REPORT NUMBER: SINCAP-CAL-22-009

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

Audi AG
2022 Audi Q4 e-tron quattro
5 Door SUV

NHTSA No: M20225802

PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
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September 1, 2023

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing & FMVSS 305 Indicant Testing of a 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225802		***5. Report Date*** September 1, 2023 ***6. Performing Organization Code*** CAL
7. Author(s) Matthew Pronko, Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2022-009
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** 693JJ920D00016
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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 2022 Audi Q4 e-tron quattro 5 Door 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 October 13, 2022.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.06 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 187 mm located at level 2. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)	N/A	1000	57.261
Maximum Thoracic Rib Deflection	mm	44	14.665
Total Abdominal Force	N	2500	496.983
Pubic Symphysis Force	N	6000	1120.290

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)	N/A	1000	121.611
Maximum Thoracic Rib Deflection	mm	38	15.369
Resultant Lower Spine Acceleration	G	82	35.138
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2952.852
Maximum Abdomen Rib Deflection	mm	45*	8.684

**Proposed IARV*

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590

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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 693JJ920D00016. The purpose of this test is to generate comparative side impact performance in a 2022 Audi Q4 e-tron quattro 5 Door 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 2022 Audi Q4 e-tron quattro 5 Door 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 62.06 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 October 13, 2022. 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	IARV	Result
Head Injury Criteria (HIC36)	N/A	1000	57.261
Maximum Thoracic Rib Deflection	mm	44	14.665
Total Abdominal Force	N	2500	496.983
Pubic Symphysis Force	N	6000	1120.290

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)	N/A	1000	121.611
Maximum Thoracic Rib Deflection	mm	38	15.369
Resultant Lower Spine Acceleration	G	82	35.138
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2952.852
Maximum Abdomen Rib Deflection	mm	45*	8.684

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No	No	N/A
Knee Airbag	No	N/A	No	N/A
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	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

GENERAL COMMENTS:

1. P1 serial number – F033
2. P4 serial number – 300

Data Anomalies:

The following channel was questionable for:

- Left Rear Sill Y Acceleration,Exceeded calibration range at 30.5 ms
- Left B-Pillar Lower Y Acceleration,Exceeded calibration range and saturated at 10.6 ms 14.1 ms
- Left B-Pillar Middle Y Acceleration,Exceeded calibration range and saturated at 11 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 - Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 - Dummy Lateral Clearance Dimensions

Data Sheet No. 5 - Camera and Instrumentation Data

Data Sheet No. 6 - 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. 305-1 - General Test and Parameter Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-2 - Pre-Impact Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-3 - Pre-Impact Electrical Isolation Measurements and Calculations for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-4 - Post-Impact Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-5 - Static Rollover Test Data for Indicant FMVSS No. 305 Testing

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test
Test Date: 10/13/2022

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20225802
Model Year	2022
Make	Audi
Model	Q4 e-tron
Body Style	SUV
VIN	WA1H2BFZ4NP054134
Body Color	Grey
Odometer Reading (km/mi)	8 mi
Engine Displacement (L)	N/A
Type / No. Cylinders	Electric Vehicle
Engine Placement	N/A
Transmission Type	Automatic
Transmission Speeds	1-Speed
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Audi AG
Date of Manufacture	08/22
Vehicle Type	MPV

GVWR	2740
GVWR Front	1285
GVWR Rear	1540

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	N/A	5	
Vehicle Capacity Weight (VCW) (kg)				425	(A)
DSC x 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				84.8	(A-B)

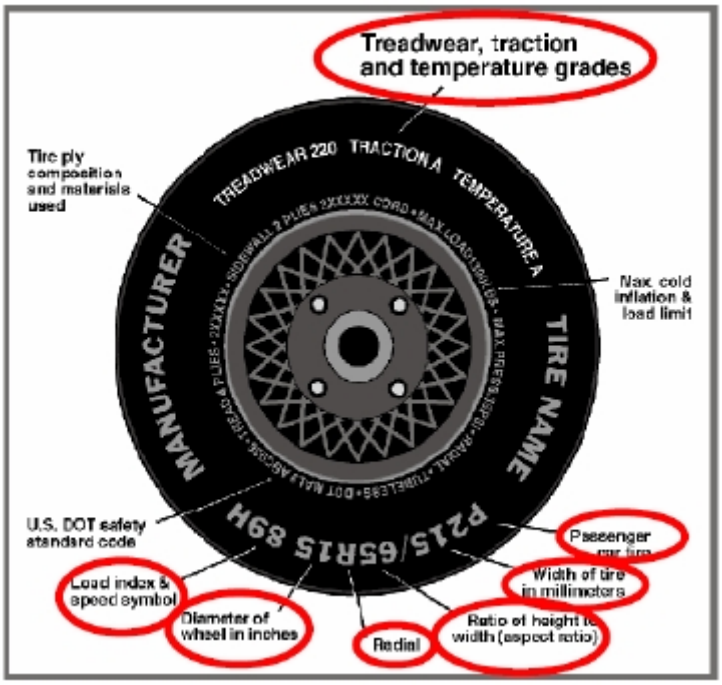
VEHICLE SEAT TYPE

Seating Location	Type Of Seat Pan				Type Of Seat Back		
	Bucket	Bench	Split Bench	Contour	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front	X						X
Rear or Second Row Seat			X		X		
Third Row Seat	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	300	300
Recommended Tire Size	235/50R20	235/45R20
Tire Size on Vehicle	235/50R20	235/45R20
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Alenza Sport	Alenza Sport
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyester	1 Polyester, 2 Steel, 2 Nylon
Load Index / Speed Symbol	104T	105T
Tire Material	Rubber	Rubber
DOT Safety Code Left	2761004EX3022	2761004EY3022
DOT Safety Code Right	2761004EX3022	2761004EY3022

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV | NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test | Test Date: 10/13/2022

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	297	289	296	290
Tire Placard	kPa	300	300	300	300
Owner's Manual	kPa	300	300	300	300
As Tested	kPa	300	300	300	300

MDB TIRE SPECIFICATIONS

	Units	Requirements	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	221	221	221	221

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	539	585.5		588	656		581	676.5	
Right	kg	558	562.5		577.5	627.5		569	631	
Ratio	%	48.9	51.1		47.6	52.4		46.8	53.2	
Totals	kg	1097	1148	2245	1165.5	1283.5	2449	1150	1307.5	2457.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2245	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	84.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2456.8	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range

(i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)? [X] **Yes** [ ] **No**

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Rqmt***
LF	mm	872	875	Yes
RF	mm	877	875	Yes
RR	mm	874	877	Yes
LR	mm	870	878	Yes
Vehicle CG (Aft of Front Axle)	mm	1472	1450	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	18	12	

****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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Rear speaker	2.5
Truck Carpeting	19
Tool kit & Compressor	2
Ballast / Equipment Added	38.5

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	930
Aft 25 mm target	932

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

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

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 passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max	Min	Mid
Driver Seat	21.2	11.5	16.4
Front Passenger Seat	22.9	13.2	18.1
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	16.4	9	Max	71	77	82
			Mid	36	43	48
			Min	2	9	15
Front Passenger Seat	18.1	7	Max	69	75	79
			Mid	35	41	45
			Min	1	7	11
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 SYSTEMS DATA

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

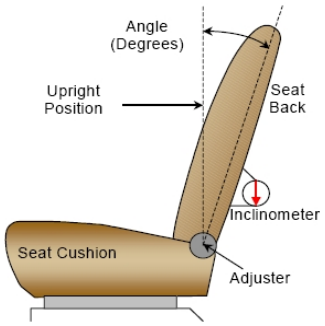
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	248	Power	124	Power
Front Passenger Seat	208	Power	104	Power
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

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



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	61.4	Power	1.0	Power
Front Passenger Seat	60.3	Power	1.0	Power
Front Center Seat*				
Struck Side Rear Seat w/ Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

**if applicable*

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

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.

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

HEAD RESTRAINT ADJUSTMENT

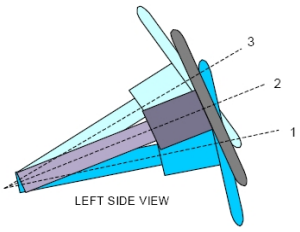
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	8 (0-7)	Uppermost & Full Forward
Rear Seat	1 - Fixed	1

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 No. 1	20.1	
Geometric center - Position No. 2	22.8	
Uppermost - Position No. 3	25.5	
Telescoping Steering Wheel Travel		60
Test Position	22.8	30

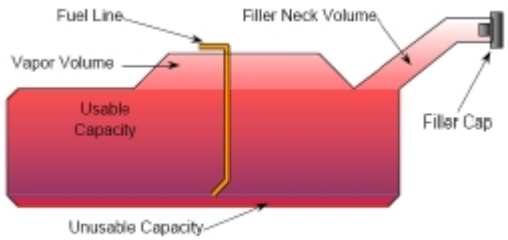


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is an electric vehicle. The charge port is on the right rear quarter panel of the vehicle.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

FUEL TANK CAPACITY

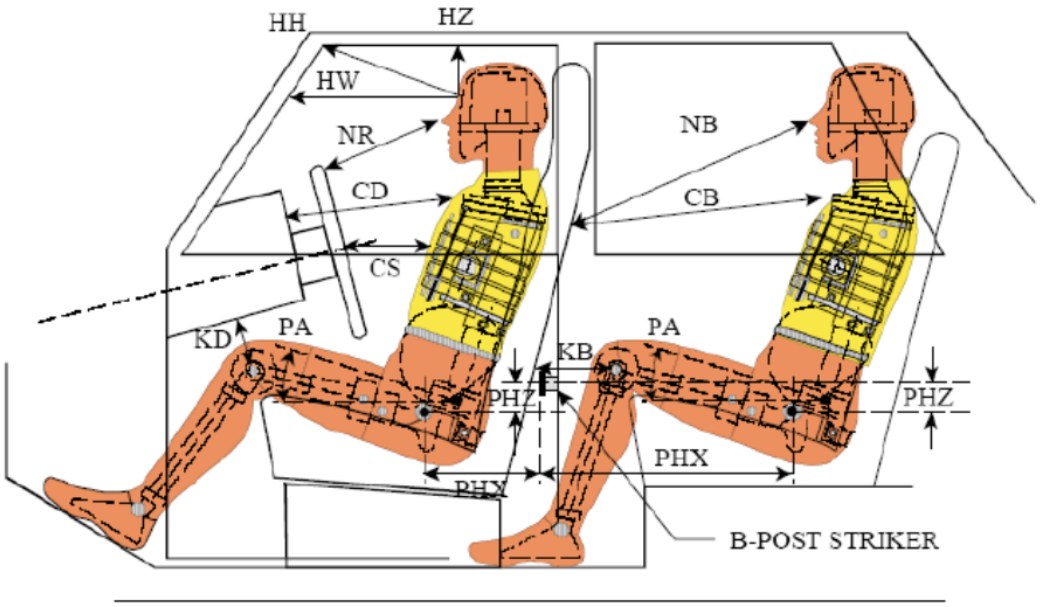
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	
Usable Capacity of “Optional Tank” (see Form No. 1)	
Usable Capacity of “Standard Tank” (see Owner’s Manual)	
Usable Capacity of “Optional Tank” (see Owner’s Manual)	
93% of Usable Capacity	
Actual Amount of Solvent Used in Test	
1/3 of Usable Capacity	

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** ☒ **N/A**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



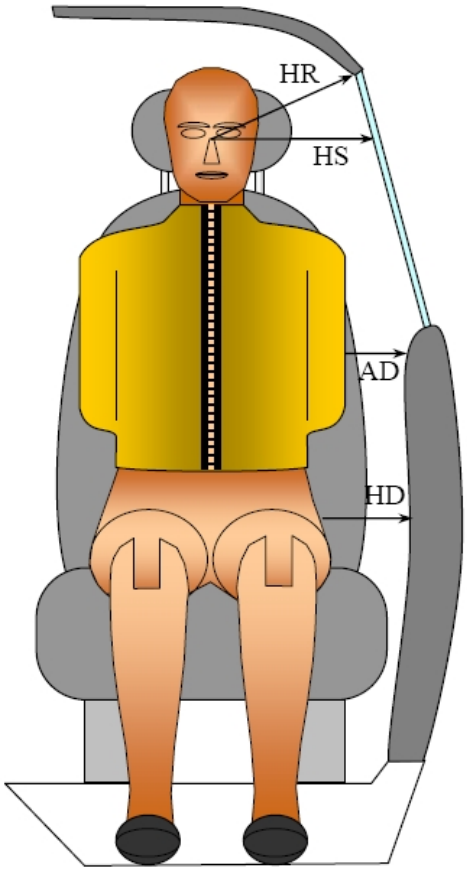
LEFT SIDE VIEW

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

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Left Rear Passenger (Serial No. 300)	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Header to Header	438			
HW		Header to Windshield	775			
HZ	HZ	Head to Roof Liner	200		264	
NR	NB	Nose to Rim/Seat Back	436		584	
CD	CB	Chest to Dash/Seat Back	631		575	
CS		Chest to Steering Wheel	385			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	290	31.9	310	6.5
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	295	34.4	288	5.3
PAX°	PAX°	Pelvic Tilt Angle X		20.4		20.8
	PAY°	Pelvic Tilt Angle Y		0.6		0.3
PHX	PHX	Hip Point to Striker (X-Axis)	156		195	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	238		275	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



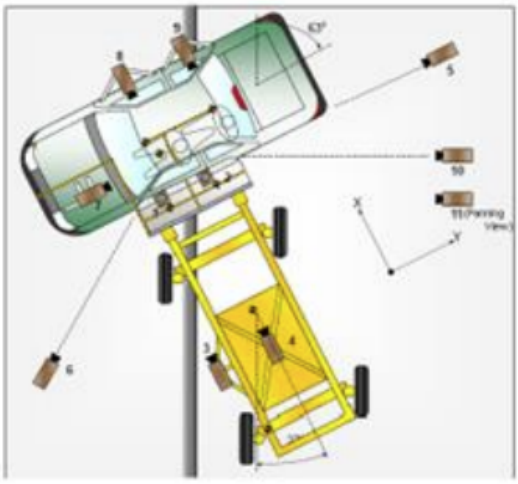
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Left Rear Passenger (Serial No. 300)
HR	Head to Side Header	mm	243	270
HS	Head to Side Window	mm	366	365
AD	Arm to Door	mm	119	160
HD	Hip Point to Door	mm	158	185

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test
Test Date: 10/13/2022



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	457	-8992	12	1000
2	Overhead Close-up	0	0	-8992	24	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	7248	-1465	28	1000
6	Left Front	-2929	-5779	-1580	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12	1000
9	Passenger Side (OB)				12	1000
10	Real-time Left Rear				Zoom	60
11	Real-time In Run				Zoom	60

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

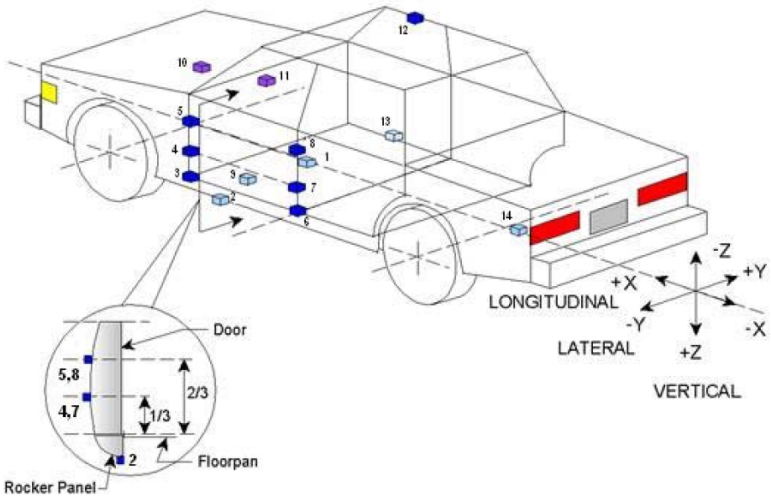
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

INSTRUMENTATION

Description	Number of Channels
Driver Dummy Channels	16
Passenger Dummy Channels	22
Vehicle Structure Accelerometers	24
MDB Accelerometers	7
Total	69

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



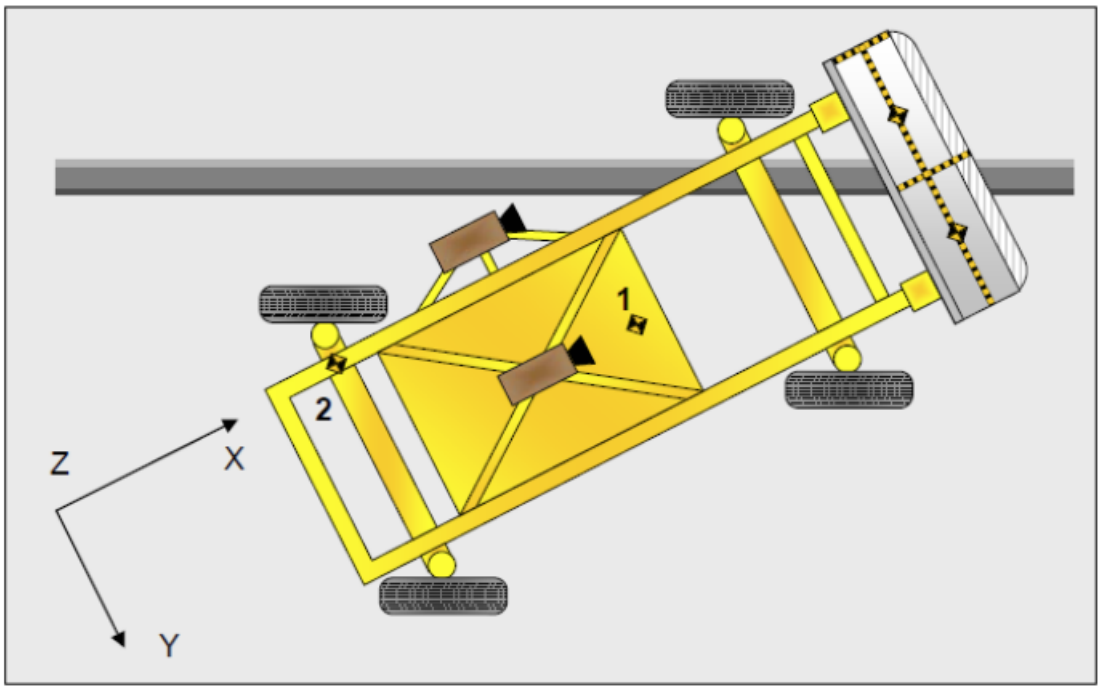
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2380	26	-56
2	Right Sill at Front Seat	2759	663	14
3	Right Sill at Rear Seat	1849	657	20
4	Left Sill at Front Door	2772	-663	41
5	Left Sill at Rear Door	1846	-657	19
6	A-Post Lower	3346	-630	-226
7	A-Post Middle	3178	-660	-701
8	B-Post Lower	2153	-688	-114
9	B-Post Middle	2069	-673	-595
10	Front Seat Track	2230	-606	13
11	Rear Seat Structure	1783	452	-118
12	Rt. Rear Occ. Compartment	2060	440	75
13	Engine Block	3885	235	-494
14	Rear Above Axle	782	20	-147

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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



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): 1498

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test
Test Date: 10/13/2022

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	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	Curtain Airbag
Back of Head	Curtain Airbag, Side Headliner and Head Restraint	Rear Middle Seat Head Restraint
Left Shoulder	Curtain Airbag	Side Seaback and Torso Pelvis Airbag
Upper Torso	Seatback and Torso/Pelvis Airbag	Seatback
Lower Torso	Seatback and Torso/Pelvis Airbag	Seatback and Torso/Pelvis Airbag
Left Hip	Seat Pan	Seat Pan and Passenger Door
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

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 buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Front driver window opened slightly
Other Notable Effects	None

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test
Test Date: 10/13/2022

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No	No	N/A
Knee Airbag	No	N/A	No	N/A
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	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		2766
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		443
Actual Impact Point (Aft of Frontal Axle)	mm		2753
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+13
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	-2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test
Test Date: 10/13/2022

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Frame	4120
Wheelbase of Framework Carriage	2600
CG Location of Front Axle	1120

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

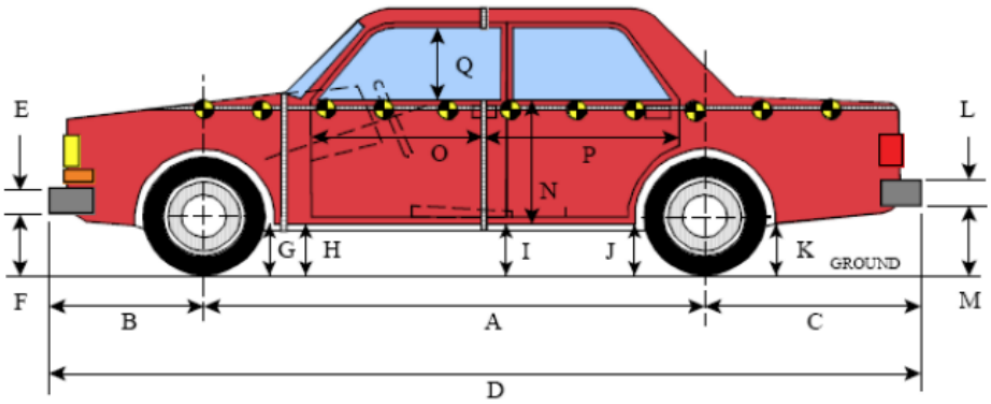
Measured Parameter	Units	Requirement	Value
Target Velocity	km/h	61.10 to 62.70	62.06
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.06
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.01
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	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	291
B	Top of Bumper	533	800	Left	210
C	Mid-Level	686	800	Left	219
D	Top of Stack	813	800	Left	207

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



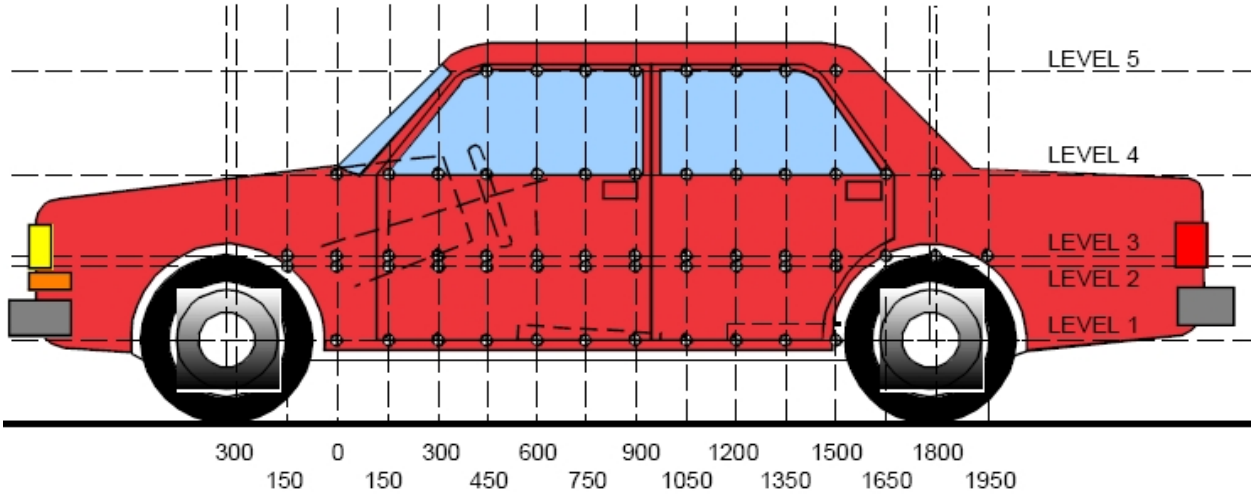
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2766	2798	32
B	Front Axle to FSOV	854	821	-33
C	Rear Axle to RSOV	976	975	-1
D2	Total Length at Centerline	4594	4594	0
E	Front Bumper Thickness	174	174	0
F	Front Bumper Bottom to Ground	279	281	2
G	Sill Height at Front Wheel Well	221	228	7
H	Sill Height at Front Door Leading Edge	234	238	4
I	Sill Height at B Pillar	228	230	2
J1	Sill Height at Rear Wheel Well	230	231	1
J2	Pinch Weld Height at Rear Wheel Well	212	215	3
K	Sill Height Aft of Rear Wheel Well	278	286	8
L	Rear Bumper Thickness	150	150	0
M	Rear Bumper Bottom to Ground	432	443	11
N	Sill Height to Bottom of Front Window Sill	886	843	-43
O	Front Door Leading Edge to Impact CL	768	765	-3
P	Rear Door Trailing Edge to Impact CL	1336	1293	-43
Q	Front Window Opening	432	438	6
R	Right Side Length	4513	4513	0
S	Left Side Length	4515	4515	0
T	Vehicle Width at B-Pillars	1859	1753	-106
U	Front Wheel Track Width	1582	1570	-12
V	Rear Wheel Track Width	1562	1567	5

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	315	55	1200
2	Occupant H-Point	mm	635	187	1650
3	Mid-Door	mm	722	182	1500
4	Window Sill	mm	1076	53	1650
5	Window Top	mm	1558	0	1200

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: 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test Test Date: 10/13/2022

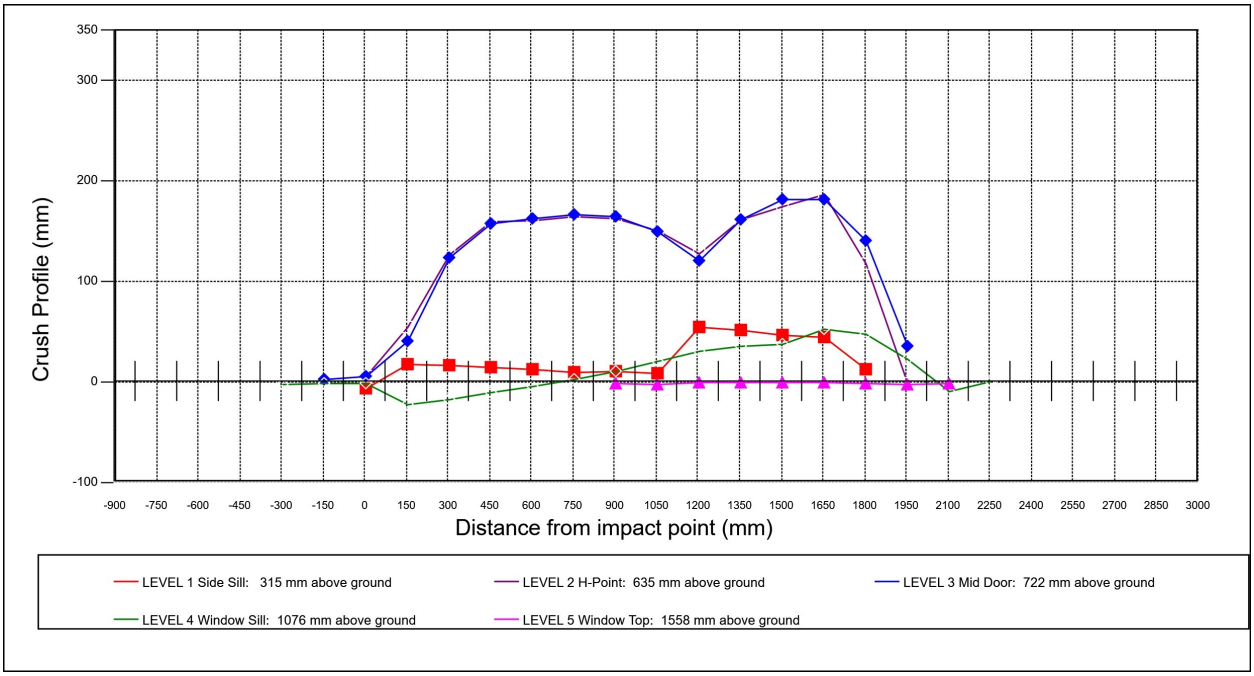
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	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				813					815					-2	
-150			927	826				924	827				3	-1	
0	898	926	926	836		904	920	924	837		-6	6	2	-1	
150	903	922	924	838		885	867	883	860		18	55	41	-22	
300	907	918	920	841		890	791	796	858		17	127	124	-17	
450	906	914	917	835		891	754	759	845		15	160	158	-10	
600	906	912	916	843		893	751	753	847		13	161	163	-4	
750	906	913	916	848		896	748	749	845		10	165	167	3	
900	906	915	915	854	622	895	752	750	843	623	11	163	165	11	-1
1050	904	915	914	855	632	895	764	764	834	634	9	151	150	21	-2
1200	901	916	912	856	634	846	788	791	825	634	55	128	121	31	0
1350	897	916	909	855	633	845	754	747	819	633	52	162	162	36	0
1500	891	915	906	853	630	844	740	724	815	630	47	175	182	38	0
1650	899	913	908	849	623	854	726	726	796	623	45	187	182	53	0
1800	900	913	912	844	612	887	795	771	796	613	13	118	141	48	-1
1950		907	907	849	594		908	871	826	596		-1	36	23	-2
2100				858	560				867	561				-9	-1
2250				860					859					1	
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

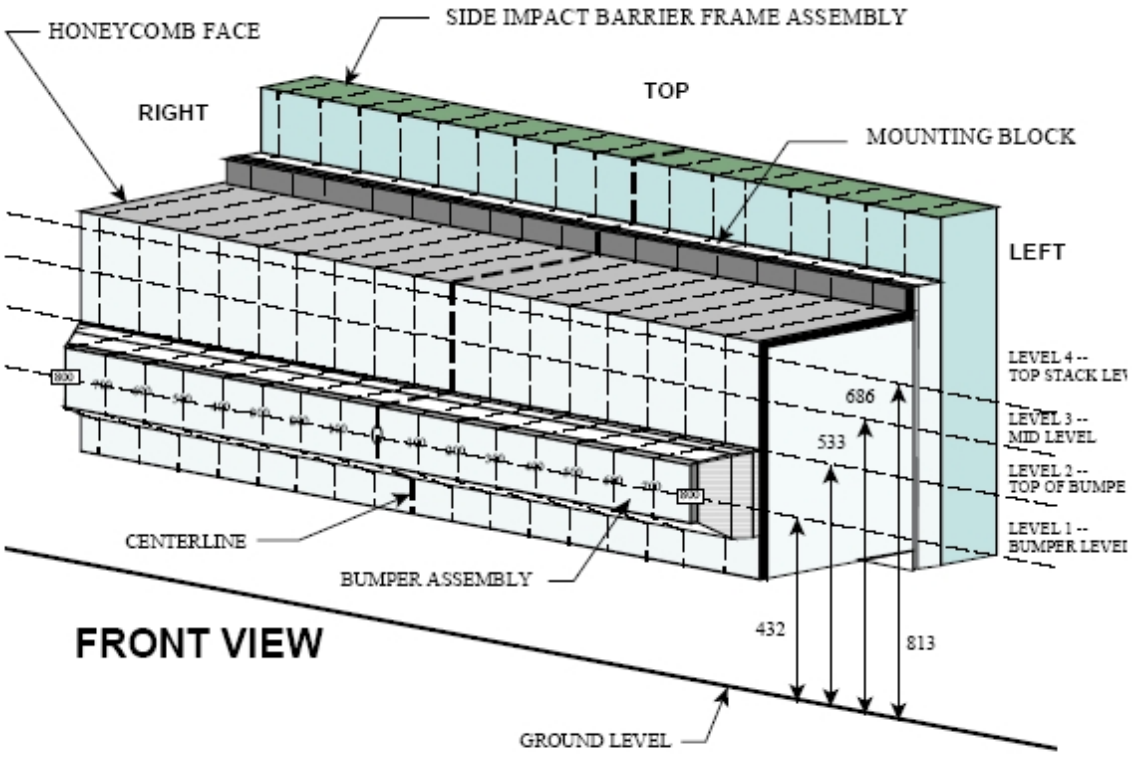
Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



NOTE: Dimensions are shown in millimeters, mm

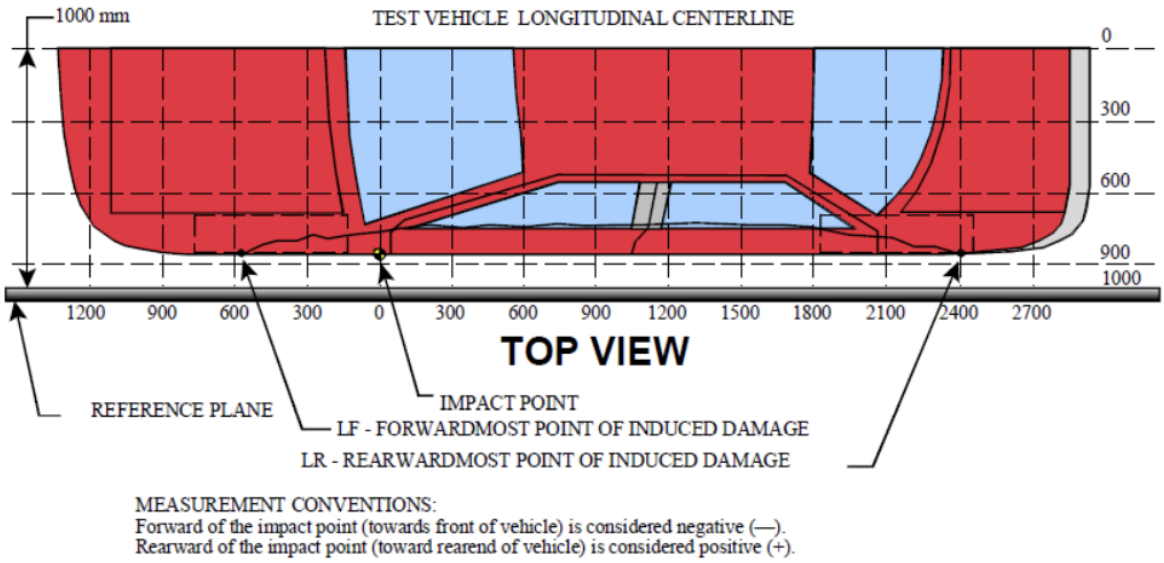
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	291	288	285	284	284	285	283	280	272	262	258	257	254	253	250	252	258
2	179	181	175	176	172	188	177	165	167	156	151	149	146	148	149	156	210
3	104	83	87	90	96	113	109	89	81	73	68	72	71	81	105	162	219
4	107	81	80	103	136	169	152	117	101	96	101	102	95	109	124	150	207

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

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



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

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-150	3	76	73	3
2	270	3	187	79	108
3	690	3	249	84	165
4	1110	3	225	87	138
5	1530	3	276	94	182
6	1950	3	129	93	36

MDB DAMAGE PROFILE DISTANCES

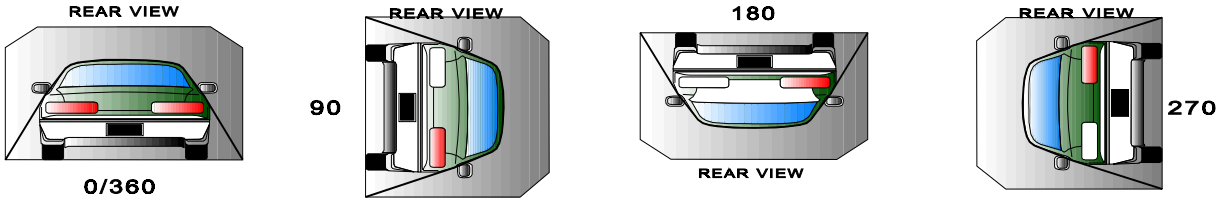
DPD	Distance From Center of MDB (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	247	505	-258
2	480 mm left of center	1	261	514	-253
3	160 mm left of center	1	254	514	-260
4	160 mm right of center	1	232	513	-281
5	480 mm right of center	1	229	513	-284
6	800 mm right of center	1	210	501	-291

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022
Test Time:	3:22 PM	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.)

D. Spillage Detail: No Spillage Occurred



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	62	300	362
90° to 180°	68	300	368
180° to 270°	69	300	369
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

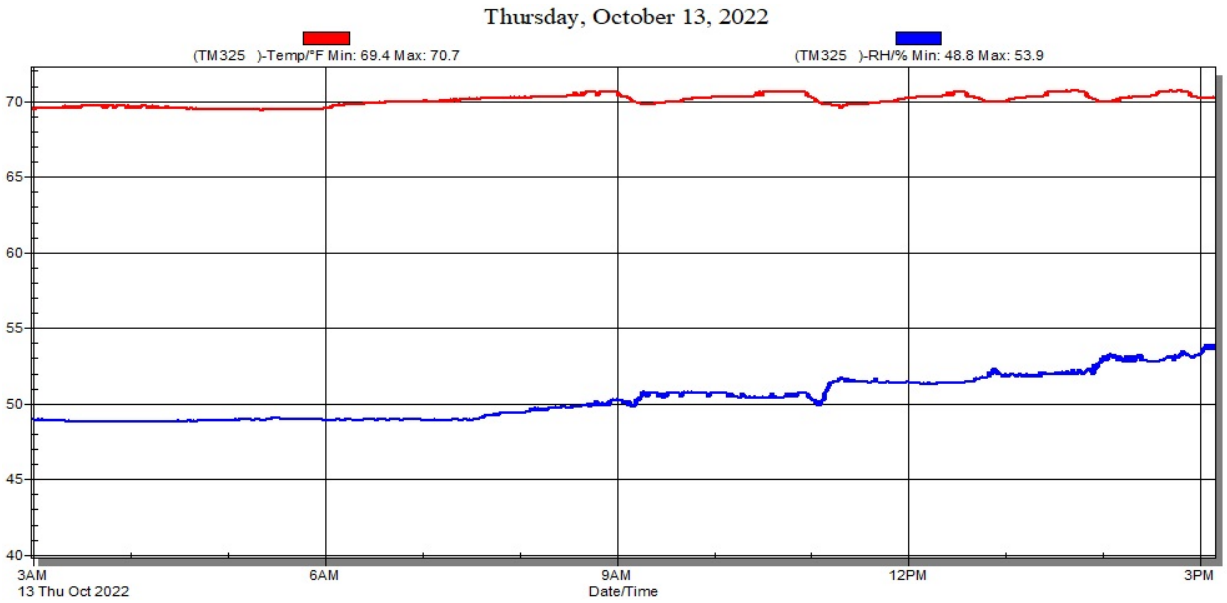
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



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

DATA SHEET NO. 305-1
GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test Test Date: 10/13/2022

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Electric
Propulsion Battery Type	Lithium-Ion
Nominal Voltage (Volts)	372.8
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside the HV battery housing
Auxiliary Battery Type	Lithium-Ion

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	LiPF6 + EC + EMC
Electrolyte Fluid Specific Gravity	1.29 g/cm3
Electrolyte Fluid Kinematic Viscosity (centistokes)	3.19 mm2/sec
Electrolyte Fluid Color	Clear and colorless
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	G12evo, Pink (Magenta)
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	240
Maximum State of Charge	V	408
95% of Maximum	V	387.6
Test Voltage *	V	375
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

* *For all battery types-No less than 95% of Maximum Operating Voltage; for batteries that are rechargeable ONLY by an energy source on the vehicle-maximum practicable state of charge within normal operating range.*

DATA SHEET NO. 305-2
PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

VEHICLE CHASSIS GROUND PT(S) LOCATION(S) & PROPULSION BATTERY SYSTEM

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Any point of the vehicle that is easily accessible is eligible as a chassis ground point for measurement of electrical isolation.
Details of Propulsion Battery Components	Install the new HV-Adapter box between the HV battery and the PTC (electric heater) that you will find when removing the trim below the dashboard at the area of the occupant passenger river (see document with detailed usage of HV-Adapter). This box have two extra outputs for measurement the positive and negative points for automatic disconnect and propulsion battery.

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

PROPULSION BATTERY VOLTAGE, RESISTANCE & ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	240-408
Propulsion Battery Voltage: (ready to drive position)	V_b	V	375
Propulsion Battery to Vehicle Chassis	V_1	V	303
Propulsion Battery to Vehicle Chassis	V_2	V	307
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	200,000
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	23.9
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	30.3
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	4,701,962
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	3,629,009
Lesser value of R_{i1} and R_{i2}	R_i	Ω	3,629,009
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	9,677

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

NOTES:

- *The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.*
- *If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.*
- *The known resistance Ro (in Ohms) should be approximately 500 times the nominal operating voltage of the vehicle (in volts) per SAE J1766*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*

DATA SHEET NO. 305-4
POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Calibration Date		4/28/2022
Propulsion Battery Voltage (Vb)	V	0.93

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V_b =	0.930	V	Time:	4	Minutes	27	Seconds
V_1 =	0.290	V	Time:	4	Minutes	39	Seconds
V_2 =	0.680	Ω	Time:	4	Minutes	43	Seconds
R_o =	200,000	V					
V_1' =	0.100	V	Time:	4	Minutes	47	Seconds
V_2' =	0.260	Ω	Time:	4	Minutes	51	Seconds
R_{i1} =	1,271,034	Ω	Time:	4	Minutes	47	Seconds
R_{i2} =	460,860	Ω	Time:	4	Minutes	51	Seconds
R_i =	460,860	Ω/V	Time:	4	Minutes	51	Seconds
R_i/V_b =	495,548	Ω/V	Time:	4	Minutes	51	Seconds

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)?	X	Yes		No (Fail)

NOTES:

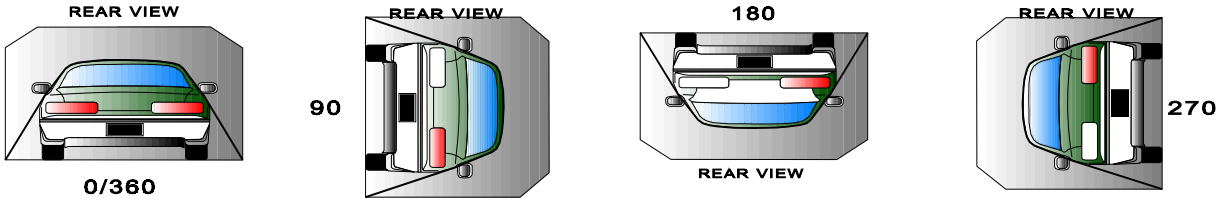
- *$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$, $R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$, R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical Isolation Value is 500 Ω/V*

PROPULSION BATTERY SYSTEM COMPONENTS

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	None	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	None	X	
Is propulsion battery electrolyte spillage visible in the passenger compartment?	None	X	

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225802
Test Program:	NCAP Side MDB Impact Test	Test Date:	10/13/2022



Rear View

DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1 -3 min)		FMVSS 301 Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	2	5	6	2	7
90° to 180°	1	8	5	6	8	7
180° to 270°	1	9	5	6	9	7
270° to 360°	1	10	5	6	10	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0	Liters	No Spillage Occurred
90° to 180°	0	Liters	No Spillage Occurred
180° to 270°	0	Liters	No Spillage Occurred
270° to 360°	0	Liters	No Spillage Occurred
Total Spillage	0	Liters	No Spillage Occurred

** FMVSS 305 Requirements: Maximum allowable propulsion battery electrolyte spillage is **5.0 Liters***

Is the total spillage of propulsion battery electrolyte greater than 5.0 Liters?		Yes (Fail)	X	No
Is propulsion battery electrolyte spillage visible in the passenger compartment?		Yes (Fail)	X	No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Calibration Date		4/28/2022
Propulsion Battery Voltage (Vb)	V	0.93

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.*

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225802
Test Program: NCAP Side MDB Impact Test
Test Date: 10/13/2022

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units		Minutes	Seconds
V_b =	90°	0.02	V	Time:	1	5
	180°	0.13	V		21	45
	270°	0.02	V		28	15
	360°	0.05	V		34	42
V_1 =	90°	0.08	V	Time:	1	18
	180°	0.12	V		21	55
	270°	0.35	V		28	32
	360°	0.19	V		34	51
V_2 =	90°	0.02	V	Time:	1	23
	180°	0.11	V		21	59
	270°	0.04	V		29	3
	360°	0.10	V		34	55
V_1' =	90°	0.00	V	Time:	1	28
	180°	0.00	V		22	4
	270°	0.04	V		29	7
	360°	0.00	V		34	59
V_2' =	90°	0.00	Ω	Time:	1	32
	180°	0.00	Ω		22	8
	270°	0.00	Ω		29	11
	360°	0.00	Ω		35	4
R_{i1} =	90°	Zero Volts	Ω	Time:	1	28
	180°	Zero Volts	Ω		22	4
	270°	Zero Volts	Ω		29	7
	360°	Zero Volts	Ω		34	59
R_{i2} =	90°	Zero Volts	Ω	Time:	1	32
	180°	Zero Volts	Ω		22	8
	270°	Zero Volts	Ω		29	11
	360°	Zero Volts	Ω		35	4
R_i =	90°	Zero Volts	Ω/V	Time:	1	28
	180°	Zero Volts	Ω/V		22	4
	270°	Zero Volts	Ω/V		29	7
	360°	Zero Volts	Ω/V		34	59
R_i/V_b =	90°	Zero Volts	Ω/V	Time:	1	28
	180°	Zero Volts	Ω/V		22	4
	270°	Zero Volts	Ω/V		29	7
	360°	Zero Volts	Ω/V		34	59

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? [X] Yes [ ] No (Fail)

APPENDIX A

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



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



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



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



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



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



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



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



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



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



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



Figure A-12: Post-Test Rear 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

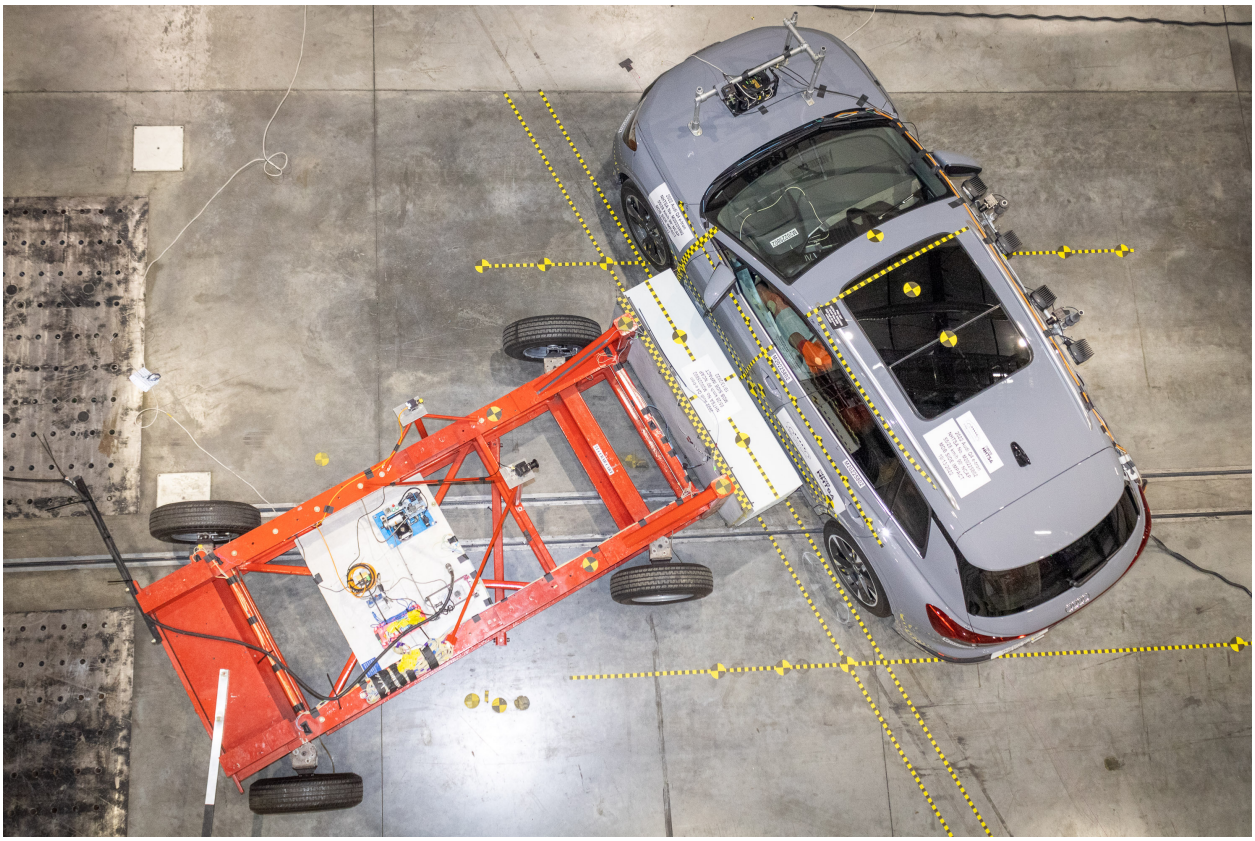


Figure A-15: Pre-Test Overhead View of Test Area

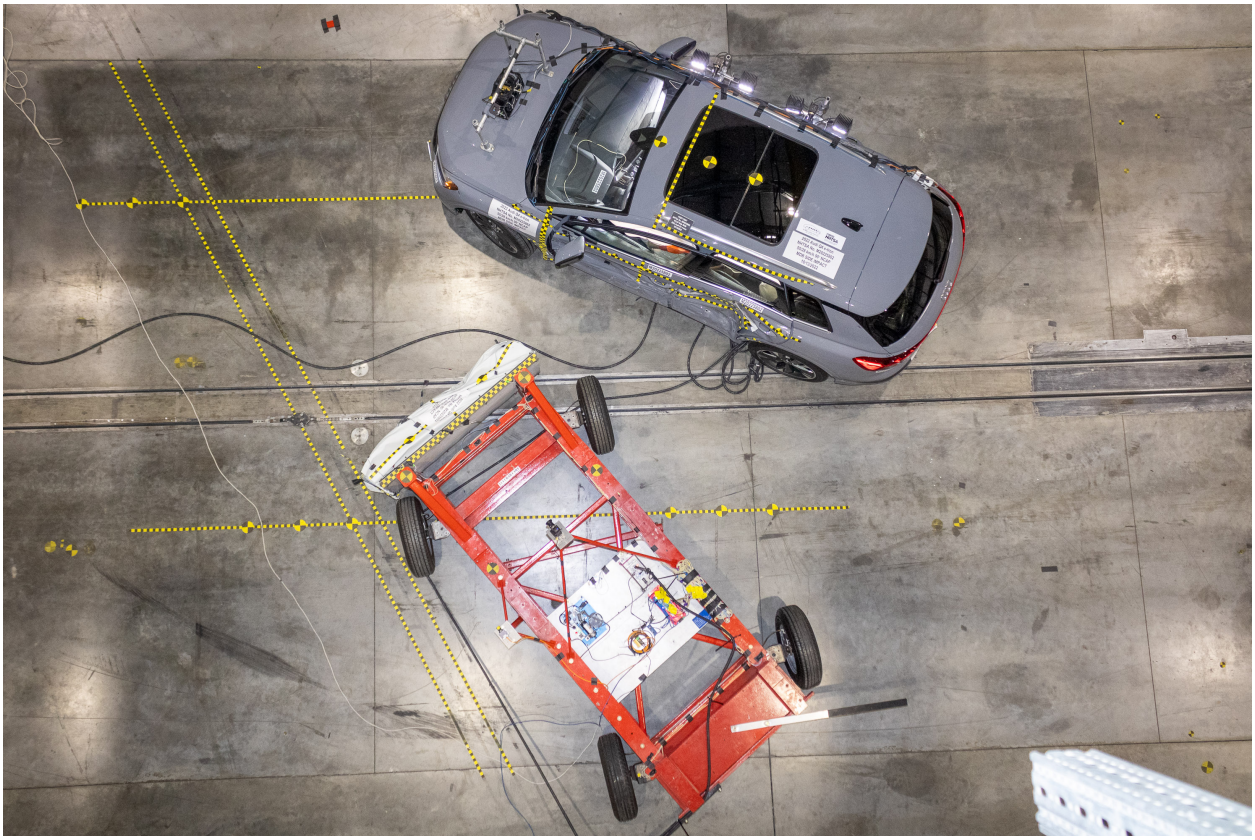


Figure A-16: Post-Test Overhead View of Test Area



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

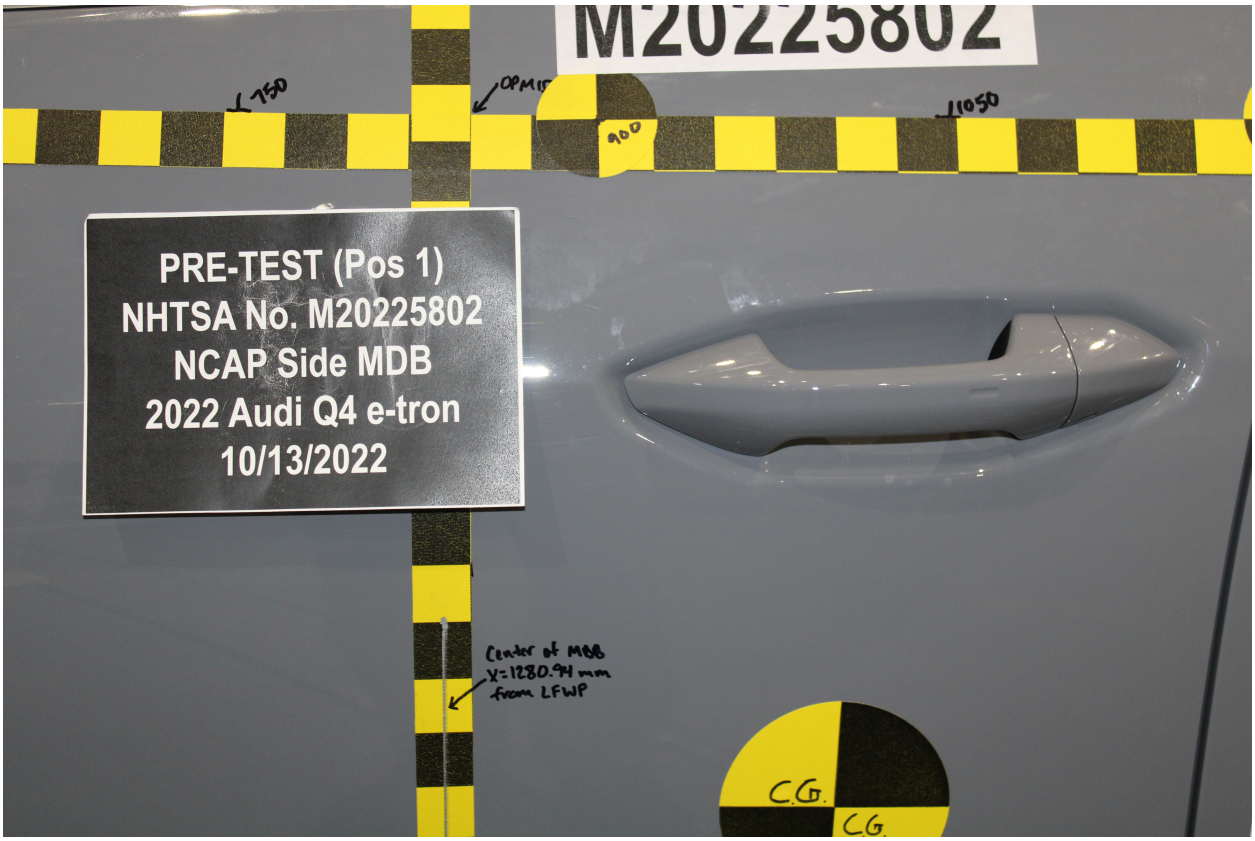


Figure A-21: Pre-Test Left Front Door Latch Close-Up



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

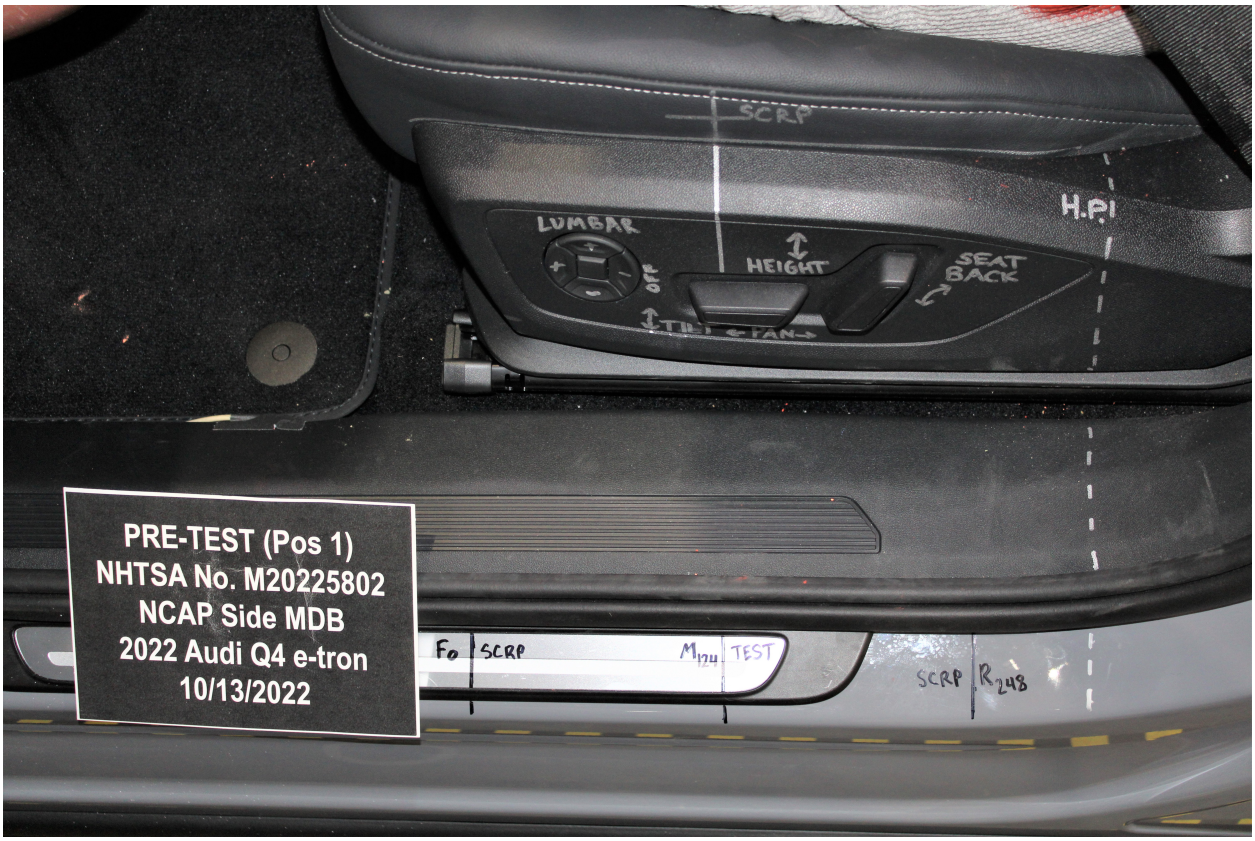


Figure A-39: Pre-Test Close-Up Left Side View of Driver Seat Track



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



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

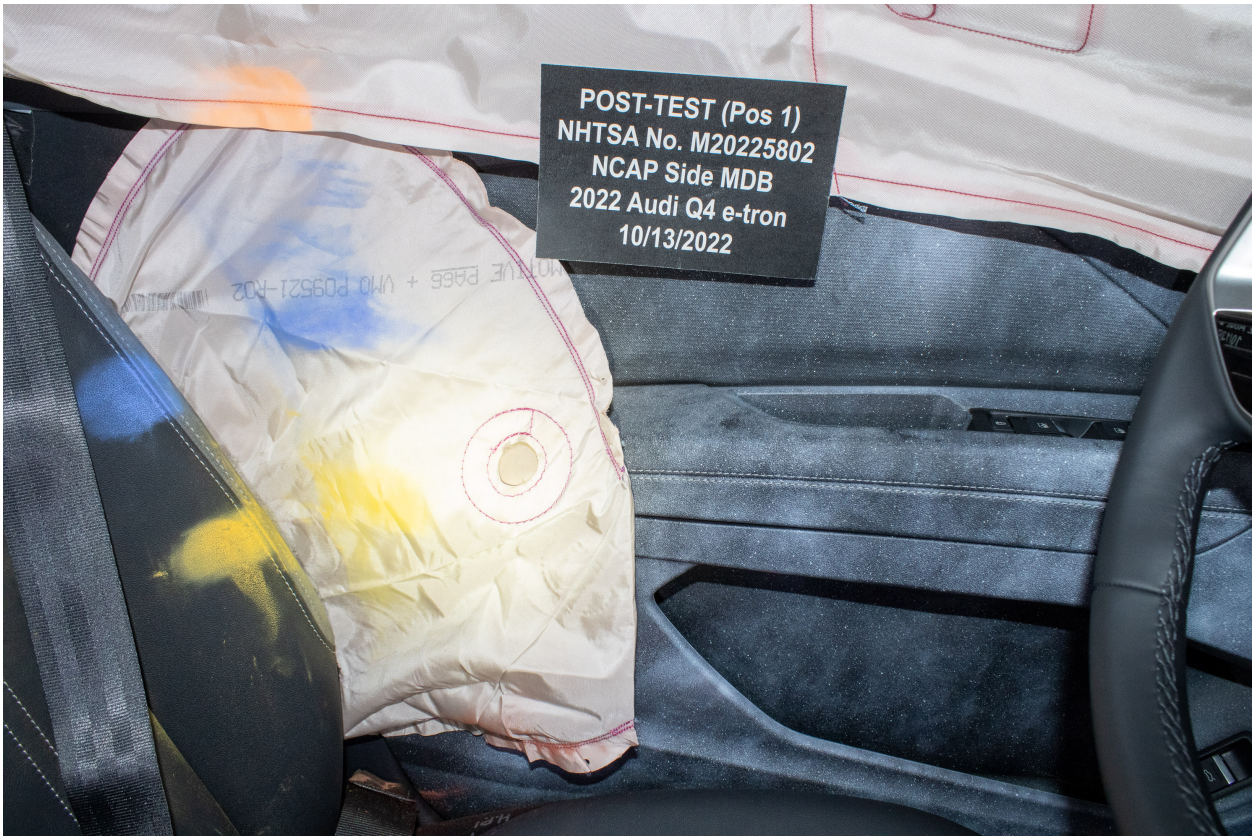


Figure A-51: Post-Test Driver Dummy Close-Up Torso Contact with Side Air Bag View



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

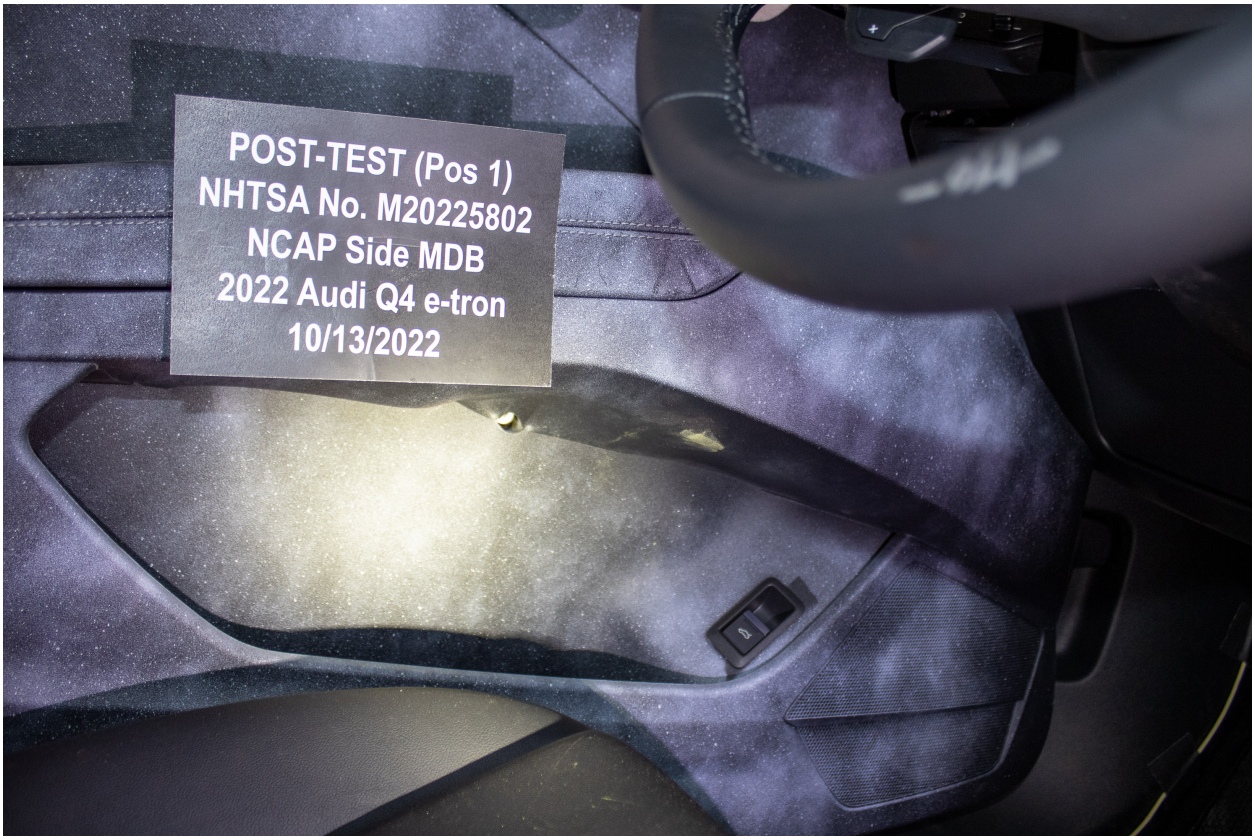


Figure A-54: Post-Test Driver Dummy Close-Up Knee Contact View



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

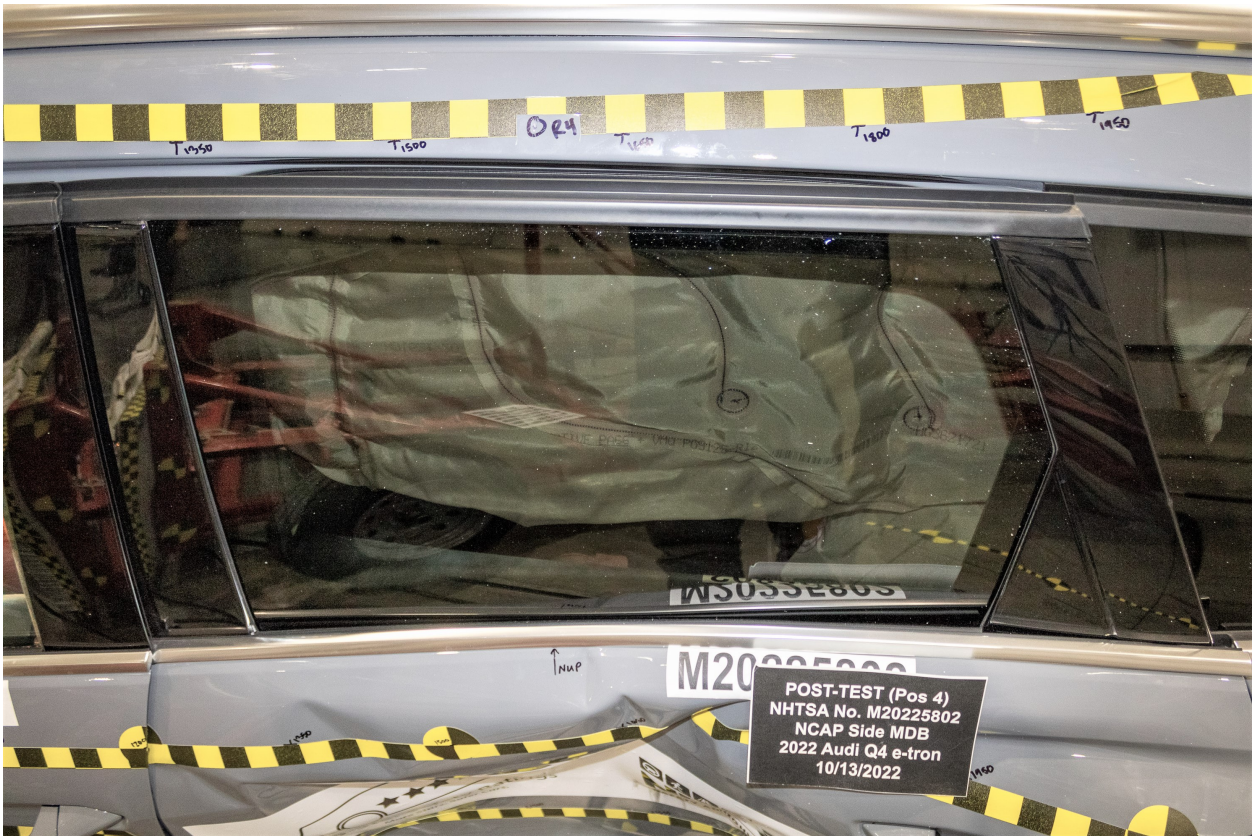


Figure A-70: Post-Test Rear Passenger Dummy and Door Clearance View



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 Charging Port



Figure A-83: Post-Test Charging Port



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

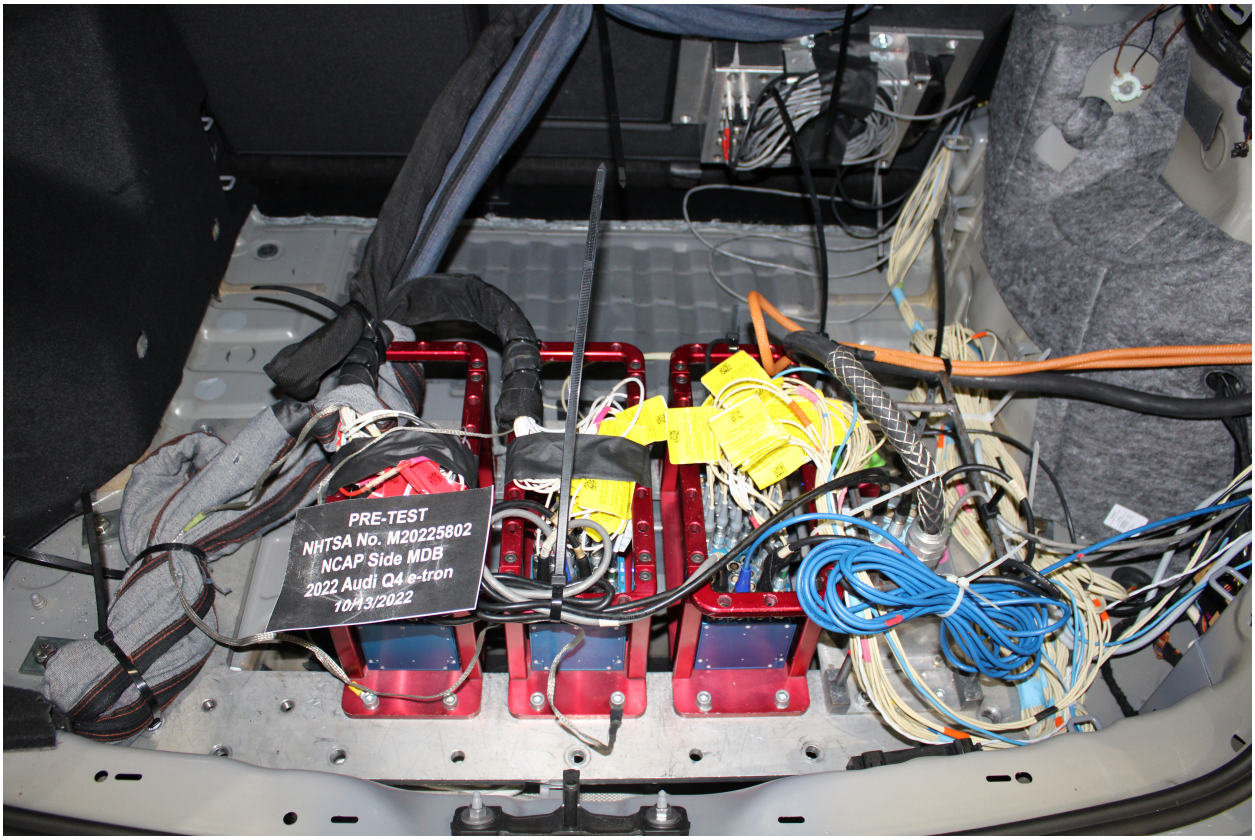


Figure A-94: Pre-Test Ballast View



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

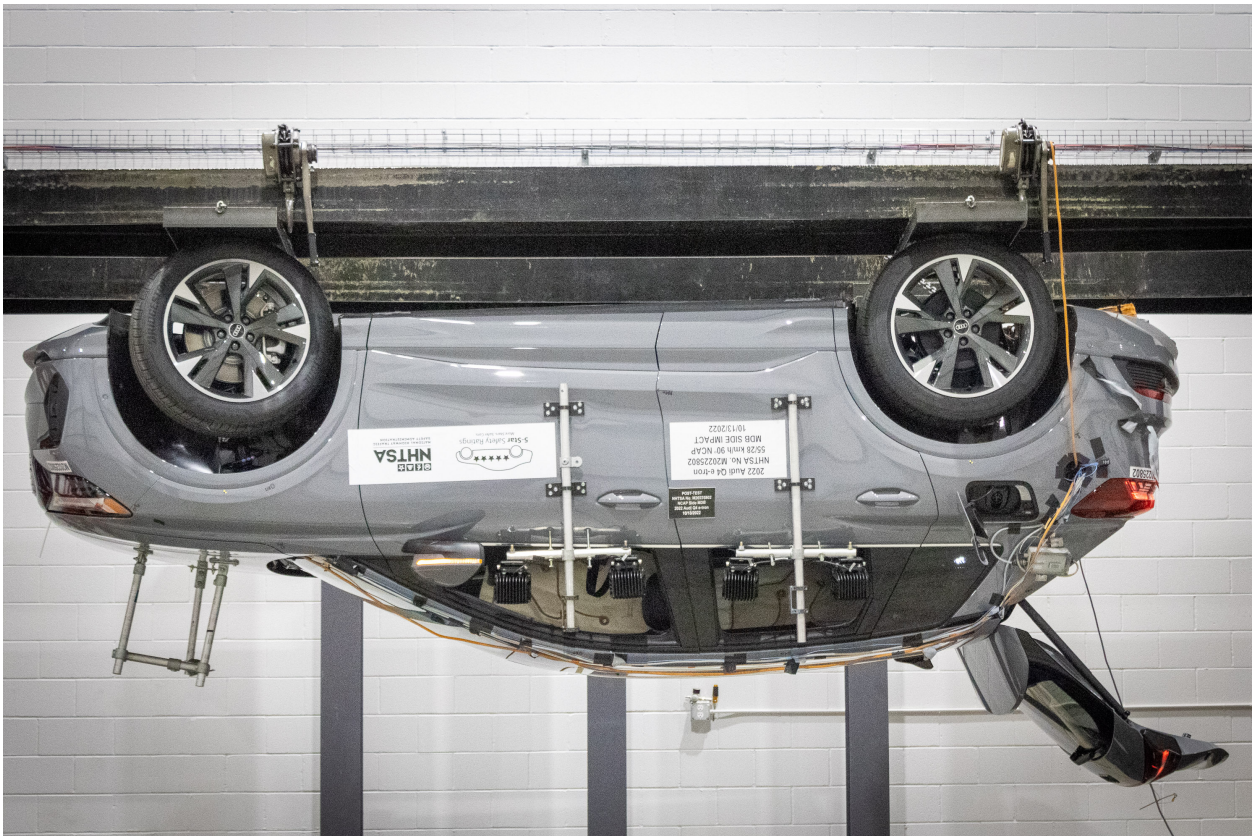


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

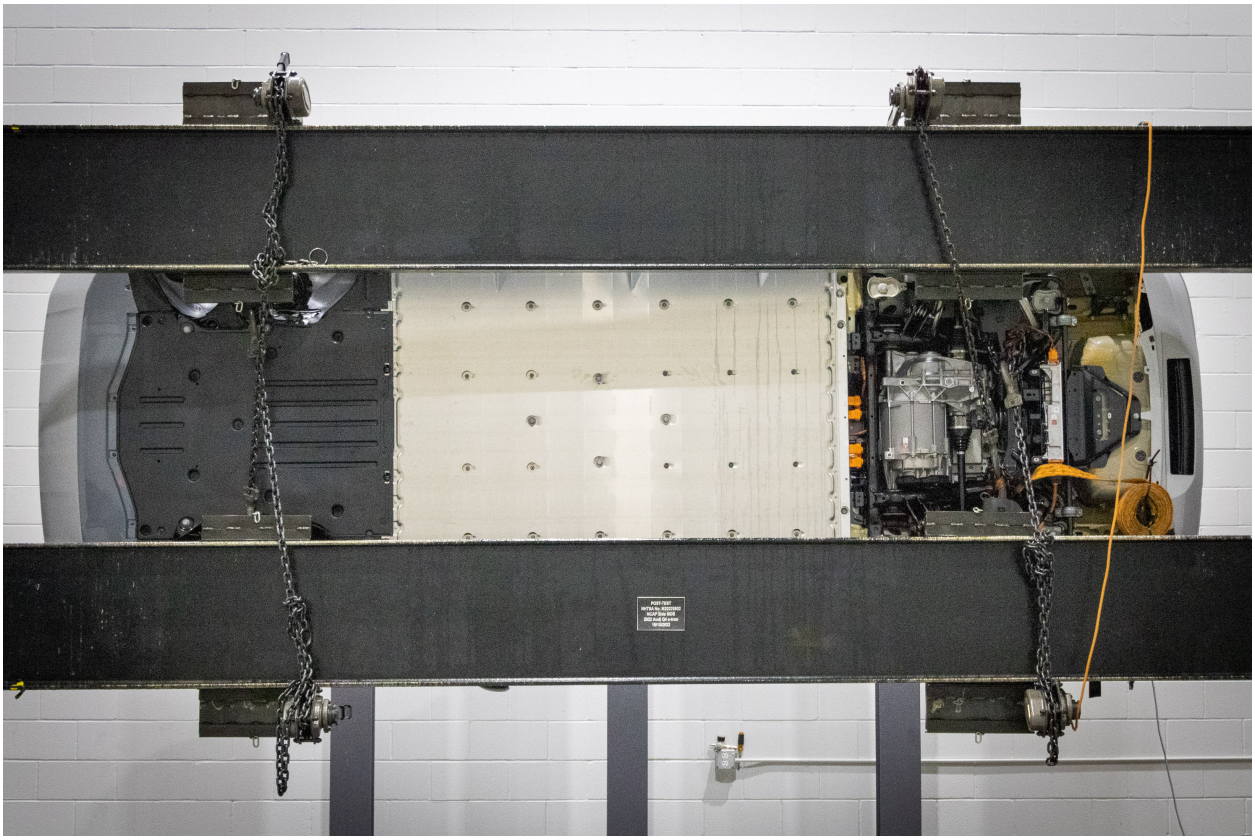


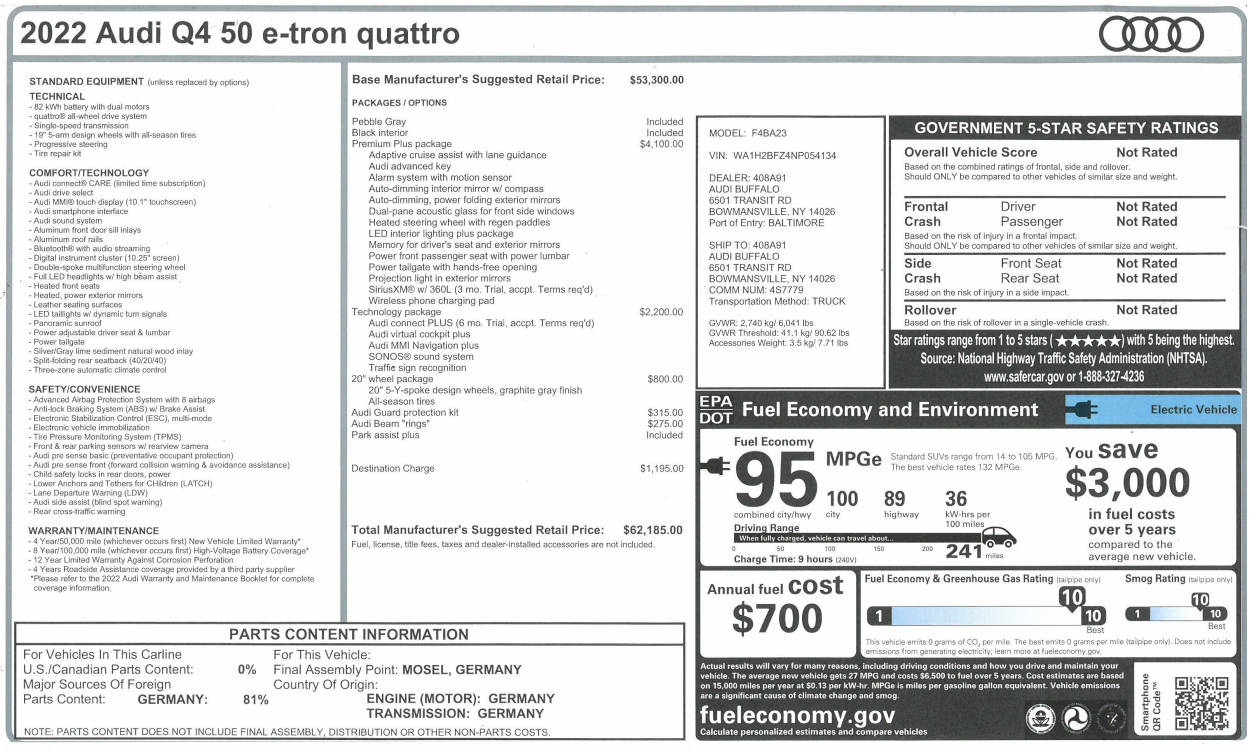
Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees



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



Figure A-101: Impact Event



2022 Audi Q4 50 e-tron quattro

STANDARD EQUIPMENT (unless replaced by options)

TECHNICAL
- 82 kWh battery with dual motors
- quattro® all-wheel drive system
- Single-speed transmission
- 19" 5-arm design wheels with all-season tires
- Progressive steering
- Tire repair kit

COMFORT/TECHNOLOGY
- Audi connect® CARE (limited time subscription)
- Audi drive select
- Audi MMI® touch display (10.1" touchscreen)
- Audi smartphone interface
- Audi sound system
- Aluminum front door sill inlays
- Aluminum roof rails
- Bluetooth® with audio streaming
- Digital instrument cluster (10.25" screen)
- Double-spoke multifunction steering wheel
- Full LED headlights w/ high beam assist
- Heated front seats
- Heated, power exterior mirrors
- Leather seating surfaces
- LED taillights w/ dynamic turn signals
- Panoramic sunroof
- Power adjustable driver seat & lumbar
- Power tailgate
- Silver/Gray lime sediment natural wood inlay
- Split-folding rear seatback (40/20/40)
- Three-zone automatic climate control

SAFETY/CONVENIENCE
- Advanced Airbag Protection System with 8 airbags
- Anti-lock Braking System (ABS) w/ Brake Assist
- Electronic Stabilization Control (ESC), multi-mode
- Electronic vehicle immobilization
- Tire Pressure Monitoring System (TPMS)
- Front & rear parking sensors w/ rearview camera
- Audi pre sense basic (preventative occupant protection)
- Audi pre sense front (forward collision warning & avoidance assistance)
- Child safety locks in rear doors, power
- Lower Anchors and Tethers for CHildren (LATCH)
- Lane Departure Warning (LDW)
- Audi side assist (blind spot warning)
- Rear cross-traffic warning

WARRANTY/MAINTENANCE
- 4 Year/50,000 mile (whichever occurs first) New Vehicle Limited Warranty*
- 8 Year/100,000 mile (whichever occurs first) High-Voltage Battery Coverage*
- 12 Year Limited Warranty Against Corrosion Perforation
- 4 Years Roadside Assistance coverage provided by a third party supplier

*Please refer to the 2022 Audi Warranty and Maintenance Booklet for complete coverage information.

Base Manufacturer's Suggested Retail Price: $53,300.00

PACKAGES / OPTIONS

Pebble Gray	Included
Black interior	Included
Premium Plus package	$4,100.00
Adaptive cruise assist with lane guidance	
Audi advanced key	
Alarm system with motion sensor	
Auto-dimming interior mirror w/ compass	
Auto-dimming, power folding exterior mirrors	
Dual-pane acoustic glass for front side windows	
Heated steering wheel with regen paddles	
LED interior lighting plus package	
Memory for driver's seat and exterior mirrors	
Power front passenger seat with power lumbar	
Power tailgate with hands-free opening	
Projection light in exterior mirrors	
SiriusXM® w/ 360L (3 mo. Trial, accpt. Terms req'd)	
Wireless phone charging pad	
Technology package	$2,200.00
Audi connect PLUS (6 mo. Trial, accpt. Terms req'd)	
Audi virtual cockpit plus	
Audi MMI Navigation plus	
SONOS® sound system	
Traffic sign recognition	
20" wheel package	$800.00
20" 5-Y-spoke design wheels, graphite gray finish	
All-season tires	
Audi Guard protection kit	$315.00
Audi Beam "rings"	$275.00
Park assist plus	Included
Destination Charge	$1,195.00

Total Manufacturer's Suggested Retail Price: $62,185.00

Fuel, license, title fees, taxes and dealer-installed accessories are not included.

MODEL: F4BA23

VIN: WA1H2BFZ4NP054134

DEALER: 408A91
AUDI BUFFALO
6501 TRANSIT RD
BOWMANSVILLE, NY 14026
Port of Entry: BALTIMORE

SHIP TO: 408A91
AUDI BUFFALO
6501 TRANSIT RD
BOWMANSVILLE, NY 14026
COMM NUM: 4S7779
Transportation Method: TRUCK

GVWR: 2,740 kg/ 6,041 lbs
GVWR Threshold: 41.1 kg/ 90.62 lbs
Accessories Weight: 3.5 kg/ 7.71 lbs

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score		**Not Rated**
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		
Frontal Crash	Driver	**Not Rated**
	Passenger	**Not Rated**
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front Seat	**Not Rated**
	Rear Seat	**Not Rated**
Based on the risk of injury in a side impact.		
Rollover		**Not Rated**
Based on the risk of rollover in a single-vehicle crash.		

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA).
www.safercar.gov or 1-888-327-4236

EPA DOT Fuel Economy and Environment — Electric Vehicle

Fuel Economy: **95** MPGe (combined city/hwy) — 100 city, 89 highway, 36 kW-hrs per 100 miles
Standard SUVs range from 14 to 105 MPG. The best vehicle rates 132 MPGe.
Driving Range: When fully charged, vehicle can travel about... 241 miles
Charge Time: 9 hours (240V)

You save **$3,000** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$700**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 10 (Best)
Smog Rating (tailpipe only): 10 (Best)

This vehicle emits 0 grams of CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Does not include emissions from generating electricity; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $6,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $0.13 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

PARTS CONTENT INFORMATION

For Vehicles In This Carline
U.S./Canadian Parts Content: 0%
Major Sources Of Foreign Parts Content: GERMANY: 81%

For This Vehicle:
Final Assembly Point: MOSEL, GERMANY
Country Of Origin:
ENGINE (MOTOR): GERMANY
TRANSMISSION: GERMANY

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

Figure A-102: Monroney Label

– The upper edge of the head restraint is as even as possible with the top of your head.
– The head restraint is as close as possible to the back of the head.
– The head restraints in any occupied rear seats are all the way up.

WARNING

– There is one head restraint for each seat. All vehicle occupants must adjust the head restraint correctly before every trip. Having head restraints that are not adjusted correctly or not installed in the vehicle increases the risk of a neck injury during sudden or unexpected driving or braking maneuvers or in a collision.
– Only remove the rear seat head restraints if it is necessary to install a child safety seat ⇨ *page 70*. Stow the removed head restraints securely, for example in the luggage compartment. Reinstall the head restraints immediately once the child safety seat has been removed. Driving without head restraints increases the risk of serious neck injuries.

Front head restraints

Applies to: vehicles with adjustable head restraints

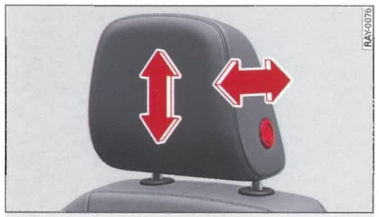


Fig. 54 Front seat: adjusting the head restraint

The settings depend on the vehicle equipment.

Adjusting the head restraints

▸ To adjust the head restraint upward, downward, or backward, press the button on the side and slide the head restraint. Release the button and slide the head restraint farther until it locks into place.
▸ To adjust the head restraint to the front, slide it until it locks into place.

Rear head restraints

Applies to: vehicles with adjustable head restraints

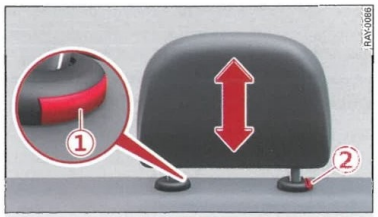


Fig. 55 Rear seat: adjusting or removing the head restraint

Adjusting the head restraints

▸ To adjust the head restraint upward, slide it until it locks into place.
▸ To adjust the head restraint downward, press the button ② and slide the head restraint. Release the button and slide the head restraint farther until it locks into place.

Removing the head restraints

Applies to: vehicles with removable head restraints

▸ Fold the backrest forward slightly ⇨ *page 79*.
▸ Move the head restraint upward all the way.
▸ Press the button ② ⇨ *fig. 55*. If the head restraint is equipped with another button, then also press that button ①. Pull the head restraint out of the backrest at the same time ⇨ ⚠ *in General information on page 61*.

Installing the head restraints

▸ Fold the backrest forward slightly ⇨ *page 79*.
▸ Slide the posts on the head restraint down into the guides until the posts click into place.
▸ Press the button ② and slide the head restraint all the way down. It should not be possible to remove the head restraint from the backrest without pressing the button.

Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

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

– The upper edge of the head restraint is as even as possible with the top of your head.
– The head restraint is as close as possible to the back of the head.
– The head restraints in any occupied rear seats are all the way up.

WARNING

– There is one head restraint for each seat. All vehicle occupants must adjust the head restraint correctly before every trip. Having head restraints that are not adjusted correctly or not installed in the vehicle increases the risk of a neck injury during sudden or unexpected driving or braking maneuvers or in a collision.
– Only remove the rear seat head restraints if it is necessary to install a child safety seat ⇨ *page 70*. Stow the removed head restraints securely, for example in the luggage compartment. Reinstall the head restraints immediately once the child safety seat has been removed. Driving without head restraints increases the risk of serious neck injuries.

Front head restraints

Applies to: vehicles with adjustable head restraints

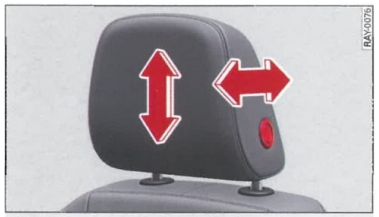


Fig. 54 Front seat: adjusting the head restraint

The settings depend on the vehicle equipment.

Adjusting the head restraints

▸ To adjust the head restraint upward, downward, or backward, press the button on the side and slide the head restraint. Release the button and slide the head restraint farther until it locks into place.
▸ To adjust the head restraint to the front, slide it until it locks into place.

Rear head restraints

Applies to: vehicles with adjustable head restraints

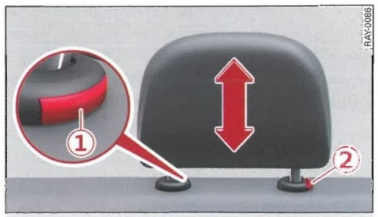


Fig. 55 Rear seat: adjusting or removing the head restraint

Adjusting the head restraints

▸ To adjust the head restraint upward, slide it until it locks into place.
▸ To adjust the head restraint downward, press the button ② and slide the head restraint. Release the button and slide the head restraint farther until it locks into place.

Removing the head restraints

Applies to: vehicles with removable head restraints

▸ Fold the backrest forward slightly ⇨ *page 79*.
▸ Move the head restraint upward all the way.
▸ Press the button ② ⇨ *fig. 55*. If the head restraint is equipped with another button, then also press that button ①. Pull the head restraint out of the backrest at the same time ⇨ ⚠ *in General information on page 61*.

Installing the head restraints

▸ Fold the backrest forward slightly ⇨ *page 79*.
▸ Slide the posts on the head restraint down into the guides until the posts click into place.
▸ Press the button ② and slide the head restraint all the way down. It should not be possible to remove the head restraint from the backrest without pressing the button.



Figure 305-1: Auxiliary Power Module Warning Label

Photo Not Applicable

Figure 305-2: Power Inverter Warning Label



Figure 305-3 First Responder Warning Label

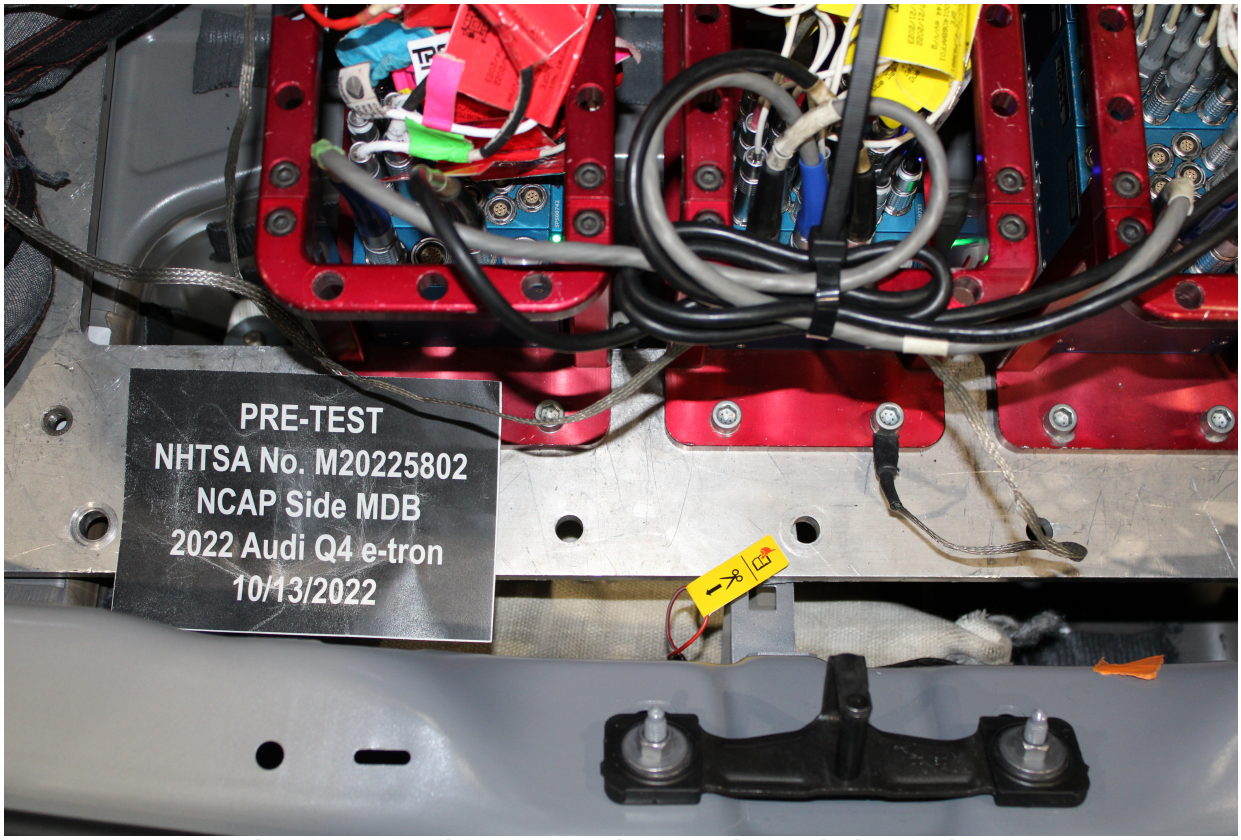


Figure 305-4: First Responder Warning Label Location

Photo Not Applicable

Figure 305-5: Other Vehicle Label(s) Related to Electrical Propulsion System



Figure 305-6: Manual High Voltage Service Disconnect in Place



Figure 305-7: Manual High Voltage Service Disconnect Removed (Plug)

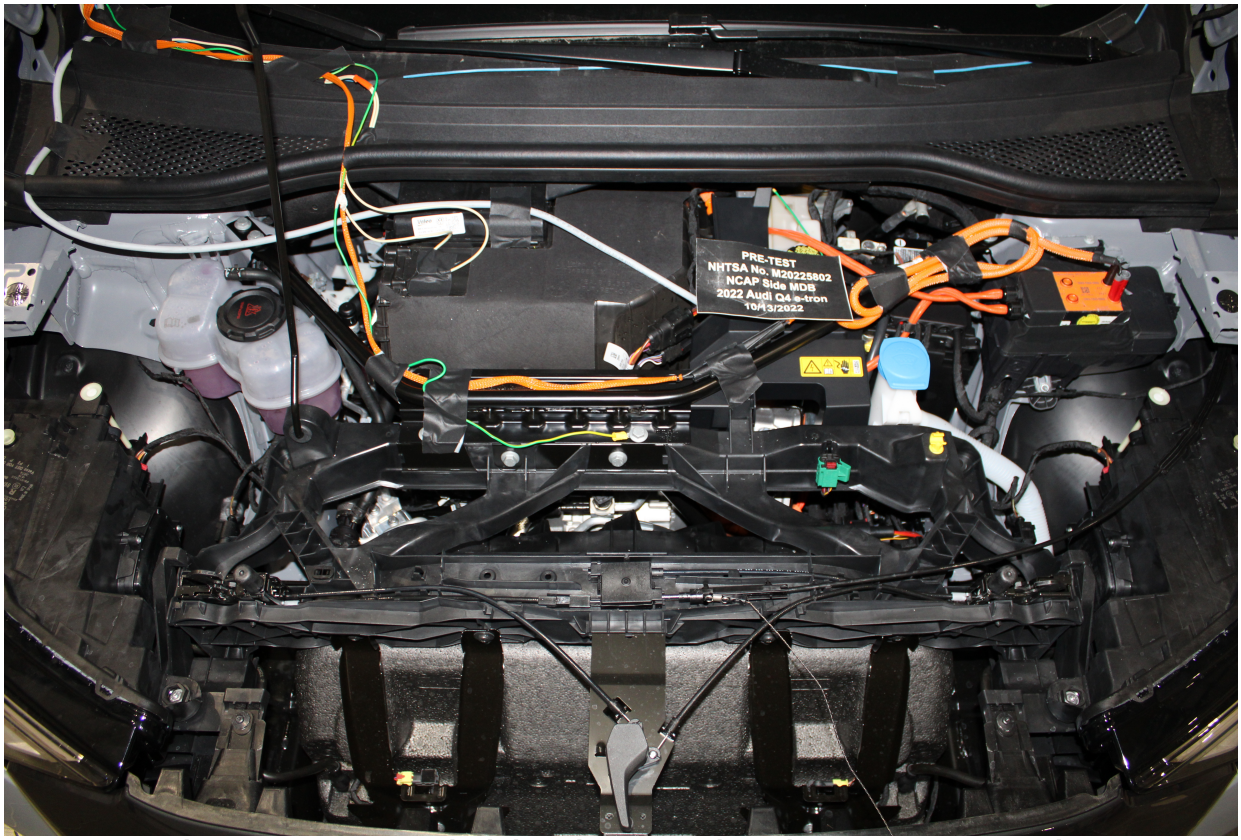


Figure 305-8: Manual High Voltage Service Disconnect Removed (Location where removed)

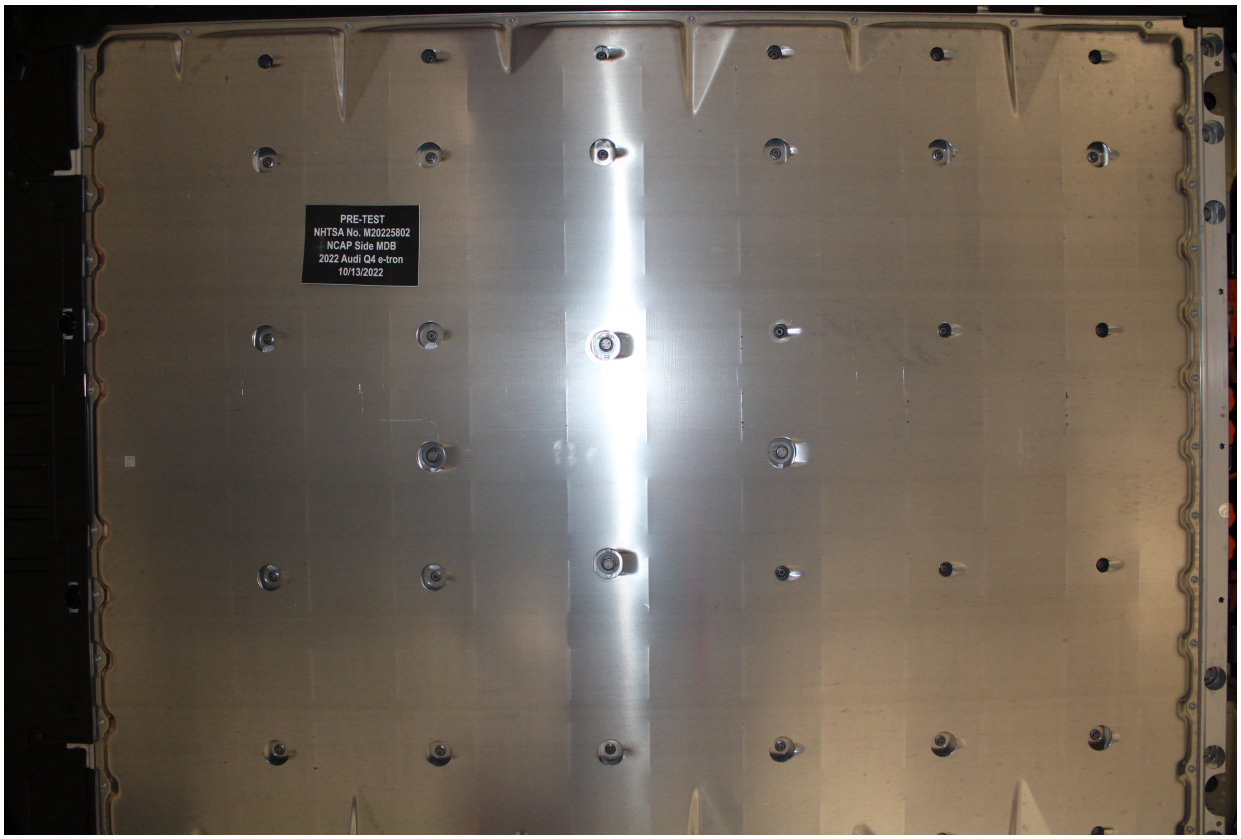


Figure 305-9: Pre-Impact View of Propulsion Battery

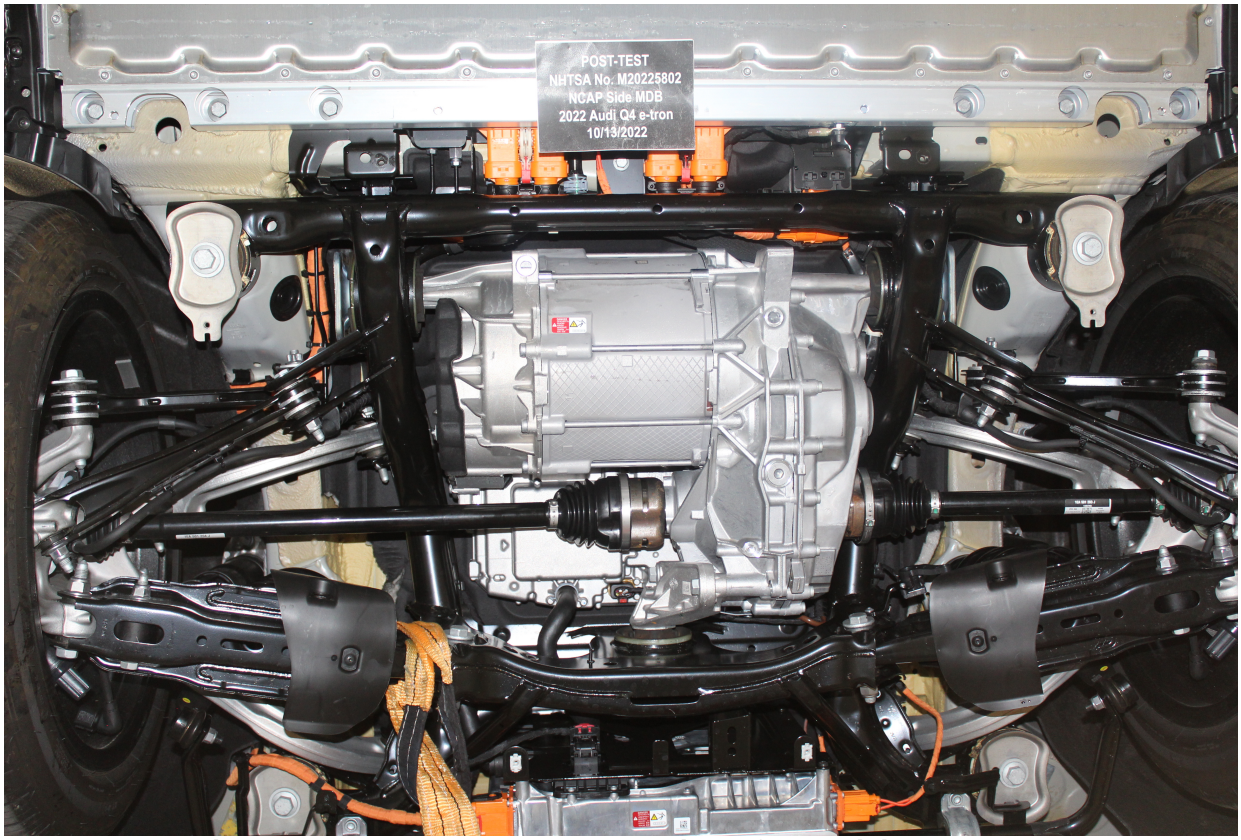


Figure 305-10: Post-Impact Front View of Propulsion Battery

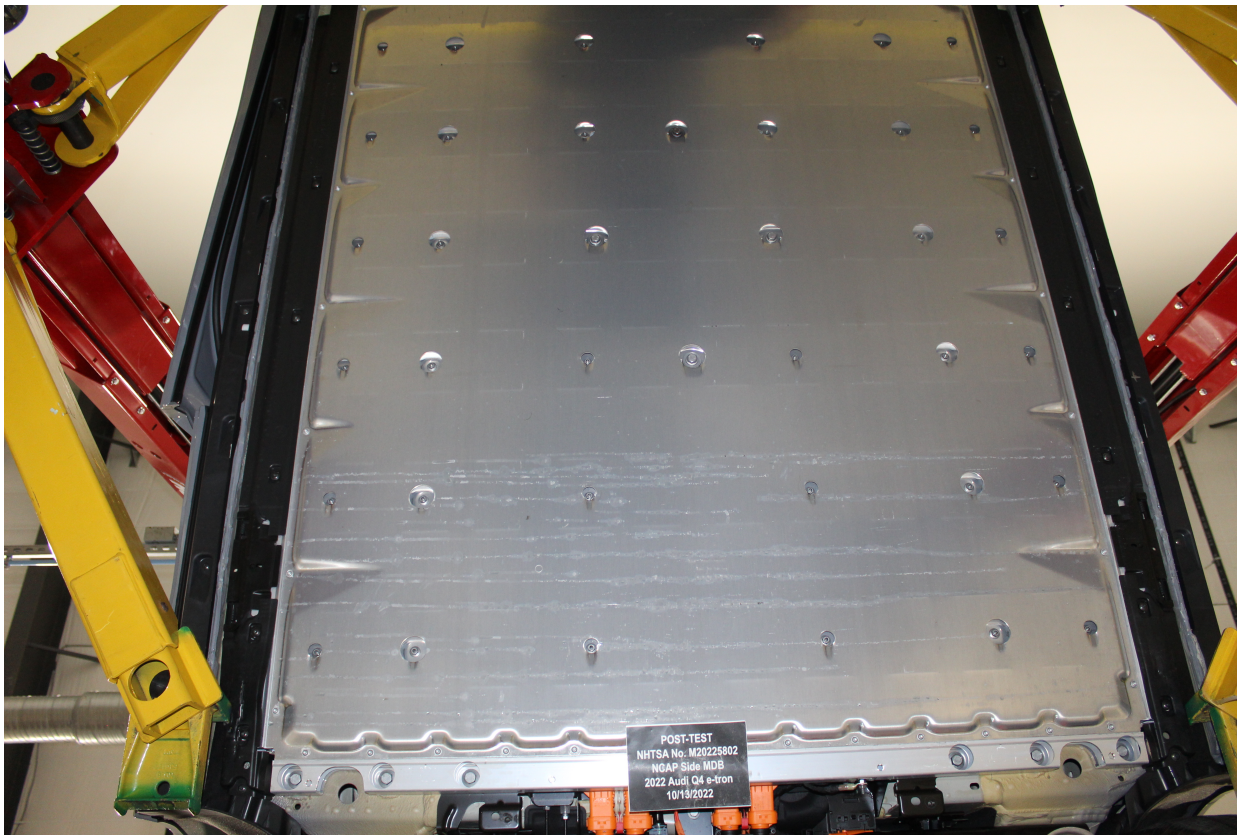


Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)

Photo Not Applicable

Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

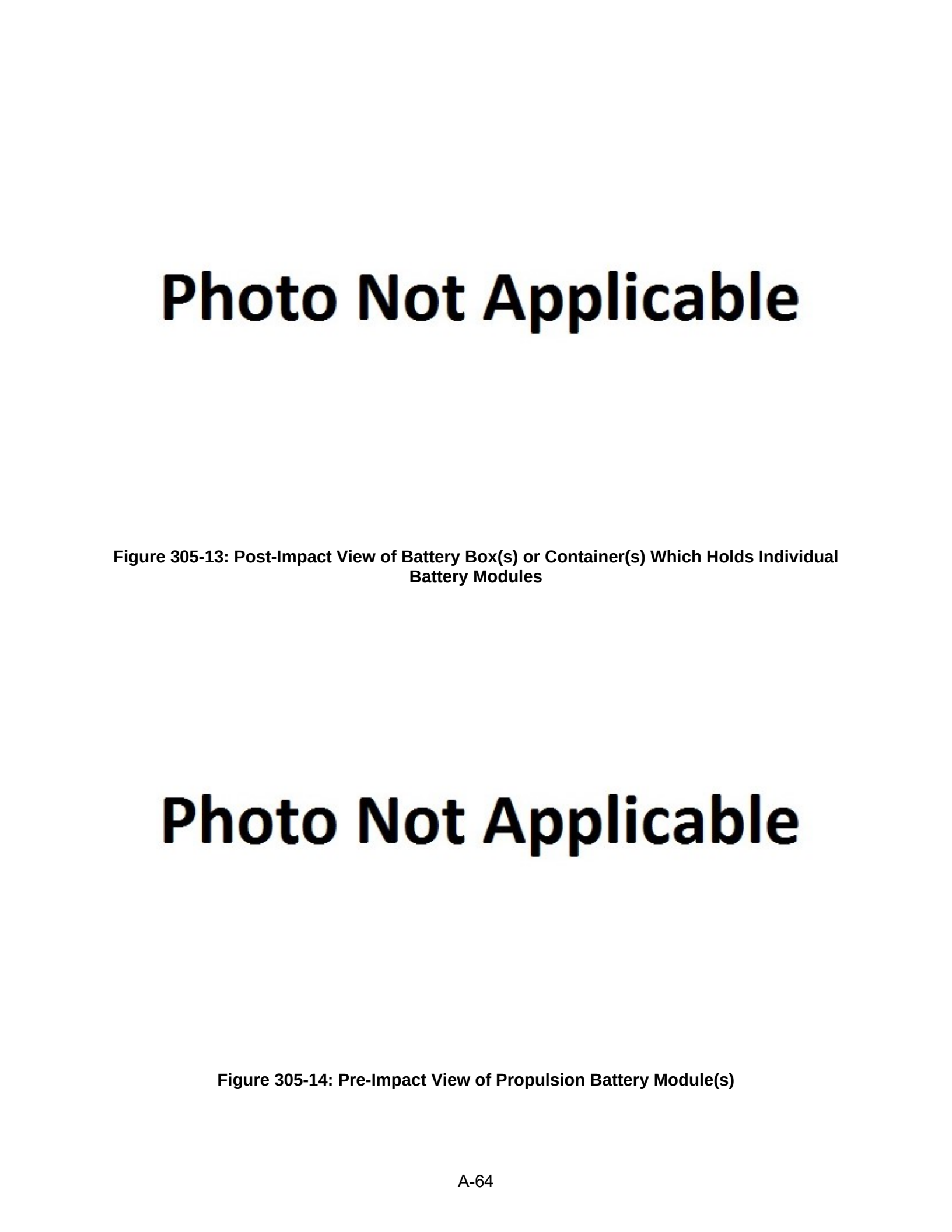


Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

Figure 305-14: Pre-Impact View of Propulsion Battery Module(s)

Photo Not Applicable

Figure 305-15: Post-Impact View of Propulsion Battery Module(s)

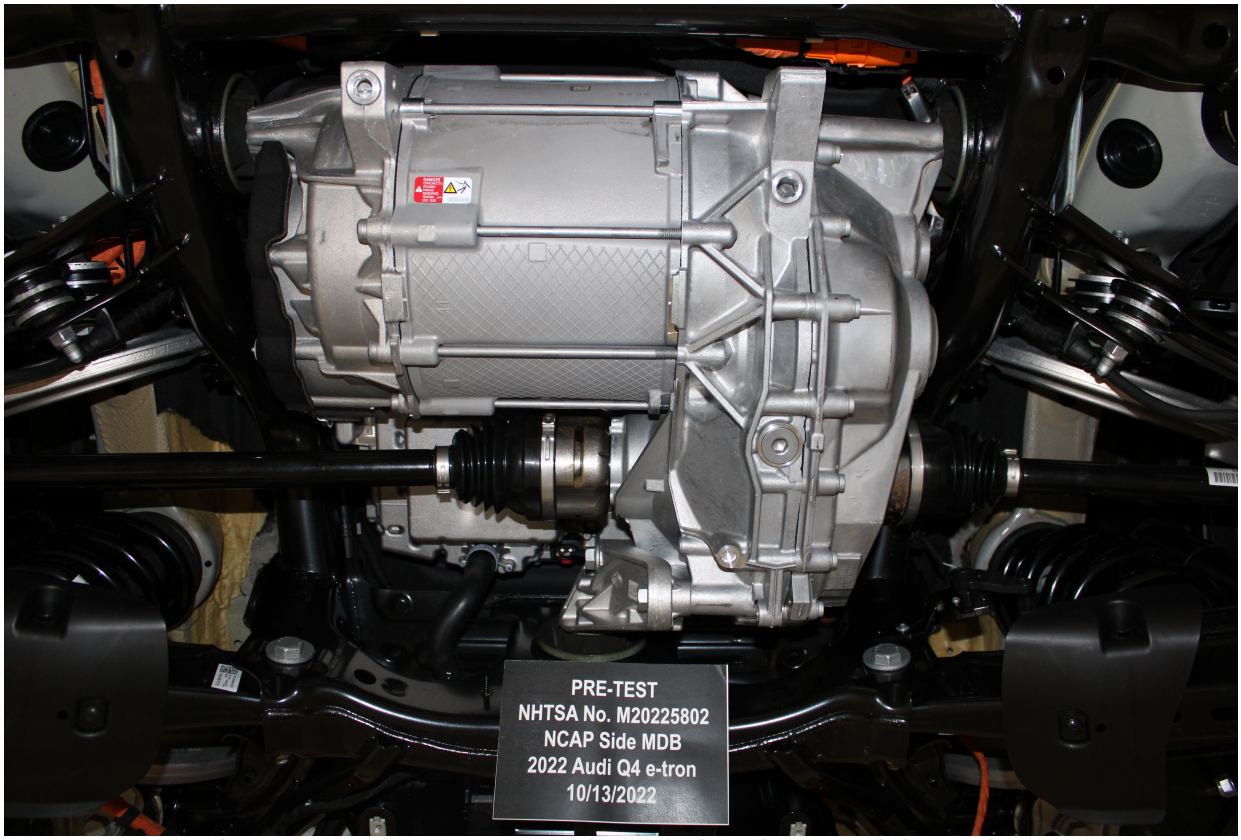


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

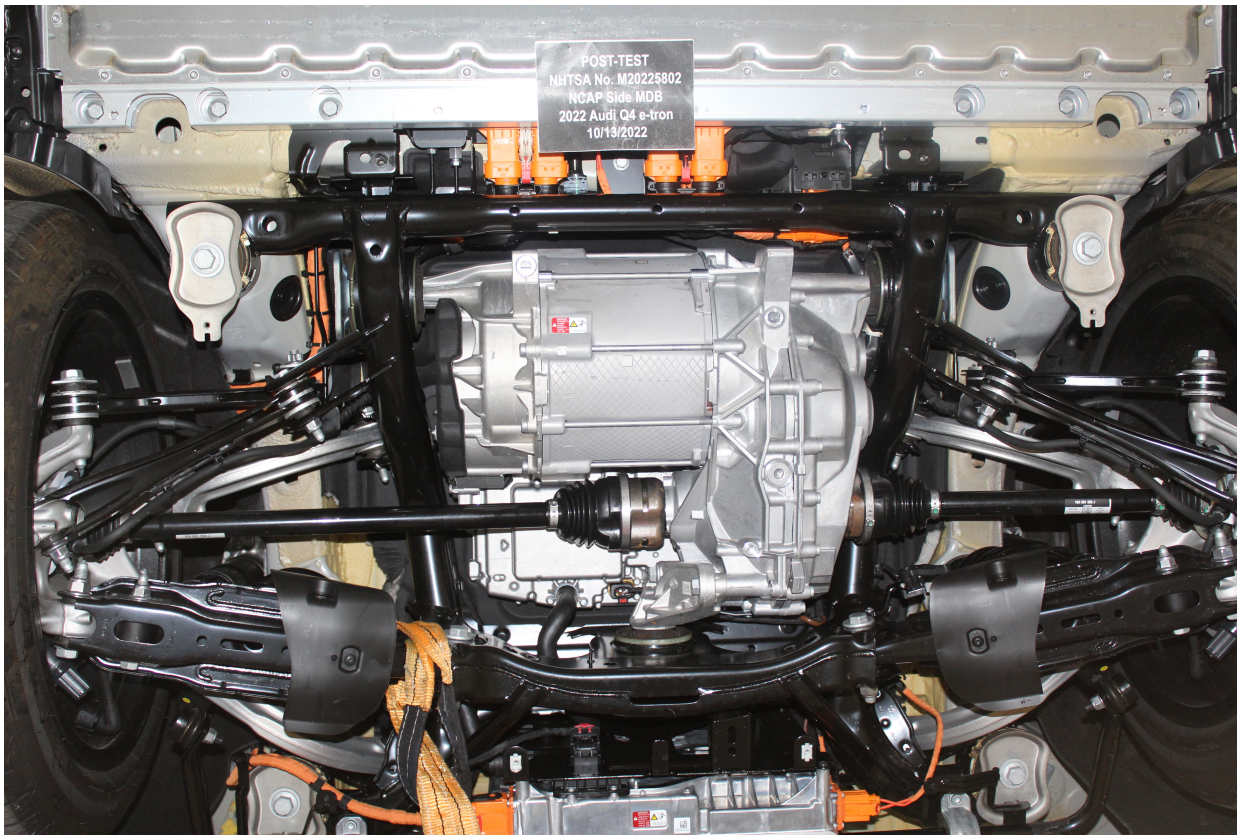


Figure 305-17: Post-Impact View of Electric Propulsion Drive



Figure 305-18: Pre-Impact View of High Voltage Interconnect(s)

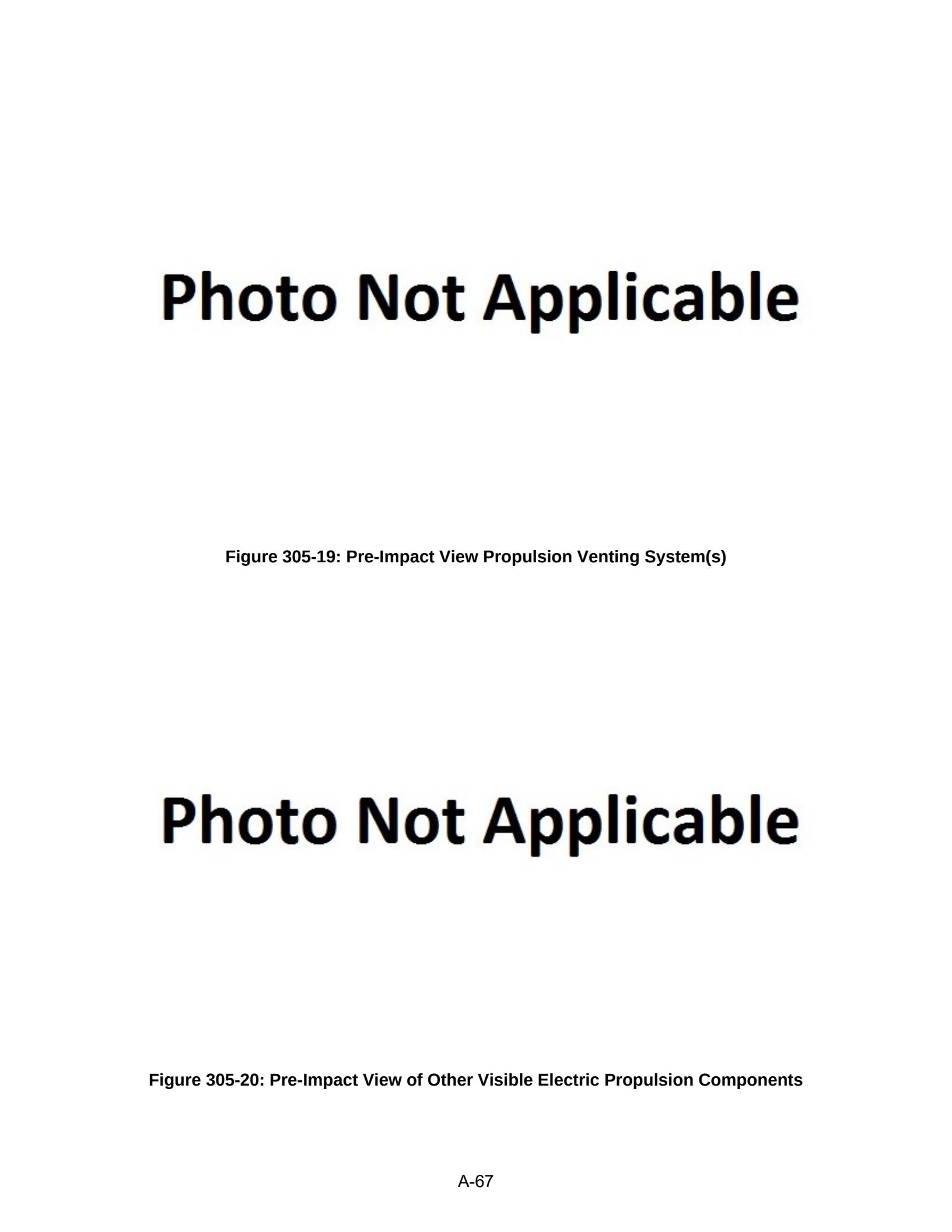


Figure 305-19: Pre-Impact View Propulsion Venting System(s)

Figure 305-20: Pre-Impact View of Other Visible Electric Propulsion Components



Figure 305-21: Pre-Impact View of Ground Lead Attached



Figure 305-22: Pre-Impact View of High Voltage Leads Attached

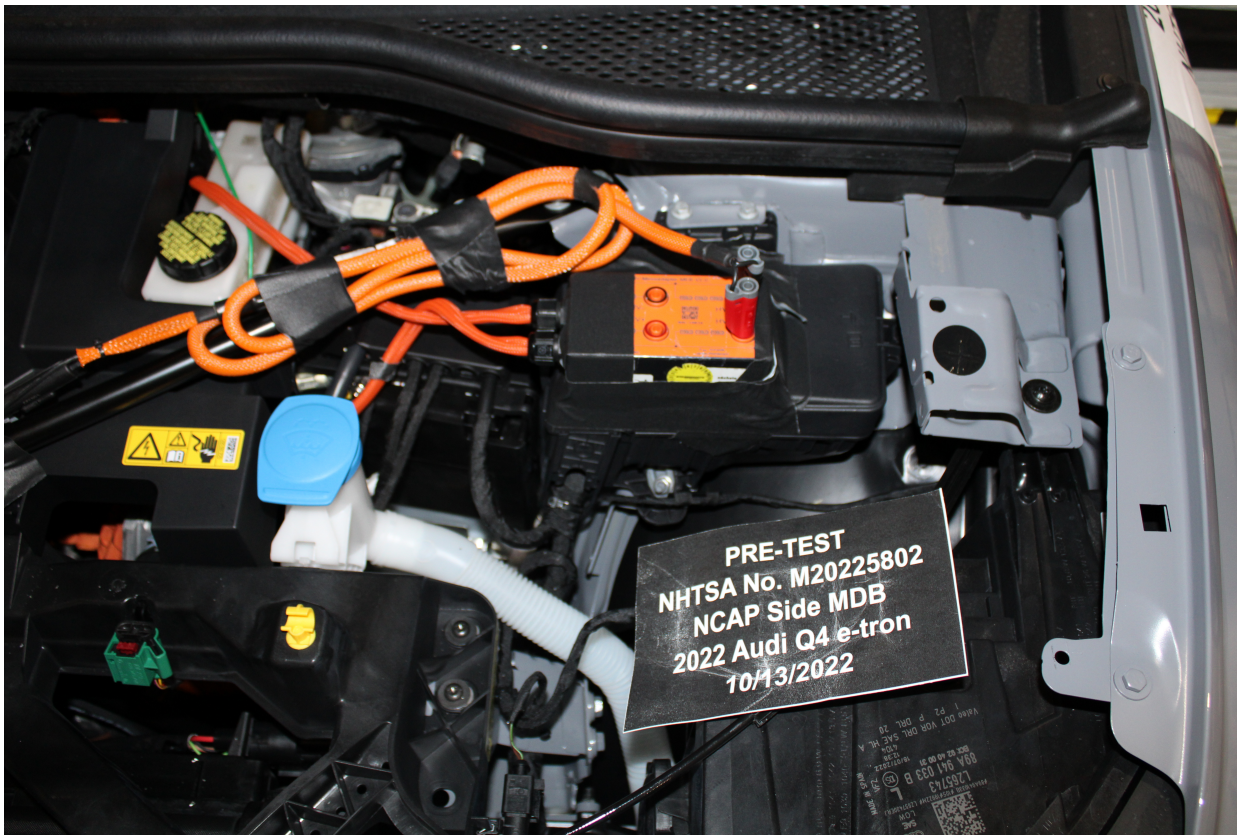


Figure 305-23: Pre-Impact Close-Up View of High Voltage Leads Attached



Figure 305-24: Pre-Impact View of Installed Test Interface Port



Figure 305-25: Post-Impact View of Installed Test Interface Port

Photo Not Applicable

Figure 305-26: Pre-Impact View of Other Test Devices

Photo Not Applicable

Figure 305-27: Post-Impact View of Other Test Devices



Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

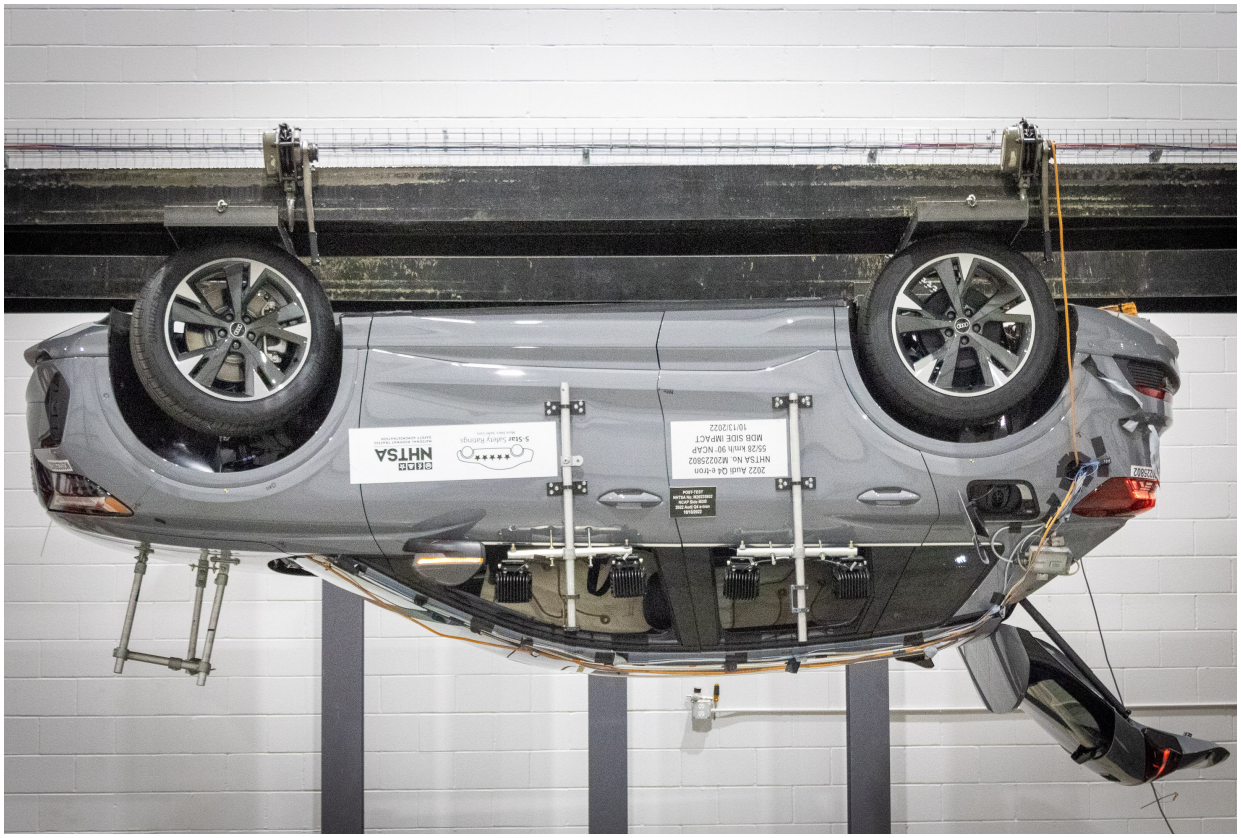


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

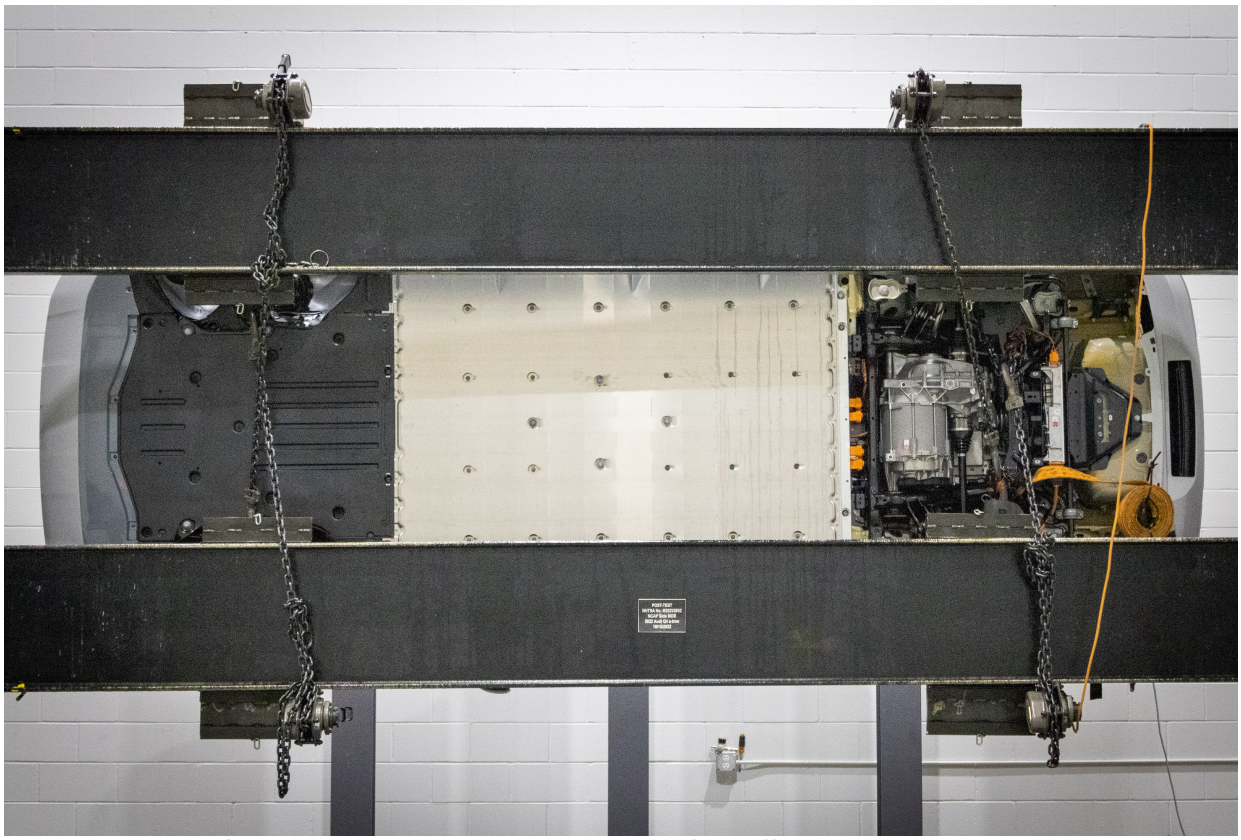


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

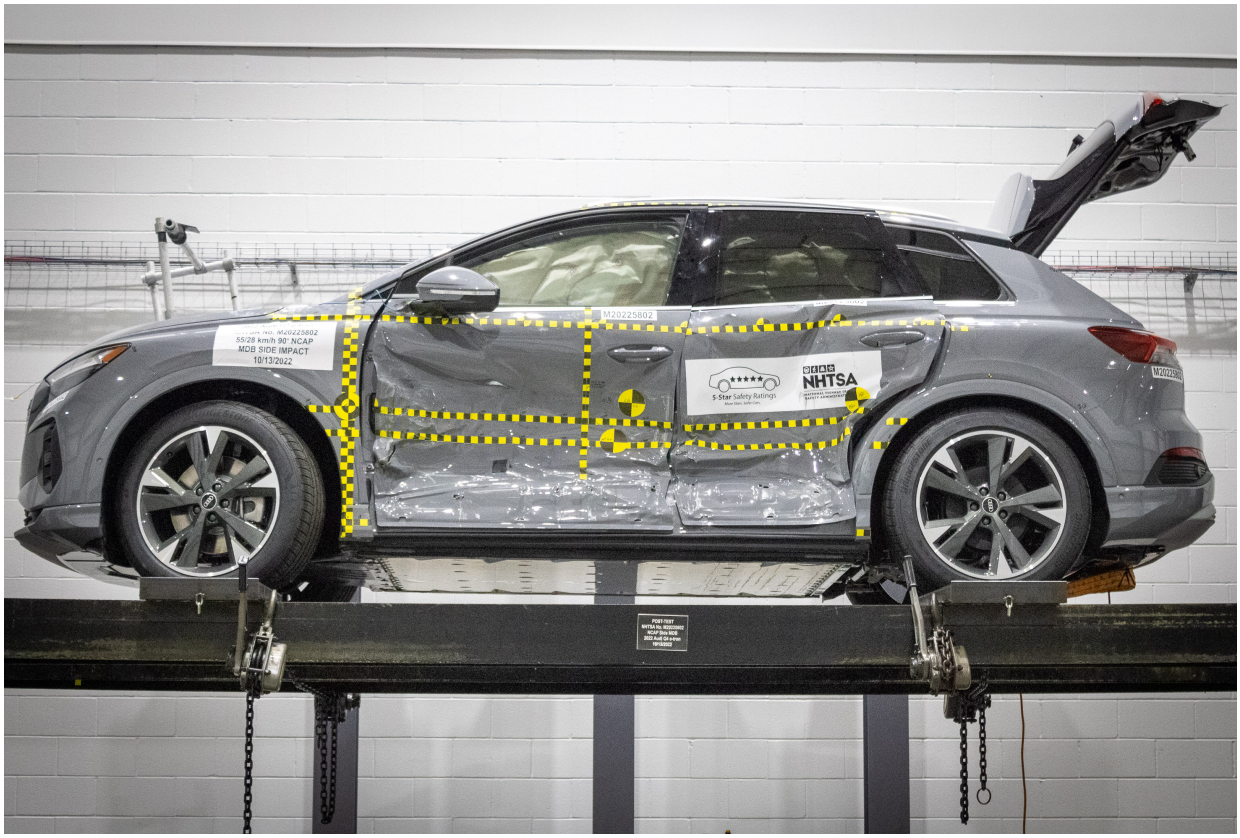


Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees



Figure 305-32: Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



Figure 305-33: Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photo Not Applicable

Figure 305-34: Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

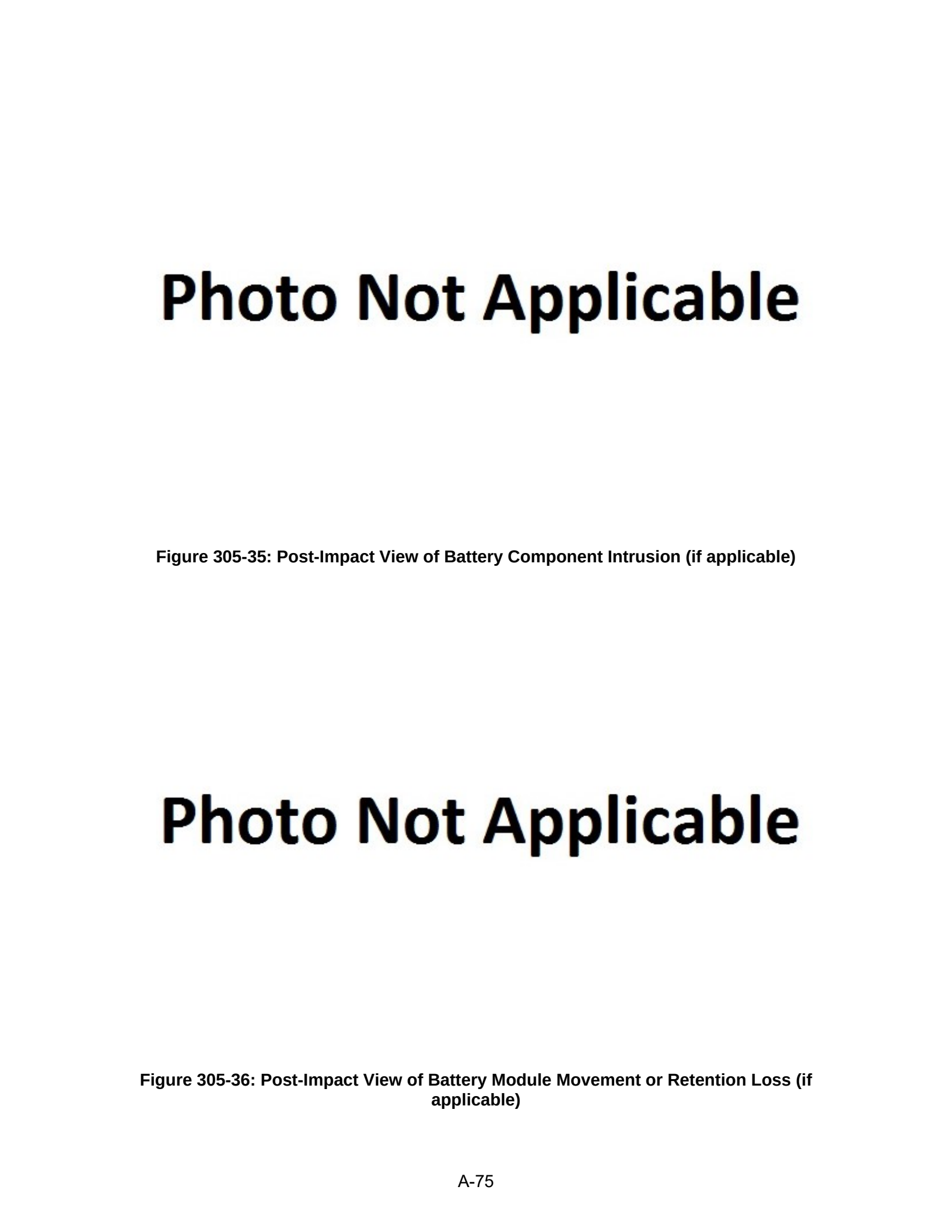


Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)



Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (Prior to static roll)

Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (After static roll)

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

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Driver Dummy Instrumentation Plots

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The following additional dummy and vehicle response data can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.NHTSA.gov

Additional Driver & Passenger Dummy Instrumentation Data

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

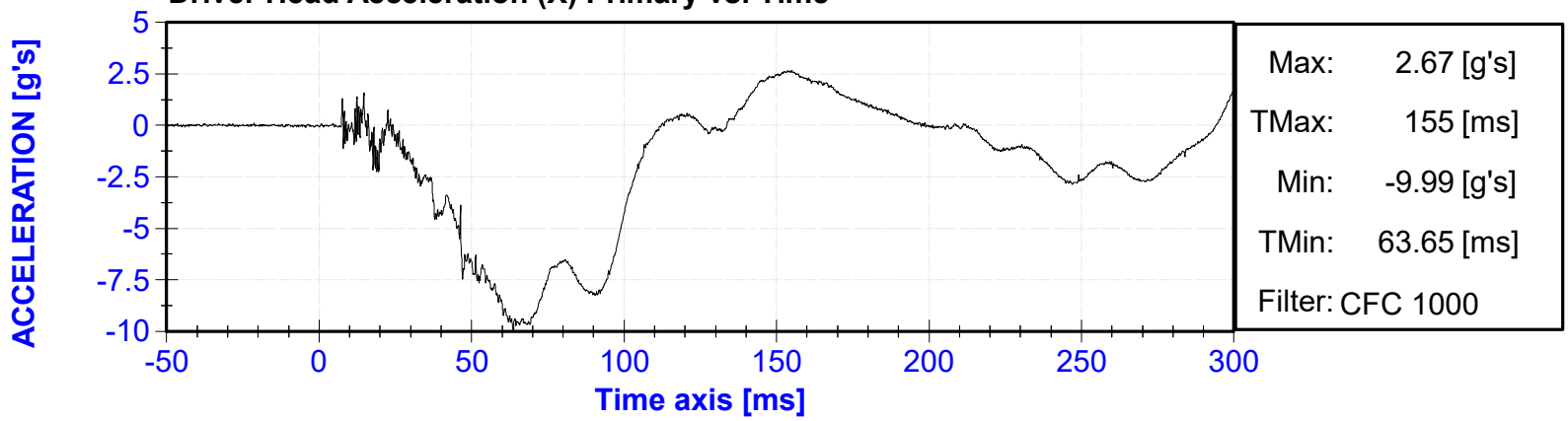
Vehicle Instrumentation Data

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

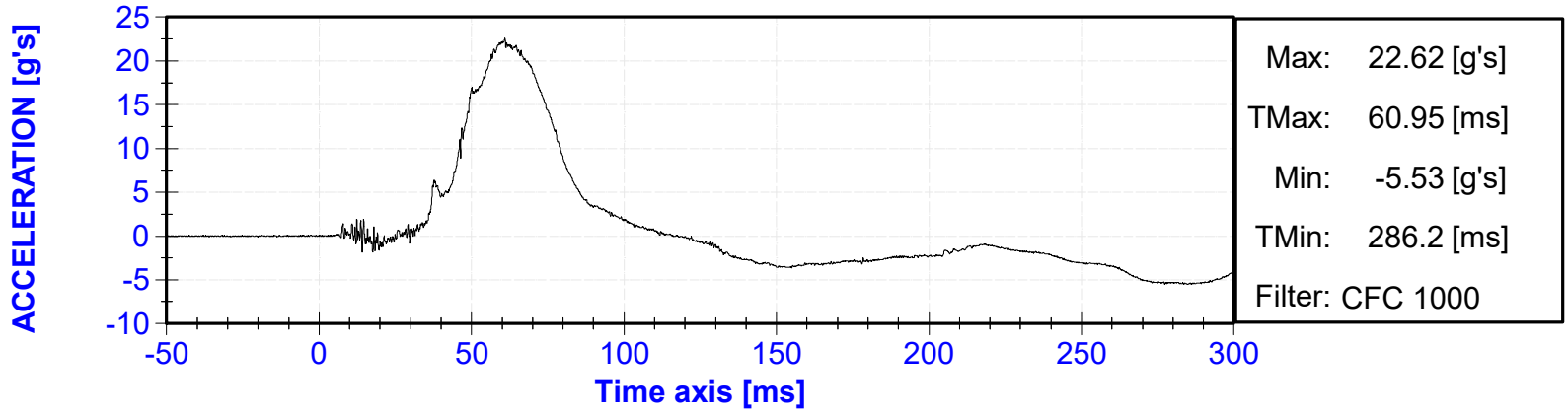
MDB Instrumentation Data

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

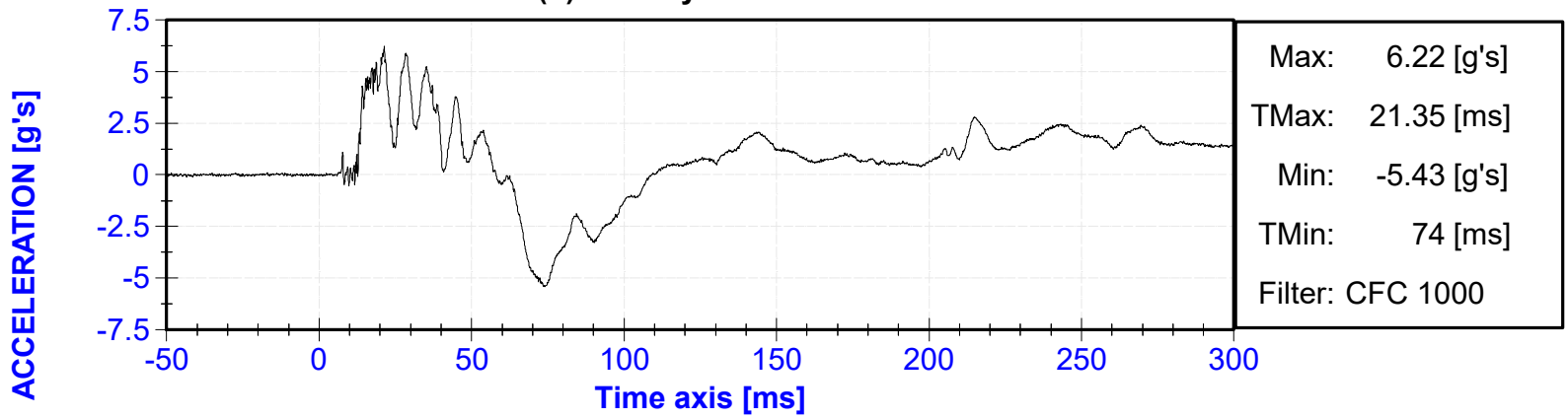
Driver Head Acceleration (X) Primary vs. Time



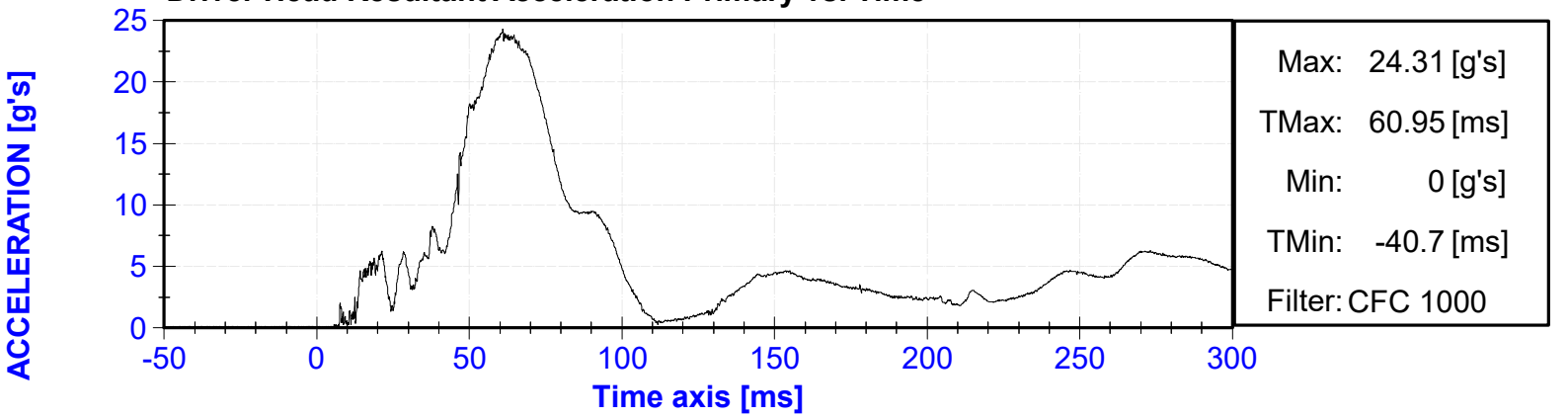
Driver Head Acceleration (Y) Primary vs. Time



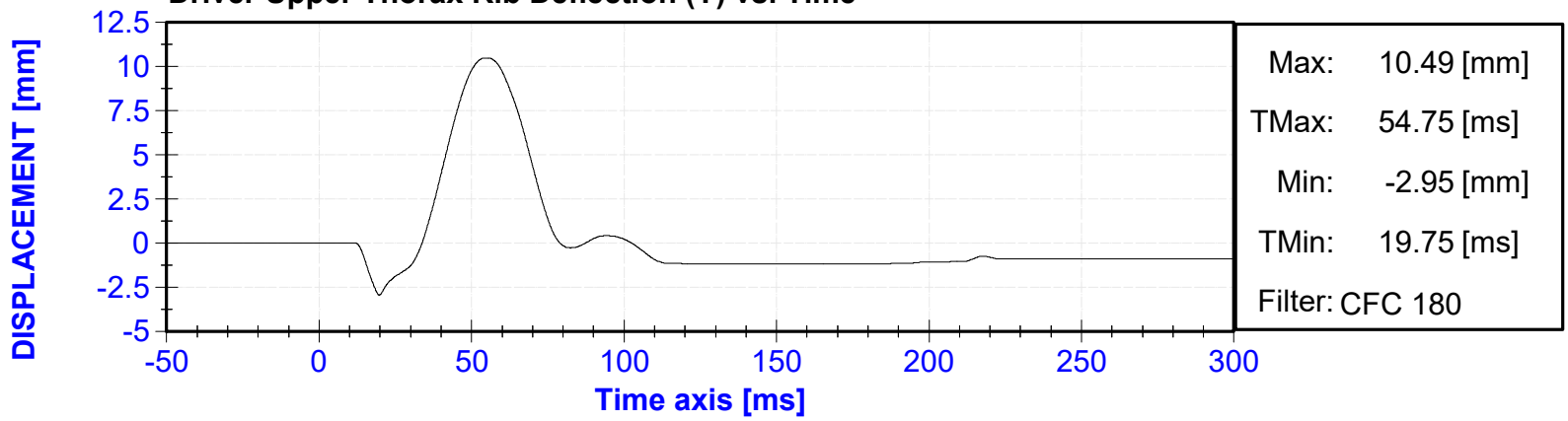
Driver Head Acceleration (Z) Primary vs. Time



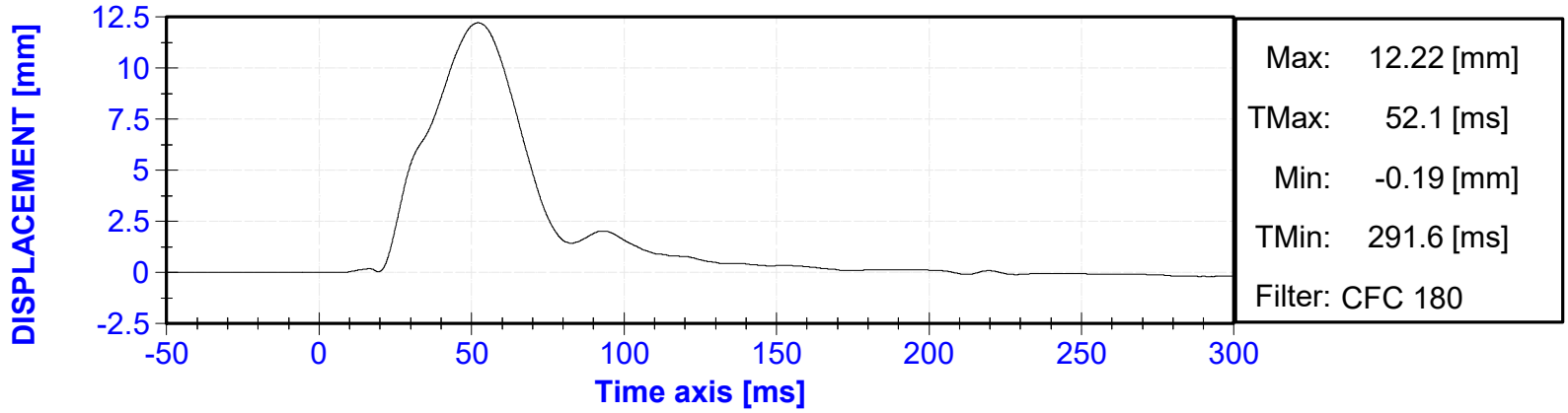
Driver Head Resultant Acceleration Primary vs. Time



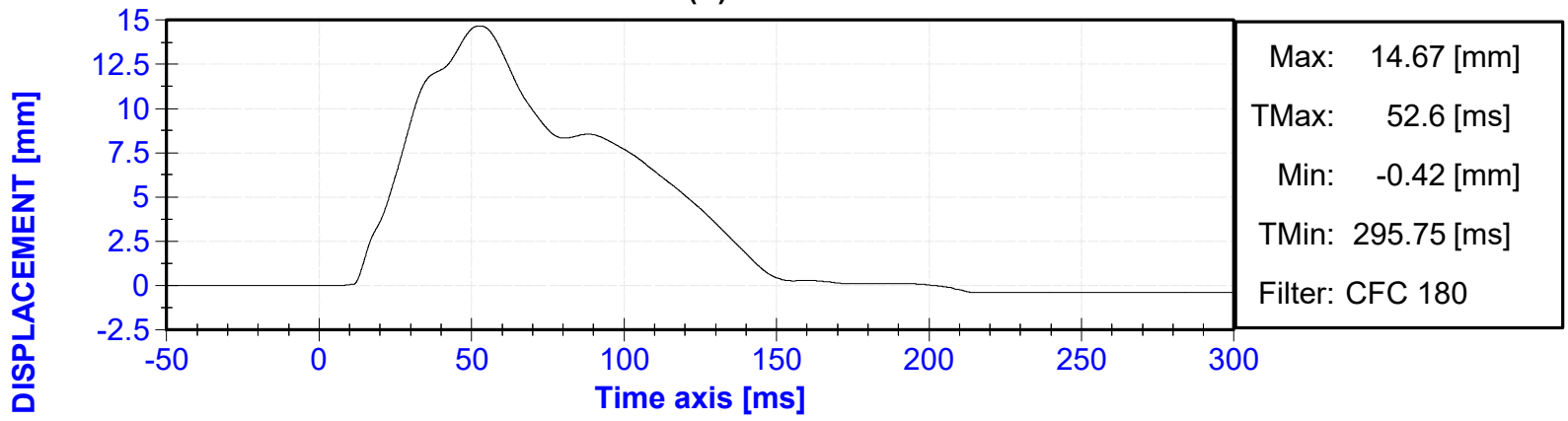
Driver Upper Thorax Rib Deflection (Y) vs. Time



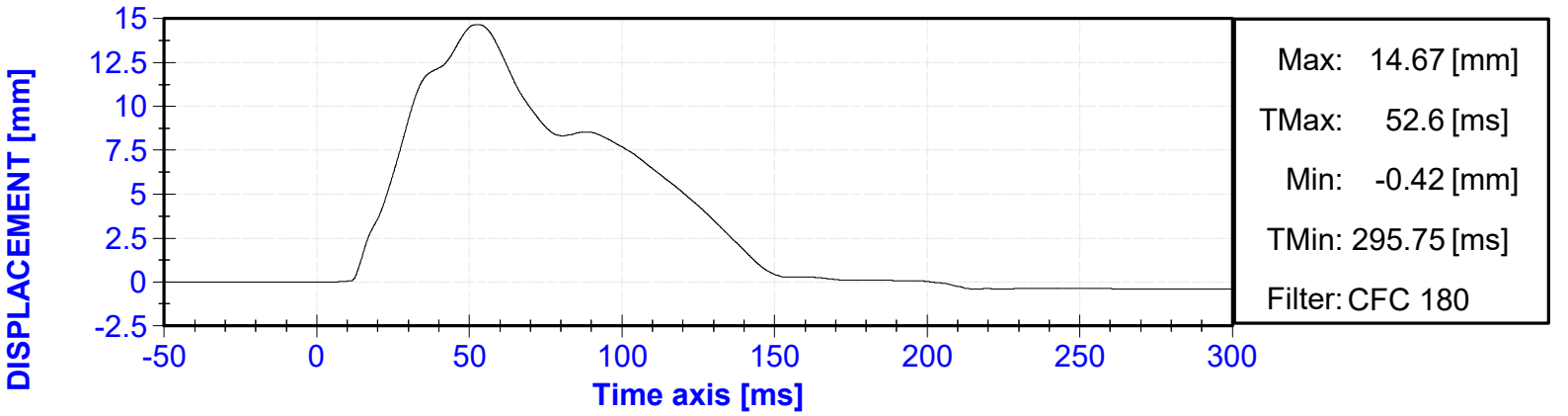
Driver Middle Thorax Rib Deflection (Y) vs. Time



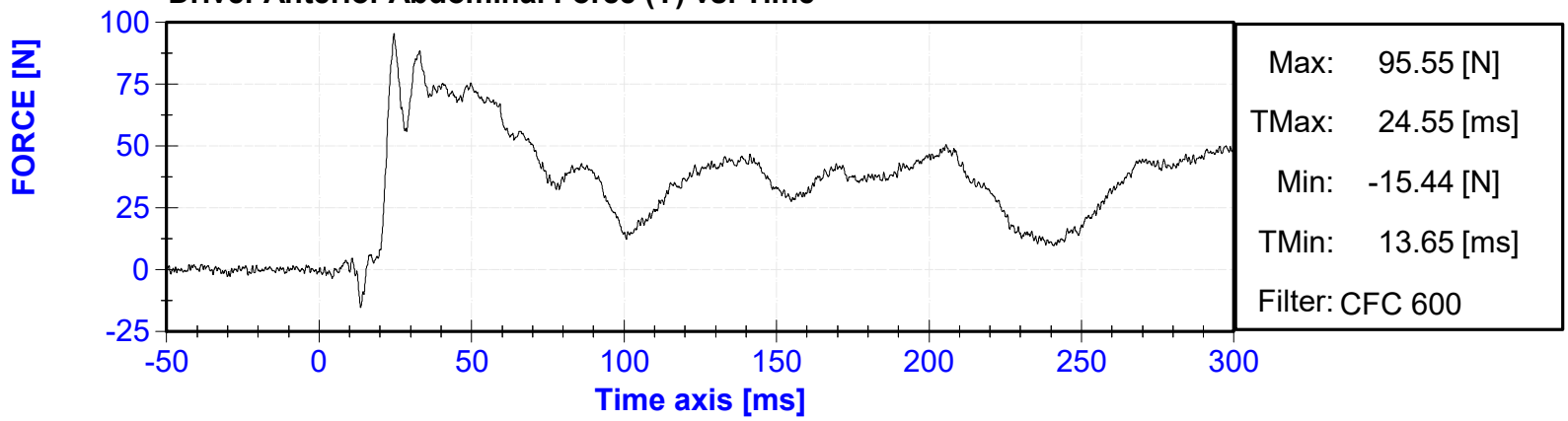
Driver Lower Thorax Rib Deflection (Y) vs. Time



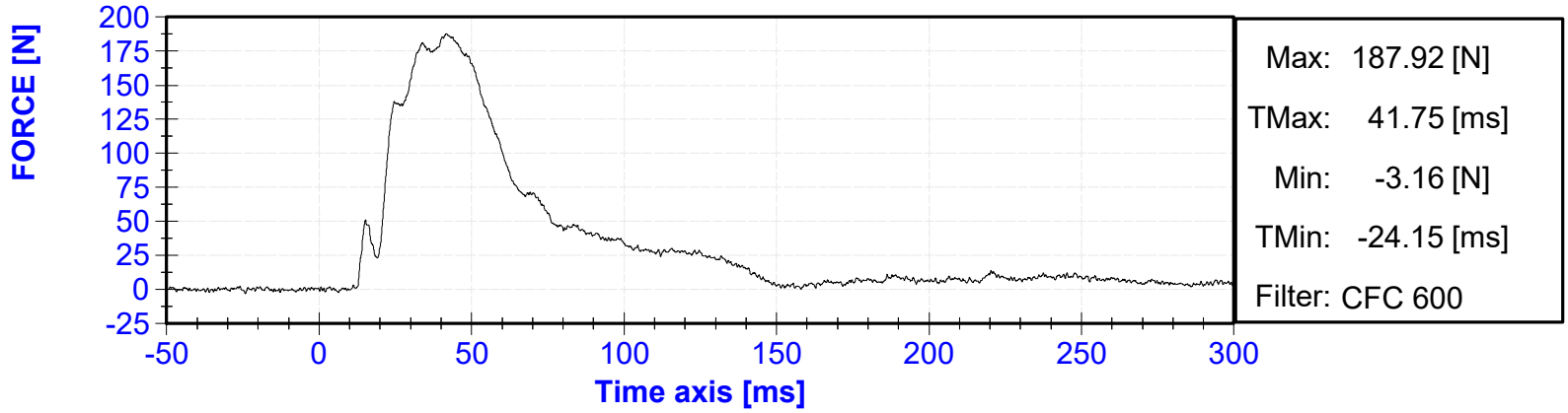
Driver Thorax Rib Deflection Maximum vs. Time



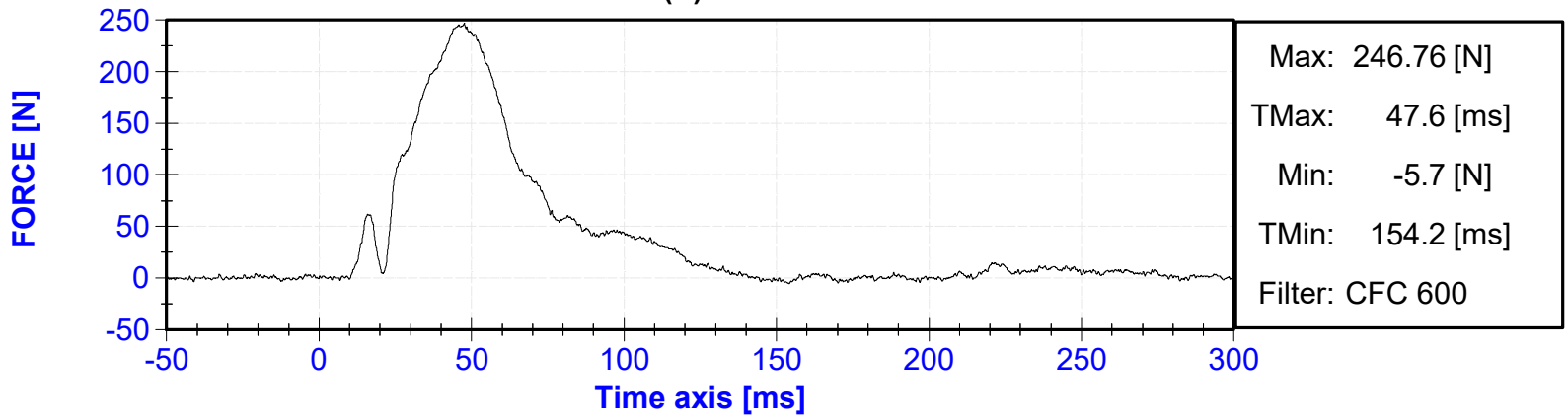
Driver Anterior Abdominal Force (Y) vs. Time



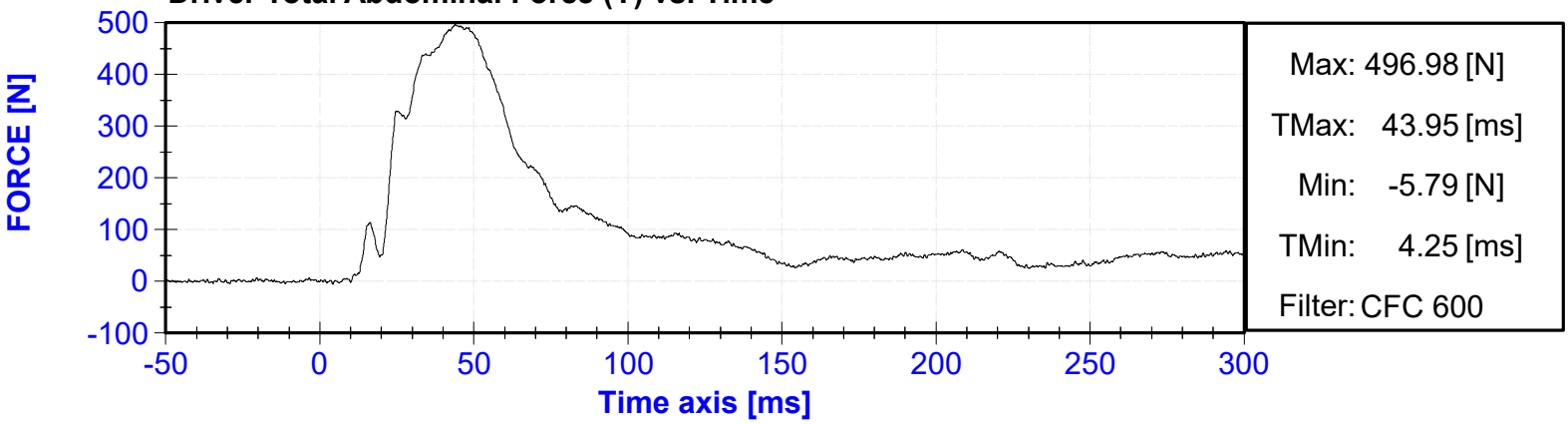
Driver Middle Abdominal Force (Y) vs. Time



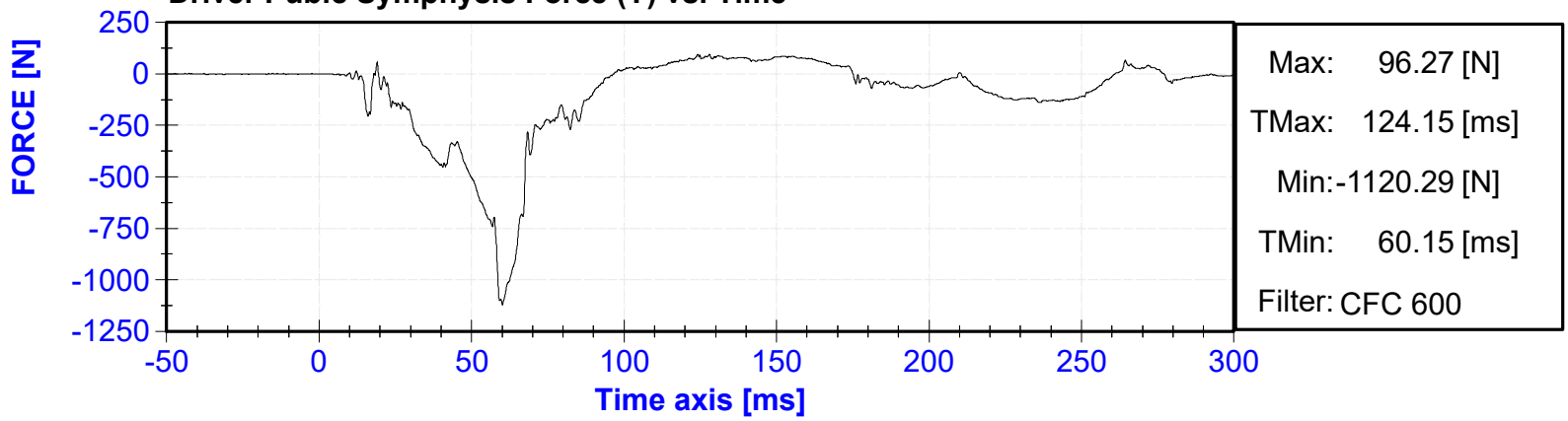
Driver Posterior Abdominal Force (Y) vs. Time



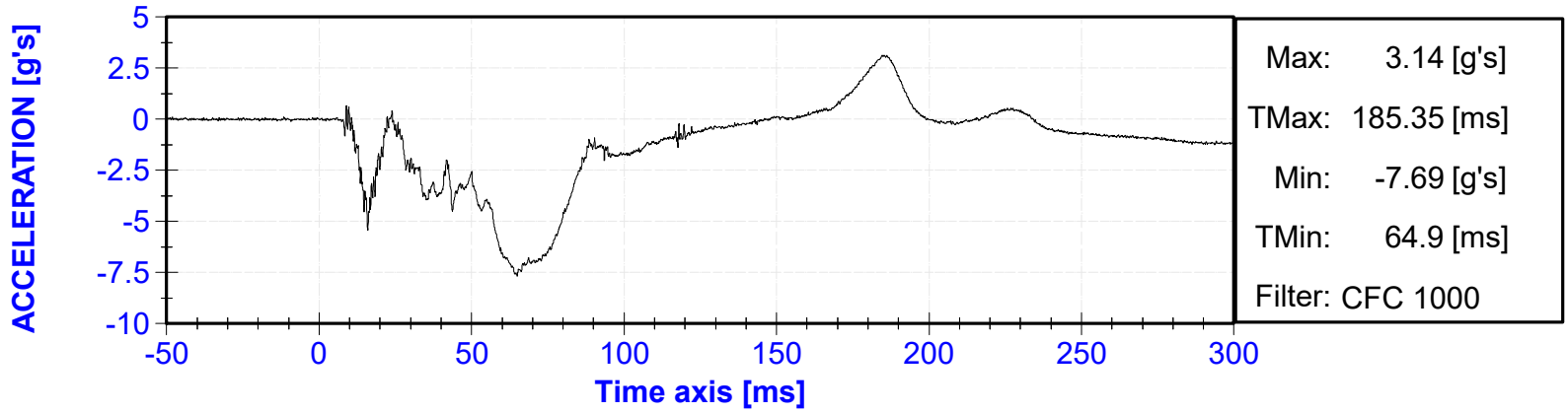
Driver Total Abdominal Force (Y) vs. Time



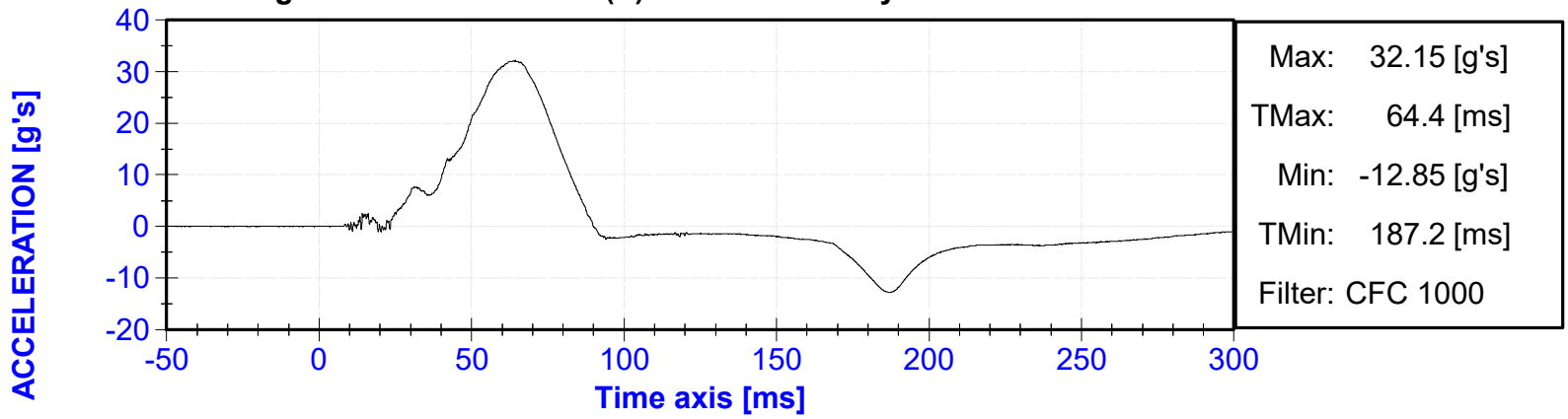
Driver Pubic Symphysis Force (Y) vs. Time



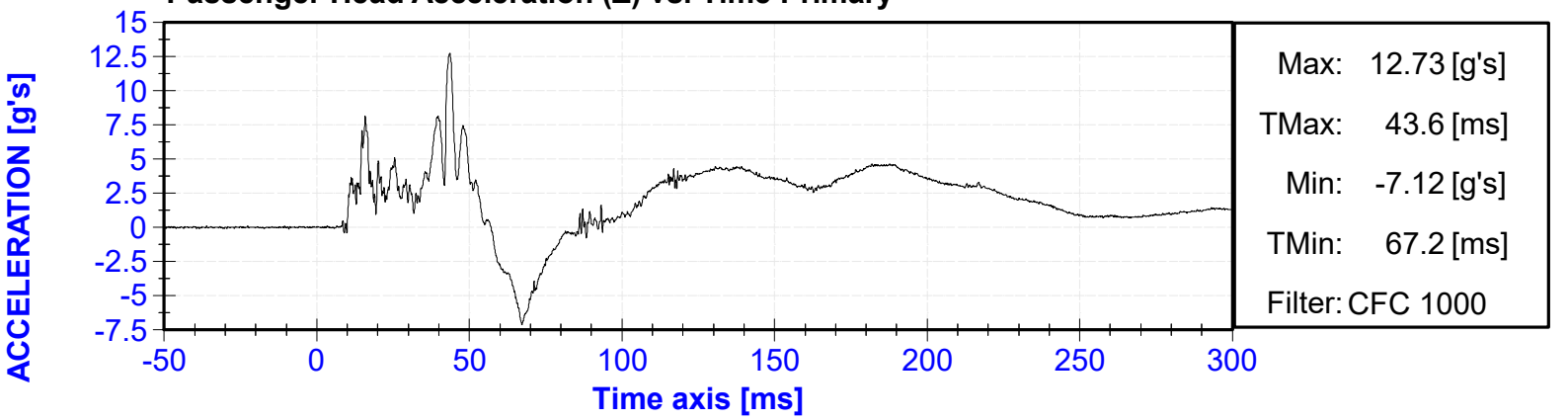
Passenger Head Acceleration (X) vs. Time Primary



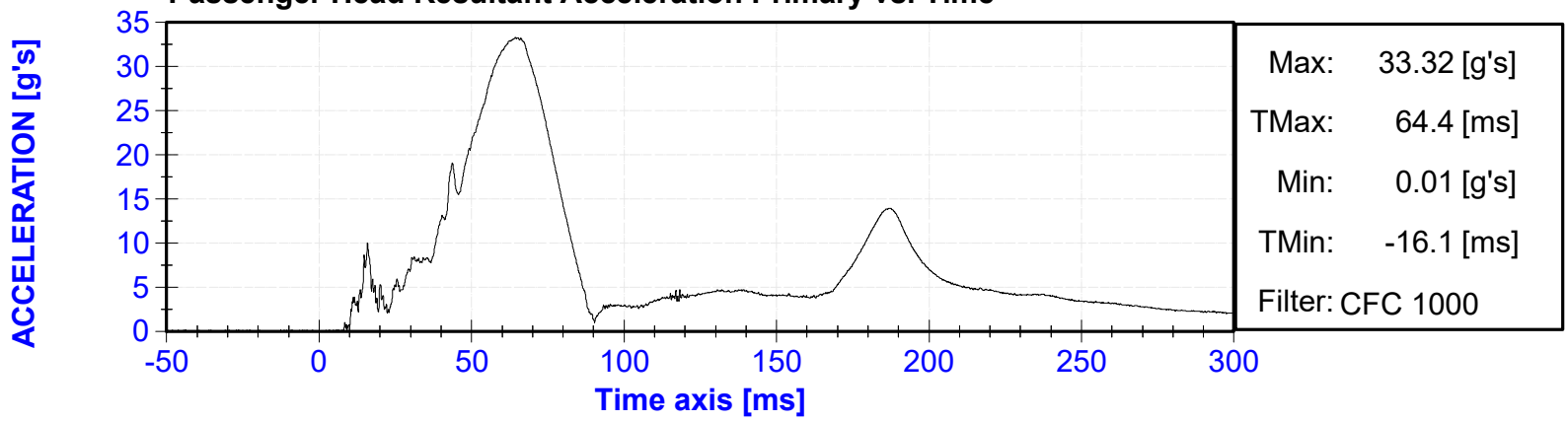
Passenger Head Acceleration (Y) vs. Time Primary



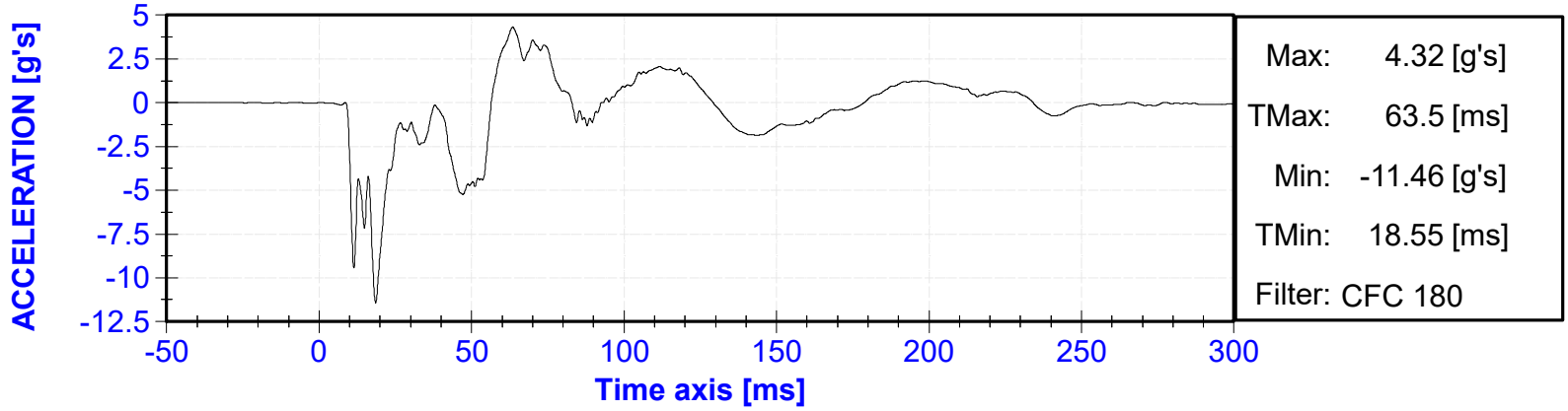
Passenger Head Acceleration (Z) vs. Time Primary



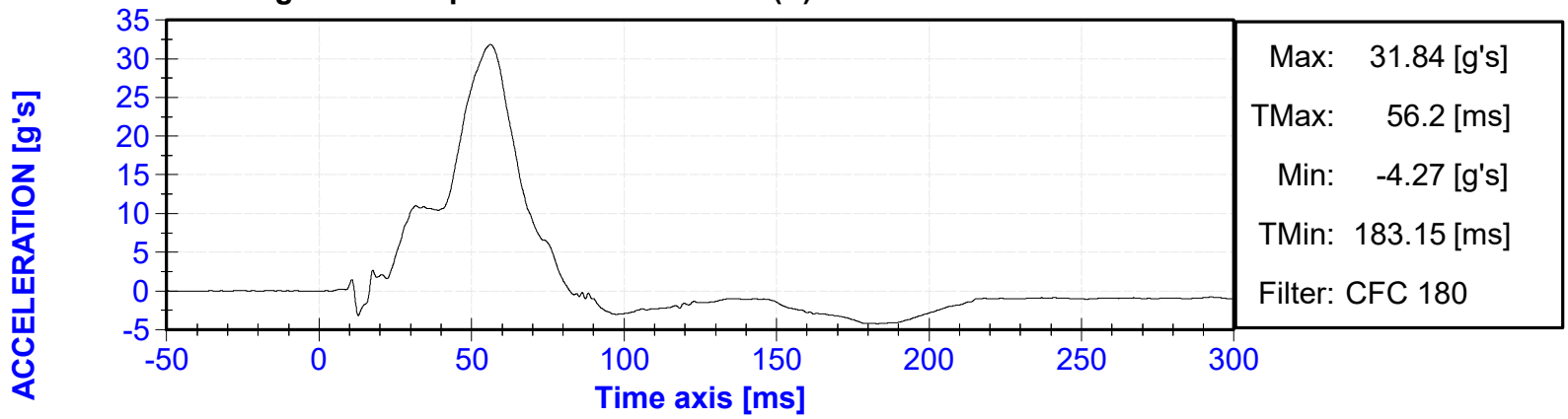
Passenger Head Resultant Acceleration Primary vs. Time



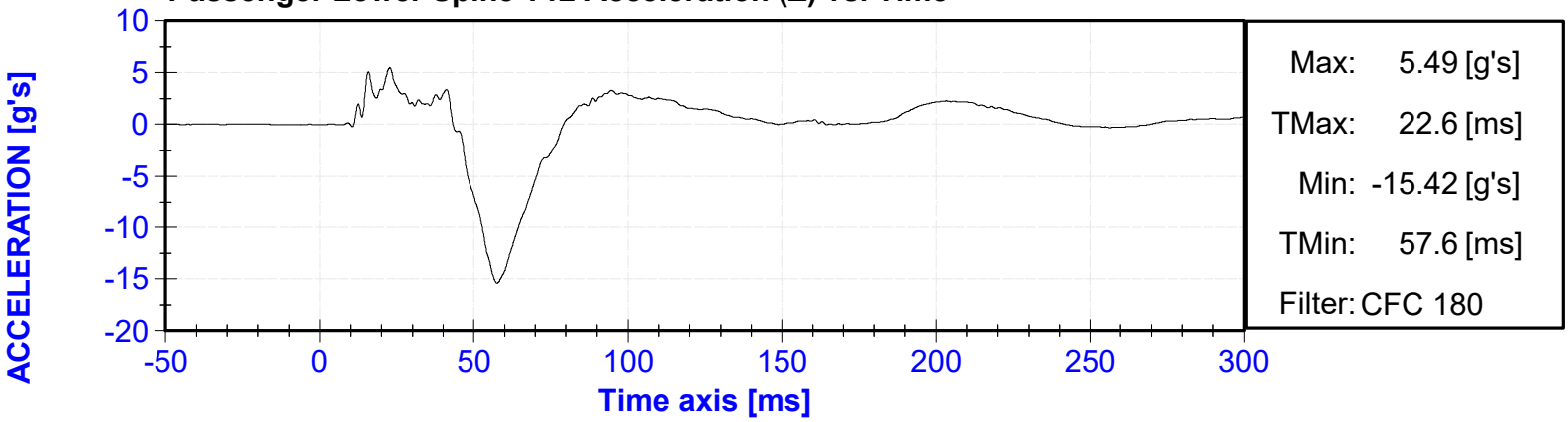
Passenger Lower Spine T12 Acceleration (X) vs. Time



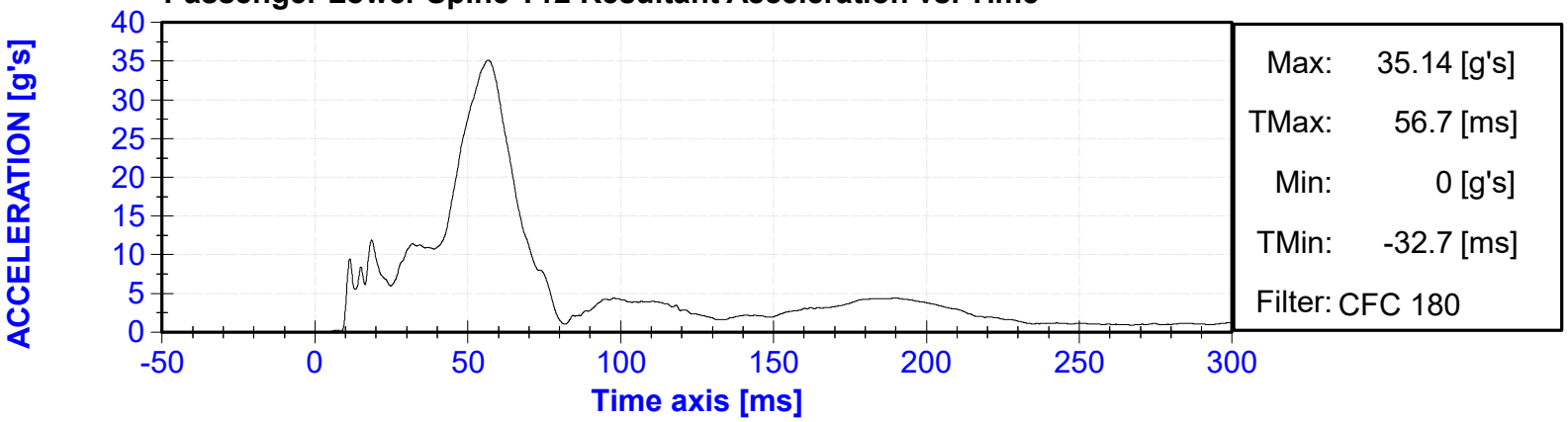
Passenger Lower Spine T12 Acceleration (Y) vs. Time



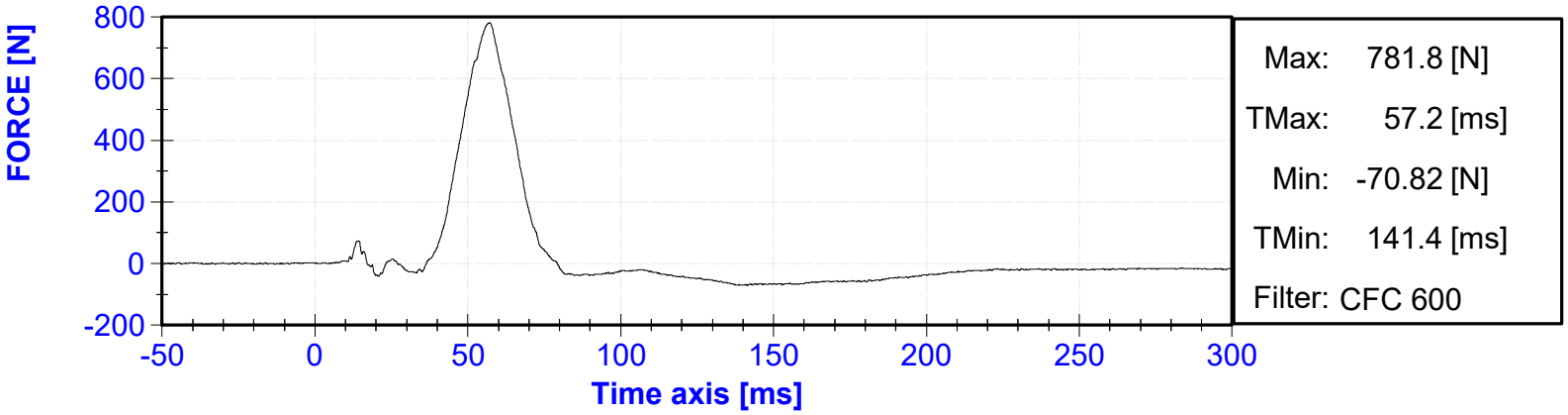
Passenger Lower Spine T12 Acceleration (Z) vs. Time



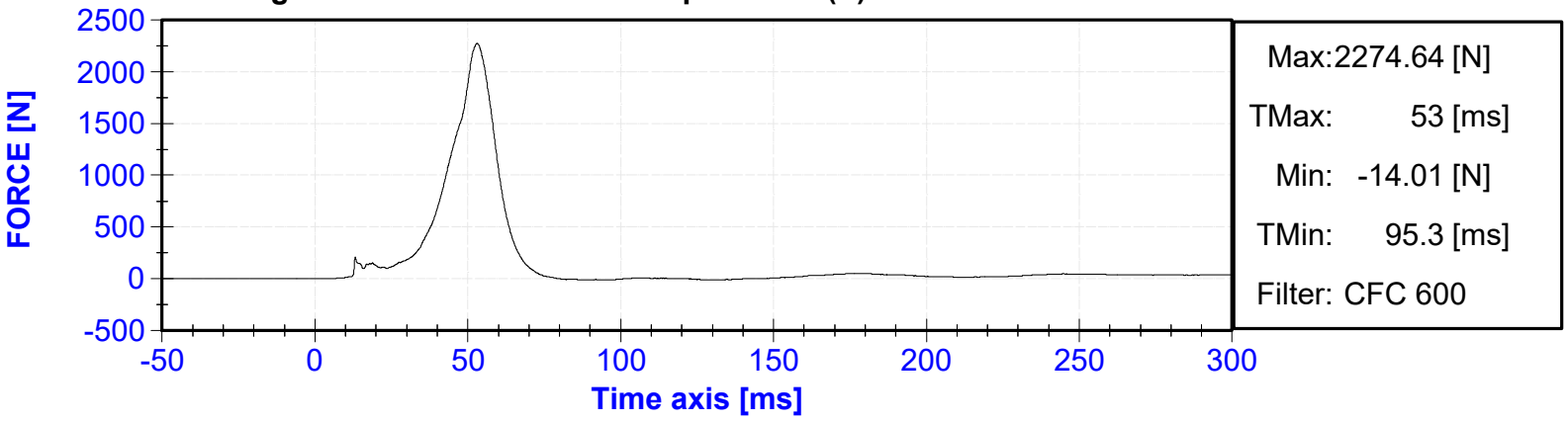
Passenger Lower Spine T12 Resultant Acceleration vs. Time



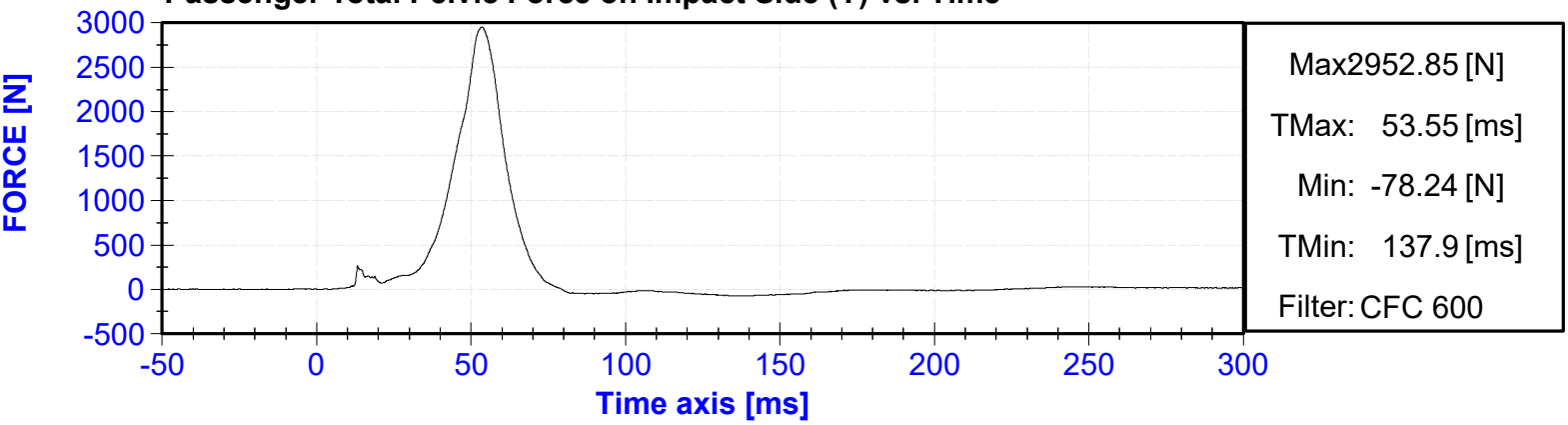
Passenger Iliac Force on Impact Side (Y) vs. Time



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



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



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

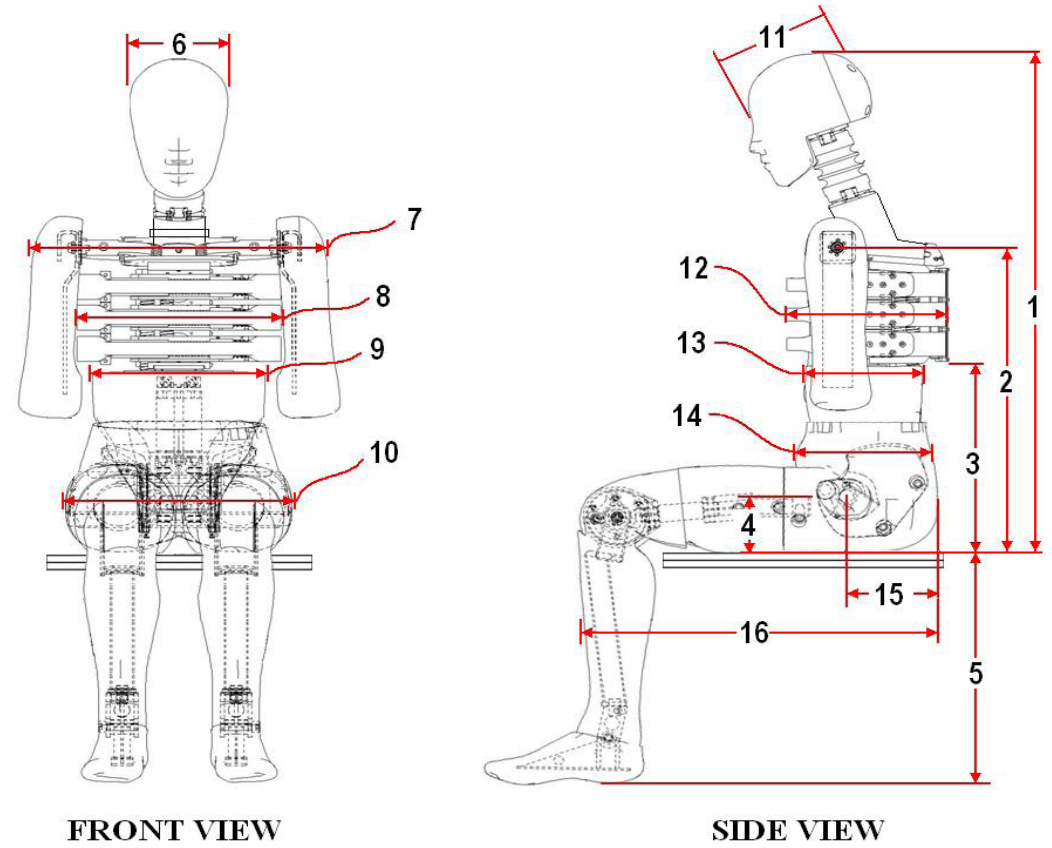
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 10/6/2022

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	350	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	420	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	469	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	200	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	607	Pass

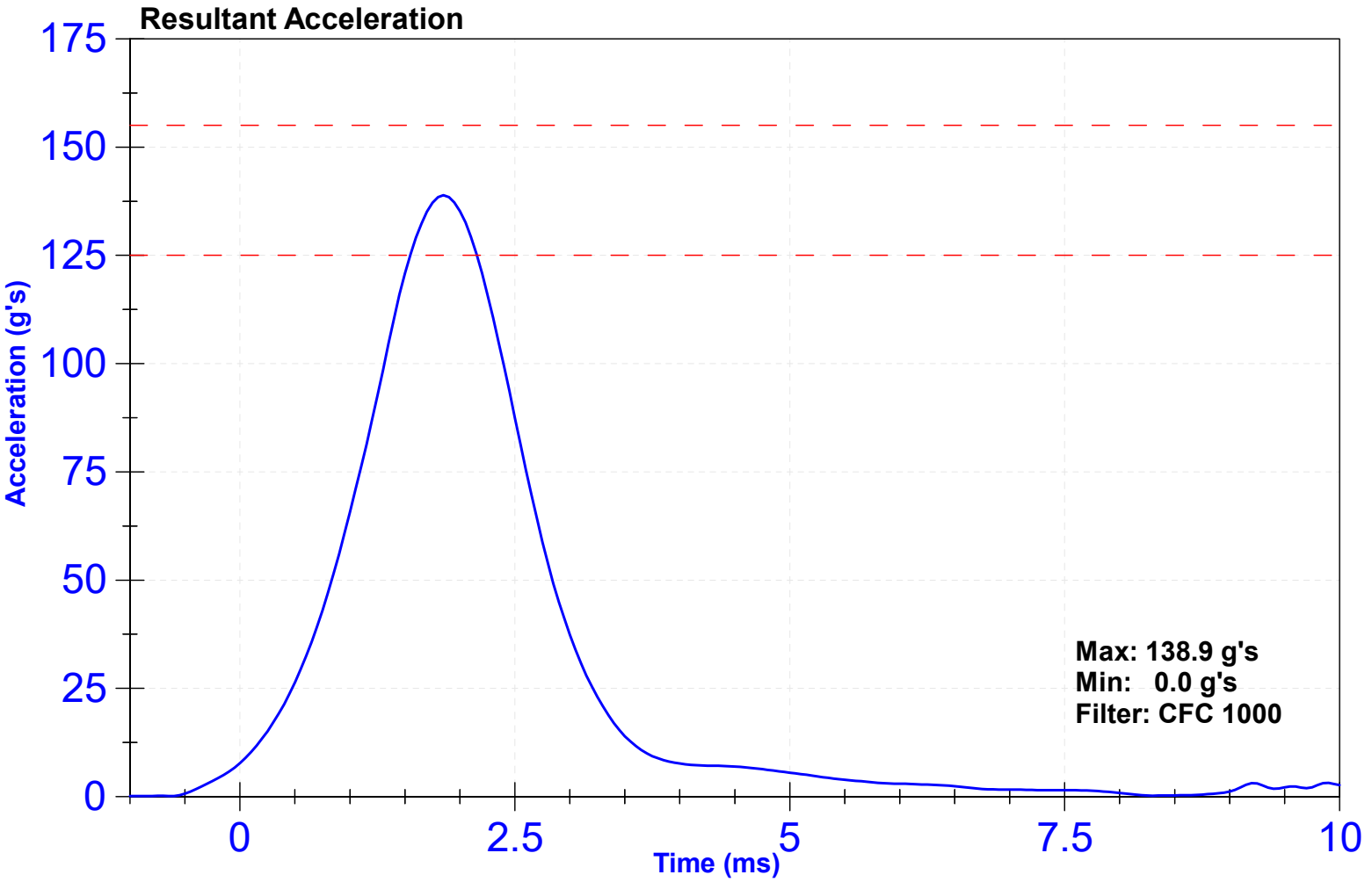
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

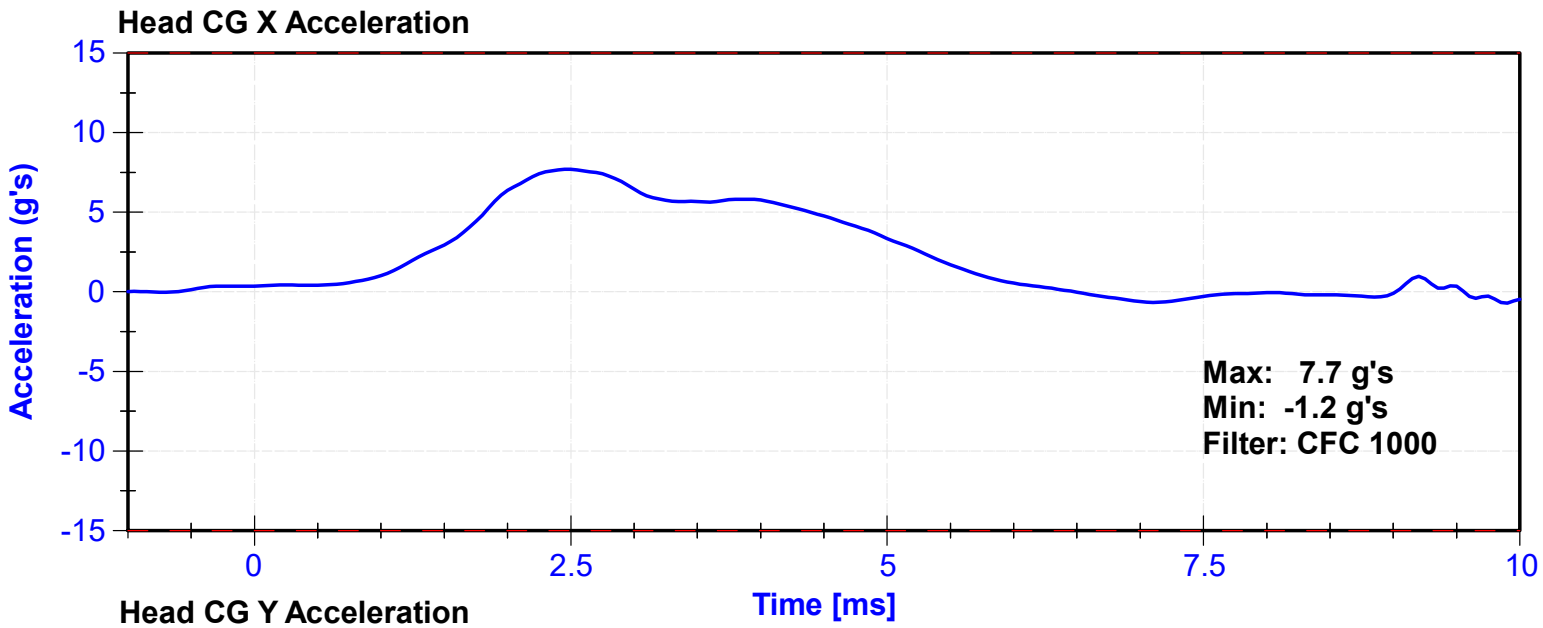
Results

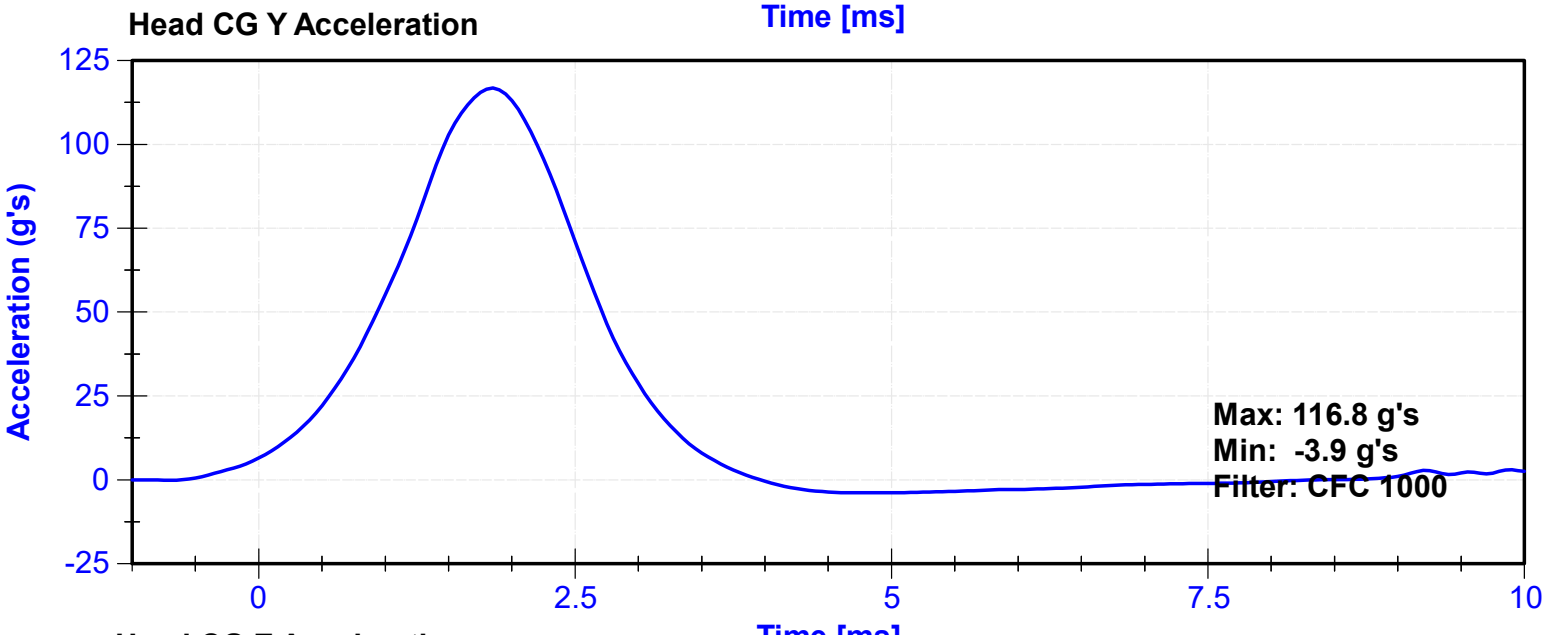
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Resultant Acceleration	125	155	g's	138.9	Pass
Oscillation	0	15	%	2.36	Pass
Fore-Aft Acceleration	-15	15	g's	7.7	Pass

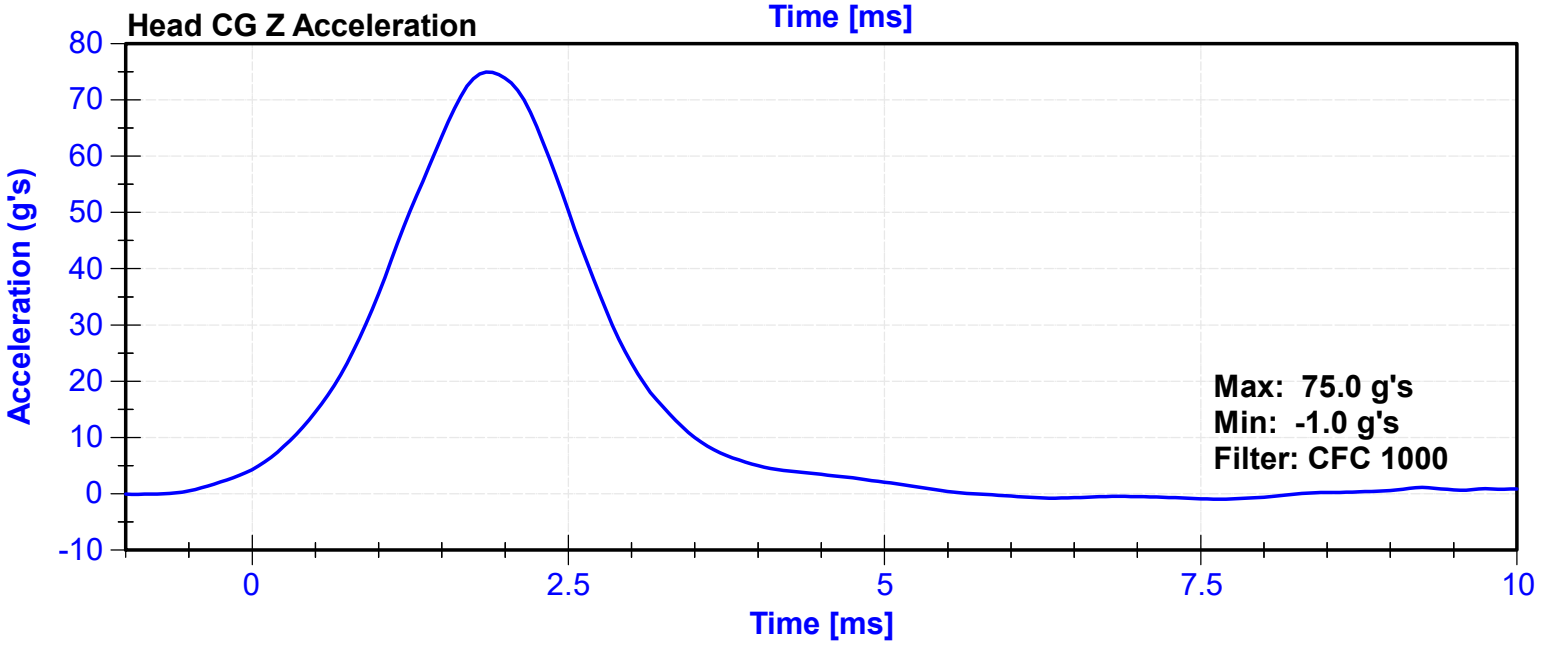
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	7/21/2022	1/17/2023
Y Accelerometer	Endevco	P49216	7/21/2022	1/17/2023
Z Accelerometer	Endevco	P51303	7/21/2022	1/17/2023




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 7.7 g's
Min: -1.2 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 116.8 g's
Min: -3.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]
Max: 75.0 g's
Min: -1.0 g's
Filter: CFC 1000

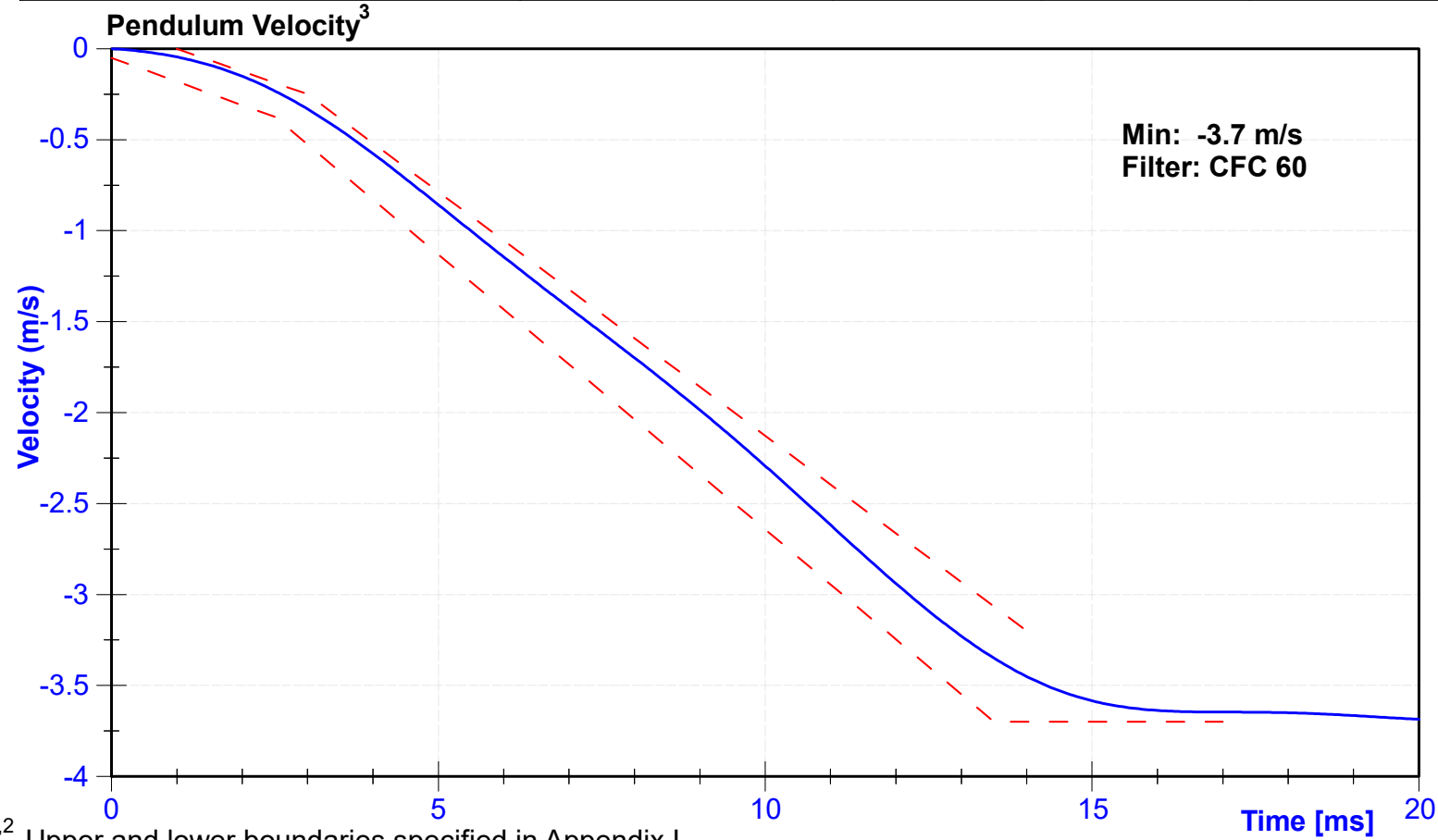
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

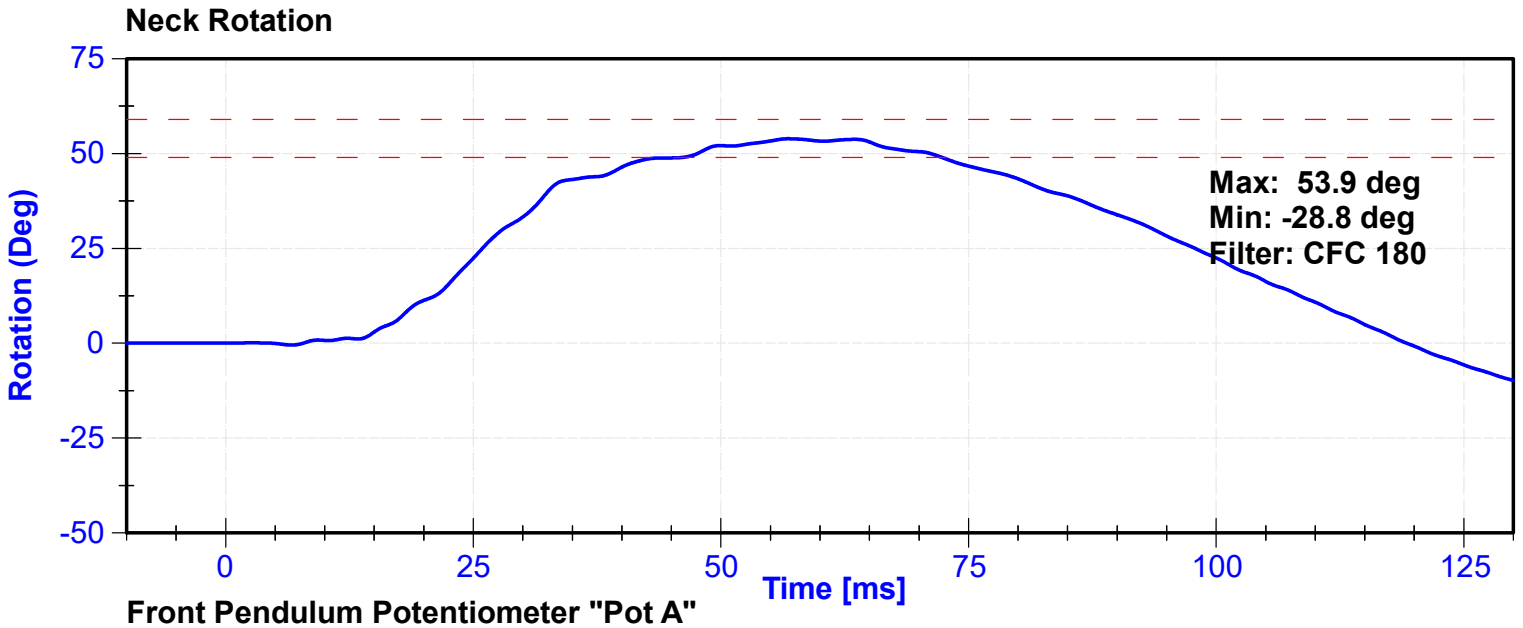
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	36.4	Pass
Velocity	3.3	3.5	m/s	3.40	Pass
Lateral Neck Rotation	49	59	deg	53.9	Pass
Time at Maximum Rotation	54	66	ms	56.8	Pass
Time of Rotation Decay from Maximum	53	88	ms	62.4	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

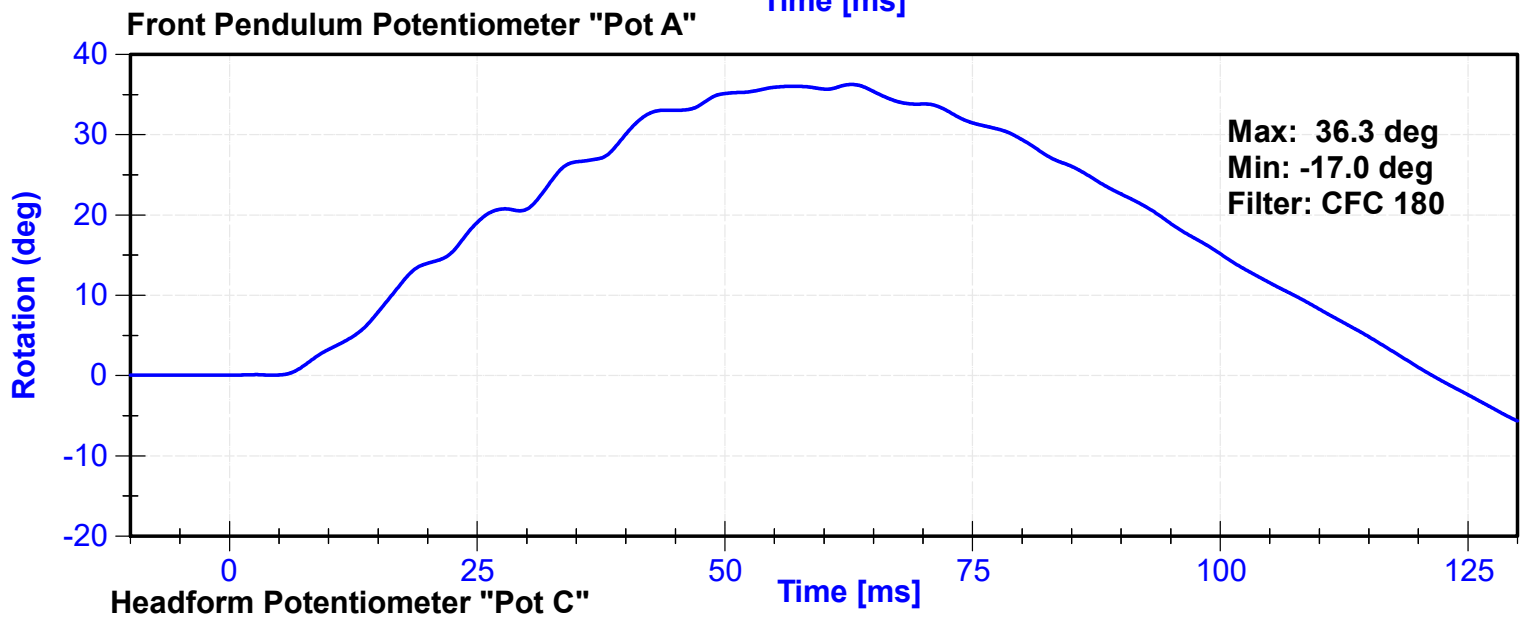
Transducer Calibrations

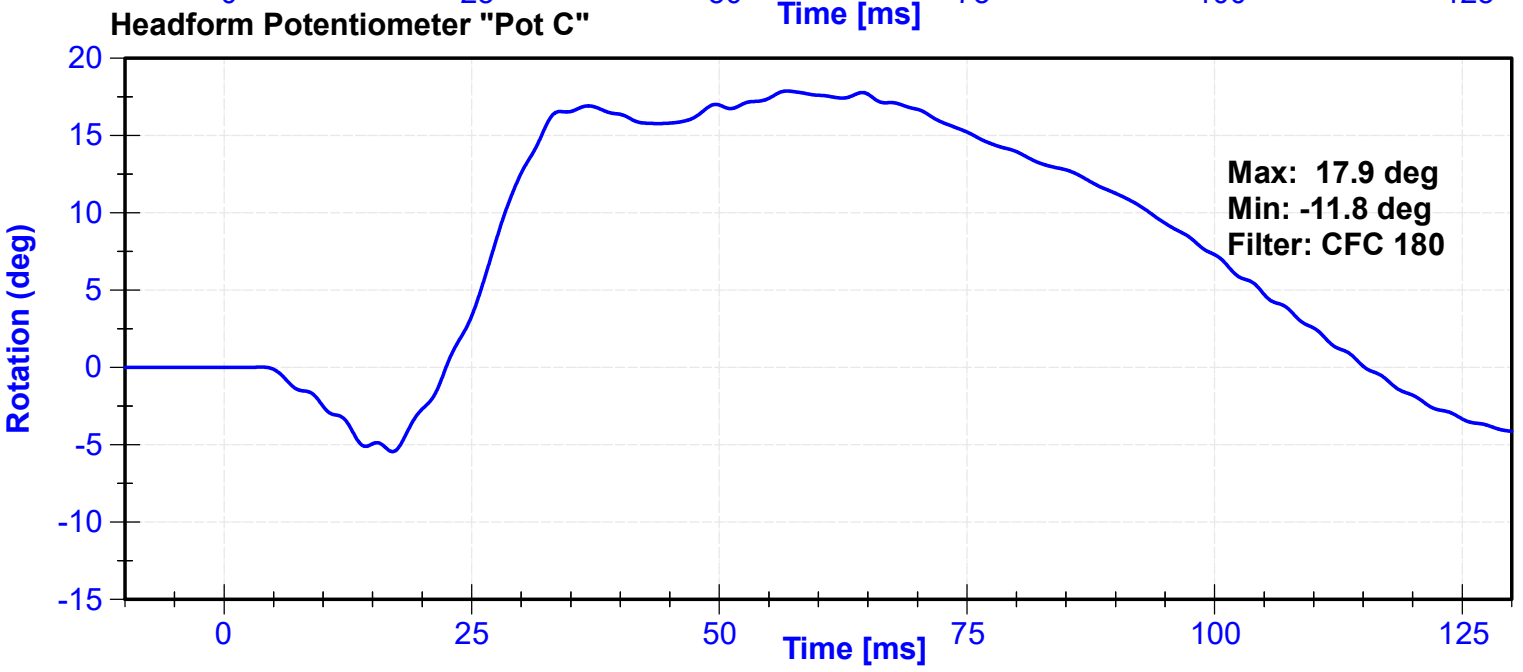
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/28/2021	10/28/2022
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



[1,2] Upper and lower boundaries specified in Appendix I


Neck Rotation
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]
Max: 53.9 deg
Min: -28.8 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]
Max: 36.3 deg
Min: -17.0 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]
Max: 17.9 deg
Min: -11.8 deg
Filter: CFC 180

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

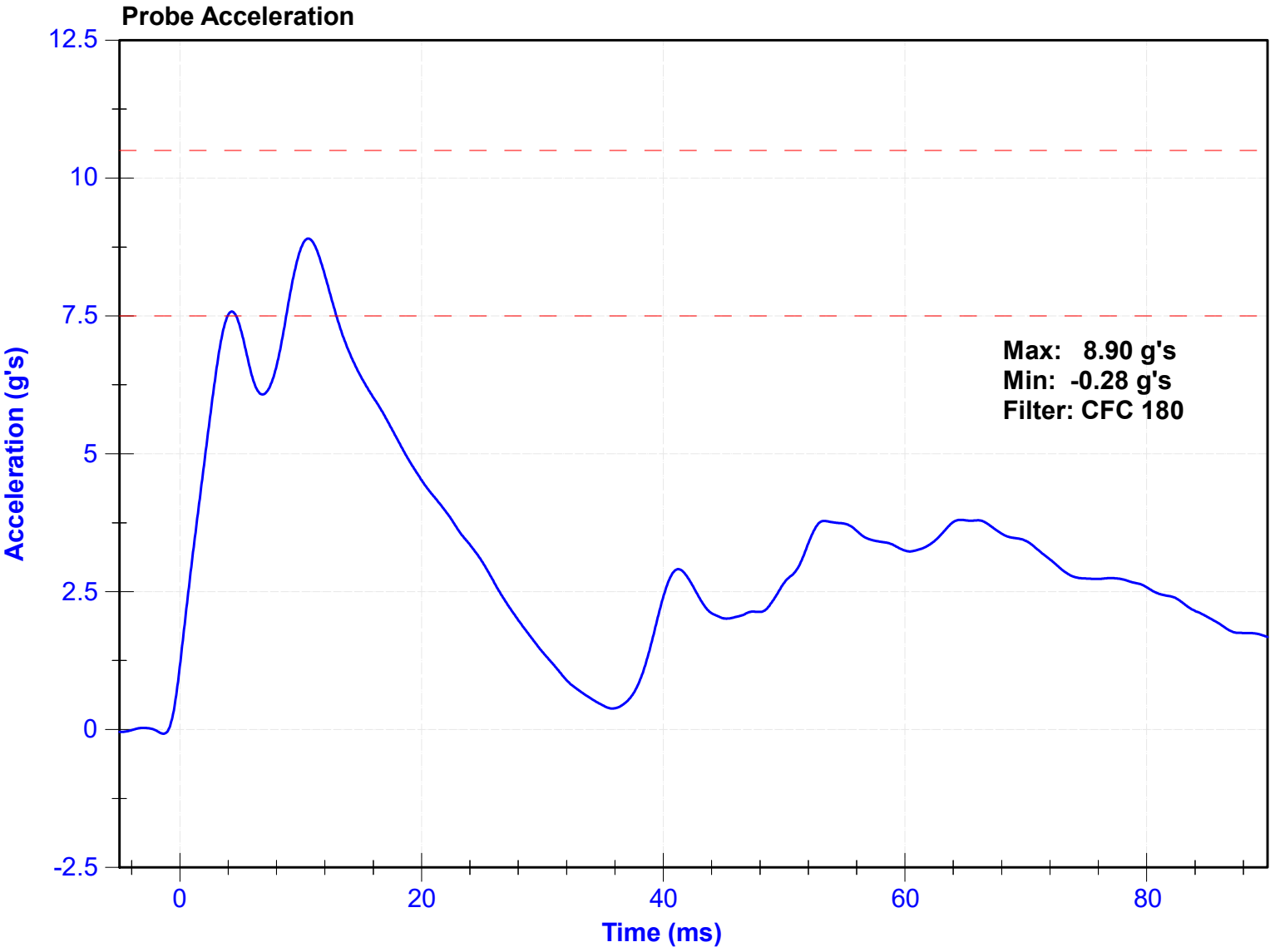
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.0	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	7.5	10.5	g's	8.90	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25885	10/25/2021	10/25/2022



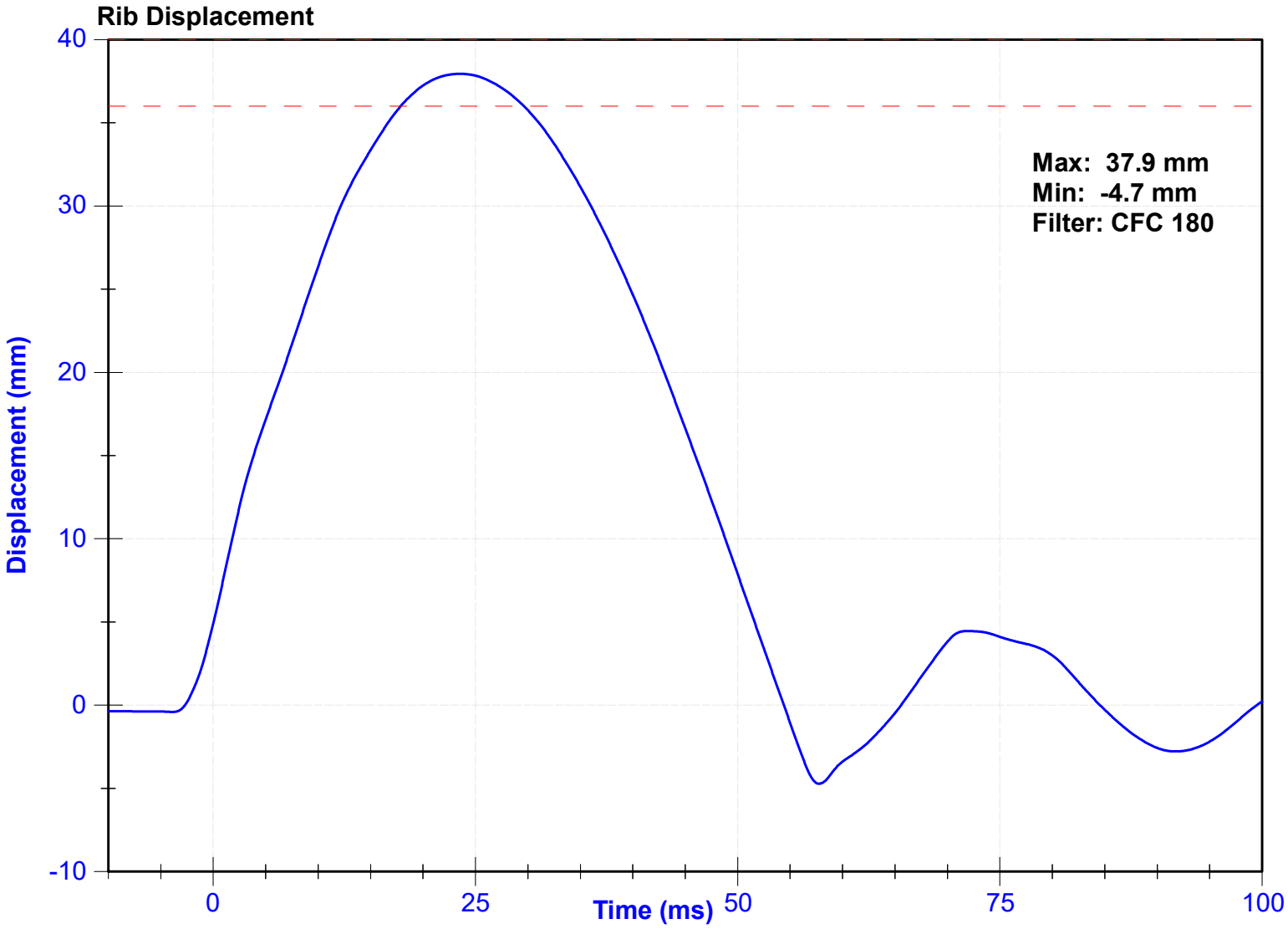
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023



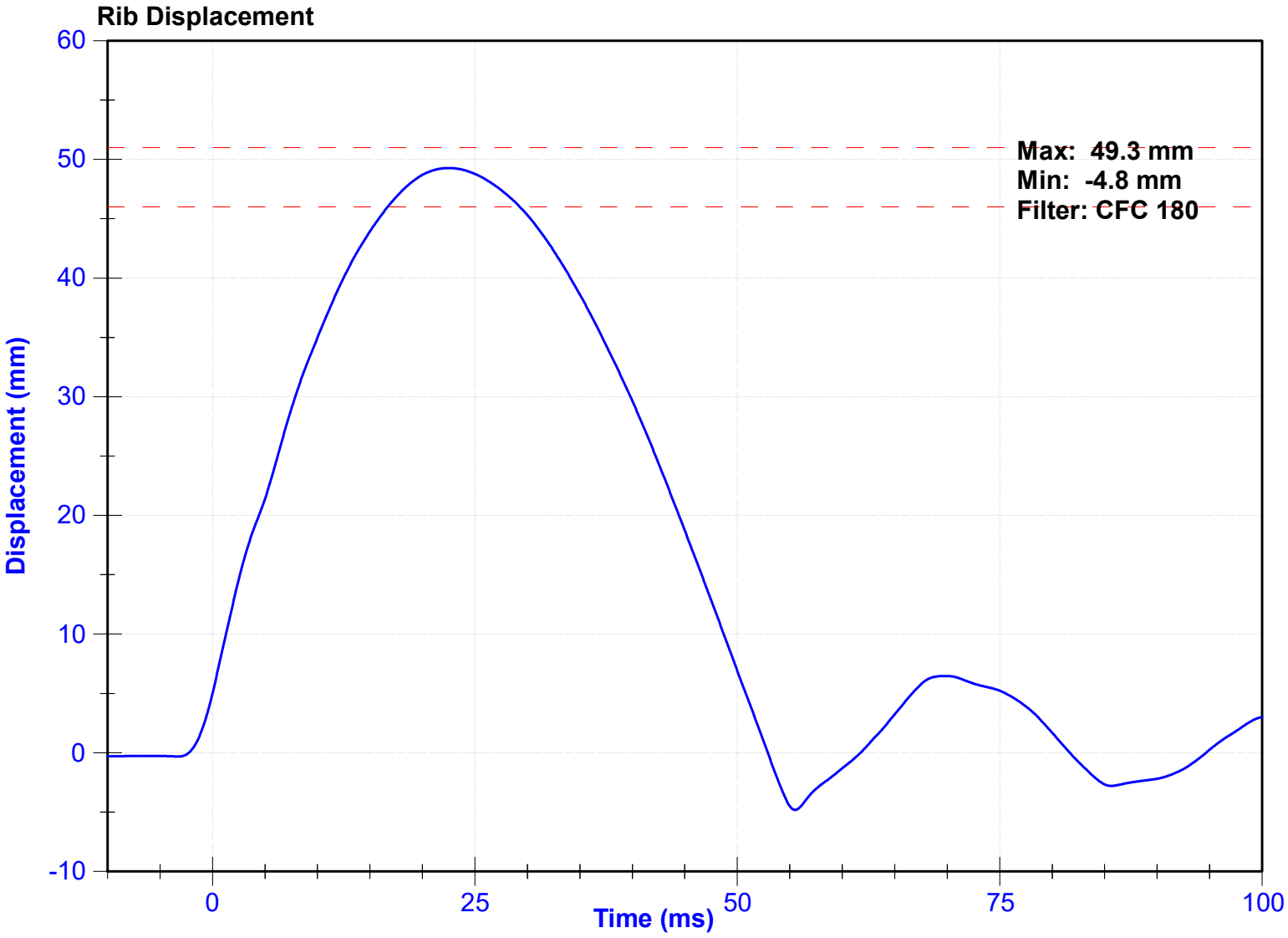
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023



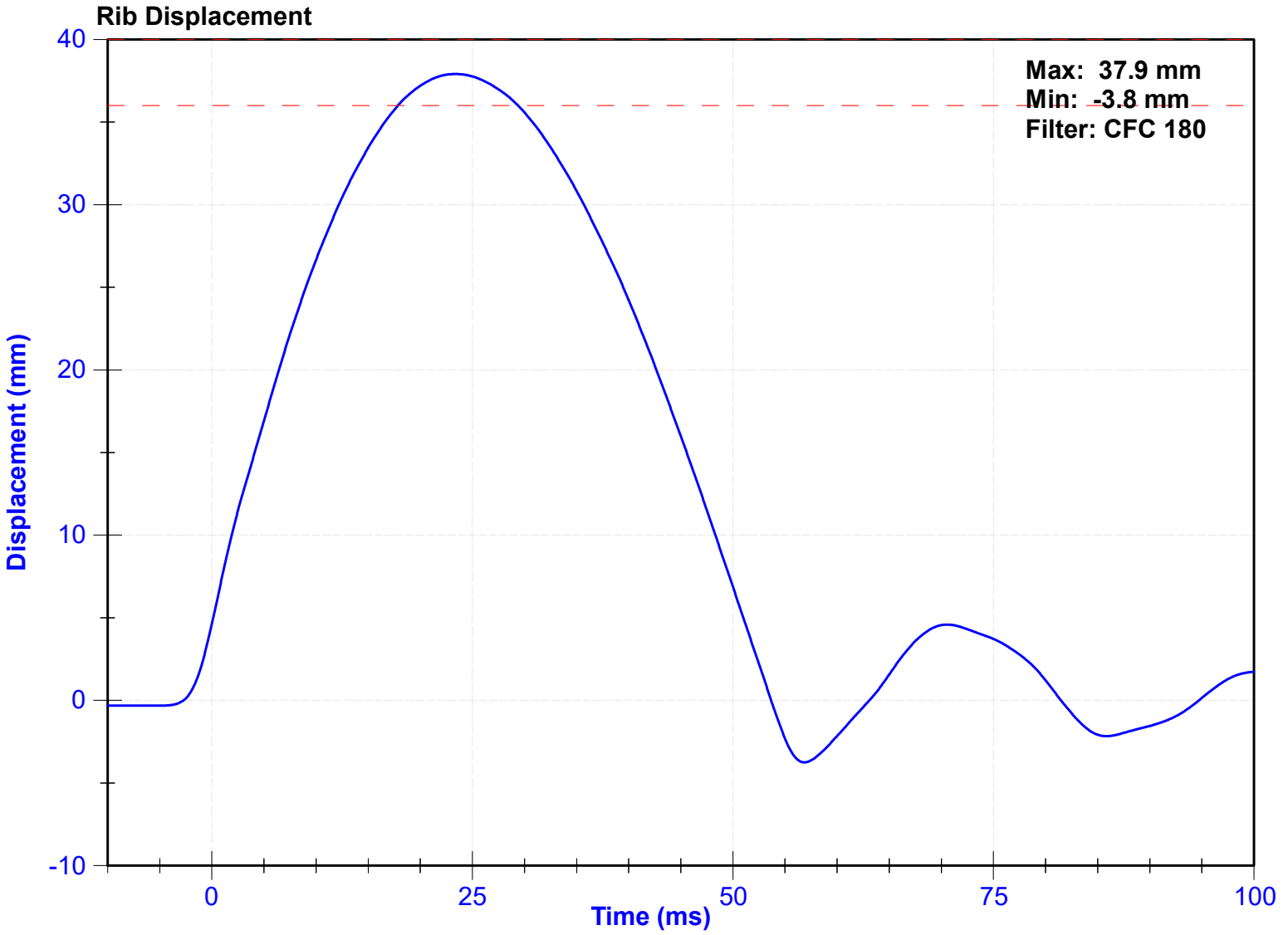
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023



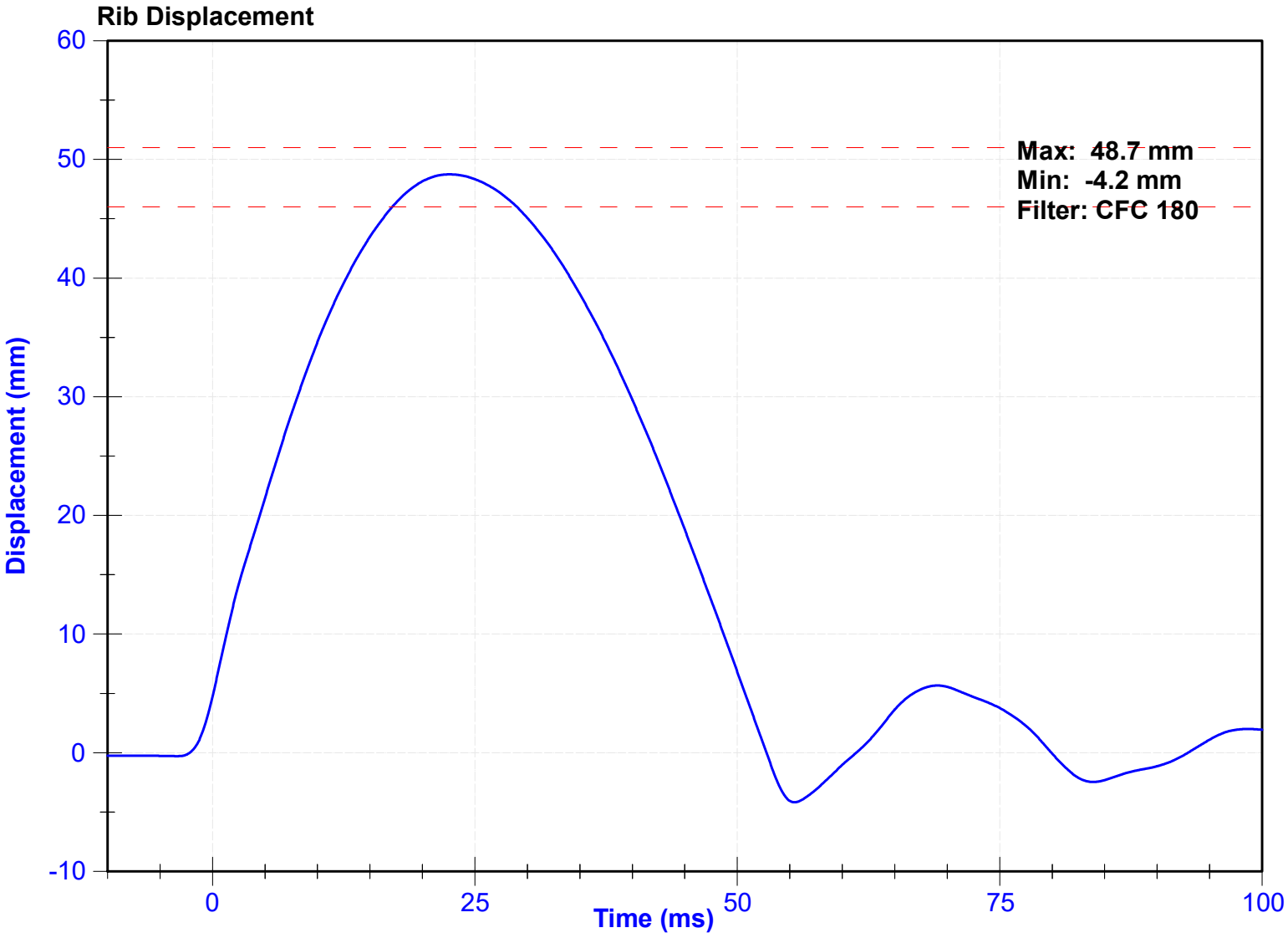
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023



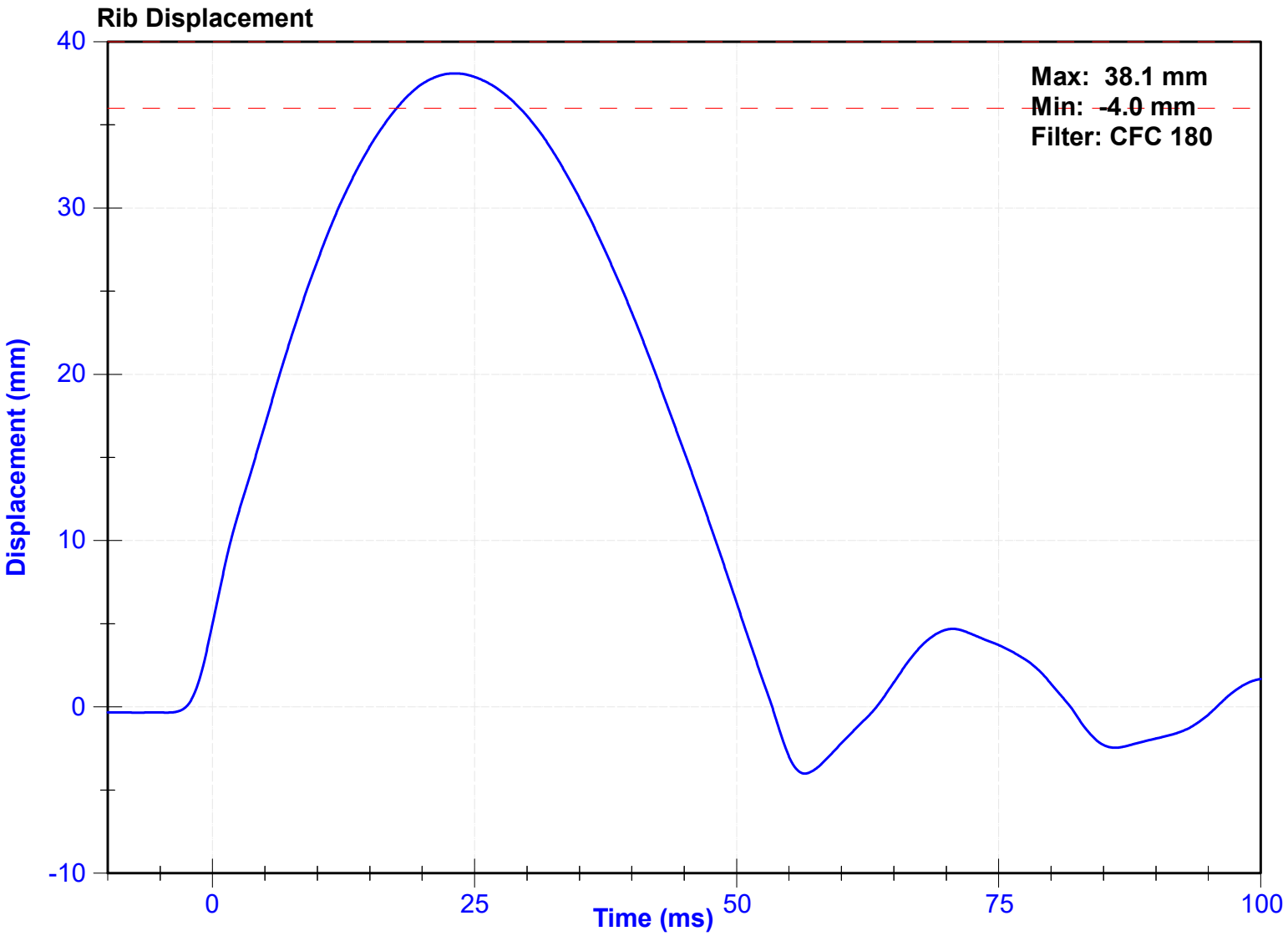
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Rib Displacement	36	40	mm	38.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	7/21/2022	1/19/2023



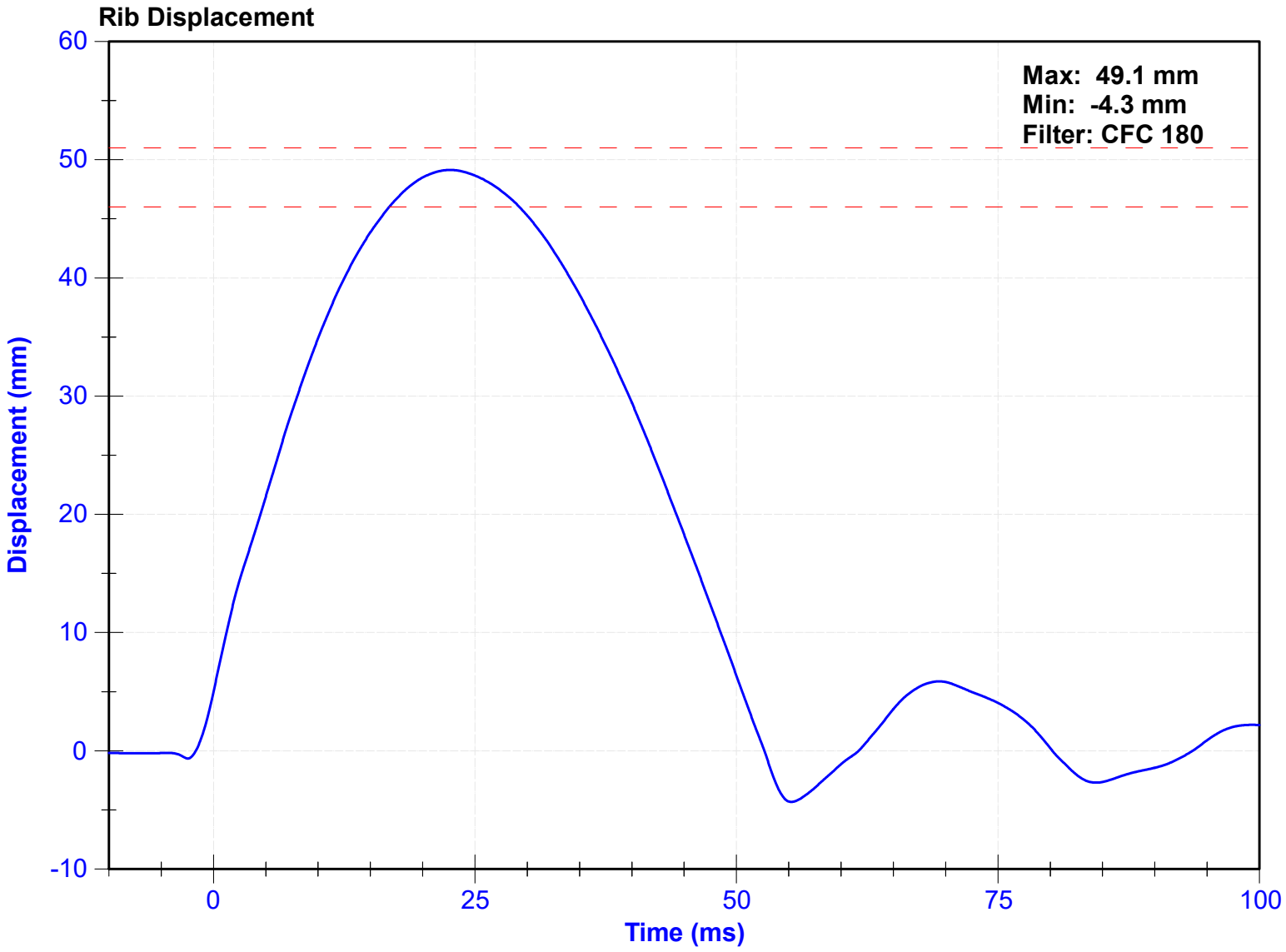
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	35.7	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	7/21/2022	1/19/2023



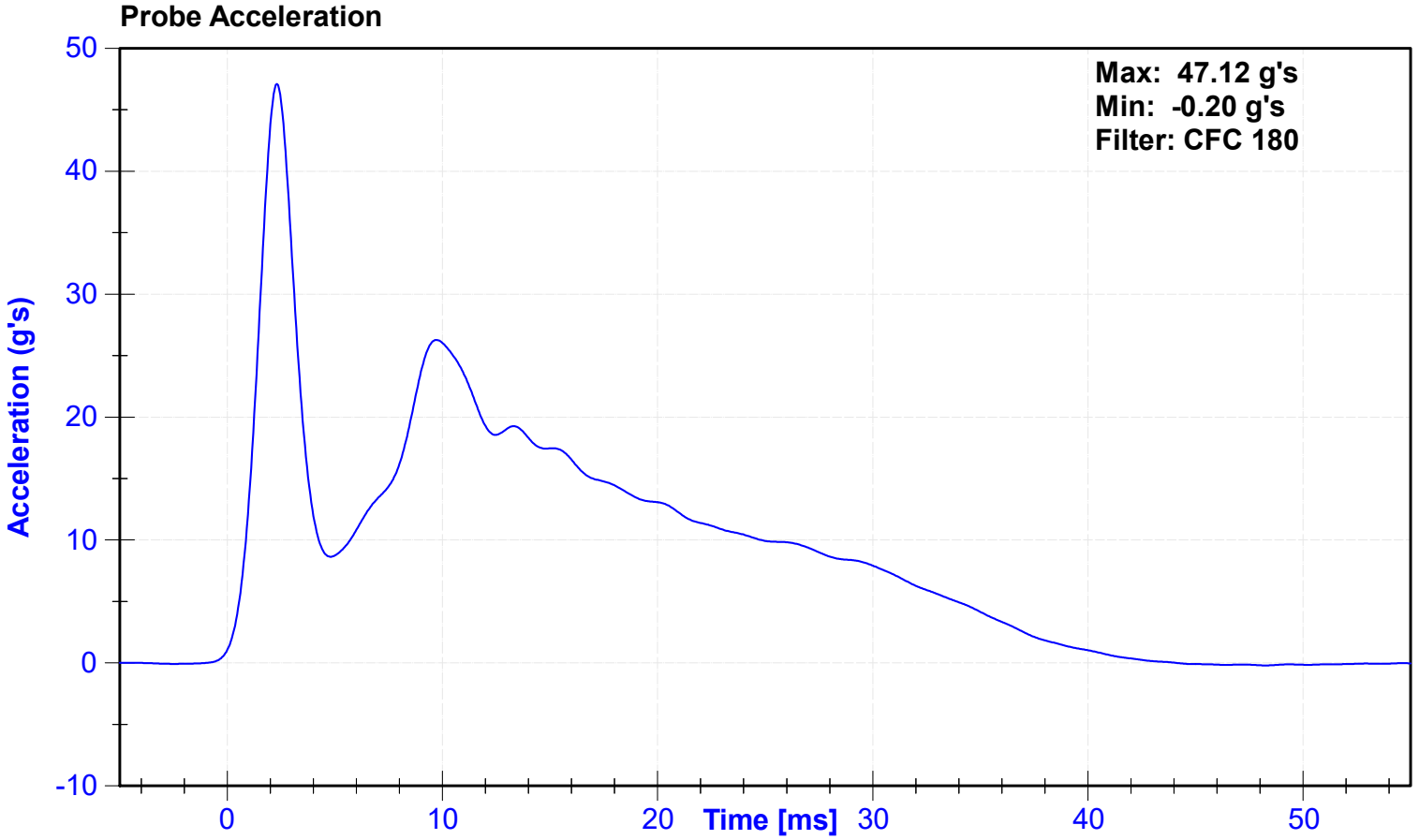
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

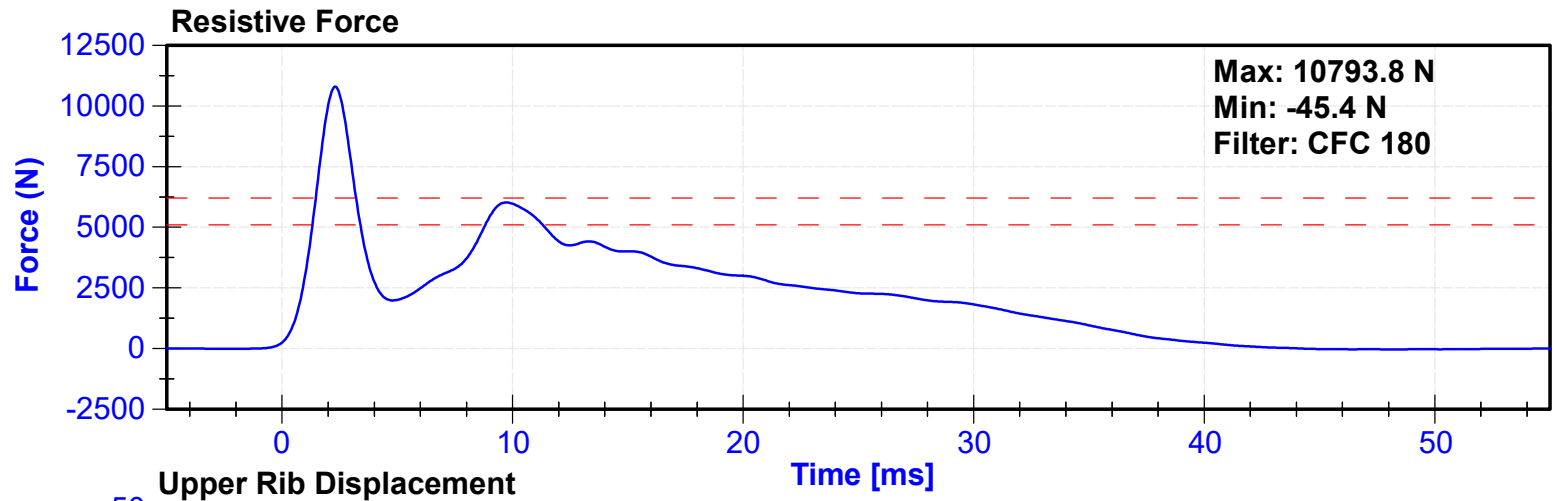
Results

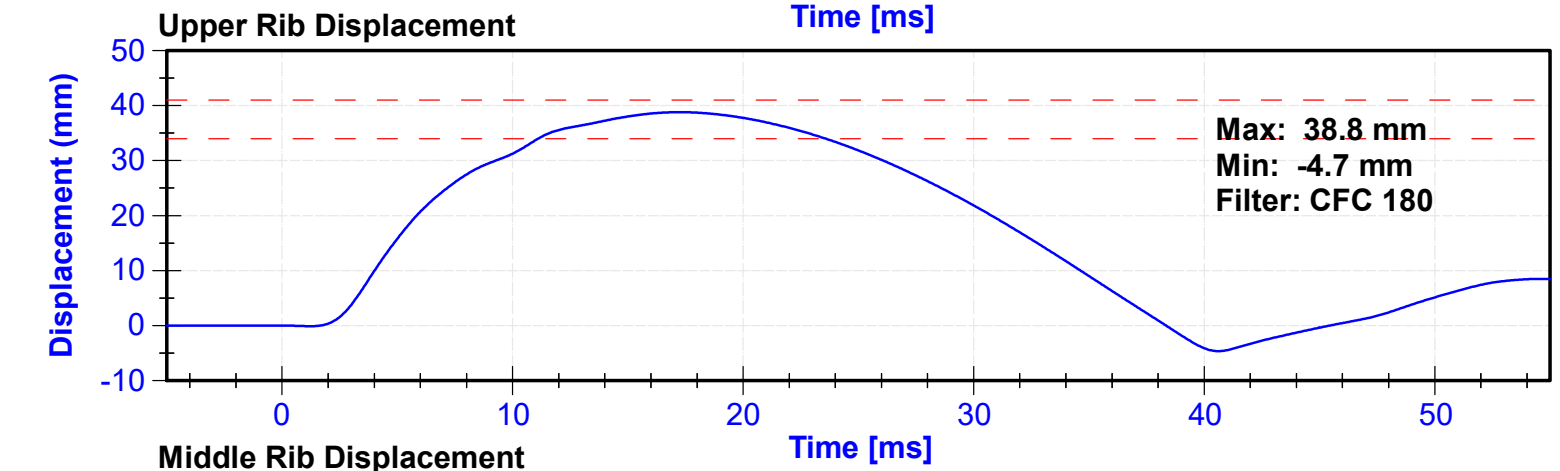
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.0	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	6022.3	Pass
Upper Thorax Rib Deflection	34	41	mm	38.8	Pass
Mid Thorax Rib Deflection	37	45	mm	41.0	Pass
Lower Thorax Rib Deflection	37	44	mm	40.2	Pass

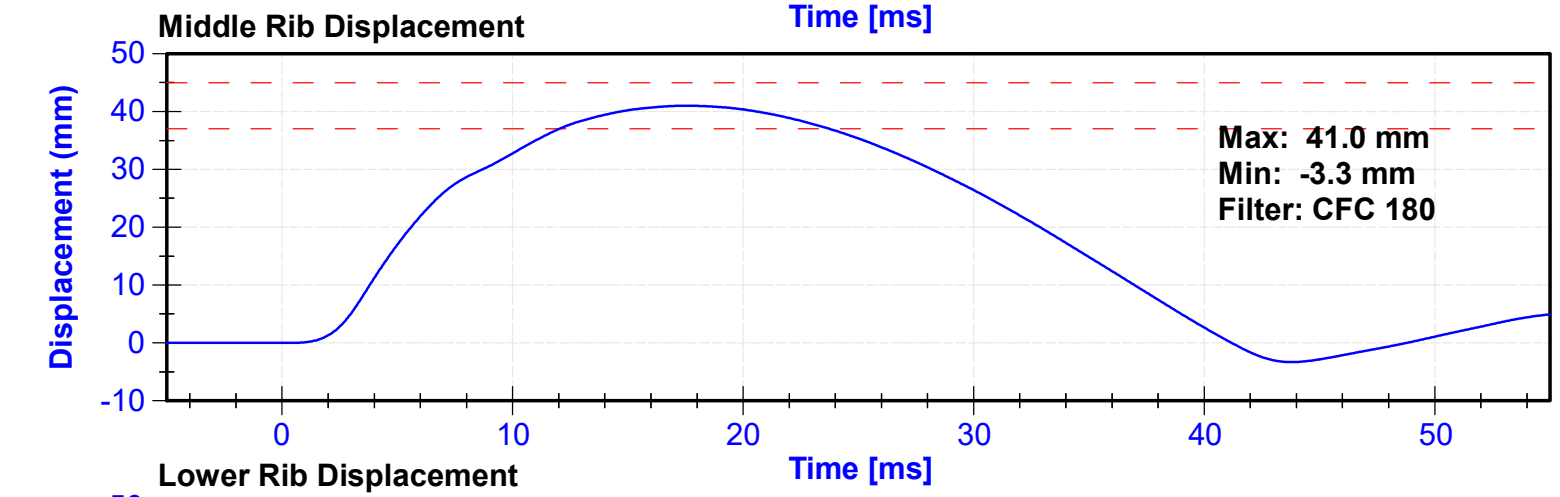
Transducer Calibrations

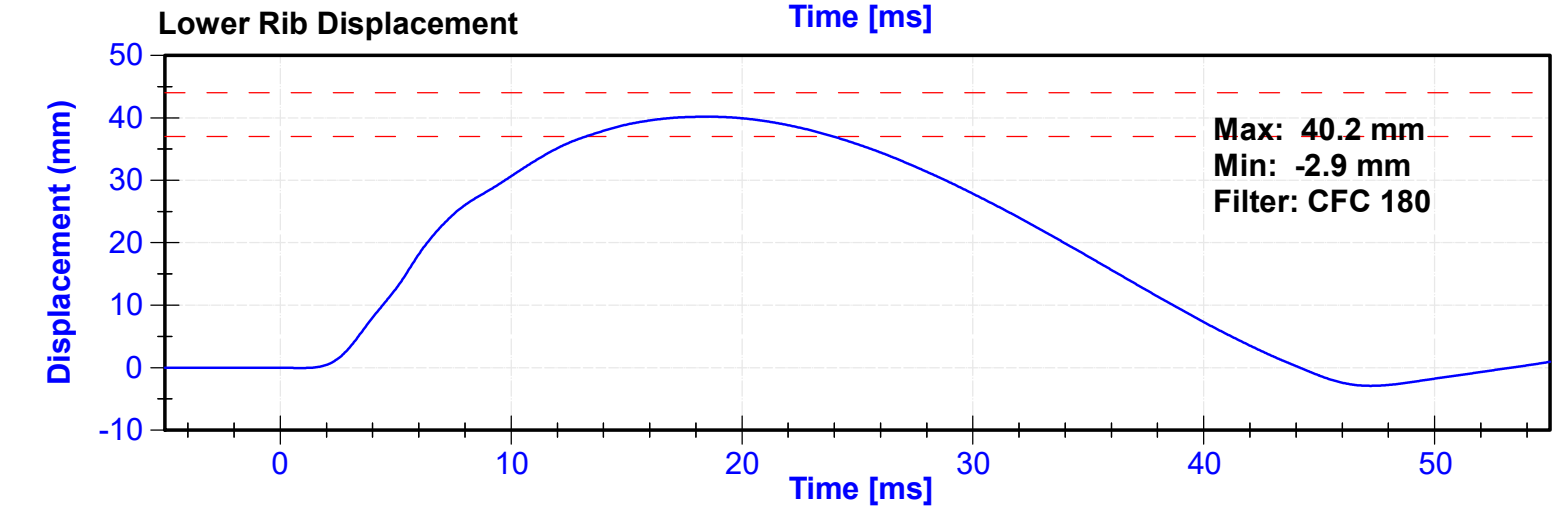
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Upper Thorax Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023
Lower Thorax Rib Potentiometer	Honeywell	178GFE	7/21/2022	1/19/2023




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]
Max: 10793.8 N
Min: -45.4 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 38.8 mm
Min: -4.7 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 41.0 mm
Min: -3.3 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 40.2 mm
Min: -2.9 mm
Filter: CFC 180

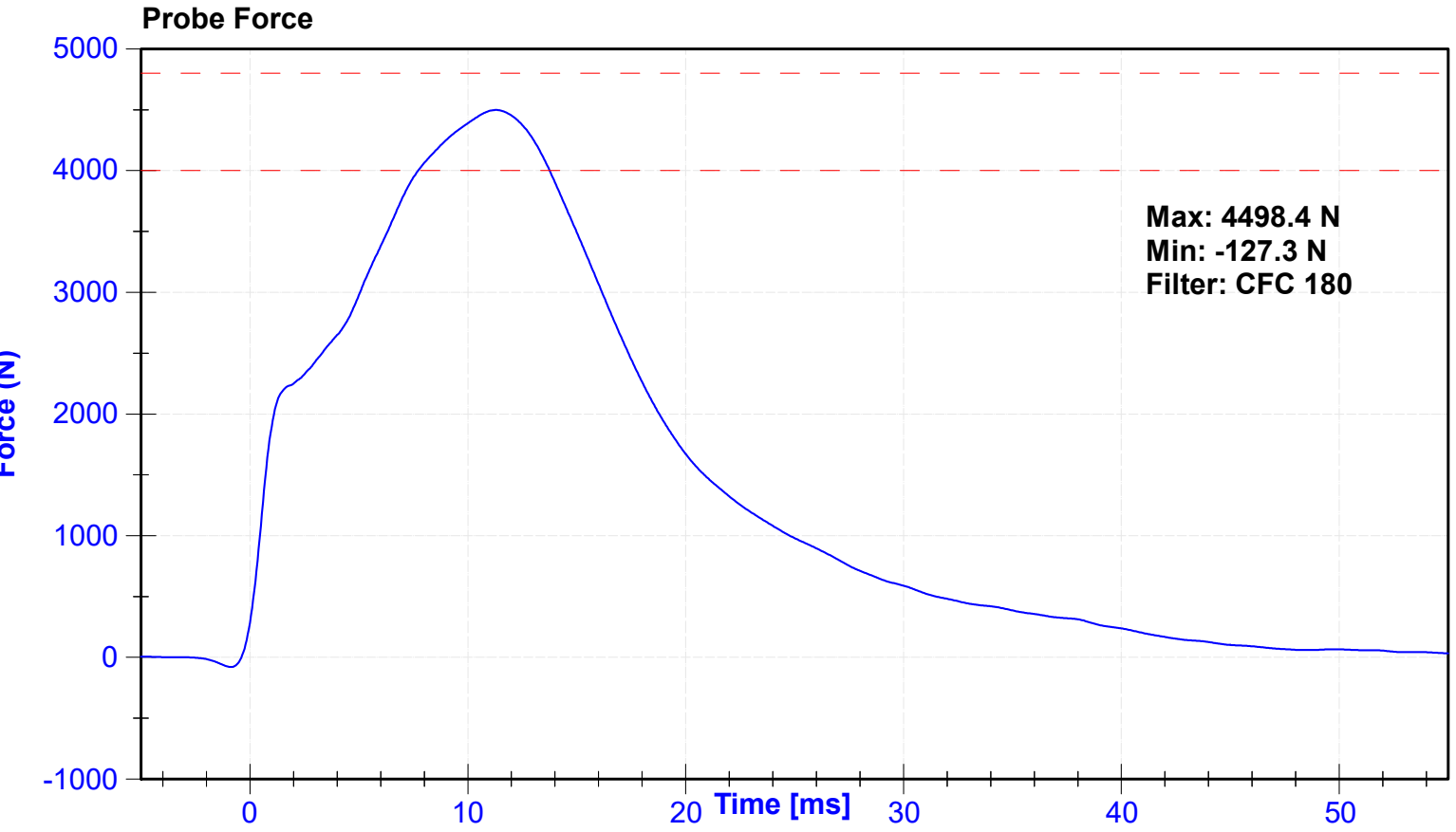
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

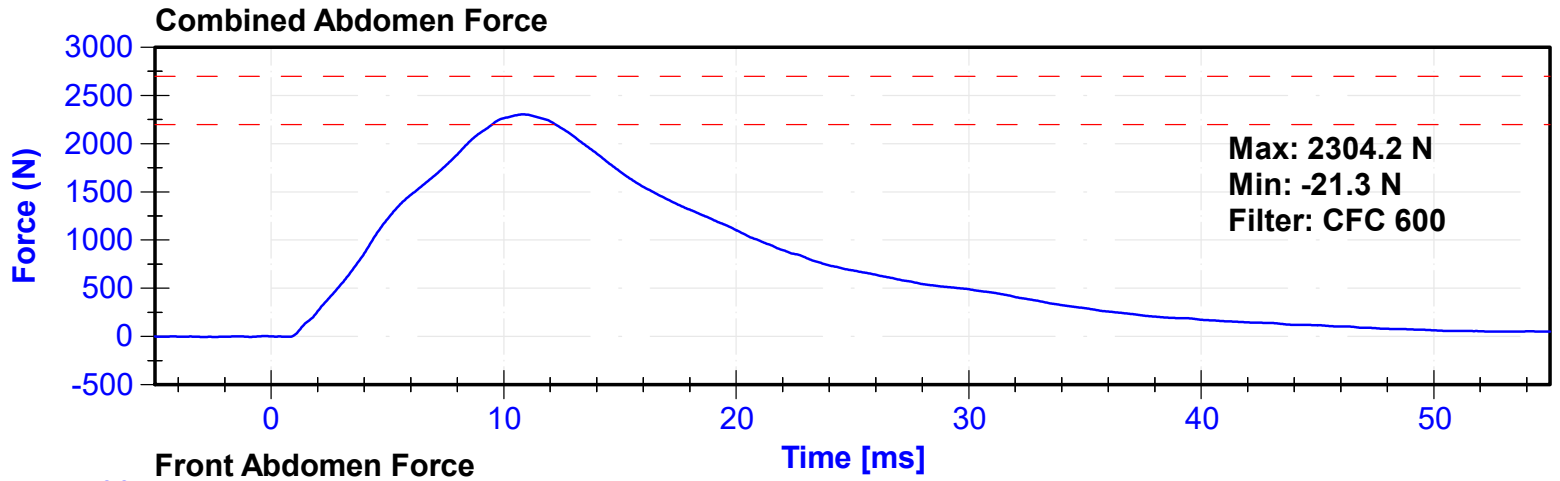
Results

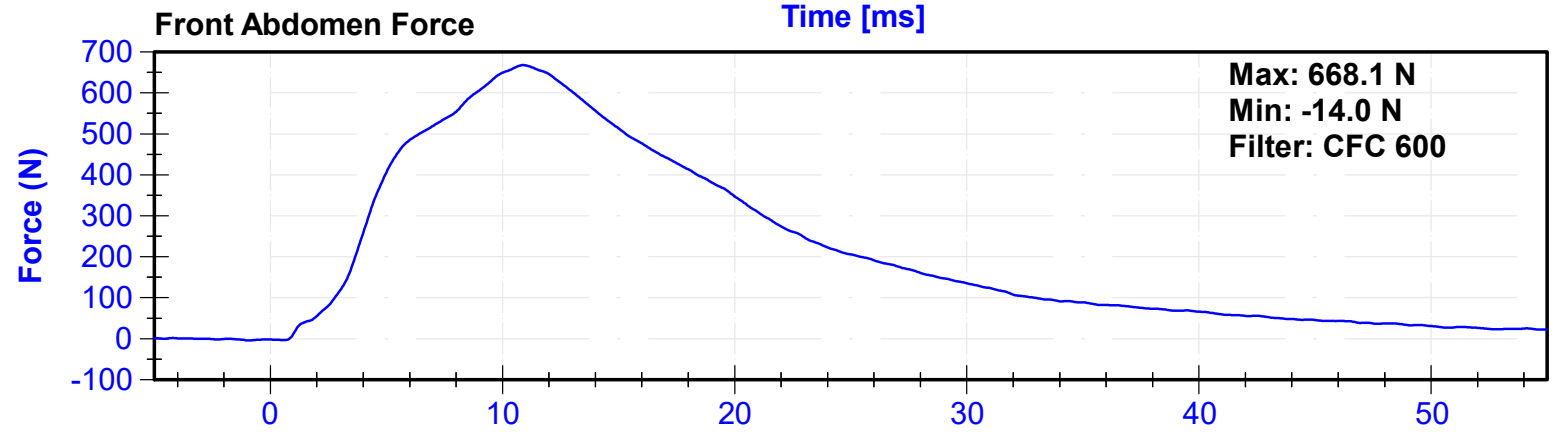
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.0	Pass
Velocity	3.9	4.1	m/s	4.04	Pass
Combined Abdomen Force	2200	2700	N	2304.2	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.85	Pass
Resistive Probe Force	4000	4800	N	4498.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.30	Pass

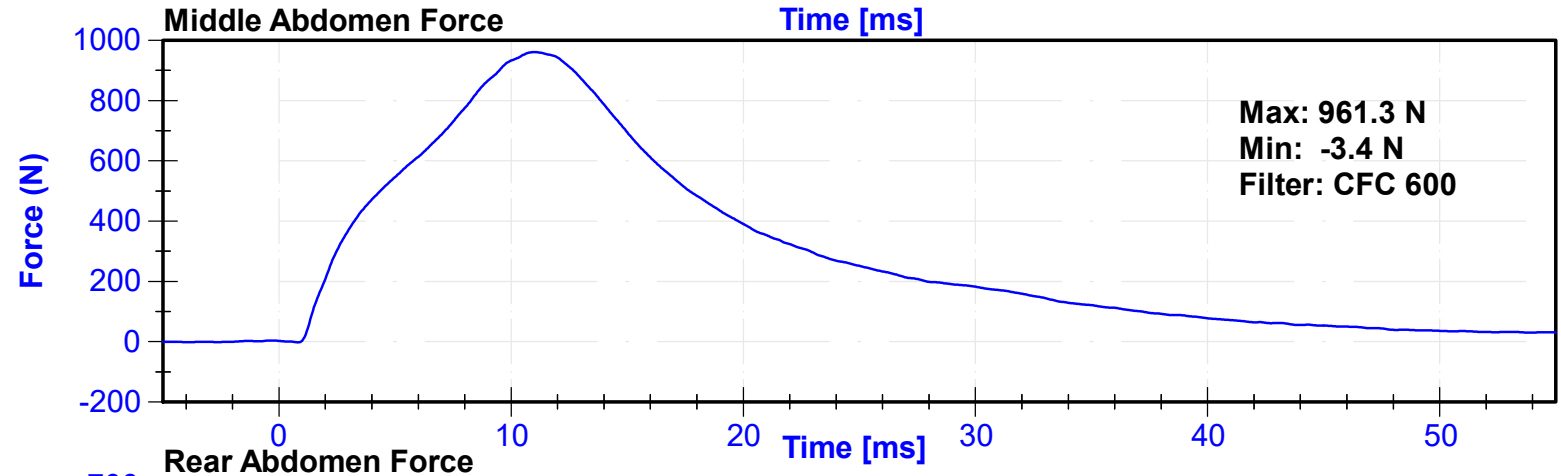
Transducer Calibrations

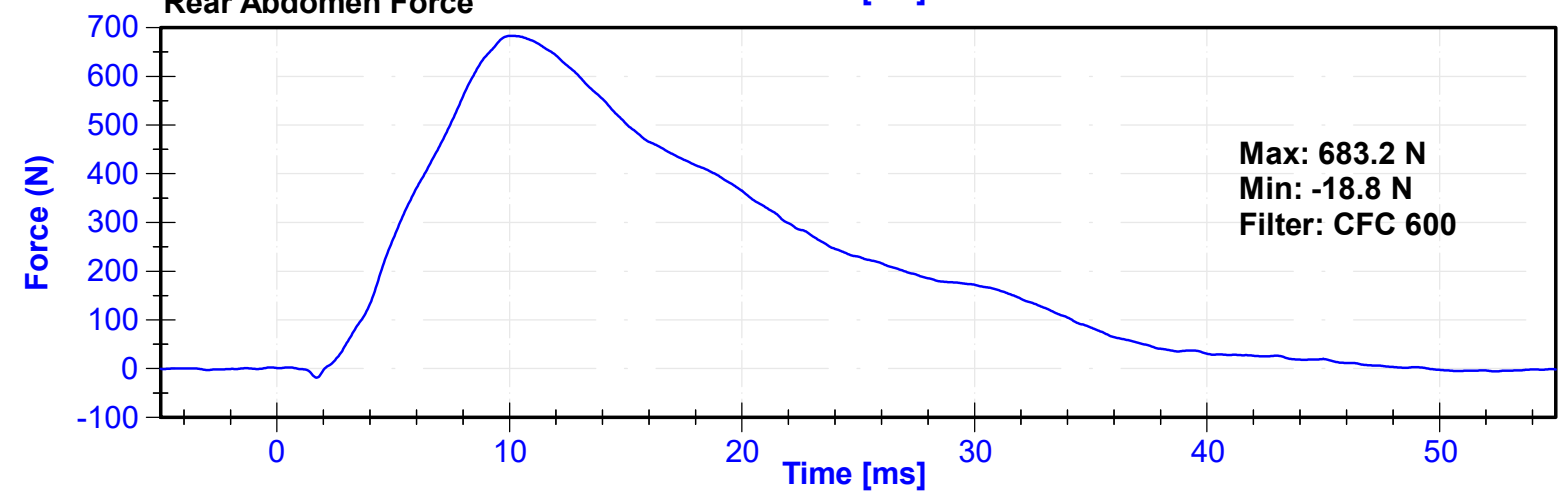
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2304.2 N
Min: -21.3 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 668.1 N
Min: -14.0 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 961.3 N
Min: -3.4 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 683.2 N
Min: -18.8 N
Filter: CFC 600

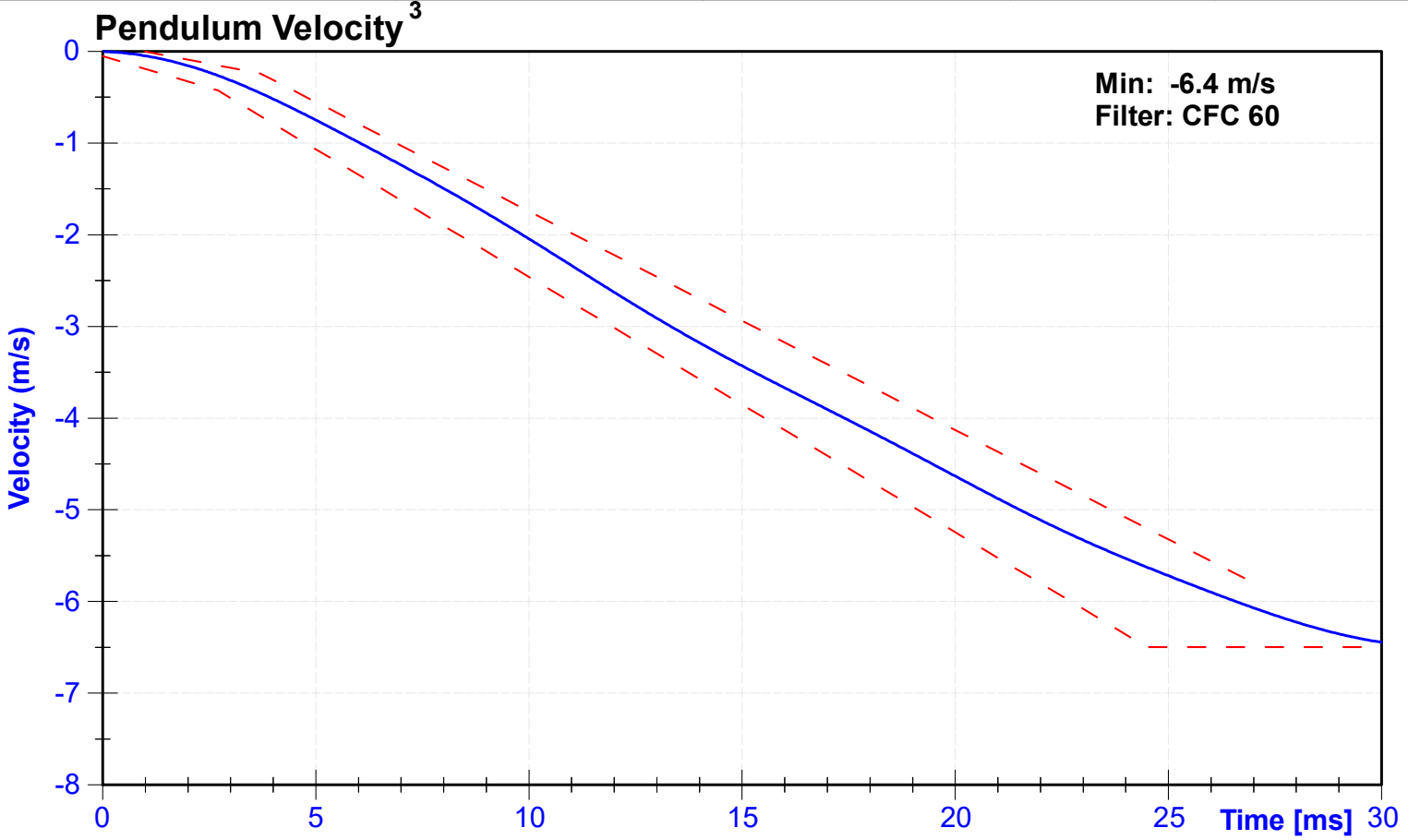
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

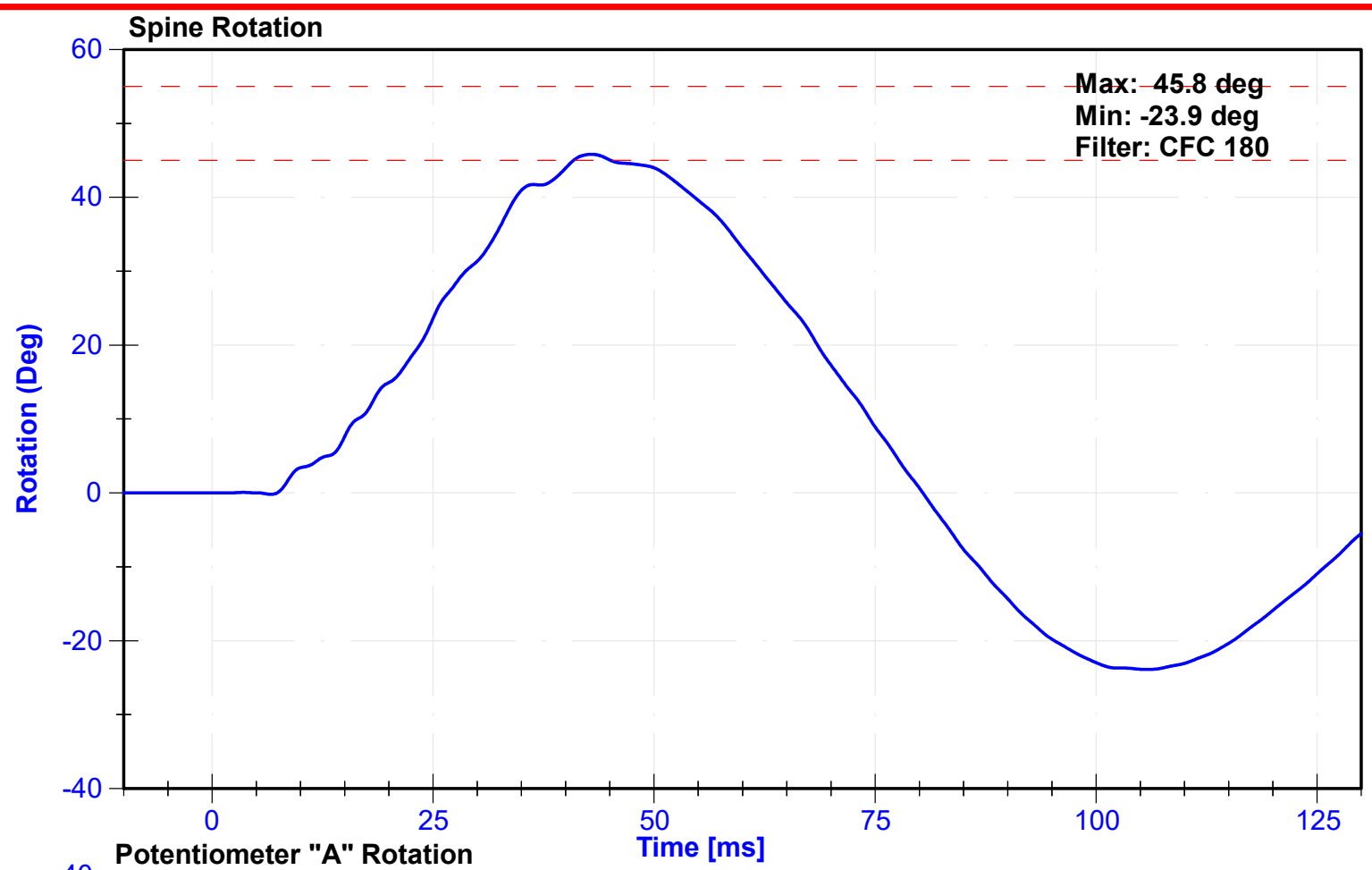
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	36.4	Pass
Velocity	5.95	6.15	m/s	6.051	Pass
Lateral Spine Rotation	45	55	deg	45.8	Pass
Time at Maximum Rotation	39	53	ms	42.9	Pass
Time of Decay to Zero Degrees	37	57	ms	37.6	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

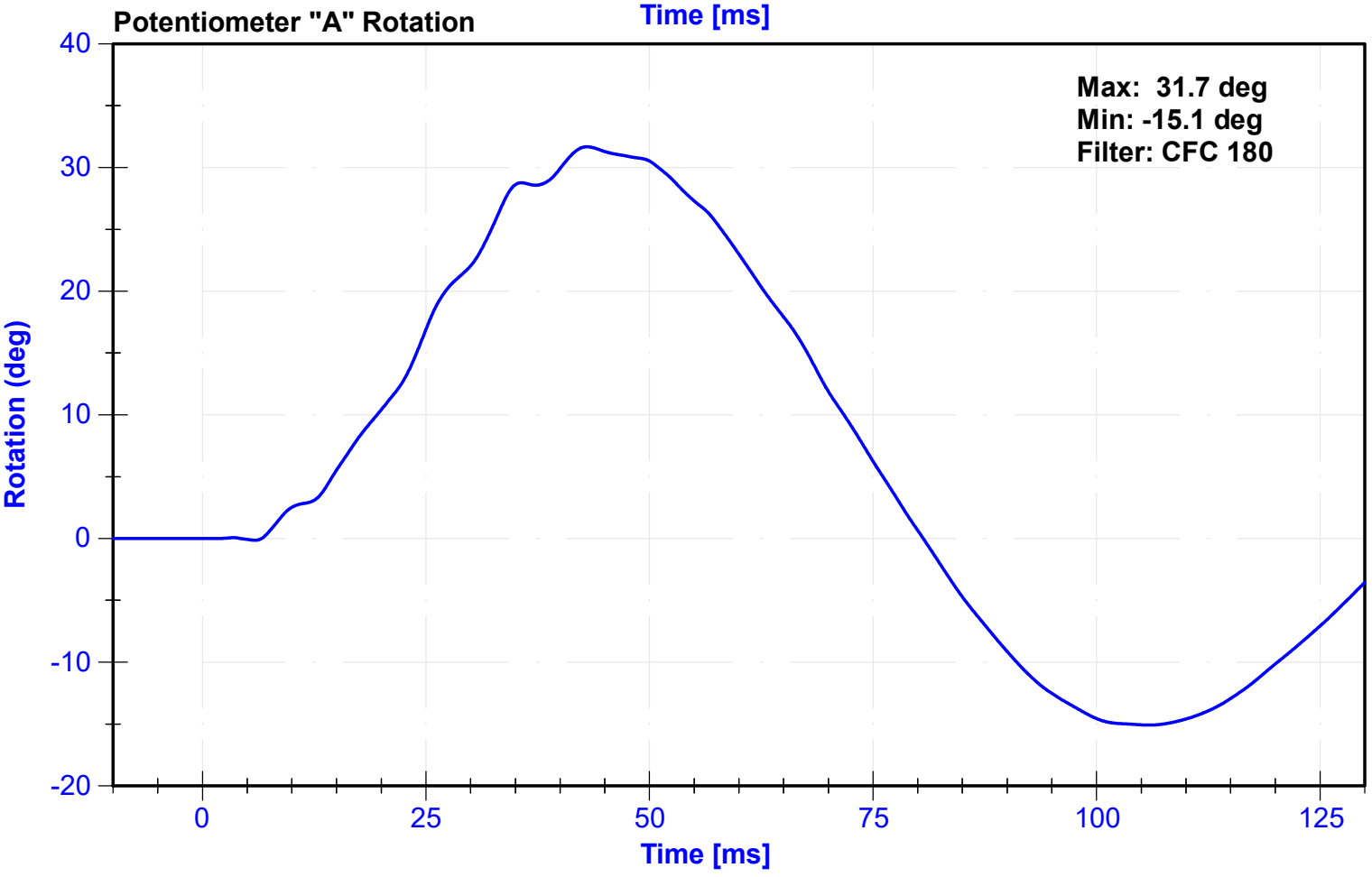
Transducer Calibrations

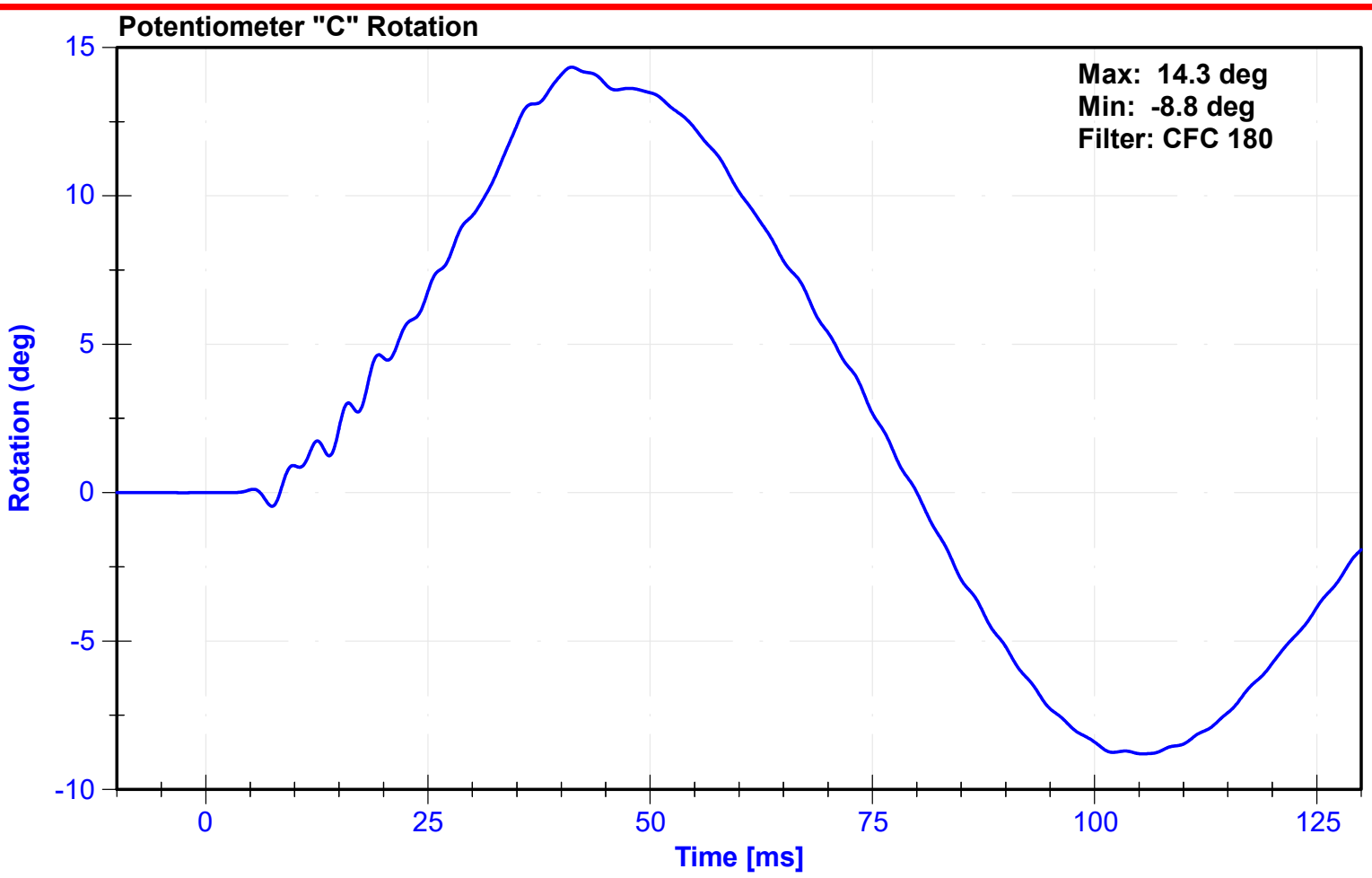
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/28/2021	10/28/2022
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



[1,2] Upper and lower boundaries specified in Appendix I


Spine Rotation
Max: 45.8 deg
Min: -23.9 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 31.7 deg
Min: -15.1 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



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

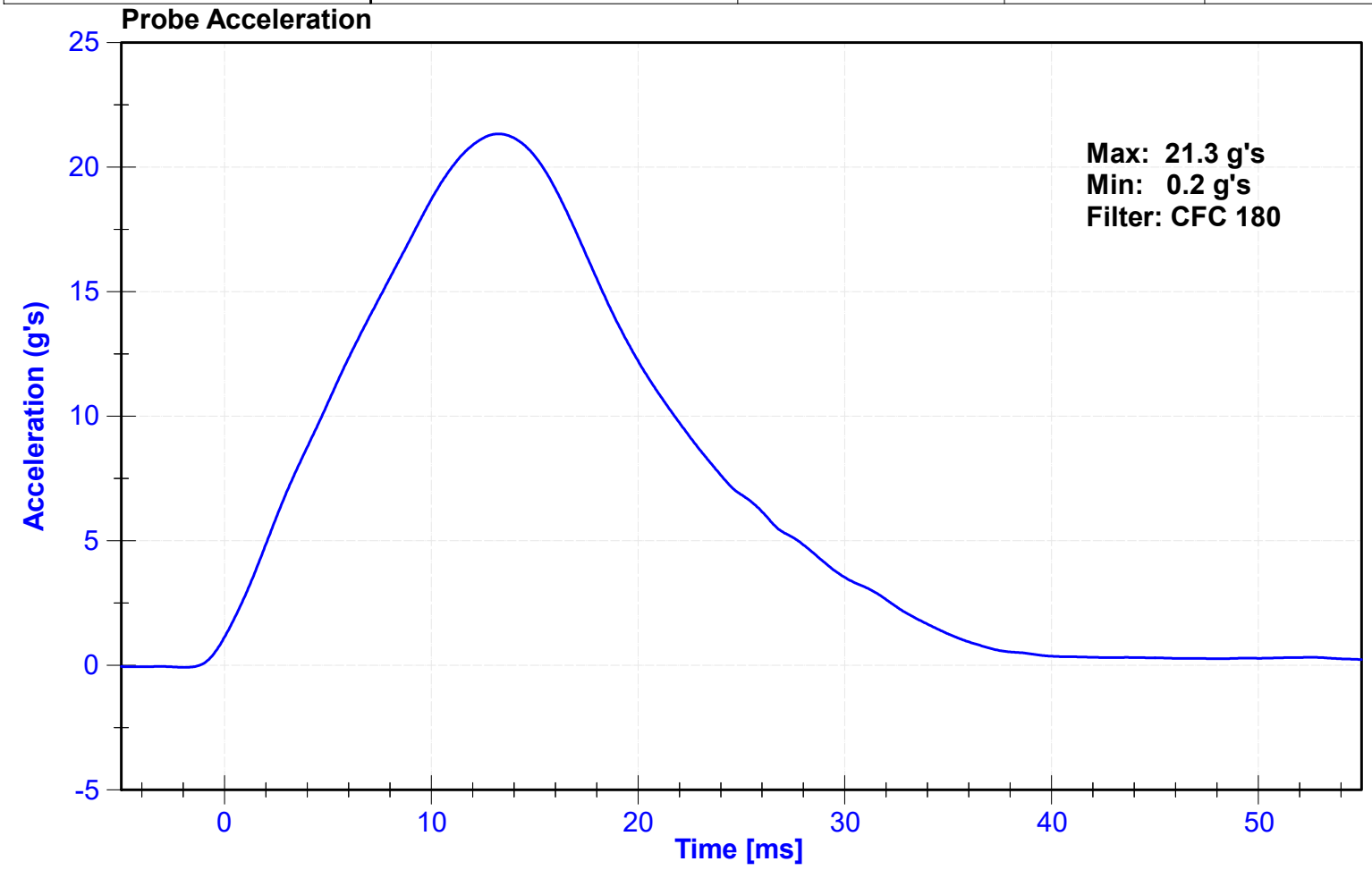
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

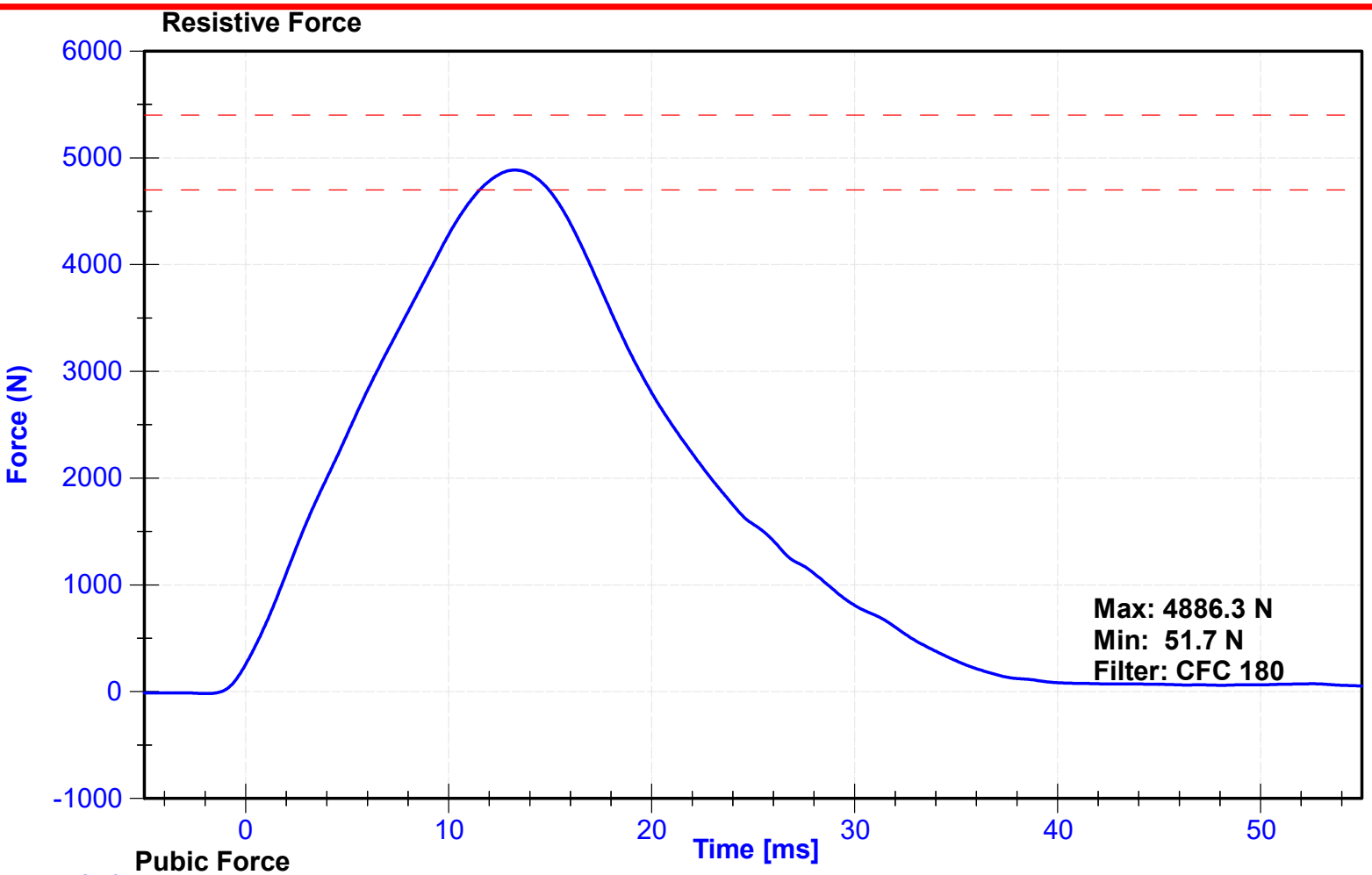
Results

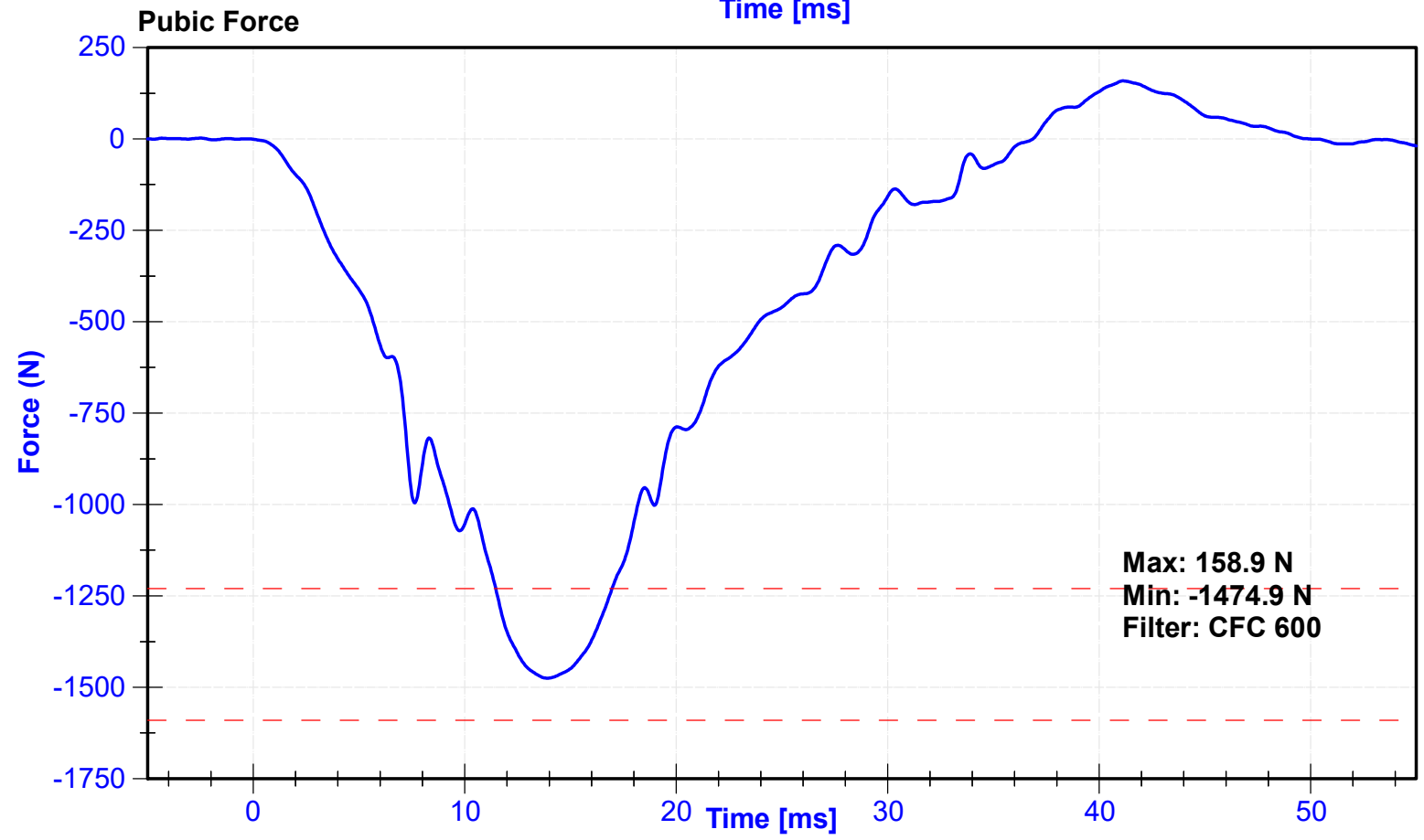
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.0	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Resistive Force	4700	5400	N	4886.3	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.25	Pass
Pubic Force	-1590	-1230	N	-1474.9	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.90	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Pubic Load Cell	Denton	459-FY	6/14/2022	6/14/2023




Resistive Force
6000
5000
4000
3000
2000
1000
0
-1000
Force (N)
0
10
20
30
40
50
Time [ms]
Max: 4886.3 N
Min: 51.7 N
Filter: CFC 180


Pubic Force
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
Force (N)
0
10
20
30
40
50
Time [ms]
Max: 158.9 N
Min: -1474.9 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

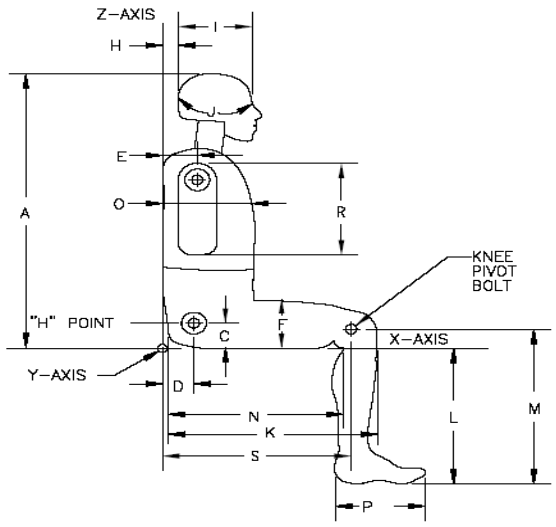
SERIAL NO:300

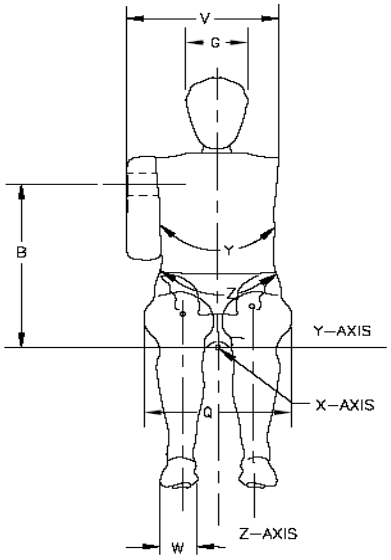
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 10/10/2022

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	778	Pass
B	Shoulder Pivot Height	437	453	444	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	105	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	360	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	204	Pass
P	Foot Length	216	232	223	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	315	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	86	Pass
Y	Chest Circumference w/jacket	851	881	879	Pass
Z	Waist Circumference	761	791	775	Pass

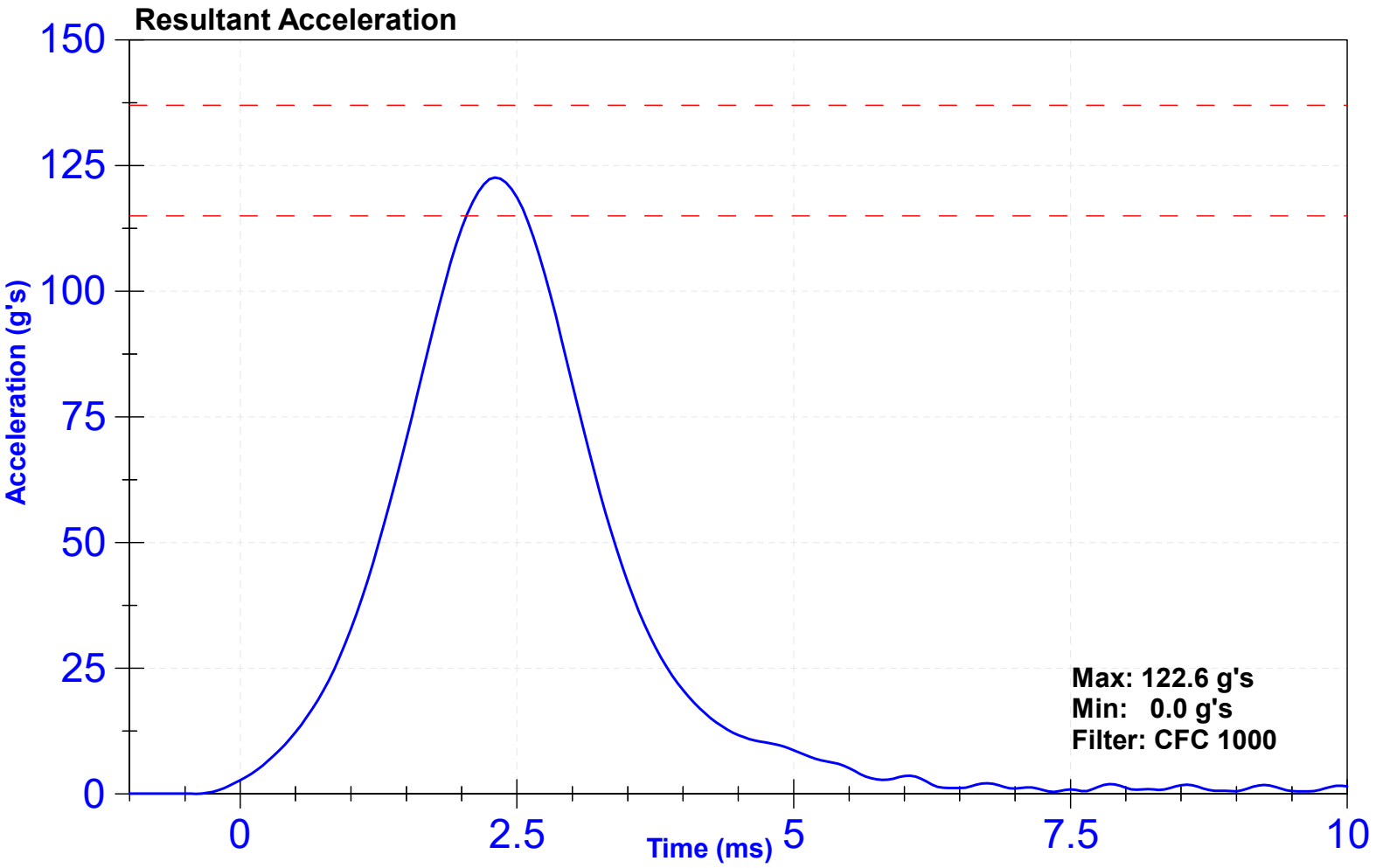
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

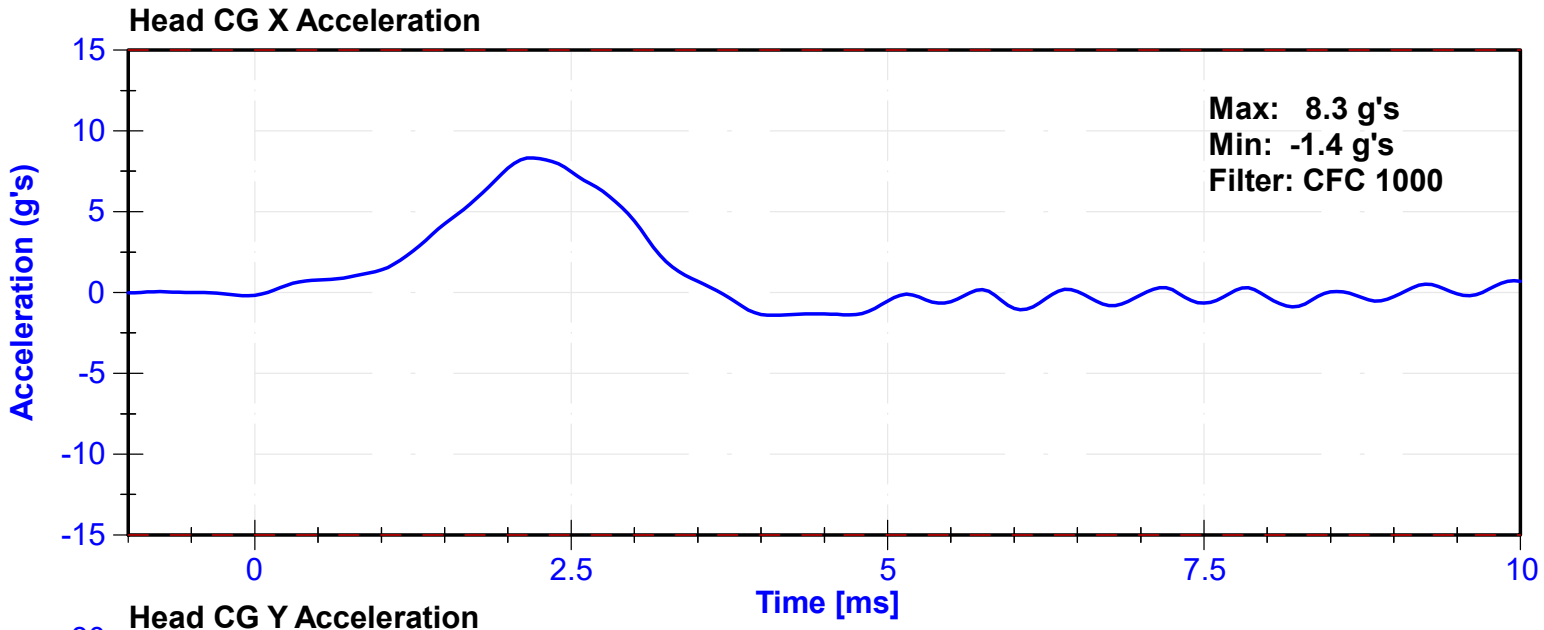
Results

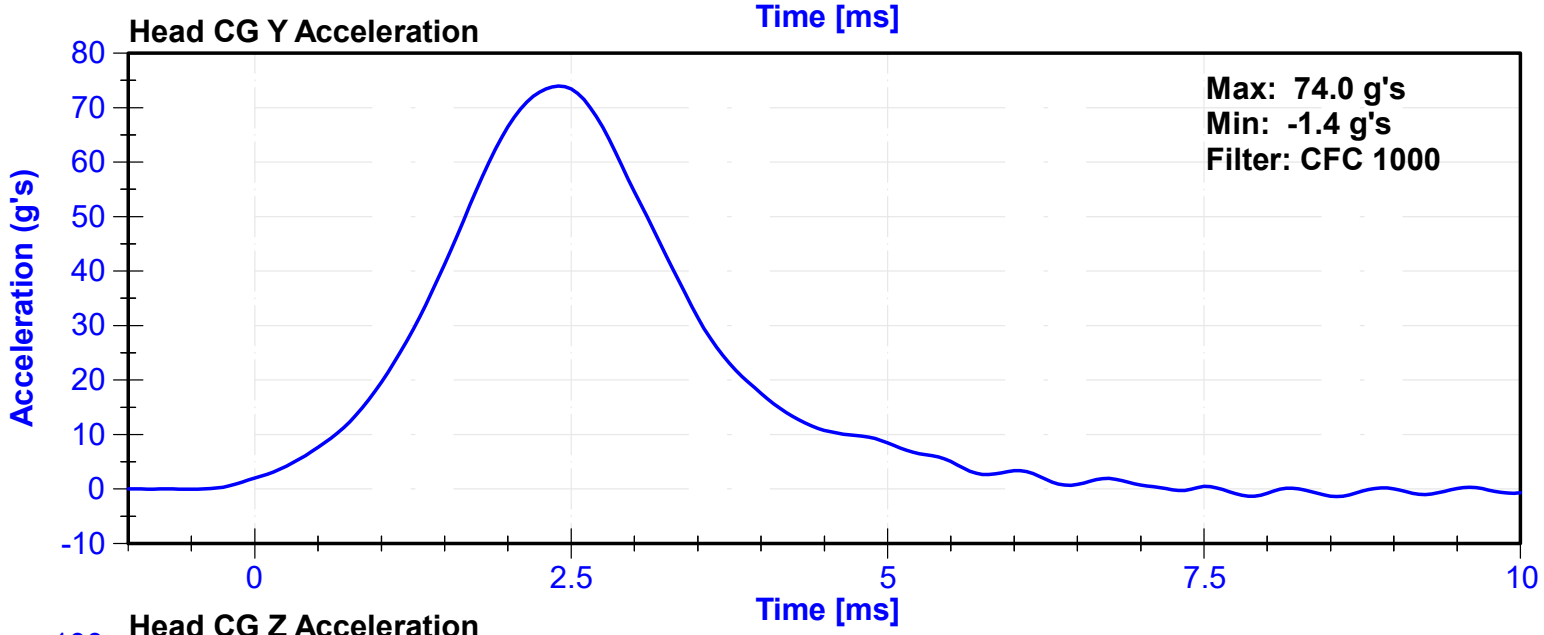
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.0	Pass
Resultant Acceleration	115	137	g's	122.6	Pass
Oscillation	0	15	%	2.9	Pass
Fore-Aft Acceleration	-15	15	g's	8.3	Pass

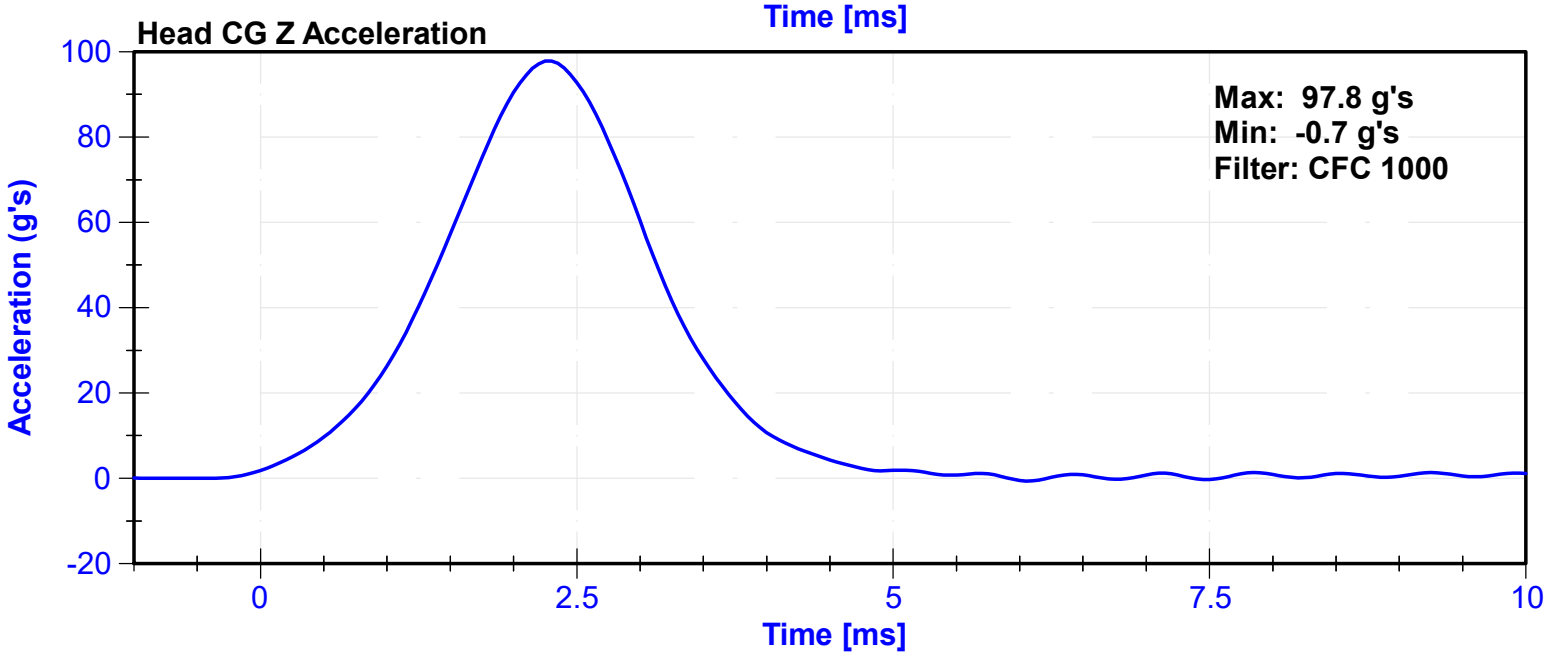
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	10/3/2022	4/1/2023
Y Accelerometer	Endevco	P58777	10/3/2022	4/1/2023
Z Accelerometer	Endevco	P79189	10/3/2022	4/1/2023




Head CG X Acceleration
Max: 8.3 g's
Min: -1.4 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 74.0 g's
Min: -1.4 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 97.8 g's
Min: -0.7 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]

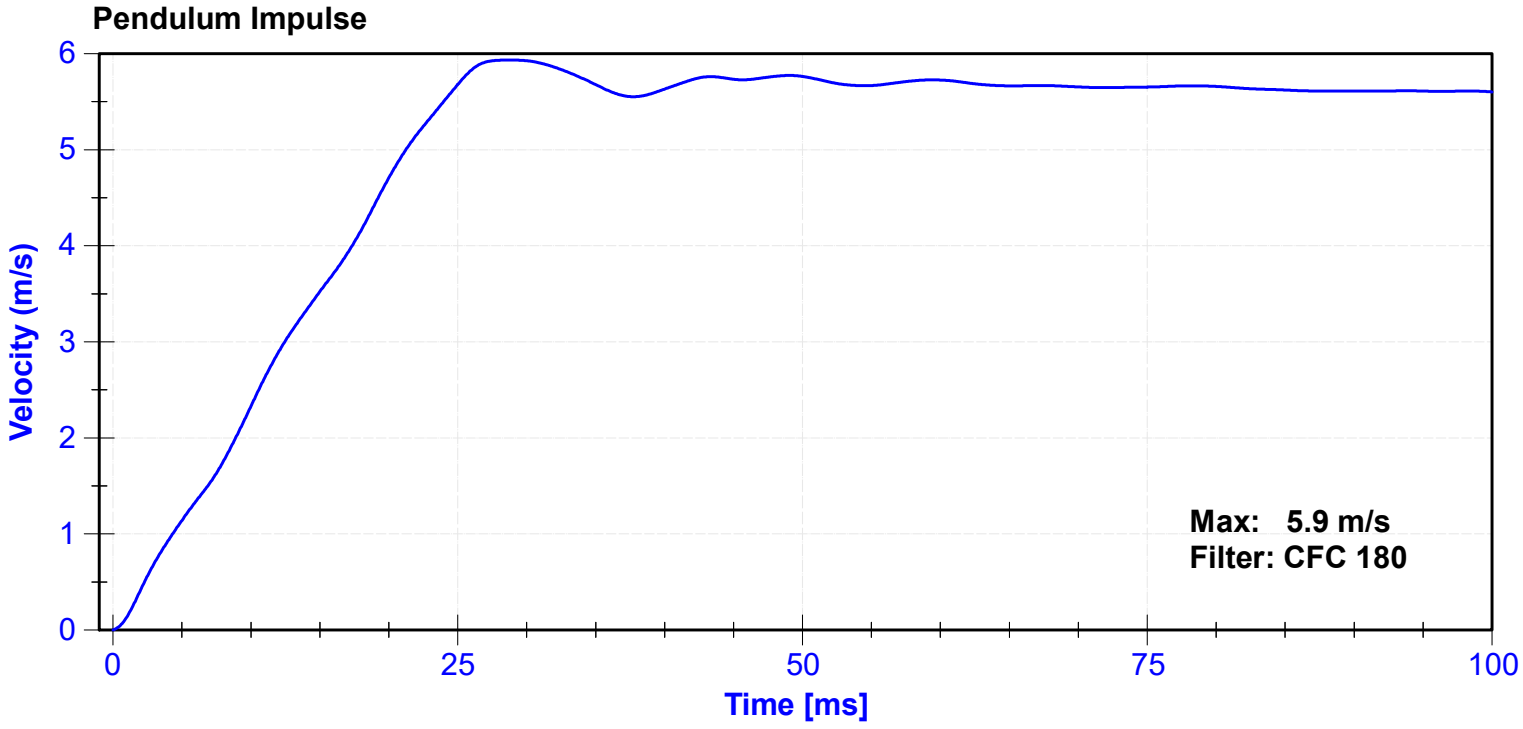
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

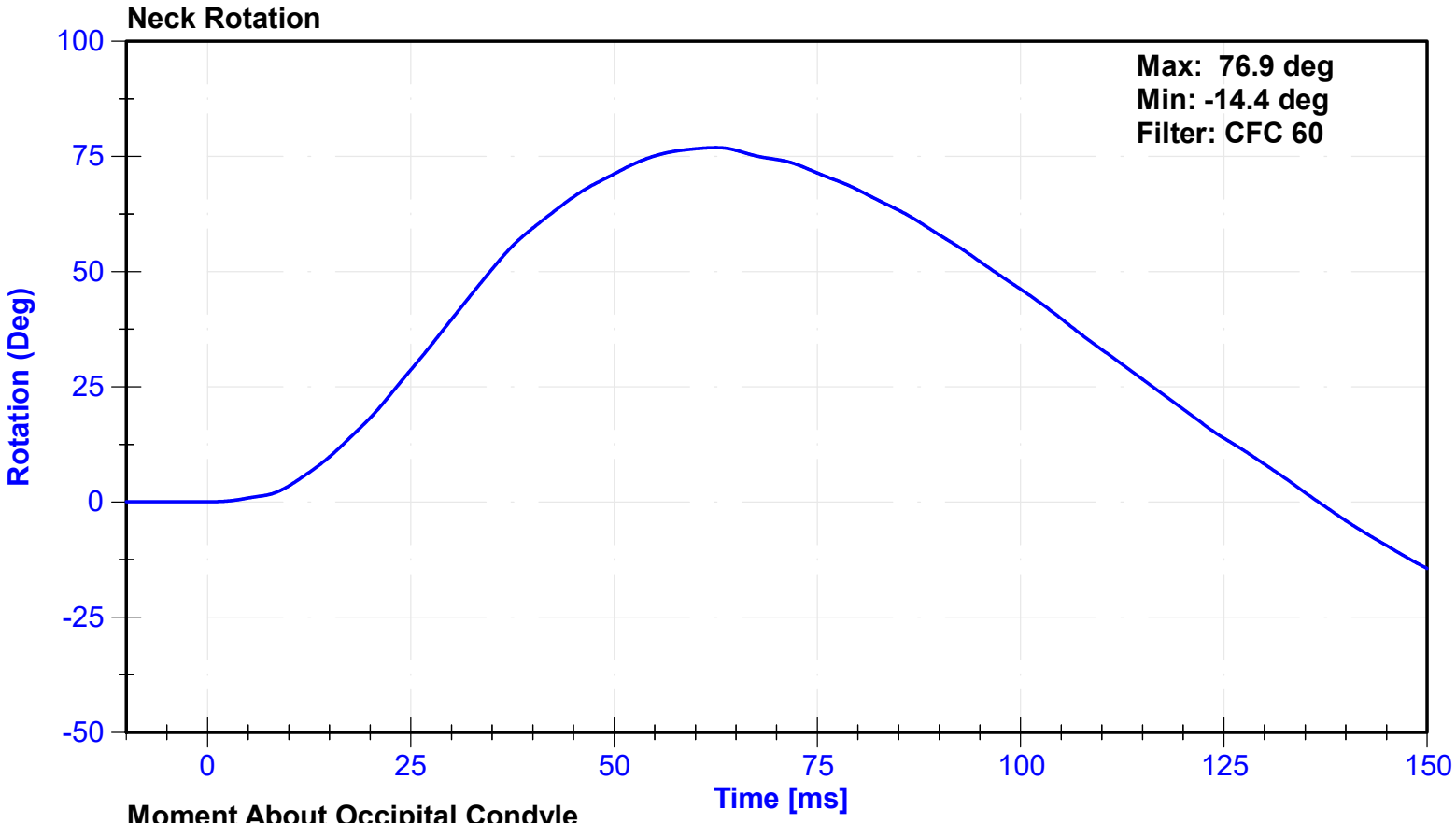
Results

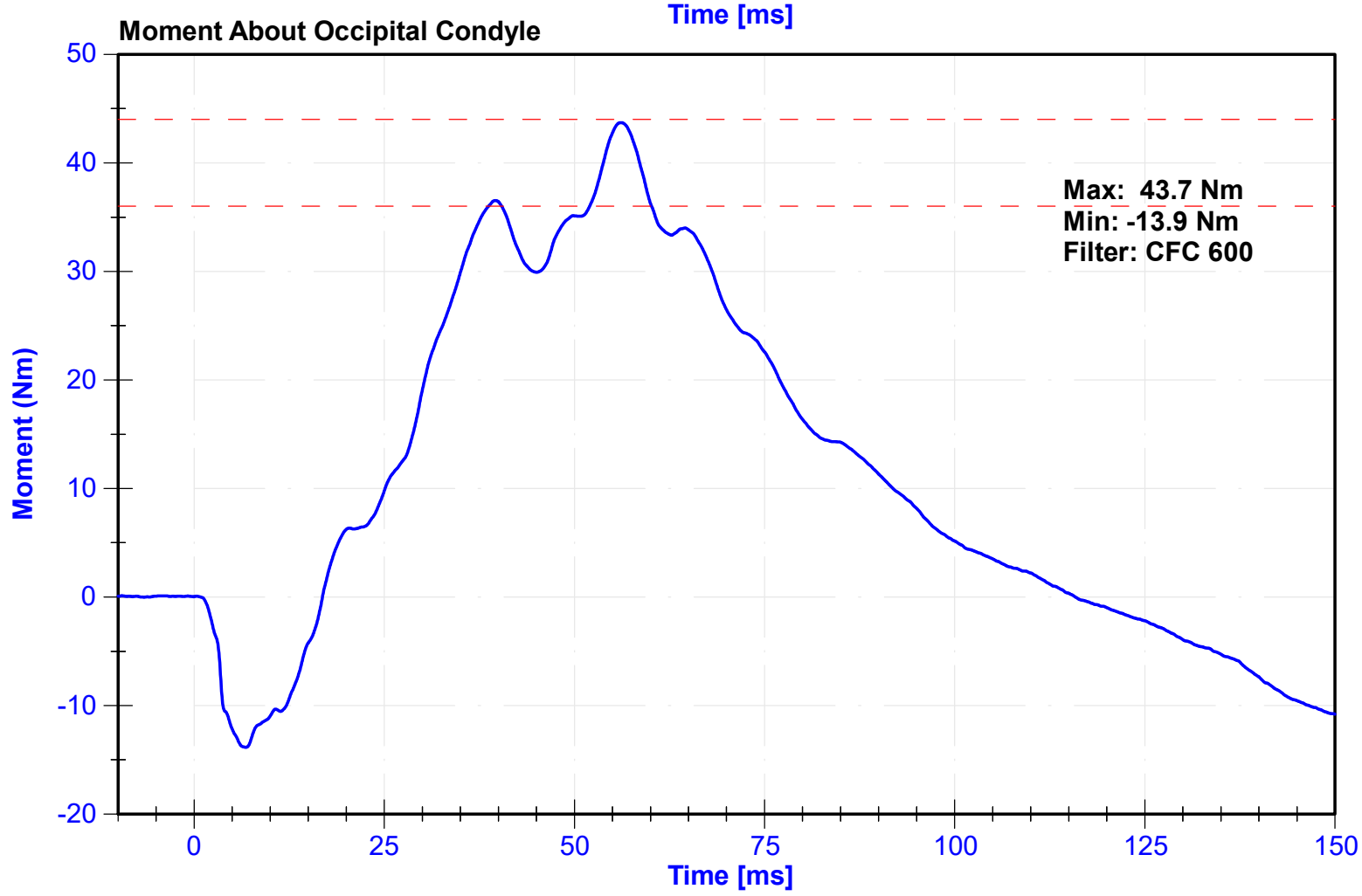
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.2	Pass
Velocity	5.51	5.63	m/s	5.567	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.33	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.52	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.71	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.68	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.93	Pass
Neck Rotation	71	81	deg	76.9	Pass
Time at Maximum Rotation	50	70	ms	62.5	Pass
Moment about the OC	36	44	Nm	43.7	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	7231CT	10/28/2021	10/28/2022
Pendulum Potentiometer	Servo	4961	2/23/2022	2/23/2023
Condyle Potentiometer	Servo	DS185	11/12/2021	11/12/2022
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023




Neck Rotation
Max: 76.9 deg
Min: -14.4 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 43.7 Nm
Min: -13.9 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

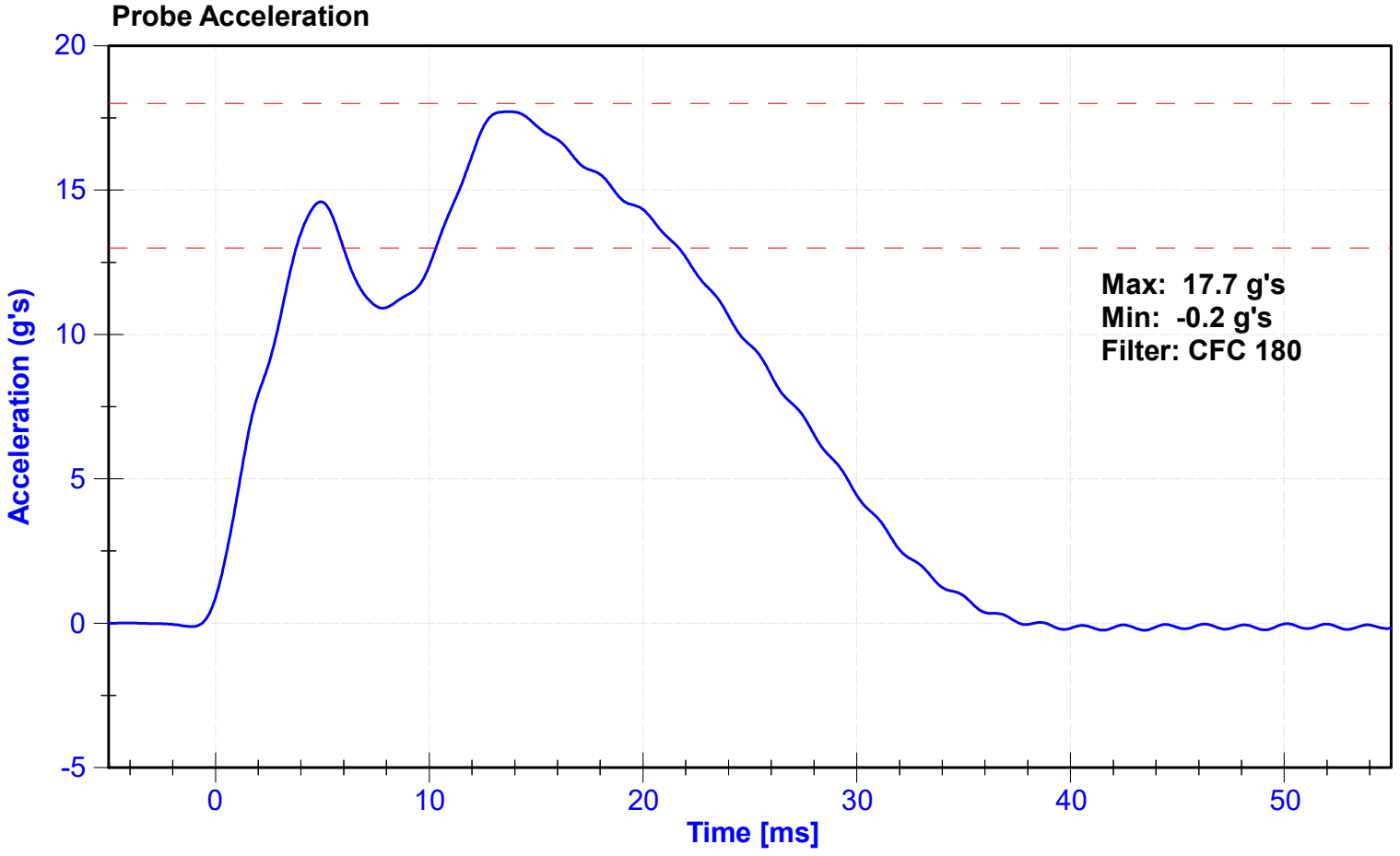
ATD Manufacturer	Humanetics	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

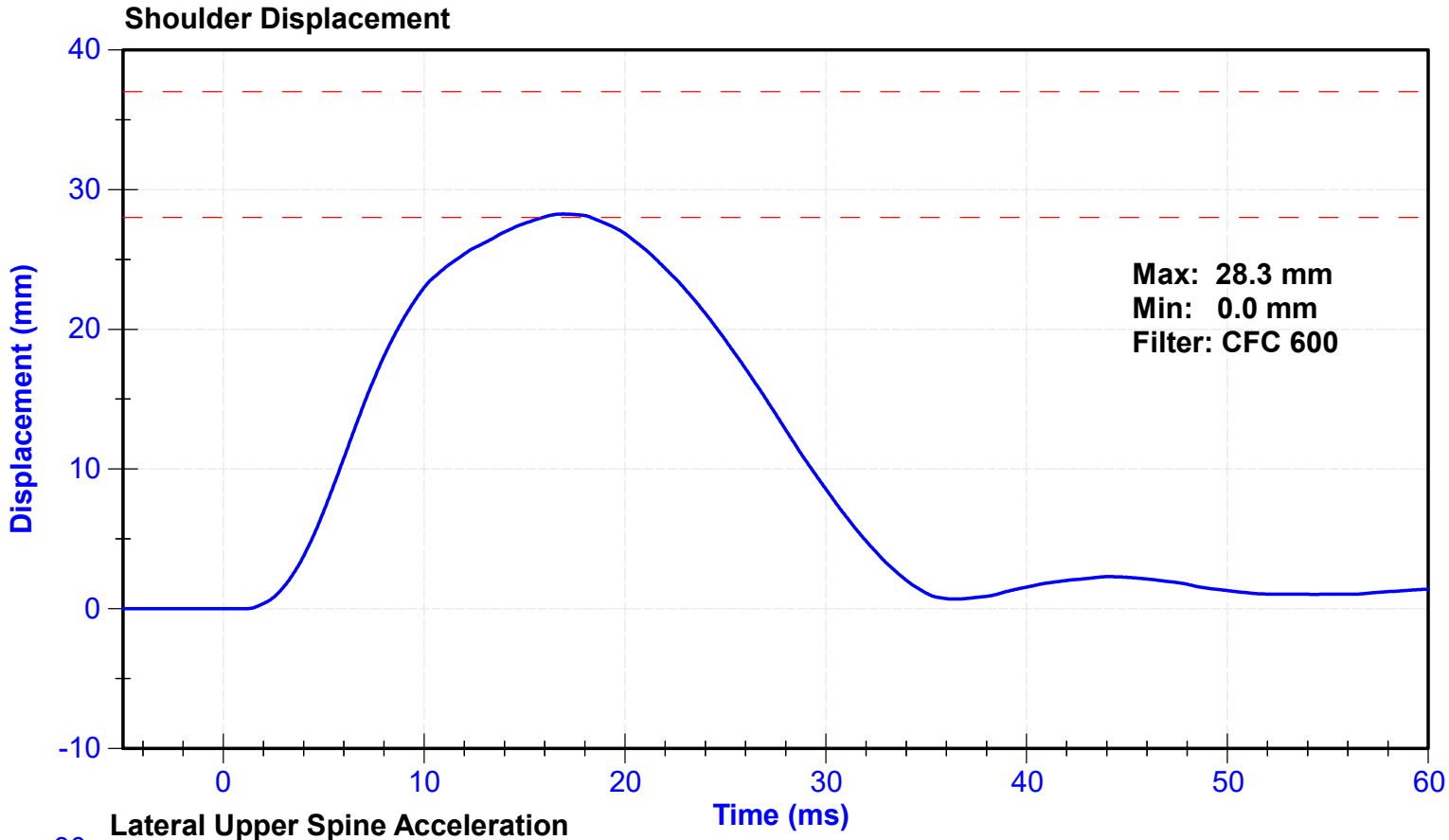
Results

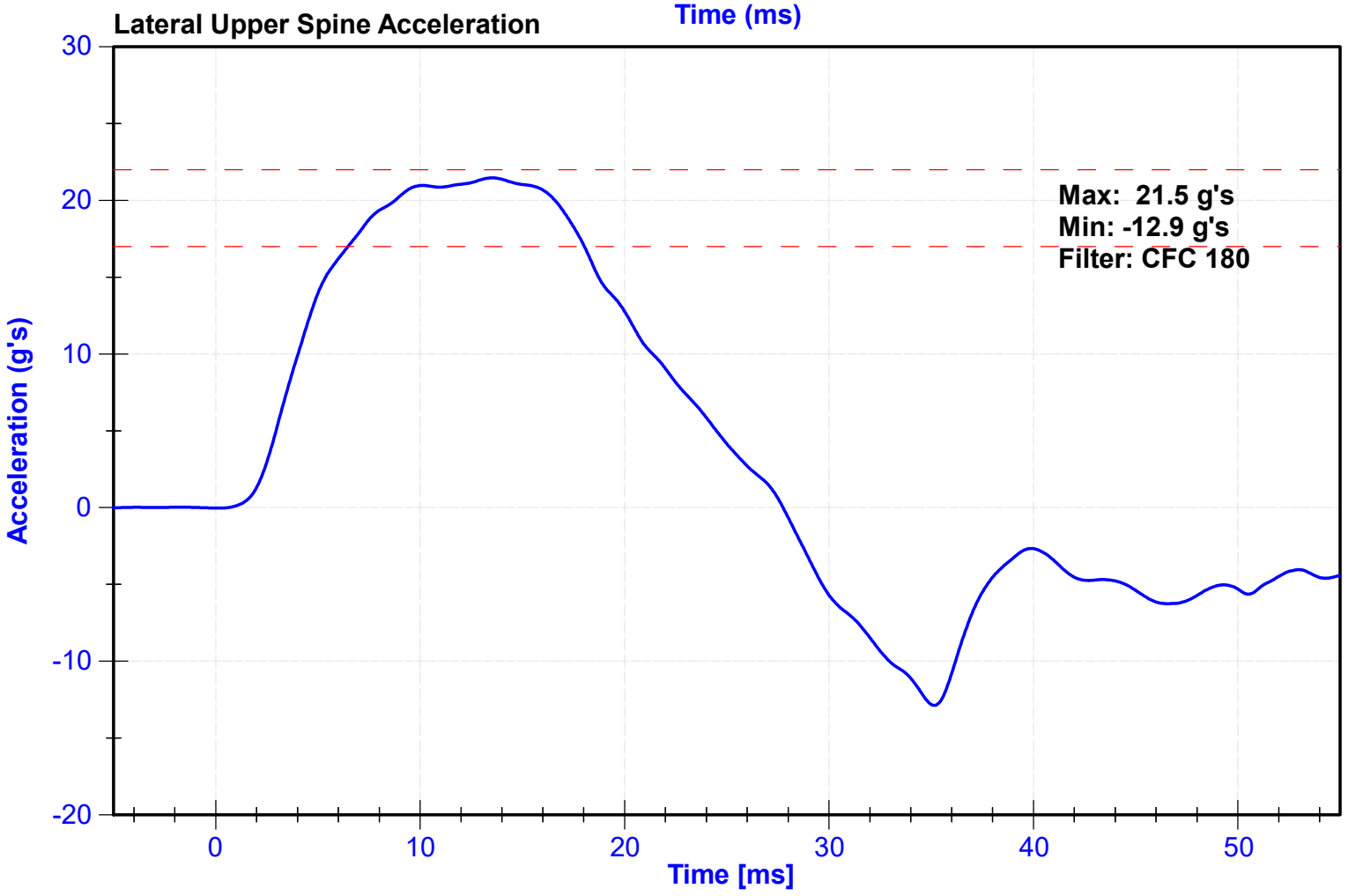
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.9	Pass
Humidity	10	70	%	39.7	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	17.7	Pass
Shoulder Deflection	28	37	mm	28.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	21.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.3 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 21.5 g's
Min: -12.9 g's
Filter: CFC 180

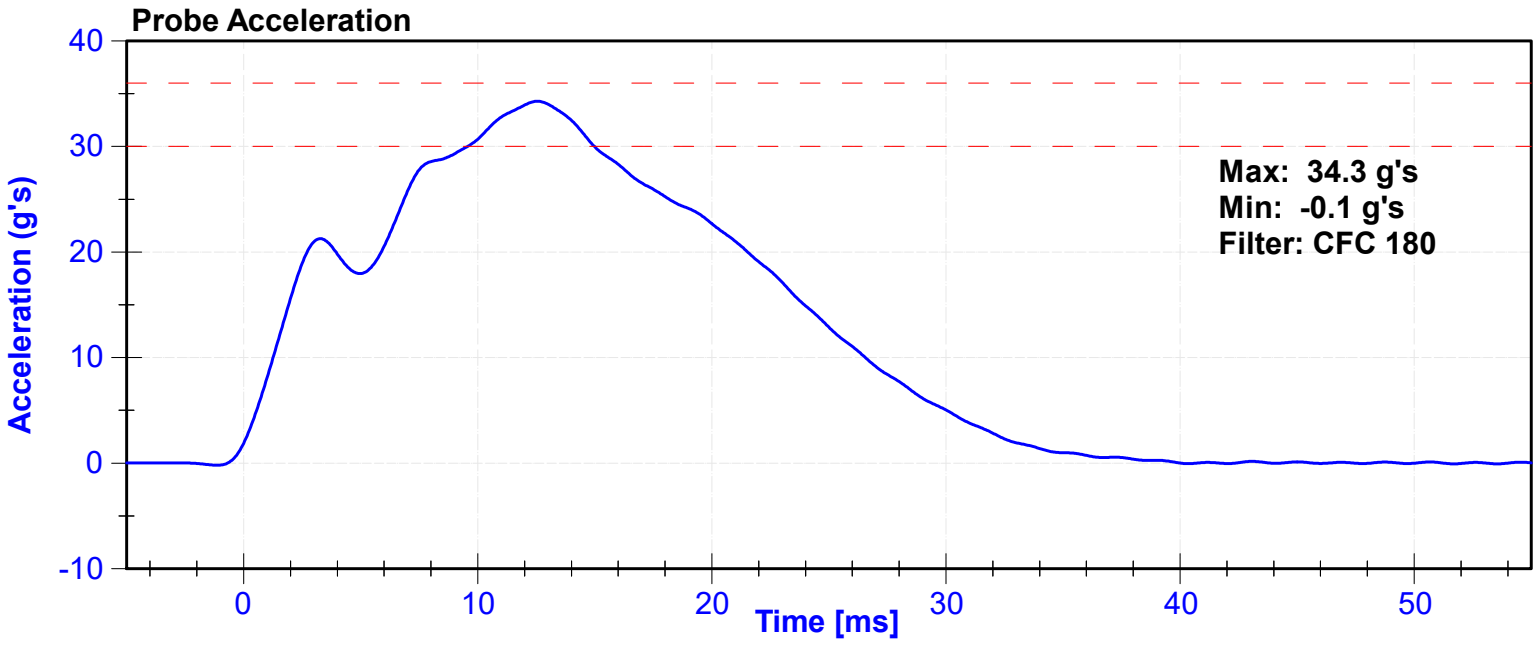
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

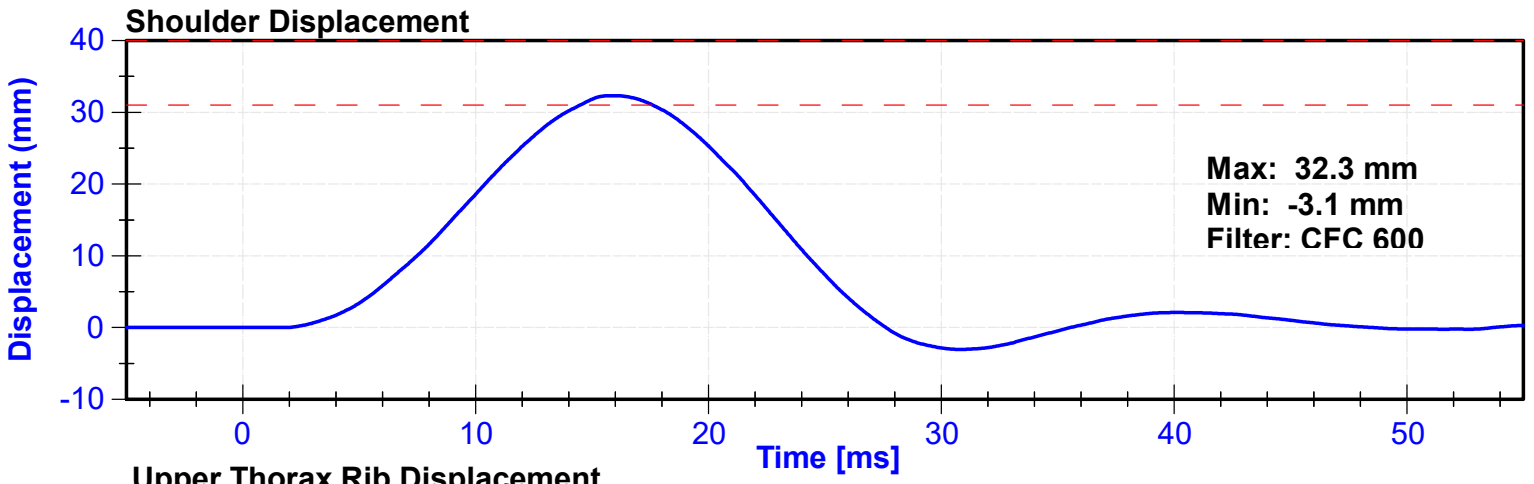
Results

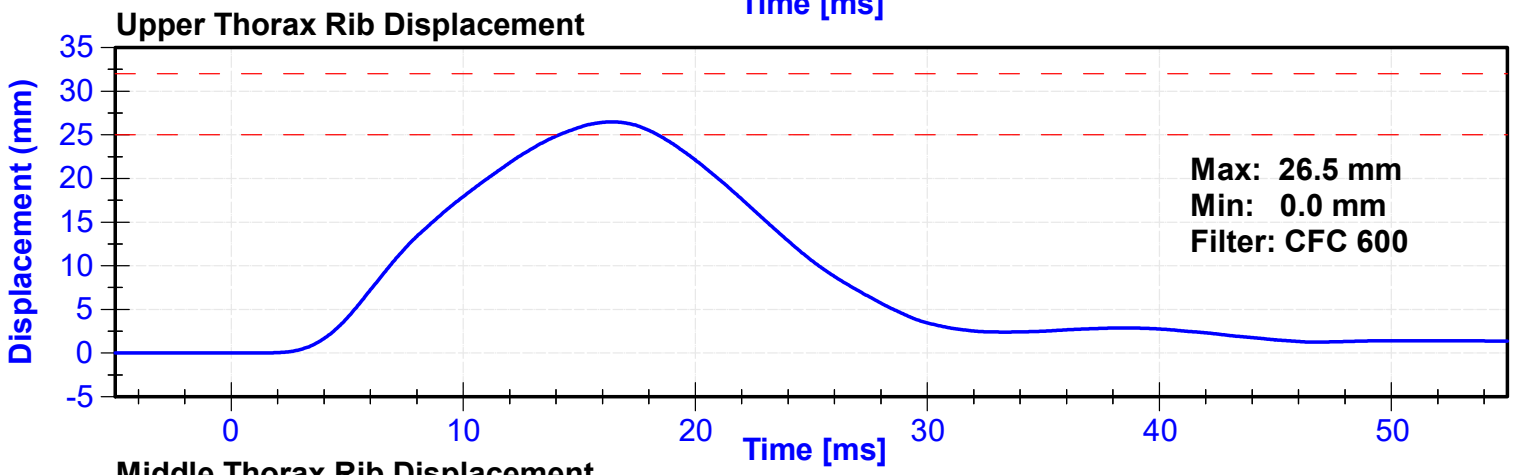
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.9	Pass
Humidity	10	70	%	39.7	Pass
Velocity	6.6	6.8	m/s	6.74	Pass
Probe Acceleration after 5 ms	30	36	g's	34.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.6	Pass
Shoulder Deflection	31	40	mm	32.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.5	Pass
Mid Thorax Rib Deflection	30	36	mm	30.5	Pass
Lower Thorax Rib Deflection	32	38	mm	33.4	Pass

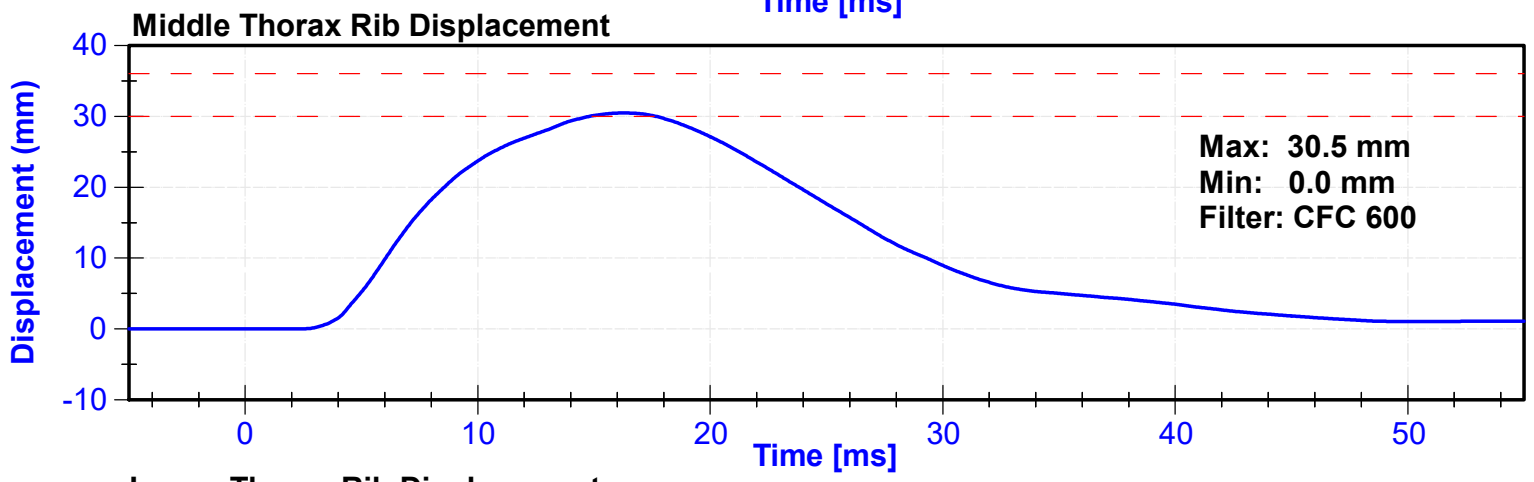
Transducer Calibrations

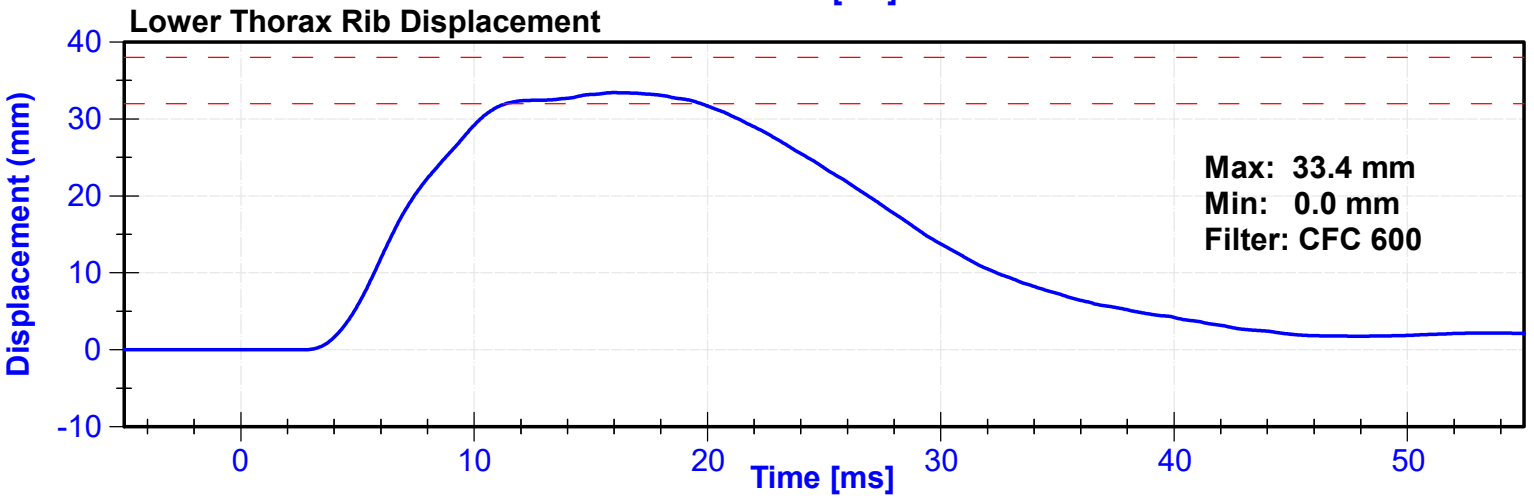
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine T1 Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

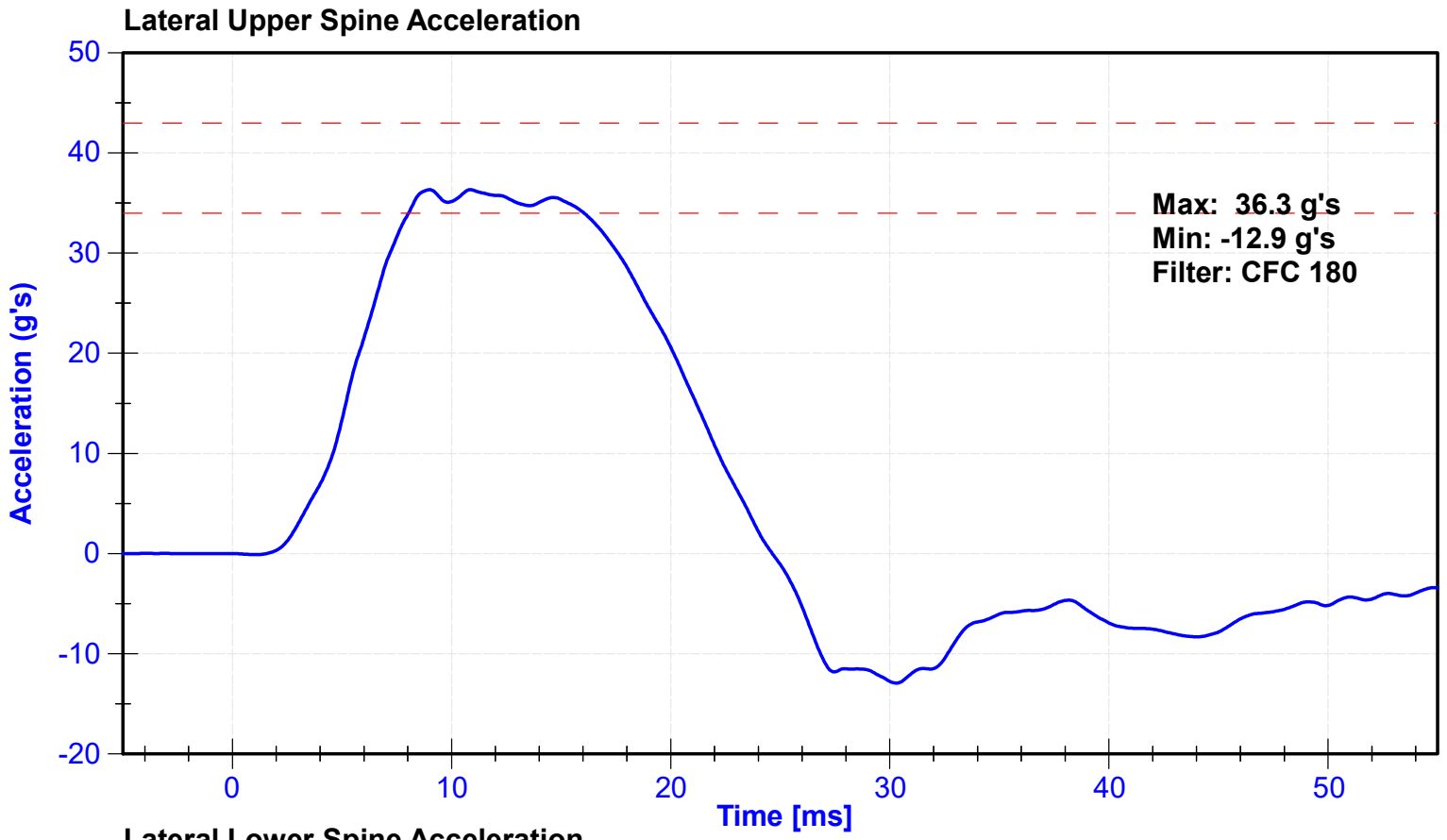


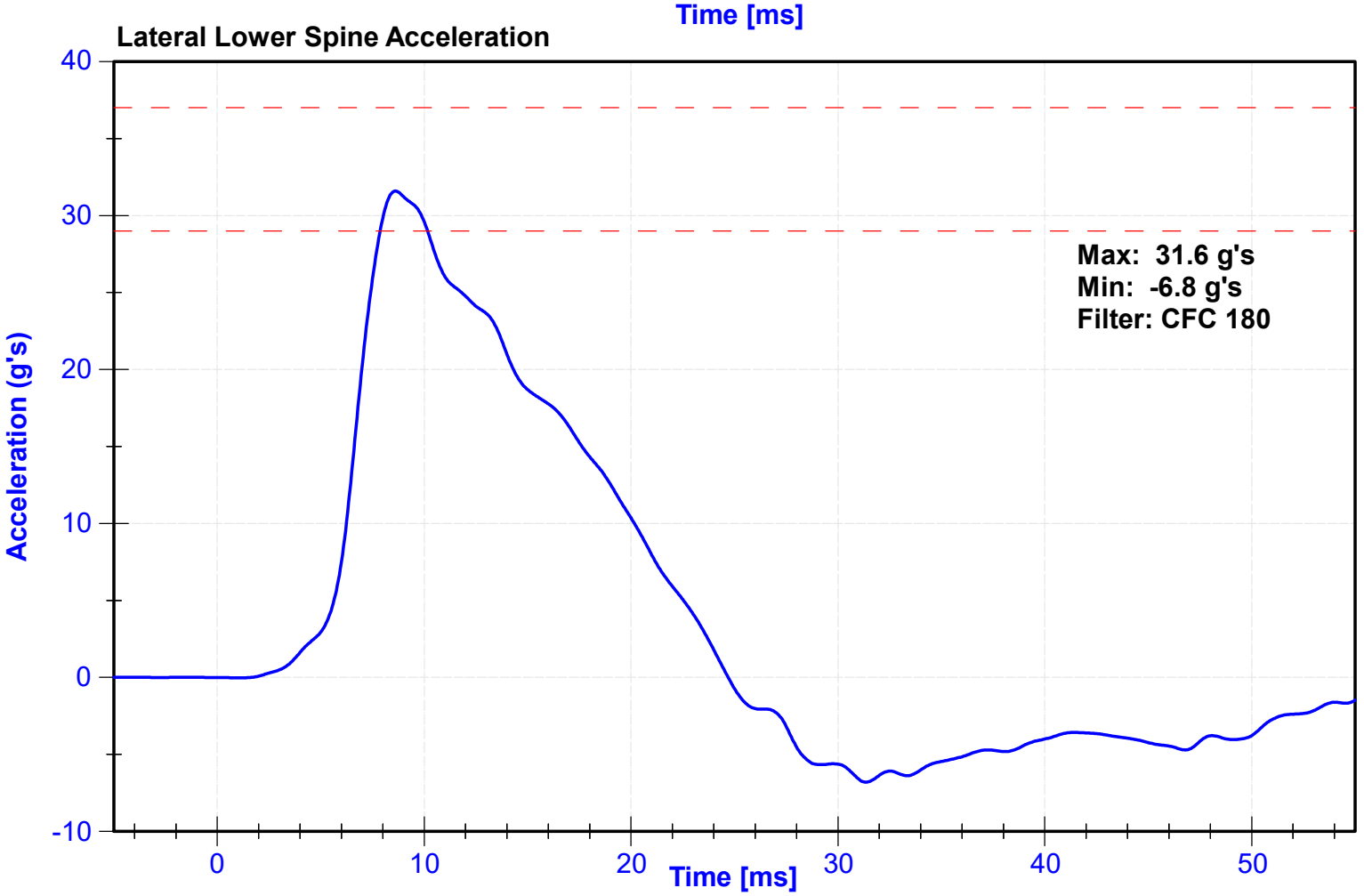

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 32.3 mm
Min: -3.1 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.5 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.5 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 36.3 g's
Min: -12.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 31.6 g's
Min: -6.8 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

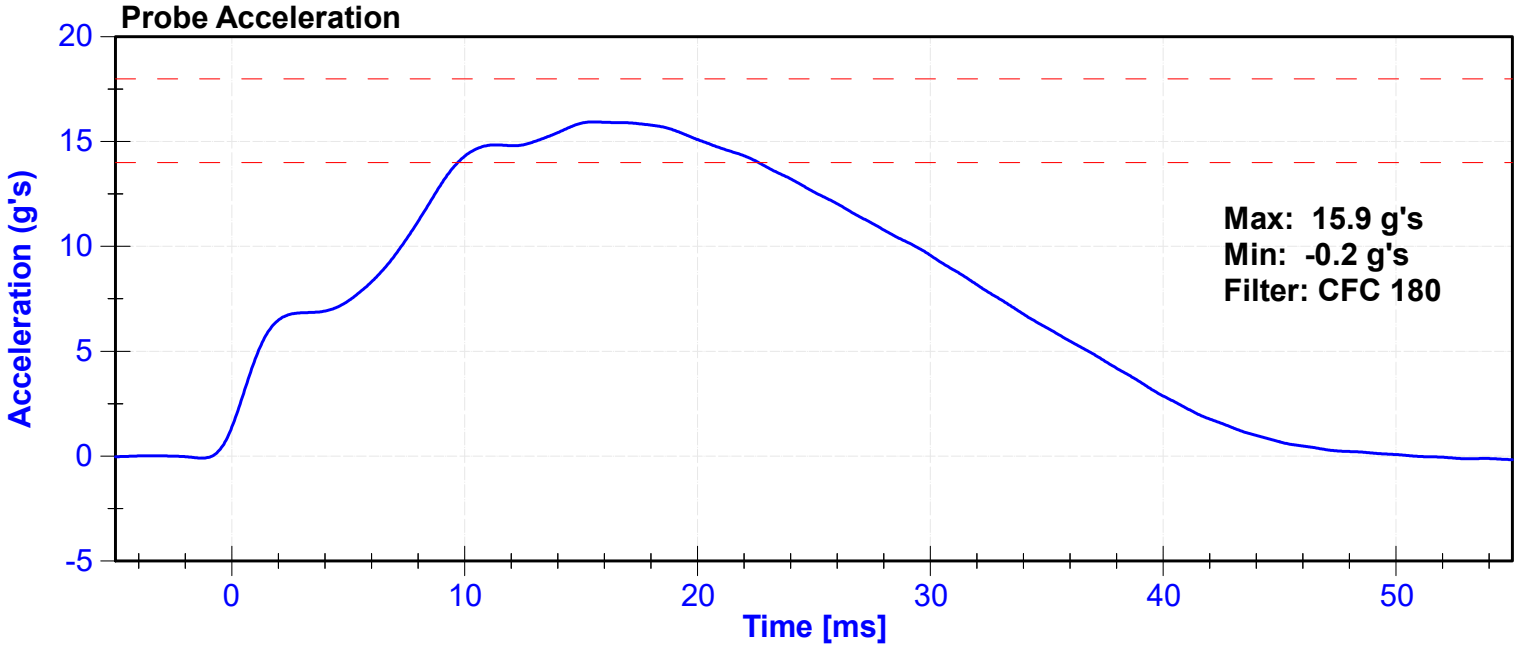
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

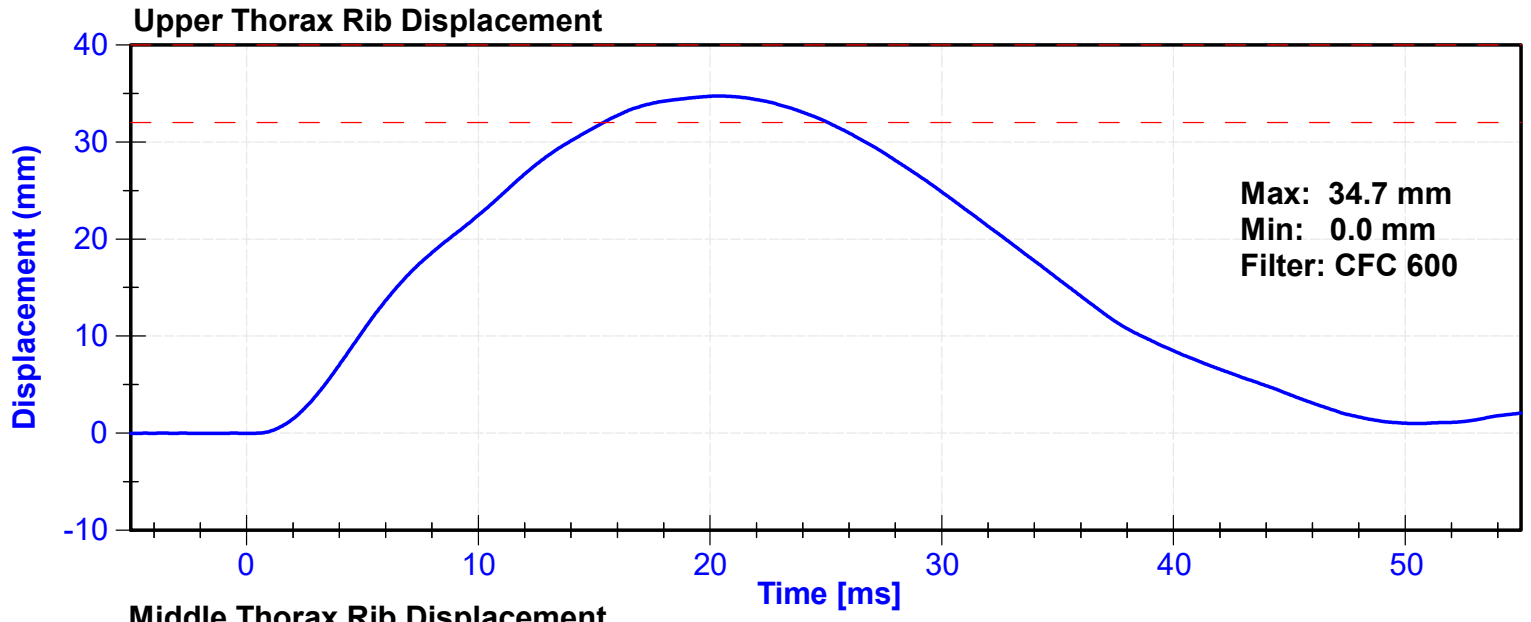
Results

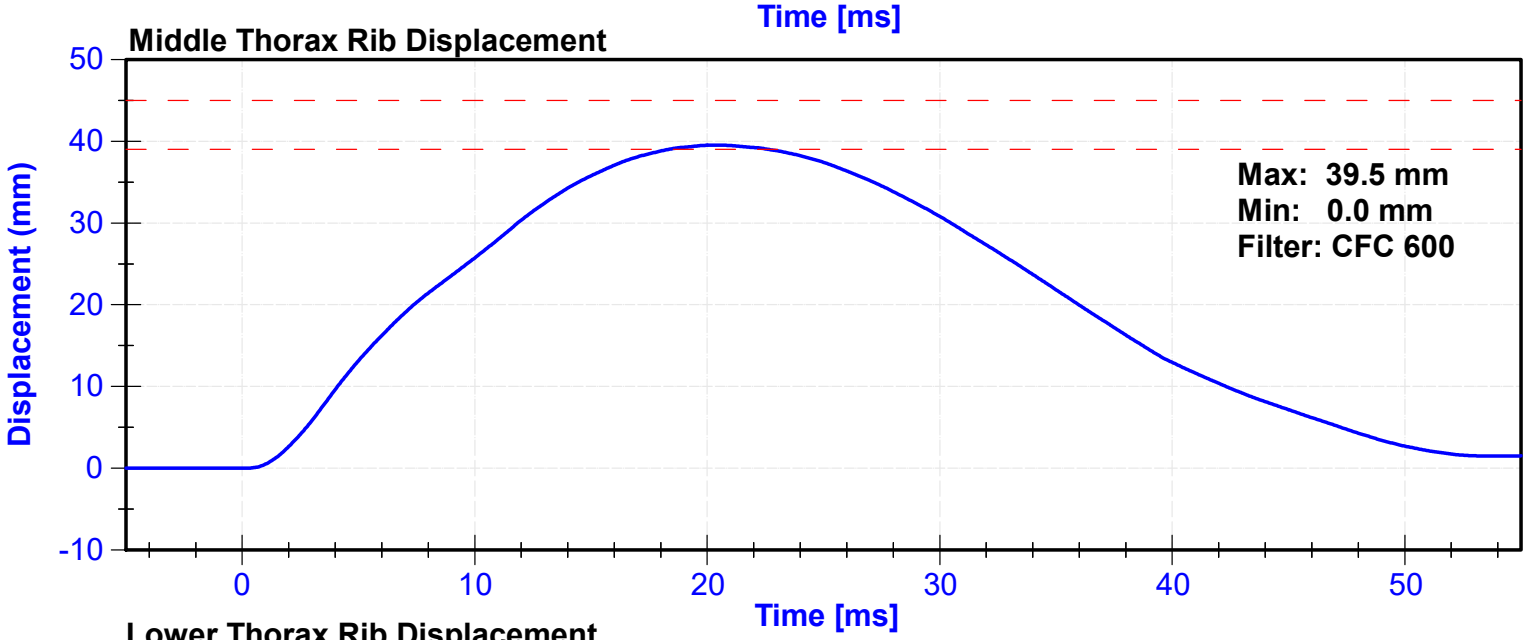
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.9	Pass
Humidity	10	70	%	39.7	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.9	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	8.9	Pass
Upper Thorax Rib Deflection	32	40	mm	34.7	Pass
Middle Thorax Rib Deflection	39	45	mm	39.5	Pass
Lower Thorax Rib Deflection	35	43	mm	37.3	Pass

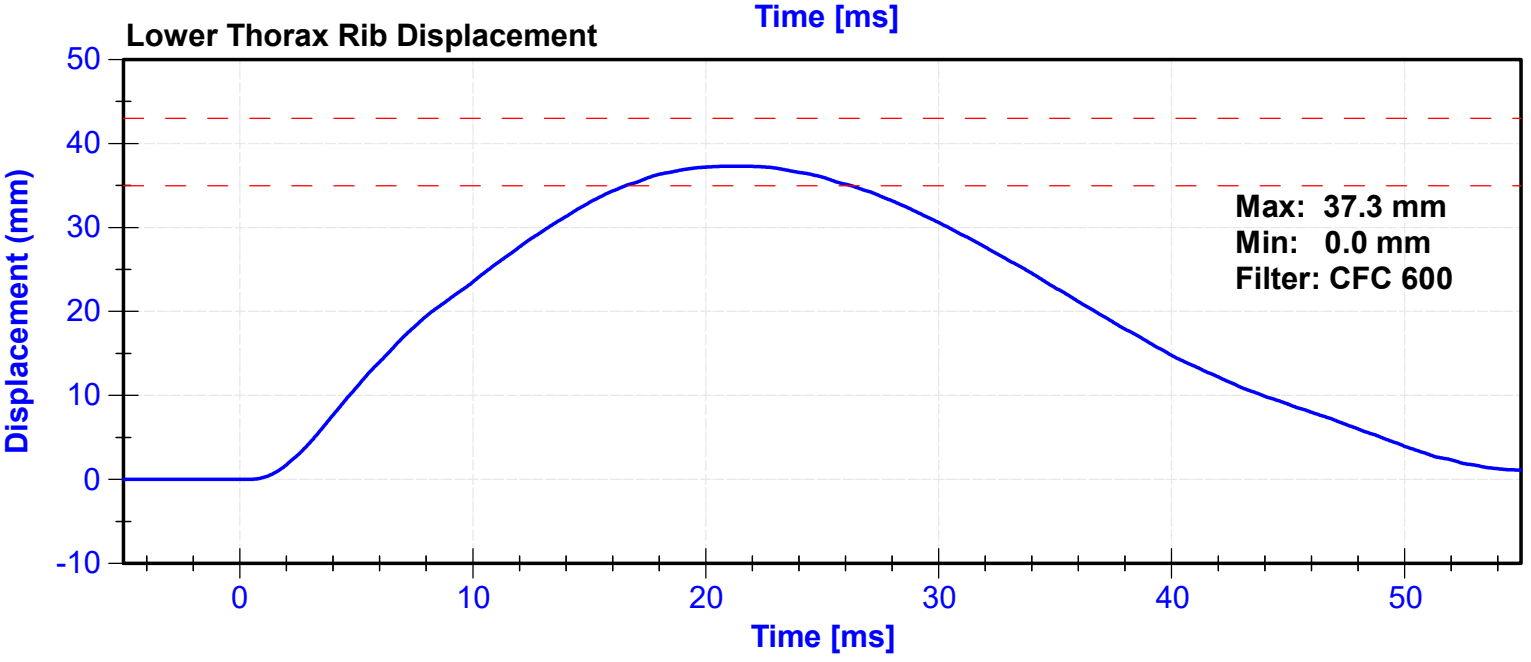
Transducer Calibrations

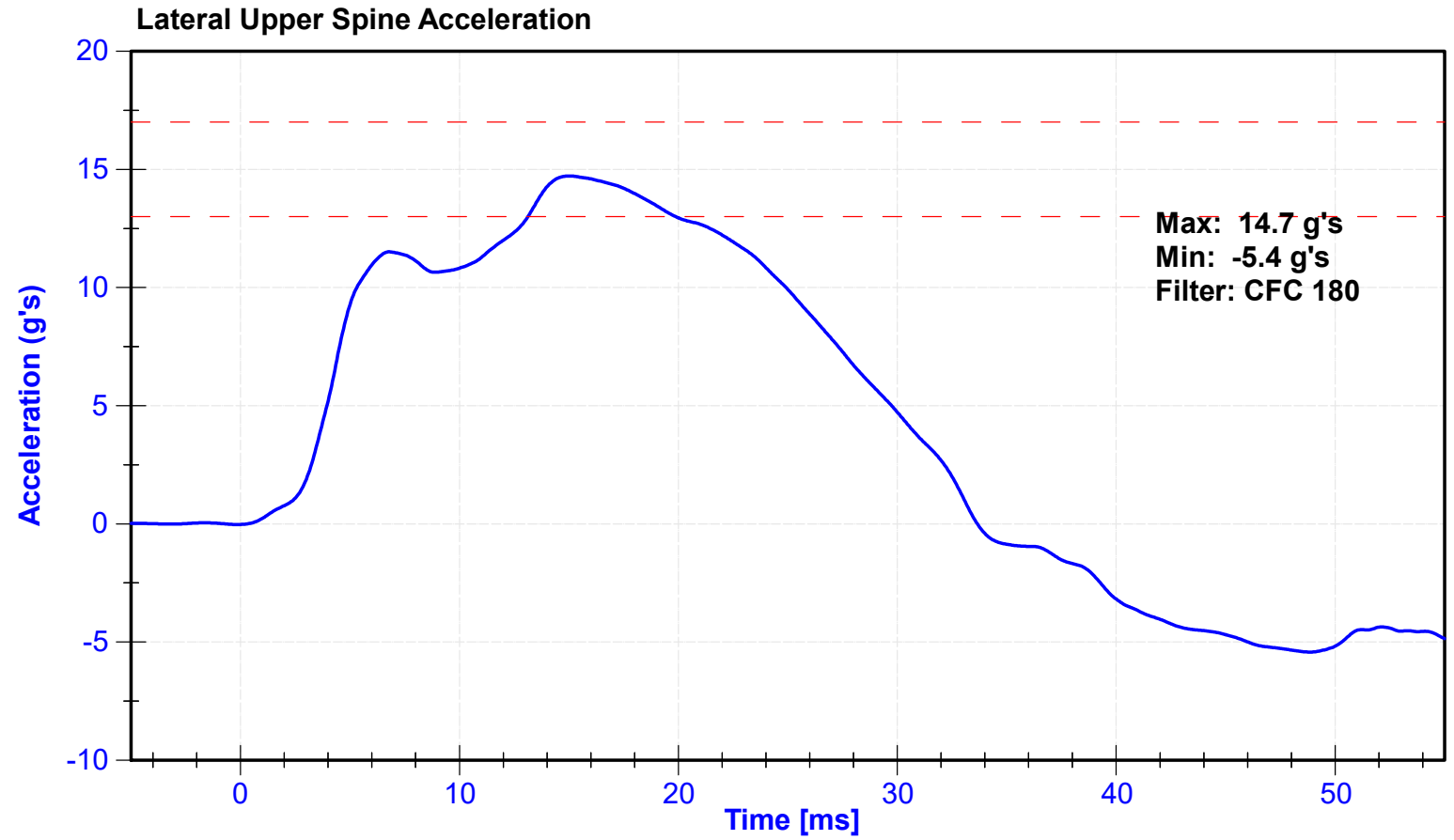
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

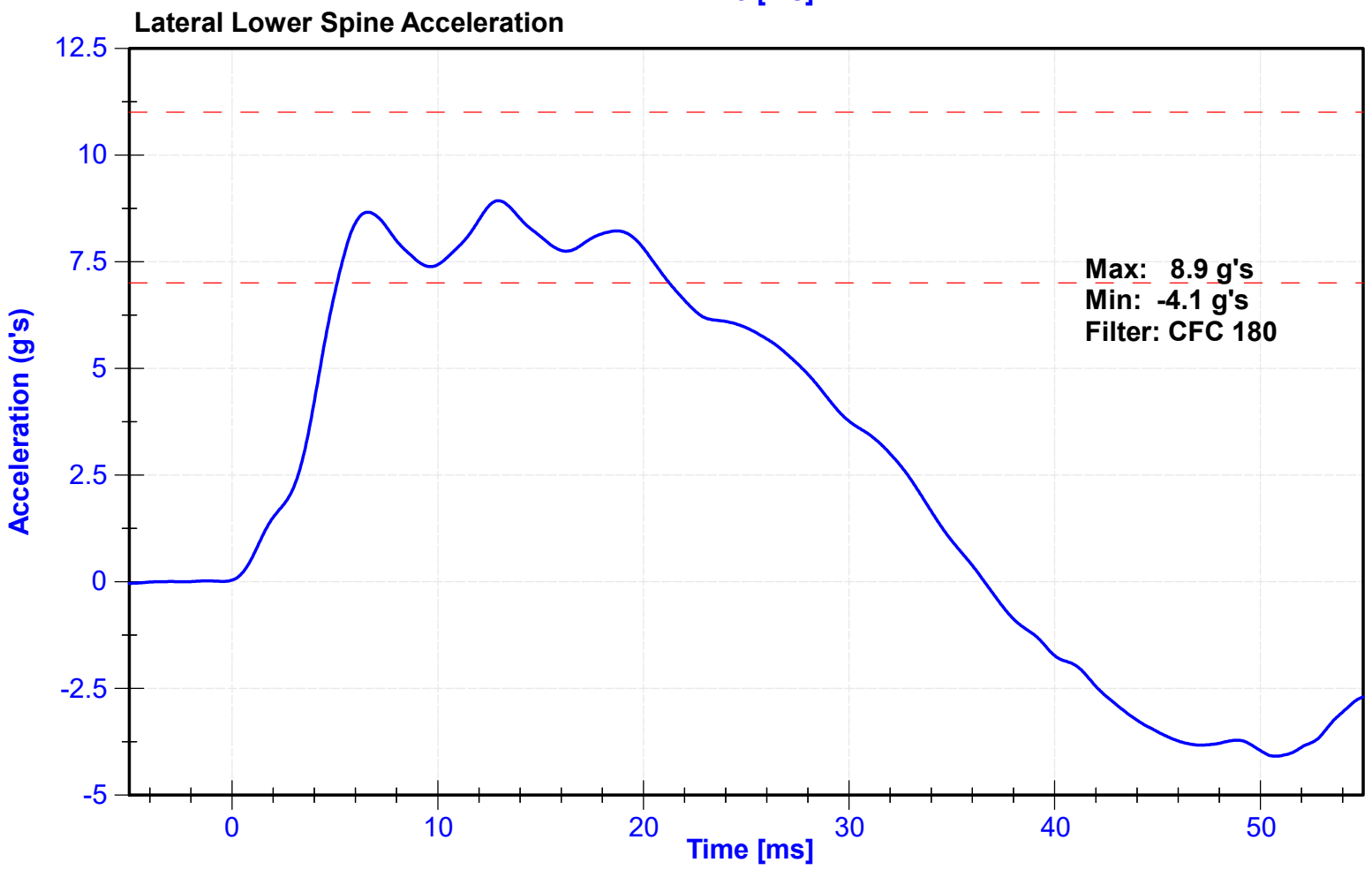



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.7 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.5 mm
Min: 0.0 mm
Filter: CFC 600


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


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 14.7 g's
Min: -5.4 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 8.9 g's
Min: -4.1 g's
Filter: CFC 180

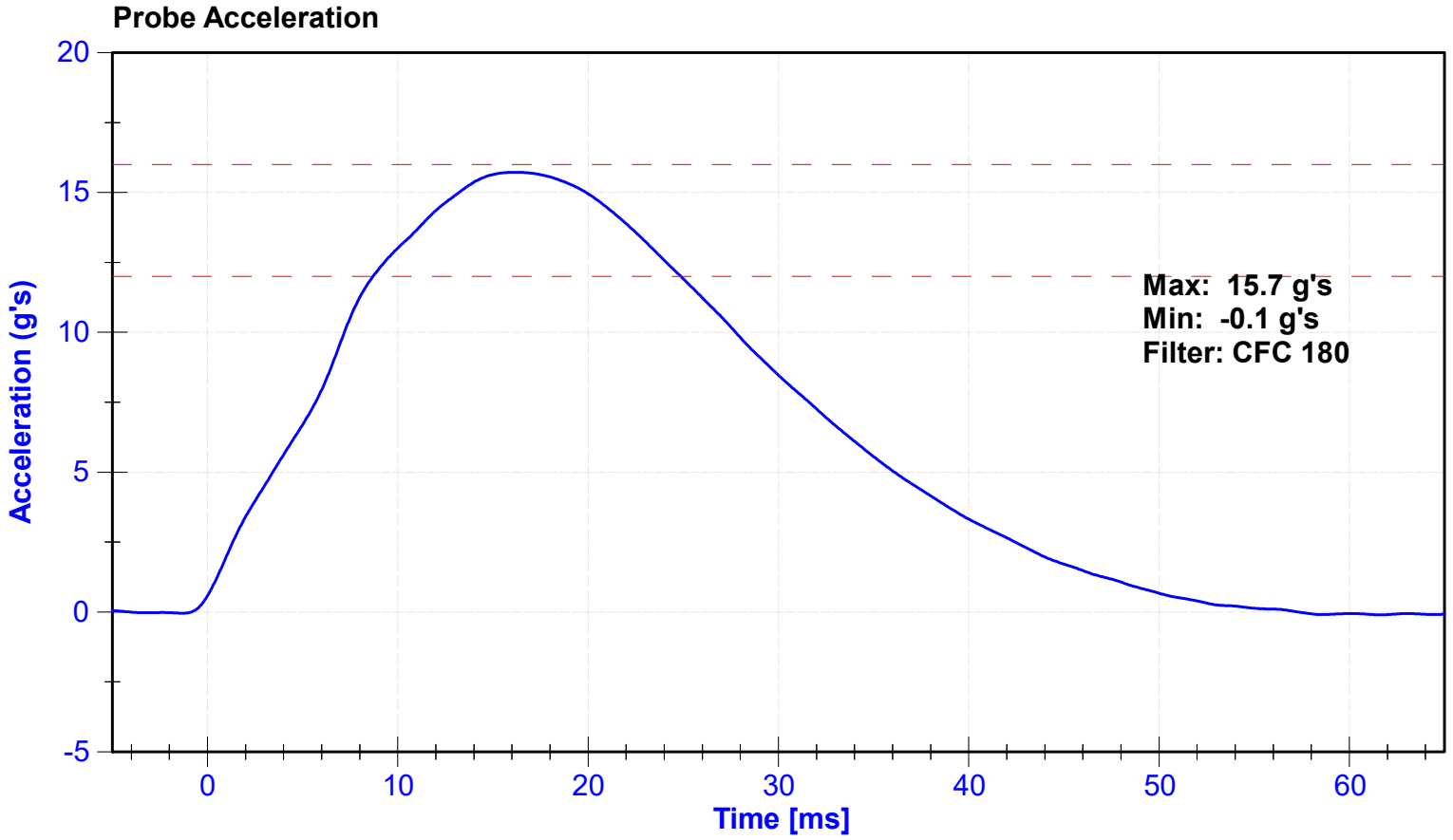
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

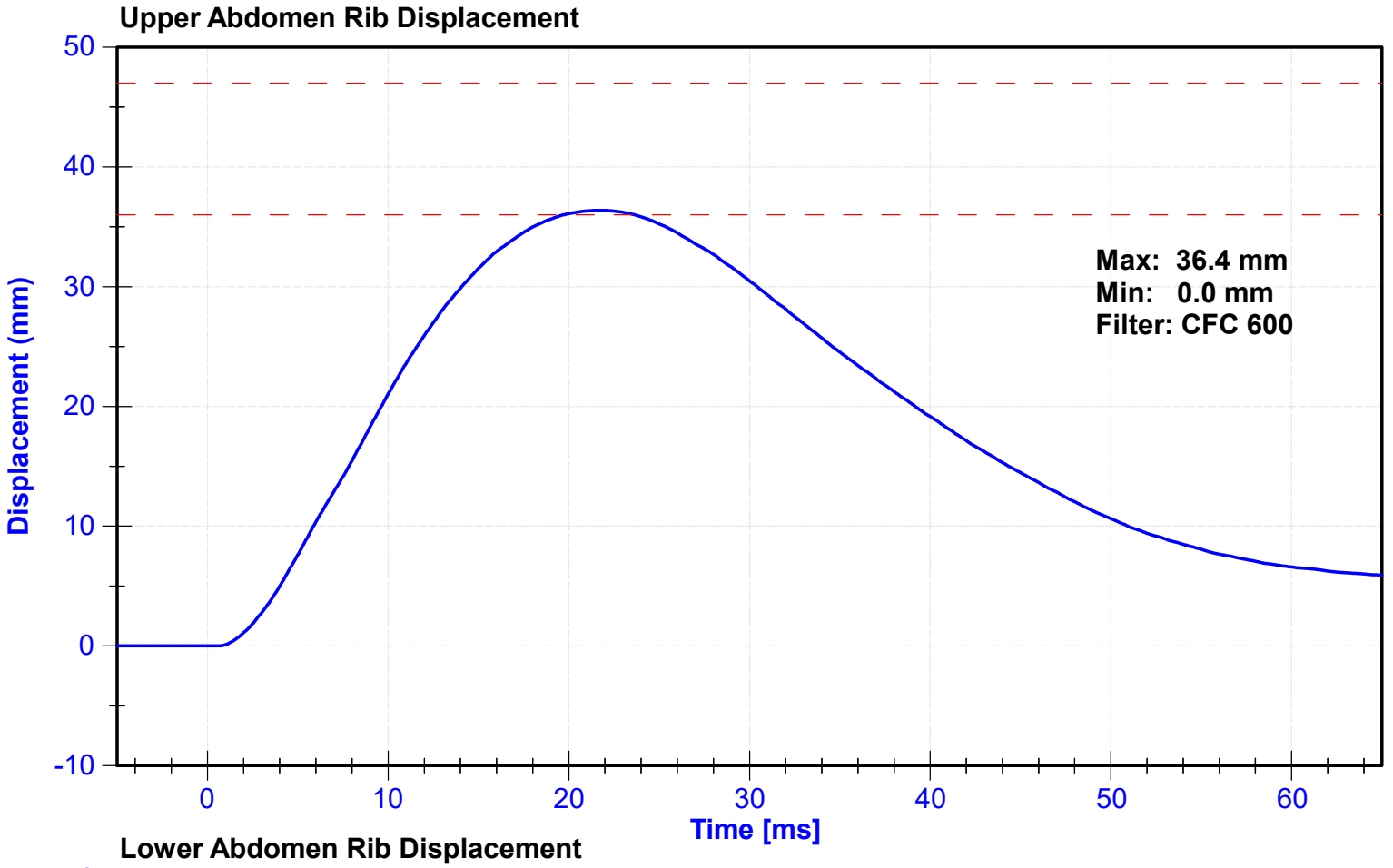
Results

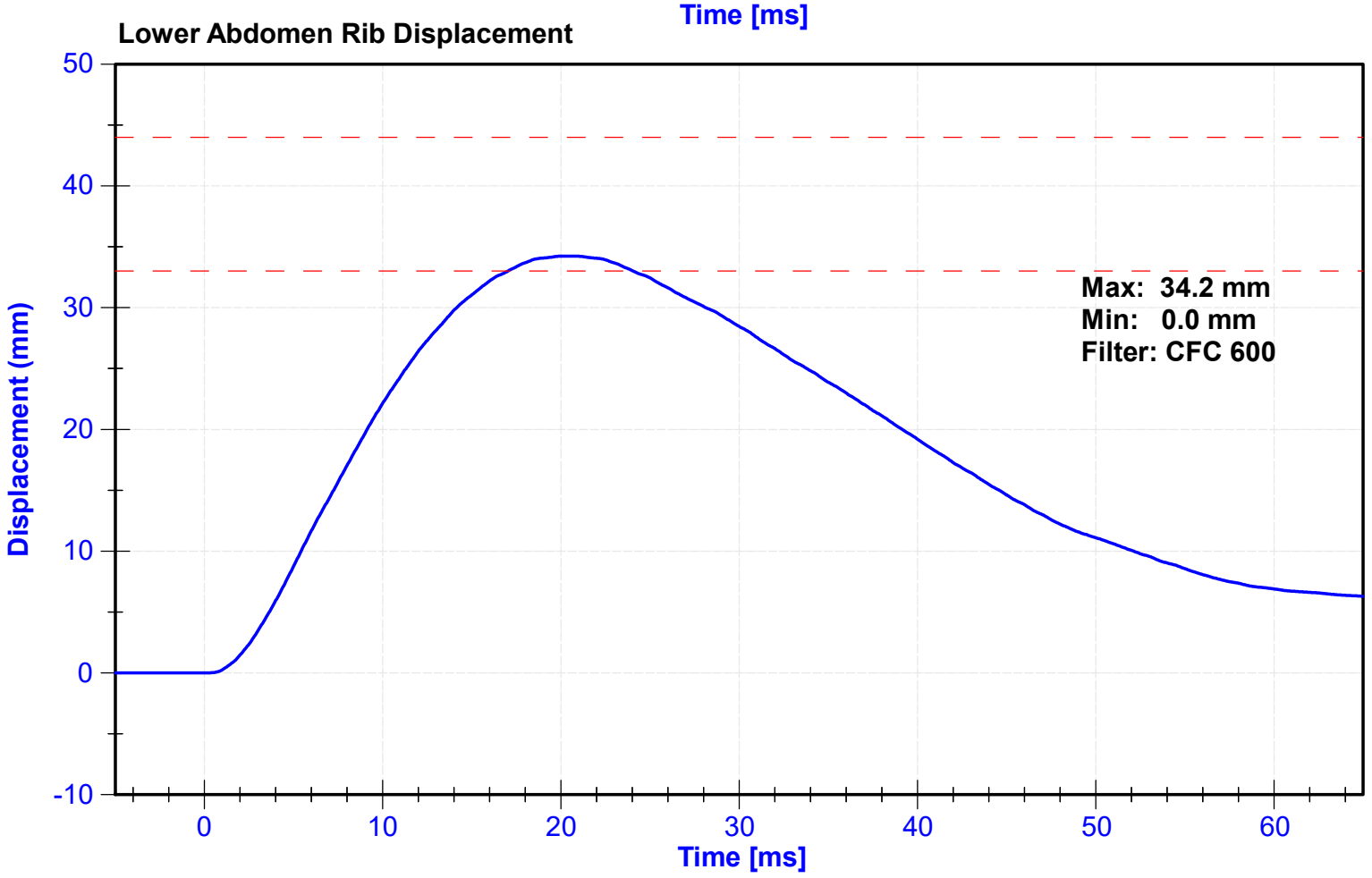
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	12	16	g's	15.7	Pass
Lateral Lower Spine Acceleration	9	14	g's	13.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	36.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	34.2	Pass

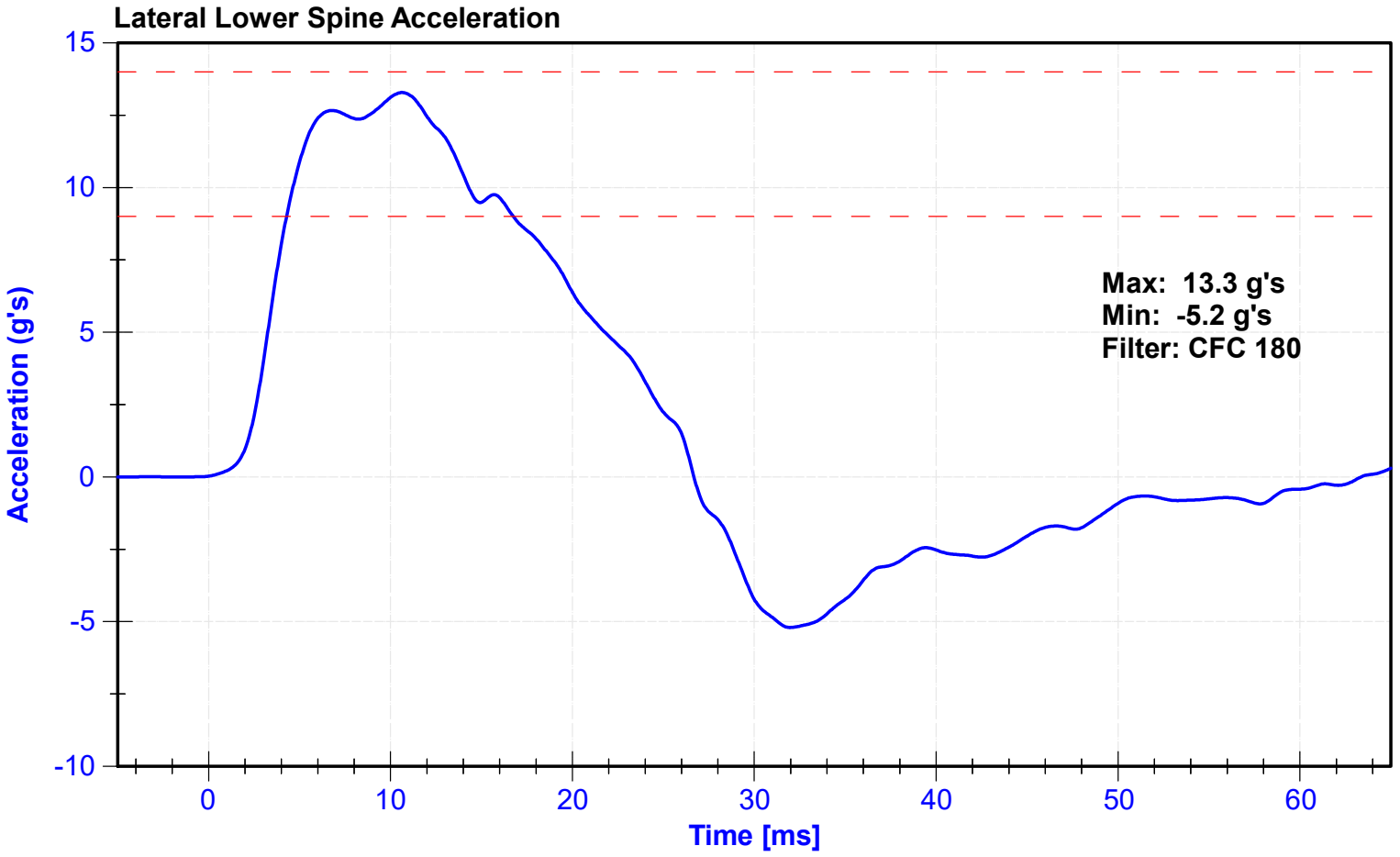
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Abdomen Rib Potentiometer	Servo	307GFE	10/4/2022	4/4/2023
Lower Abdomen Rib Potentiometer	Servo	308GFE	10/4/2022	4/4/2023




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 36.4 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 34.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
0
10
20
30
40
50
60
Time [ms]
Max: 13.3 g's
Min: -5.2 g's
Filter: CFC 180

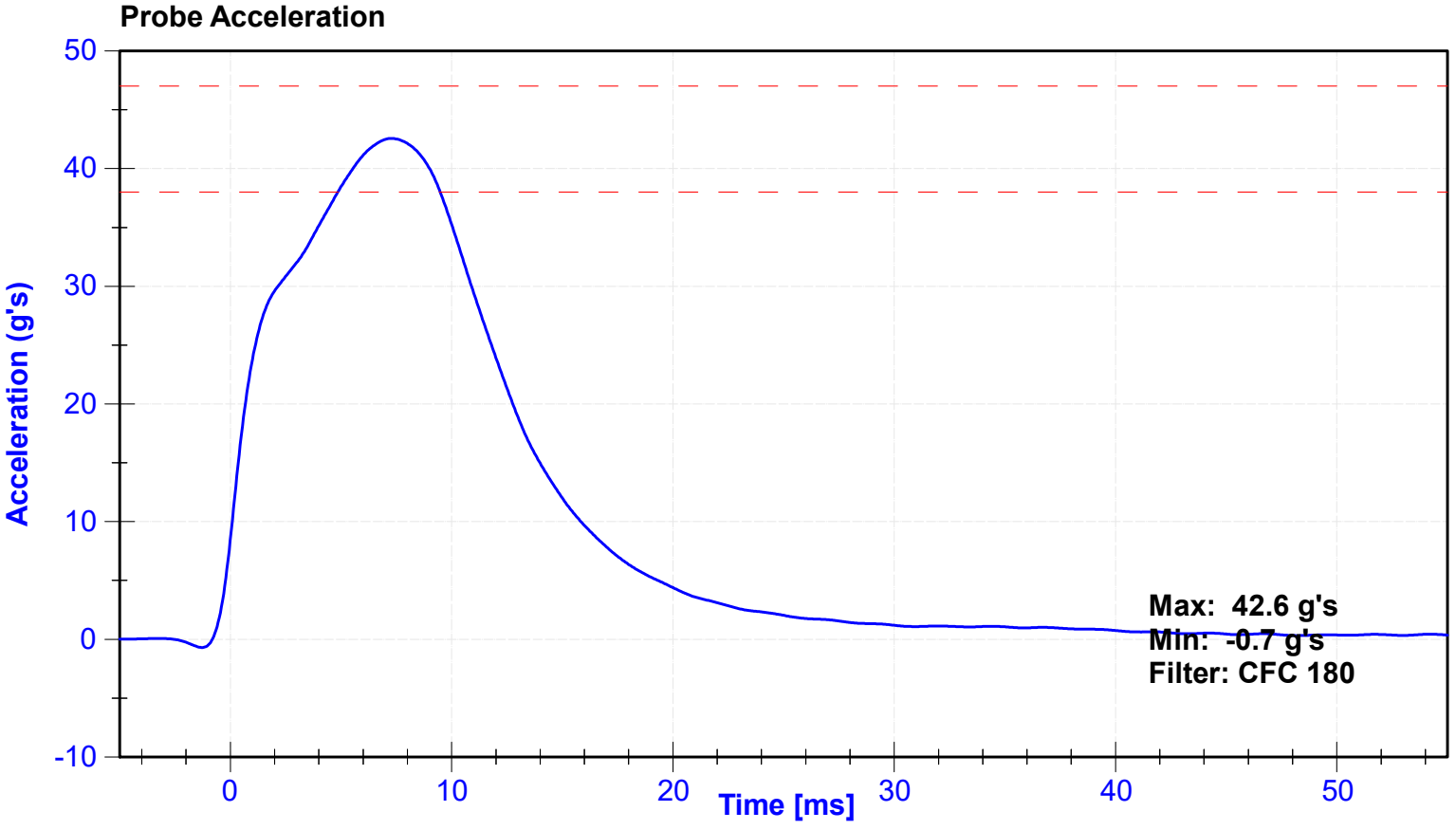
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

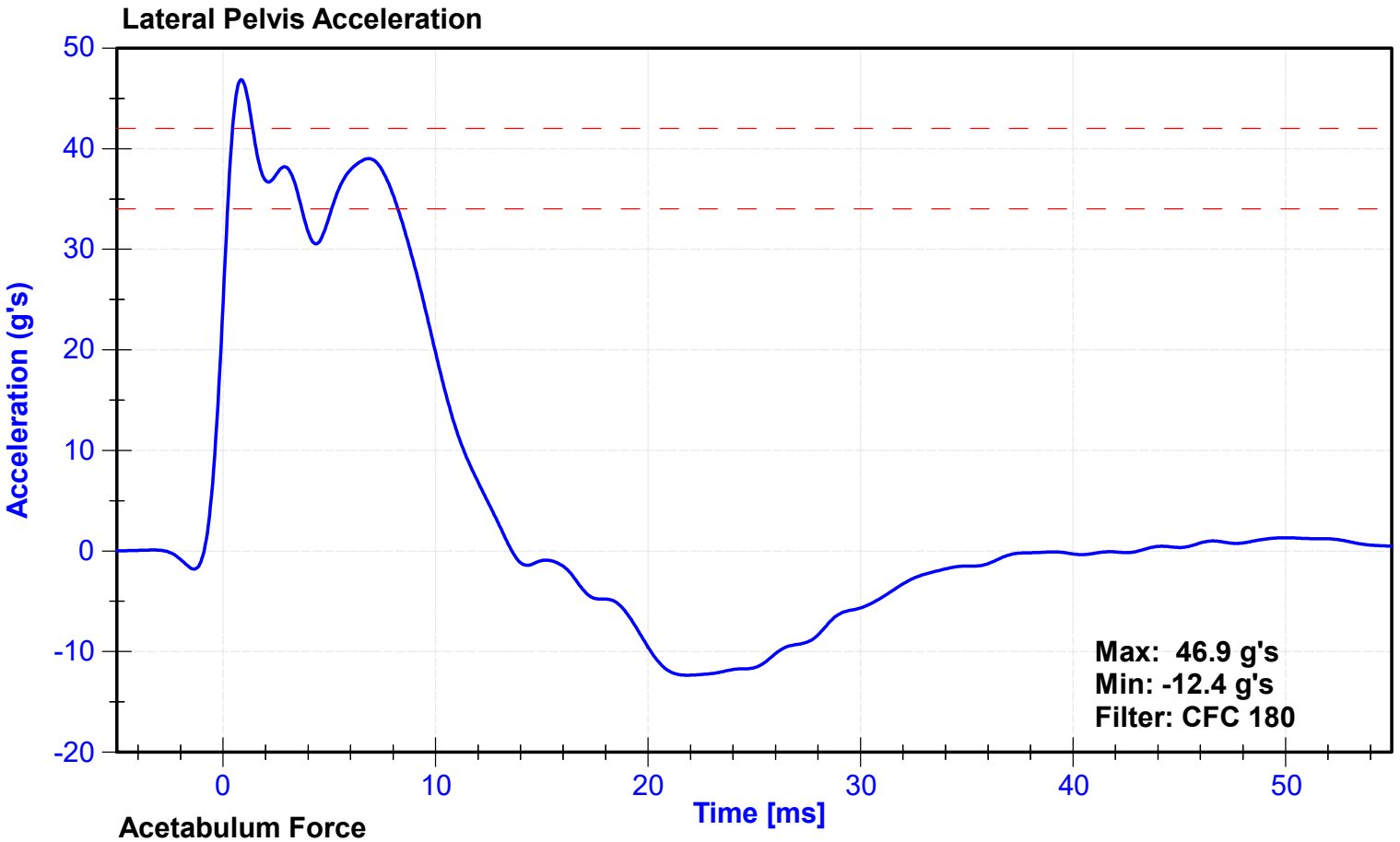
Results

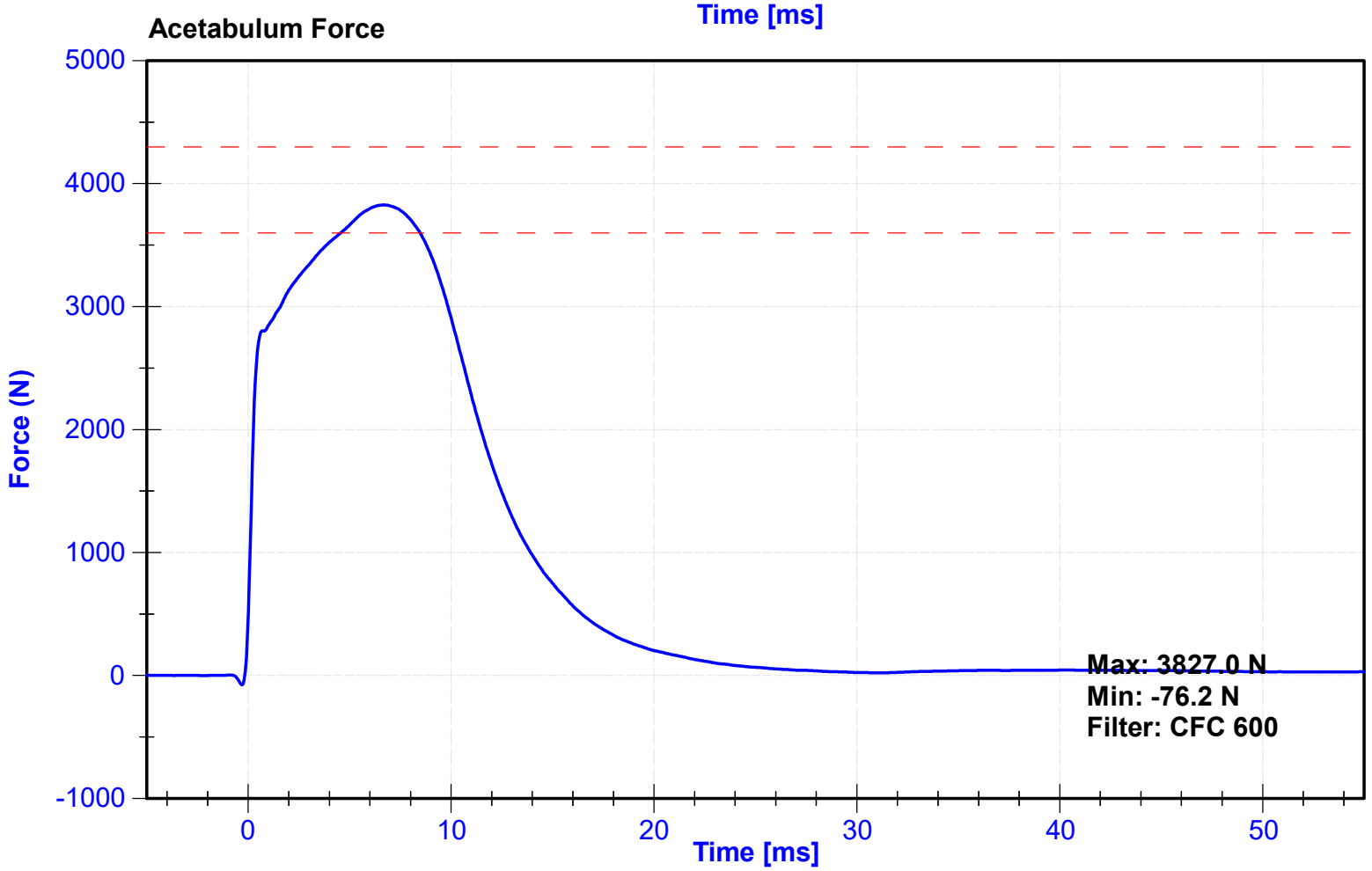
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.9	Pass
Humidity	10	70	%	39.7	Pass
Velocity	6.6	6.8	m/s	6.74	Pass
Probe Acceleration	38	47	g's	42.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.0	Pass
Acetabulum Force	3600	4300	N	3827.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Acetabulum Load Cell	Denton	267-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 46.9 g's
Min: -12.4 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3827.0 N
Min: -76.2 N
Filter: CFC 600

SACO RESEARCH

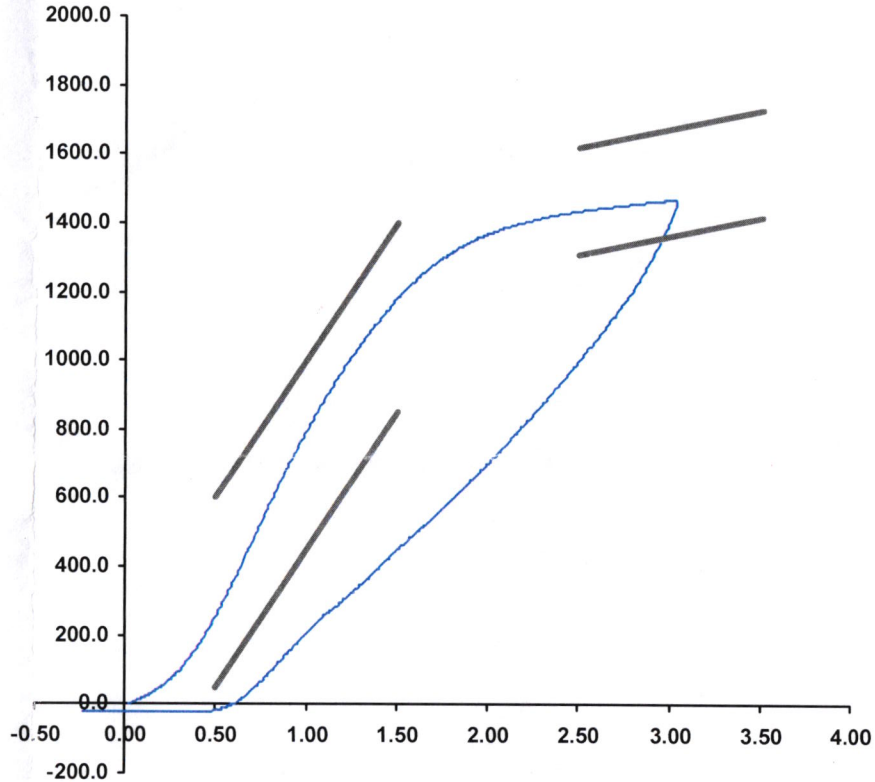
300 Cert 1
10/10/2022

SID-IIs Pelvis Plug Certification Test

Plug S/N 15418
Test Number 20078
Report Number 20132
Test Date 9/9/2021 9:43:56 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	263	50	600
Force @ 1.5 mm (N)	1,183	850	1,400
Force @ 2.5 mm (N)	1,436	1,306	1,618
Force @ 3.0 mm (N)	1,469	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 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

SACO RESEARCH

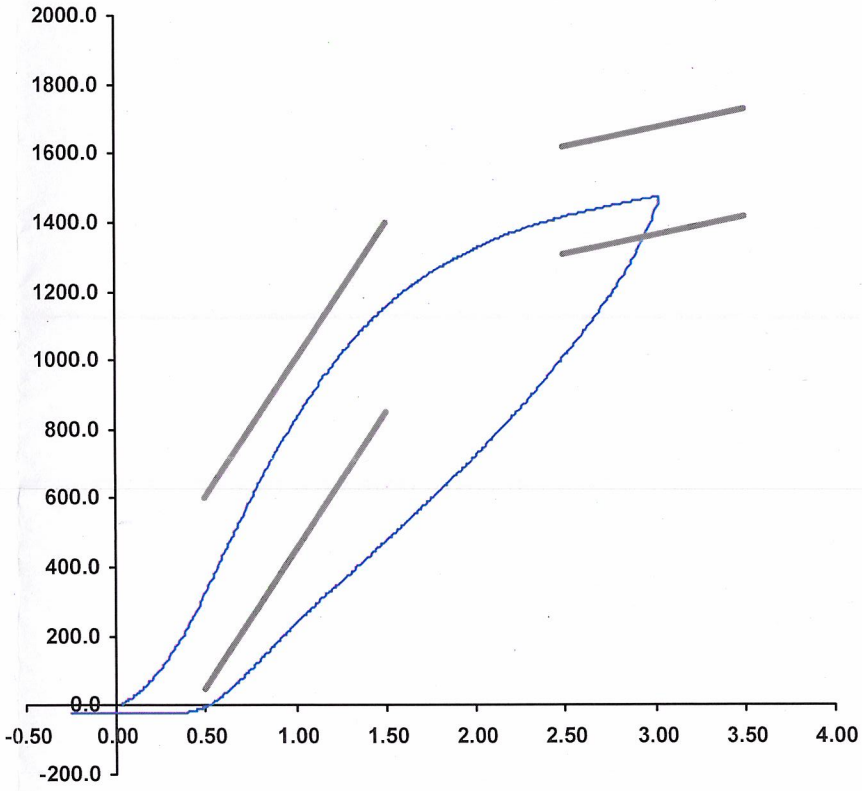
300 Crash
Impact Side
7/19/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 15221
Test Number 17972
Report Number 18021
Test Date 3/10/2021 12:34:25 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	333	50	600
Force @ 1.5 mm (N)	1,153	850	1,400
Force @ 2.5 mm (N)	1,416	1,306	1,618
Force @ 3.0 mm (N)	1,473	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 10-Mar-21
SACO Research

By : DC Date : 3/10/2021

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

SACO RESEARCH

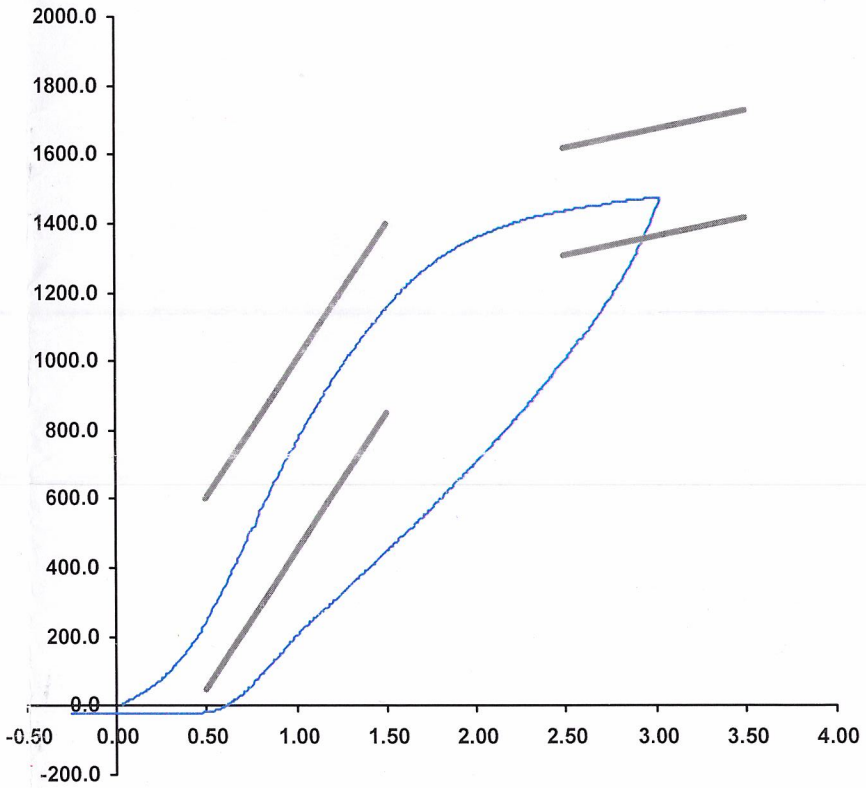
300 Crash
Non-Impact side
7/19/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 15441
Test Number 20102
Report Number 20156
Test Date 9/9/2021 10:26:16 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	248	50	600
Force @ 1.5 mm (N)	1,159	850	1,400
Force @ 2.5 mm (N)	1,437	1,306	1,618
Force @ 3.0 mm (N)	1,476	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 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

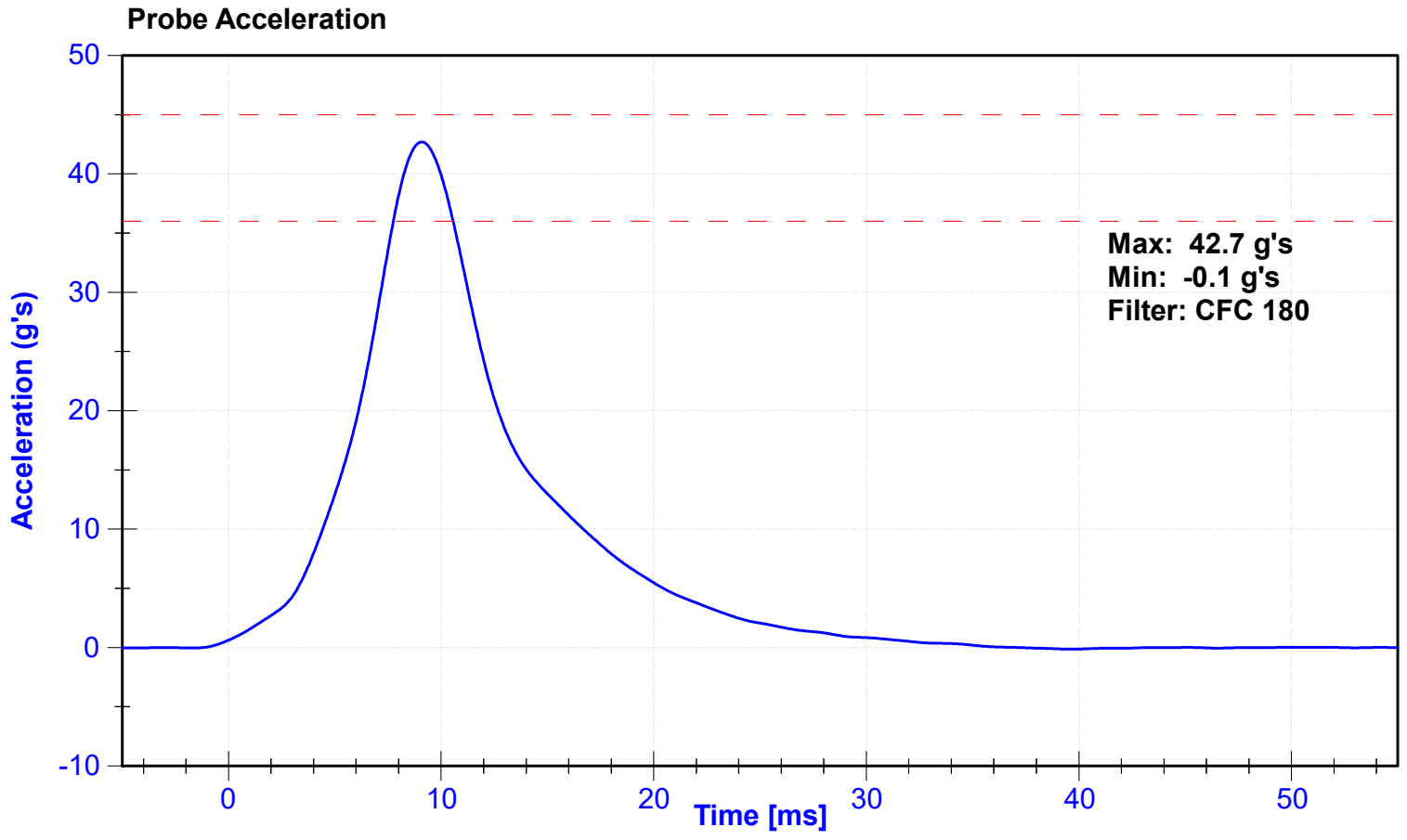
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

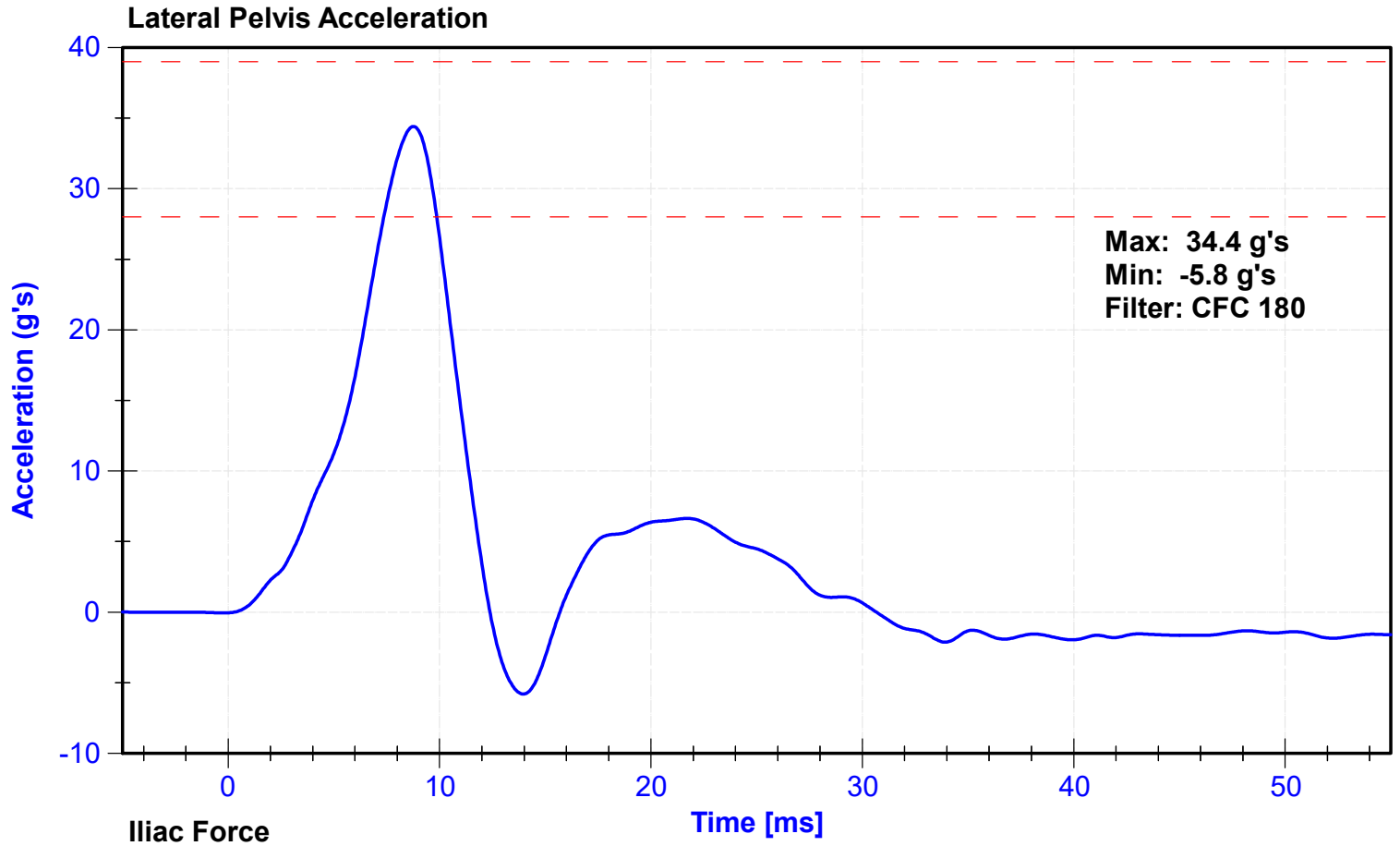
Results

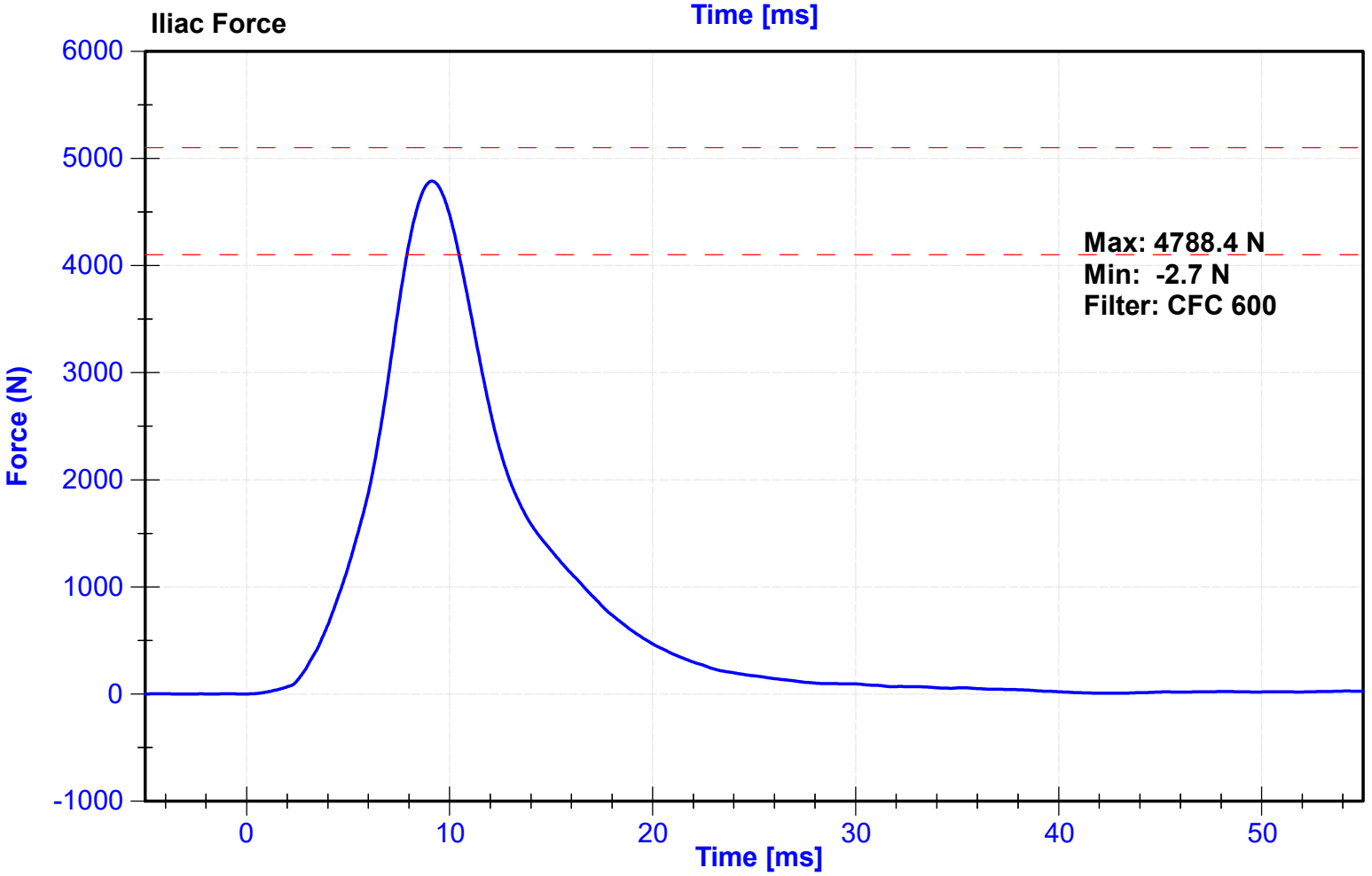
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.9	Pass
Humidity	10	70	%	39.7	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	36	45	g's	42.7	Pass
Lateral Pelvis Acceleration	28	39	g's	34.4	Pass
Iliac Force	4100	5100	N	4788.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Iliac Load Cell	Denton	280-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 34.4 g's
Min: -5.8 g's
Filter: CFC 180


Iliac Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4788.4 N
Min: -2.7 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

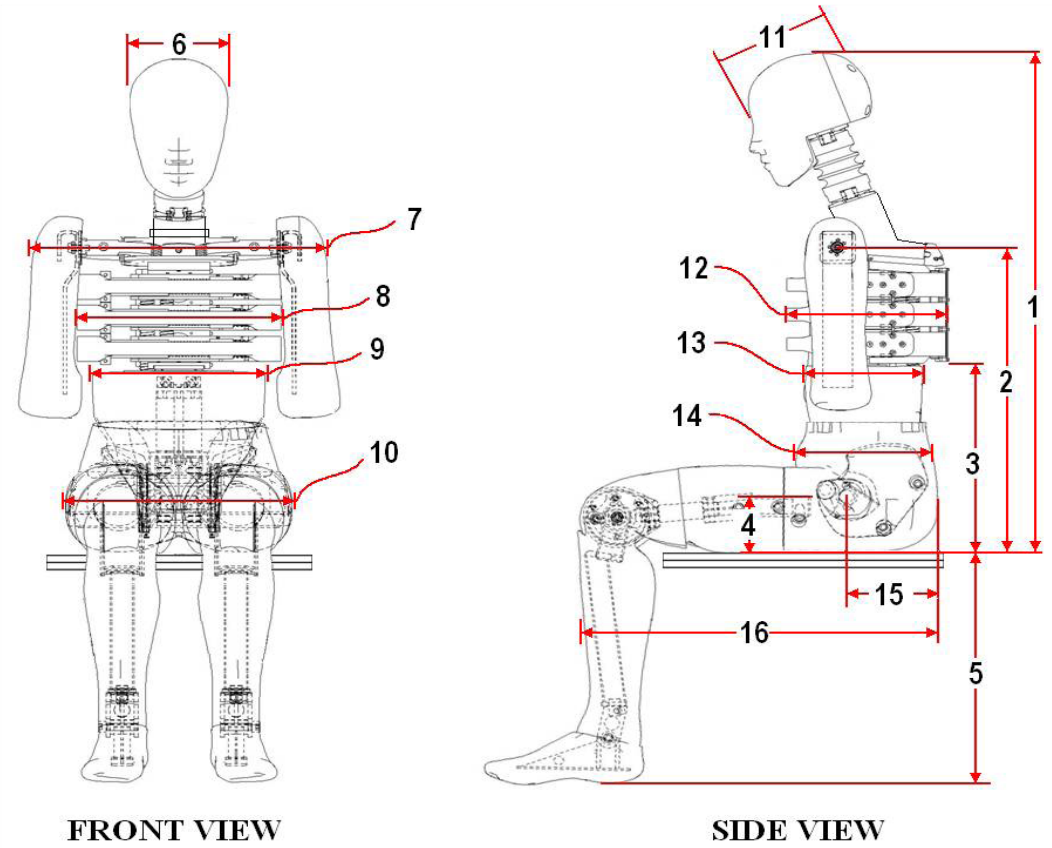
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE It

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 10/18/2022

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	908	Pass
2	Seat to Shoulder Joint	558	572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	350	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	420	Pass
6	Head Width	152	158	157	Pass
7	Shoulder/Arm Width	461	479	469	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	202	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	157	Pass
16	Back of Buttocks to Front Knee	597	615	607	Pass

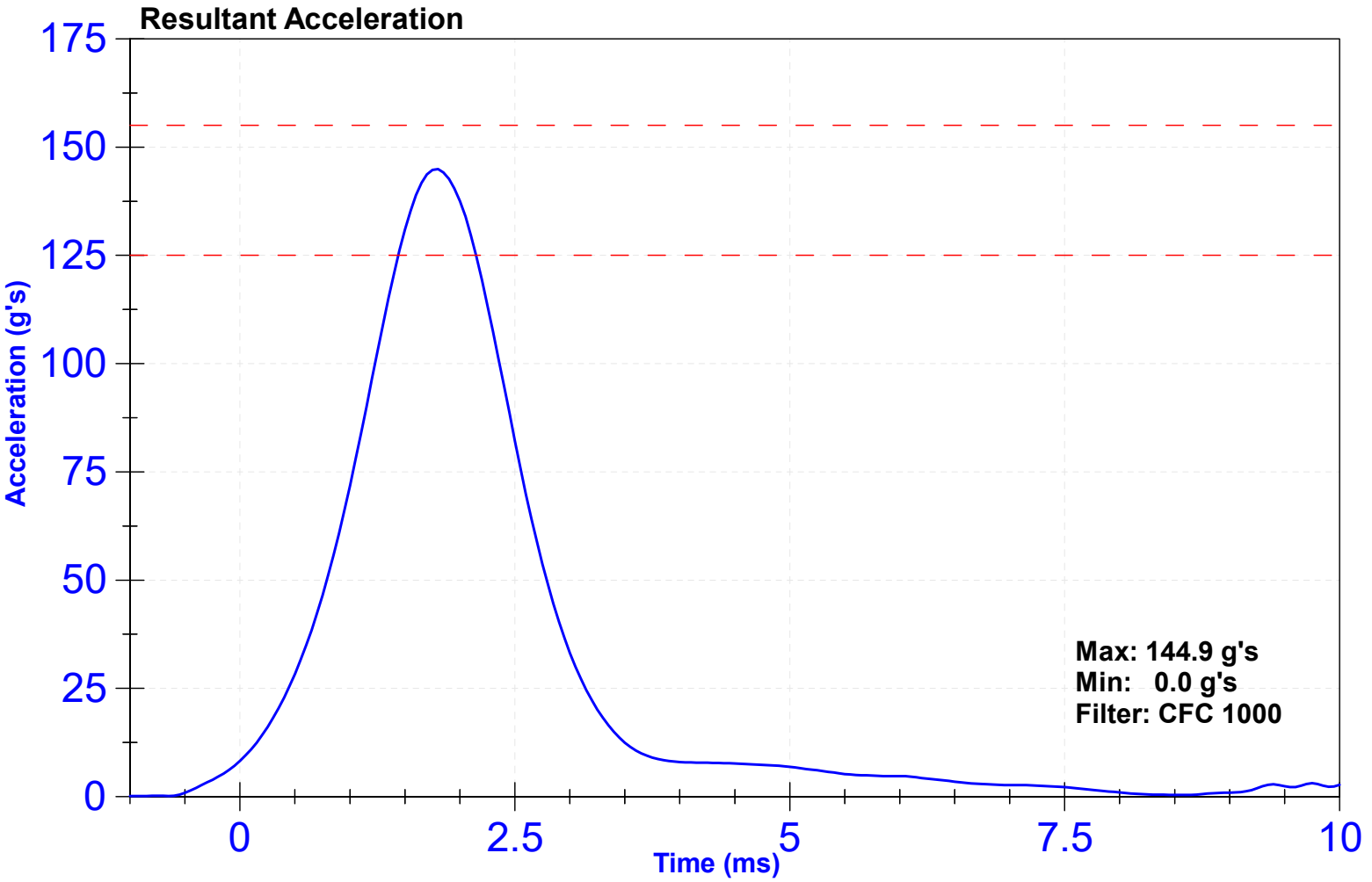
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

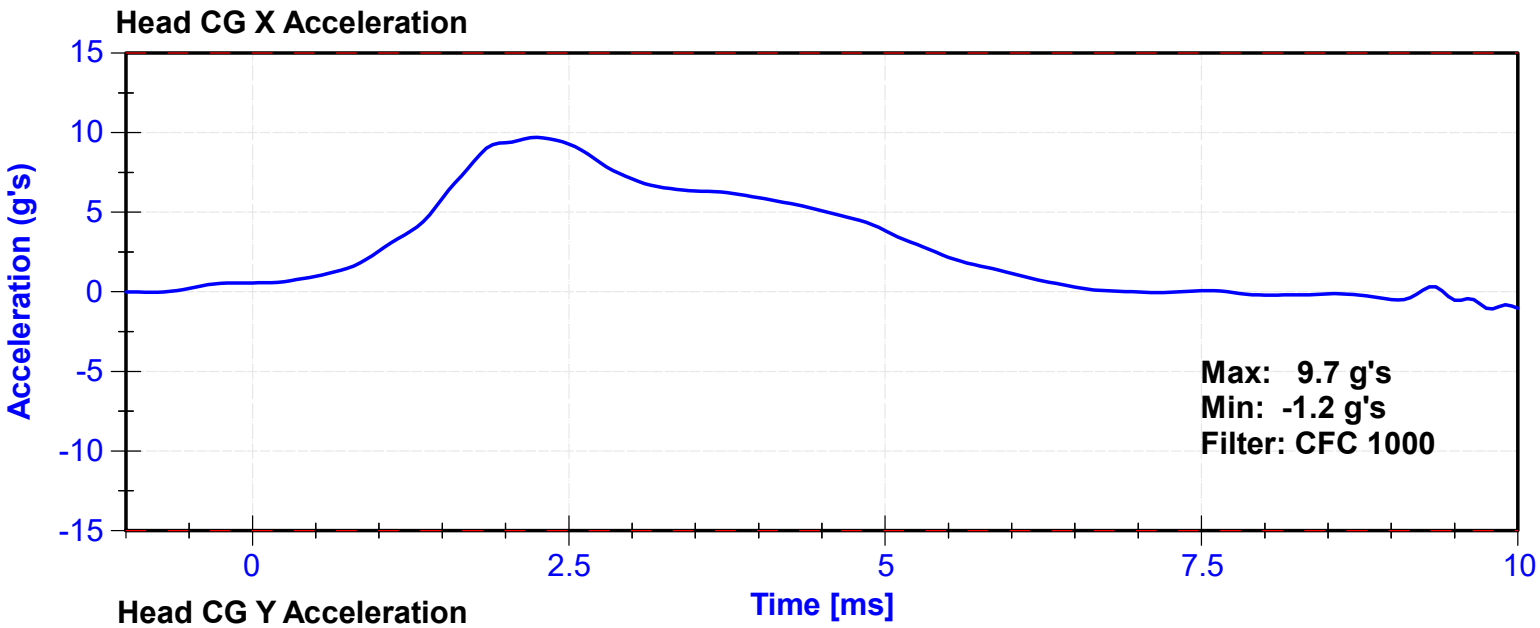
Results

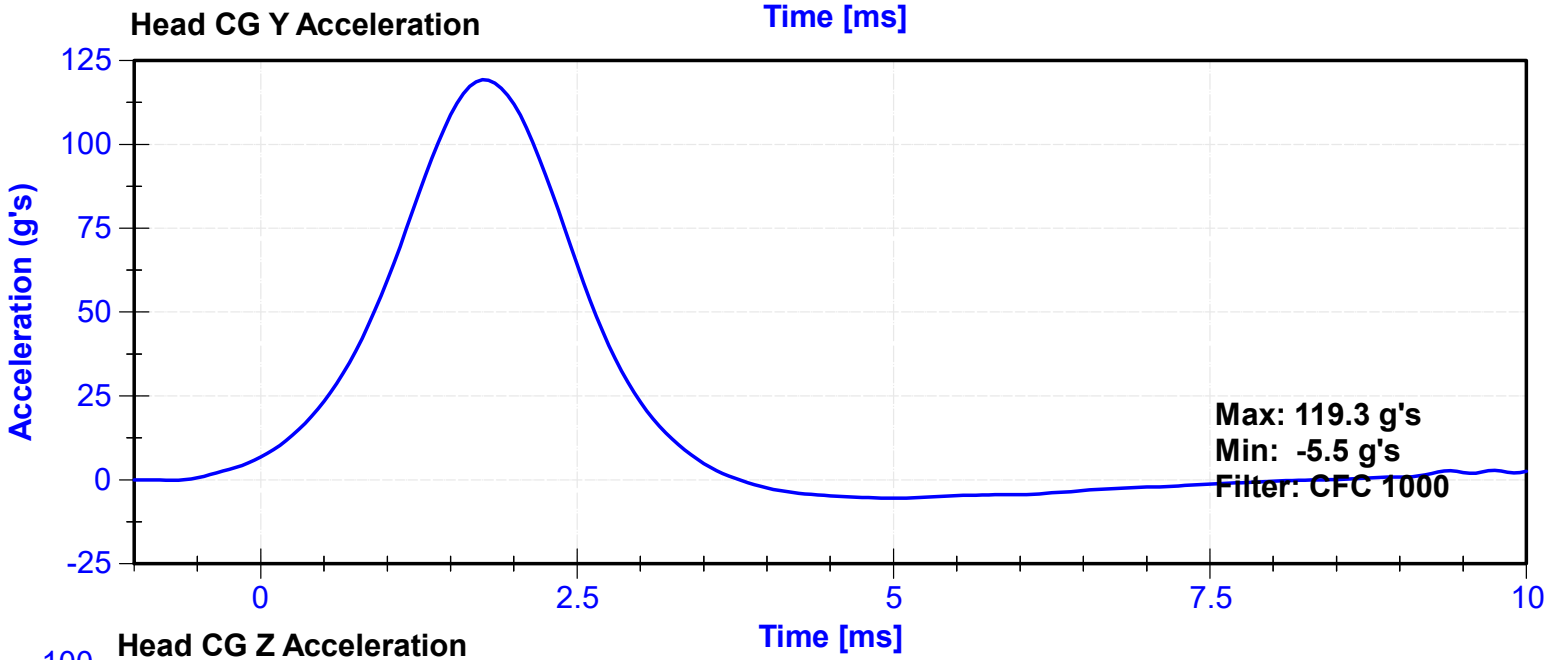
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Resultant Acceleration	125	155	g's	144.9	Pass
Oscillation	0	15	%	3.27	Pass
Fore-Aft Acceleration	-15	15	g's	9.7	Pass

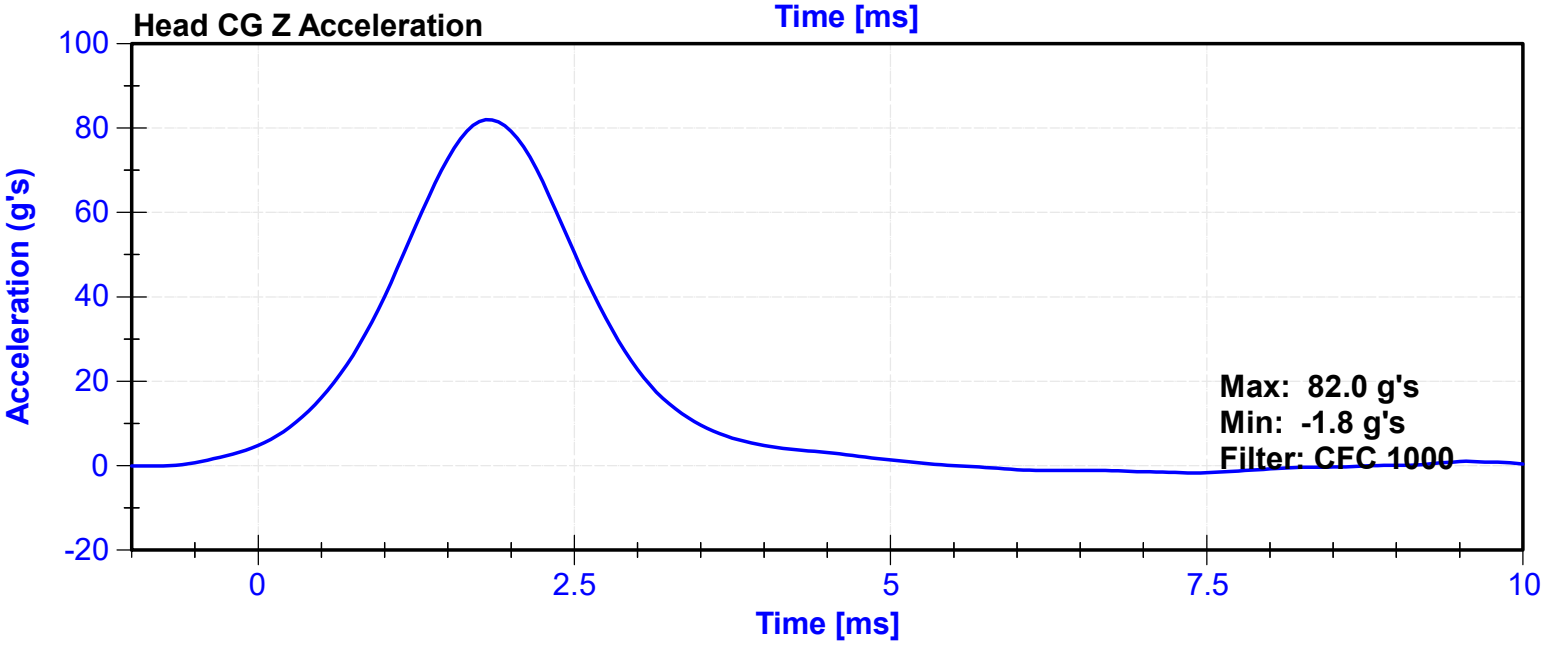
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	7/21/2022	1/17/2023
Y Accelerometer	Endevco	P49216	7/21/2022	1/17/2023
Z Accelerometer	Endevco	P51303	7/21/2022	1/17/2023




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 9.7 g's
Min: -1.2 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 119.3 g's
Min: -5.5 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]
Max: 82.0 g's
Min: -1.8 g's
Filter: CFC 1000

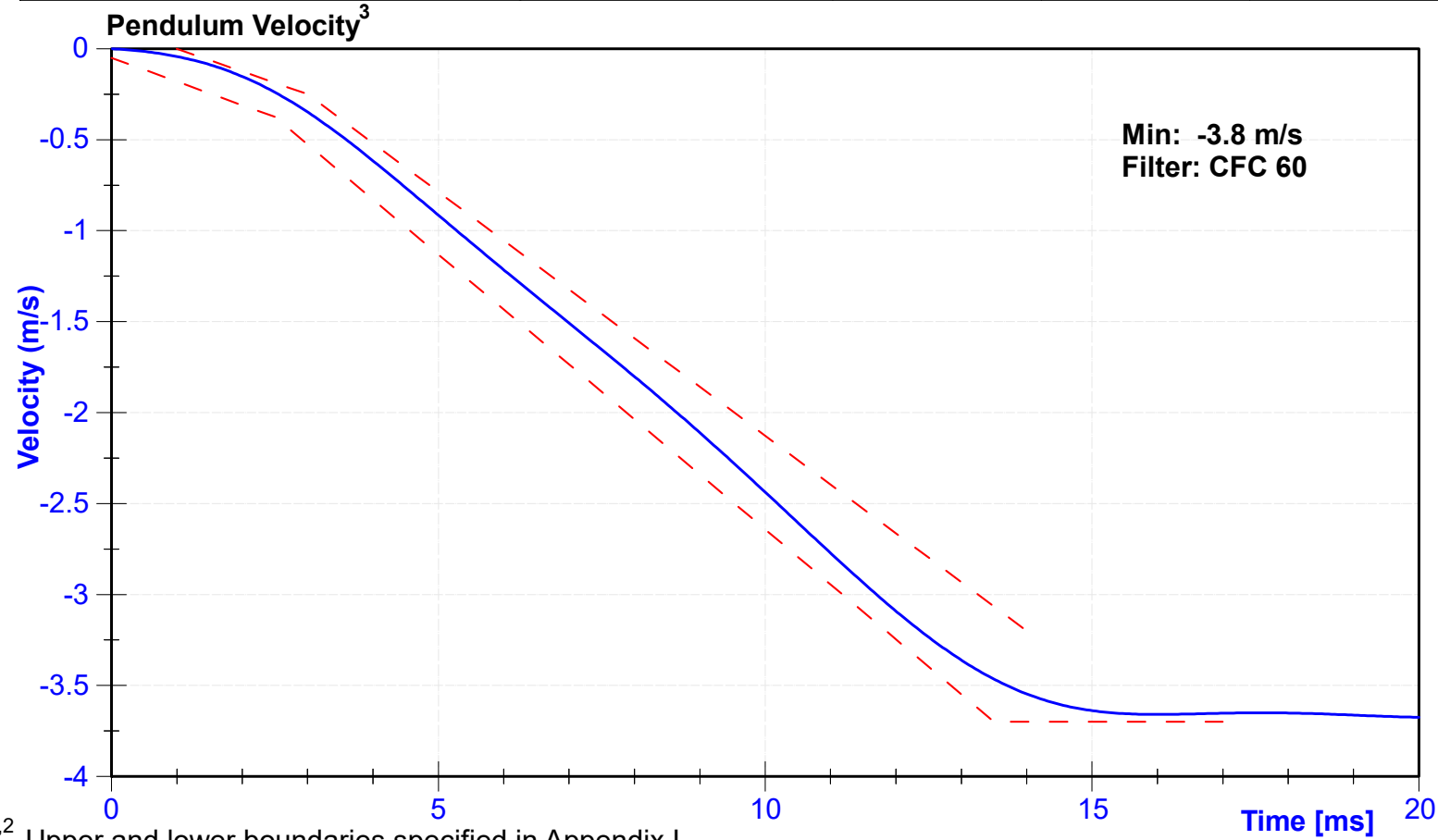
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

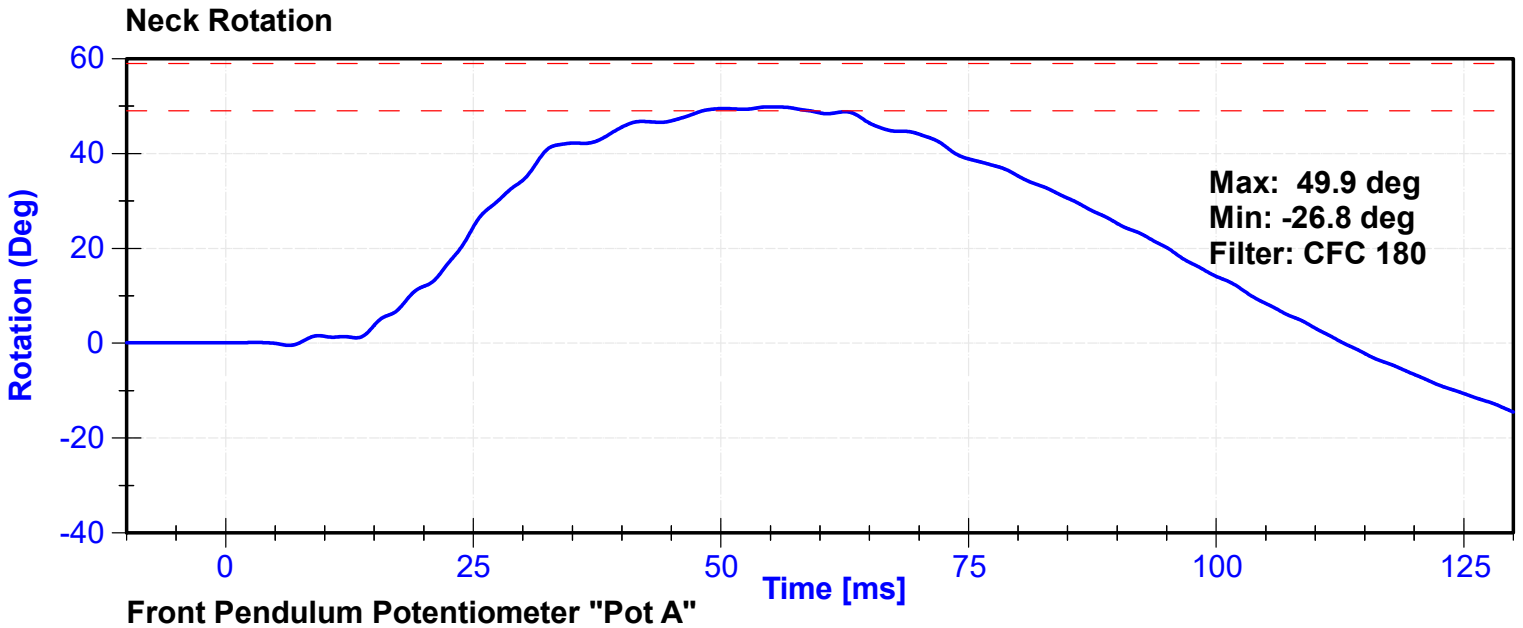
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Velocity	3.3	3.5	m/s	3.41	Pass
Lateral Neck Rotation	49	59	deg	49.9	Pass
Time at Maximum Rotation	54	66	ms	54.7	Pass
Time of Rotation Decay from Maximum	53	88	ms	58.2	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

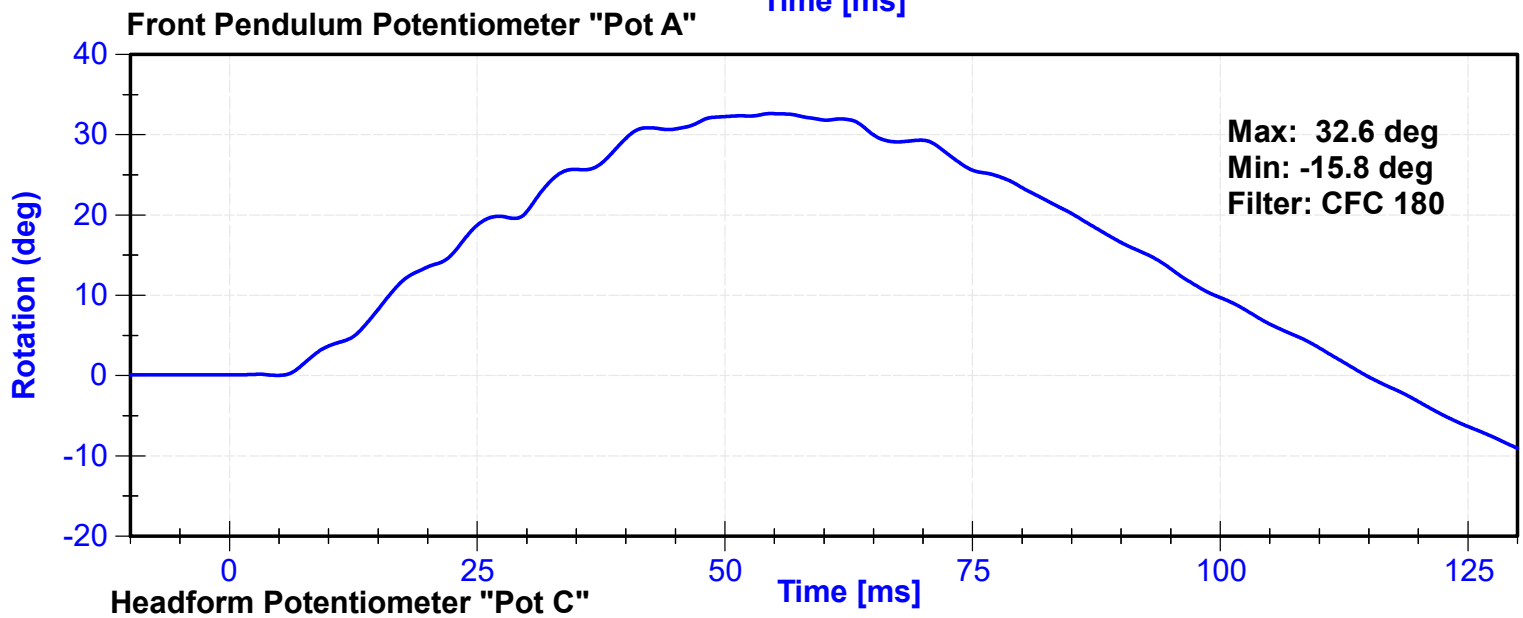
Transducer Calibrations

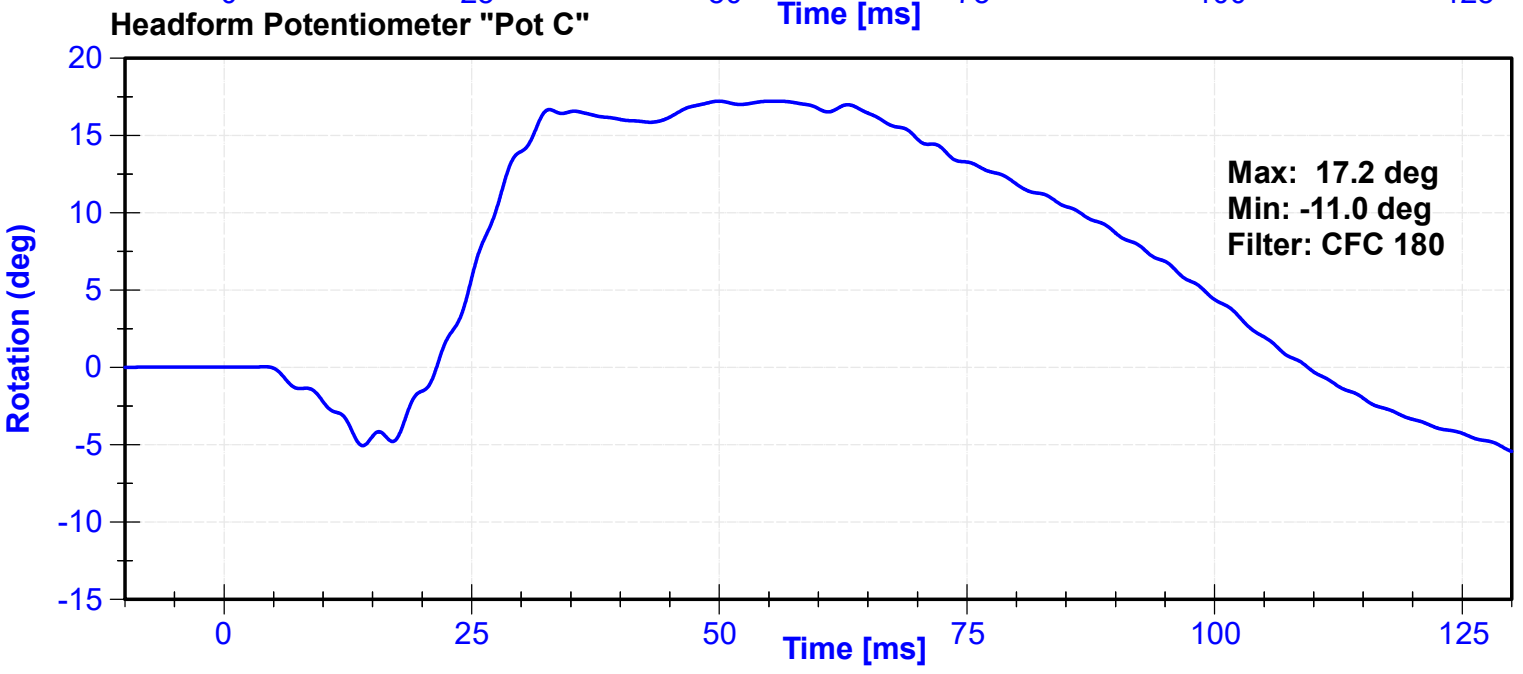
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/28/2021	10/28/2022
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



[1,2] Upper and lower boundaries specified in Appendix I


Neck Rotation
Rotation (Deg)
Time [ms]
Max: 49.9 deg
Min: -26.8 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 32.6 deg
Min: -15.8 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 17.2 deg
Min: -11.0 deg
Filter: CFC 180

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

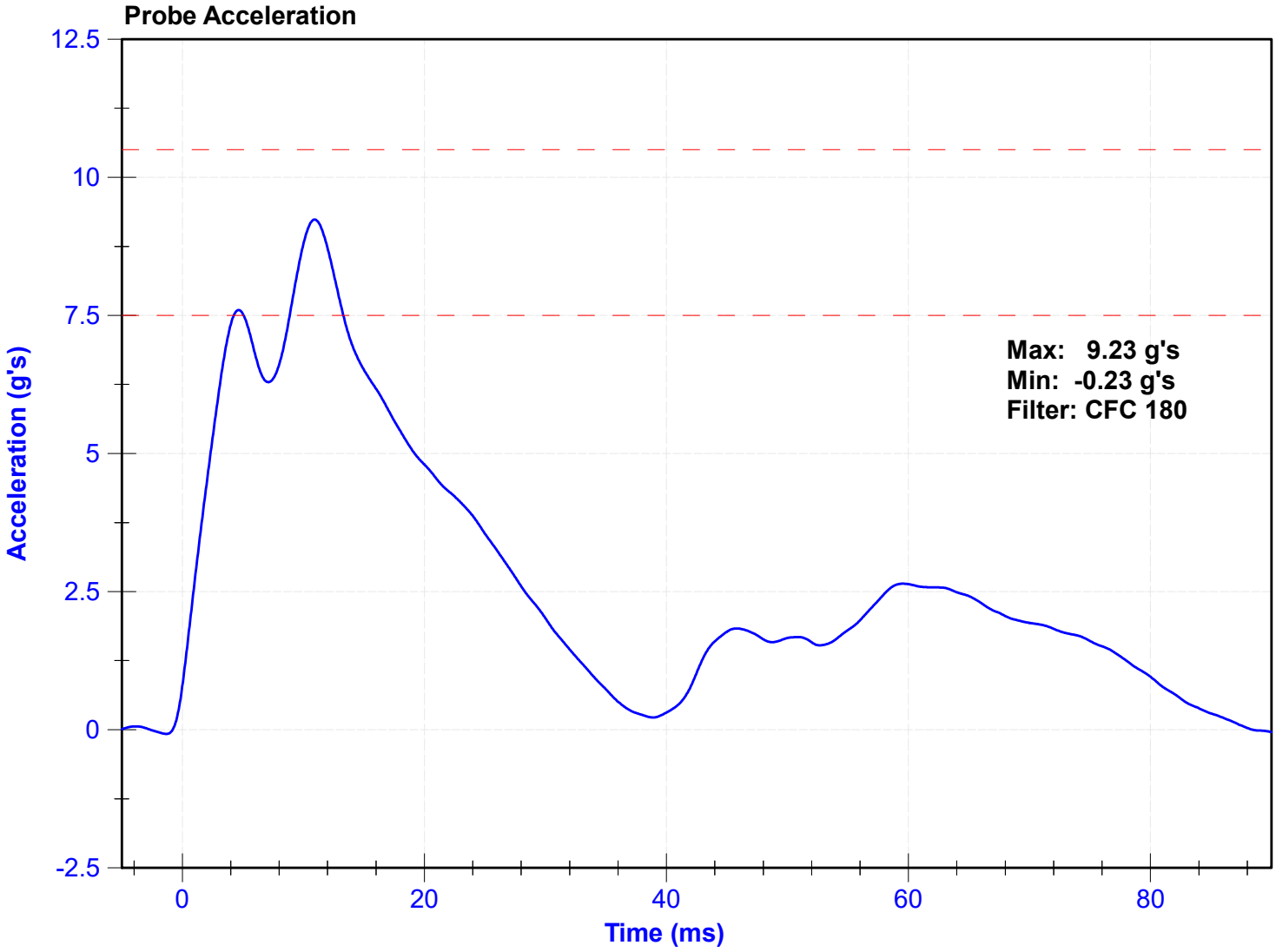
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	38.1	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	7.5	10.5	g's	9.23	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25885	10/25/2021	10/25/2022



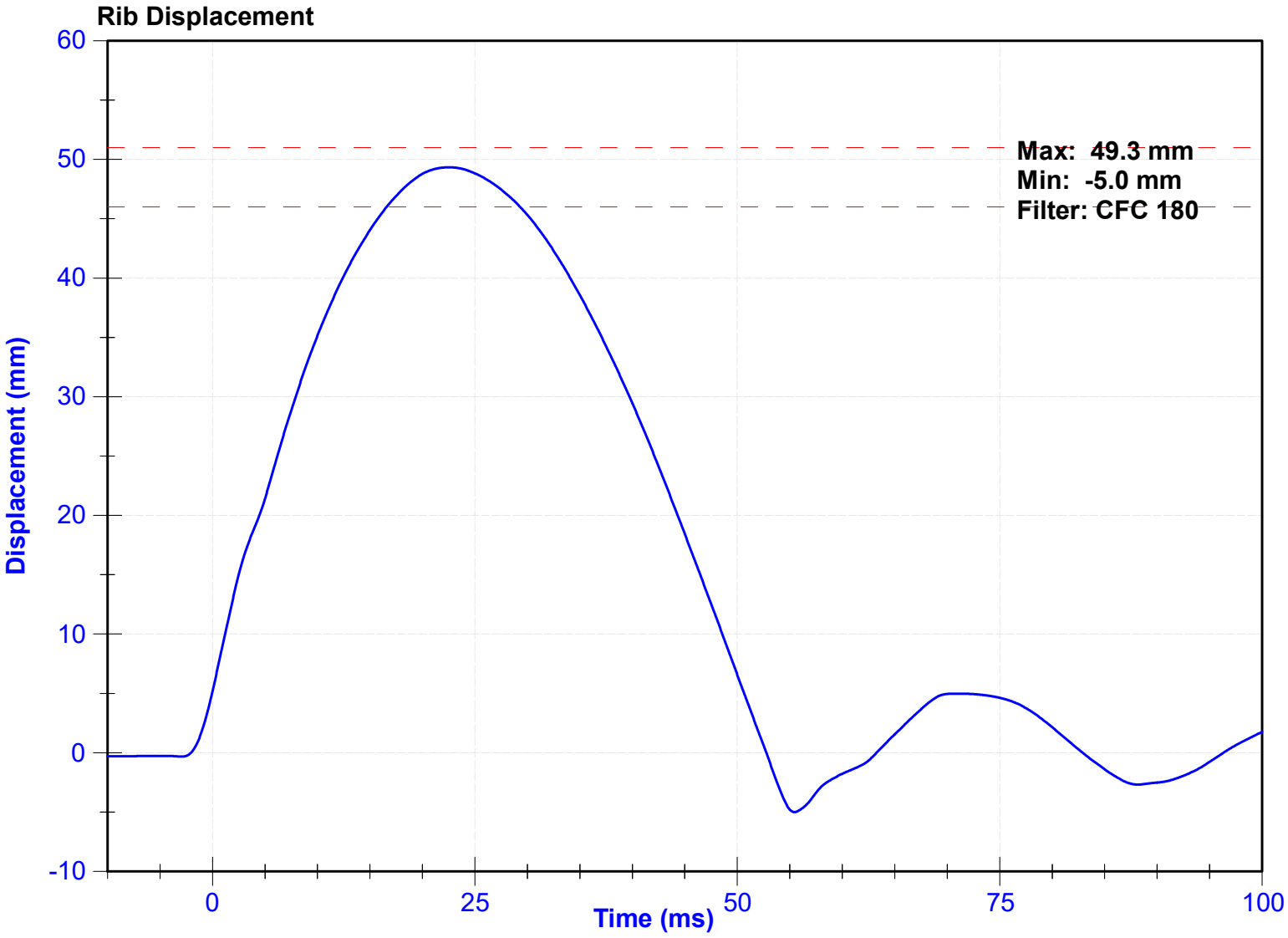
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023



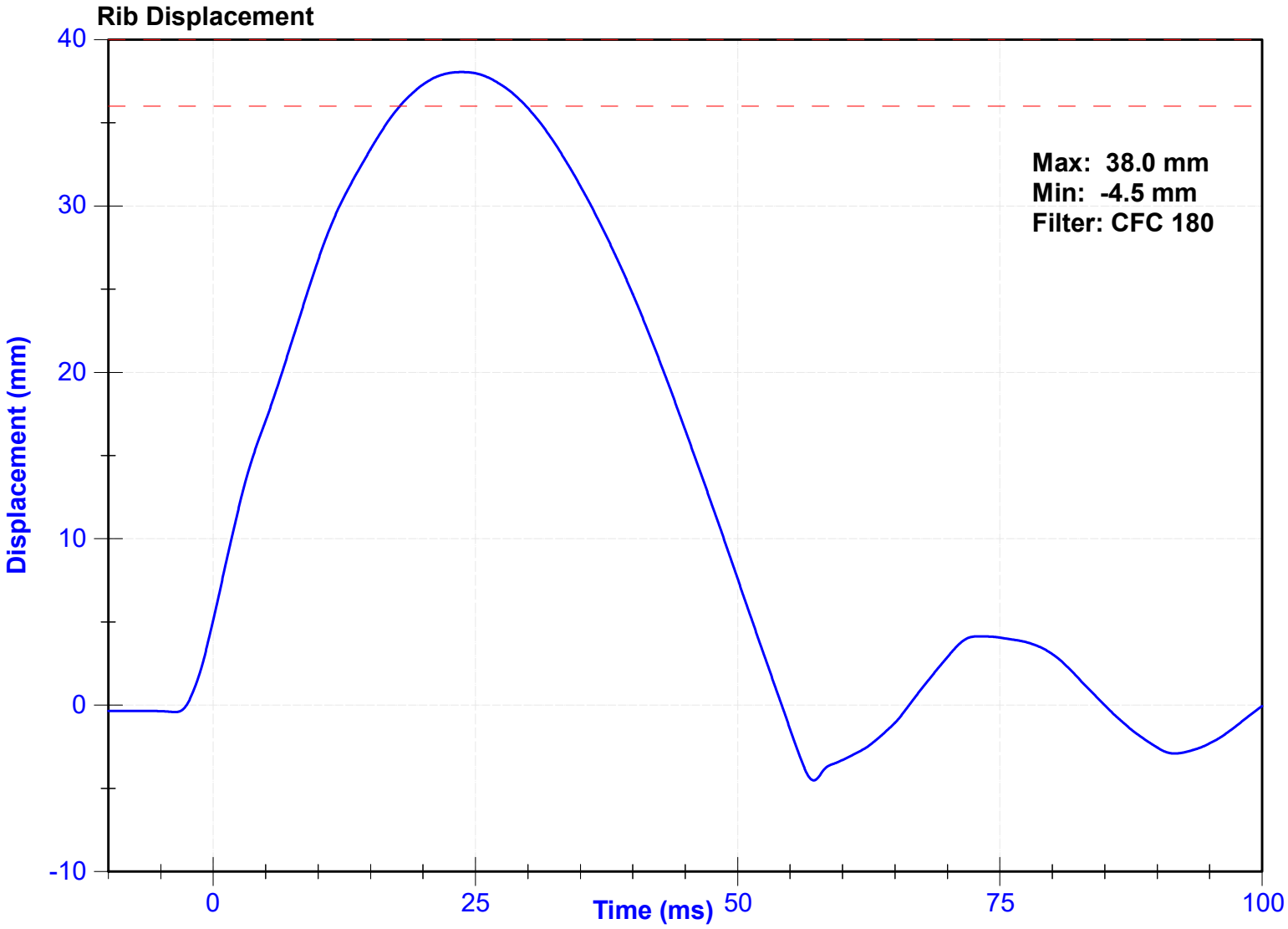
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023



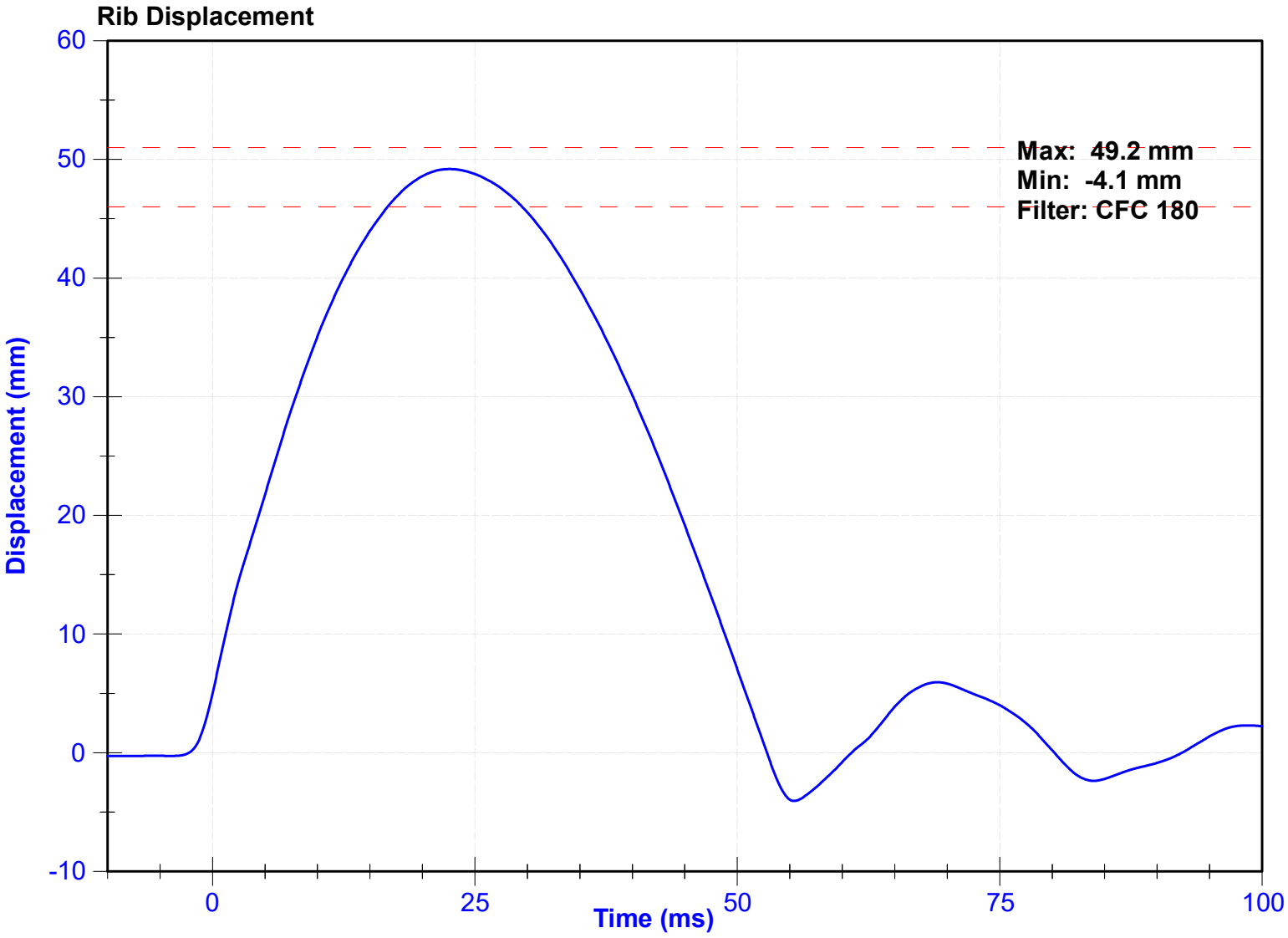
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Rib Displacement	46	51	mm	49.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023



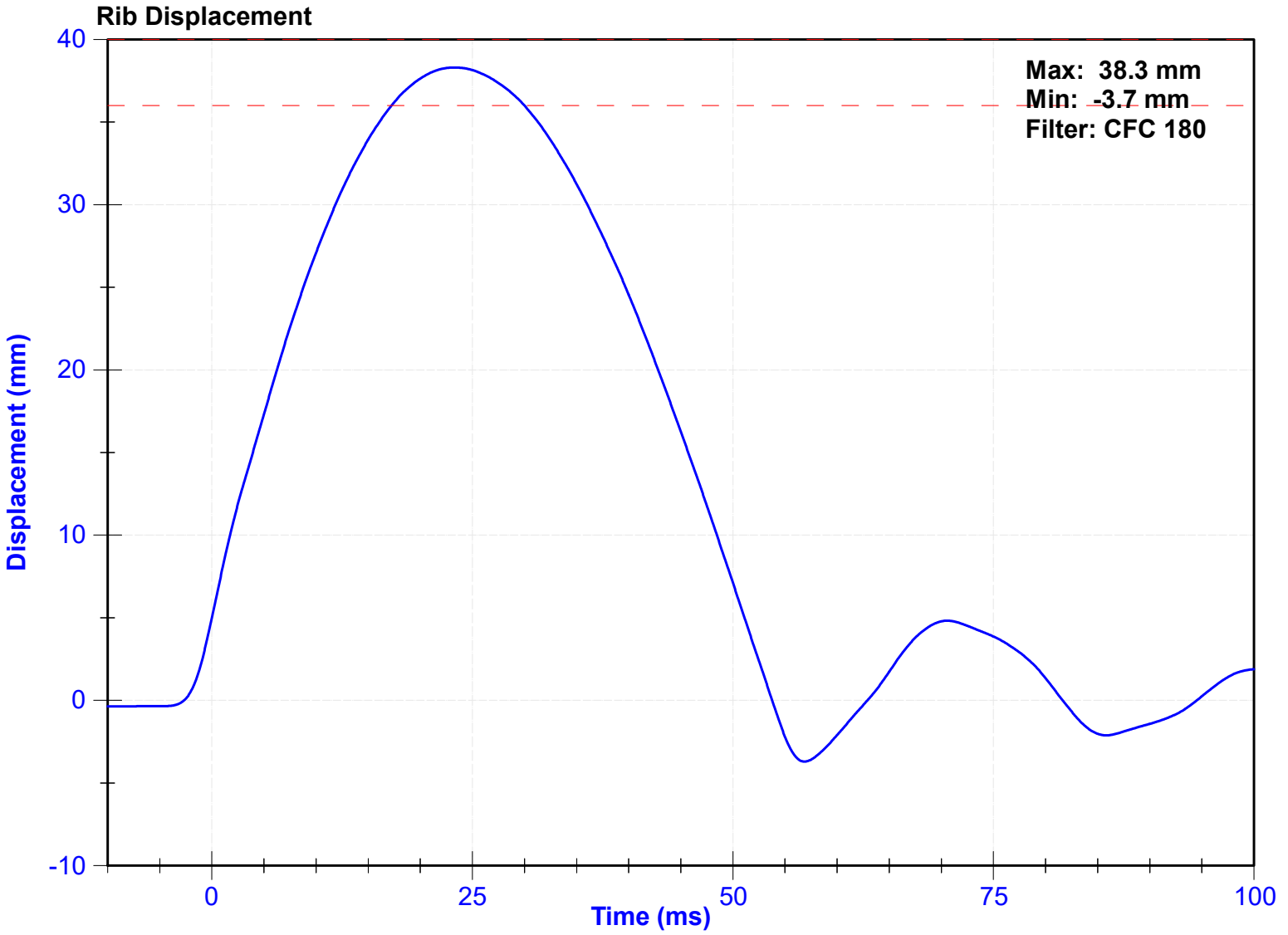
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Rib Displacement	36	40	mm	38.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023



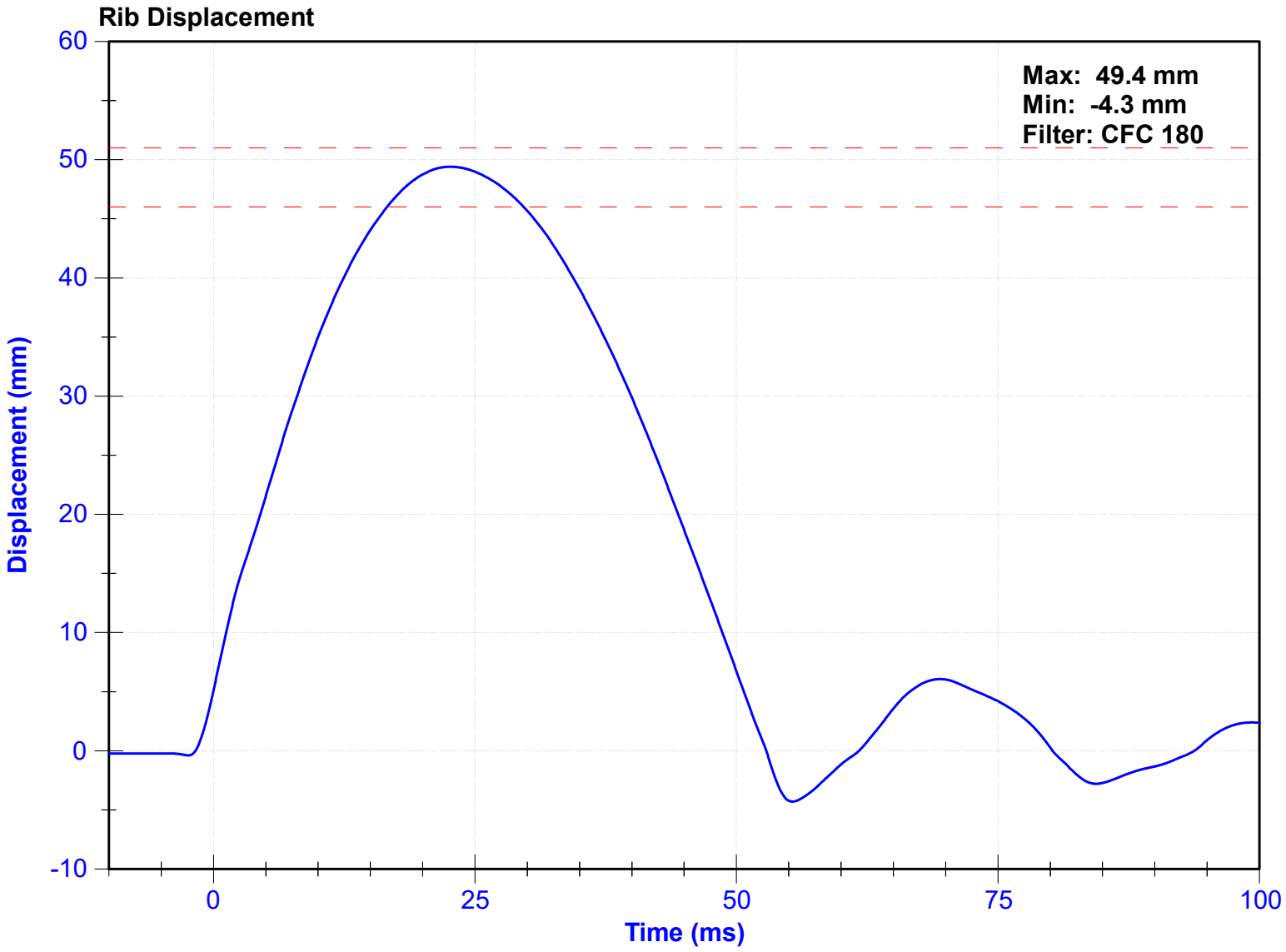
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Rib Displacement	46	51	mm	49.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	7/21/2022	1/19/2023



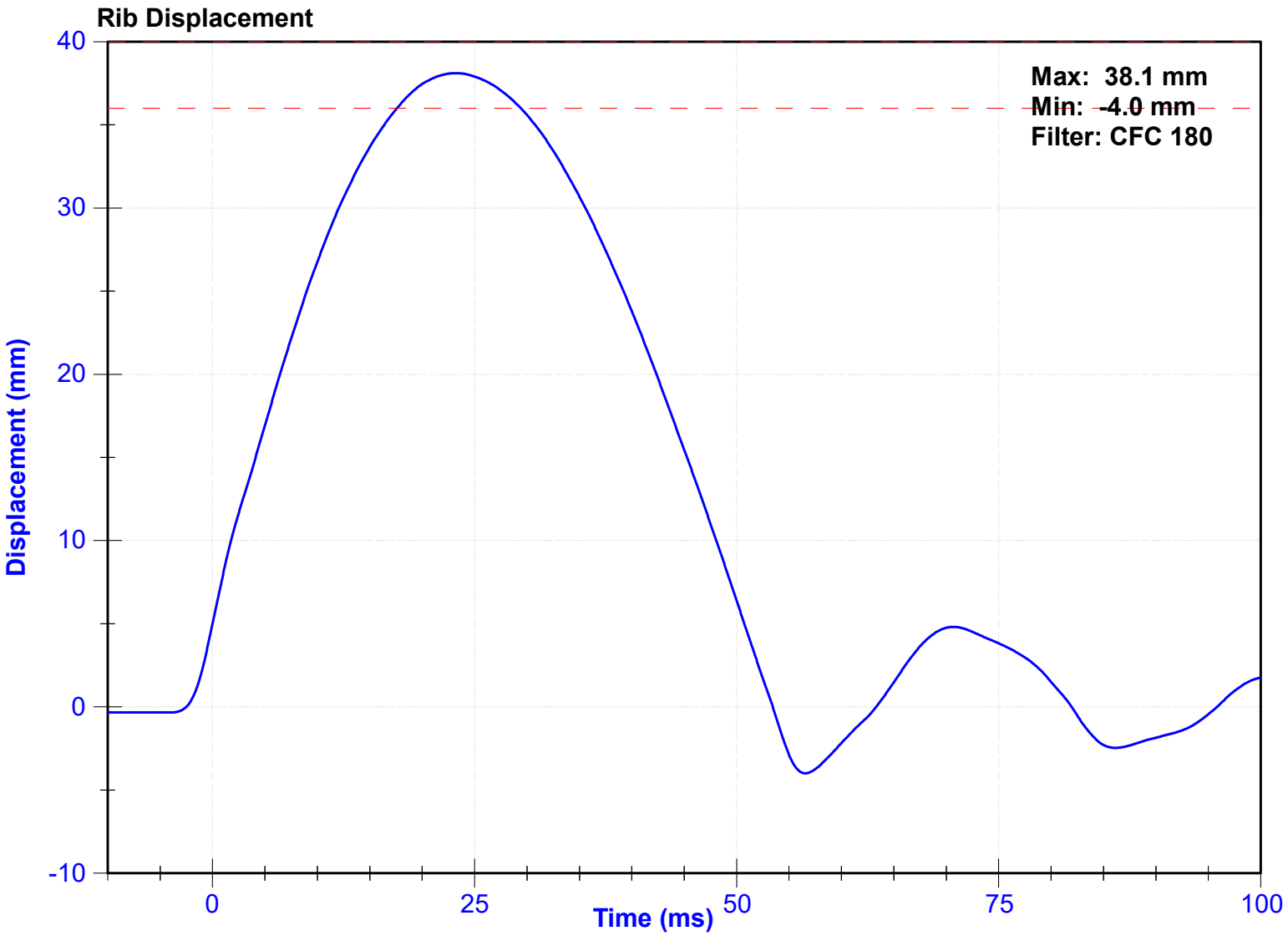
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.0	Pass
Rib Displacement	36	40	mm	38.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	7/21/2022	1/19/2023



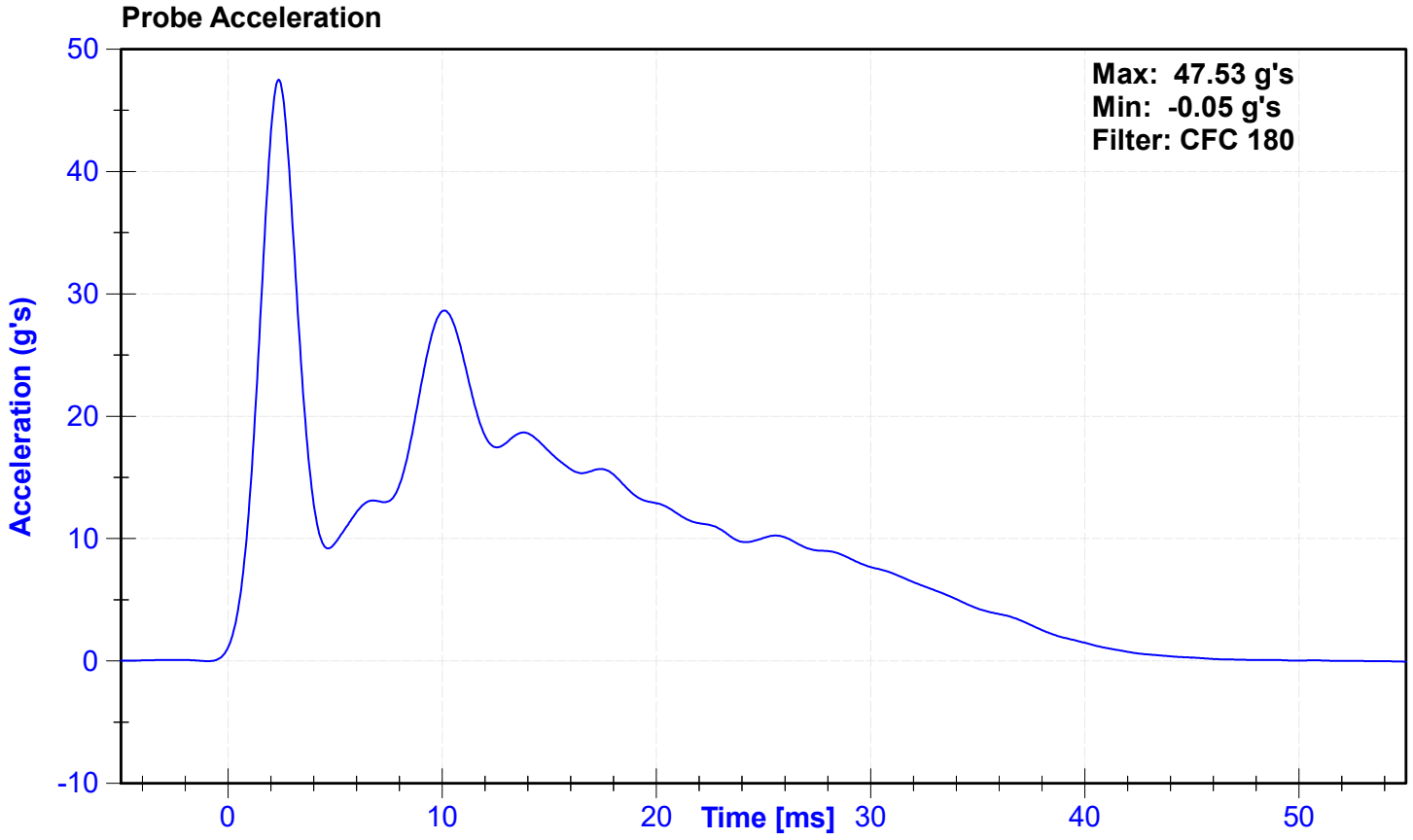
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

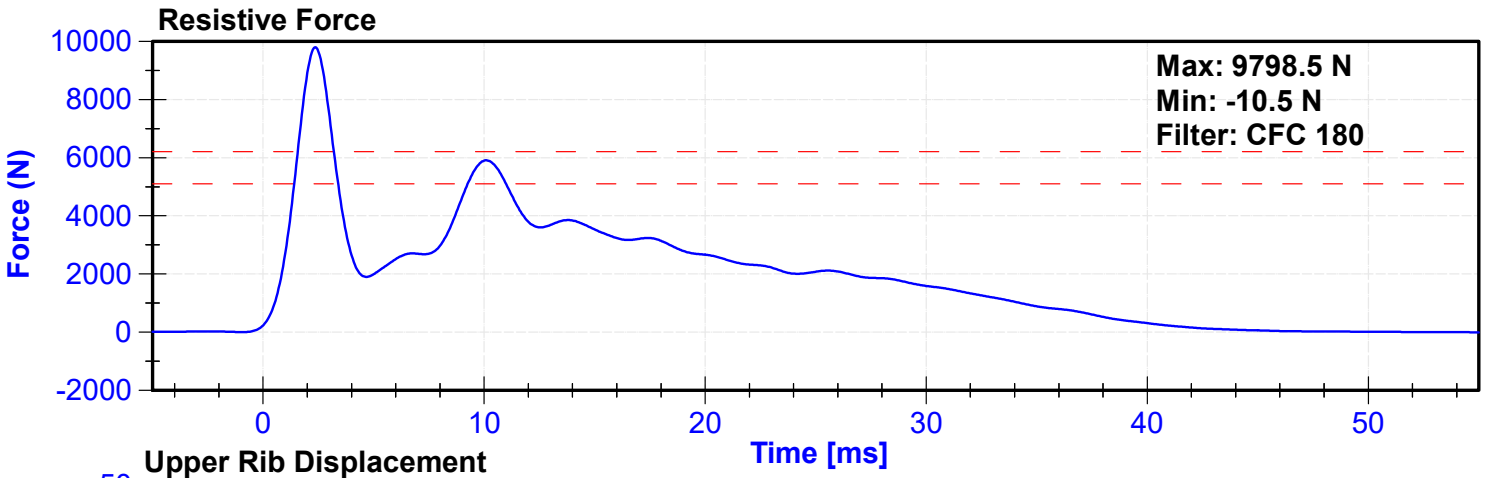
Results

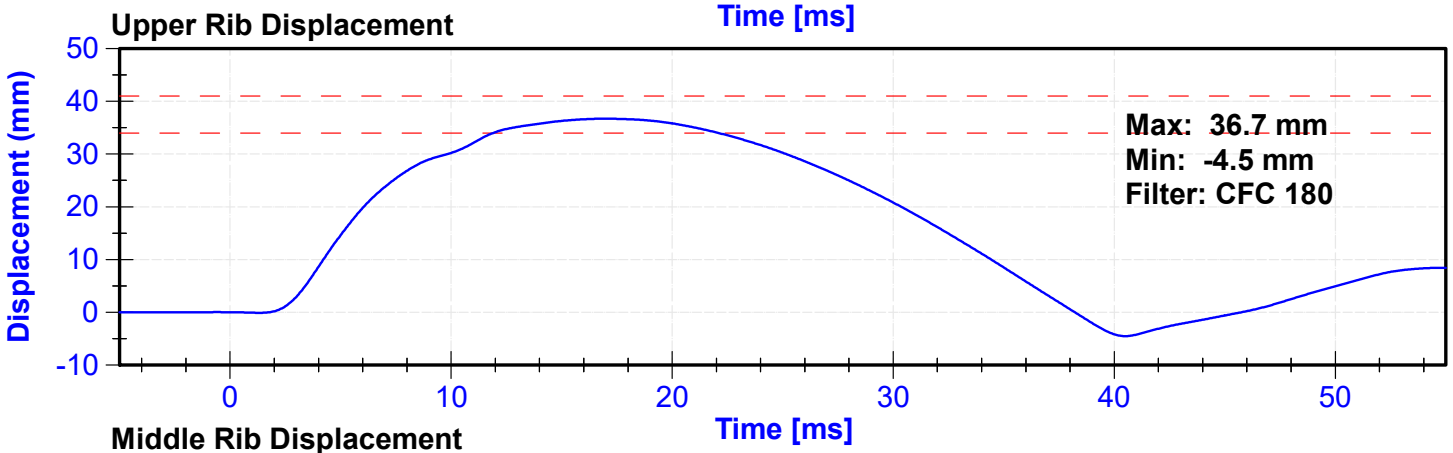
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	38.1	Pass
Velocity	5.4	5.6	m/s	5.54	Pass
Resistive Force after 6ms	5100	6200	N	5906.6	Pass
Upper Thorax Rib Deflection	34	41	mm	36.7	Pass
Mid Thorax Rib Deflection	37	45	mm	40.7	Pass
Lower Thorax Rib Deflection	37	44	mm	39.8	Pass

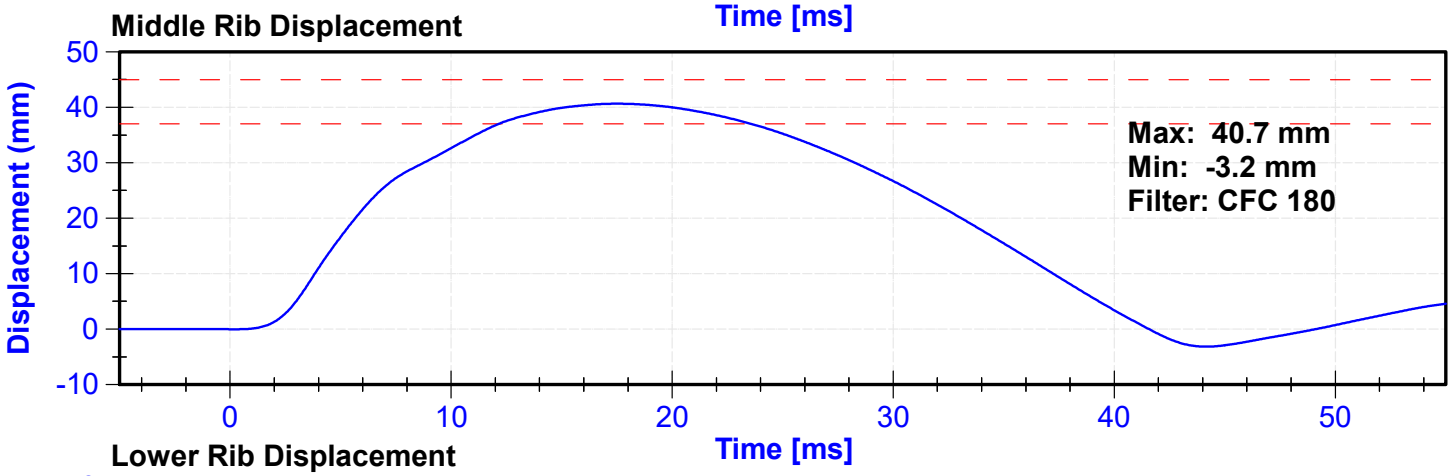
Transducer Calibrations

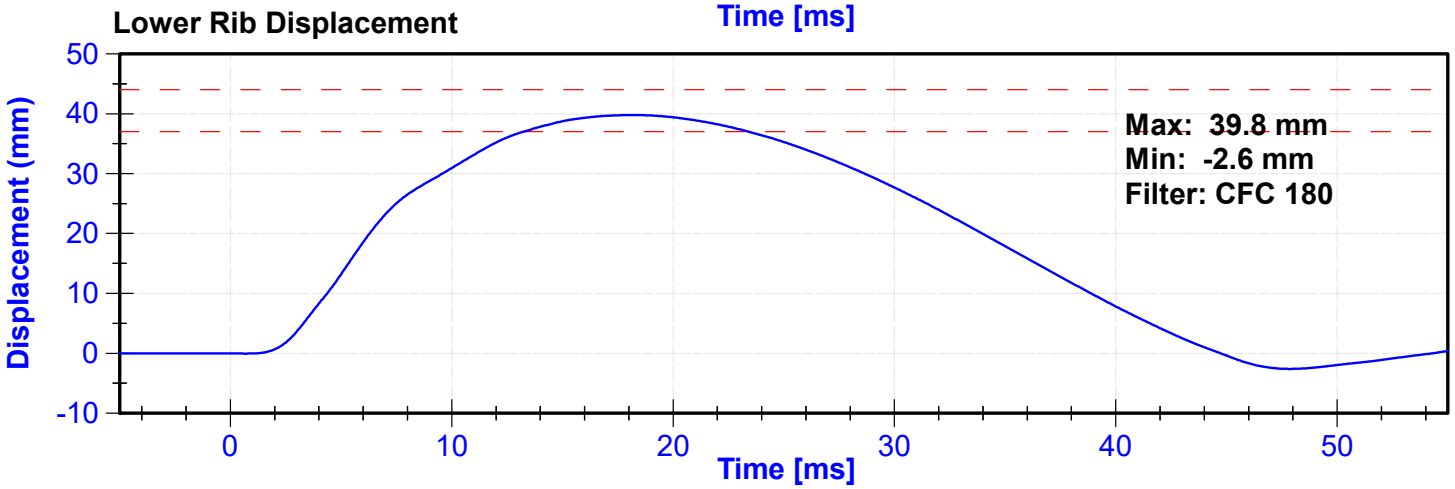
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Upper Thorax Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023
Lower Thorax Rib Potentiometer	Honeywell	178GFE	7/21/2022	1/19/2023




Resistive Force
Force (N)
10000
8000
6000
4000
2000
0
-2000
0
10
20
30
40
50
Time [ms]
Max: 9798.5 N
Min: -10.5 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 36.7 mm
Min: -4.5 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 40.7 mm
Min: -3.2 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 39.8 mm
Min: -2.6 mm
Filter: CFC 180

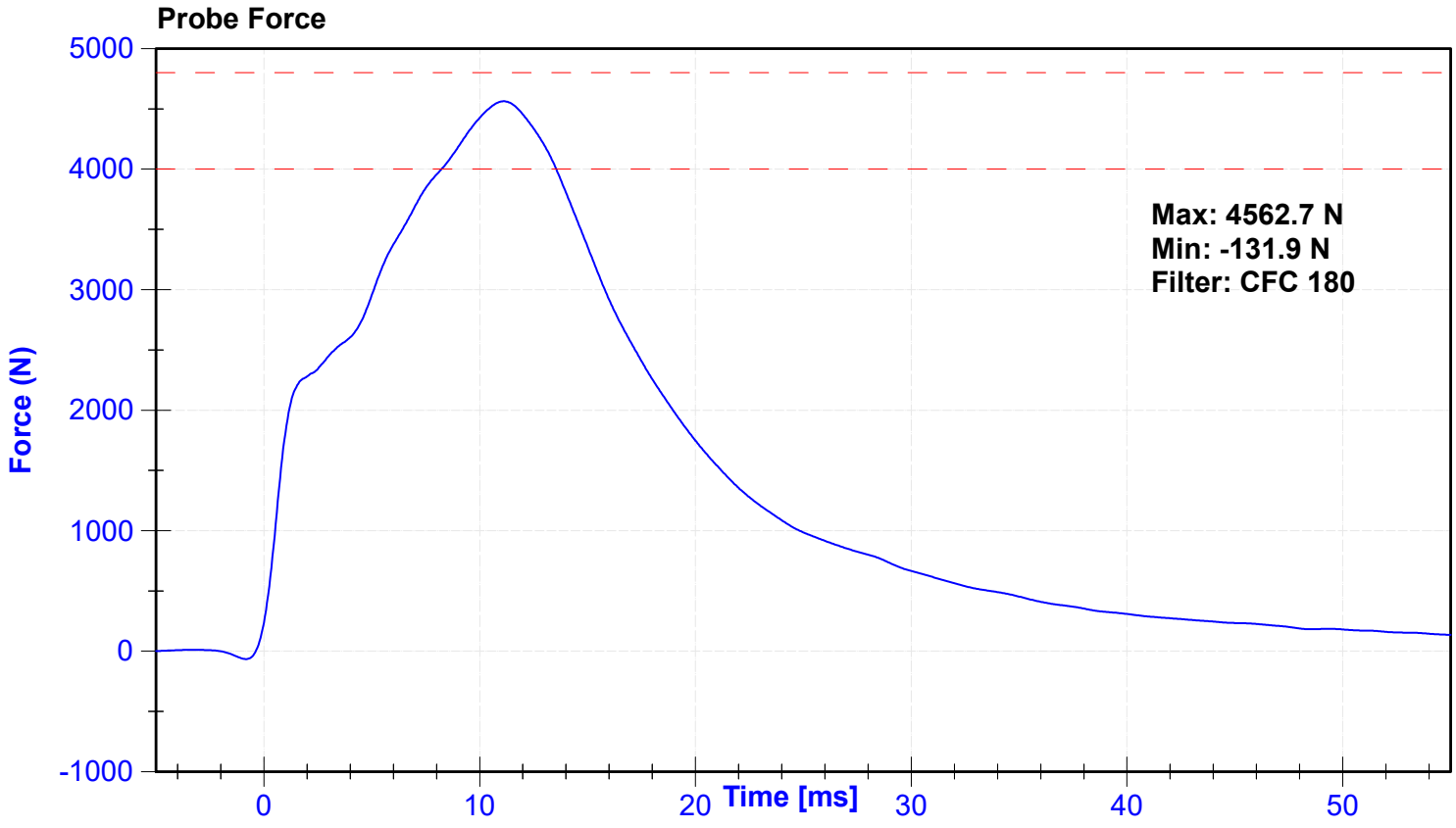
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

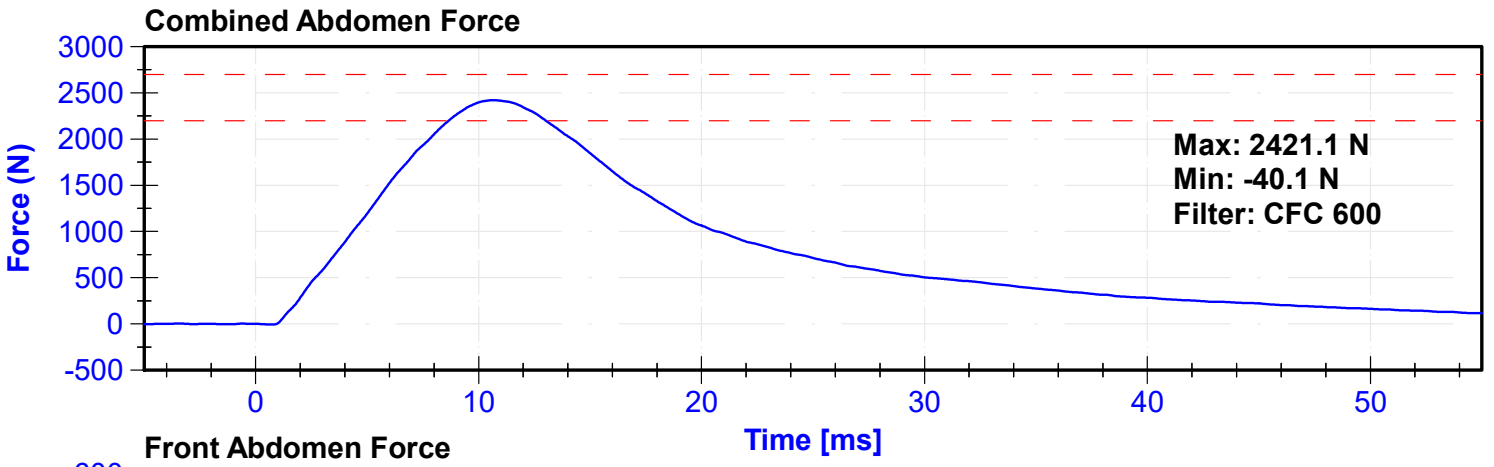
Results

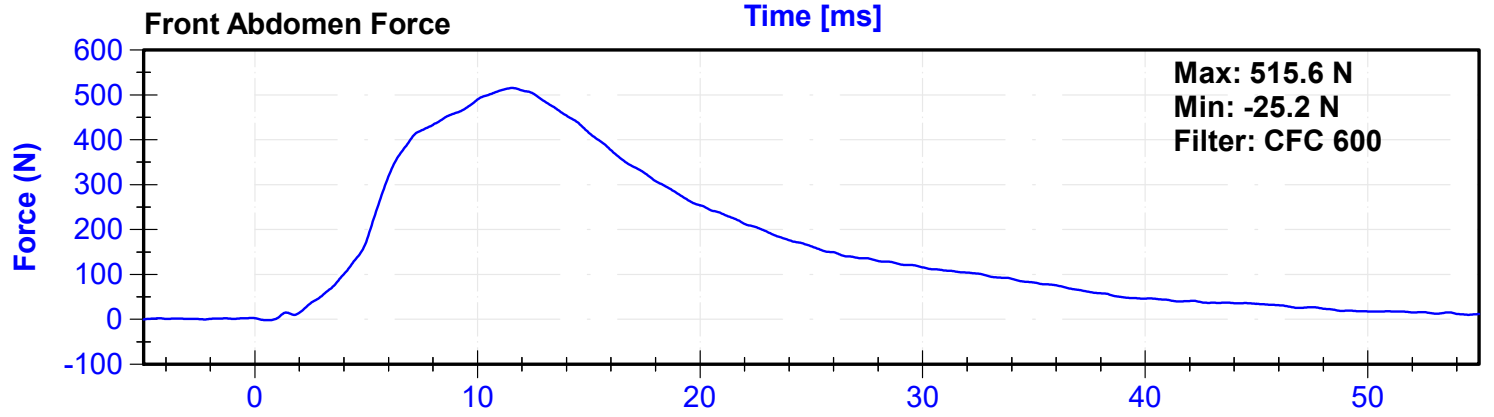
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	38.1	Pass
Velocity	3.9	4.1	m/s	4.04	Pass
Combined Abdomen Force	2200	2700	N	2421.1	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.65	Pass
Resistive Probe Force	4000	4800	N	4562.7	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.10	Pass

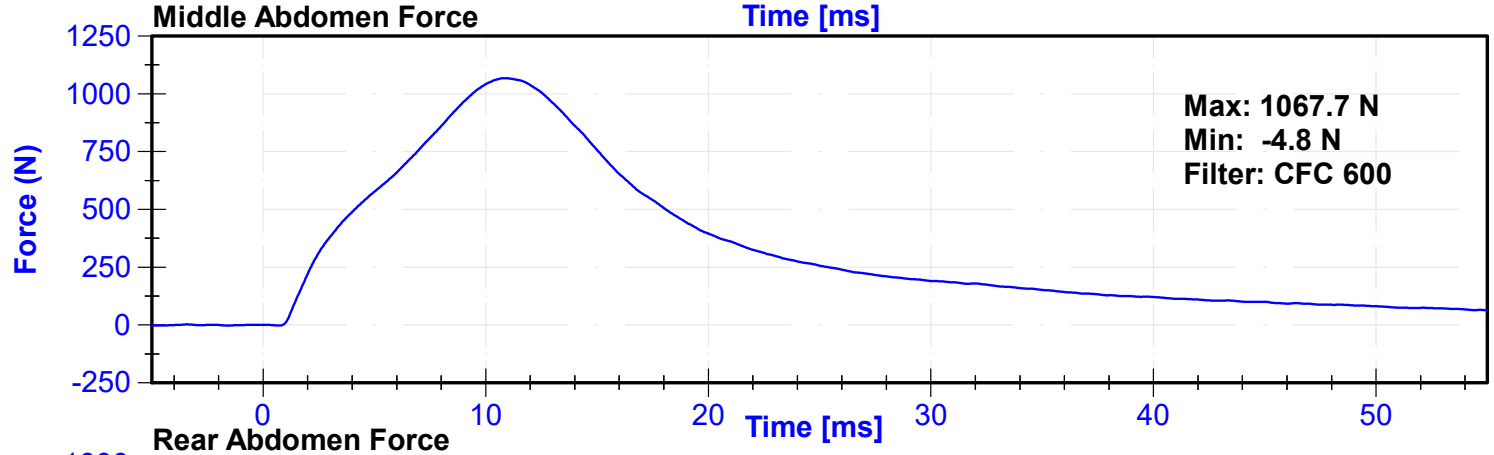
Transducer Calibrations

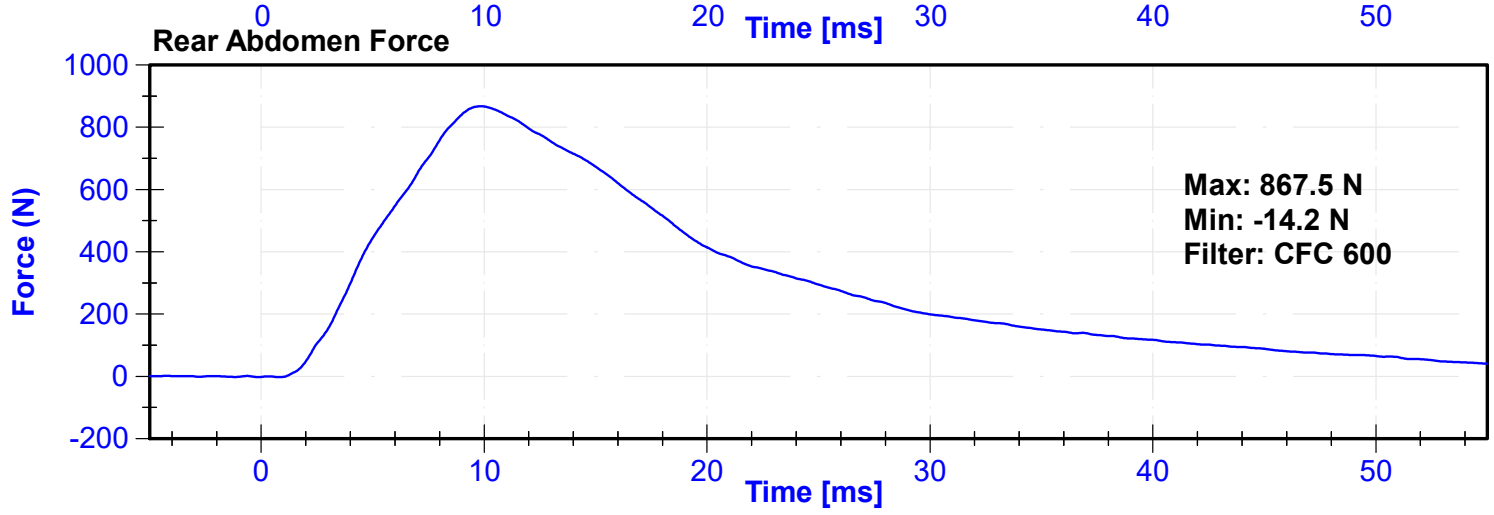
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2421.1 N
Min: -40.1 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 515.6 N
Min: -25.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1067.7 N
Min: -4.8 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 867.5 N
Min: -14.2 N
Filter: CFC 600

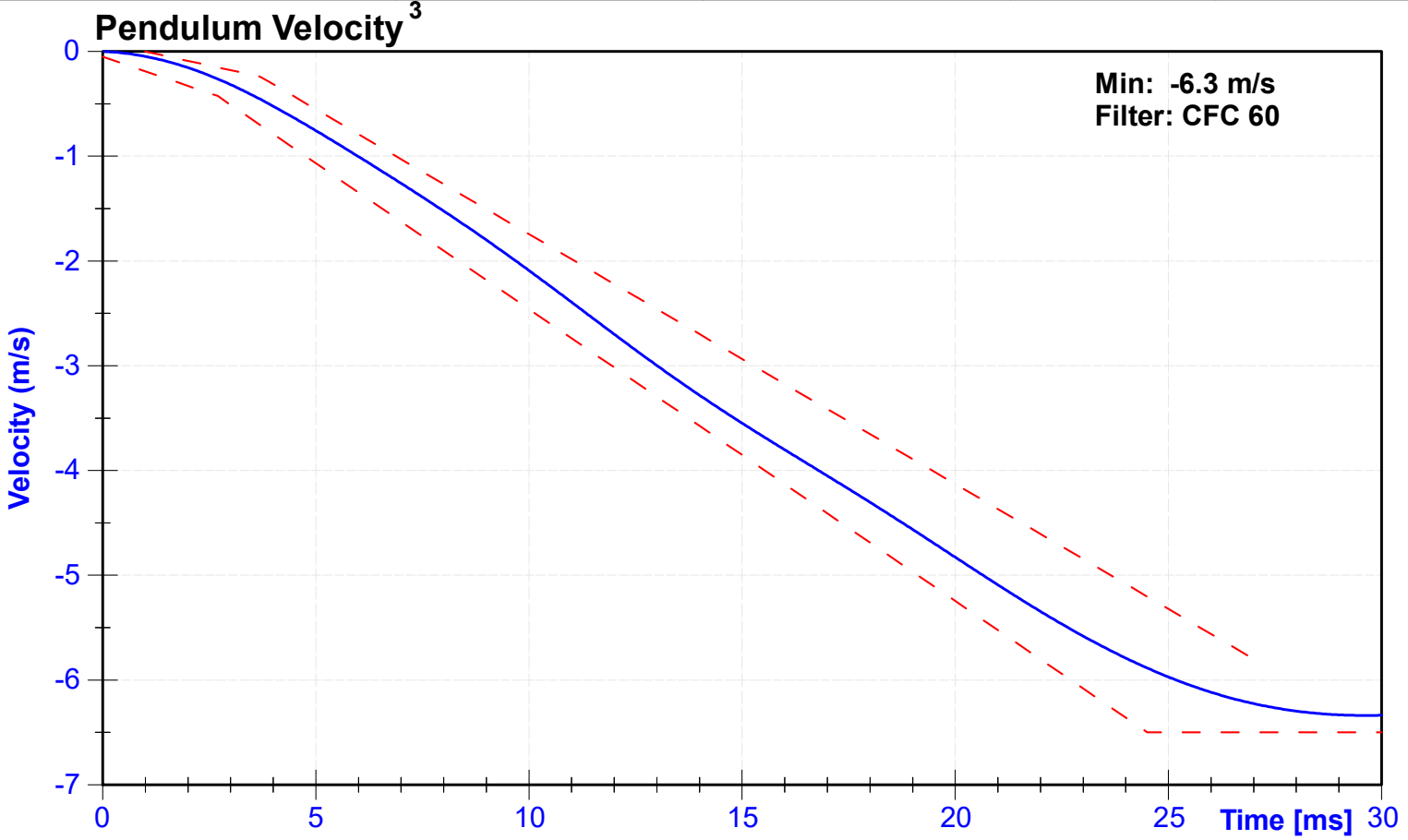
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

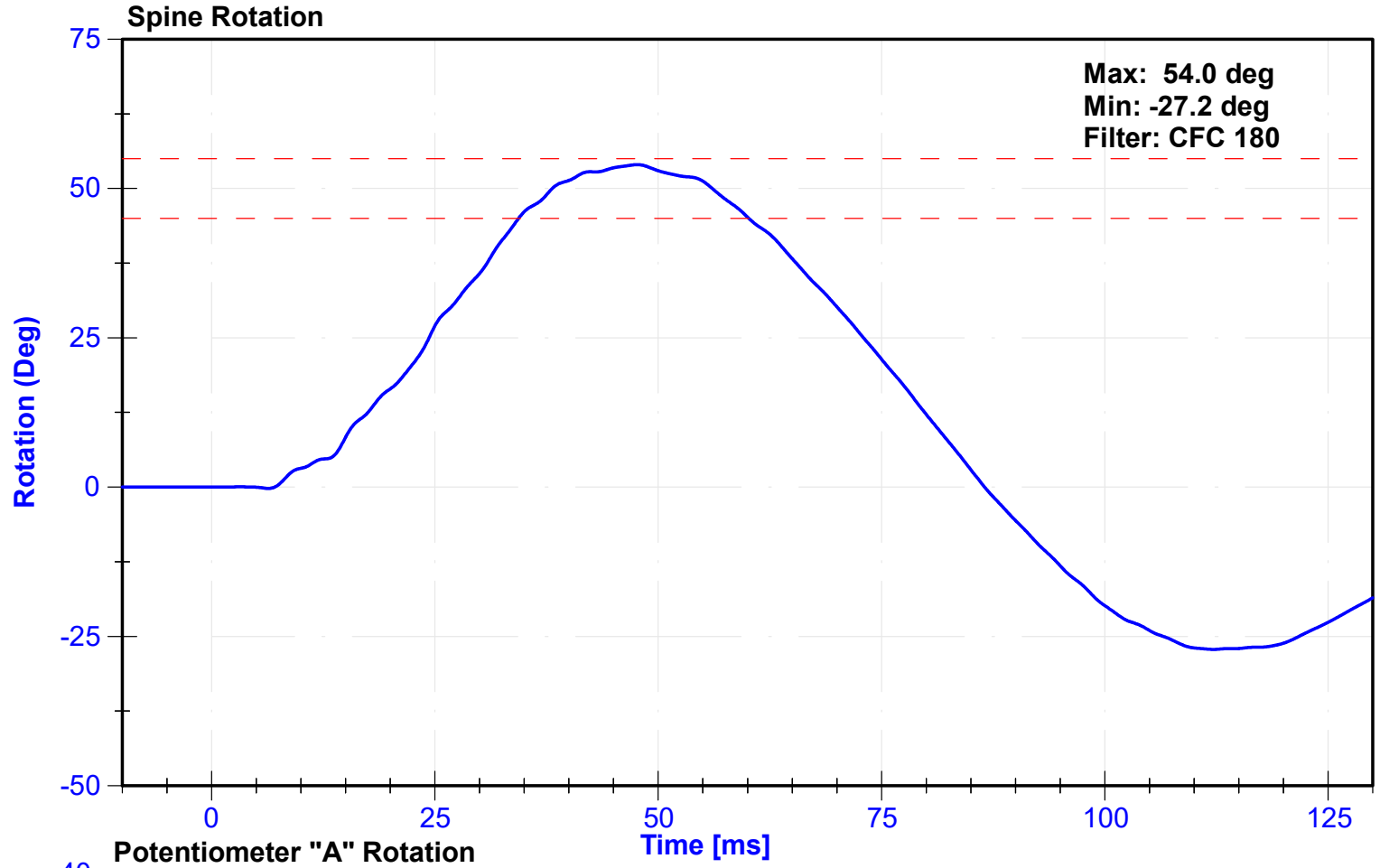
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	42.2	Pass
Velocity	5.95	6.15	m/s	6.040	Pass
Lateral Spine Rotation	45	55	deg	54.0	Pass
Time at Maximum Rotation	39	53	ms	47.6	Pass
Time of Decay to Zero Degrees	37	57	ms	38.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

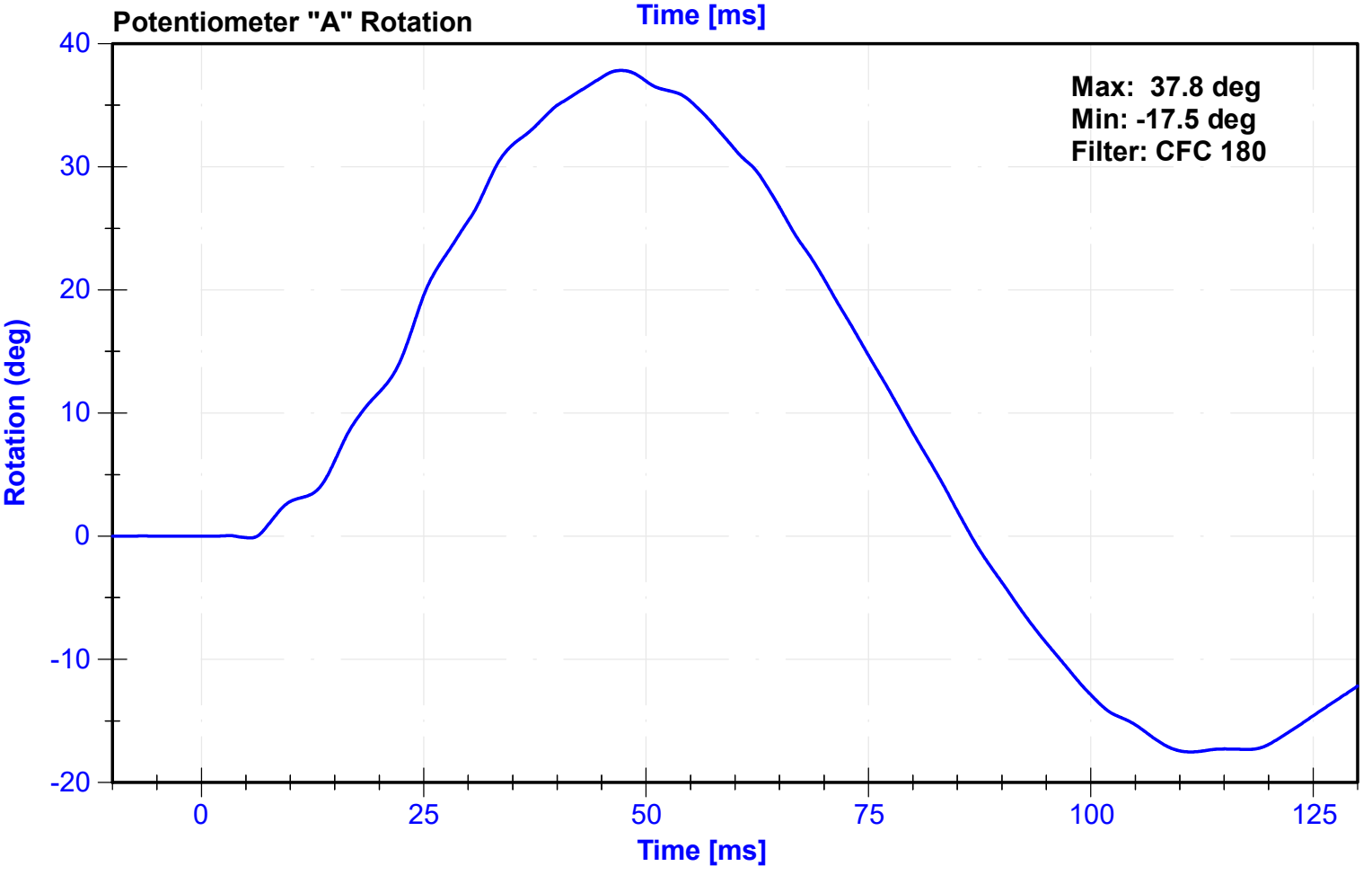
Transducer Calibrations

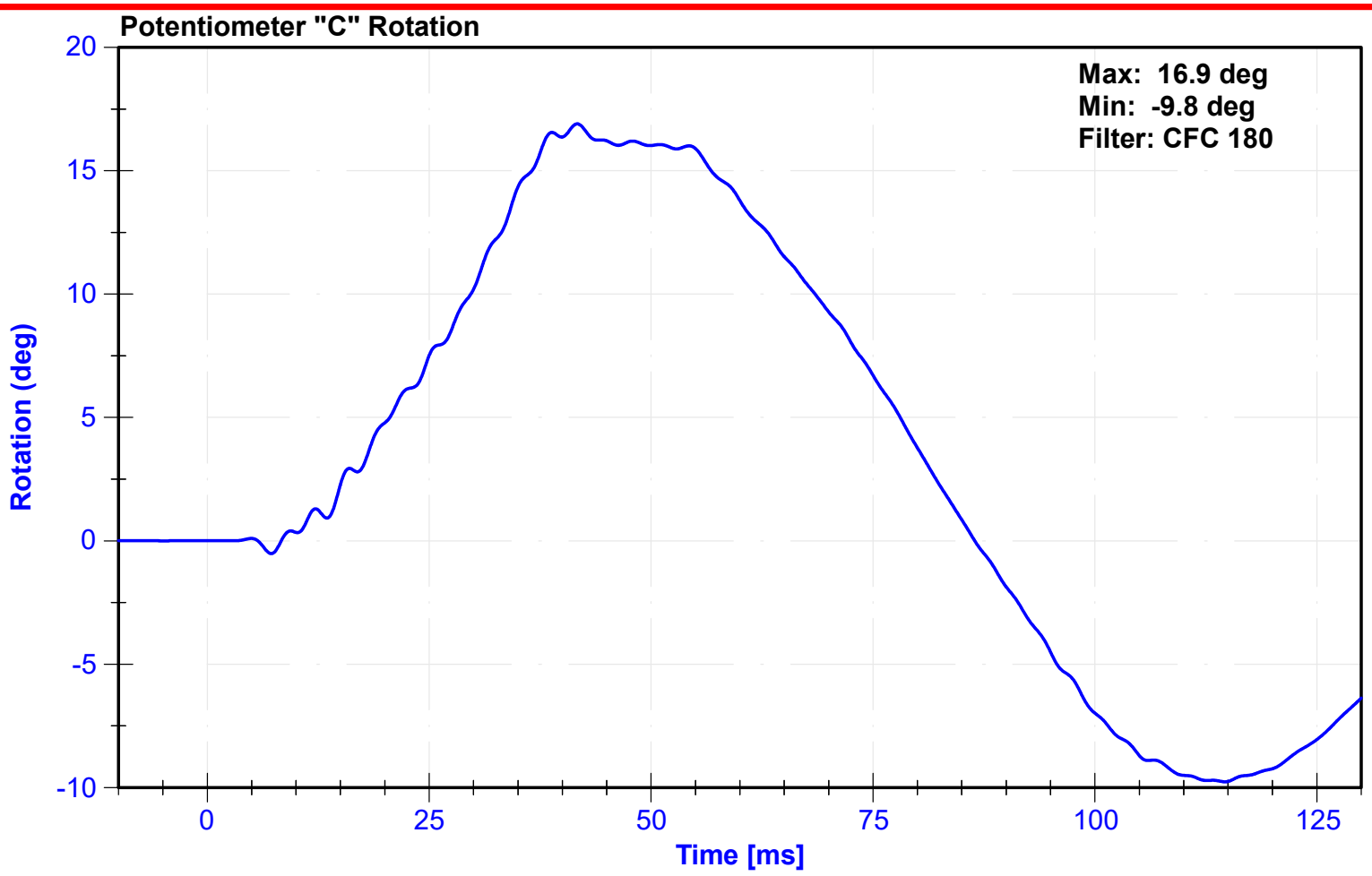
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/28/2021	10/28/2022
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



[1,2] Upper and lower boundaries specified in Appendix I


Spine Rotation
Max: 54.0 deg
Min: -27.2 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 37.8 deg
Min: -17.5 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



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

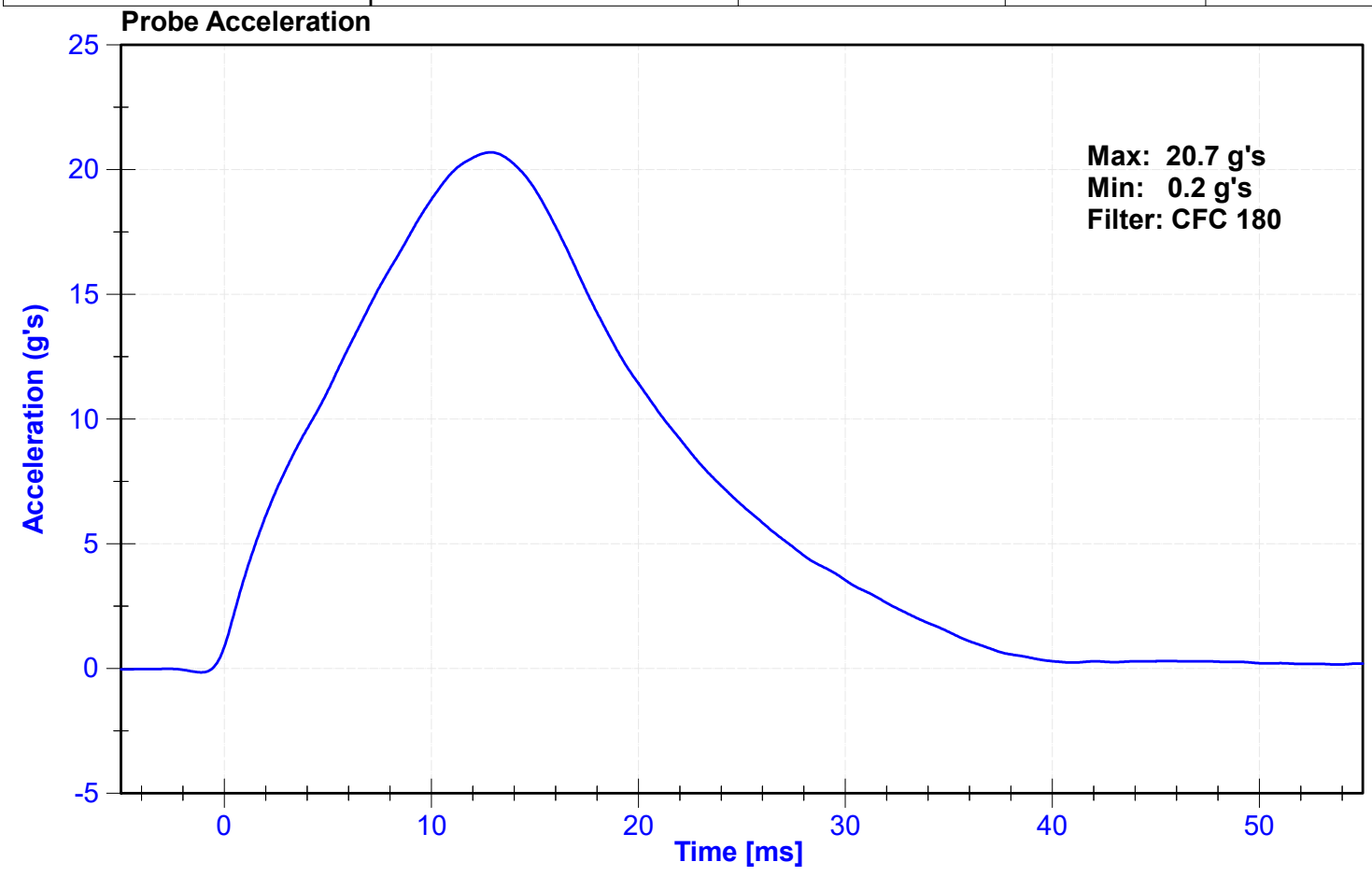
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

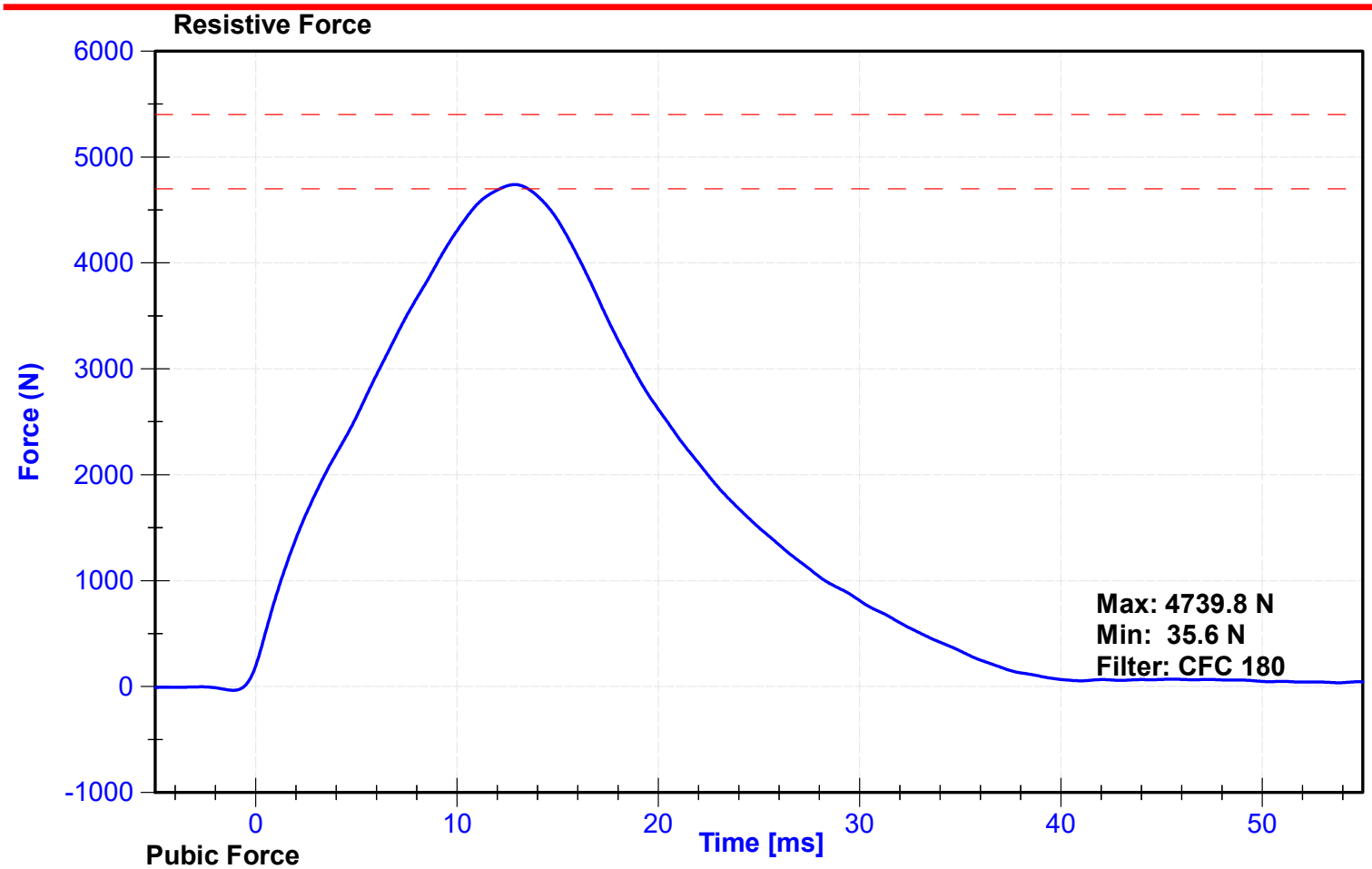
Results

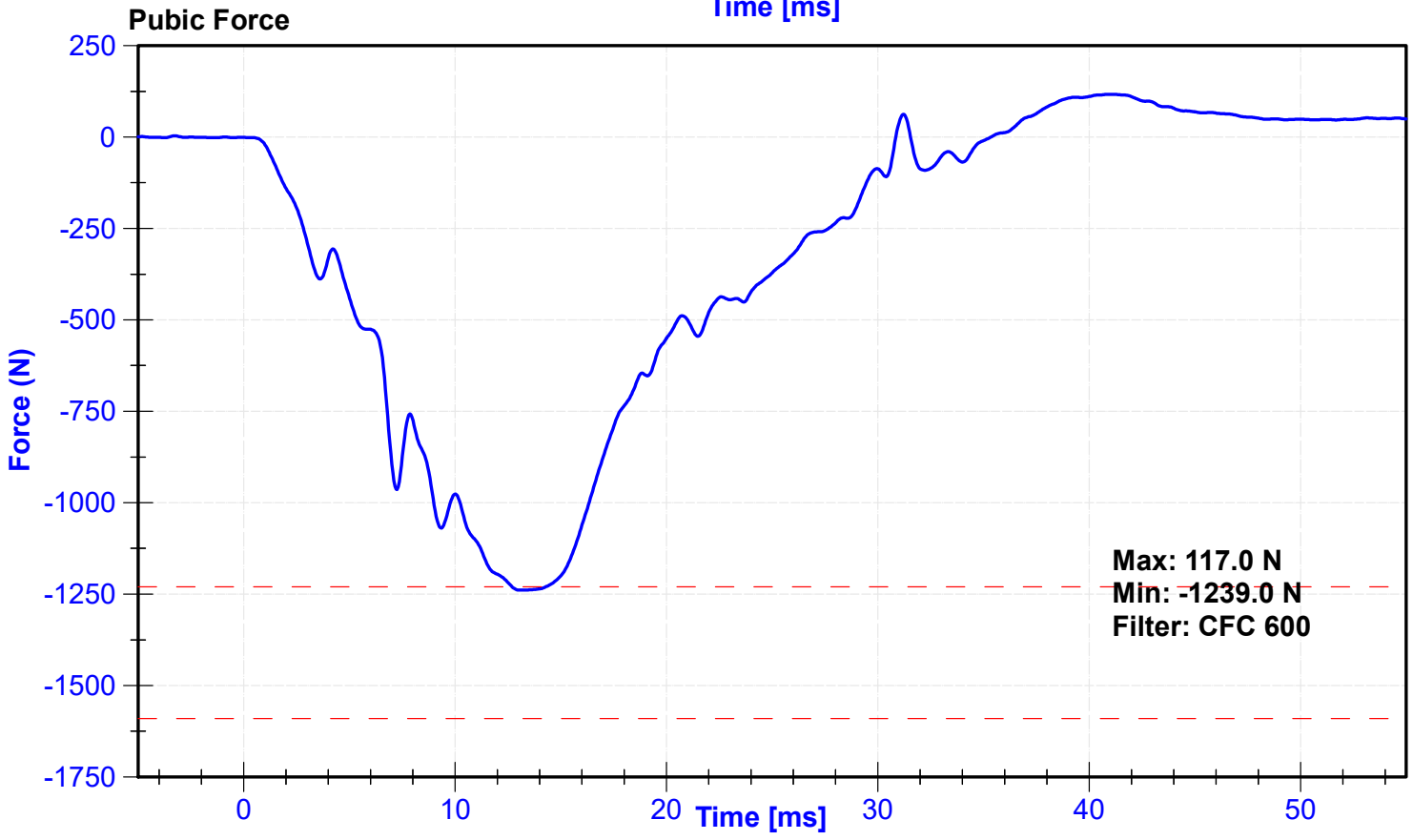
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	38.1	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Resistive Force	4700	5400	N	4739.8	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.85	Pass
Pubic Force	-1590	-1230	N	-1239.0	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.15	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Pubic Load Cell	Denton	459-FY	6/14/2022	6/14/2023




Resistive Force
Force (N)
Time [ms]
Max: 4739.8 N
Min: 35.6 N
Filter: CFC 180


Pubic Force
Force (N)
Time [ms]
Max: 117.0 N
Min: -1239.0 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

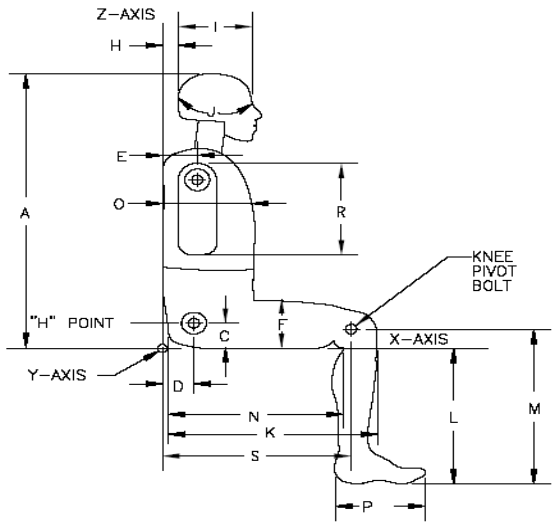
SERIAL NO:300

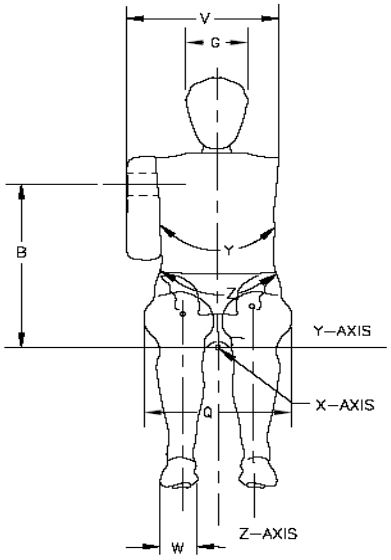
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 10/17/2022

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	444	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	105	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	42	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	545	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	400	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	201	Pass
P	Foot Length	216	232	223	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	315	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	86	Pass
Y	Chest Circumference w/jacket	851	881	876	Pass
Z	Waist Circumference	761	791	775	Pass

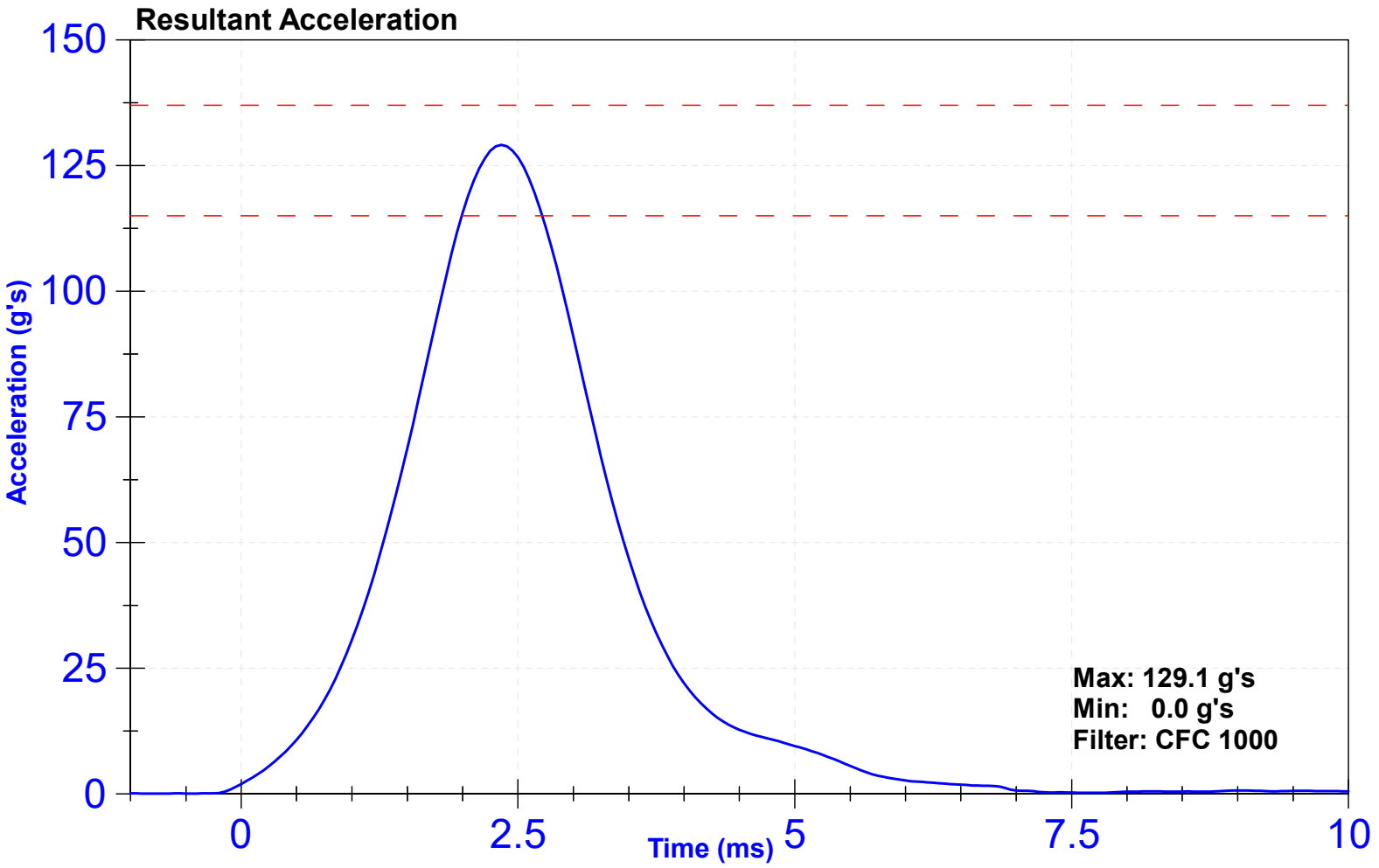
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

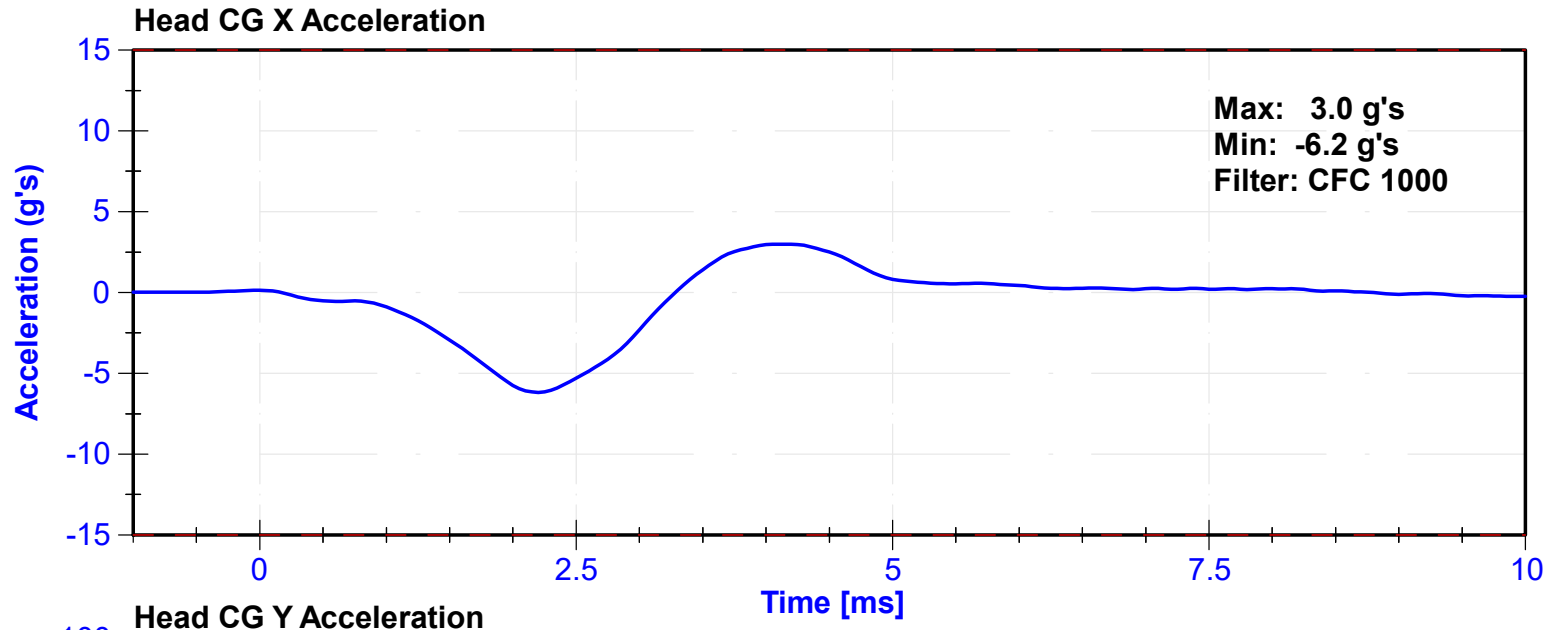
Results

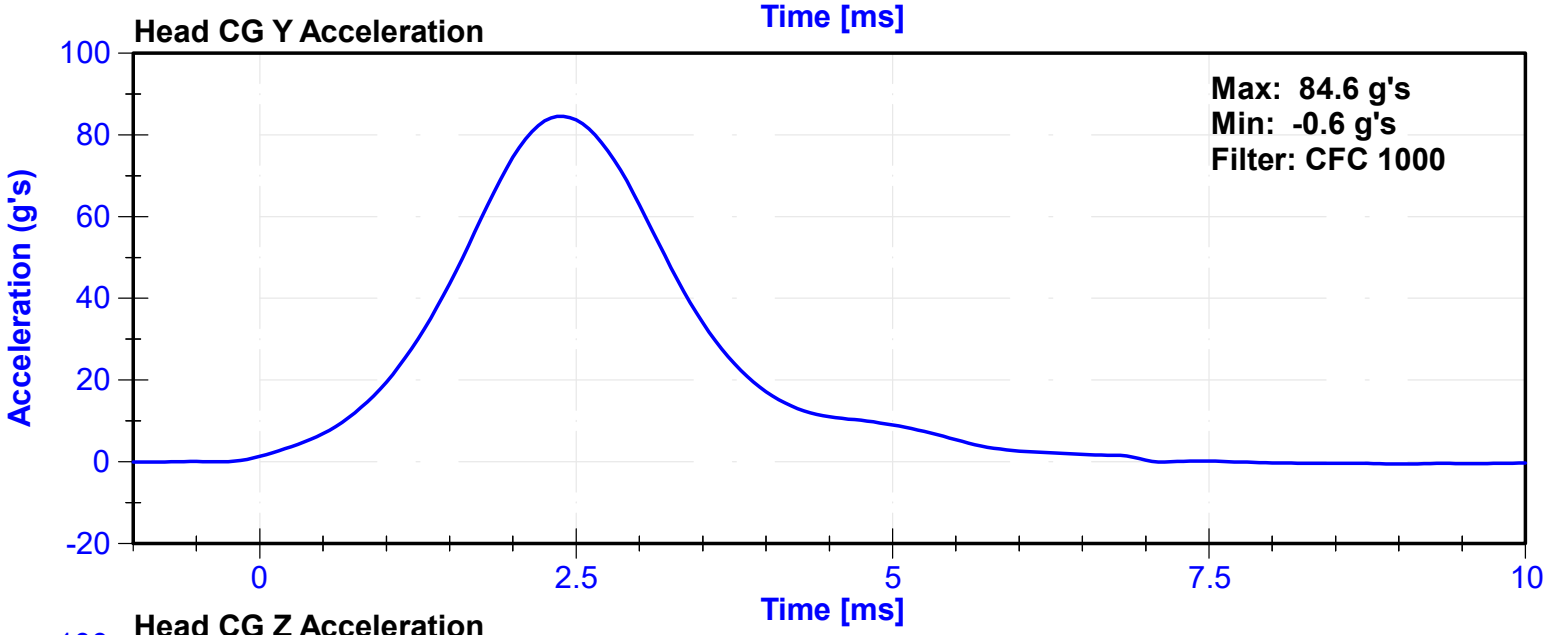
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	42.2	Pass
Resultant Acceleration	115	137	g's	129.1	Pass
Oscillation	0	15	%	0.5	Pass
Fore-Aft Acceleration	-15	15	g's	-6.2	Pass

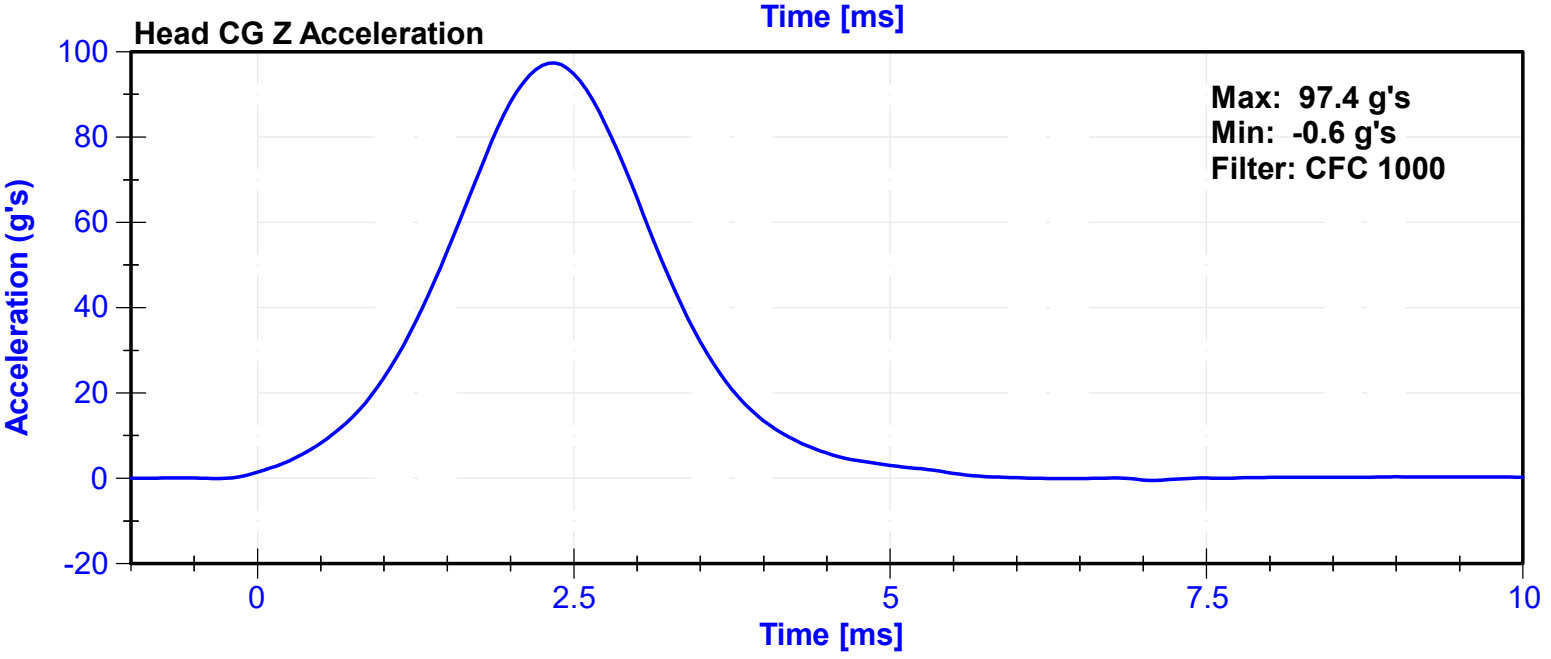
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	10/3/2022	4/1/2023
Y Accelerometer	Endevco	P58777	10/3/2022	4/1/2023
Z Accelerometer	Endevco	P79189	10/3/2022	4/1/2023




Head CG X Acceleration
Max: 3.0 g's
Min: -6.2 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 84.6 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 97.4 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]

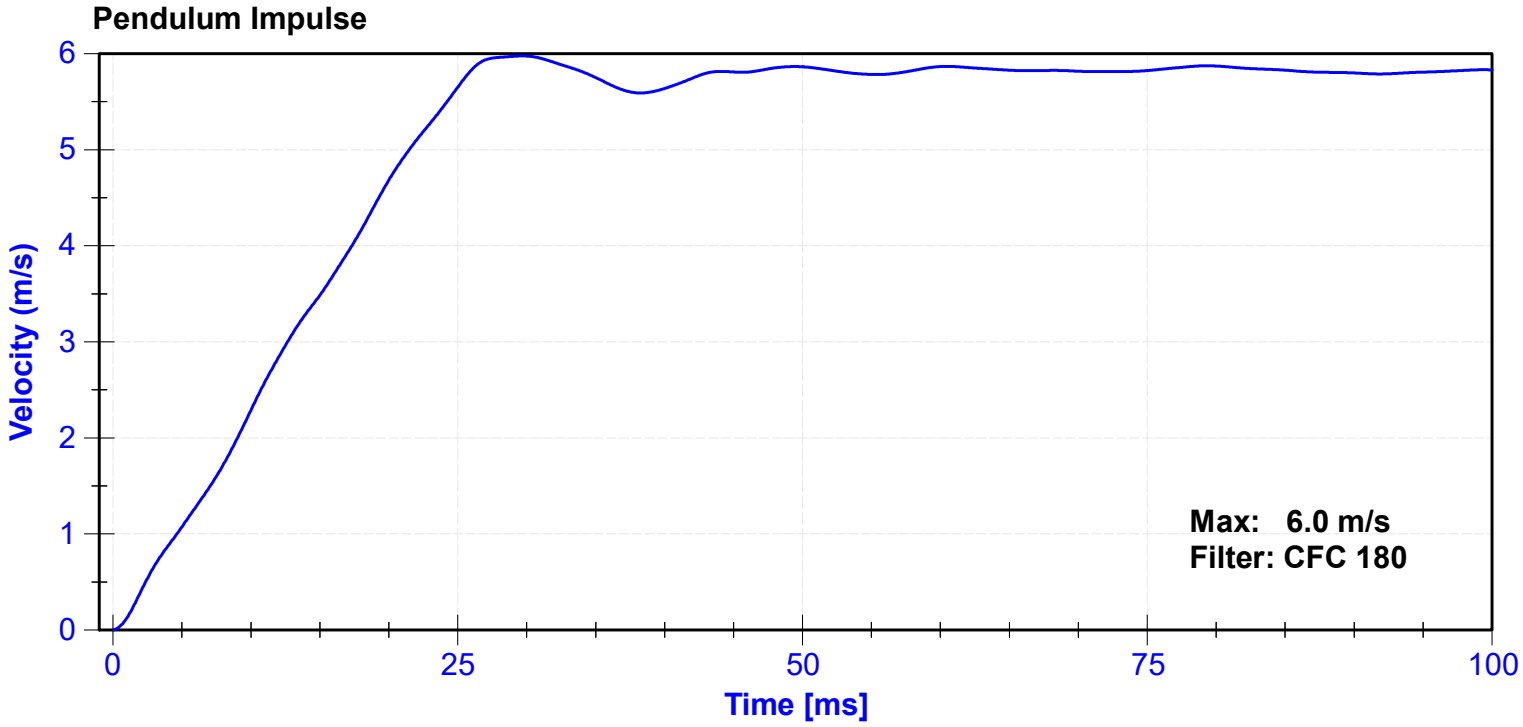
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

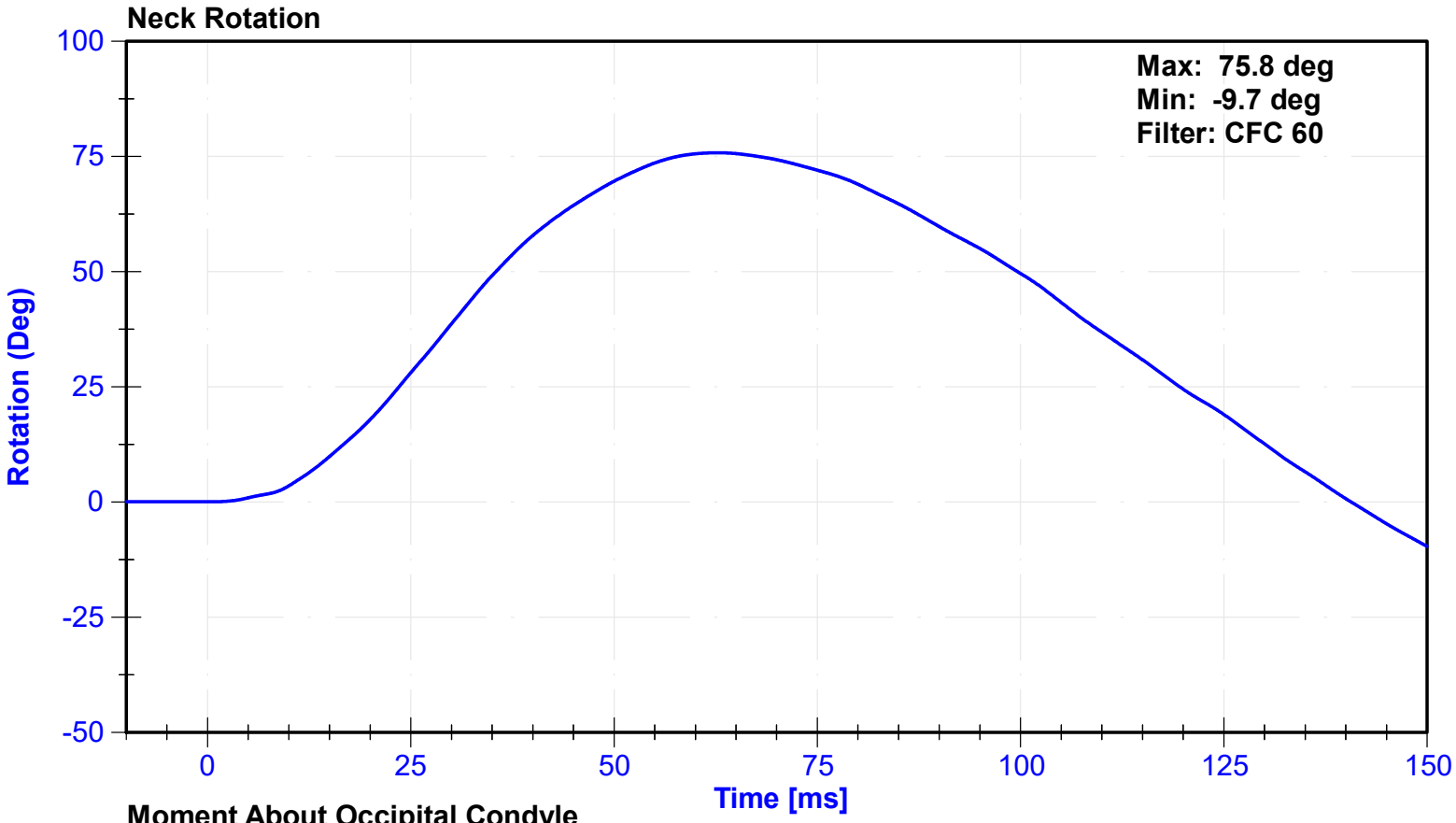
Results

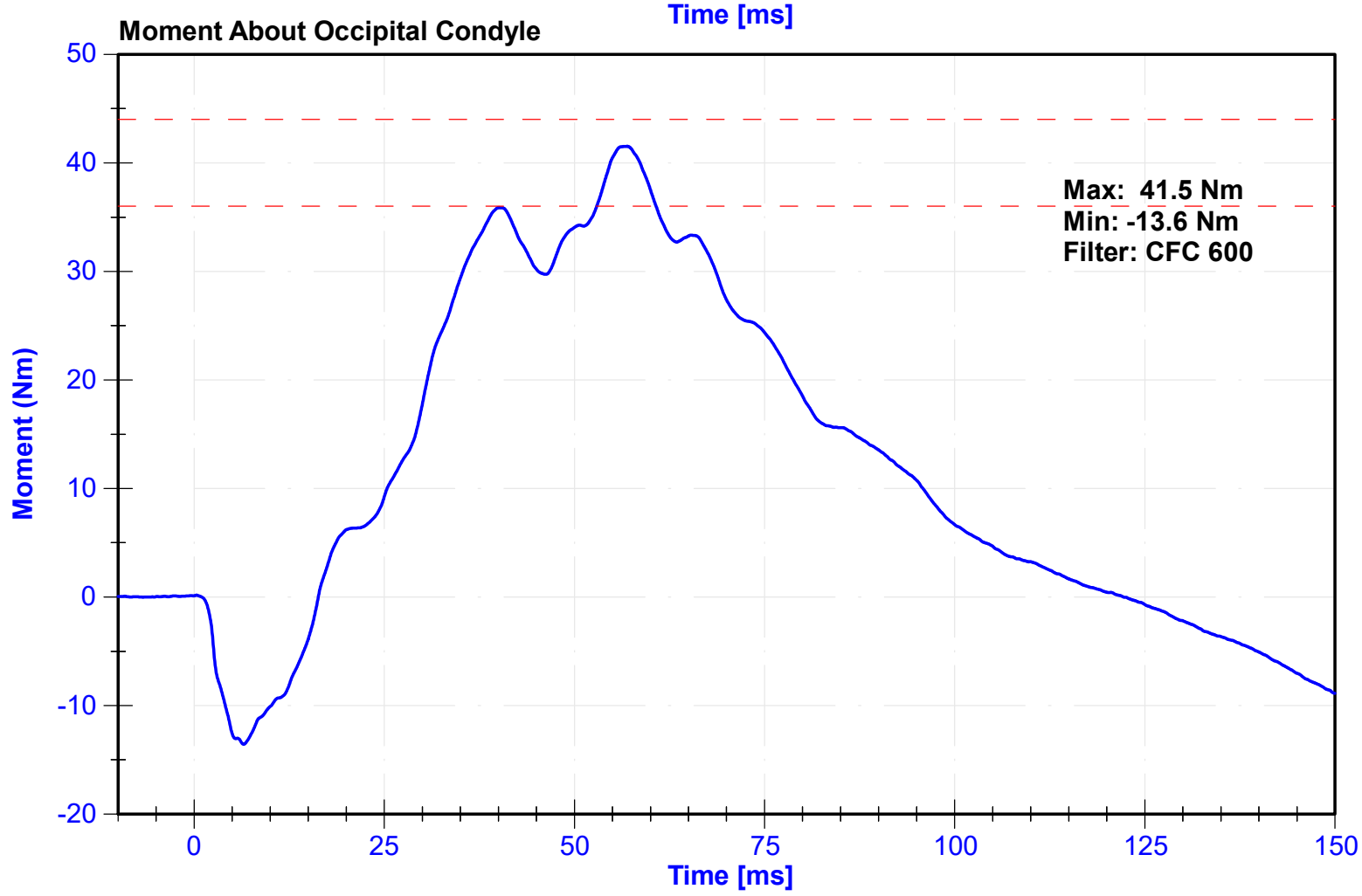
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	42.2	Pass
Velocity	5.51	5.63	m/s	5.594	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.29	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.49	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.68	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.65	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.97	Pass
Neck Rotation	71	81	deg	75.8	Pass
Time at Maximum Rotation	50	70	ms	62.7	Pass
Moment about the OC	36	44	Nm	41.5	Pass
Moment Decay to 0 Nm	102	126	ms	122.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231CT	10/28/2021	10/28/2022
Pendulum Potentiometer	Servo	4961	2/23/2022	2/23/2023
Condyle Potentiometer	Servo	DS185	11/12/2021	11/12/2022
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023




Neck Rotation
Max: 75.8 deg
Min: -9.7 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 41.5 Nm
Min: -13.6 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

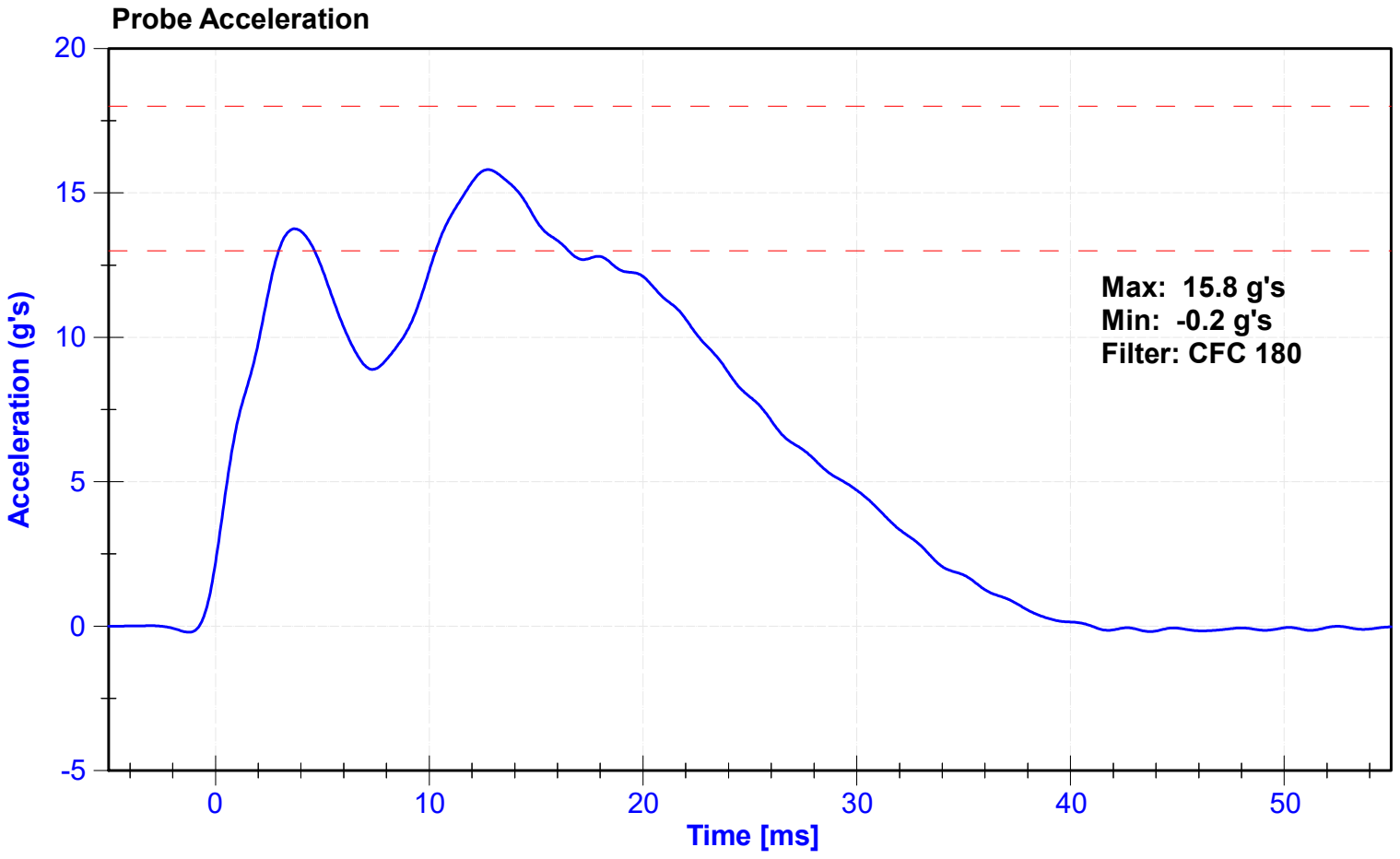
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

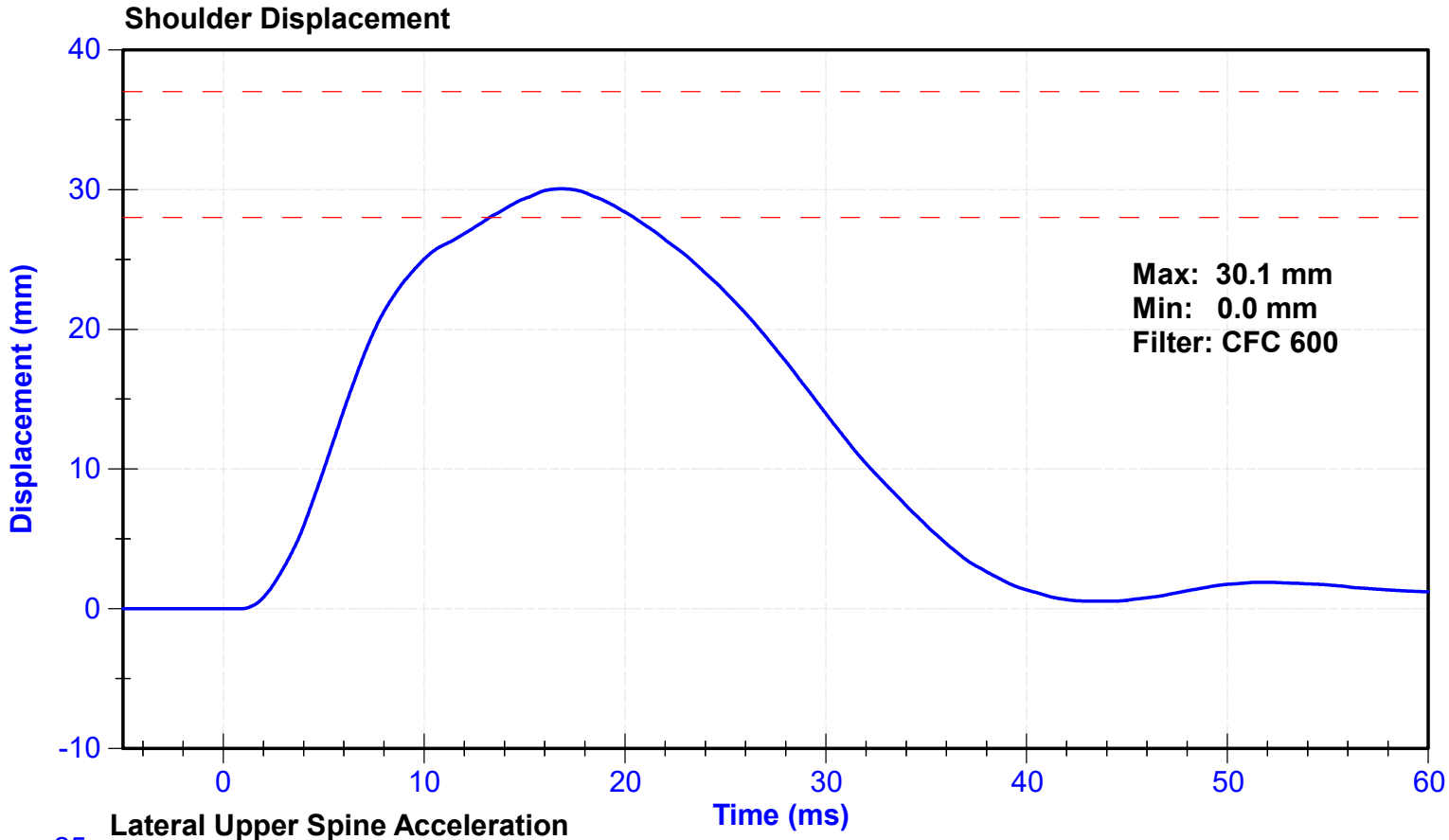
Results

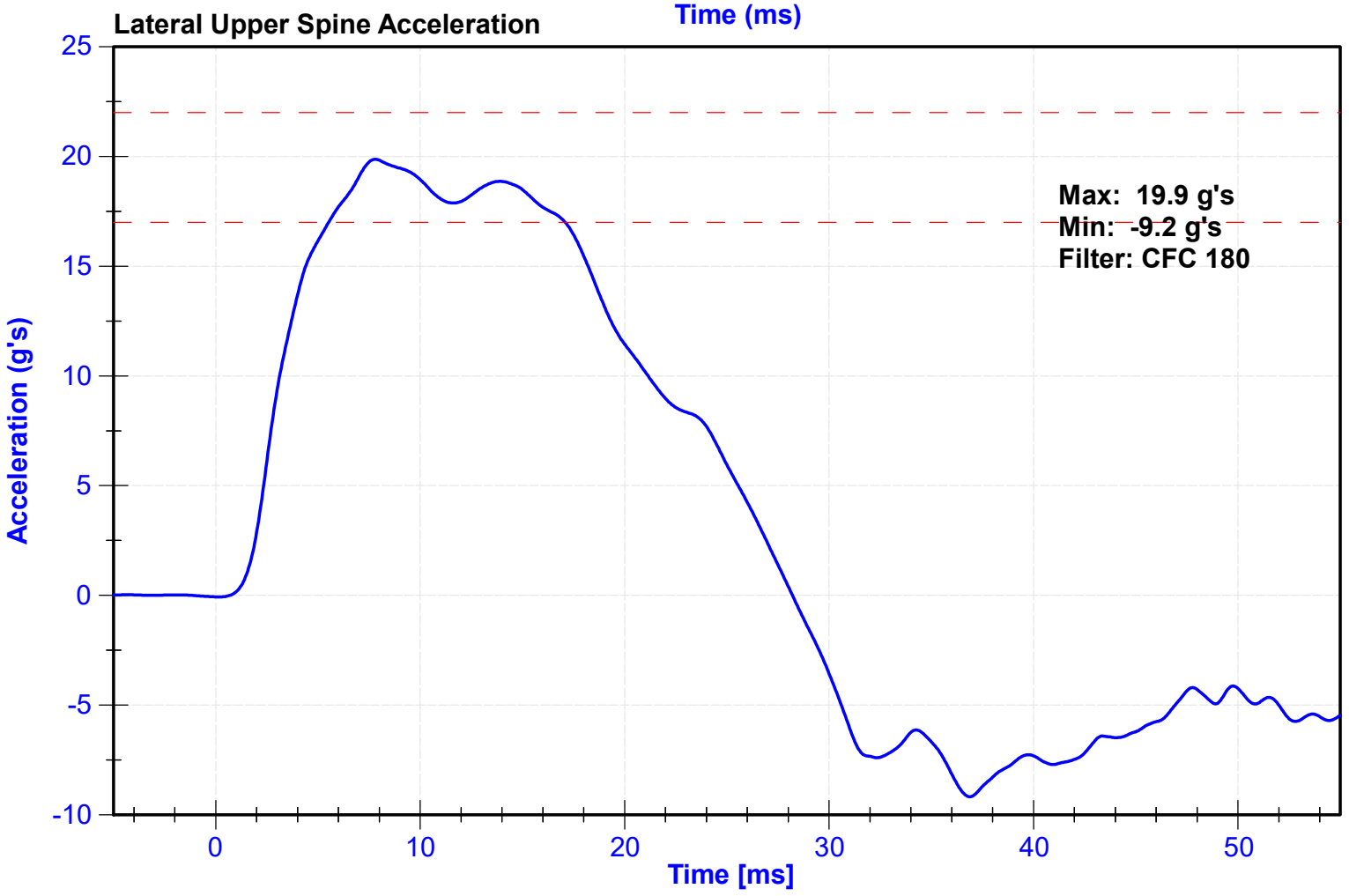
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	30.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023




Shoulder Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time (ms)
Max: 30.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]
Max: 19.9 g's
Min: -9.2 g's
Filter: CFC 180

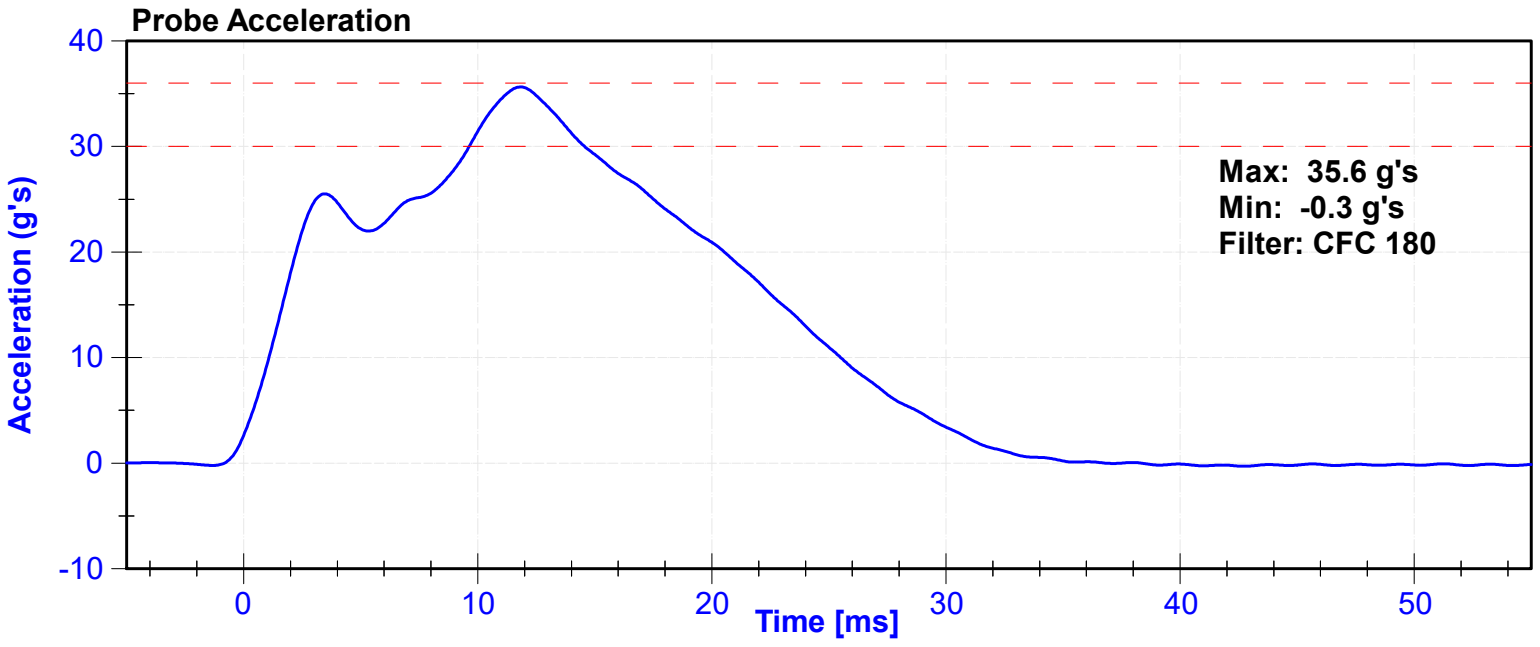
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

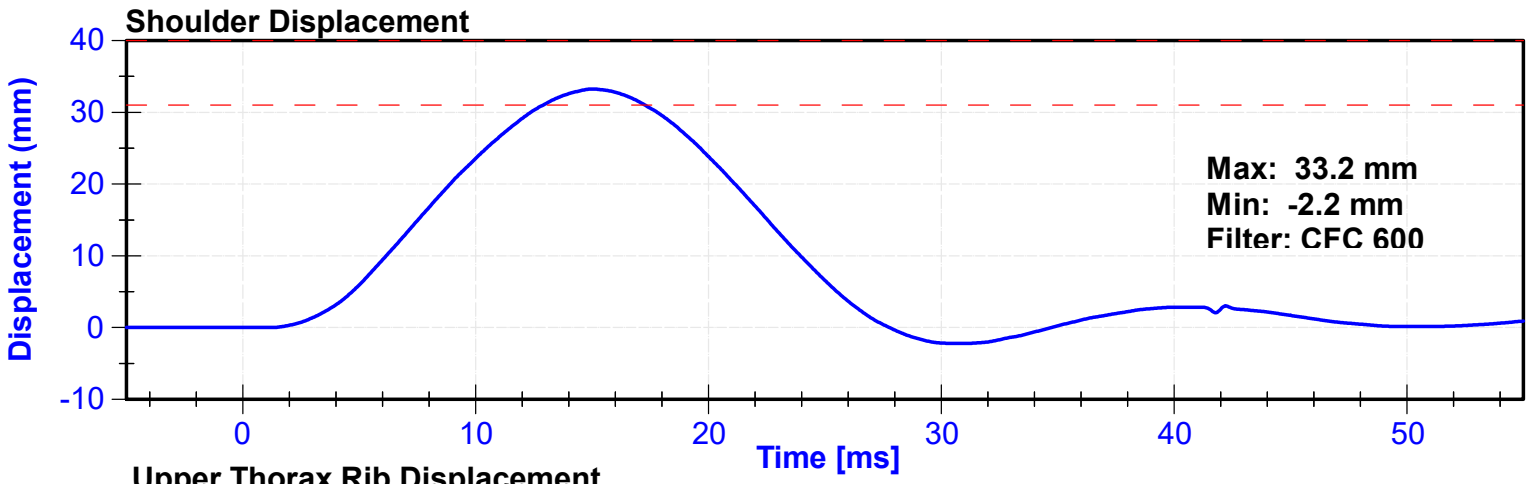
Results

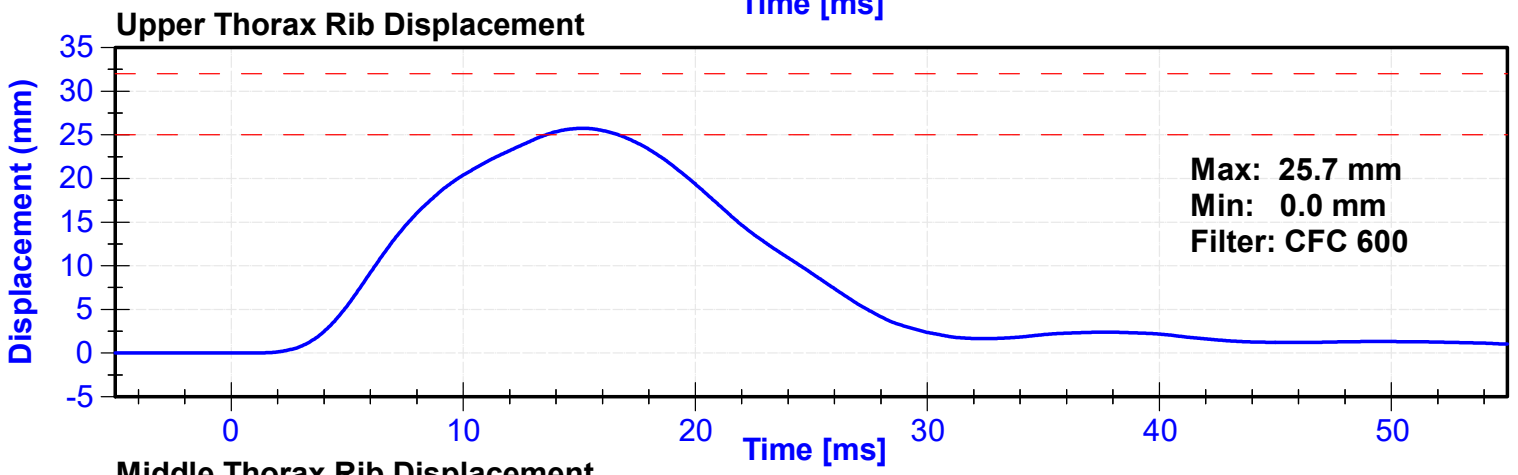
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.1	Pass
Velocity	6.6	6.8	m/s	6.73	Pass
Probe Acceleration after 5 ms	30	36	g's	35.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.9	Pass
Lateral Lower Spine Acceleration	29	37	g's	35.3	Pass
Shoulder Deflection	31	40	mm	33.2	Pass
Upper Thorax Rib Deflection	25	32	mm	25.7	Pass
Mid Thorax Rib Deflection	30	36	mm	30.7	Pass
Lower Thorax Rib Deflection	32	38	mm	33.4	Pass

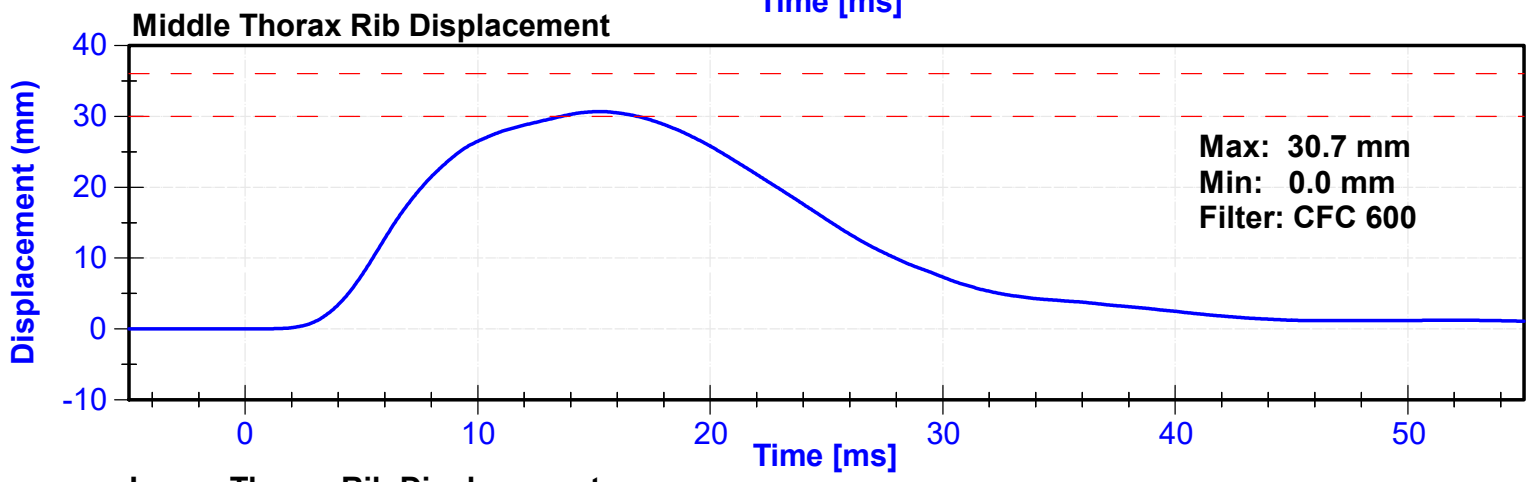
Transducer Calibrations

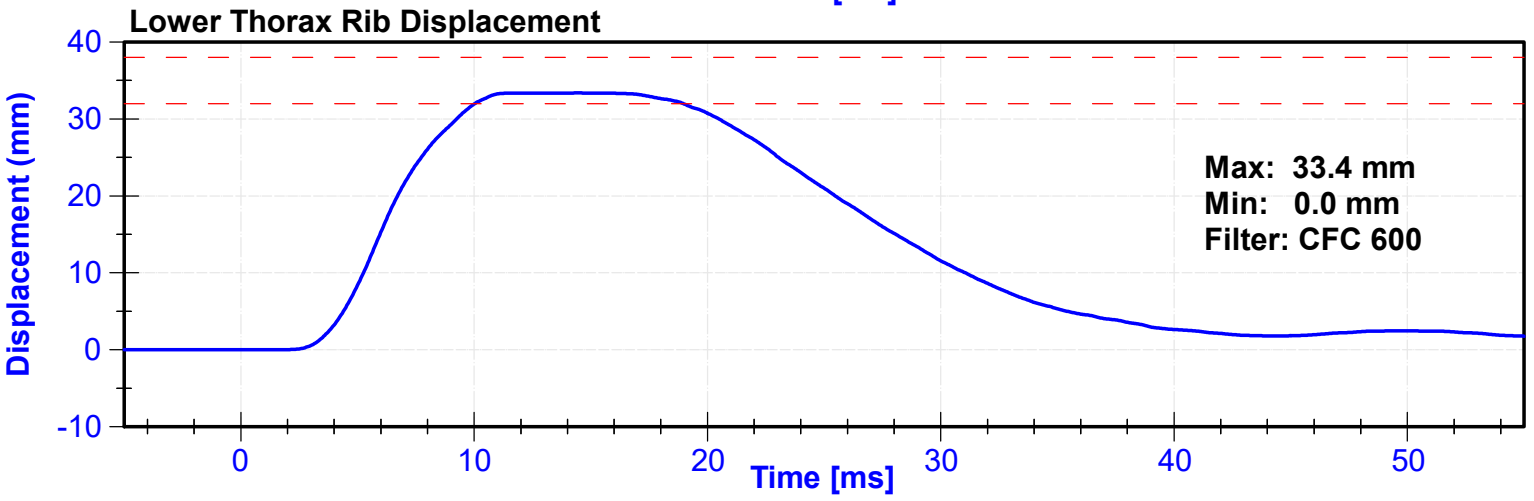
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine T1 Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

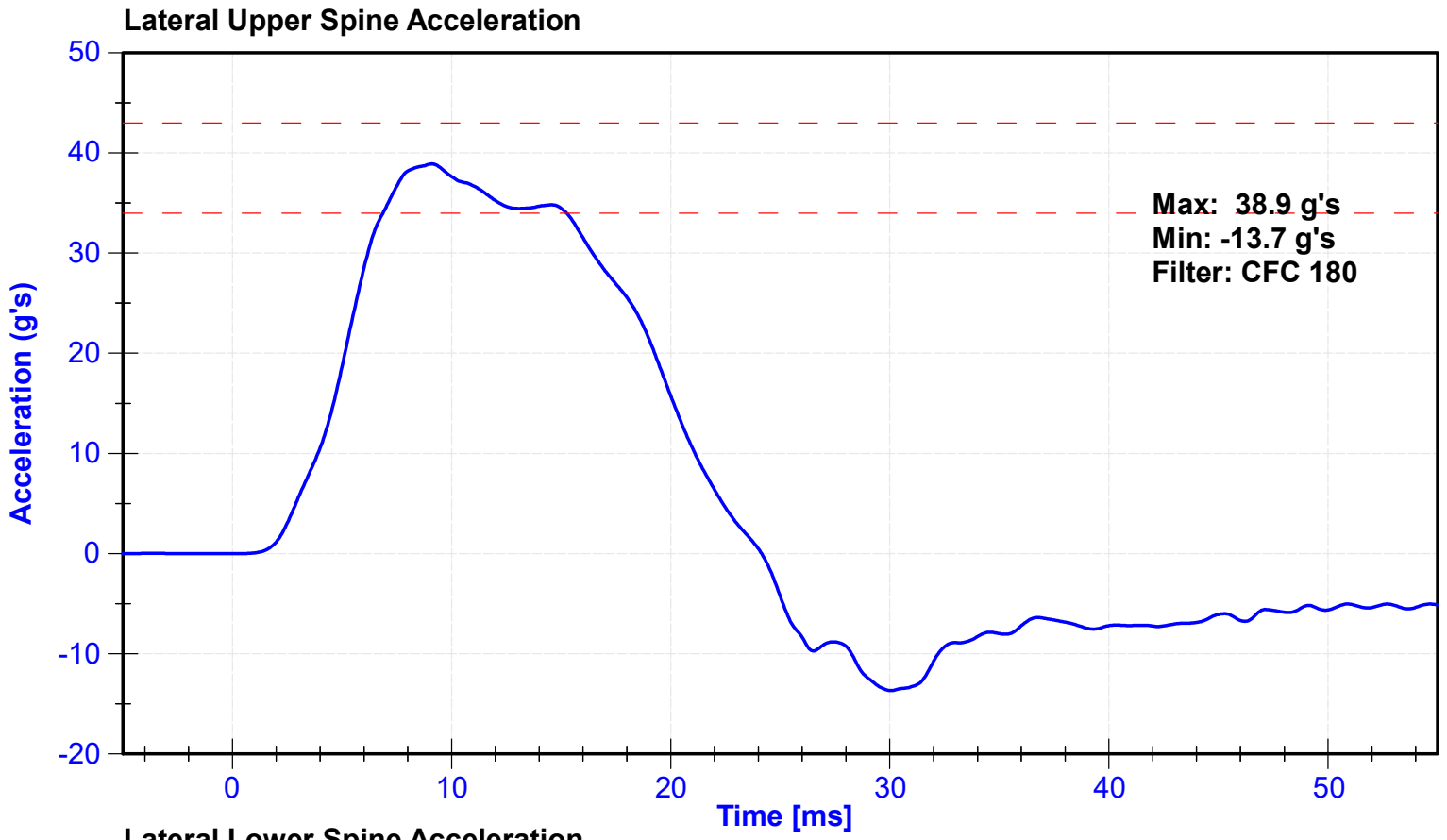


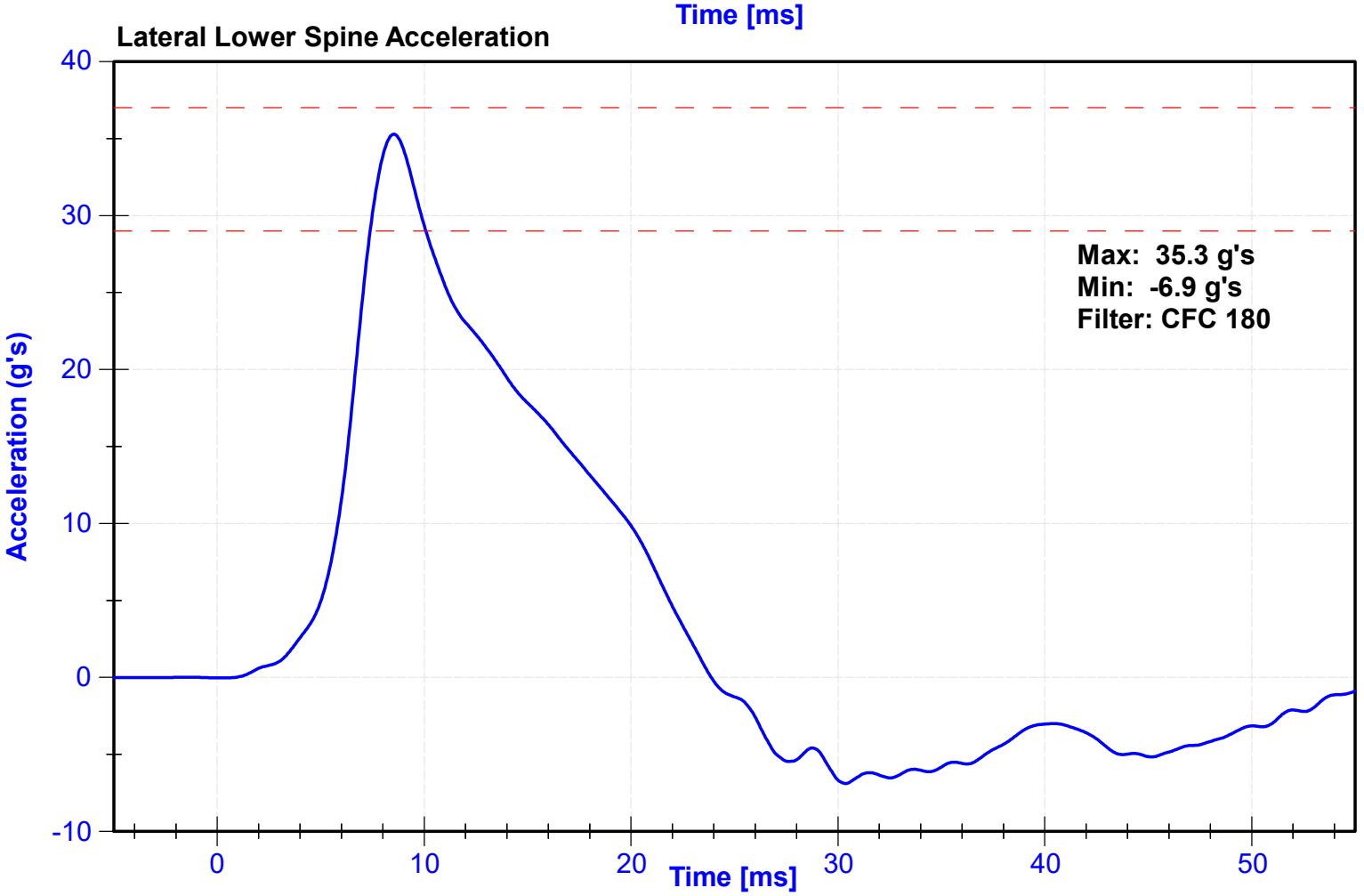

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.2 mm
Min: -2.2 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 25.7 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.7 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 38.9 g's
Min: -13.7 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 35.3 g's
Min: -6.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

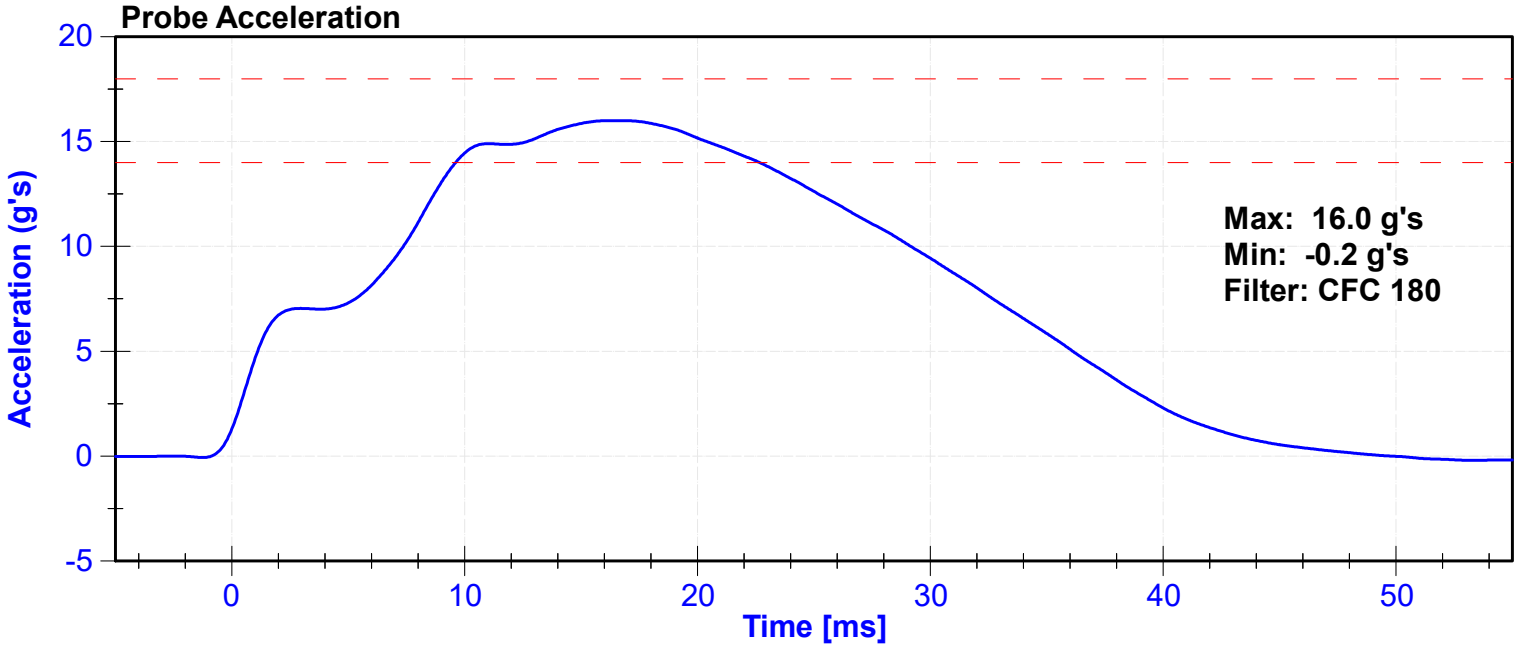
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

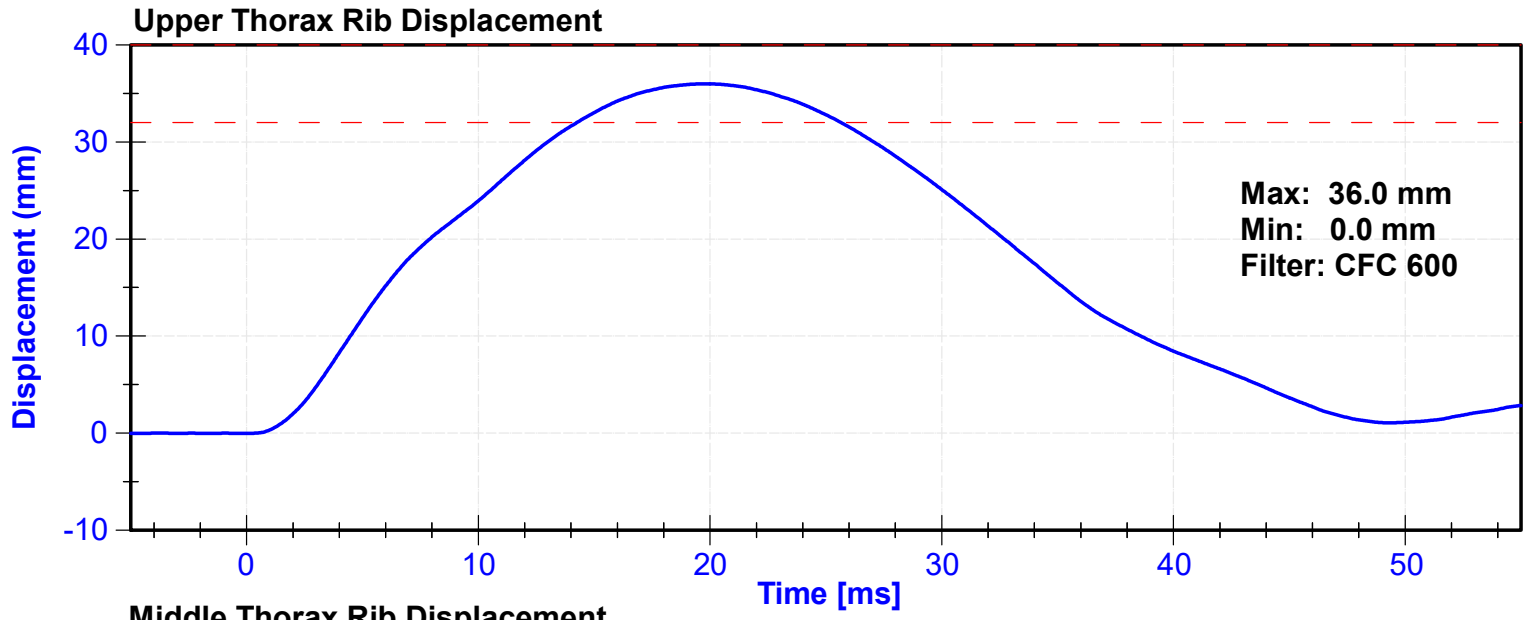
Results

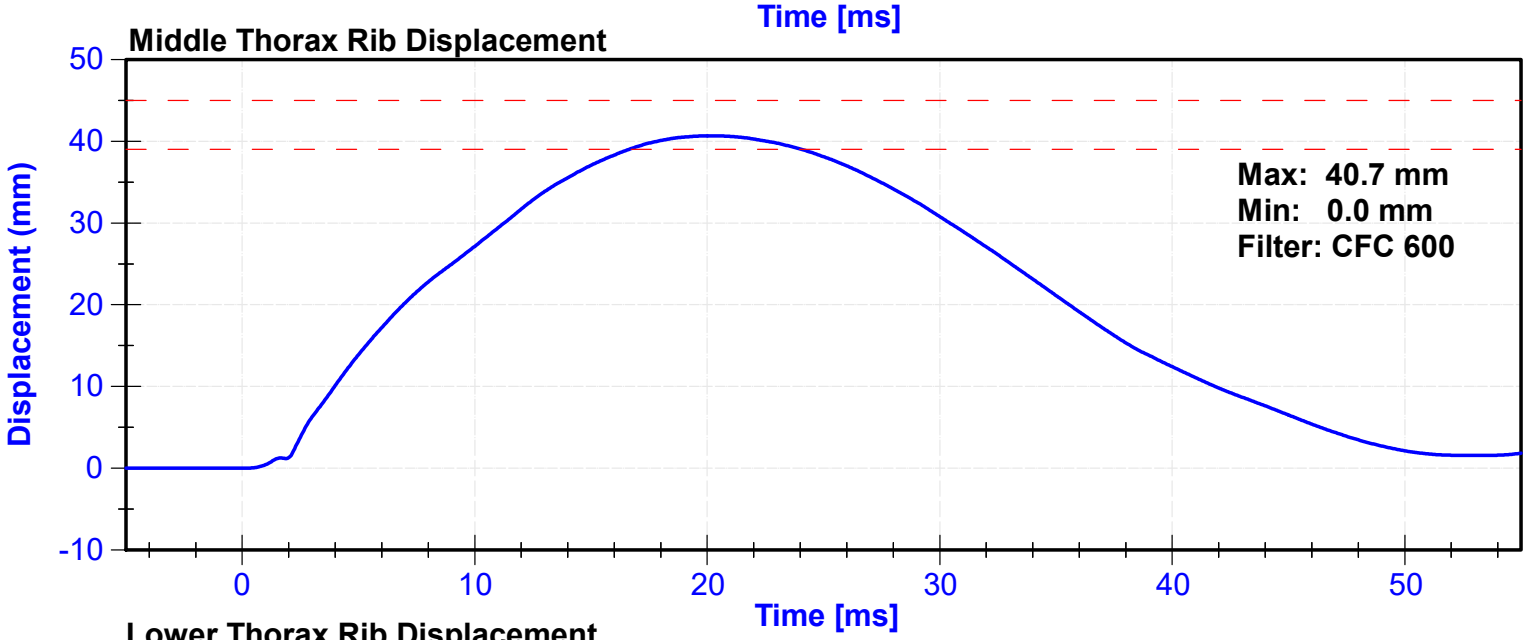
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.0	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.0	Pass
Lateral Lower Spine Acceleration	7	11	g's	8.9	Pass
Upper Thorax Rib Deflection	32	40	mm	36.0	Pass
Middle Thorax Rib Deflection	39	45	mm	40.7	Pass
Lower Thorax Rib Deflection	35	43	mm	37.9	Pass

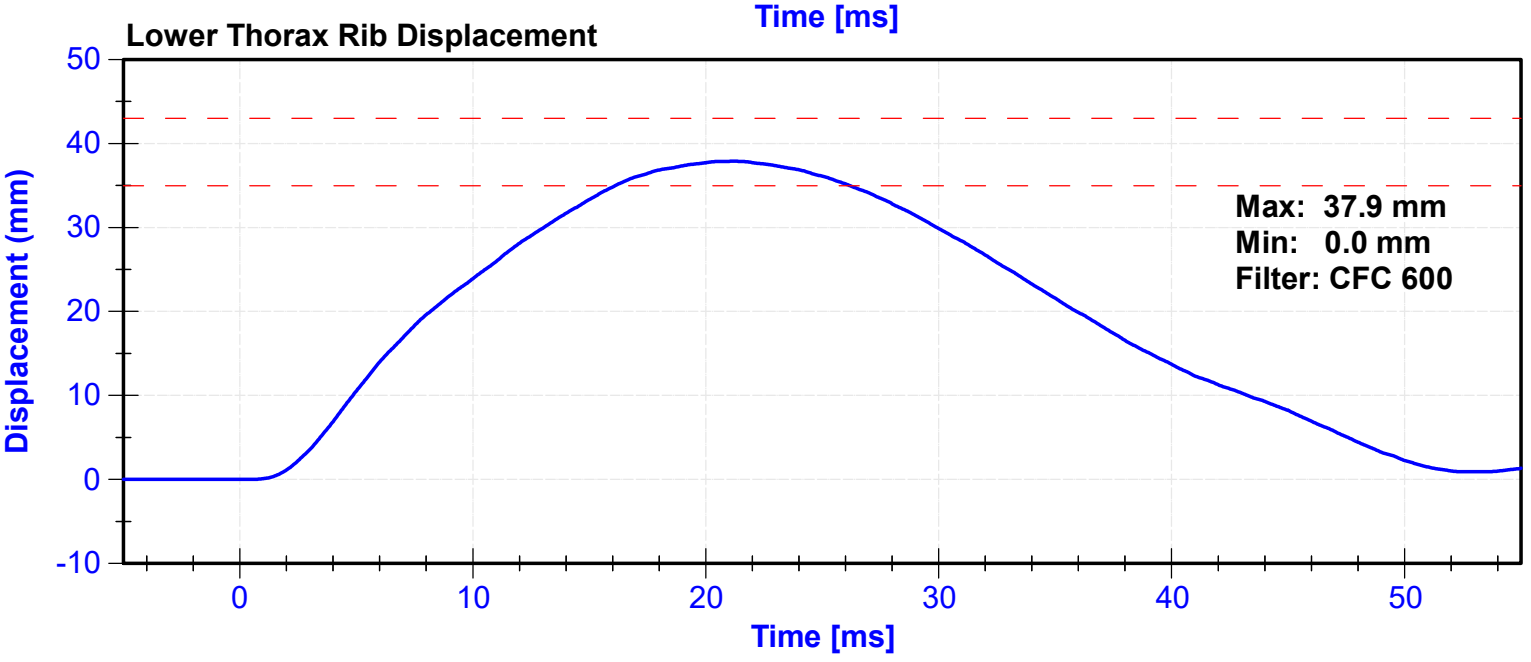
Transducer Calibrations

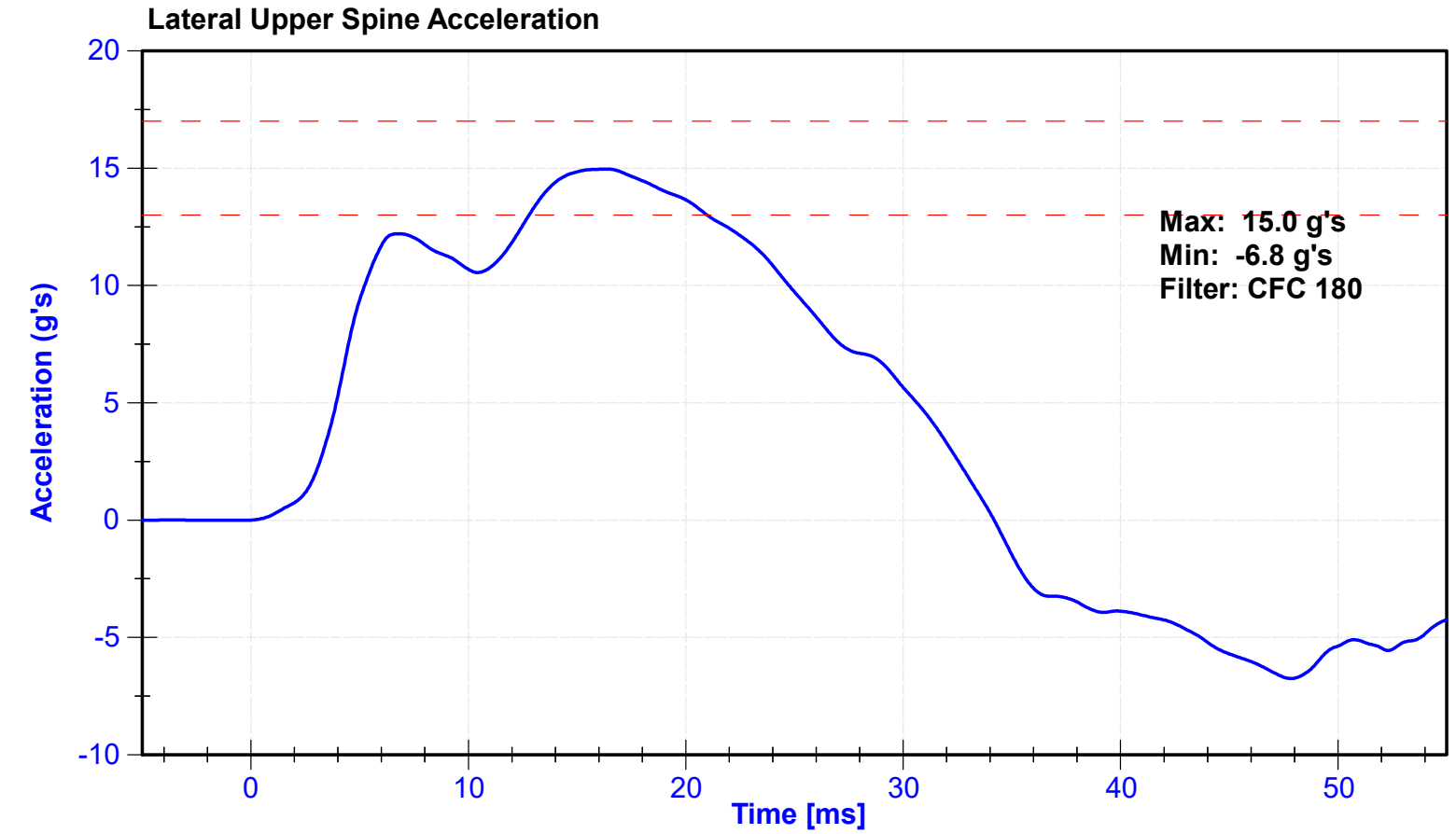
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

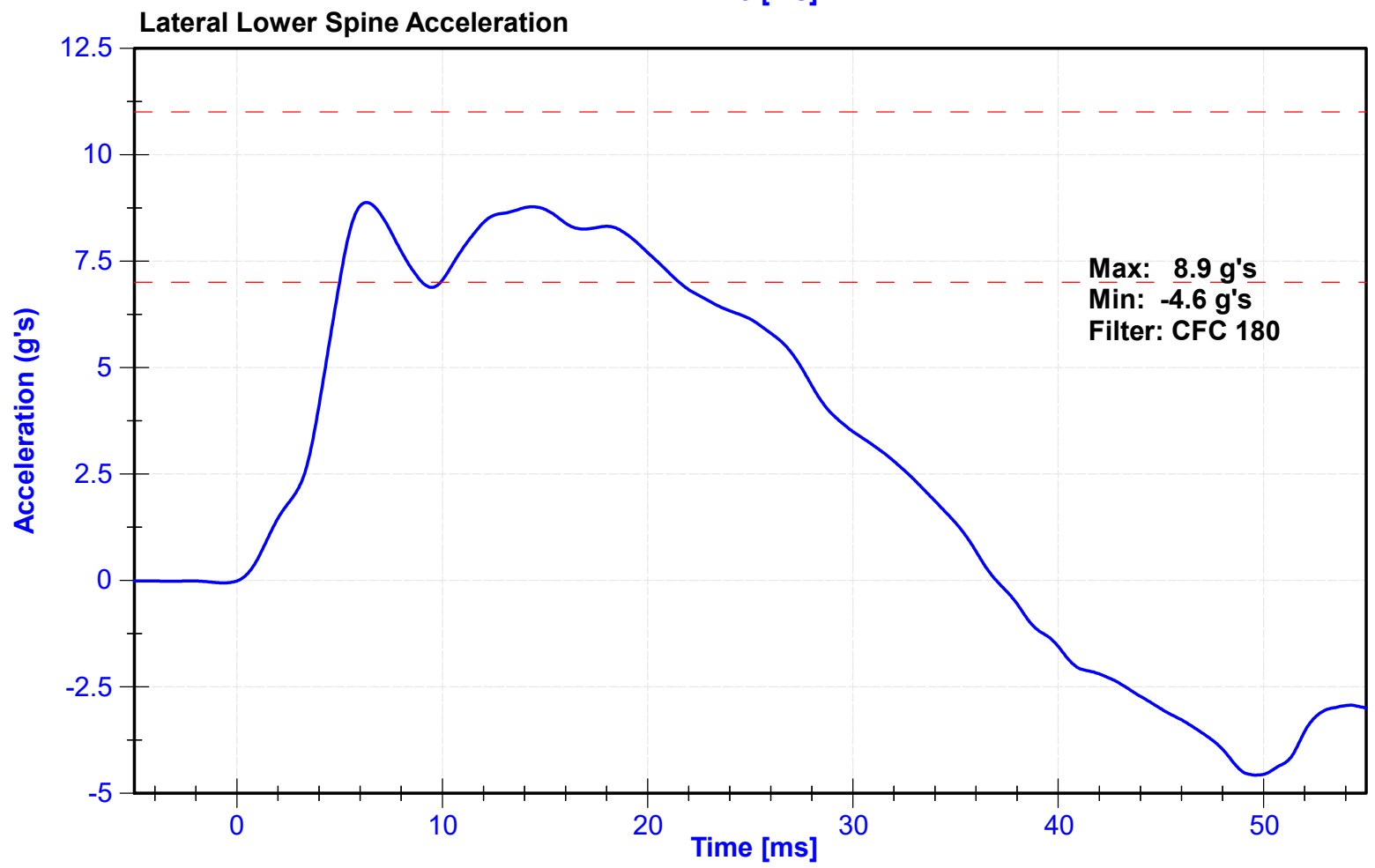



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.0 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.7 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.0 g's
Min: -6.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 8.9 g's
Min: -4.6 g's
Filter: CFC 180

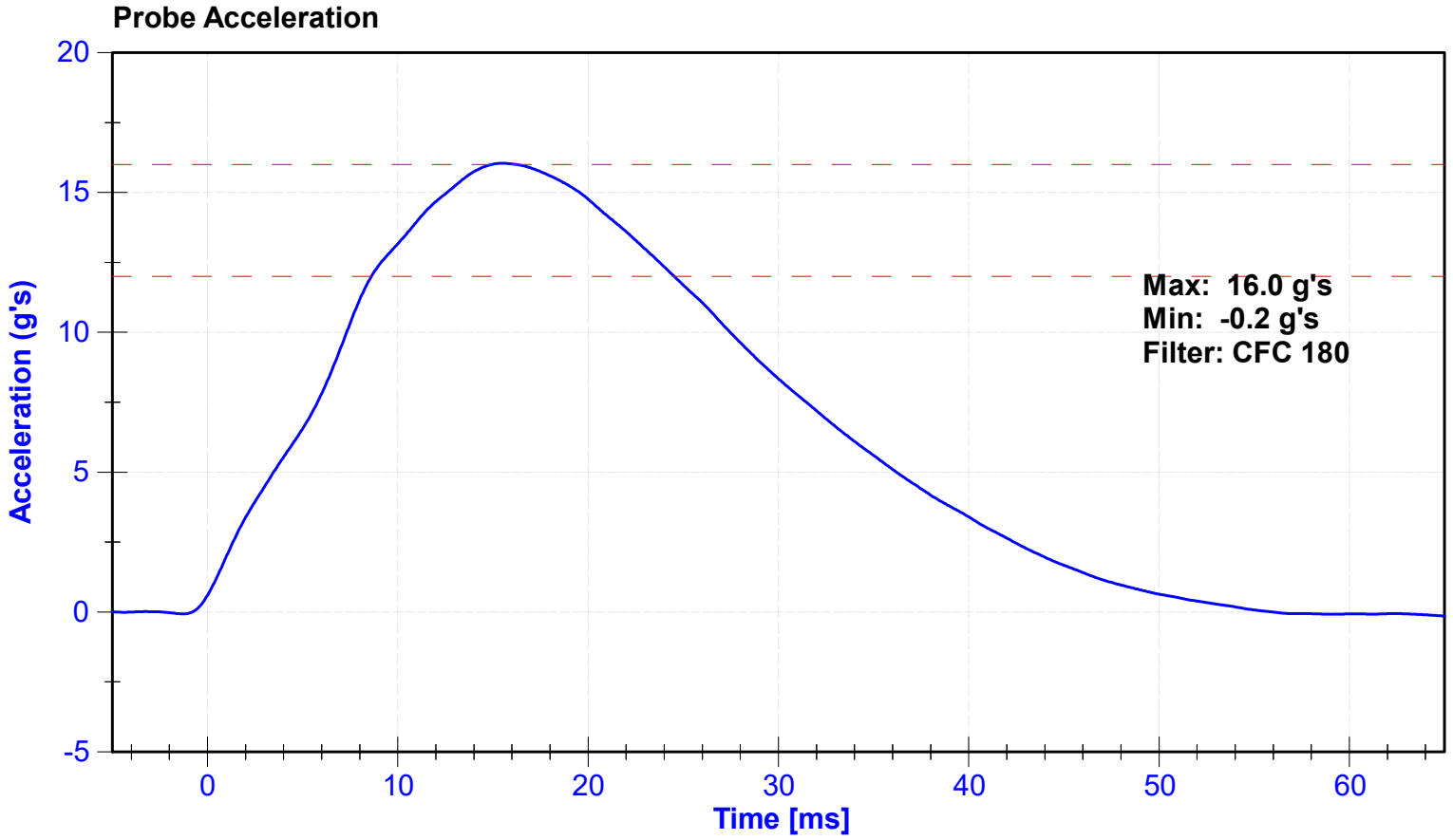
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

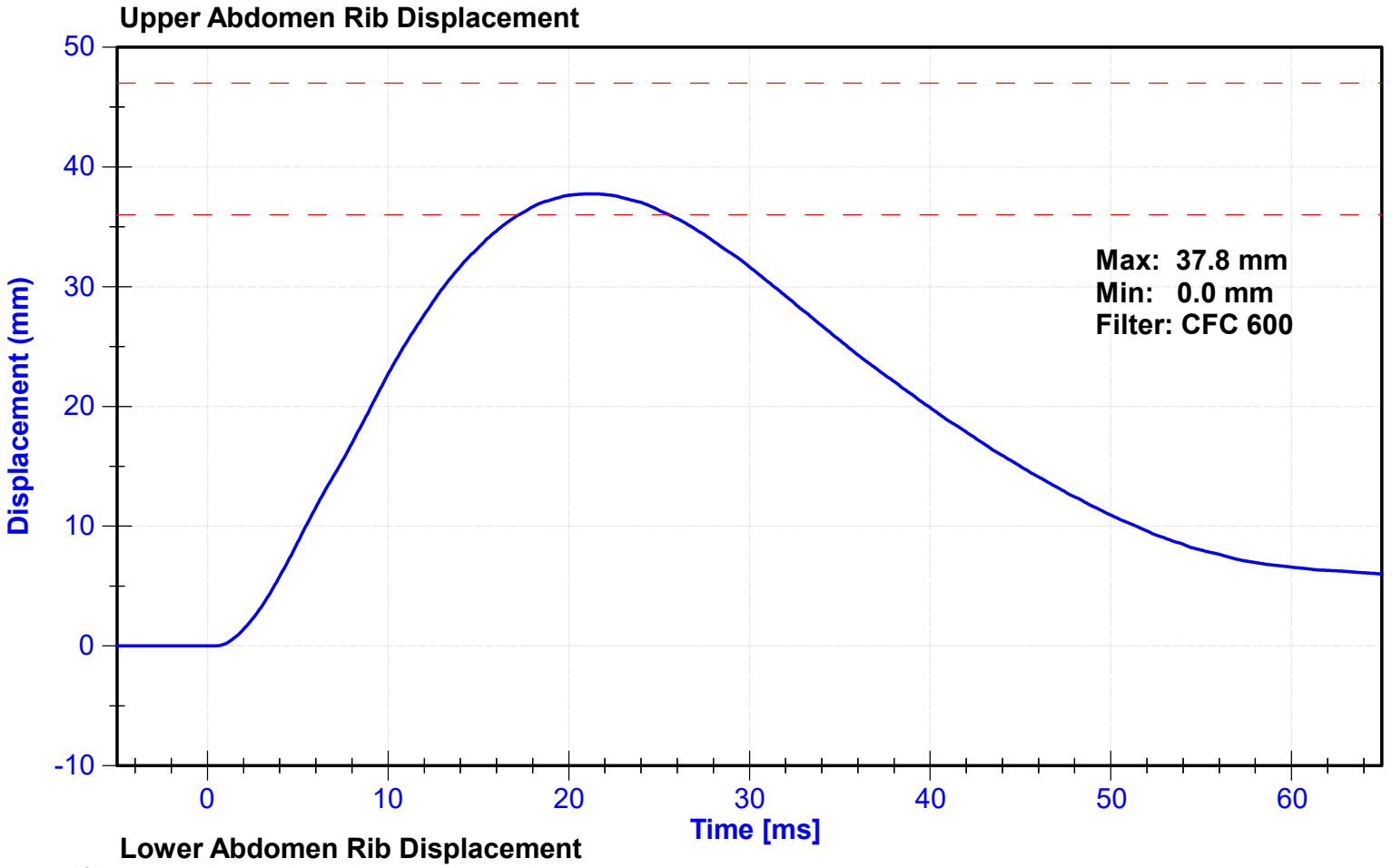
Results

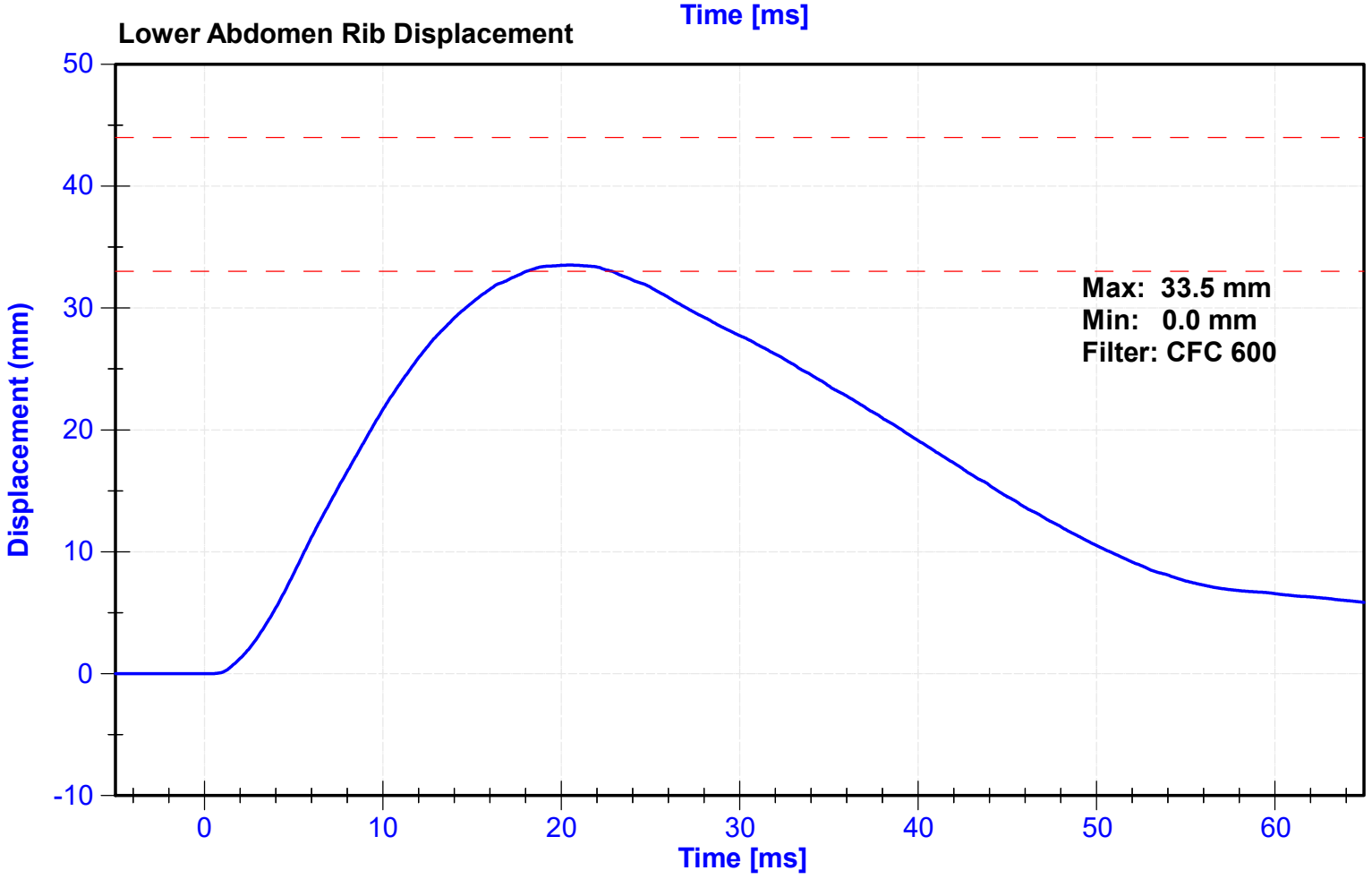
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	12	16	g's	16.0	Pass
Lateral Lower Spine Acceleration	9	14	g's	13.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	37.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	33.5	Pass

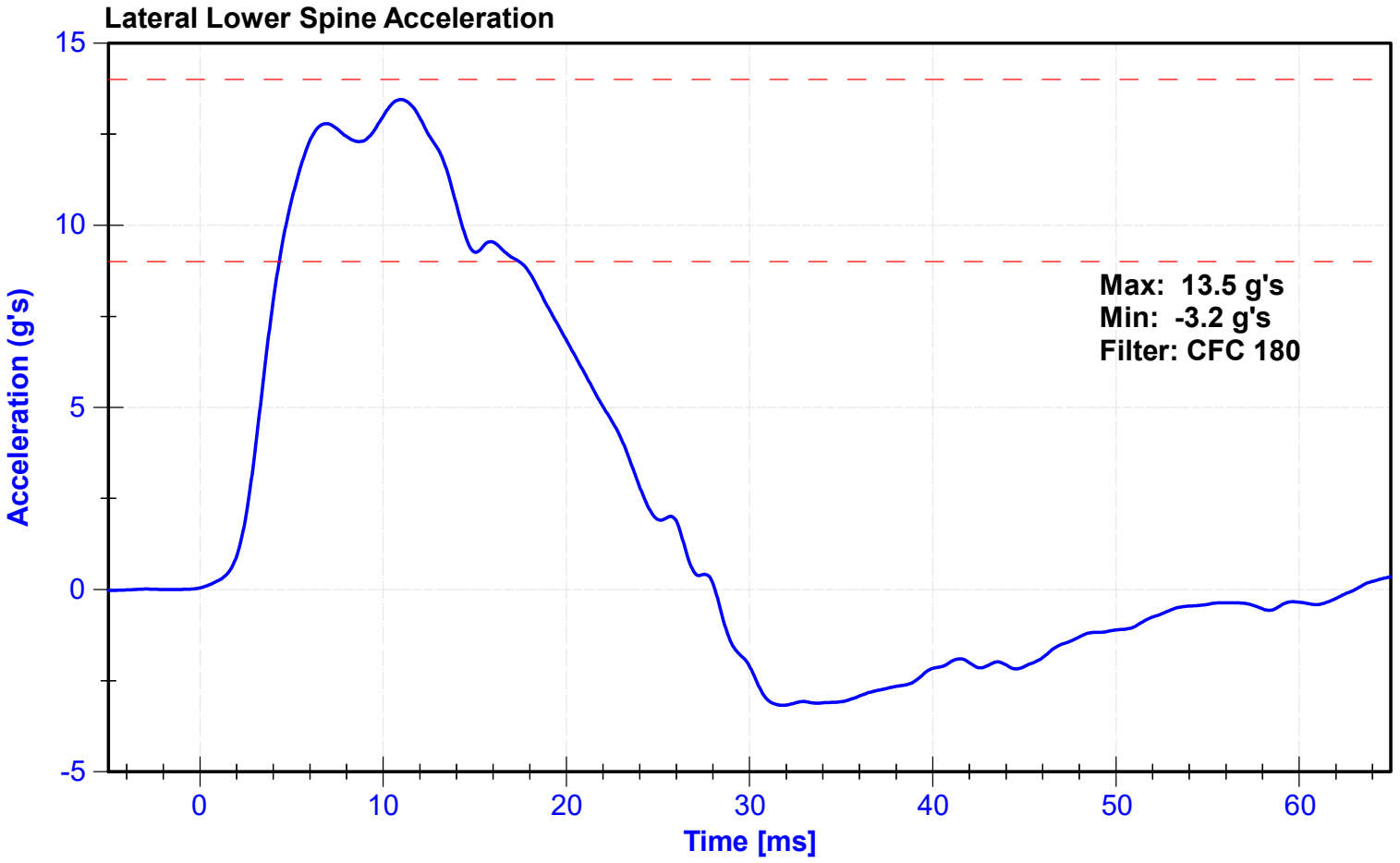
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Abdomen Rib Potentiometer	Servo	307GFE	10/4/2022	4/4/2023
Lower Abdomen Rib Potentiometer	Servo	308GFE	10/4/2022	4/4/2023




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 37.8 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 33.5 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
10
5
0
-5
0
10
20
30
40
50
60
Time [ms]
Max: 13.5 g's
Min: -3.2 g's
Filter: CFC 180

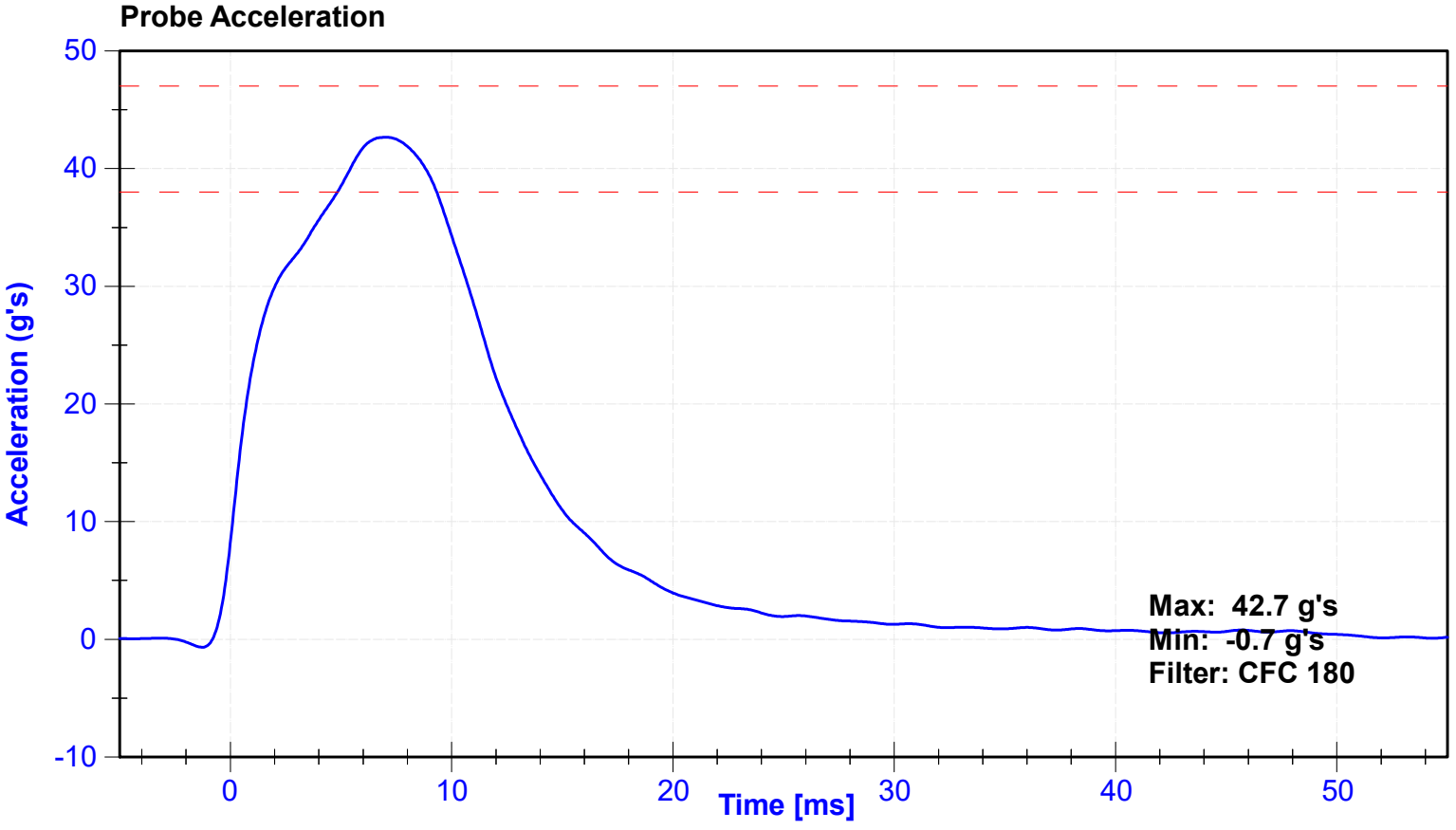
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

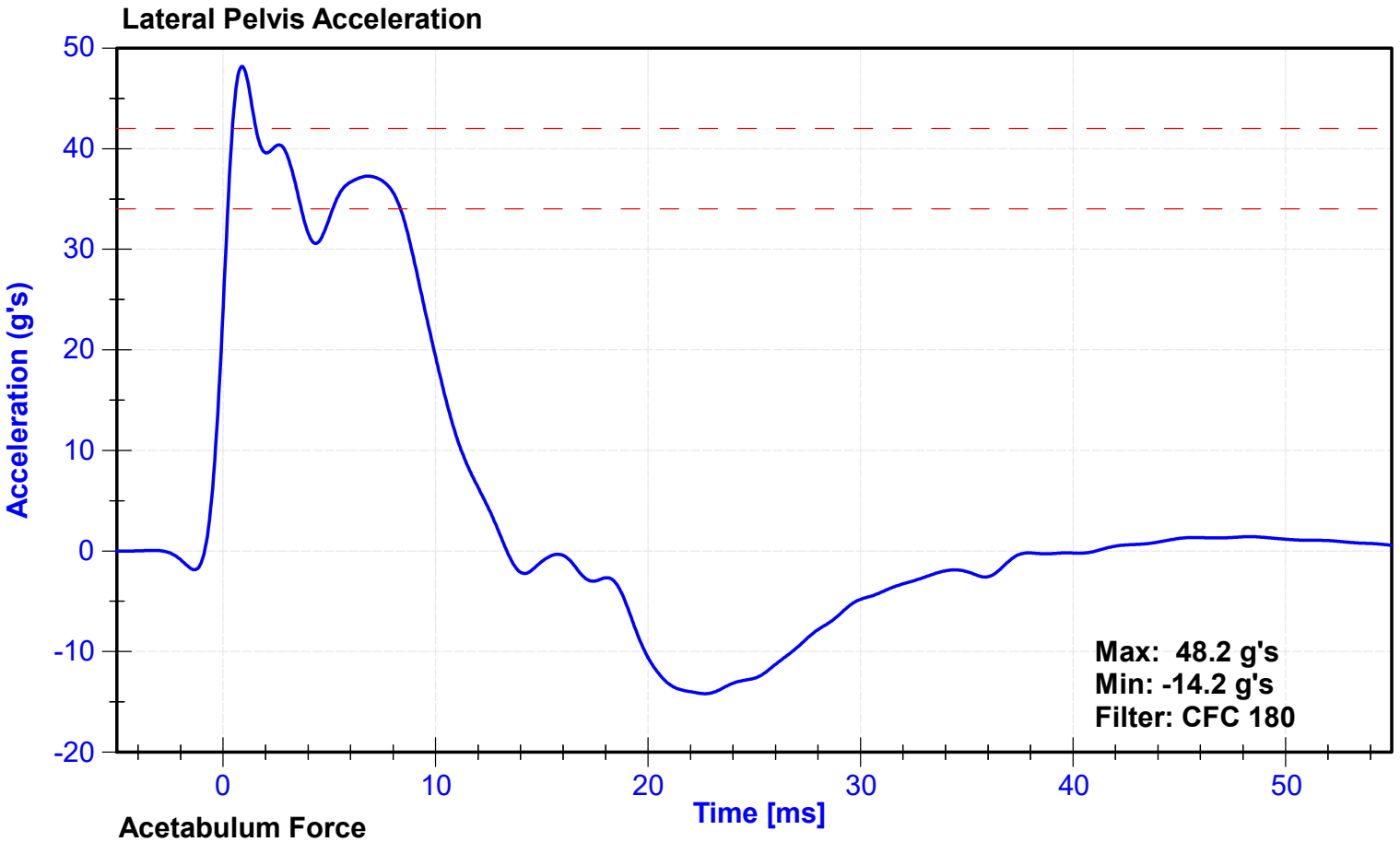
Results

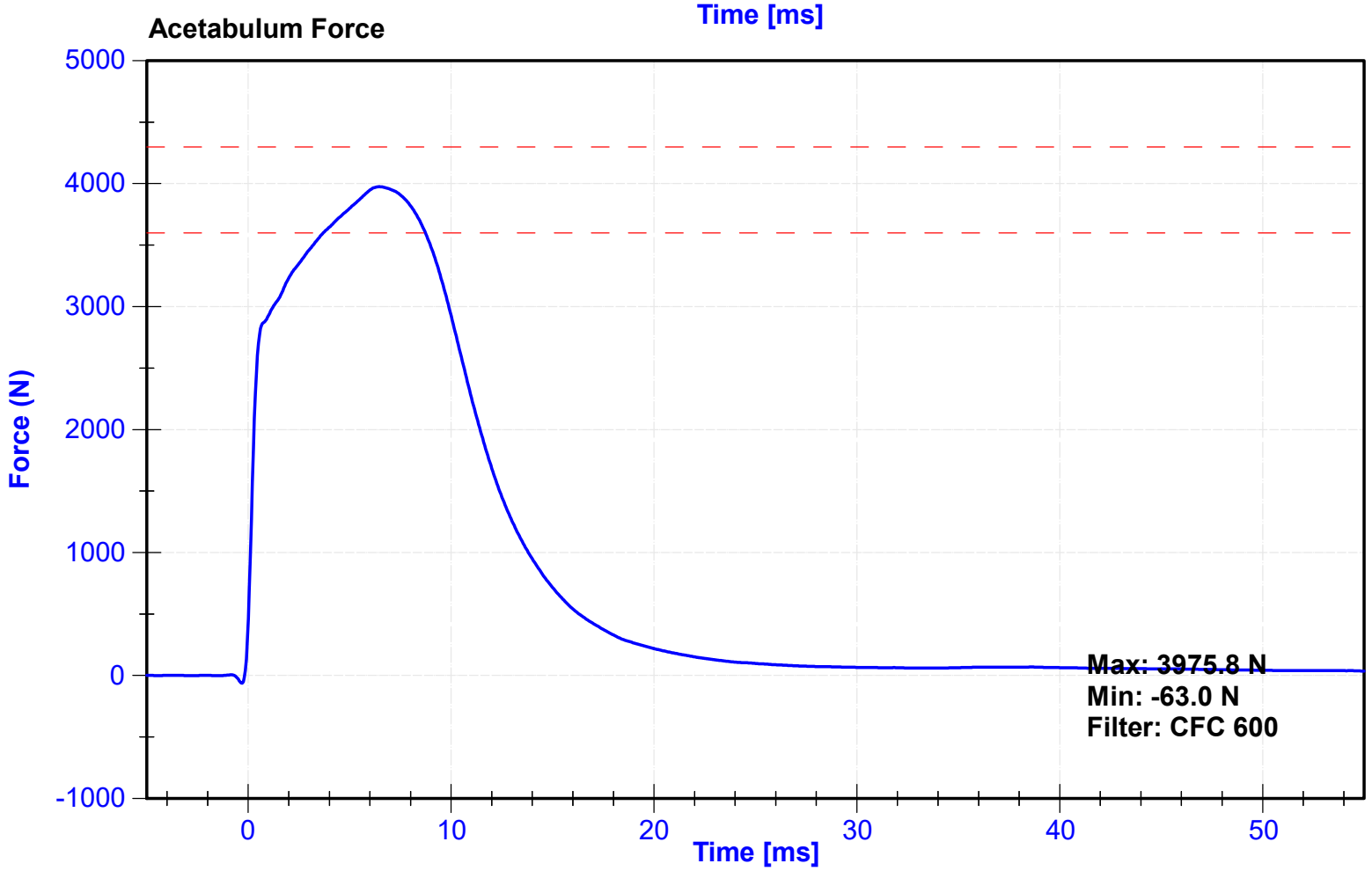
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.1	Pass
Velocity	6.6	6.8	m/s	6.73	Pass
Probe Acceleration	38	47	g's	42.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	37.3	Pass
Acetabulum Force	3600	4300	N	3975.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Acetabulum Load Cell	Denton	267-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 48.2 g's
Min: -14.2 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3975.8 N
Min: -63.0 N
Filter: CFC 600

300 CERT

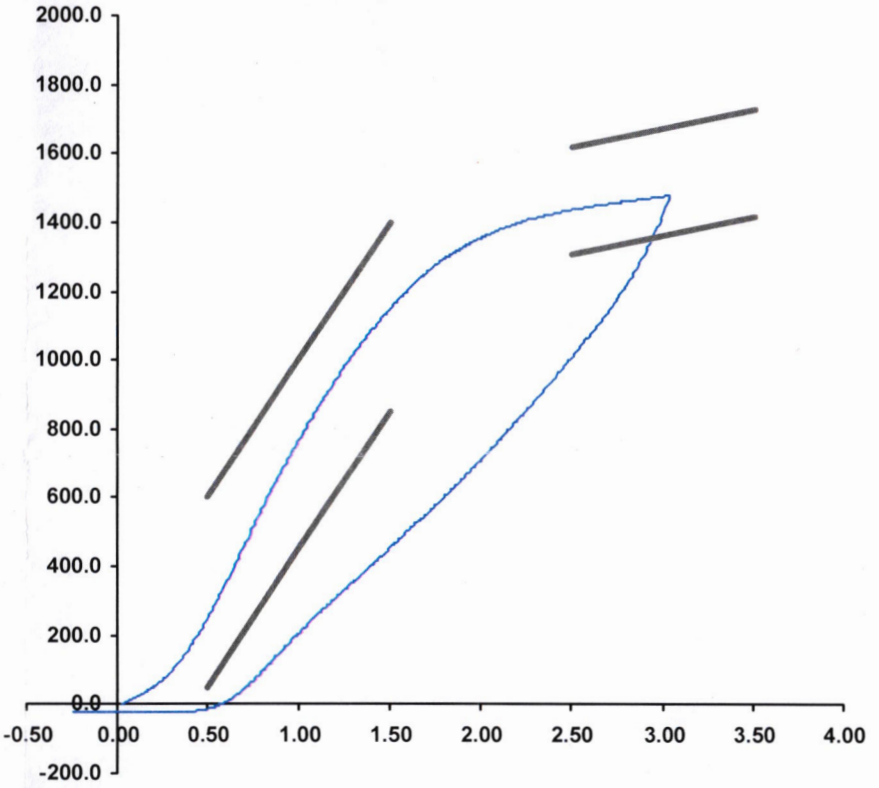
10/17/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 15415
Test Number 20075
Report Number 20129
Test Date 9/9/2021 9:39:32 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	254	50	600
Force @ 1.5 mm (N)	1,157	850	1,400
Force @ 2.5 mm (N)	1,438	1,306	1,618
Force @ 3.0 mm (N)	1,478	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 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

300 CRASH

10/17/22

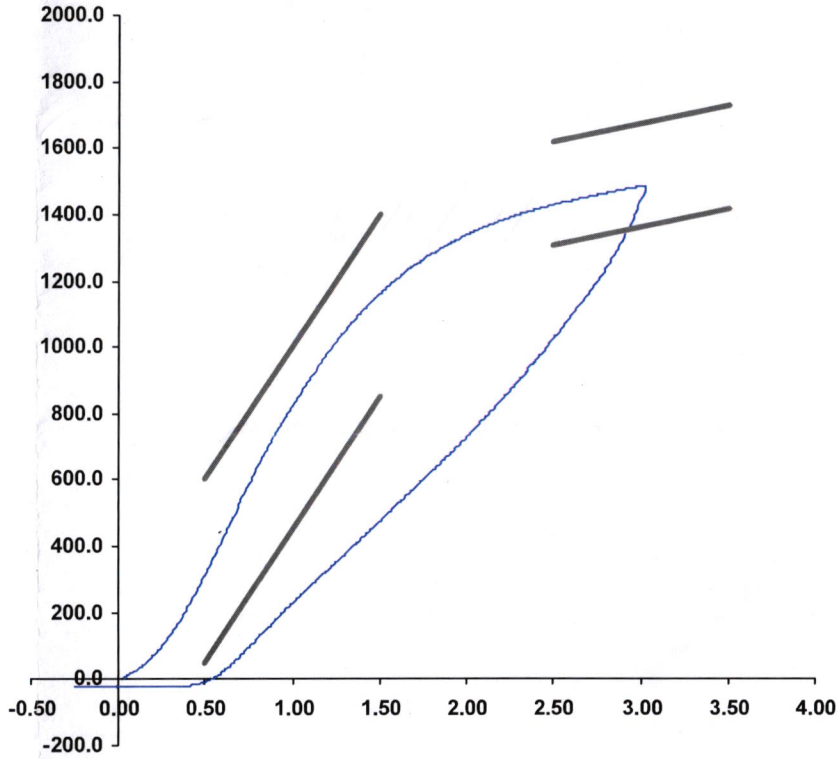
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 15162
Test Number 17874
Report Number 17923
Test Date 3/5/2021 11:37:24 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	316	50	600
Force @ 1.5 mm (N)	1,165	850	1,400
Force @ 2.5 mm (N)	1,431	1,306	1,618
Force @ 3.0 mm (N)	1,486	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 **05-Mar-21**
SACO Research

By : DC Date : 3/5/2021

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

300 NONIMPACT
10/17/22

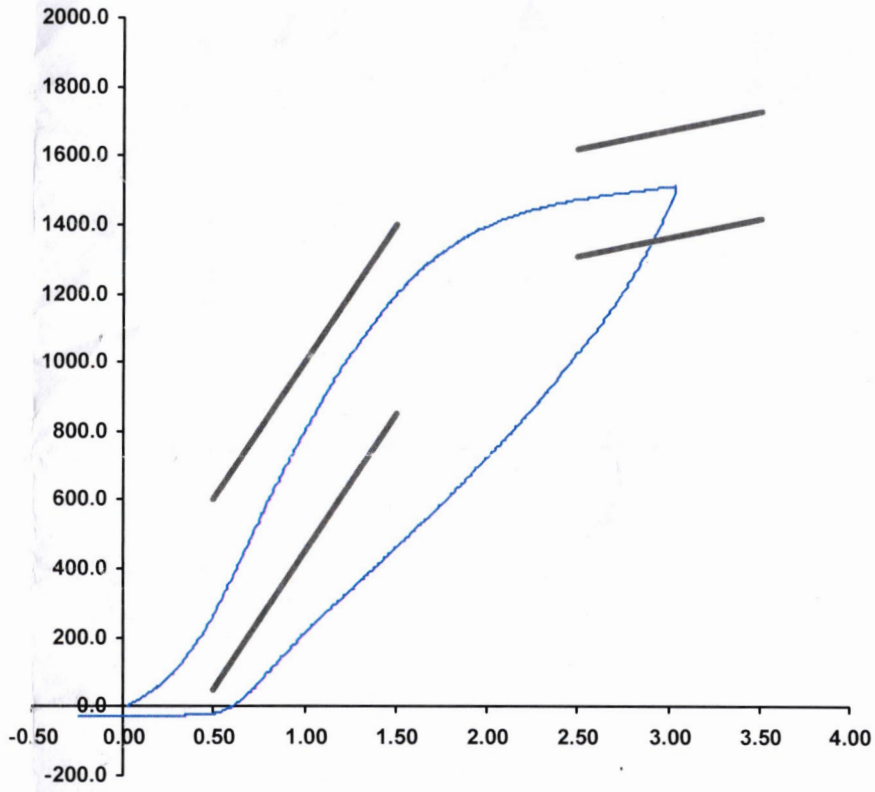
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 15453
Test Number 20114
Report Number 20168
Test Date 9/9/2021 10:52:30 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	276	50	600
Force @ 1.5 mm (N)	1,202	850	1,400
Force @ 2.5 mm (N)	1,474	1,306	1,618
Force @ 3.0 mm (N)	1,511	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 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

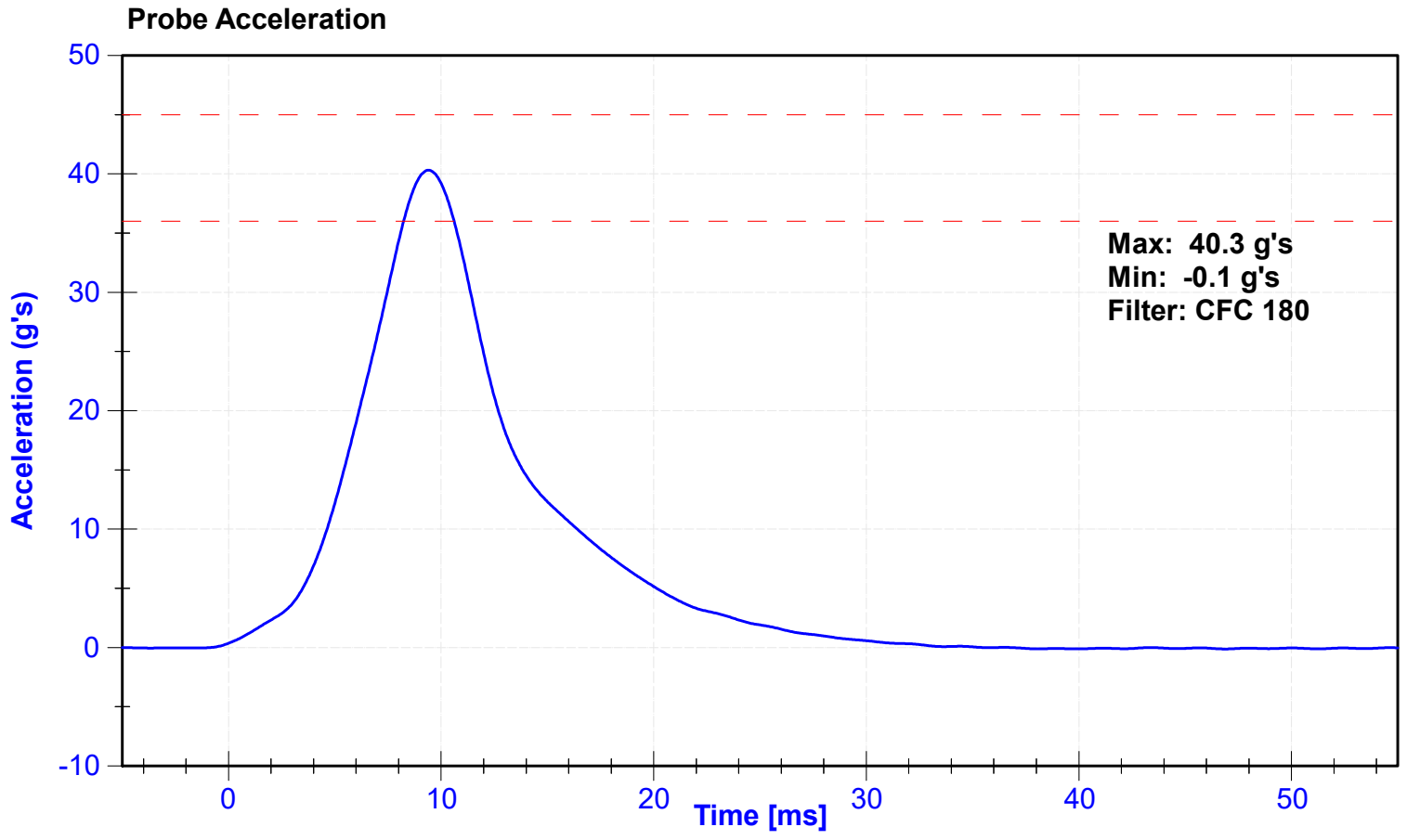
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

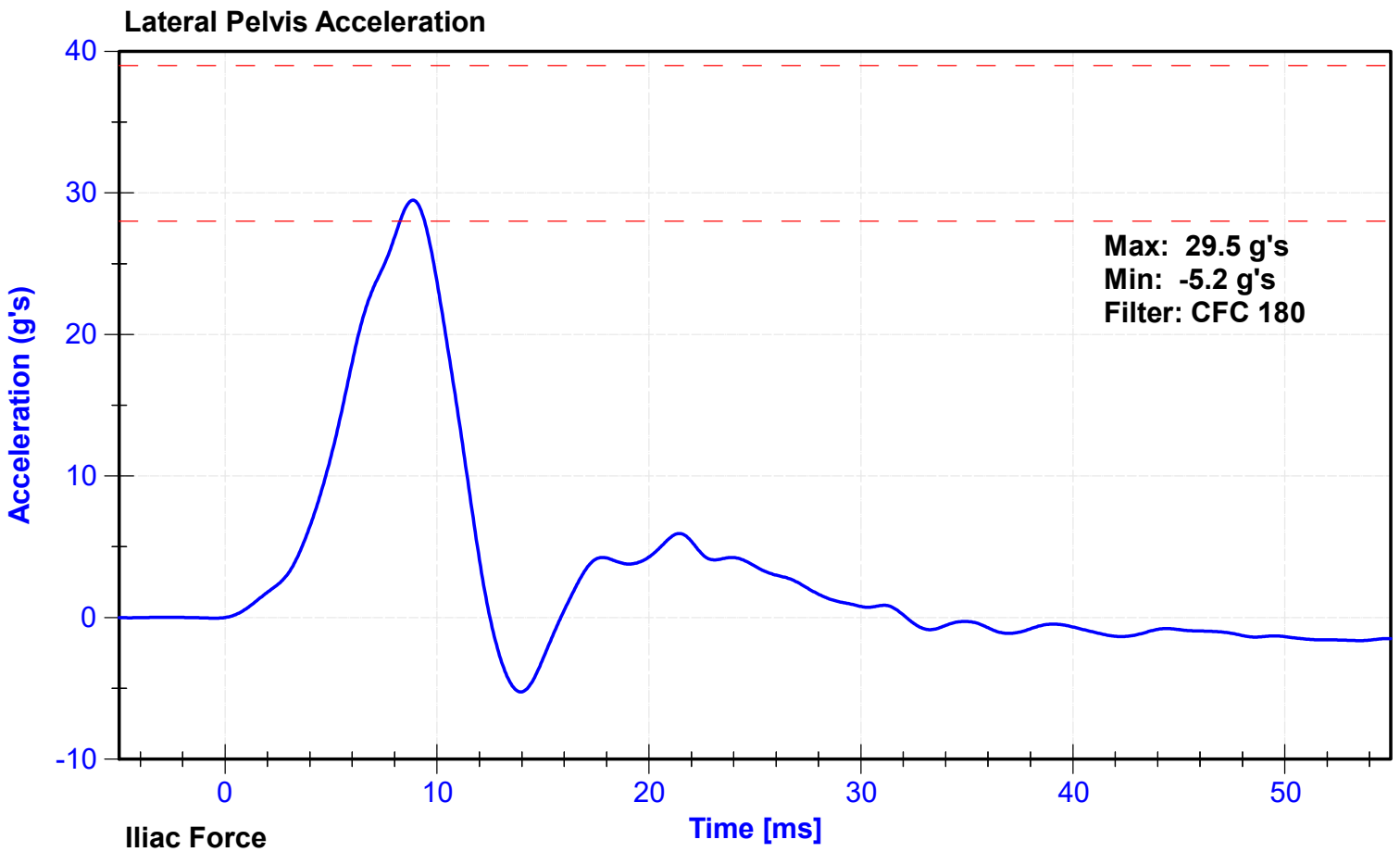
Results

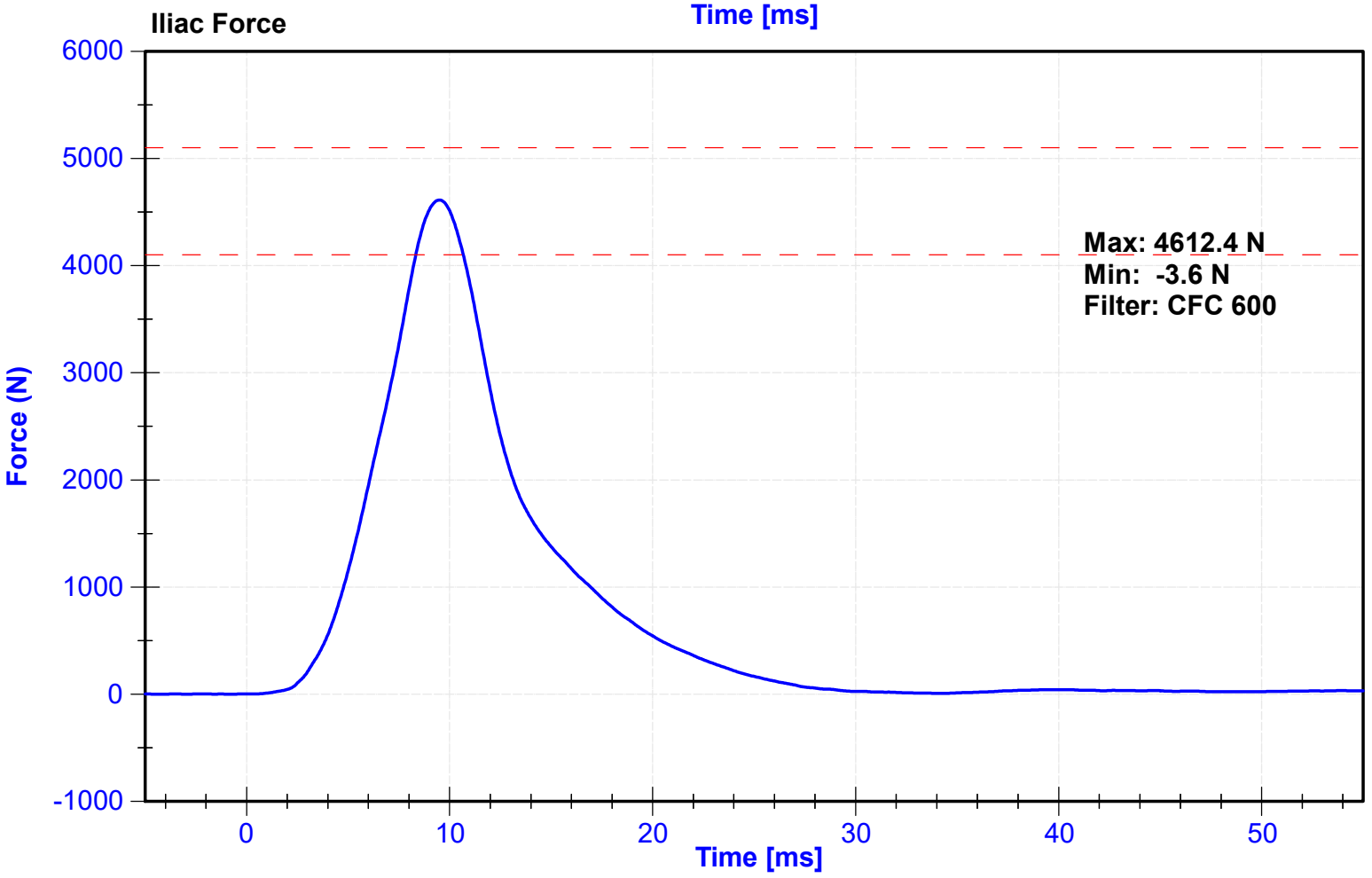
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	35.1	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	36	45	g's	40.3	Pass
Lateral Pelvis Acceleration	28	39	g's	29.5	Pass
Iliac Force	4100	5100	N	4612.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Iliac Load Cell	Denton	280-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 29.5 g's
Min: -5.2 g's
Filter: CFC 180


Iliac Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4612.4 N
Min: -3.6 N
Filter: CFC 600

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	7/21/2022
		Y	P49216	Endevco	7/21/2022
		Z	P51303	Endevco	7/21/2022
	Redundant	X	P58868	Endevco	7/21/2022
		Y	P16755	Endevco	7/21/2022
		Z	P52132	Endevco	7/21/2022
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	7/25/2022
	Middle	Y	185GFE	Honeywell	7/21/2022
	Lower	Y	178GFE	Honeywell	7/21/2022
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	7/21/2022
		Y	P39731	Endevco	7/21/2022
		Z	P52033	Endevco	7/21/2022
Pubic Symphysis Load Cell		Y	459-FY	Denton	6/14/2022

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 300		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	P59018	Endevco	10/3/2022
			Y	P79189	Endevco	10/3/2022
			Z	P58777	Endevco	10/3/2022
		Redundant	X	P68057	Endevco	10/3/2022
			Y	P58986	Endevco	10/3/2022
			Z	P52025	Endevco	10/3/2022
Displacement Potentiometers	Thoracic Rib	Upper	Y	2316GFE	Servo	10/4/2022
		Middle	Y	040GFE	Servo	10/4/2022
		Lower	Y	1156GFE	Servo	10/4/2022
	Abdominal Rib	Upper	Y	307GFE	Servo	10/4/2022
		Lower	Y	308GFE	Servo	10/4/2022
Lower Spine Accelerometers (T12)			X	P64003	Endevco	10/3/2022
			Y	P52071	Endevco	10/3/2022
			Z	P17283	Endevco	10/3/2022
Acetabulum Load Cell			Y	267-FY	Denton	8/11/2022
Iliac Wing Load Cell			Y	280-FY	Denton	8/11/2022
Pelvis Plug (struck side)				15221	SACO	3/10/2021
Pelvis Plug (non-struck side)				15221	SACO	3/10/2021

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A280842	Measurement Specialties	7/26/2022
	Vehicle Center of Gravity	Y	A335457	Measurement Specialties	8/19/2022
	Vehicle Center of Gravity	Z	A350918	Measurement Specialties	7/26/2022
2	Right Sill at Front Seat	X	A280914	Measurement Specialties	8/18/2022
	Right Sill at Front Seat	Y	A351008	Measurement Specialties	8/18/2022
	Right Sill at Front Seat	Z	A352369	Measurement Specialties	8/18/2022
3	Right Sill at Rear Seat	X	A398662	Measurement Specialties	8/23/2022
	Right Sill at Rear Seat	Y	A405534	Measurement Specialties	8/23/2022
	Right Sill at Rear Seat	Z	A405588	Measurement Specialties	10/6/2022
4	Left Sill at Front Door	Y	A374346	Measurement Specialties	9/20/2022
5	Left Sill at Rear Door	Y	A413600	Measurement Specialties	9/20/2022
6	Left A-Post Lower	Y	A431374	Measurement Specialties	9/2/2022
7	Left A-Post Middle	Y	A399980	Measurement Specialties	9/22/2022
8	Left B-Post Lower	Y	A428008	Measurement Specialties	10/5/2022
9	Left B-Post Middle	Y	A405558	Measurement Specialties	10/4/2022
10	Front Seat Track	Y	A290917	Measurement Specialties	9/20/2022
11	Rear Seat Track or Structure	Y	A428024	Measurement Specialties	7/18/2022
12	Right Rear Occ. Compartment	Y	A399996	Measurement Specialties	8/3/2022
13	Engine Block	X	A431196	Measurement Specialties	7/25/2022
	Engine Block	Y	A431386	Measurement Specialties	7/25/2022
14	Rear Floorpan Above Axle	X	A431248	Measurement Specialties	8/18/2022
	Rear Floorpan Above Axle	Y	A431254	Measurement Specialties	8/30/2022
	Rear Floorpan Above Axle	Z	A431350	Measurement Specialties	8/29/2022

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A405546	Measurement Specialties	6/16/2022
MDB Center of Gravity	Y	A413593	Measurement Specialties	6/16/2022
MDB Center of Gravity	Z	A413602	Measurement Specialties	6/16/2022
Left Frame at Rear Axle Centerline	X	A372809	Measurement Specialties	6/16/2022
Left Frame at Rear Axle Centerline	Y	A372813	Measurement Specialties	6/16/2022