

REPORT NUMBER: SPNCAP-CAL-23-007

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**Toyota Motor Corporation
2023 Lexus GX 460
5 Door SUV**

NHTSA No: M20235104

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



June 16, 2023

FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number 693JJ919D000016.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: Alexander Rudniski Date: June 16, 2023
Alexander Rudniski, Test Engineer

Approved by: Quinn Porzio Date: June 16, 2023
Quinn Porzio, 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: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SPNCAP-CAL-23-007		2. Government Accession No.		3. Recipient's Catalog No.																												
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2023 Lexus GX 460 5 Door SUV NHTSA No.: M20235104				5. Report Date June 16, 2023																												
				6. Performing Organization Code CAL																												
7. Author(s) Alexander Rudniski, Test Engineer Quinn Porzio, Test Engineer				8. Performing Organization Report No. CAL-DOT-2023-007																												
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225				10. Work Unit No.																												
				11. Contract or Grant No. 693JJ919D000016																												
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE Washington, D.C. 20590				13. Type of Report and Period Covered: Final Test Report June 9, 2023 - June 16, 2023																												
				14. Sponsoring Agency Code NRM-110																												
15. Supplementary Notes																																
16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2023 Lexus GX 460 5 Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 9, 2023. The impact velocity of the vehicle was 32.04 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 411 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No.300)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC36)</td> <td></td> <td>1000</td> <td>386.371</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>44.753</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3548.903</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>18.394</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45</td> <td>14.400</td> </tr> </tbody> </table> 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.						Measurement Description	Driver ATD (SID-IIs) (Serial No.300)			Units	Threshold	Result	Head Injury Criteria (HIC36)		1000	386.371	Resultant Lower Spine Acceleration	G	82	44.753	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3548.903	Maximum Thoracic Rib Deflection	mm	38	18.394	Maximum Abdominal Rib Deflection	mm	45	14.400
Measurement Description	Driver ATD (SID-IIs) (Serial No.300)																															
	Units	Threshold	Result																													
Head Injury Criteria (HIC36)		1000	386.371																													
Resultant Lower Spine Acceleration	G	82	44.753																													
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3548.903																													
Maximum Thoracic Rib Deflection	mm	38	18.394																													
Maximum Abdominal Rib Deflection	mm	45	14.400																													
17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs				18. Distribution Statement <u>Copies of this report are available from:</u> National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave. Washington, D.C. 20590																												
19. Security Class. (of this report) UNCLASSIFIED		20. Security Class. (of this page) UNCLASSIFIED		21. No. of Pages 126	22. Price																											

Form DOT F1700.7 (8-72)

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1-1
2	Summary of Test Results	2-1
3	Occupant and Vehicle Information	3-1
 <u>Data Sheet</u>		 <u>Page</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data	3-6
3	Dummy Longitudinal Clearance Dimensions	3-9
4	Dummy Lateral Clearance Dimensions	3-10
5	Camera and instrumentation Data	3-11
6	Vehicle Accelerometer Data	3-12
7	Rigid Pole Load Cell Data	3-13
8	Post-Test Observations	3-14
9	Test Vehicle Profile Measurements	3-16
10	Test Vehicle Exterior Crush Measurements	3-17
11	Vehicle Damage Profile Distances	3-20
12	FMVSS No. 301 Static Rollover Results	3-21
13	Dummy / Vehicle Temperature and Humidity Stabilization Data	3-22
 <u>Appendix</u>		 <u>Page</u>
A	Photographs	A-1
B	Vehicle and Dummy Response Data Plots	B-1
C	Dummy Configuration and Performance Verification Data	C-1
D	Test Equipment and Instrumentation Calibration Data	D-1

SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2023 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ919D000016. The purpose of this test is to generate comparative side impact performance in a 2023 Lexus GX 460 5 Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2023 Lexus GX 460 5 Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.04 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 9, 2023. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572U (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated March 2020. The side impact event was documented by 11 cameras. Camera locations and other pertinent camera information are included on page 3-11 in this report.

The Part 572U (SID-IIs) dummy was instrumented accordingly:

Head CG tri-axial accelerometers

Thorax upper, middle, and lower rib displacement potentiometers

Abdomen upper and lower rib displacement potentiometers

Lower spine tri-axial accelerometers

Iliac load cell

Acetabulum load cell

Appendix B contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D identifies all serial numbers, manufacturers, and calibration dates for test equipment, dummy sensors, potentiometers, and load cells used to collect data during the test.

Injury readings for the SID-IIs dummy were recorded as follows:

INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	386.371
Resultant Lower Spine Acceleration	G	82	44.753
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3548.903
Maximum Thoracic Rib Deflection	mm	38	18.394
Maximum Abdominal Rib Deflection	mm	45	14.400

*Proposed IARV

Supplemental restraint information was recorded as follows:

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	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Airbag 3 - - Torso Airbag	No	N/A	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 - 300

Data Anomalies:

- Left Front Sill Y Acceleration, Exceeded calibration range and saturated at 28.7 ms
- Left Middle B-Pillar Y Acceleration, Exceeded calibration range at 12.7 ms
- Load Cell Pole Barrier #1 Fy, Questionable data throughout

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 - Vehicle Accelerometer Data

Data Sheet No. 7- Rigid Pole Load Cell Data

Data Sheet No. 8 - Post-Test Observations

Data Sheet No. 9 - Test Vehicle Profile Measurements

Data Sheet No. 10 - Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 - Vehicle Damage Profile Distances

Data Sheet No. 12 - FMVSS No. 301 Static Rollover Results

Data Sheet No. 13 - Dummy / Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20235104	Traction Control System (TCS)	Yes
Model Year	2023	Auto-Leveling System	No
Make	Lexus	Automatic Door Locks (ADL)	Yes
Model	GX 460	Power Window Auto-Reverse	Yes
Body Style	SUV	Other Optional Feature	N/A
VIN	JTJAM7BX3P5353144	Driver Front Airbag	Yes
Body Color	Nebula Gray Pearl	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	3 Miles	Driver Head/Torso Airbag	No
Engine Displacement (L)	4.6	Driver Torso Airbag	No
Type / No. Cylinders	V8	Driver Torso / Pelvis Airbag	Yes
Engine Placement	Inline	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	6-Speed	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head / Torso Airbag	No
Final Drive	AWD	Rear Pass. Torso Airbag	Yes
Roof Rack	No	Rear Pass. Torso / Pelvis Airbag	No
Sunroof / T-Top	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	Yes	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation	GVWR	2990
Date of Manufacture	01/23	GVWR Front	1450
Vehicle Type	MPV	GVWR Rear	1725

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	2	7	
Vehicle Capacity Weight (VCW) (kg)				580	(A)
DSC x 68.04 kg				476.28	(B)
Cargo Weight (RCLW) (kg)				103.72	(A-B)

VEHICLE SEAT TYPE

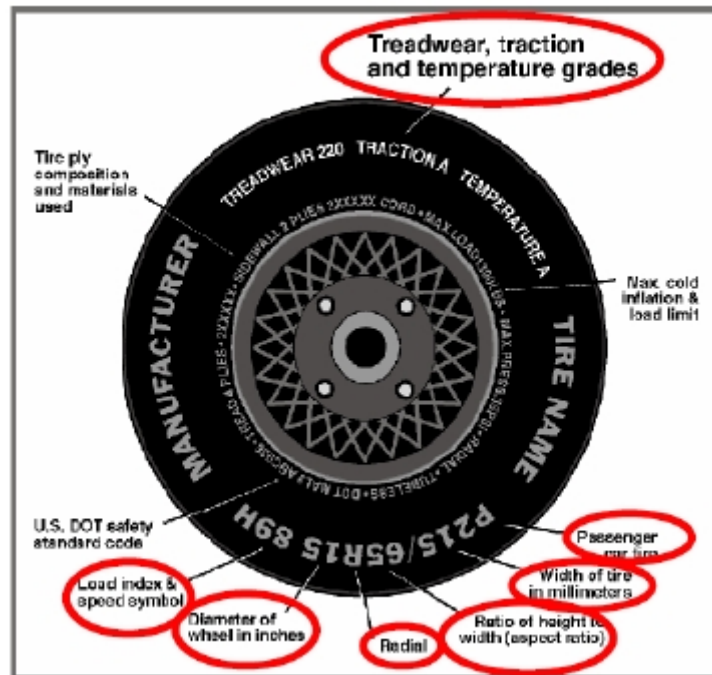
Seating Location	Type Of Seat Pan				Type Of Seat Back	
	Bucket	Bench	Split Bench	Contour	Fixed	Adjustable
						W/ Lever W/ Knob
Front	X					X
Rear or Second Row Seat			X			X
Third Row Seat			X			X

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

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023

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)	220	220
Recommended Tire Size	265/60R18	265/60R18
Tire Size on Vehicle	265/60R18	265/60R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Latitude Tour HP	Latitude Tour HP
Treadwear	440	440
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	109H	109H
Tire Material	Rubber	Rubber
DOT Safety Code Left	OC5E002X3922	OC5E002X3922
DOT Safety Code Right	OC5E002X3922	OC5E002X3922

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

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	236	245	218	226
Tire Placard	kPa	220	220	220	220
Owner's Manual	kPa	220	220	220	220
As Tested	kPa	220	220	220	220

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Rear	Total	Total	Front	Rear	Total
Left	kg	628	576		644	640		648	646	
Right	kg	602	551		612	608		607	611	
Ratio	%	52.2	47.8		50.2	49.8		50.0	50.0	
Totals	kg	1230	1127	2357	1256	1248	2504	1255	1257	2512

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2357	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	103.7	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2510.7	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range (i.e. Calculated

Test Vehicle Target Weight – 4.5 kg to – 9 kg)?



Yes



No

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	- 0.15	-0.15	- 0.10	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	- 0.35	-0.20	- 0.20	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	+ 0.15	+0.30	+ 0.30	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	- 0.25	-0.25	- 0.10	Yes
Vehicle CG (Aft of Front Axle)	mm	1335	1392	1398	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	-18	-21	-25	

* ND = Nose Down (-), NU = Nose Up (+)

** LD = Left Down (-), LU = Left Up (+)

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for Meets Requirement

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

Test Vehicle: 2023 Lexus GX 460 5 Door SUV	NHTSA No.: M20235104
Test Program: NCAP Side Pole Impact Test	Test Date: 06/09/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	11
Ballast / Equipment Added	52
Test Height – Adjustable Suspension Setting, if Applicable	N/A

TEST SURFACE MARKING

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	936
Aft 25 mm target	934

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

Test Vehicle: 2023 Lexus GX 460 5 Door SUV

NHTSA No.: M20235104

Test Program: NCAP Side Pole Impact Test

Test Date: 06/09/2023

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, 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	19.4	8.3	13.9
Front Passenger Seat	18.4	7.0	12.7
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	13.9	45	Max	48	57	65
			Mid	27	36	45
			Min	6	16	25
Front Passenger Seat	12.7	46	Max	48	57	66
			Mid	28	37	46
			Min	7	16	25
Front Center Seat*			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	Fixed	Fixed	Max			
			Mid			
			Min			

*If applicable

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

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

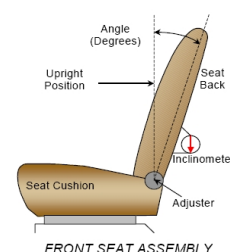
NHTSA No.: M20235104
 Test Date: 06/09/2023

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	220	Powered	0	Powered
Front Passenger Seat	220	Powered	0	Powered
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

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. 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 passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back are set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	45.0	Powered	-6.25	Powered
Front Passenger Seat	46.0	Powered	-5.8	Powered
Front Center Seat				
Struck Side Rear Seat	30.9	9 (0-8)	14.9	0
Non-Struck Side Rear Seat	30.5	9 (0-8)	14.5	0
Rear Center Seat	30.5	9 (0-8)	14.5	0

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. Zero is defined as the uppermost detent

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

HEAD RESTRAINT ADJUSTMENT

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

Seat	Total # of Positions	Placed in Position #
Driver Seat	3 (0-2)	Lowermost

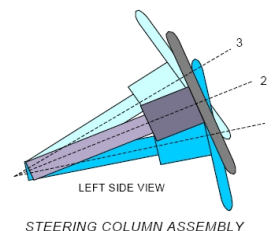
DATA SHEET NO. 2 ... (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023

STEERING COLUMN POSITIONS

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

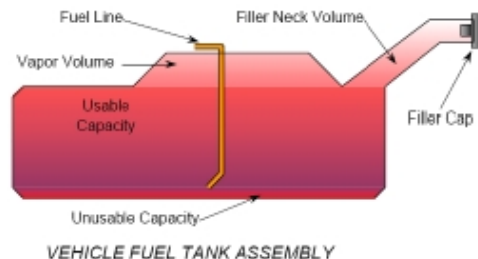


	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	20.9	
Geometric center - Position No. 2	28.0	
Uppermost - Position No. 3	35.1	
Telescoping Steering Wheel Travel		40
Test Position	28.0	20

FUEL PUMP

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

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



FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" - see Form No. 1	87
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	87
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	80.9
Actual Amount of Solvent Used in Test	80.9
1/3 of Usable Capacity	29

Is the Actual Amount of Solvent Used in the test equal to 93% $\pm$ 1% of the Usable

Capacity stated in Form No. 1?



Yes

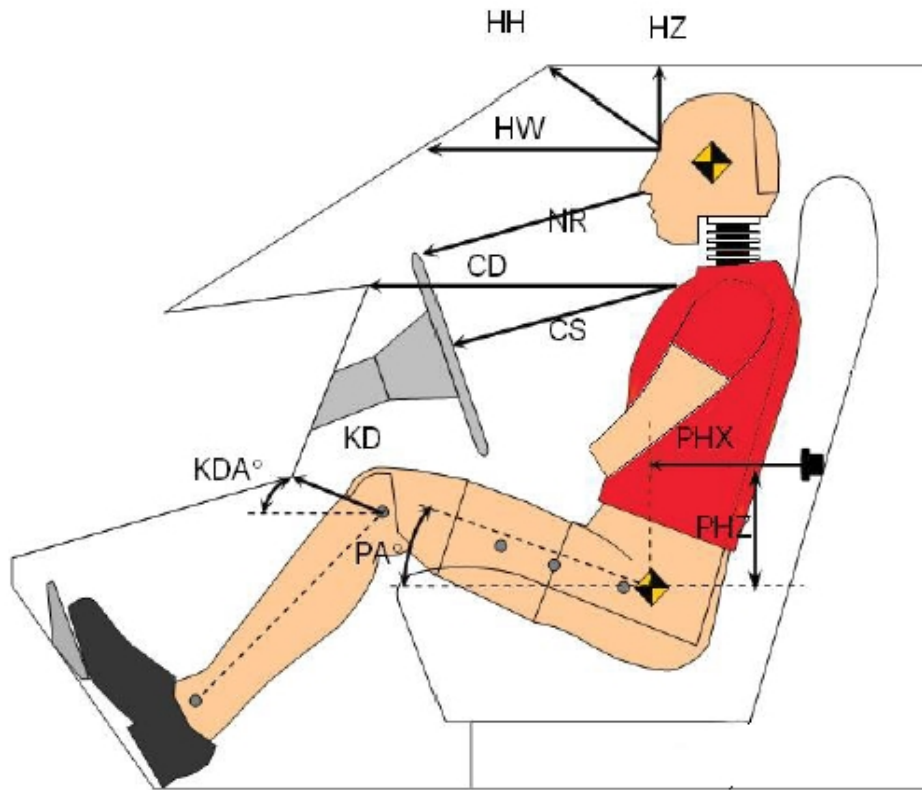


No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023



Left Side View

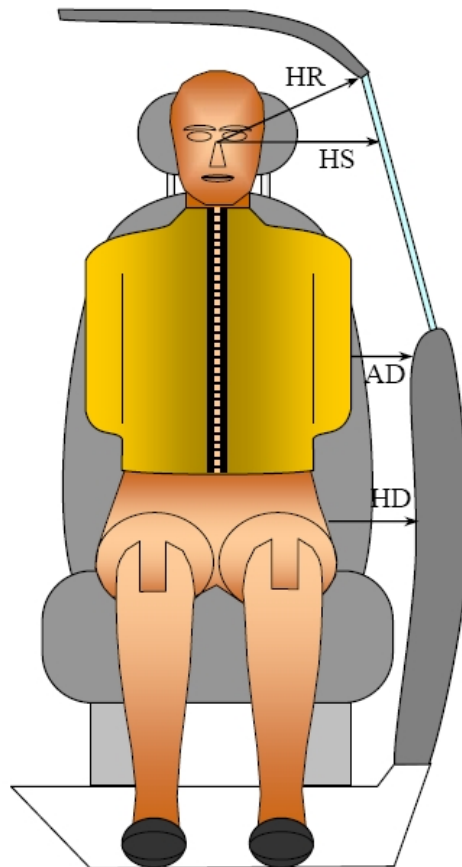
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. 300)	
		Length (mm)	Angle (°)
HH	Head to Header	339	
HW	Head to Windshield	579	
HZ	Head to Roof Liner	195	
NR	Nose to Rim	270	
CD	Chest to Dash	444	
CS	Chest to Steering Wheel	197	
KD(L) / KDA(L)°	Left Knee to Dash	121	30.2
KD(R) / KDA(R)°	Right Knee to Dash	108	19.6
PAX°	Pelvic Tilt Angle (X-Axis)		18.3
PAY°	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	343	
PHZ	Hip Point to Striker (Z-Axis)	133	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023



FRONT VIEW OF DUMMY

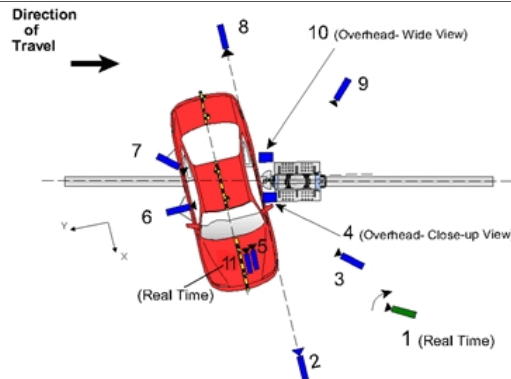
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver – Length (Serial No. 300)
HR	Head to Side Header	mm	250
HS	Head to Side Window	mm	348
AD	Arm to Door	mm	119
HD	H-Point to Door	mm	161

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	30
2	Front ground level - impact view	0	7410	-1351	24	1000
3	Impact side 45° - forward pole view	791	5902	-1380	24	1000
4	Overhead Close-up view of impact	0	0	-9200	24	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	0	-8805	-1464	24	1000
9	Impact side 45° - rearward pole view	-4085	-3183	-1448	28	1000
10	Overhead wide - view of impact	0	0	-9200	16	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	60

Notes: Reference - From Point of Impact for X and Y; from Ground for Z
+X = Forward of vehicle, +Y = Right of vehicle, +Z = Down
* All measurements accurate to ± 6 mm. Vehicle is at a 75° angle to the rigid pole.

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

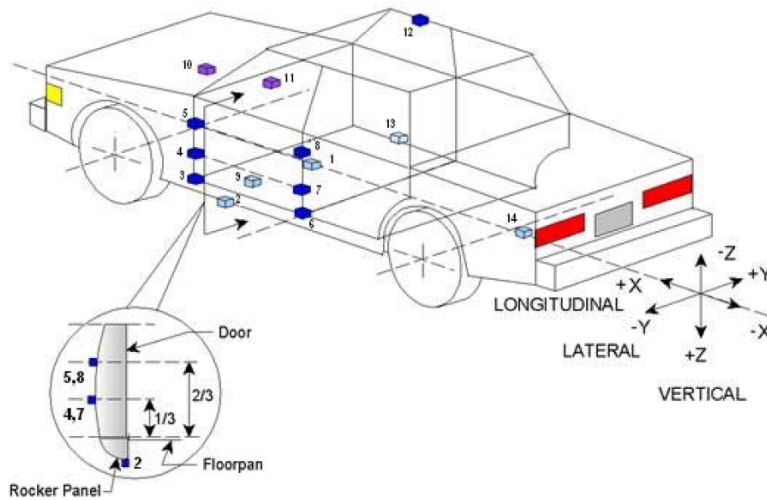
INSTRUMENTATION

Description	Number of Channels
Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	42

DATA SHEET NO. 6 **TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2244	-4	-20
2	Left Floor Sill	2932	-689	31
3	A-Pillar Sill	3340	-658	-18
4	A-Pillar Low	3475	-645	-182
5	A-Pillar Mid	3255	-676	-689
6	B-Pillar Sill	2222	-695	-4
7	B-Pillar Low	2256	-694	-246
8	B-Pillar Mid	2222	-677	-633
9	Driver Seat Track	2523	-581	-26
10	Engine Top	3968	3	-503
11	Firewall	3627	37	-581
12	Right Roof	2355	648	-1161
13	Right Floor Sill	2933	661	71
14	Rear Floor Pan	1201	117	-105

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

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023

POLE BARRIER



RIGID POLE LOAD CELL LOCATION

ID	Units	Height From Ground
1	mm	200
2	mm	590
3	mm	750
4	mm	1075
5	mm	1260
6	mm	1740
7	mm	1920
8	mm	2300

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag & Headliner
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag & Headrest
Left Shoulder	Torso/Pelvis Airbag & Seat Back
Upper Torso	Seat Back
Lower Torso	Seat Back
Left Hip	Seat Pan & Torso/Pelvis Airbag
Left Knee	Driver Door & Steering Column

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

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

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar & B-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracked Throughout
Side Window Damage	Driver window shattered but remained laminated
Other Notable Effects	Sunroof shattered during impact event

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Airbag 3 - Torso Airbag	No	N/A	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

VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

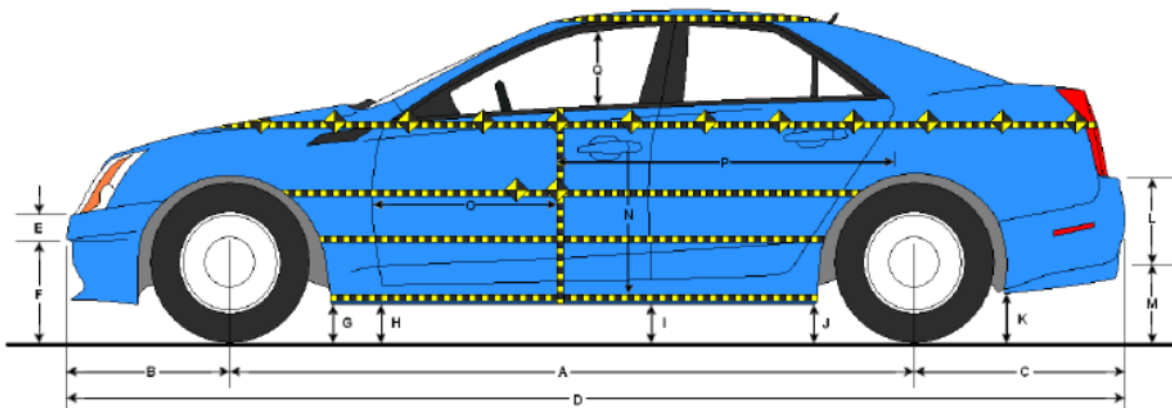
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1189
Actual Impact Point - Aft of Front Axle	mm		1190
Horizontal Offset (+ forward / - rearward)	mm	+/- 38*	-1
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.04
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	31.98

*Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

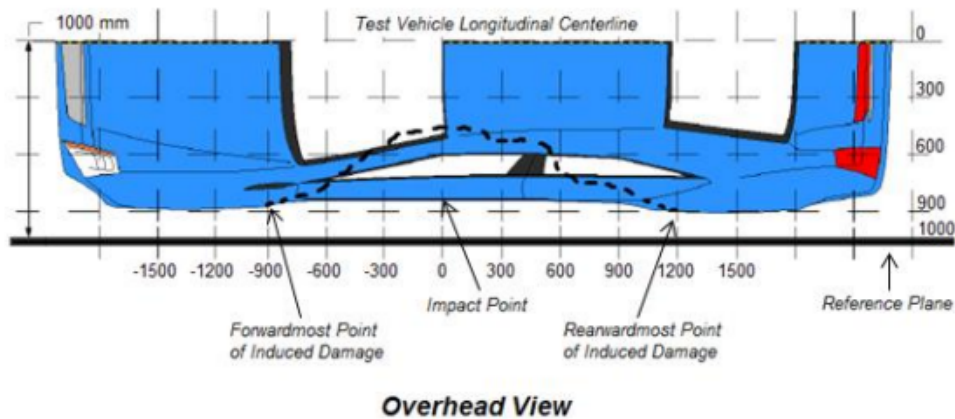
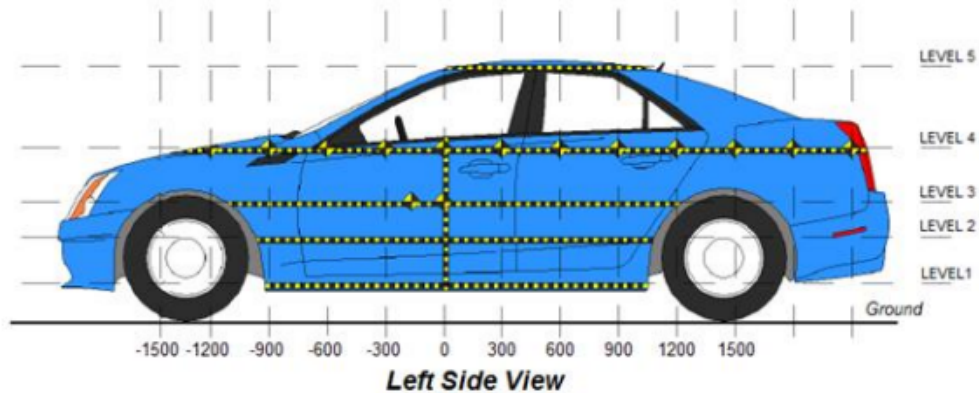
No.	Measurement Description	Pre-Test	Post-Test	Change
A	Vehicle Wheelbase	2793	2734	-59
B	Front Axle to FSOV	987	1045	58
C	Rear Axle to RSOV	1107	1061	-46
D	Total Length at Centerline	4886	4840	-46
E	Front Bumper Thickness	138	138	0
F	Front Bumper Bottom to Ground	422	450	28
G	Sill Height at Front Wheel Well	255	249	-6
H	Sill Height at Front Door Leading Edge	262	268	6
I	Sill Height at B Pillar	285	251	-34
J1	Sill Height at Rear Wheel Well	269	316	47
J2	Pinch Weld Height at Rear Wheel Well	400	422	22
K	Sill Height Aft of Rear Wheel Well	317	338	21
L	Rear Bumper Thickness	132	132	0
M	Rear Bumper Bottom to Ground	462	461	-1
N	Sill Height to Bottom of Front Window Sill	786	784	-2
O	Front Door Leading Edge to Impact CL	639	531	-108
P	Rear Door Trailing Edge to Impact CL	1441	1337	-104
Q	Front Window Opening	426	429	3
R	Right Side Length	4836	4818	-18
S	Left Side Length	4832	4750	-82
T	Vehicle Width at B-Pillars	1878	1687	-191
U	Front Wheel Track Width	1590	1596	6
V	Rear Wheel Track Width	1584	1577	-7

* All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO.10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	518	381	0
2	Driver H-Point	mm	849	409	0
3	Mid-Door	mm	906	411	0
4	Window Sill	mm	1182	353	0
5	Window Top	mm	1734	165	0

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.10 ... (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

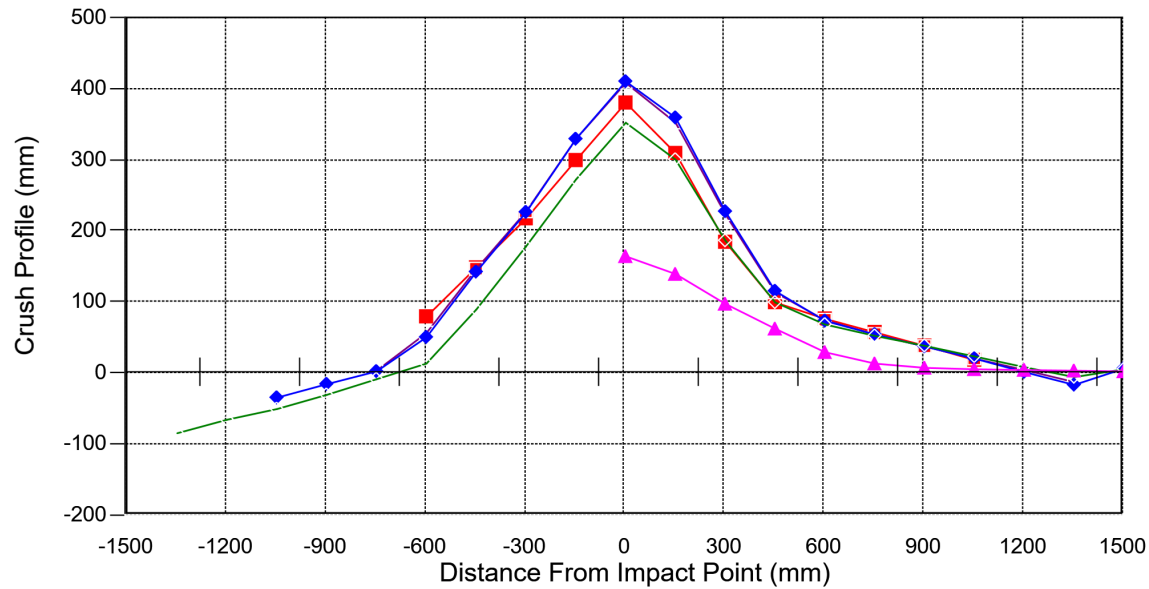
	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350				818					902					-84	
-1200				832					897					-65	
-1050			944	836				978	886				-34	-50	
-900			944	839				959	869				-15	-30	
-750		943	937	841			939	934	849			4	3	-8	
-600	910	930	927	836		830	873	876	822		80	57	51	14	
-450	903	920	919	843		754	773	776	753		149	147	143	90	
-300	900	918	917	850		682	690	690	671		218	228	227	179	
-150	898	919	919	853		598	589	589	580		300	330	330	273	
0	897	919	920	855	624	516	510	509	502	459	381	409	411	353	165
150	896	918	919	857	641	586	565	559	556	501	310	353	360	301	140
300	894	917	918	859	645	709	693	690	672	547	185	224	228	187	98
450	892	915	916	860	648	792	801	800	760	585	100	114	116	100	63
600	891	912	914	859	648	814	837	840	790	618	77	75	74	69	30
750	891	911	912	858	648	833	856	857	805	634	58	55	55	53	14
900	899	928	928	857	647	860	890	890	818	639	39	38	38	39	8
1050	913	938	937	856	646	894	917	916	832	640	19	21	21	24	6
1200		942	940	854	645		937	938	845	640		5	2	9	5
1350		943	944	857	644		955	960	862	640		-12	-16	-5	4
1500			944	862	644			937	856	641			7	6	3

NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

DATA SHEET NO.10 ... (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
 Test Date: 06/09/2023



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.11 **VEHICLE DAMAGE PROFILE DISTANCE**

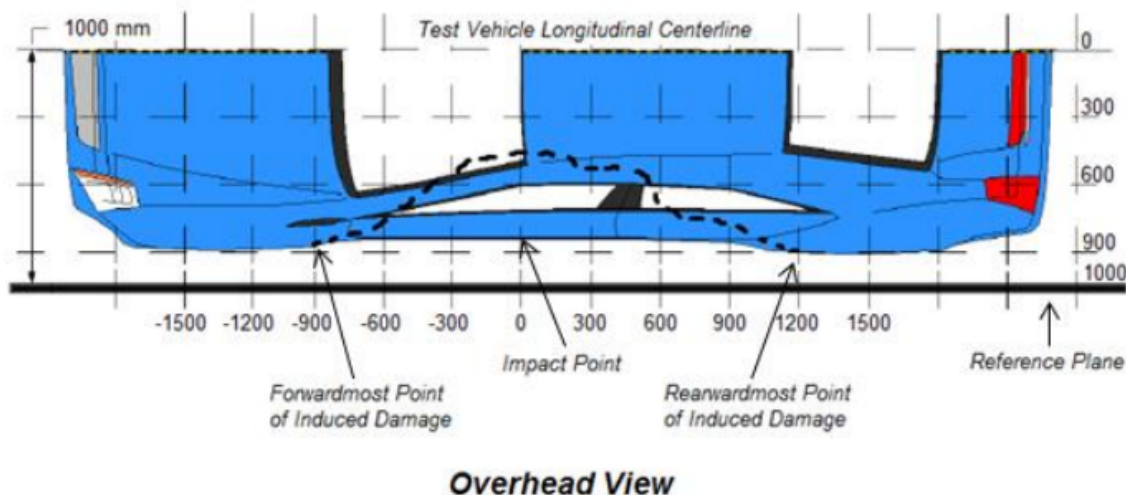
Test Vehicle: 2023 Lexus GX 460 5 Door SUV

NHTSA No.: M20235104

Test Program: NCAP Side Pole Impact Test

Test Date: 06/09/2023

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



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-1050	3	22	56	-34
2	-540	3	164	76	88
3	-30	3	475	80	395
4	480	3	192	84	108
5	990	3	94	67	27
6	1500	3	63	56	7

DATA SHEET NO.12
FMVSS NO.301 STATIC ROLLOVER RESULTS

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023

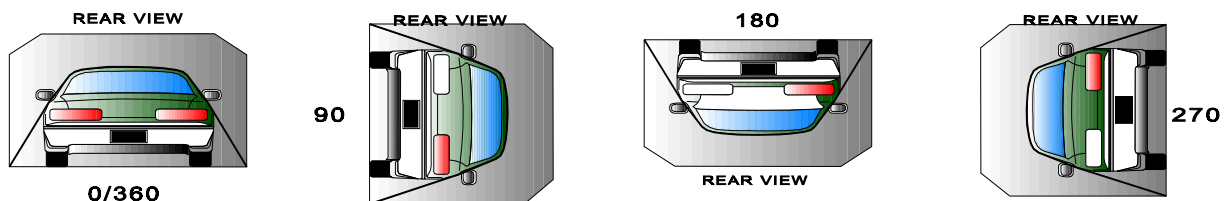
Test Time: 10:10AM

Temperature: 21.0 °C

- A. From impact until vehicle motion ceases: 0 oz
(Maximum allowable is 1 oz.)
B. For the 5-minute period after motion ceases: 0 oz
(Maximum allowable is 5 oz.)
C. For the following 25 minutes: 0 oz
(Maximum allowable is 1 oz.)

D. Spillage Detail:

No Spillage Occurred



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	65	300	365
90° to 180°	66	300	366
180° to 270°	68	300	368
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

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

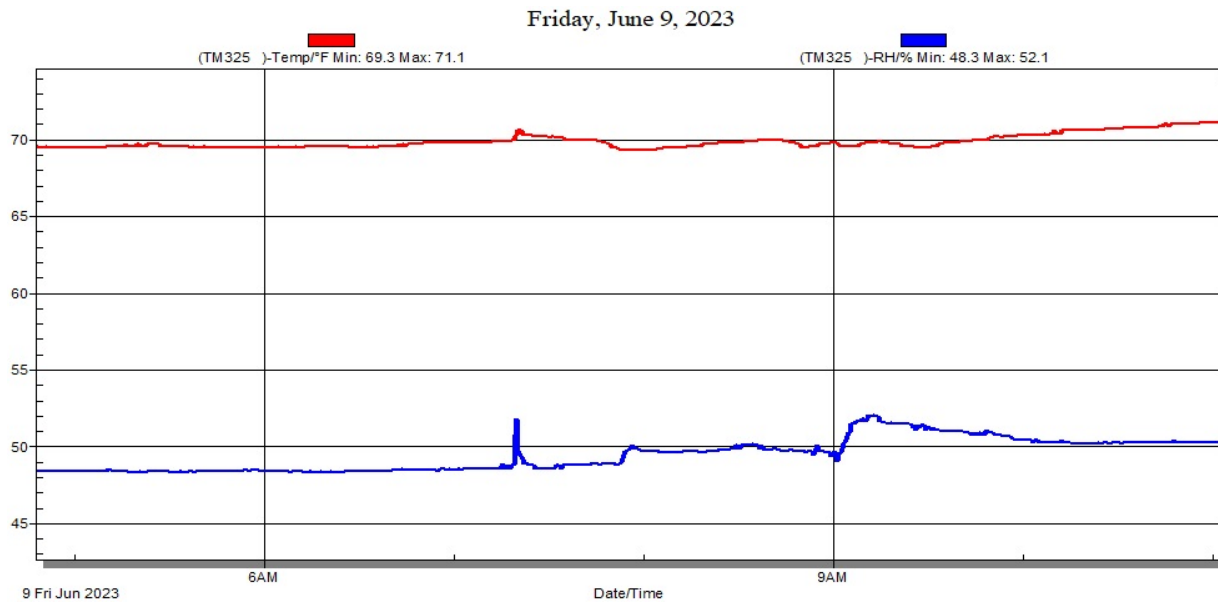
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 13
DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2023 Lexus GX 460 5 Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20235104
Test Date: 06/09/2023



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

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-4
2	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-4
3	Pre-Test Frontal View of Test Vehicle	A-5
4	Post-Test Frontal View of Test Vehicle	A-5
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
7	Pre-Test Left Side View of Test Vehicle	A-7
8	Post-Test Left Side View of Test Vehicle	A-7
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
11	Pre-Test Rear View of Test Vehicle	A-9
12	Post-Test Rear View of Test Vehicle	A-9
13	Pre-Test Right Side View of Test Vehicle	A-10
14	Post-Test Right Side View of Test Vehicle	A-10
15	Pre-Test Overhead View of Test Area	A-11
16	Post-Test Overhead View of Test Area	A-11
17	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-12
18	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-12
19	Pre-Test Close-Up View of Impact Point Target	A-13
20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-13
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-14
22	Post-Test Front Close-Up View of Dummy	A-14
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-15
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-15
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-16
26	Pre-Test Frontal View of Seat Back Prior to Dummy Positioning	A-16
27	Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint	A-17
28	Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning	A-17
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-18
30	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-18
31	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-19
32	Pre-Test Placement of Dummy's Feet	A-19
33	Pre-Test View of Belt Anchorage for Dummy	A-20
34	Pre-Test Left Side View of Steering Wheel	A-20
35	Pre-Test View of Disengaged Parking Brake	A-21

Fig.	Description	Page
36	Pre-Test View of Parking Brake	A-21
37	Pre-Test Close-Up Left Side View of Driver Seat Track	A-22
38	Pre-Test Close-Up Left Side View of Driver Seat Back	A-22
39	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-23
40	Pre-Test Dummy and Door Clearance View	A-23
41	Post-Test Dummy and Door Clearance View	A-24
42	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-24
43	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-25
44	Pre-Test Inner Door Panel View	A-25
45	Post-Test Inner Door Panel View Showing Dummy Contact Location	A-26
46	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-26
47	Post-Test Dummy Close-Up Head Contact with Side Airbag View	A-27
48	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-27
49	Post-Test Dummy Close-Up Torso Contact with Side Airbag View	A-28
50	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-28
51	Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View	A-29
52	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-29
53	Pre-Test Right Side View of Dummy and Rear Seat of Occupant Compartment	A-30
54	Post-Test Inner Rear Passenger Torso Air Bag Deployment View	A-30
55	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-31
56	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-31
57	Close-Up View of Vehicle's Certification Label	A-32
58	Close-Up View of Vehicle's Tire Information Placard or Label	A-32
59	Pre-Test Pole Barrier Front View	A-33
60	Post-Test Pole Barrier Front View	A-33
61	Pre-Test Pole Barrier Side View	A-34
62	Post-Test Pole Barrier Side View	A-34
63	Pre-Test Ballast View	A-35
64	Post-Test Primary and Redundant Speed Trap Read-Out	A-35
65	FMVSS No. 301 Static Rollover 0 Degrees	A-36
66	FMVSS No. 301 Static Rollover 90 Degrees	A-36
67	FMVSS No. 301 Static Rollover 180 Degrees	A-37
68	FMVSS No. 301 Static Rollover 270 Degrees	A-37
69	FMVSS No. 301 Static Rollover 360 Degrees	A-38
70	Impact Event	A-38
71	Monroney Label	A-39
72	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-39
73	Post-Test View of Shattered Vehicle Inner Door Panel	A-41



M20235104

Figure A-1: As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



M20235104

Figure A-2: As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



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



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



Figure A-5: Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-6: Post-Test Left Front $\frac{3}{4}$ 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 $\frac{3}{4}$ View of Test Vehicle



Figure A-10: Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle

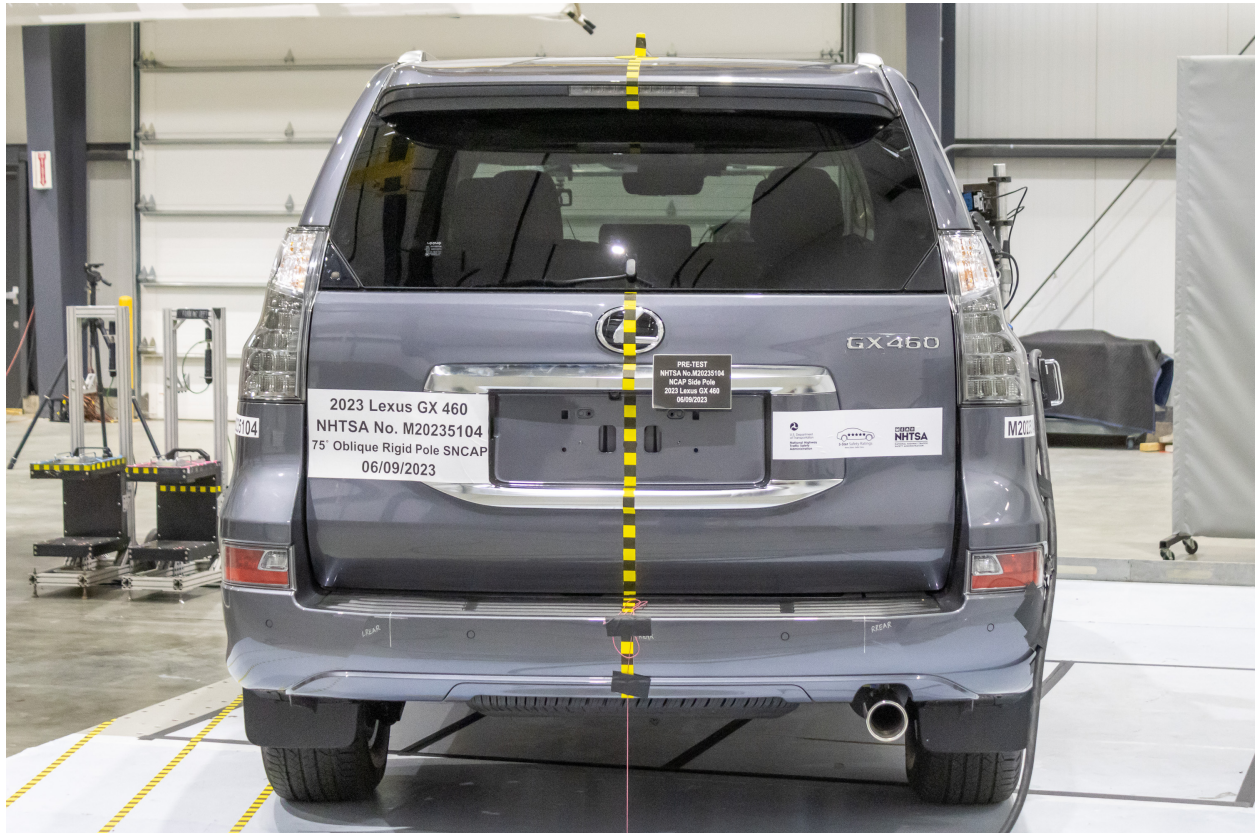


Figure A-11: Pre-Test Rear View of Test Vehicle



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



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



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



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

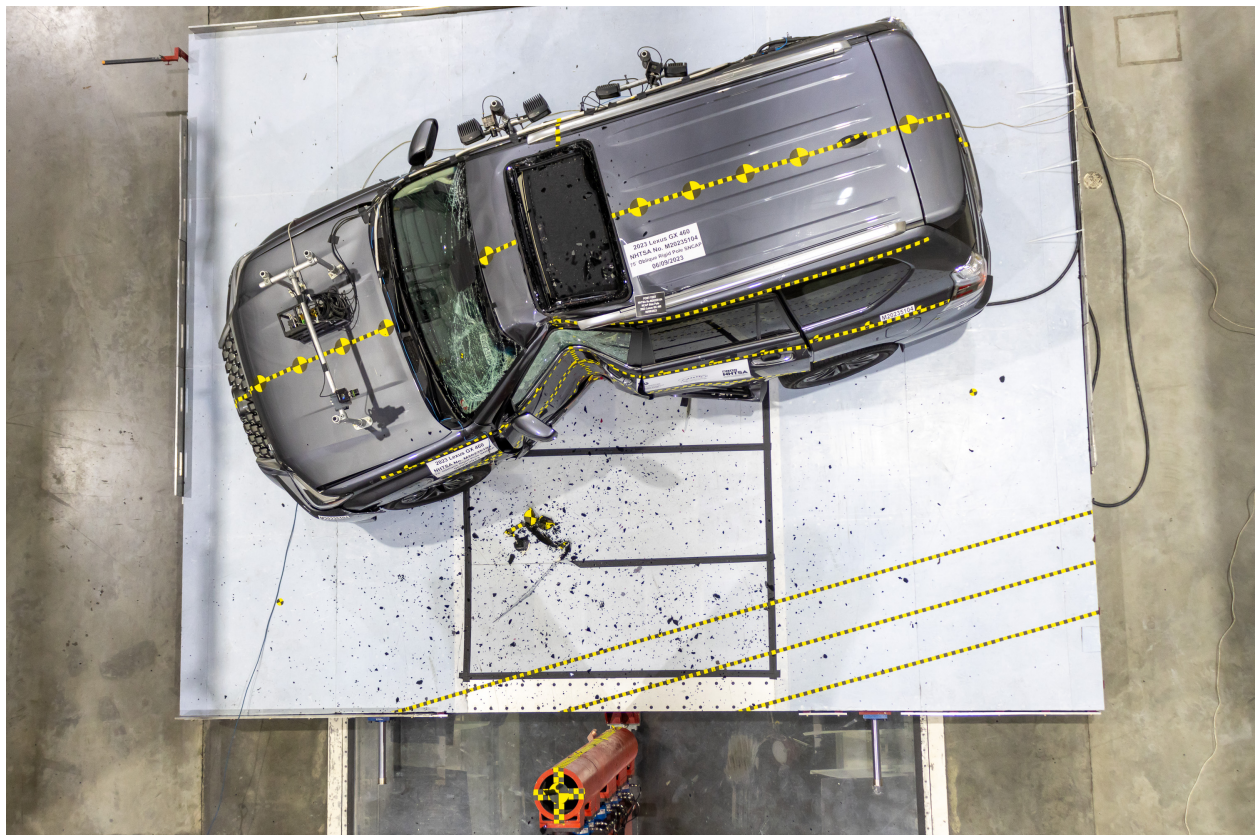


Figure A-16: Post-Test Overhead View of Test Area

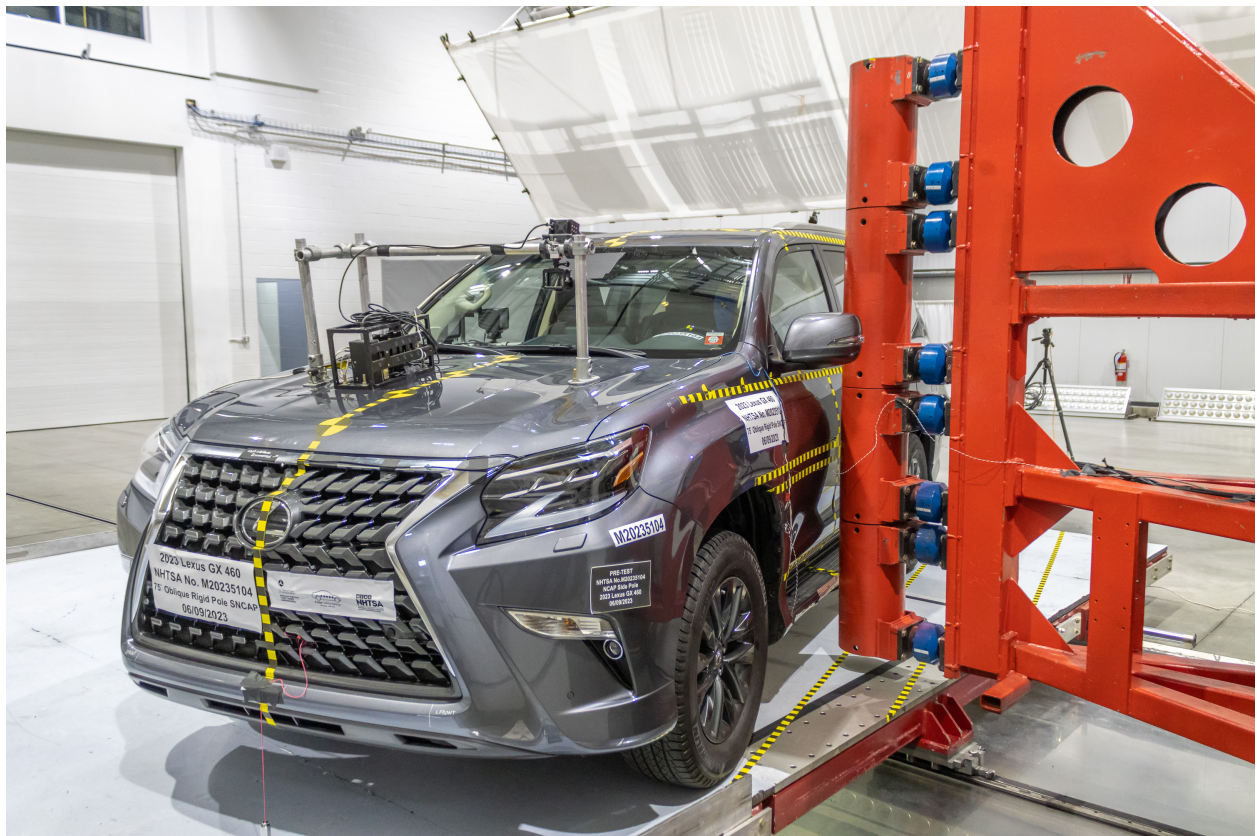


Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of 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 Showing Impact Location



Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest



Figure A-22: Post-Test Front Close-Up View of Dummy



Figure A-23: Pre-Test Left Side View of Dummy Showing Belt and Chalking



Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning

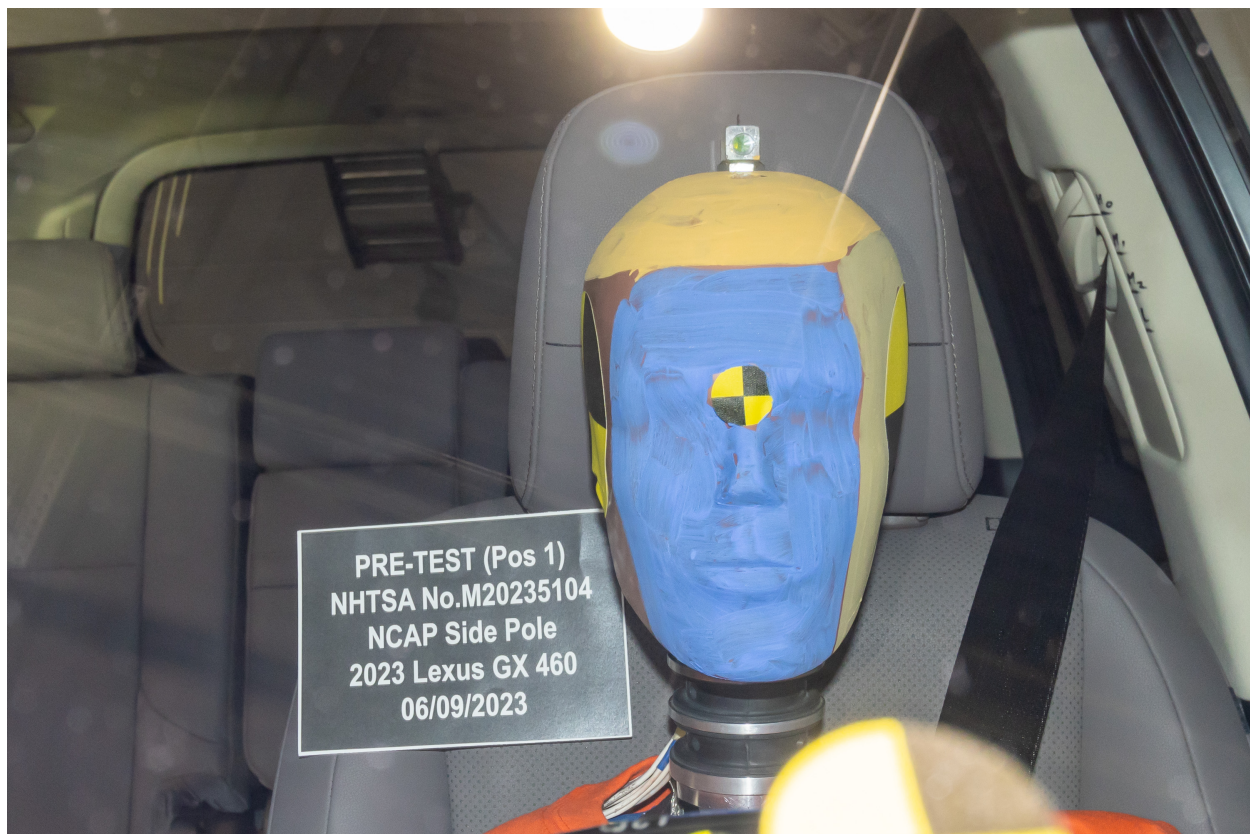


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan



Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Figure A-32: Pre-Test Placement of Dummy's Feet



Figure A-33: Pre-Test View of Belt Anchorage for Dummy



Figure A-34: Pre-Test Left Side View of Steering Wheel



Figure A-35: Pre-Test View of Disengaged Parking Brake



Figure A-36: Pre-Test View of Parking Brake



Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Track

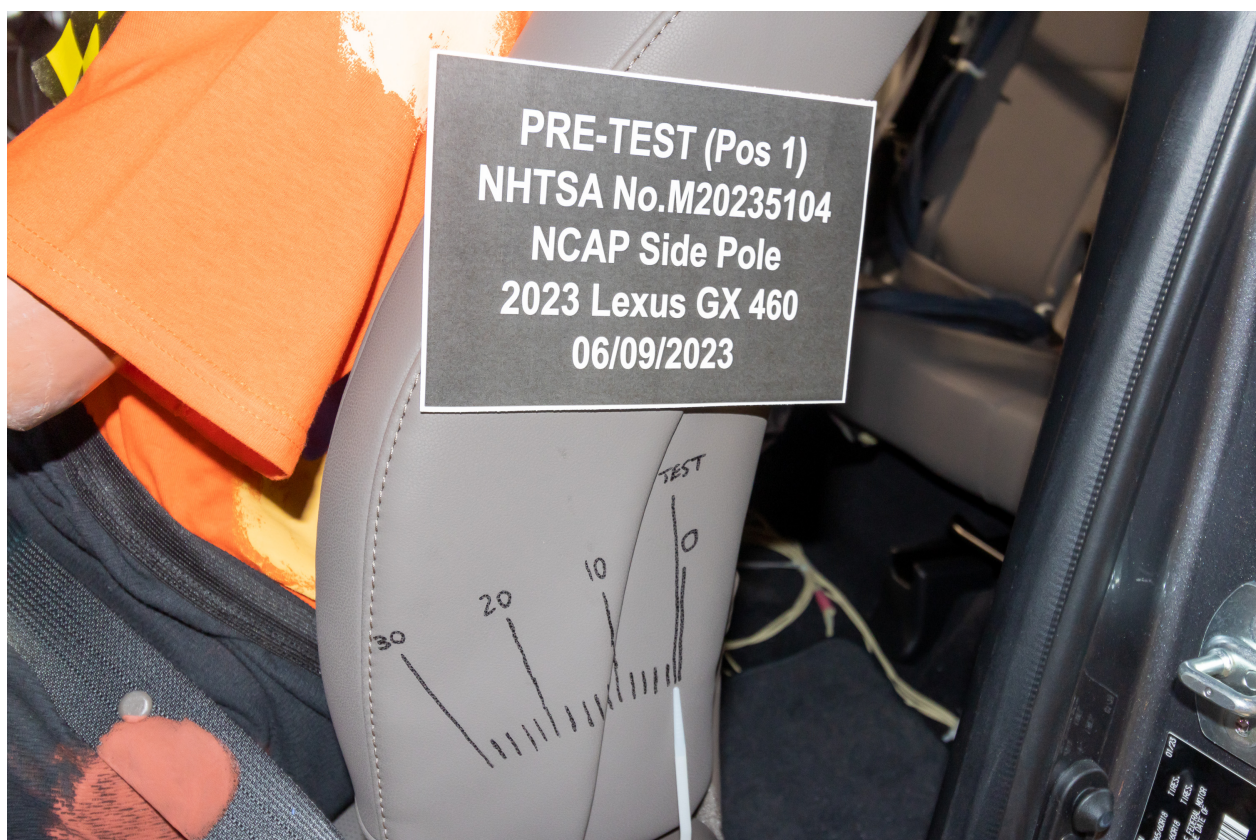


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



Figure A-39: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-40: Pre-Test Dummy and Door Clearance View



Figure A-41: Post-Test Dummy and Door Clearance View



Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-44: Pre-Test Inner Door Panel View



Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



Figure A-46: Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View



Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



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



Figure A-51: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



Figure A-52: Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Figure A-53: Pre-Test Right Side View of Dummy and Rear Seat of Occupant Compartment



Figure A-54: Post-Test Inner Rear Passenger Torso Air Bag Deployment View



Figure A-55: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-56: Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-57: Close-Up View of Vehicle's Certification Label



Figure A-58: Close-Up View of Vehicle's Tire Information Placard or Label

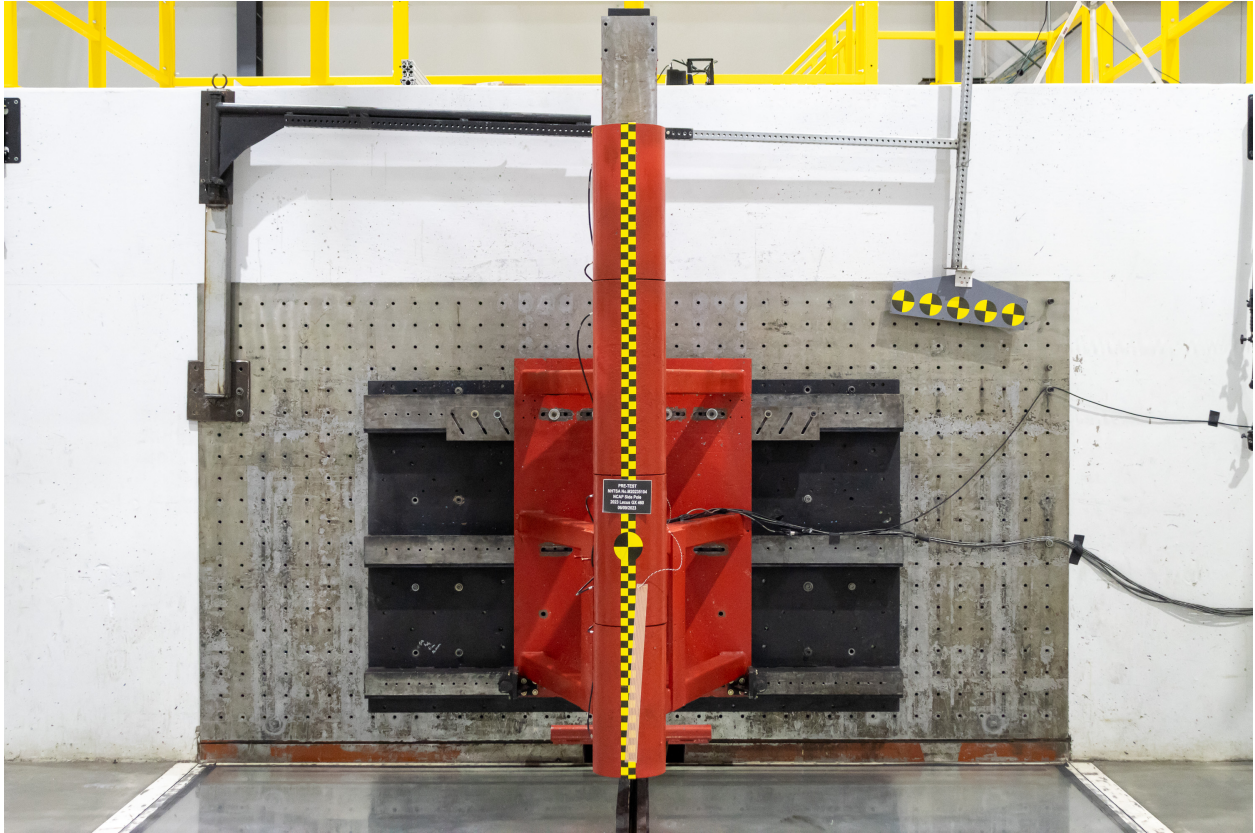


Figure A-59: Pre-Test Pole Barrier Front View

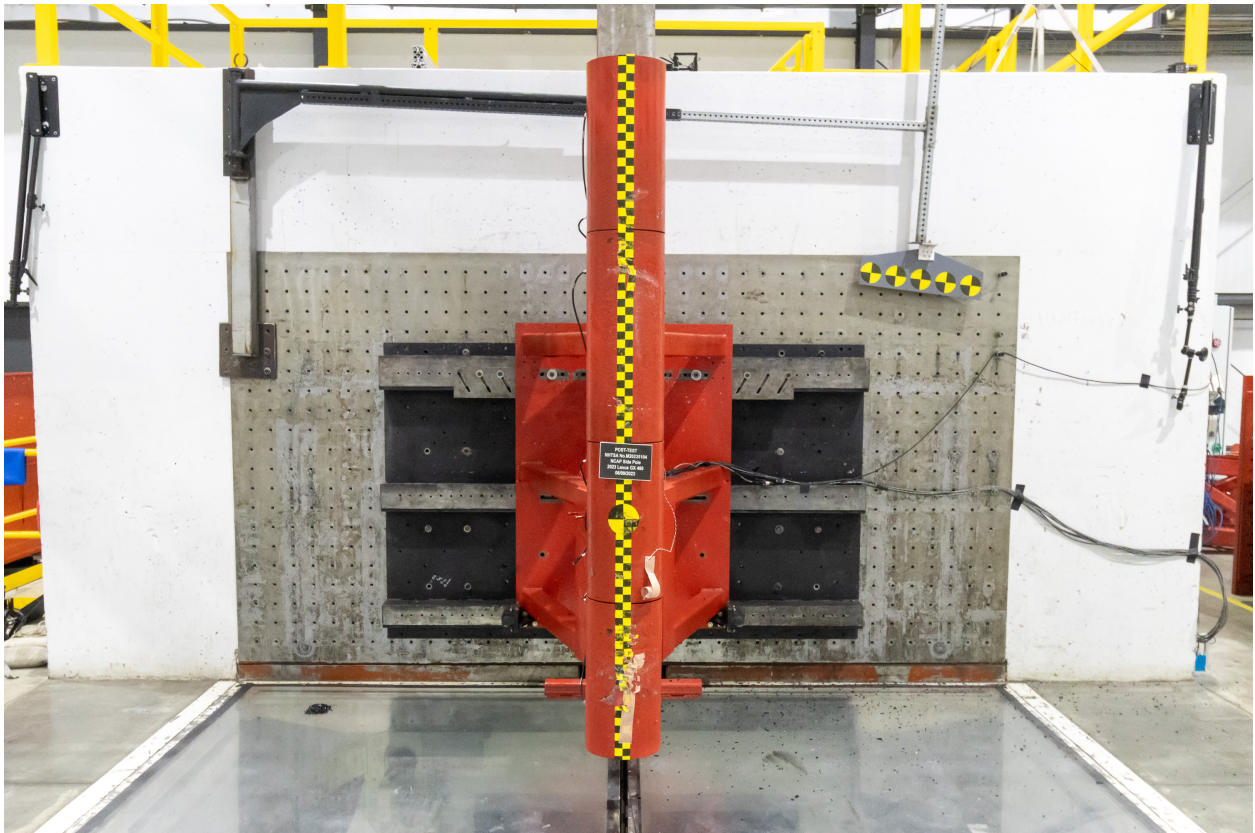


Figure A-60: Post-Test Pole Barrier Front View

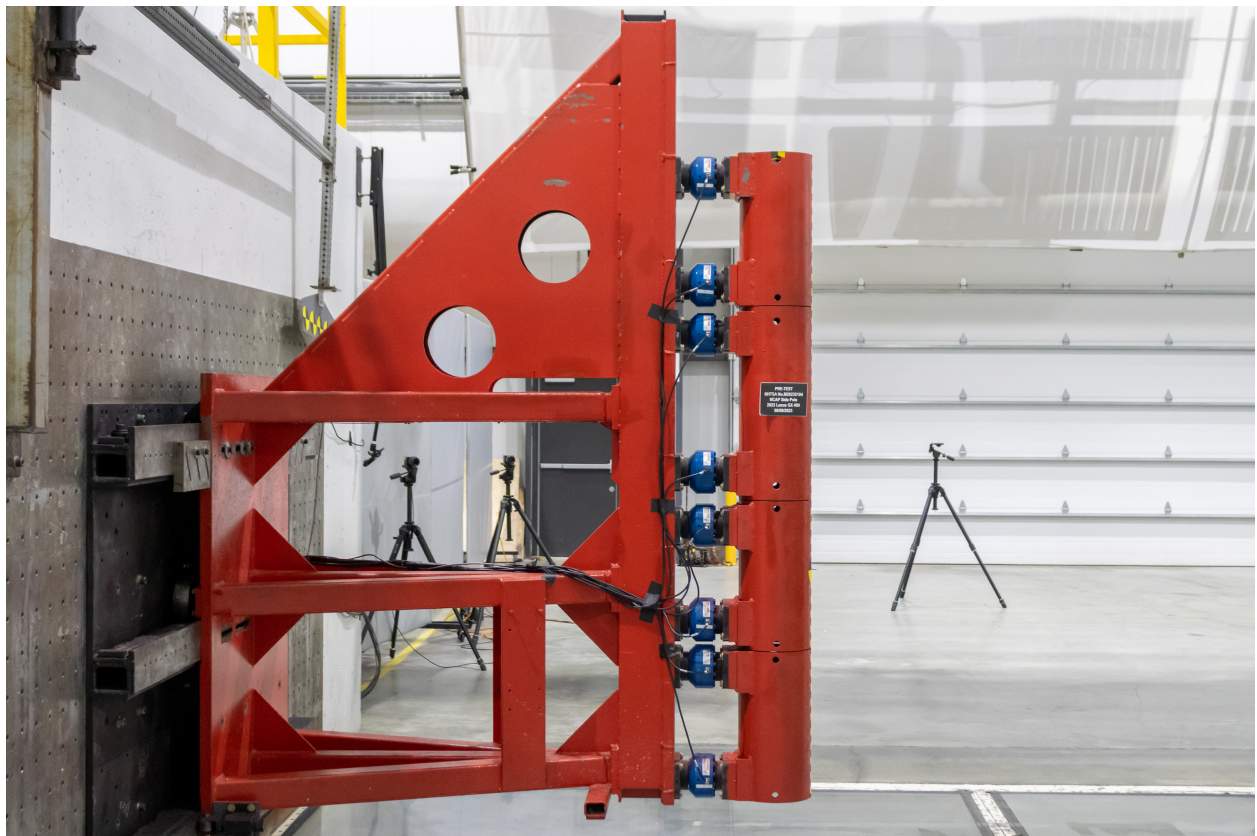


Figure A-61: Pre-Test Pole Barrier Side View

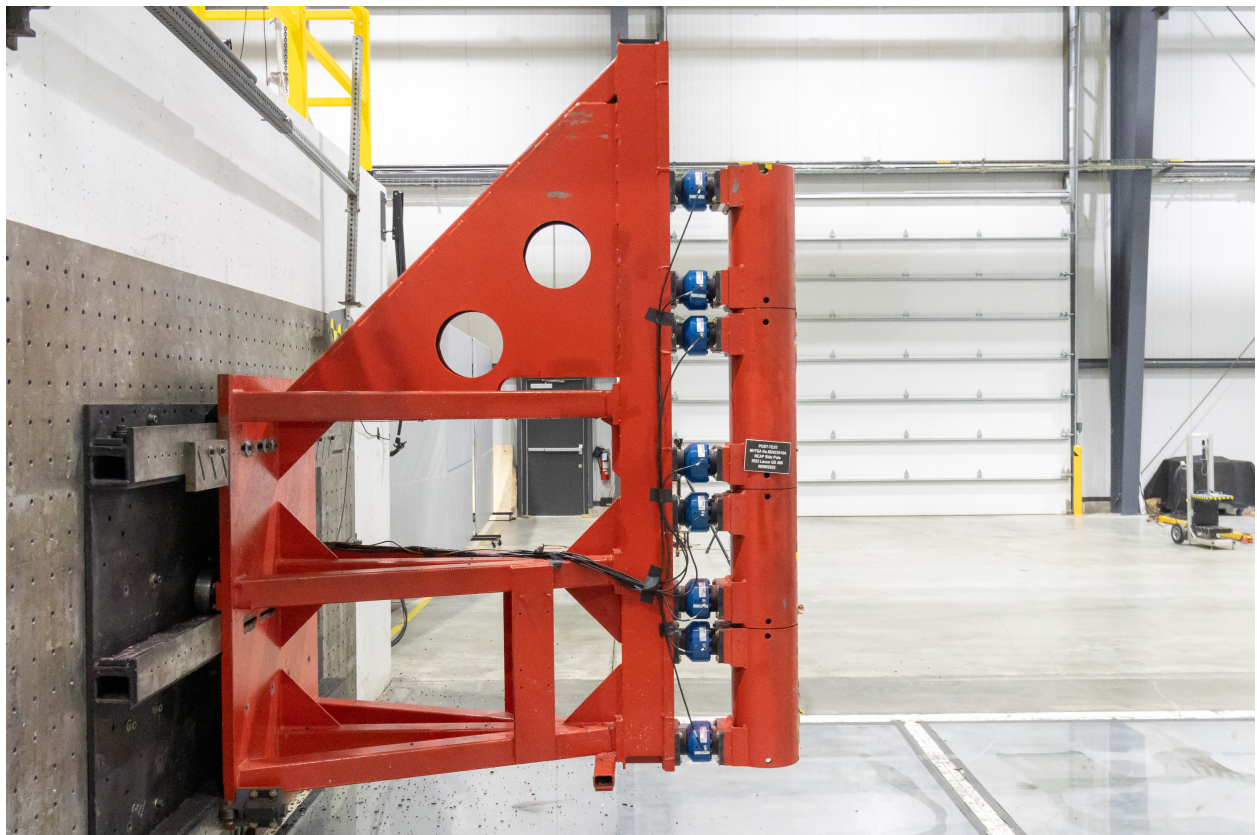


Figure A-62: Post-Test Pole Barrier Side View

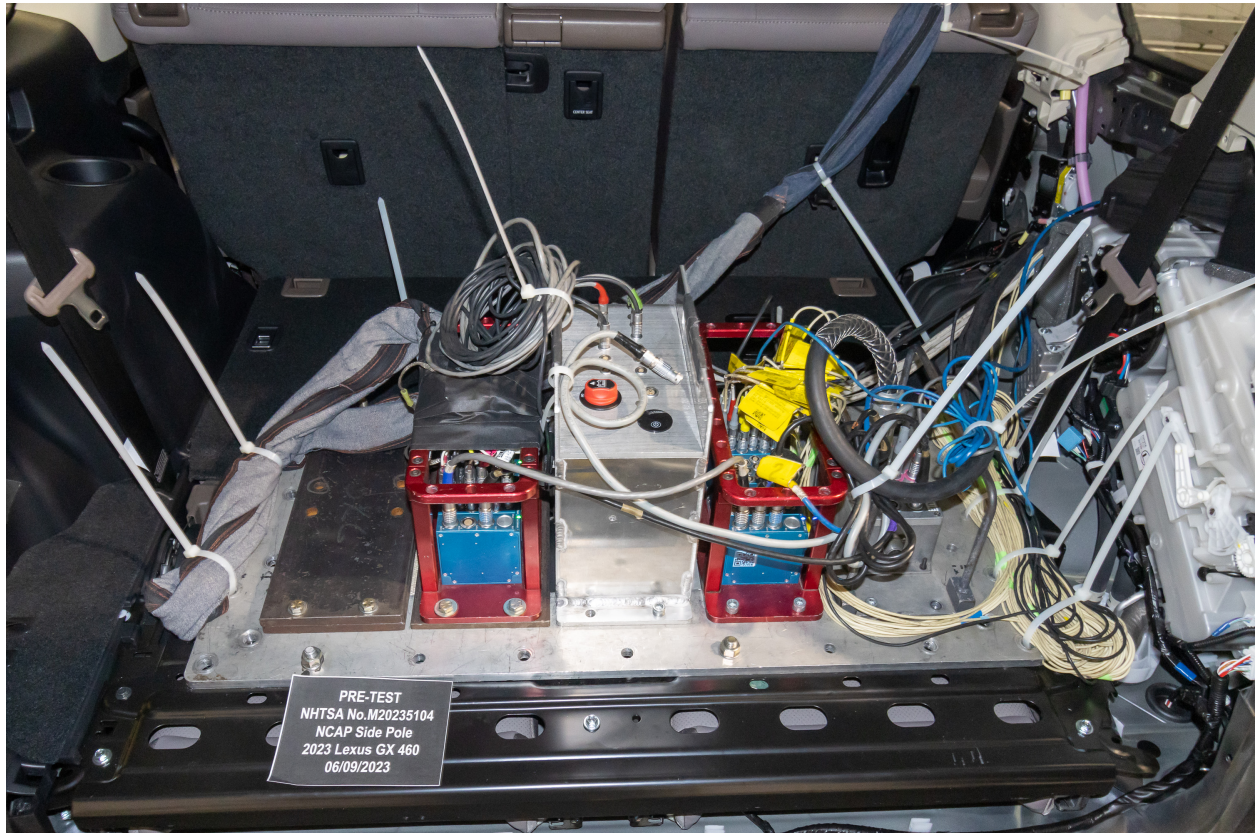


Figure A-63: Pre-Test Ballast View



Figure A-64: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-65: FMVSS No. 301 Static Rollover 0 Degrees

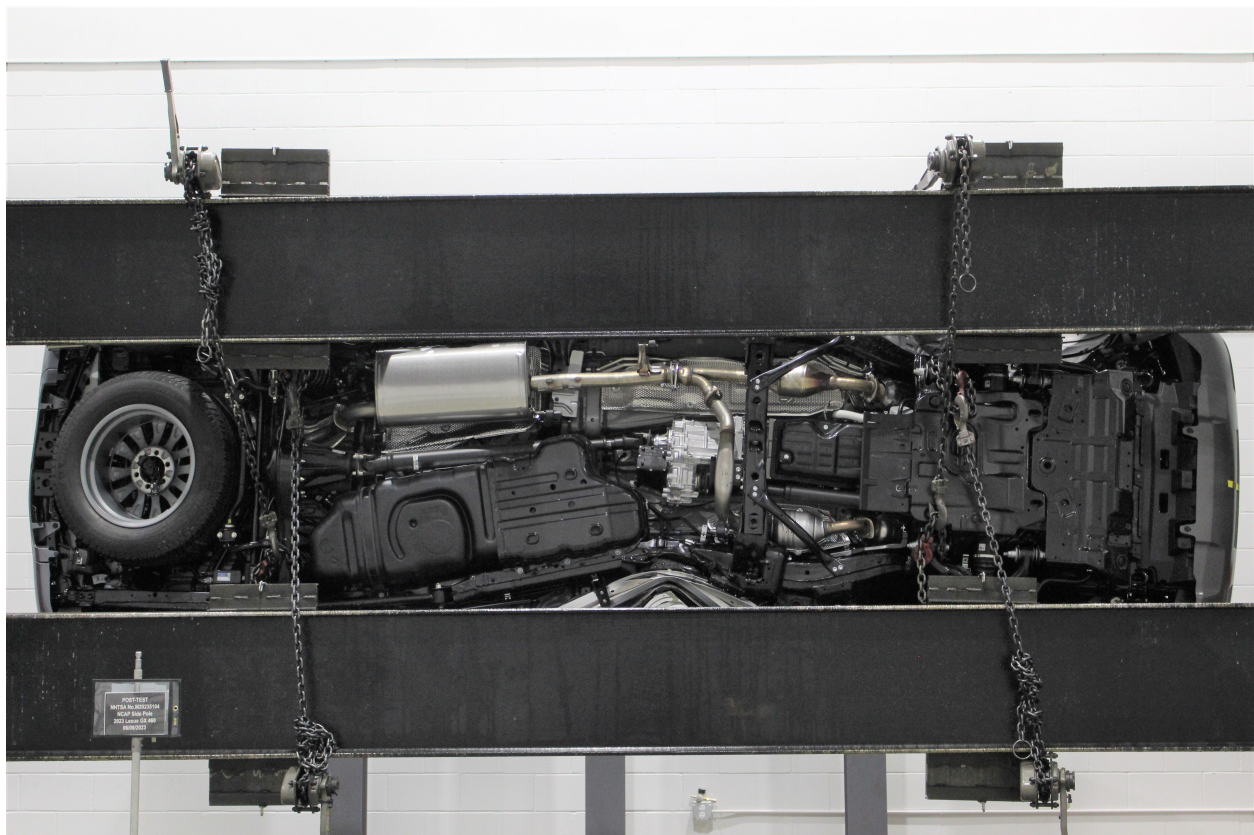


Figure A-66: FMVSS No. 301 Static Rollover 90 Degrees



Figure A-67: FMVSS No. 301 Static Rollover 180 Degrees



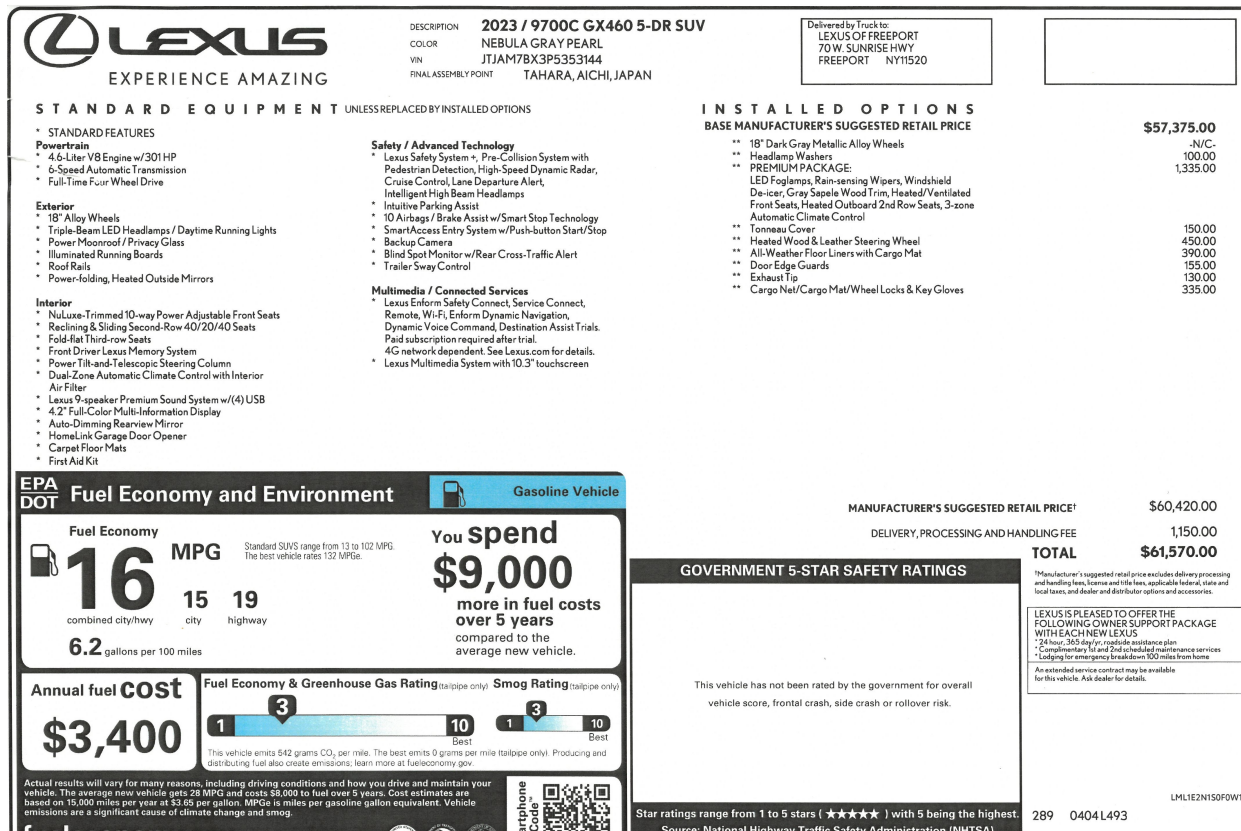
Figure A-68: FMVSS No. 301 Static Rollover 270 Degrees



Figure A-69: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-70: Impact Event



EPA DOT Fuel Economy and Environment

Fuel Economy

16 MPG

combined city/hwy

15 city

19 highway

6.2 gallons per 100 miles

You spend \$9,000 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$3,400

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **Smog Rating** (tailpipe only)

1 3 10 Best

This vehicle emits 542 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fuelconomy.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 \$6,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.65 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

MANUFACTURER'S SUGGESTED RETAIL PRICE* **\$60,420.00**

DELIVERY, PROCESSING AND HANDLING FEE **1,150.00**

TOTAL **\$61,570.00**

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA)

289 0404 L493

LML1E2N1S0F0W1

*Manufacturer's suggested retail price excludes delivery, processing and handling fees, license and title fees, applicable federal, state and local taxes, and dealer and distributor options and accessories.

LEXUS IS PLEASED TO OFFER THE FOLLOWING OWNER SUPPORT PACKAGE WITH EACH NEW LEXUS:

- 24-hour, 365-day in-vehicle assistance plan
- Complimentary 1st and 2nd scheduled maintenance services
- Locking for emergencies for add-on 100 miles from home

An extended service contract may be available for this vehicle. Ask dealer for details.

Figure A-71: Monroney Label

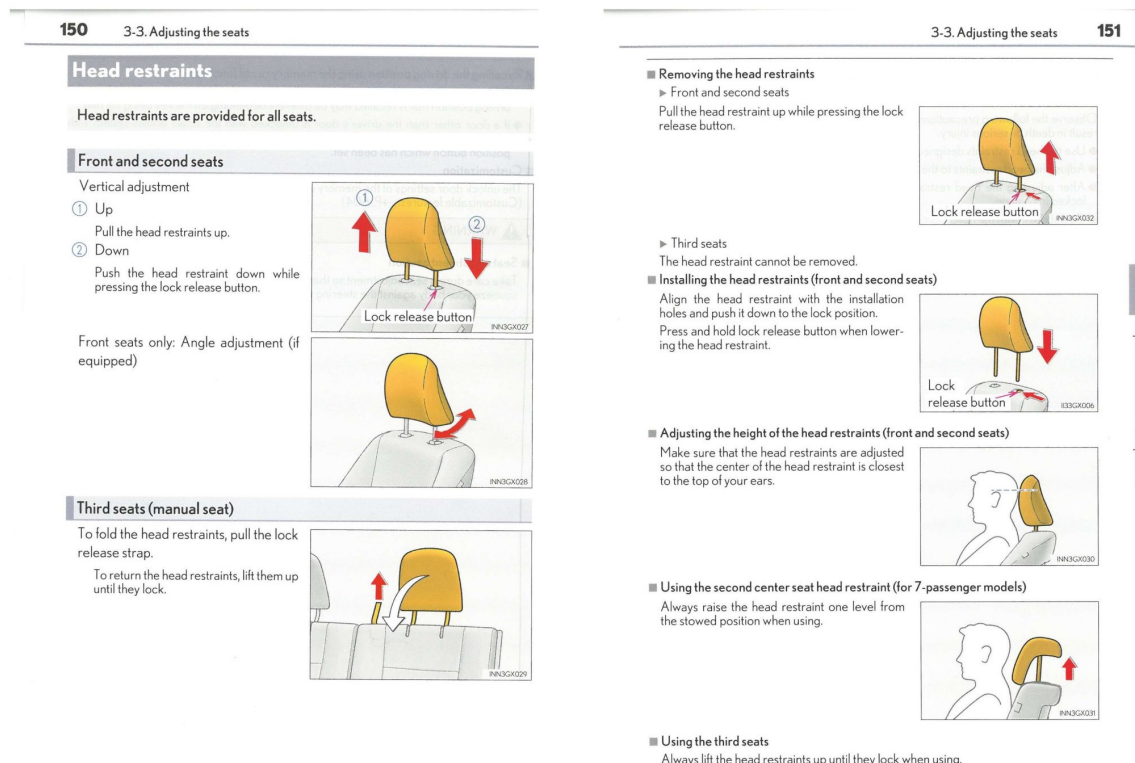


Figure A-72: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



Figure A-73: Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B

VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

Driver Dummy Instrumentation Plots

Fig.	Description	Page
Plot 1	Driver Head Acceleration (X) Primary vs. Time	B-4
Plot 2	Driver Head Acceleration (Y) Primary vs. Time	B-4
Plot 3	Driver Head Acceleration (Z) Primary vs. Time	B-4
Plot 4	Driver Head Resultant Primary vs. Time	B-4
Plot 5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-5
Plot 6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-5
Plot 7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-5
Plot 8	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-5
Plot 9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-6
Plot 10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-6
Plot 11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-6

The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.NHTSA.gov

Additional Driver Dummy Instrumentation Data

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

Vehicle Instrumentation Data

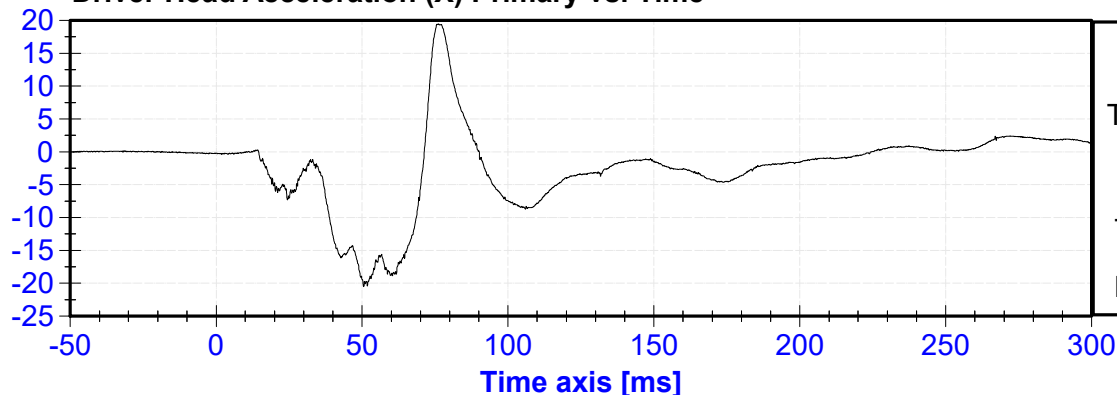
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

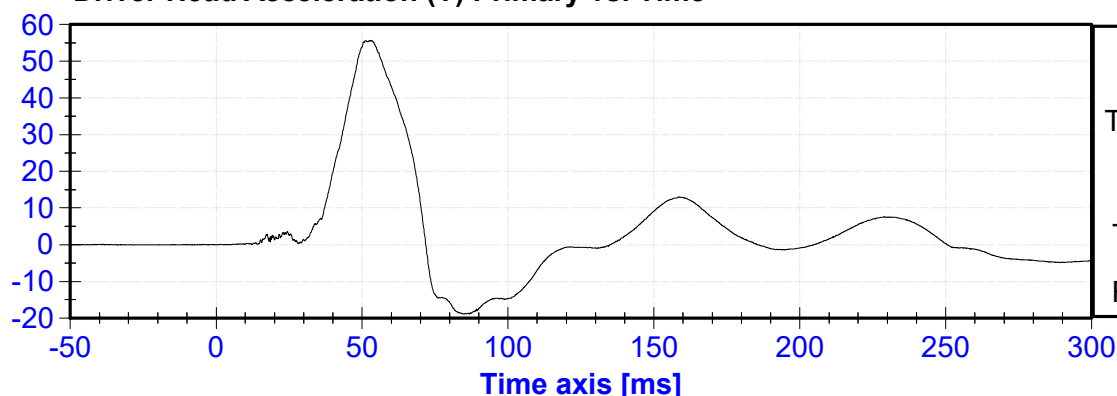
ACCELERATION [g's]

Driver Head Acceleration (X) Primary vs. Time



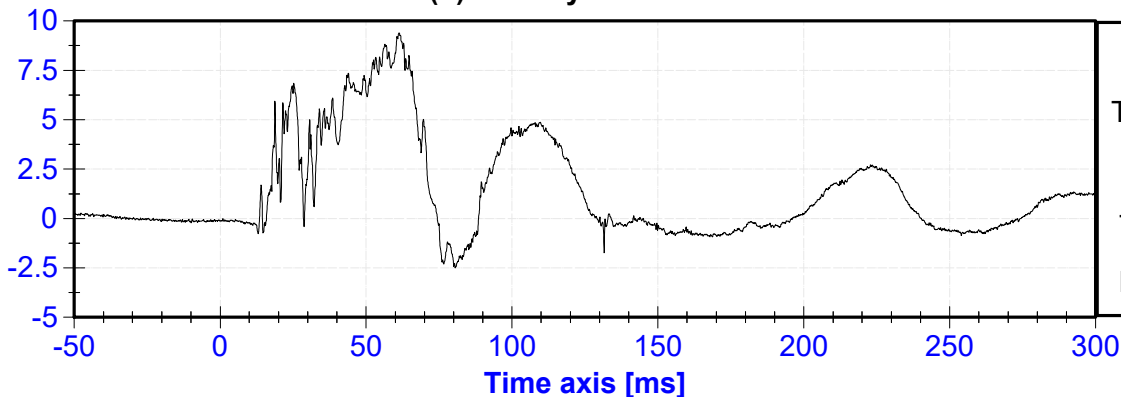
ACCELERATION [g's]

Driver Head Acceleration (Y) Primary vs. Time



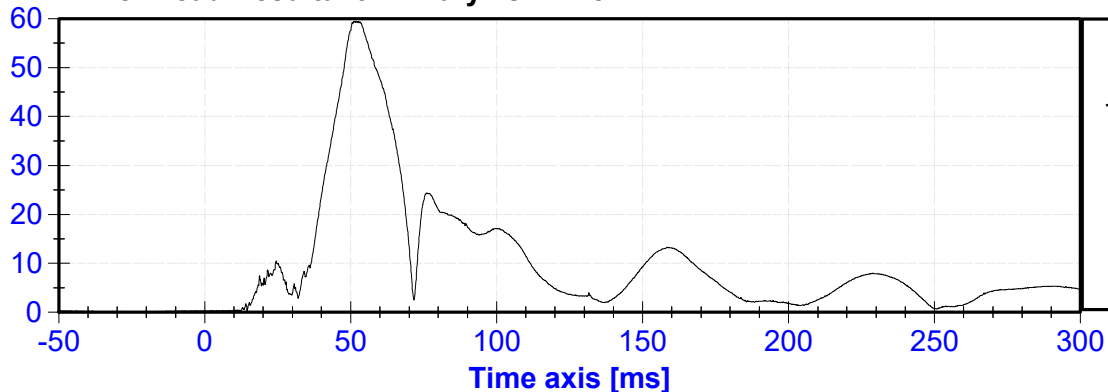
ACCELERATION [g's]

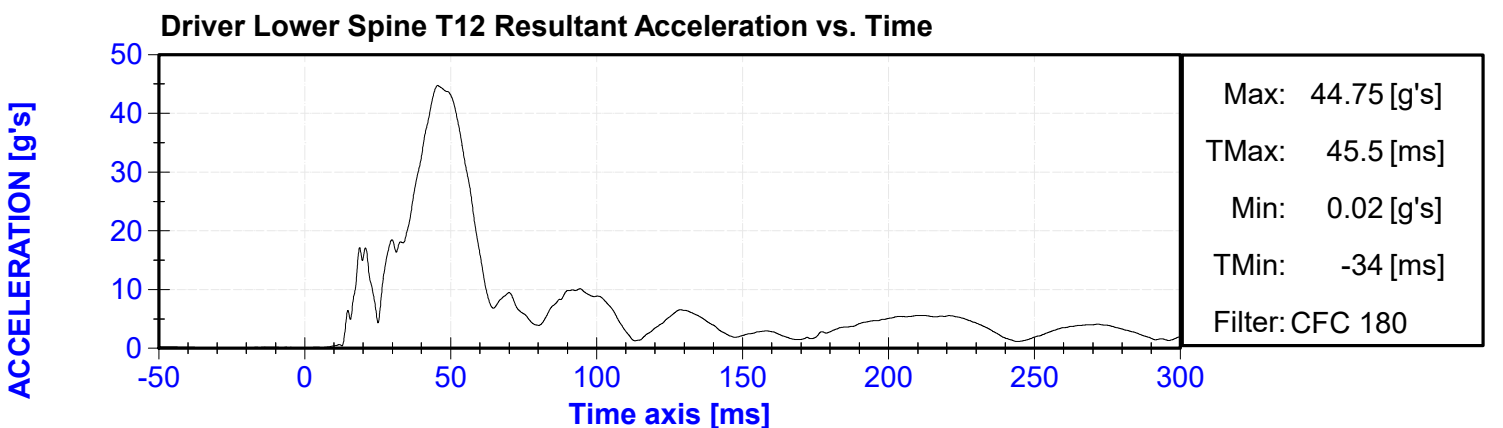
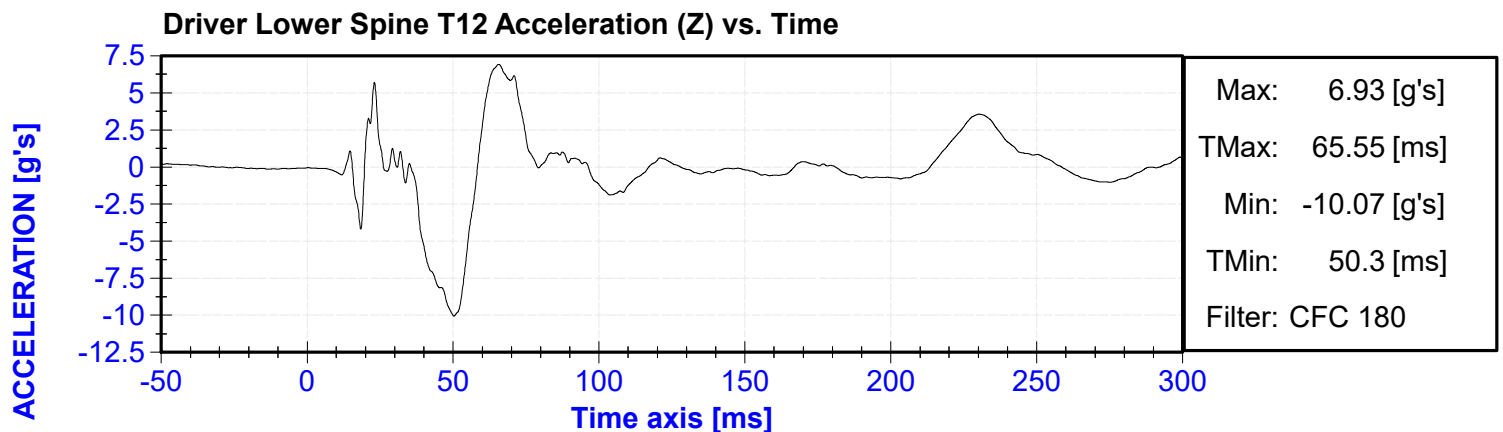
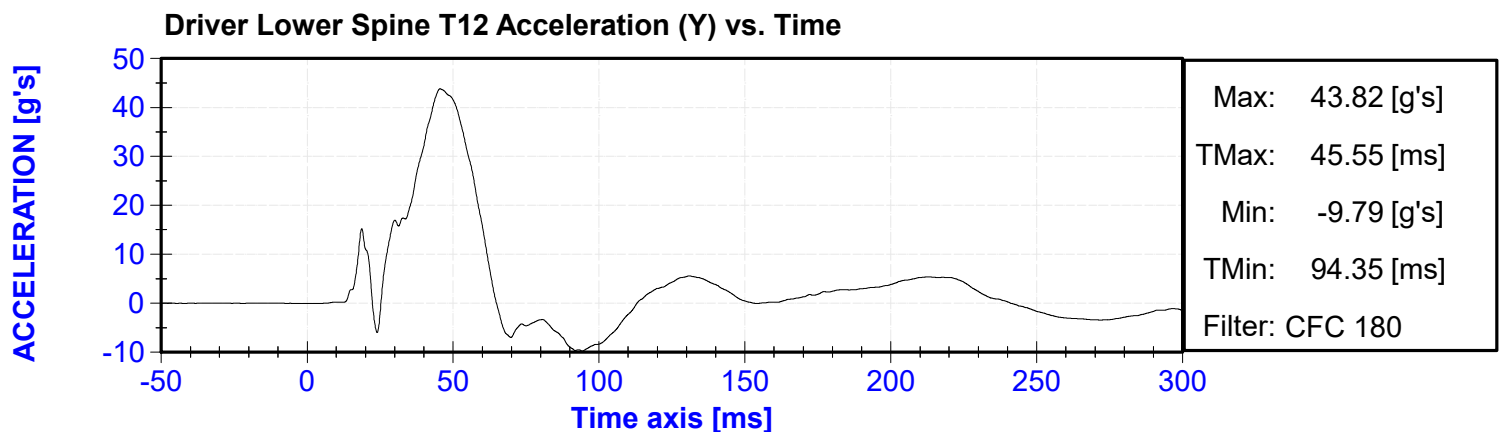
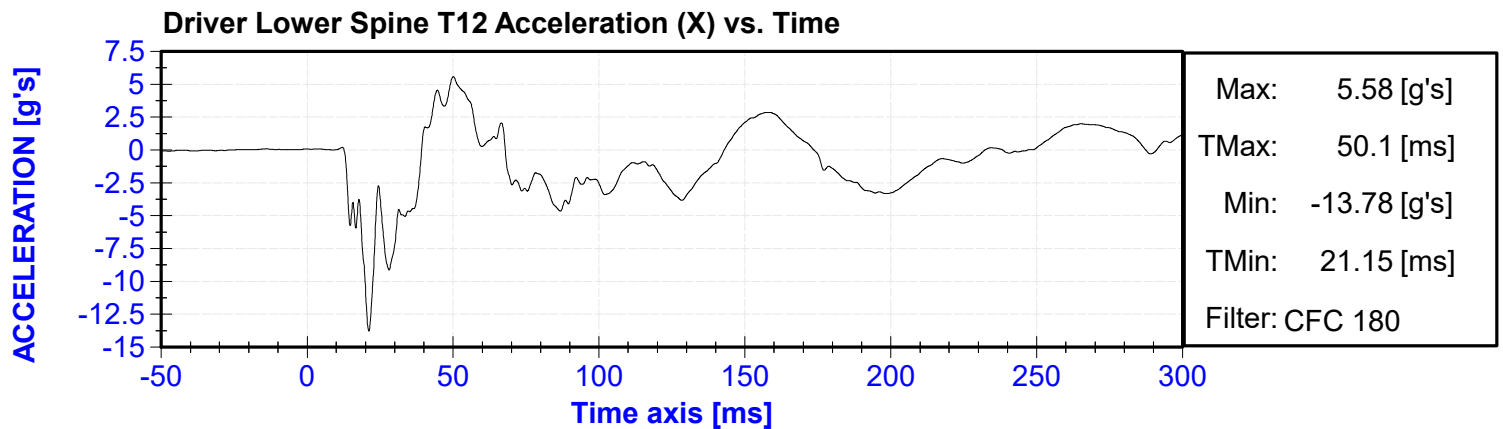
Driver Head Acceleration (Z) Primary vs. Time

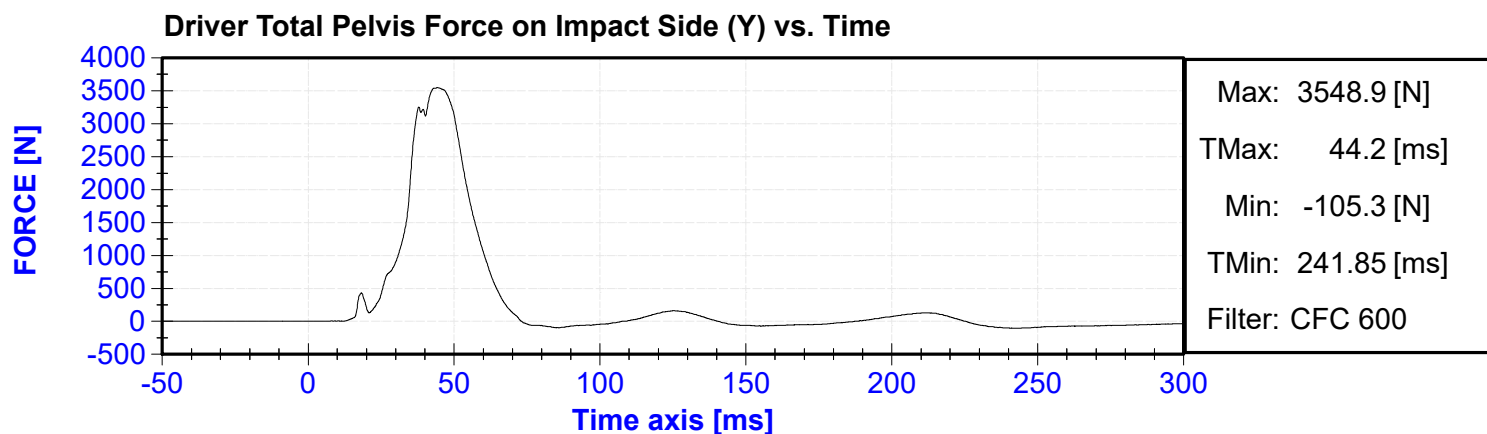
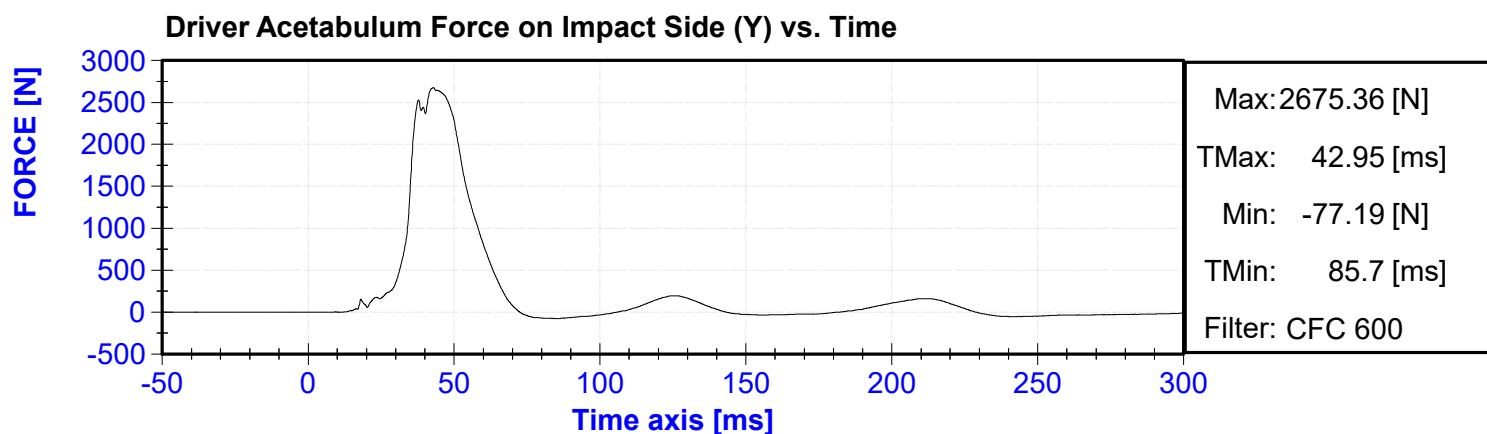
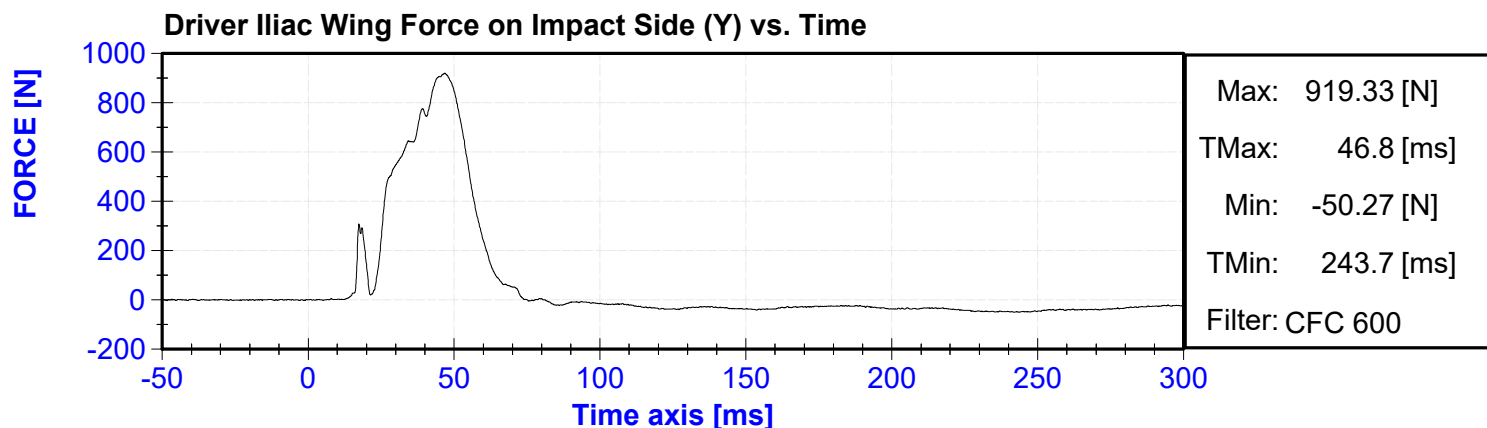


ACCELERATION [g's]

Driver Head Resultant Primary vs. Time







APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO:300

(CONFIGURED FOR LEFT SIDE IMPACT)

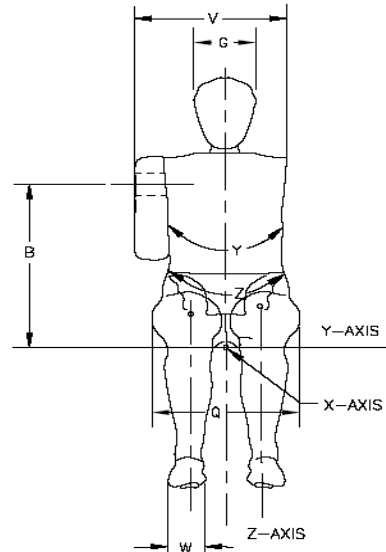
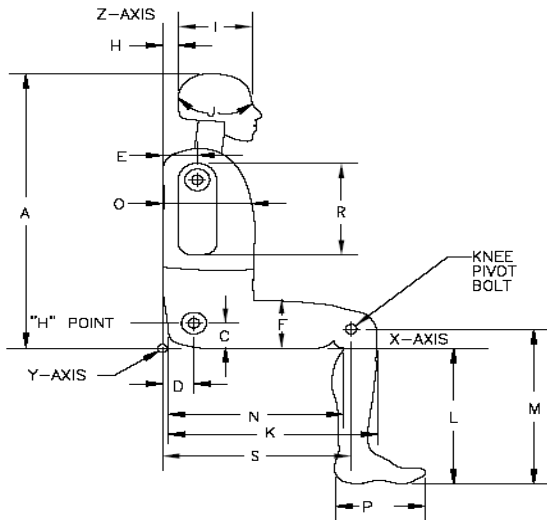


External Measurements - SID-IIs

Technician: K. Brogan

Date: 06/02/2023

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	783	Pass
B	Shoulder Pivot Height	437	453	444	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	123	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	42	Pass
I	Head Depth	178	188	181	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	353	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	199	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	876	Pass
Z	Waist Circumference	761	791	773	Pass

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

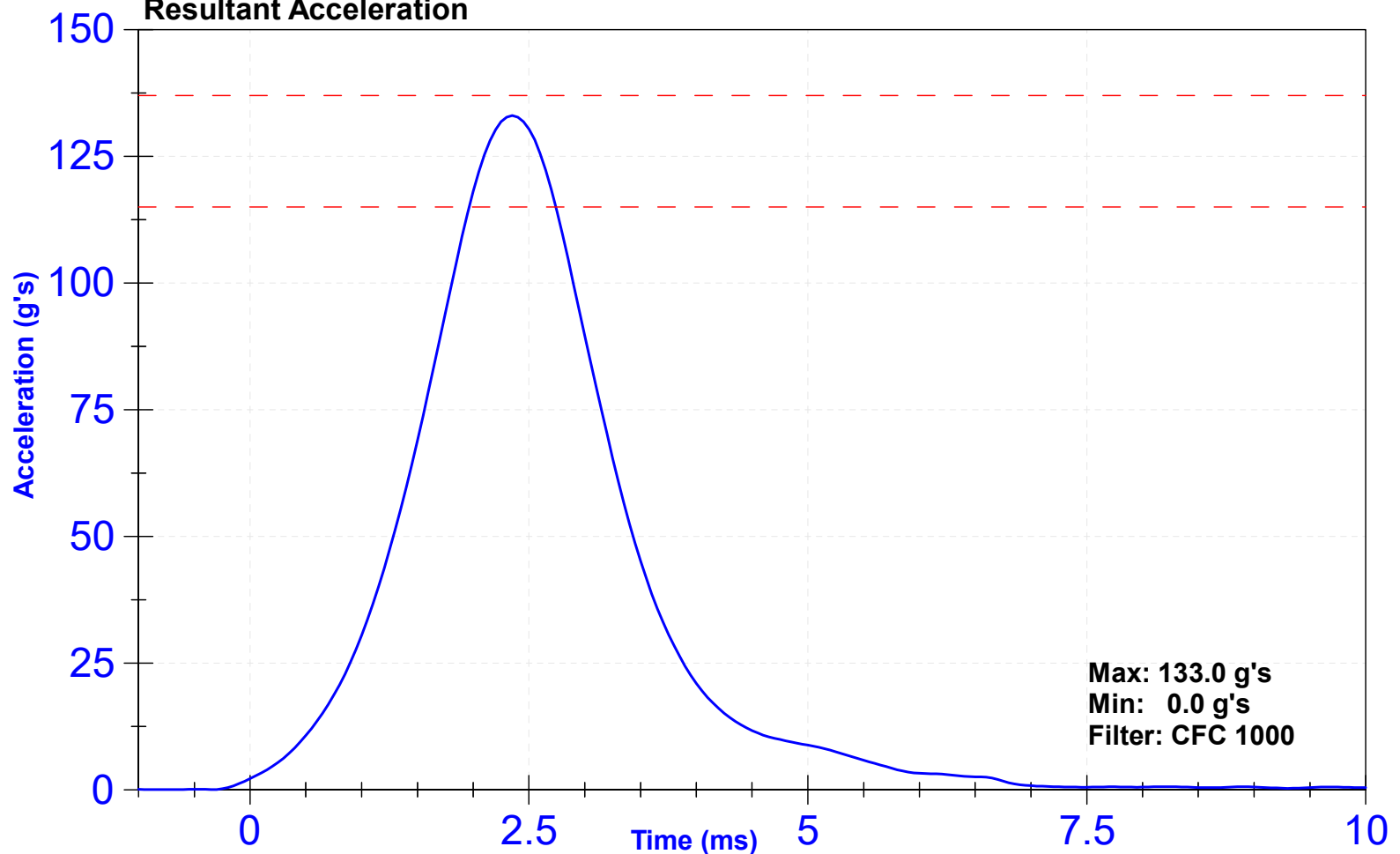
Results

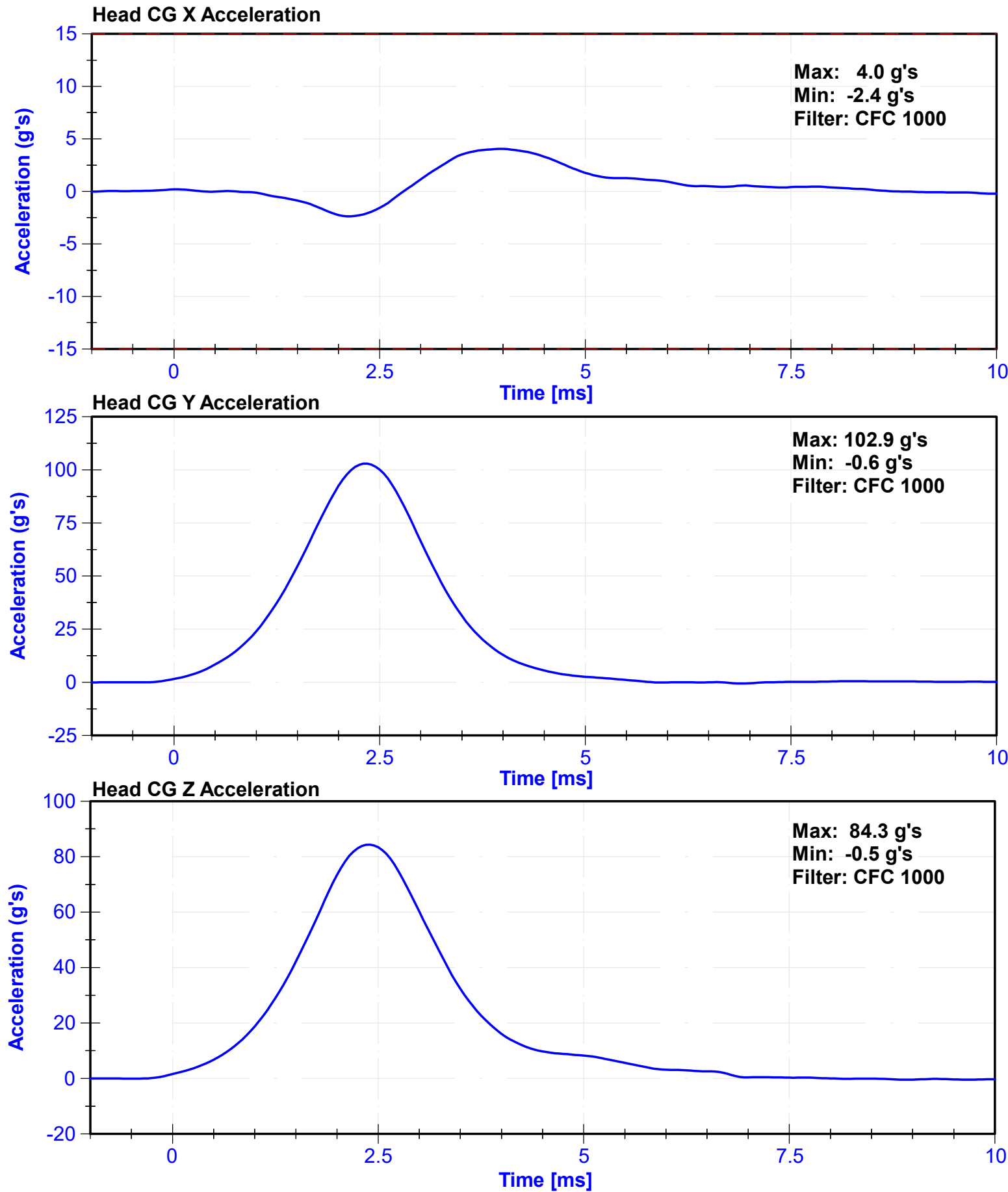
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	35.6	Pass
Resultant Acceleration	115	137	g's	133.0	Pass
Oscillation	0	15	%	0.4	Pass
Fore-Aft Acceleration	-15	15	g's	4.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	4/4/2023	10/1/2023
Y Accelerometer	Endevco	P79189	4/4/2023	10/1/2023
Z Accelerometer	Endevco	P79587	4/4/2023	10/1/2023

Resultant Acceleration





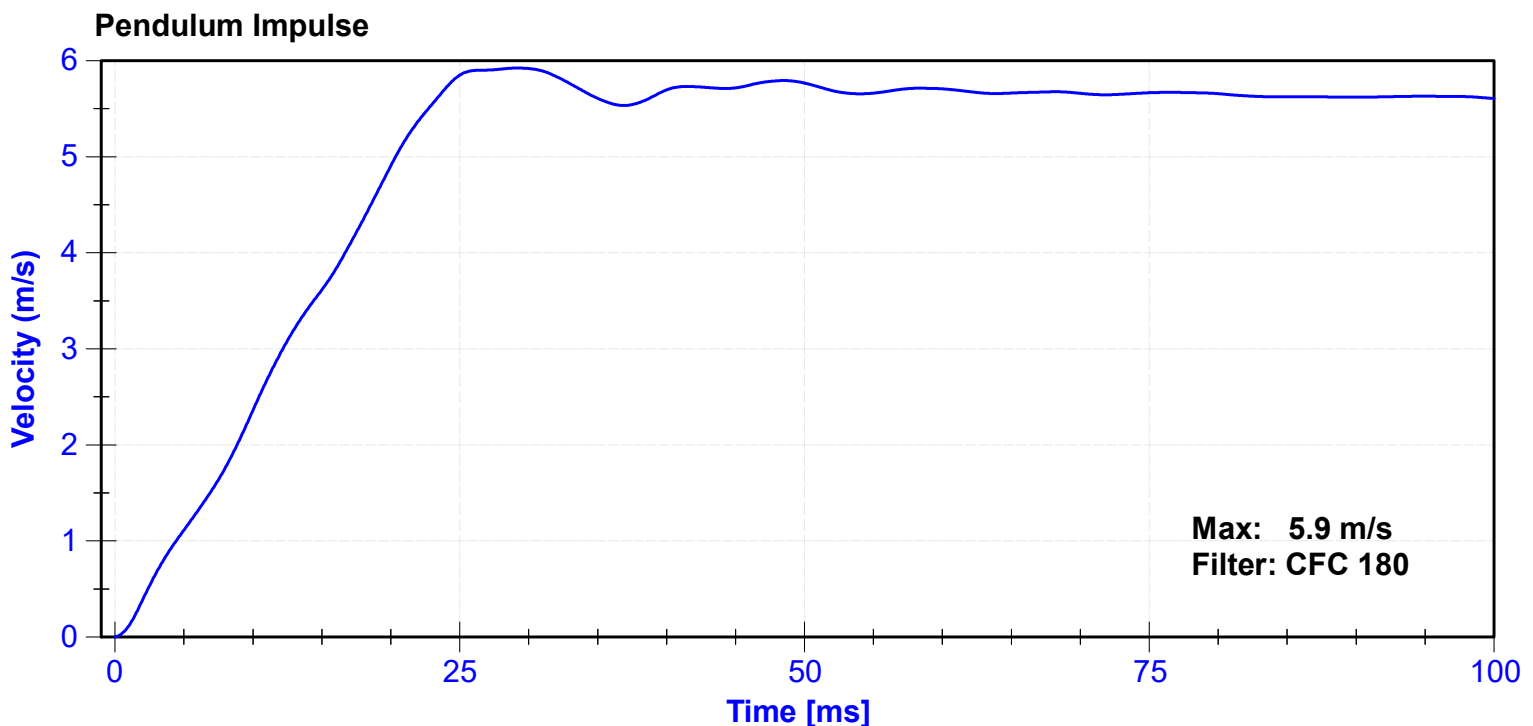
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

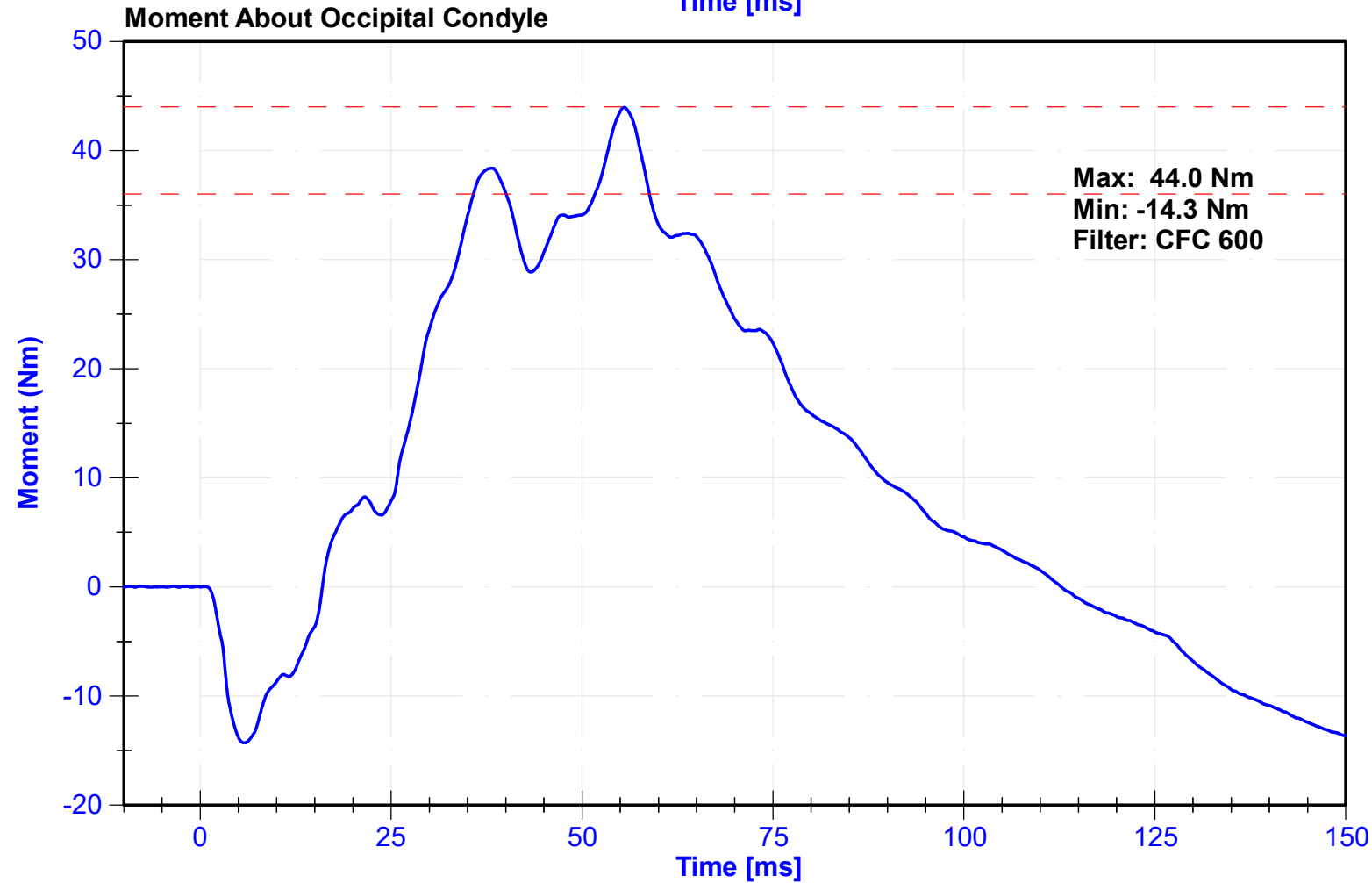
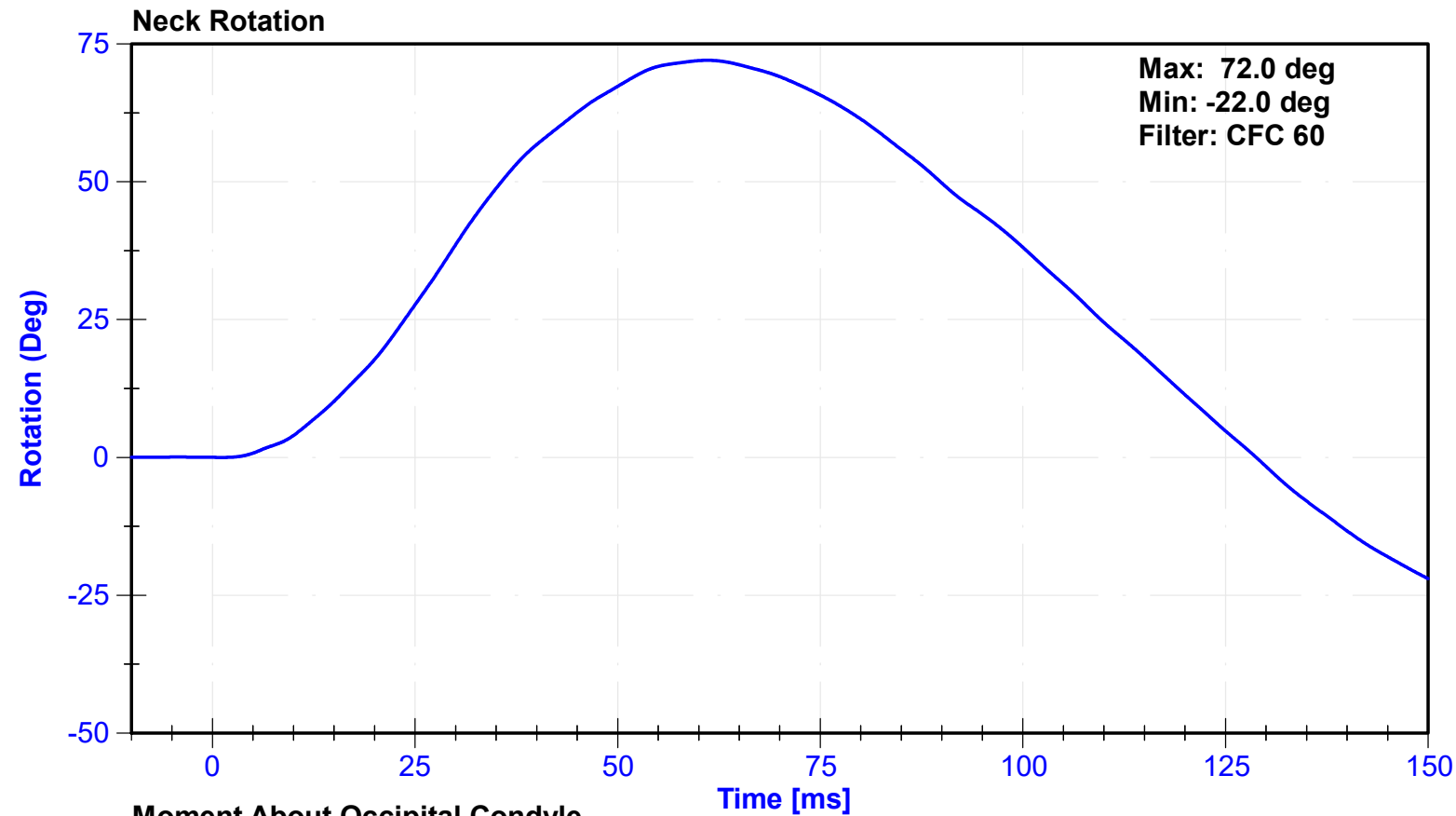
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	50.2	Pass
Velocity	5.51	5.63	m/s	5.587	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.36	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.61	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.91	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.85	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.92	Pass
Neck Rotation	71	81	deg	72.0	Pass
Time at Maximum Rotation	50	70	ms	61.1	Pass
Moment about the OC	36	44	Nm	44.0	Pass
Moment Decay to 0 Nm	102	126	ms	112.8	Pass

Transducer Calibrations

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





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

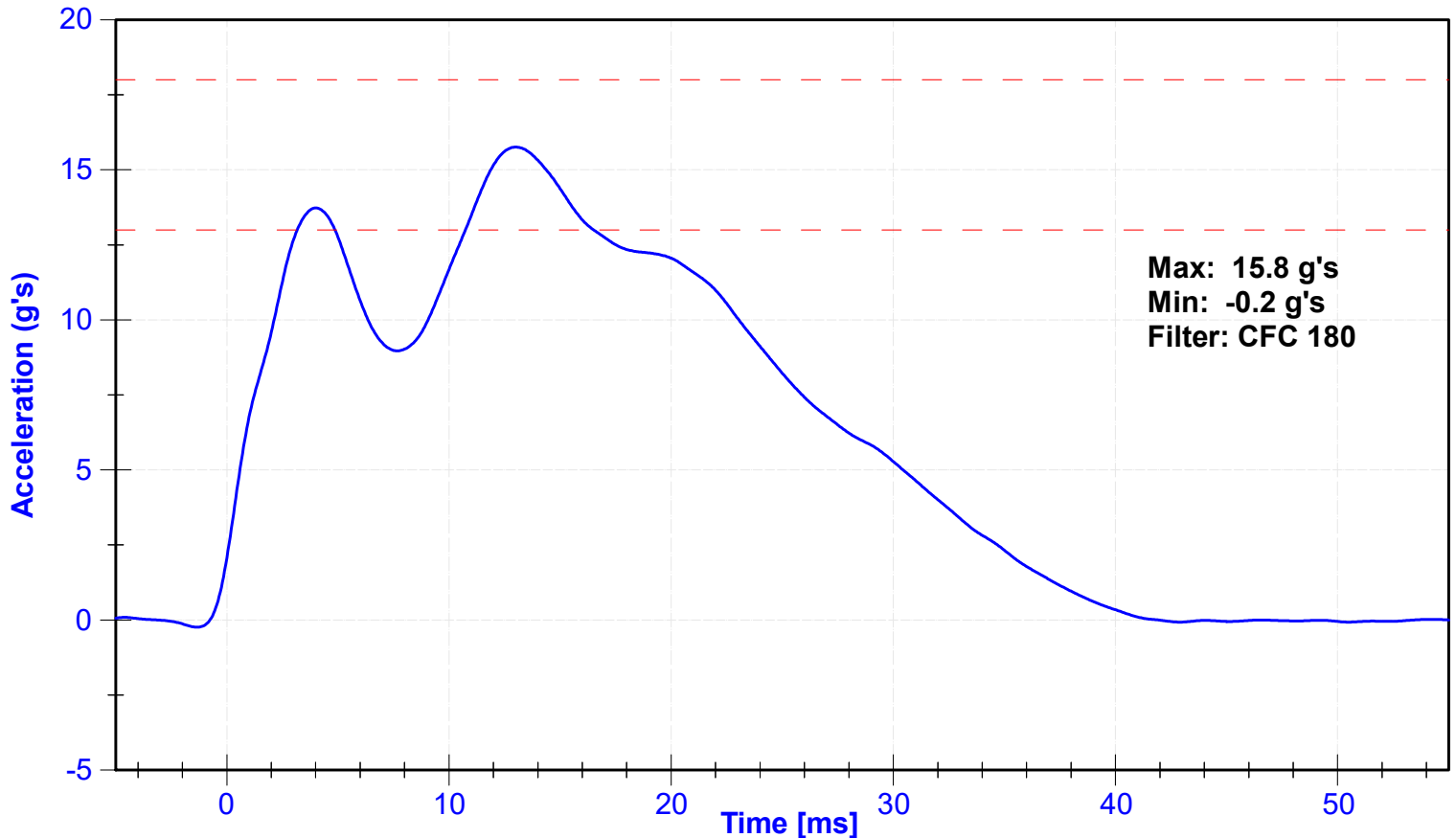
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	50.2	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	30.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.0	Pass

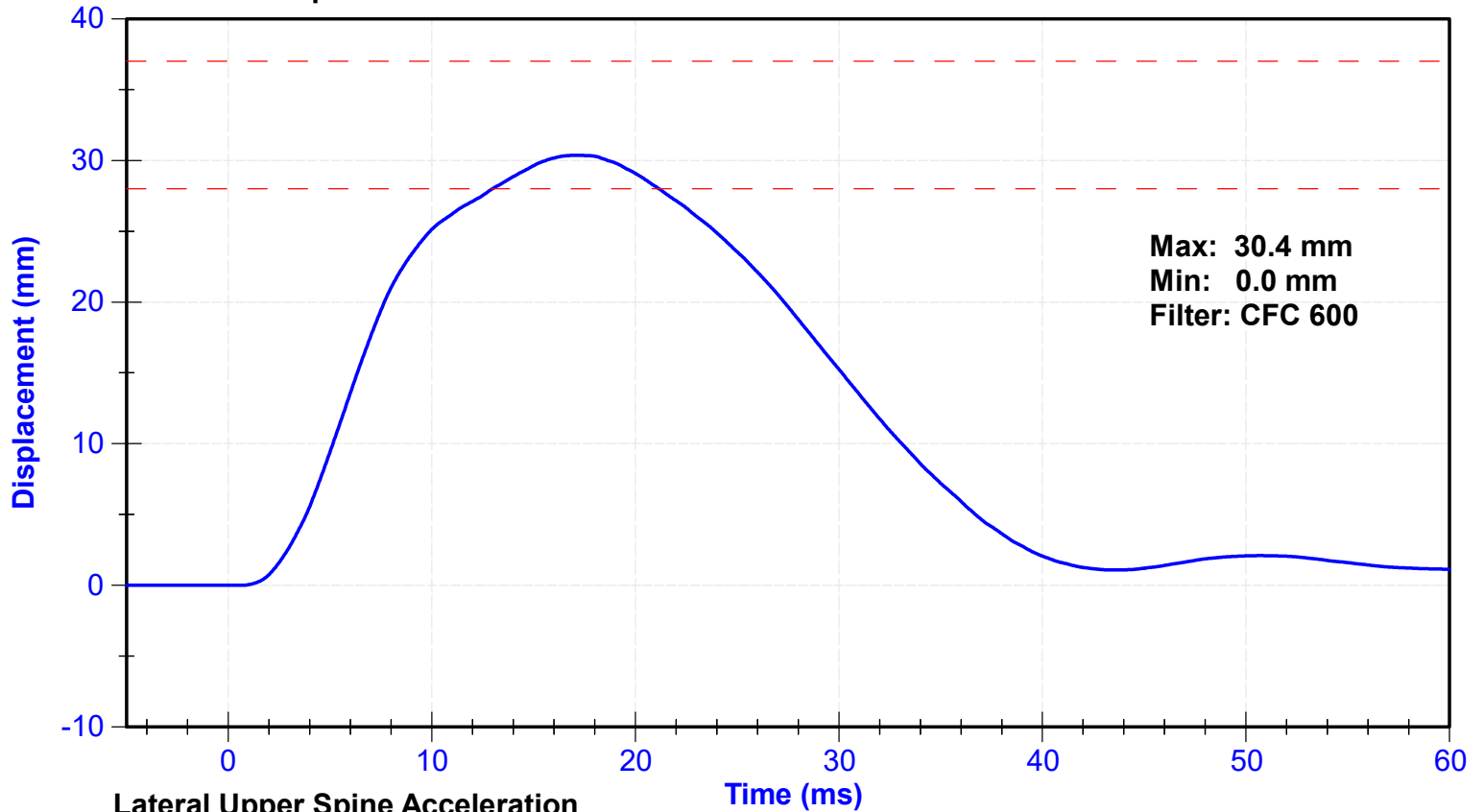
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Shoulder Potentiometer	Servo	053GFE	4/10/2023	10/9/2023
Upper Spine Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023

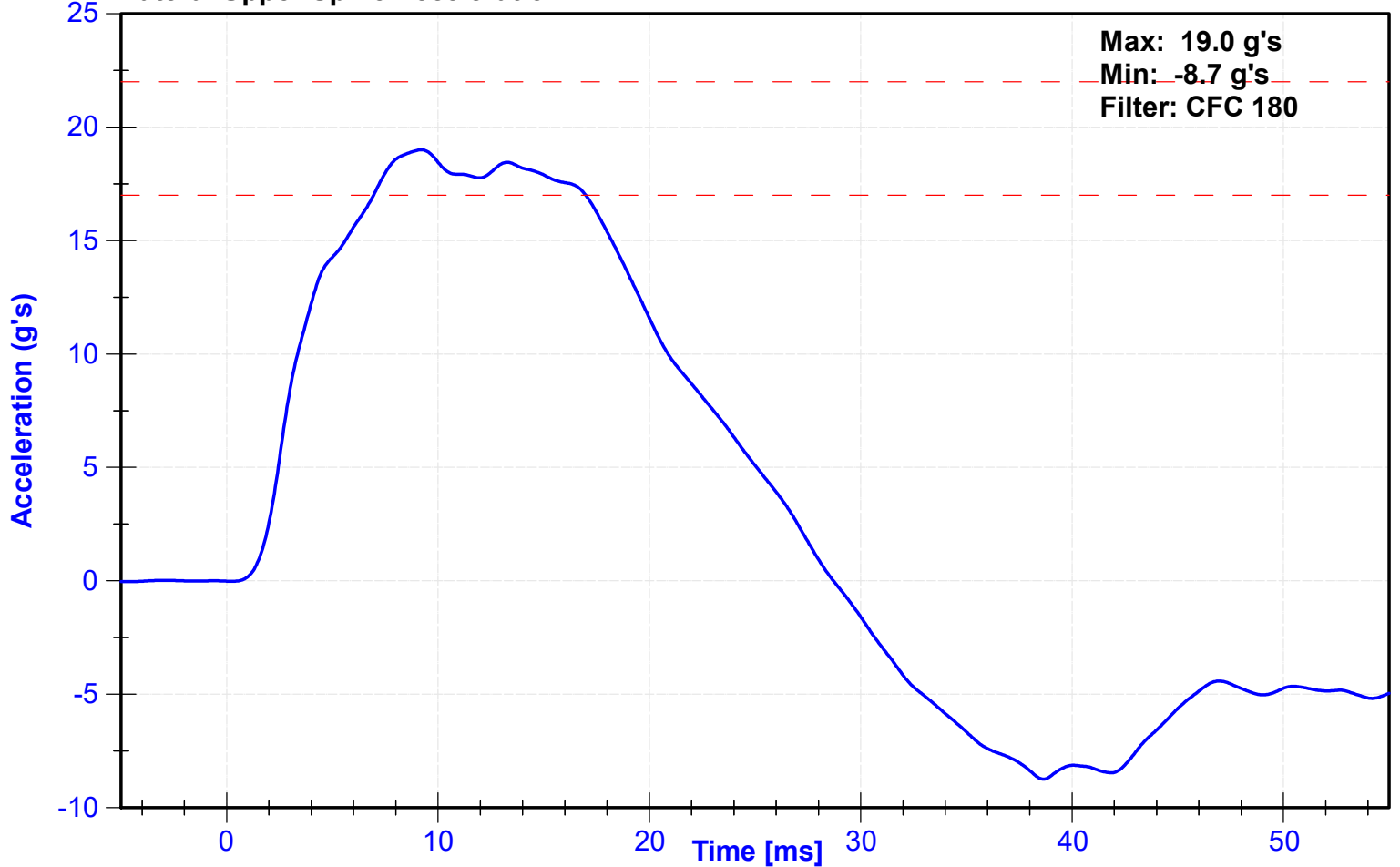
Probe Acceleration



Shoulder Displacement



Lateral Upper Spine Acceleration



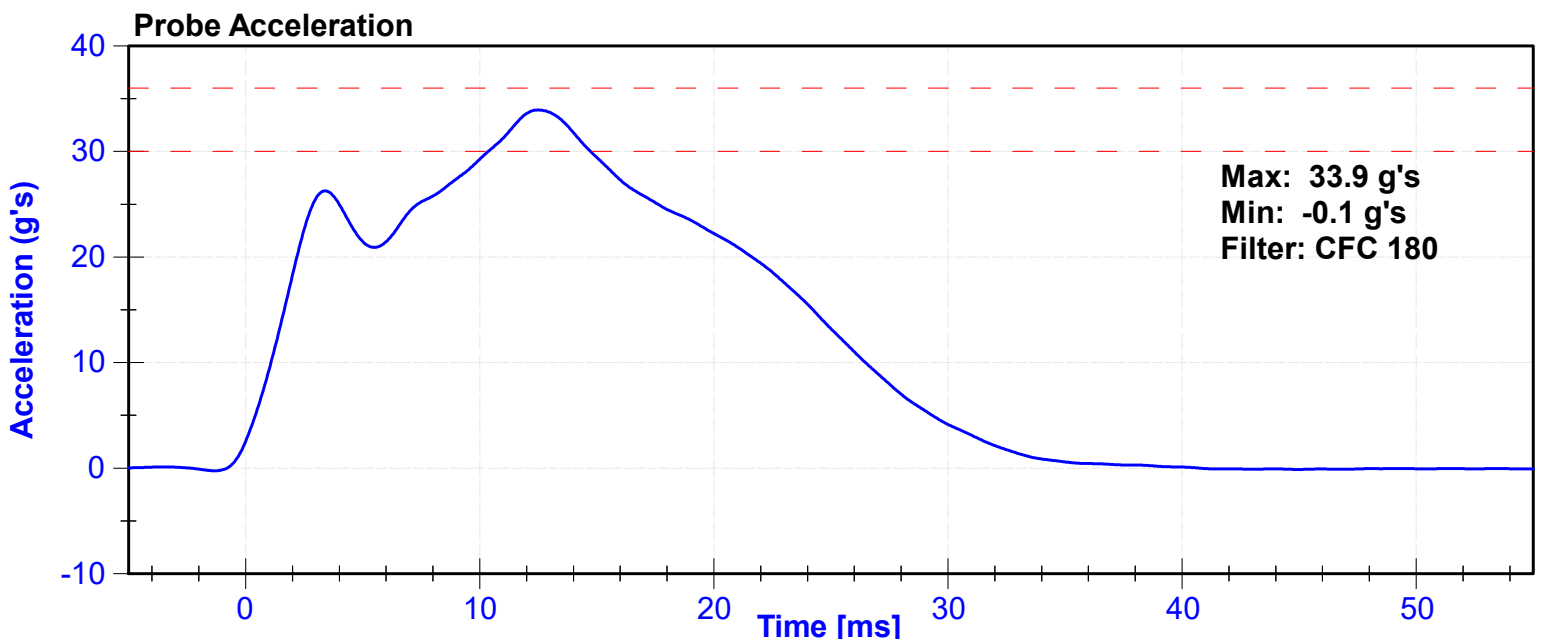
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

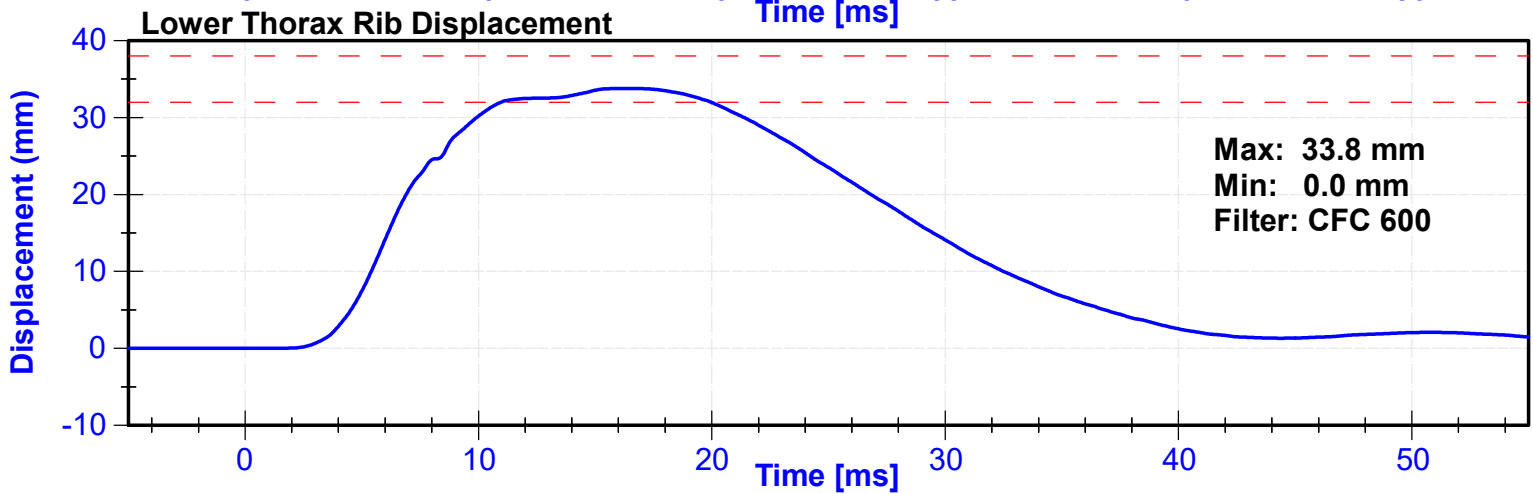
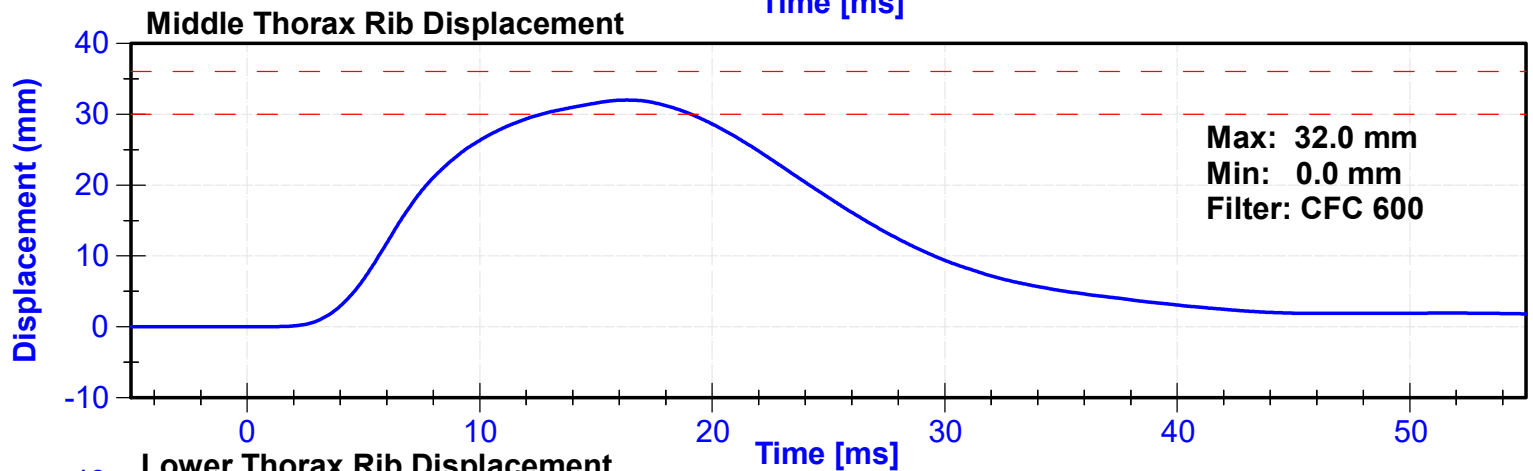
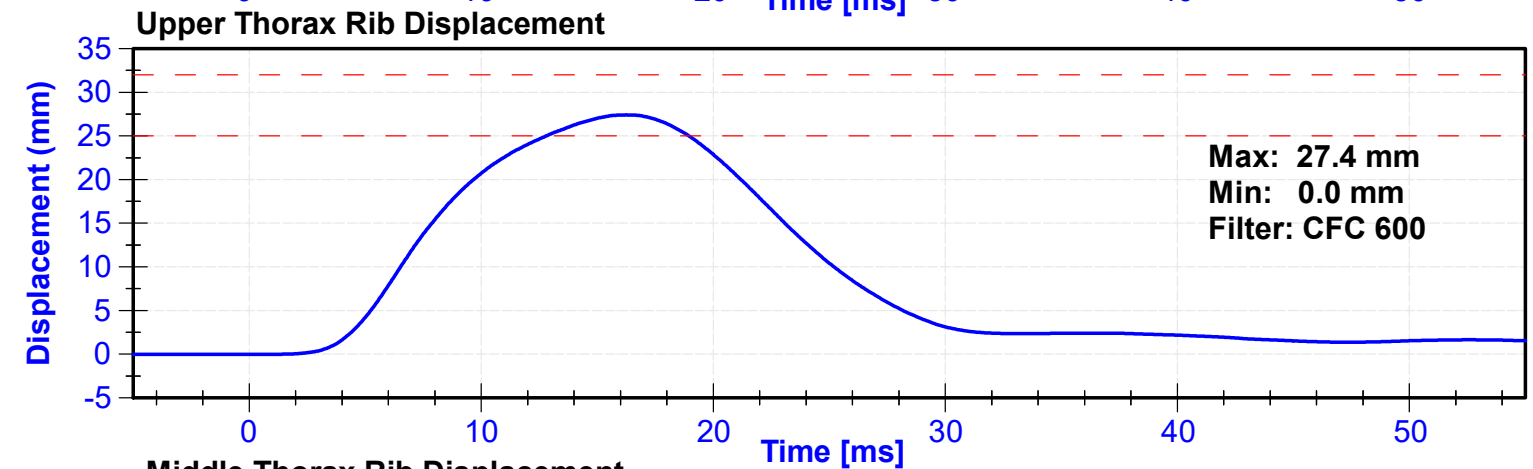
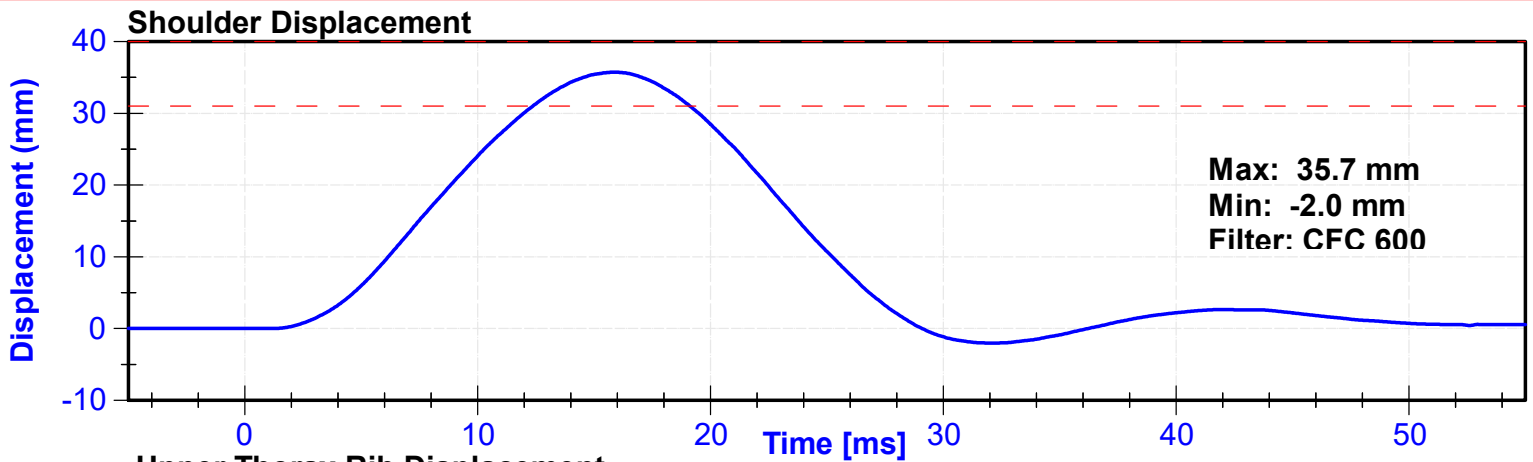
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	50.2	Pass
Velocity	6.6	6.8	m/s	6.71	Pass
Probe Acceleration after 5 ms	30	36	g's	33.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.3	Pass
Shoulder Deflection	31	40	mm	35.7	Pass
Upper Thorax Rib Deflection	25	32	mm	27.4	Pass
Mid Thorax Rib Deflection	30	36	mm	32.0	Pass
Lower Thorax Rib Deflection	32	38	mm	33.8	Pass

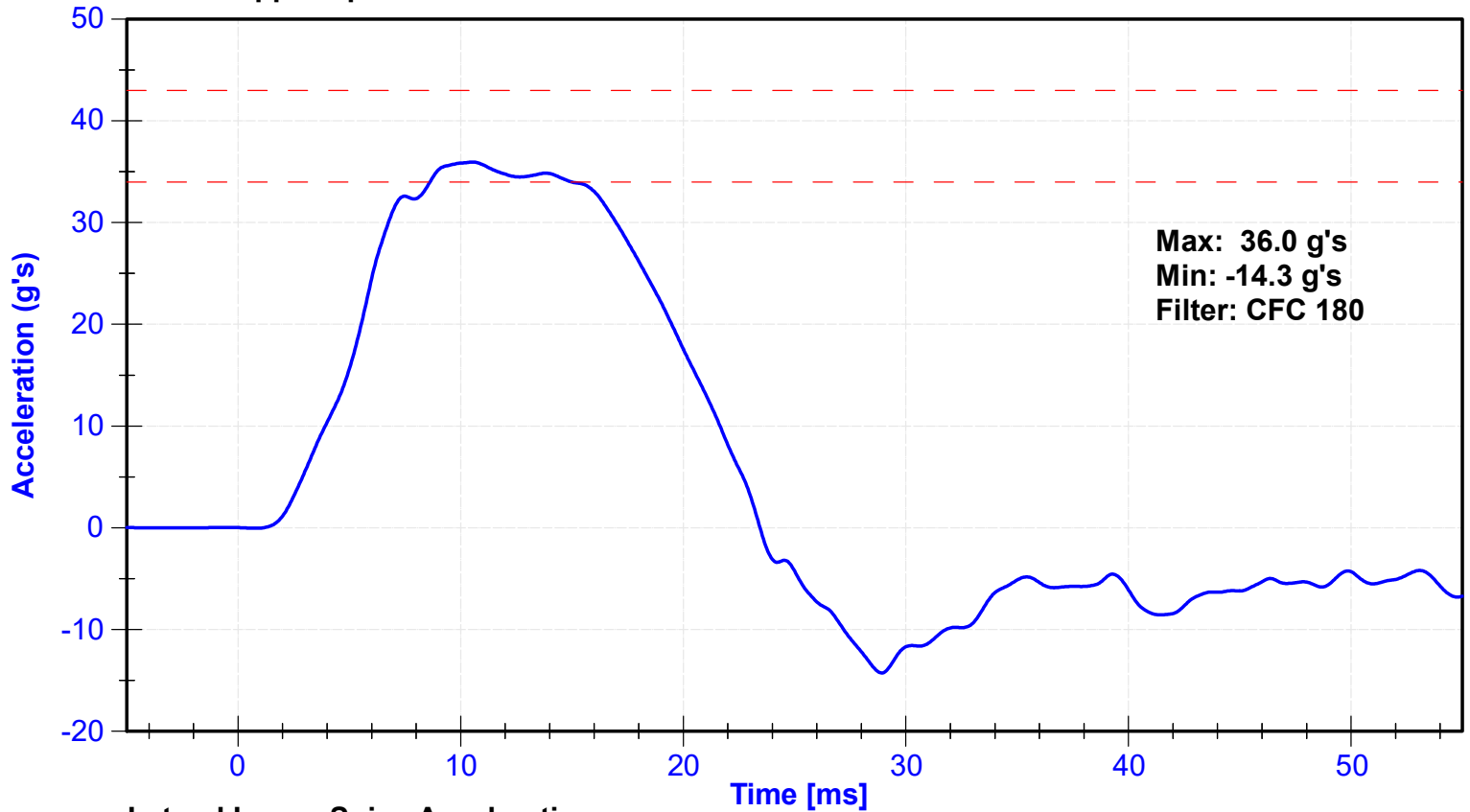
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Upper Spine T1 Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Shoulder Potentiometer	Servo	053GFE	4/10/2023	10/9/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	4/10/2023	10/9/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	4/10/2023	10/9/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	4/10/2023	10/9/2023

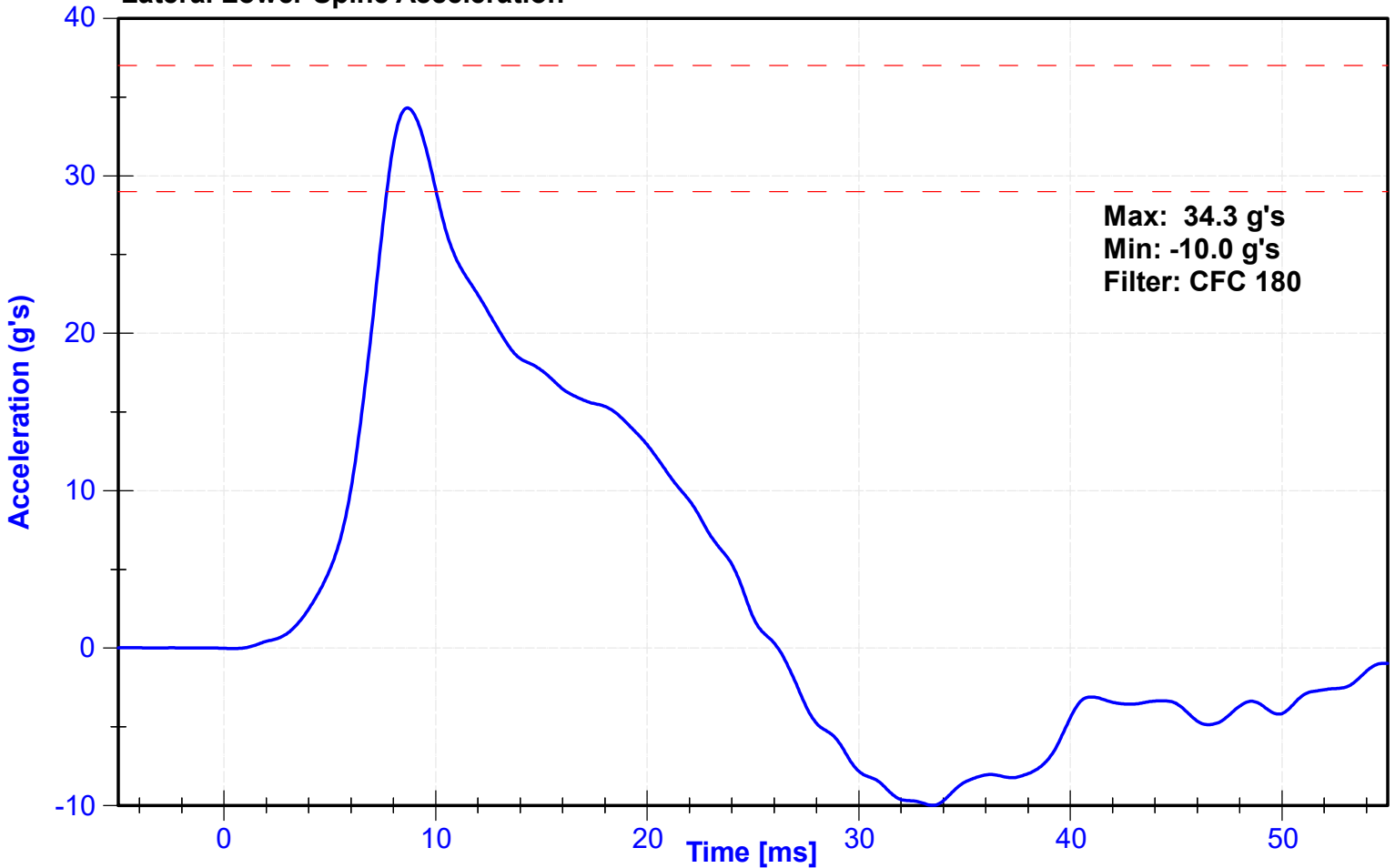




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



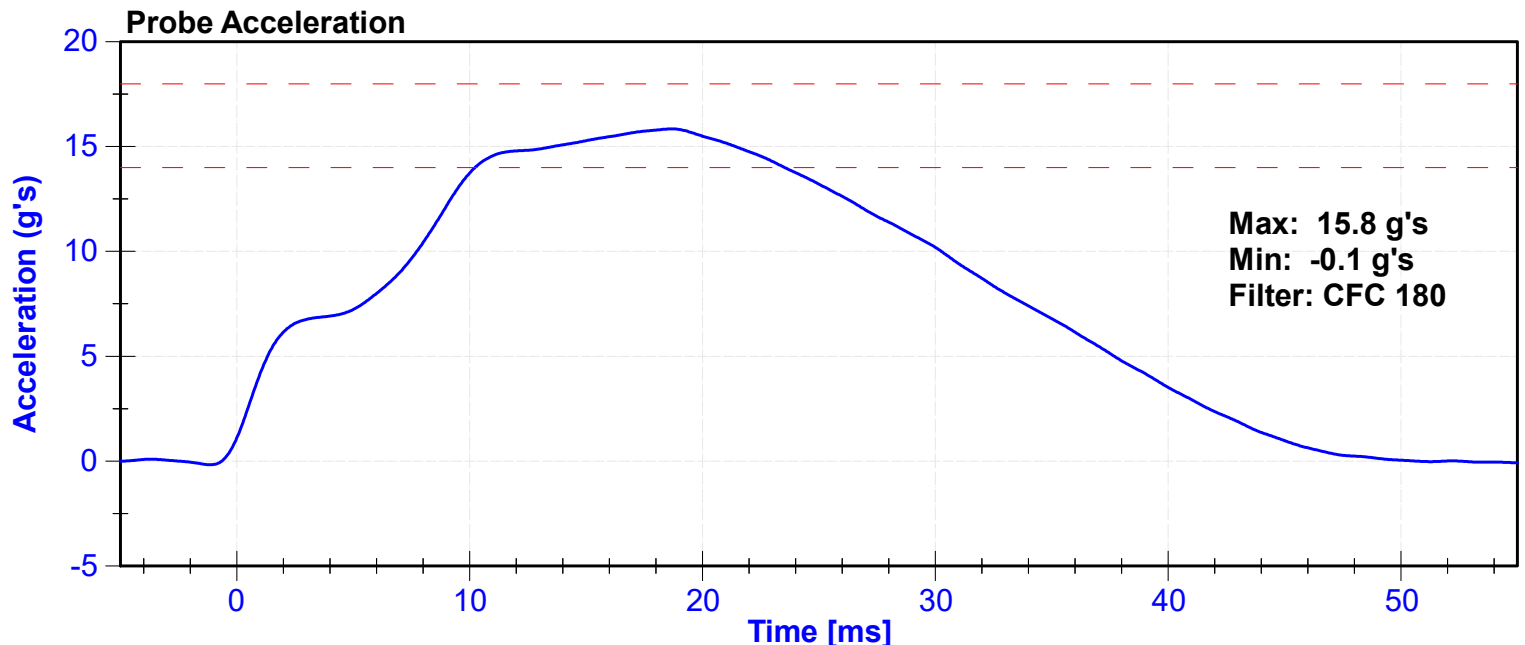
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

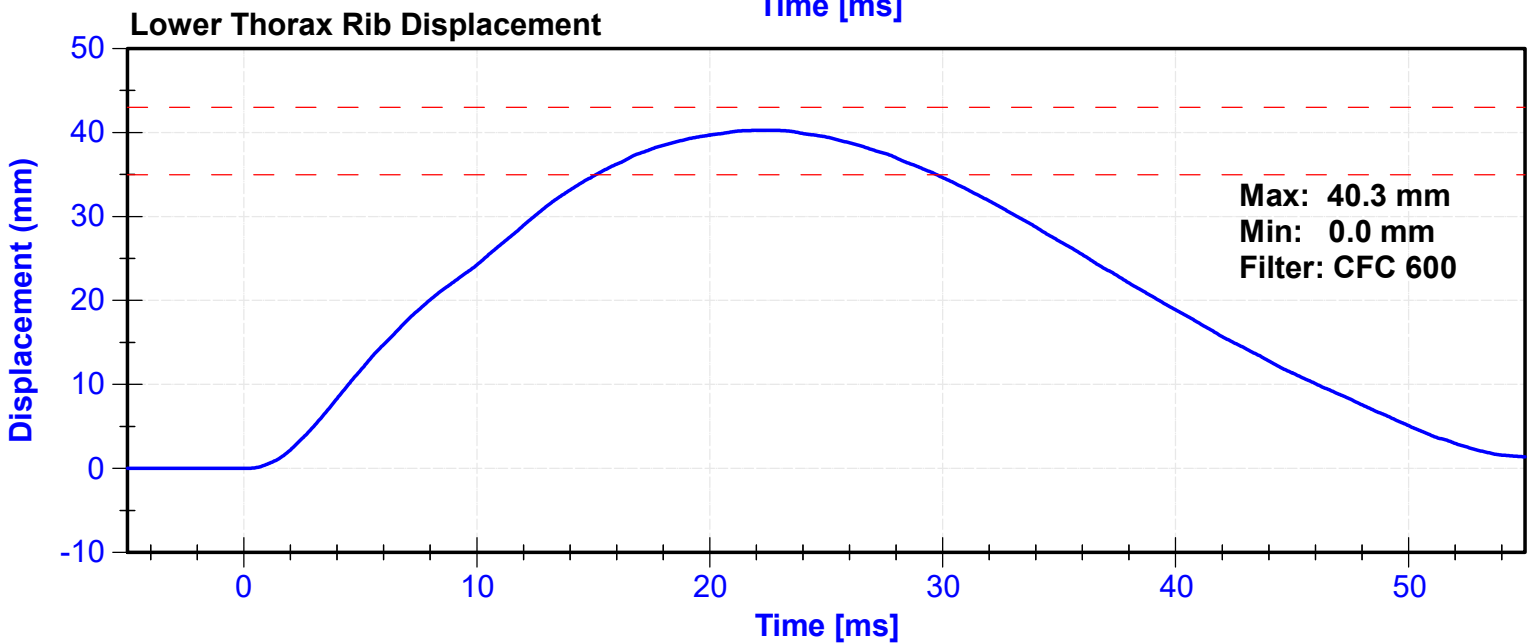
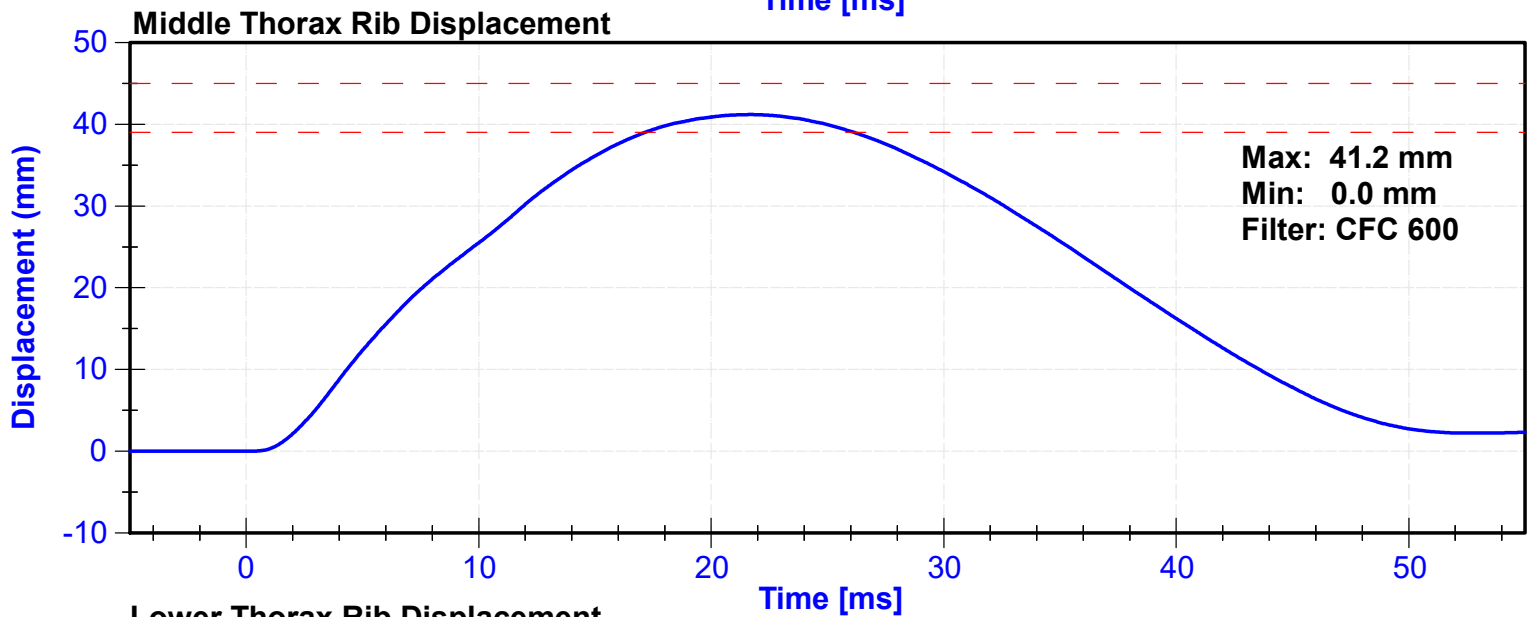
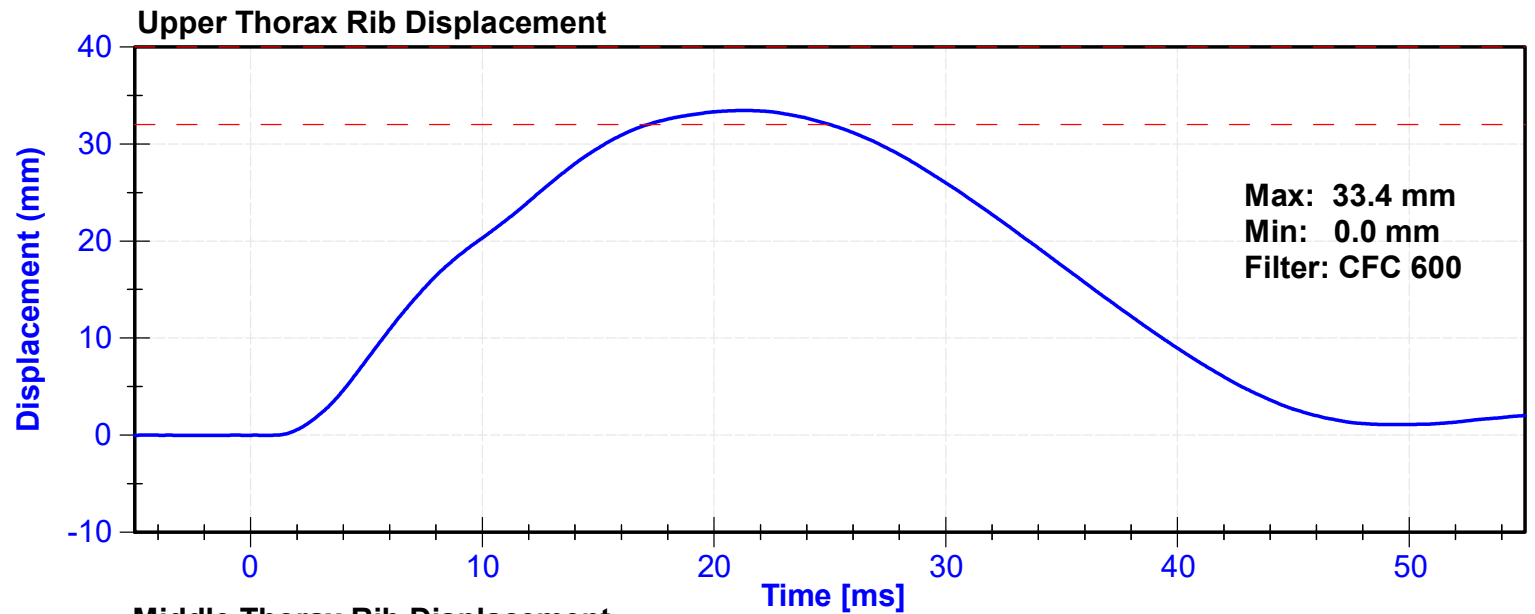
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	50.2	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.6	Pass
Upper Thorax Rib Deflection	32	40	mm	33.4	Pass
Middle Thorax Rib Deflection	39	45	mm	41.2	Pass
Lower Thorax Rib Deflection	35	43	mm	40.3	Pass

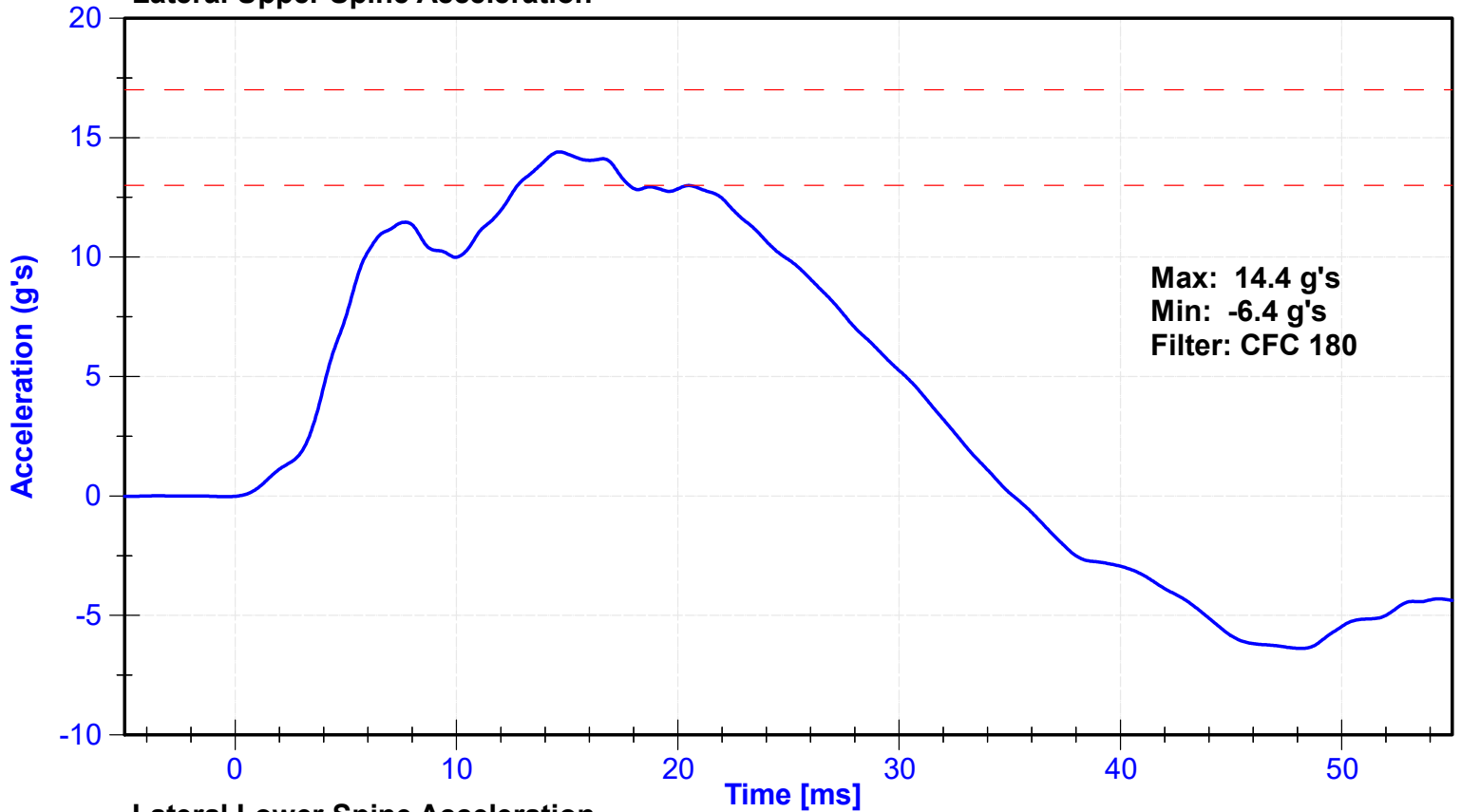
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Upper Spine Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023
Lower Spine Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	4/10/2023	10/9/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	4/10/2023	10/9/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	4/10/2023	10/9/2023

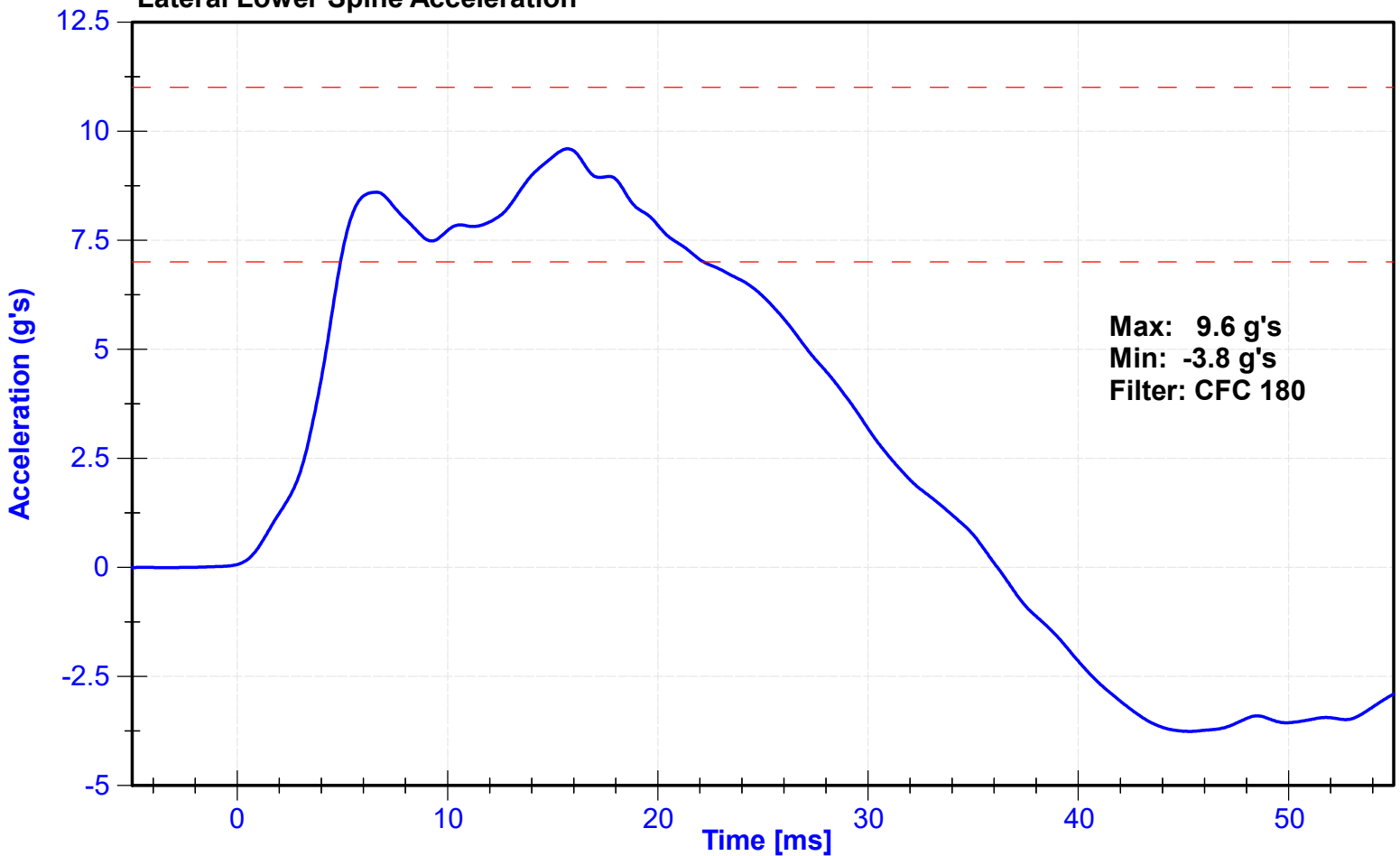




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



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

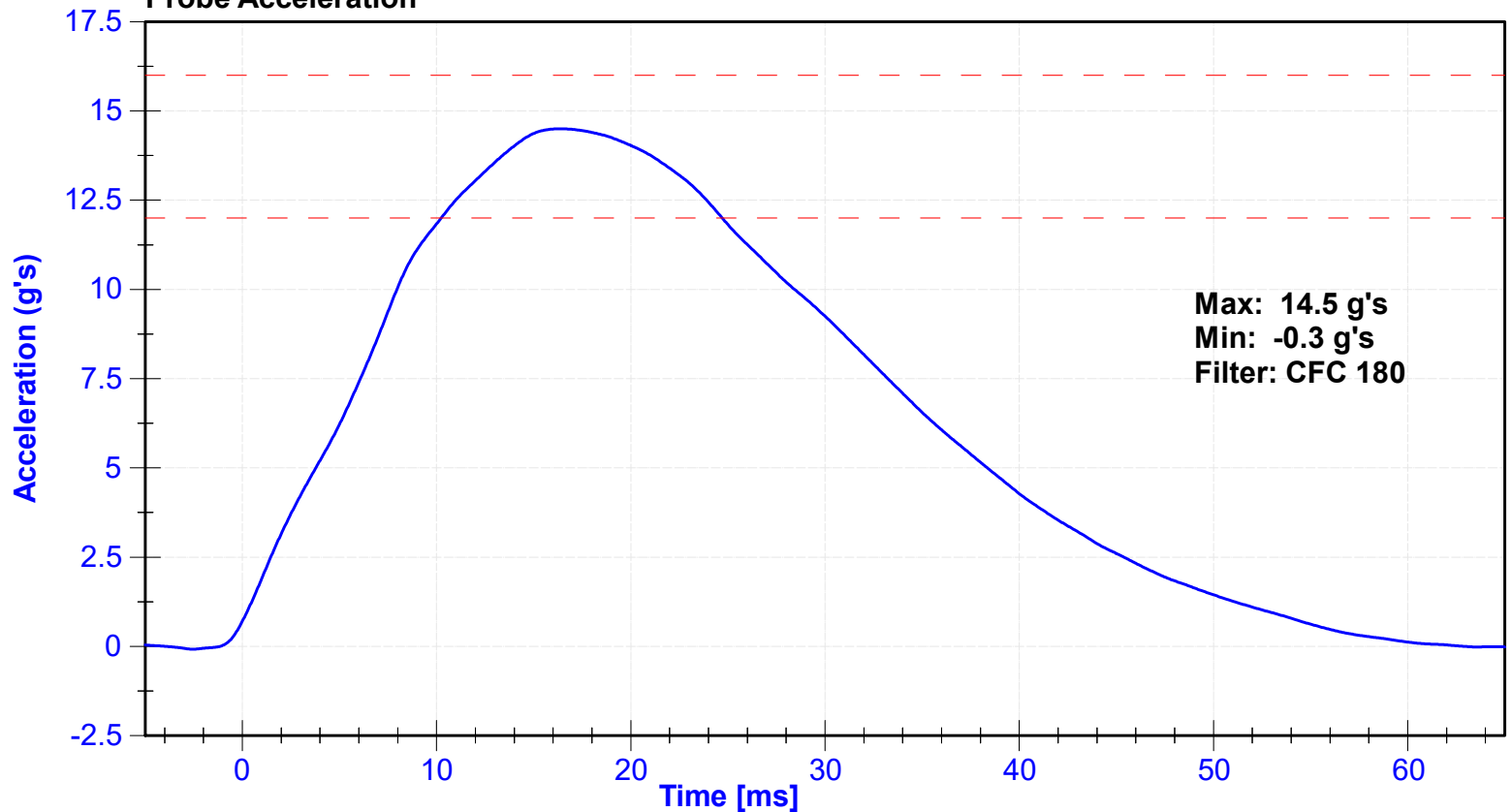
Results

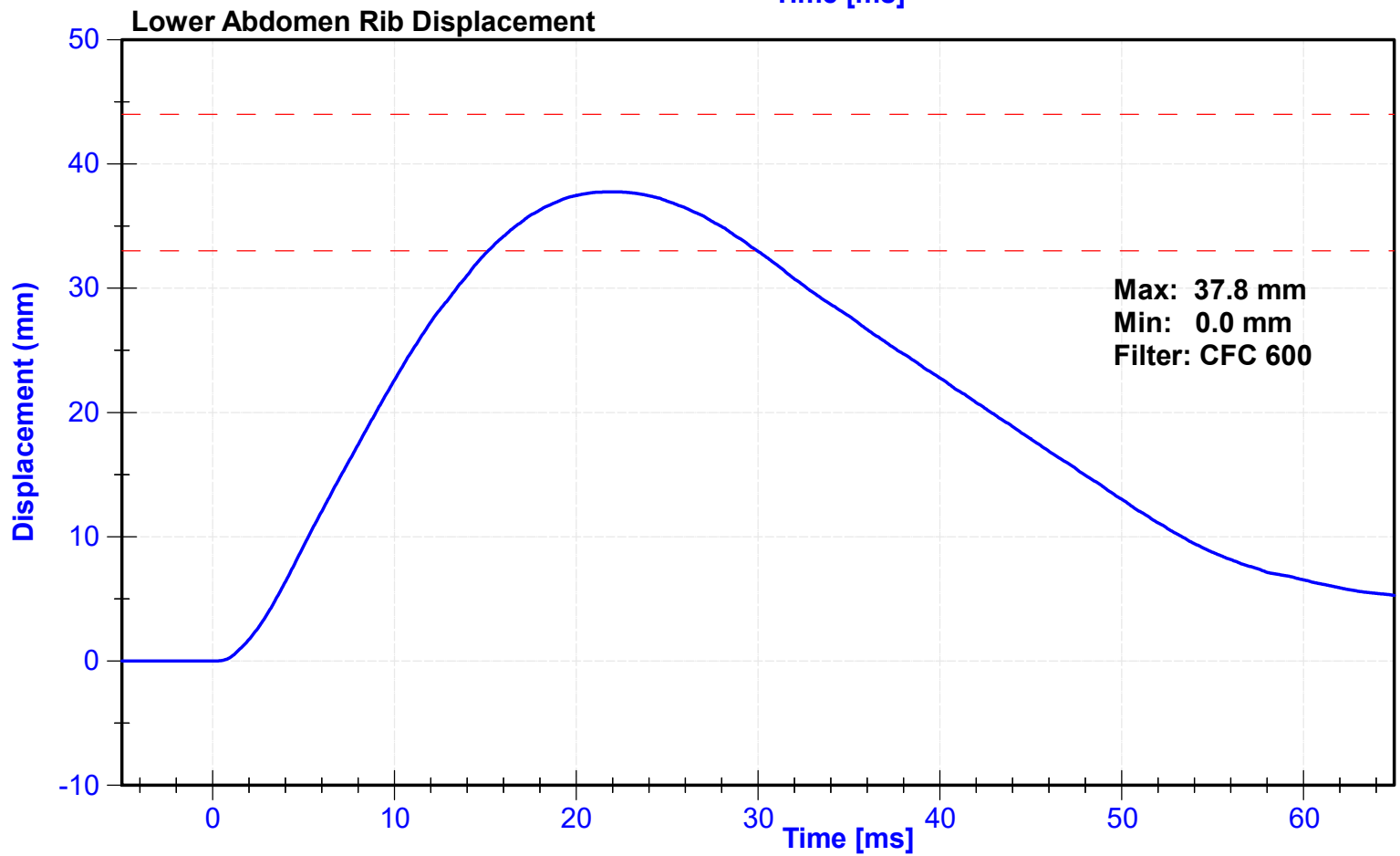
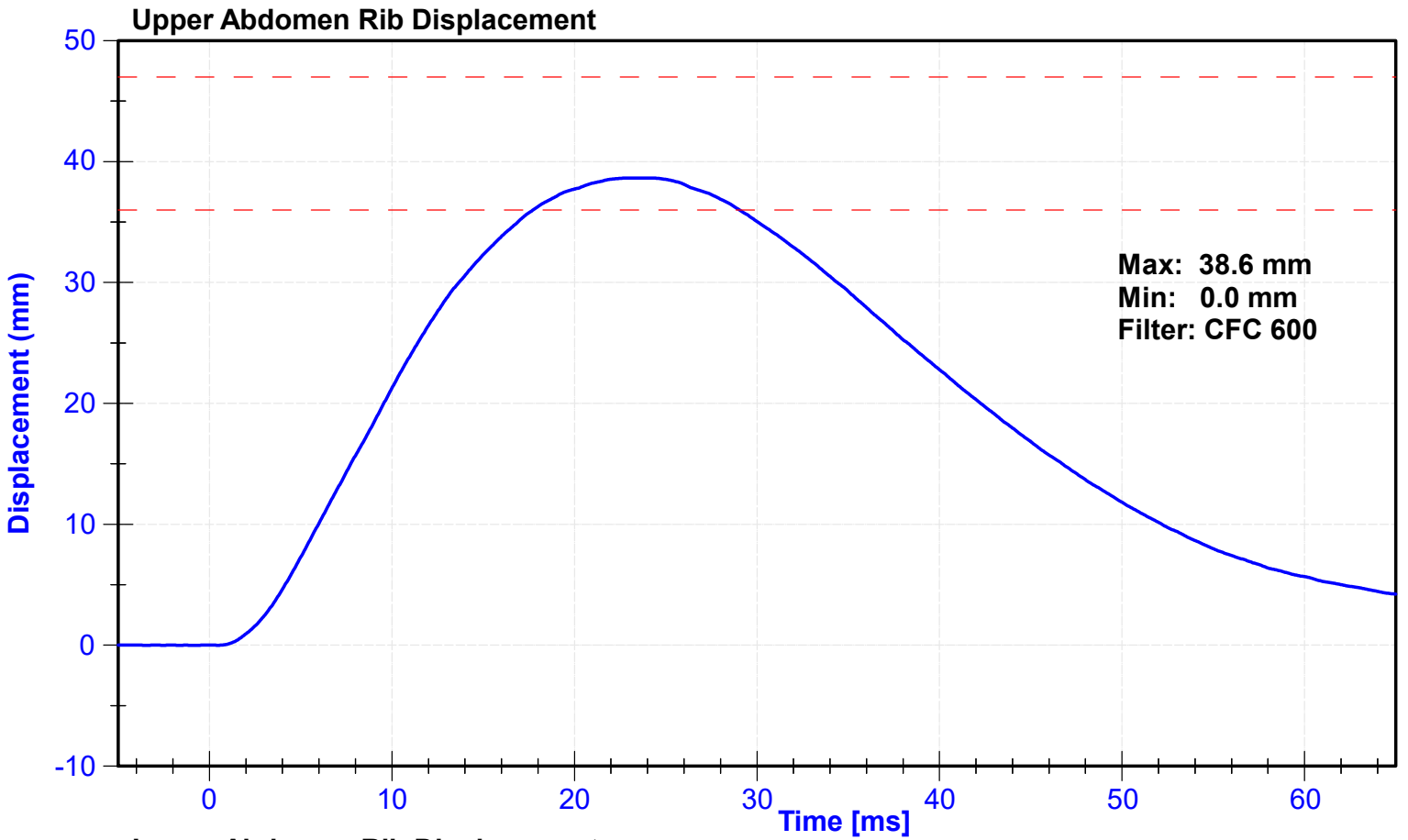
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	50.2	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	12	16	g's	14.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.4	Pass
Upper Abdomen Rib Deflection	36	47	mm	38.6	Pass
Lower Abdomen Rib Deflection	33	44	mm	37.8	Pass

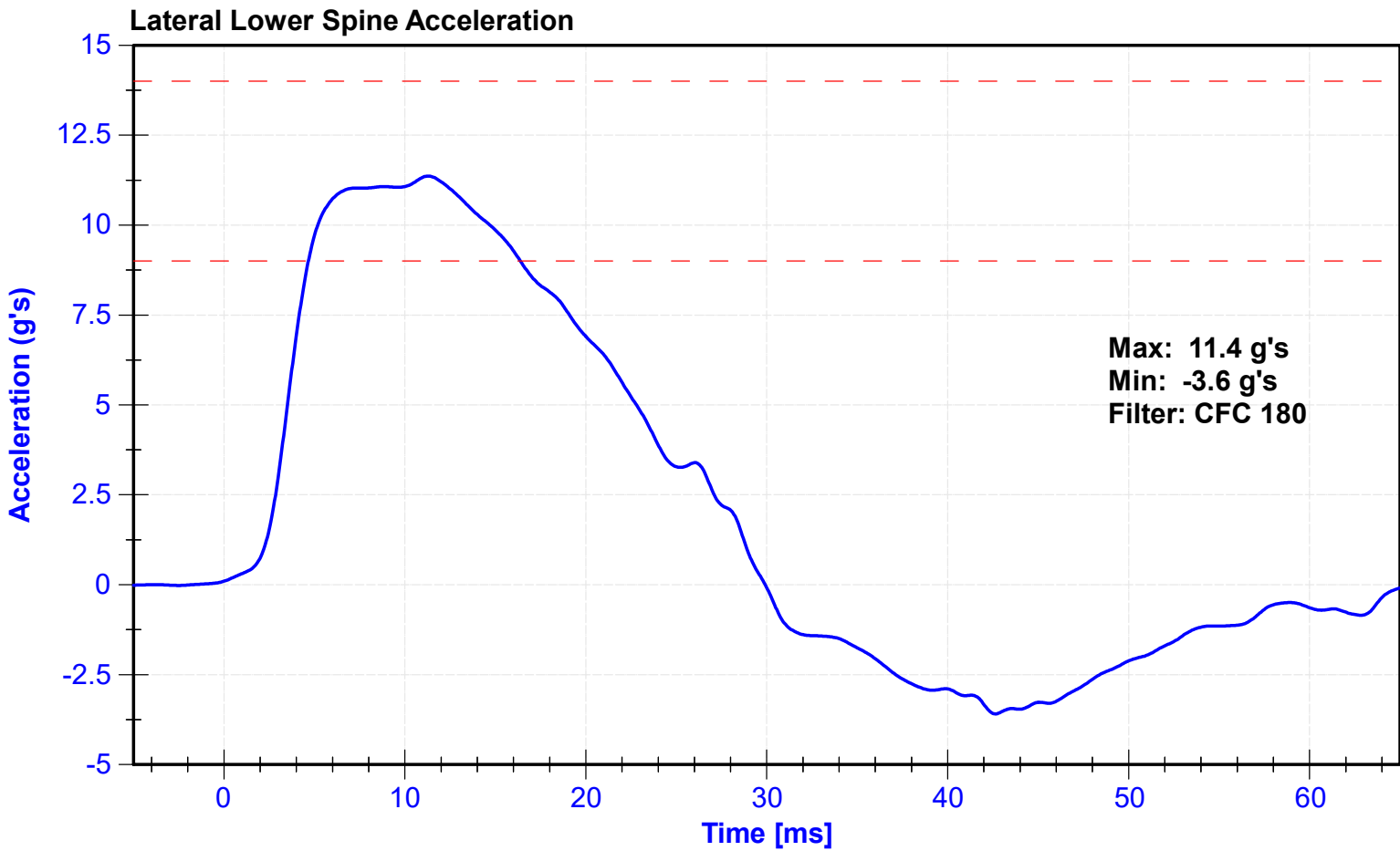
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Lower Spine Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Upper Abdomen Rib Potentiometer	Servo	307GFE	4/10/2023	10/9/2023
Lower Abdomen Rib Potentiometer	Servo	308GFE	4/10/2023	10/9/2023

Probe Acceleration







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

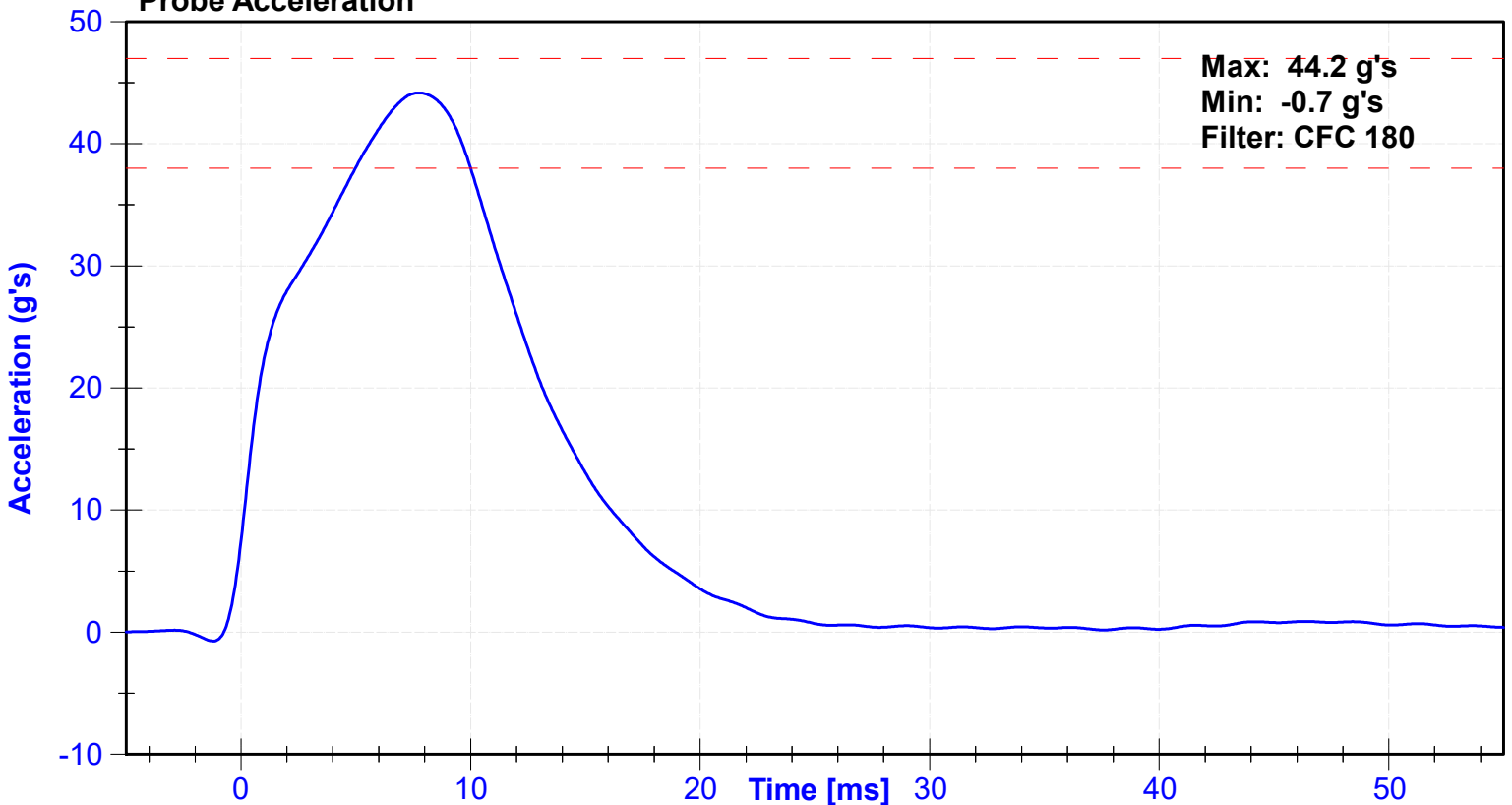
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	50.2	Pass
Velocity	6.6	6.8	m/s	6.71	Pass
Probe Acceleration	38	47	g's	44.2	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.8	Pass
Acetabulum Force	3600	4300	N	3771.1	Pass

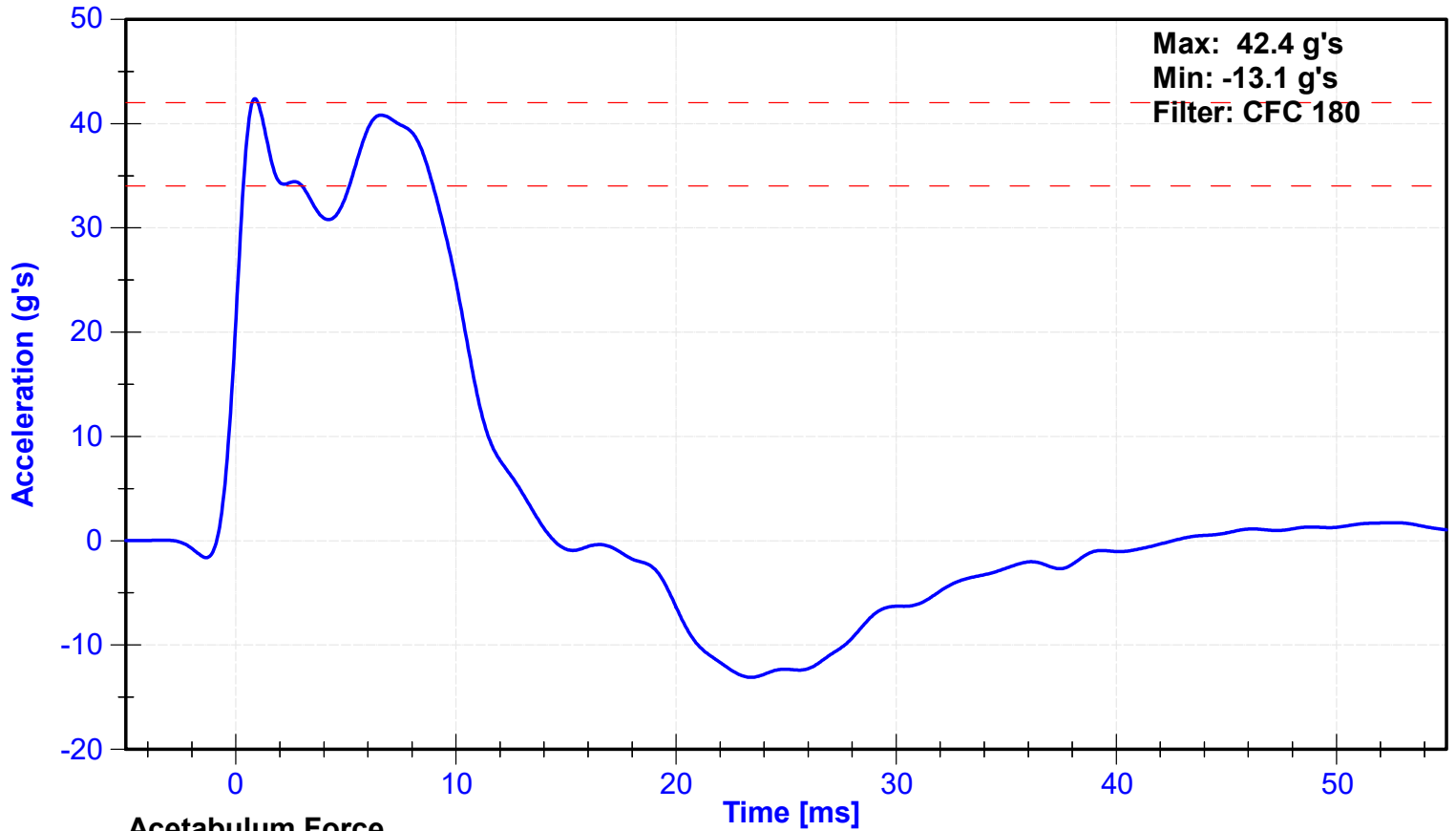
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Pelvis Y Accelerometer	Endevco	P51731	4/4/2023	10/1/2023
Acetabulum Load Cell	Denton	267-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A

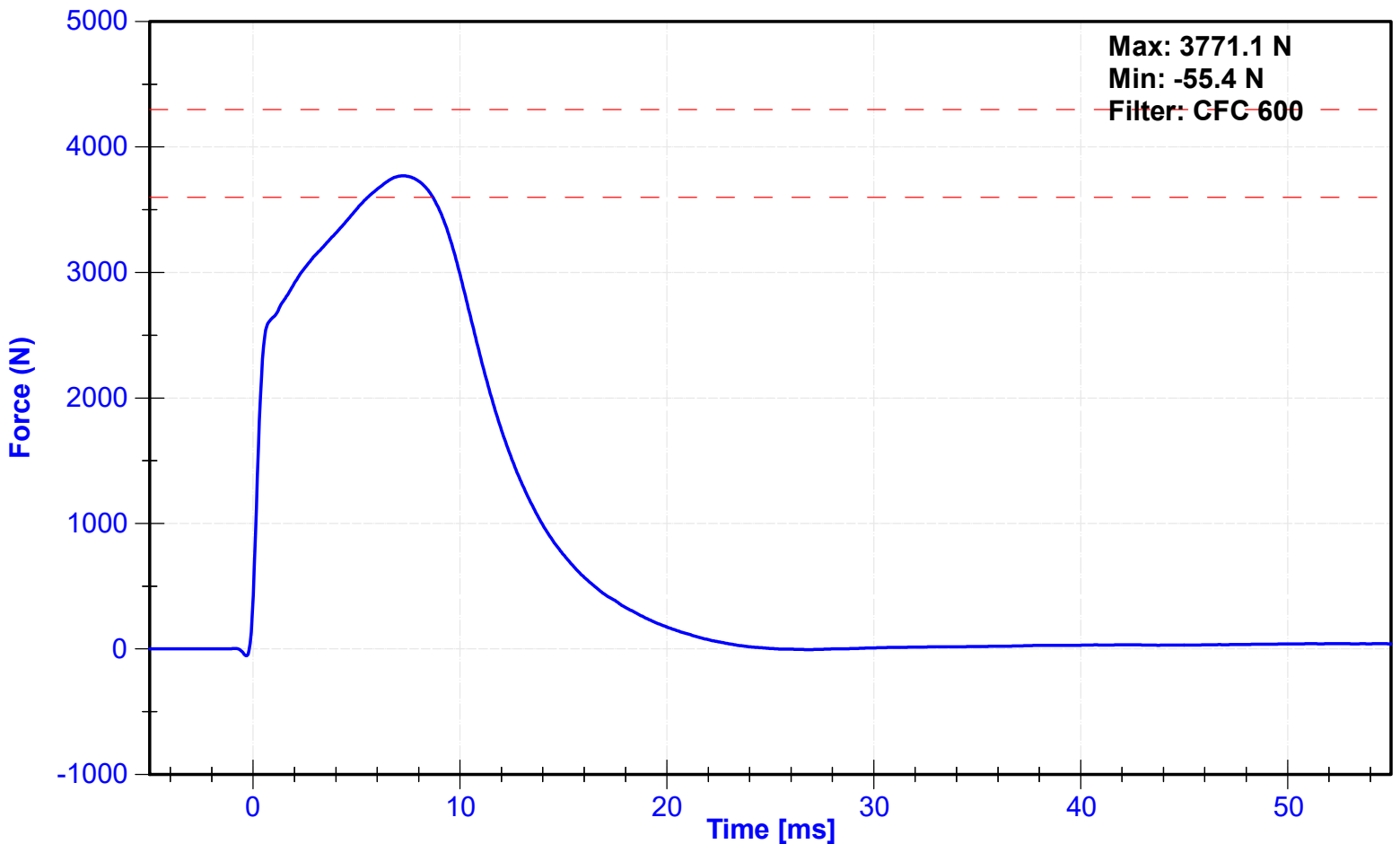
Probe Acceleration



Lateral Pelvis Acceleration



Acetabulum Force





SID-ILs Pelvis Plug Certification Test

Plug S/N 14213

Test Number 14353

Report Number 14397

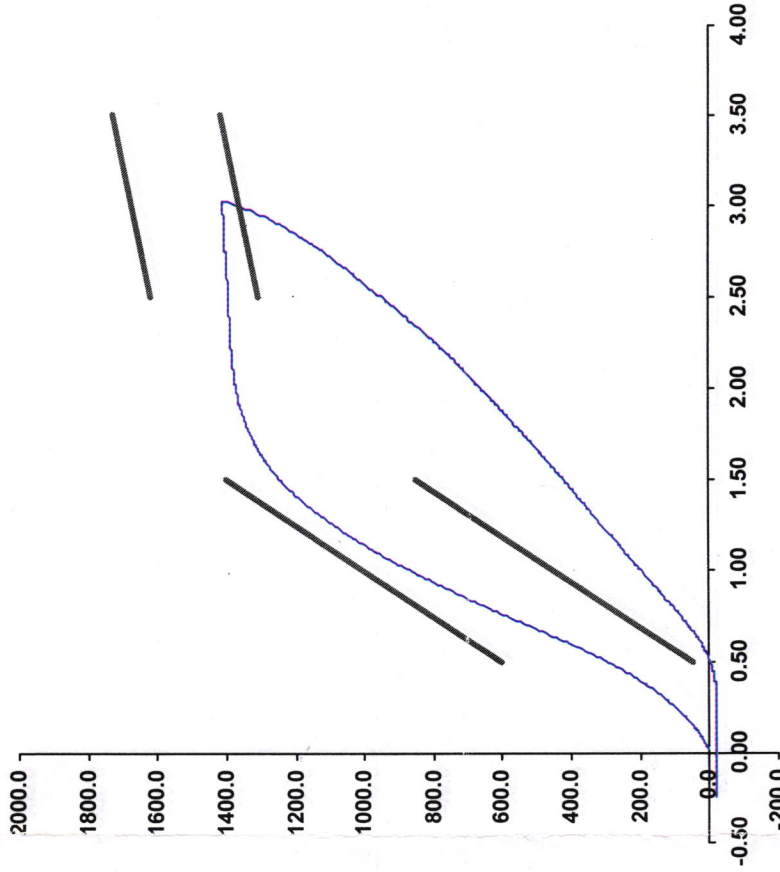
Test Date 7/3/2020 9:00:57 AM

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator	Part Number 180-4450
Template No 107	03-Jul-20
SACO Research	

By: DC Date: 7/3/2020
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



Crash
300 6/2/2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15344

Test Number 19691

Report Number 19743

Test Date 7/20/2021 12:18:48 PM

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

Testing Machine STM-20 5965542

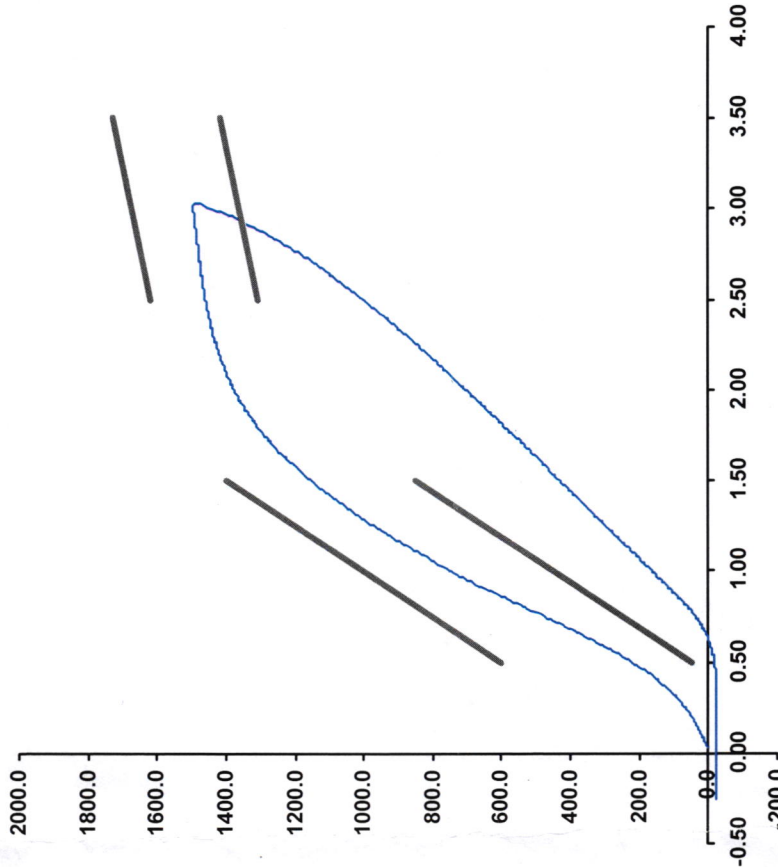
Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 20-Jul-21

SACO Research

By: DC Date: 7/26/2021

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 15429

Test Number 20090

Report Number 20144

Test Date 9/9/2021 10:05:41 AM

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

Testing Machine STM-20 5965542

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

Preload Value (-N) 22.24

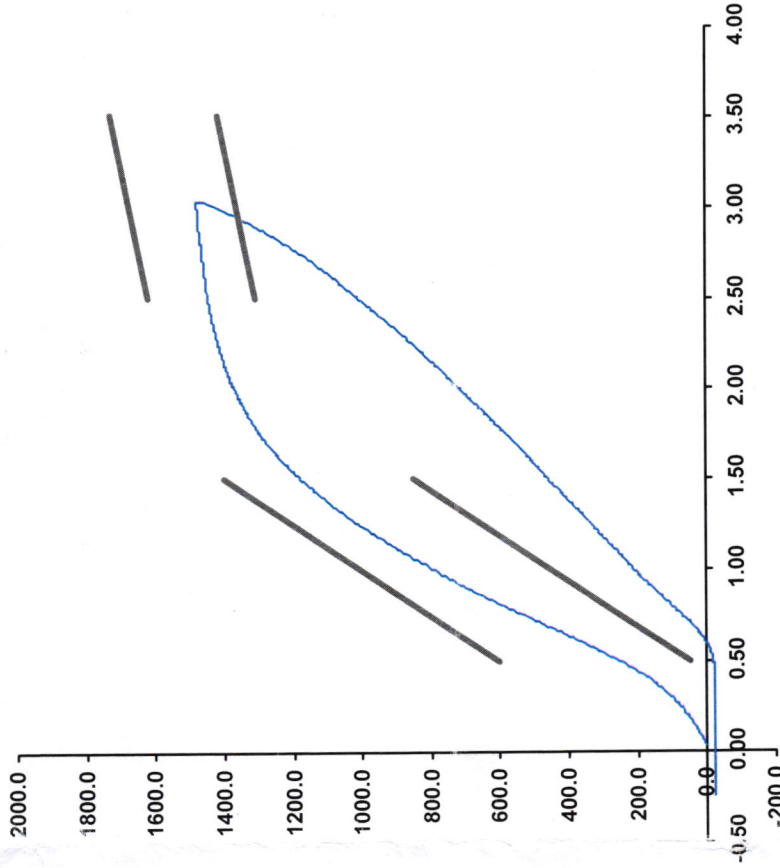
Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Now-IMPACT
300 6/2/2023

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 09-Sep-21

SACO Research

By: DC Date: 9/9/2021

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

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

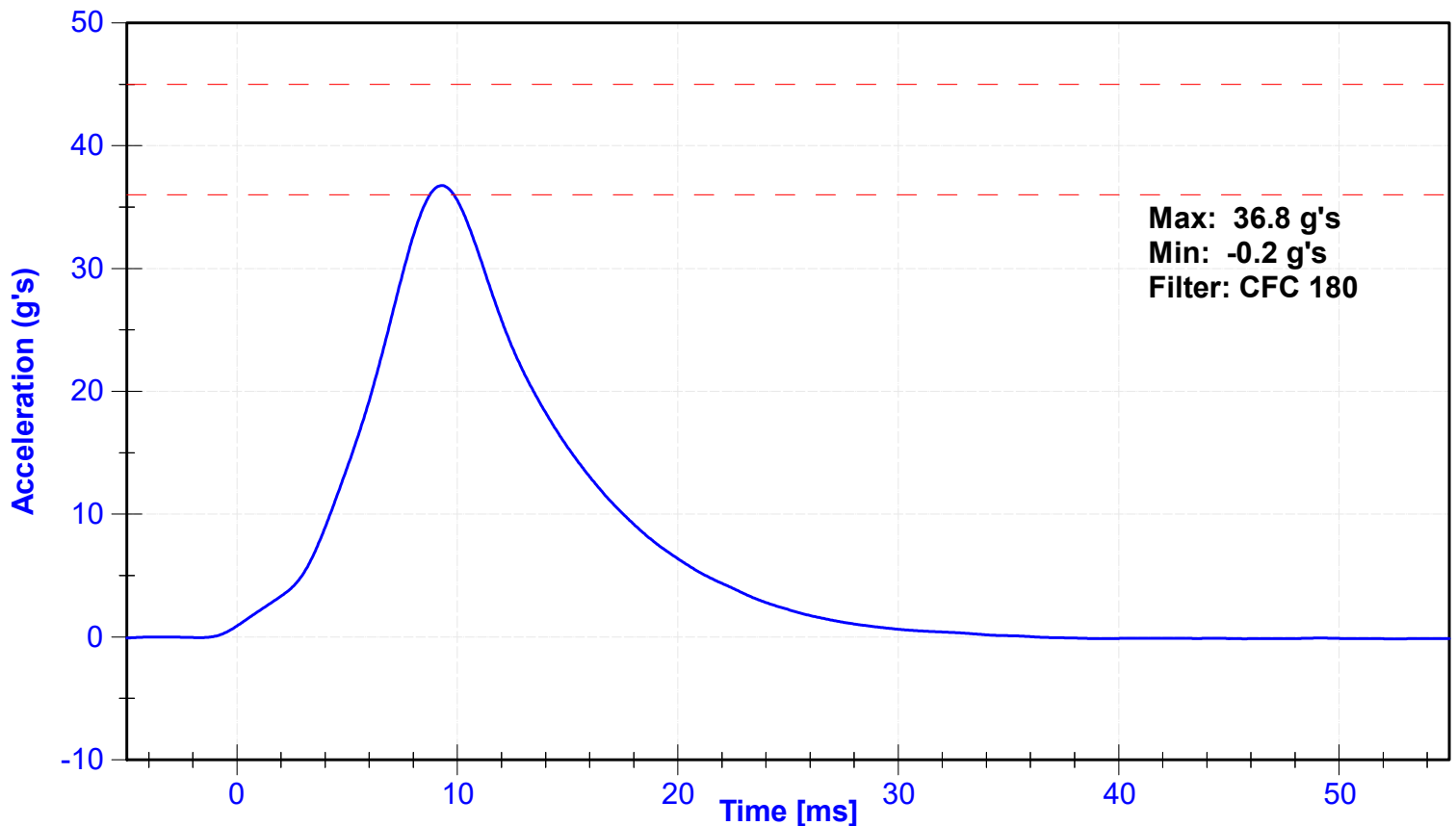
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	50.2	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	36	45	g's	36.8	Pass
Lateral Pelvis Acceleration	28	39	g's	28.0	Pass
Iliac Force	4100	5100	N	4230.1	Pass

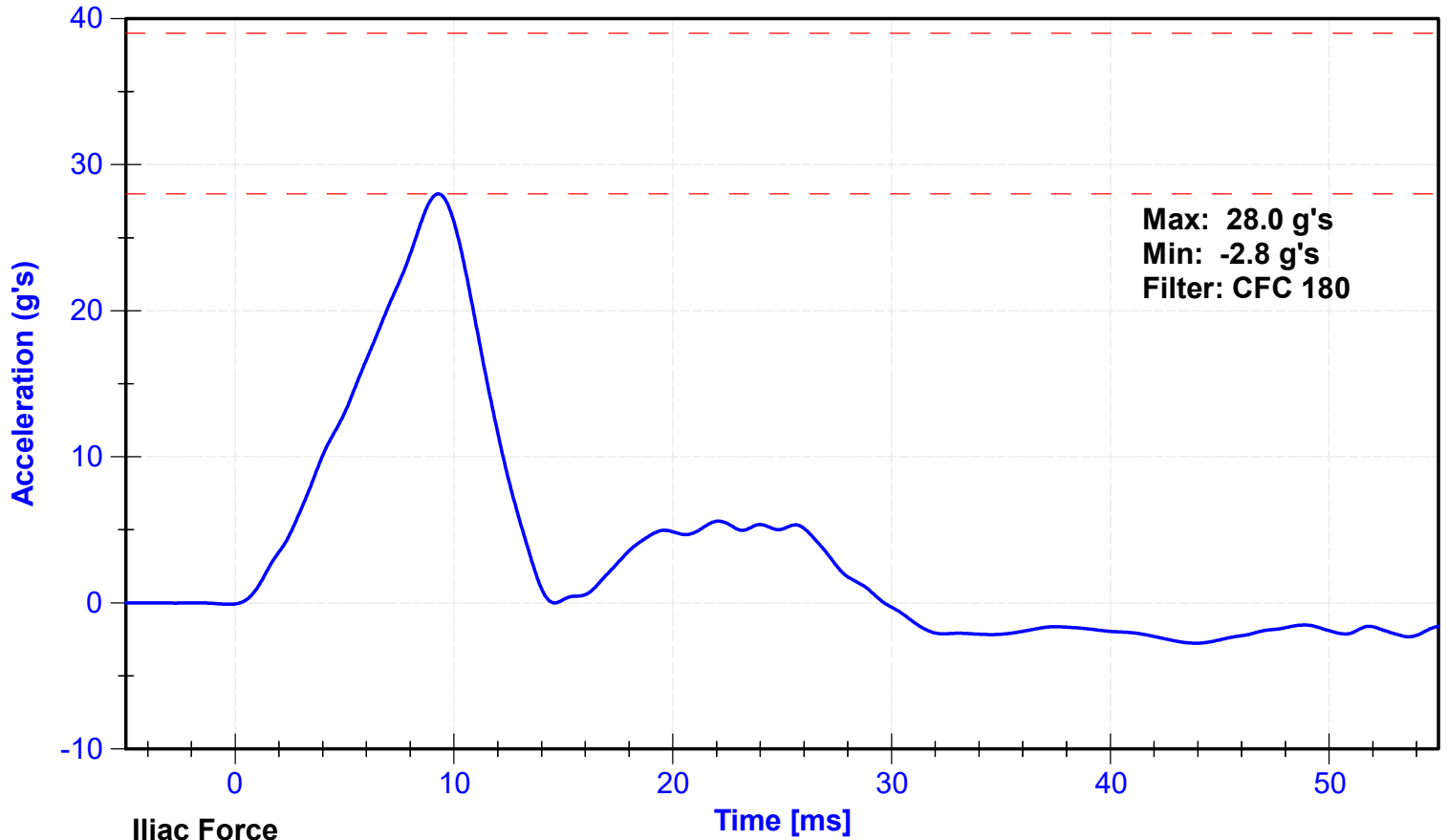
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Pelvis Y Accelerometer	Endevco	P51731	4/4/2023	10/1/2023
Iliac Load Cell	Denton	280-FY	8/11/2022	8/11/2023

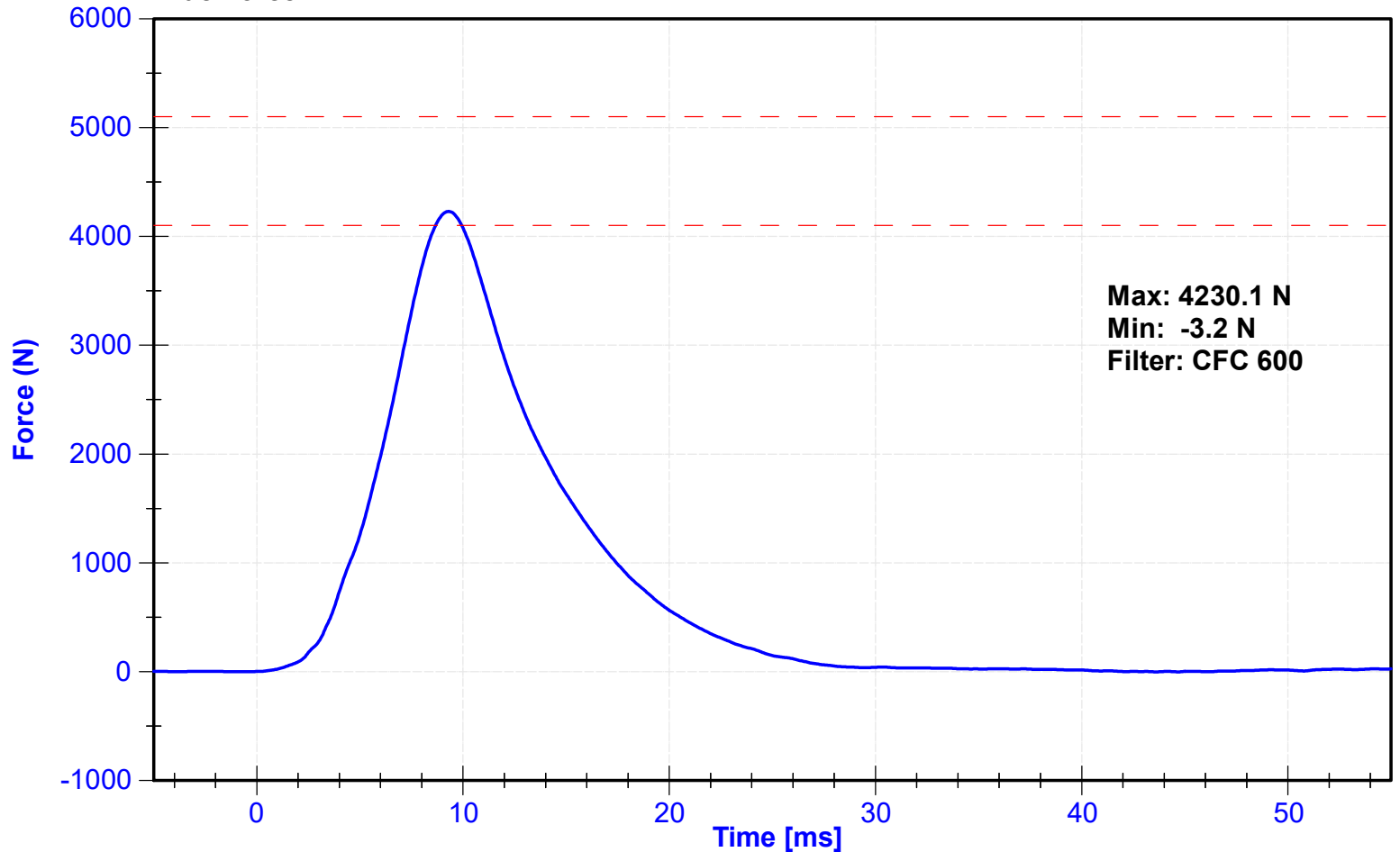
Probe Acceleration



Lateral Pelvis Acceleration



Iliac Force



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO:300

(CONFIGURED FOR LEFT SIDE IMPACT)

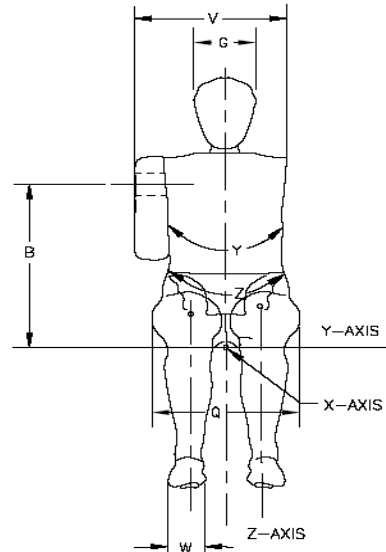
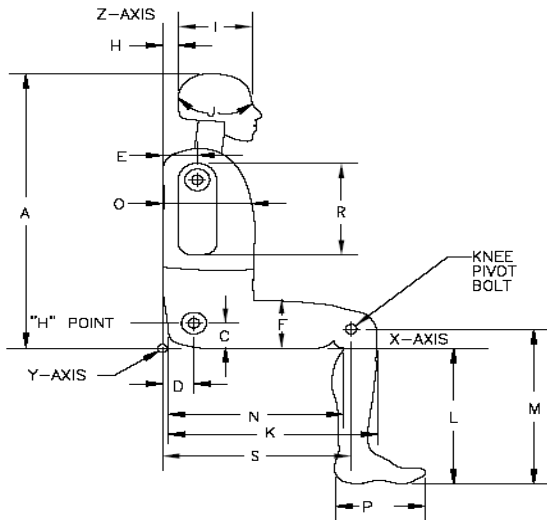


External Measurements - SID-IIs

Technician: K. Brogan

Date: 06/14/2023

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	783	Pass
B	Shoulder Pivot Height	437	453	443	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	123	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	547	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	198	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	480	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	876	Pass
Z	Waist Circumference	761	791	777	Pass

ATD Manufacturer	FTSS	Test Technician	Z. Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

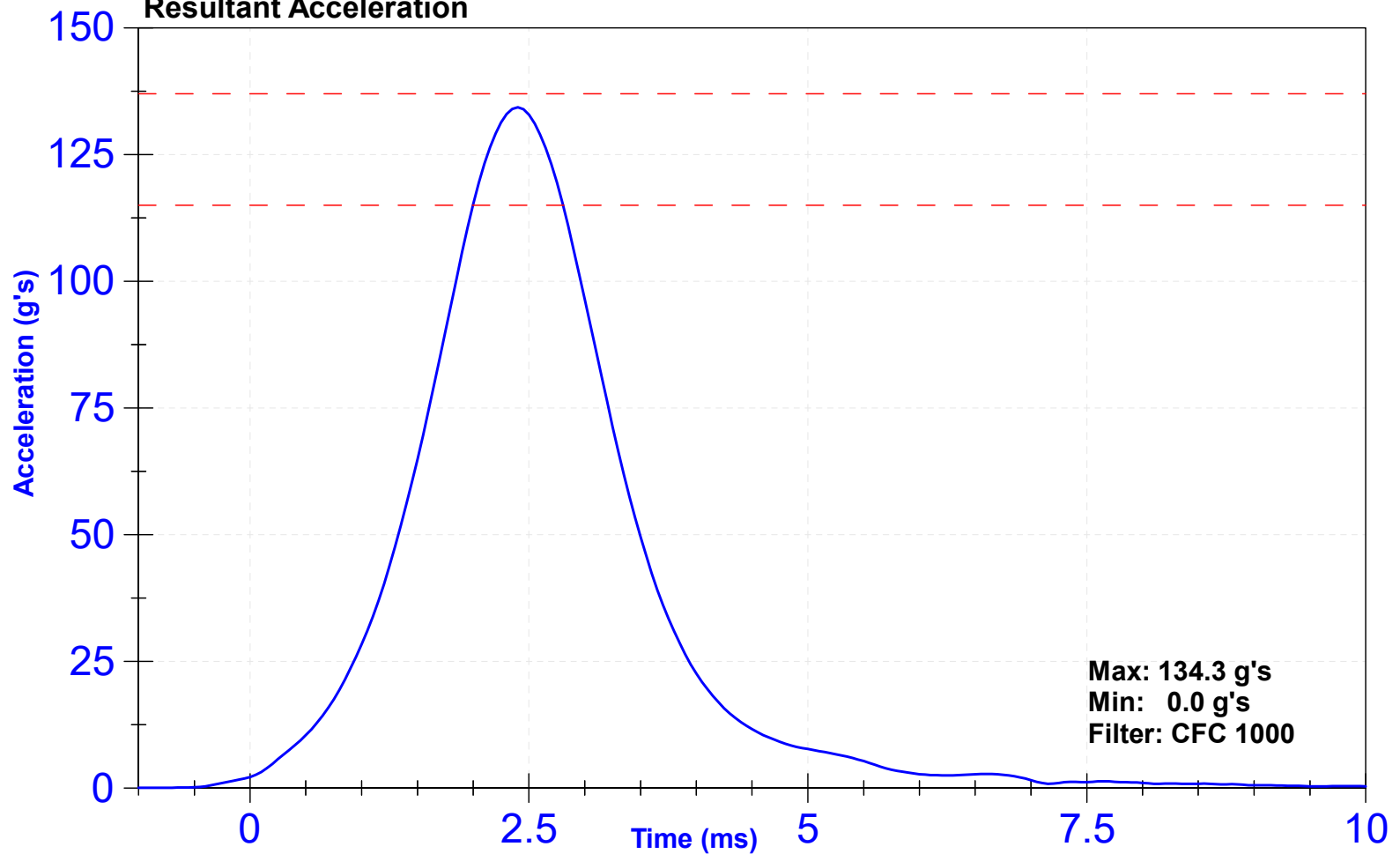
Results

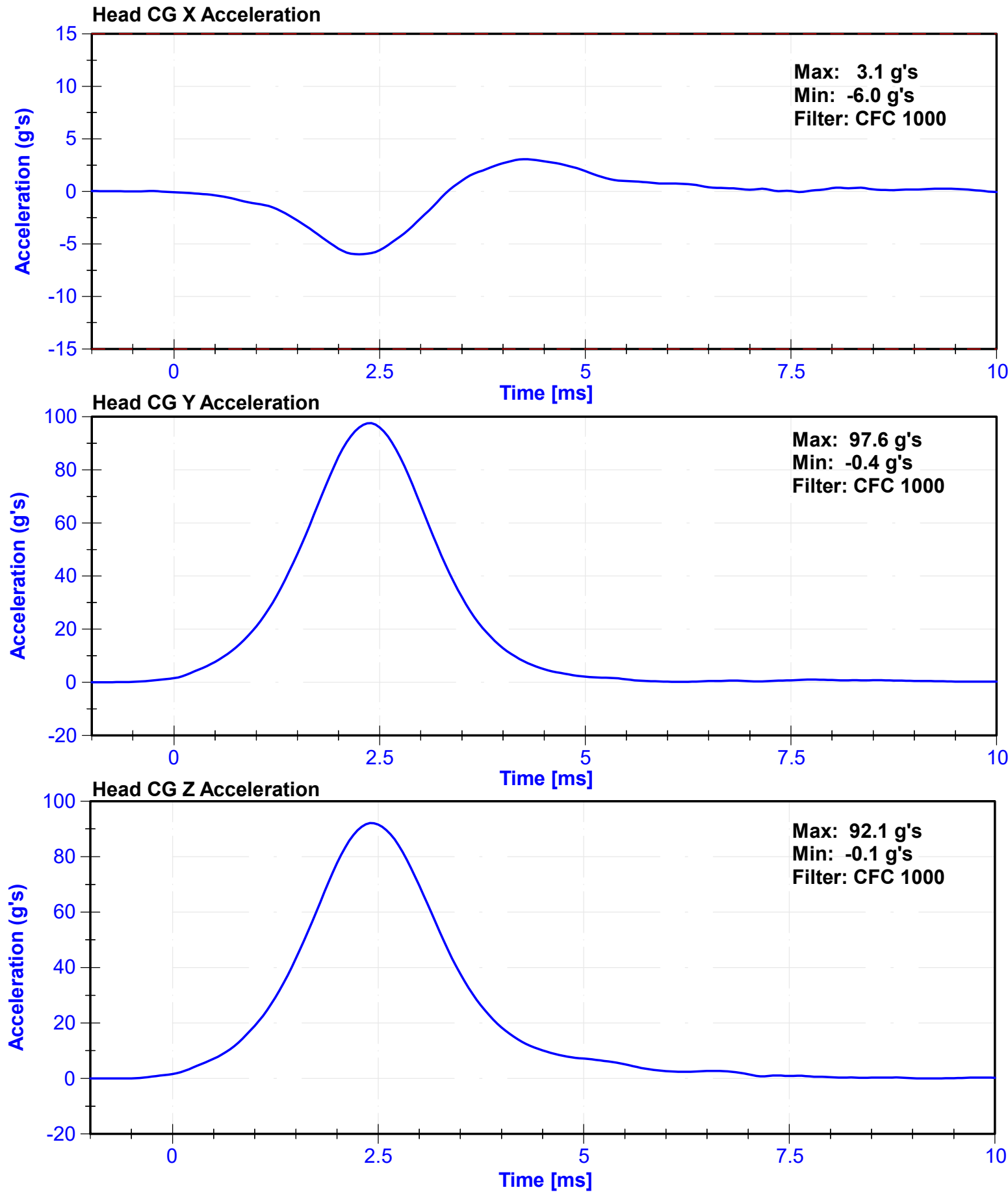
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	42	Pass
Resultant Acceleration	115	137	g's	134.3	Pass
Oscillation	0	15	%	2.0	Pass
Fore-Aft Acceleration	-15	15	g's	-6.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	4/4/2023	10/1/2023
Y Accelerometer	Endevco	P79189	4/4/2023	10/1/2023
Z Accelerometer	Endevco	P79587	4/4/2023	10/1/2023

Resultant Acceleration





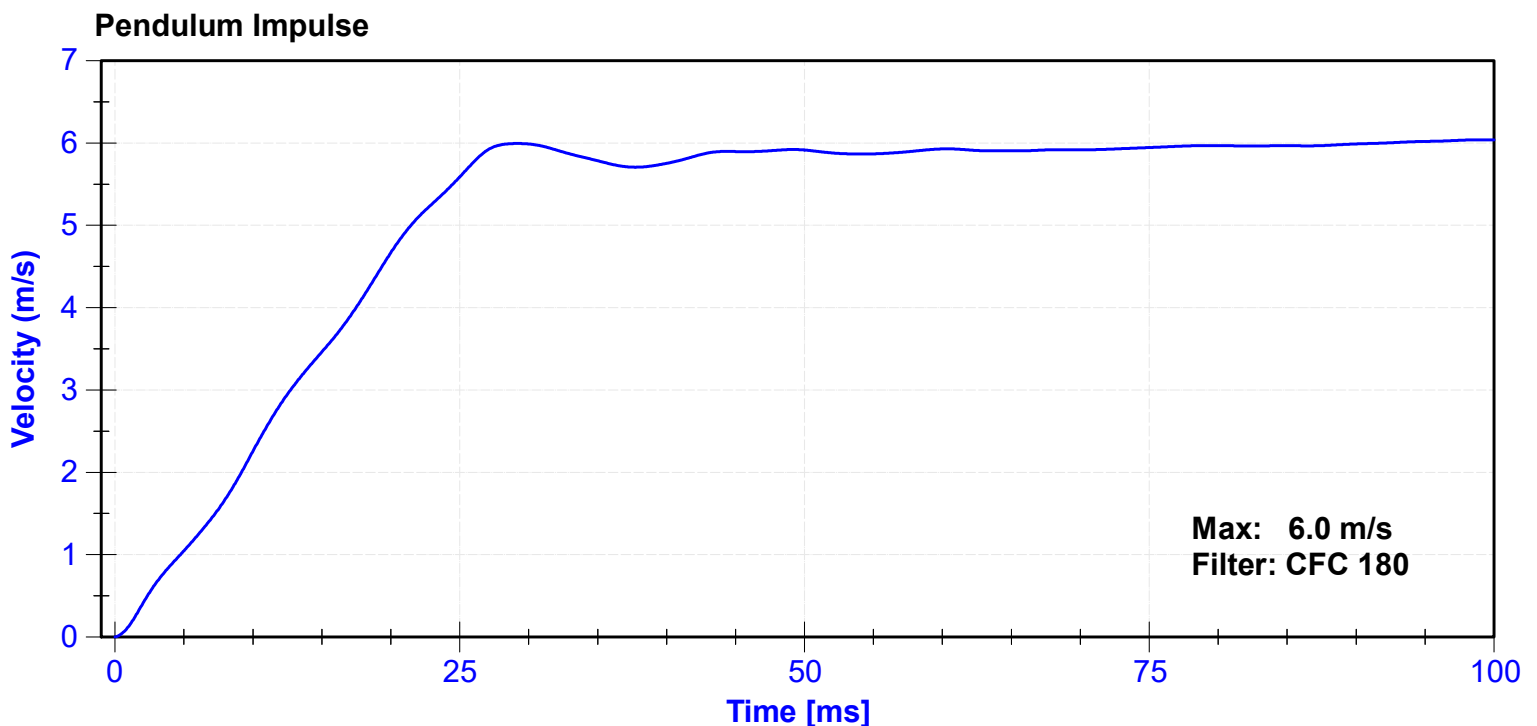
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

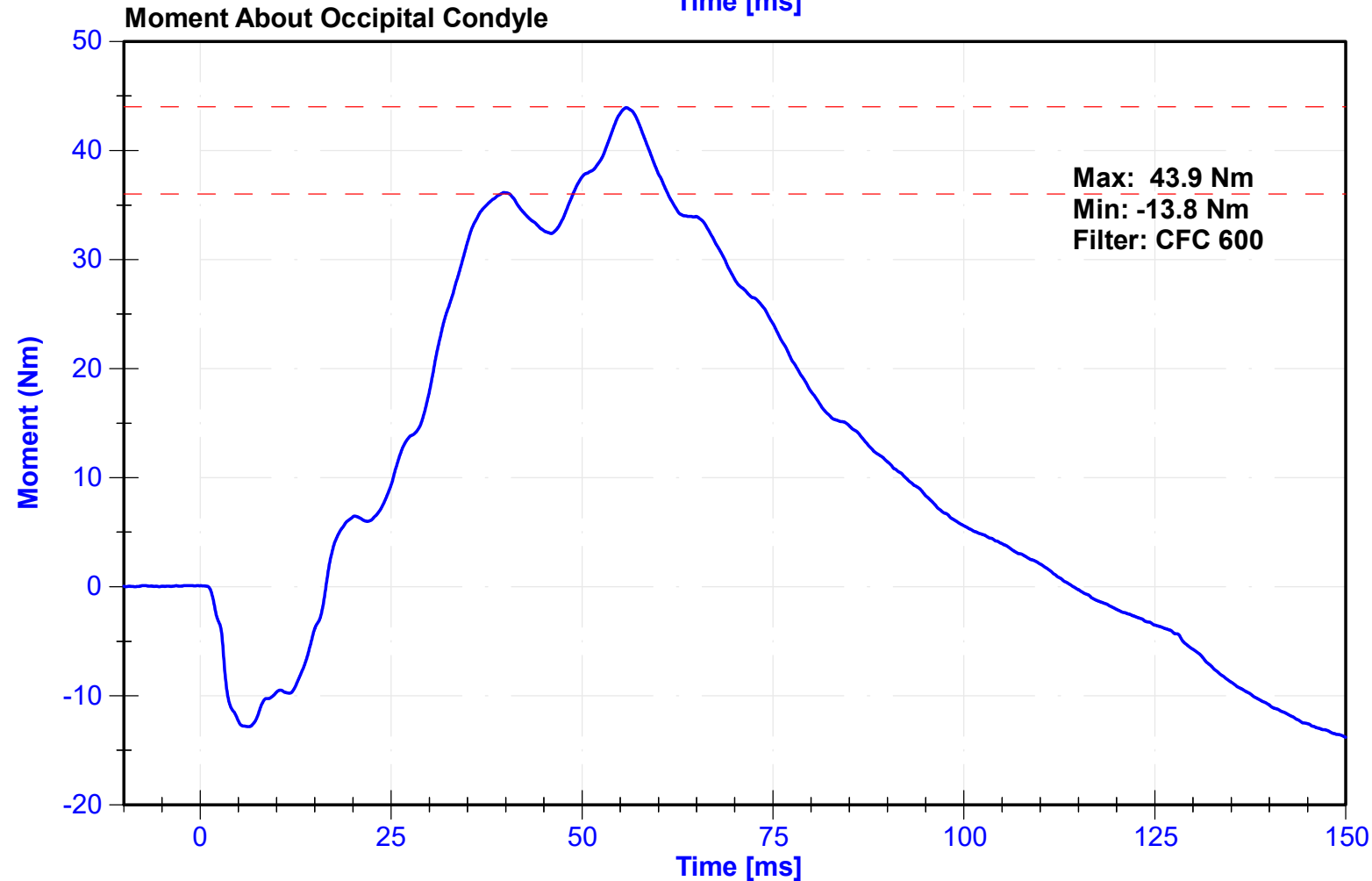
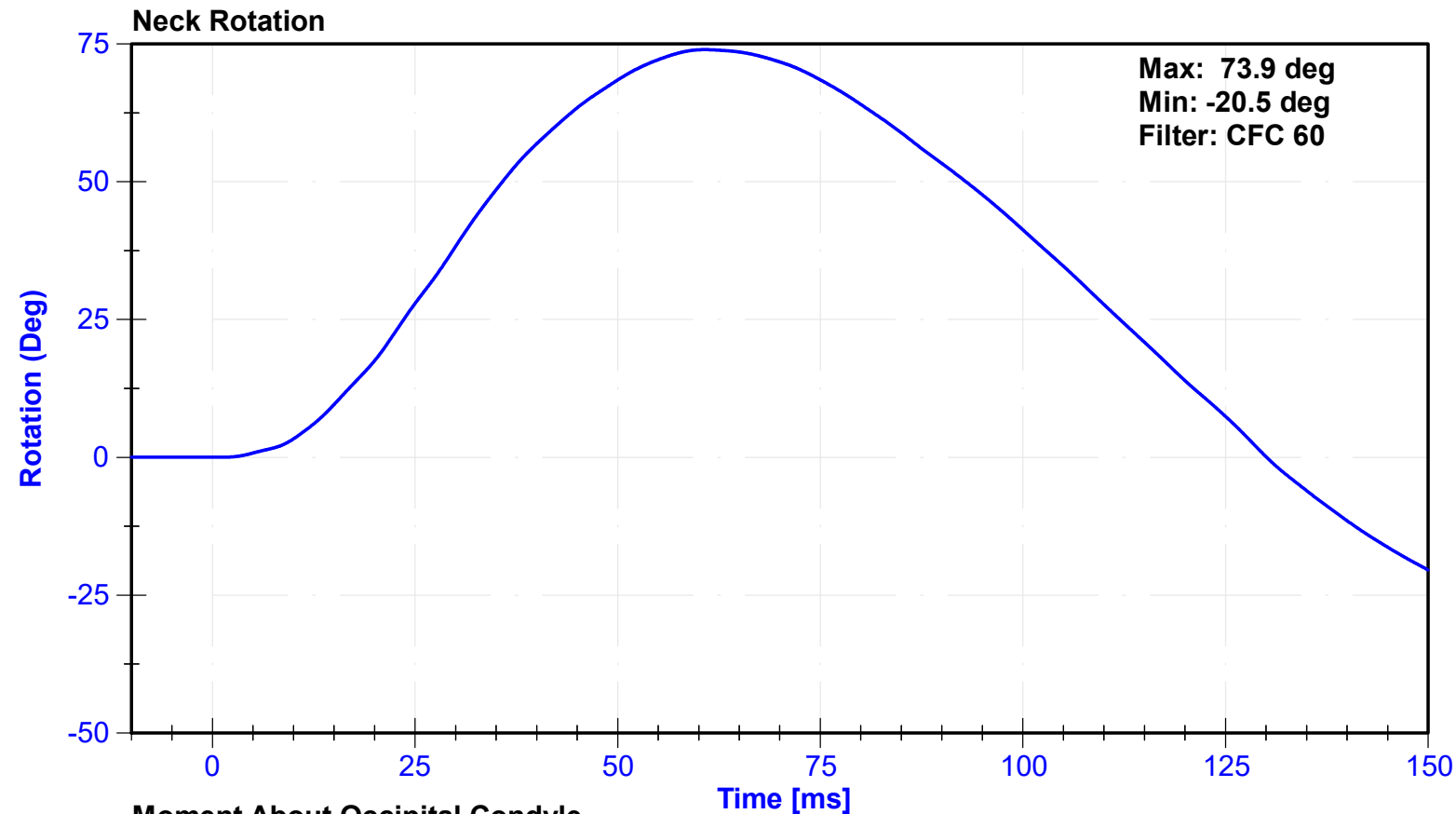
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	47.5	Pass
Velocity	5.51	5.63	m/s	5.614	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.26	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.46	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.67	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.59	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.04	Pass
Neck Rotation	71	81	deg	73.9	Pass
Time at Maximum Rotation	50	70	ms	60.8	Pass
Moment about the OC	36	44	Nm	43.9	Pass
Moment Decay to 0 Nm	102	126	ms	114.4	Pass

Transducer Calibrations

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





ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

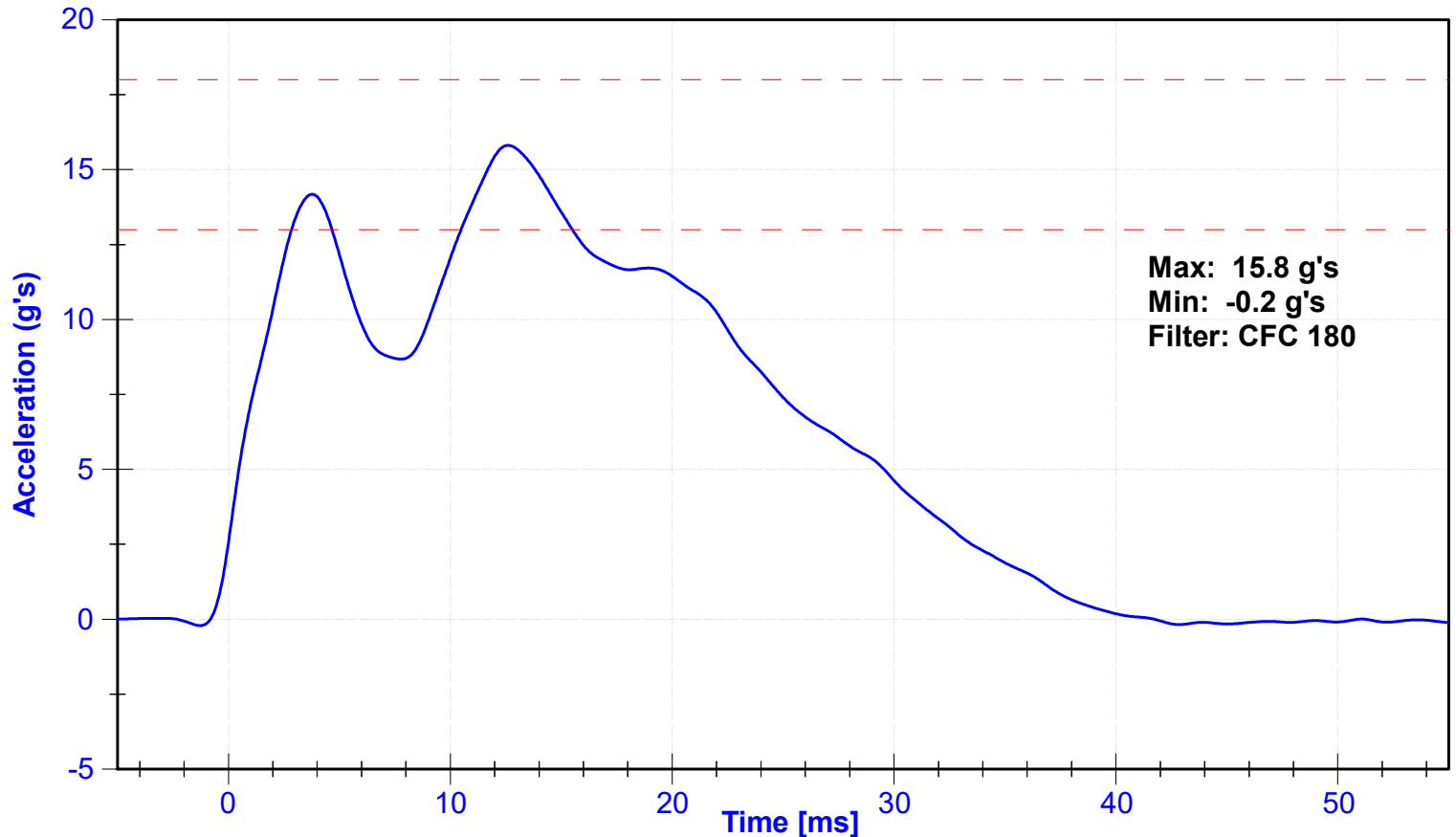
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	30.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.6	Pass

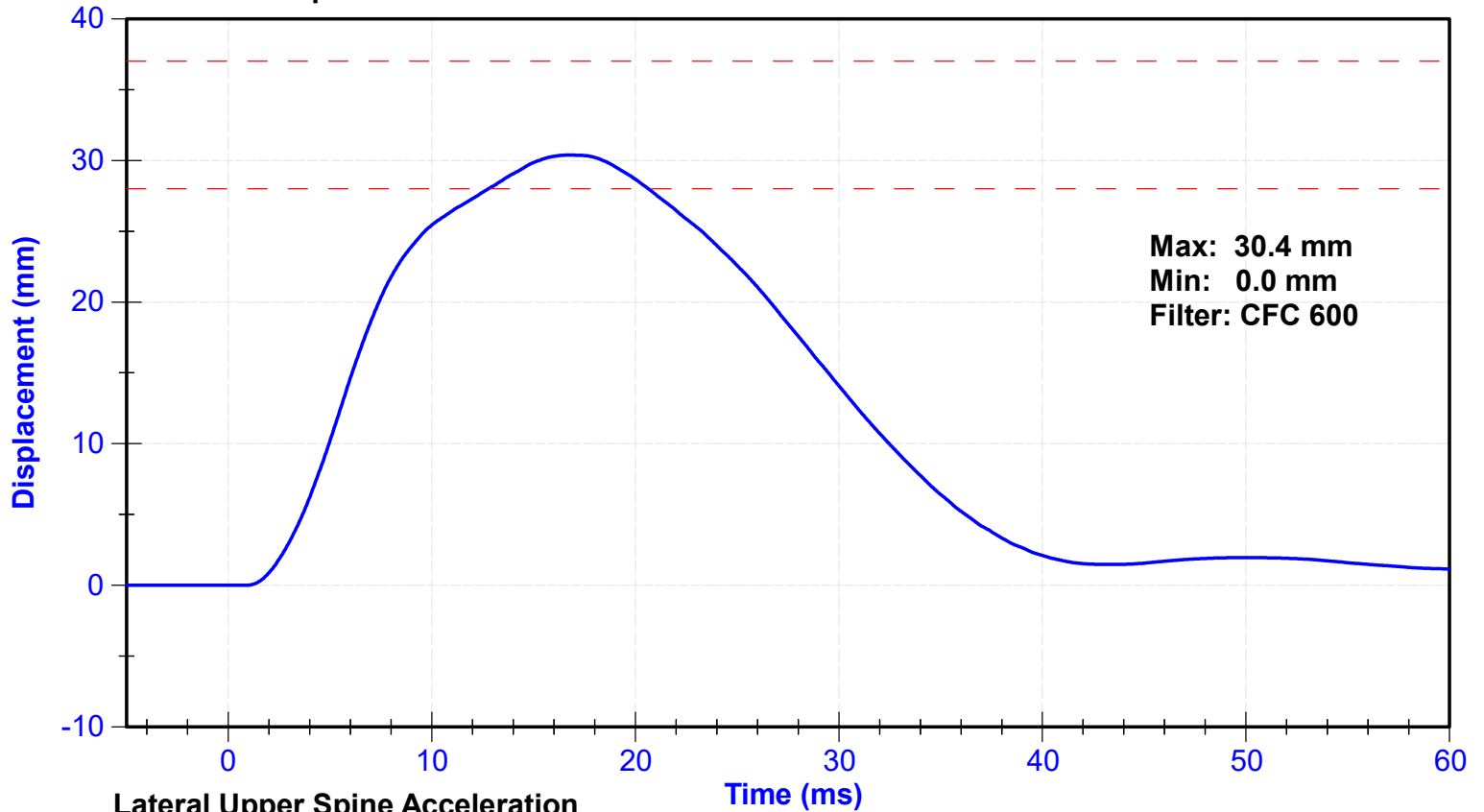
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Shoulder Potentiometer	Servo	053GFE	4/10/2023	10/9/2023
Upper Spine Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023

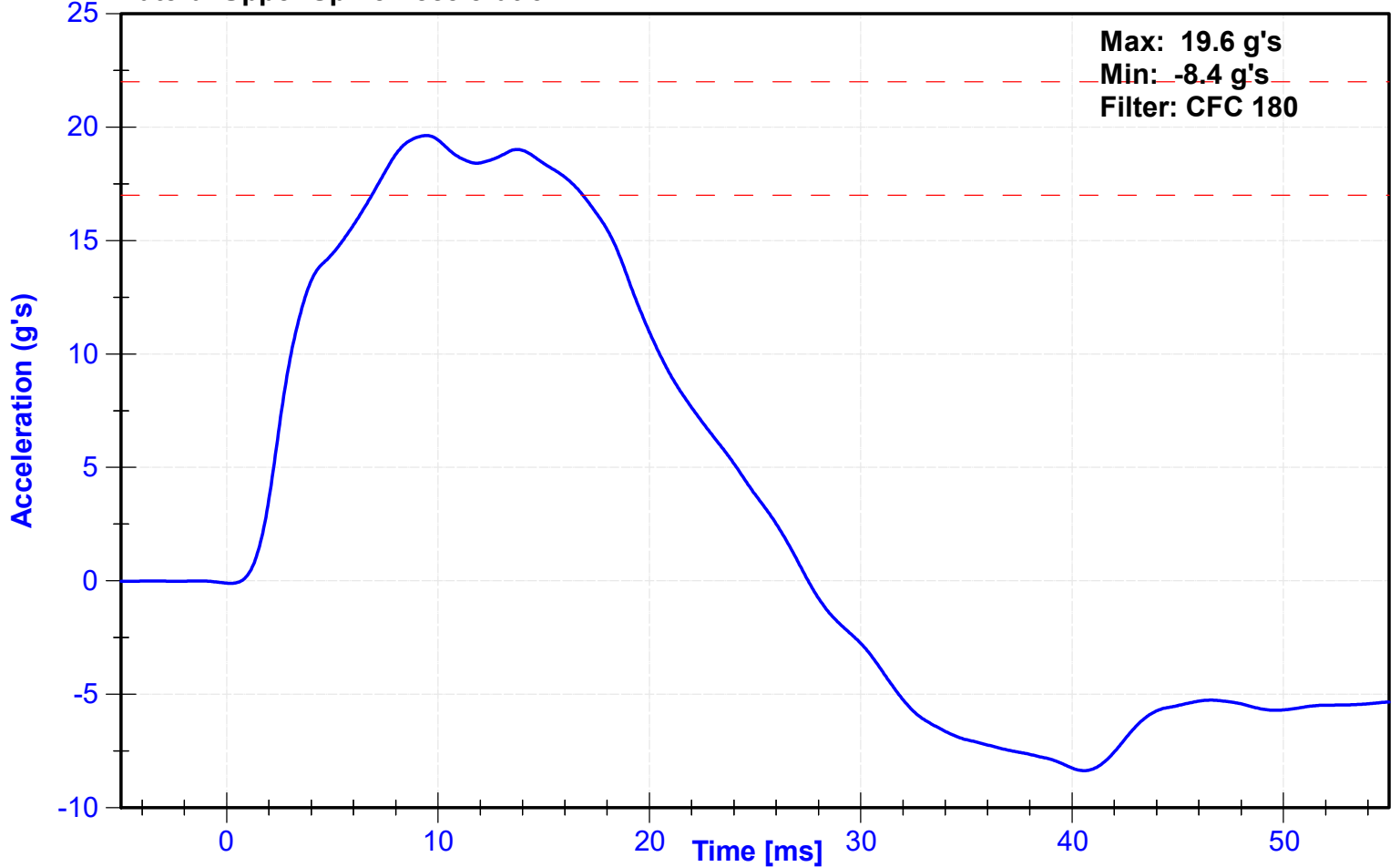
Probe Acceleration



Shoulder Displacement



Lateral Upper Spine Acceleration



ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

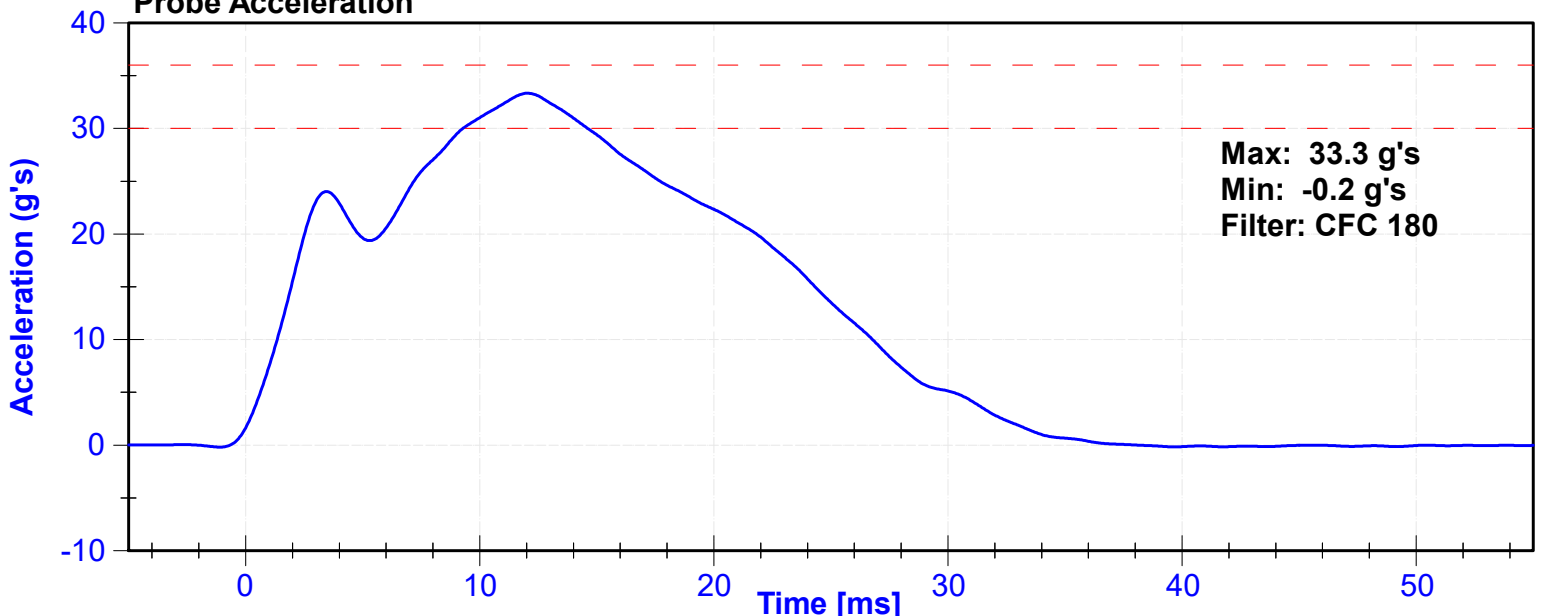
Results

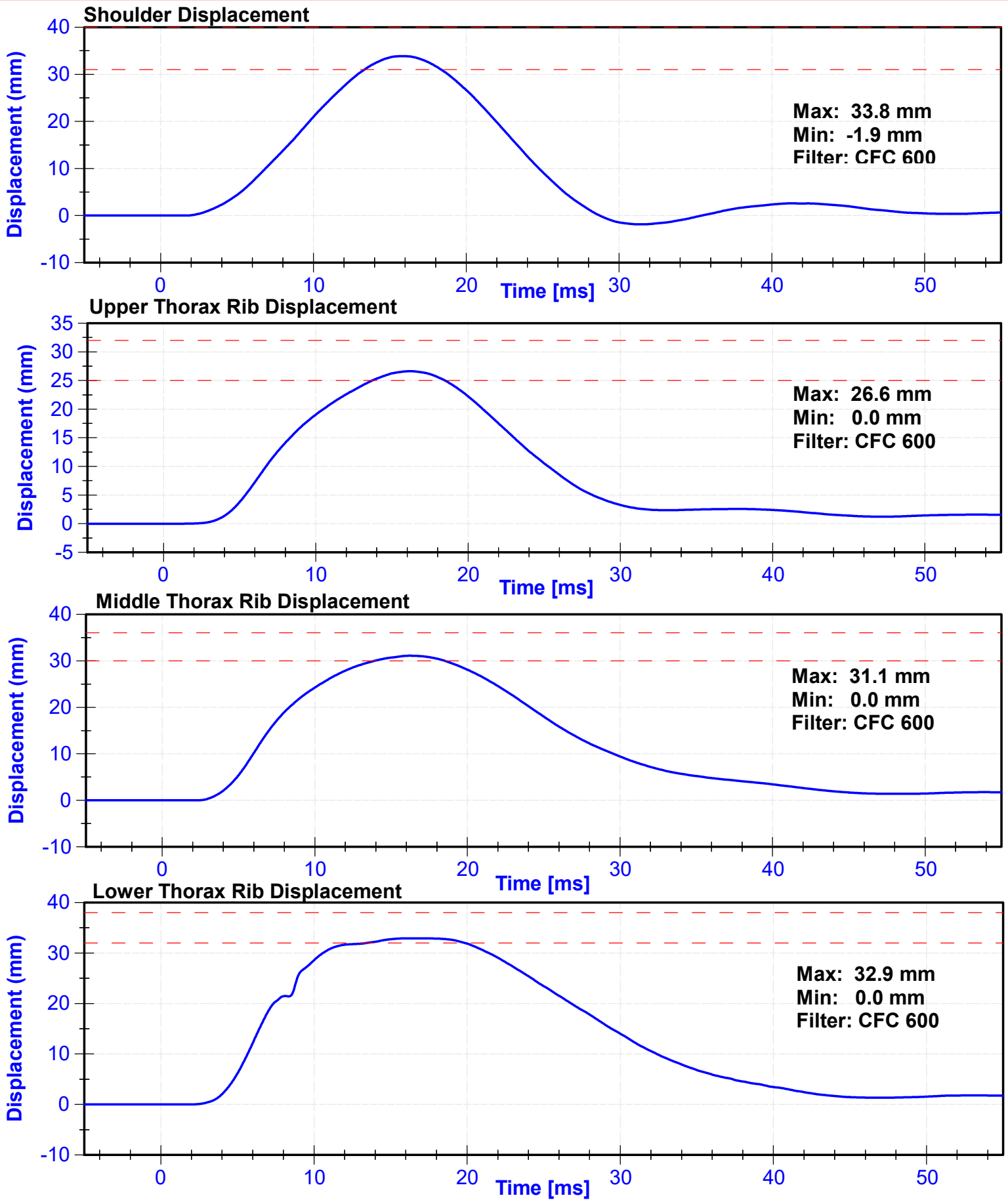
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	33.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.2	Pass
Shoulder Deflection	31	40	mm	33.8	Pass
Upper Thorax Rib Deflection	25	32	mm	26.6	Pass
Mid Thorax Rib Deflection	30	36	mm	31.1	Pass
Lower Thorax Rib Deflection	32	38	mm	32.9	Pass

Transducer Calibrations

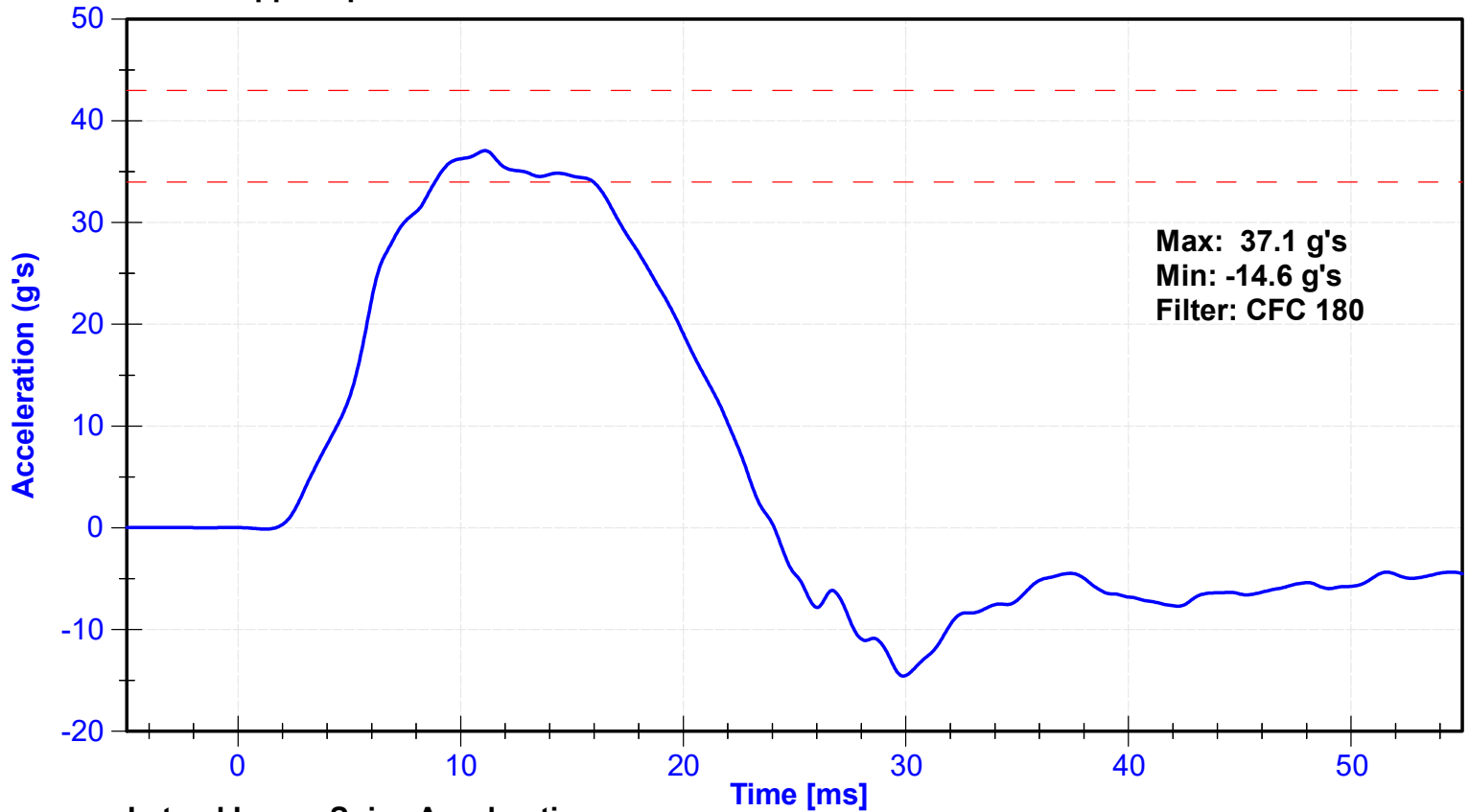
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Shoulder Potentiometer	Servo	053GFE	4/10/2023	10/9/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	4/10/2023	10/9/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	4/10/2023	10/9/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	4/10/2023	10/9/2023

Probe Acceleration

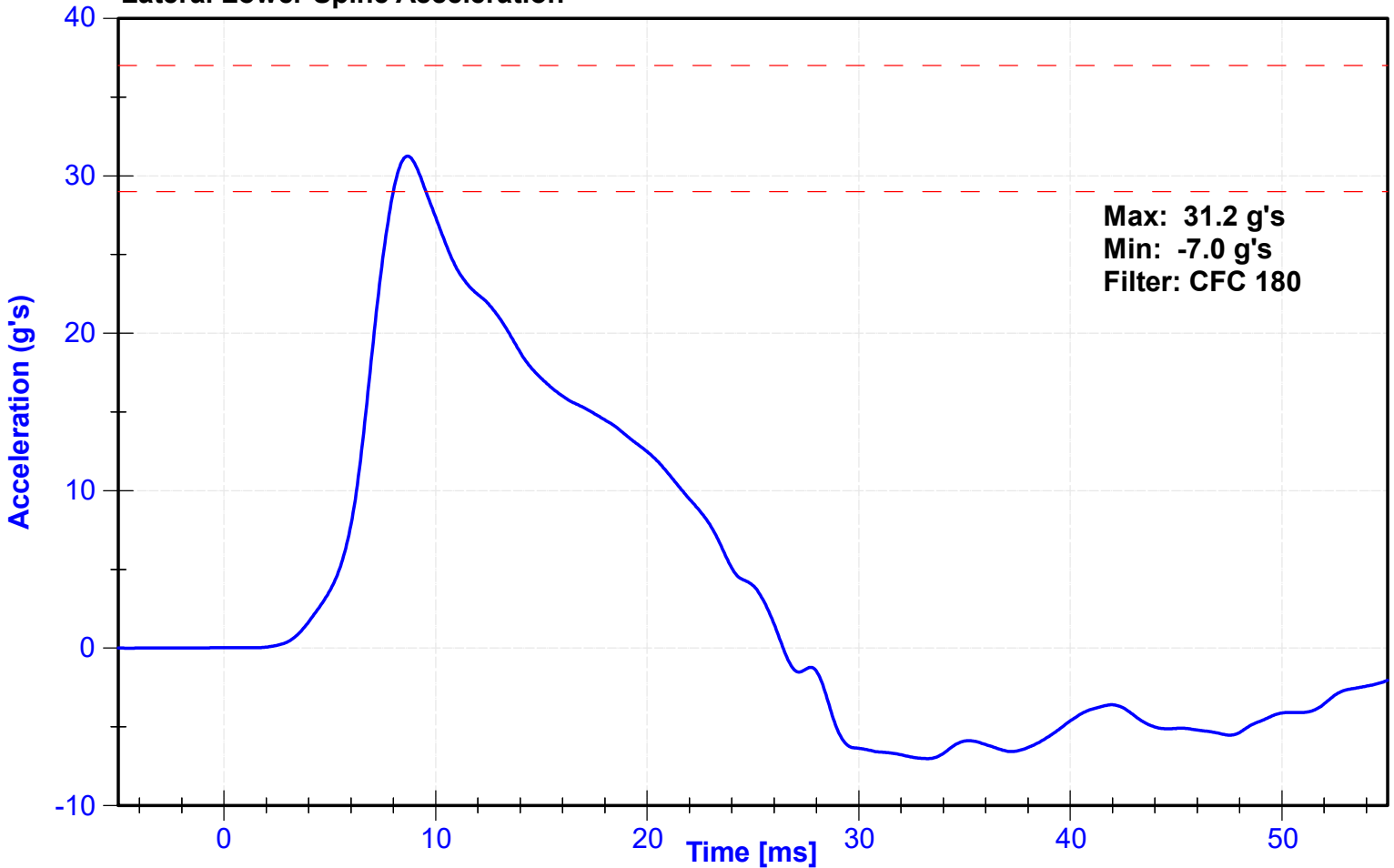




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



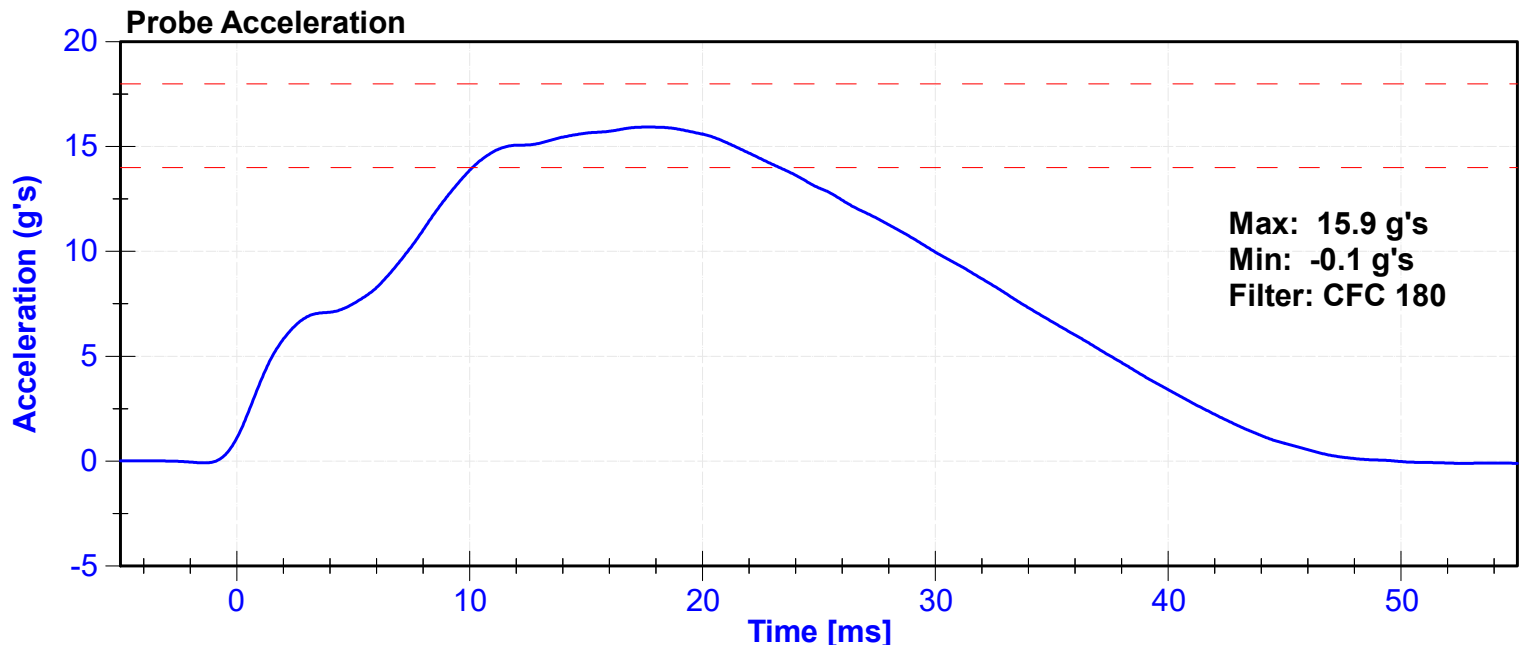
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

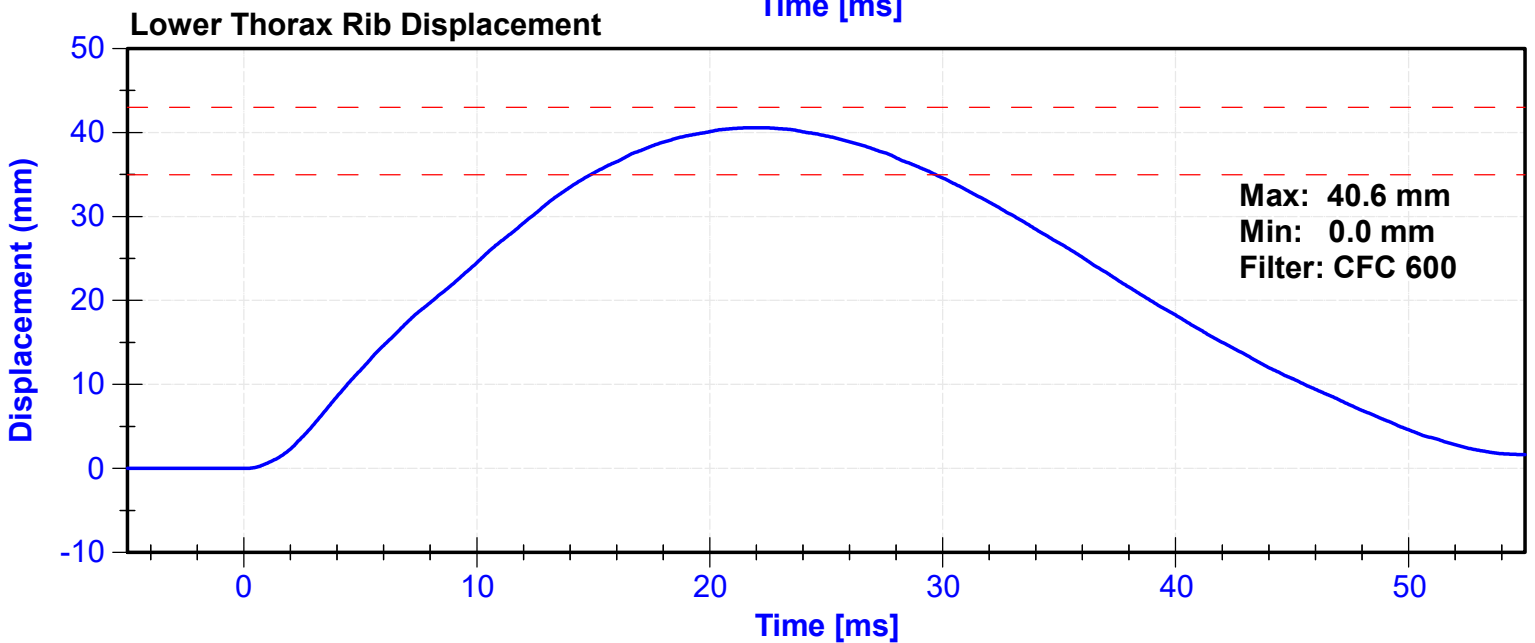
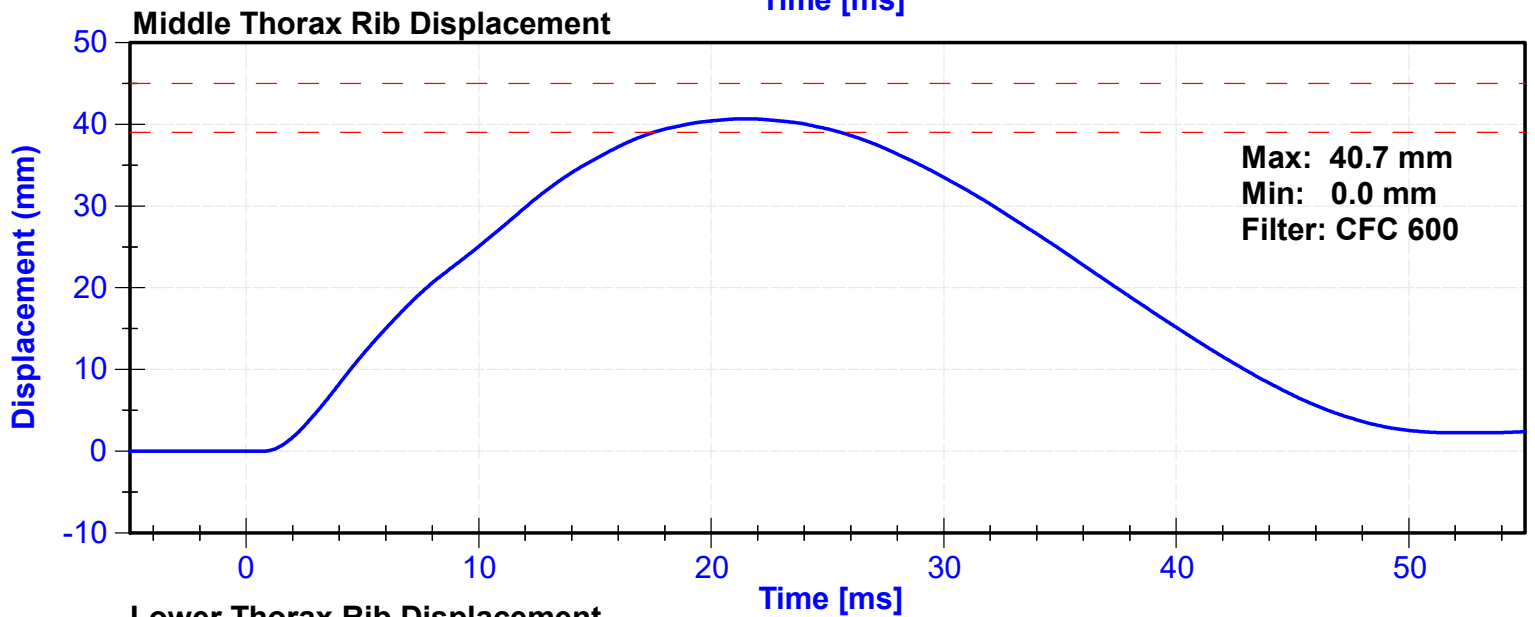
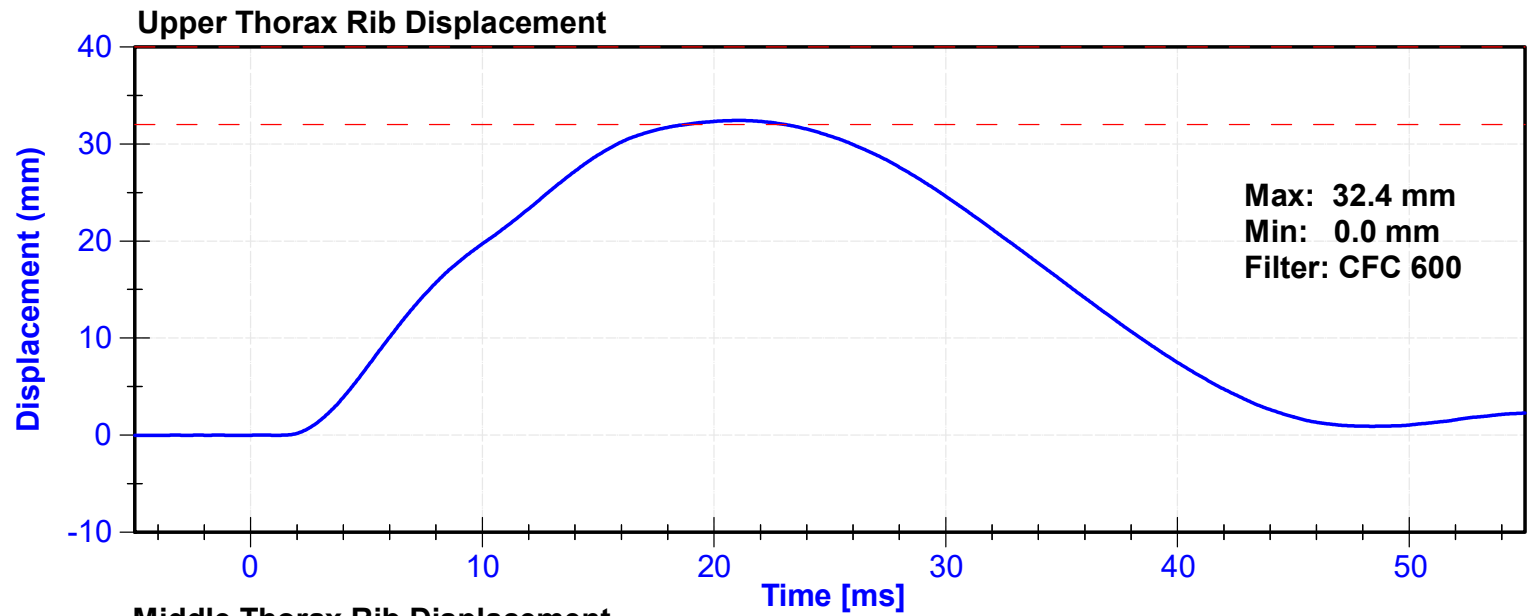
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	15.9	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.3	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.3	Pass
Upper Thorax Rib Deflection	32	40	mm	32.4	Pass
Middle Thorax Rib Deflection	39	45	mm	40.7	Pass
Lower Thorax Rib Deflection	35	43	mm	40.6	Pass

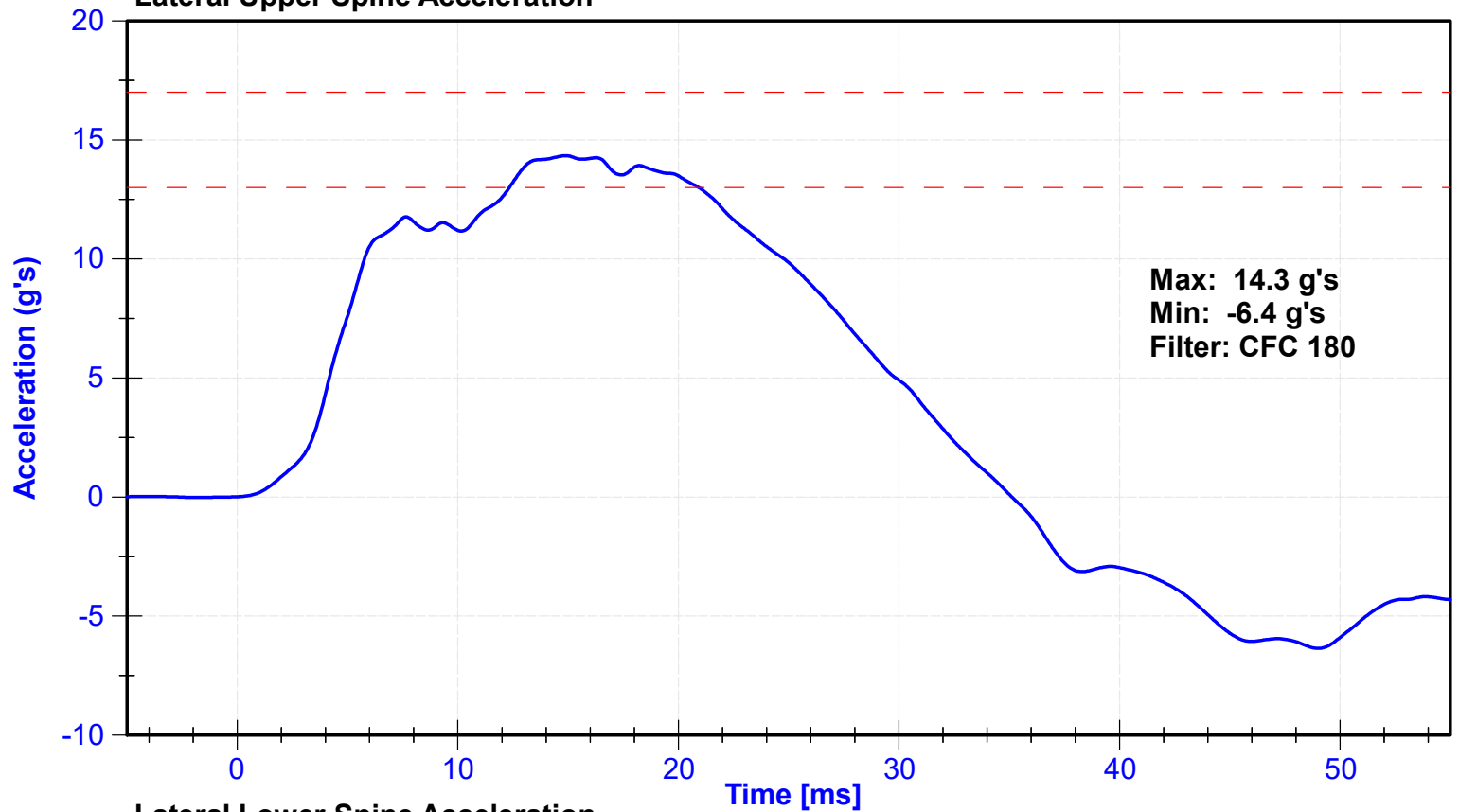
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023
Lower Spine Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	4/10/2023	10/9/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	4/10/2023	10/9/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	4/10/2023	10/9/2023

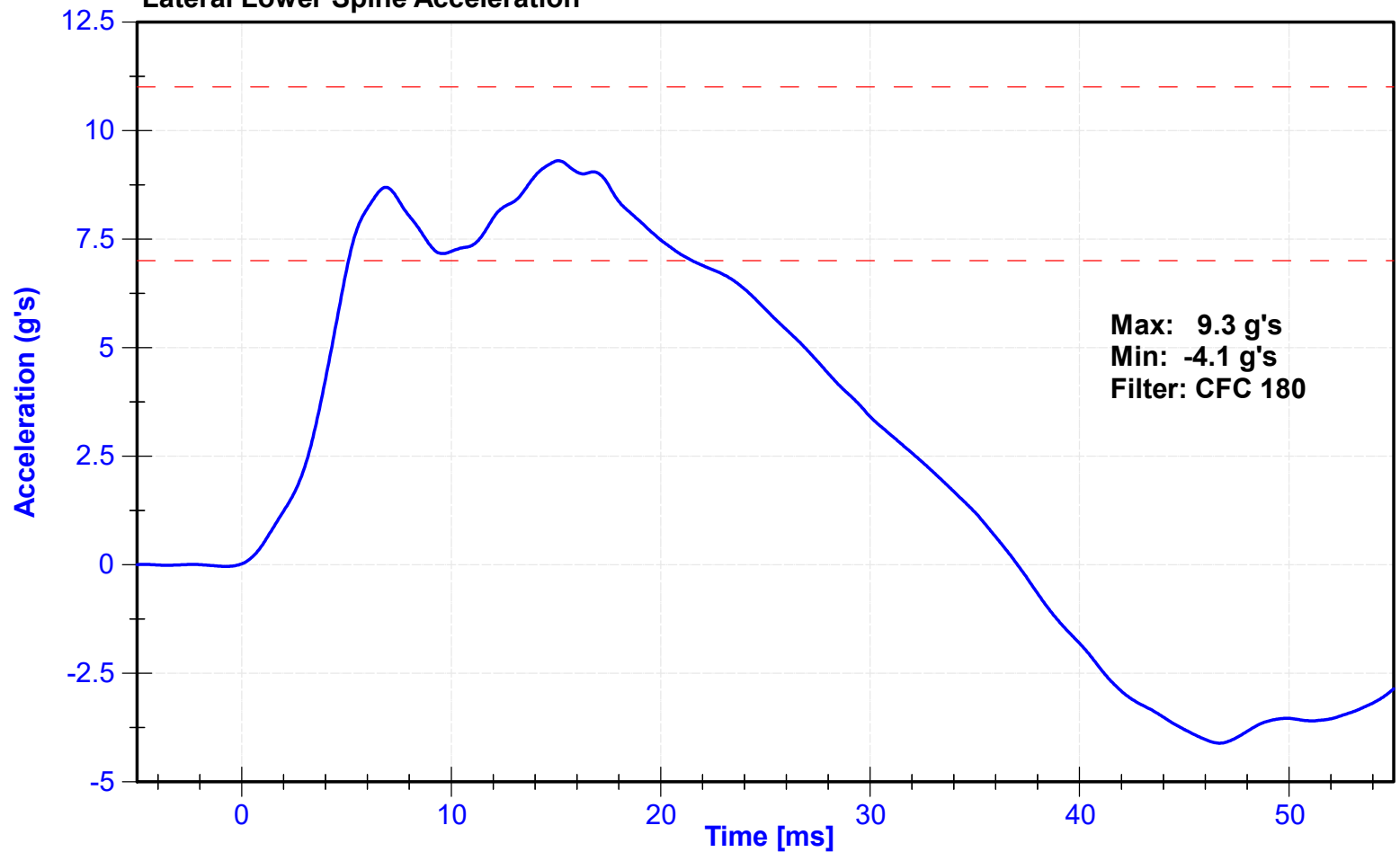




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

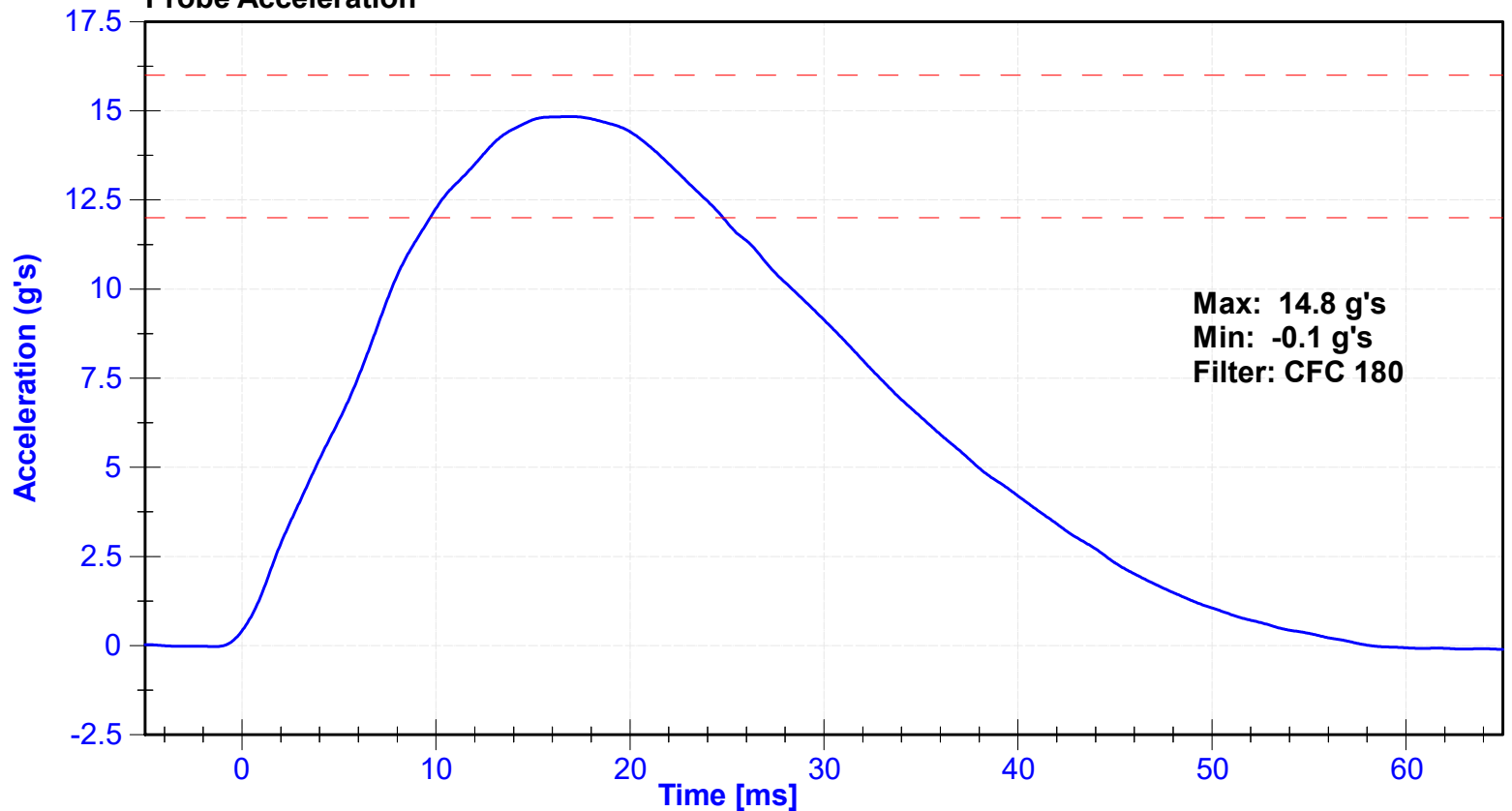
Results

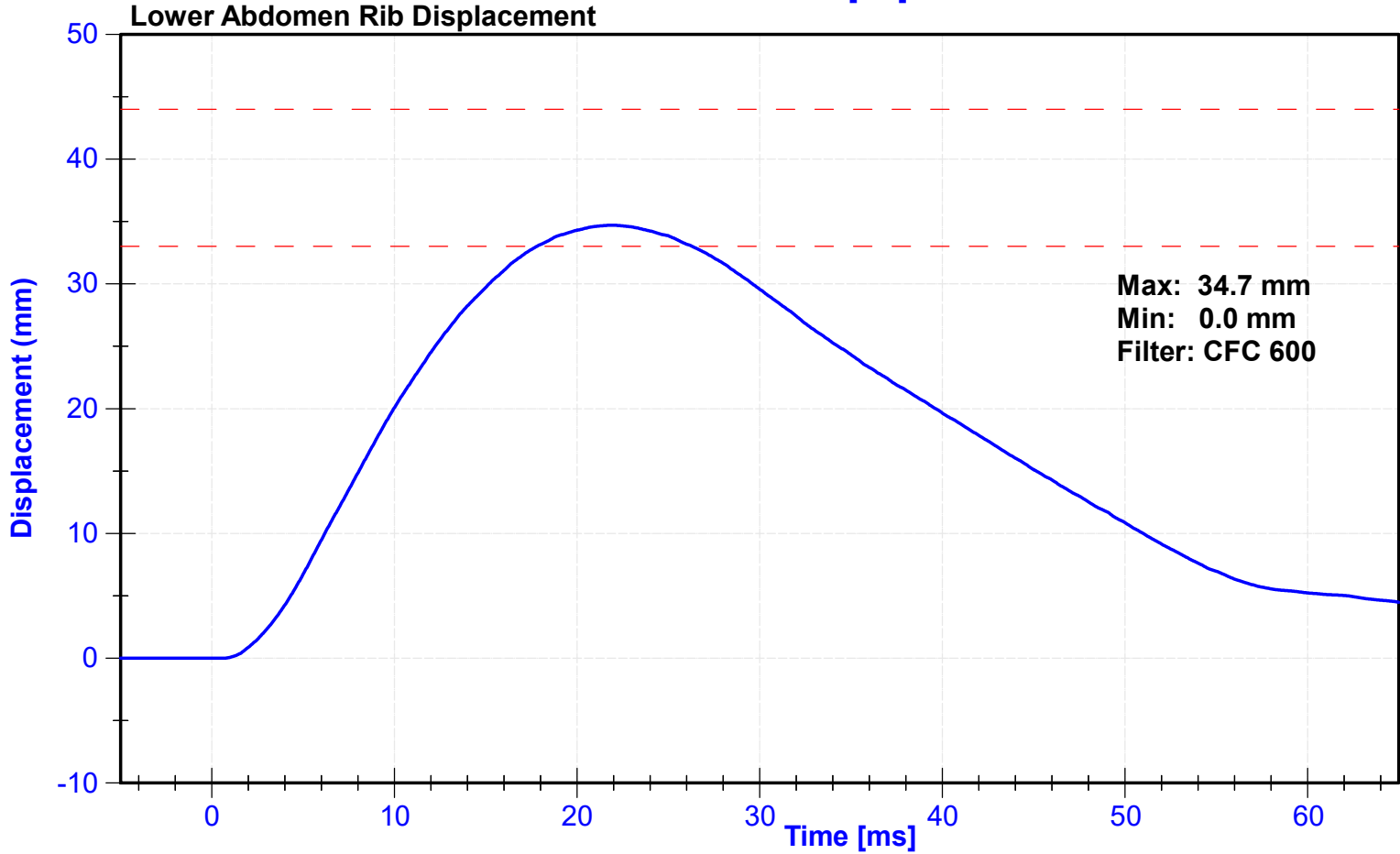
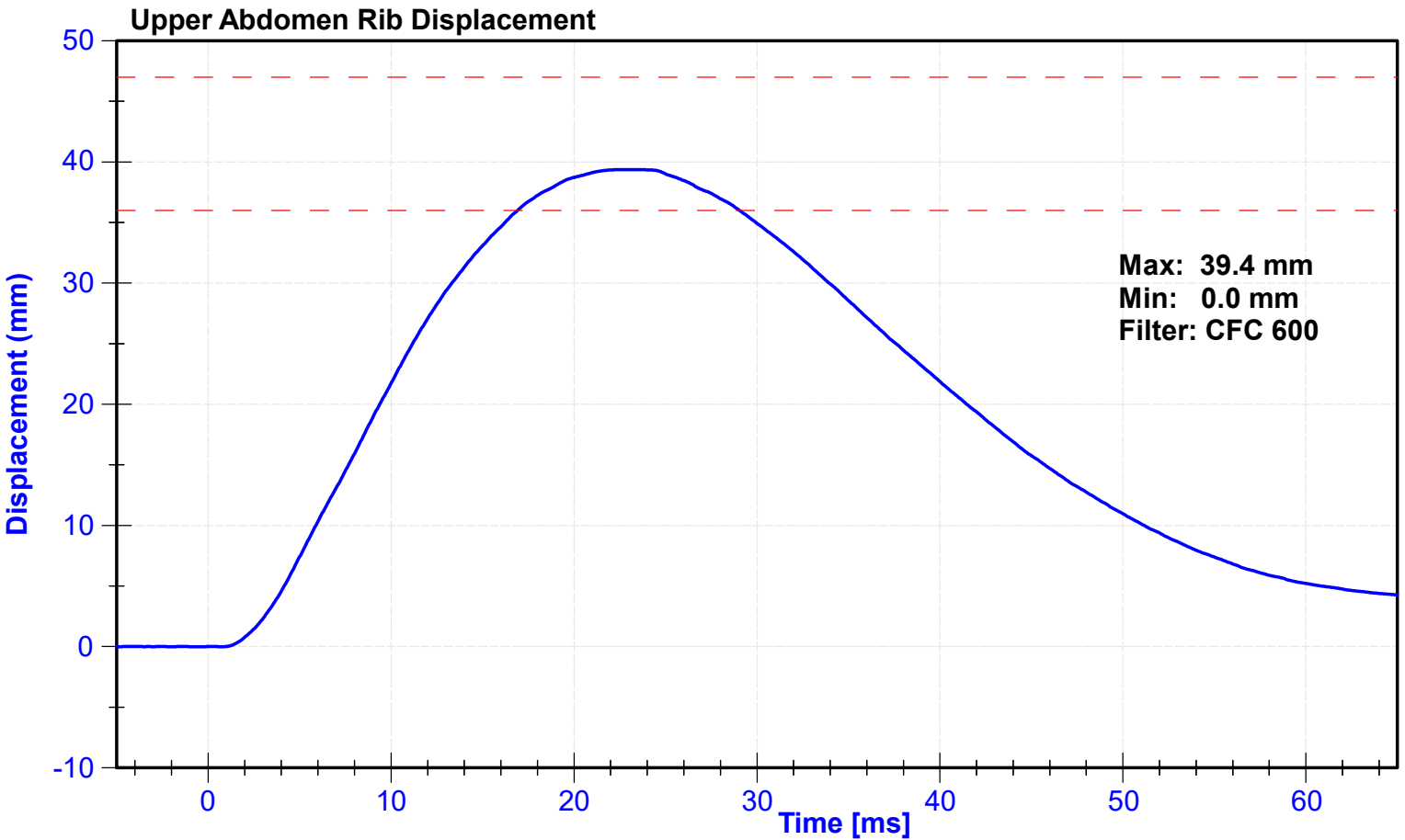
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	12.4	Pass
Upper Abdomen Rib Deflection	36	47	mm	39.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	34.7	Pass

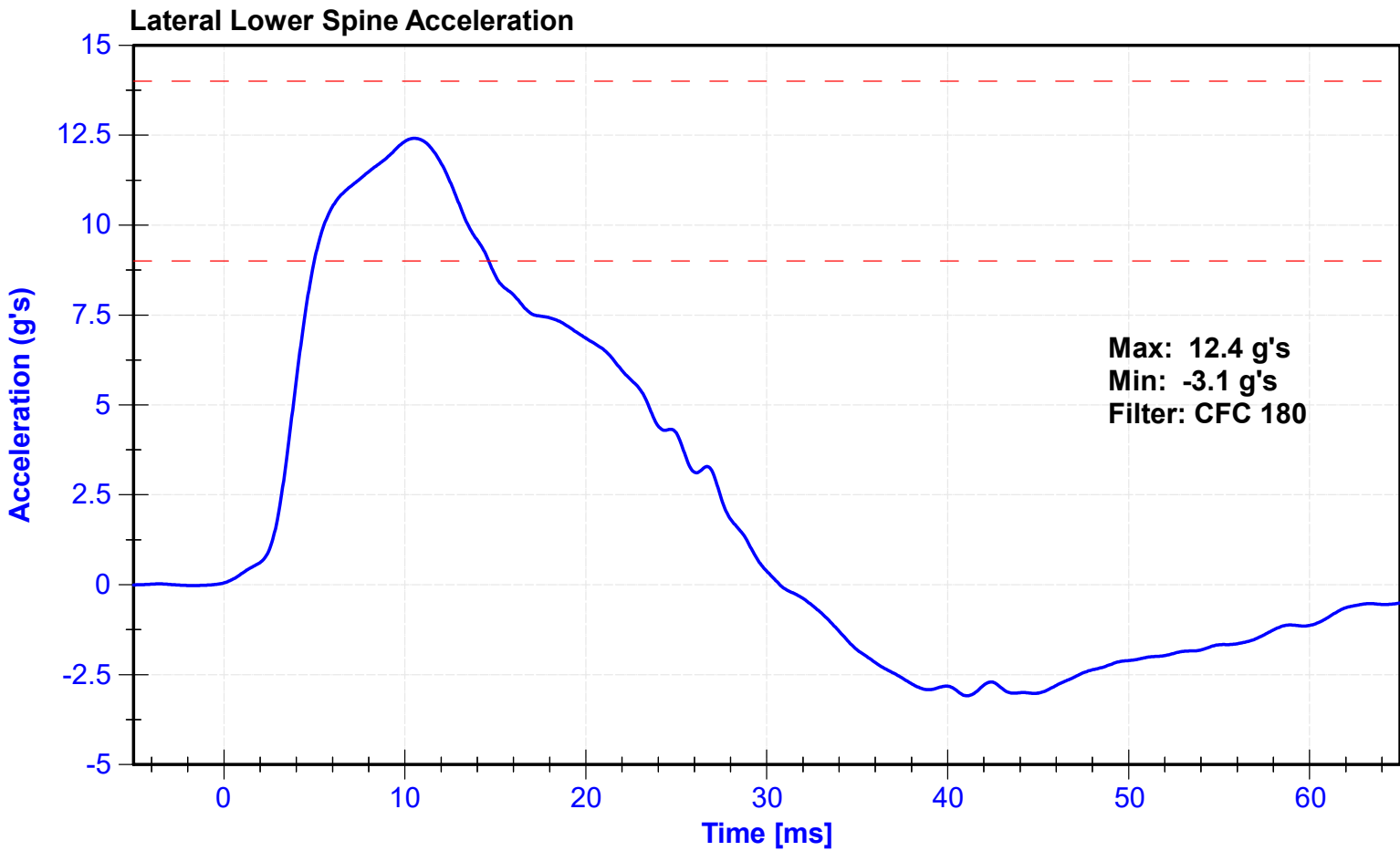
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Lower Spine Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Upper Abdomen Rib Potentiometer	Servo	307GFE	4/10/2023	10/9/2023
Lower Abdomen Rib Potentiometer	Servo	308GFE	6/14/2023	12/13/2023

Probe Acceleration







ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

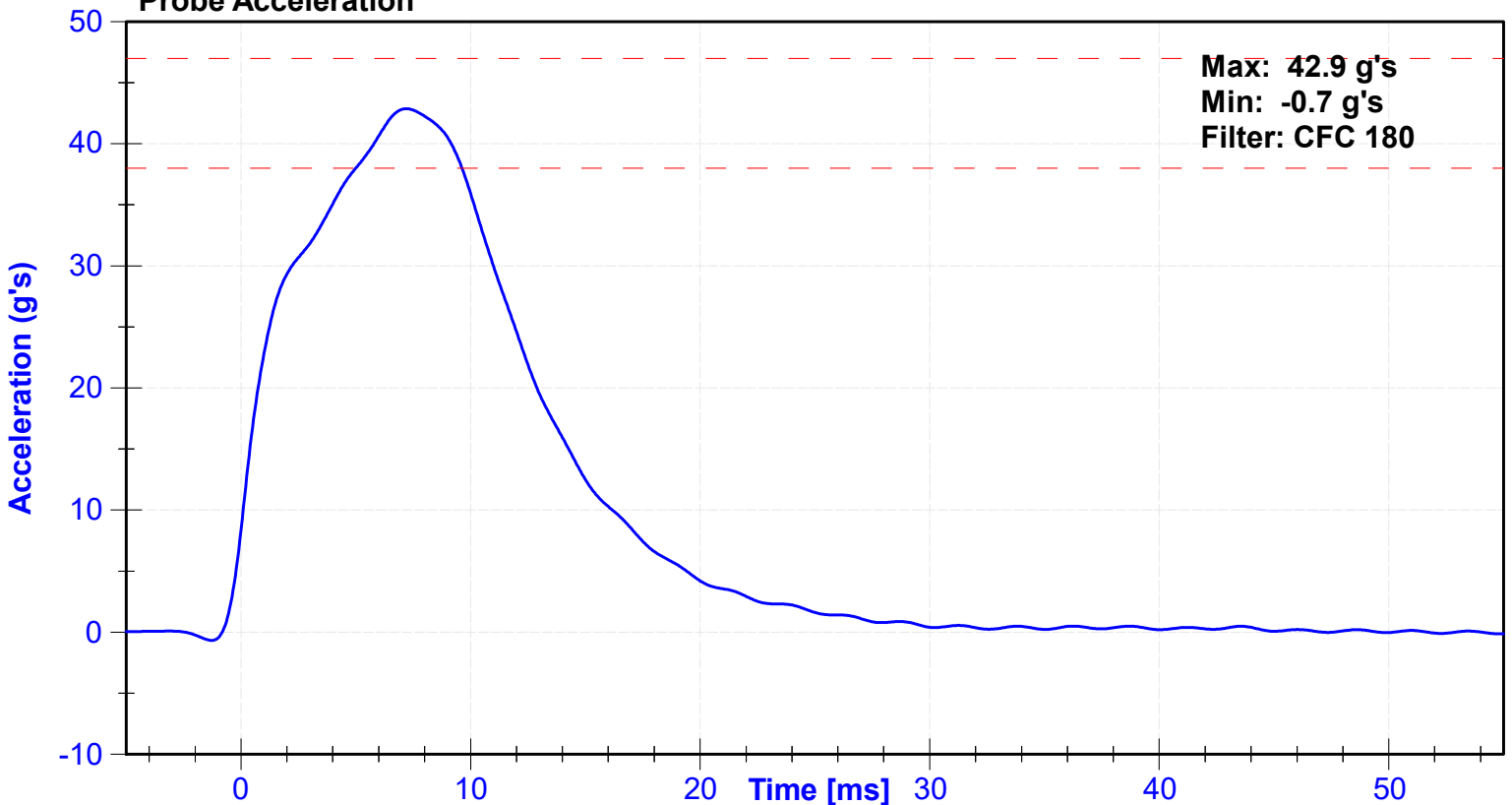
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	6.6	6.8	m/s	6.69	Pass
Probe Acceleration	38	47	g's	42.9	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.3	Pass
Acetabulum Force	3600	4300	N	3839.7	Pass

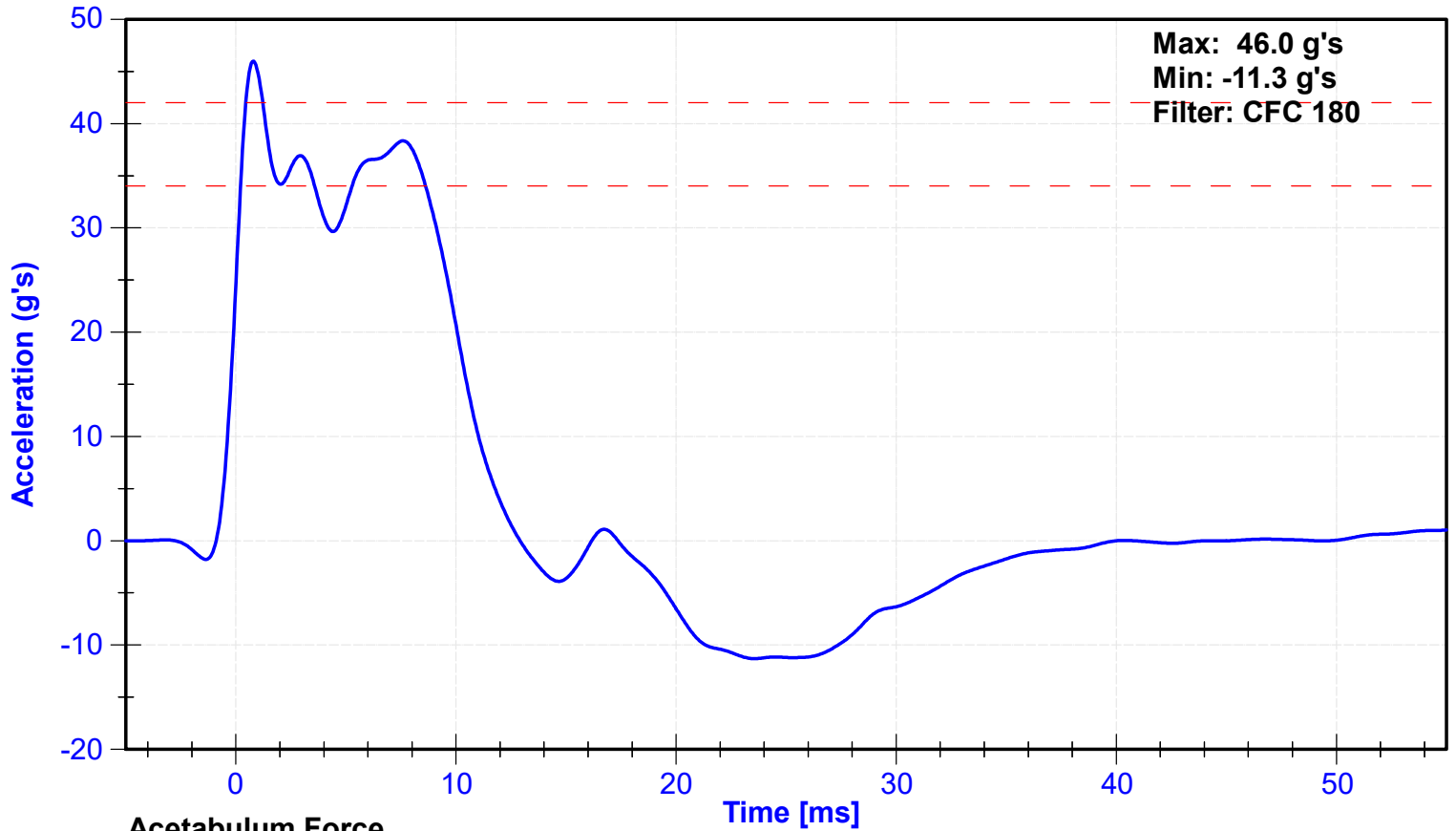
Transducer Calibrations

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

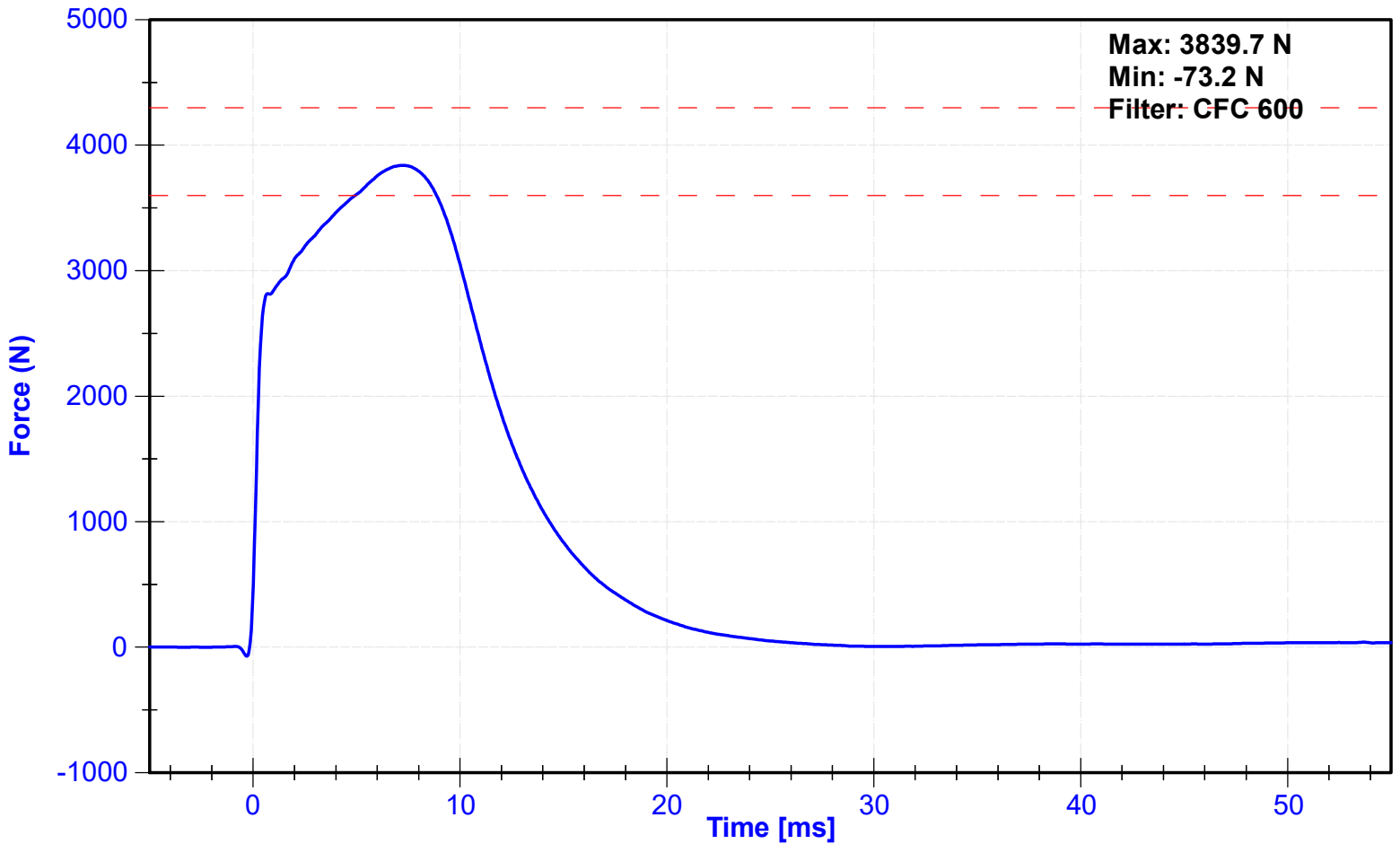
Probe Acceleration



Lateral Pelvis Acceleration



Acetabulum Force





CERT

SID-IIs Pelvis Plug Certification Test

Plug S/N 15439

Test Number 20100

Report Number 20154

Test Date 9/9/2021 10:24:12 AM

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

Testing Machine STM-20 5965542

Load Cell S/N (F1360947), Units (LBS) 1000

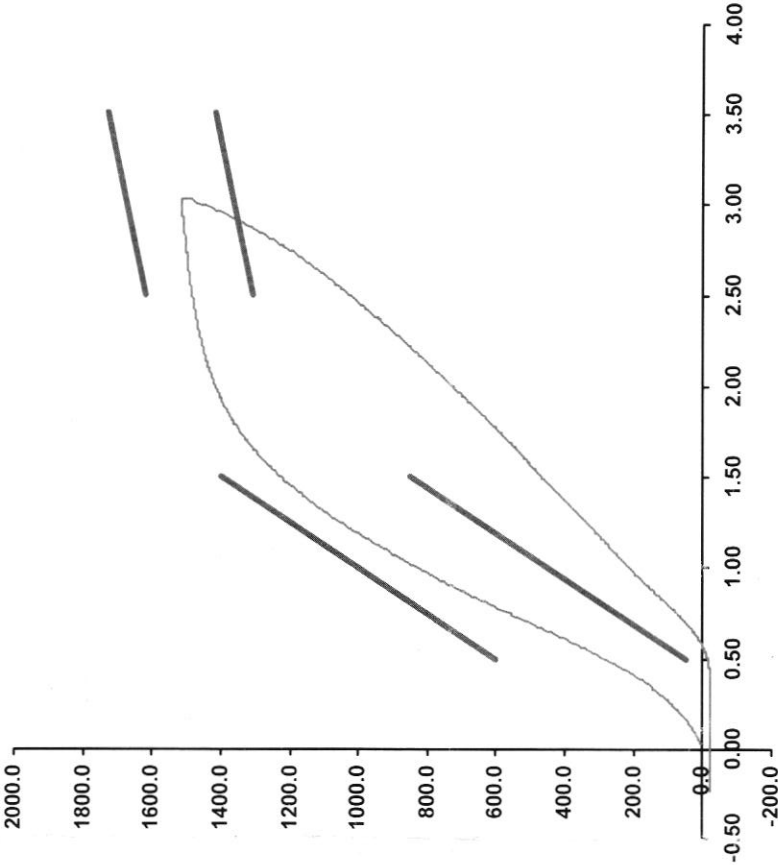
Preload Value (-N) 22.24

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 09-Sep-21

SACO Research

By : DC Date : 9/9/2021

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

SID-IIs Pelvis Plug Certification Test

Plug S/N 14806

Test Number 17238

Report Number 17284

Test Date 1/28/2021 10:13:08 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	292	600
Force @ 1.5 mm (N)	1,073	1,400
Force @ 2.5 mm (N)	1,342	1,618
Force @ 3.0 mm (N)	1,404	1,673

Testing Machine STM-20 5965542

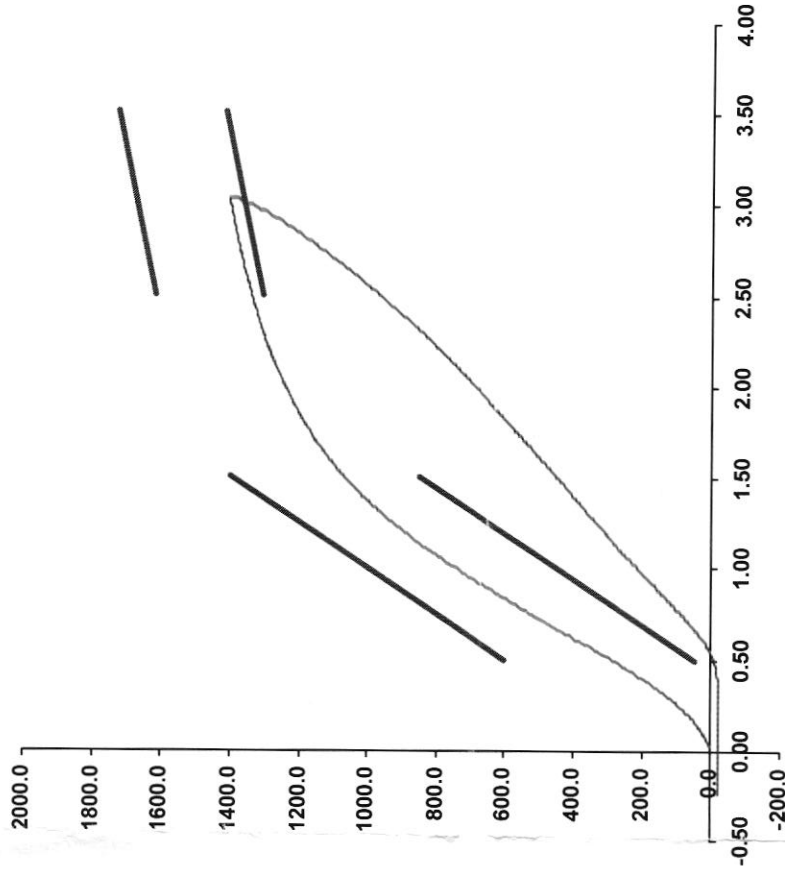
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) Per Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 28-Jan-21

SACO Research

By : DC

Date : 1/28/2021

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 14136

Test Number 14174

Report Number 14219

Test Date 6/28/2020 11:45:19 AM

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

Testing Machine STM-20 5965542

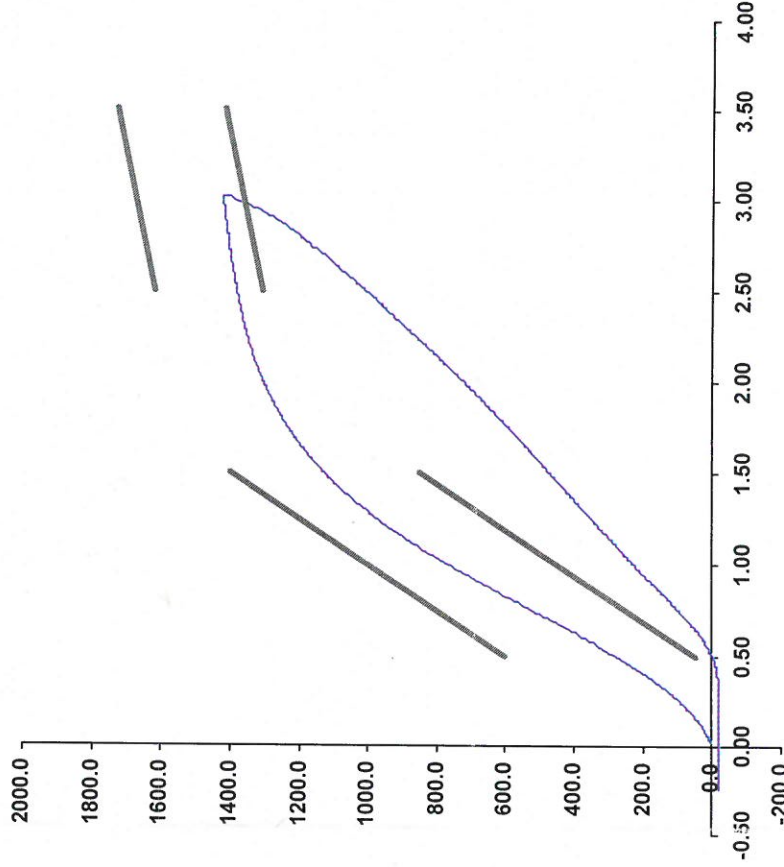
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 28-Jun-20

SACO Research

By: DC Date: 6-29-2020
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

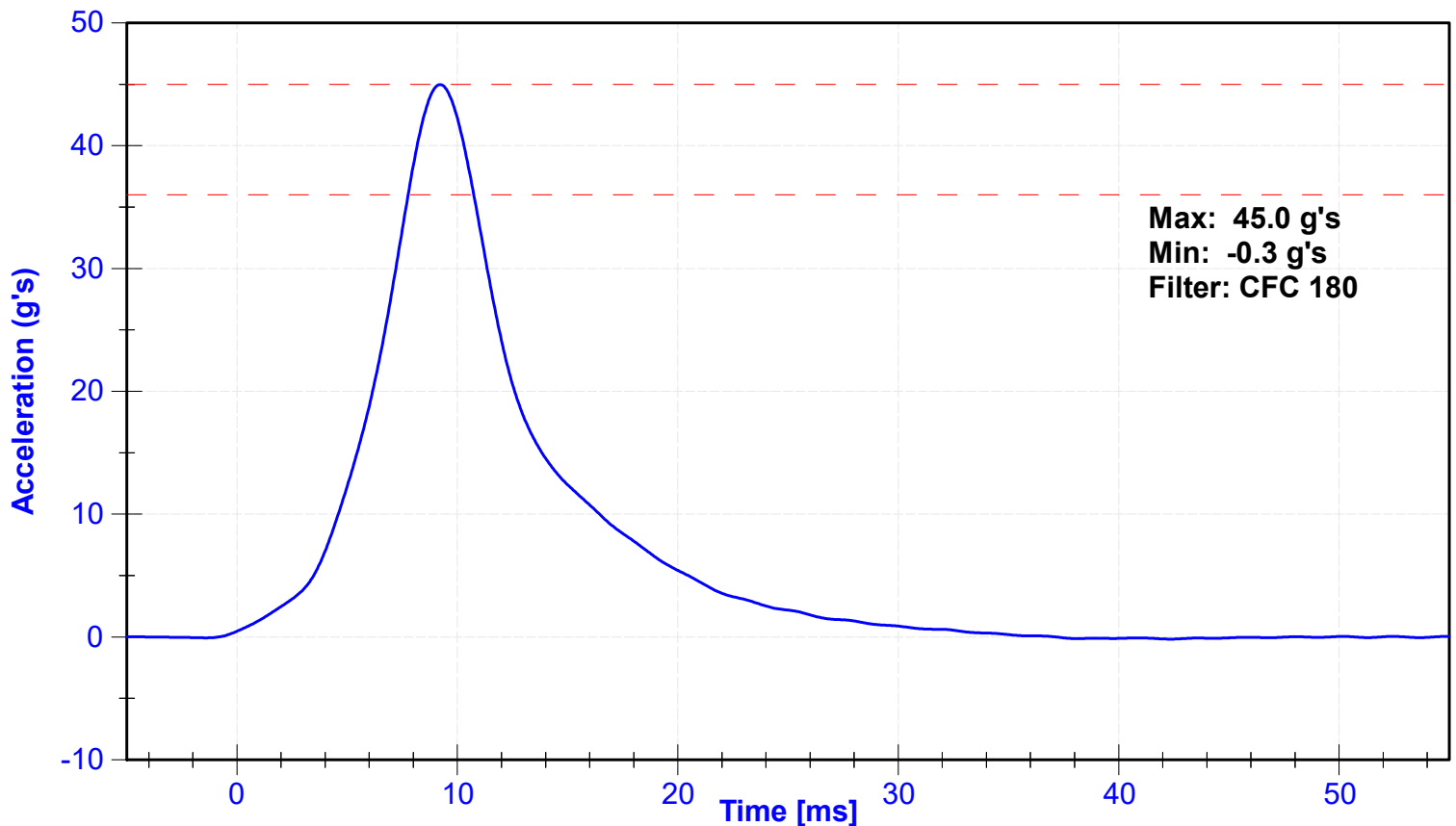
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	36	45	g's	45.0	Pass
Lateral Pelvis Acceleration	28	39	g's	36.7	Pass
Iliac Force	4100	5100	N	5059.0	Pass

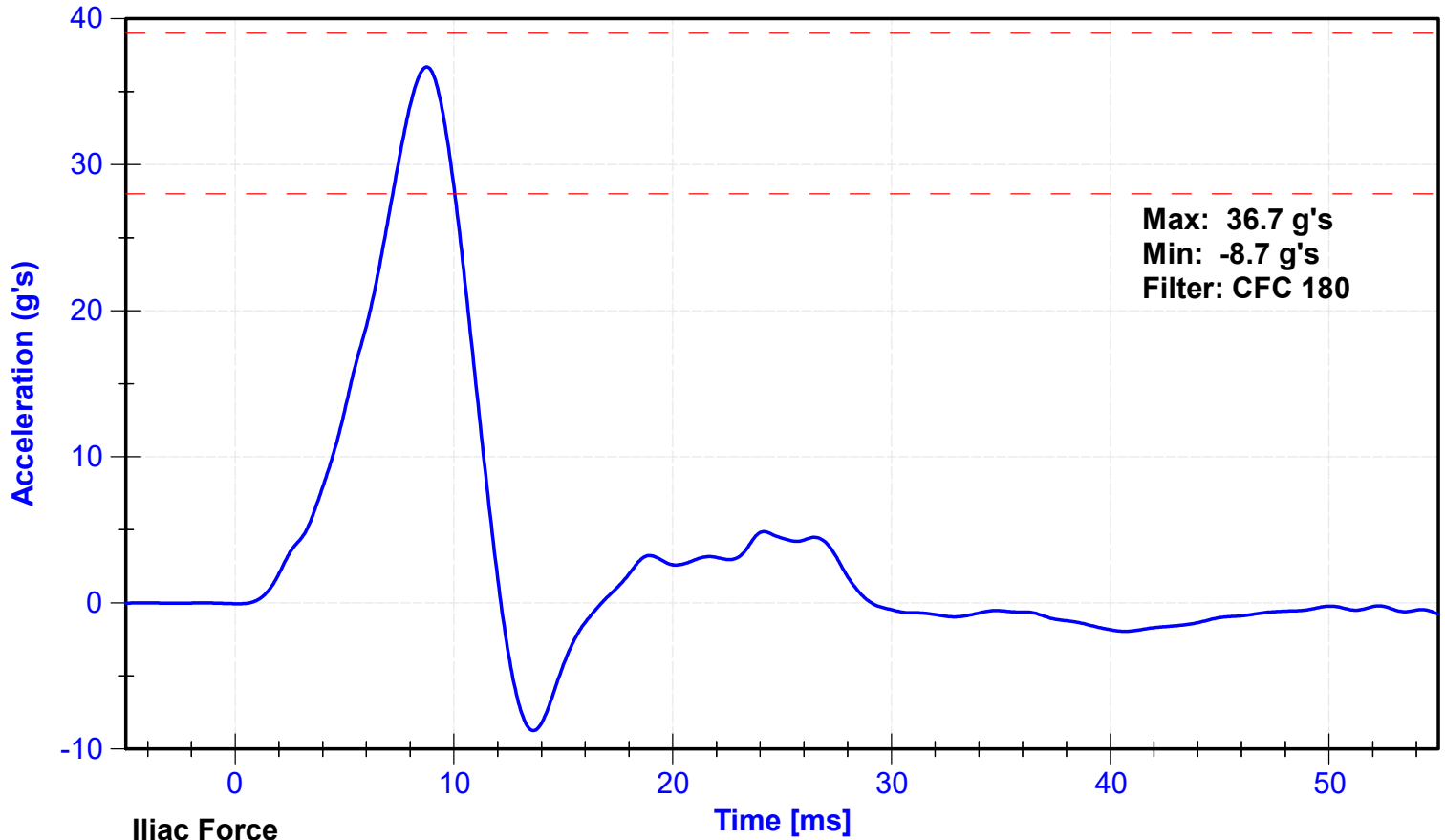
Transducer Calibrations

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

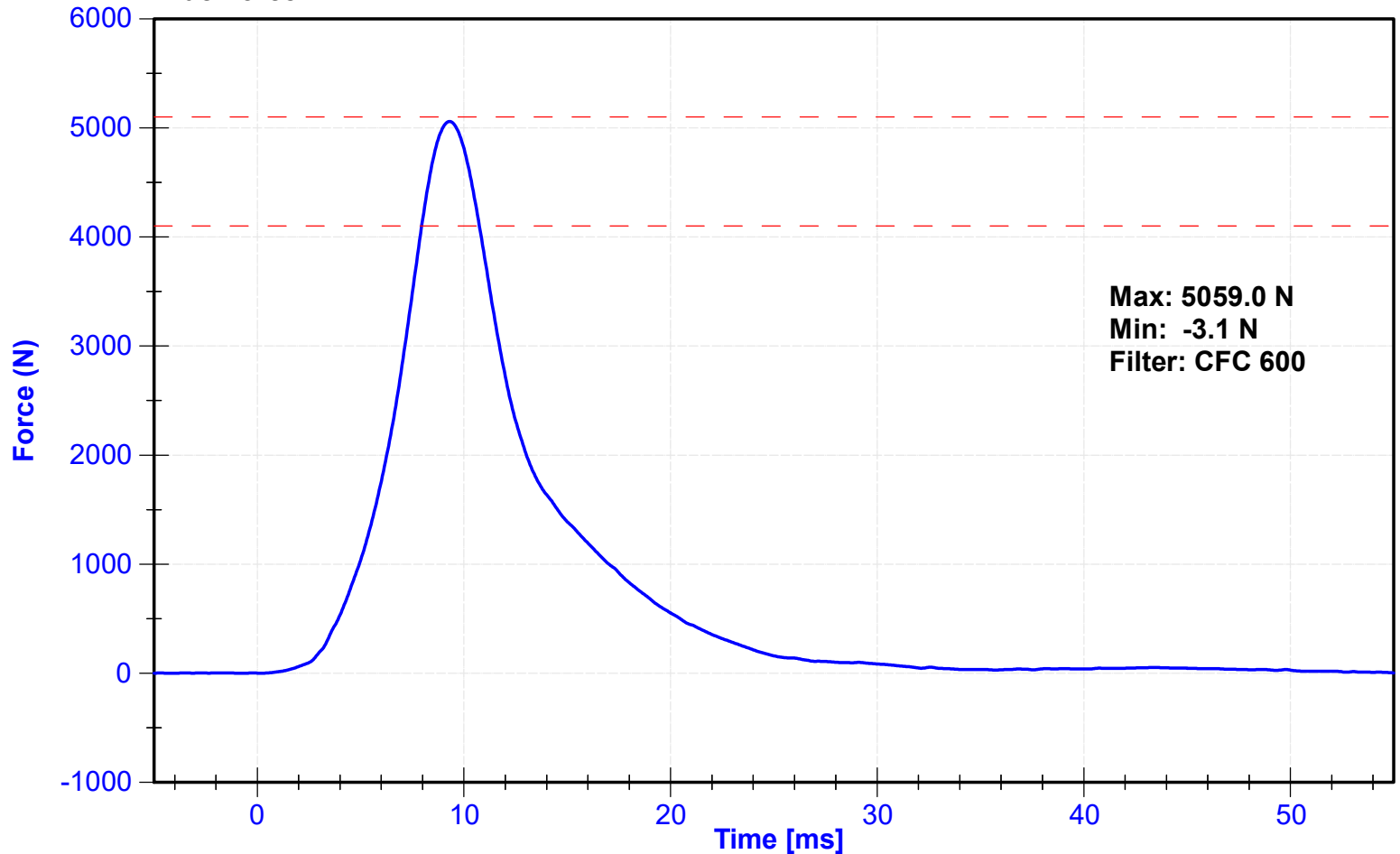
Probe Acceleration



Lateral Pelvis Acceleration



Iliac Force



APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N: 300			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	P59018	Endevco	4/4/2023
			Y	P79189	Endevco	4/4/2023
			Z	P79587	Endevco	4/4/2023
Head Accelerometers - Redundant			X	P68057	Endevco	4/4/2023
			Y	P58986	Endevco	4/4/2023
			Z	P52025	Endevco	4/4/2023
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	2316GFE	Servo	4/10/2023
		Middle	Y	040GFE	Servo	4/10/2023
		Lower	Y	1156GFE	Servo	4/10/2023
	Abdominal Rib	Upper	Y	307GFE	Servo	4/10/2023
		Lower	Y	308GFE	Servo	4/10/2023
Lower Spine Accelerometers (T12)			X	P64003	Endevco	4/4/2023
			Y	P52071	Endevco	4/4/2023
			Z	P17283	Endevco	4/4/2023
Acetabulum Load Cell			Y	267-FY	Denton	8/11/2022
Lilac Wing Load Cell			Y	280-FY	Denton	8/11/2022
Pelvis Plug (Struck Side)				15344	SACO	7/20/2021
Pelvis Plug (Non-Struck Side)				15429	SACO	9/9/2021

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A431226	Measurement Specialties	2/9/2023
Vehicle Center of Gravity	Y	A431255	Measurement Specialties	2/9/2023
Vehicle Center of Gravity	Z	A431357	Measurement Specialties	2/9/2023
Left Floor Sill	Y	G23411	Endevco	4/24/2023
A-Pillar Sill	Y	G23415	Endevco	4/24/2023
A-Pillar Low	Y	G23437	Endevco	4/24/2023
A-Pillar Mid	Y	G23632	Endevco	4/25/2023
B-Pillar Sill	Y	G23410	Endevco	4/24/2023
B-Pillar Low	Y	G23433	Endevco	4/24/2023
B-Pillar Mid	Y	G23432	Endevco	4/24/2023
Driver Seat	Y	G23409	Endevco	4/24/2023
Engine Top	X	A396634	Measurement Specialties	3/20/2023
Engine Top	Y	A398316	Measurement Specialties	3/20/2023
Firewall	Y	A428036	Measurement Specialties	5/30/2023
Right Roof	Y	A405583	Measurement Specialties	3/16/2023
Right Floor Sill	Y	G22213	Endevco	3/23/2023
Rear Floorpan	X	A266234	Measurement Specialties	3/17/2023
Rear Floorpan	Y	A352402	Measurement Specialties	3/17/2023

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	1220AF-1117006-F0	Interface	7/19/2022
Load Cell 2	1220AF-18870-F0	Interface	7/19/2022
Load Cell 3	1220AF-1117025-F0	Interface	7/19/2022
Load Cell 4	1220AF-1130989-F0	Interface	7/19/2022
Load Cell 5	1220AF-1281288-F0	Interface	3/17/2023
Load Cell 6	1220AF-1281285-F0	Interface	3/17/2023
Load Cell 7	1220AF-1117035-F0	Interface	7/19/2022
Load Cell 8	1220AF-1117011-F0	Interface	7/19/2022