REPORT NUMBER: SPNCAP-CAL-22-007

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

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

NHTSA No: M20225801

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

September 1, 2023

FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Administration, in response to Contract Number 693JJ920D00016.

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Prepared by:  Date: September 1, 2023

Quinn Porzio, Test Engineer

Approved by:  Date: September 1, 2023

Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date: _____

_____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. *Report No.* SPNCAP-CAL-22-007	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing & FMVSS 305 Indicant Testing of a 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225801		***5. Report Date*** September 1, 2023 ***6. Performing Organization Code*** CAL
7. Author(s) Quinn Porzio, Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2022-007
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.*** 693JJ920D00016
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report October 12, 2022 - September 1, 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 2022 Audi Q4 e-tron quattro 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 October 12, 2022.

The impact velocity of the vehicle was 32.12 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 mm located at level . The test vehicle's occupant performance data is as follows:

M easurement Description	Driver ATD (SID-IIs) (Serial No.DG8012)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	287.637
Resultant Lower Spine Acceleration	G	82	44.964
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4880.967
Maximum Thoracic Rib Deflection	mm	38	25.996
Maximum Abdomen Rib Deflection	mm	45	21.937

No test failures were reported.

17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, 1200 New Jersey Ave. SE Washington, D.C. 20590

19. Security Class. (of this report)	***20. Security Class. (of this page)***	***21. No. of Pages***	***22. Price***
UNCLASSIFIED	UNCLASSIFIED	153	

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. 693JJ920D00016. The purpose of this test is to generate comparative side impact performance in a 2022 Audi Q4 e-tron quattro 5 Door SUV. The side impact test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure, TP-214P-01 dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2022 Audi Q4 e-tron quattro 5 Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75º and a velocity of 32.12 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on October 12, 2022. 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 572V (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 572V (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	287.637
Resultant Lower Spine Acceleration	G	82	44.964
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4880.967
Maximum Thoracic Rib Deflection	mm	38	25.996
Maximum Abdomen Rib Deflection	mm	45	21.937

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

GENERAL COMMENTS:

1. P1 serial number - DG8012

Data Anomalies:

- Left Lower A-Pillar Y Acceleration,Exceeded calibration range at 72.1 ms
- Left Front Sill Y Acceleration,Exceeded calibration range at 19.1 ms
- Load Cell Pole Barrier #2 Fy,Questionable data after 16 ms
- Load Cell Pole Barrier #1 Fy,Questionable data after 15 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. 305-1 - General Test and Parameter Data for Indicant FMVSS No. 305 Testing

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

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

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

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

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20225801
Model Year	2022
Make	Audi
Model	Q4 e-tron
Body Style	SUV
VIN	WA1J2BFZ4NP052465
Body Color	Blue
Odometer Reading (km/mi)	11 mi
Engine Displacement (L)	N/A
Type / No. Cylinders	82 kwh Battery
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	1-Speed
Overdrive	N/A
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	AUDI AG
Date of Manufacture	07/22
Vehicle Type	MPV

GVWR	2740
GVWR Front	1285
GVWR Rear	1540

VEHICLE SEATING AND WEIGHT CAPACITY DATA

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

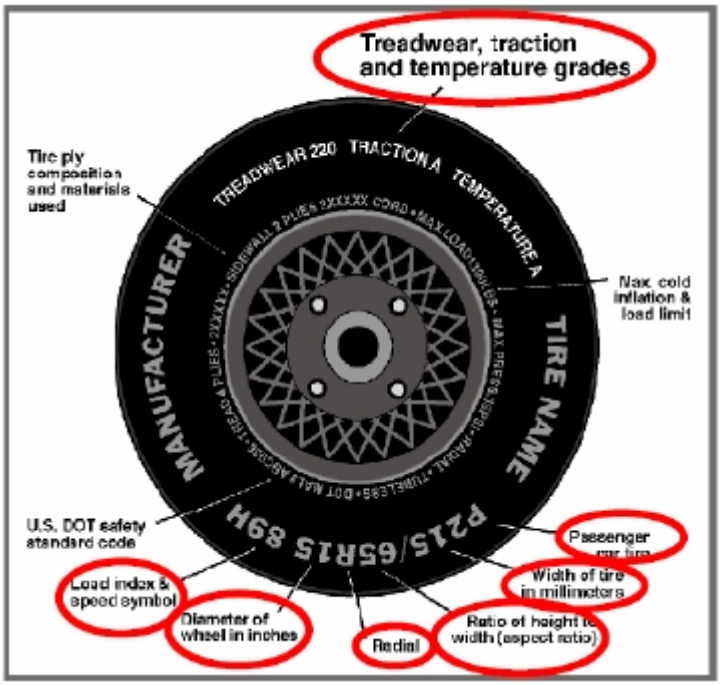
VEHICLE SEAT TYPE

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

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	300	300
Recommended Tire Size	235/50R20	255/45R20
Tire Size on Vehicle	235/50R20	255/45R20
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Alenza Sport	Alenza Sport
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyester	1 Polyester, 2 Steel, 2 Nylon
Load Index / Speed Symbol	104T	105T
Tire Material	Rubber	Rubber
DOT Safety Code Left	2761004EX2622	2761004EY2522
DOT Safety Code Right	2761004EX2622	2761004EY2522

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	305	310	307	310
Tire Placard	kPa	300	300	300	300
Owner's Manual	kPa	300	300	300	300
As Tested	kPa	300	300	300	300

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	550	581.5		559.5	634.5		551	661.5	
Right	kg	561.5	562.5		581	607		559	612	
Ratio	%	49	51		47.9	52.1		47	53	
Totals	kg	1111.5	1144	2255.5	1140.5	1241.5	2382	1110	1273.5	2383.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2255.5	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	84.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2390.3	(A+B+C)

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

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

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	+0.30	+0.10	+0.10	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.30	-0.25	+0.25	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.05	-0.05	-0.0	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	+0.05	+0.10	+0.15	Yes
Vehicle CG (Aft of Front Axle)	mm	1403	1442	1478	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	3	2	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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	19
Rear Speaker	2.5
Tool Kit & Compressor	2
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	953
Aft 25 mm target	953

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022

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	21.9	12.4	17.2
Front Passenger Seat	22.4	12.8	17.6
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	17.2	48	Max	70	77	82
			Mid	36	42	48
			Min	2	8	14
Front Passenger Seat	17.6	45	Max	69	74	79
			Mid	35	40	45
			Min	1	5	11
Front Center Seat*			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	Fixed	Fixed	Max			
			Mid			
			Min			

**If applicable*

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

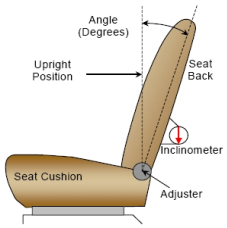
Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	246	Power	0	Power
Front Passenger Seat	208	Power	0	Power
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

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.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat	61.2	Power	2.6	Power
Front Passenger Seat	60.3	Power	2.4	Power
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

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

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	7 (0-6)	Lowermost

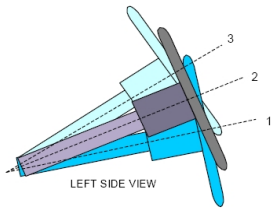
DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

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	19.7	
Geometric center position No. 2	22.4	
Uppermost position No. 3	25.1	
Telescoping Steering Wheel Travel		58
Test Position	22.4	29

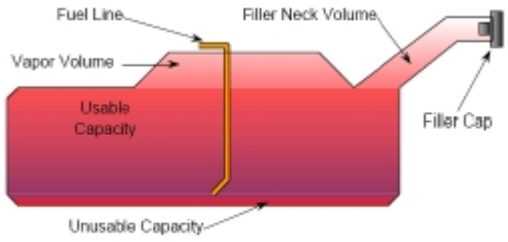


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is equipped with an electric charge port. The charge port is on the right rear of the vehicle.



VEHICLE FUEL TANK ASSEMBLY

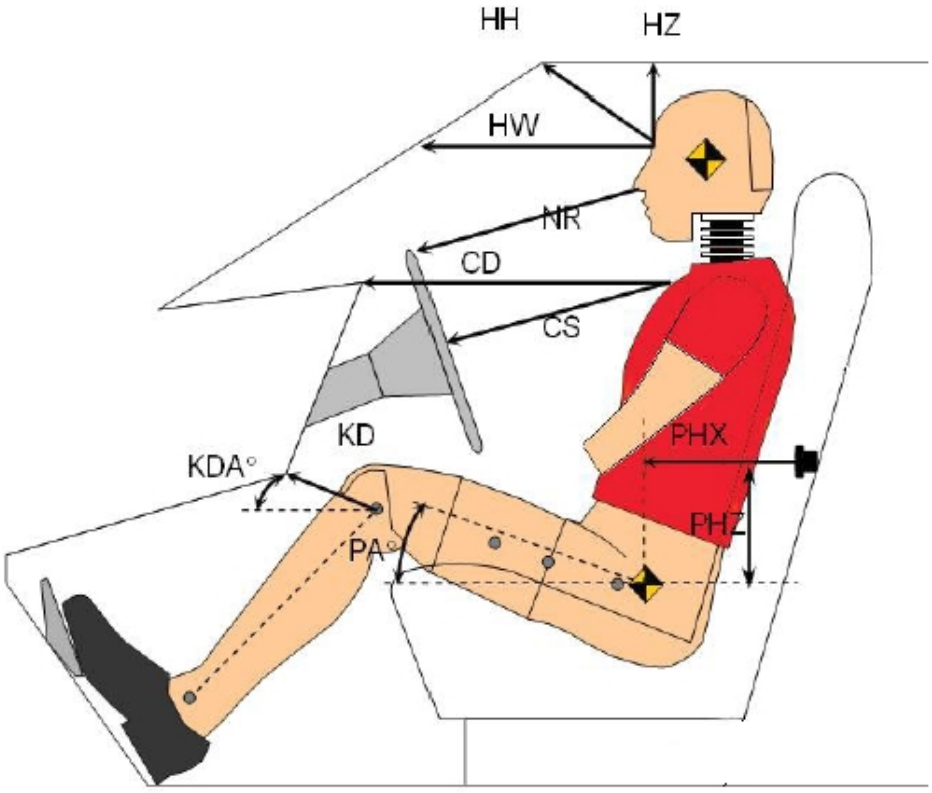
FUEL TANK CAPACITY

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

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022



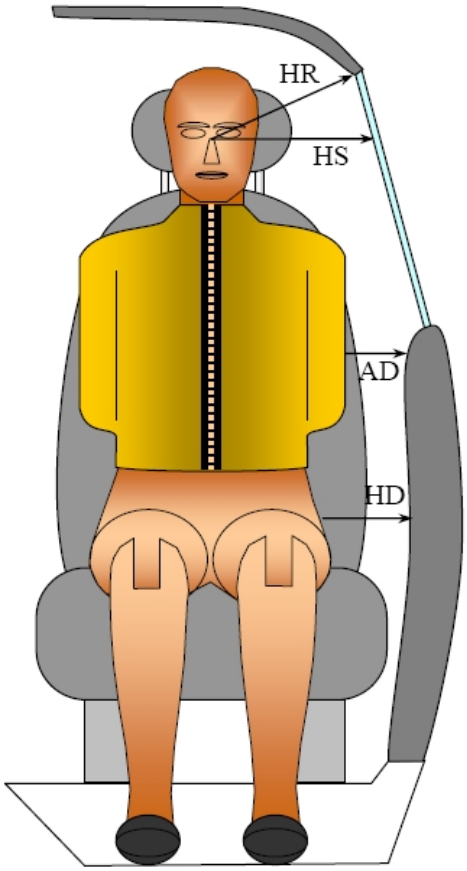
Left Side View

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	338	
HW	Head to Windshield	714	
HZ	Head to Roof Liner	231	
NR	Nose to Rim	254	
CD	Chest to Dash	463	
CS	Chest to Steering Wheel	212	
KD(L) / KDA(L)◦	Left Knee to Dash	202	36.8
KD(R) / KDA(R)◦	Right Knee to Dash	207	44.5
PAX◦	Pelvic Tilt Angle (X-Axis)		20.1
PAY◦	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	307	
PHZ	Hip Point to Striker (Z-Axis)	195	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022



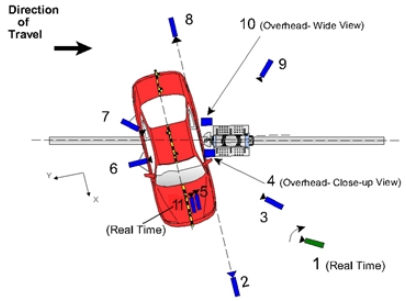
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver – Length (Serial No. DG8012)
HR	Head to Side Header	mm	279
HS	Head to Side Window	mm	389
AD	Arm to Door	mm	176
HD	H-Point to Door	mm	177

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022



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	0	-7921	-1488	28	1000
3	Impact side 45º - forward pole view	4263	-5123	-1498	24	1000
4	Overhead Close-up view of impact	0	0	-9159	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	0	7369	-1451	28	1000
9	Impact side 45º - rearward pole view	918	5312	-1459	24	1000
10	Overhead wide - view of impact	0	-310	-9159	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 75º angle to the rigid pole.*

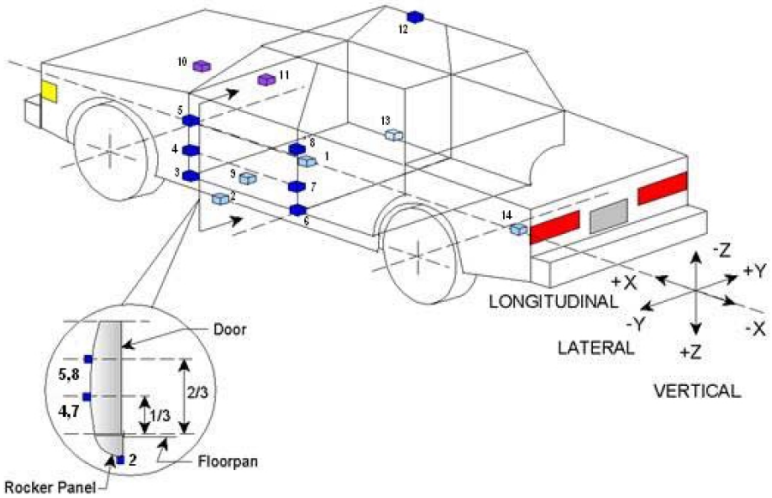
Comments: All cameras operated as intended.

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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1860	16	48
2	Left Floor Sill	2946	-654	29
3	A-Pillar Sill	3158	-630	26
4	A-Pillar Low	3335	-625	-225
5	A-Pillar Mid	3167	-660	-701
6	B-Pillar Sill	2005	-647	41
7	B-Pillar Low	2162	-689	-136
8	B-Pillar Mid	2081	-678	-570
9	Seat	2541	-612	-26
10	Engine	4014	33	-452
11	Firewall	3691	-113	-483
12	Roof	2303	605	-1149
13	Right Floor Sill	2749	650	32
14	Rear Deck	1141	64	-148

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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

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: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Seatback & Head Restraint
Left Shoulder	Curtain Airbag & Torso/Pelvis Airbag
Upper Torso	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback & Torso/Pelvis Airbag
Left Hip	Seat Pan & Driver Door
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: 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test Test Date: 10/12/2022

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks along Driver A-Pillar
Side Window Damage	Driver Window has cracks throughout
Other Notable Effects	Left Rear Window opened approximately 50 mm

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No	No	N/A
Knee Airbag	No	N/A	No	N/A
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other	N/A	N/A	N/A	N/A

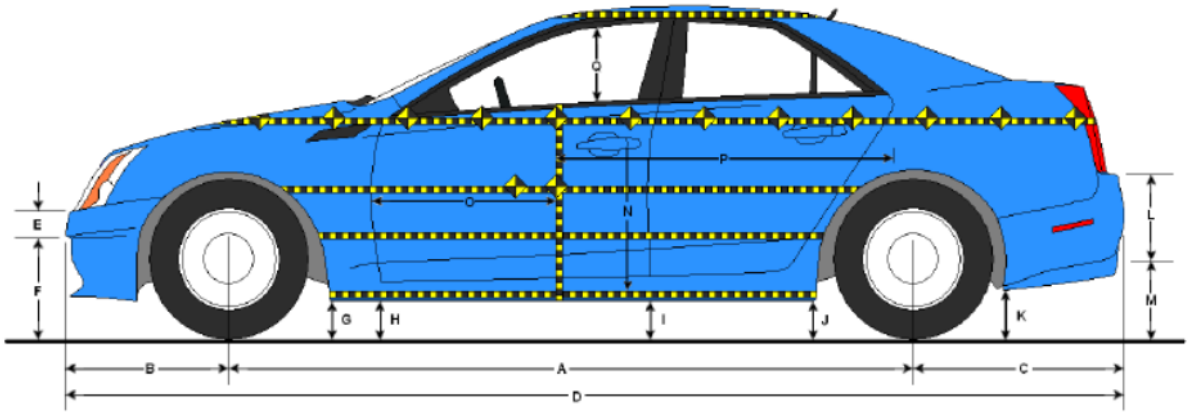
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1164
Actual Impact Point - Aft of Front Axle	mm		1169
Horizontal Offset (+ forward / - rearward)	mm	+/- 38	-5
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	32.12
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.14

*Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

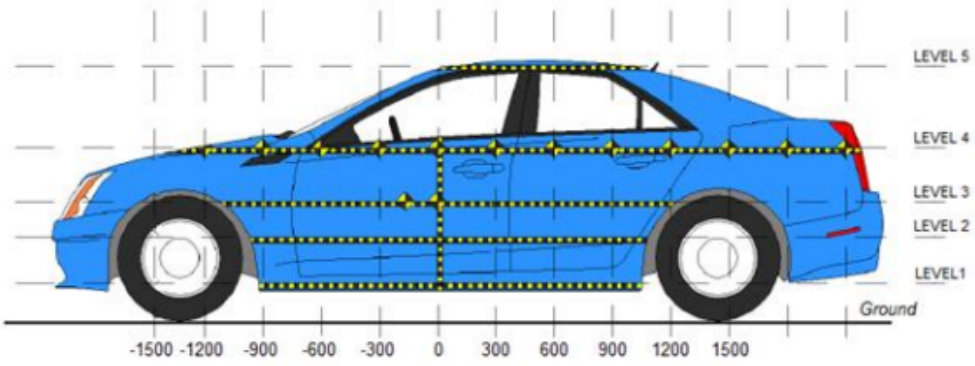
No.	Measurement Description	Pre-Test	Post-Test	Change
A	Vehicle Wheelbase	2766	2765	-1
B	Front Axle to FSOV	855	861	6
C	Rear Axle to RSOV	975	967	-8
D	Total Vehicle Length at Centerline	4595	4593	-2
E	Front Bumper Thickness	170	170	0
F	Front Bumper Bottom to Ground	288	288	0
G	Sill Height at Front Wheel Well	228	232	4
H	Sill Height at Front Door Leading Edge	231	239	8
I	Sill Height at B Pillar	233	220	-13
J1	Sill Height at Rear Wheel Well	235	233	-2
J2	Pinch Weld Height at Rear Wheel Well	220	215	-5
K	Sill Height Aft of Rear Wheel Well	280	276	-4
L	Rear Bumper Thickness	150	150	0
M	Rear Bumper Bottom to Ground	441	432	-9
N	Sill Height to Window Bottom Sill	881	882	1
O	Front Door Leading Edge to Impact CL	689	668	-21
P	Rear Door Trailing Edge to Impact CL	1423	1408	-15
Q	Front Window Opening	404	398	-6
R	Right Side Length	4514	4536	22
S	Left Side Length	4517	4498	-19
T	Vehicle Width at B-Pillars	1859	1848	-11
U	Front Wheel Track width	1580	1578	-2
V	Rear Wheel Track Width	1566	1562	-4

* All measurements in mm with tolerance of ± 3mm

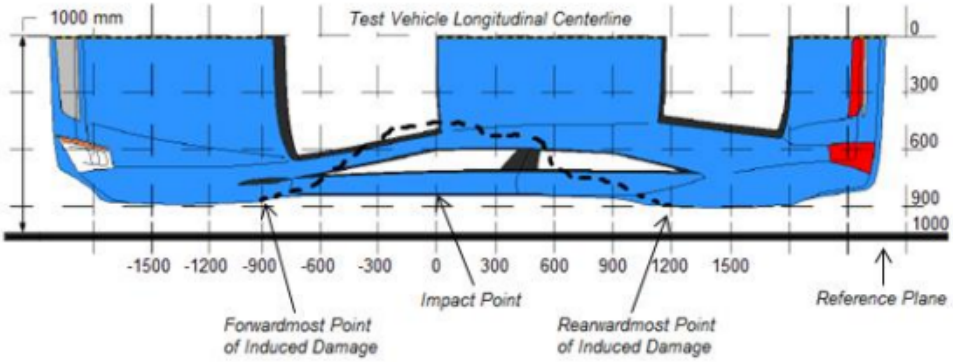
DATA SHEET NO.10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

MAXIMUM EXTERIOR CRUSH MEASUREMENTS



Left Side View



Overhead View

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	300	75	0
2	Occupant H-Point	mm	680	157	0
3	Mid-Door	mm	771	166	0
4	Window Sill	mm	1073	124	0
5	Window Top	mm	1558	9	150

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: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022

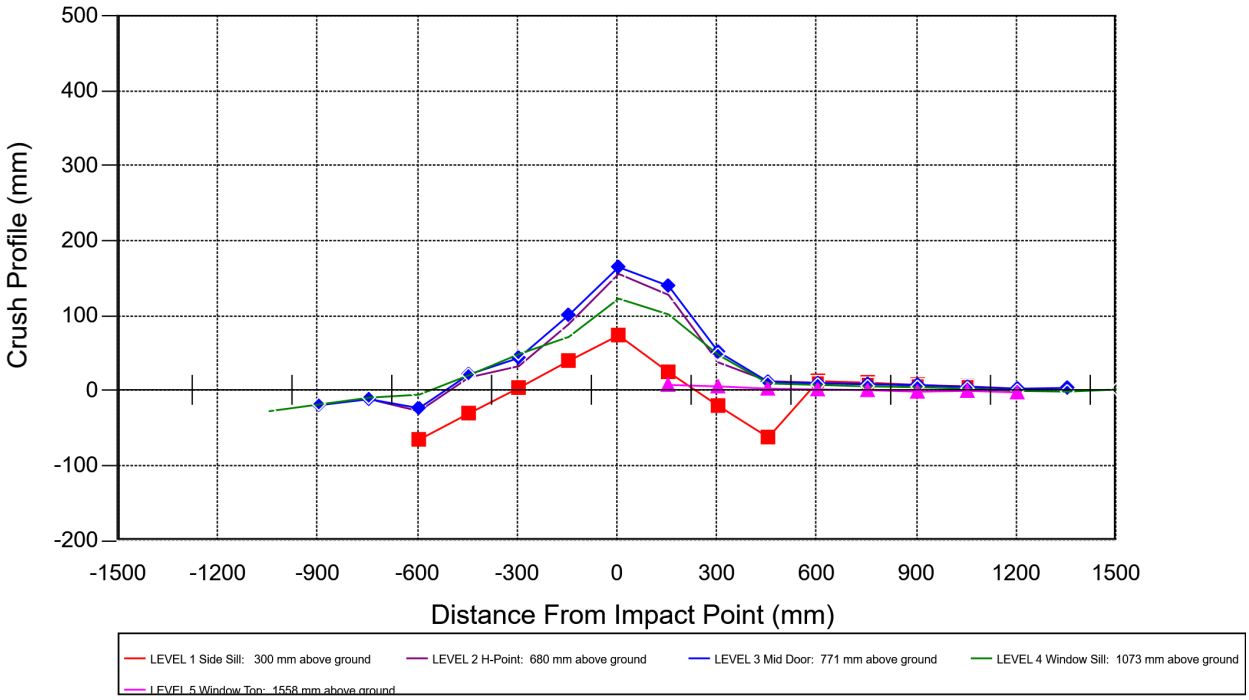
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050				821					847					-26	
-900			933	834				951	851				-18	-17	
-750		929	934	840			939	944	848			-10	-10	-8	
-600	906	928	928	843		970	954	950	847		-64	-26	-22	-4	
-450	908	923	924	848		937	904	901	826		-29	19	23	22	
-300	903	919	921	844		898	885	876	794		5	34	45	50	
-150	903	916	919	848		862	826	817	775		41	90	102	73	
0	903	916	919	854		828	759	753	730		75	157	166	124	
150	892	915	918	857	632	866	786	777	754	623	26	129	141	103	9
300	890	913	916	859	637	909	874	863	810	630	-19	39	53	49	7
450	887	911	913	860	638	948	897	900	849	634	-61	14	13	11	4
600	882	909	910	858	635	868	897	899	849	632	14	12	11	9	3
750	878	906	907	855	631	866	896	897	848	629	12	10	10	7	2
900	889	906	906	852	623	880	898	897	846	623	9	8	9	6	0
1050	892	910	909	848	612	885	903	903	844	611	7	7	6	4	1
1200		902	915	854	588		898	911	853	589	0	4	4	1	-1
1350			910	859				905	859		0	0	5	0	0
1500				863					860		0	0	0	3	0

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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

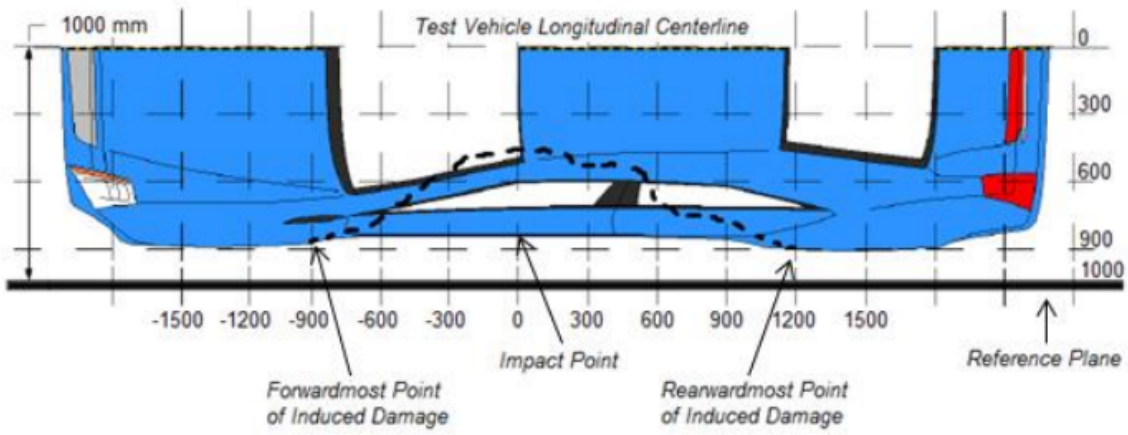


Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.11
VEHICLE DAMAGE PROFILE DISTANCE

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

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



Overhead View

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-900	3	49	67	-18
2	-450	3	99	76	23
3	0	3	247	81	166
4	450	3	100	87	13
5	900	3	103	94	9
6	1350	3	95	90	5

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

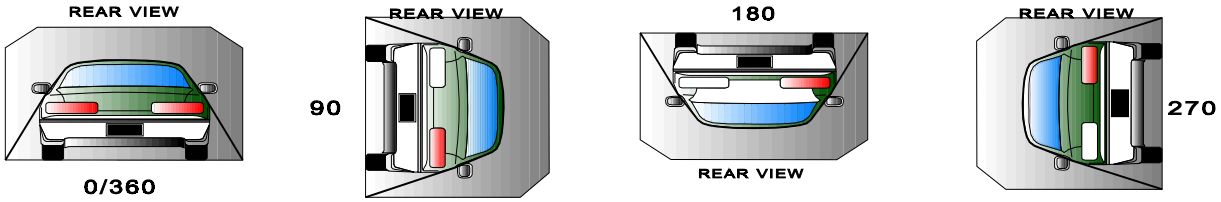
Test Time: 3:22 PM Temperature: 21 °C

A. From impact until vehicle motion ceases: 0 oz
(Maximum allowable is 1 oz.)

B. For the 5-minute period after motion ceases: 0 oz
(Maximum allowable is 5 oz.)

C. For the following 25 minutes: 0 oz
(Maximum allowable is 1 oz.)

D. Spillage Detail: No Spillage Occurred



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	73	300	373
90° to 180°	68	300	368
180° to 270°	64	300	364
270° to 360°	72	300	372

FMVSS 301 SPILLAGE TABLE

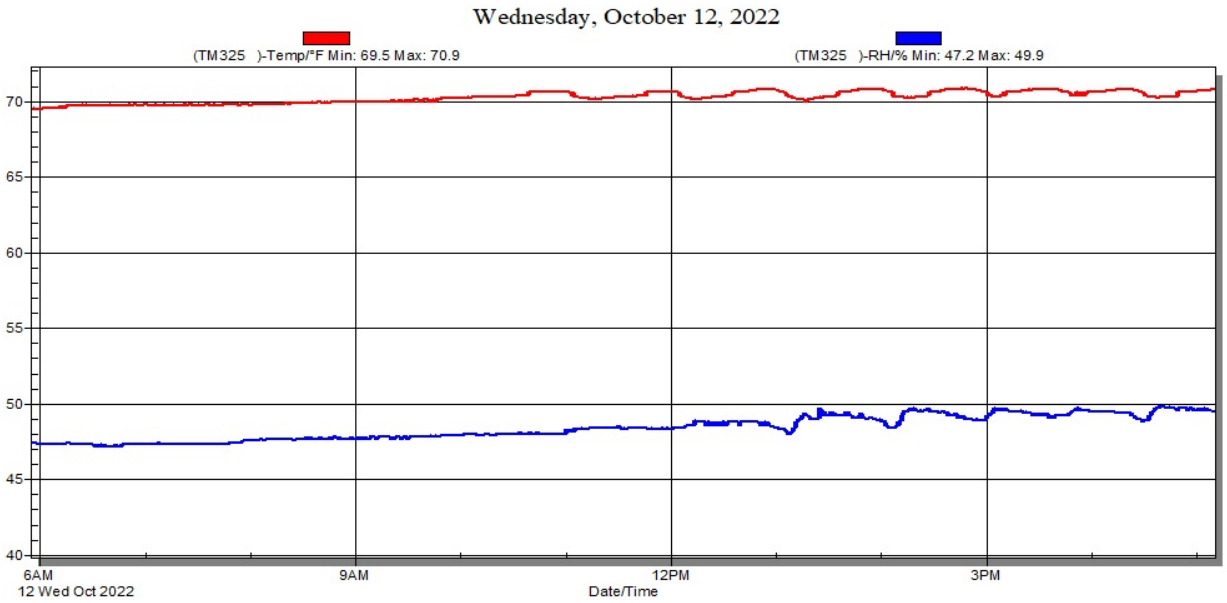
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022



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

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test Test Date: 10/12/2022

ELECTRIC VEHICLE PROPULSION SYSTEM

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

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

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

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	240
Maximum State of Charge	V	408
95% of Maximum	V	387.6
Test Voltage *	V	375.9
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

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

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

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

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Ground point is located under the hood on the vehicle chassis.
Details of Propulsion Battery Components	Installed the new HV-Adapter box between the HV battery and the PTC (electric heater) located under the vehicle hood in the engine compartment. This box have two extra outputs for measurement the positive and negative points for automatic disconnect and propulsion battery.

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test Test Date: 10/12/2022

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Resolution	V	0.0001
Last Calibration Date		04/28/2022
Propulsion Battery Voltage	V	0.97

NOTES:

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

PROPULSION BATTERY VOLTAGE, RESISTANCE & ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	240-408
Propulsion Battery Voltage: (ready to drive position)	V_b	V	374.9
Propulsion Battery to Vehicle Chassis	V_1	V	298.0
Propulsion Battery to Vehicle Chassis	V_2	V	301.0
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	200,000
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	63.7
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	64.6
$_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	1,478,677
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	1,456,483
Lesser value of R_{i1} and R_{i2}	R_i	Ω	1,456,483
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	3,885

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

NOTES:

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

If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant

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

Test Vehicle:	2022 Audi Q4 e-tron quattro 5 Door SUV	NHTSA No.:	M20225801
Test Program:	NCAP Side Pole Impact Test	Test Date:	10/12/2022

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Calibration Date		04/28/2022
Propulsion Battery Voltage (Vb)	V	0.97

NOTES:

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

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V_b =	0.965	V	Time:	23	Minutes	3	Seconds
V_1 =	0.595	V	Time:	23	Minutes	8	Seconds
V_2 =	0.570	V	Time:	23	Minutes	12	Seconds
R_o =	200,000	Ω					
V_1' =	0.127	V	Time:	23	Minutes	16	Seconds
V_2' =	0.374	Ω	Time:	23	Minutes	22	Seconds
R_{i1} =	1,443,049	Ω	Time:	23	Minutes	16	Seconds
R_{i2} =	214,223	Ω	Time:	23	Minutes	22	Seconds
R_i =	214,223	Ω/V	Time:	23	Minutes	22	Seconds
R_i/V_b =	221,992	Ω/V	Time:	23	Minutes	22	Seconds

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

NOTES:

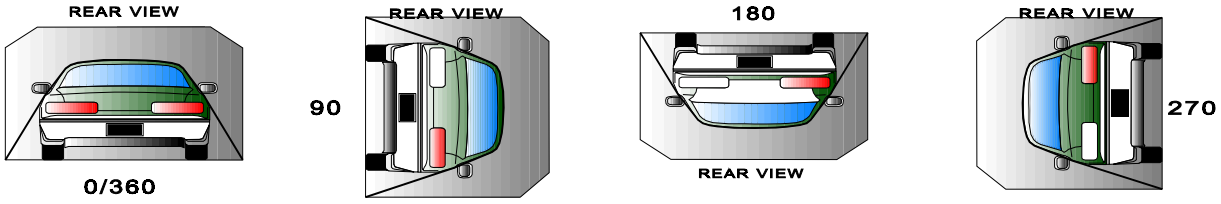
- *R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1'], R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2'], R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical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

PROPULSION BATTERY SYSTEM COMPONENTS

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

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV
NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test
Test Date: 10/12/2022



Rear View

DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1 -3 min)		FMVSS 301 Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	13	5	6	13	7
90° to 180°	1	8	5	6	8	7
180° to 270°	1	4	5	6	4	7
270° to 360°	1	12	5	6	12	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0	Liters	None
90° to 180°	0	Liters	None
180° to 270°	0	Liters	None
270° to 360°	0	Liters	None
Total Spillage	0	Liters	None

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

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

Is propulsion battery electrolyte spillage visible in the passenger compartment? [ ] Yes (Fail) [X] No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Calibration Date		04/28/2022
Propulsion Battery Voltage (Vb)	V	0.97

NOTES:

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

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

Test Vehicle: 2022 Audi Q4 e-tron quattro 5 Door SUV NHTSA No.: M20225801
Test Program: NCAP Side Pole Impact Test Test Date: 10/12/2022

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units		Minutes	Seconds
V_b =	90°	0.23	V	Time:	1	9
	180°	0.25	V		10	38
	270°	0.13	V		16	46
	360°	0.39	V		23	1
V_1 =	90°	0.09	V	Time:	1	18
	180°	0.24	V		10	50
	270°	0.26	V		16	53
	360°	0.05	V		23	22
V_2 =	90°	0.04	V	Time:	1	23
	180°	0.36	V		10	55
	270°	0.37	V		16	59
	360°	0.08	V		23	27
V_1' =	90°	0.01	V	Time:	1	37
	180°	0.01	V		10	59
	270°	0.37	V		17	5
	360°	0.00	V		23	33
V_2' =	90°	0.01	V	Time:	1	43
	180°	0.02	V		11	4
	270°	0.03	V		17	9
	360°	0.00	V		23	45
R_{i1} =	90°	2,219,101	Ω	Time:	1	37
	180°	8,639,302	Ω		10	59
	270°	17,257,701	Ω		17	5
	360°	253,470,833	Ω		23	33
R_{i2} =	90°	3,472,222	Ω	Time:	1	43
	180°	5,918,924	Ω		11	4
	270°	3,799,726	Ω		17	9
	360°	253,678,481	Ω		23	45
R_i =	90°	2,219,101	Ω	Time:	1	37
	180°	5,918,924	Ω		11	4
	270°	3,799,726	Ω		17	9
	360°	253,470,833	Ω		23	33
R_i/V_b =	90°	9,819,032	Ω/V	Time:	10	59
	180°	24,060,666	Ω/V		11	4
	270°	29,455,241	Ω/V		17	9
	360°	648,263,001	Ω/V		1	43

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

APPENDIX A

PHOTOGRAPHS

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



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



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

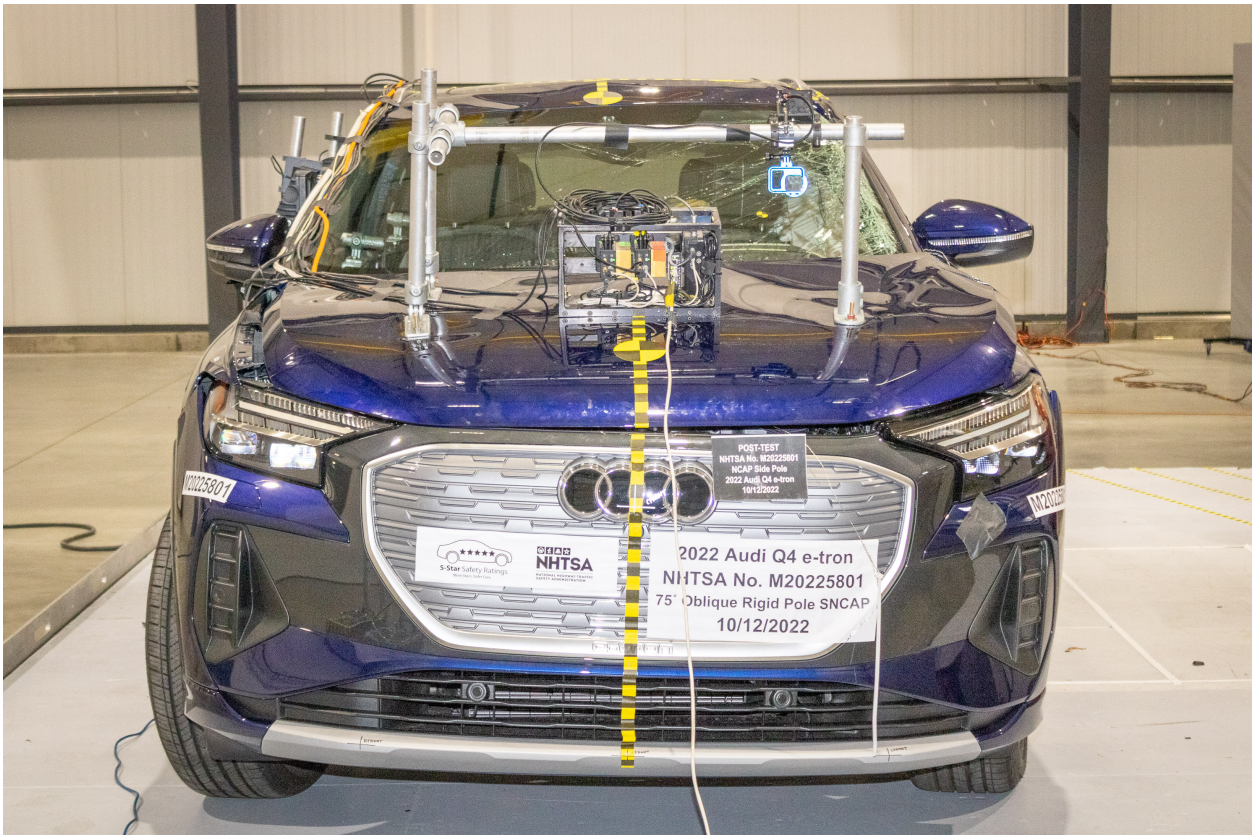


Figure A-4: Post-Test Frontal View of Test Vehicle

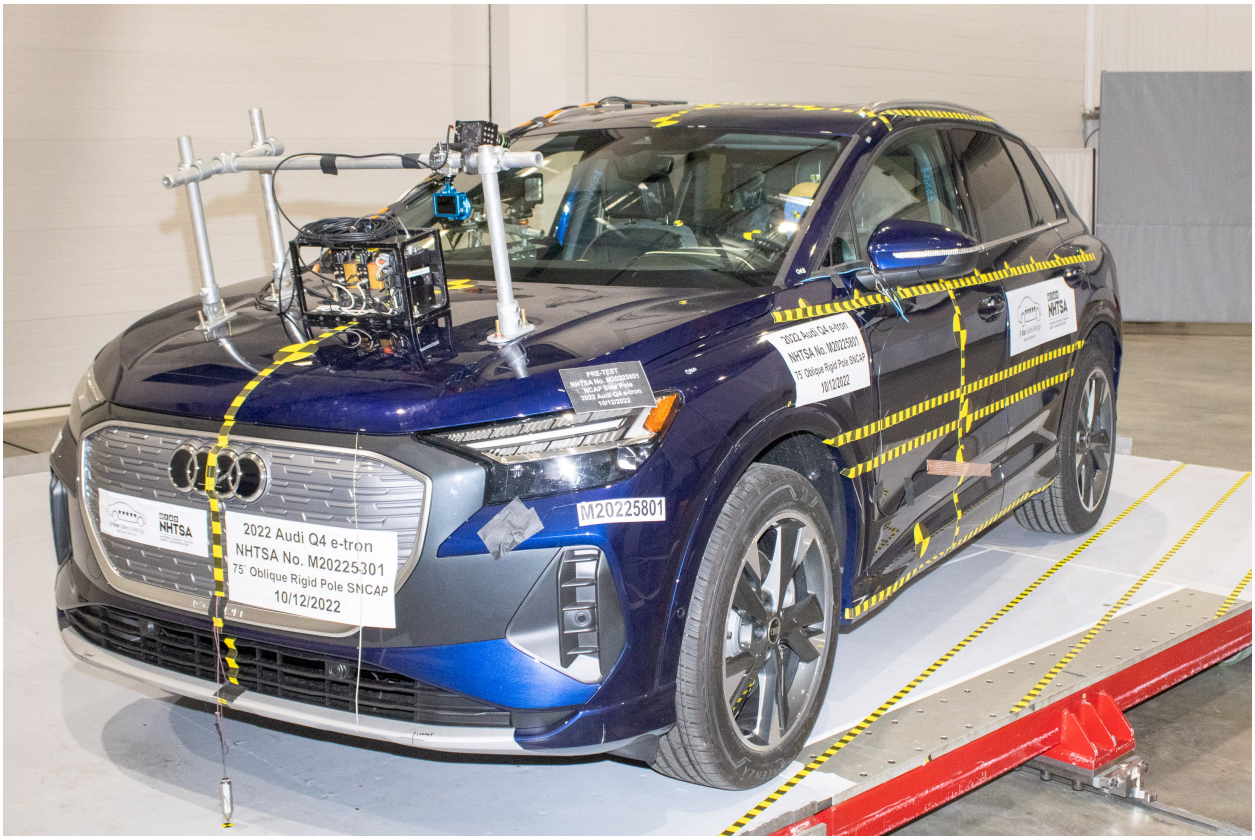


Figure A-5: Pre-Test Left Front ¾ View of Test Vehicle



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



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



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



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



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



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

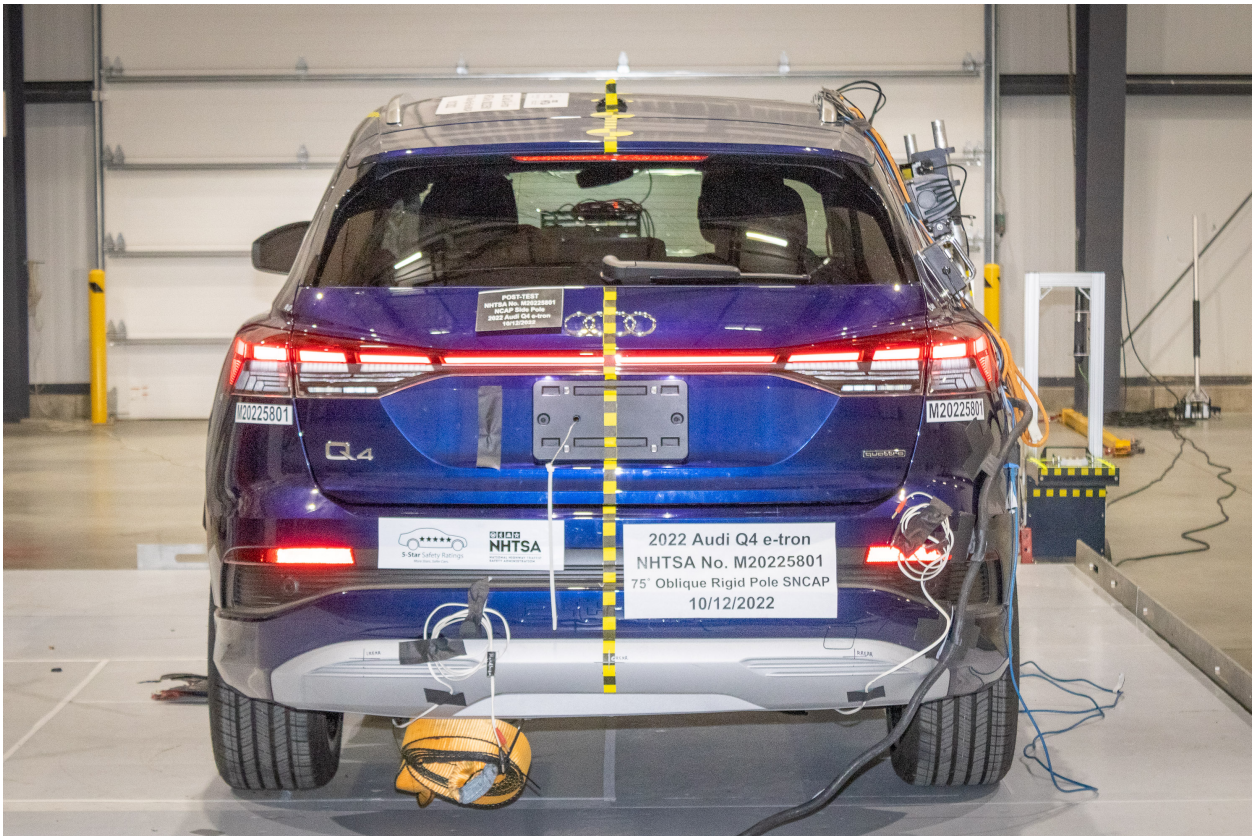


Figure A-12: Post-Test Rear View of Test Vehicle



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



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

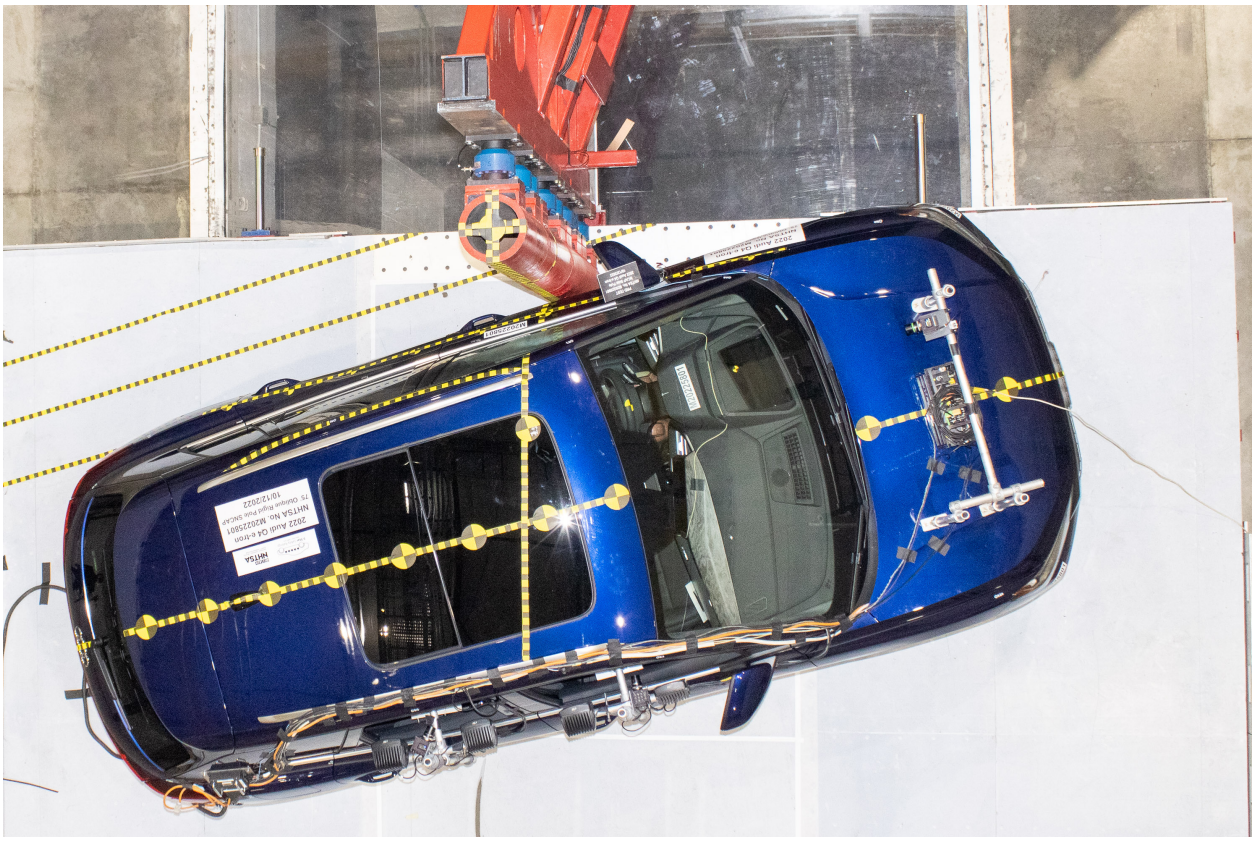


Figure A-15: Pre-Test Overhead View of Test Area

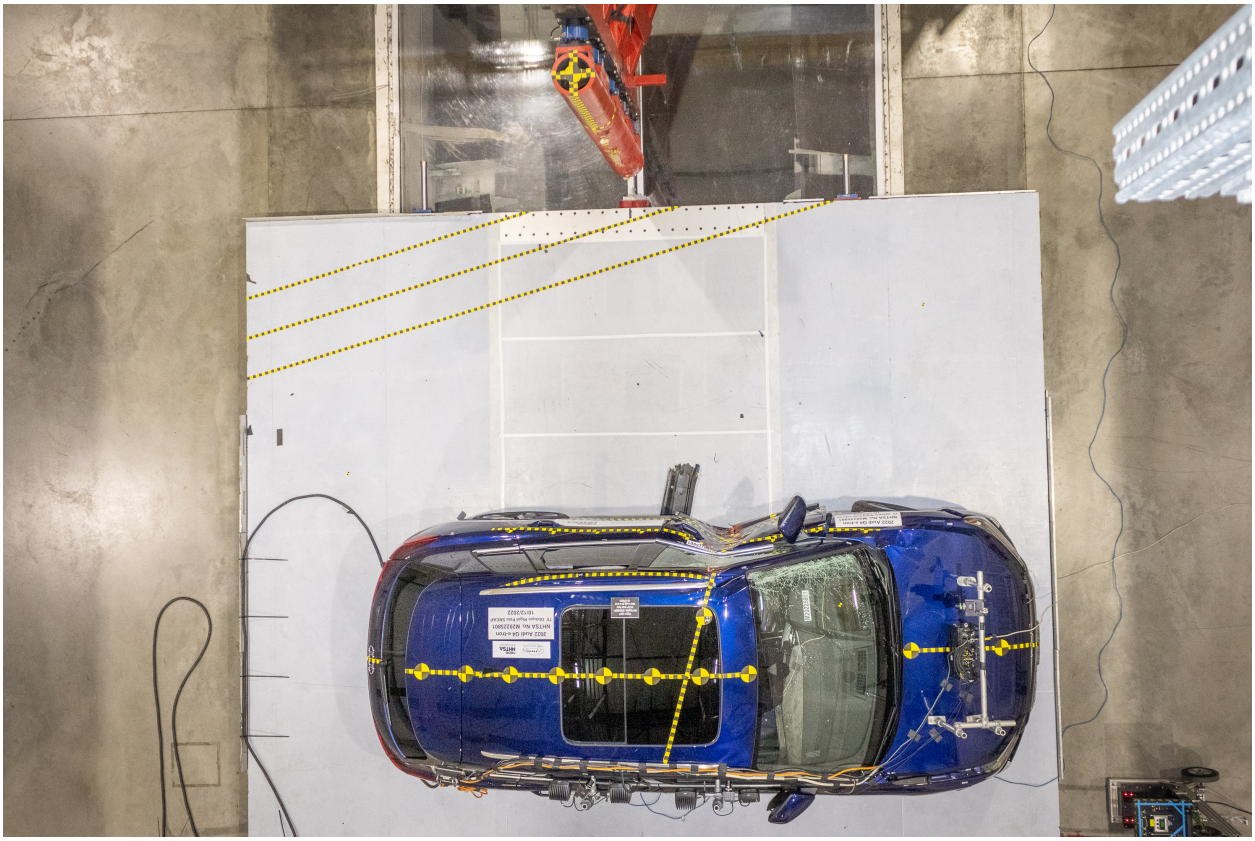


Figure A-16: Post-Test Overhead View of Test Area



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

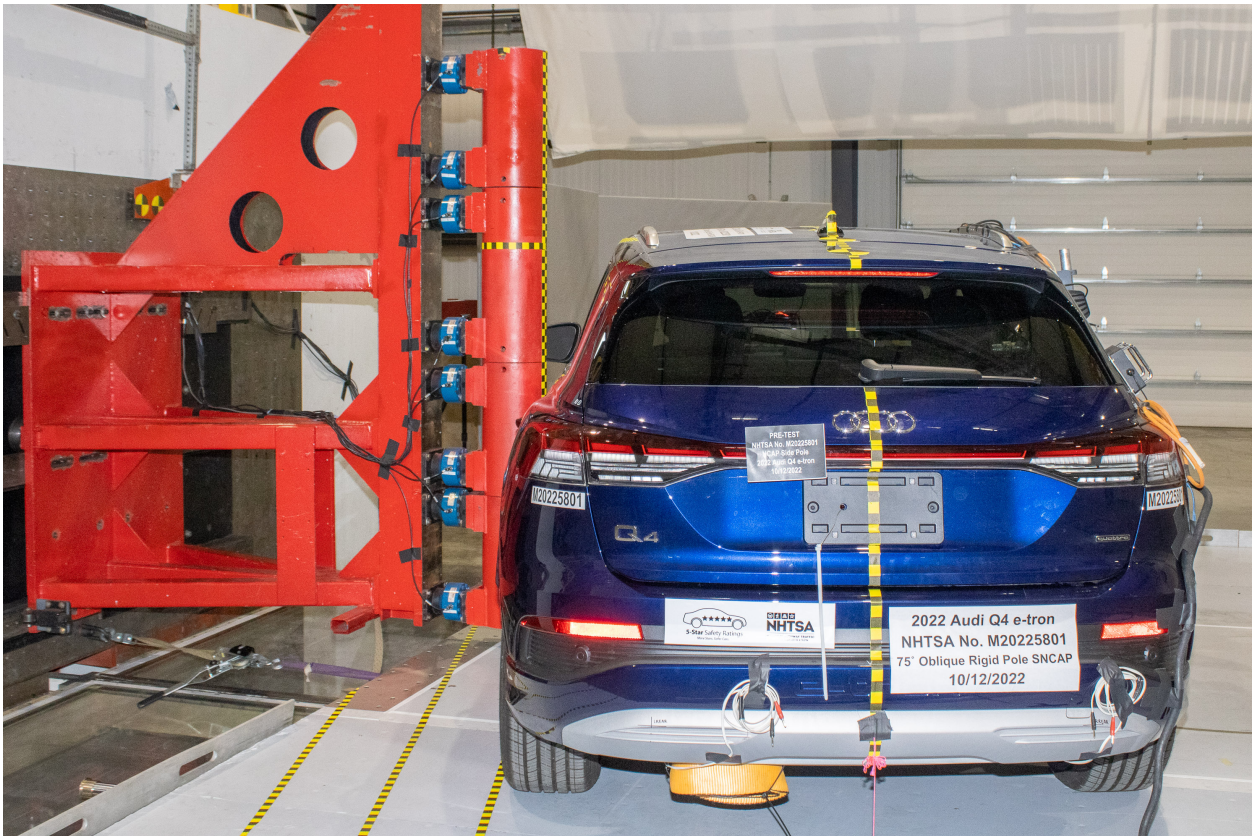


Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



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

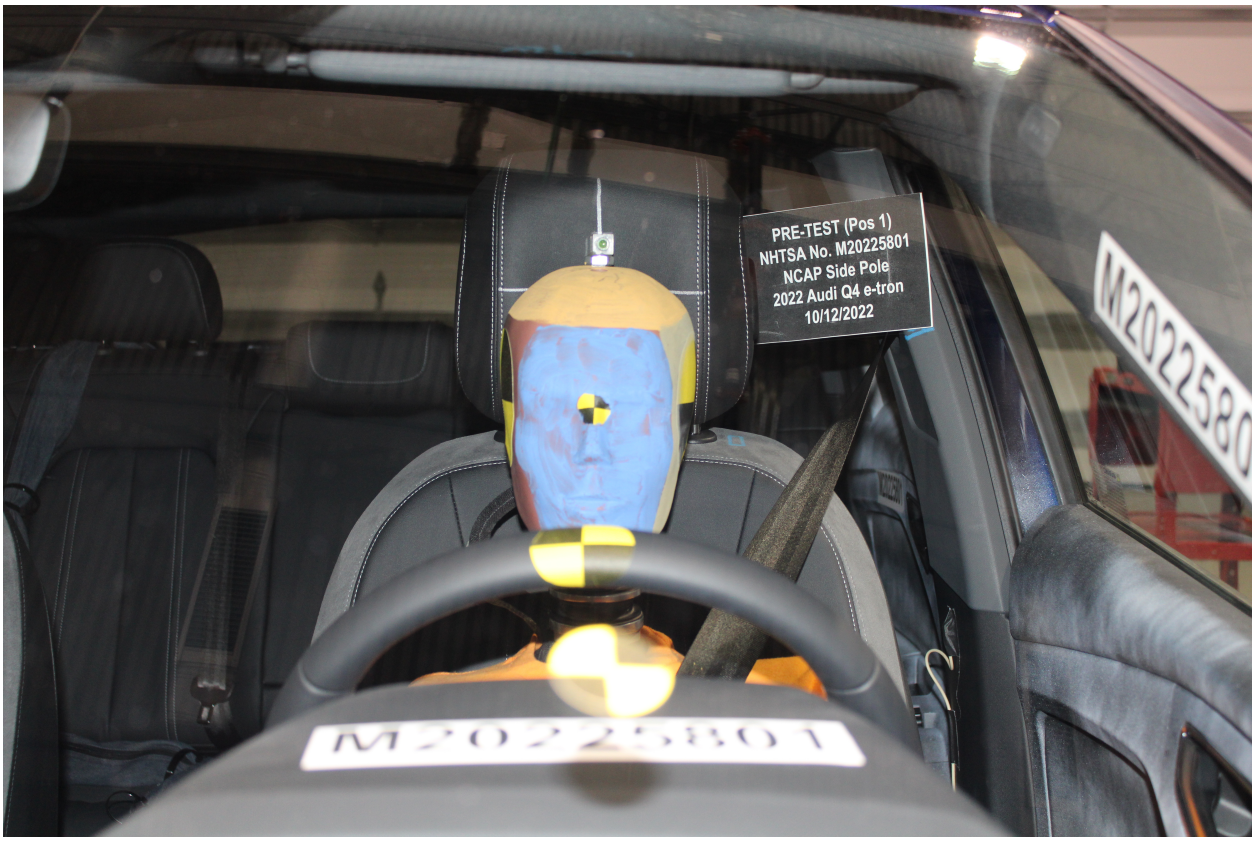


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest



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

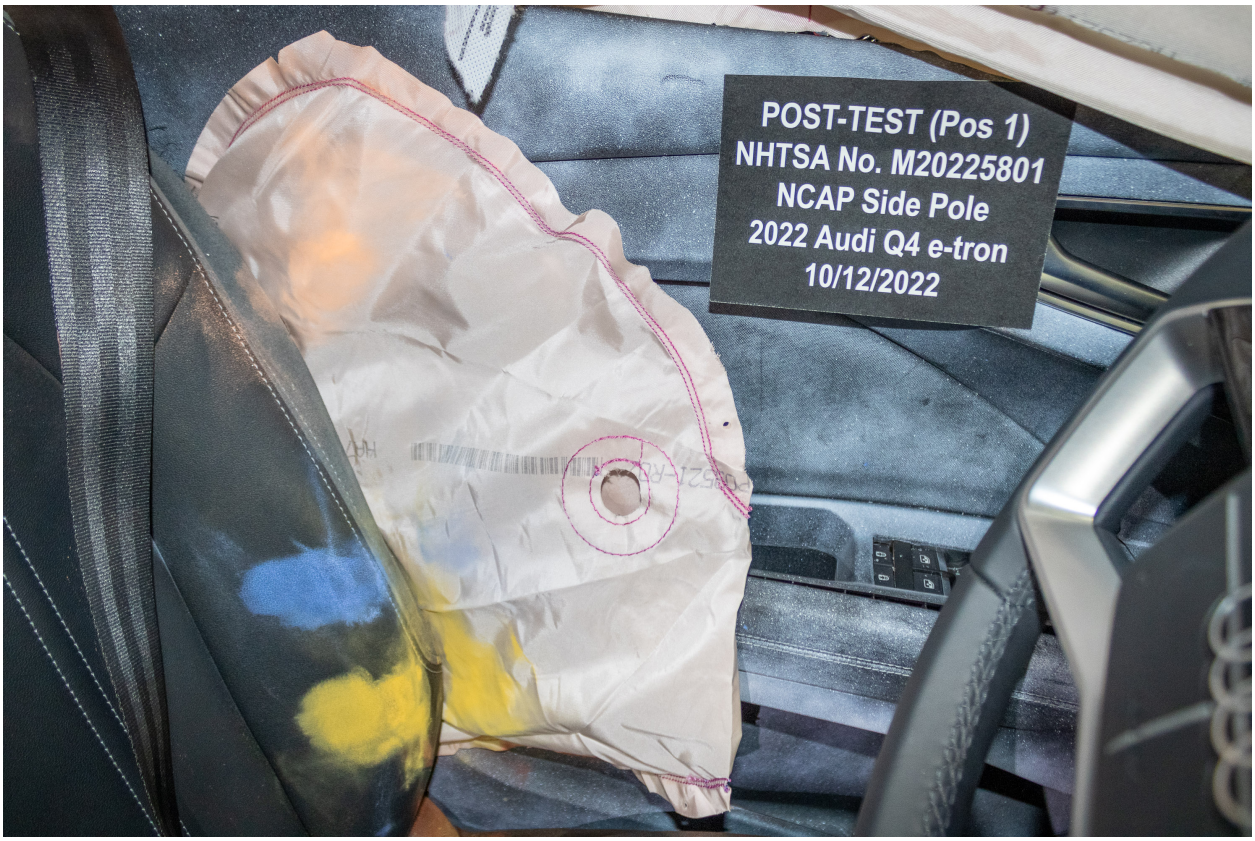


Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



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

Photo Not Applicable

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 Charging Port



Figure A-56: Post-Test Charging Port



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

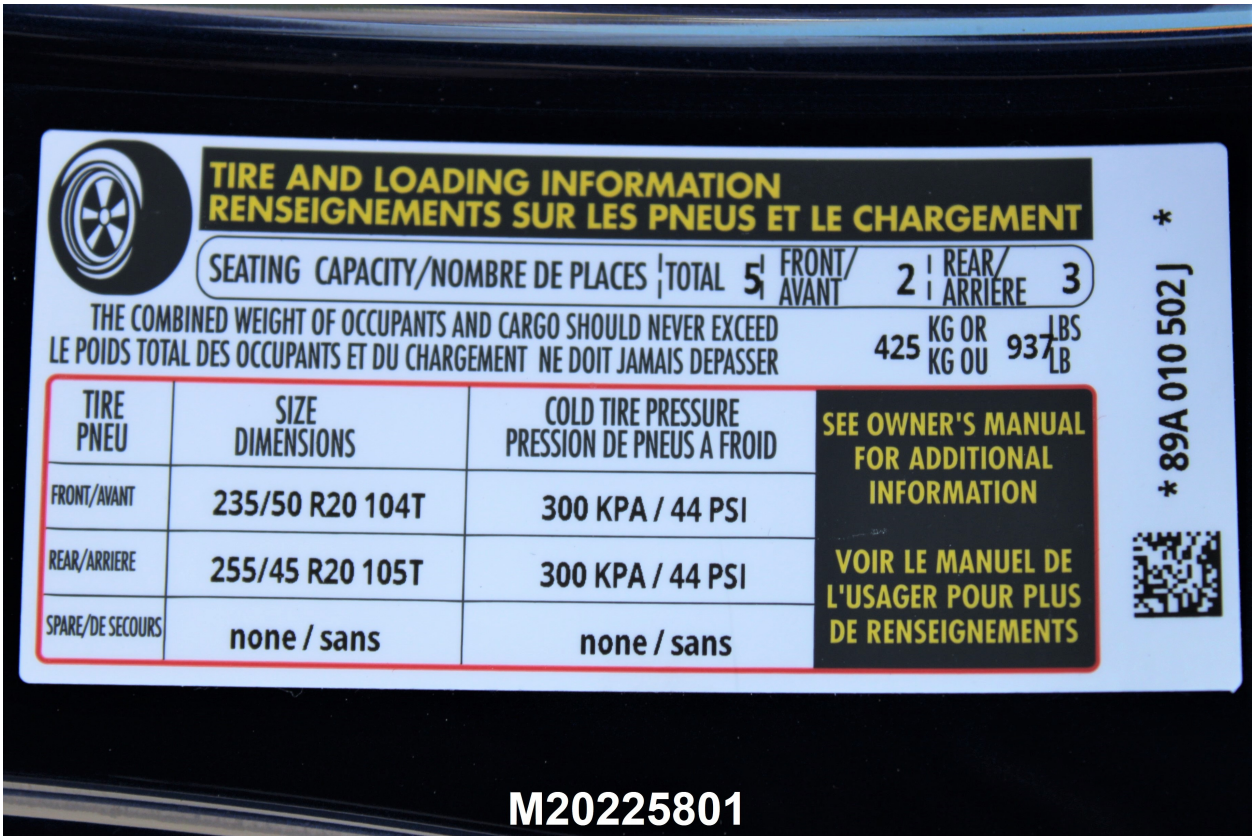


Figure A-58: Close-Up View of Vehicle's Tire Information Placard or Label

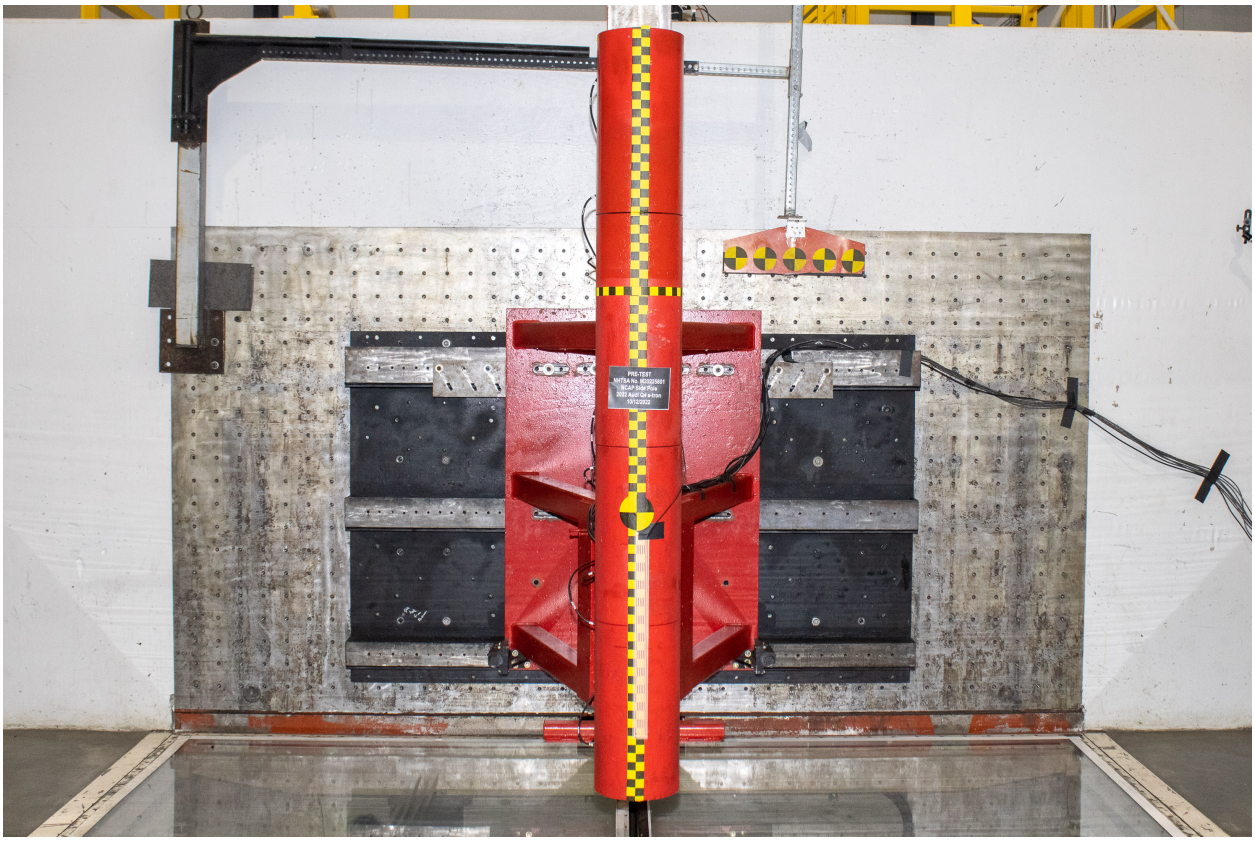


Figure A-59: Pre-Test Pole Barrier Front View

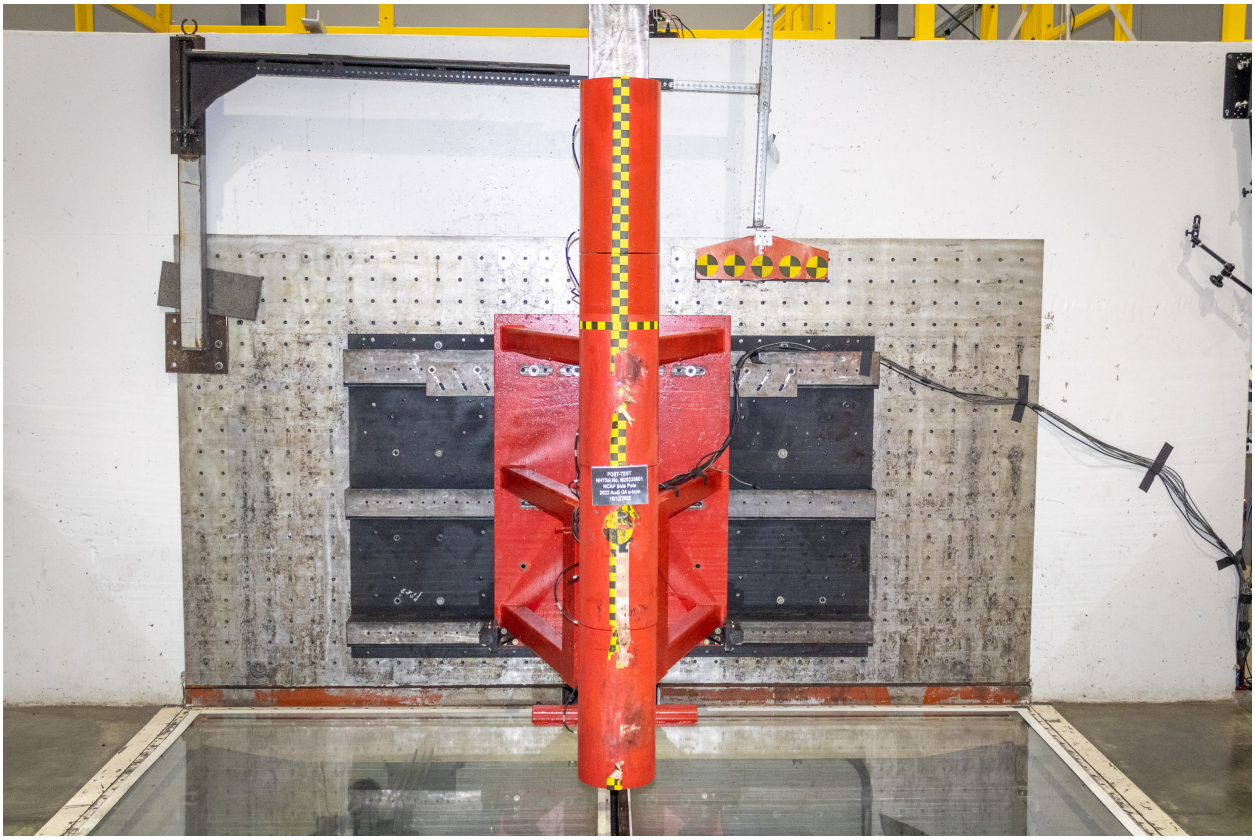


Figure A-60: Post-Test Pole Barrier Front View

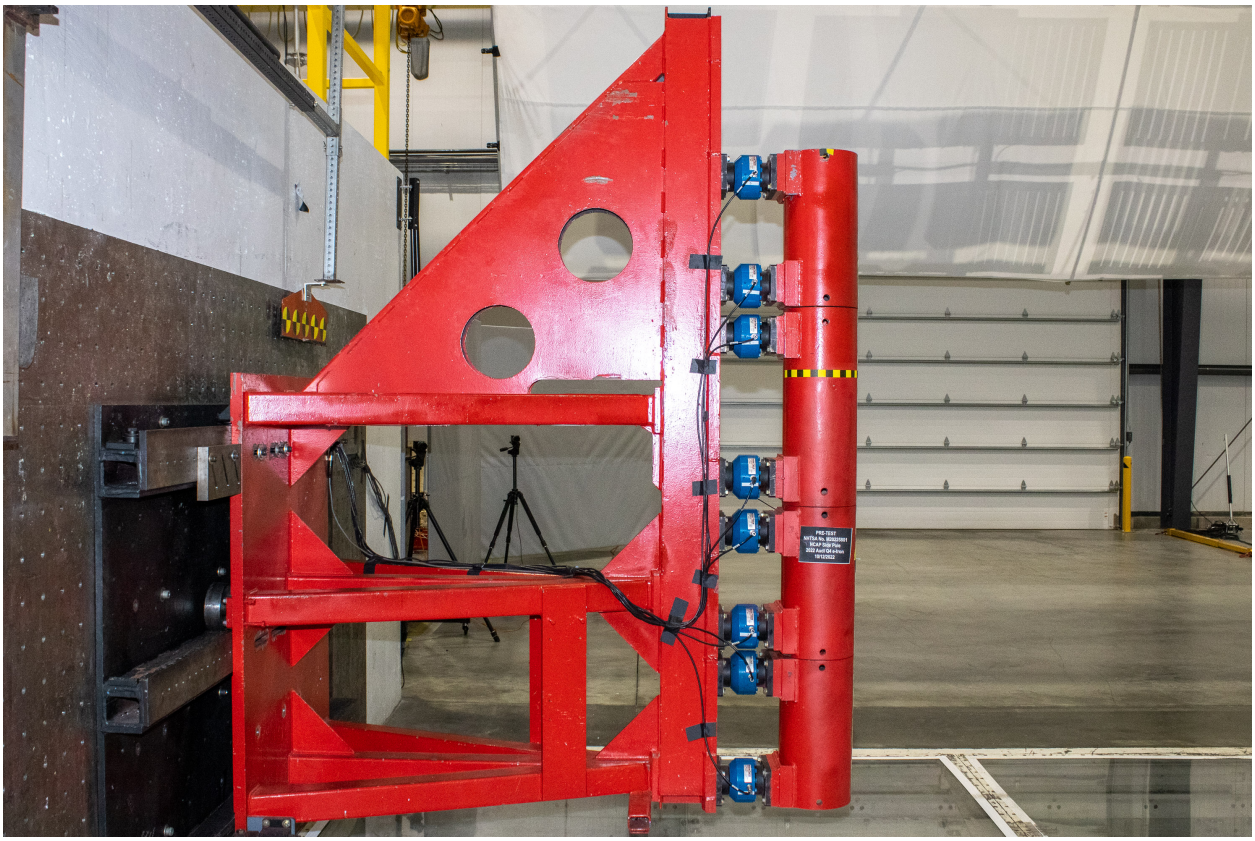


Figure A-61: Pre-Test Pole Barrier Side View

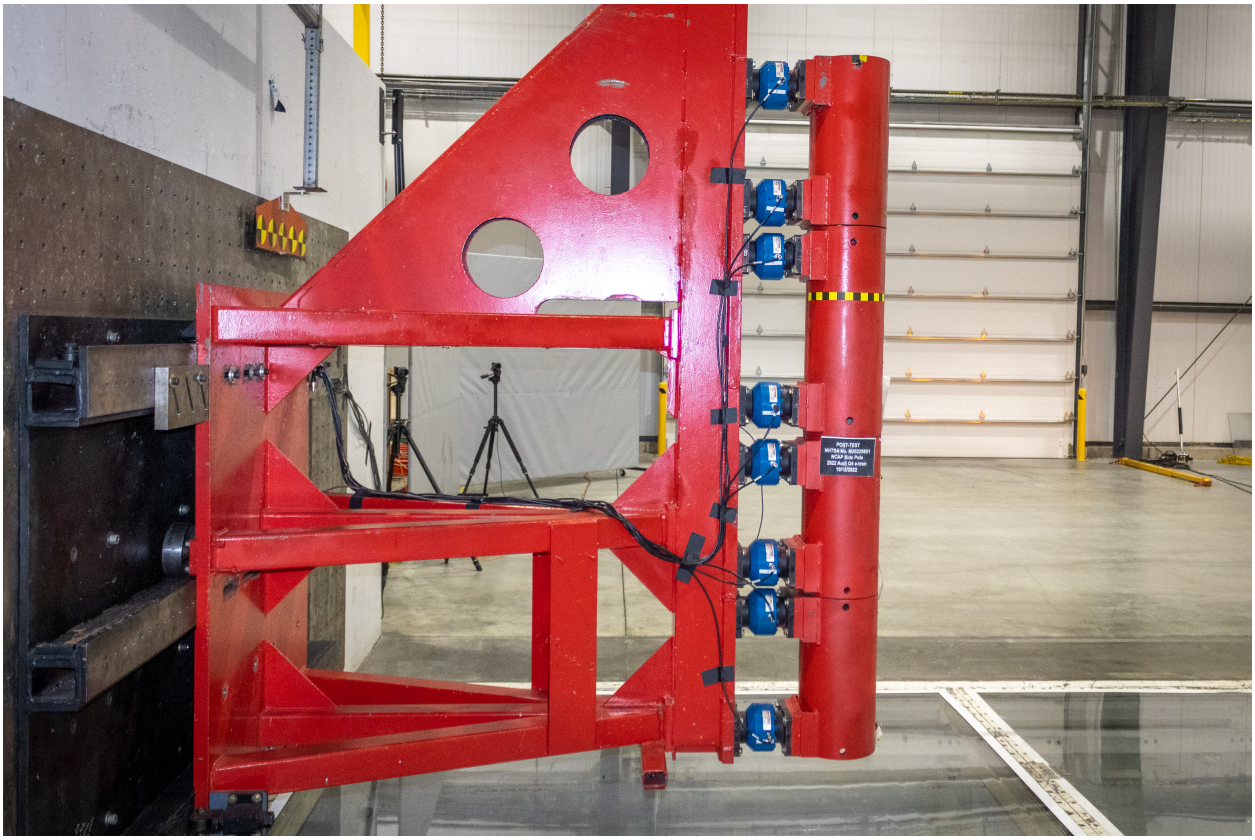


Figure A-62: Post-Test Pole Barrier Side View

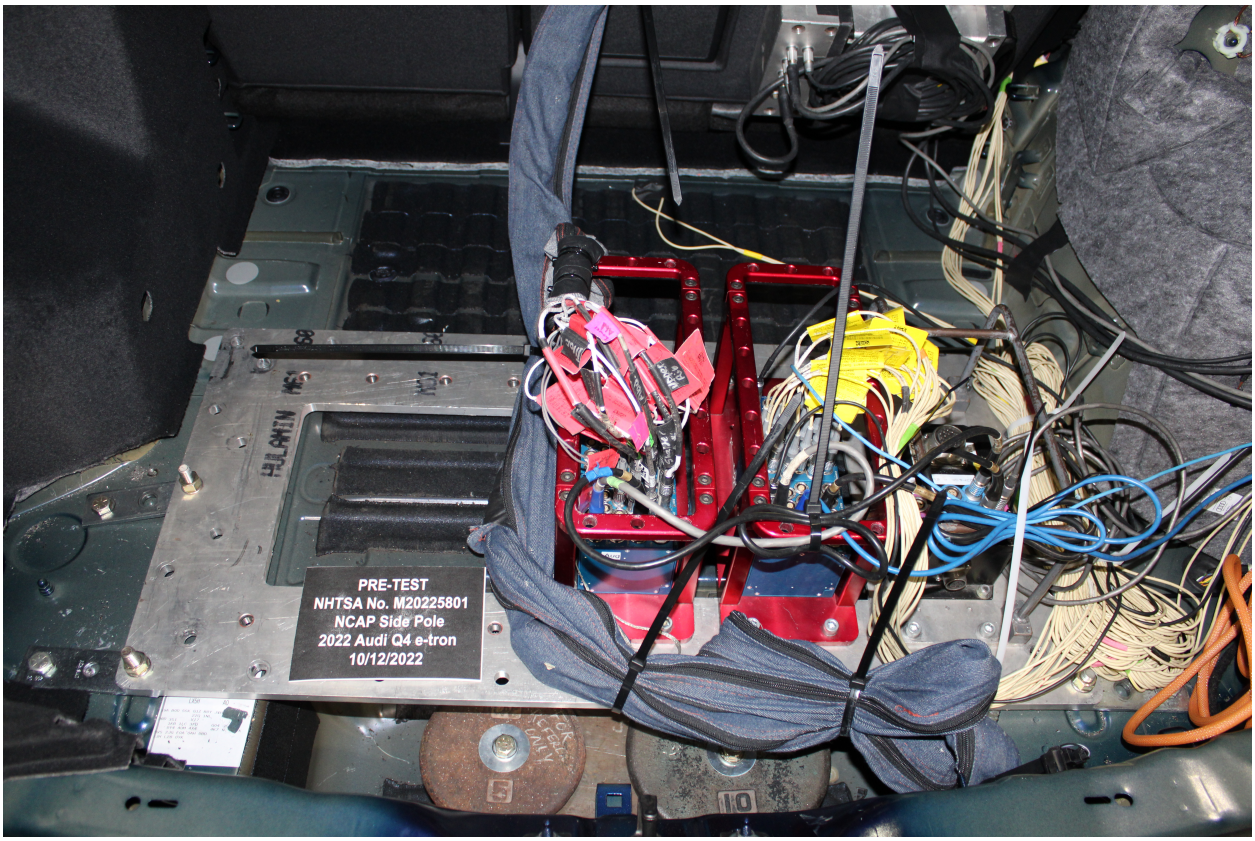


Figure A-63: Pre-Test Ballast View



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

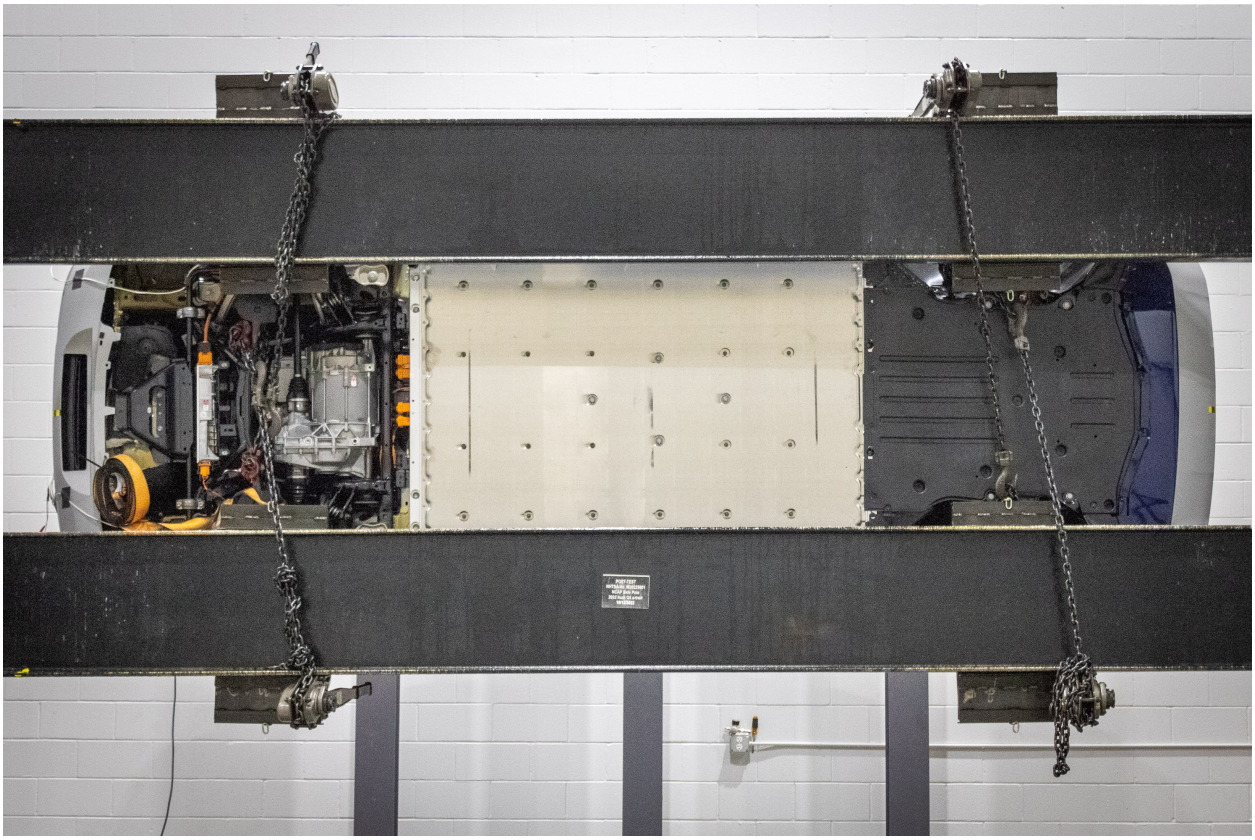


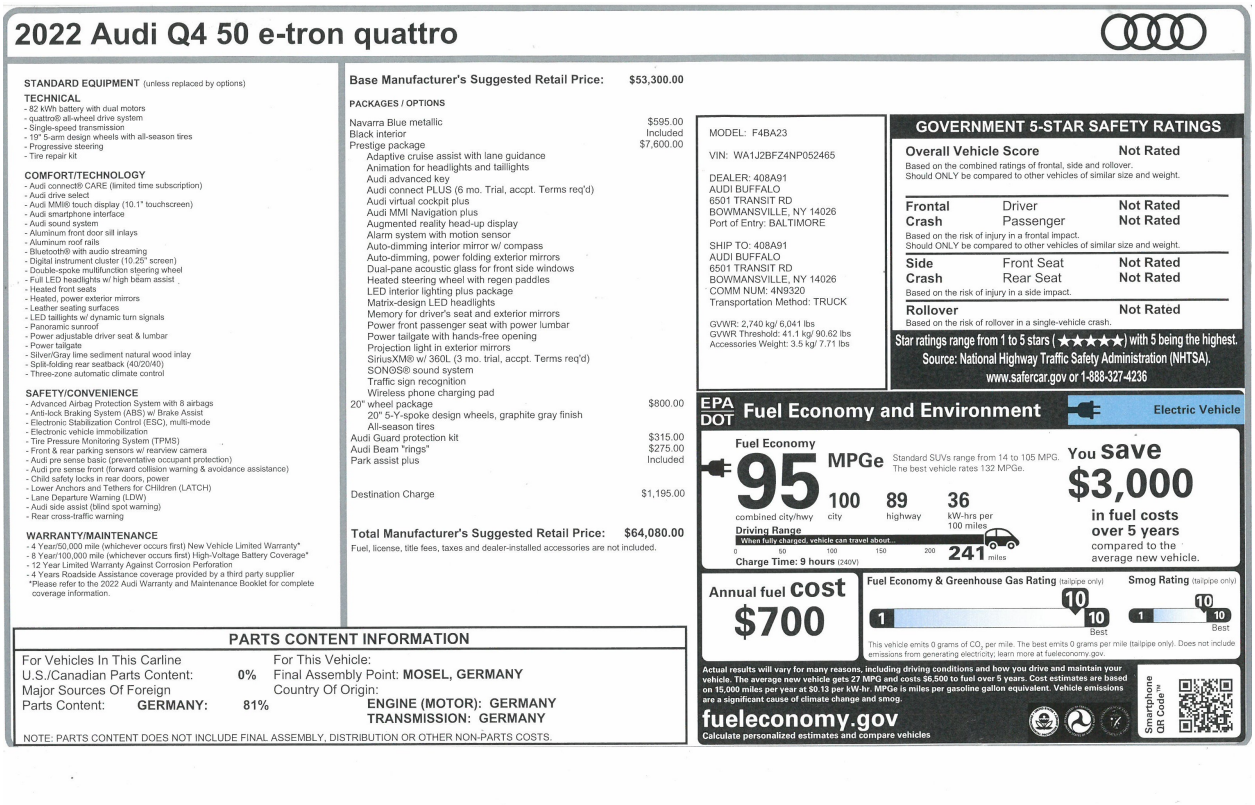
Figure A-68: FMVSS No. 301 Static Rollover 270 Degrees



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



Figure A-70: Impact Event



2022 Audi Q4 50 e-tron quattro

STANDARD EQUIPMENT (unless replaced by options)

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

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

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

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

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

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

PACKAGES / OPTIONS

Navarra Blue metallic	$595.00
Black interior	Included
Prestige package	$7,600.00
Adaptive cruise assist with lane guidance	
Animation for headlights and taillights	
Audi advanced key	
Audi connect PLUS (6 mo. Trial, accpt. Terms req'd)	
Audi virtual cockpit plus	
Audi MMI Navigation plus	
Augmented reality head-up display	
Alarm system with motion sensor	
Auto-dimming interior mirror w/ compass	
Auto-dimming, power folding exterior mirrors	
Dual-pane acoustic glass for front side windows	
Heated steering wheel with regen paddles	
LED interior lighting plus package	
Matrix-design LED headlights	
Memory for driver's seat and exterior mirrors	
Power front passenger seat with power lumbar	
Power tailgate with hands-free opening	
Projection light in exterior mirrors	
SiriusXM® w/ 360L (3 mo. trial, accpt. Terms req'd)	
SONOS® sound system	
Traffic sign recognition	
Wireless phone charging pad	
20" wheel package	$800.00
20" 5-Y-spoke design wheels, graphite gray finish	
All-season tires	
Audi Guard protection kit	$315.00
Audi Beam "rings"	$275.00
Park assist plus	Included
Destination Charge	$1,195.00

Total Manufacturer's Suggested Retail Price: $64,080.00

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

MODEL: F4BA23

VIN: WA1J2BFZ4NP052465

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

SHIP TO: 408A91
AUDI BUFFALO
6501 TRANSIT RD
BOWMANSVILLE, NY 14026
COMM NUM: 4N9320
Transportation Method: TRUCK

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

GOVERNMENT 5-STAR SAFETY RATINGS

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

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

EPA DOT Fuel Economy and Environment — Electric Vehicle

Fuel Economy: **95** MPGe (combined city/hwy) — Standard SUVs range from 14 to 105 MPG. The best vehicle rates 132 MPGe.

100 city | 89 highway | 36 kW-hrs per 100 miles

Driving Range: When fully charged, vehicle can travel about... 241 miles

Charge Time: 9 hours (240V)

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

Annual fuel cost **$700**

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

Smog Rating (tailpipe only): 10 — 1 — 10 Best

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

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

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

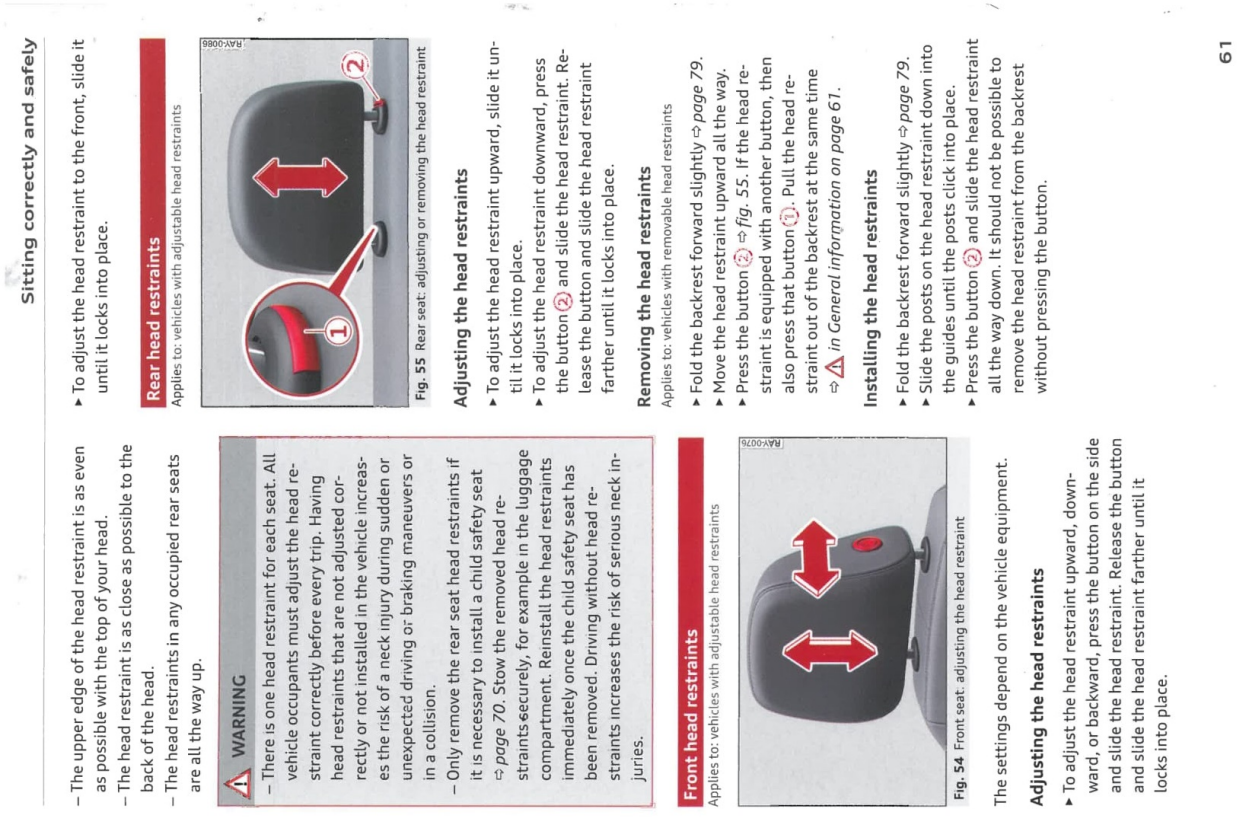
PARTS CONTENT INFORMATION

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

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

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

Figure A-71: Monroney Label



Sitting correctly and safely

- To adjust the head restraint to the front, slide it until it locks into place.

Rear head restraints

Applies to: vehicles with adjustable head restraints

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

Adjusting the head restraints

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

Removing the head restraints

Applies to: vehicles with removable head restraints

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

Installing the head restraints

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

61

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

⚠ WARNING

– There is one head restraint for each seat. All vehicle occupants must adjust the head restraint correctly before every trip. Having head restraints that are not adjusted correctly or not installed in the vehicle increases the risk of a neck injury during sudden or unexpected driving or braking maneuvers or in a collision.

– Only remove the rear seat head restraints if it is necessary to install a child safety seat ⇨ *page 70*. Stow the removed head restraints securely, for example in the luggage compartment. Reinstall the head restraints immediately once the child safety seat has been removed. Driving without head restraints increases the risk of serious neck injuries.

Front head restraints

Applies to: vehicles with adjustable head restraints

Fig. 54 Front seat: adjusting the head restraint

The settings depend on the vehicle equipment.

Adjusting the head restraints

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

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



Figure 305-1: Auxiliary Power Module Warning Label



Figure 305-2: Power Inverter Warning Label

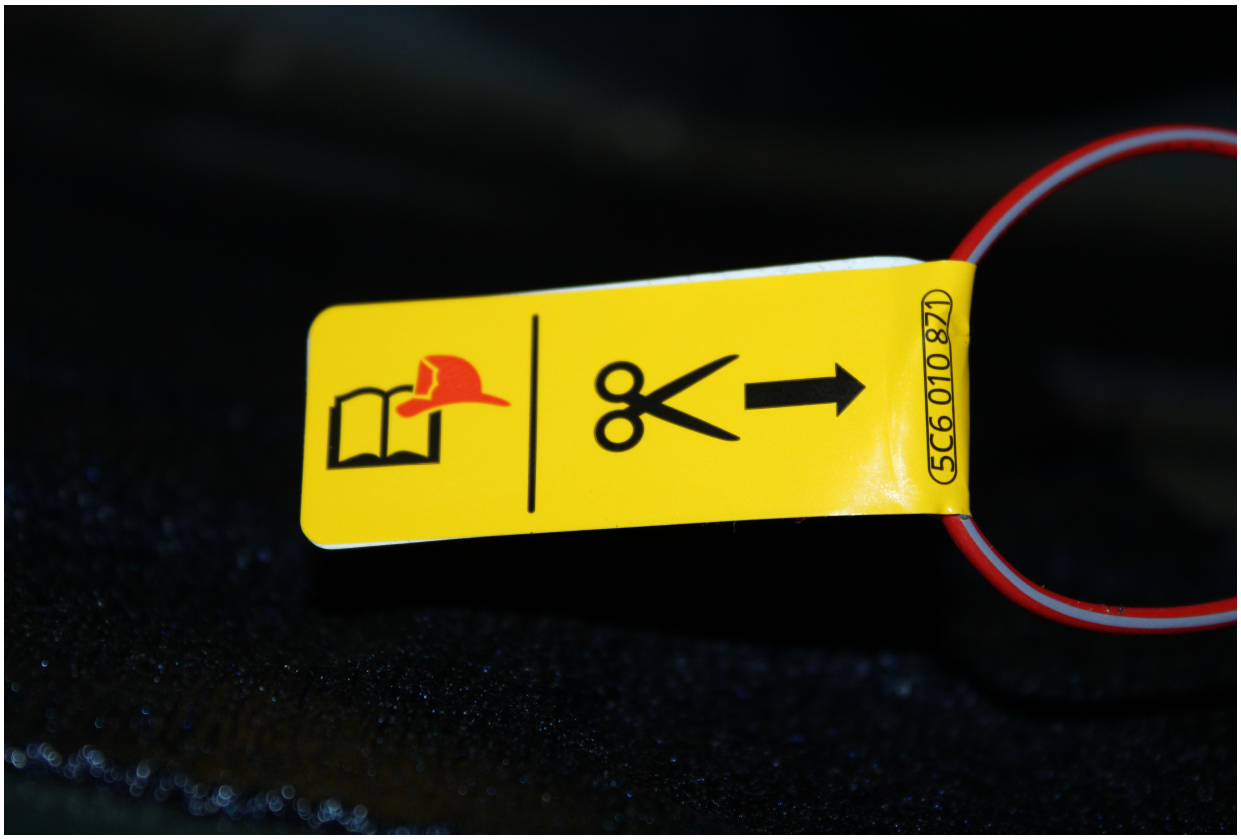


Figure 305-3 First Responder Warning Label

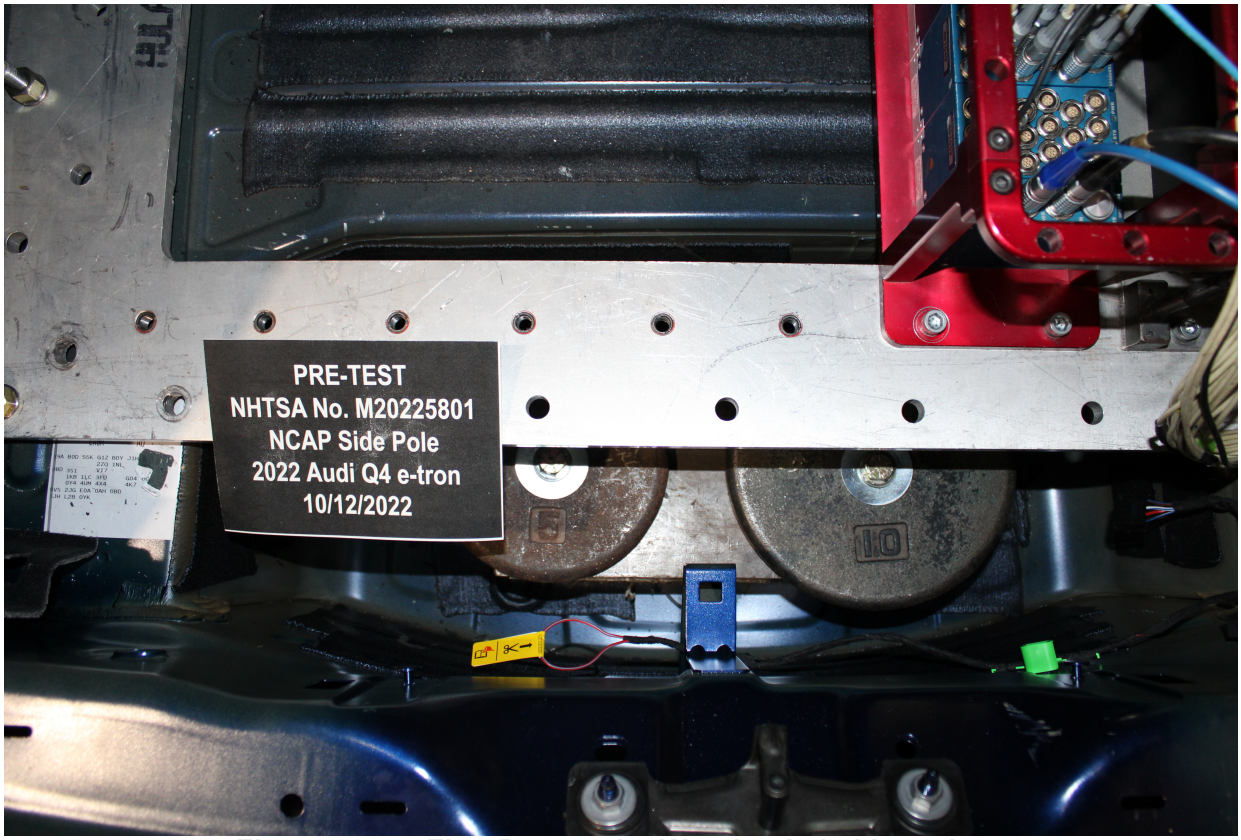


Figure 305-4: First Responder Warning Label Location

Photo Not Applicable

Figure 305-5: Other Vehicle Label Related to Electric Propulsion System



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



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

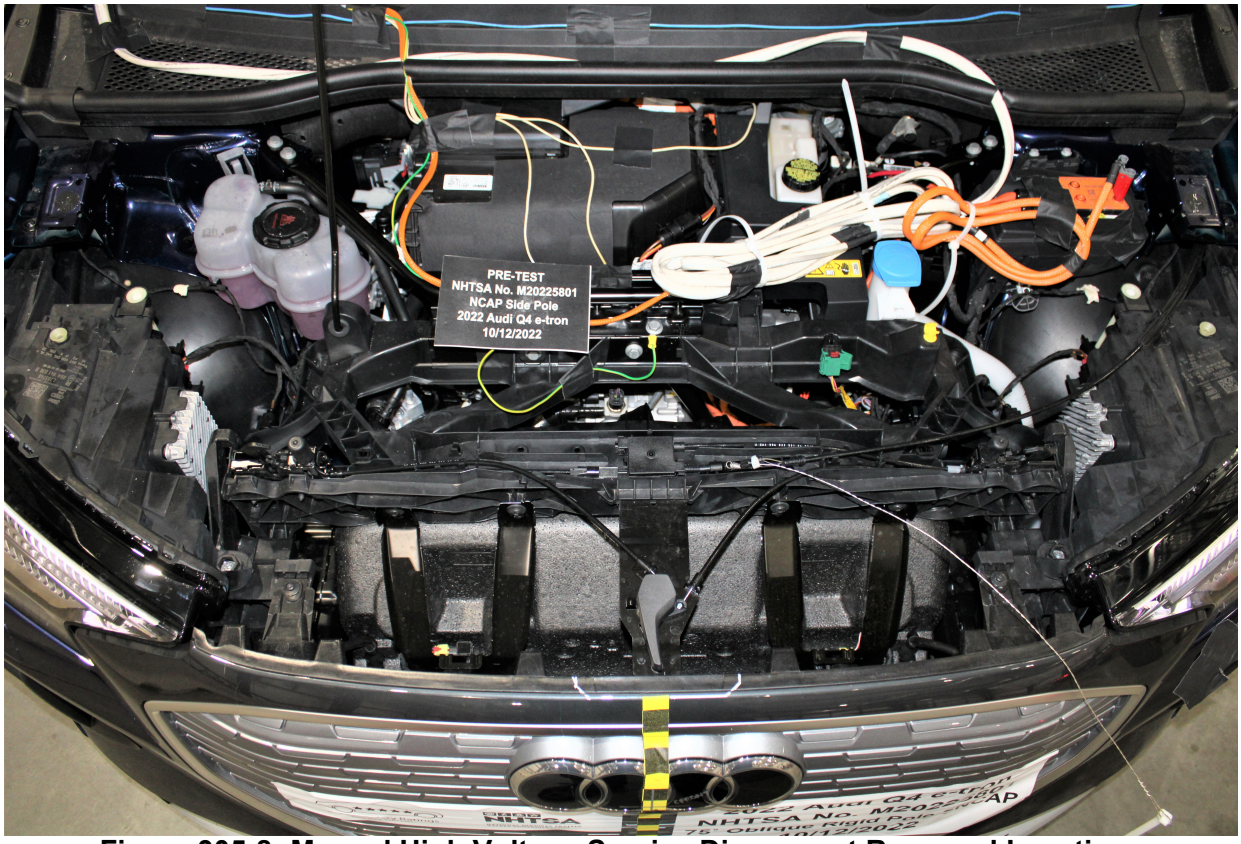


Figure 305-8: Manual High Voltage Service Disconnect Removed Location

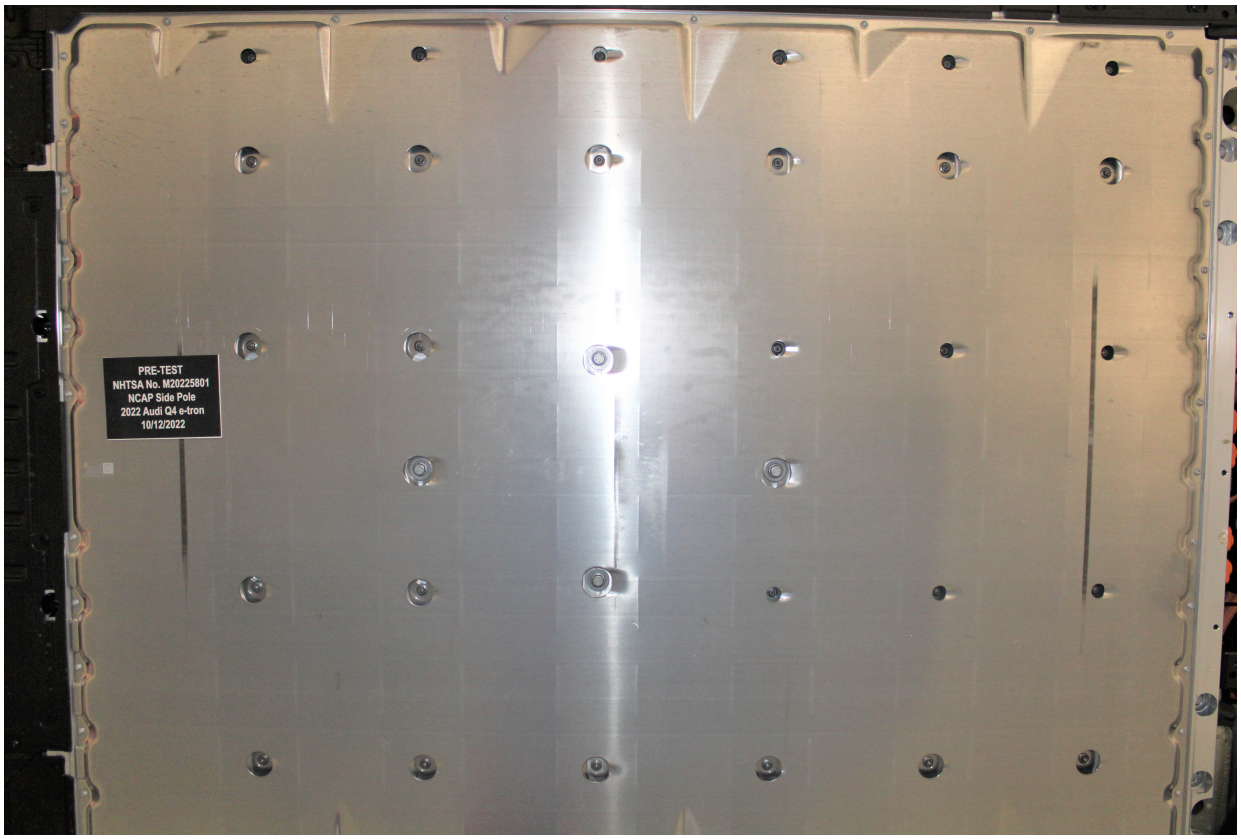


Figure 305-9: Pre-Impact View of Propulsion Battery



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

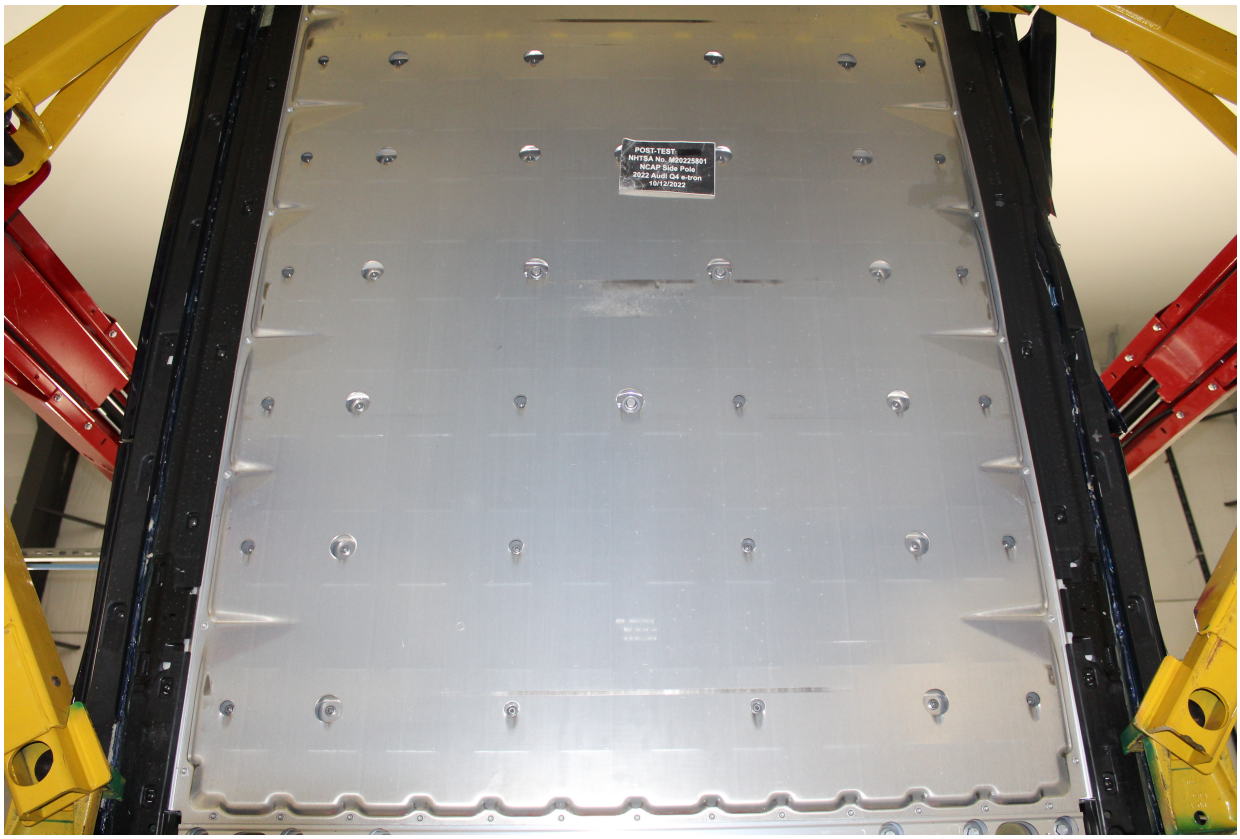


Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)

Photo Not Applicable

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



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

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

Photo Not Applicable

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

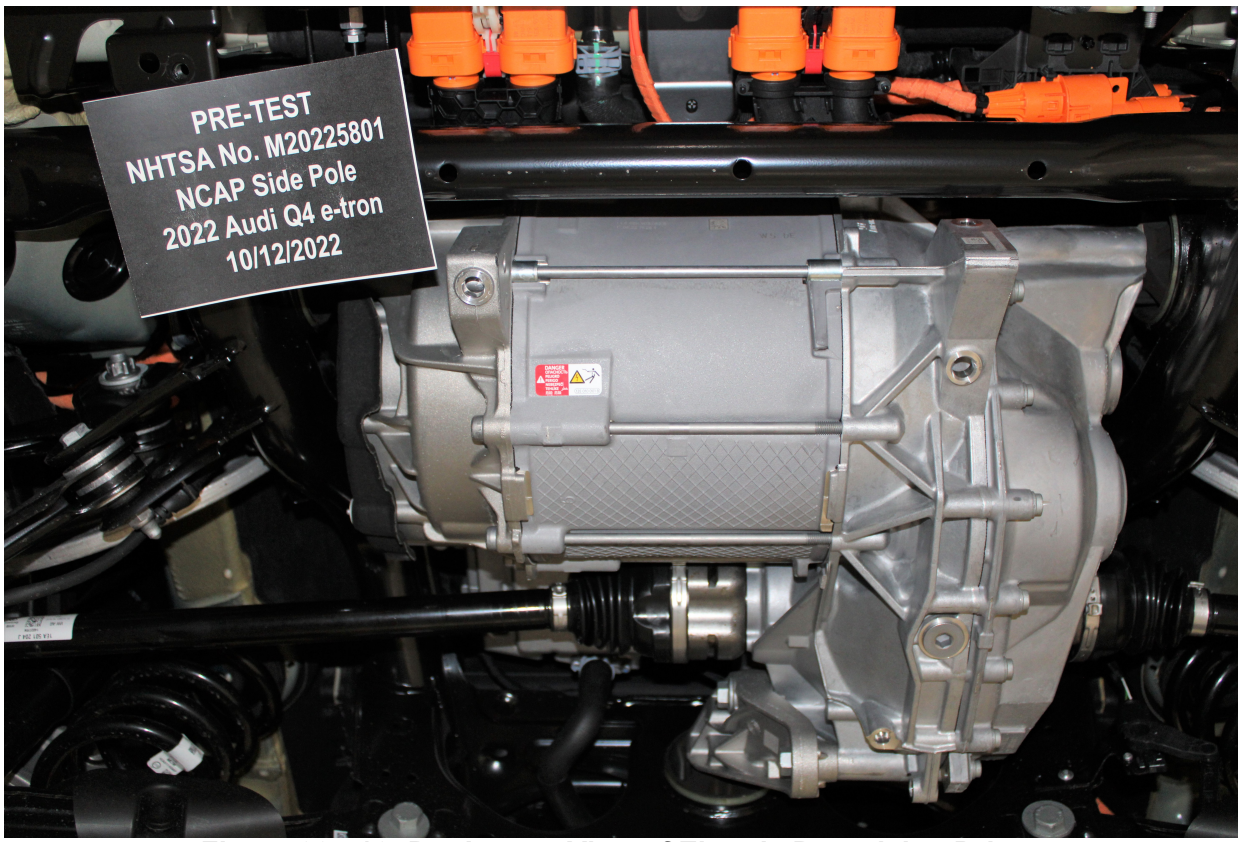


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

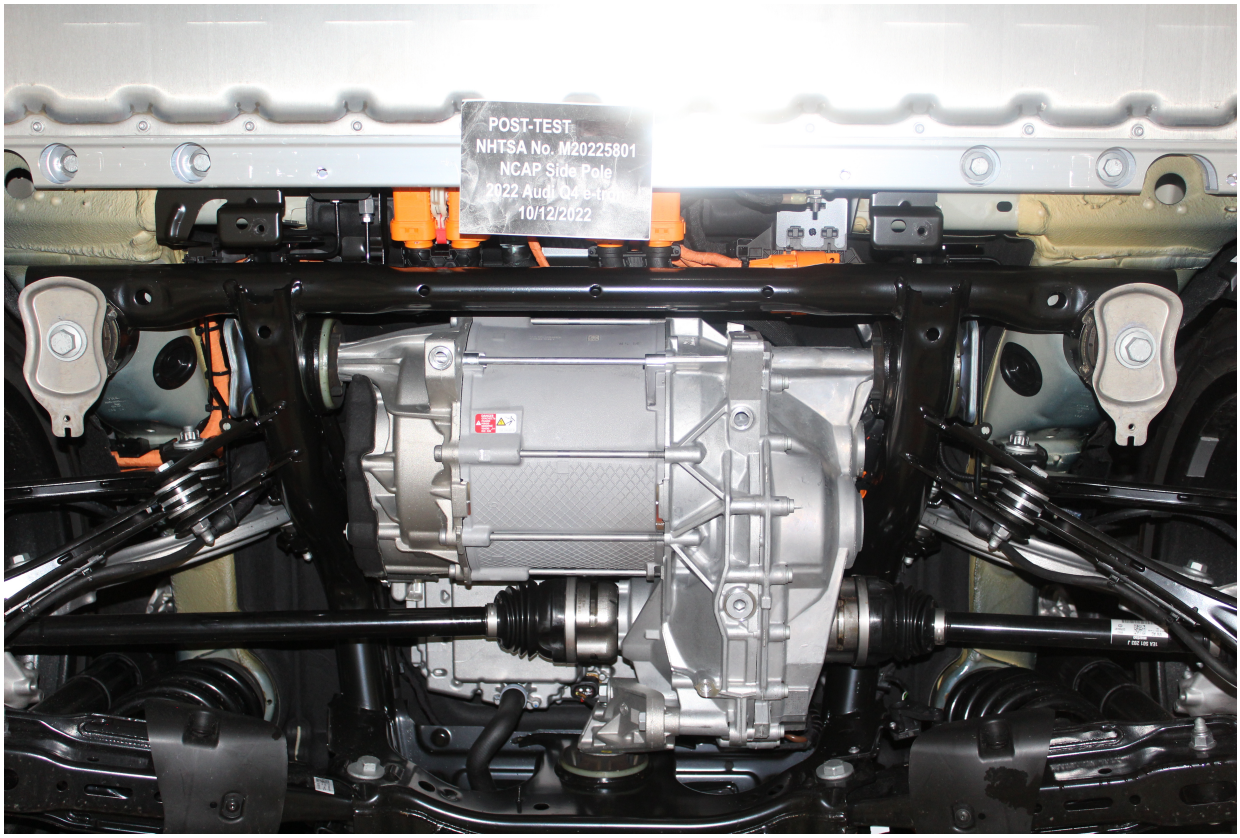


Figure 305-17: Post-Impact View of Electric Propulsion Drive

Photo Not Applicable

Figure 305-18: Pre-Impact View of High Voltage Interconnects

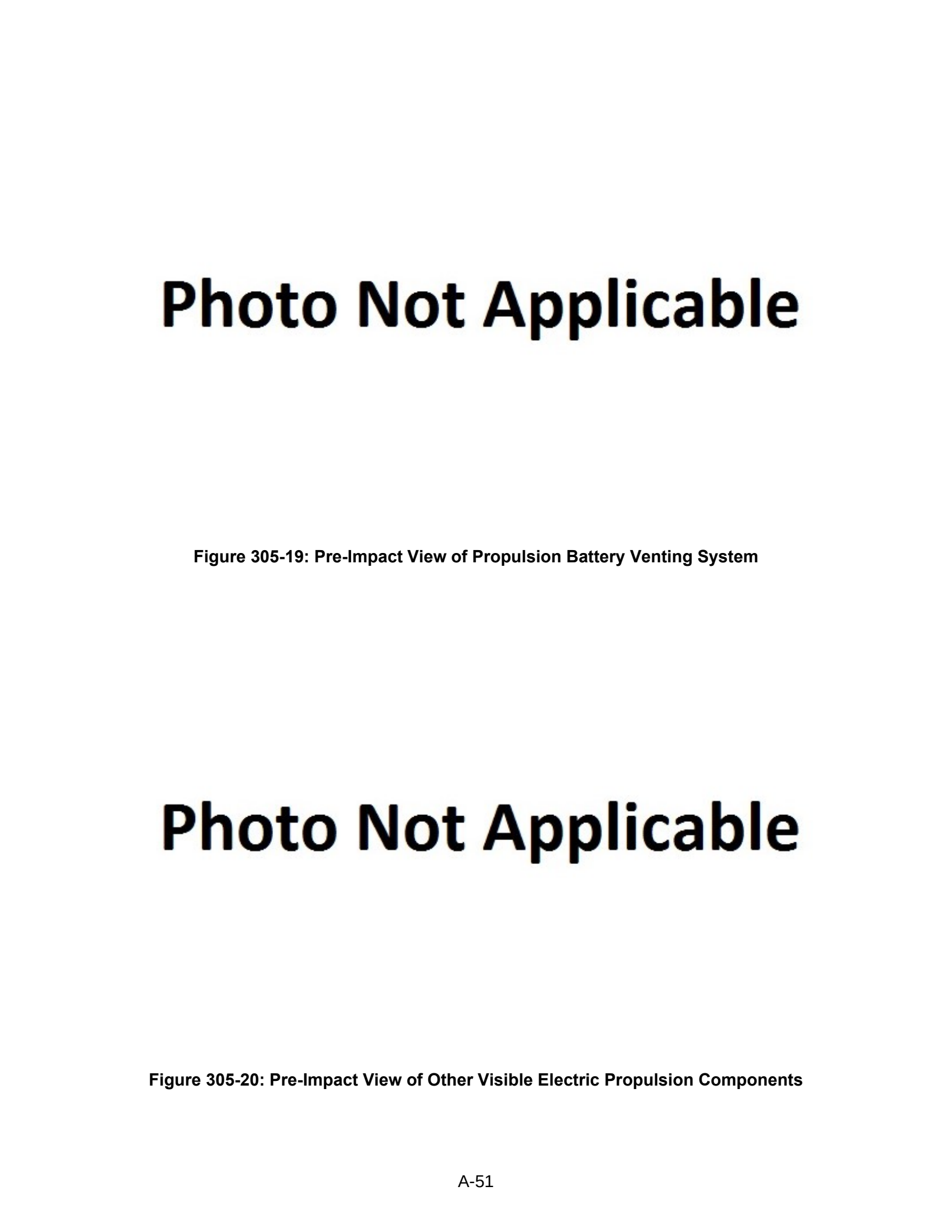


Figure 305-19: Pre-Impact View of Propulsion Battery Venting System

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



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



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



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

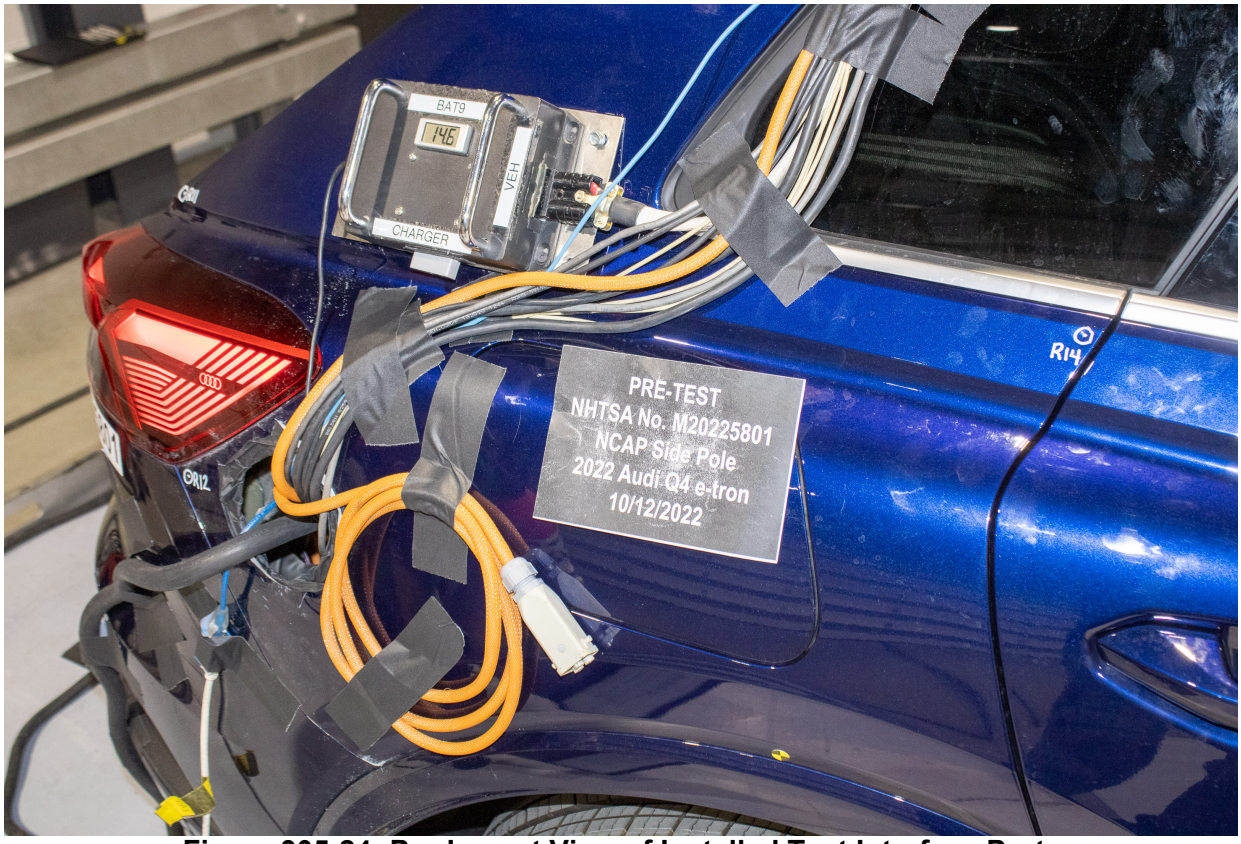


Figure 305-24: Pre-Impact View of Installed Test Interface Port

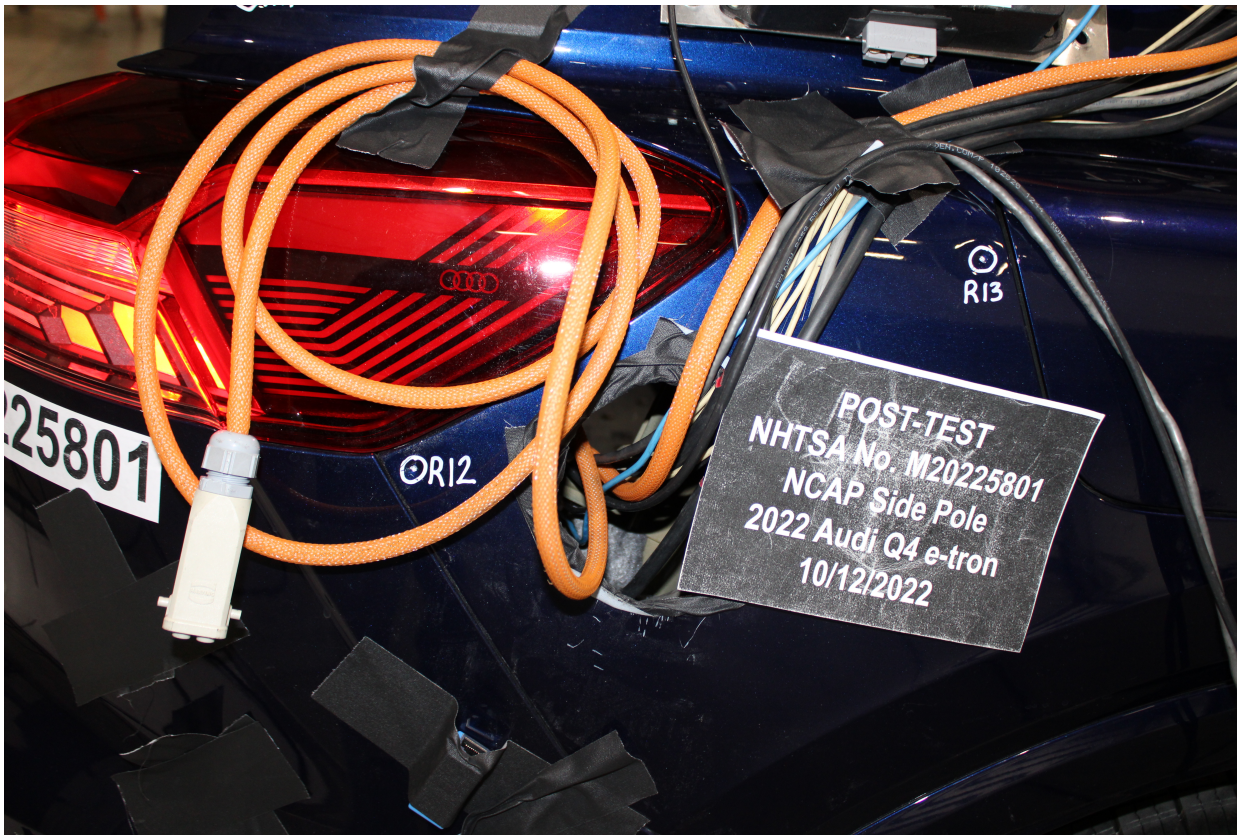


Figure 305-25: Post-Impact View of Installed Test Interface Port

Photo Not Applicable

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

Photo Not Applicable

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

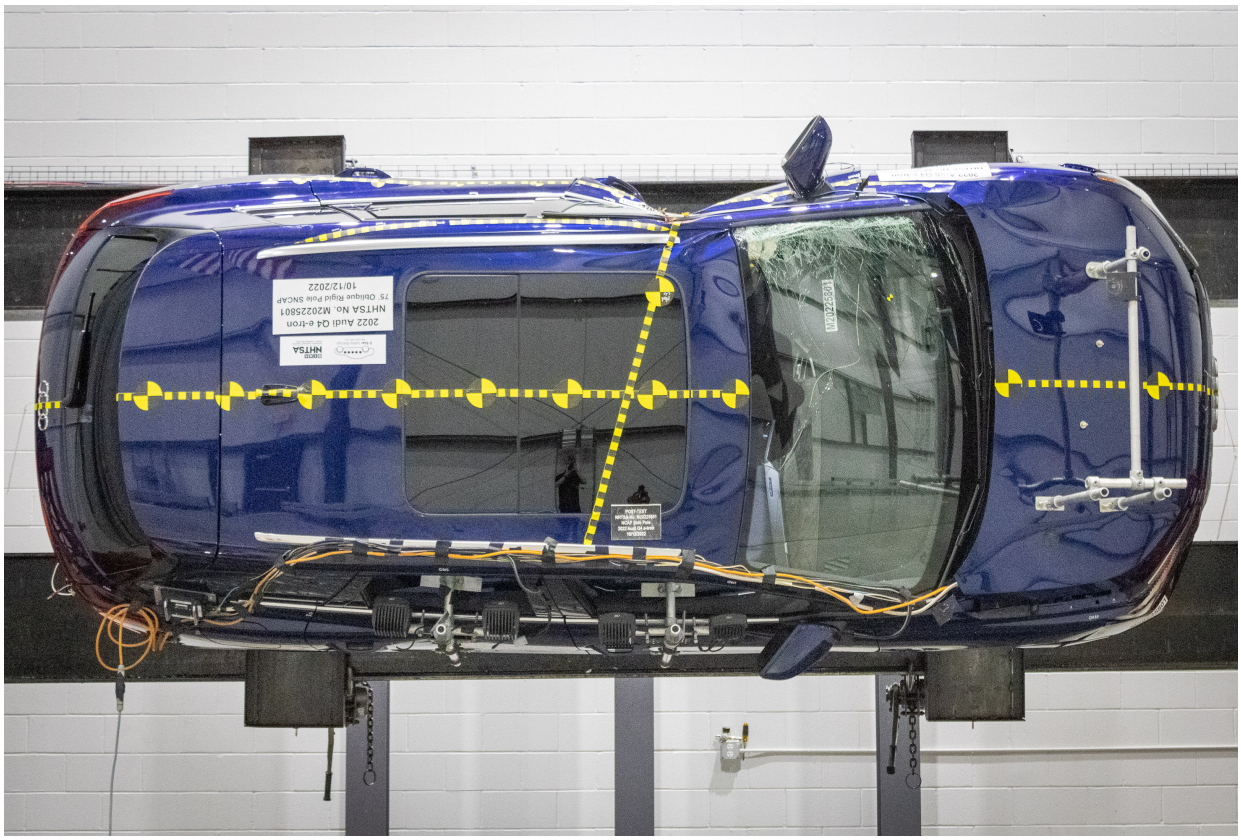


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees



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

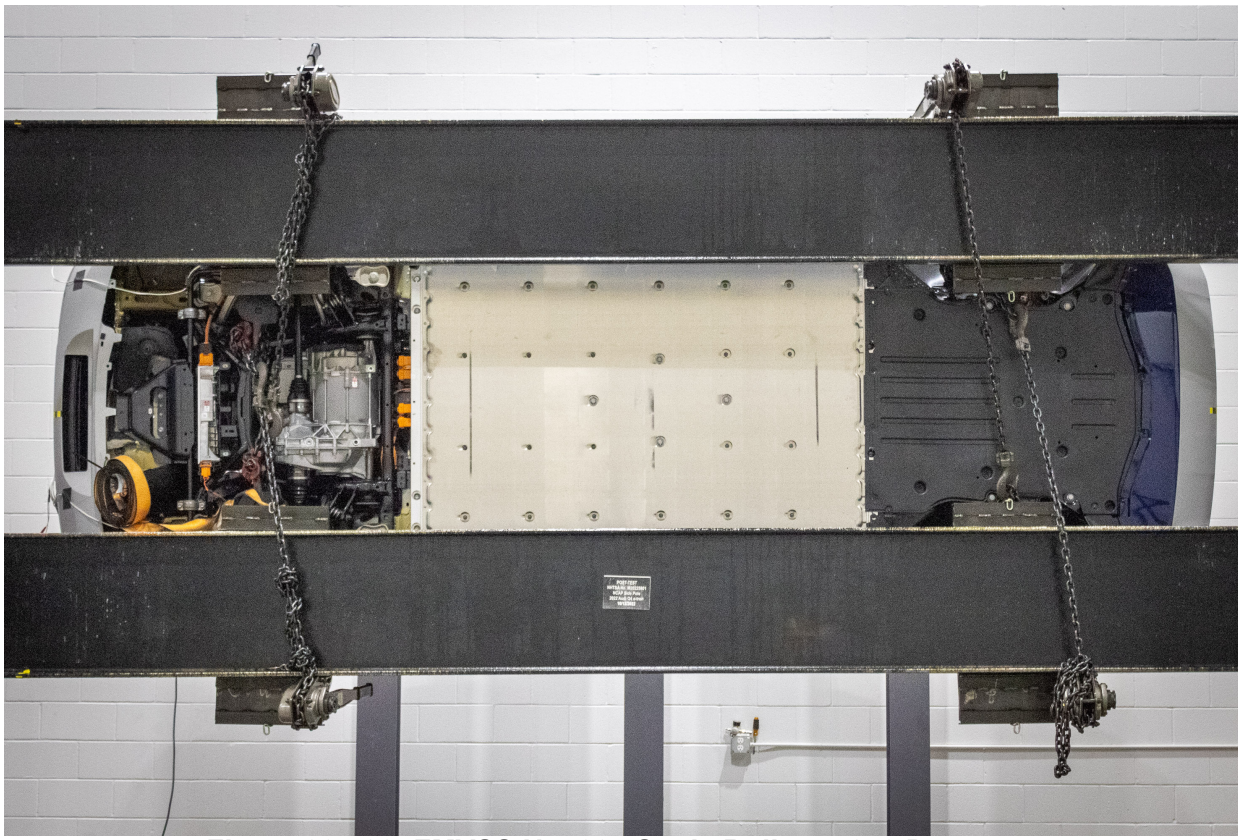


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees



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



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



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

Photo Not Applicable

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



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

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

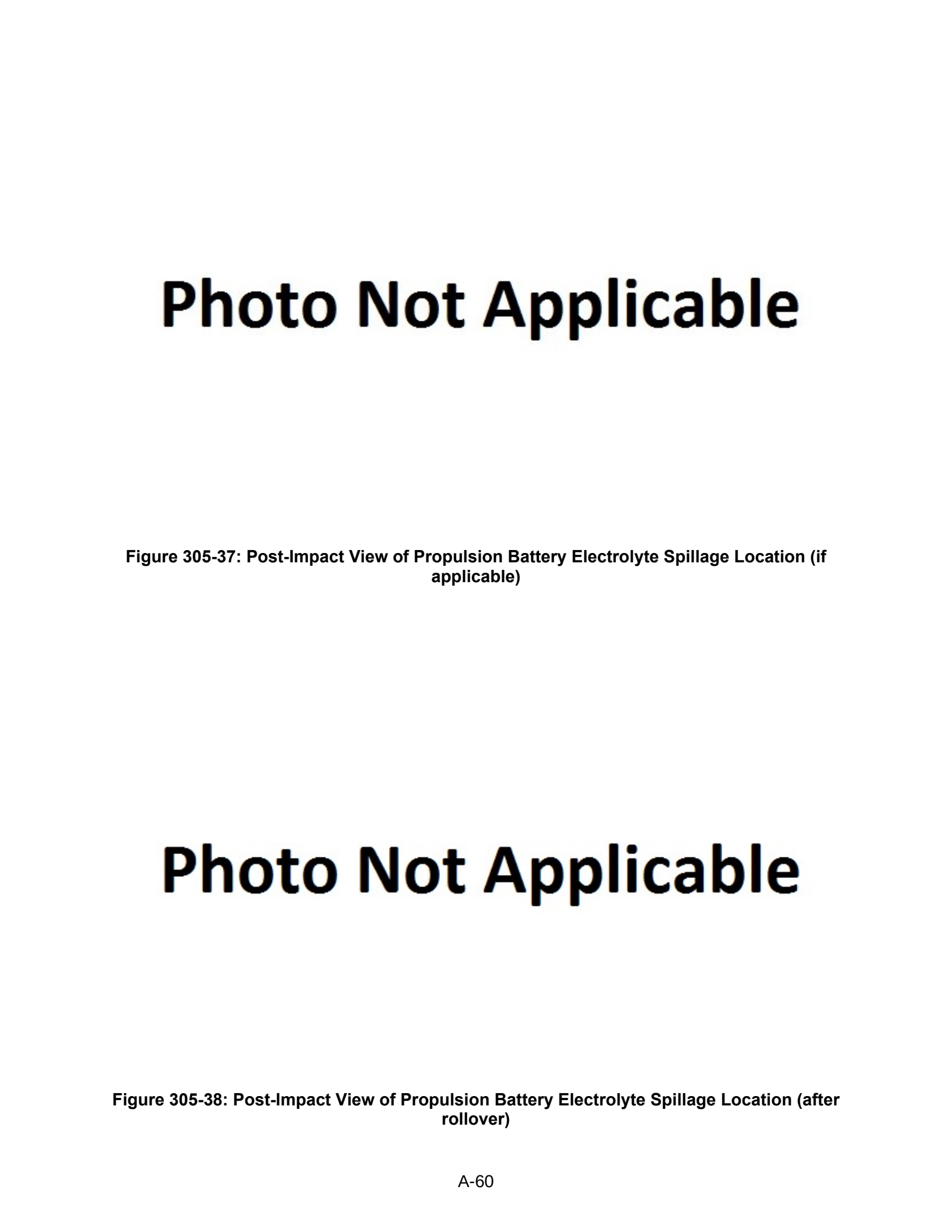


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)

Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (after rollover)



Figure 305-39: Pre-Impact Charging Port View

Figure 305-38: Post-Impact Charging Port View

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

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)

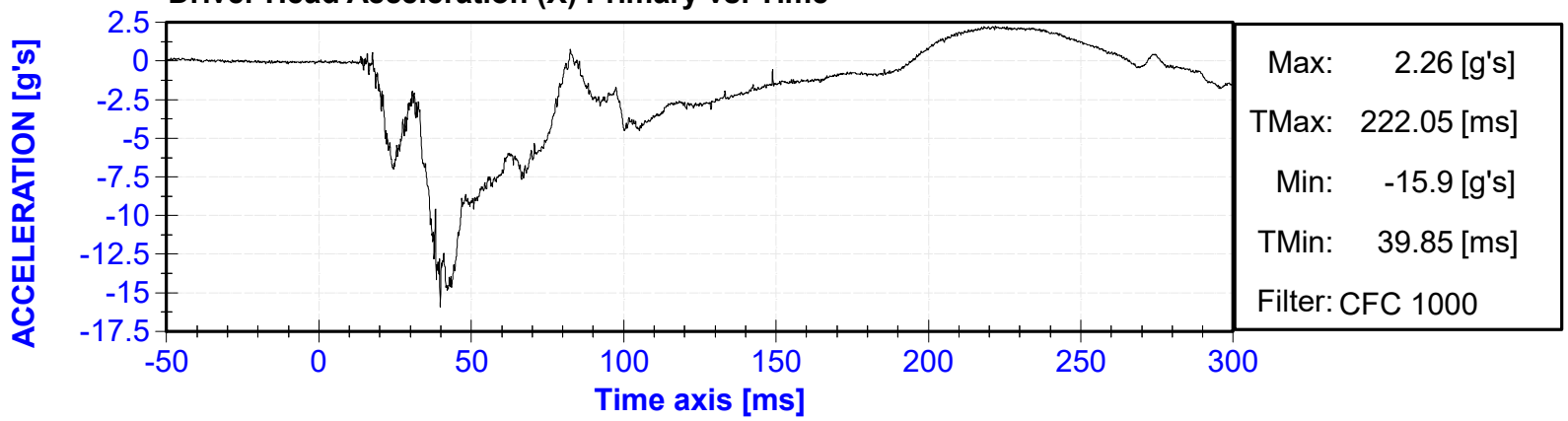
Vehicle Instrumentation Data

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)

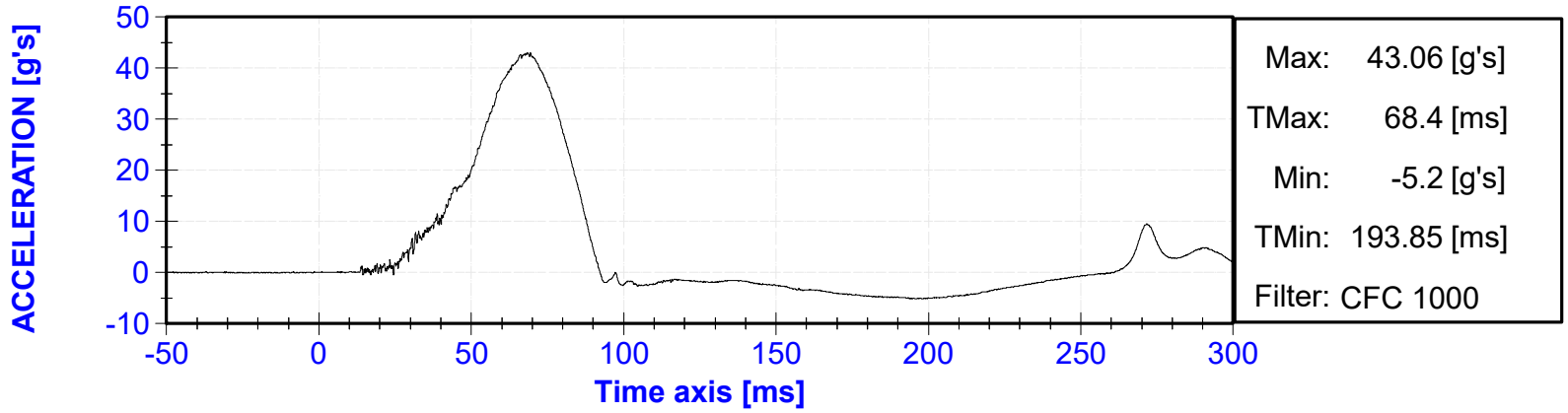
Pole Instrumentation Data

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)

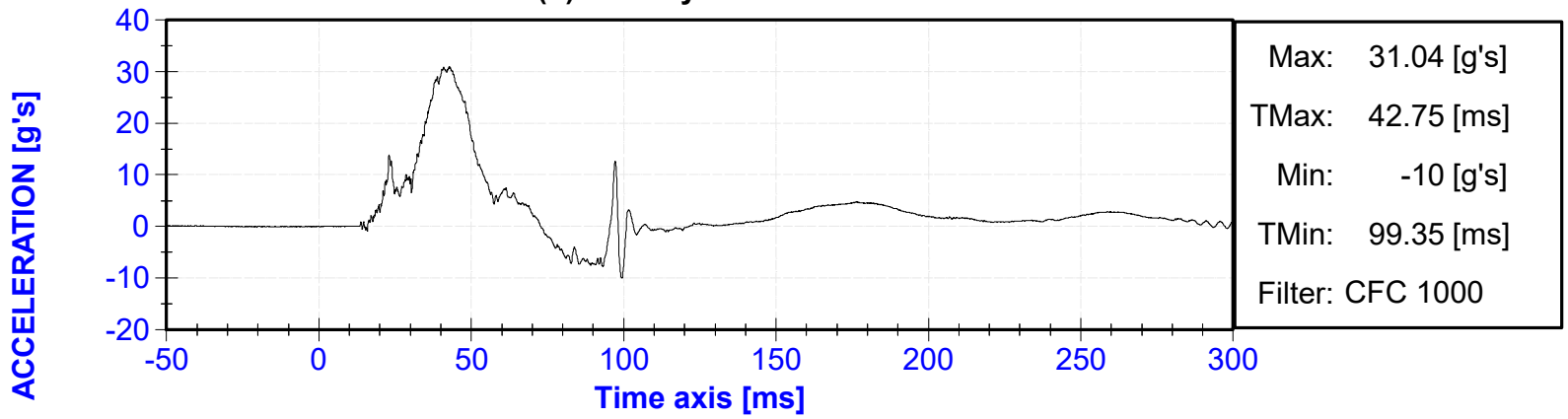
Driver Head Acceleration (X) Primary vs. Time



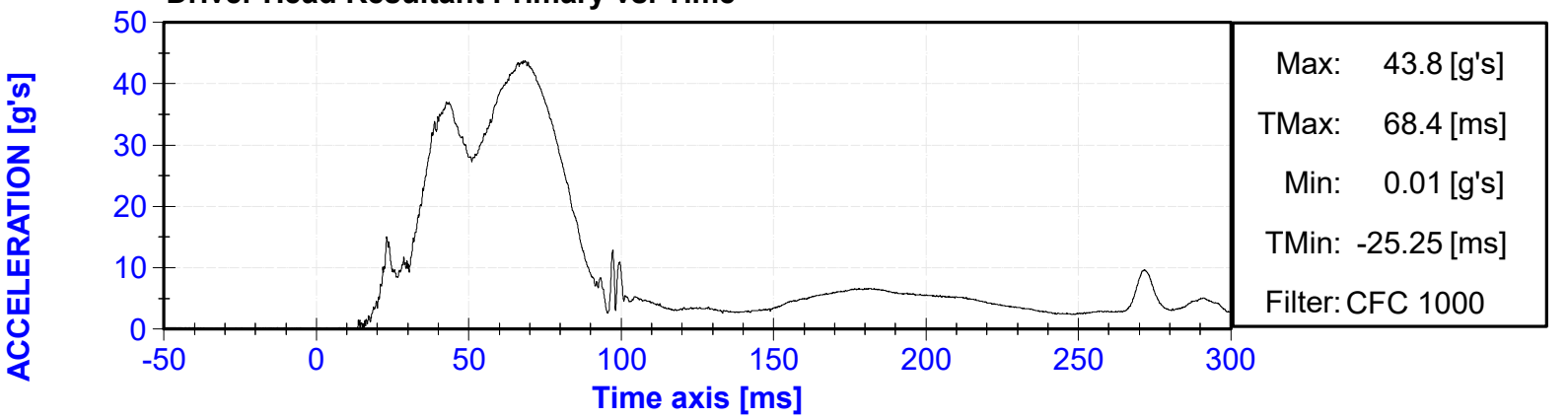
Driver Head Acceleration (Y) Primary vs. Time



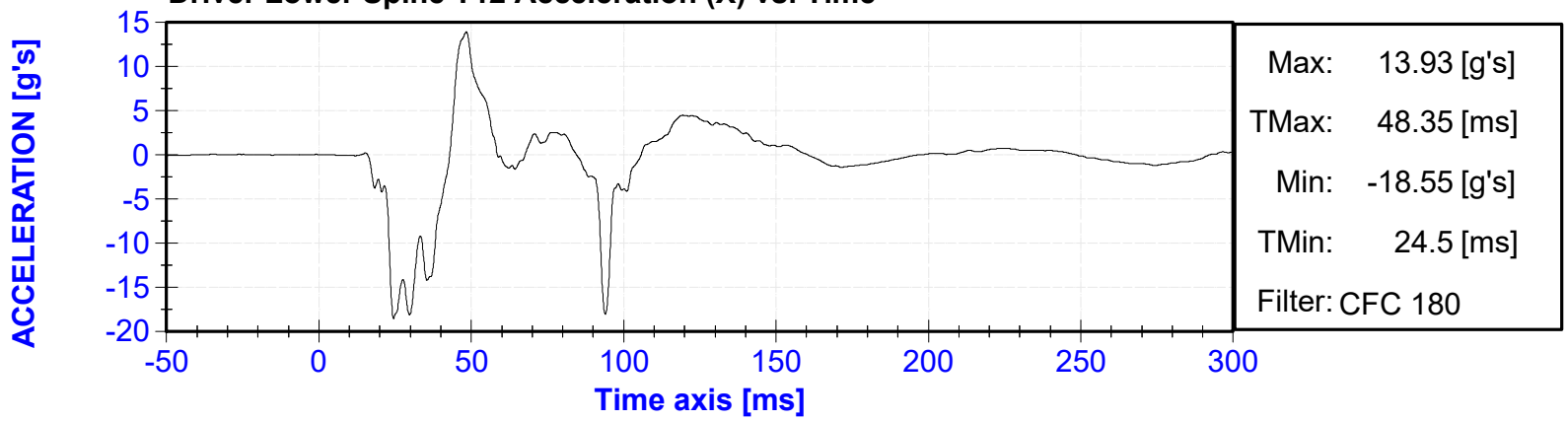
Driver Head Acceleration (Z) Primary vs. Time



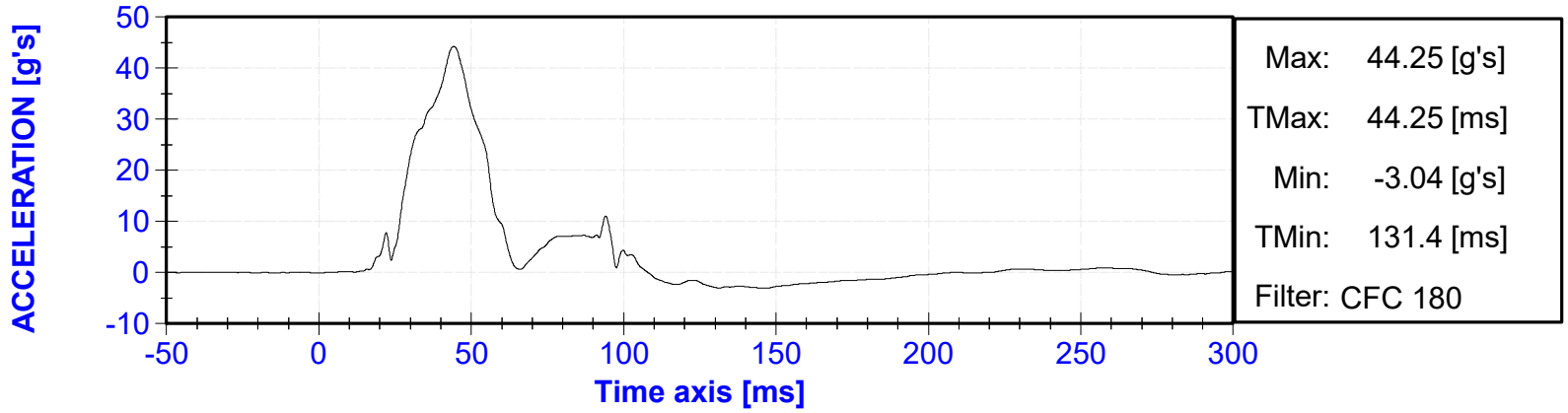
Driver Head Resultant Primary vs. Time



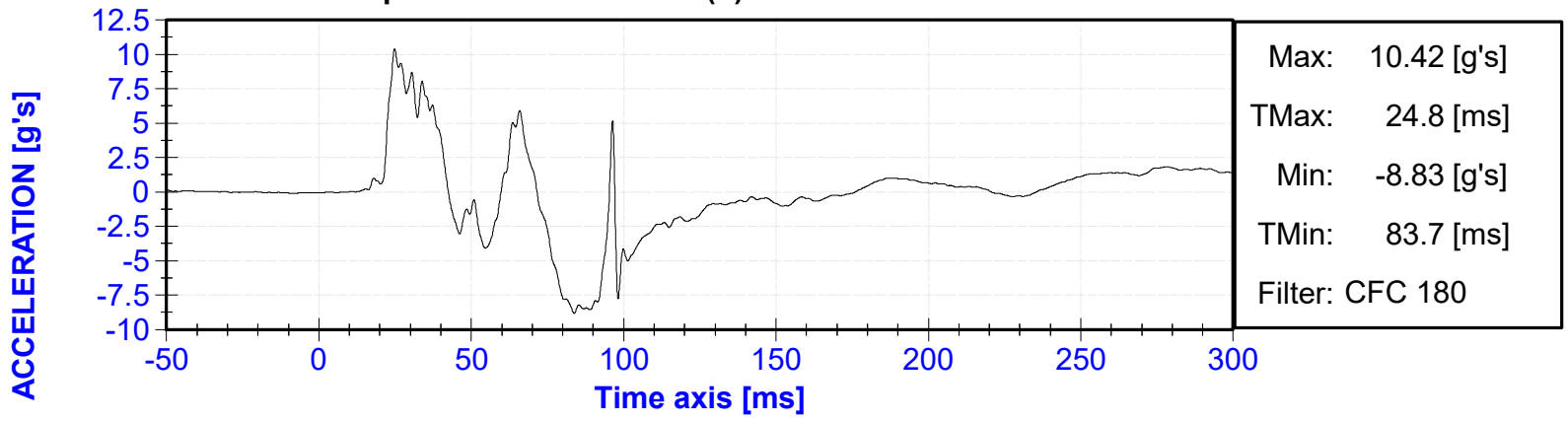
Driver Lower Spine T12 Acceleration (X) vs. Time



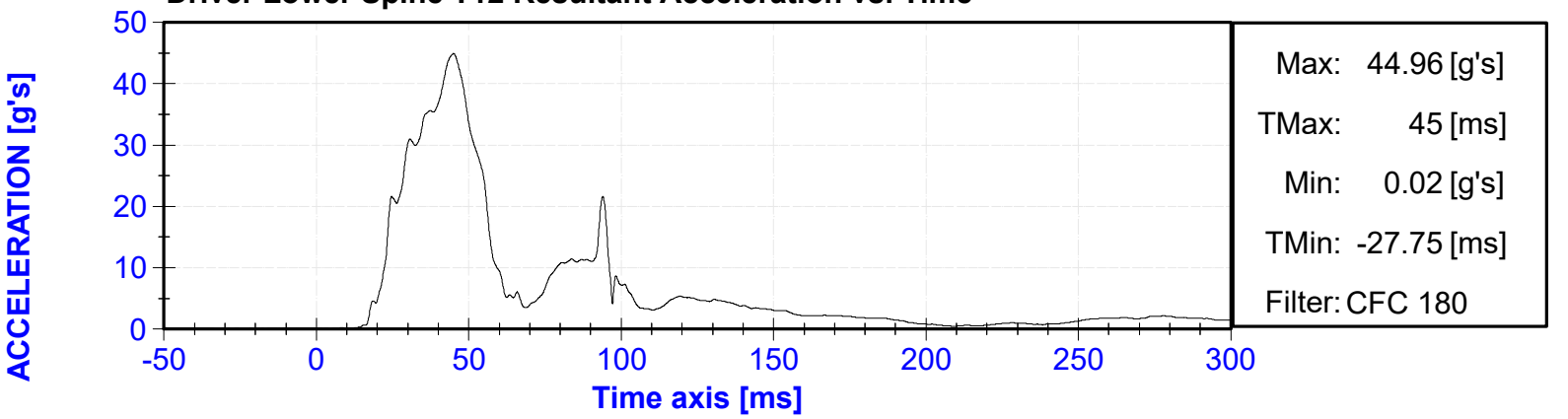
Driver Lower Spine T12 Acceleration (Y) vs. Time



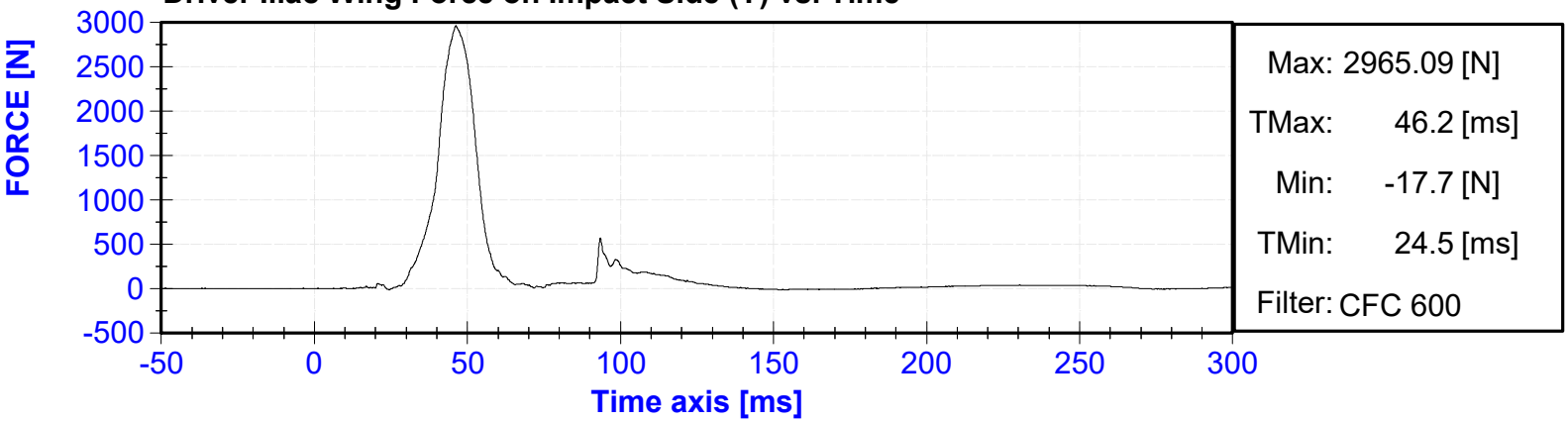
Driver Lower Spine T12 Acceleration (Z) vs. Time



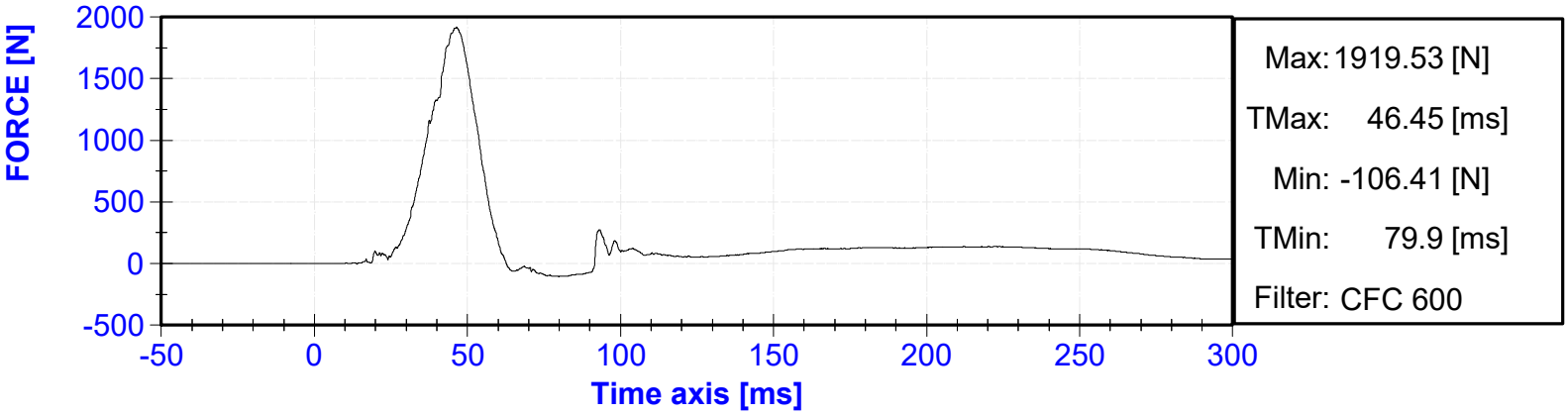
Driver Lower Spine T12 Resultant Acceleration vs. Time



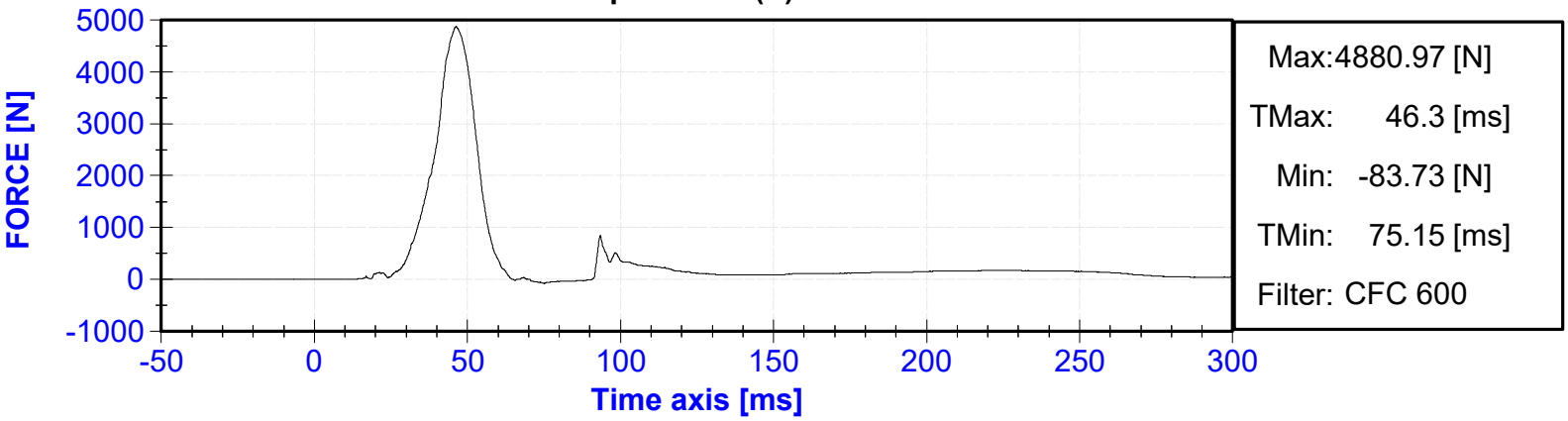
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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

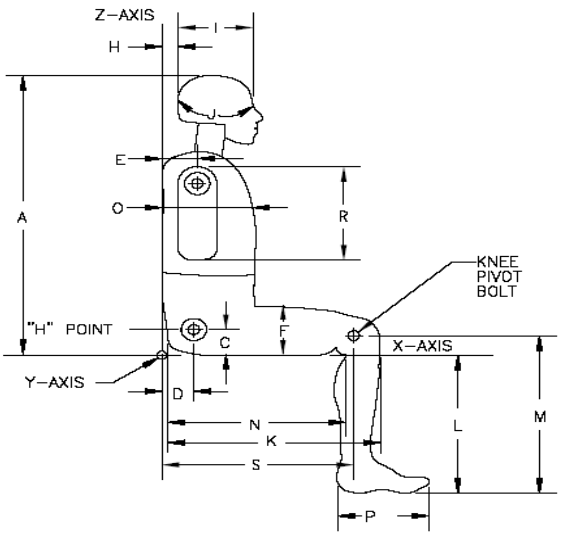
SERIAL NO:DG8012

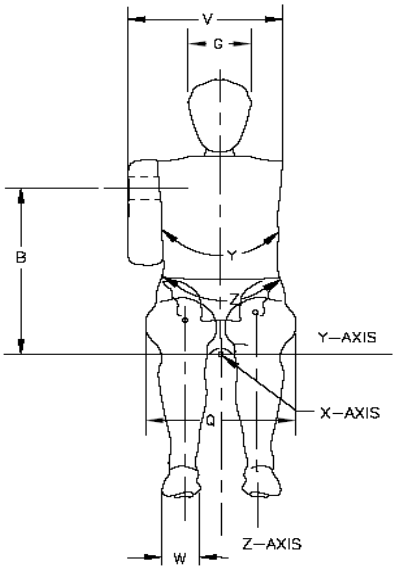
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

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

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	45	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	225	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	868	Pass
Z	Waist Circumference	761	791	780	Pass

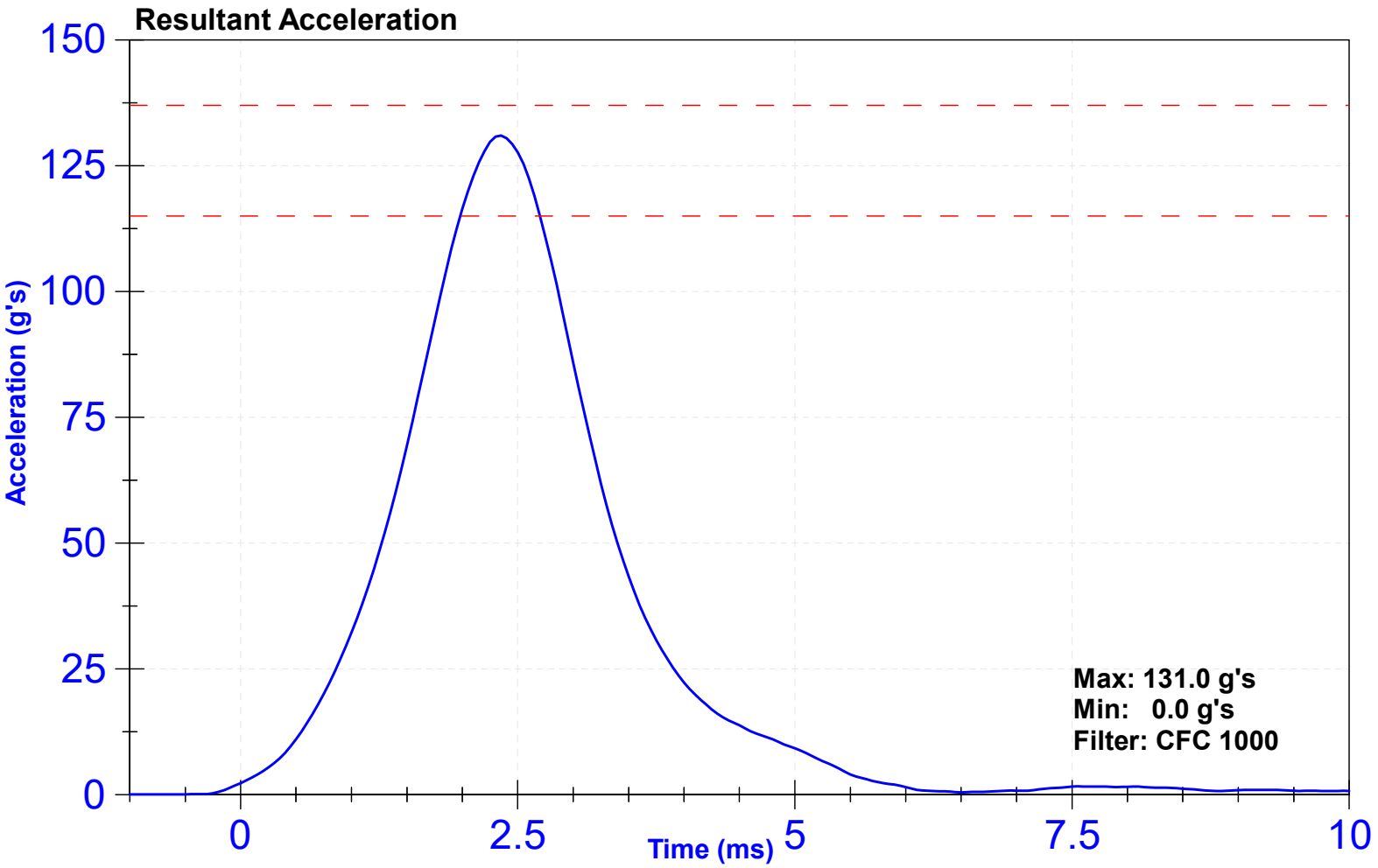
ATD Manufacturer	FTSS	Test Technician	C. Mantell
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

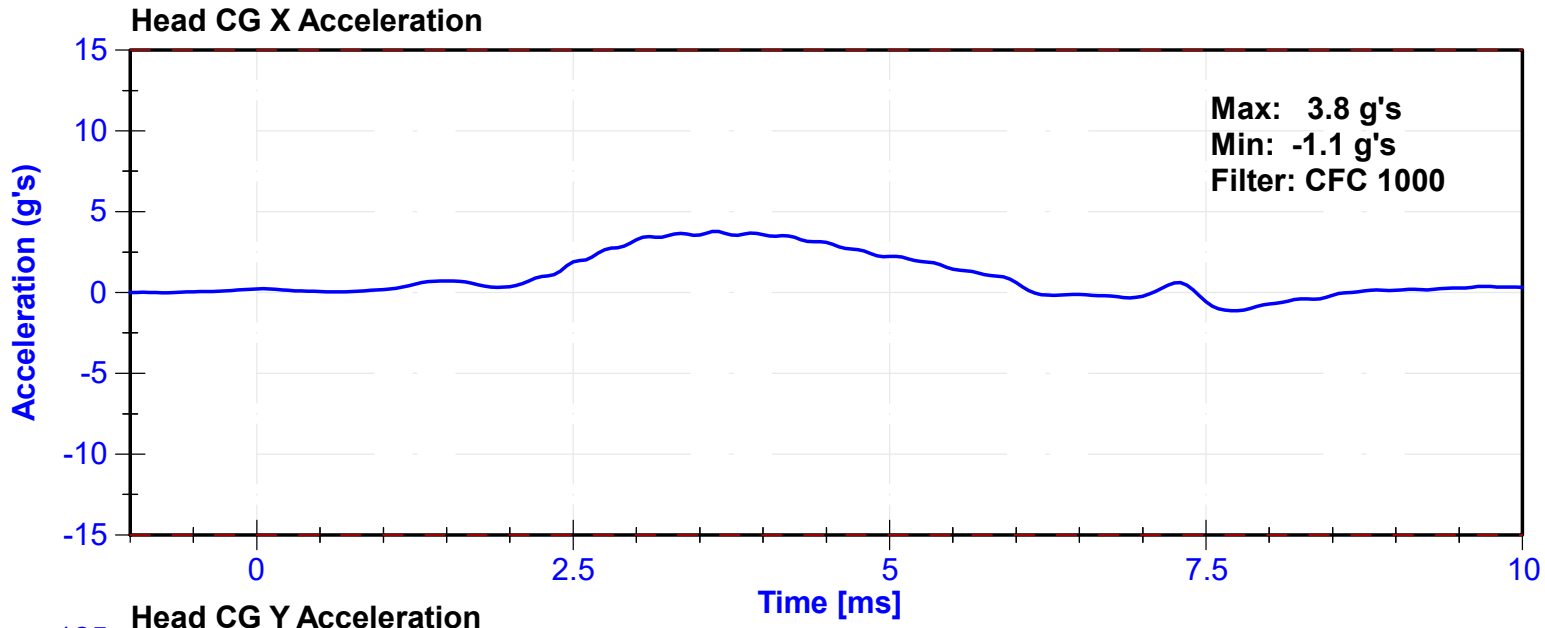
Results

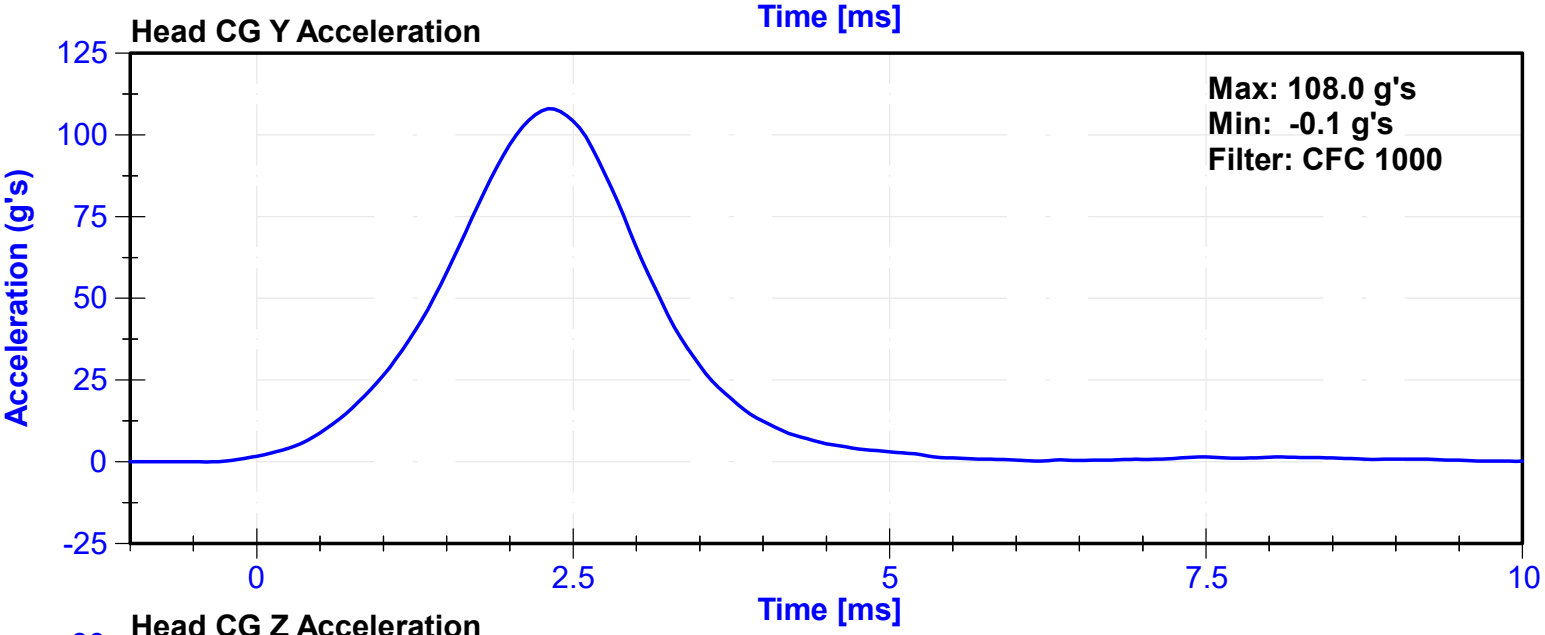
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	42.3	Pass
Resultant Acceleration	115	137	g's	131.0	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	3.8	Pass

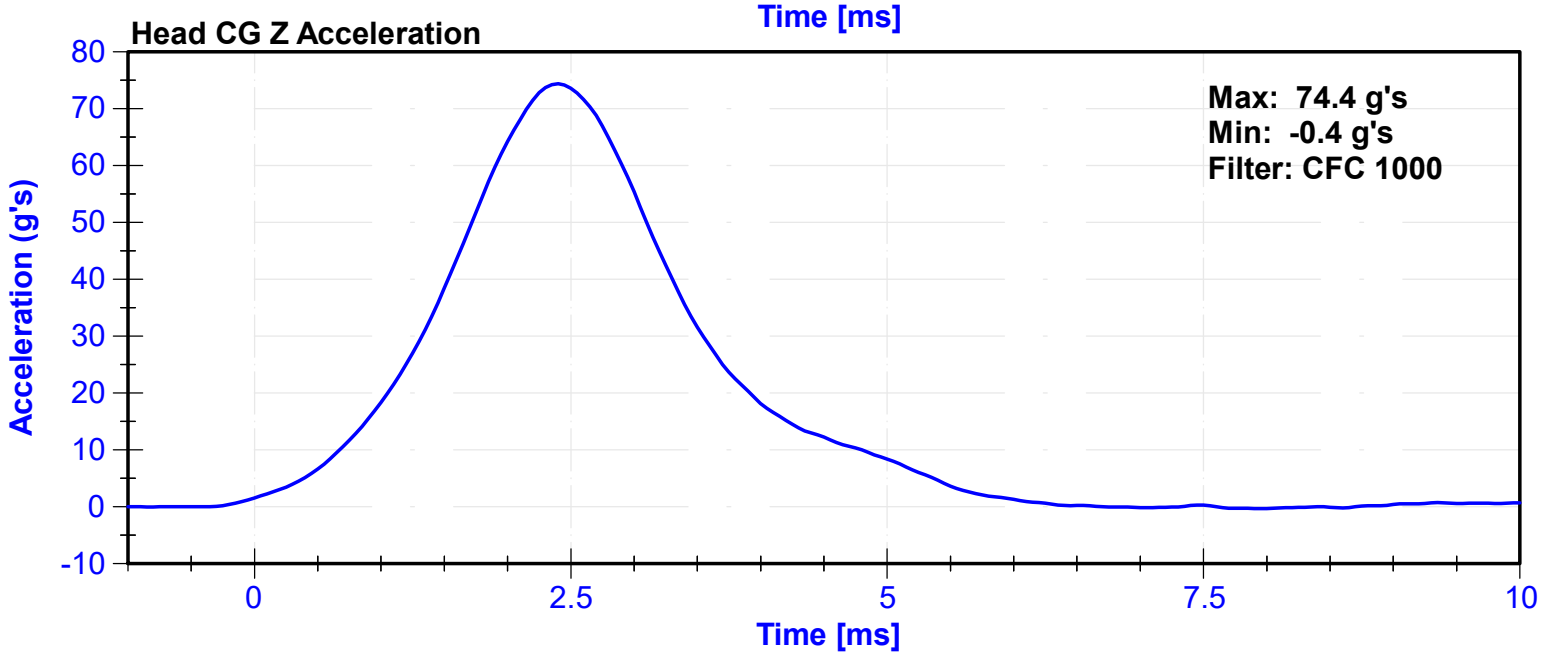
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P74788	6/17/2022	12/14/2022
Y Accelerometer	Endevco	P83432	6/17/2022	12/14/2022
Z Accelerometer	Endevco	P83319	6/17/2022	12/14/2022




Head CG X Acceleration
Max: 3.8 g's
Min: -1.1 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 108.0 g's
Min: -0.1 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 74.4 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

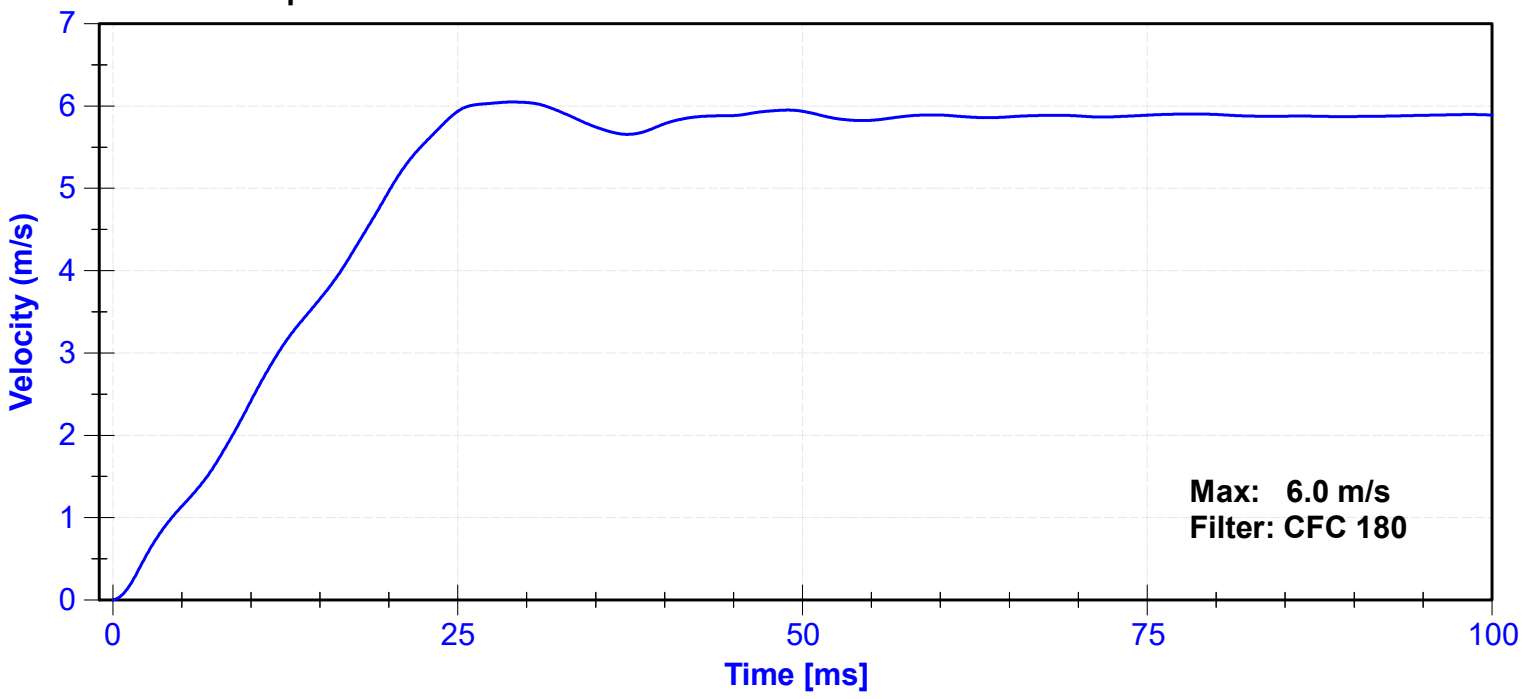
Results

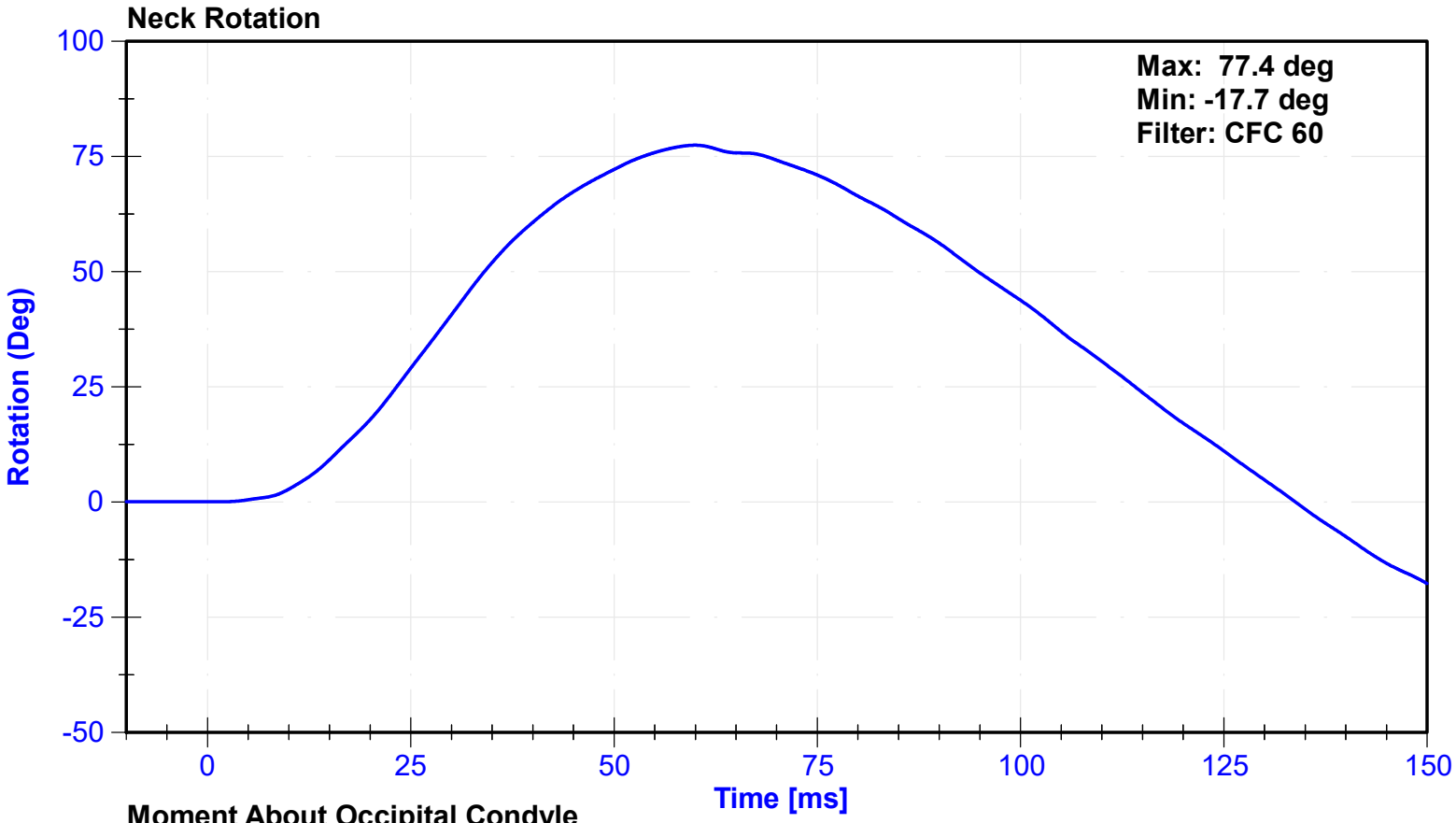
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	41.2	Pass
Velocity	5.51	5.63	m/s	5.600	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.42	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.66	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.96	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.93	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.05	Pass
Neck Rotation	71	81	deg	77.4	Pass
Time at Maximum Rotation	50	70	ms	60.0	Pass
Moment about the OC	36	44	Nm	43.9	Pass
Moment Decay to 0 Nm	102	126	ms	115.3	Pass

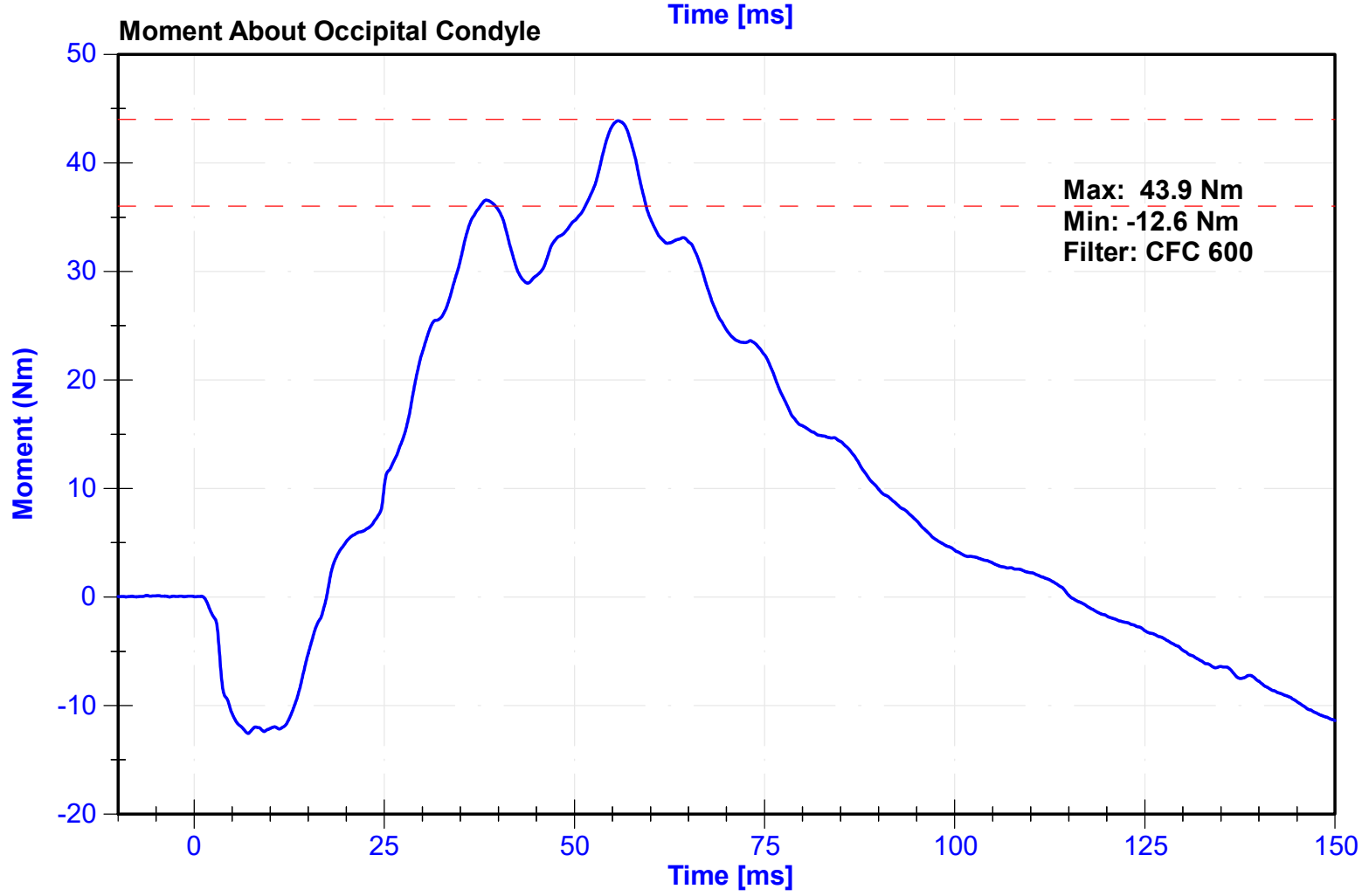
Transducer Calibrations

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

Pendulum Impulse




Neck Rotation
Max: 77.4 deg
Min: -17.7 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 43.9 Nm
Min: -12.6 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

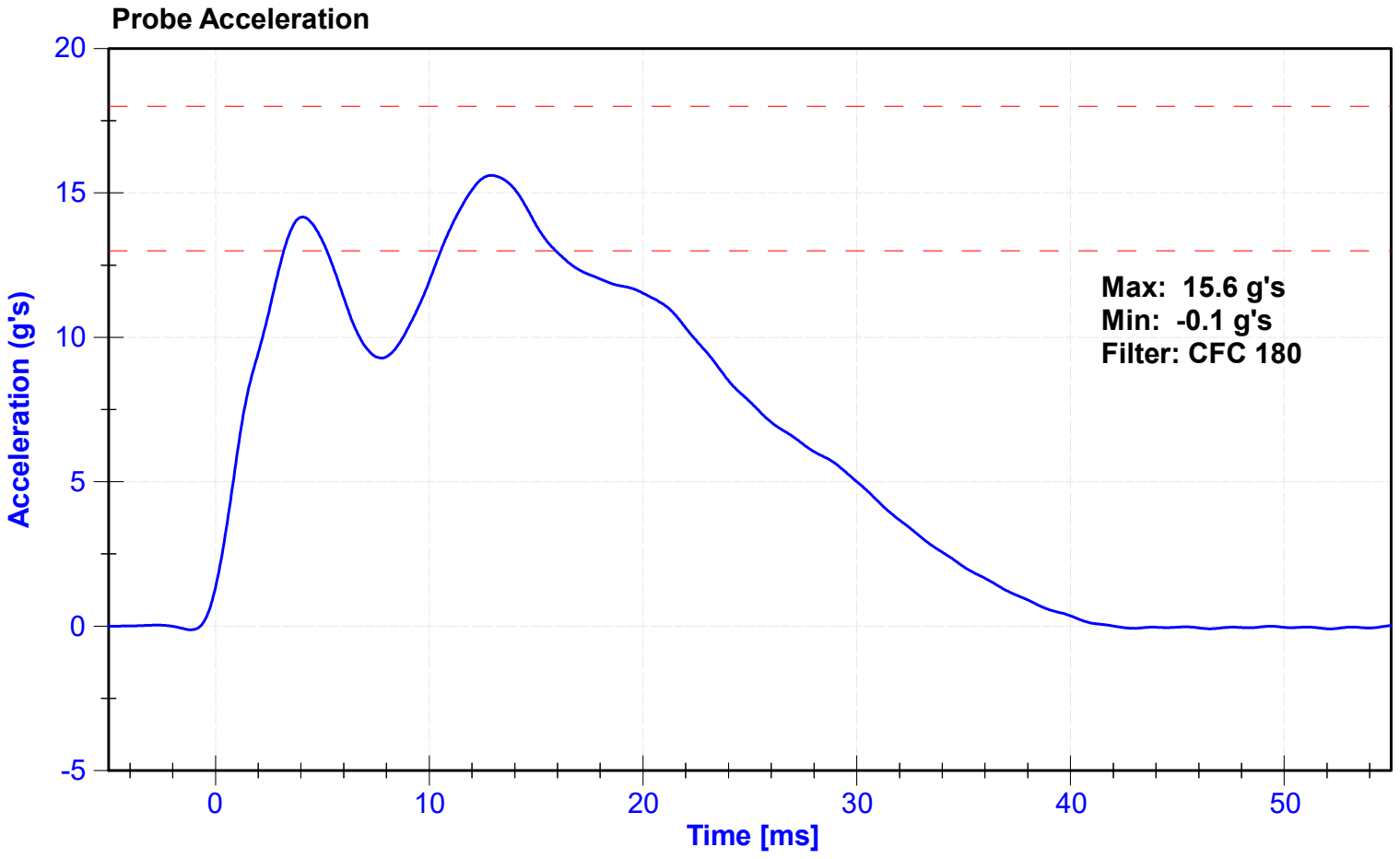
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

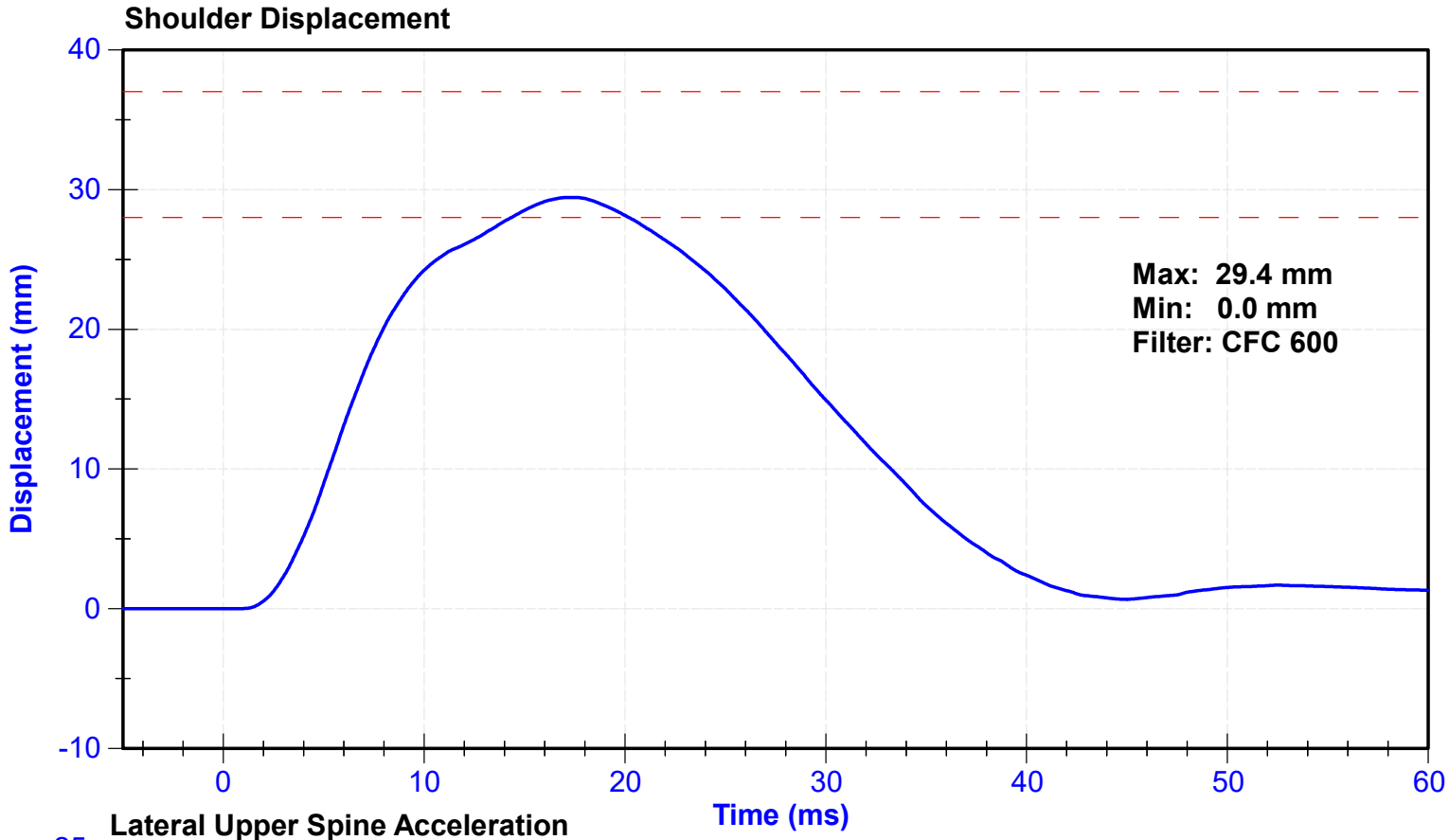
Results

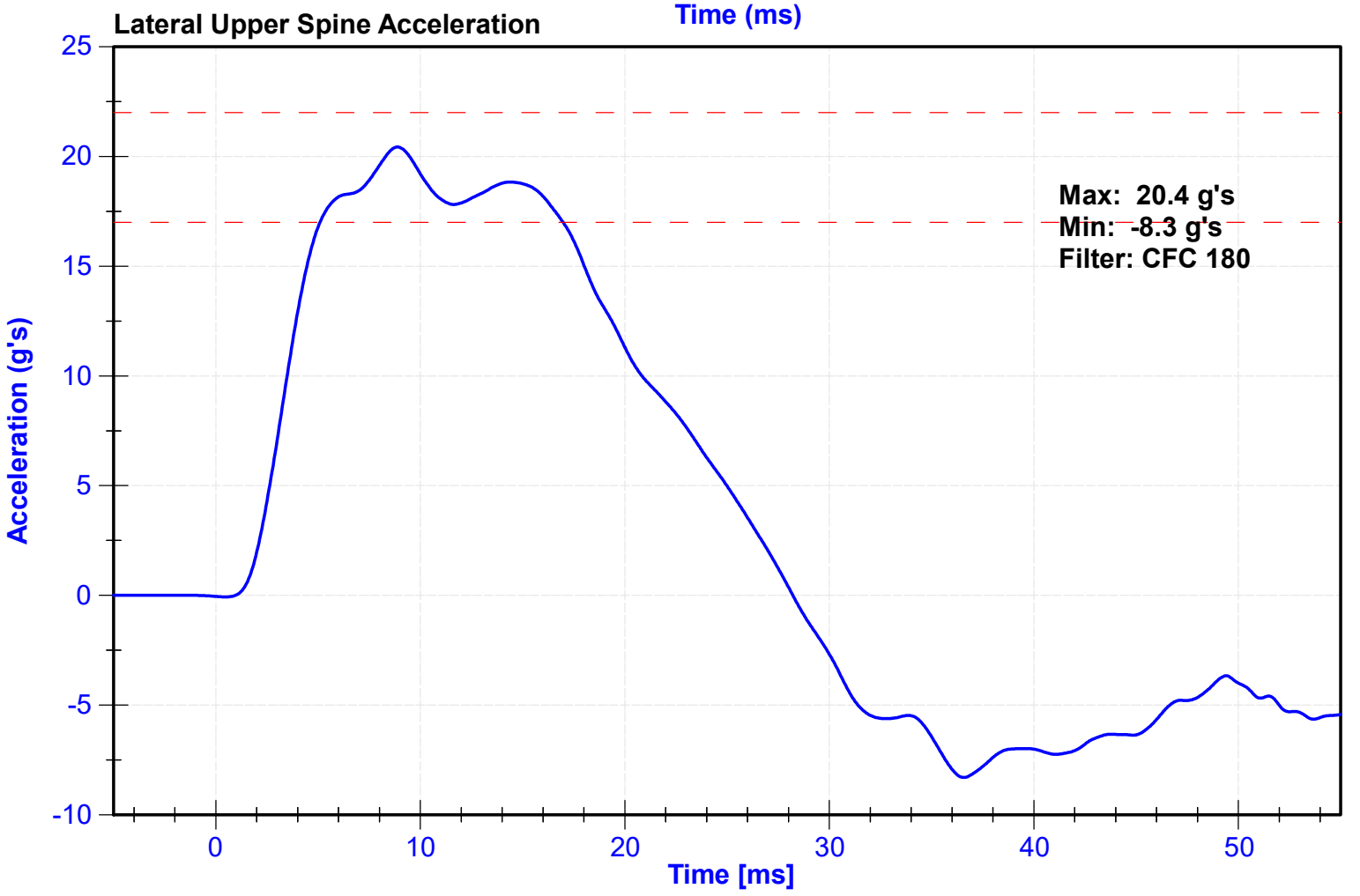
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	29.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.4 g's
Min: -8.3 g's
Filter: CFC 180

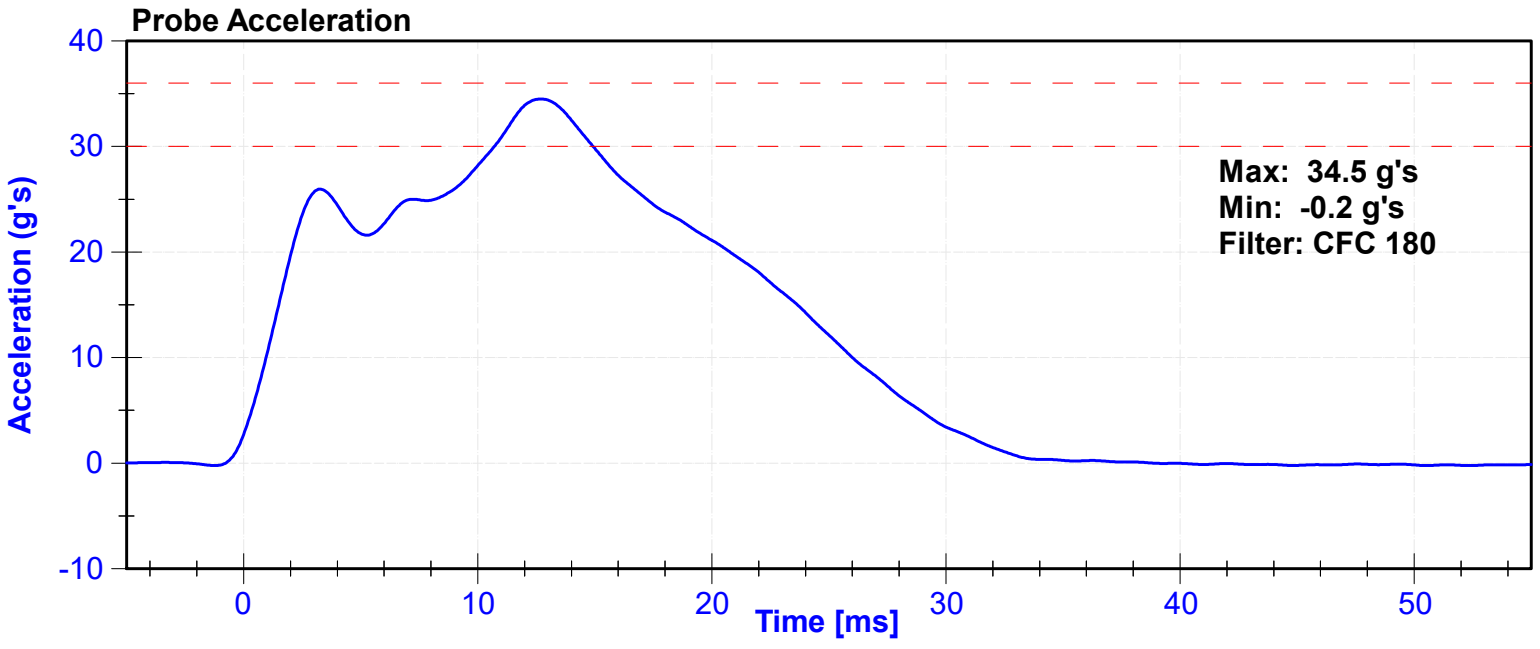
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

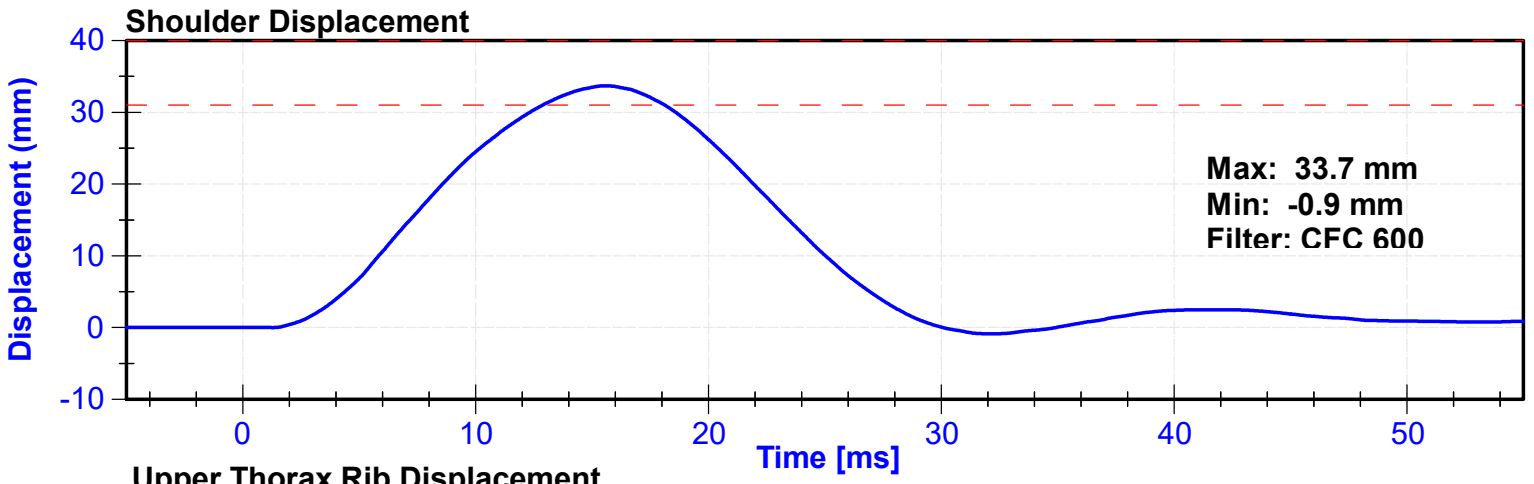
Results

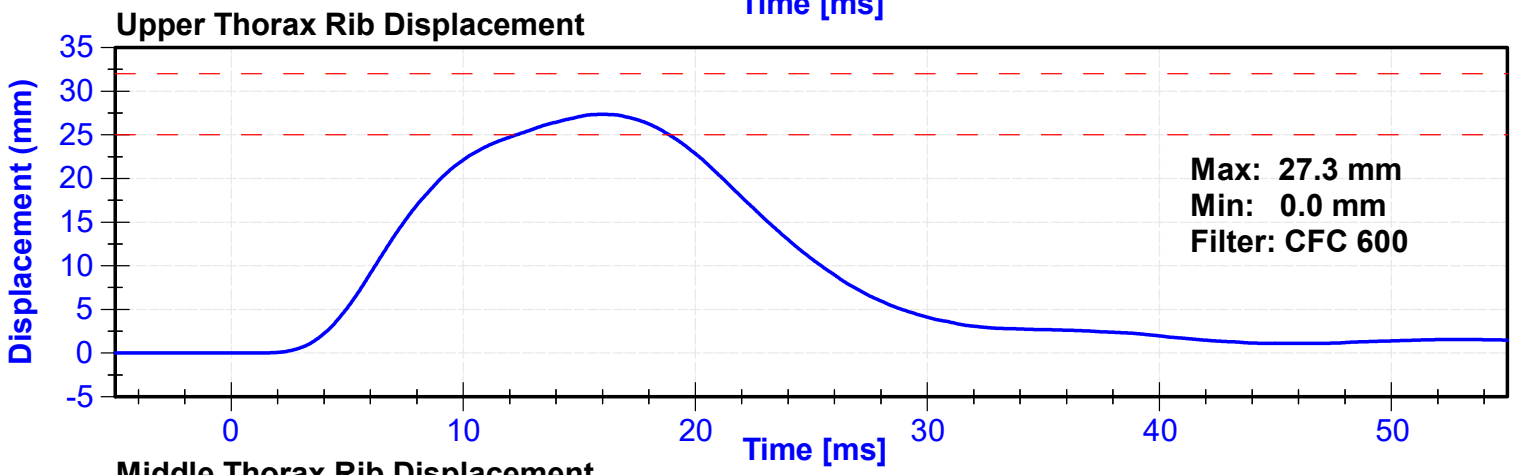
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	34.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.2	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.8	Pass
Shoulder Deflection	31	40	mm	33.7	Pass
Upper Thorax Rib Deflection	25	32	mm	27.3	Pass
Mid Thorax Rib Deflection	30	36	mm	30.7	Pass
Lower Thorax Rib Deflection	32	38	mm	33.1	Pass

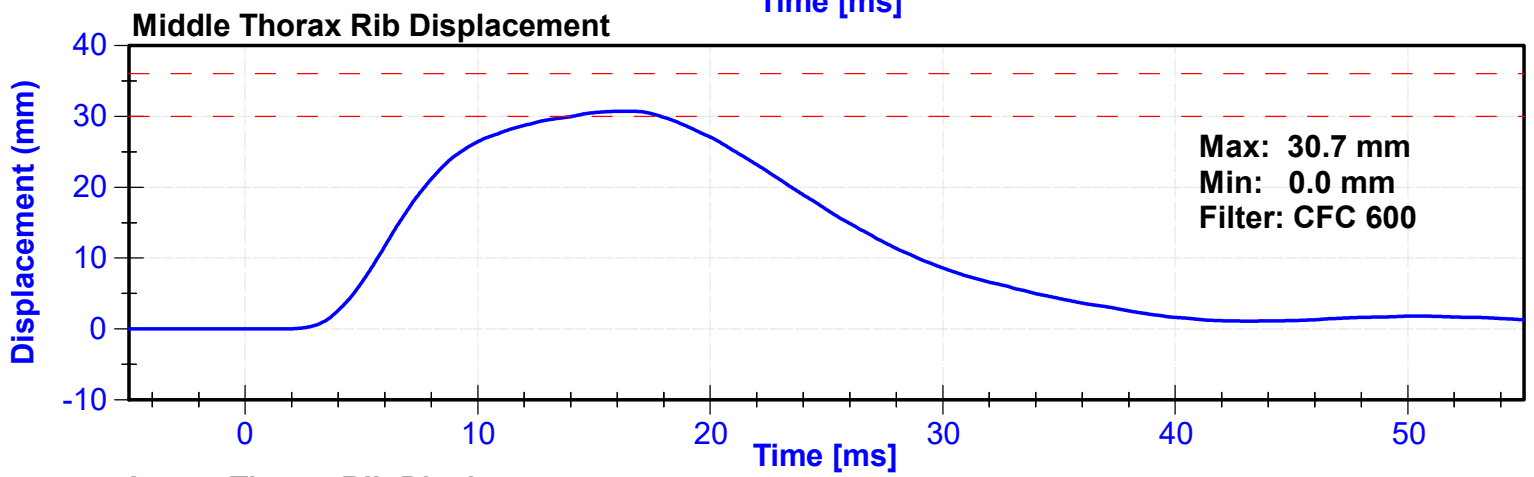
Transducer Calibrations

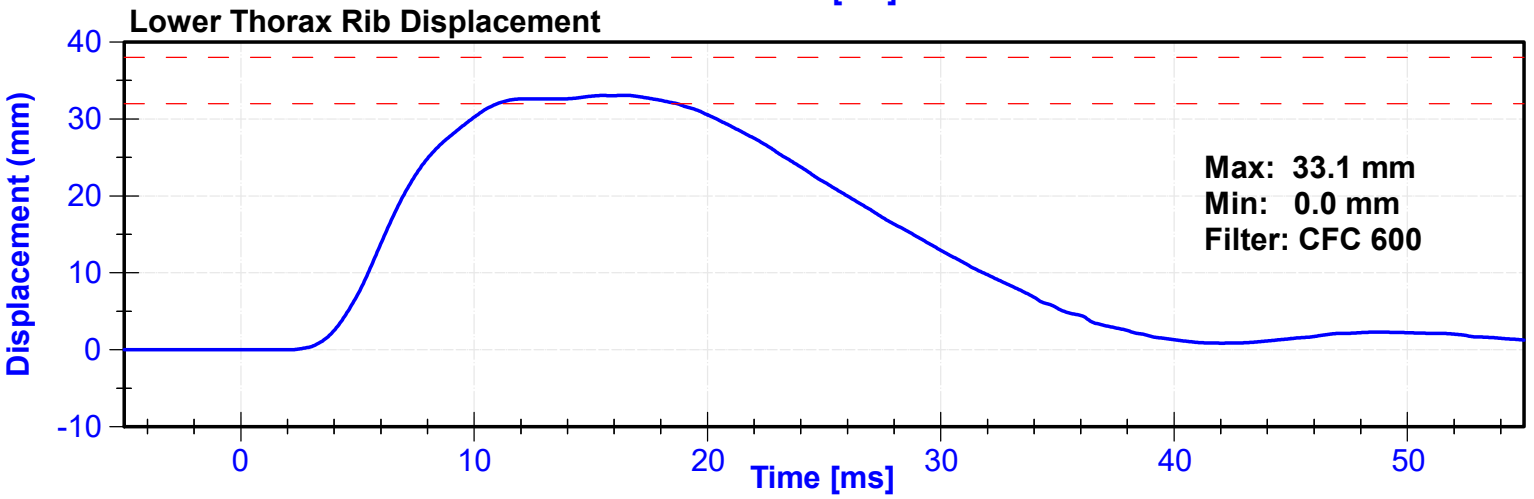
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine T1 Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Upper Spine T12 Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022

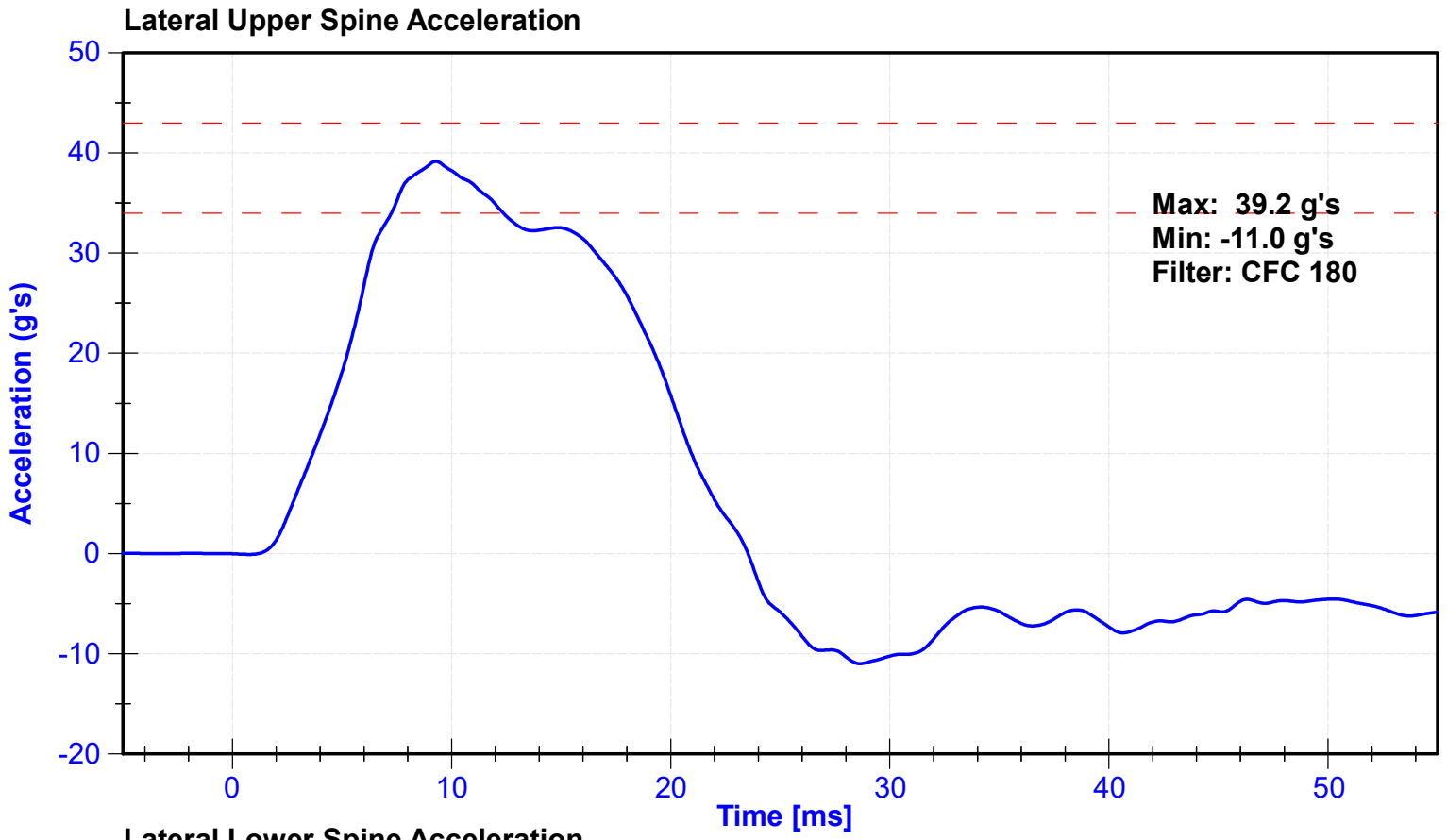


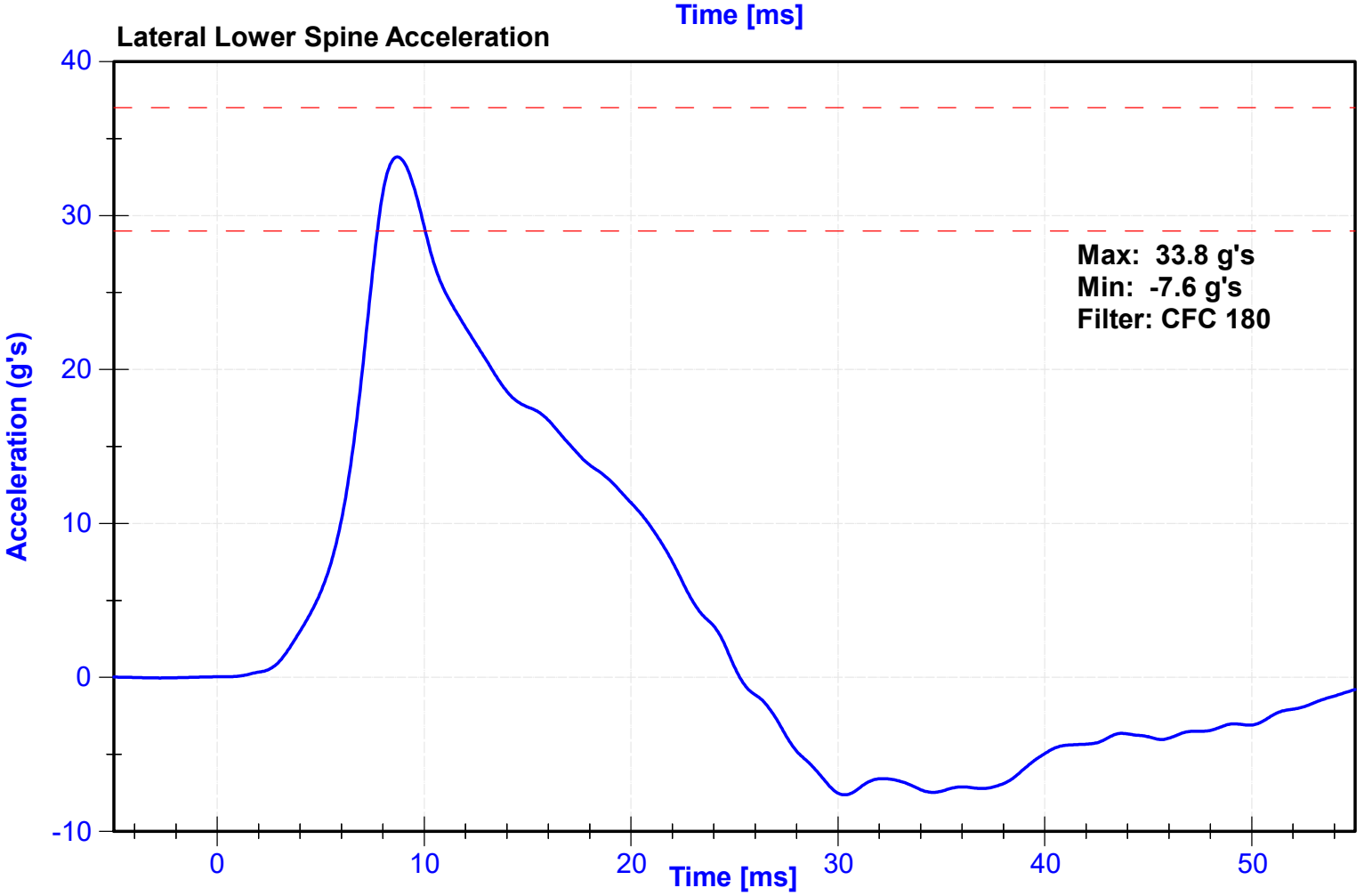

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.7 mm
Min: -0.9 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 27.3 mm
Min: 0.0 mm
Filter: CFC 600


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


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 39.2 g's
Min: -11.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 33.8 g's
Min: -7.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

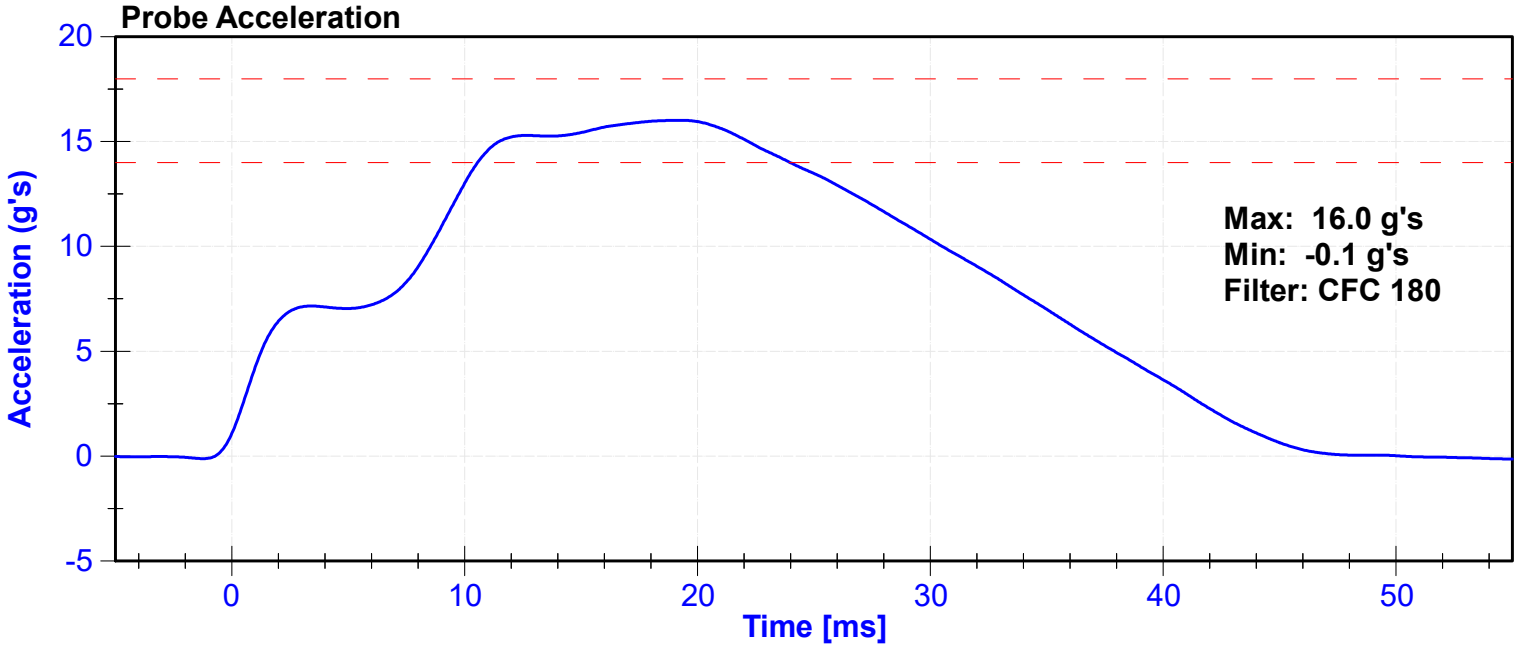
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

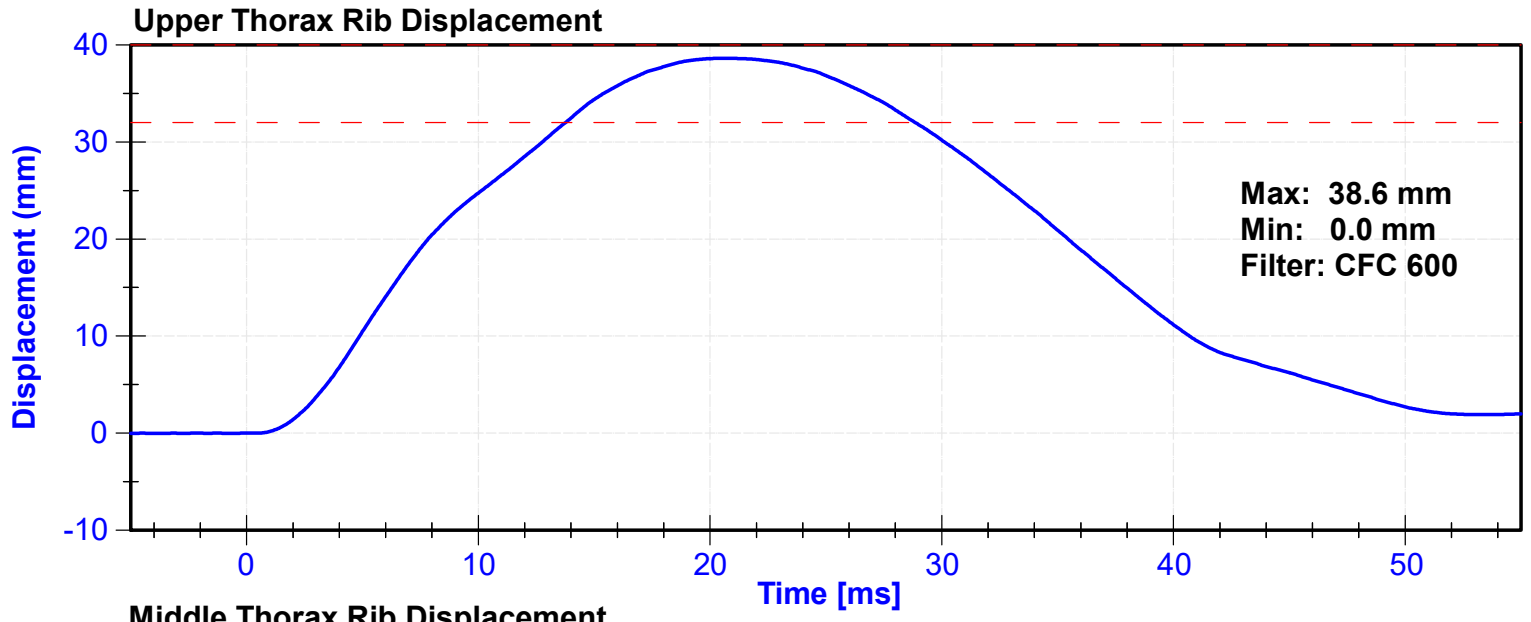
Results

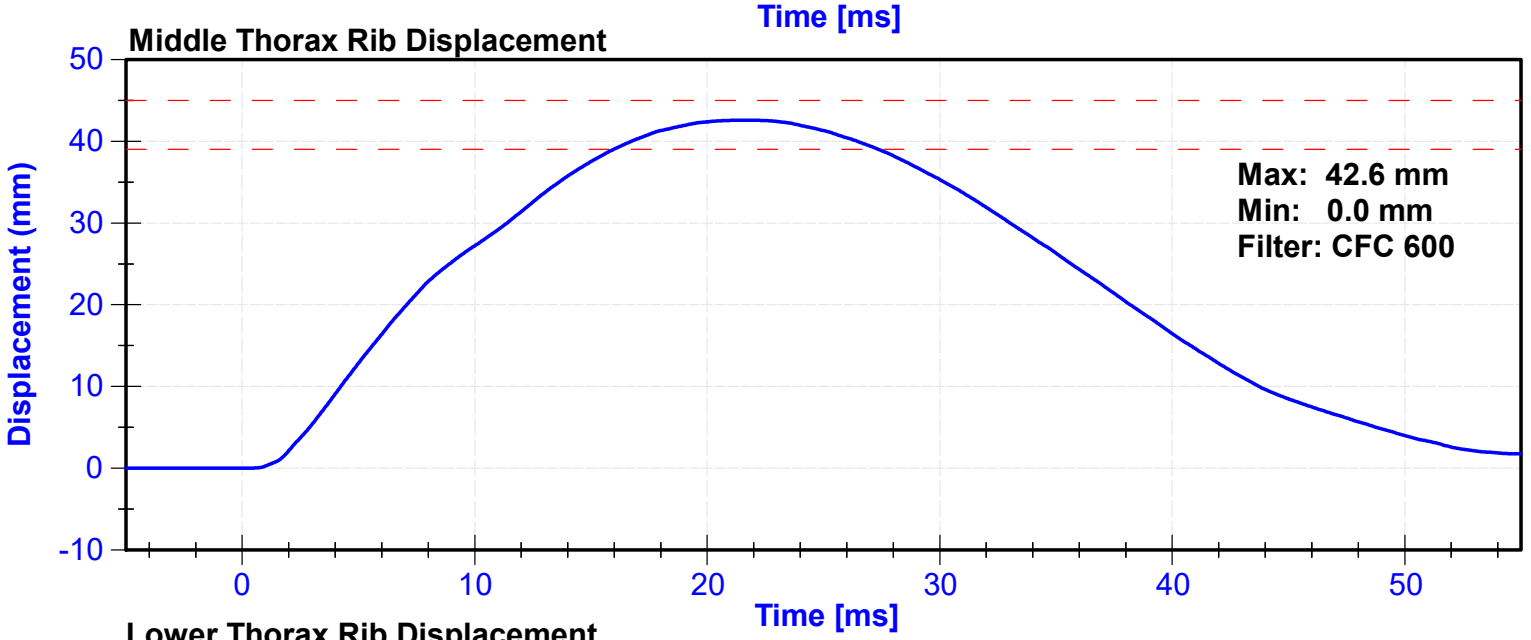
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.0	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.3	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.4	Pass
Upper Thorax Rib Deflection	32	40	mm	38.6	Pass
Middle Thorax Rib Deflection	39	45	mm	42.6	Pass
Lower Thorax Rib Deflection	35	43	mm	39.9	Pass

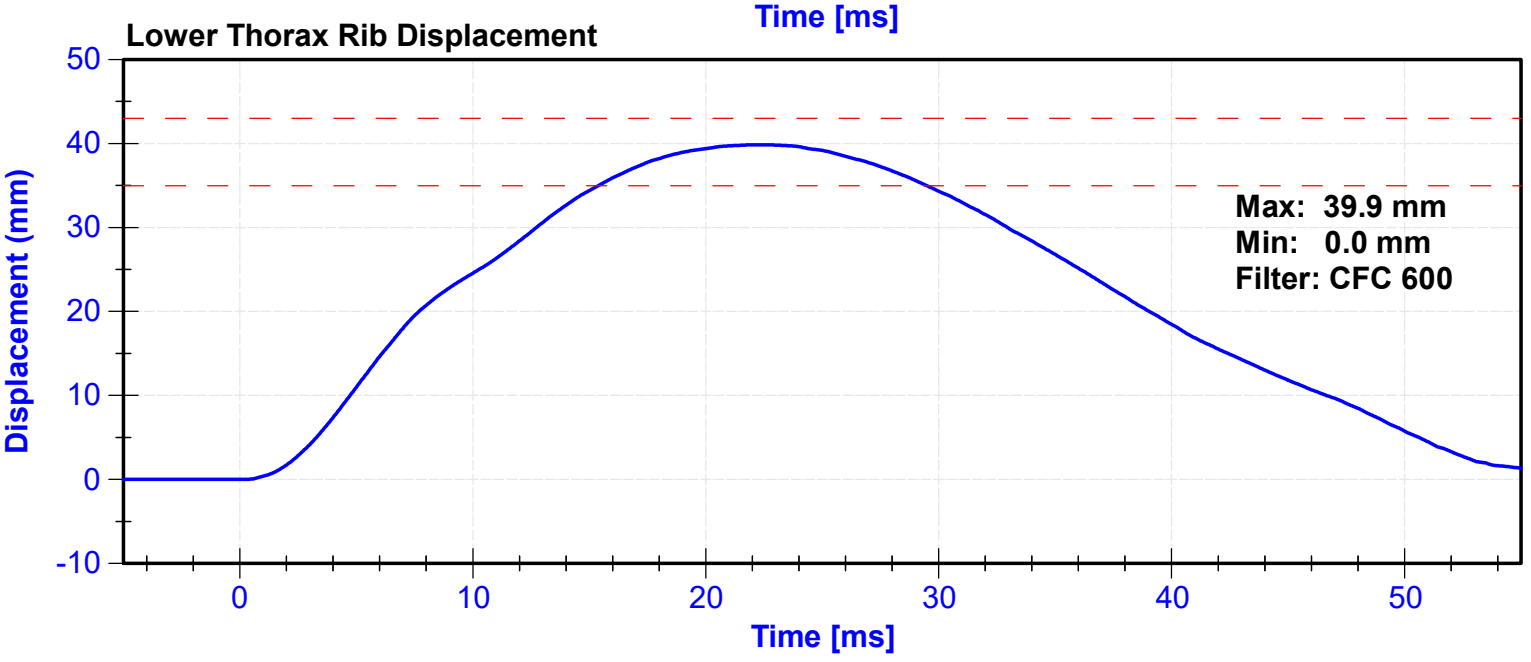
Transducer Calibrations

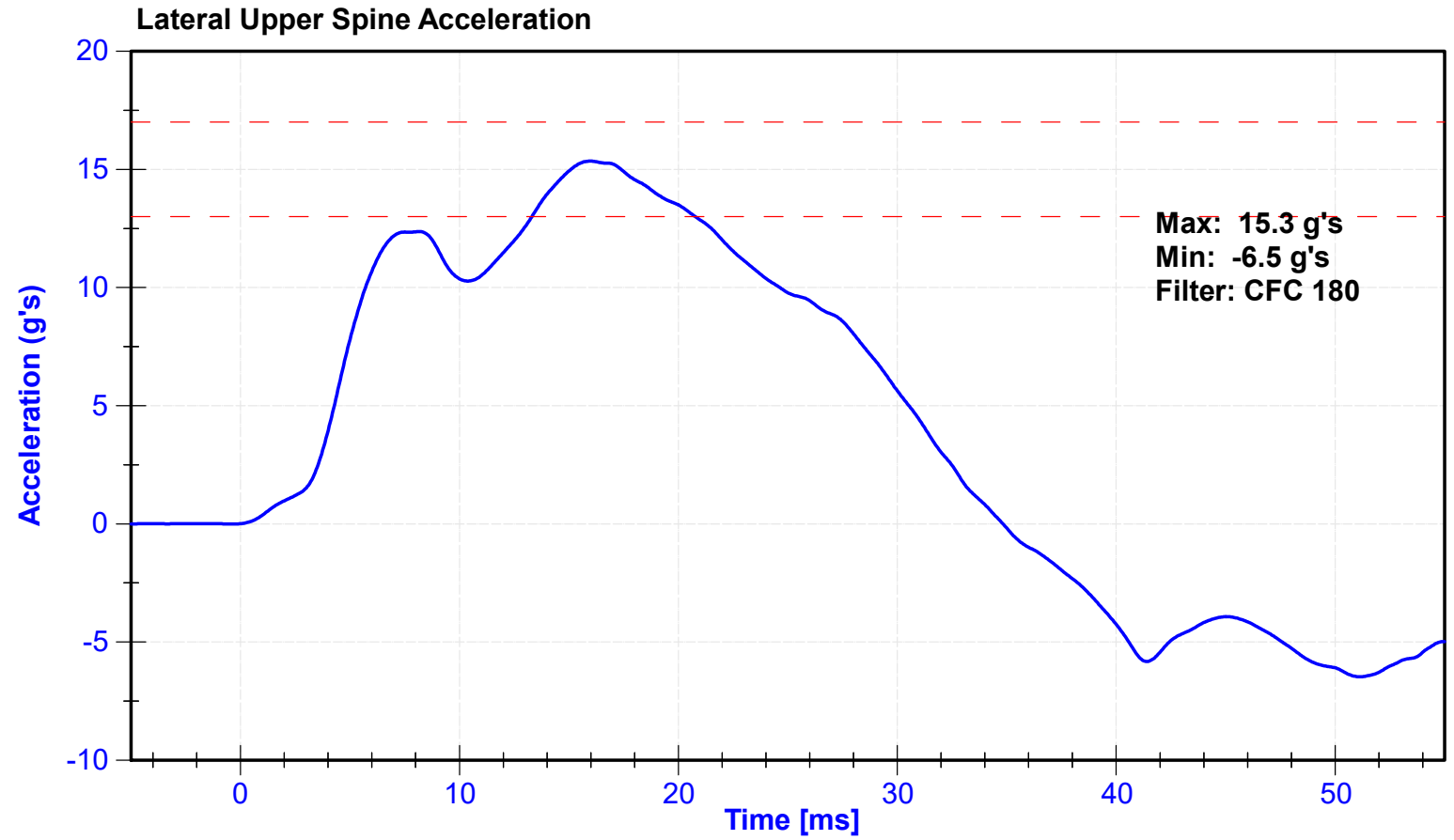
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022

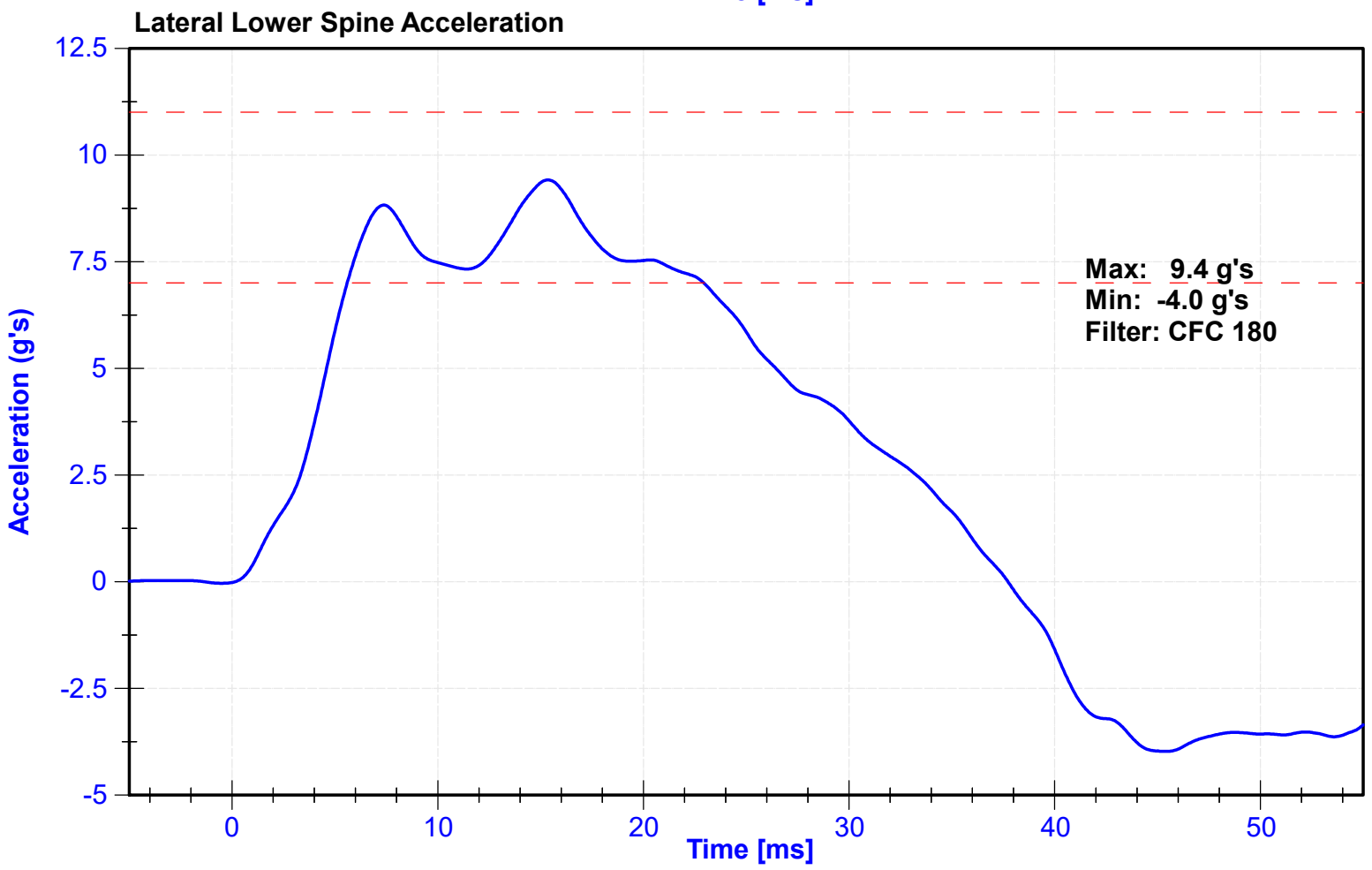



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.6 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.6 mm
Min: 0.0 mm
Filter: CFC 600


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


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.3 g's
Min: -6.5 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.4 g's
Min: -4.0 g's
Filter: CFC 180

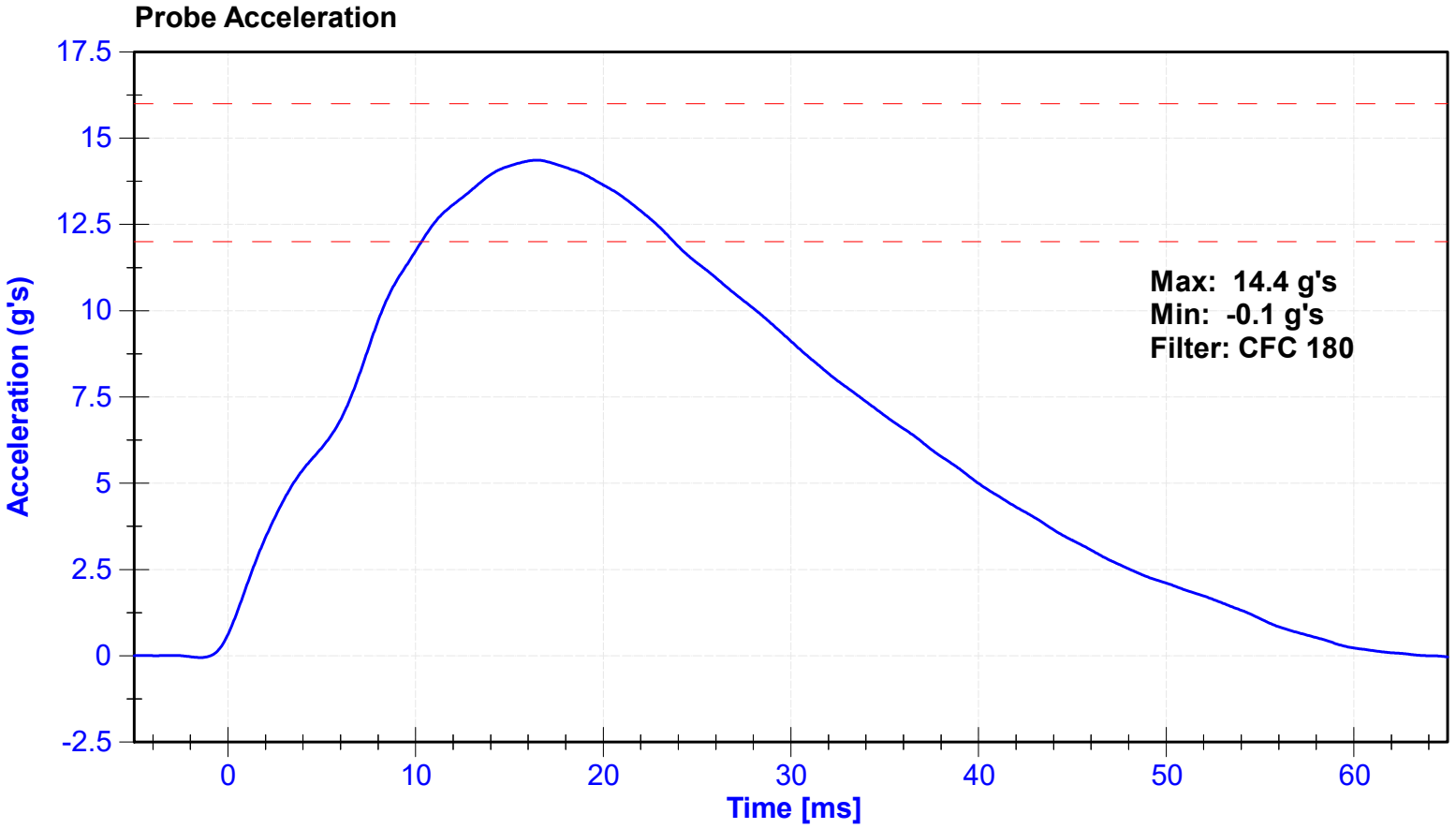
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

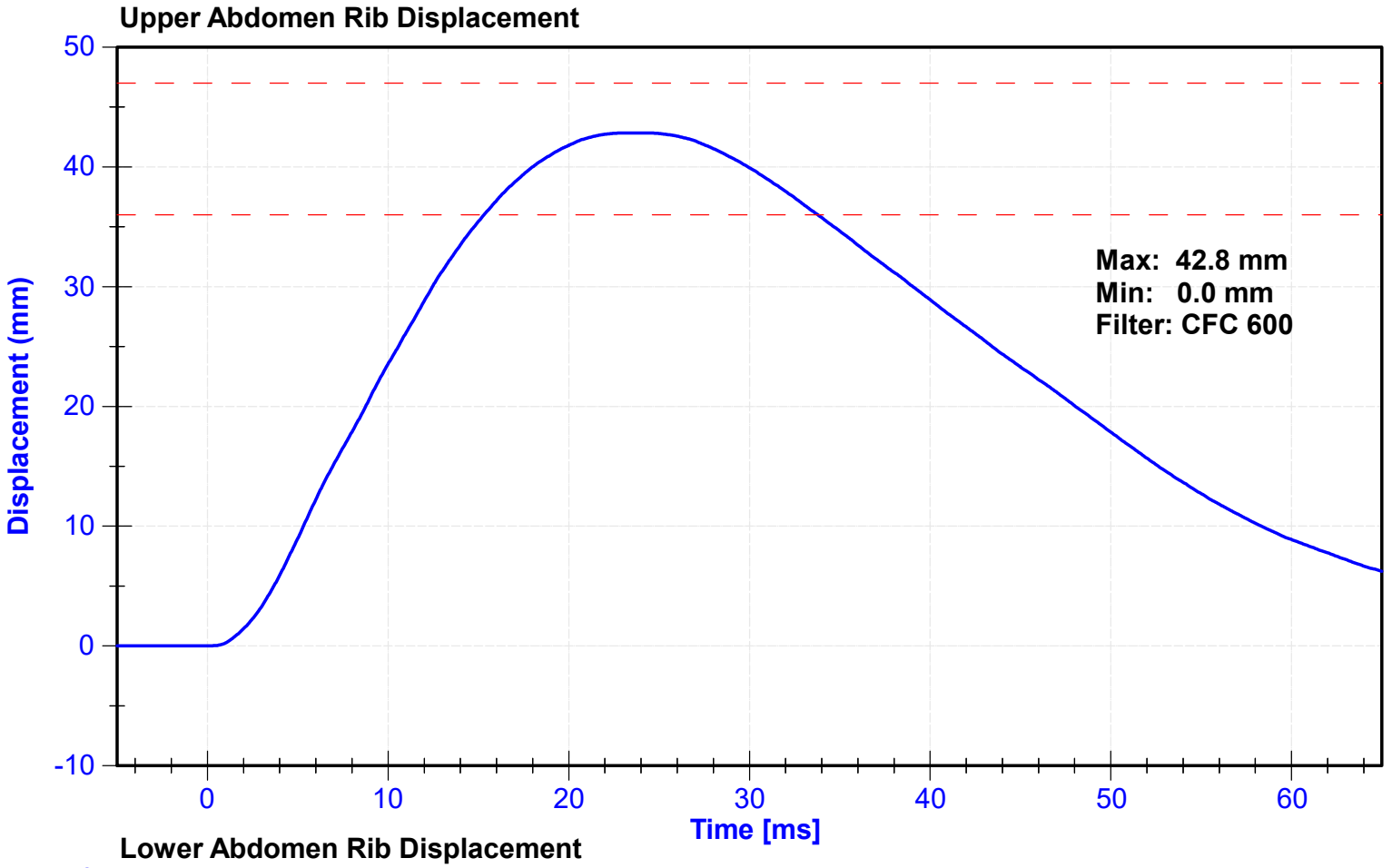
Results

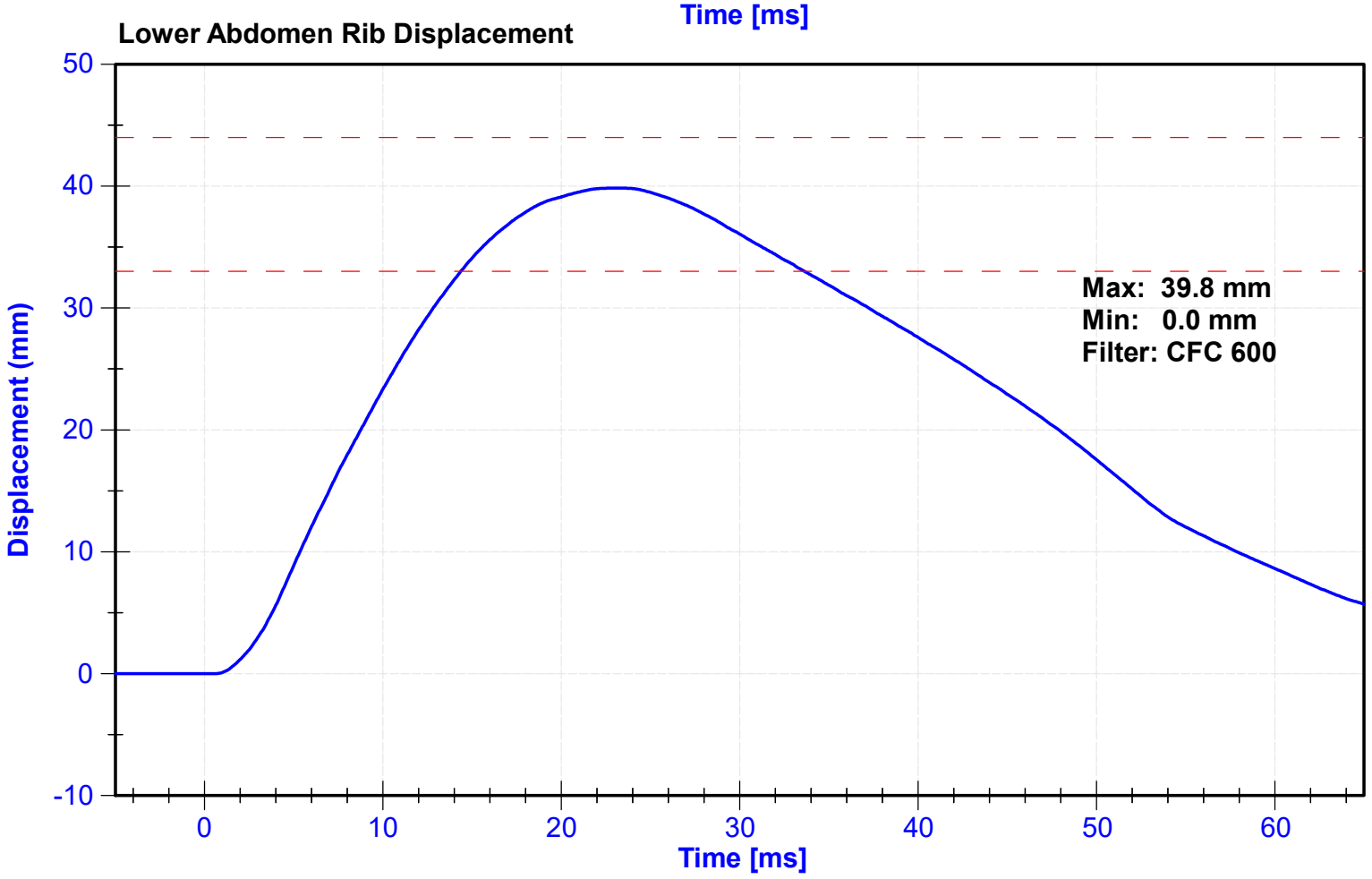
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.4	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.9	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.8	Pass

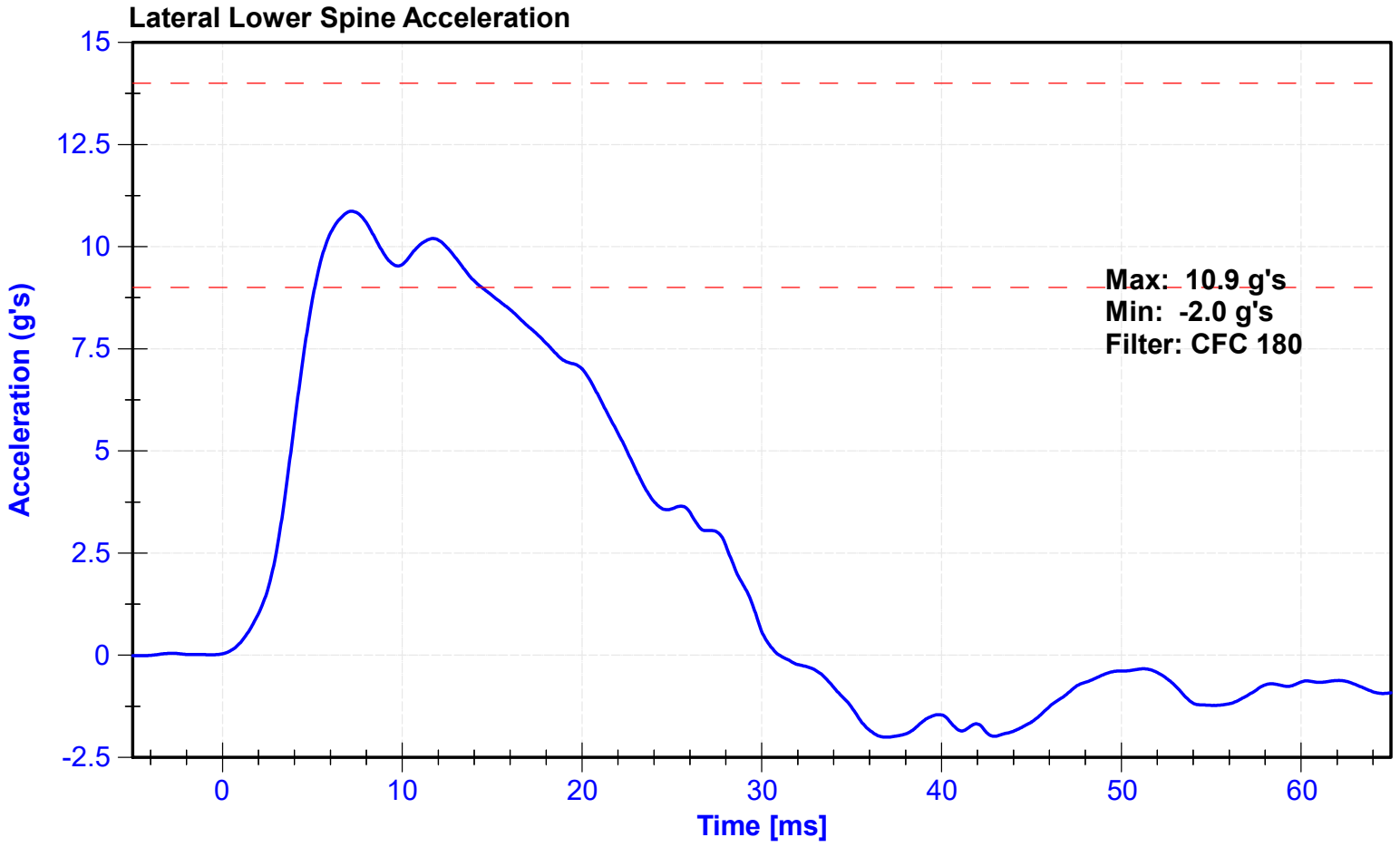
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Abdomen Rib Potentiometer	Servo	008GFE	6/17/2022	12/16/2022
Lower Abdomen Rib Potentiometer	Servo	041 GFE	6/17/2022	12/16/2022




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 42.8 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 39.8 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 10.9 g's
Min: -2.0 g's
Filter: CFC 180

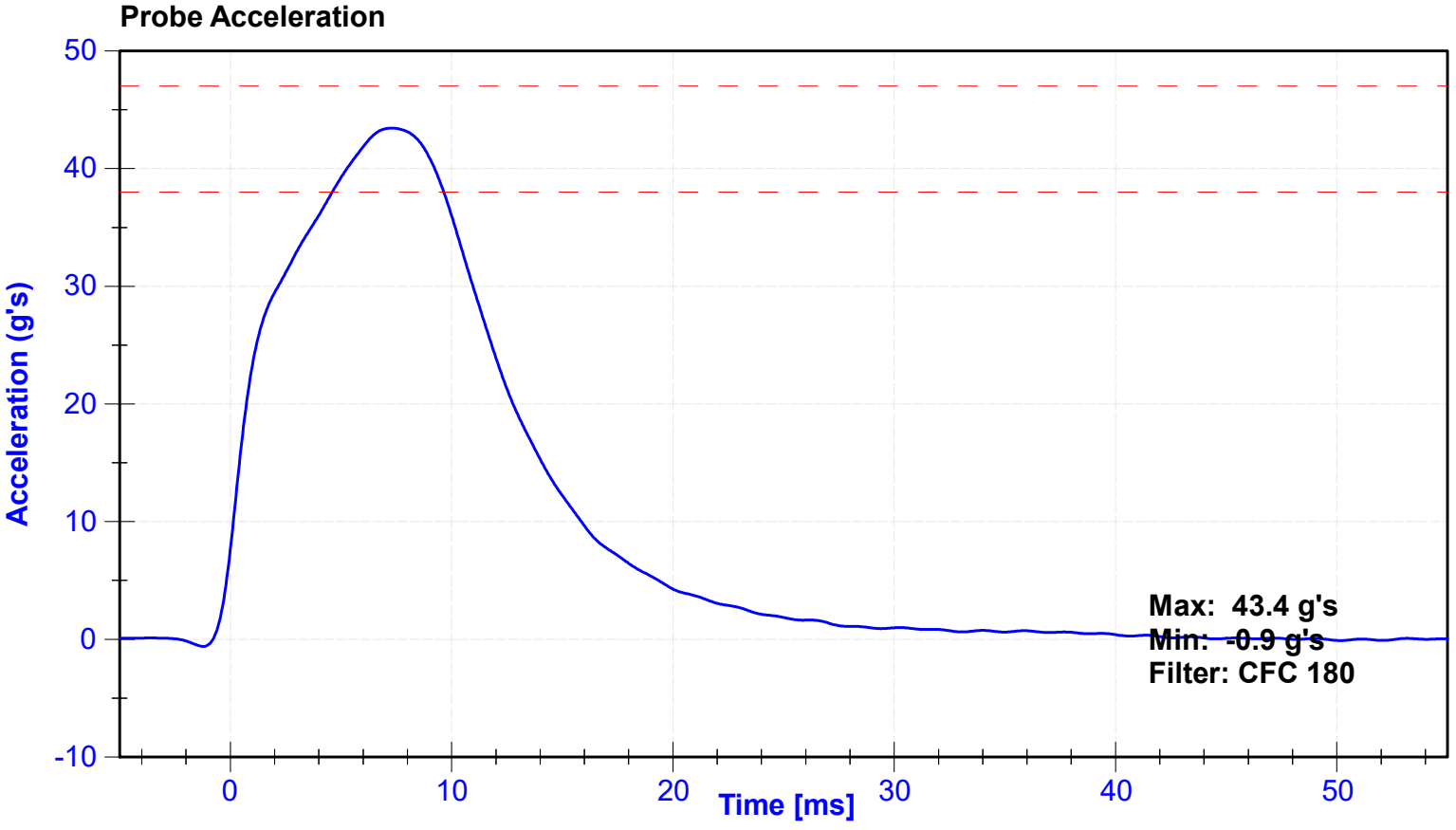
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

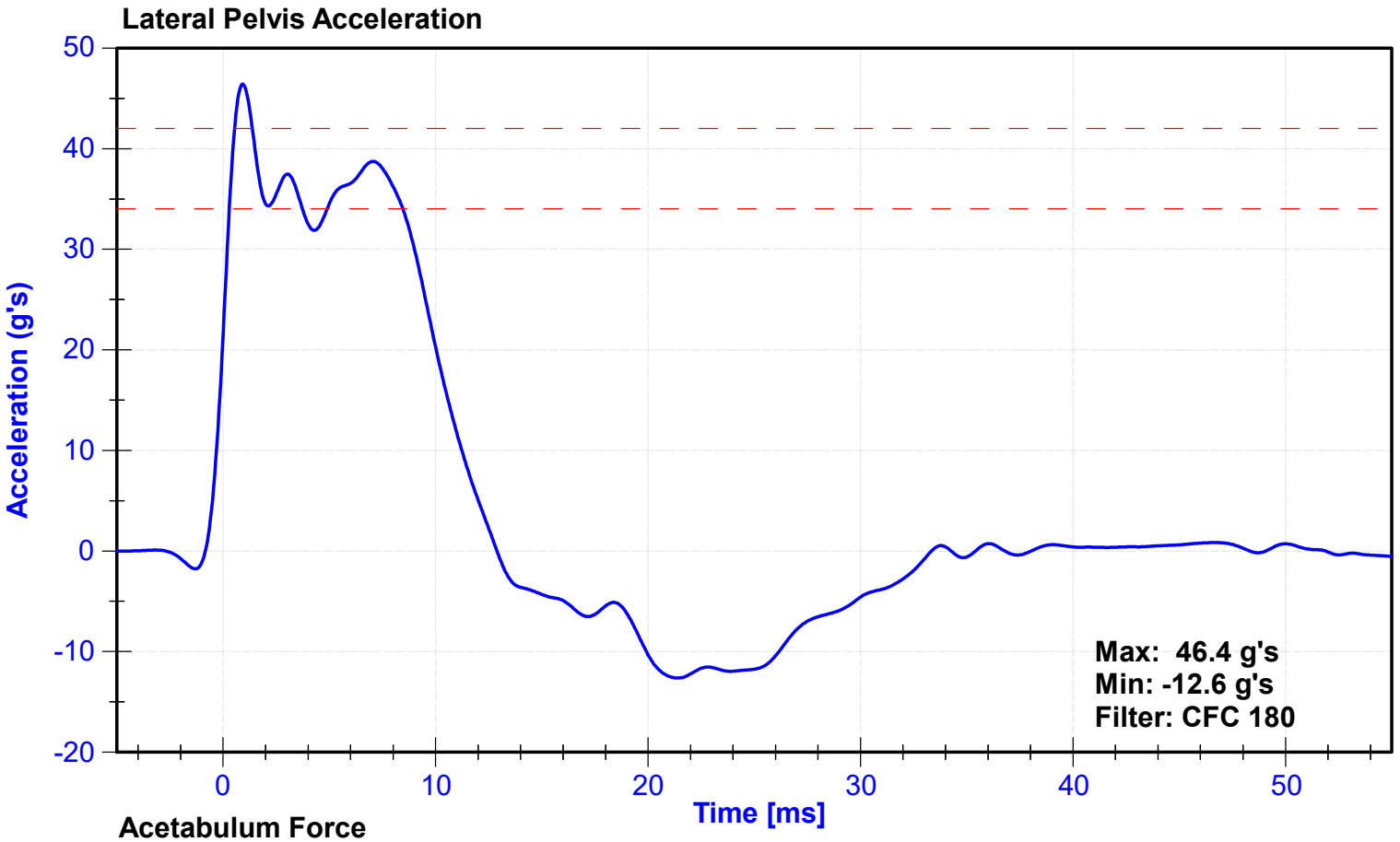
Results

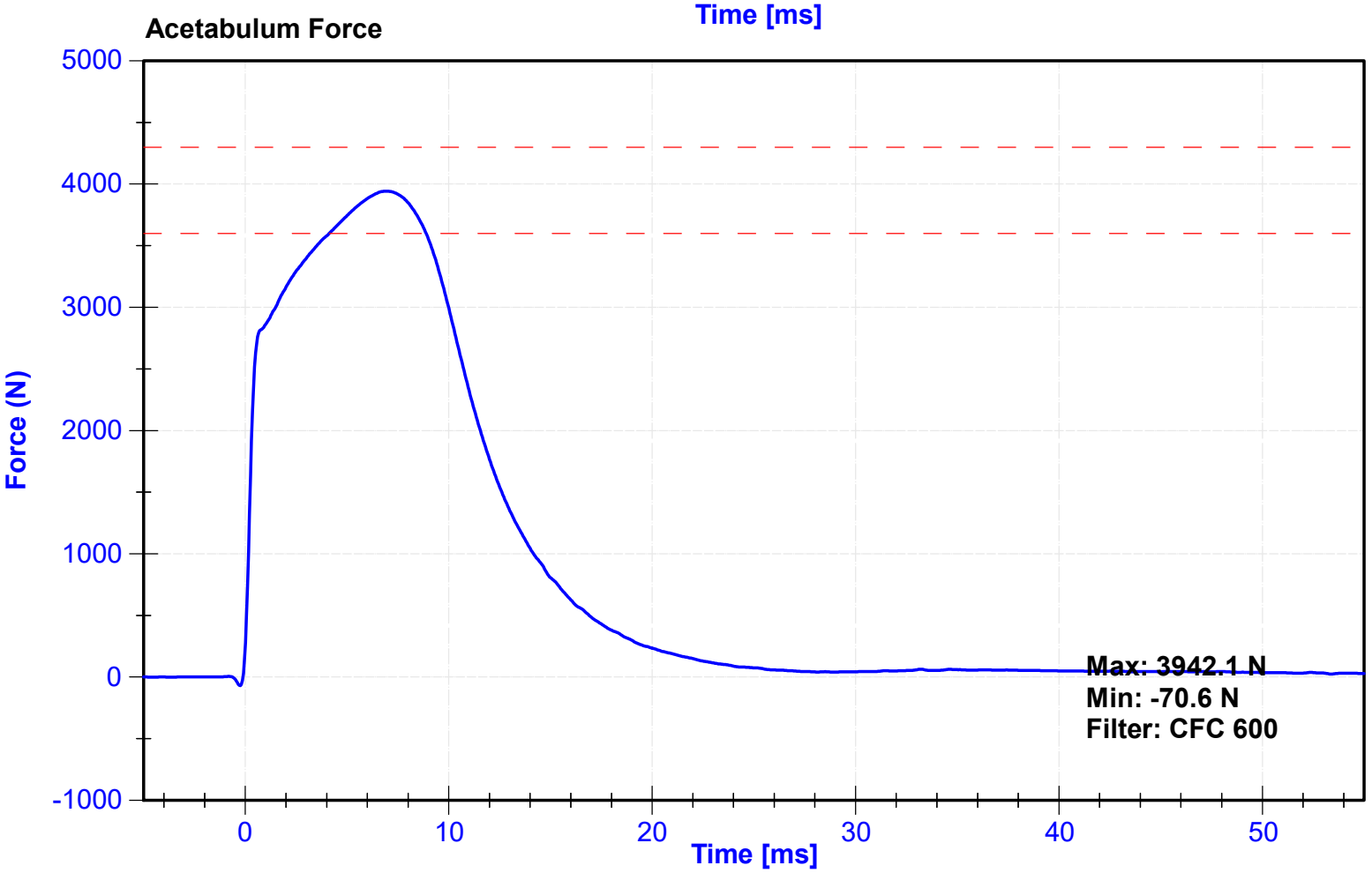
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	43.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.7	Pass
Acetabulum Force	3600	4300	N	3942.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 46.4 g's
Min: -12.6 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3942.1 N
Min: -70.6 N
Filter: CFC 600

SACO RESEARCH

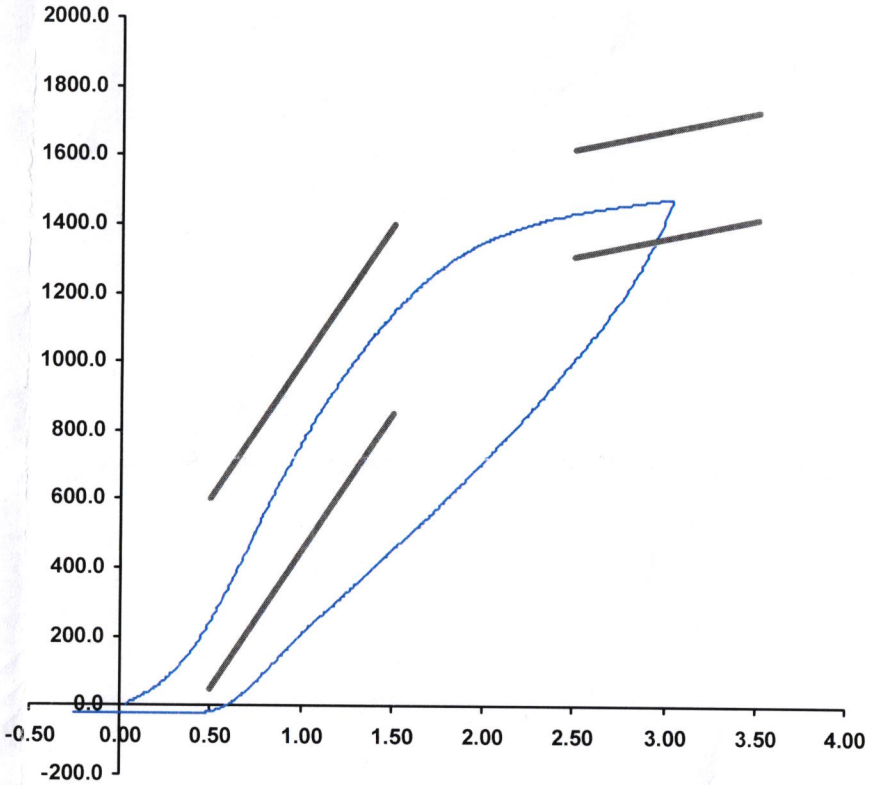
VG8012
Cert
10/10/2022

SID-IIs Pelvis Plug Certification Test

Plug S/N 15431
Test Number 20092
Report Number 20146
Test Date 9/9/2021 10:08:48 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	252	50	600
Force @ 1.5 mm (N)	1,149	850	1,400
Force @ 2.5 mm (N)	1,435	1,306	1,618
Force @ 3.0 mm (N)	1,475	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By : DC Date : 9/9/2021

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

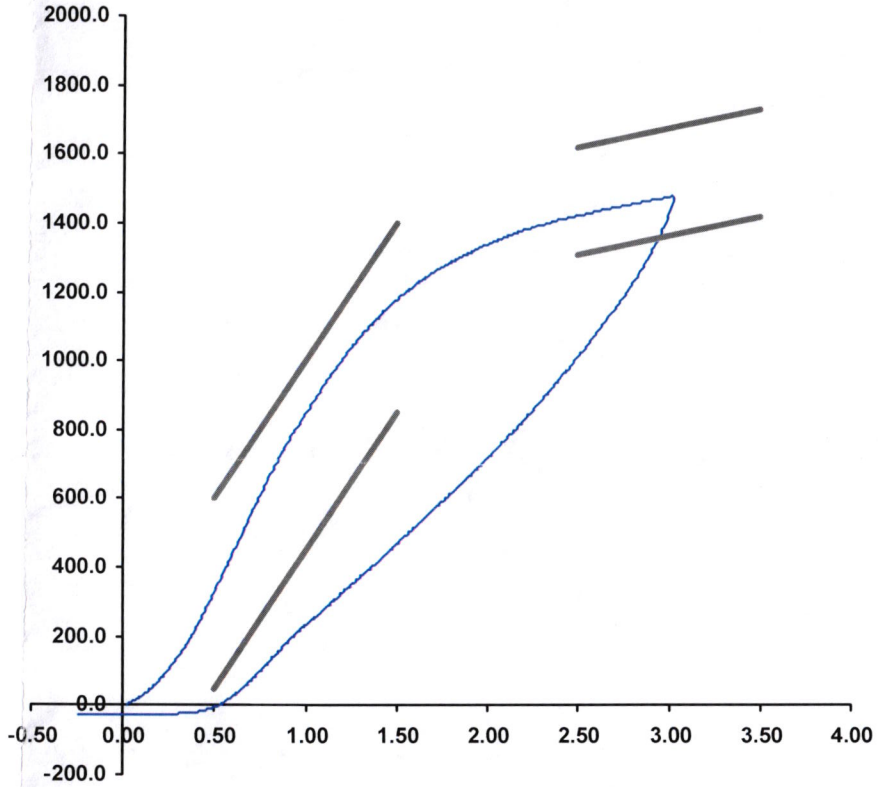
DG8012 Crash CAL5326
10/10/2022

SID-IIs Pelvis Plug Certification Test

Plug S/N 15127
Test Number 17839
Report Number 17888
Test Date 3/5/2021 10:04:35 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	335	50	600
Force @ 1.5 mm (N)	1,177	850	1,400
Force @ 2.5 mm (N)	1,423	1,306	1,618
Force @ 3.0 mm (N)	1,477	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 05-Mar-21
SACO Research

By : DC Date : 3/5/2021

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

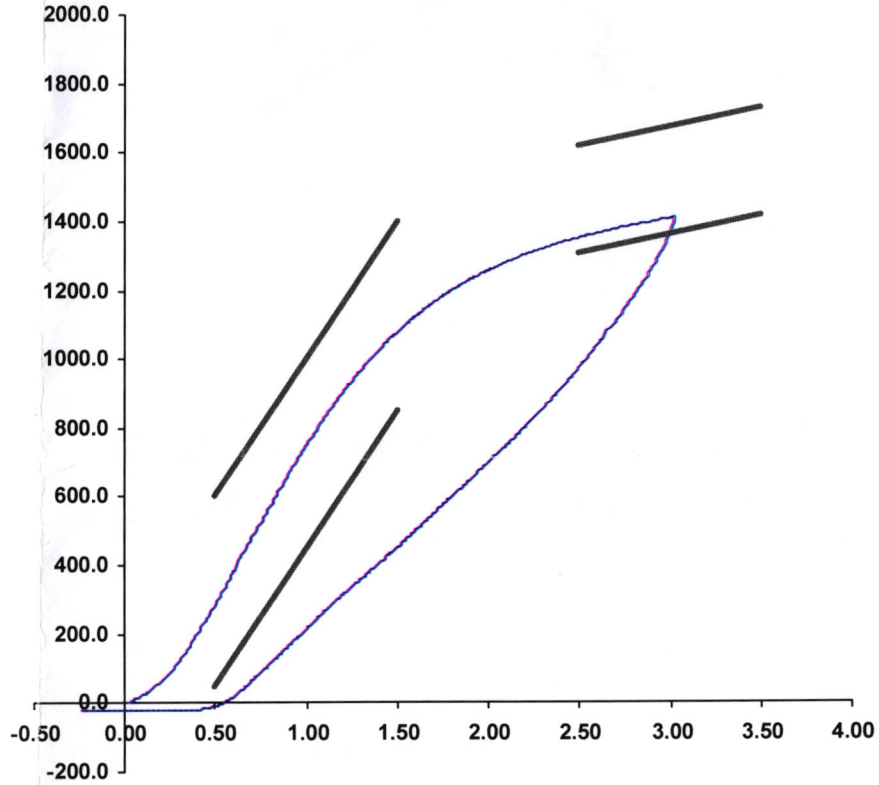
DG8012 CAL5326
Non-Impact
10/10/2022

SID-IIs Pelvis Plug Certification Test

Plug S/N 14830
Test Number 17262
Report Number 17308
Test Date 1/28/2021 11:05:19 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	288	50	600
Force @ 1.5 mm (N)	1,080	850	1,400
Force @ 2.5 mm (N)	1,351	1,306	1,618
Force @ 3.0 mm (N)	1,407	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 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

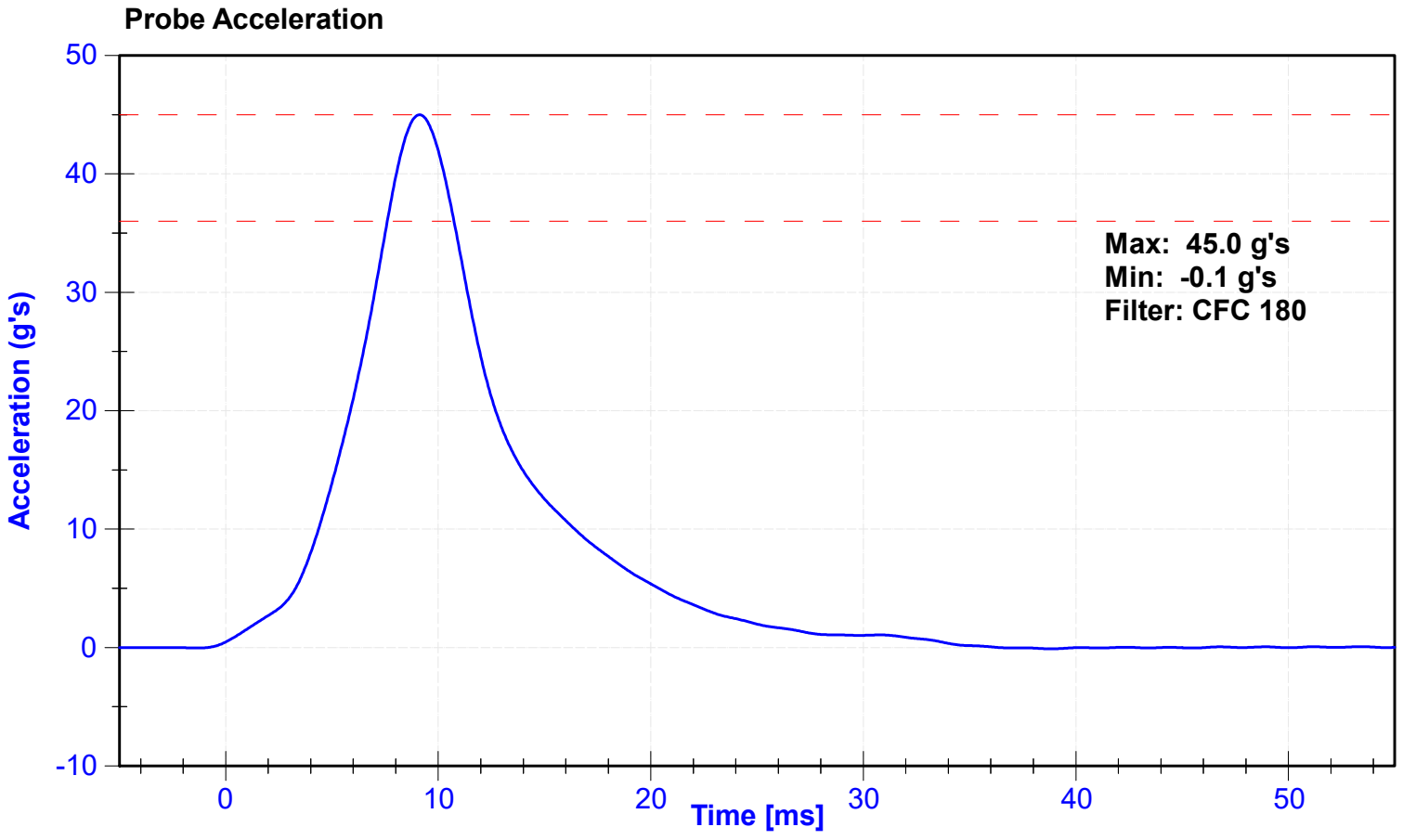
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

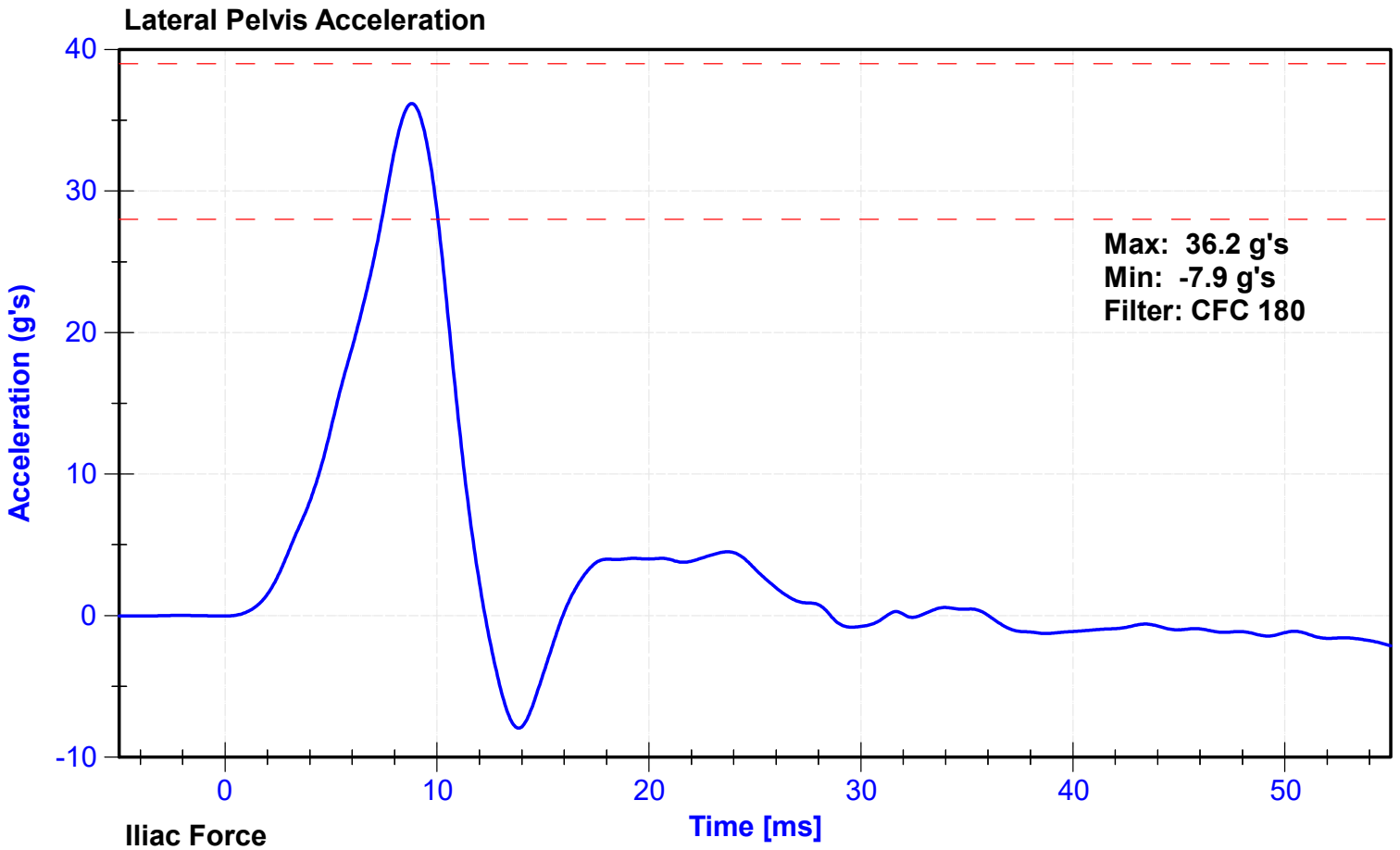
Results

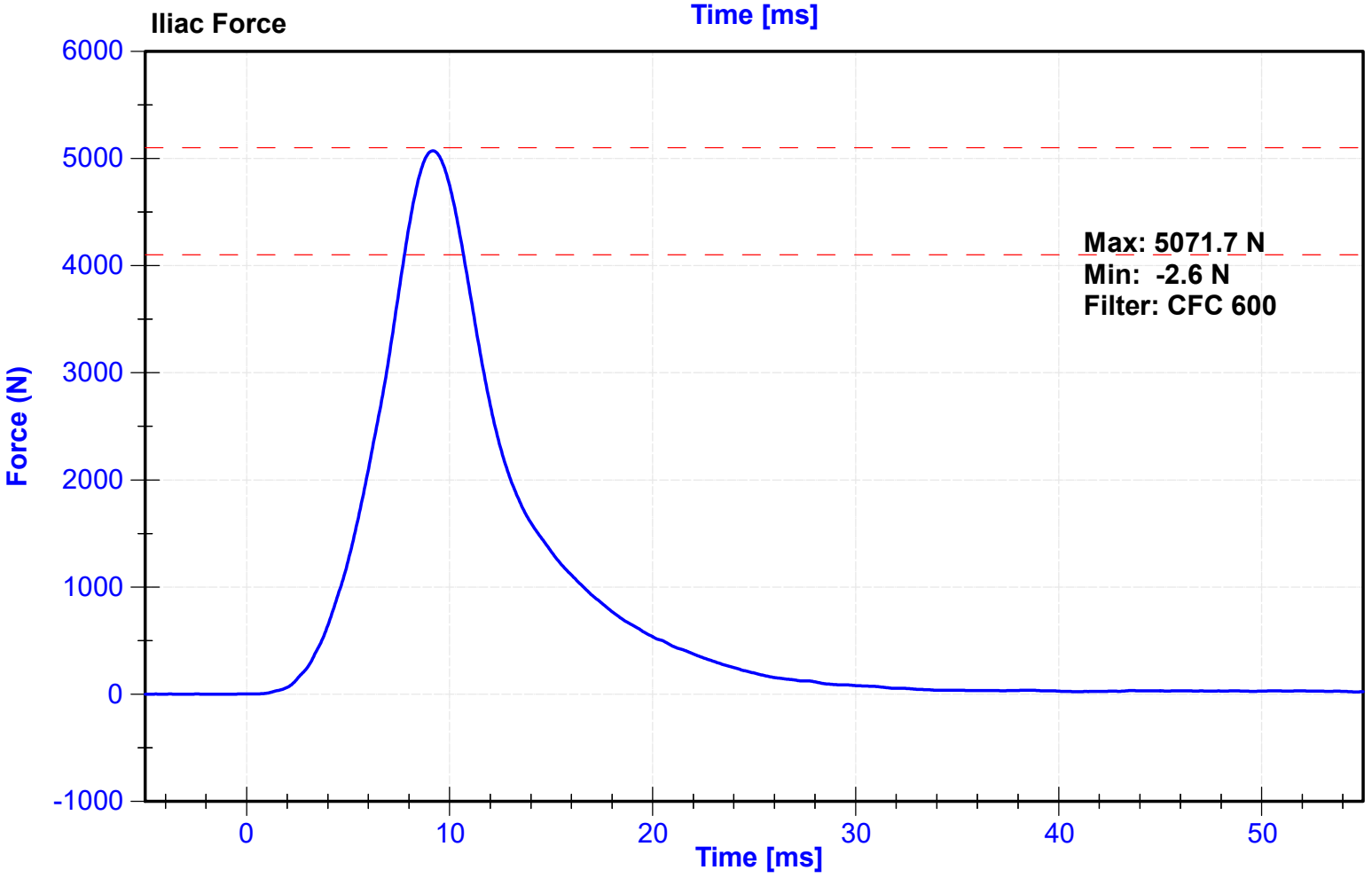
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	36	45	g's	45.0	Pass
Lateral Pelvis Acceleration	28	39	g's	36.2	Pass
Iliac Force	4100	5100	N	5071.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Iliac Load Cell	Denton	290-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 36.2 g's
Min: -7.9 g's
Filter: CFC 180


Iliac Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 5071.7 N
Min: -2.6 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

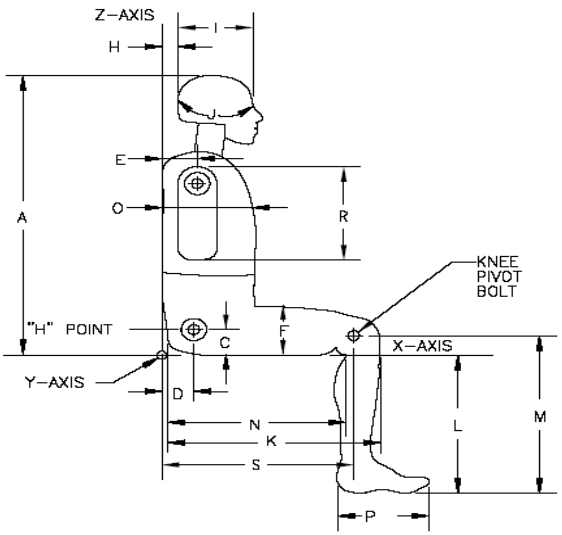
SERIAL NO:DG8012

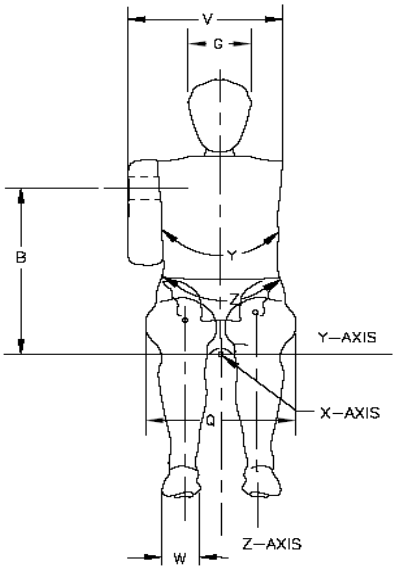
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

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

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	45	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	533	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	225	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	868	Pass
Z	Waist Circumference	761	791	781	Pass

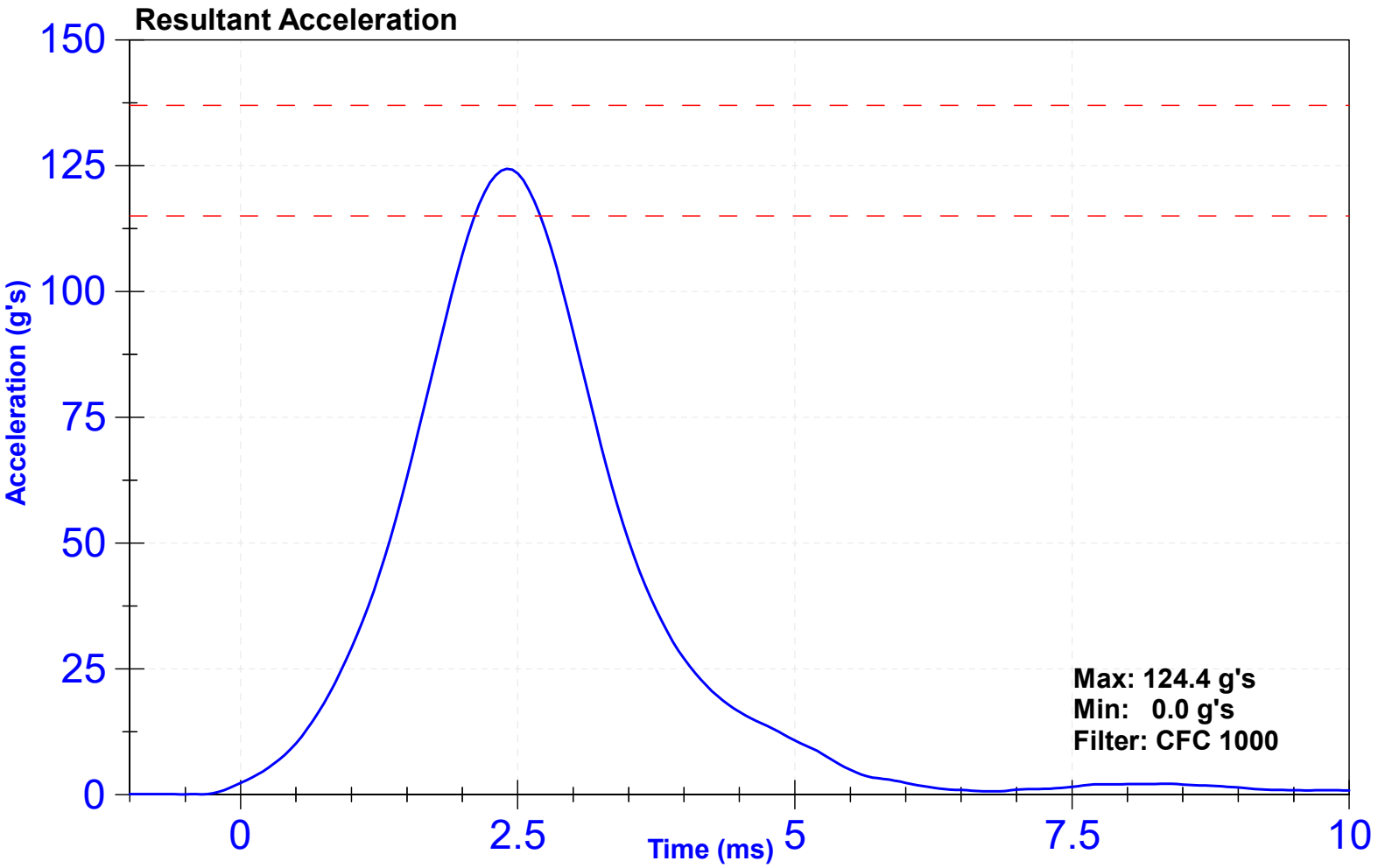
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

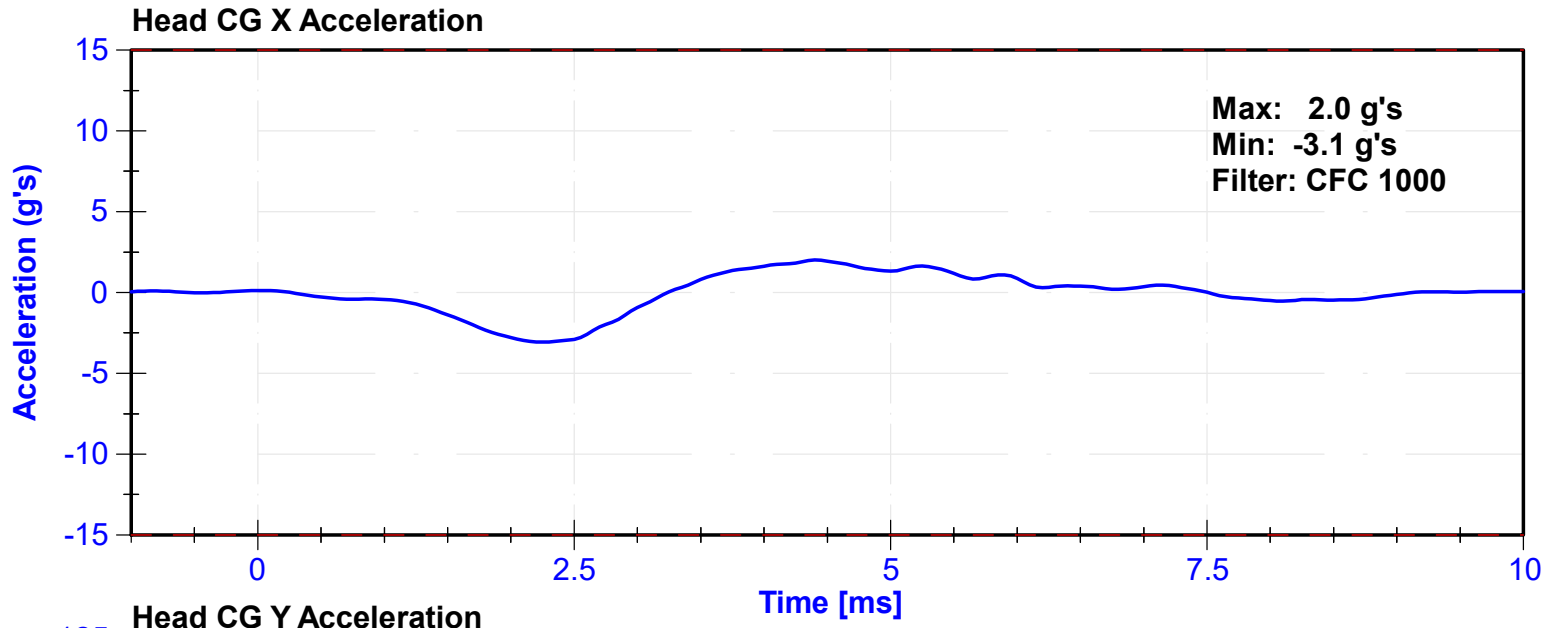
Results

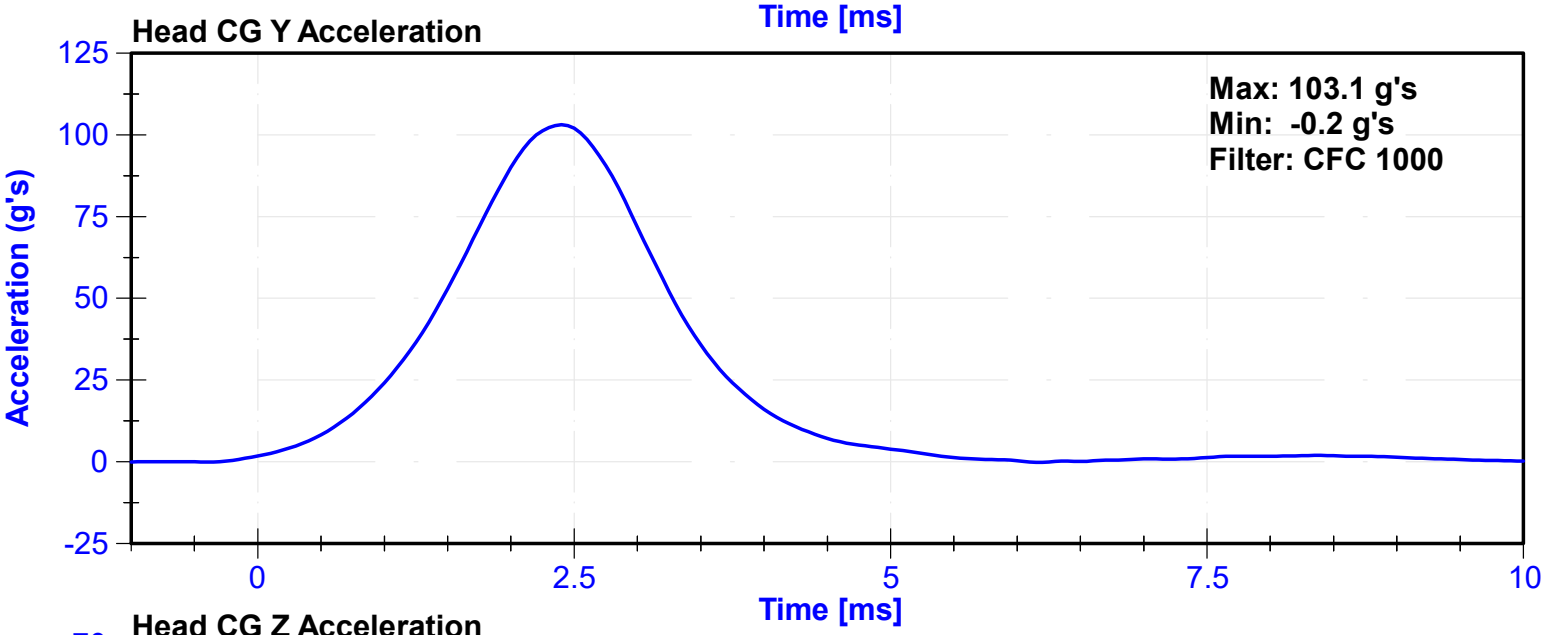
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22.0	Pass
Humidity	10	70	%	52.0	Pass
Resultant Acceleration	115	137	g's	124.4	Pass
Oscillation	0	15	%	1.7	Pass
Fore-Aft Acceleration	-15	15	g's	-3.1	Pass

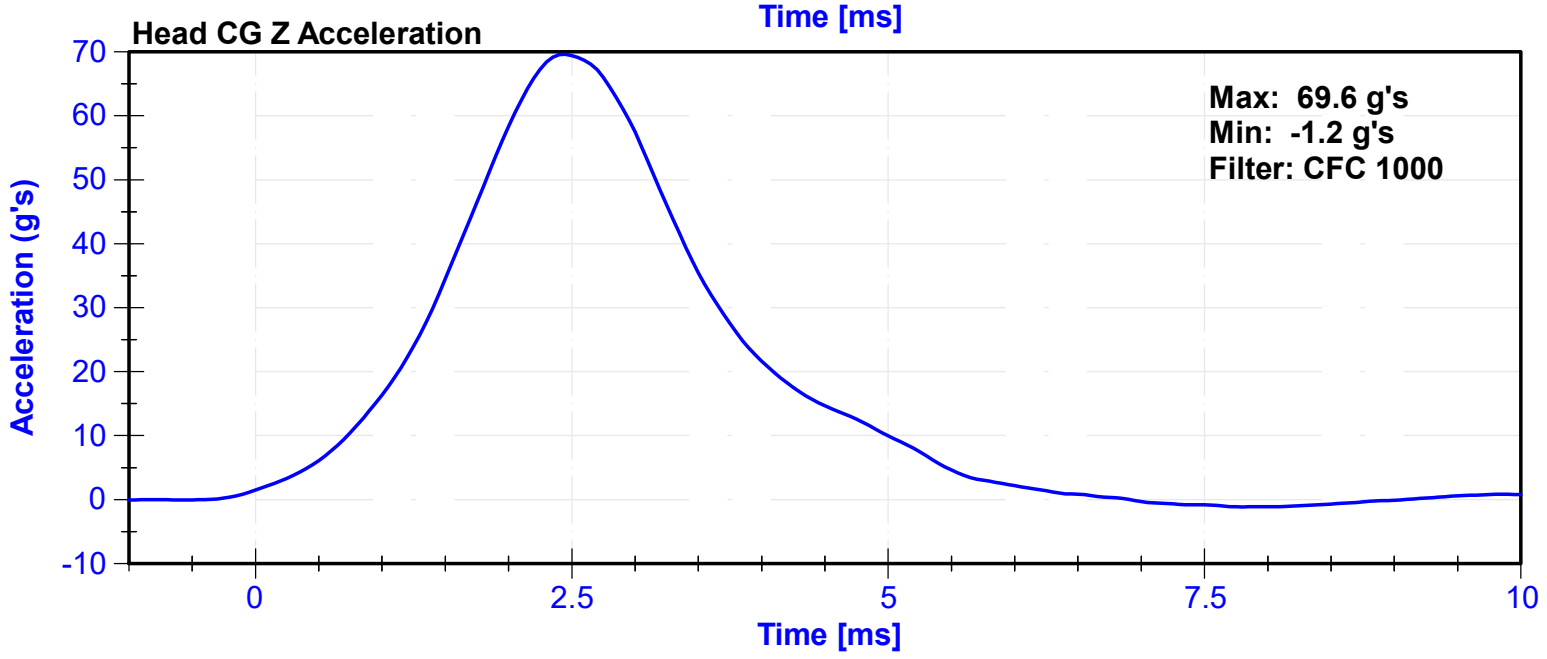
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P74788	6/17/2022	12/14/2022
Y Accelerometer	Endevco	P83432	6/17/2022	12/14/2022
Z Accelerometer	Endevco	P83319	6/17/2022	12/14/2022




Head CG X Acceleration
Max: 2.0 g's
Min: -3.1 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 103.1 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 69.6 g's
Min: -1.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

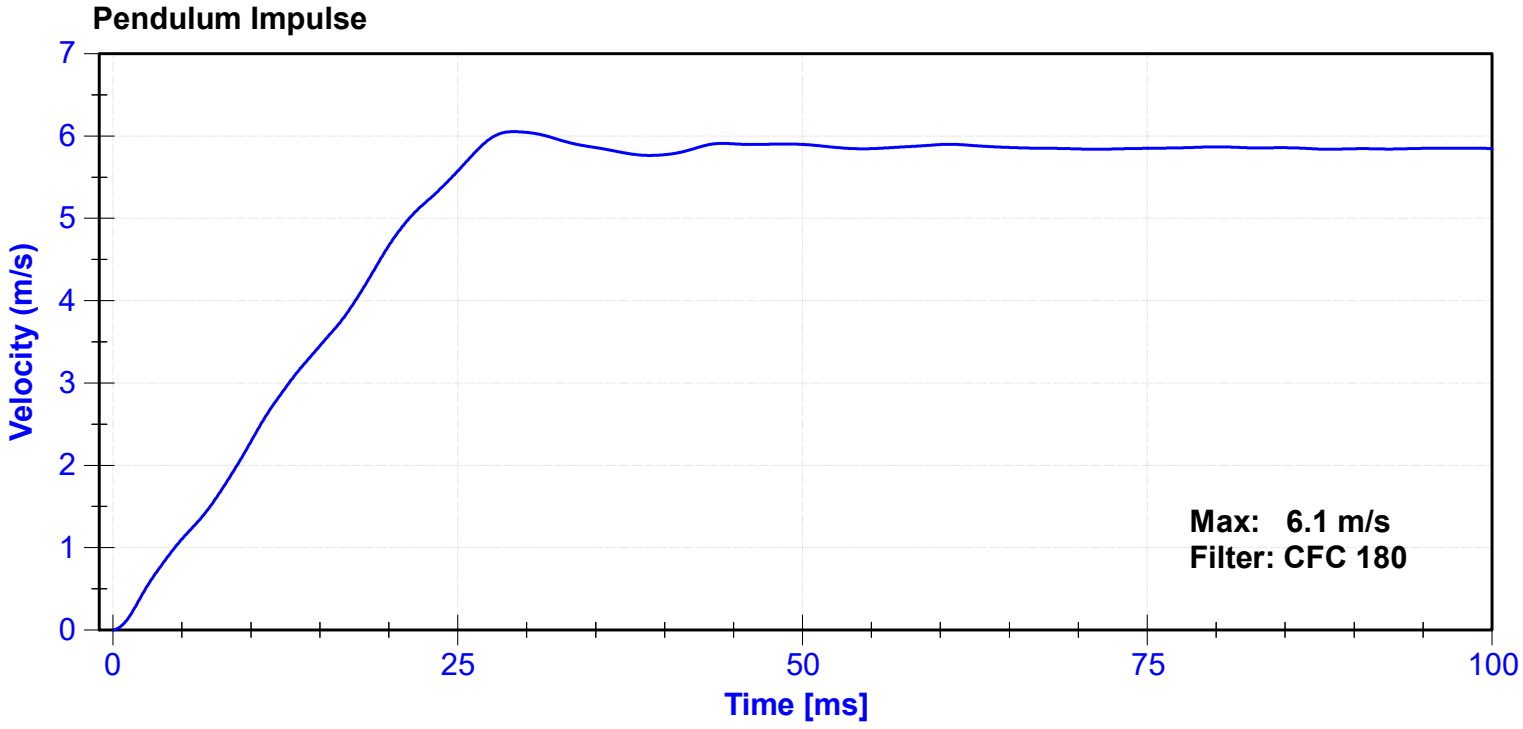
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

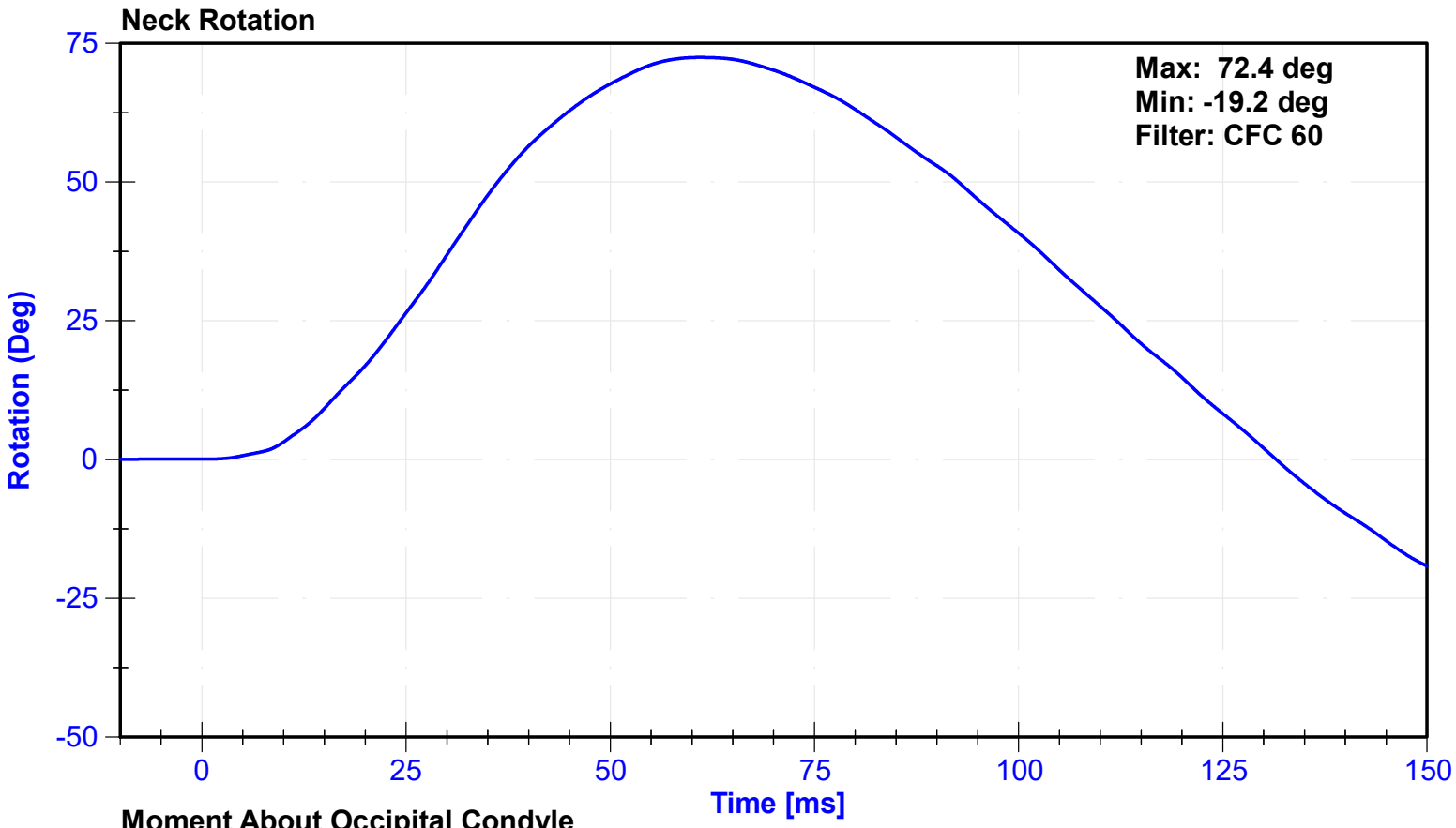
Results

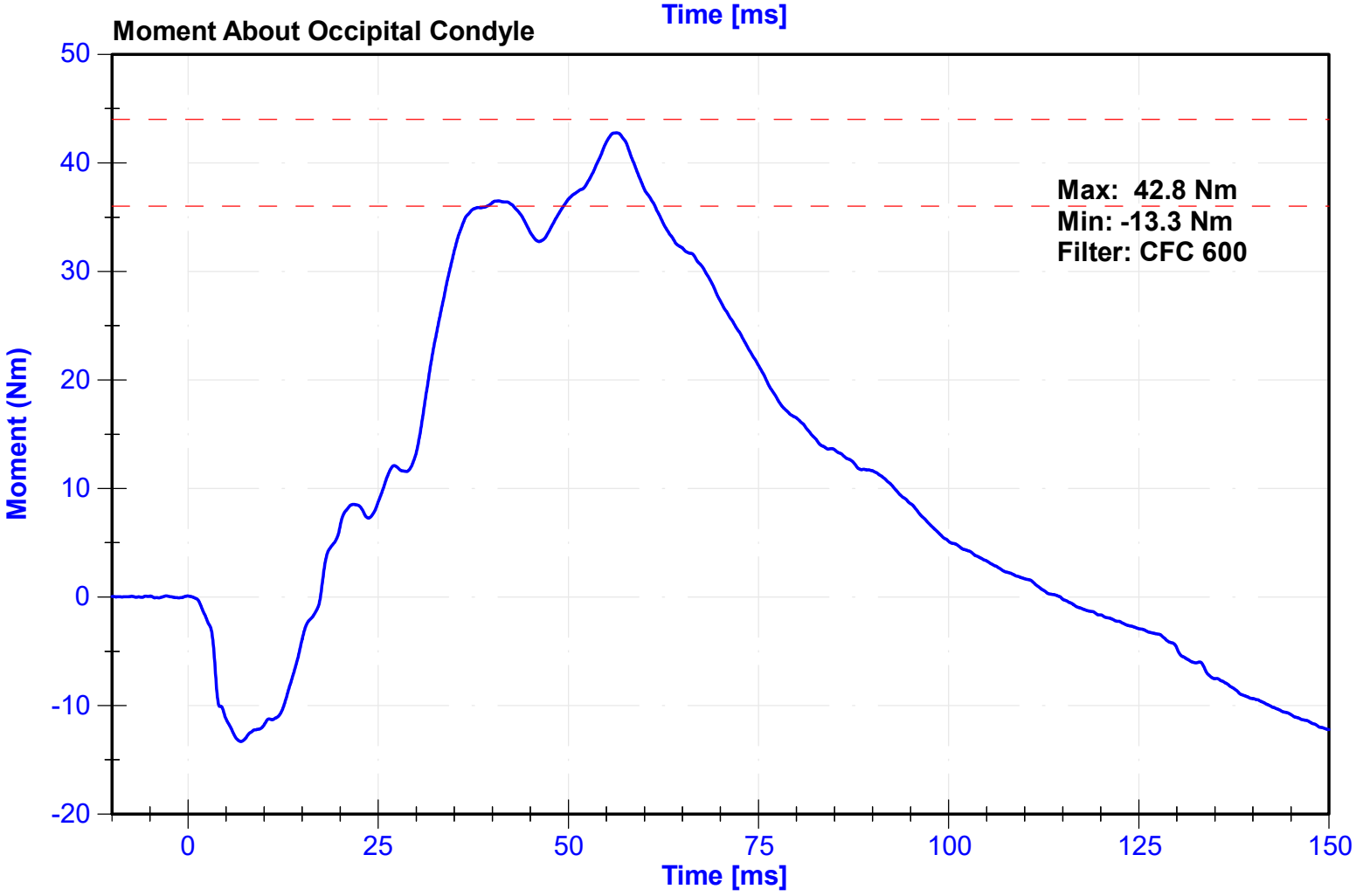
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22.0	Pass
Humidity	10	70	%	42.0	Pass
Velocity	5.51	5.63	m/s	5.602	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.29	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.45	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.67	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.57	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.05	Pass
Neck Rotation	71	81	deg	72.4	Pass
Time at Maximum Rotation	50	70	ms	61.0	Pass
Moment about the OC	36	44	Nm	42.8	Pass
Moment Decay to 0 Nm	102	126	ms	114.7	Pass

Transducer Calibrations

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




Neck Rotation
Max: 72.4 deg
Min: -19.2 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.8 Nm
Min: -13.3 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

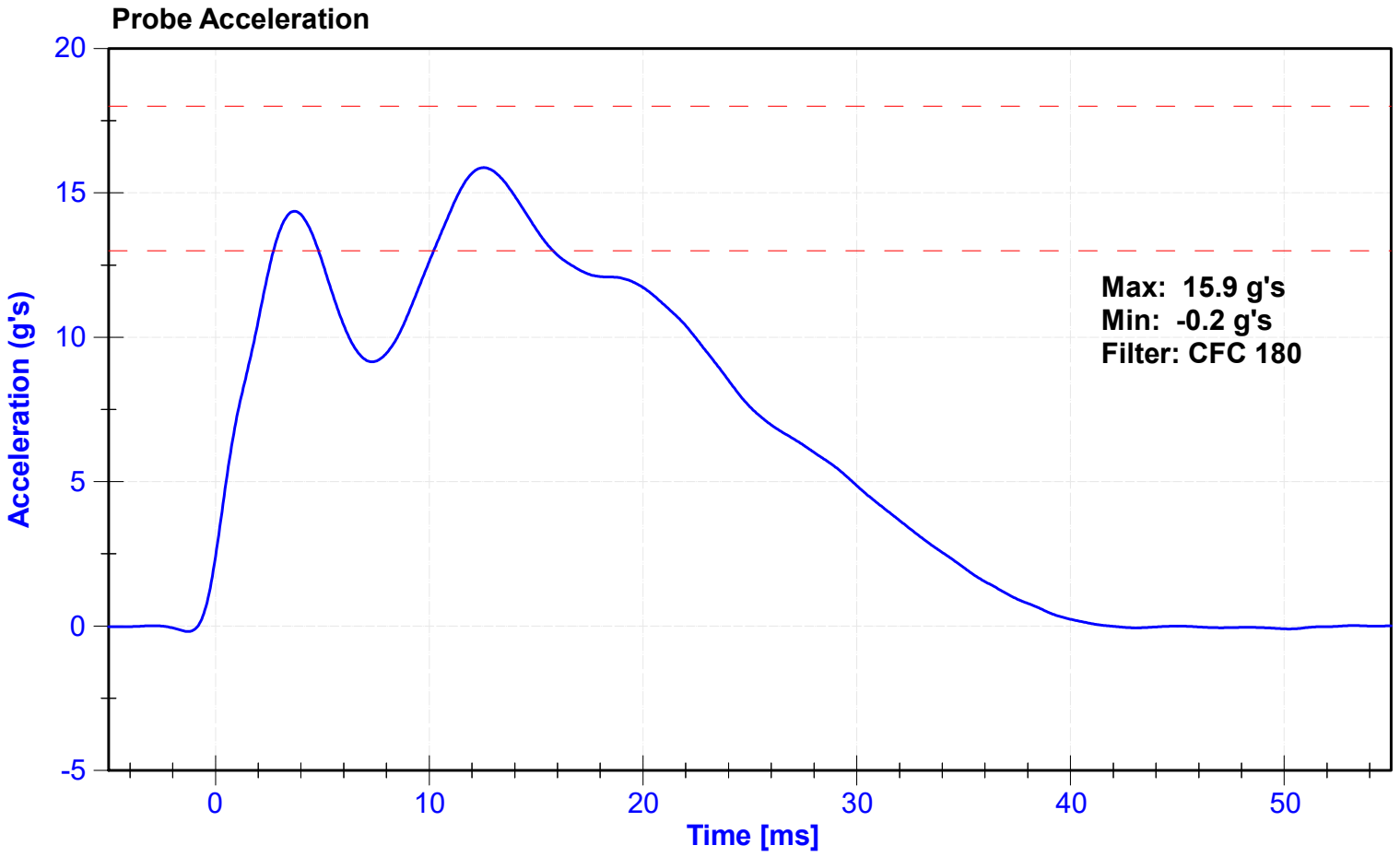
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

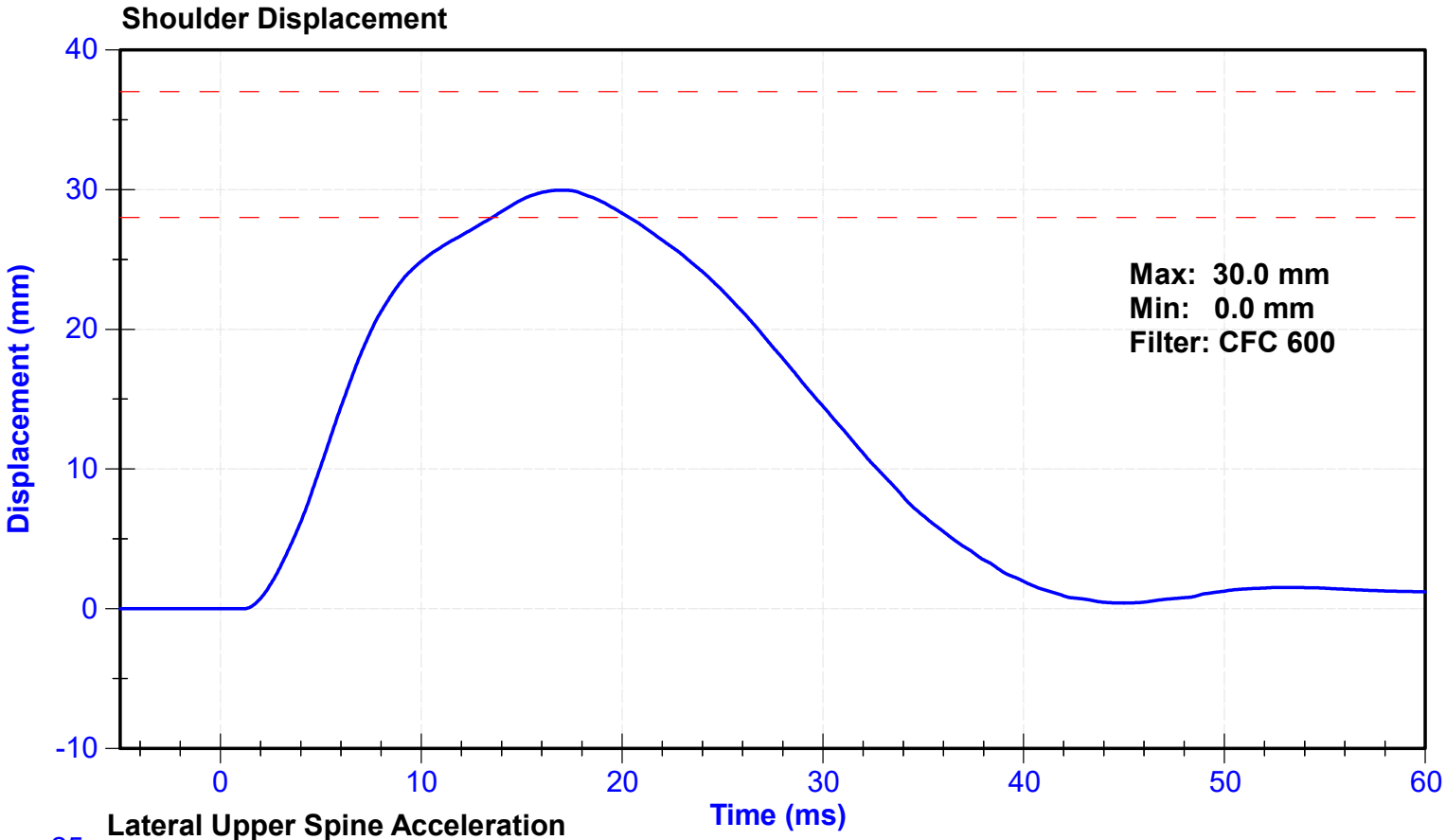
Results

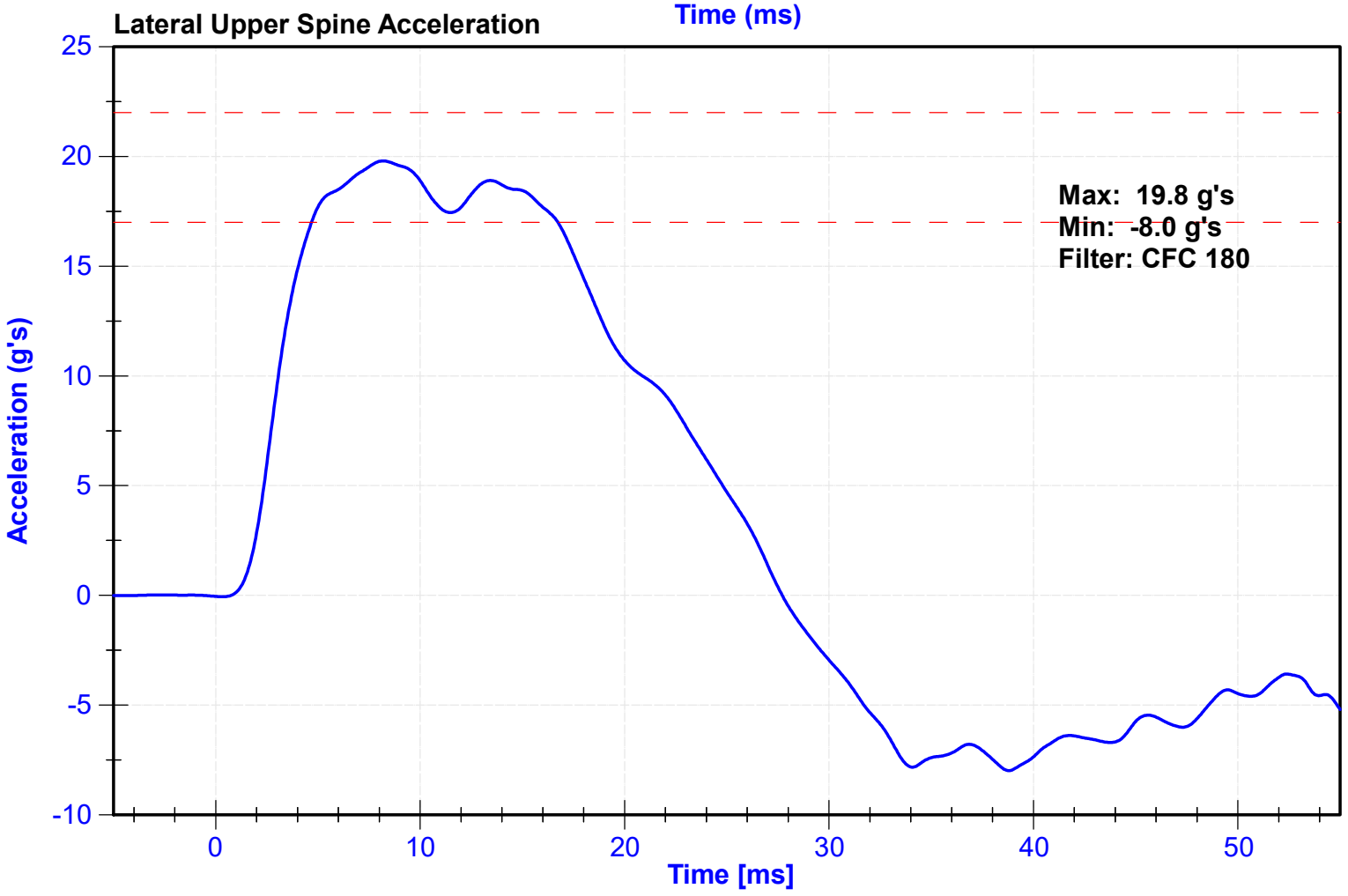
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22.0	Pass
Humidity	10	70	%	42.0	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	15.9	Pass
Shoulder Deflection	28	37	mm	30.0	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 30.0 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.8 g's
Min: -8.0 g's
Filter: CFC 180

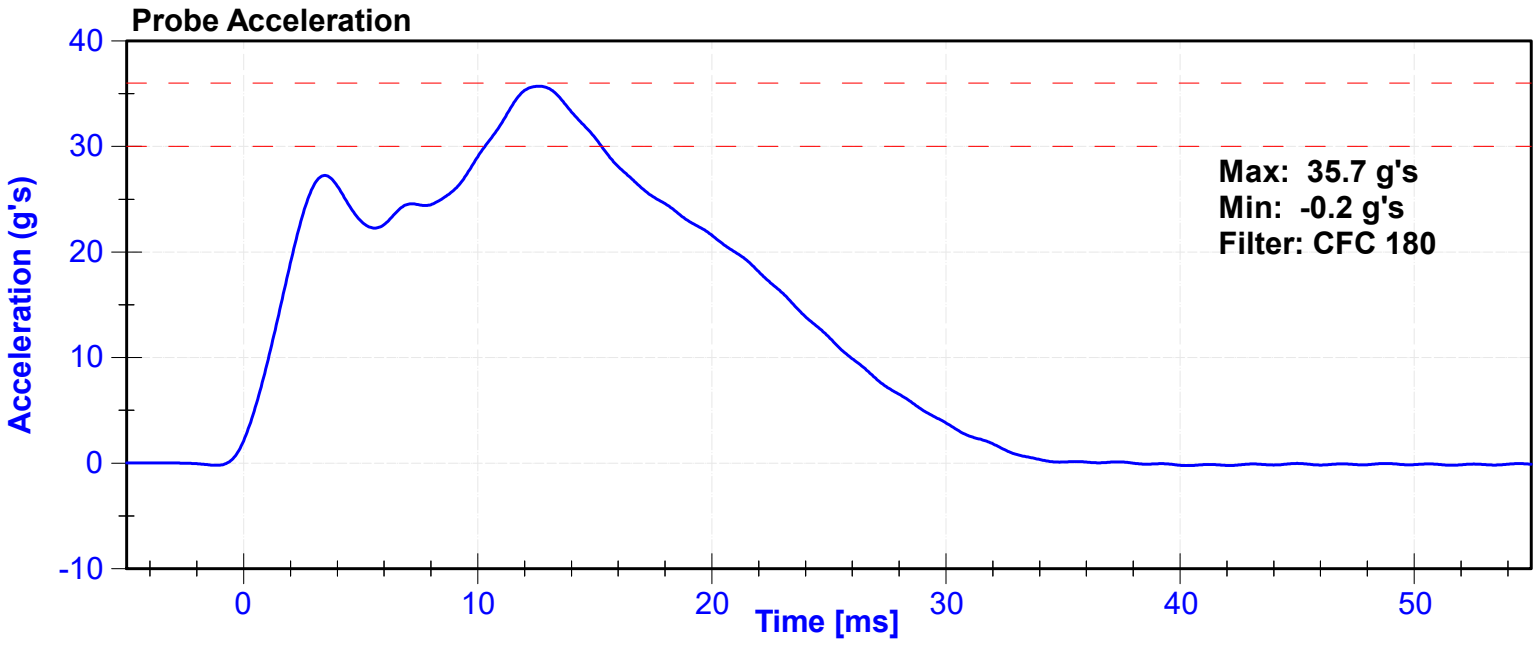
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

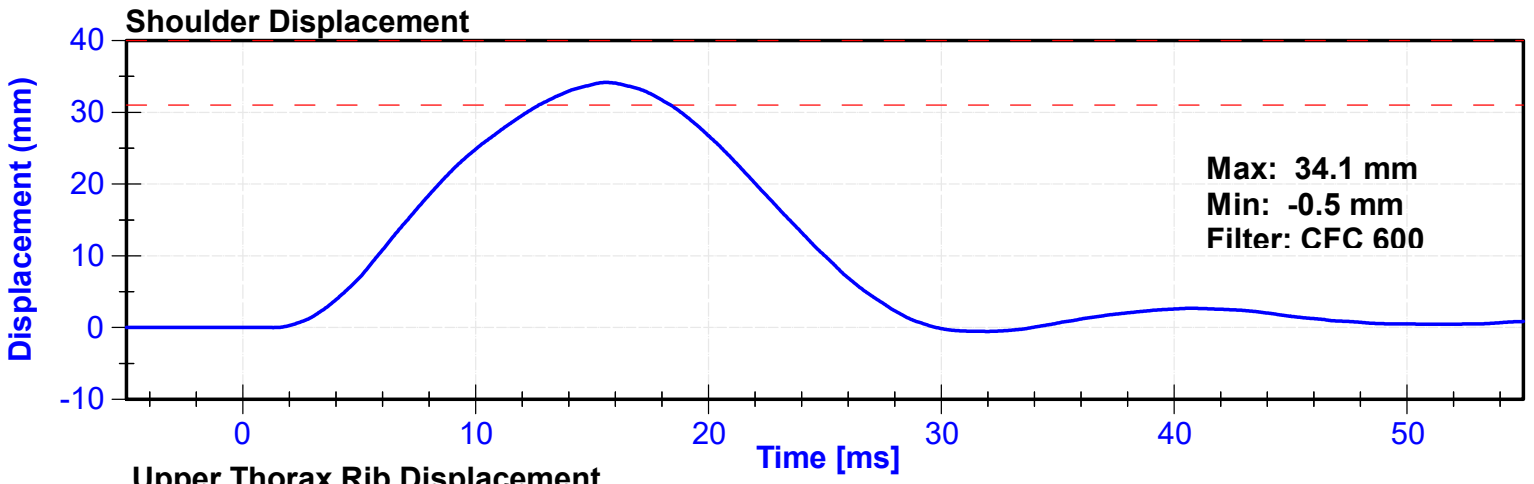
Results

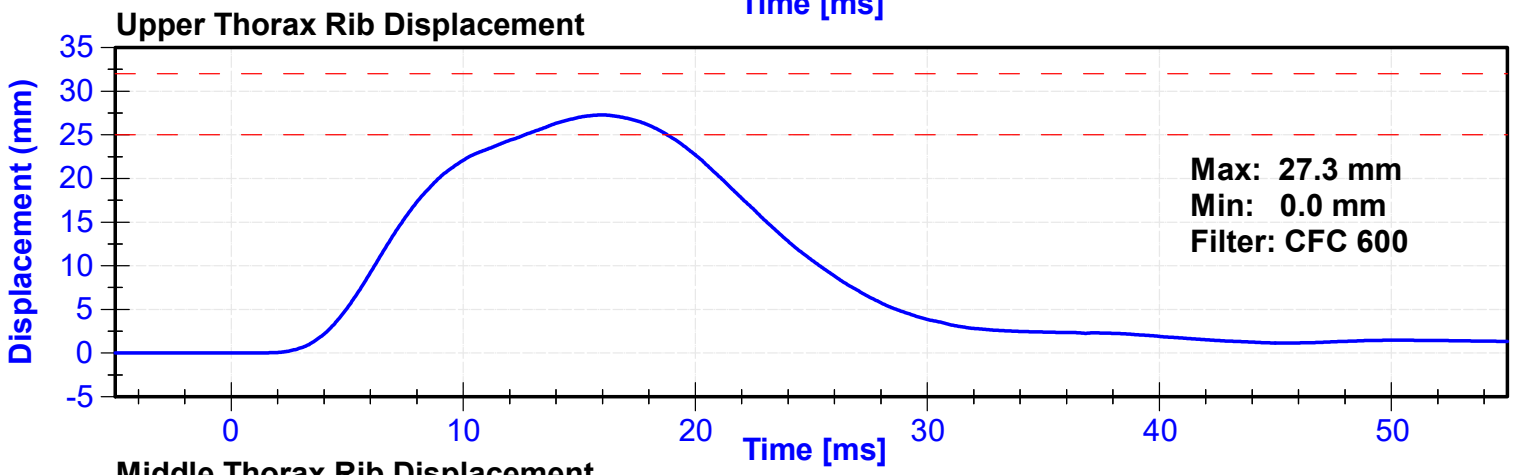
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22.0	Pass
Humidity	10	70	%	42.0	Pass
Velocity	6.6	6.8	m/s	6.72	Pass
Probe Acceleration after 5 ms	30	36	g's	35.7	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.9	Pass
Lateral Lower Spine Acceleration	29	37	g's	35.9	Pass
Shoulder Deflection	31	40	mm	34.1	Pass
Upper Thorax Rib Deflection	25	32	mm	27.3	Pass
Mid Thorax Rib Deflection	30	36	mm	30.5	Pass
Lower Thorax Rib Deflection	32	38	mm	32.5	Pass

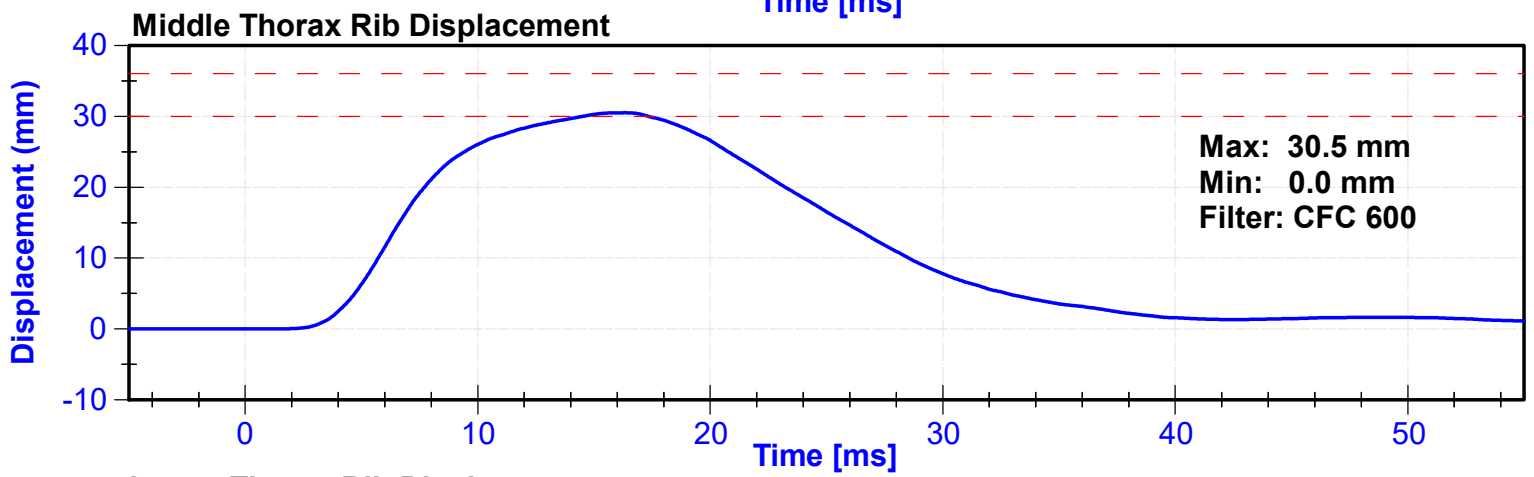
Transducer Calibrations

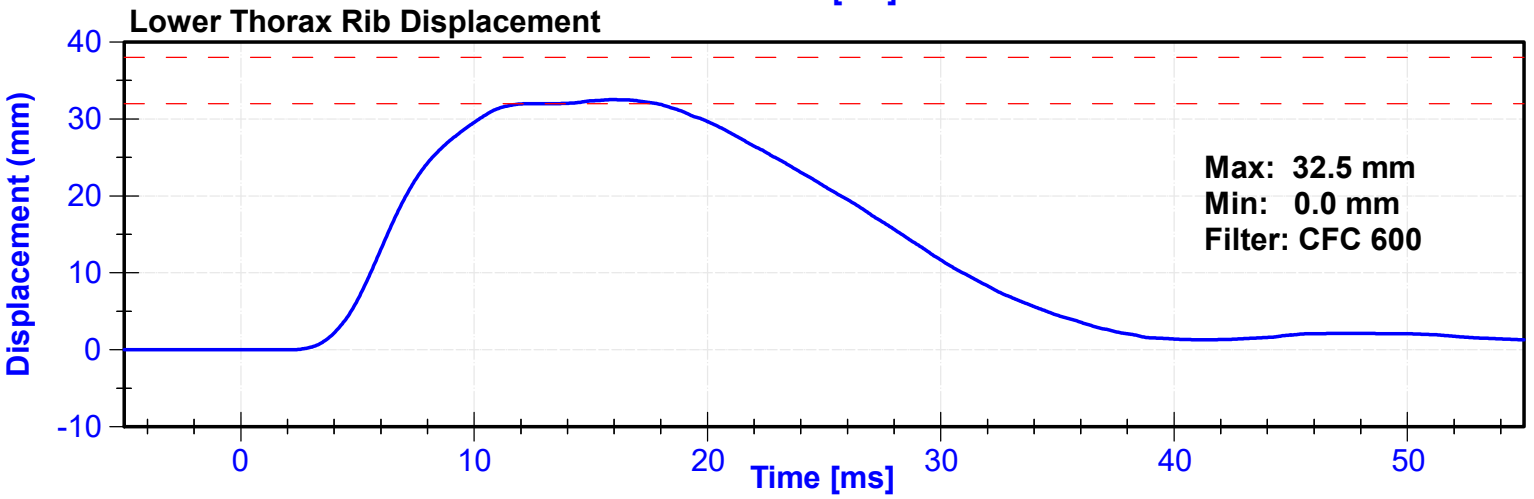
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine T1 Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Upper Spine T12 Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022

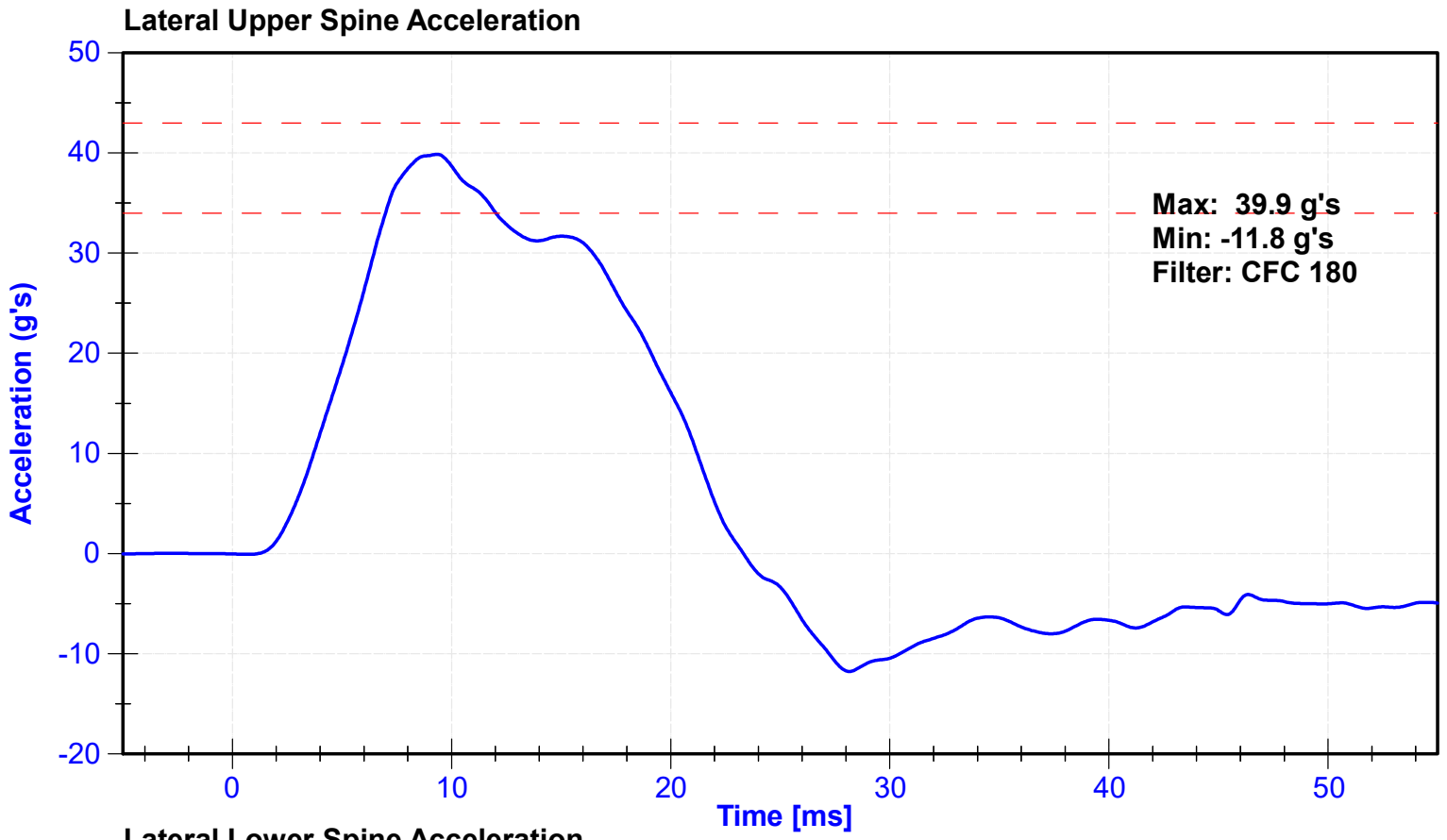


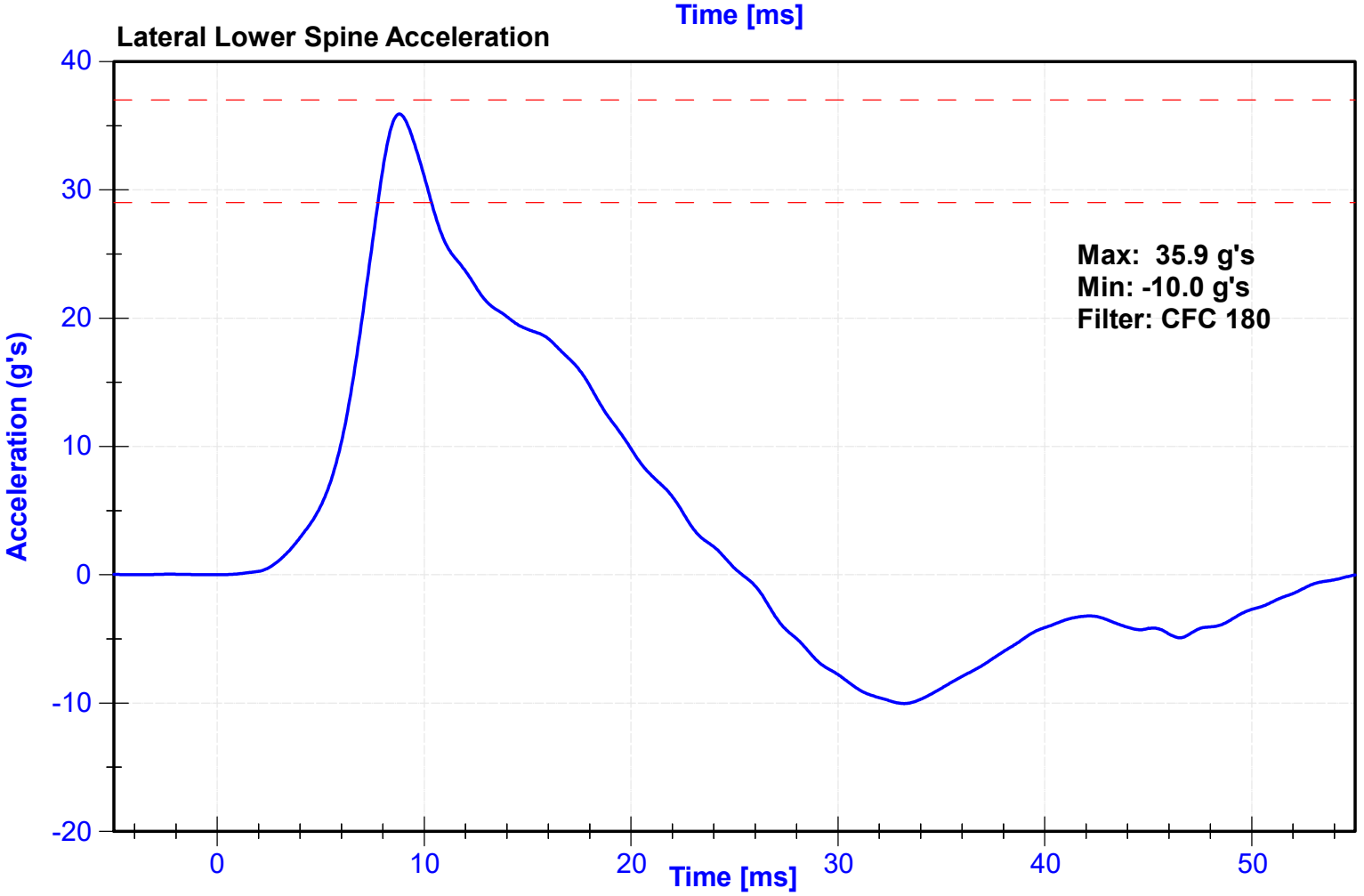

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.1 mm
Min: -0.5 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 27.3 mm
Min: 0.0 mm
Filter: CFC 600


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


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.5 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 39.9 g's
Min: -11.8 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 35.9 g's
Min: -10.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
-20
0
10
20
30
40
50

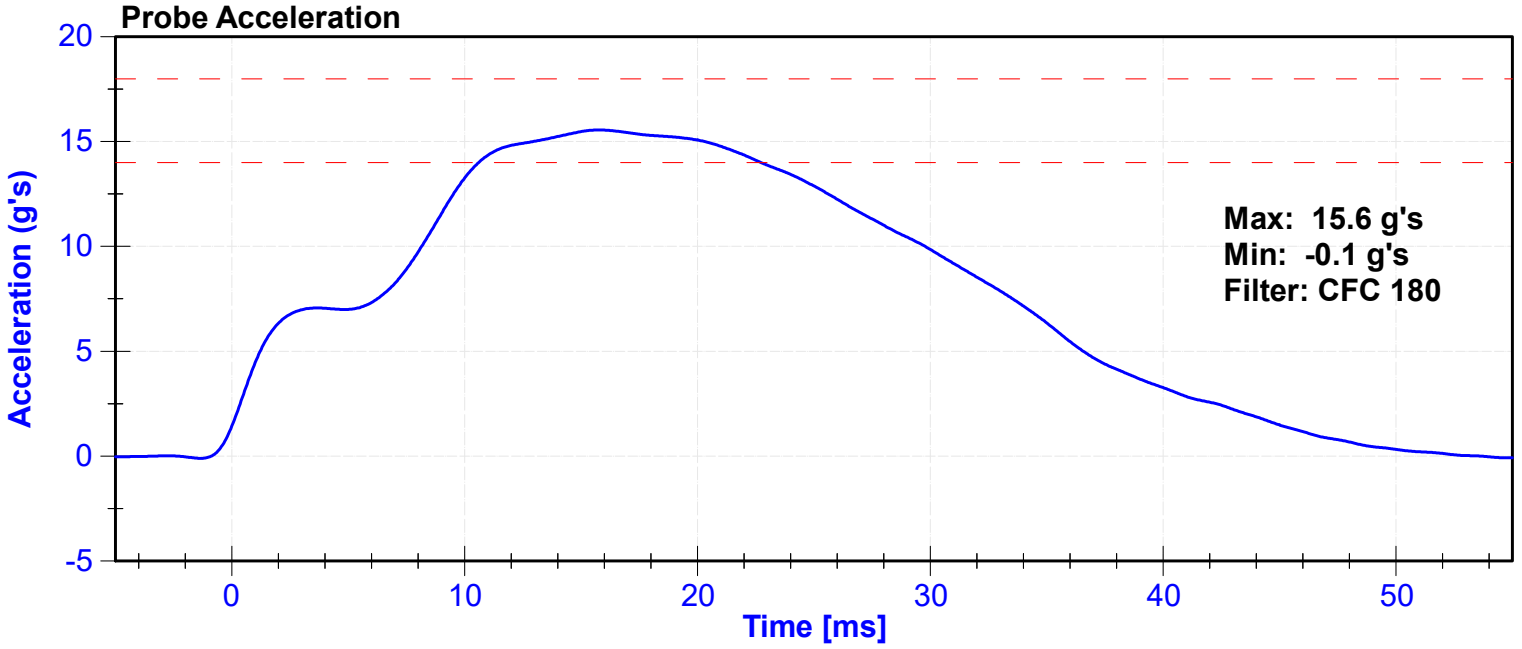
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

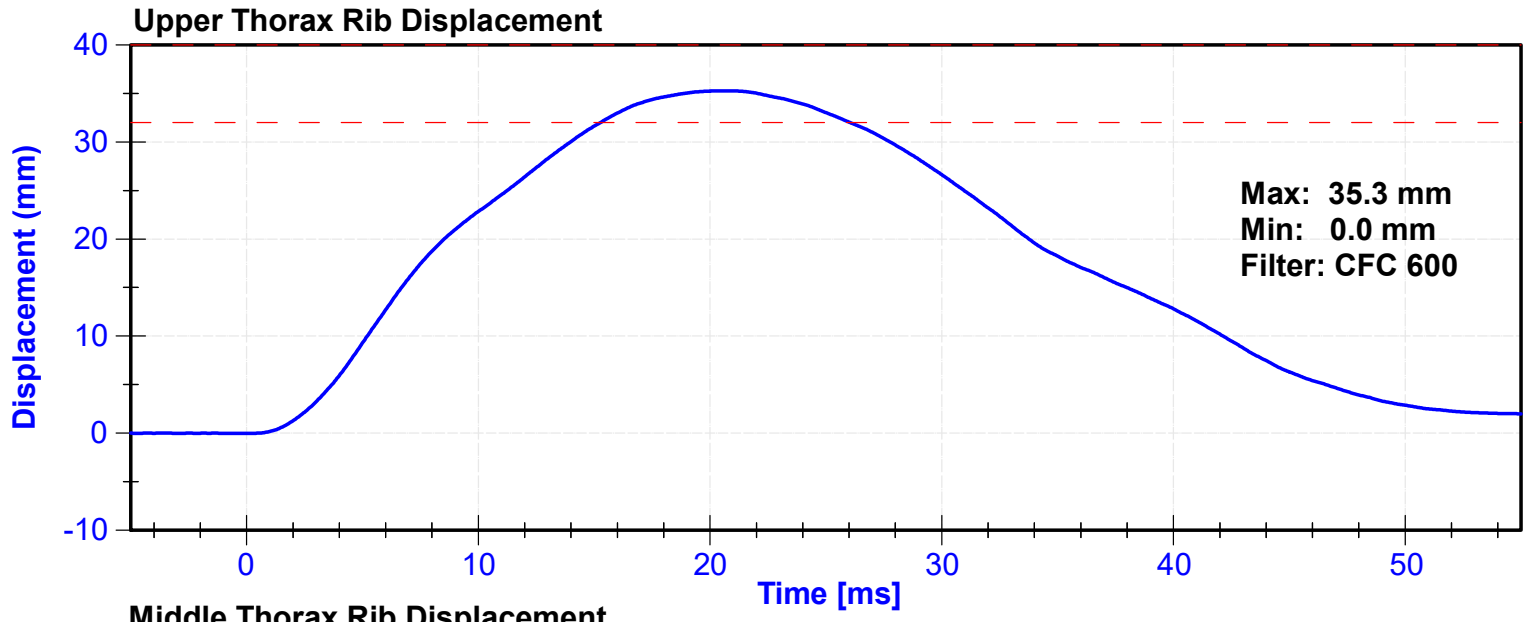
Results

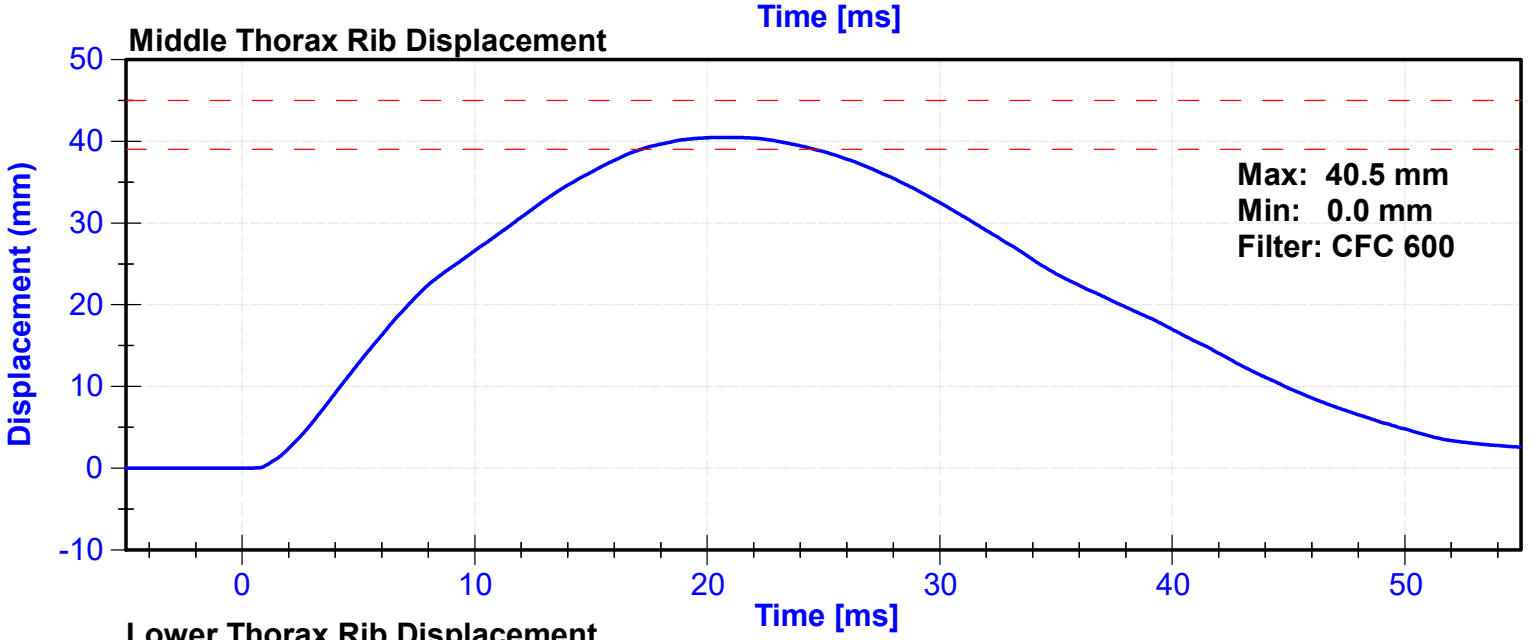
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	22.0	Pass
Humidity	10	70	%	42.0	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	14	18	g's	15.6	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.0	Pass
Lateral Lower Spine Acceleration	7	11	g's	8.5	Pass
Upper Thorax Rib Deflection	32	40	mm	35.3	Pass
Middle Thorax Rib Deflection	39	45	mm	40.5	Pass
Lower Thorax Rib Deflection	35	43	mm	39.1	Pass

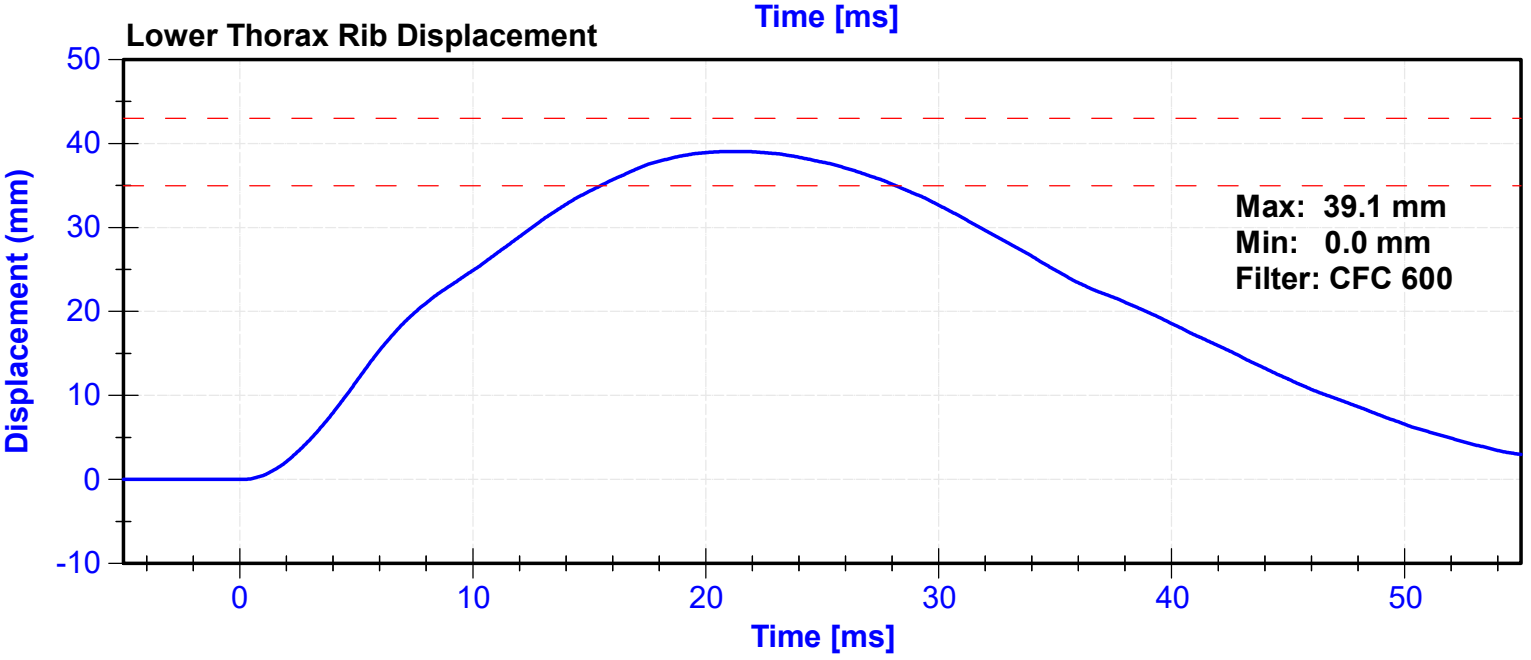
Transducer Calibrations

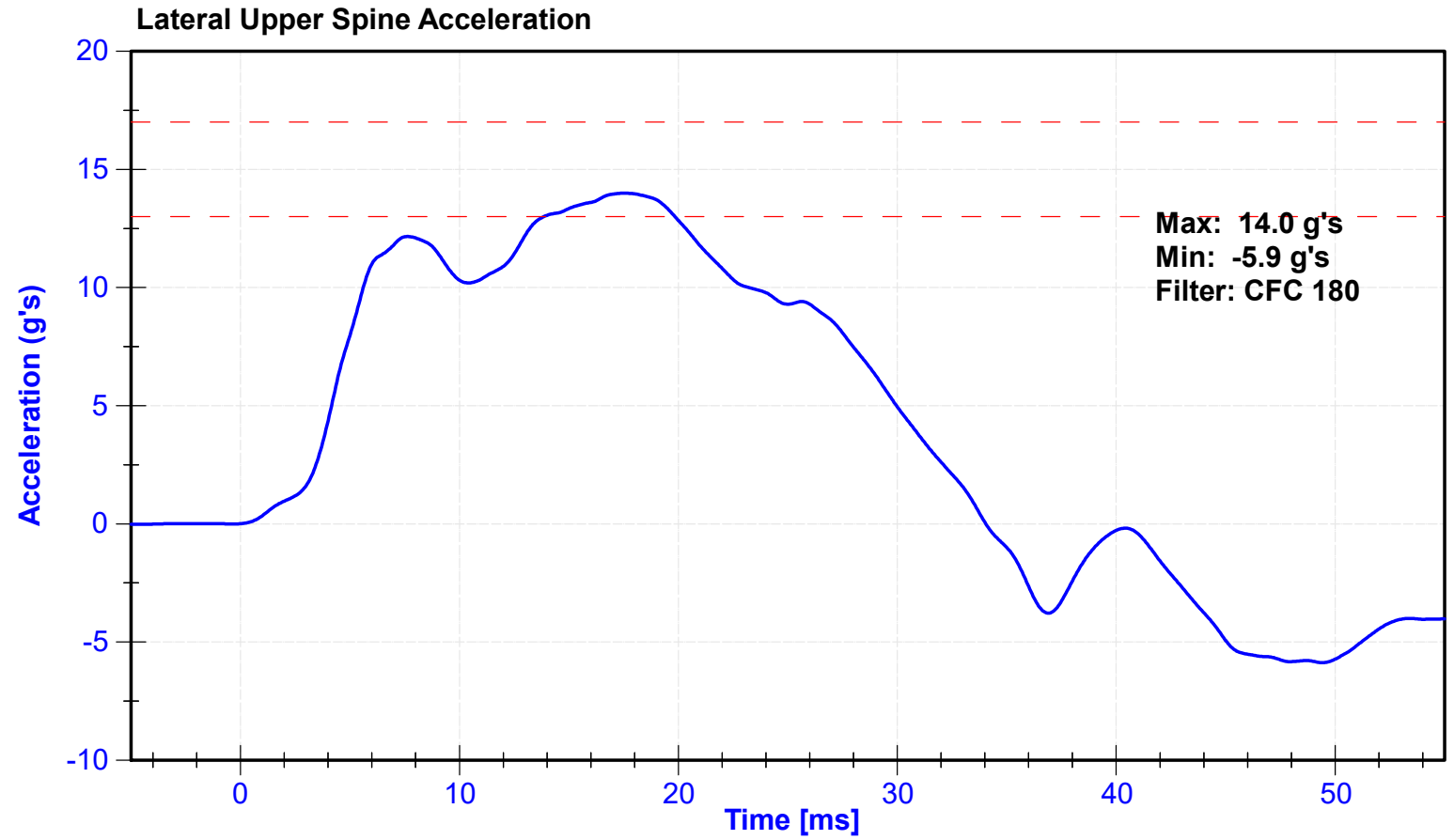
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022

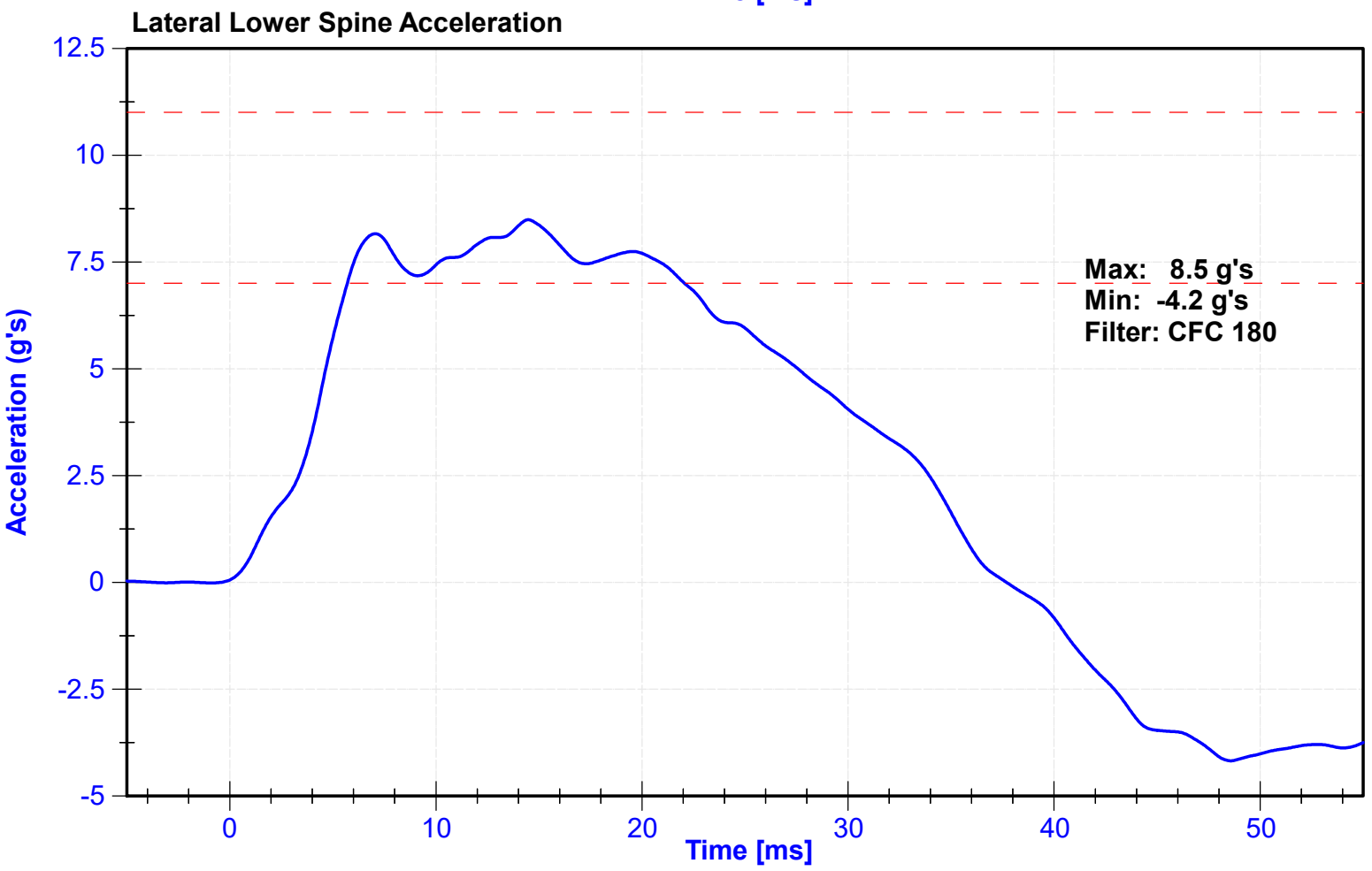



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.3 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.5 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 14.0 g's
Min: -5.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 8.5 g's
Min: -4.2 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

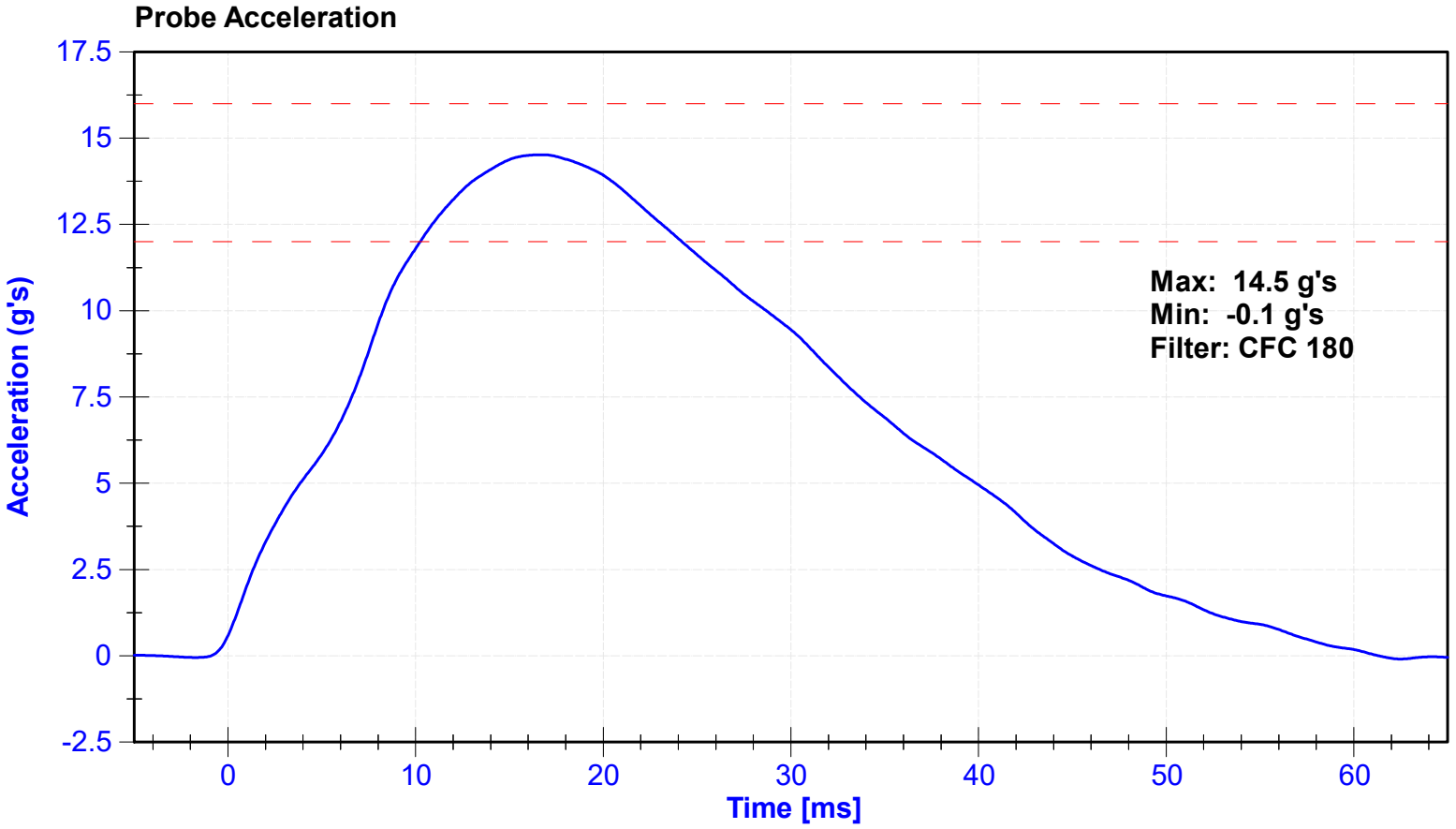
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

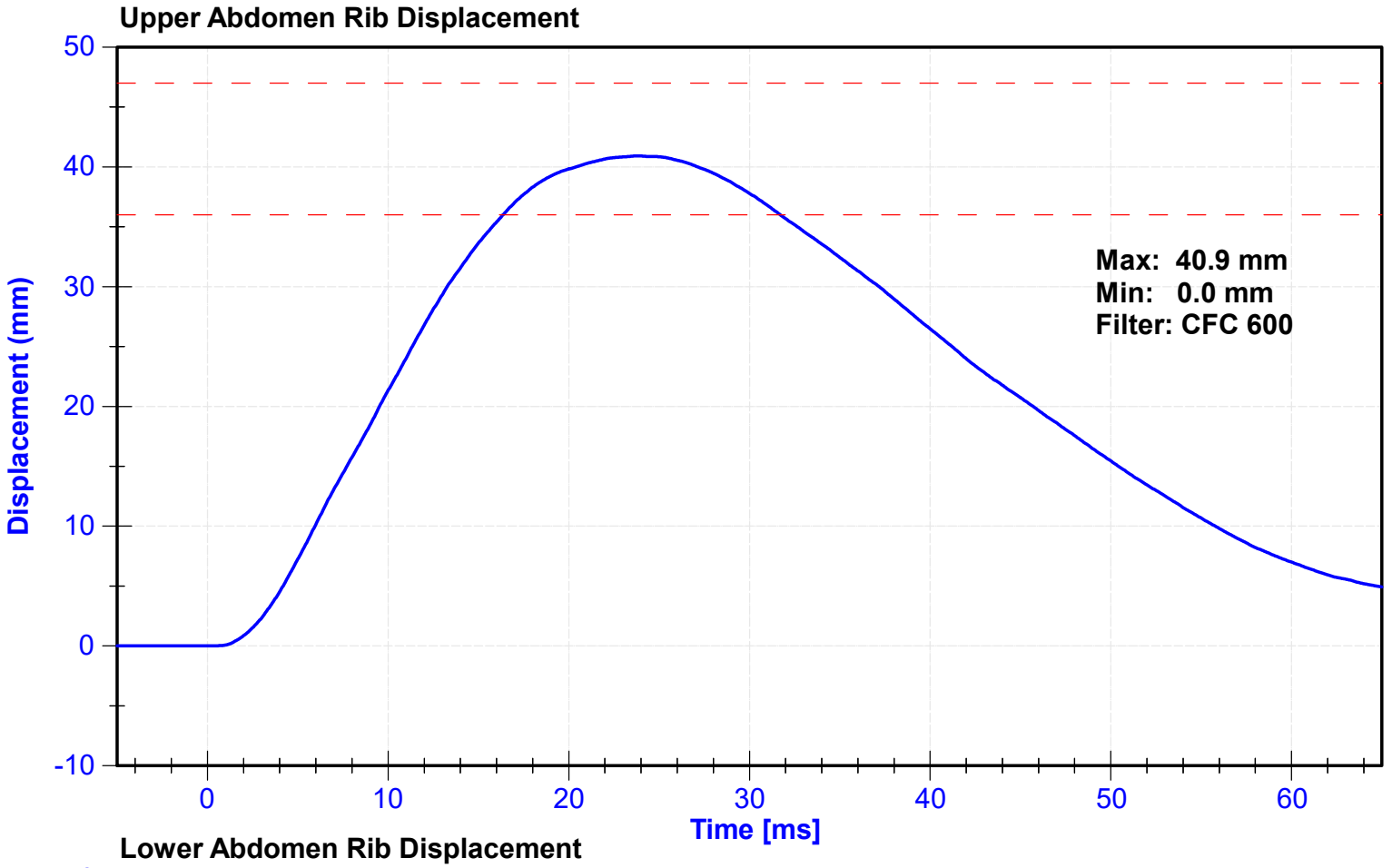
Results

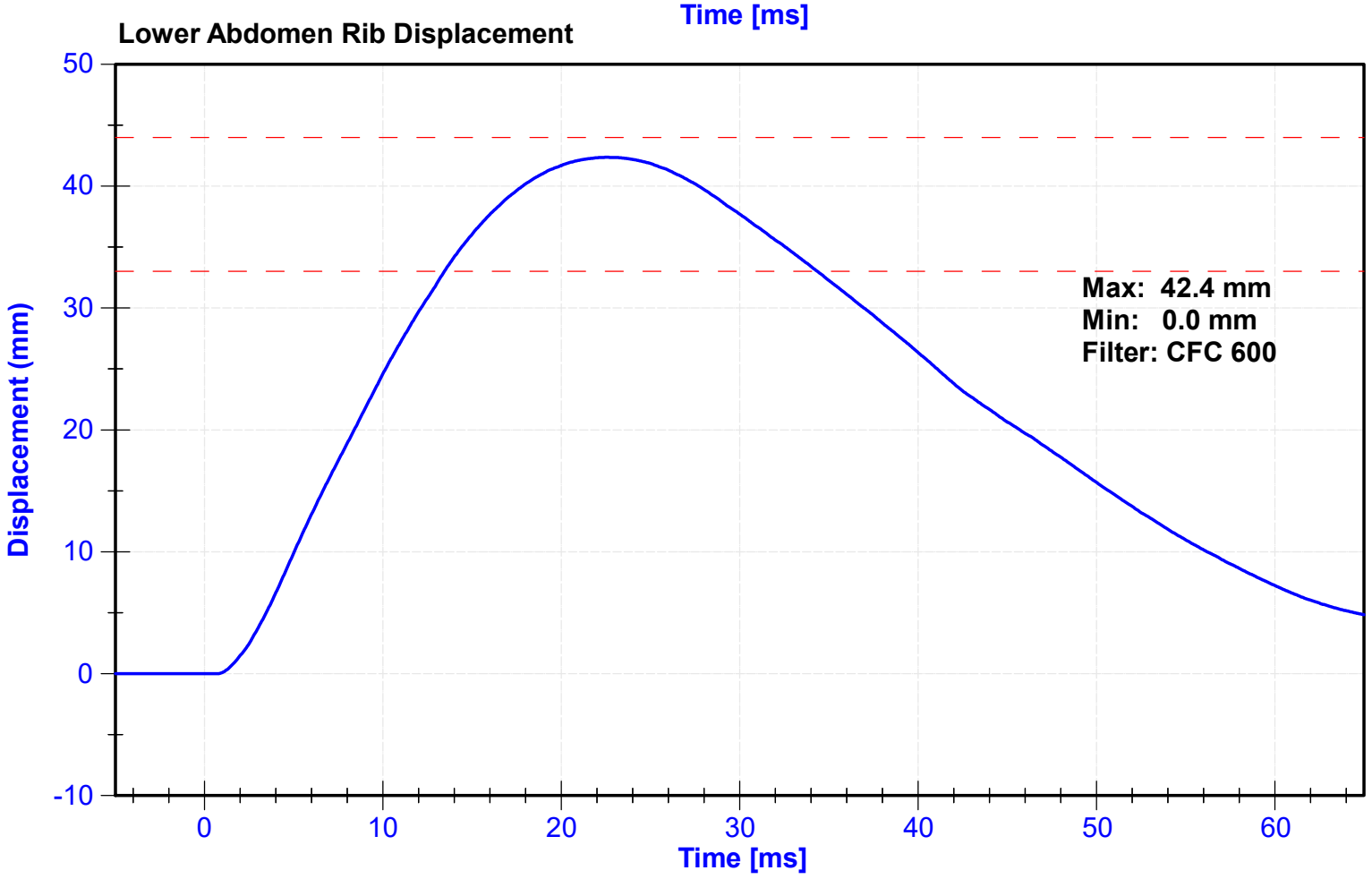
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	36.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.1	Pass
Upper Abdomen Rib Deflection	36	47	mm	40.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	42.4	Pass

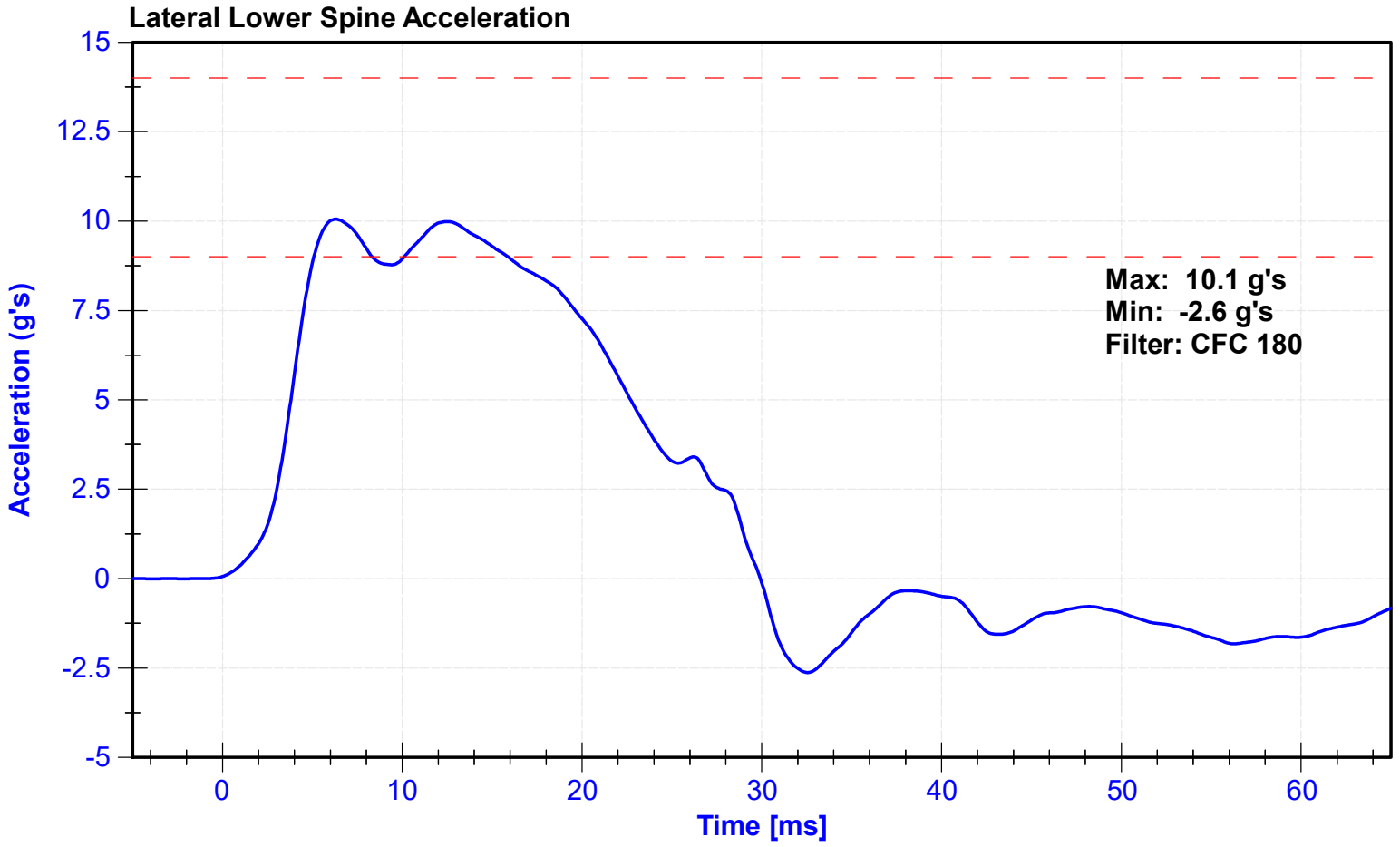
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Abdomen Rib Potentiometer	Servo	008GFE	6/17/2022	12/16/2022
Lower Abdomen Rib Potentiometer	Servo	041 GFE	6/17/2022	12/16/2022




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 40.9 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 42.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 10.1 g's
Min: -2.6 g's
Filter: CFC 180

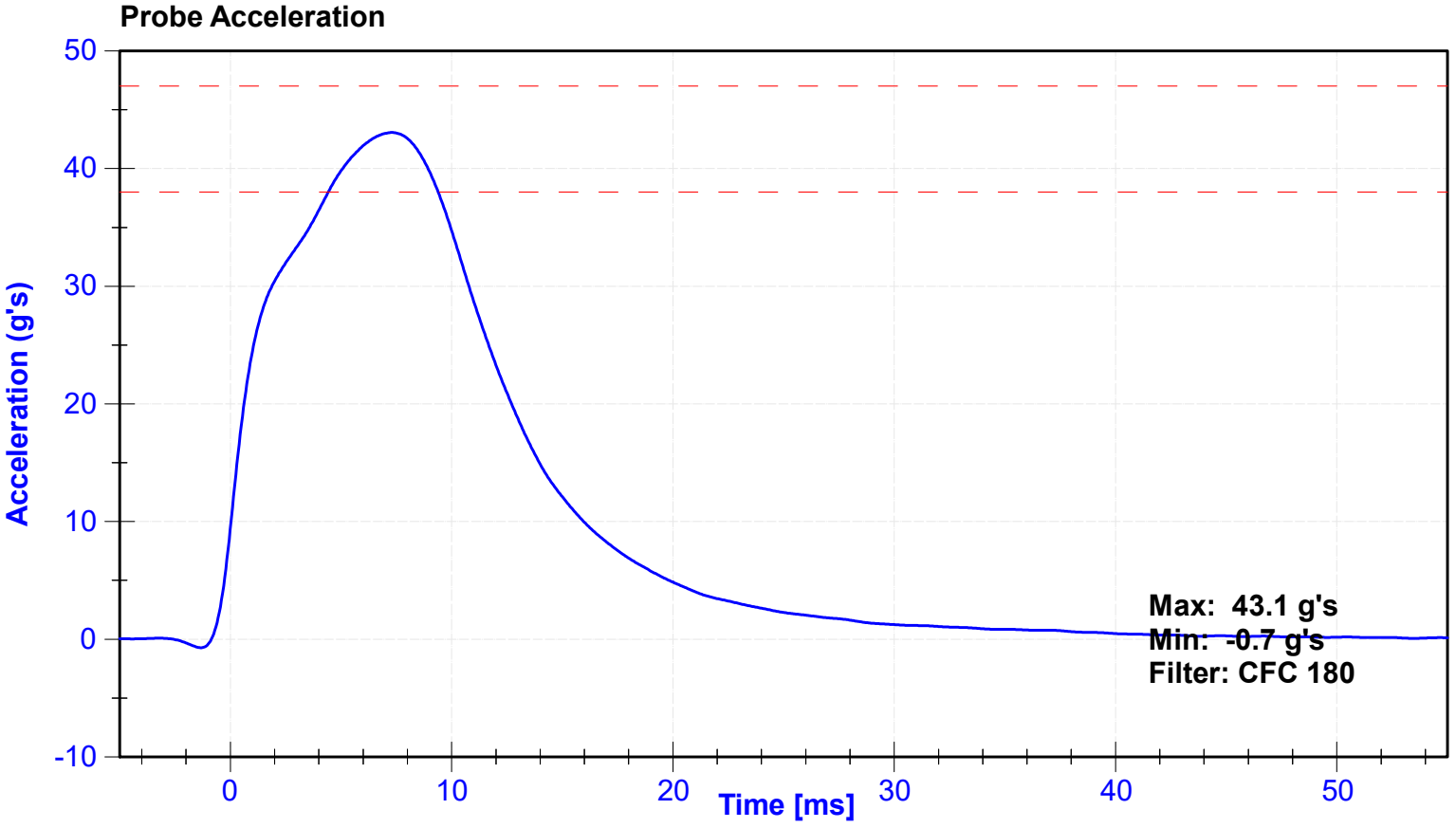
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

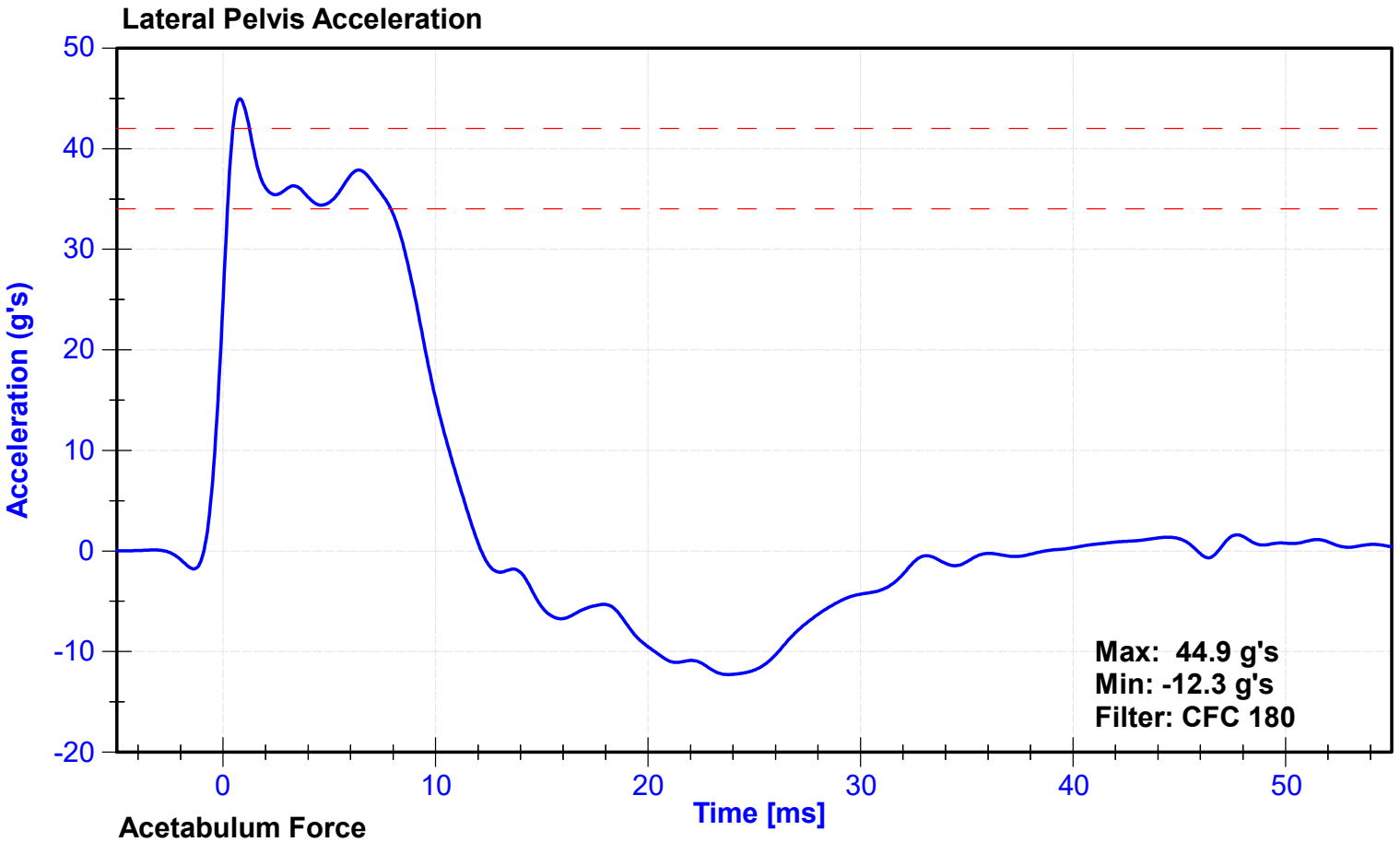
Results

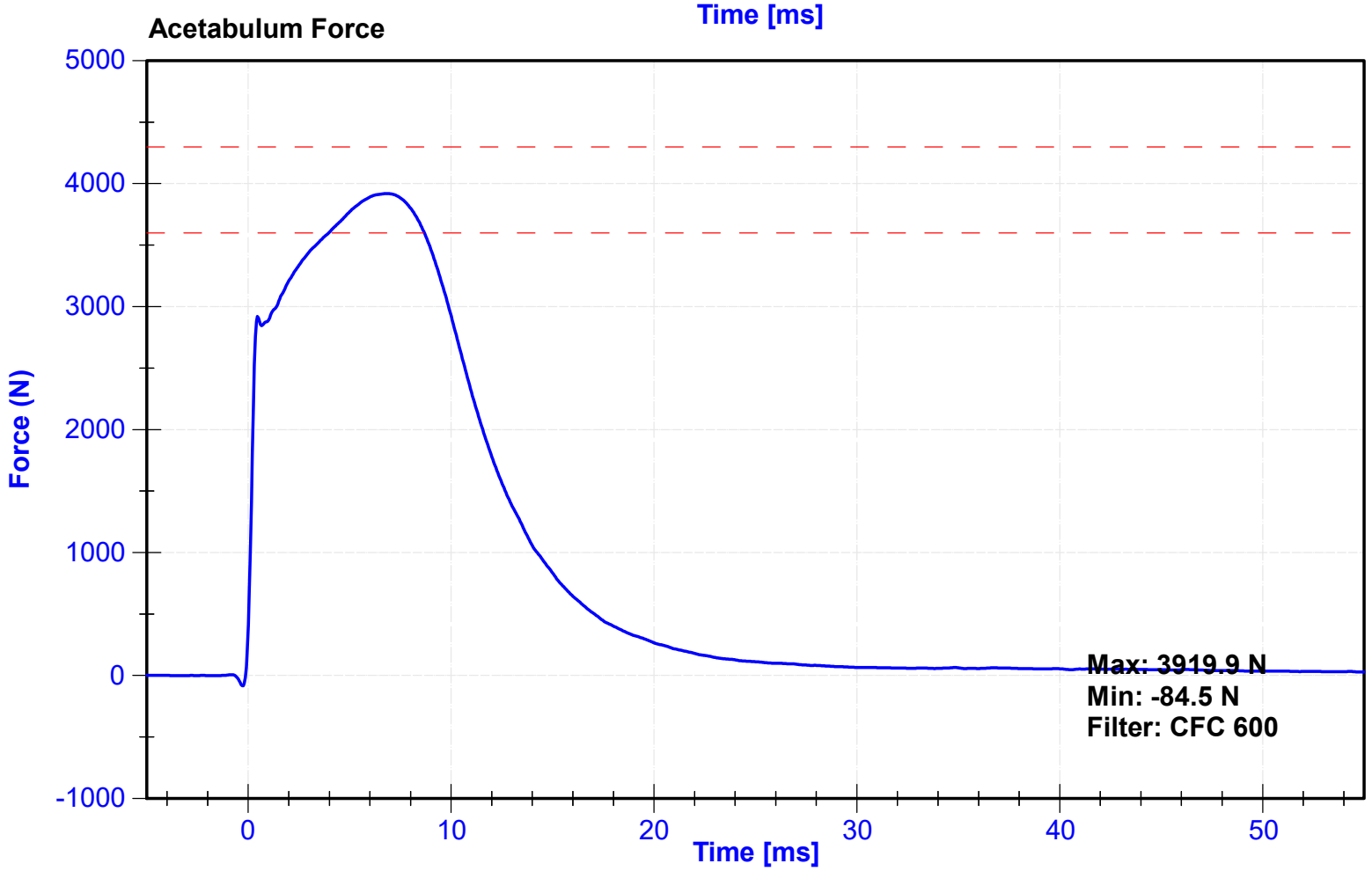
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	36.5	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	43.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	37.9	Pass
Acetabulum Force	3600	4300	N	3919.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 44.9 g's
Min: -12.3 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3919.9 N
Min: -84.5 N
Filter: CFC 600

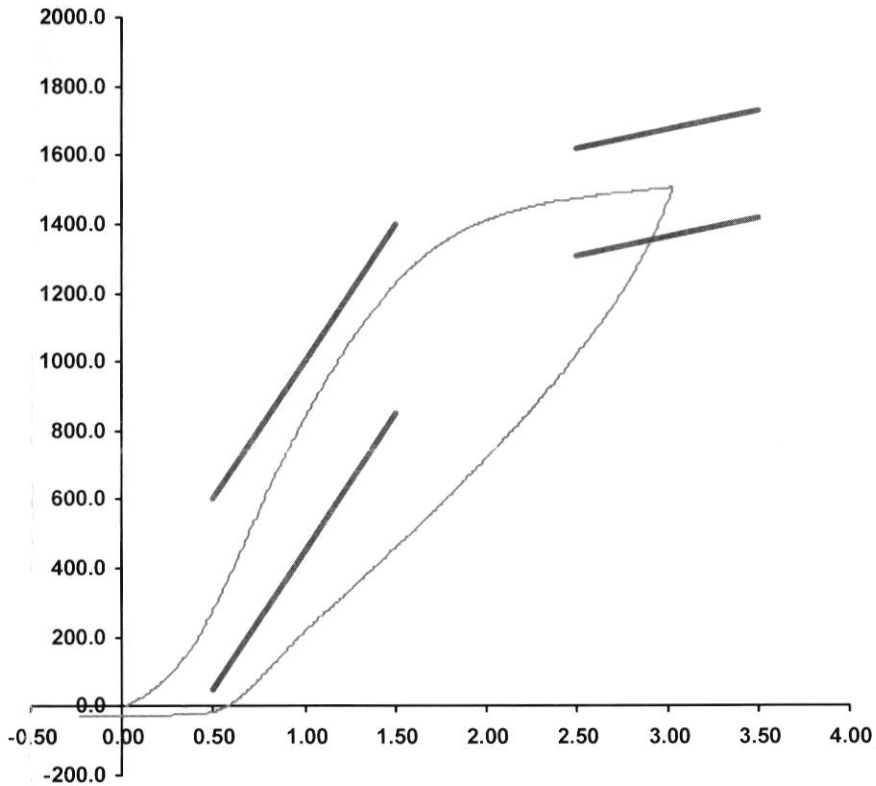
Cert 10/14/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 15438
Test Number 20099
Report Number 20153
Test Date 9/9/2021 10:22:32 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	291	50	600
Force @ 1.5 mm (N)	1,232	850	1,400
Force @ 2.5 mm (N)	1,476	1,306	1,618
Force @ 3.0 mm (N)	1,506	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By : DC Date : 9/9/2021

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

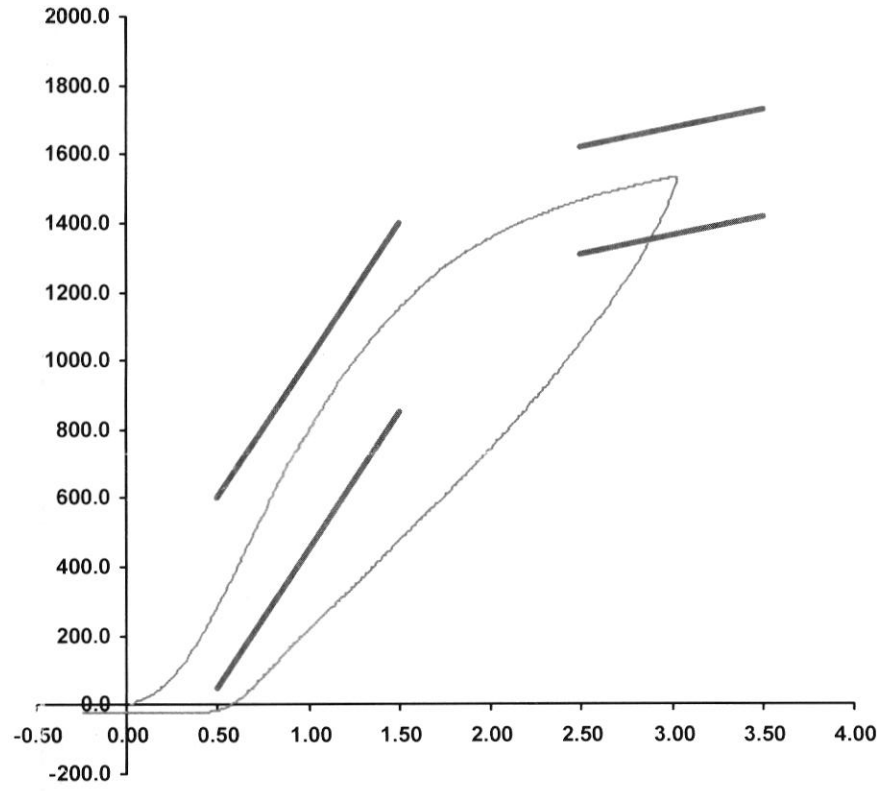
Crash 10/14/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 15462
Test Number 20181
Report Number 20235
Test Date 9/22/2021 7:55:57 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	295	50	600
Force @ 1.5 mm (N)	1,156	850	1,400
Force @ 2.5 mm (N)	1,466	1,306	1,618
Force @ 3.0 mm (N)	1,532	1,361	1,673

Force (-N) vs Extension (-mm)



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

G-45

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 22-Sep-21
SACO Research

By : DC Date : 9/22/2021

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

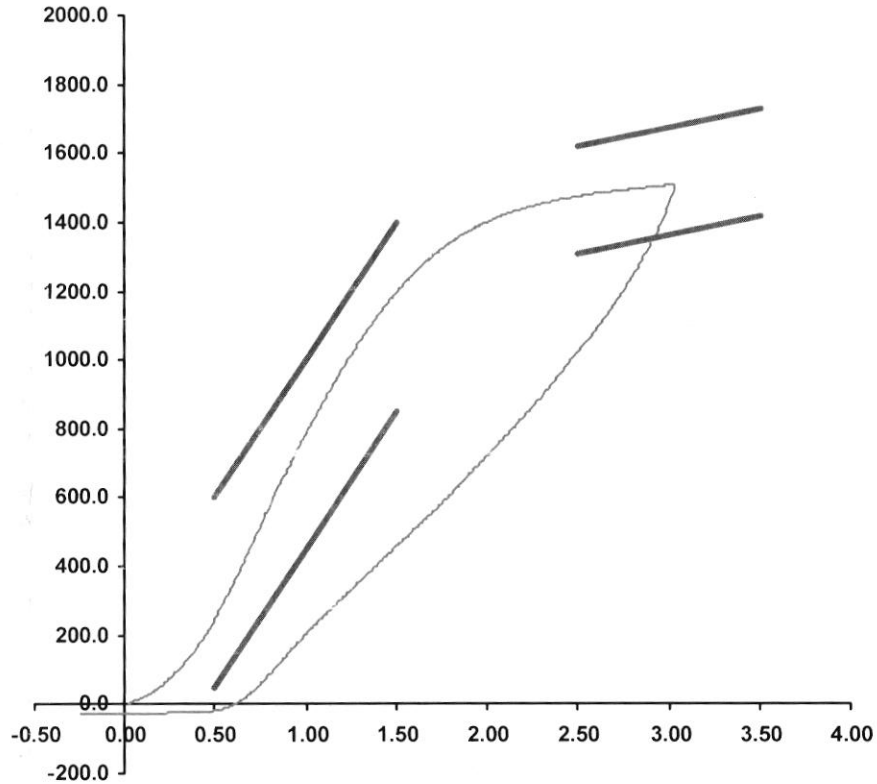
None Impact 10/14/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 15458
Test Number 20119
Report Number 20173
Test Date 9/9/2021 10:59:43 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	256	50	600
Force @ 1.5 mm (N)	1,202	850	1,400
Force @ 2.5 mm (N)	1,476	1,306	1,618
Force @ 3.0 mm (N)	1,509	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By : DC Date : 9/9/2021

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

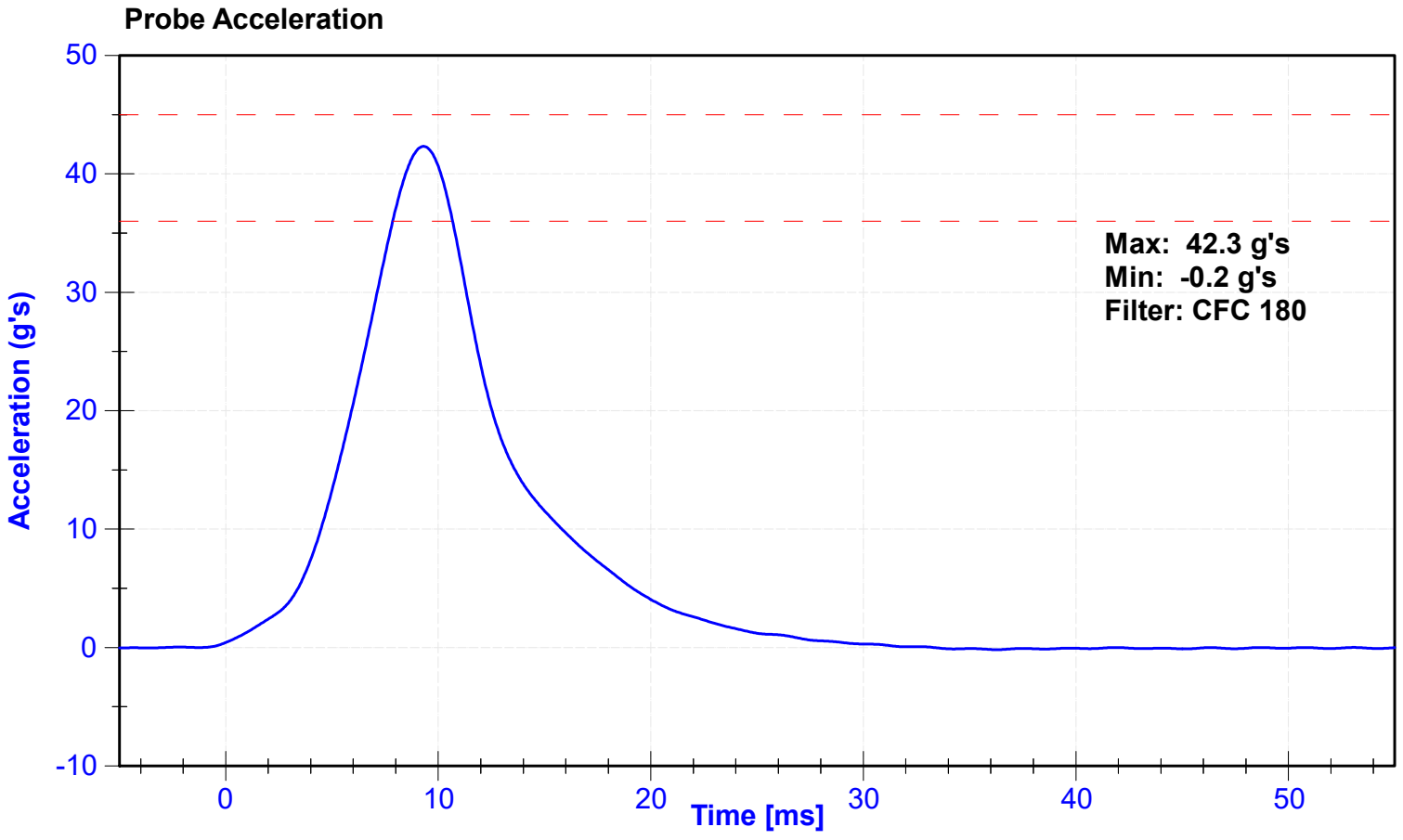
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

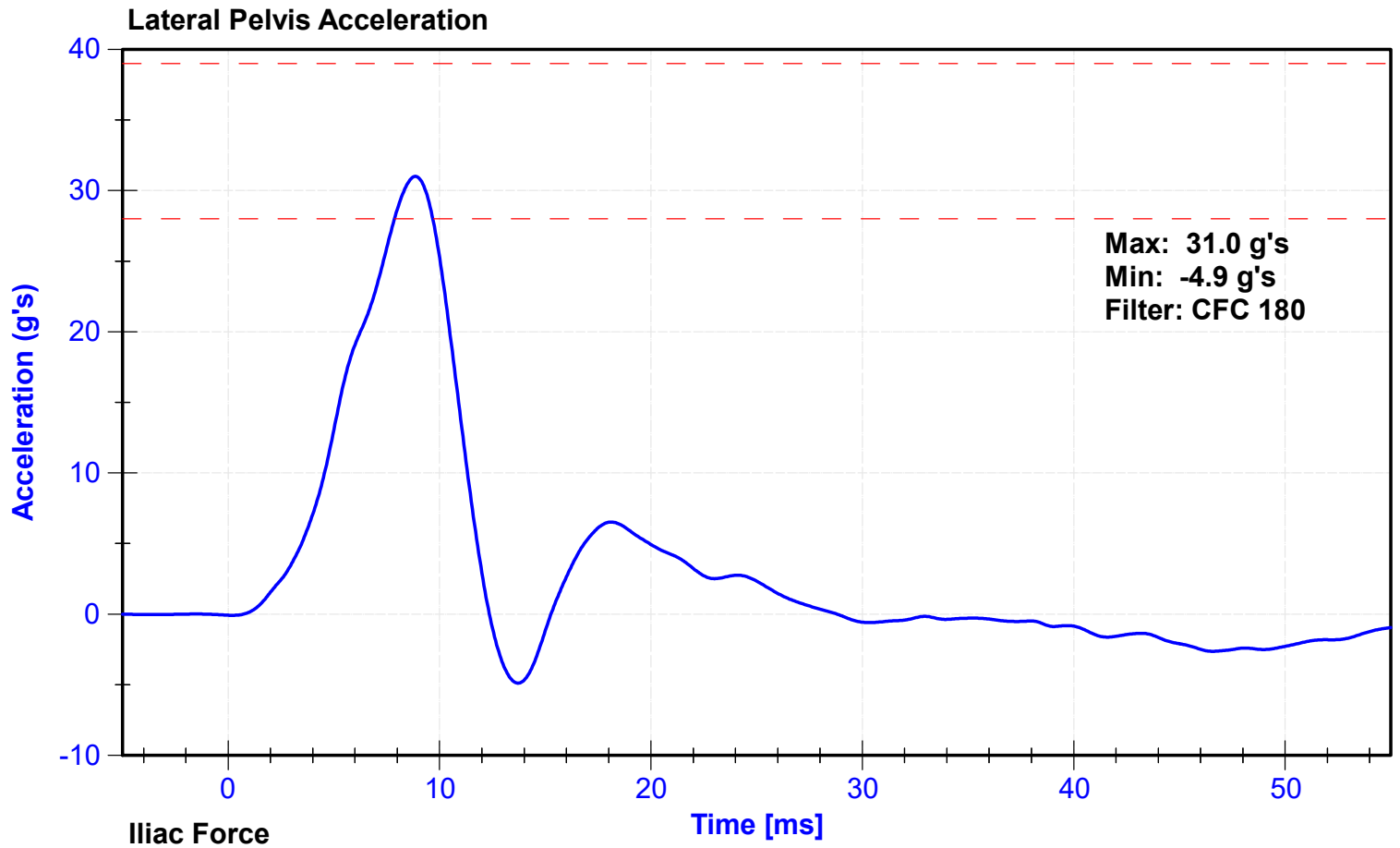
Results

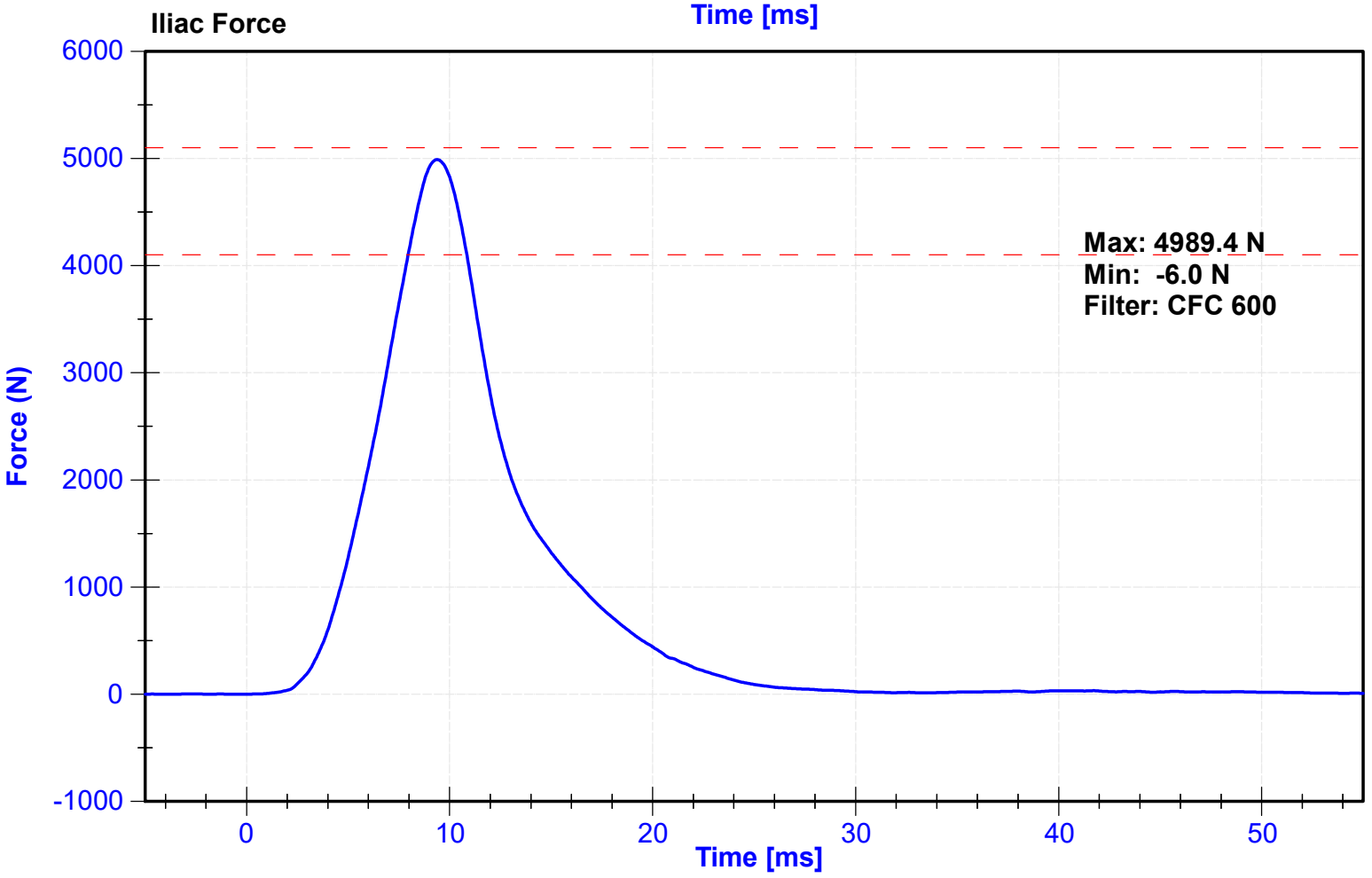
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	36.5	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	36	45	g's	42.3	Pass
Lateral Pelvis Acceleration	28	39	g's	31.0	Pass
Iliac Force	4100	5100	N	4989.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Iliac Load Cell	Denton	290-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 31.0 g's
Min: -4.9 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4989.4 N
Min: -6.0 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: DG8012		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	P74788	Endevco	6/17/2022
			Y	P83432	Endevco	6/17/2022
			Z	P83319	Endevco	6/17/2022
Head Accelerometers - Redundant			X	P80334	Endevco	6/17/2022
			Y	P52155	Endevco	6/17/2022
			Z	P83322	Endevco	6/17/2022
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	1199GFE	Servo	6/17/2022
		Middle	Y	1246GFE	Servo	6/17/2022
		Lower	Y	011GFE	Servo	6/17/2022
	Abdominal Rib	Upper	Y	008GFE	Servo	6/17/2022
		Lower	Y	041 GFE	Servo	6/17/2022
Lower Spine Accelerometers (T12)			X	P71272	Endevco	6/17/2022
			Y	P51327	Endevco	6/17/2022
			Z	P52067	Endevco	6/17/2022
Acetabulum Load Cell			Y	276-FY	Denton	8/11/2022
Lilac Wing Load Cell			Y	290-FY	Denton	8/11/2022
Pelvis Plug (Struck Side)				15127	SACO	3/5/2021
Pelvis Plug (Non-Struck Side)				14830	SACO	1/28/2021

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A399954	Measurement Specialties	9/29/2022
Vehicle Center of Gravity	Y	A400736	Measurement Specialties	9/29/2022
Vehicle Center of Gravity	Z	A405604	Measurement Specialties	9/29/2022
Left Floor Sill	Y	A431244	Measurement Specialties	6/15/2022
A-Pillar Sill	Y	A428010	Measurement Specialties	7/18/2022
A-Pillar Low	Y	A405556	Measurement Specialties	8/30/2022
A-Pillar Mid	Y	A398644	Measurement Specialties	7/13/2022
B-Pillar Sill	Y	A374359	Measurement Specialties	8/22/2022
B-Pillar Low	Y	A396619	Measurement Specialties	6/15/2022
B-Pillar Mid	Y	A405561	Measurement Specialties	9/26/2022
Driver Seat	Y	A428014	Measurement Specialties	7/14/2022
Engine Top	X	A335422	Measurement Specialties	9/29/2022
Engine Top	Y	A335466	Measurement Specialties	9/29/2022
Firewall	Y	A428043	Measurement Specialties	7/13/2022
Right Roof	Y	A315004	Measurement Specialties	7/19/2022
Right Floor Sill	Y	A431361	Measurement Specialties	9/2/2022
Rear Floorpan	X	A352360	Measurement Specialties	10/3/2022
Rear Floorpan	Y	A399936	Measurement Specialties	10/3/2022

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-1117019-F0	Interface	7/19/2022
Load Cell 6	1220AF-1117017-F0	Interface	7/19/2022
Load Cell 7	1220AF-1117035-F0	Interface	7/19/2022
Load Cell 8	1220AF-1117011-F0	Interface	7/19/2022