

REPORT NUMBER: NCAP-CAL-23-008

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

**General Motors LLC
2023 Chevrolet Colorado
4 Door Truck**

NHTSA No: M20230101

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



September 18, 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 693JJ920D000016.

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Date: September 18, 2023

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Date: September 18, 2023

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2023 Chevrolet Colorado 4 Door Truck 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 July 12, 2023. The impact velocity of the vehicle was 32.23 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 344 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>250.707</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>32.160</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>2608.797</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>17.489</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45*</td> <td>13.288</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	250.707	Resultant Lower Spine Acceleration	G	82	32.160	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2608.797	Maximum Thoracic Rib Deflection	mm	38	17.489	Maximum Abdominal Rib Deflection	mm	45*	13.288
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Form DOT F1700.7 (8-72)

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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. 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2023 Chevrolet Colorado 4 Door Truck. 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 Chevrolet Colorado 4 Door Truck. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.23 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on July 12, 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	250.707
Resultant Lower Spine Acceleration	G	82	32.160
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2608.797
Maximum Thoracic Rib Deflection	mm	38	17.489
Maximum Abdominal Rib Deflection	mm	45*	13.288

*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	Yes		
Knee Airbag	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other	N/A	N/A	N/A	N/A

GENERAL COMMENTS:

1. P1 serial number - 300

Data Anomalies:

- Vehicle CG Z Acceleration, Exceeded calibration range and saturated at 62.2 ms
- Left Front Sill Y Acceleration, Exceeded calibration range at 17.2 ms
- Left Middle A-Pillar Y Acceleration, Exceeded calibration range at 21.9 ms 26.7 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

Data Sheet No. 2 - Seat, Seat Belt, Steering Wheel Adjustment and Fuel 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 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20230101
Model Year	2023
Make	Chevrolet
Model	Colorado
Body Style	Truck
VIN	1GCGSBEC8P1150773
Body Color	White
Odometer Reading (km/mi)	164
Engine Displacement (L)	2.7
Type / No. Cylinders	I4
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	8-speed
Overdrive	Yes
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
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	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	N/A

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC
Date of Manufacture	04/23
Vehicle Type	Truck

GVWR	2631 kg
GVWR Front	1588 kg
GVWR Rear	1633 kg

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)				678
DSC x 68.04 kg				340.2
Cargo Weight (RCLW) (kg)				136

(A)

(B)

(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

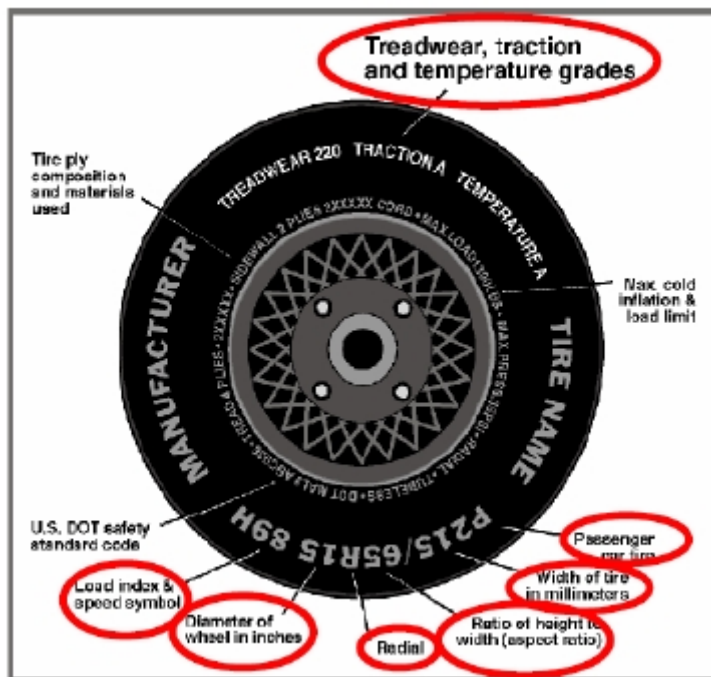
Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck

NHTSA No.: M20230101

Test Program: NCAP Side Pole Impact Test

Test Date: 07/12/2023

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)	260	260
Recommended Tire Size	255/65R17	255/65R17
Tire Size on Vehicle	255/65R17	255/65R17
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Wrangler	Wrangler
Treadwear	680	680
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index / Speed Symbol	110T	110T
Tire Material	Rubber	Rubber
DOT Safety Code Left	1PL22JACR	1PL22JACR
DOT Safety Code Right	1PL22JACR	1PL22JACR

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

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	258	261	260	262
Tire Placard	kPa	260	260	260	260
Owner's Manual	kPa	260	260	260	260
As Tested	kPa	260	260	260	260

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Rear	Total	Total	Front	Rear	Total
Left	kg	534	435		565	488		566	512	
Right	kg	537	426		576	482		539	502	
Ratio	%	55.4	44.6		54.1	45.9		52.1	47.9	
Totals	kg	1071	861	1932	1141	970	2111	1105	1014	2119

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1932	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50.0	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2118	(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	-1.45	-1.45	-1.5	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-1.15	-1.15	-1.0	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	+0.65	+0.65	+0.65	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	+0.15	-0.15	-0.15	Yes
Vehicle CG (Aft of Front Axle)	mm	1487	1533	1597	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	2	1	14	

* 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: <u>2023 Chevrolet Colorado 4 Door Truck</u>	NHTSA No.: <u>M20230101</u>
Test Program: <u>NCAP Side Pole Impact Test</u>	Test Date: <u>07/12/2023</u>

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Nothing Removed	0
Ballast / Equipment Added	27.6

Test Height – Adjustable Suspension Setting, if Applicable	N/A
--	-----

TEST SURFACE MARKING

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	951
Aft 25 mm target	949

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

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck

NHTSA No.: M20230101

Test Program: NCAP Side Pole Impact Test

Test Date: 07/12/2023

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	14.9	10.8	12.9
Front Passenger Seat	Fixed	Fixed	Fixed
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	12.9	23	Max	-	-	-
			Mid	15	19	23
			Min	-	-	-
Front Passenger Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Front Center Seat*			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	Fixed	Fixed	Max			
			Mid			
			Min			

*If applicable

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

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck

NHTSA No.: M20230101

Test Program: NCAP Side Pole Impact Test

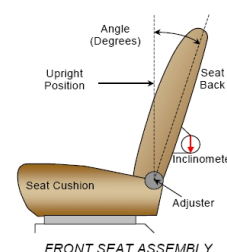
Test Date: 07/12/2023

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	25 (0-24)	0	0
Front Passenger Seat	240	25 (0-24)	0	0
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

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	+ 36.0	32 (0-31)	-16.15	6
Front Passenger Seat	+36.5	32 (0-31)	-14.1	6
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

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	8 (0-7)	Lowermost

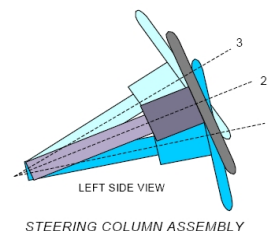
DATA SHEET NO. 2 ... (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023

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.

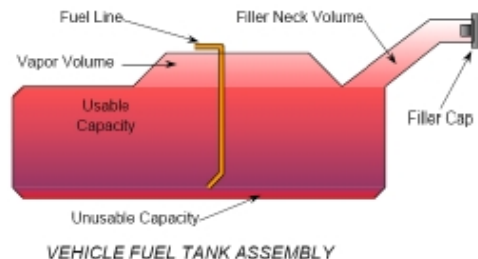


	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	21.0	
Geometric center - Position No. 2	22.9	
Uppermost - Position No. 3	24.7	
Telescoping Steering Wheel Travel		N/A
Test Position	22.9	N/A

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	81.4
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	81.4
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	75.7
Actual Amount of Solvent Used in Test	75.7
1/3 of Usable Capacity	27.1

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

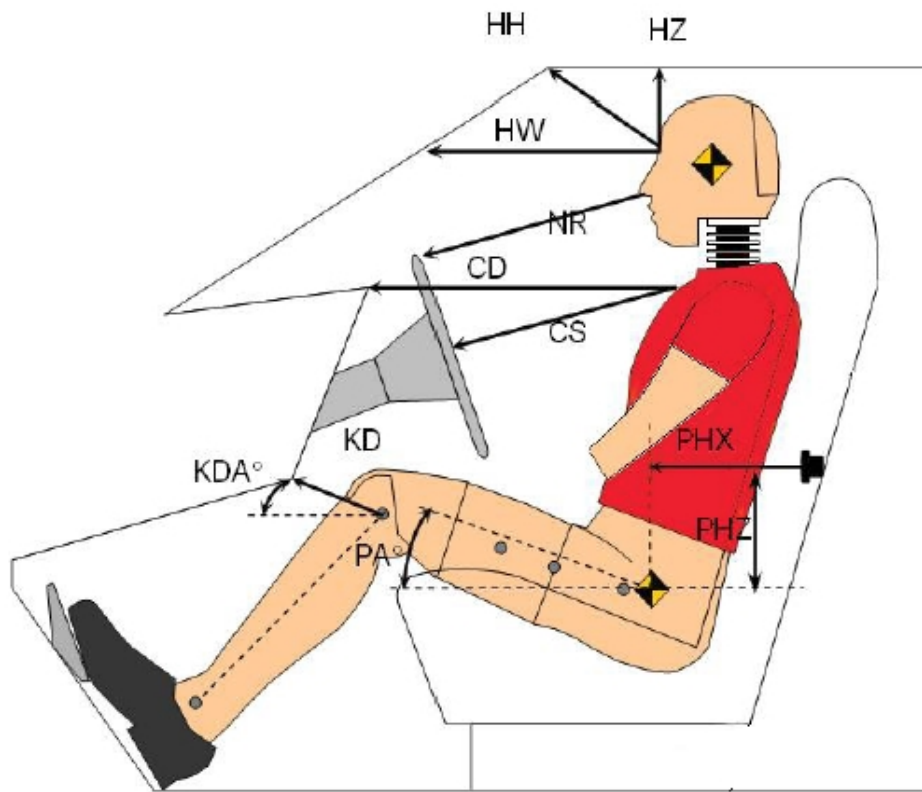


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DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023



Left Side View

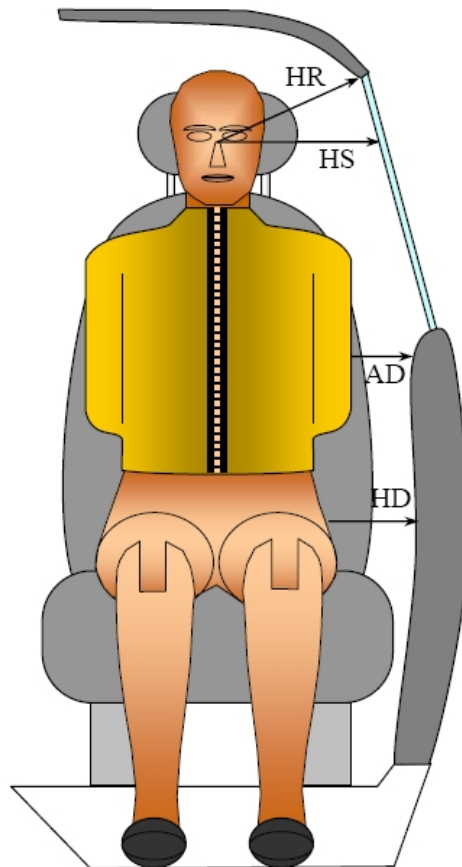
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. 300)	
		Length (mm)	Angle (°)
HH	Head to Header	447	
HW	Head to Windshield	732	
HZ	Head to Roof Liner	295	
NR	Nose to Rim	355	
CD	Chest to Dash	490	
CS	Chest to Steering Wheel	271	
KD(L) / KDA(L)°	Left Knee to Dash	160	25.4
KD(R) / KDA(R)°	Right Knee to Dash	148	31.0
PAX°	Pelvic Tilt Angle (X-Axis)		21.3
PAY°	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	315	
PHZ	Hip Point to Striker (Z-Axis)	110	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023



FRONT VIEW OF DUMMY

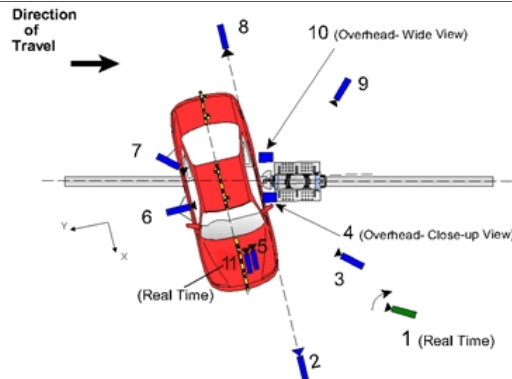
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver – Length (Serial No. 300)
HR	Head to Side Header	mm	284
HS	Head to Side Window	mm	373
AD	Arm to Door	mm	162
HD	H-Point to Door	mm	178

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023



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	60
2	Front ground level - impact view	8103	0	-1563	28	1000
3	Impact side 45° - forward pole view	5194	-927	-1607	24	1000
4	Overhead Close-up view of impact	0	0	-9375	28	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	-9117	0	-1694	28	1000
9	Impact side 45° - rearward pole view	-5366	-4452	-1565	24	1000
10	Overhead wide - view of impact	0	0	-9375	12.5	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	30

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.

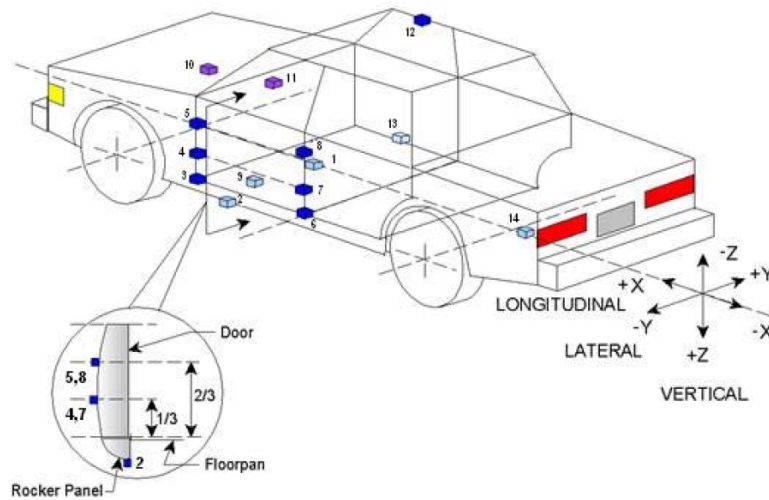
INSTRUMENTATION

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 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2904	4	-212
2	Left Floor Sill	3485	-642	-19
3	A-Pillar Sill	3859	-647	-34
4	A-Pillar Low	3938	-649	-176
5	A-Pillar Mid	3860	-655	-777
6	B-Pillar Sill	2781	-665	-111
7	B-Pillar Low	2805	-671	-345
8	B-Pillar Mid	2775	-659	-742
9	Driver Seat Track	3019	-564	-83
10	Engine Top	4645	1	-526
11	Firewall	4270	254	-594
12	Right Roof	2948	580	-1234
13	Right Floor Sill	3457	639	-16
14	Rear Floor Pan	1480	3	-274

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 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023

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 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

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

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
Test Date: 07/12/2023

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar, B-Pillar & C-Pillar buckled
Sill Separation	None
Windshield Damage	Cracked throughout
Side Window Damage	Driver window shattered
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	Yes		
Knee Airbag	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
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		1350
Actual Impact Point - Aft of Front Axle	mm		1363
Horizontal Offset (+ forward / - rearward)	mm	+/- 38*	-13
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	32.23
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.18

*Of Intended Impact Point

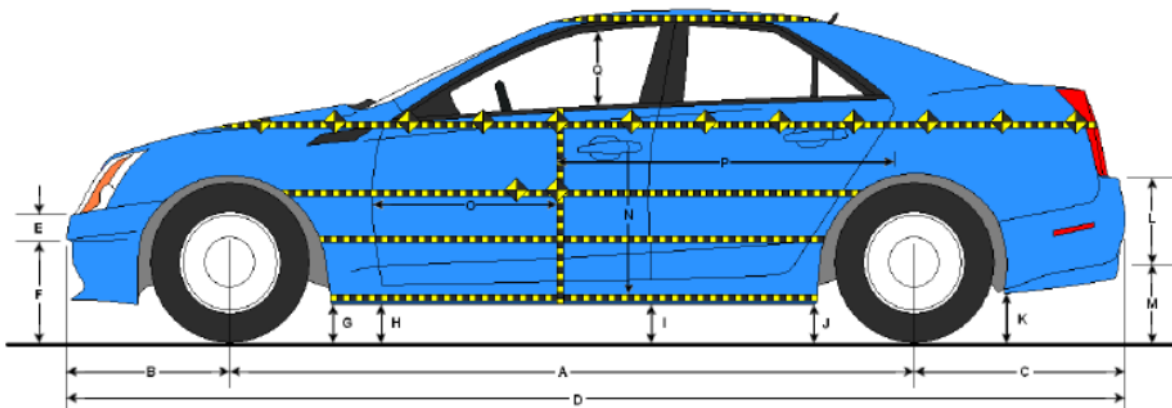
DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck

NHTSA No.: M20230101

Test Program: NCAP Side Pole Impact Test

Test Date: 07/12/2023



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

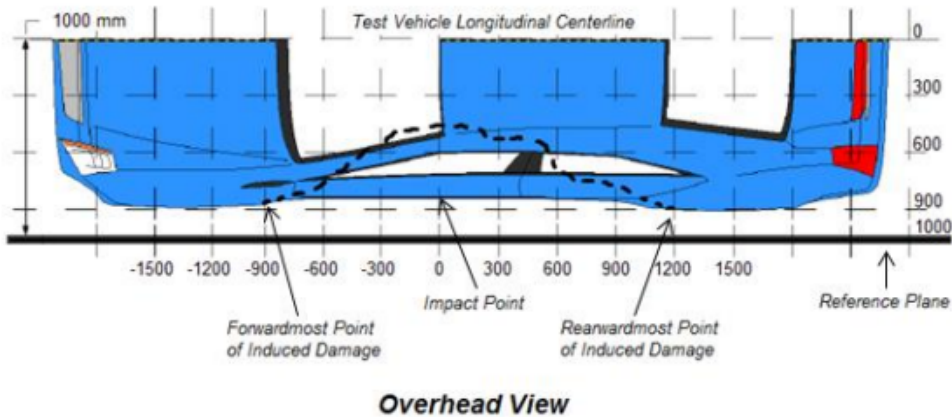
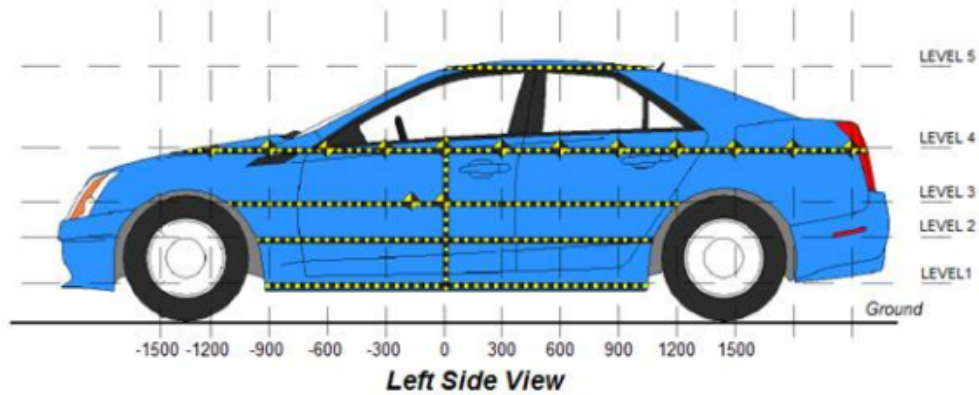
No.	Measurement Description	Pre-Test	Post-Test	Change
A	Vehicle Wheelbase	3337	3300	-37
B	Front Axle to FSOV	884	920	36
C	Rear Axle to RSOV	1199	1164	-35
D	Total Length at Centerline	5419	5384	-35
E	Front Bumper Thickness	125	125	0
F	Front Bumper Bottom to Ground	422	441	19
G	Sill Height at Front Wheel Well	357	356	-1
H	Sill Height at Front Door Leading Edge	402	404	2
I	Sill Height at B Pillar	424	429	5
J1	Sill Height at Rear Wheel Well	444	464	20
J2	Pinch Weld Height at Rear Wheel Well	415	441	26
K	Sill Height Aft of Rear Wheel Well	480	522	42
L	Rear Bumper Thickness	152	152	0
M	Rear Bumper Bottom to Ground	522	520	-2
N	Sill Height to Bottom of Front Window Sill	741	741	0
O	Front Door Leading Edge to Impact CL	735	666	-69
P	Rear Door Trailing Edge to Impact CL	1275	1190	-85
Q	Front Window Opening	403	403	0
R	Right Side Length	5355	5328	-27
S	Left Side Length	5351	5290	-61
T	Vehicle Width at B-Pillars	1812	1652	-160
U	Front Wheel Track width	1600	1600	0
V	Rear Wheel Track Width	1558	1594	36

* All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO.10 **TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	495	309	0
2	Driver H-Point	mm	828	341	0
3	Mid-Door	mm	884	344	0
4	Window Sill	mm	1222	305	0
5	Window Top	mm	1757	108	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 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

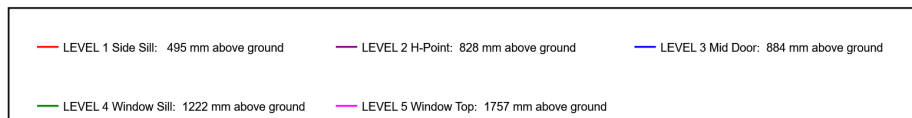
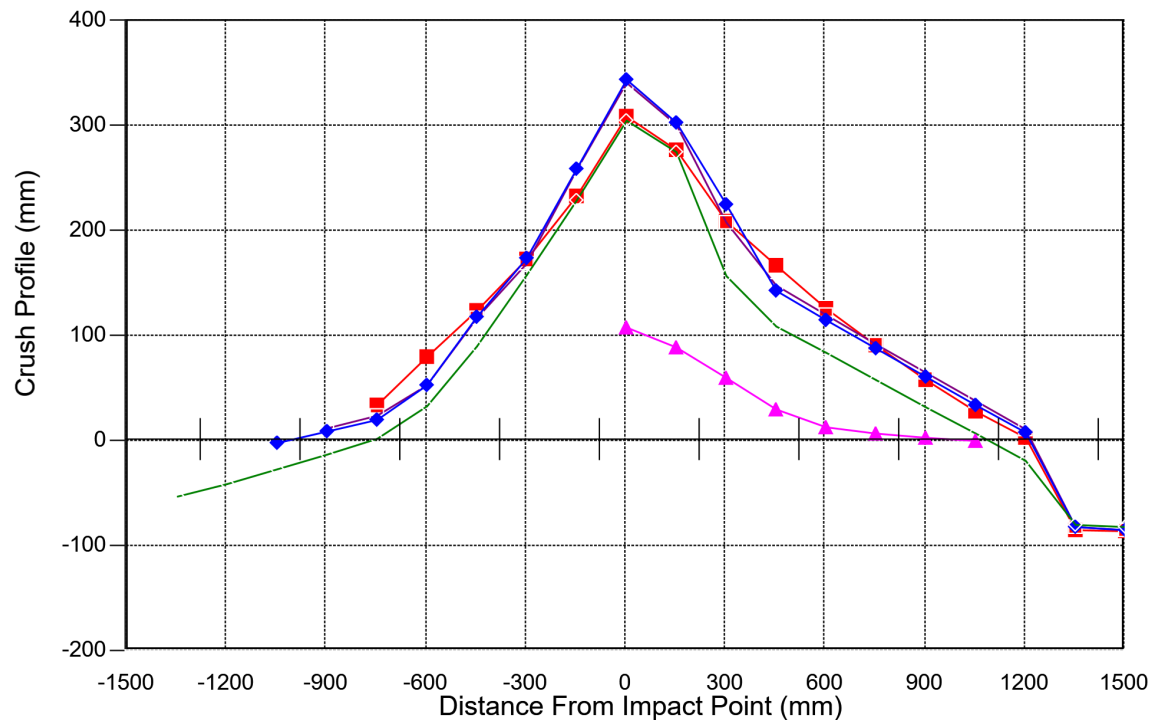
	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350				803					856					-53	
-1200				810					851					-41	
-1050			951	815				953	842				-2	-27	
-900		933	935	818			921	926	831			12	9	-13	
-750	871	911	909	821		837	887	889	819		34	24	20	2	
-600	850	881	881	823		770	828	828	790		80	53	53	33	
-450	850	873	878	830		726	756	760	740		124	117	118	90	
-300	850	874	879	835		677	705	705	677		173	169	174	158	
-150	850	875	880	840		617	617	621	611		233	258	259	229	
0	849	876	880	846	573	540	535	536	541	465	309	341	344	305	108
150	847	876	880	850	619	570	575	577	575	530	277	301	303	275	89
300	846	876	880	854	625	637	668	655	697	565	209	208	225	157	60
450	846	876	879	856	628	679	728	736	747	598	167	148	143	109	30
600	844	875	878	858	629	718	755	763	774	616	126	120	115	84	13
750	844	875	877	859	630	753	783	789	801	623	91	92	88	58	7
900	842	875	876	859	629	784	810	815	827	626	58	65	61	32	3
1050	840	877	878	859	626	812	839	844	852	626	28	38	34	7	0
1200	838	885	889	859		835	874	881	878		3	11	8	-19	
1350	845	895	898	854		930	977	980	934		-85	-82	-82	-80	
1500	913	918	920	860		999	1003	1005	942		-86	-85	-85	-82	

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 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023



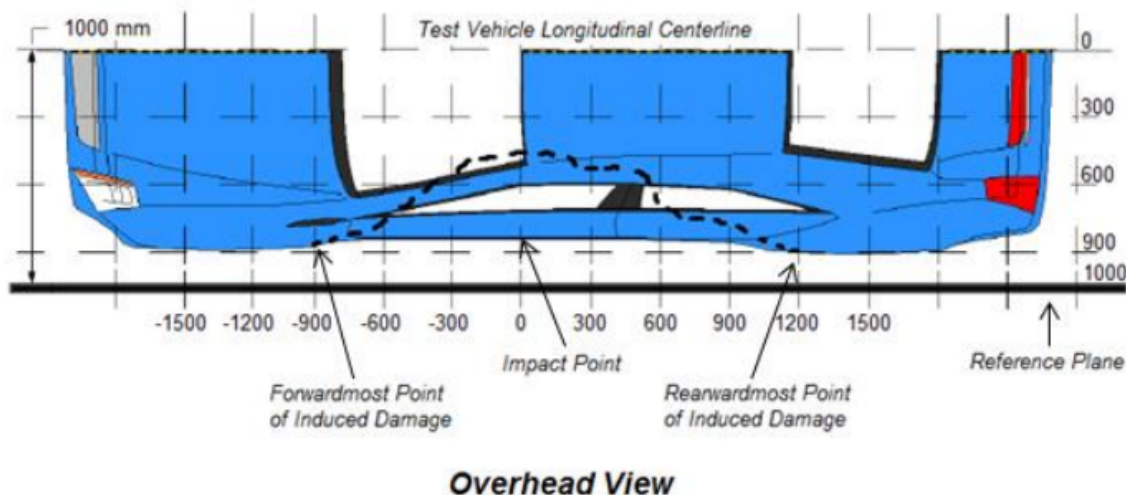
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20230101
 Test Date: 07/12/2023

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	47	49	-2
2	-540	3	199	120	79
3	-30	3	447	120	327
4	480	3	259	121	138
5	990	3	168	123	45
6	1500	3	-5	80	-85

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

Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck

NHTSA No.: M20230101

Test Program: NCAP Side Pole Impact Test

Test Date: 07/12/2023

Test Time: 9:58 AM

Temperature: 21.2 °C

A. From impact until vehicle motion ceases:
(Maximum allowable is 1 oz.)

0 oz

B. For the 5-minute period after motion ceases:
(Maximum allowable is 5 oz.)

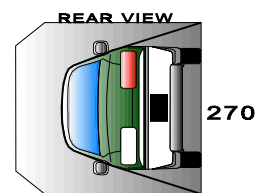
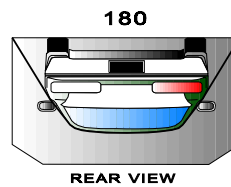
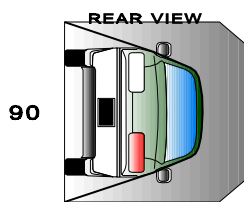
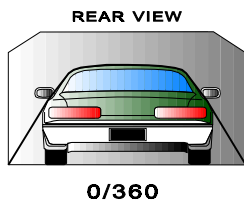
0 oz

C. For the following 25 minutes:
(Maximum allowable is 1 oz.)

0 oz

D. Spillage Detail:

No Spillage Occurred



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	68	300	368
90° to 180°	67	300	367
180° to 270°	67	300	367
270° to 360°	69	300	369

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

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

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

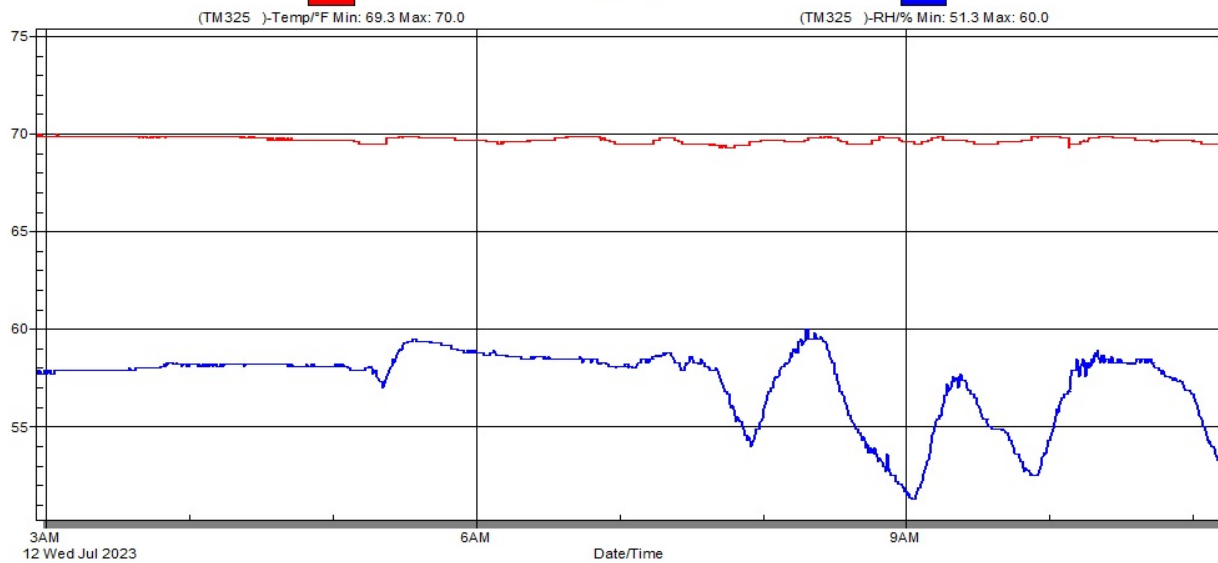
Test Vehicle: 2023 Chevrolet Colorado 4 Door Truck

NHTSA No.: M20230101

Test Program: NCAP Side Pole Impact Test

Test Date: 07/12/2023

Wednesday, July 12, 2023



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

APPENDIX A
PHOTOGRAPHS

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M20230101

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



M20230101

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

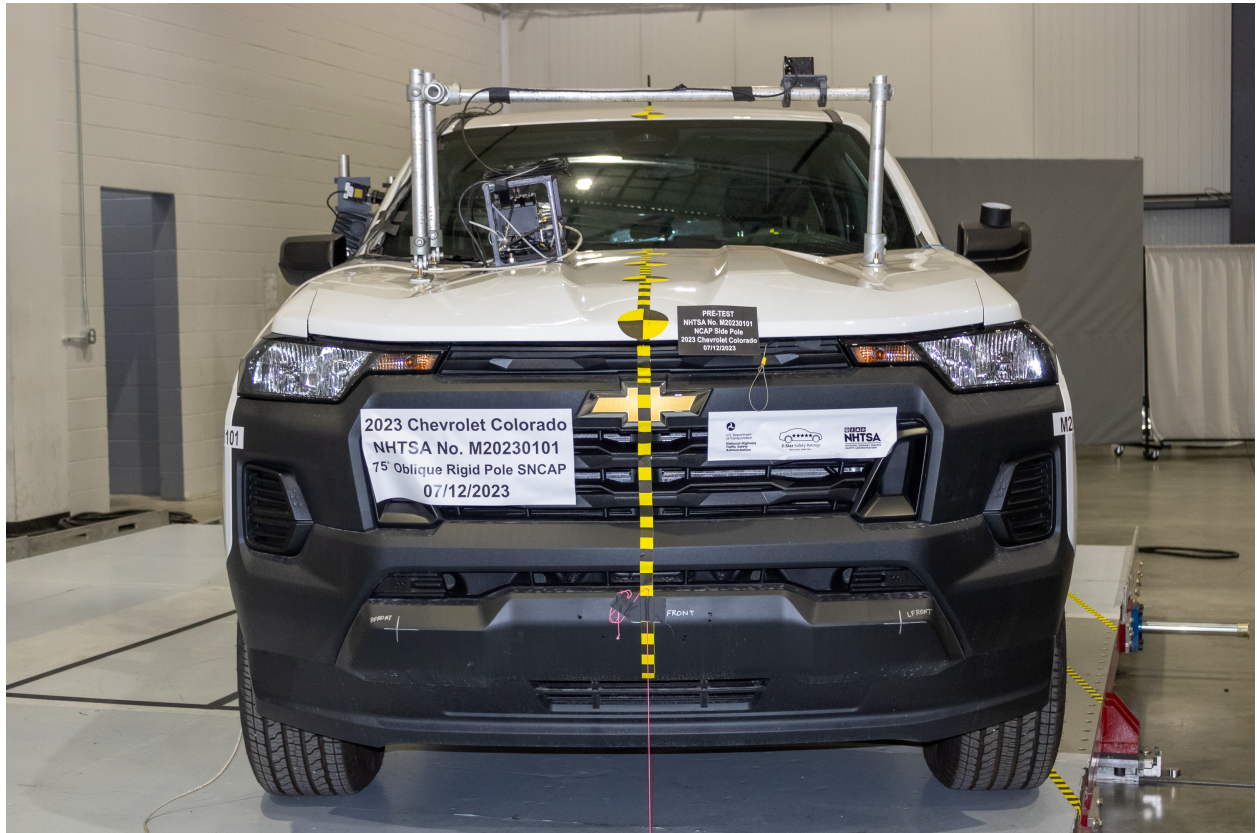


Figure A-3: Pre-Test Frontal View of Test Vehicle



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

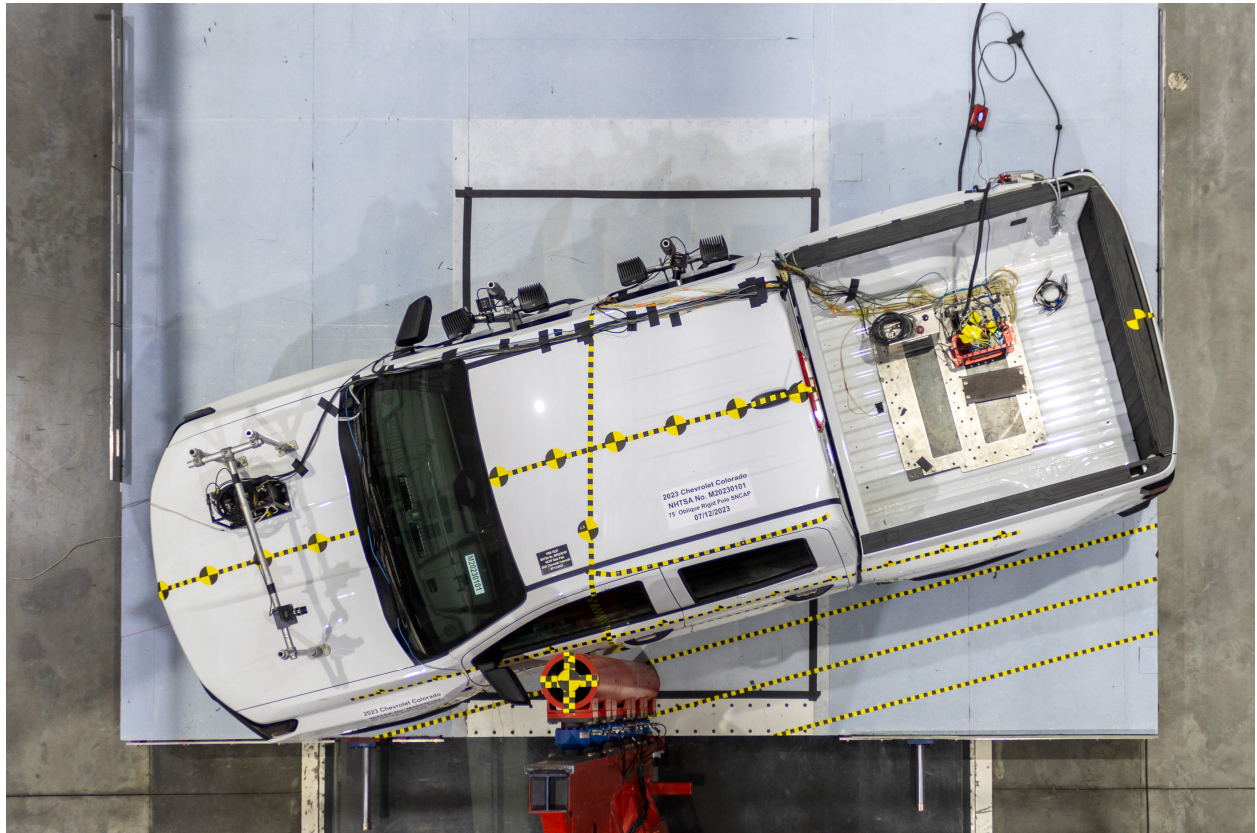


Figure A-15: Pre-Test Overhead View of Test Area

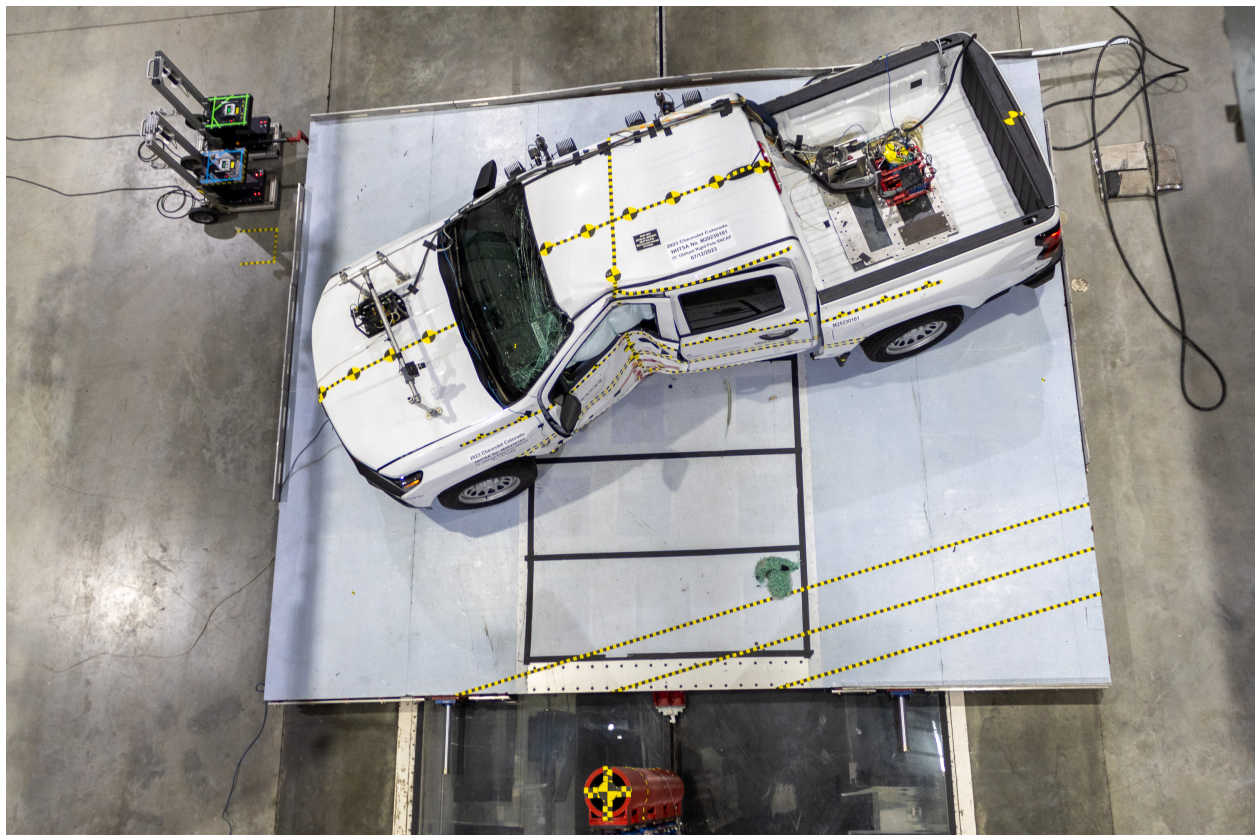


Figure A-16: Post-Test Overhead View of Test Area



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

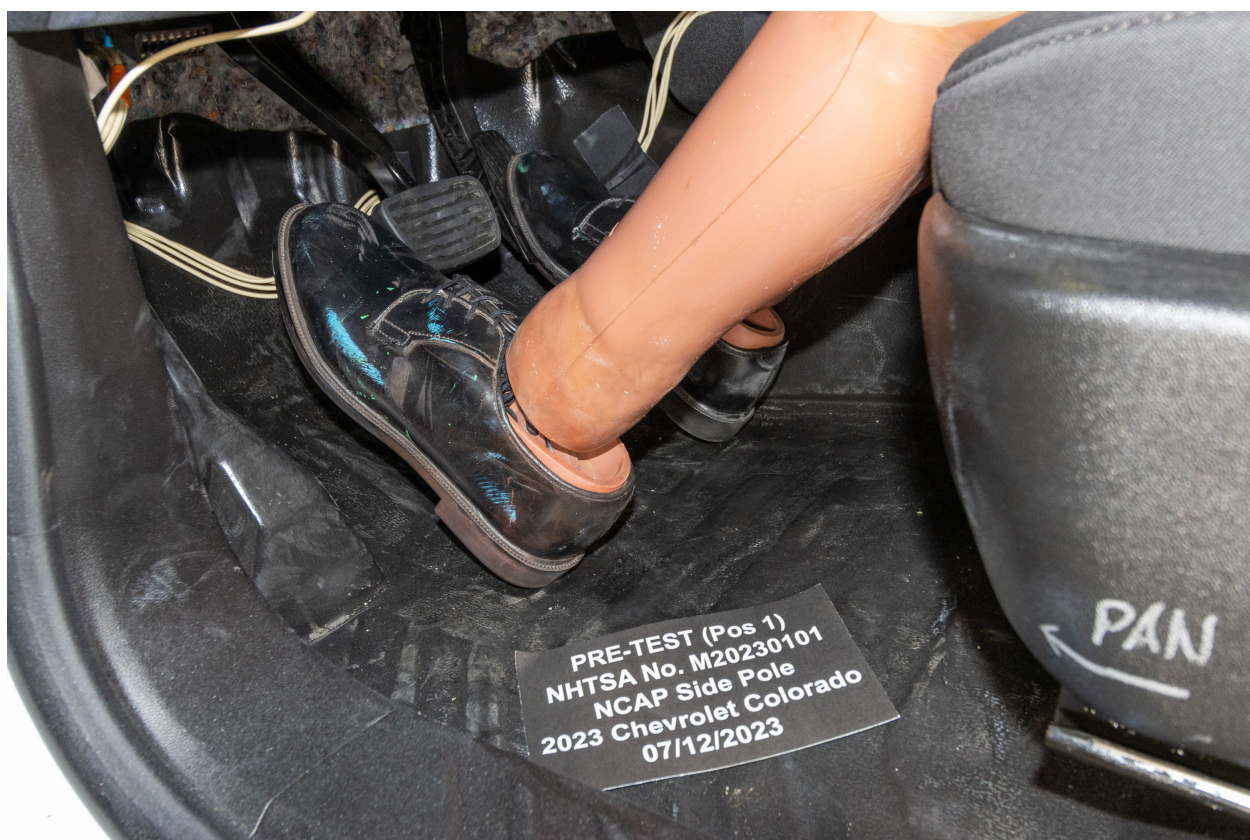


Figure A-32: Pre-Test Placement of Dummy's Feet



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

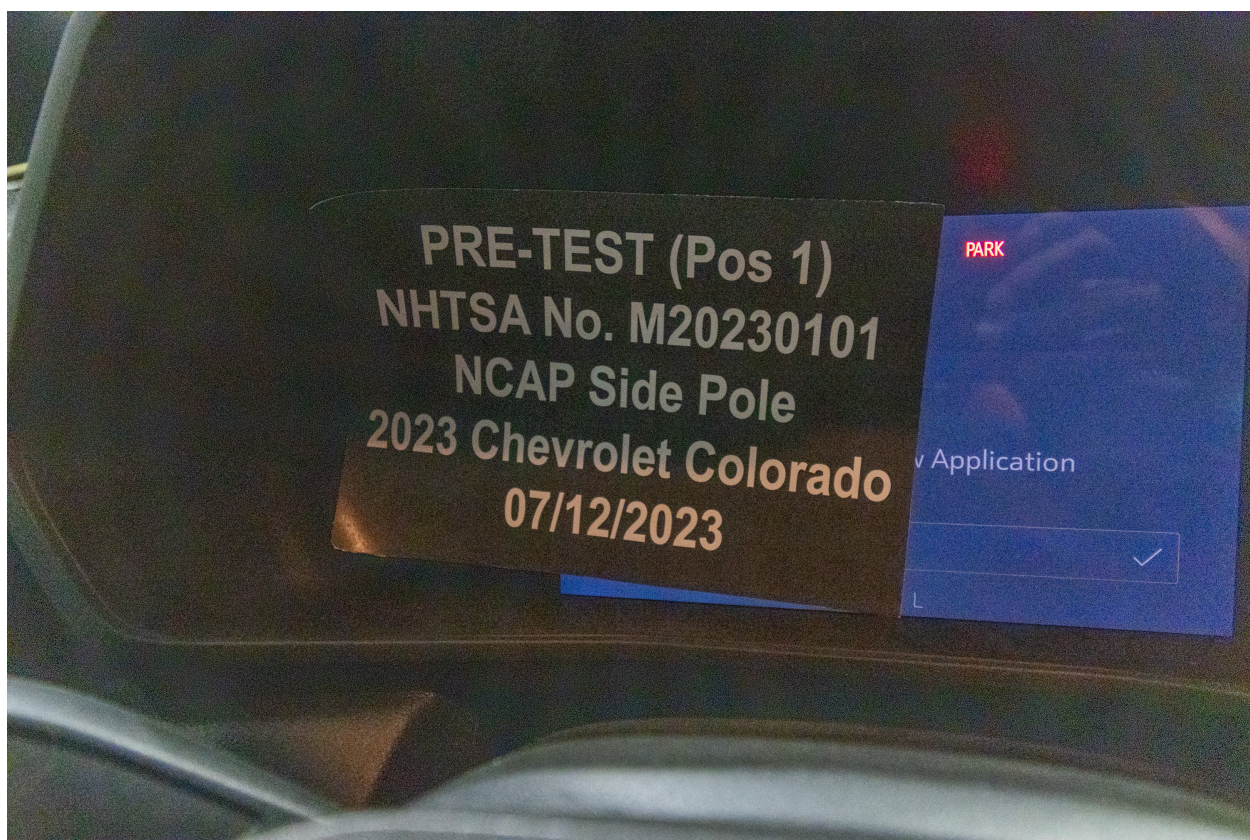


Figure A-36: Pre-Test View of Parking Brake



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

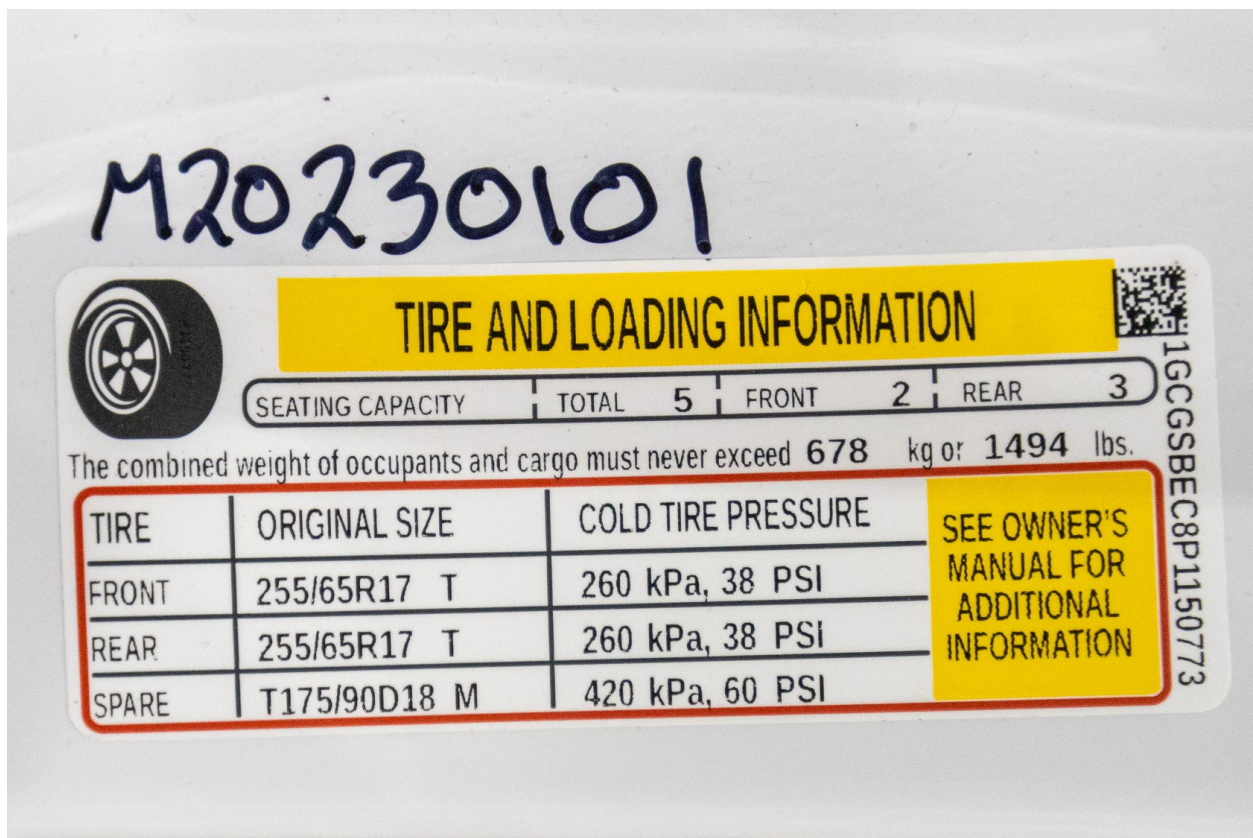


Figure A-58: Close-Up View of Vehicle's Tire Information Placard or Label



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



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

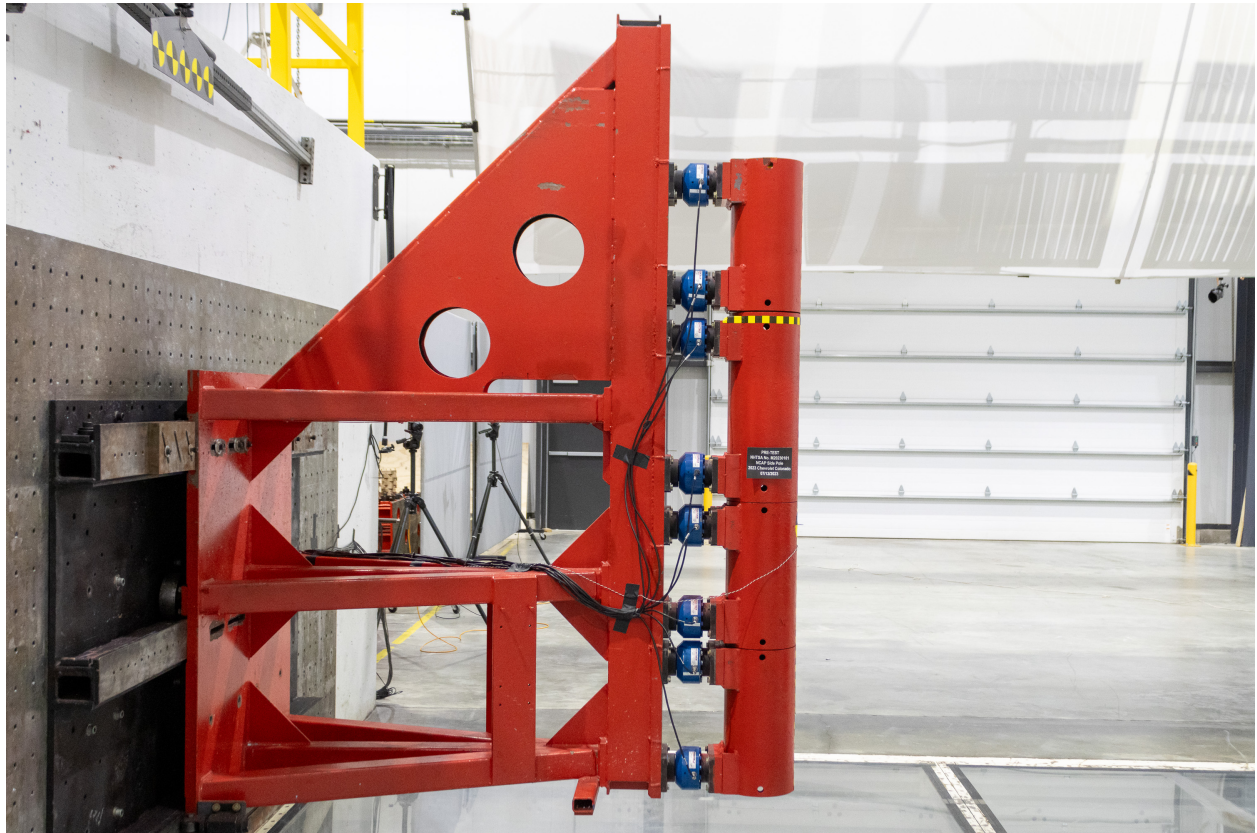


Figure A-61: Pre-Test Pole Barrier Side View

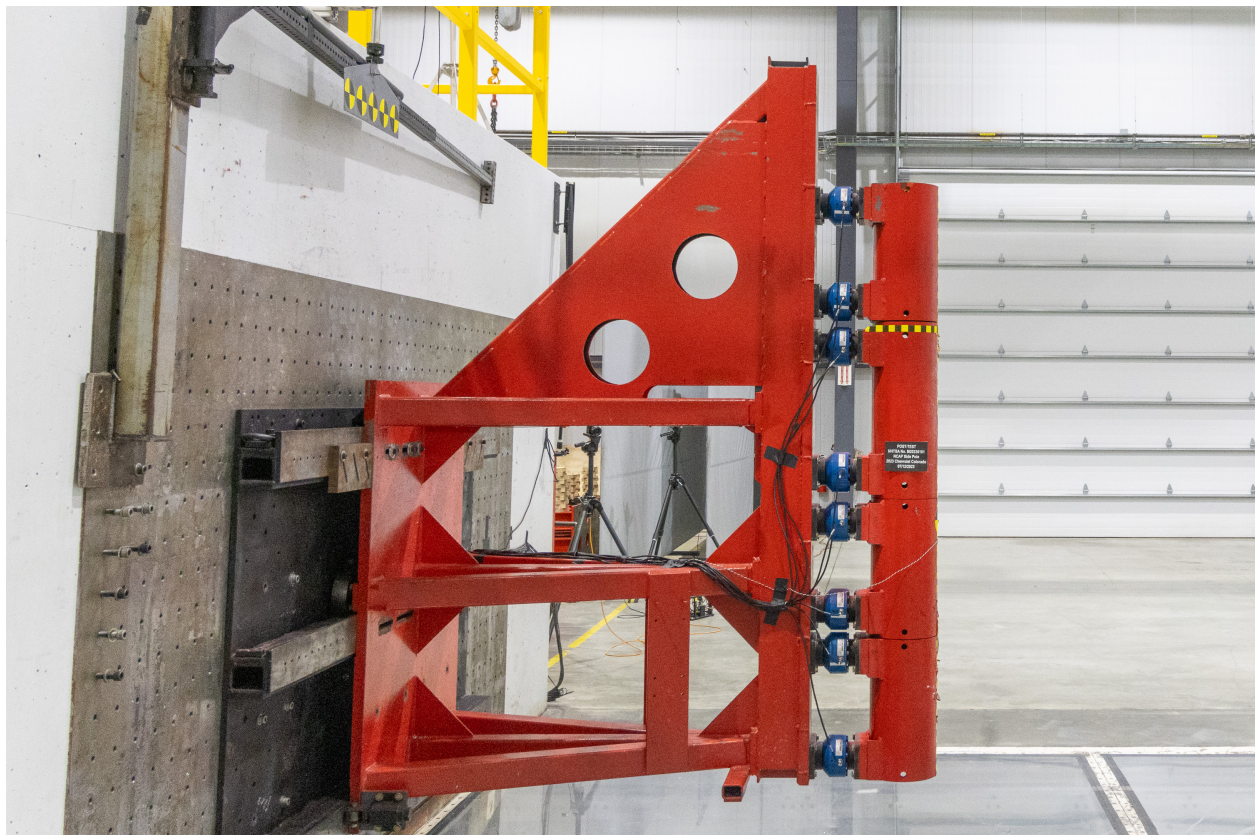


Figure A-62: Post-Test Pole Barrier Side View

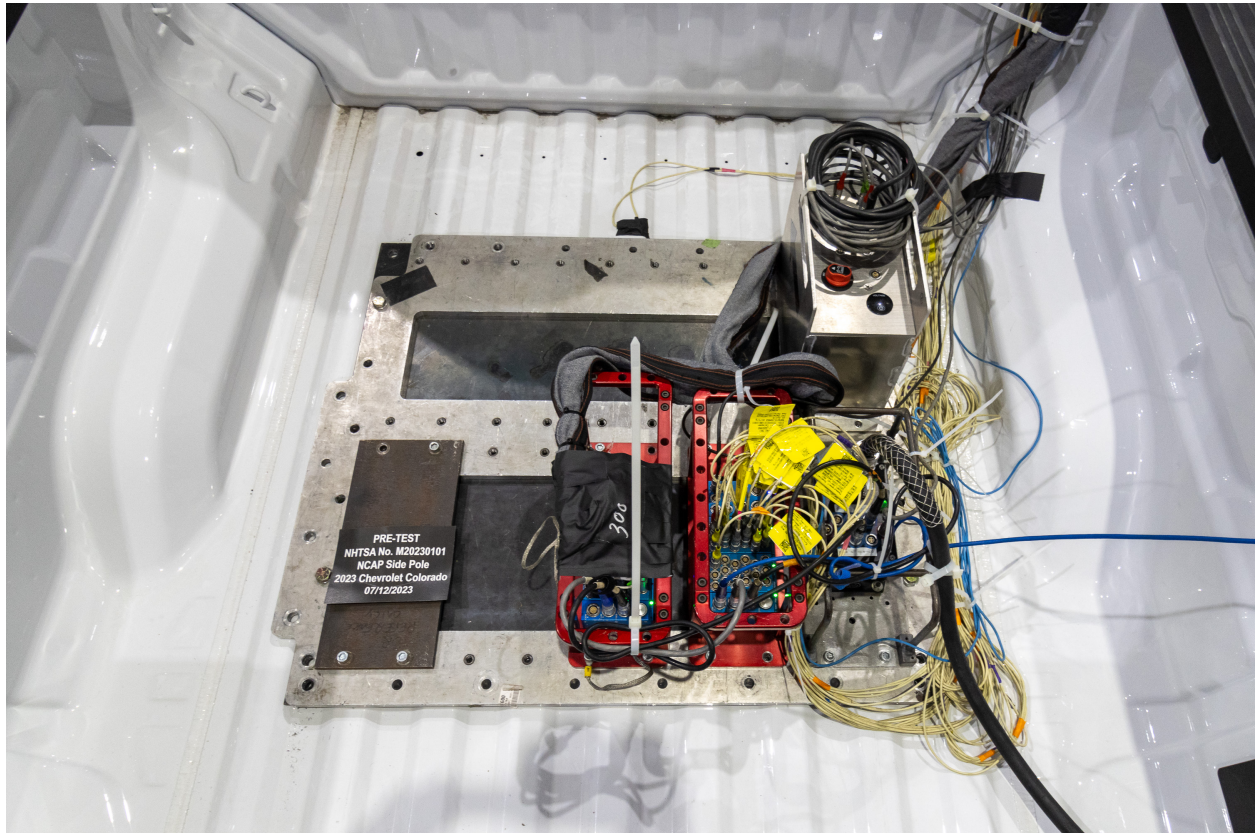


Figure A-63: Pre-Test Ballast View



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



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

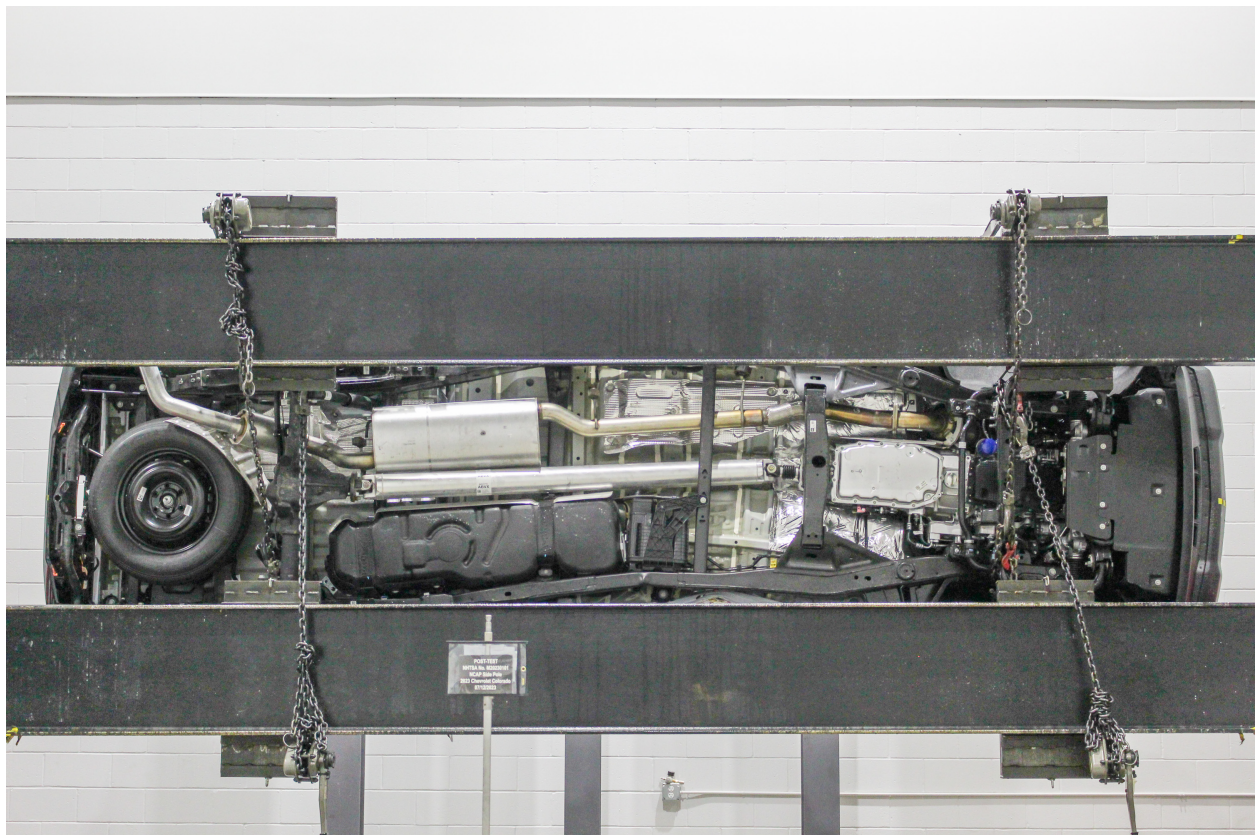


Figure A-66: FMVSS No. 301 Static Rollover 90 Degrees

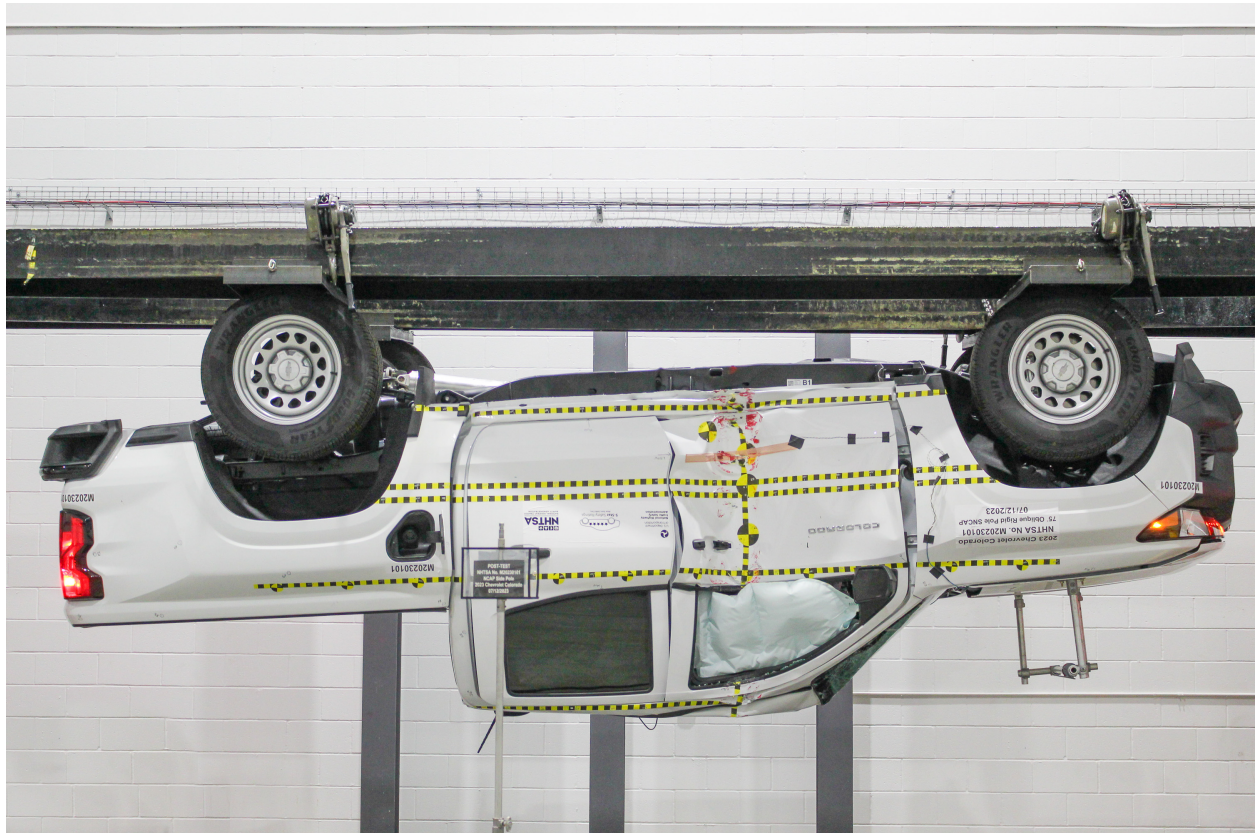


Figure A-67: FMVSS No. 301 Static Rollover 180 Degrees



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



CHEVROLET

2023 COLORADO 2WD WT CREW CAB

EXTERIOR: SUMMIT WHITE
INTERIOR: JET BLACK CLOTH SEATS

ENGINE: 2.7L TURBO
TRANSMISSION: 8-SPEED AUTO

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STANDARD VEHICLE PRICE	\$29,200.00																					
AUTO LOCKING REAR DIFFERENTIAL	325.00																					
FLOOR COVERING, FULL LENGTH VINYL	50.00																					
REAR AXLE 3.42 RATIO	INC.																					
Frontal Crash	Driver Passenger	To Be Rated																				
Side Crash	Front seat Rear seat	To Be Rated																				
Rollover		To Be Rated																				
EPA DOT Fuel Economy and Environment COLORADO 2WD Fuel Economy 22 MPG combined city/hwy 20 city 25 highway 4.5 gallons per 100 miles You spend \$2,000 more in fuel costs over 5 years compared to the average new vehicle. Annual fuel cost \$2,000 Fuel Economy & Greenhouse Gas Rating (tailpipe only) 5 (Best) This vehicle emits 406 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. Smog Rating (tailpipe only) 7 (Best) Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 29 MPG and costs \$8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.95 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog. fuelconomy.gov Calculate personalized estimates and compare vehicles			GOVERNMENT 5-STAR SAFETY RATINGS Overall Vehicle Score To Be Rated Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight. <table border="1"> <tr> <td>Frontal Crash</td> <td>Driver Passenger</td> <td>To Be Rated</td> </tr> <tr> <td>Side Crash</td> <td>Front seat Rear seat</td> <td>To Be Rated</td> </tr> <tr> <td>Rollover</td> <td></td> <td>To Be Rated</td> </tr> </table> 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		Frontal Crash	Driver Passenger	To Be Rated	Side Crash	Front seat Rear seat	To Be Rated	Rollover		To Be Rated	PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 45% MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 23% NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS. FOR THIS VEHICLE: FINAL ASSEMBLY POINT: WENTZVILLE, MO U.S.A. COUNTRY OF ORIGIN: ENGINE: UNITED STATES TRANSMISSION: UNITED STATES ORDER NO COTOPN SALES CODE E SALES CODE 1643 DEALER NO 0689 VIN 1GCGS8BC8P110773 LEADER CAR CHEVROLET YORKVILLE, LLC 5043 COMMERCIAL DRIVE YORKVILLE, NY 13496-1105 GZ 1GA4479683								
Frontal Crash	Driver Passenger	To Be Rated																				
Side Crash	Front seat Rear seat	To Be Rated																				
Rollover		To Be Rated																				

Figure A-71: Monroney Label

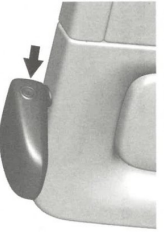
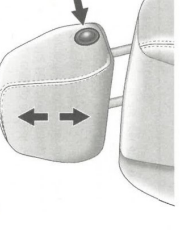
8 Seats and Restraints Seats and Restraints Head Restraints Head Restraints 8 Front Seats Seat Adjustment 9 Reclining Seatbacks 10 Heated and Ventilated Front Seats 11 Rear Seats Rear Seats 13 Seat Belts Seat Belts 14 How to Wear Seat Belts Properly 14 Lap-Shoulder Belt 16 Seat Belt Use During Pregnancy 19 Seat Belt Extender 20 Safety System Check 20 Replacing Seat Belt System Parts after a Crash 20 Airbag System Airbag System 21 Where Are the Airbags? 21 When Should an Airbag Inflate? 23 What Makes an Airbag Inflate? 24 How Does an Airbag Restrain? 24 What Will You See after an Airbag Inflates? Passenger Sensing System 24 Activating the Airbag Equipped Vehicle 26 Adding Equipment to the Airbag-Equipped Vehicle 29 Airbag System Check 30 Replacing Airbag System Parts after a Crash 31 Child Restraints Older Children 31 Infants and Young Children 32 Child Restraint Systems 34 Where to Put the Restraint 36 Lower Anchors and Tethers for Children (LATCH System) 37 Replacing LATCH System Parts after a Crash 45 Securing Child Restraints (With the Seat Belt in the Rear Seat) 45 Securing Child Restraints (With the Seat Belt in the Front Seat) 47	Head Restraints Warning With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/spinal injury in a crash. Do not drive until the head restraints for all occupants are installed and adjusted properly.  Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash. Seats and Restraints 9 If you are installing a child restraint in the rear seat, see <i>Lower Anchors and Tethers for Children (LATCH System)</i> → 37. Center Headrest The vehicle's rear seat may be equipped with a headrest in the center seating position that cannot be adjusted. If you are installing a child restraint in the rear seat, see <i>Lower Anchors and Tethers for Children (LATCH System)</i> → 37. Front Seats Seat Adjustment Warning You can lose control of the vehicle if you try to adjust a driver seat while the vehicle is moving. Adjust the driver seat only when the vehicle is not moving. Rear Head Restraints The vehicle's rear seats have head restraints in the outboard seating positions that cannot be adjusted up or down.  The rear outboard head restraints are designed to be folded forward to allow for better visibility when the rear seat is unoccupied. To fold the head restraint, press the button on the side of the head restraint. When an occupant is in the seat, always return the head restraint to the upright position until it locks into place. Push and pull on the head restraint to make sure that it is locked. Front Seats The vehicle's front seats have adjustable head restraints in the outboard seating positions.  The height of the head restraint can be adjusted. To raise or lower the head restraint, press the button located on the side of the head restraint and pull up or push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place. The front seat outboard head restraints are not removable.
---	--

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 AND DUMMY RESPONSE DATA PLOTS

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

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)

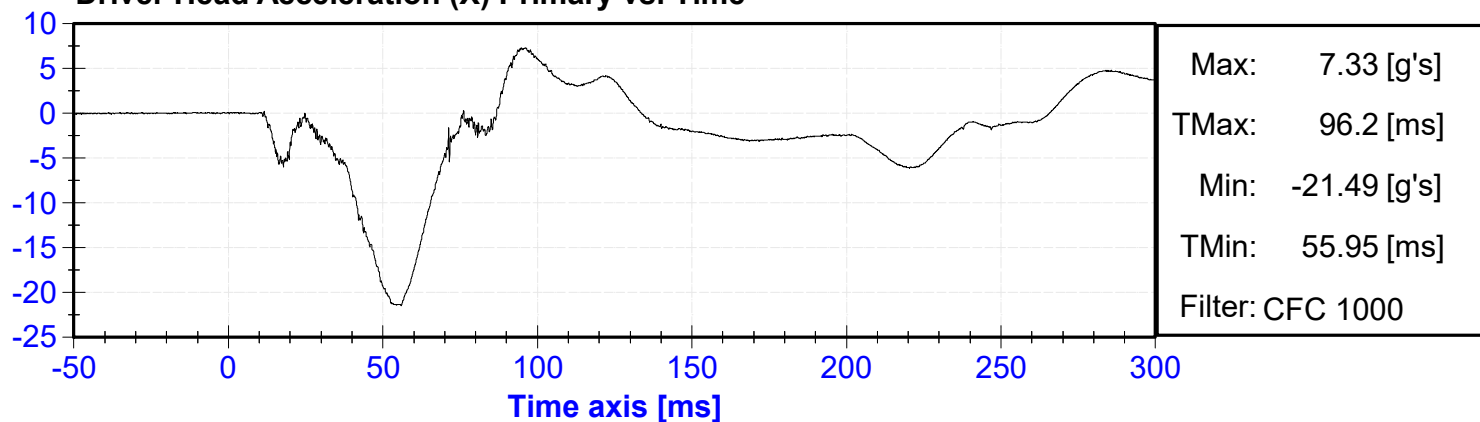
Vehicle Instrumentation Data

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)

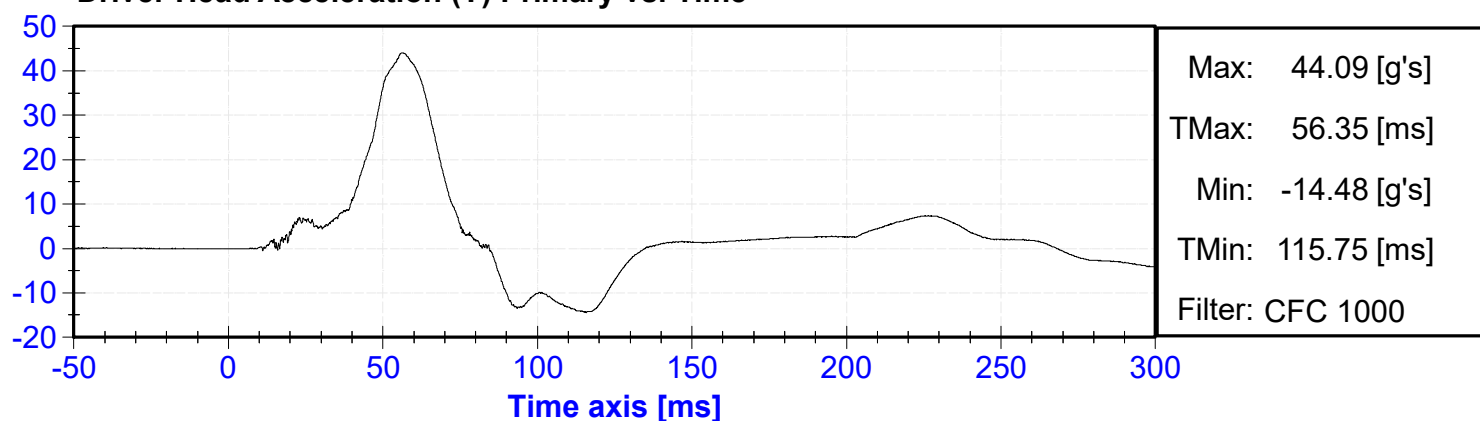
Pole Instrumentation Data

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)

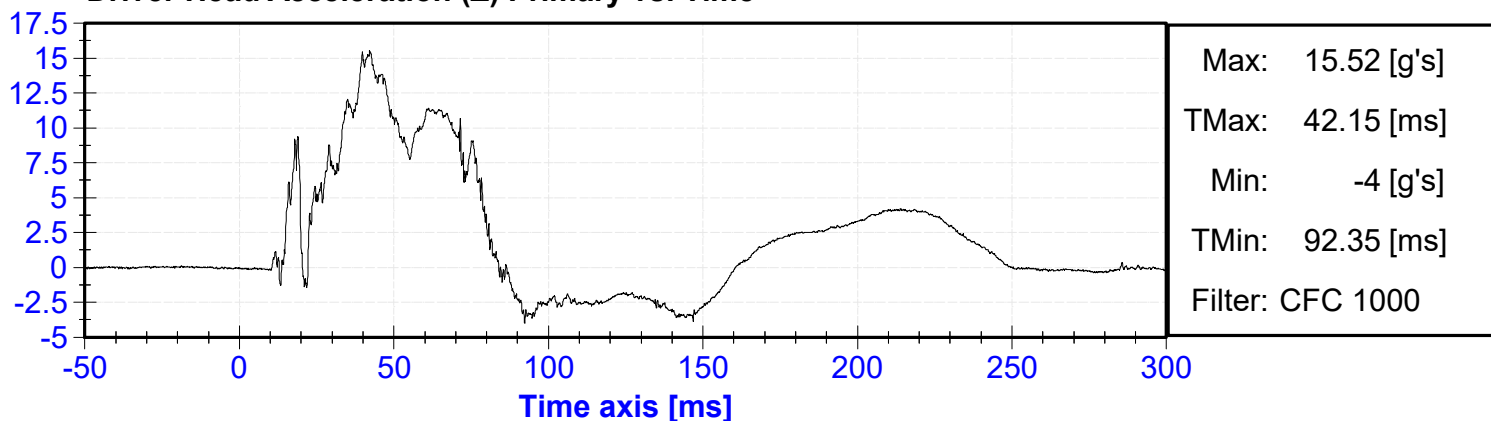
Driver Head Acceleration (X) Primary vs. Time



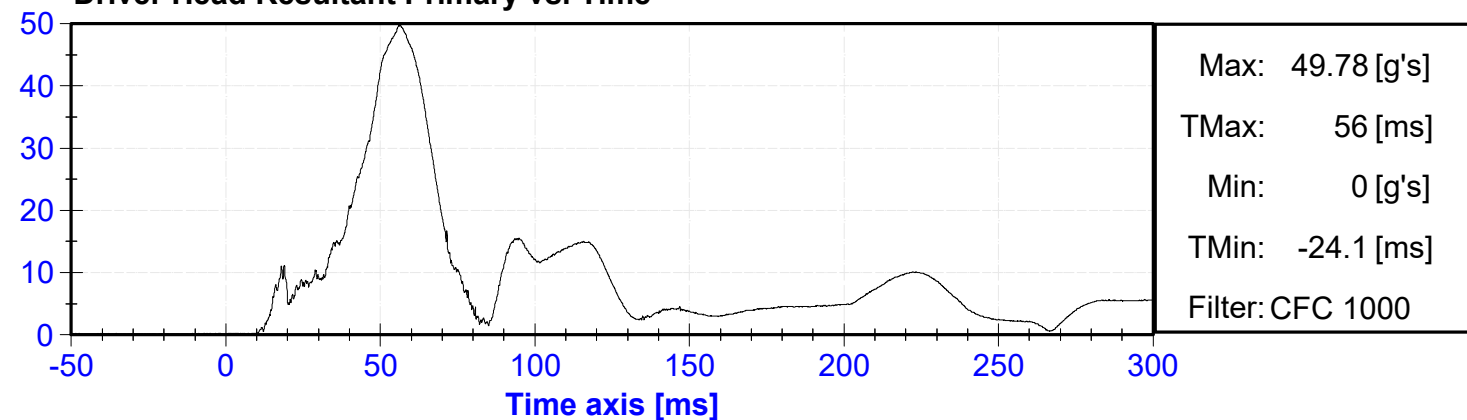
Driver Head Acceleration (Y) Primary vs. Time



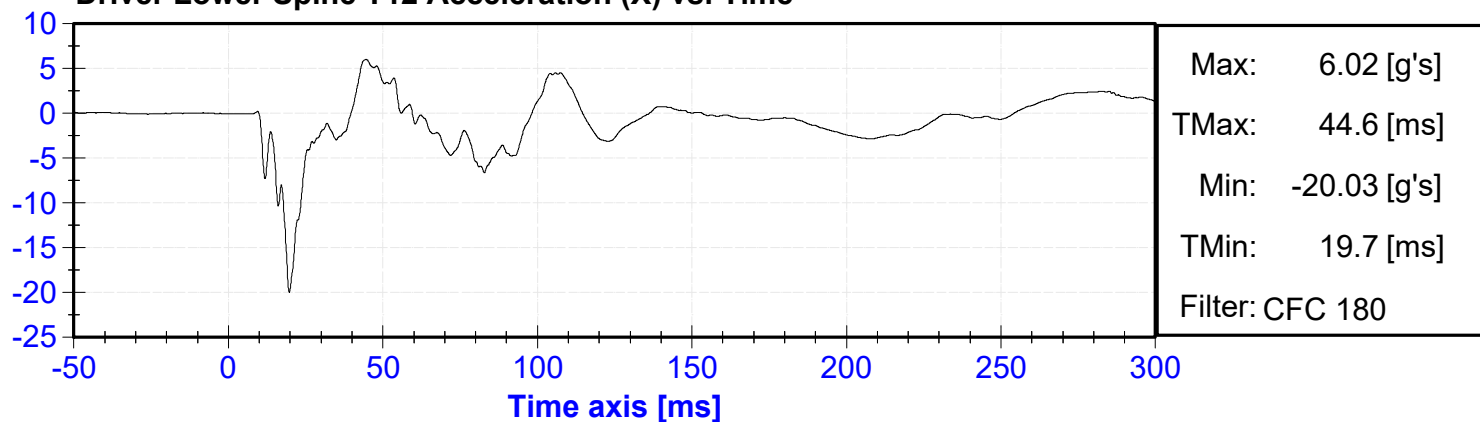
Driver Head Acceleration (Z) Primary vs. Time



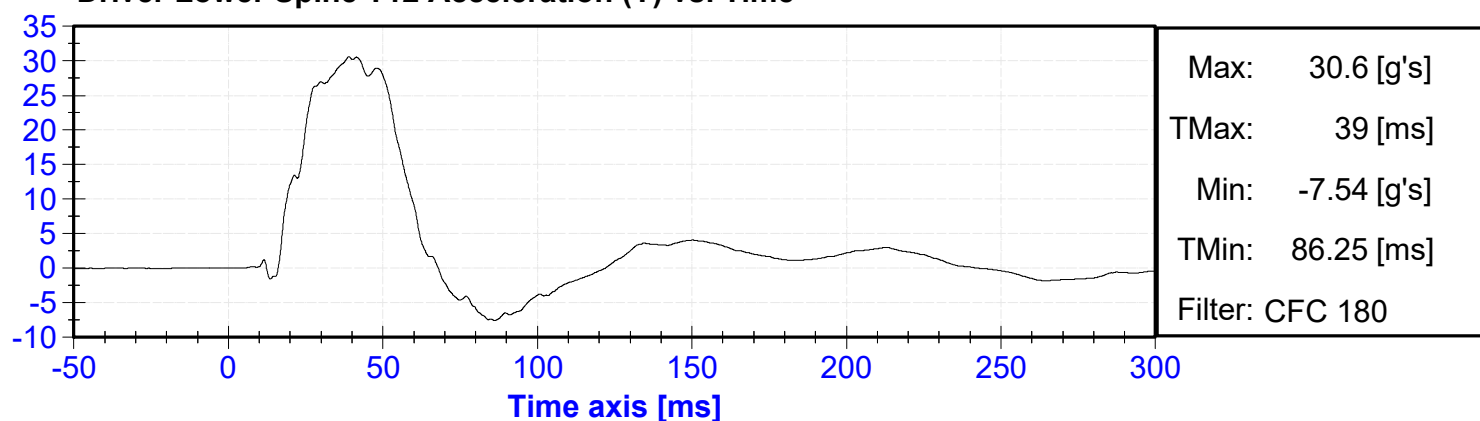
Driver Head Resultant Primary vs. Time



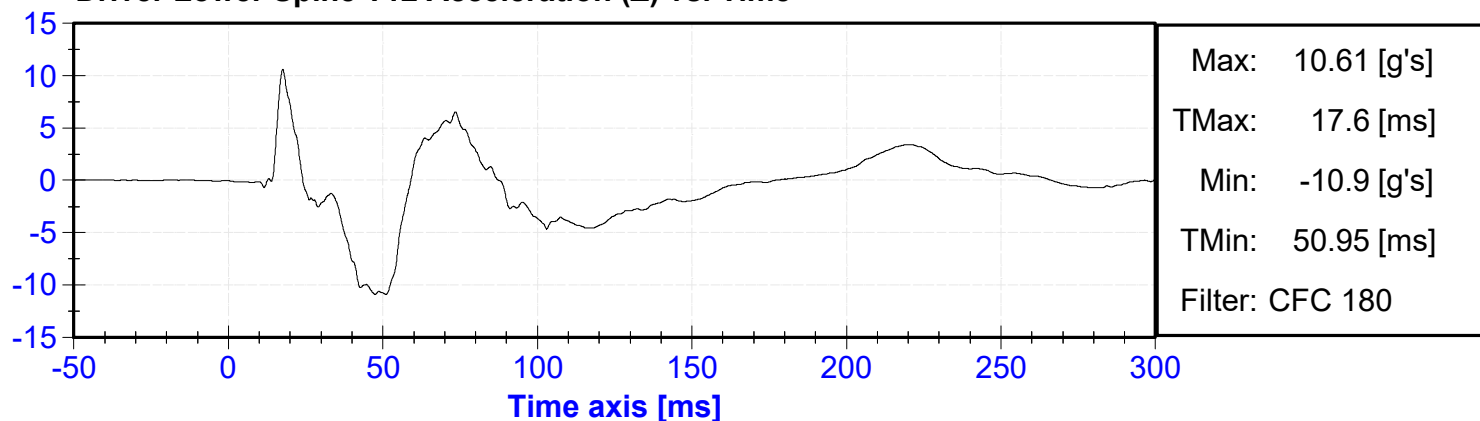
Driver Lower Spine T12 Acceleration (X) vs. Time



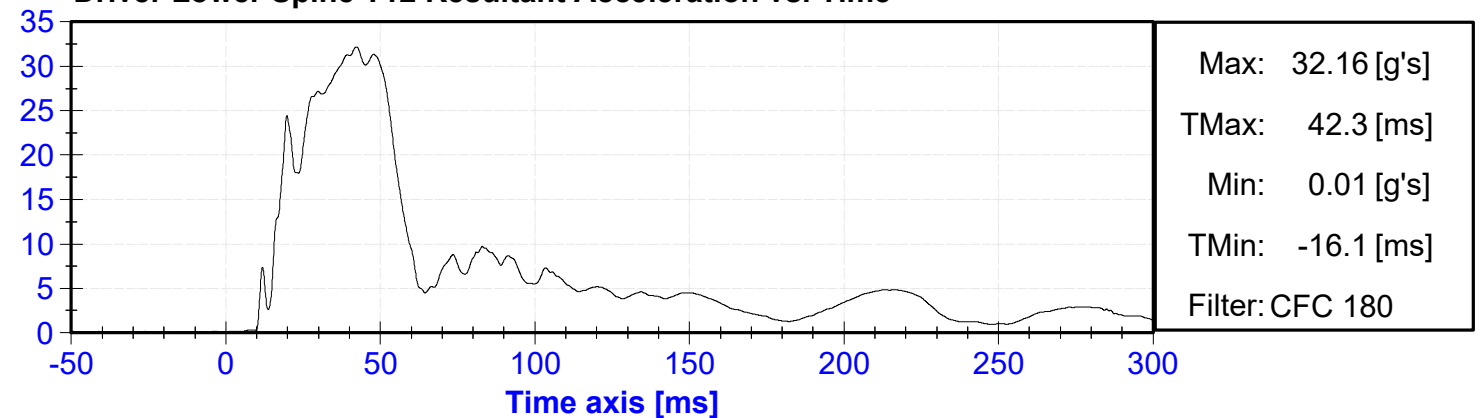
Driver Lower Spine T12 Acceleration (Y) vs. Time



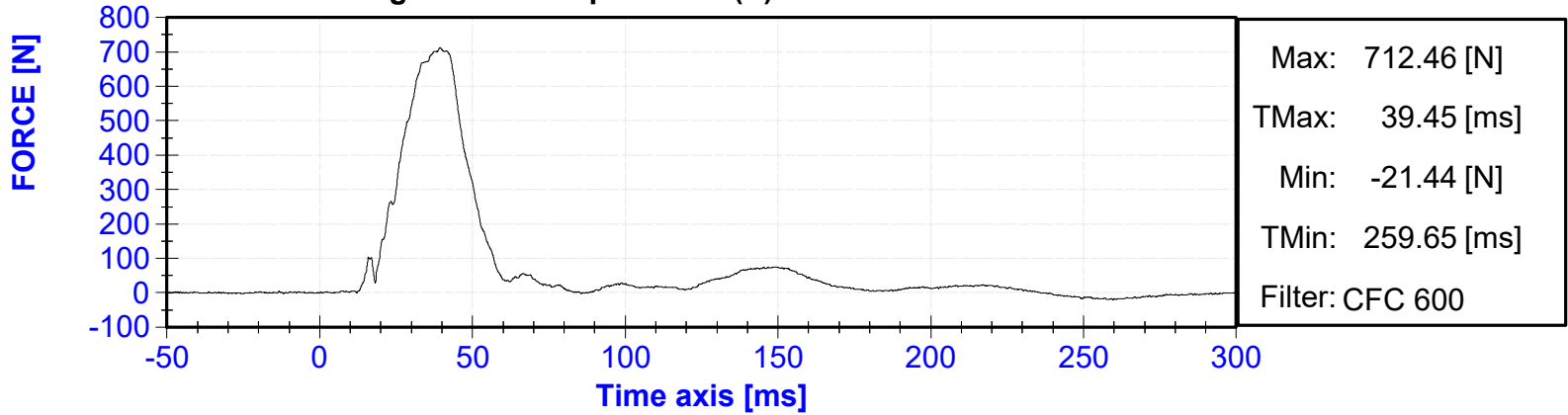
Driver Lower Spine T12 Acceleration (Z) vs. Time



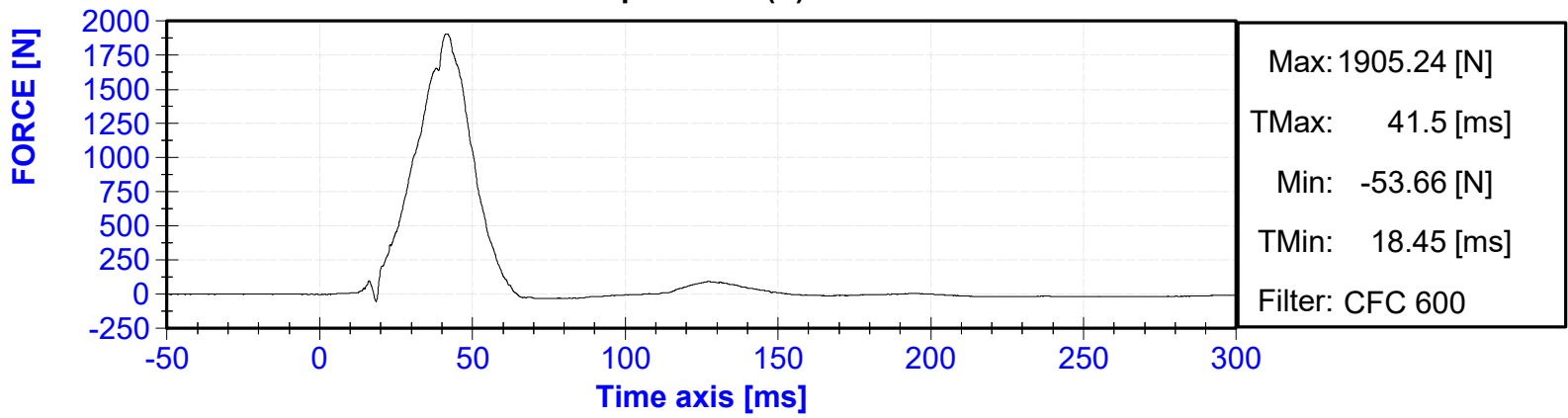
Driver Lower Spine T12 Resultant Acceleration vs. Time



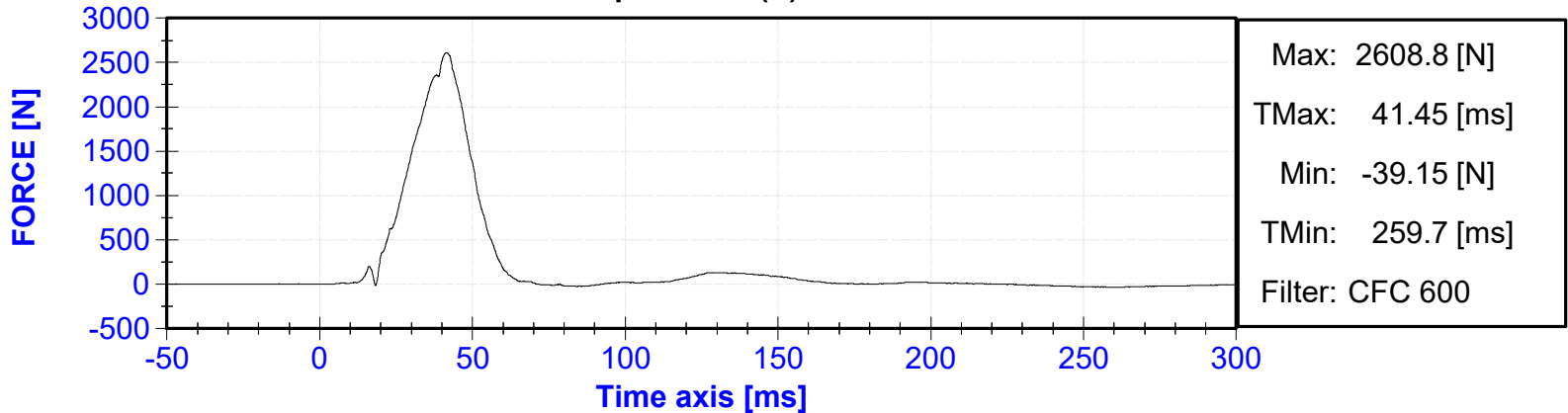
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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



Driver Total Pelvis Force on Impact Side (Y) 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)

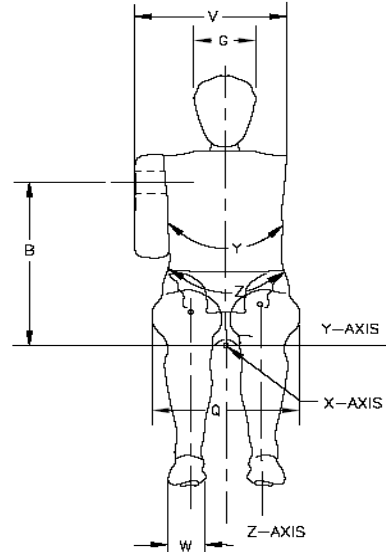
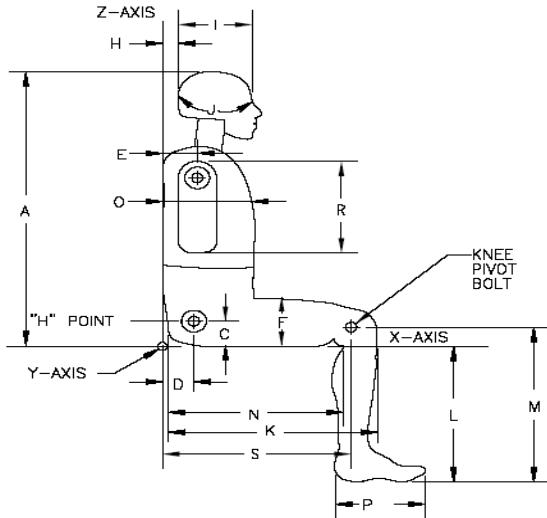


External Measurements - SID-IIs

Technician: K. Brogan

Date: 06/14/2023

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

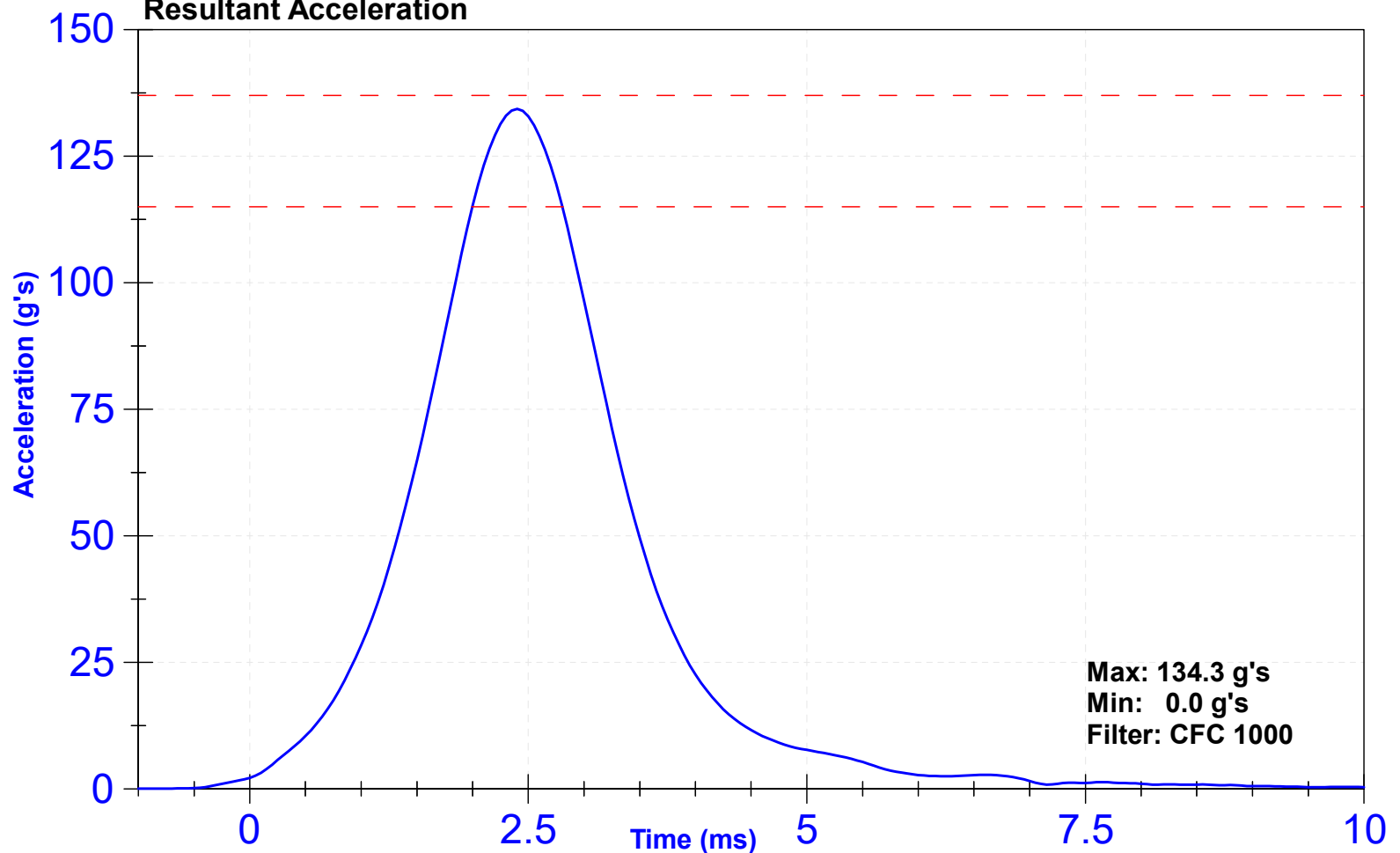
Results

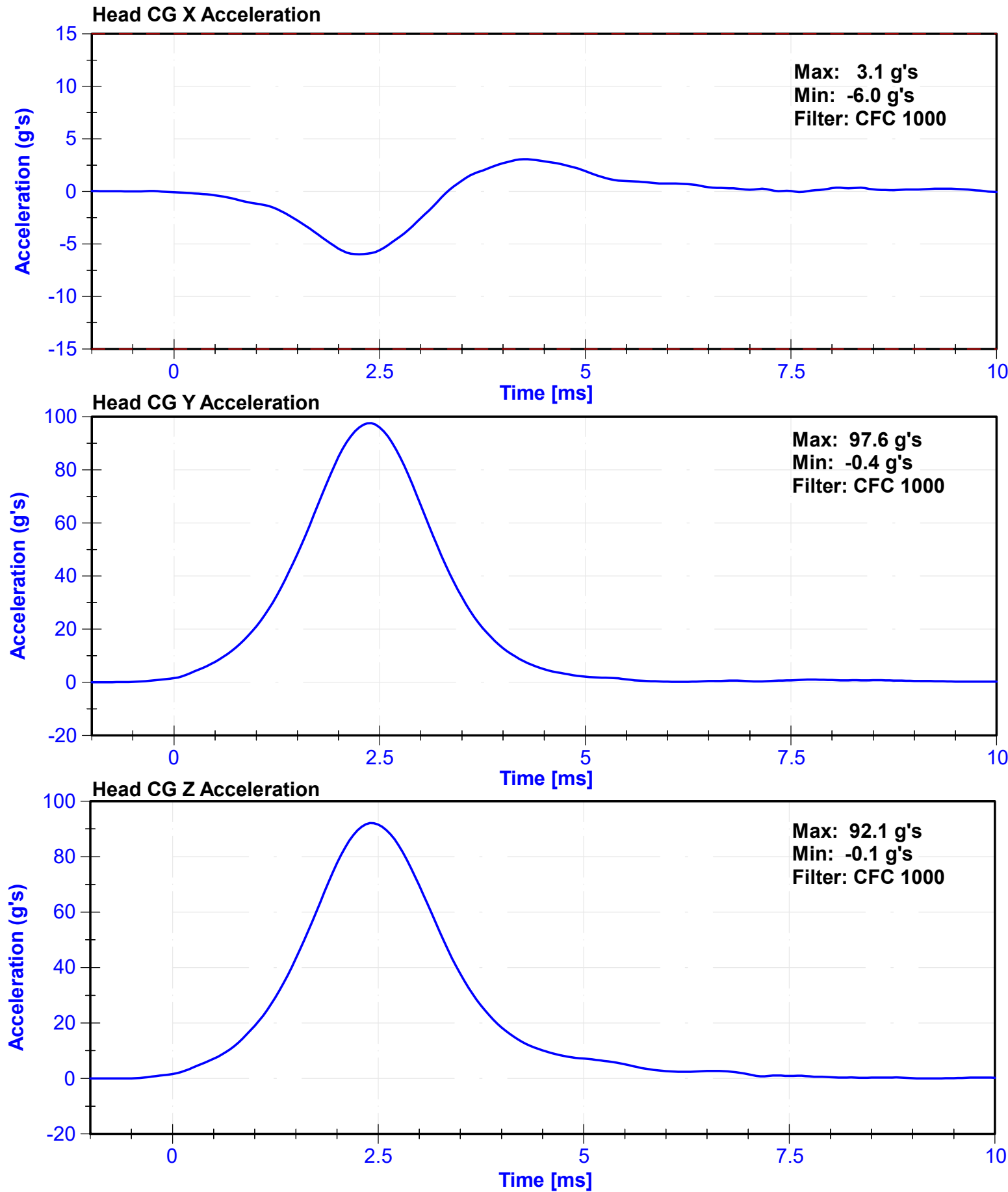
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	42	Pass
Resultant Acceleration	115	137	g's	134.3	Pass
Oscillation	0	15	%	2.0	Pass
Fore-Aft Acceleration	-15	15	g's	-6.0	Pass

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





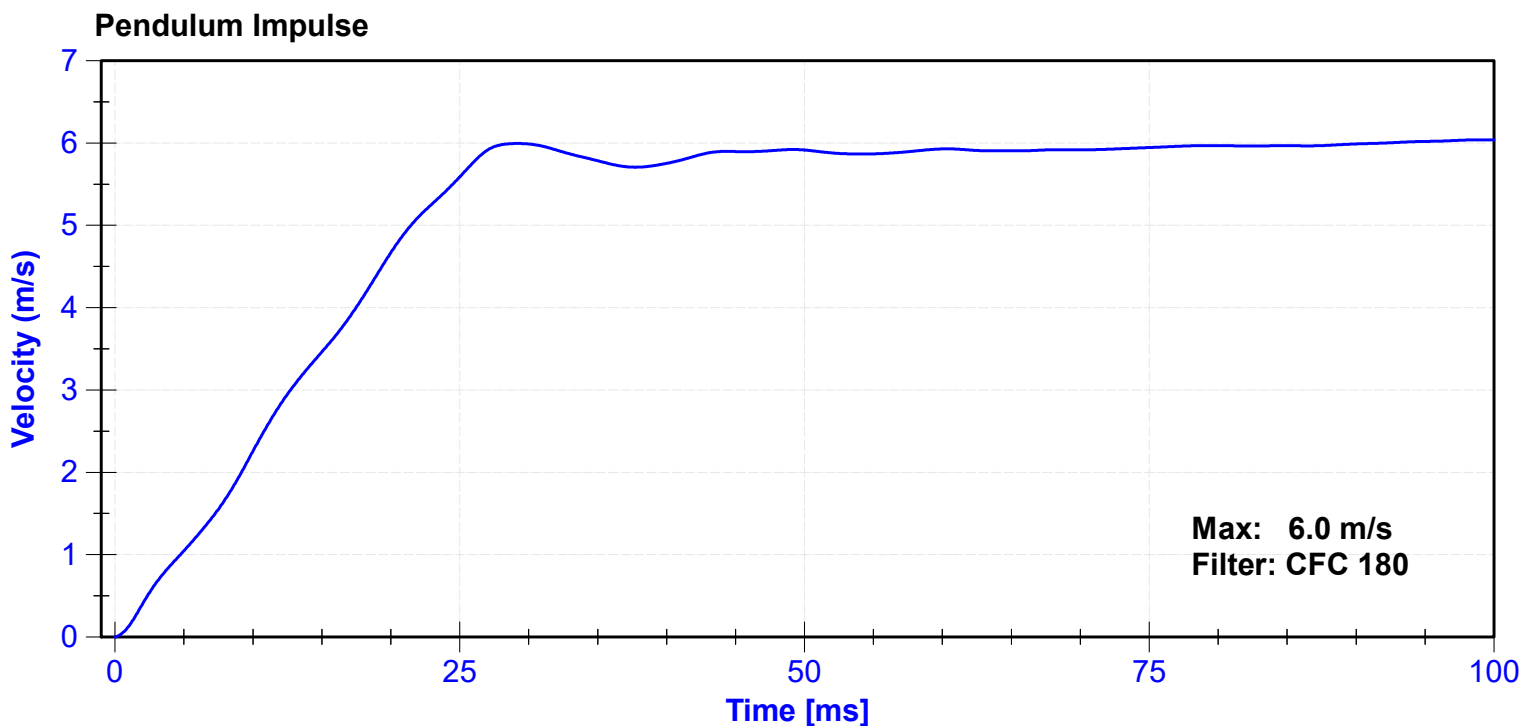
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

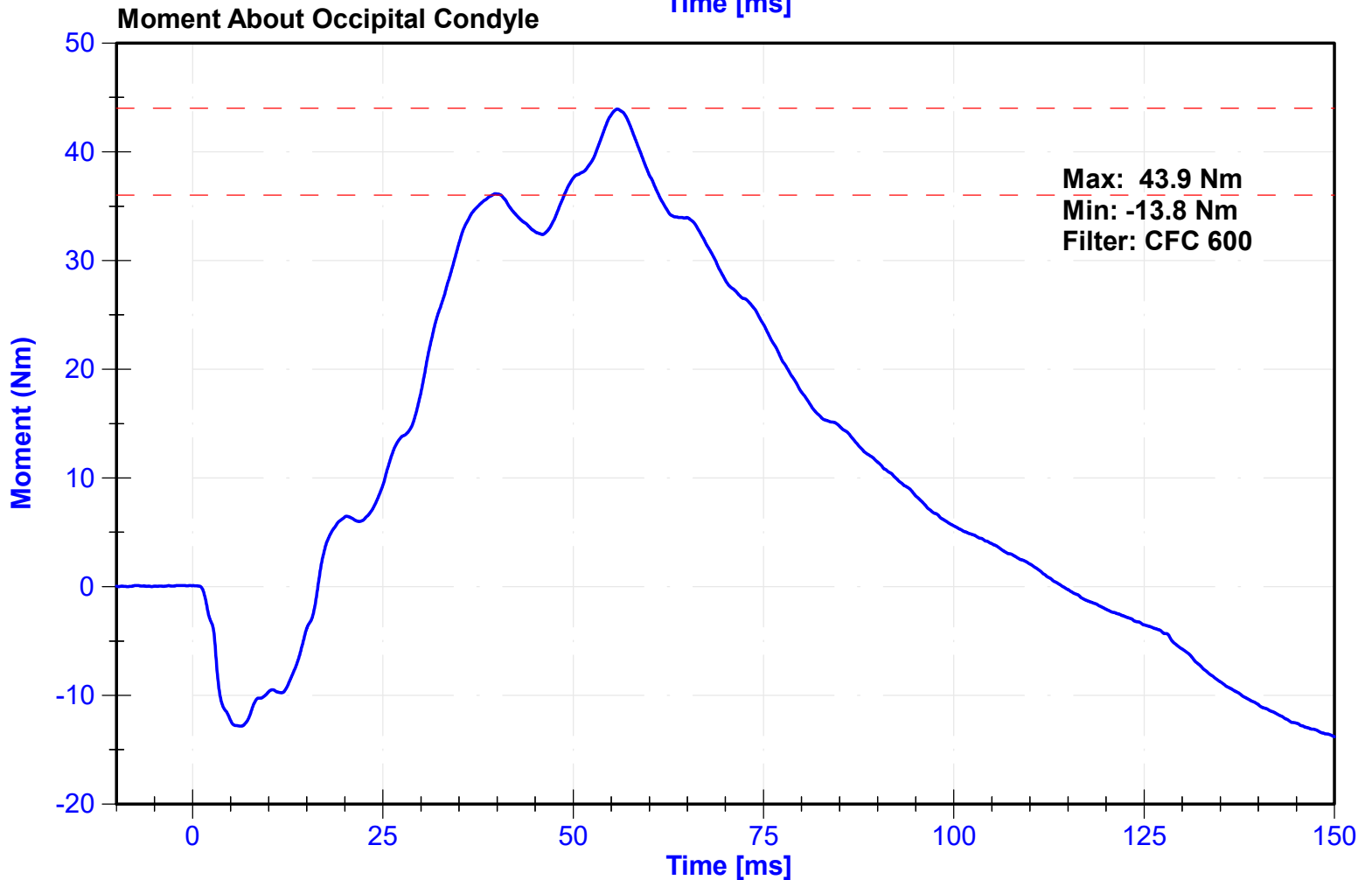
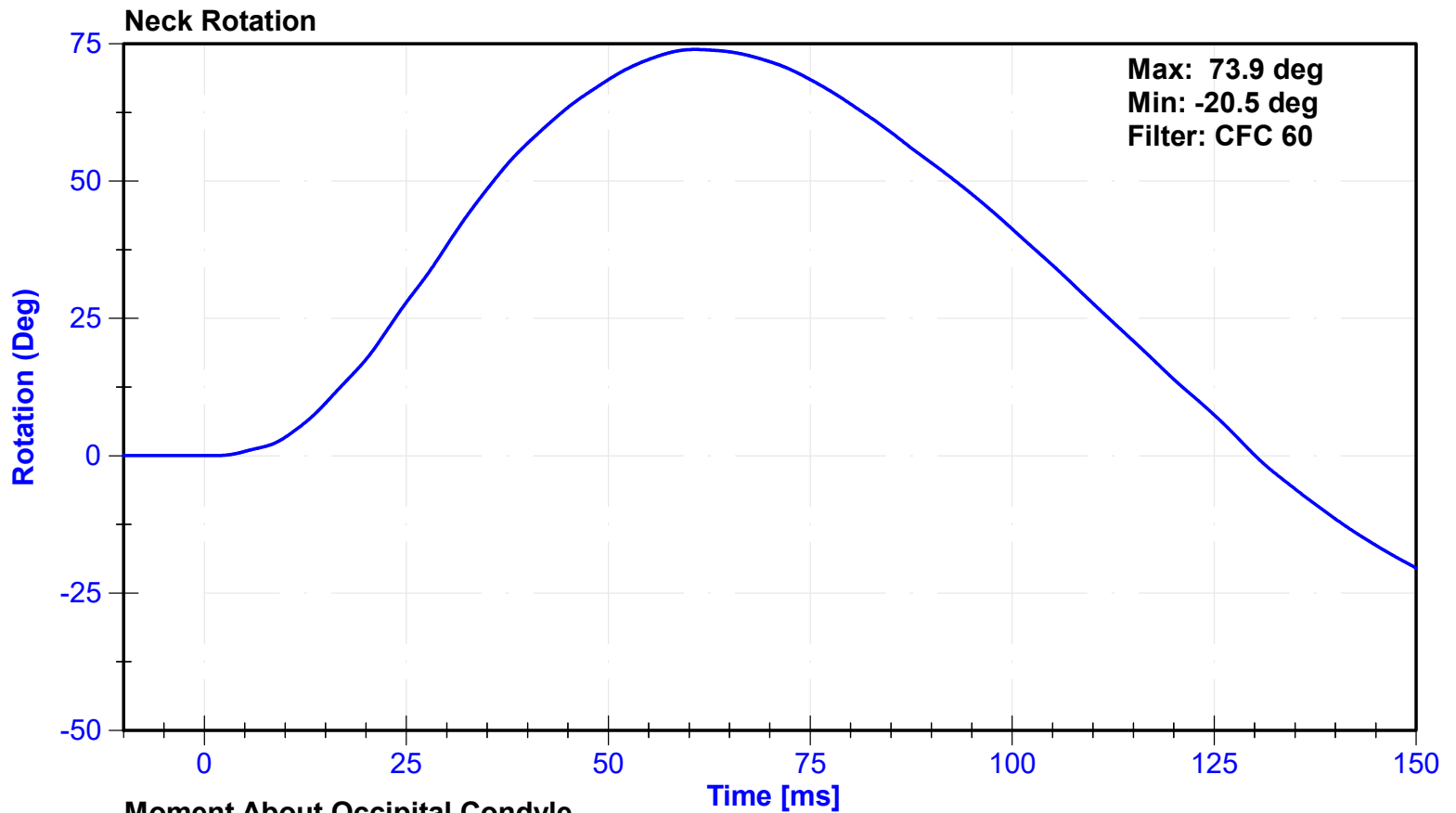
Results

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

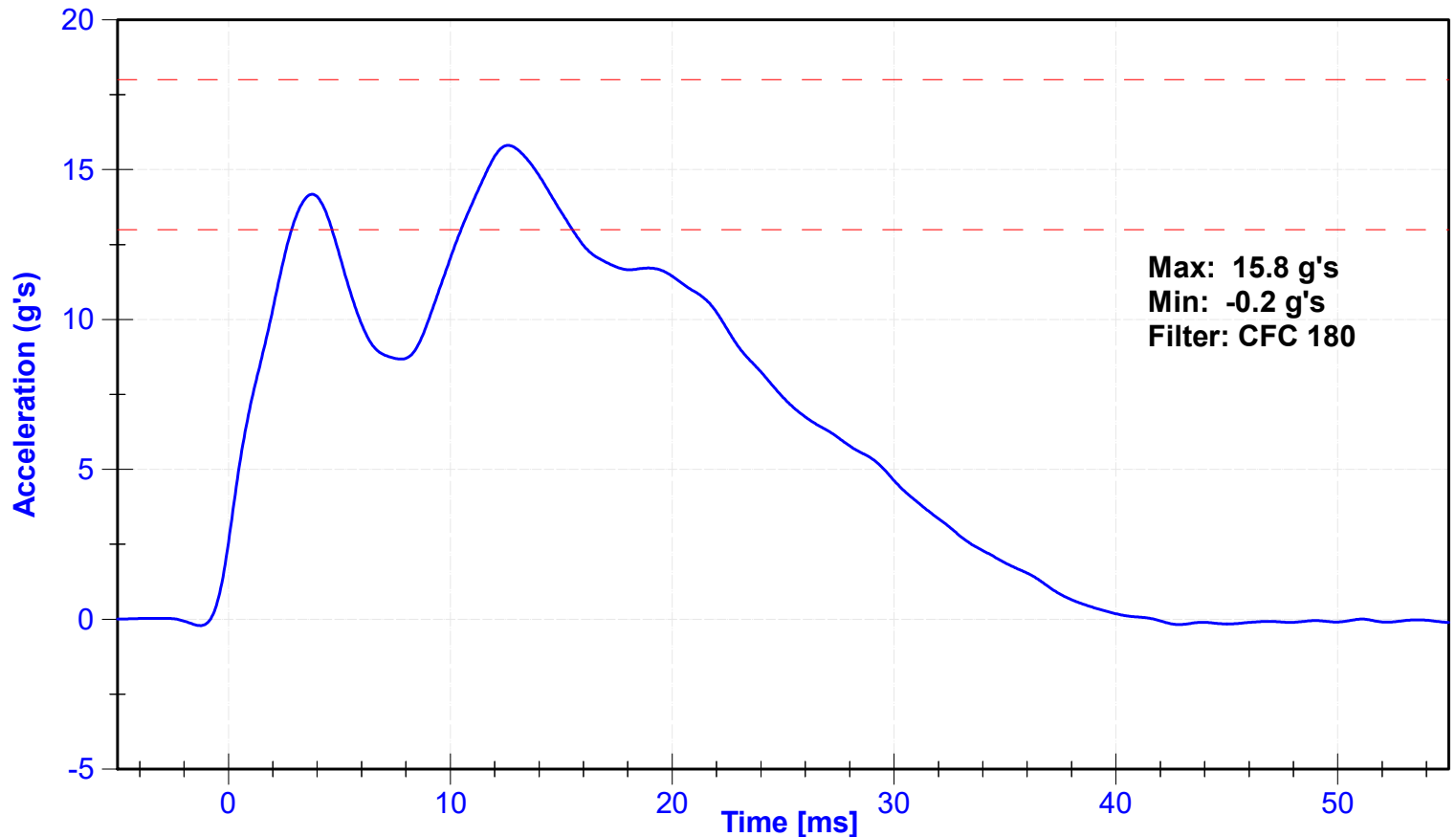
Results

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

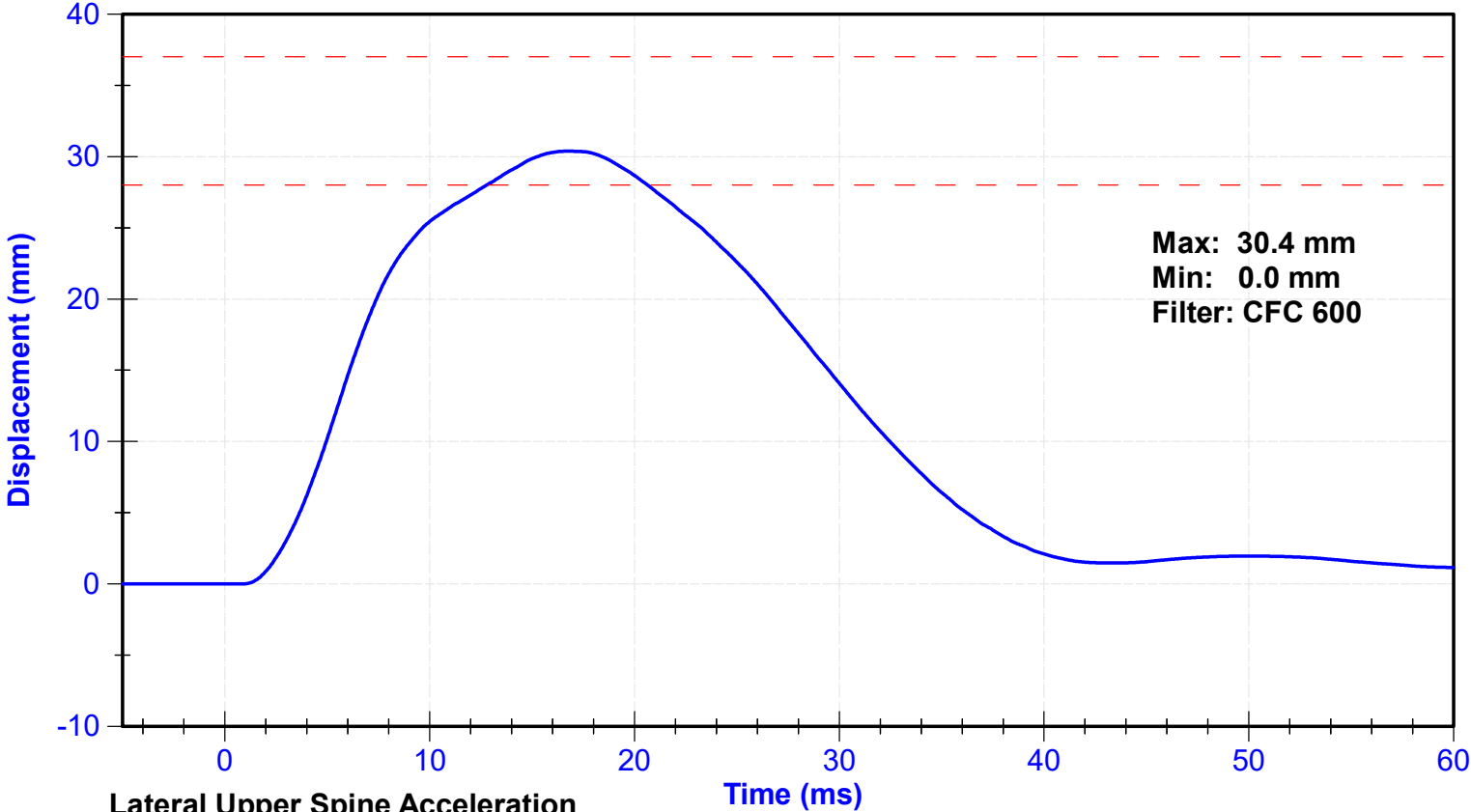
Transducer Calibrations

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

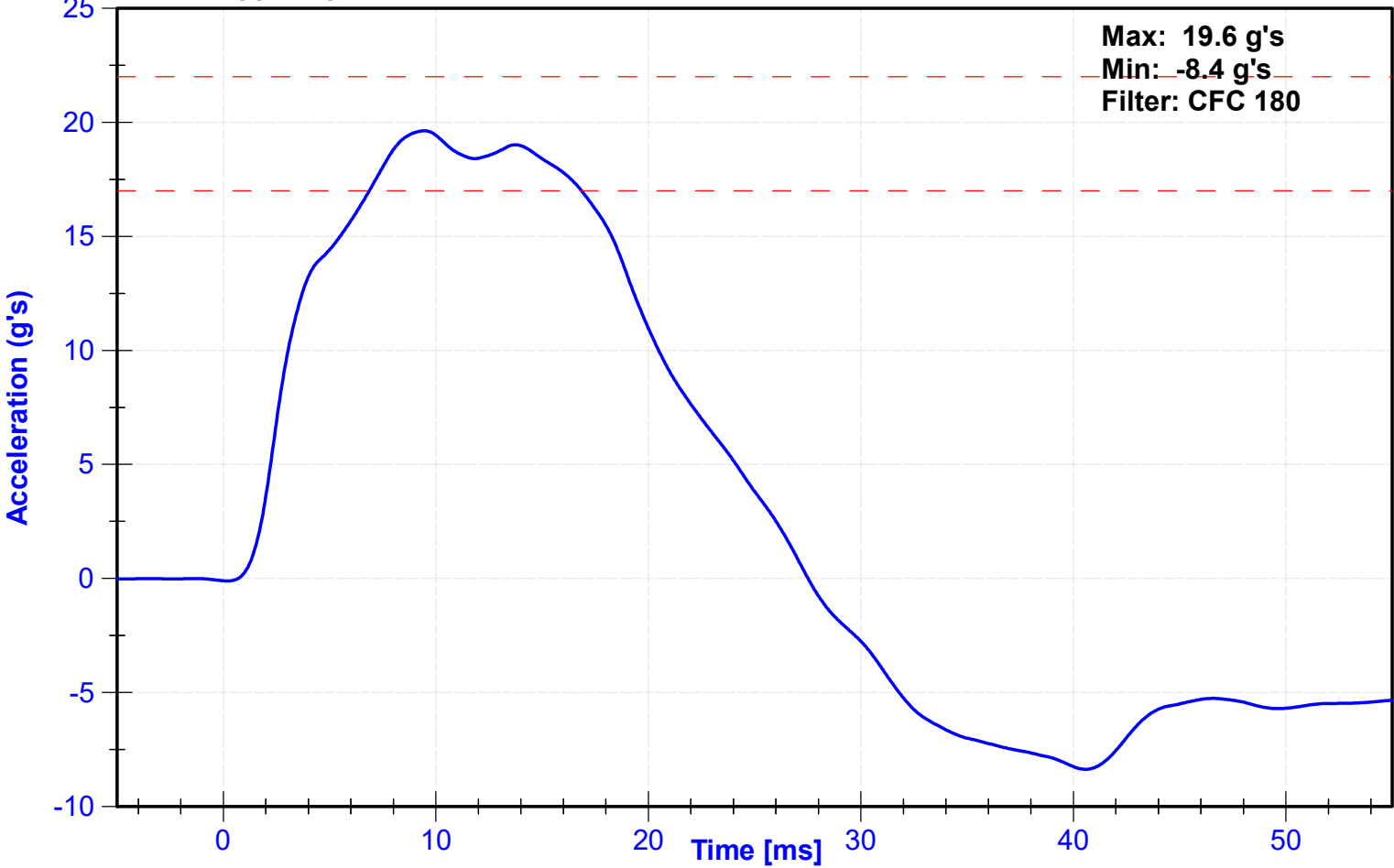
Probe Acceleration



Shoulder Displacement



Lateral Upper Spine Acceleration



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

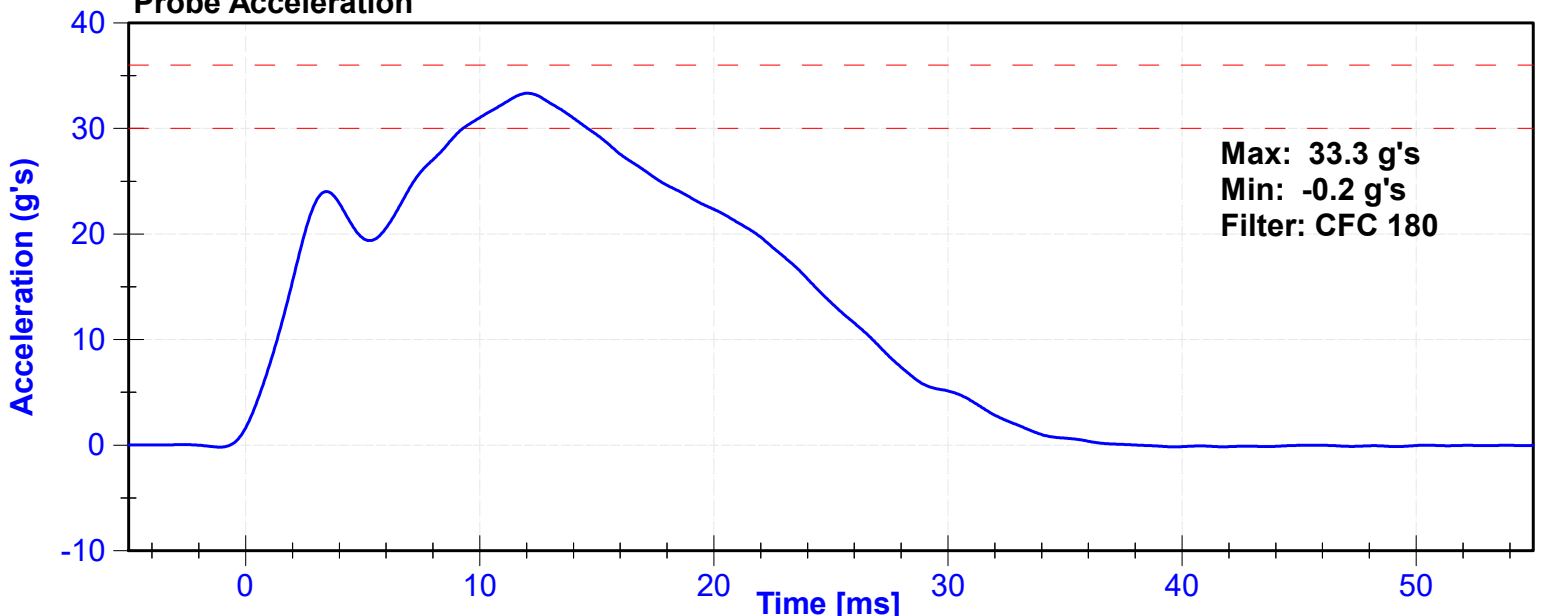
Results

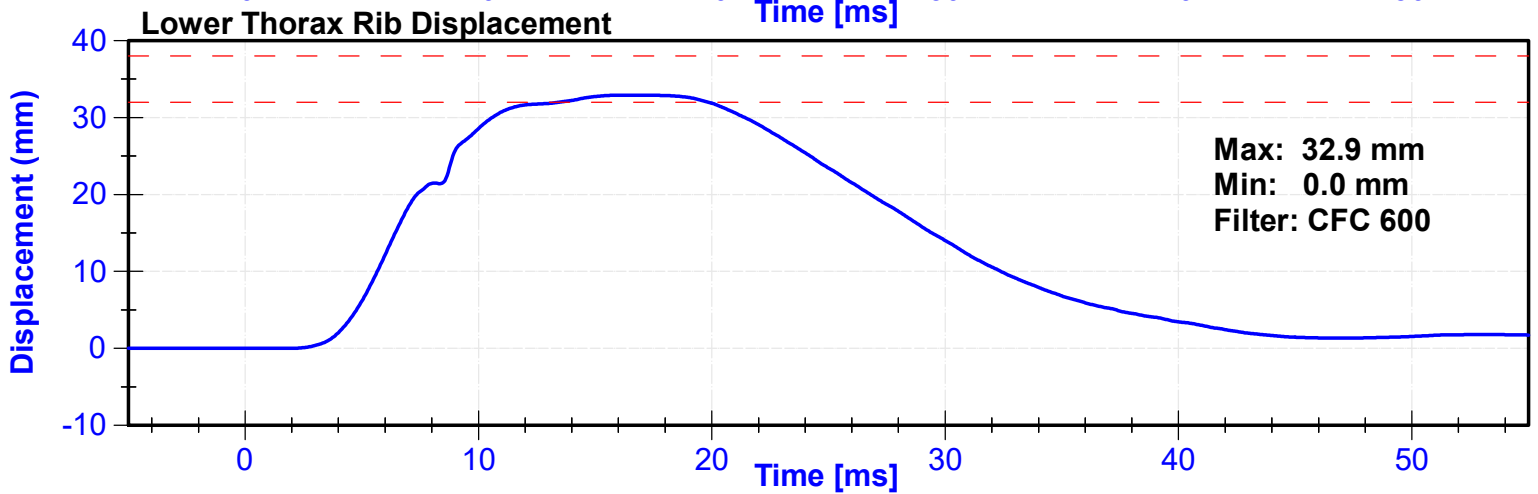
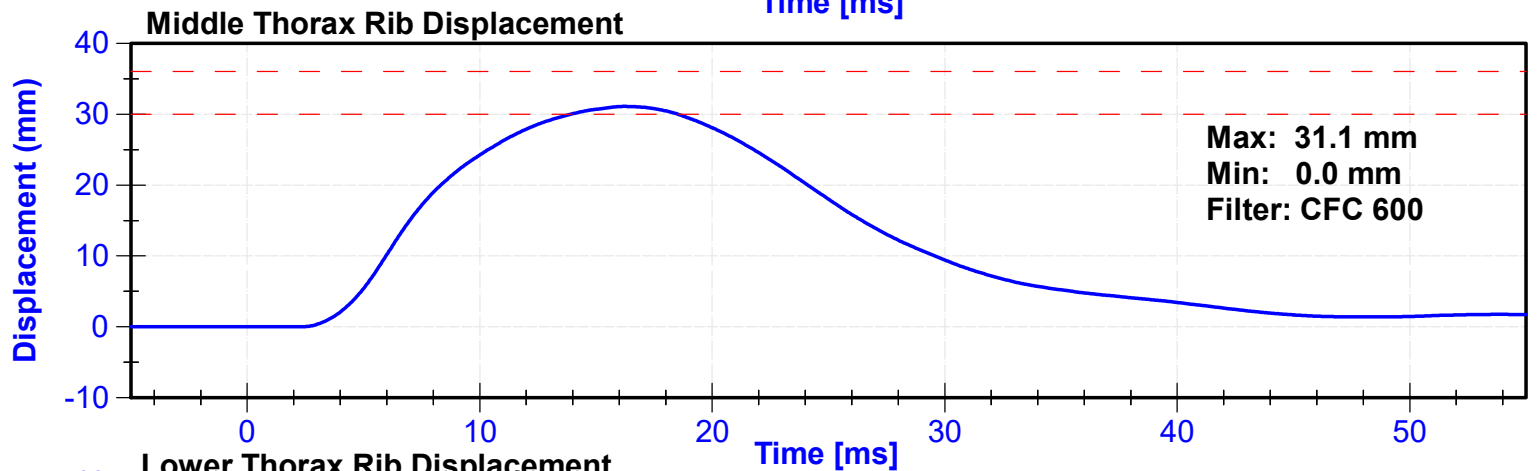
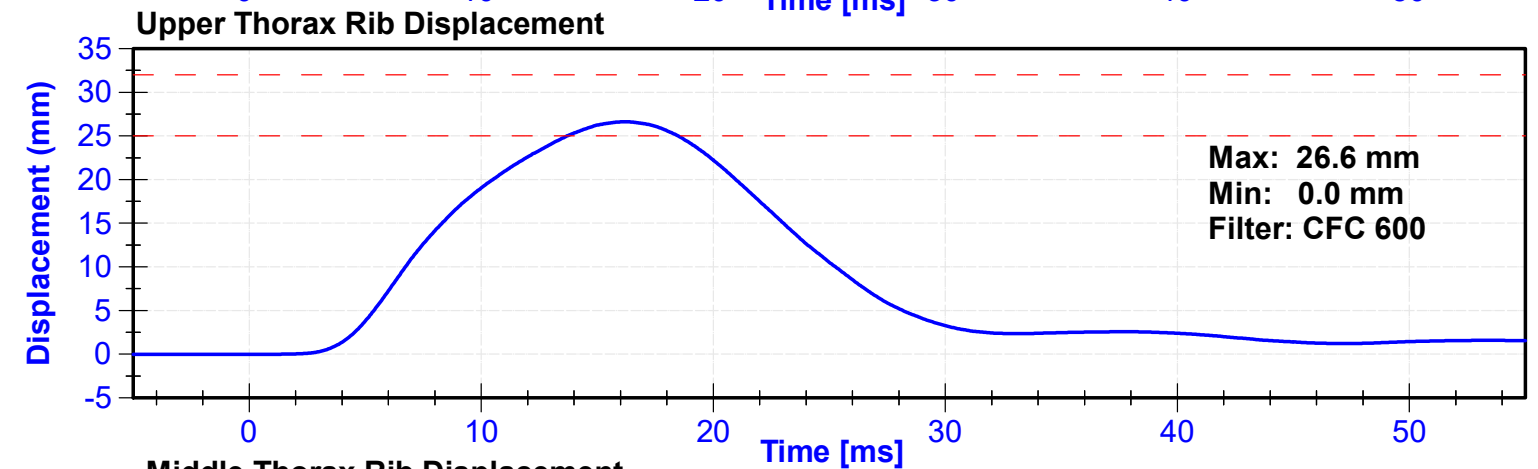
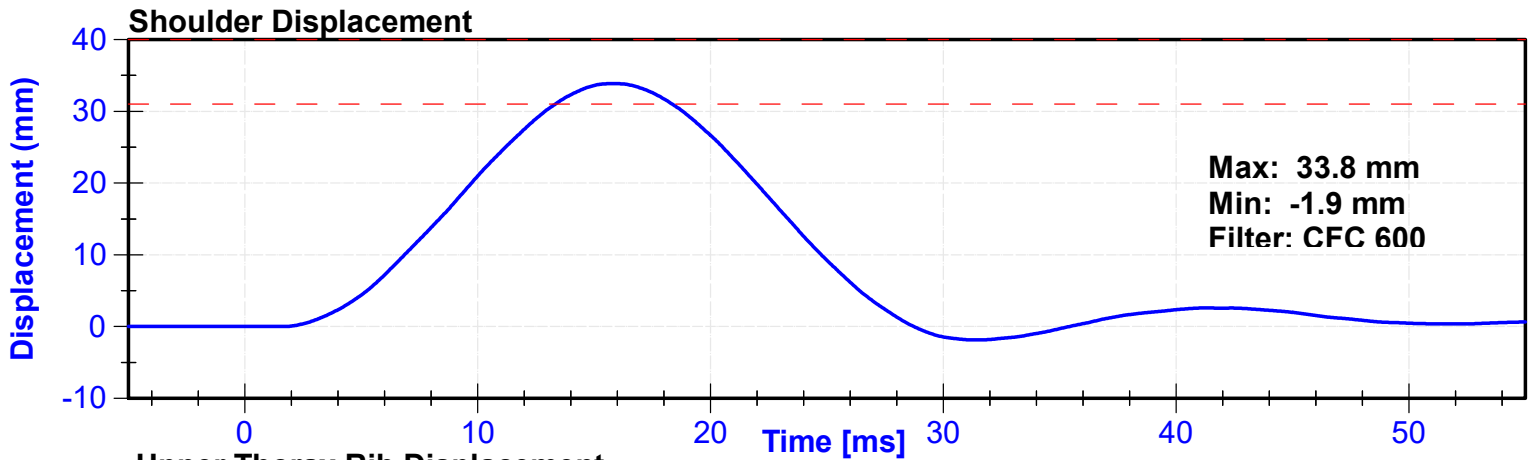
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	33.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.1	Pass
Lateral Lower Spine Acceleration	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

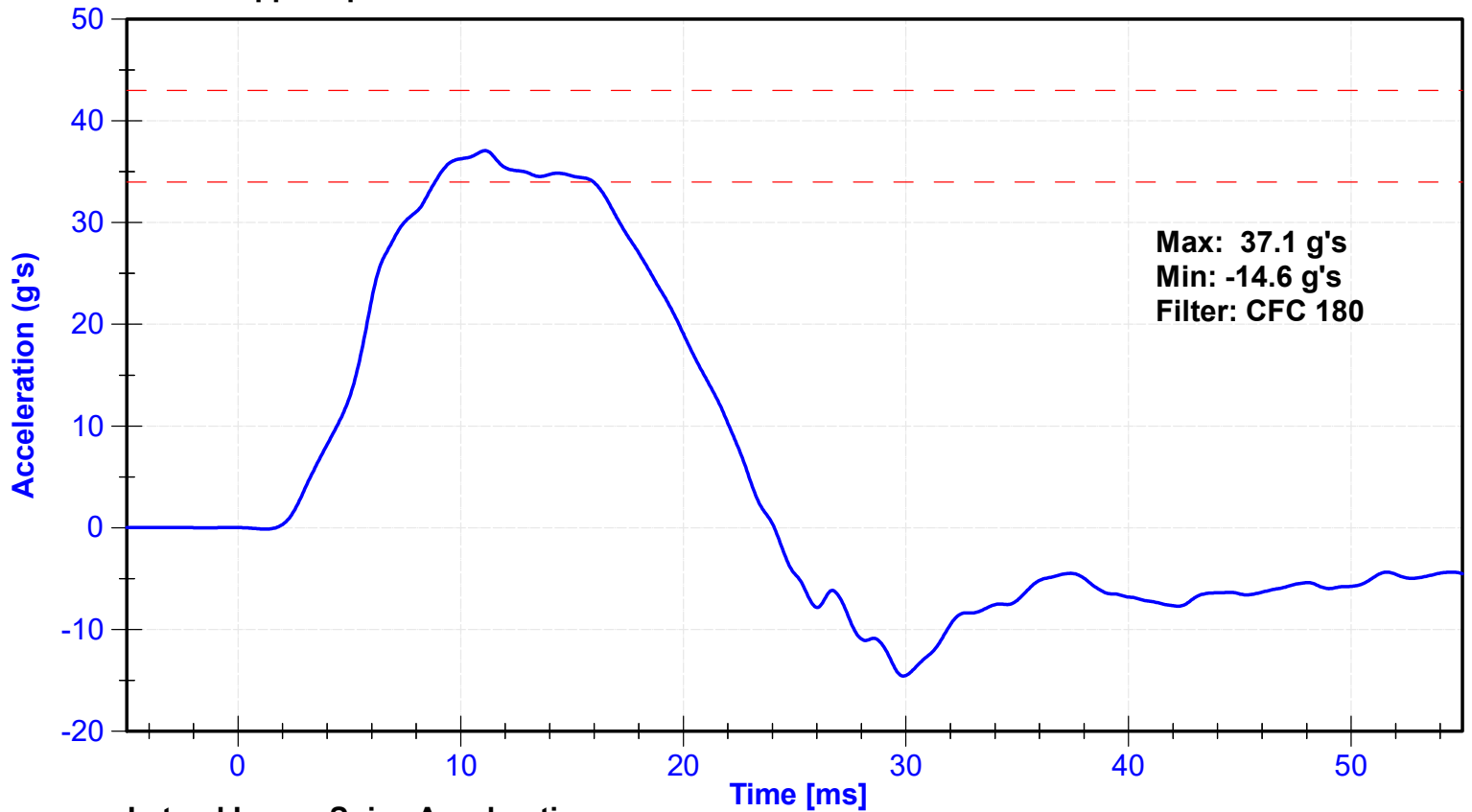
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	T20880	4/4/2023	10/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	4/4/2023	10/1/2023
Shoulder Potentiometer	Servo	053GFE	4/10/2023	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

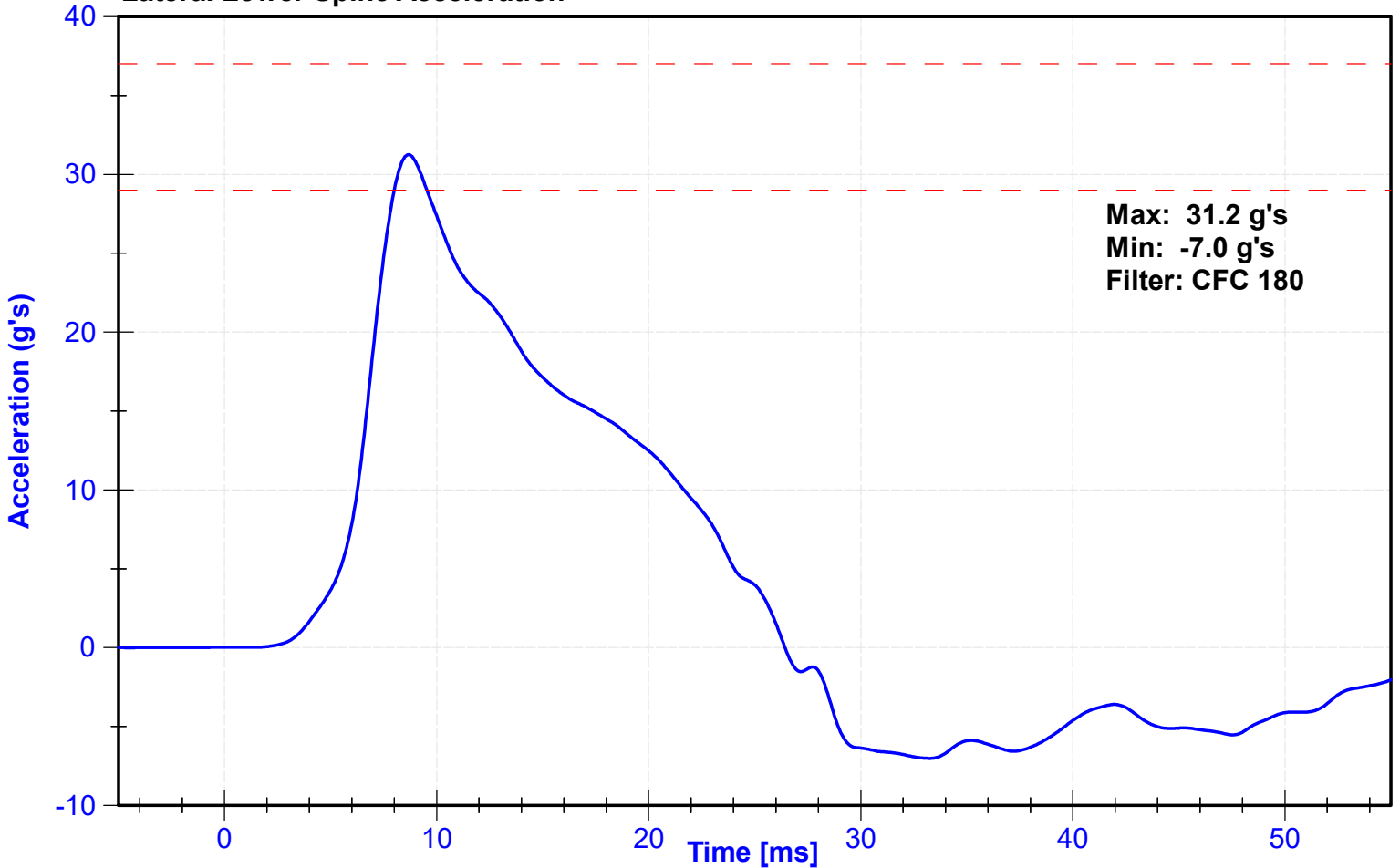




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



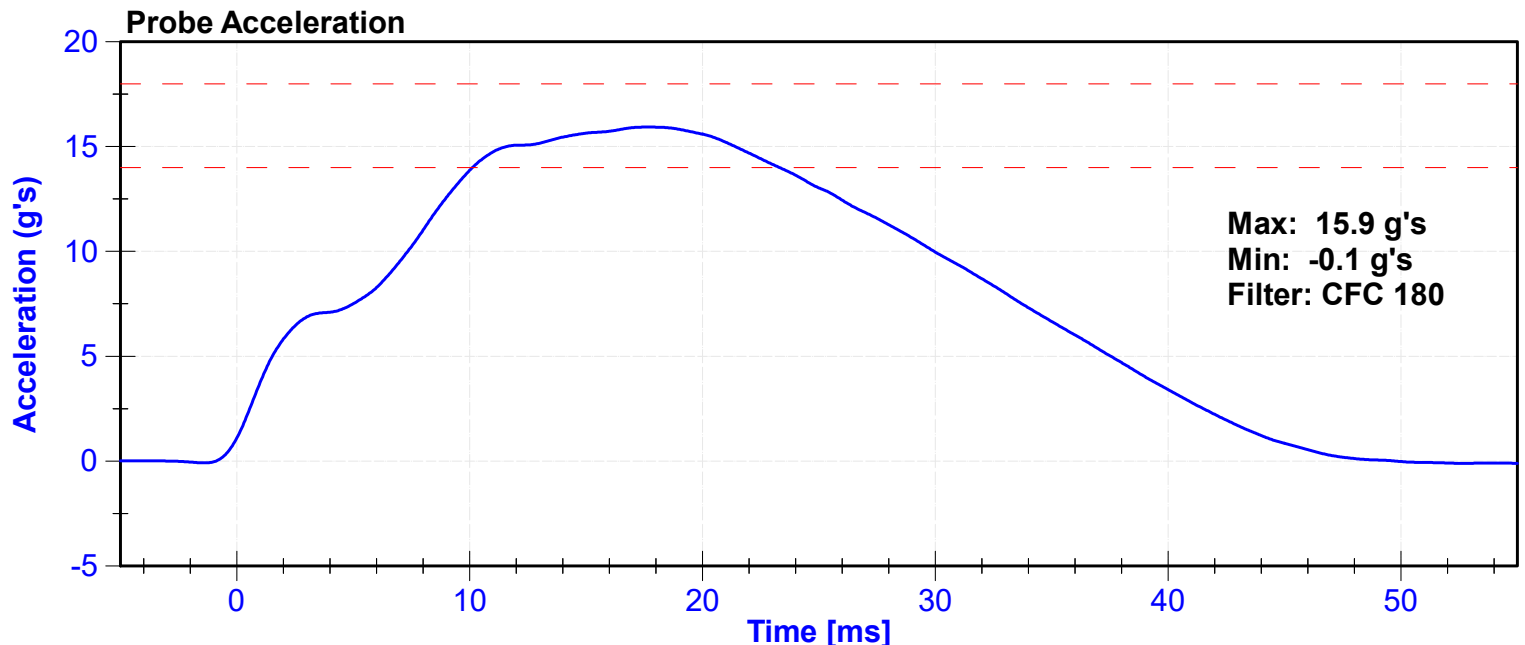
ATD Manufacturer	FTSS	Test Technician	Z.Schneider
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

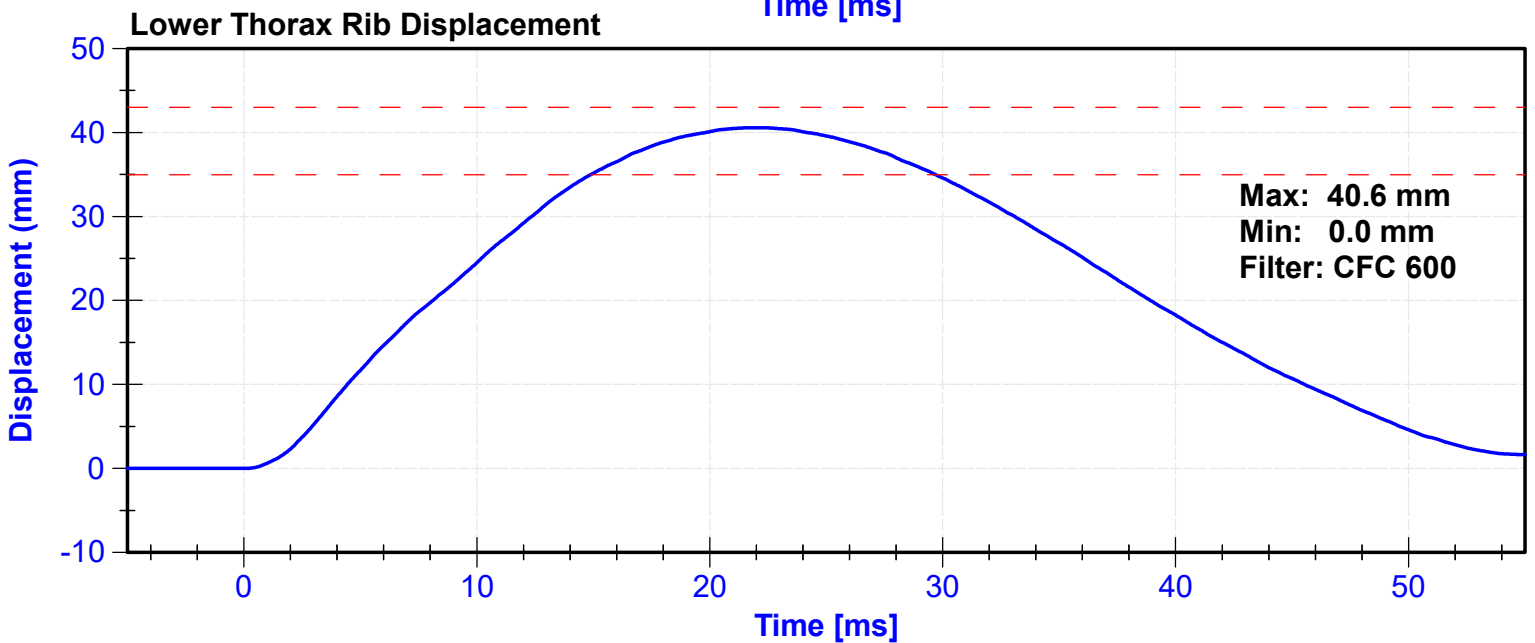
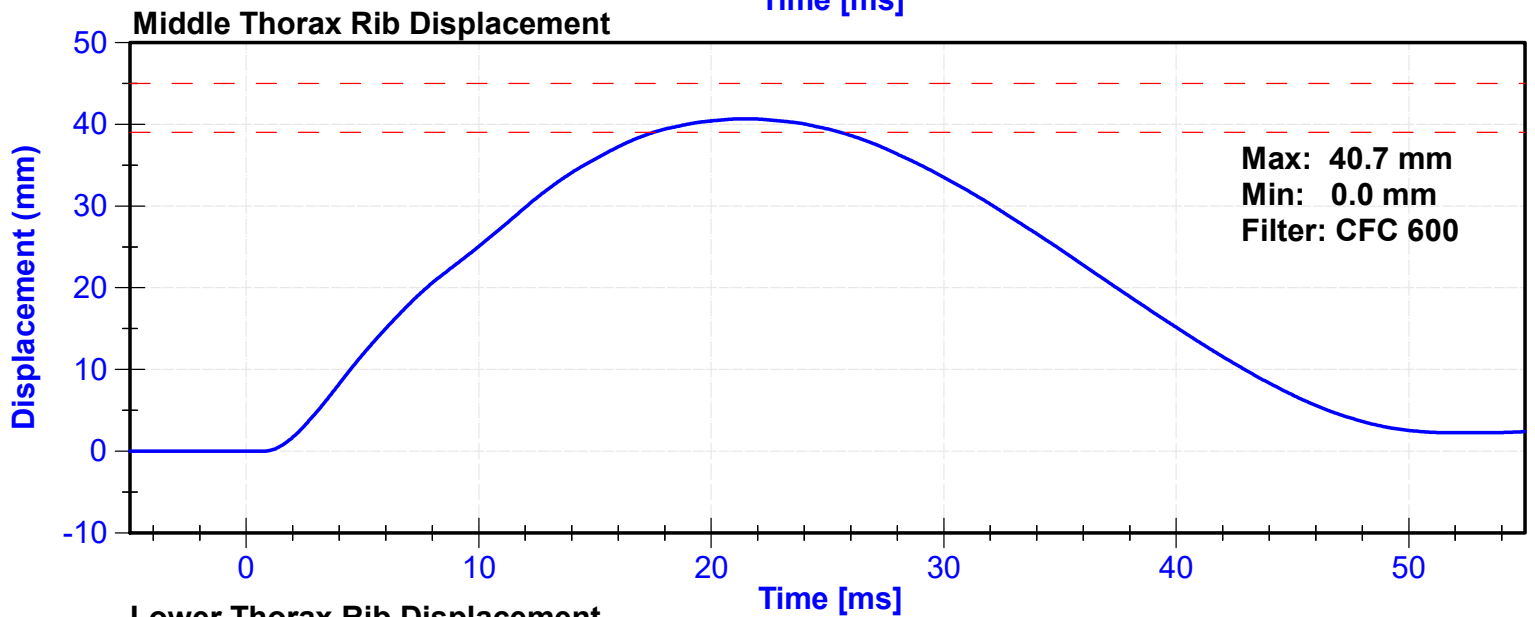
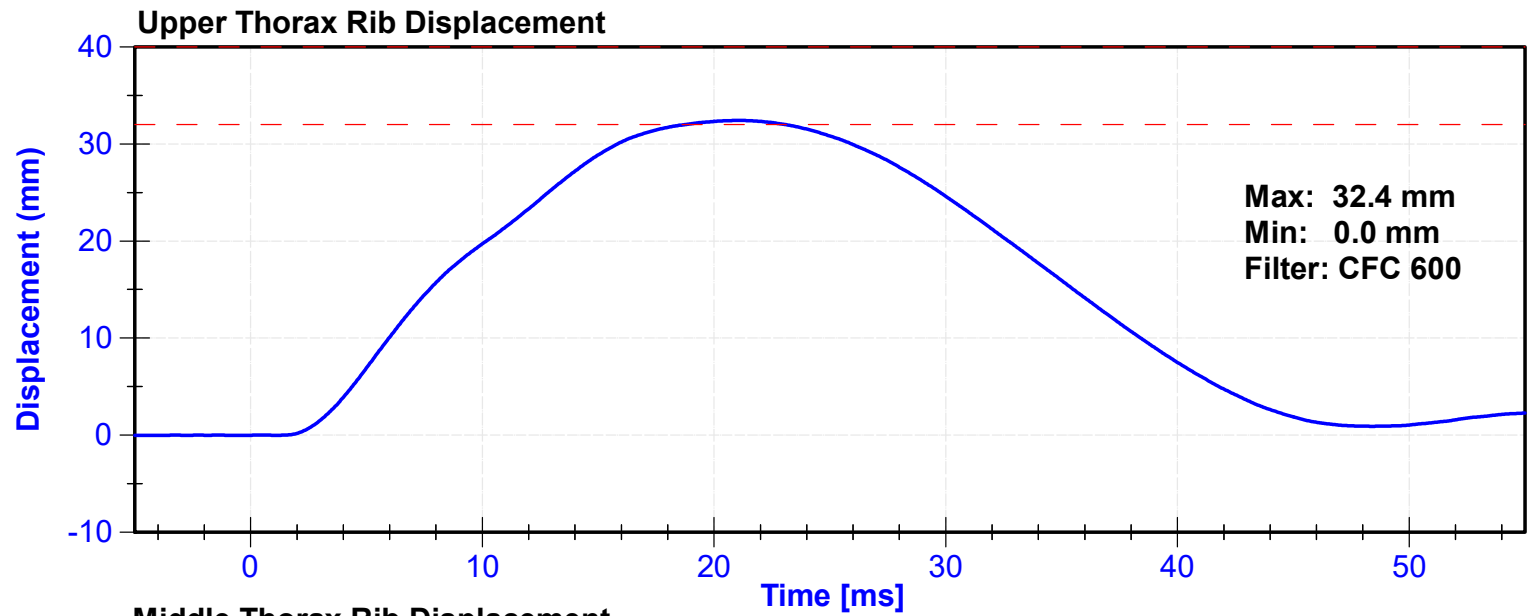
Results

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

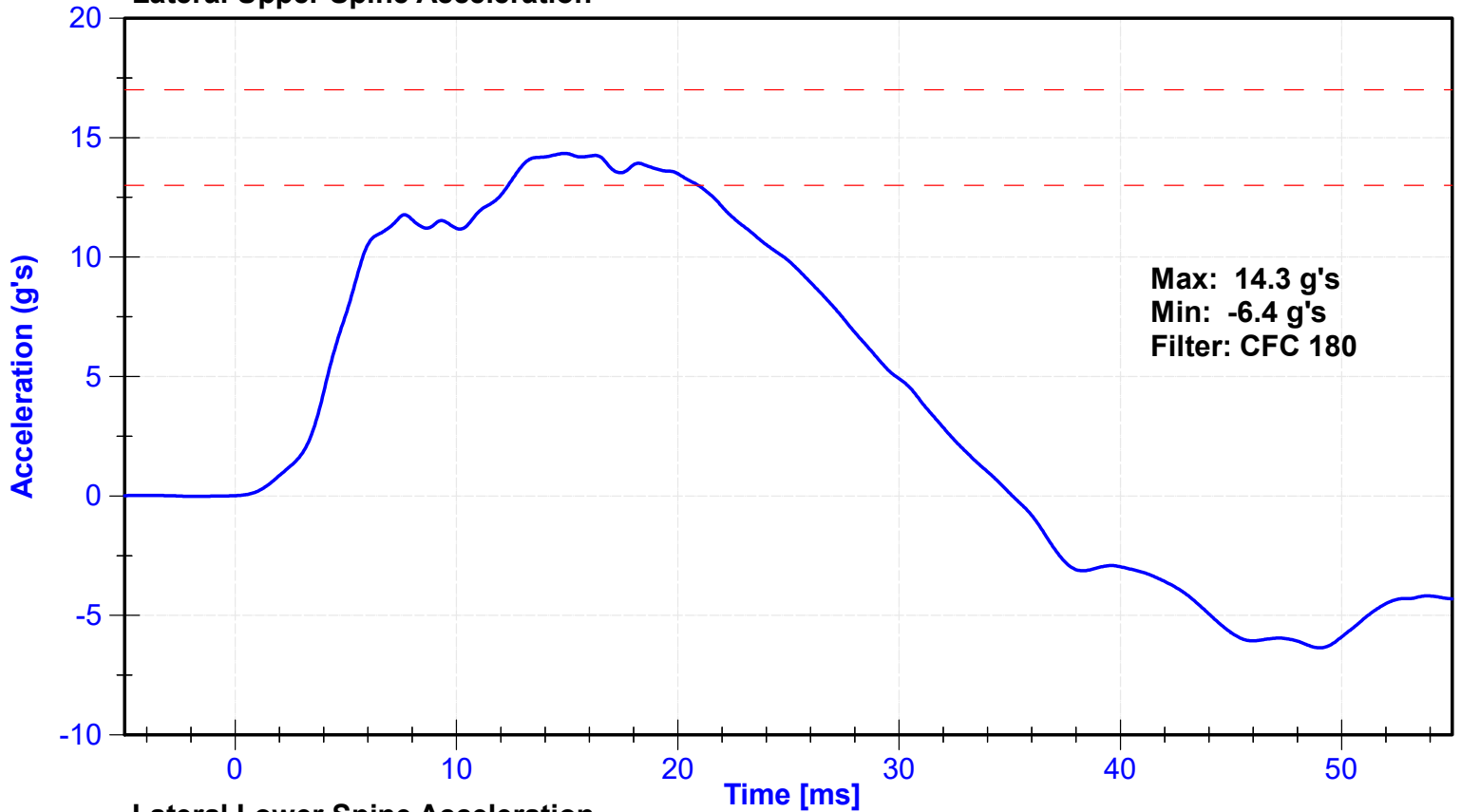
Transducer Calibrations

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

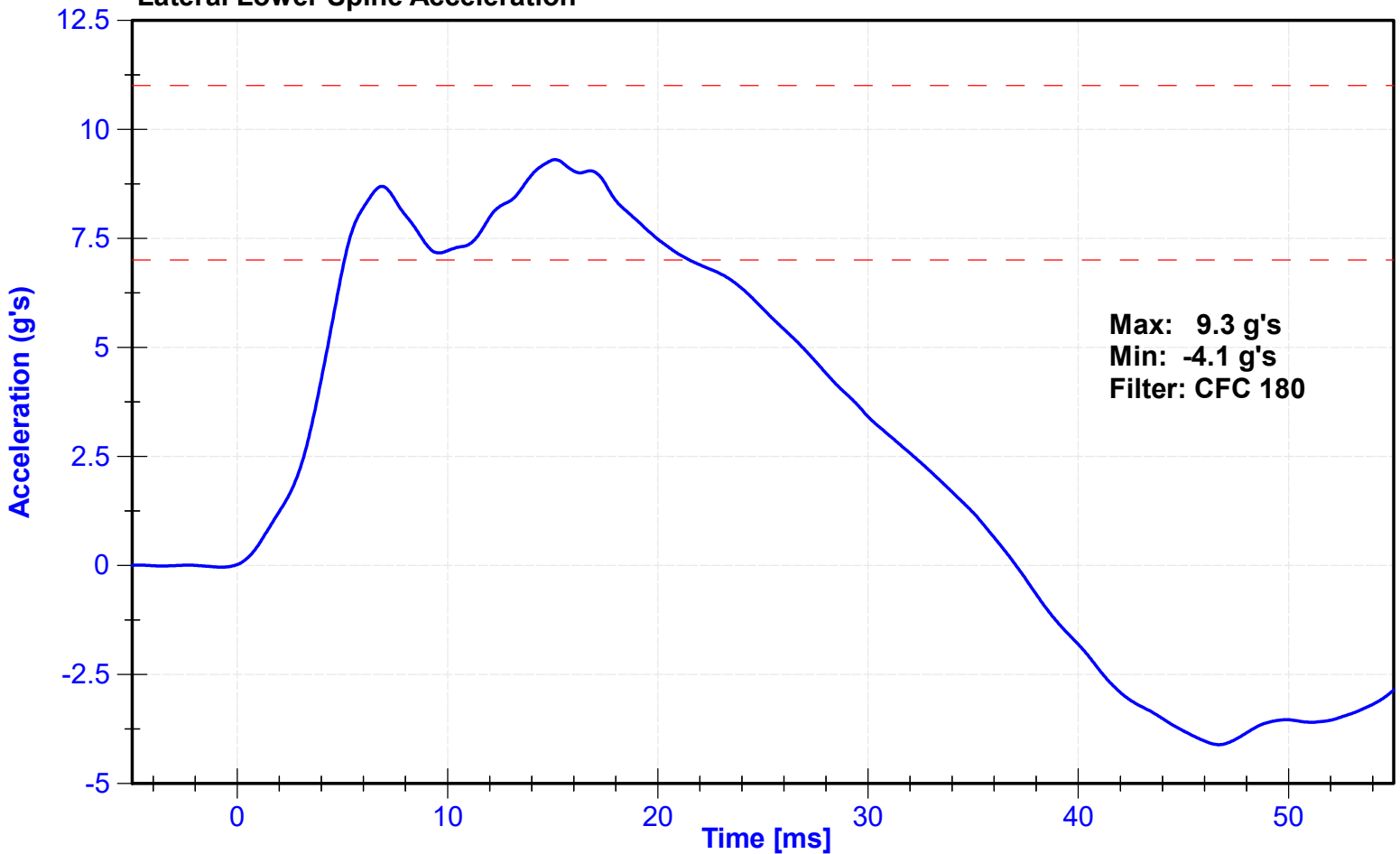




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



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

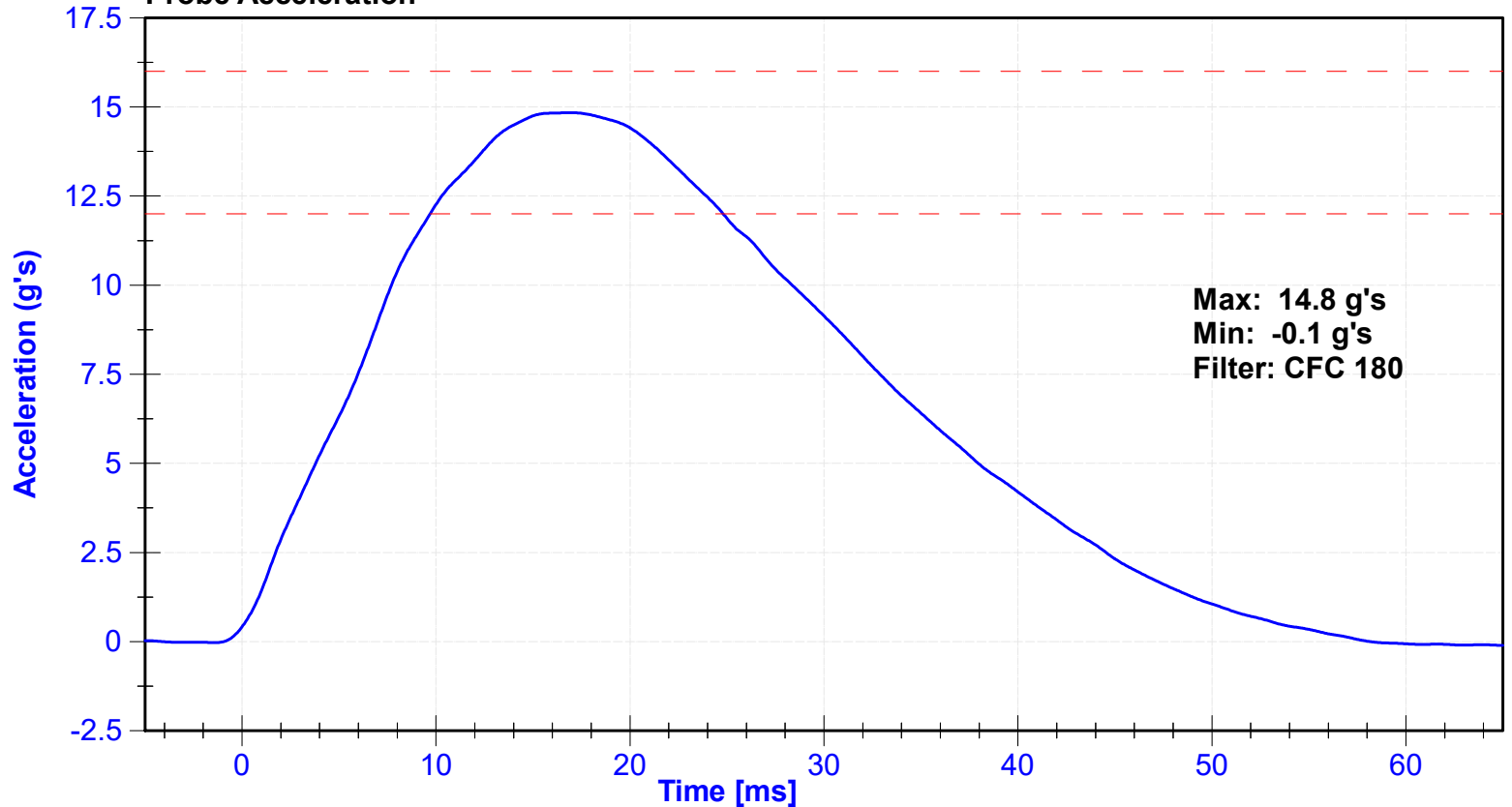
Results

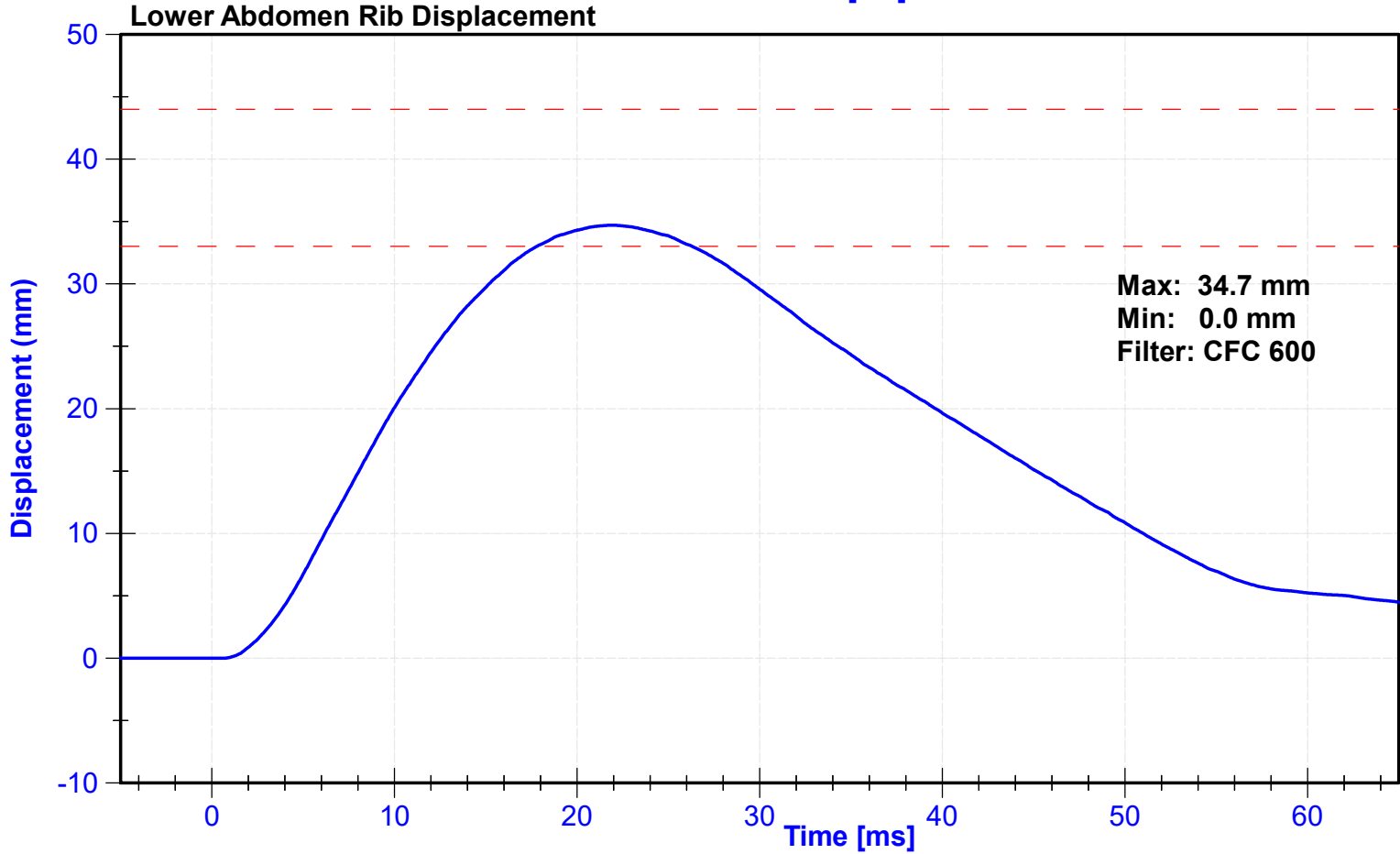
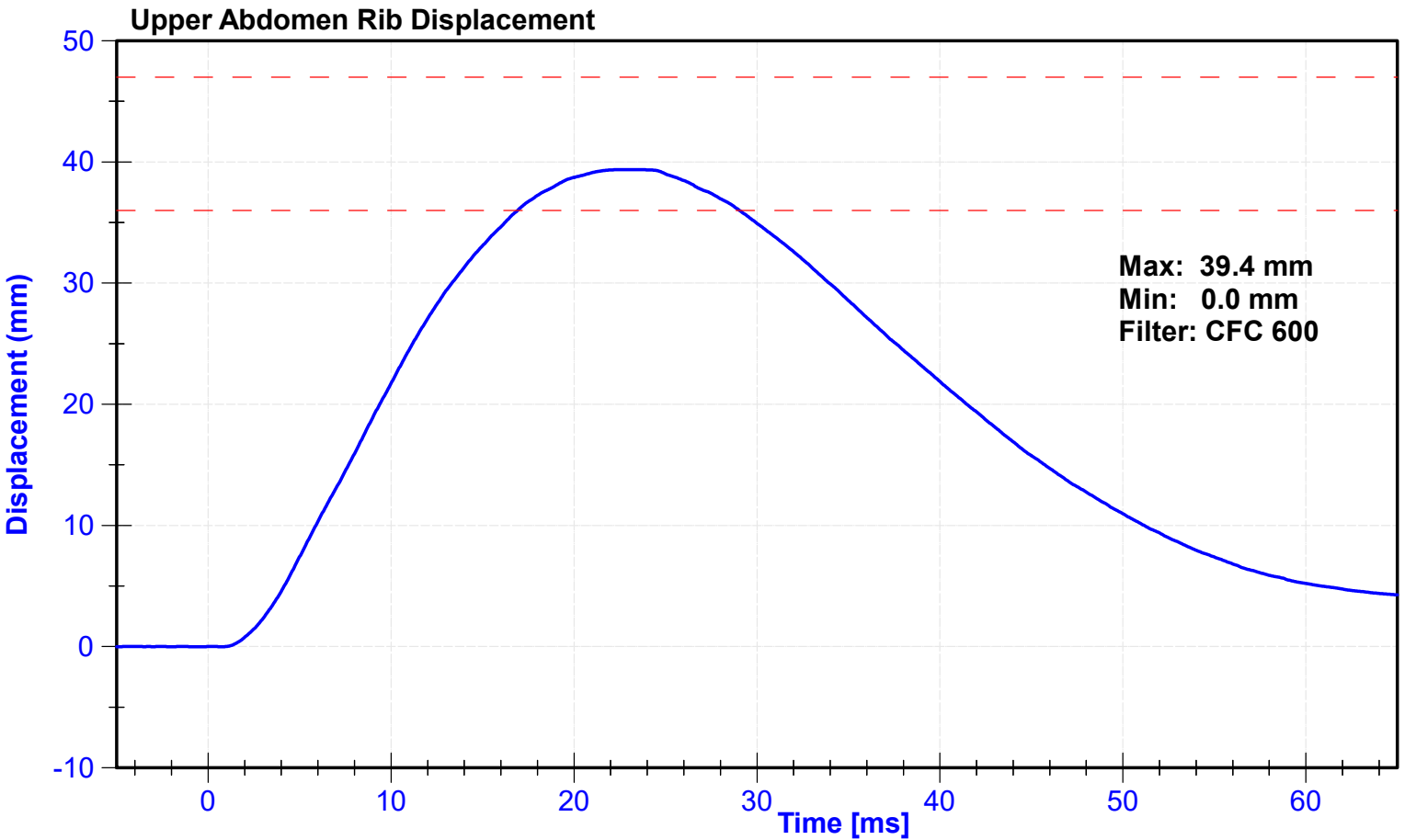
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	12.4	Pass
Upper Abdomen Rib Deflection	36	47	mm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

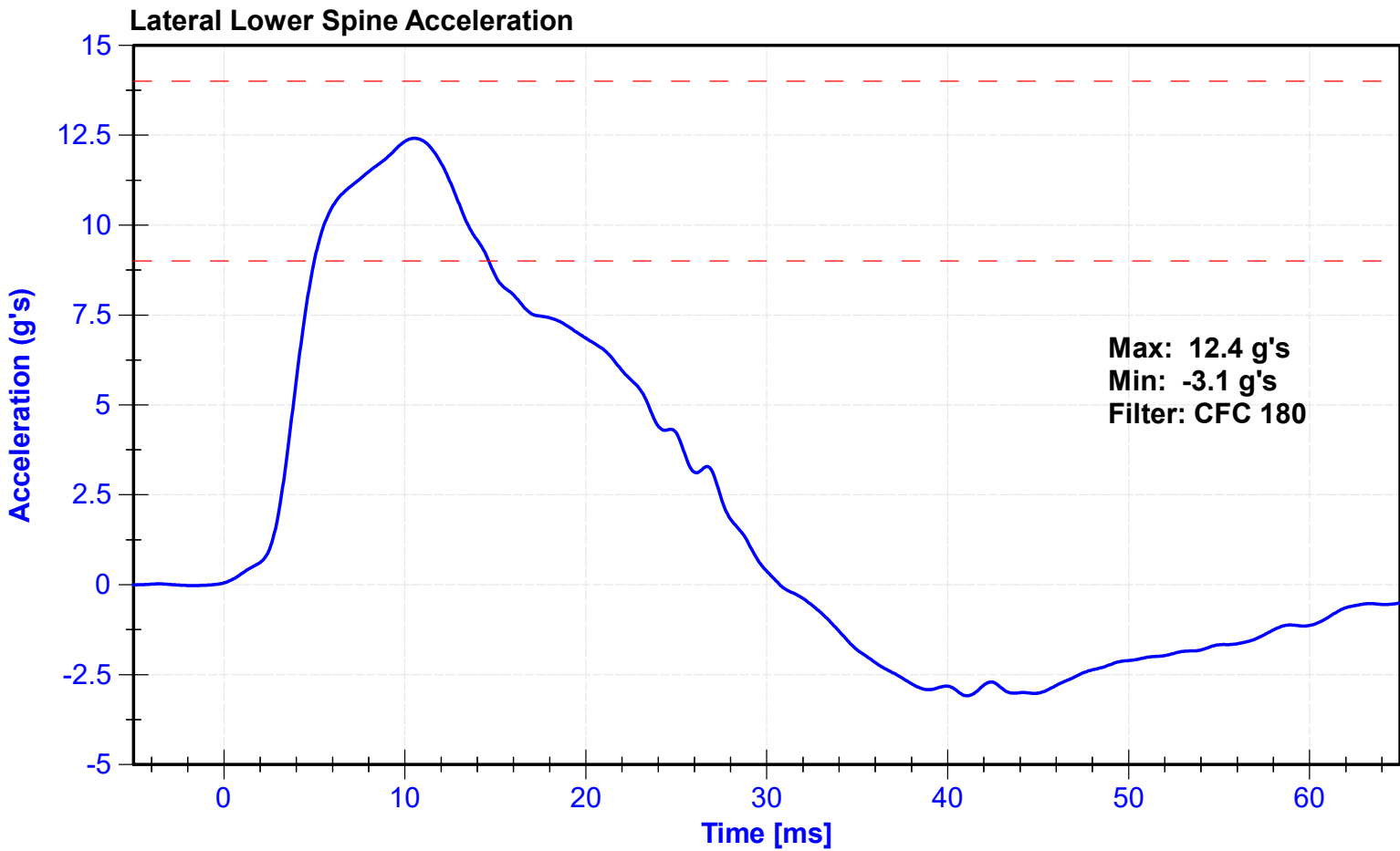
Transducer Calibrations

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

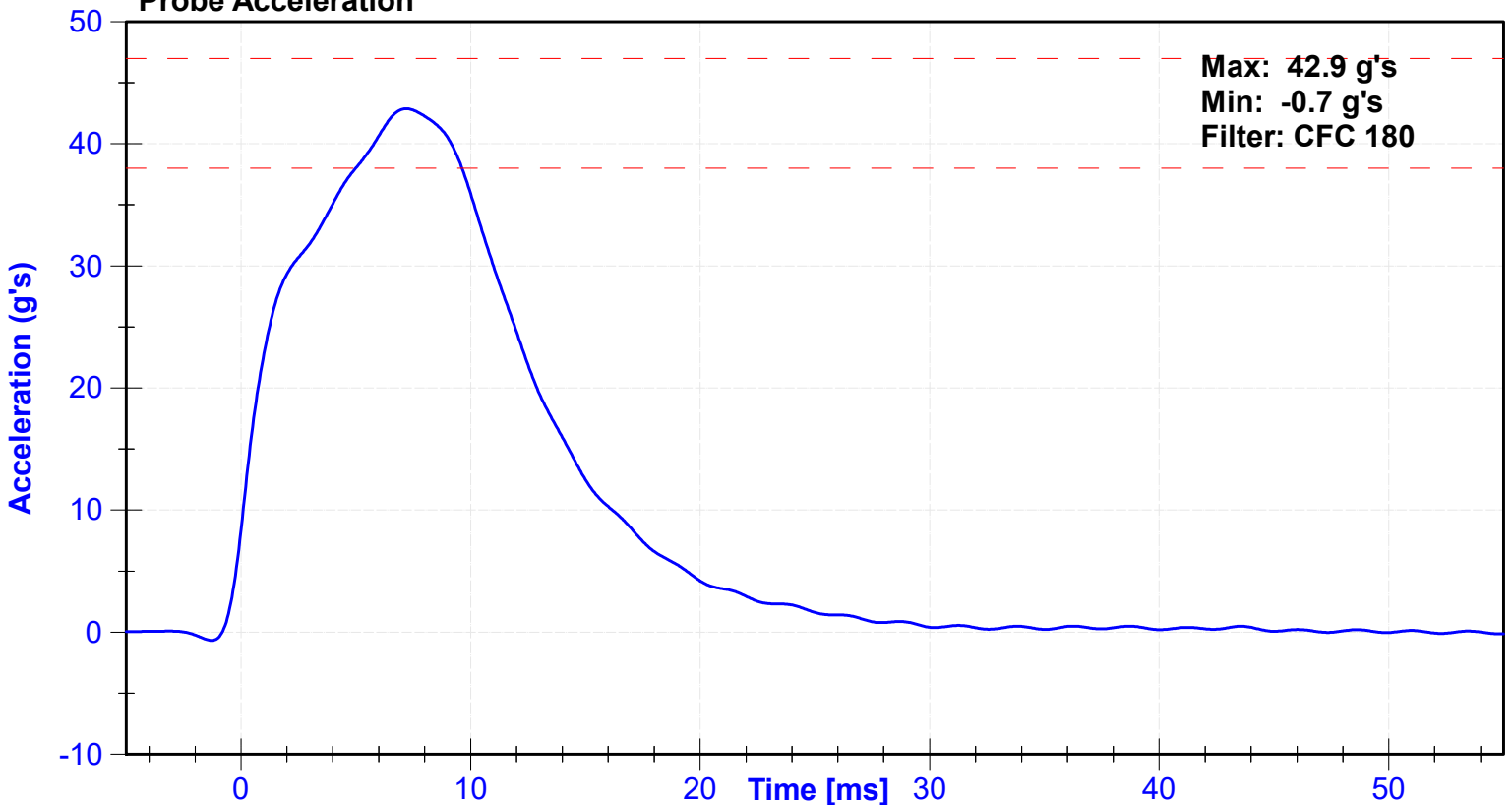
Results

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

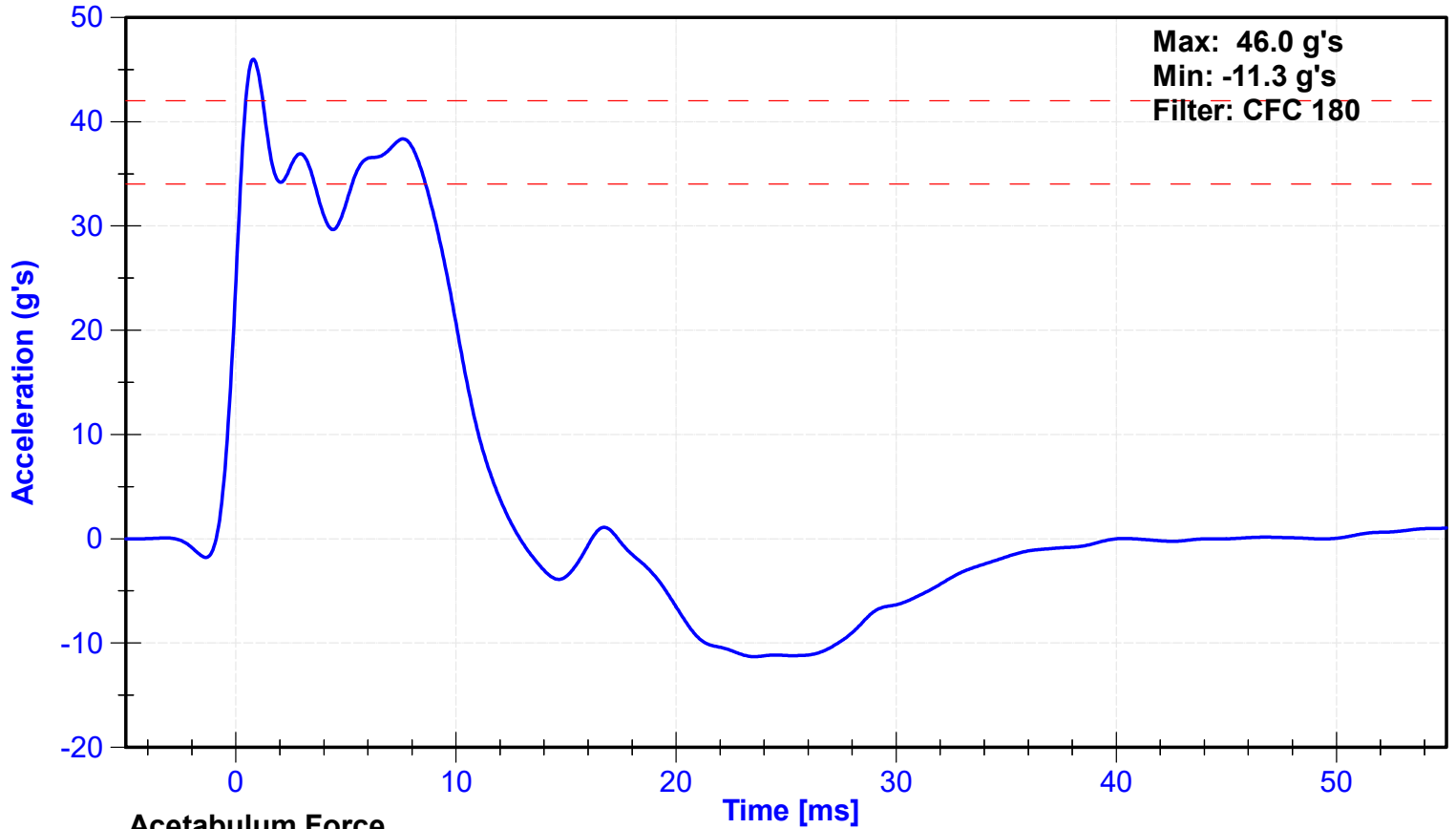
Transducer Calibrations

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

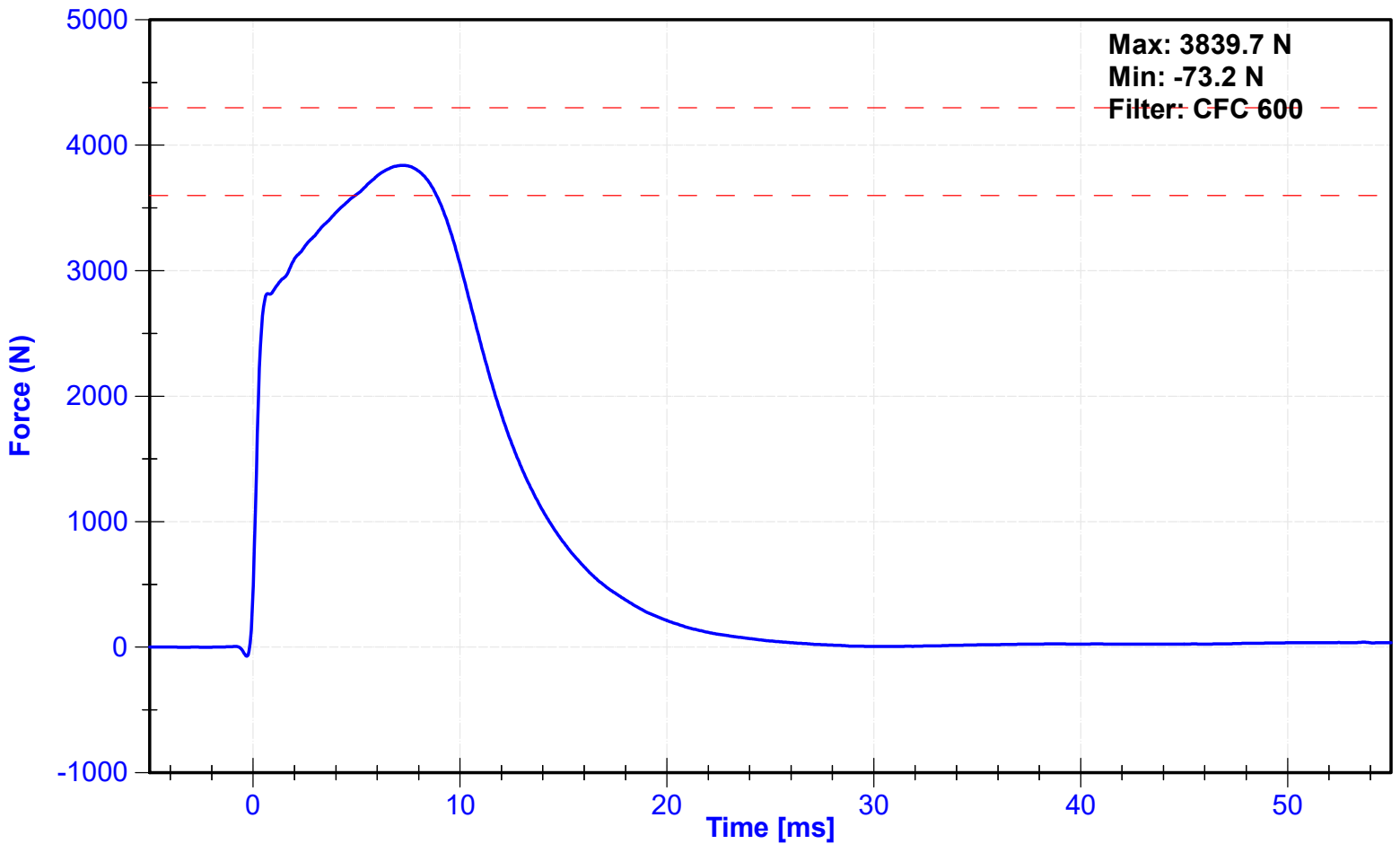
Probe Acceleration



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

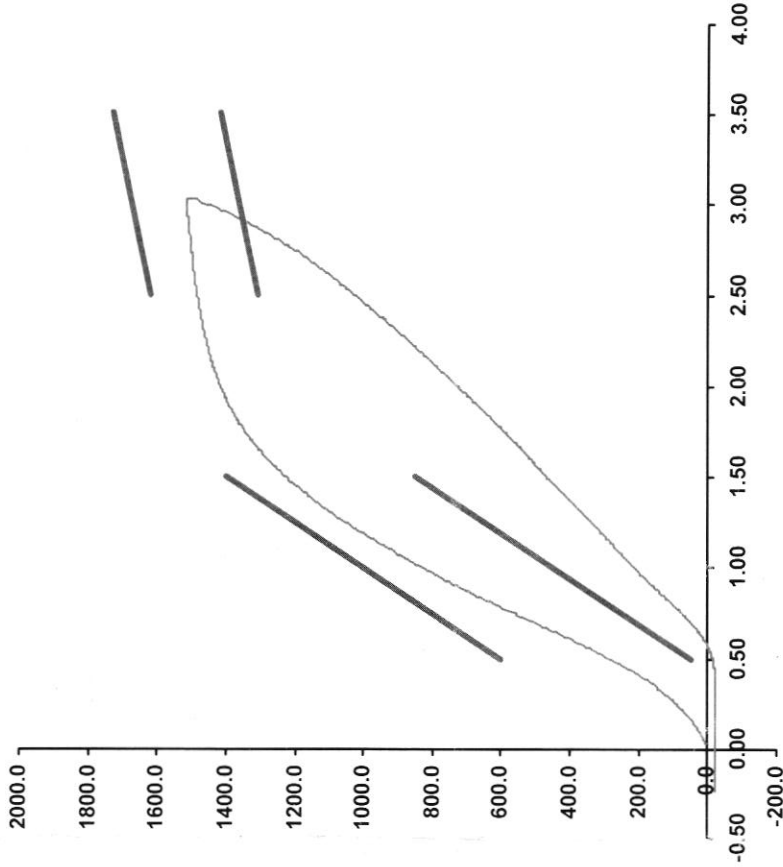
Preload Value (-N) 22.24

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

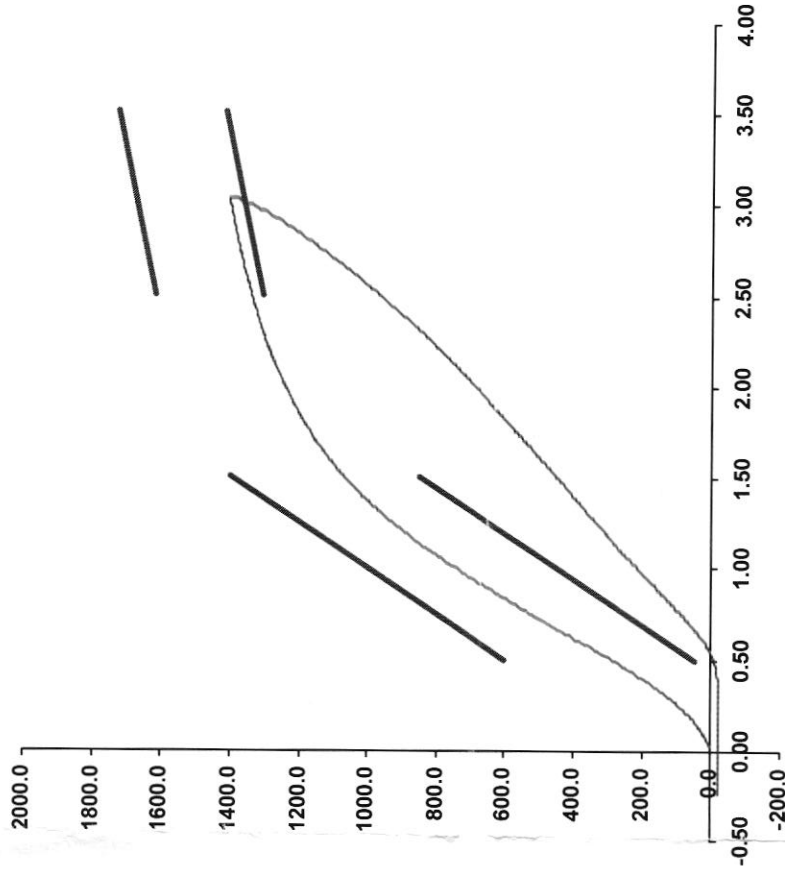
Testing Machine STM-20 5965542

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

Crosshead Speed (mm / min) 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:



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

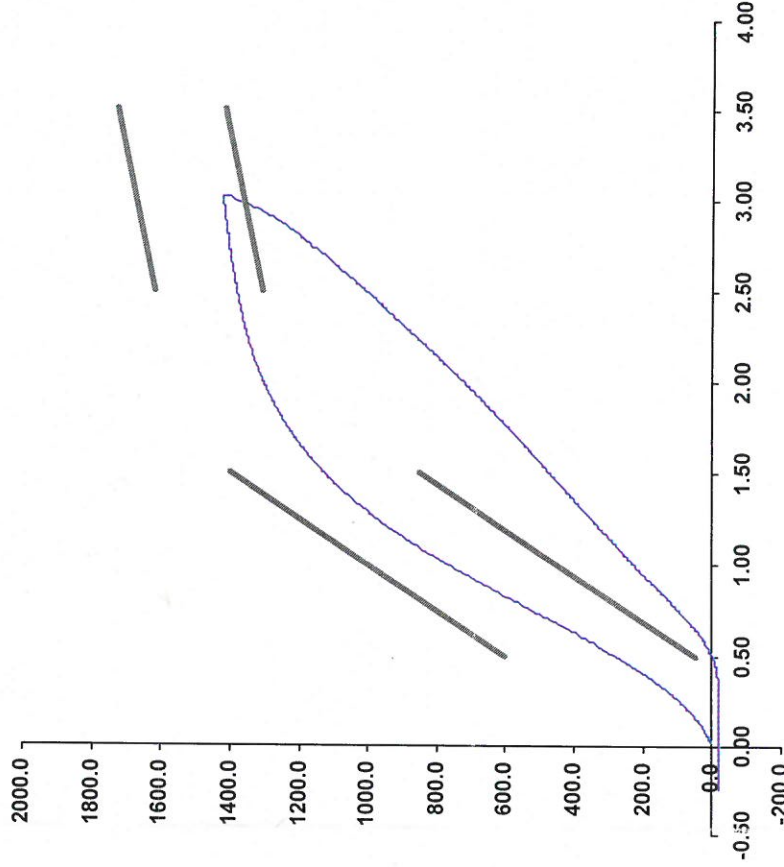
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) 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 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

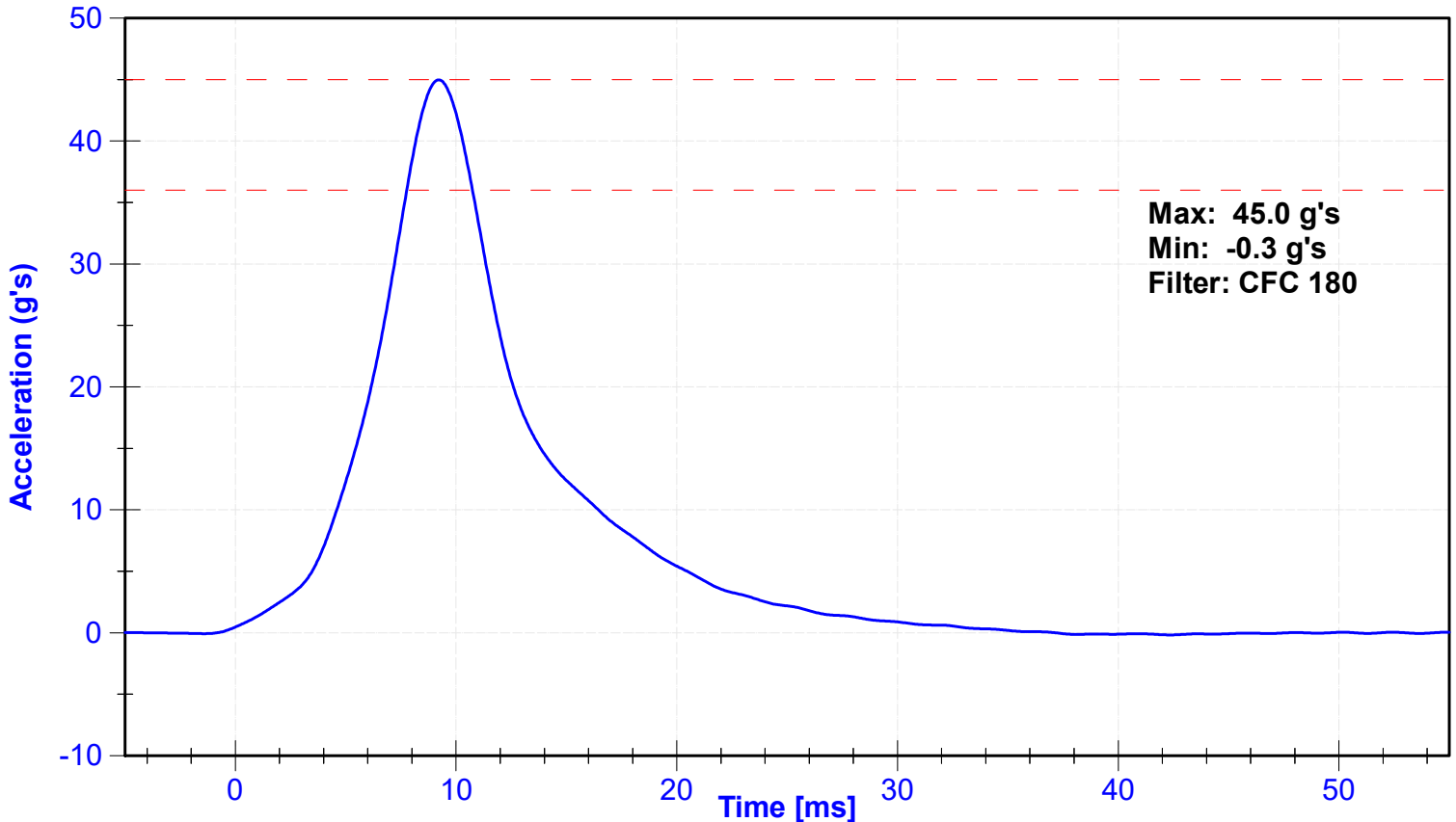
Results

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

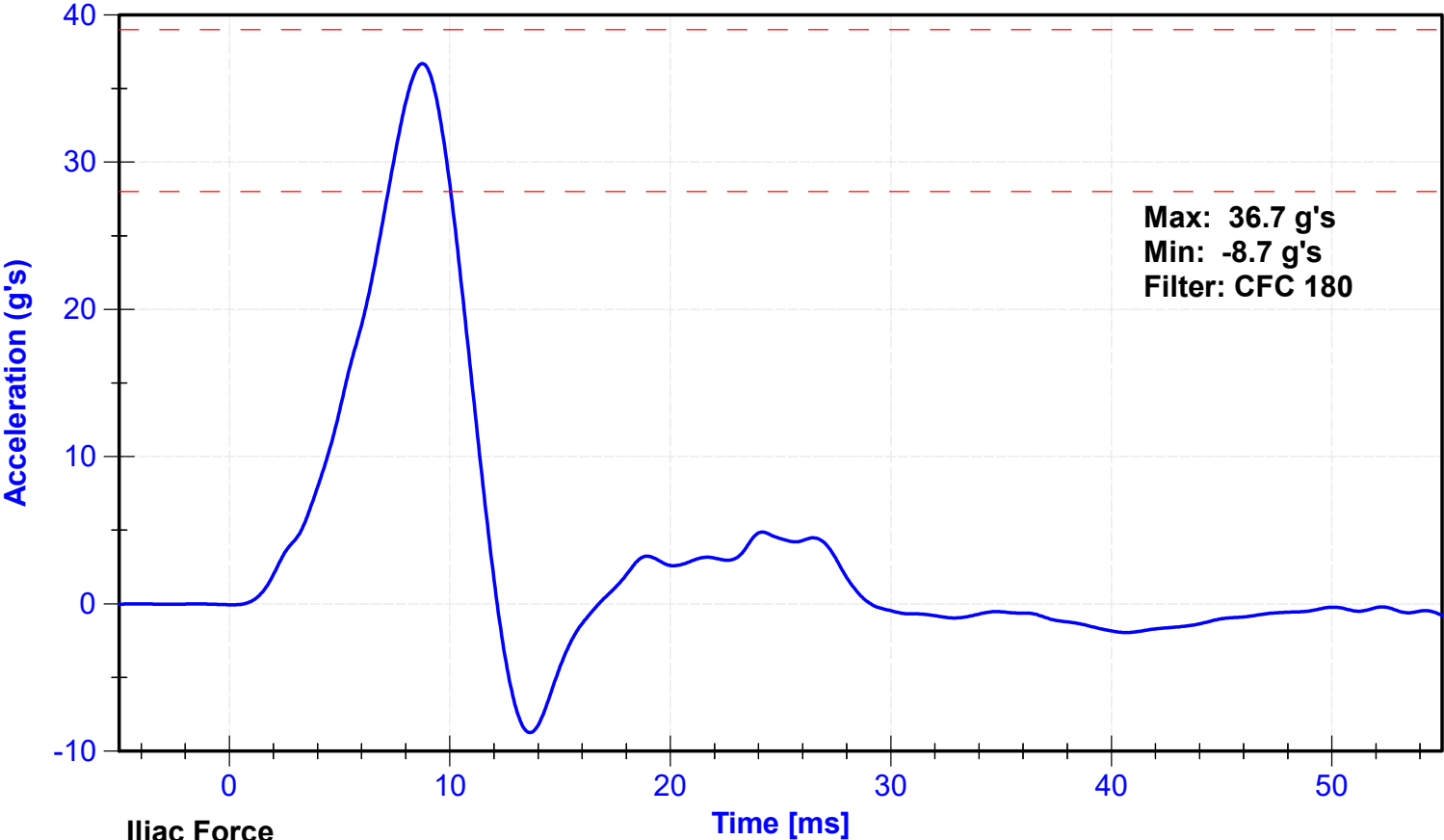
Transducer Calibrations

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

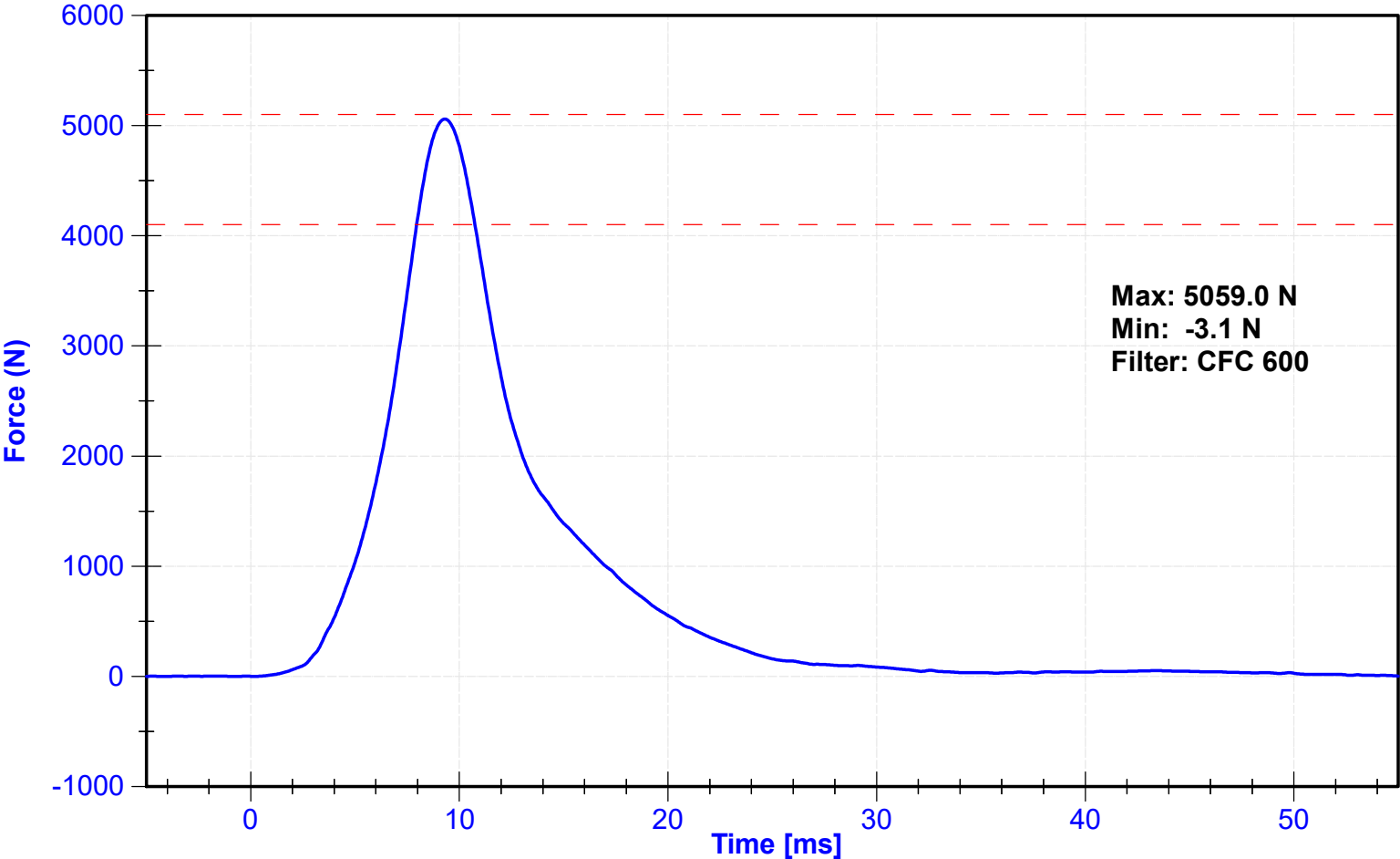
Probe Acceleration



Lateral Pelvis Acceleration



Iliac Force



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO:300

(CONFIGURED FOR LEFT SIDE IMPACT)

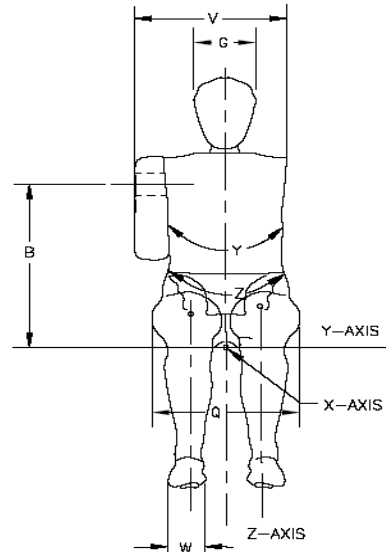
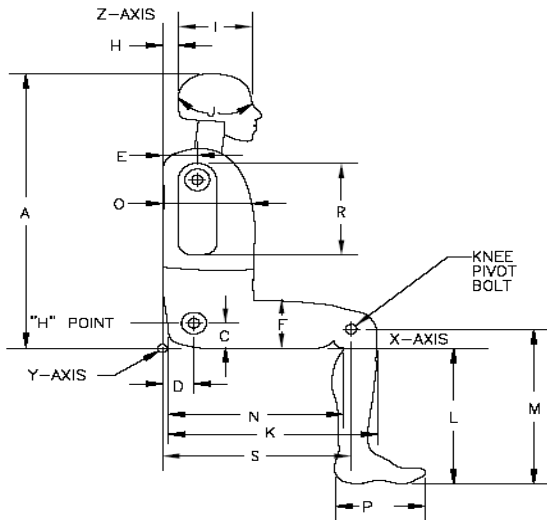


External Measurements - SID-IIs

Technician: K. Brogan

Date: 07/13/2023

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	443	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	144	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	123	Pass
G	Head Breadth	140	148	142	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	181	Pass
J	Head Circumference	541	551	545	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	401	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	317	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	482	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	779	Pass

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

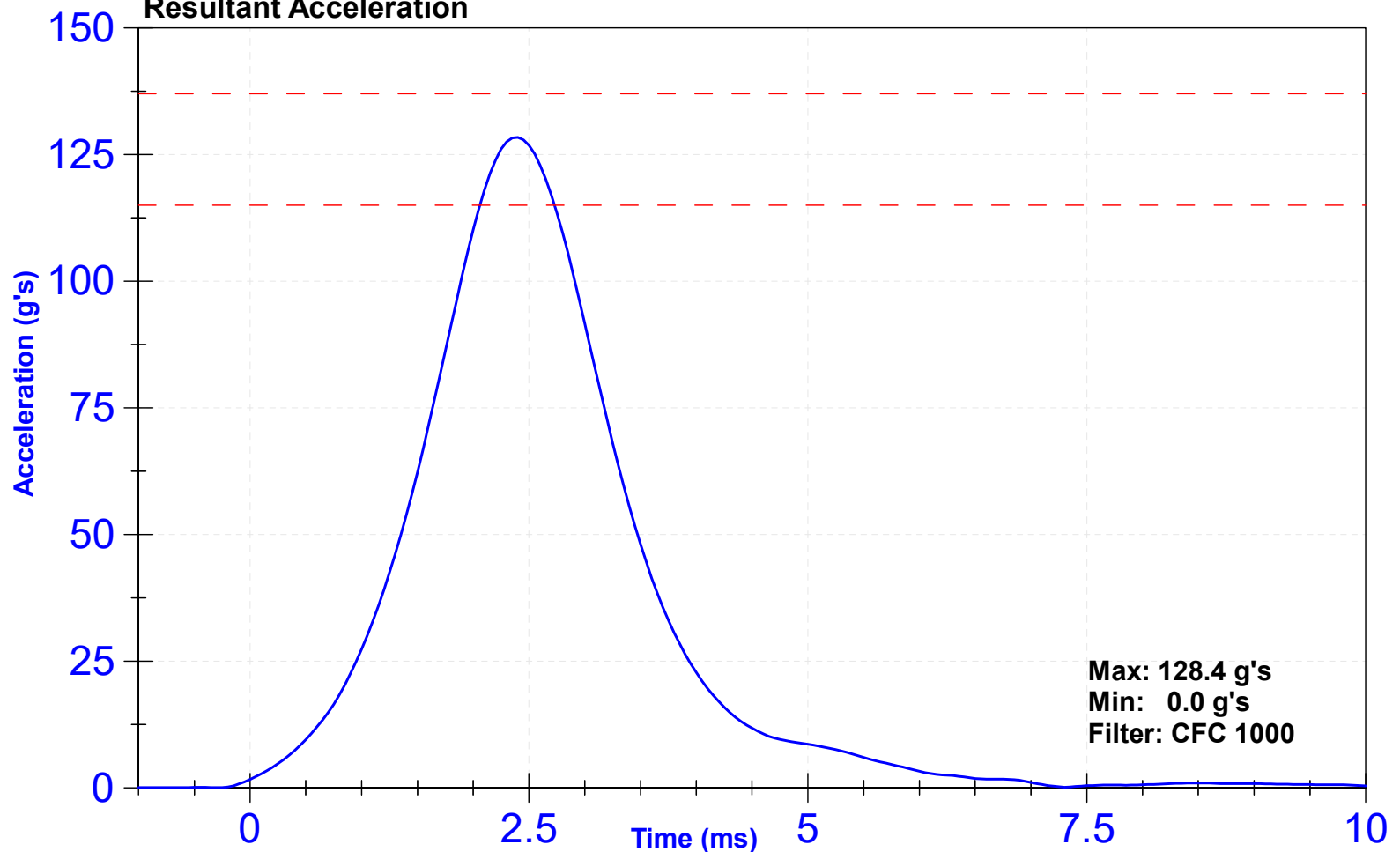
Results

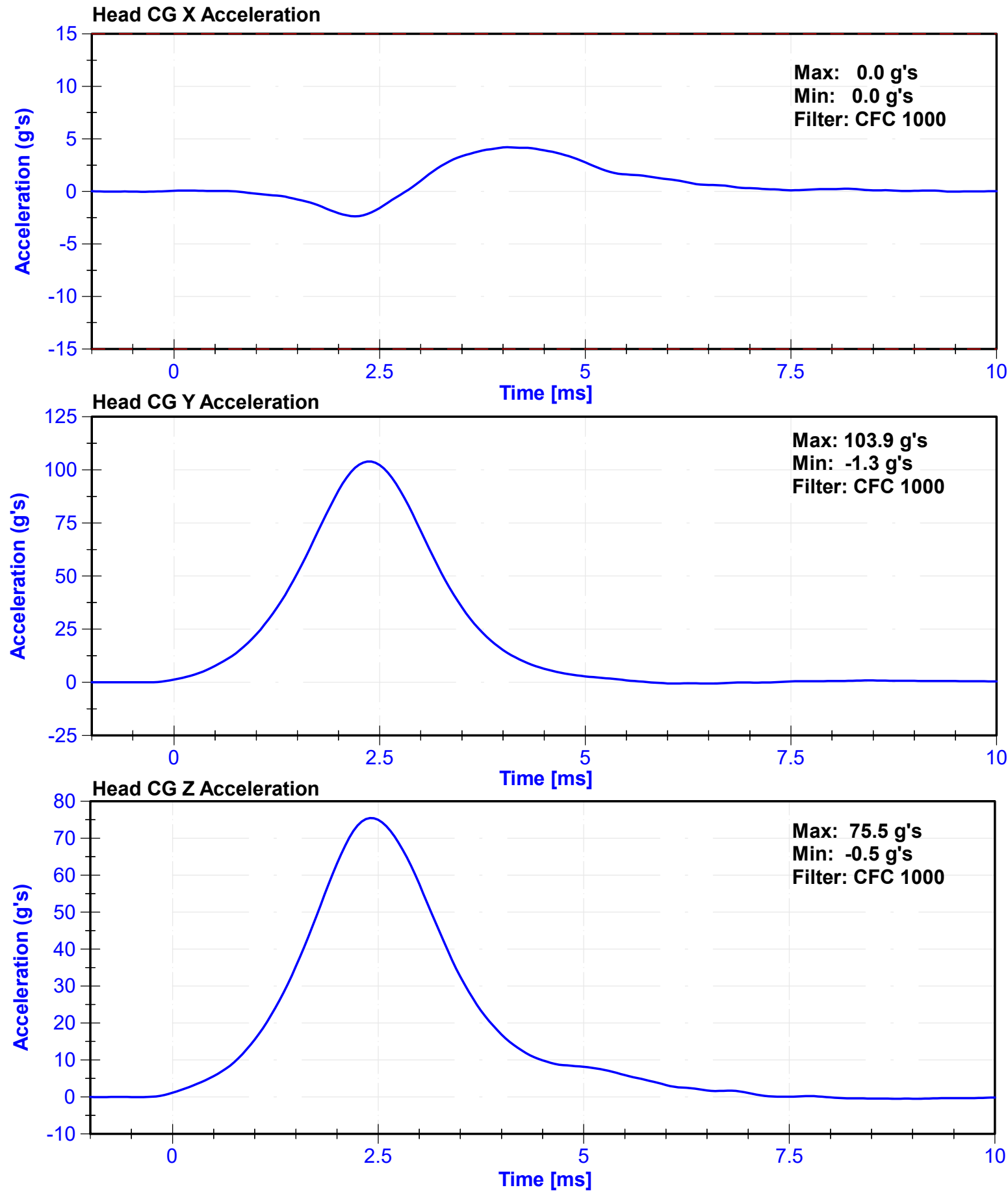
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	60	Pass
Resultant Acceleration	115	137	g's	128.4	Pass
Oscillation	0	15	%	1.3	Pass
Fore-Aft Acceleration	-15	15	g's	0.0	Pass

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





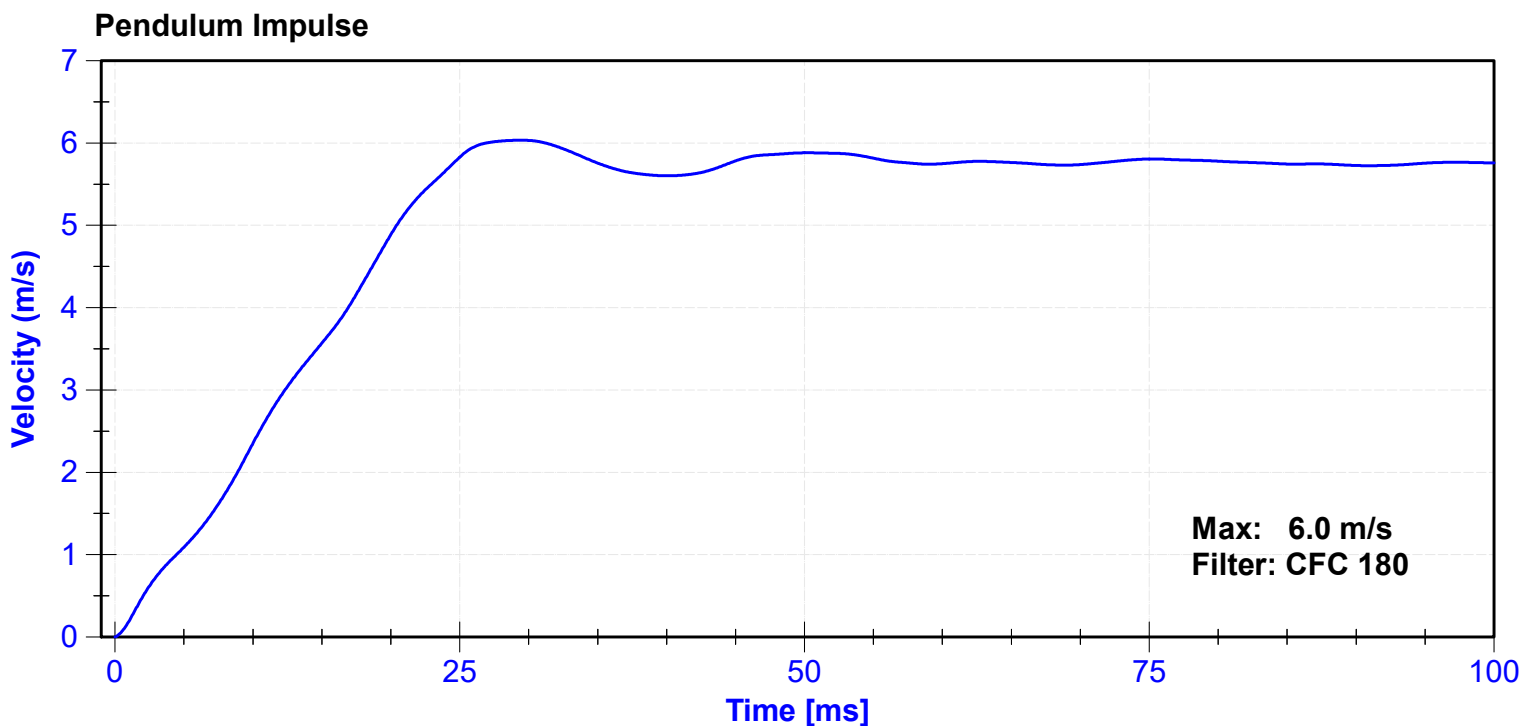
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

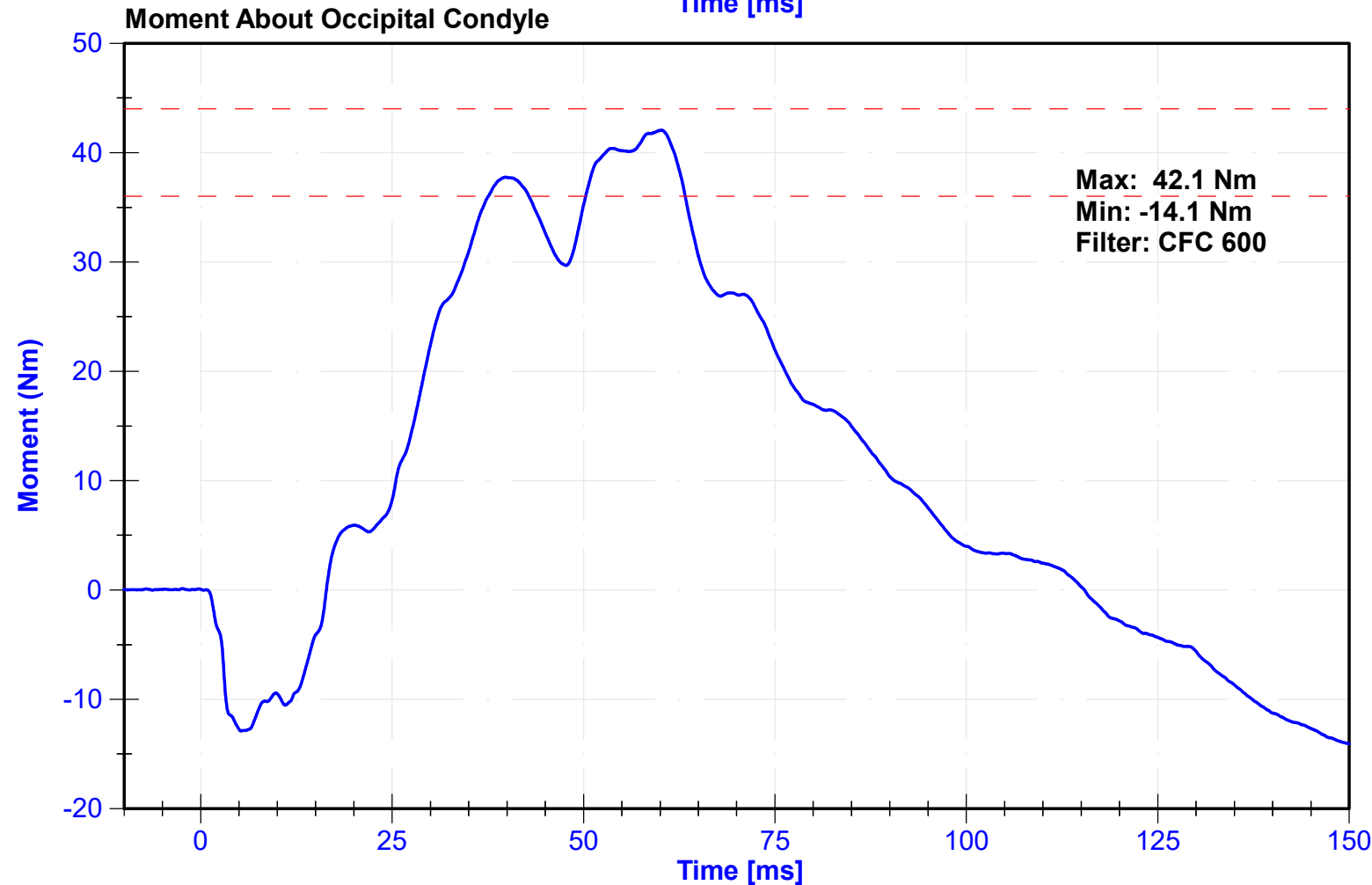
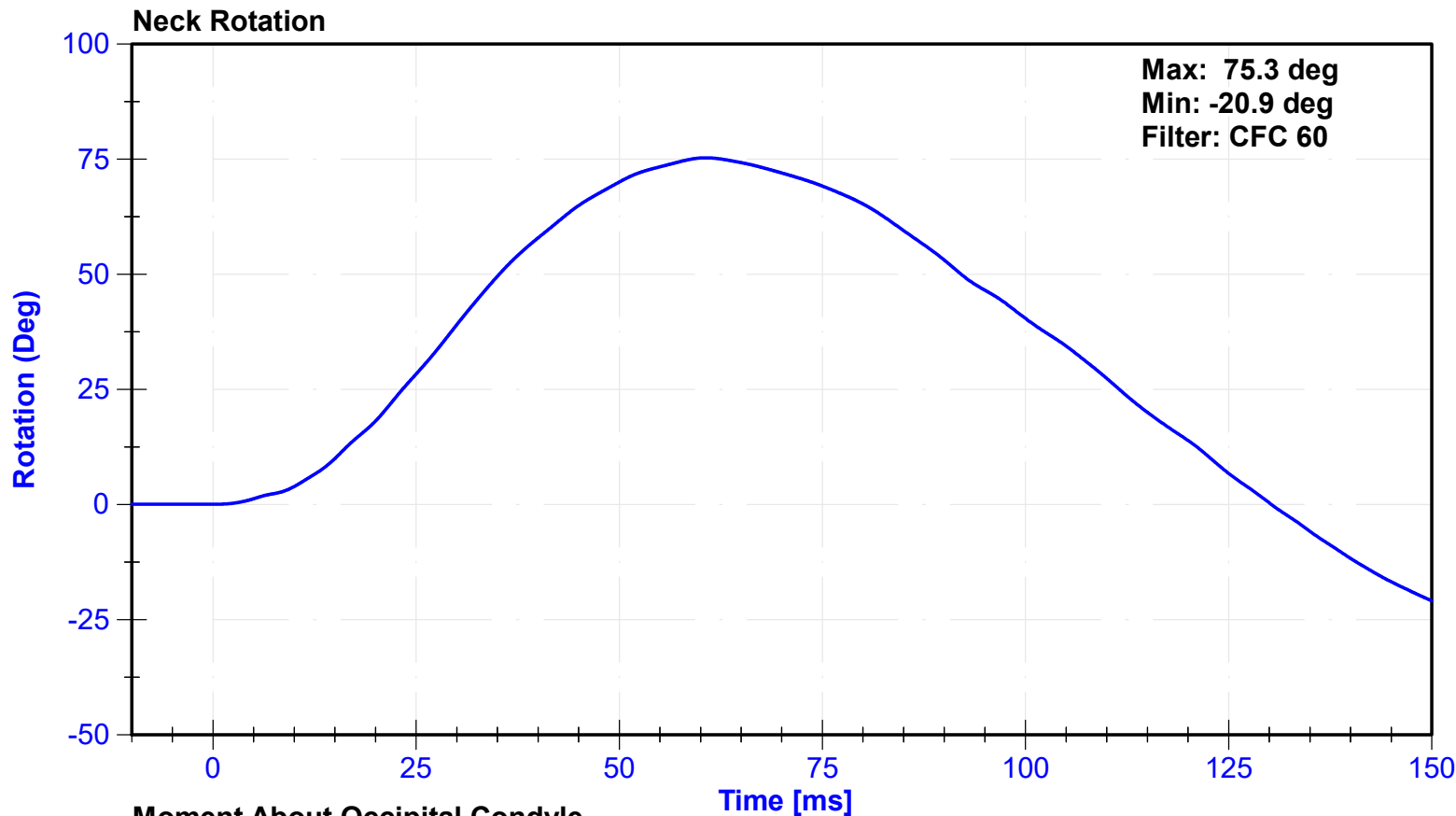
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	59	Pass
Velocity	5.51	5.63	m/s	5.607	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.35	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.57	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.89	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.83	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.03	Pass
Neck Rotation	71	81	deg	75.3	Pass
Time at Maximum Rotation	50	70	ms	60.7	Pass
Moment about the OC	36	44	Nm	42.1	Pass
Moment Decay to 0 Nm	102	126	ms	115.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/31/2022	10/31/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Denton	1716ATF_2184-FY	5/18/2023	5/17/2024





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

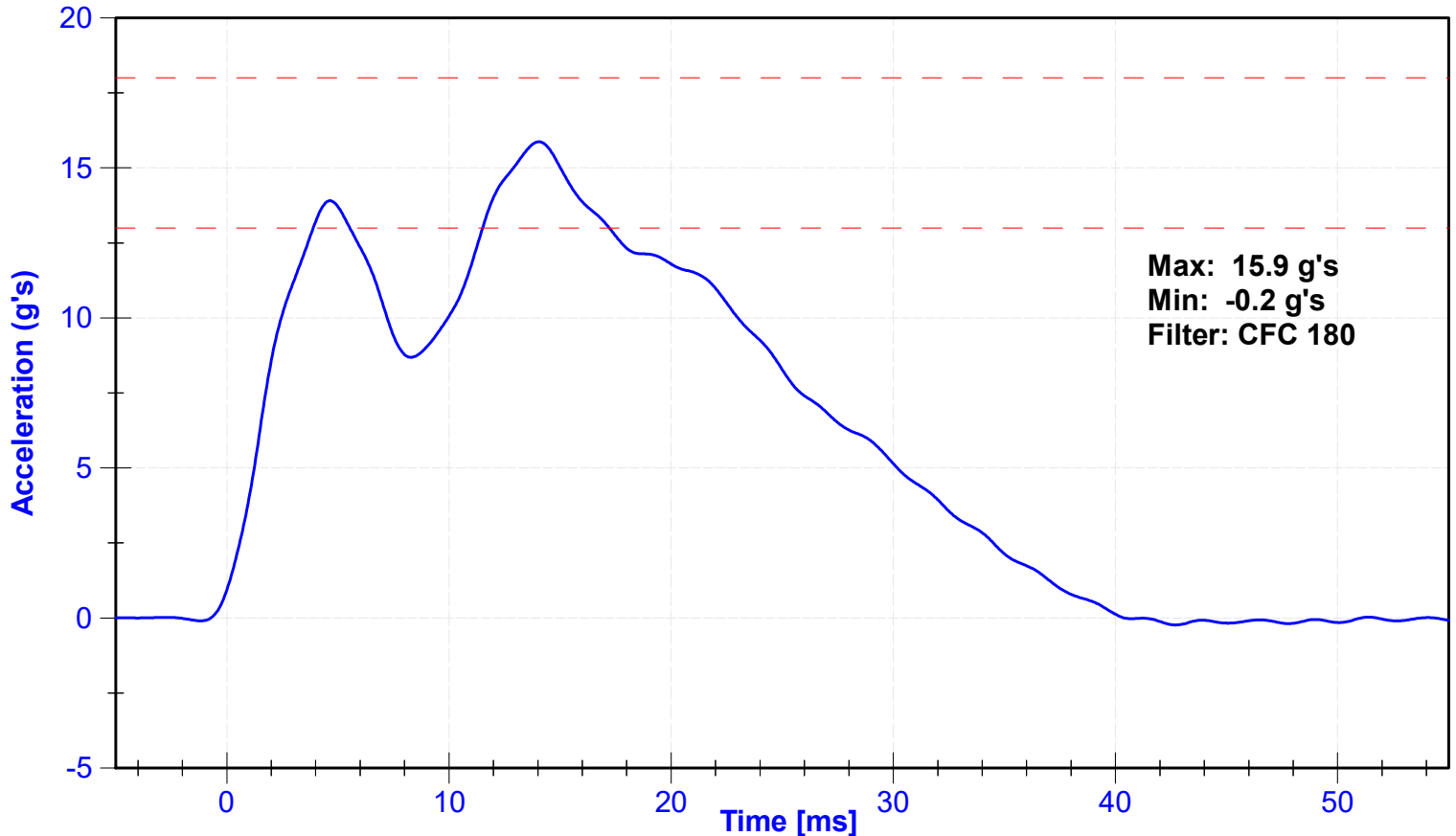
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	58	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	13	18	g's	15.9	Pass
Shoulder Deflection	28	37	mm	29.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.0	Pass

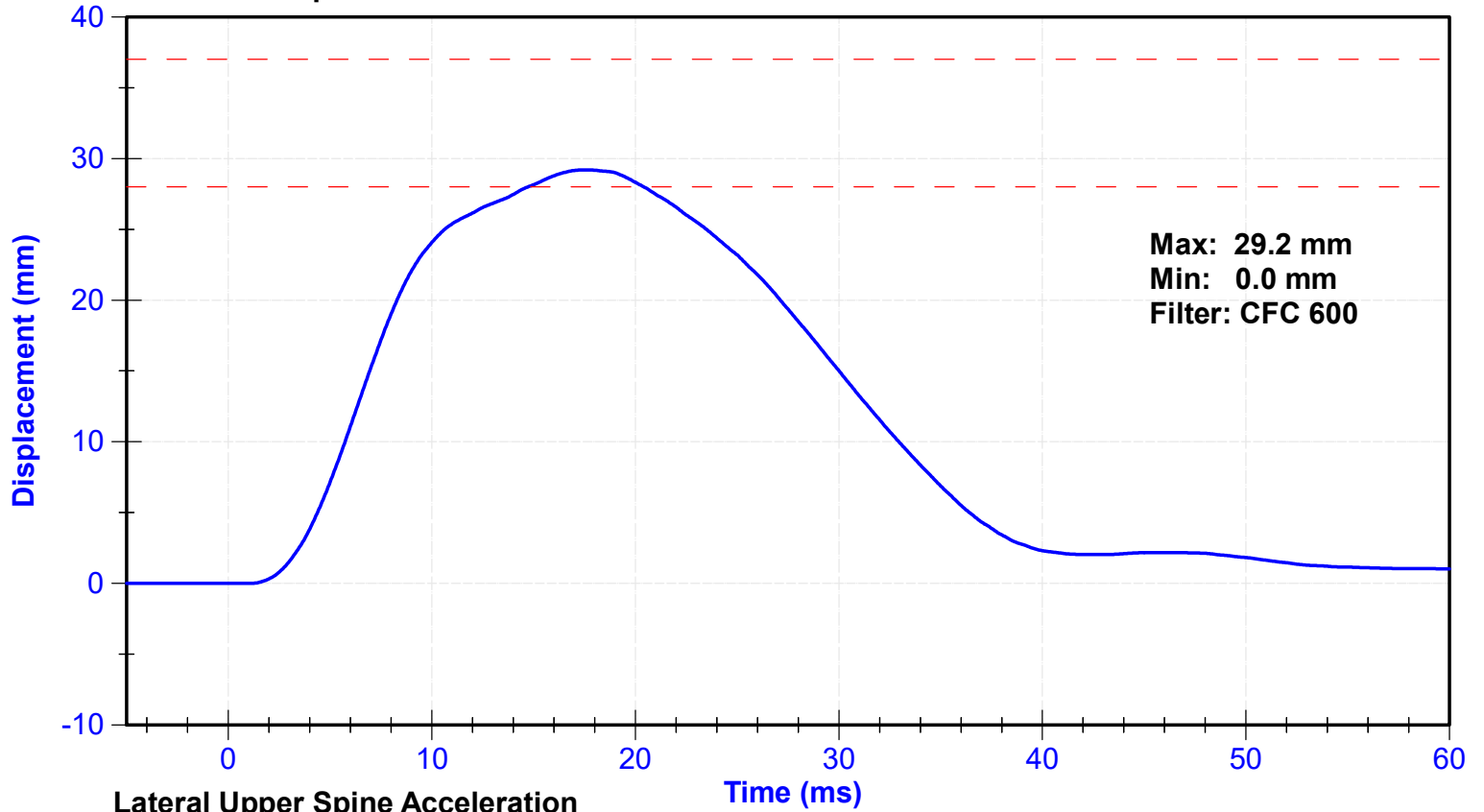
Transducer Calibrations

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

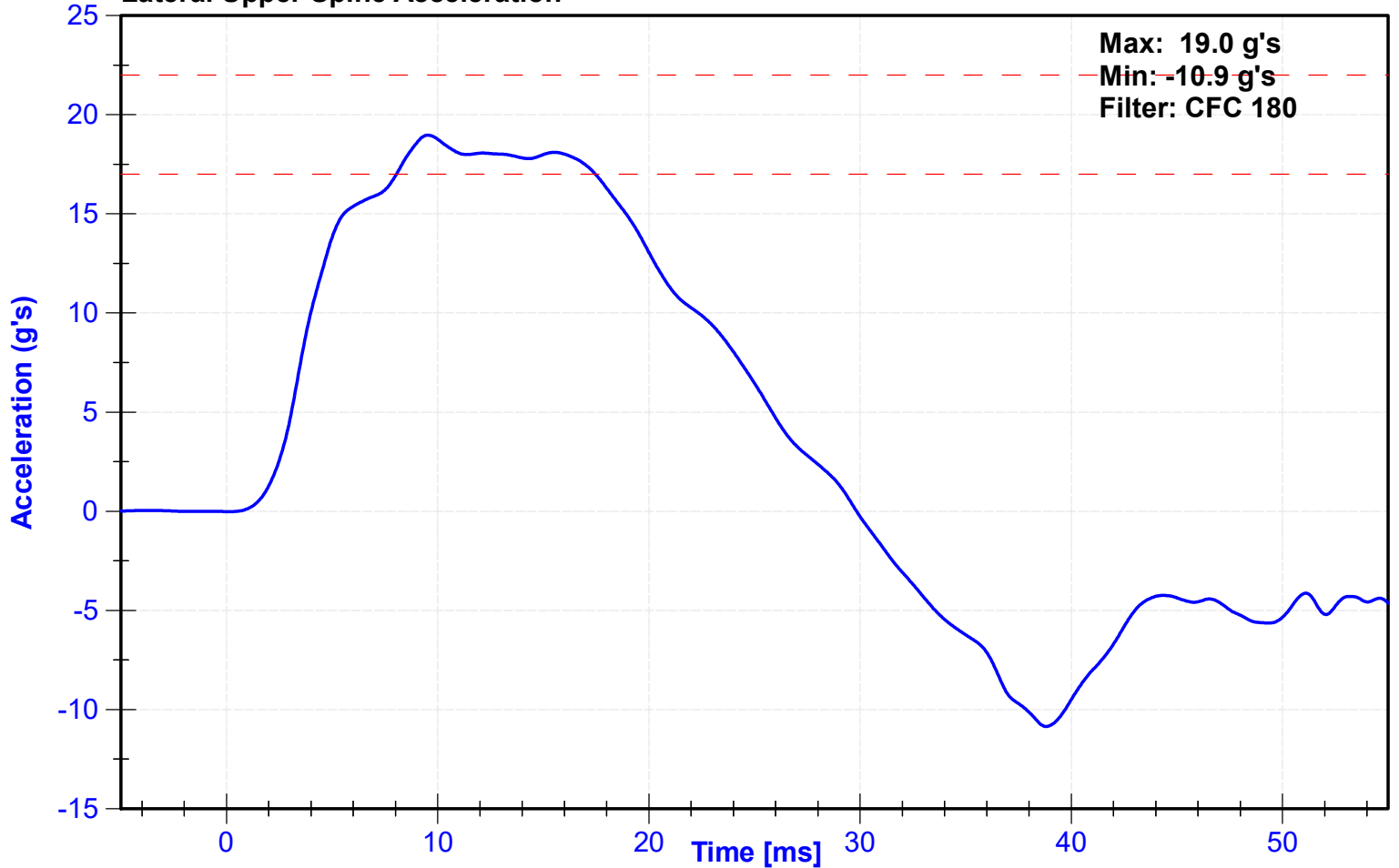
Probe Acceleration



Shoulder Displacement



Lateral Upper Spine Acceleration



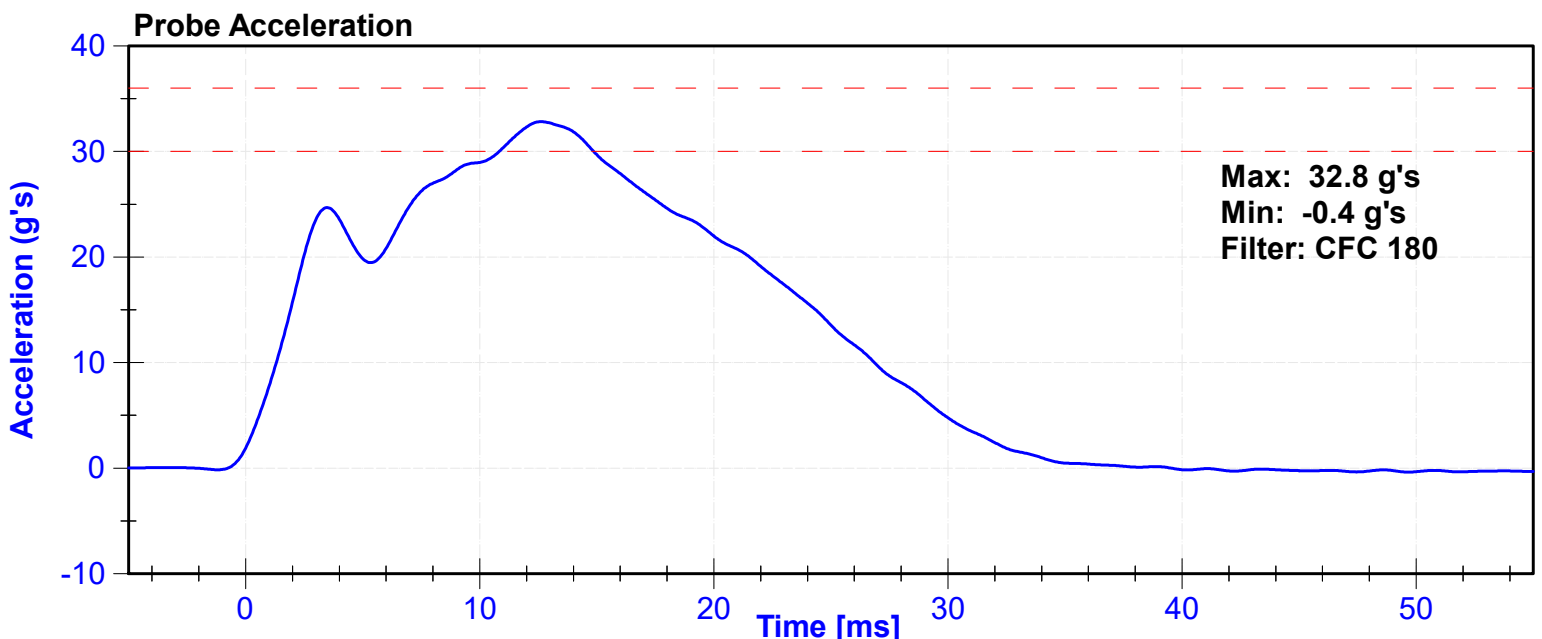
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

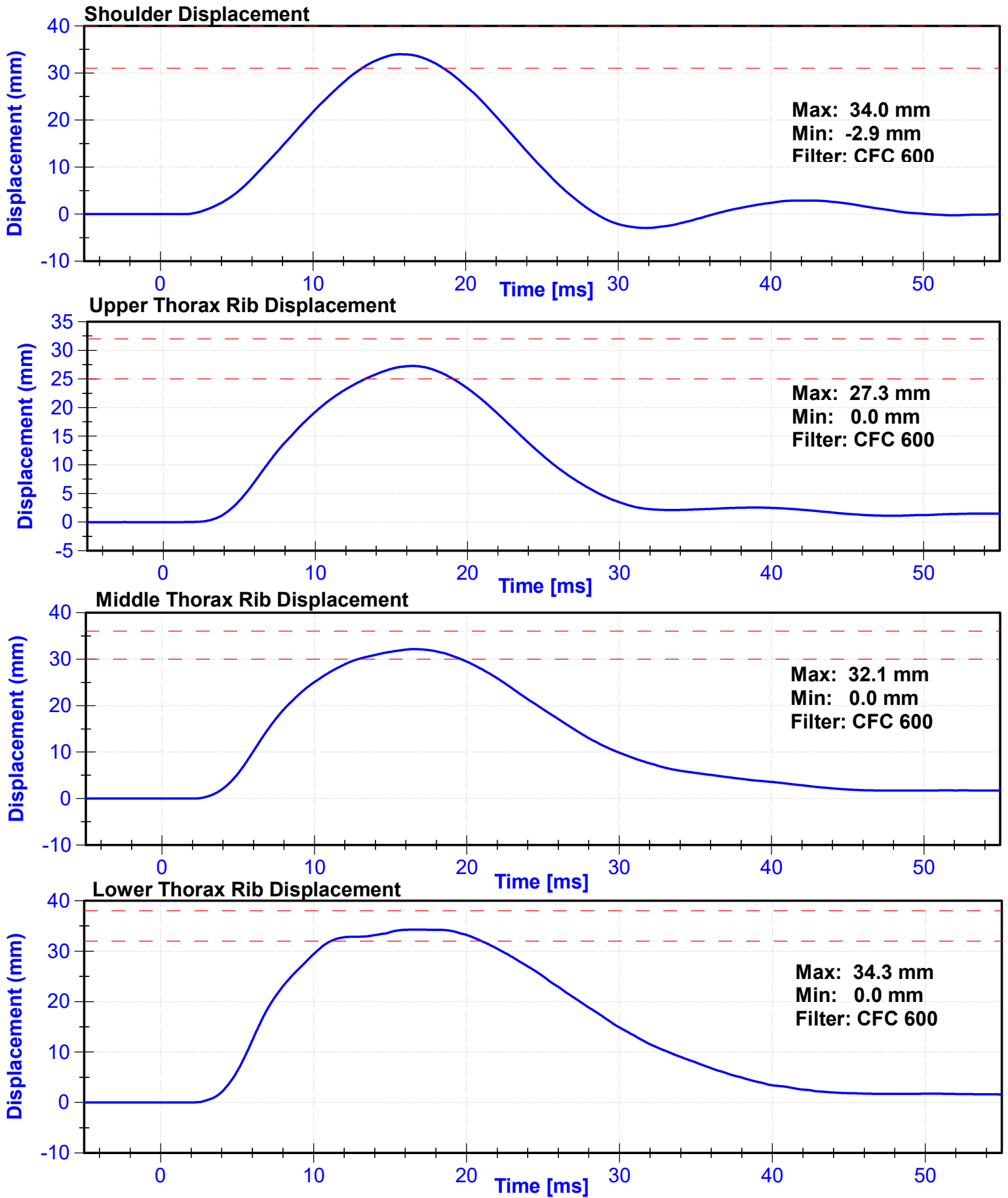
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	58	Pass
Velocity	6.6	6.8	m/s	6.75	Pass
Probe Acceleration after 5 ms	30	36	g's	32.8	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.1	Pass
Shoulder Deflection	31	40	mm	34.0	Pass
Upper Thorax Rib Deflection	25	32	mm	27.3	Pass
Mid Thorax Rib Deflection	30	36	mm	32.1	Pass
Lower Thorax Rib Deflection	32	38	mm	34.3	Pass

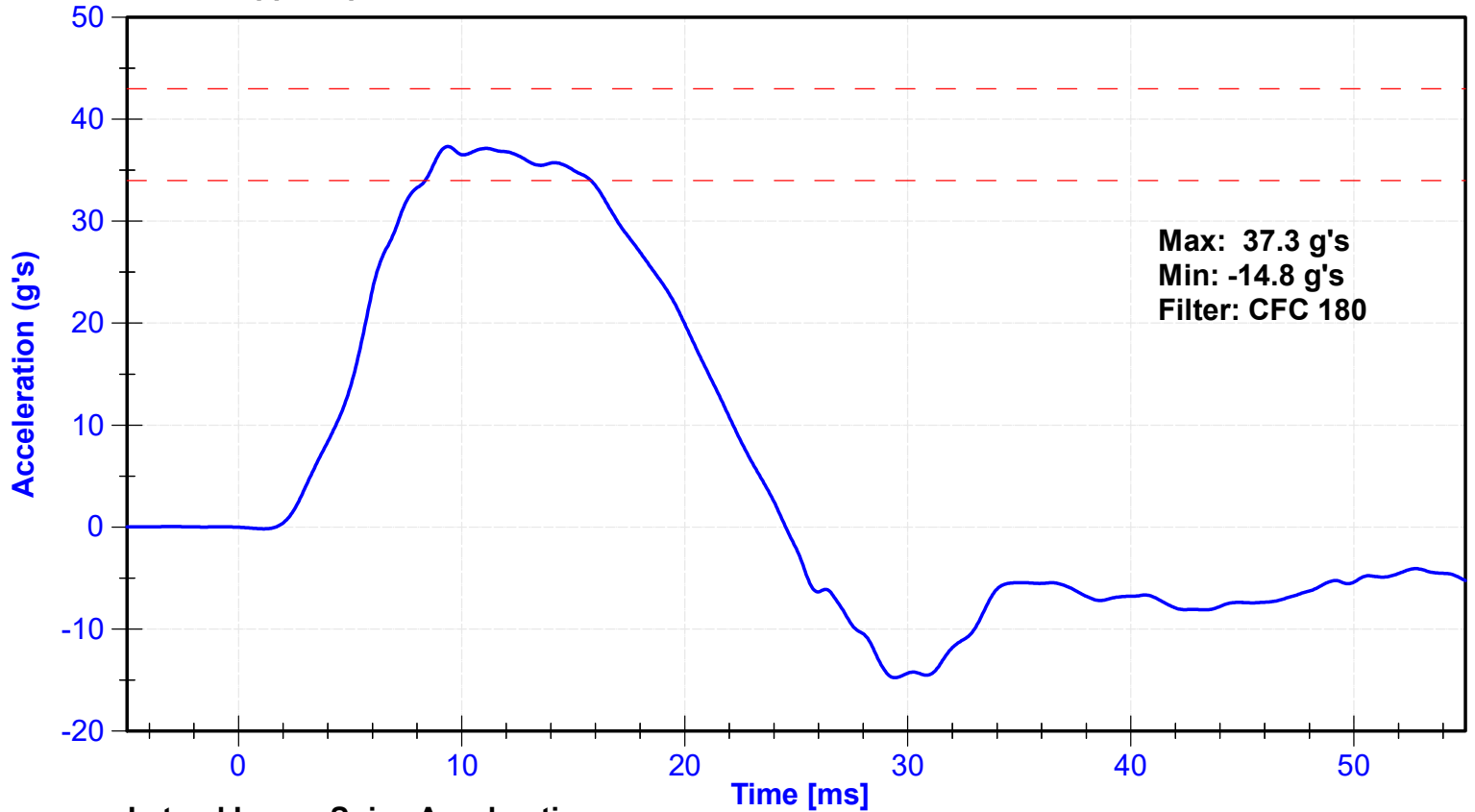
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	11/18/2023
Upper Spine 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

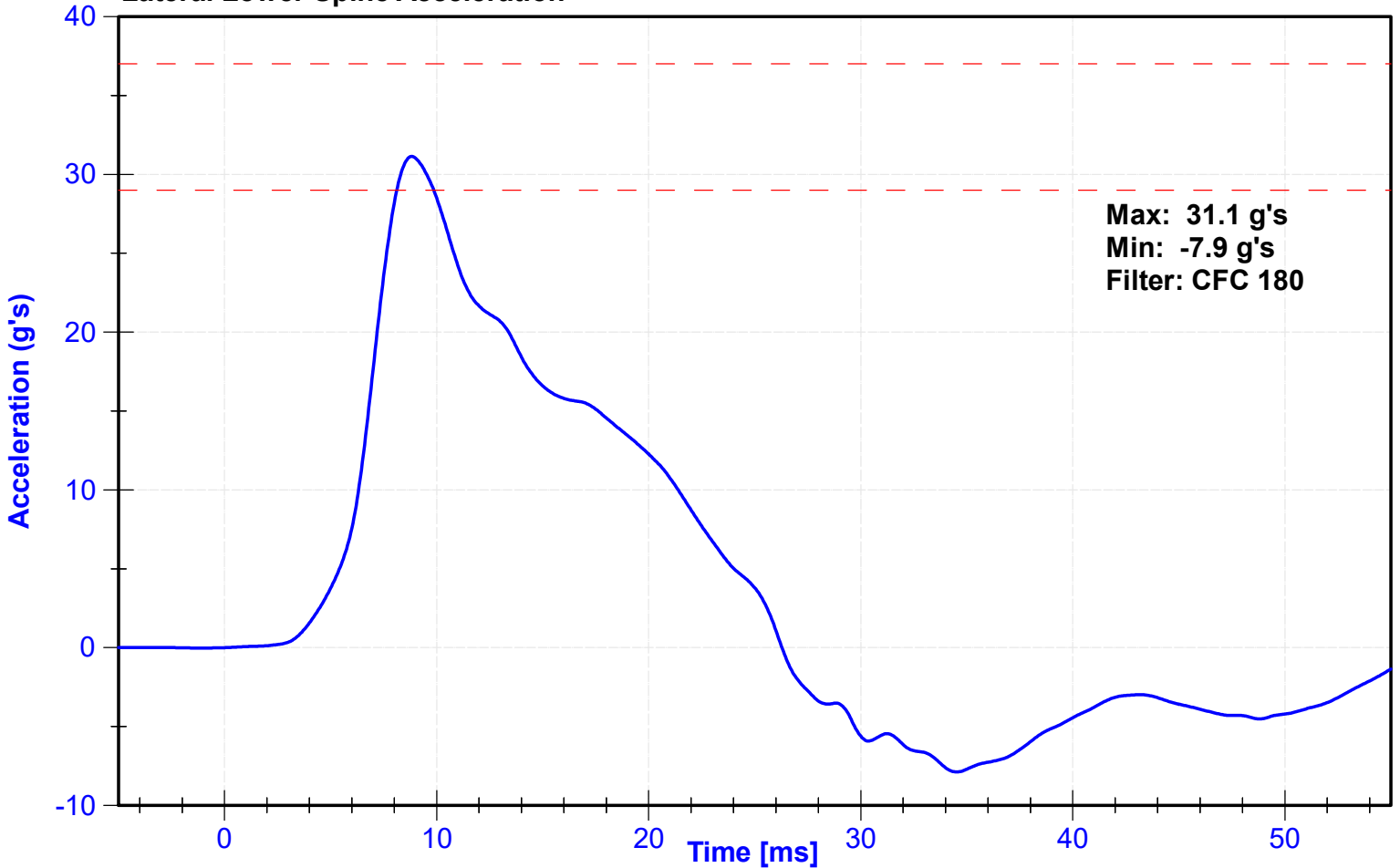




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



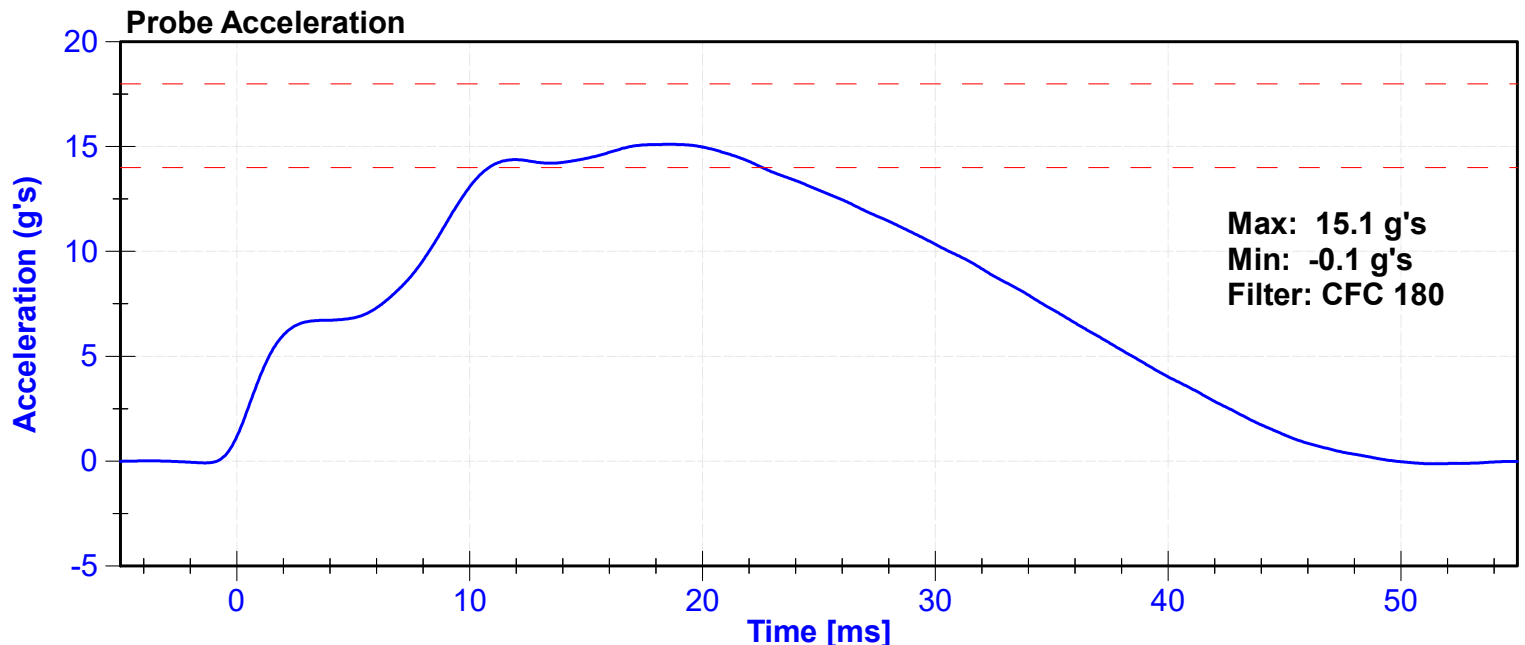
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

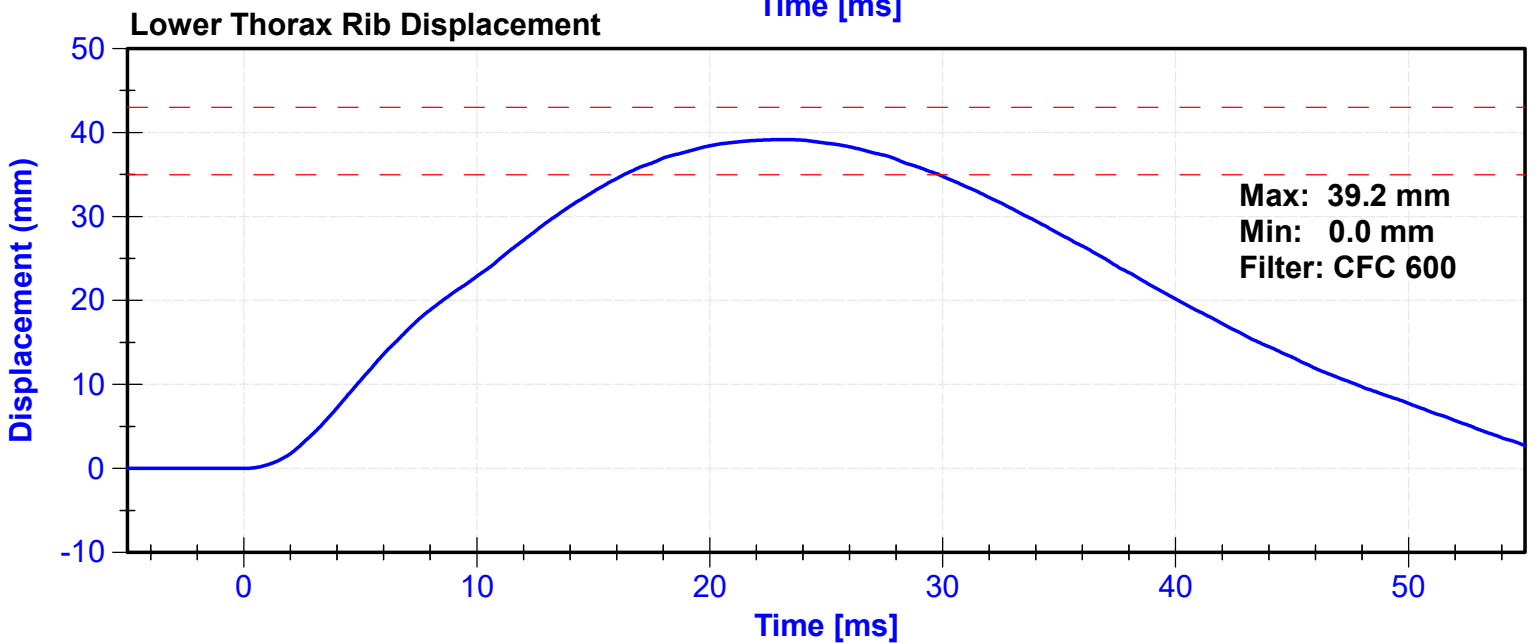
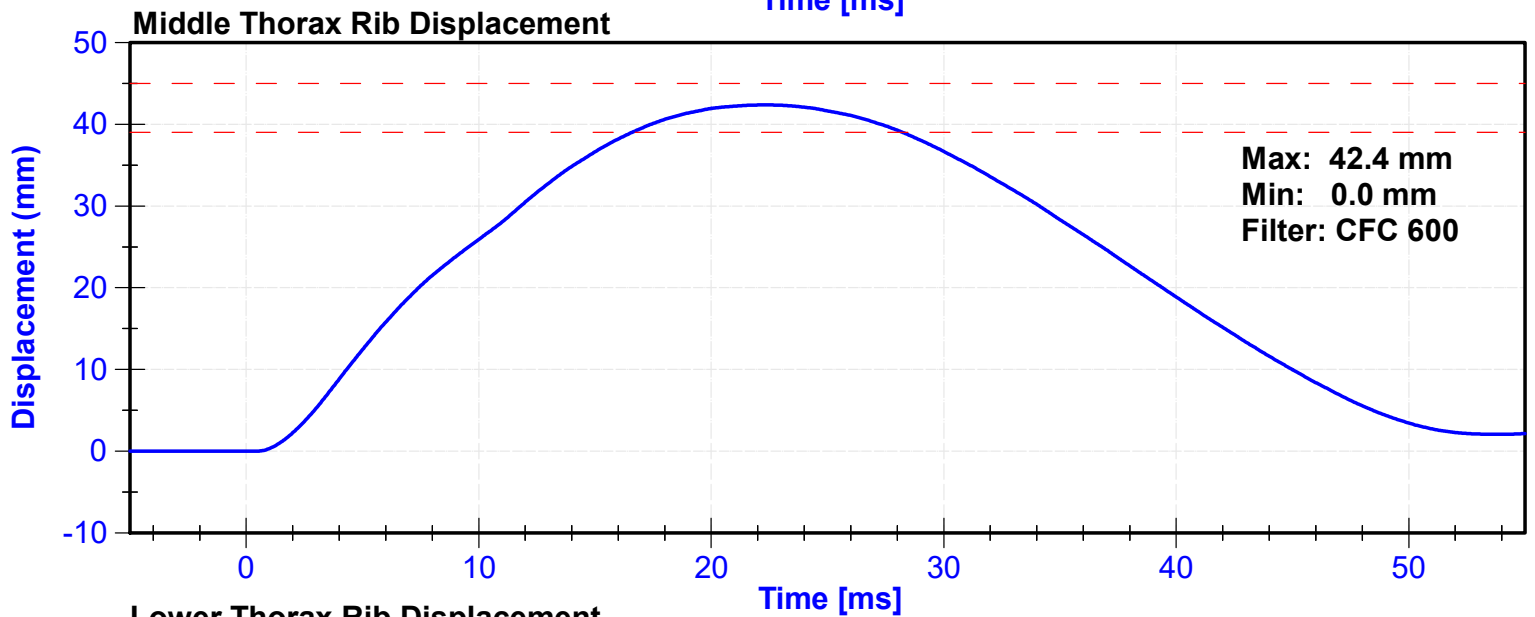
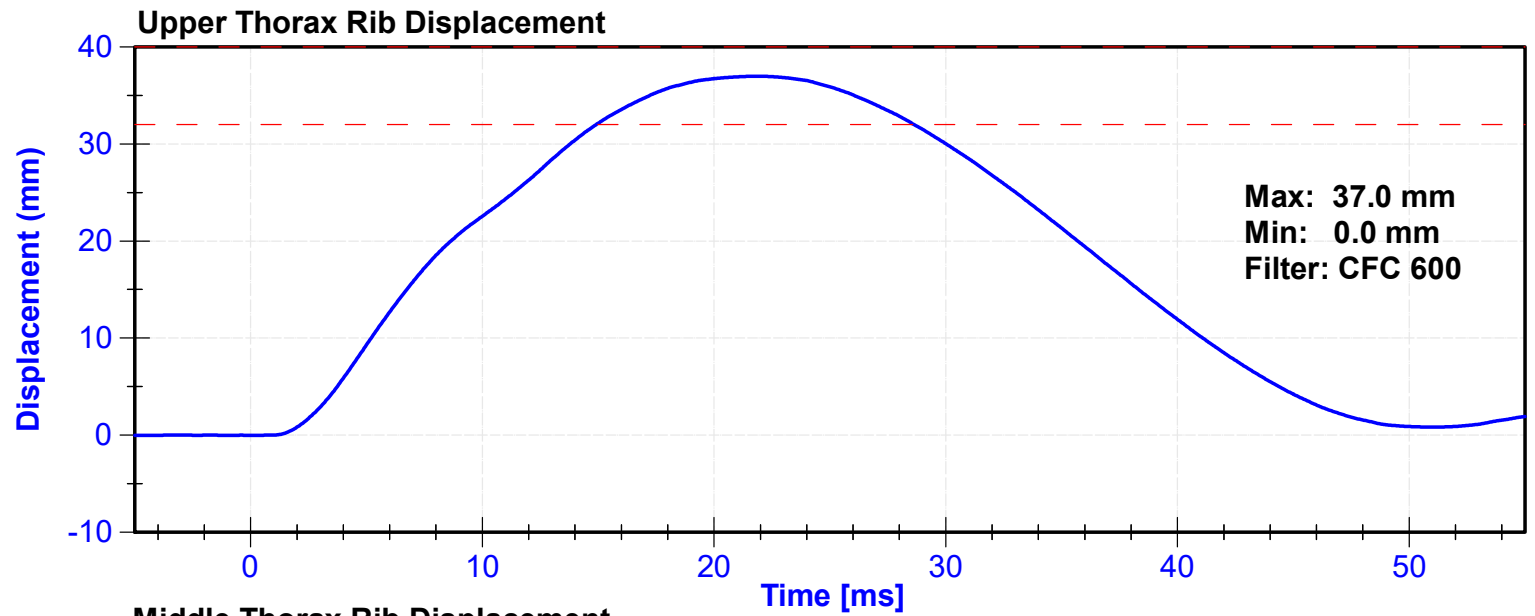
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	58	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	14	18	g's	15.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.9	Pass
Lateral Lower Spine Acceleration	7	11	g's	8.6	Pass
Upper Thorax Rib Deflection	32	40	mm	37.0	Pass
Middle Thorax Rib Deflection	39	45	mm	42.4	Pass
Lower Thorax Rib Deflection	35	43	mm	39.2	Pass

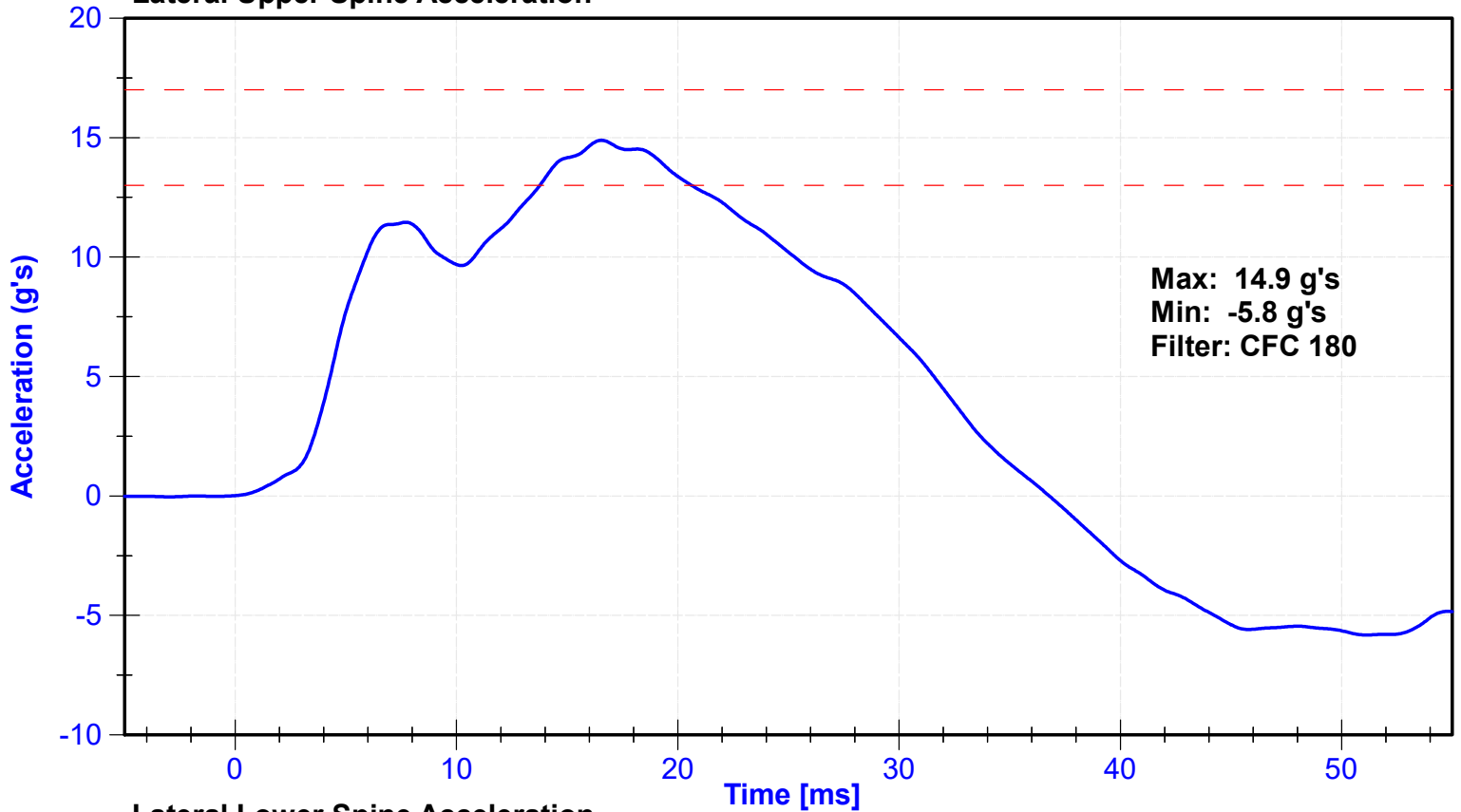
Transducer Calibrations

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

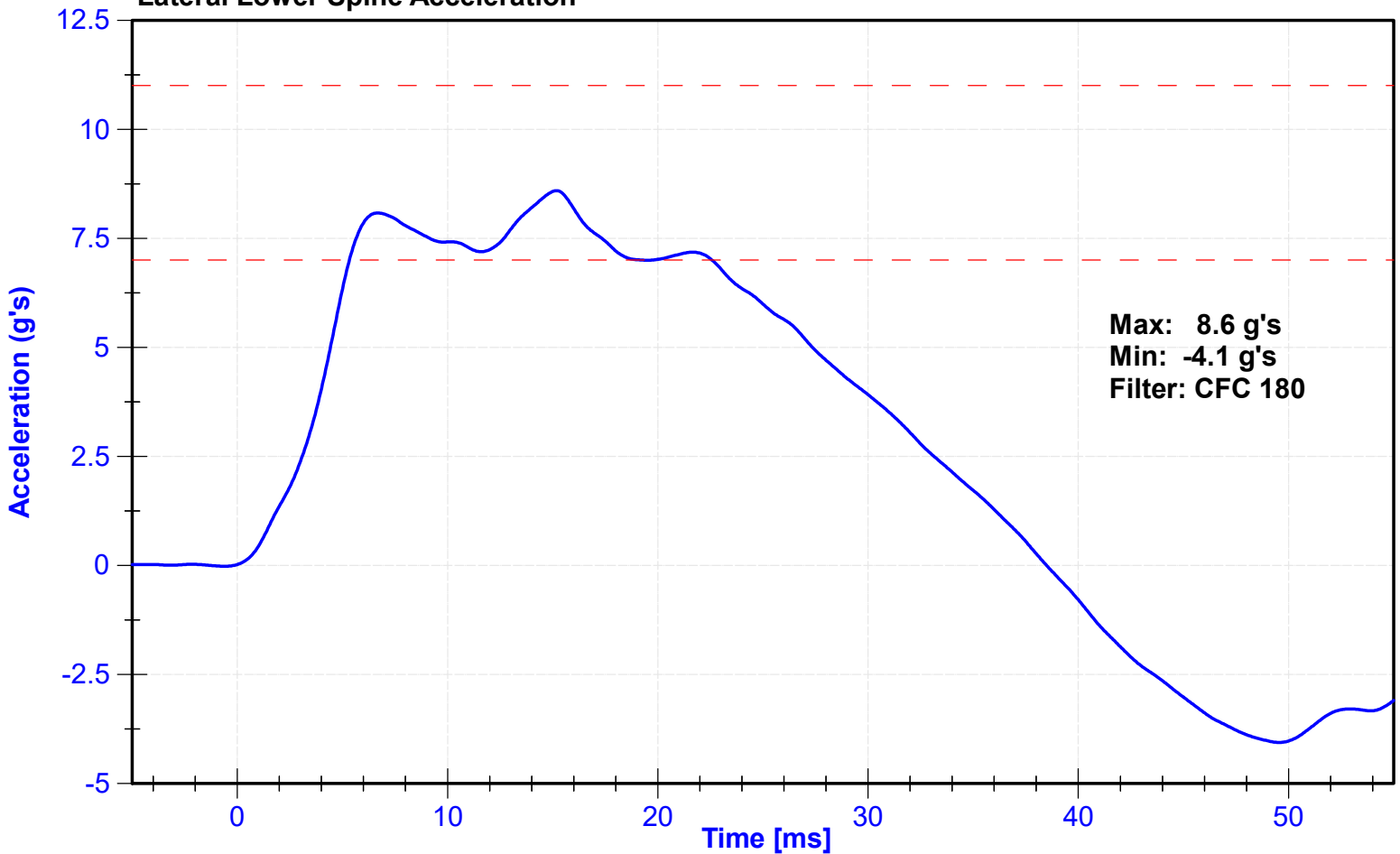




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



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

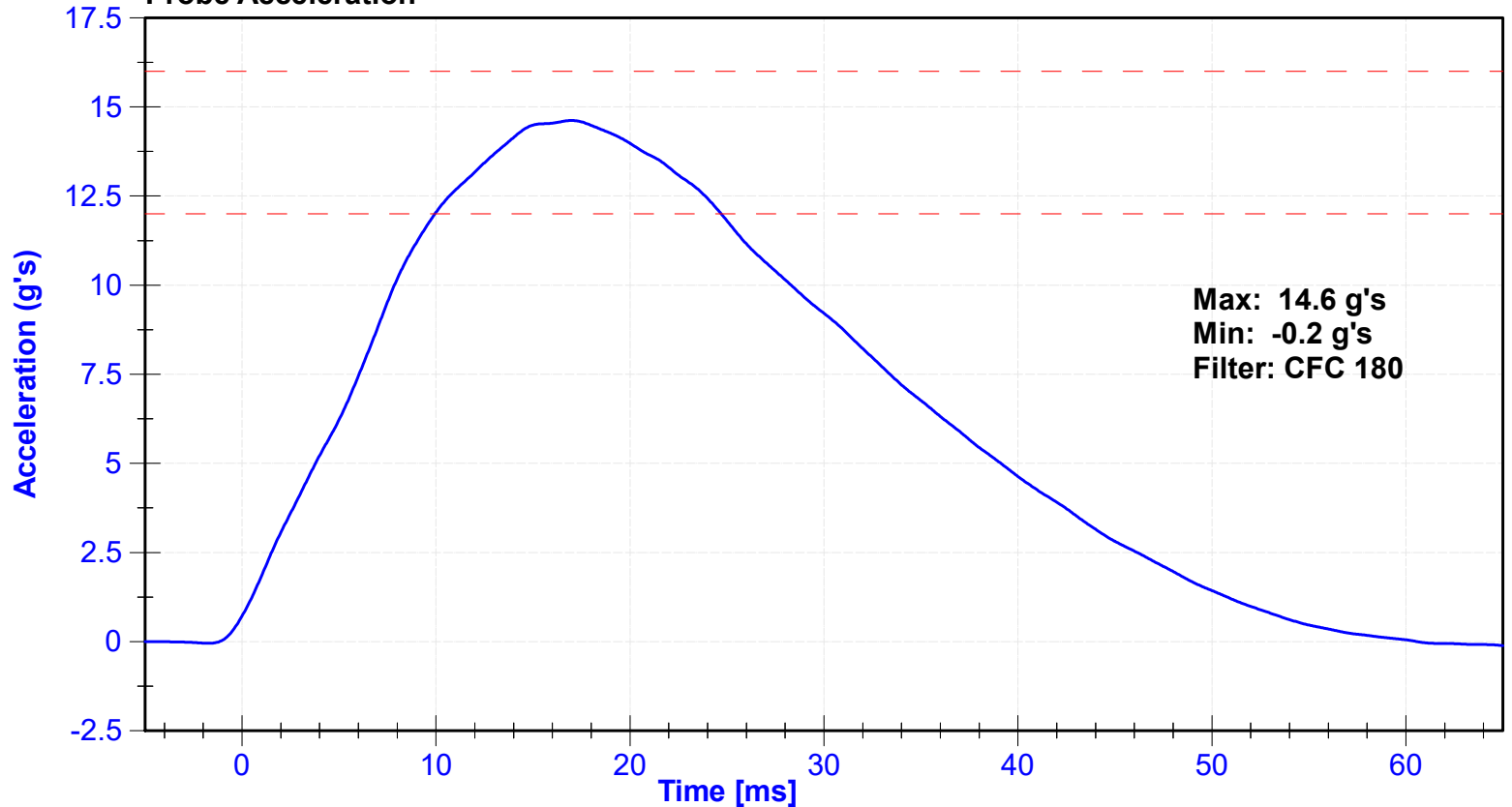
Results

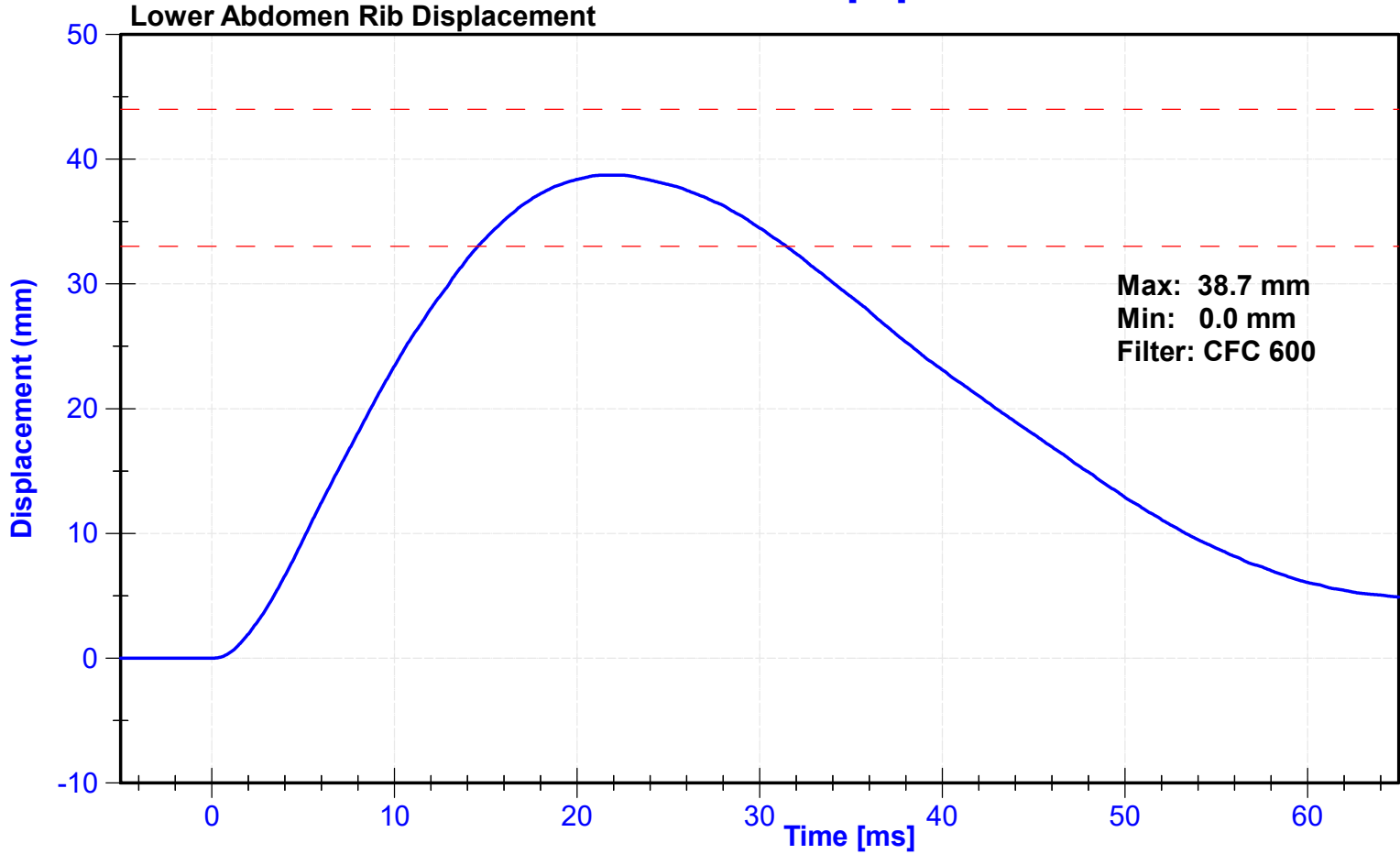
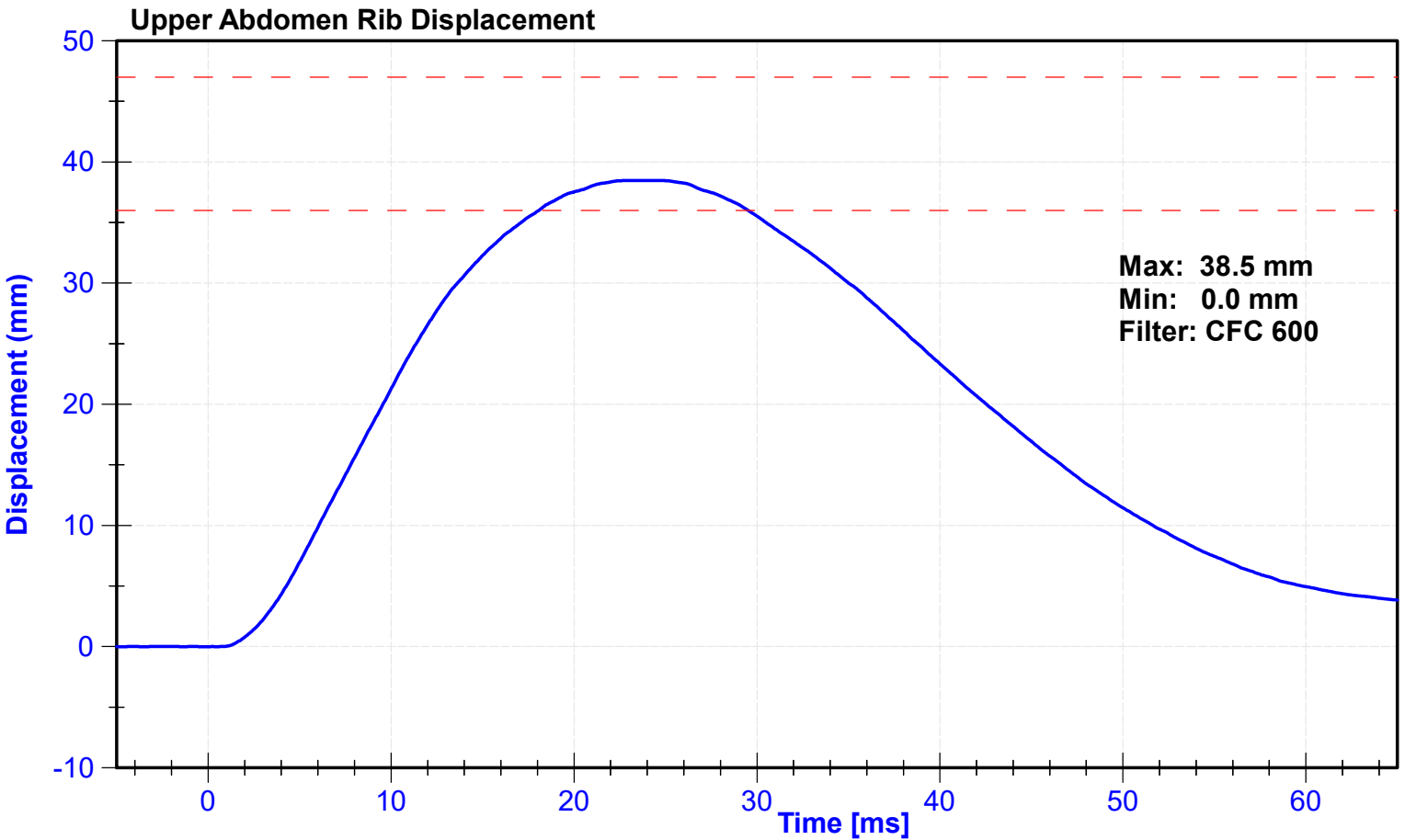
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	58	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	12	16	g's	14.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.2	Pass
Upper Abdomen Rib Deflection	36	47	mm	38.5	Pass
Lower Abdomen Rib Deflection	33	44	mm	38.7	Pass

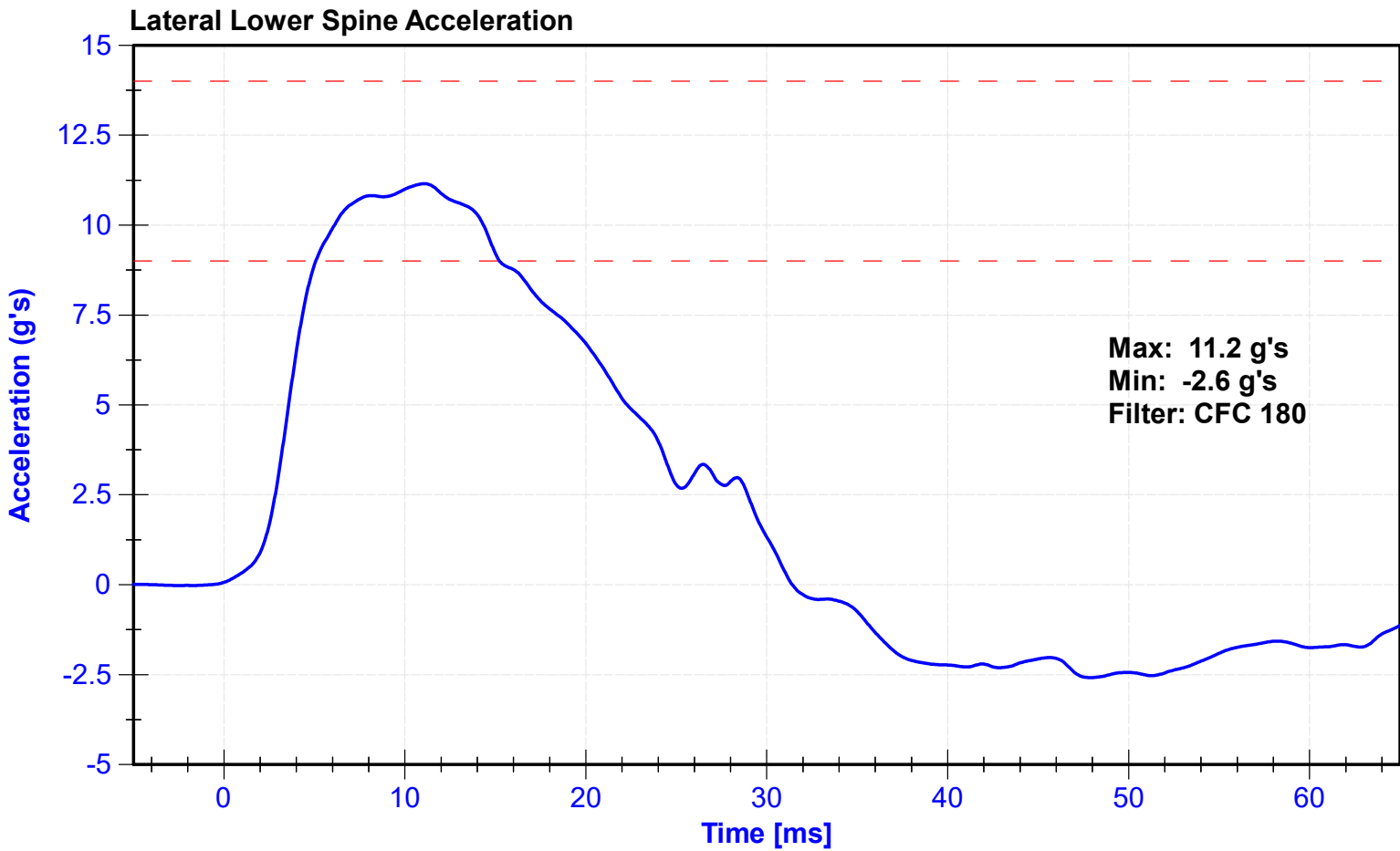
Transducer Calibrations

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	6/14/2023	12/13/2023

Probe Acceleration







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

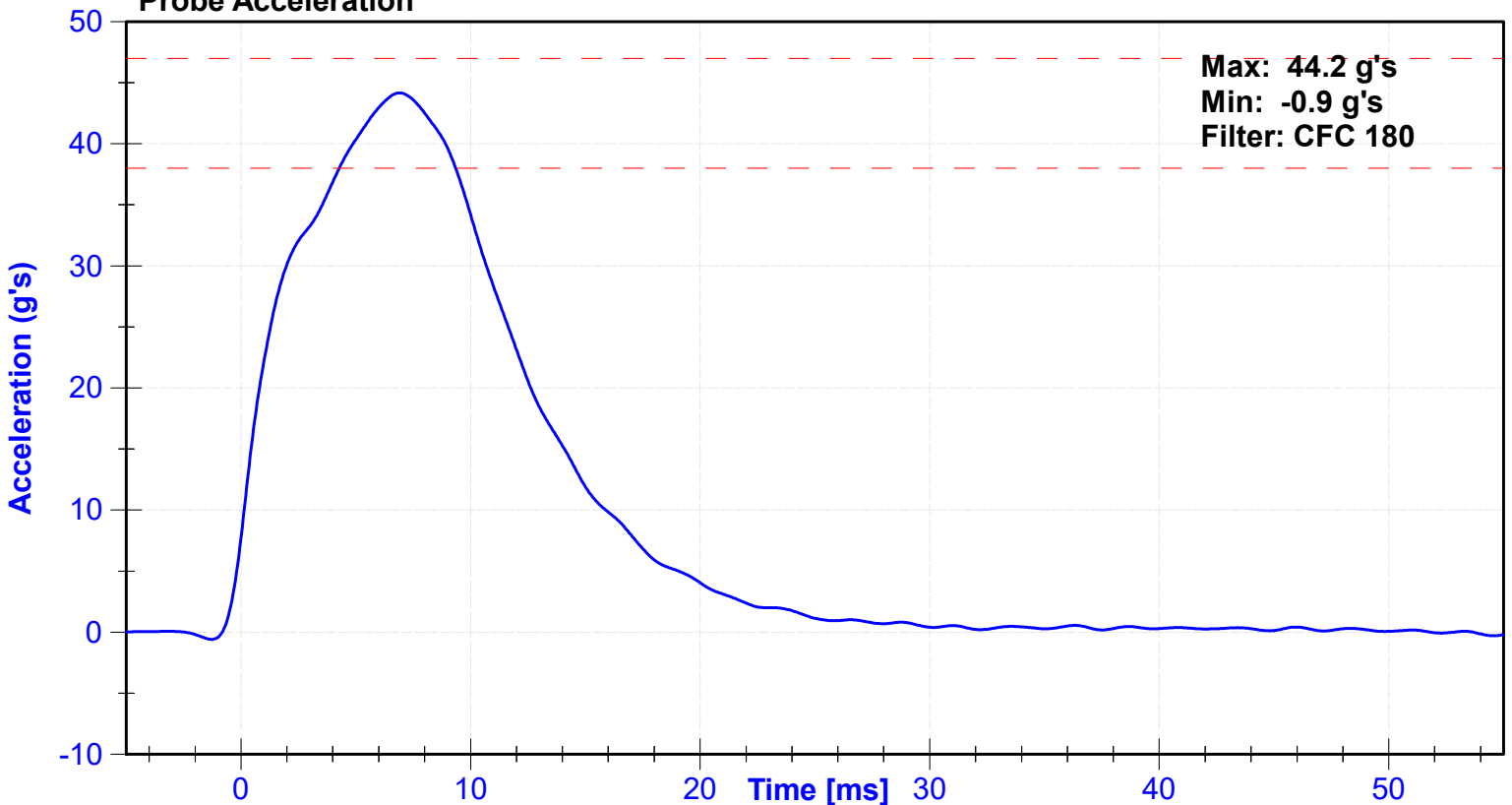
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	58	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration	38	47	g's	44.2	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.1	Pass
Acetabulum Force	3600	4300	N	3975.8	Pass

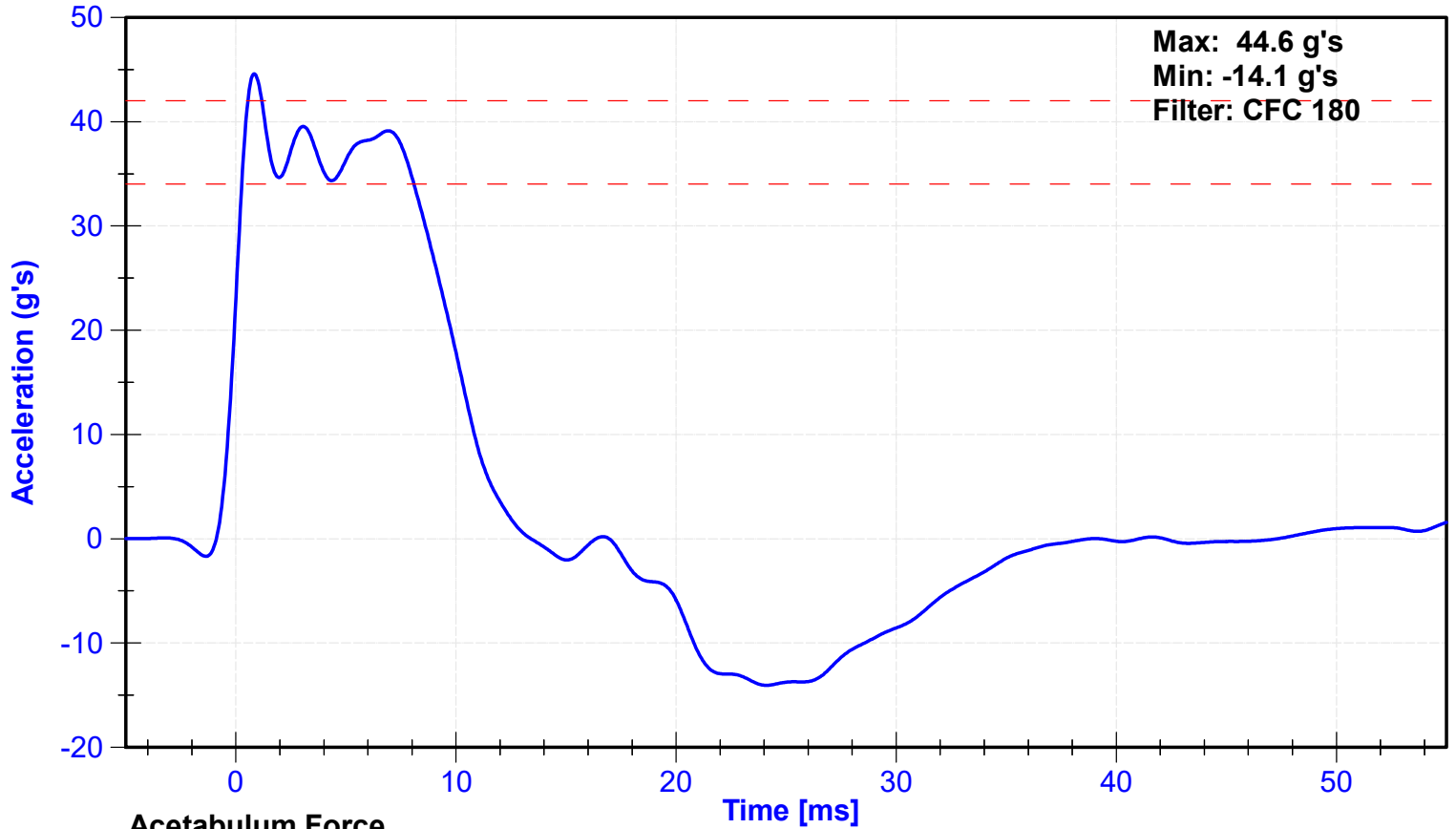
Transducer Calibrations

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

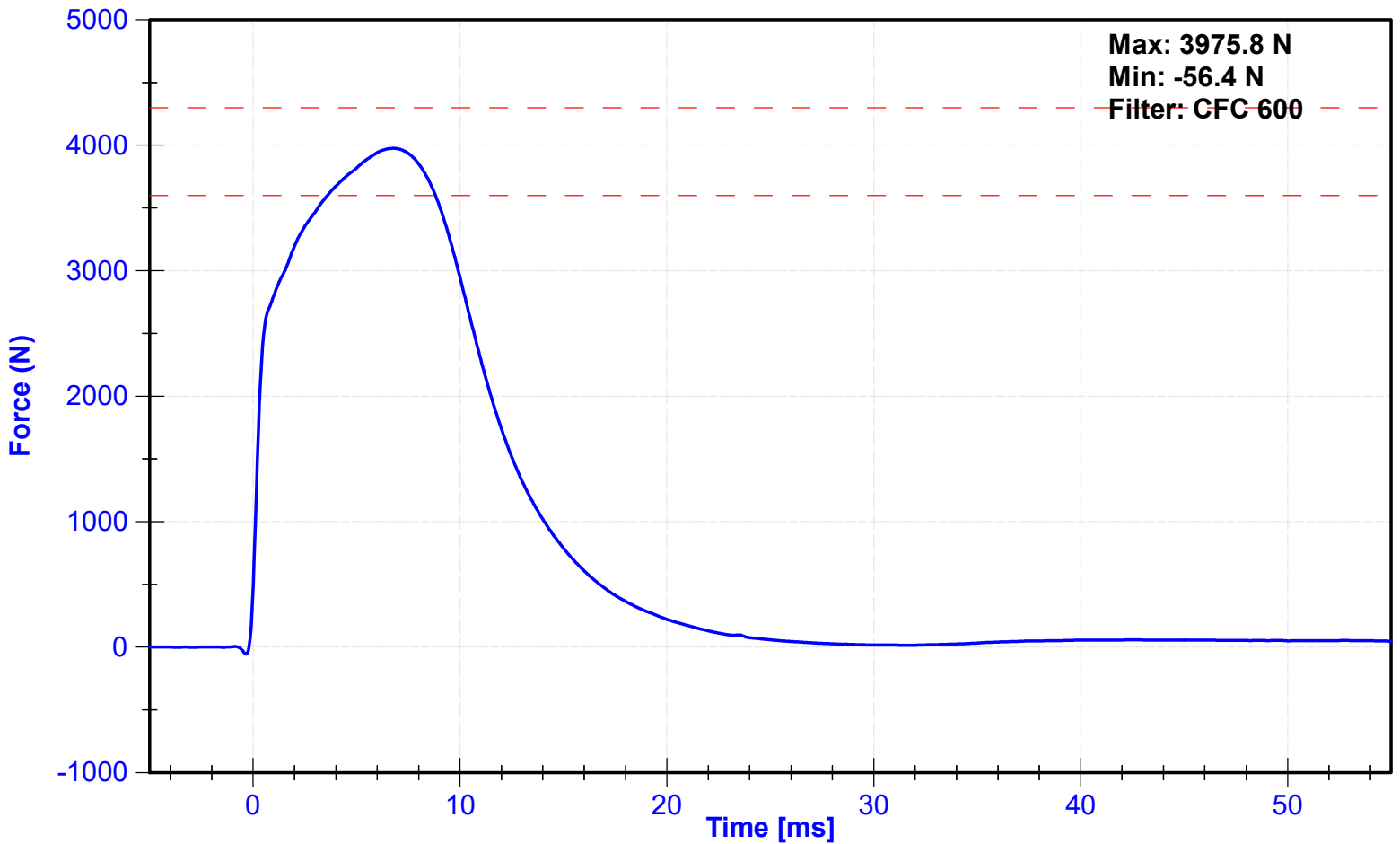
Probe Acceleration



Lateral Pelvis Acceleration



Acetabulum Force





07-13-2023
CERTIFICATION

SID-ILs Pelvis Plug Certification Test

Plug S/N 14151

Test Number 14189

Report Number 14234

Test Date 6/28/2020 12:17:09 PM

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

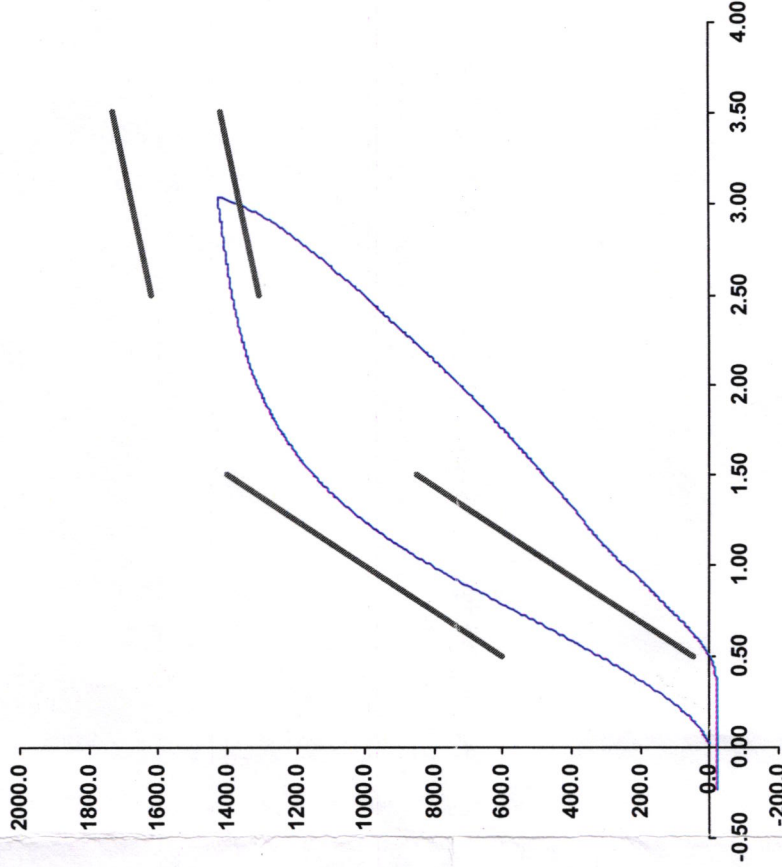
Load Cell S/N (F1360947), Units (LBS) 1000

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 28-Jun-20

SACO Research

By: D.C Date: 6-28-2020
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



07-13-2023
Impact

SID-IIs Pelvis Plug Certification Test

Plug S/N 15483

Test Number 20268

Report Number 20322

Test Date 9/28/2021 11:02:39 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

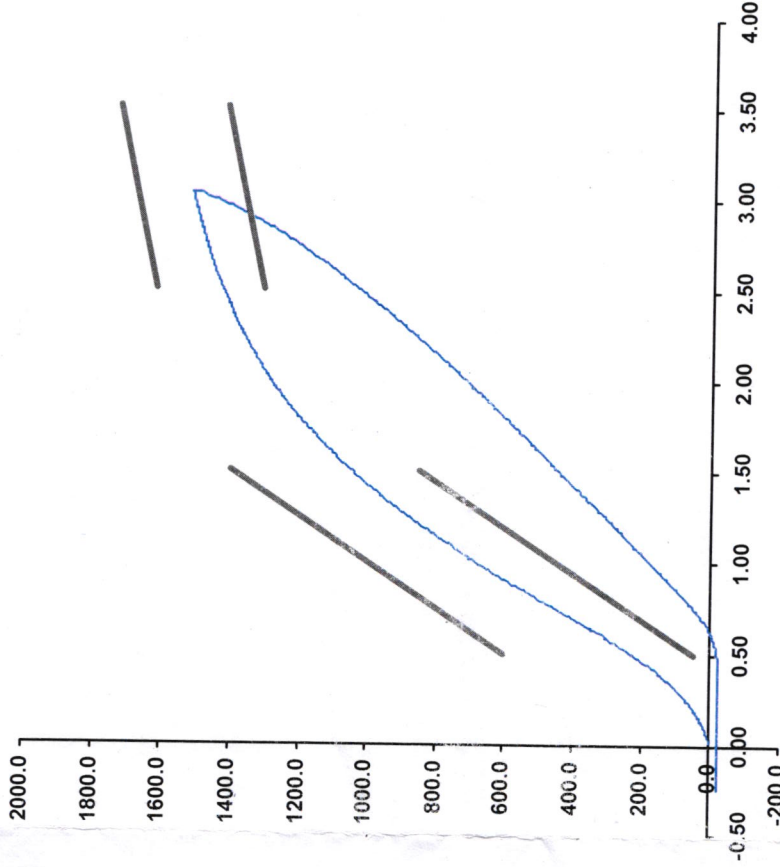
45

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 28-Sep-21

SACO Research

By : DC Date : 9/28/2021

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



07-10-23

Non Impact

SID-Ils Pelvis Plug Certification Test

Plug S/N 15607

Test Number 20462

Report Number 20516

Test Date 10/7/2021 1:16:58 PM

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

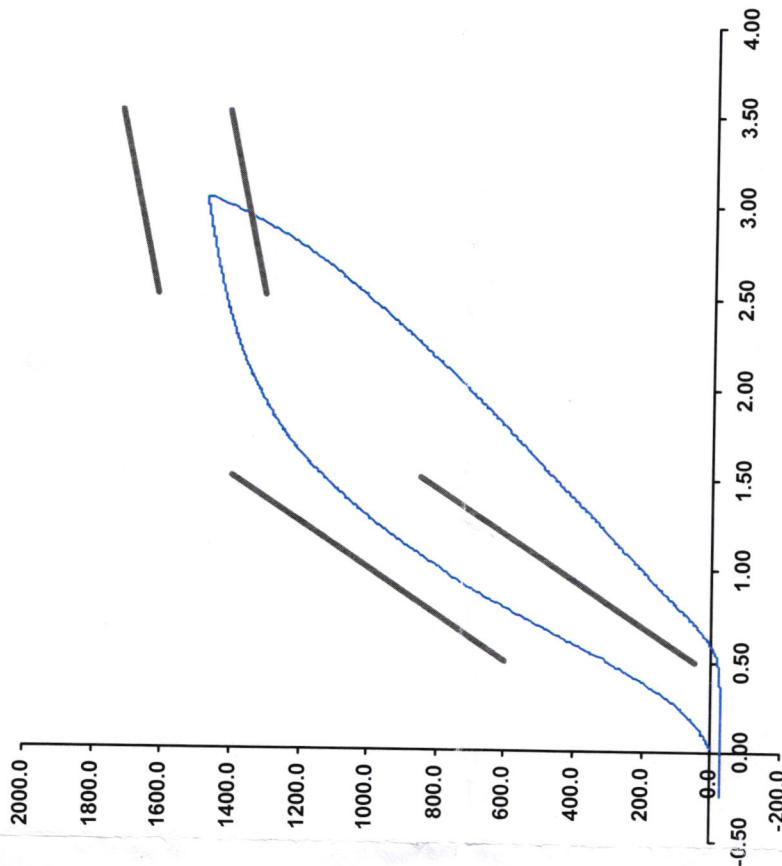
Testing Machine STM-20 5965542

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

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator

Part Number 180-4450

Template No 107 07-Oct-21

SACO Research

By : DC

Date : 10/7/21

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

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

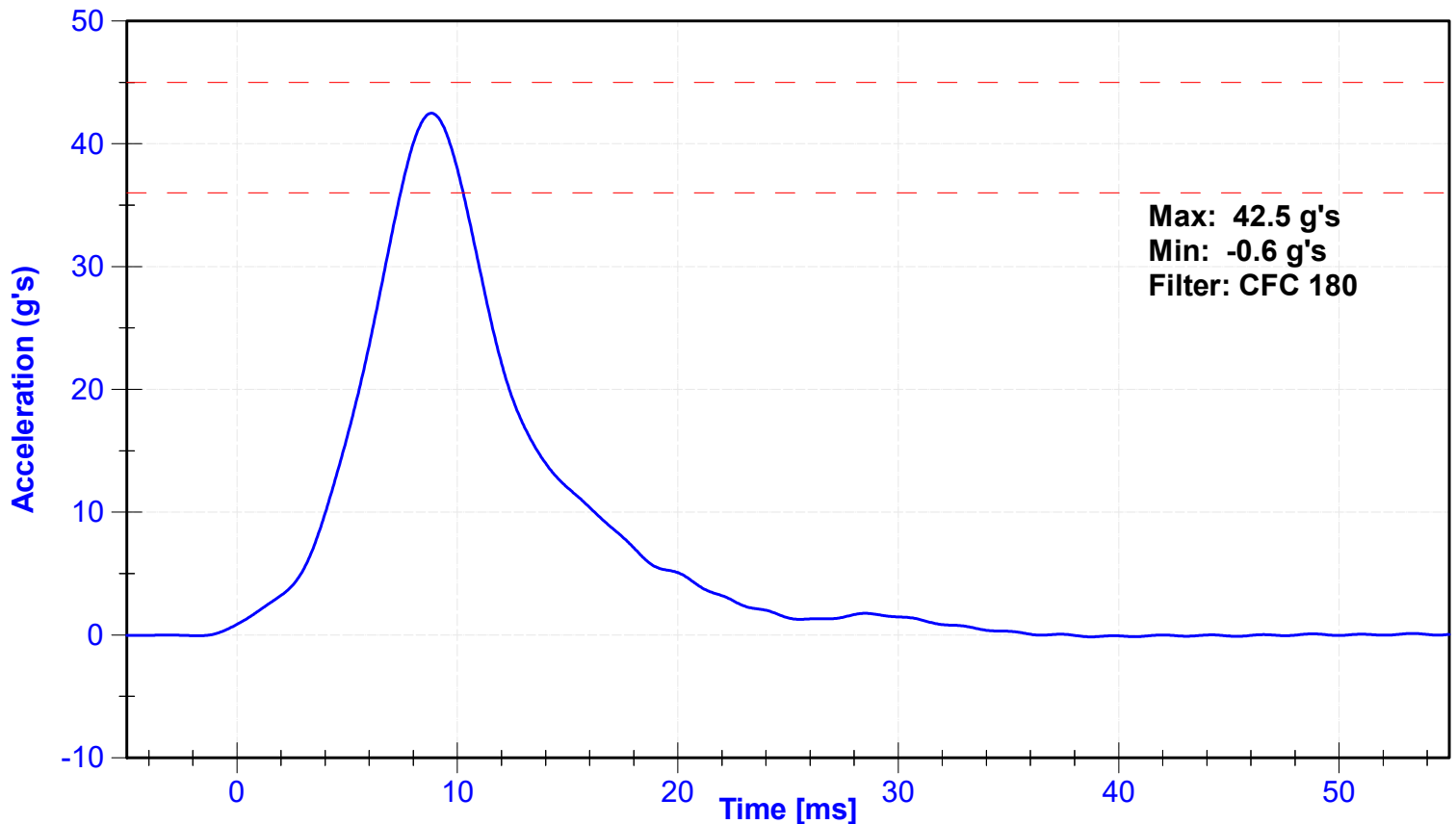
Results

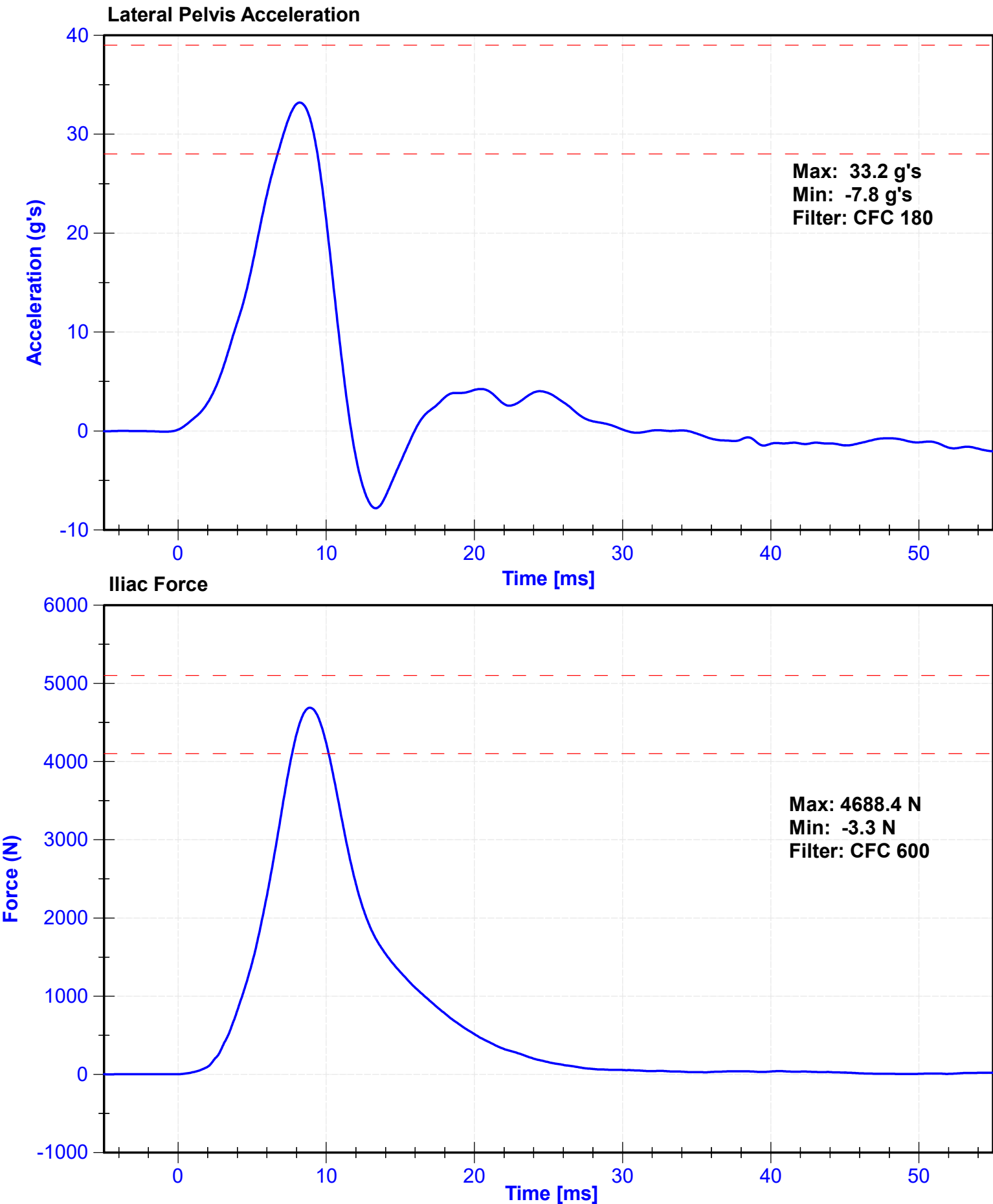
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	58	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	36	45	g's	42.5	Pass
Lateral Pelvis Acceleration	28	39	g's	33.2	Pass
Iliac Force	4100	5100	N	4688.4	Pass

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





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	6/14/2023
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)				17284	SACO	1/28/2021
Pelvis Plug (Non-Struck Side)				14174	SACO	6/28/2020

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A280952	Measurement Specialties	6/1/2023
Vehicle Center of Gravity	Y	A370944	Measurement Specialties	3/6/2023
Vehicle Center of Gravity	Z	A374256	Measurement Specialties	3/22/2023
Left Floor Sill	Y	G22584	Endevco	7/5/2023
A-Pillar Sill	Y	G22391	Endevco	6/28/2023
A-Pillar Low	Y	G22591	Endevco	6/28/2023
A-Pillar Mid	Y	G22906	Endevco	2/25/2023
B-Pillar Sill	Y	G22627	Endevco	4/11/2023
B-Pillar Low	Y	G22675	Endevco	6/28/2023
B-Pillar Mid	Y	G22392	Endevco	6/28/2023
Driver Seat	Y	A274261	Measurement Specialties	2/13/2023
Engine Top	X	A405538	Measurement Specialties	6/28/2023
Engine Top	Y	A405541	Measurement Specialties	6/28/2023
Firewall	Y	A400749	Measurement Specialties	3/17/2023
Right Roof	Y	A373239	Measurement Specialties	4/10/2023
Right Floor Sill	Y	A315125	Measurement Specialties	3/16/2023
Rear Floorpan	X	A431358	Measurement Specialties	6/28/2023
Rear Floorpan	Y	A431380	Measurement Specialties	6/28/2023

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	1220AF-1277329-F0	Interface	3/2/2023
Load Cell 2	1220AF-1117017-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