REPORT NUMBER: SINCAP-CAL-24-004

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

Hyundai Motor Company
2024 Hyundai Ioniq 5
5 Door Hatchback

NHTSA No: O20244207

PREPARED BY:
CALSPAN CORPORATION
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October 25, 2024

FINAL REPORT

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

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Prepared by: Alexander Rudniski Date: October 25, 2024
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Matthew Pronko, Test Engineer

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: _____

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7. Author(s) Alexander Rudniski, Test Engineer Matthew Pronko, Test Engineer	***8. Performing Organization Report No.*** CAL-DOT-2024-004
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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 2024 Hyundai Ioniq 5 5 Door Hatchback in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 20, 2024.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.11 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 227 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	100.085
Maximum Thorax Rib Deflection	mm	44	28.937
Total Abdominal Force	N	2500	1367.420
Pubic Symphysis Force	N	6000	1069.048
Lower Spine (T12) Resultant Acceleration	G	82*	35.906

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	57.434
Maximum Thorax Rib Deflection	mm	38*	13.973
Lower Spine (T12) Resultant Acceleration	G	82	27.608
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	848.509
Maximum Abdominal Rib Deflection	mm	45*	10.846

**Proposed IARV*

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

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

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2024 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2024 Hyundai Ioniq 5 5 Door Hatchback. 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 2024 Hyundai Ioniq 5 5 Door Hatchback was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.11 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 20, 2024. 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	100.085
Maximum Thorax Rib Deflection	mm	44	28.937
Total Abdominal Force	N	2500	1367.420
Pubic Symphysis Force	N	6000	1069.048
Lower Spine (T12) Resultant Acceleration	G	82*	35.906

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	57.434
Maximum Thorax Rib Deflection	mm	38*	13.973
Lower Spine (T12) Resultant Acceleration	G	82	27.608
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	848.509
Maximum Abdominal Rib Deflection	mm	45*	10.846

*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 – 300

Data Anomalies:

The following channel was questionable for:

- Left Front Sill Y Acceleration, Exceeded calibration range at 10.3 ms 44.8 ms
- Left Rear Sill Y Acceleration, Exceeded calibration range at 11 ms
- Left B-Pillar Middle Y Acceleration, Exceeded calibration range at 11.1 ms
- Left Front Sill Y Acceleration, Exceeded calibration range at 10.3 ms 44.8 ms
- Left Rear Sill Y Acceleration, Exceeded calibration range at 11 ms
- Left B-Pillar Middle Y Acceleration, Exceeded calibration range at 11.1 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 - Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 - Dummy Lateral Clearance Dimensions

Data Sheet No. 5 - Camera and Instrumentation Data

Data Sheet No. 6 - Test Vehicle Accelerometer Locations

Data Sheet No. 7- MDB Accelerometer Locations

Data Sheet No. 8 - Post-Test Observations

Data Sheet No. 9 - MDB Summary of Results

Data Sheet No. 10 - Test Vehicle Profile Measurements

Data Sheet No. 11 - Test Vehicle Exterior Crush Measurements

Data Sheet No. 12 - MDB Exterior Static Crush Measurements

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

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

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

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

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

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

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

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

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback
NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test
Test Date: 02/20/2024

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20244207
Model Year	2024
Make	Hyundai
Model	Ioniq 5
Body Style	5 Door SUV
VIN	KM8KM4DB2RU247540
Body Color	Lucid Blue
Odometer Reading (km/mi)	11 mi
Engine Displacement (L)	N/A
Type / No. Cylinders	Electric Vehicle
Engine Placement	N/A
Transmission Type	Automatic
Transmission Speeds	Direct Drive
Overdrive	No
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
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	Hyundai Motor Company
Date of Manufacture	SEP/2023
Vehicle Type	MPV

GVWR (KG)	2395
GAWR Front (KG)	1280
GAWR Rear (KG)	1370

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	N/A	5	
Vehicle Capacity Weight (VCW) (kg)				430	(A)
DSC x 68.04 kg				340	(B)
Cargo Weight (RCLW) (kg)				90	(A-B)

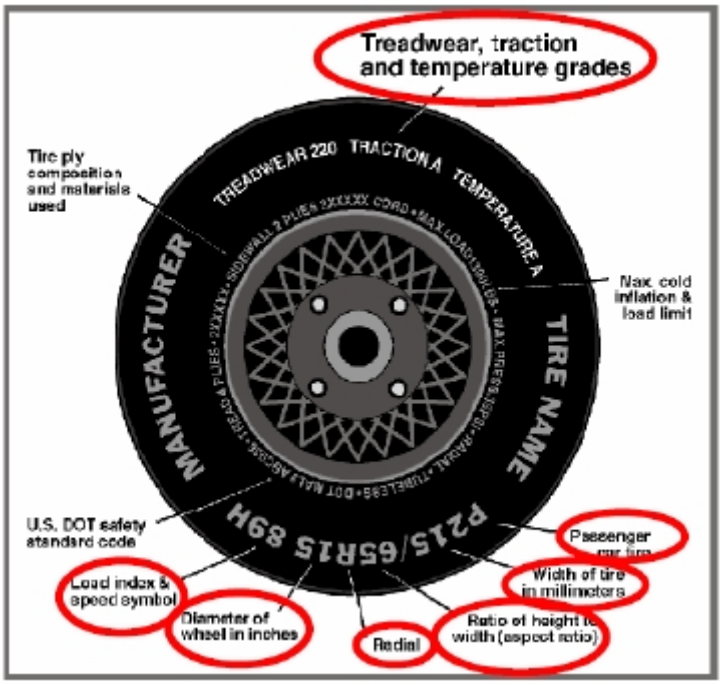
VEHICLE SEAT TYPE

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

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	235/55R19	235/55R19
Tire Size on Vehicle	235/55R19	235/55R19
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy	Primacy
Treadwear	540	540
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index / Speed Symbol	101H	101H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1B9 8F OBLX 3223	1B9 8F OBLX 3223
DOT Safety Code Right	1B9 8F OBLX 3223	1B9 8F OBLX 3223

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

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback | NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test | Test Date: 02/20/2024

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	253	253	252	250
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

MDB TIRE SPECIFICATIONS

	Units	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	452	475		503	544		494	571	
Right	kg	449	472		480	531		461	540	
Ratio	%	48.8	51.2		47.8	52.2		46.2	53.8	
Totals	kg	901	947	1848	983	1075	2058	955	1111	2066

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1848	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	90	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2065	(A+B+C)

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

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

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Rqmt***
LF	mm	868	867	Yes
RF	mm	877	872	Yes
RR	mm	883	884	Yes
LR	mm	876	882	Yes
Vehicle CG (Aft of Front Axle)	mm	1614	1568	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	+26	+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:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	17
Right Rear Window	3
Tire Kit	3
Ballast / Equipment Added	25

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	922
Aft 25 mm target	919
Pre-Impact Angle Line	230

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

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

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	22.3	12.9	17.6
Front Passenger Seat	17.0	13.8	15.4
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixe	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	17.6	17.6	Max	71	78	84
			Mid	38	45	51
			Min	4	12	18
Front Passenger Seat	15.4	15.4	Max	-	-	-
			Mid	-	-	-
			Min	10	17	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:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

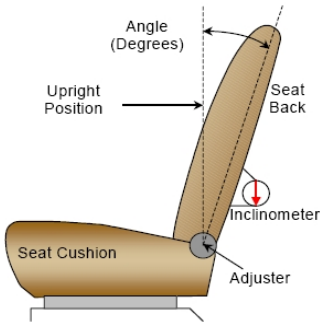
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	260	Power	130	Power
Front Passenger Seat	260	27 (0-26)	130	13
Front Center Seat				
Struck Side Rear Seat	135	10 (0-9)	135	9
Non-Struck Side Rear Seat	135	10 (0-9)	135	9
Rear Center Seat	135	10 (0-9)	135	9

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

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



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	64.4	Power	2.0	Power
Front Passenger Seat	59.9	31 (0-30)	2.8	6
Front Center Seat*				
Struck Side Rear Seat w/ Seated Dummy	32.4	16 (0-15)	8.55	0
Non-Struck Side Rear Seat	23.5	16 (0-15)	8.55	0
Rear Center Seat*	32.4	16 (0-15)	8.55	0

**if applicable*

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

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

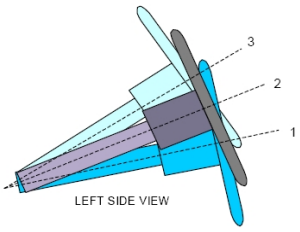
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

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

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	23.0	
Geometric center - Position No. 2	25.5	
Uppermost - Position No. 3	28.0	
Telescoping Steering Wheel Travel		55
Test Position	25.5	27.5

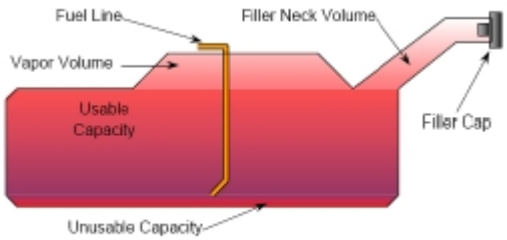


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

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



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

FUEL TANK CAPACITY

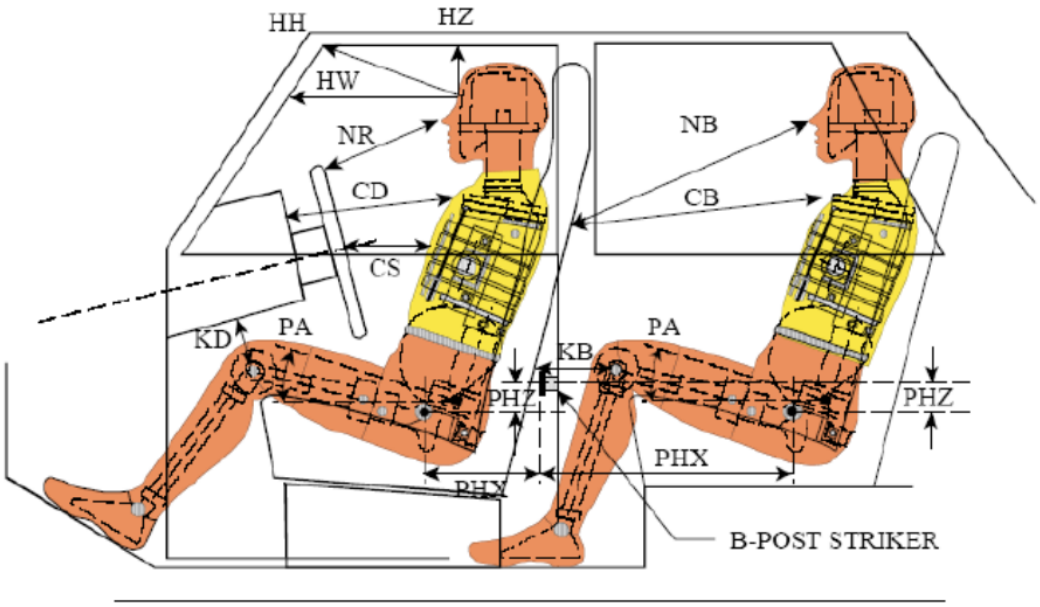
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	N/A
Usable Capacity of “Optional Tank” (see Form No. 1)	N/A
Usable Capacity of “Standard Tank” (see Owner’s Manual)	N/A
Usable Capacity of “Optional Tank” (see Owner’s Manual)	N/A
93% of Usable Capacity	N/A
Actual Amount of Solvent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

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



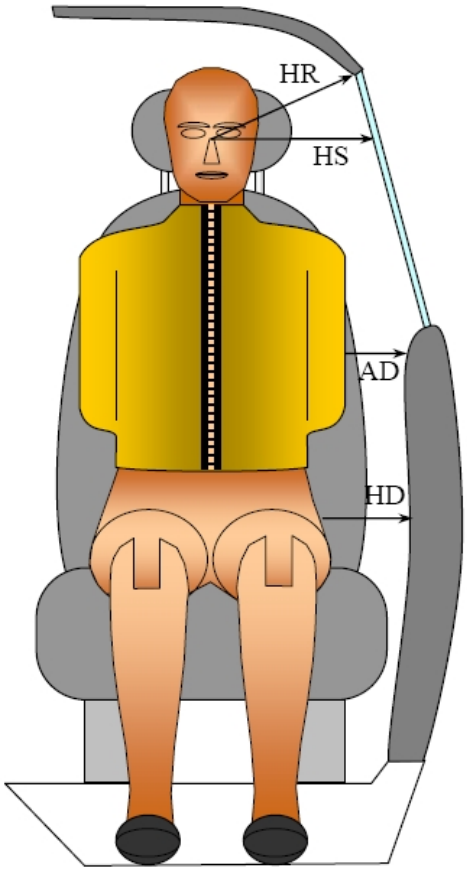
NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

LEFT SIDE VIEW

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Left Rear Passenger (Serial No. 300)	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Header to Header	375			
HW		Header to Windshield	667			
HZ	HZ	Head to Roof Liner	196		289	
NR	NB	Nose to Rim/Seat Back	425		557	
CD	CB	Chest to Dash/Seat Back	618		549	
CS		Chest to Steering Wheel	340			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	220	22.7	346	24.8
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	204	23.4	347	22.9
PAX°	PAX°	Pelvic Tilt Angle X		21.6		19.6
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (X-Axis)	219		358	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	182		188	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



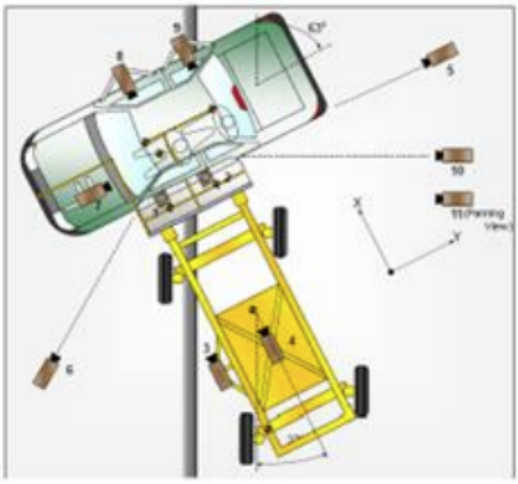
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Left Rear Passenger (Serial No. 300)
HR	Head to Side Header	mm	227	278
HS	Head to Side Window	mm	370	409
AD	Arm to Door	mm	118	196
HD	Hip Point to Door	mm	147	192

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback
NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test
Test Date: 02/20/2024



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	138	-9226	12.5	1000
2	Overhead Close-up	0	0	-9220	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	255	7575	-1290	28	1000
6	Left Front	-2560	-4318	-1308	24	1000
7	Driver Front (OB)				12.5	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	60
11	Real-time In Run				Zoom	60

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

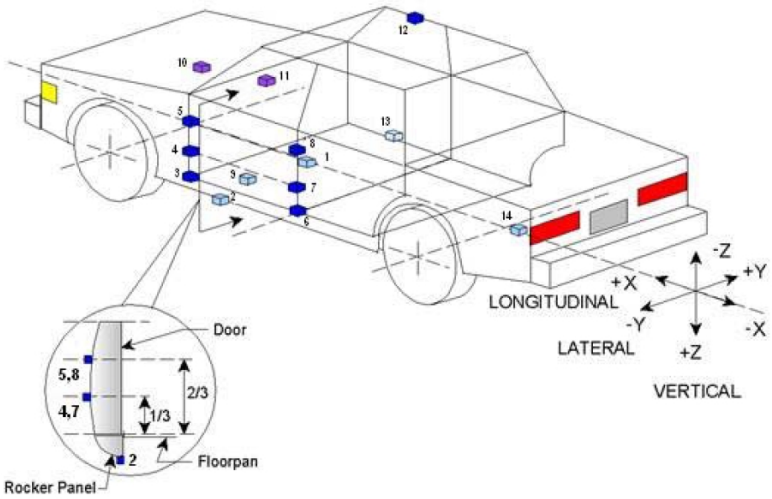
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

INSTRUMENTATION

Description	Number of Channels
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:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



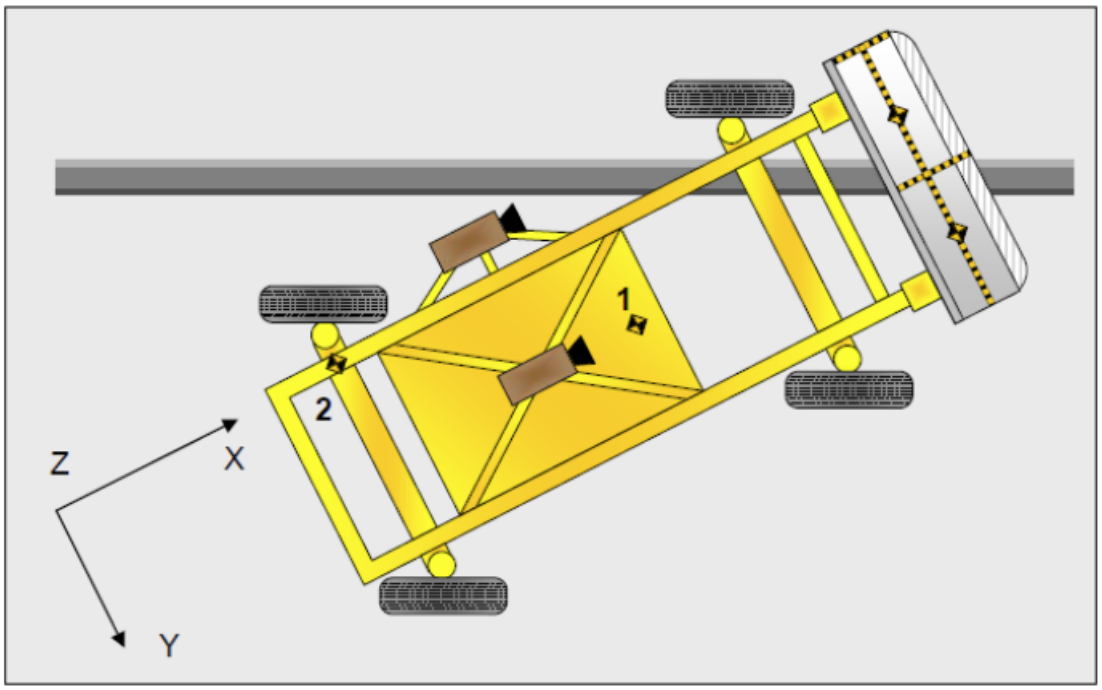
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1876	-6	535
2	Right Sill at Front Seat	2884	663	486
3	Right Sill at Rear Seat	1978	666	463
4	Left Sill at Front Door	2894	-664	480
5	Left Sill at Rear Door	1901	-662	473
6	A-Post Lower	3296	-649	308
7	A-Post Middle	3169	-682	-224
8	B-Post Lower	2135	-681	180
9	B-Post Middle	2088	-681	-226
10	Front Seat Track	2402	-566	491
11	Rear Seat Structure	1666	-564	366
12	Rt. Rear Occ. Compartment	2028	405	532
13	Engine Block	3827	-88	275
14	Rear Above Axle	460	1	289

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:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



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): 1508

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test Test Date: 02/20/2024

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag & Side Header	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag & Side Header	Curtain Airbag & Head Restraint
Left Shoulder	Curtain Airbag	Seat Back
Upper Torso	Seat Back	Seat Back
Lower Torso	Seat Back	Torso/Pelvis Airbag & Seat Back
Left Hip	Torso/ Pelvis Airbag and Seat Pan	Torso/Pelvis Airbag & Seat Pan
Left Knee	Door Trim	Door Trim

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar & C-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Driver and left rear passenger window cracked throughout
Other Notable Effects	None

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

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test Test Date: 02/20/2024

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		3002
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		508
Actual Impact Point (Aft of Frontal Axle)	mm		503
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+5
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	-2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

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

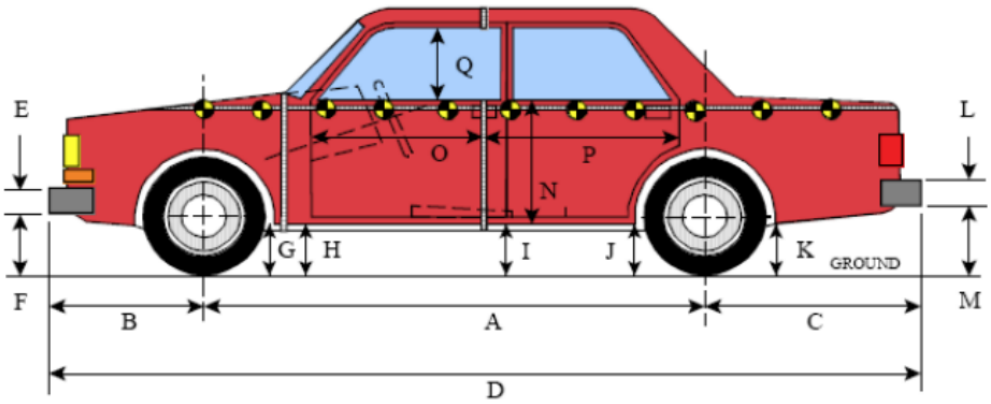
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.11
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.21
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	257
B	Top of Bumper	533	700	Right	143
C	Mid-Level	686	800	Right	143
D	Top of Stack	813	800	Left	114

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



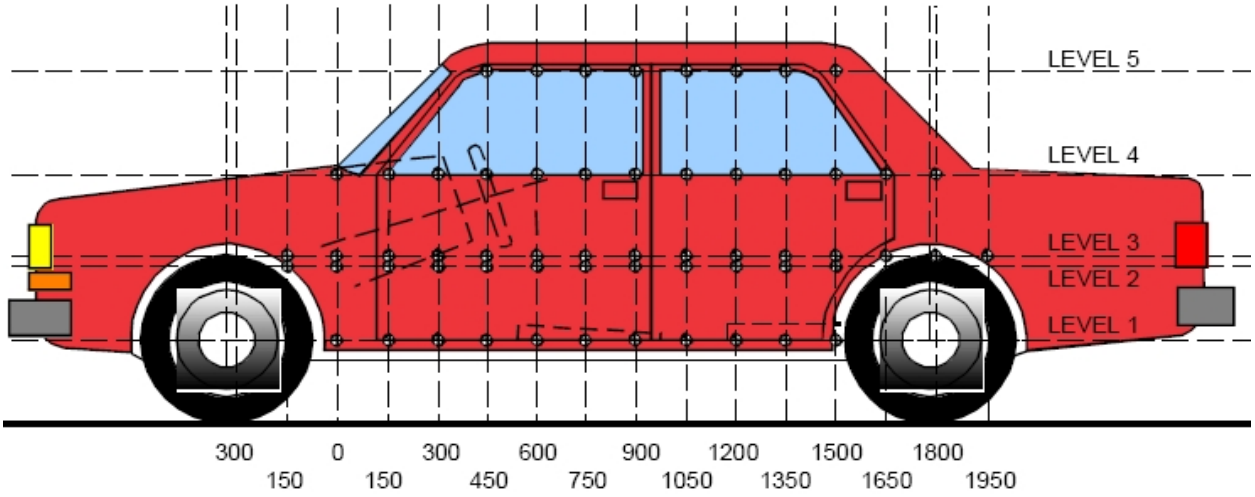
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	3002	2990	-12
B	Front Axle to FSOV	848	844	-4
C	Rear Axle to RSOV	784	800	16
D2	Total Length at Centerline	4634	4634	0
E	Front Bumper Thickness	124	124	0
F	Front Bumper Bottom to Ground	453	446	-7
G	Sill Height at Front Wheel Well	178	177	-1
H	Sill Height at Front Door Leading Edge	201	196	-5
I	Sill Height at B Pillar	205	222	17
J1	Sill Height at Rear Wheel Well	210	209	-1
J2	Pinch Weld Height at Rear Wheel Well	183	185	2
K	Sill Height Aft of Rear Wheel Well	246	253	7
L	Rear Bumper Thickness	180	180	0
M	Rear Bumper Bottom to Ground	511	512	1
N	Sill Height to Bottom of Front Window Sill	852	814	-38
O	Front Door Leading Edge to Impact CL	787	788	1
P	Rear Door Trailing Edge to Impact CL	1559	1538	-21
Q	Front Window Opening	455	486	31
R	Right Side Length	4559	4559	0
S	Left Side Length	4558	4557	-1
T	Vehicle Width at B-Pillars	1876	1750	-126
U	Front Wheel Track Width	1636	1631	-5
V	Rear Wheel Track Width	1660	1646	-14

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



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	287	51	1200
2	Occupant H-Point	mm	605	220	1500
3	Mid-Door	mm	692	227	1350
4	Window Sill	mm	1019	91	1350
5	Window Top	mm	1515	9	1650

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: 2024 Hyundai Ioniq 5 5 Door Hatchback NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test Test Date: 02/20/2024

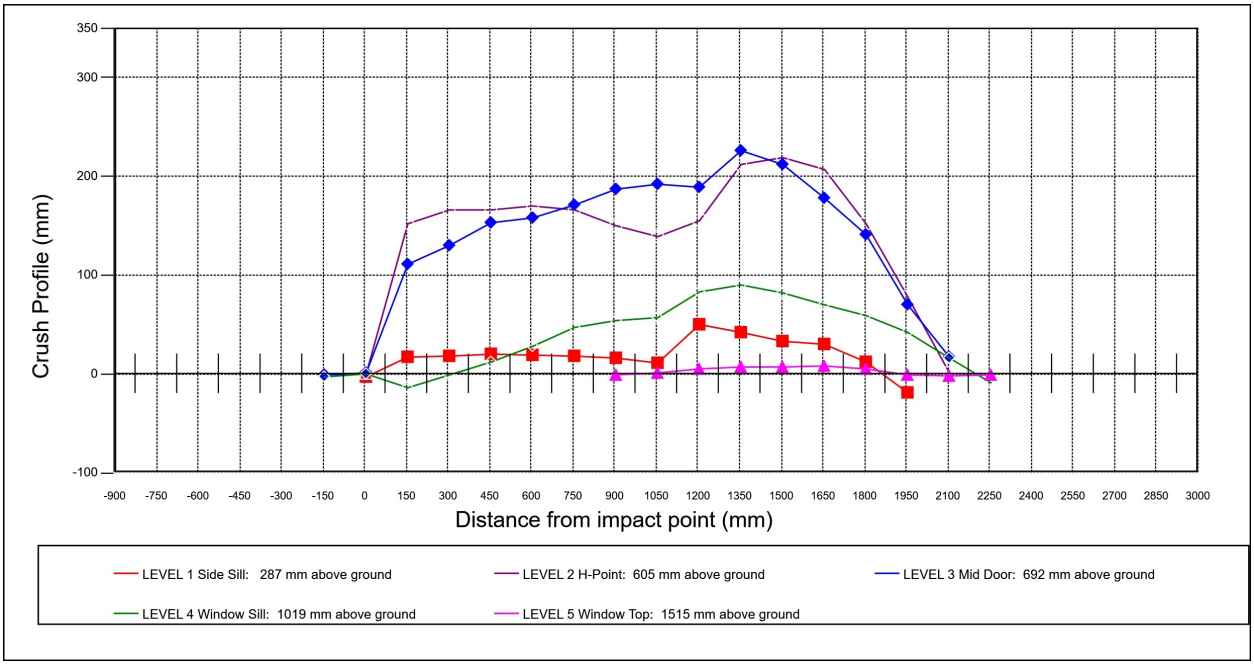
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	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															
-150		940	944	823			940	944	825			0	0	-2	
0	929	934	934	836		931	933	927	835		-2	1	7	1	
150	924	926	922	846		906	773	810	859		18	153	112	-13	
300	925	924	919	854		906	757	788	854		19	167	131	0	
450	925	922	918	861		904	755	764	848		21	167	154	13	
600	923	920	916	868		903	749	757	839		20	171	159	29	
750	921	918	912	873		902	751	740	825		19	167	172	48	
900	917	915	915	878	632	900	764	727	823	632	17	151	188	55	0
1050	912	912	917	883	642	900	772	724	825	640	12	140	193	58	2
1200	906	910	920	886	646	855	754	730	802	640	51	156	190	84	6
1350	901	913	921	889	648	858	700	694	798	640	43	213	227	91	8
1500	895	916	923	891	647	861	696	710	808	639	34	220	213	83	8
1650	890	918	925	892	646	859	710	746	821	637	31	208	179	71	9
1800	888	921	926	893	643	875	768	784	833	637	13	153	142	60	6
1950	894	923	926	891	637	912	844	855	848	637	-18	79	71	43	0
2100		937	935	888	624		935	917	871	625		2	18	17	-1
2250				882	605				890	605				-8	0
2400															
2550															
2700															
2850															
3000															

NOTE: *Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition.*
Vehicle measurements forward of the vertical impact reference line are negative.
The crush profile grid is established prior to test based on an estimated impact point.

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

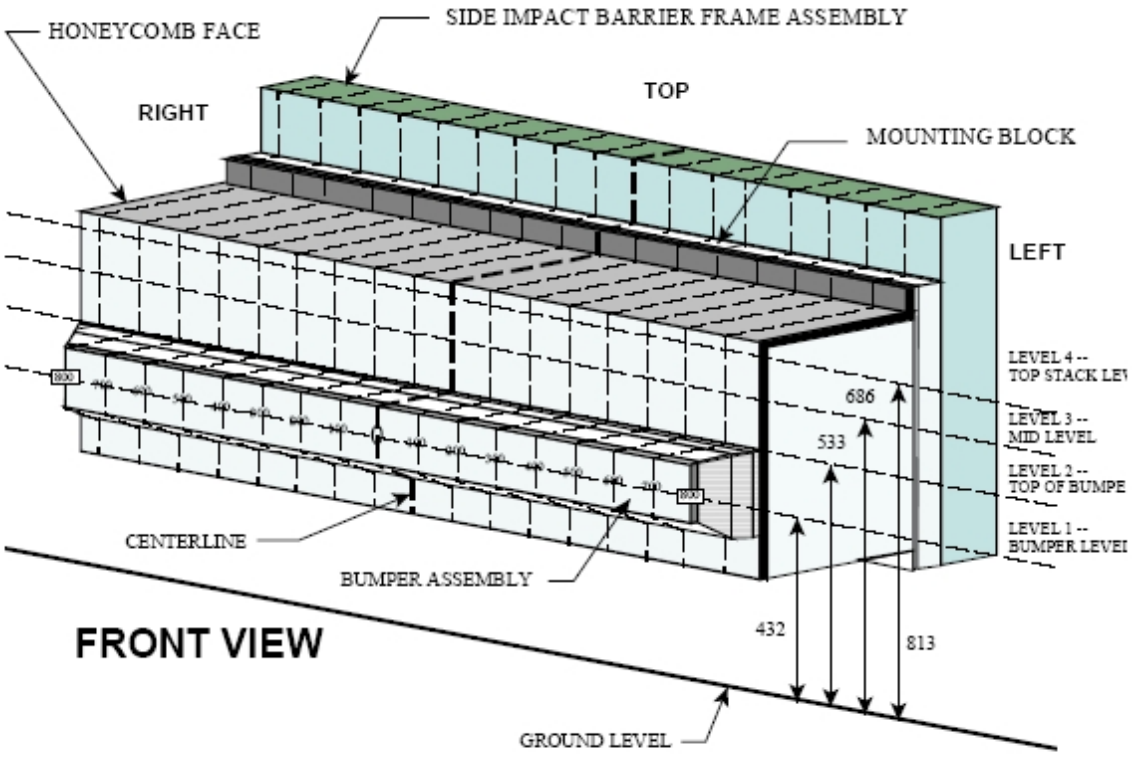
Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



NOTE: Dimensions are shown in millimeters, mm

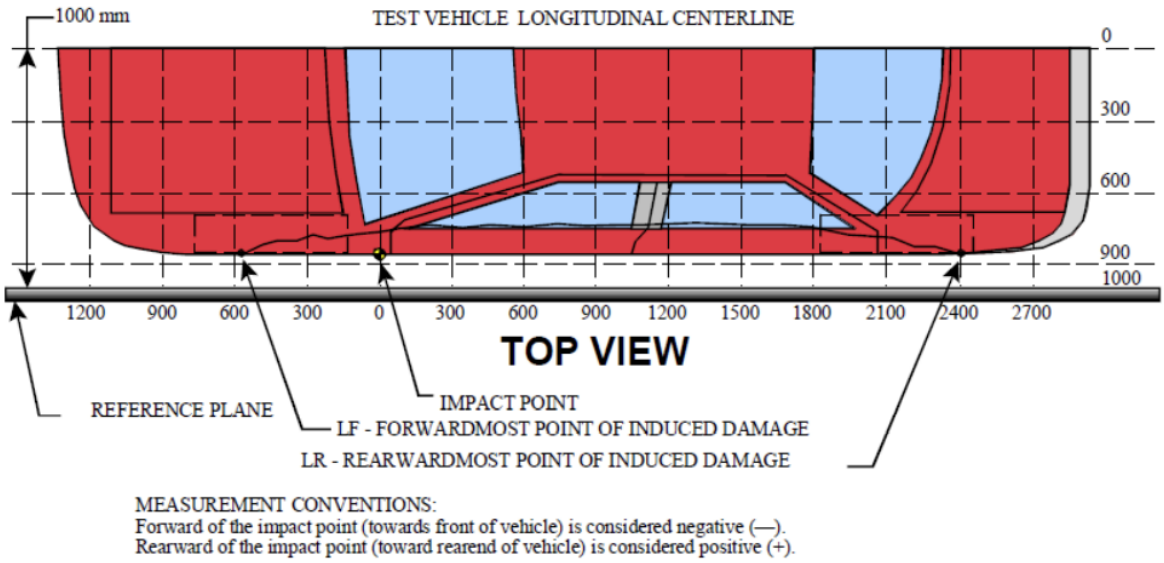
DEFORMABLE BARRIER STATIC CRUSH

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	257	251	248	247	243	240	237	231	228	214	210	204	200	196	192	193	225
2	143	140	139	137	129	139	132	129	121	112	105	91	87	84	81	74	91
3	143	88	65	53	56	78	76	61	53	45	42	44	46	52	71	93	124
4	107	76	52	41	41	52	78	105	69	58	55	59	65	74	87	100	114

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

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	0	3	73	71	2
2	420	3	231	82	149
3	840	3	268	86	182
4	1260	3	284	80	204
5	1680	3	246	75	171
6	2100	3	83	65	18

MDB DAMAGE PROFILE DISTANCES

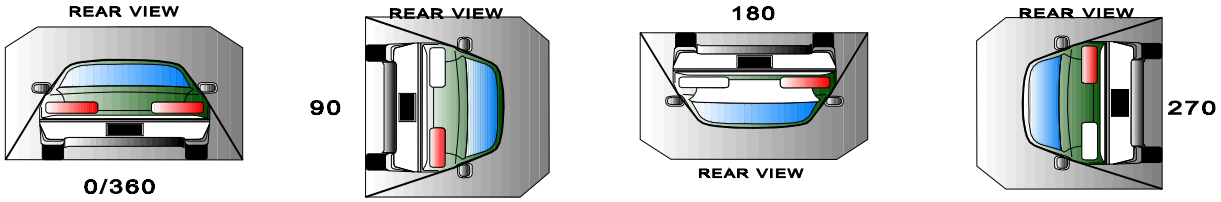
DPD	Distance From Center of MDB (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	280	505	-225
2	480 mm left of center	1	317	514	-197
3	160 mm left of center	1	302	514	-212
4	160 mm right of center	1	279	513	-235
5	480 mm right of center	1	267	513	-246
6	800 mm right of center	1	244	501	-257

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024
Test Time:	11:42 AM	Temperature:	21 °C

A. From impact until vehicle motion ceases: N/A oz
(Maximum allowable is 1 oz.)
B. For the 5-minute period after motion ceases: N/A oz
(Maximum allowable is 5 oz.)
C. For the following 25 minutes: N/A oz
(Maximum allowable is 1 oz.)

D. Spillage Detail: Electric Vehicle



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°			
90° to 180°			
180° to 270°			
270° to 360°			

FMVSS 301 SPILLAGE TABLE

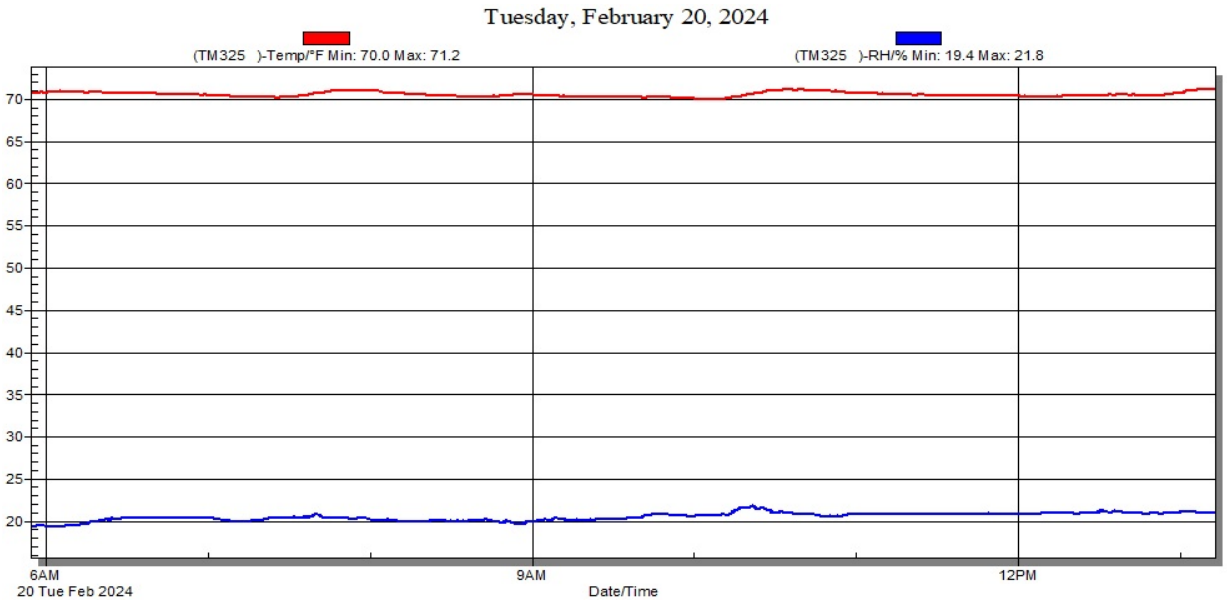
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°				
90° to 180°				
180° to 270°				
270° to 360°				

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024



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

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Electric
Propulsion Battery Type	Lithium-ion Polymer
Nominal Voltage (Volts)	697
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside of Propulsion Battery (Rear Side)
Auxiliary Battery Type	Lead-Acid

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	Liquid solution, LiPF6 salt, Carbonate solvent
Electrolyte Fluid Specific Gravity	1.19 g/cm3
Electrolyte Fluid Kinematic Viscosity (centistokes)	2~3 cP @ 25˚C
Electrolyte Fluid Color	Transparent & Pale Yellow
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Applied (Water-cooled type), Blue
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	480
Maximum State of Charge	V	826
95% of Maximum	V	784.7
Test Voltage *	V	594.4
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

* *For all battery types-No less than 95% of Maximum Operating Voltage; for batteries that are rechargeable ONLY by an energy source on the vehicle-maximum practicable state of charge within normal operating range*.
Battery charge indicator on vehicle instrumentation cluster showed that SOC was at 100%.

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

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

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Chassis ground is located on underside of vehicle body.
Details of Propulsion Battery Components	Additional high voltage system diagram provided in FMVSS 305 Form1.

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		06/20/2024

NOTES:

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

PROPULSION BATTERY VOLTAGE, RESISTANCE & ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	480-826
Propulsion Battery Voltage: (ready to drive position)	V_b	V	597.4
Propulsion Battery to Vehicle Chassis	V_1	V	422.0
Propulsion Battery to Vehicle Chassis	V_2	V	426.0
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	200,200
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	52.9
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	53.1
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	2,806,958
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	2,798,647
Lesser value of R_{i1} and R_{i2}	R_i	Ω	2,798,647
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	4,685

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

NOTES:

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

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

Test Vehicle:	2024 Hyundai Ioniq 5 5 Door Hatchback	NHTSA No.:	O20244207
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/20/2024

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Calibration Date		06/20/2024

NOTES:

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

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V_b =	13.7	V	Time:	1	Minutes	45	Seconds
V_1 =	2.8	V	Time:	1	Minutes	52	Seconds
V_2 =	9.7	V	Time:	1	Minutes	59	Seconds
R_o =	200,200	Ω					
V_1' =	0.1	V	Time:	2	Minutes	8	Seconds
V_2' =	0.2	V	Time:	2	Minutes	13	Seconds
R_{i1} =	24,131,250	Ω	Time:	2	Minutes	8	Seconds
R_{i2} =	12,254,510	Ω	Time:	2	Minutes	13	Seconds
R_i =	12,254,510	Ω/V	Time:	2	Minutes	13	Seconds
R_i/V_b =	894,490	Ω/V	Time:	2	Minutes	13	Seconds

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

NOTES:

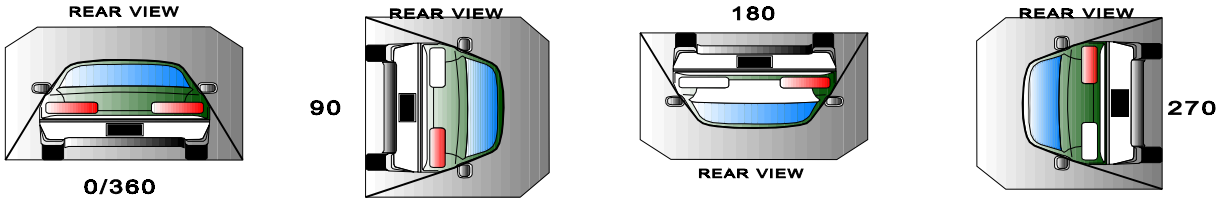
- *$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$, $R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$, R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical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

PROPULSION BATTERY SYSTEM COMPONENTS

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

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

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback
NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test
Test Date: 02/20/2024



Rear View

DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1 -3 min)		FMVSS 301 Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	12	5	6	12	7
90° to 180°	1	6	5	6	6	7
180° to 270°	1	1	5	6	1	7
270° to 360°	1	3	5	6	3	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

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

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

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

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Calibration Date		06/20/2024

NOTES:

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

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

Test Vehicle: 2024 Hyundai Ioniq 5 5 Door Hatchback
NHTSA No.: O20244207
Test Program: NCAP Side MDB Impact Test
Test Date: 02/20/2024

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units	R_o=200,200 Ω	Minutes	Seconds
V_b =	90°	13.7	V	Time:	1	23
	180°	13.7	V		11	4
	270°	13.7	V		17	33
	360°	13.7	V		23	35
V_1 =	90°	4.6	V	Time:	1	34
	180°	4.5	V		11	13
	270°	4.6	V		17	42
	360°	4.6	V		23	48
V_2 =	90°	5.7	V	Time:	1	54
	180°	5.7	V		11	31
	270°	5.7	V		18	1
	360°	5.8	V		24	4
V_1' =	90°	0.3	V	Time:	2	4
	180°	0.3	V		11	44
	270°	0.3	V		18	10
	360°	0.3	V		24	15
V_2' =	90°	0.4	V	Time:	2	13
	180°	0.4	V		11	57
	270°	0.4	V		18	20
	360°	0.4	V		24	25
R_{i1} =	90°	6,425,259	Ω	Time:	2	4
	180°	6,353,013	Ω		11	44
	270°	6,425,259	Ω		18	10
	360°	6,487,641	Ω		24	15
R_{i2} =	90°	4,793,385	Ω	Time:	2	13
	180°	4,746,847	Ω		11	57
	270°	4,793,385	Ω		18	20
	360°	4,846,221	Ω		24	25
R_i =	90°	4,793,385	Ω/V	Time:	2	13
	180°	4,746,847	Ω/V		11	57
	270°	4,793,385	Ω/V		18	20
	360°	4,846,221	Ω/V		24	25
R_i/V_b =	90°	349,882	Ω/V	Time:	2	13
	180°	346,485	Ω/V		11	57
	270°	349,882	Ω/V		18	20
	360°	353,739	Ω/V		24	25

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

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

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

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

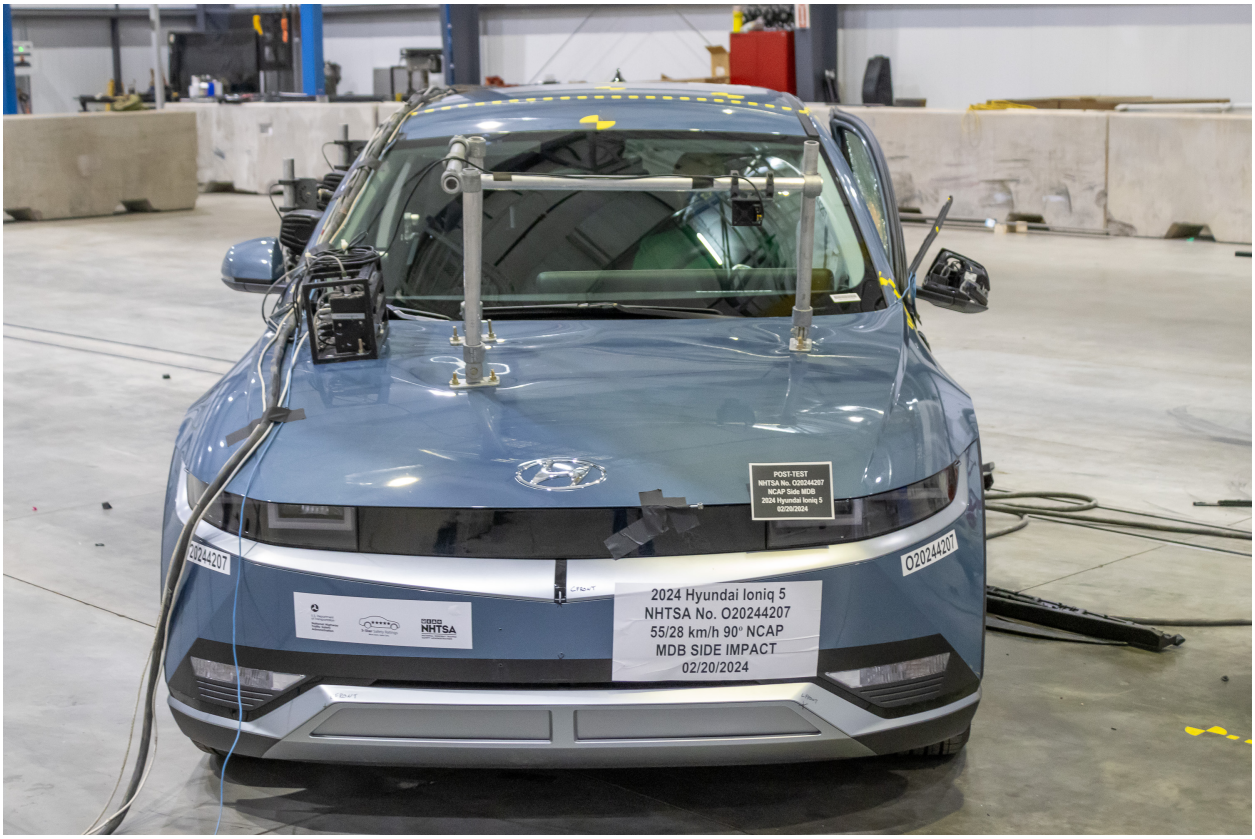


Figure A-4: Post-Test Frontal View of Test Vehicle

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

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

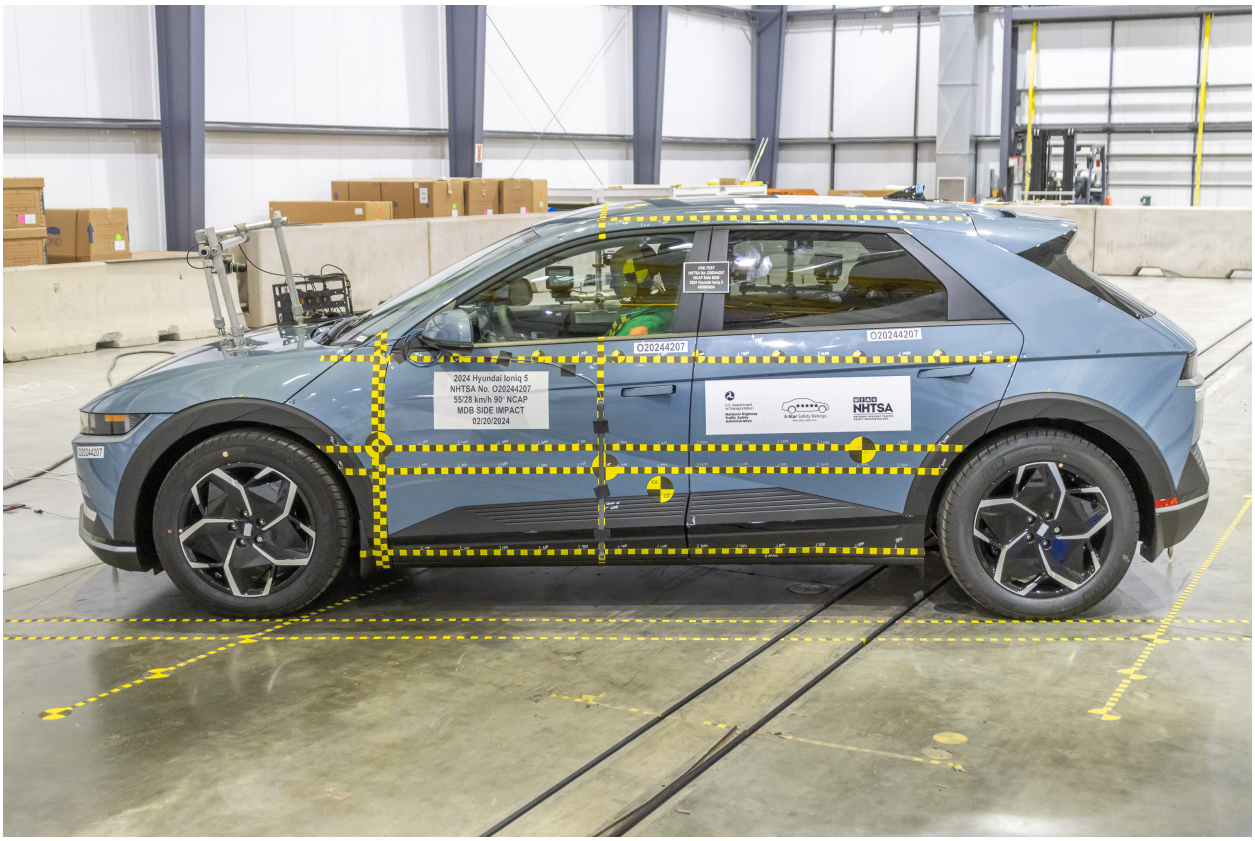


Figure A-7: Pre-Test Left Side View of Test Vehicle

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

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

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

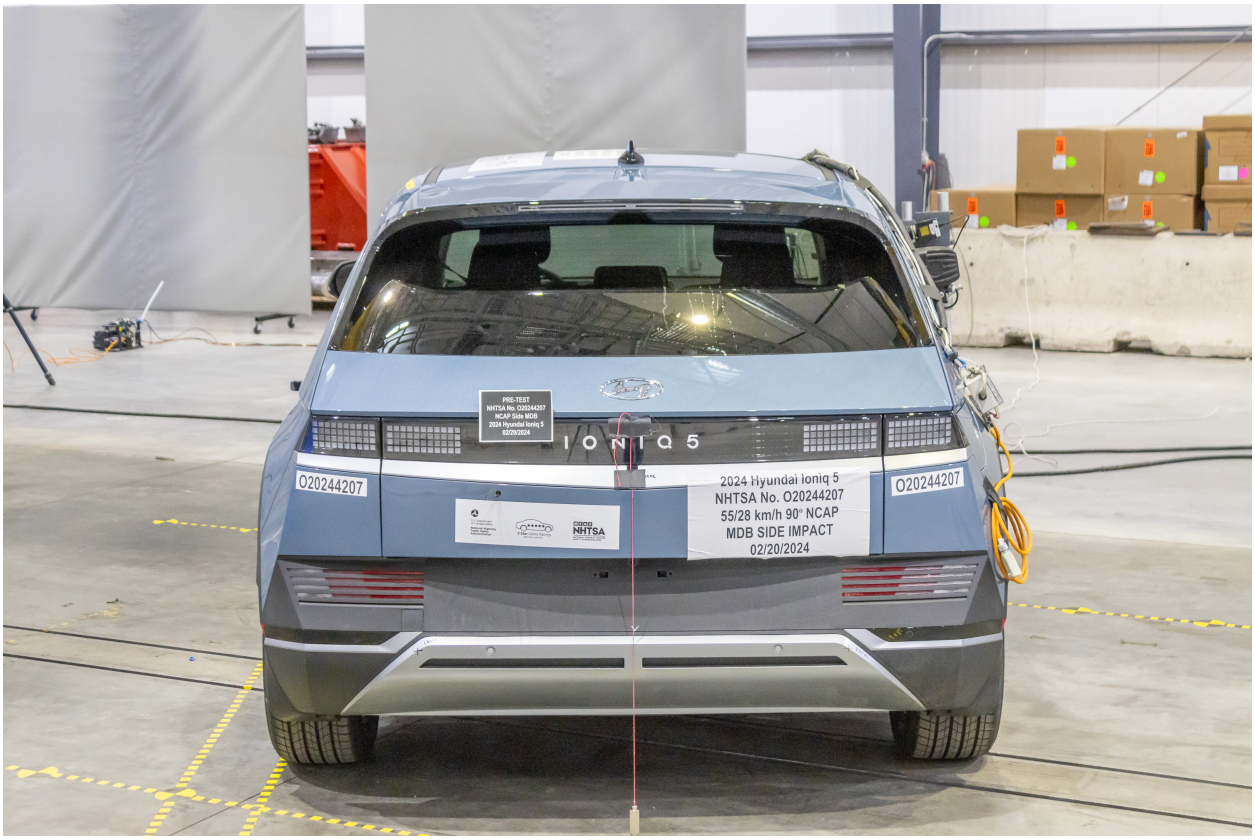


Figure A-11: Pre-Test Rear View of Test Vehicle

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

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

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

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

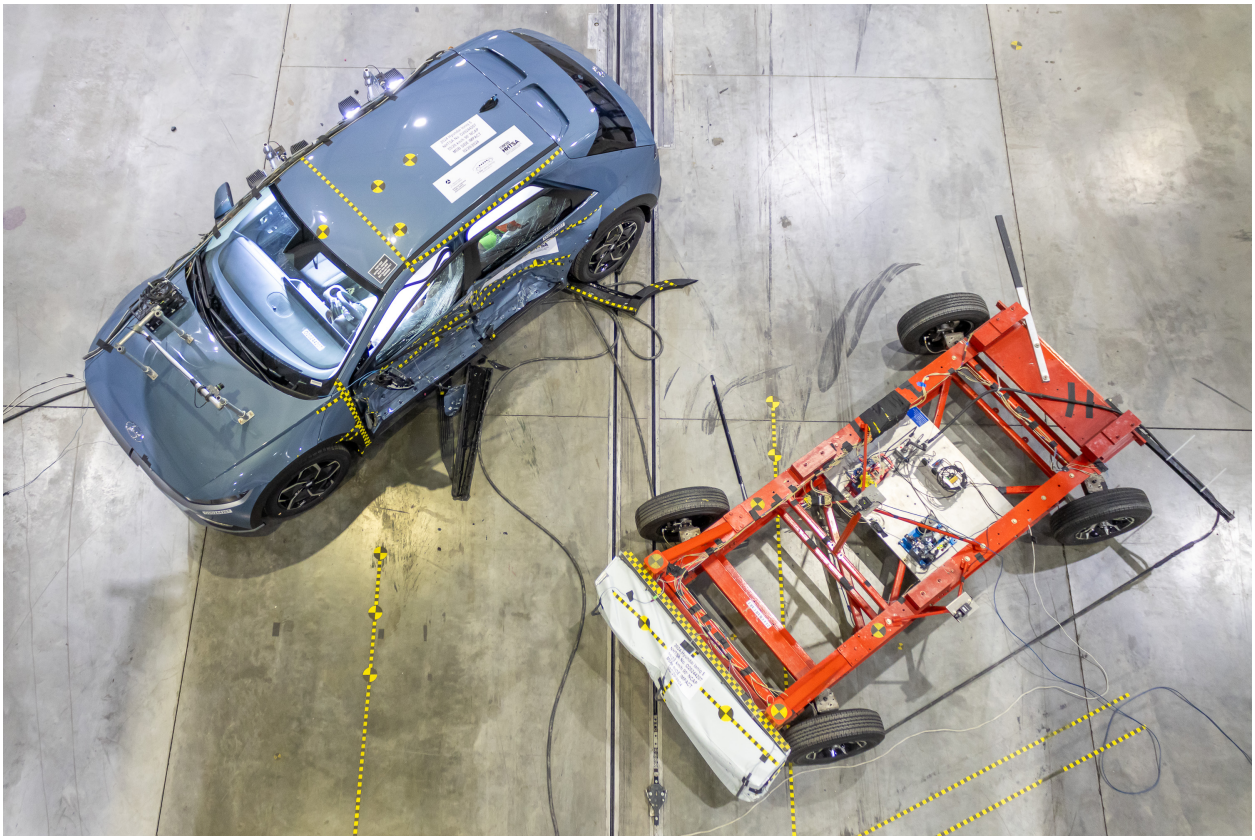


Figure A-16: Post-Test Overhead View of Test Area

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

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

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

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

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

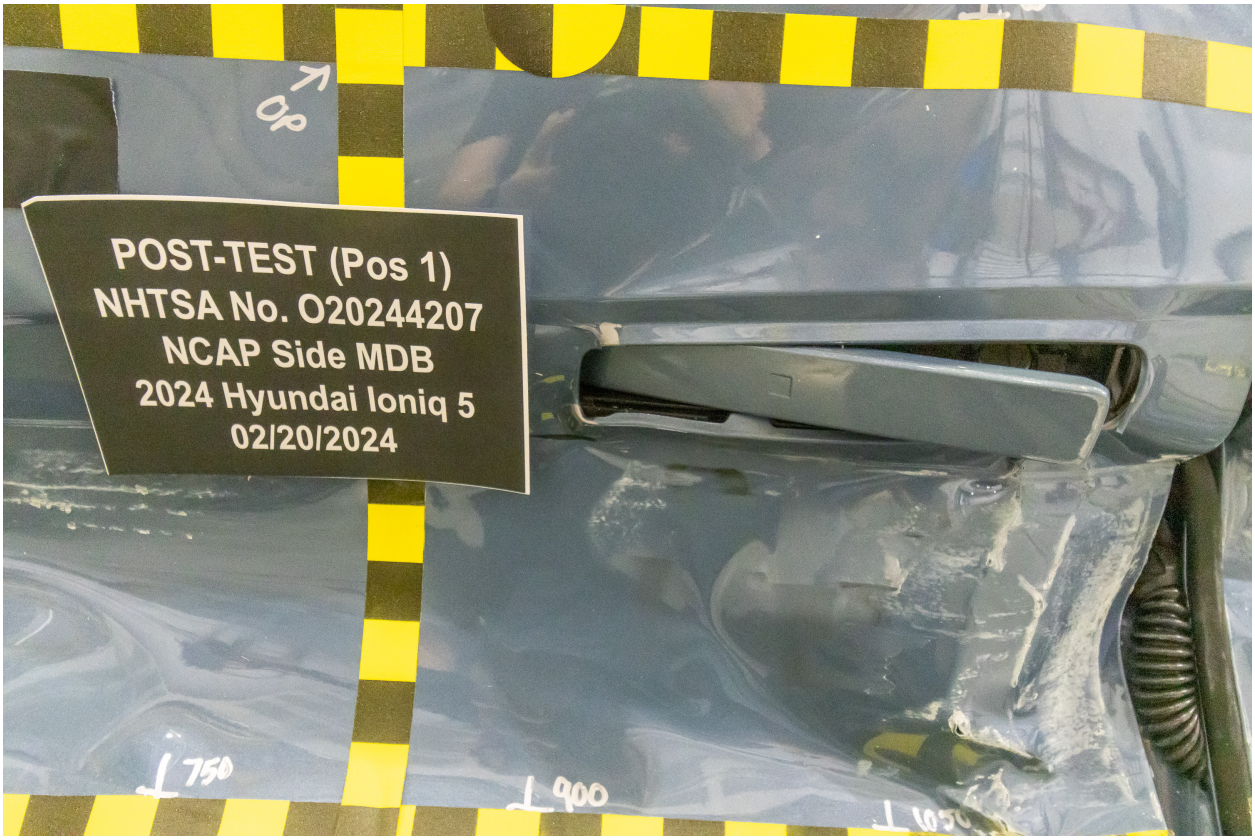


Figure A-22: Post-Test Left Front Door Latch Close-Up

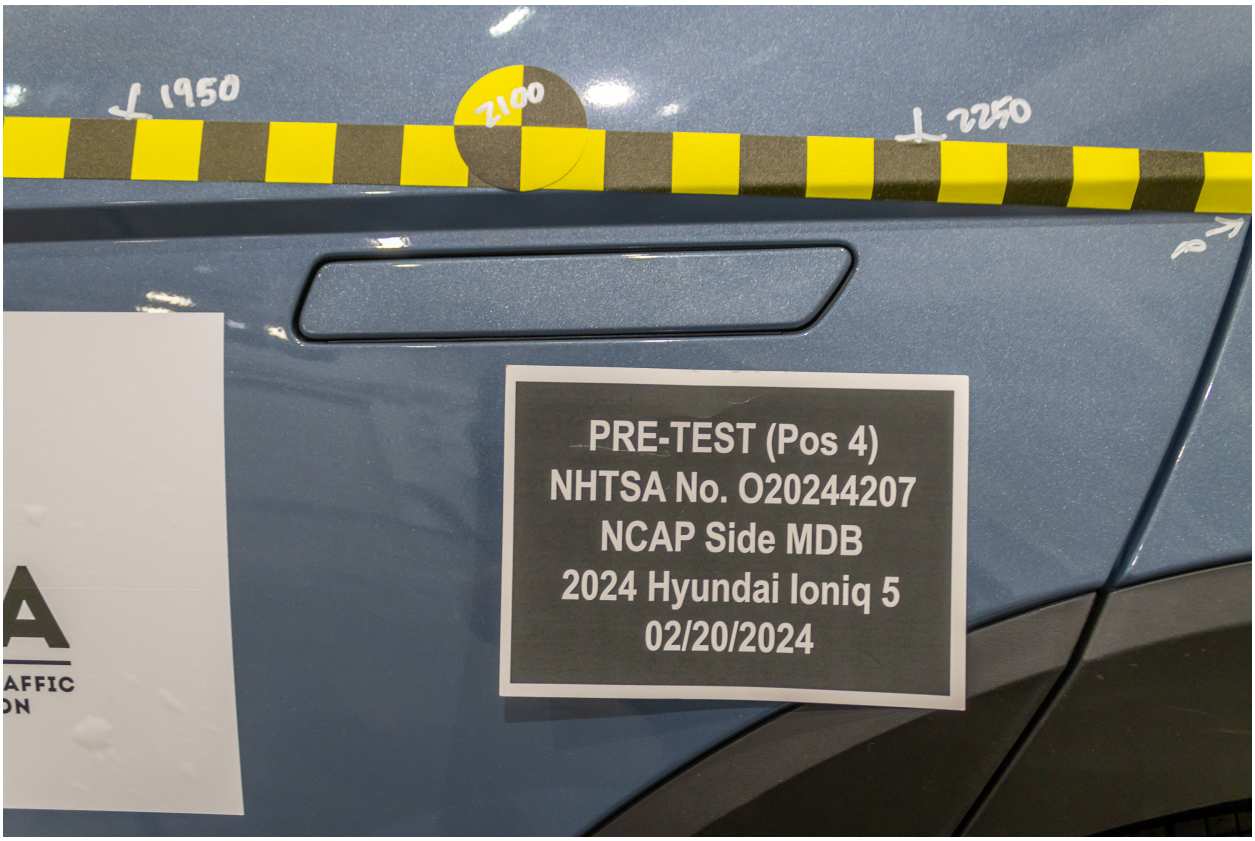


Figure A-23: Pre-Test Left Rear Door Latch Close-Up

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

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

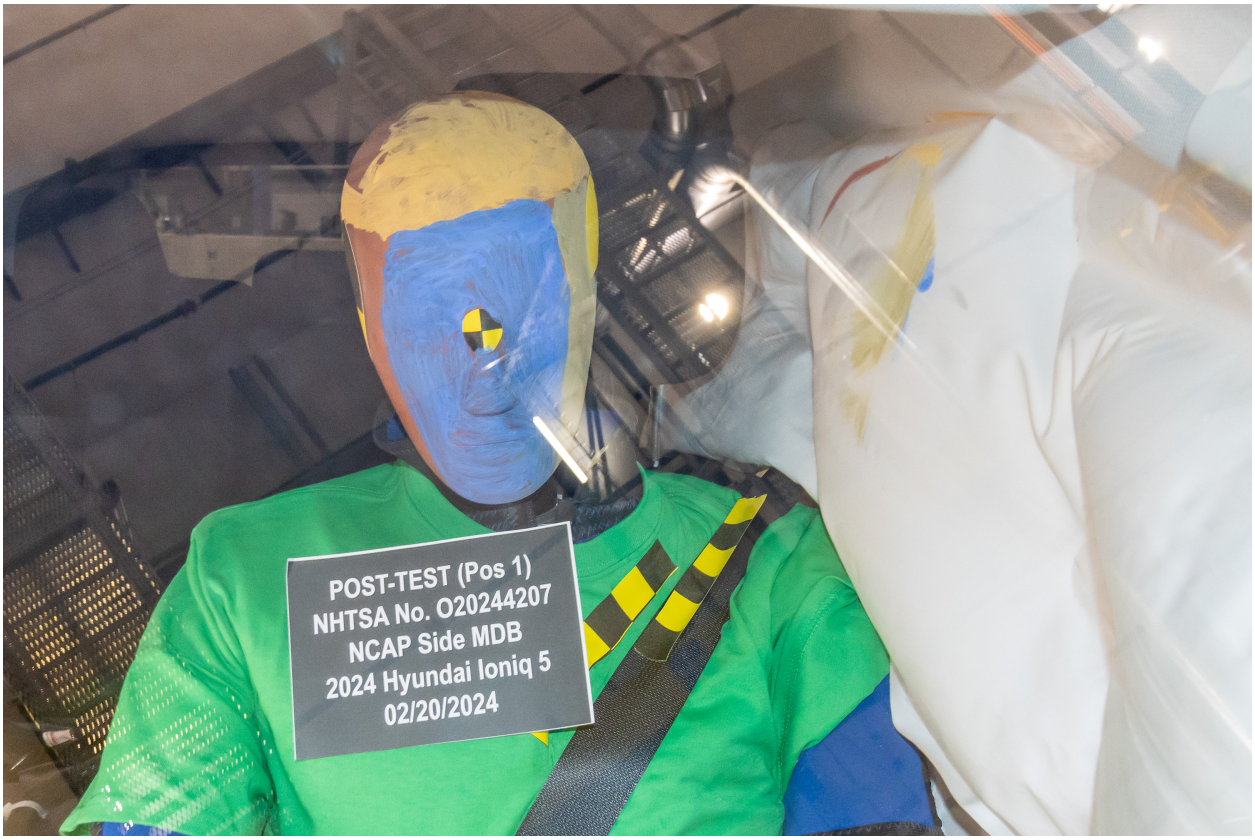


Figure A-26: Post-Test Front Close-up View of Driver Dummy

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

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

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

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

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

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

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

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

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

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

Figure A-37: View of Disengaged Parking Brake

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

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

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

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

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

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

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

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

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

Figure A-47: Post-Test Driver Inner Door Panel View

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

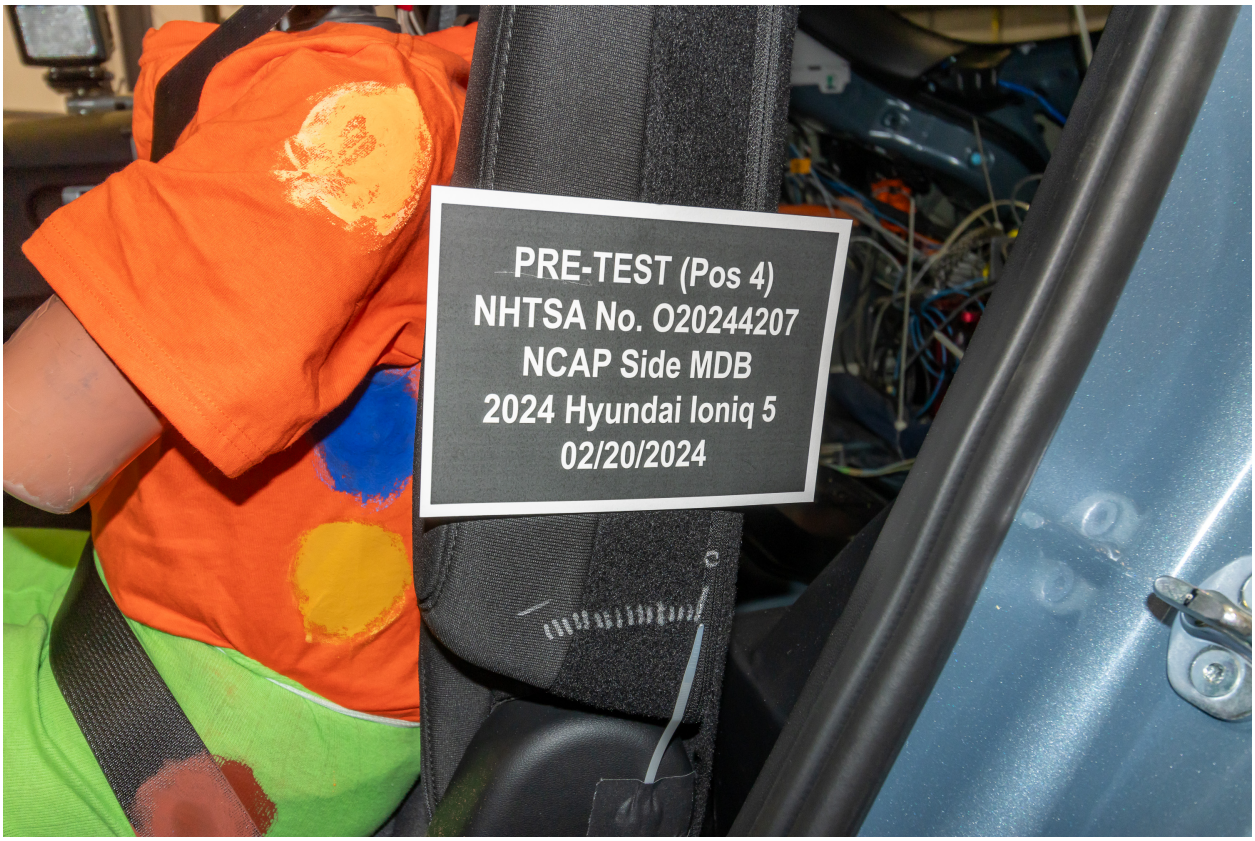


Figure A-67: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

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

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

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

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

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

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

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

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

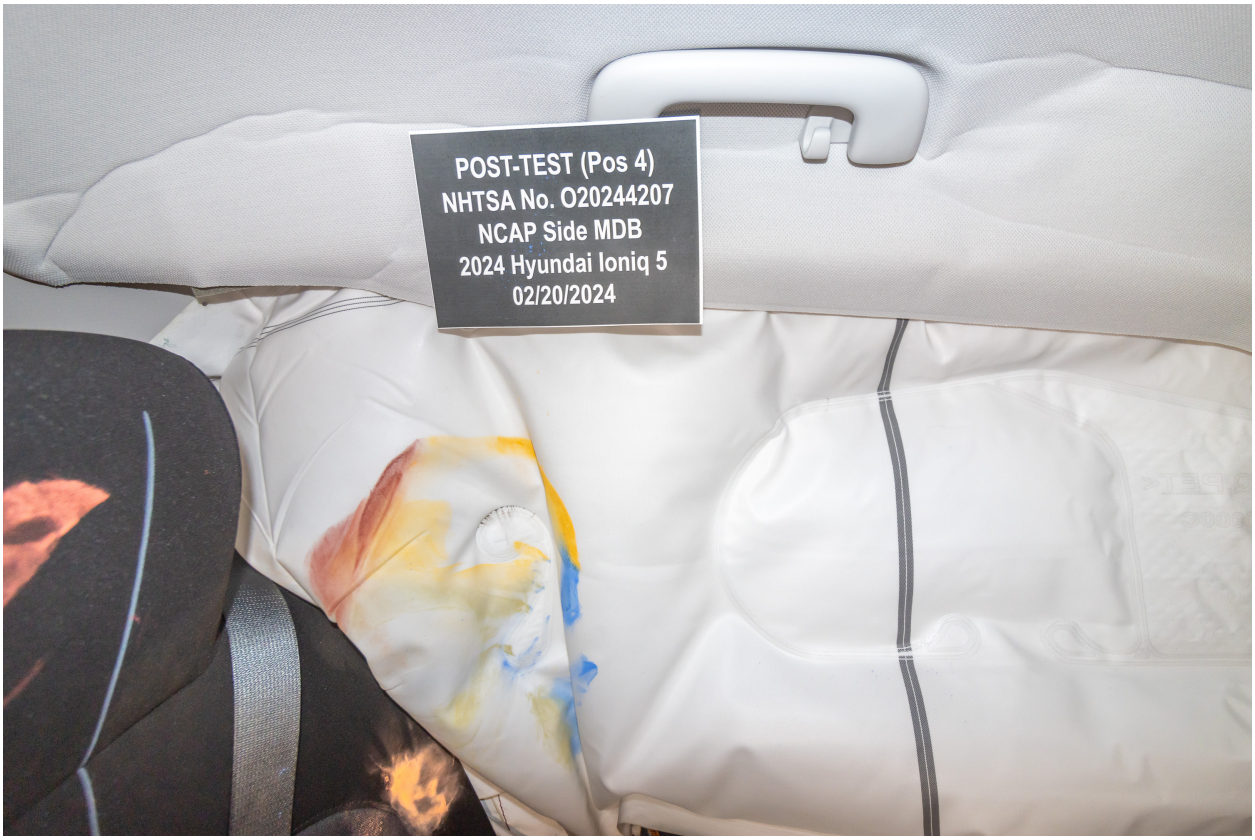


Figure A-76: Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air Bag View

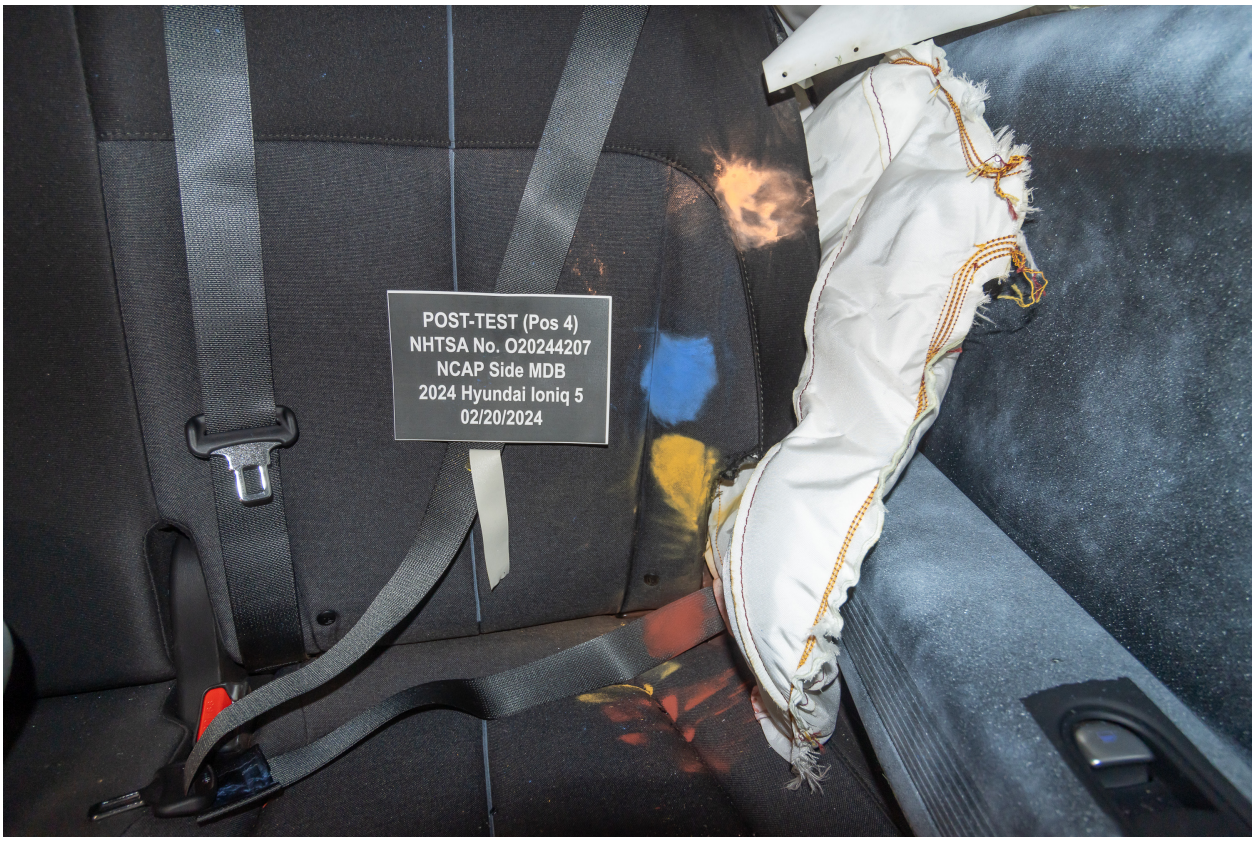


Figure A-77: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View

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

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

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

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

Figure A-82: Pre-Test Charging Port

Figure A-83: Post-Test Charging Port

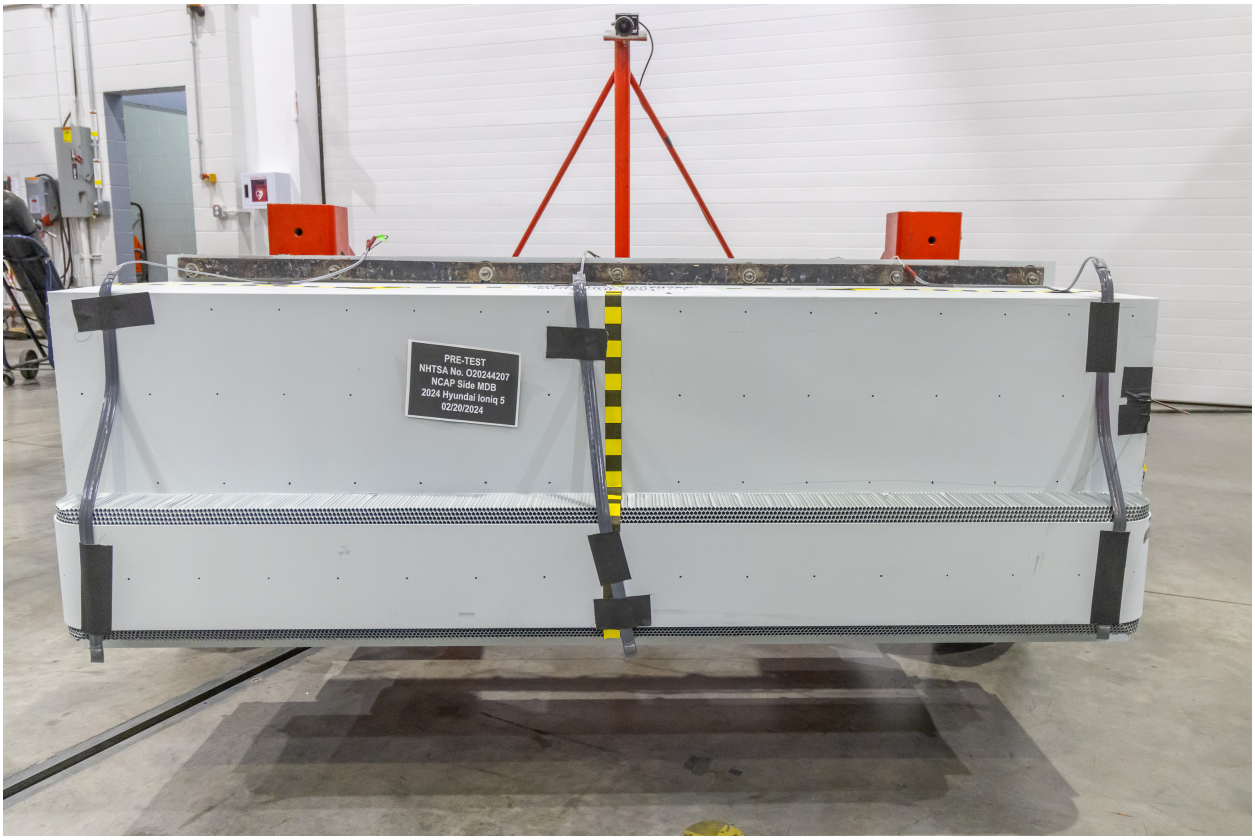


Figure A-84: Pre-Test Front View of MDB Impactor Face

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

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

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

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

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

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

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

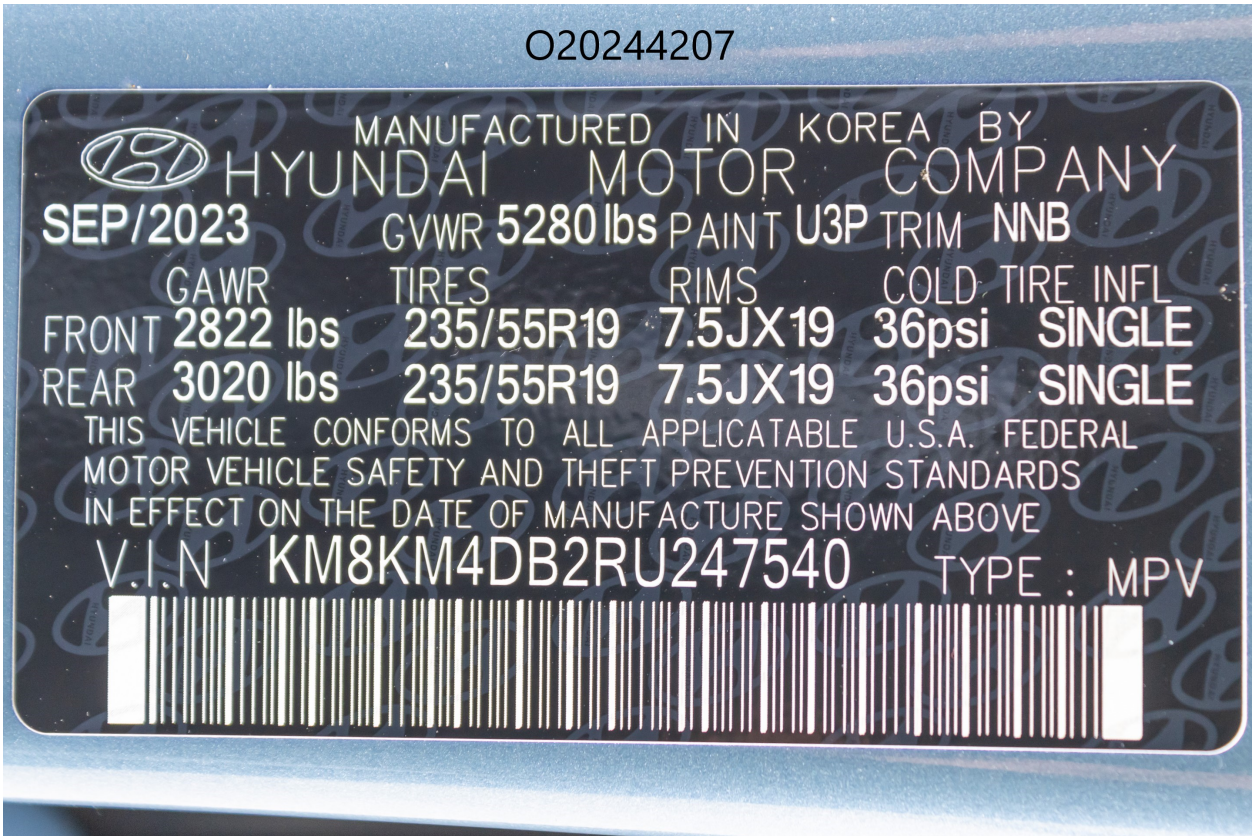


Figure A-92: Close-Up View of Vehicle's Certification Label

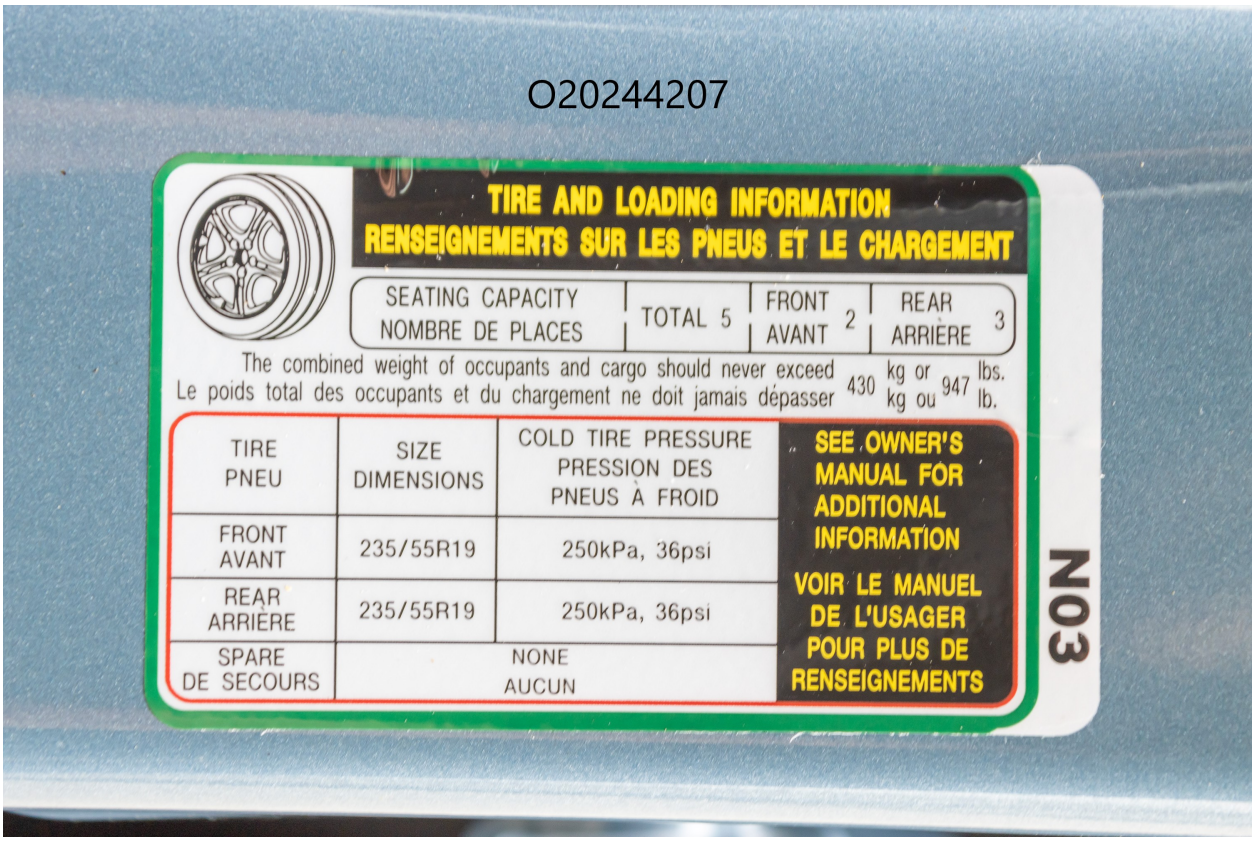


Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

Figure A-94: Pre-Test Ballast View

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

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

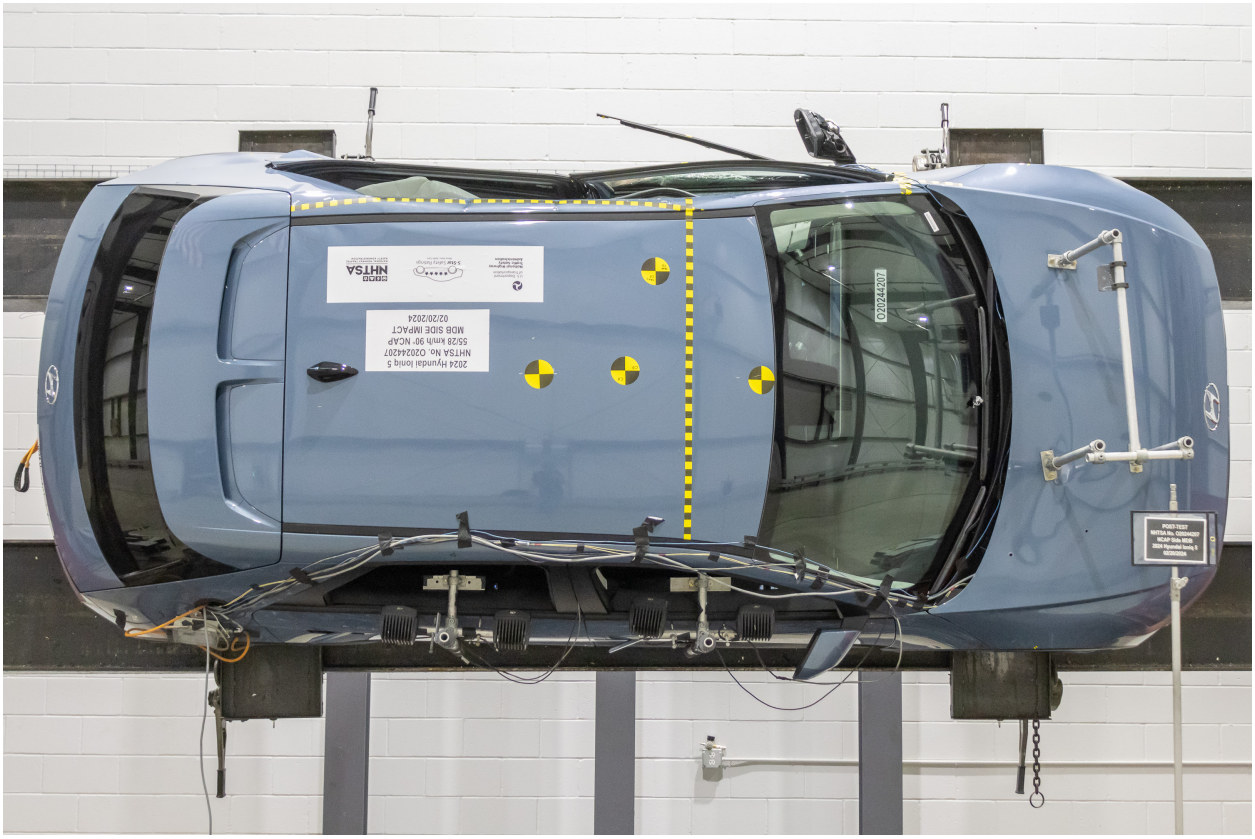


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

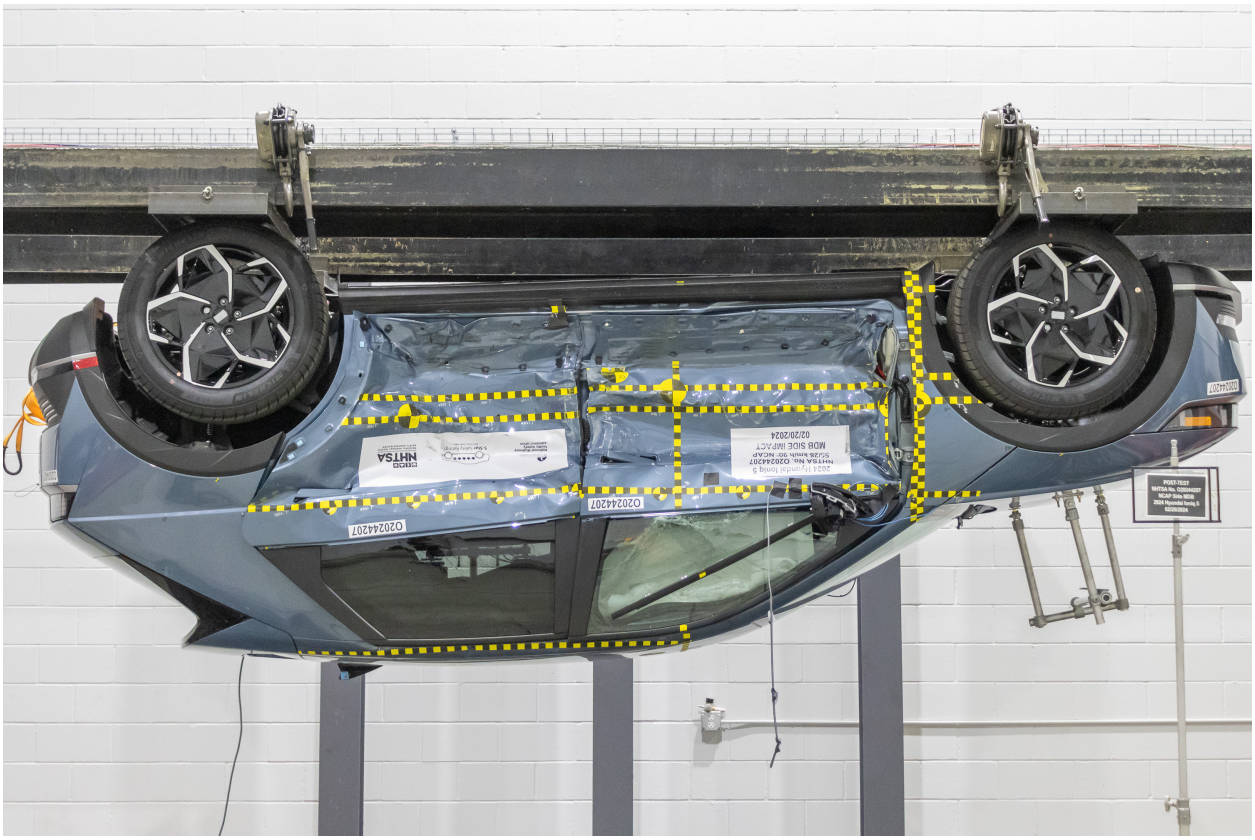


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

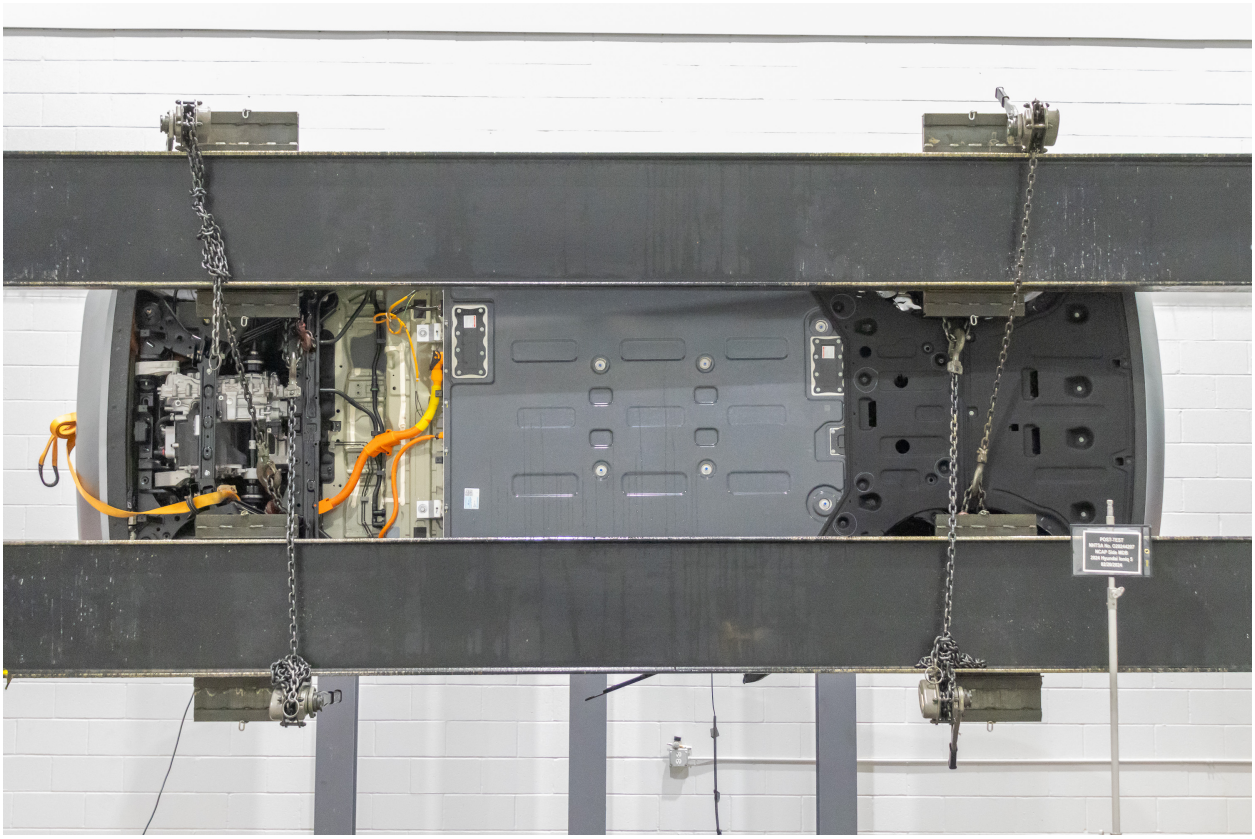
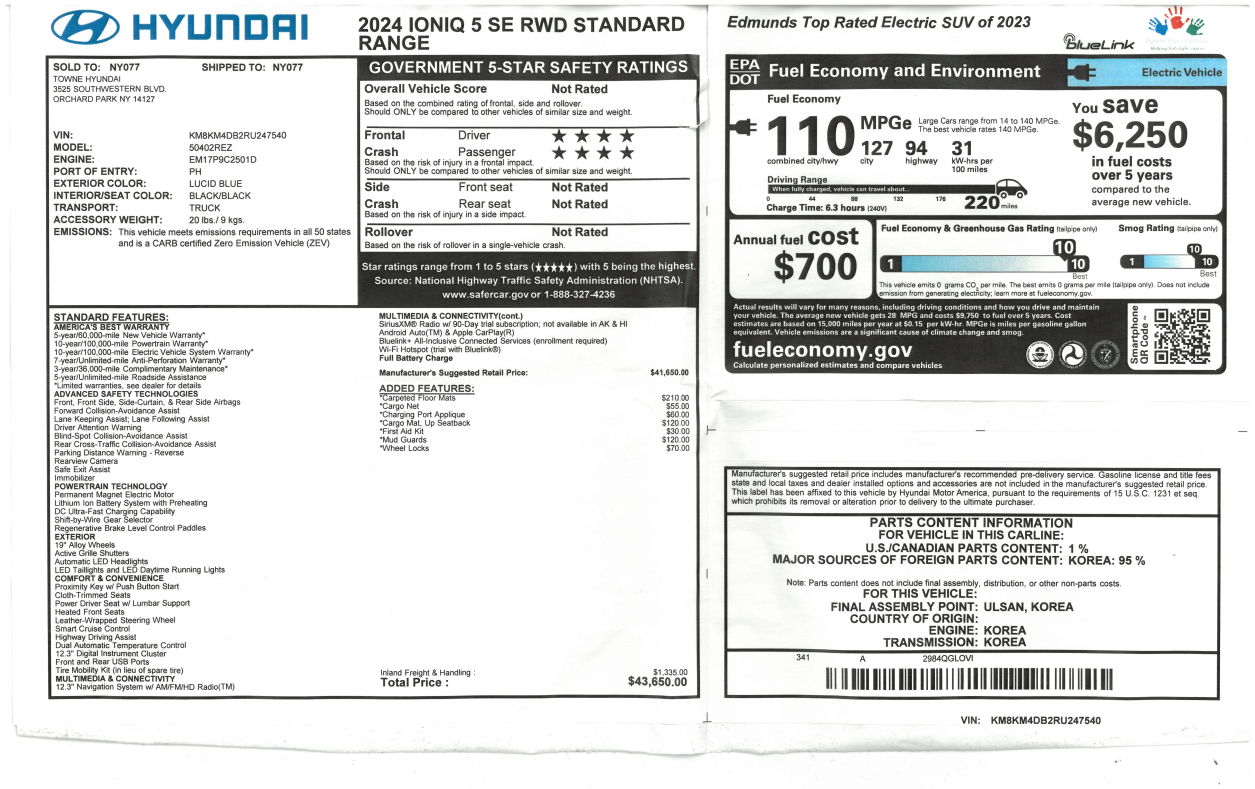


Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

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

Figure A-101: Impact Event



HYUNDAI

2024 IONIQ 5 SE RWD STANDARD RANGE

SOLD TO: NY077 SHIPPED TO: NY077
TOWNE HYUNDAI
3525 SOUTHWESTERN BLVD.
ORCHARD PARK NY 14127

VIN:	KM8KM4DB2RU247540
MODEL:	50402REZ
ENGINE:	EM17P9C2501D
PORT OF ENTRY:	PH
EXTERIOR COLOR:	LUCID BLUE
INTERIOR/SEAT COLOR:	BLACK/BLACK
TRANSPORT:	TRUCK
ACCESSORY WEIGHT:	20 lbs./ 9 kgs.
EMISSIONS:	This vehicle meets emissions requirements in all 50 states and is a CARB certified Zero Emission Vehicle (ZEV)

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score		Not Rated
Based on the combined rating of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		
Frontal	Driver	★★★★
Crash	Passenger	★★★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side	Front seat	Not Rated
Crash	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

STANDARD FEATURES:

AMERICA'S BEST WARRANTY
5-year/60,000-mile New Vehicle Warranty*
10-year/100,000-mile Powertrain Warranty*
10-year/100,000-mile Electric Vehicle System Warranty*
7-year/Unlimited-mile Anti-Perforation Warranty*
3-year/36,000-mile Complimentary Maintenance*
5-year/Unlimited-mile Roadside Assistance
*Limited warranties, see dealer for details
ADVANCED SAFETY TECHNOLOGIES
Front, Front Side, Side-Curtain, & Rear Side Airbags
Forward Collision-Avoidance Assist
Lane Keeping Assist; Lane Following Assist
Driver Attention Warning
Blind-Spot Collision-Avoidance Assist
Rear Cross-Traffic Collision-Avoidance Assist
Parking Distance Warning - Reverse
Rearview Camera
Safe Exit Assist
Immobilizer
POWERTRAIN TECHNOLOGY
Permanent Magnet Electric Motor
Lithium Ion Battery System with Preheating
DC Ultra-Fast Charging Capability
Shift-by-Wire Gear Selector
Regenerative Brake Level Control Paddles
EXTERIOR
19" Alloy Wheels
Active Grille Shutters
Automatic LED Headlights
LED Taillights and LED Daytime Running Lights
COMFORT & CONVENIENCE
Proximity Key w/ Push Button Start
Cloth-Trimmed Seats
Power Driver Seat w/ Lumbar Support
Heated Front Seats
Leather-Wrapped Steering Wheel
Smart Cruise Control
Highway Driving Assist
Dual Automatic Temperature Control
12.3" Digital Instrument Cluster
Front and Rear USB Ports
Tire Mobility Kit (in lieu of spare tire)
MULTIMEDIA & CONNECTIVITY
12.3" Navigation System w/ AM/FM/HD Radio(TM)

MULTIMEDIA & CONNECTIVITY(cont.)
SiriusXM® Radio w/ 90-Day trial subscription; not available in AK & HI
Android Auto(TM) & Apple CarPlay(R)
Bluelink+ All-Inclusive Connected Services (enrollment required)
Wi-Fi Hotspot (trial with Bluelink®)
Full Battery Charge

Manufacturer's Suggested Retail Price: $41,650.00

ADDED FEATURES:

*Carpeted Floor Mats	$210.00
*Cargo Net	$55.00
*Charging Port Applique	$60.00
*Cargo Mat, Up Seatback	$120.00
*First Aid Kit	$30.00
*Mud Guards	$120.00
*Wheel Locks	$70.00

Inland Freight & Handling : $1,335.00
Total Price : **$43,650.00**

Edmunds Top Rated Electric SUV of 2023

BlueLink

EPA DOT Fuel Economy and Environment — Electric Vehicle

Fuel Economy
110 MPGe combined city/hwy — Large Cars range from 14 to 140 MPGe. The best vehicle rates 140 MPGe.
127 city | 94 highway | 31 kW-hrs per 100 miles

Driving Range
When fully charged, vehicle can travel about...
0 44 88 132 176 **220** miles
Charge Time: 6.3 hours (240V)

You **save** **$6,250** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel **cost** **$700**

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

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

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $9,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $0.15 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline license and title fees state and local taxes and dealer installed options and accessories are not included in the manufacturer's suggested retail price. This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements of 15 U.S.C. 1231 et seq. which prohibits its removal or alteration prior to delivery to the ultimate purchaser.

PARTS CONTENT INFORMATION
FOR VEHICLE IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 1 %
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 95 %

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: ULSAN, KOREA
COUNTRY OF ORIGIN:
ENGINE: KOREA
TRANSMISSION: KOREA

341 A 2984QGLOVI

VIN: KM8KM4DB2RU247540

Figure A-102: Monroney Label

3

NOTICE

To prevent damage, NEVER hit or pull on the head restraints.

Front seat head restraints

The driver's and front passenger's seats are equipped with adjustable head restraints for the passengers safety and comfort.

Adjusting the height up and down

To raise the head restraint:
1. Pull it up to the desired position (1).

To lower the head restraint:
1. Push and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

NOTICE

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

3-17

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

3

Rear seat head restraints

The rear seats are equipped with head restraints in all the seating positions for the passenger's safety and comfort.

Adjusting the height up and down

To raise the head restraint:
1. Pull it up to the desired position (1).

To lower the head restraint:
1. Push and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

Removal/Reinstallation

To remove the head restraint:
1. Raise the head restraint as far as it can go.
2. Press the head restraint release button (1) while pulling the head restraint up (2).

To reinstall the head restraint:
1. Put the head restraint poles into the holes (3) while pressing the release button (1).
2. Adjust the head restraint to the appropriate height.

Seat Warmers

Seat warmers are provided to warm the seats during cold weather.

During mild weather or under conditions where the operation of the seat warmer is not needed, keep the seat warmers OFF.

⚠ WARNING

The seat warmers can cause a SERIOUS BURN, even at low temperatures and especially if used for long periods of time.

Passengers must be able to feel if the seat is becoming too warm so they can turn it off, if needed.

Seat warmer consume large amounts of electricity. Please avoid using seat warmers while the vehicle is off in order to prevent battery discharge.

3-19

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

Figure 305-1: Auxiliary Power Module Warning Label

Figure 305-2: Power Inverter Warning Label

Figure 305-3 First Responder Warning Label

Figure 305-4: First Responder Warning Label Location

Photo Not Applicable

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

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

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

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

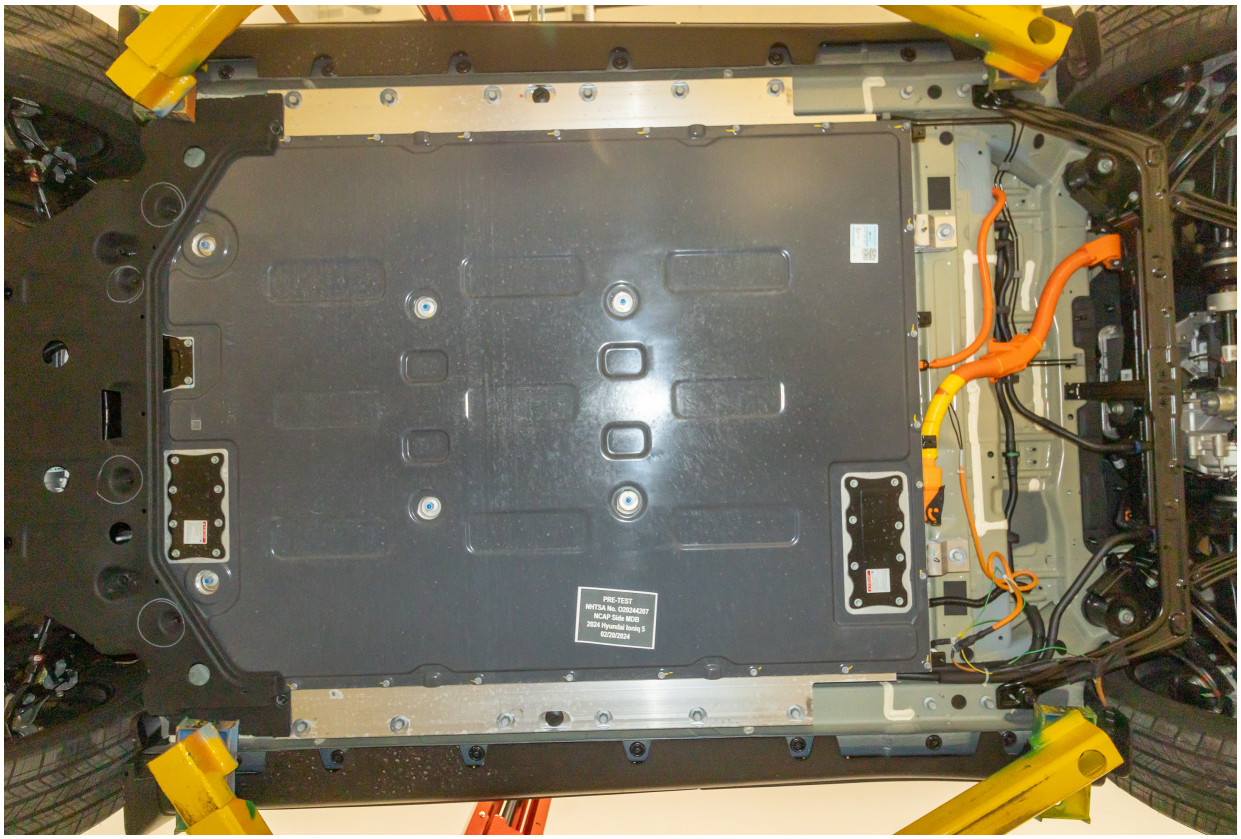


Figure 305-9: Pre-Impact View of Propulsion Battery

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

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

Photo Not Applicable

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

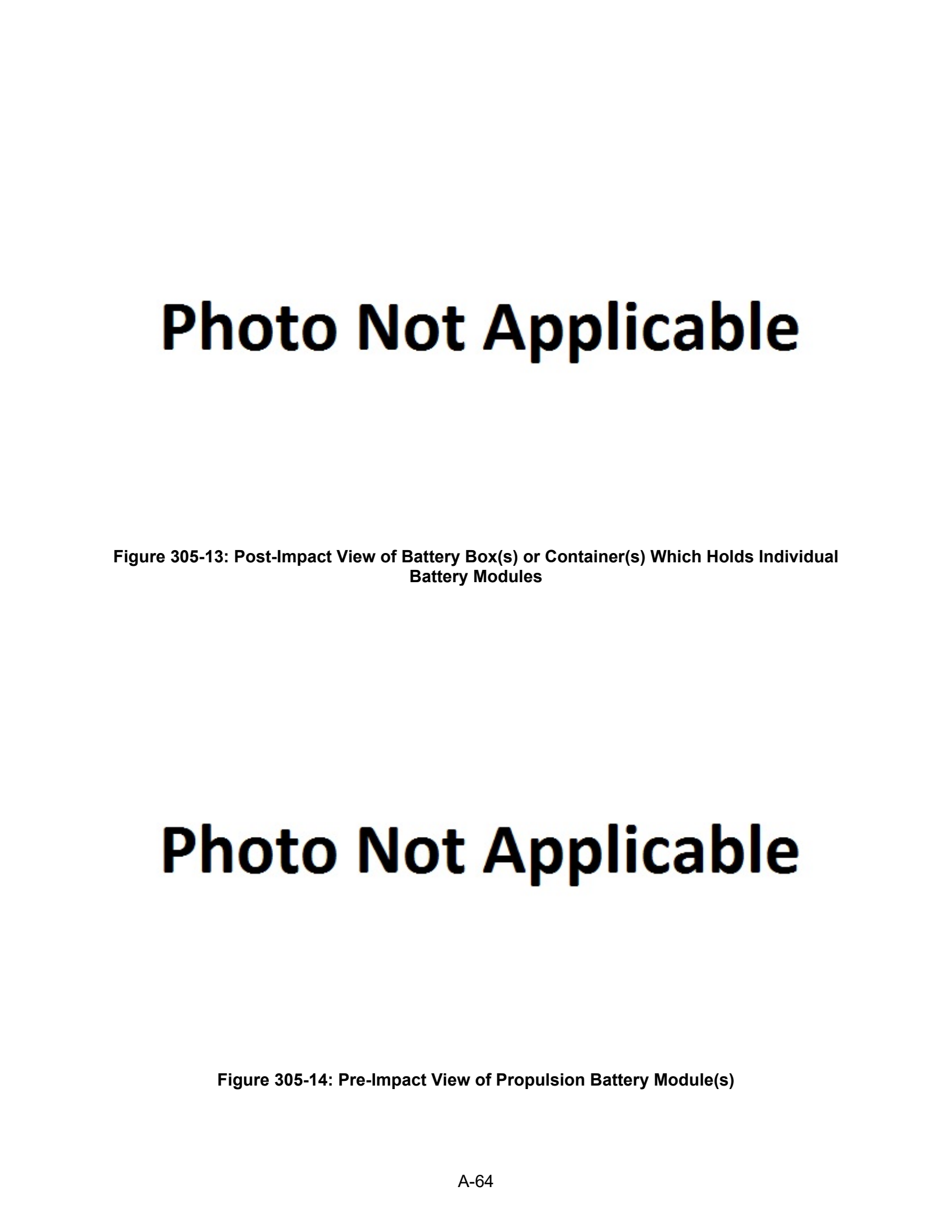


Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

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

Photo Not Applicable

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

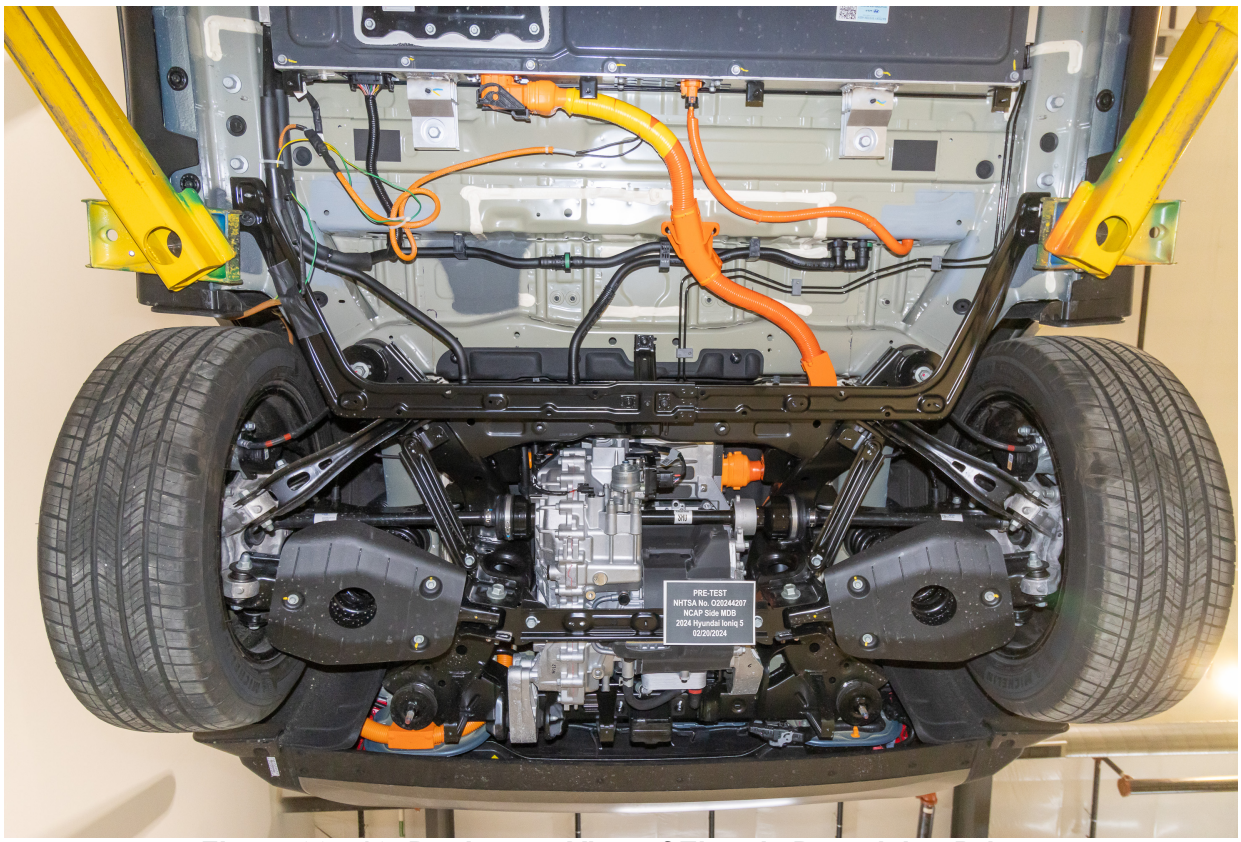


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

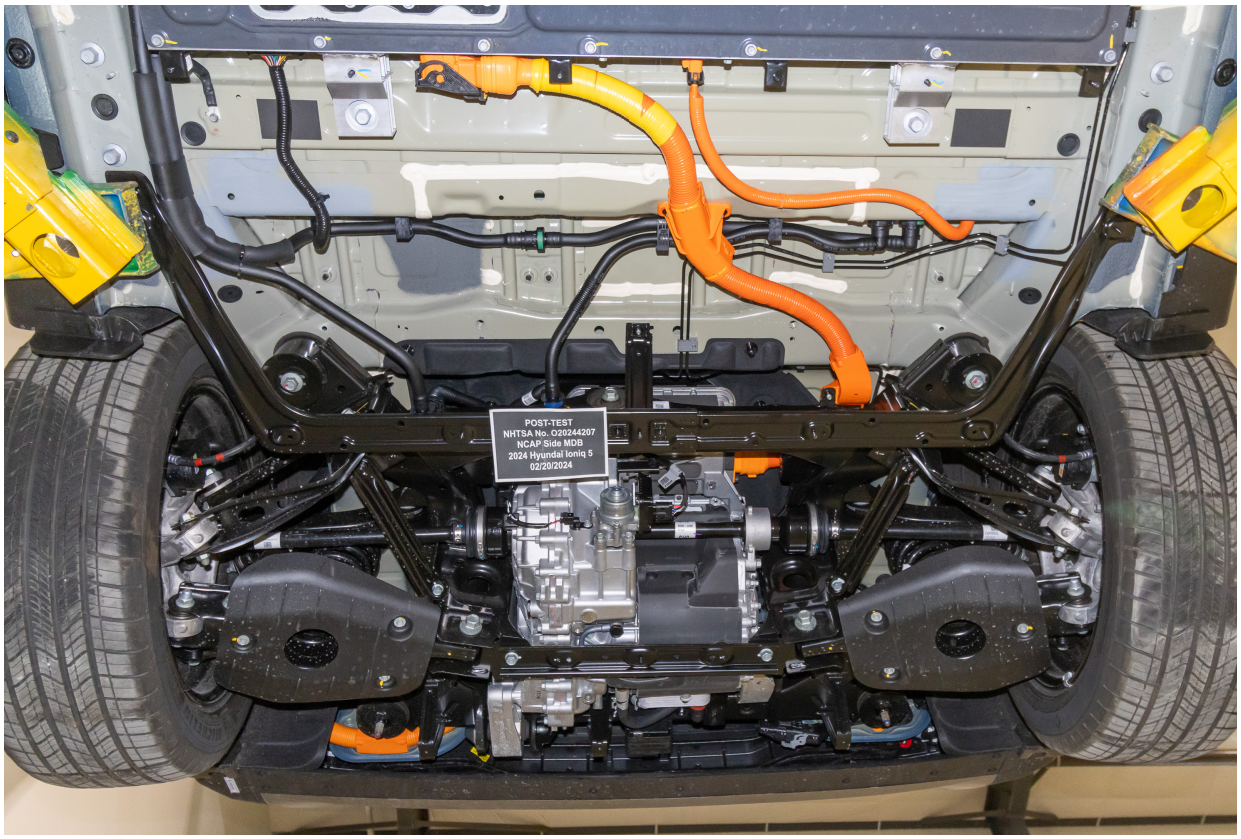


Figure 305-17: Post-Impact View of Electric Propulsion Drive

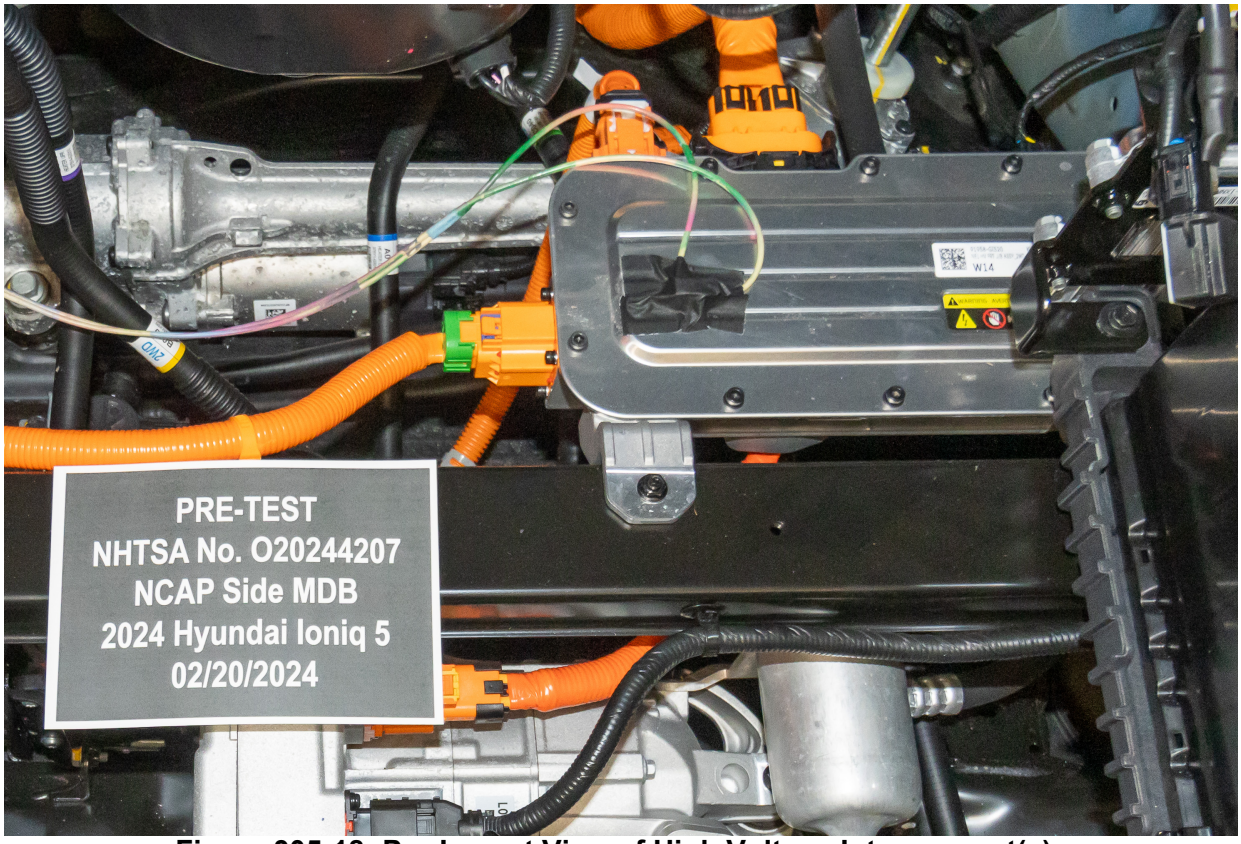


Figure 305-18: Pre-Impact View of High Voltage Interconnect(s)

Photo Not Applicable

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

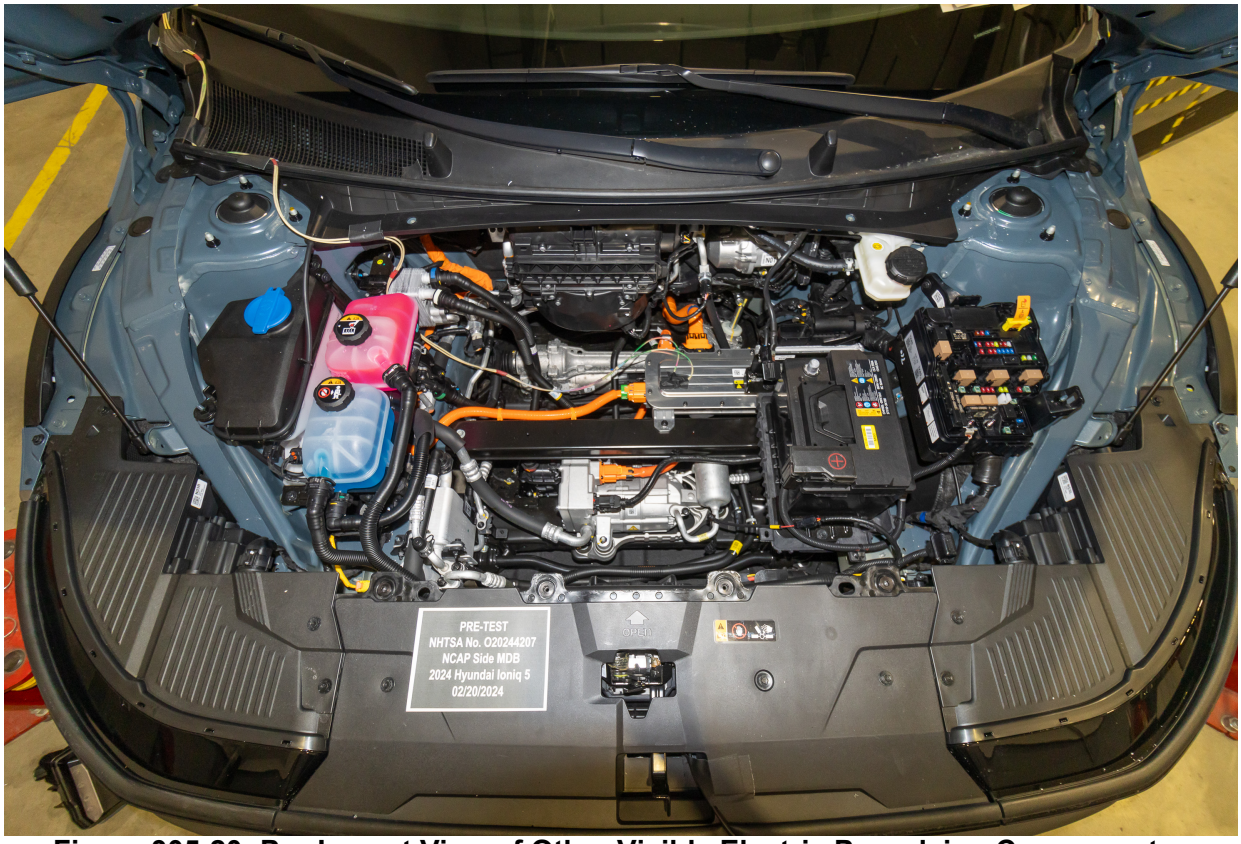


Figure 305-20: Pre-Impact View of Other Visible Electric Propulsion Components

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

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

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

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

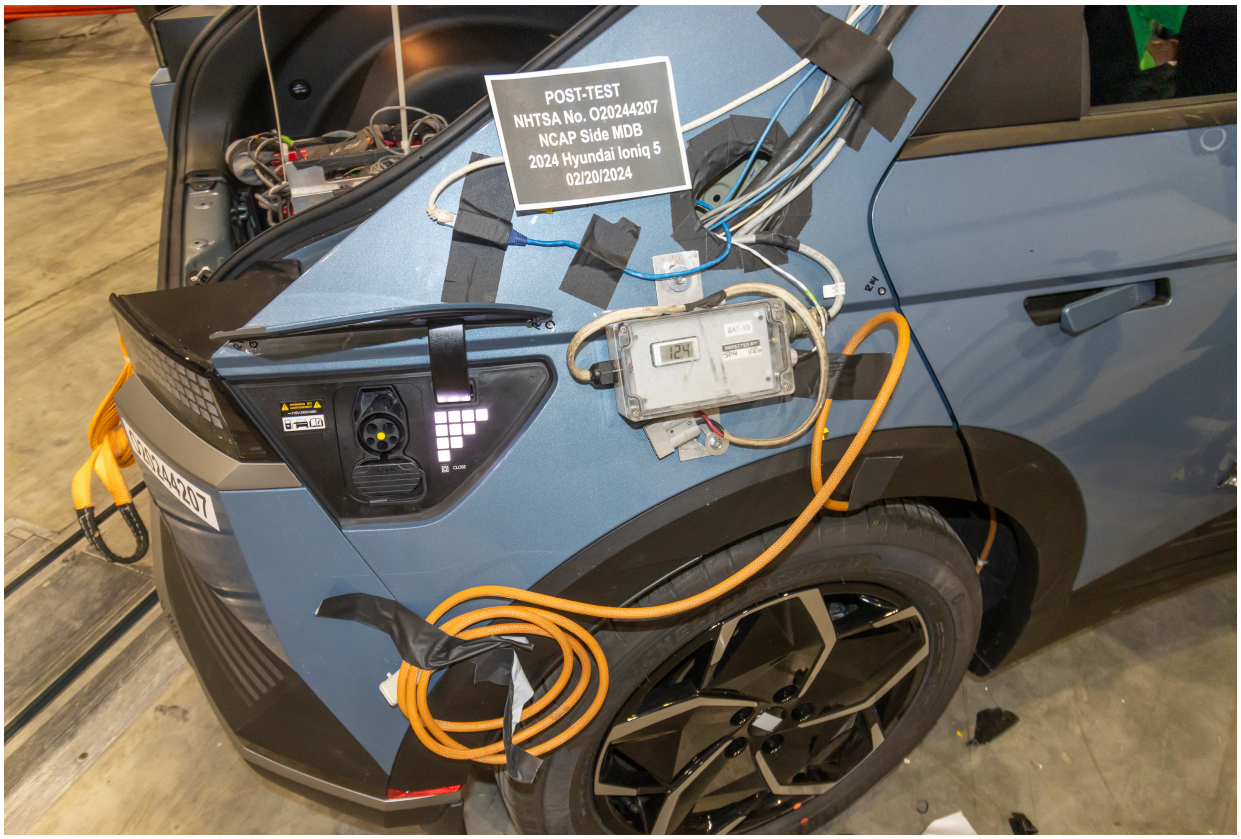


Figure 305-25: Post-Impact View of Installed Test Interface Port

Photo Not Applicable

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

Photo Not Applicable

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

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

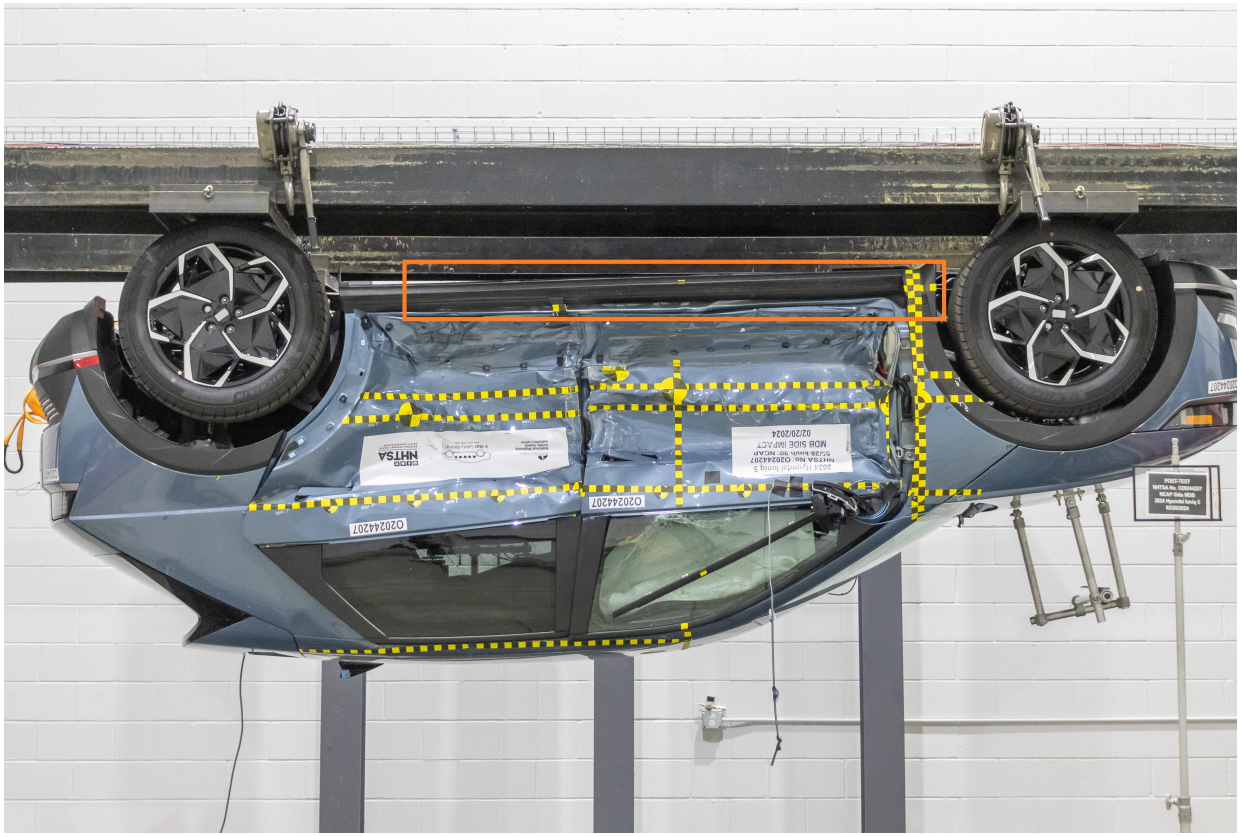


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

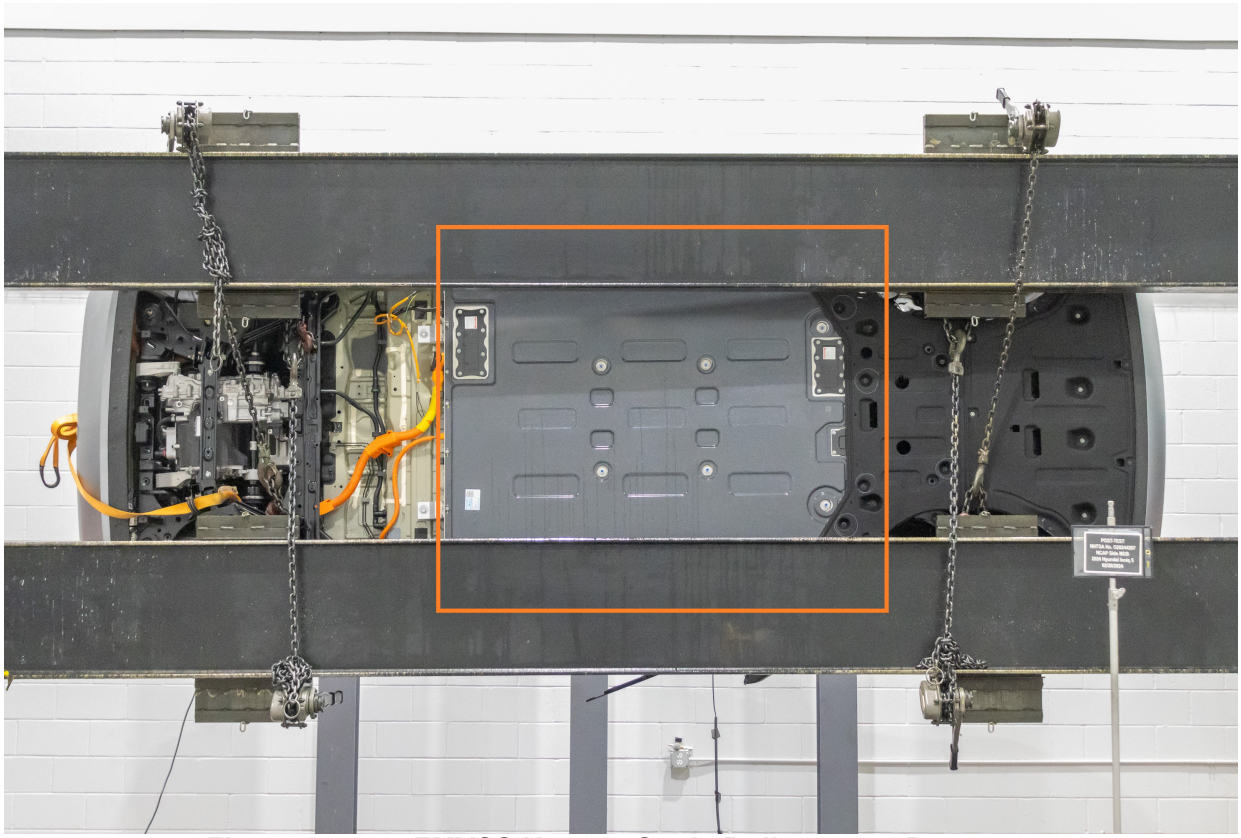


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

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

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

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

Photo Not Applicable

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

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

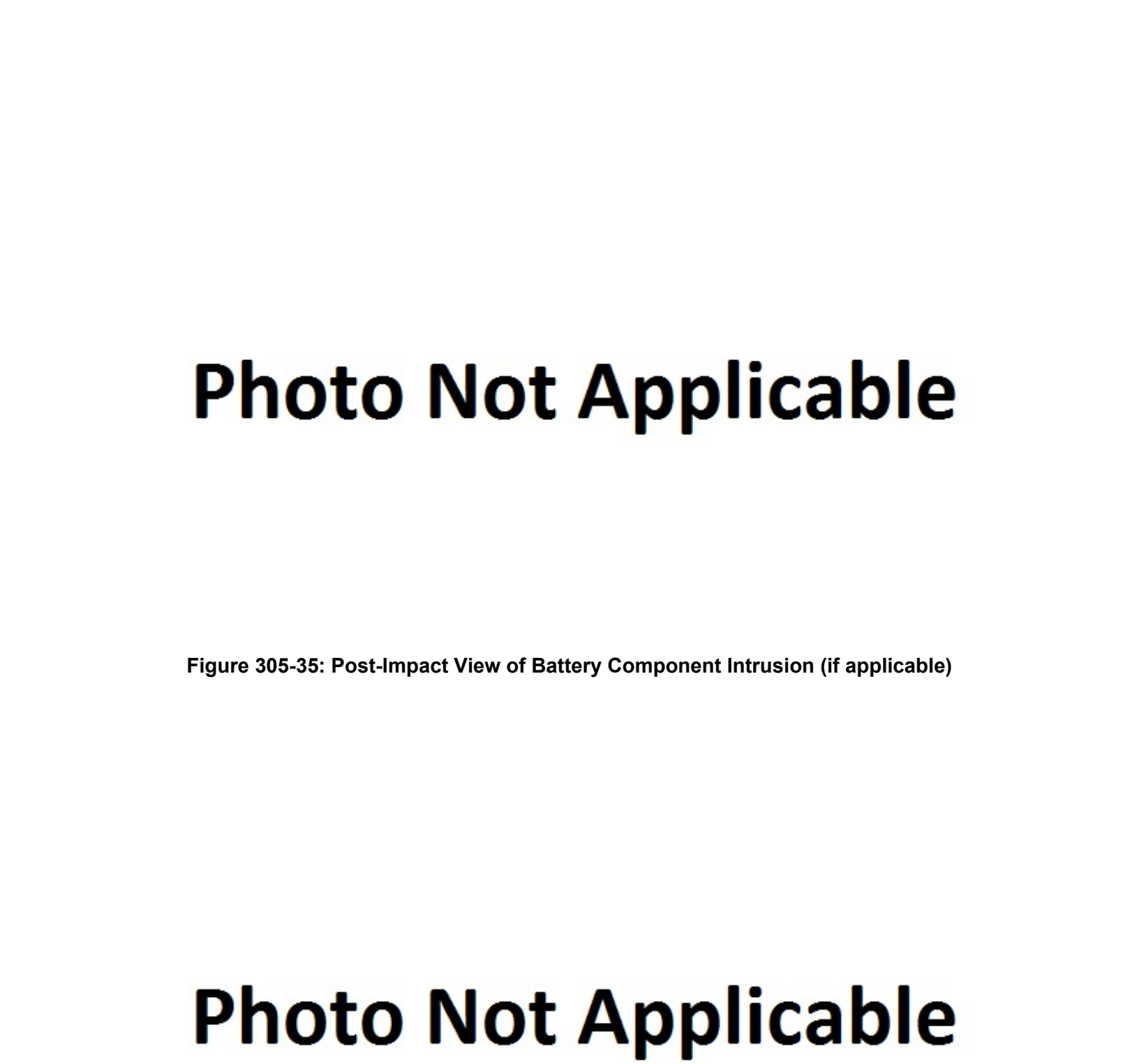


Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

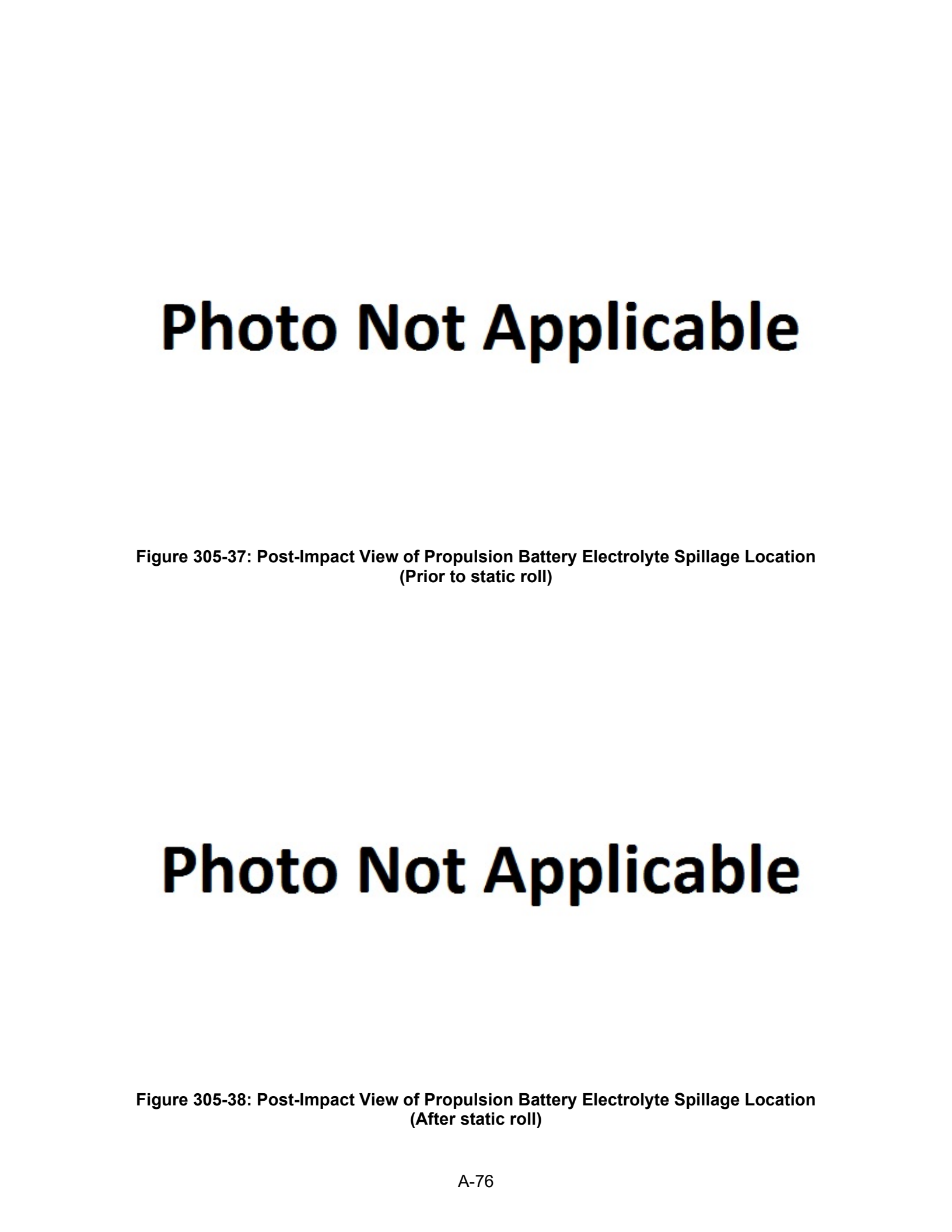


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (Prior to static roll)

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

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA TRACES

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Driver Dummy Instrumentation Plots

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Plot 6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-6
Plot 7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-6
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The following additional dummy and vehicle response data can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.NHTSA.gov

Additional Driver & Passenger Dummy Instrumentation Data

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

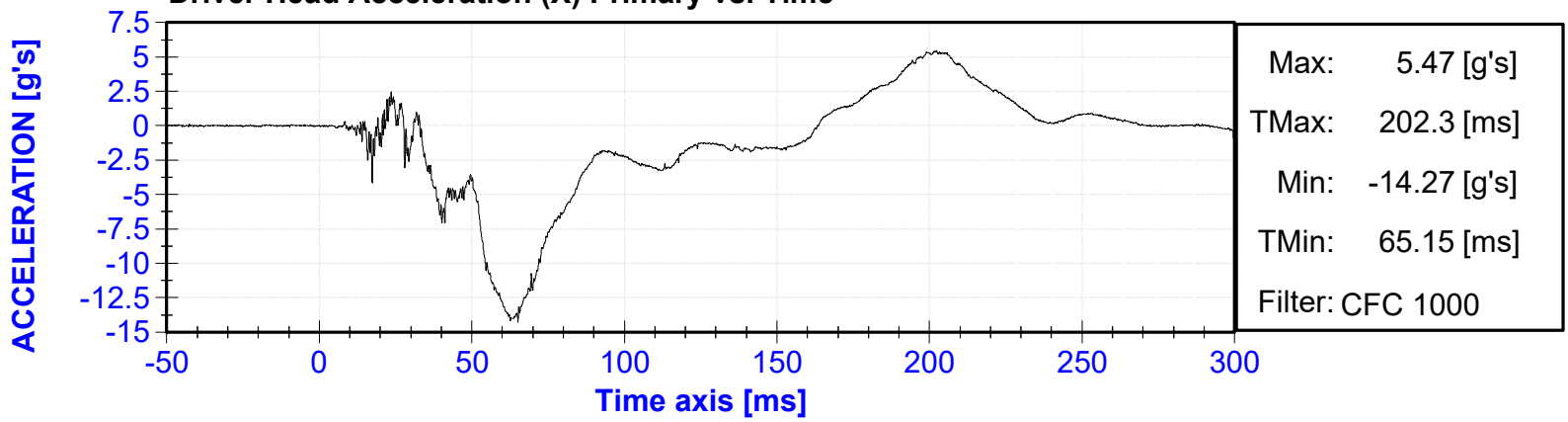
Vehicle Instrumentation Data

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

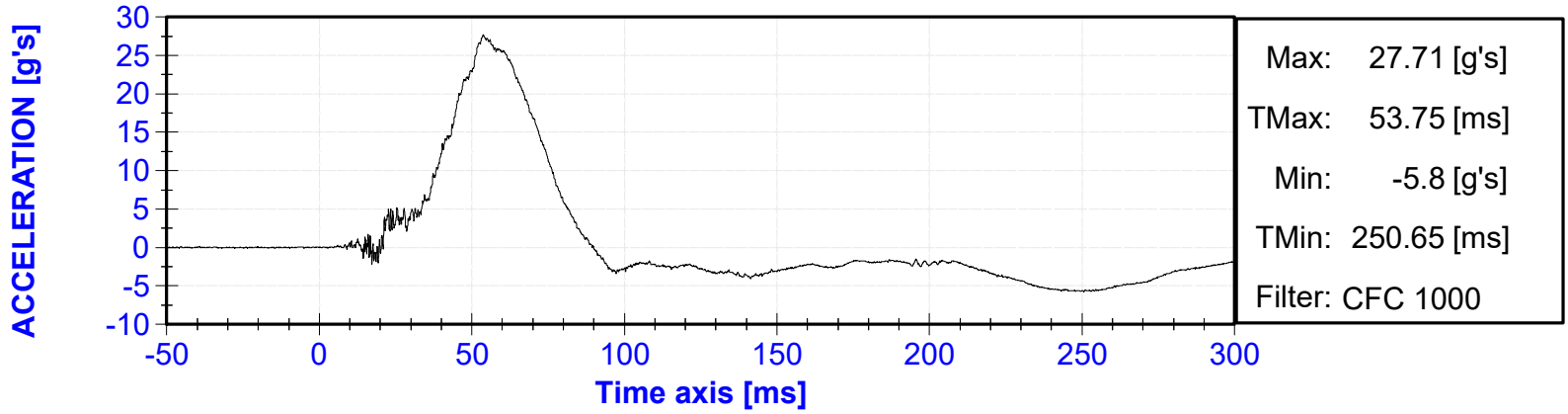
MDB Instrumentation Data

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

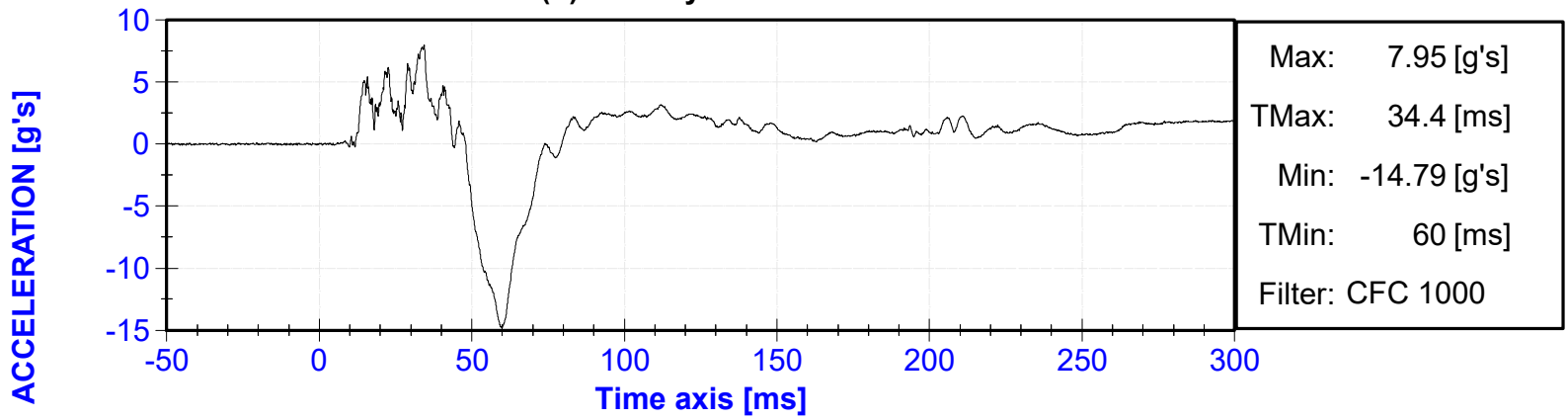
Driver Head Acceleration (X) Primary vs. Time



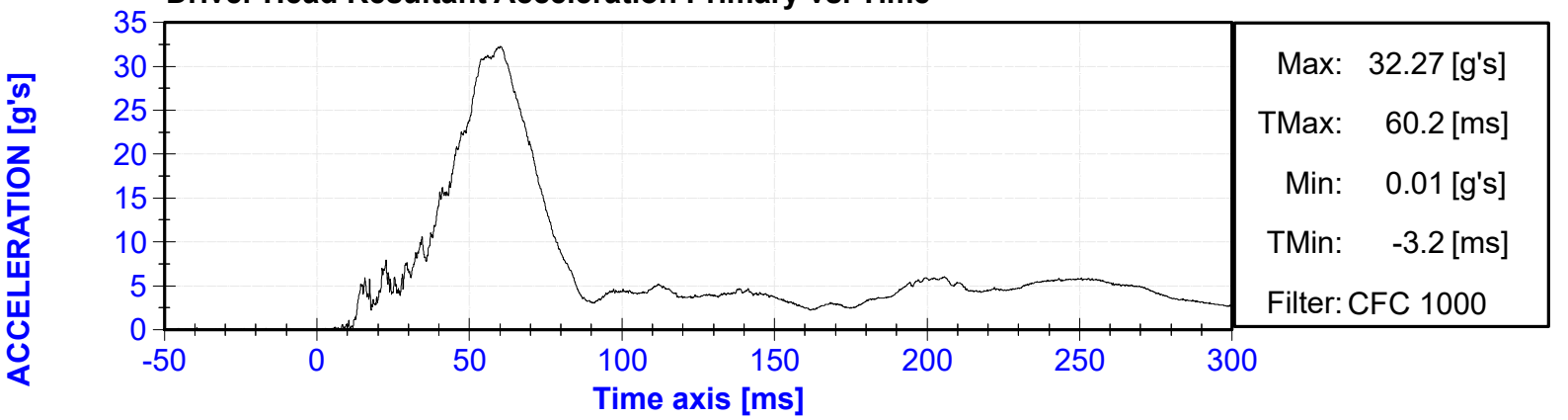
Driver Head Acceleration (Y) Primary vs. Time



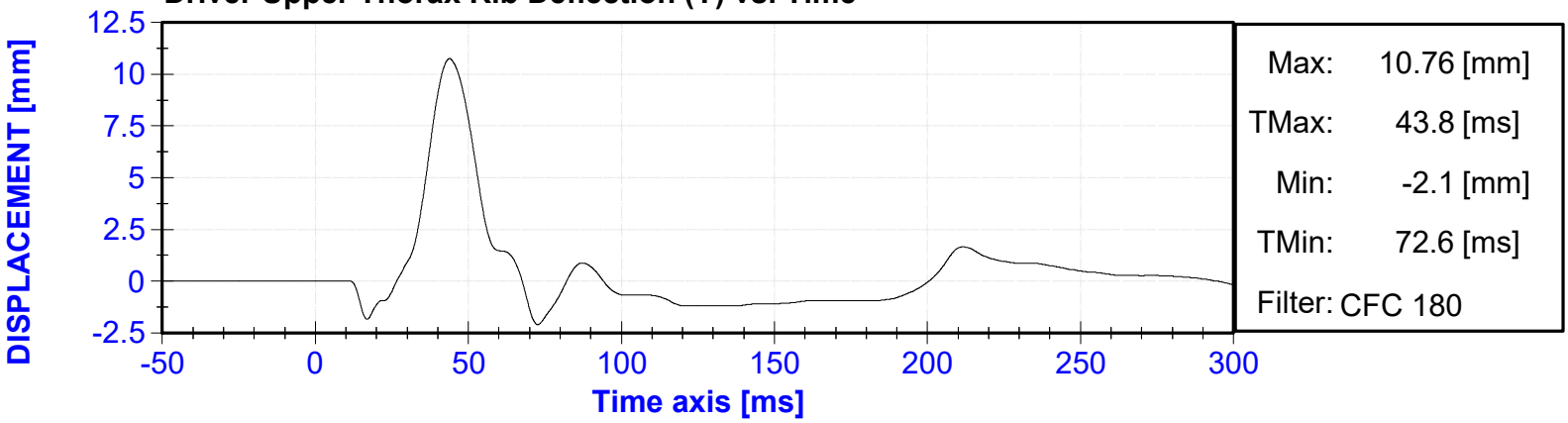
Driver Head Acceleration (Z) Primary vs. Time



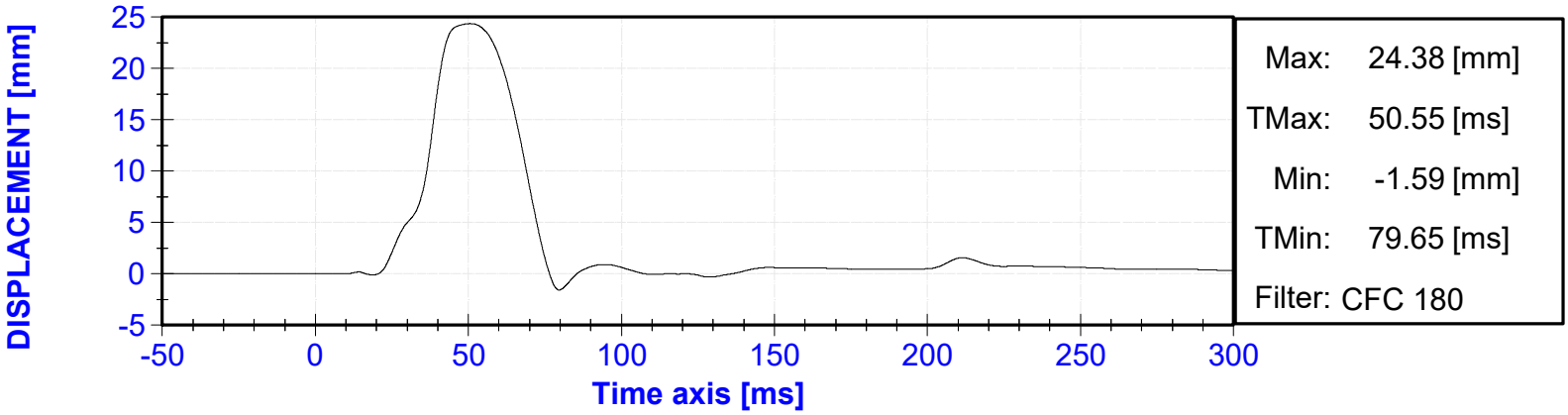
Driver Head Resultant Acceleration Primary vs. Time



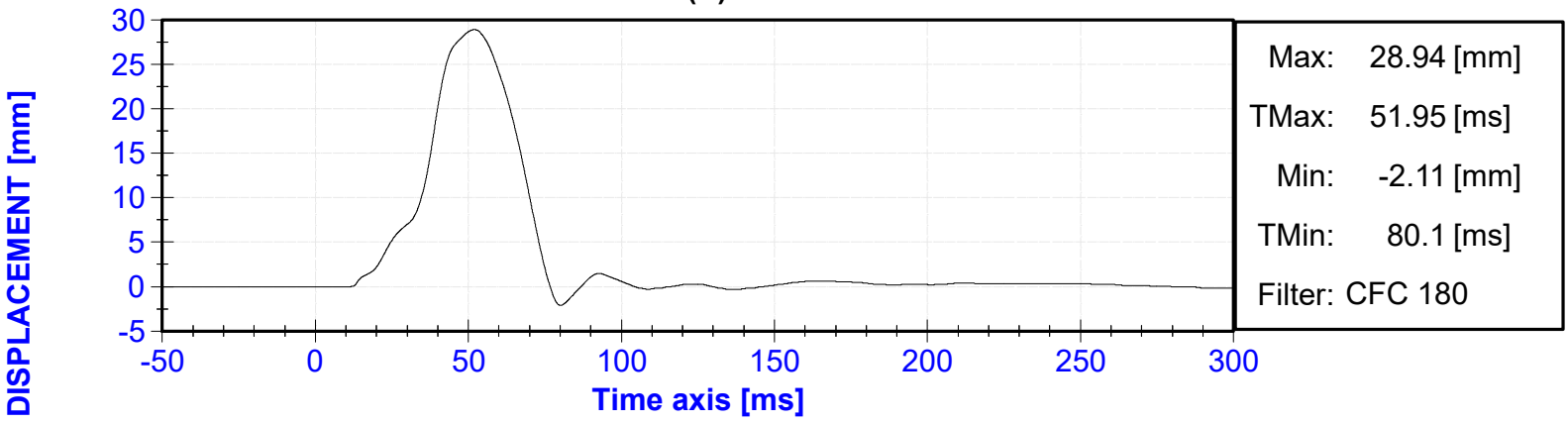
Driver Upper Thorax Rib Deflection (Y) vs. Time



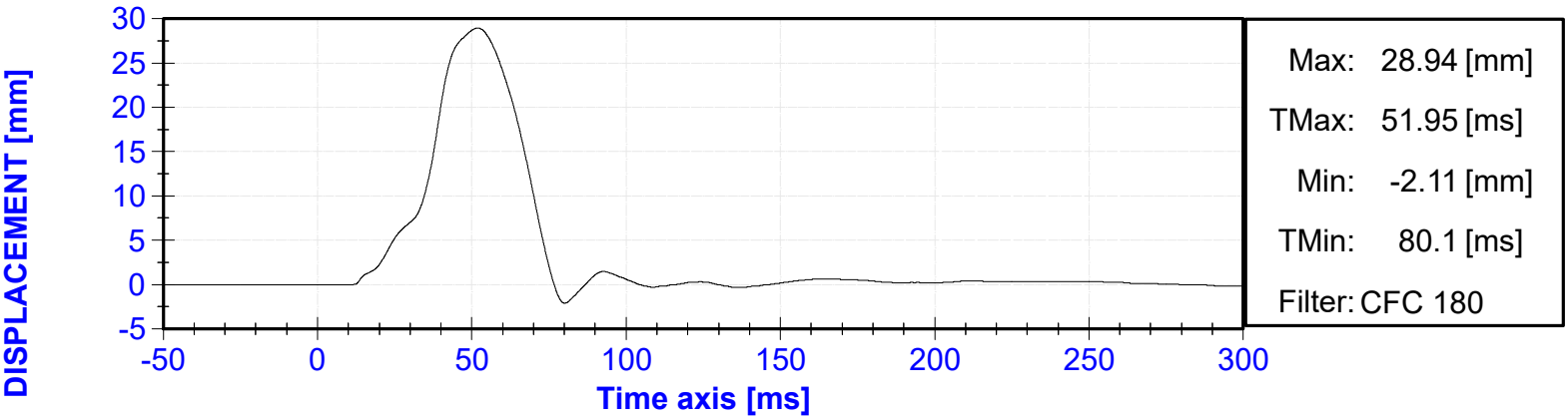
Driver Middle Thorax Rib Deflection (Y) vs. Time



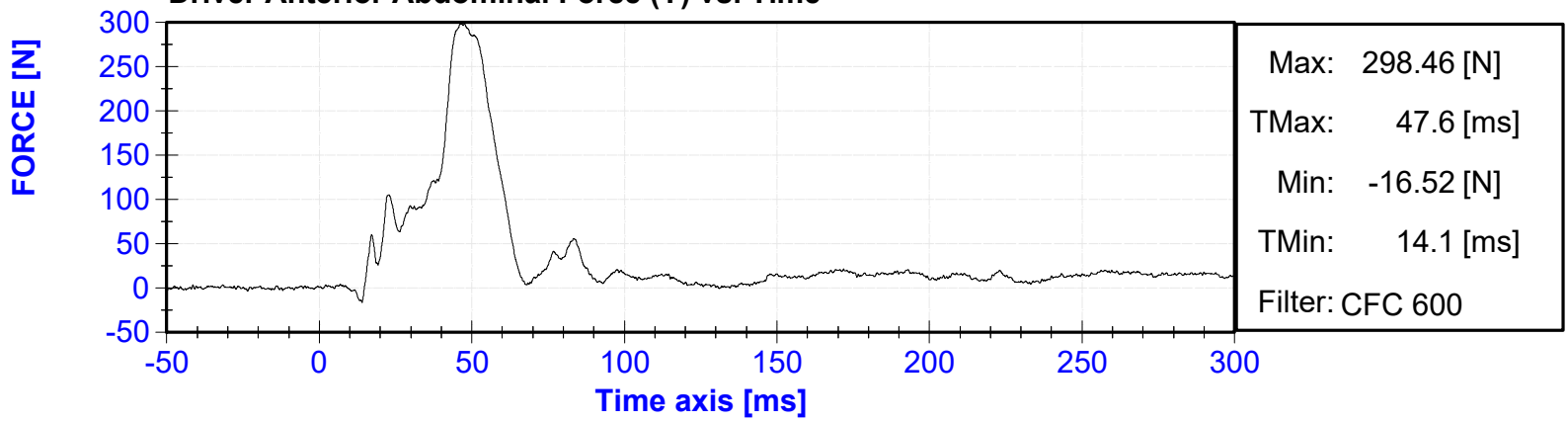
Driver Lower Thorax Rib Deflection (Y) vs. Time



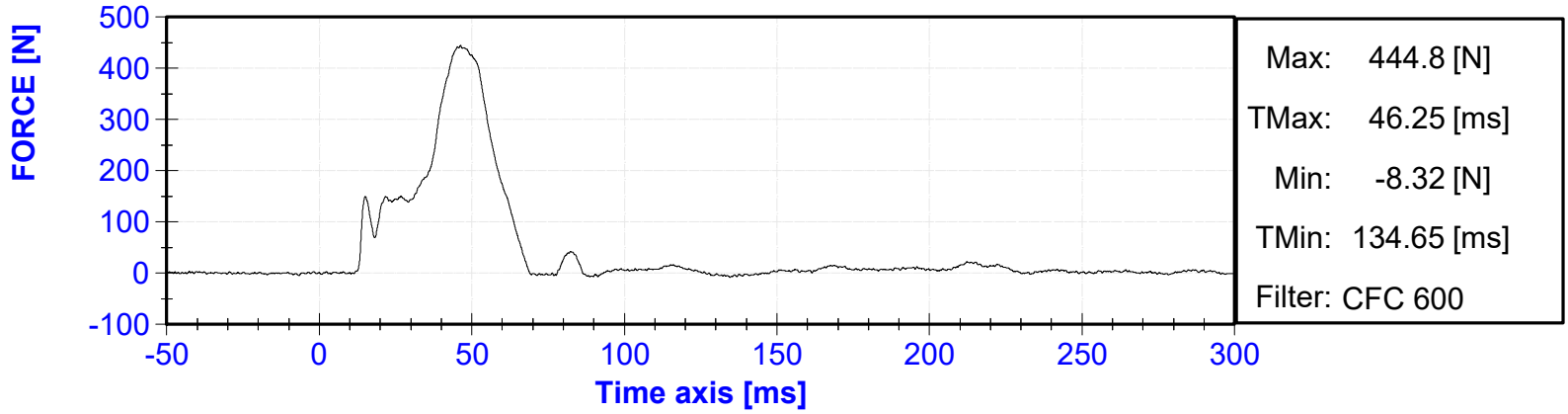
Driver Thorax Rib Deflection Maximum vs. Time



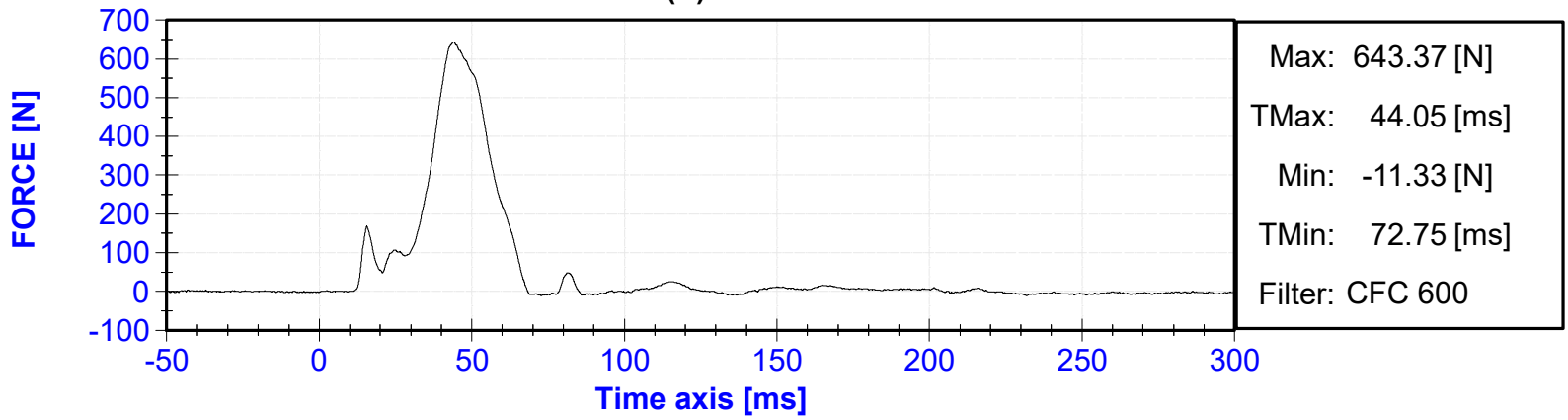
Driver Anterior Abdominal Force (Y) vs. Time



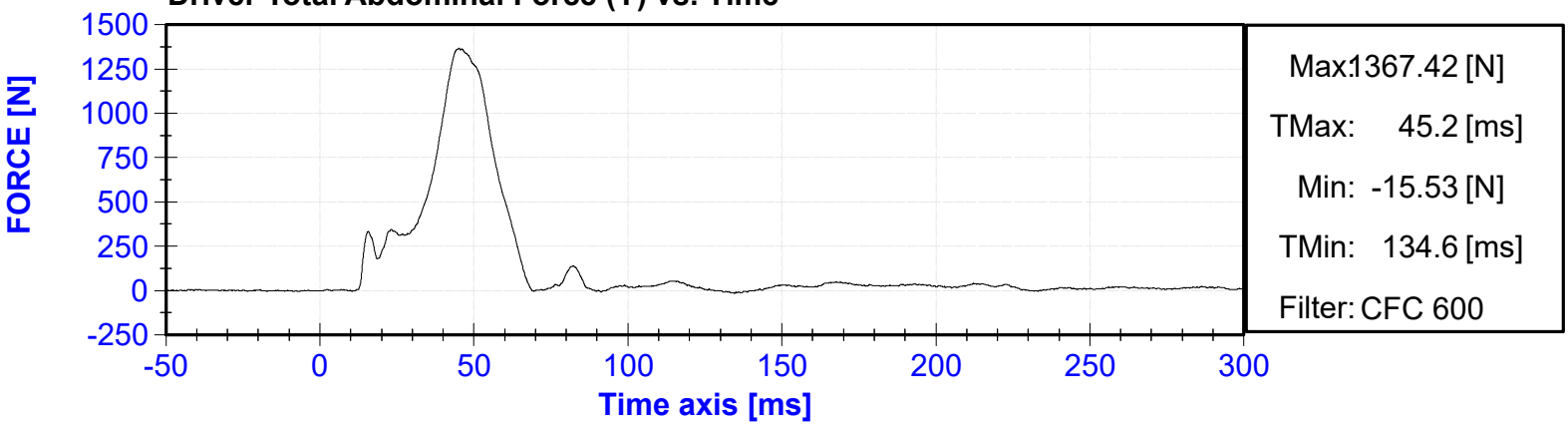
Driver Middle Abdominal Force (Y) vs. Time



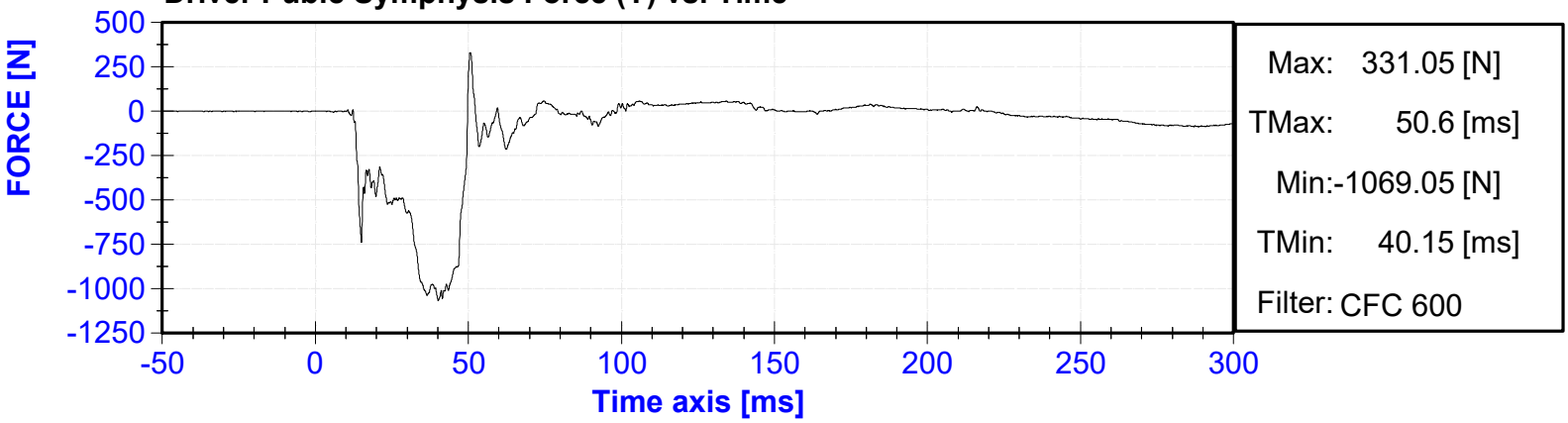
Driver Posterior Abdominal Force (Y) vs. Time



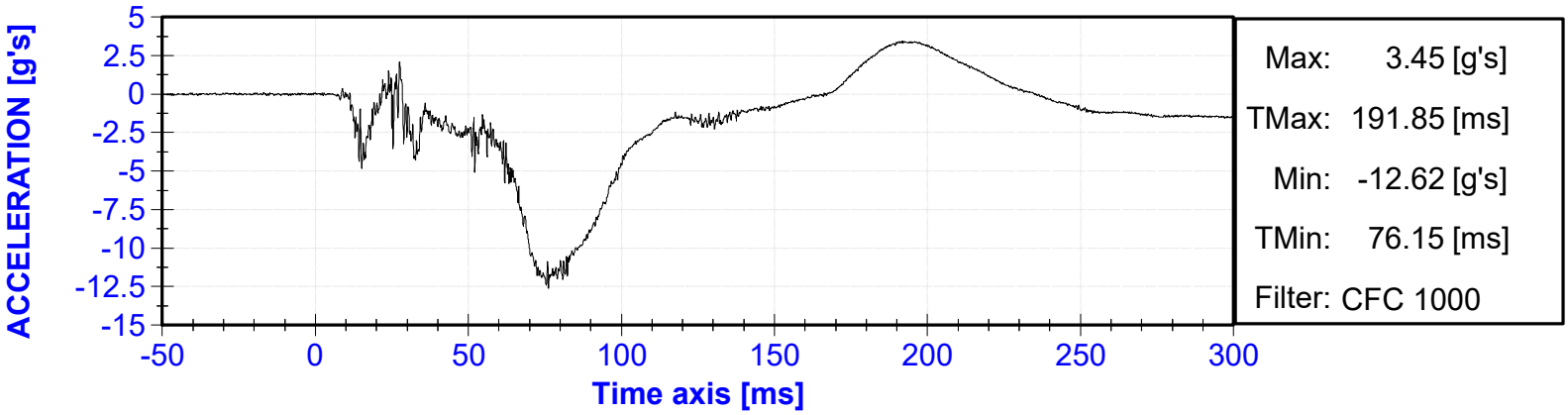
Driver Total Abdominal Force (Y) vs. Time



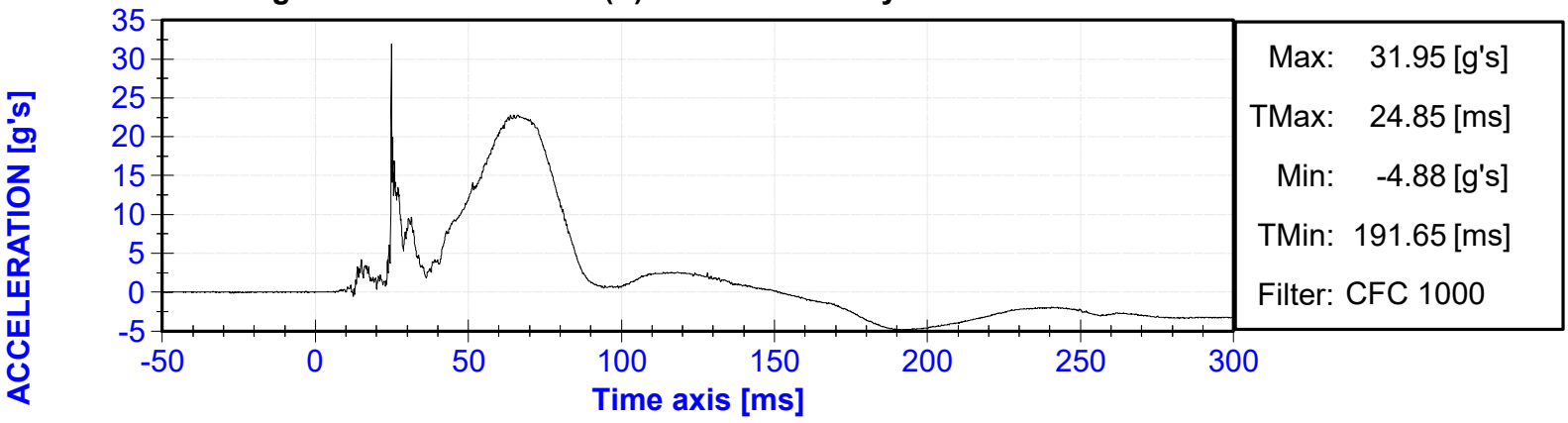
Driver Pubic Symphysis Force (Y) vs. Time



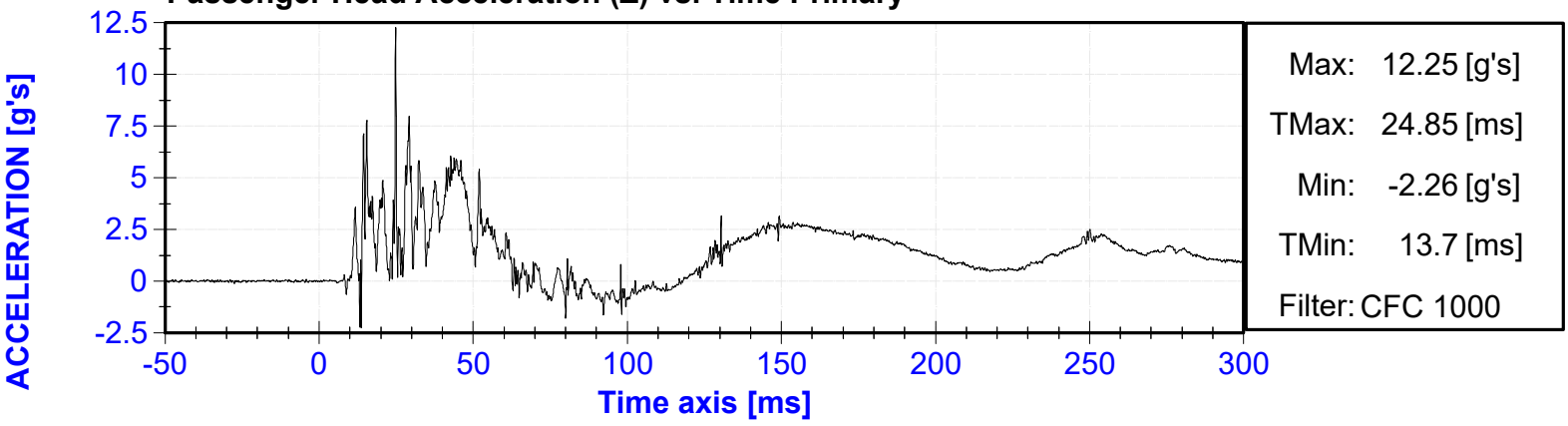
Passenger Head Acceleration (X) vs. Time Primary



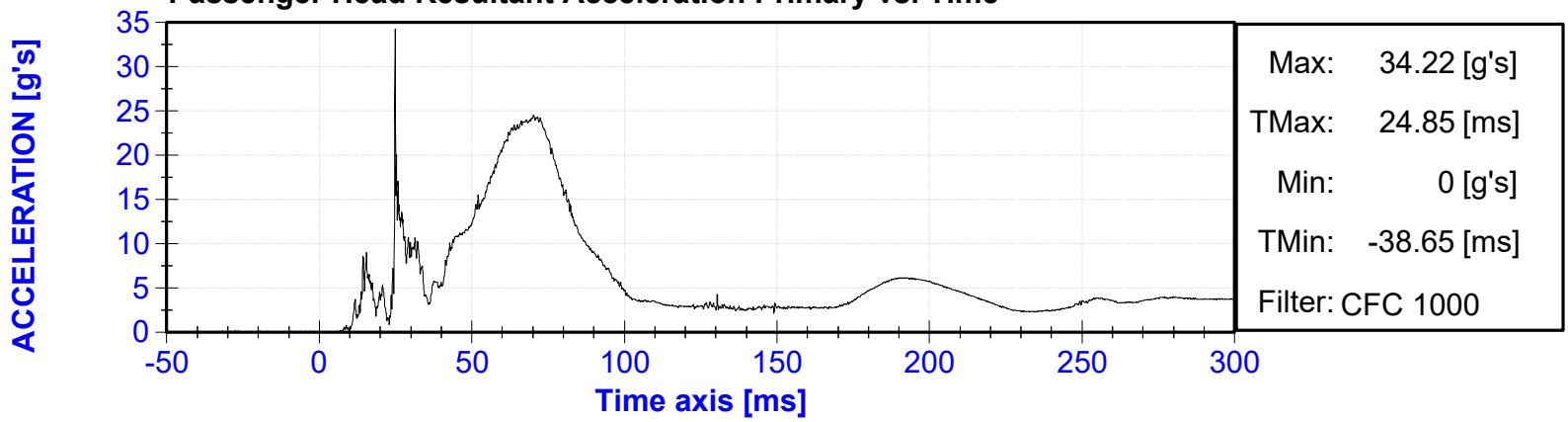
Passenger Head Acceleration (Y) vs. Time Primary



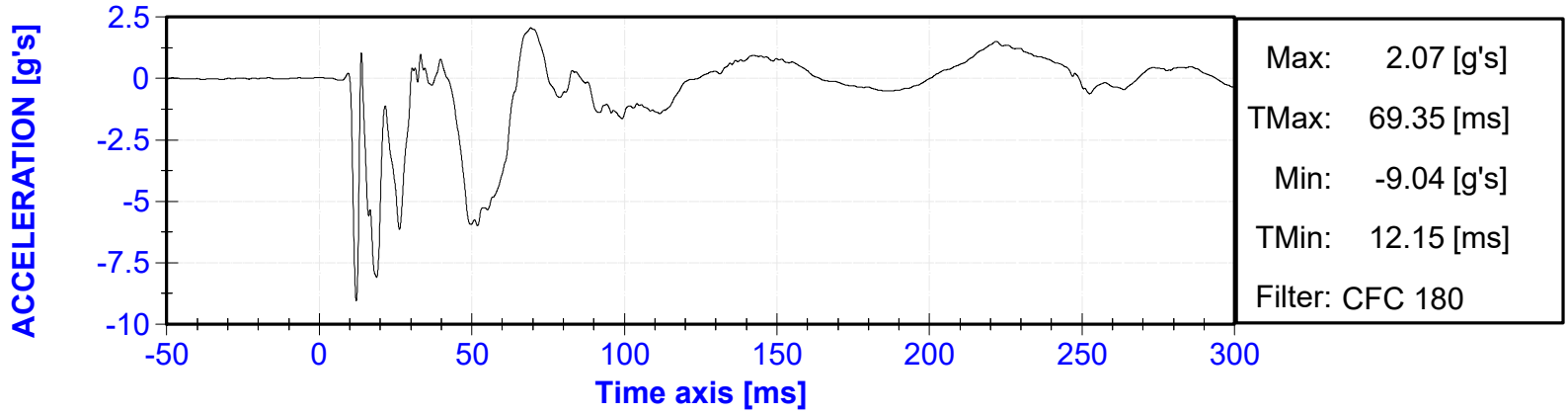
Passenger Head Acceleration (Z) vs. Time Primary



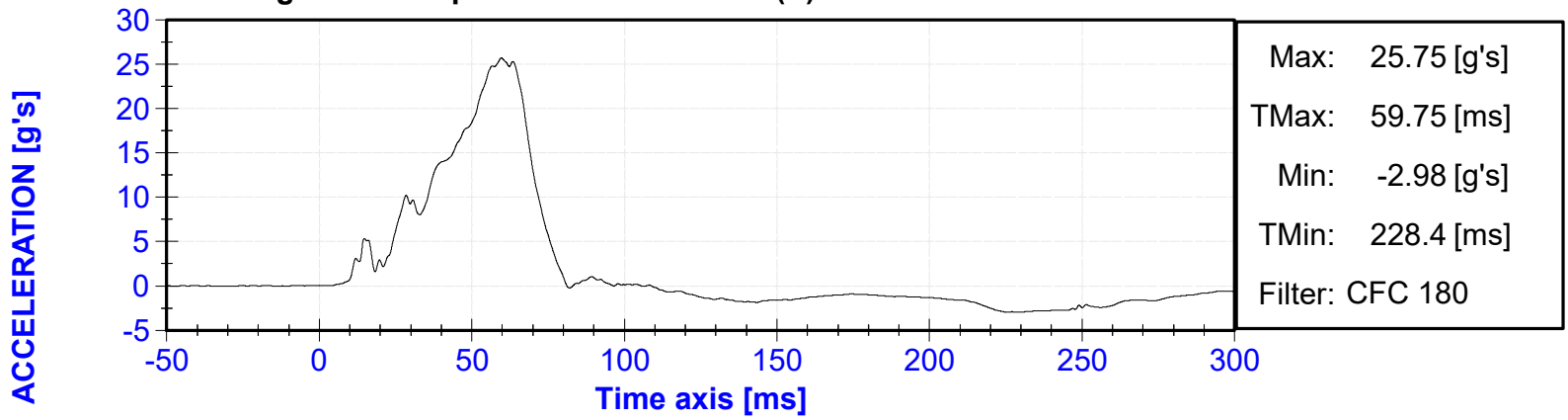
Passenger Head Resultant Acceleration Primary vs. Time



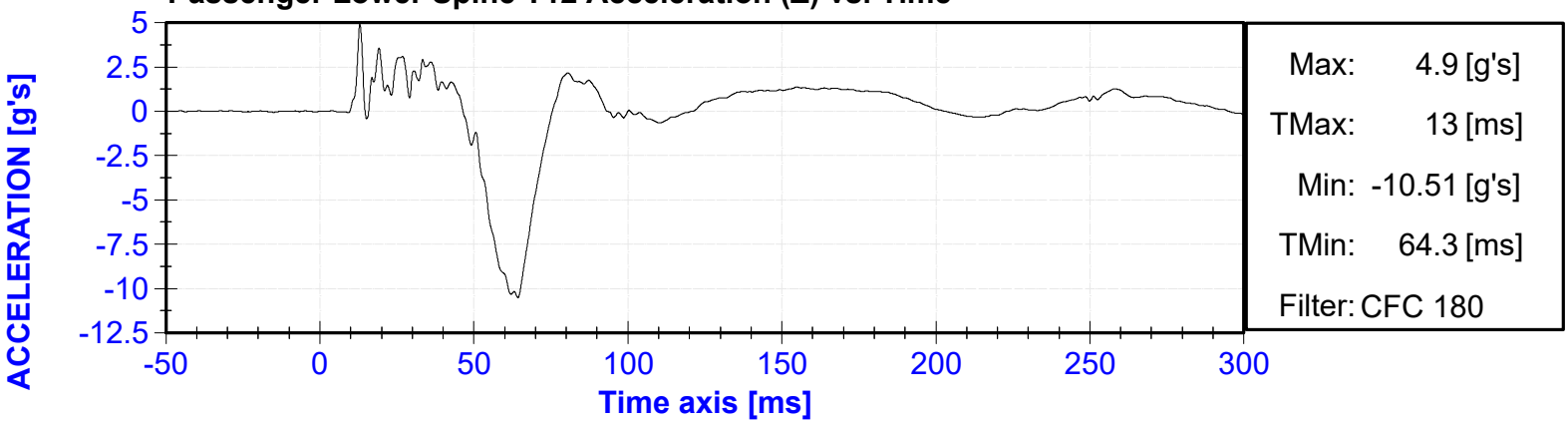
Passenger Lower Spine T12 Acceleration (X) vs. Time



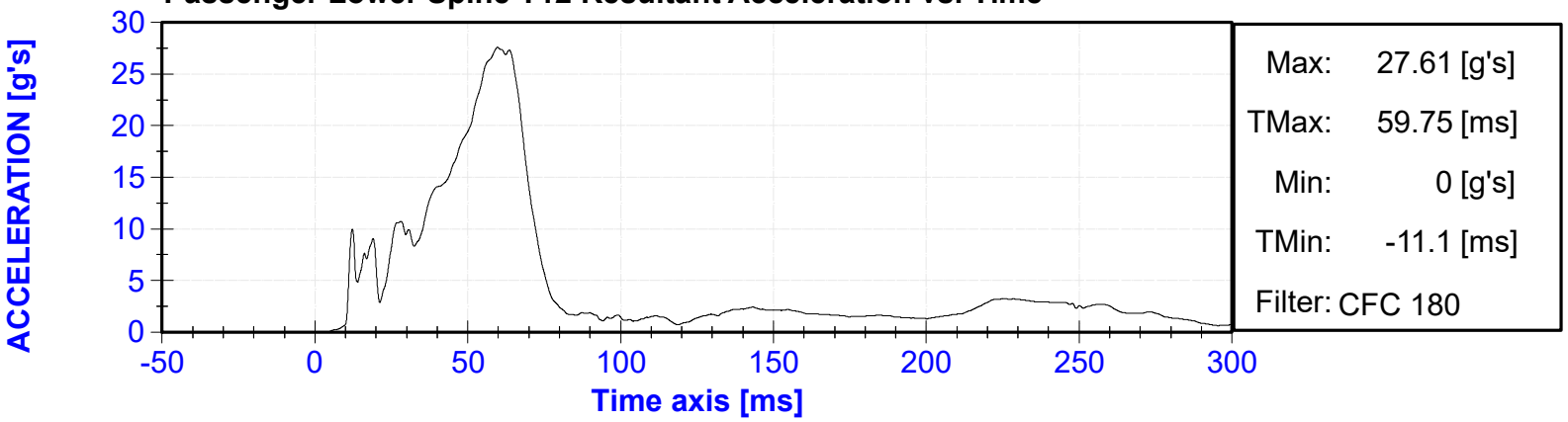
Passenger Lower Spine T12 Acceleration (Y) vs. Time



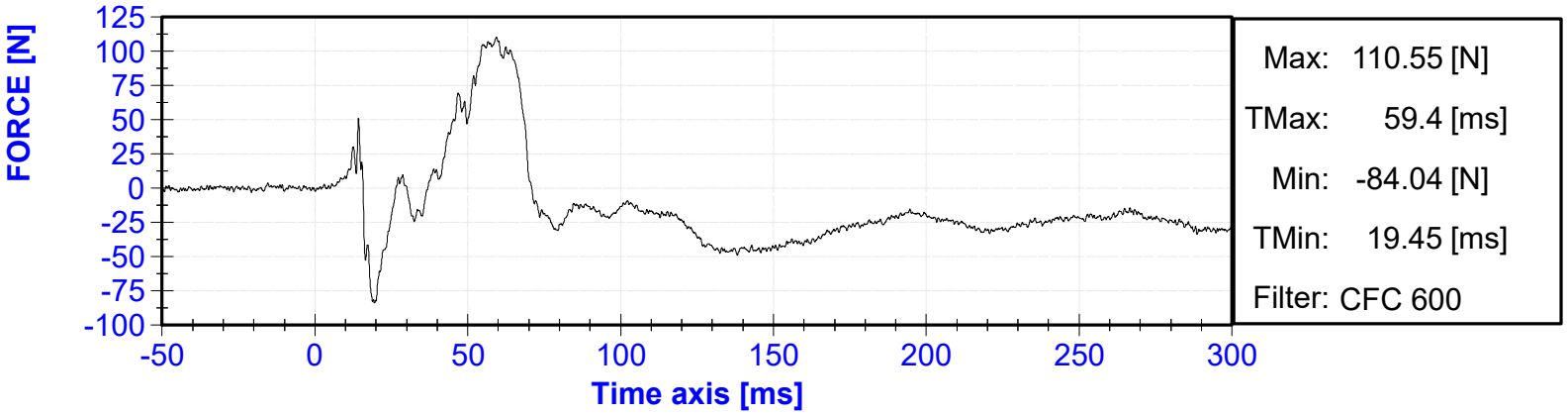
Passenger Lower Spine T12 Acceleration (Z) vs. Time



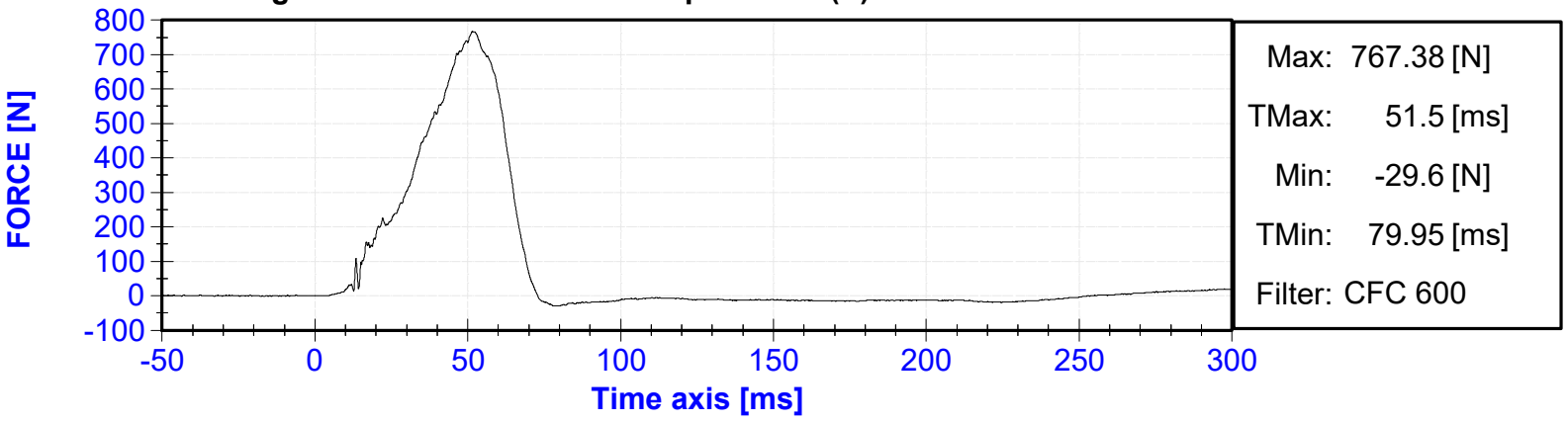
Passenger Lower Spine T12 Resultant Acceleration vs. Time



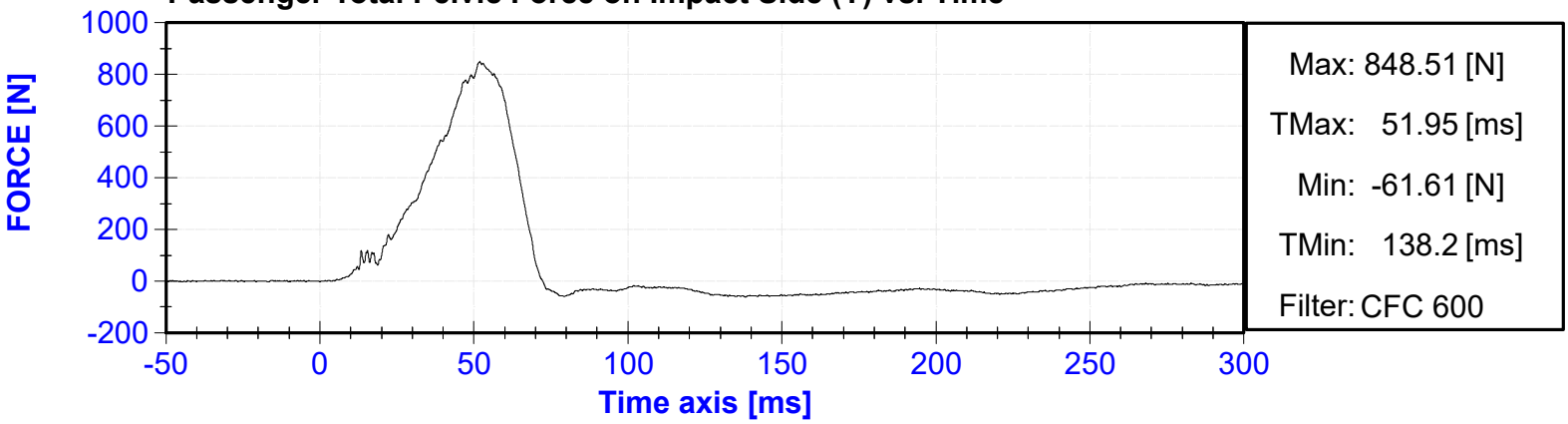
Passenger Iliac Force on Impact Side (Y) vs. Time



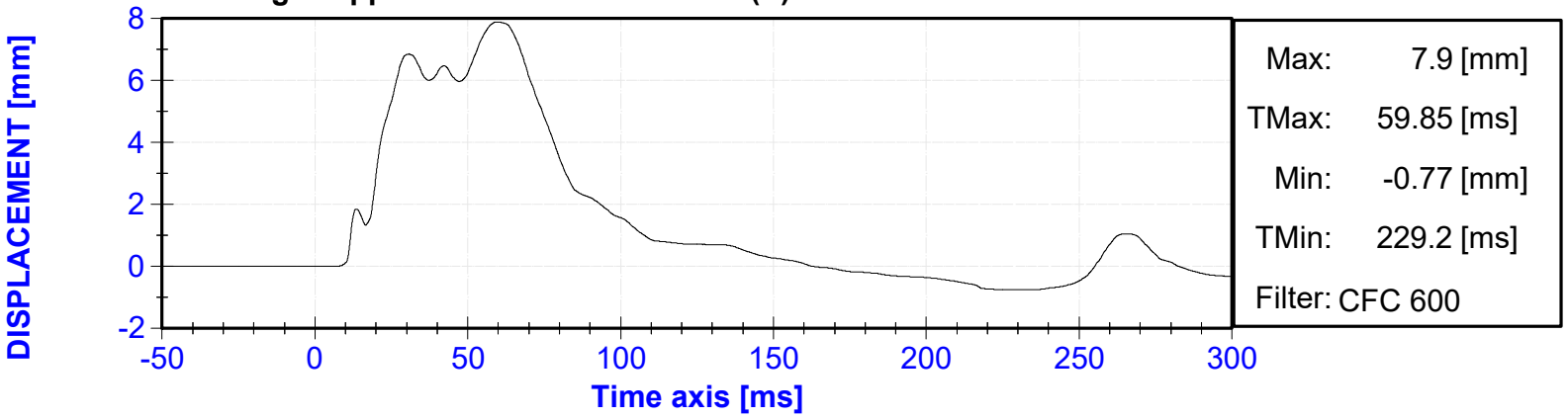
Passenger Acetabulum Force on Impact Side (Y) vs. Time



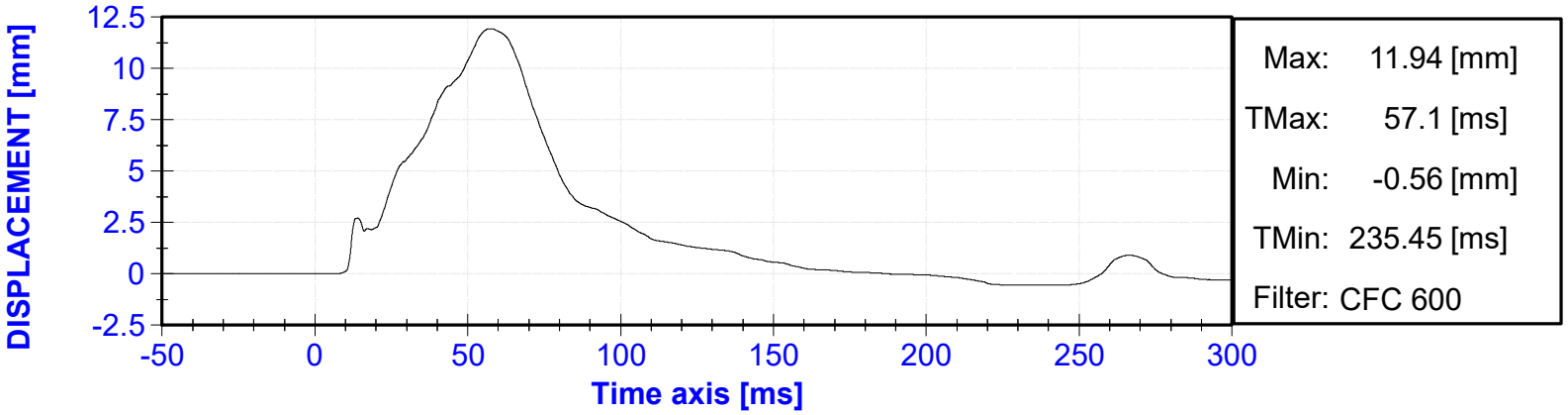
Passenger Total Pelvic Force on Impact Side (Y) vs. Time



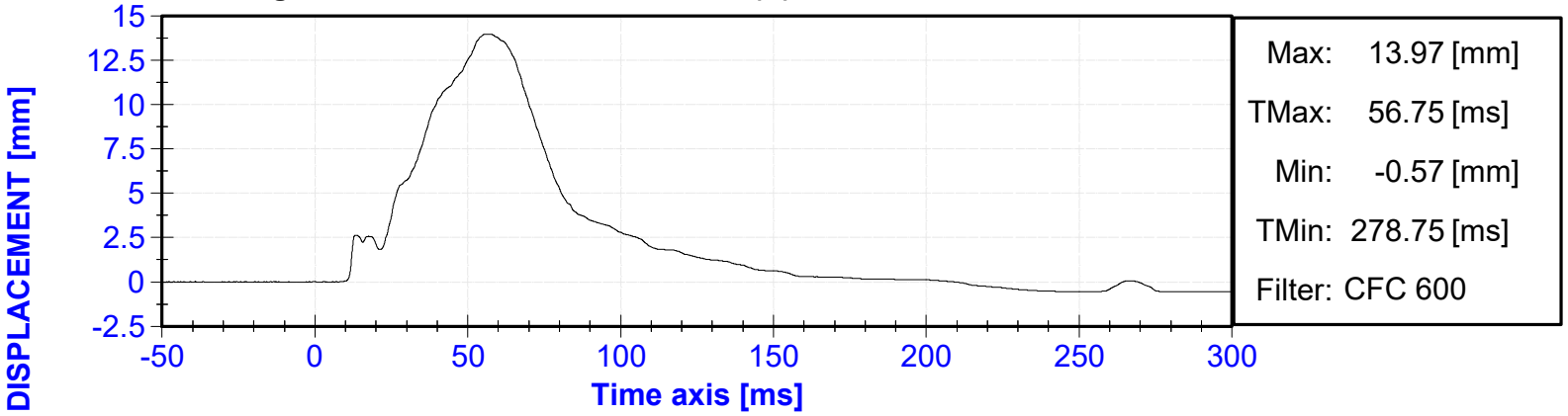
Passenger Upper Thorax Rib Deflection (Y) vs Time



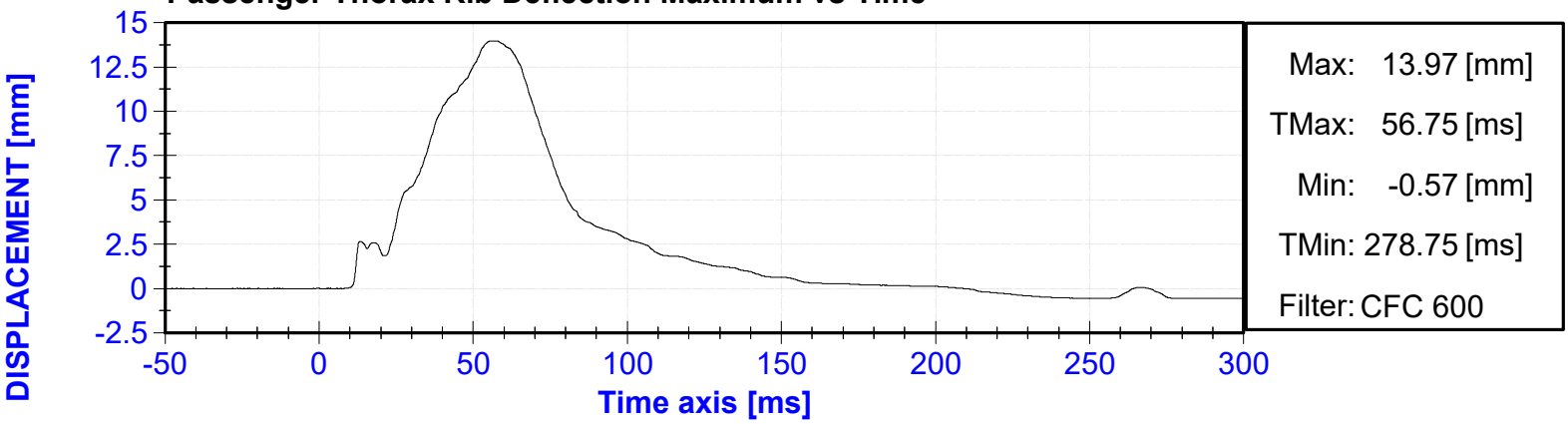
Passenger Middle Thorax Rib Deflection (Y) vs Time

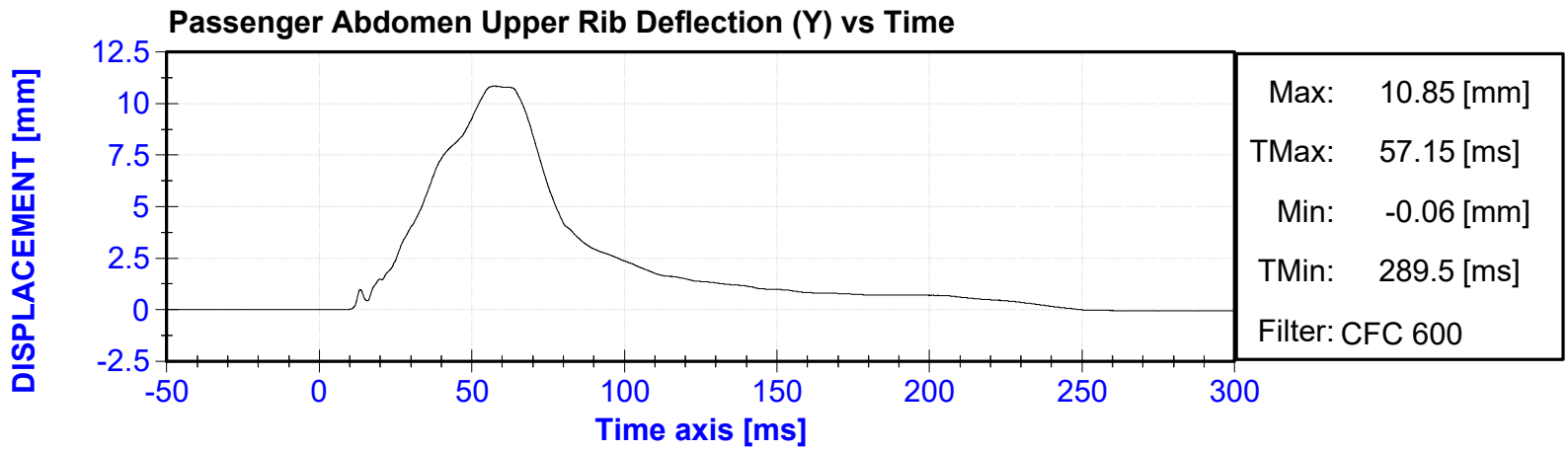


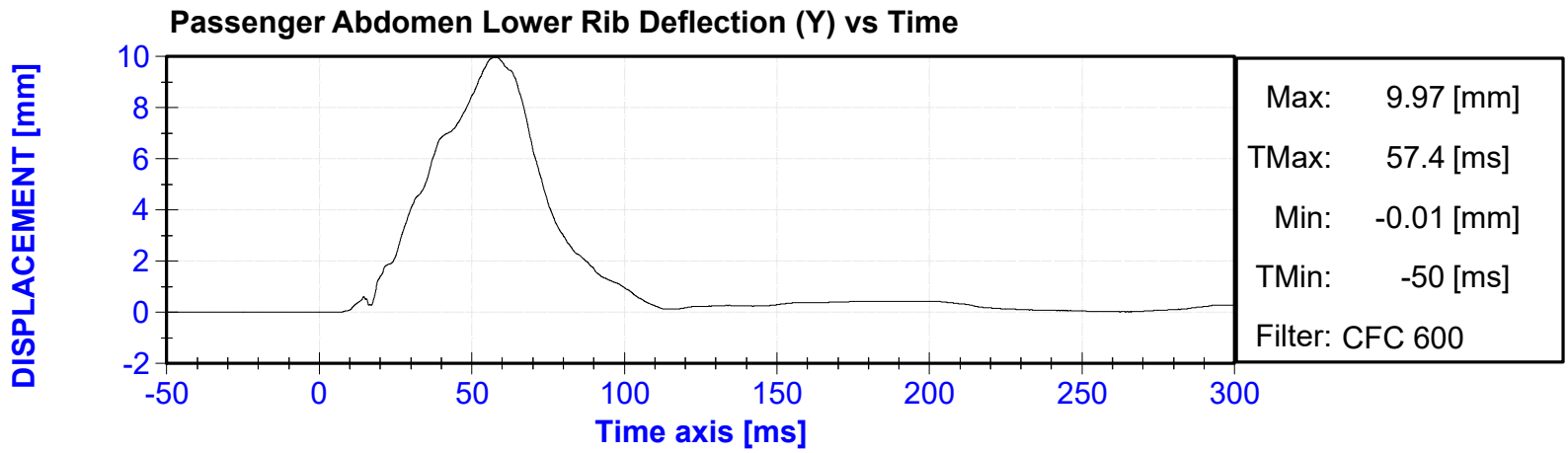
Passenger Lower Thorax Rib Deflection (Y) vs Time

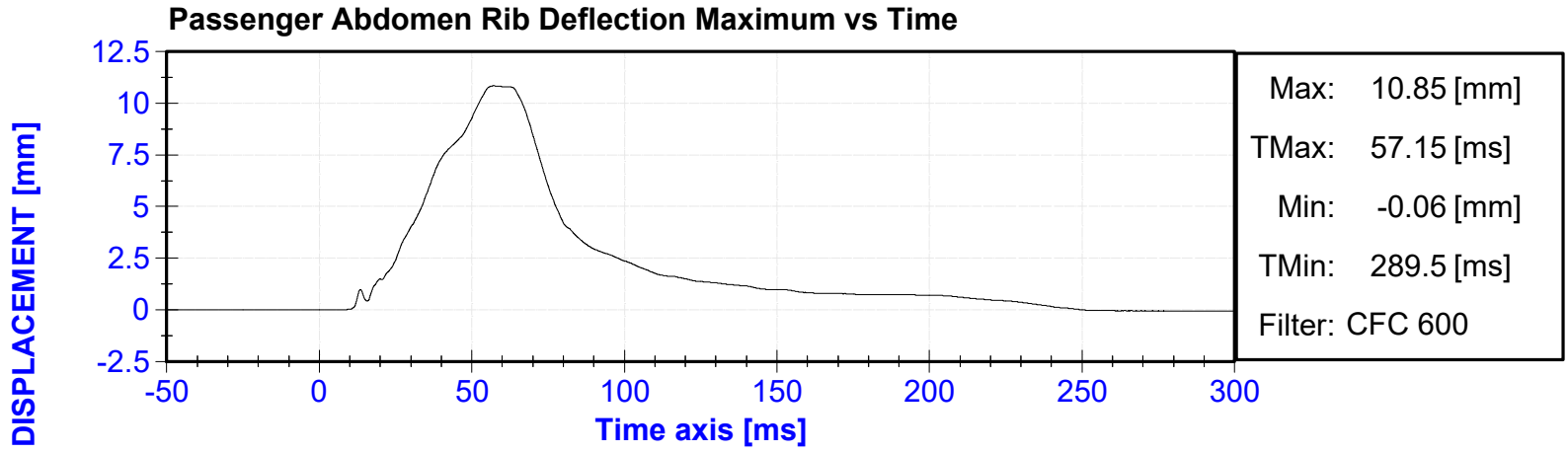


Passenger Thorax Rib Deflection Maximum vs Time




Passenger Abdomen Upper Rib Deflection (Y) vs Time
DISPLACEMENT [mm]
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 10.85 [mm]
TMax: 57.15 [ms]
Min: -0.06 [mm]
TMin: 289.5 [ms]
Filter: CFC 600


Passenger Abdomen Lower Rib Deflection (Y) vs Time
DISPLACEMENT [mm]
10
8
6
4
2
0
-2
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 9.97 [mm]
TMax: 57.4 [ms]
Min: -0.01 [mm]
TMin: -50 [ms]
Filter: CFC 600


Passenger Abdomen Rib Deflection Maximum vs Time
DISPLACEMENT [mm]
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 10.85 [mm]
TMax: 57.15 [ms]
Min: -0.06 [mm]
TMin: 289.5 [ms]
Filter: CFC 600

APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

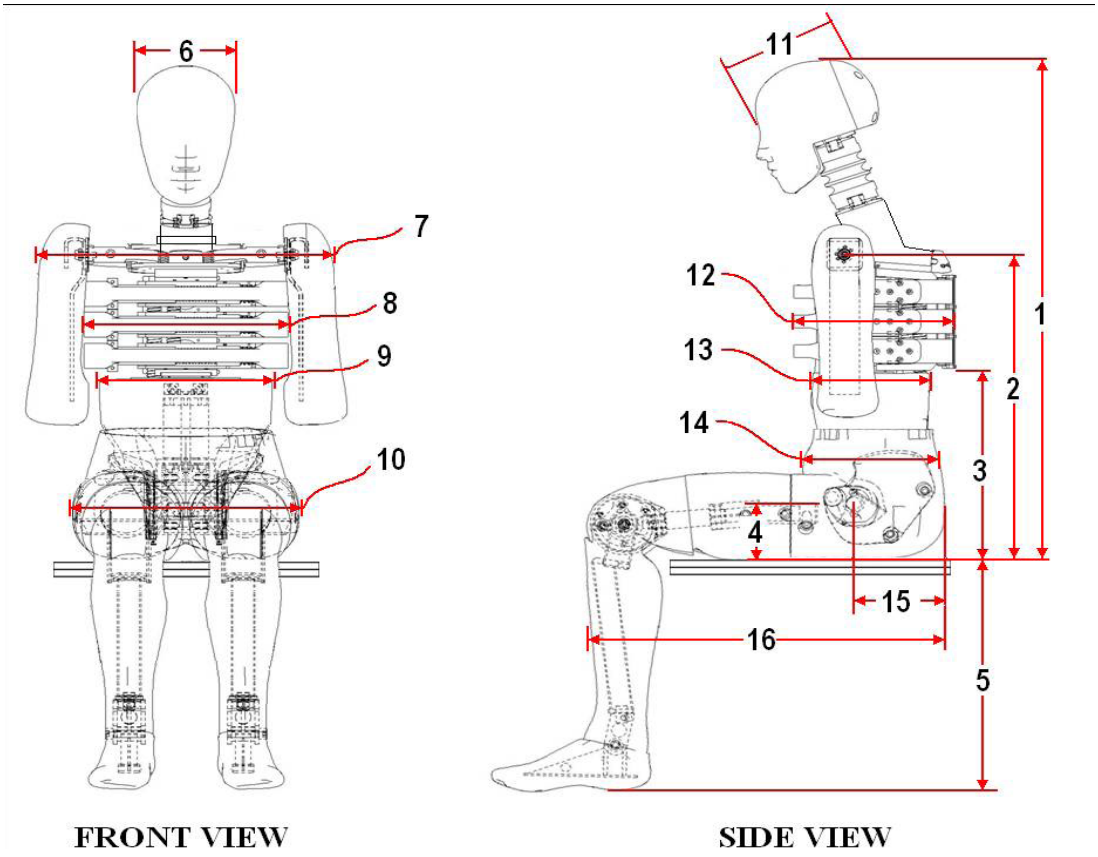
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 1/25/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	915	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	429	Pass
6	Head Width	152	158	156	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	282	Pass
10	Pelvis Lap Width	359	373	370	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	201	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	611	Pass

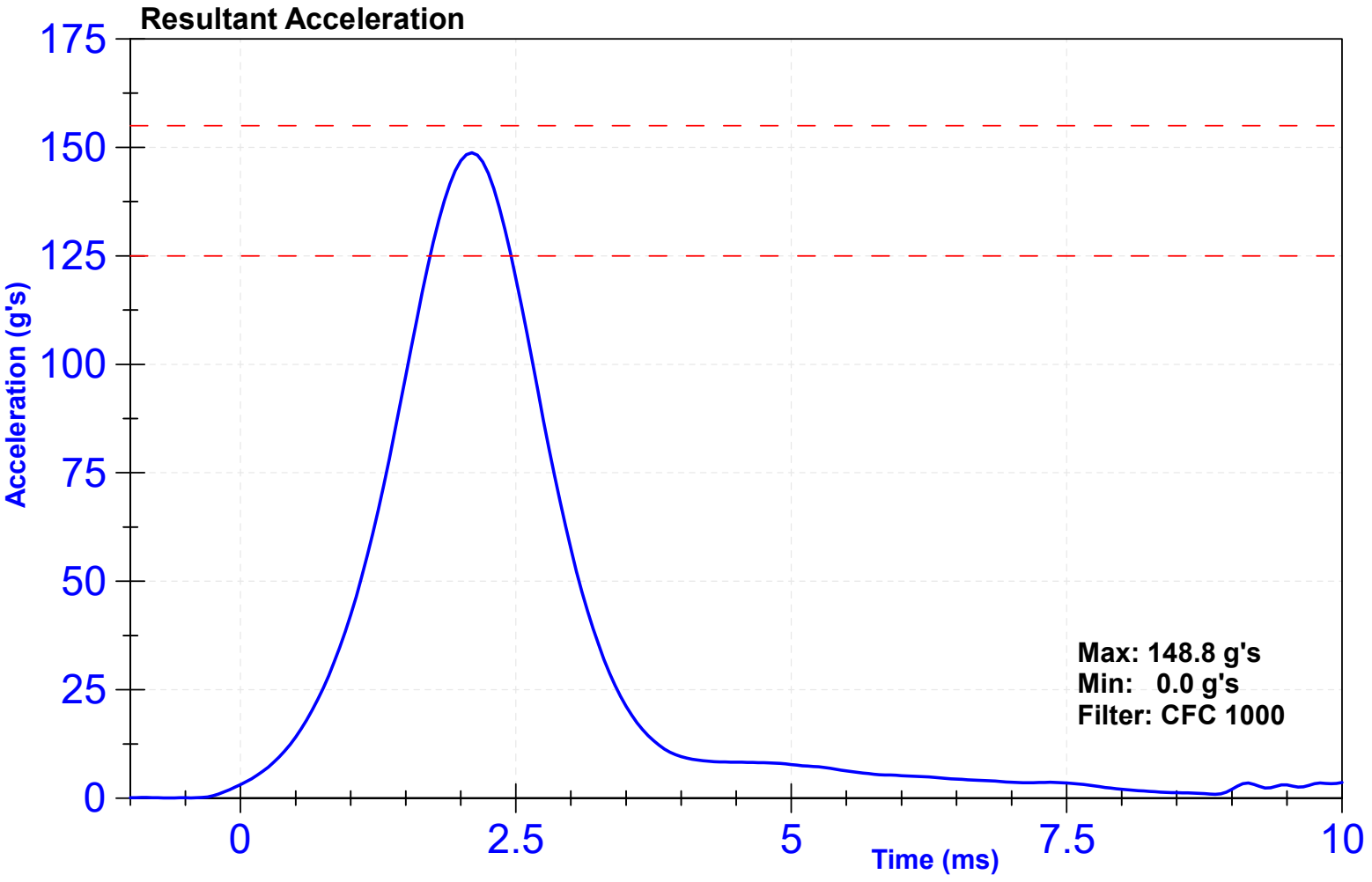
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

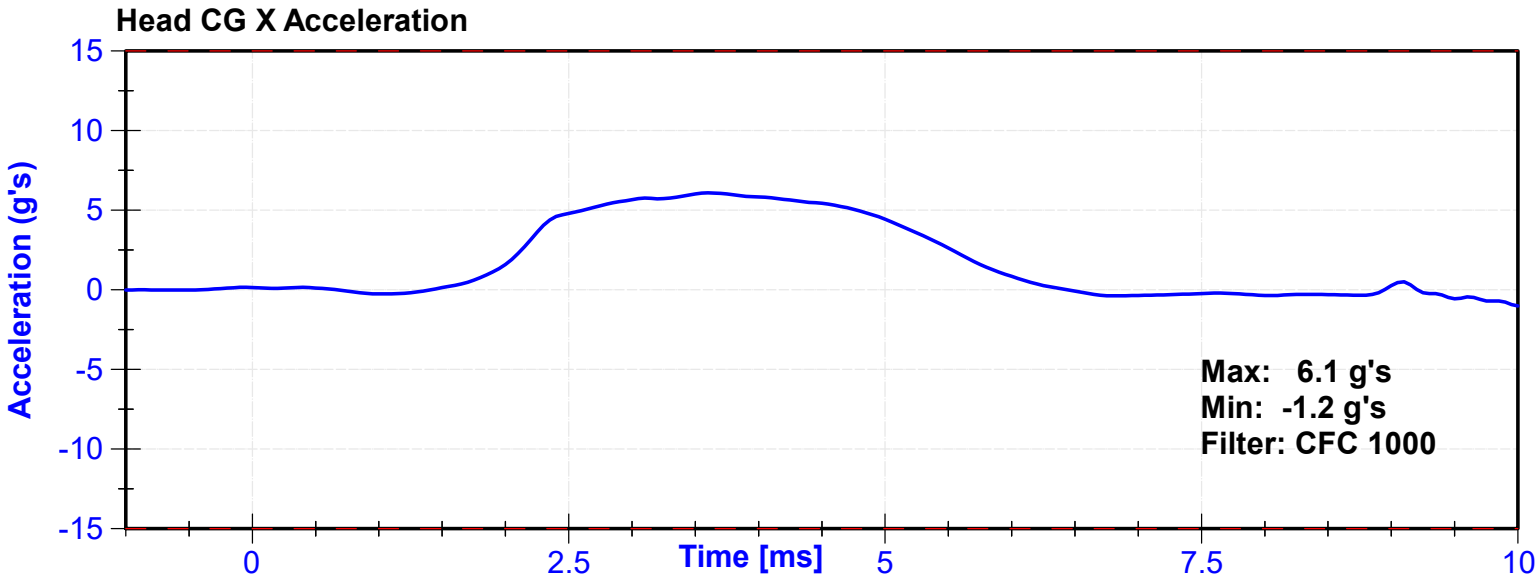
Results

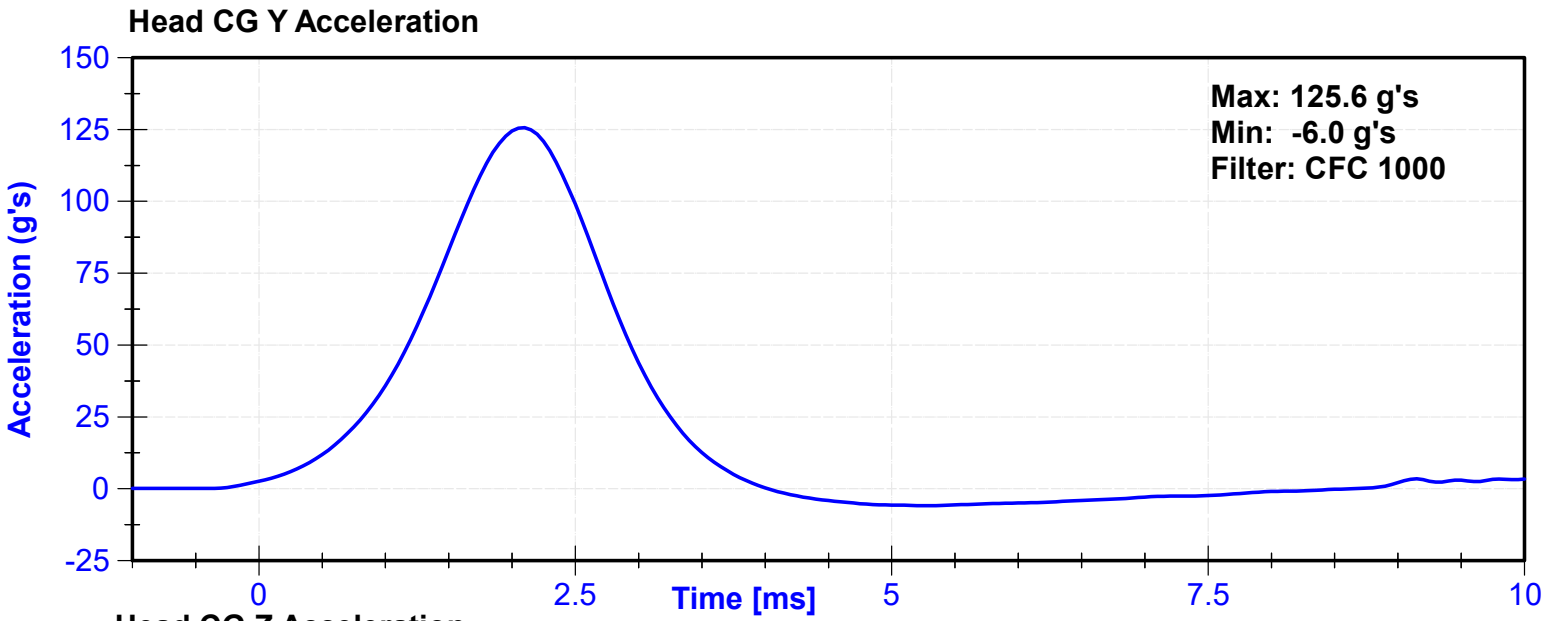
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	22	Pass
Resultant Acceleration	125	155	g's	148.8	Pass
Oscillation	0	15	%	2.58	Pass
Fore-Aft Acceleration	-15	15	g's	6.1	Pass

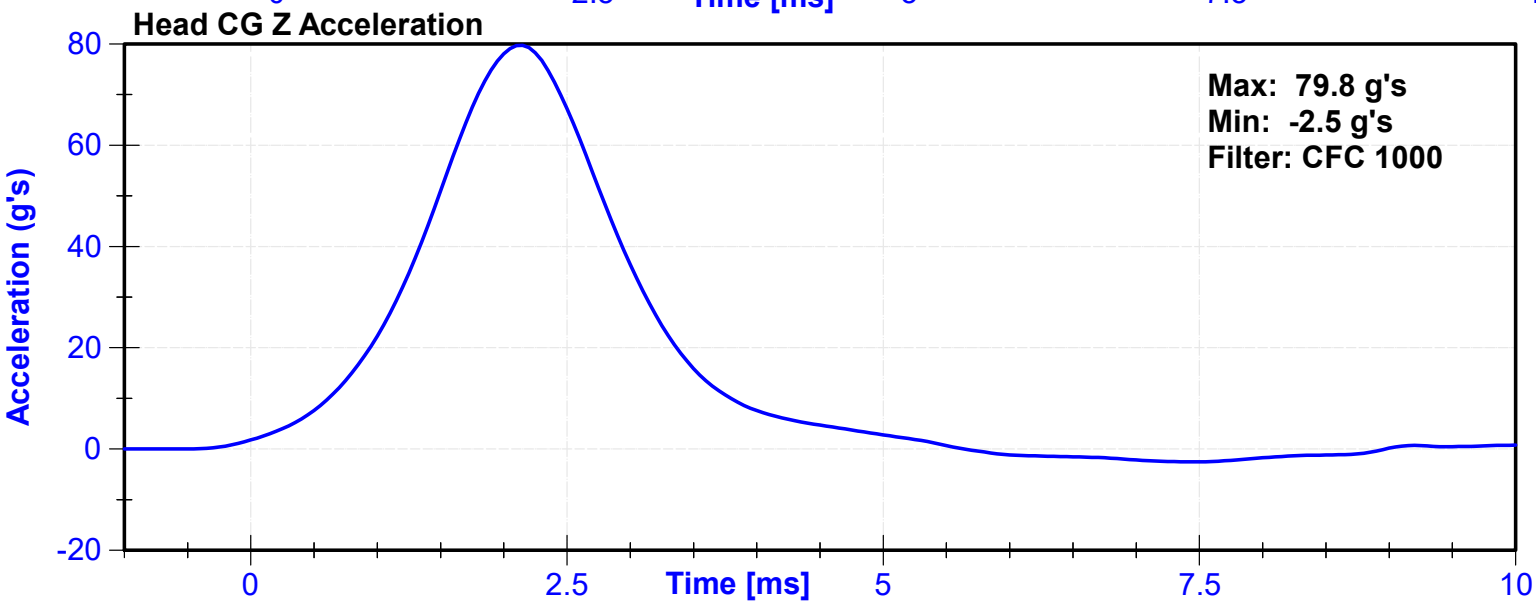
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	11/16/2023	5/14/2024
Y Accelerometer	Endevco	P49216	11/16/2023	5/14/2024
Z Accelerometer	Endevco	P51303	11/16/2023	5/14/2024




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 6.1 g's
Min: -1.2 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 125.6 g's
Min: -6.0 g's
Filter: CFC 1000


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

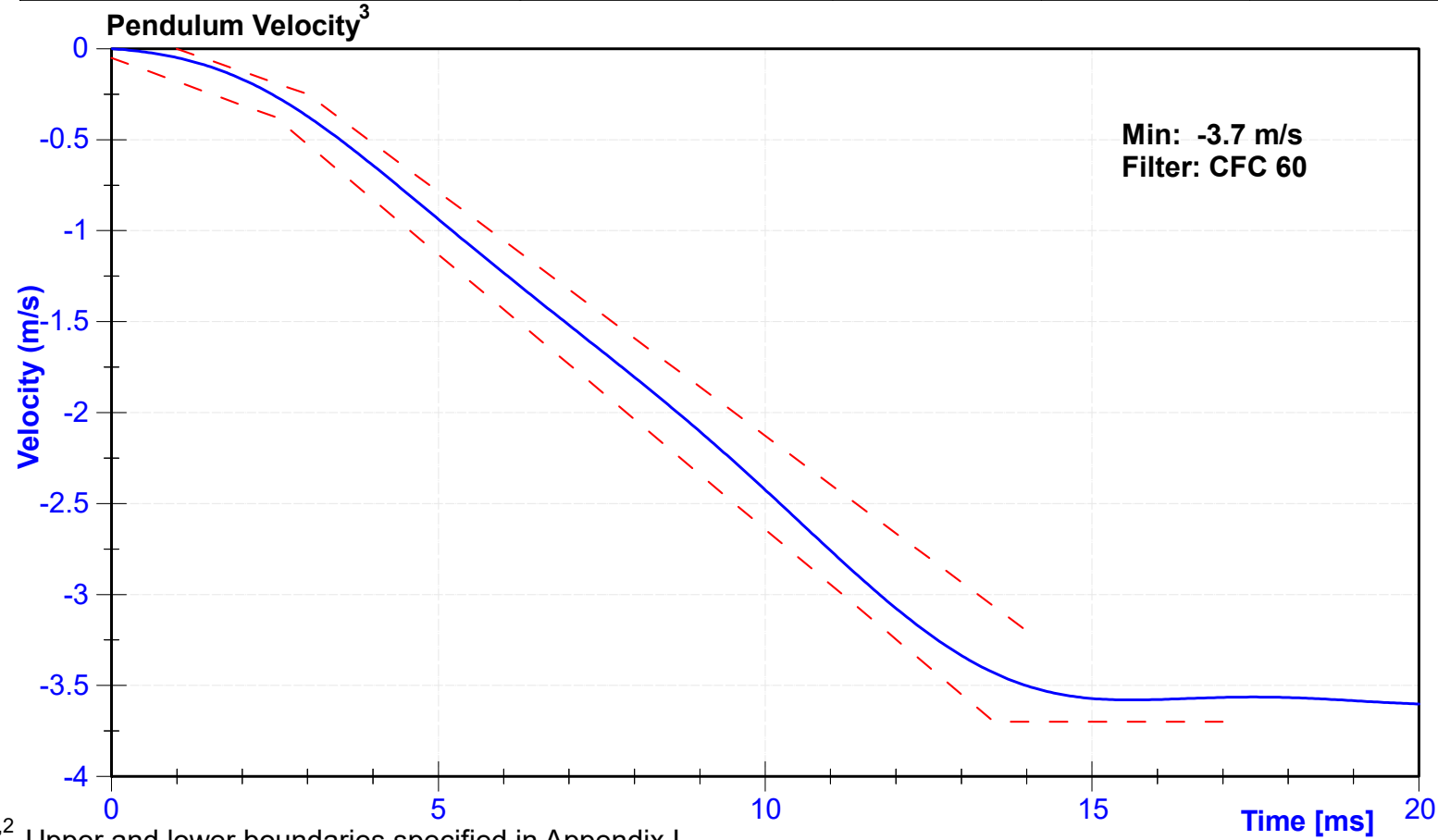
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

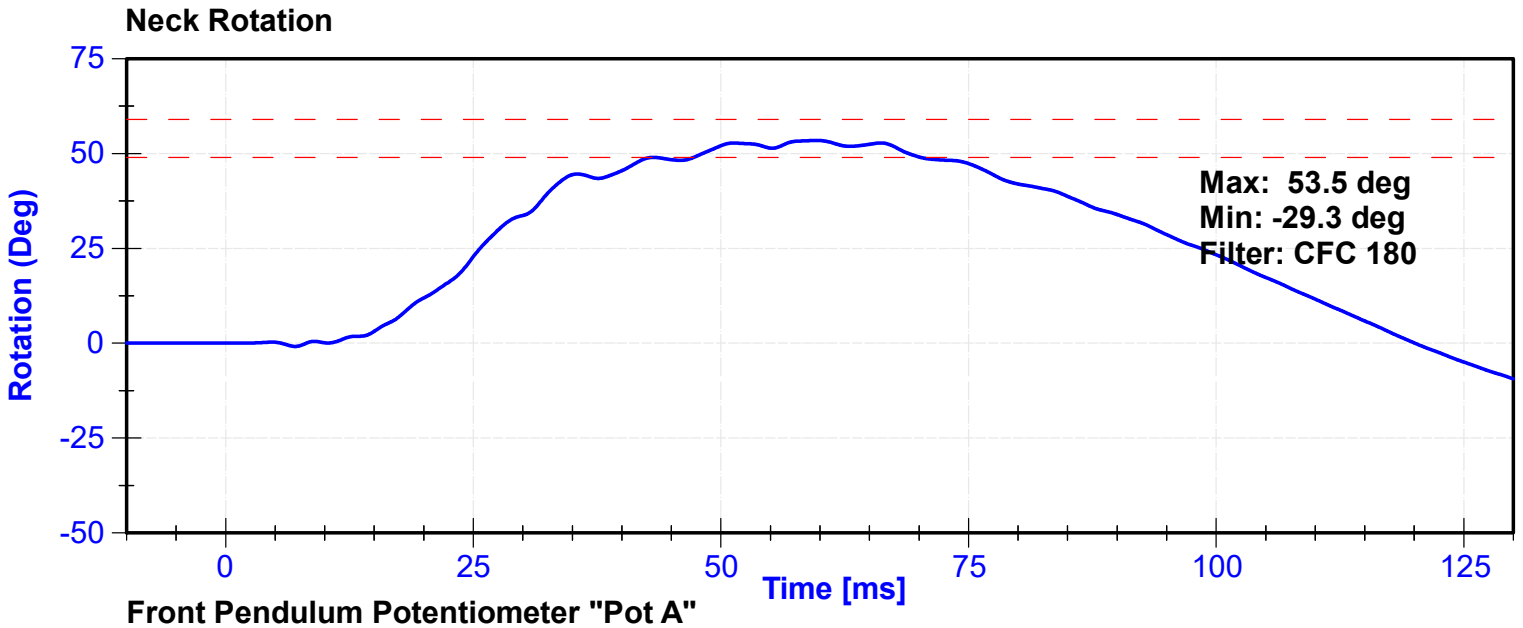
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	22	Pass
Velocity	3.3	3.5	m/s	3.36	Pass
Lateral Neck Rotation	49	59	deg	53.5	Pass
Time at Maximum Rotation	54	66	ms	59.6	Pass
Time of Rotation Decay from Maximum	53	88	ms	60.5	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

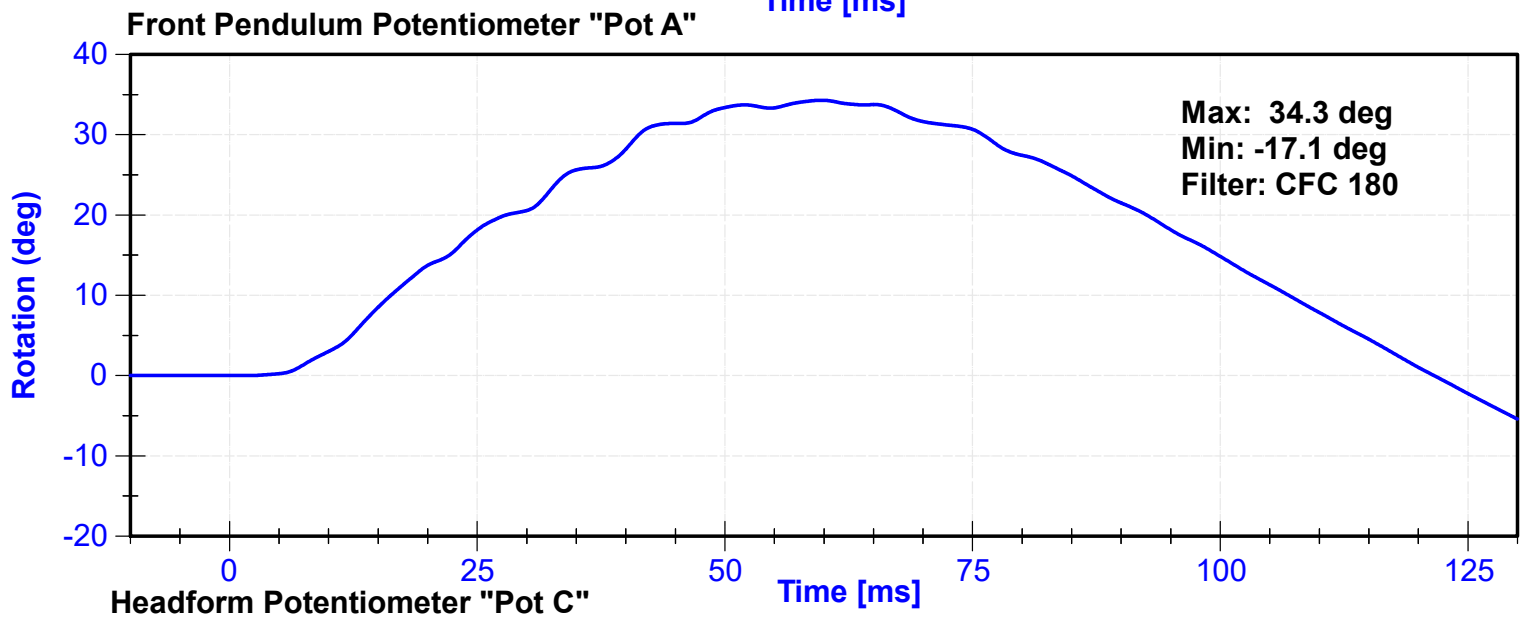
Transducer Calibrations

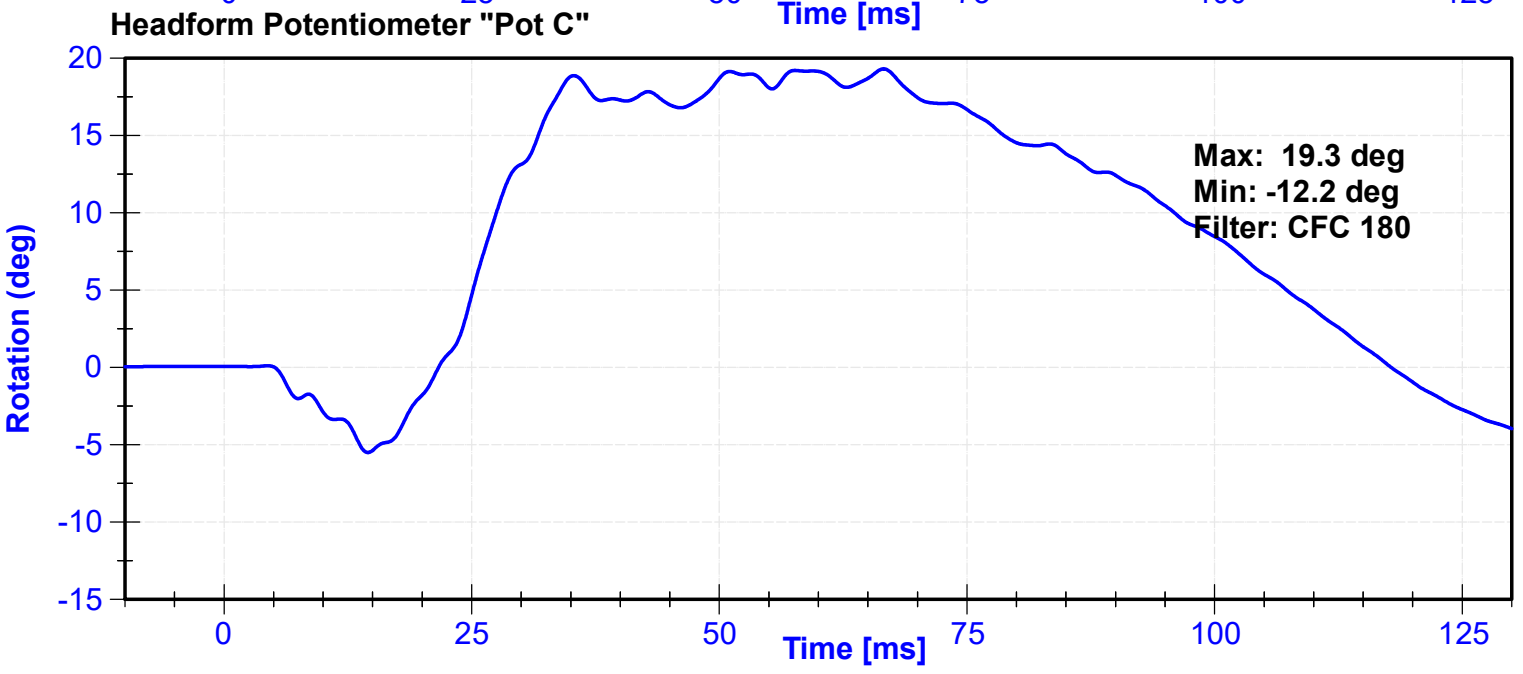
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024



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


Neck Rotation
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]
Max: 53.5 deg
Min: -29.3 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: 34.3 deg
Min: -17.1 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: 19.3 deg
Min: -12.2 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

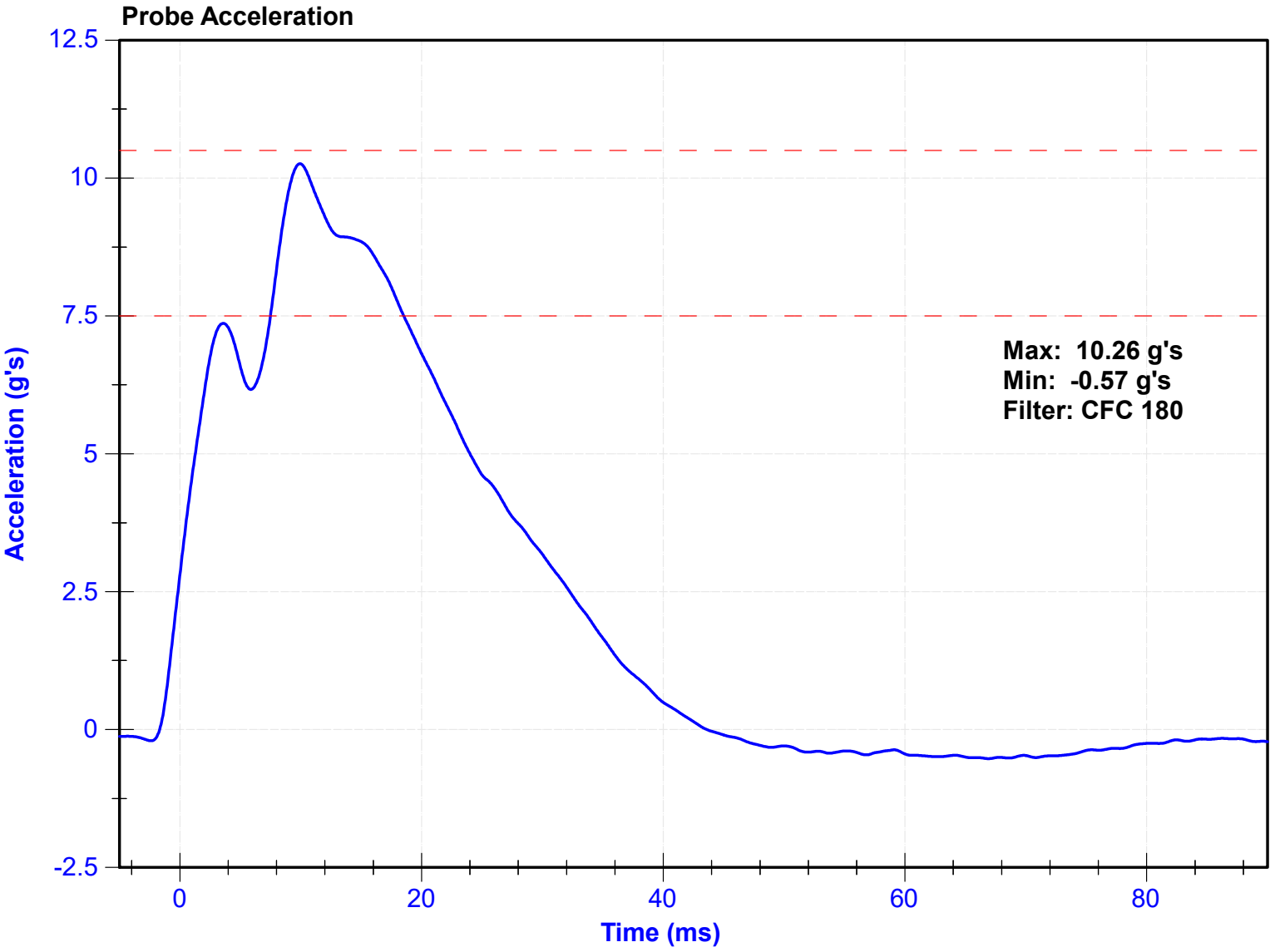
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	4.2	4.4	m/s	4.22	Pass
Probe Acceleration	7.5	10.5	g's	10.26	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024



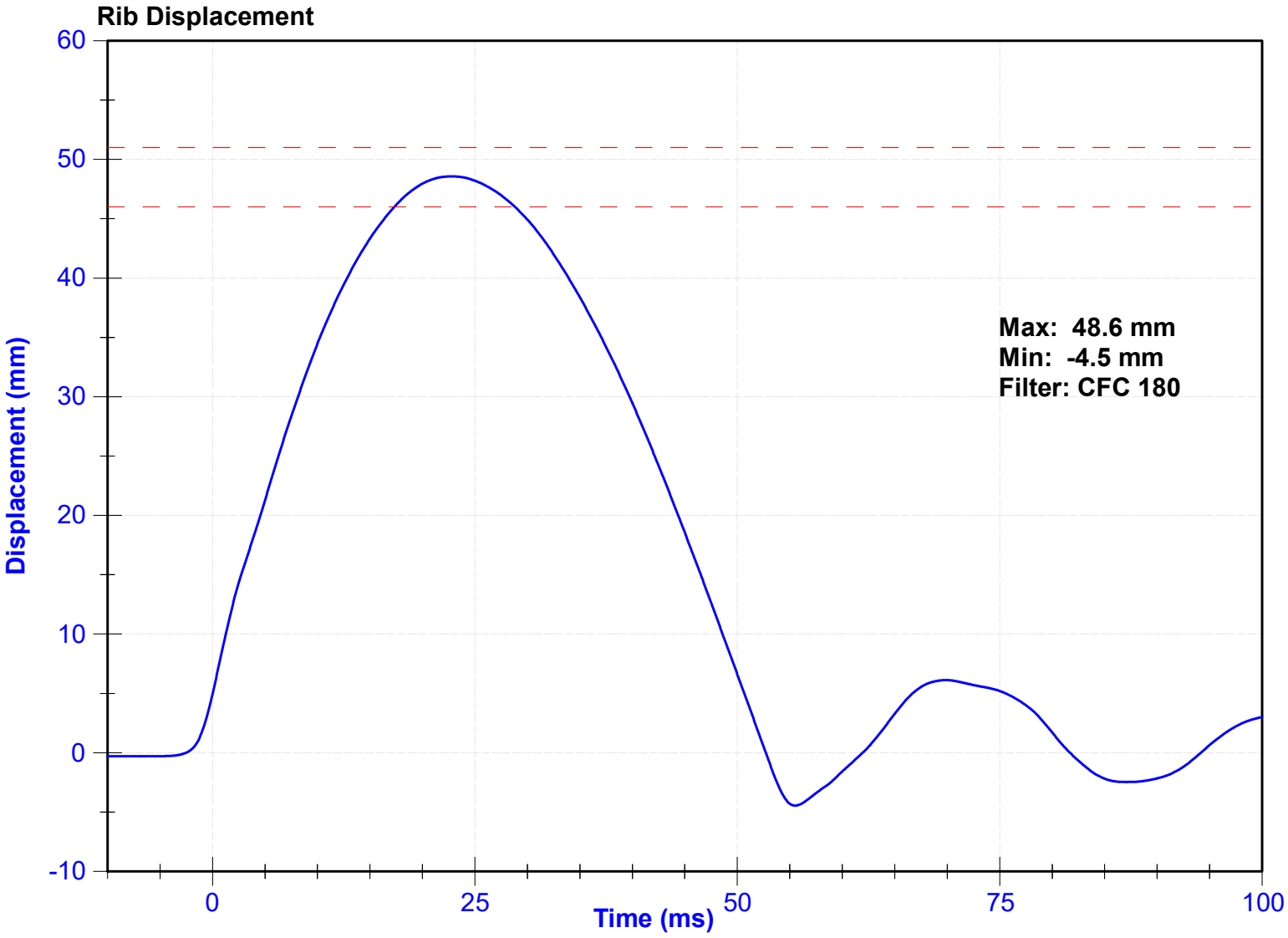
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22	Pass
Rib Displacement	46	51	mm	48.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	11/17/2023	5/17/2024



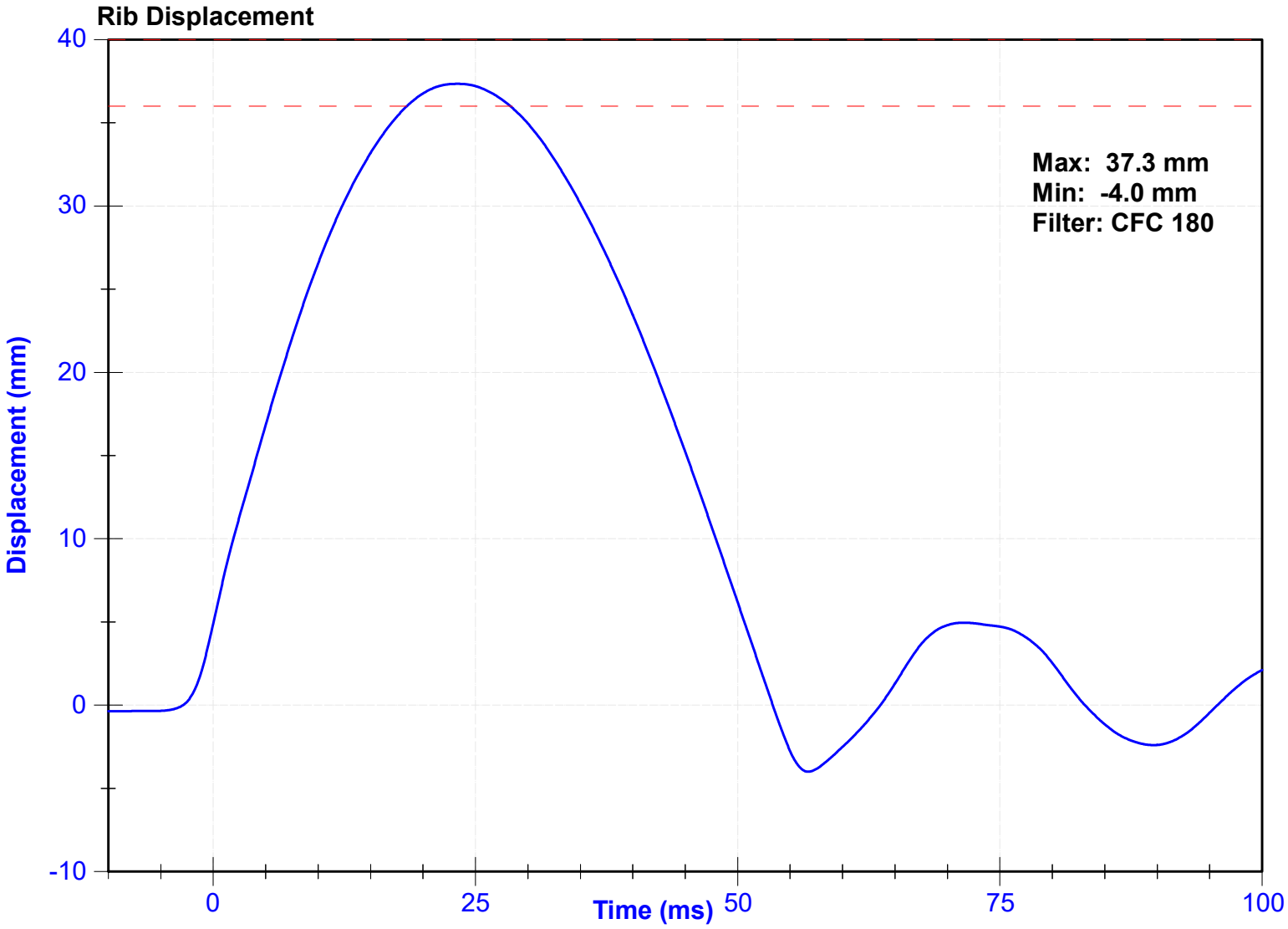
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	11/17/2023	5/17/2024



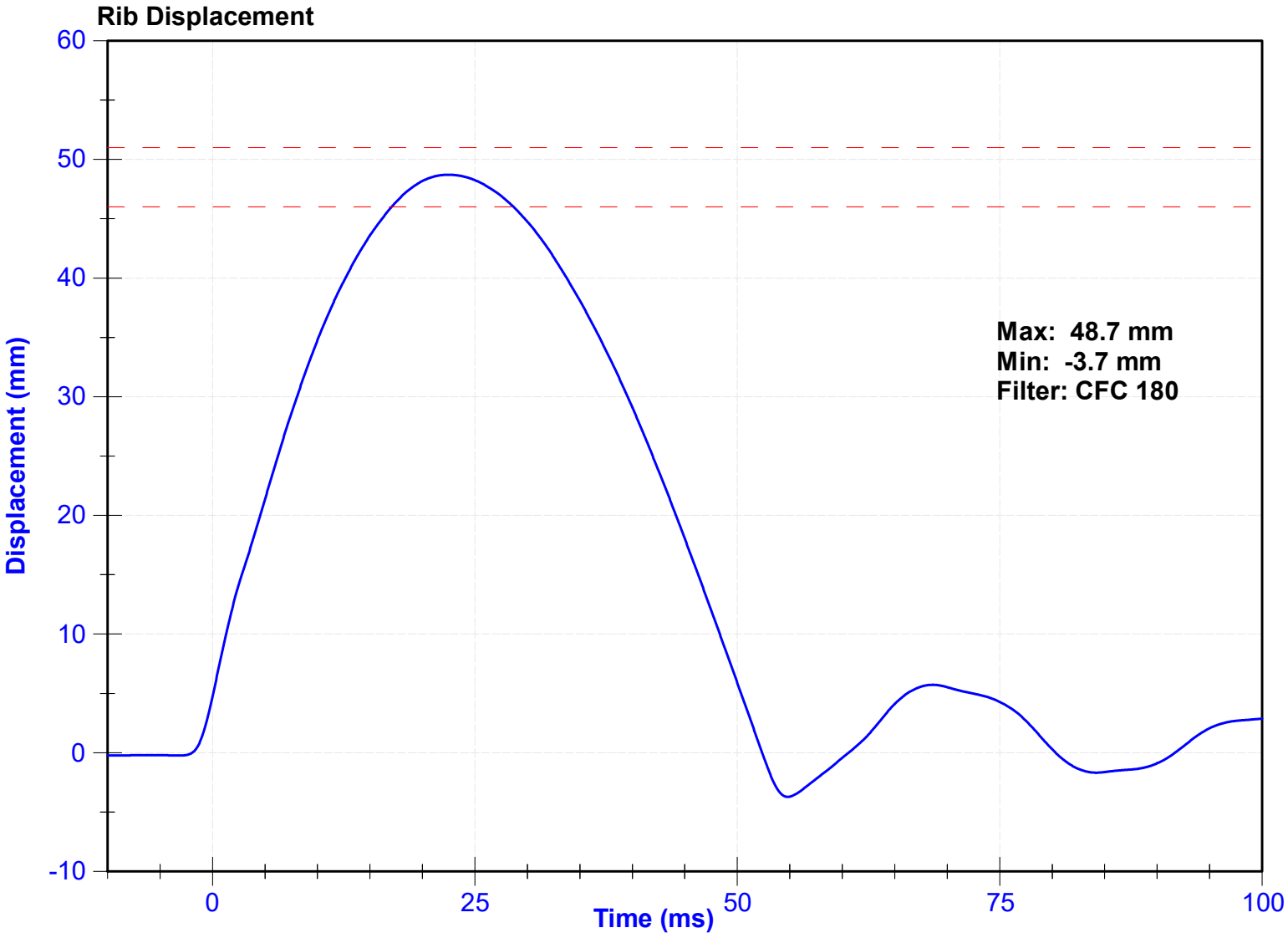
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	11/17/2023	5/17/2024



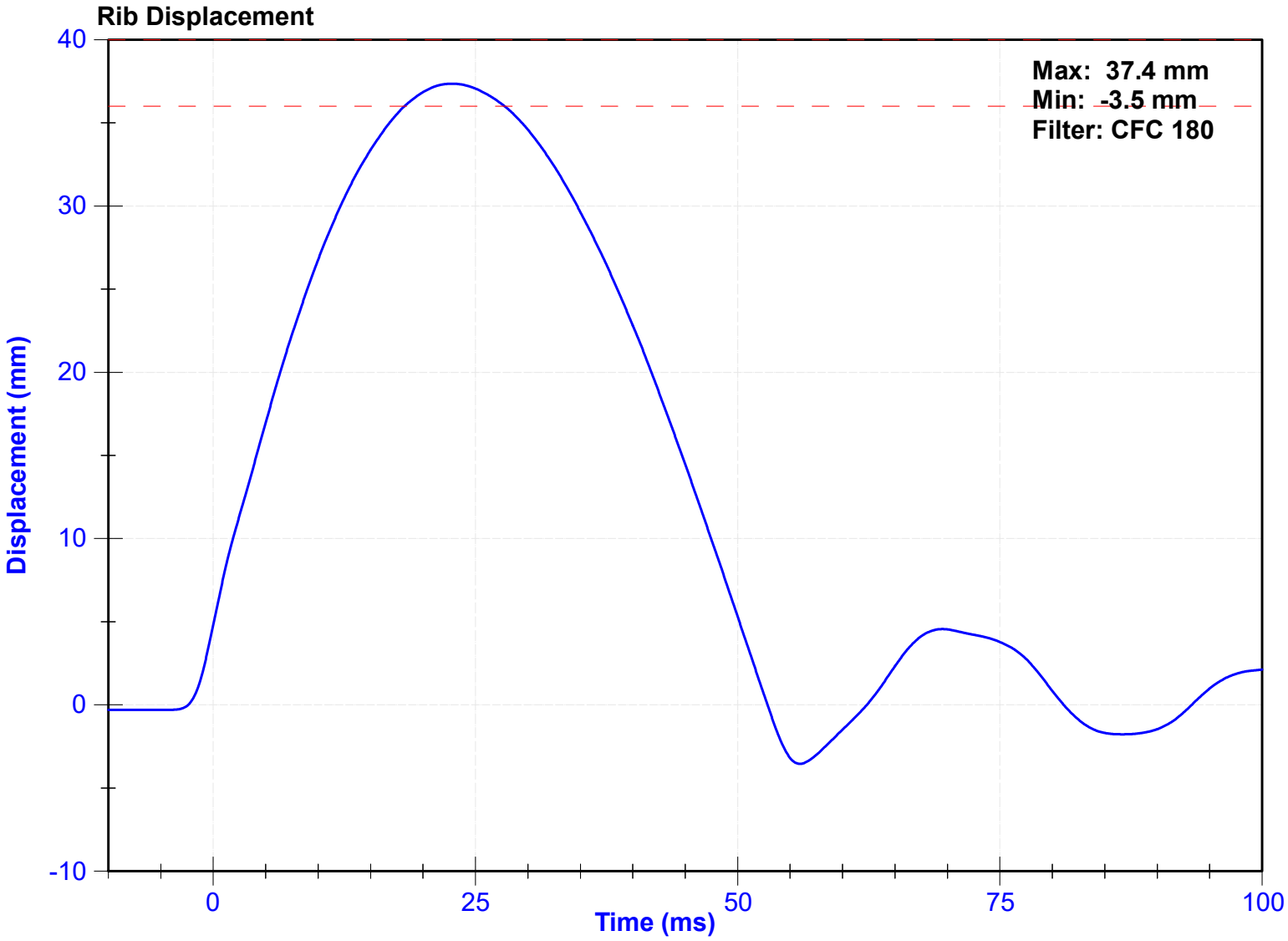
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	11/17/2023	5/17/2024



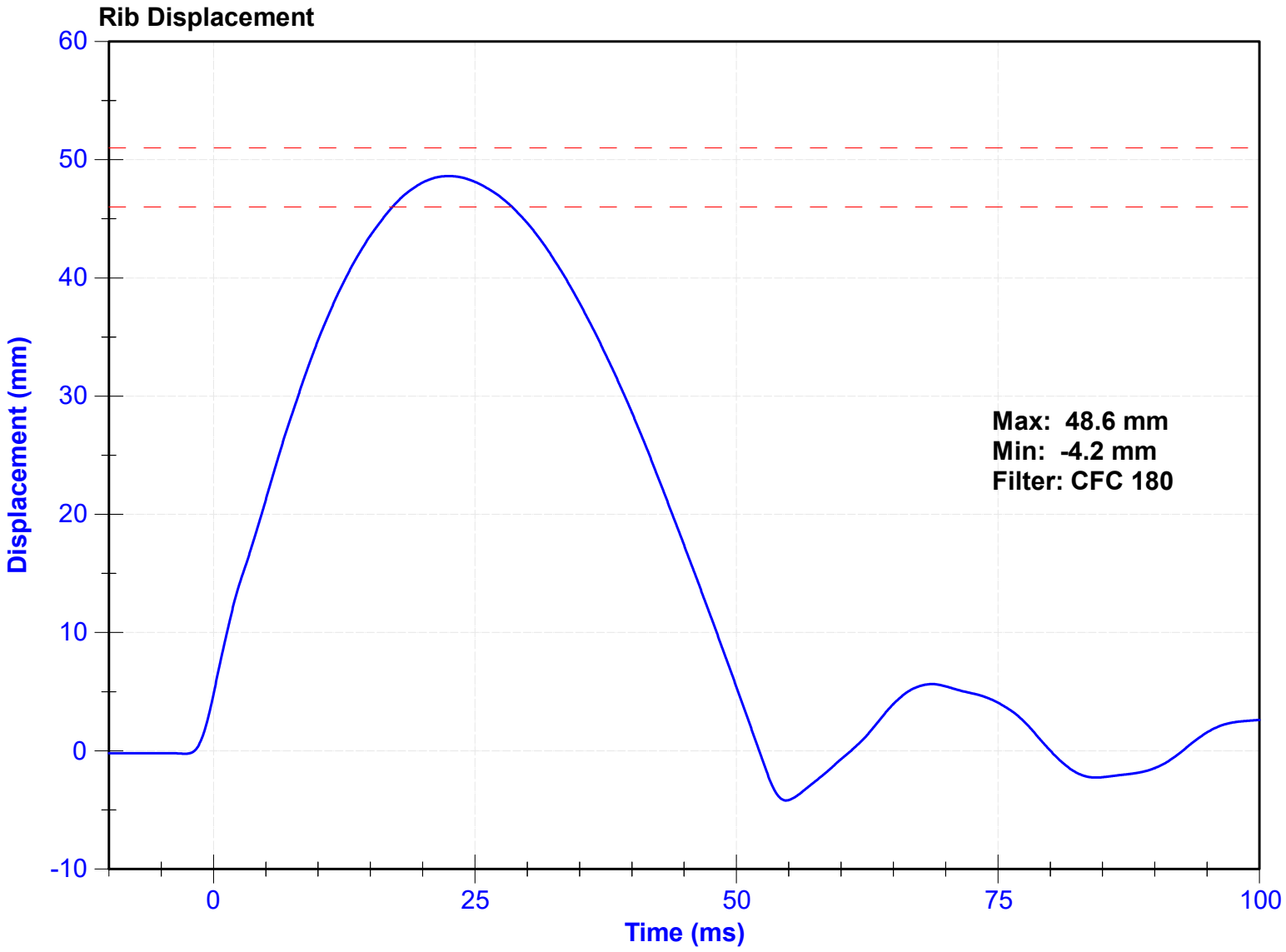
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22	Pass
Rib Displacement	46	51	mm	48.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	11/17/2023	5/17/2024



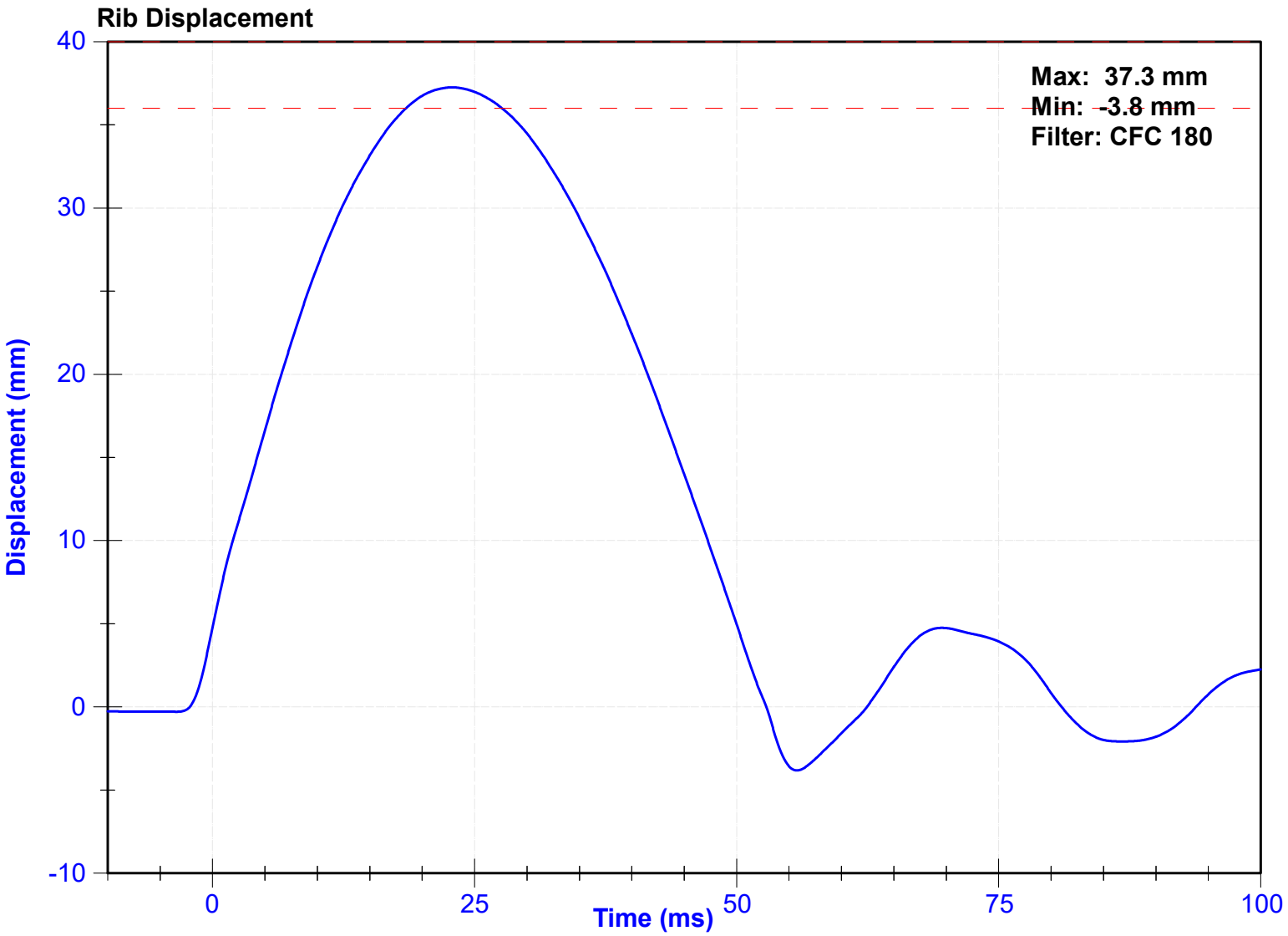
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	22	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	11/17/2023	5/17/2024



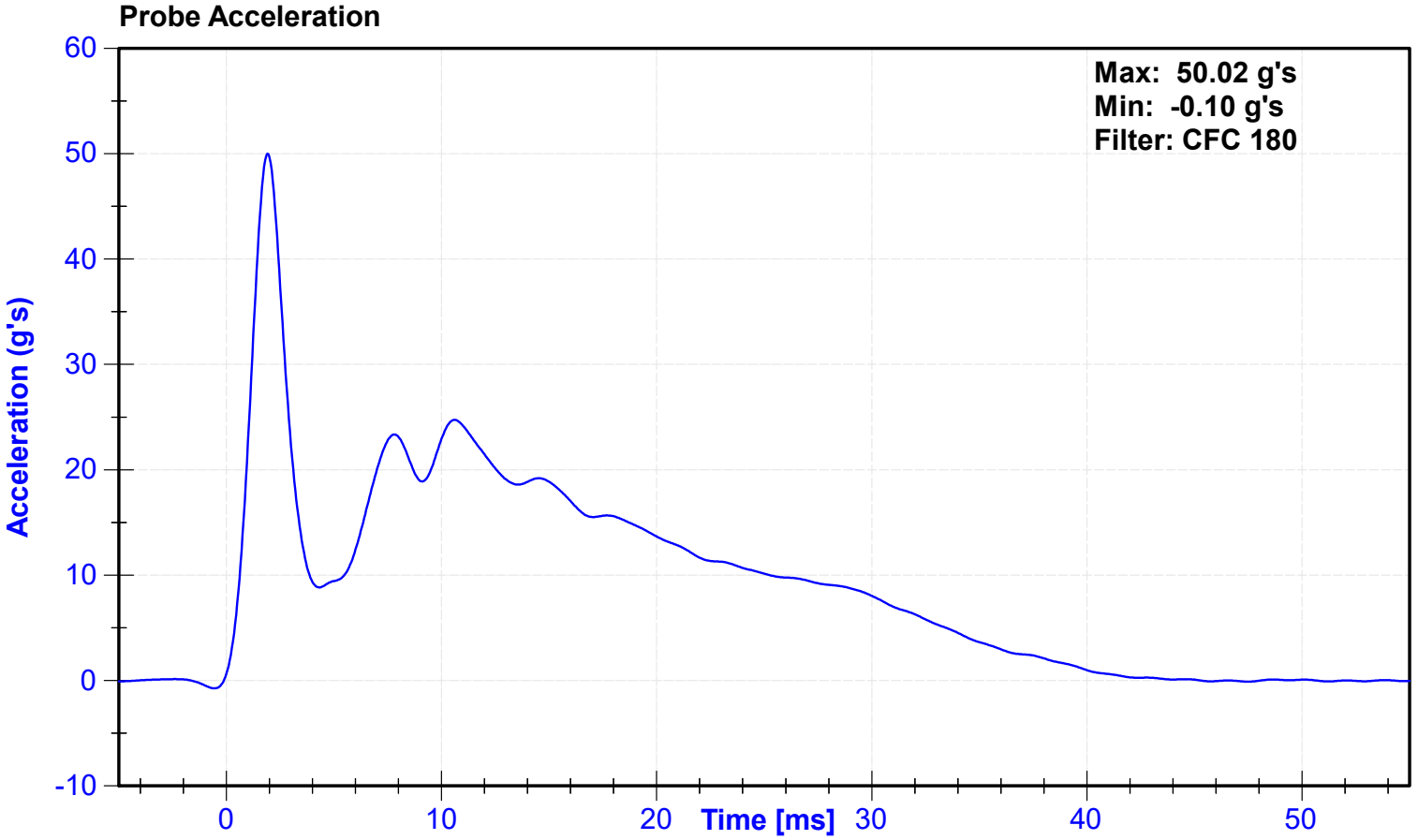
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

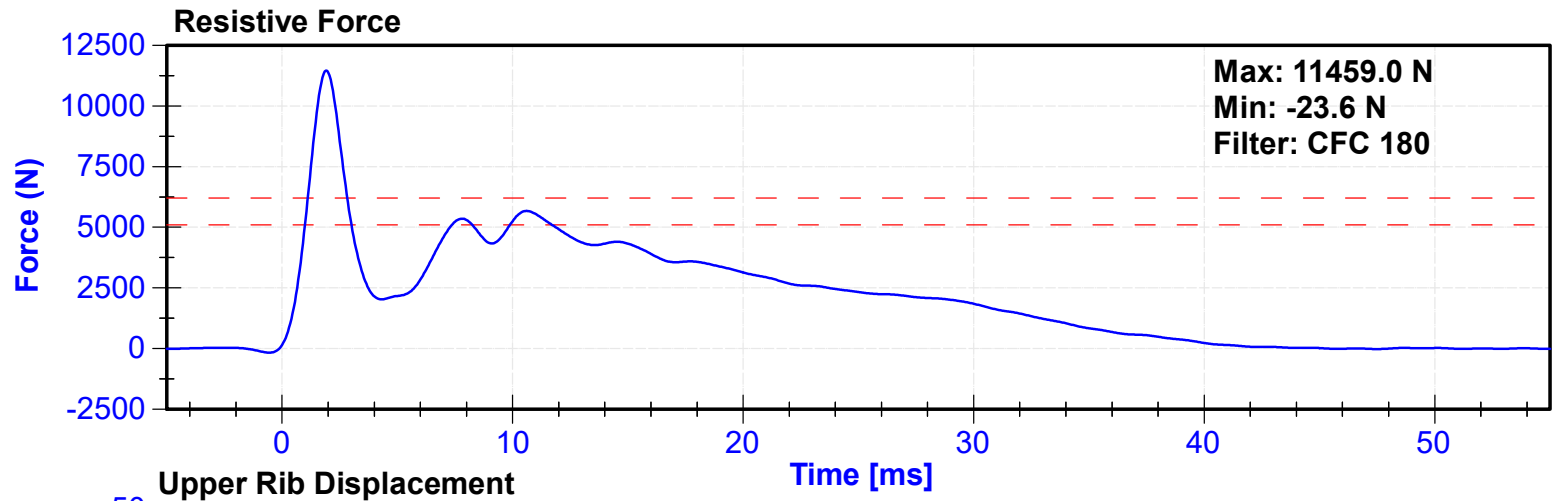
Results

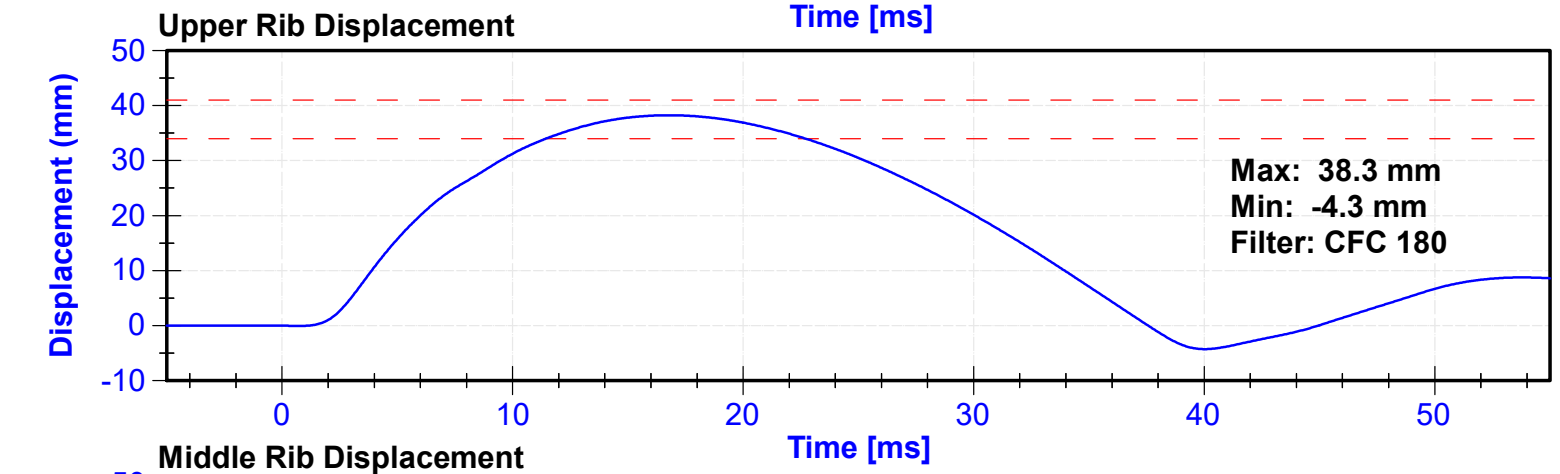
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	5.4	5.6	m/s	5.54	Pass
Resistive Force after 6ms	5100	6200	N	5669.4	Pass
Upper Thorax Rib Deflection	34	41	mm	38.3	Pass
Mid Thorax Rib Deflection	37	45	mm	42.1	Pass
Lower Thorax Rib Deflection	37	44	mm	40.2	Pass

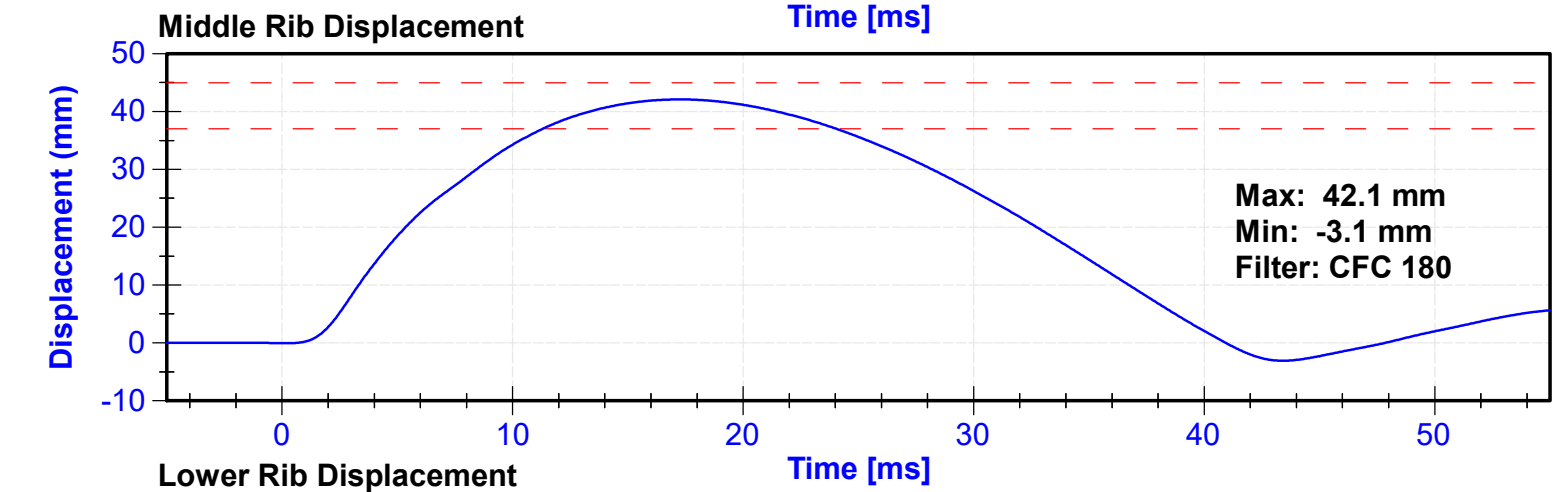
Transducer Calibrations

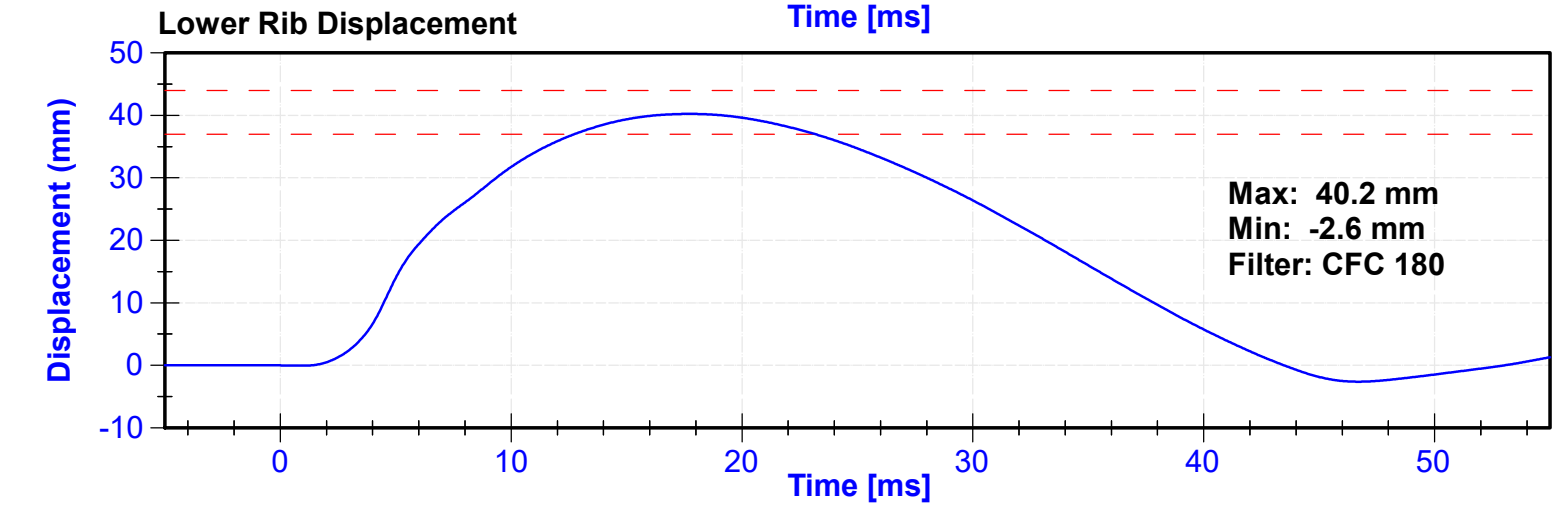
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Upper Thorax Rib Potentiometer	Honeywell	179GFE	11/17/2023	5/17/2024
Middle Thorax Rib Potentiometer	Honeywell	185GFE	11/17/2023	5/17/2024
Lower Thorax Rib Potentiometer	Honeywell	178GFE	11/17/2023	5/17/2024




Resistive Force
Max: 11459.0 N
Min: -23.6 N
Filter: CFC 180
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]


Upper Rib Displacement
Max: 38.3 mm
Min: -4.3 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Middle Rib Displacement
Max: 42.1 mm
Min: -3.1 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Lower Rib Displacement
Max: 40.2 mm
Min: -2.6 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]

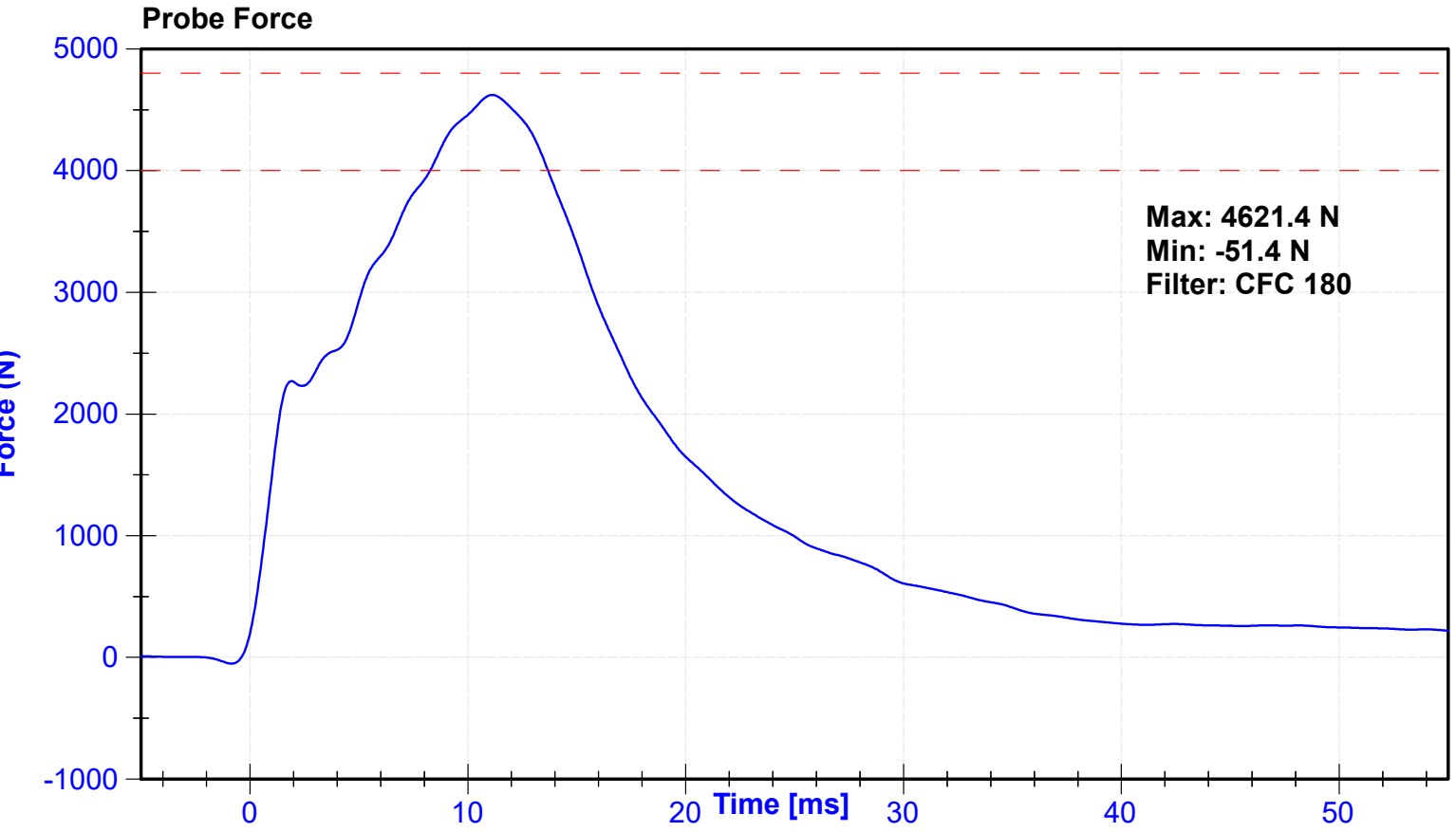
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

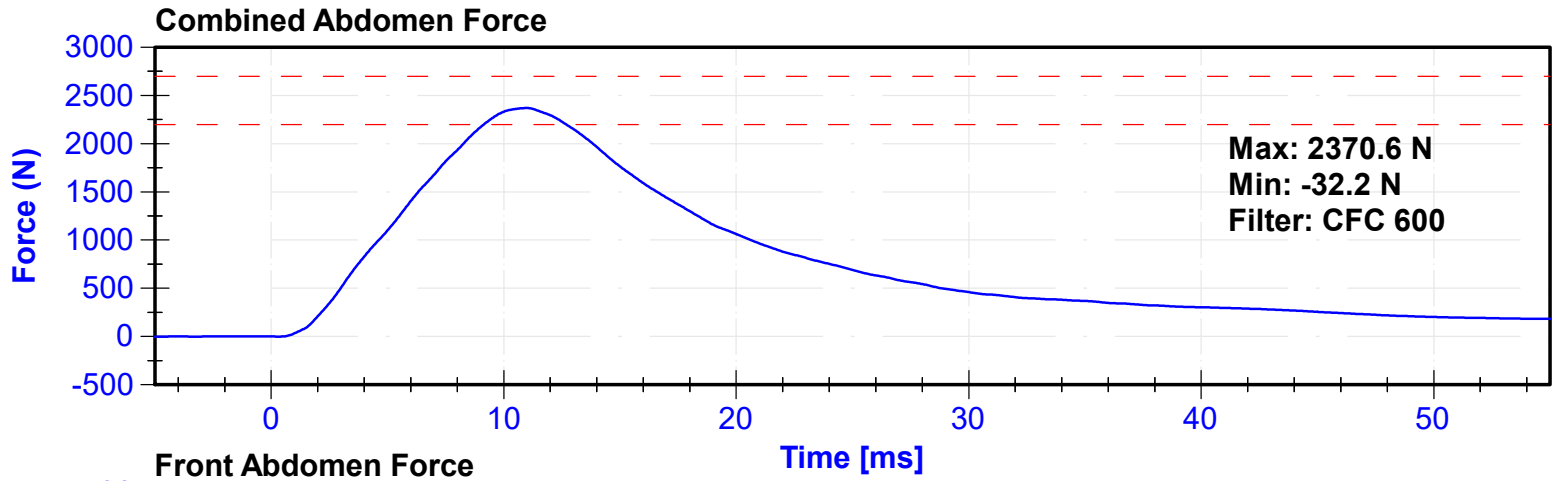
Results

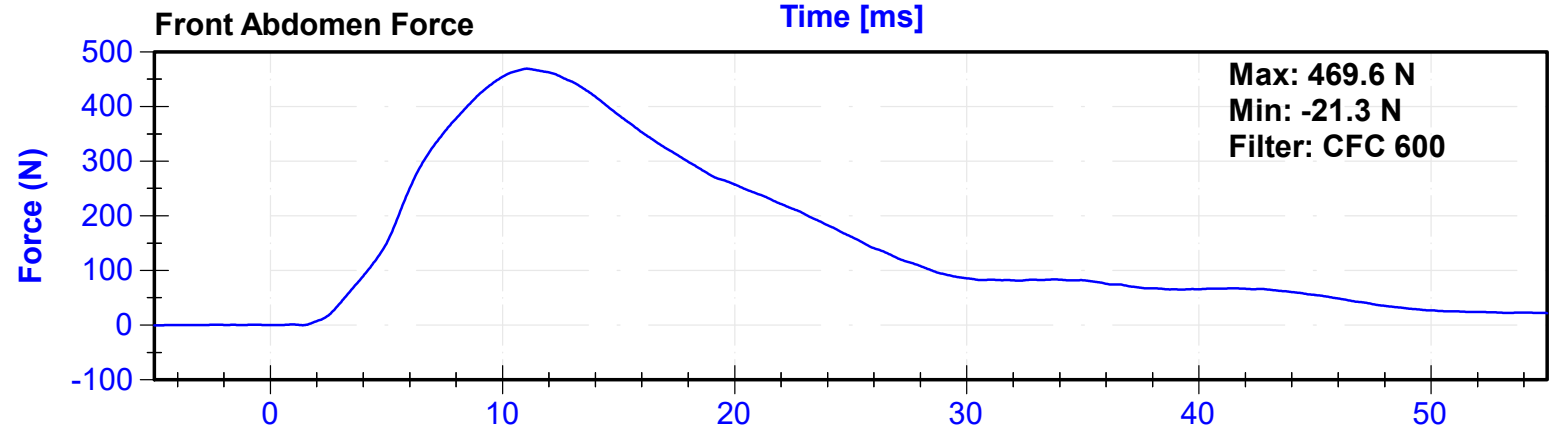
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	3.9	4.1	m/s	3.96	Pass
Combined Abdomen Force	2200	2700	N	2370.6	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.95	Pass
Resistive Probe Force	4000	4800	N	4621.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.15	Pass

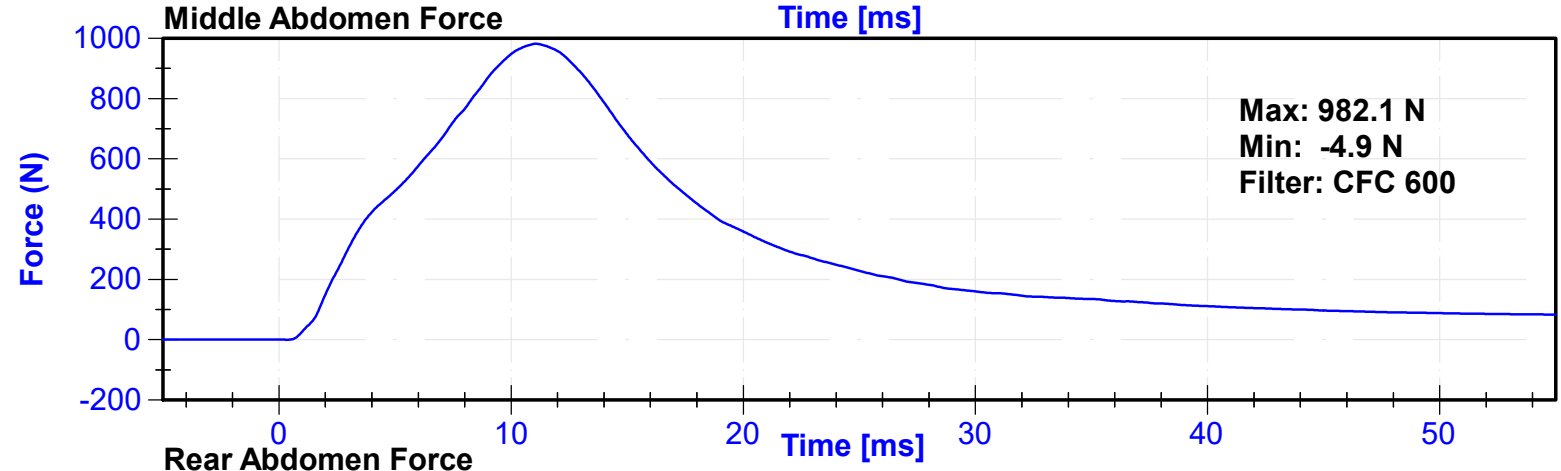
Transducer Calibrations

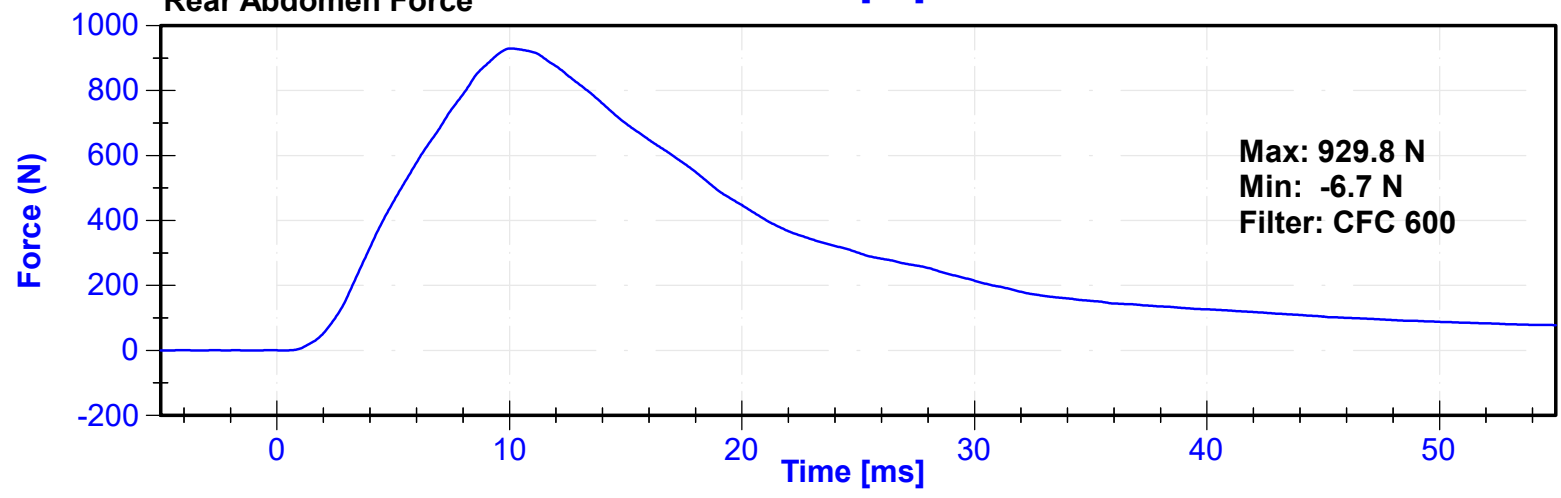
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Front Abdomen Load Cell	Denton	DM5846	5/18/2023	5/17/2024
Middle Abdomen Load Cell	Denton	1529	5/18/2023	5/17/2024
Rear Abdomen Load Cell	Denton	1533	5/18/2023	5/17/2024




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2370.6 N
Min: -32.2 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 469.6 N
Min: -21.3 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 982.1 N
Min: -4.9 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 929.8 N
Min: -6.7 N
Filter: CFC 600

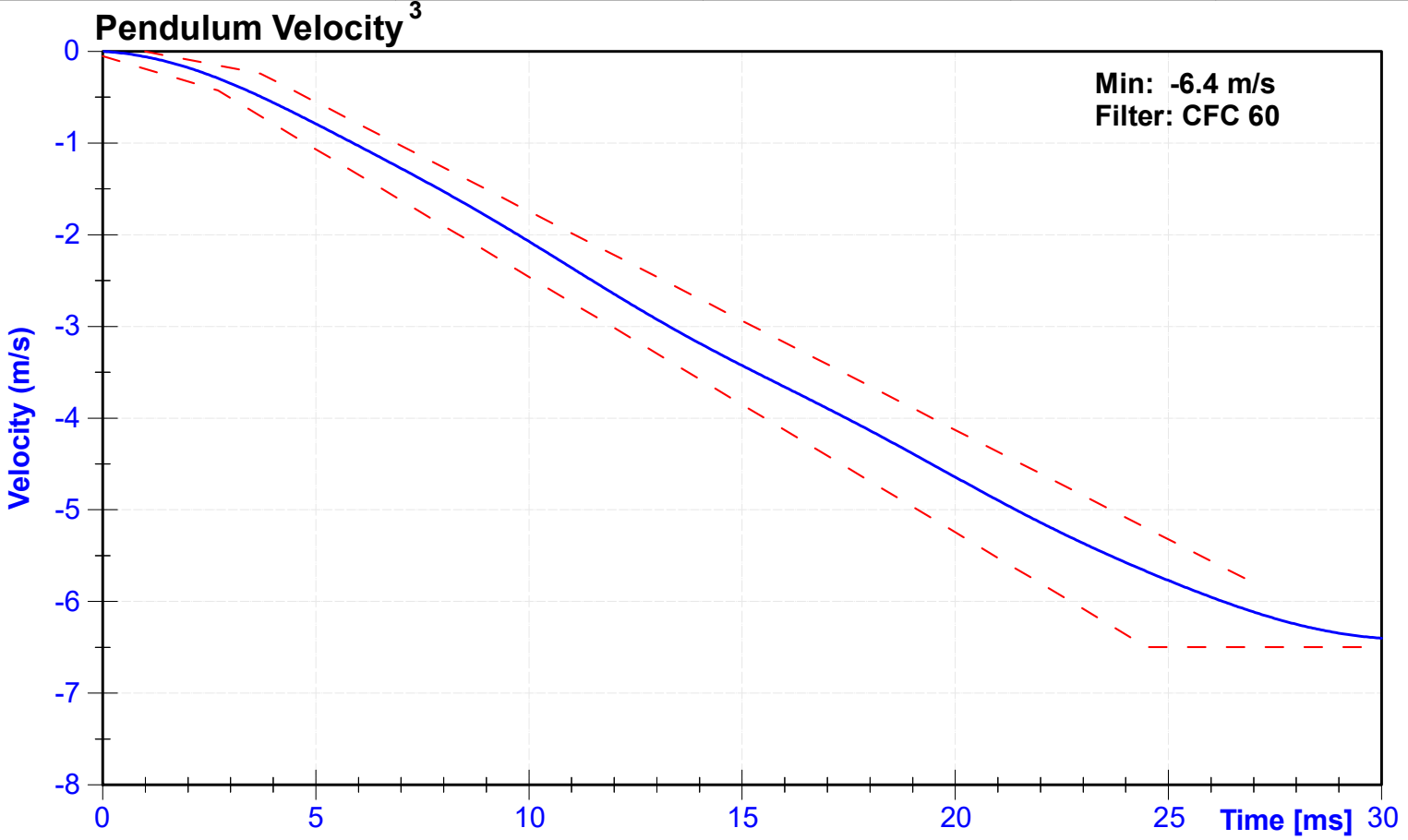
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

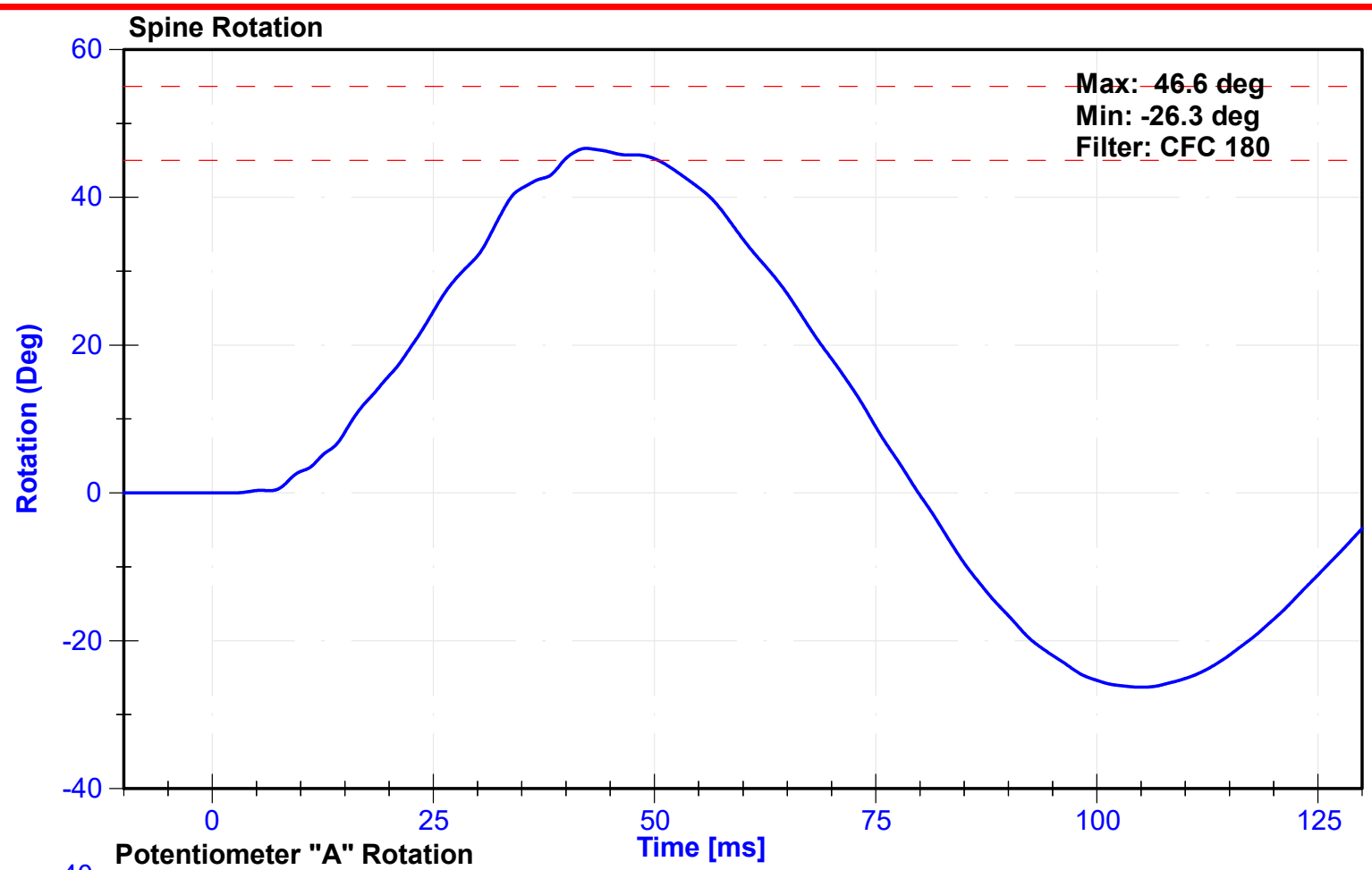
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	22	Pass
Velocity	5.95	6.15	m/s	6.004	Pass
Lateral Spine Rotation	45	55	deg	46.6	Pass
Time at Maximum Rotation	39	53	ms	42.3	Pass
Time of Decay to Zero Degrees	37	57	ms	37.6	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

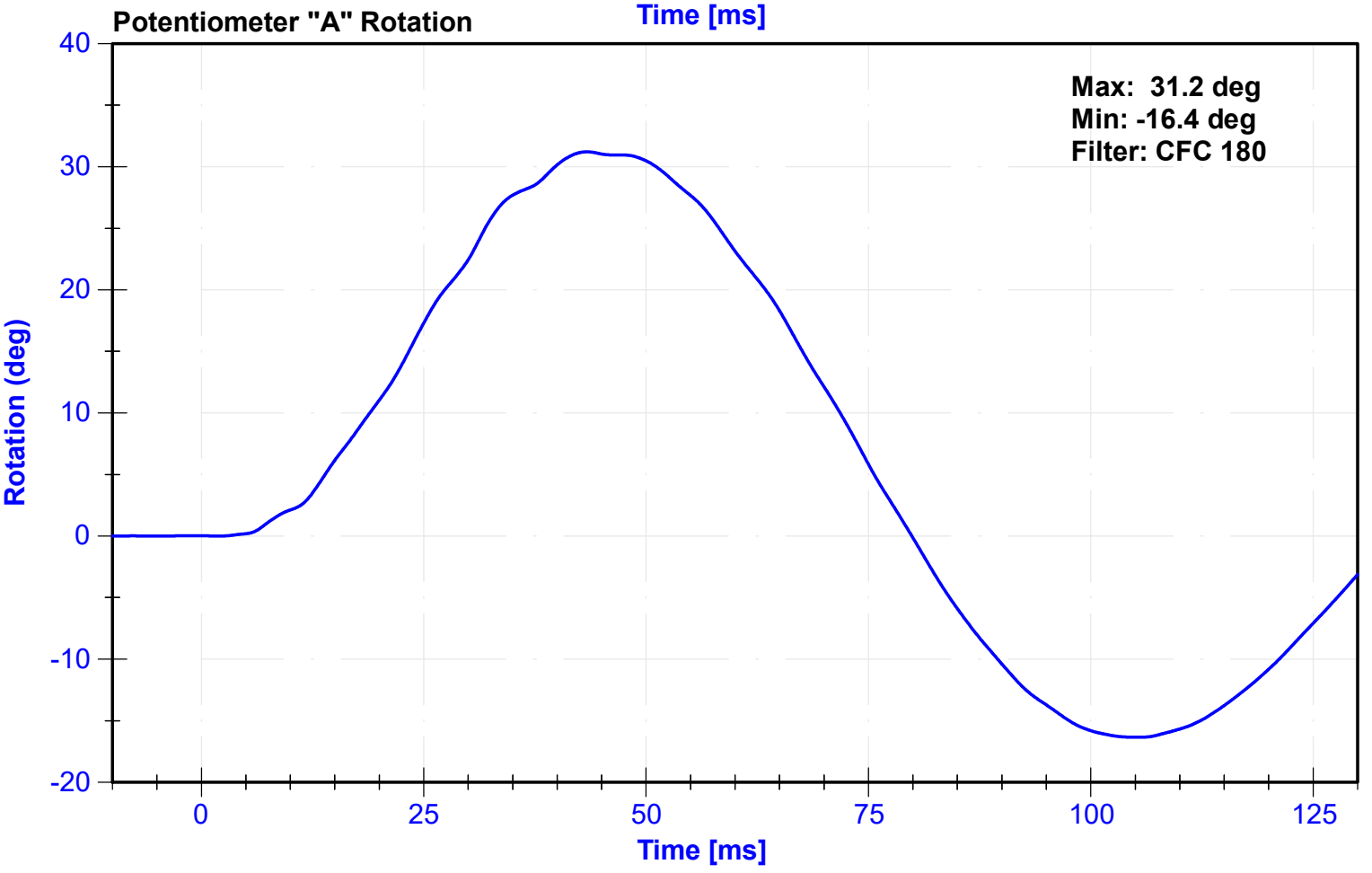
Transducer Calibrations

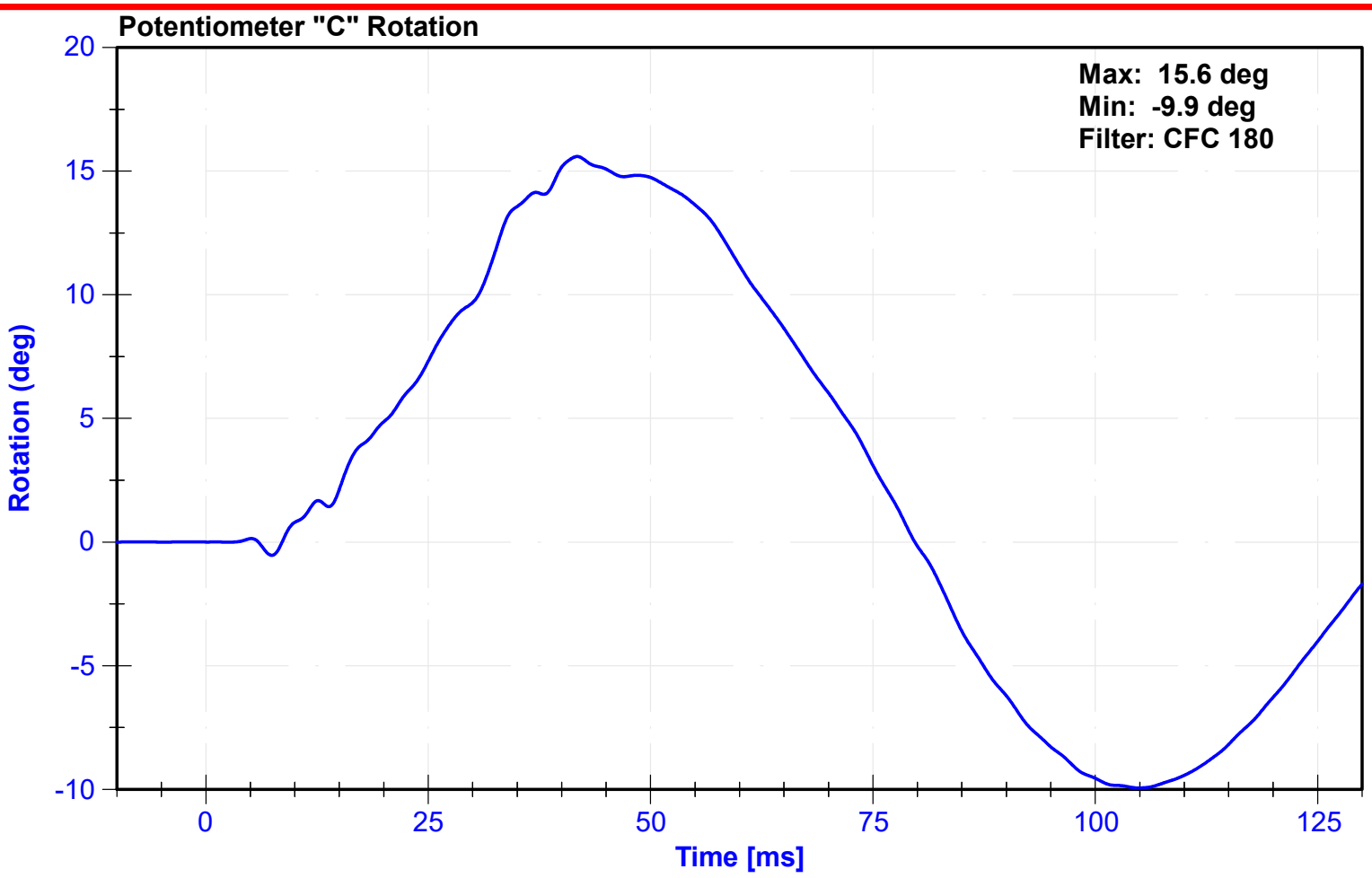
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024



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


Spine Rotation
Max: 46.6 deg
Min: -26.3 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 31.2 deg
Min: -16.4 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

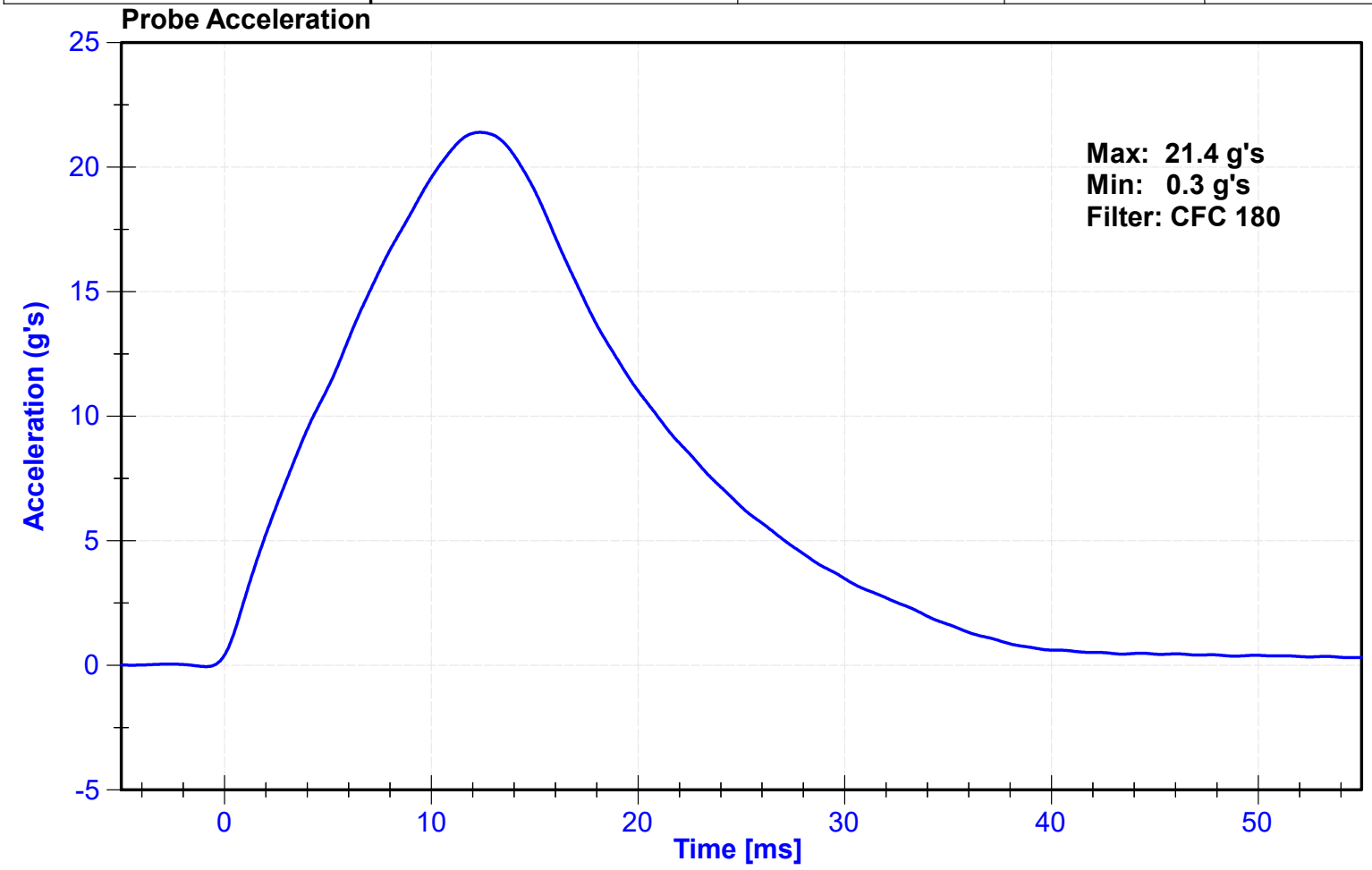
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

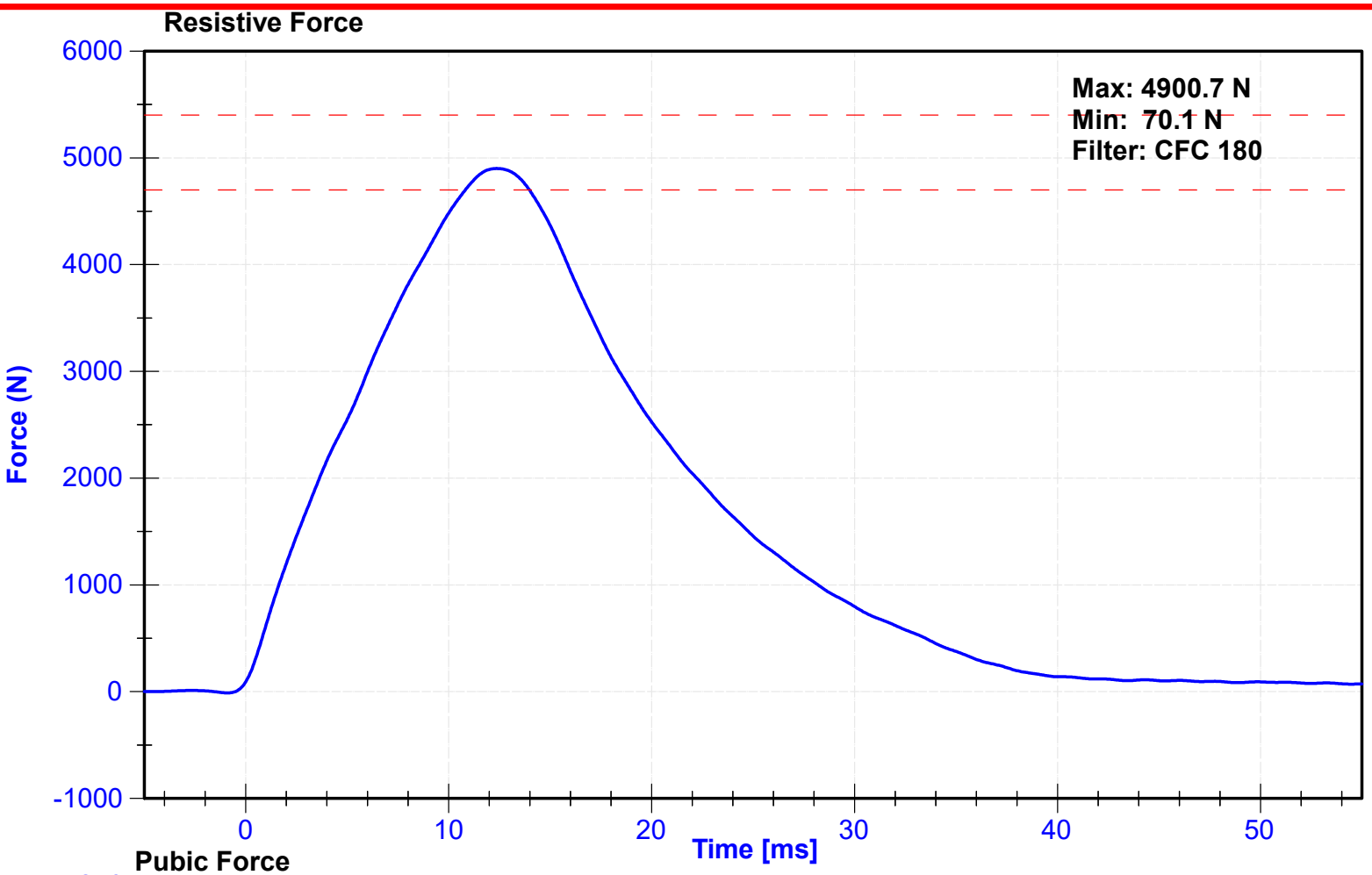
Results

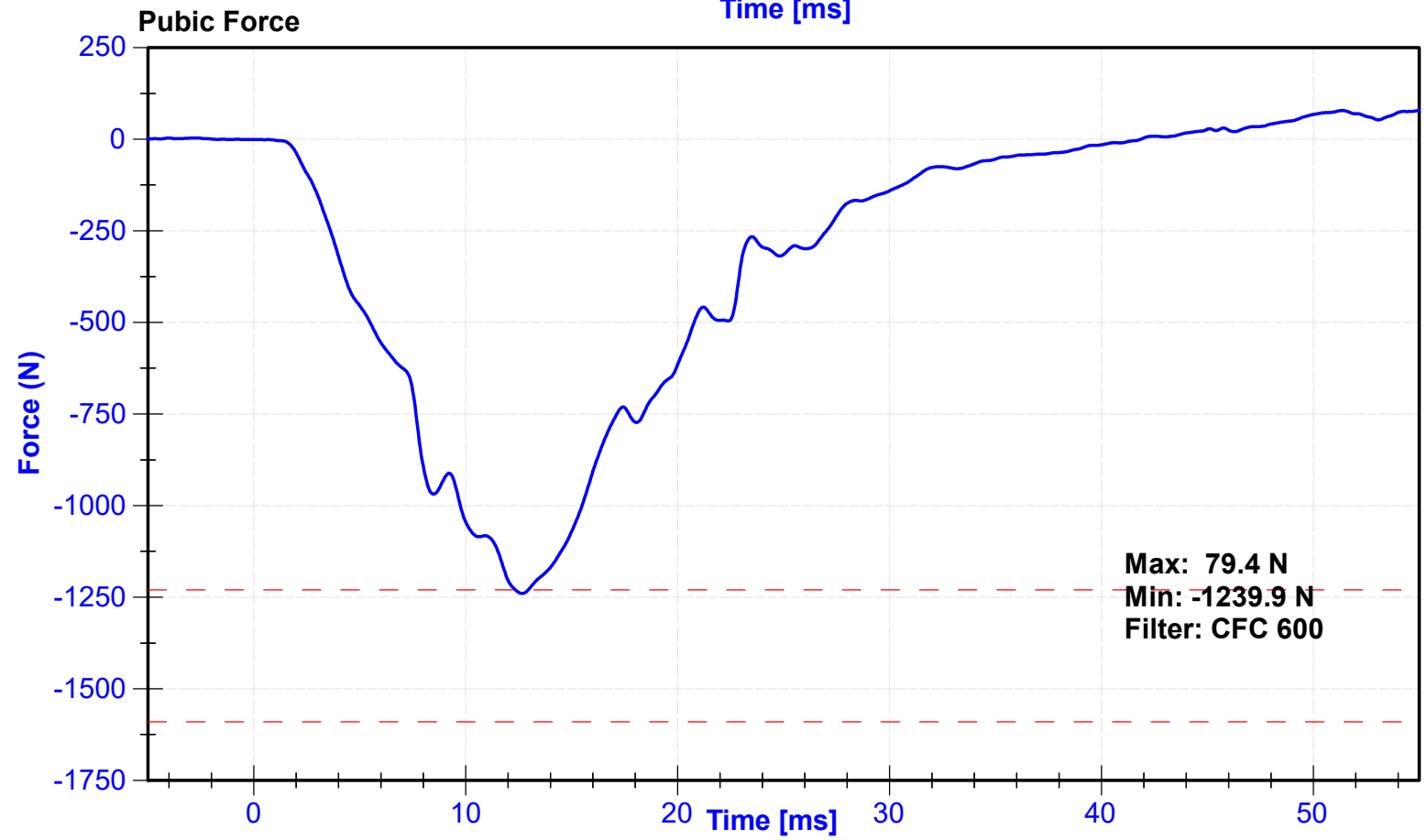
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	4.2	4.4	m/s	4.25	Pass
Resistive Force	4700	5400	N	4900.7	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.35	Pass
Pubic Force	-1590	-1230	N	-1239.9	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.65	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Pubic Load Cell	Denton	459-FY	6/20/2023	6/19/2024




Resistive Force
Max: 4900.7 N
Min: 70.1 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: 79.4 N
Min: -1239.9 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

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

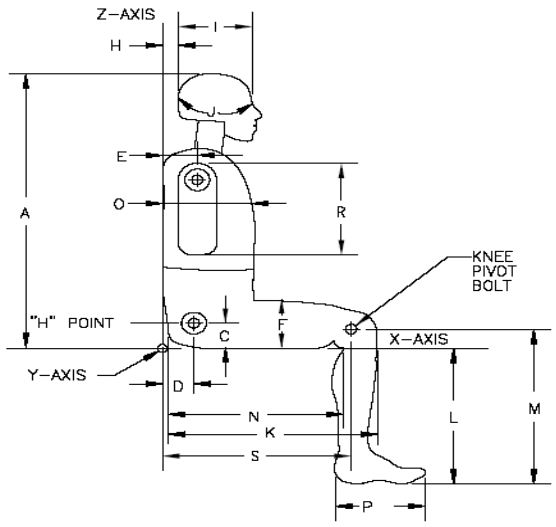
SERIAL NO:300

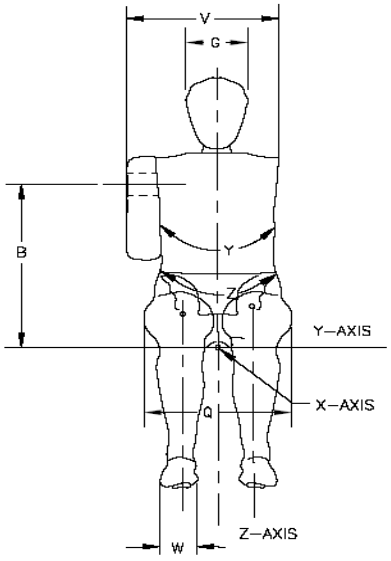
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 1/25/2024

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	99	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	181	Pass
J	Head Circumference	541	551	549	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	434	Pass
O	Chest Depth w/o jacket	195	211	199	Pass
P	Foot Length	216	232	223	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	488	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	86	Pass
Y	Chest Circumference w/jacket	851	881	876	Pass
Z	Waist Circumference	761	791	780	Pass

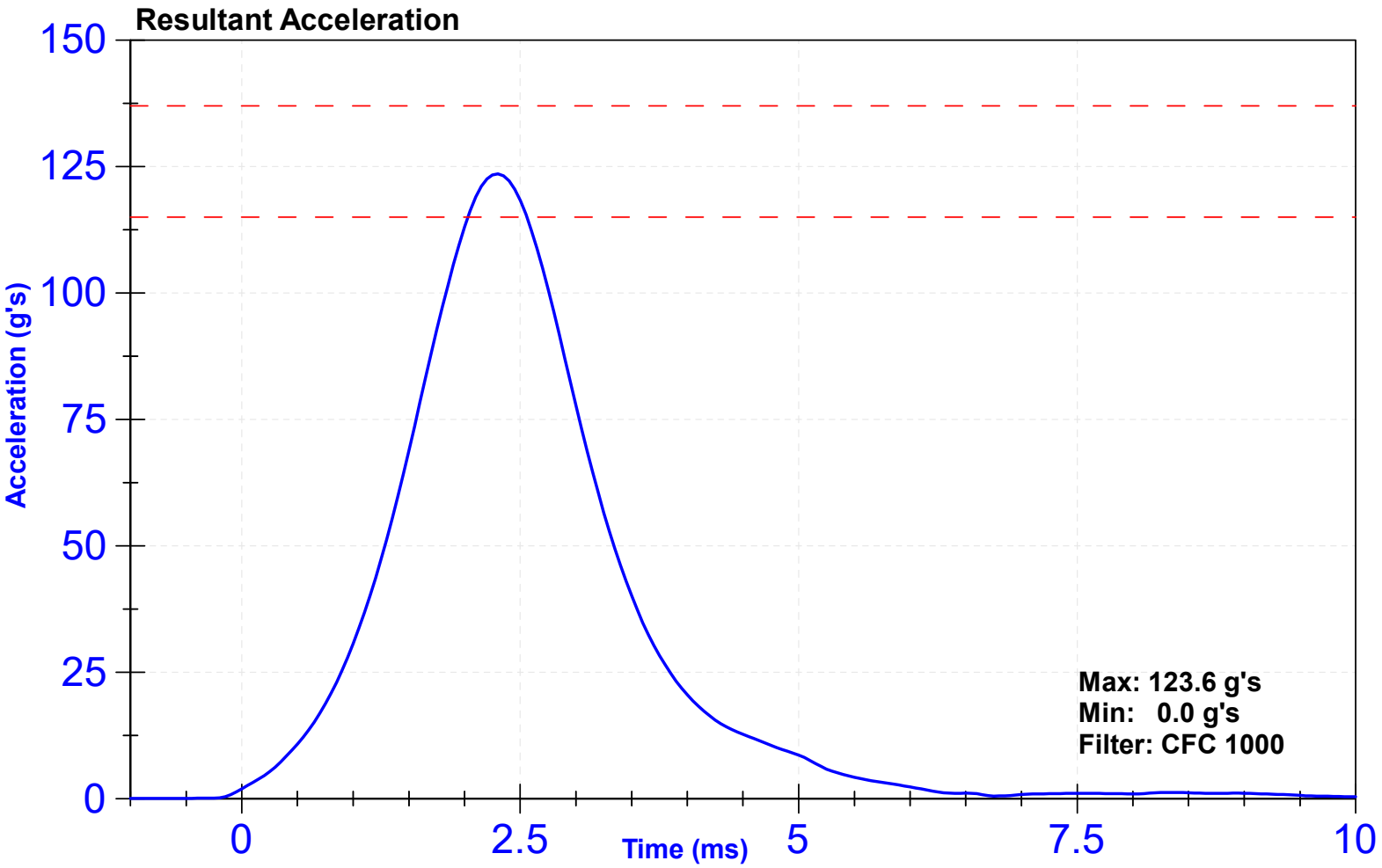
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

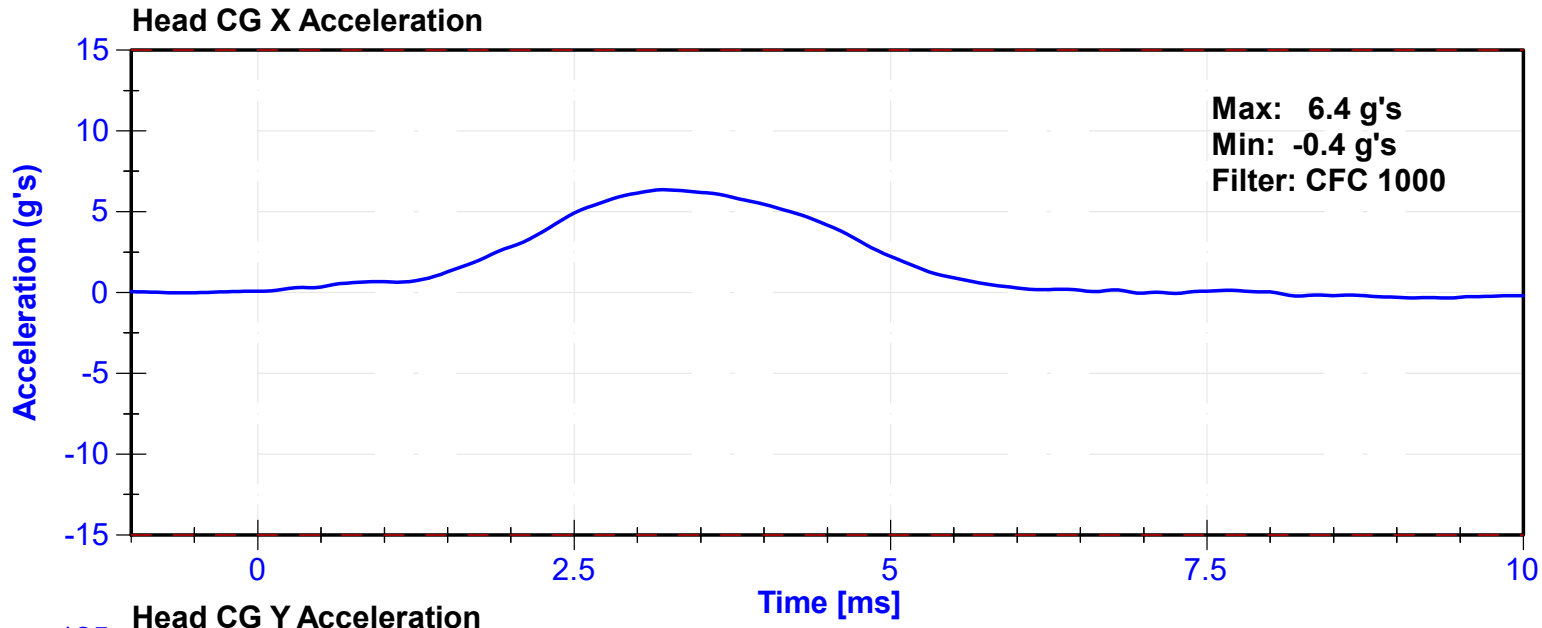
Results

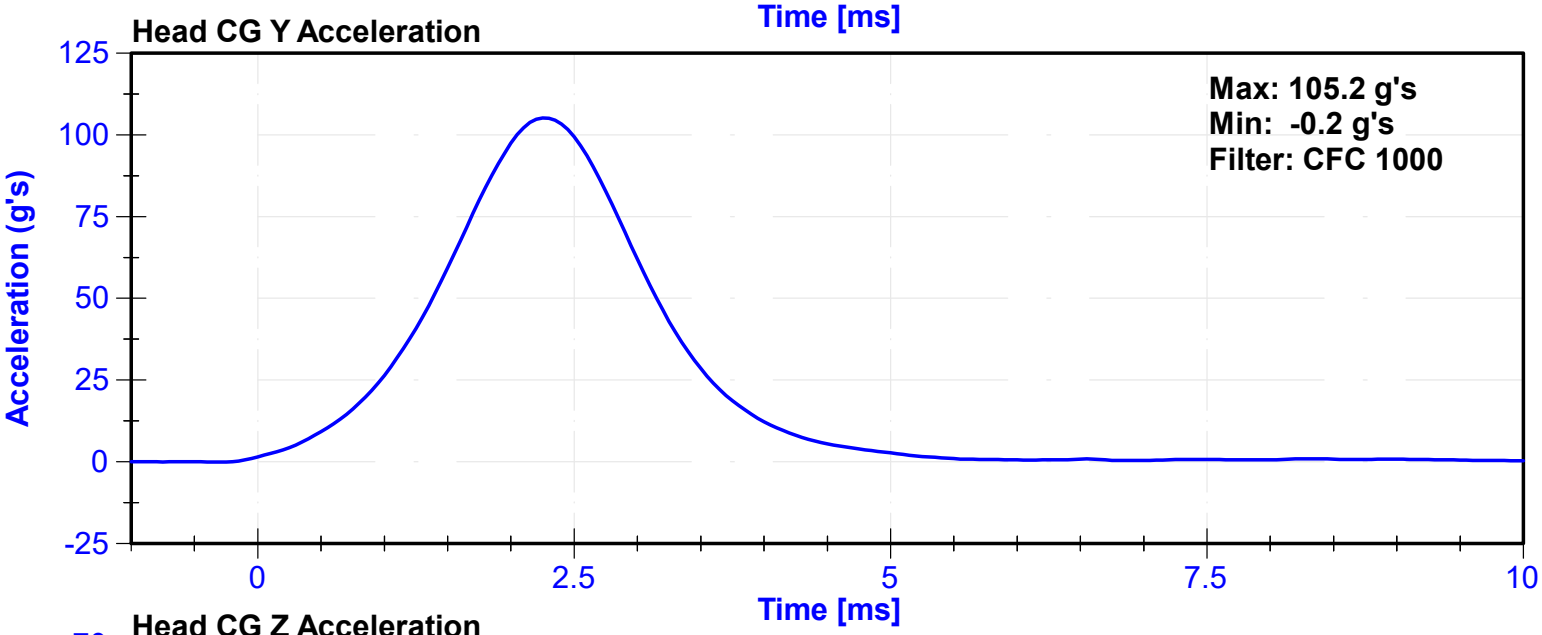
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	18	Pass
Resultant Acceleration	115	137	g's	123.6	Pass
Oscillation	0	15	%	0.9	Pass
Fore-Aft Acceleration	-15	15	g's	6.4	Pass

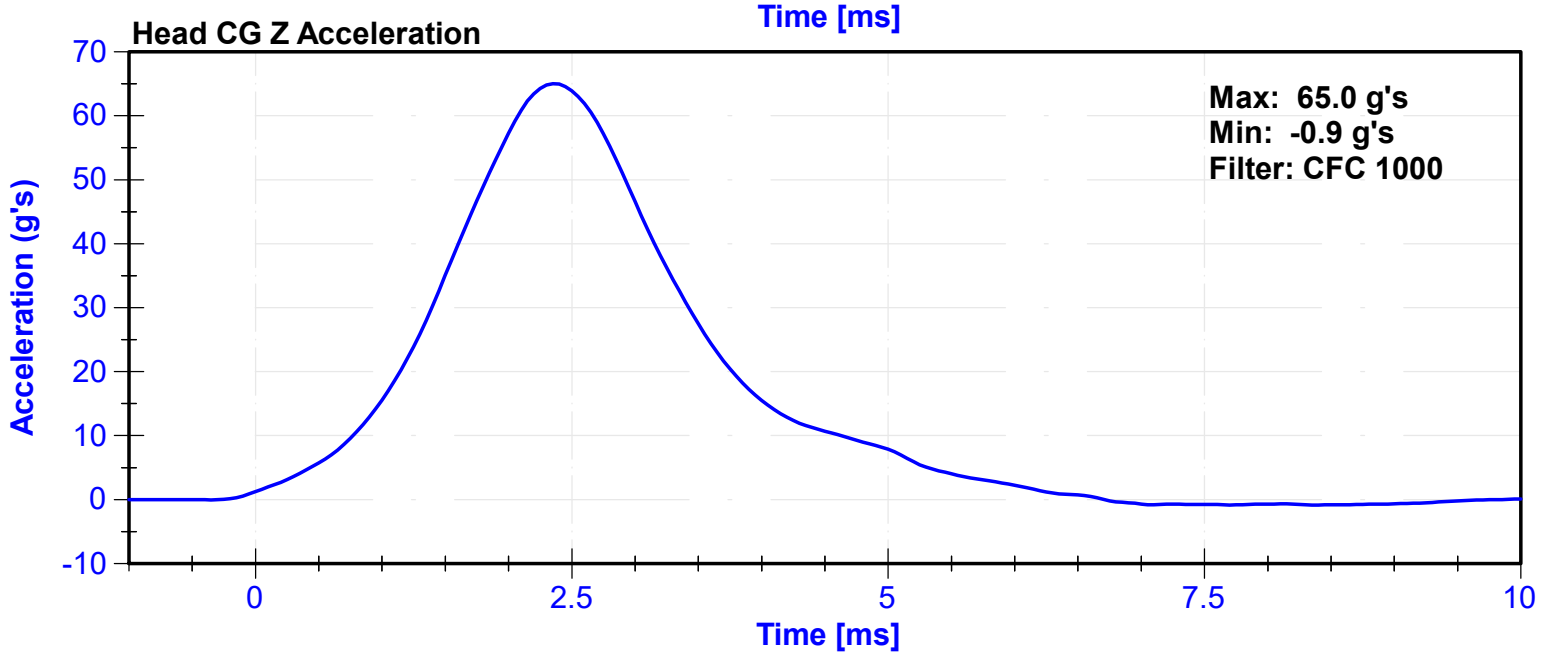
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	11/15/2023	5/13/2024
Y Accelerometer	Endevco	P79189	11/15/2023	5/13/2024
Z Accelerometer	Endevco	P79587	11/15/2023	5/13/2024




Head CG X Acceleration
Max: 6.4 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 105.2 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 65.0 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

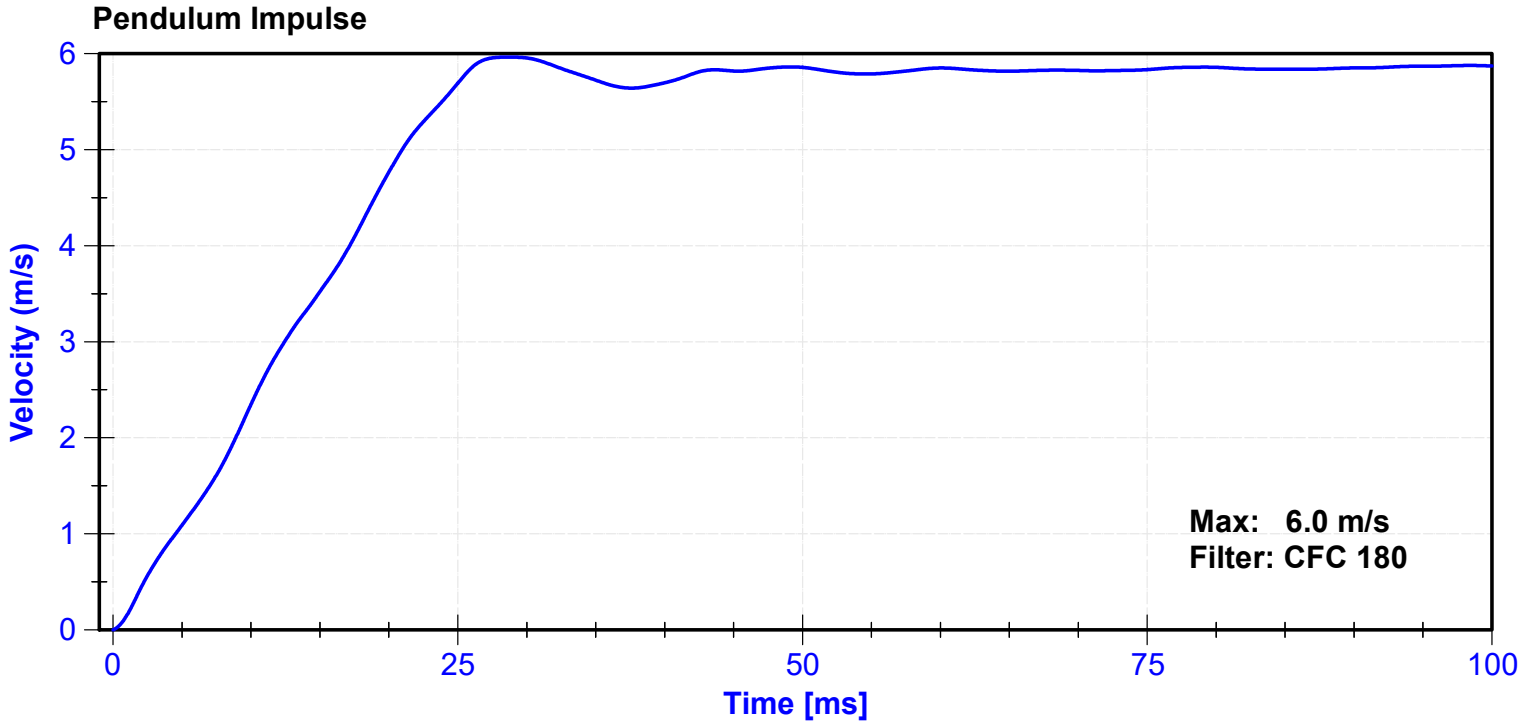
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

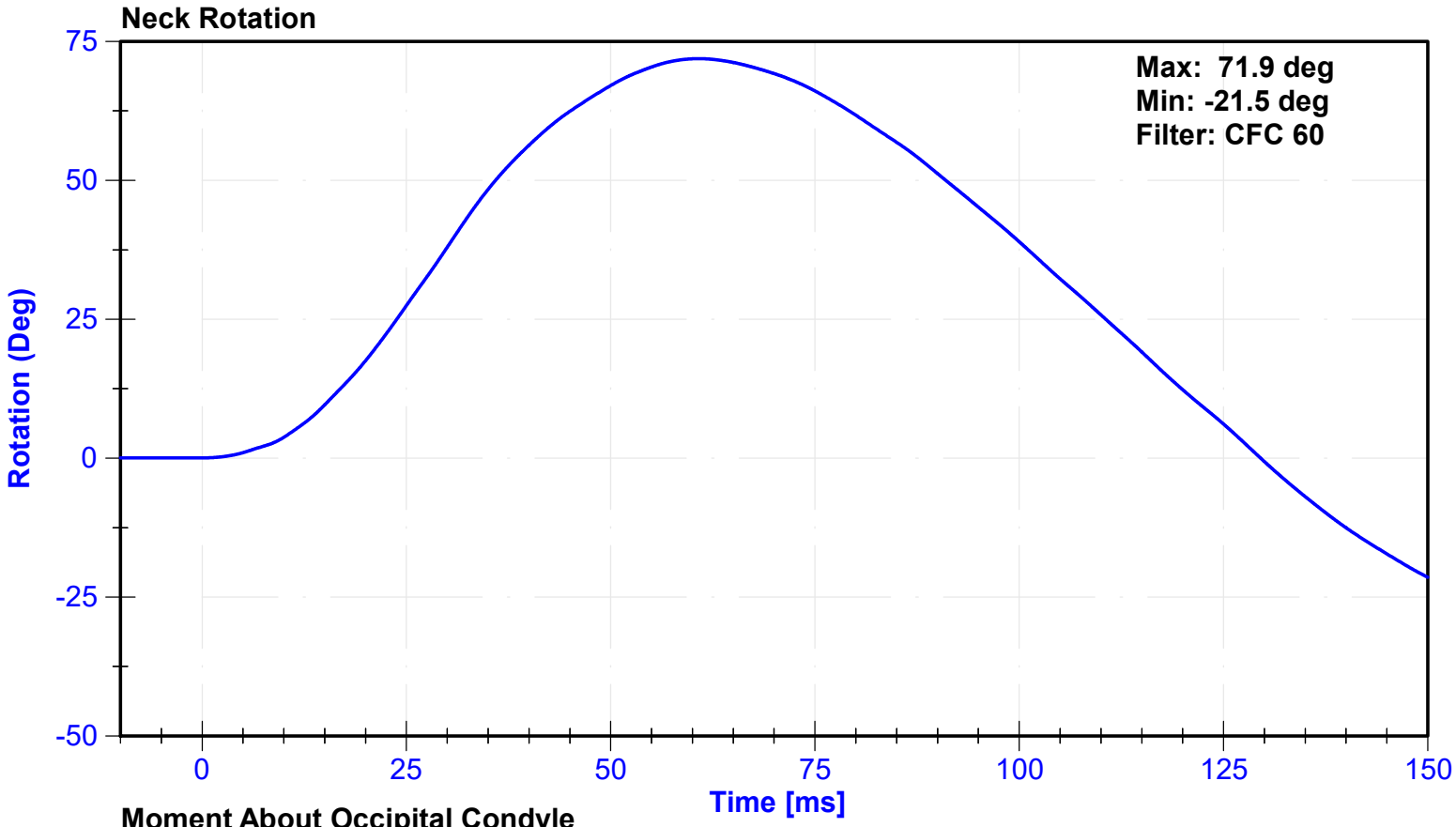
Results

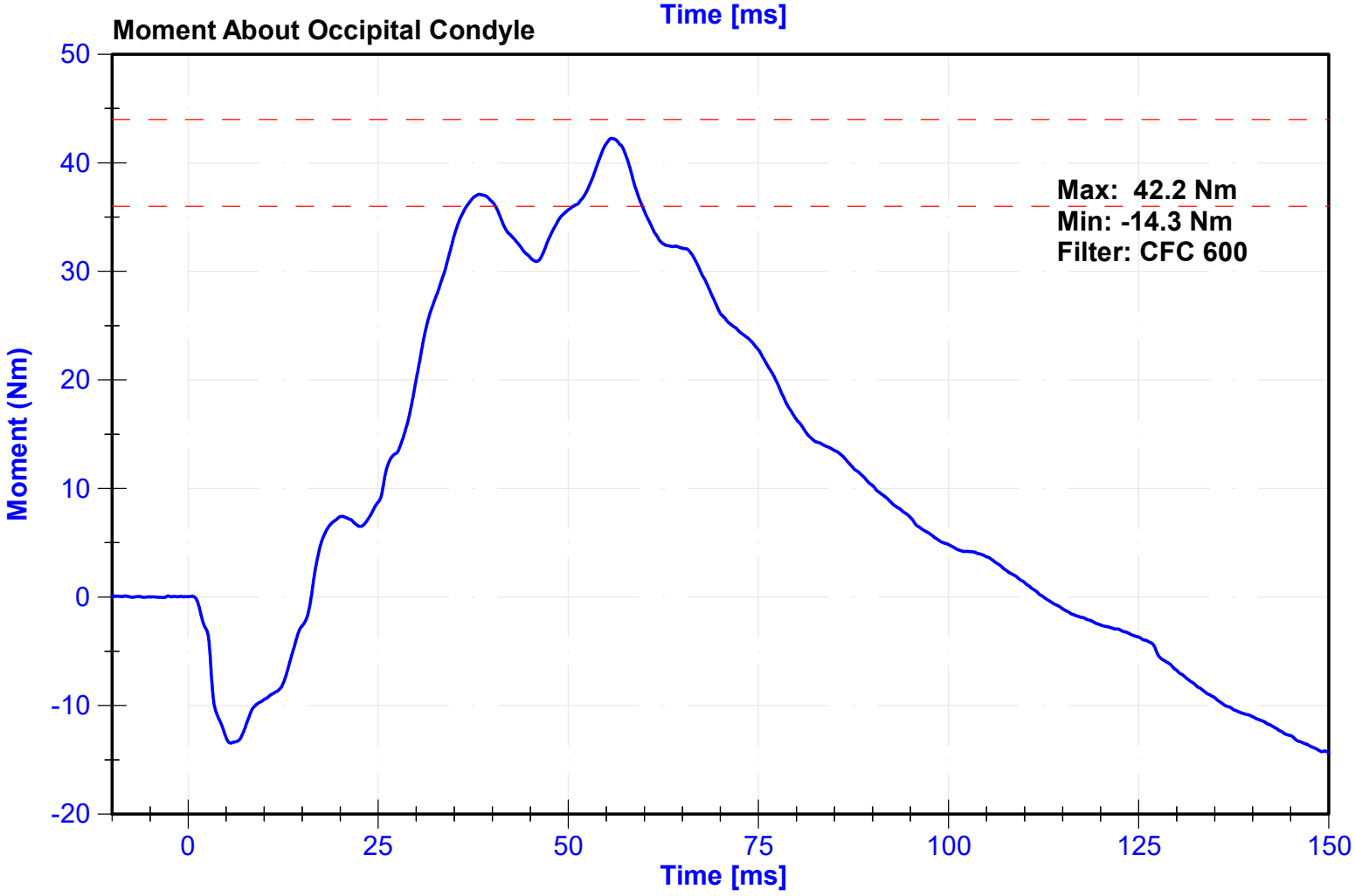
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	17.5	Pass
Velocity	5.51	5.63	m/s	5.547	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.35	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.52	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.76	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.69	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.96	Pass
Neck Rotation	71	81	deg	71.9	Pass
Time at Maximum Rotation	50	70	ms	60.8	Pass
Moment about the OC	36	44	Nm	42.2	Pass
Moment Decay to 0 Nm	102	126	ms	112.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/31/2023	4/28/2024
Pendulum Potentiometer	Servo	4961	10/2/2023	10/1/2024
Condyle Potentiometer	Servo	DS185	10/2/2023	10/1/2024
Upper Neck Load Cell	Denton	1716ATF_2184-FY	5/18/2023	5/17/2024




Neck Rotation
Max: 71.9 deg
Min: -21.5 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: 42.2 Nm
Min: -14.3 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

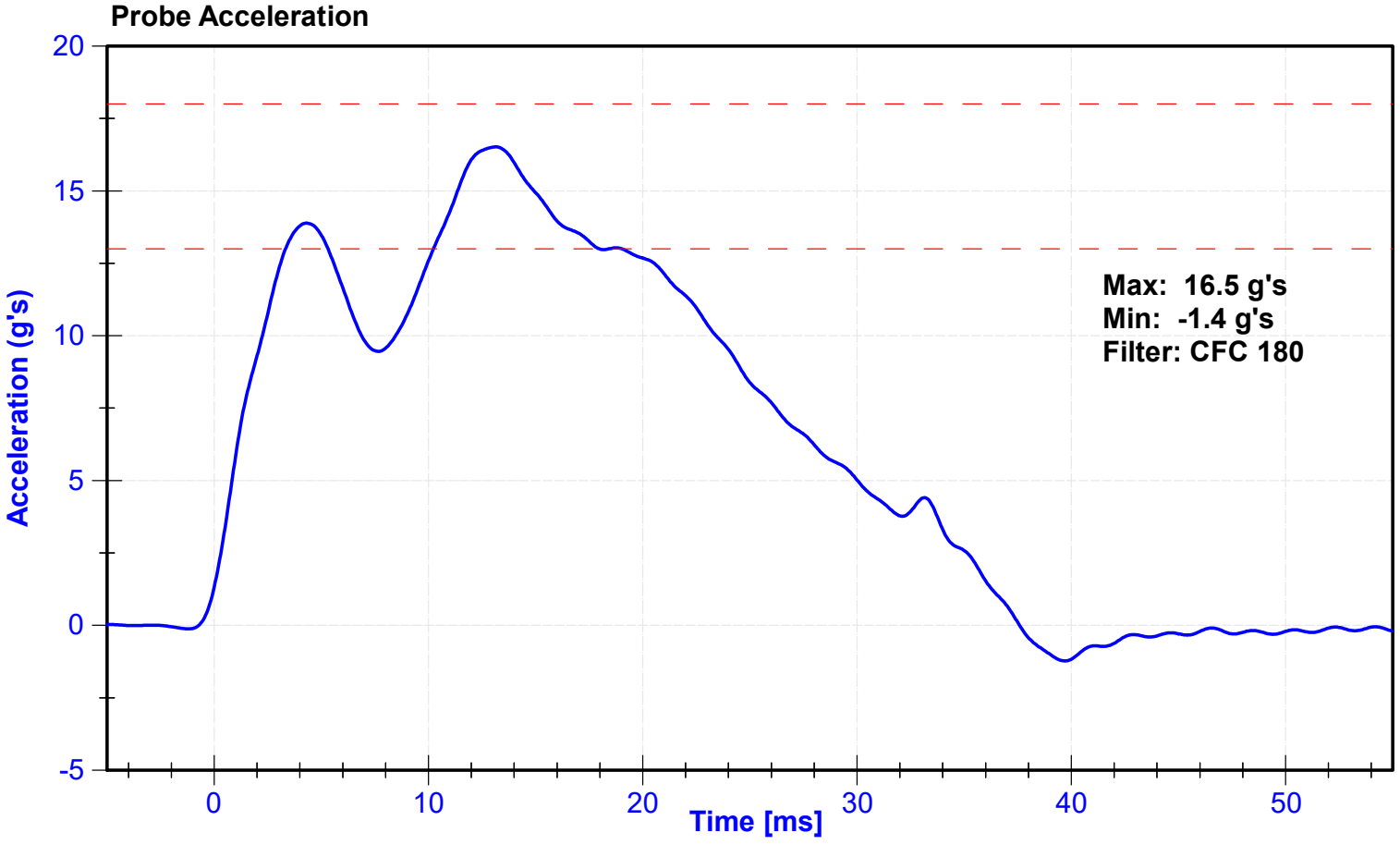
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

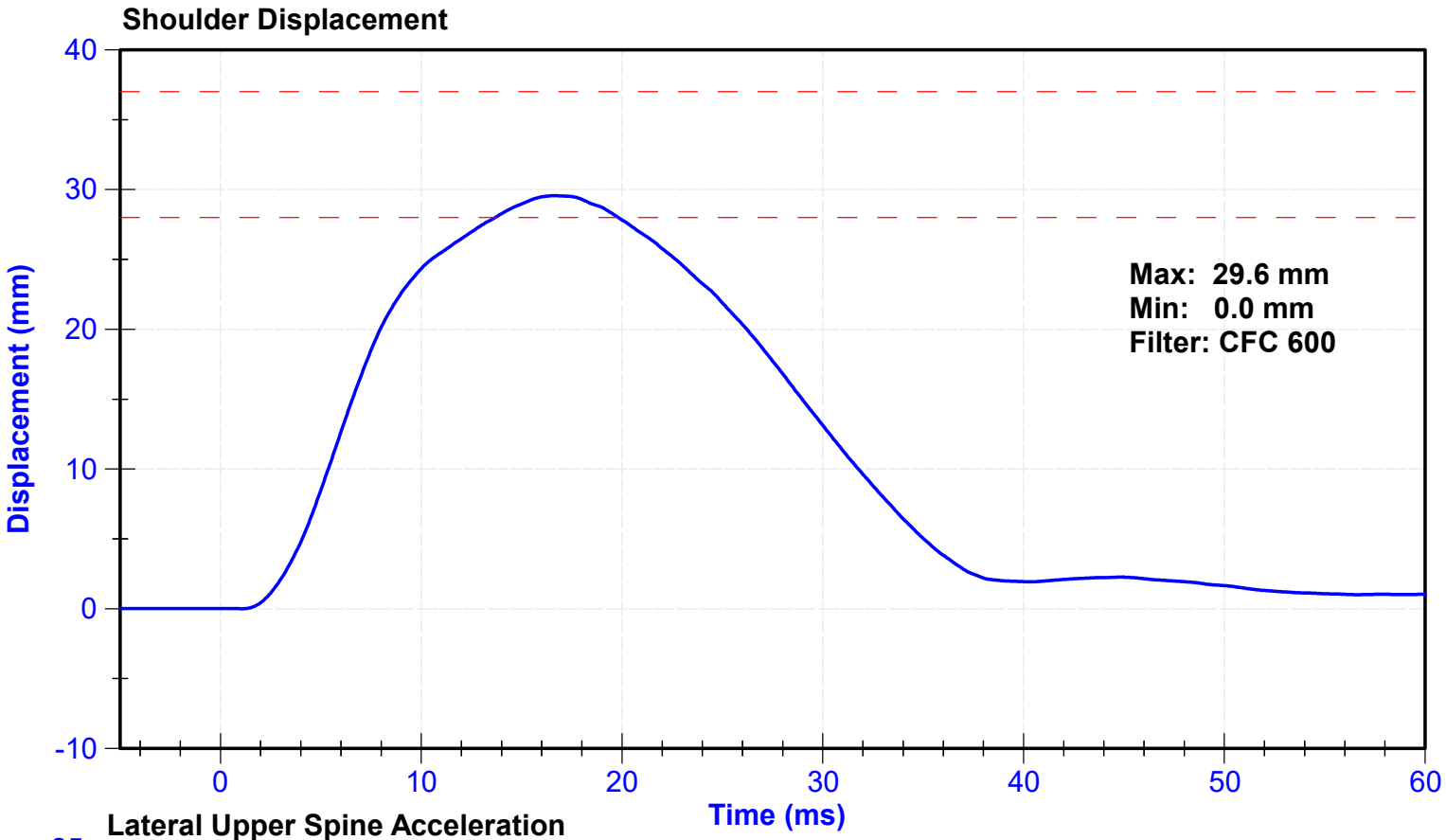
Results

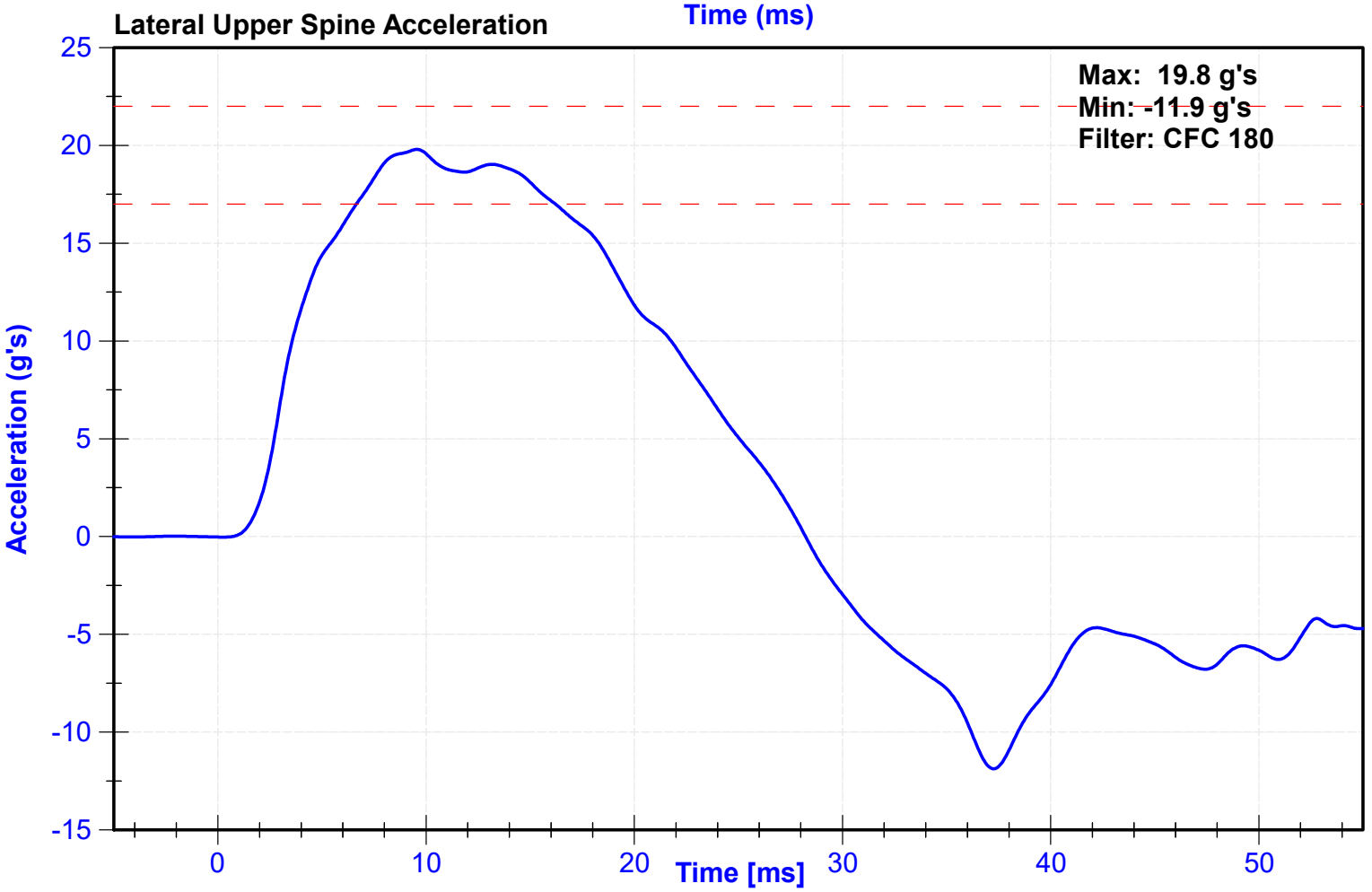
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	13	18	g's	16.5	Pass
Shoulder Deflection	28	37	mm	29.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Shoulder Potentiometer	Servo	053GFE	11/17/2023	5/17/2024
Upper Spine Y Accelerometer	Endevco	T20880	11/16/2023	5/14/2024




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.6 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.8 g's
Min: -11.9 g's
Filter: CFC 180

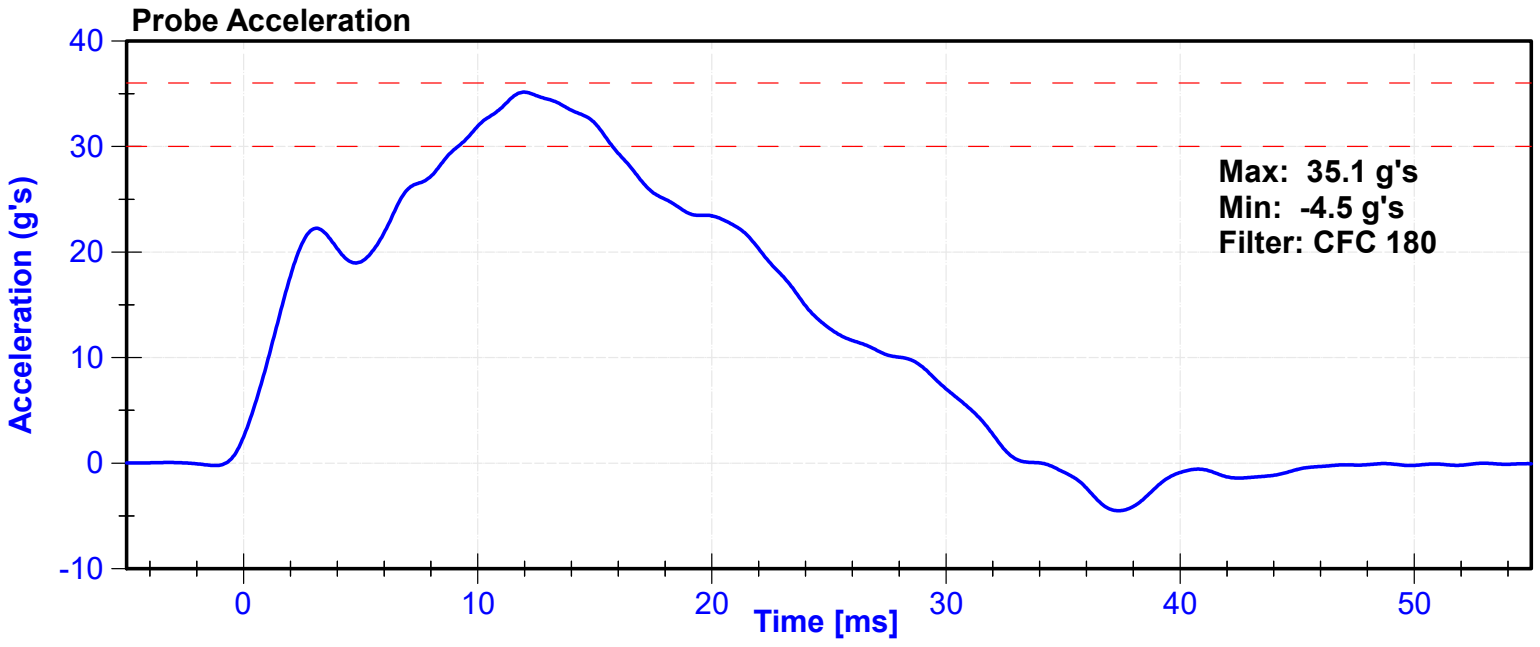
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

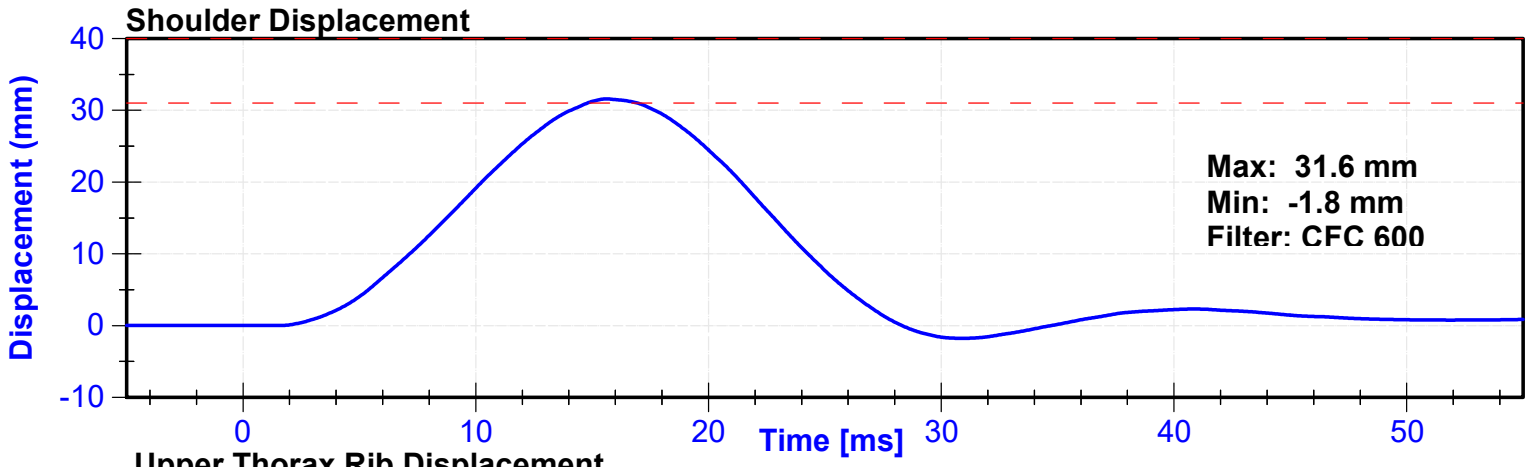
Results

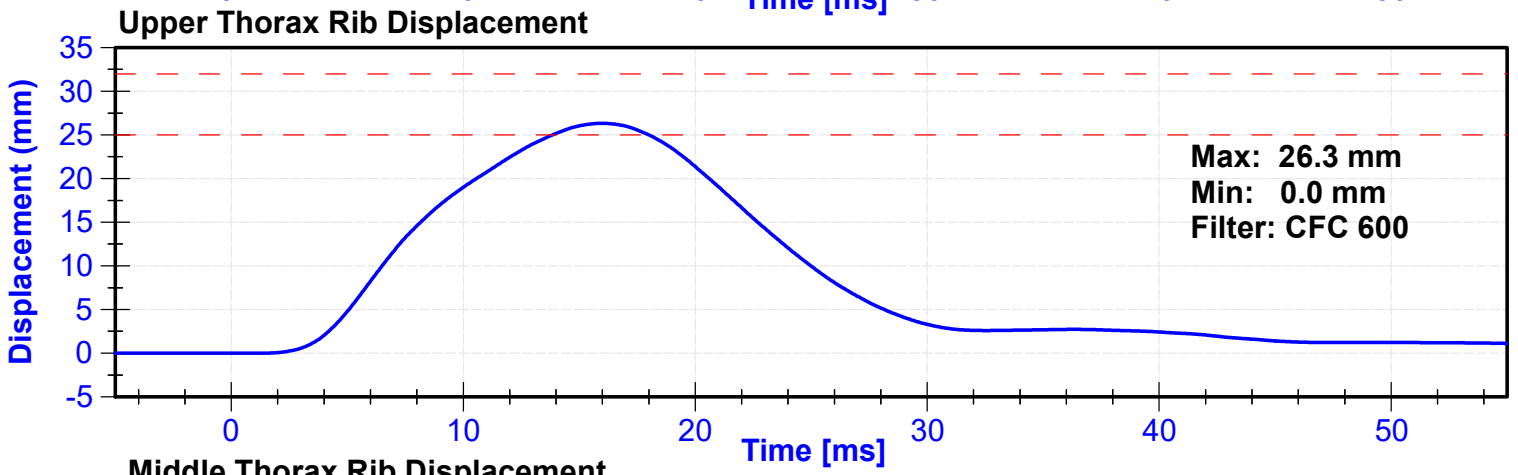
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	35.1	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.7	Pass
Shoulder Deflection	31	40	mm	31.6	Pass
Upper Thorax Rib Deflection	25	32	mm	26.3	Pass
Mid Thorax Rib Deflection	30	36	mm	31.0	Pass
Lower Thorax Rib Deflection	32	38	mm	34.1	Pass

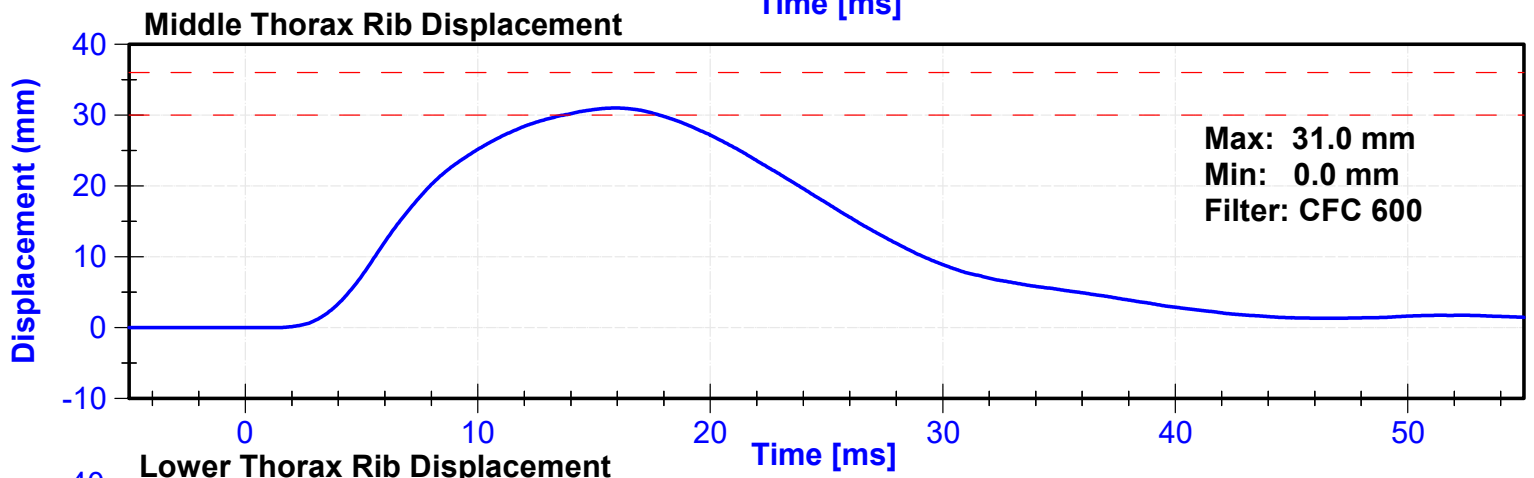
Transducer Calibrations

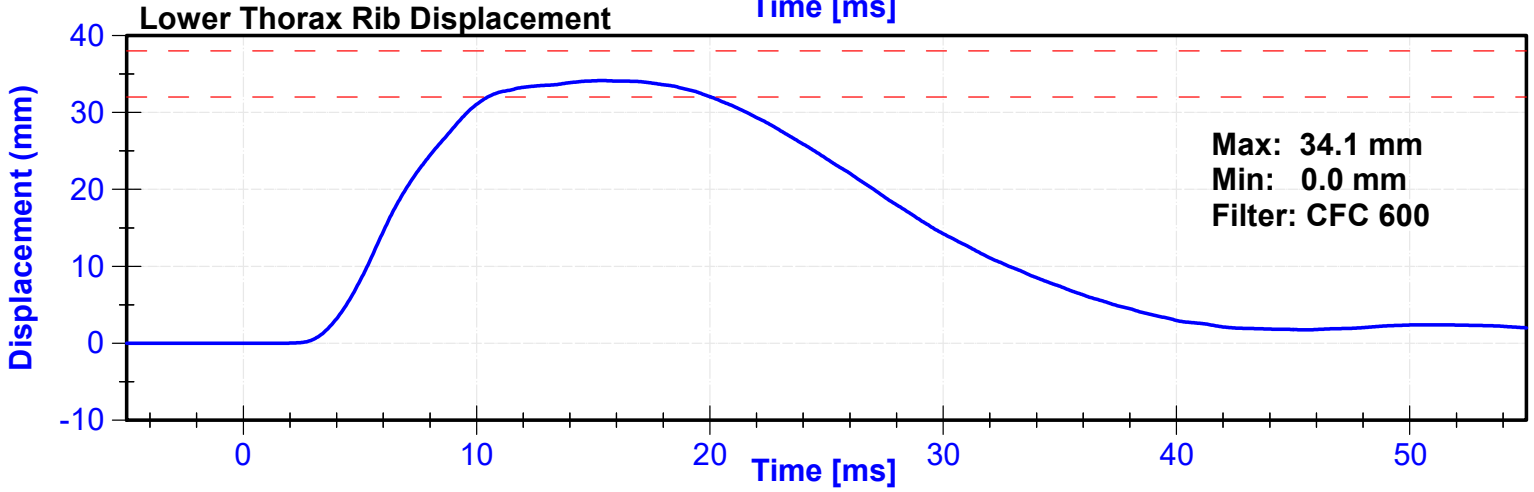
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Upper Spine T1 Y Accelerometer	Endevco	T20880	11/16/2023	5/14/2024
Upper Spine T12 Y Accelerometer	Endevco	P52071	11/16/2023	5/14/2024
Shoulder Potentiometer	Servo	053GFE	11/17/2023	5/17/2024
Upper Thorax Rib Potentiometer	Servo	2316GFE	11/17/2023	5/17/2024
Middle Thorax Rib Potentiometer	Servo	307GFE	11/17/2023	5/17/2024
Lower Thorax Rib Potentiometer	Servo	1156GFE	11/17/2023	5/17/2024

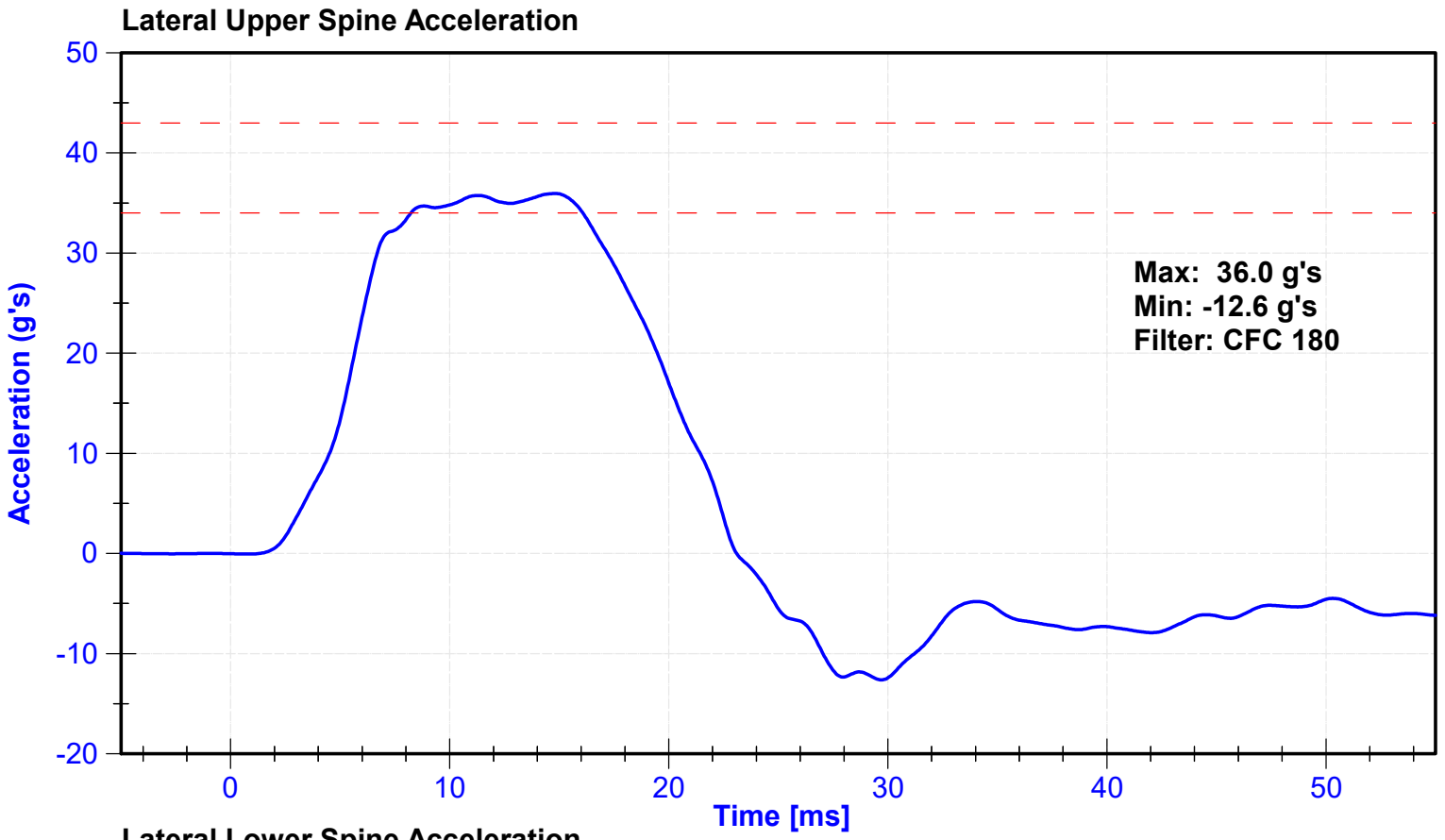


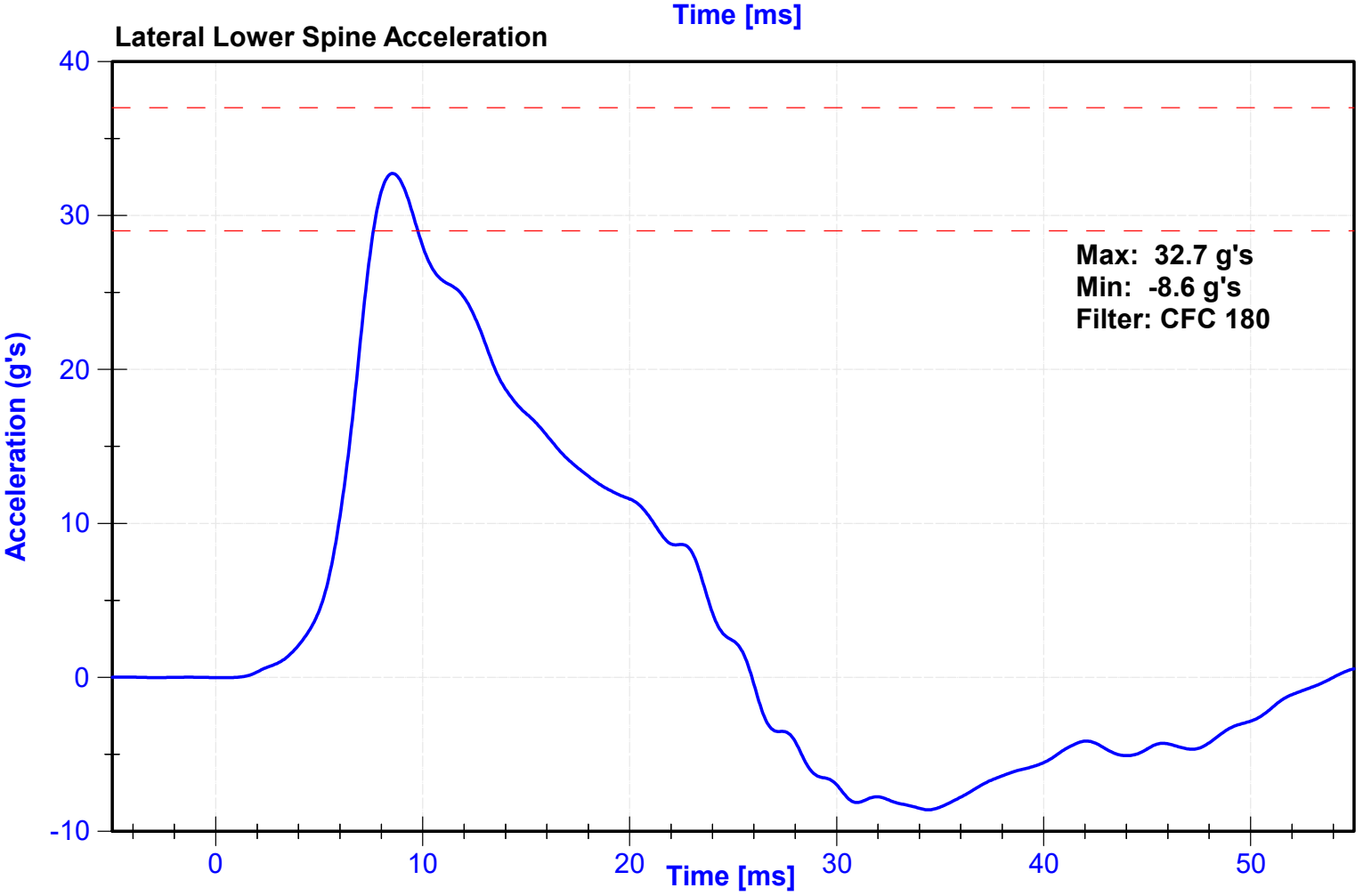

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.6 mm
Min: -1.8 mm
Filter: CFC 600


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: 31.0 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 36.0 g's
Min: -12.6 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 32.7 g's
Min: -8.6 g's
Filter: CFC 180

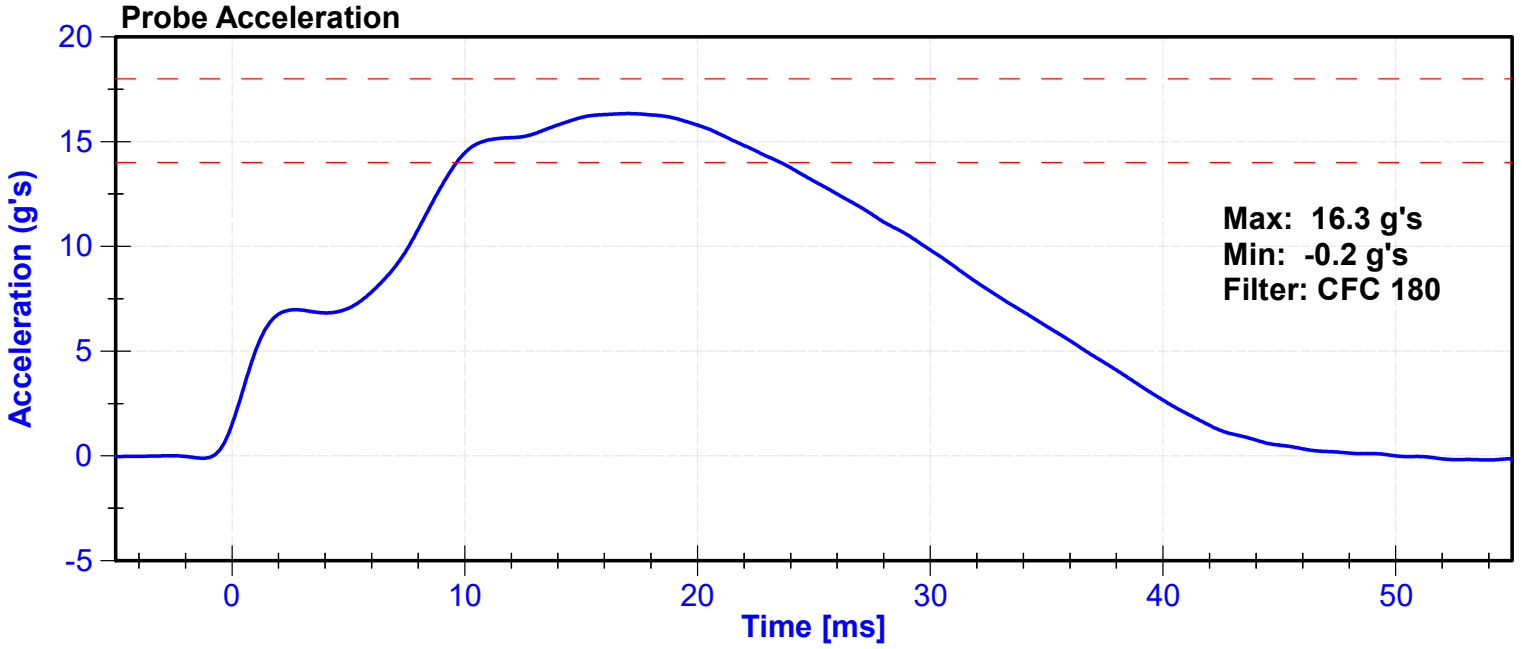
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

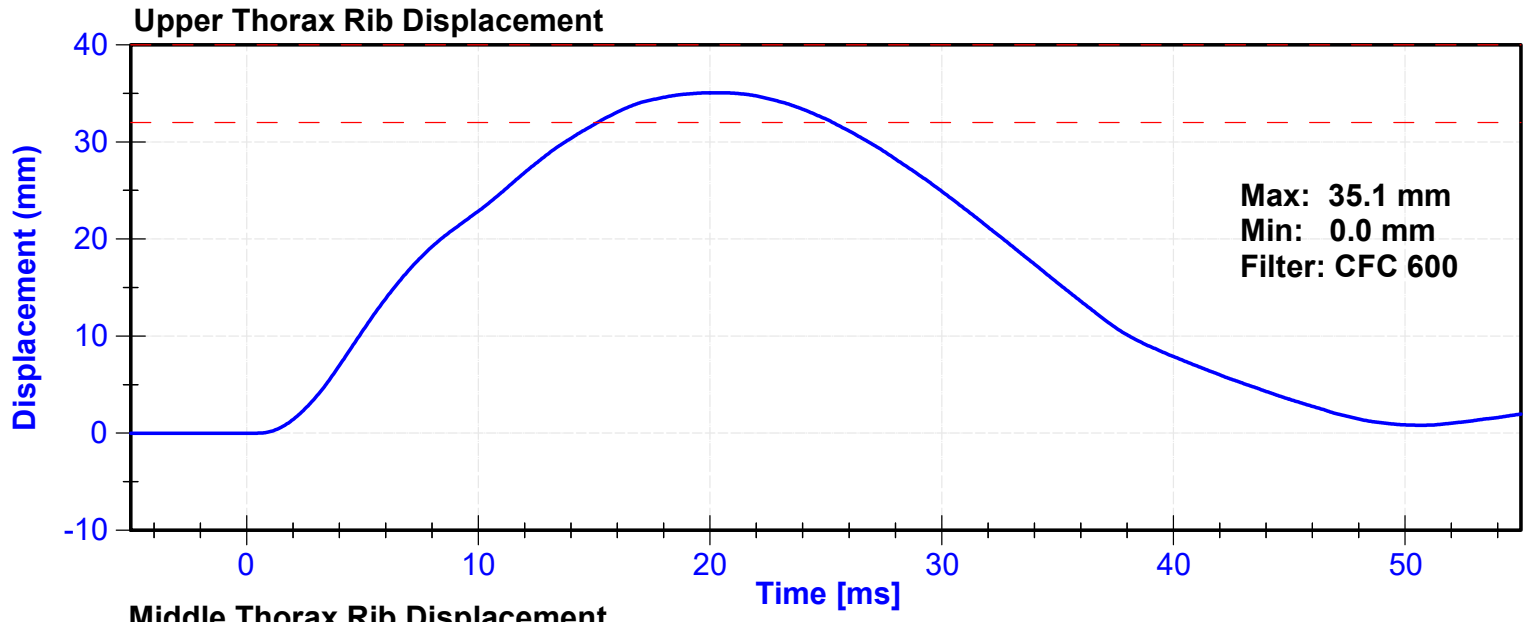
Results

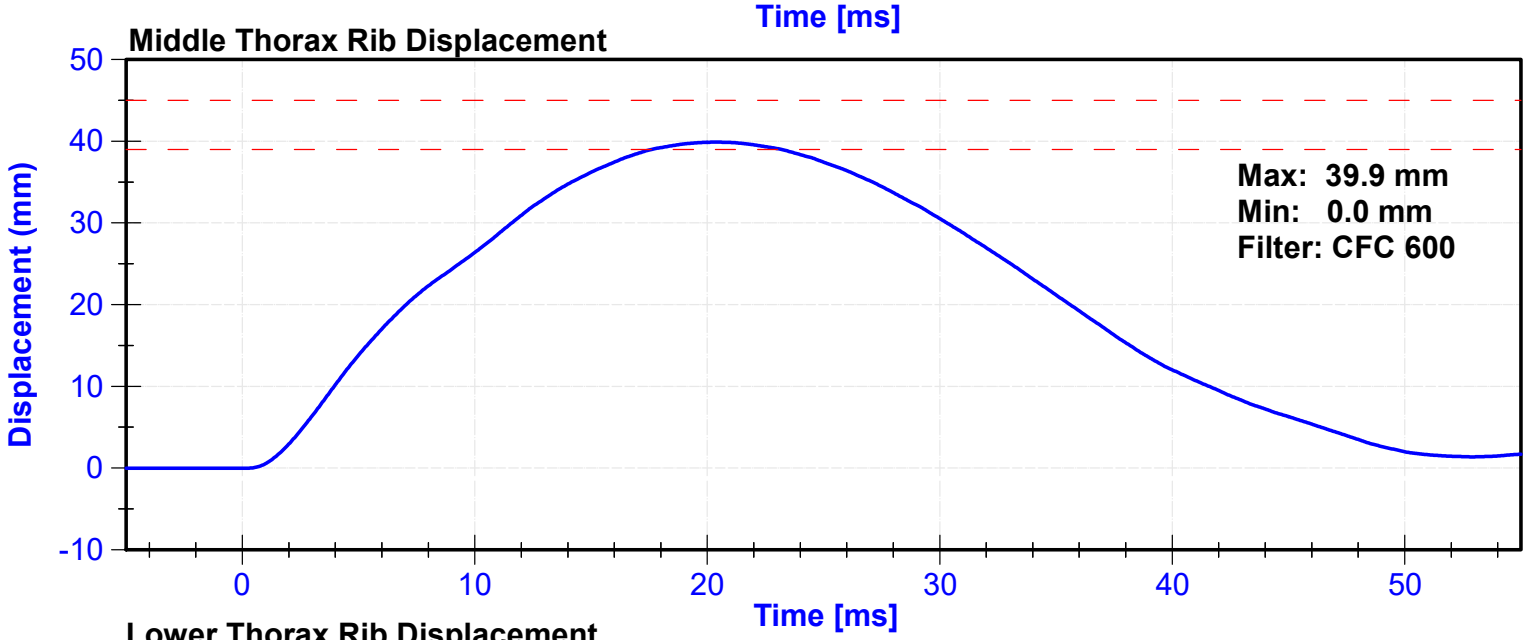
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	14	18	g's	16.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.1	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.4	Pass
Upper Thorax Rib Deflection	32	40	mm	35.1	Pass
Middle Thorax Rib Deflection	39	45	mm	39.9	Pass
Lower Thorax Rib Deflection	35	43	mm	38.1	Pass

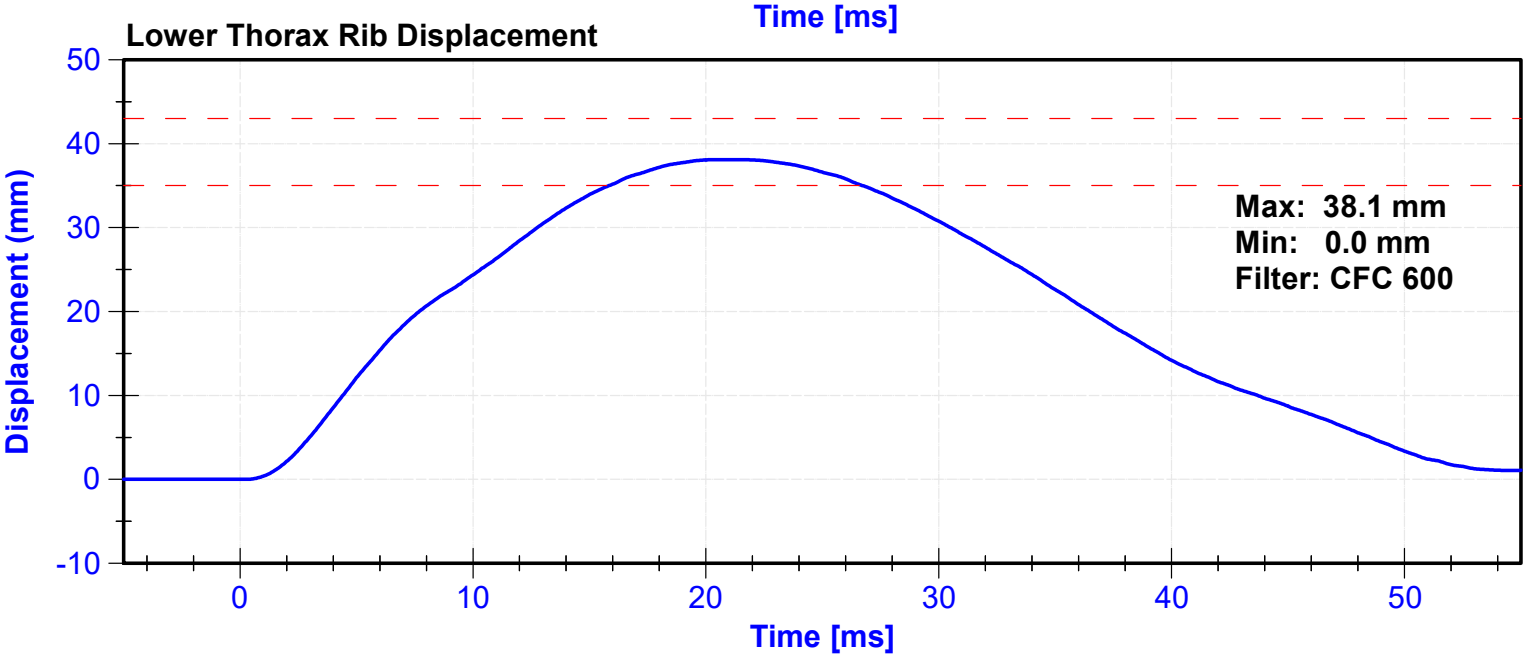
Transducer Calibrations

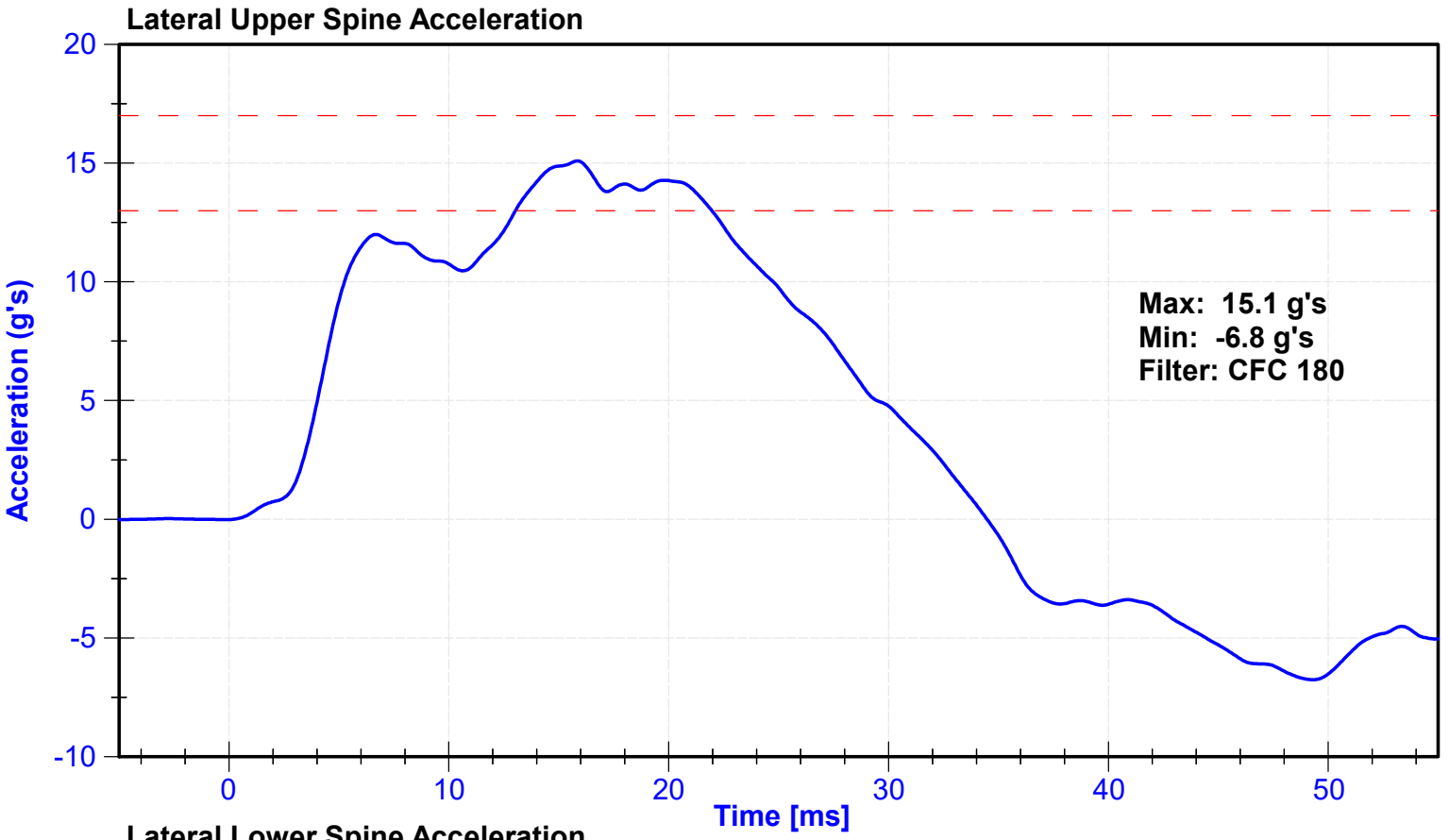
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Upper Spine Y Accelerometer	Endevco	T20880	11/16/2023	5/14/2024
Lower Spine Y Accelerometer	Endevco	P52071	11/16/2023	5/14/2024
Upper Thorax Rib Potentiometer	Servo	2316GFE	11/17/2023	5/17/2024
Middle Thorax Rib Potentiometer	Servo	307GFE	11/17/2023	5/17/2024
Lower Thorax Rib Potentiometer	Servo	1156GFE	11/17/2023	5/17/2024

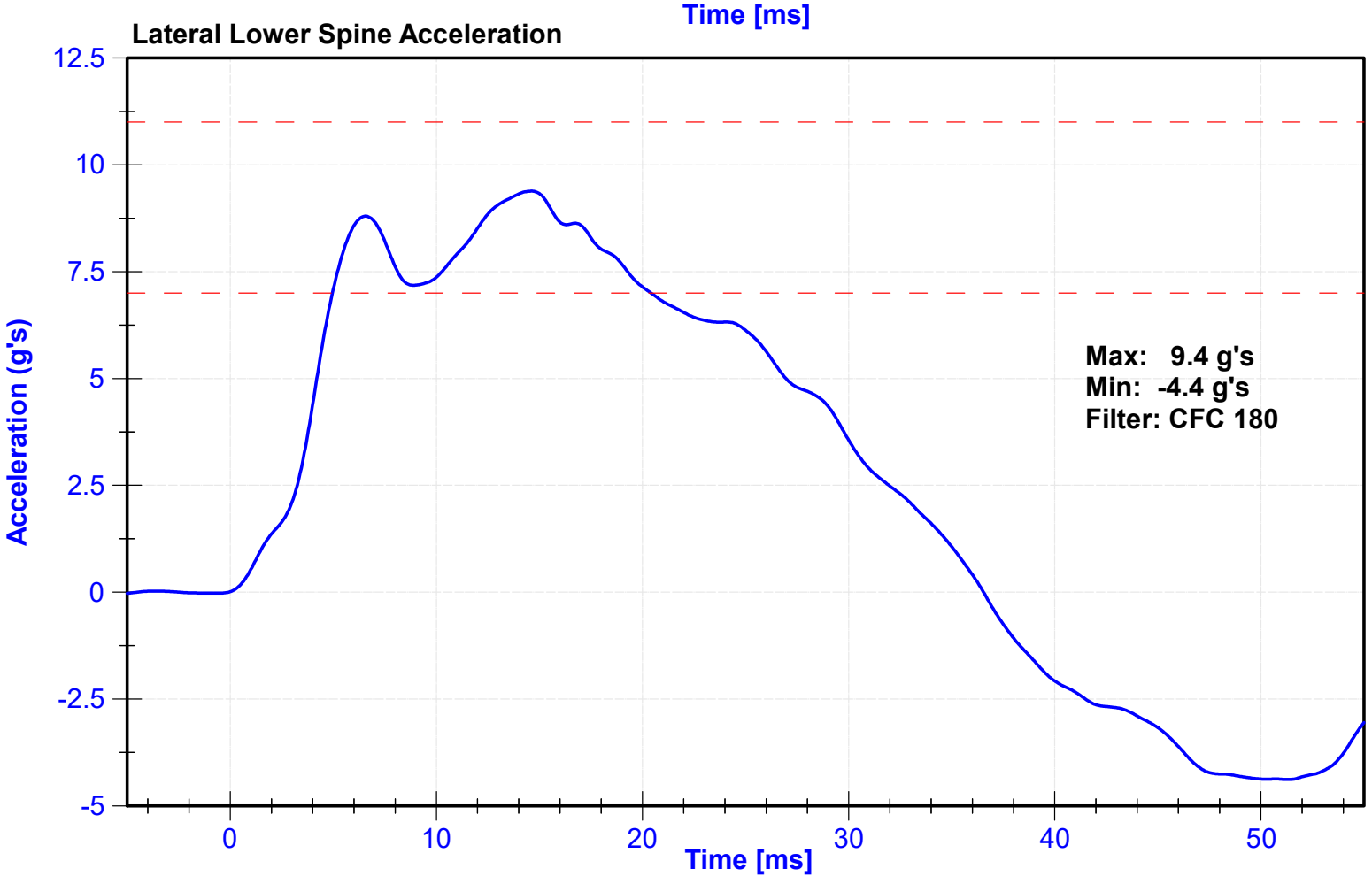



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.1 mm
Min: 0.0 mm
Filter: CFC 600


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


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


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.1 g's
Min: -6.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.4 g's
Min: -4.4 g's
Filter: CFC 180

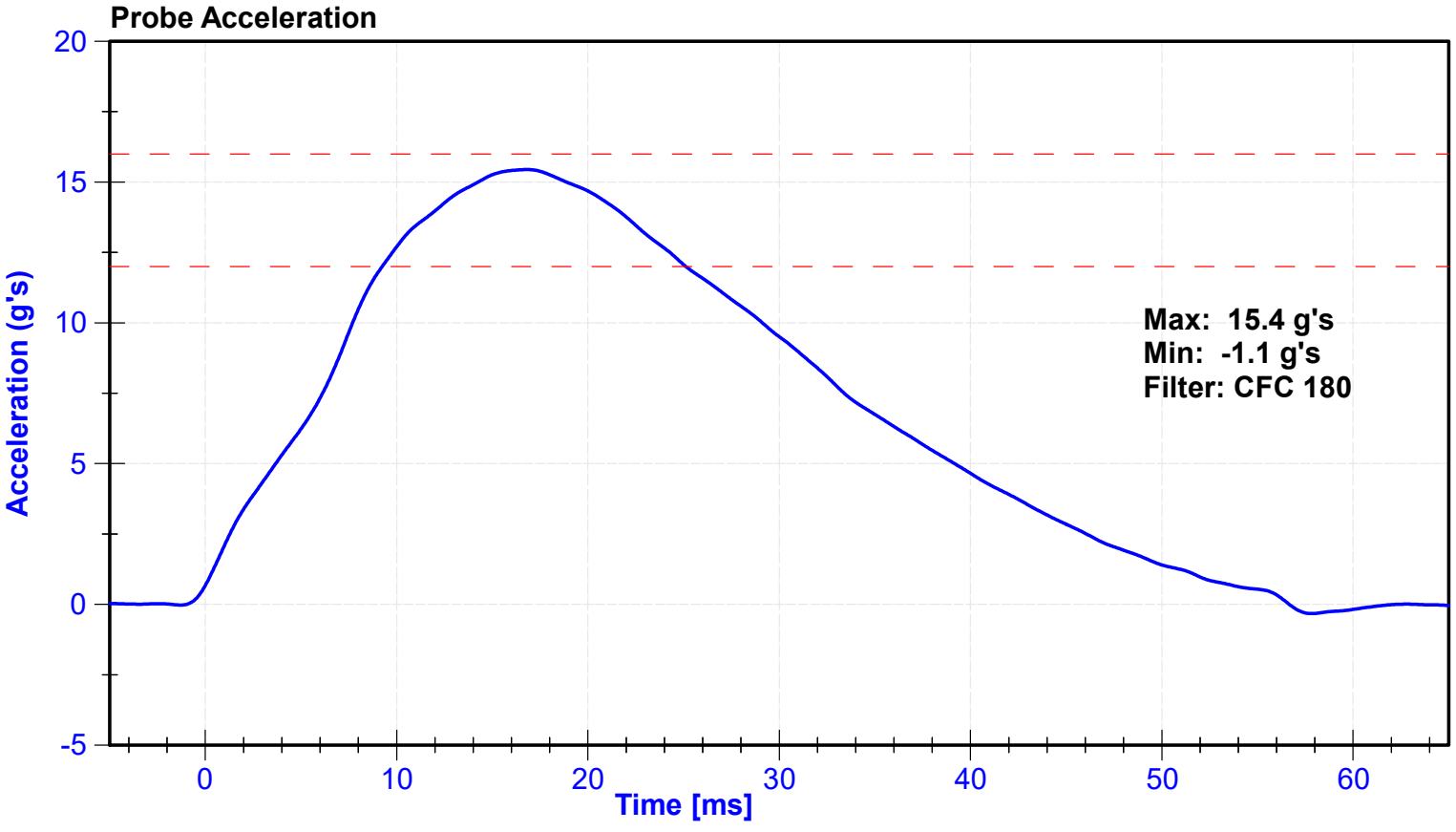
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

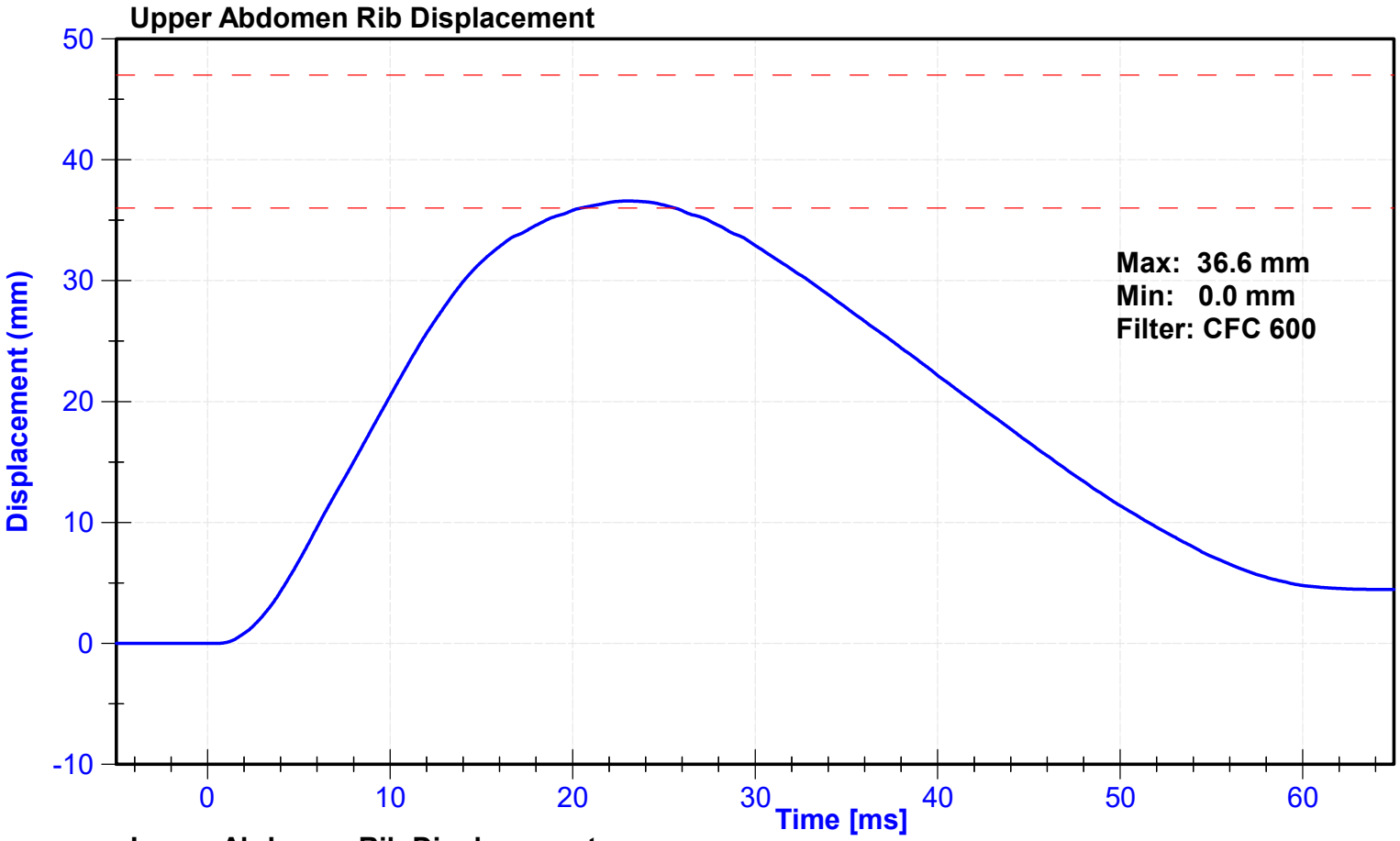
Results

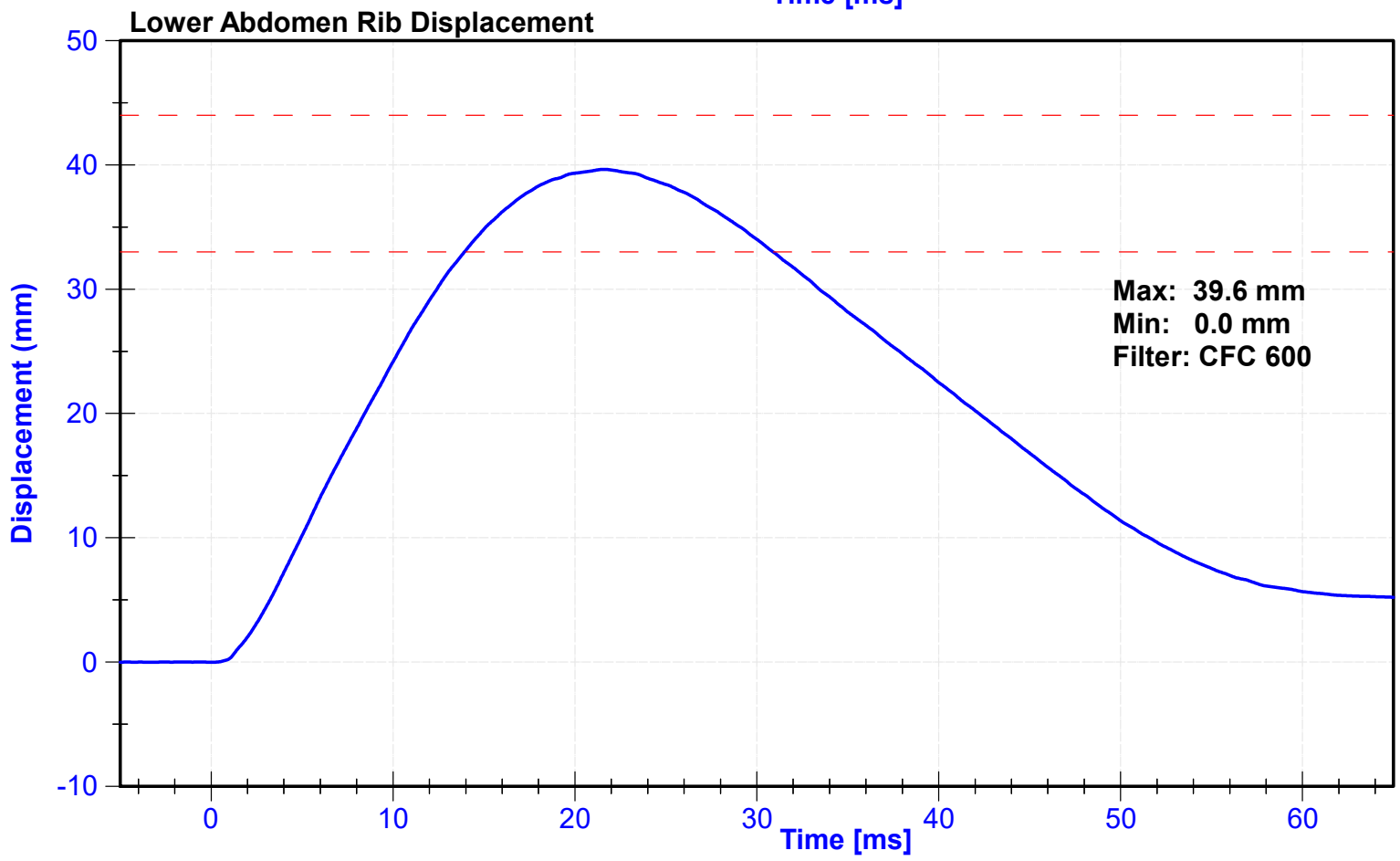
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	12	16	g's	15.4	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.6	Pass
Upper Abdomen Rib Deflection	36	47	mm	36.6	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.6	Pass

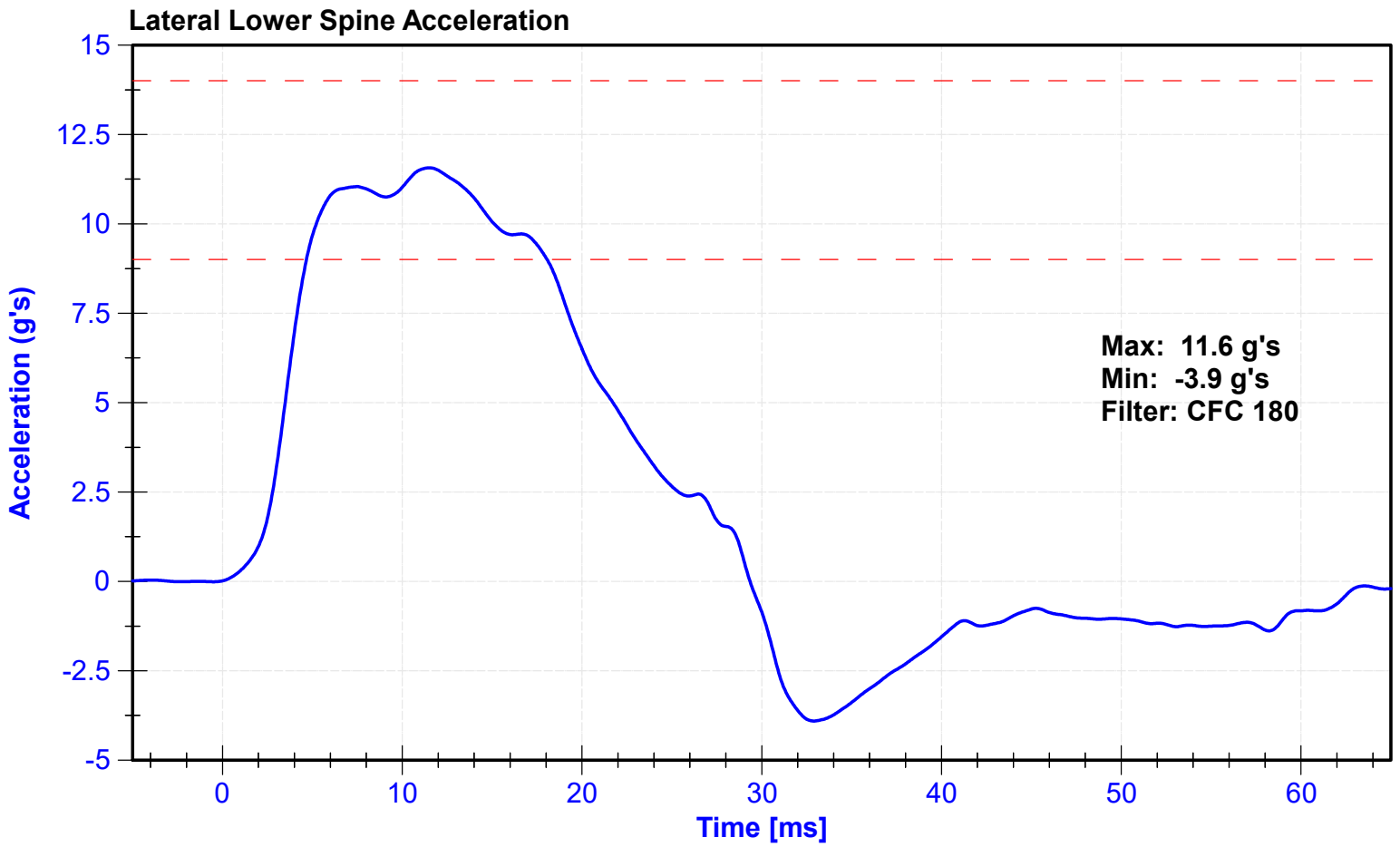
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Lower Spine Y Accelerometer	Endevco	P52071	11/16/2023	5/14/2024
Upper Abdomen Rib Potentiometer	Servo	060GFE	11/21/2023	5/21/2024
Lower Abdomen Rib Potentiometer	Servo	308GFE	11/17/2023	5/17/2024




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 36.6 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: 39.6 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: 11.6 g's
Min: -3.9 g's
Filter: CFC 180

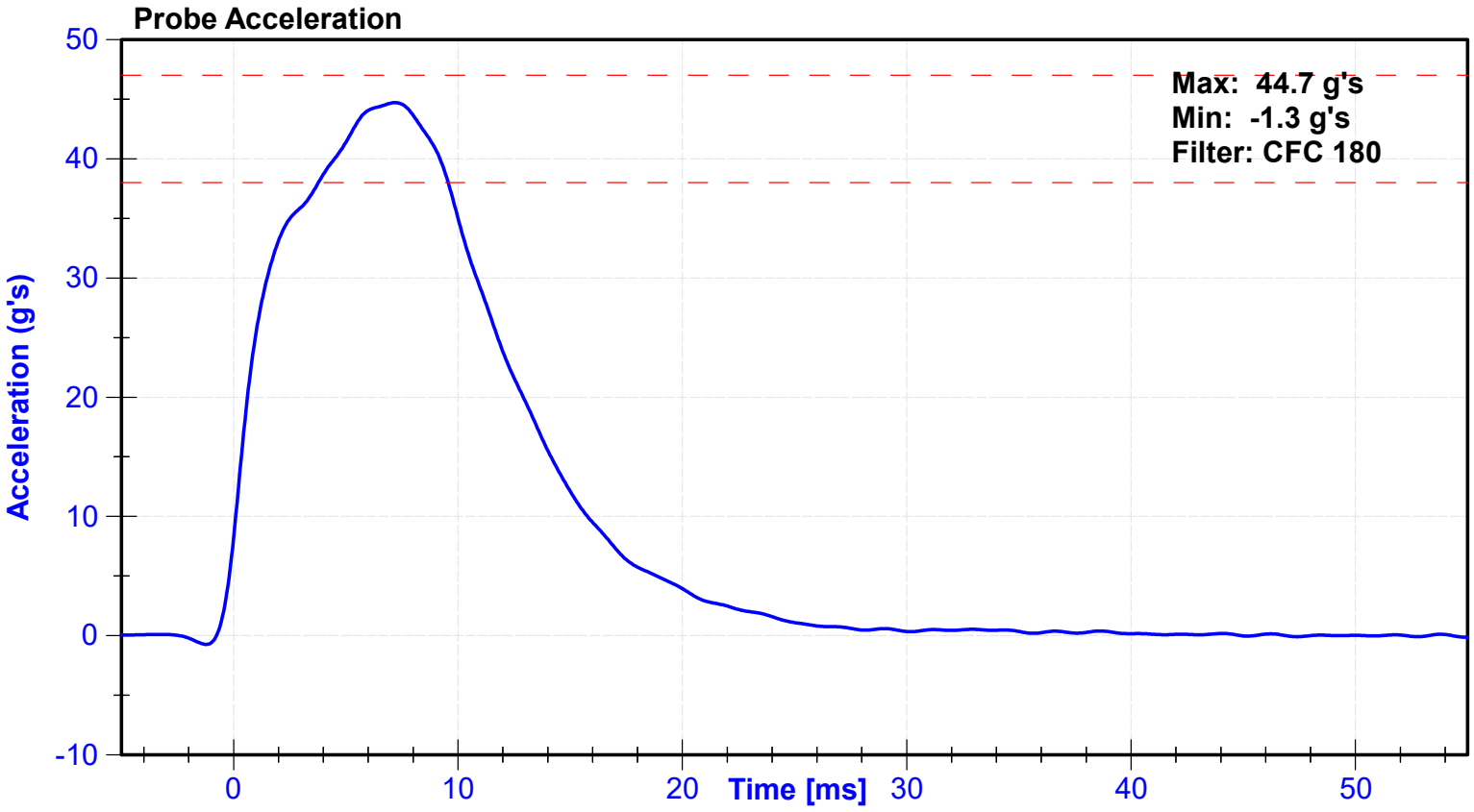
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

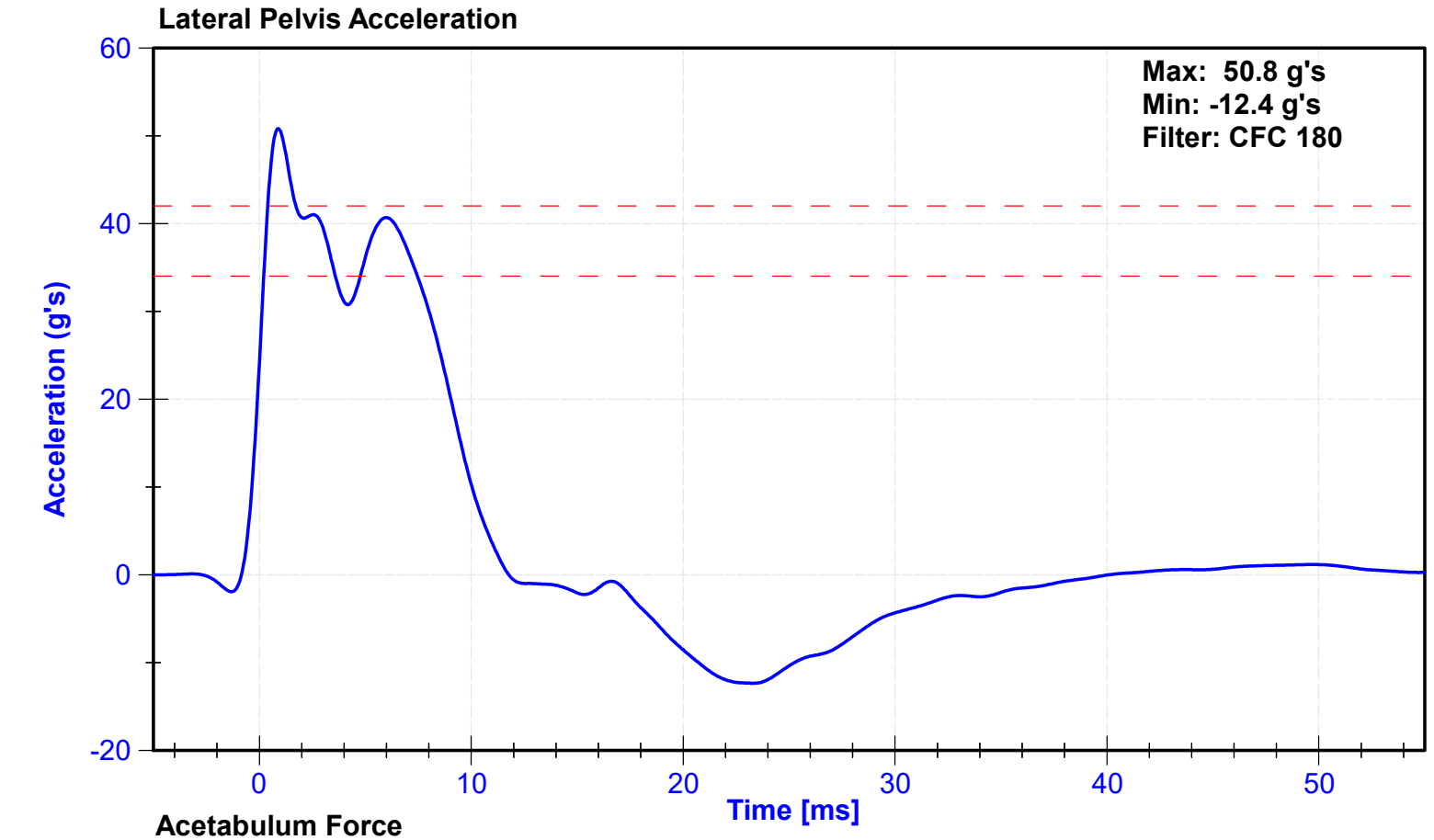
Results

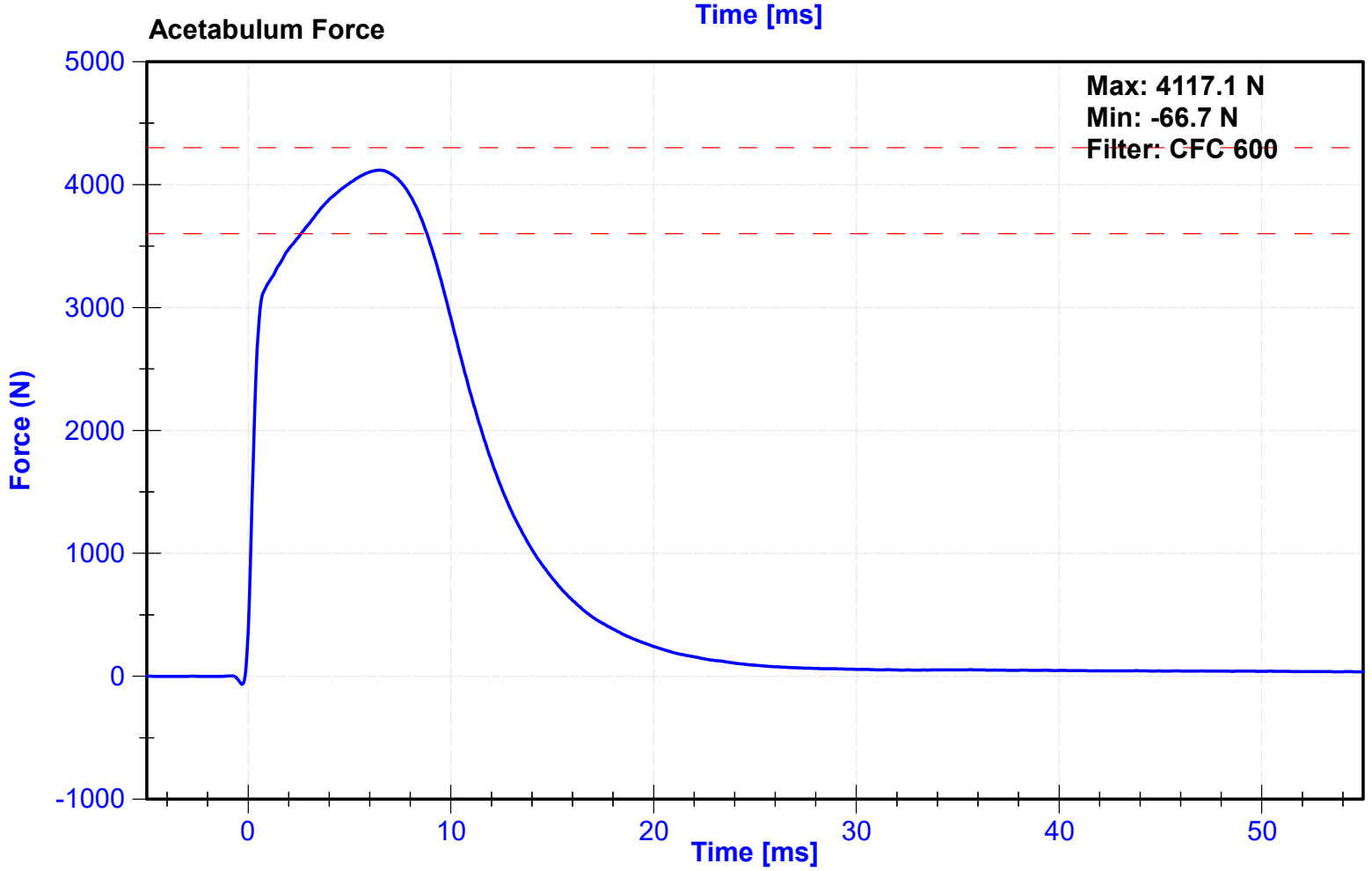
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration	38	47	g's	44.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.7	Pass
Acetabulum Force	3600	4300	N	4117.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Pelvis Y Accelerometer	Endevco	P51731	11/15/2023	5/13/2024
Acetabulum Load Cell	Denton	267-FY	9/11/2023	9/10/2024
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 50.8 g's
Min: -12.4 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 4117.1 N
Min: -66.7 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

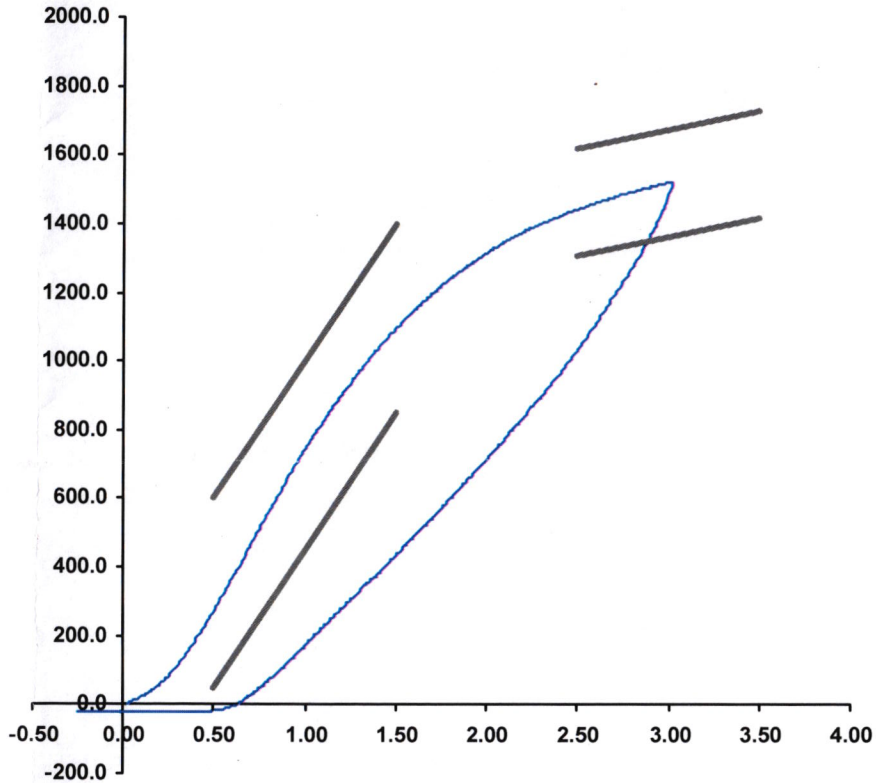
300 CERTIFICATION PLUG
1/25/24

SID-IIs Pelvis Plug Certification Test

Plug S/N 16476
Test Number 23259
Report Number 23316
Test Date 7/14/2022 11:58:25 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	270	50	600
Force @ 1.5 mm (N)	1,093	850	1,400
Force @ 2.5 mm (N)	1,441	1,306	1,618
Force @ 3.0 mm (N)	1,519	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 14-Jul-22
SACO Research

By : DC Date : 7/14/22

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

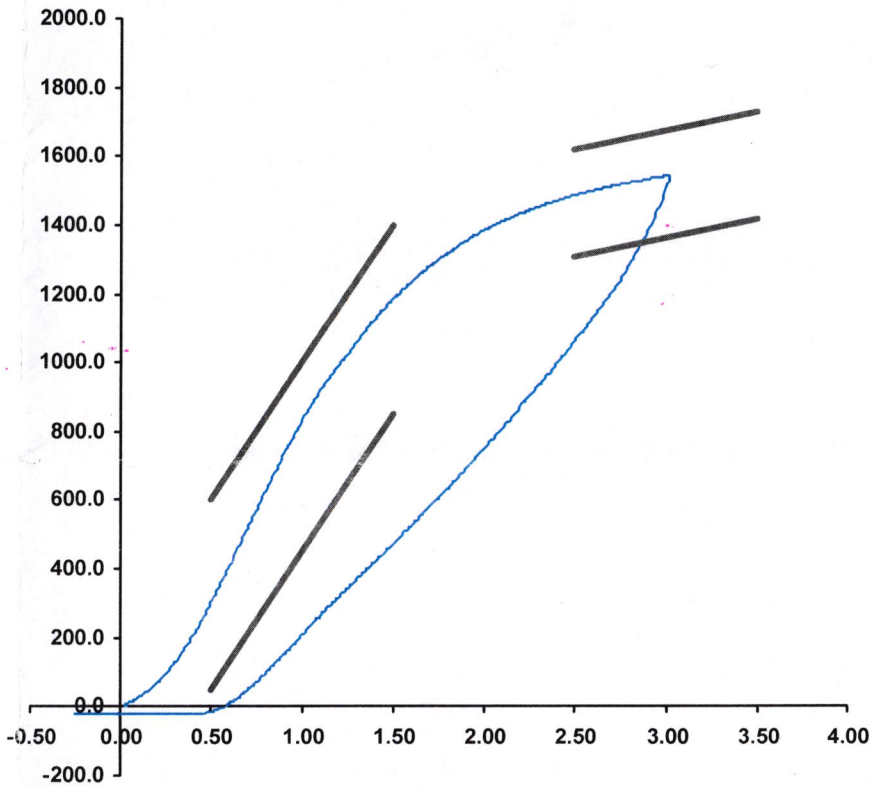
300 IRASH
1/25/24

SID-IIs Pelvis Plug Certification Test

Plug S/N 16371
Test Number 22938
Report Number 22995
Test Date 5/20/2022 2:00:34 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	301	50	600
Force @ 1.5 mm (N)	1,185	850	1,400
Force @ 2.5 mm (N)	1,487	1,306	1,618
Force @ 3.0 mm (N)	1,542	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-May-22
SACO Research

By : DC Date : 5/20/2022

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

SACO RESEARCH

300 NOW IMPACT
1/25/24

SID-IIs Pelvis Plug Certification Test

Plug S/N 16407
Test Number 22976
Report Number 23034
Test Date 5/23/2022 9:52:26 AM

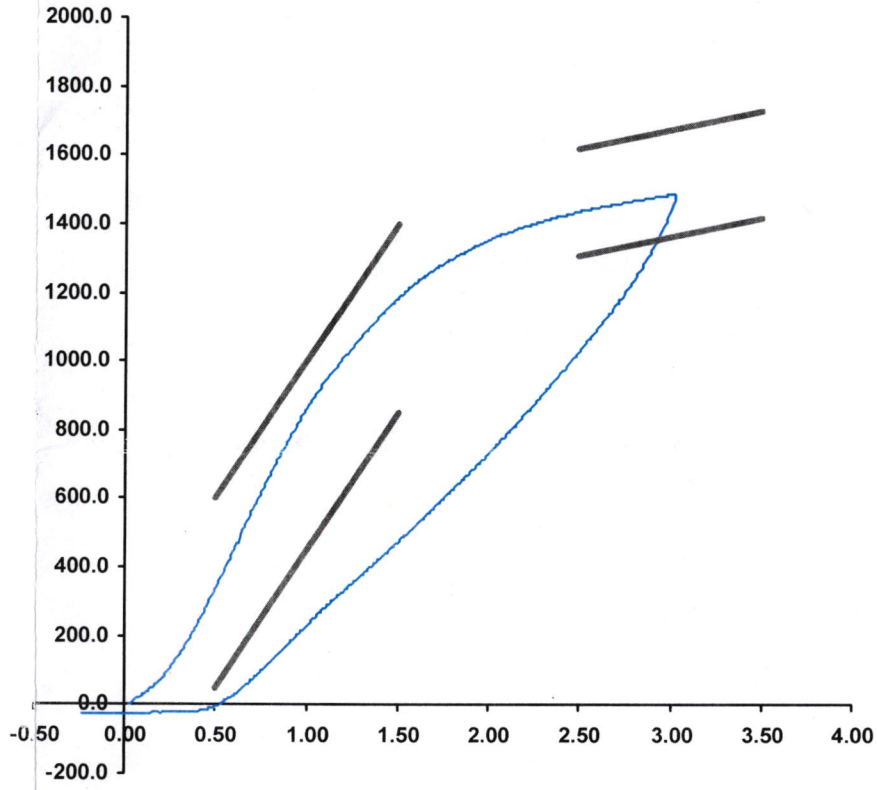
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	345	50	600
Force @ 1.5 mm (N)	1,185	850	1,400
Force @ 2.5 mm (N)	1,437	1,306	1,618
Force @ 3.0 mm (N)	1,485	1,361	1,673

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 23-May-22
SACO Research

By : DC Date : 5/23/2022

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

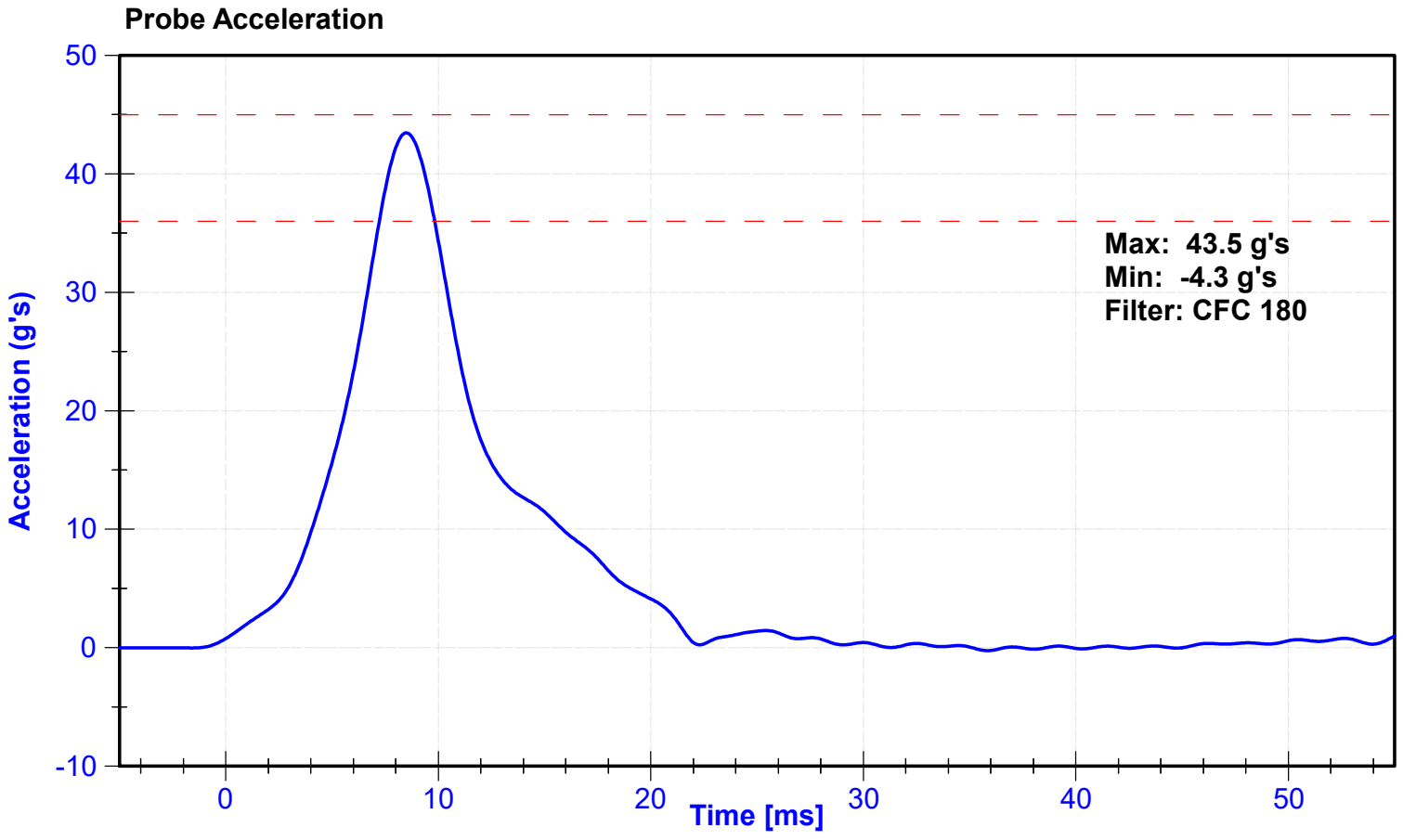
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

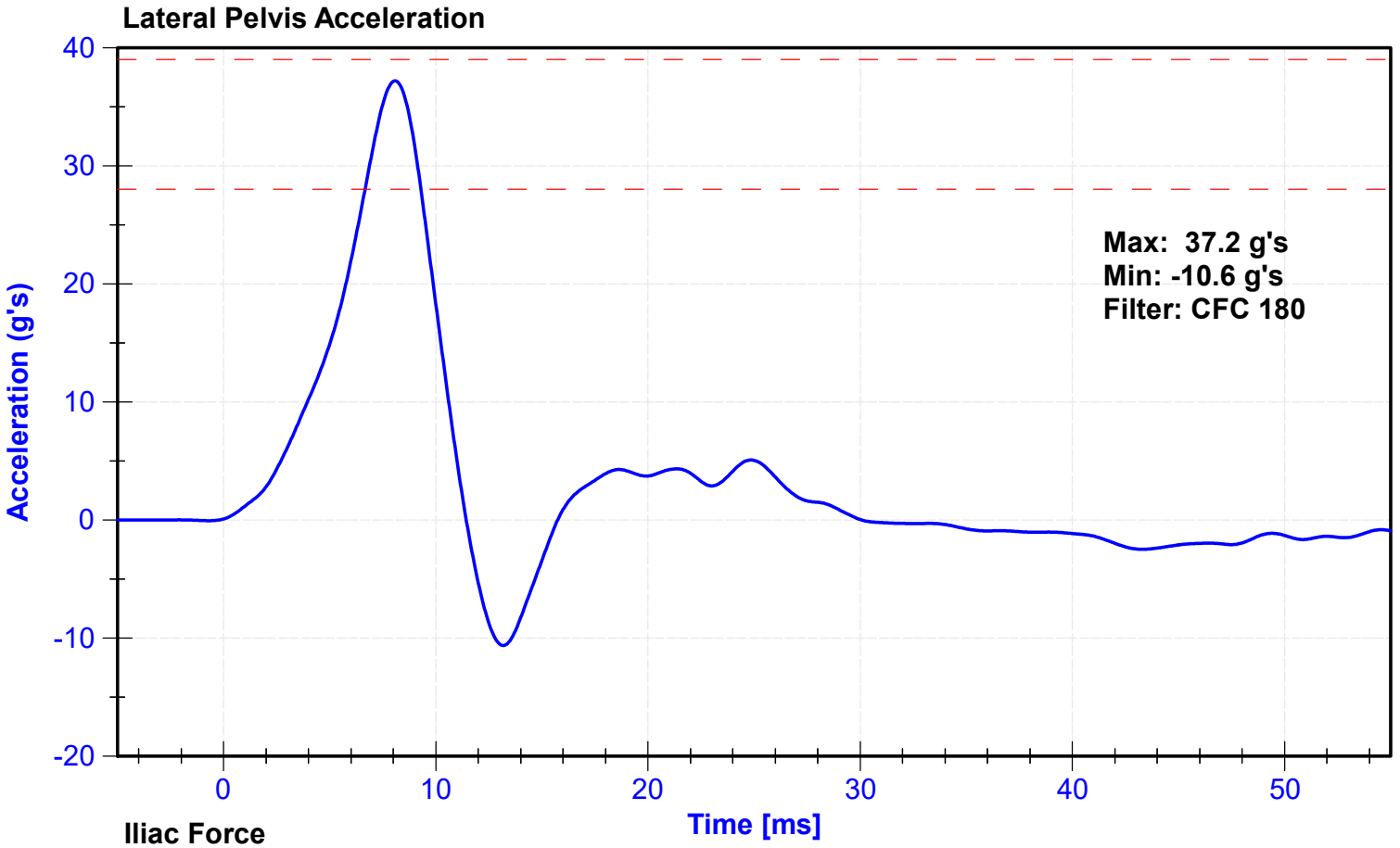
Results

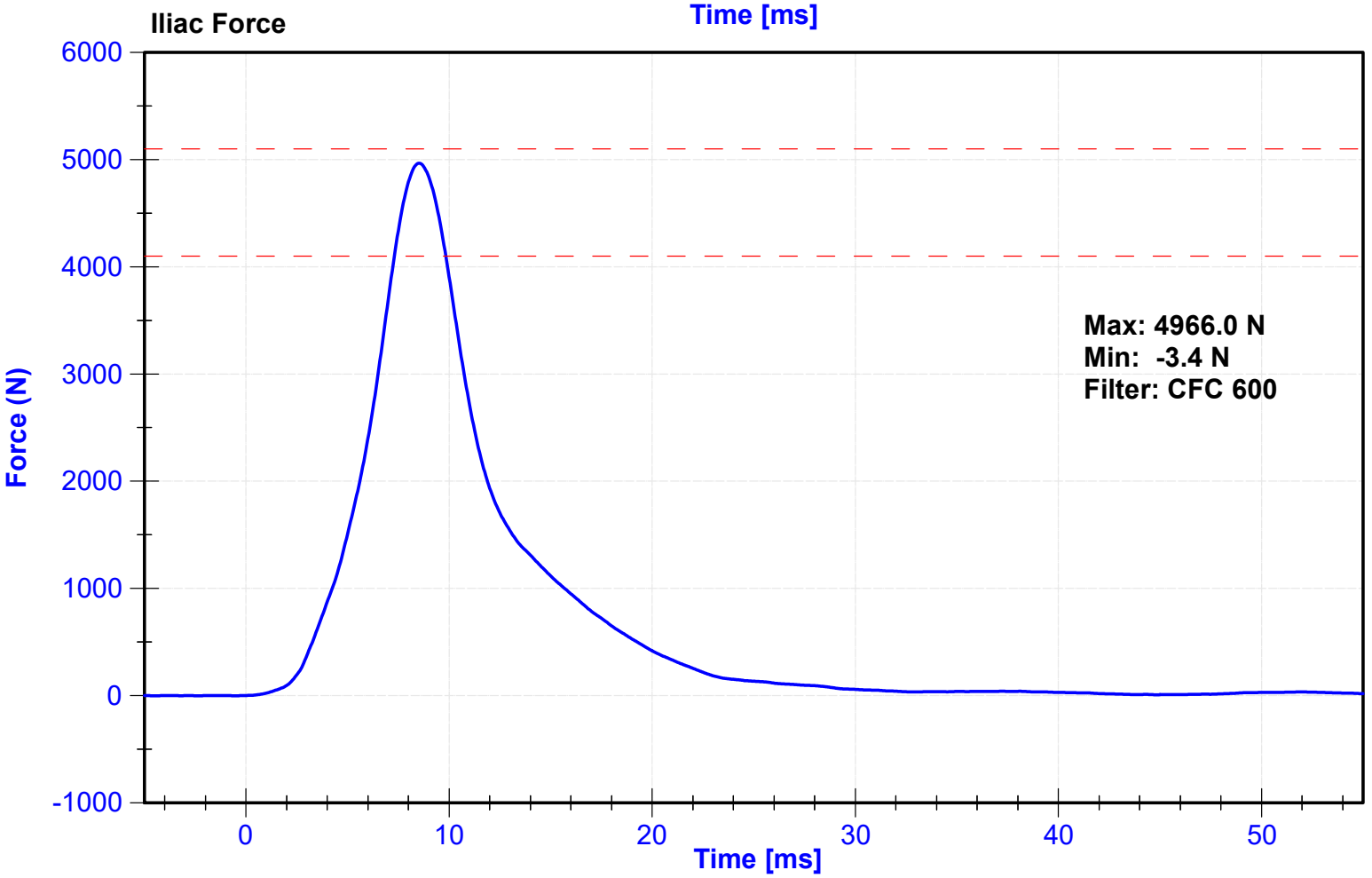
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.38	Pass
Probe Acceleration	36	45	g's	43.5	Pass
Lateral Pelvis Acceleration	28	39	g's	37.2	Pass
Iliac Force	4100	5100	N	4966.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Pelvis Y Accelerometer	Endevco	P51731	11/15/2023	5/13/2024
Iliac Load Cell	Denton	321	9/11/2023	9/10/2024




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 37.2 g's
Min: -10.6 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: 4966.0 N
Min: -3.4 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

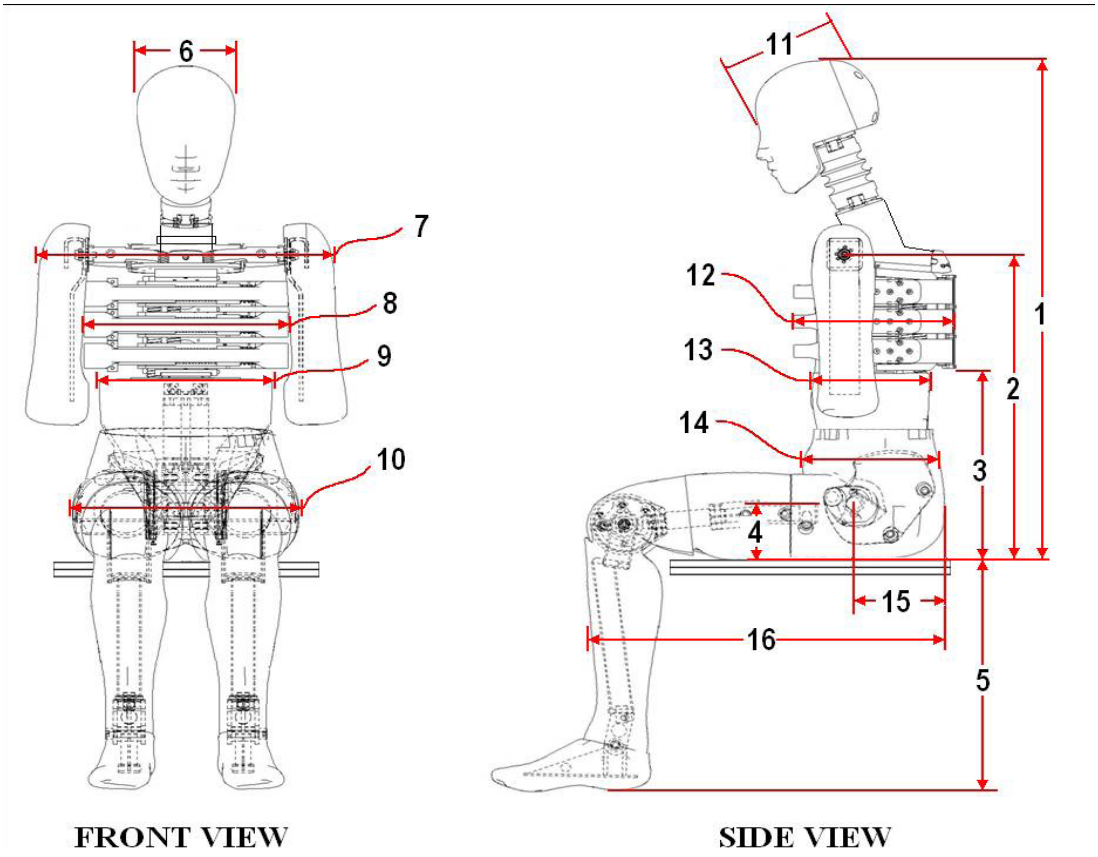
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE It

External Measurements - EuroSID-2re

Technician: T. Roseman Date: 2/22/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	915	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	353	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	429	Pass
6	Head Width	152	158	156	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	282	Pass
10	Pelvis Lap Width	359	373	370	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	201	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	611	Pass

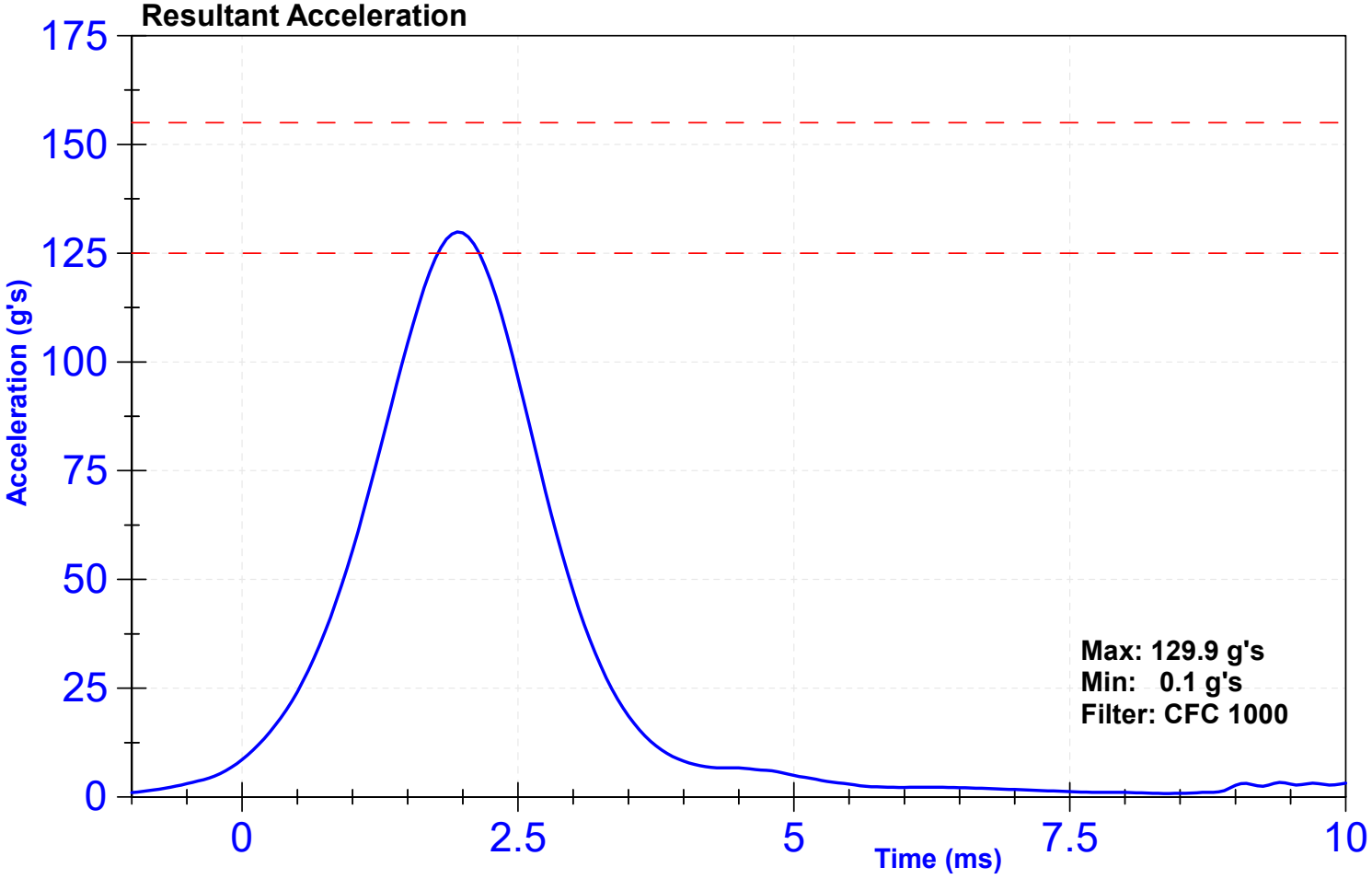
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

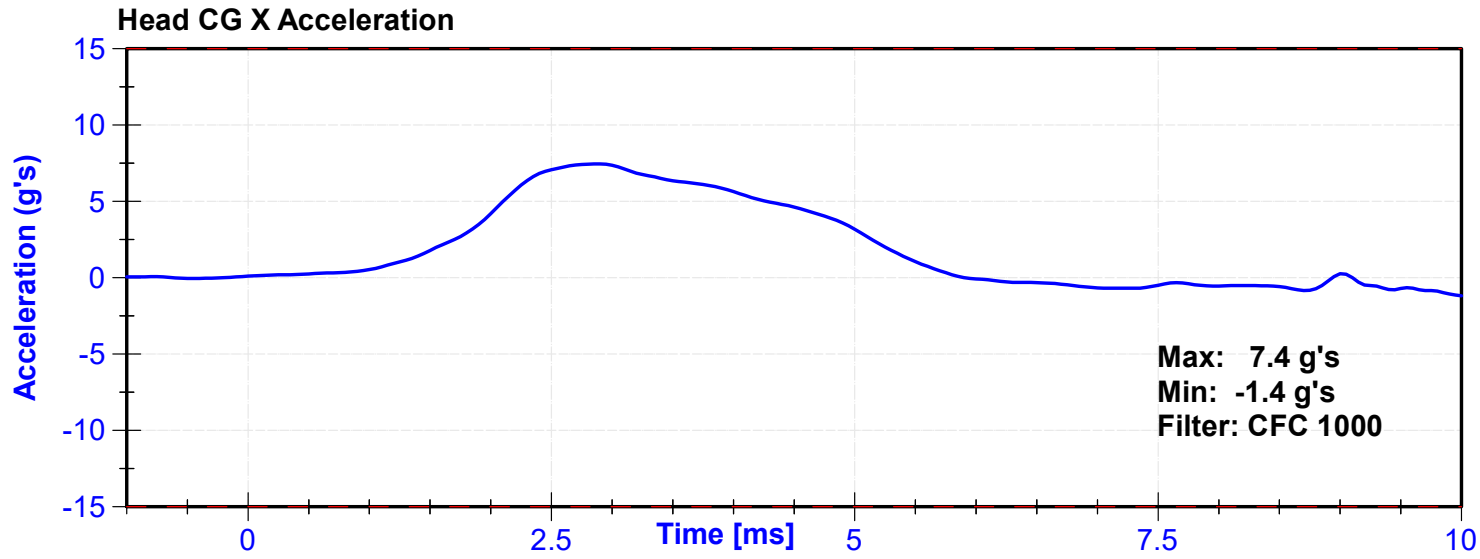
Results

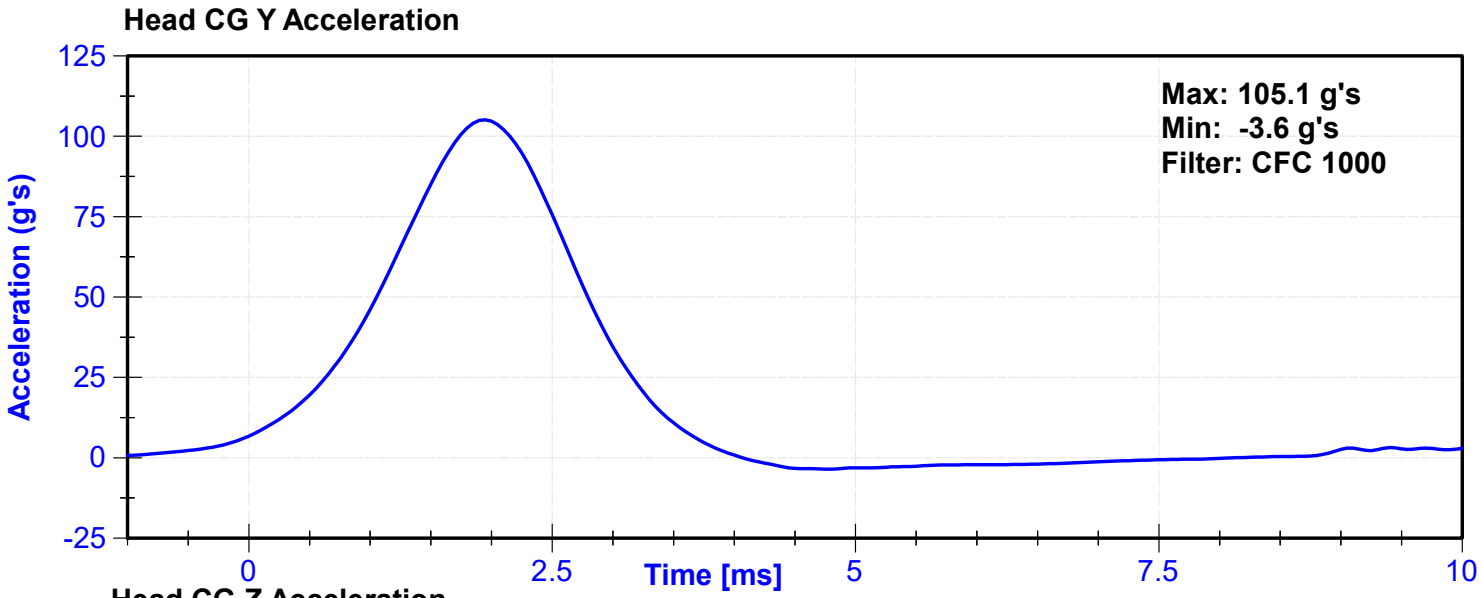
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18	Pass
Resultant Acceleration	125	155	g's	129.9	Pass
Oscillation	0	15	%	5.13	Pass
Fore-Aft Acceleration	-15	15	g's	7.4	Pass

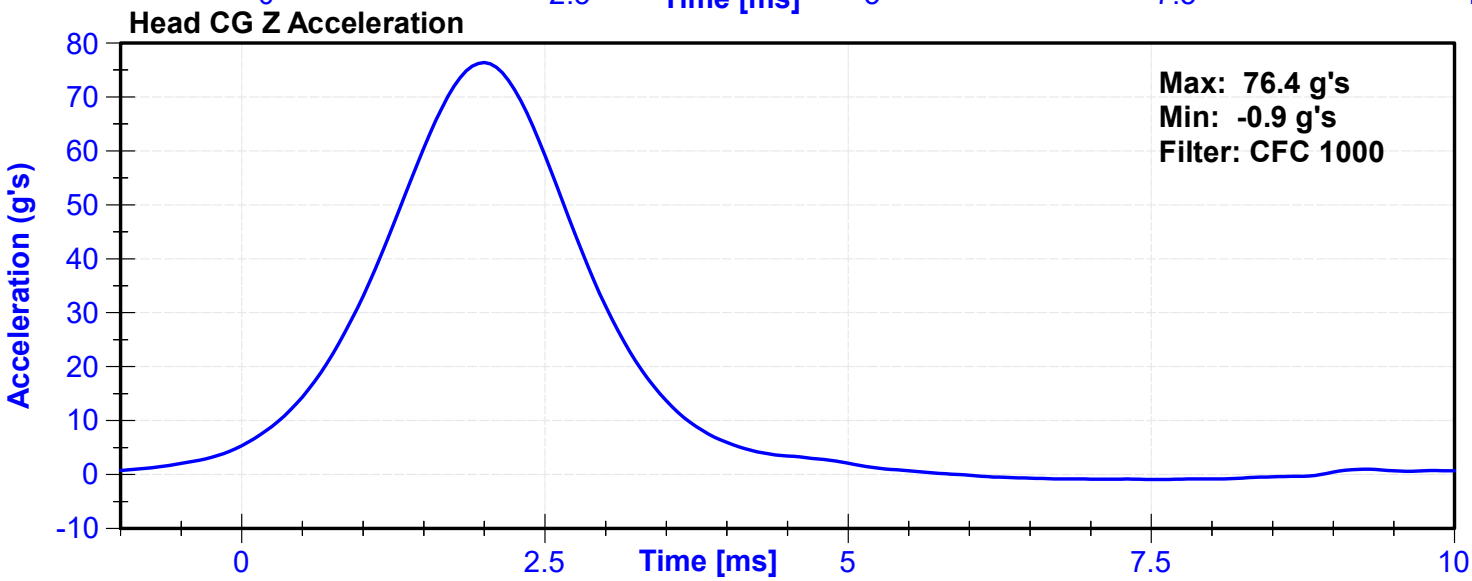
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	11/16/2023	5/14/2024
Y Accelerometer	Endevco	P49216	11/16/2023	5/14/2024
Z Accelerometer	Endevco	P51303	11/16/2023	5/14/2024




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
Time [ms]
5
7.5
10
Max: 7.4 g's
Min: -1.4 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
Time [ms]
5
7.5
10
Max: 105.1 g's
Min: -3.6 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
Time [ms]
5
7.5
10
Max: 76.4 g's
Min: -0.9 g's
Filter: CFC 1000

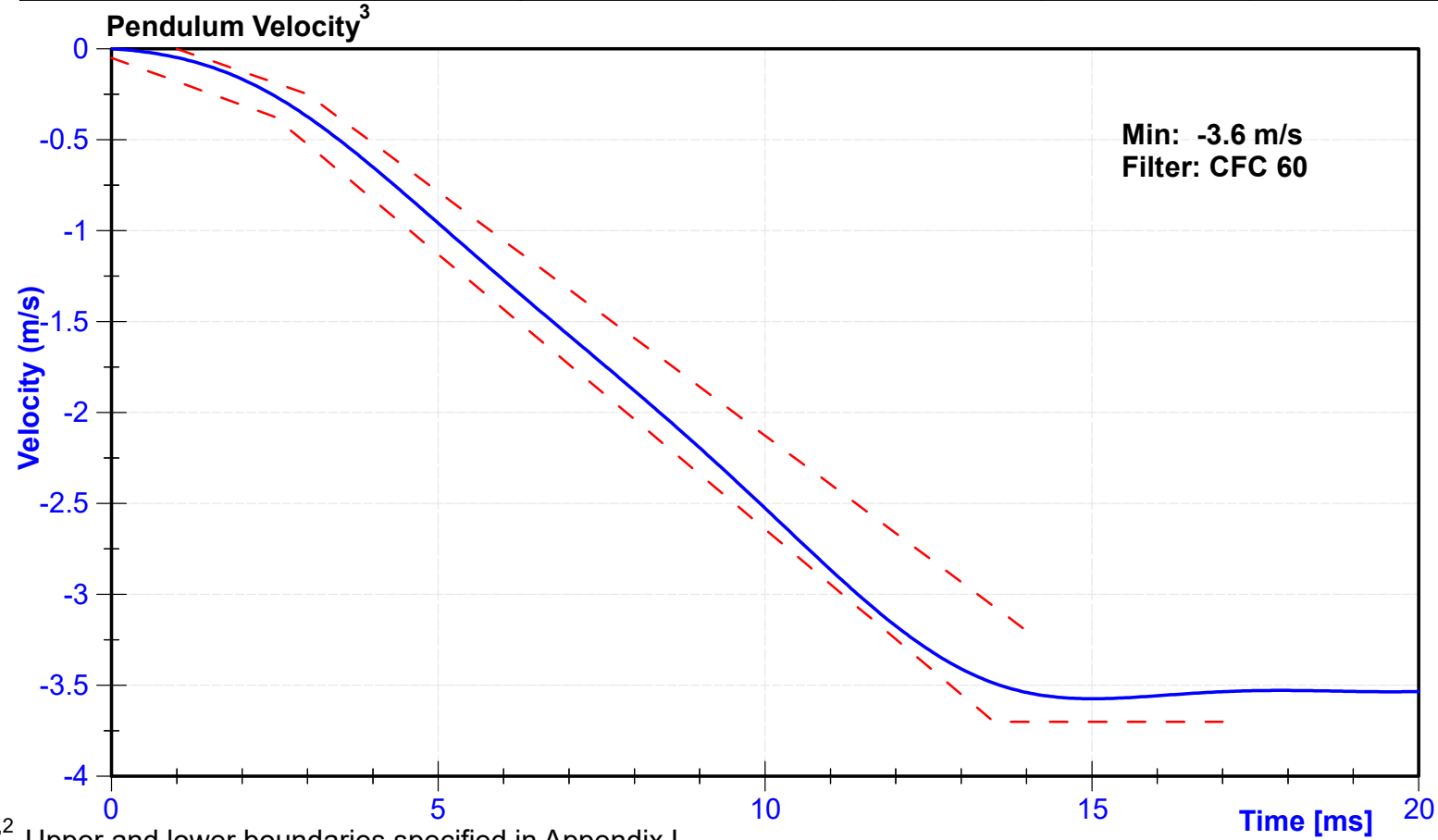
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

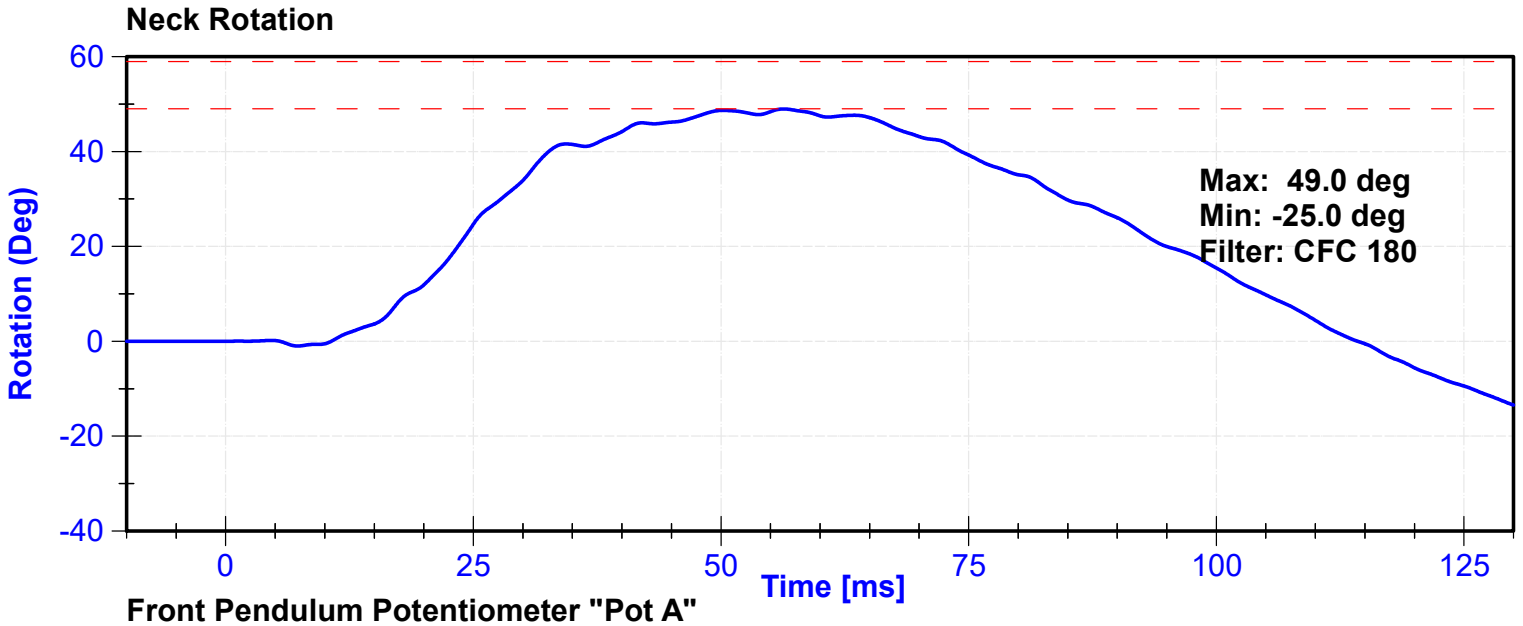
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	3.3	3.5	m/s	3.37	Pass
Lateral Neck Rotation	49	59	deg	49.0	Pass
Time at Maximum Rotation	54	66	ms	56.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	58.0	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

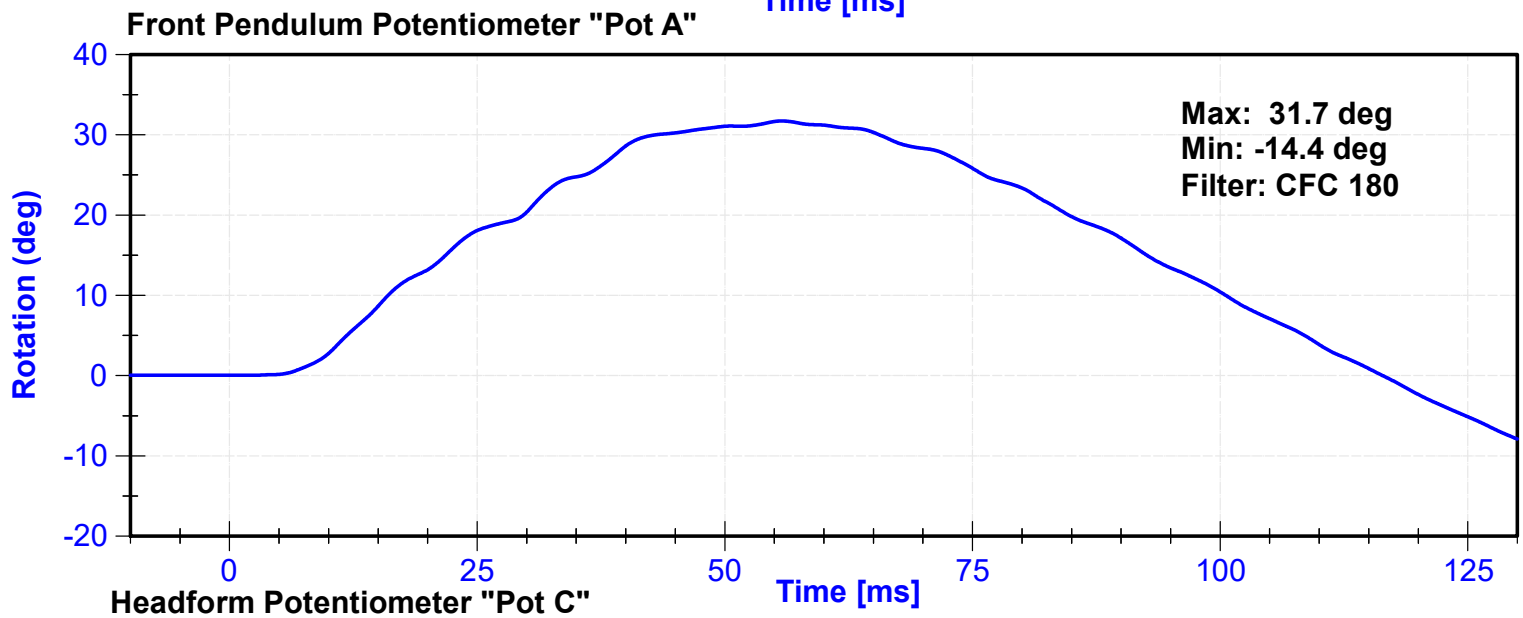
Transducer Calibrations

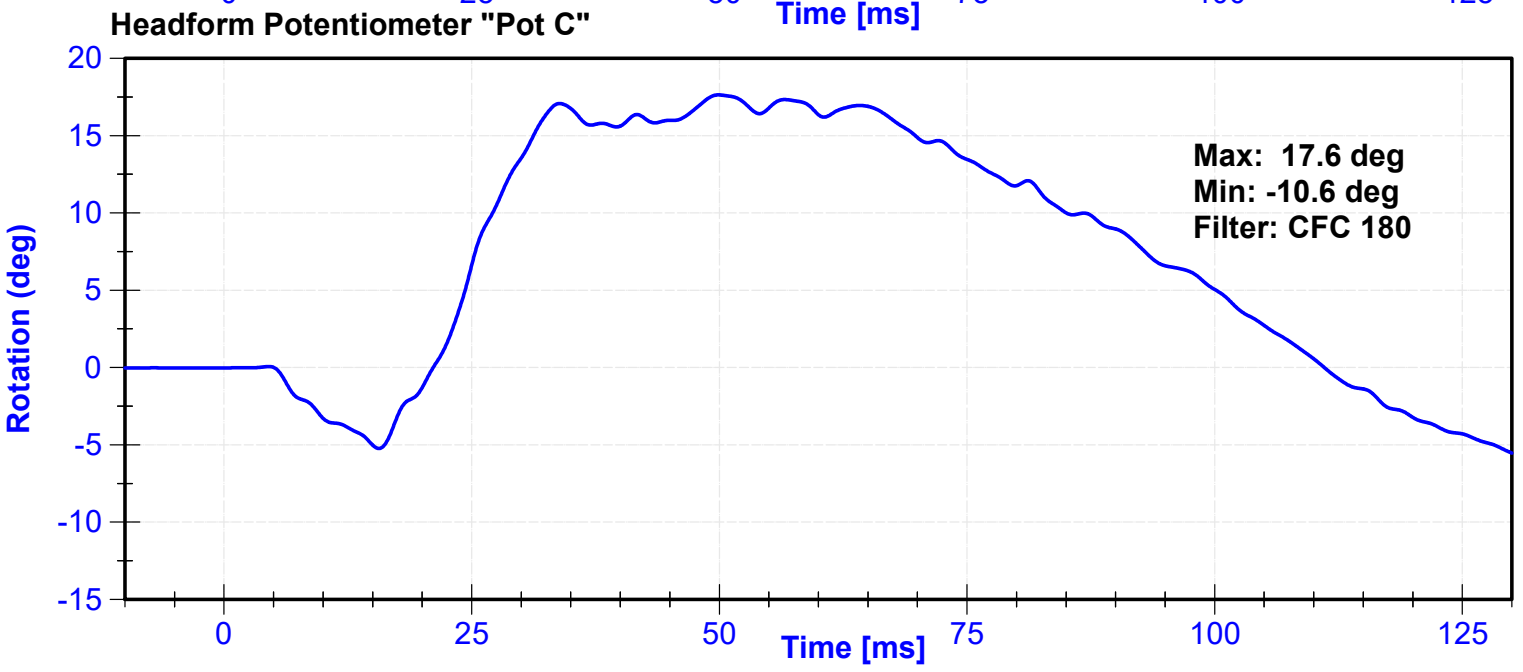
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024



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


Neck Rotation
Rotation (Deg)
Time [ms]
Max: 49.0 deg
Min: -25.0 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 31.7 deg
Min: -14.4 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 17.6 deg
Min: -10.6 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

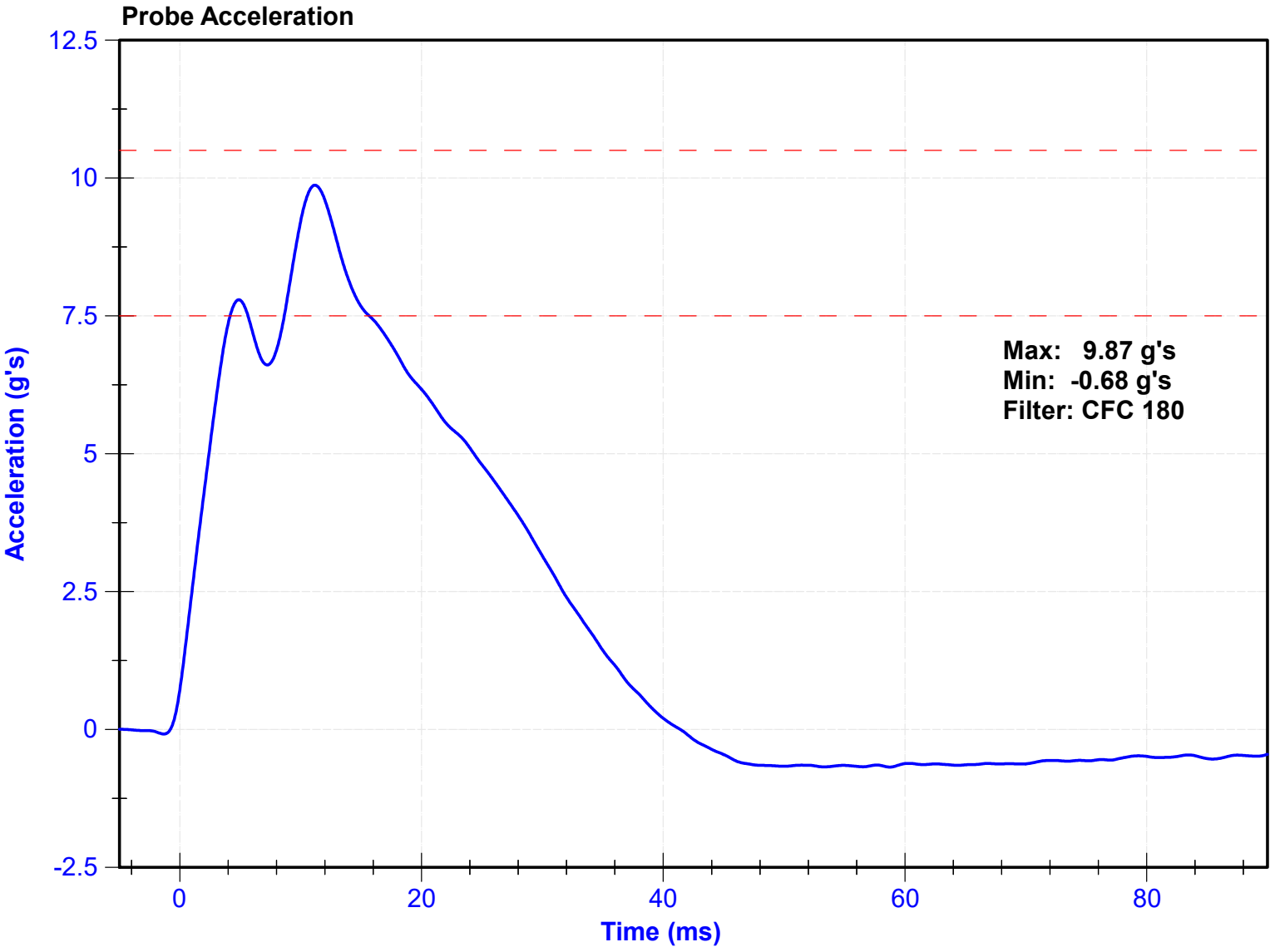
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	7.5	10.5	g's	9.87	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024



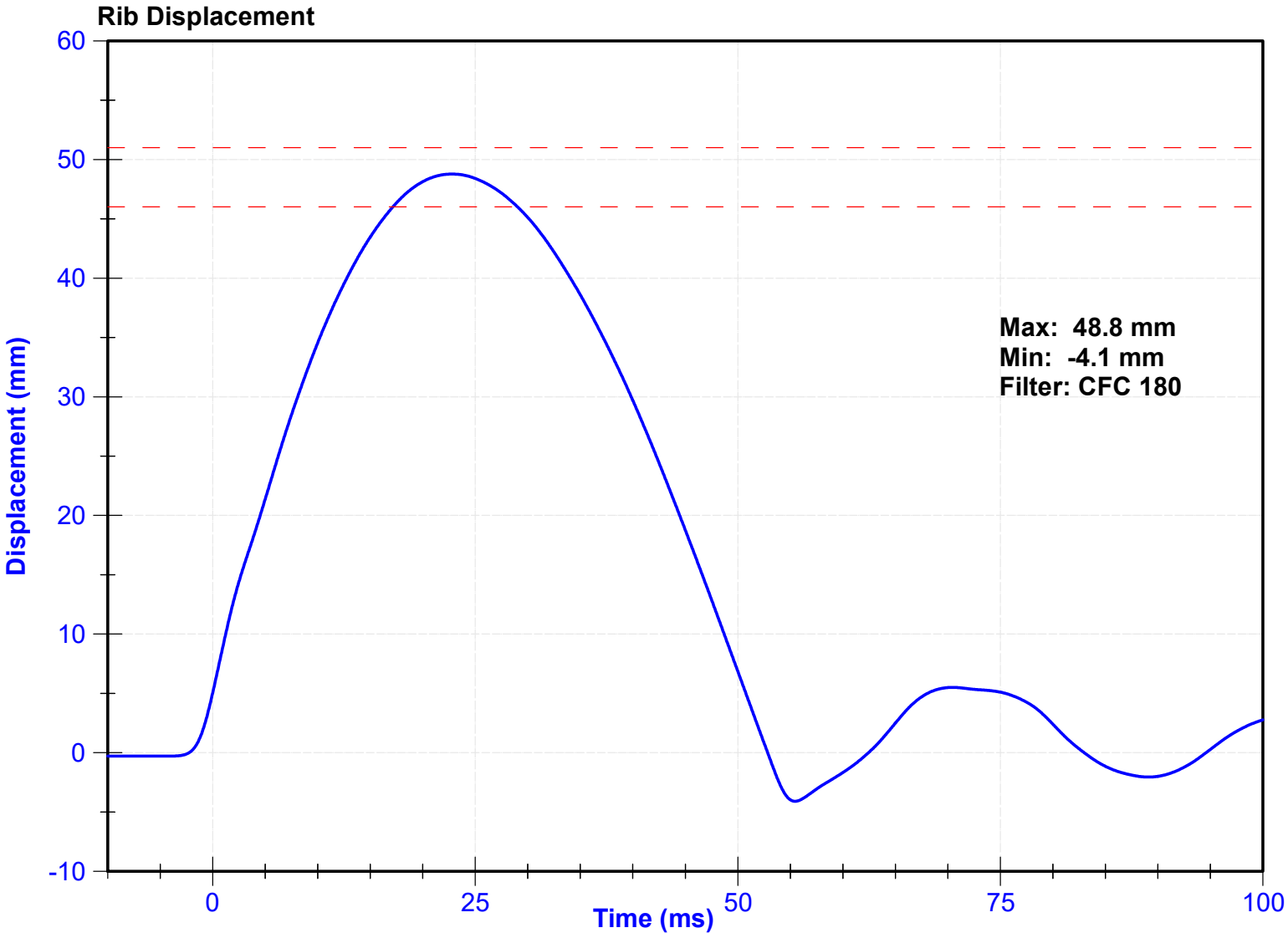
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18.0	Pass
Rib Displacement	46	51	mm	48.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	11/17/2023	5/17/2024



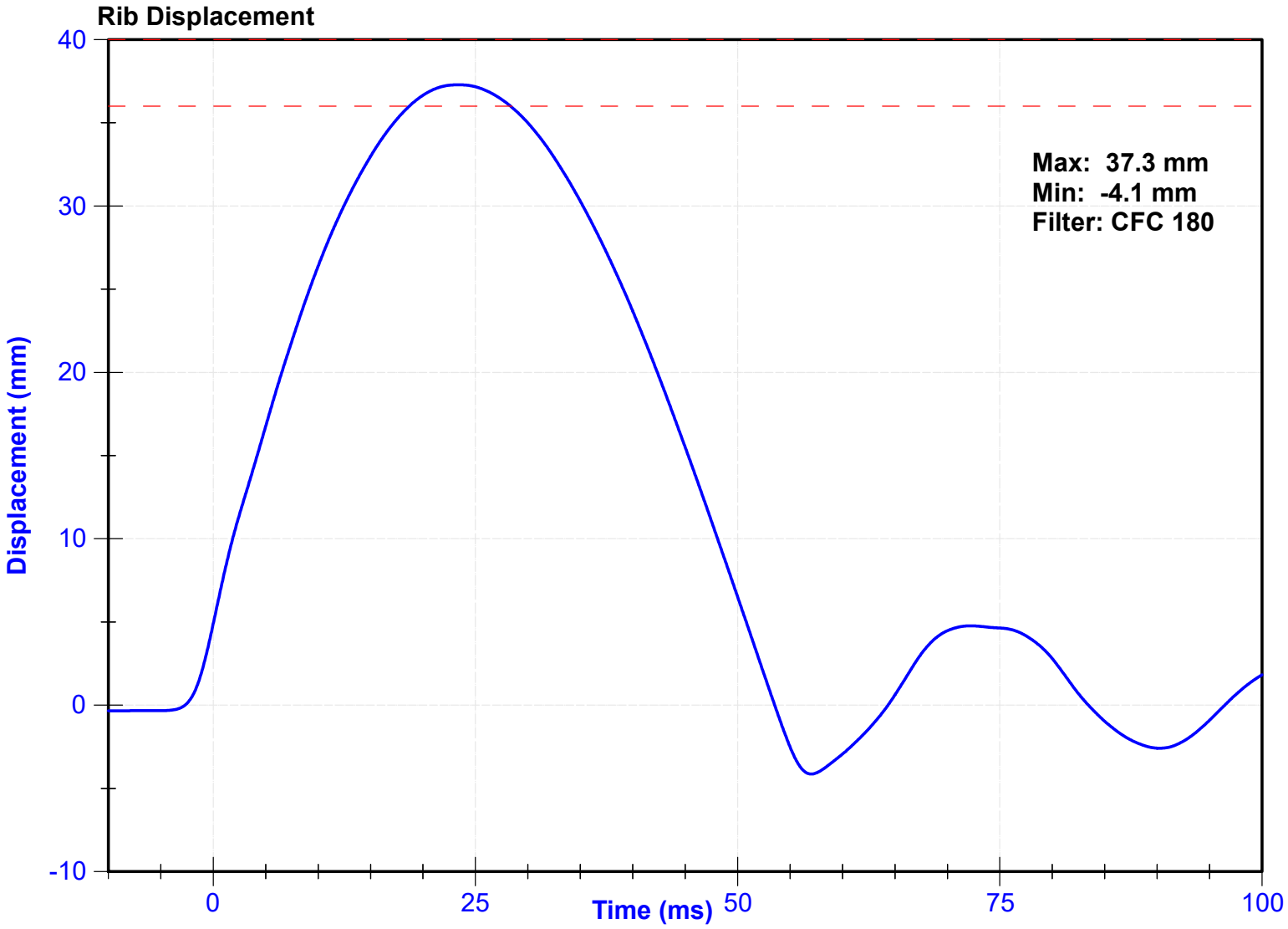
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18.0	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	11/17/2023	5/17/2024



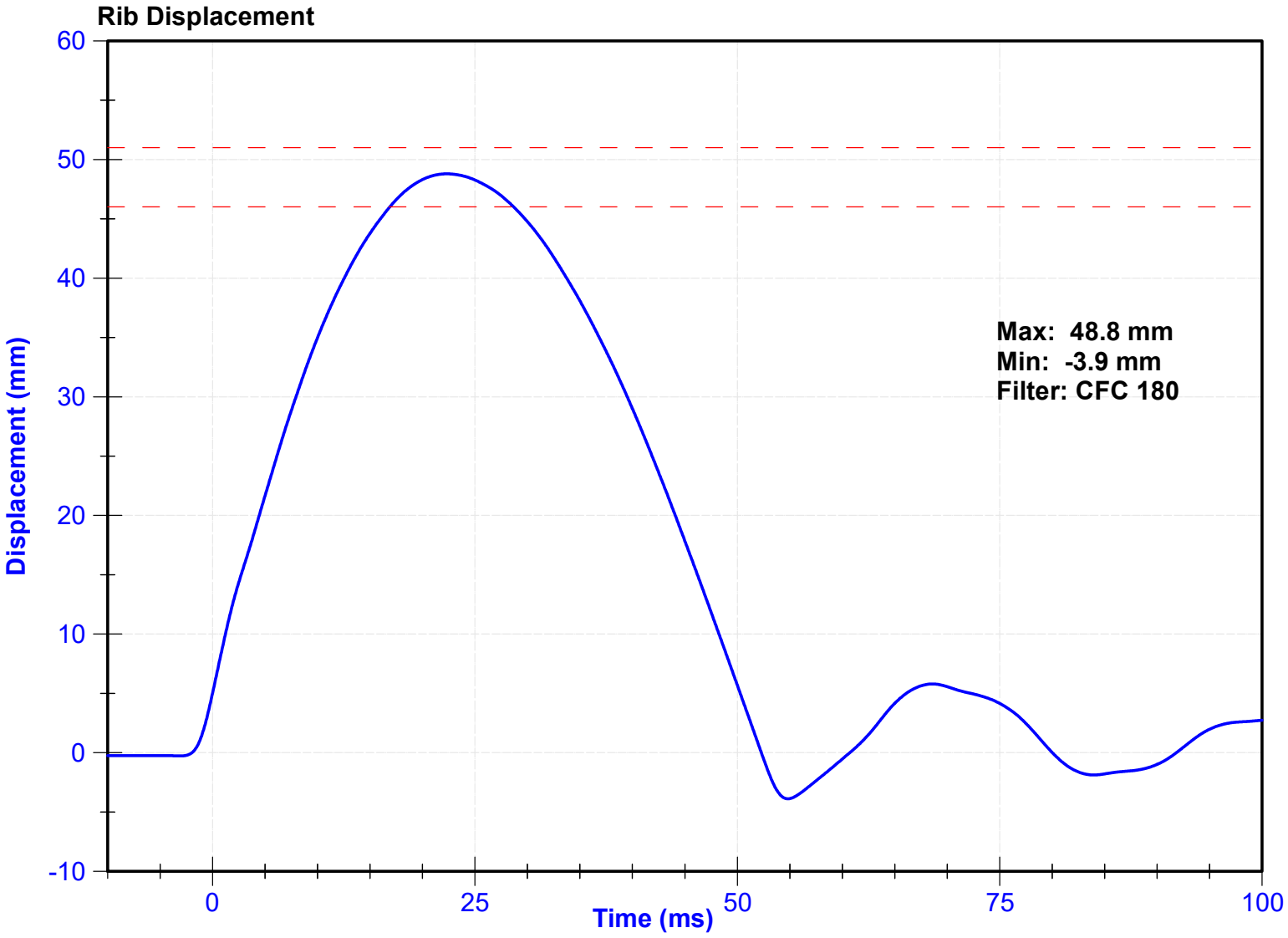
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18.0	Pass
Rib Displacement	46	51	mm	48.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	11/17/2023	5/17/2024



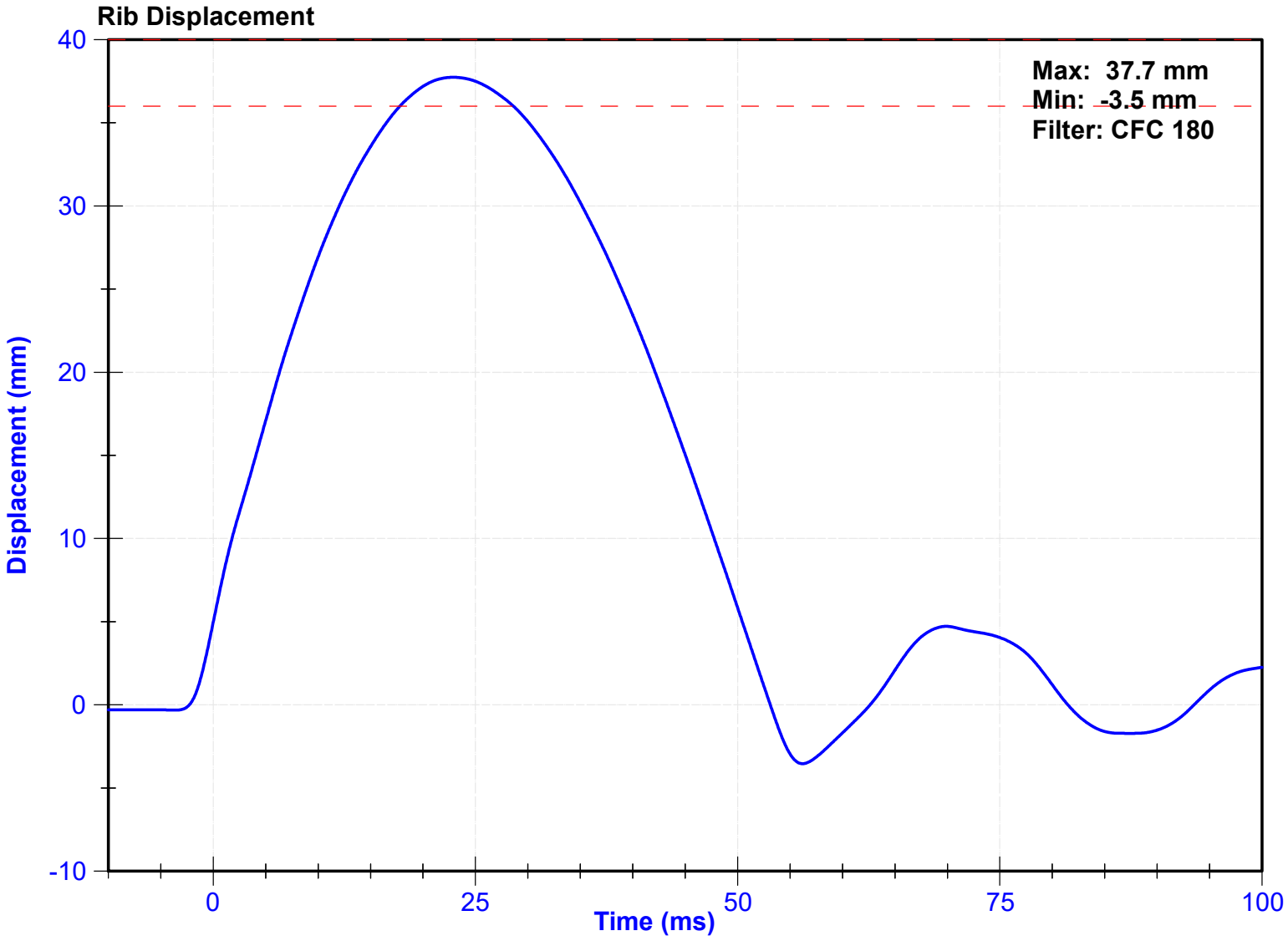
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18.0	Pass
Rib Displacement	36	40	mm	37.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	11/17/2023	5/17/2024



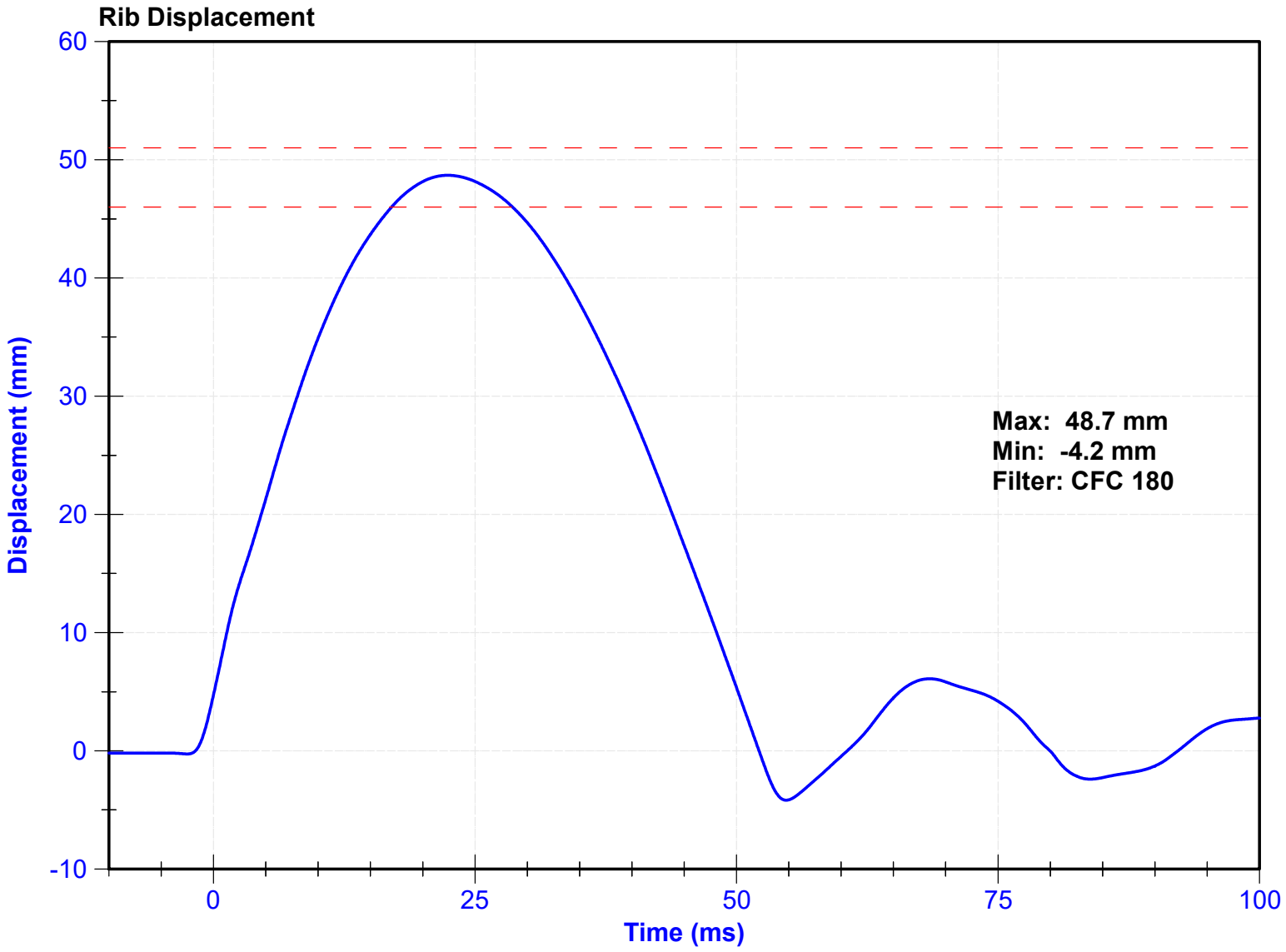
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18.0	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	11/17/2023	5/17/2024



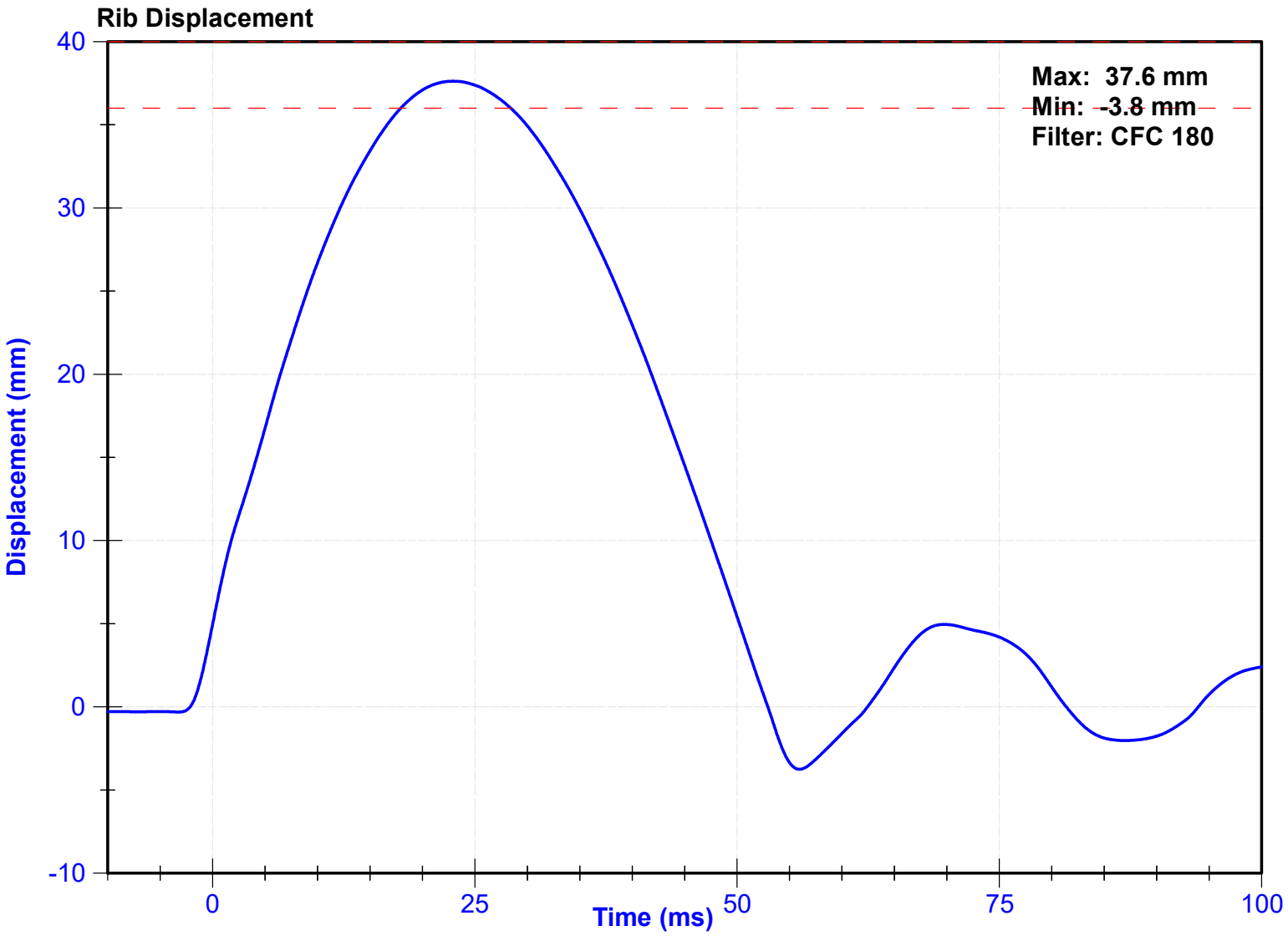
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantel

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18.0	Pass
Rib Displacement	36	40	mm	37.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	11/17/2023	5/17/2024



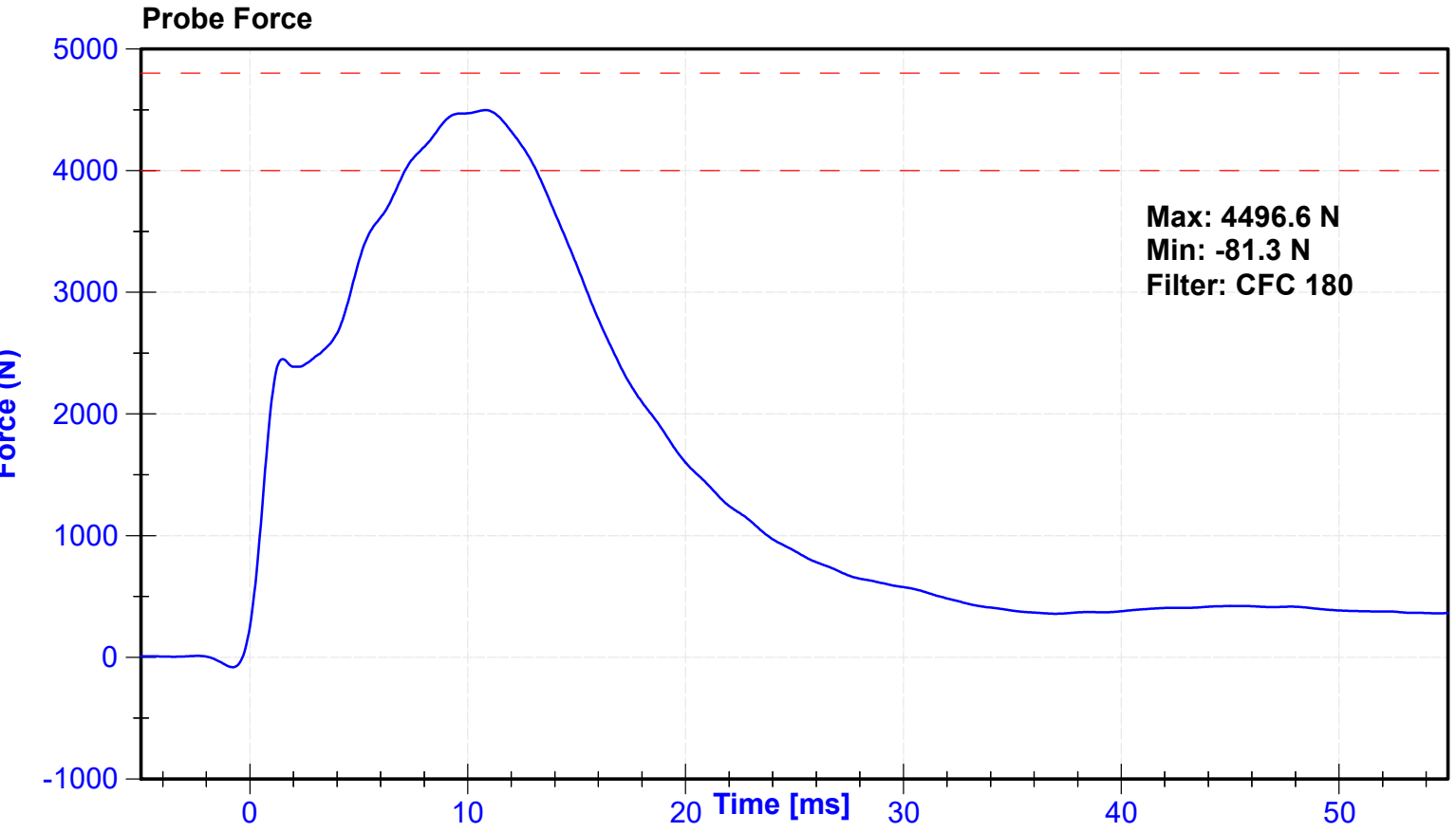
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

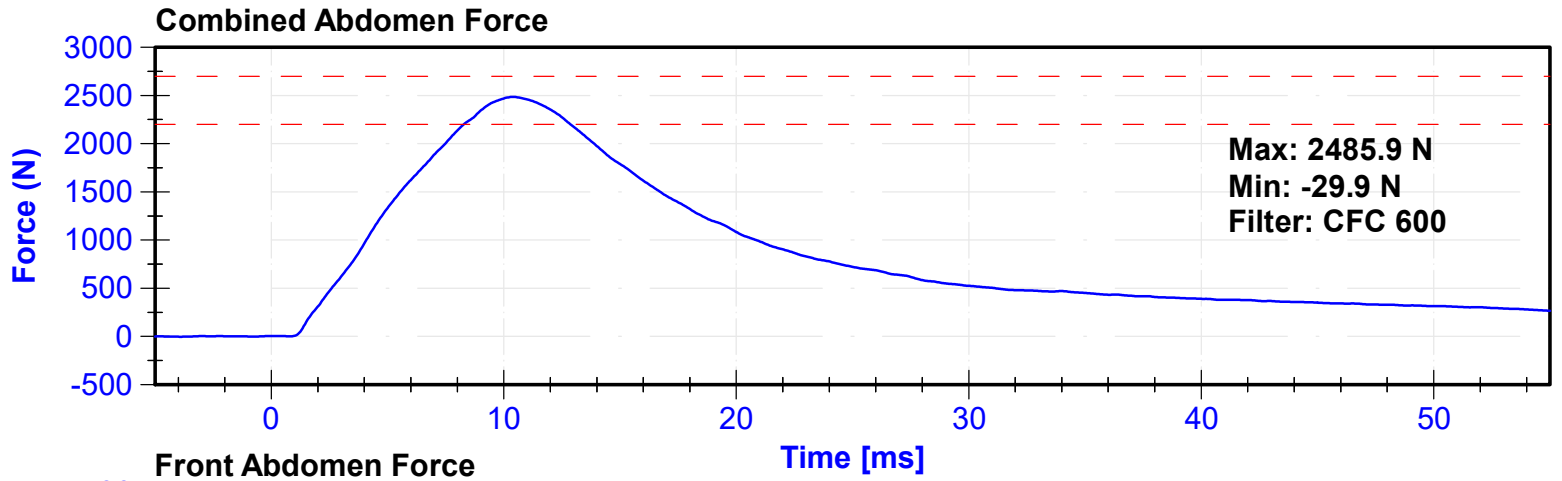
Results

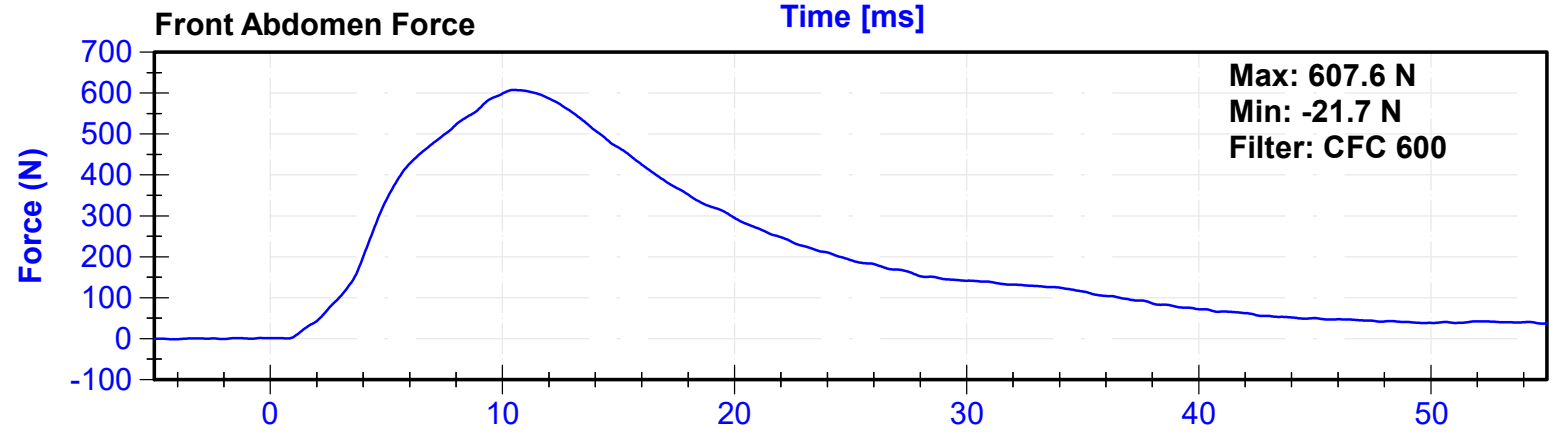
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	3.9	4.1	m/s	4.03	Pass
Combined Abdomen Force	2200	2700	N	2485.9	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.40	Pass
Resistive Probe Force	4000	4800	N	4496.6	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.80	Pass

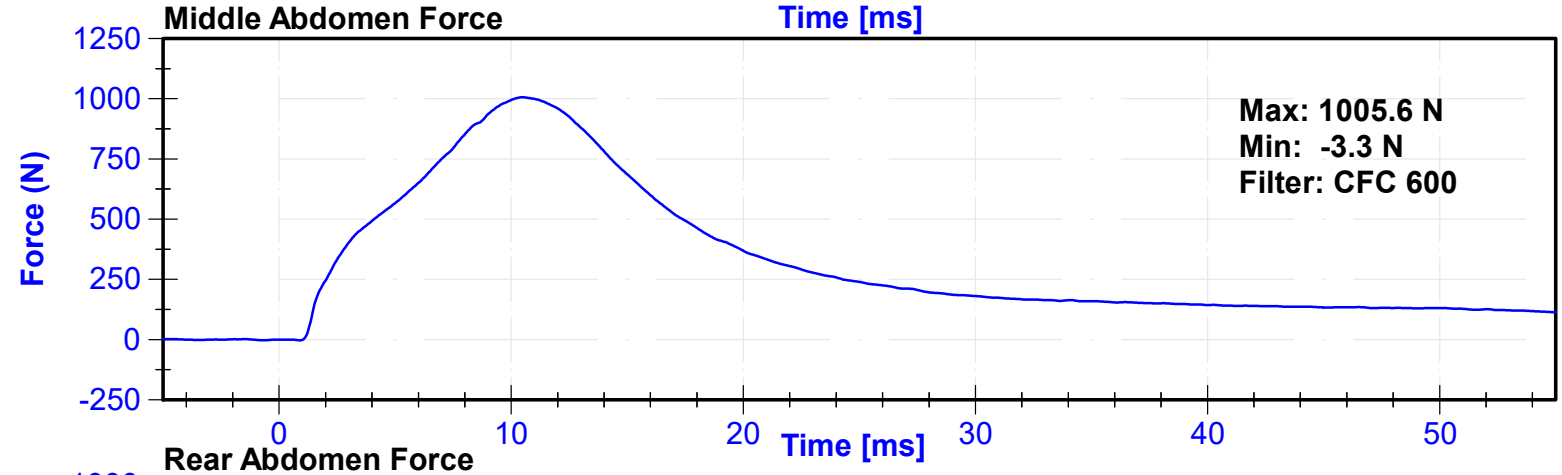
Transducer Calibrations

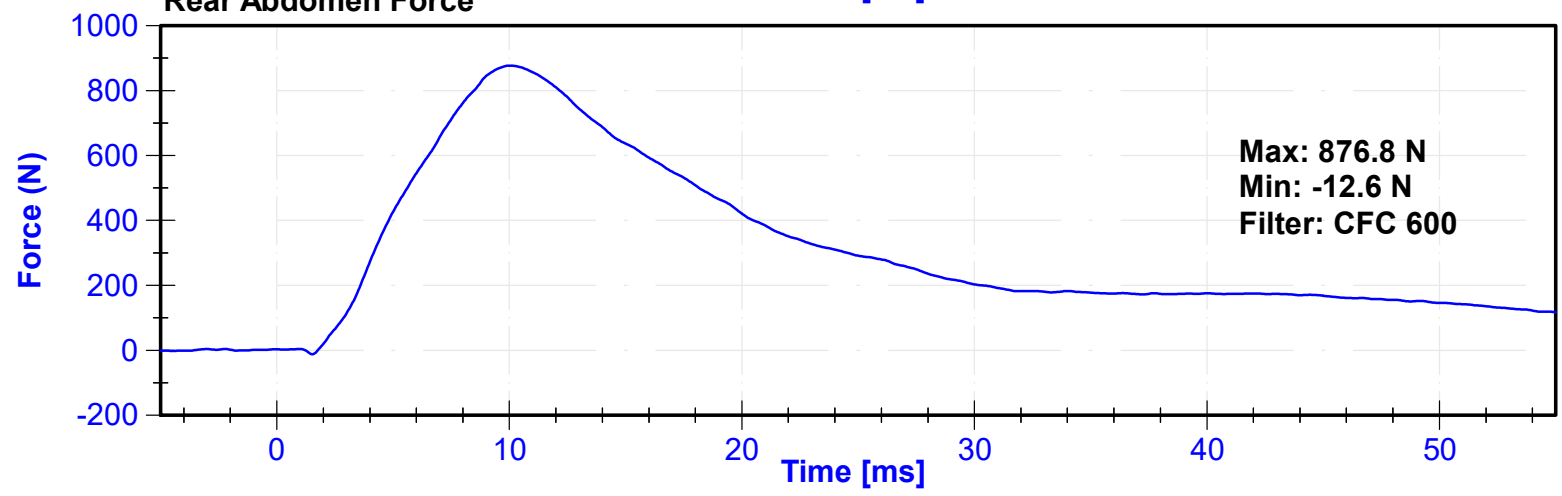
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Front Abdomen Load Cell	Denton	DM5846	5/18/2023	5/17/2024
Middle Abdomen Load Cell	Denton	1529	5/18/2023	5/17/2024
Rear Abdomen Load Cell	Denton	1533	5/18/2023	5/17/2024




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2485.9 N
Min: -29.9 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 607.6 N
Min: -21.7 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1005.6 N
Min: -3.3 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 876.8 N
Min: -12.6 N
Filter: CFC 600

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

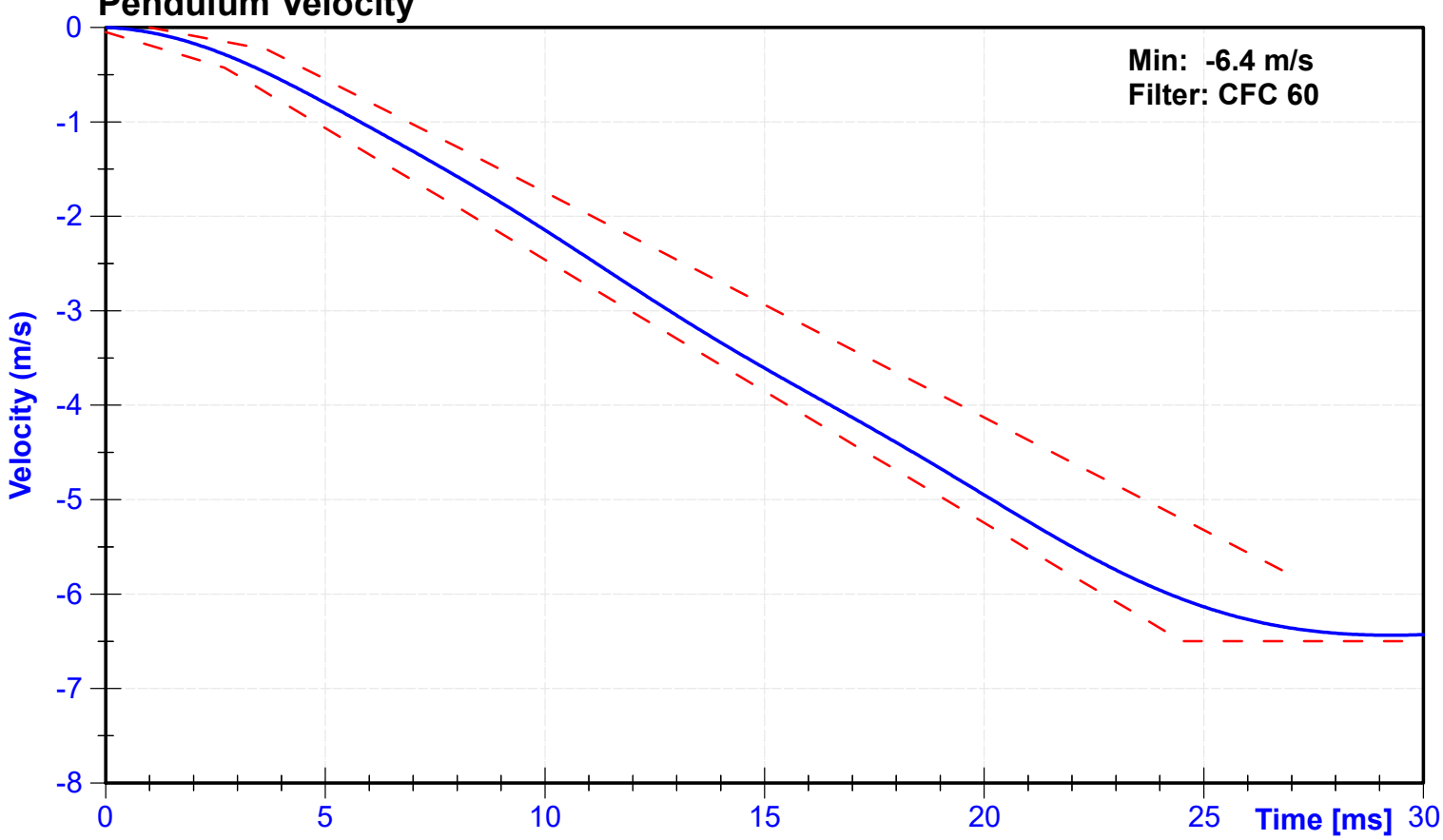
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	5.95	6.15	m/s	6.042	Pass
Lateral Spine Rotation	45	55	deg	54.1	Pass
Time at Maximum Rotation	39	53	ms	45.1	Pass
Time of Decay to Zero Degrees	37	57	ms	38.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

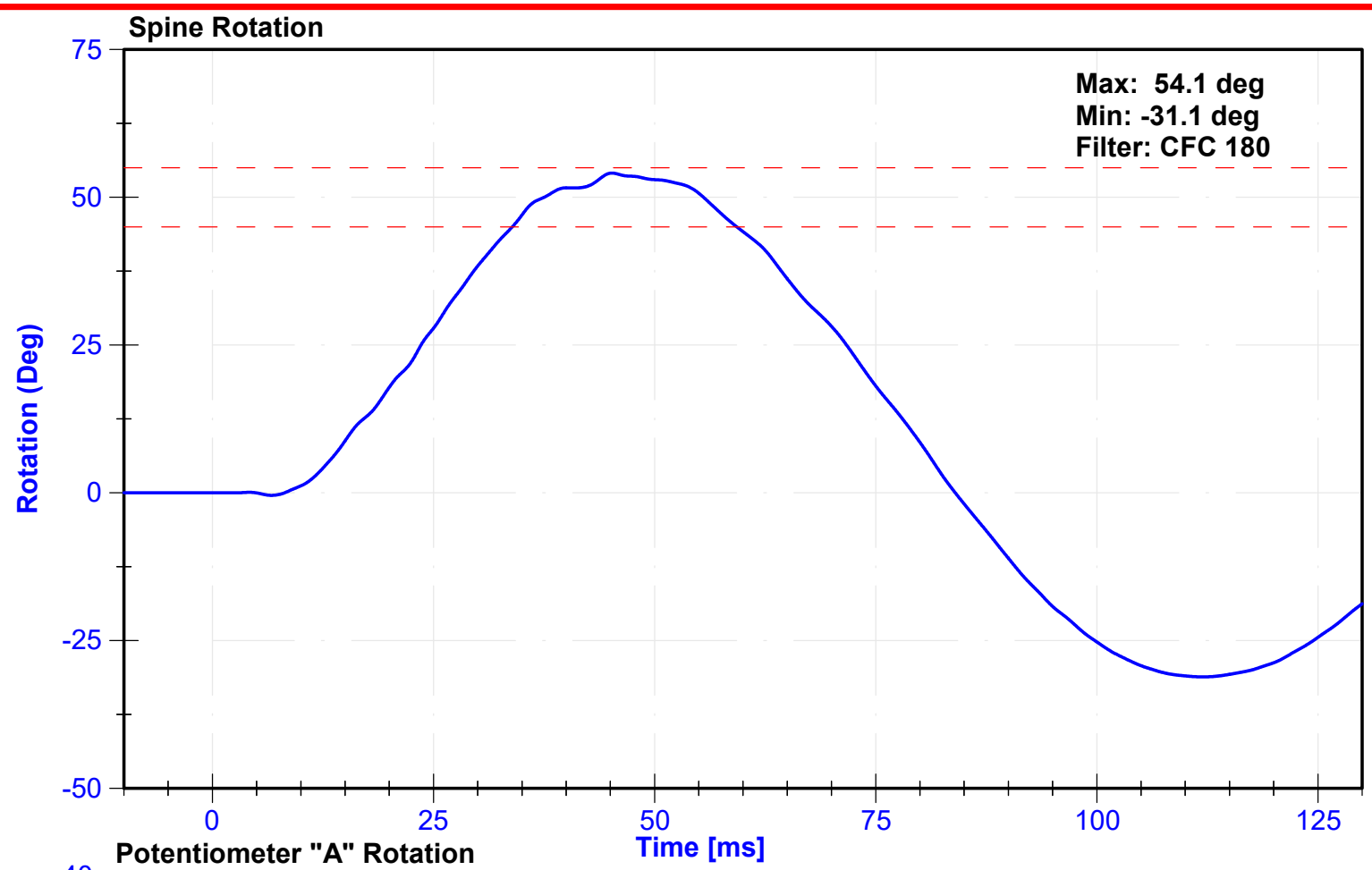
Transducer Calibrations

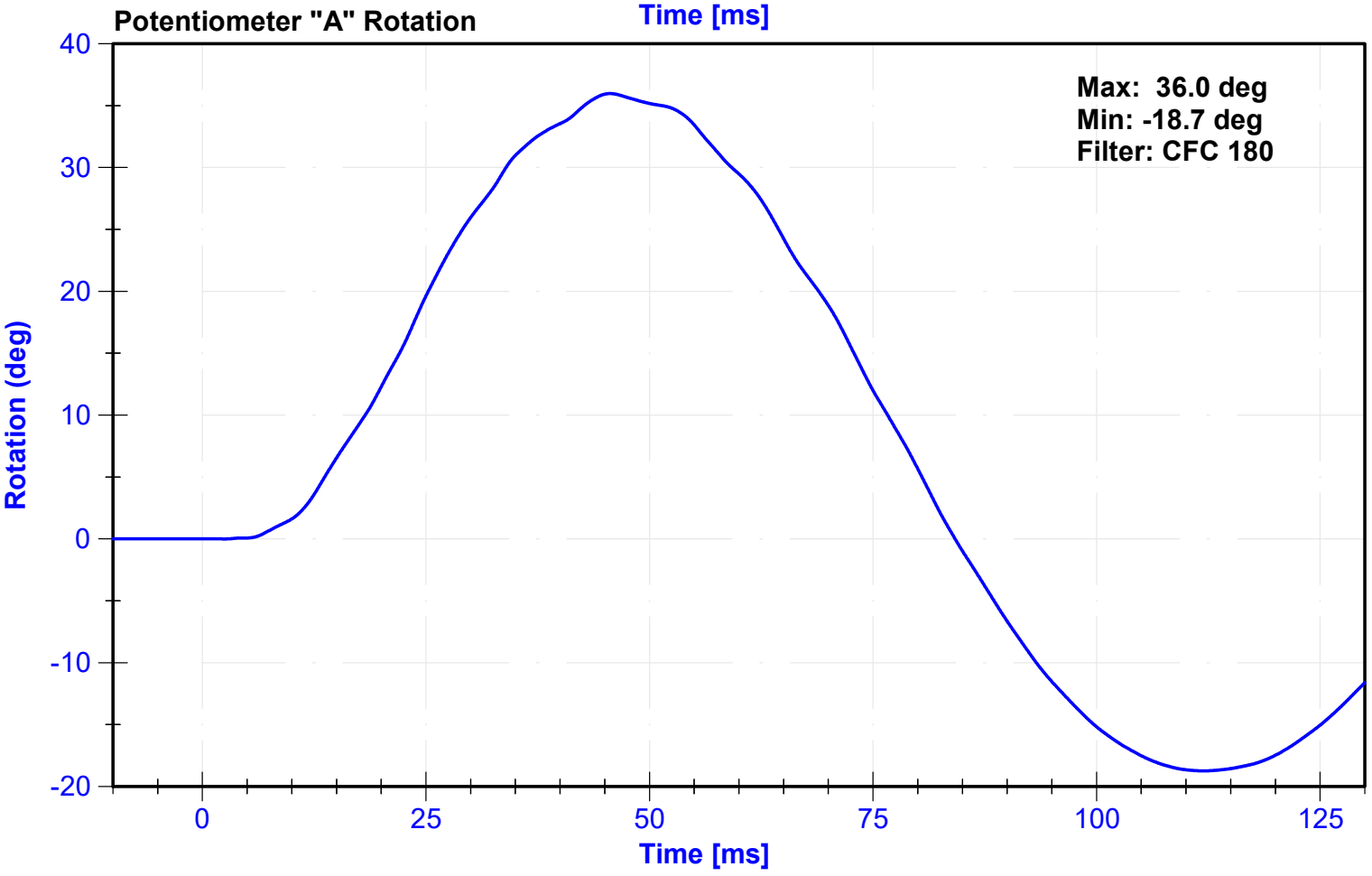
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024

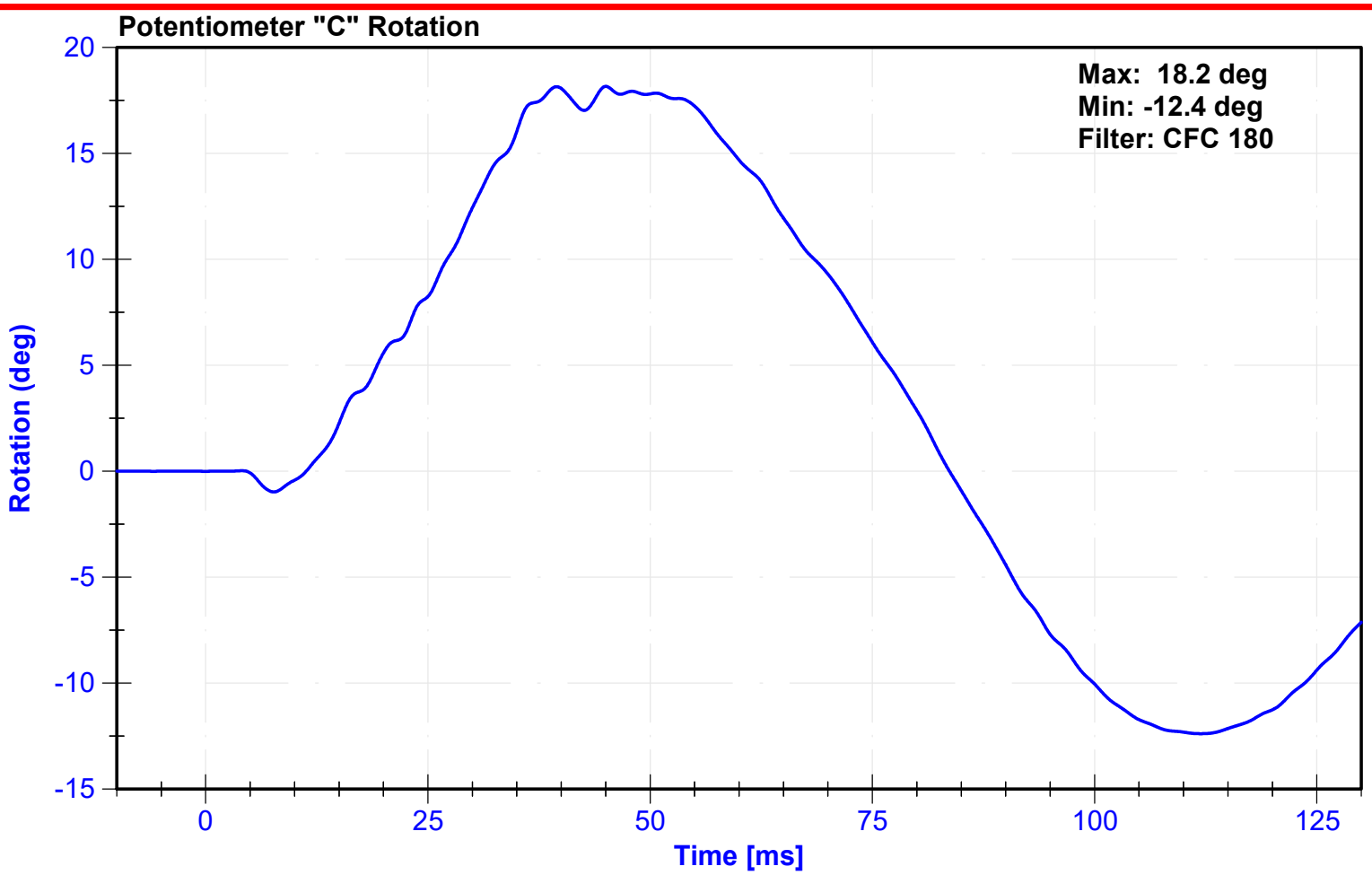
Pendulum Velocity[3]



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


Spine Rotation
Max: 54.1 deg
Min: -31.1 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 36.0 deg
Min: -18.7 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

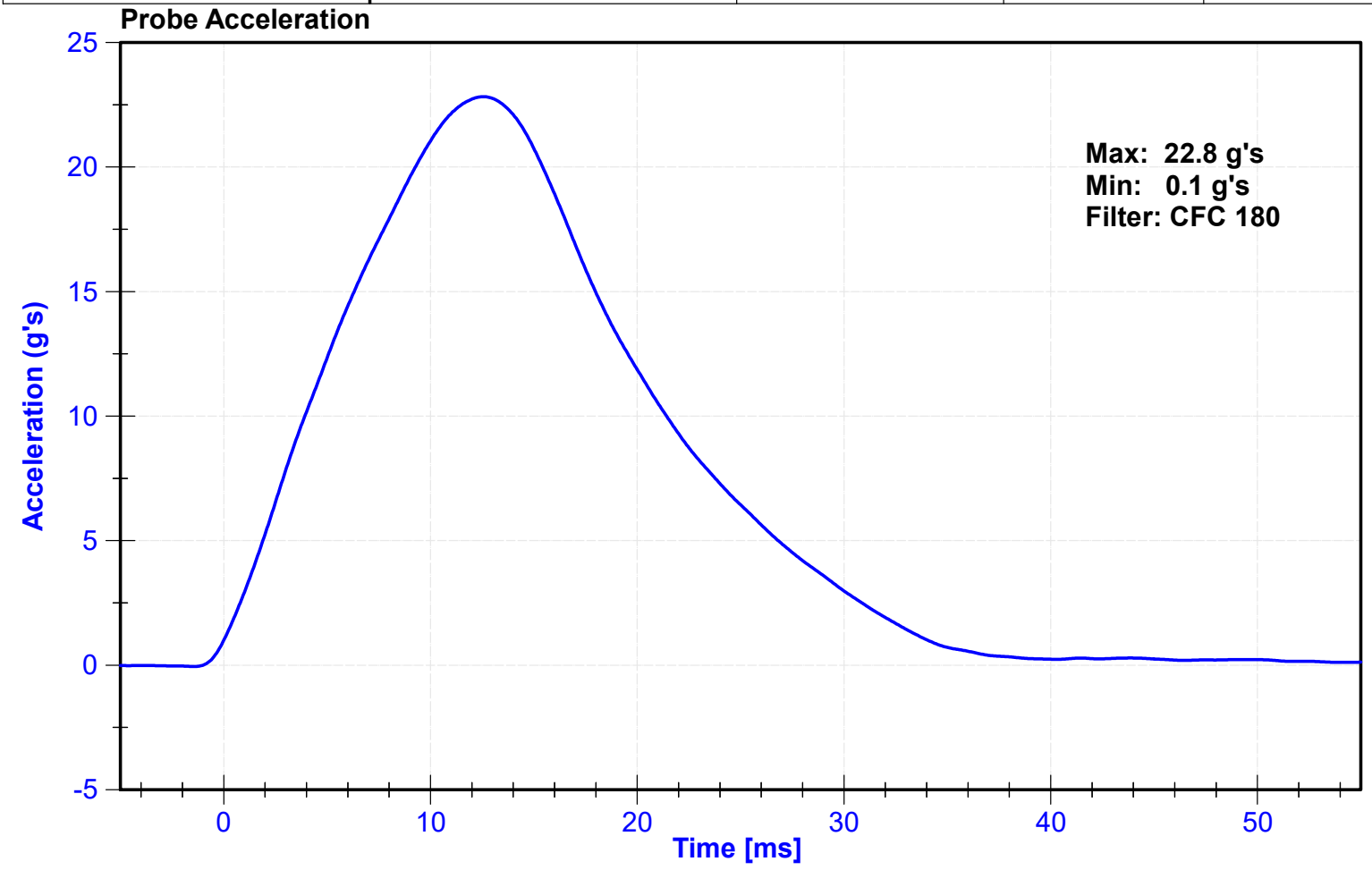
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

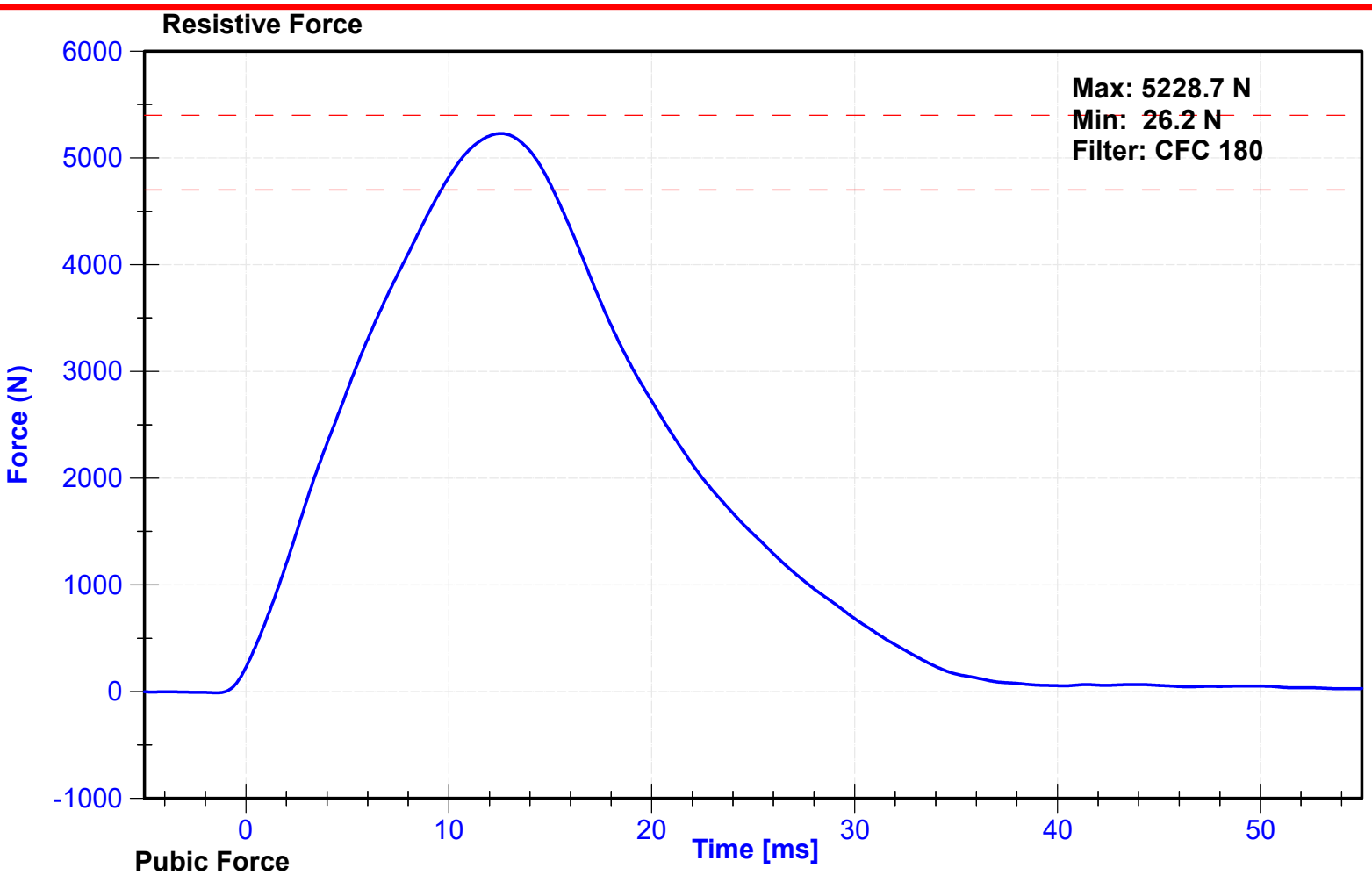
Results

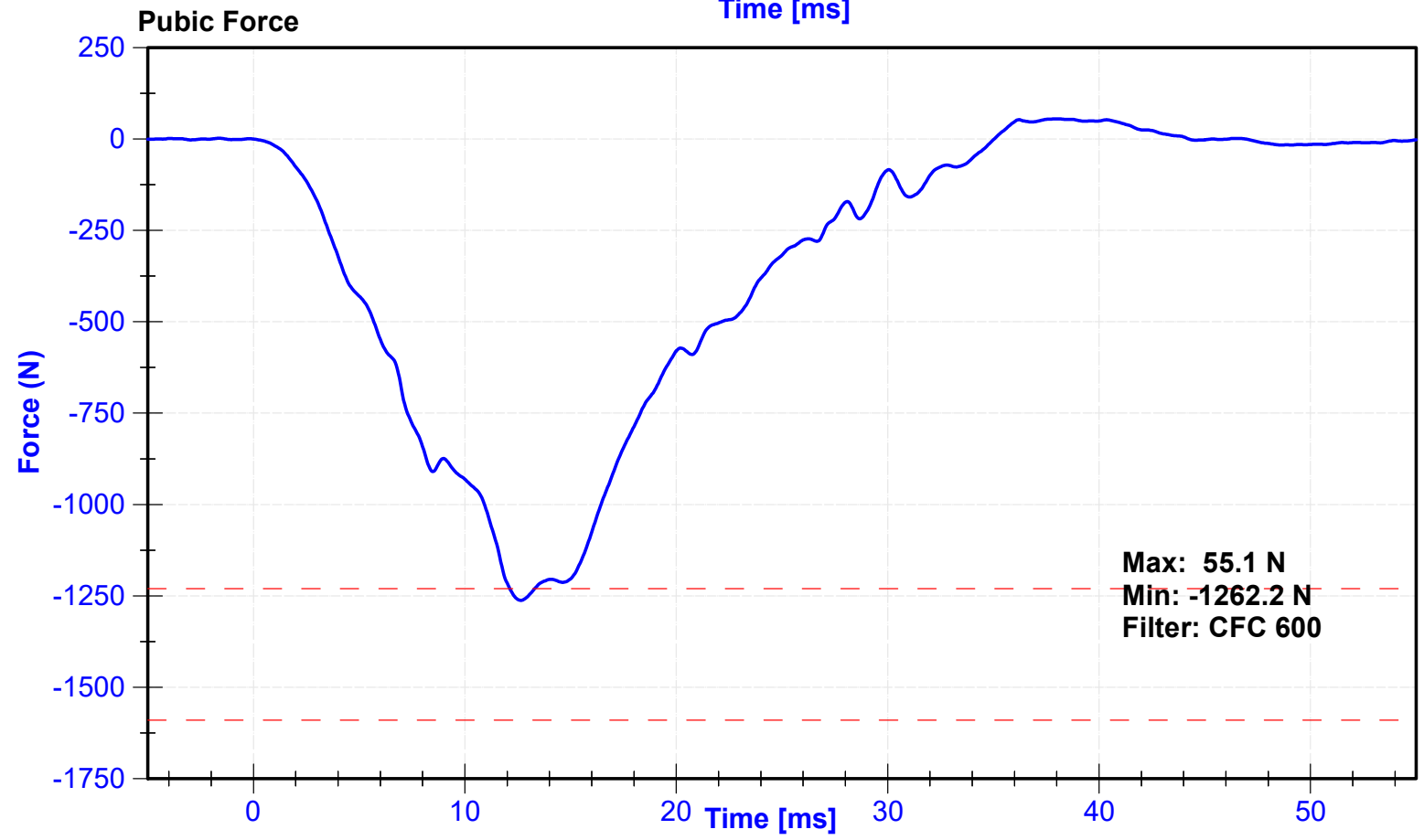
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	27	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Resistive Force	4700	5400	N	5228.7	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.55	Pass
Pubic Force	-1590	-1230	N	-1262.2	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.65	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Pubic Load Cell	Denton	459-FY	6/20/2023	6/19/2024




Resistive Force
Max: 5228.7 N
Min: 26.2 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: 55.1 N
Min: -1262.2 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

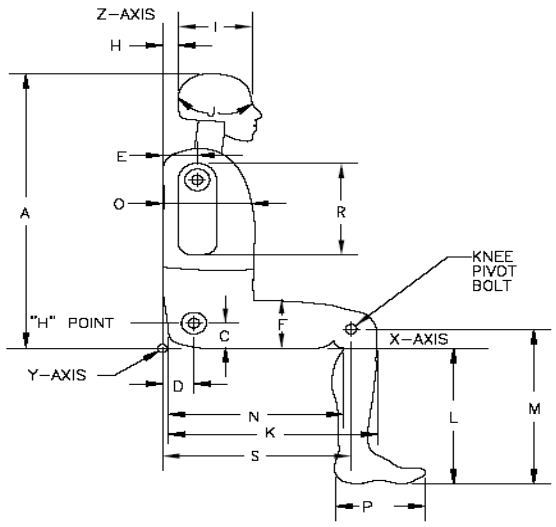
SERIAL NO:300

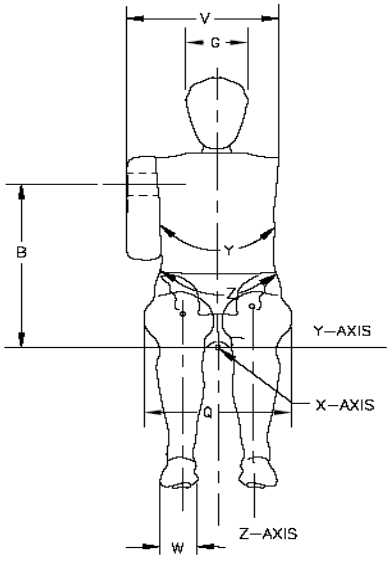
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 2/22/2024

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	100	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	181	Pass
J	Head Circumference	541	551	549	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	434	Pass
O	Chest Depth w/o jacket	195	211	199	Pass
P	Foot Length	216	232	223	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	488	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	86	Pass
Y	Chest Circumference w/jacket	851	881	877	Pass
Z	Waist Circumference	761	791	780	Pass

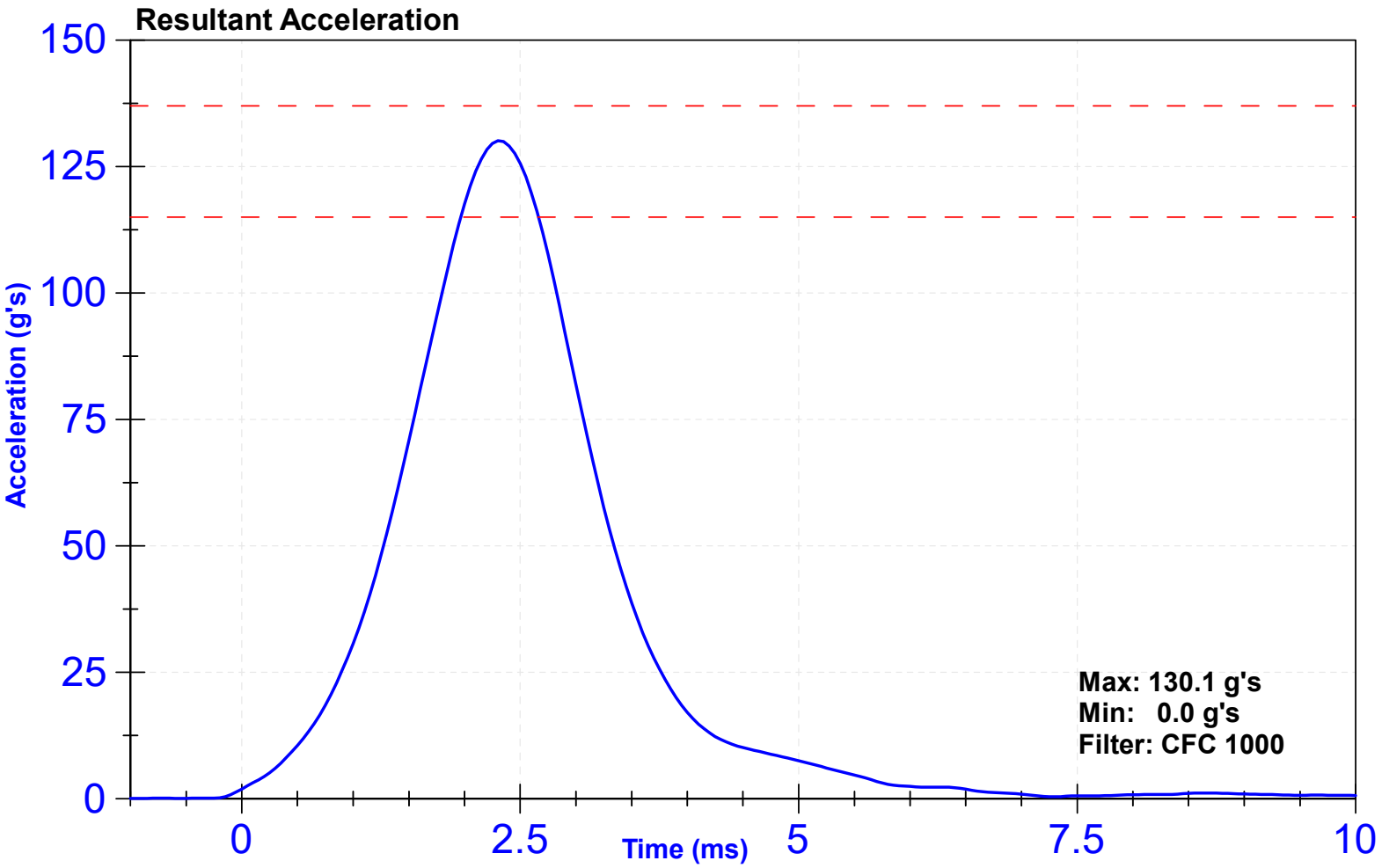
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

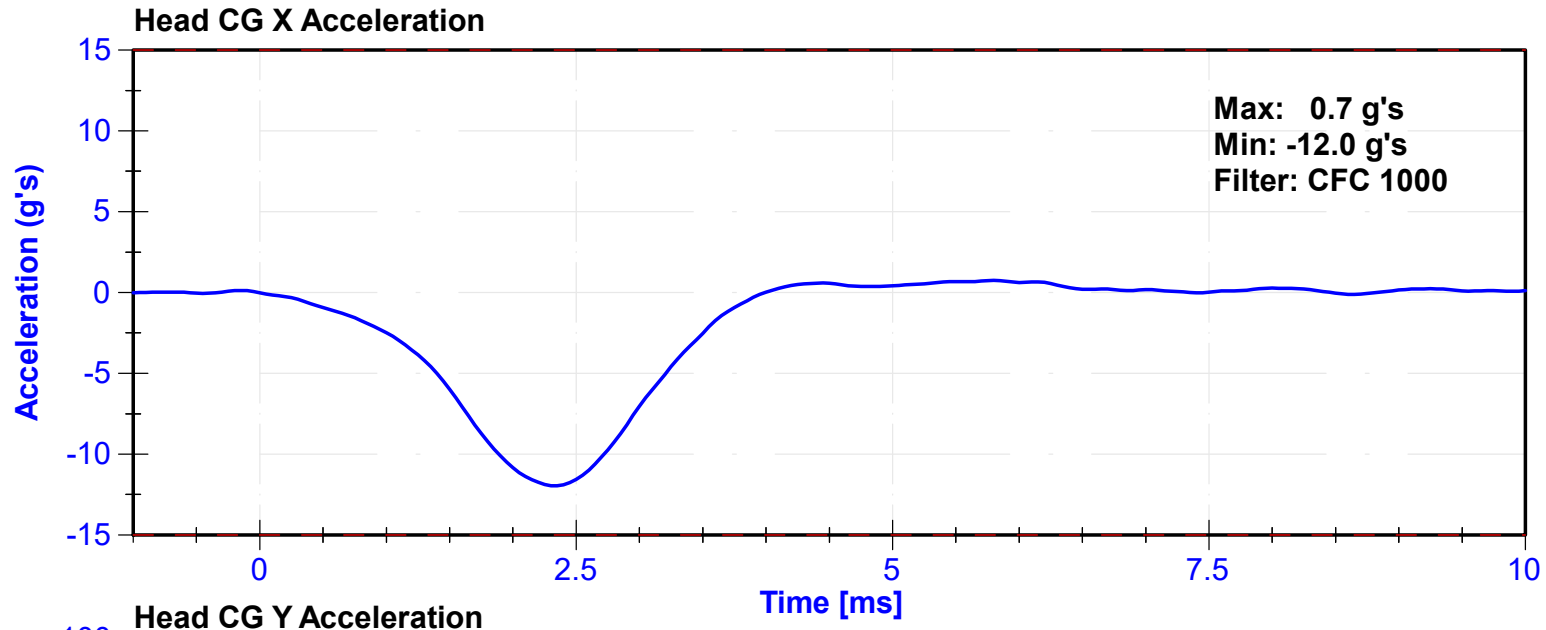
Results

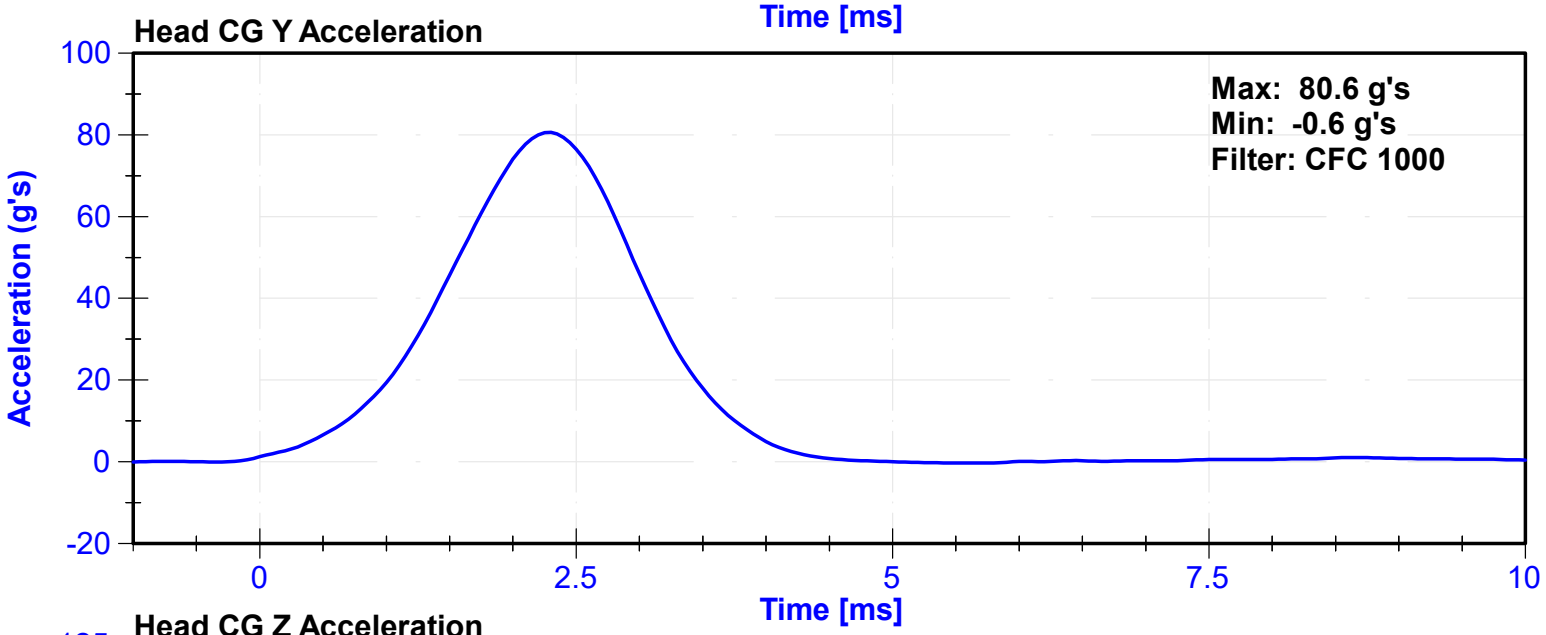
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	18	Pass
Resultant Acceleration	115	137	g's	130.1	Pass
Oscillation	0	15	%	1.7	Pass
Fore-Aft Acceleration	-15	15	g's	-12.0	Pass

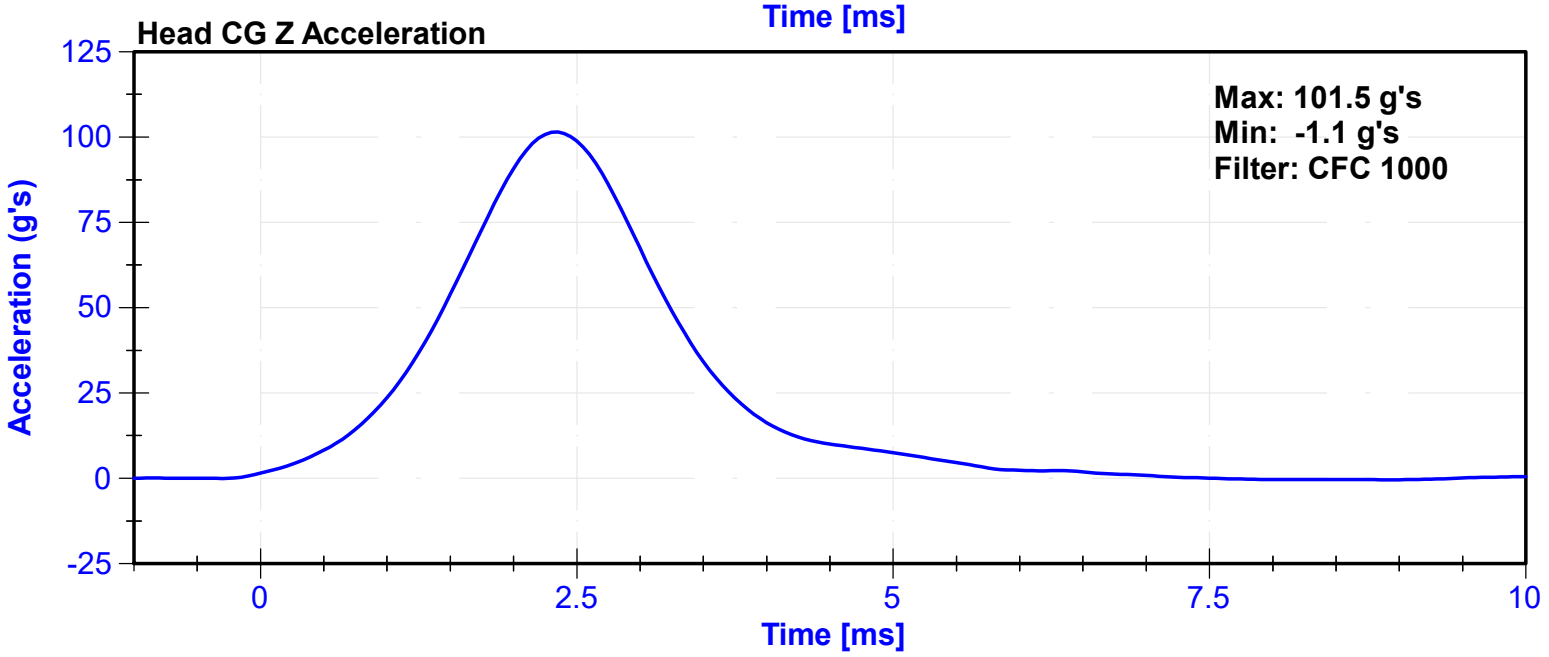
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	11/15/2023	5/13/2024
Y Accelerometer	Endevco	P79189	11/15/2023	5/13/2024
Z Accelerometer	Endevco	P79587	11/15/2023	5/13/2024




Head CG X Acceleration
Max: 0.7 g's
Min: -12.0 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: 80.6 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 101.5 g's
Min: -1.1 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]

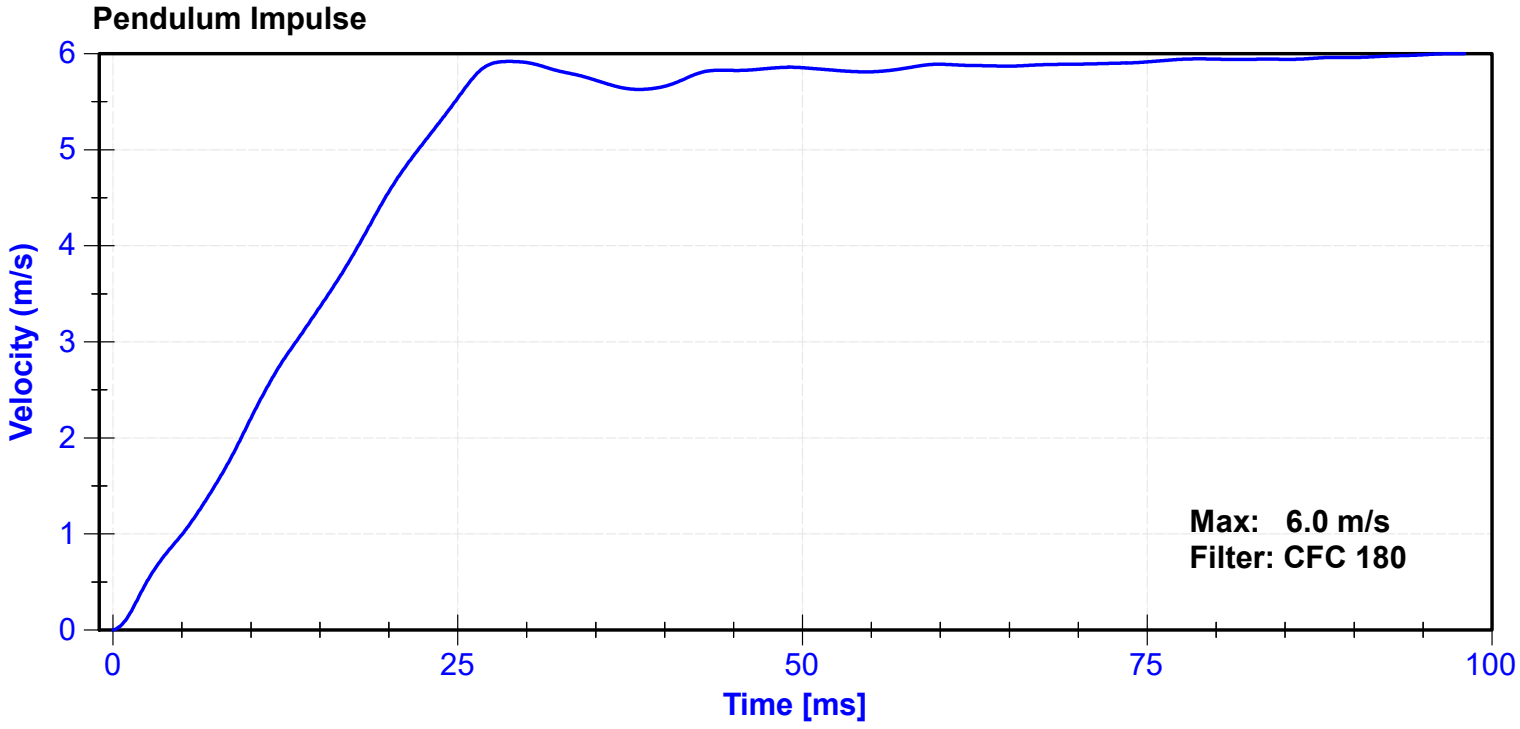
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

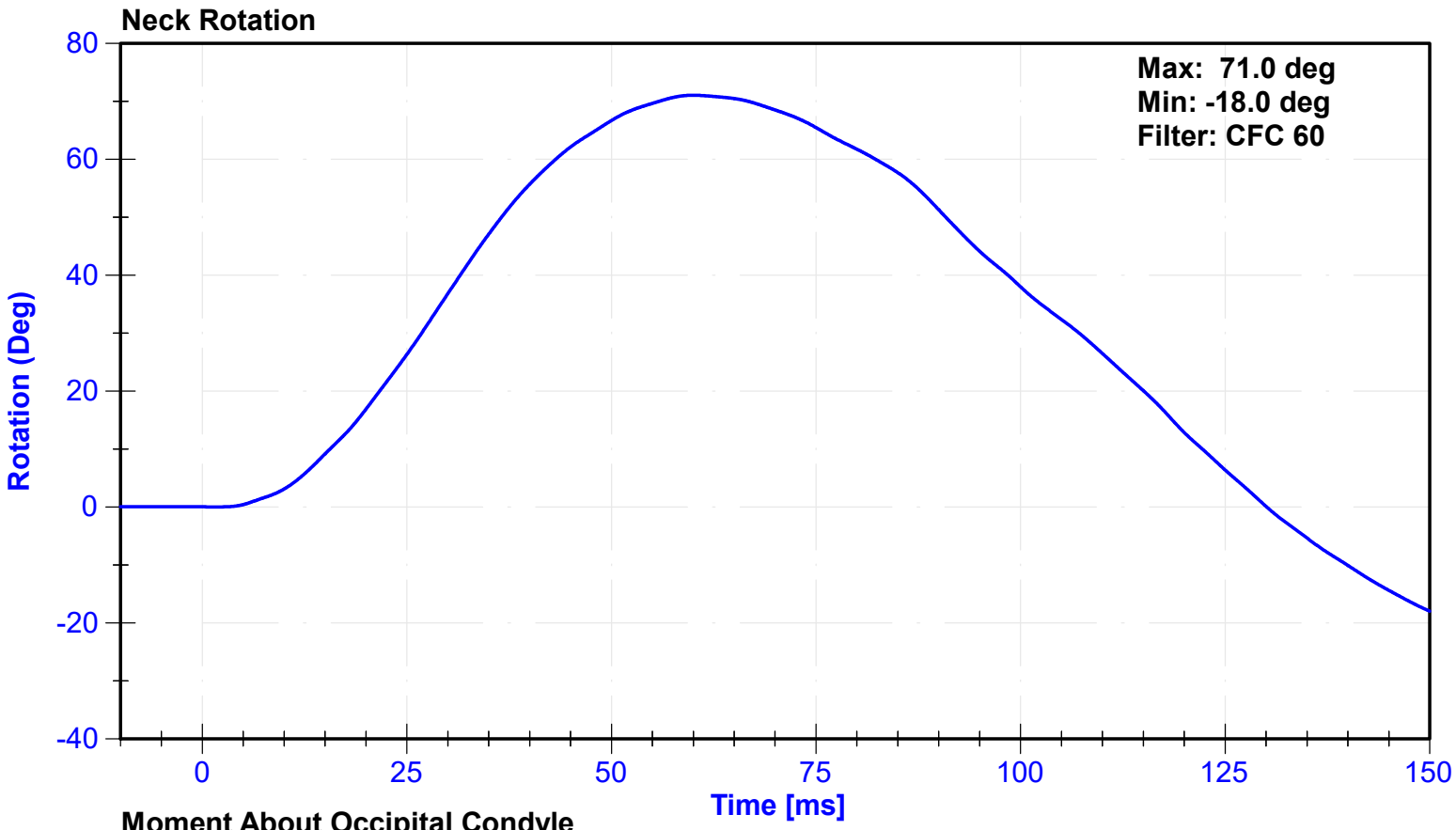
Results

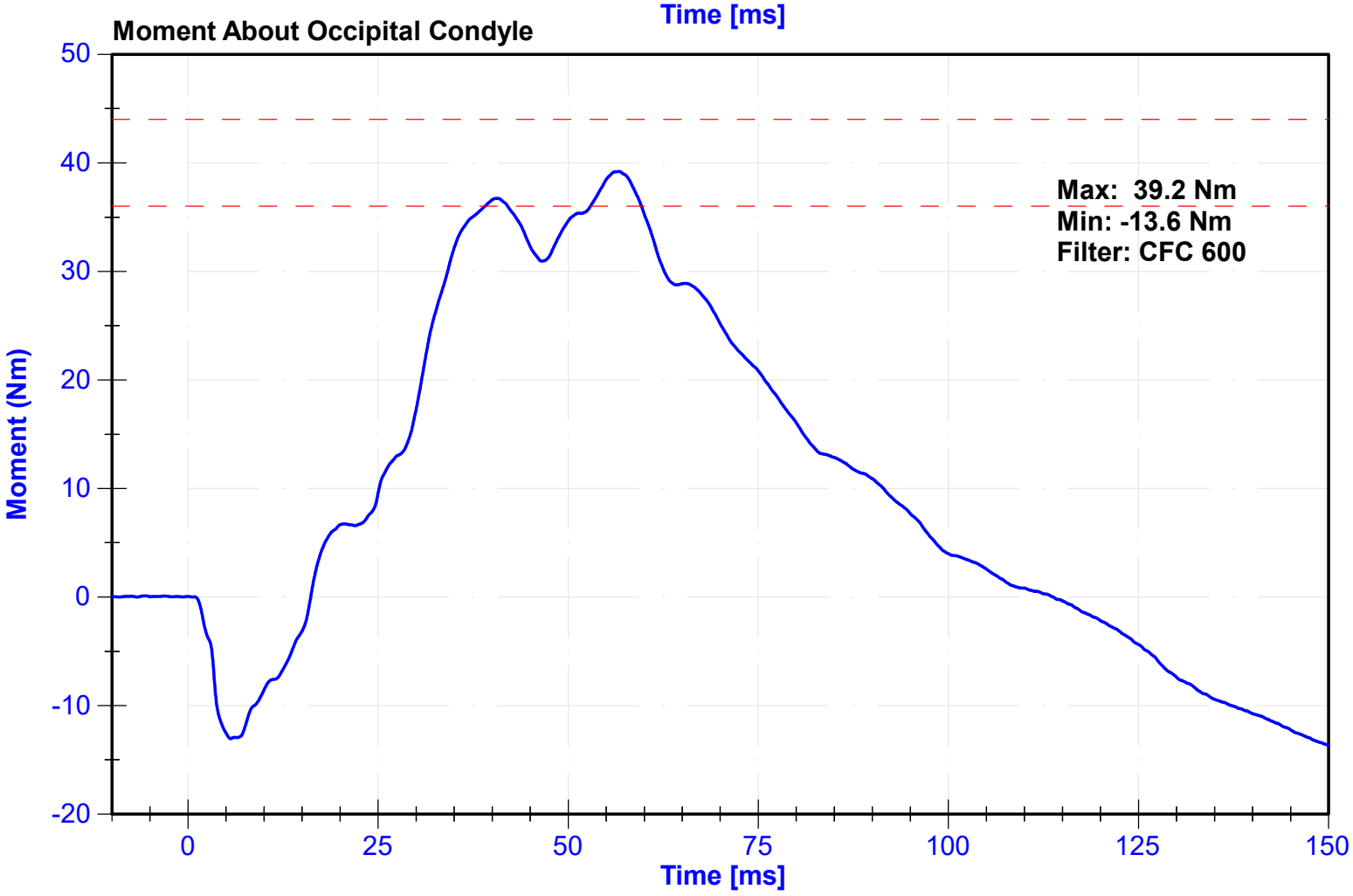
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	30	Pass
Velocity	5.51	5.63	m/s	5.533	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.20	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.36	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.56	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.54	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.00	Pass
Neck Rotation	71	81	deg	71.0	Pass
Time at Maximum Rotation	50	70	ms	60.0	Pass
Moment about the OC	36	44	Nm	39.2	Pass
Moment Decay to 0 Nm	102	126	ms	113.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/31/2023	4/28/2024
Pendulum Potentiometer	Servo	4961	10/2/2023	10/1/2024
Condyle Potentiometer	Servo	DS185	10/2/2023	10/1/2024
Upper Neck Load Cell	Denton	1716ATF_2184-FY	5/18/2023	5/17/2024




Neck Rotation
Max: 71.0 deg
Min: -18.0 deg
Filter: CFC 60
Rotation (Deg)
80
60
40
20
0
-20
-40
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 39.2 Nm
Min: -13.6 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

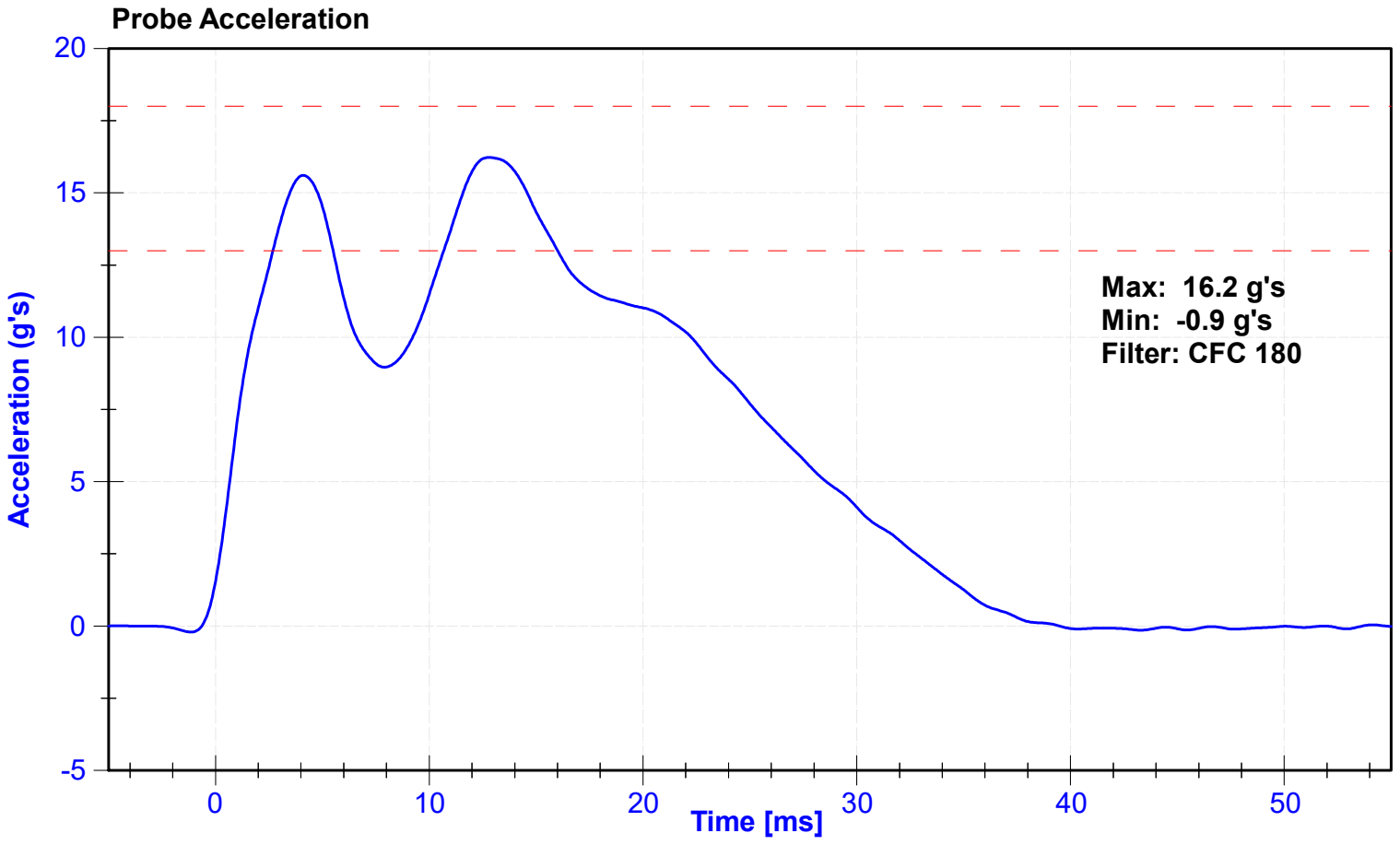
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

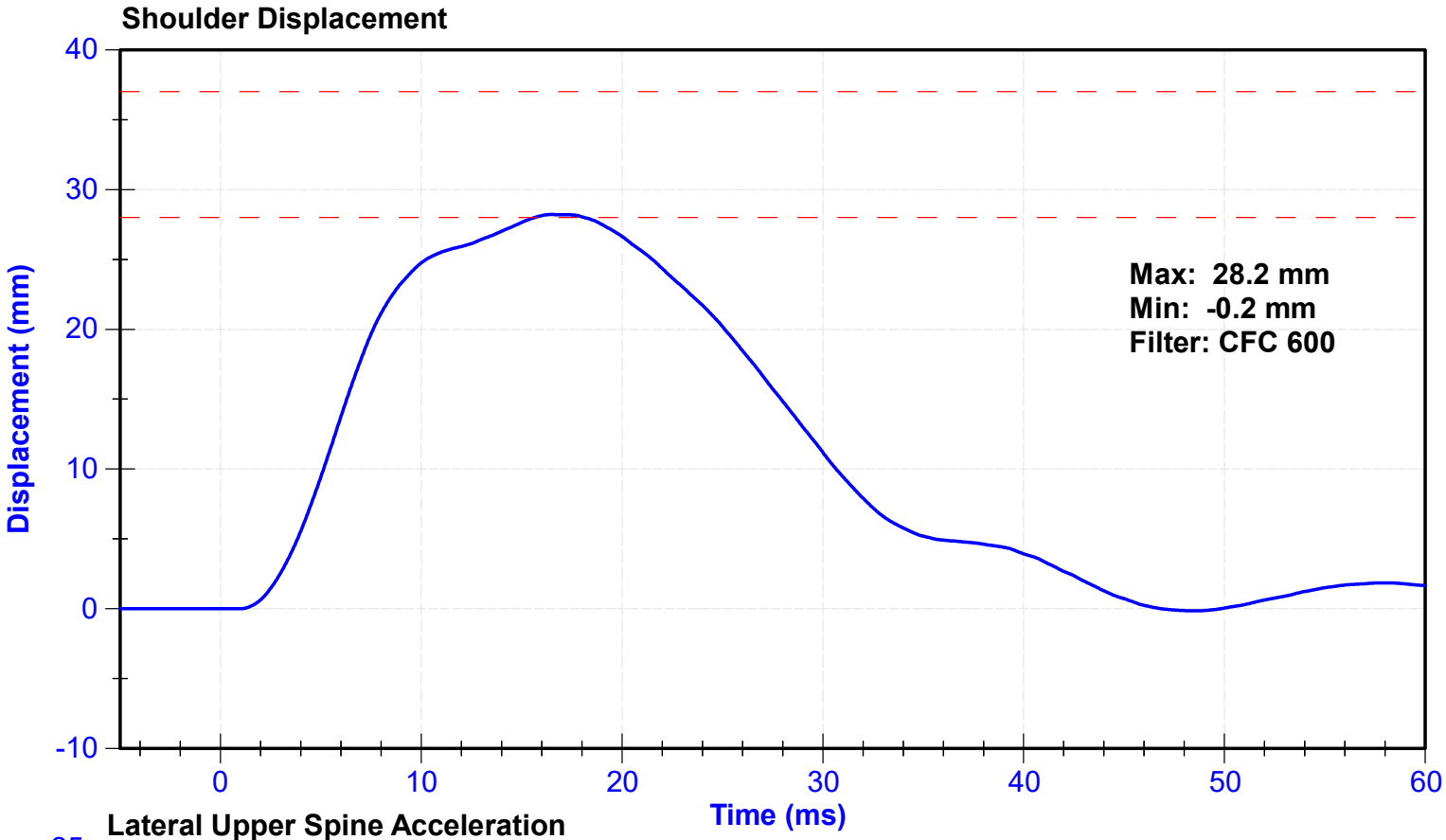
Results

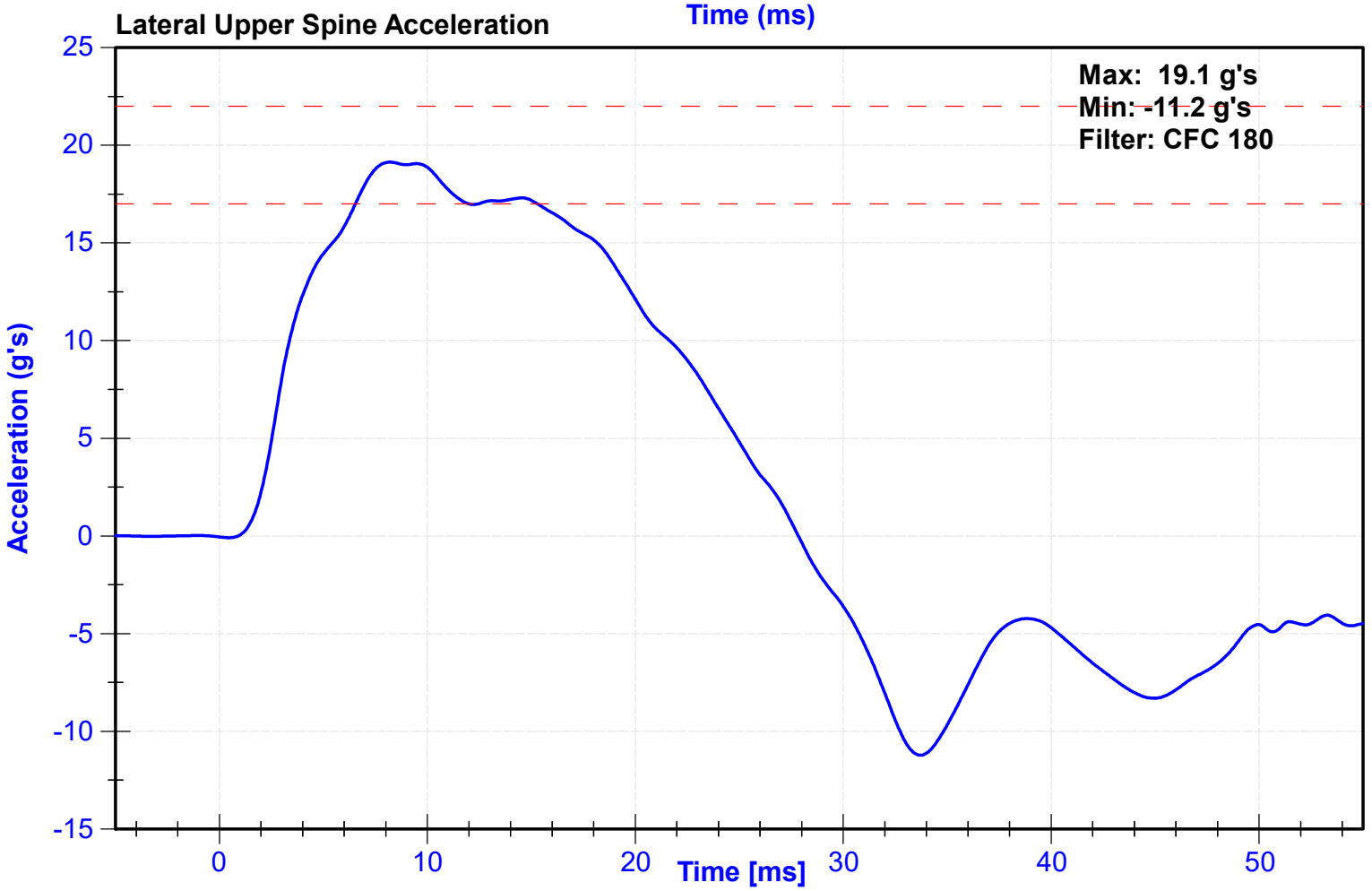
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	16.2	Pass
Shoulder Deflection	28	37	mm	28.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Shoulder Potentiometer	Servo	053GFE	11/17/2023	5/17/2024
Upper Spine Y Accelerometer	Endevco	T20880	11/16/2023	5/14/2024




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.2 mm
Min: -0.2 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.1 g's
Min: -11.2 g's
Filter: CFC 180

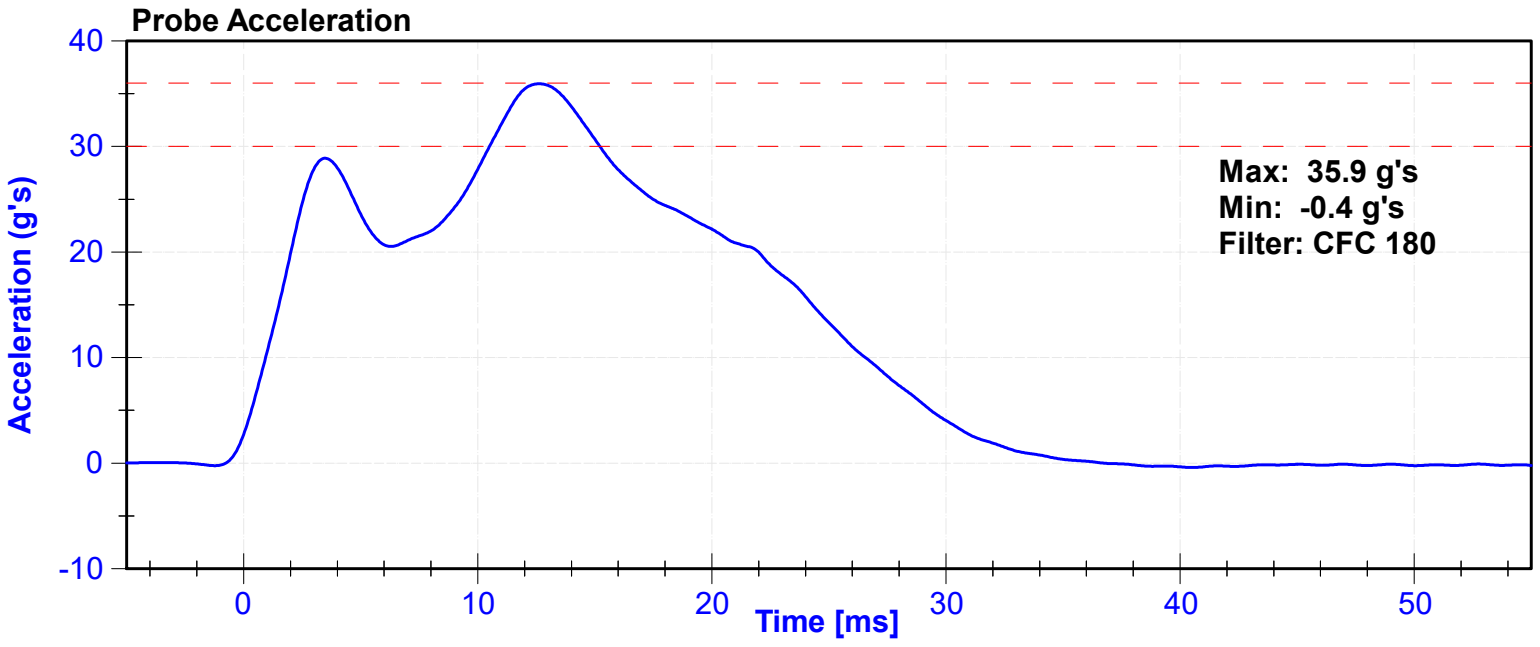
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

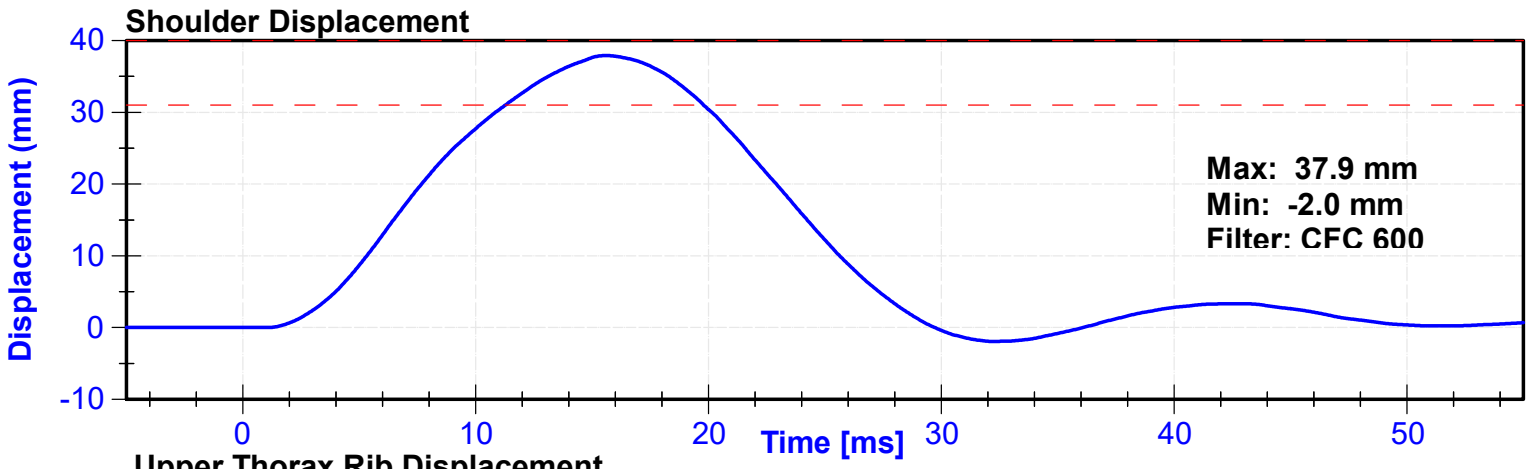
Results

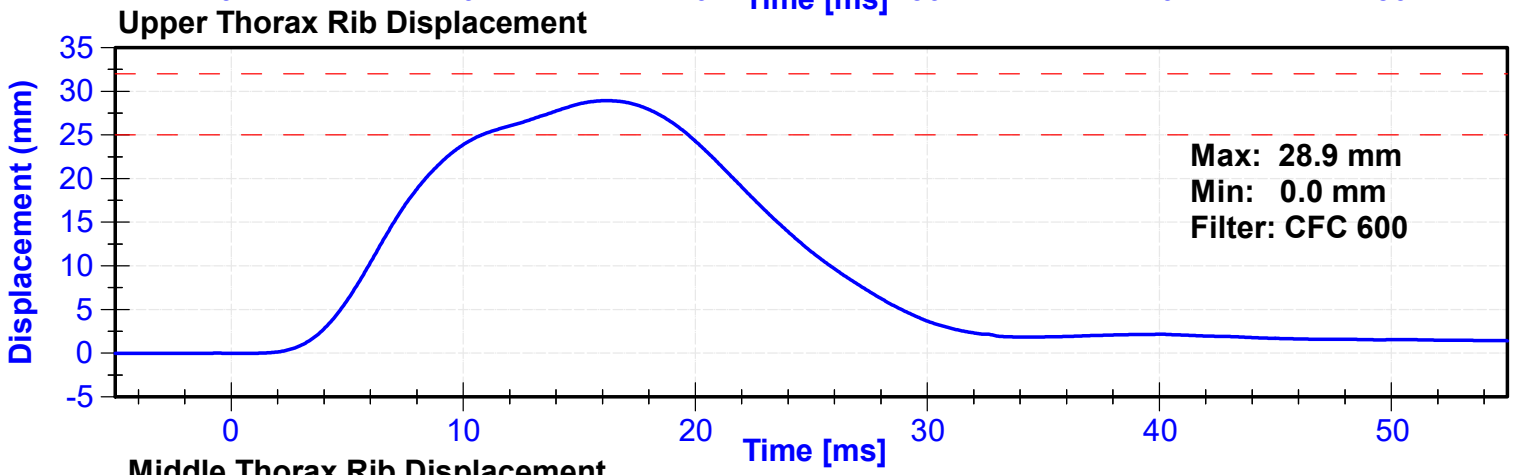
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration after 5 ms	30	36	g's	35.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.6	Pass
Shoulder Deflection	31	40	mm	37.9	Pass
Upper Thorax Rib Deflection	25	32	mm	28.9	Pass
Mid Thorax Rib Deflection	30	36	mm	30.0	Pass
Lower Thorax Rib Deflection	32	38	mm	32.1	Pass

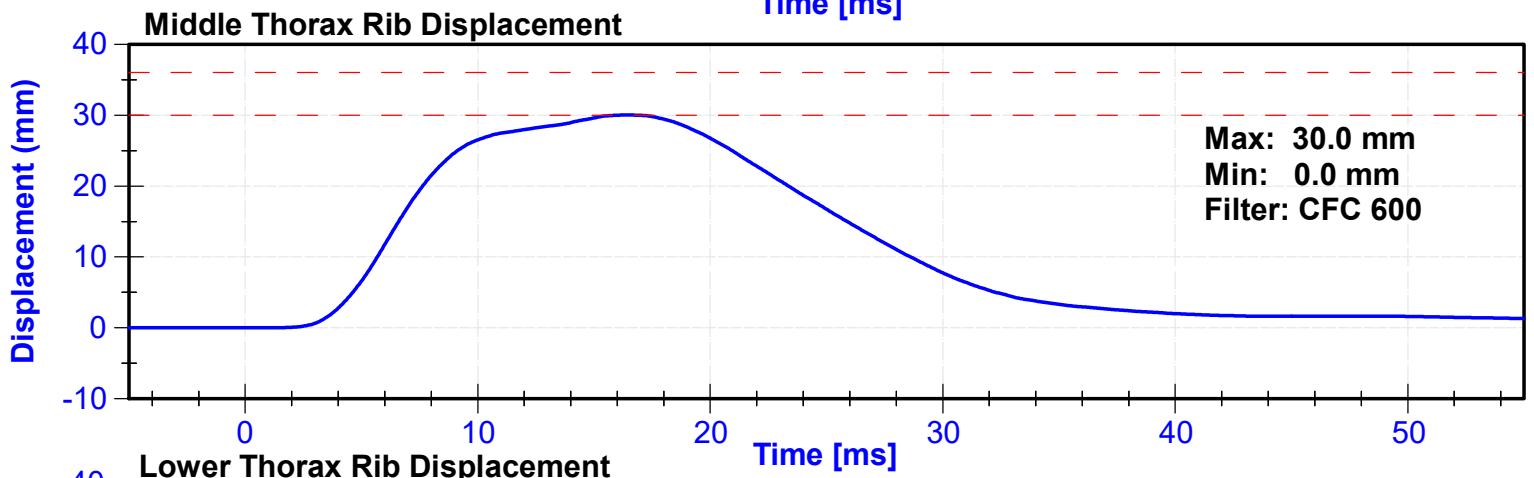
Transducer Calibrations

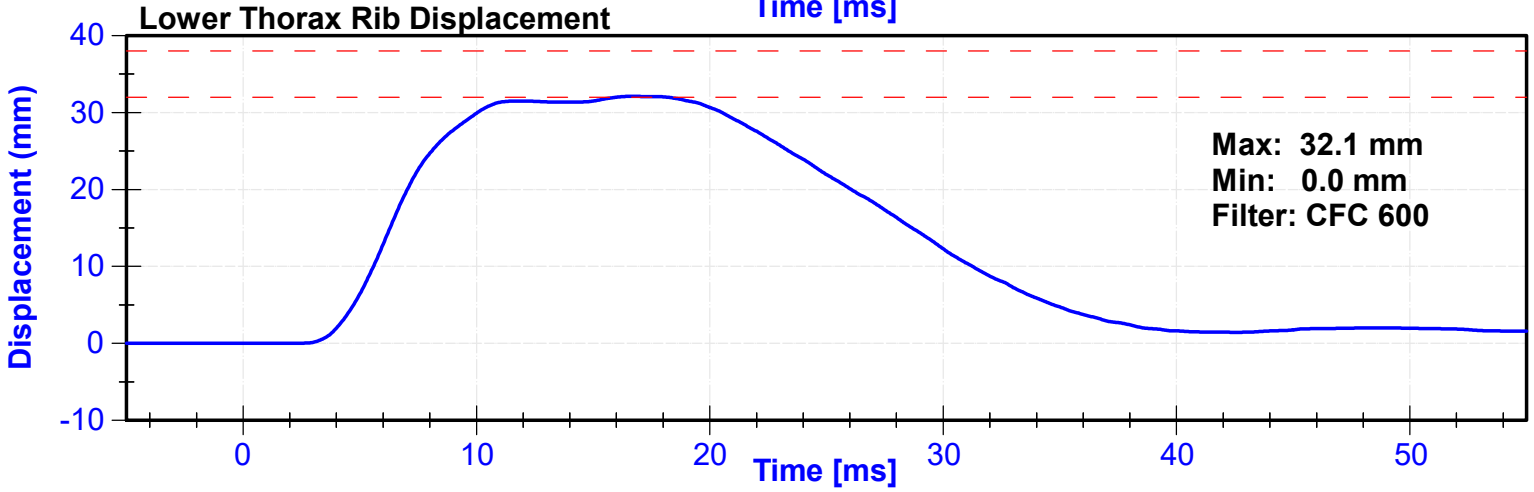
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Upper Spine T1 Y Accelerometer	Endevco	T20880	11/16/2023	5/14/2024
Upper Spine T12 Y Accelerometer	Endevco	P52071	11/16/2023	5/14/2024
Shoulder Potentiometer	Servo	053GFE	11/17/2023	5/17/2024
Upper Thorax Rib Potentiometer	Servo	2316GFE	11/17/2023	5/17/2024
Middle Thorax Rib Potentiometer	Servo	307GFE	11/17/2023	5/17/2024
Lower Thorax Rib Potentiometer	Servo	1156GFE	11/17/2023	5/17/2024

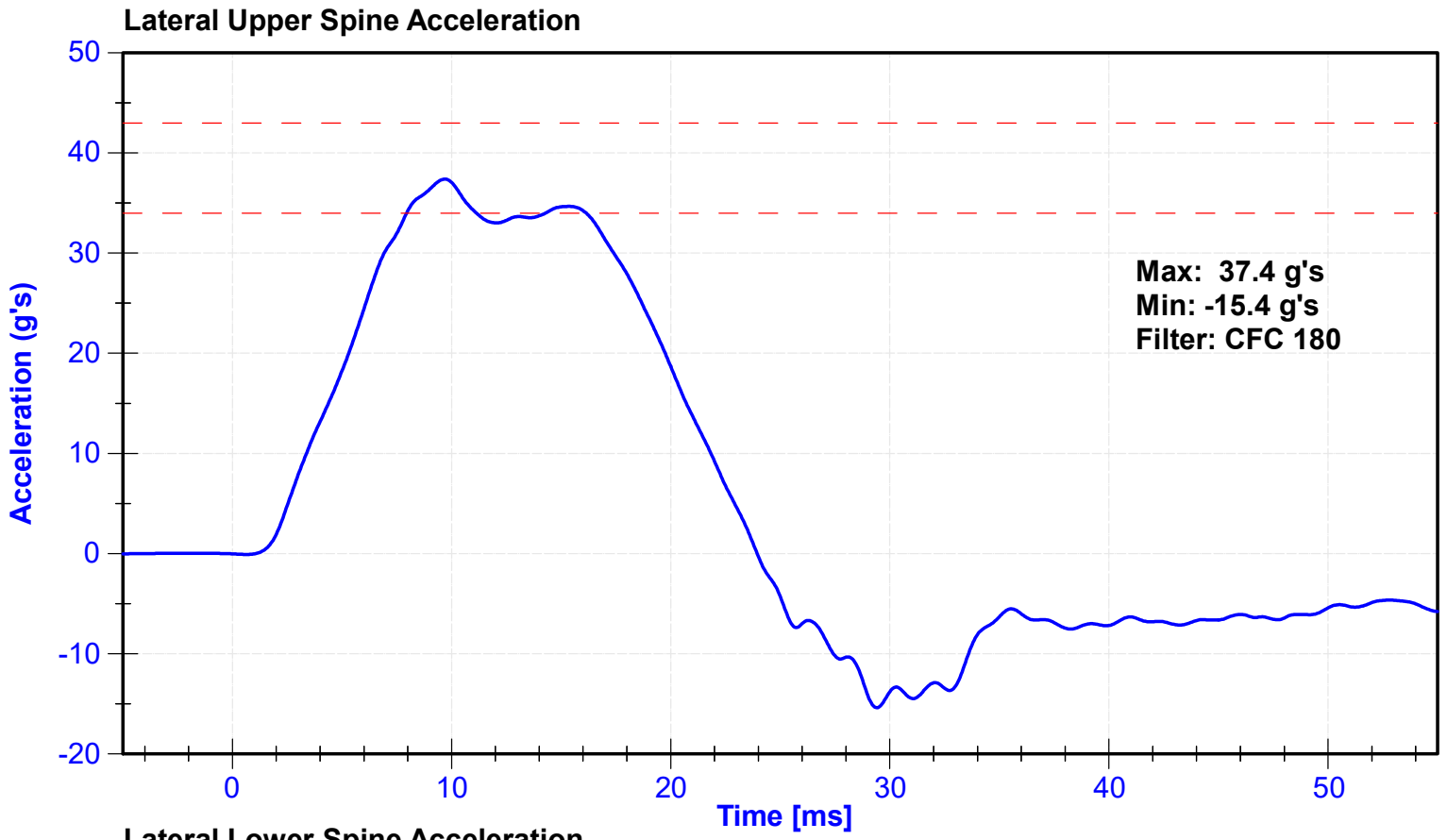


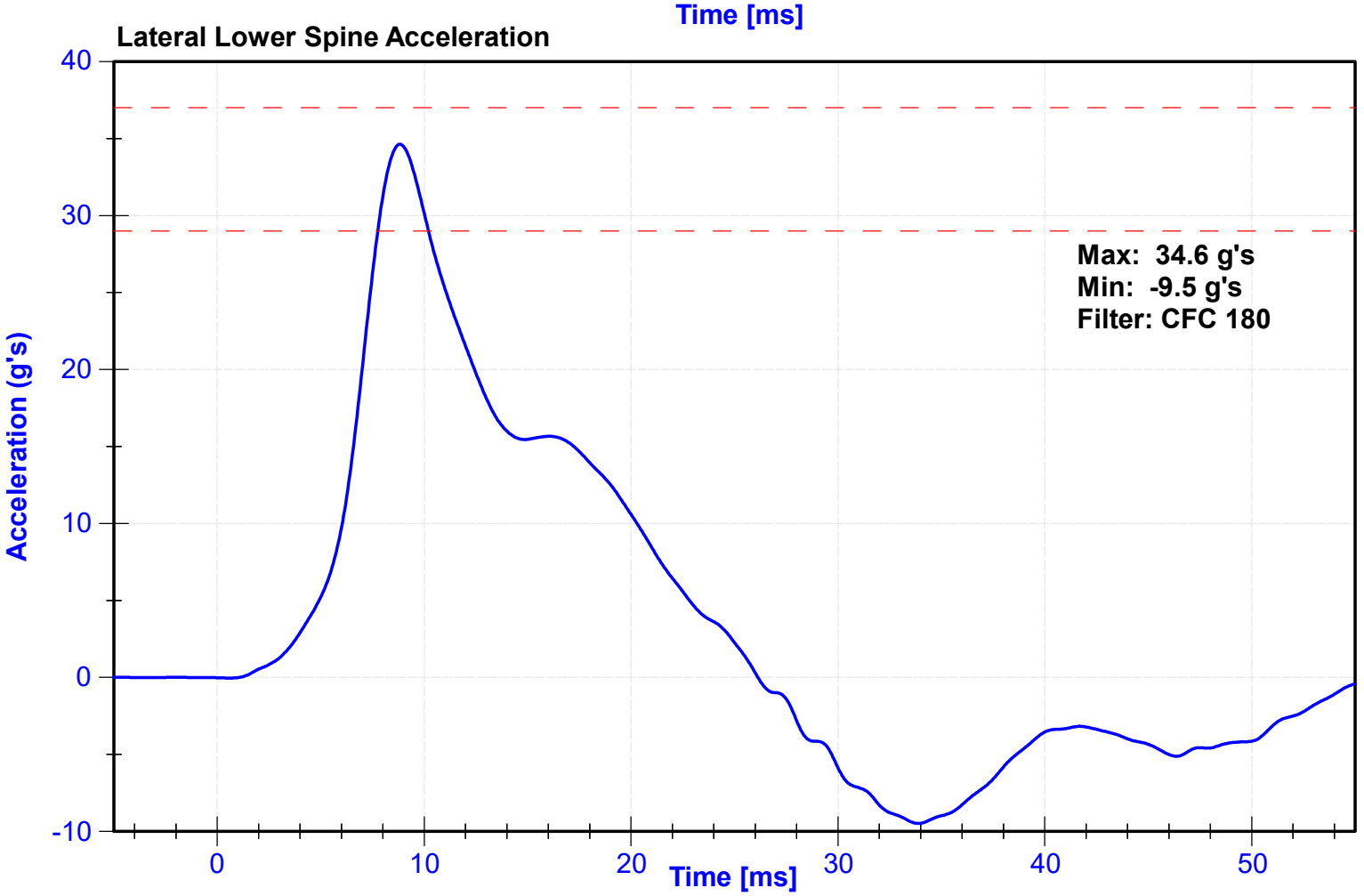

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 37.9 mm
Min: -2.0 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 28.9 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
Acceleration (g's)
Time [ms]
Max: 37.4 g's
Min: -15.4 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 34.6 g's
Min: -9.5 g's
Filter: CFC 180

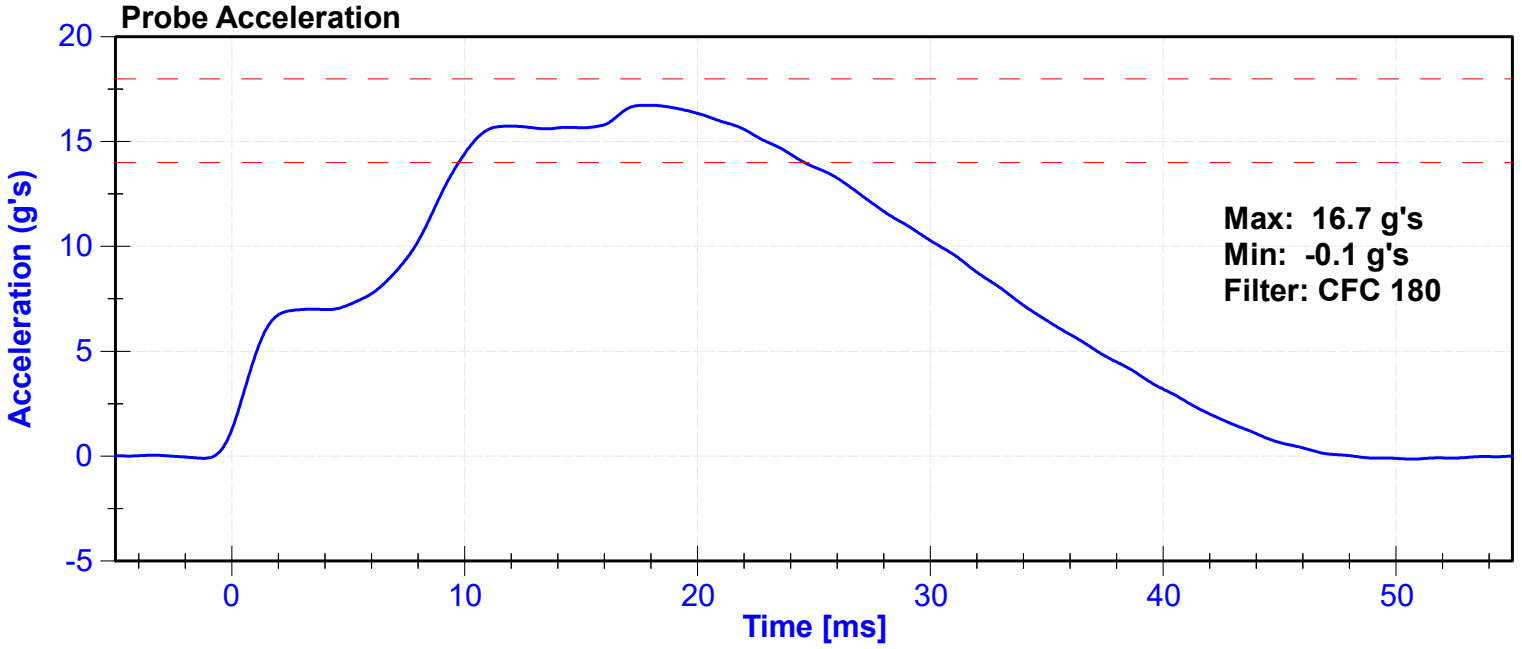
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

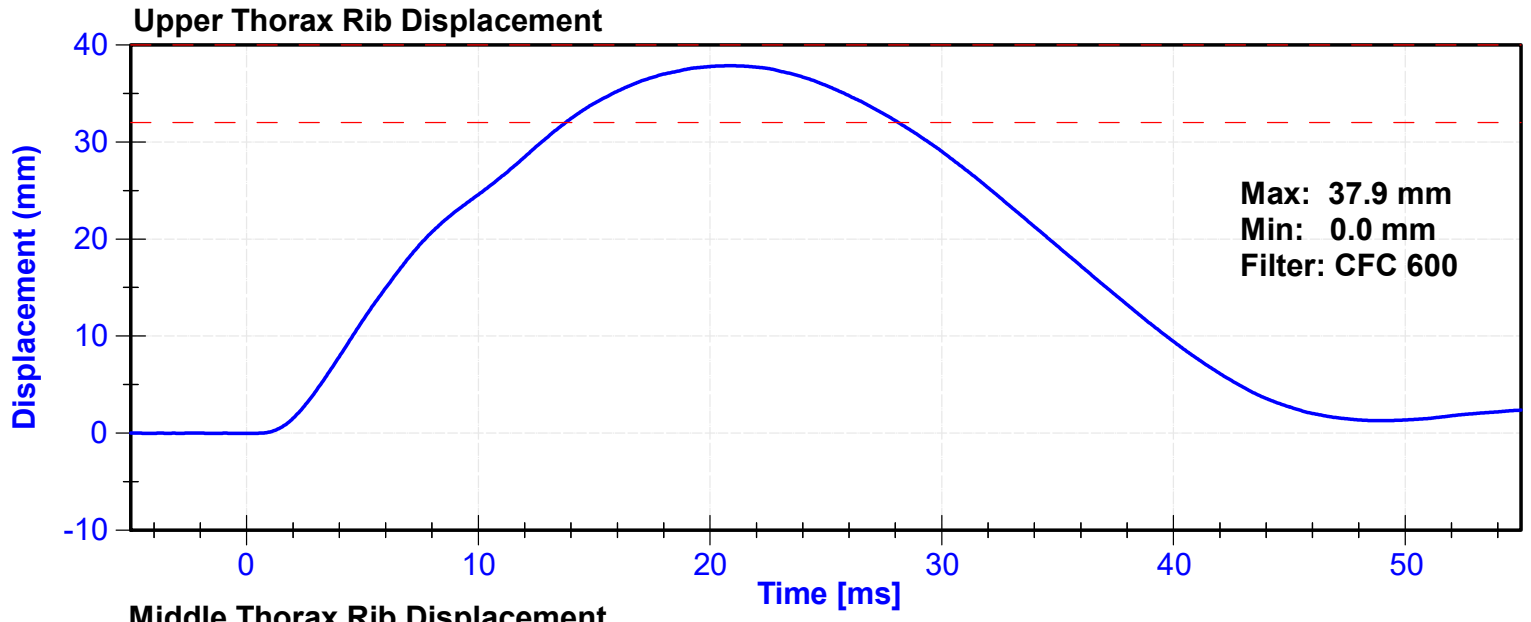
Results

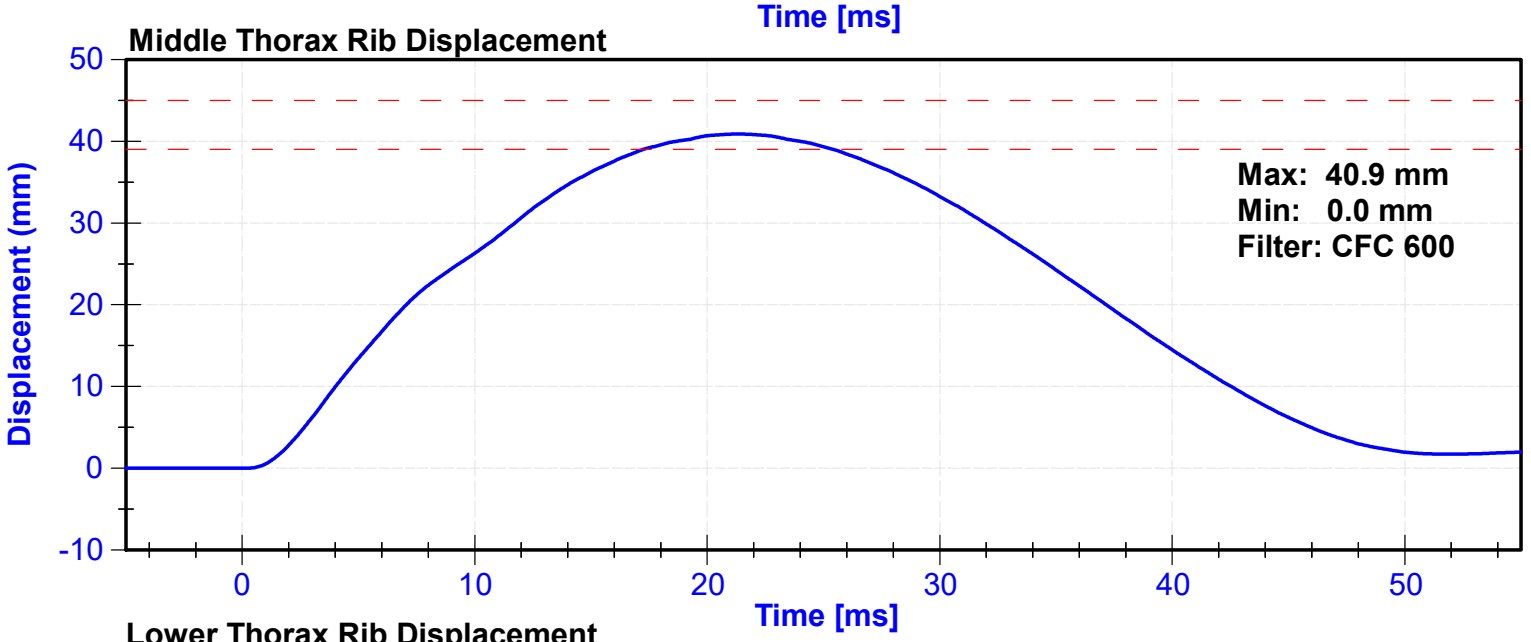
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	14	18	g's	16.7	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.6	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.6	Pass
Upper Thorax Rib Deflection	32	40	mm	37.9	Pass
Middle Thorax Rib Deflection	39	45	mm	40.9	Pass
Lower Thorax Rib Deflection	35	43	mm	35.8	Pass

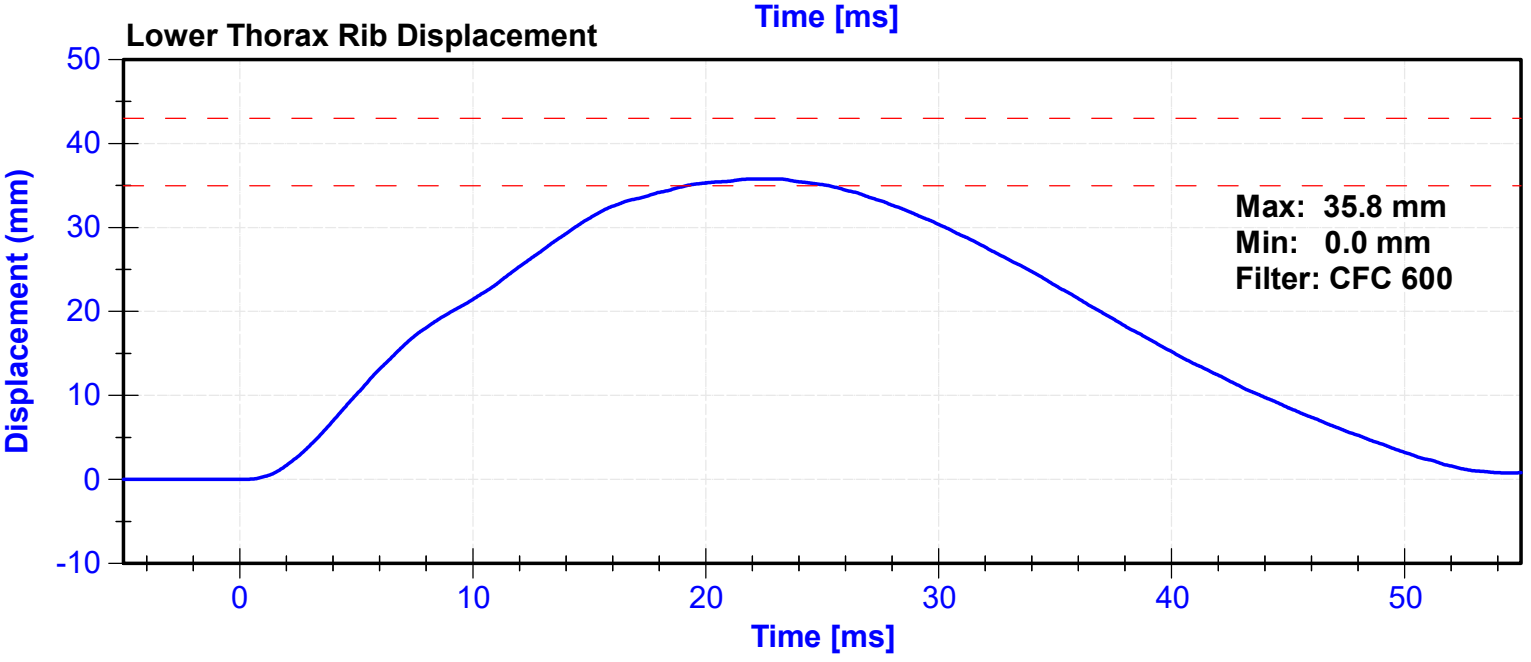
Transducer Calibrations

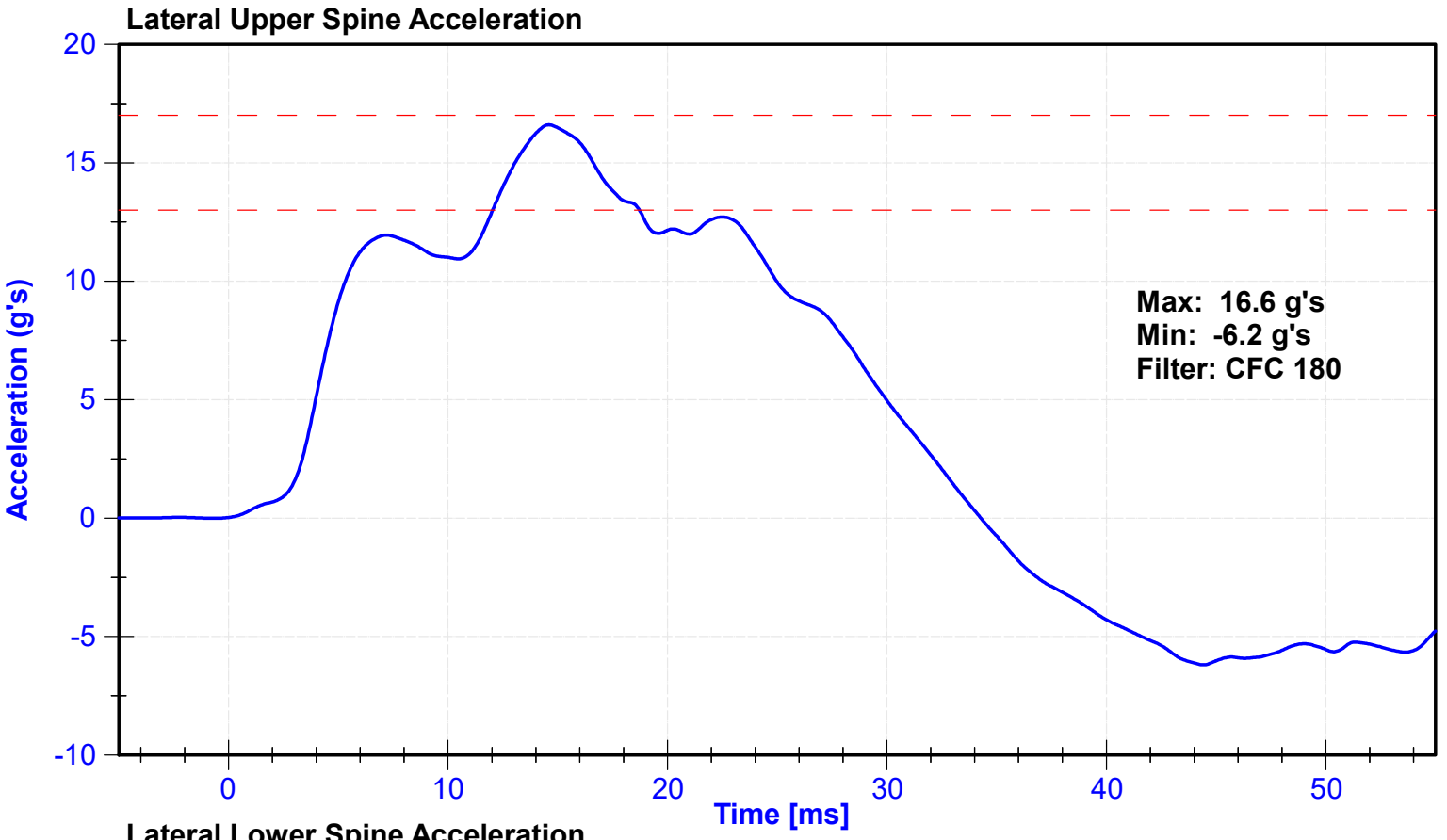
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Upper Spine Y Accelerometer	Endevco	T20880	11/16/2023	5/14/2024
Lower Spine Y Accelerometer	Endevco	P52071	11/16/2023	5/14/2024
Upper Thorax Rib Potentiometer	Servo	2316GFE	11/17/2023	5/17/2024
Middle Thorax Rib Potentiometer	Servo	307GFE	11/17/2023	5/17/2024
Lower Thorax Rib Potentiometer	Servo	1156GFE	11/17/2023	5/17/2024

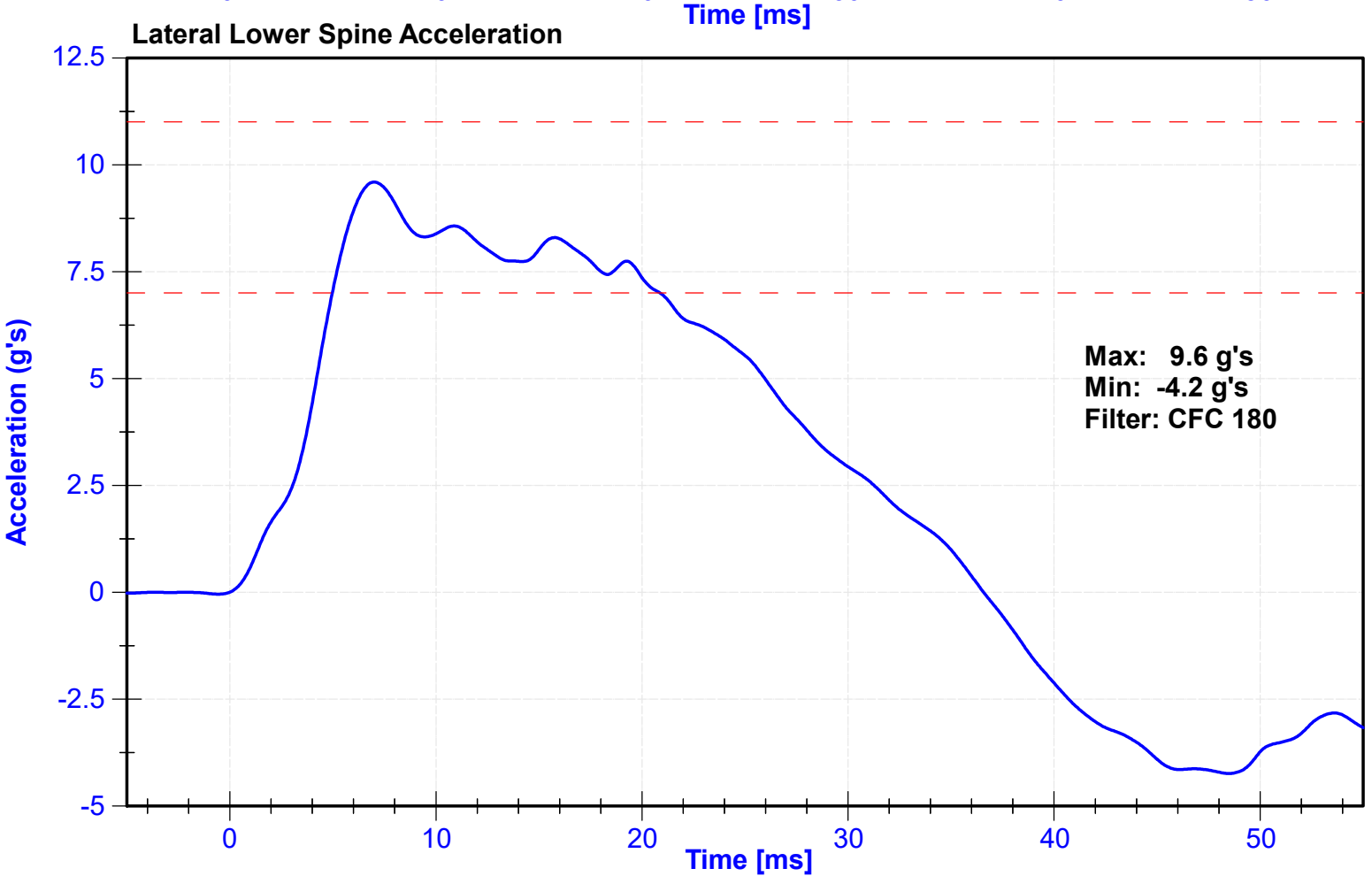



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.9 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.9 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.8 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: 16.6 g's
Min: -6.2 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: 9.6 g's
Min: -4.2 g's
Filter: CFC 180

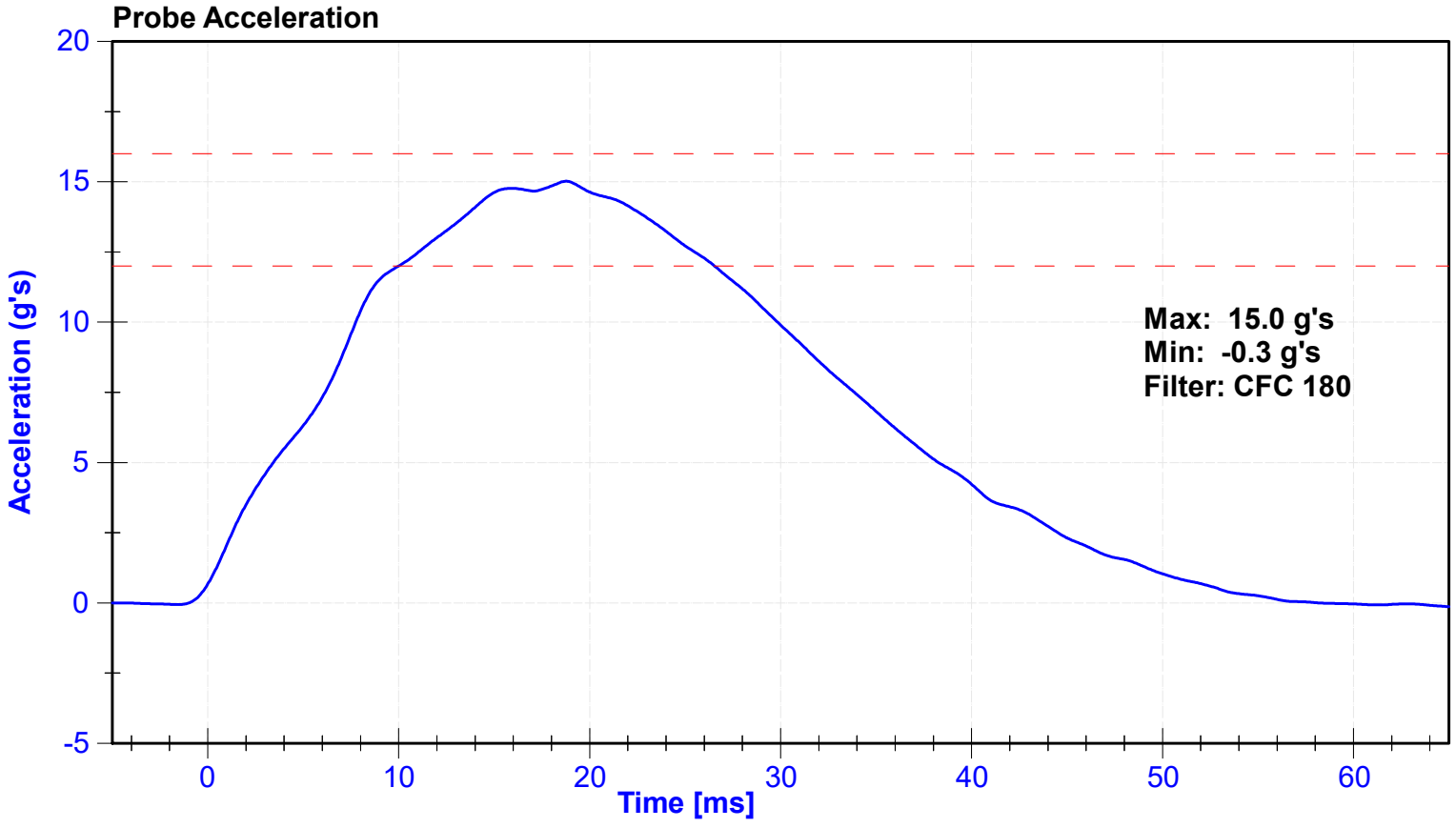
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

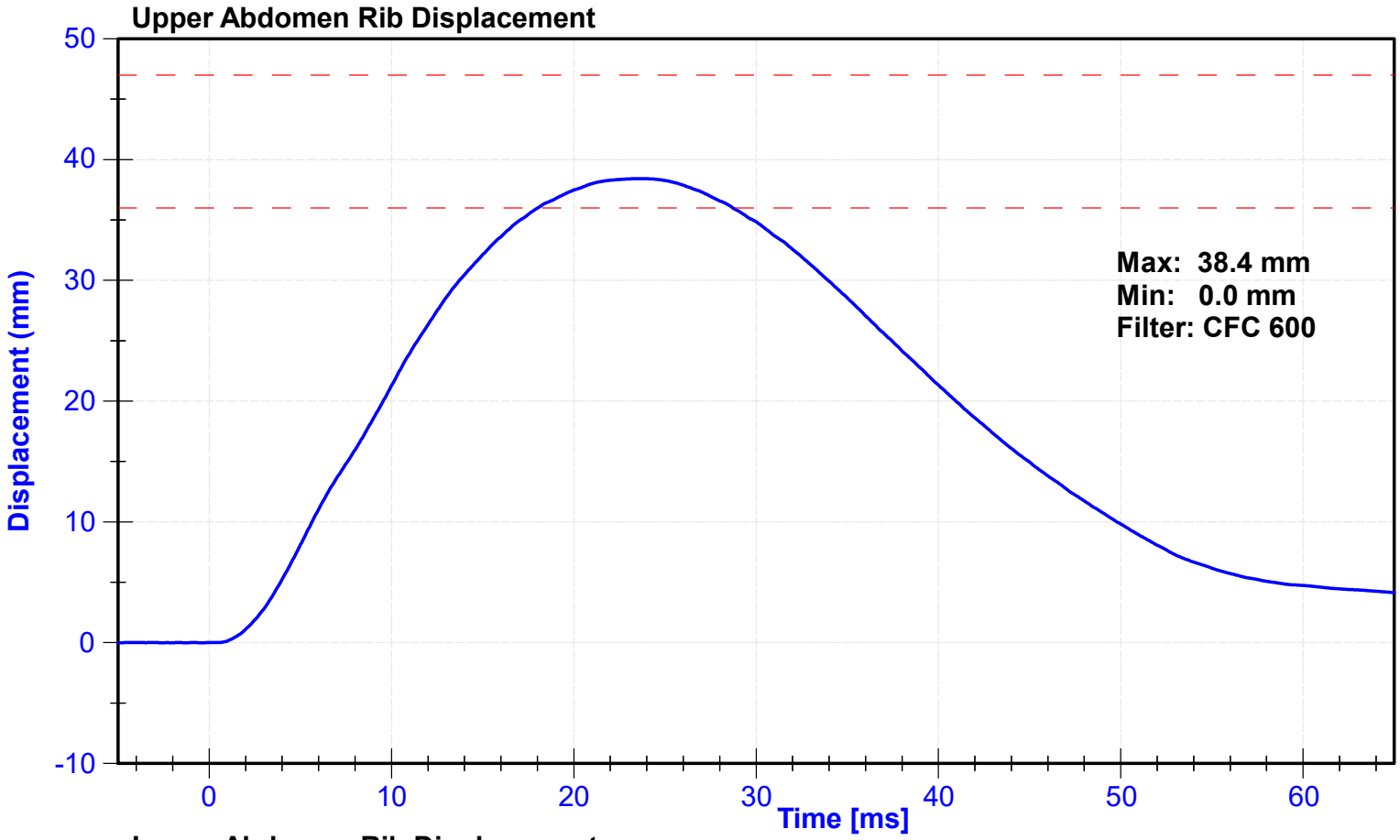
Results

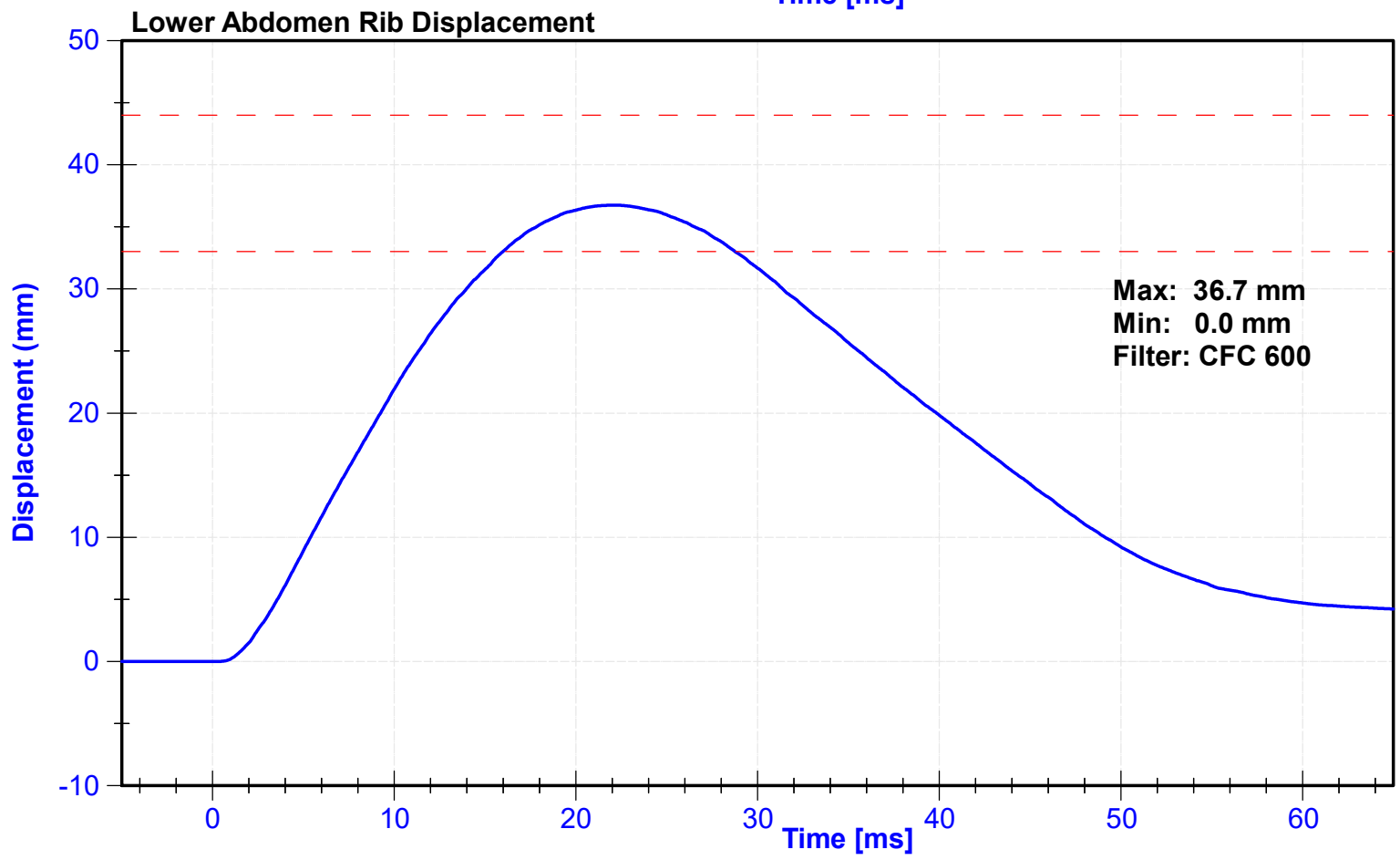
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	12	16	g's	15.0	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.8	Pass
Upper Abdomen Rib Deflection	36	47	mm	38.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	36.7	Pass

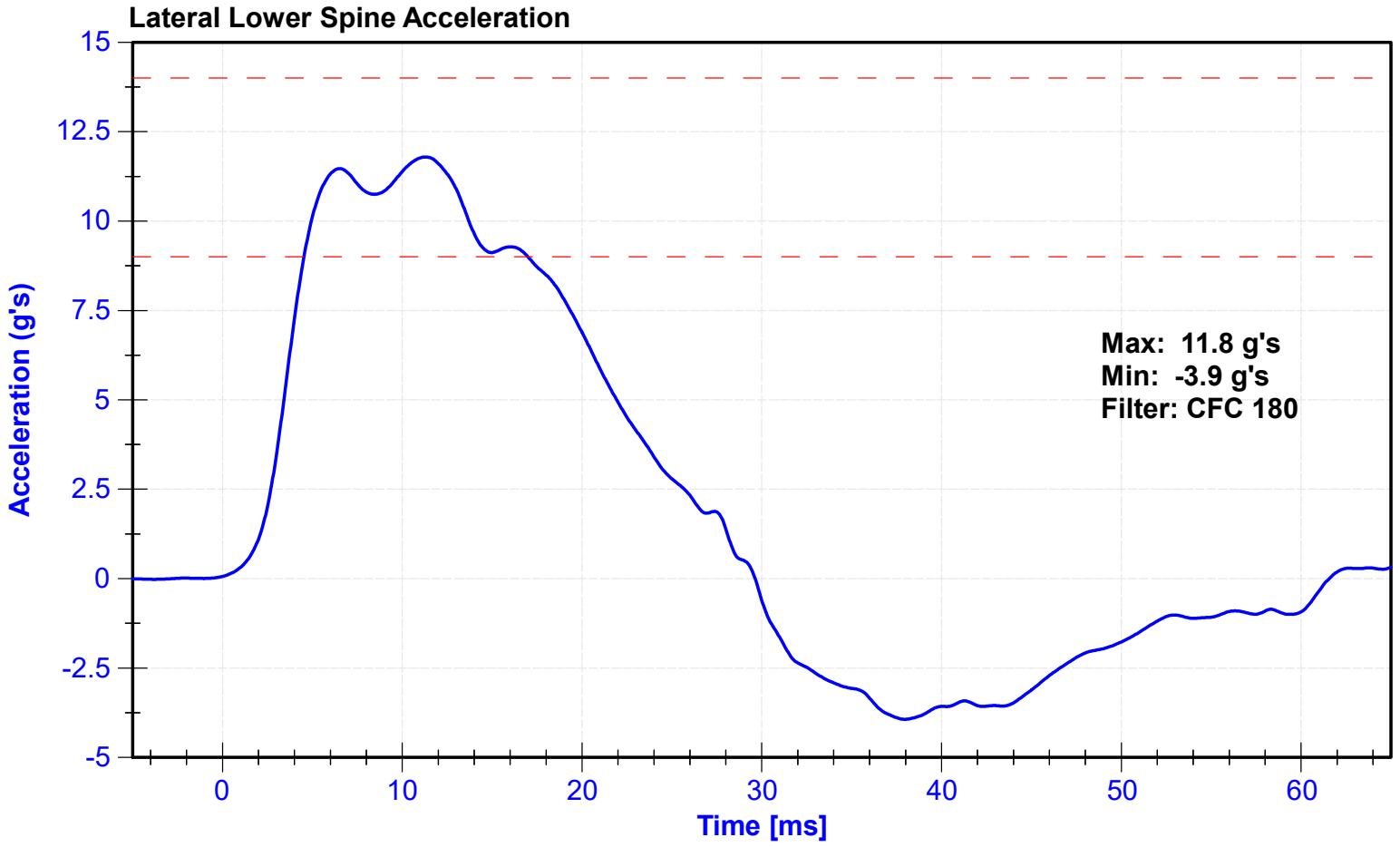
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Lower Spine Y Accelerometer	Endevco	P52071	11/16/2023	5/14/2024
Upper Abdomen Rib Potentiometer	Servo	060GFE	11/21/2023	5/21/2024
Lower Abdomen Rib Potentiometer	Servo	308GFE	11/17/2023	5/17/2024




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 38.4 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 36.7 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: 11.8 g's
Min: -3.9 g's
Filter: CFC 180

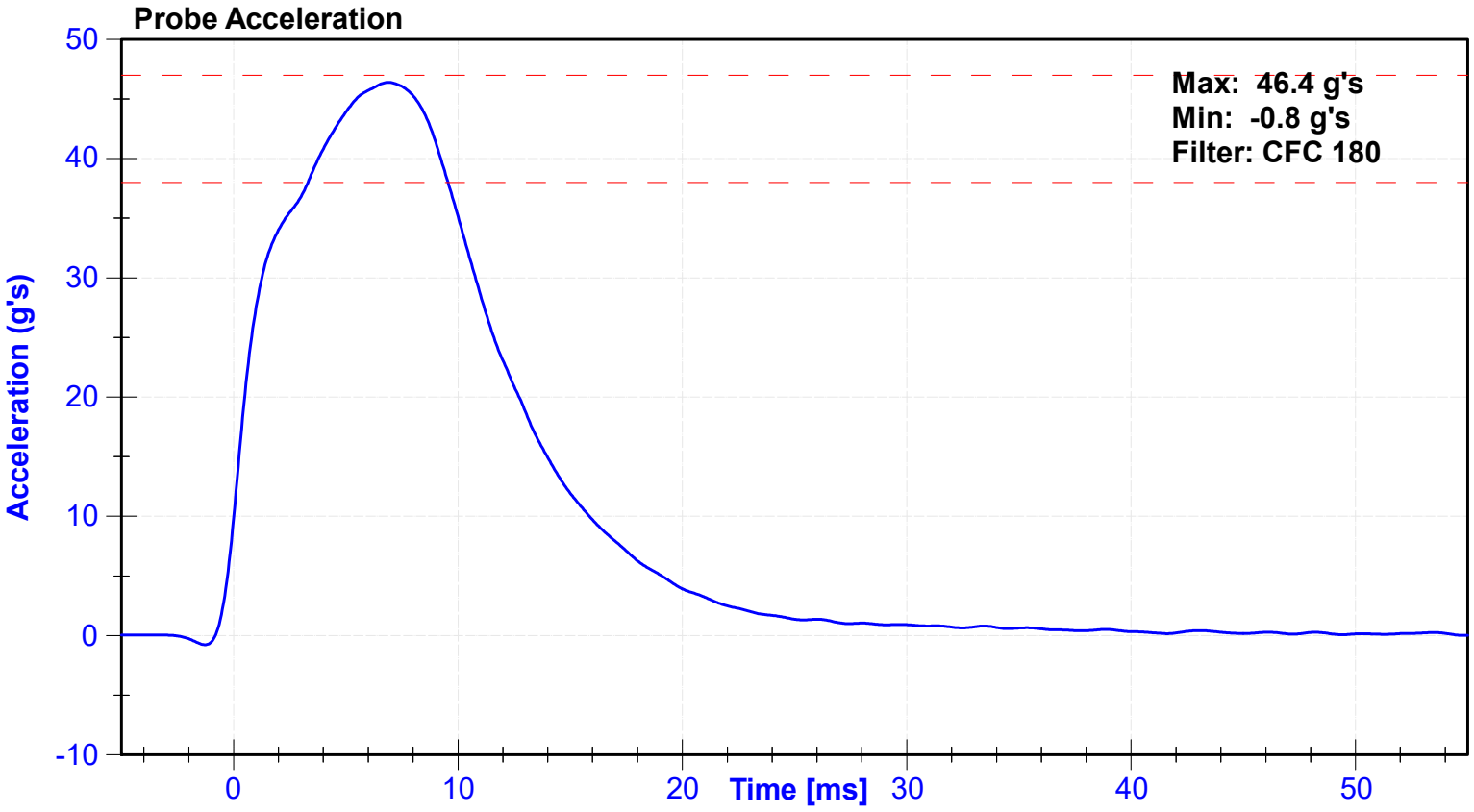
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

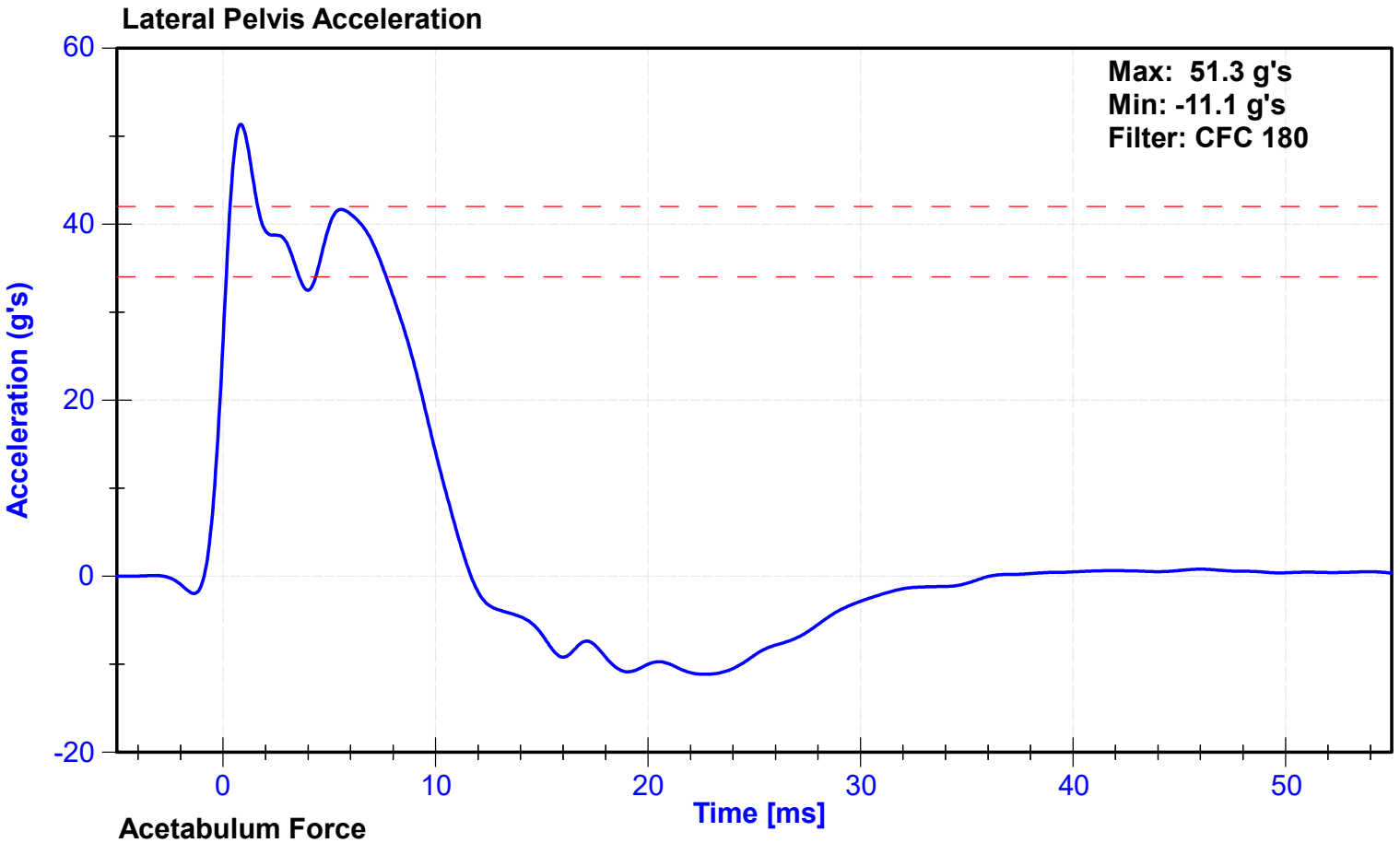
Results

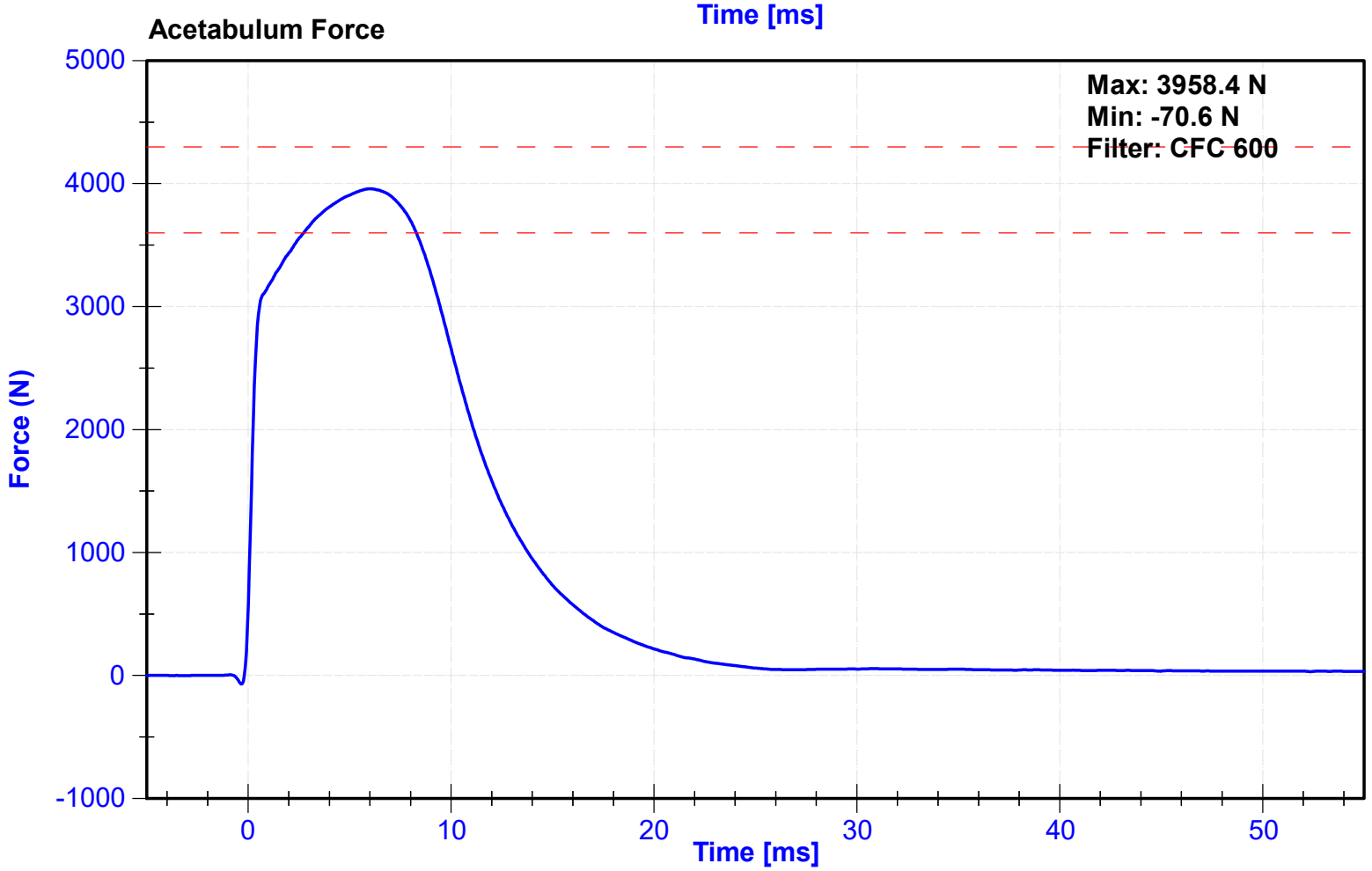
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration	38	47	g's	46.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.1	Pass
Acetabulum Force	3600	4300	N	3958.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Pelvis Y Accelerometer	Endevco	P51731	11/15/2023	5/13/2024
Acetabulum Load Cell	Denton	267-FY	9/11/2023	9/10/2024
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 51.3 g's
Min: -11.1 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3958.4 N
Min: -70.6 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

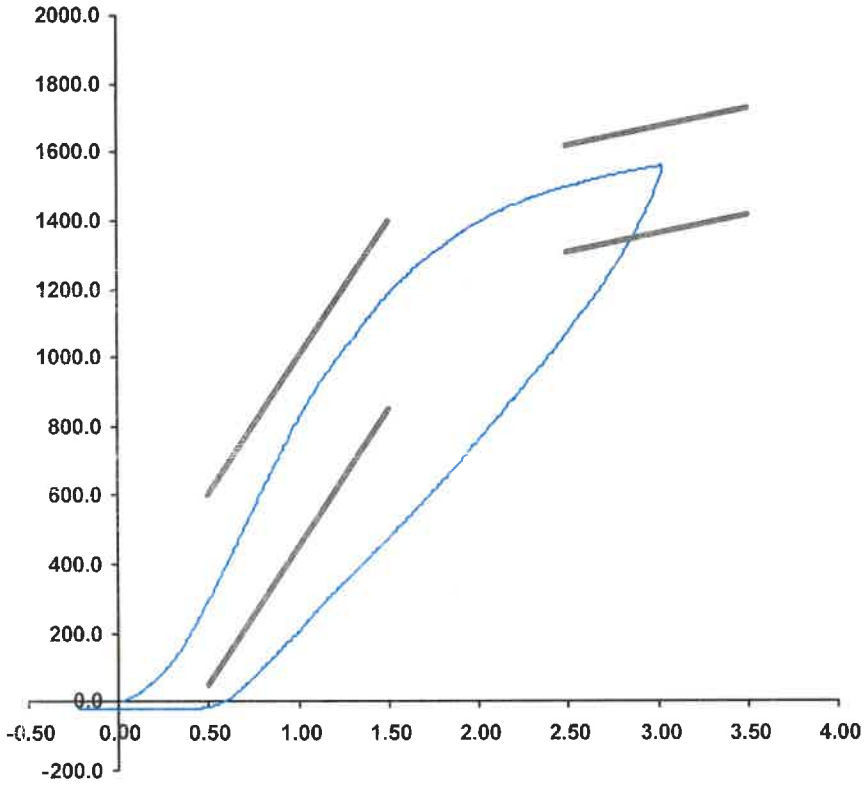
300 Cert
2-22-24

SID-IIs Pelvis Plug Certification Test

Plug S/N 16301
Test Number 22867
Report Number 22924
Test Date 5/20/2022 10:24:32 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	303	50	600
Force @ 1.5 mm (N)	1,183	850	1,400
Force @ 2.5 mm (N)	1,500	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-May-22
SACO Research

By : DO Date : 5/20/2022

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

300 Crash
2-22-24

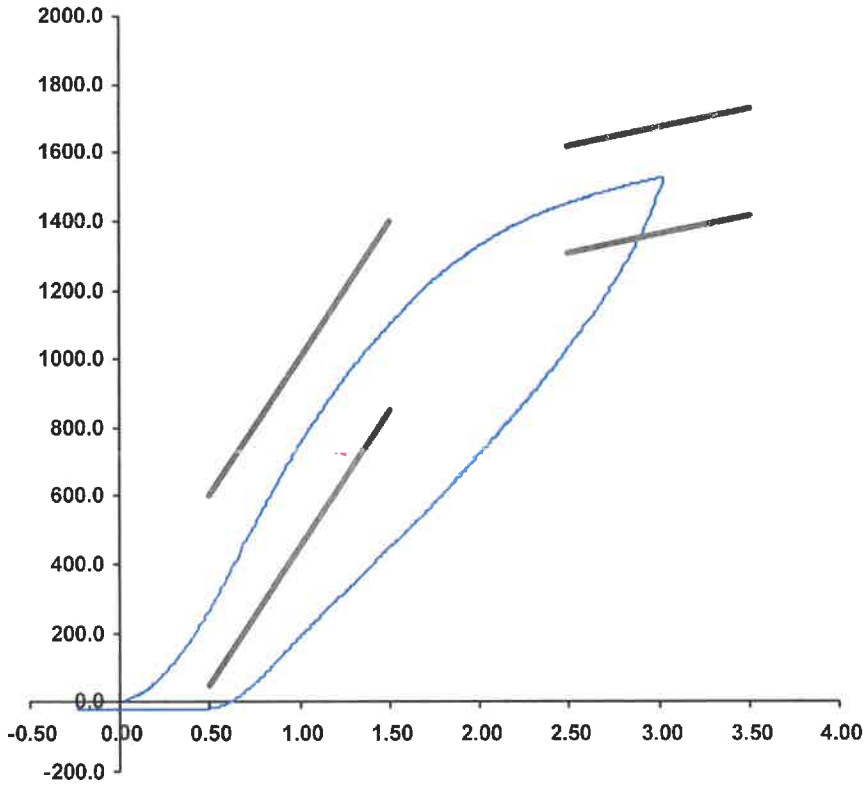
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16541
Test Number 23325
Report Number 23382
Test Date 7/15/2022 9:06:10 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	269	50	600
Force @ 1.5 mm (N)	1,102	850	1,400
Force @ 2.5 mm (N)	1,453	1,306	1,618
Force @ 3.0 mm (N)	1,525	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 15-Jul-22
SACO Research

By : DC Date : 7/15/22

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

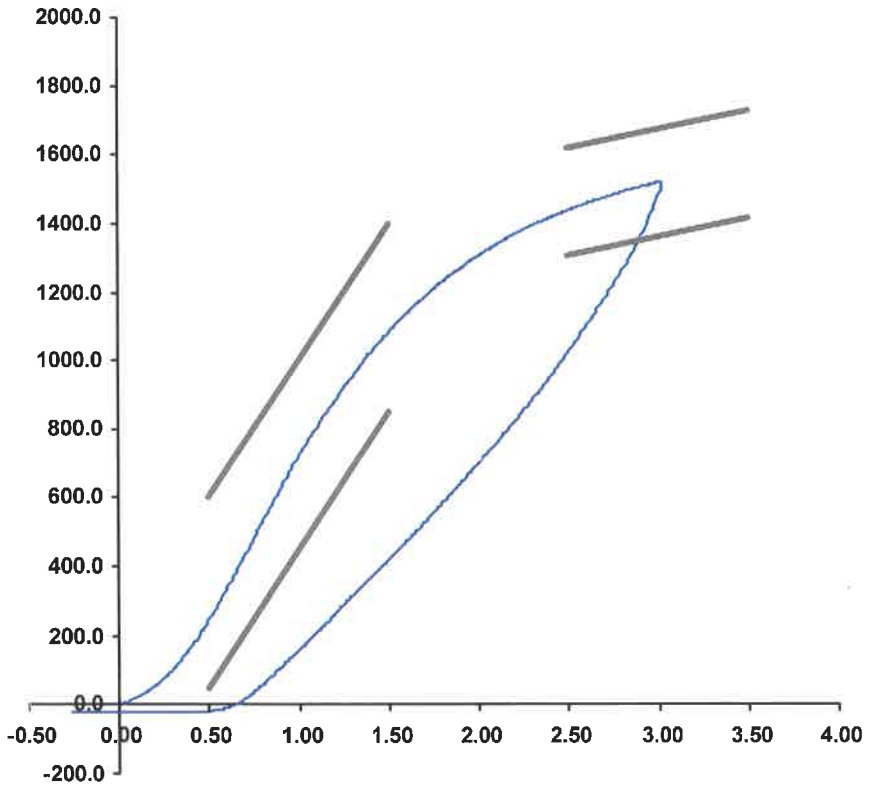
300 Non-Impact
2-22-24

SID-IIs Pelvis Plug Certification Test

Plug S/N 16478
Test Number 23261
Report Number 23318
Test Date 7/14/2022 12:03:43 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	248	50	600
Force @ 1.5 mm (N)	1,082	850	1,400
Force @ 2.5 mm (N)	1,437	1,306	1,618
Force @ 3.0 mm (N)	1,519	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 14-Jul-22
SACO Research

By : DC Date : 7/14/2022

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

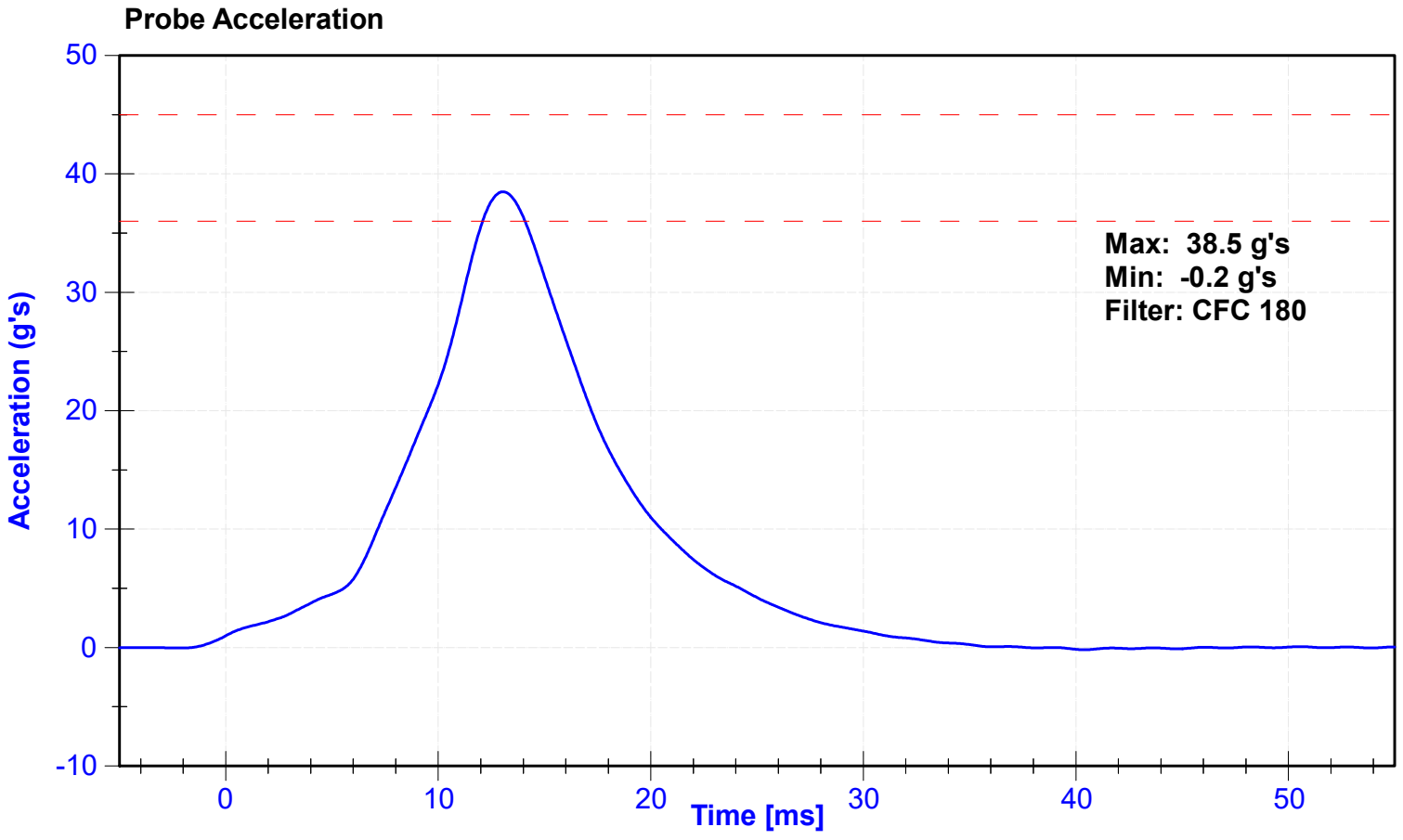
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

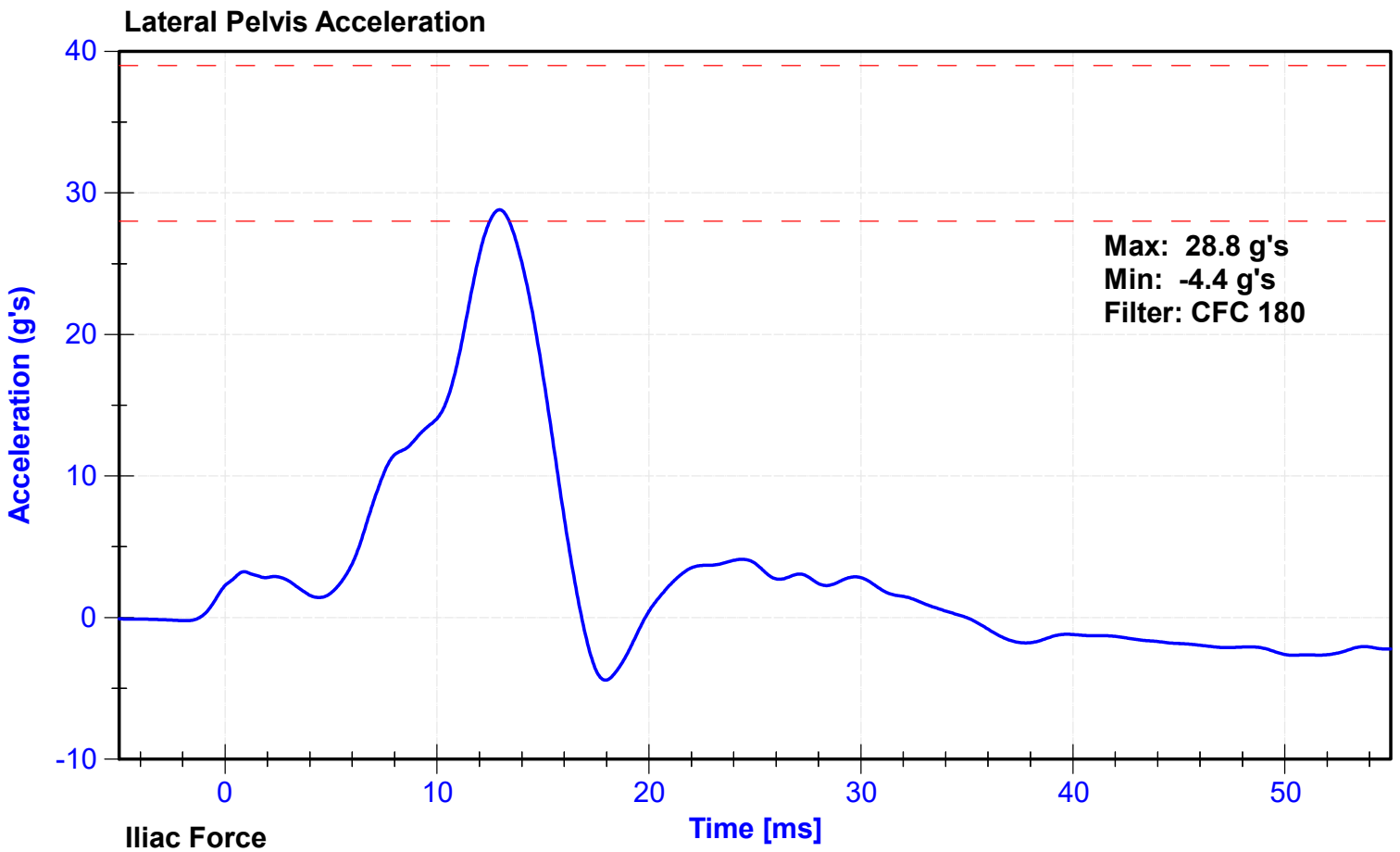
Results

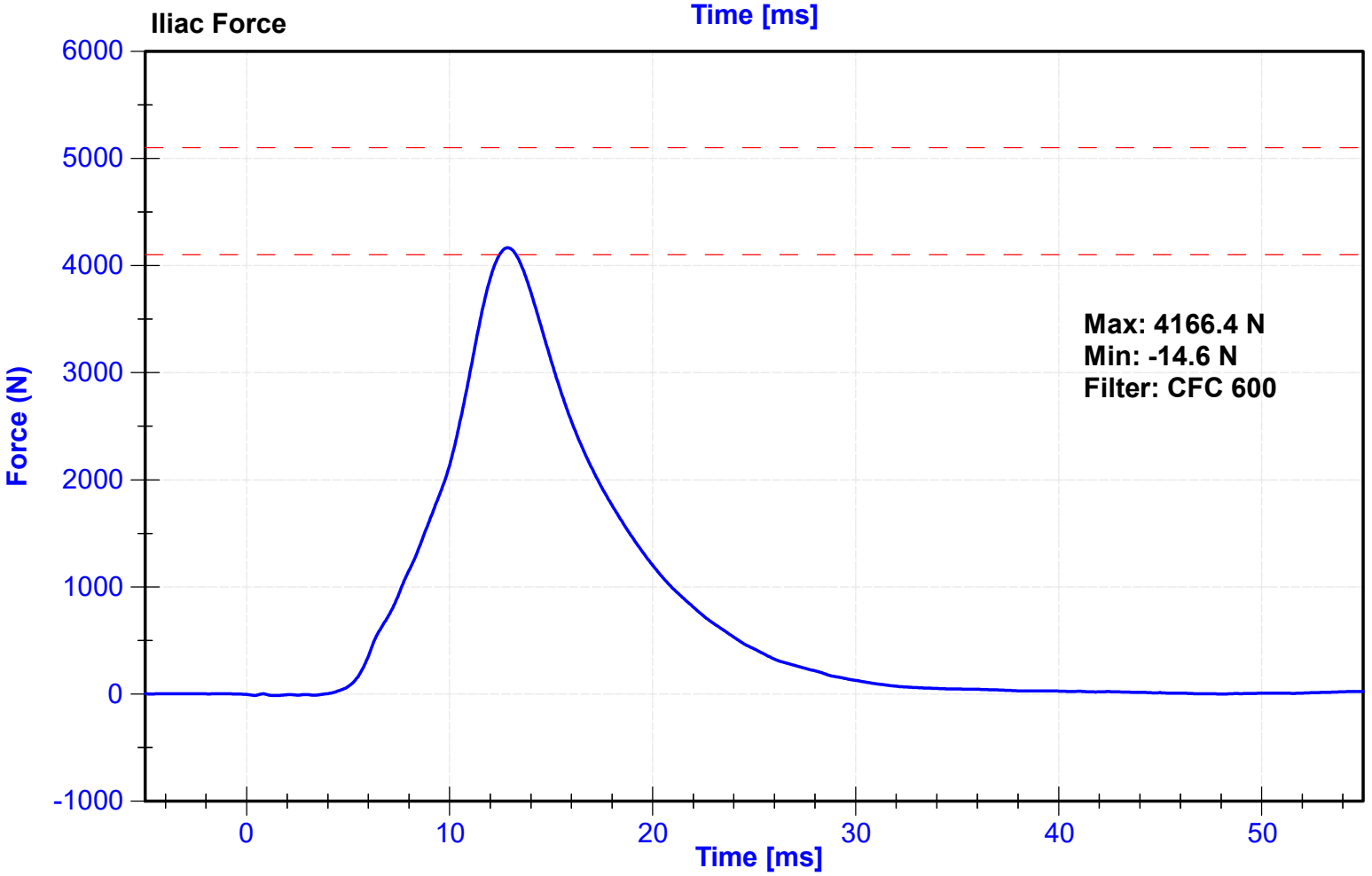
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	30.1	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	36	45	g's	38.5	Pass
Lateral Pelvis Acceleration	28	39	g's	28.8	Pass
Iliac Force	4100	5100	N	4166.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Pelvis Y Accelerometer	Endevco	P51731	11/15/2023	5/13/2024
Iliac Load Cell	Denton	321	9/11/2023	9/10/2024




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 28.8 g's
Min: -4.4 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: 4166.4 N
Min: -14.6 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N _F033__		
			Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers	Primary	X	P63861	Endevco	11/16/2023
		Y	P49216	Endevco	11/16/2023
		Z	P51303	Endevco	11/16/2023
	Redundant	X	P58868	Endevco	11/16/2023
		Y	P59020	Endevco	11/16/2023
		Z	P52132	Endevco	11/16/2023
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	11/17/2023
	Middle	Y	185GFE	Honeywell	11/17/2023
	Lower	Y	178GFE	Honeywell	11/17/2023
Abdomen Load Cells	Forward	Y	DM5846	Denton	05/18/2023
	Middle	Y	1529	Denton	05/18/2023
	Rear	Y	1533	Denton	05/24/2023
Lower Spine Accelerometers (T12)		X	P58997	Endevco	11/16/2023
		Y	T31029	Endevco	01/24/2024
		Z	P52033	Endevco	11/16/2023
Pubic Symphysis Load Cell		Y	459-FY	Denton	06/20/2023

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N __300__		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	P59018	Endevco	11/15/2023
			Y	P79189	Endevco	11/15/2023
			Z	P79587	Endevco	11/15/2023
		Redundant	X	P68057	Endevco	11/15/2023
			Y	P58986	Endevco	11/15/2023
			Z	P52025	Endevco	11/15/2023
Displacement Potentiometers	Thoracic Rib	Upper	Y	2316GFE	Servo	11/17/2023
		Middle	Y	307GFE	Servo	11/17/2023
		Lower	Y	1156GFE	Servo	11/17/2023
	Abdominal Rib	Upper	Y	060GFE	Servo	11/21/2023
		Lower	Y	308GFE	Servo	11/17/2023
Lower Spine Accelerometers (T12)			X	P64003	Endevco	11/16/2023
			Y	P52071	Endevco	11/16/2023
			Z	P17283	Endevco	11/16/2023
Acetabulum Load Cell			Y	267-FY	Denton	09/11/2023
Iliac Wing Load Cell			Y	321	Denton	09/11/2023
Pelvis Plug (struck side)				16371	SACO	05/20/2022
Pelvis Plug (non-struck side)				16407	SACO	05/23/2022

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A398324	Measurement Specialties	10/14/2023
	Vehicle Center of Gravity	Y	A398332	Measurement Specialties	10/14/2023
	Vehicle Center of Gravity	Z	A400004	Measurement Specialties	10/14/2023
2	Right Sill at Front Seat	X	A405546	Measurement Specialties	09/14/2023
	Right Sill at Front Seat	Y	A413593	Measurement Specialties	09/14/2023
	Right Sill at Front Seat	Z	A413602	Measurement Specialties	09/14/2023
3	Right Sill at Rear Seat	X	A352330	Measurement Specialties	01/29/2024
	Right Sill at Rear Seat	Y	A352367	Measurement Specialties	01/29/2024
	Right Sill at Rear Seat	Z	A374305	Measurement Specialties	01/29/2024
4	Left Sill at Front Door	Y	G24582	Endevco	11/30/2023
5	Left Sill at Rear Door	Y	G24307	Endevco	11/10/2023
6	Left A-Post Lower	Y	G24616	Endevco	11/29/2023
7	Left A-Post Middle	Y	G24583	Endevco	11/30/2023
8	Left B-Post Lower	Y	G24239	Endevco	09/11/2023
9	Left B-Post Middle	Y	G24237	Endevco	09/11/2023
10	Front Seat Track	Y	G24236	Endevco	09/11/2023
11	Rear Seat Track or Structure	Y	G24612	Endevco	11/29/2023
12	Right Rear Occ. Compartment	Y	G24615	Endevco	11/29/2023
13	Engine Block	X	A405532	Measurement Specialties	10/11/2023
	Engine Block	Y	A405535	Measurement Specialties	10/11/2023
14	Rear Floorpan Above Axle	X	A315183	Measurement Specialties	10/31/2023
	Rear Floorpan Above Axle	Y	A315719	Measurement Specialties	10/31/2023
	Rear Floorpan Above Axle	Z	A315878	Measurement Specialties	10/31/2023

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	G22717	Endevco	08/25/2023
MDB Center of Gravity	Y	G22737	Endevco	08/25/2023
MDB Center of Gravity	Z	G22738	Endevco	08/25/2023
Left Frame at Rear Axle Centerline	X	A284318	Measurement Specialties	10/12/2023
Left Frame at Rear Axle Centerline	Y	A374216	Measurement Specialties	10/12/2023