REPORT NUMBER: SINCAP-CAL-23-001

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

Audi AG
2023 Audi Q7
5 Door SUV

NHTSA No: M20235801

PREPARED BY:
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October 24, 2023

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Prepared by: _____ Date: October 24, 2023
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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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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 2023 Audi Q7 5 Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP MDB Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 1, 2023.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.61 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 198 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)		1000	58.487
Maximum Thorax Rib Deflection	mm	44	15.730
Total Abdominal Force	N	2500	489.110
Pubic Symphysis Force	N	6000	958.131
Lower Spine (T12) Resultant Acceleration	G	82*	20.558
Measurement Description	**Passenger ATD (SID-IIs)**		
	Units	**IARV**	**Result**
Head Injury Criteria (HIC36)		1000	31.191
Maximum Thorax Rib Deflection	mm	38*	8.471
Lower Spine (T12) Resultant Acceleration	G	82	35.806
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2831.387
Maximum Abdominal Rib Deflection	mm	45*	18.726

**Proposed IARV*

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

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

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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 2023 Audi Q7 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 2023 Audi Q7 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 61.61 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan Corporation's Transportation Test Operations Center in Buffalo, New York on February 1, 2023. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

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

The Dummies were instrumented in the following manner:

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

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

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	58.487
Maximum Thorax Rib Deflection	mm	44	15.730
Total Abdominal Force	N	2500	489.110
Pubic Symphysis Force	N	6000	958.131
Lower Spine (T12) Resultant Acceleration	G	82*	20.558

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	31.191
Maximum Thorax Rib Deflection	mm	38*	8.471
Lower Spine (T12) Resultant Acceleration	G	82	35.806
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2831.387
Maximum Abdominal Rib Deflection	mm	45*	18.726

**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		
Knee Airbag	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 - DG8012

Data Anomalies:

The following channel was questionable for:

- Left B-Pillar Lower Y Acceleration,Exceeded calibration range at 11.8 ms 23 ms
- Left B-Pillar Middle Y Acceleration,Exceeded calibration range at 9.8 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. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Audi Q7 5 Door SUV
NHTSA No.: M20235801
Test Program: NCAP Side MDB Impact Test
Test Date: 02/01/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20235801
Model Year	2023
Make	Audi
Model	Q7
Body Style	SUV
VIN	WA1LCBF72PD002513
Body Color	Gray
Odometer Reading (km/mi)	10 miles
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	8-speed
Overdrive	Yes
Final Drive	All Wheel Drive
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	N/A
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	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Audi AG
Date of Manufacture	09 22
Vehicle Type	MPV

GVWR	2900
GVWR Front	1450
GVWR Rear	1650

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	2	7	
Vehicle Capacity Weight (VCW) (kg)				610	(A)
DSC x 68.04 kg				476.28	(B)
Cargo Weight (RCLW) (kg)				133.72	(A-B)

VEHICLE SEAT TYPE

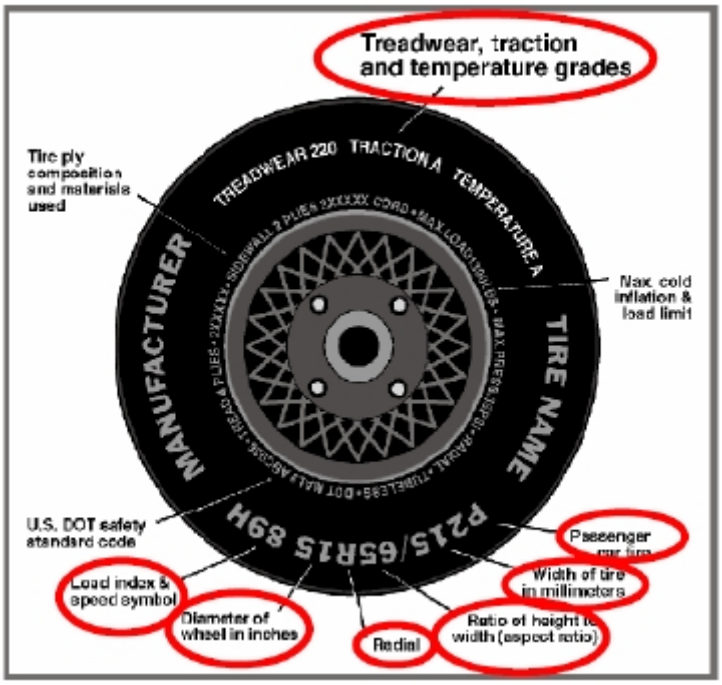
Seating Location	Type Of Seat Pan				Type Of Seat Back		
	Bucket	Bench	Split Bench	Contour	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front	X						X
Rear or Second Row Seat			X			X	
Third Row Seat			X		X		

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

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

VEHICLE TIRE INFORMATION

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



TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	260	280
Recommended Tire Size	255/55 R19	255/55 R19
Tire Size on Vehicle	255/55 R19	255/55 R19
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Scorpion Verde	Scorpion Verde
Treadwear	600	600
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	2 Rayon, 2 Steel, 2 Polyamide	2 Rayon, 2 Steel, 2 Polyamide
Load Index / Speed Symbol	111H	111H
Tire Material	Rubber	Rubber
DOT Safety Code Left	93 26 T228 1322	93 26 T228 1322
DOT Safety Code Right	93 26 T228 1322	93 26 T228 1322

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

Test Vehicle: 2023 Audi Q7 5 Door SUV | NHTSA No.: M20235801
Test Program: NCAP Side MDB Impact Test | Test Date: 02/01/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	260	260	280	280
Tire Placard	kPa	260	260	280	280
Owner's Manual	kPa	260	260	280	280
As Tested	kPa	260	260	280	280

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	207	207	207	207

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	562.0	511.5		613.0	611.0		606.0	617.5	
Right	kg	611.5	487.0		629.0	572.0		596.0	585.5	
Ratio	%	54.0	46.0		51.2	48.8		50.0	50.0	
Totals	kg	1173.5	998.5	2172.0	1242.0	1183.0	2425.0	1202.0	1203.0	2405.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2172	(A)
Actual Weight of 2 P572V (ES-2re and SID-IIs) ATDs Used	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	133.72	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2432.72	(A+B+C)

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

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

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Tested	Fully Loaded	Meets Rqmt***
LF	mm	876	866	Yes
RF	mm	879	872	Yes
RR	mm	880	890	Yes
LR	mm	878	887	Yes
Vehicle CG (Aft of Front Axle)	mm	1461	1498	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	8	15	

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

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

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

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	19
Rear Speaker	4.5
Floor Mats	3.5
Air Compressor	1.5
Ballast / Equipment Added	83

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	278
Aft 25 mm target	277
Pre-Impact Angle Line	270

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:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max	Min	Mid
Driver Seat	21.4	11.7	16.6
Front Passenger Seat	20.3	10.7	15.5
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	16.6	12.2	Max	72	81	91
			Mid	37	46	56
			Min	3	12	22
Front Passenger Seat	15.5	11.2	Max	72	81	92
			Mid	37	46	57
			Min	2	11	22
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:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

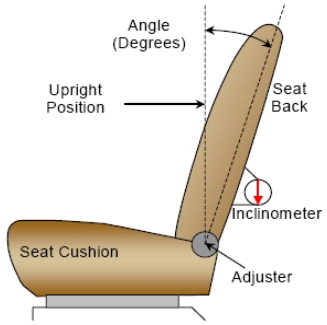
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	246	Power	123	Power
Front Passenger Seat	246	Power	123	Power
Front Center Seat				
Struck Side Rear Seat	110	12 (0-11)	110	11
Non-Struck Side Rear Seat	110	12 (0-11)	110	11
Rear Center Seat	110	12 (0-11)	110	11

**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	70.3	Power	22.9	Power
Front Passenger Seat	72.1	Power	22.9	Power
Front Center Seat				
Struck Side Rear Seat	30.0	16 (0-15)	7.1	2
Non-Struck Side Rear Seat	30.4	16 (0-15)	7.1	2
Rear Center Seat	30.0	16 (0-15)	7.1	2

**if applicable*

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

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

HEAD RESTRAINT ADJUSTMENT

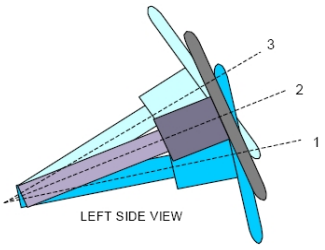
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	5 (0-4)	Uppermost & Forward
Rear Seat	2 (0-1)	Lowermost

STEERING COLUMN ADJUSTMENT

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

	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	21.9	
Geometric center - Position No. 2	24.0	
Uppermost - Position No. 3	26.1	
Telescoping Steering Wheel Travel		70
Test Position	24.0	35

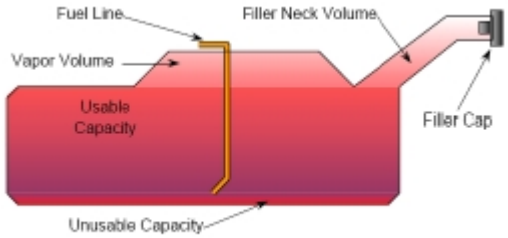


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

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



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

FUEL TANK CAPACITY

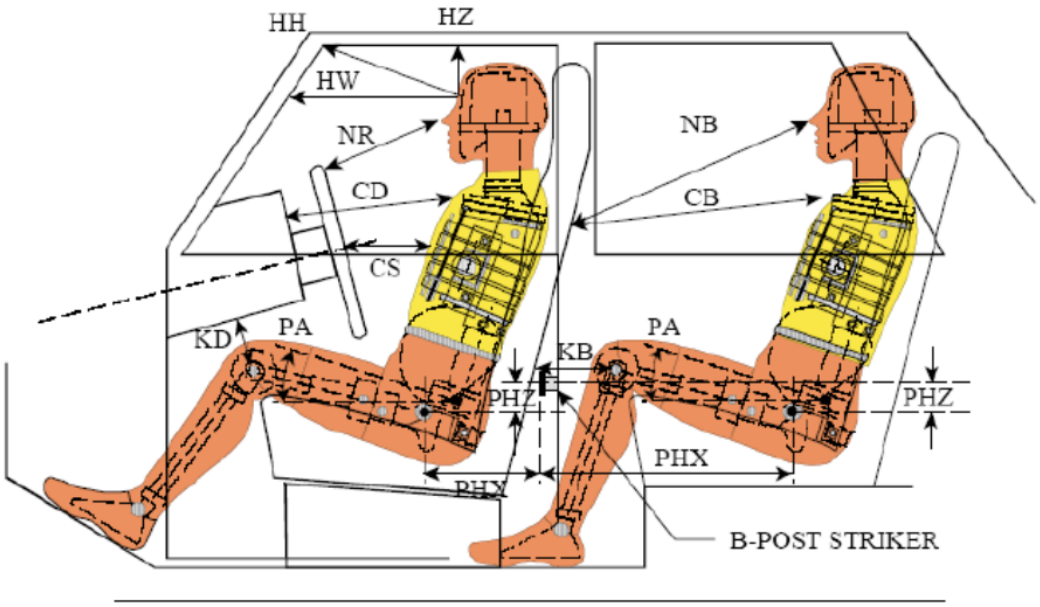
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	85.0
Usable Capacity of “Optional Tank” (see Form No. 1)	N/A
Usable Capacity of “Standard Tank” (see Owner’s Manual)	85.0
Usable Capacity of “Optional Tank” (see Owner’s Manual)	N/A
93% of Usable Capacity	79.1
Actual Amount of Solvent Used in Test	79.0
1/3 of Usable Capacity	28.3

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



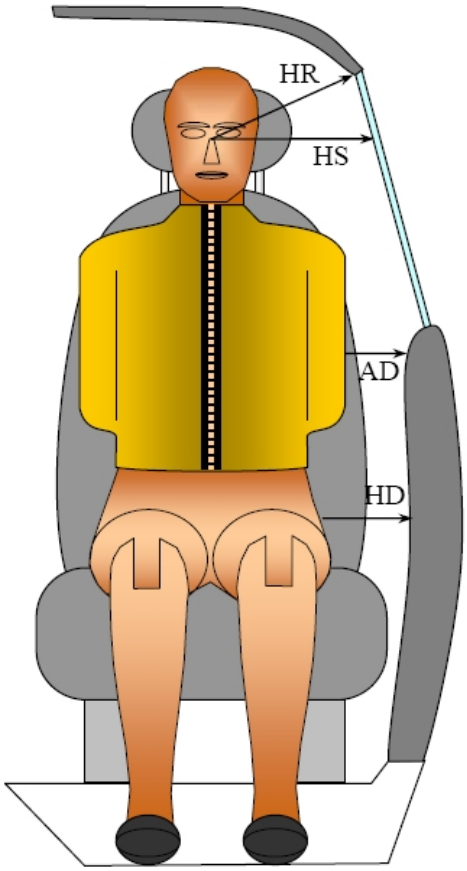
LEFT SIDE VIEW

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. DG8012)	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Header to Header	383			
HW		Header to Windshield	655			
HZ	HZ	Head to Roof Liner	206		293	
NR	NB	Nose to Rim/Seat Back	410		515	
CD	CB	Chest to Dash/Seat Back	546		531	
CS		Chest to Steering Wheel	368			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	215	34.6	329	16.7
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	231	8.2	302	18.9
PAX°	PAX°	Pelvic Tilt Angle X		20.6		20.2
	PAY°	Pelvic Tilt Angle Y				0.3
PHX	PHX	Hip Point to Striker (X-Axis)	142		284	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	154		201	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



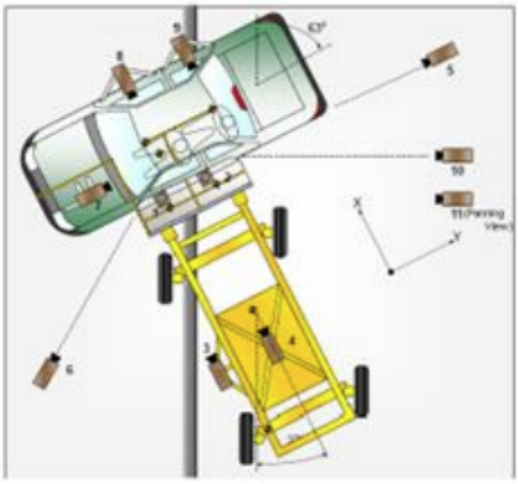
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Left Rear Passenger (Serial No. DG8012)
HR	Head to Side Header	mm	243	271
HS	Head to Side Window	mm	362	344
AD	Arm to Door	mm	132	140
HD	Hip Point to Door	mm	173	132

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 Audi Q7 5 Door SUV
NHTSA No.: M20235801
Test Program: NCAP Side MDB Impact Test
Test Date: 02/01/2023



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	-650	-8418	12.5	1000
2	Overhead Close-up	0	0	-8464	24	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	9650	-1442	24	1000
6	Left Front	2993	-6474	-1420	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	30
11	Real-time In Run				Zoom	30

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

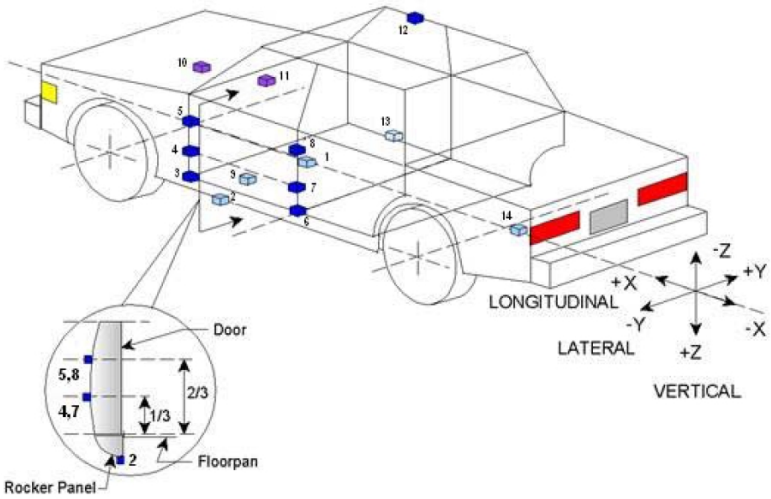
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

INSTRUMENTATION

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

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



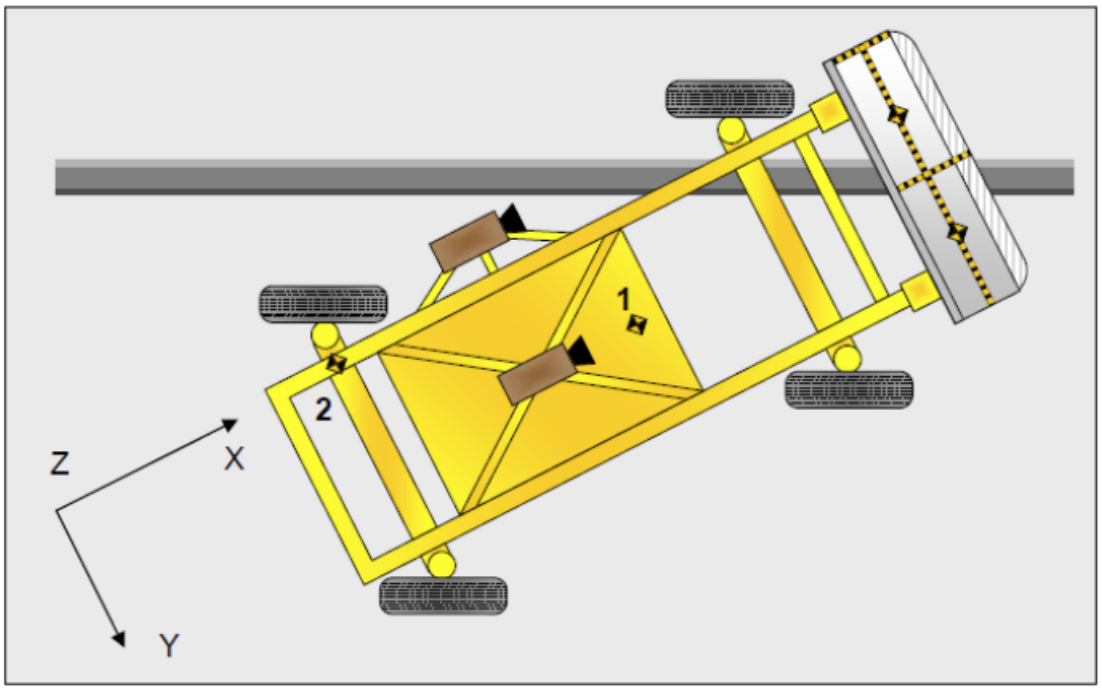
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2746	-25	-357
2	Right Sill at Front Seat	3096	751	42
3	Right Sill at Rear Seat	2144	762	113
4	Left Sill at Front Door	3081	-754	45
5	Left Sill at Rear Door	2149	-762	114
6	A-Post Lower	3458	-690	-10
7	A-Post Middle	3527	-678	-220
8	B-Post Lower	2456	-731	-53
9	B-Post Middle	2408	-725	-361
10	Front Seat Track	2579	-637	3
11	Rear Seat Structure	2085	-252	34
12	Rt. Rear Occ. Compartment	2082	473	133
13	Engine Block	4466	-155	-282
14	Rear Above Axle	968	-2	-52

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



MDB ACCELEROMETER LOCATIONS

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

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

Width between left and right contact switches (mm): 1500

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Audi Q7 5 Door SUV NHTSA No.: M20235801
Test Program: NCAP Side MDB Impact Test Test Date: 02/01/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	None	None
Top of Head	Curtain Airbag	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Head Restraint, & Curtain Airbag	Head Rest, Curtain Airbag & Seatback
Left Shoulder	Torso/Pelvis Airbag	Torso/Pelvis Airbag
Upper Torso	Seat Bolster, & Torso/Pelvis Airbag	Seat Bolster, & Torso/Pelvis Airbag
Lower Torso	Seat Bolster, & Torso/Pelvis Airbag	Torso/Pelvis Airbag
Left Hip	Seat Pan, Torso/Pelvis Airbag & Door	Passenger Door
Left Knee	None	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)	N/A	N/A	N/A	N/A	N/A

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	None
Other Notable Effects	None

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

Test Vehicle: 2023 Audi Q7 5 Door SUV NHTSA No.: M20235801
Test Program: NCAP Side MDB Impact Test Test Date: 02/01/2023

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	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		2995
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		508
Actual Impact Point (Aft of Frontal Axle)	mm		502
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+6
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	+3

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

MDB SPECIFICATIONS

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

MDB WEIGHTS

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

SPEED AND ANGLE AT IMPACT DATA

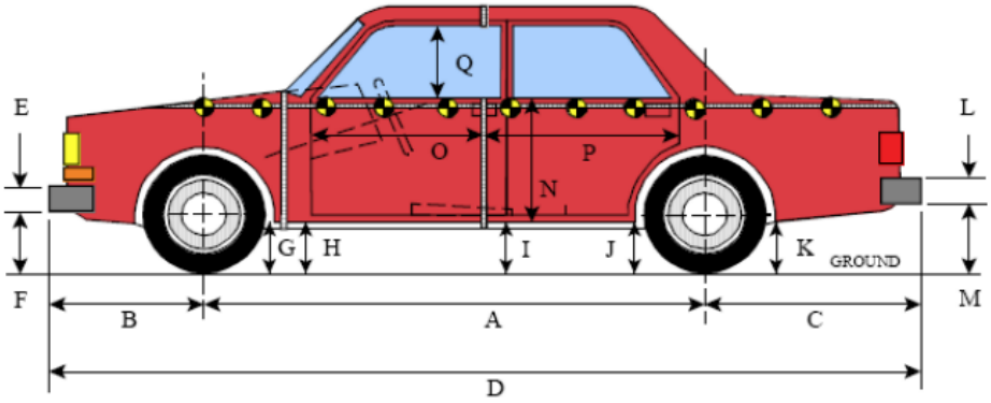
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	61.61
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	61.61
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle 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	Left	268
B	Top of Bumper	533	800	Left	185
C	Mid-Level	686	800	Left	168
D	Top of Stack	813	800	Left	195

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



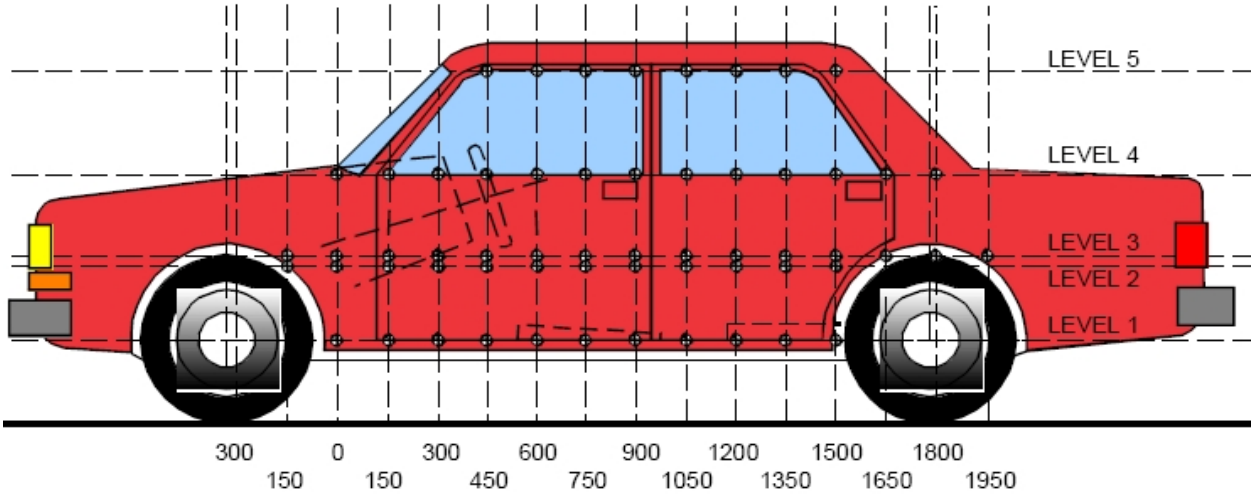
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2995	2997	2
B	Front Axle to FSOV	974	975	1
C	Rear Axle to RSOV	1091	1087	-4
D	Total Length at Centerline	5059	5059	0
E	Front Bumper Thickness	143	146	3
F	Front Bumper Bottom to Ground	398	396	-2
G	Sill Height at Front Wheel Well	263	263	0
H	Sill Height at Front Door Leading Edge	260	261	1
I	Sill Height at B Pillar	290	288	-2
J1	Sill Height at Rear Wheel Well	241	228	-13
J2	Pinch Weld Height at Rear Wheel Well	231	235	4
K	Sill Height Aft of Rear Wheel Well	310	310	0
L	Rear Bumper Thickness	200	200	0
M	Rear Bumper Bottom to Ground	426	433	7
N	Sill Height to Bottom of Front Window Sill	911	825	-86
O	Front Door Leading Edge to Impact CL	739	737	-2
P	Rear Door Trailing Edge to Impact CL	1520	1508	-12
Q	Front Window Opening	498	508	10
R	Right Side Length	4981	4983	2
S	Left Side Length	4985	4982	-3
T	Maximum Vehicle Width	1958	1868	-90
U	Front Wheel Track Width	1668	1656	-12
V	Rear Wheel Track Width	1682	1638	-44

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



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	388	86	1650
2	Driver H-Point	mm	755	198	1650
3	Mid-Door	mm	812	195	1500
4	Window Sill	mm	1126	42	1350
5	Window Top	mm	1684	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: 2023 Audi Q7 5 Door SUV NHTSA No.: M20235801
Test Program: NCAP Side MDB Impact Test Test Date: 02/01/2023

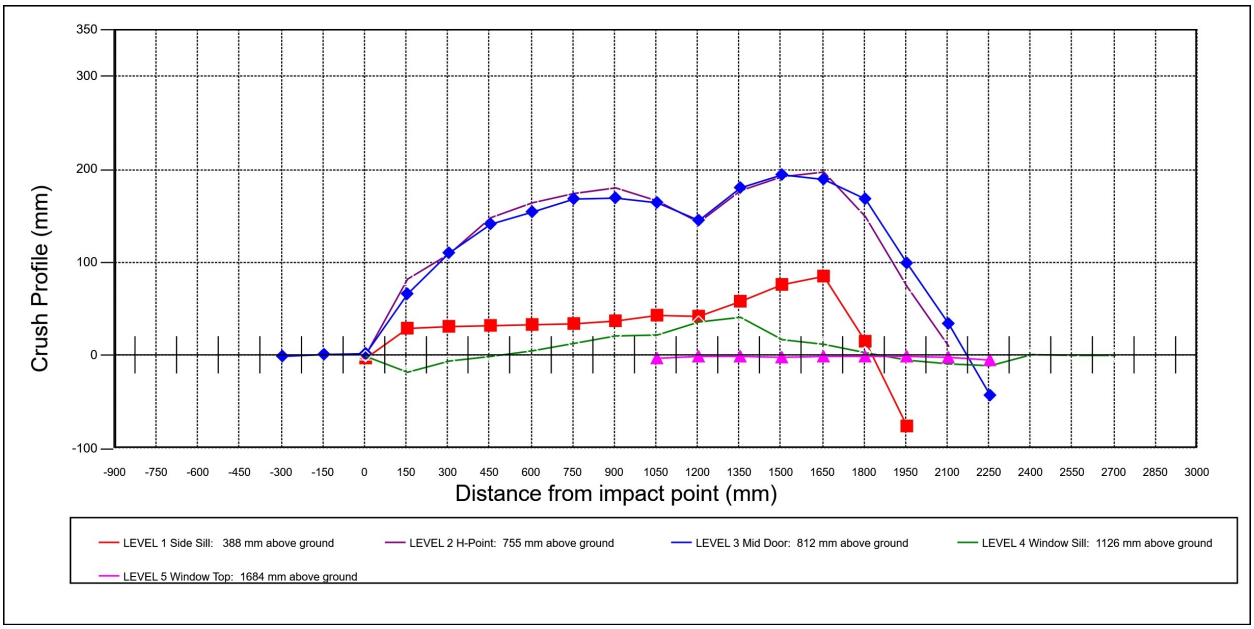
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300			978					978					0		
-150		974	976				972	974				2	2		
0	961	969	969	881		963	967	966	881		-2	2	3	0	
150	963	969	969	903		933	886	902	920		30	83	67	-17	
300	963	970	969	909		931	860	858	914		32	110	111	-5	
450	958	971	971	912		925	822	829	912		33	149	142	0	
600	958	972	972	916		924	807	817	910		34	165	155	6	
750	958	973	973	919		923	798	804	905		35	175	169	14	
900	958	973	974	922		920	792	804	900		38	181	170	22	
1050	959	973	973	923	655	915	806	808	900	657	44	167	165	23	-2
1200	959	970	971	922	659	916	826	825	885	659	43	144	146	37	0
1350	958	970	970	922	660	899	792	789	880	660	59	178	181	42	0
1500	958	968	968	921	660	881	775	773	903	661	77	193	195	18	-1
1650	959	965	965	920	657	873	767	775	907	657	86	198	190	13	0
1800	962	965	964	918	652	946	815	795	914	652	16	150	169	4	0
1950	963	965	964	920	649	1038	890	864	924	649	-75	75	100	-4	0
2100		979	979	922	636		968	944	930	637		11	35	-8	-1
2250			985	924	617			1027	934	621			-42	-10	-4
2400				923					921					2	
2550				916					915					1	
2700				910					909					1	
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 the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.*

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

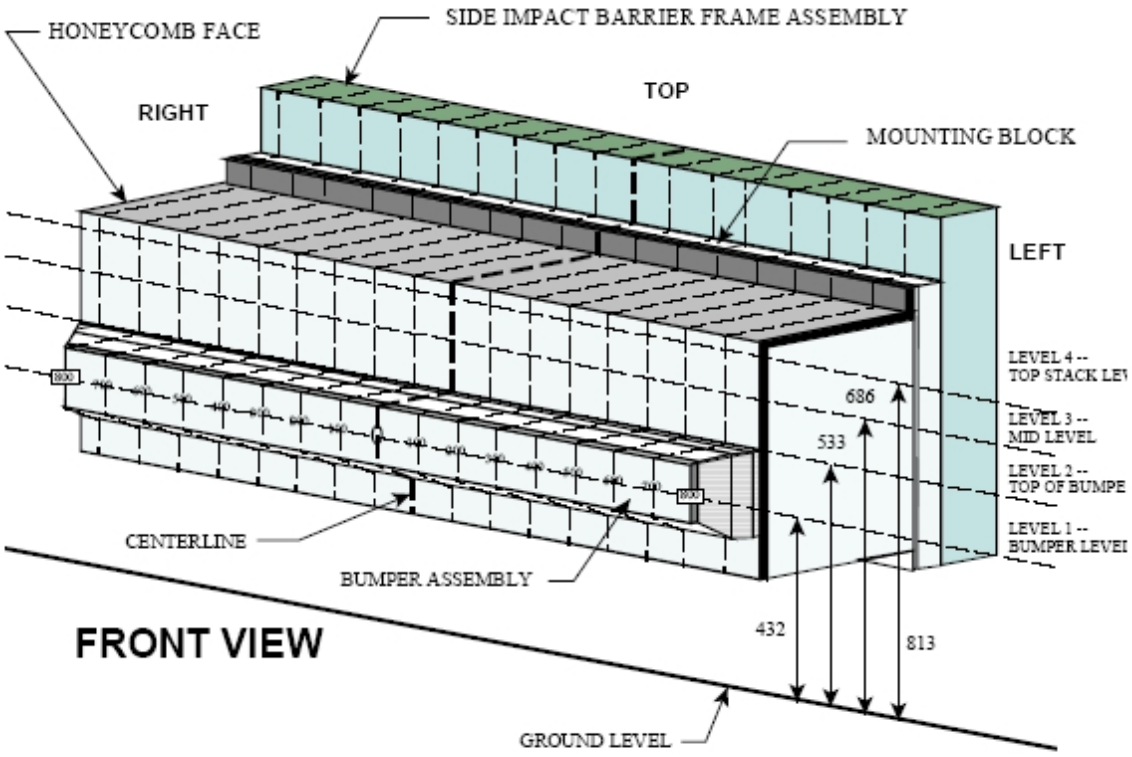
Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



NOTE: Dimensions are shown in millimeters, mm

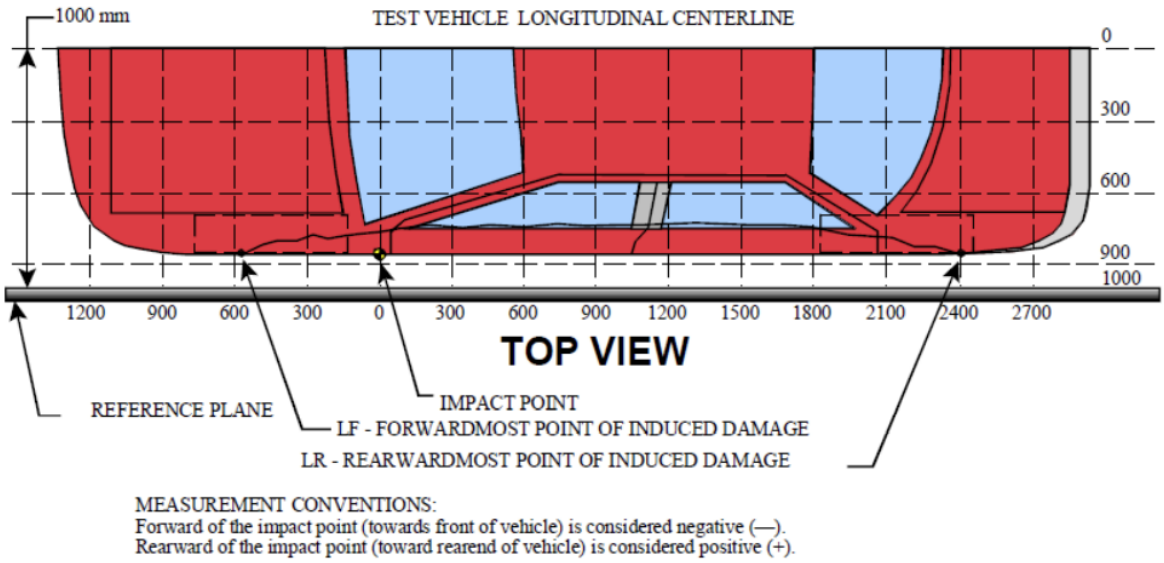
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	222	230	236	242	251	264	254	255	256	252	253	254	256	258	259	261	268
2	113	124	131	137	142	153	143	150	159	161	160	163	166	156	158	159	185
3	87	76	74	75	82	109	114	86	70	67	69	75	83	95	116	138	168
4	100	89	82	85	94	123	108	86	97	86	83	89	102	114	132	158	195

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023

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



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

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-150	3	26	24	2
2	420	3	165	29	136
3	990	3	194	27	167
4	1560	3	226	33	193
5	2130	3	39	20	19
6	2700	3	56	21	35

MDB DAMAGE PROFILE DISTANCES

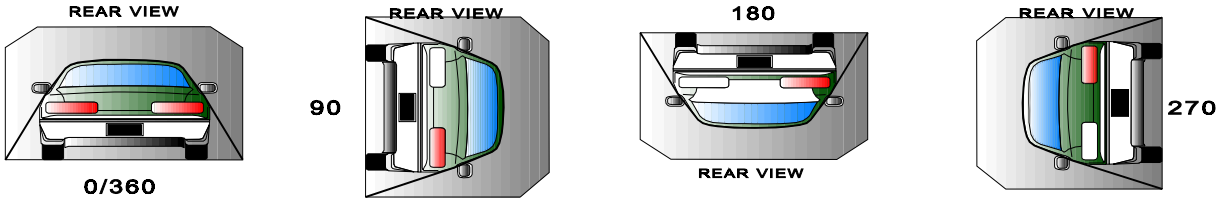
DPD	Distance From Center of MDB	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	237	505	-268
2	480 mm left of center	1	256	514	-258
3	160 mm left of center	1	261	514	-253
4	160 mm right of center	1	259	513	-254
5	480 mm right of center	1	269	513	-244
6	800 mm right of center	1	279	501	-222

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

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023
Test Time:	11:32 AM	Temperature:	21.1 °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°	68	300	368
90° to 180°	67	300	367
180° to 270°	64	300	364
270° to 360°	64	300	364

FMVSS 301 SPILLAGE TABLE

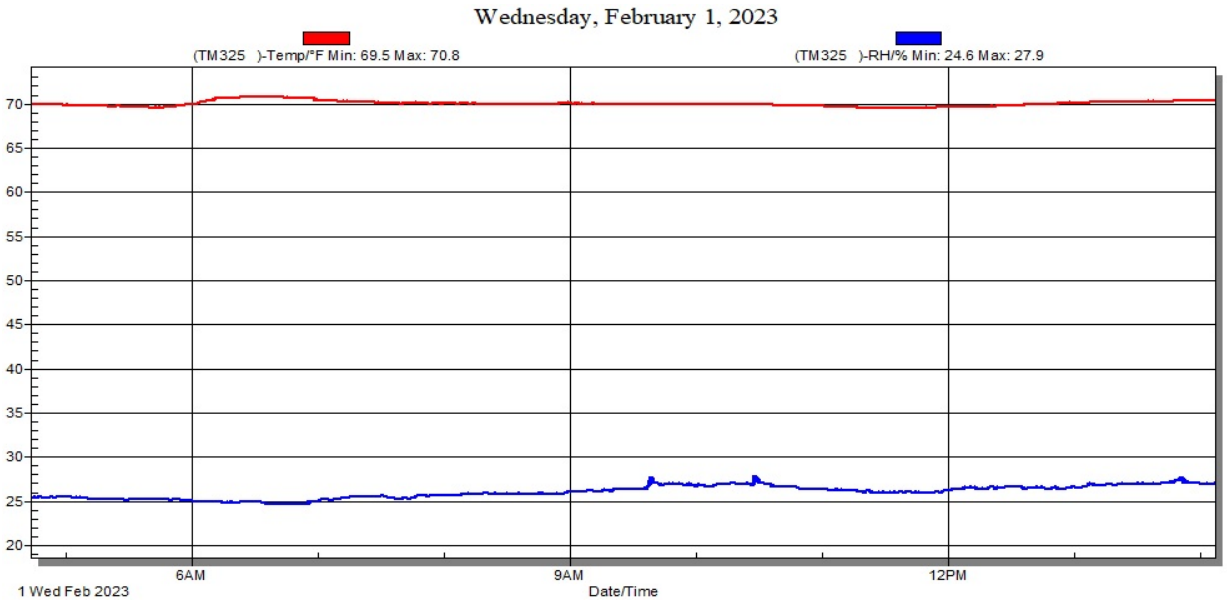
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle:	2023 Audi Q7 5 Door SUV	NHTSA No.:	M20235801
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/01/2023



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

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

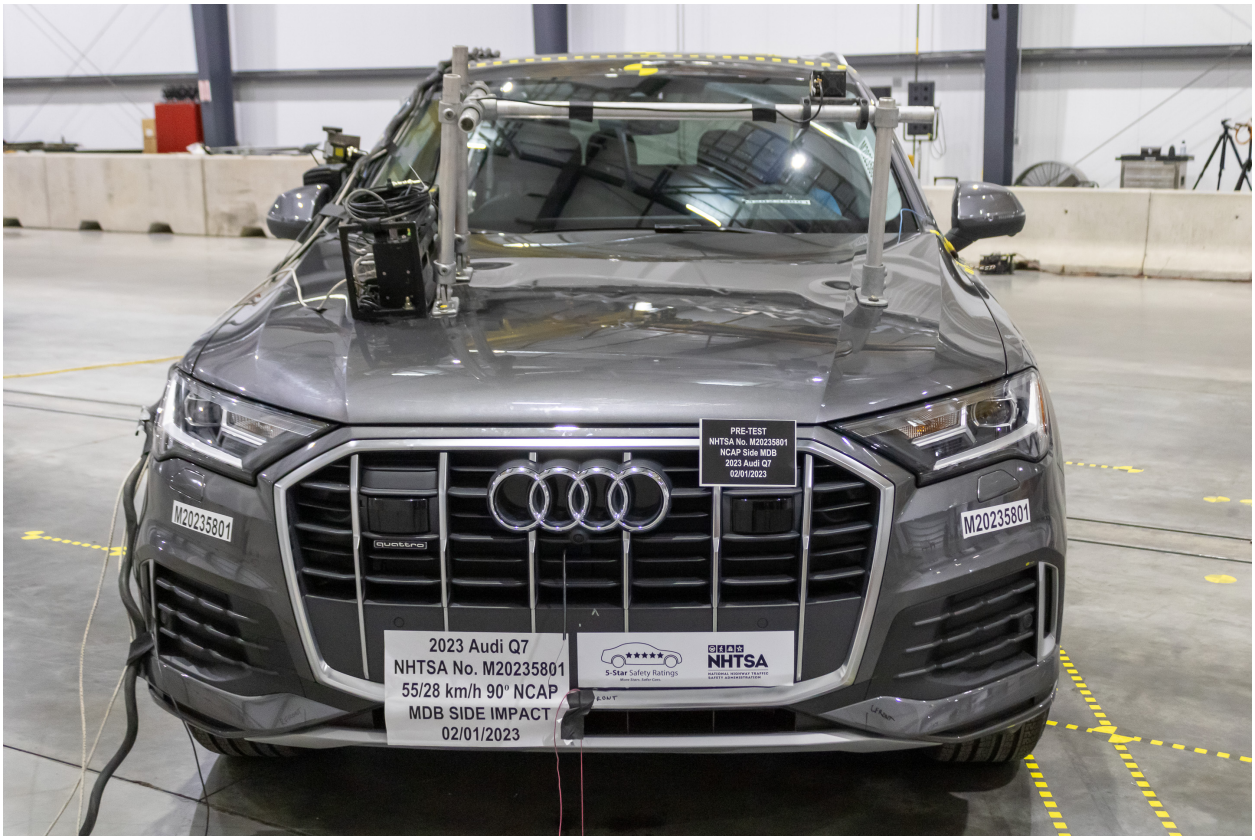

Figure A-3: Pre-Test Frontal View of Test Vehicle



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 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

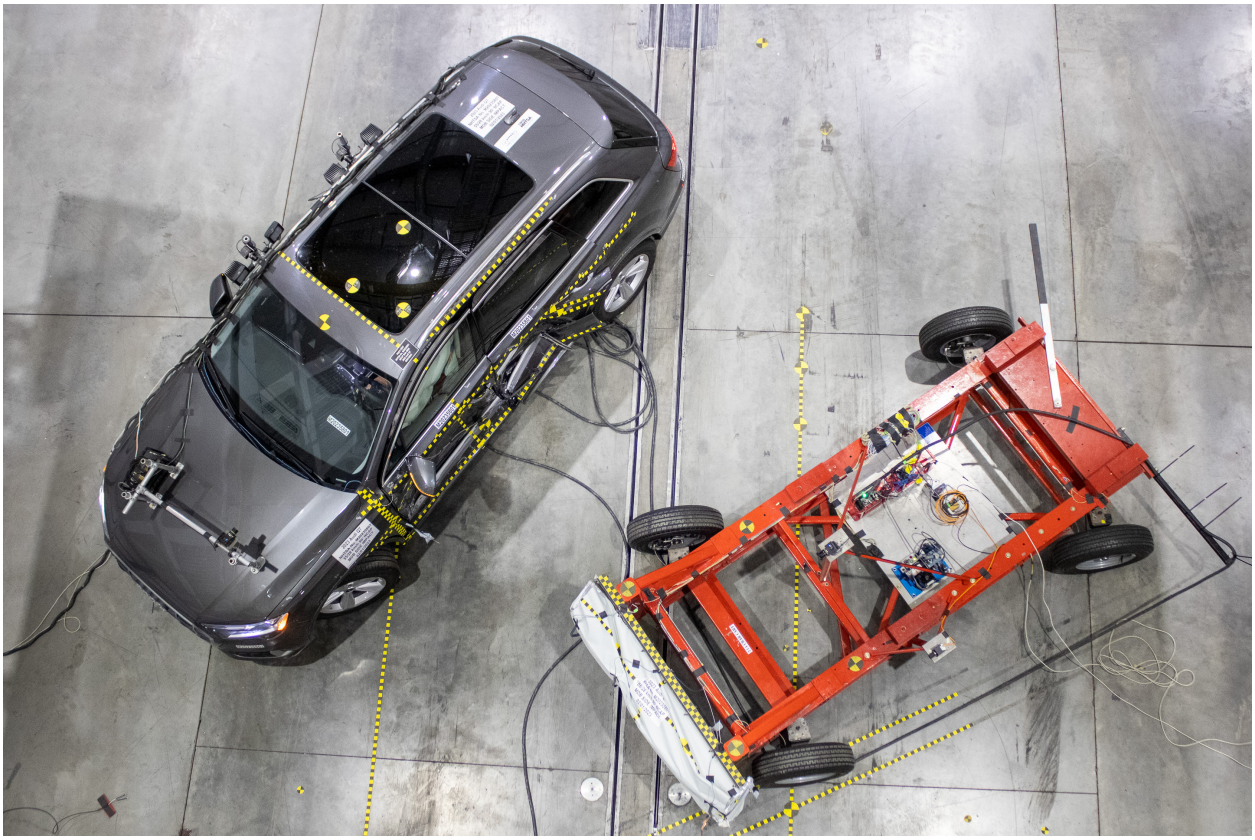

Figure A-16: Post-Test Overhead View of Test Area



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

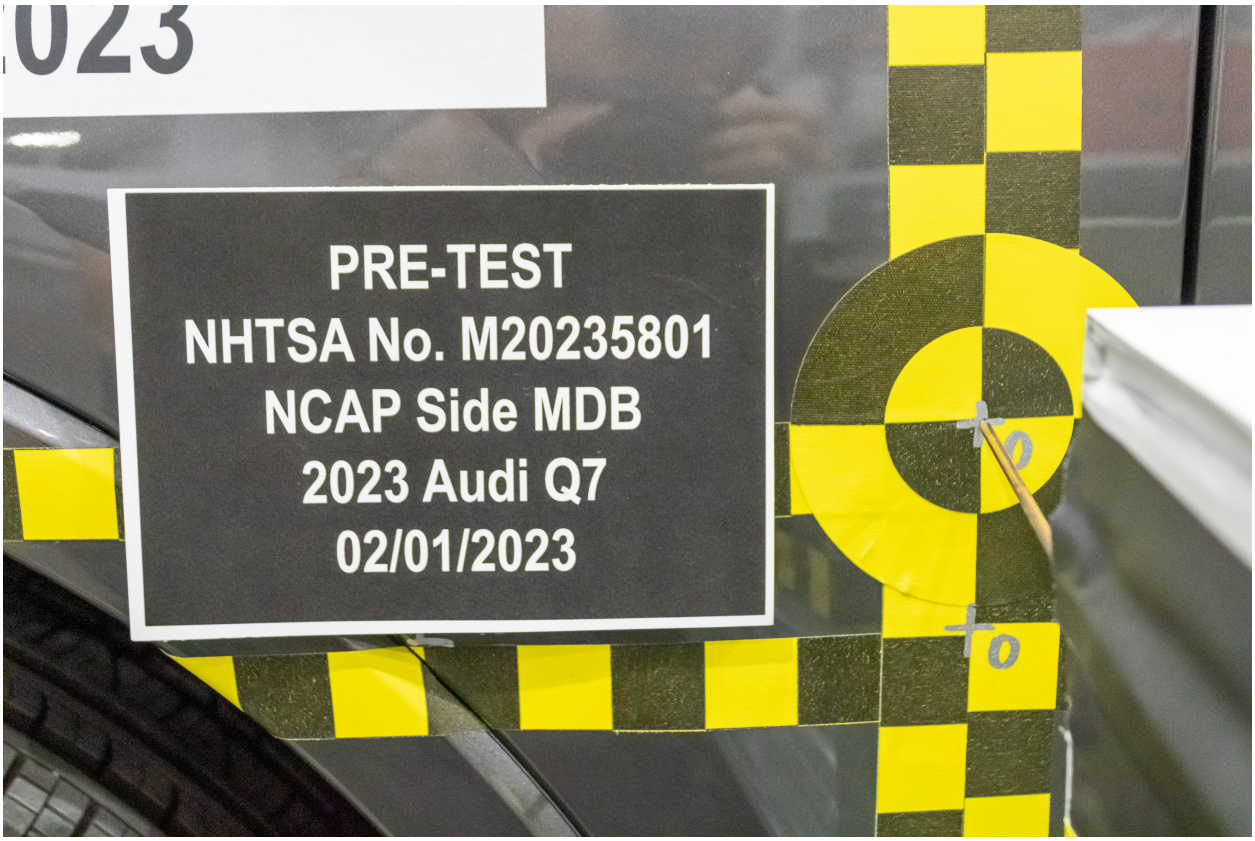

Figure A-19: Pre-Test Close-Up View of Impact Point Target



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

Photo Not Applicable

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

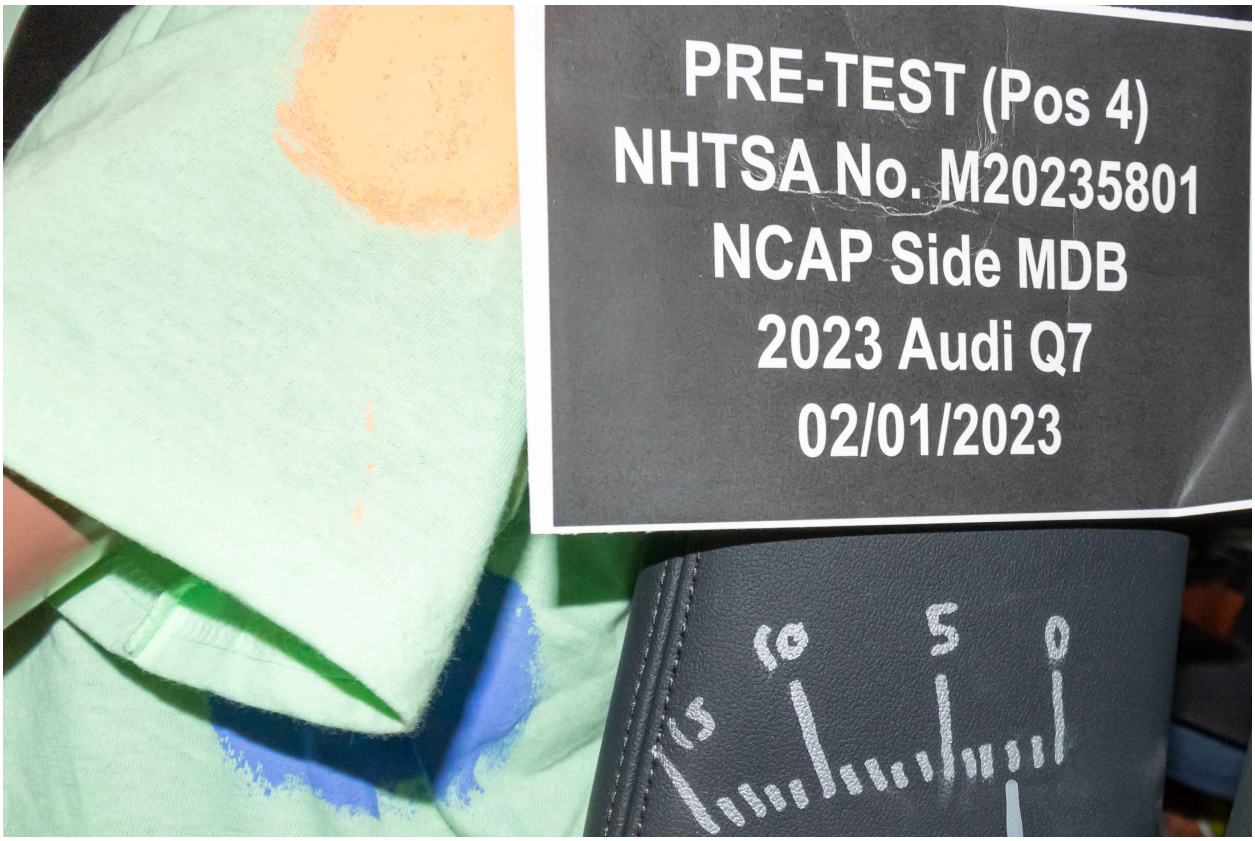

Figure A-67: Pre-test Close-Up Left Side View of Rear Passenger Seat Back



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 Views



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

Photo Not Applicable

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



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



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



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

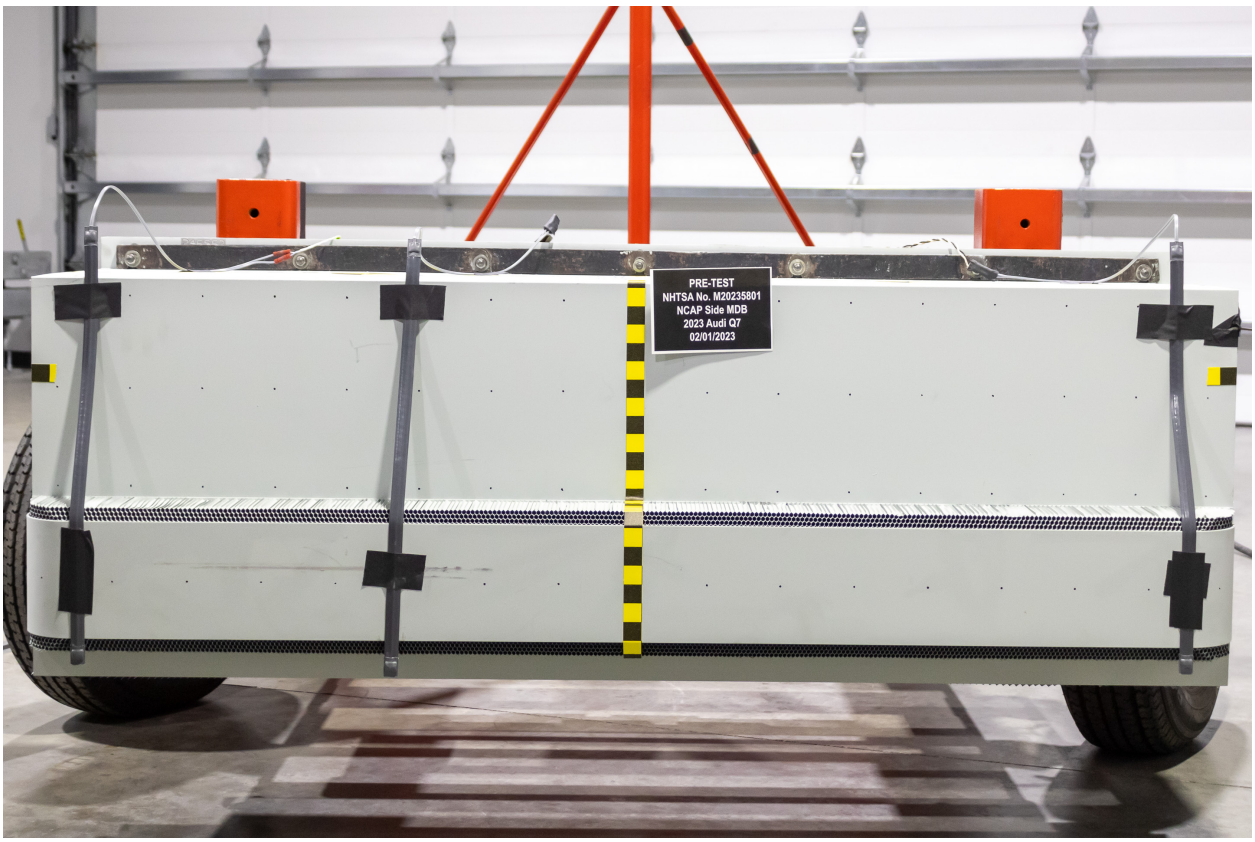

Figure A-84: Pre-Test Front View of MDB Impactor Face



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



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



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



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



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



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



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



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



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



Figure A-94: Pre-Test Ballast View



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



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



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

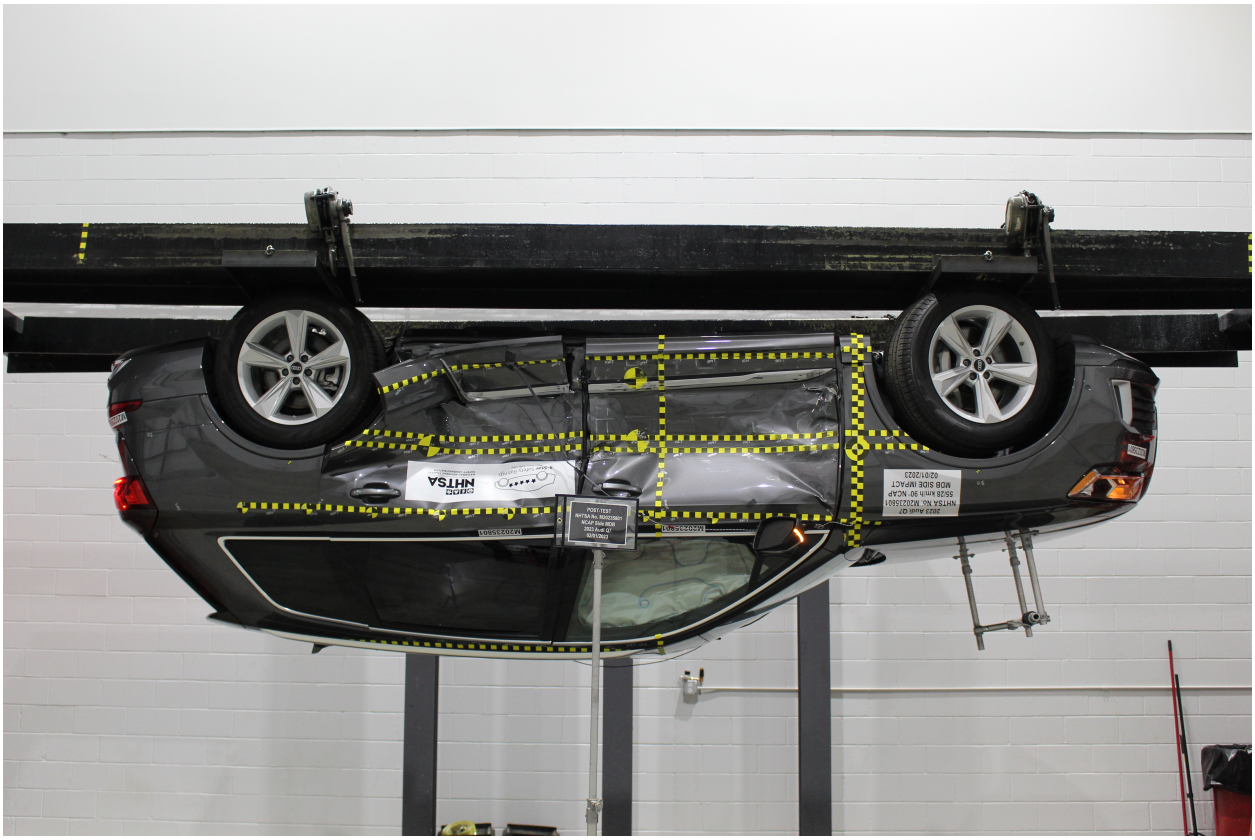

Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

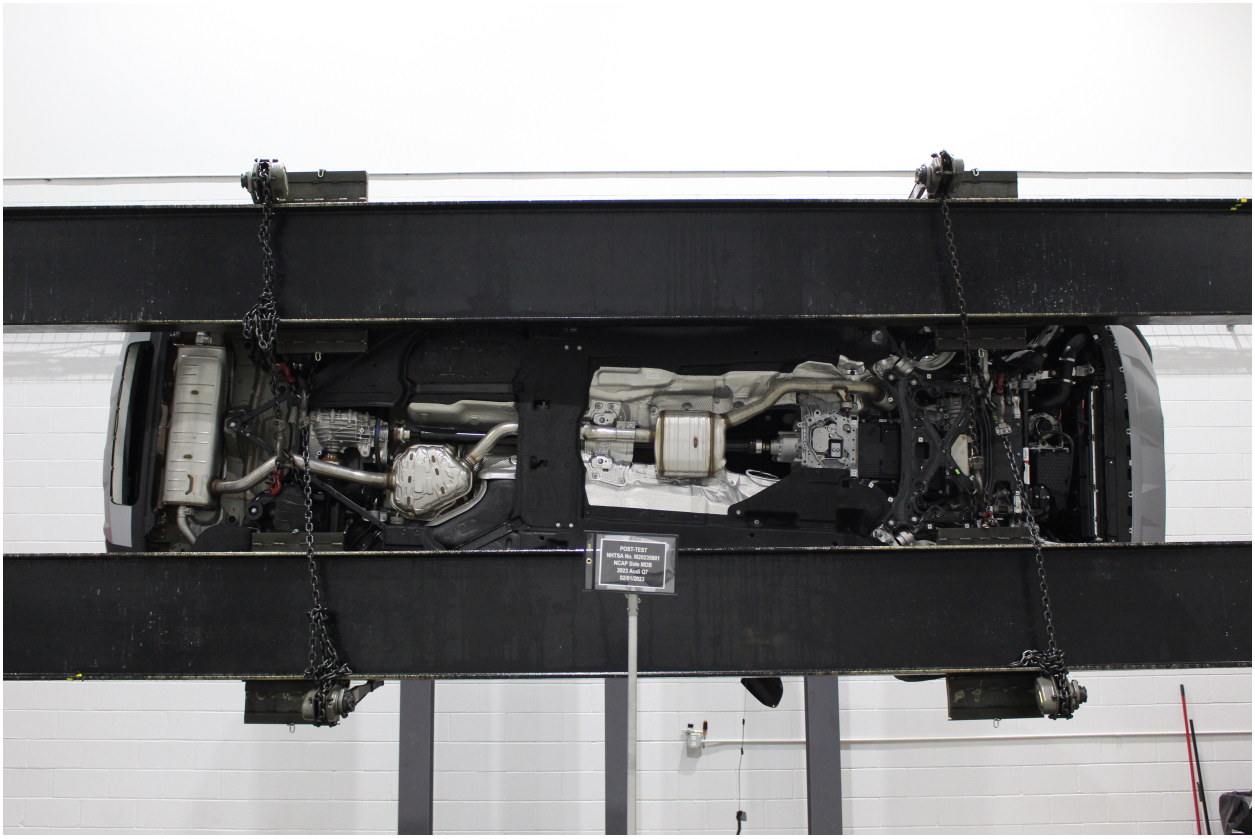

Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

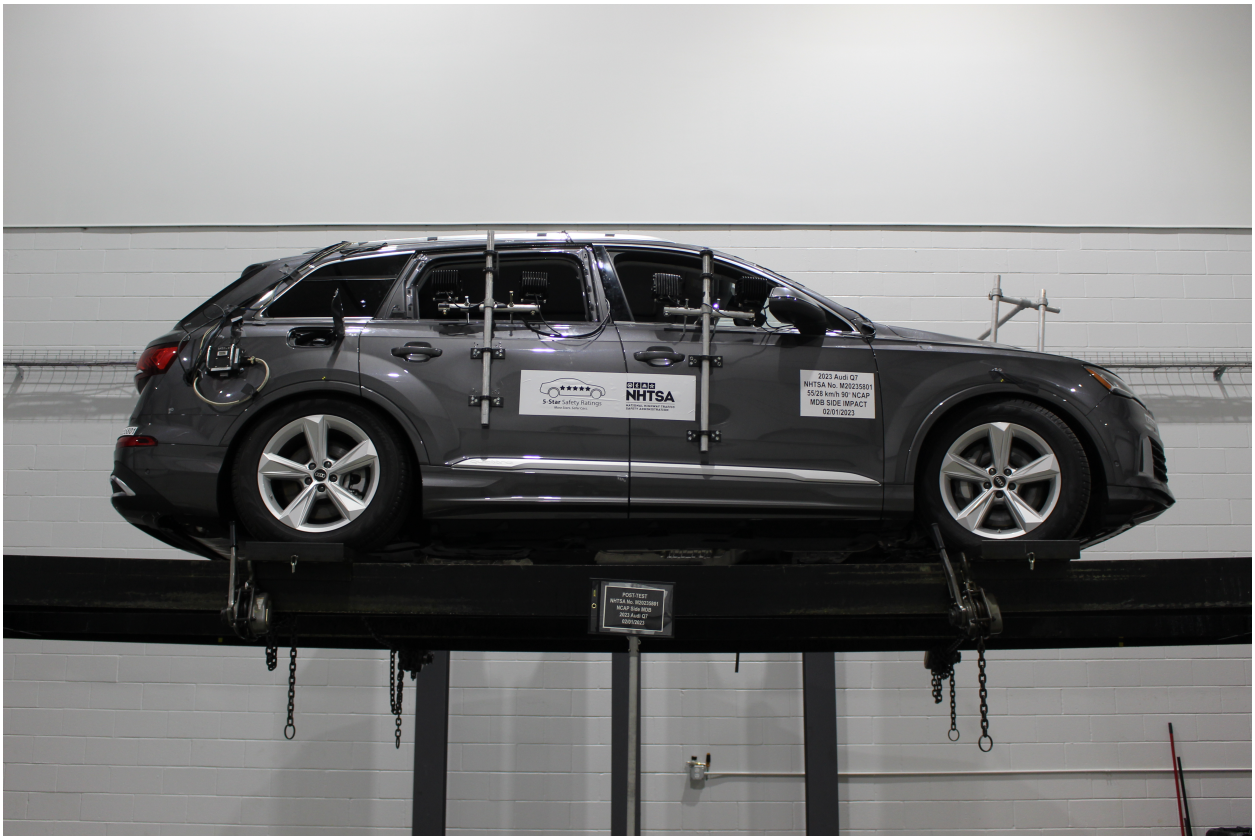

Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-101: Impact Event

2023 Audi Q7 45 TFSI quattro

STANDARD EQUIPMENT (unless replaced by options)

TECHNICAL
- 2.0L TFSI® I4 engine
- 8-speed Tiptronic® transmission
- quattro® all-wheel drive system
- Energy recuperation system and engine start-stop
- 19" 5-arm-star design wheels with all-season run-flat tires

COMFORT/TECHNOLOGY
- Audi advanced key w/ handsfree tailgate (open/close)
- Audi connect® CARE (limited time subscription)
- Audi connect® PLUS (6 mo. trial, acceptance of Terms req'd)
- Audi MMI® Navigation plus w/ MMI touch response
- Audi smartphone interface
- Audi sound system
- Audi virtual cockpit plus
- Aluminum roof rails
- Auto-dimming interior mirror w/ compass
- Bluetooth® w/ audio streaming
- Garage door opener (HomeLink®)
- Heated, auto-dimming, power-folding exterior mirrors with memory
- Heated front seats
- Integrated Toll Module®: Nationwide Toll Collection Technology (subscription req'd)
- Leather seating surfaces
- LED headlights w/ high beam assist
- Panoramic sunroof with electric sunshade
- Power adjustable front seats with driver memory/lumbar
- Power-folding 3rd row (includes LATCH for all 2nd & 3rd row seats)
- SiriusXM® w/ 360L (3 mo. trial subscription, acceptance of Terms req'd)
- Three-zone automatic climate control
- 3-spoke multifunction steering wheel w/ shift paddles
- 7 passenger seating

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 w/ anti-theft alarm & interior motion sensor
- 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*
- 12 Year Limited Warranty Against Corrosion Perforation
- 4 Years Roadside Assistance coverage provided by a third party supplier

*Please refer to the 2023 Audi Warranty and Maintenance Booklet for complete coverage information.

Base Manufacturer's Suggested Retail Price:	**$58,200.00**
PACKAGES / OPTIONS	
Samurai Gray metallic	$595.00
Black interior	Included
Premium Plus package	$4,700.00
Bang & Olufsen Premium sound system with 3D sound	
Convenience package	
Illuminated door sills	
Matrix-design LED headlights with DRL signature	
Audi Beam - Rings	$475.00
Cargo cover	$365.00
Audi Guard all-weather floor mats	$220.00
Destination Charge	$1,195.00
Subtotal:	**$65,750.00**
CREDIT - Matrix-design headlights	**-$1,250.00**
Total Manufacturer's Suggested Retail Price:	**$64,500.00**

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

MODEL: 4MGAC1

VIN: WA1LCBF72PD002513

DEALER: 422A55
AUDI SOUTH COAST
1425 AUTO MALL DR
SANTA ANA, CA 92705
Port of Entry: SAN DIEGO

SHIP TO: 422A55
AUDI SOUTH COAST
1425 AUTO MALL DR
SANTA ANA, CA 92705
COMM NUM: 4E2626
Transportation Method: TRUCK

GVWR: 2,900 kg/ 6,393 lbs
GVWR Threshold: 43.5 kg/ 95.9 lbs
Accessories Weight: 7.98 kg/ 17.6 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 — Gasoline Vehicle

Fuel Economy
21 MPG
19 city / 25 highway
combined city/hwy
4.8 gallons per 100 miles

Standard SUVs range from 14 to 102 MPG.
The best vehicle rates 132 MPGe.

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

Annual fuel **cost $2,600**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 4 (1 — 10 Best)
Smog Rating (tailpipe only): 5 (1 — 10 Best)

This vehicle emits 414 grams of CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.65 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

PARTS CONTENT INFORMATION

For Vehicles In This Carline		For This Vehicle:	
U.S./Canadian Parts Content:	1%	Final Assembly Point:	BRATISLAVA, SLOVAKIA
Major Sources Of Foreign		Country Of Origin:	
Parts Content:	SLOVAKIA: 33%		ENGINE: HUNGARY
	GERMANY: 19%		TRANSMISSION: HUNGARY

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

Figure A-102: Monroney Label

Sitting correctly and safely

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 81*. 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

RAZ-0683

Fig. 61 Front seat: adjusting 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 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.

Rear head restraints

Applies to: vehicles with adjustable head restraints

RAZ-0823

Fig. 62 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.

Third row seats: adjusting the head restraint

Applies to: vehicles with third row seats

The head restraints are automatically folded in when the backrest is folded down ⇨ *page 69*.

- To fold the head restraint in manually, pull on the release loop under the head restraint.

You must manually unfold the head restraint after unfolding the backrest.

- Unfold the head restraint by tilting it upward until you feel it click into place.

Removing the head restraints

Applies to: vehicles with removable head restraints

- Applies to: vehicles with folding backrests: Fold the backrest forward slightly ⇨ *page 91*.
- Move the head restraint upward all the way.
- Insert a suitable object, such as the extended vehicle key or mechanical key, into the release point (1) on the inside or outside of the base.
- Press the button (2) and pull the head restraint out of the backrest ⇨ ⚠ *in General information on page 71*.

Installing the head restraints

Applies to: vehicles with removable head restraints

- Fold the backrest forward slightly ⇨ *page 91*.

71

4M1012721BG

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

Sitting correctly and safely

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 81*. 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

RAZ-0683

Fig. 61 Front seat: adjusting 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 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.

Rear head restraints

Applies to: vehicles with adjustable head restraints

RAZ-0823

Fig. 62 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.

Third row seats: adjusting the head restraint

Applies to: vehicles with third row seats

The head restraints are automatically folded in when the backrest is folded down ⇨ *page 69*.

- To fold the head restraint in manually, pull on the release loop under the head restraint.

You must manually unfold the head restraint after unfolding the backrest.

- Unfold the head restraint by tilting it upward until you feel it click into place.

Removing the head restraints

Applies to: vehicles with removable head restraints

- Applies to: vehicles with folding backrests: Fold the backrest forward slightly ⇨ *page 91*.
- Move the head restraint upward all the way.
- Insert a suitable object, such as the extended vehicle key or mechanical key, into the release point (1) on the inside or outside of the base.
- Press the button (2) and pull the head restraint out of the backrest ⇨ ⚠ *in General information on page 71*.

Installing the head restraints

Applies to: vehicles with removable head restraints

- Fold the backrest forward slightly ⇨ *page 91*.

71

4M1012721BG

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

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

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Driver Dummy Instrumentation Plots

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

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)

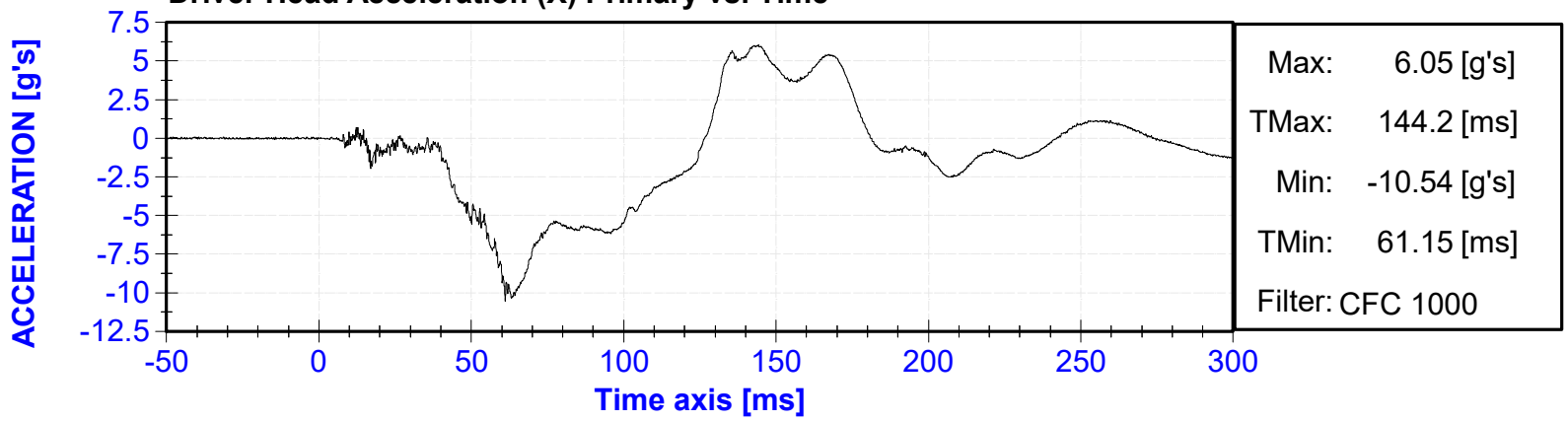
Vehicle Instrumentation Data

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)

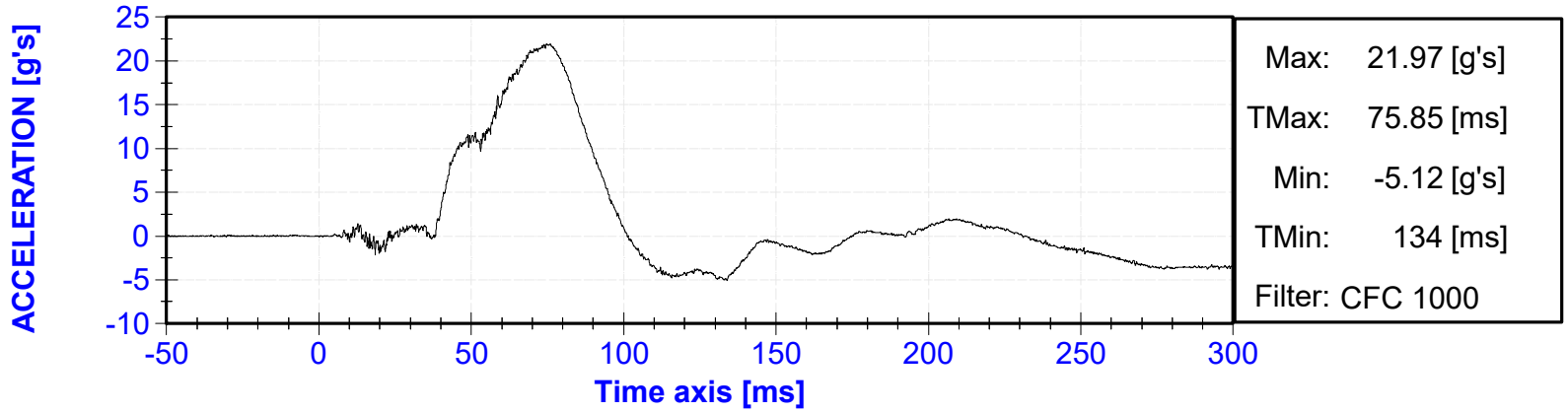
MDB Instrumentation Data

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

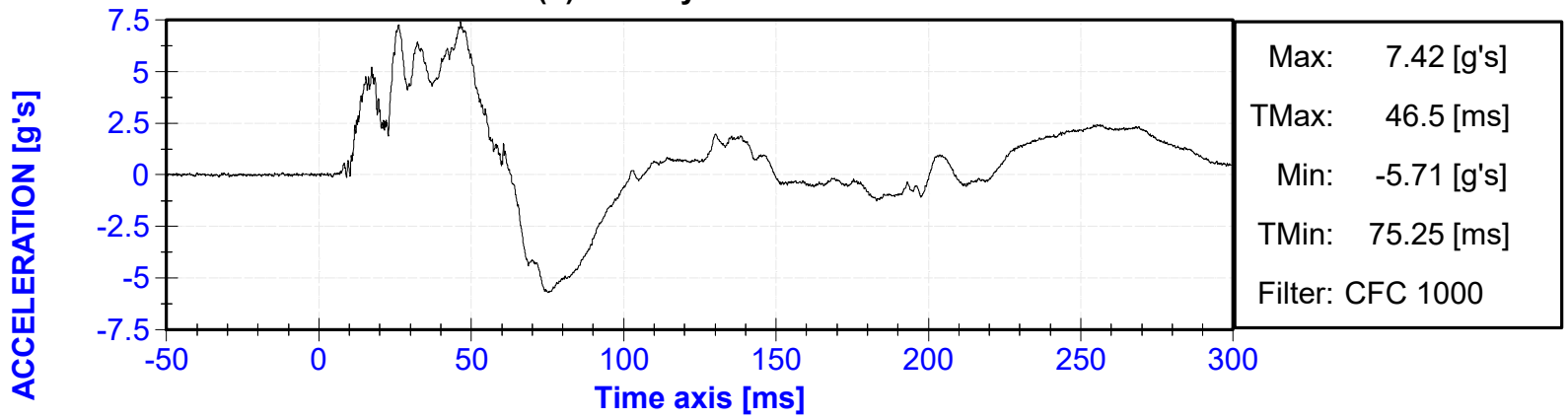
Driver Head Acceleration (X) Primary vs. Time



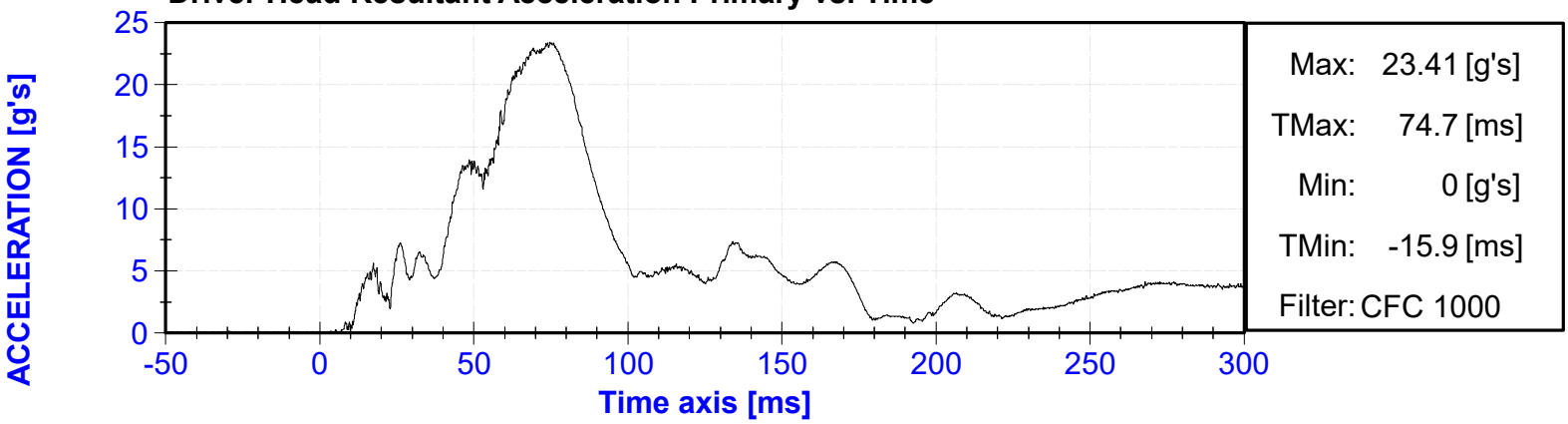
Driver Head Acceleration (Y) Primary vs. Time



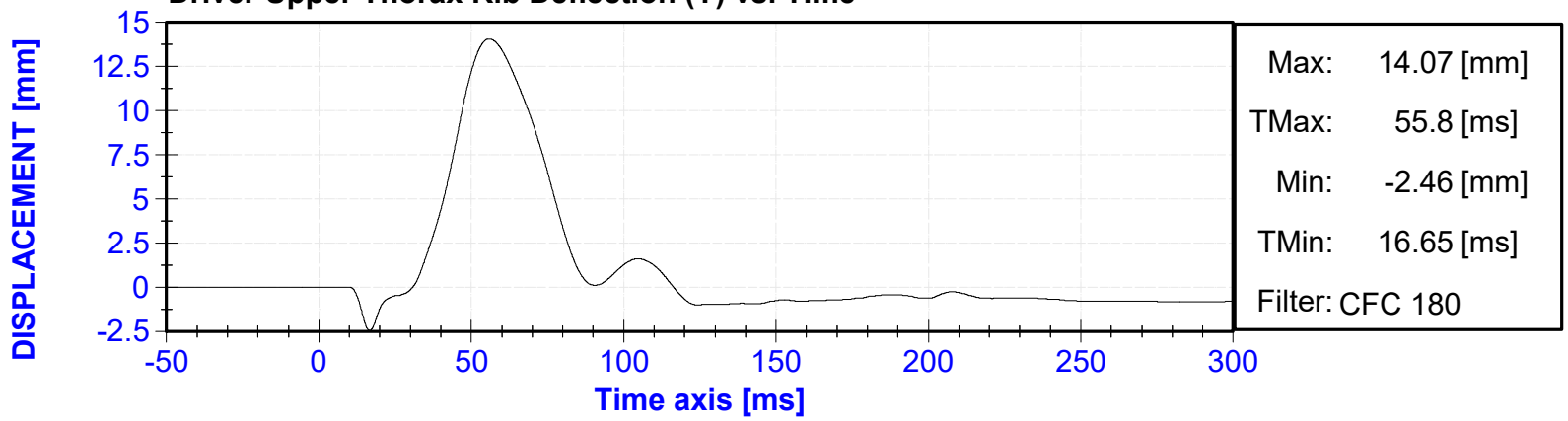
Driver Head Acceleration (Z) Primary vs. Time



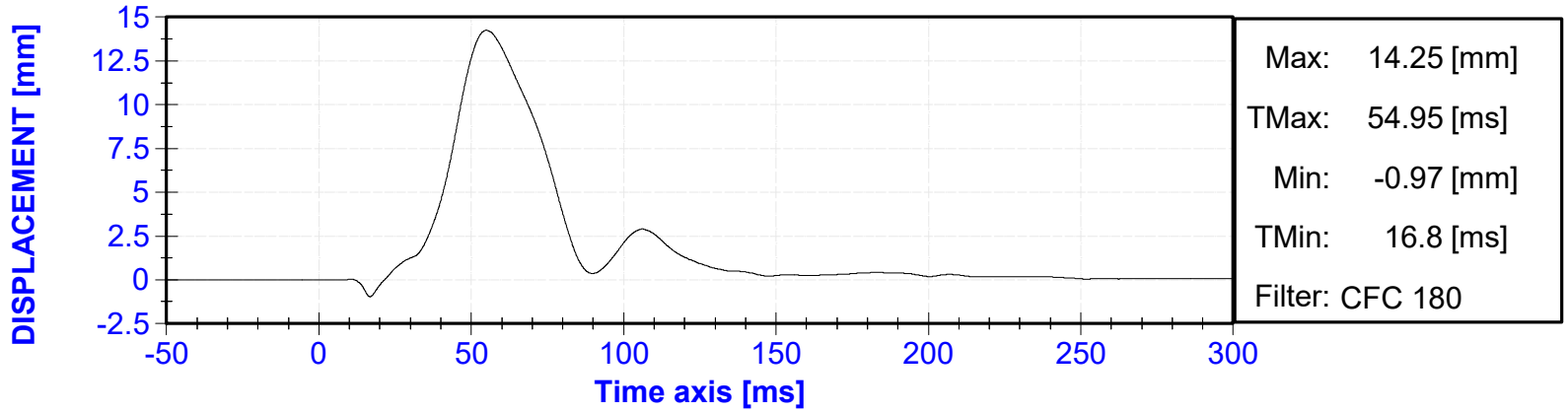
Driver Head Resultant Acceleration Primary vs. Time



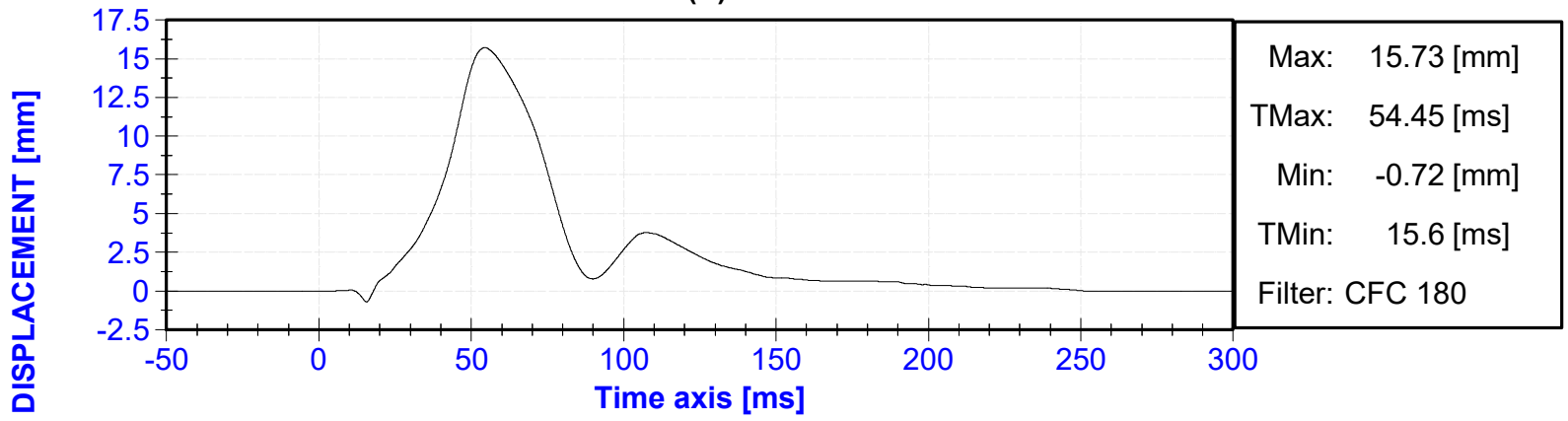
Driver Upper Thorax Rib Deflection (Y) vs. Time



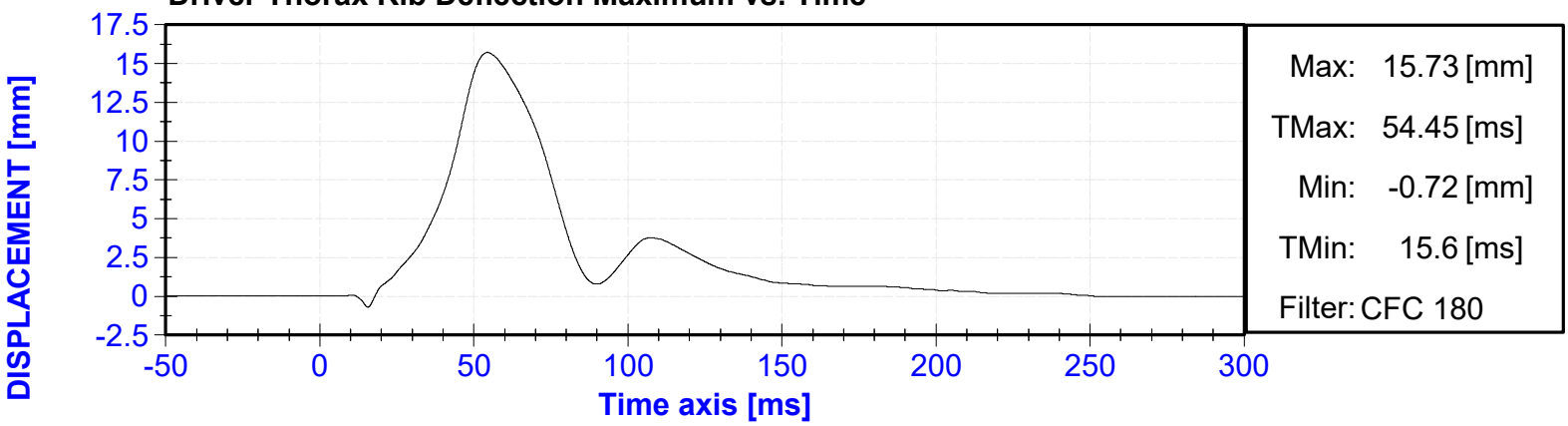
Driver Middle Thorax Rib Deflection (Y) vs. Time



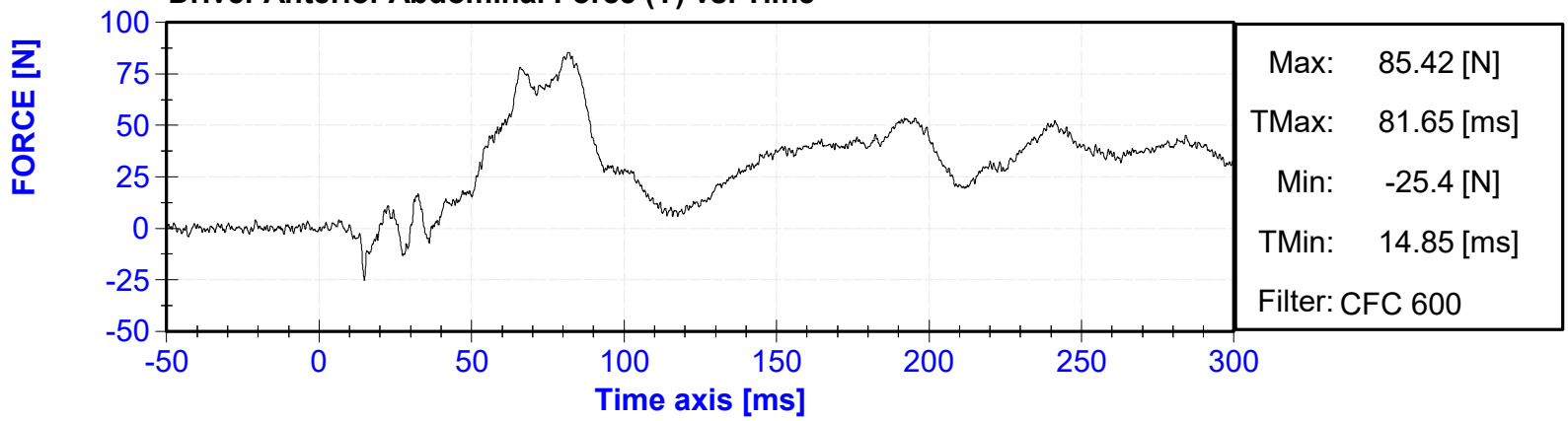
Driver Lower Thorax Rib Deflection (Y) vs. Time



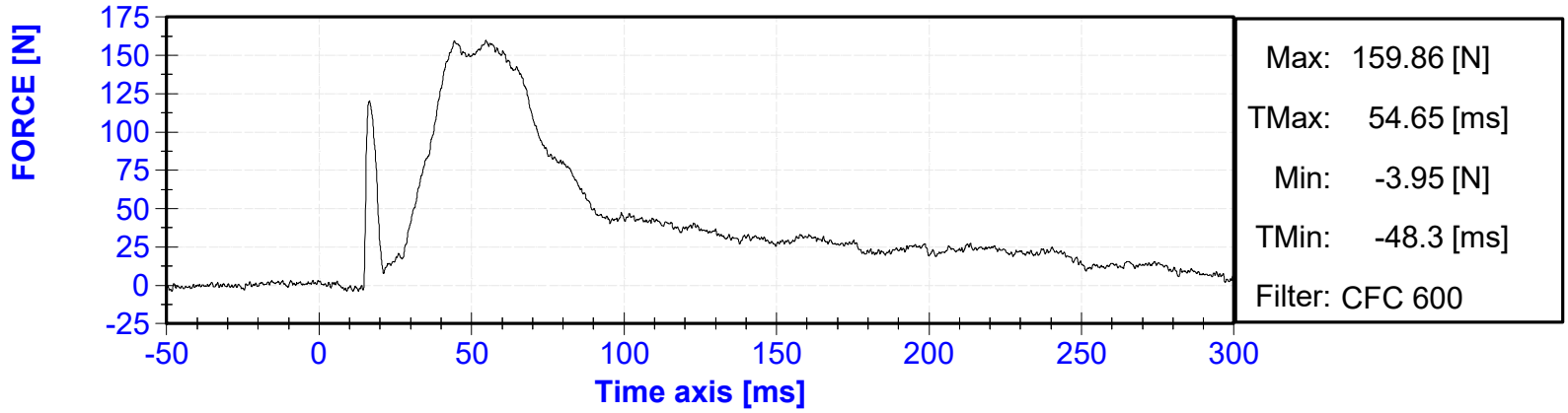
Driver Thorax Rib Deflection Maximum vs. Time



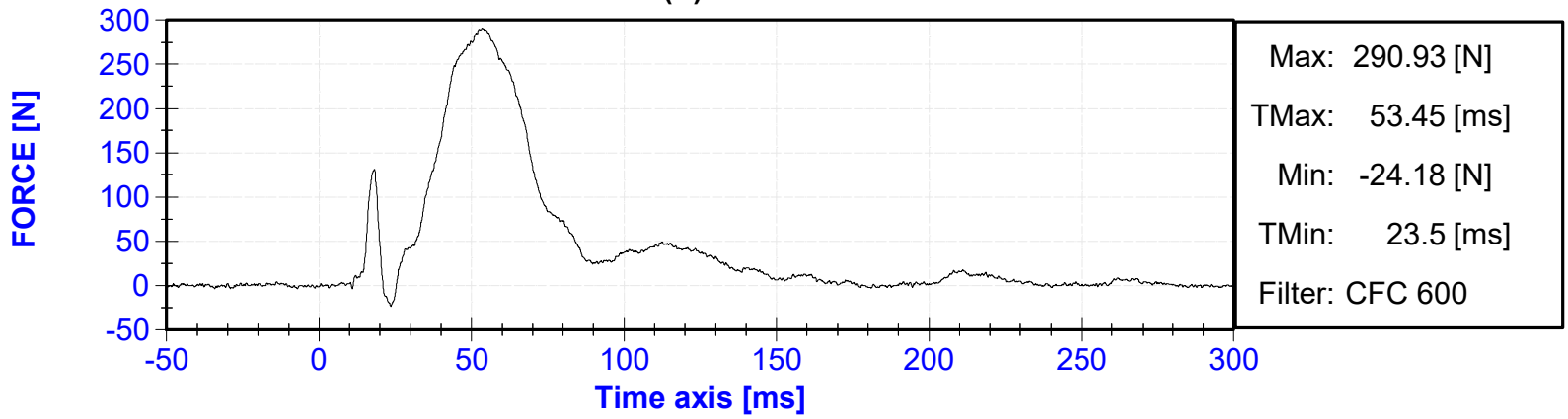
Driver Anterior Abdominal Force (Y) vs. Time



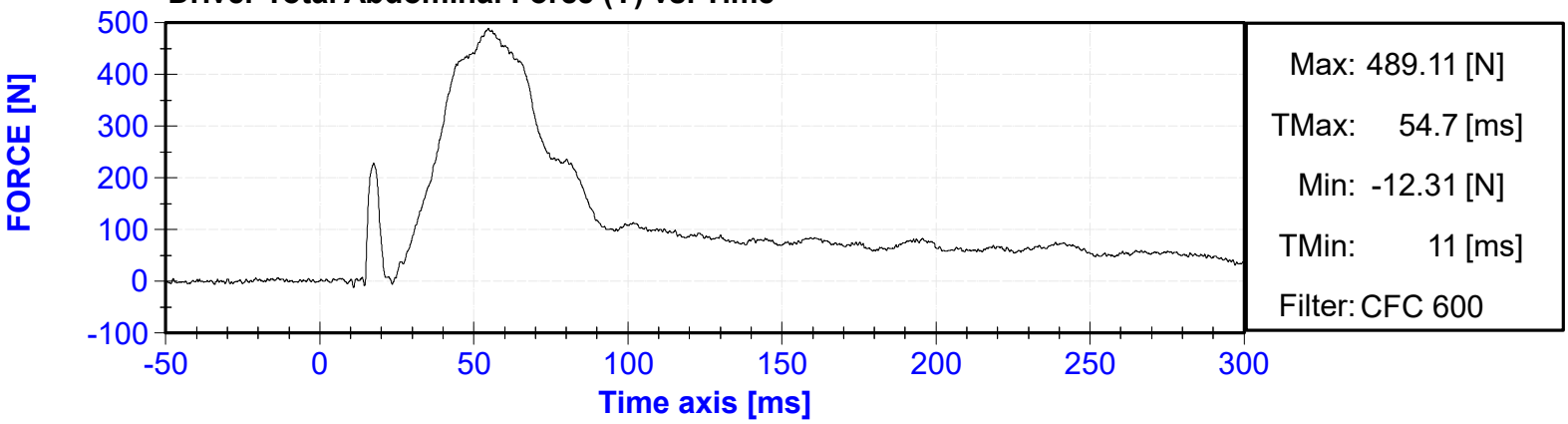
Driver Middle Abdominal Force (Y) vs. Time



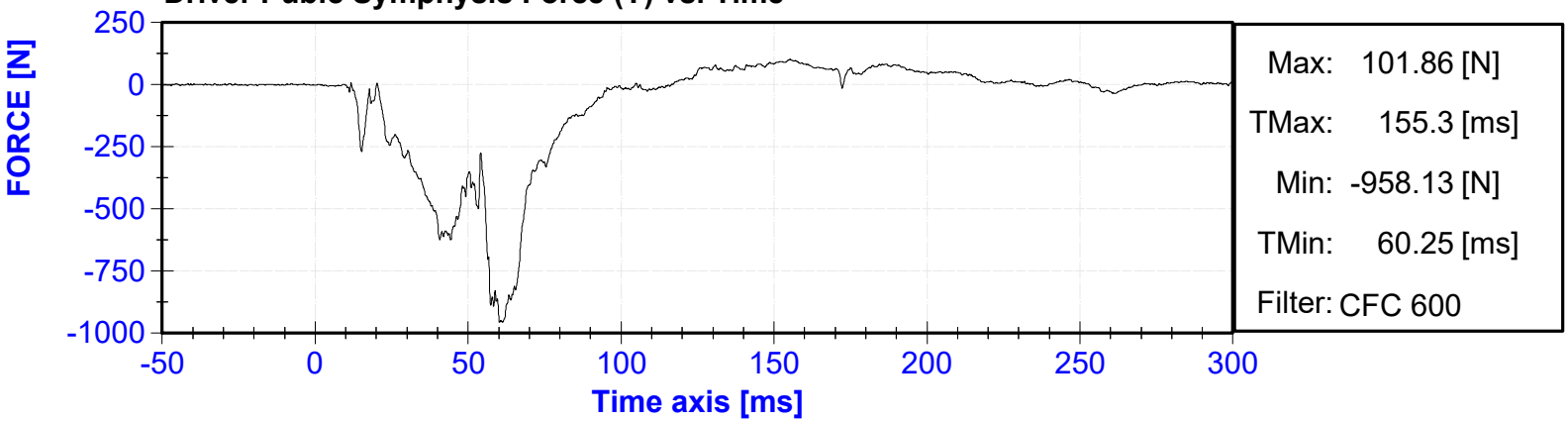
Driver Posterior Abdominal Force (Y) vs. Time



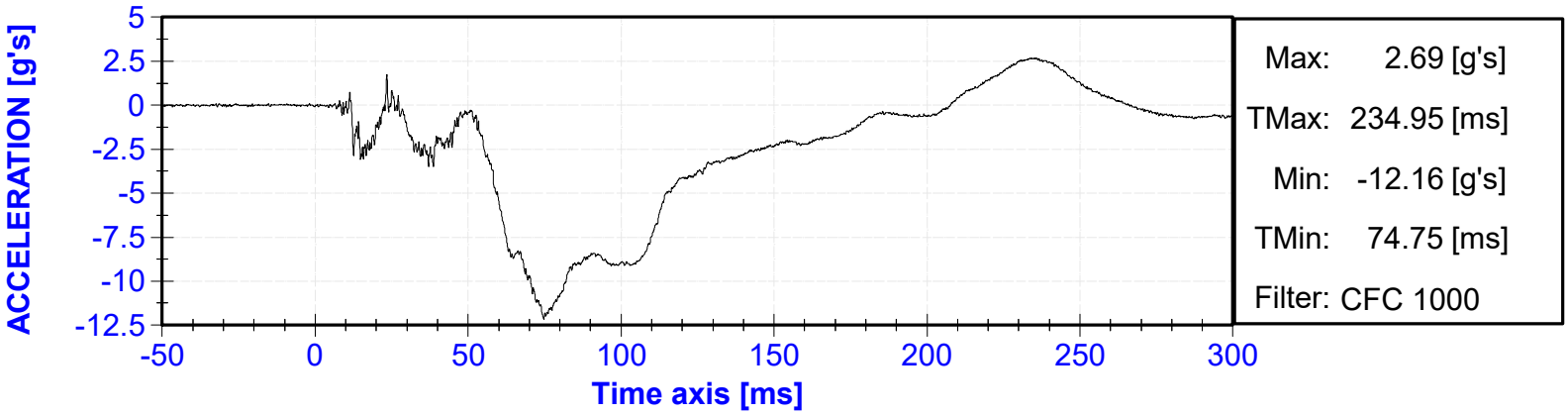
Driver Total Abdominal Force (Y) vs. Time



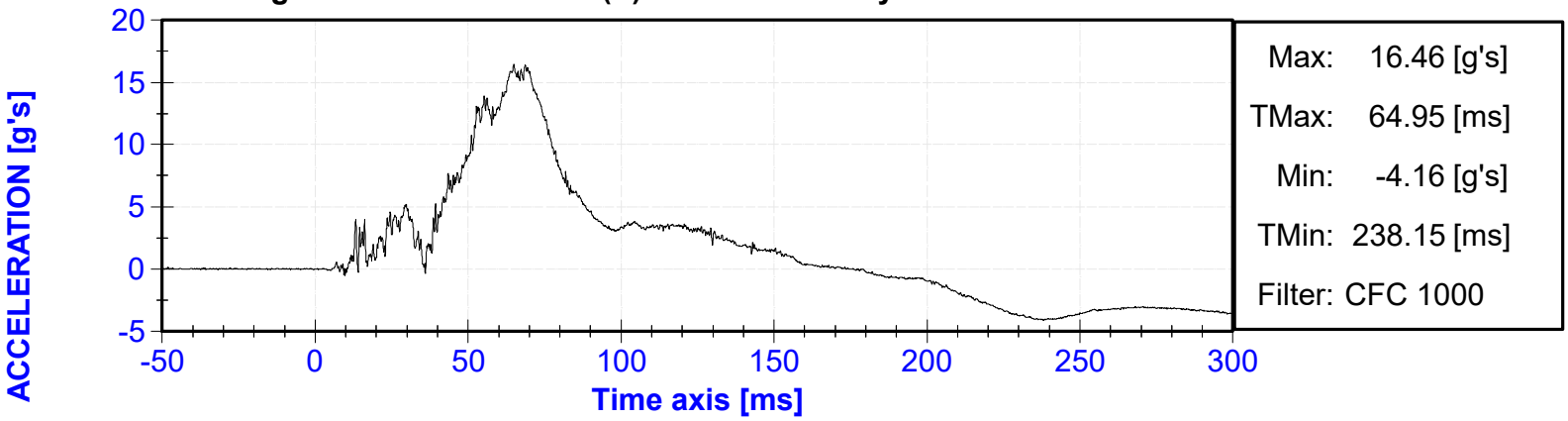
Driver Pubic Symphysis Force (Y) vs. Time



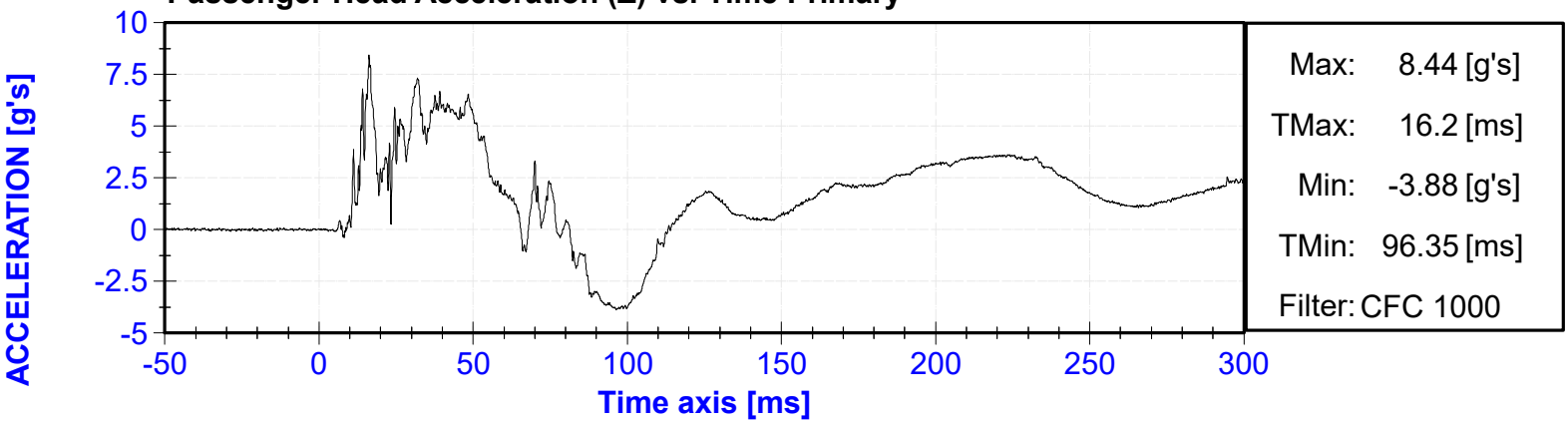
Passenger Head Acceleration (X) vs. Time Primary



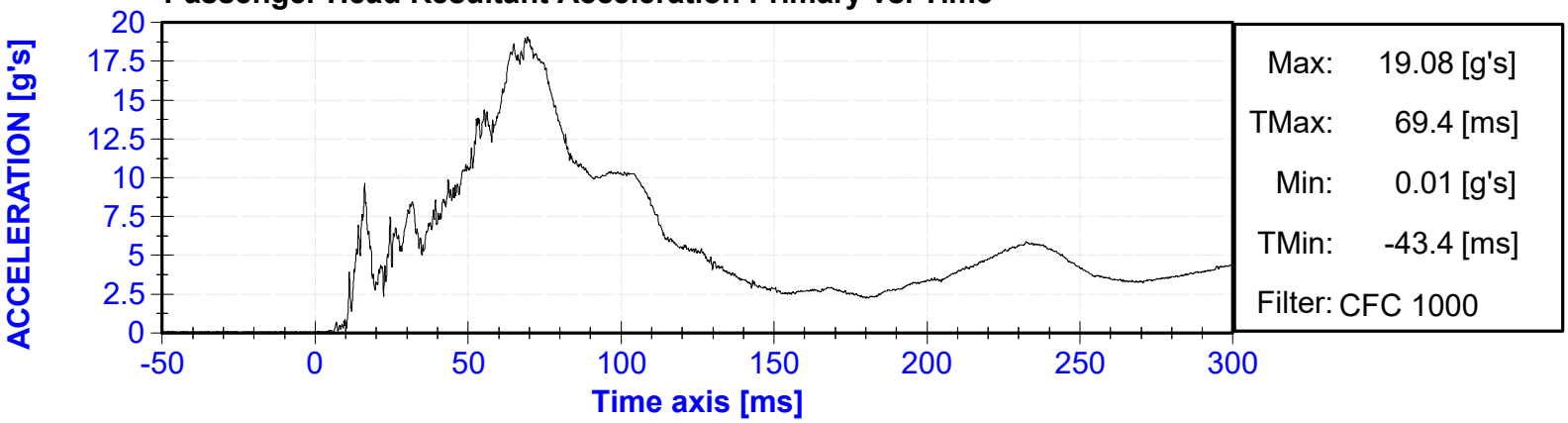
Passenger Head Acceleration (Y) vs. Time Primary



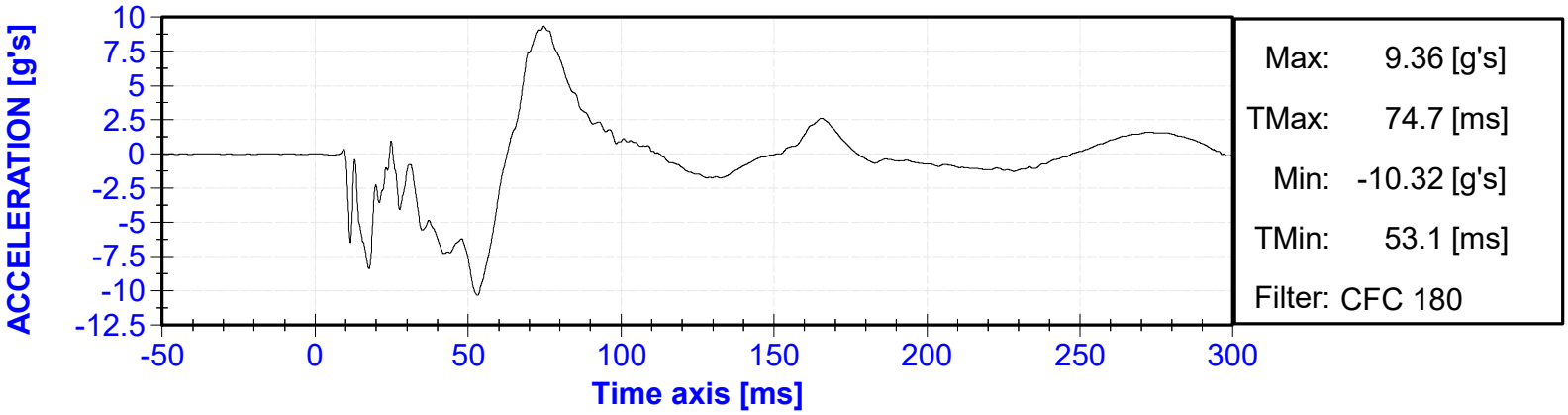
Passenger Head Acceleration (Z) vs. Time Primary



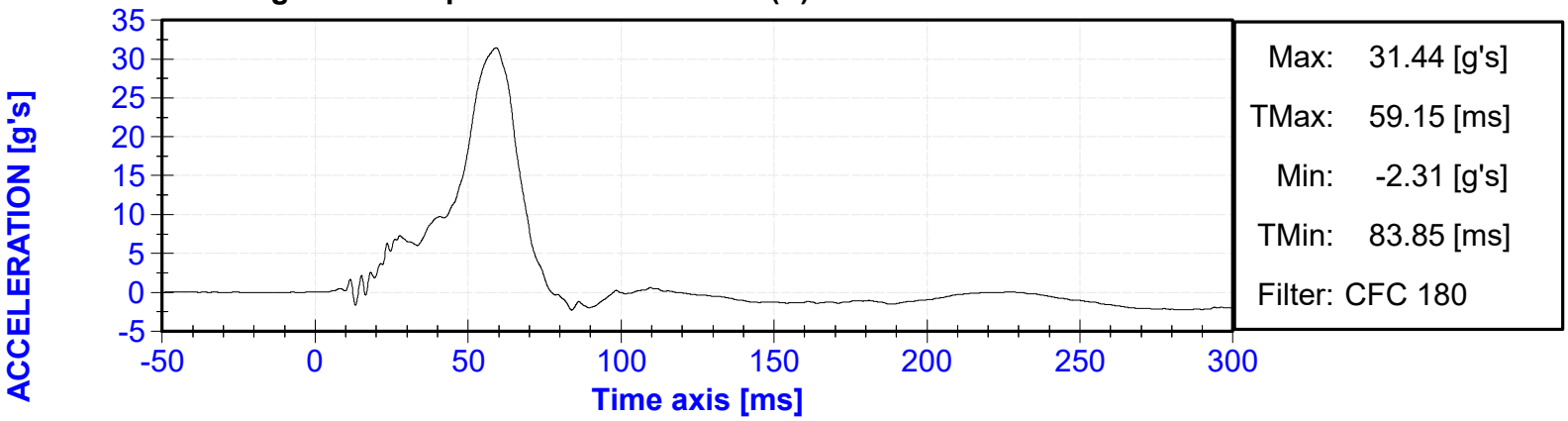
Passenger Head Resultant Acceleration Primary vs. Time



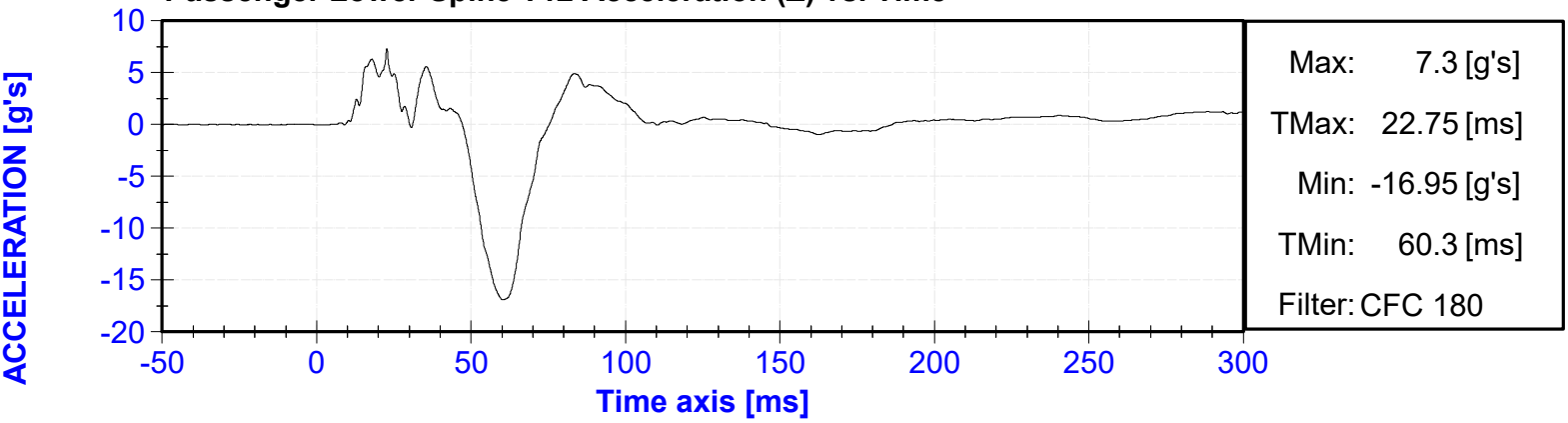
Passenger Lower Spine T12 Acceleration (X) vs. Time



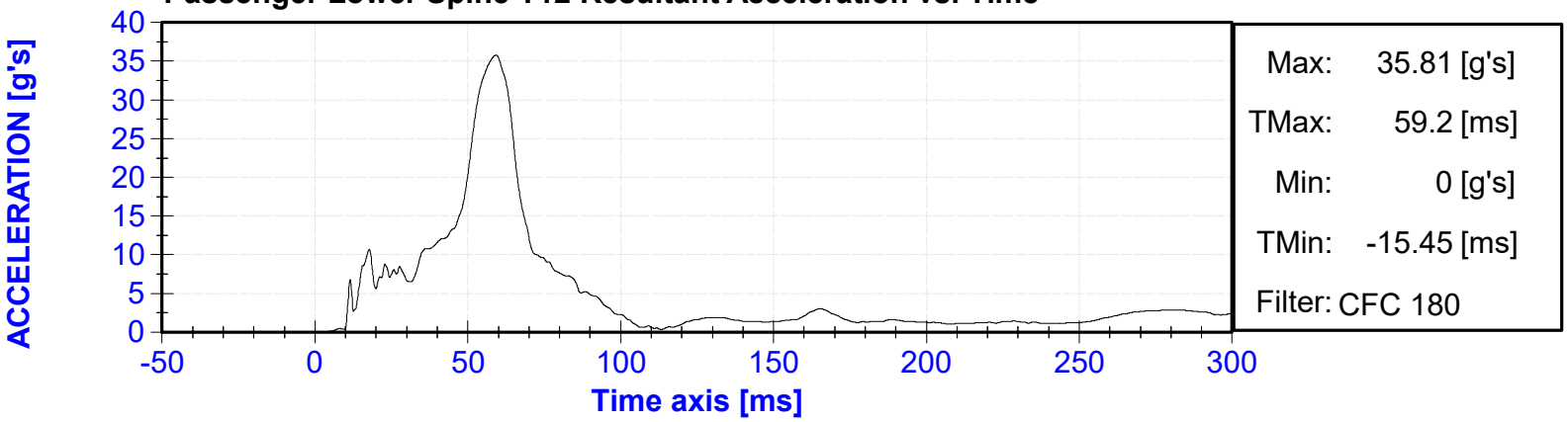
Passenger Lower Spine T12 Acceleration (Y) vs. Time



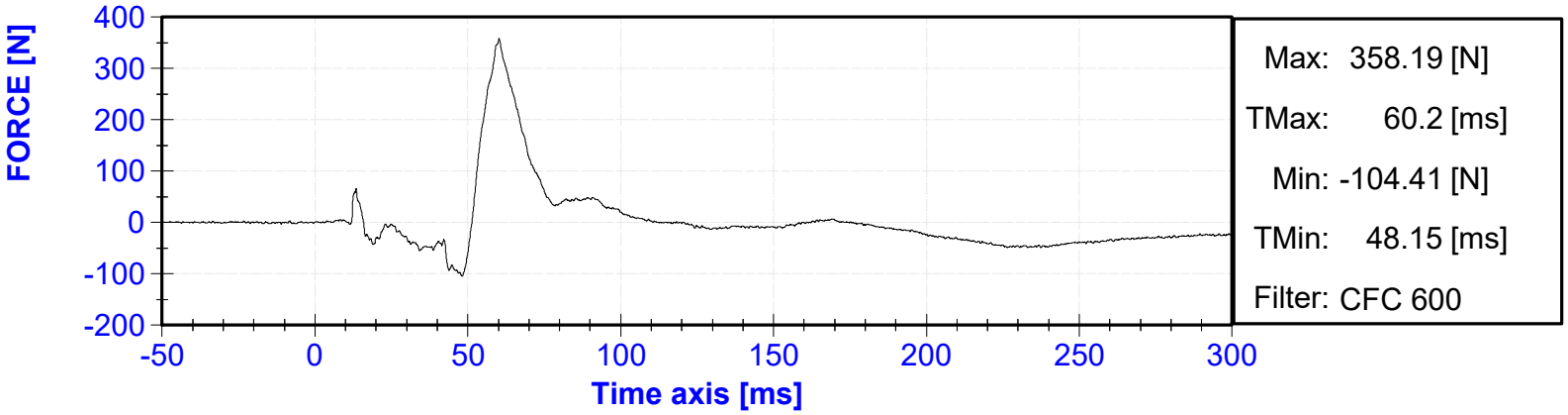
Passenger Lower Spine T12 Acceleration (Z) vs. Time



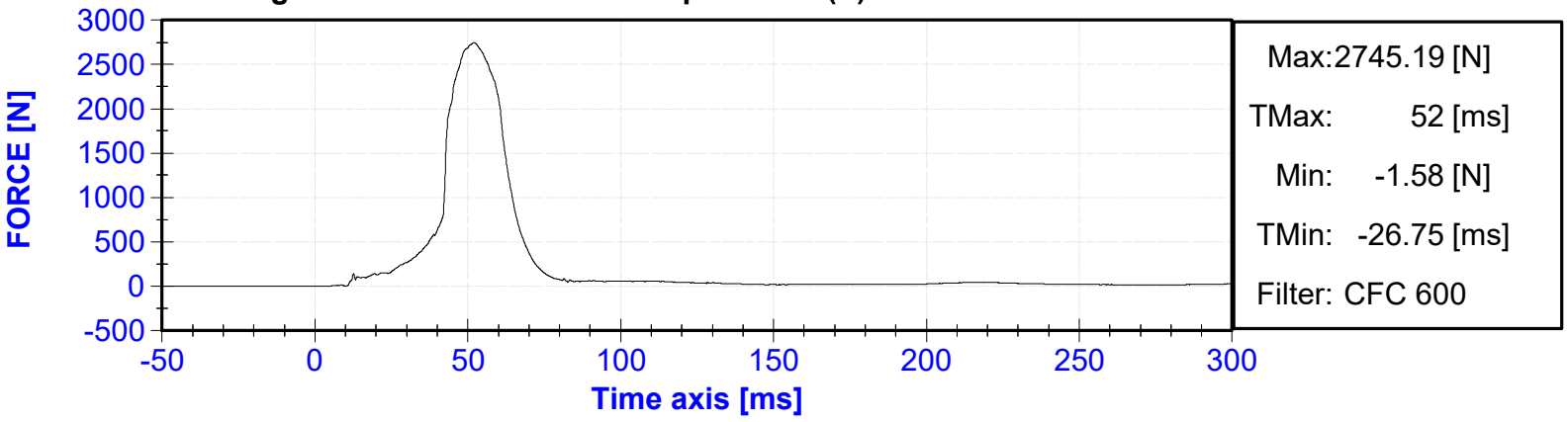
Passenger Lower Spine T12 Resultant Acceleration vs. Time



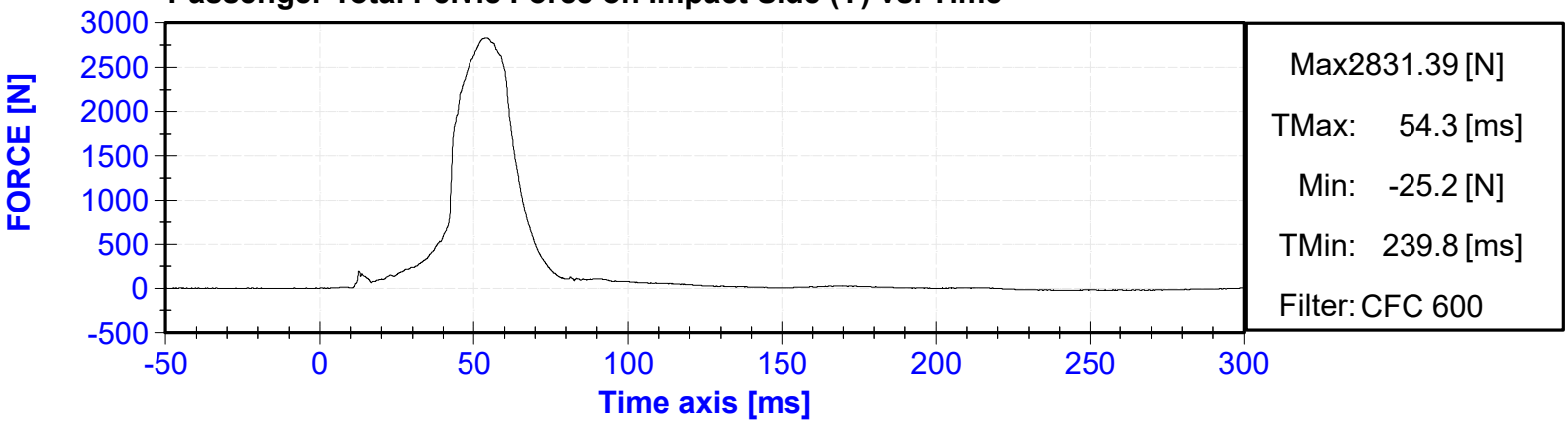
Passenger Iliac Force on Impact Side (Y) vs. Time



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



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



APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

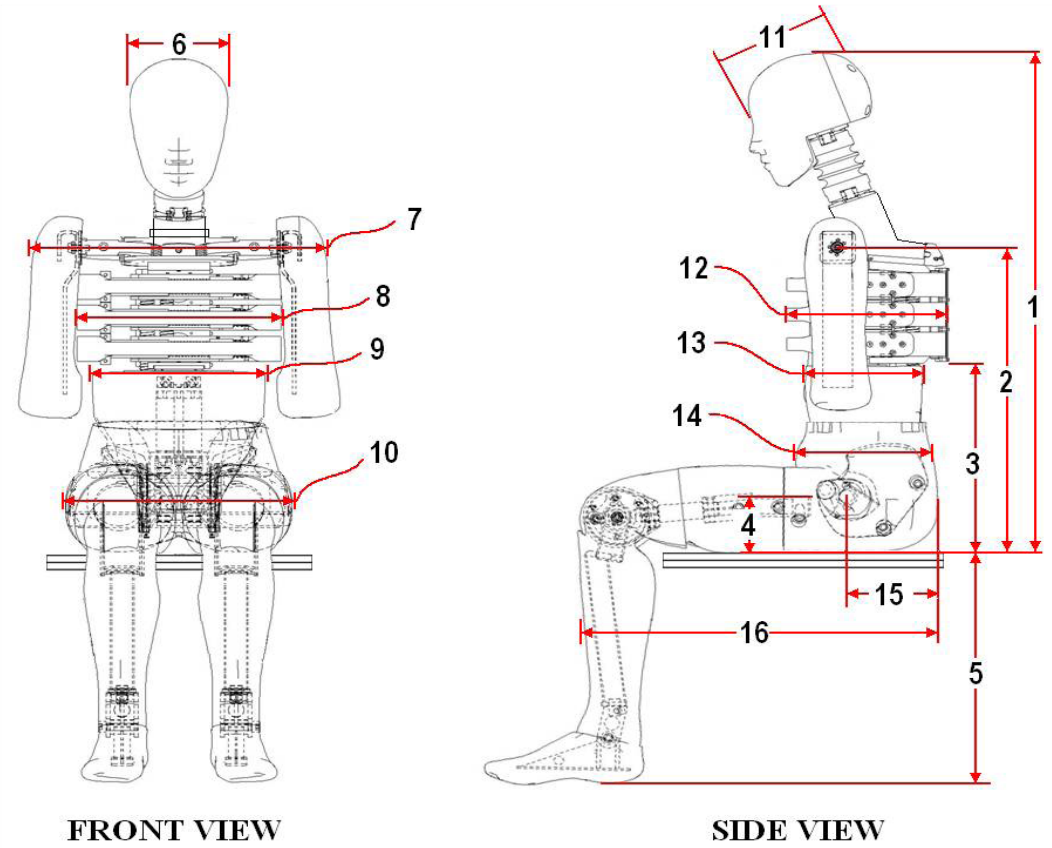
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 12/19/2022

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	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	350	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	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	329	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	203	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	606	Pass

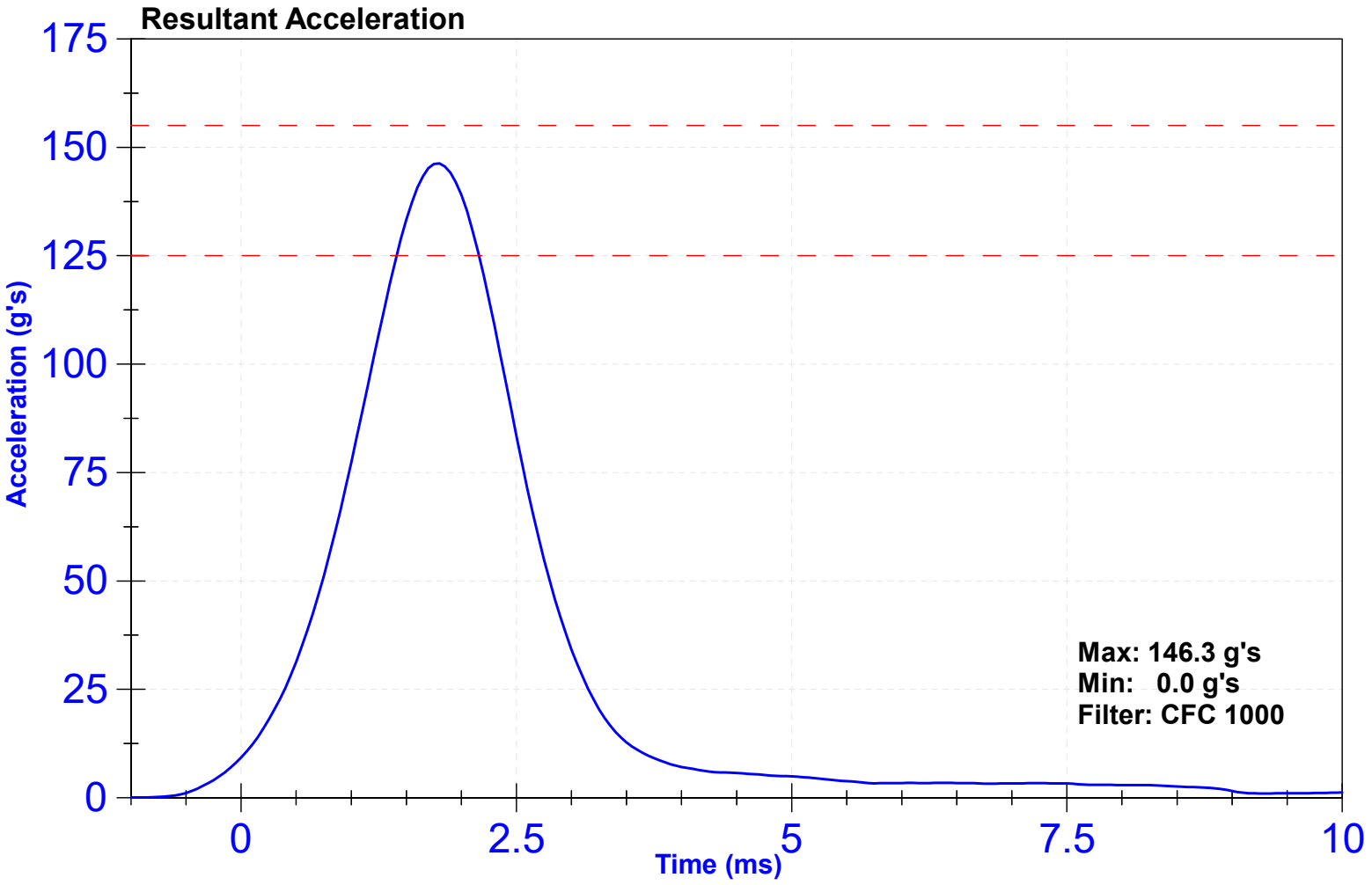
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

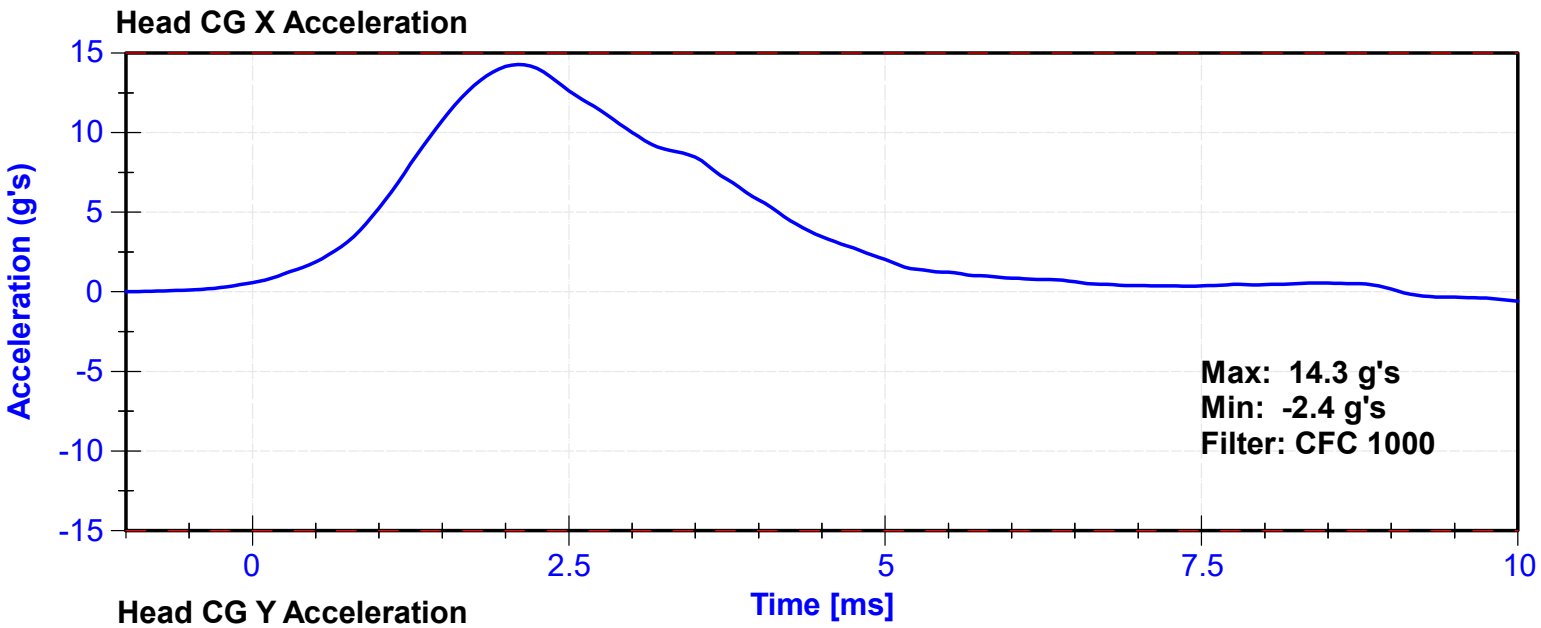
Results

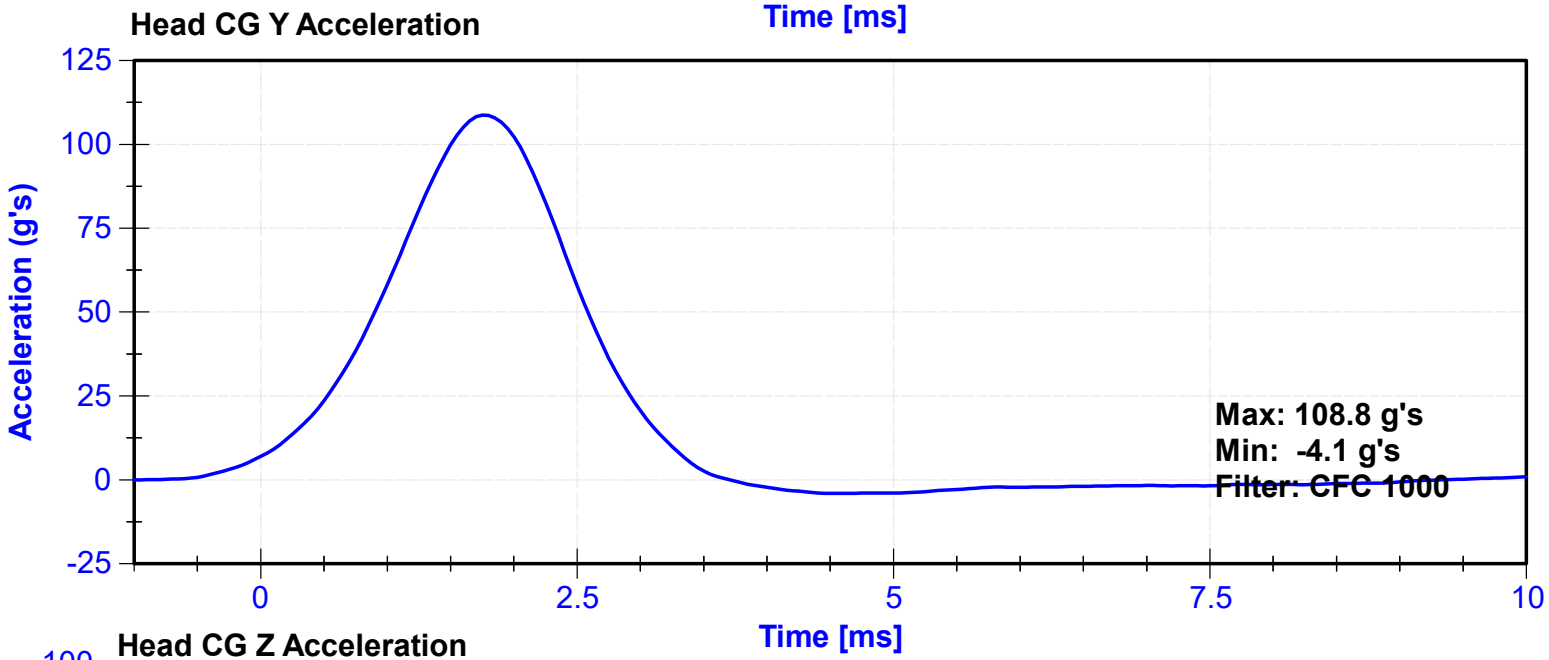
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Resultant Acceleration	125	155	g's	146.3	Pass
Oscillation	0	15	%	2.36	Pass
Fore-Aft Acceleration	-15	15	g's	14.3	Pass

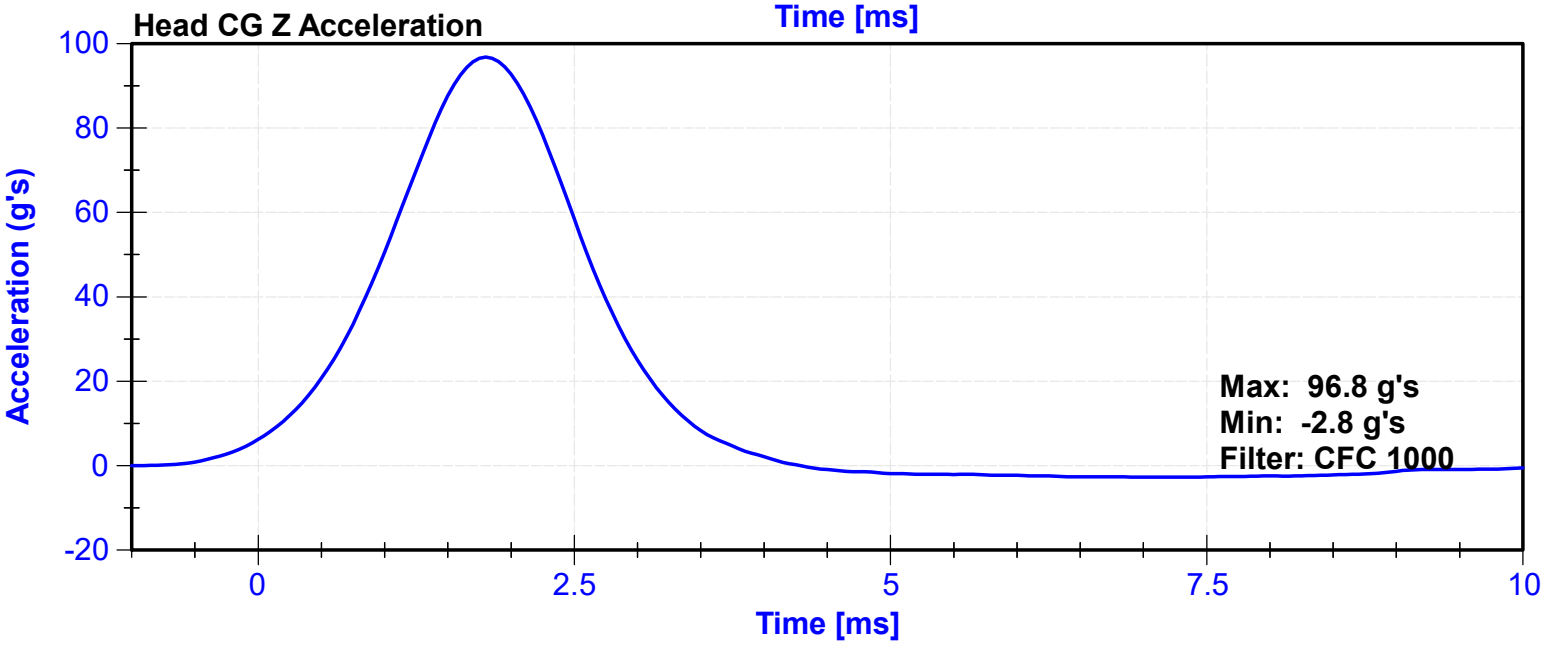
Transducer Calibrations

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: 14.3 g's
Min: -2.4 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: 108.8 g's
Min: -4.1 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: 96.8 g's
Min: -2.8 g's
Filter: CFC 1000

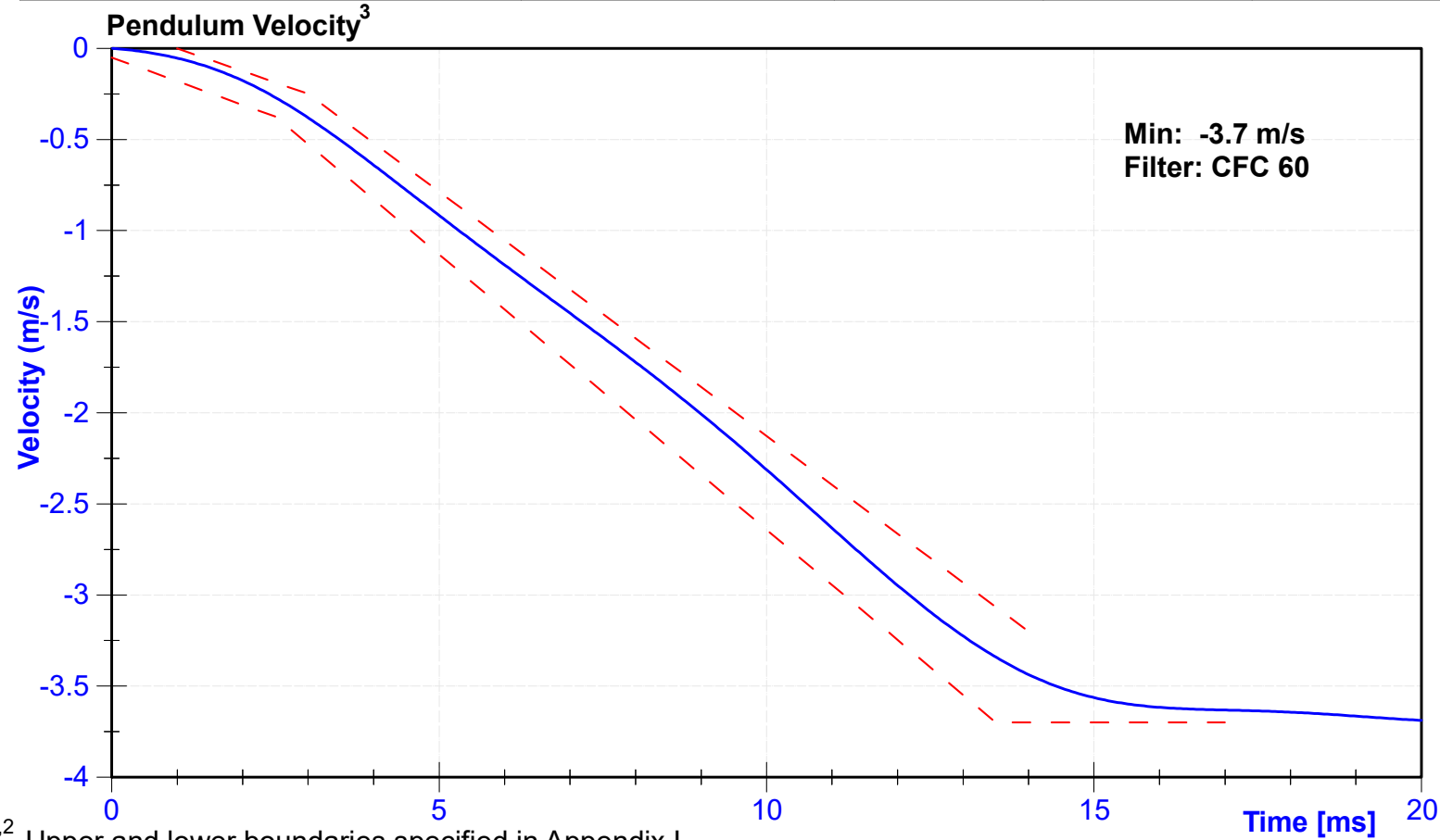
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	3.3	3.5	m/s	3.41	Pass
Lateral Neck Rotation	49	59	deg	49.6	Pass
Time at Maximum Rotation	54	66	ms	58.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	54.3	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

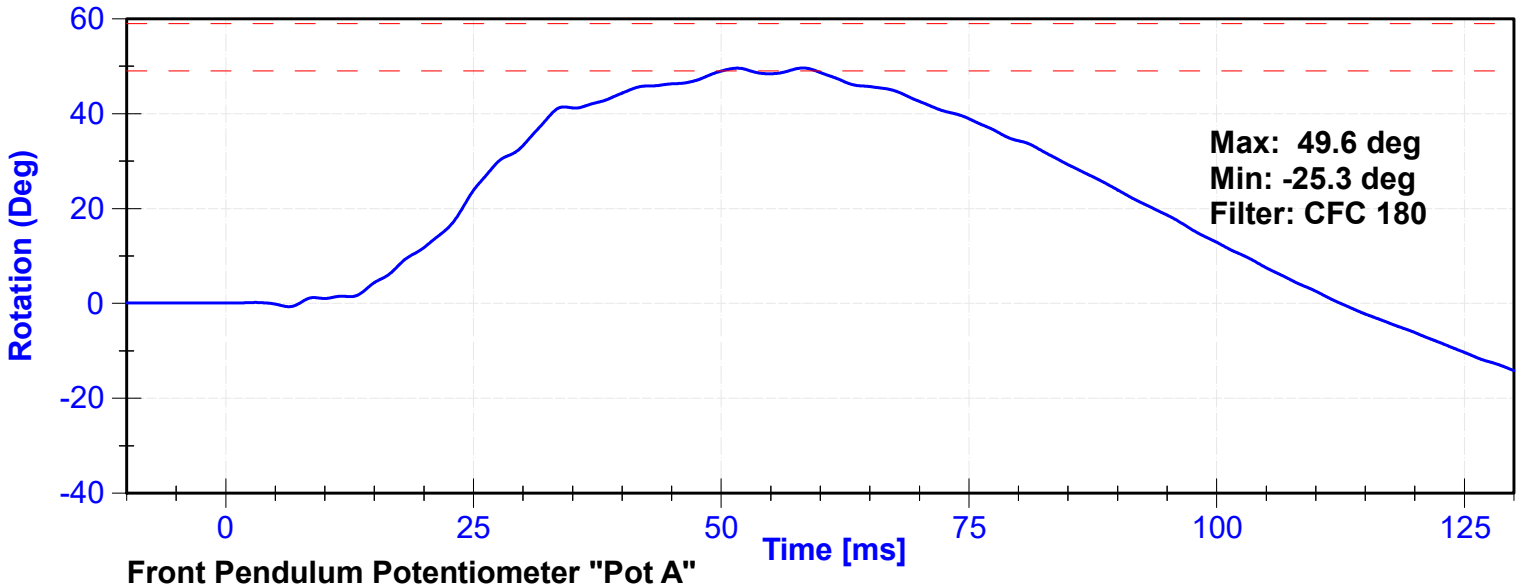
Transducer Calibrations

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

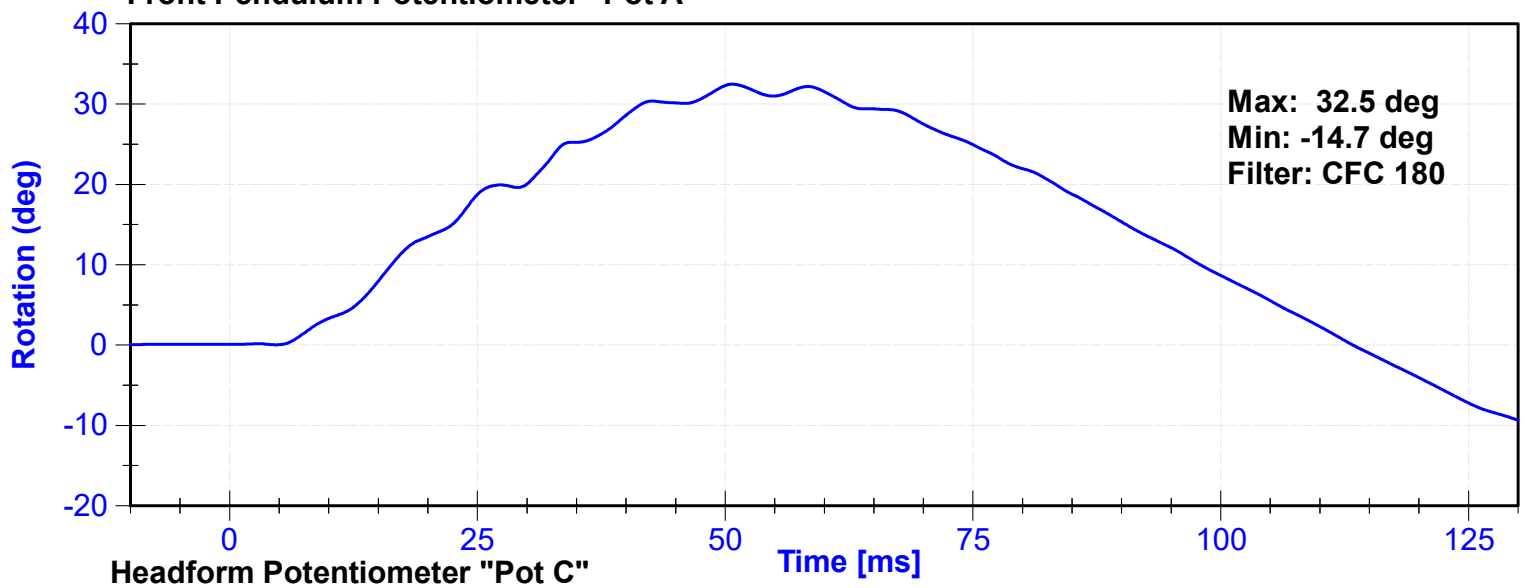


[1,2] Upper and lower boundaries specified in Appendix I

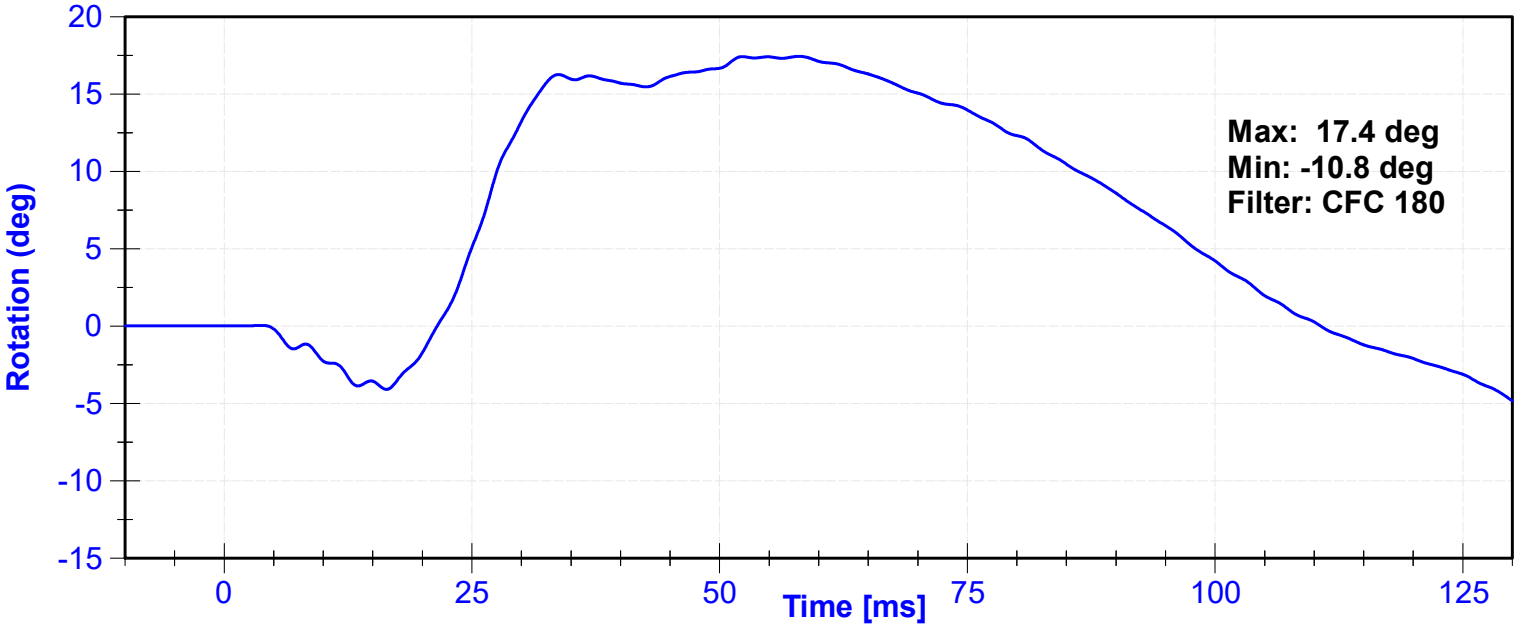
Neck Rotation



Front Pendulum Potentiometer "Pot A"



Headform Potentiometer "Pot C"



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

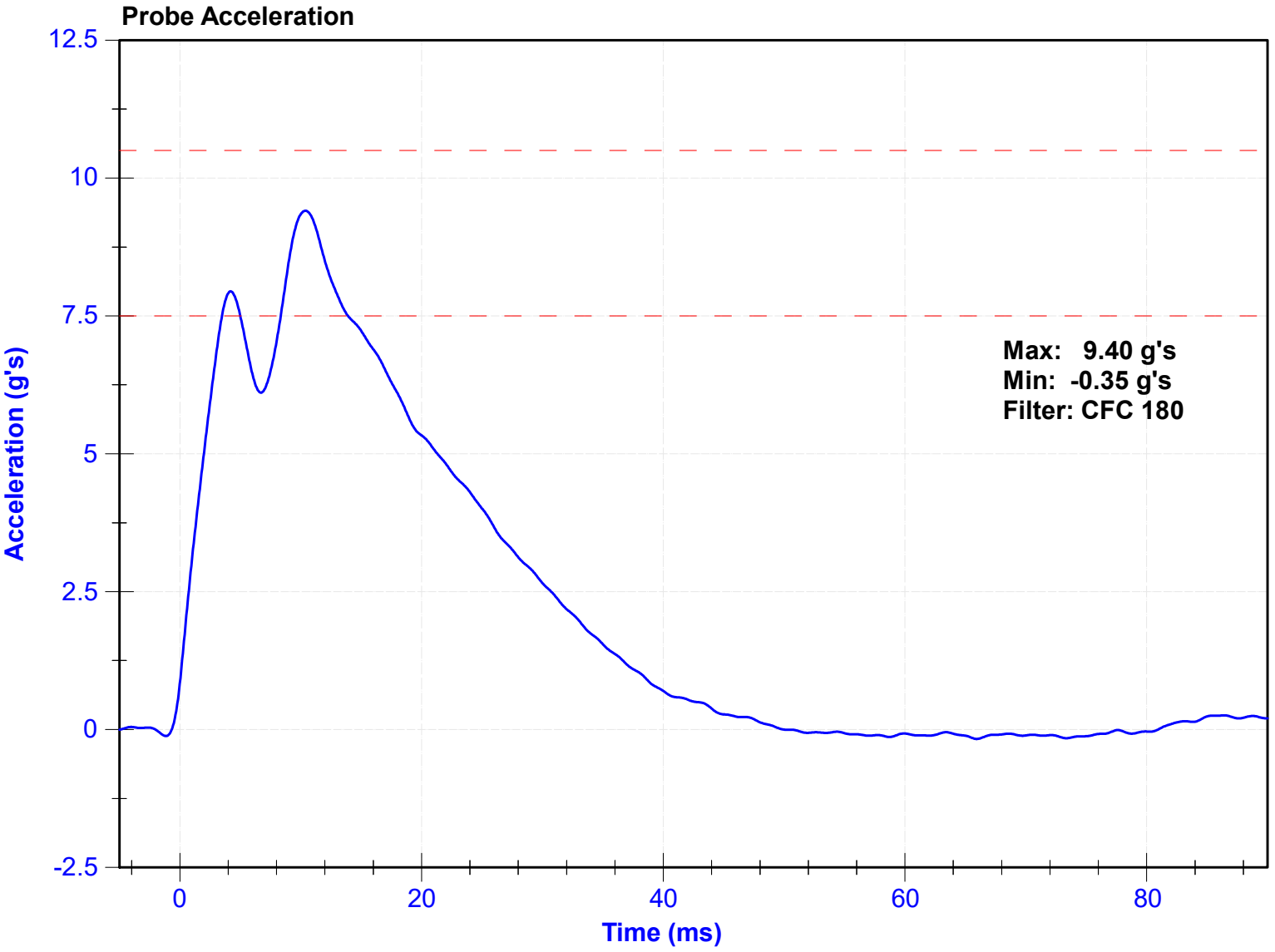
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	20.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	7.5	10.5	g's	9.40	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18494	11/5/2022	5/4/2023



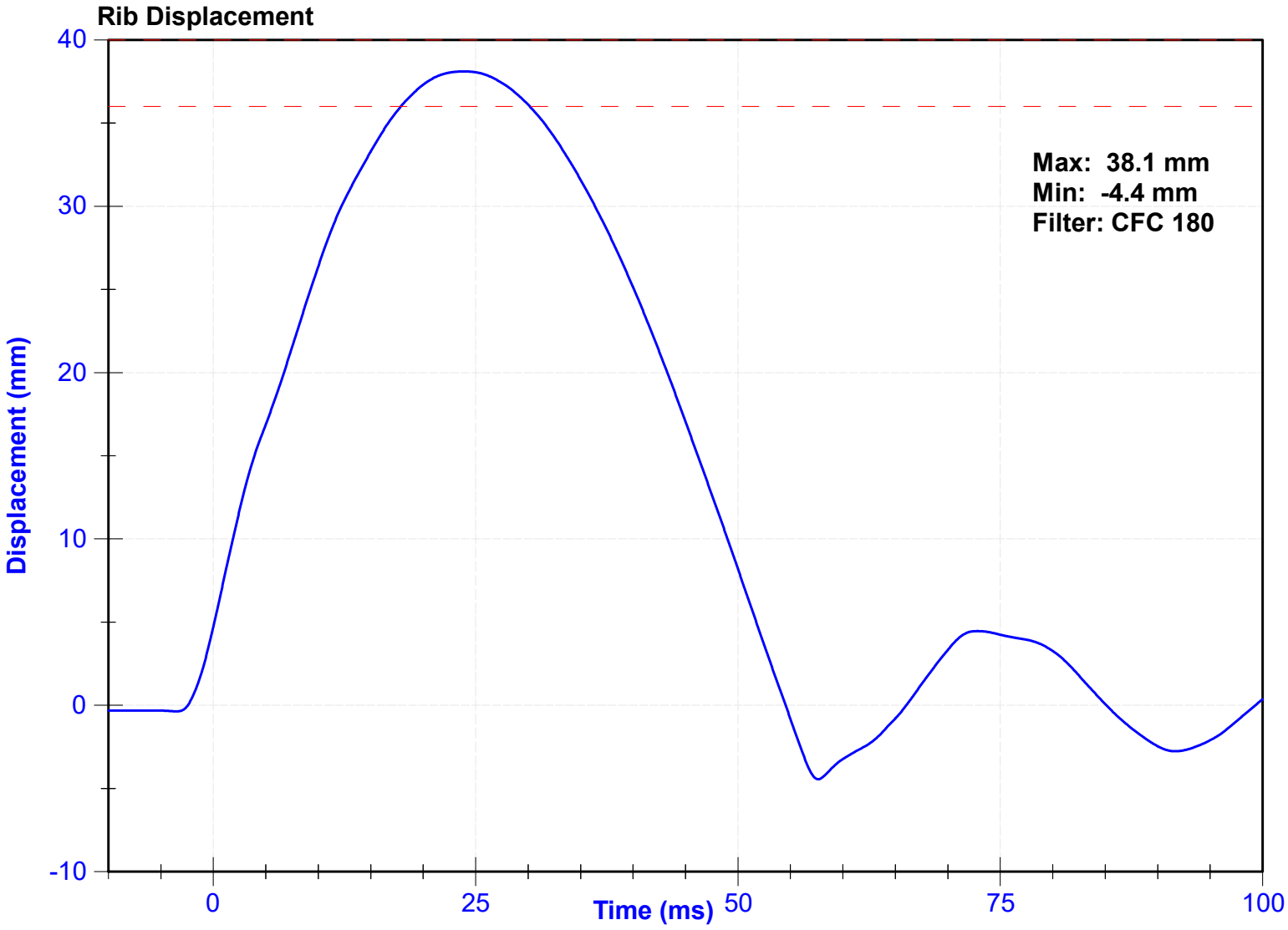
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Rib Displacement	36	40	mm	38.1	Pass

Transducer Calibrations

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



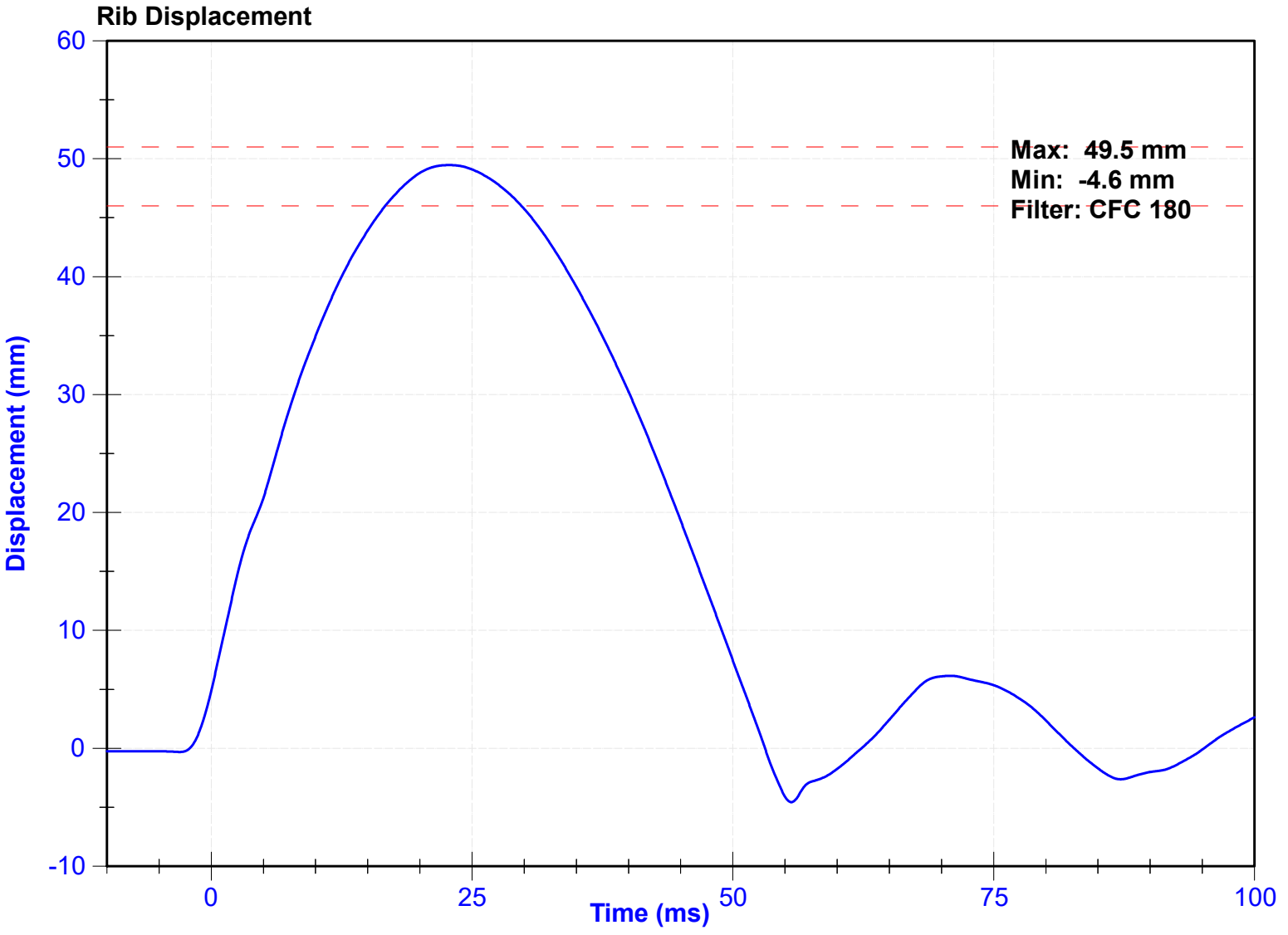
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Rib Displacement	46	51	mm	49.5	Pass

Transducer Calibrations

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



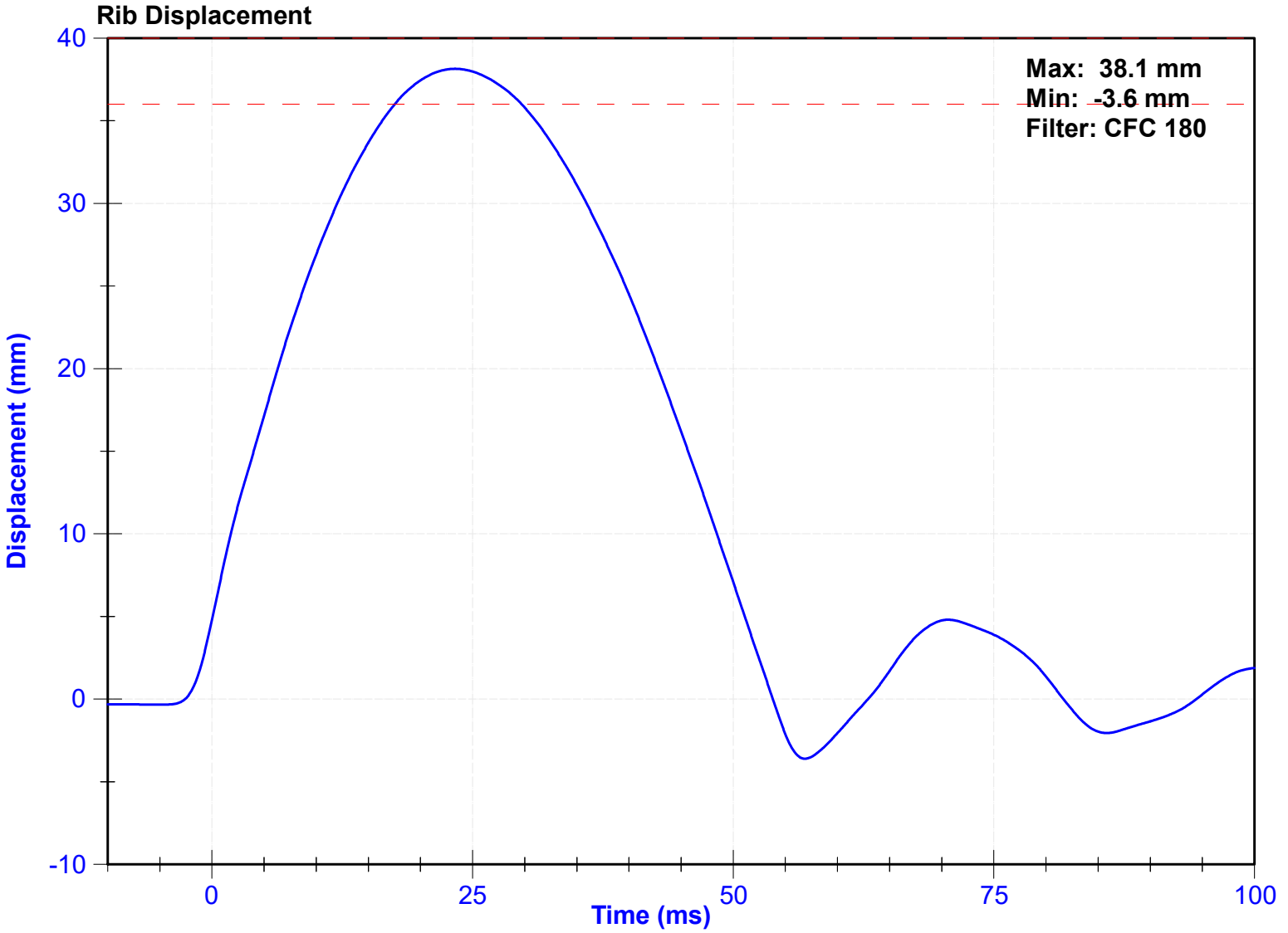
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Rib Displacement	36	40	mm	38.1	Pass

Transducer Calibrations

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



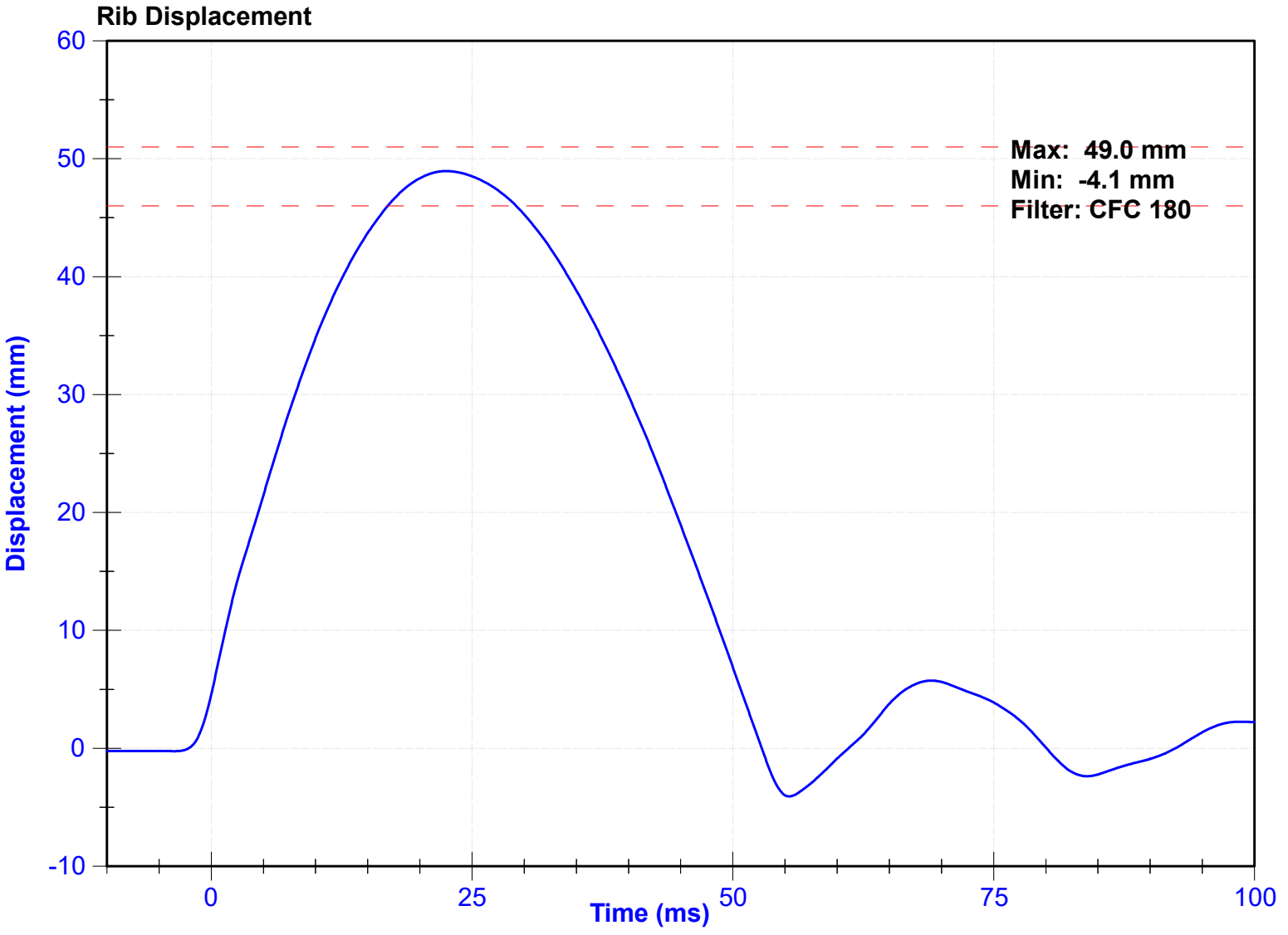
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Rib Displacement	46	51	mm	49.0	Pass

Transducer Calibrations

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



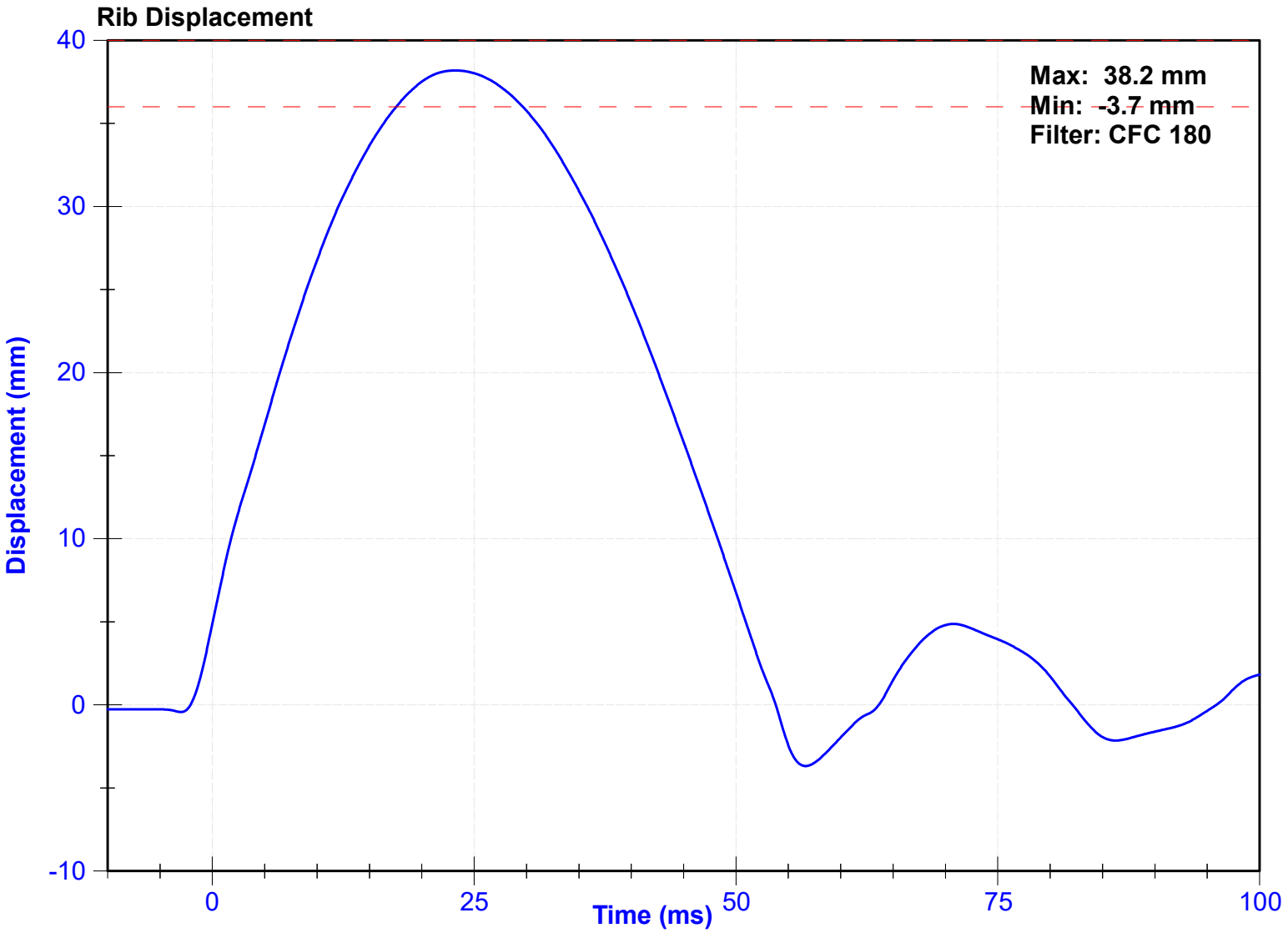
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Rib Displacement	36	40	mm	38.2	Pass

Transducer Calibrations

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



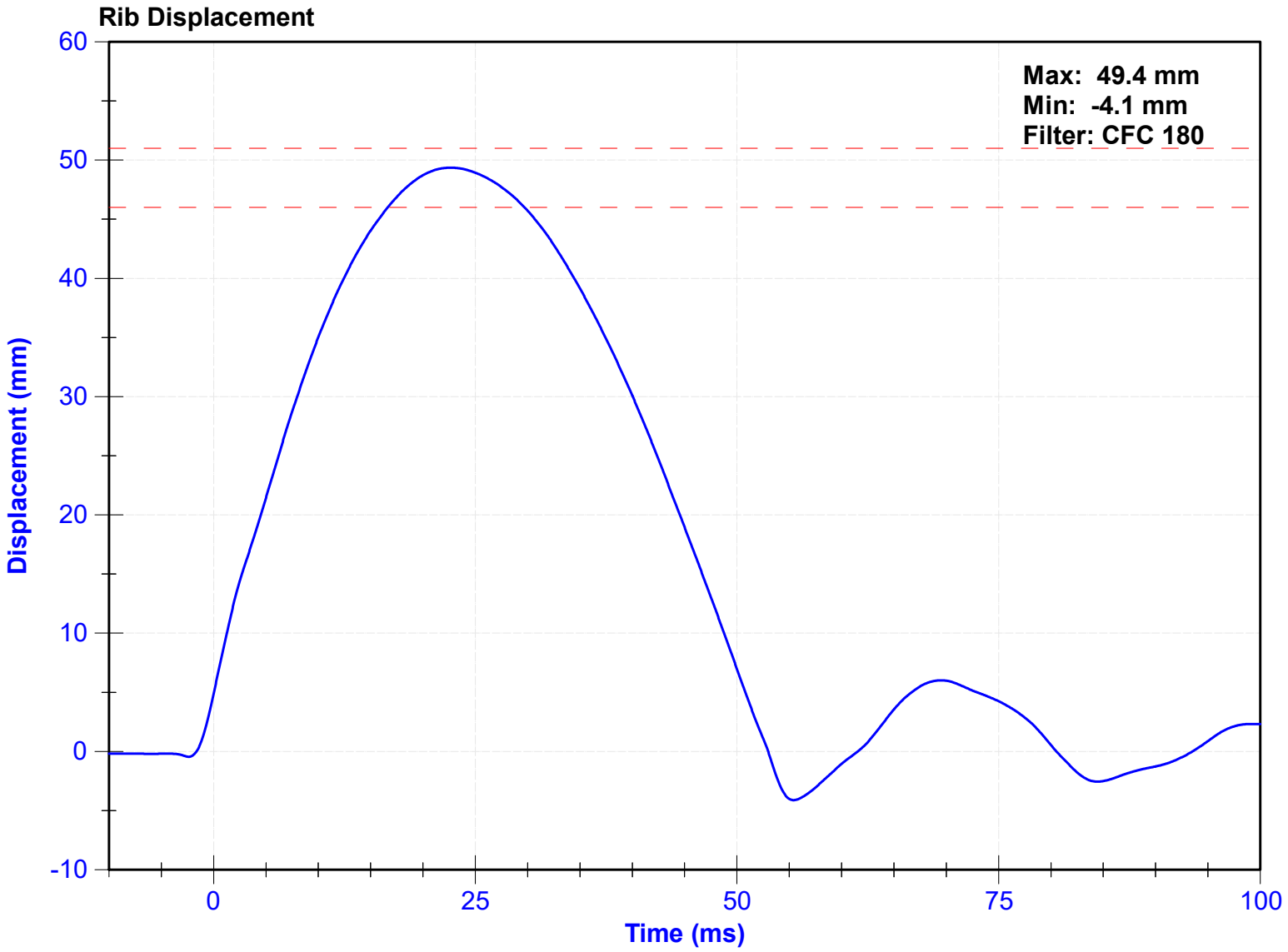
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	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



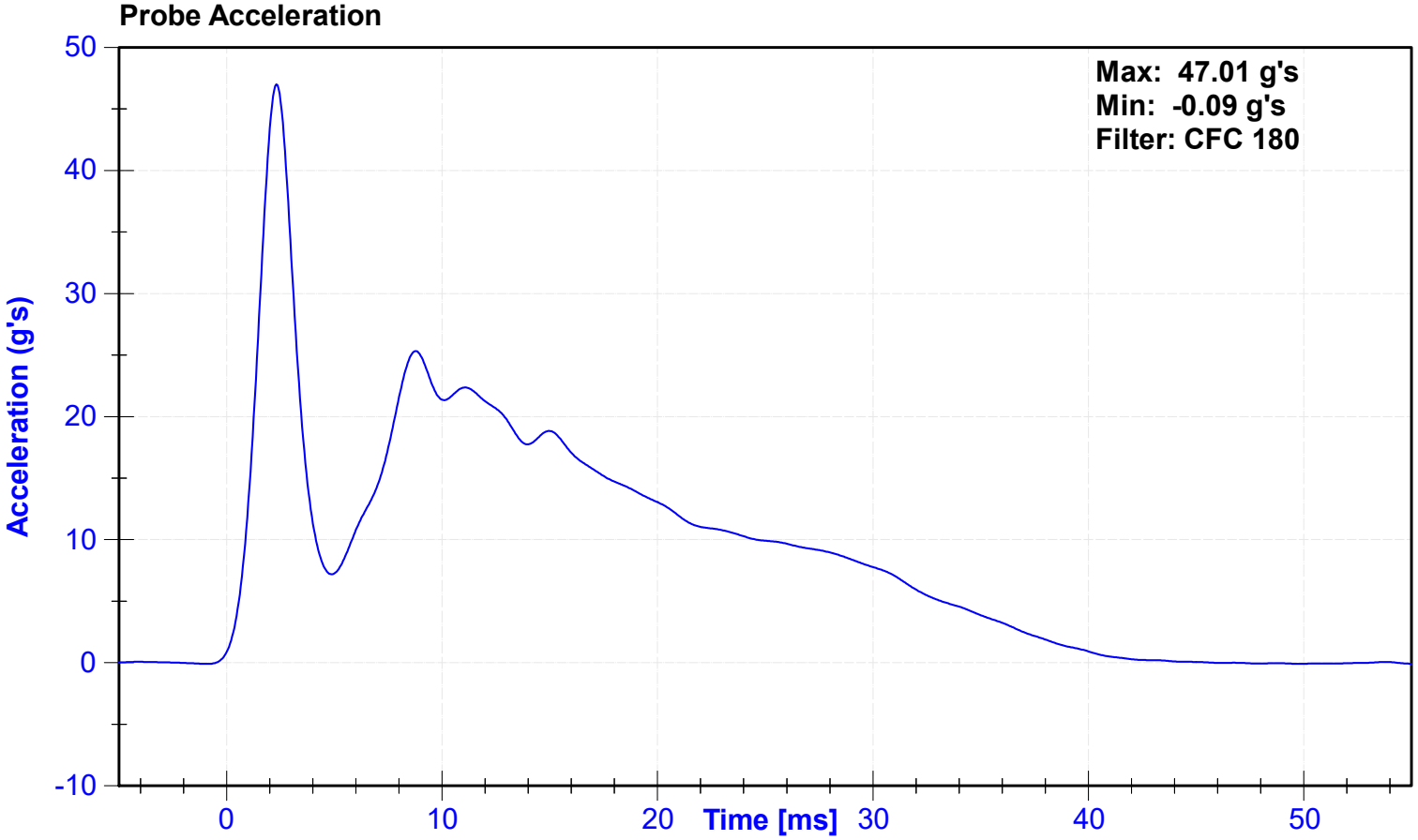
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

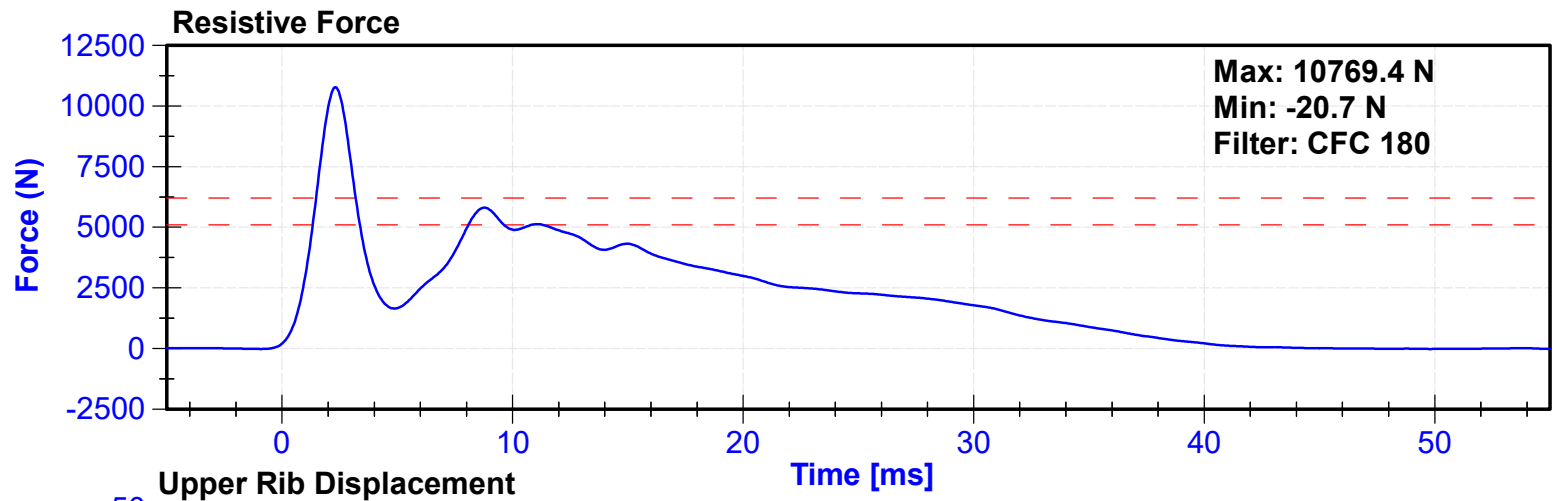
Results

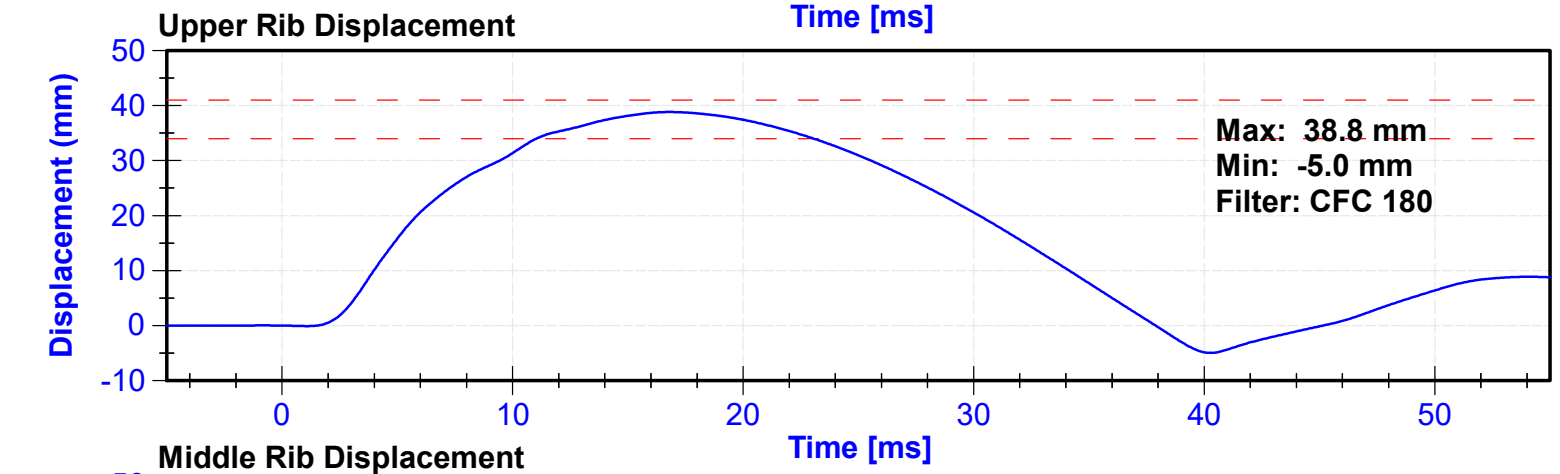
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	20.5	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	5804.9	Pass
Upper Thorax Rib Deflection	34	41	mm	38.8	Pass
Mid Thorax Rib Deflection	37	45	mm	40.7	Pass
Lower Thorax Rib Deflection	37	44	mm	40.1	Pass

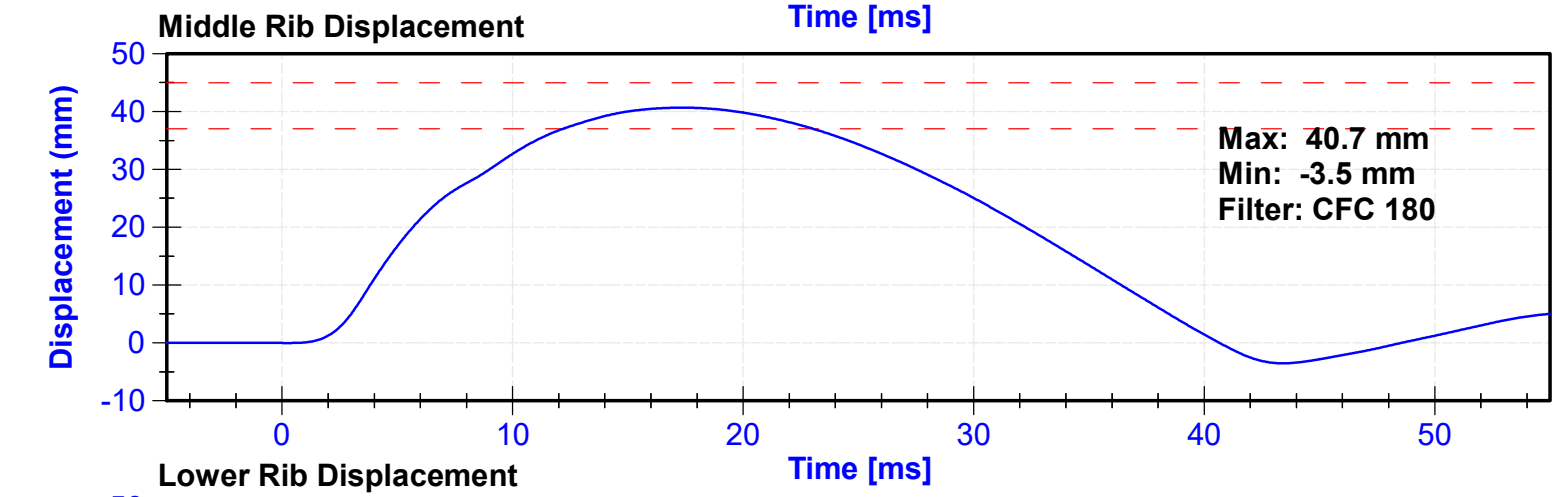
Transducer Calibrations

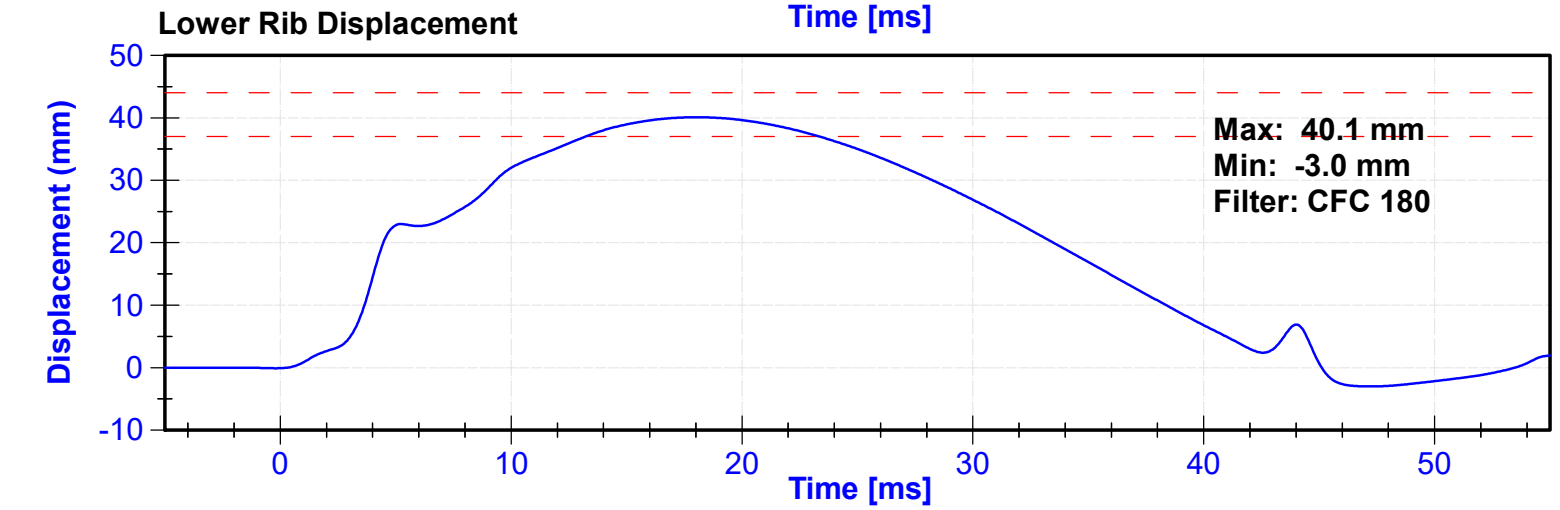
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Upper Thorax Rib Potentiometer	Honeywell	179GFE	7/25/2022	1/23/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	7/21/2022	1/19/2023
Lower Thorax Rib Potentiometer	Honeywell	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: 10769.4 N
Min: -20.7 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: -5.0 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: -3.5 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: 40.1 mm
Min: -3.0 mm
Filter: CFC 180

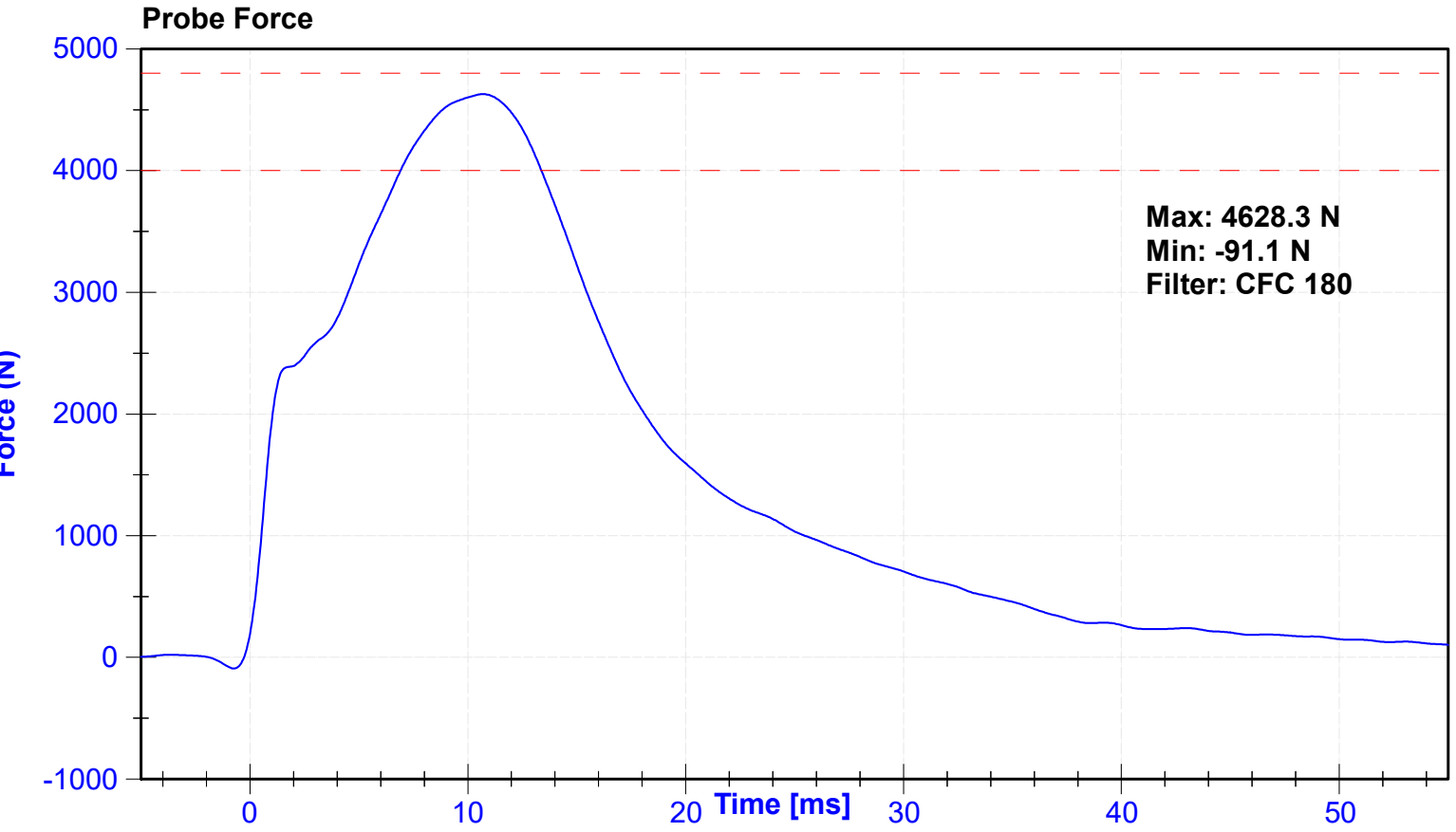
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

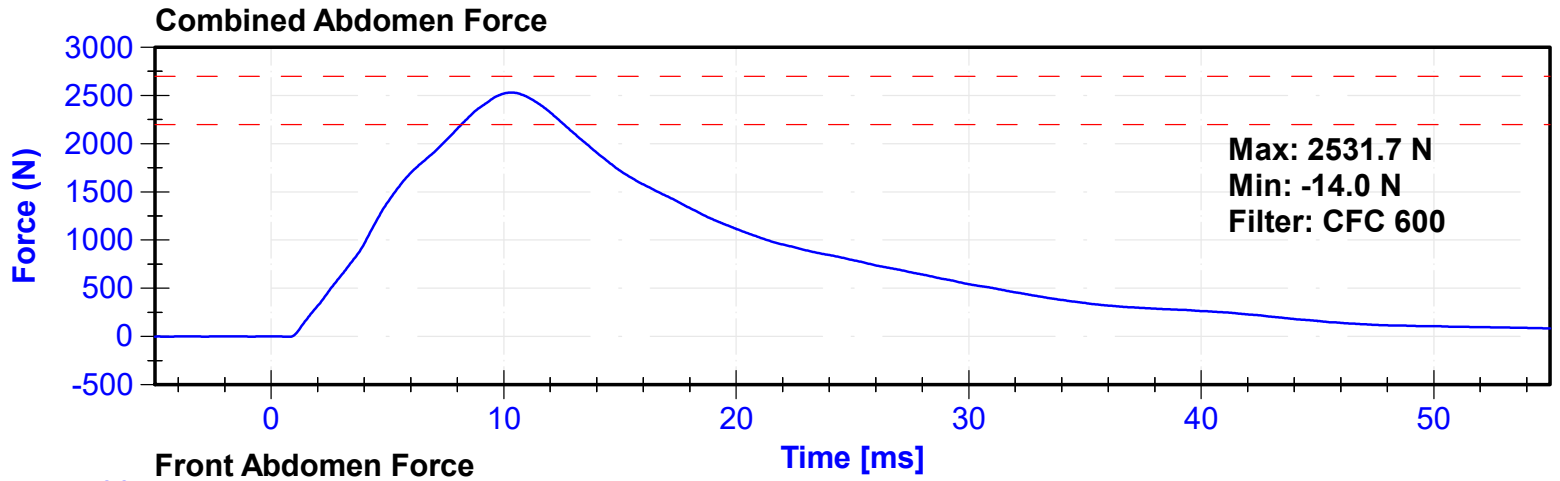
Results

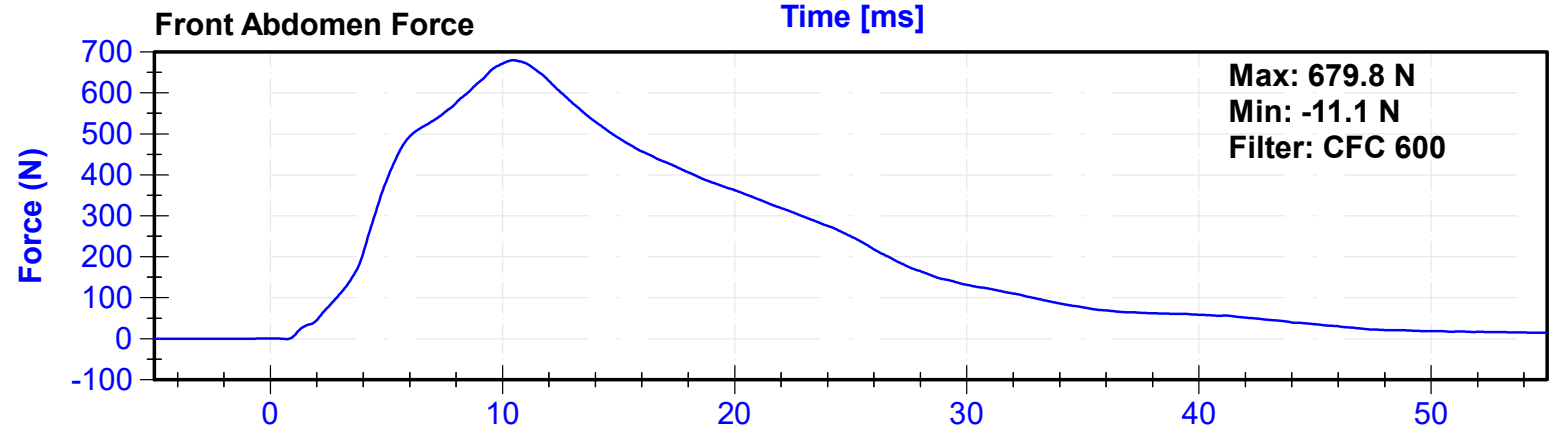
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	20.5	Pass
Velocity	3.9	4.1	m/s	4.06	Pass
Combined Abdomen Force	2200	2700	N	2531.7	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.30	Pass
Resistive Probe Force	4000	4800	N	4628.3	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.70	Pass

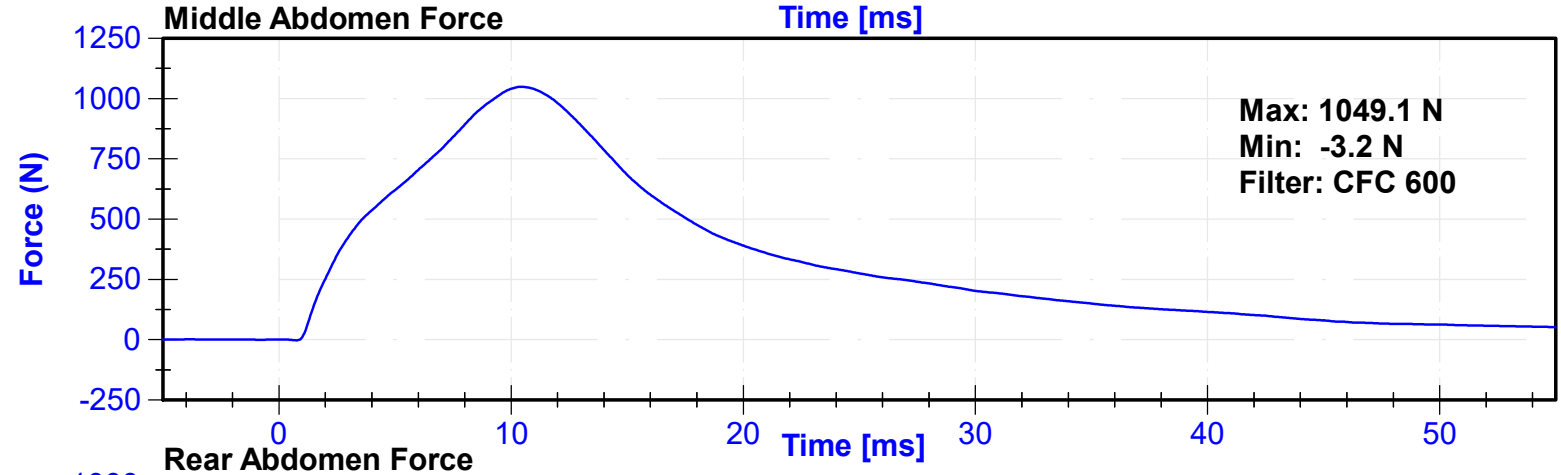
Transducer Calibrations

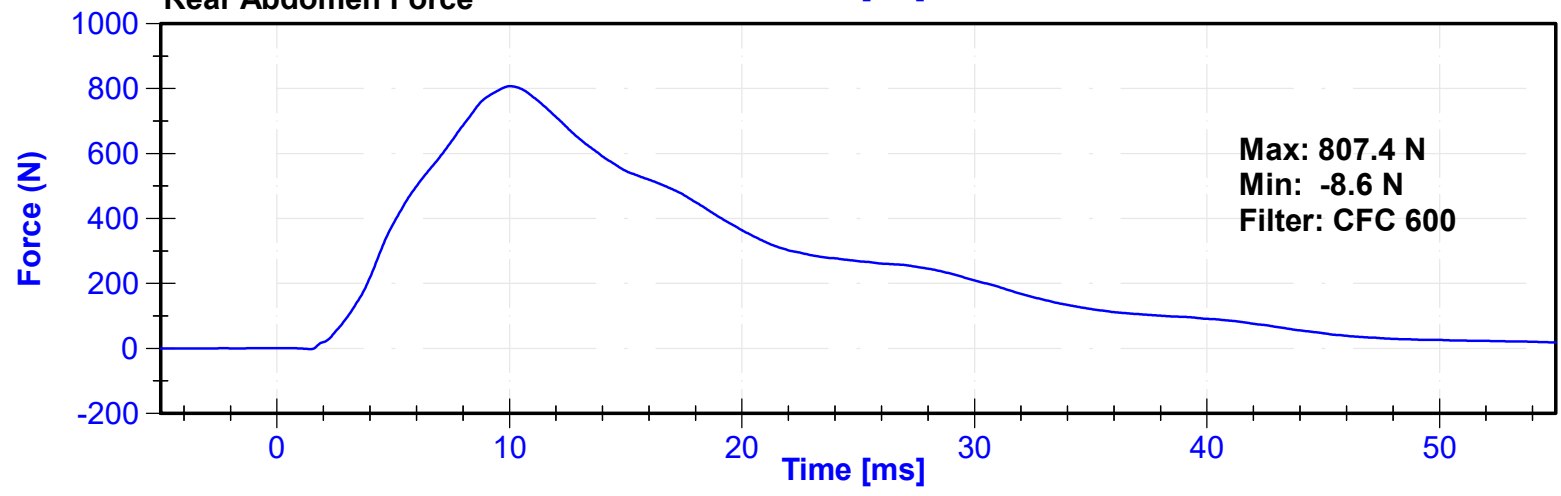
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2531.7 N
Min: -14.0 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 679.8 N
Min: -11.1 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1049.1 N
Min: -3.2 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 807.4 N
Min: -8.6 N
Filter: CFC 600

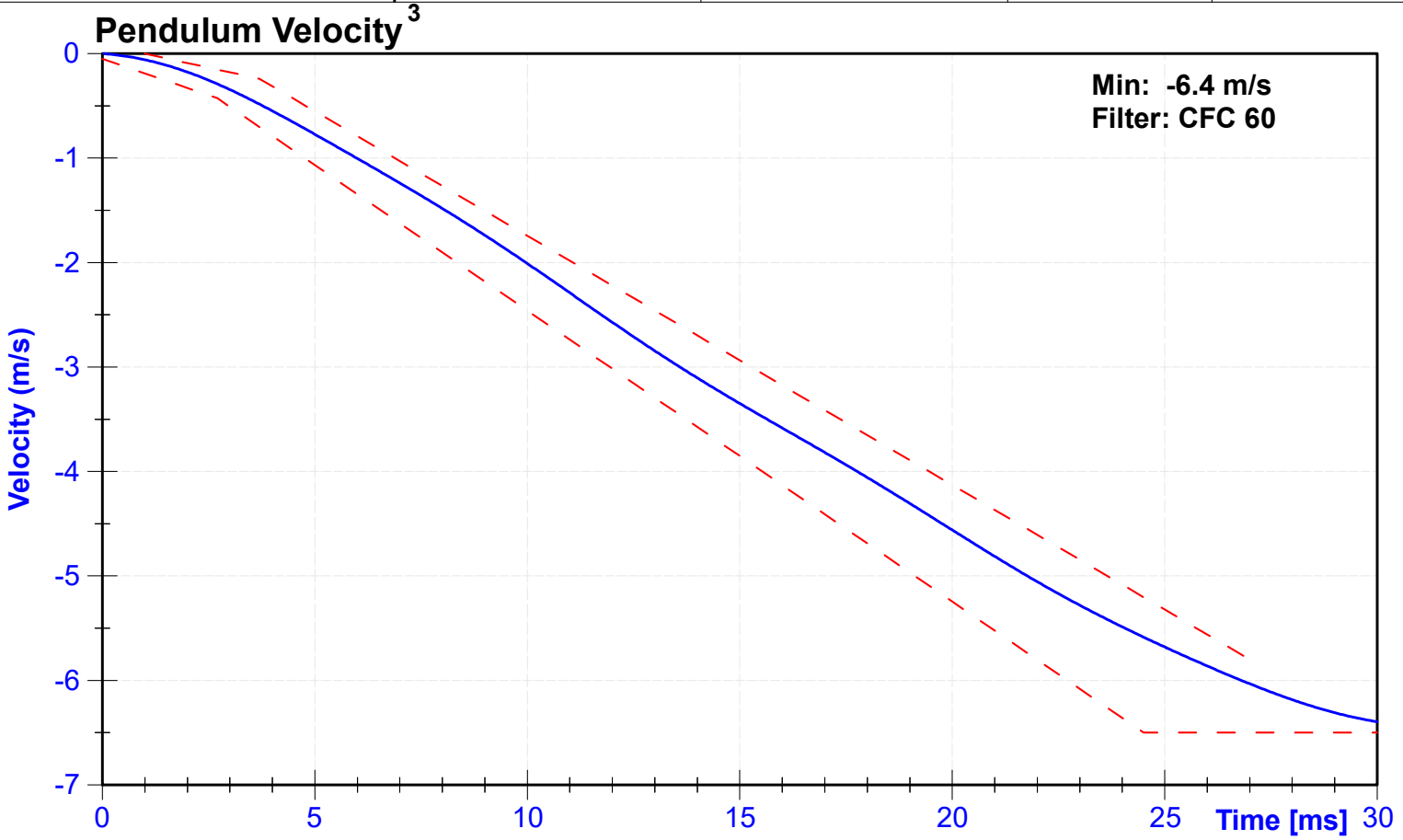
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

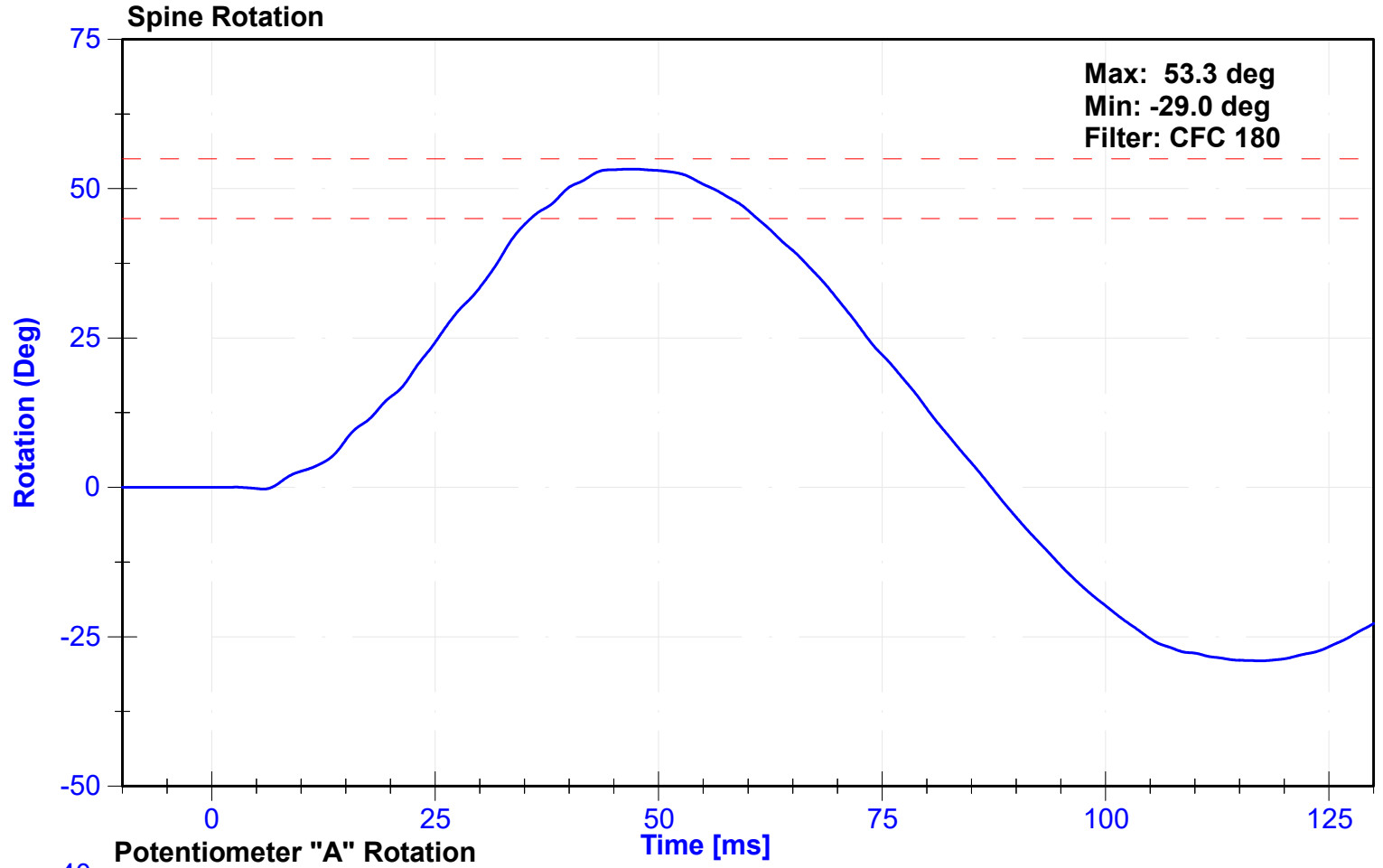
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	21	Pass
Velocity	5.95	6.15	m/s	6.067	Pass
Lateral Spine Rotation	45	55	deg	53.3	Pass
Time at Maximum Rotation	39	53	ms	47.2	Pass
Time of Decay to Zero Degrees	37	57	ms	40.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

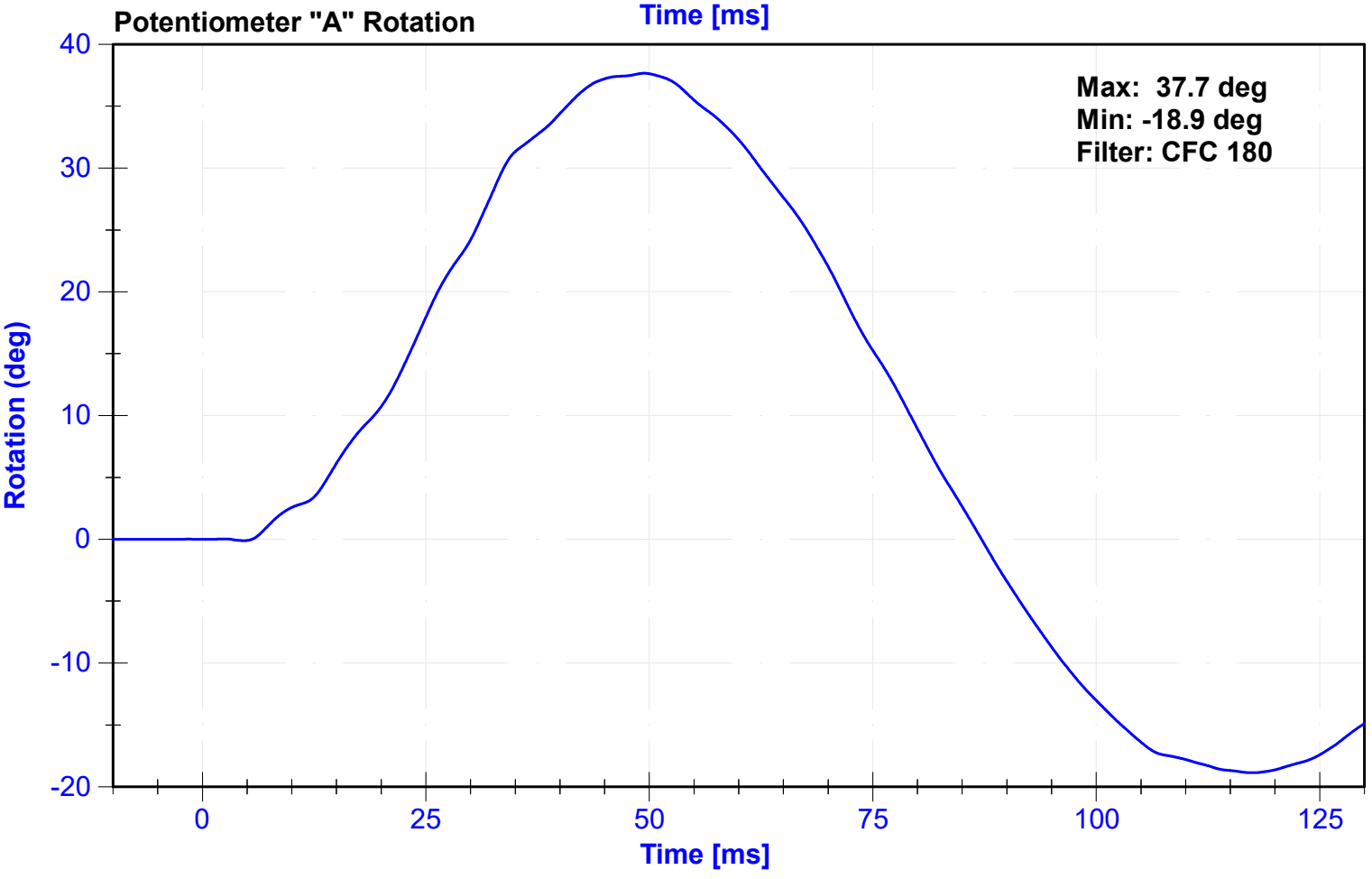
Transducer Calibrations

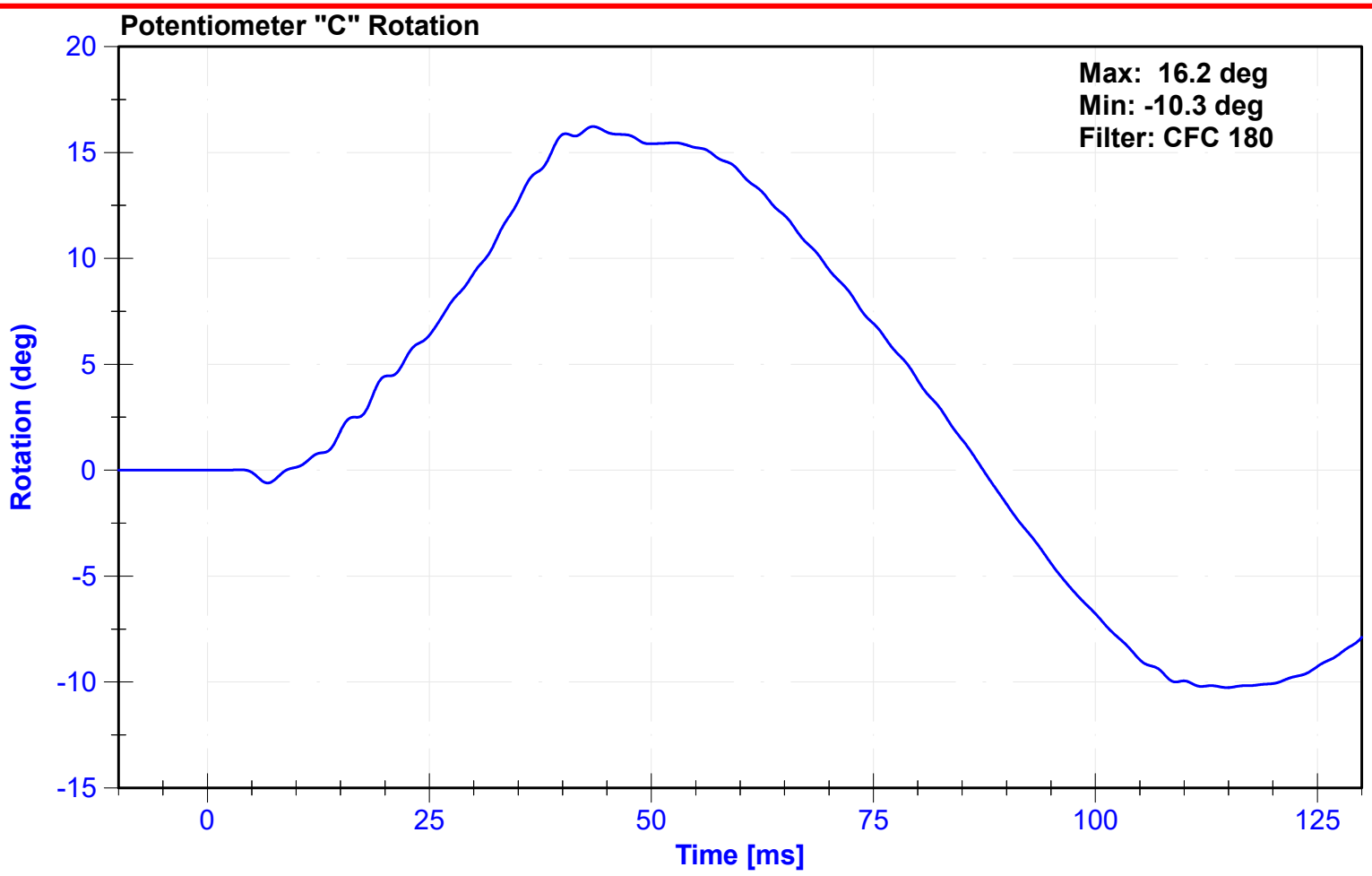
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



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


Spine Rotation
Max: 53.3 deg
Min: -29.0 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 37.7 deg
Min: -18.9 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

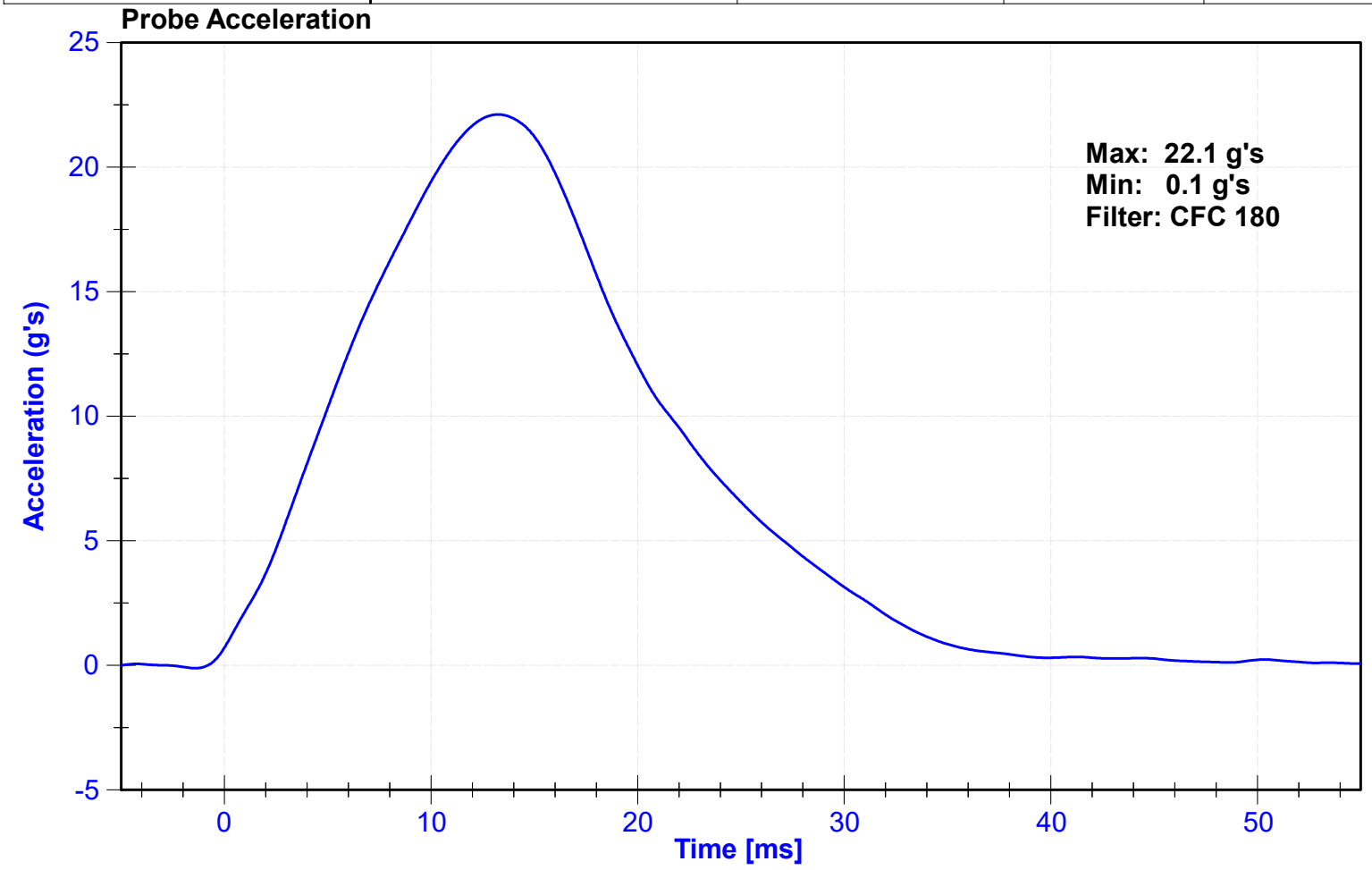
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

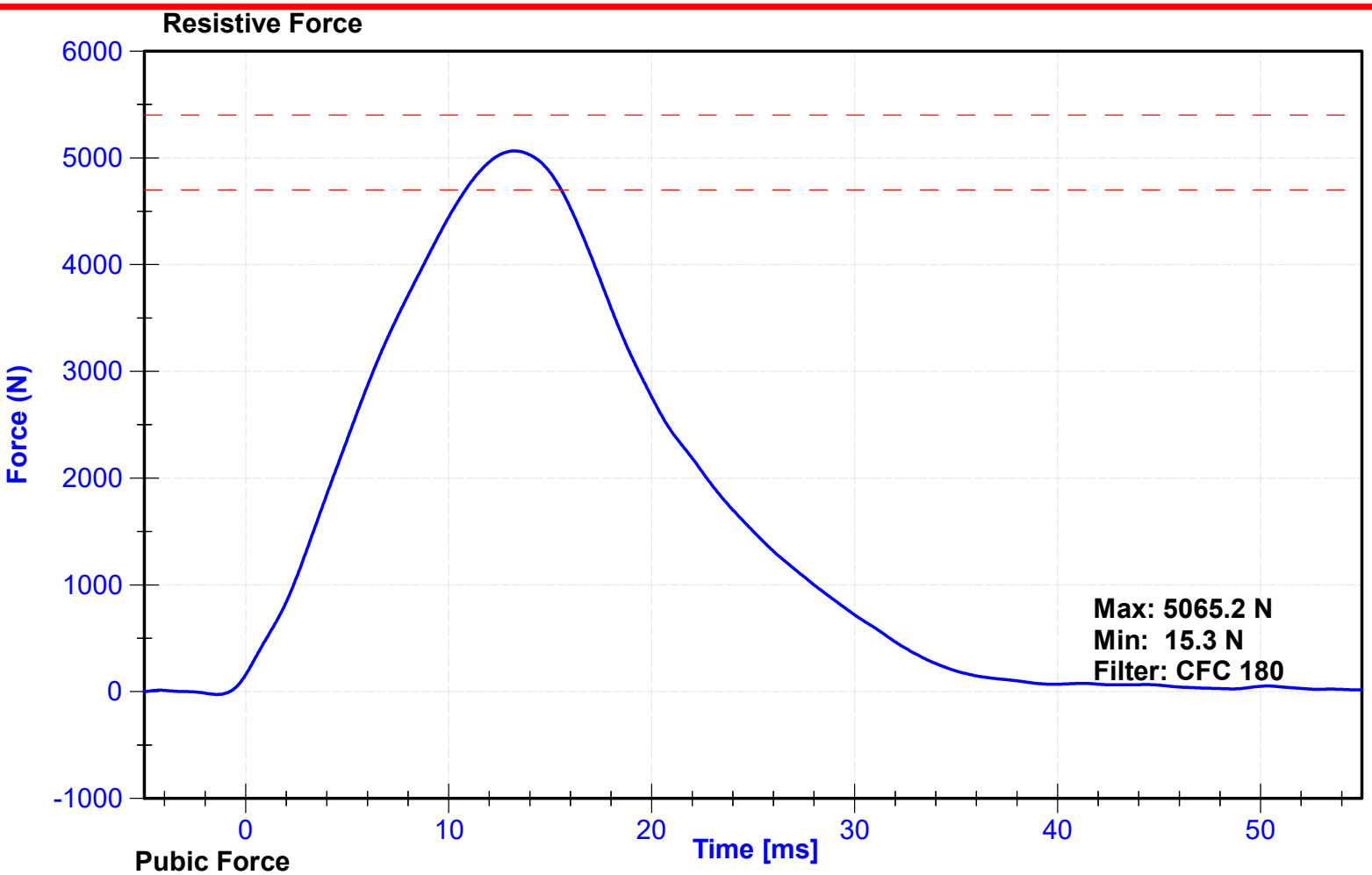
Results

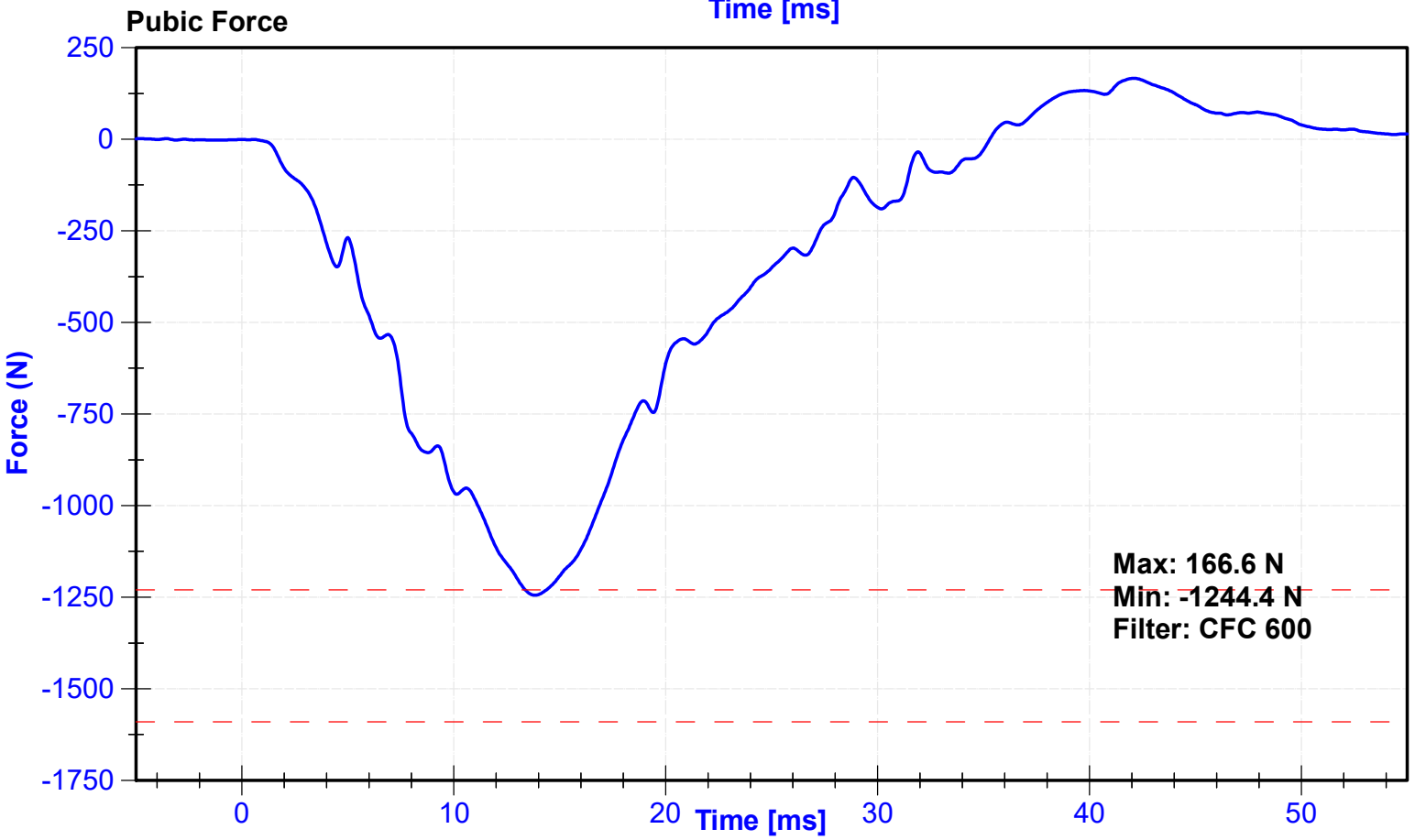
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	20.5	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Resistive Force	4700	5400	N	5065.2	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.25	Pass
Pubic Force	-1590	-1230	N	-1244.4	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.80	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
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: 5065.2 N
Min: 15.3 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: 166.6 N
Min: -1244.4 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

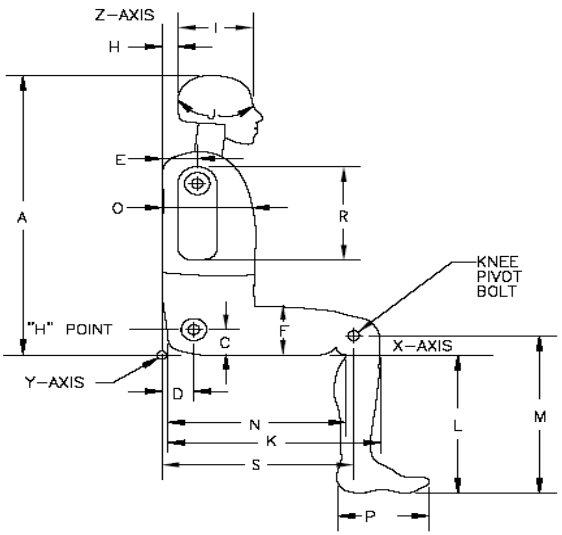
SERIAL NO:DG8012

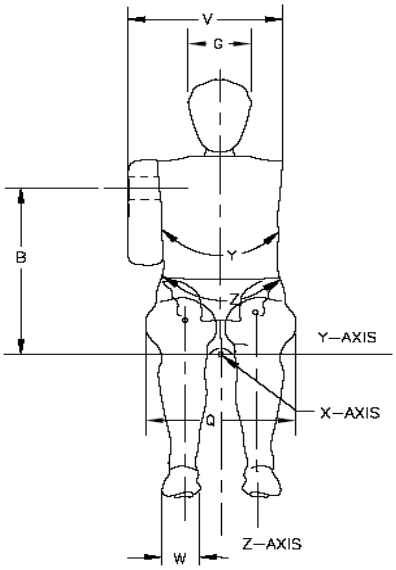
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 01/09/2023

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	783	Pass
B	Shoulder Pivot Height	437	453	443	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	103	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	226	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	781	Pass

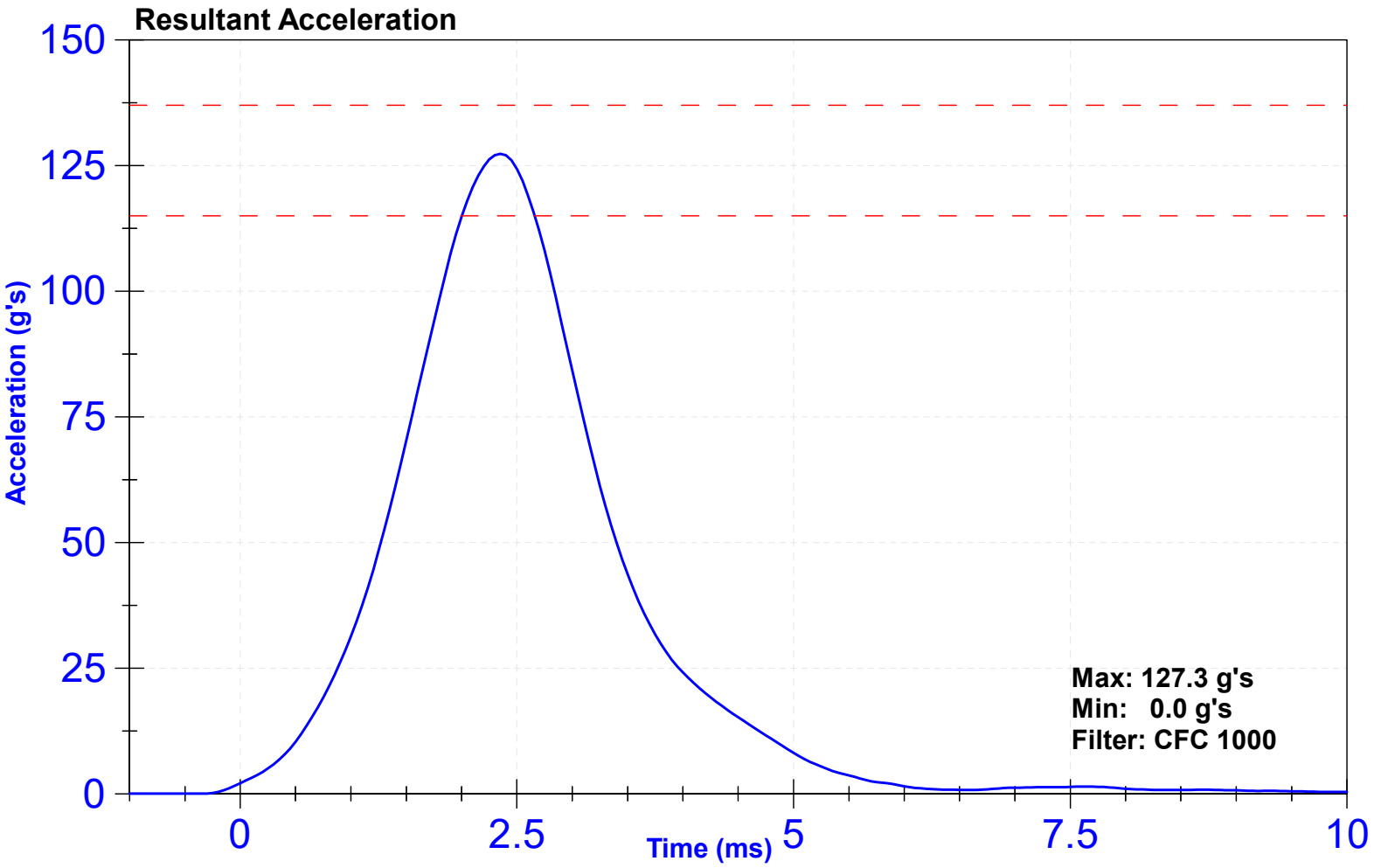
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

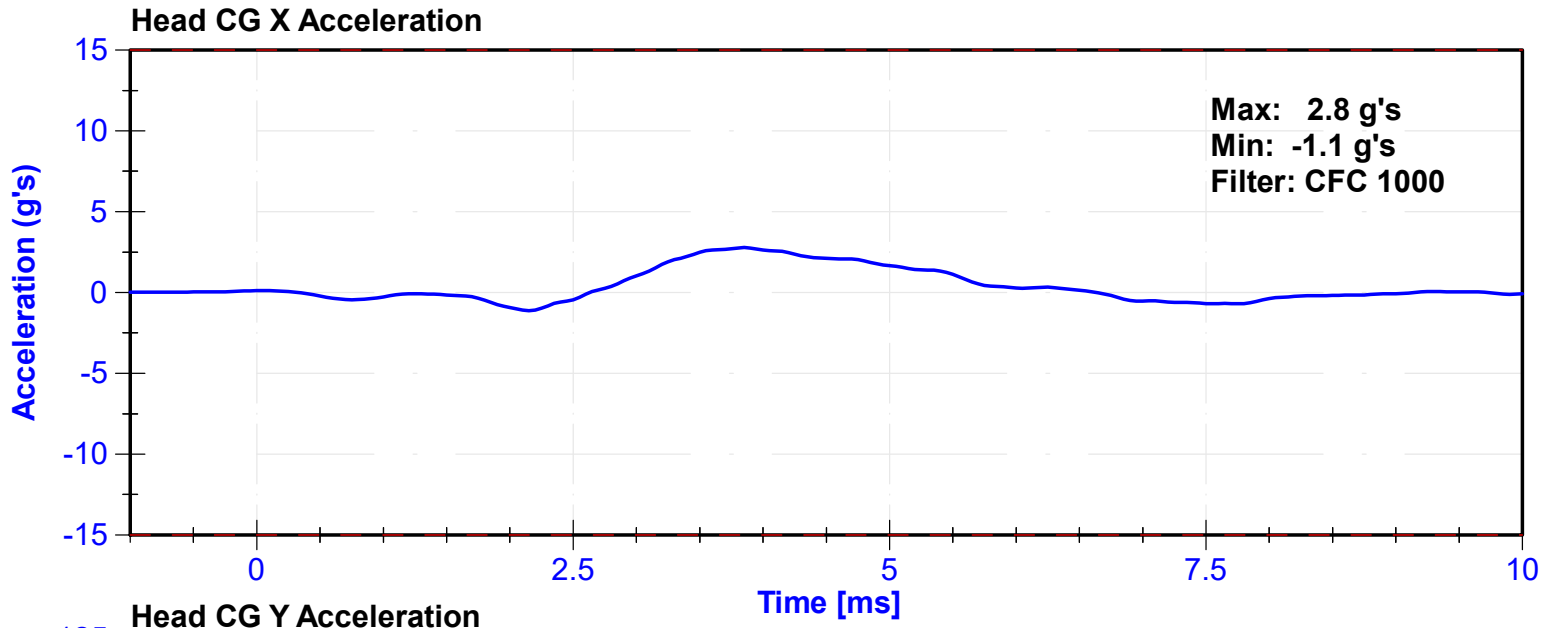
Results

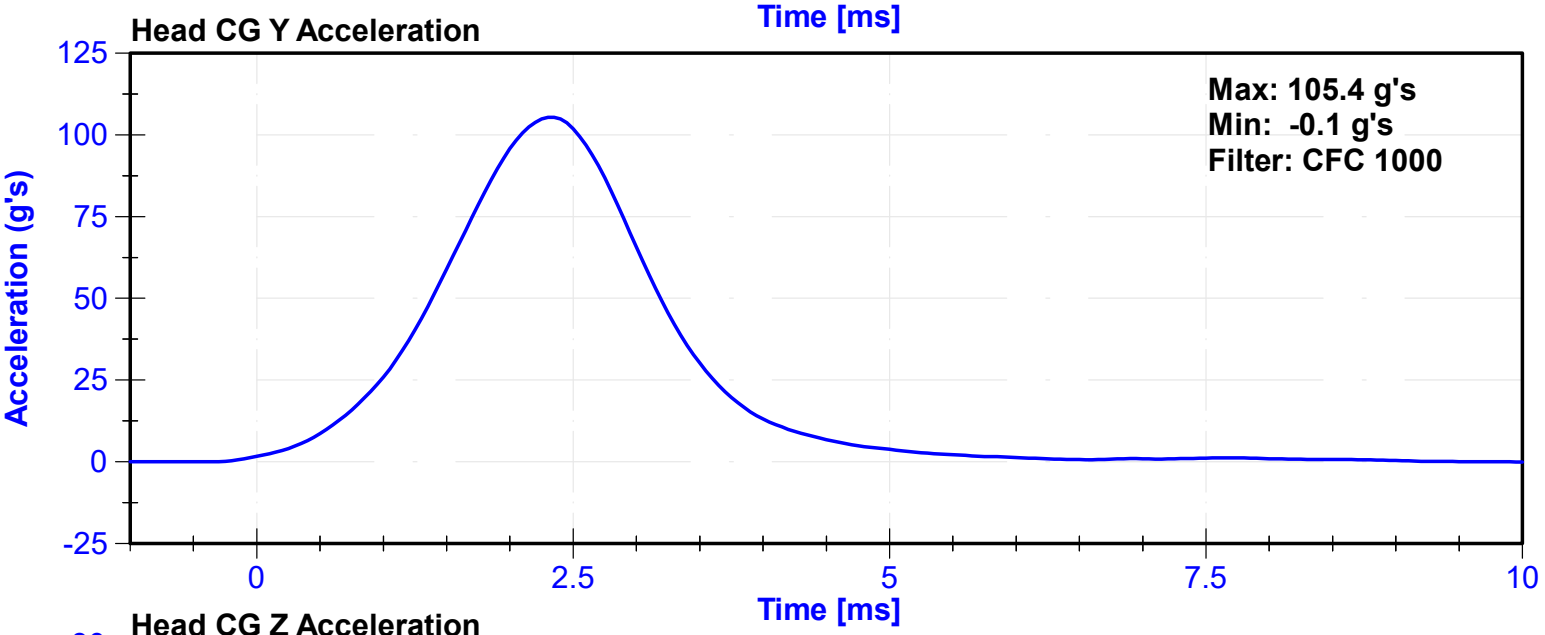
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	29.5	Pass
Resultant Acceleration	115	137	g's	127.3	Pass
Oscillation	0	15	%	1.1	Pass
Fore-Aft Acceleration	-15	15	g's	2.8	Pass

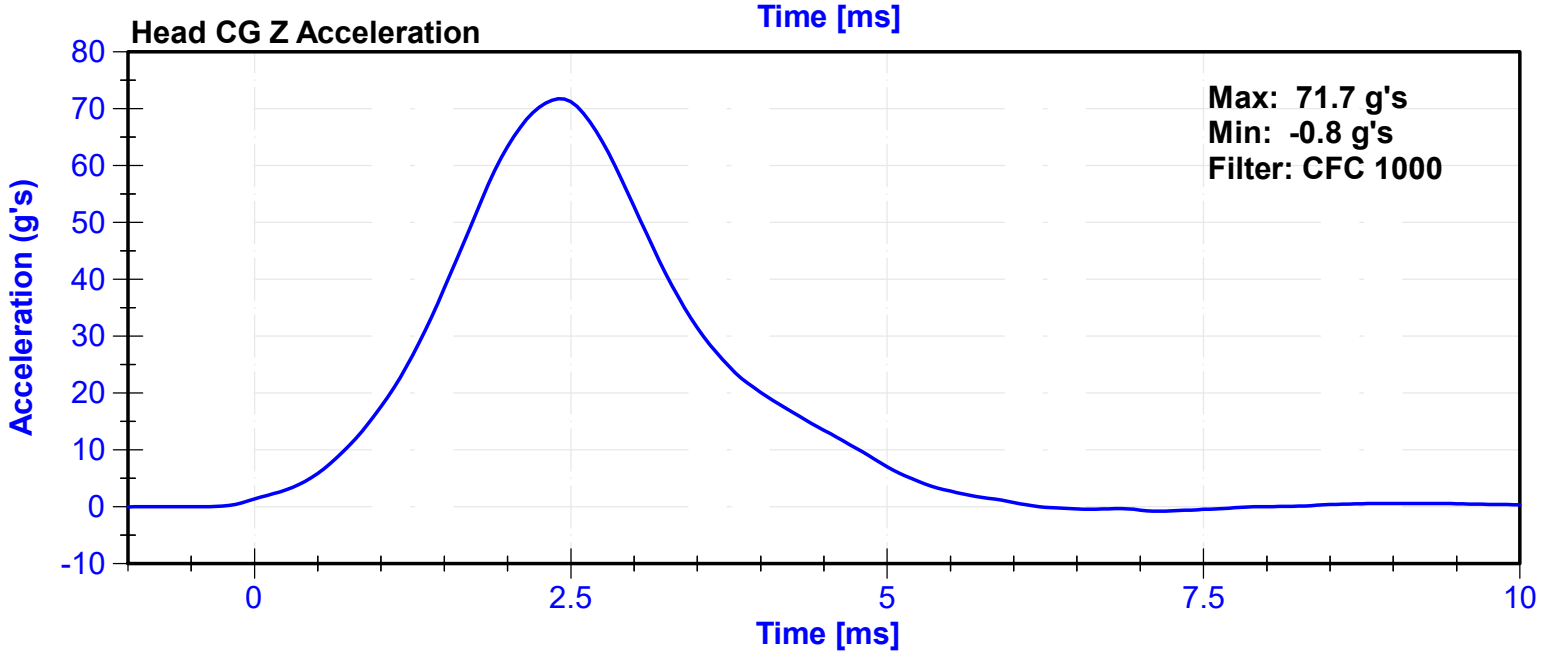
Transducer Calibrations

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




Head CG X Acceleration
Max: 2.8 g's
Min: -1.1 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: 105.4 g's
Min: -0.1 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 71.7 g's
Min: -0.8 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

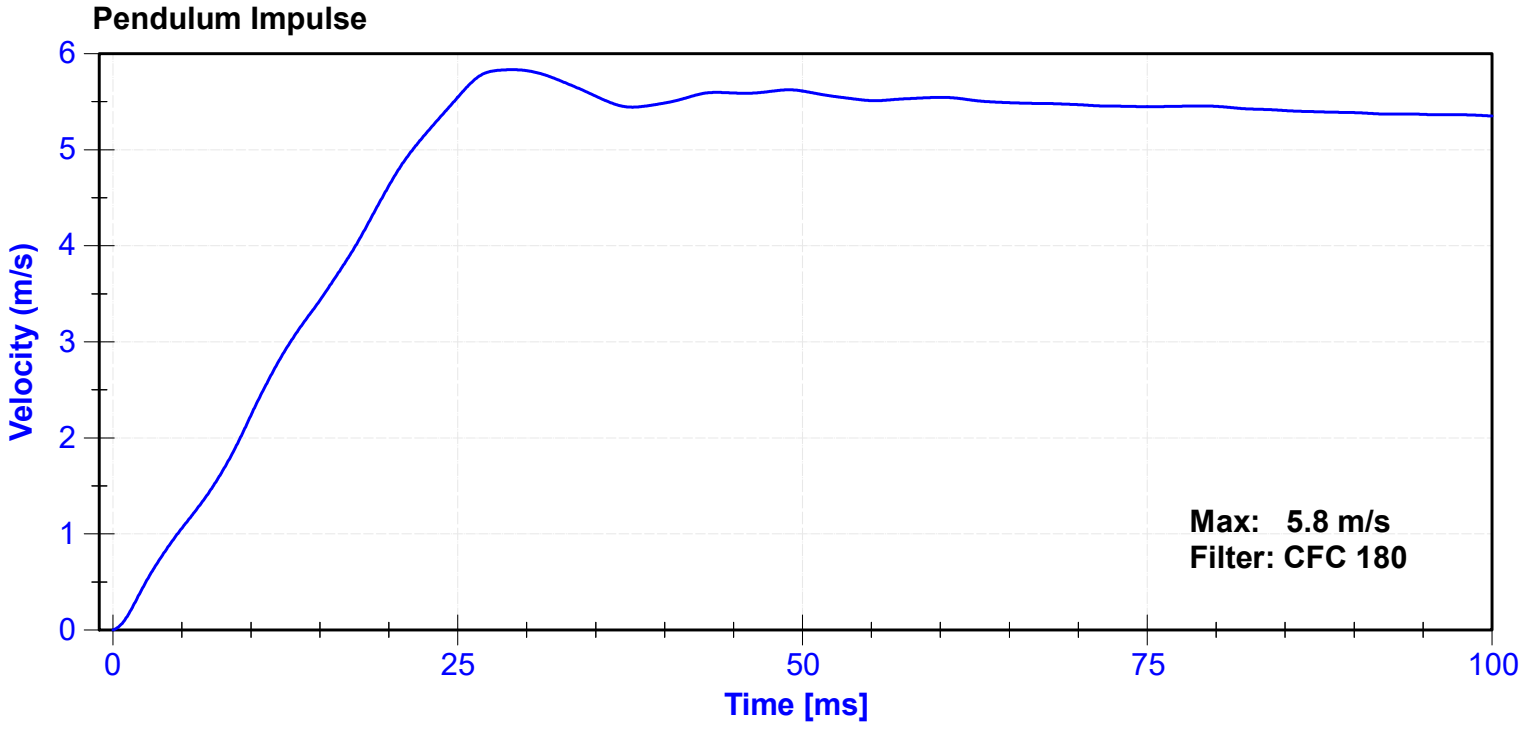
ATD Manufacturer	FTSS	Test Technician	D.Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

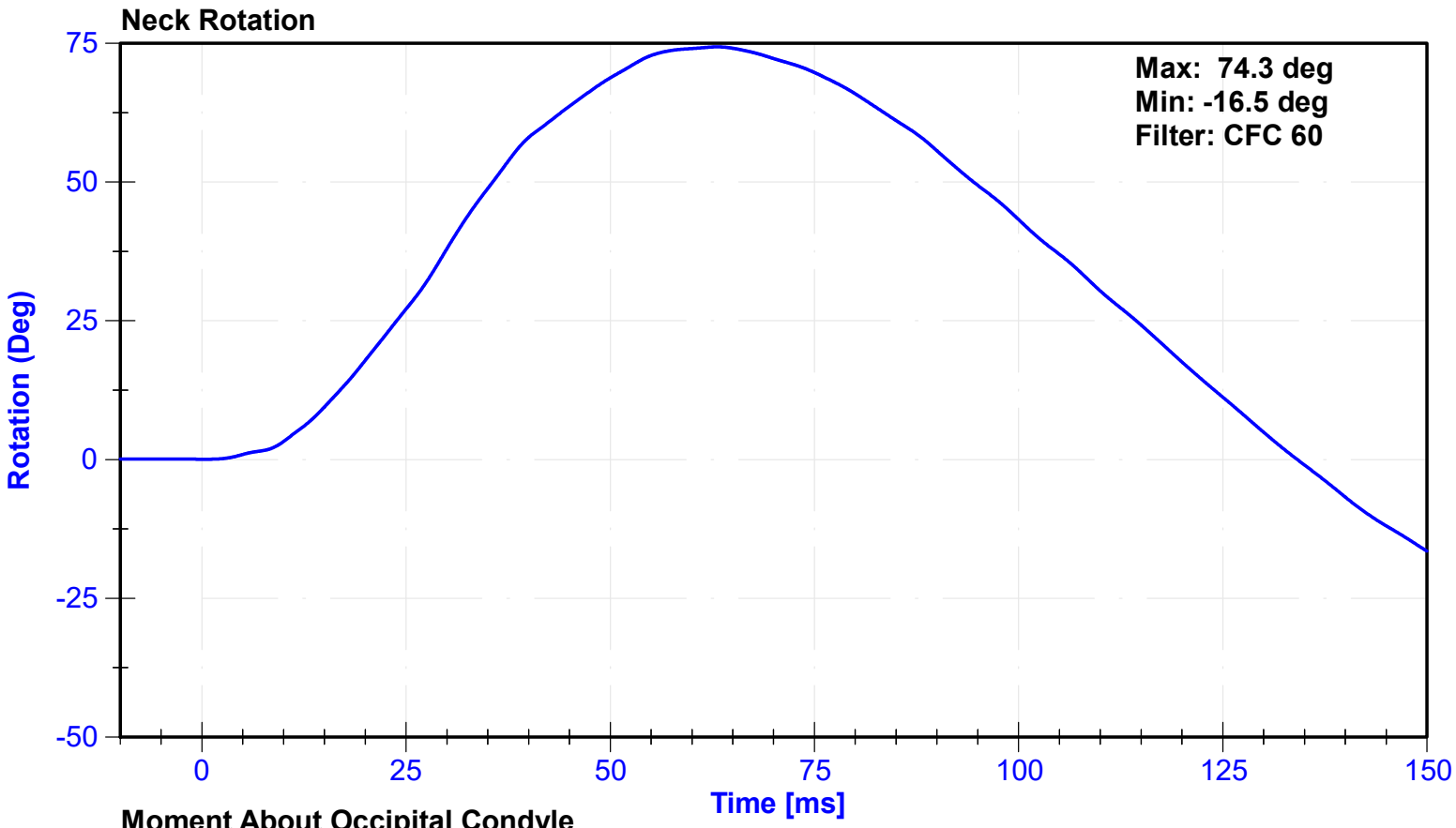
Results

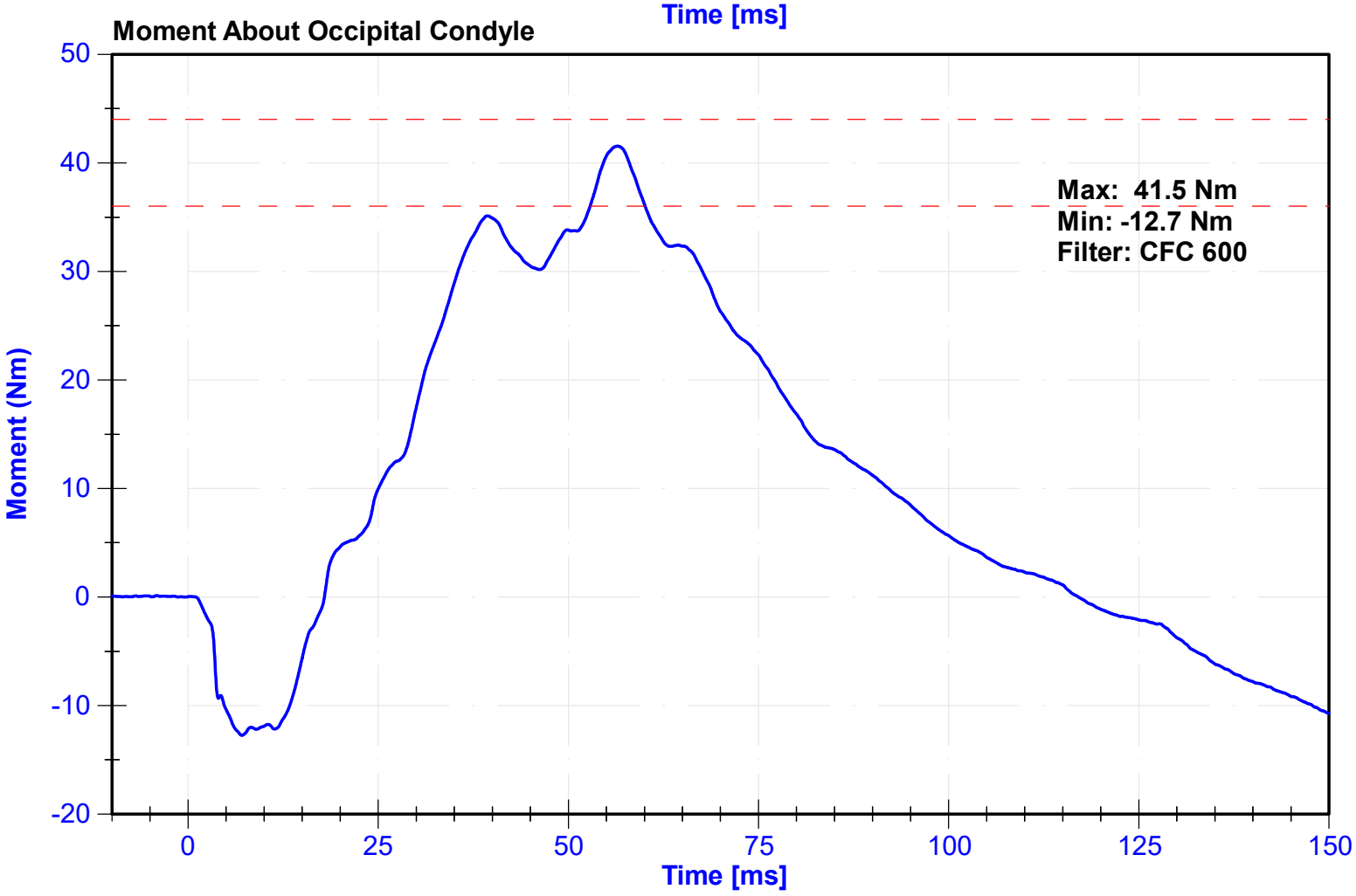
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	21	Pass
Velocity	5.51	5.63	m/s	5.523	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.24	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.43	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.62	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.55	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.83	Pass
Neck Rotation	71	81	deg	74.3	Pass
Time at Maximum Rotation	50	70	ms	63.1	Pass
Moment about the OC	36	44	Nm	41.5	Pass
Moment Decay to 0 Nm	102	126	ms	117.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Denton	1716A-1037-FY	8/12/2022	8/12/2023




Neck Rotation
Max: 74.3 deg
Min: -16.5 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 41.5 Nm
Min: -12.7 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

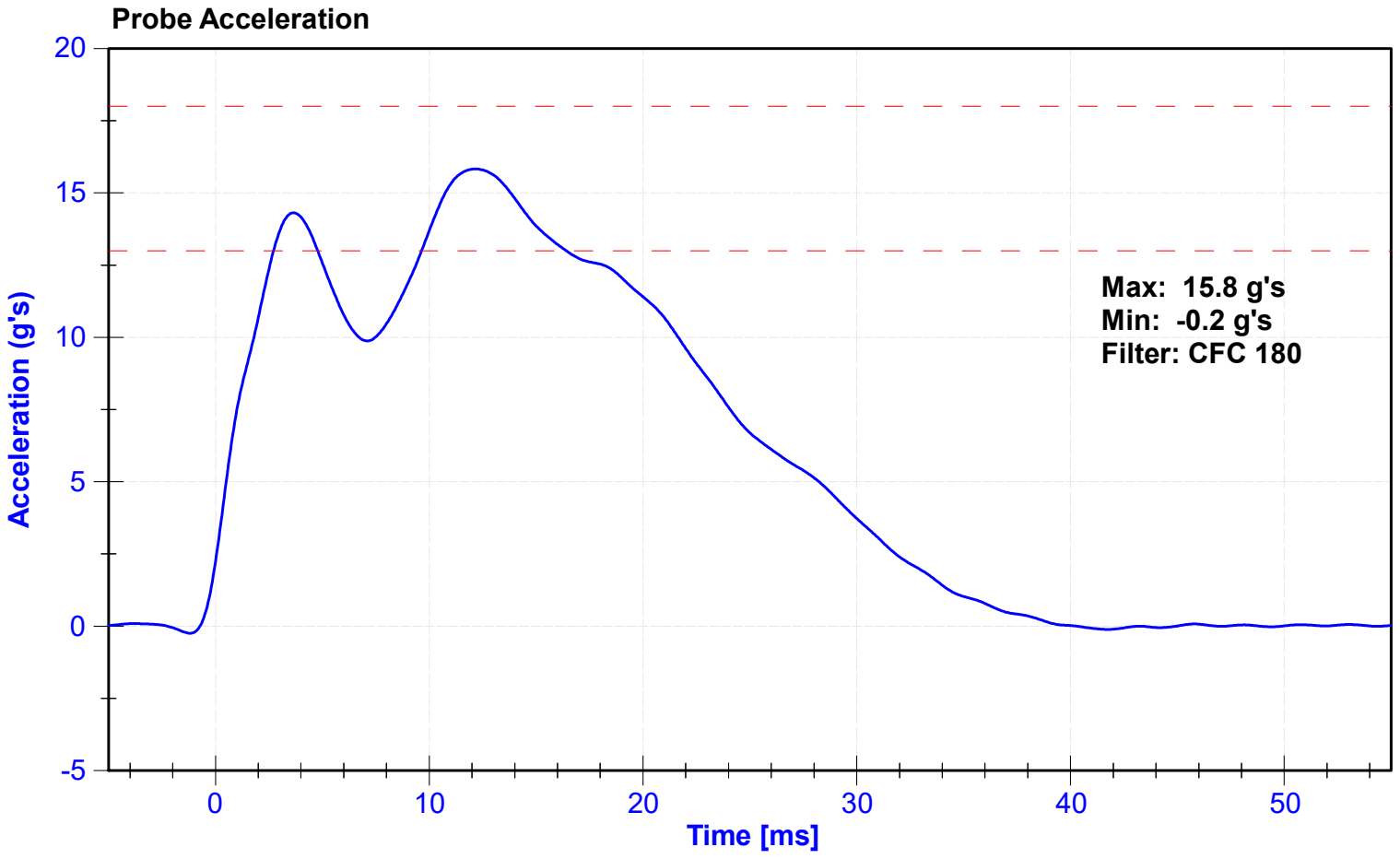
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

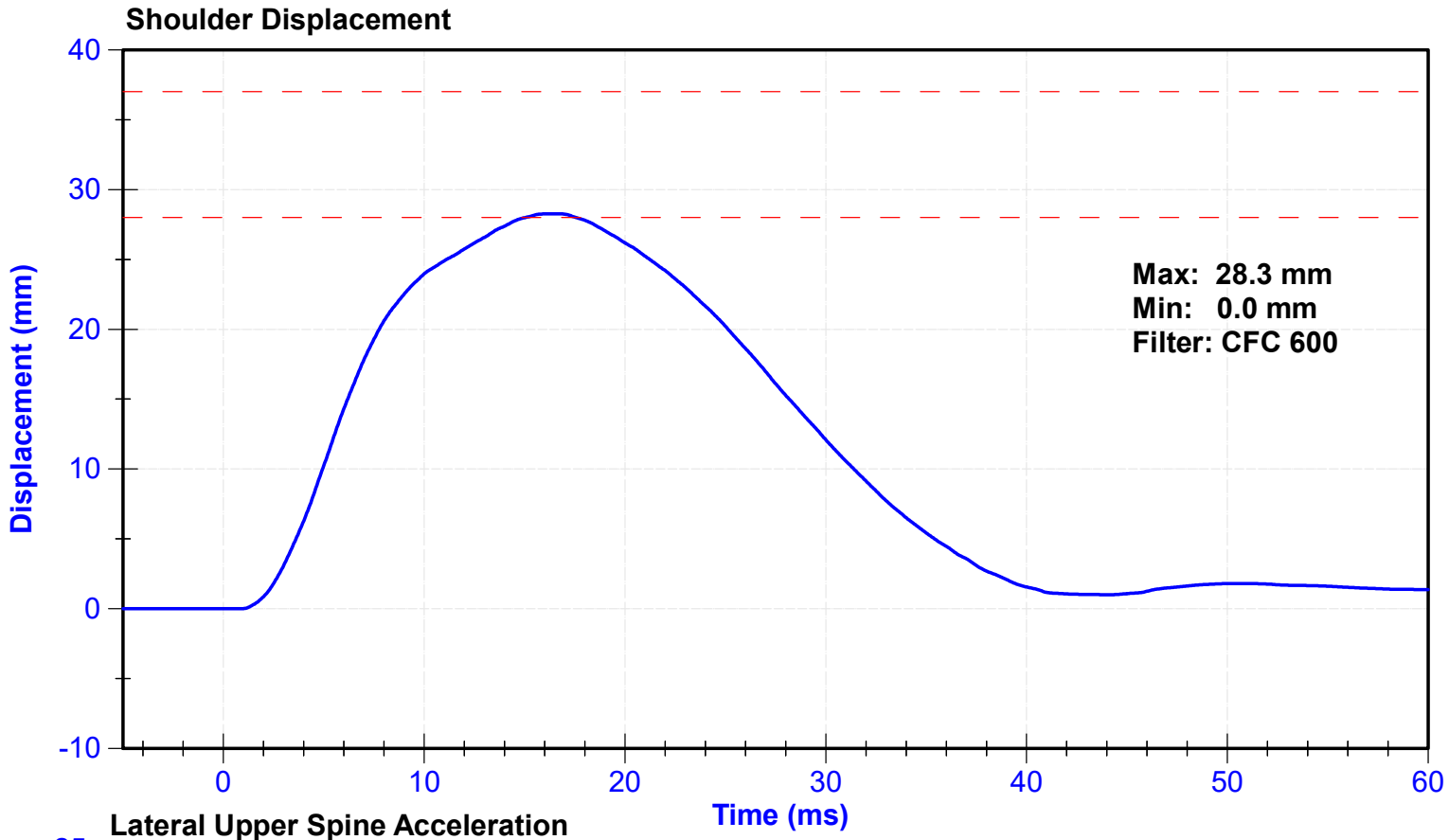
Results

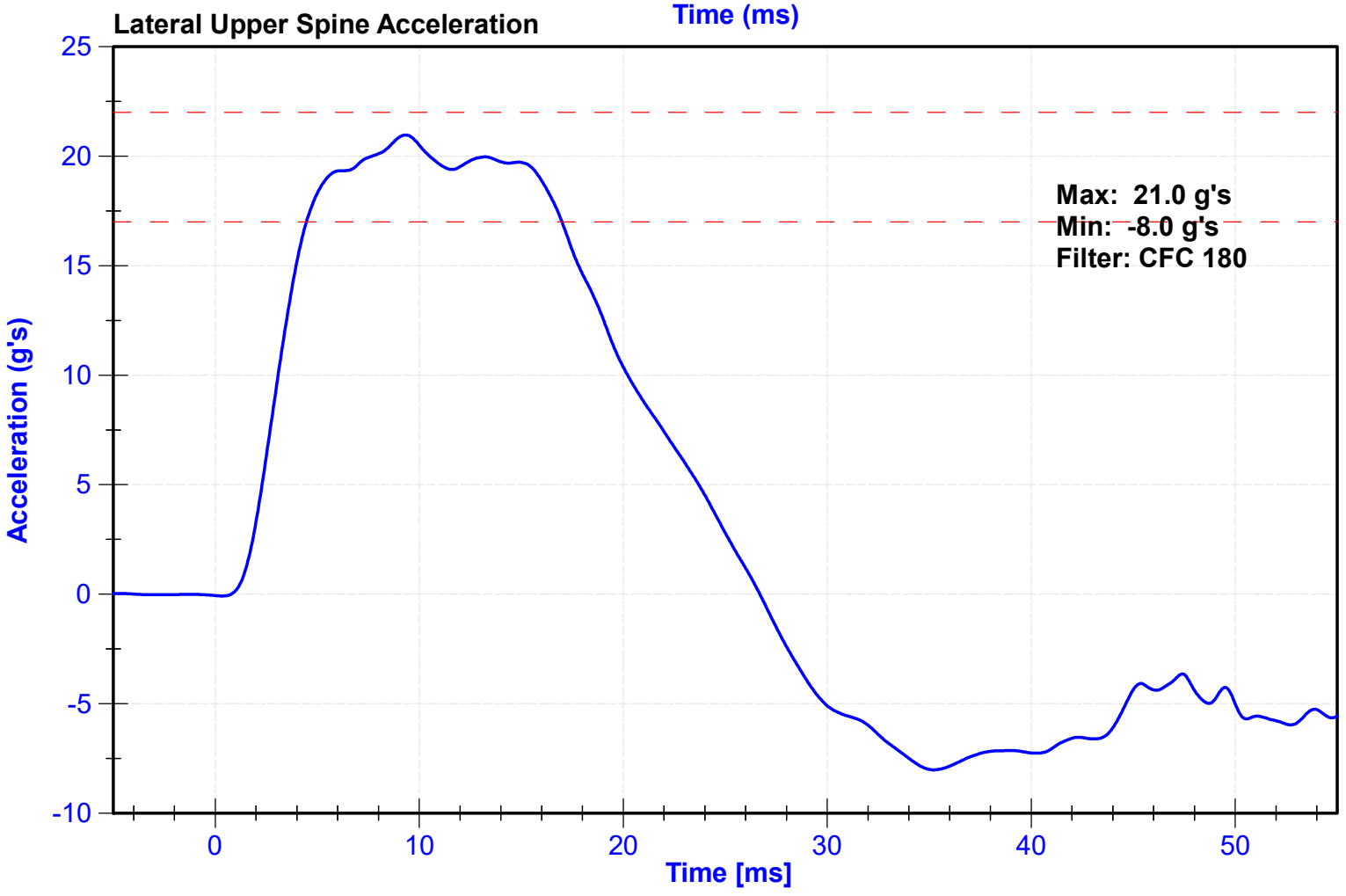
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	28.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	21.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023




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: 21.0 g's
Min: -8.0 g's
Filter: CFC 180

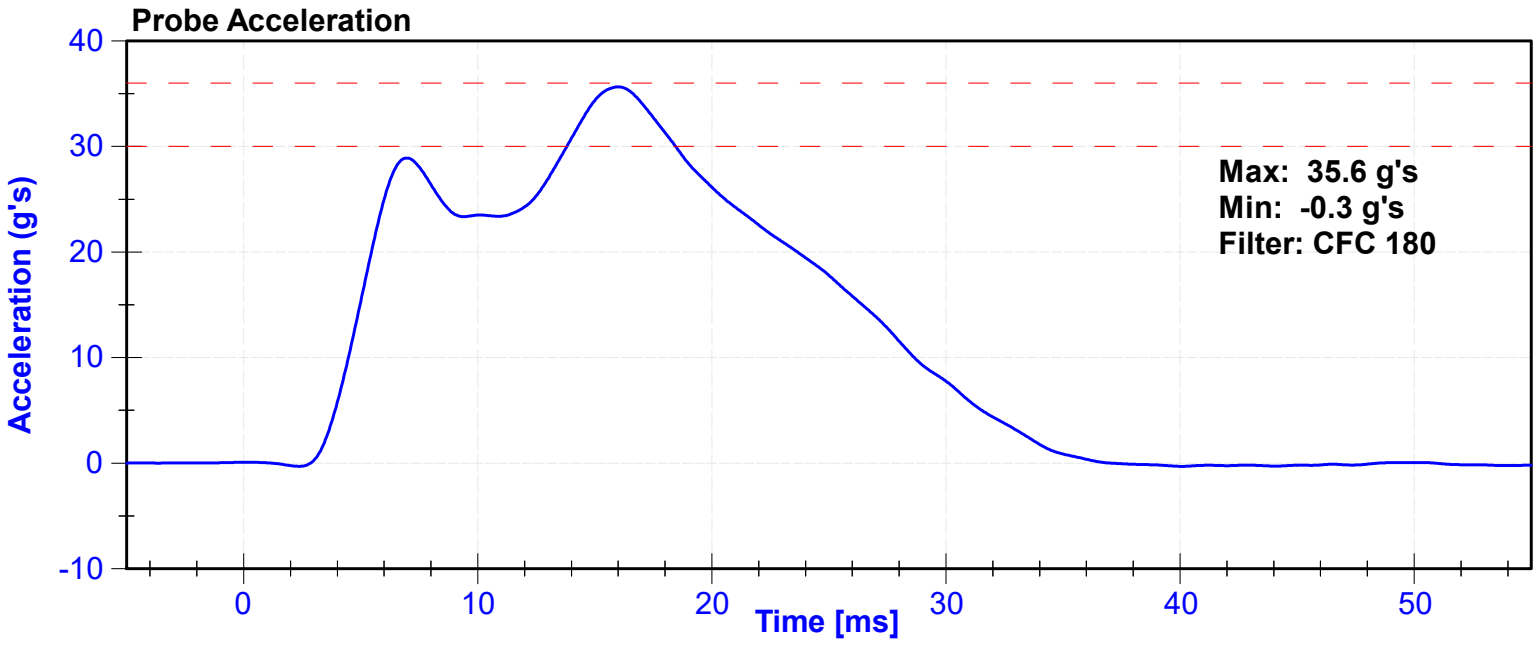
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

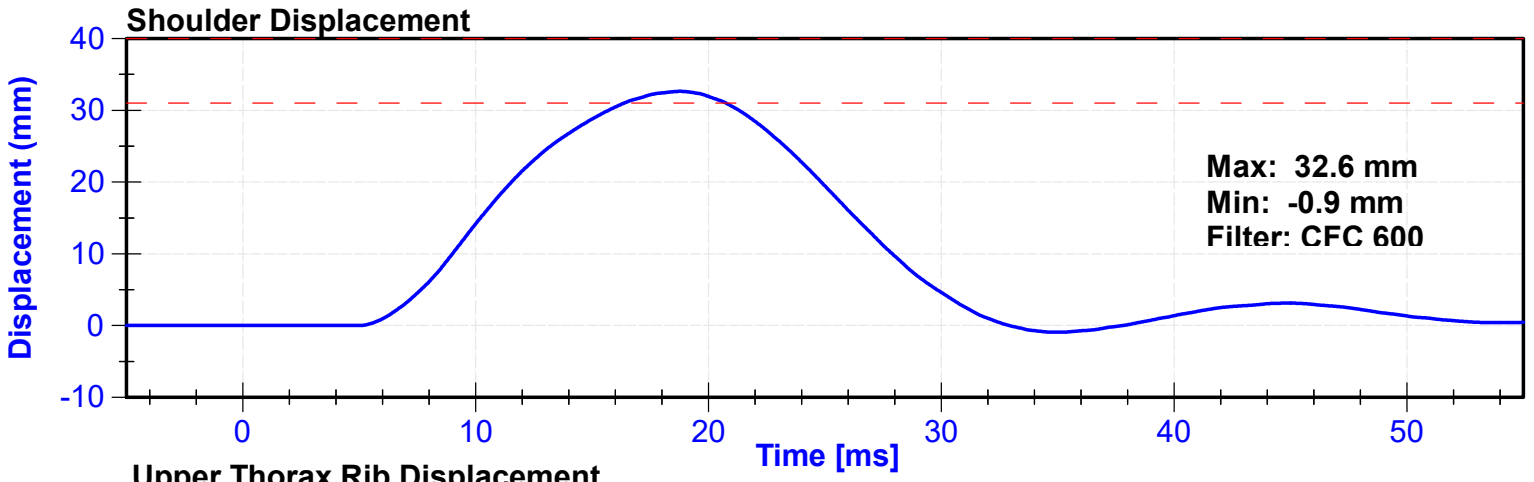
Results

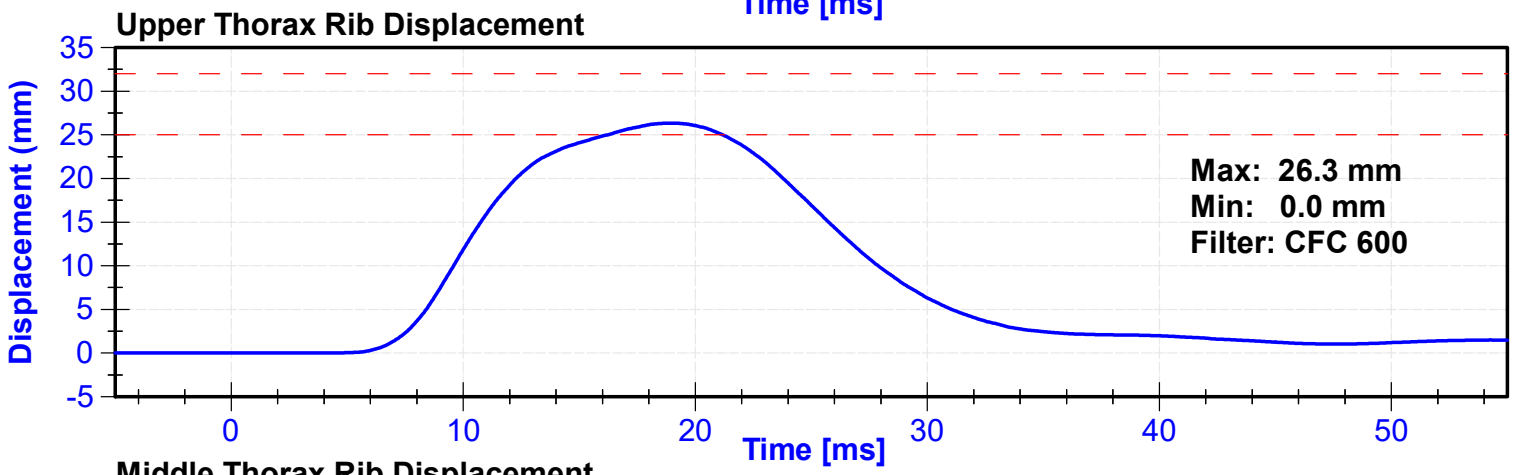
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	21	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	35.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	41.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.6	Pass
Shoulder Deflection	31	40	mm	32.6	Pass
Upper Thorax Rib Deflection	25	32	mm	26.3	Pass
Mid Thorax Rib Deflection	30	36	mm	30.0	Pass
Lower Thorax Rib Deflection	32	38	mm	32.1	Pass

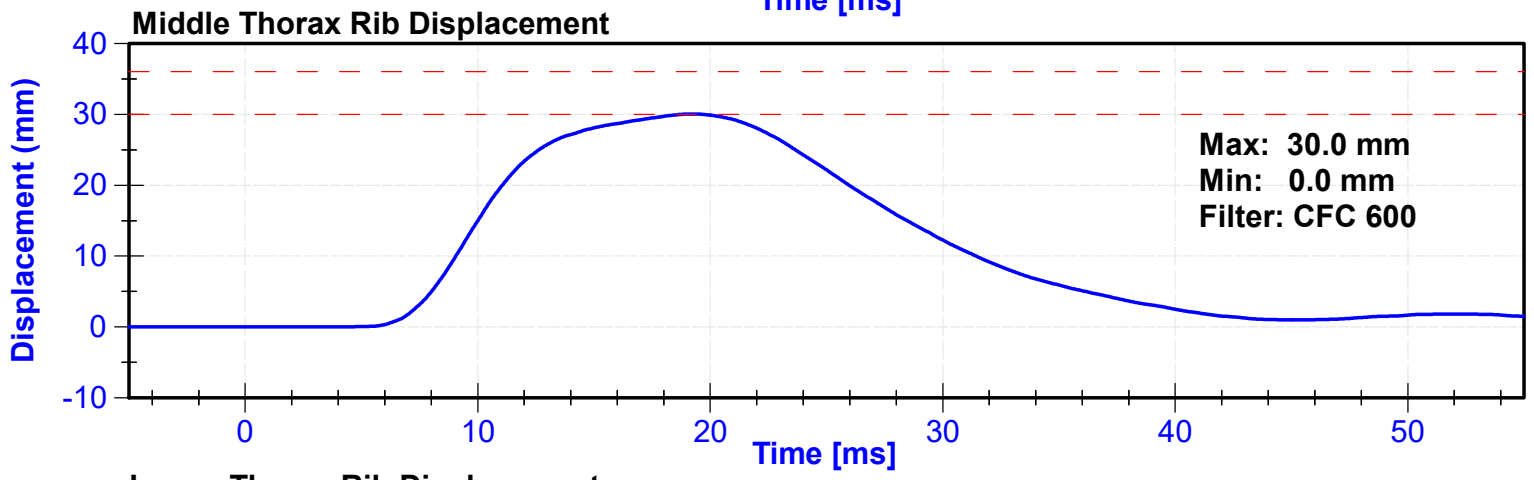
Transducer Calibrations

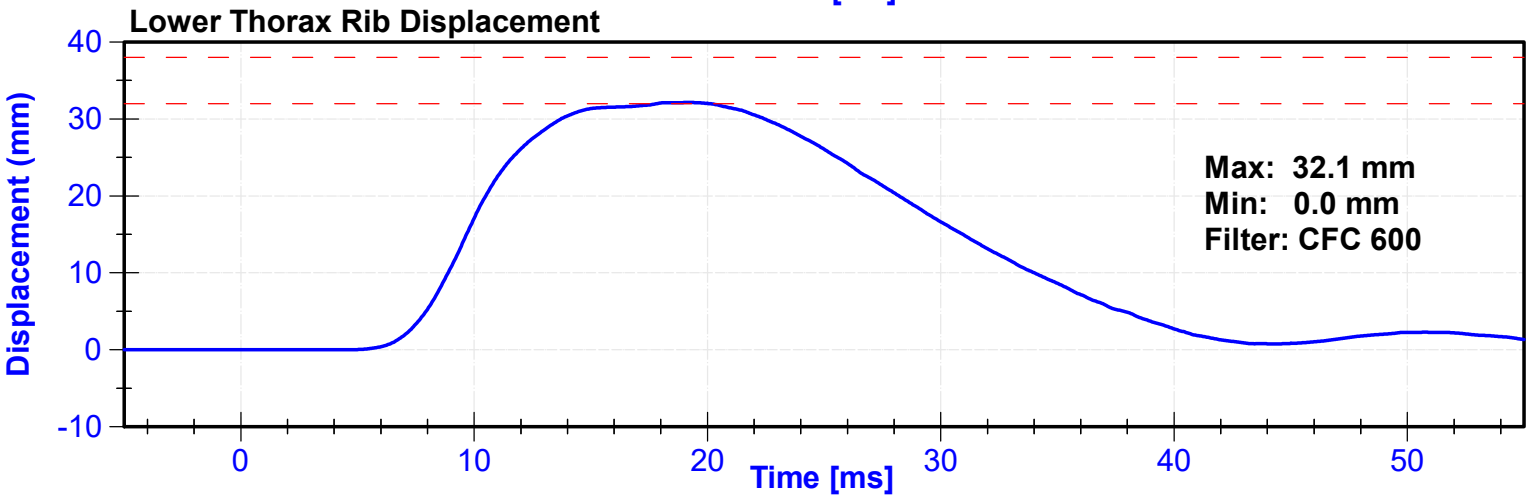
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Upper Spine T1 Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Upper Spine T12 Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023

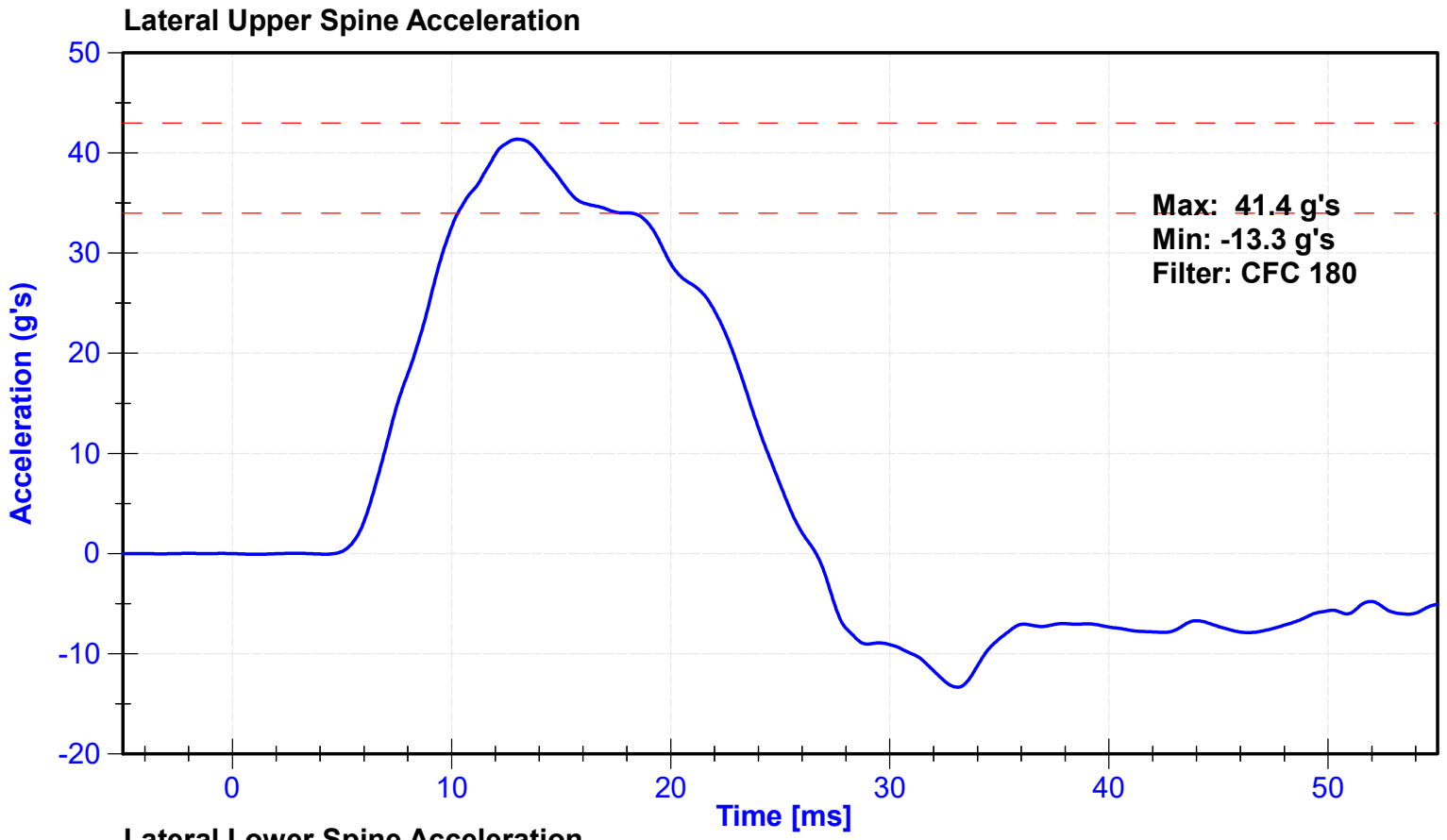


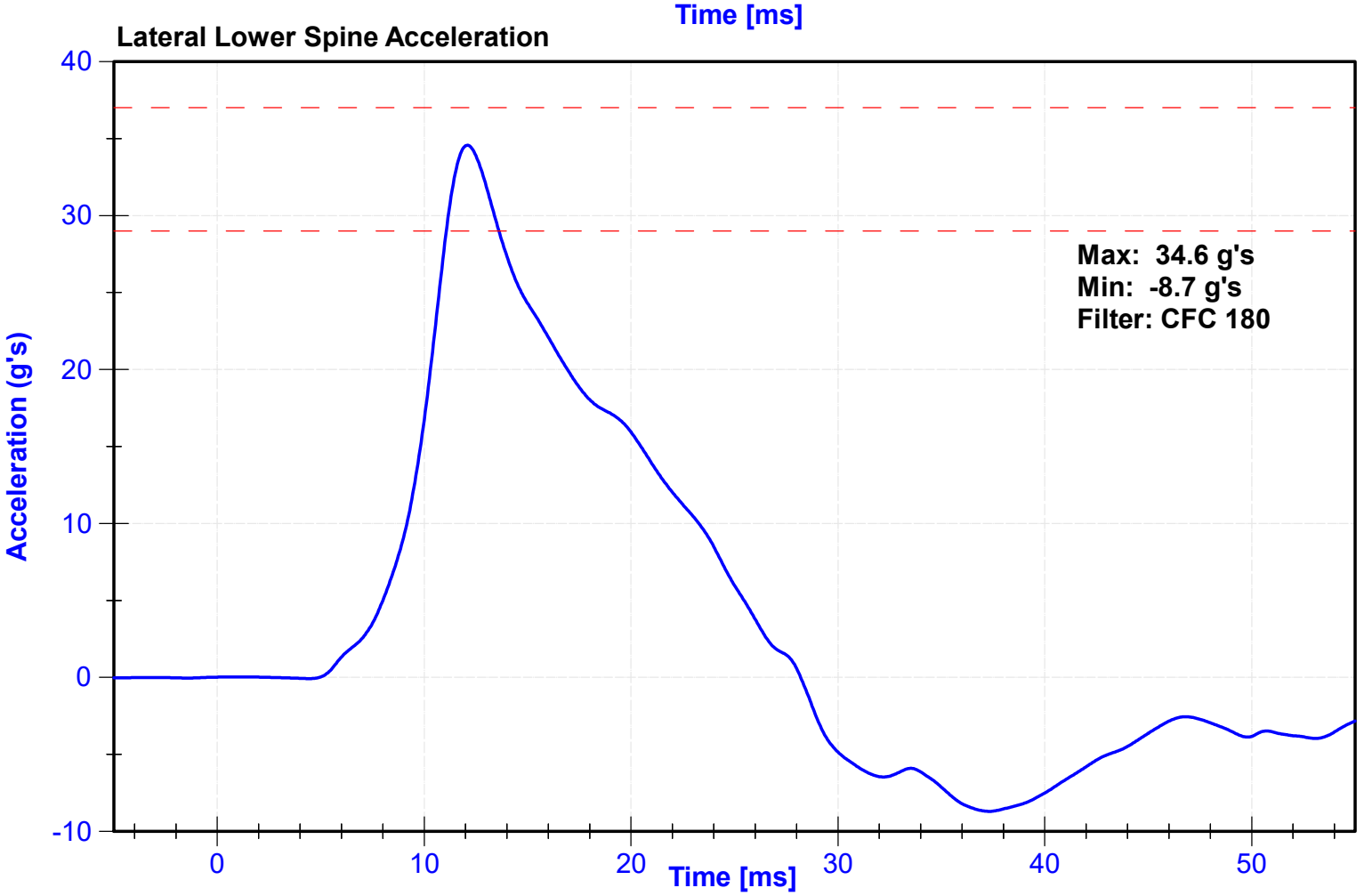

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 32.6 mm
Min: -0.9 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.3 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.0 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 41.4 g's
Min: -13.3 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: 34.6 g's
Min: -8.7 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

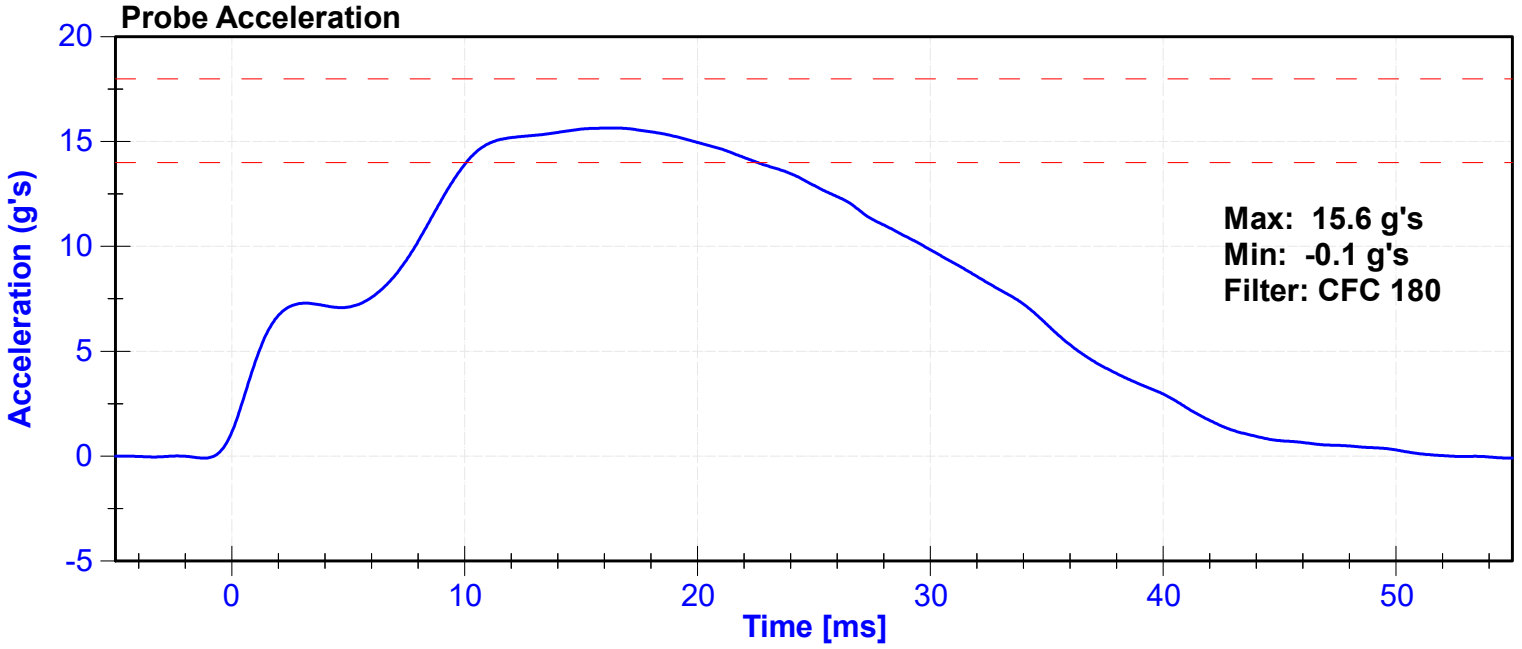
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

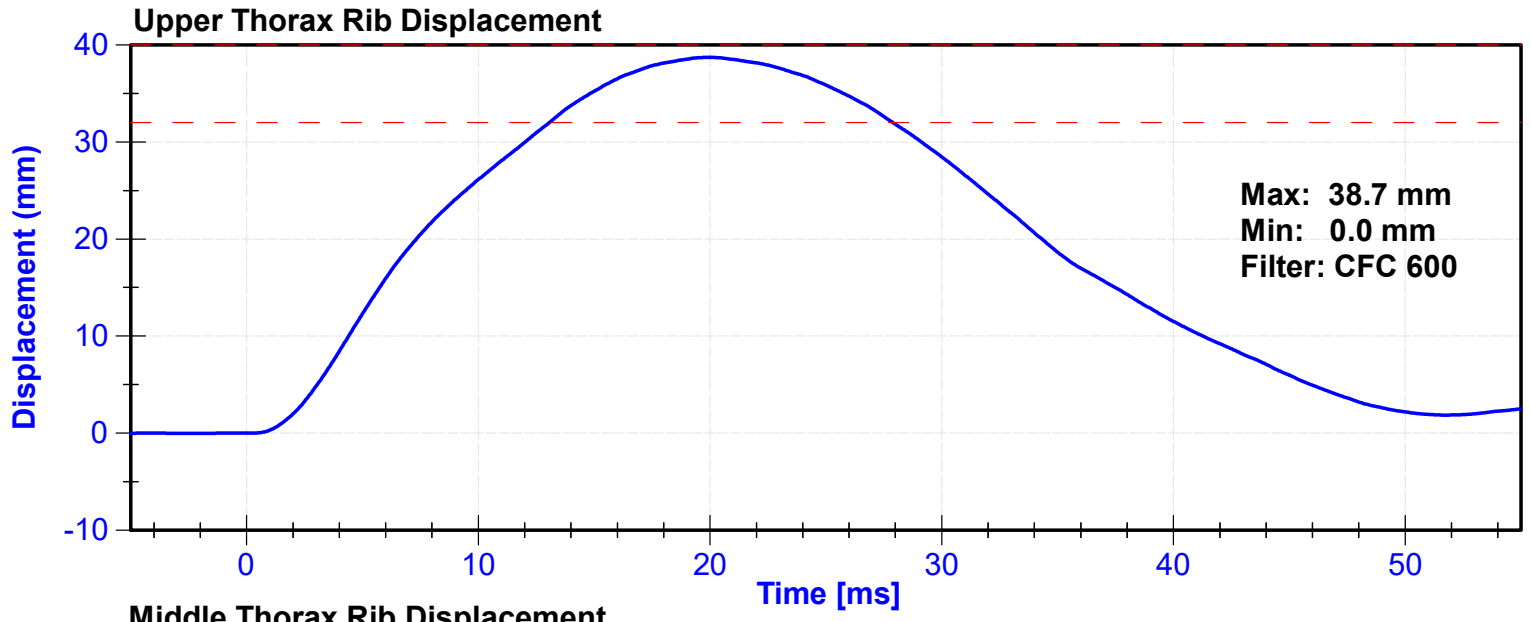
Results

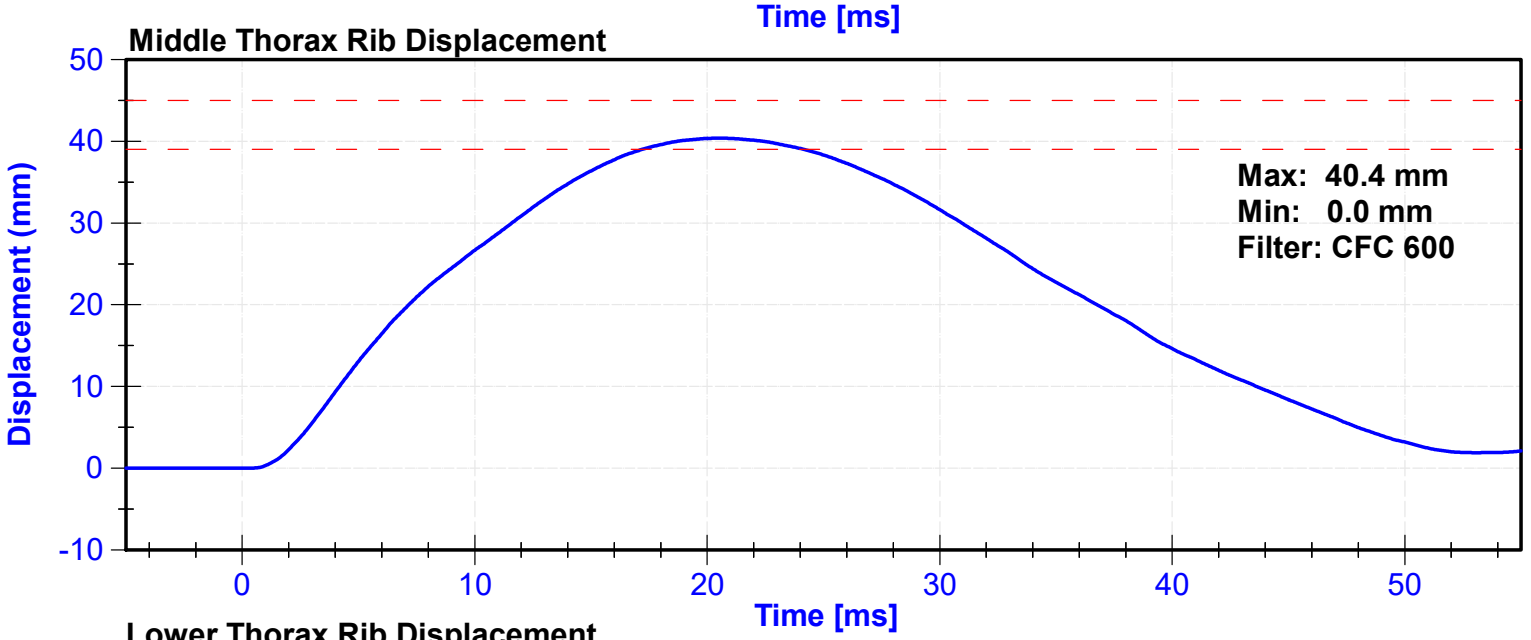
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	15.6	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	8.8	Pass
Upper Thorax Rib Deflection	32	40	mm	38.7	Pass
Middle Thorax Rib Deflection	39	45	mm	40.4	Pass
Lower Thorax Rib Deflection	35	43	mm	35.1	Pass

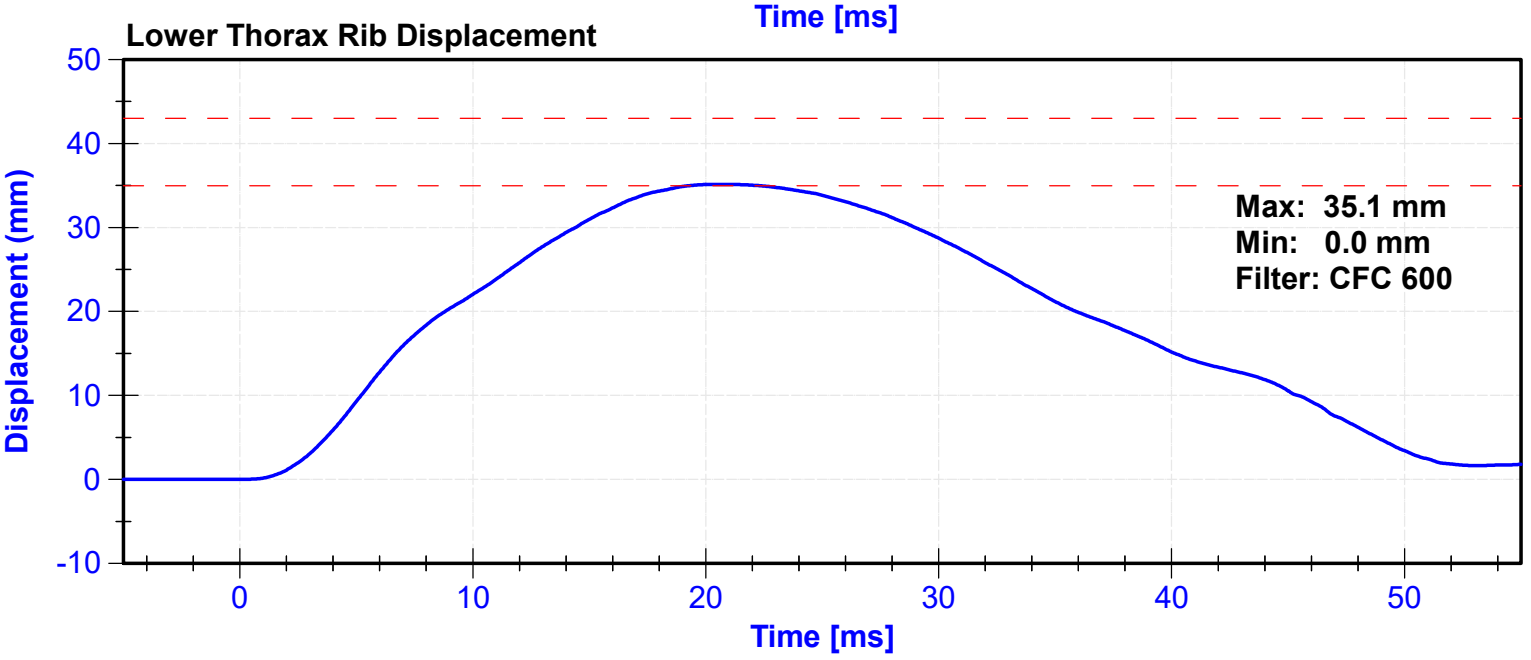
Transducer Calibrations

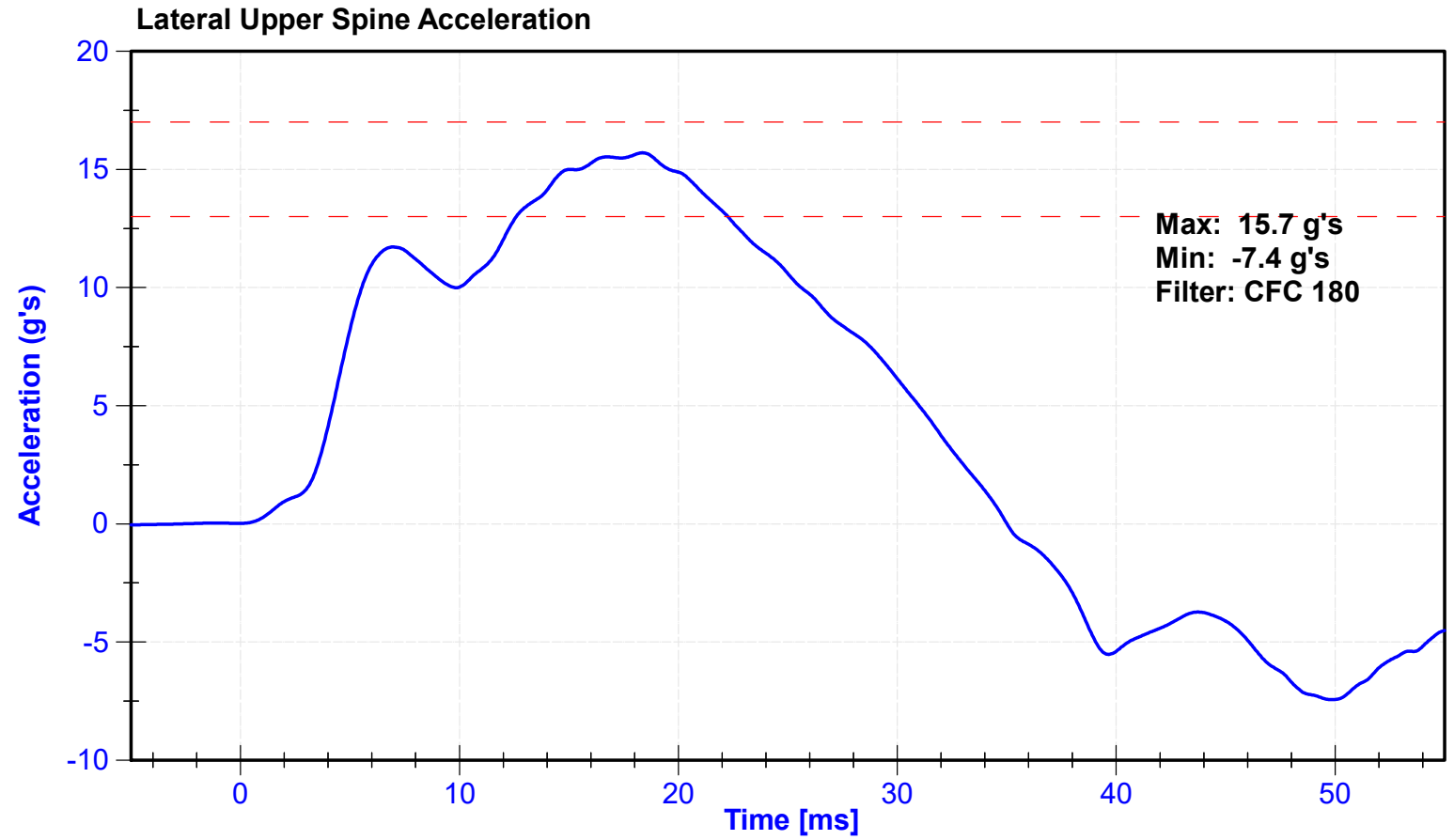
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023

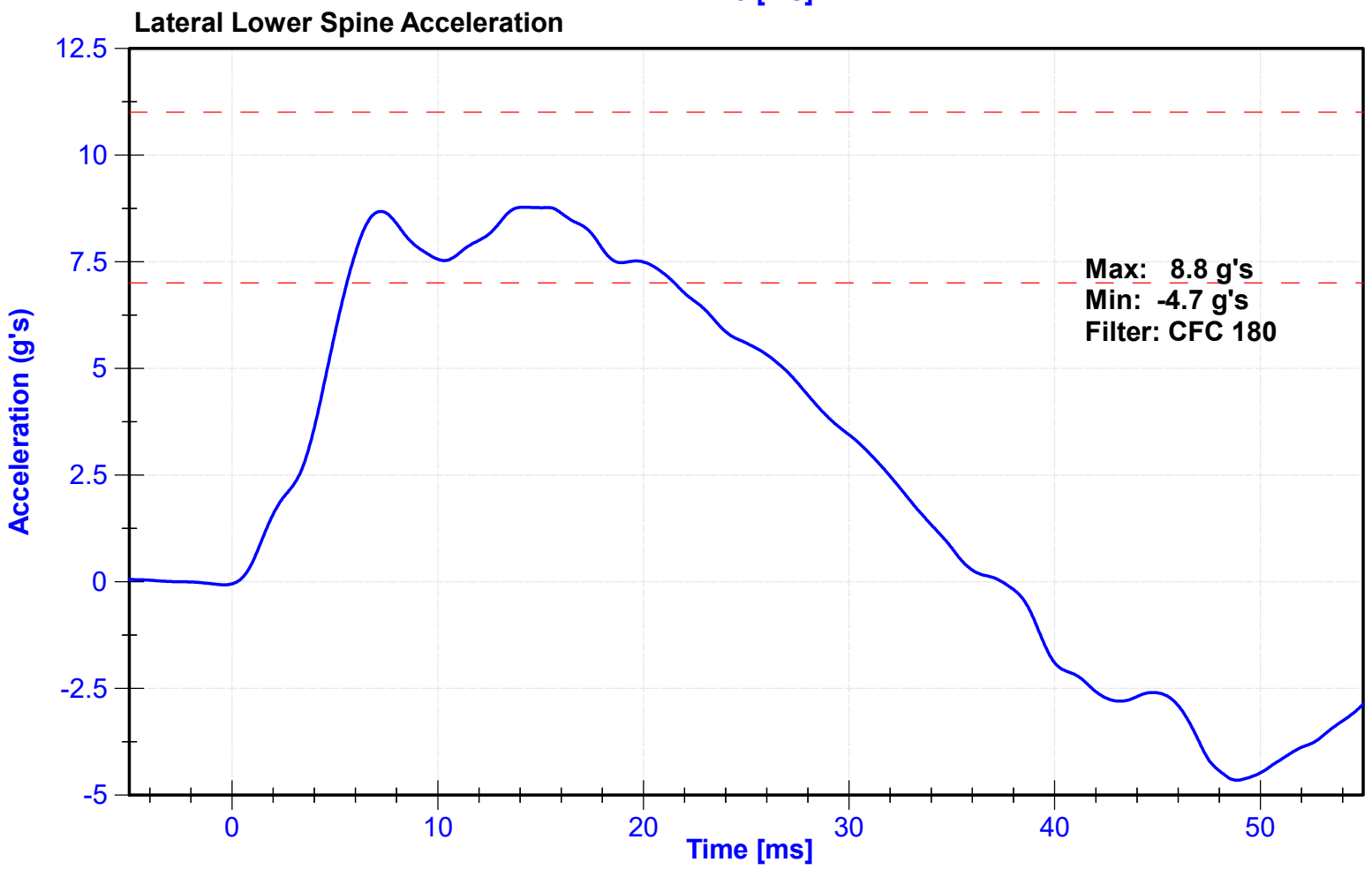



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.7 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.4 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.7 g's
Min: -7.4 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 8.8 g's
Min: -4.7 g's
Filter: CFC 180

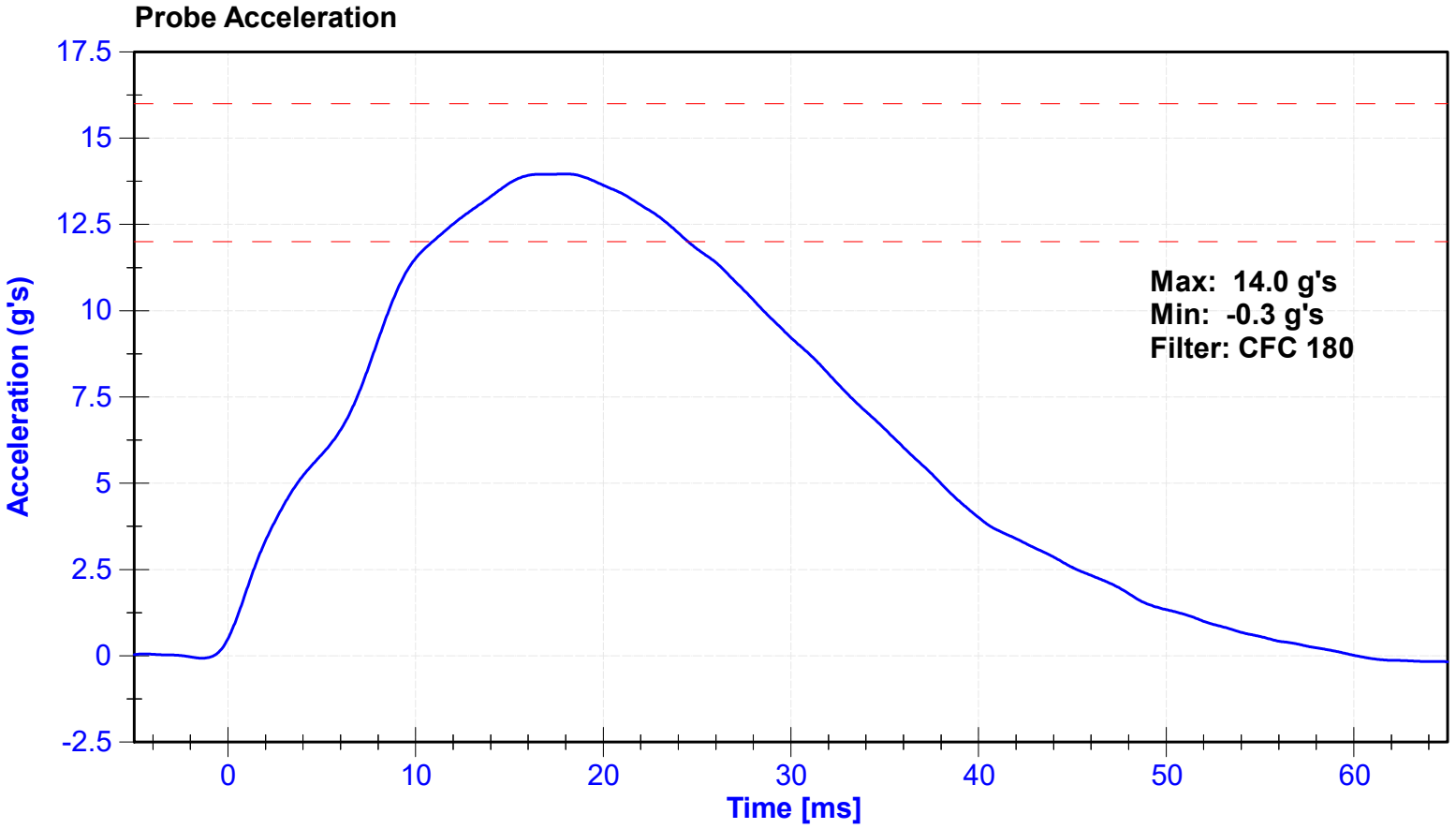
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

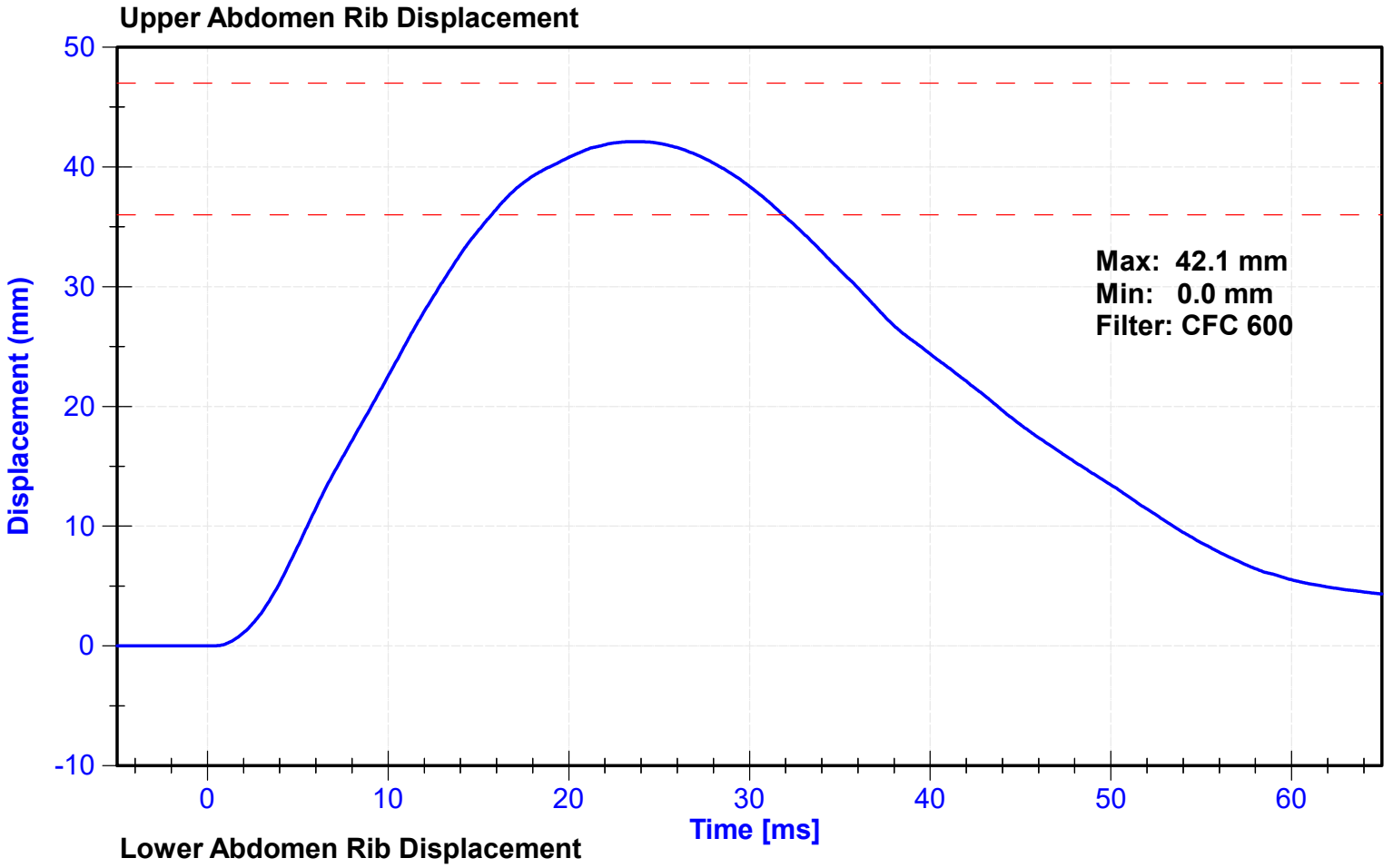
Results

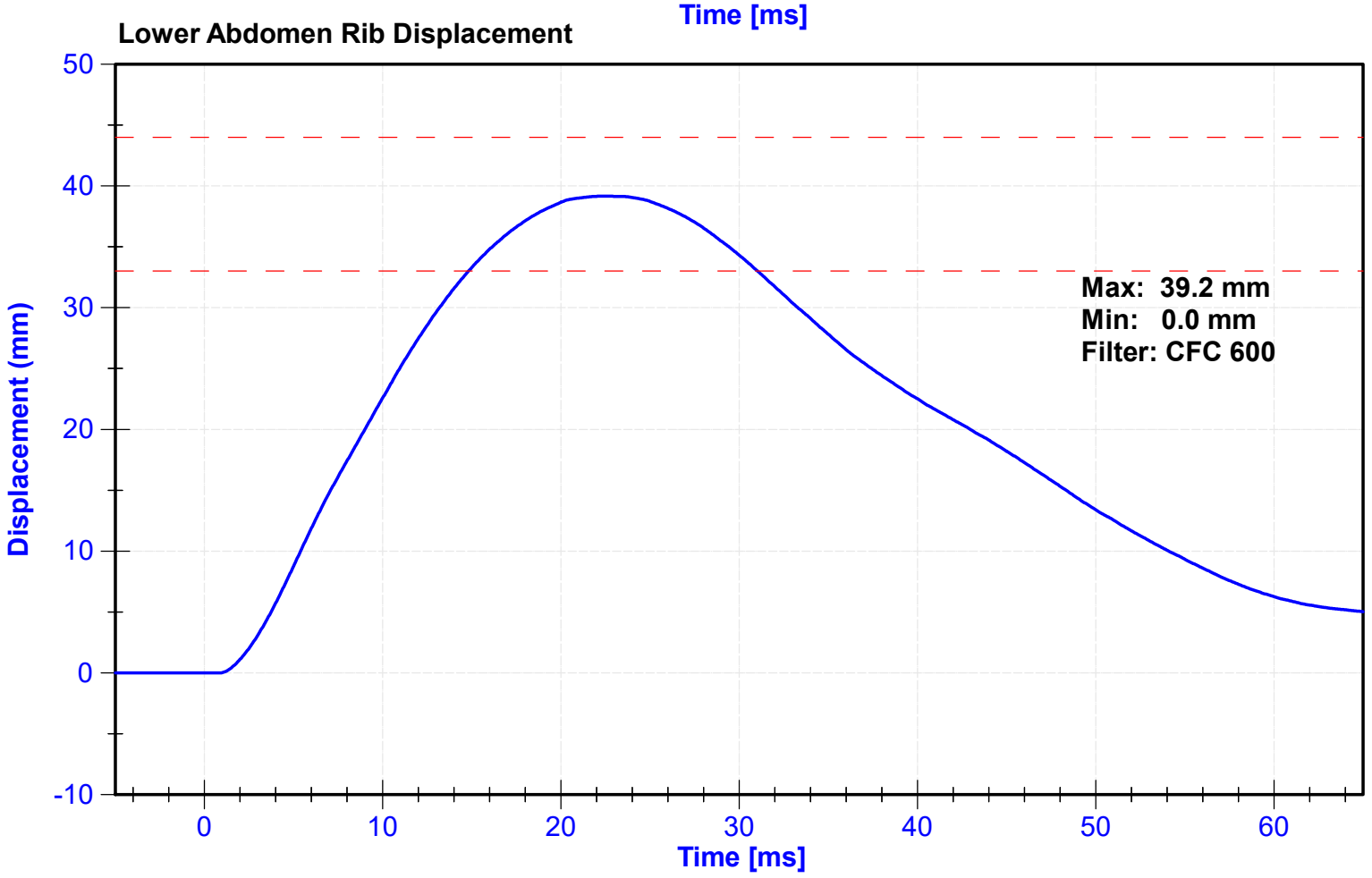
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.0	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.9	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.1	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.2	Pass

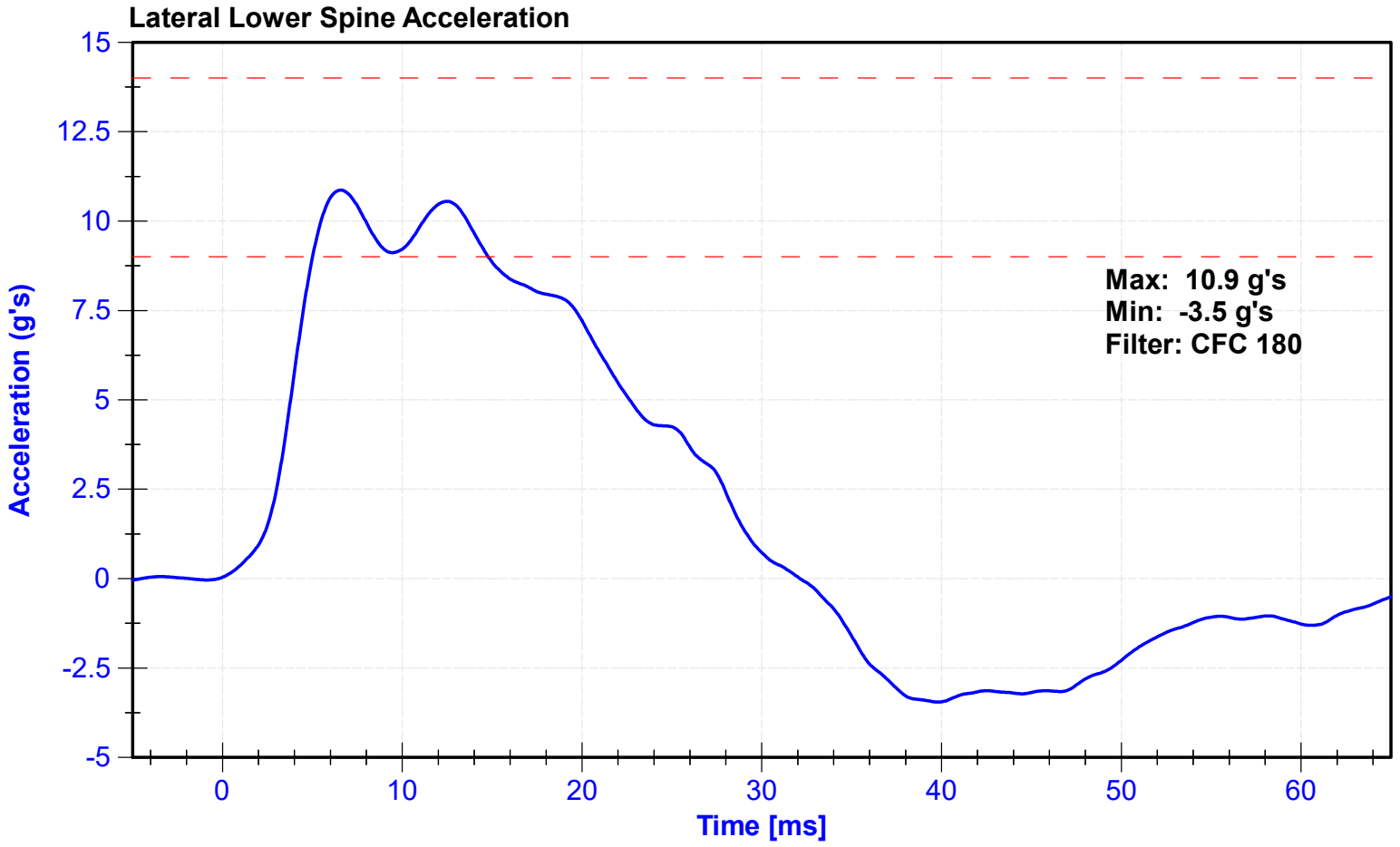
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Abdomen Rib Potentiometer	Servo	008GFE	12/13/2022	6/13/2023
Lower Abdomen Rib Potentiometer	Servo	041 GFE	12/13/2022	6/13/2023




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 10.9 g's
Min: -3.5 g's
Filter: CFC 180

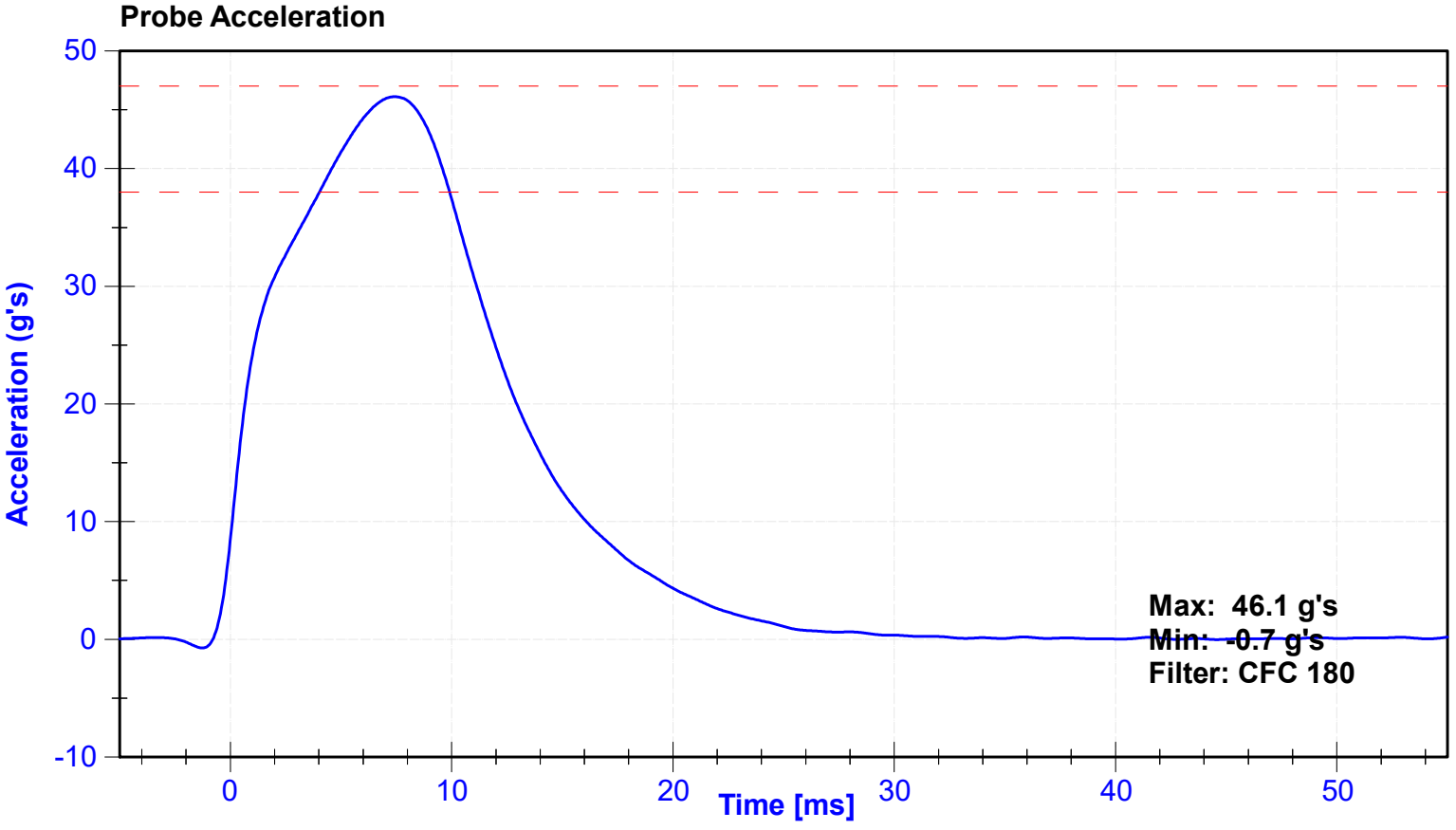
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

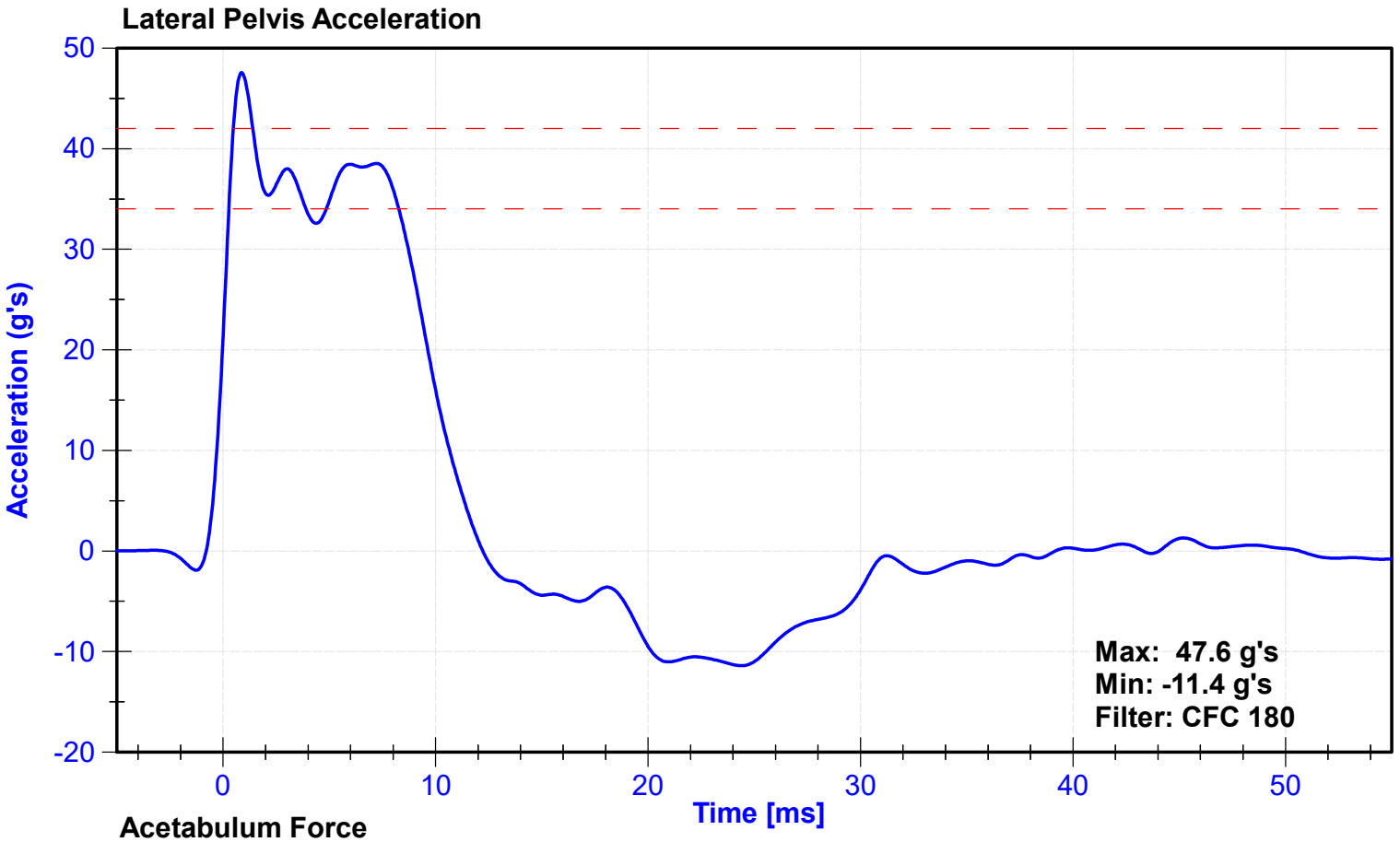
Results

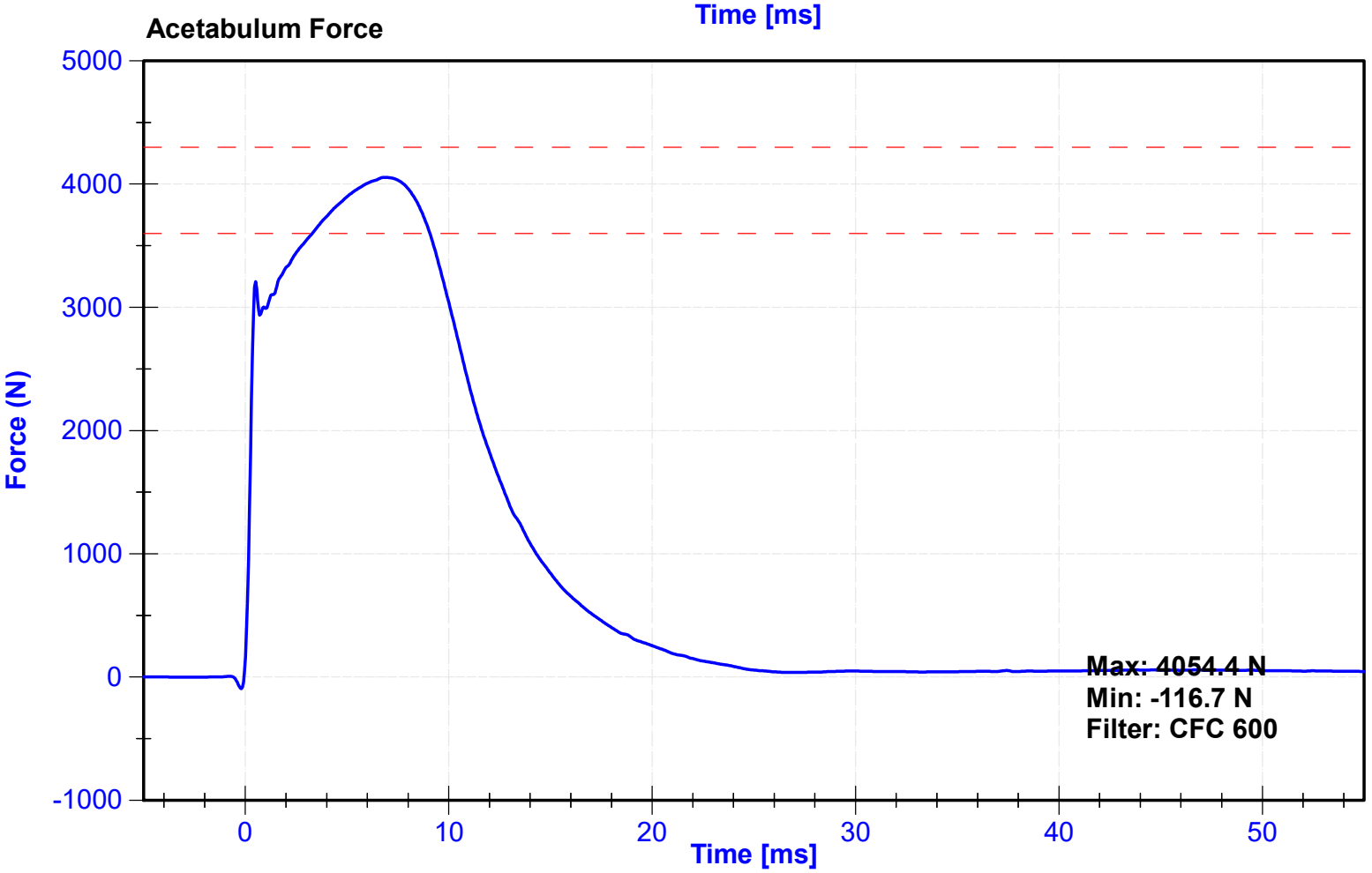
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	21	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration	38	47	g's	46.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.5	Pass
Acetabulum Force	3600	4300	N	4054.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 47.6 g's
Min: -11.4 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: 4054.4 N
Min: -116.7 N
Filter: CFC 600

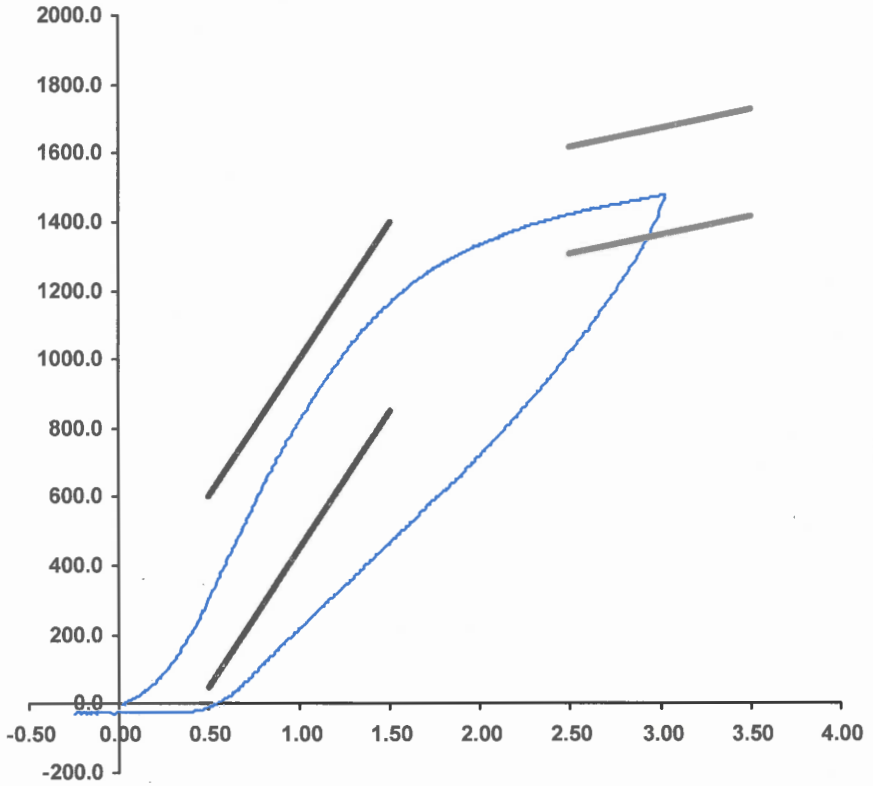
DG8012
Certification Plug
1-09-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15166
Test Number 17882
Report Number 17931
Test Date 3/8/2021 11:55:56 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	316	50	600
Force @ 1.5 mm (N)	1,164	850	1,400
Force @ 2.5 mm (N)	1,422	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

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 08-Mar-21
SACO Research

By : DC Date : 3/8/2021

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

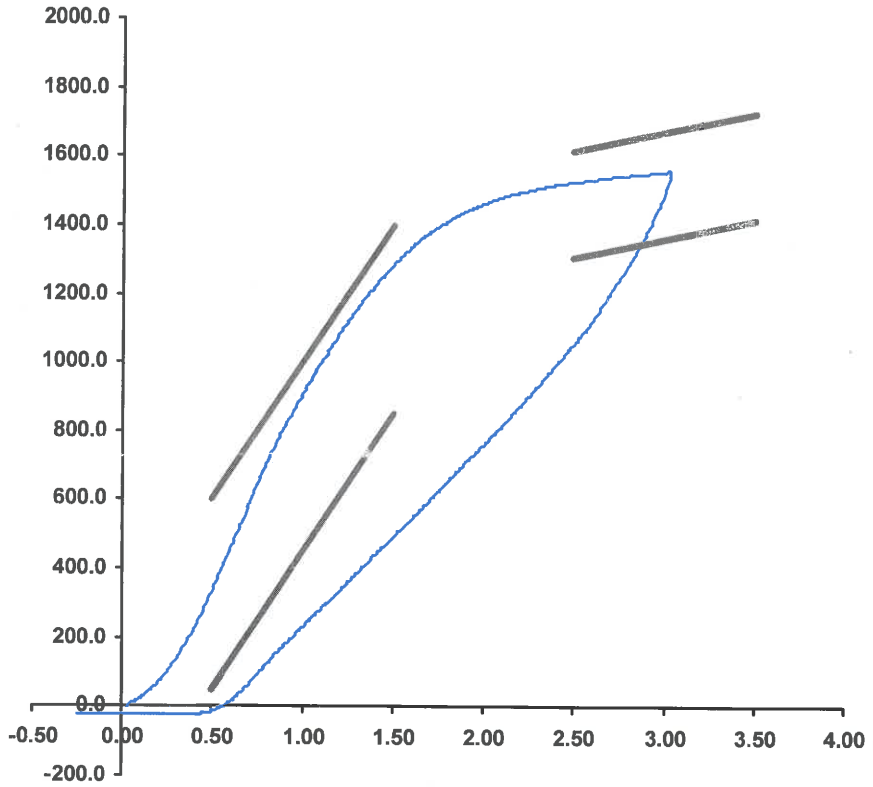
DG8012
CRASH PLUG
1-09-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15361
Test Number 19708
Report Number 19760
Test Date 7/20/2021 12:51:14 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	343	50	600
Force @ 1.5 mm (N)	1,289	850	1,400
Force @ 2.5 mm (N)	1,527	1,306	1,618
Force @ 3.0 mm (N)	1,558	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 20-Jul-21
SACO Research

By : DC Date : 7/20/2021

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

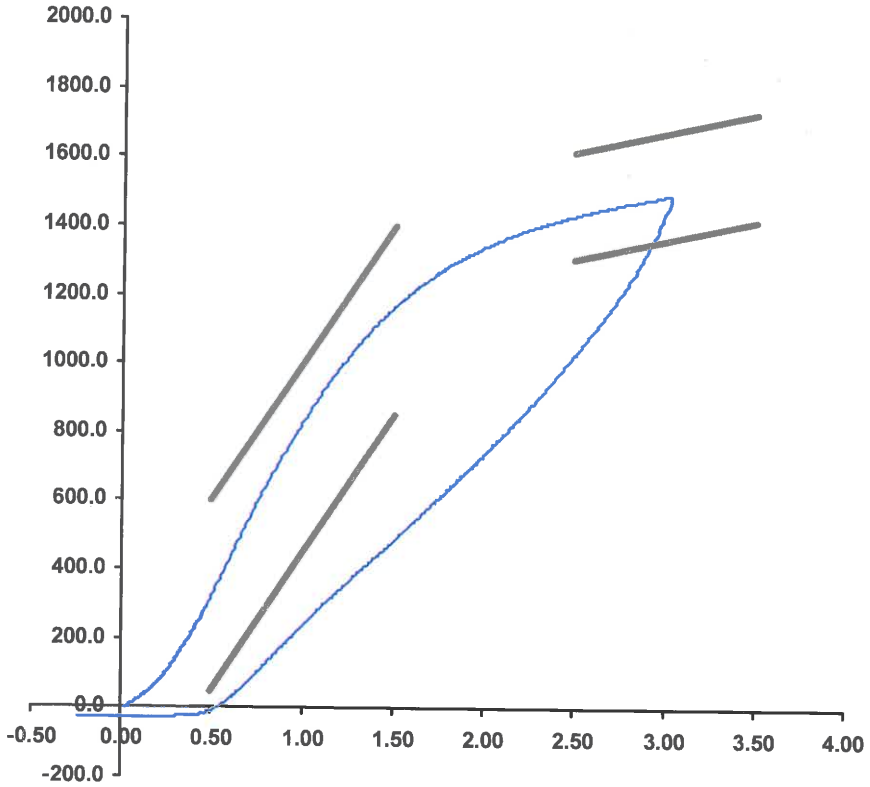
DG8012
NON-IMPACT PLUG
1-09-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15247
Test Number 17998
Report Number 18047
Test Date 3/10/2021 1:28:18 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	331	50	600
Force @ 1.5 mm (N)	1,166	850	1,400
Force @ 2.5 mm (N)	1,432	1,306	1,618
Force @ 3.0 mm (N)	1,490	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

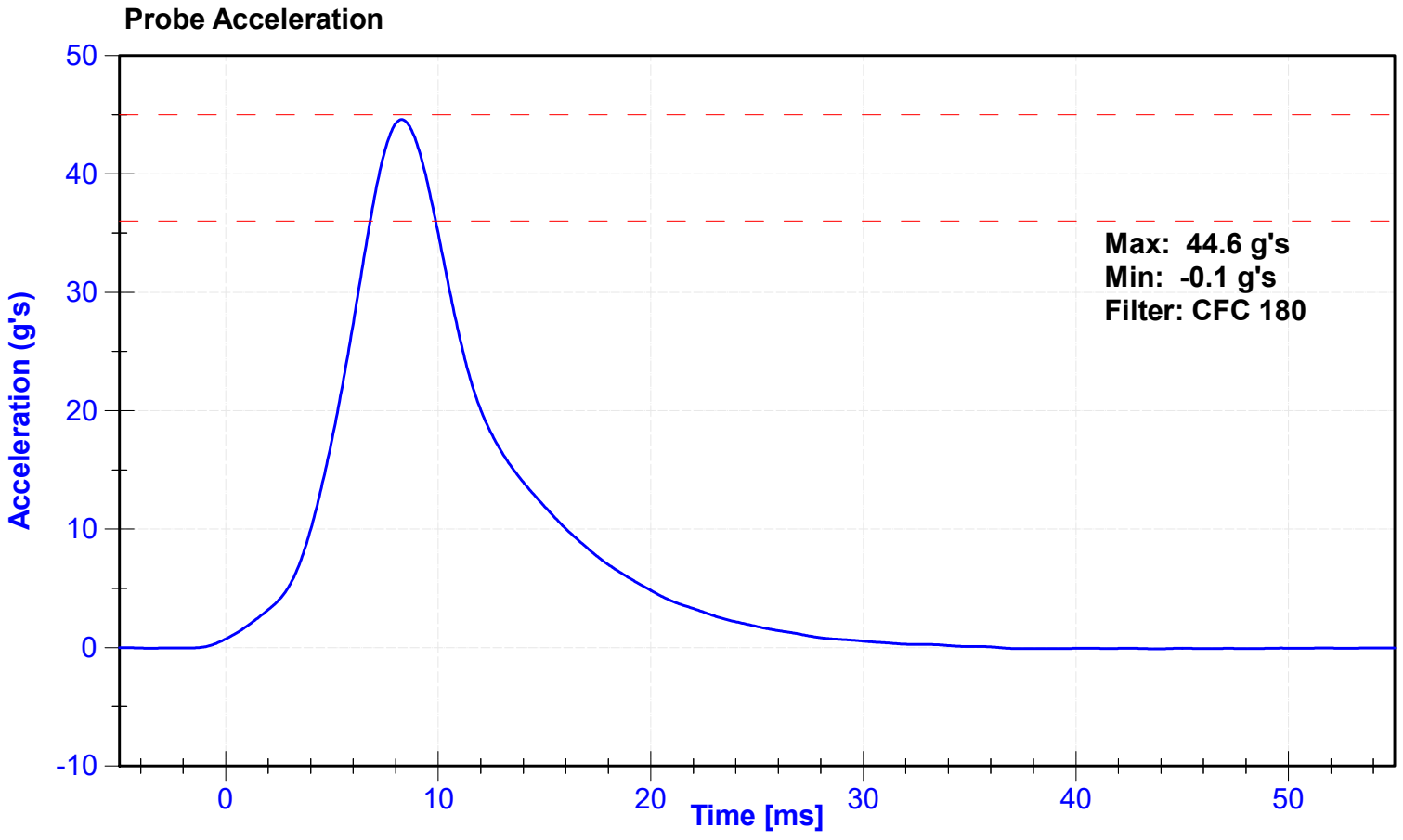
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

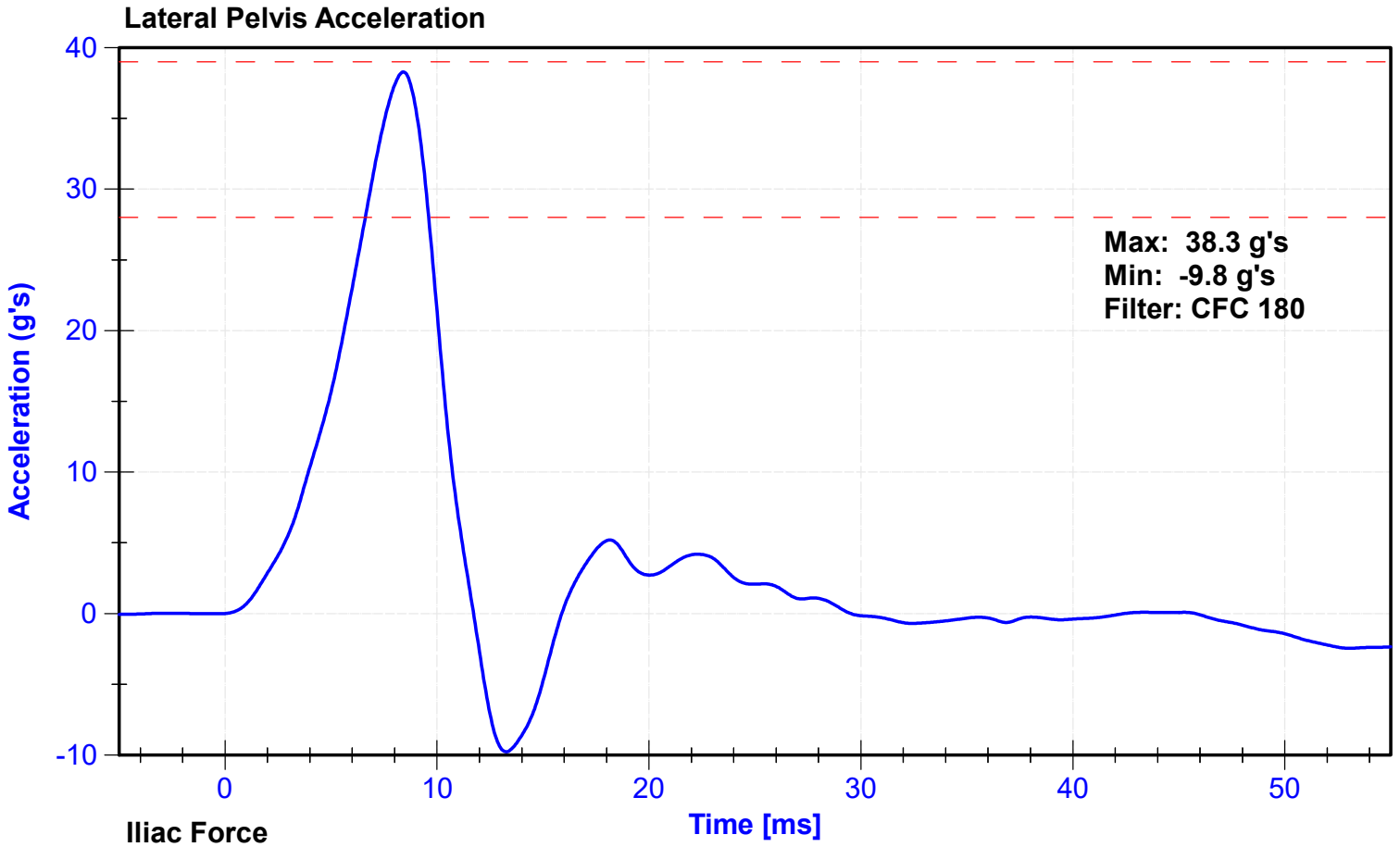
Results

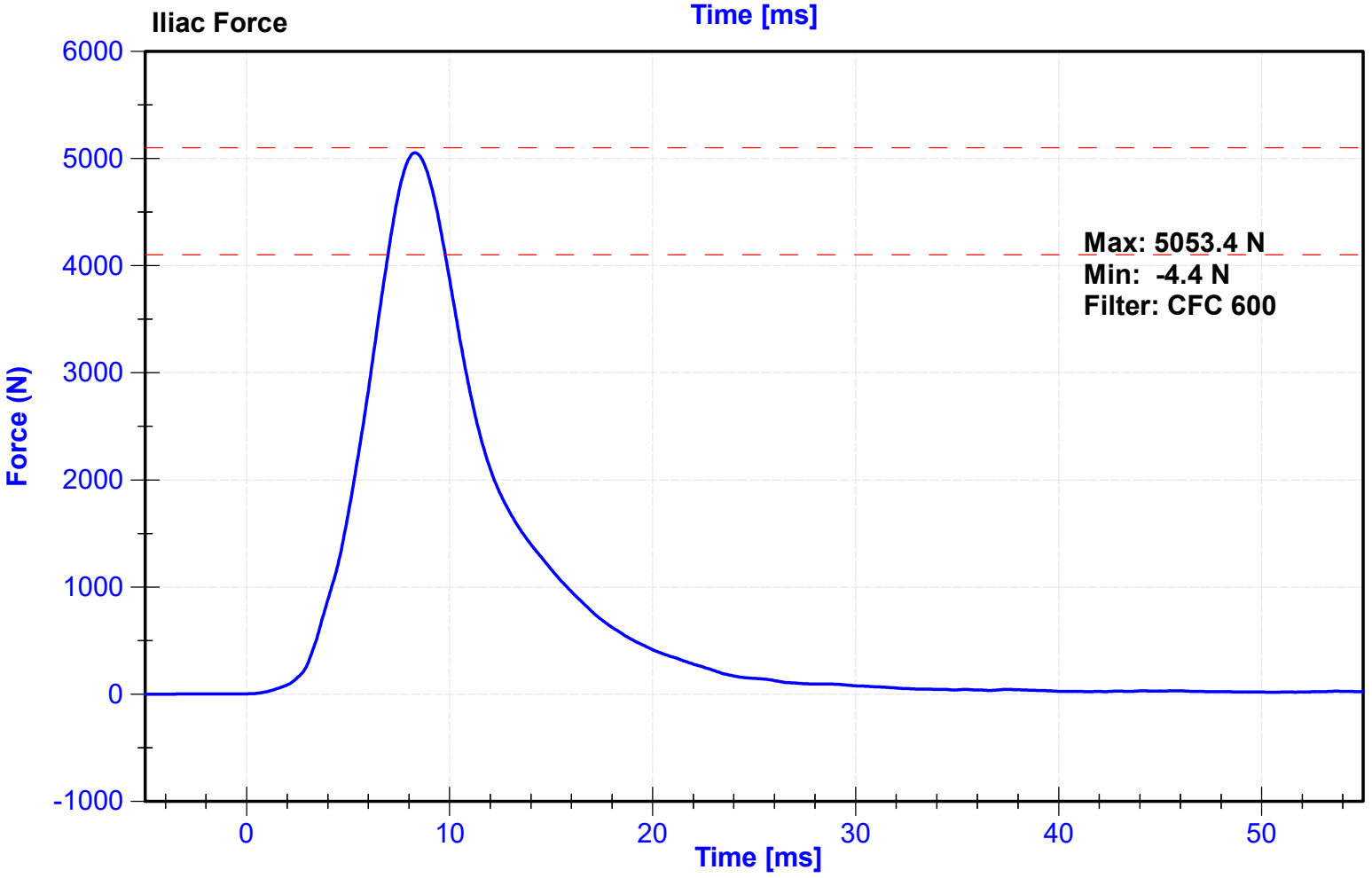
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	21	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	36	45	g's	44.6	Pass
Lateral Pelvis Acceleration	28	39	g's	38.3	Pass
Iliac Force	4100	5100	N	5053.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18494	11/5/2022	5/4/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Iliac Load Cell	Denton	290-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 38.3 g's
Min: -9.8 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 5053.4 N
Min: -4.4 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

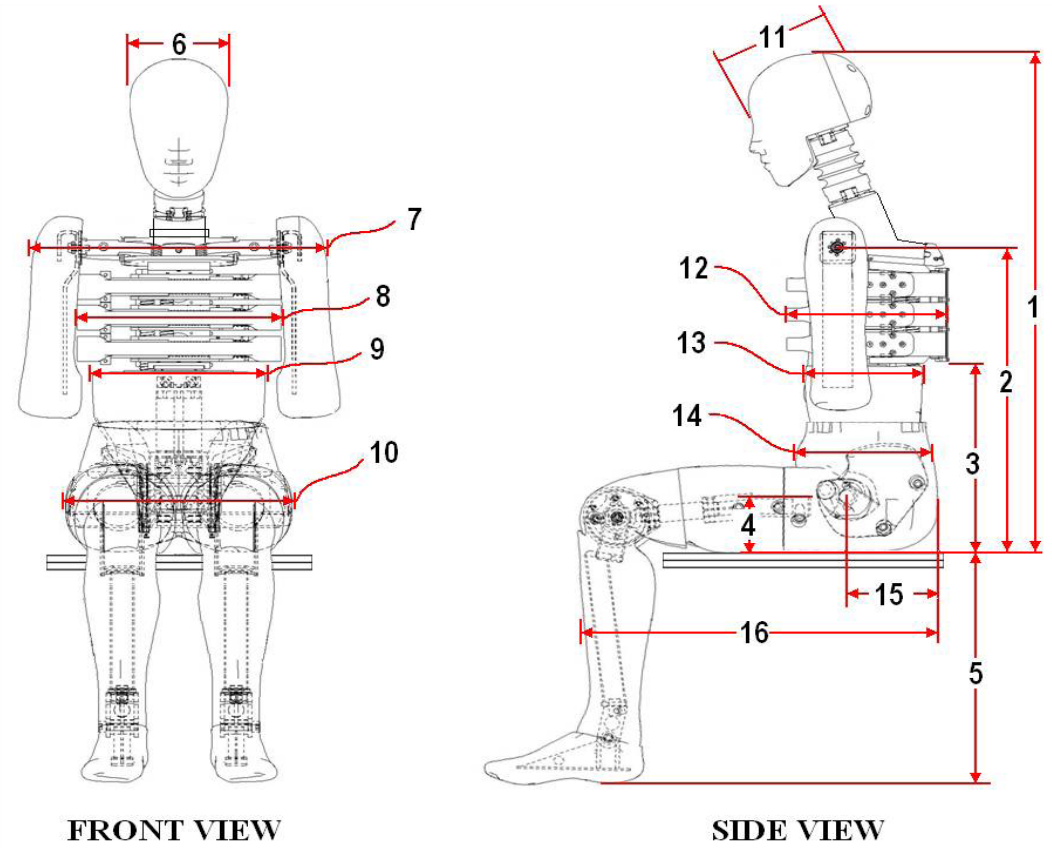
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 02/02/2023

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	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	423	Pass
6	Head Width	152	158	157	Pass
7	Shoulder/Arm Width	461	479	468	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	367	Pass
11	Head Depth	196	206	202	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	201	Pass
14	Pelvis Depth	235	245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	157	Pass
16	Back of Buttocks to Front Knee	597	615	611	Pass

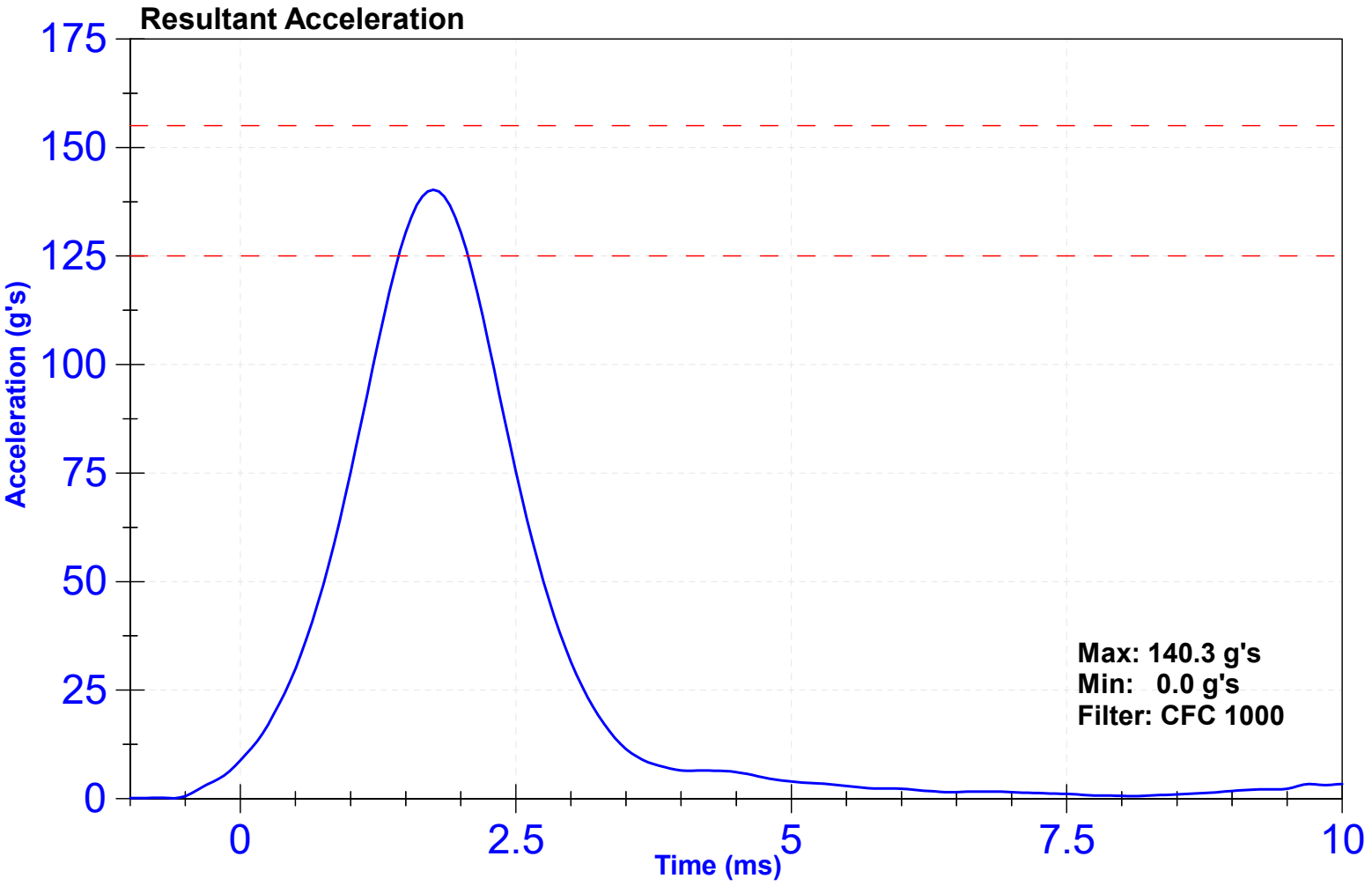
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

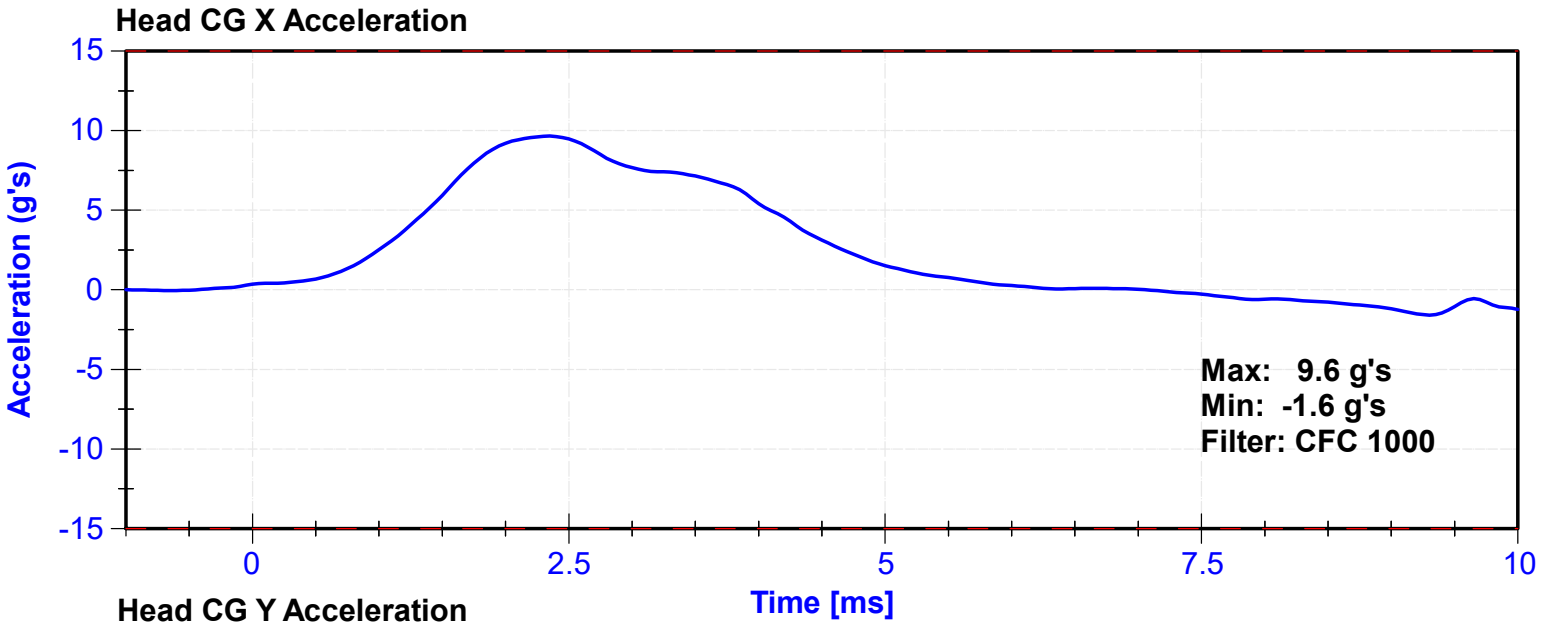
Results

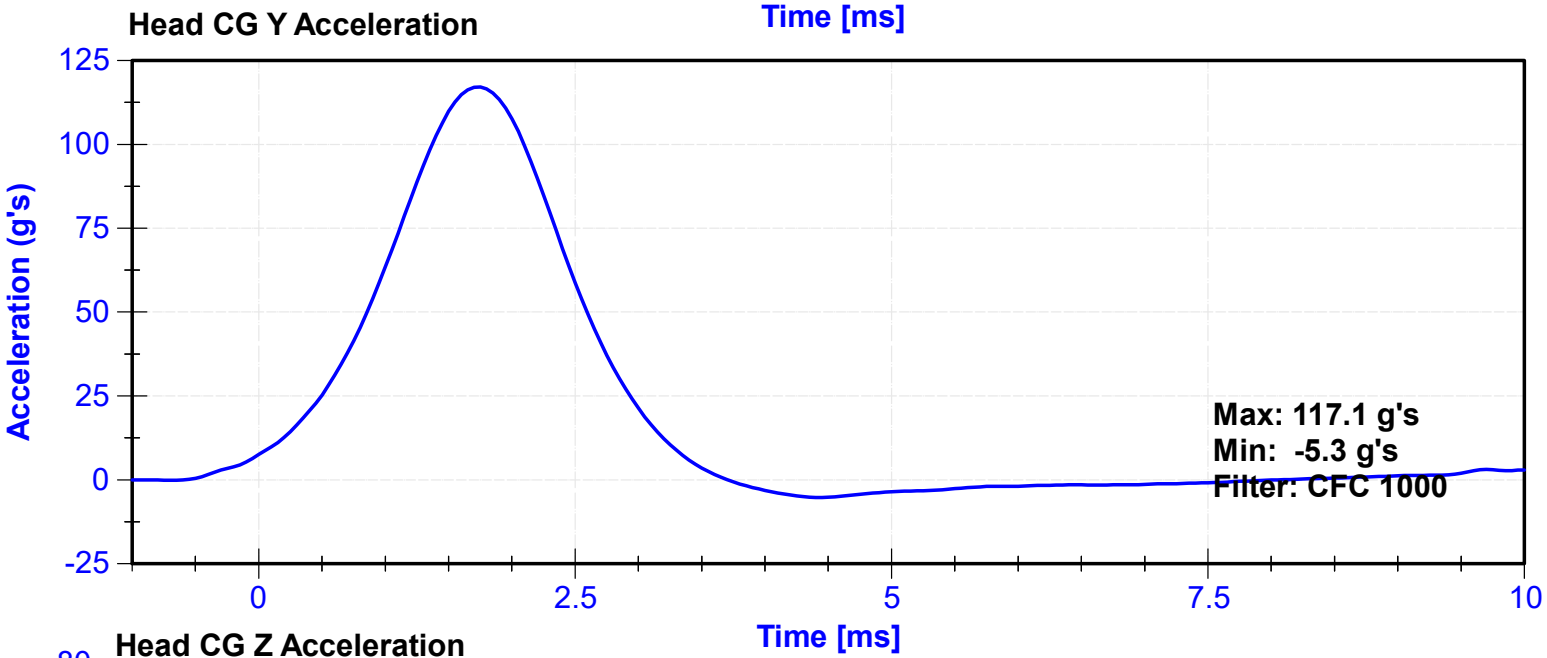
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Resultant Acceleration	125	155	g's	140.3	Pass
Oscillation	0	15	%	4.62	Pass
Fore-Aft Acceleration	-15	15	g's	9.6	Pass

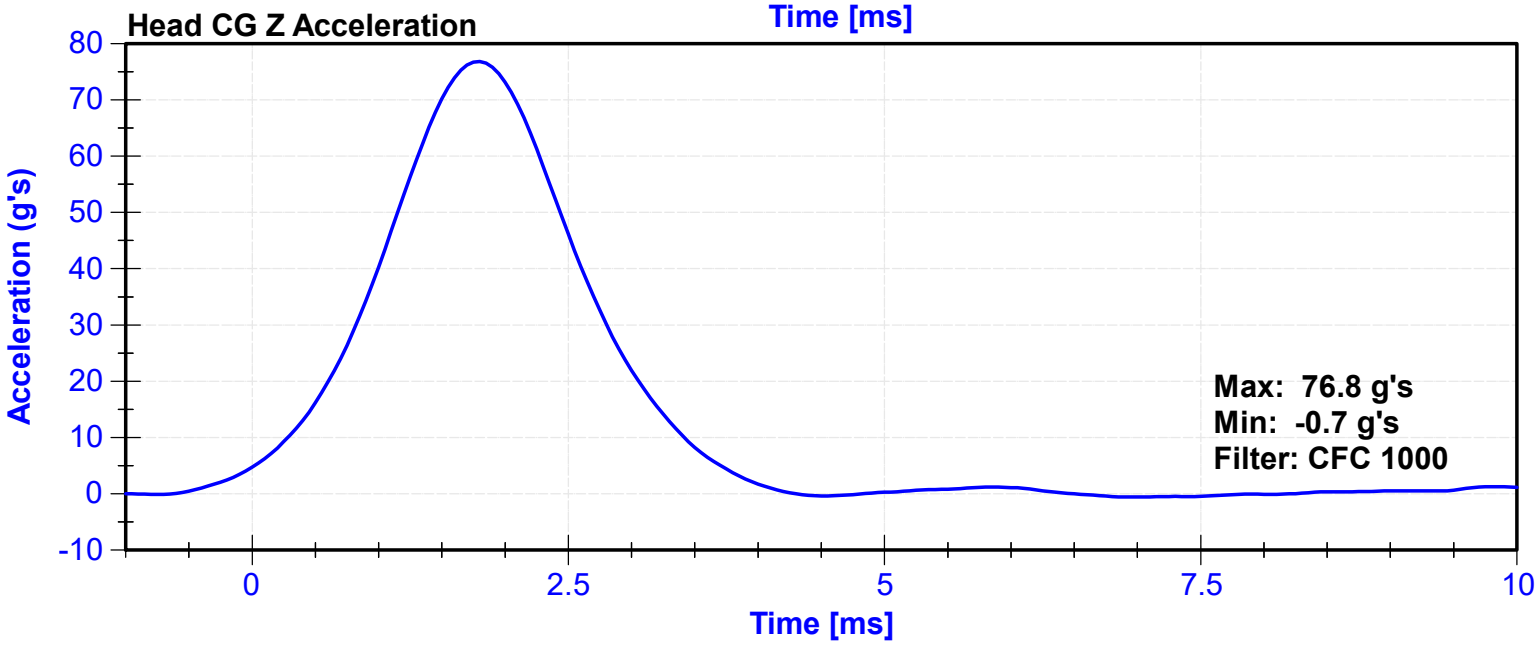
Transducer Calibrations

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




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 9.6 g's
Min: -1.6 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: 117.1 g's
Min: -5.3 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: 76.8 g's
Min: -0.7 g's
Filter: CFC 1000

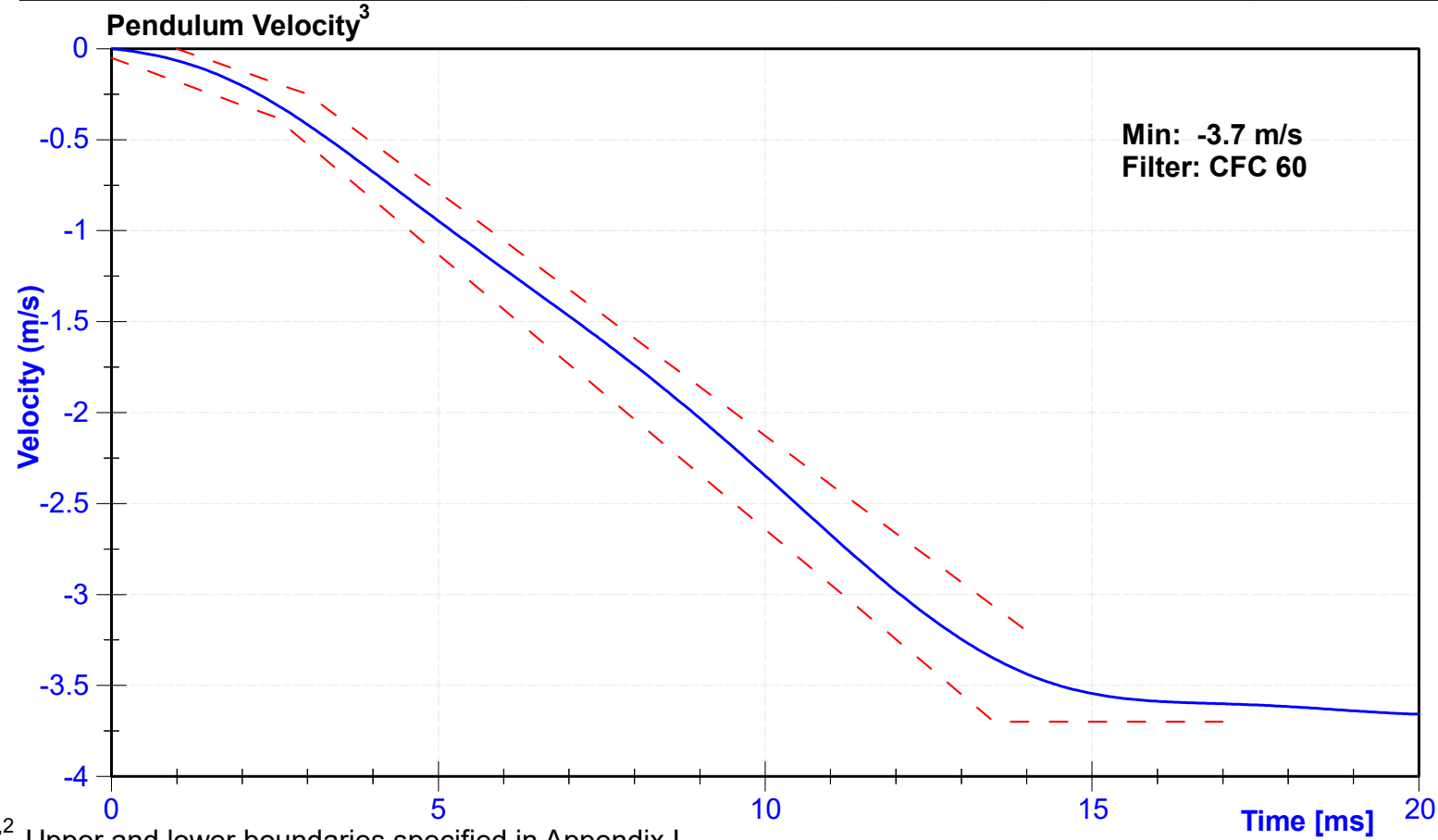
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

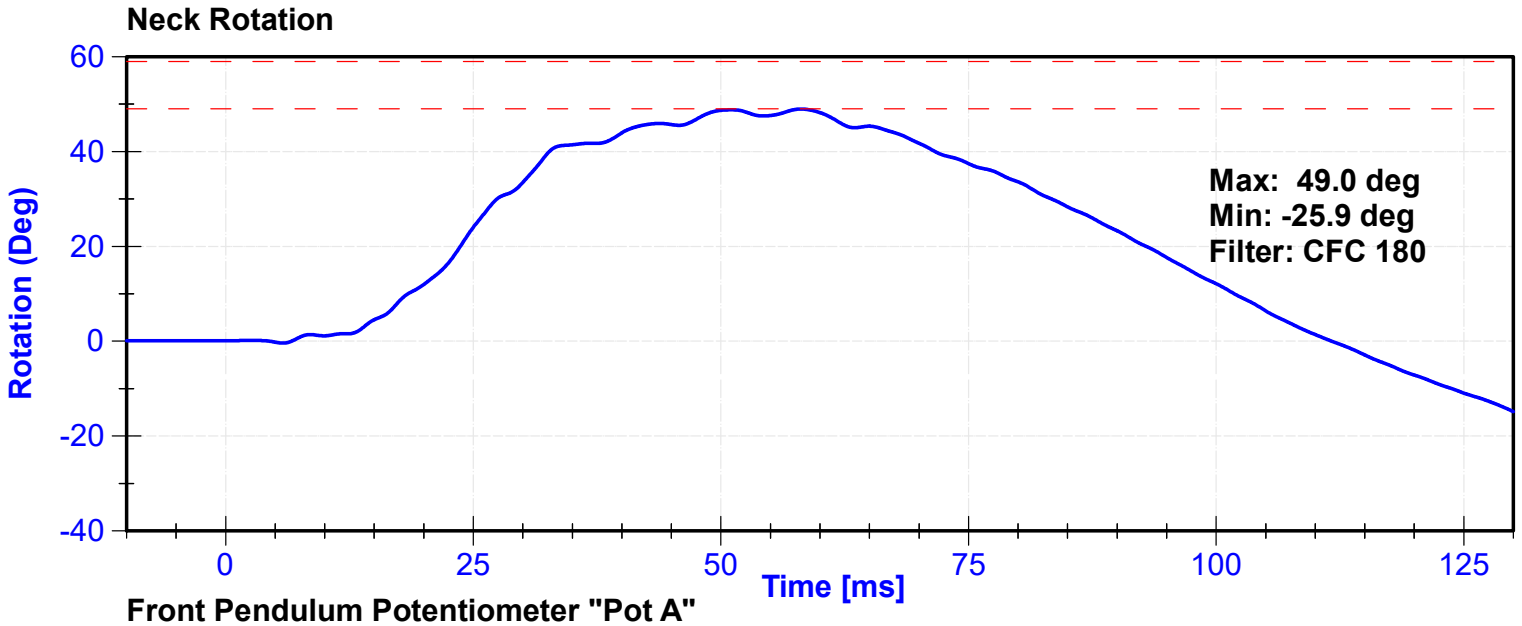
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	3.3	3.5	m/s	3.41	Pass
Lateral Neck Rotation	49	59	deg	49.0	Pass
Time at Maximum Rotation	54	66	ms	58.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	53.7	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

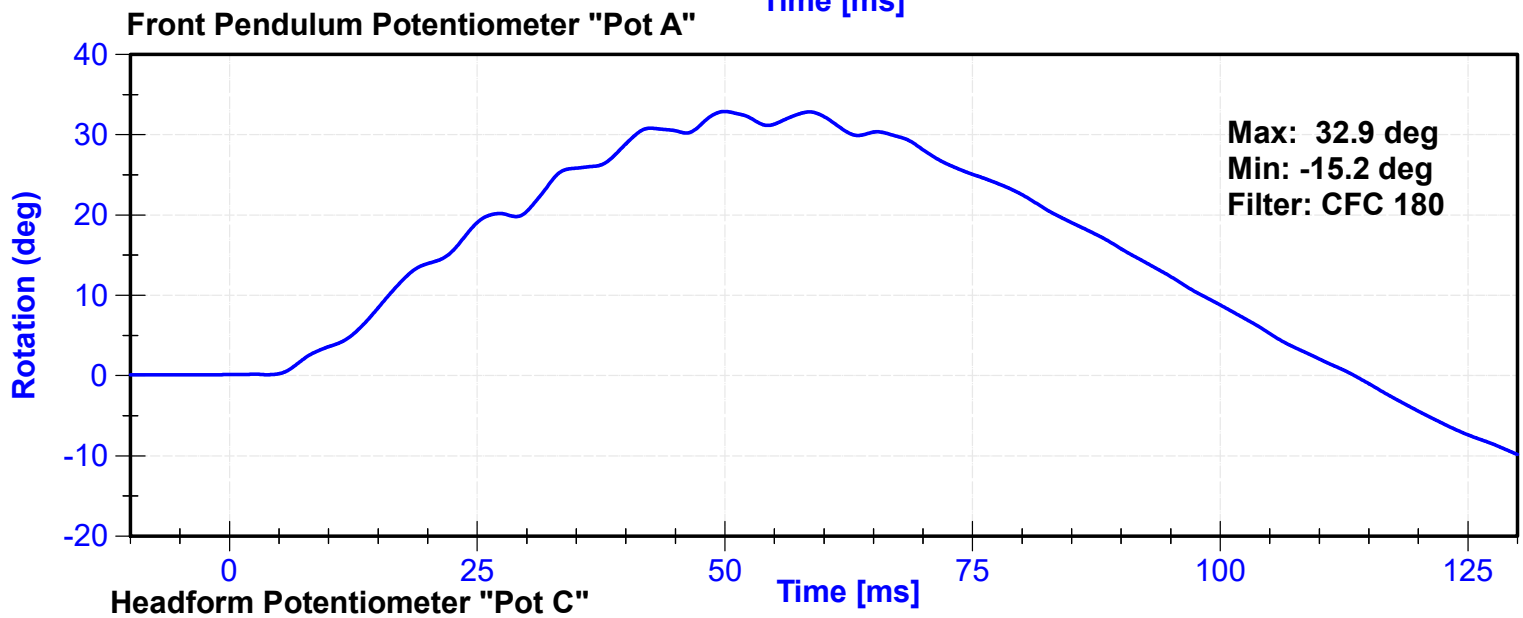
Transducer Calibrations

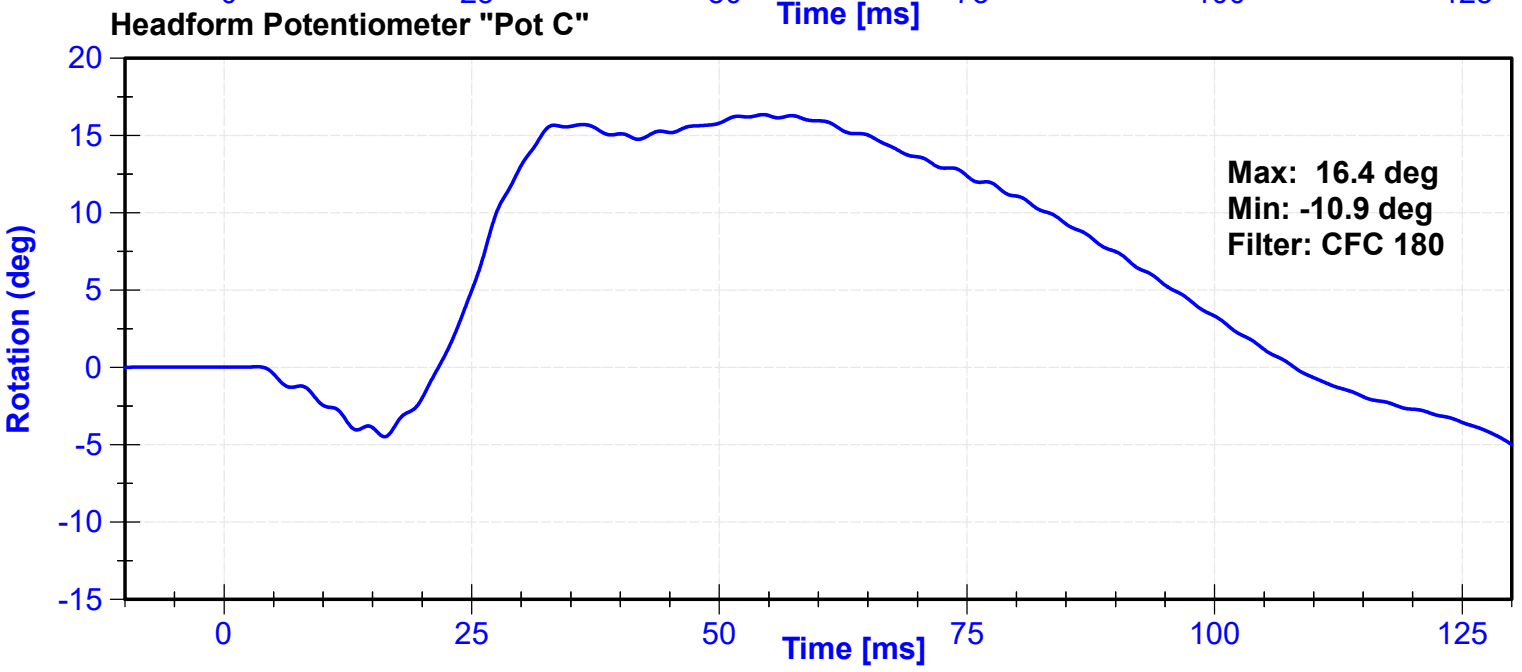
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



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


Neck Rotation
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]
Max: 49.0 deg
Min: -25.9 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: 32.9 deg
Min: -15.2 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: 16.4 deg
Min: -10.9 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

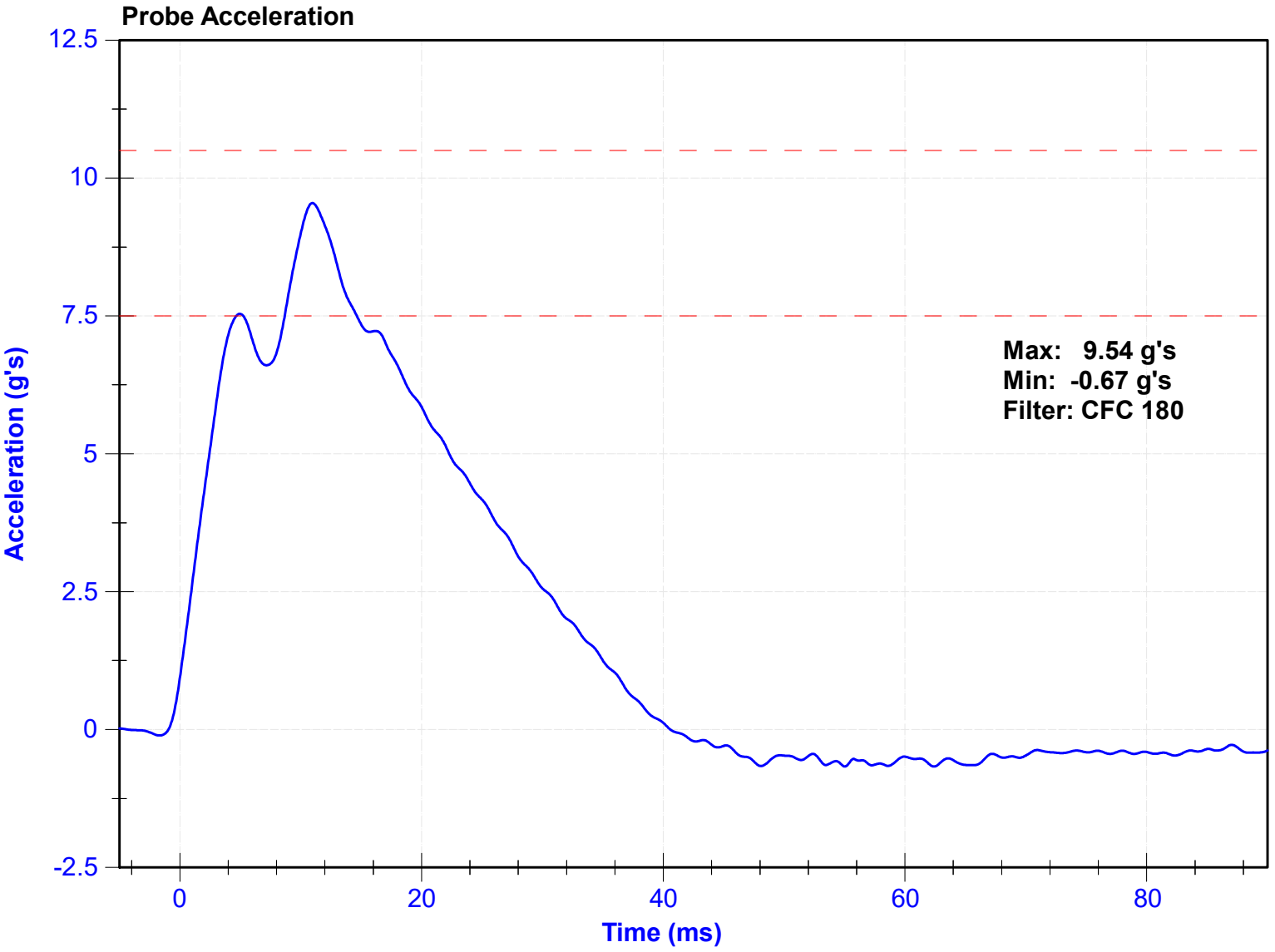
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	7.5	10.5	g's	9.54	Pass

Transducer Calibrations

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



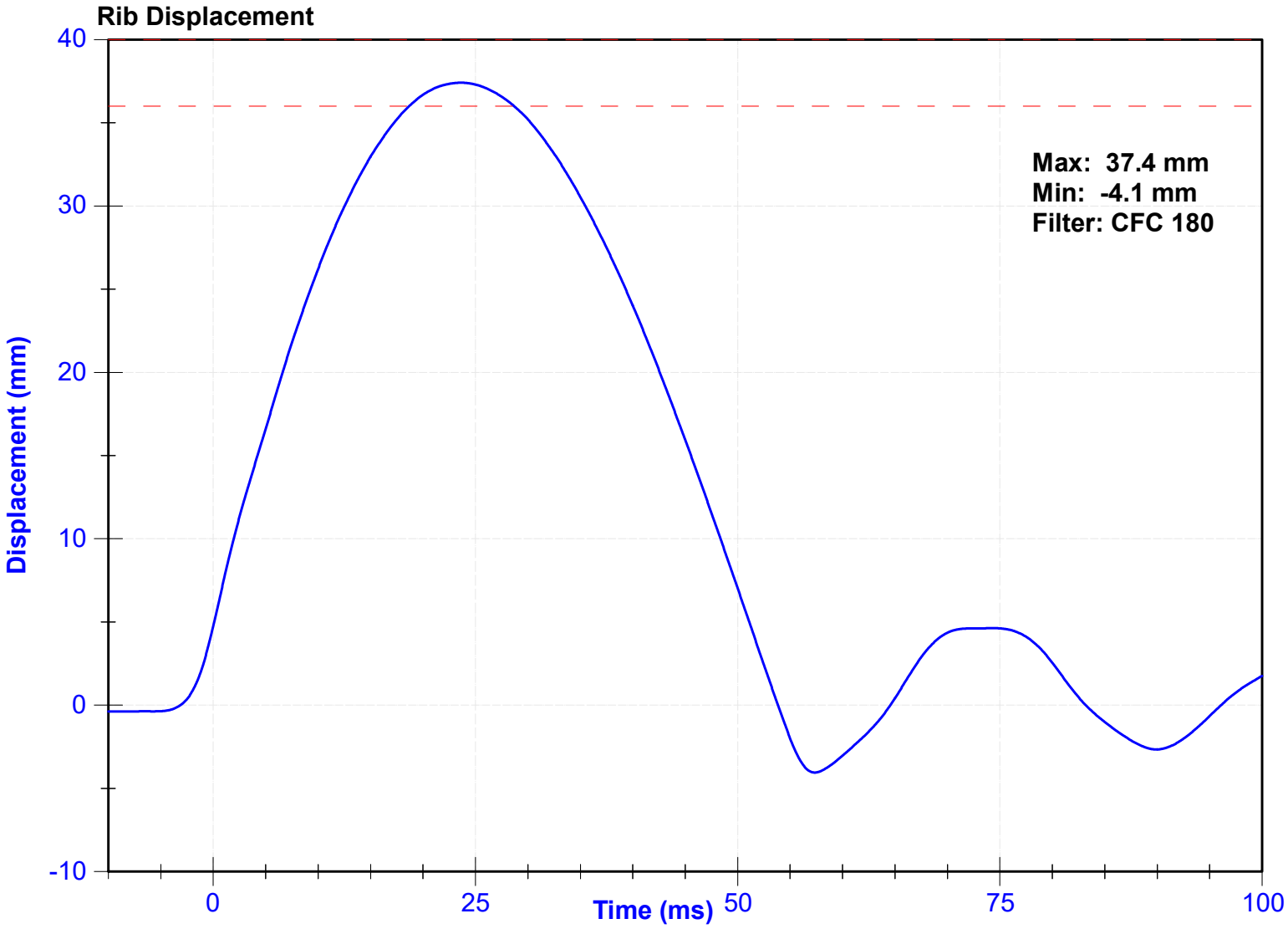
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	15	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

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



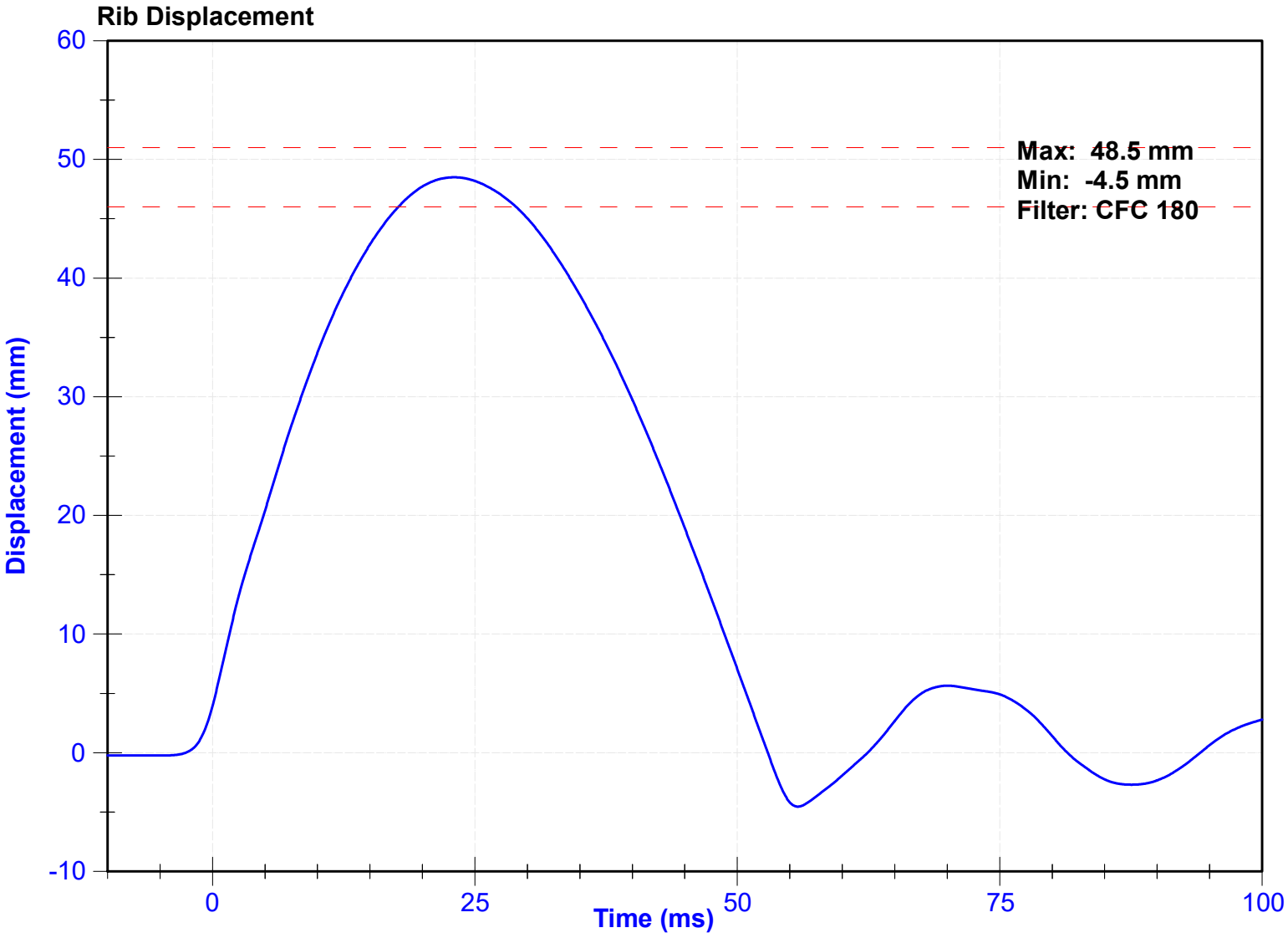
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	15	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

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



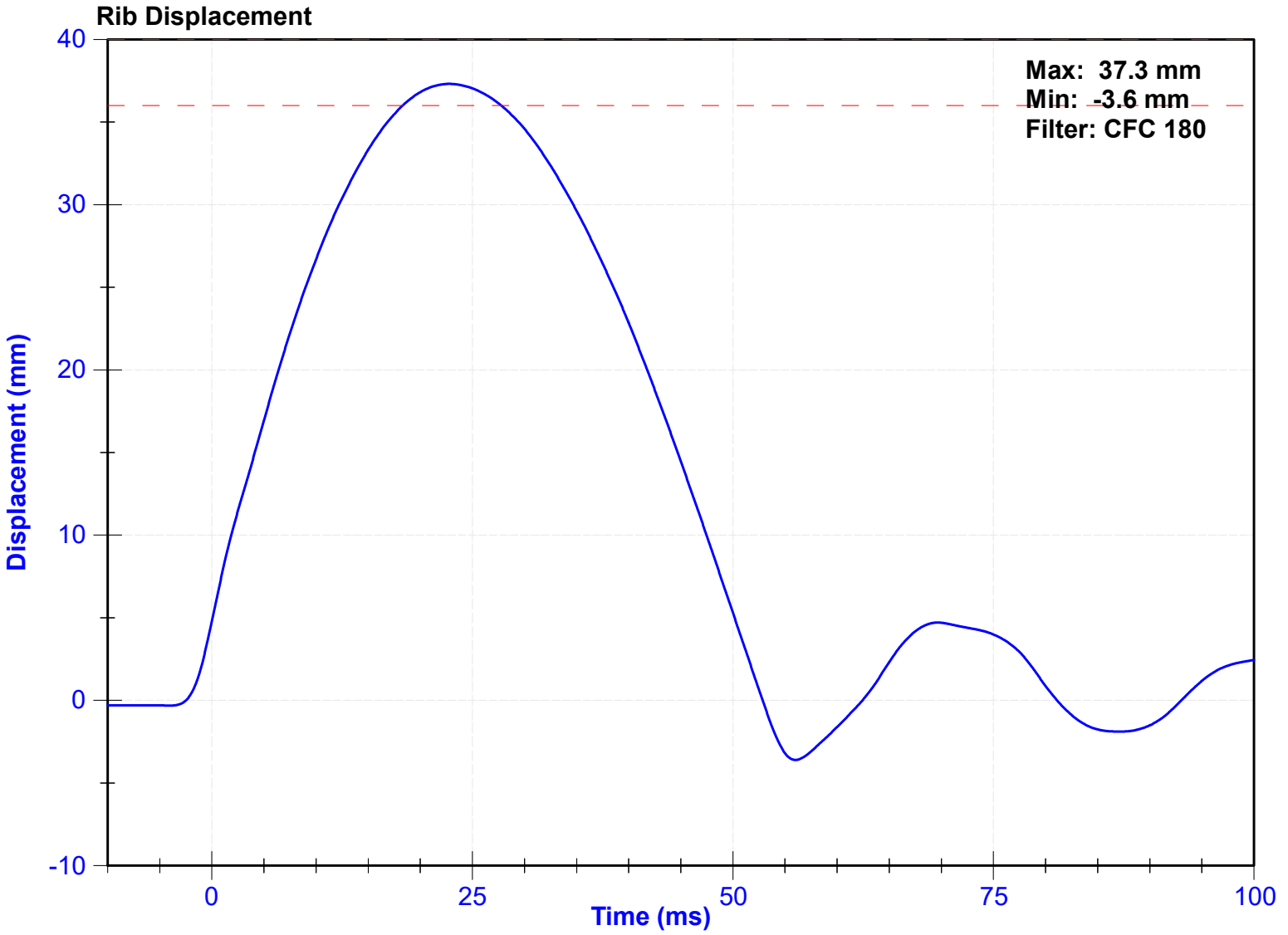
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	15	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

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



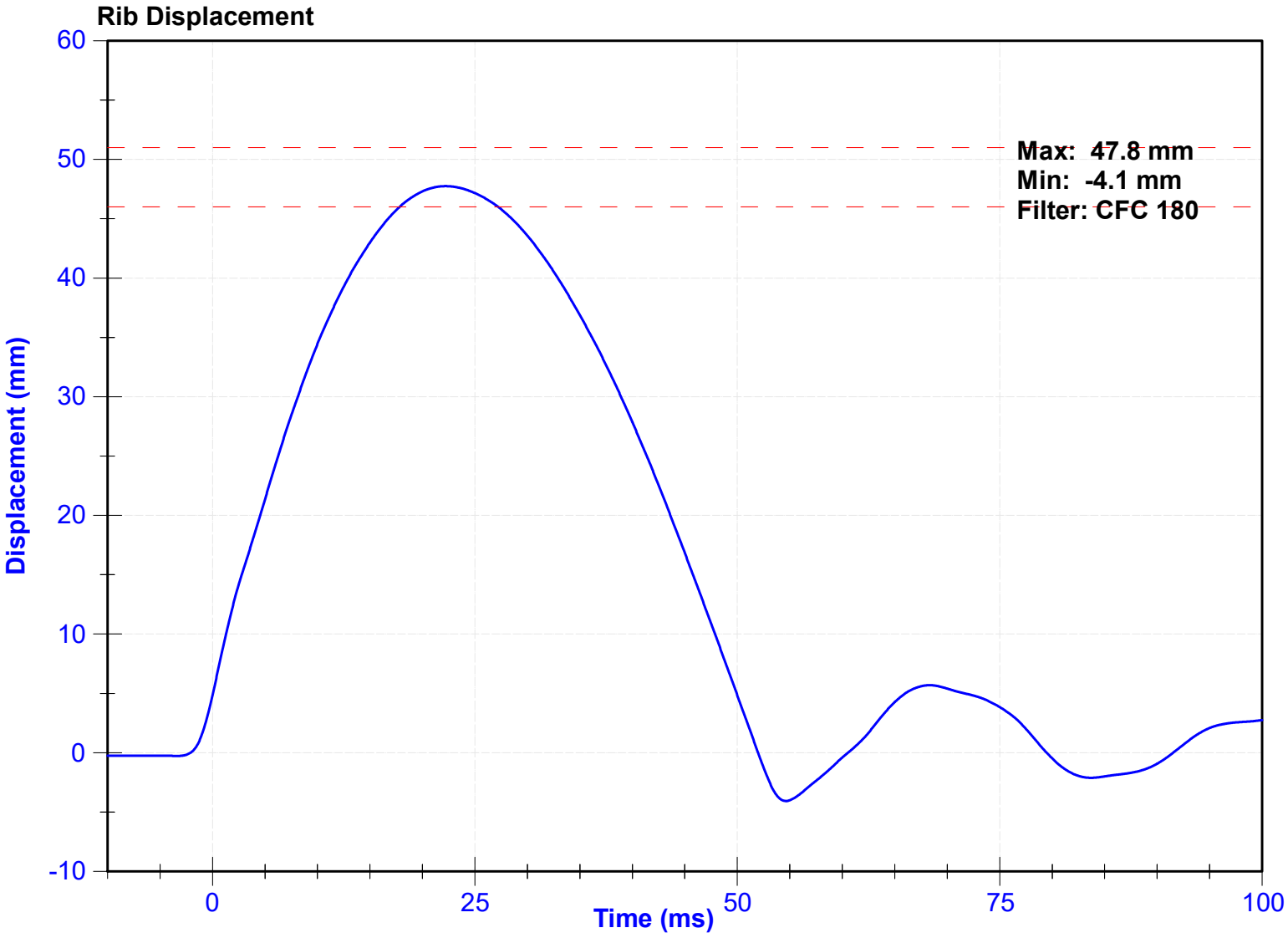
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	15	Pass
Rib Displacement	46	51	mm	47.8	Pass

Transducer Calibrations

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



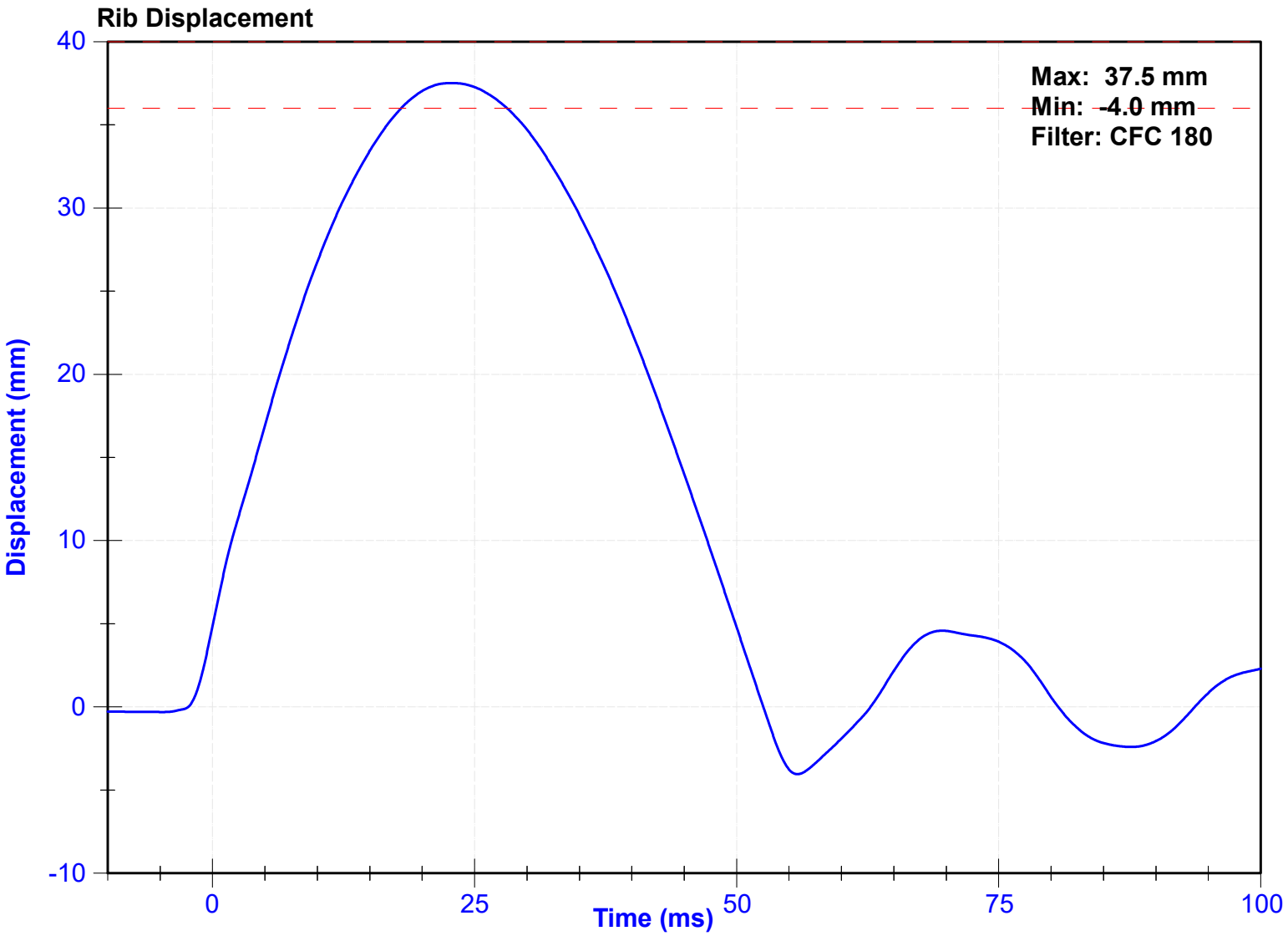
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	15	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

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



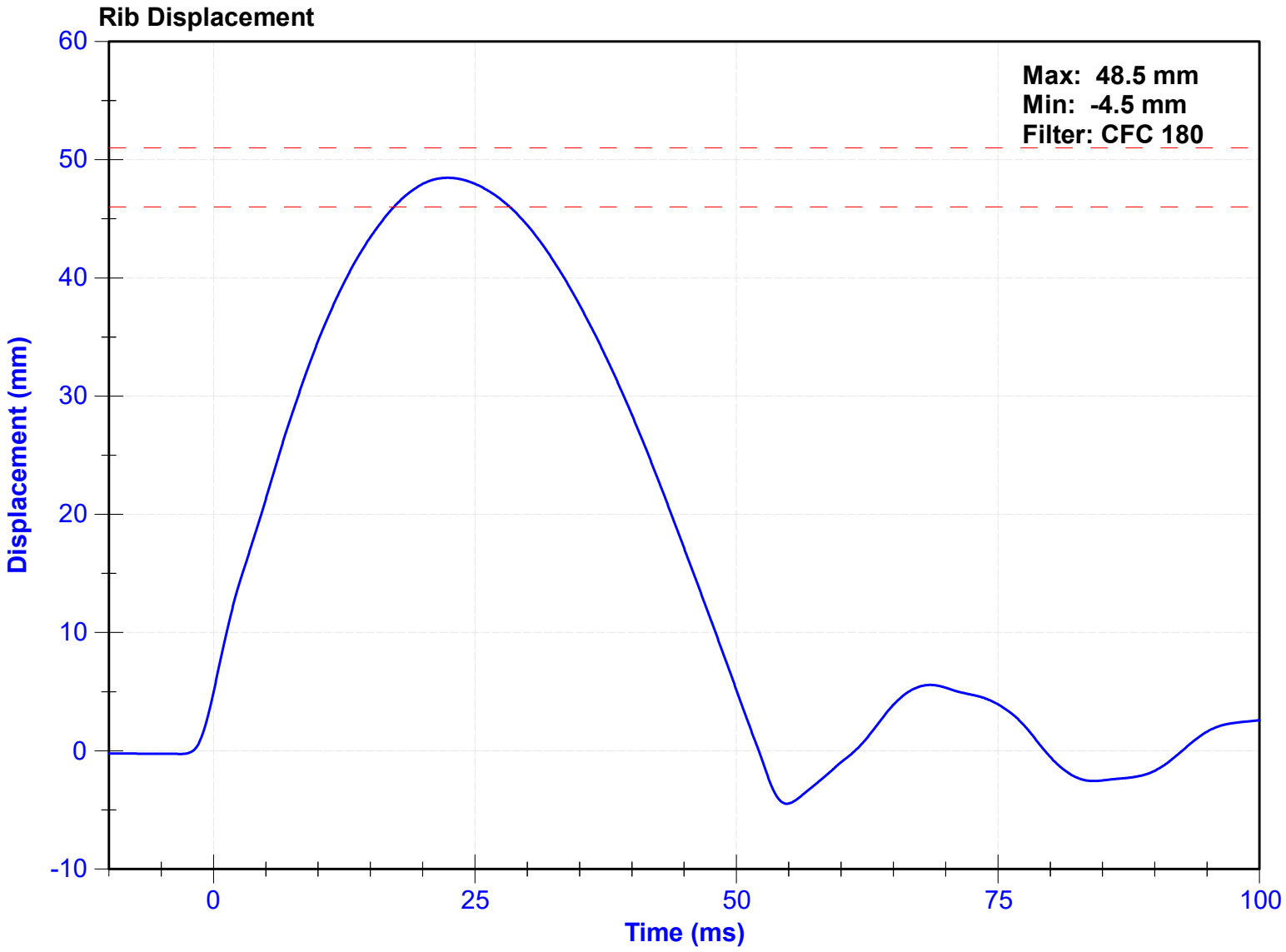
ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	15	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

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



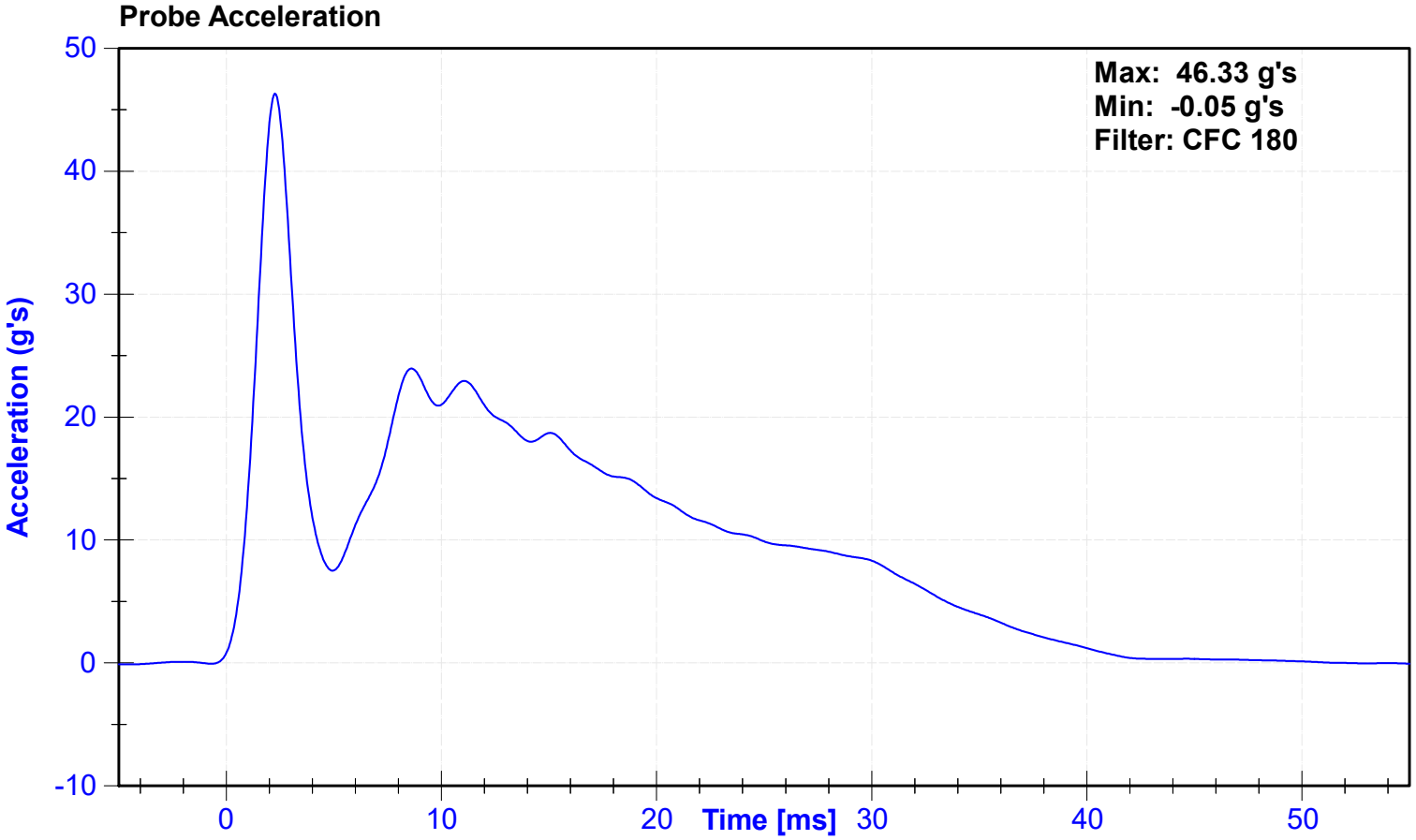
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

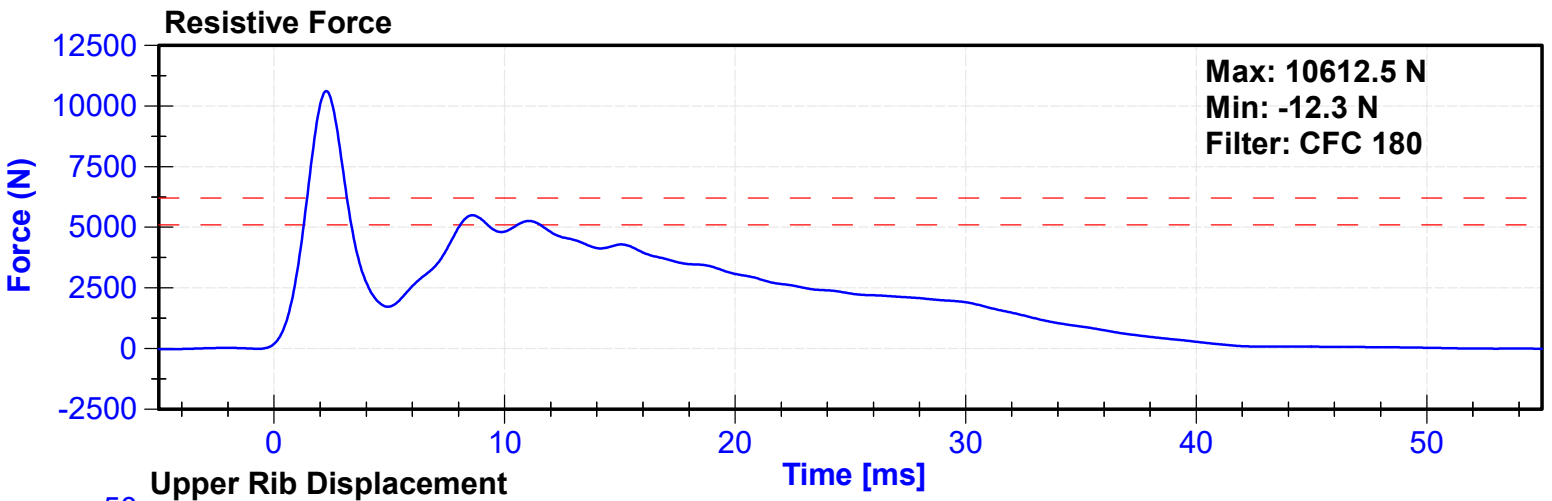
Results

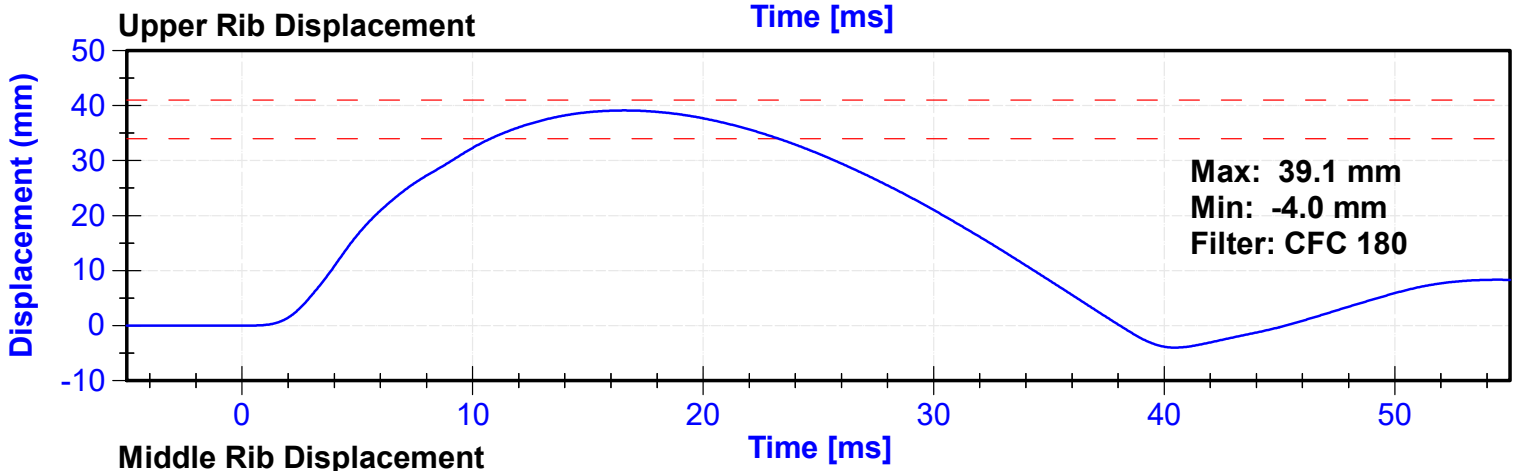
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	5488.5	Pass
Upper Thorax Rib Deflection	34	41	mm	39.1	Pass
Mid Thorax Rib Deflection	37	45	mm	41.7	Pass
Lower Thorax Rib Deflection	37	44	mm	39.4	Pass

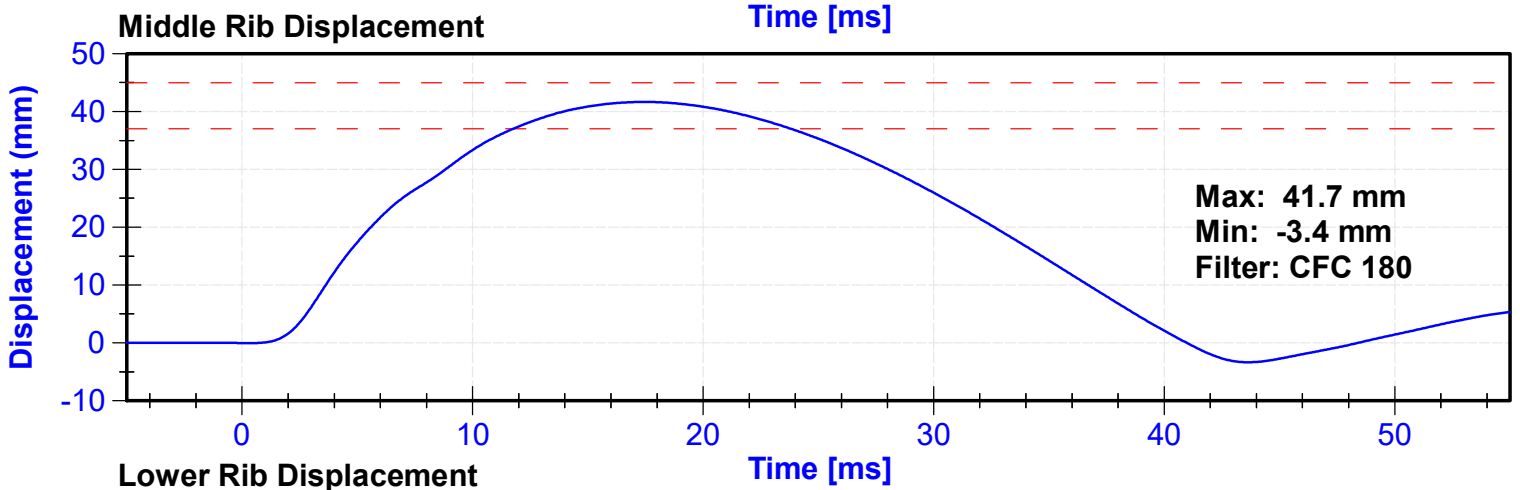
Transducer Calibrations

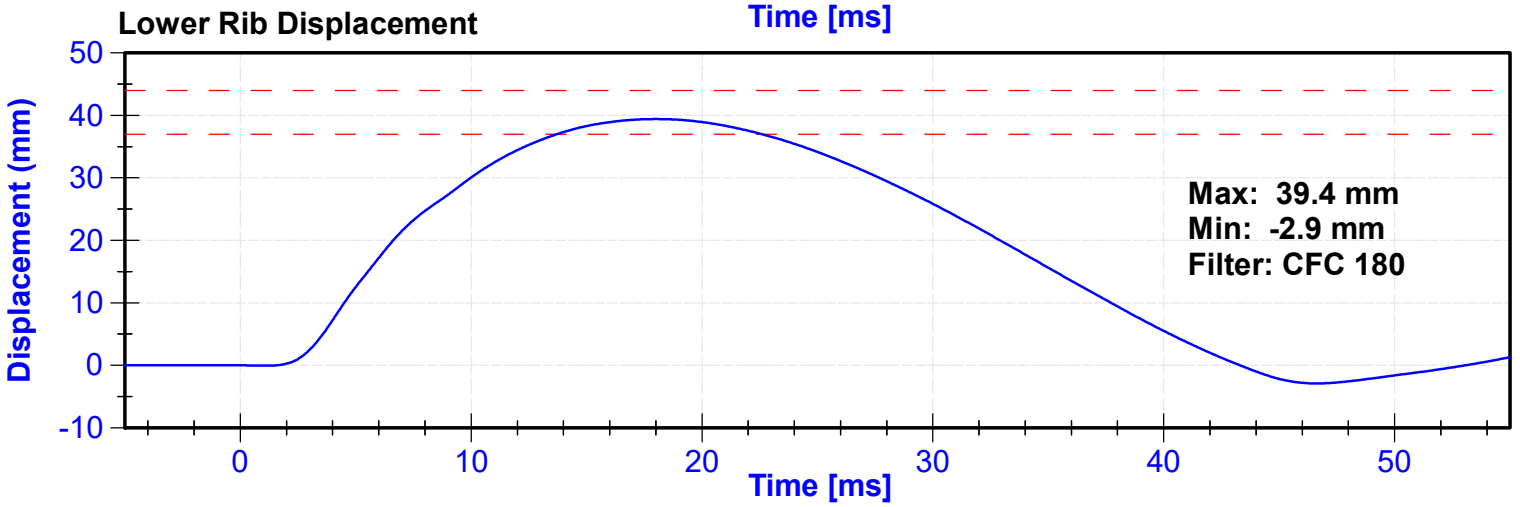
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Thorax Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023
Lower Thorax Rib Potentiometer	Honeywell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




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
Max: 10612.5 N
Min: -12.3 N
Filter: CFC 180
0
10
20
30
40
50
Time [ms]


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
Max: 39.1 mm
Min: -4.0 mm
Filter: CFC 180
0
10
20
30
40
50
Time [ms]


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
Max: 41.7 mm
Min: -3.4 mm
Filter: CFC 180
0
10
20
30
40
50
Time [ms]


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
Max: 39.4 mm
Min: -2.9 mm
Filter: CFC 180
0
10
20
30
40
50
Time [ms]

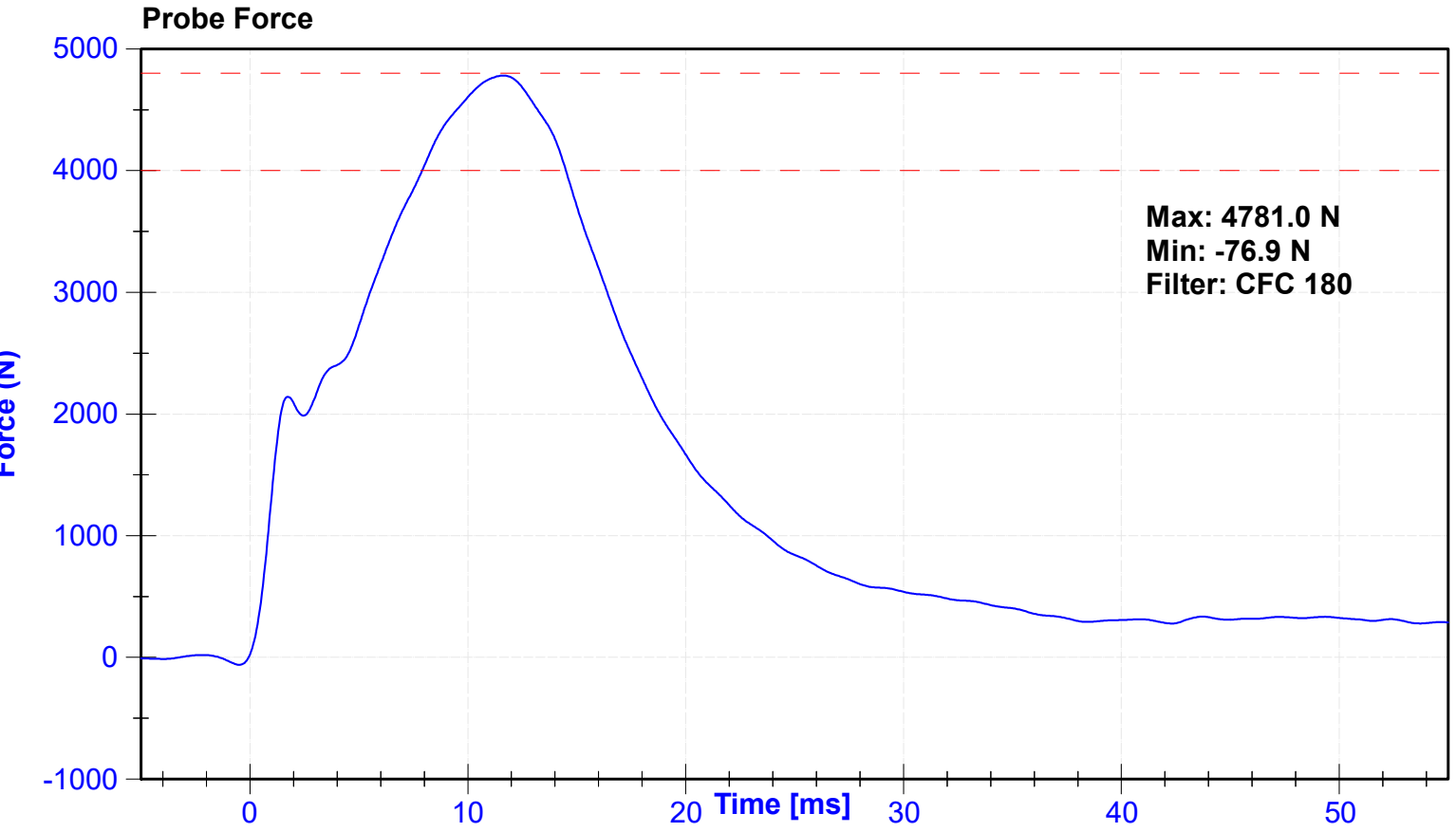
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

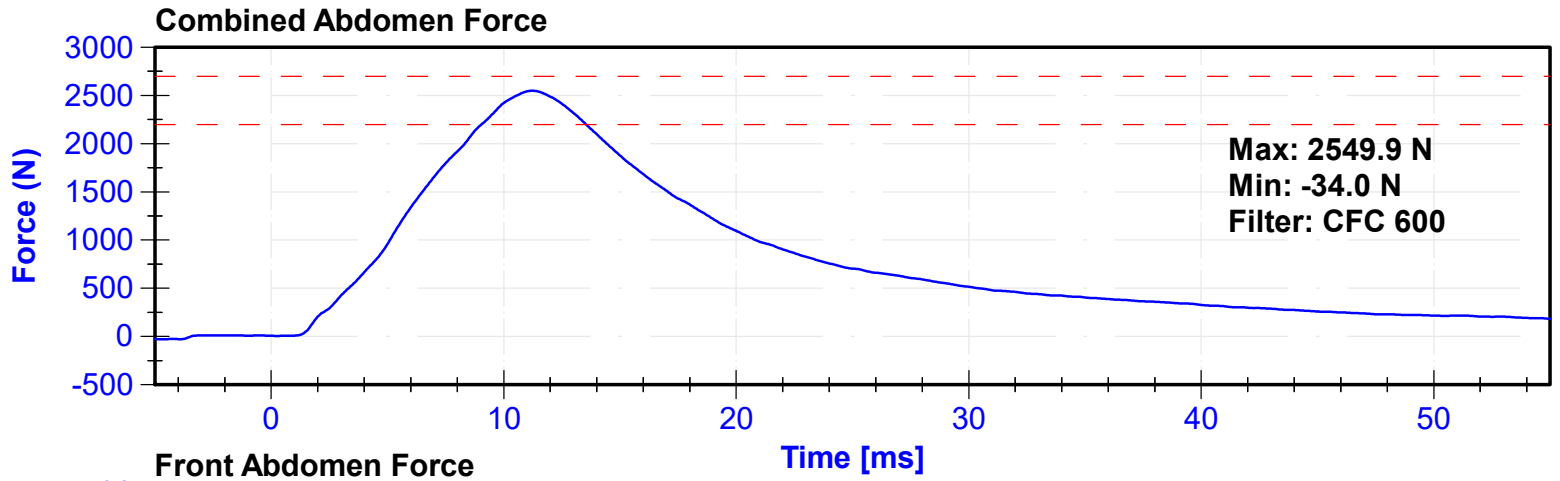
Results

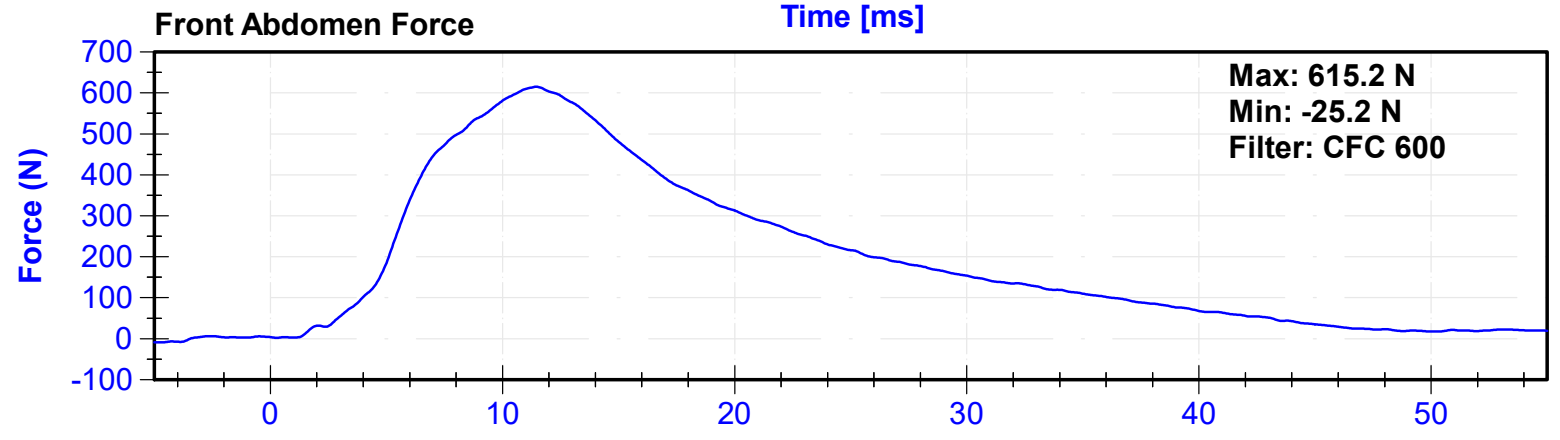
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	3.9	4.1	m/s	4.05	Pass
Combined Abdomen Force	2200	2700	N	2549.9	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.20	Pass
Resistive Probe Force	4000	4800	N	4781.0	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.60	Pass

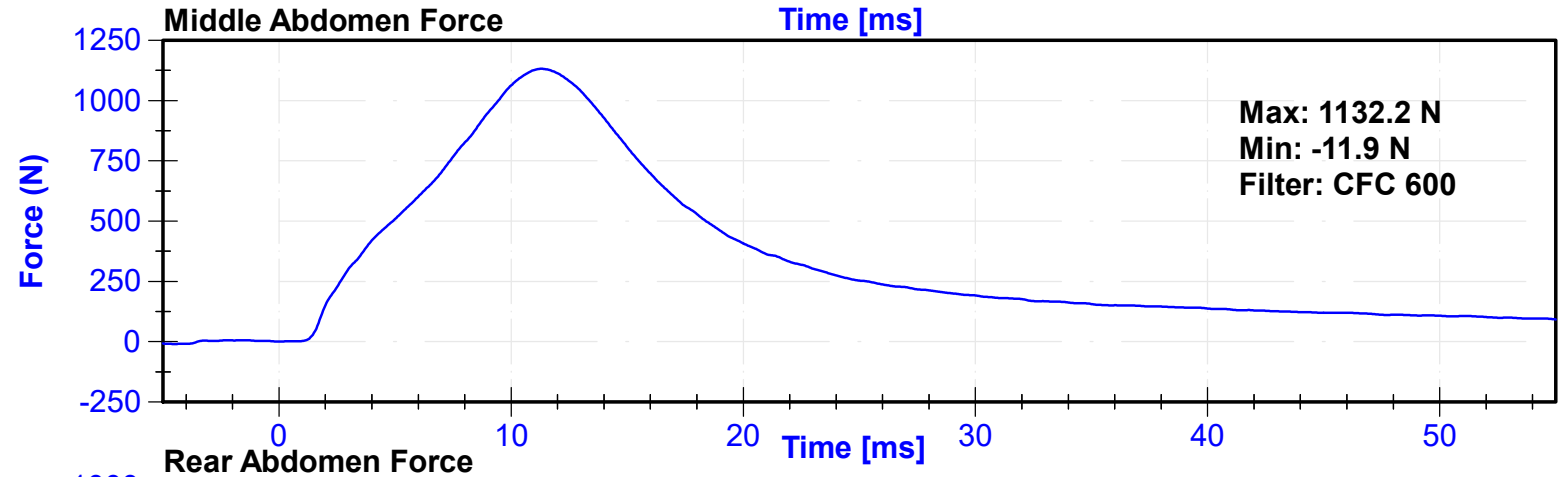
Transducer Calibrations

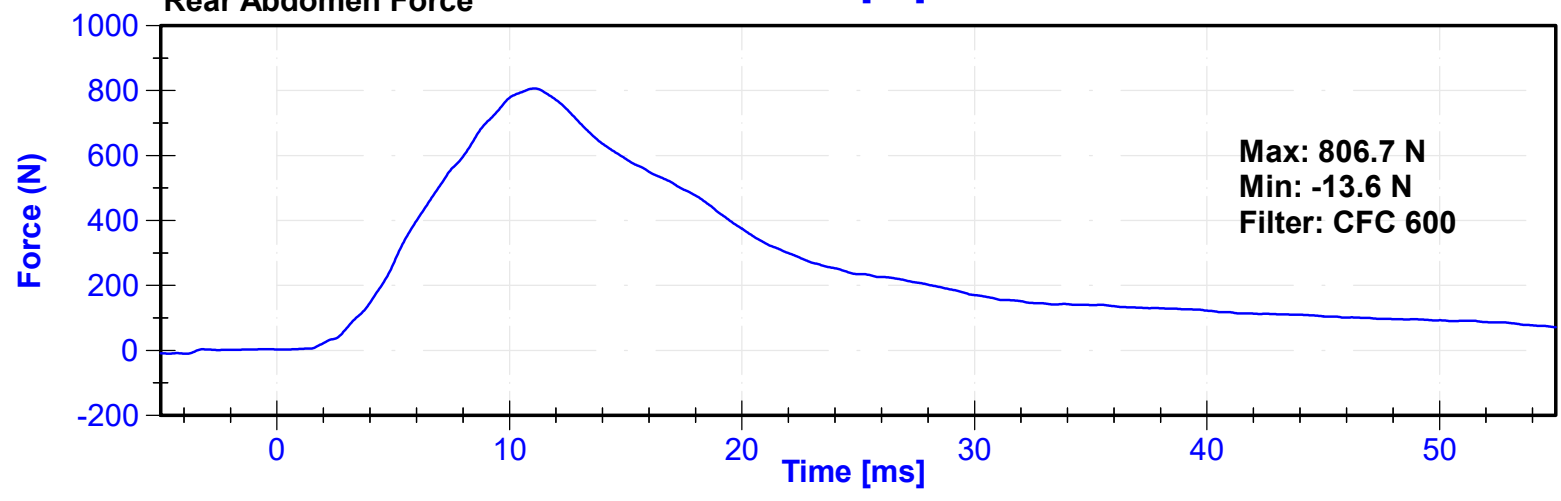
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2549.9 N
Min: -34.0 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 615.2 N
Min: -25.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1132.2 N
Min: -11.9 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 806.7 N
Min: -13.6 N
Filter: CFC 600

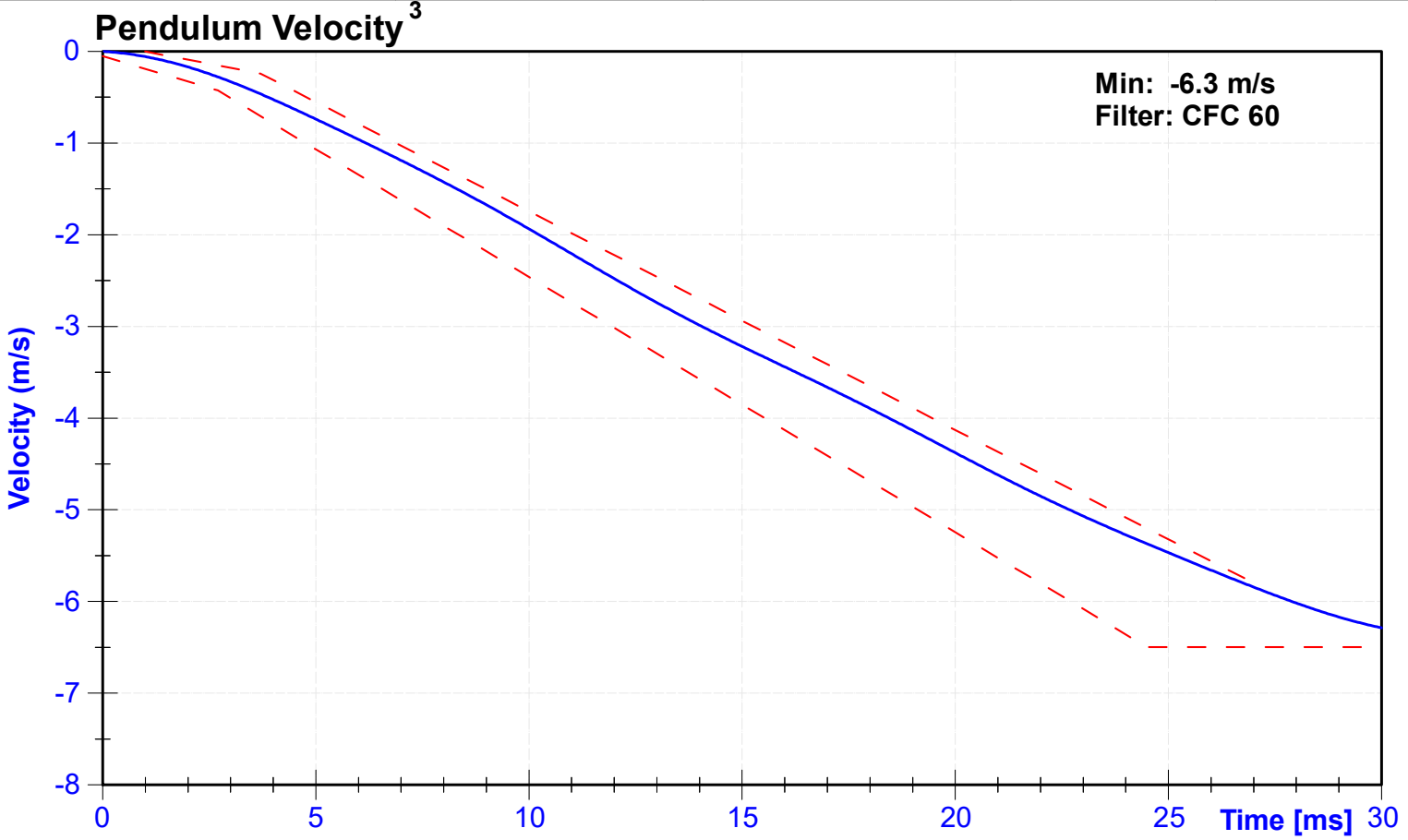
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

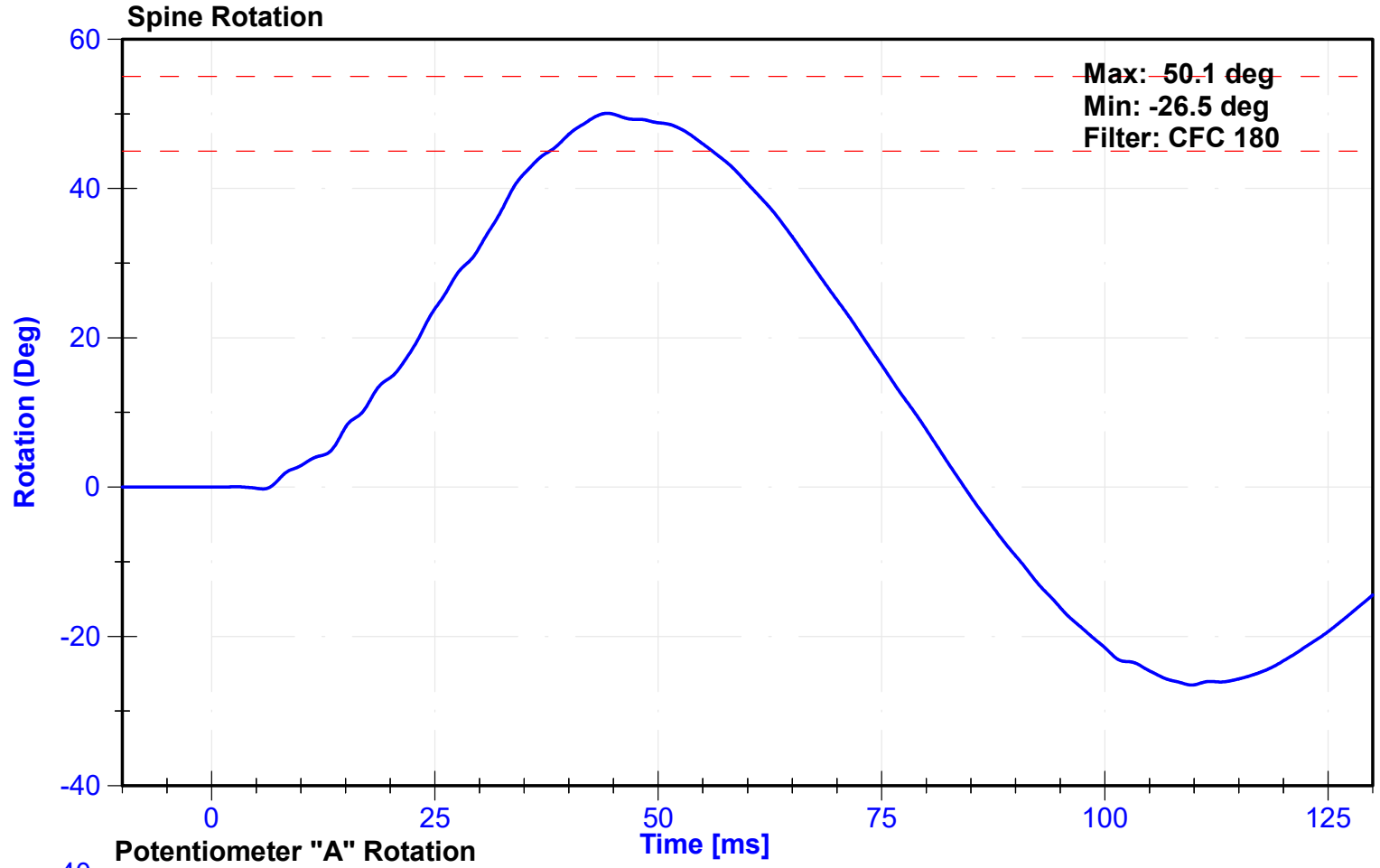
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	5.95	6.15	m/s	6.049	Pass
Lateral Spine Rotation	45	55	deg	50.1	Pass
Time at Maximum Rotation	39	53	ms	44.3	Pass
Time of Decay to Zero Degrees	37	57	ms	40.0	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

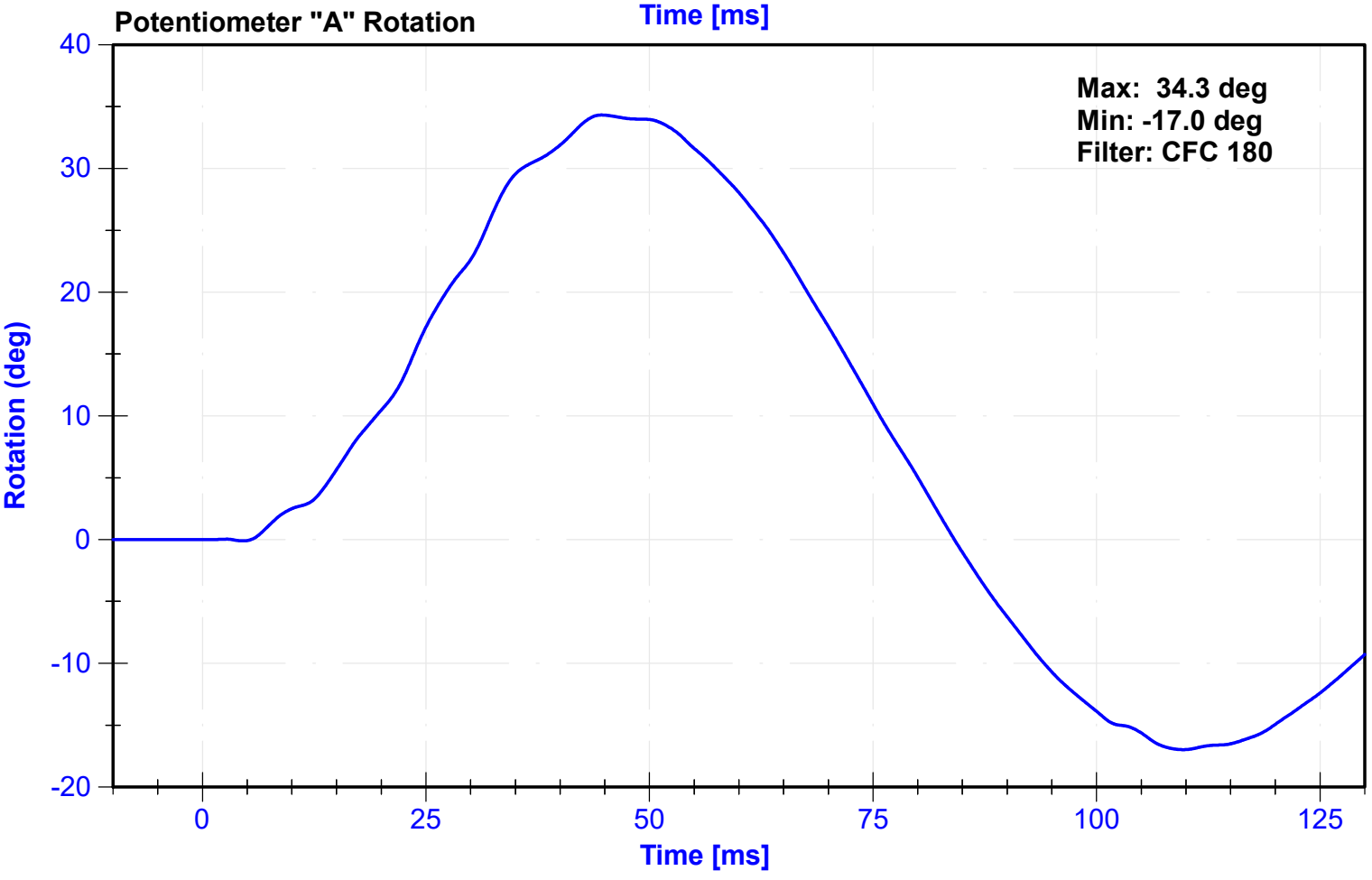
Transducer Calibrations

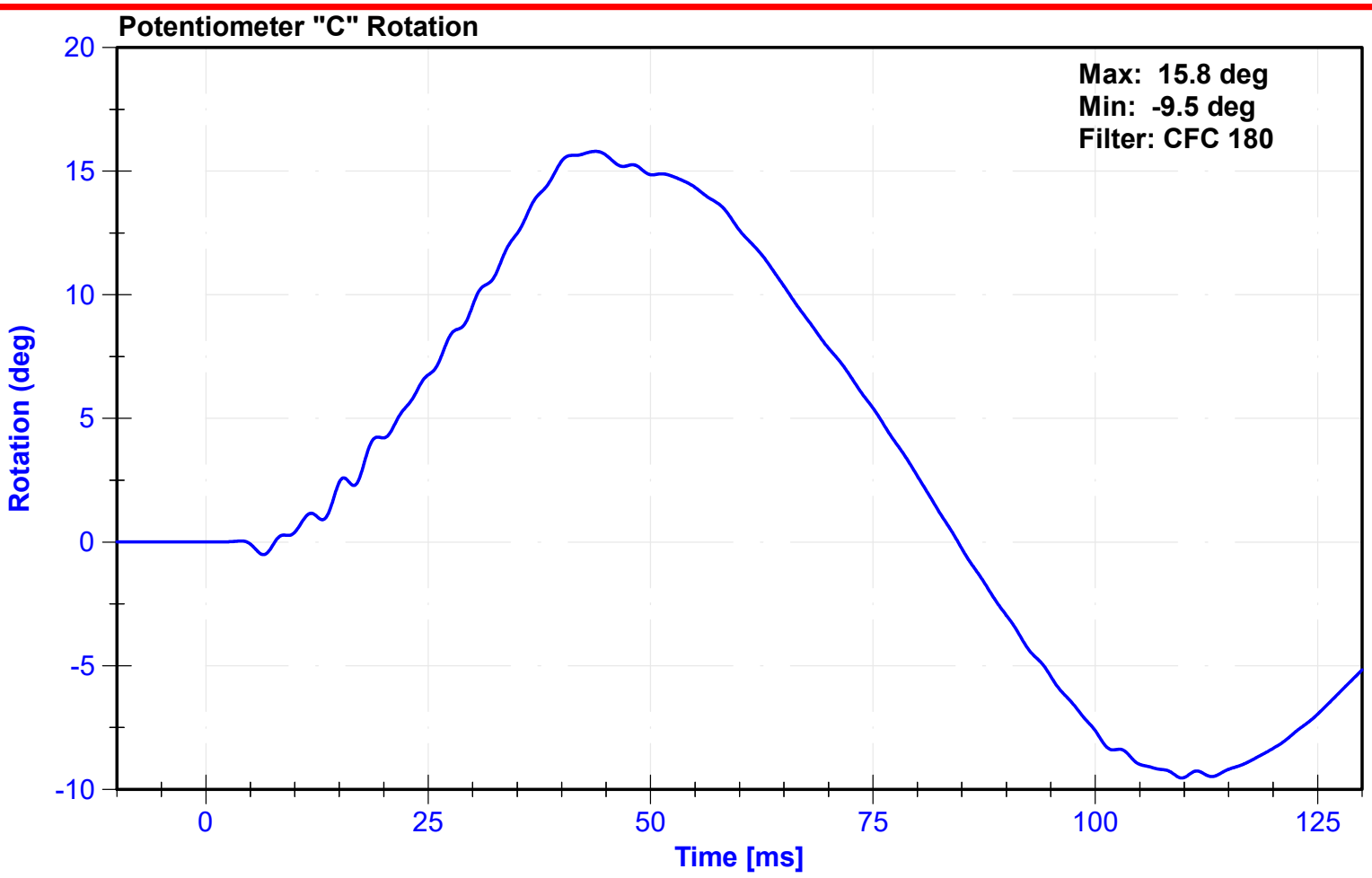
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



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


Spine Rotation
Max: 50.1 deg
Min: -26.5 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 34.3 deg
Min: -17.0 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

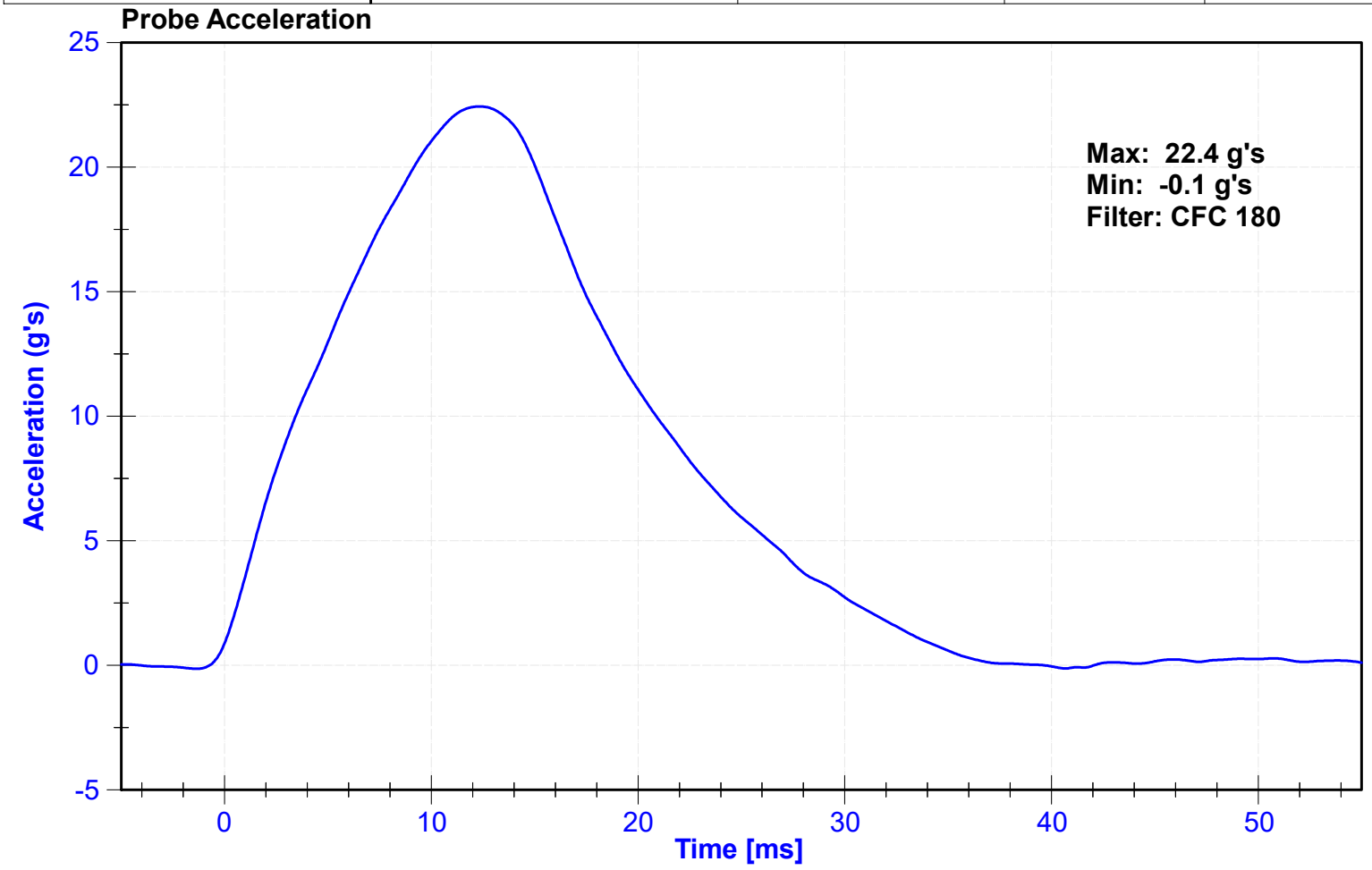
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

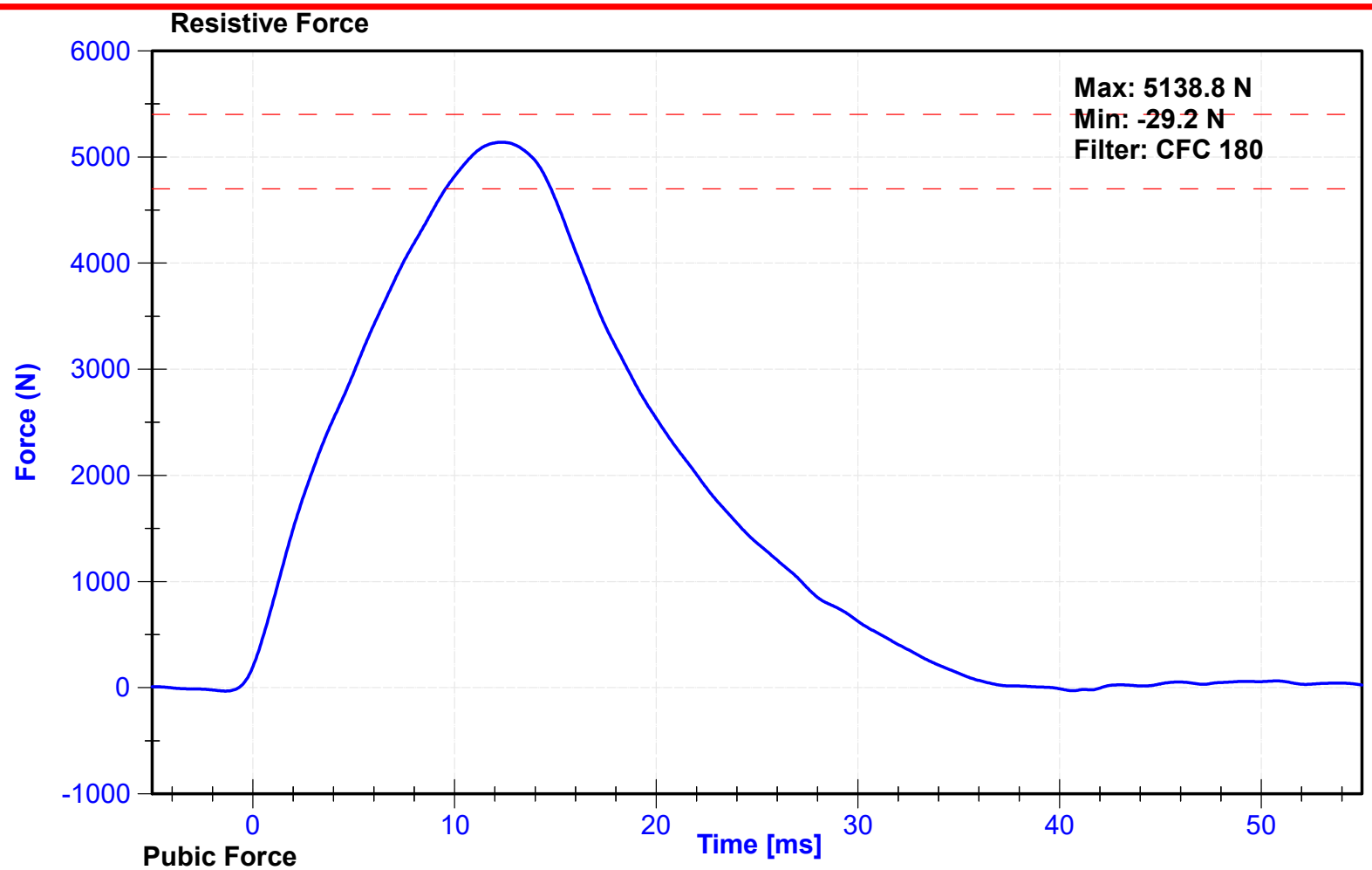
Results

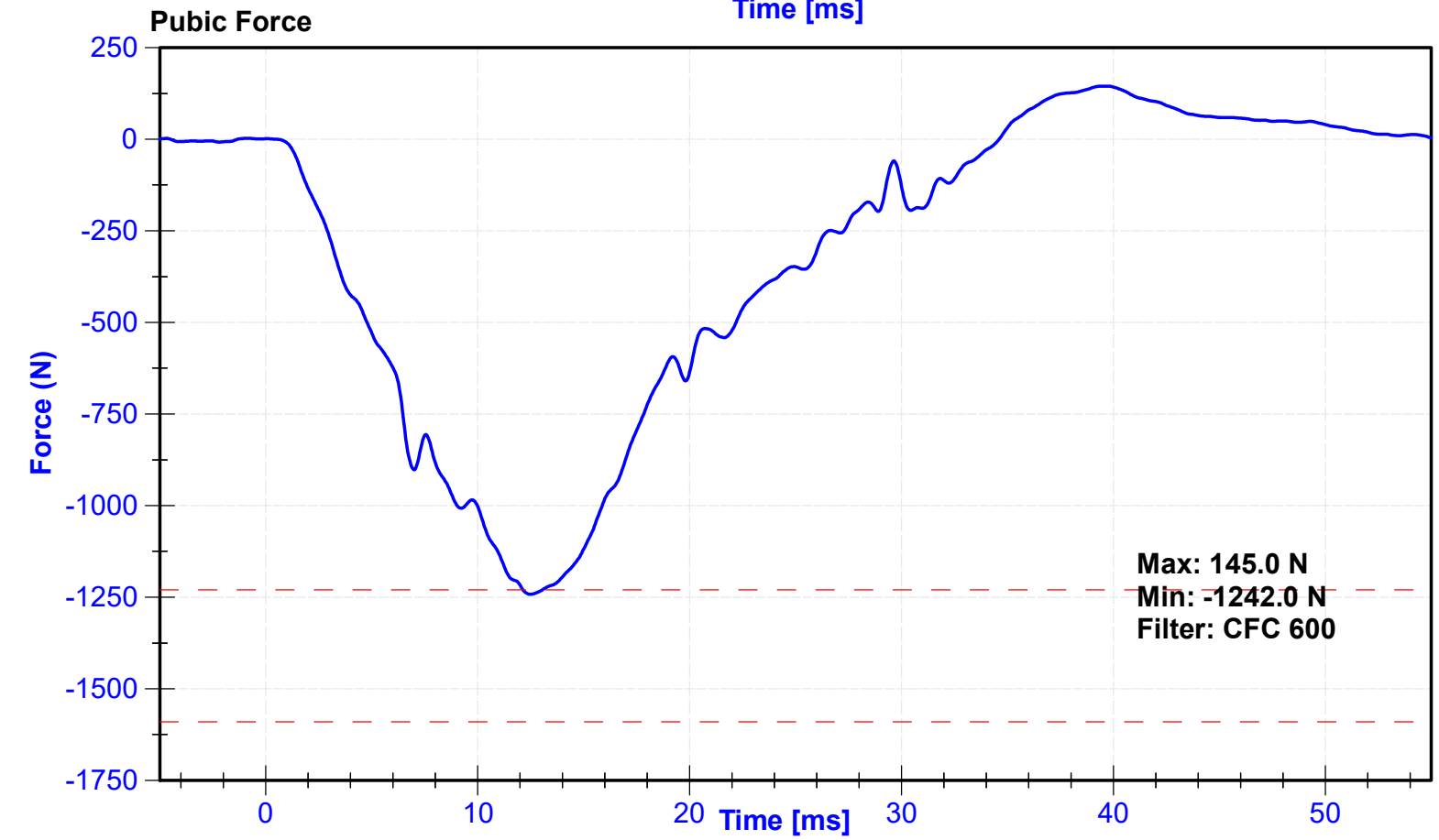
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Resistive Force	4700	5400	N	5138.8	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.35	Pass
Pubic Force	-1590	-1230	N	-1242.0	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.45	Pass

Transducer Calibrations

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




Resistive Force
Max: 5138.8 N
Min: -29.2 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Pubic Force
Max: 145.0 N
Min: -1242.0 N
Filter: CFC 600
Force (N)
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
0
10
20
30
40
50
Time [ms]

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

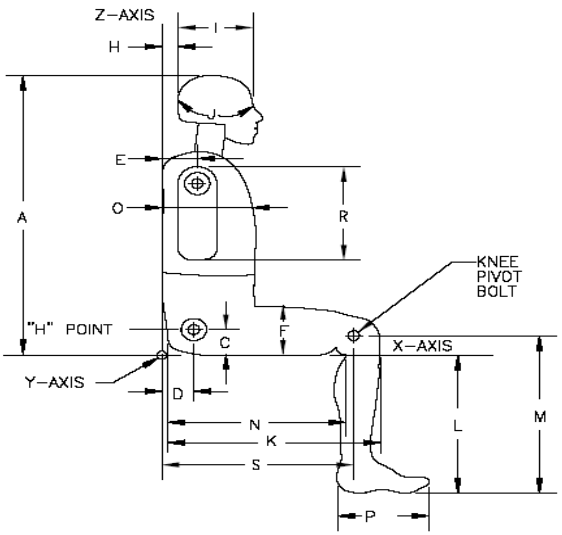
SERIAL NO:DG8012

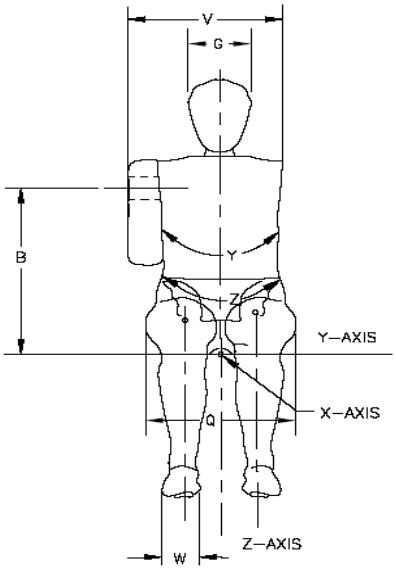
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 02/03/2023

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	784	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	82	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	183	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	402	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	201	Pass
P	Foot Length	216	232	226	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	780	Pass

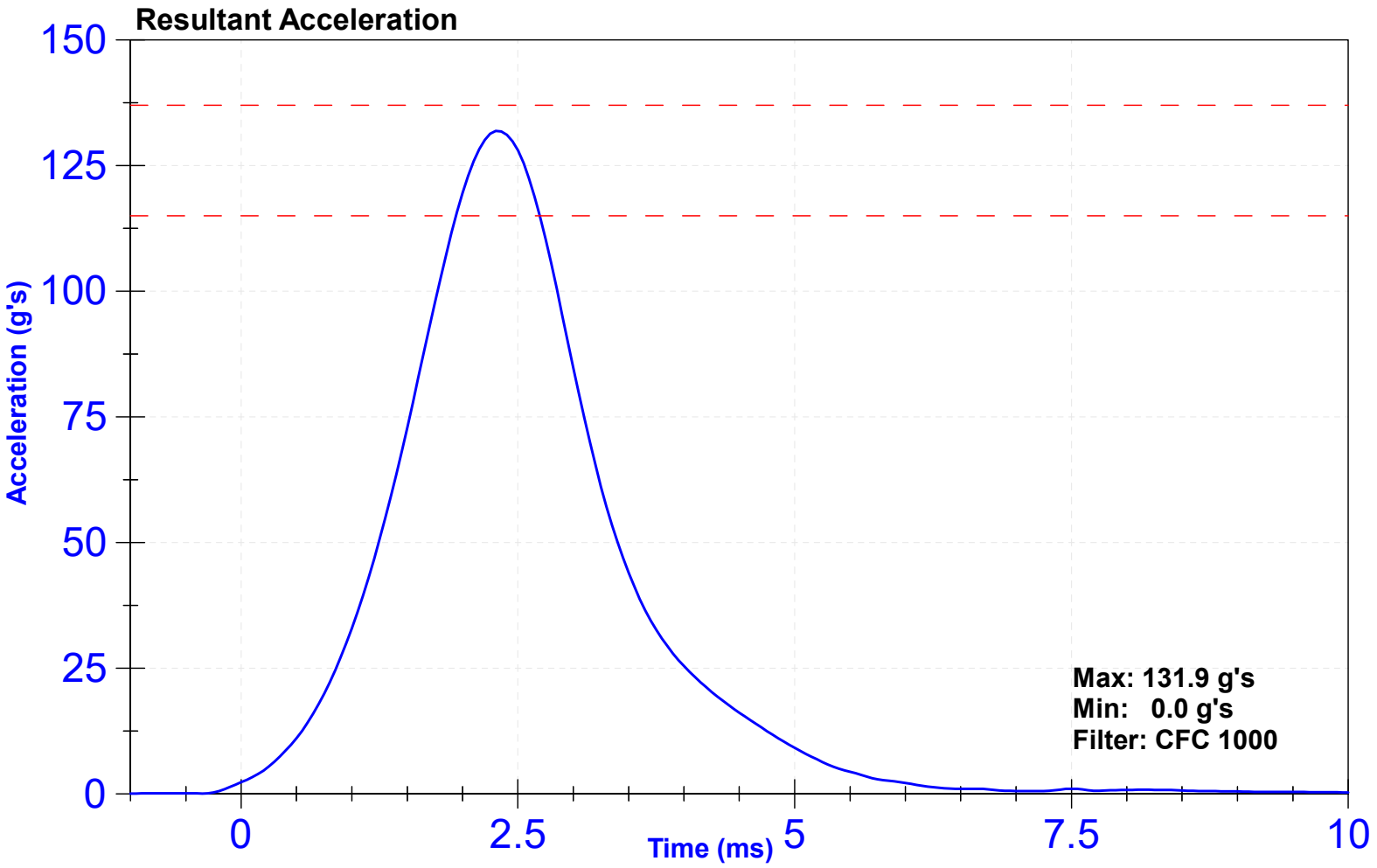
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

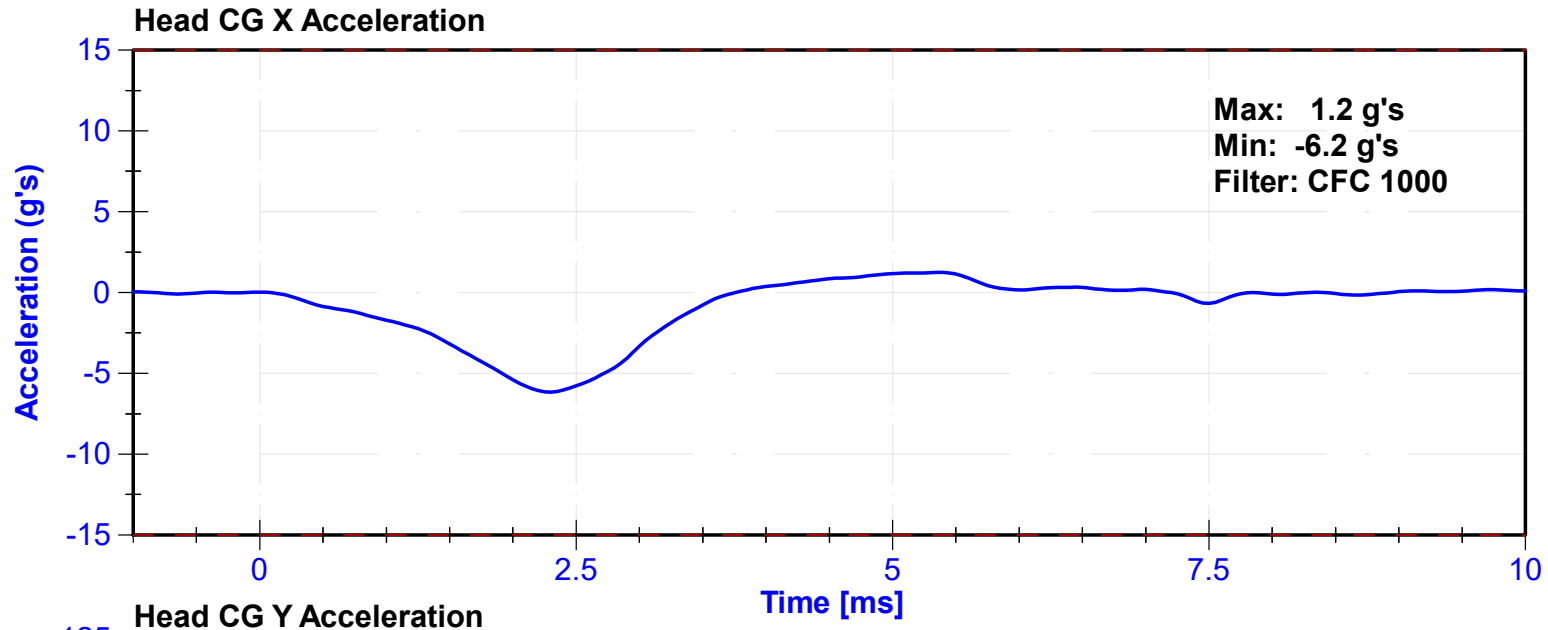
Results

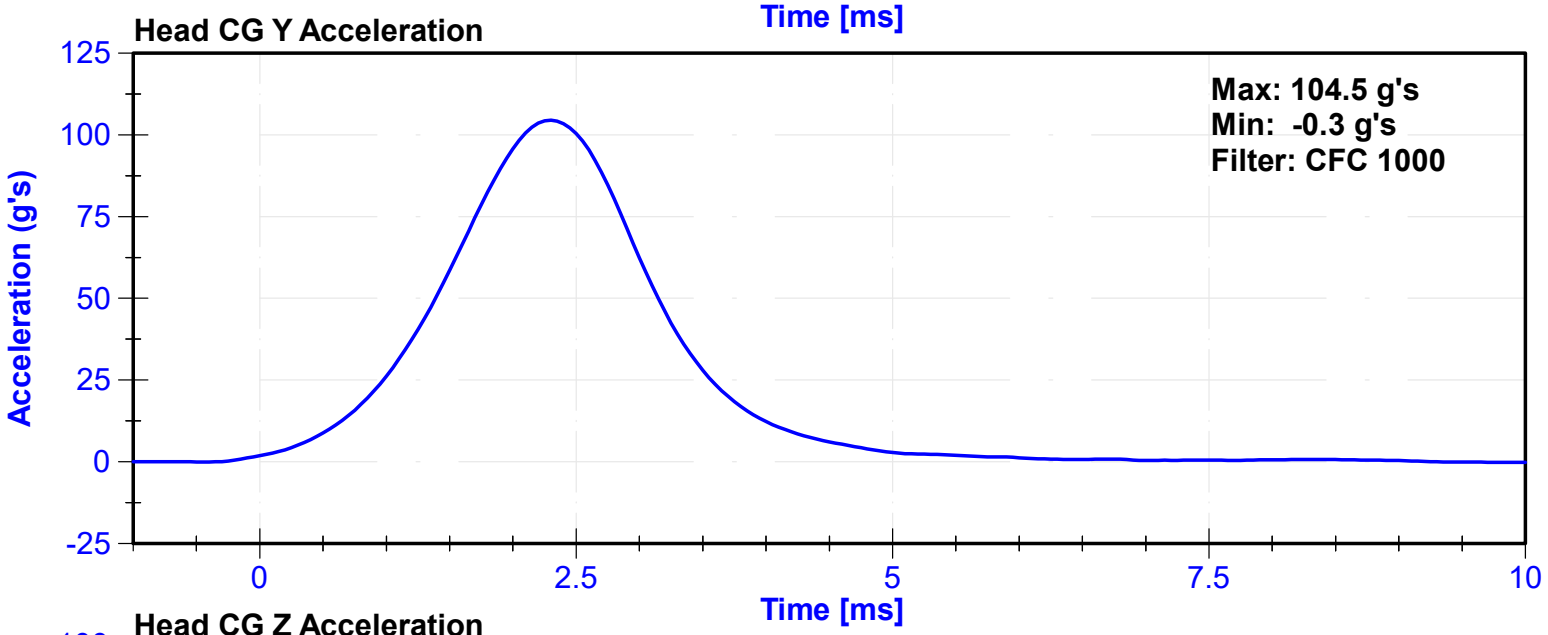
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	15.5	Pass
Resultant Acceleration	115	137	g's	131.9	Pass
Oscillation	0	15	%	0.7	Pass
Fore-Aft Acceleration	-15	15	g's	-6.2	Pass

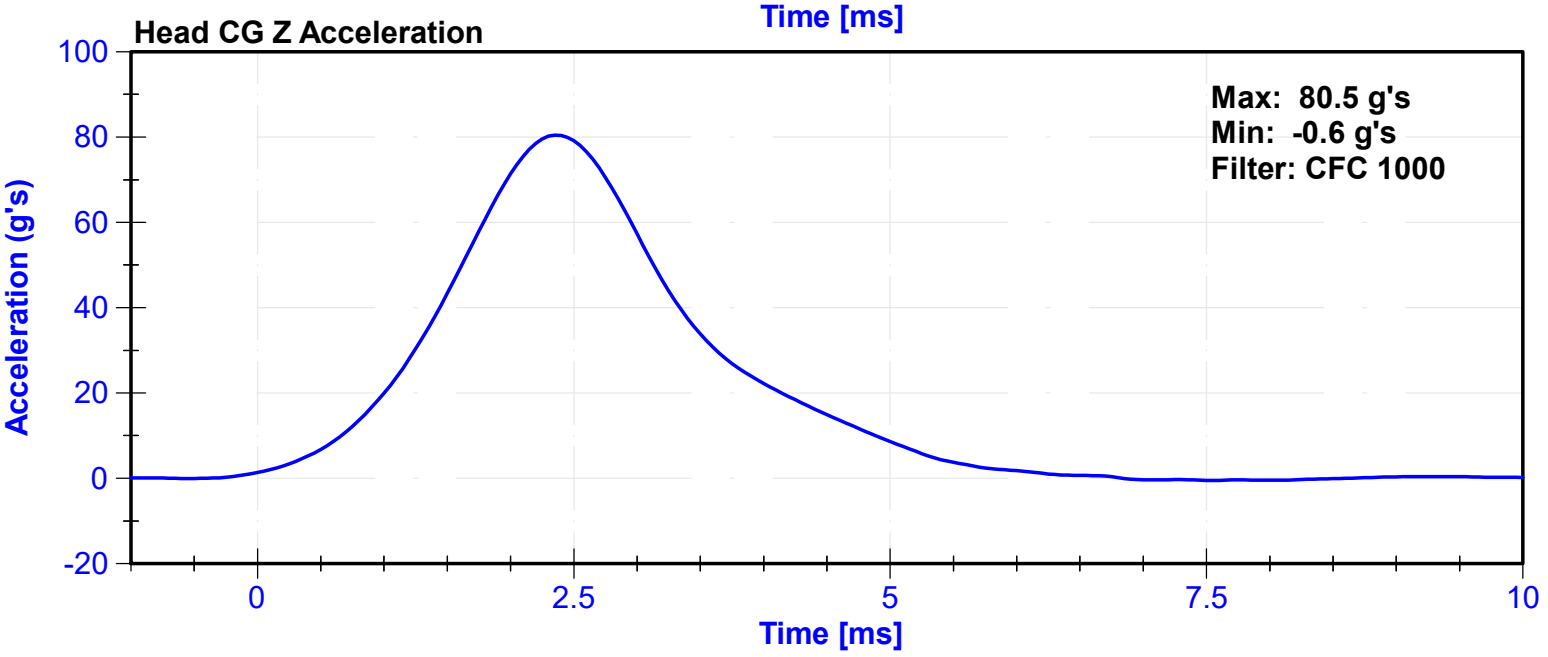
Transducer Calibrations

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




Head CG X Acceleration
Max: 1.2 g's
Min: -6.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 104.5 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 80.5 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

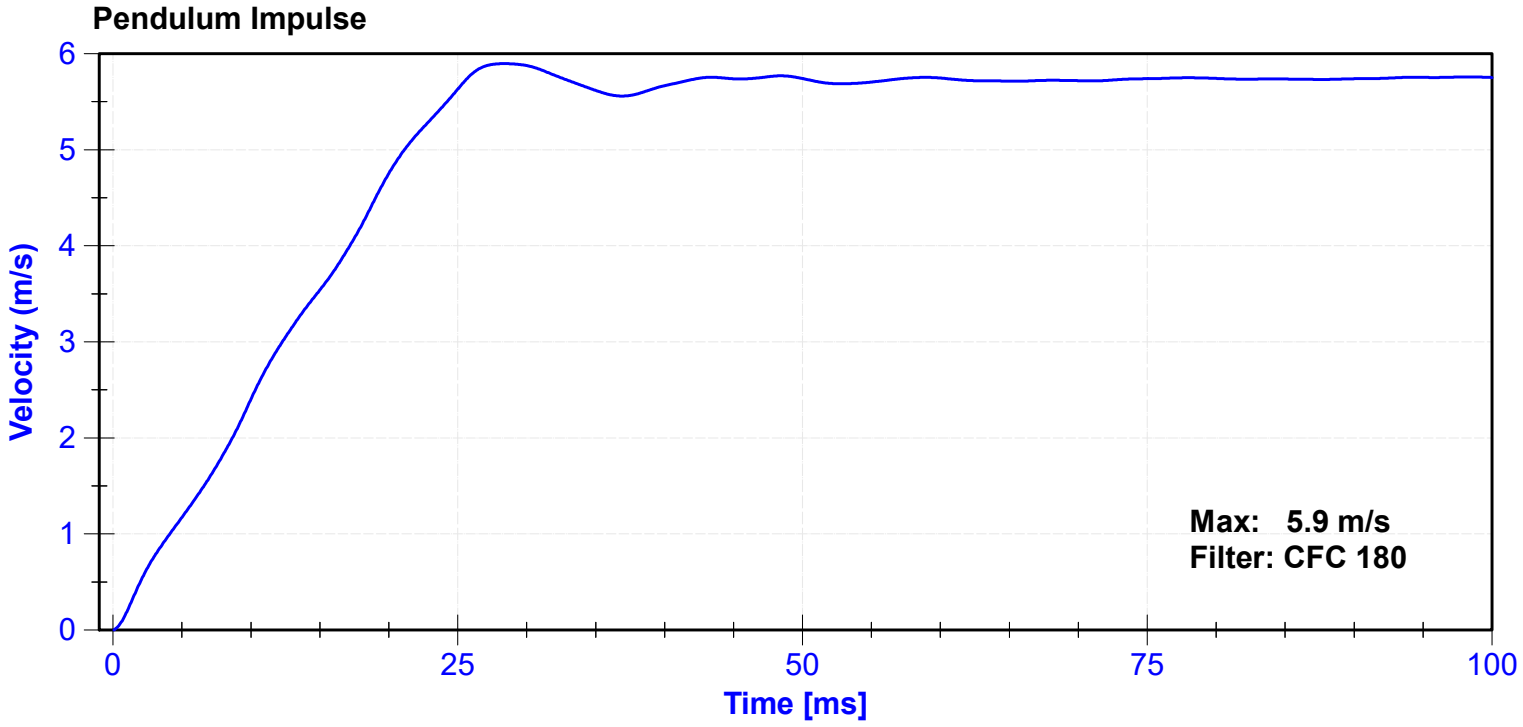
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

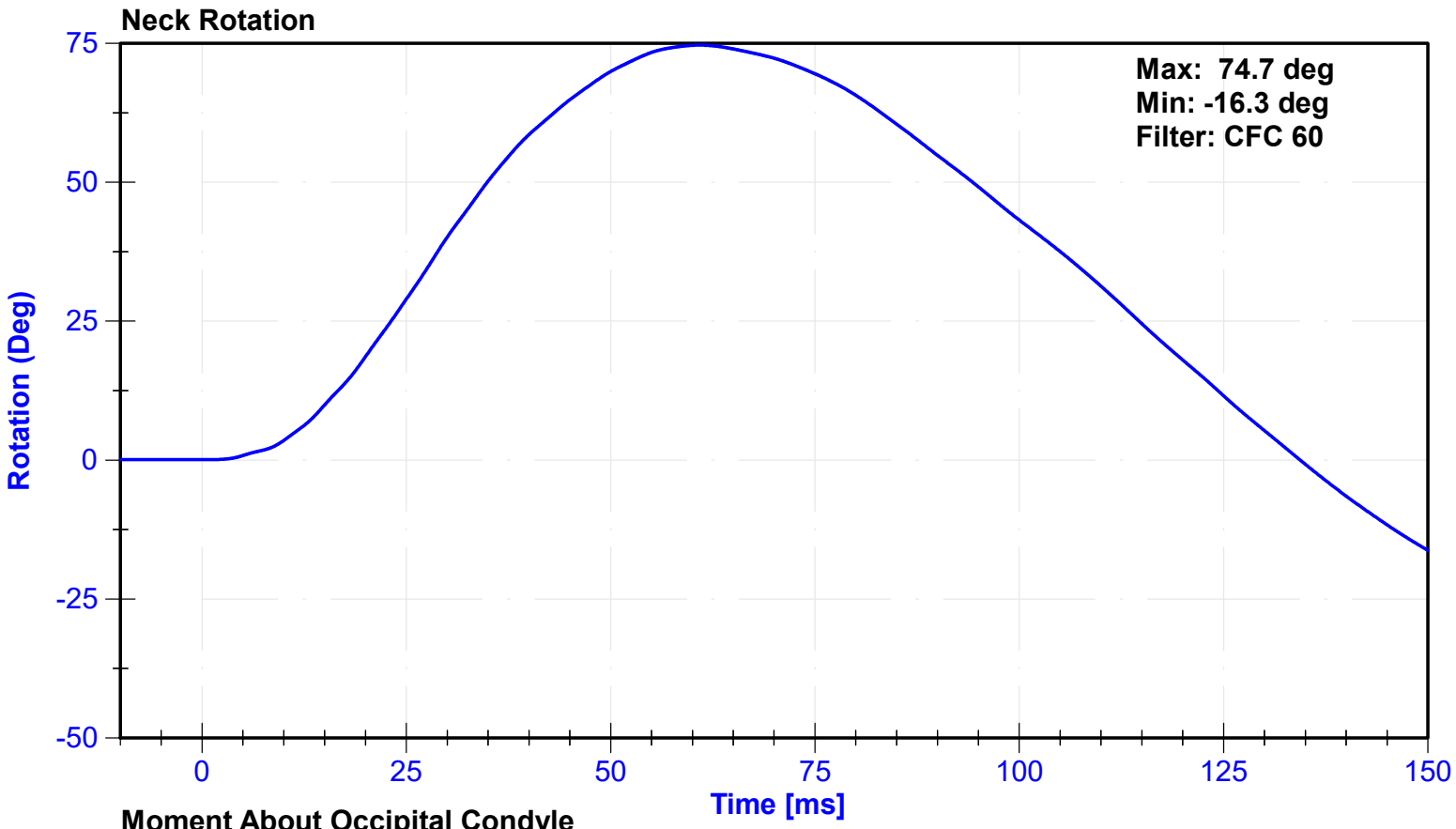
Results

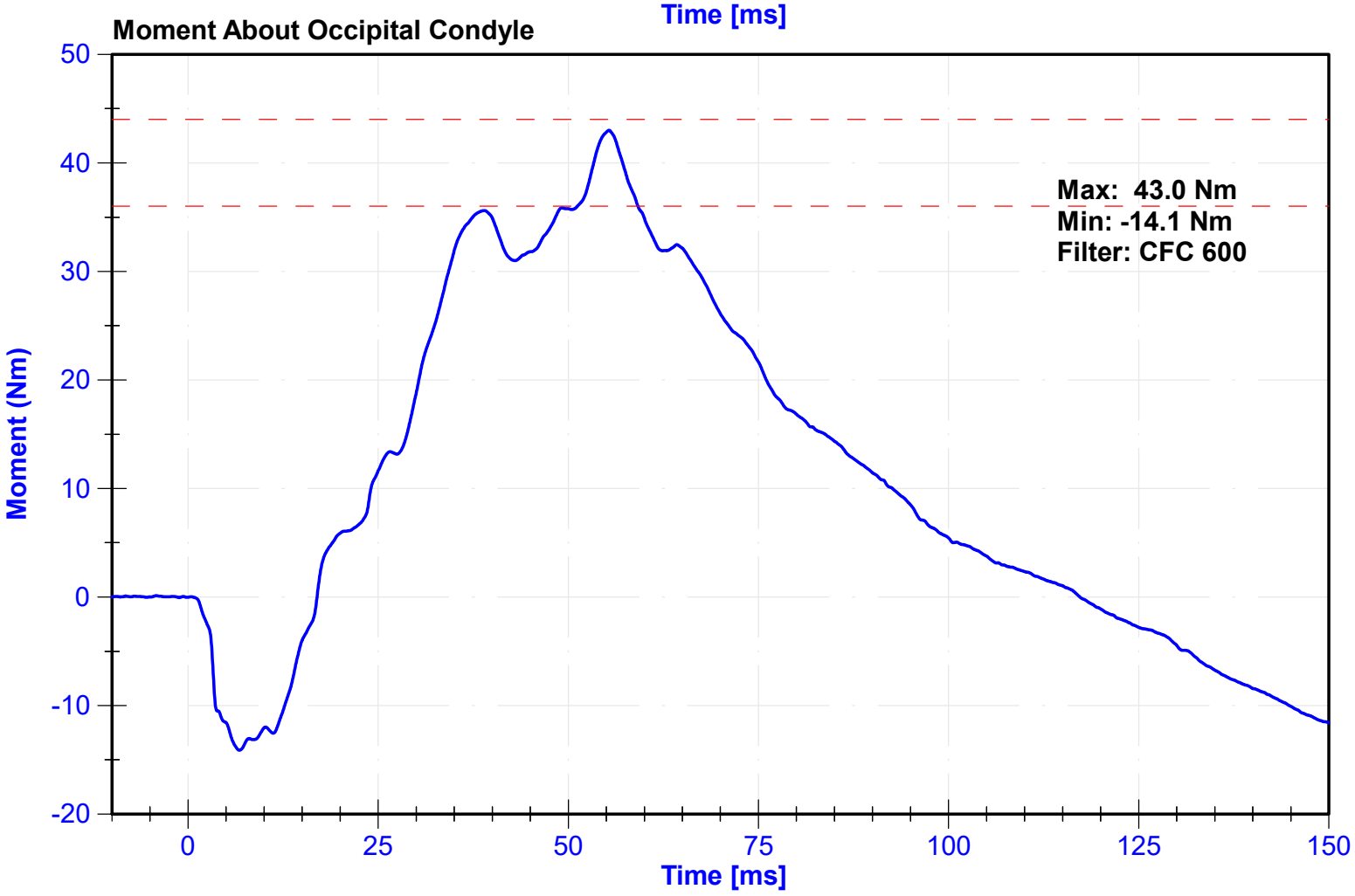
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	15.5	Pass
Velocity	5.51	5.63	m/s	5.545	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.40	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.54	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.75	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.63	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.89	Pass
Neck Rotation	71	81	deg	74.7	Pass
Time at Maximum Rotation	50	70	ms	60.9	Pass
Moment about the OC	36	44	Nm	43.0	Pass
Moment Decay to 0 Nm	102	126	ms	117.3	Pass

Transducer Calibrations

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




Neck Rotation
Max: 74.7 deg
Min: -16.3 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 43.0 Nm
Min: -14.1 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

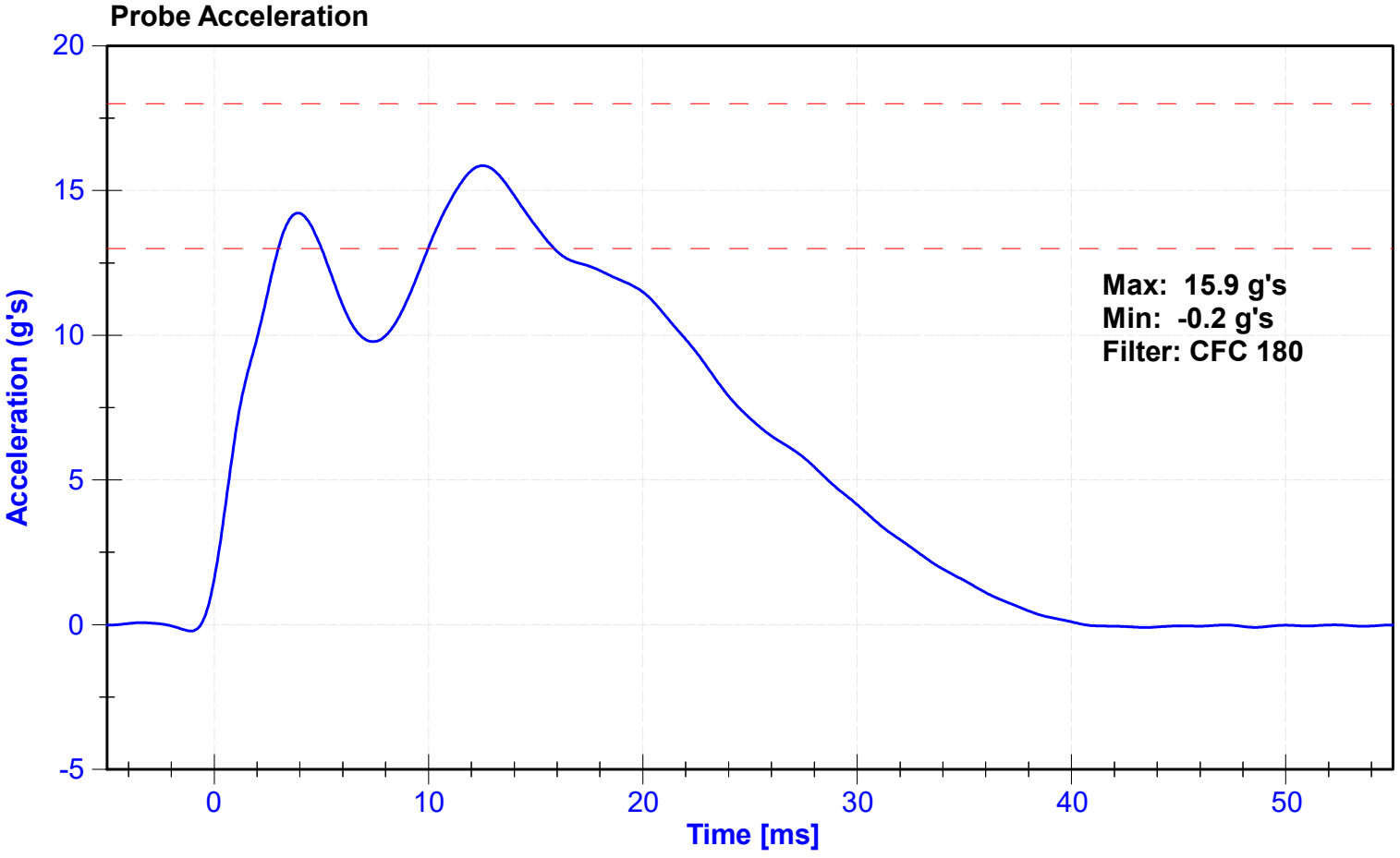
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

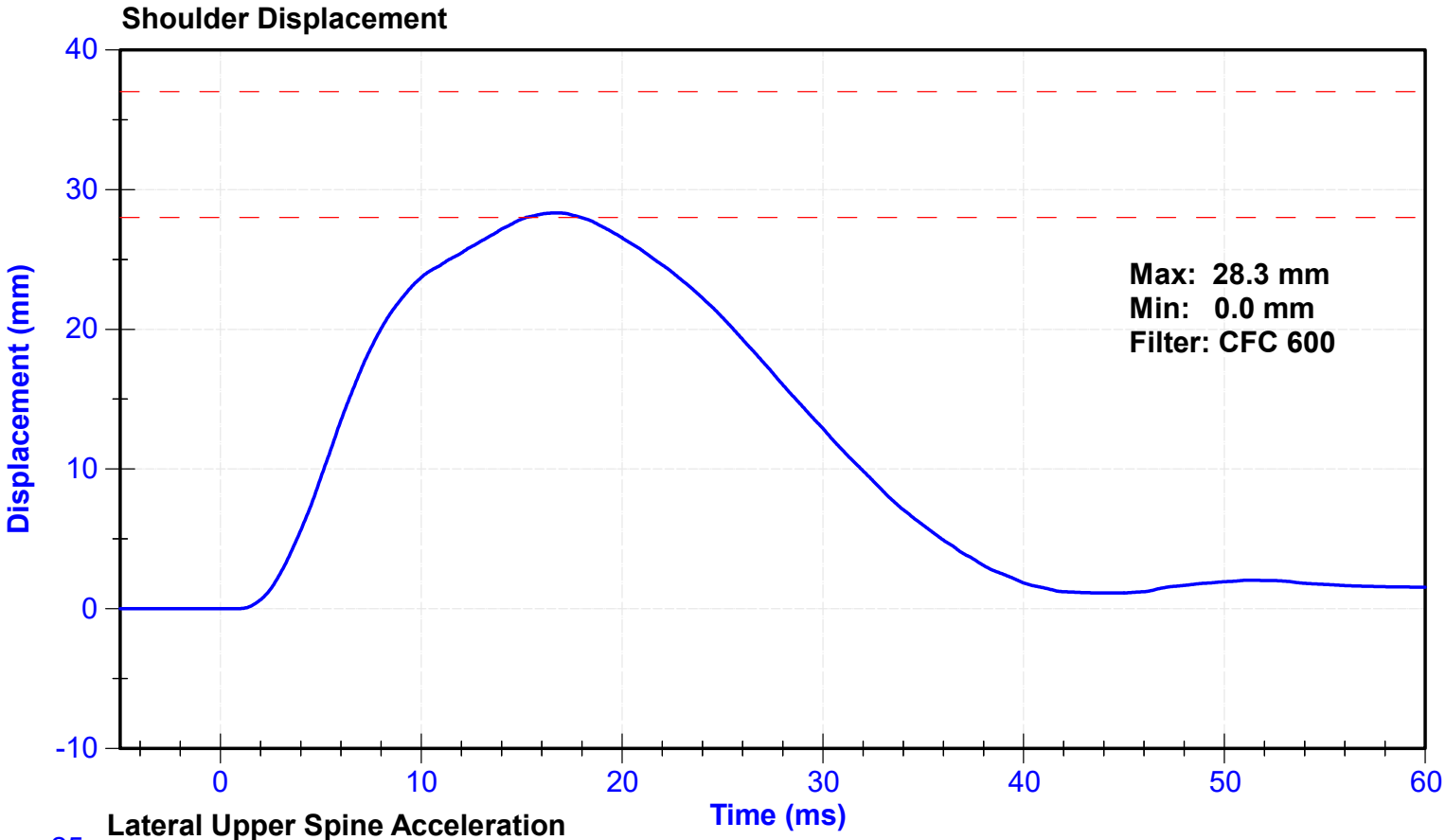
Results

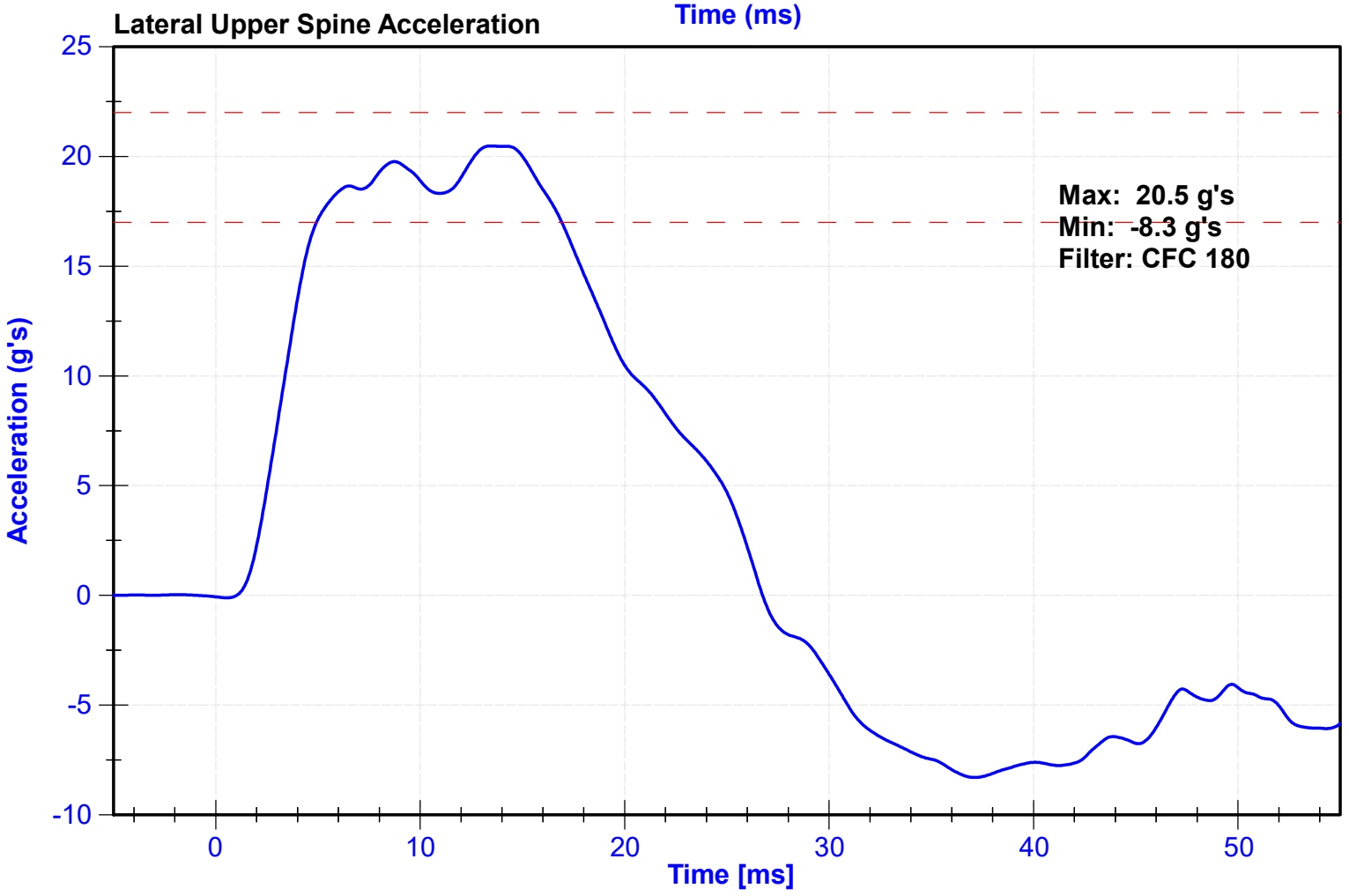
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	15.9	Pass
Shoulder Deflection	28	37	mm	28.3	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.5	Pass

Transducer Calibrations

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




Shoulder Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time (ms)
Max: 28.3 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: 20.5 g's
Min: -8.3 g's
Filter: CFC 180

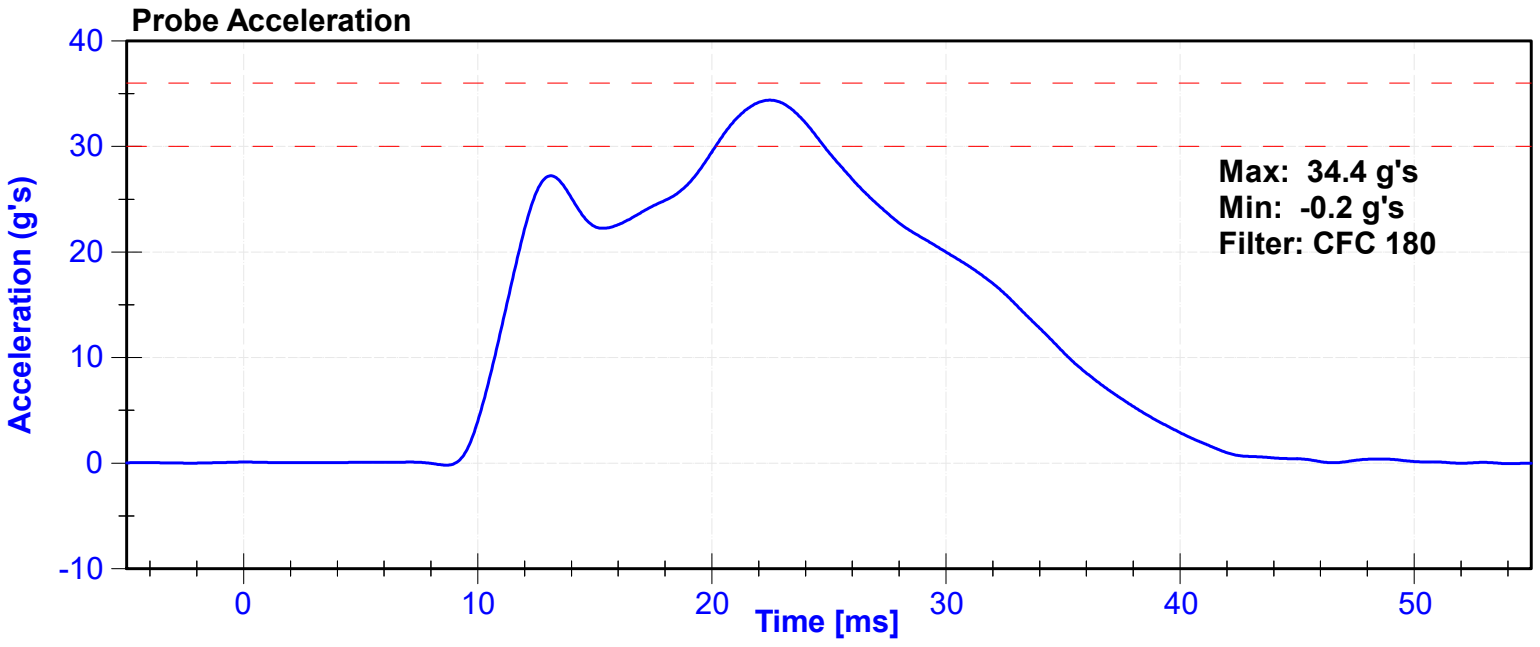
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

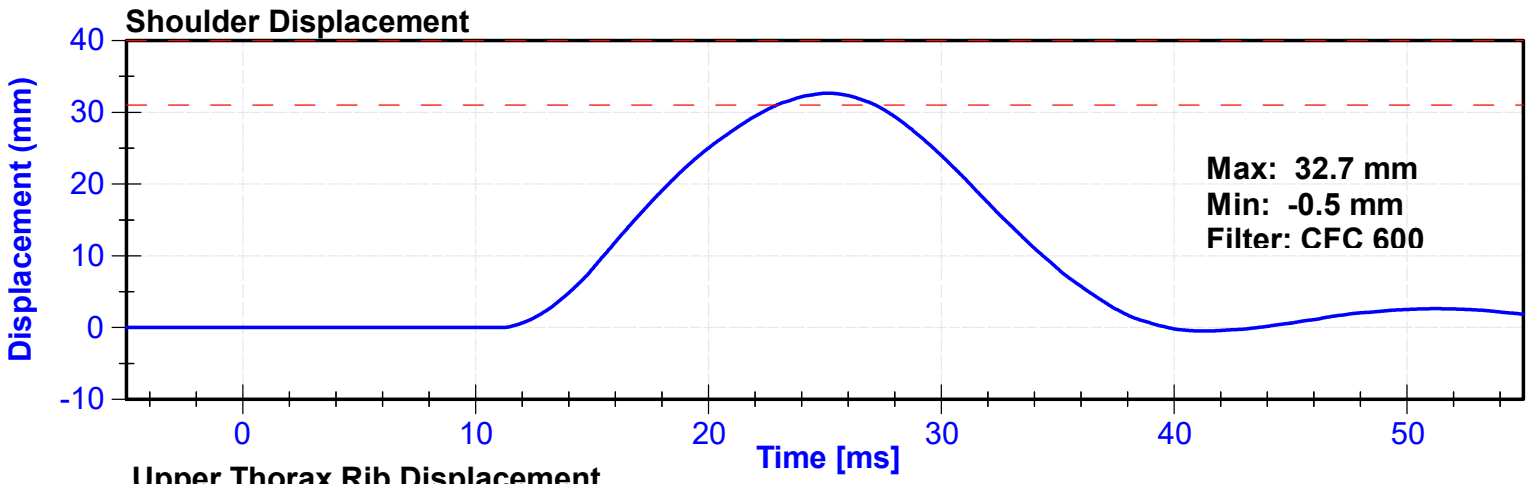
Results

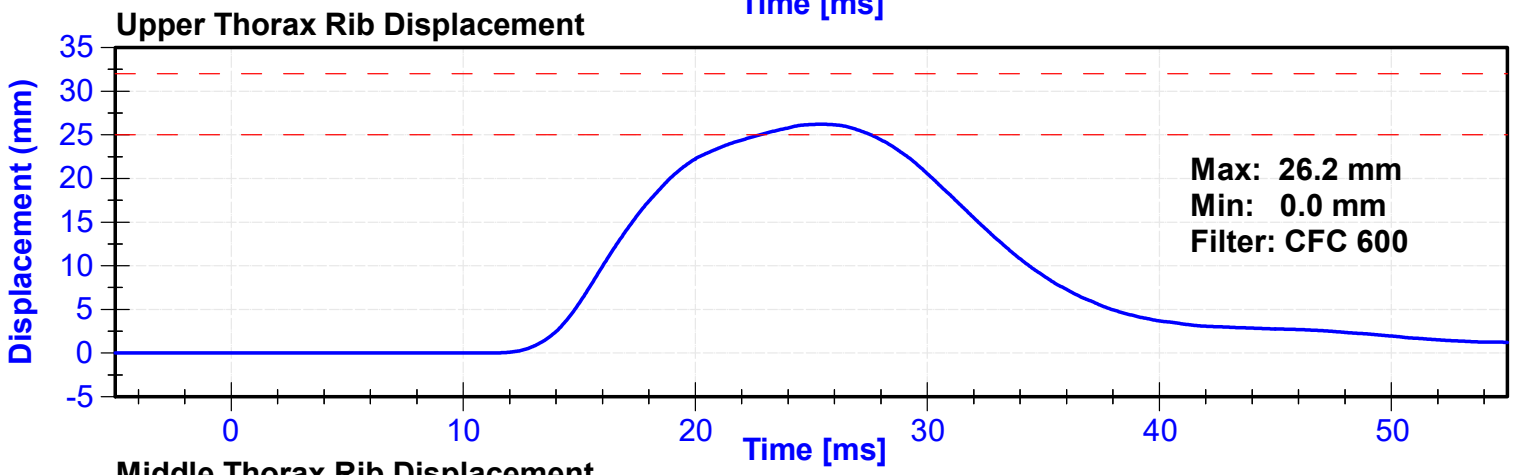
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration after 5 ms	30	36	g's	34.4	Pass
Lateral Upper Spine Acceleration	34	43	g's	40.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.5	Pass
Shoulder Deflection	31	40	mm	32.7	Pass
Upper Thorax Rib Deflection	25	32	mm	26.2	Pass
Mid Thorax Rib Deflection	30	36	mm	30.1	Pass
Lower Thorax Rib Deflection	32	38	mm	32.3	Pass

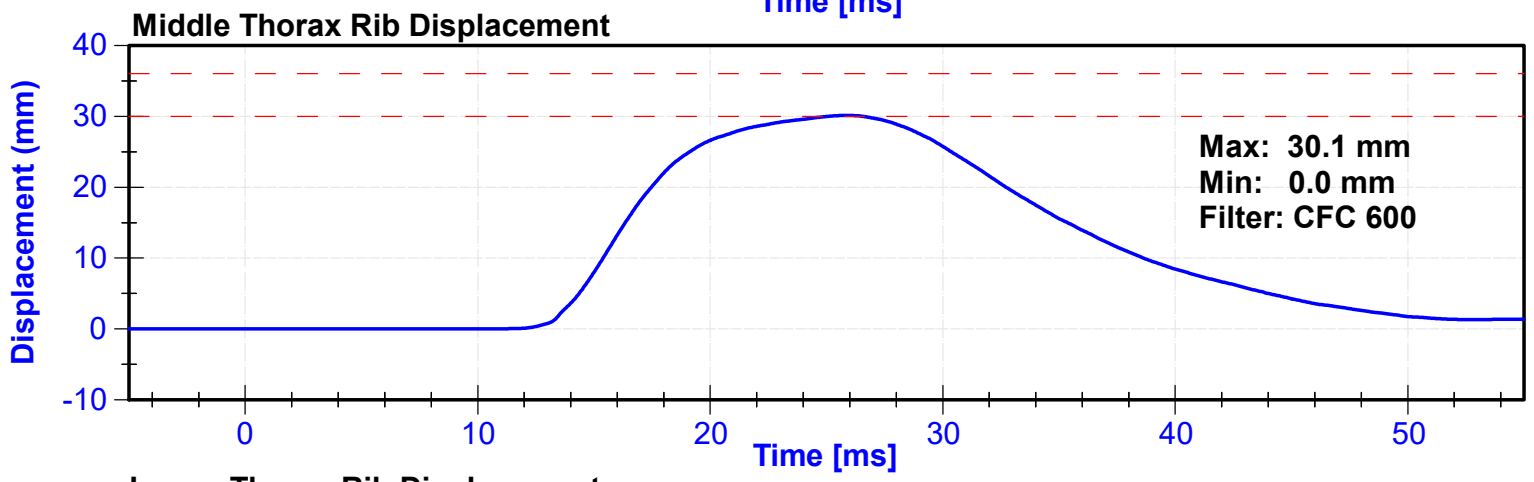
Transducer Calibrations

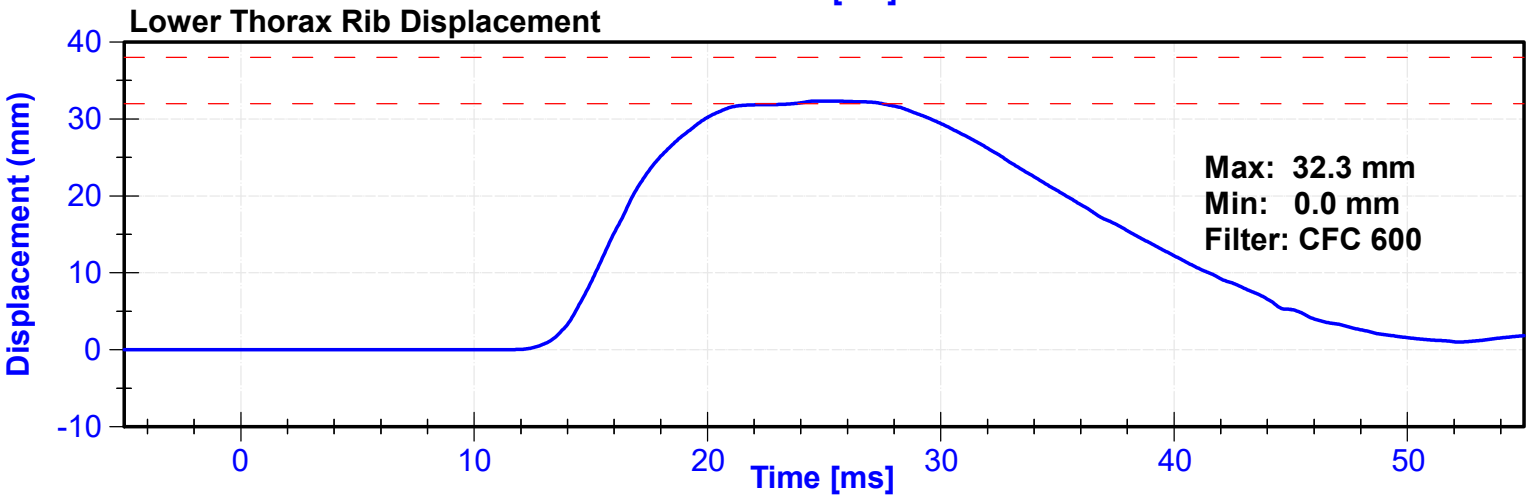
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Upper Spine T12 Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Shoulder Potentiometer	Servo	1274GFE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

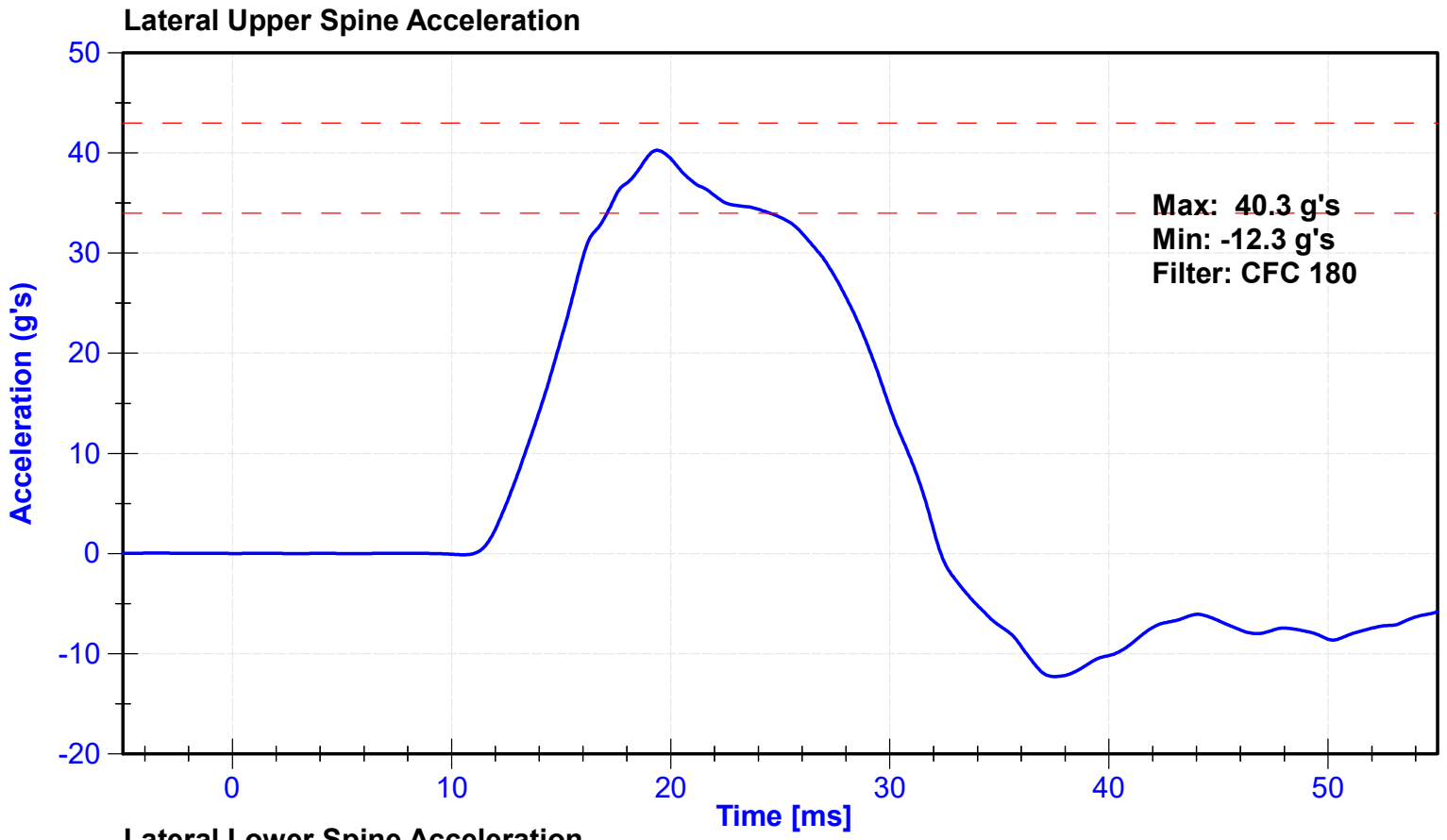


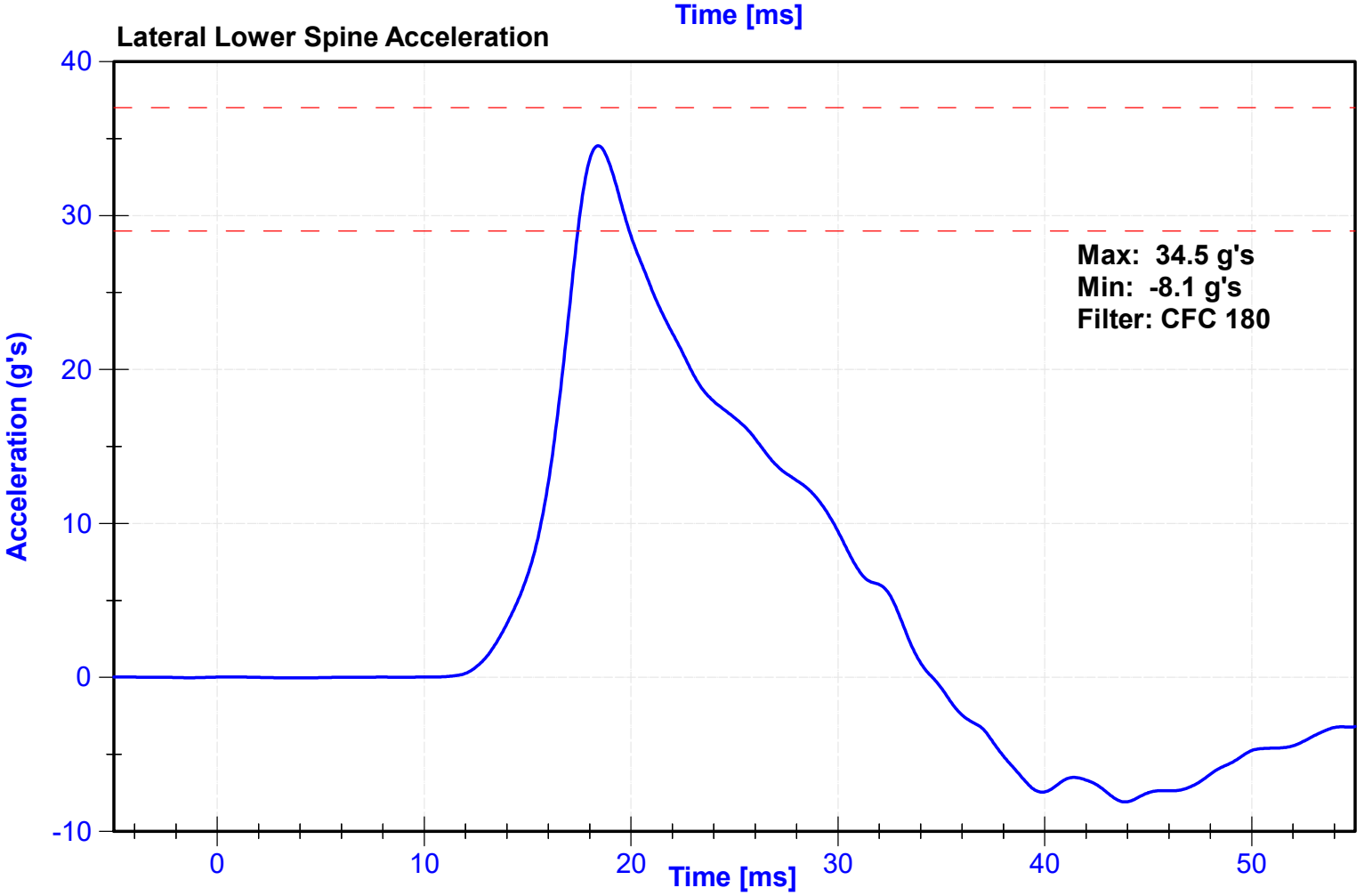

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 32.7 mm
Min: -0.5 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.2 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.3 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 40.3 g's
Min: -12.3 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: 34.5 g's
Min: -8.1 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

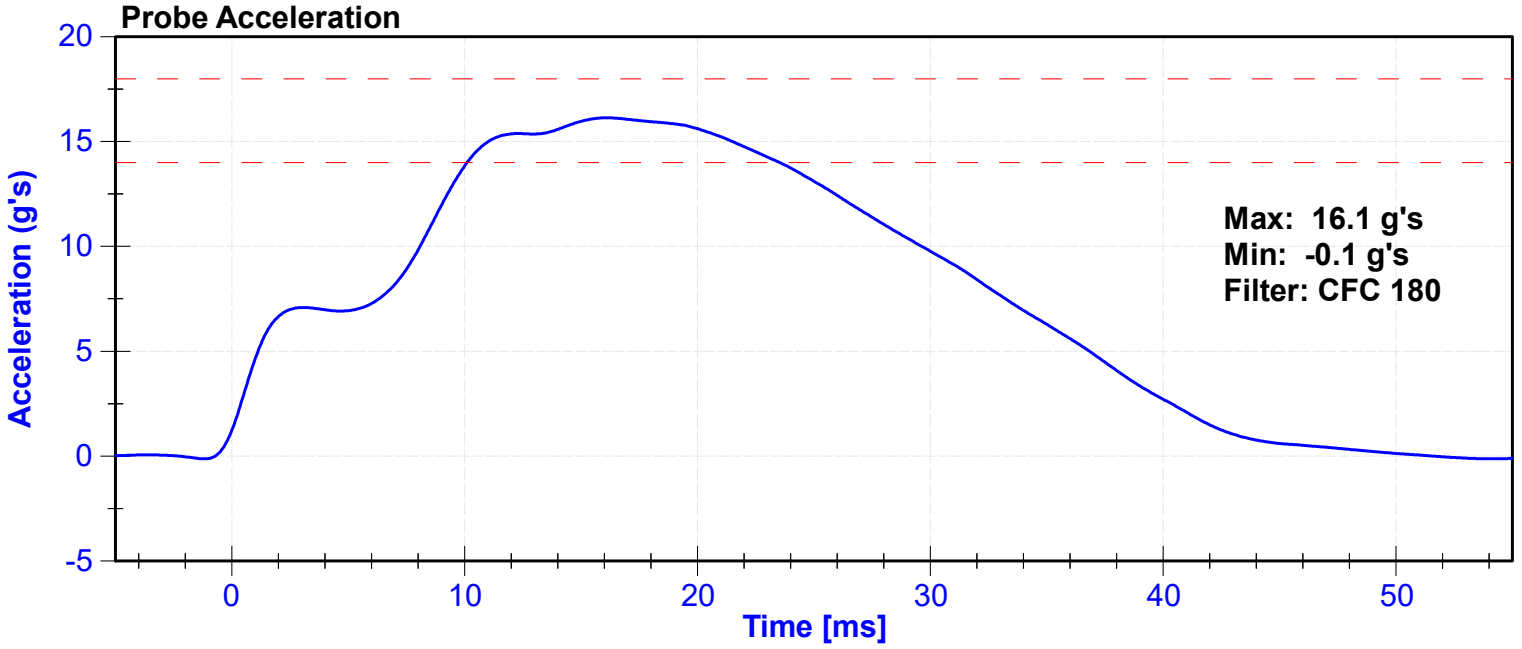
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

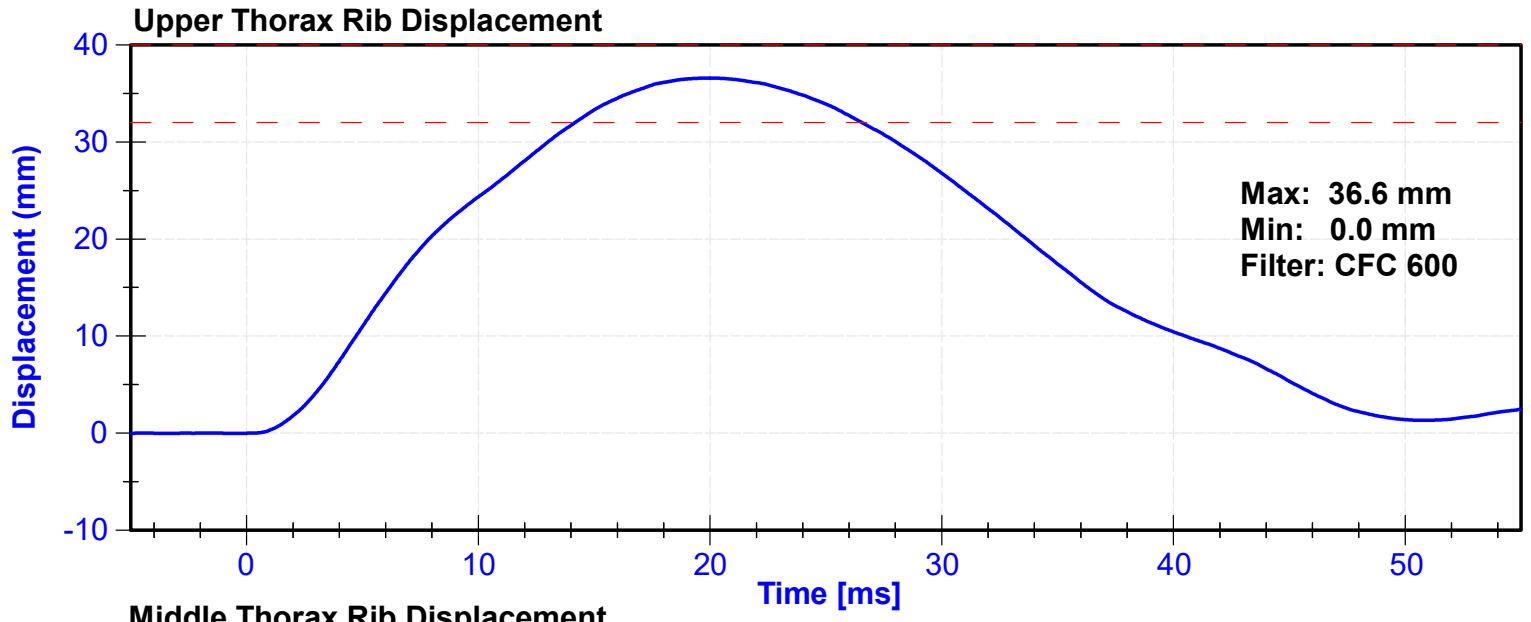
Results

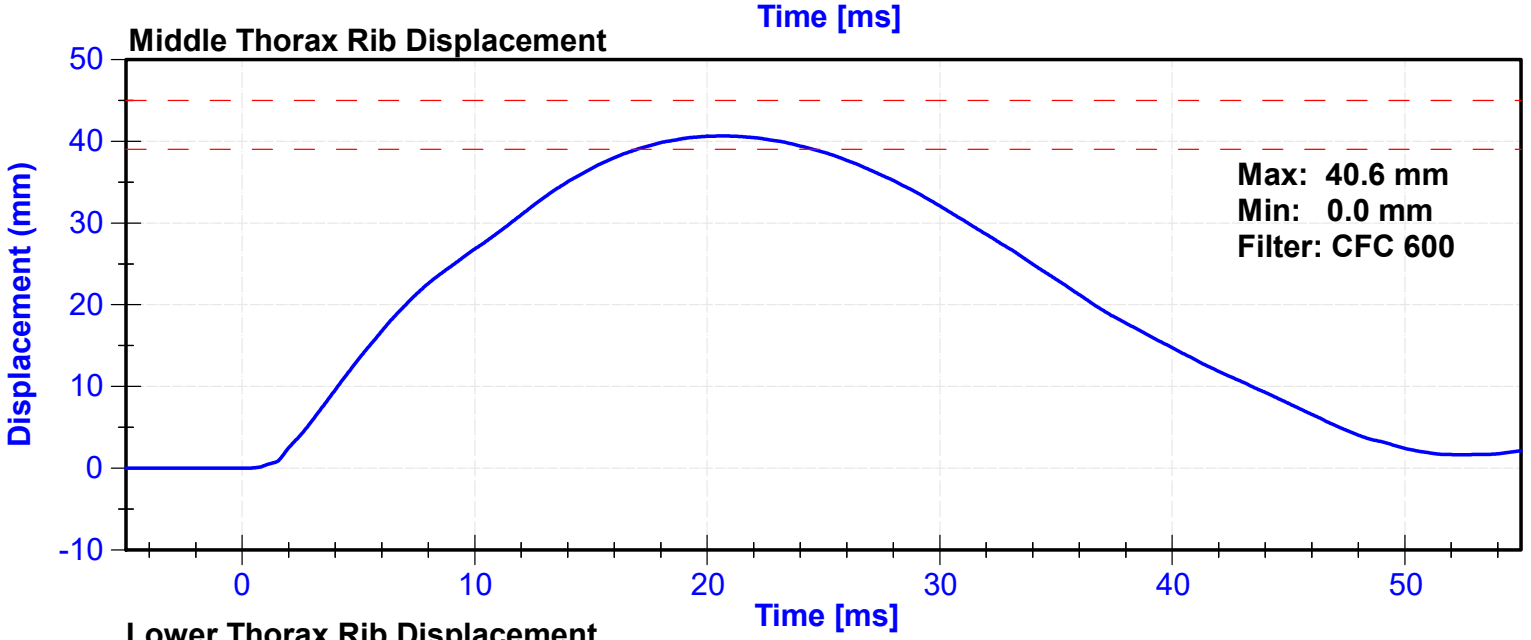
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.5	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.0	Pass
Upper Thorax Rib Deflection	32	40	mm	36.6	Pass
Middle Thorax Rib Deflection	39	45	mm	40.6	Pass
Lower Thorax Rib Deflection	35	43	mm	37.8	Pass

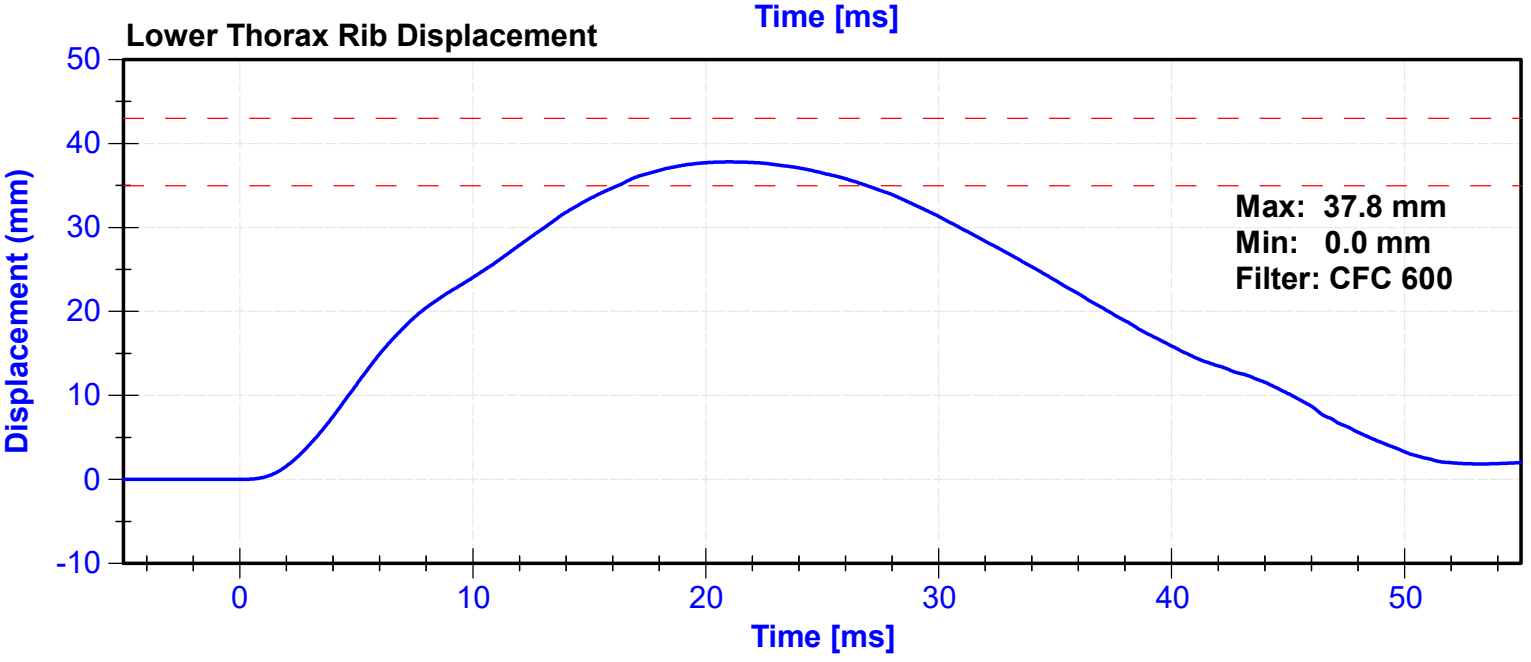
Transducer Calibrations

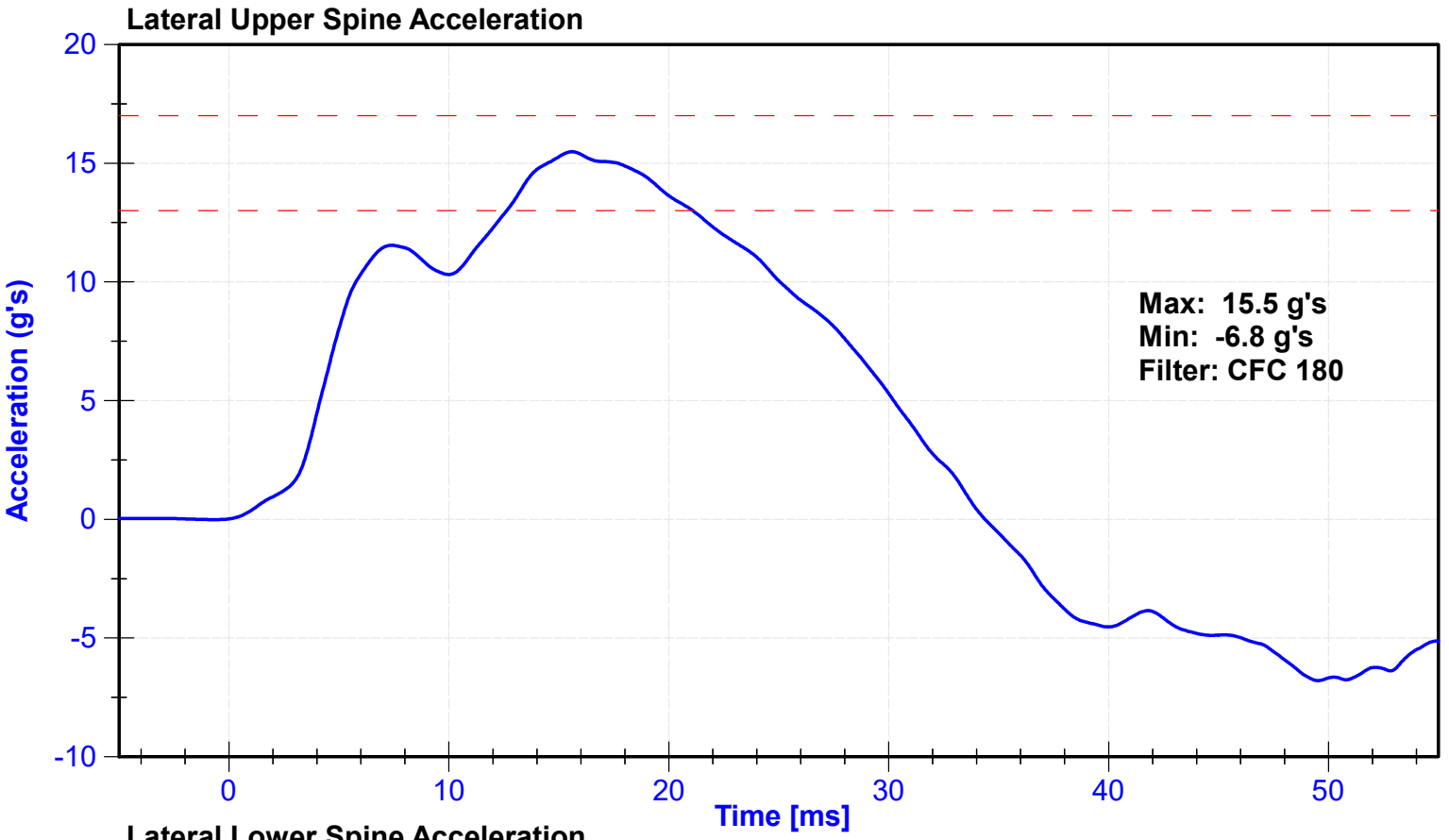
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE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

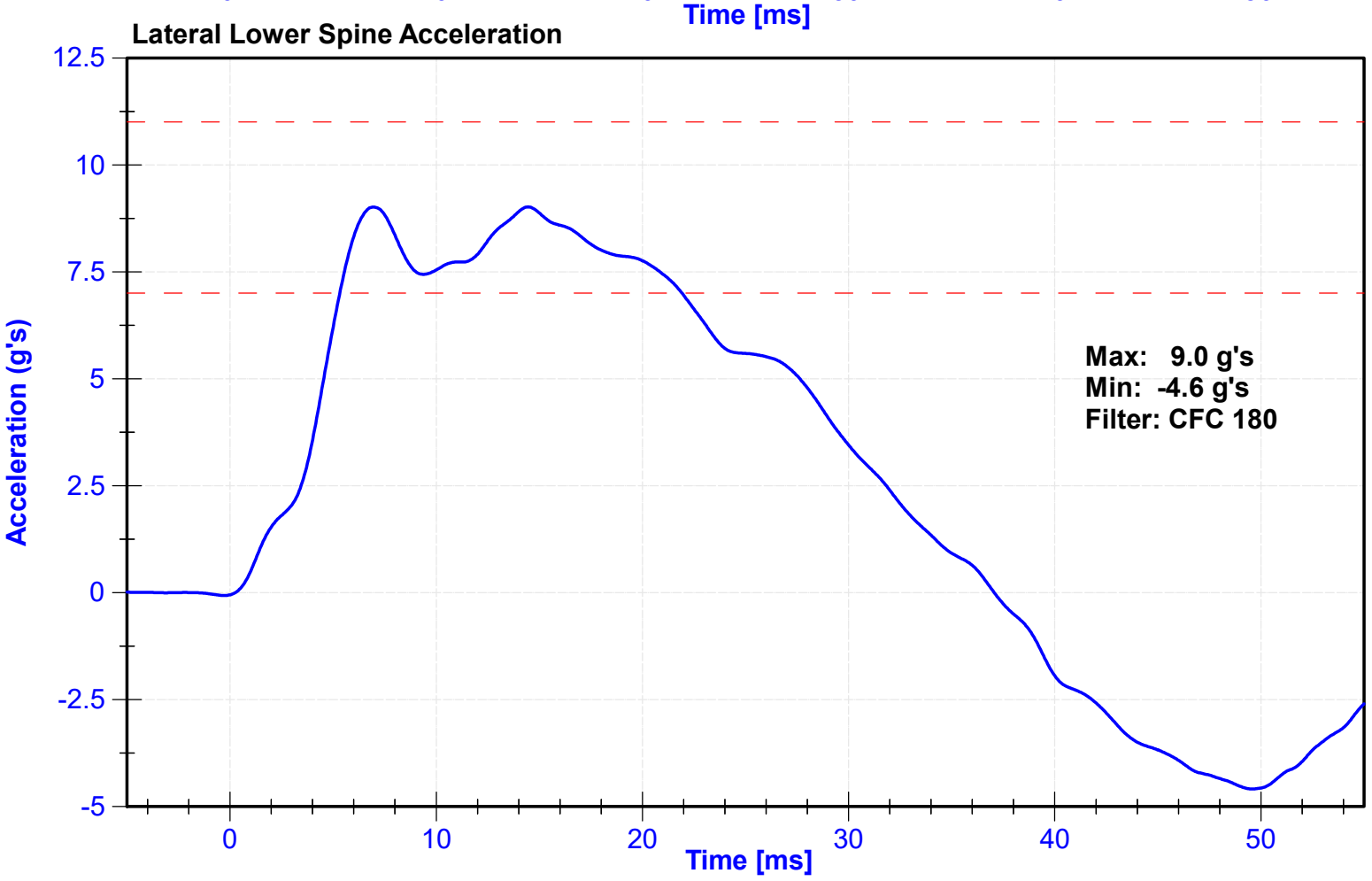



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.6 mm
Min: 0.0 mm
Filter: CFC 600


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


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.8 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]
Max: 15.5 g's
Min: -6.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
Time [ms]
Max: 9.0 g's
Min: -4.6 g's
Filter: CFC 180

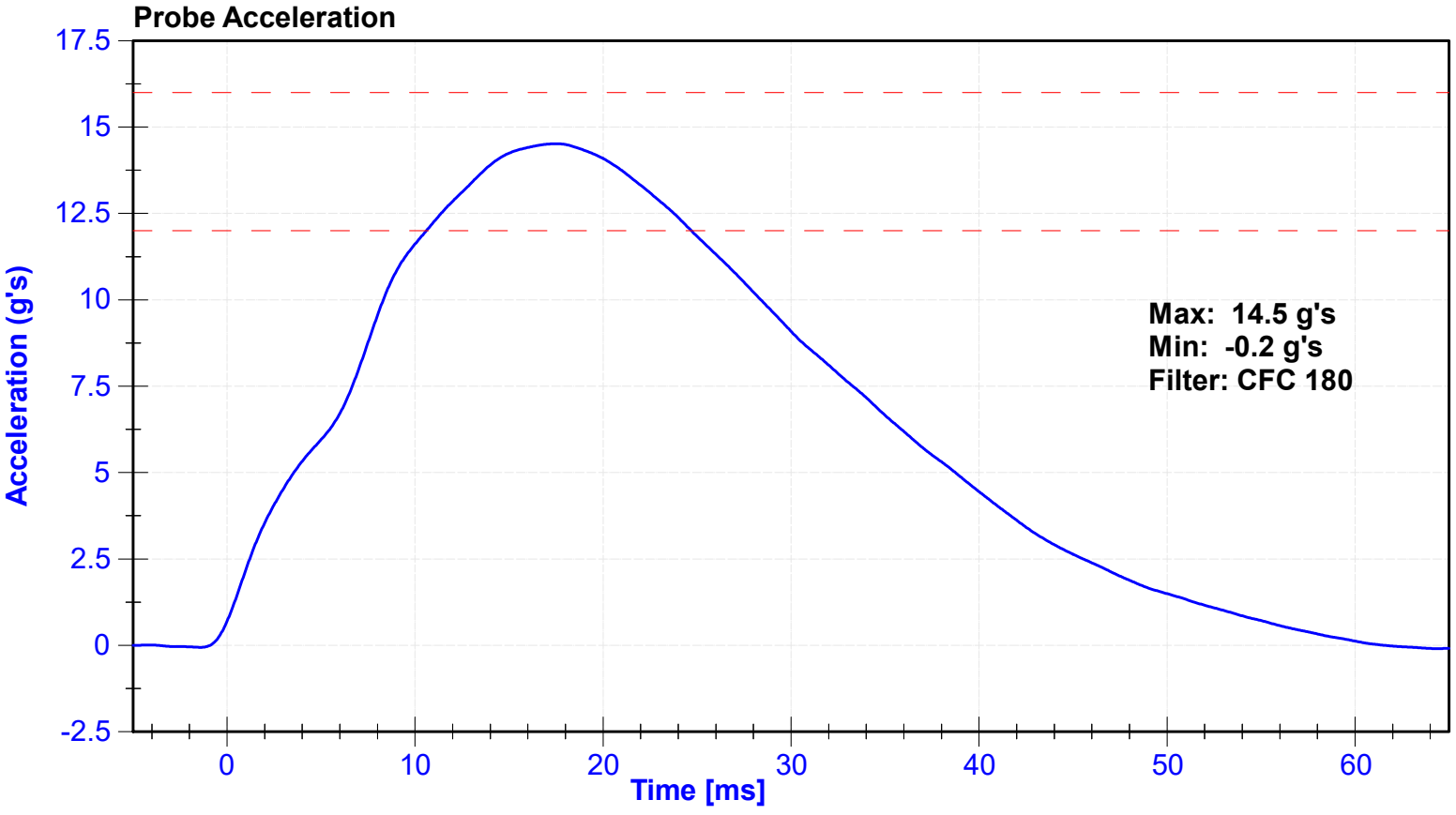
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

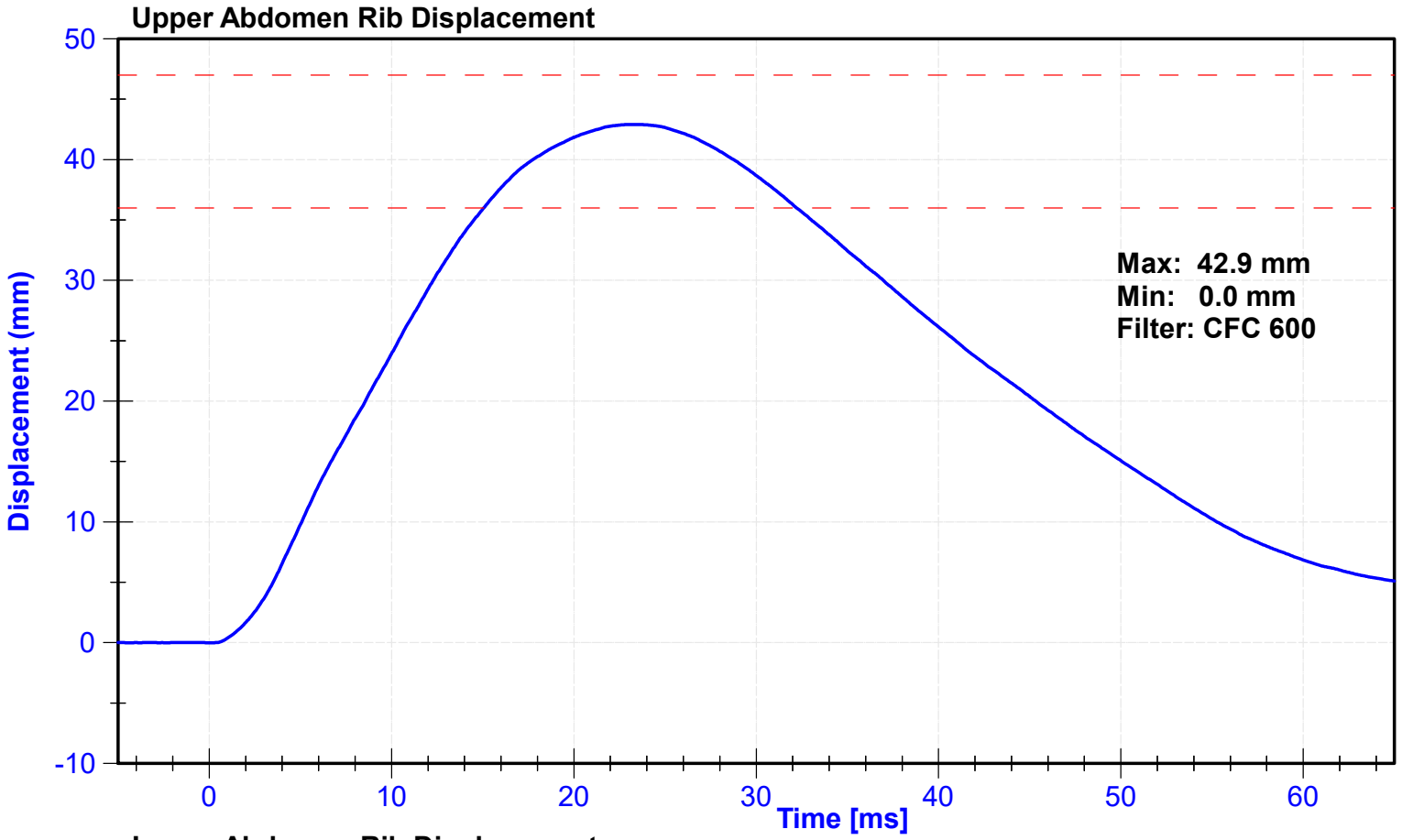
Results

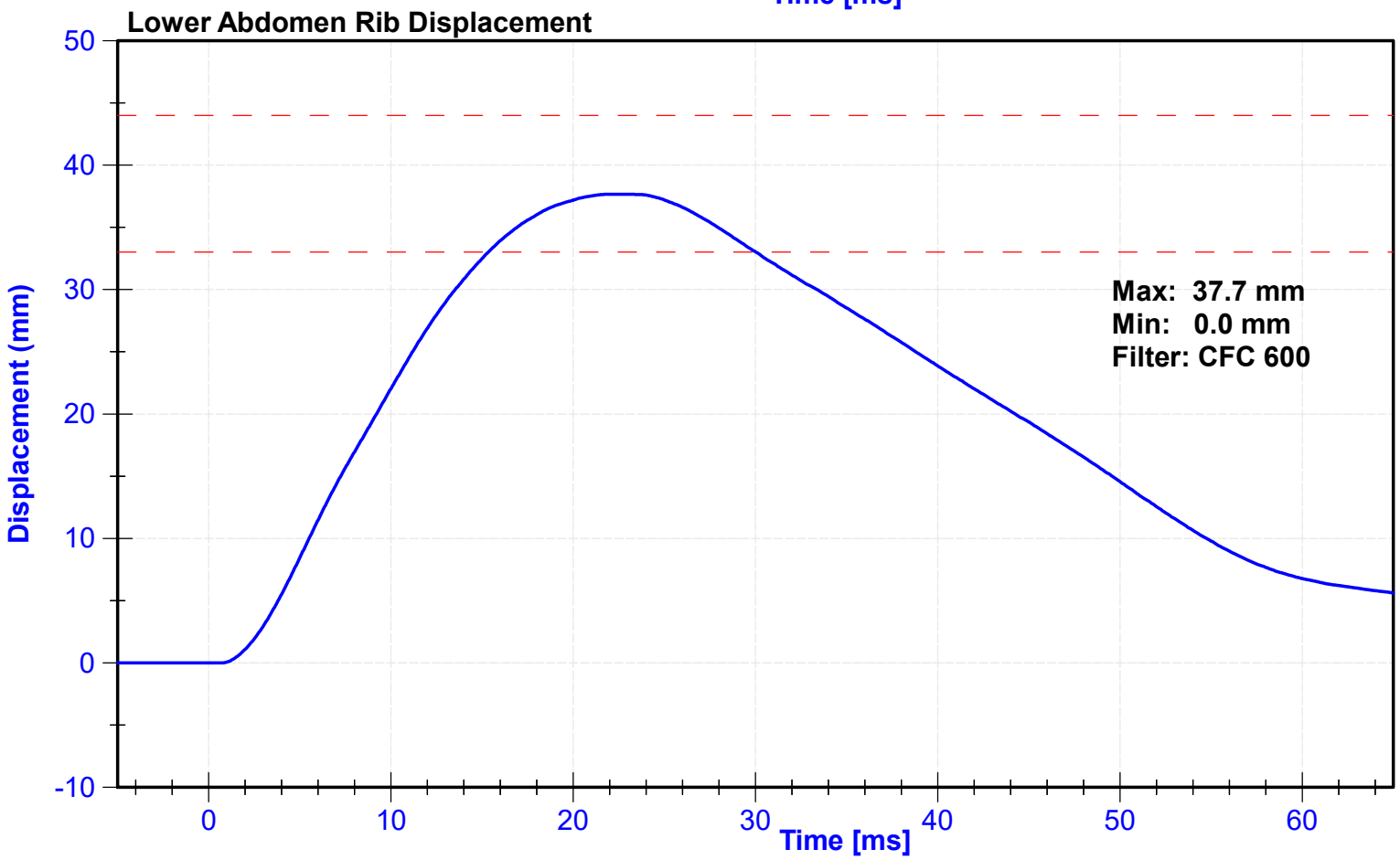
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	13.2	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.0	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	37.7	Pass

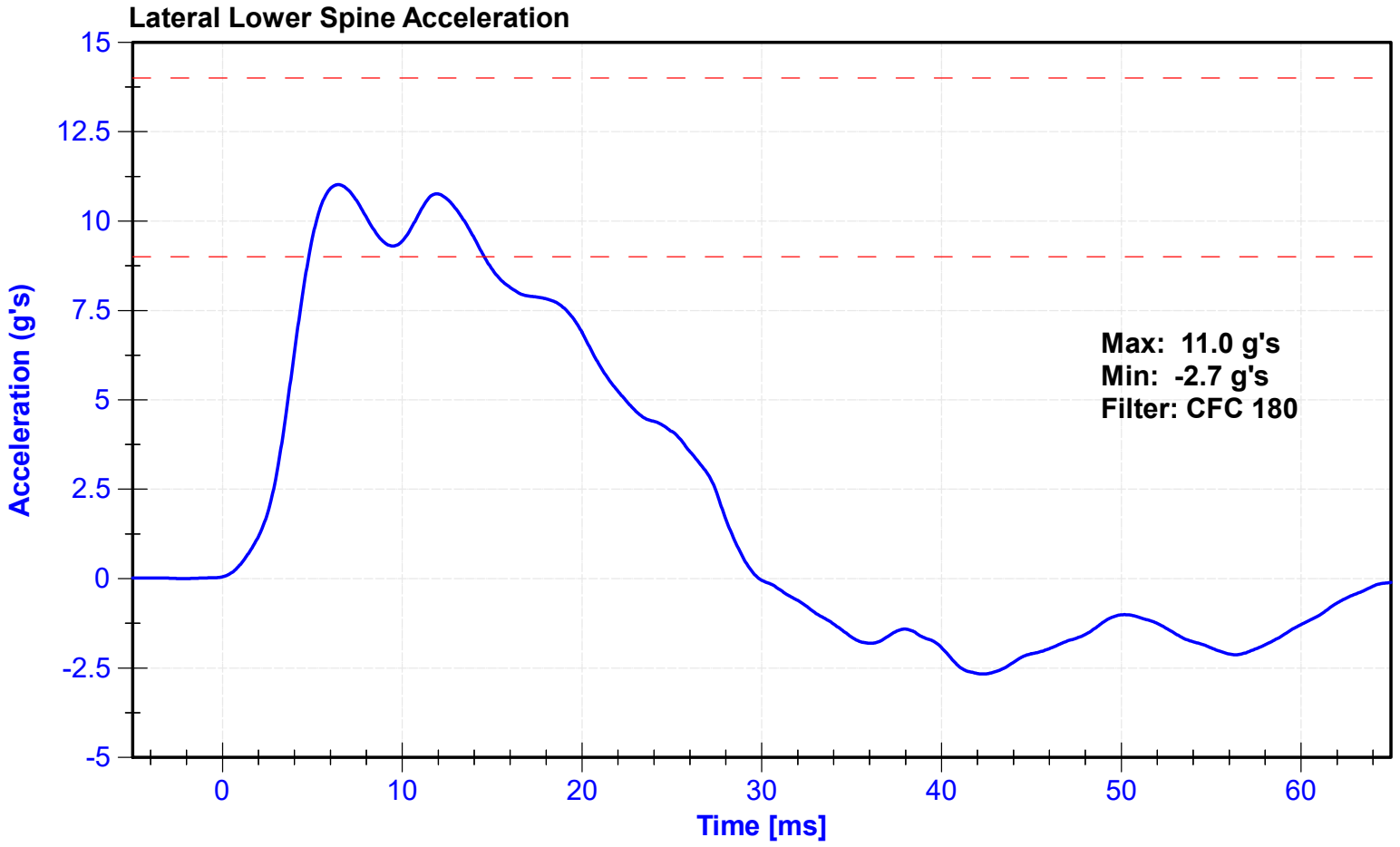
Transducer Calibrations

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




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 42.9 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: 37.7 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.0 g's
Min: -2.7 g's
Filter: CFC 180

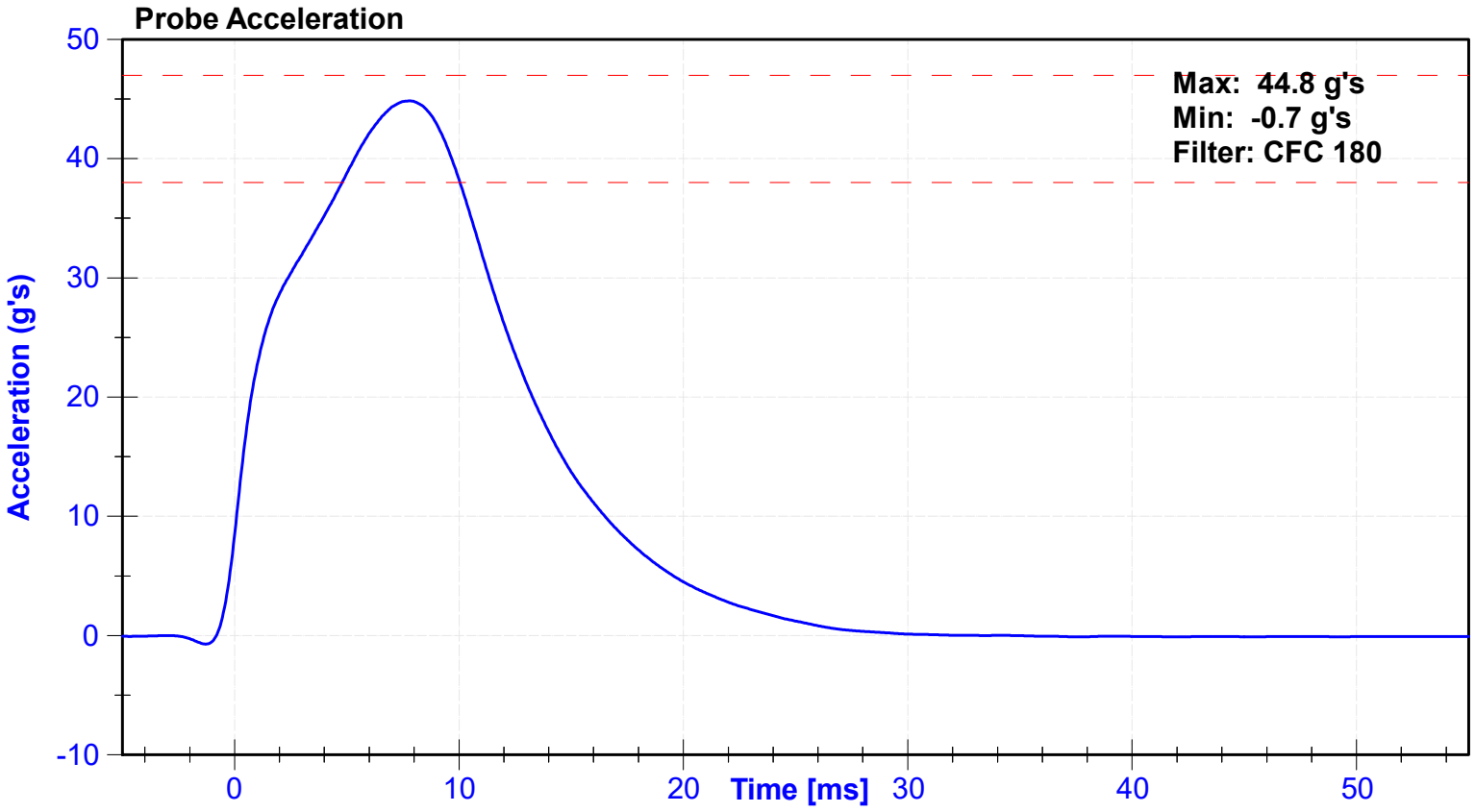
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

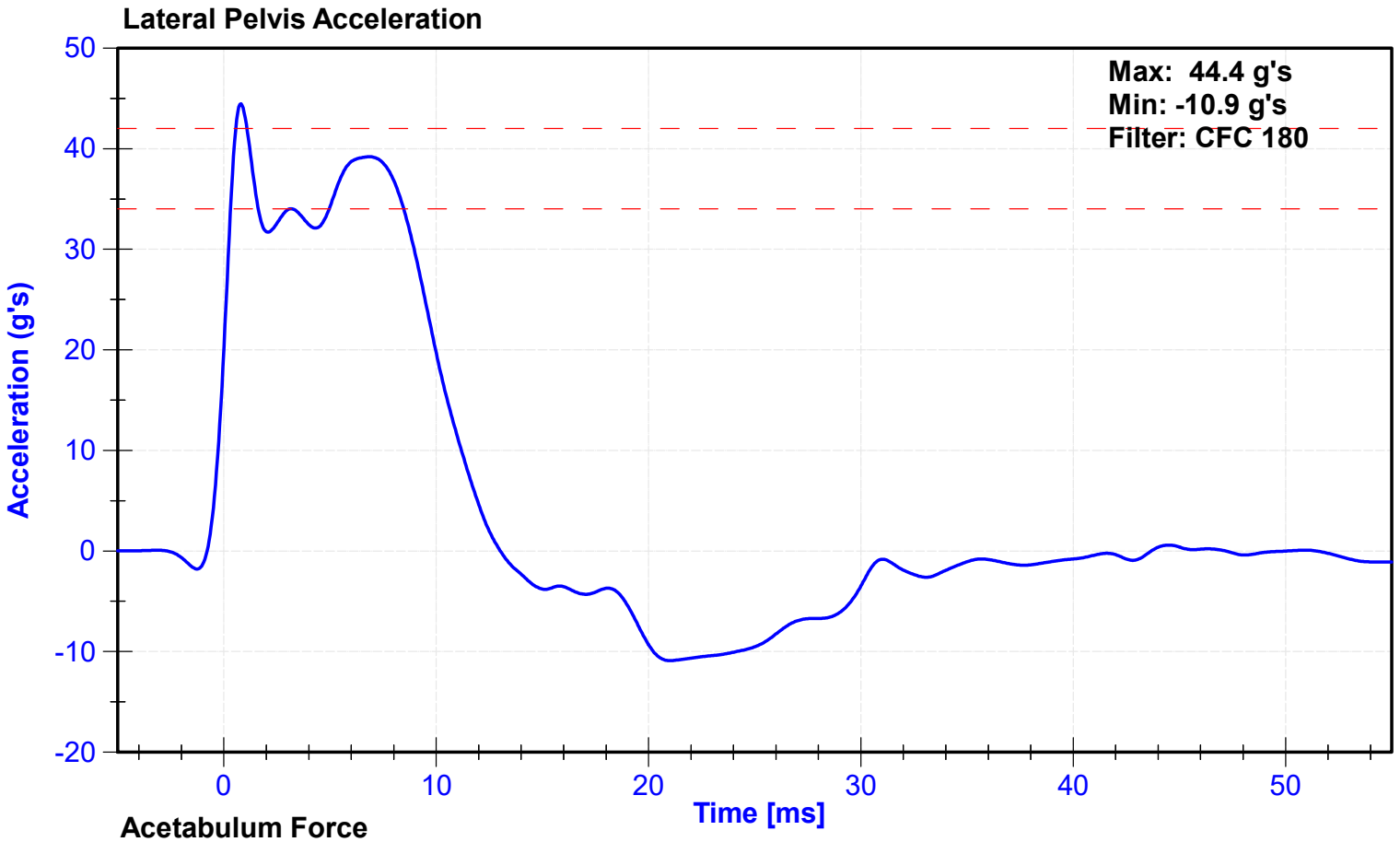
Results

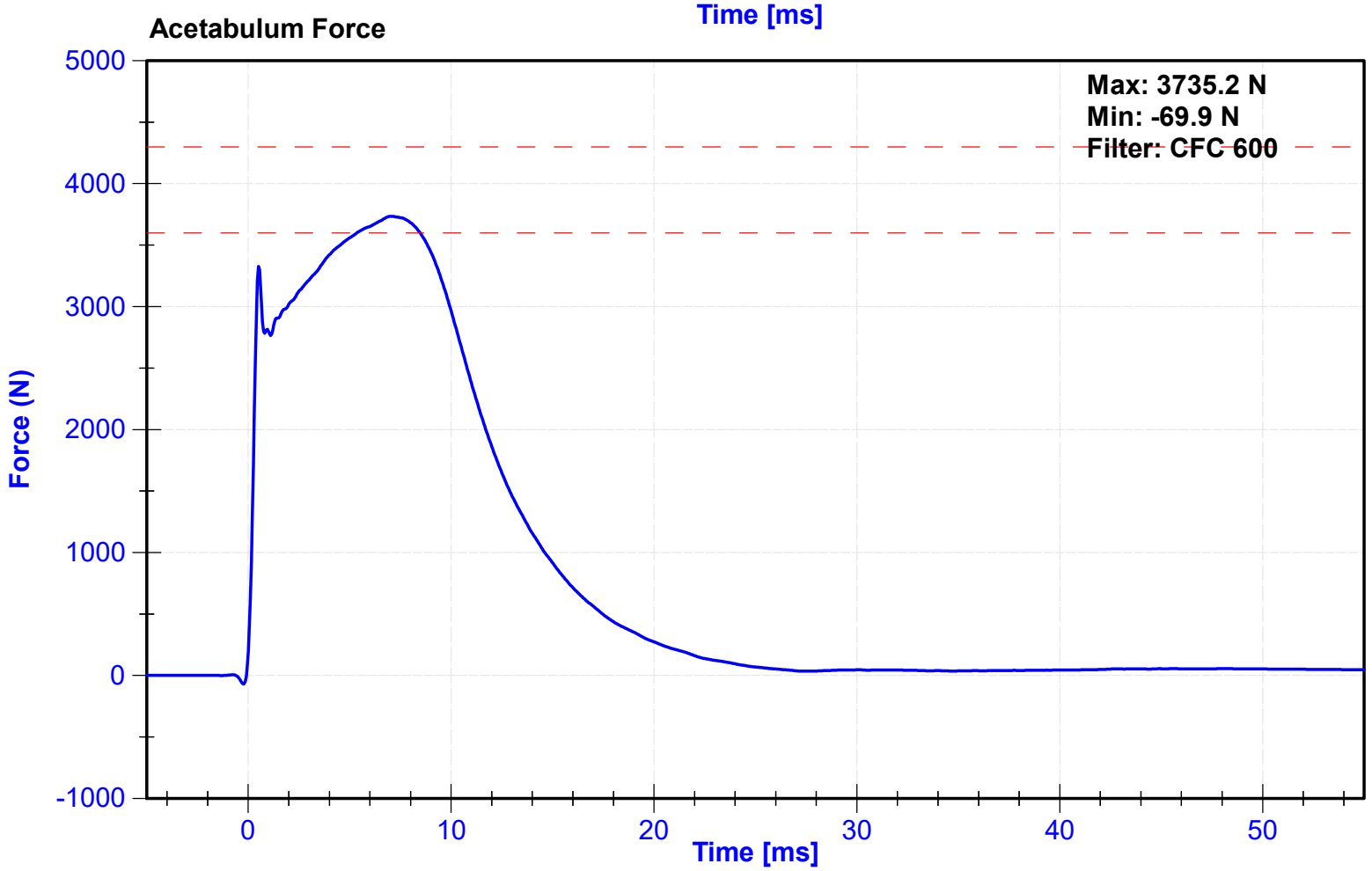
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	13.2	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration	38	47	g's	44.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.2	Pass
Acetabulum Force	3600	4300	N	3735.2	Pass

Transducer Calibrations

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




Lateral Pelvis Acceleration
Max: 44.4 g's
Min: -10.9 g's
Filter: CFC 180
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3735.2 N
Min: -69.9 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 15434 CERTIFICATION 2/3/23 SPM

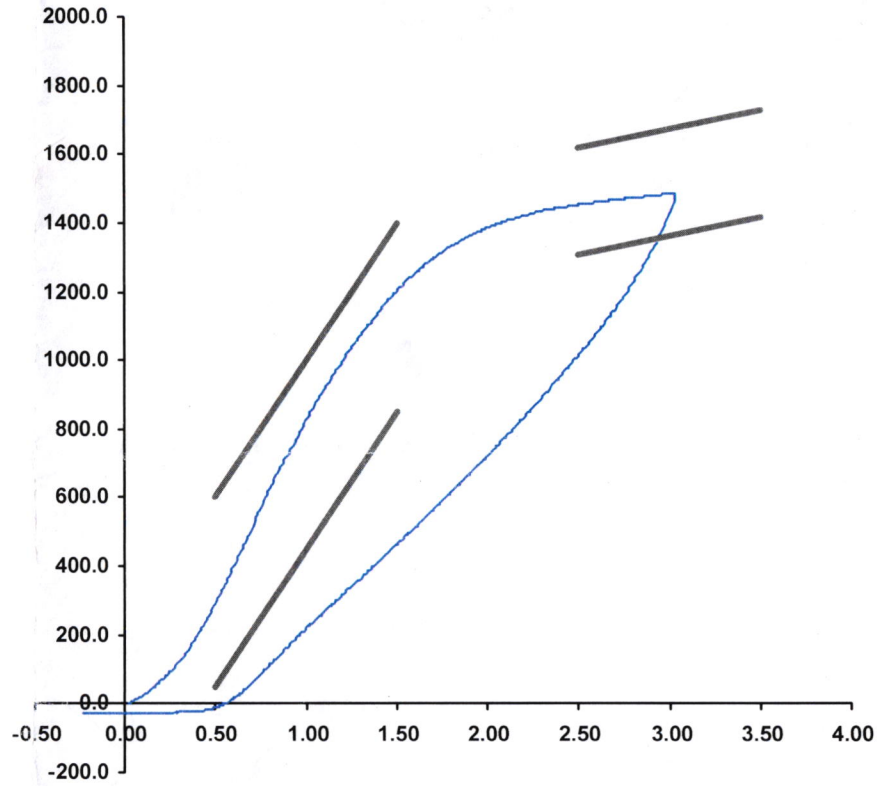
Test Number 20095

Report Number 20149

Test Date 9/9/2021 10:14:57 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	301	50	600
Force @ 1.5 mm (N)	1,207	850	1,400
Force @ 2.5 mm (N)	1,455	1,306	1,618
Force @ 3.0 mm (N)	1,485	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

SID-IIs Pelvis Plug Certification Test

Plug S/N 15450 CRASH LEFT IMPACT 2/3/23 1PM

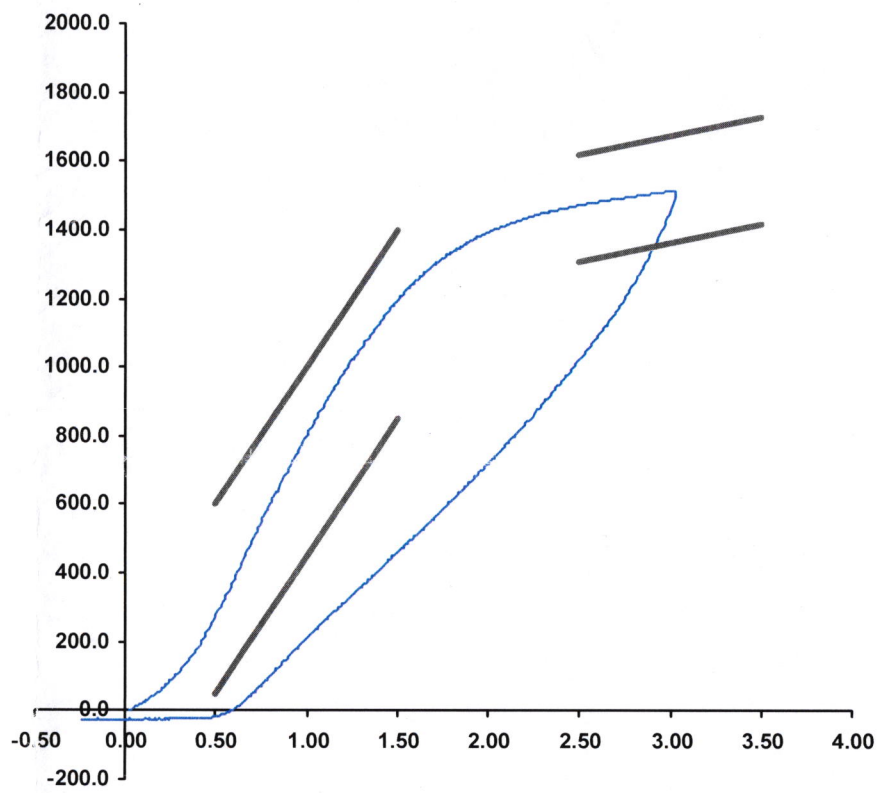
Test Number 20111

Report Number 20165

Test Date 9/9/2021 10:49:14 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	288	50	600
Force @ 1.5 mm (N)	1,201	850	1,400
Force @ 2.5 mm (N)	1,475	1,306	1,618
Force @ 3.0 mm (N)	1,514	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

SID-IIs Pelvis Plug Certification Test

Plug S/N 15278 CRASH RIGHT NON-IMPACT 2/3/23 JPM

Test Number 18153

Report Number 18201

Test Date 3/22/2021 11:17:18 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	295	50	600
Force @ 1.5 mm (N)	1,195	850	1,400
Force @ 2.5 mm (N)	1,442	1,306	1,618
Force @ 3.0 mm (N)	1,490	1,361	1,673

Testing Machine STM-20 5965542

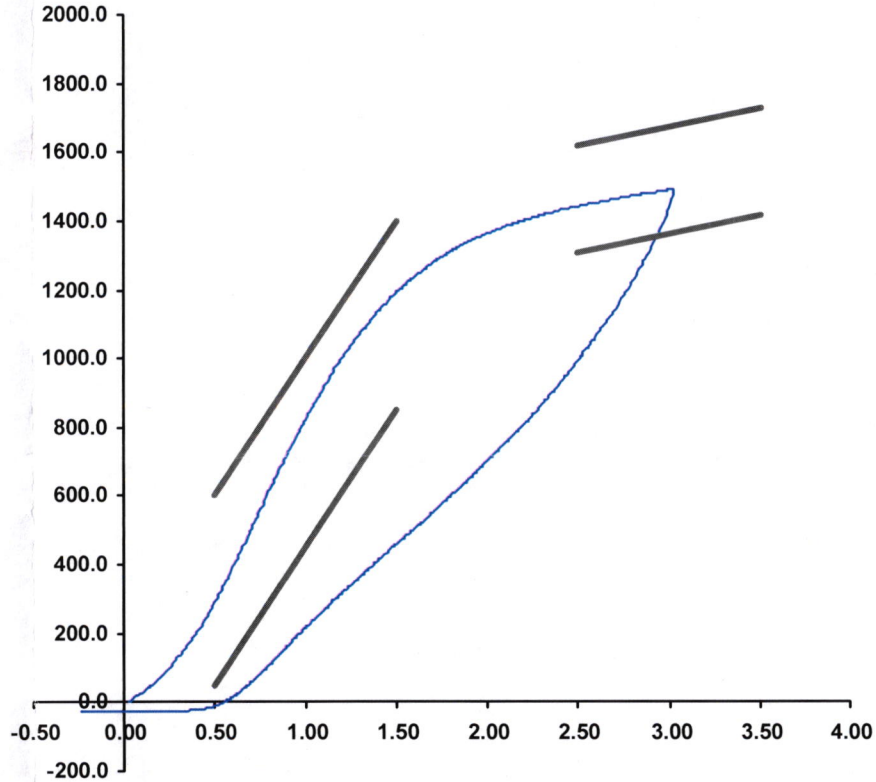
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 22-Mar-21

SACO Research

By : DC Date : 3/22/2021

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

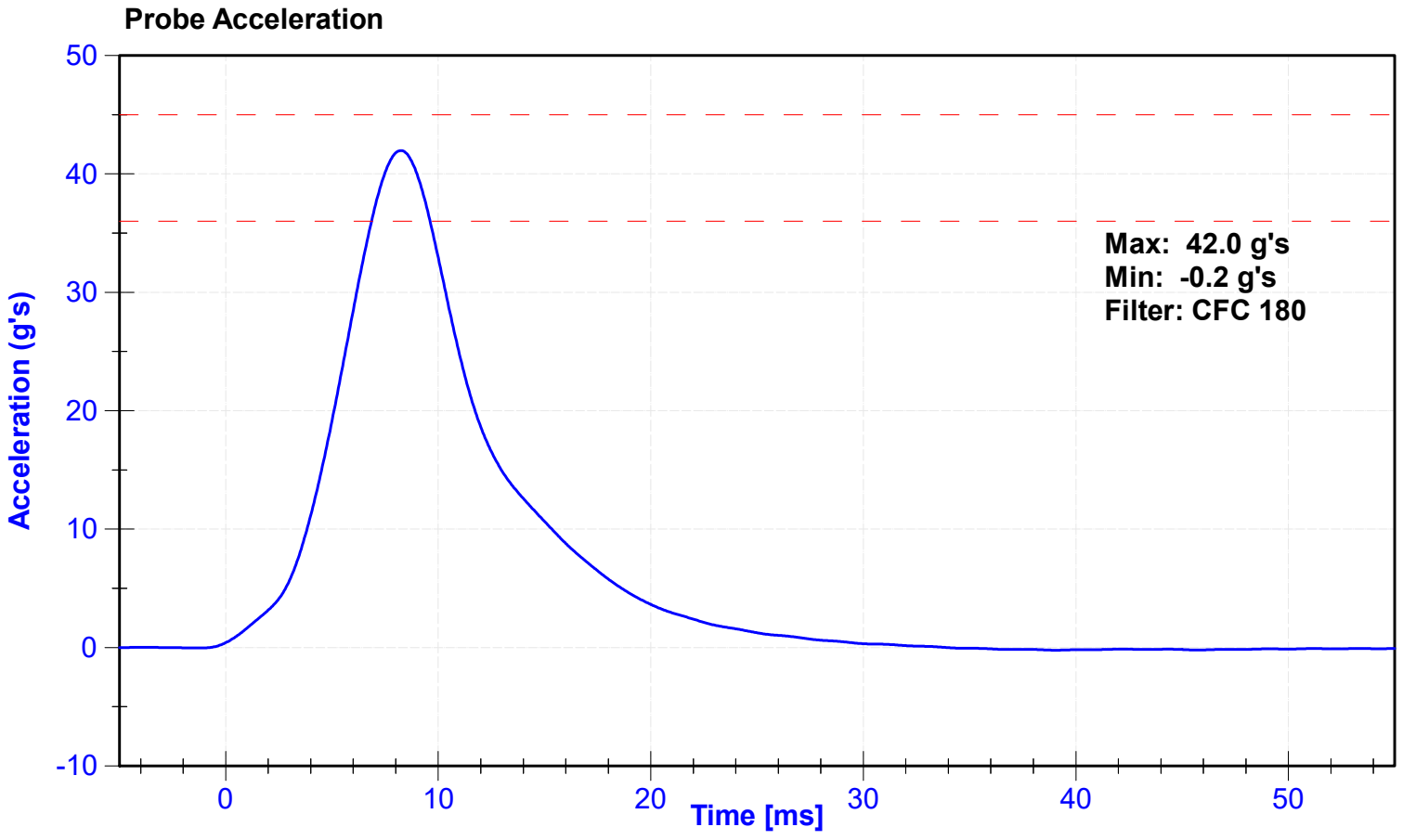
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

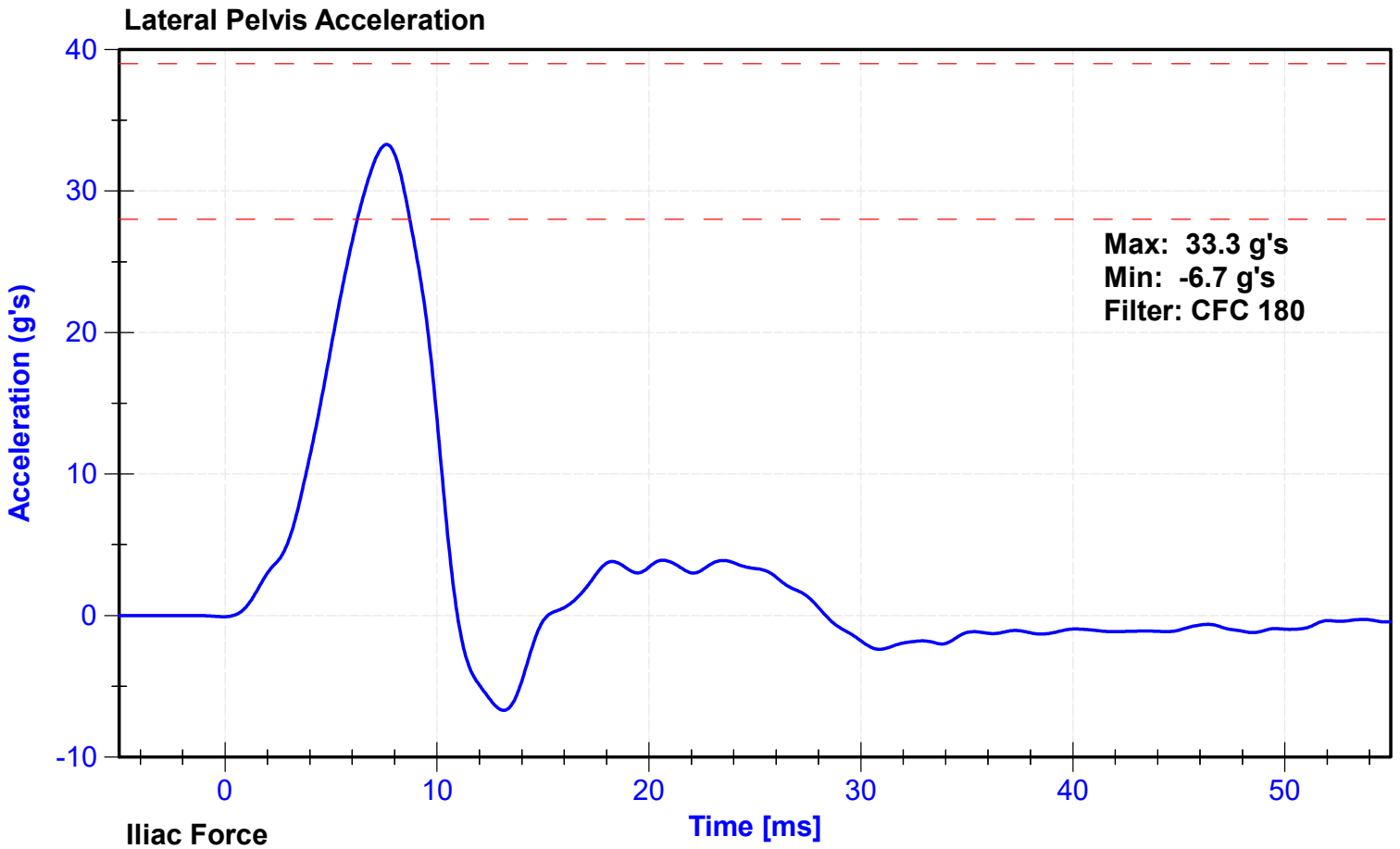
Results

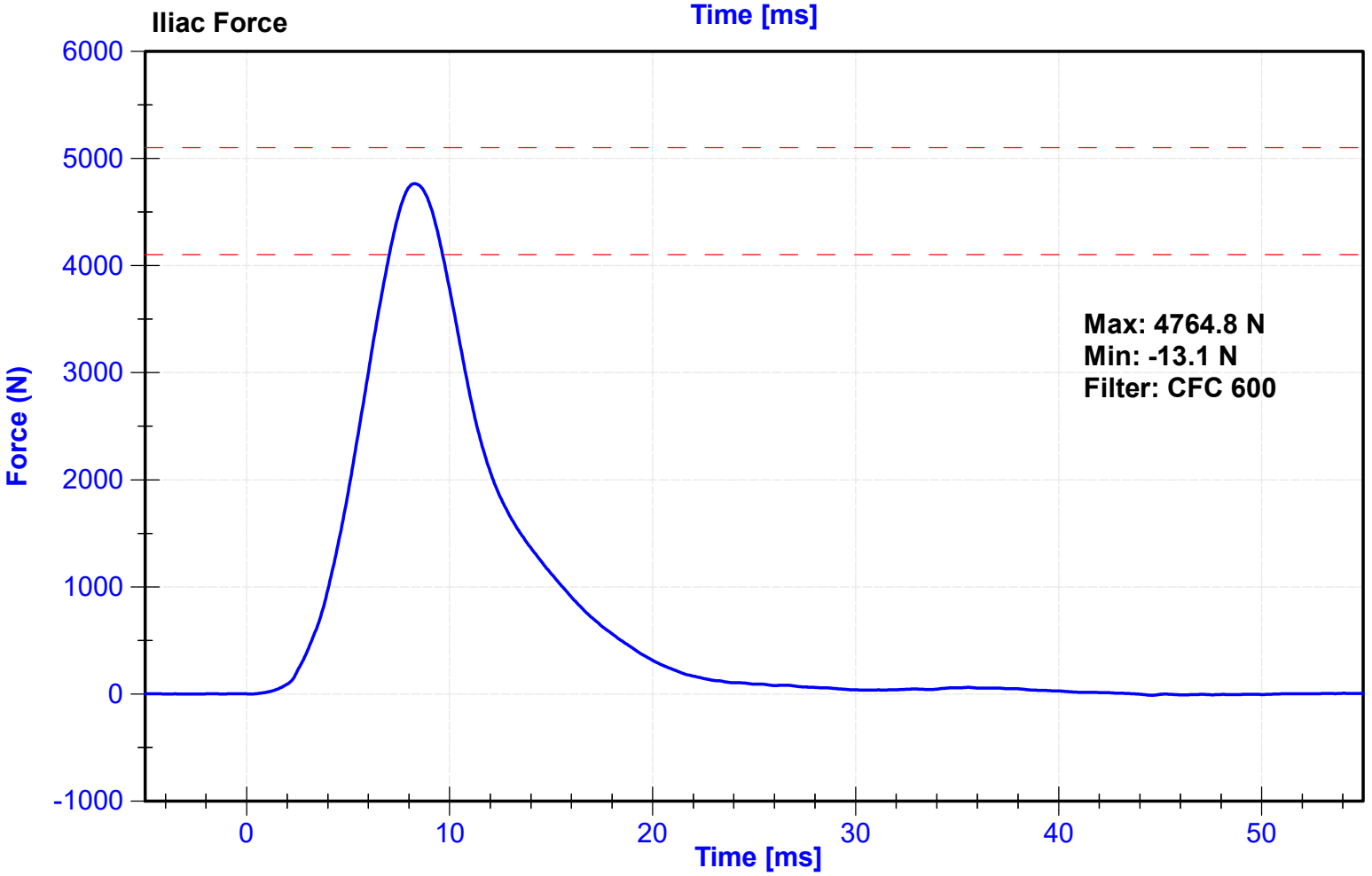
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	13.0	Pass
Velocity	4.2	4.4	m/s	4.20	Pass
Probe Acceleration	36	45	g's	42.0	Pass
Lateral Pelvis Acceleration	28	39	g's	33.3	Pass
Iliac Force	4100	5100	N	4764.8	Pass

Transducer Calibrations

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




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 33.3 g's
Min: -6.7 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: 4764.8 N
Min: -13.1 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	1/17/2023
		Y	P49216	Endevco	1/17/2023
		Z	P51303	Endevco	1/17/2023
	Redundant	X	P58868	Endevco	1/17/2023
		Y	P59020	Endevco	1/12/2023
		Z	P52132	Endevco	1/17/2023
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	1/17/2023
	Middle	Y	185GFE	Honeywell	1/17/2023
	Lower	Y	178GFE	Honeywell	1/17/2023
Abdomen Load Cells	Forward	Y	1509	Denton	8/12/2022
	Middle	Y	1508	Denton	8/12/2022
	Rear	Y	1507	Denton	8/12/2022
Lower Spine Accelerometers (T12)		X	P51740	Endevco	1/17/2023
		Y	P83320	Endevco	1/17/2023
		Z	P52033	Endevco	1/17/2023
Pubic Symphysis Load Cell		Y	459-FY	Denton	6/14/2022

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N __DG8012__		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	P74788	Endevco	12/12/2022
			Y	P51668	Endevco	12/12/2022
			Z	P83319	Endevco	12/12/2022
		Redundant	X	P80334	Endevco	12/12/2022
			Y	P52155	Endevco	12/12/2022
			Z	P83322	Endevco	12/12/2022
Displacement Potentiometers	Thoracic Rib	Upper	Y	1199GFE	Servo	12/13/2022
		Middle	Y	1246GFE	Servo	12/13/2022
		Lower	Y	011GFE	Servo	12/13/2022
	Abdominal Rib	Upper	Y	008GFE	Servo	12/13/2022
		Lower	Y	041 GFE	Servo	12/13/2022
Lower Spine Accelerometers (T12)			X	P71272	Endevco	12/12/2022
			Y	P51327	Endevco	12/12/2022
			Z	P52067	Endevco	12/12/2022
Acetabulum Load Cell			Y	276-FY	Denton	8/11/2022
Iliac Wing Load Cell			Y	290-FY	Denton	8/11/2022
Pelvis Plug (struck side)				15361	SACO	1/9/2023
Pelvis Plug (non-struck side)				15247	SACO	1/9/2023

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	G22219	Endevco	9/21/2022
	Vehicle Center of Gravity	Y	G22224	Endevco	9/21/2022
	Vehicle Center of Gravity	Z	G22230	Endevco	9/21/2022
2	Right Sill at Front Seat	X	A255839	Measurement Specialties	1/20/2023
	Right Sill at Front Seat	Y	A428008	Measurement Specialties	10/31/2022
	Right Sill at Front Seat	Z	A315707	Measurement Specialties	1/20/2023
3	Right Sill at Rear Seat	X	A280942	Measurement Specialties	1/20/2023
	Right Sill at Rear Seat	Y	A315958	Measurement Specialties	1/20/2023
	Right Sill at Rear Seat	Z	A374220	Measurement Specialties	1/20/2023
4	Left Sill at Front Door	Y	A399938	Measurement Specialties	1/20/2023
5	Left Sill at Rear Door	Y	A315814	Measurement Specialties	1/20/2023
6	Left A-Post Lower	Y	G22231	Endevco	1/5/2023
7	Left A-Post Middle	Y	G22647	Endevco	11/24/2022
8	Left B-Post Lower	Y	G22596	Endevco	1/9/2023
9	Left B-Post Middle	Y	G22616	Endevco	11/2/2022
10	Front Seat Track	Y	A405554	Measurement Specialties	11/8/2022
11	Rear Seat Track or Structure	Y	A428009	Measurement Specialties	11/21/2022
12	Right Rear Occ. Compartment	Y	G22645	Endevco	11/24/2022
13	Engine Block	X	A374261	Measurement Specialties	12/29/2022
	Engine Block	Y	A374319	Measurement Specialties	12/29/2022
14	Rear Floorpan Above Axle	X	A282683	Measurement Specialties	11/14/2022
	Rear Floorpan Above Axle	Y	A335462	Measurement Specialties	11/14/2022
	Rear Floorpan Above Axle	Z	A373249	Measurement Specialties	11/14/2022

TABLE 4 – MDB Instrumentation

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