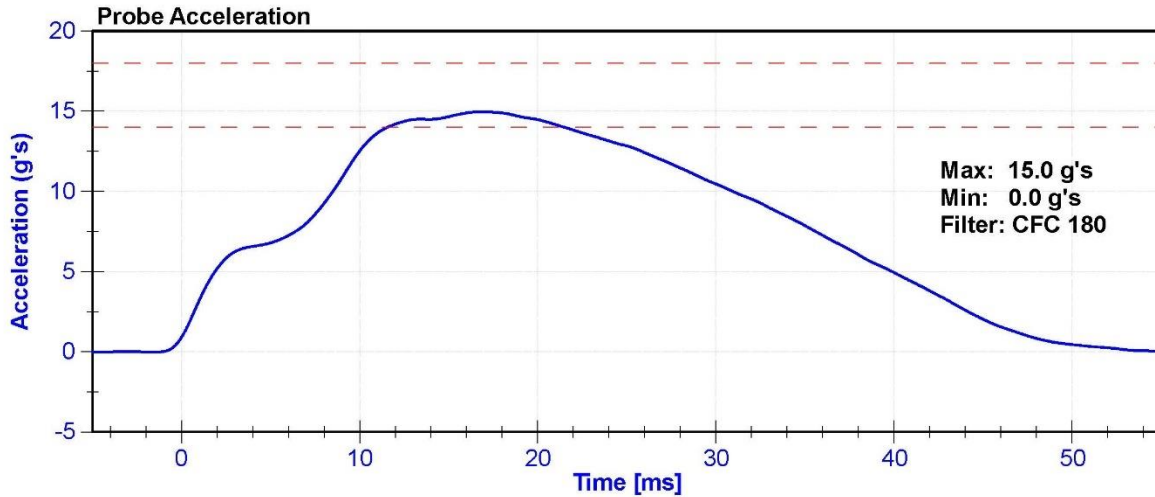
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

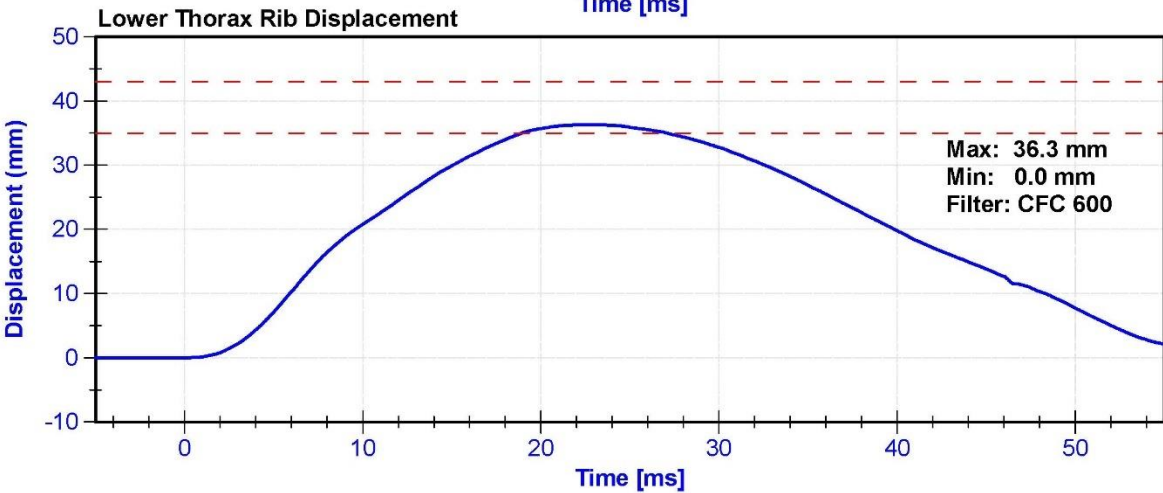
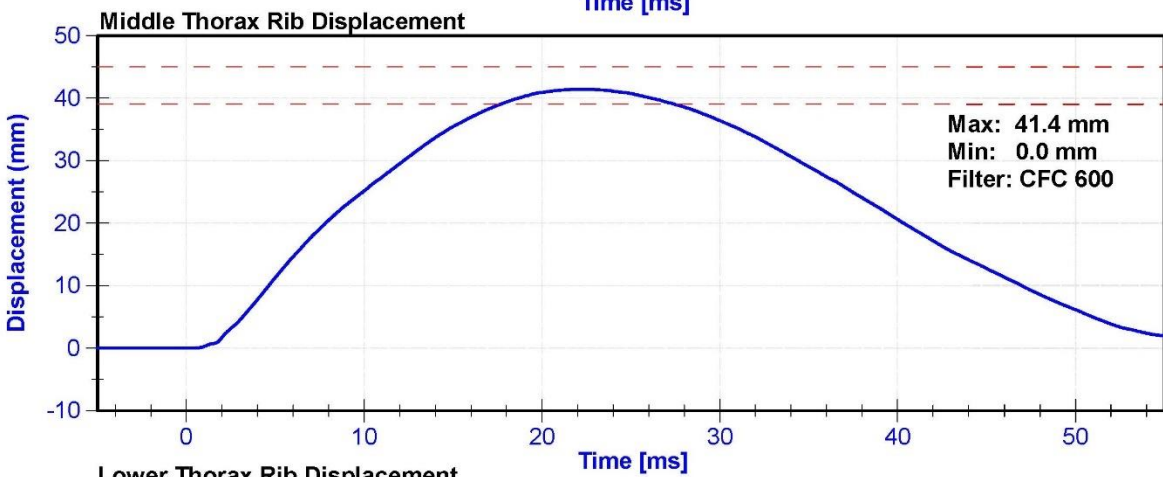
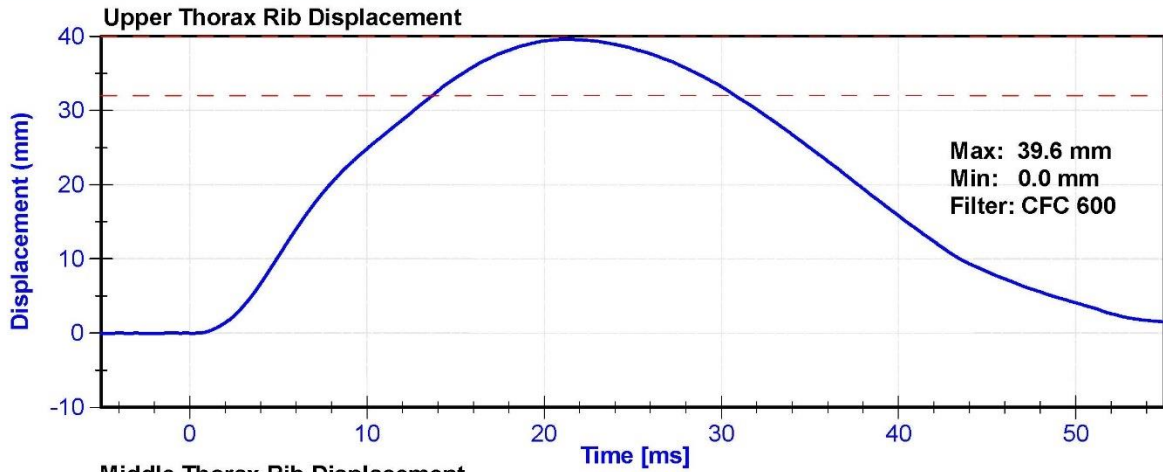
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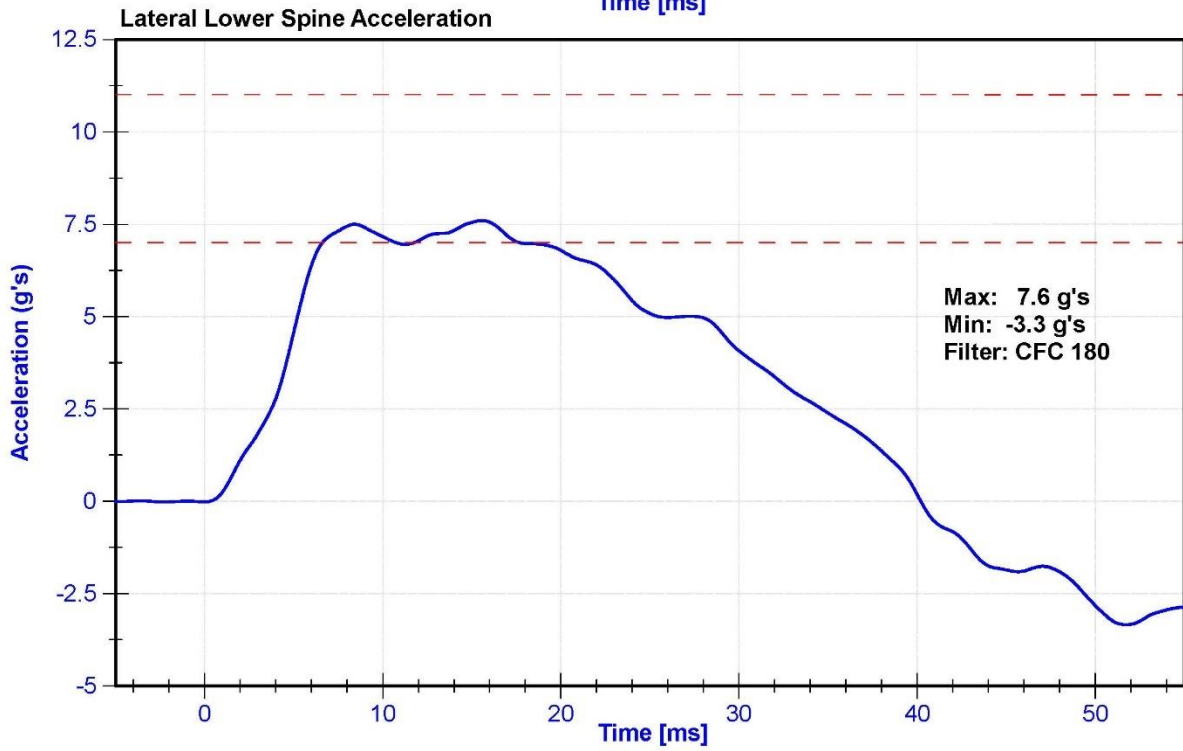
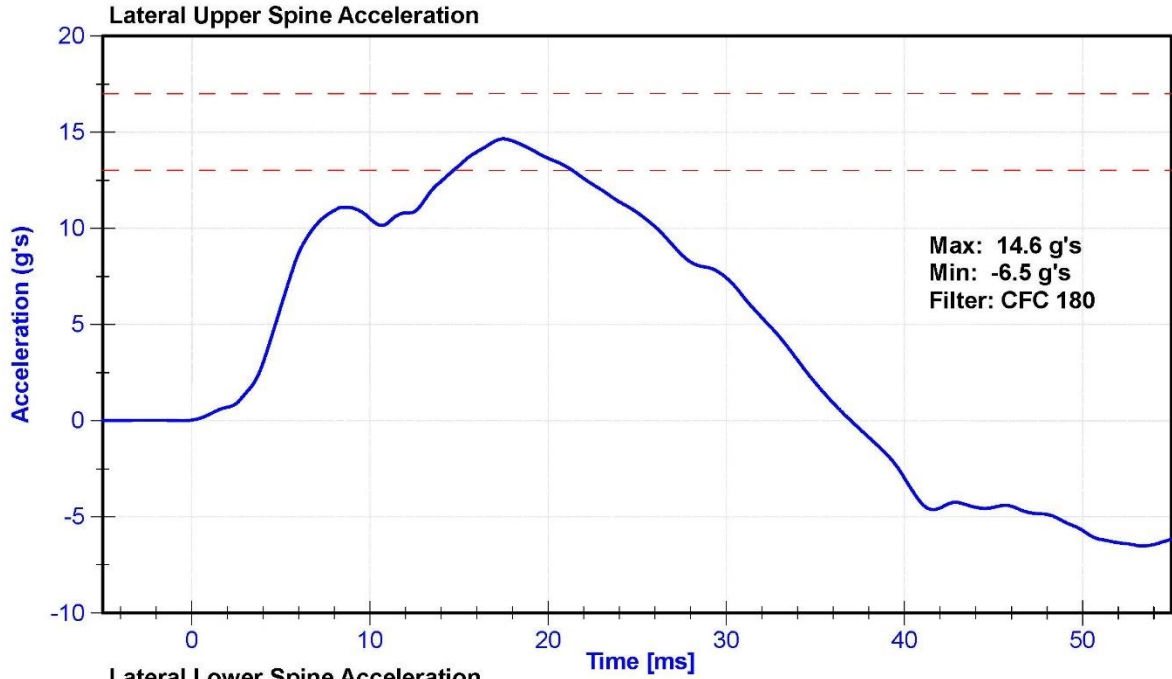
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.2	Pass
Humidity	10	70	%	35.0	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	15.0	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.6	Pass
Lateral Lower Spine Acceleration	7	11	g's	7.6	Pass
Upper Thorax Rib Deflection	32	40	mm	39.6	Pass
Middle Thorax Rib Deflection	39	45	mm	41.4	Pass
Lower Thorax Rib Deflection	35	43	mm	36.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023







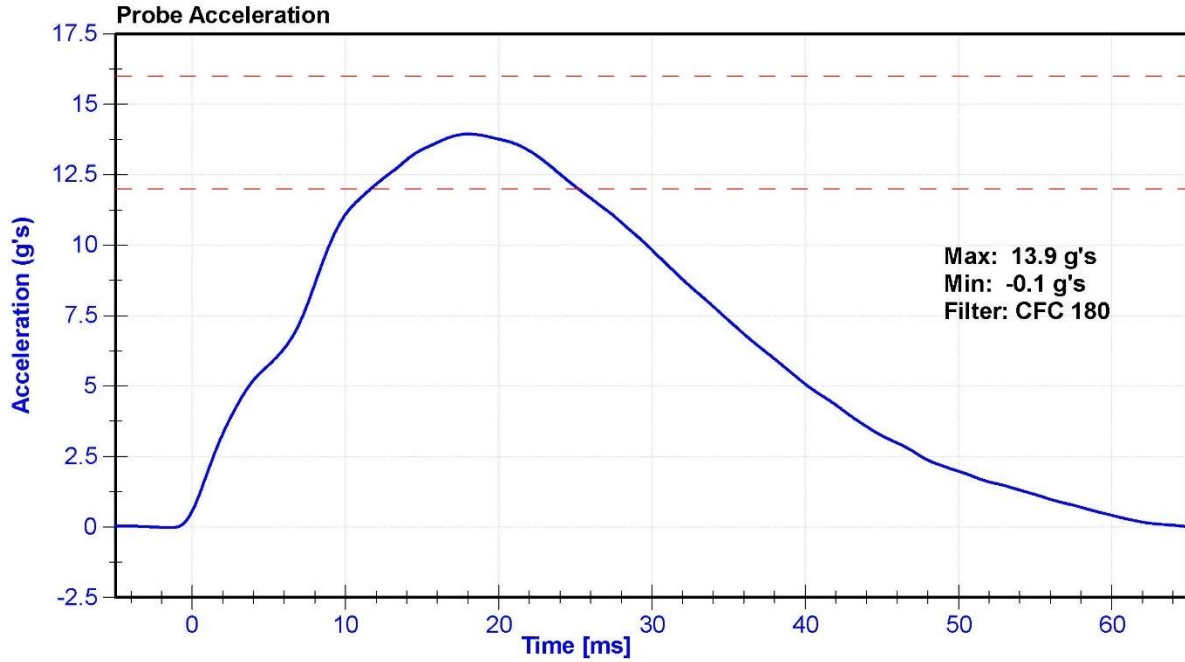
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

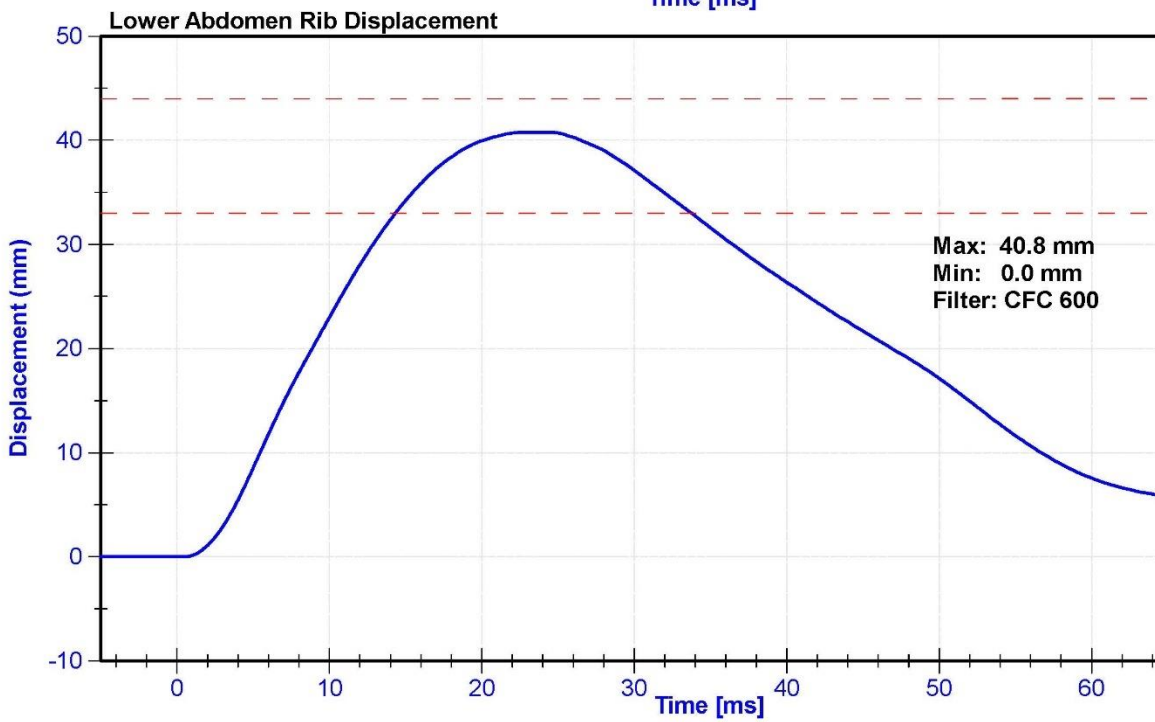
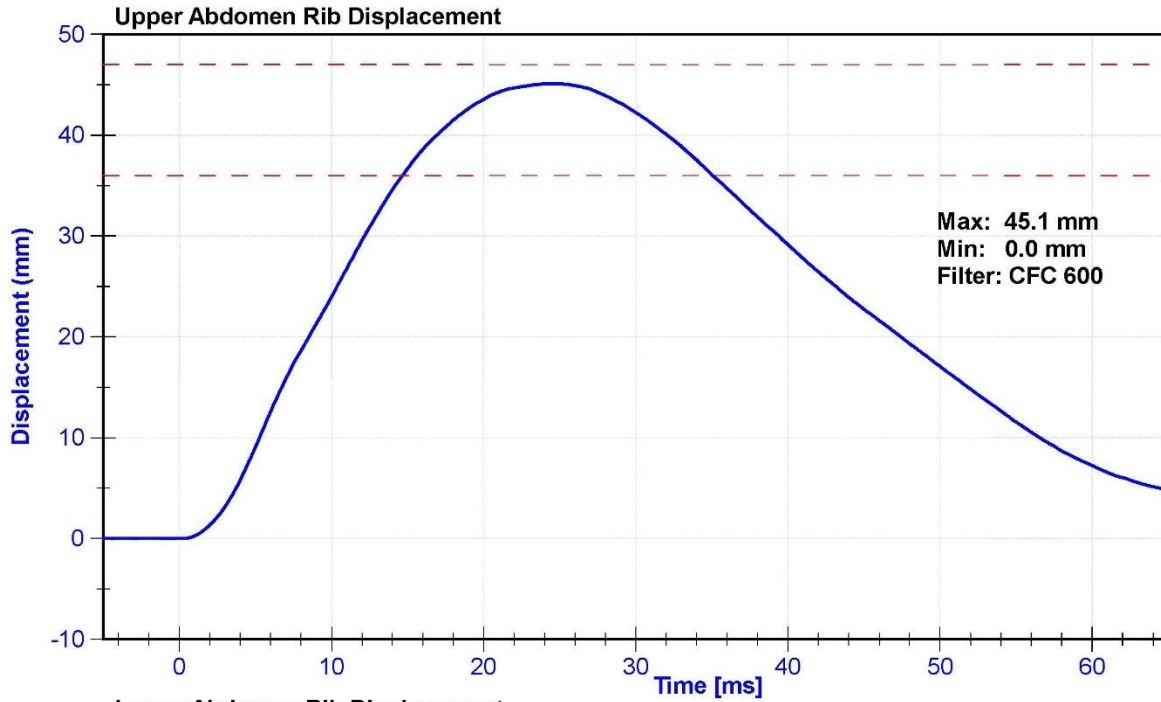
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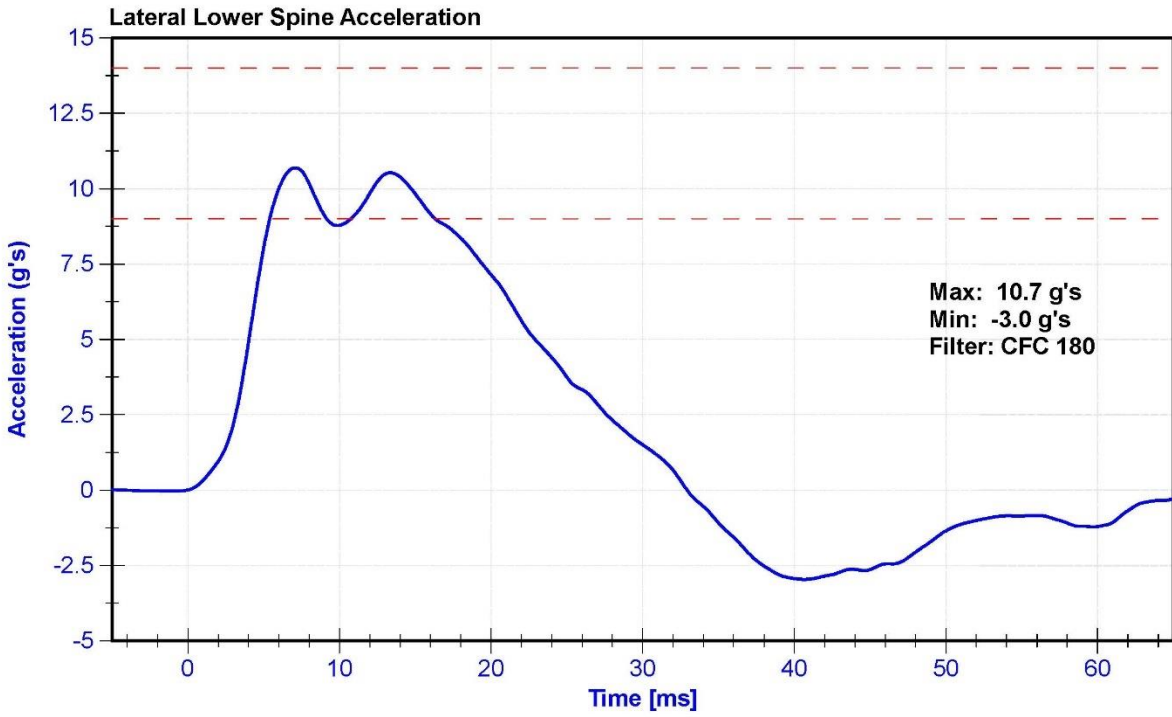
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.2	Pass
Humidity	10	70	%	35.0	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	13.9	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	45.1	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Abdomen Rib Potentiometer	Servo	008GFE	12/13/2022	6/13/2023
Lower Abdomen Rib Potentiometer	Servo	041 GFE	12/13/2022	6/13/2023







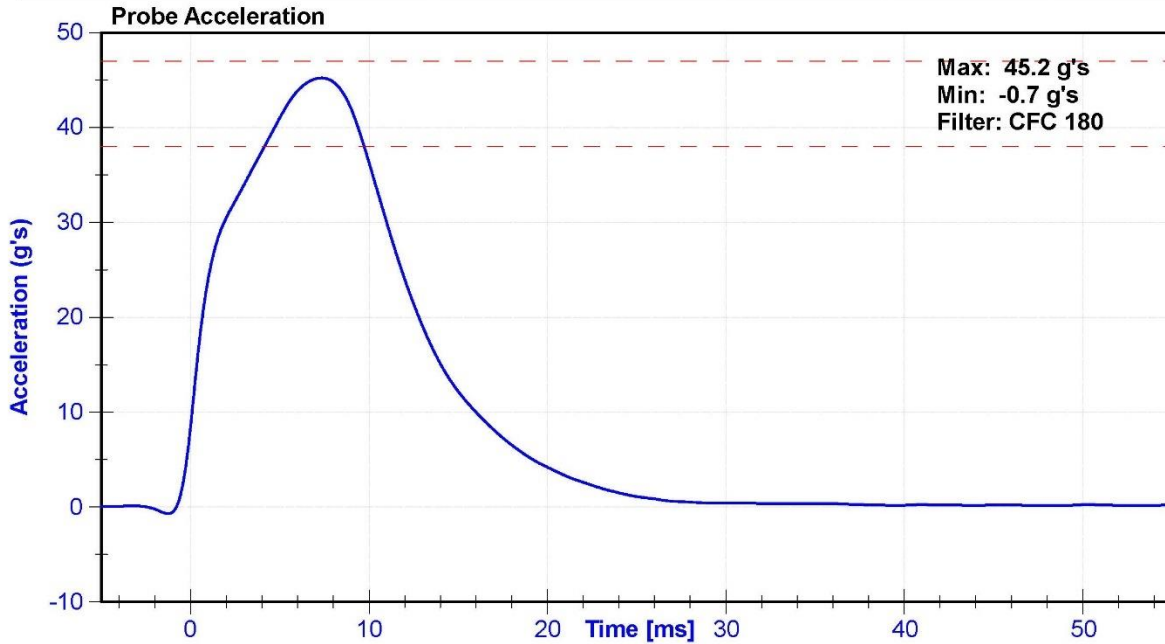
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

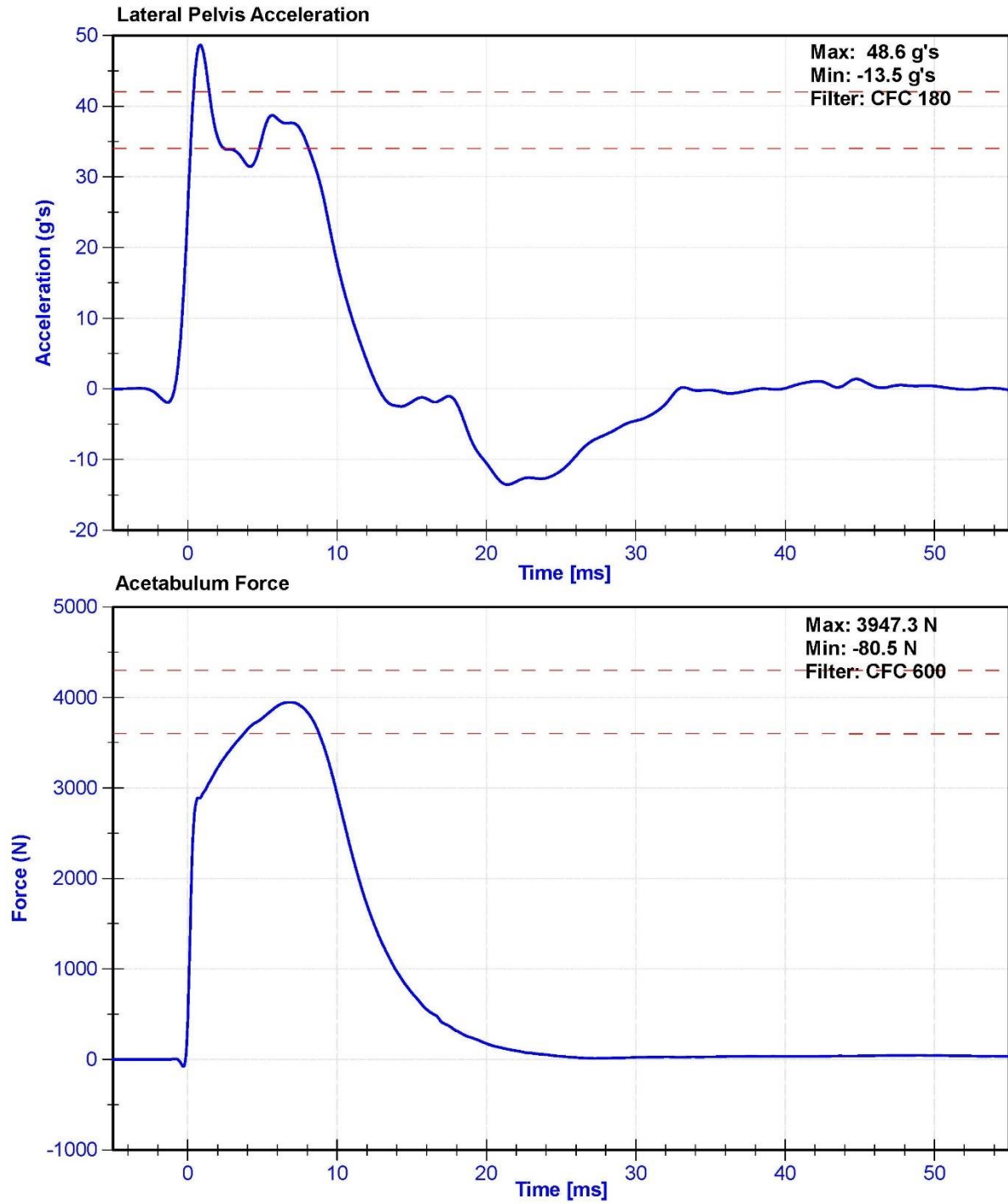
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration	38	47	g's	45.2	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.2	Pass
Acetabulum Force	3600	4300	N	3947.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A







CERT D68012
4/18/2023

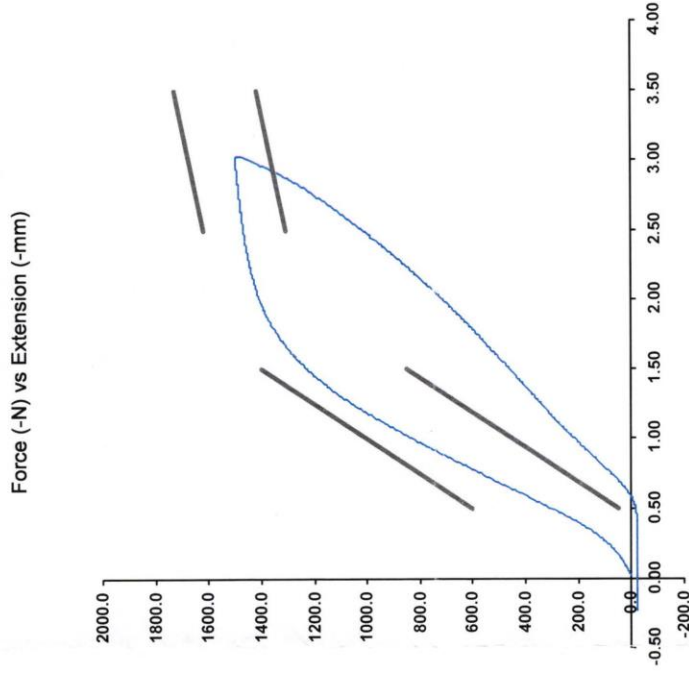
SID-IIs Pelvis Plug Certification Test

Plug S/N 15414
 Test Number 20074
 Report Number 20128
 Test Date 9/9/2021 9:38:06 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

Testing Machine STM-20 5965542
 Load Cell S/N (F1360947), Units (LBS) 1000
 Preload Value (-N) 22.24
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator	Part Number 180-4450
Template No 107 09-Sep-21 SACO Research	

By: DC Date: 9/9/2021
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



IMPACT
D68012
4/18/2023

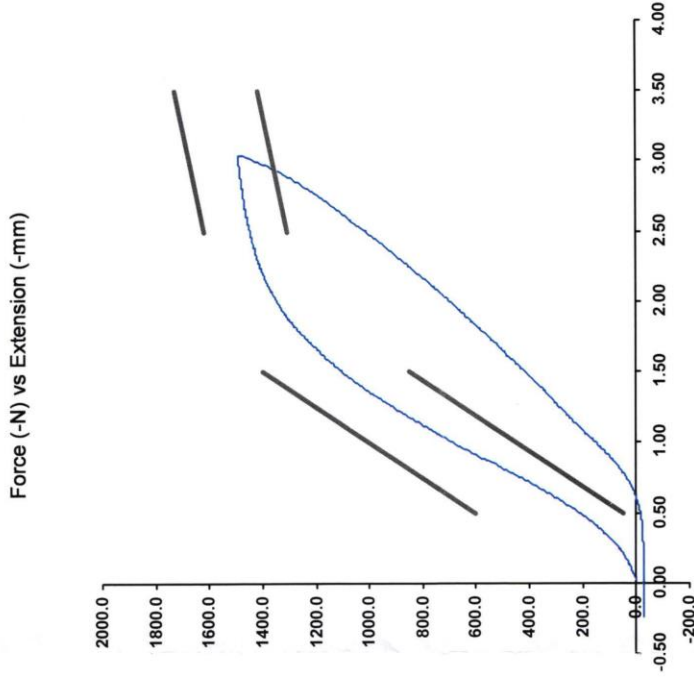
SID-IIs Pelvis Plug Certification Test

Plug S/N 15389
 Test Number 19805
 Report Number 19857
 Test Date 7/26/2021 9:36:24 AM

Test Results	Spec. Min	Spec. Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

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

Notes:



Operator
 Part Number 180-4450

Template No 107 26-Jul-21
 SACO Research

By: *DC* Date: *7/26/2021*
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



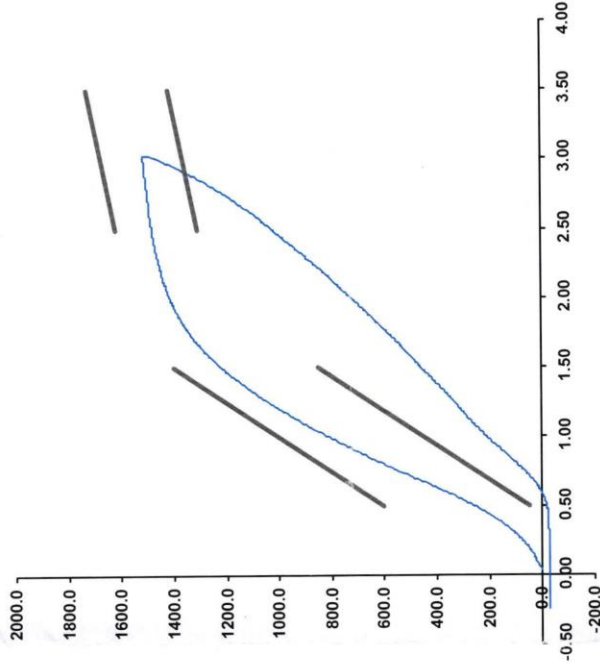
Non-Impact
D 68012

4/18/2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15428
Test Number 20089
Report Number 20143
Test Date 9/9/2021 10:03:12 AM

Force (-N) vs Extension (-mm)



Test Results	Spec. Min	Spec. Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000
Preload Value (-N) 22.24
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator
Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By: DC Date: 9/9/2021
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

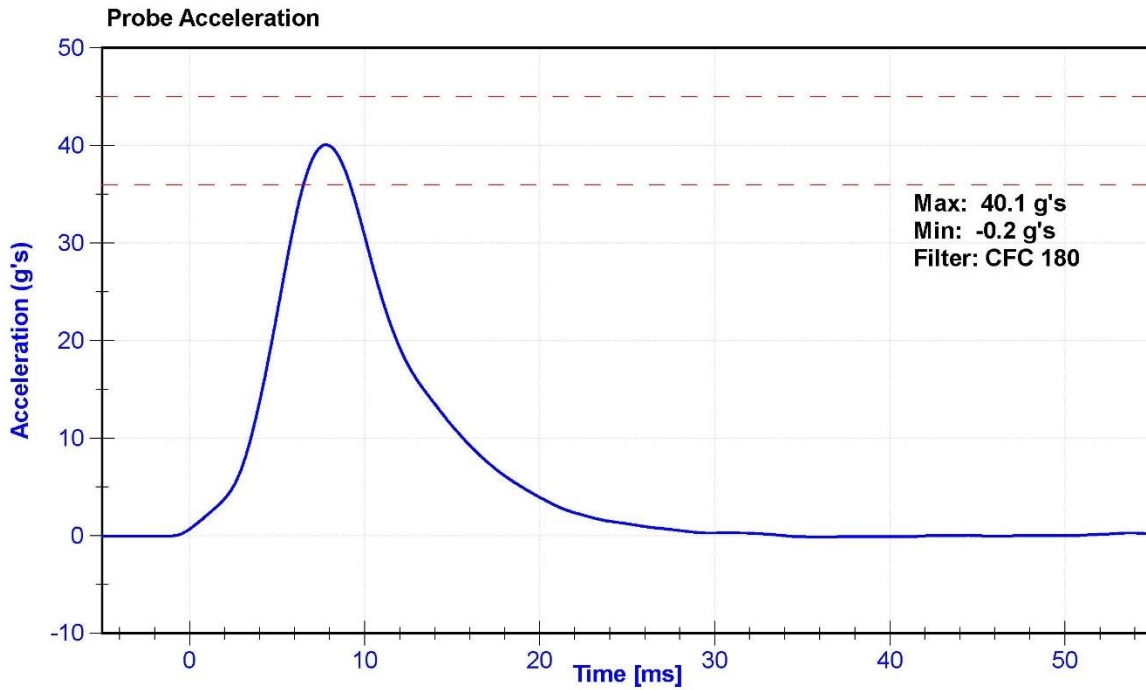
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

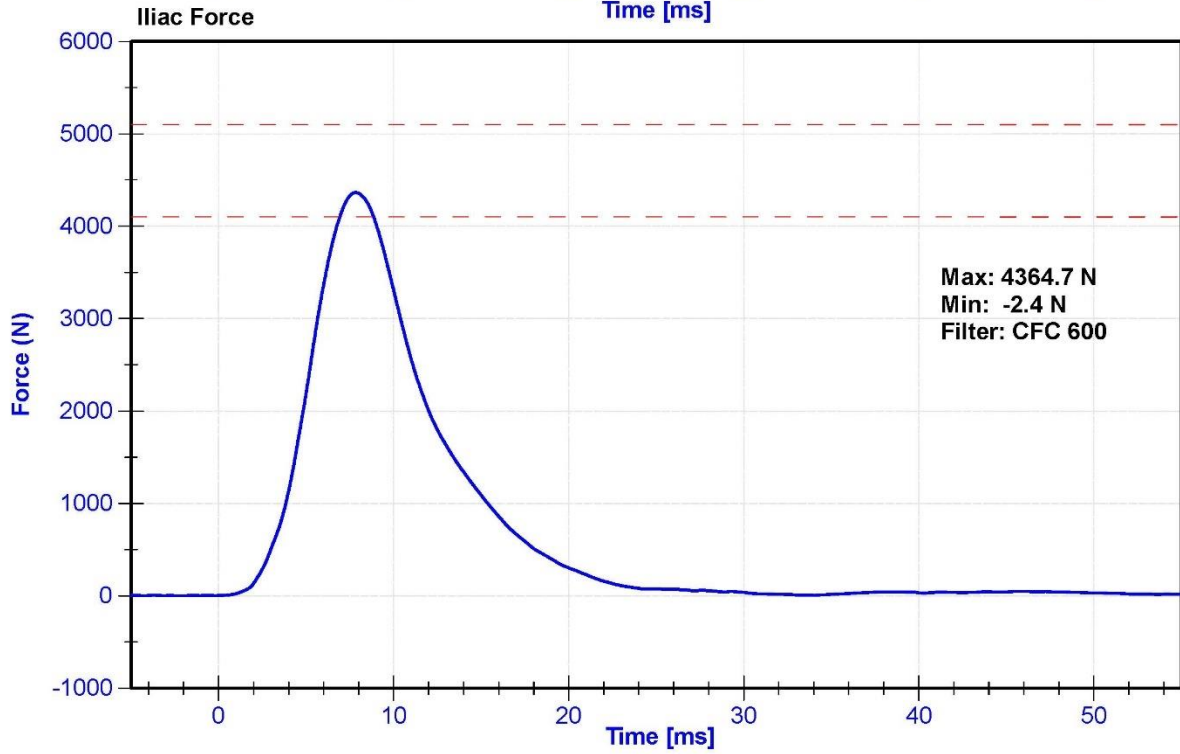
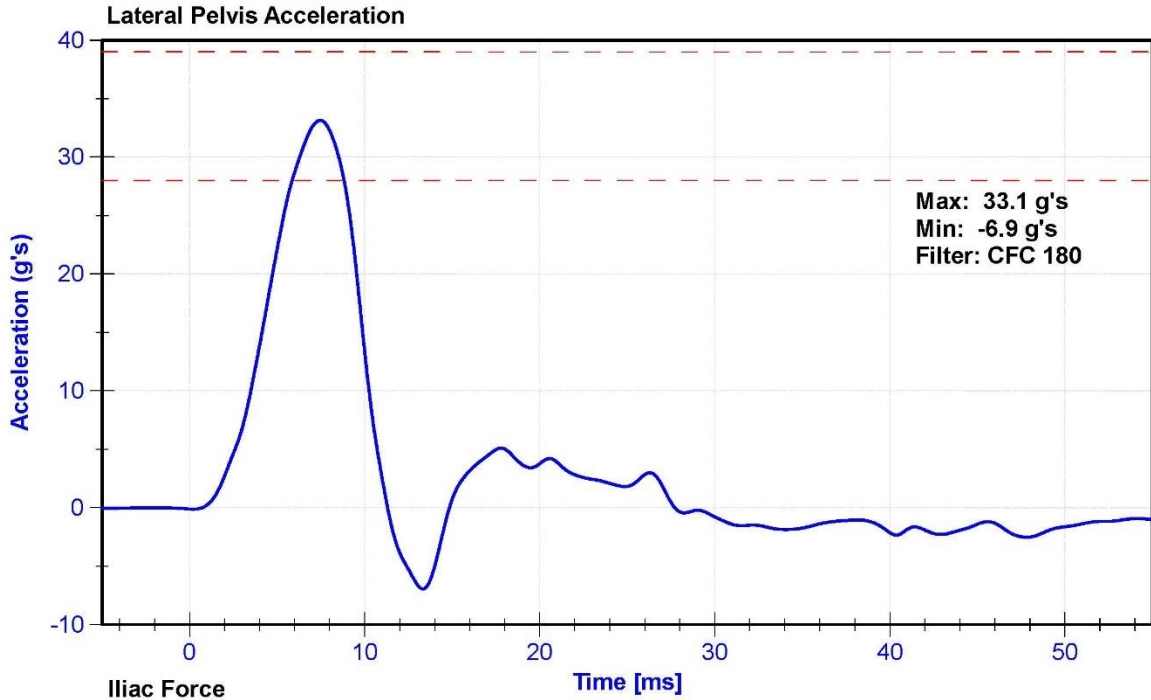
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	22.3	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	36	45	g's	40.1	Pass
Lateral Pelvis Acceleration	28	39	g's	33.1	Pass
Iliac Force	4100	5100	N	4364.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Iliac Load Cell	Denton	290-FY	8/11/2022	8/11/2023





APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N _F033_		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	P63861	Endevco	1/17/2023
		Y	P49216	Endevco	1/17/2023
		Z	P51303	Endevco	1/17/2023
	Redundant	X	P58868	Endevco	1/17/2023
		Y	P59020	Endevco	1/12/2023
		Z	P52132	Endevco	1/17/2023
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	1/17/2023
	Middle	Y	185GFE	Honeywell	1/17/2023
	Lower	Y	178GFE	Honeywell	1/17/2023
Abdomen Load Cells	Forward	Y	1509	Denton	8/12/2022
	Middle	Y	1508	Denton	8/12/2022
	Rear	Y	1507	Denton	8/12/2022
Lower Spine Accelerometers (T12)		X	P51740	Endevco	1/17/2023
		Y	T21243	Endevco	1/18/2023
		Z	P52033	Endevco	1/17/2023
Pubic Symphysis Load Cell		Y	459-FY	Denton	6/14/2022

TABLE 2 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N _DG8012_			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers	Primary	X	P74788	Endevco	12/12/2022	
		Y	P51668	Endevco	12/12/2022	
		Z	P83319	Endevco	12/12/2022	
	Redundant	X	P80334	Endevco	12/12/2022	
		Y	P52155	Endevco	12/12/2022	
		Z	P83322	Endevco	12/12/2022	
Displacement Potentiometers	Thoracic Rib	Upper	Y	1199GFE	Servo	12/13/2022
		Middle	Y	1246GFE	Servo	12/13/2022
		Lower	Y	011GFE	Servo	12/13/2022
	Abdominal Rib	Upper	Y	008GFE	Servo	12/13/2022
		Lower	Y	041 GFE	Servo	12/13/2022
Lower Spine Accelerometers (T12)		X	P71272	Endevco	12/12/2022	
		Y	P51327	Endevco	12/12/2022	
		Z	P52067	Endevco	12/12/2022	
Acetabulum Load Cell		Y	276-FY	Denton	8/11/2022	
Iliac Wing Load Cell		Y	290-FY	Denton	8/11/2022	
Pelvis Plug (struck side)			15452	SACO	9/9/2021	
Pelvis Plug (non-struck side)			15465	SACO	9/22/2021	

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A300151	Measurement Specialties	4/7/2023
	Vehicle Center of Gravity	Y	A315770	Measurement Specialties	4/7/2023
	Vehicle Center of Gravity	Z	A315949	Measurement Specialties	4/7/2023
2	Right Sill at Front Seat	X	A280951	Measurement Specialties	4/7/2023
	Right Sill at Front Seat	Y	A274239	Measurement Specialties	4/7/2023
	Right Sill at Front Seat	Z	A398323	Measurement Specialties	4/7/2023
3	Right Sill at Rear Seat	X	A290908	Measurement Specialties	4/7/2023
	Right Sill at Rear Seat	Y	A290909	Measurement Specialties	4/7/2023
	Right Sill at Rear Seat	Z	A372834	Measurement Specialties	4/7/2023
4	Left Sill at Front Door	Y	A315892	Measurement Specialties	3/6/2023
5	Left Sill at Rear Door	Y	A398662	Measurement Specialties	1/27/2023
6	Left A-Post Lower	Y	A399985	Measurement Specialties	2/2/2023
7	Left A-Post Middle	Y	G22578	Endevco	3/9/2023
8	Left B-Post Lower	Y	A428014	Measurement Specialties	1/3/2023
9	Left B-Post Middle	Y	G22435	Endevco	1/5/2023
10	Front Seat Track	Y	A405534	Measurement Specialties	1/16/2023
11	Rear Seat Track or Structure	Y	A281038	Measurement Specialties	2/27/2023
12	Right Rear Occ. Compartment	Y	G22443	Endevco	3/23/2023
13	Engine Block	X	A399971	Measurement Specialties	11/28/2022
	Engine Block	Y	G21409	Endevco	11/28/2022
14	Rear Floorpan Above Axle	X	A315905	Measurement Specialties	4/7/2023
	Rear Floorpan Above Axle	Y	A315970	Measurement Specialties	4/7/2023
	Rear Floorpan Above Axle	Z	A335459	Measurement Specialties	4/7/2023

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A398663	Measurement Specialties	11/15/2022
MDB Center of Gravity	Y	A413569	Measurement Specialties	11/15/2022
MDB Center of Gravity	Z	A413574	Measurement Specialties	11/15/2022
Left Frame at Rear Axle Centerline	X	A255878	Measurement Specialties	11/15/2022
Left Frame at Rear Axle Centerline	Y	A350971	Measurement Specialties	11/15/2022