REPORT NUMBER: SPNCAP-CAL-23-003

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

FCA US LLC
2023 Jeep Grand Cherokee 4xe
5 Door SUV

NHTSA No: M20230303

PREPARED BY:
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December 12, 2023

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Prepared by: _____ Date: December 12, 2023
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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing & FMVSS 305 Indicant Testing of a 2023 Jeep Grand Cherokee 4xe 5 Door SUV NHTSA No.: M20230303		***5. Report Date*** December 12, 2023 ***6. Performing Organization Code*** CAL
7. Author(s) Quinn Porzio, Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2023-003
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.*** 693JJ920D000016
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15. Supplementary Notes		

16. Abstract

A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2023 Jeep Grand Cherokee 4xe 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 February 24, 2023.

The impact velocity of the vehicle was 32.20 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 289 mm located at level 3. The test vehicle's occupant performance data is as follows:

M easurement Description	Driver ATD (SID-IIs) (Serial No.300)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	286.032
Resultant Lower Spine Acceleration	G	82	39.401
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2308.594
Maximum Thoracic Rib Deflection	mm	38	21.112
Maximum Abdominal Rib Deflection	mm	45*	17.605

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

17. Key Words 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

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Form DOT F1700.7 (8-72)

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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2023 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2023 Jeep Grand Cherokee 4xe 5 Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2023 Jeep Grand Cherokee 4xe 5 Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.20 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 24, 2023. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 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	286.032
Resultant Lower Spine Acceleration	G	82	39.401
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2308.594
Maximum Thoracic Rib Deflection	mm	38	21.112
Maximum Abdominal Rib Deflection	mm	45*	17.605

*Proposed IARV

Supplemental restraint information was recorded as follows:

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other	N/A	N/A	N/A	N/A

GENERAL COMMENTS:

1. P1 serial number - 300

Data Anomalies:

- Left Front Sill Y Acceleration, Exceeded calibration range at 18.9 ms
- Left Sill B-Pillar Y Acceleration, Exceeded calibration range at 16.5 ms 75.7 ms
- Left Middle B-Pillar Y Acceleration, Exceeded calibration range at 12.7 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 - Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 - Dummy Lateral Clearance Dimensions

Data Sheet No. 5 - Camera and instrumentation Data

Data Sheet No. 6 - Vehicle Accelerometer Data

Data Sheet No. 7- Rigid Pole Load Cell Data

Data Sheet No. 8 - Post-Test Observations

Data Sheet No. 9 - Test Vehicle Profile Measurements

Data Sheet No. 10 - Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 - Vehicle Damage Profile Distances

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

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

Data Sheet No. 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: 2023 Jeep Grand Cherokee 4xe 5 Door SUV
NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test
Test Date: 02/24/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20230303
Model Year	2023
Make	Jeep
Model	Grand Cherokee 4xe
Body Style	SUV
VIN	1C4RJYB66P8791196
Body Color	White
Odometer Reading (km/mi)	80 Miles
Engine Displacement (L)	2.0
Type / No. Cylinders	I4 PHEV
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	8-Speeds
Overdrive	Yes
Final Drive	Four Wheel Drive
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	FCA US LLC
Date of Manufacture	1-23
Vehicle Type	MPV

GVWR	3130
GVWR Front	1452
GVWR Rear	1724

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)				476	(A)
DSC x 68.0 kg				340	(B)
Cargo Weight (RCLW) (kg)				136	(A-B)

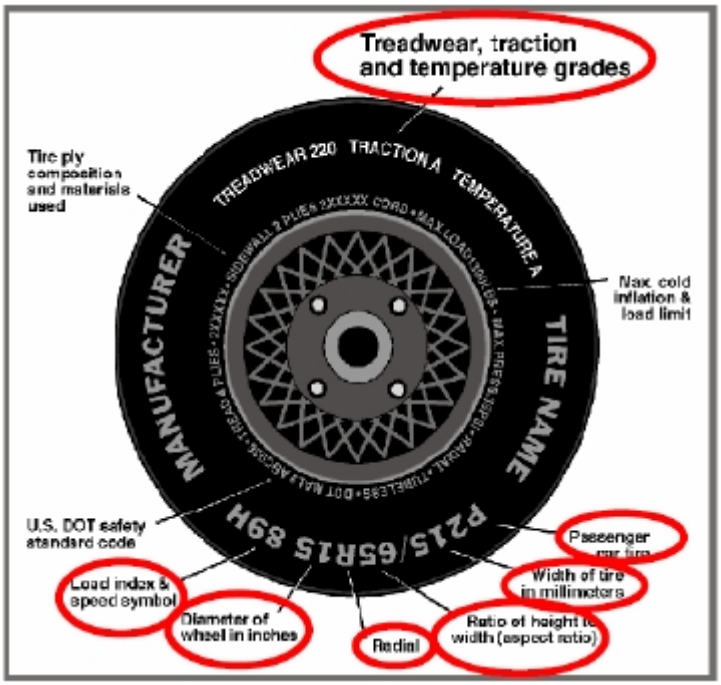
VEHICLE SEAT TYPE

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

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	270	290
Recommended Tire Size	265/50R20	265/50R20
Tire Size on Vehicle	265/50R20	265/50R20
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler H/L	Dueler H/L
Treadwear	600	600
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	107T	107T
Tire Material	Rubber	Rubber
DOT Safety Code Left	7XUM4014522	7XUM4014622
DOT Safety Code Right	7XUM4014522	7XUM4014522

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

Test Vehicle: 2023 Jeep Grand Cherokee 4xe 5 Door SUV
NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test
Test Date: 02/24/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	268	268	289	289
Tire Placard	kPa	270	270	290	290
Owner's Manual	kPa	270	270	290	290
As Tested	kPa	270	270	290	290

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	625.5	595.0		638.0	671.0		635.0	687.0	
Right	kg	664.5	563.0		680.0	637.0		665.5	648.5	
Ratio	%	52.7	47.3		50.2	49.8		49.3	50.7	
Totals	kg	1290.0	1158.0	2448.0	1318.0	1308.0	2626.0	1300.5	1335.5	2636.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2448.0	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50.0	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2634	(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	- 0.50	-0.55	- 0.85	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	- 0.70	+0.15	+ 0.30	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	- 0.15	-0.10	- 0.10	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	0.00	-0.05	- 0.20	Yes
Vehicle CG (Aft of Front Axle)	mm	1404	1477	1504	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	3	2.5	3	

* ND = Nose Down (-), NU = Nose Up (+)
** LD = Left Down (-), LU = Left Up (+)
*** The “As Tested” vehicle attitude measurements must be equal to or between the “As Delivered” and “Fully Loaded” vehicle attitude measurements. Indicate “Yes” or “No” for Meets Requirement”

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	5.5
Spare Tire	27.5
Jack	3
EV Charger & Tool Kit	3
Plastic Trim	14.5
Ballast / Equipment Added	95.7

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

Test Surface Marking

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	1010
Aft 25 mm target	1008

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max	Min	Mid
Driver Seat	19.9	11.2	15.6
Front Passenger Seat	18.8	10.3	14.6
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	15.6	31	Max	42	46	50
			Mid	22	26	31
			Min	3	7	11
Front Passenger Seat	14.6	30	Max	41	46	48
			Mid	22	26	30
			Min	3	7	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

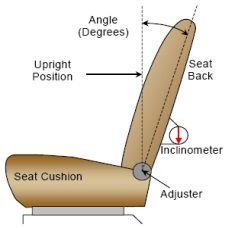
Test Vehicle: 2023 Jeep Grand Cherokee 4xe 5 Door SUV
NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test
Test Date: 02/24/2023

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	250	Power	0	Power
Front Passenger Seat	250	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	71.3	Power	5.2	Power
Front Passenger Seat	61.5	Power	5.1	Power
Front Center Seat				
Struck Side Rear Seat	16.7	10 (0-9)	11.0	0
Non-Struck Side Rear Seat	15.5	10 (0-9)	11.0	0
Rear Center Seat	16.7	10 (0-9)	11.0	0

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

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	4 (0-3)	Forward & Lowermost

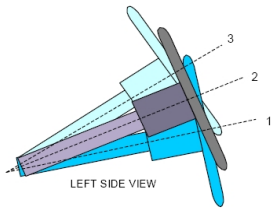
DATA SHEET NO. 2 … (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

STEERING COLUMN POSITIONS

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

	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	19.1	
Geometric center position No. 2	21.8	
Uppermost position No. 3	24.5	
Telescoping Steering Wheel Travel		70
Test Position	21.9	35

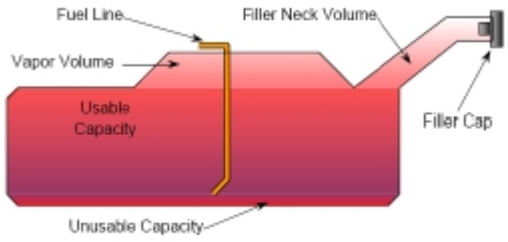


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is equipped with an electric charge port on the left front bumper of the vehicle as well as a fuel filler located on the left rear quarter panel.



VEHICLE FUEL TANK ASSEMBLY

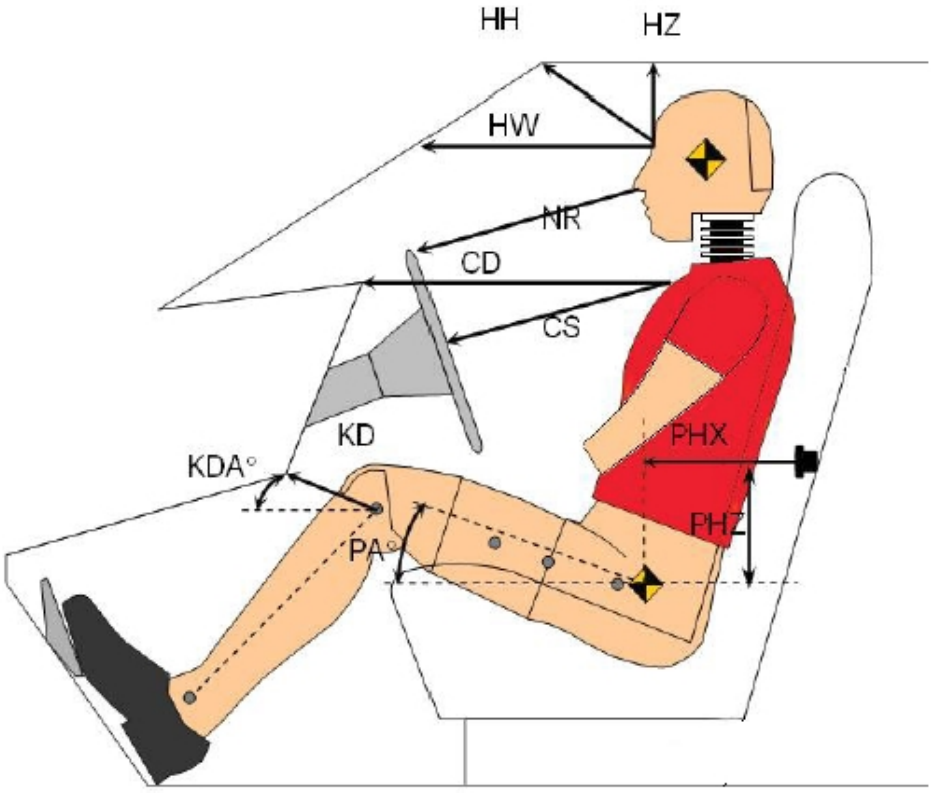
FUEL TANK CAPACITY

Description	Liters
Usable Capacity of “Standard Tank” - see Form No. 1	71.9
Usable Capacity of “Optional Tank” - see Form No. 1	N/A
Usable Capacity of “Standard Tank” - see Owner’s Manual	71.9
Usable Capacity of “Optional Tank” - see Owner’s Manual	N/A
93% of Usable Capacity	66.9
Actual Amount of Solvent Used in Test	67.0
1/3 of Usable Capacity	23.9

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023



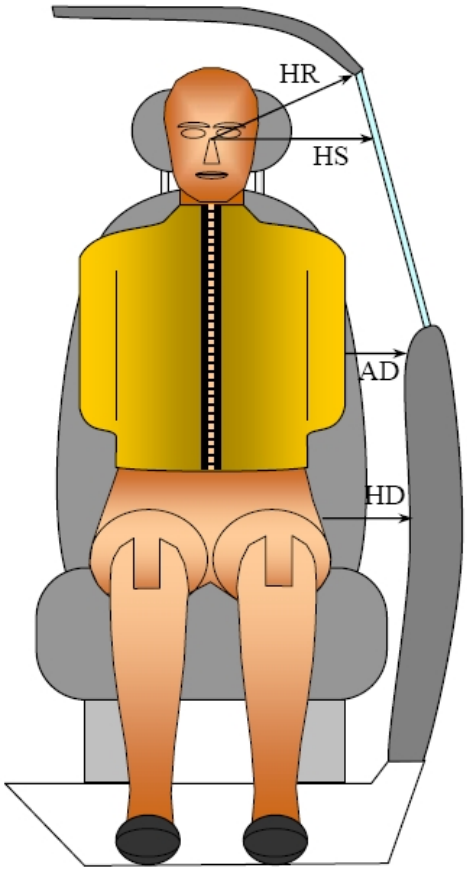
Left Side View

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. 300)	
		Length (mm)	Angle (°)
HH	Head to Header	325	
HW	Head to Windshield	646	
HZ	Head to Roof Liner	211	
NR	Nose to Rim	248	
CD	Chest to Dash	460	
CS	Chest to Steering Wheel	198	
KD(L) / KDA(L)◦	Left Knee to Dash	131	39.7
KD(R) / KDA(R)◦	Right Knee to Dash	133	27.9
PAX◦	Pelvic Tilt Angle (X-Axis)		20.3
PAY◦	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	282	
PHZ	Hip Point to Striker (Z-Axis)	50	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023



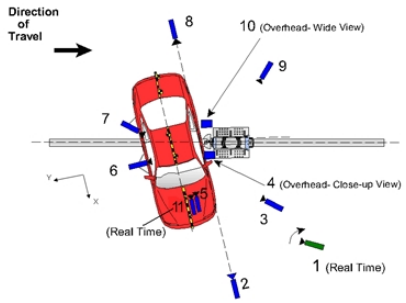
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver – Length (Serial No. 300)
HR	Head to Side Header	mm	267
HS	Head to Side Window	mm	389
AD	Arm to Door	mm	100
HD	H-Point to Door	mm	172

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 Jeep Grand Cherokee 4xe 5 Door SUV
NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test
Test Date: 02/24/2023



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	30
2	Front ground level - impact view	-320	8112	-1479	28	1000
3	Impact side 45º - forward pole view	1025	5513	-1590	24	1000
4	Overhead Close-up view of impact	0	-473	-9220	28	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12	1000
7	Onboard - dummy rear oblique view				12	1000
8	Rear ground level - impact view	-269	-8783	-1562	28	1000
9	Impact side 45º - rearward pole view	676	-6070	-1488	24	1000
10	Overhead wide - view of impact	0	-612	-9220	12	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.*

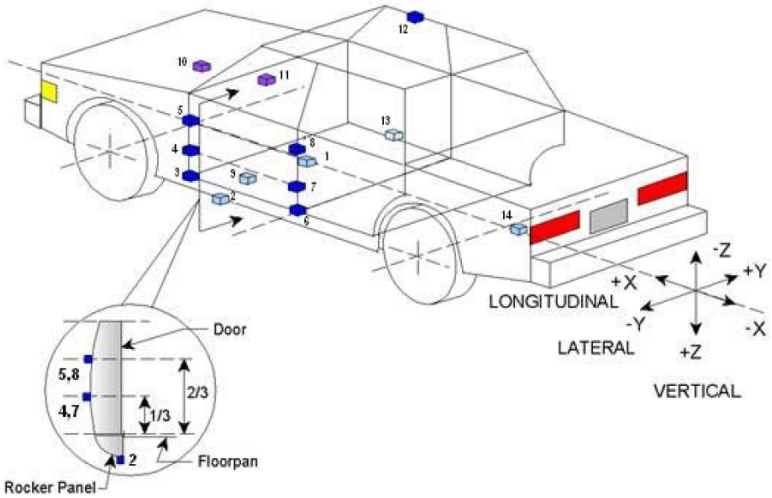
Comments: All cameras operated as intended.

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:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2101	-4	30
2	Left Floor Sill	3146	-673	82
3	A-Pillar Sill	3269	-666	77
4	A-Pillar Low	3475	-684	-168
5	A-Pillar Mid	3226	-682	-671
6	B-Pillar Sill	2228	-634	86
7	B-Pillar Low	2243	-692	-216
8	B-Pillar Mid	2196	-691	-621
9	Seat	2482	-567	26
10	Engine	3965	142	-421
11	Firewall	3644	209	-423
12	Roof	2462	677	-1129
13	Right Floor Sill	3161	680	74
14	Rear Deck	936	-8	37

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

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

POLE BARRIER

RIGID POLE LOAD CELL LOCATION

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

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Jeep Grand Cherokee 4xe 5 Door SUV
NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test
Test Date: 02/24/2023

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 & Headrest
Left Shoulder	Torso/Pelvis Airbag
Upper Torso	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback & Torso/Pelvis Airbag
Left Hip	Seat pan & Torso/Pelvis Airbag
Left Knee	Driver Door

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

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

Test Vehicle: 2023 Jeep Grand Cherokee 4xe 5 Door SUV NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test Test Date: 02/24/2023

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar & B-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracked throughout & separated along top edge
Side Window Damage	Driver window cracked throughout
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

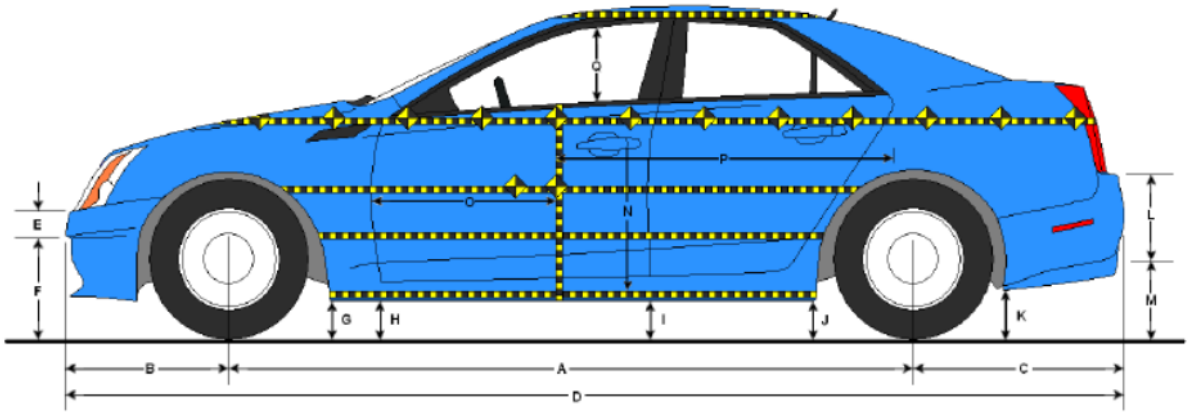
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1303
Actual Impact Point - Aft of Front Axle	mm		1302
Horizontal Offset (+ forward / - rearward)	mm	+/- 38*	+1
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.20
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.21

*Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

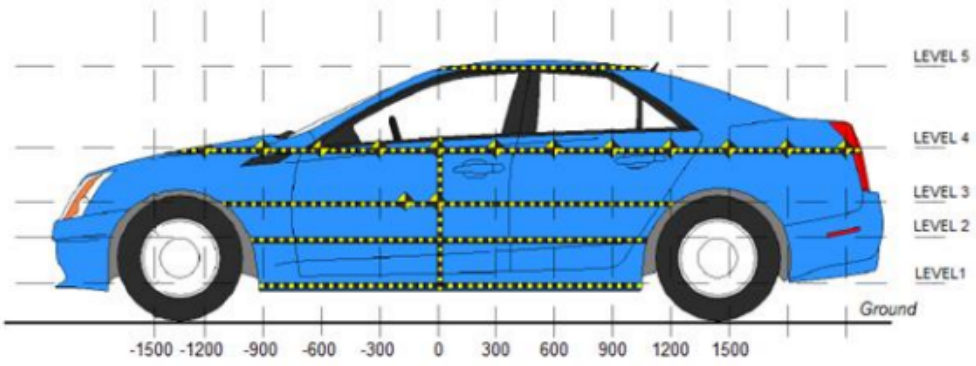
No.	Measurement Description	Pre-Test	Post-Test	Change
A	Vehicle Wheelbase	2966	2910	-56
B	Front Axle to FSOV	905	938	33
C	Rear Axle to RSOV	1043	1031	-12
D	Total Vehicle Length at Centerline	4913	4879	-34
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	672	684	12
G	Sill Height at Front Wheel Well	255	245	-10
H	Sill Height at Front Door Leading Edge	255	246	-9
I	Sill Height at B Pillar	264	256	-8
J1	Sill Height at Rear Wheel Well	254	262	8
J2	Pinch Weld Height at Rear Wheel Well	290	302	12
K	Sill Height Aft of Rear Wheel Well	315	321	6
L	Rear Bumper Thickness	135	135	0
M	Rear Bumper Bottom to Ground	570	562	-8
N	Sill Height to Window Bottom Sill	927	931	4
O	Front Door Leading Edge to Impact CL	679	633	-46
P	Rear Door Trailing Edge to Impact CL	1459	1407	-52
Q	Front Window Opening	450	446	-4
R	Right Side Length	4813	4799	-14
S	Left Side Length	4811	4761	-50
T	Vehicle Width at B-Pillars	1897	1831	-66
U	Front Wheel Track width	1665	1660	-5
V	Rear Wheel Track Width	1675	1669	-6

* All measurements in mm with tolerance of ± 3mm

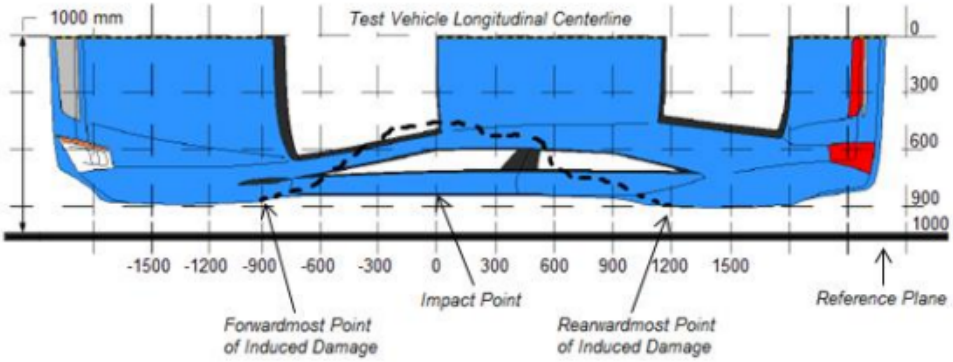
DATA SHEET NO.10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

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	411	231	0
2	Occupant H-Point	mm	808	287	0
3	Mid-Door	mm	869	289	0
4	Window Sill	mm	1184	235	0
5	Window Top	mm	1711	71	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: 2023 Jeep Grand Cherokee 4xe 5 Door SUV NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test Test Date: 02/24/2023

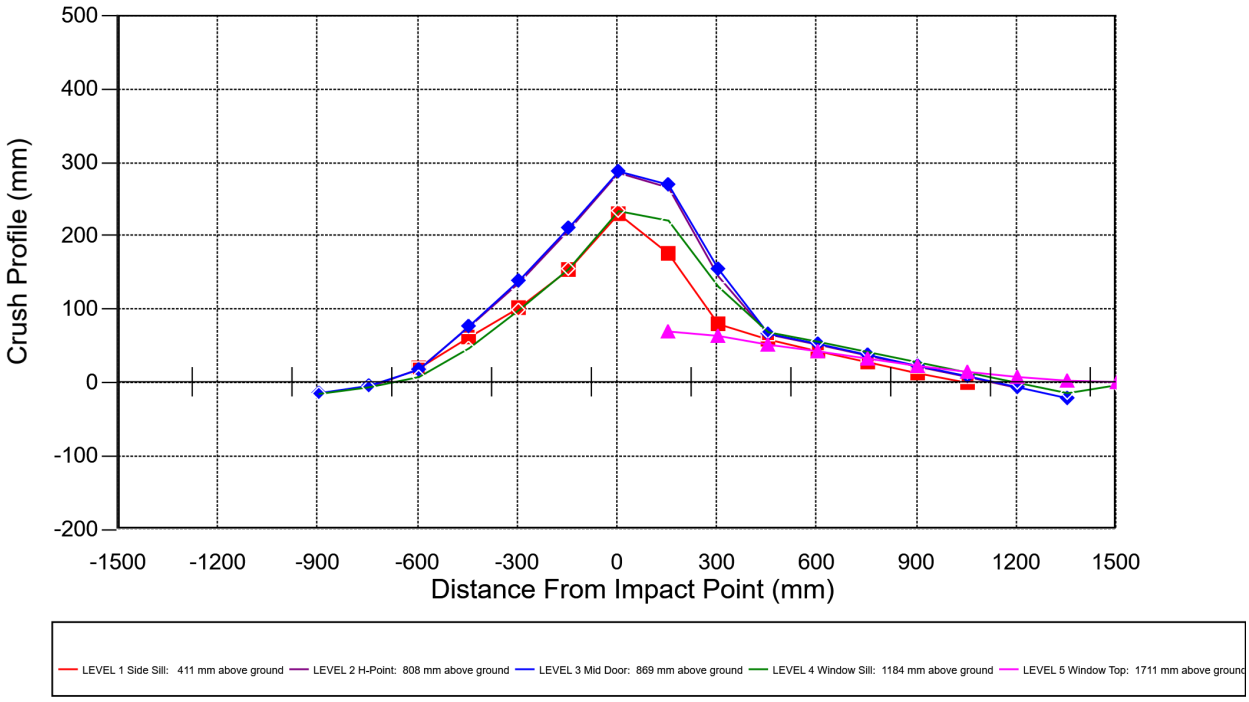
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Change				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900			970	827				983	841				-13	-14	
-750		950	950	844			955	953	849			-5	-3	-5	
-600	904	941	942	853		883	921	923	844		21	20	19	9	
-450	899	940	942	860		836	863	864	812		63	77	78	48	
-300	899	942	944	869		796	805	804	769		103	137	140	100	
-150	901	943	946	875		746	734	734	719		155	209	212	156	
0	901	945	947	882		670	658	658	647		231	287	289	235	
150	901	946	948	888	651	724	679	677	666	580	177	267	271	222	71
300	901	946	949	892	662	820	800	793	760	597	81	146	156	132	65
450	899	945	948	893	663	839	878	880	823	610	60	67	68	70	53
600	898	945	948	896	665	854	892	894	839	621	44	53	54	57	44
750	898	945	947	898	664	869	907	908	855	630	29	38	39	43	34
900	904	946	948	899	663	890	923	924	870	639	14	23	24	29	24
1050	920	952	953	899	660	919	943	943	884	644	1	9	10	15	16
1200		968	966	893	658		974	971	892	649		-6	-5	1	9
1350			978	895	652			998	908	648			-20	-13	4
1500				891	644				893	642				-2	2

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

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

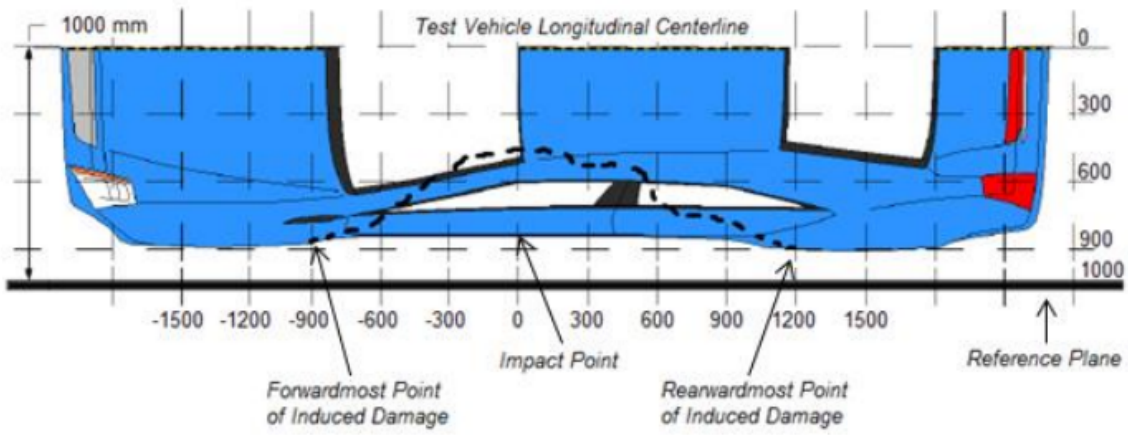


Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.11
VEHICLE DAMAGE PROFILE DISTANCE

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

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	17	30	-13
2	-450	3	136	58	78
3	0	3	342	53	289
4	450	3	120	52	68
5	900	3	76	52	24
6	1350	3	2	22	-20

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

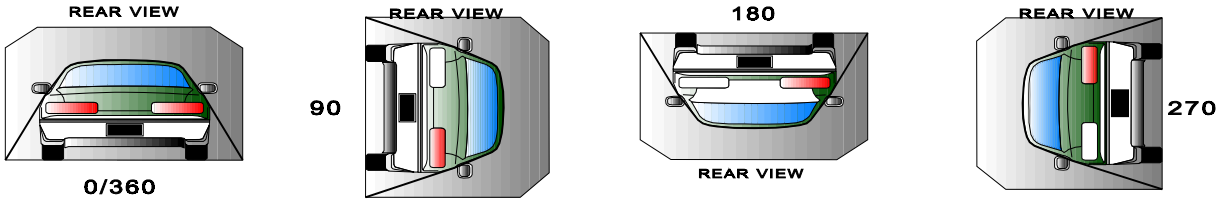
Test Time: 12:14 PM Temperature: 21 °C

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°	74	300	374
90° to 180°	66	300	366
180° to 270°	64	300	364
270° to 360°	71	300	371

FMVSS 301 SPILLAGE TABLE

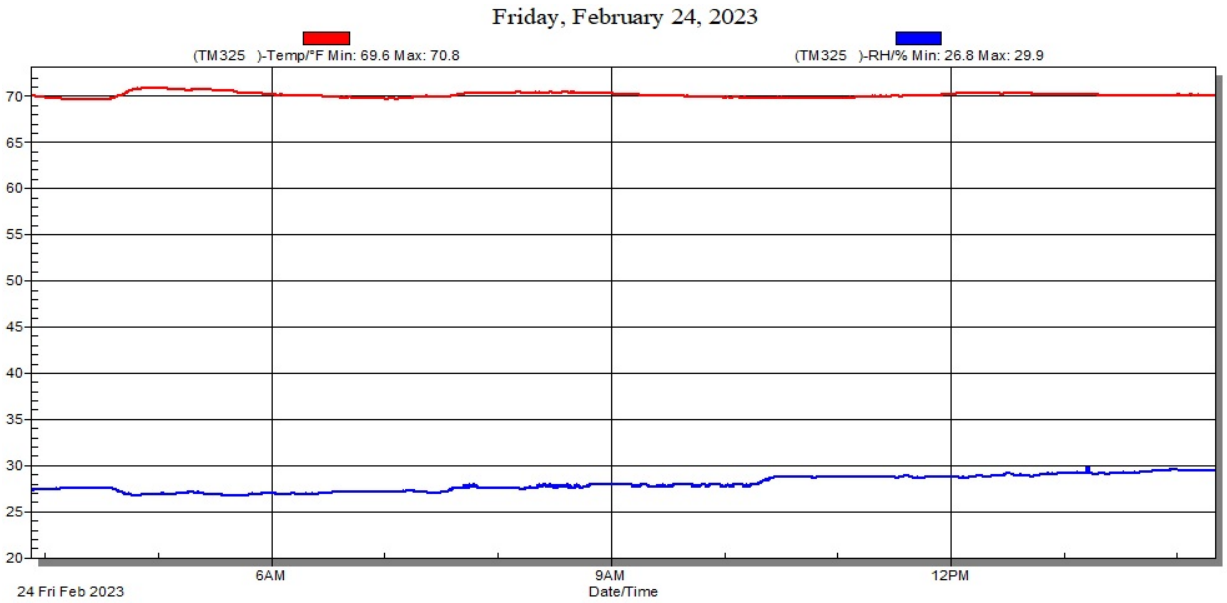
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023



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:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Gasoline-Electric Hybrid
Propulsion Battery Type	NMC Lithium Ion Polymer
Nominal Voltage (Volts)	400
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Located driver side rear trunk area
Auxiliary Battery Type	N/A

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	Organic solvent – carbonate based
Electrolyte Fluid Specific Gravity	1.2g/cm^3
Electrolyte Fluid Kinematic Viscosity (centistokes)	~3.52cP (@25ºC)
Electrolyte Fluid Color	Clear
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Ethylene-Glycol/Water mixture, Pink
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside Passenger Compartment

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	336.3
Maximum State of Charge	V	372
95% of Maximum	V	353.4
Test Voltage *	V	367.6
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:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

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

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	The Mopar test point adapter tool provided by OEM includes a ground lead along with positive and negative meter leads.
Details of Propulsion Battery Components	The propulsion battery is located under the rear passenger vehicle underbody.

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

Test Vehicle:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		5/3/2022

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	336.3 - 396.5
Propulsion Battery Voltage: (ready to drive position)	V_b	V	367.6
Propulsion Battery to Vehicle Chassis	V_1	V	309.0
Propulsion Battery to Vehicle Chassis	V_2	V	300.0
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	92.0
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	91.0
$_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	929,738
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	932,462
Lesser value of R_{i1} and R_{i2}	R_i	Ω	929,738
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	2,529

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:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		58100115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		5/3/2022

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 =	0.050	V	Time:	1	Minutes	10	Seconds
V_1 =	0.440	V	Time:	1	Minutes	14	Seconds
V_2 =	0.460	V	Time:	1	Minutes	23	Seconds
R_o =	200,000	Ω					
V_1' =	0.060	V	Time:	1	Minutes	31	Seconds
V_2' =	0.060	Ω	Time:	1	Minutes	36	Seconds
R_{i1} =	2,590,909	Ω	Time:	1	Minutes	31	Seconds
R_{i2} =	2,608,696	Ω	Time:	1	Minutes	36	Seconds
R_i =	2,590,909	Ω/V	Time:	1	Minutes	31	Seconds
R_i/V_b =	51,818,180	Ω/V	Time:	1	Minutes	31	Seconds

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

NOTES:

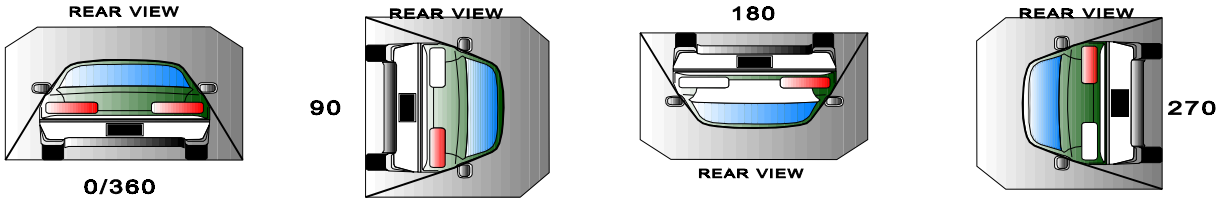
- *R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1'], R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2'], R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical 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:	2023 Jeep Grand Cherokee 4xe 5 Door SUV	NHTSA No.:	M20230303
Test Program:	NCAP Side Pole Impact Test	Test Date:	02/24/2023



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	14	5	6	14	7
90° to 180°	1	6	5	6	6	7
180° to 270°	1	4	5	6	4	7
270° to 360°	1	11	5	6	11	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0.0	Liters	No Spillage Occurred
90° to 180°	0.0	Liters	No Spillage Occurred
180° to 270°	0.0	Liters	No Spillage Occurred
270° to 360°	0.0	Liters	No Spillage Occurred
Total Spillage	0.0	Liters	No Spillage Occurred

** 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.		58100115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		5/3/2022

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: 2023 Jeep Grand Cherokee 4xe 5 Door SUV NHTSA No.: M20230303
Test Program: NCAP Side Pole Impact Test Test Date: 02/24/2023

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units	R_o=200,000Ω	Minutes	Seconds
V_b =	90°	0.00	V	Time:	1	5
	180°	0.00	V		11	25
	270°	0.00	V		17	45
	360°	0.00	V		24	15
V_1 =	90°	0.00	V	Time:	1	19
	180°	0.00	V		11	33
	270°	0.00	V		17	52
	360°	0.00	V		24	21
V_2 =	90°	0.00	V	Time:	1	24
	180°	0.00	V		11	36
	270°	0.00	V		17	50
	360°	0.00	V		24	23
V_1' =	90°	0.00	V	Time:	1	27
	180°	0.00	V		11	38
	270°	0.00	V		18	59
	360°	0.00	V		24	30
V_2' =	90°	0.00	V	Time:	1	29
	180°	0.00	V		11	40
	270°	0.00	V		17	0
	360°	0.00	V		24	32
R_{i1} =	90°	Zero Volts	Ω	Time:	1	27
	180°	Zero Volts	Ω		11	38
	270°	Zero Volts	Ω		18	59
	360°	Zero Volts	Ω		24	30
R_{i2} =	90°	Zero Volts	Ω	Time:	1	29
	180°	Zero Volts	Ω		11	40
	270°	Zero Volts	Ω		18	0
	360°	Zero Volts	Ω		24	32
R_i =	90°	Zero Volts	Ω	Time:	1	29
	180°	Zero Volts	Ω		11	40
	270°	Zero Volts	Ω		18	0
	360°	Zero Volts	Ω		24	32
R_i/V_b =	90°	Zero Volts	Ω/V	Time:	1	29
	180°	Zero Volts	Ω/V		11	40
	270°	Zero Volts	Ω/V		18	0
	360°	Zero Volts	Ω/V		24	32

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? X Yes 40 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

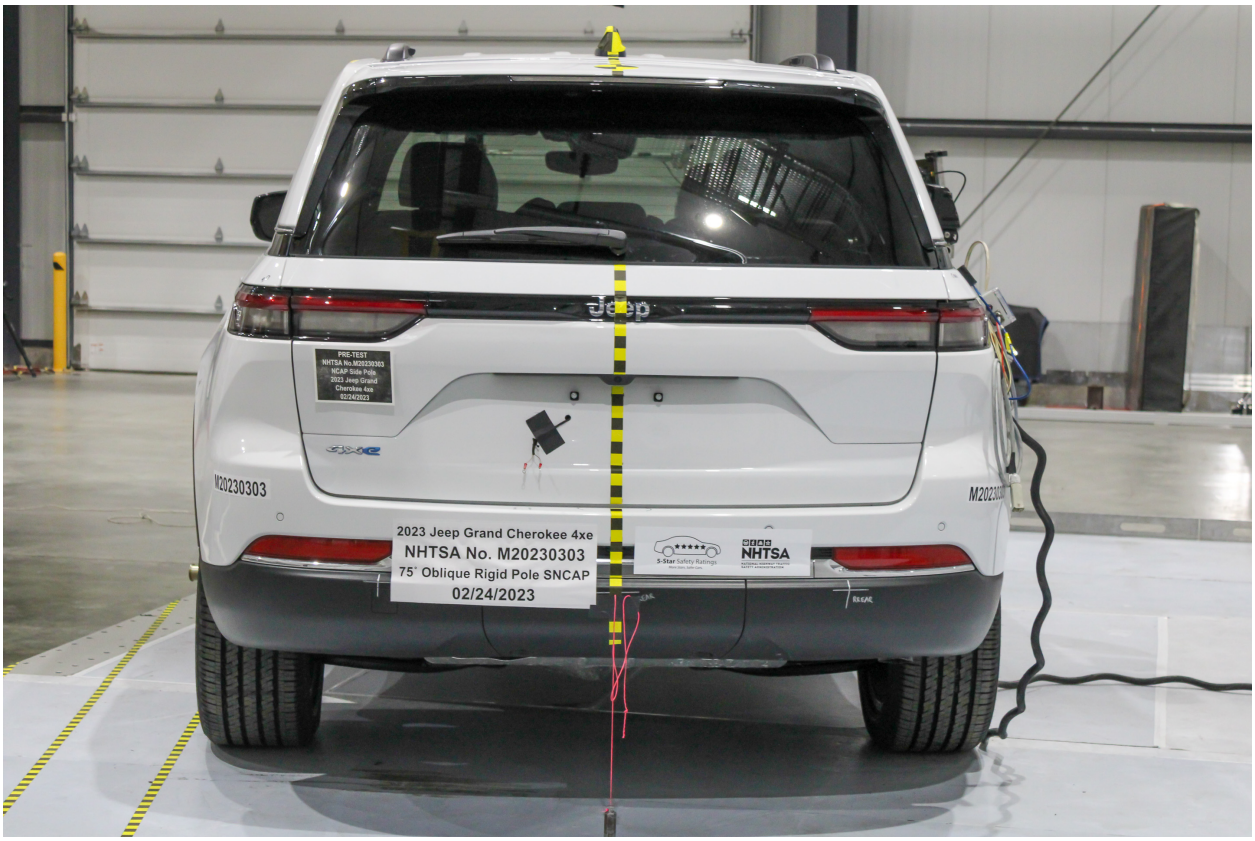


Figure A-11: Pre-Test Rear View of Test Vehicle

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

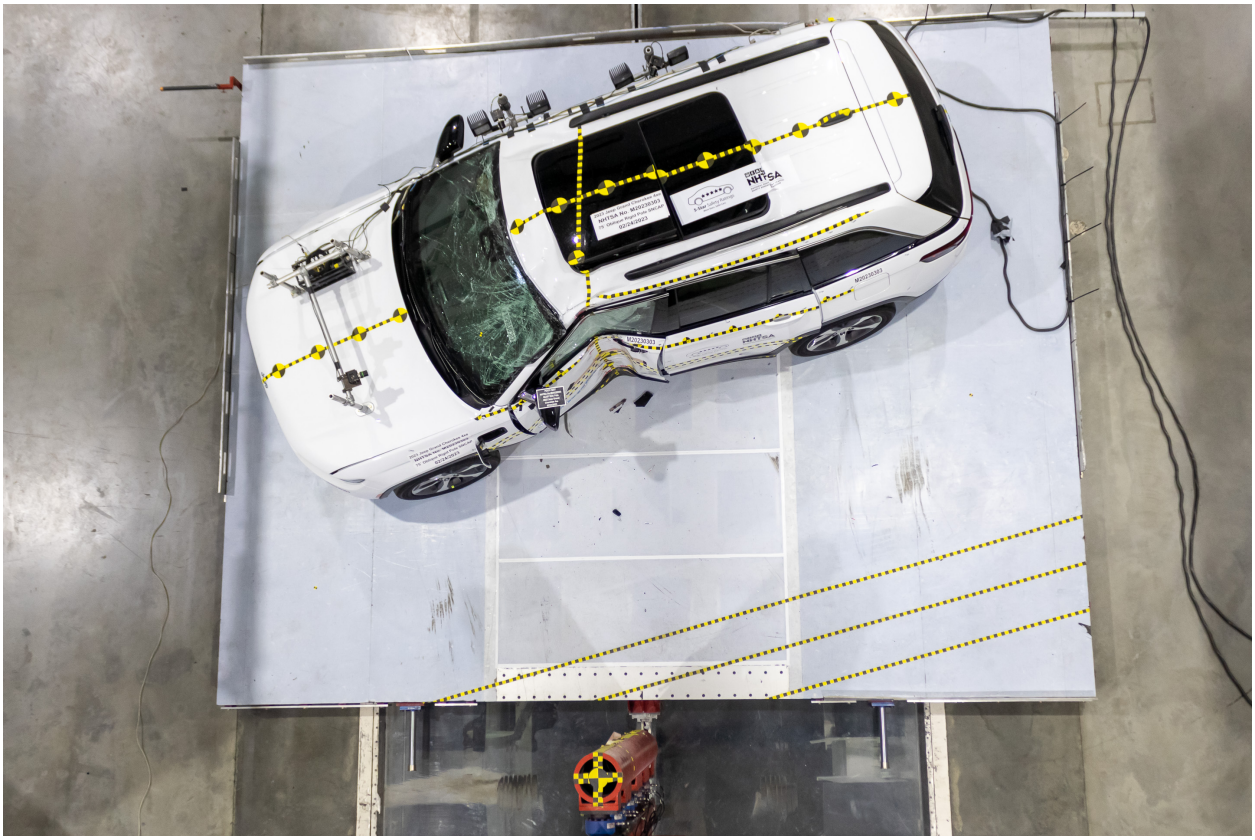


Figure A-16: Post-Test Overhead View of Test Area

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

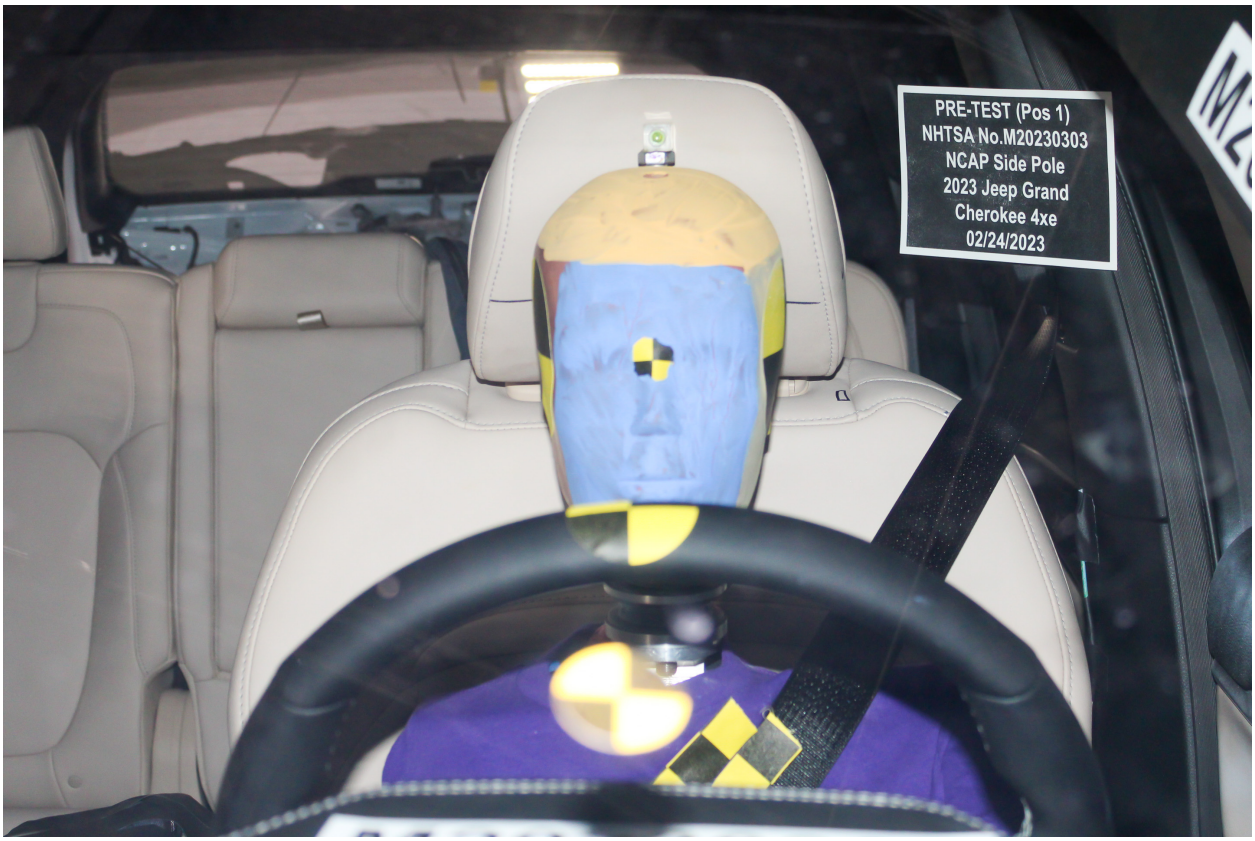


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest

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

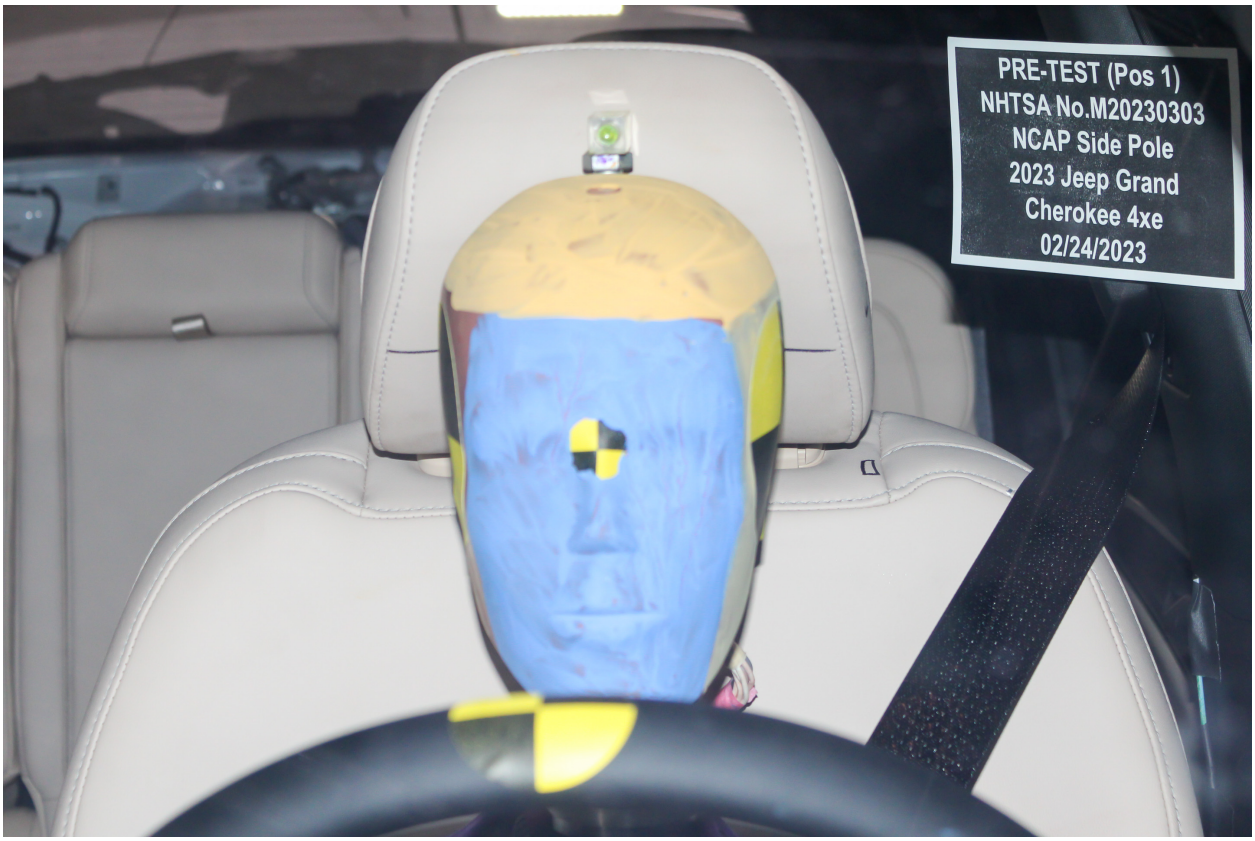


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint

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

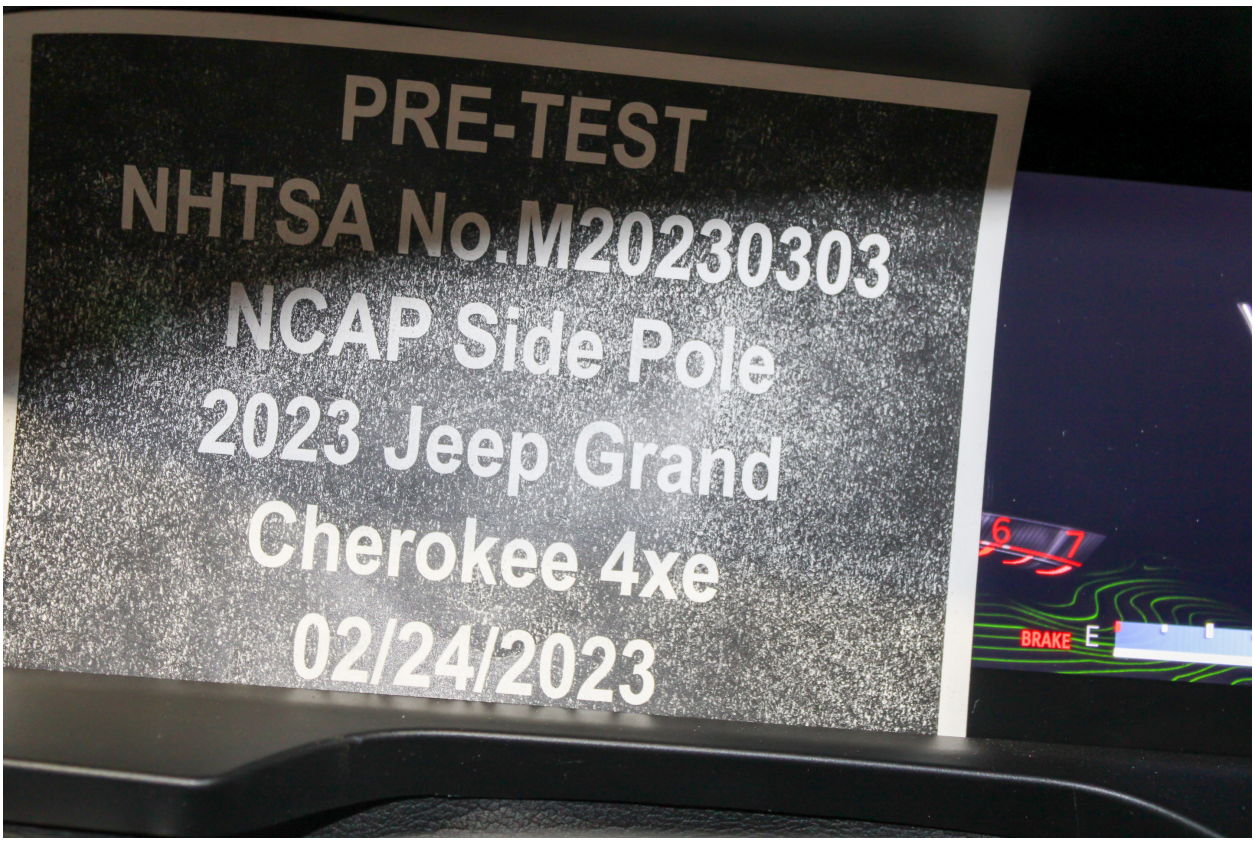


Figure A-36: Pre-Test View of Parking Brake

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

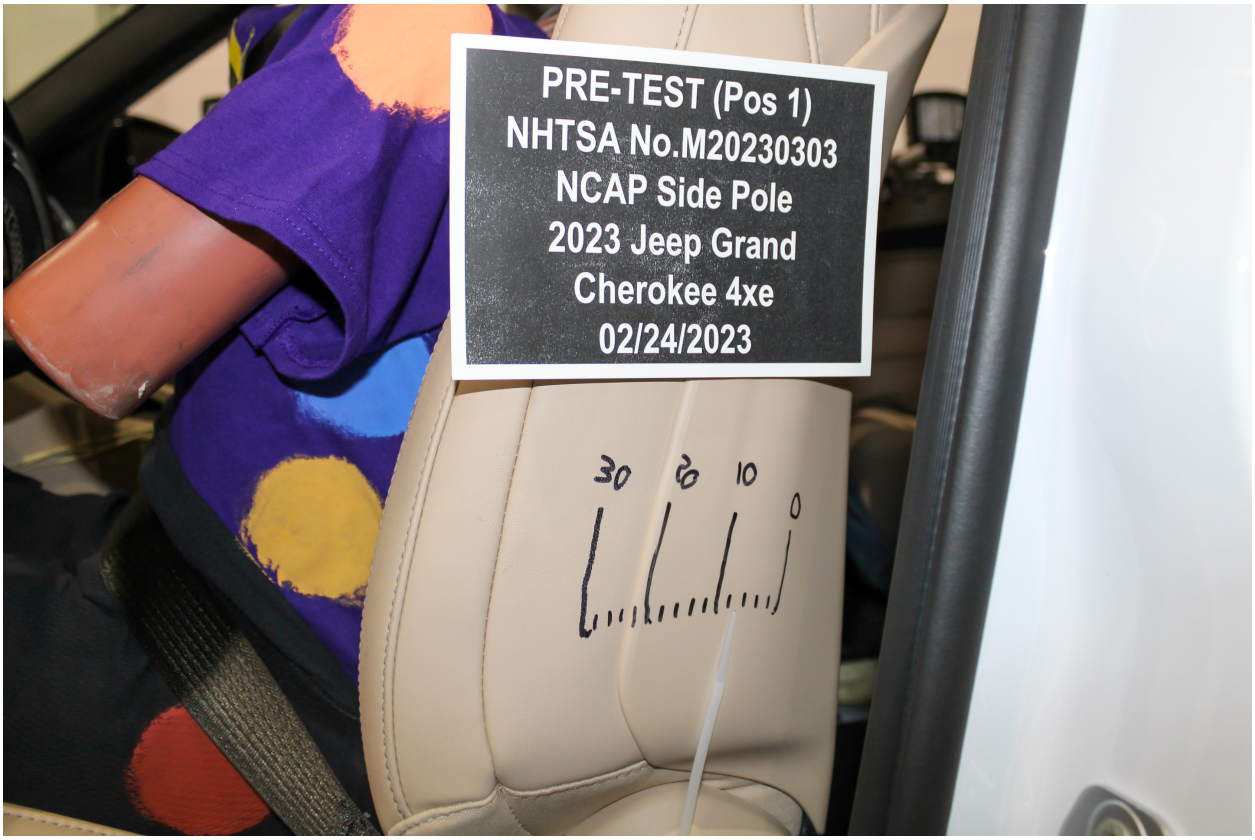


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back

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

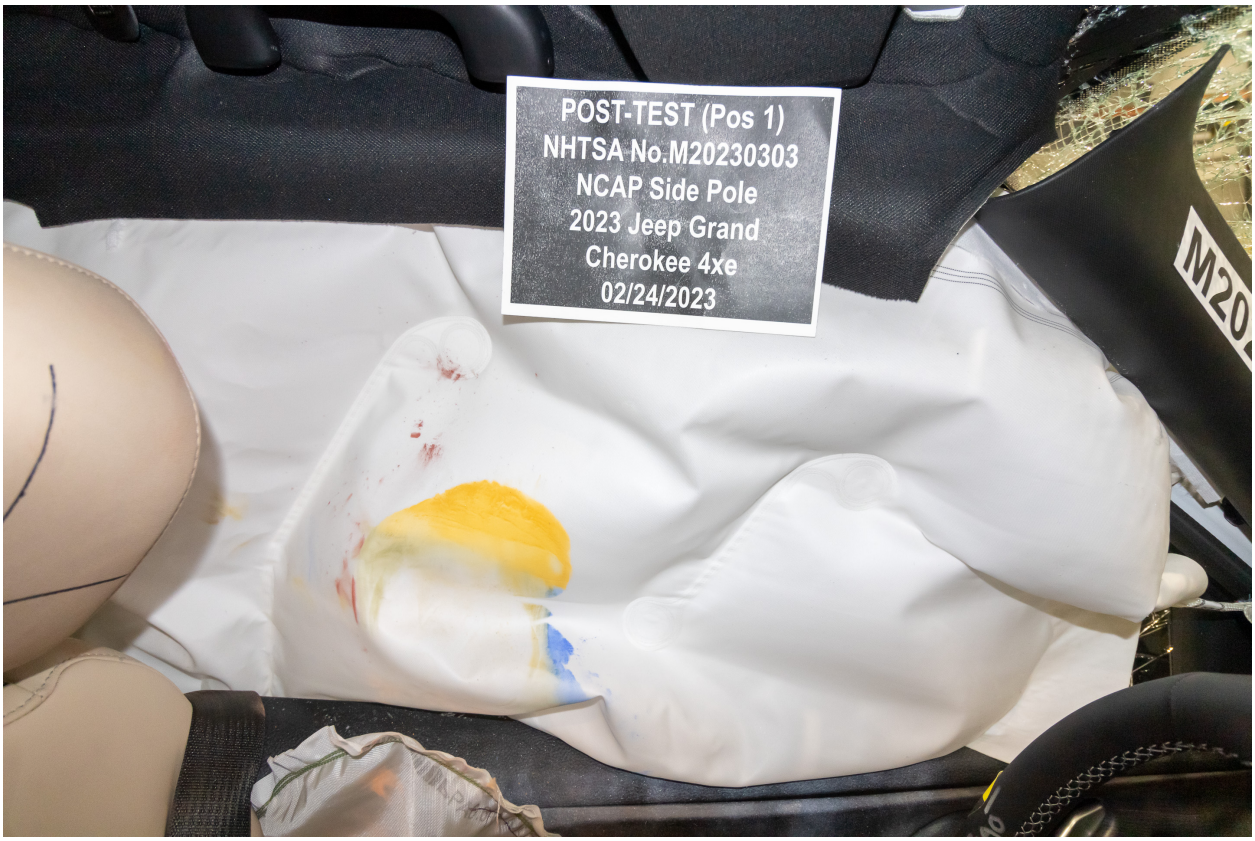


Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View

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

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

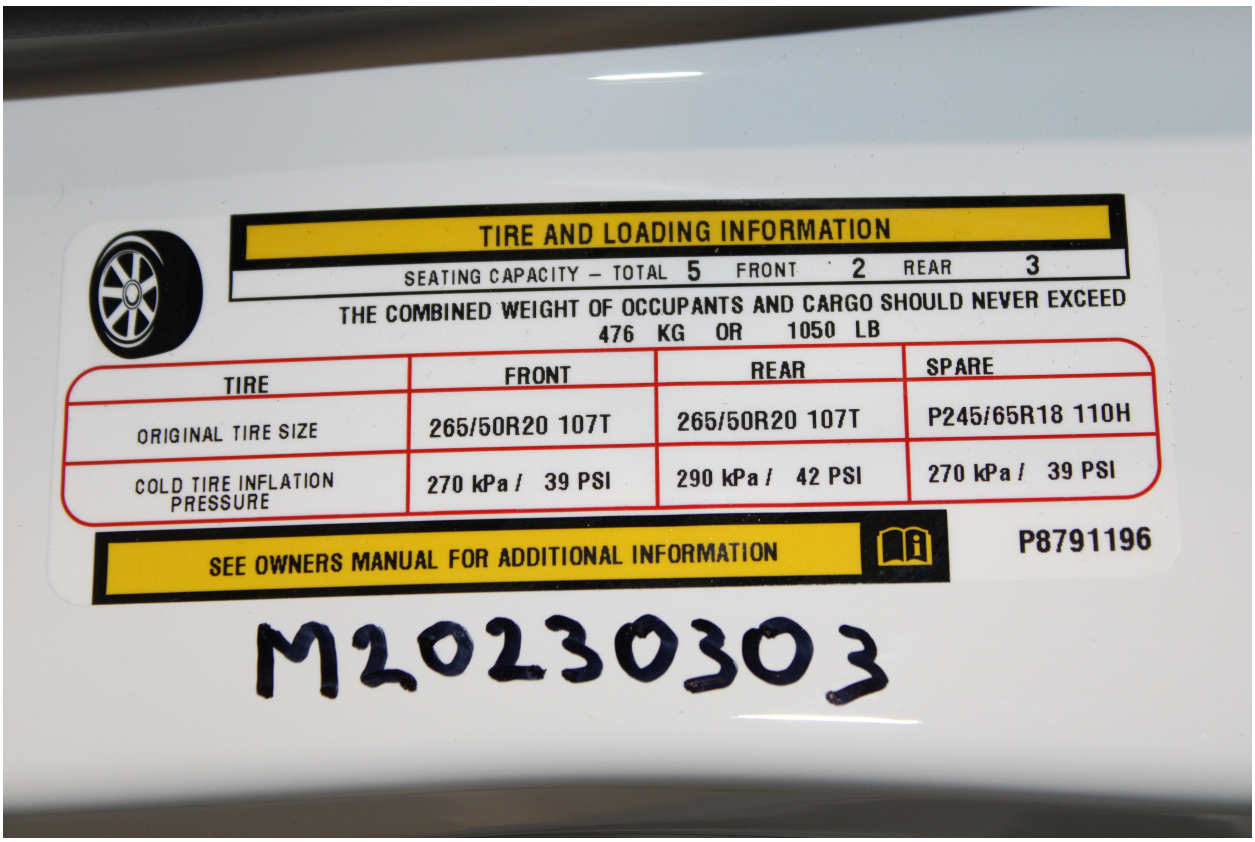


Figure A-58: Close-Up View of Vehicle's Tire Information Placard or Label

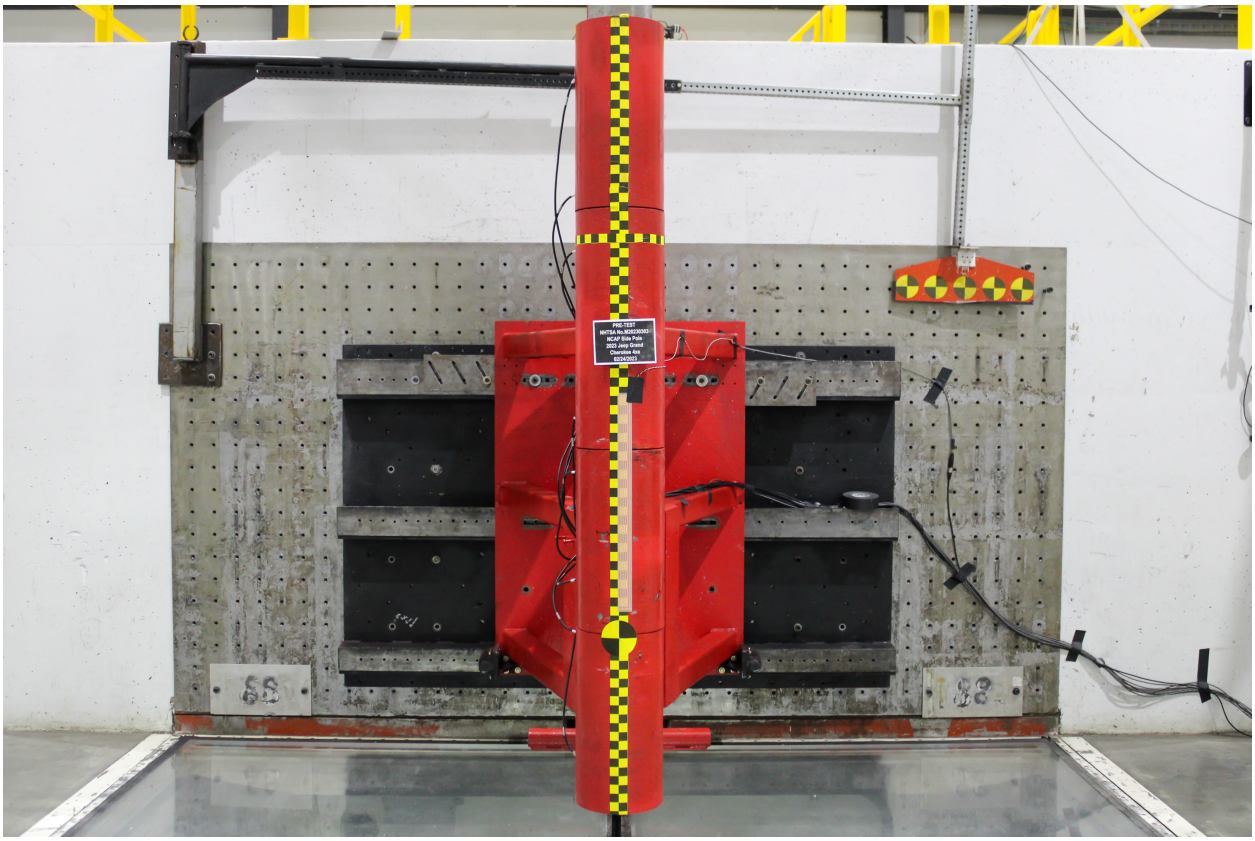


Figure A-59: Pre-Test Pole Barrier Front View

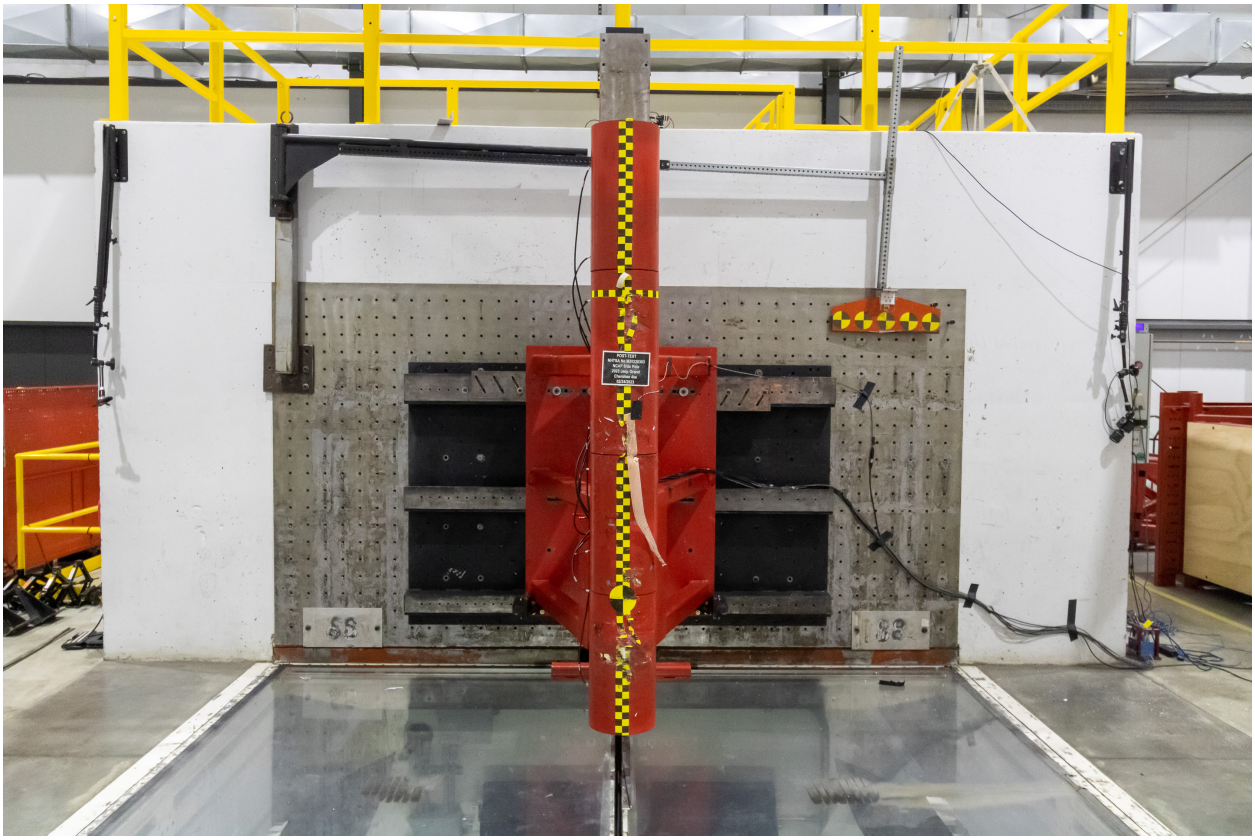


Figure A-60: Post-Test Pole Barrier Front View

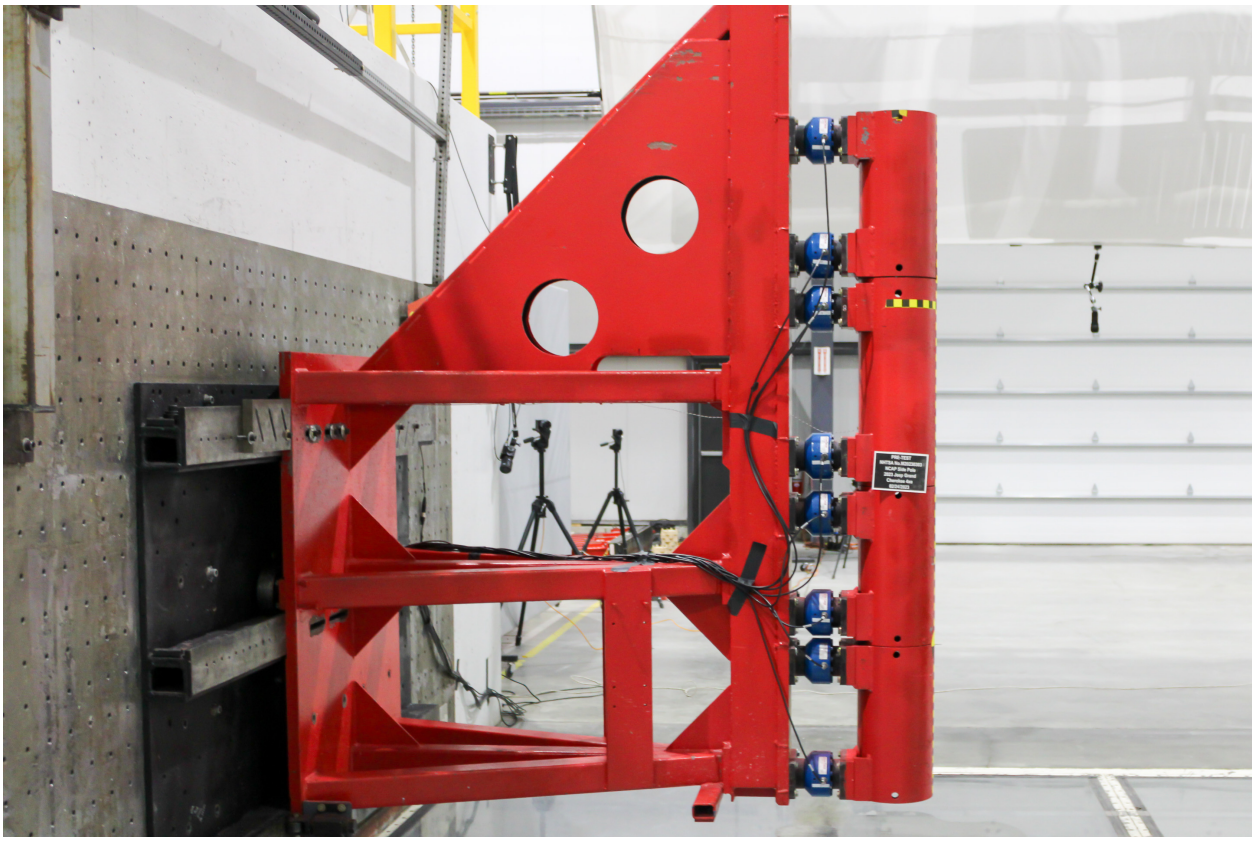


Figure A-61: Pre-Test Pole Barrier Side View

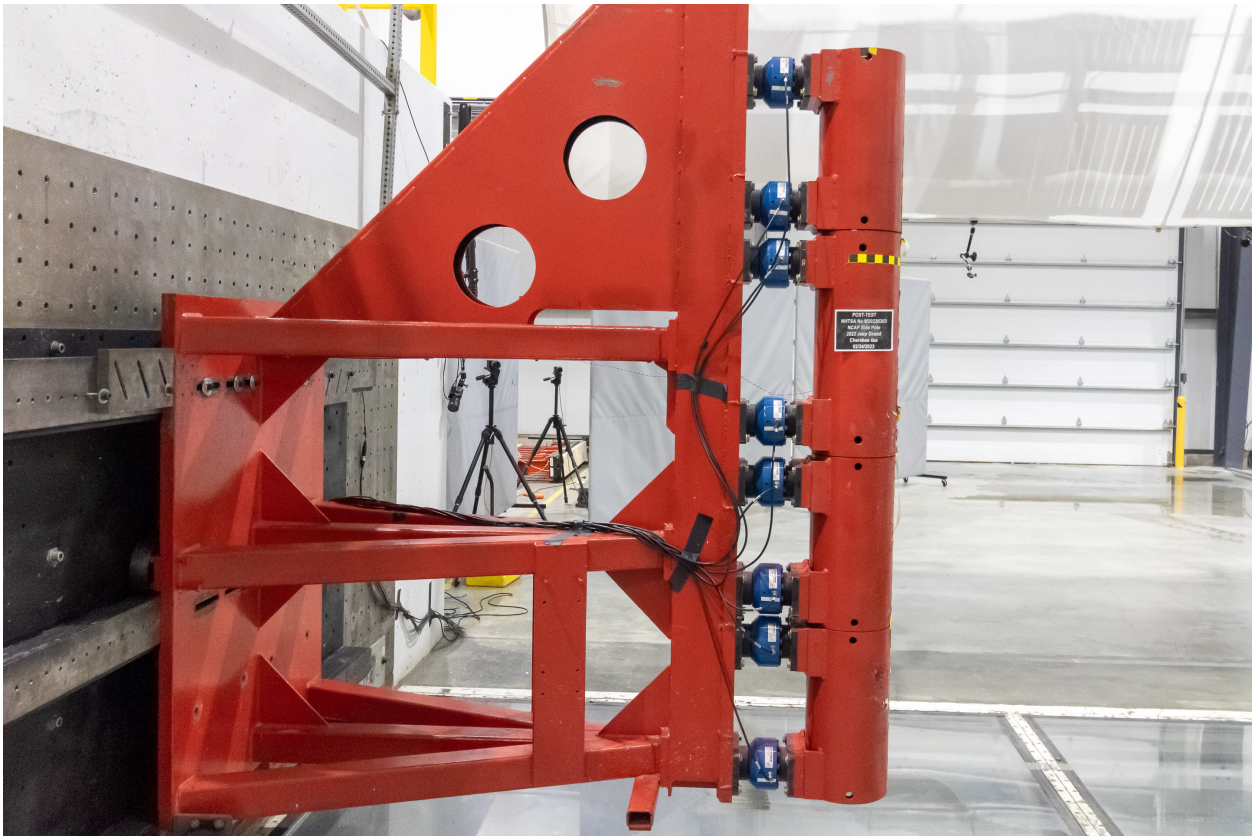


Figure A-62: Post-Test Pole Barrier Side View

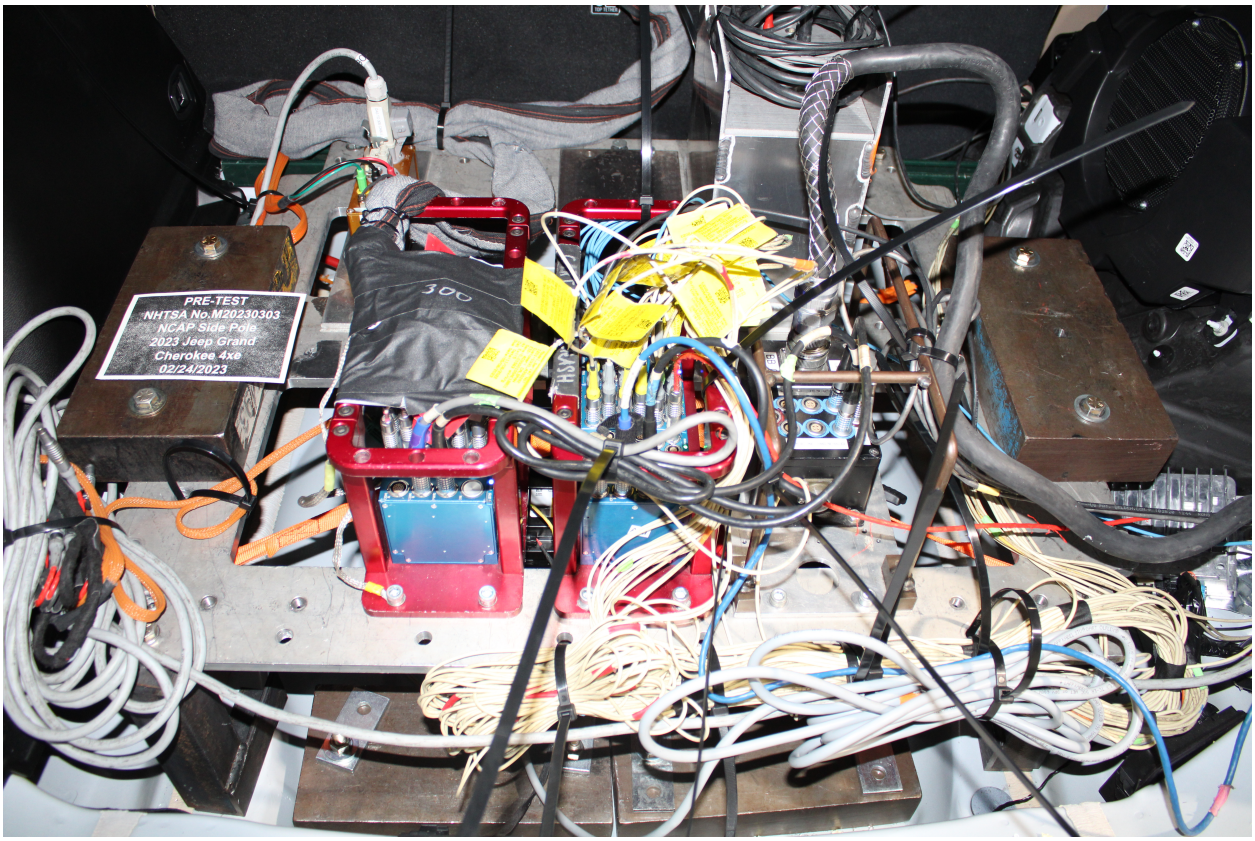


Figure A-63: Pre-Test Ballast View

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

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

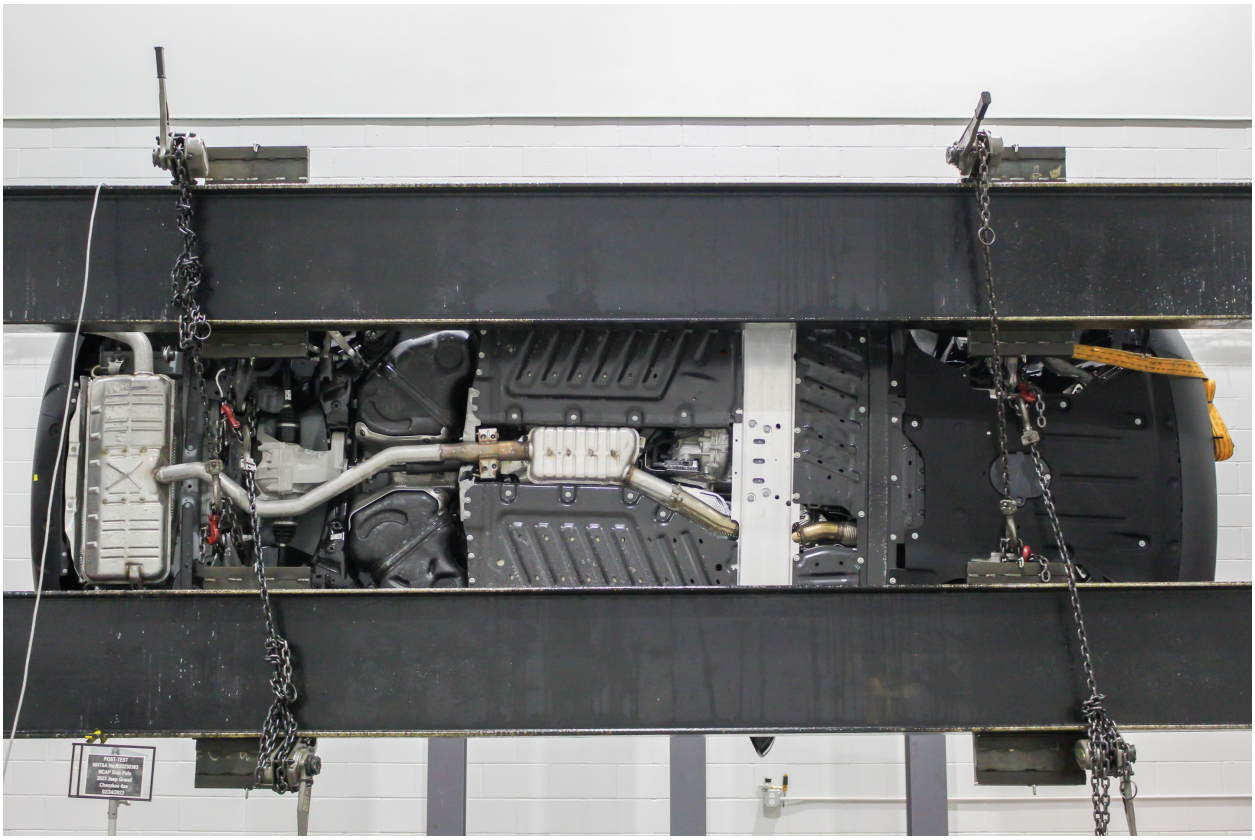


Figure A-66: FMVSS No. 301 Static Rollover 90 Degrees

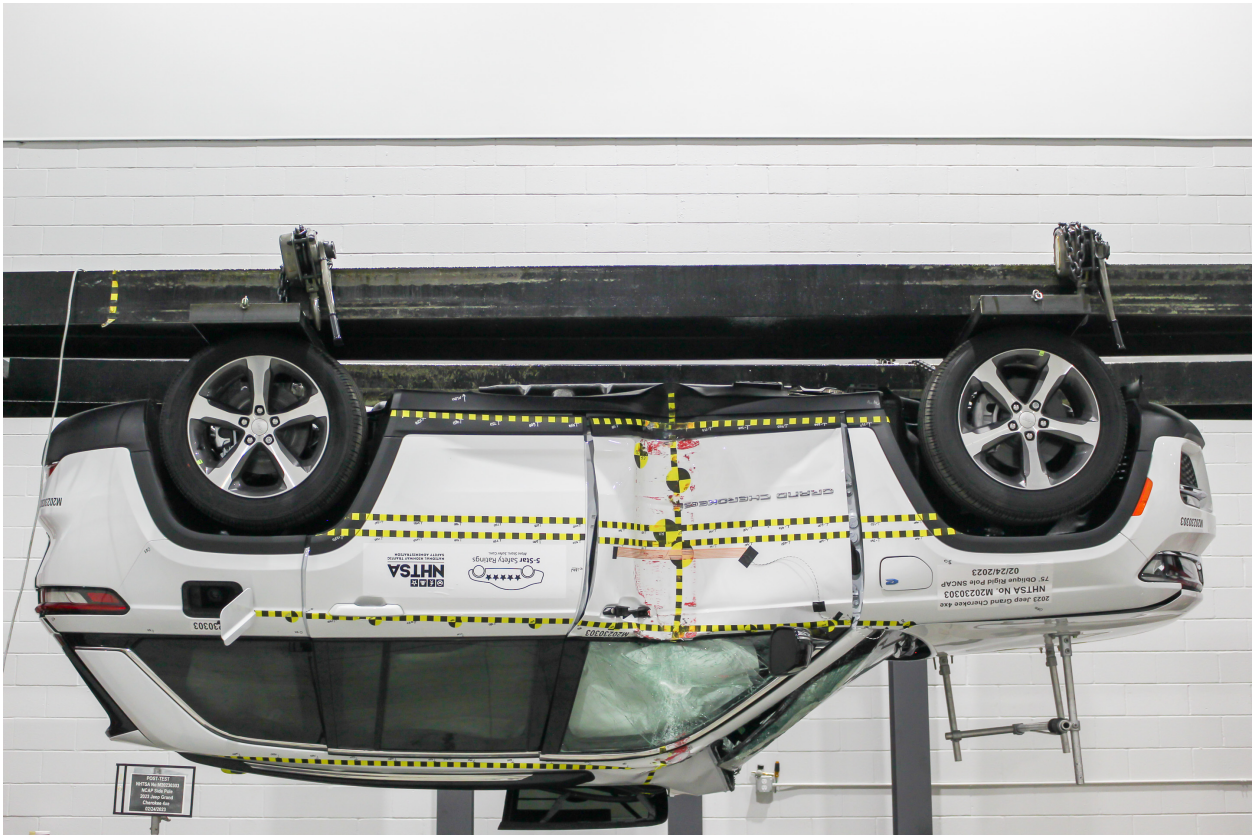
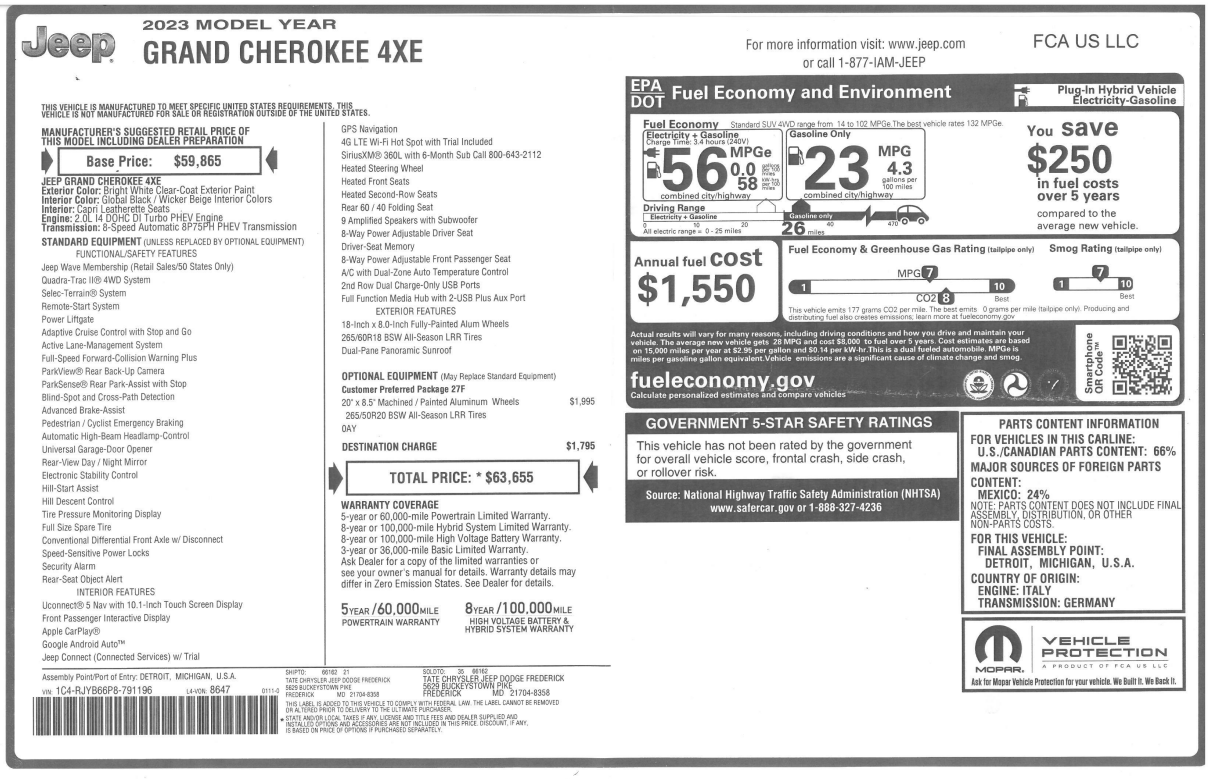


Figure A-67: FMVSS No. 301 Static Rollover 180 Degrees

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



2023 MODEL YEAR
GRAND CHEROKEE 4XE

For more information visit: www.jeep.com
or call 1-877-IAM-JEEP

FCA US LLC

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

Base Price: $59,865

JEEP GRAND CHEROKEE 4XE
Exterior Color: Bright White Clear-Coat Exterior Paint
Interior Color: Global Black / Wicker Beige Interior Colors
Interior: Capri Leatherette Seats
Engine: 2.0L I4 DOHC DI Turbo PHEV Engine
Transmission: 8-Speed Automatic 8P75PH PHEV Transmission

STANDARD EQUIPMENT (UNLESS REPLACED BY OPTIONAL EQUIPMENT)

FUNCTIONAL/SAFETY FEATURES
Jeep Wave Membership (Retail Sales/50 States Only)
Quadra-Trac II® 4WD System
Selec-Terrain® System
Remote-Start System
Power Liftgate
Adaptive Cruise Control with Stop and Go
Active Lane-Management System
Full-Speed Forward-Collision Warning Plus
ParkView® Rear Back-Up Camera
ParkSense® Rear Park-Assist with Stop
Blind-Spot and Cross-Path Detection
Advanced Brake-Assist
Pedestrian / Cyclist Emergency Braking
Automatic High-Beam Headlamp-Control
Universal Garage-Door Opener
Rear-View Day / Night Mirror
Electronic Stability Control
Hill-Start Assist
Hill Descent Control
Tire Pressure Monitoring Display
Full Size Spare Tire
Conventional Differential Front Axle w/ Disconnect
Speed-Sensitive Power Locks
Security Alarm
Rear-Seat Object Alert

INTERIOR FEATURES
Uconnect® 5 Nav with 10.1-Inch Touch Screen Display
Front Passenger Interactive Display
Apple CarPlay®
Google Android Auto™
Jeep Connect (Connected Services) w/ Trial
GPS Navigation
4G LTE Wi-Fi Hot Spot with Trial Included
SiriusXM® 360L with 6-Month Sub Call 800-643-2112
Heated Steering Wheel
Heated Front Seats
Heated Second-Row Seats
Rear 60 / 40 Folding Seat
9 Amplified Speakers with Subwoofer
8-Way Power Adjustable Driver Seat
Driver-Seat Memory
8-Way Power Adjustable Front Passenger Seat
A/C with Dual-Zone Auto Temperature Control
2nd Row Dual Charge-Only USB Ports
Full Function Media Hub with 2-USB Plus Aux Port

EXTERIOR FEATURES
18-Inch x 8.0-Inch Fully-Painted Alum Wheels
265/60R18 BSW All-Season LRR Tires
Dual-Pane Panoramic Sunroof

OPTIONAL EQUIPMENT (May Replace Standard Equipment)
Customer Preferred Package 27F
20" x 8.5" Machined / Painted Aluminum Wheels $1,995
265/50R20 BSW All-Season LRR Tires
0AY

DESTINATION CHARGE $1,795

TOTAL PRICE: * $63,655

WARRANTY COVERAGE
5-year or 60,000-mile Powertrain Limited Warranty.
8-year or 100,000-mile Hybrid System Limited Warranty.
8-year or 100,000-mile High Voltage Battery Warranty.
3-year or 36,000-mile Basic Limited Warranty.
Ask Dealer for a copy of the limited warranties or see your owner's manual for details. Warranty details may differ in Zero Emission States. See Dealer for details.

5 YEAR /60,000 MILE POWERTRAIN WARRANTY
8 YEAR /100,000 MILE HIGH VOLTAGE BATTERY & HYBRID SYSTEM WARRANTY

Assembly Point/Port of Entry: DETROIT, MICHIGAN, U.S.A.
VIN: 1C4-RJYB66P8-791196 14-VOR: 8647 0111-0

SHIPTO: 66162 21 TATE CHRYSLER JEEP DODGE FREDERICK 5625 BUCKEYSTOWN PIKE FREDERICK MD 21704-8358

SOLDTO: 30 66162 TATE CHRYSLER JEEP DODGE FREDERICK 5625 BUCKEYSTOWN PIKE FREDERICK MD 21704-8358

THIS LABEL IS ADDED TO THIS VEHICLE TO COMPLY WITH FEDERAL LAW. THE LABEL CANNOT BE REMOVED OR ALTERED PRIOR TO DELIVERY TO THE ULTIMATE PURCHASER.

* STATE AND/OR LOCAL TAXES IF ANY, LICENSE AND TITLE FEES AND DEALER SUPPLIED AND INSTALLED OPTIONS AND ACCESSORIES ARE NOT INCLUDED IN THIS PRICE. DISCOUNT, IF ANY, IS BASED ON PRICE OF OPTIONS IF PURCHASED SEPARATELY.

EPA DOT Fuel Economy and Environment

Plug-In Hybrid Vehicle Electricity-Gasoline

Fuel Economy Standard SUV 4WD range from 14 to 102 MPGe.The best vehicle rates 132 MPGe.

Electricity + Gasoline (Charge Time: 3.4 hours (240V)) 56 MPGe combined city/highway
0.0 58 kWh/100 miles

Gasoline Only 23 MPG combined city/highway
4.3 gallons per 100 miles

Driving Range
Electricity + Gasoline: All electric range = 0 - 25 miles
Gasoline only: 26 miles

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

Annual fuel cost $1,550

Fuel Economy & Greenhouse Gas Rating (tailpipe only) MPG 7 CO2 8 (1 Best, 10)

Smog Rating (tailpipe only) 7 (1 Best, 10)

This vehicle emits 177 grams CO2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions; learn more at fueleconomy.gov

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and cost $5,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.95 per gallon and $0.14 per kW-hr.This is a dual fueled automobile. 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™

GOVERNMENT 5-STAR SAFETY RATINGS

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

Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

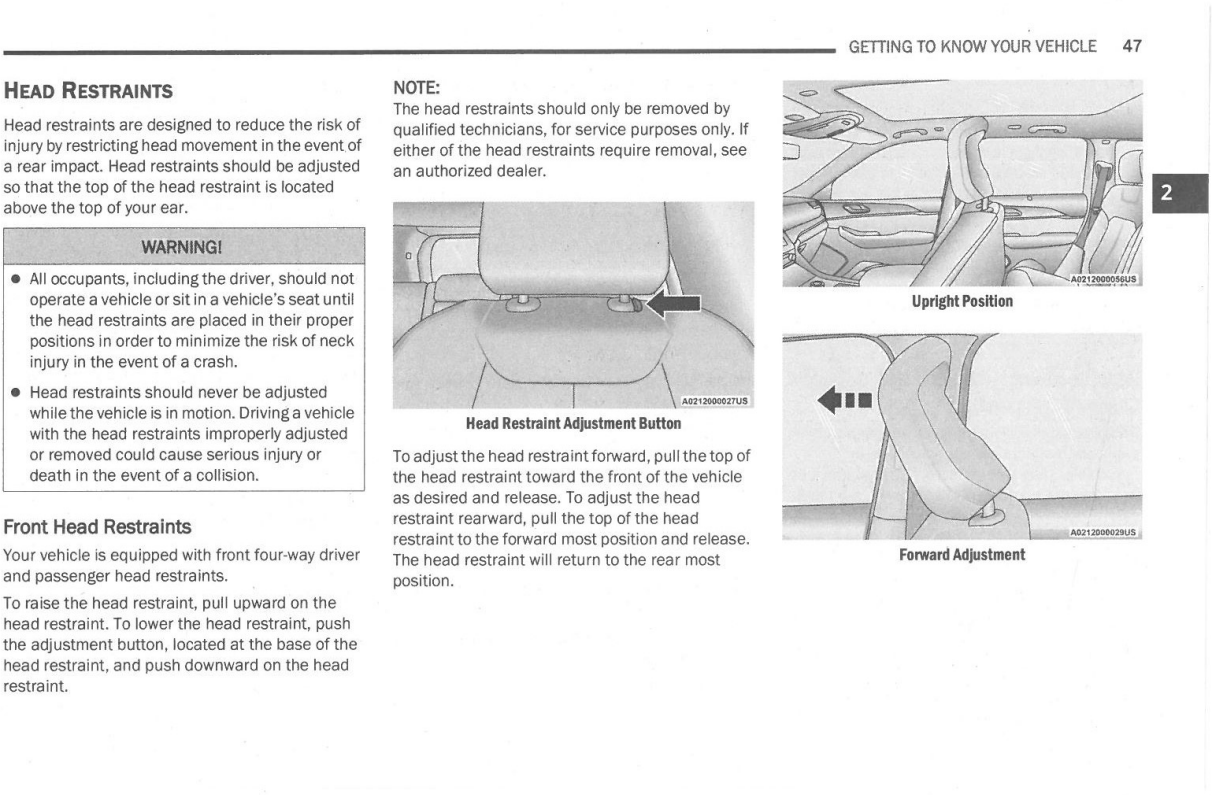
PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 66%
MAJOR SOURCES OF FOREIGN PARTS CONTENT:
MEXICO: 24%
NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
DETROIT, MICHIGAN, U.S.A.
COUNTRY OF ORIGIN:
ENGINE: ITALY
TRANSMISSION: GERMANY

MOPAR. VEHICLE PROTECTION A PRODUCT OF FCA US LLC
Ask for Mopar Vehicle Protection for your vehicle. We Built It. We Back It.

Figure A-71: Monroney Label



HEAD RESTRAINTS

Head restraints are designed to reduce the risk of injury by restricting head movement in the event of a rear impact. Head restraints should be adjusted so that the top of the head restraint is located above the top of your ear.

WARNING!

- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.
- Head restraints should never be adjusted while the vehicle is in motion. Driving a vehicle with the head restraints improperly adjusted or removed could cause serious injury or death in the event of a collision.

Front Head Restraints

Your vehicle is equipped with front four-way driver and passenger head restraints.

To raise the head restraint, pull upward on the head restraint. To lower the head restraint, push the adjustment button, located at the base of the head restraint, and push downward on the head restraint.

NOTE:
The head restraints should only be removed by qualified technicians, for service purposes only. If either of the head restraints require removal, see an authorized dealer.

Head Restraint Adjustment Button

To adjust the head restraint forward, pull the top of the head restraint toward the front of the vehicle as desired and release. To adjust the head restraint rearward, pull the top of the head restraint to the forward most position and release. The head restraint will return to the rear most position.

Upright Position

Forward Adjustment

2

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

Photo Not Applicable

Figure 305-2: Power Inverter Warning Label

Figure 305-3 First Responder Warning Label

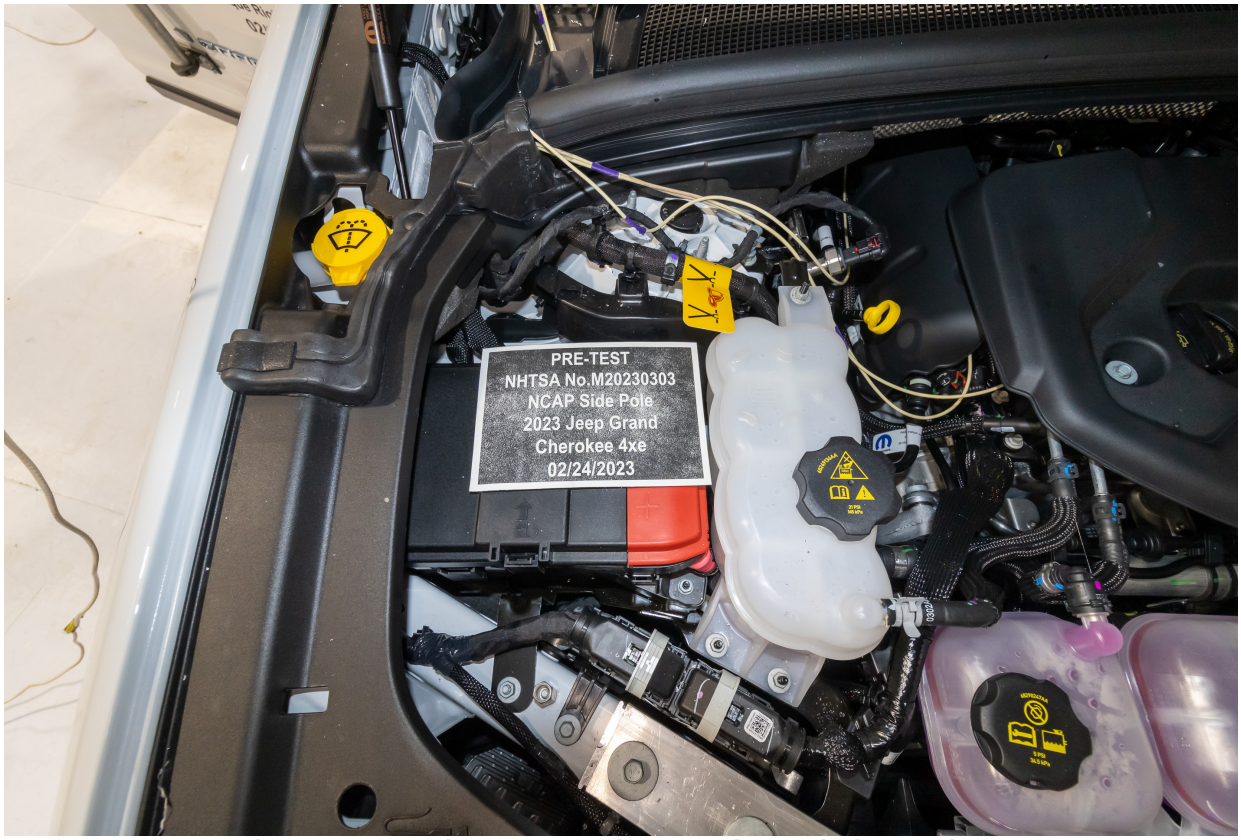


Figure 305-4: First Responder Warning Label Location

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

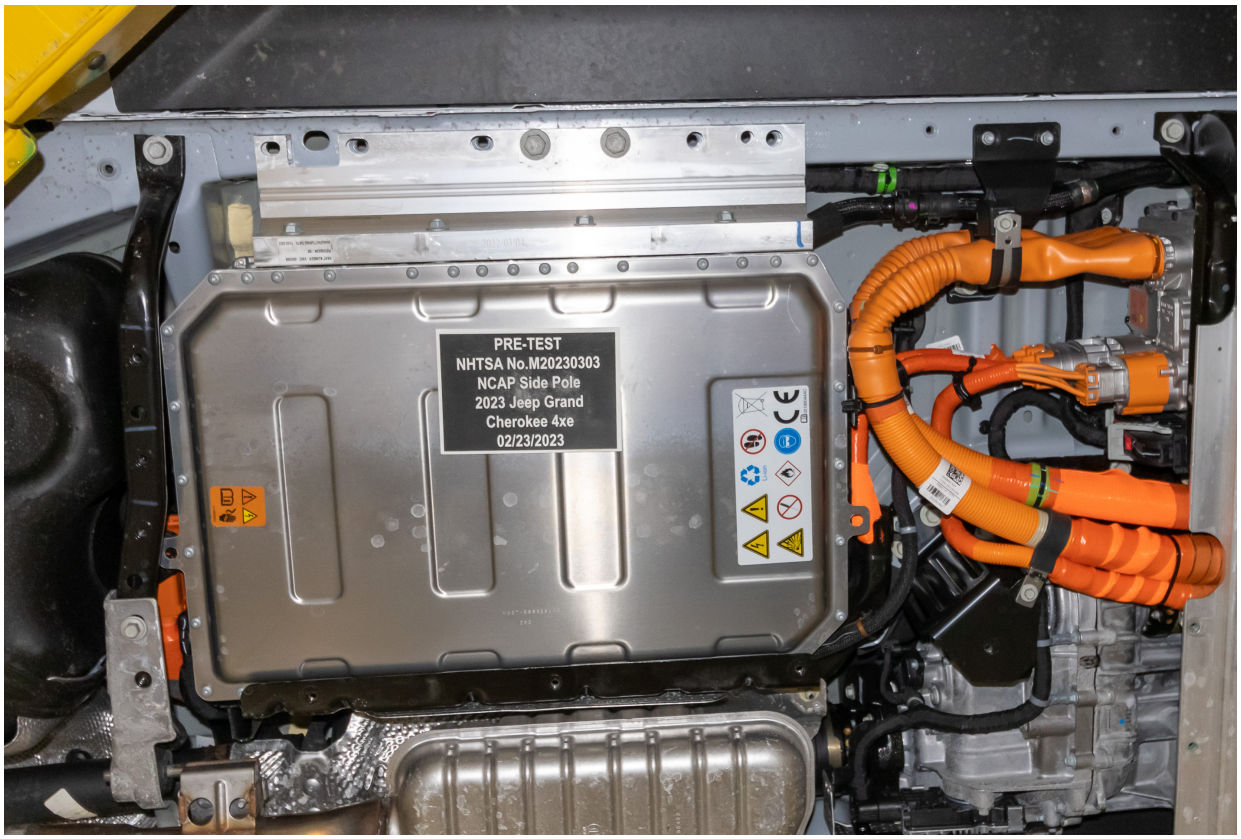


Figure 305-9: Pre-Impact View of Propulsion Battery

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

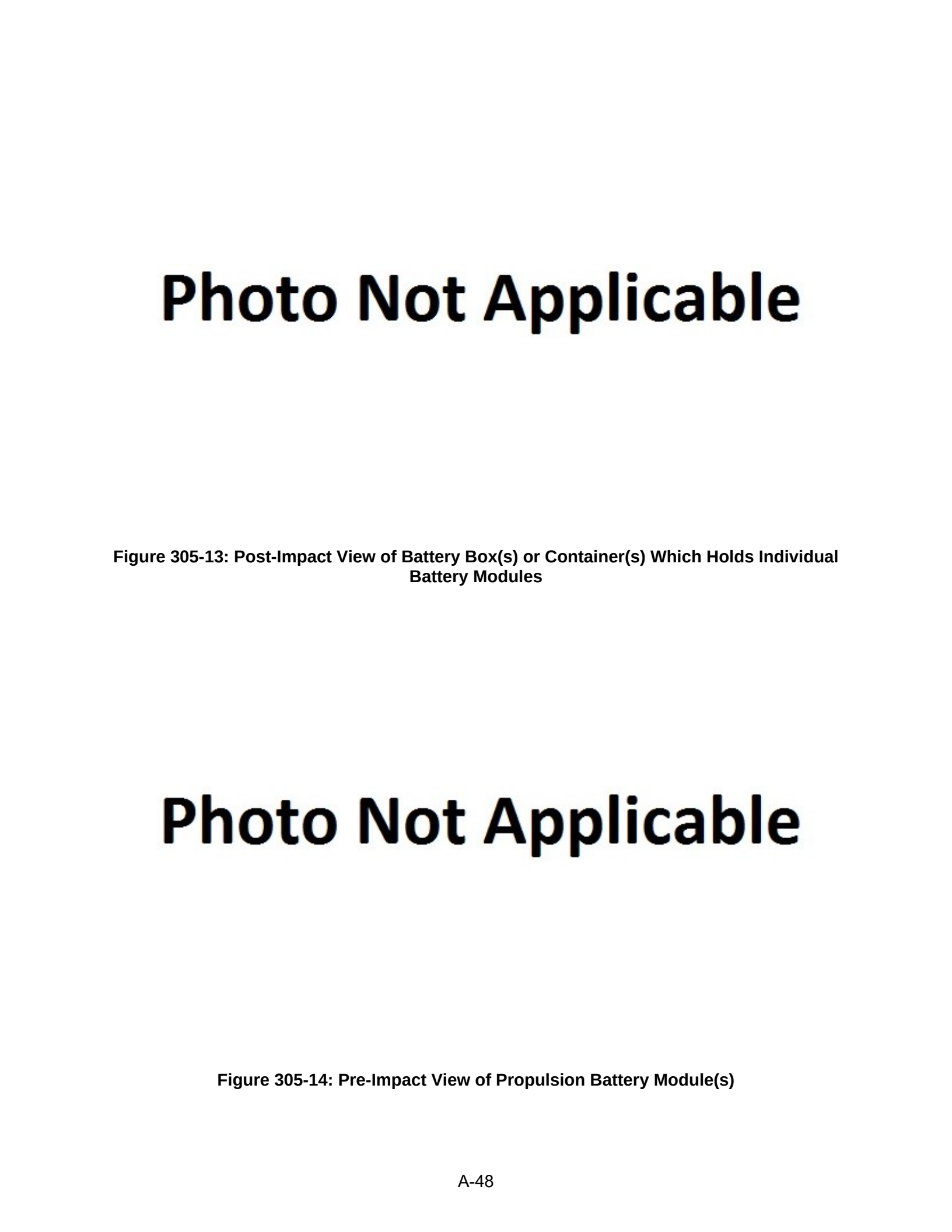


Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

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

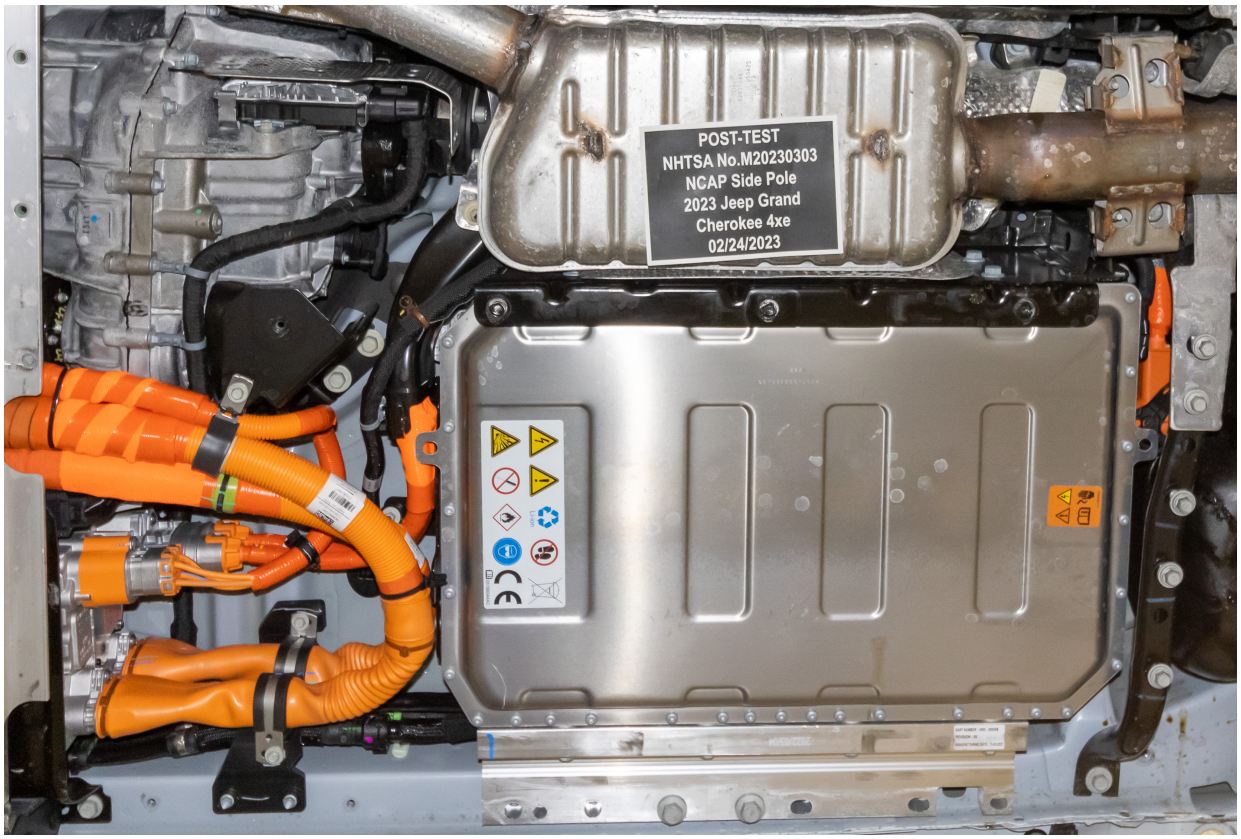


Figure 305-15: Post-Impact View of Propulsion Battery Module(s)

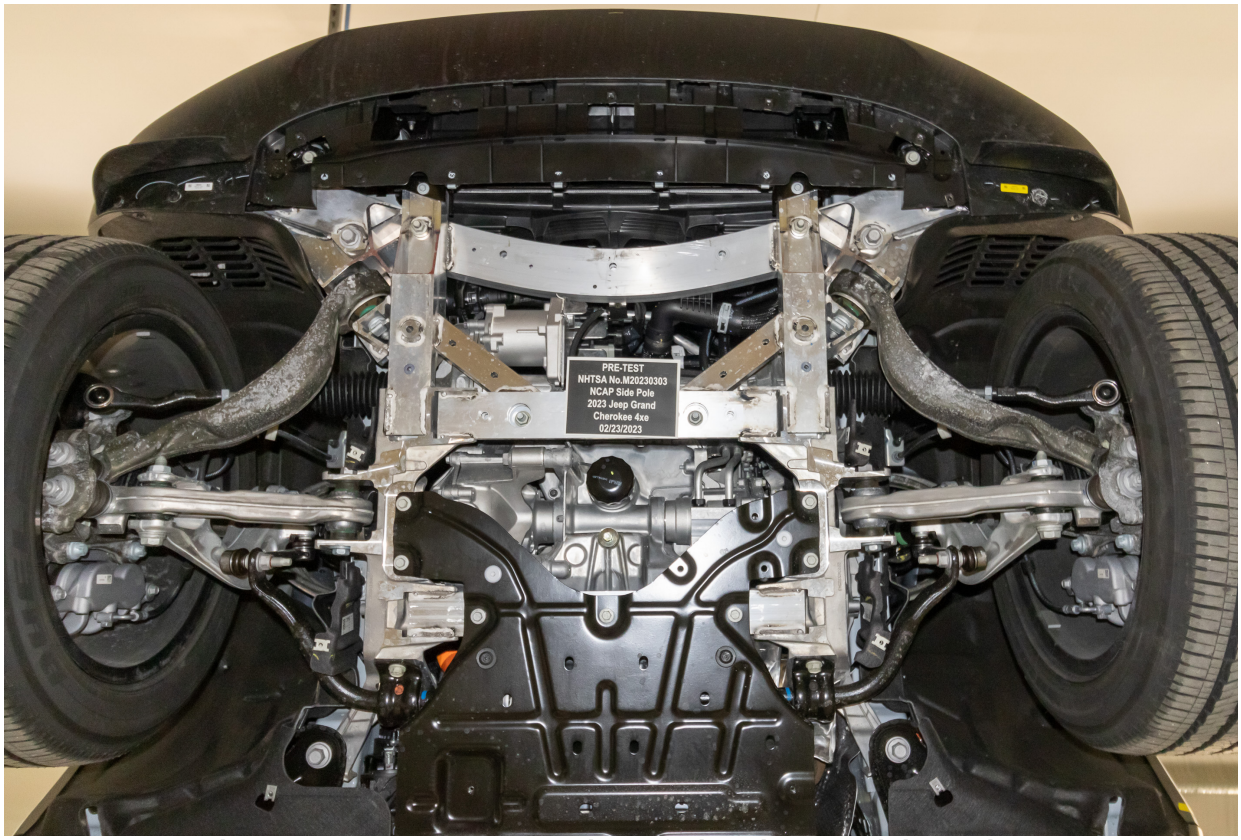


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

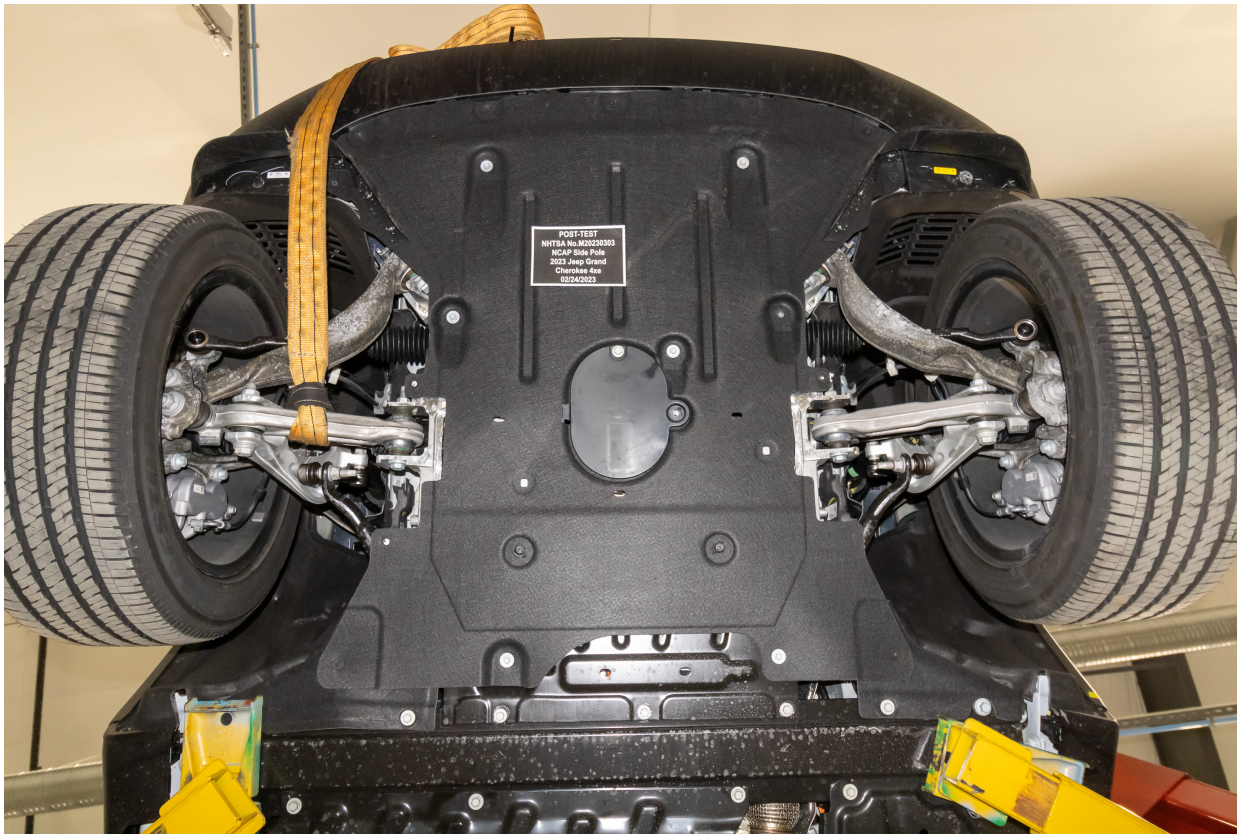


Figure 305-17: Post-Impact View of Electric Propulsion Drive

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

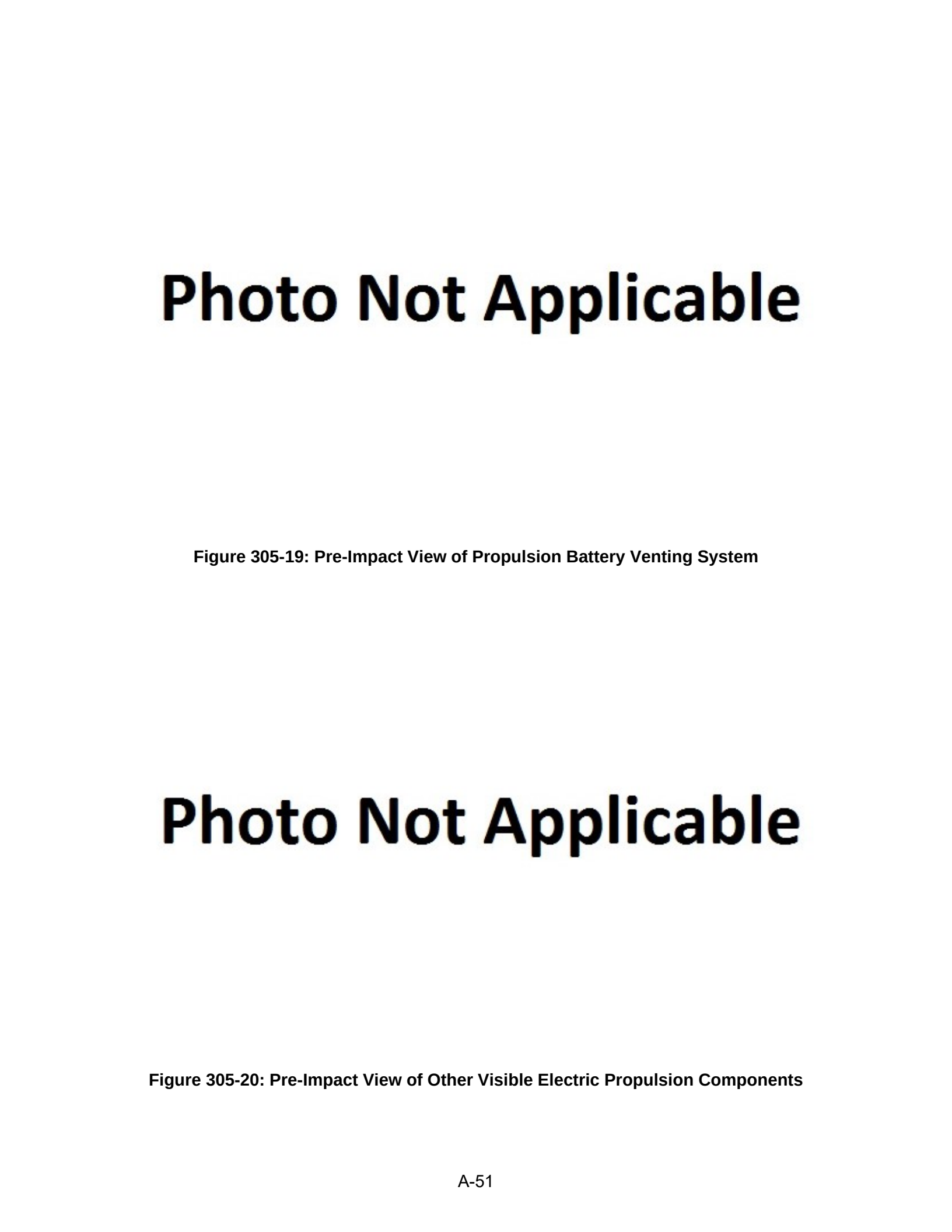


Figure 305-19: Pre-Impact View of Propulsion Battery Venting System

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

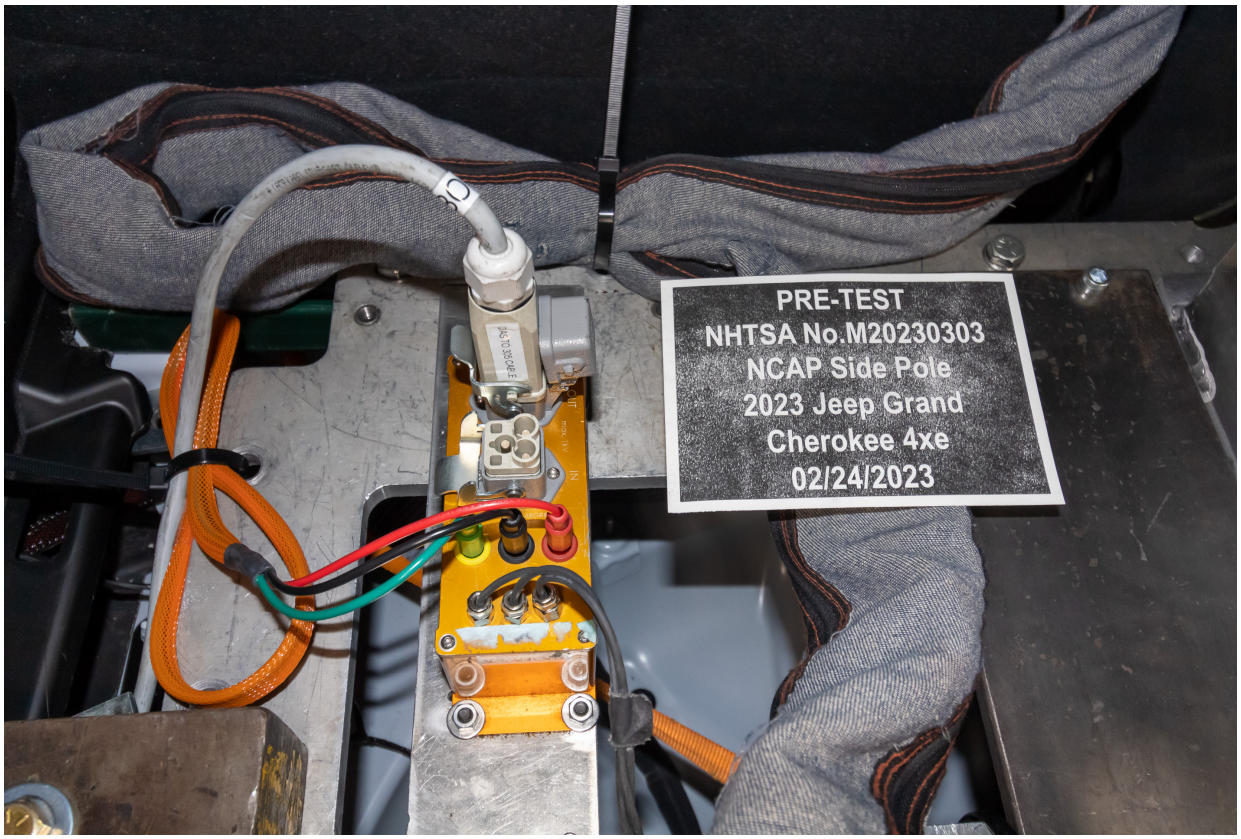


Figure 305-21: Pre-Impact View of Ground Lead Attached

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

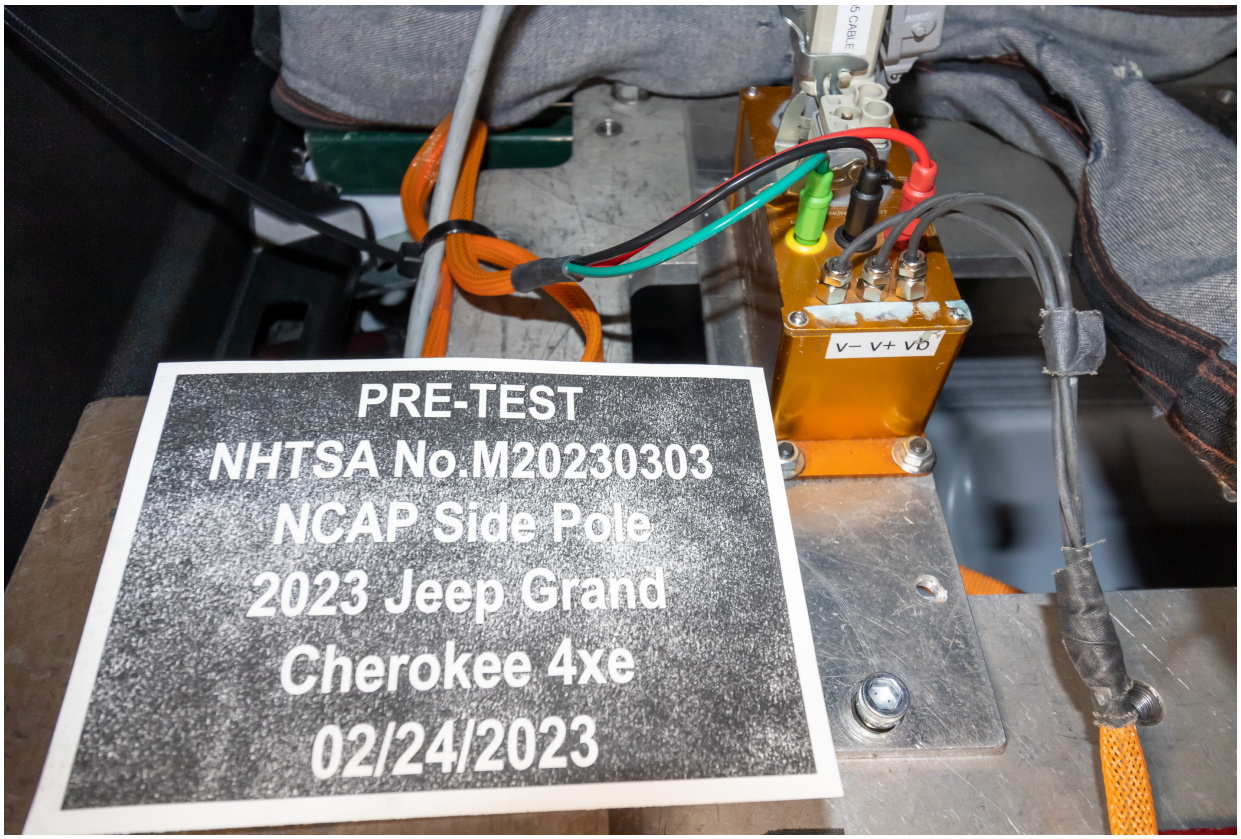


Figure 305-23: Pre-Impact Close Up View of High Voltage Leads Attached

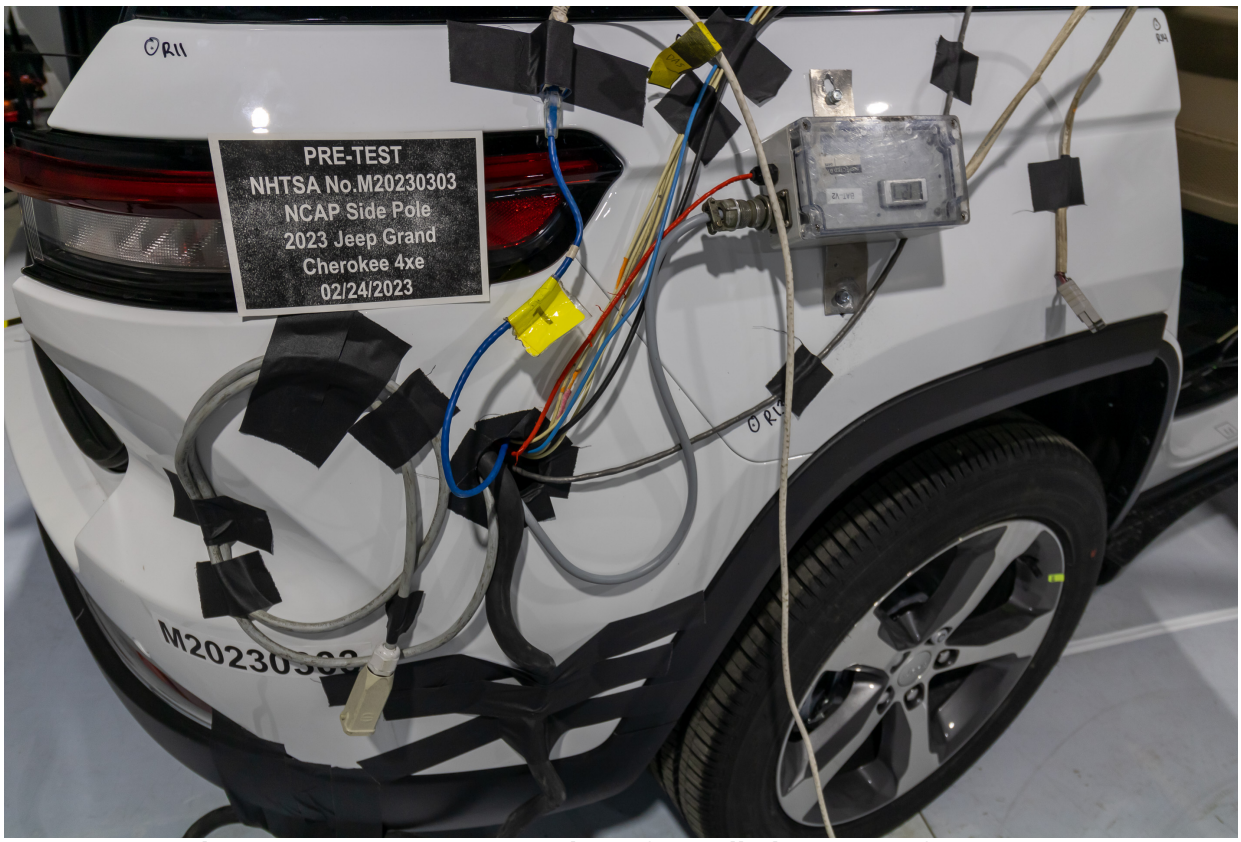


Figure 305-24: Pre-Impact View of Installed Test Interface Port

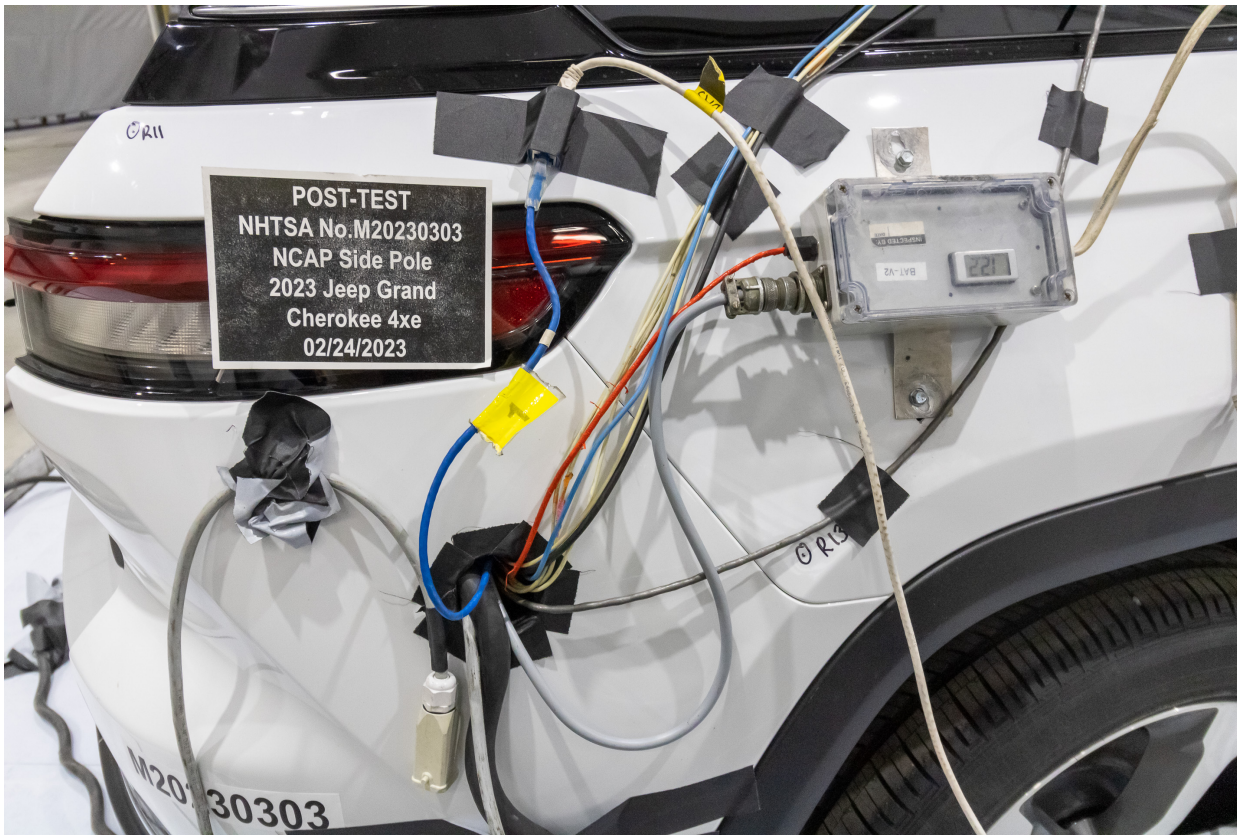


Figure 305-25: Post-Impact View of Installed Test Interface Port

Photo Not Applicable

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

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

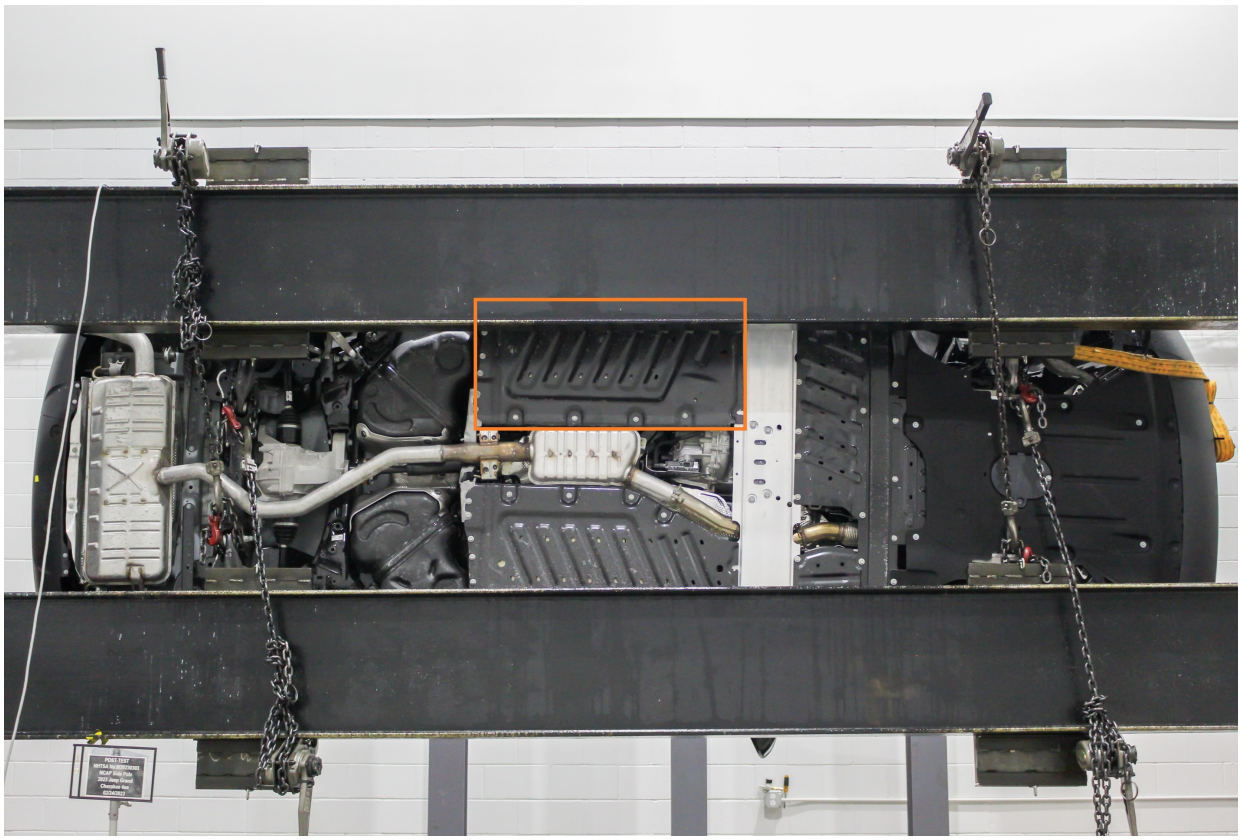


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

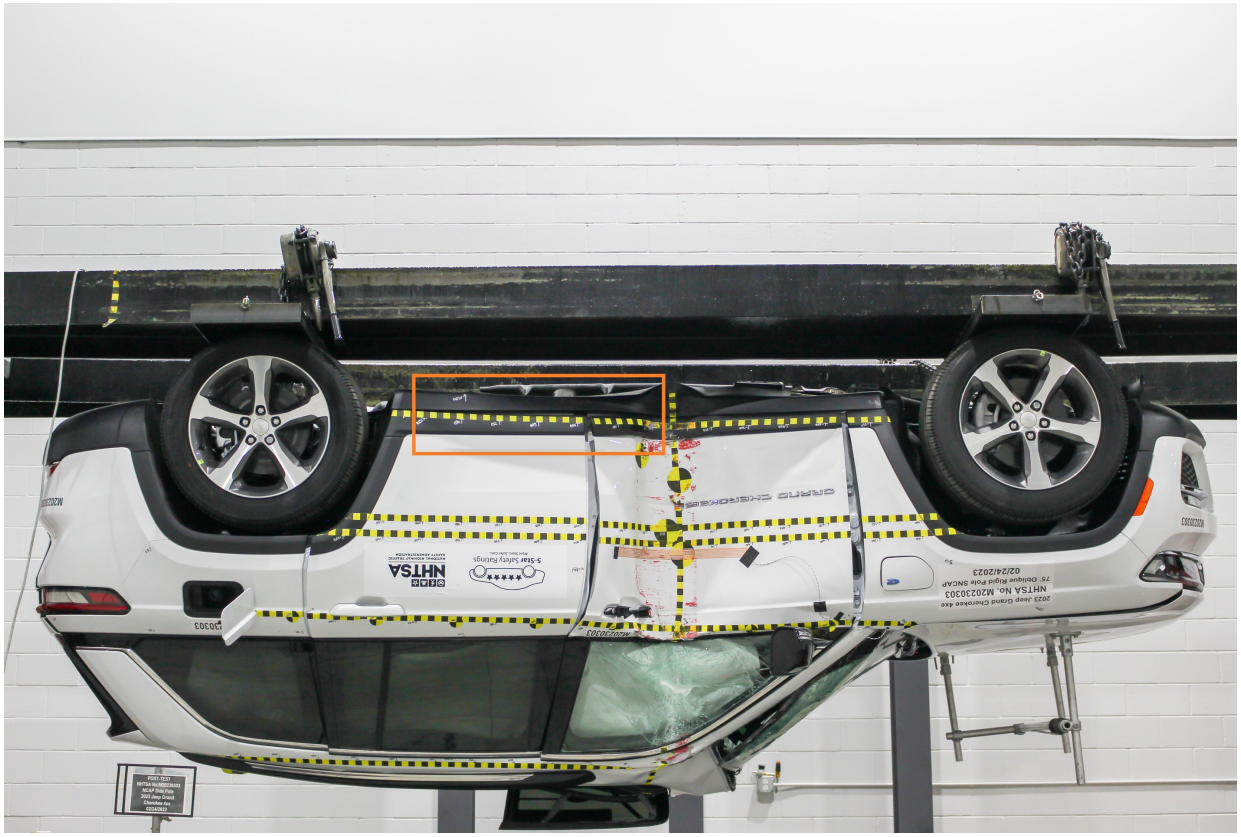


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

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)

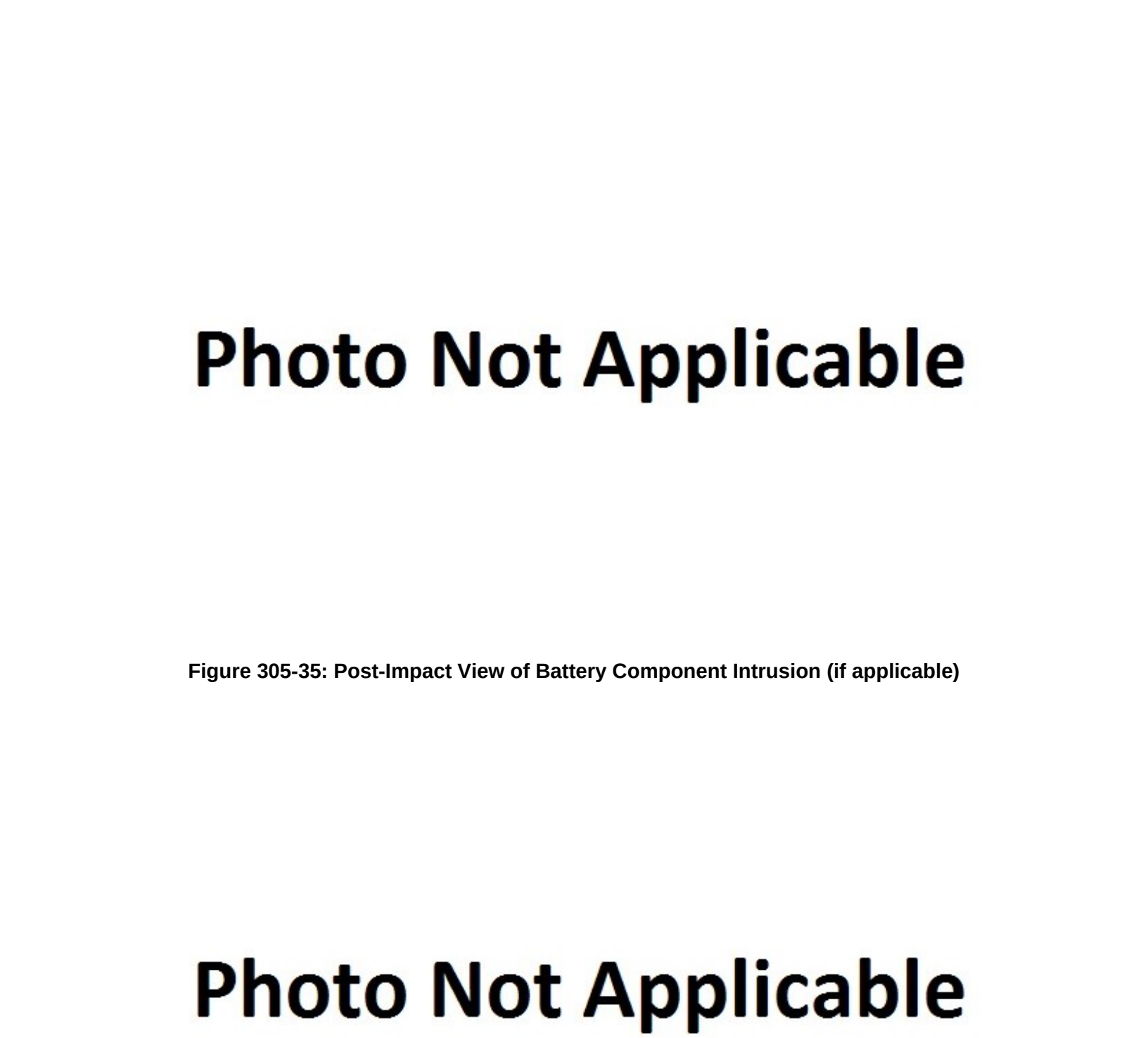


Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

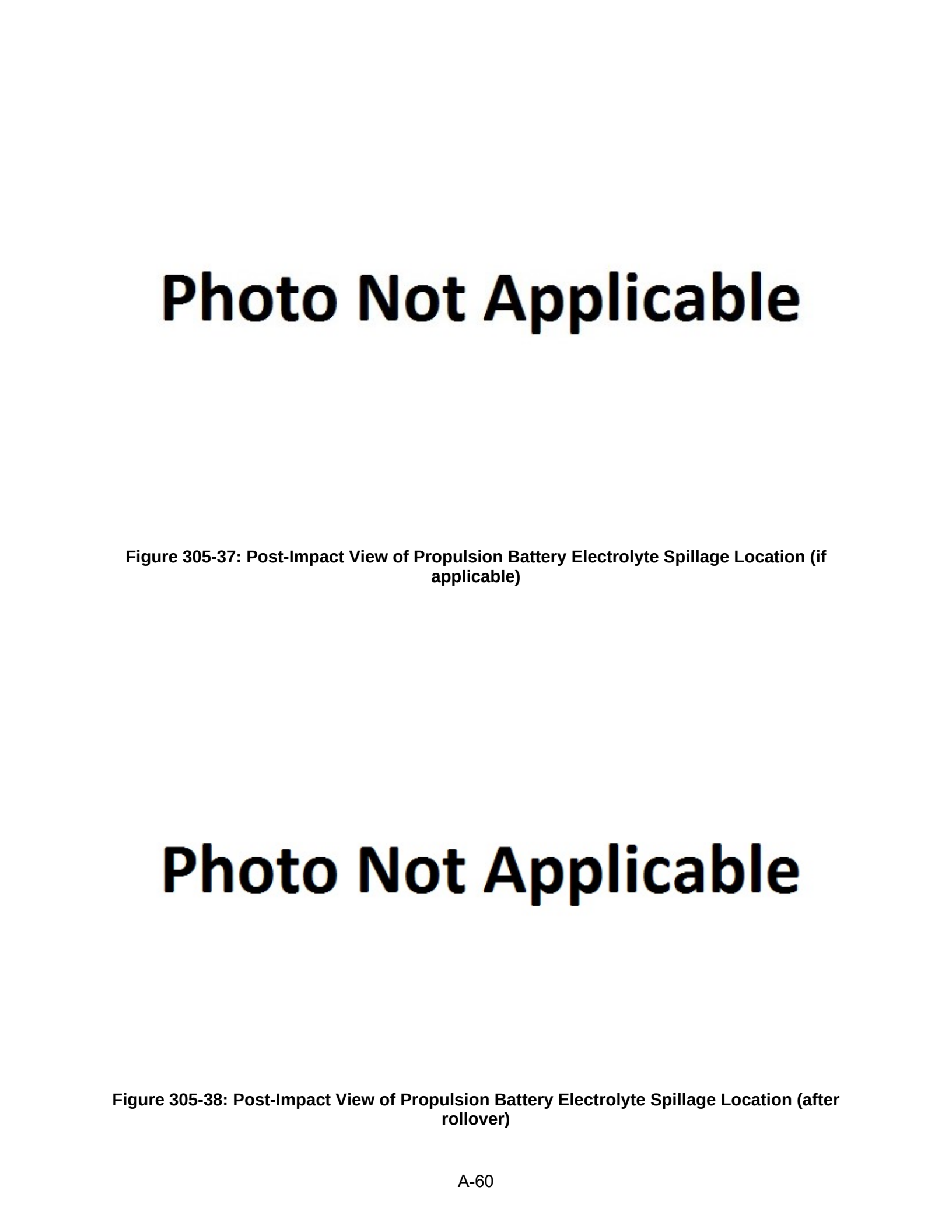


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)

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 & DUMMY RESPONSE DATA TRACES

Table of Data Plots
Driver Dummy Instrumentation Plots

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

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

Additional Driver Dummy Instrumentation Data

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

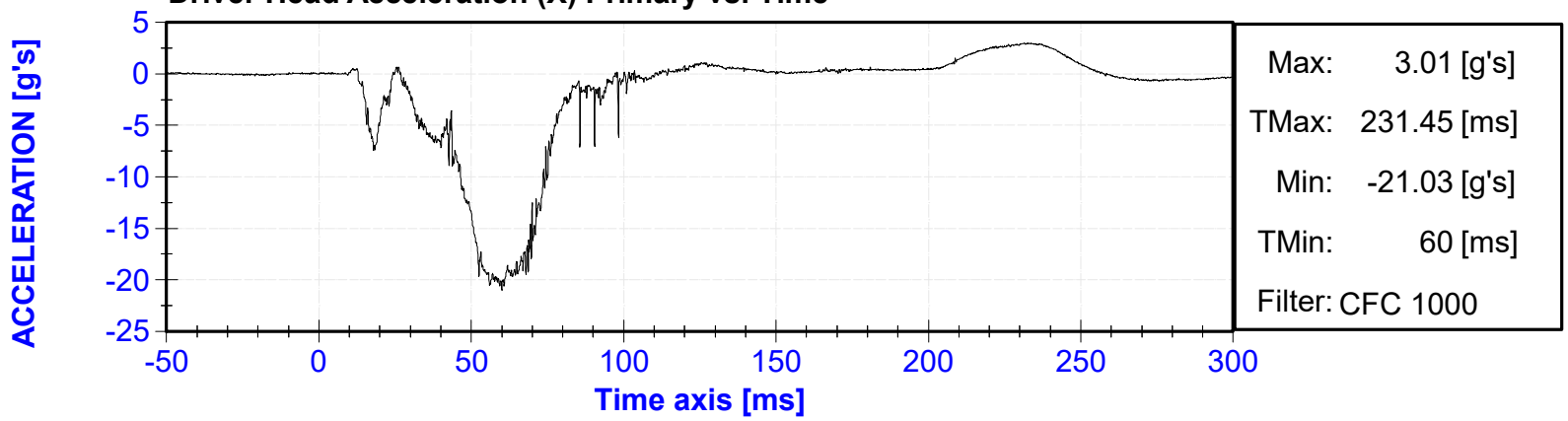
Vehicle Instrumentation Data

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

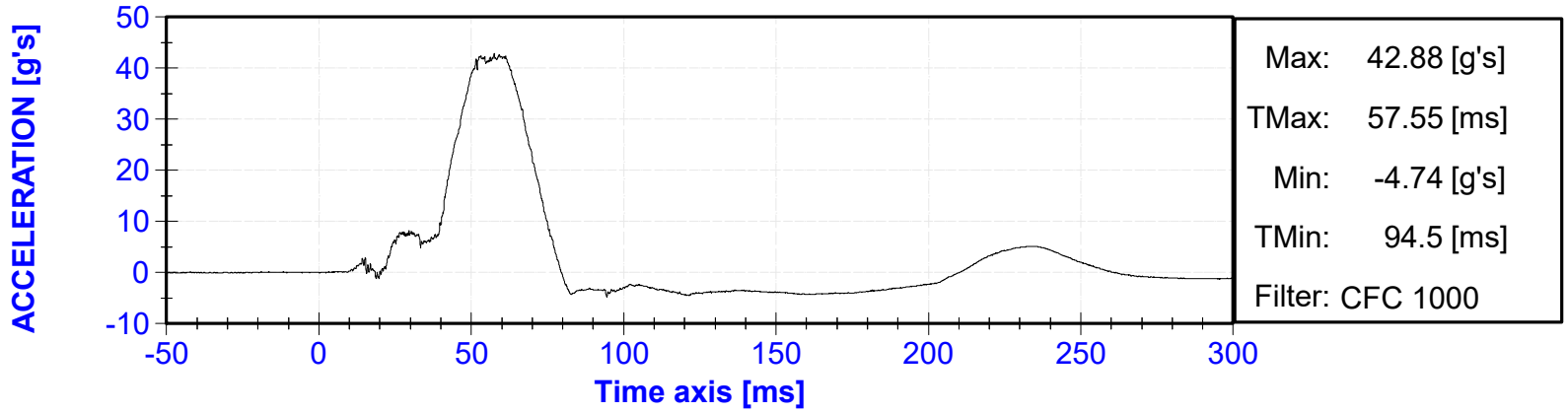
Pole Instrumentation Data

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

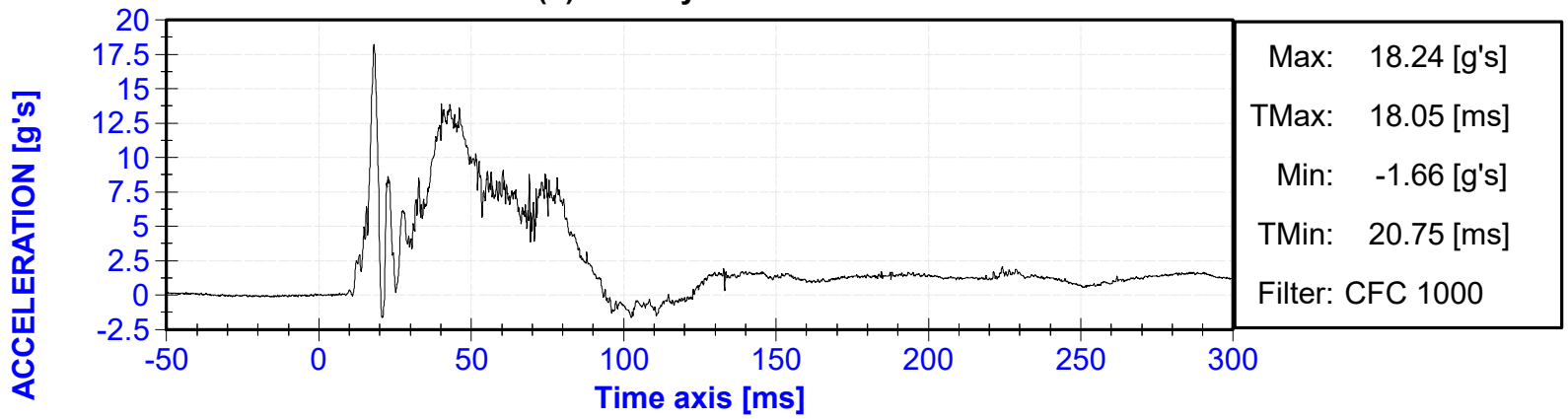
Driver Head Acceleration (X) Primary vs. Time



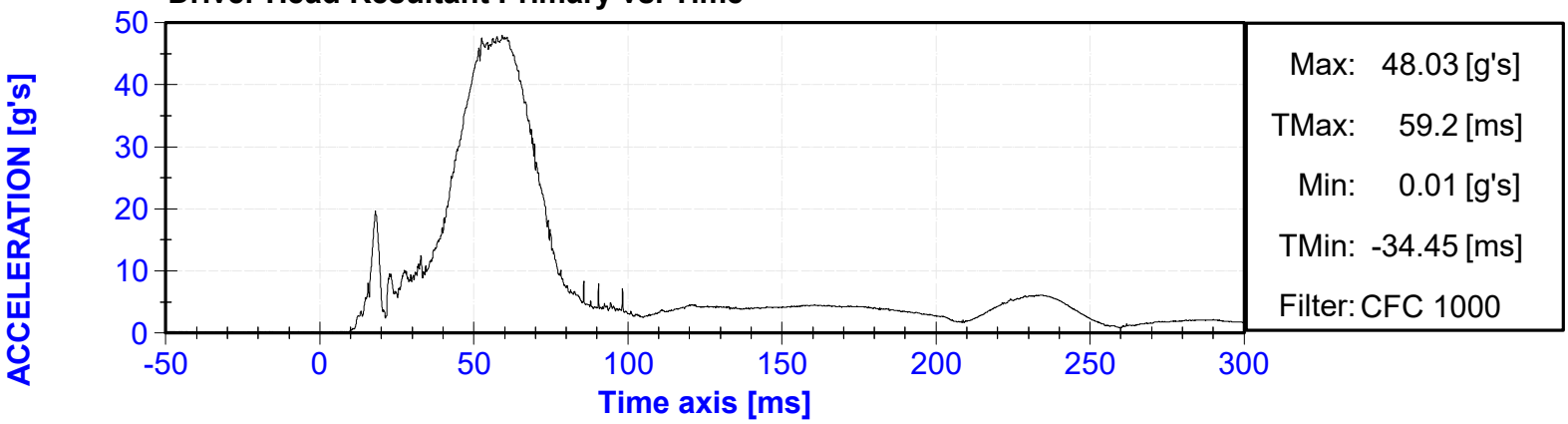
Driver Head Acceleration (Y) Primary vs. Time



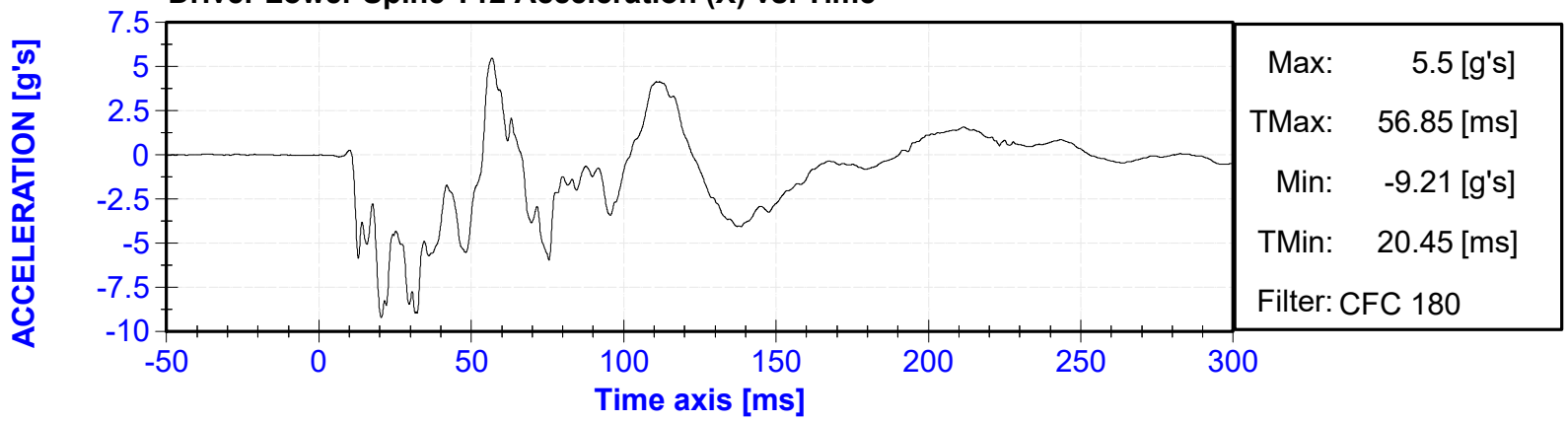
Driver Head Acceleration (Z) Primary vs. Time



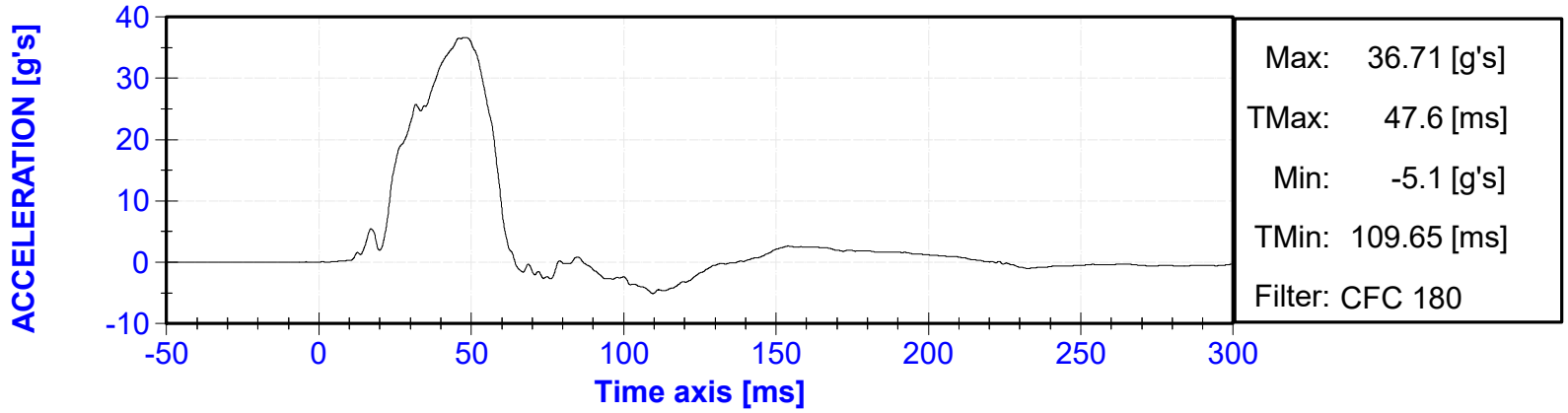
Driver Head Resultant Primary vs. Time



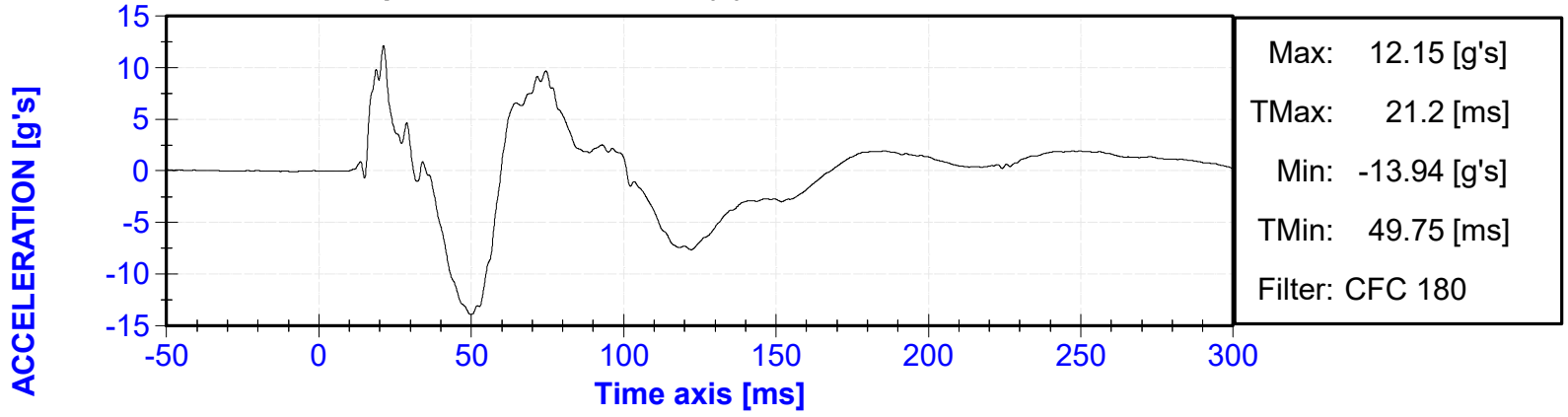
Driver Lower Spine T12 Acceleration (X) vs. Time



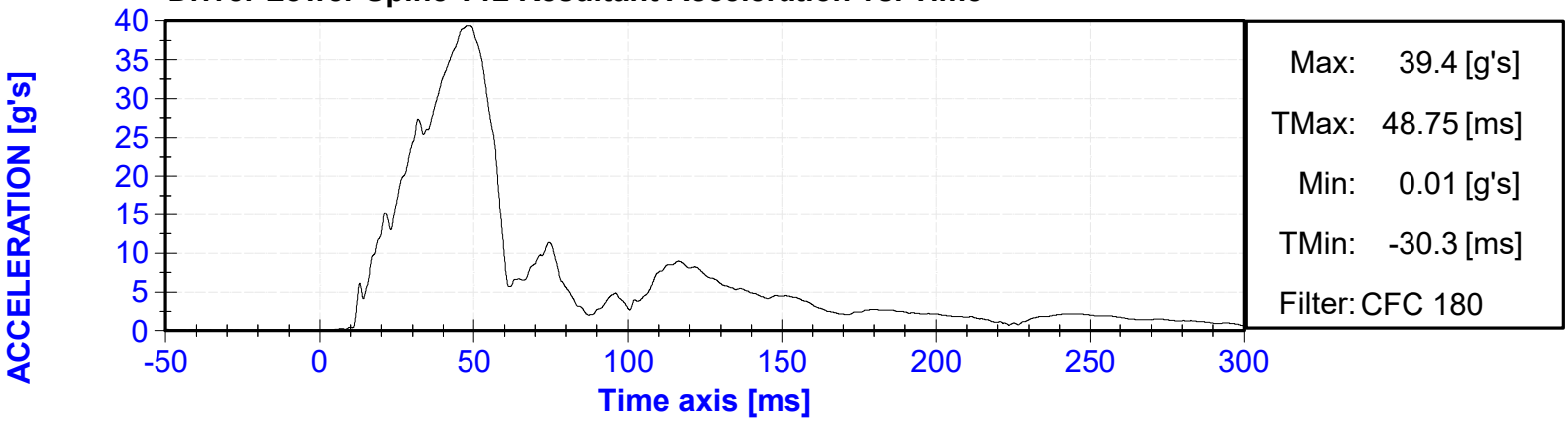
Driver Lower Spine T12 Acceleration (Y) vs. Time



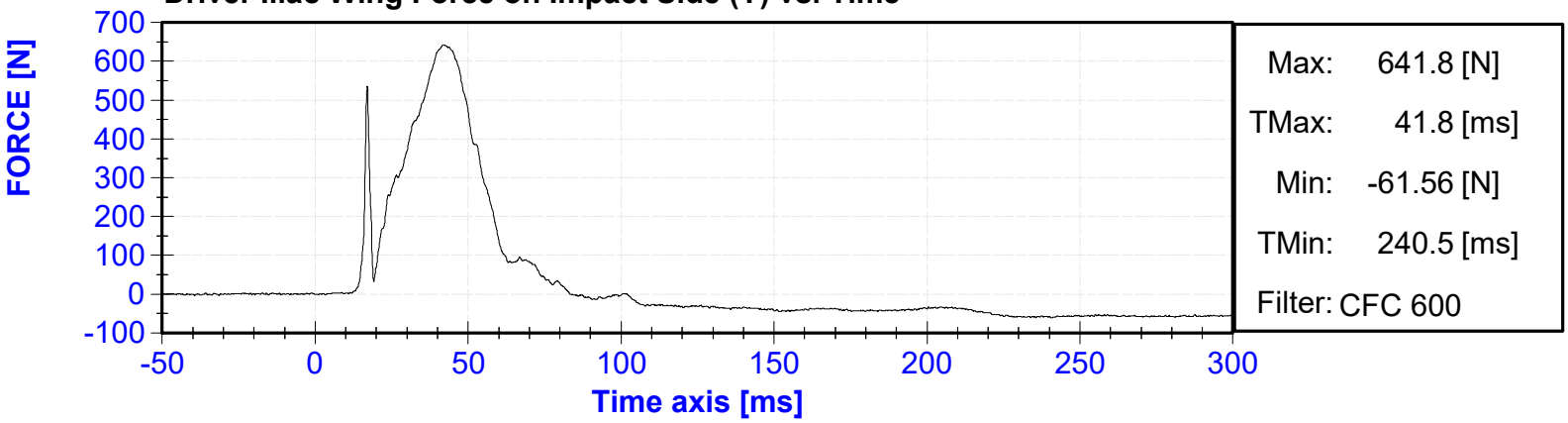
Driver Lower Spine T12 Acceleration (Z) vs. Time



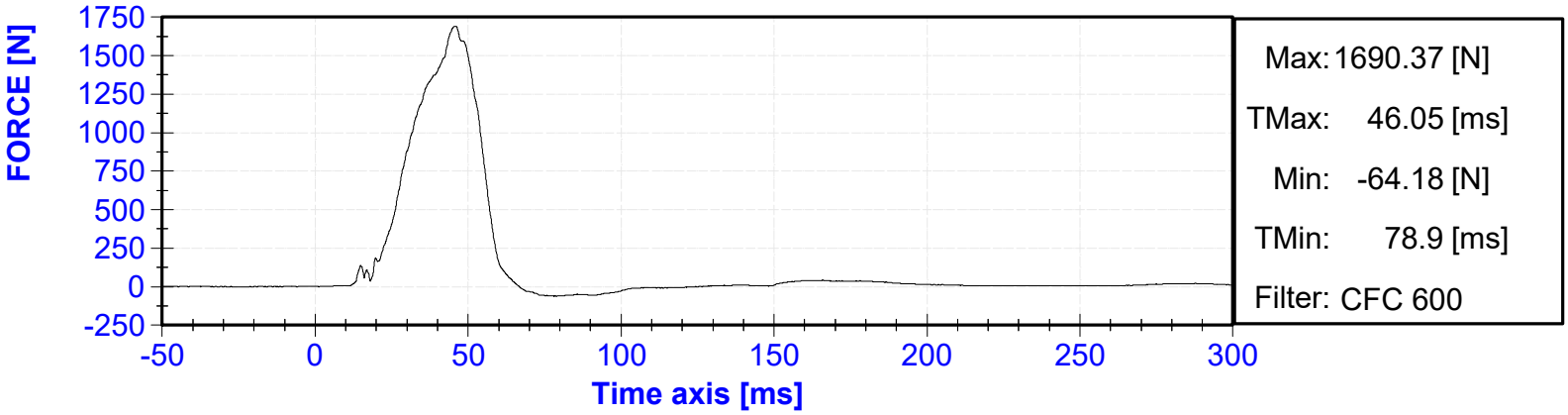
Driver Lower Spine T12 Resultant Acceleration vs. Time



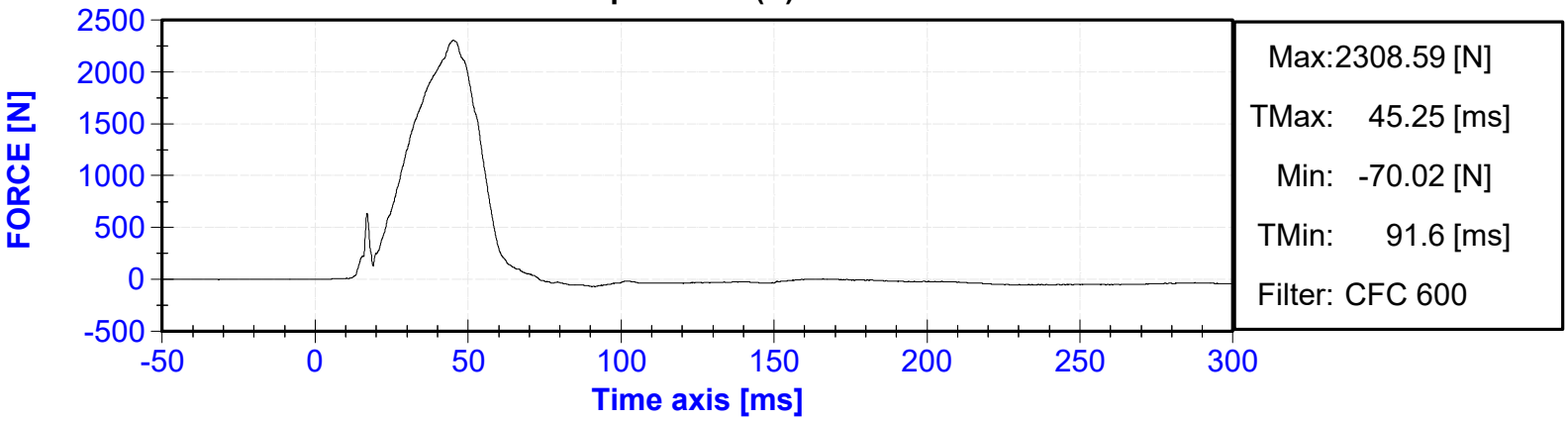
Driver Iliac Wing Force on Impact Side (Y) vs. Time



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



Driver Total Pelvis Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

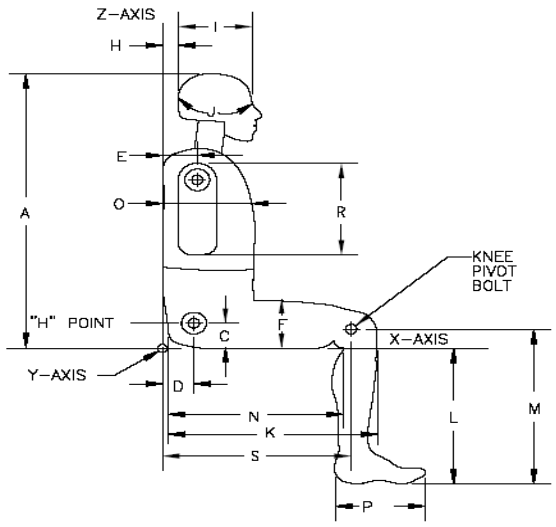
SERIAL NO:300

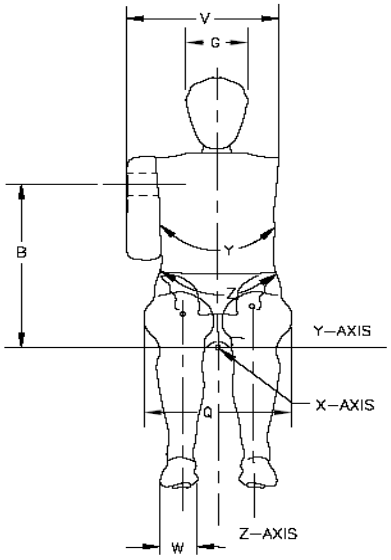
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 02/17/2023

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	783	Pass
B	Shoulder Pivot Height	437	453	444	Pass
C	H-point Height	79	89	83	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	122	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	42	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	200	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	876	Pass
Z	Waist Circumference	761	791	777	Pass

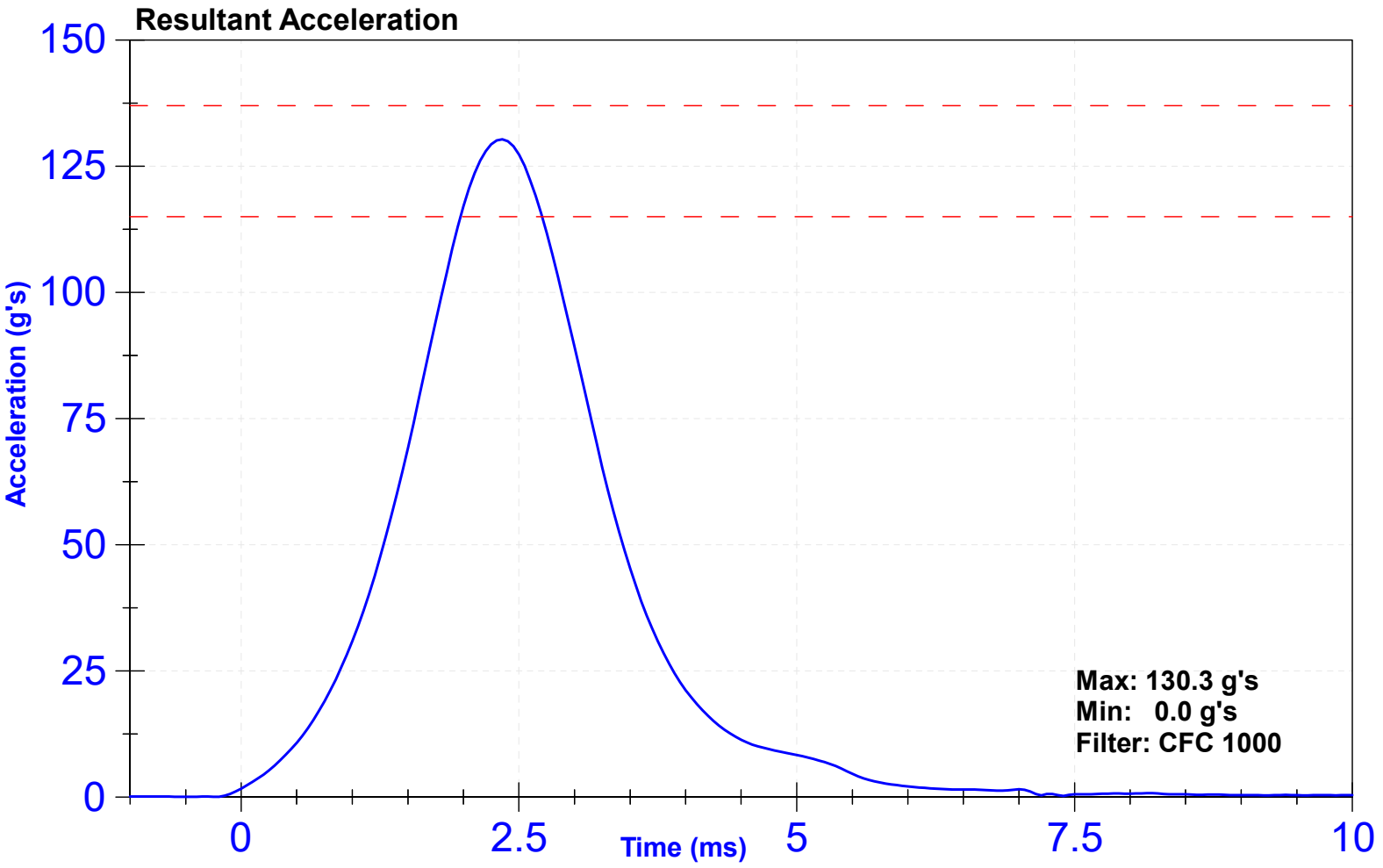
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

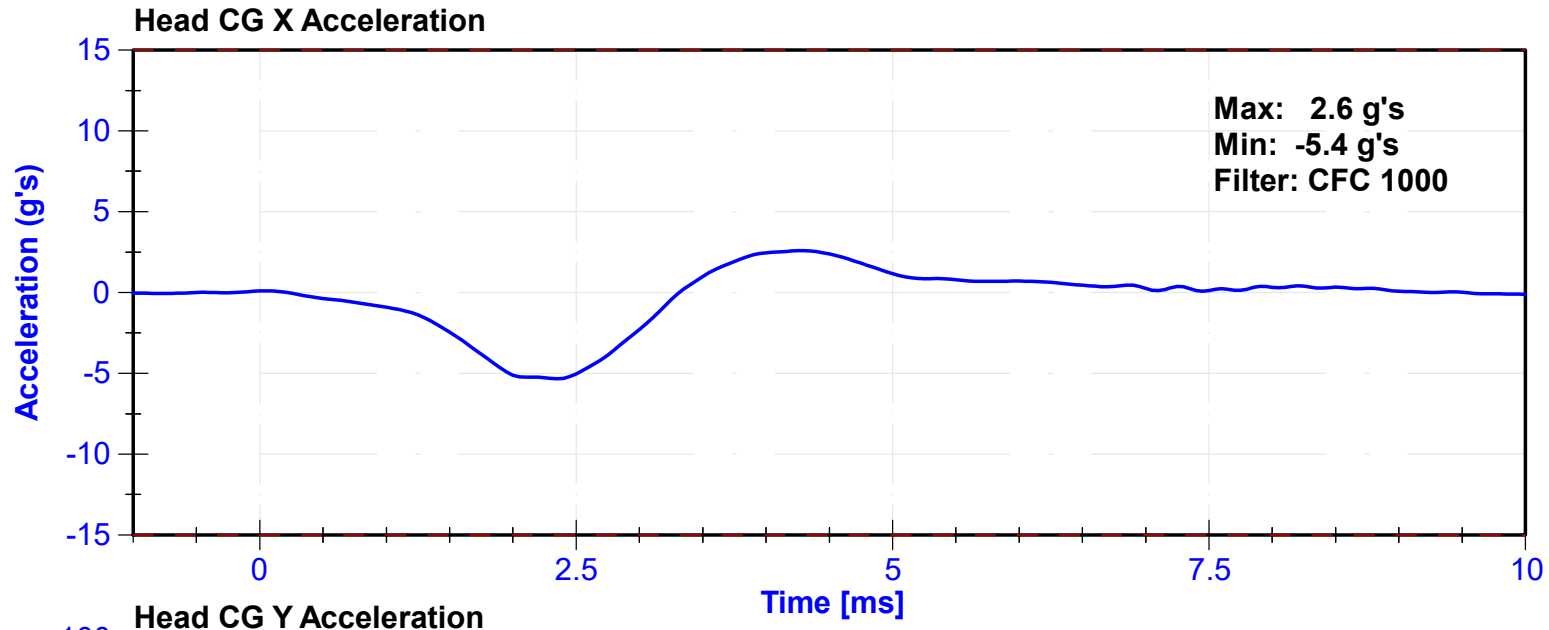
Results

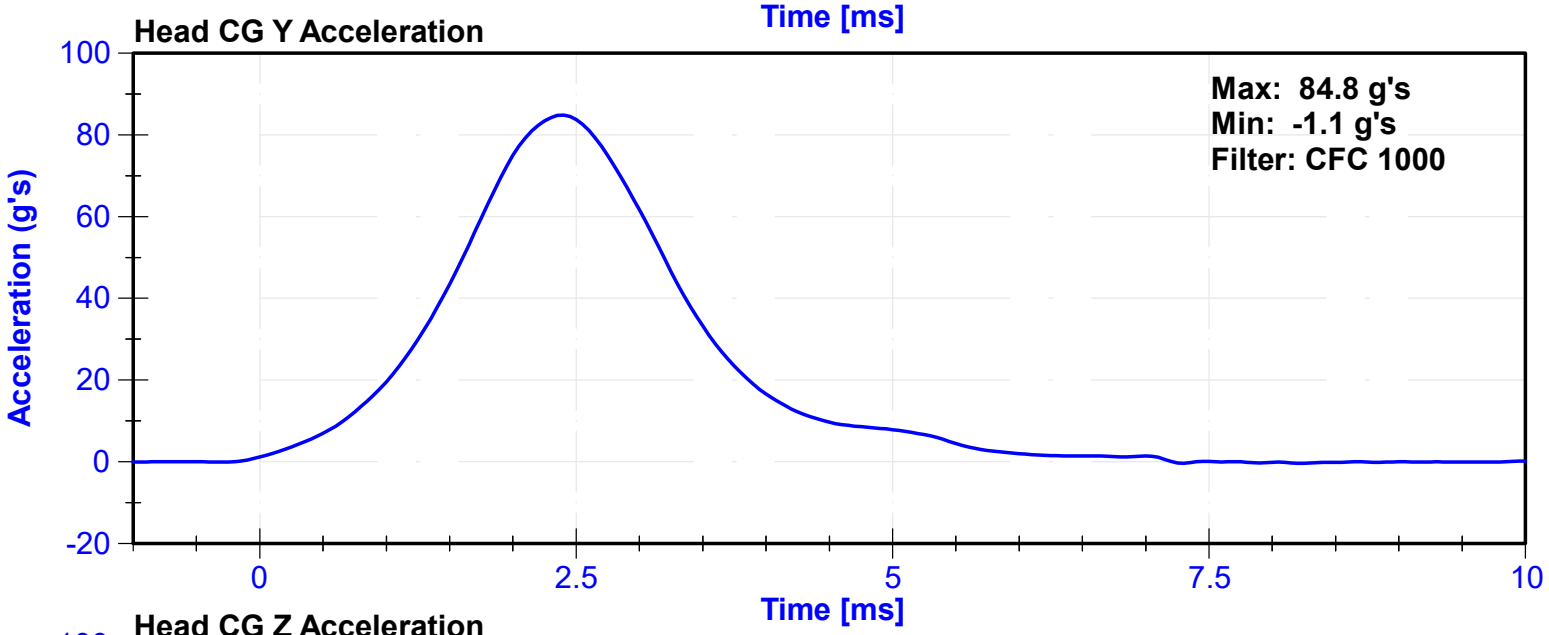
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Resultant Acceleration	115	137	g's	130.3	Pass
Oscillation	0	15	%	1.1	Pass
Fore-Aft Acceleration	-15	15	g's	-5.4	Pass

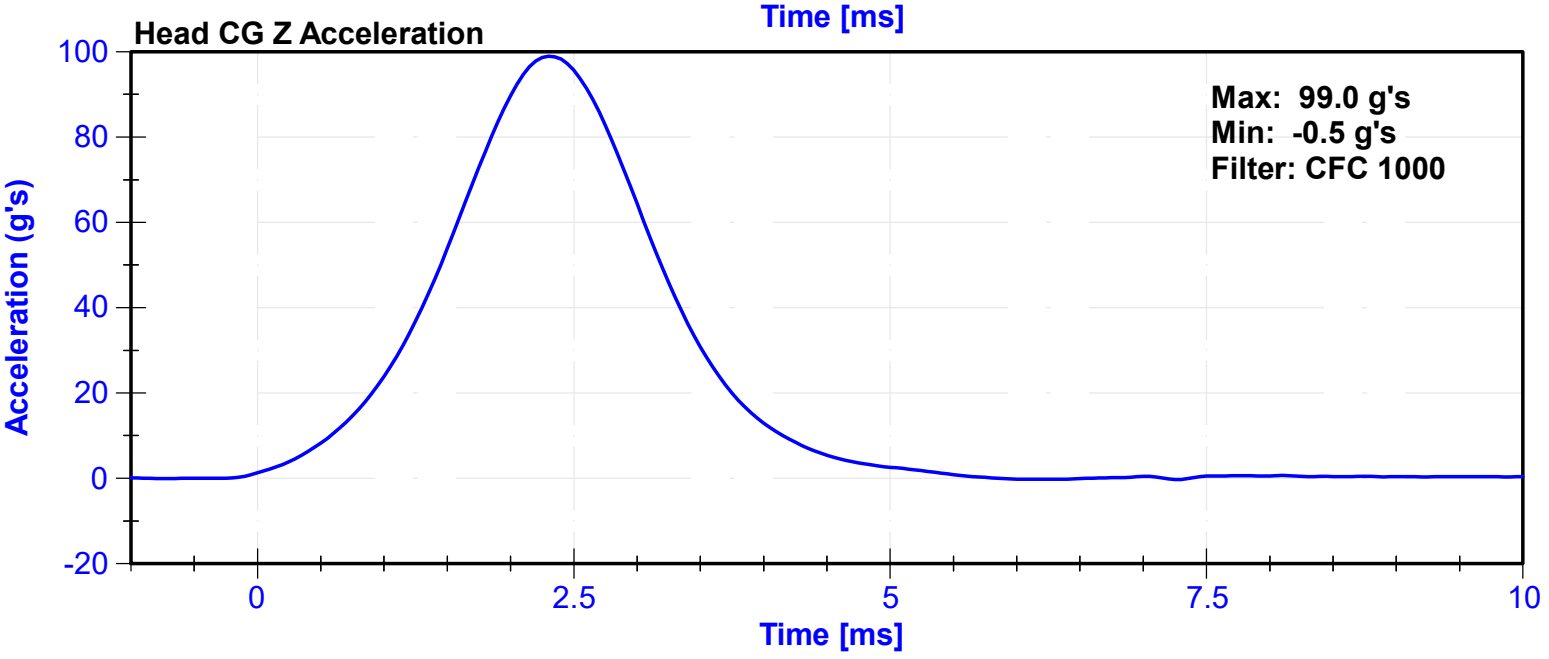
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	10/3/2022	4/1/2023
Y Accelerometer	Endevco	P58777	10/3/2022	4/1/2023
Z Accelerometer	Endevco	P79189	10/3/2022	4/1/2023




Head CG X Acceleration
Max: 2.6 g's
Min: -5.4 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: 84.8 g's
Min: -1.1 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 99.0 g's
Min: -0.5 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]

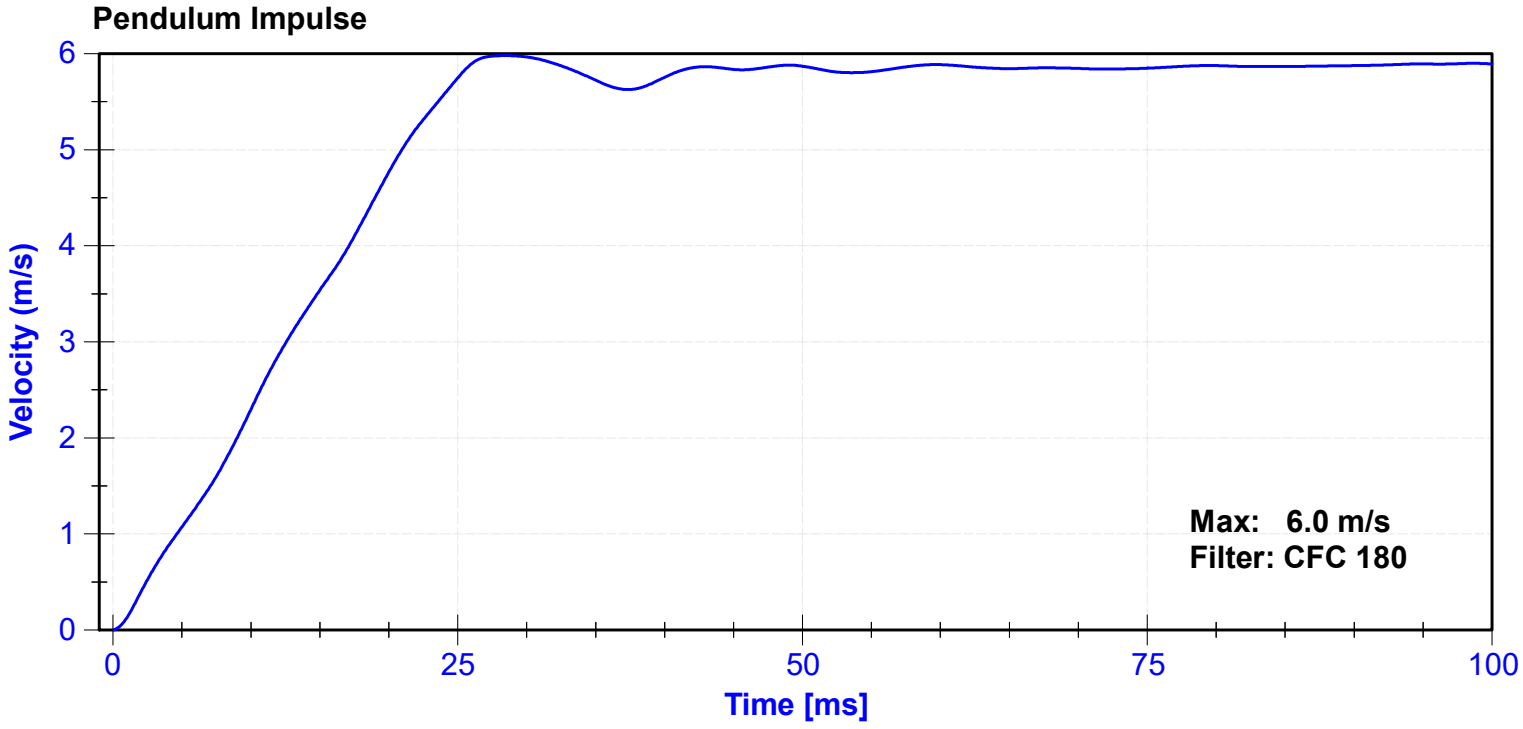
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

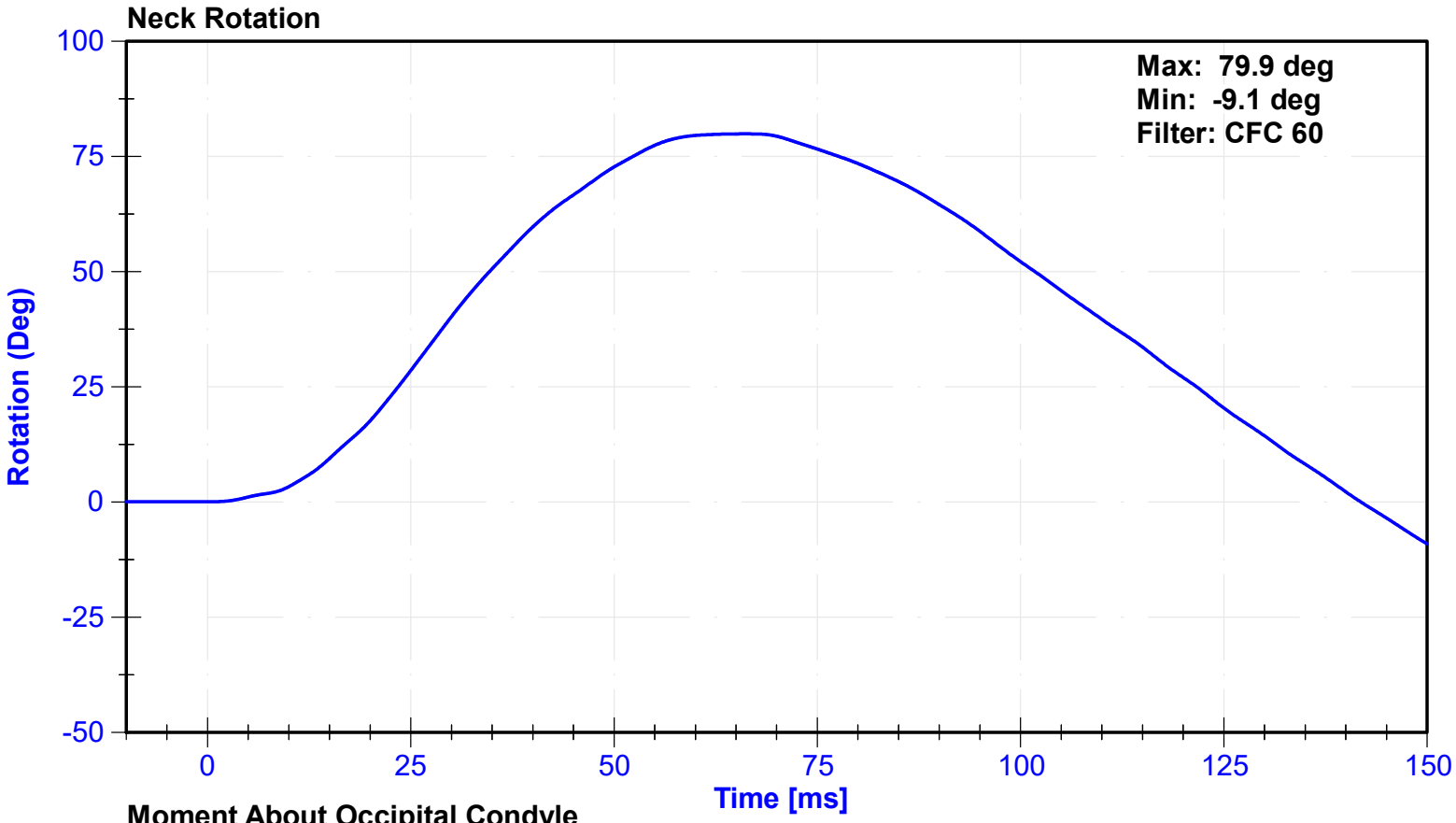
Results

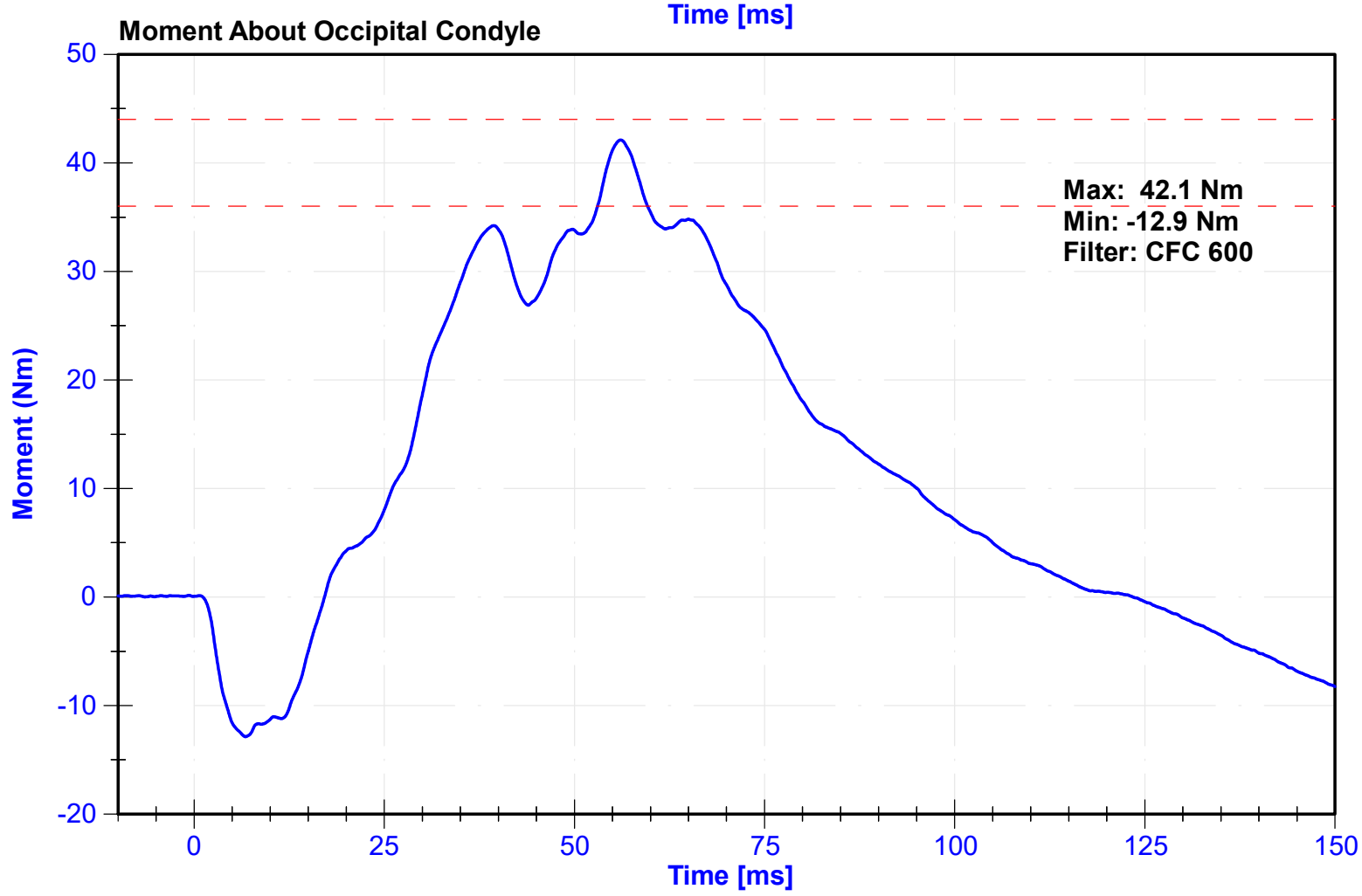
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	22.5	Pass
Velocity	5.51	5.63	m/s	5.542	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.30	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.54	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.77	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.75	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.98	Pass
Neck Rotation	71	81	deg	79.9	Pass
Time at Maximum Rotation	50	70	ms	66.0	Pass
Moment about the OC	36	44	Nm	42.1	Pass
Moment Decay to 0 Nm	102	126	ms	123.5	Pass

Transducer Calibrations

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




Neck Rotation
Max: 79.9 deg
Min: -9.1 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: 42.1 Nm
Min: -12.9 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

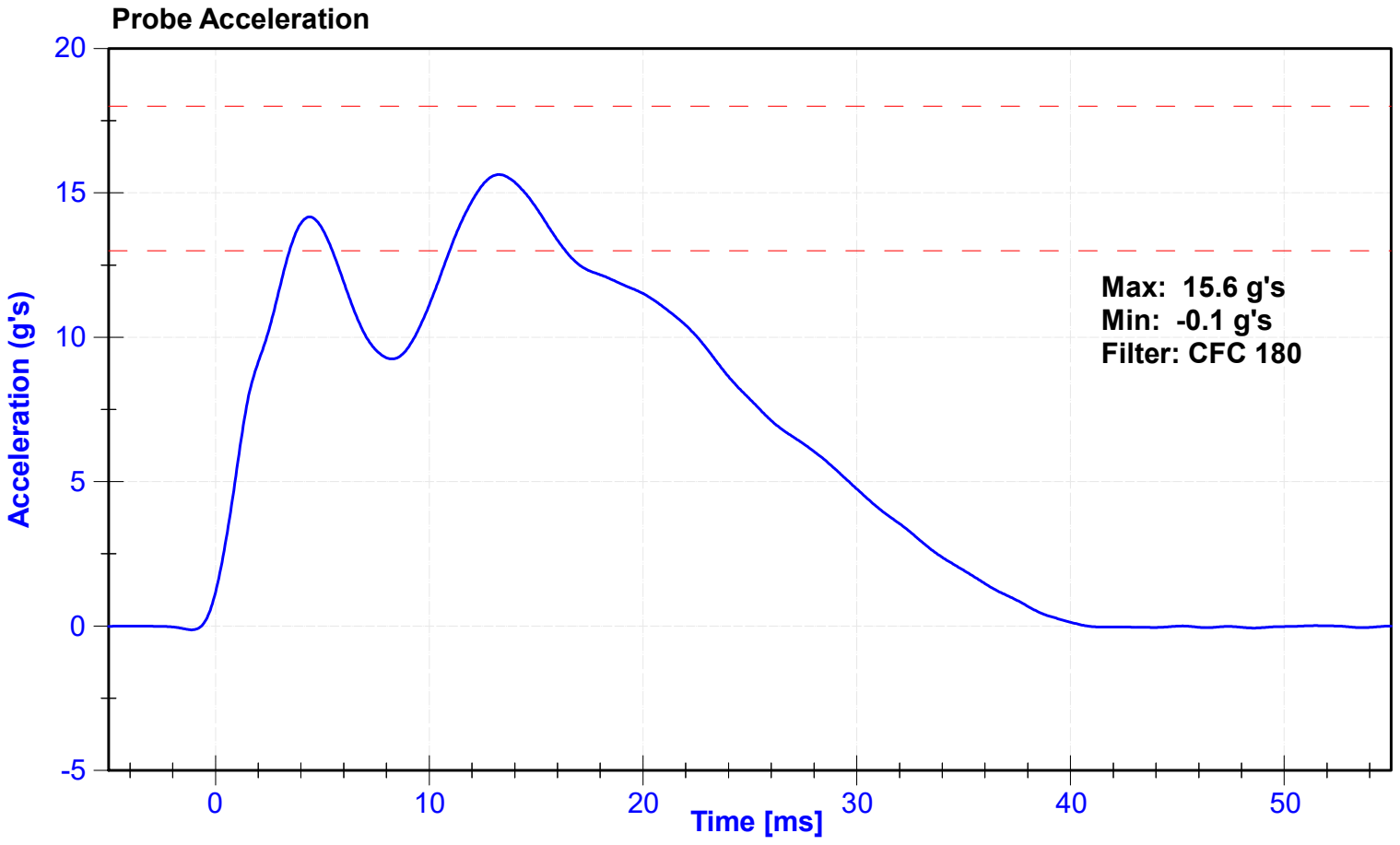
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

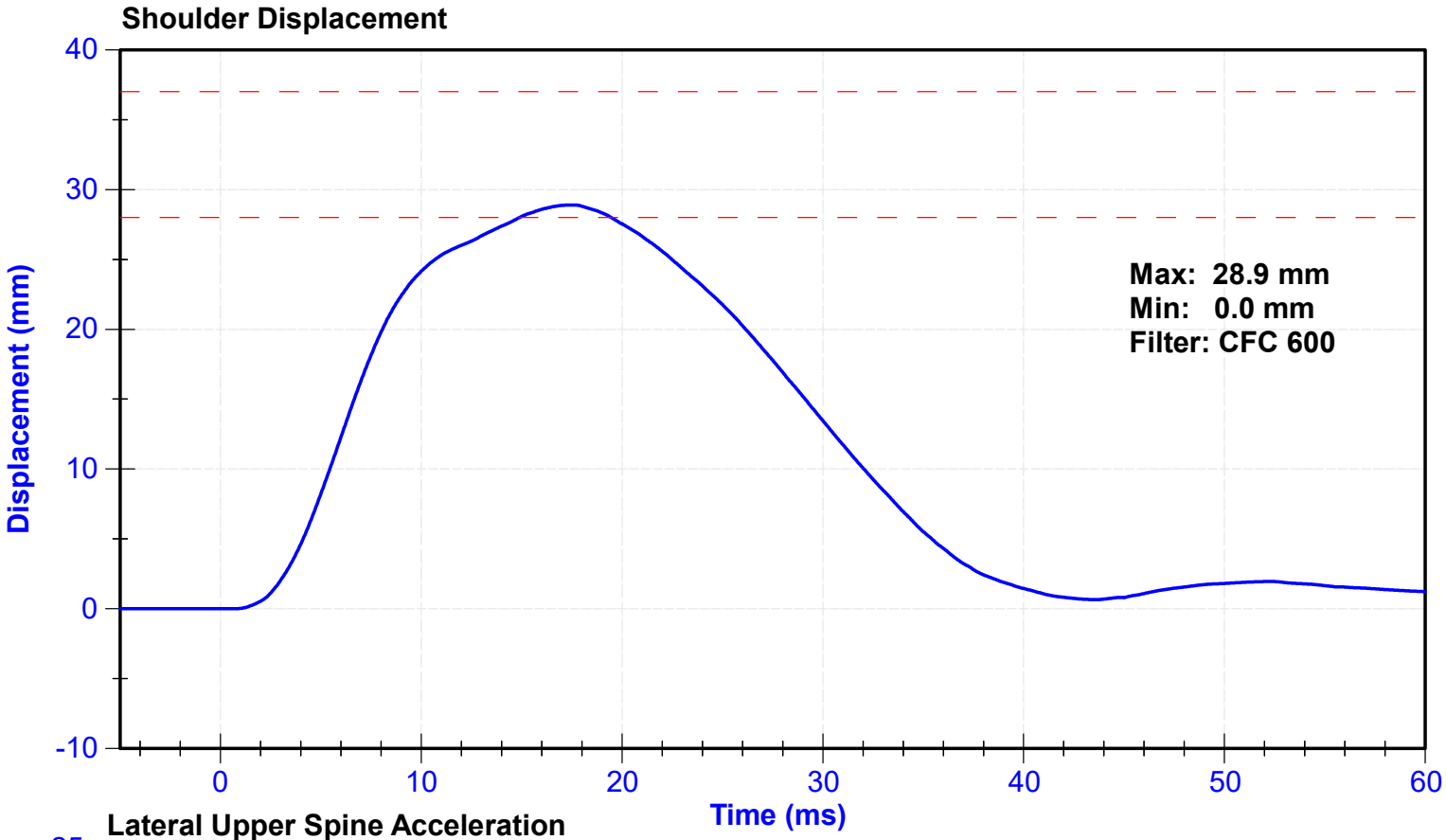
Results

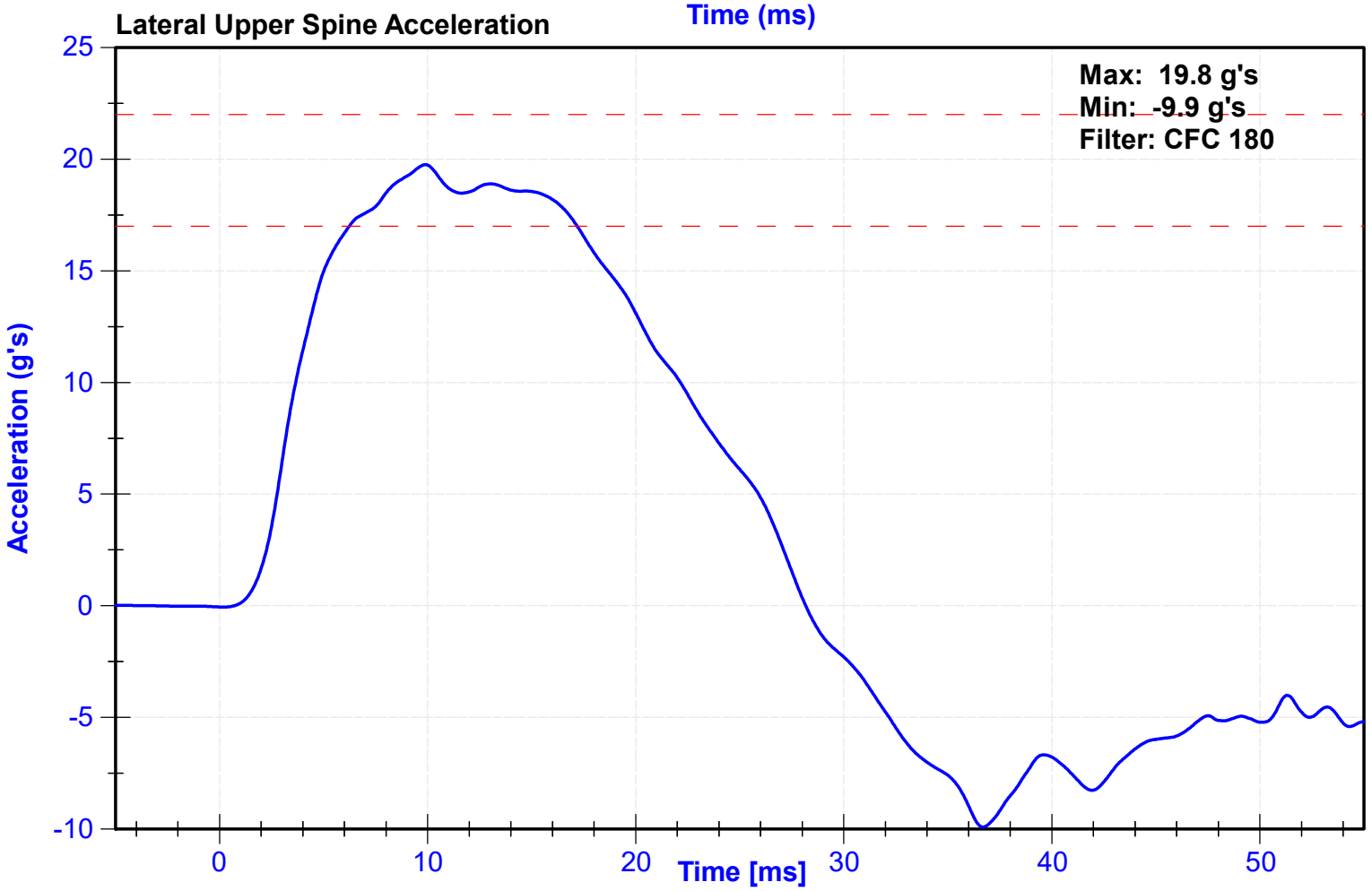
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	28.9	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.8 g's
Min: -9.9 g's
Filter: CFC 180

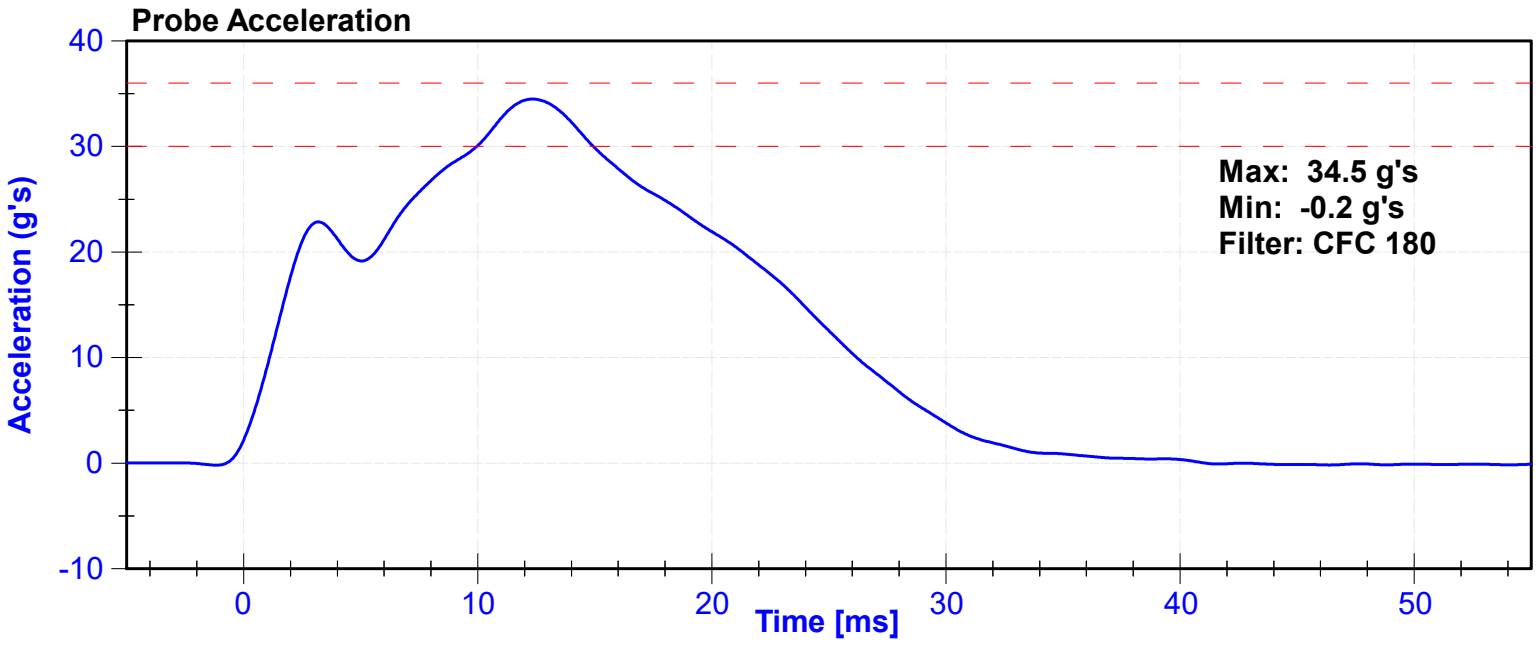
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

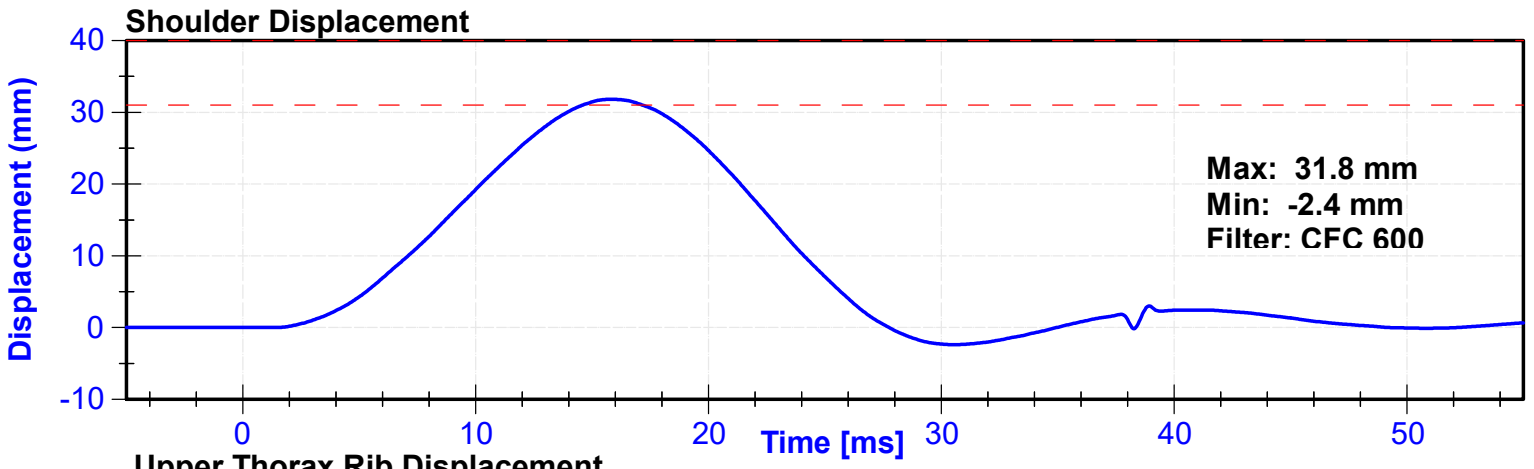
Results

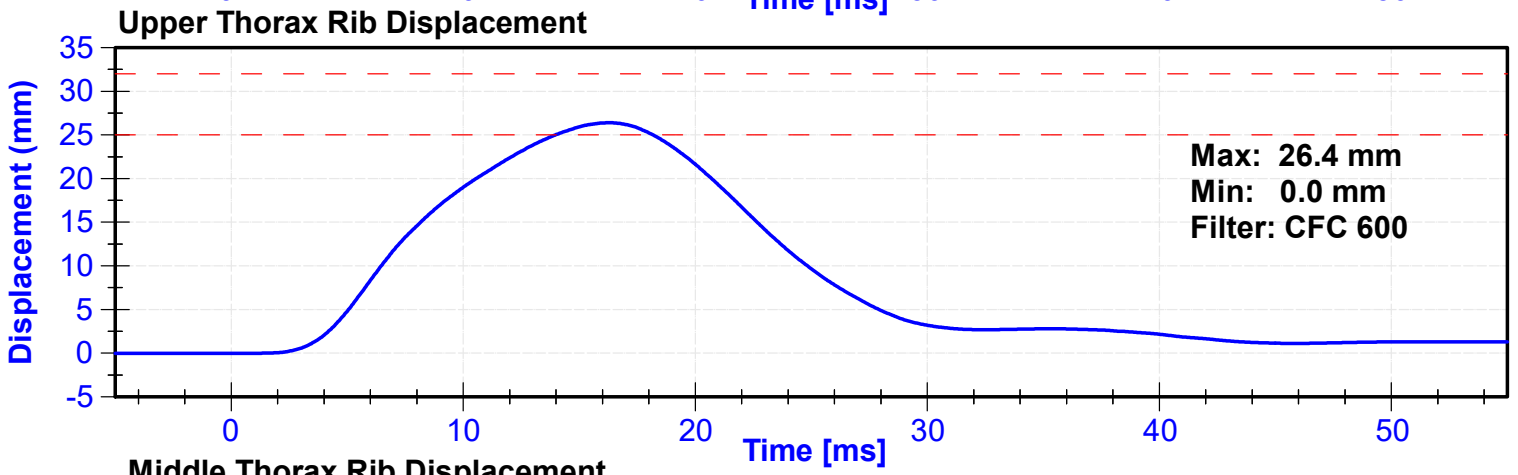
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Velocity	6.6	6.8	m/s	6.75	Pass
Probe Acceleration after 5 ms	30	36	g's	34.5	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.2	Pass
Shoulder Deflection	31	40	mm	31.8	Pass
Upper Thorax Rib Deflection	25	32	mm	26.4	Pass
Mid Thorax Rib Deflection	30	36	mm	30.9	Pass
Lower Thorax Rib Deflection	32	38	mm	34.2	Pass

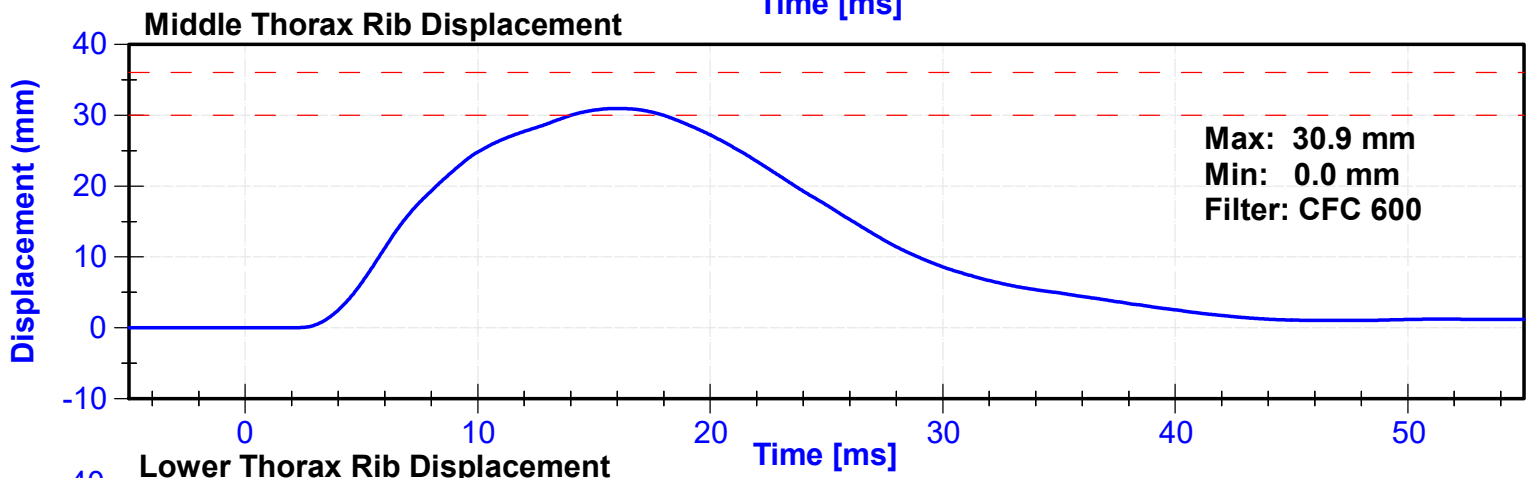
Transducer Calibrations

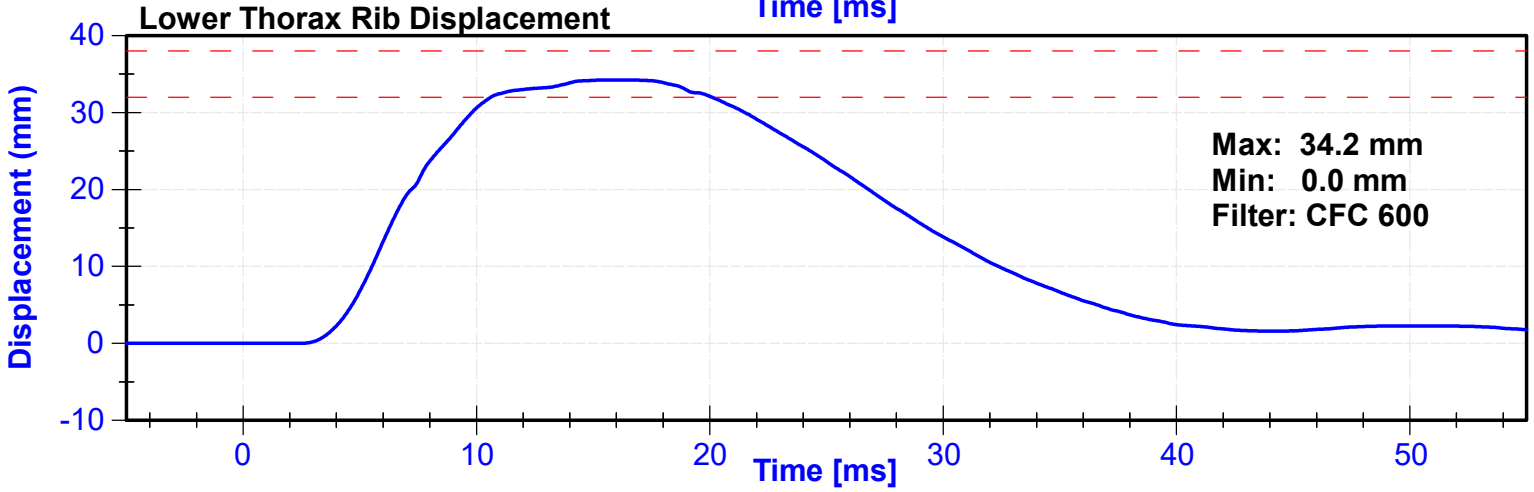
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

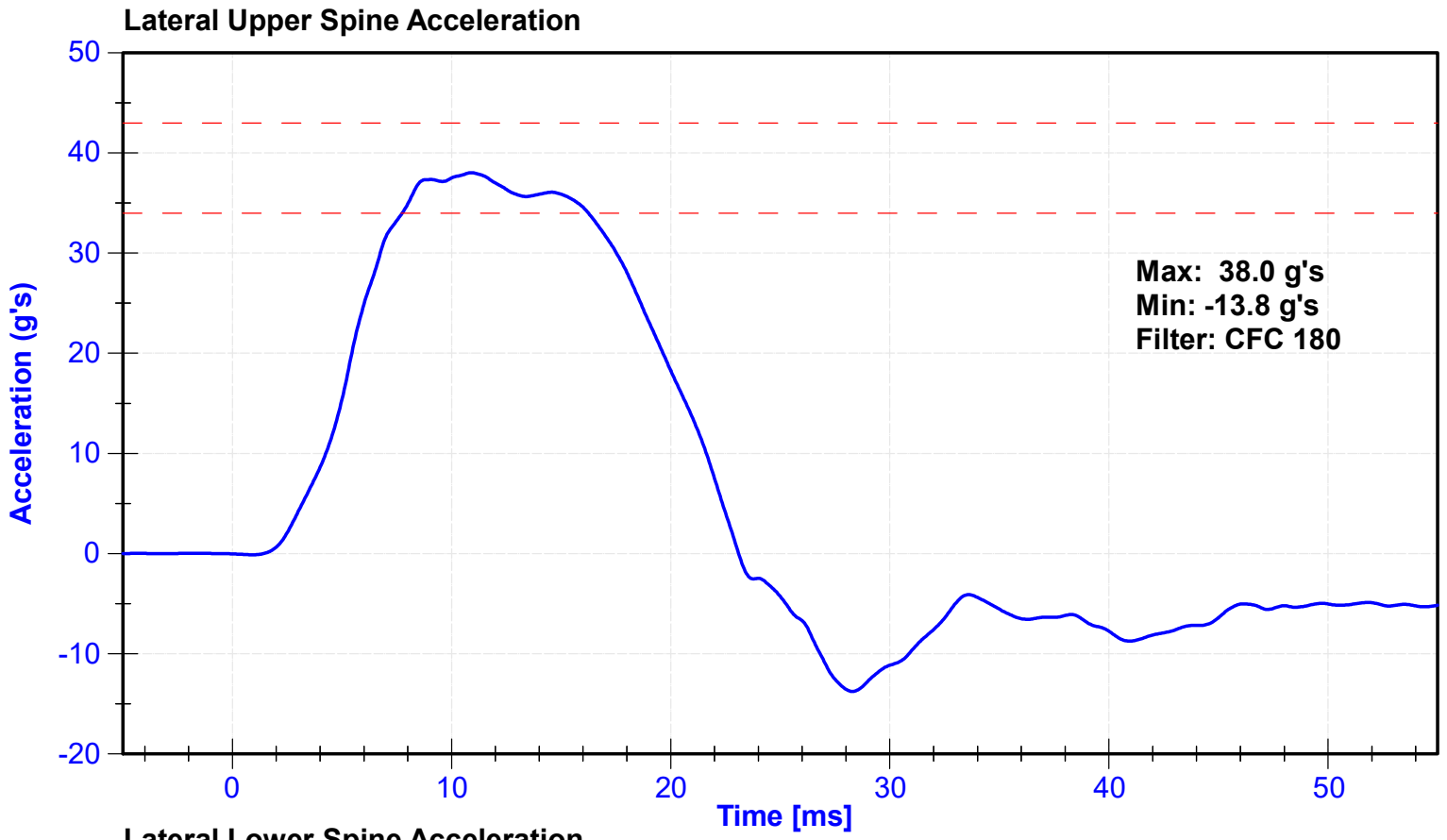


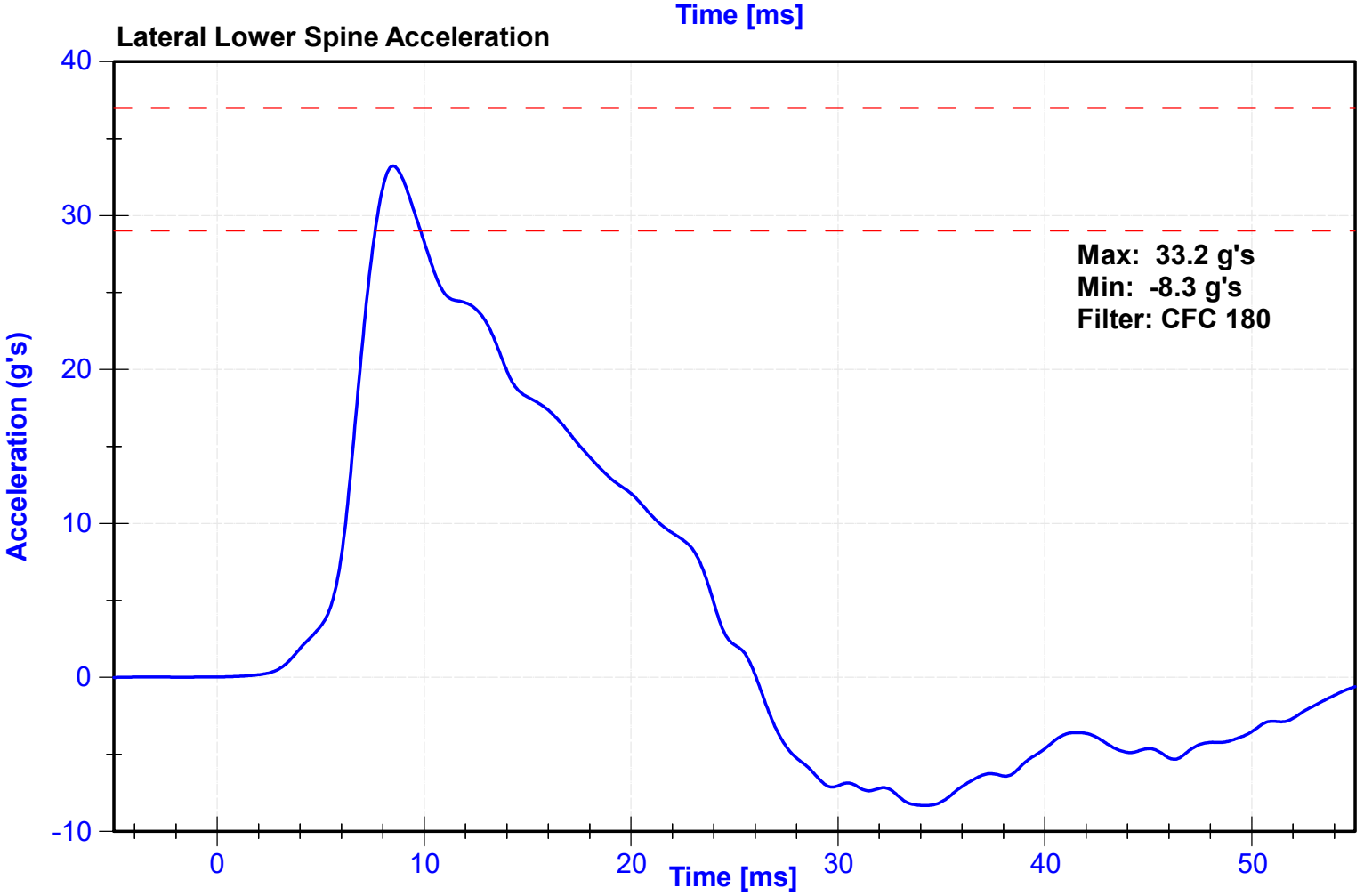

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.8 mm
Min: -2.4 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.4 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.9 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 38.0 g's
Min: -13.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 33.2 g's
Min: -8.3 g's
Filter: CFC 180

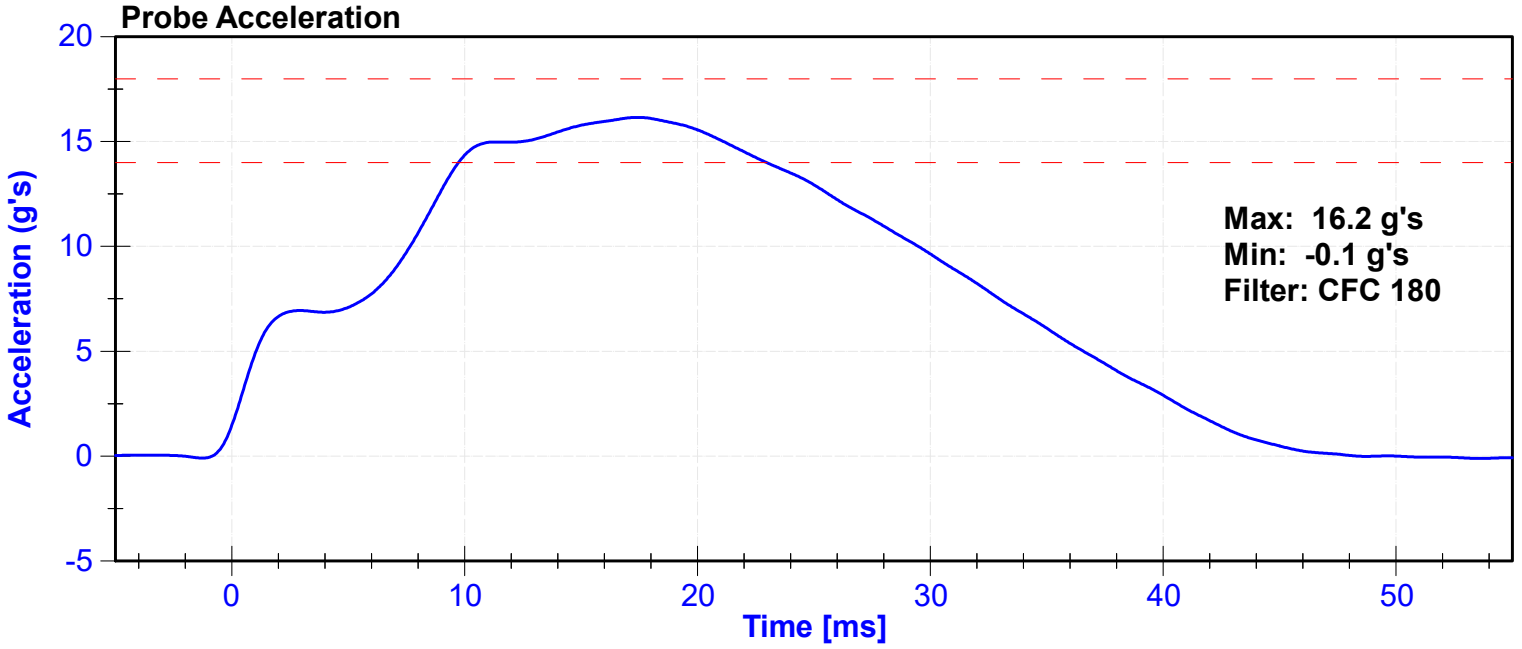
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

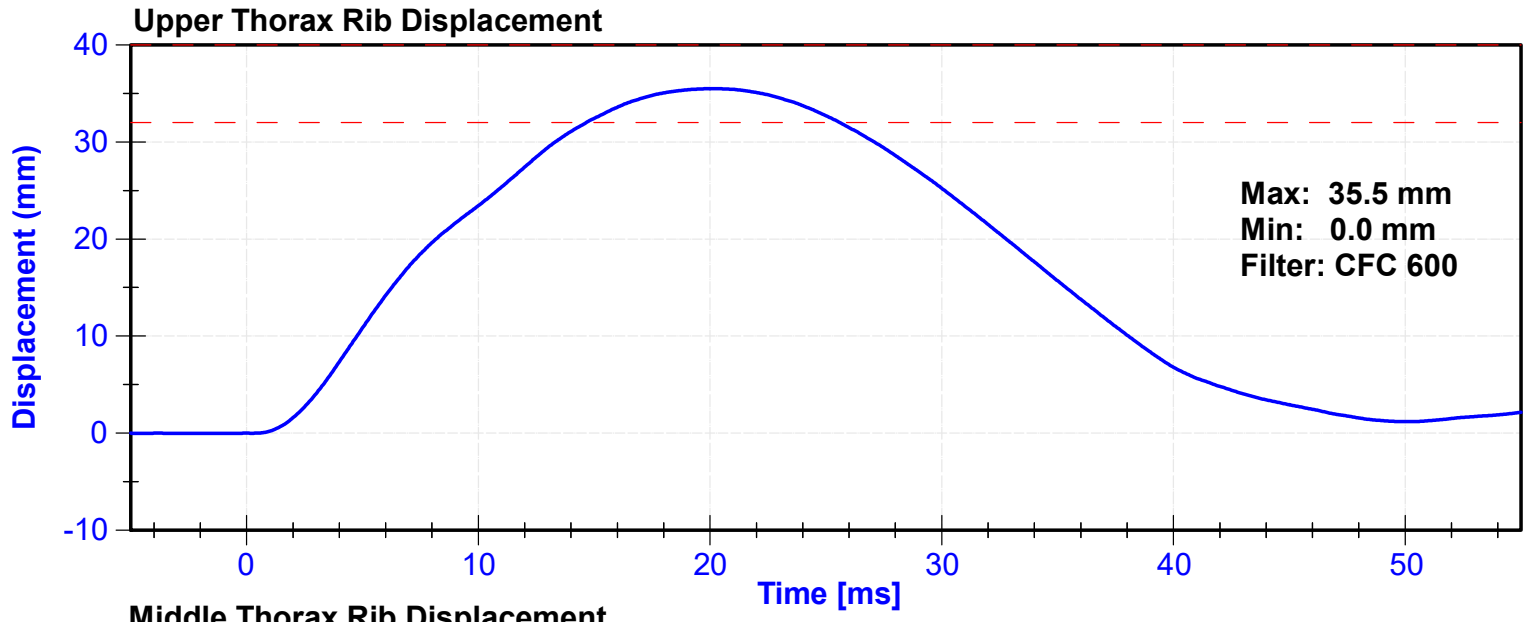
Results

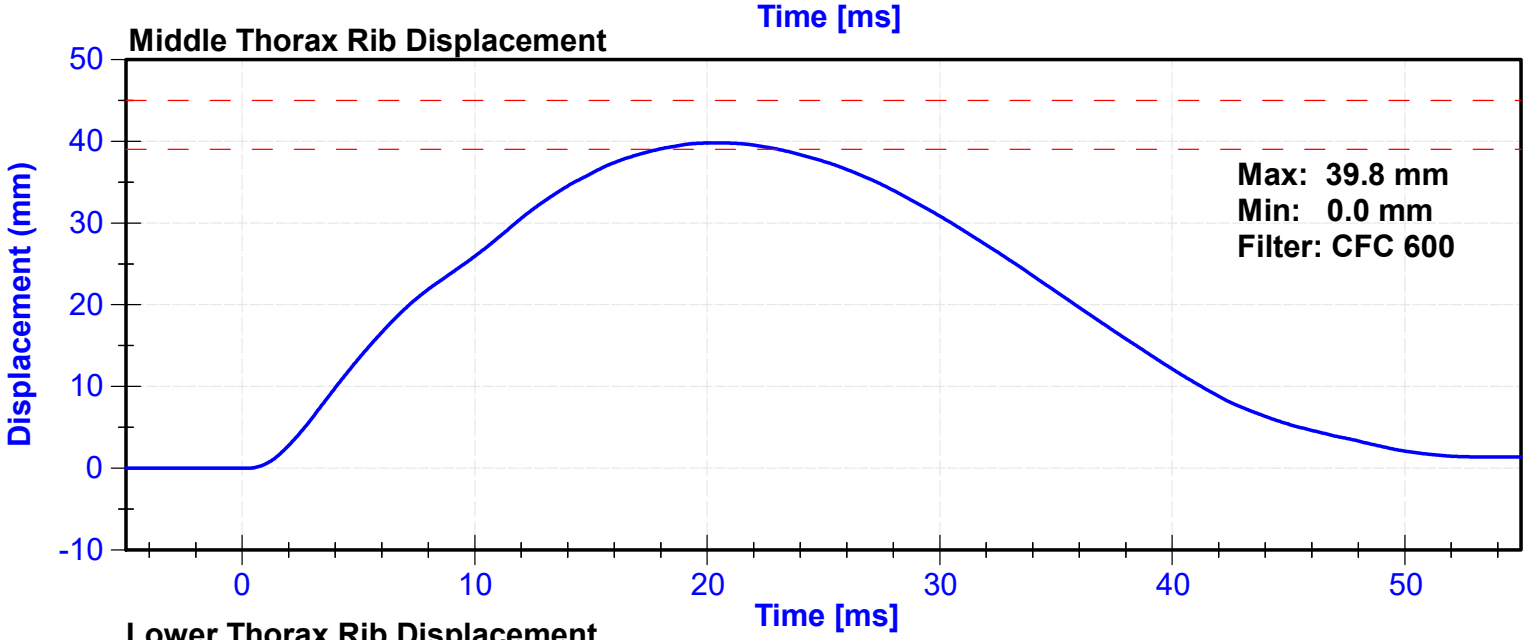
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.6	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.4	Pass
Upper Thorax Rib Deflection	32	40	mm	35.5	Pass
Middle Thorax Rib Deflection	39	45	mm	39.8	Pass
Lower Thorax Rib Deflection	35	43	mm	37.3	Pass

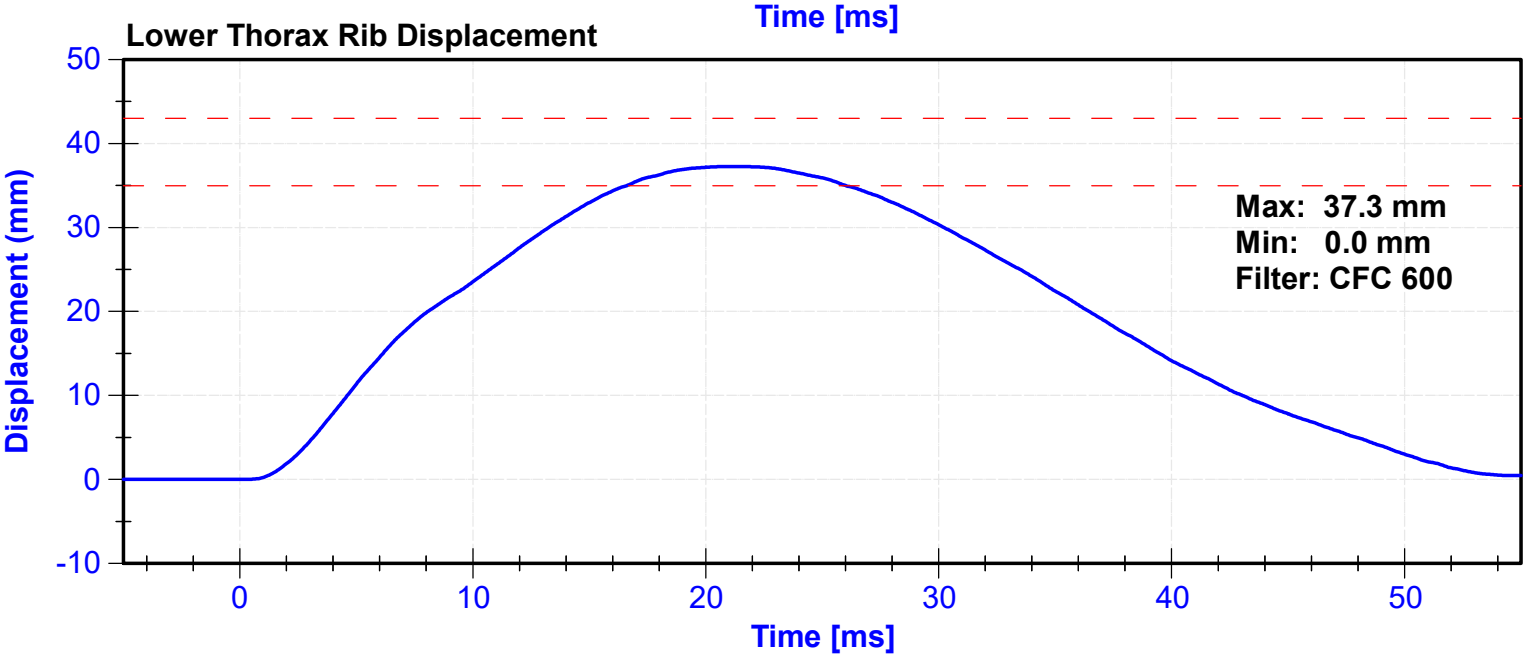
Transducer Calibrations

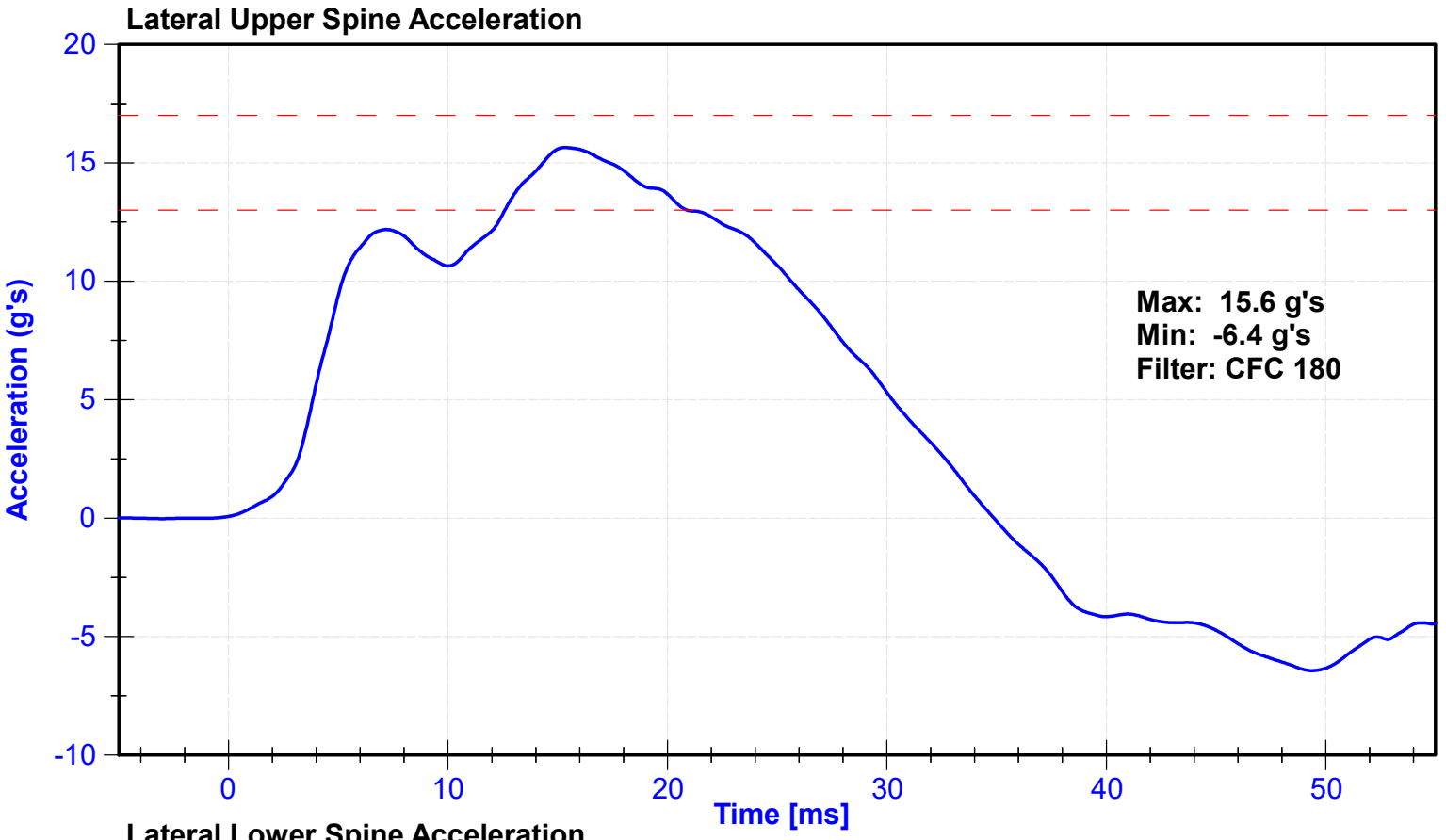
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

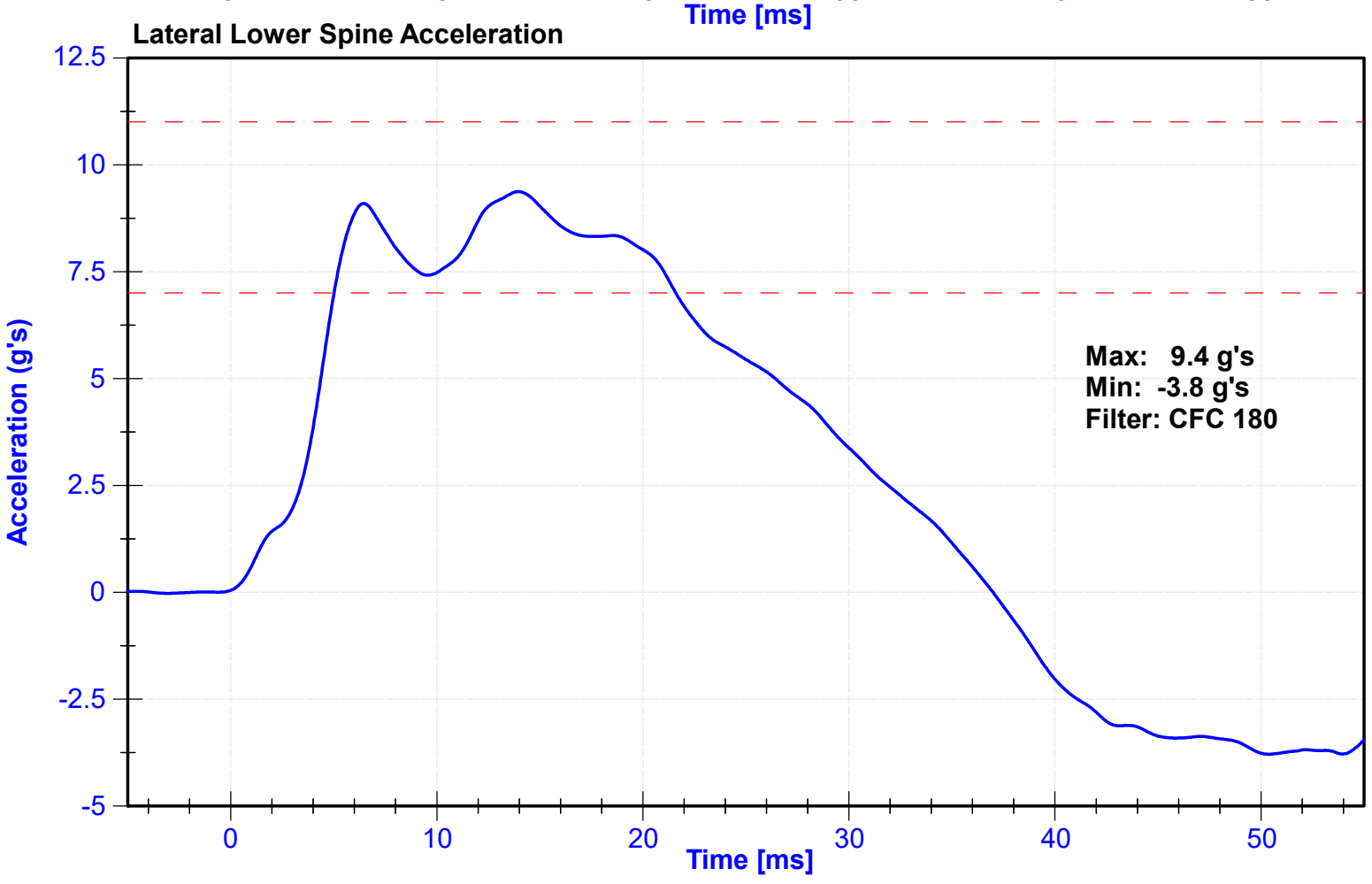



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.5 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.8 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.3 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]
Max: 15.6 g's
Min: -6.4 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
Time [ms]
Max: 9.4 g's
Min: -3.8 g's
Filter: CFC 180

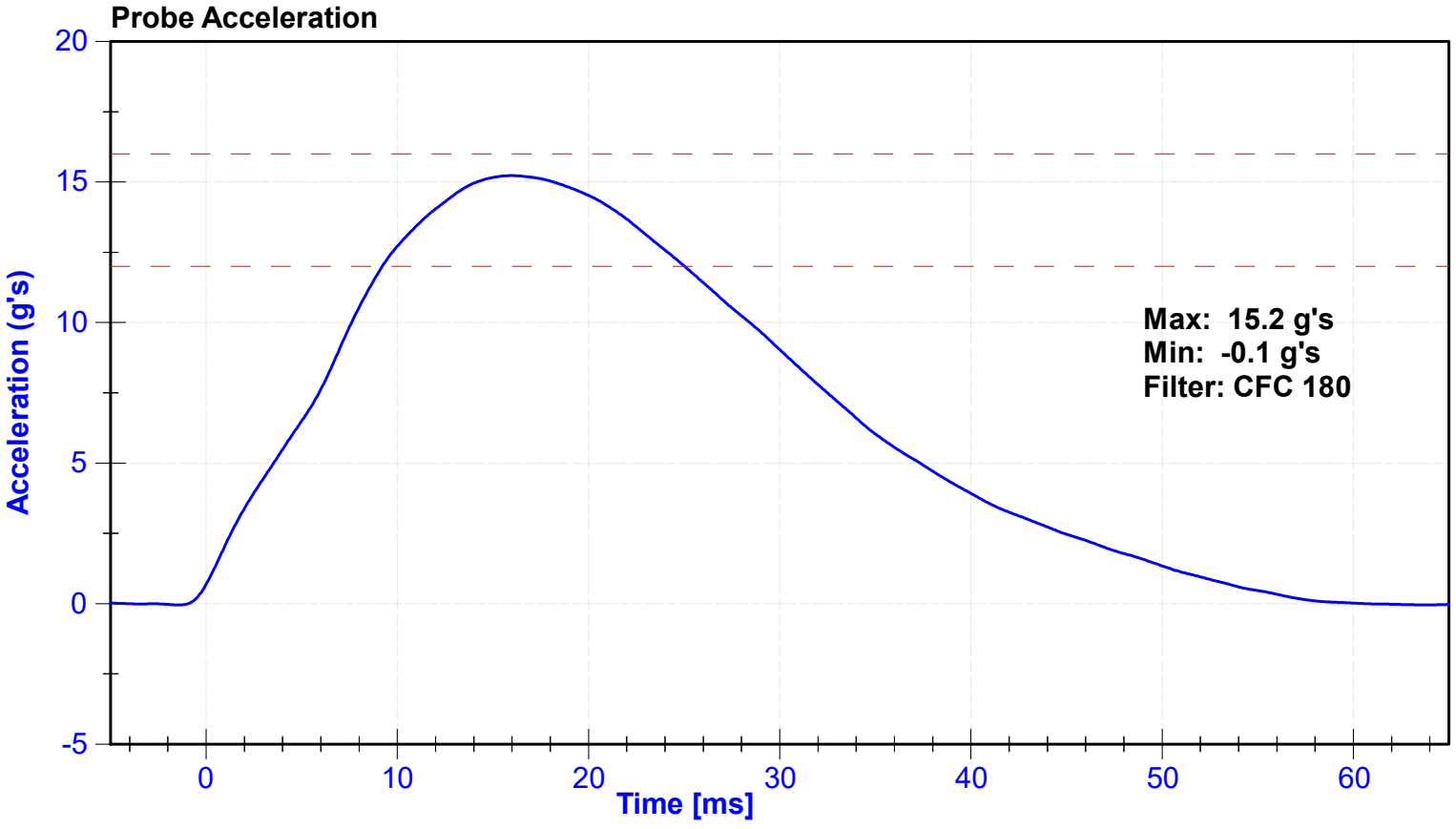
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

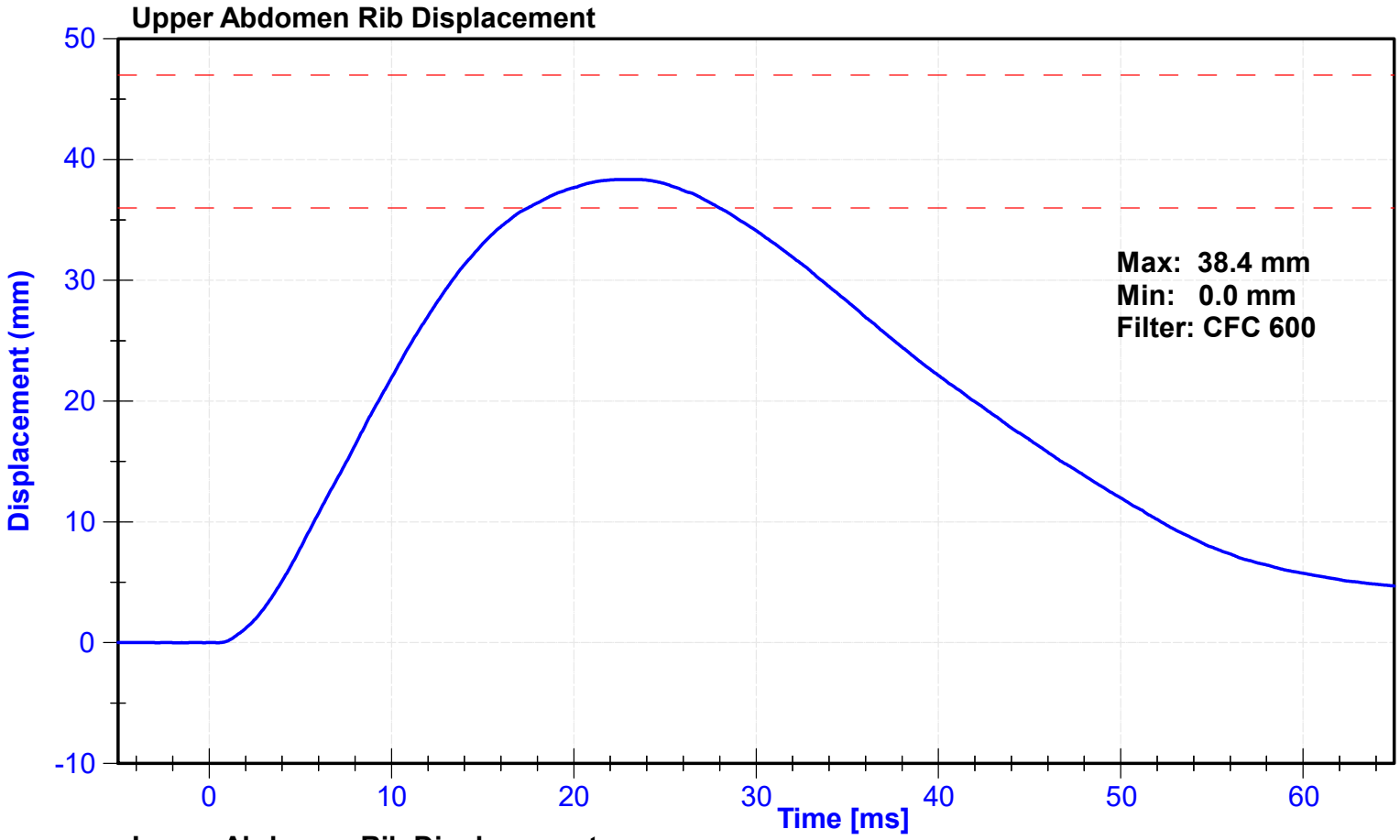
Results

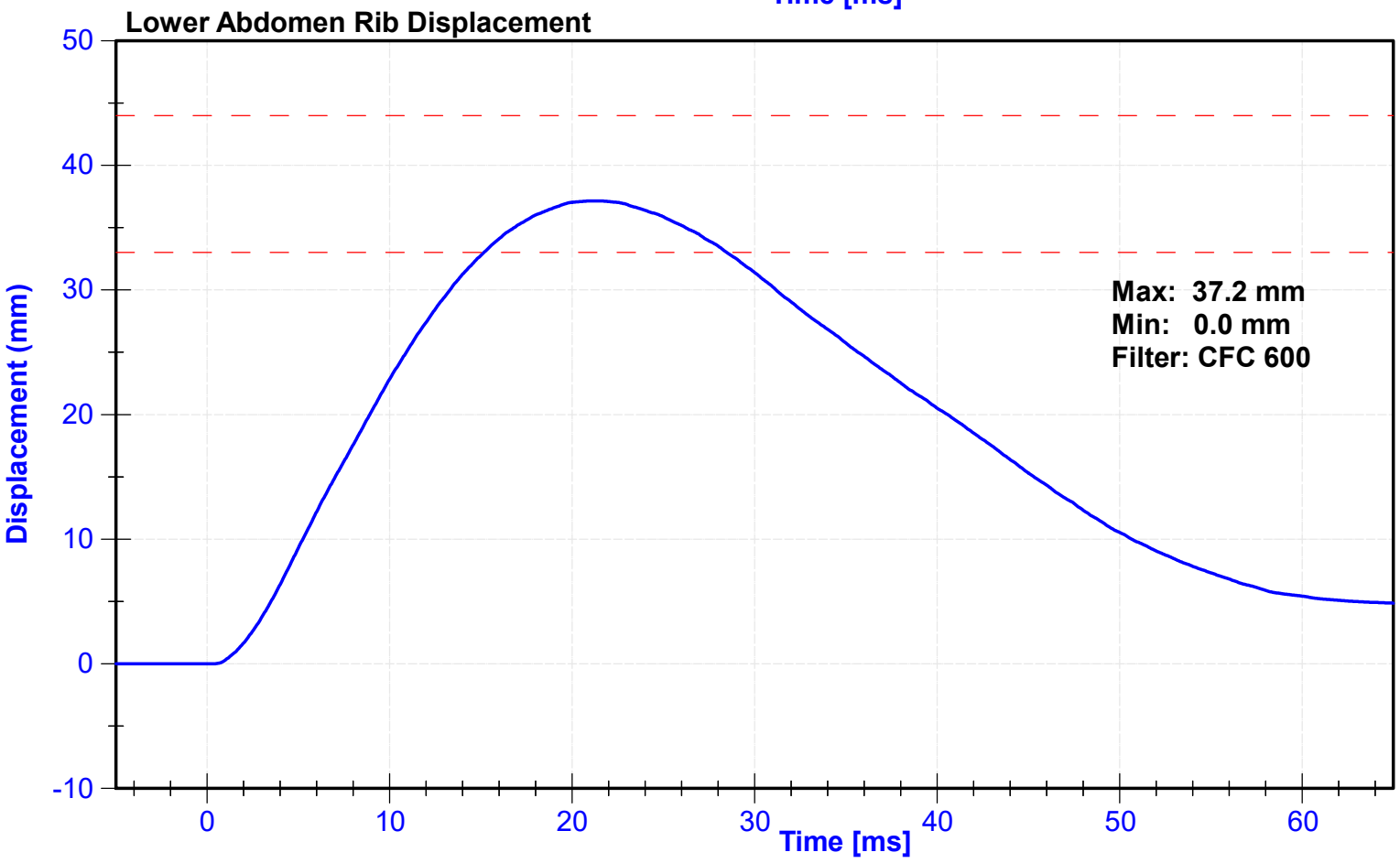
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	15.2	Pass
Lateral Lower Spine Acceleration	9	14	g's	12.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	38.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	37.2	Pass

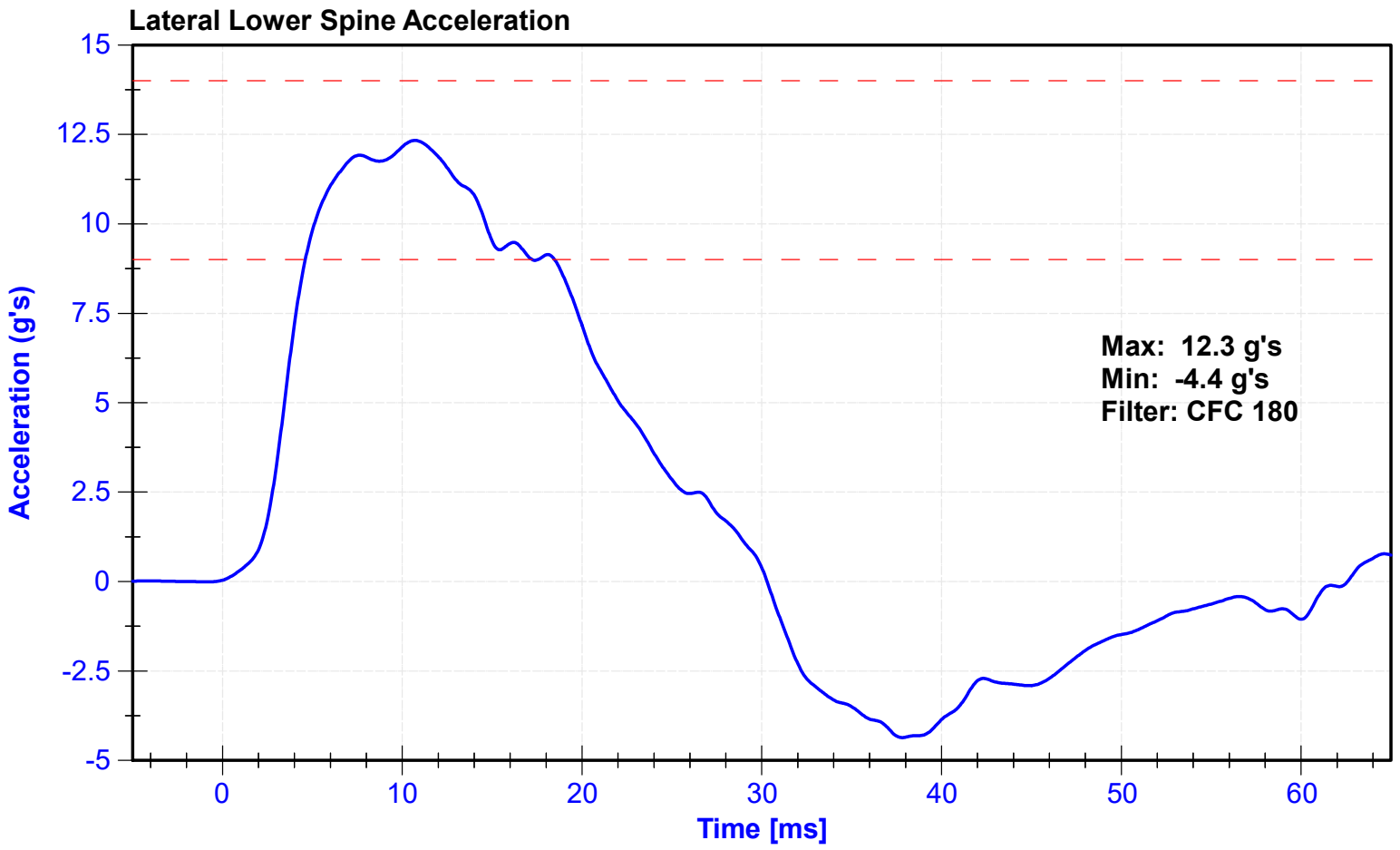
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Abdomen Rib Potentiometer	Servo	307GFE	10/4/2022	4/4/2023
Lower Abdomen Rib Potentiometer	Servo	308GFE	10/4/2022	4/4/2023




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


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 37.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 12.3 g's
Min: -4.4 g's
Filter: CFC 180

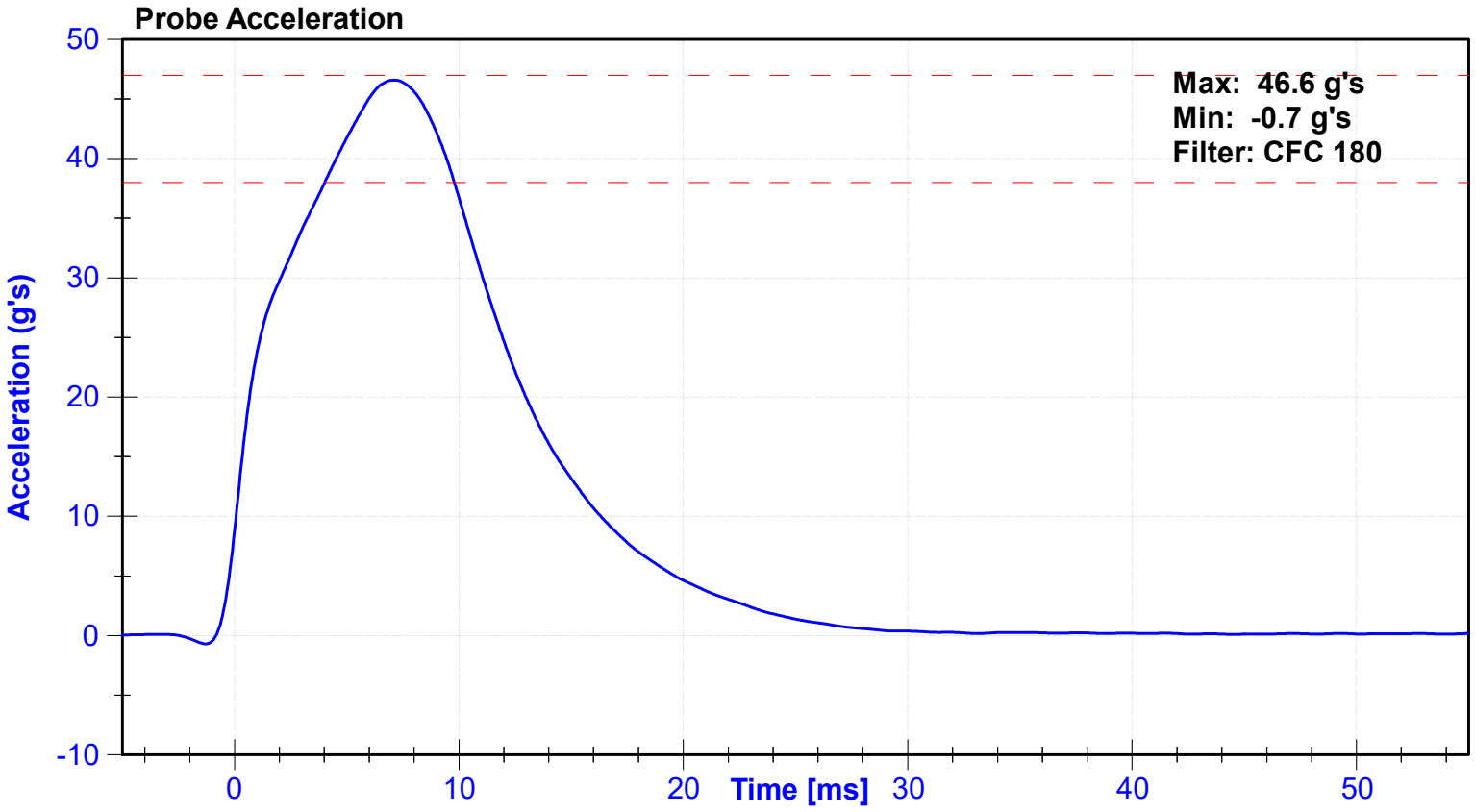
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

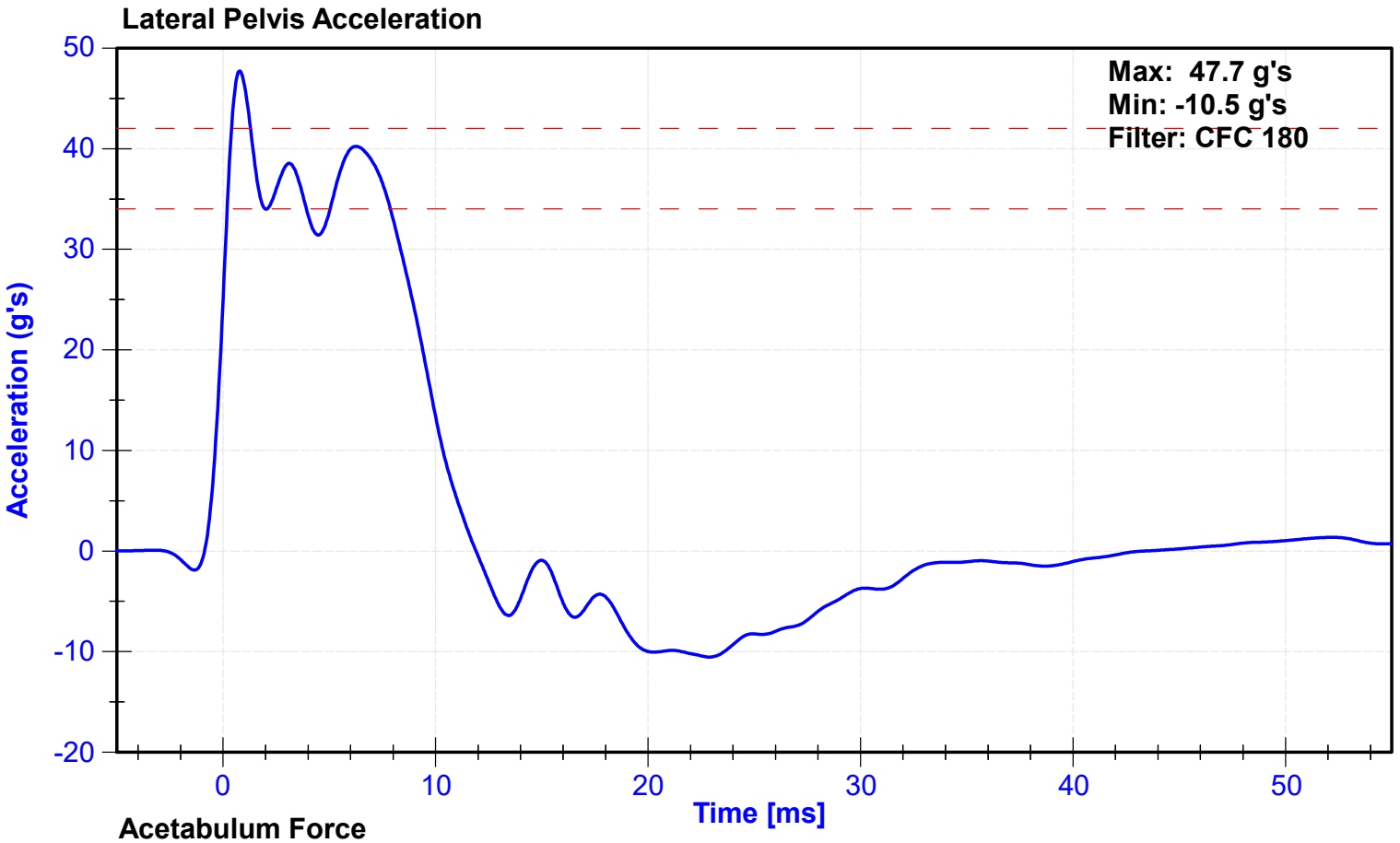
Results

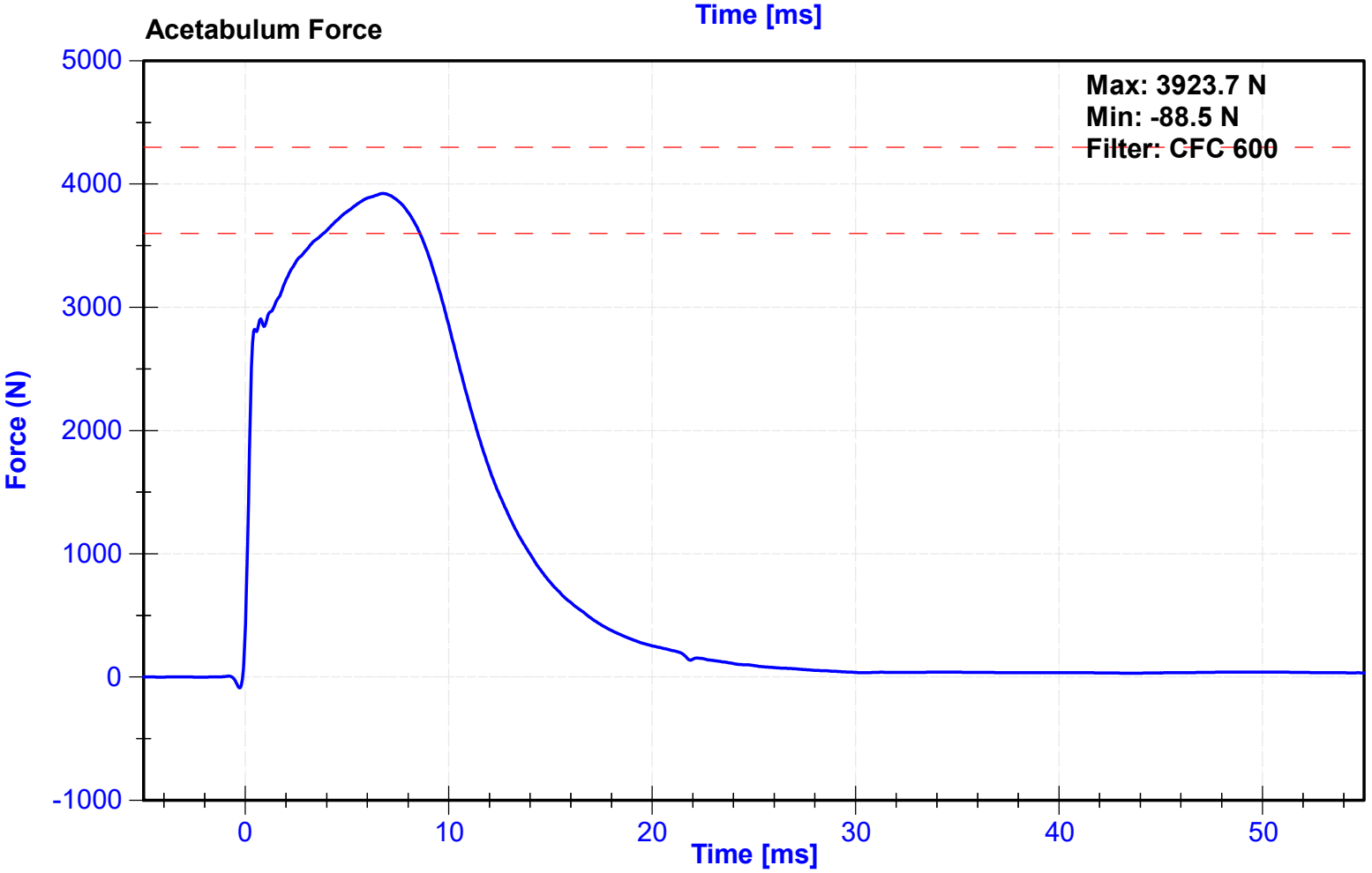
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Velocity	6.6	6.8	m/s	6.73	Pass
Probe Acceleration	38	47	g's	46.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.2	Pass
Acetabulum Force	3600	4300	N	3923.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Acetabulum Load Cell	Denton	267-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 47.7 g's
Min: -10.5 g's
Filter: CFC 180
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3923.7 N
Min: -88.5 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

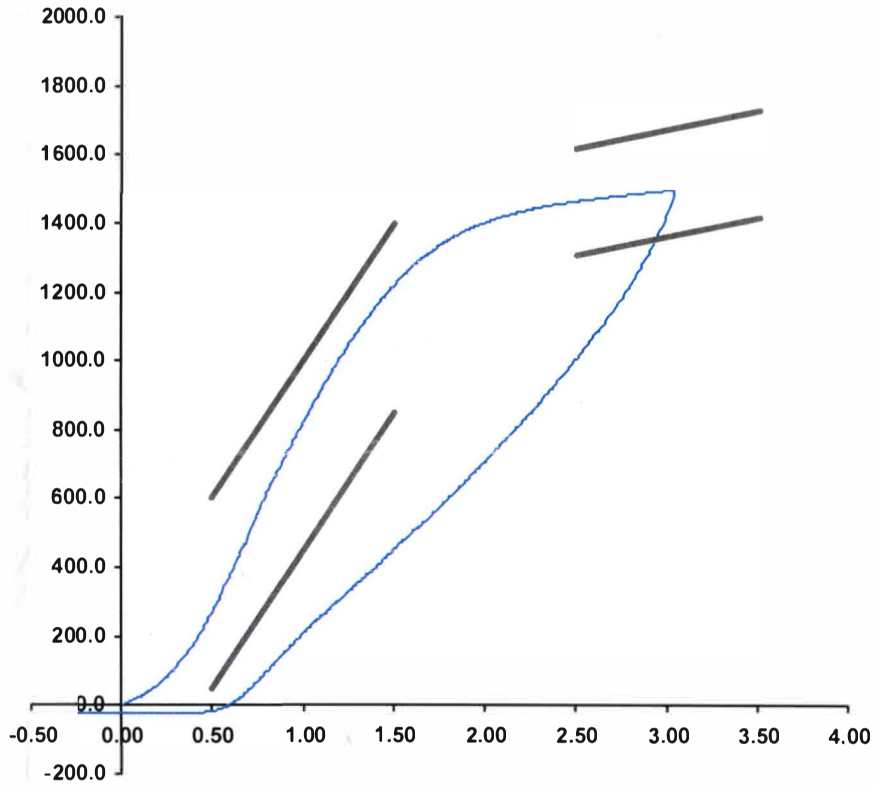
300 Cert Plug 2-17-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15459
Test Number 20120
Report Number 20174
Test Date 9/9/2021 11:00:50 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	277	50	600
Force @ 1.5 mm (N)	1,227	850	1,400
Force @ 2.5 mm (N)	1,466	1,306	1,618
Force @ 3.0 mm (N)	1,497	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

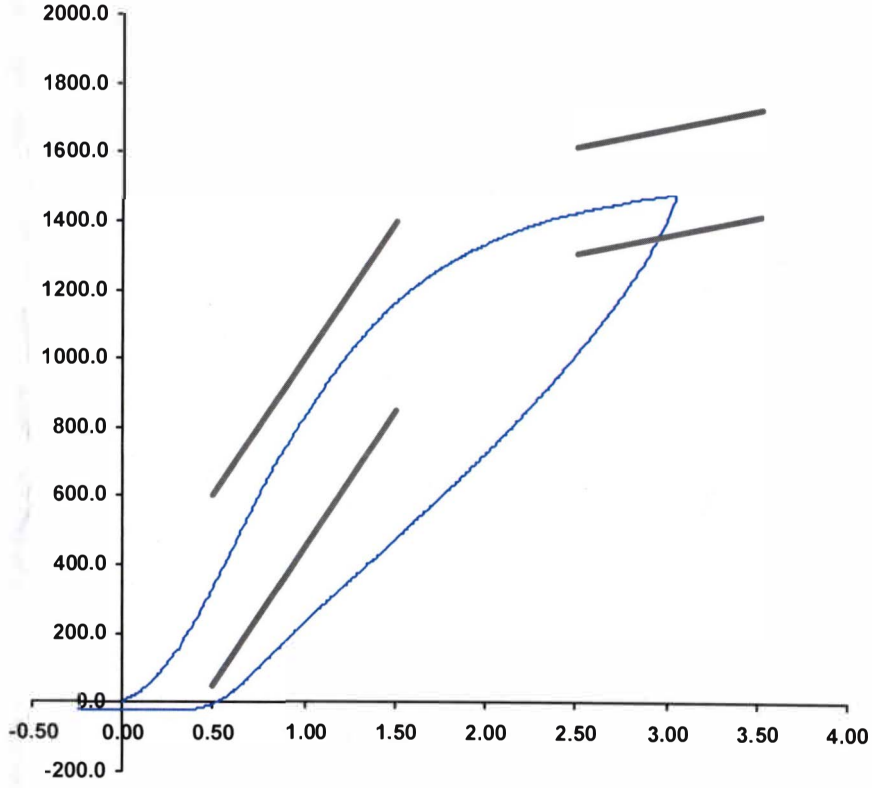
300 Impact Plug 2-17-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15211
Test Number 17962
Report Number 18011
Test Date 3/10/2021 11:56:43 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	336	50	600
Force @ 1.5 mm (N)	1,165	850	1,400
Force @ 2.5 mm (N)	1,430	1,306	1,618
Force @ 3.0 mm (N)	1,480	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 10-Mar-21
SACO Research

By : DC Date : 3/10/2021

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

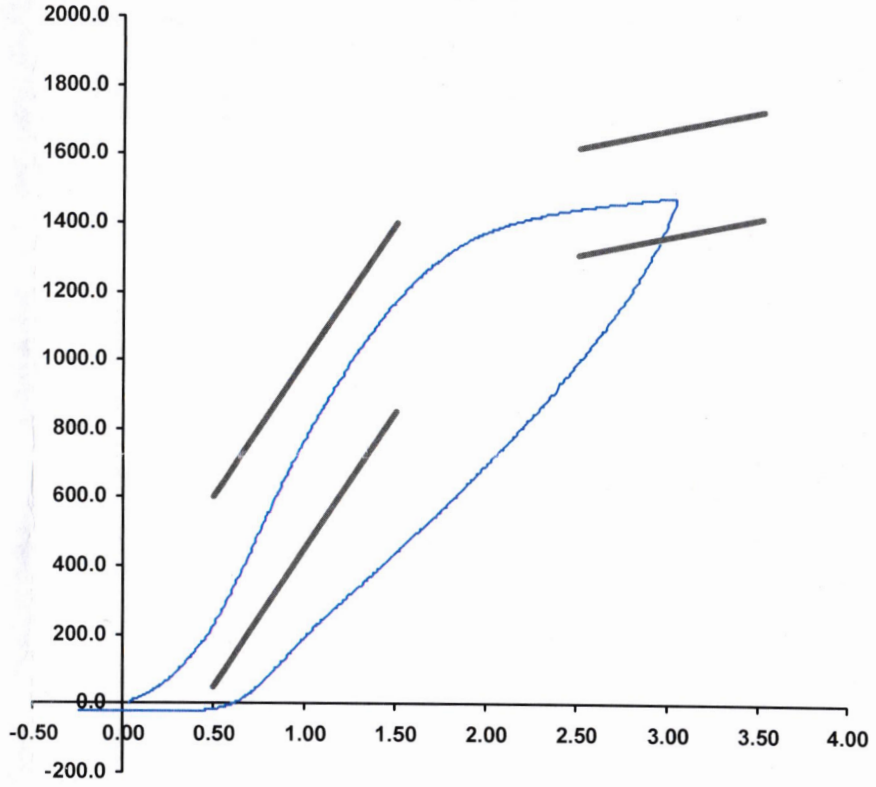
Test Non Impact
prepared 2/17/23

SID-IIs Pelvis Plug Certification Test

Plug S/N 15442
Test Number 20103
Report Number 20157
Test Date 9/9/2021 10:31:18 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	235	50	600
Force @ 1.5 mm (N)	1,175	850	1,400
Force @ 2.5 mm (N)	1,443	1,306	1,618
Force @ 3.0 mm (N)	1,476	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

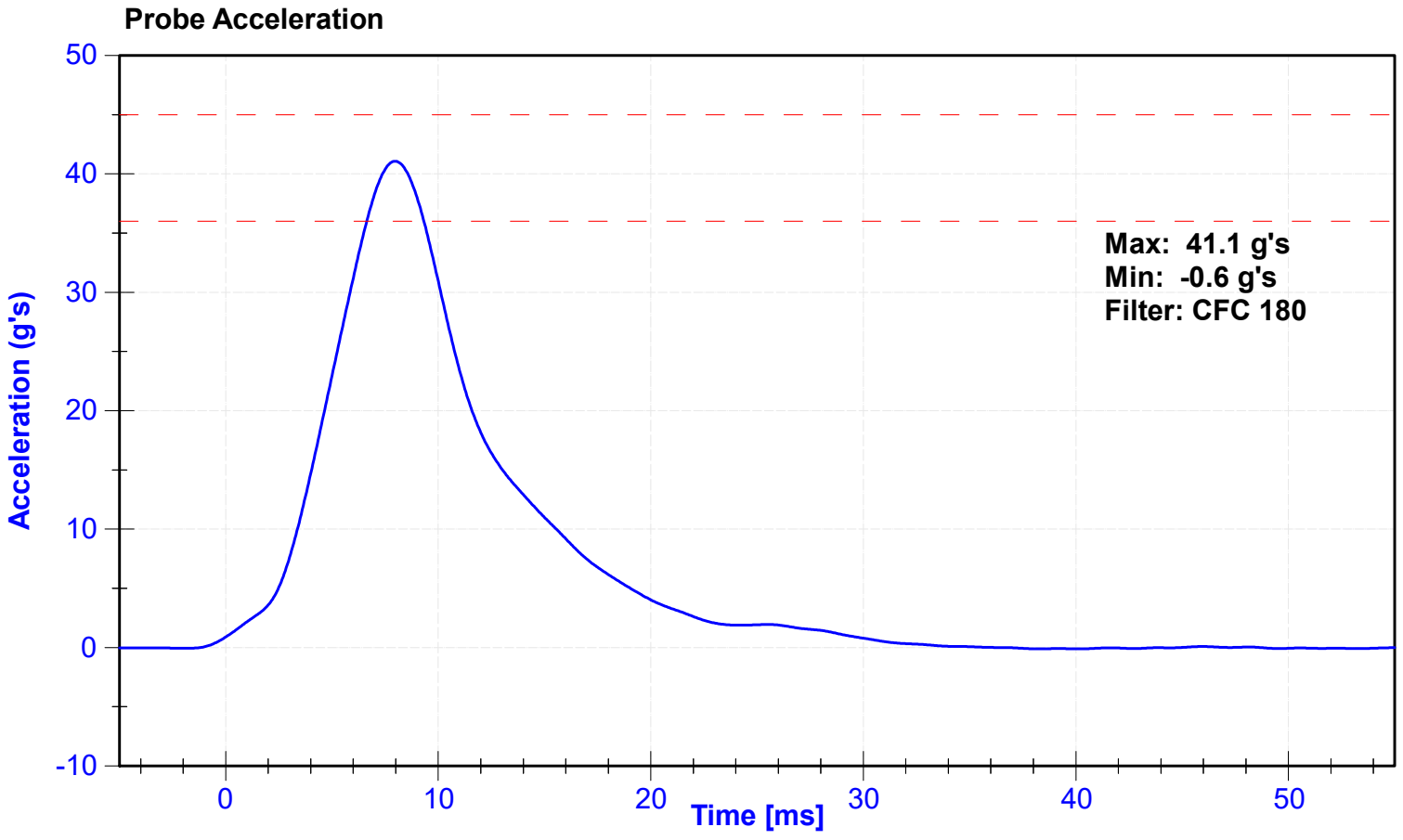
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

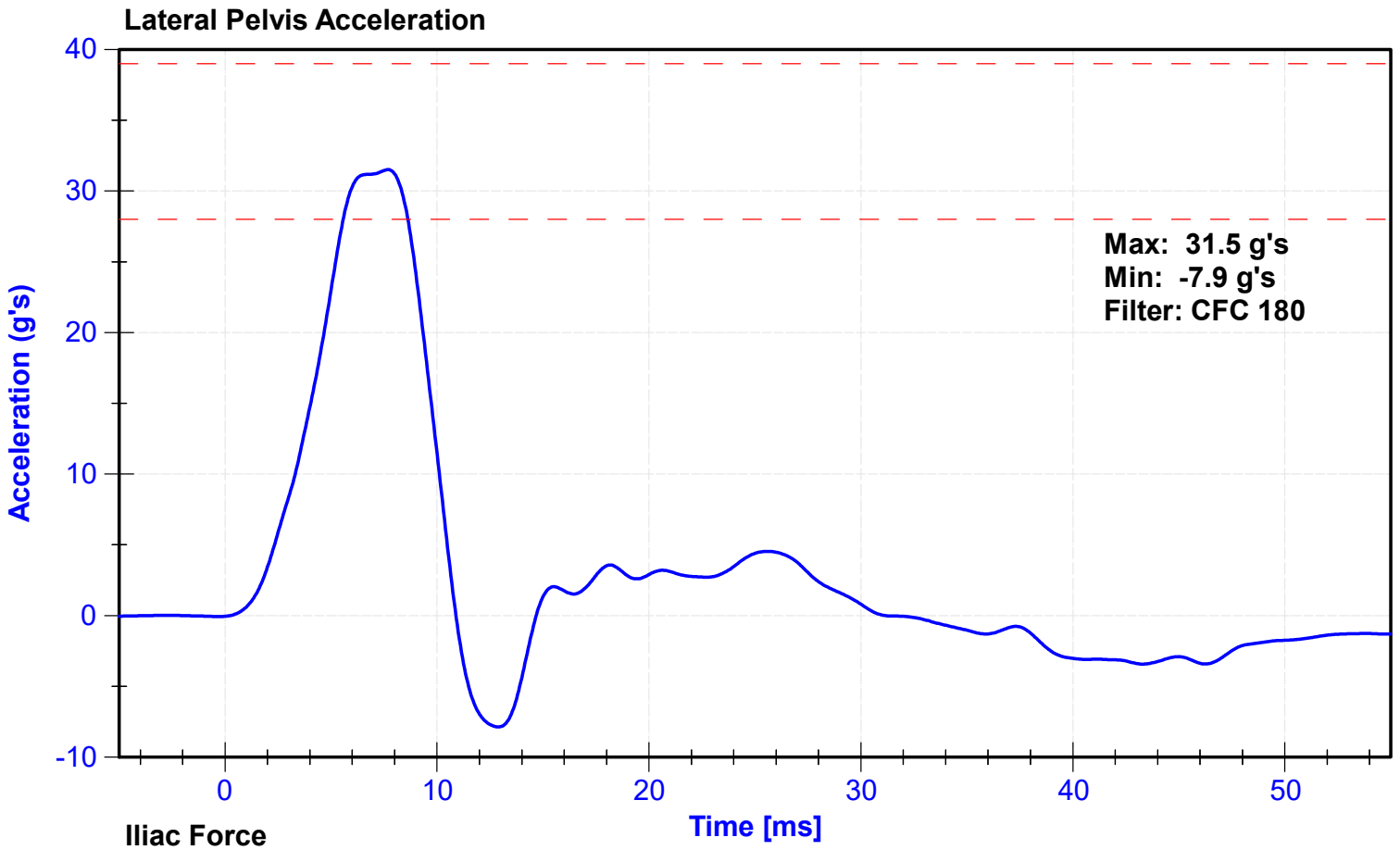
Results

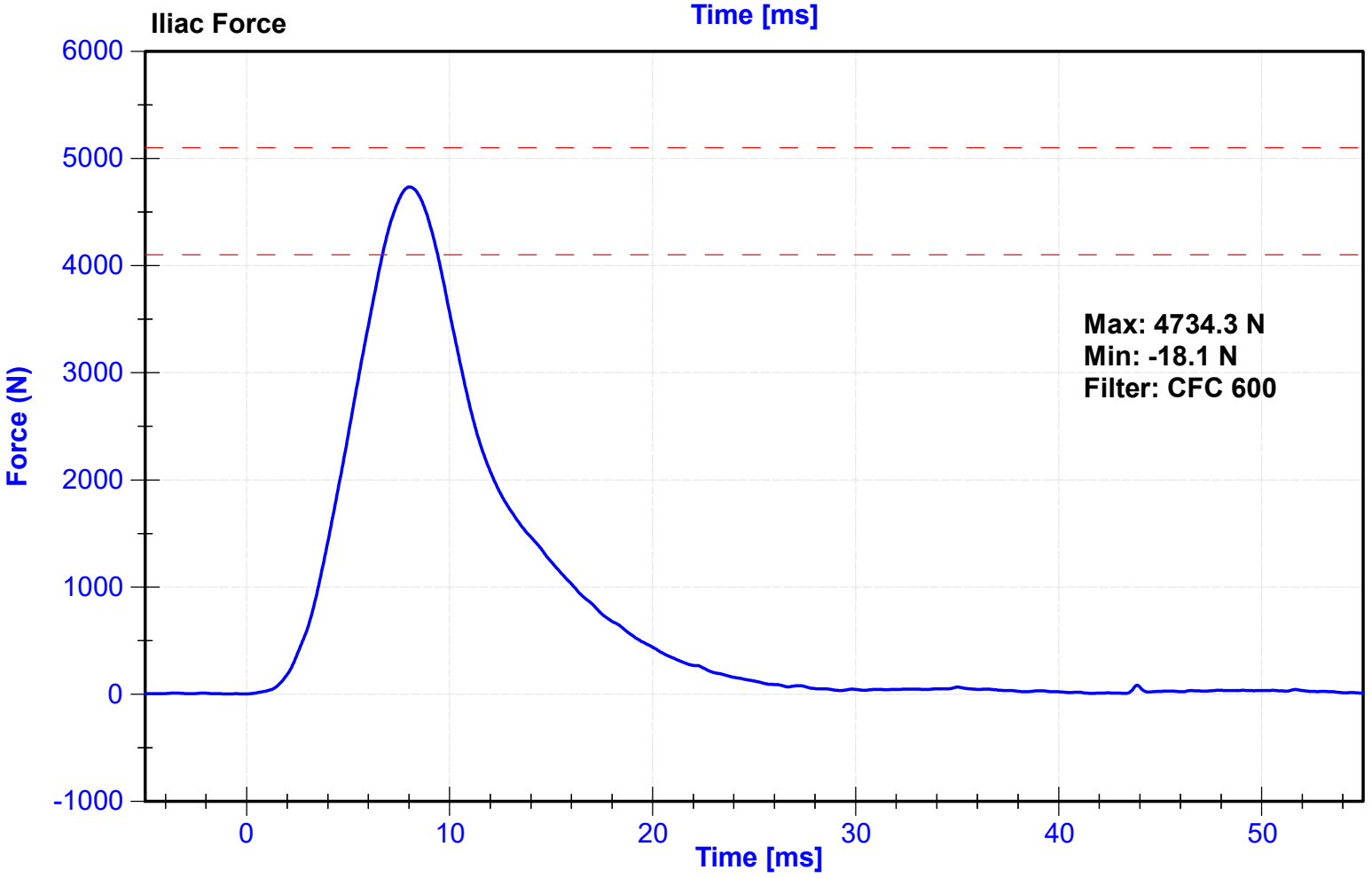
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	36	45	g's	41.1	Pass
Lateral Pelvis Acceleration	28	39	g's	31.5	Pass
Iliac Force	4100	5100	N	4734.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Iliac Load Cell	Denton	280-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: 31.5 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: 4734.3 N
Min: -18.1 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

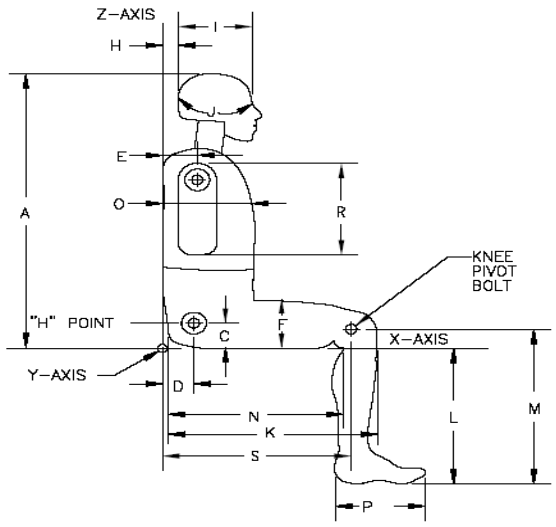
SERIAL NO:300

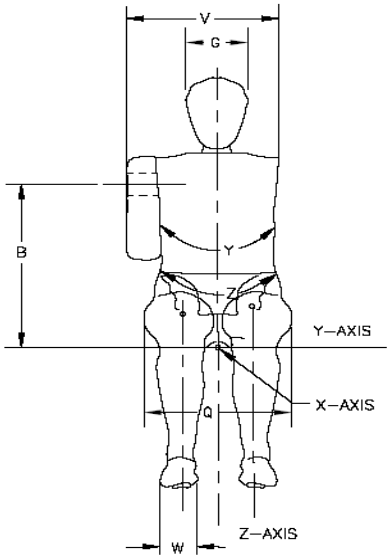
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 02/25/2023

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	444	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	122	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	42	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	199	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	876	Pass
Z	Waist Circumference	761	791	777	Pass

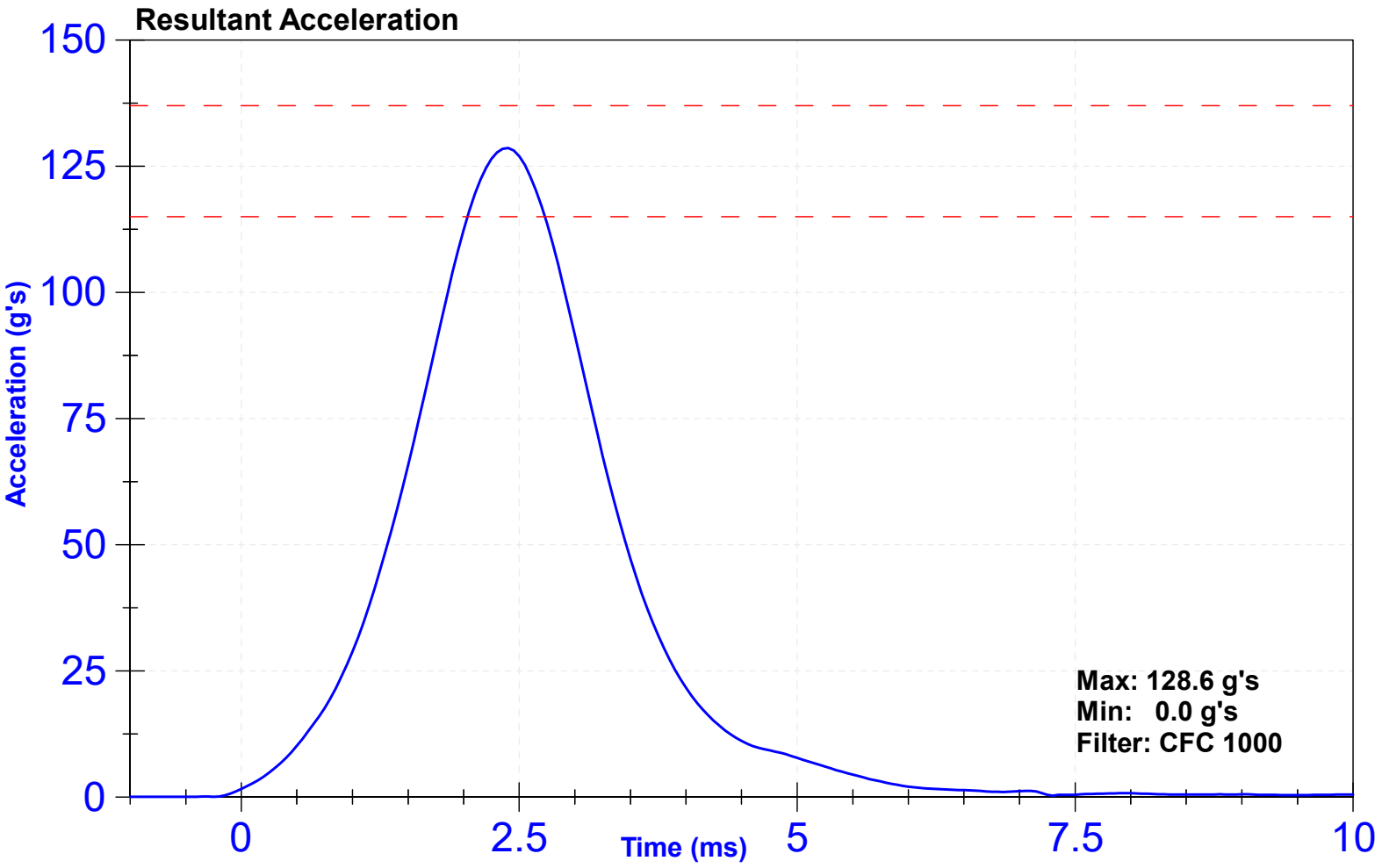
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

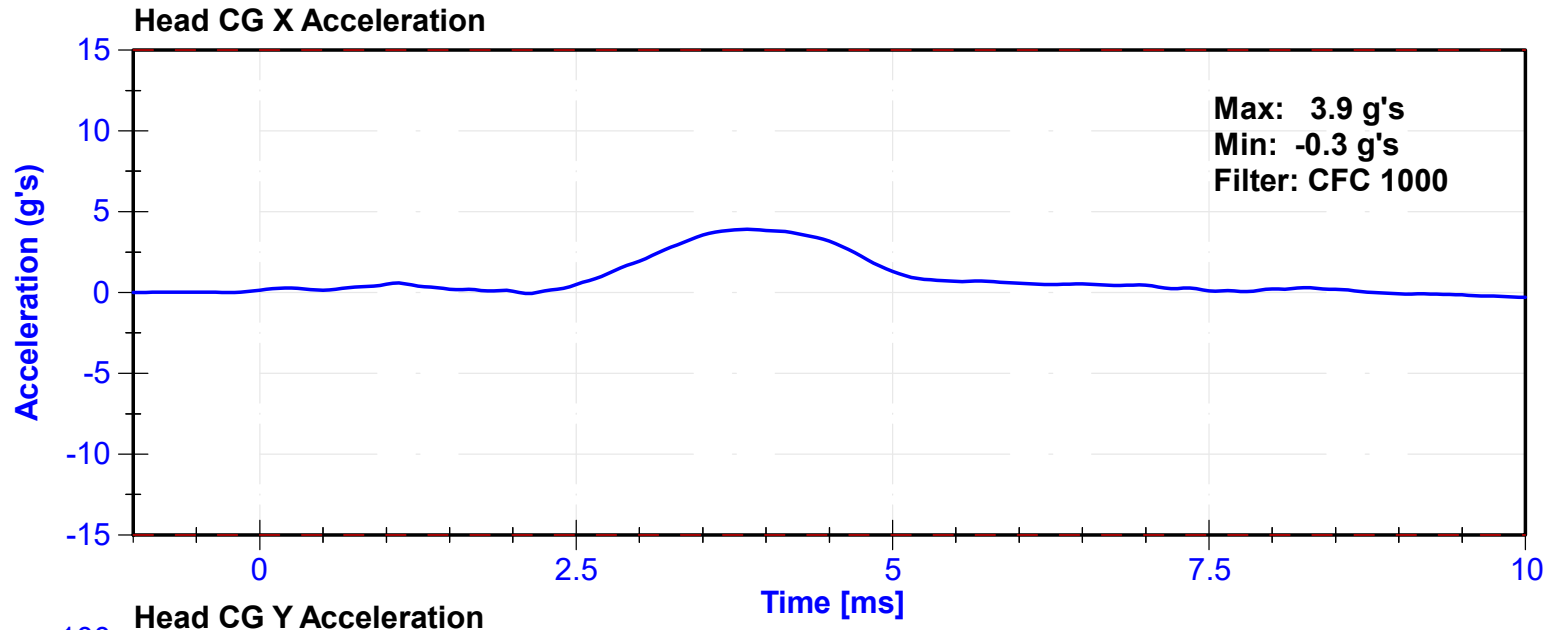
Results

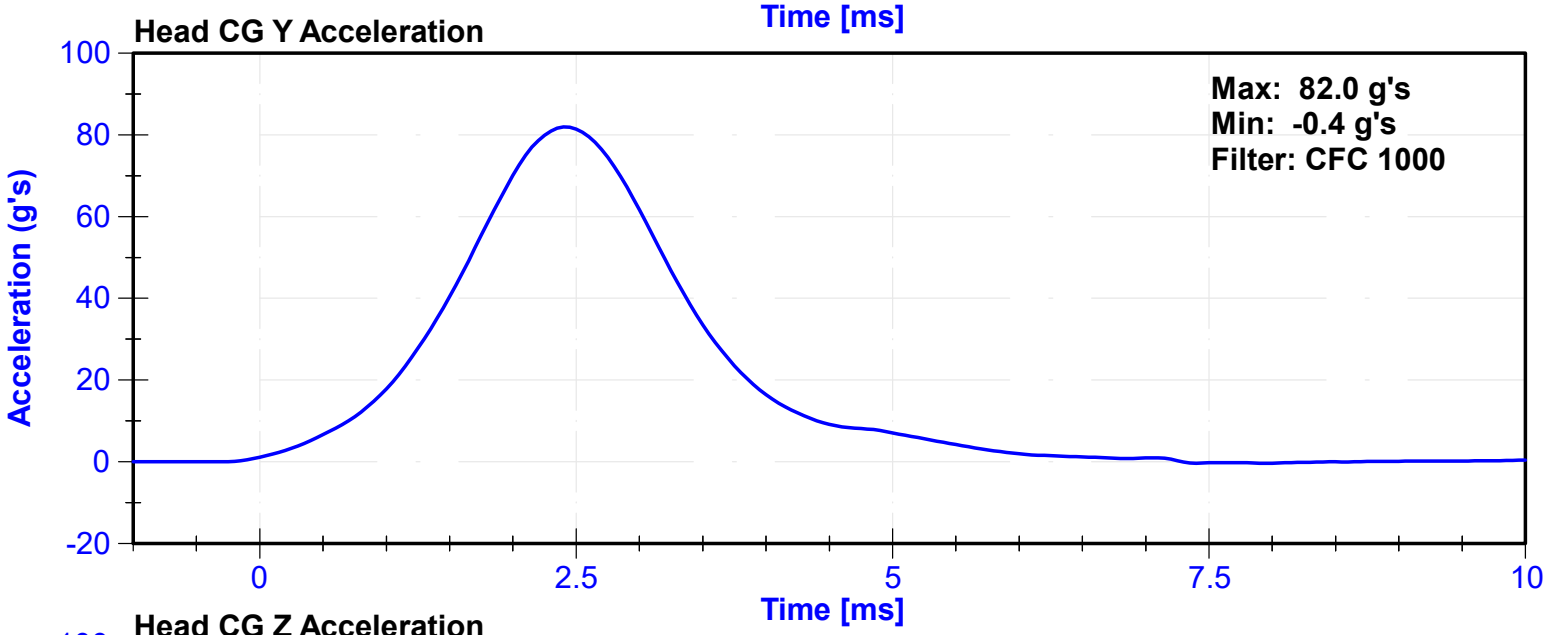
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.2	Pass
Resultant Acceleration	115	137	g's	128.6	Pass
Oscillation	0	15	%	0.9	Pass
Fore-Aft Acceleration	-15	15	g's	3.9	Pass

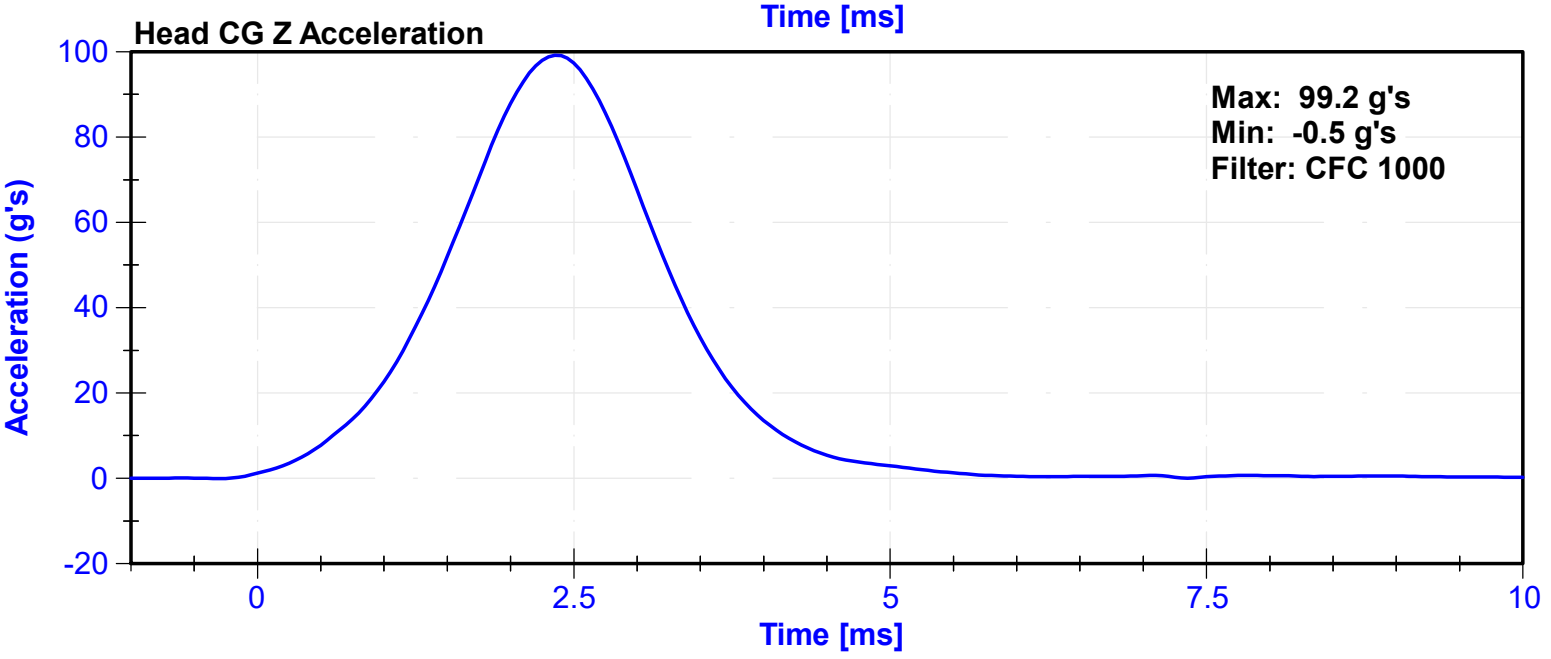
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	10/3/2022	4/1/2023
Y Accelerometer	Endevco	P58777	10/3/2022	4/1/2023
Z Accelerometer	Endevco	P79189	10/3/2022	4/1/2023




Head CG X Acceleration
Max: 3.9 g's
Min: -0.3 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: 82.0 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 99.2 g's
Min: -0.5 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]

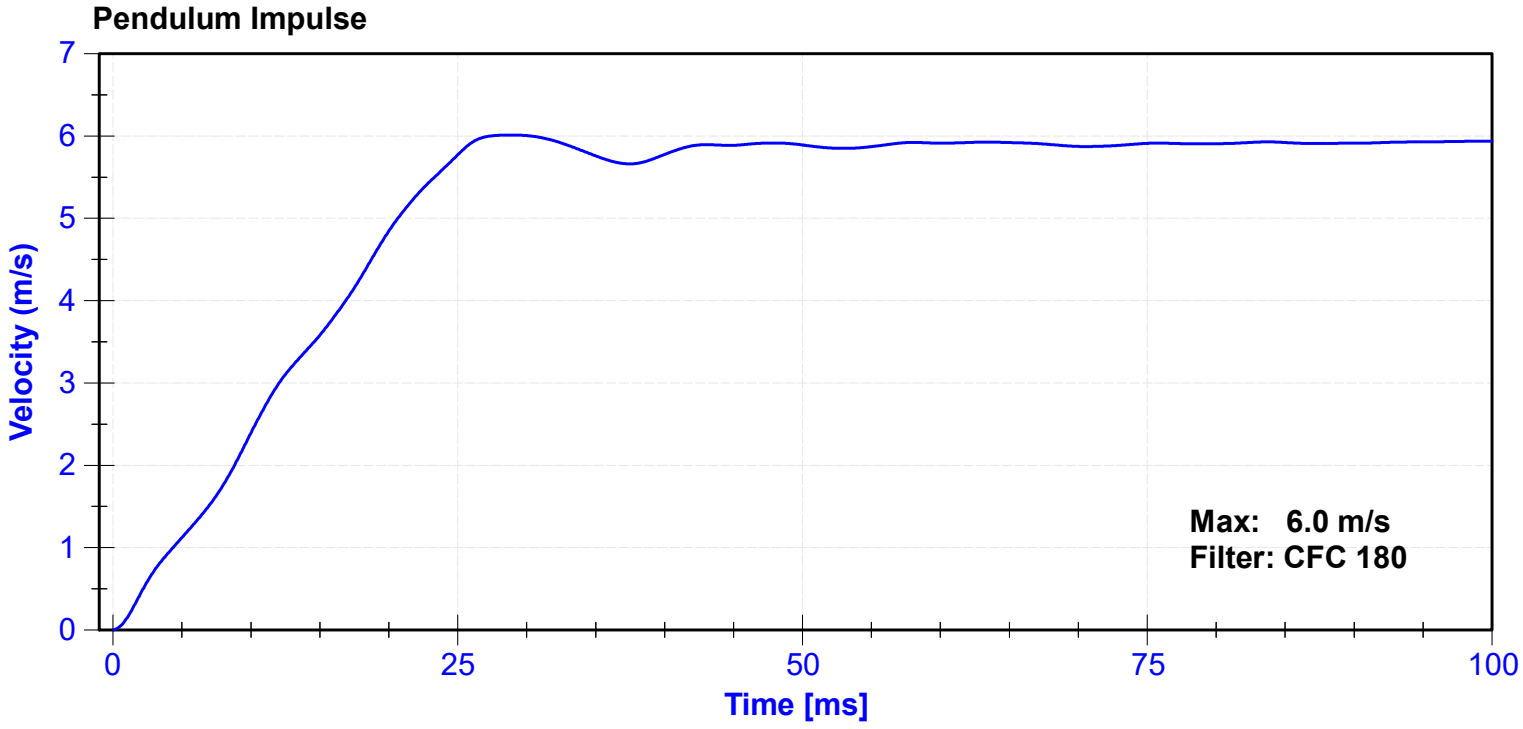
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

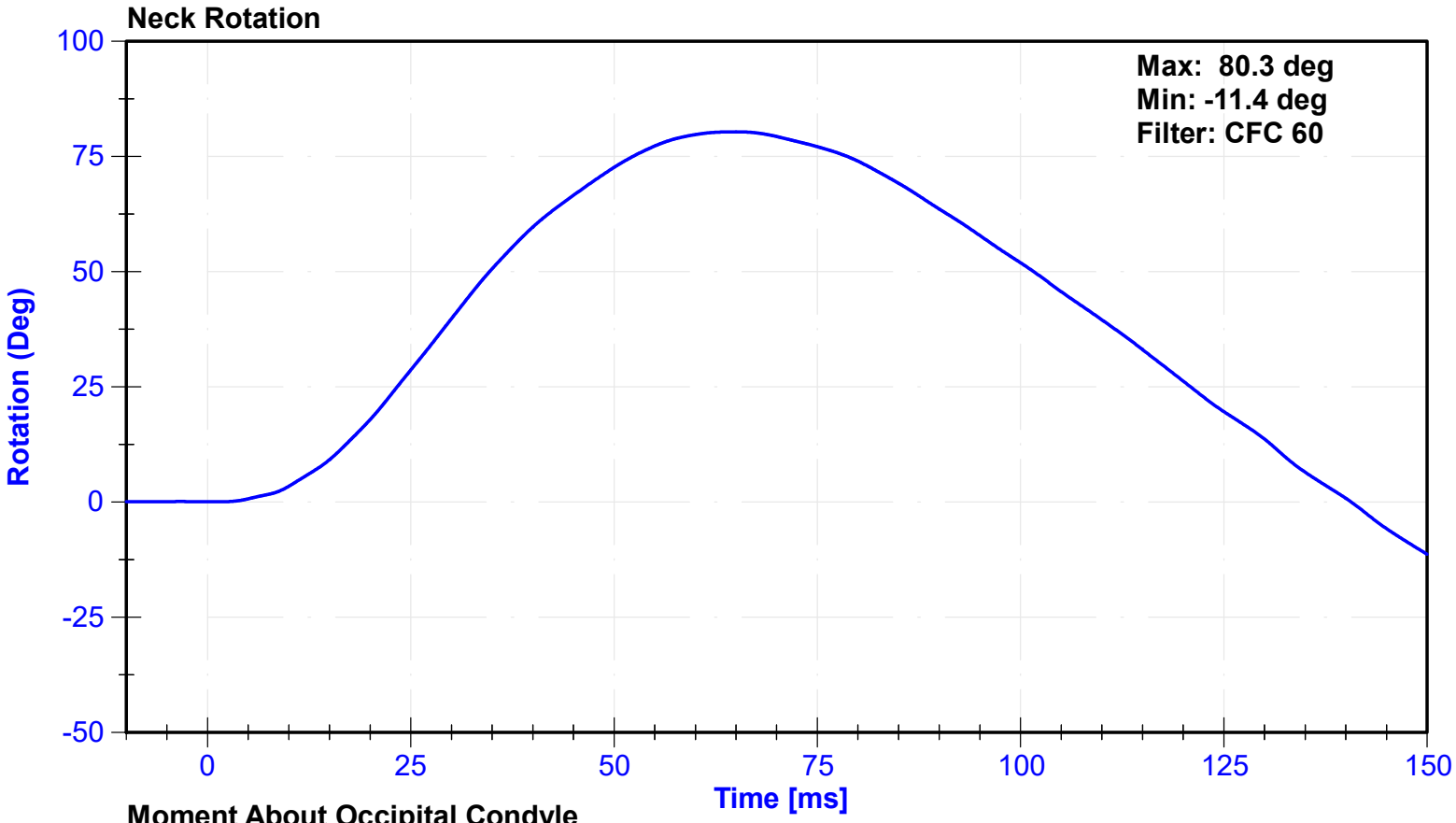
Results

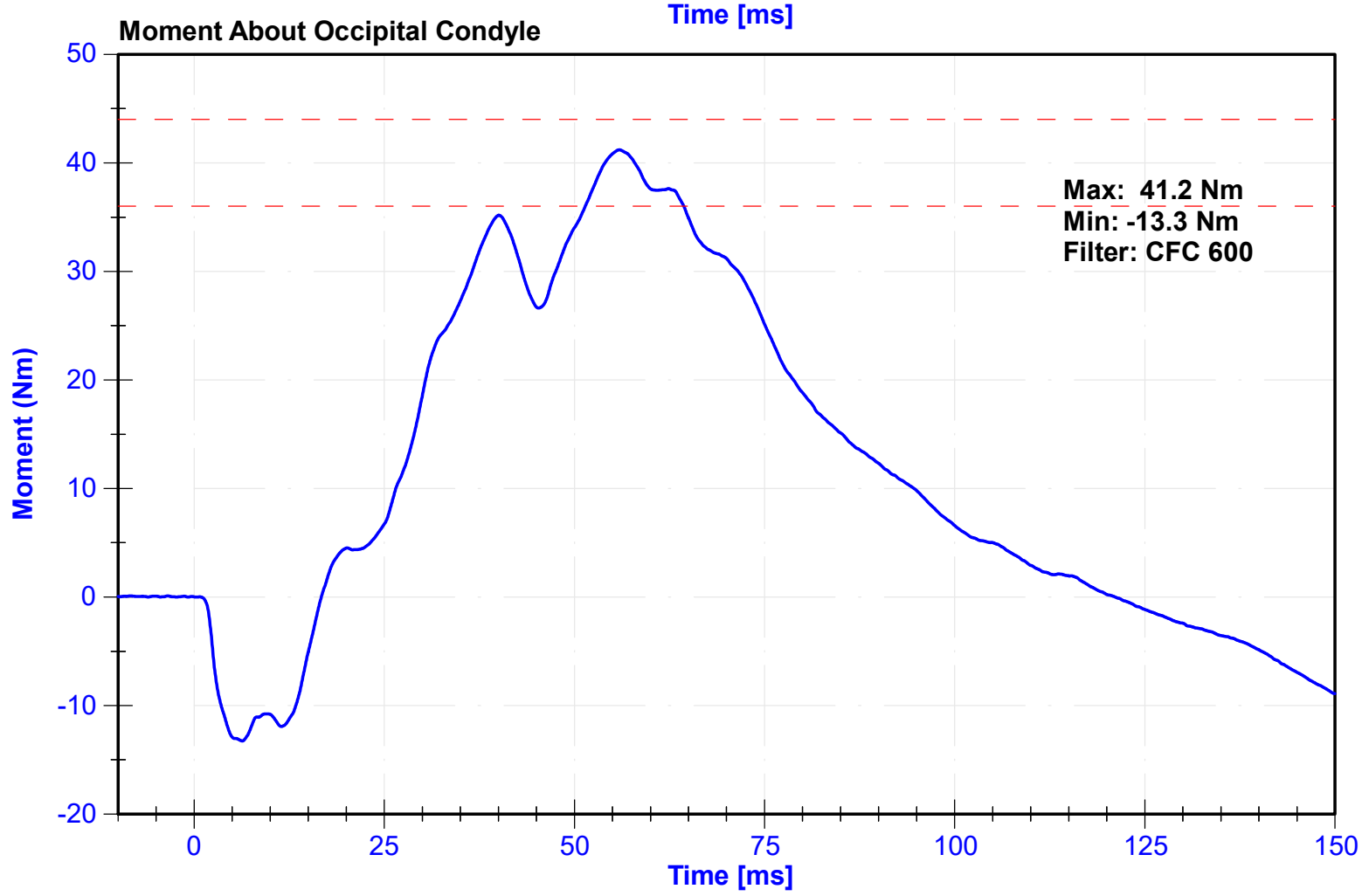
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	5.51	5.63	m/s	5.576	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.39	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.58	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.84	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.77	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.01	Pass
Neck Rotation	71	81	deg	80.3	Pass
Time at Maximum Rotation	50	70	ms	64.9	Pass
Moment about the OC	36	44	Nm	41.2	Pass
Moment Decay to 0 Nm	102	126	ms	121.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/31/2022	4/29/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023




Neck Rotation
Max: 80.3 deg
Min: -11.4 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: 41.2 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]

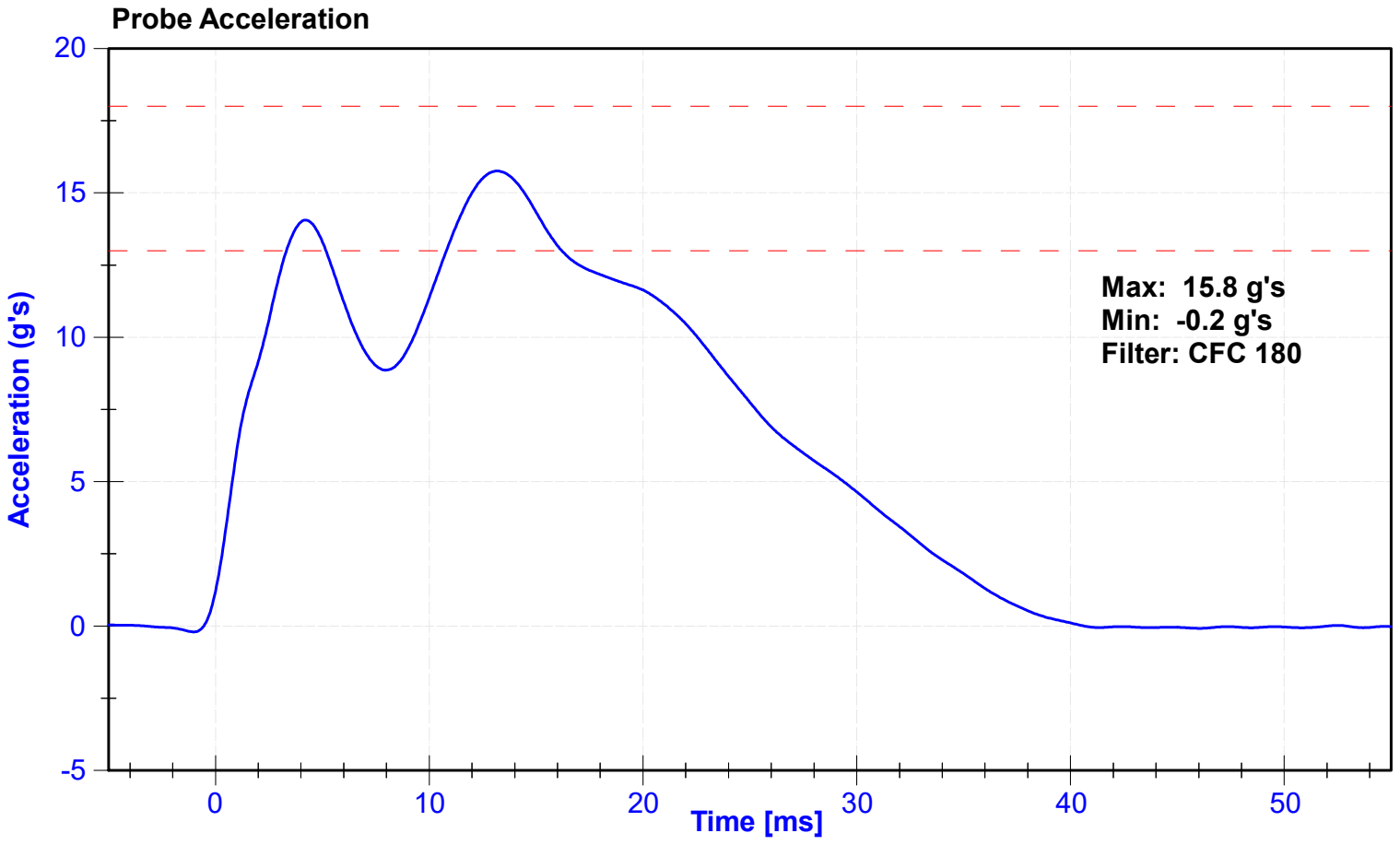
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

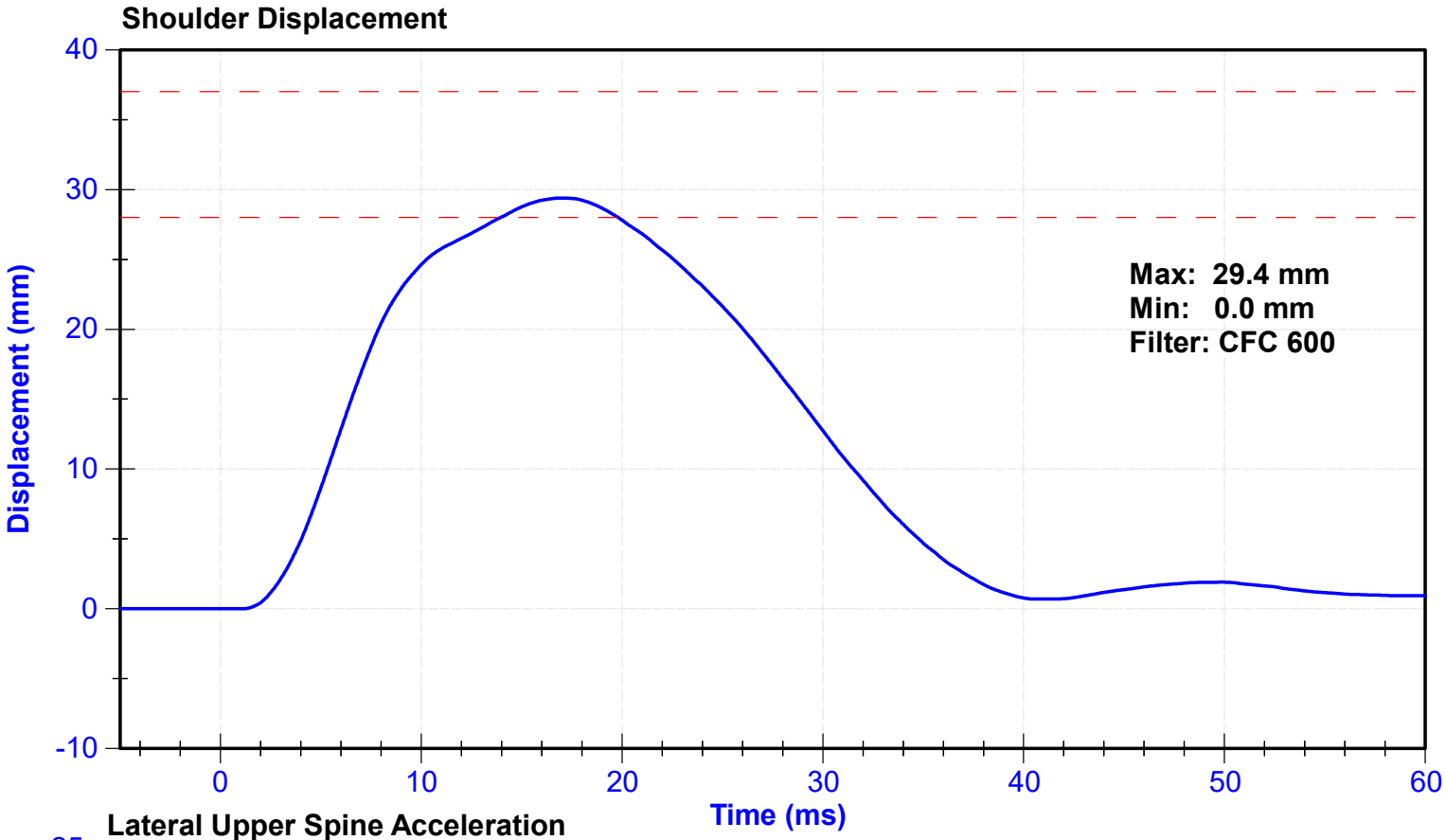
Results

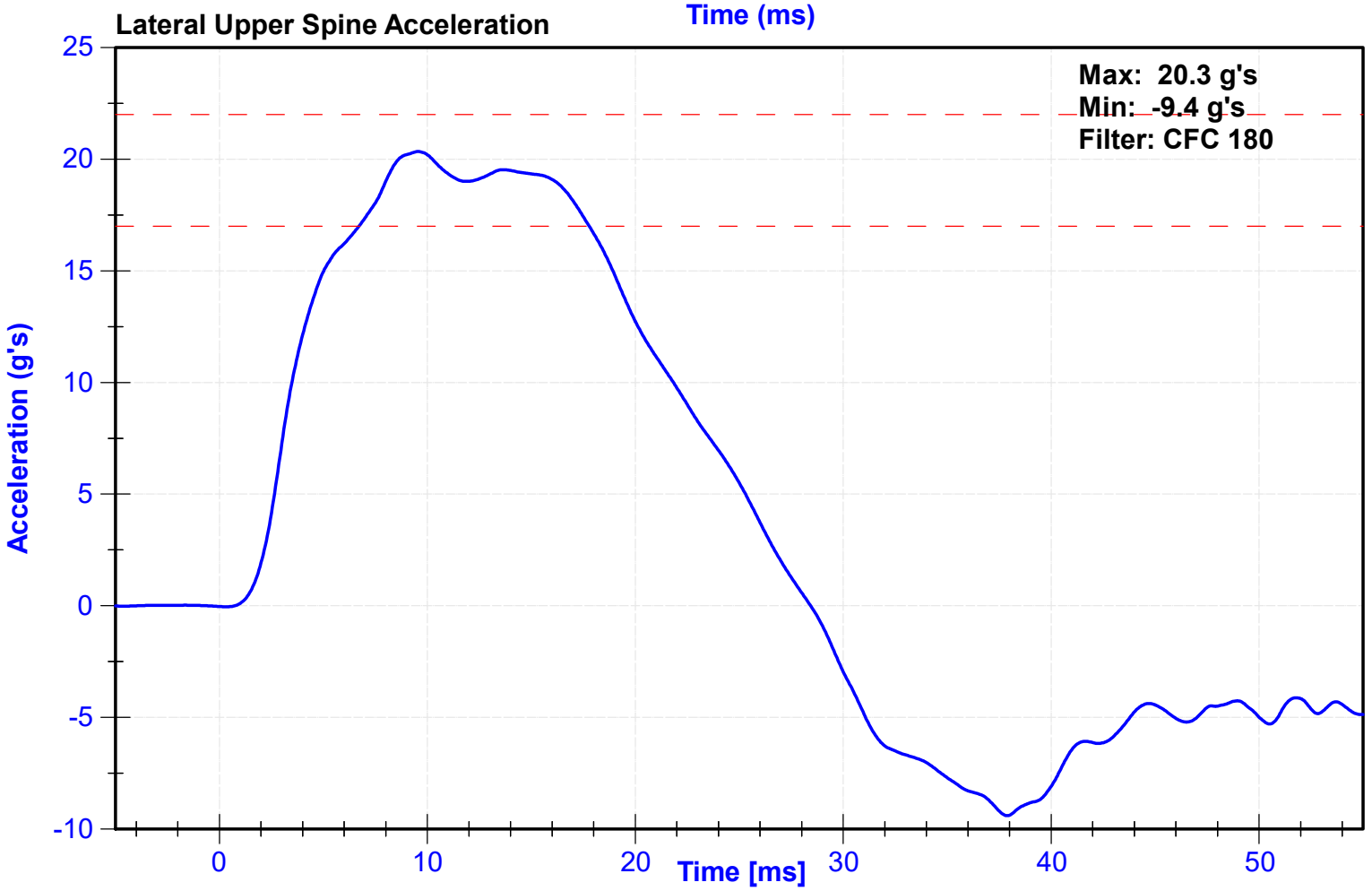
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	29.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023




Shoulder Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time (ms)
Max: 29.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]
Max: 20.3 g's
Min: -9.4 g's
Filter: CFC 180

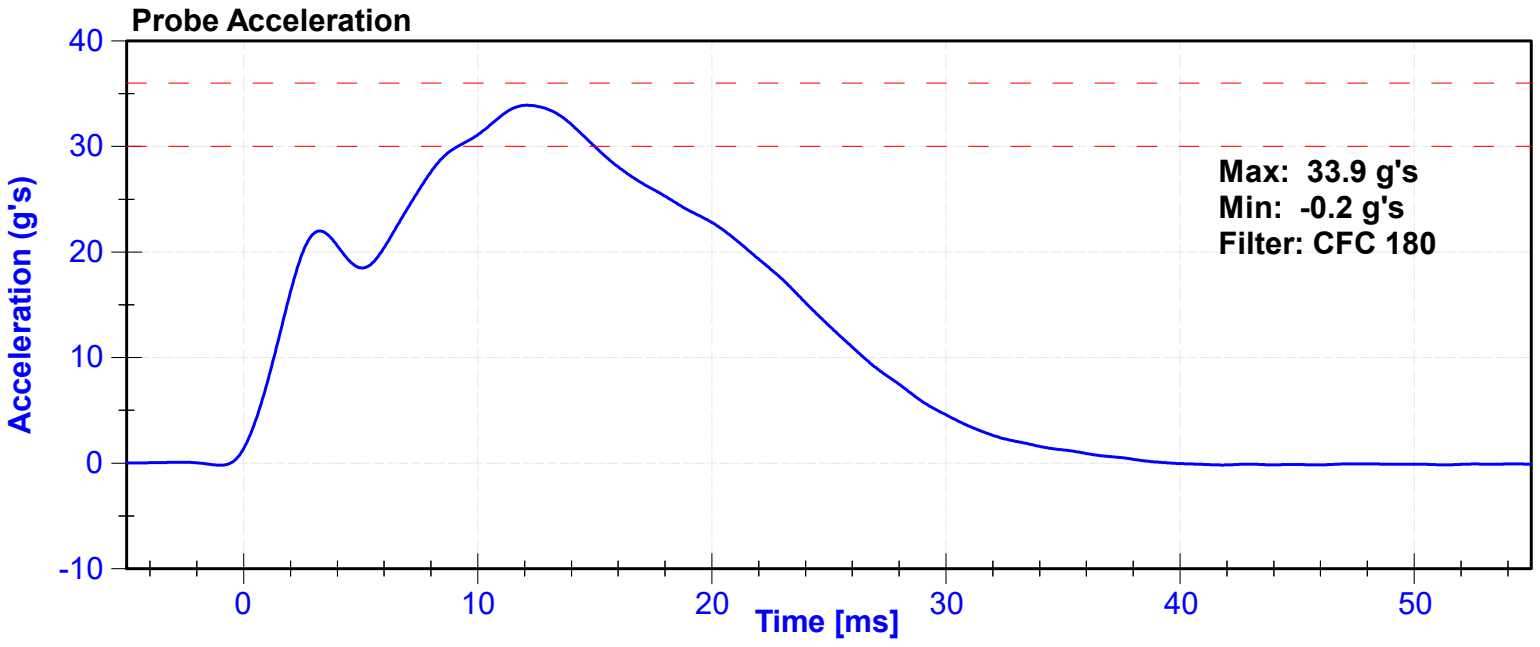
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

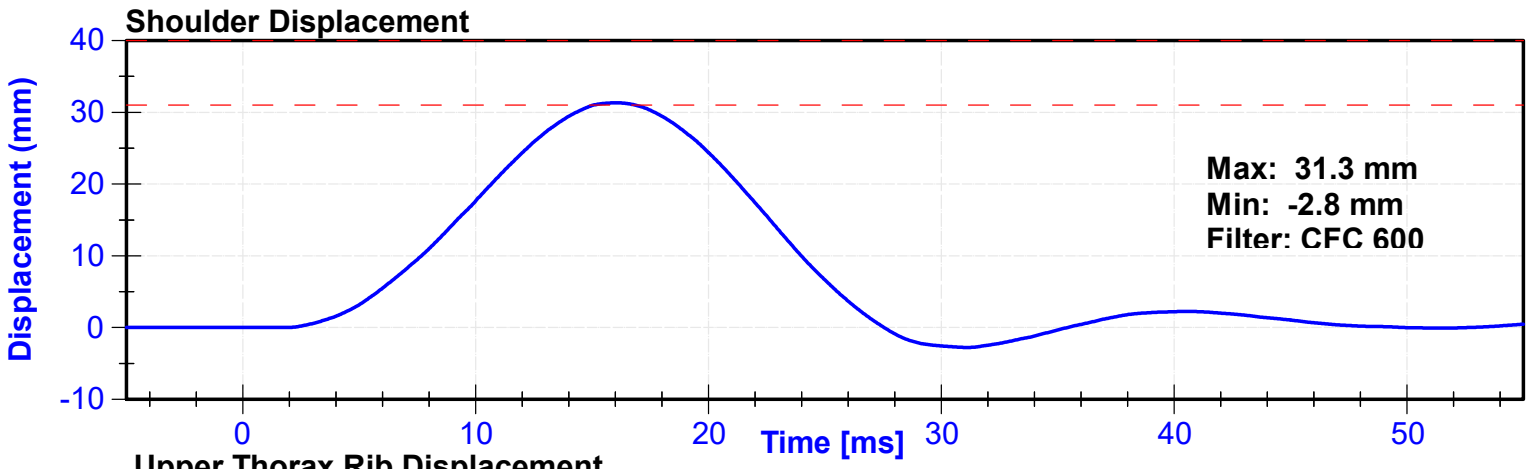
Results

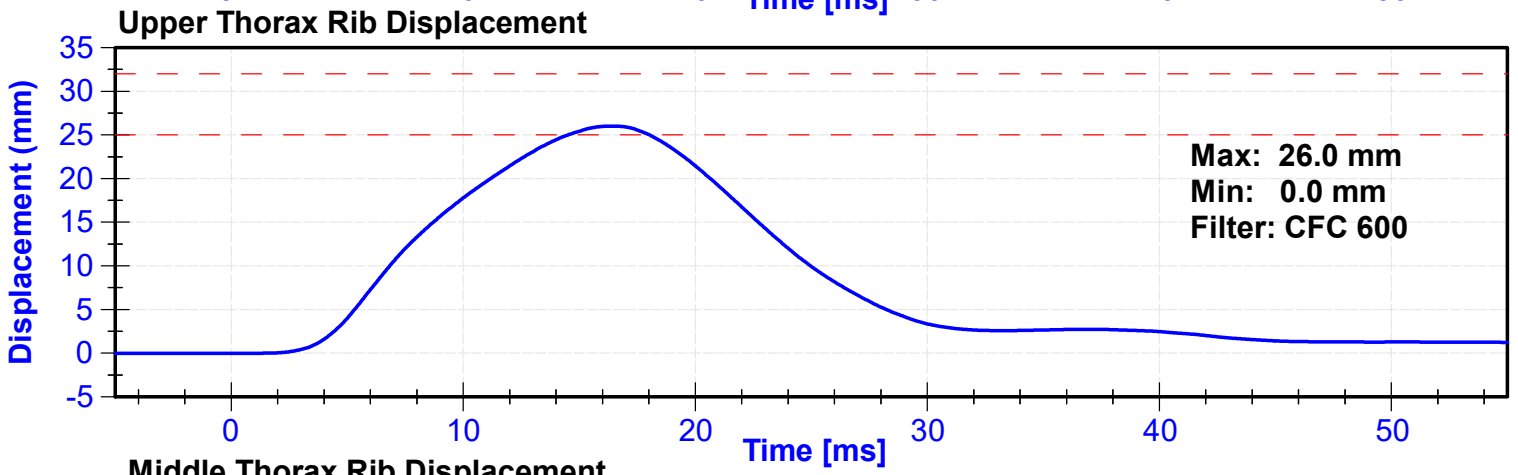
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	6.6	6.8	m/s	6.74	Pass
Probe Acceleration after 5 ms	30	36	g's	33.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.8	Pass
Lateral Lower Spine Acceleration	29	37	g's	30.1	Pass
Shoulder Deflection	31	40	mm	31.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.0	Pass
Mid Thorax Rib Deflection	30	36	mm	30.8	Pass
Lower Thorax Rib Deflection	32	38	mm	34.4	Pass

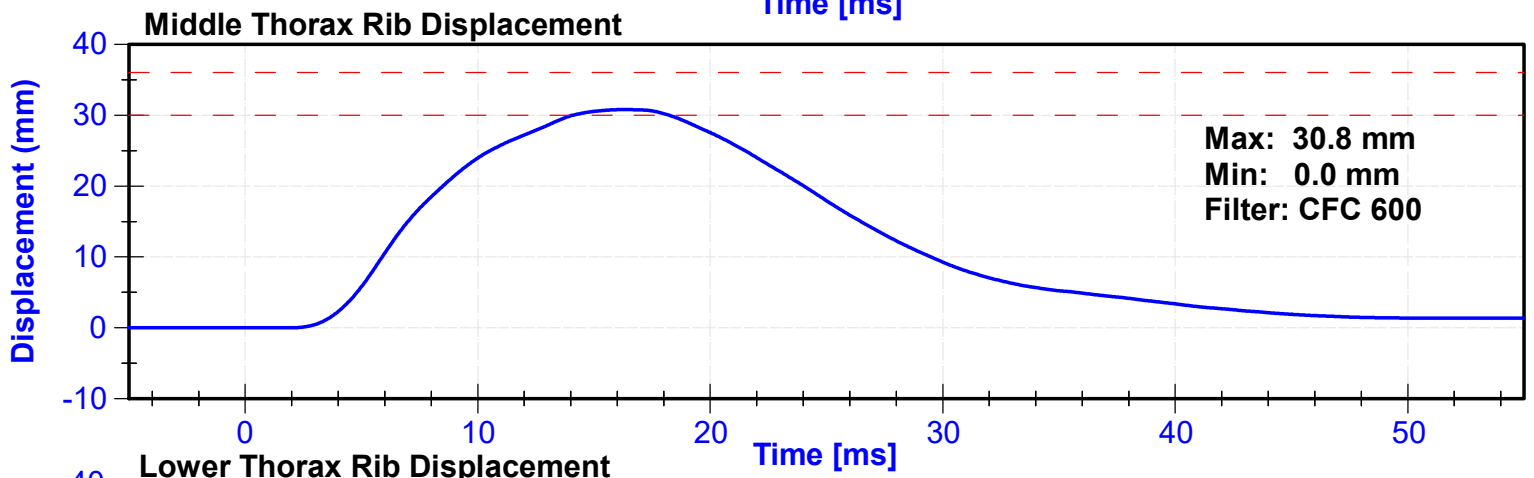
Transducer Calibrations

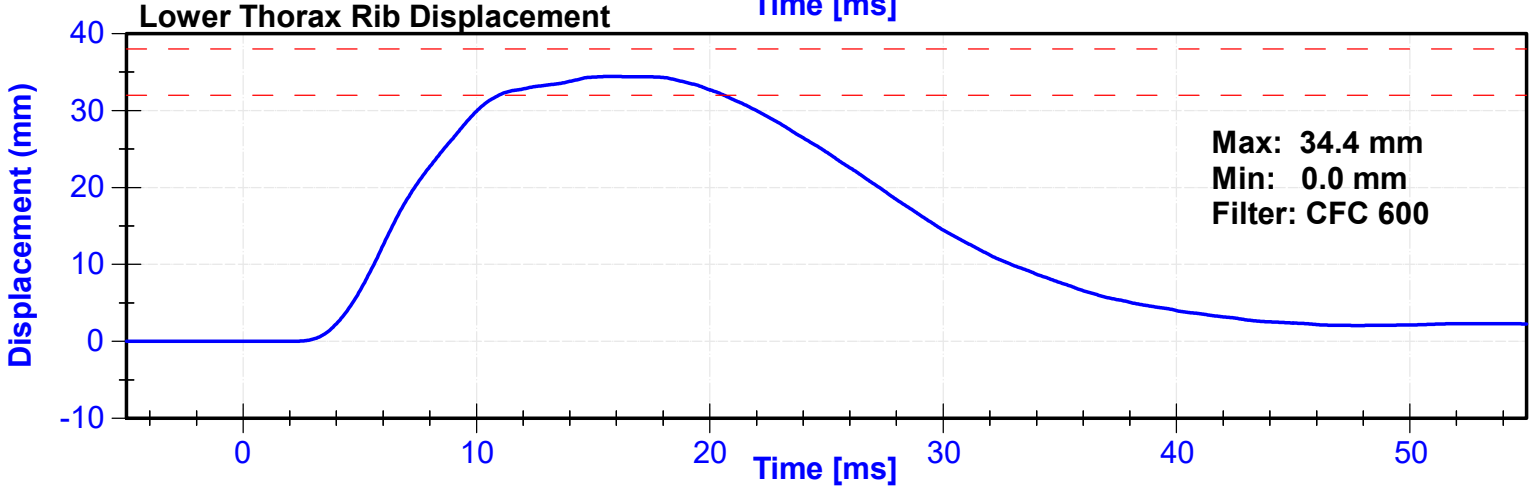
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Upper Spine T12 Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Shoulder Potentiometer	Servo	053GFE	10/4/2022	4/4/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

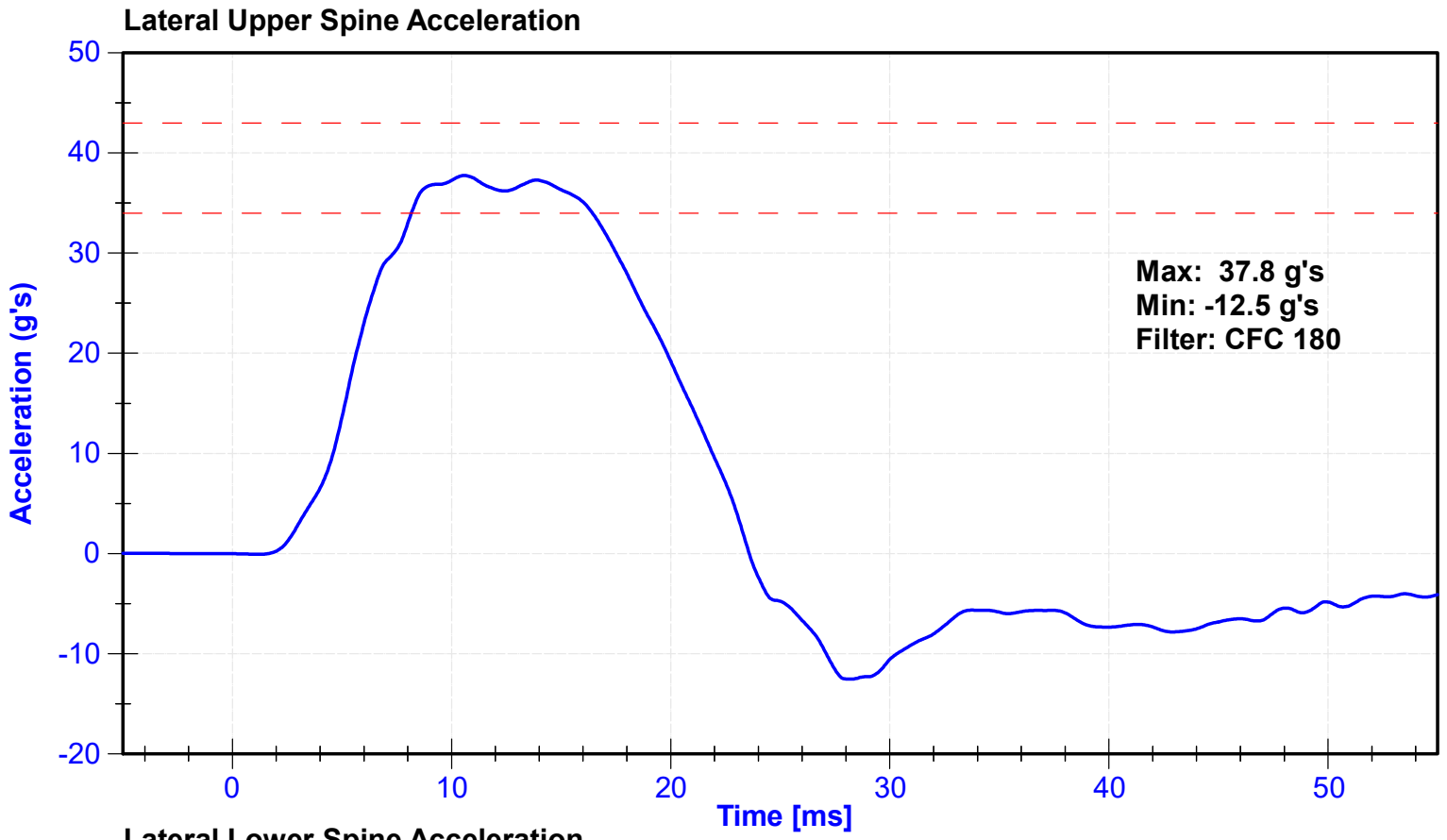


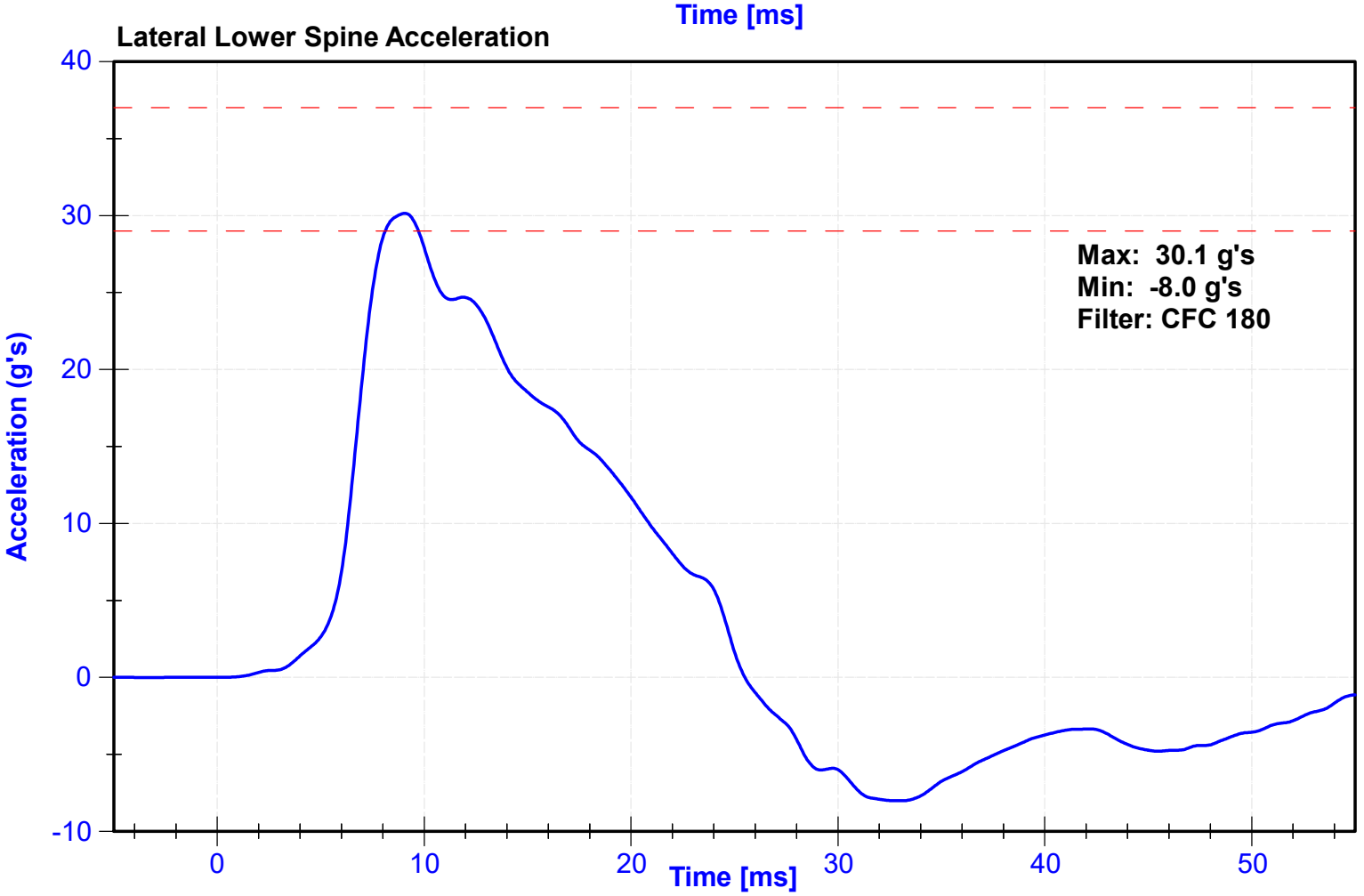

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.3 mm
Min: -2.8 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.0 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.8 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 37.8 g's
Min: -12.5 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 30.1 g's
Min: -8.0 g's
Filter: CFC 180

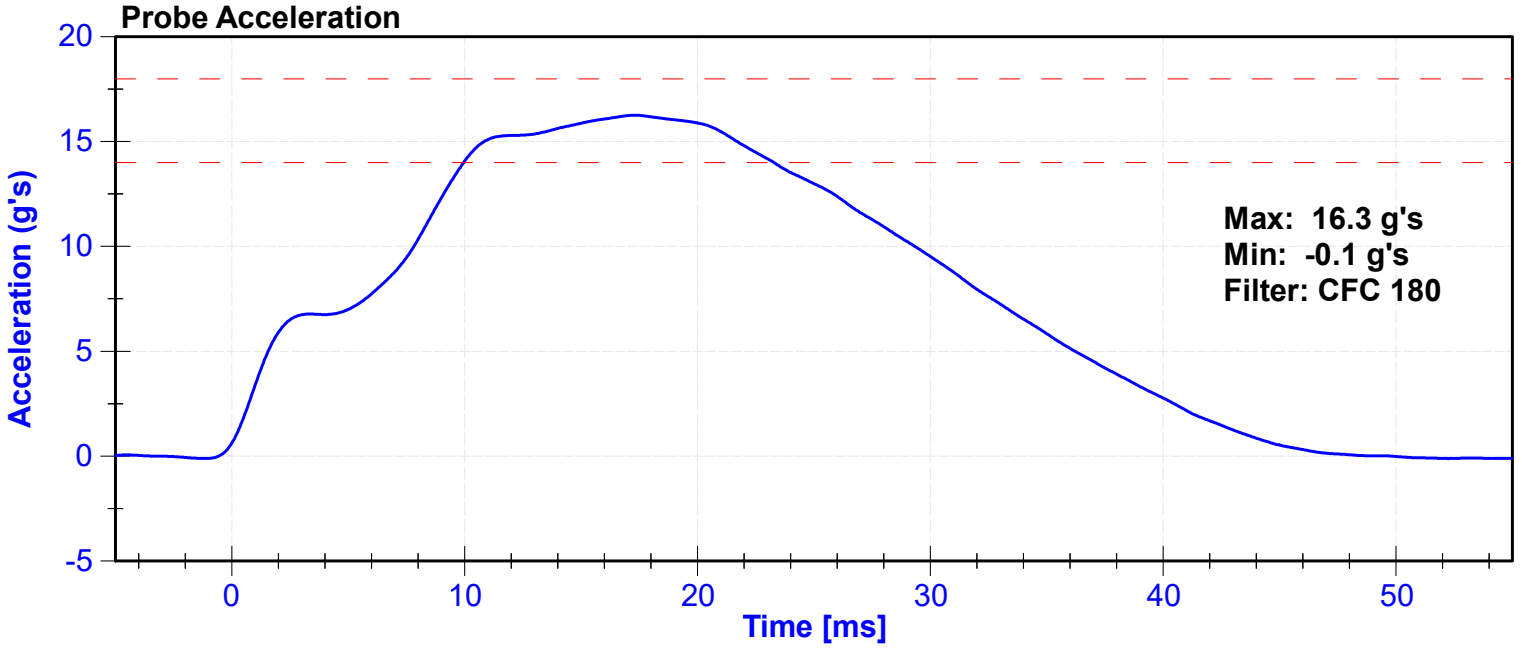
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

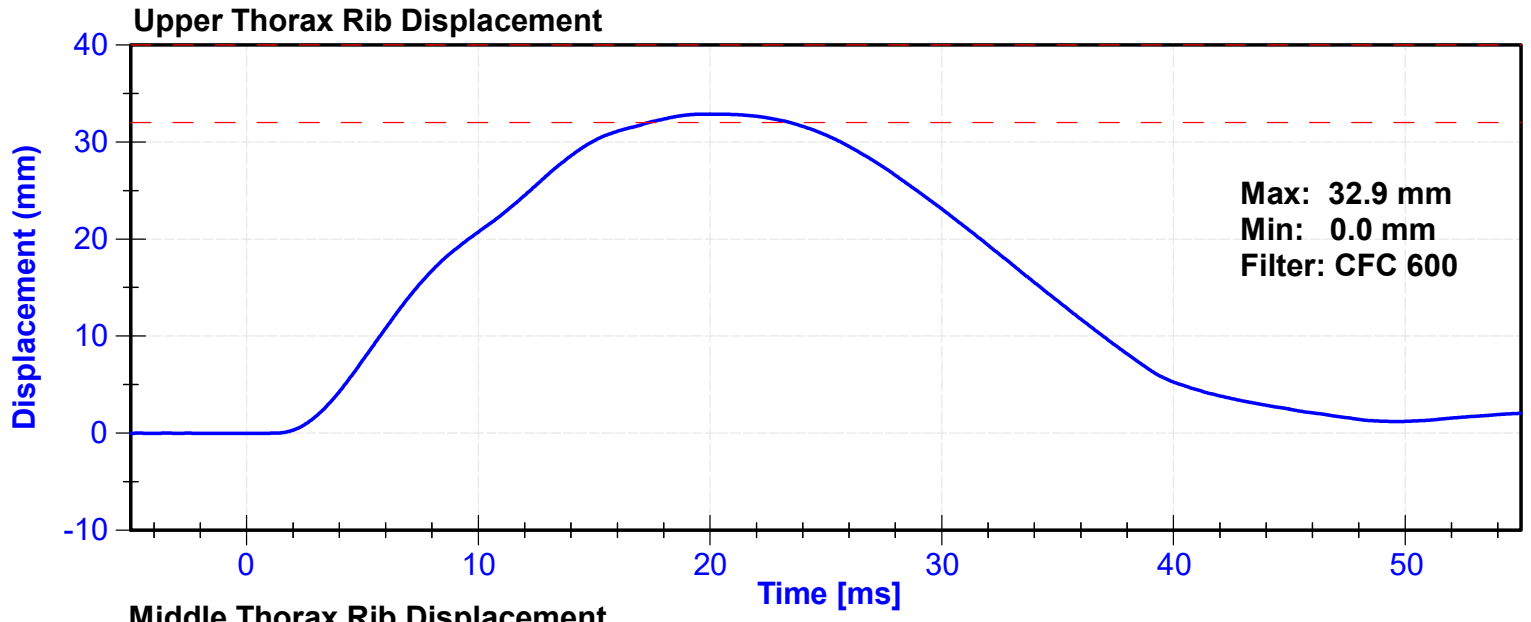
Results

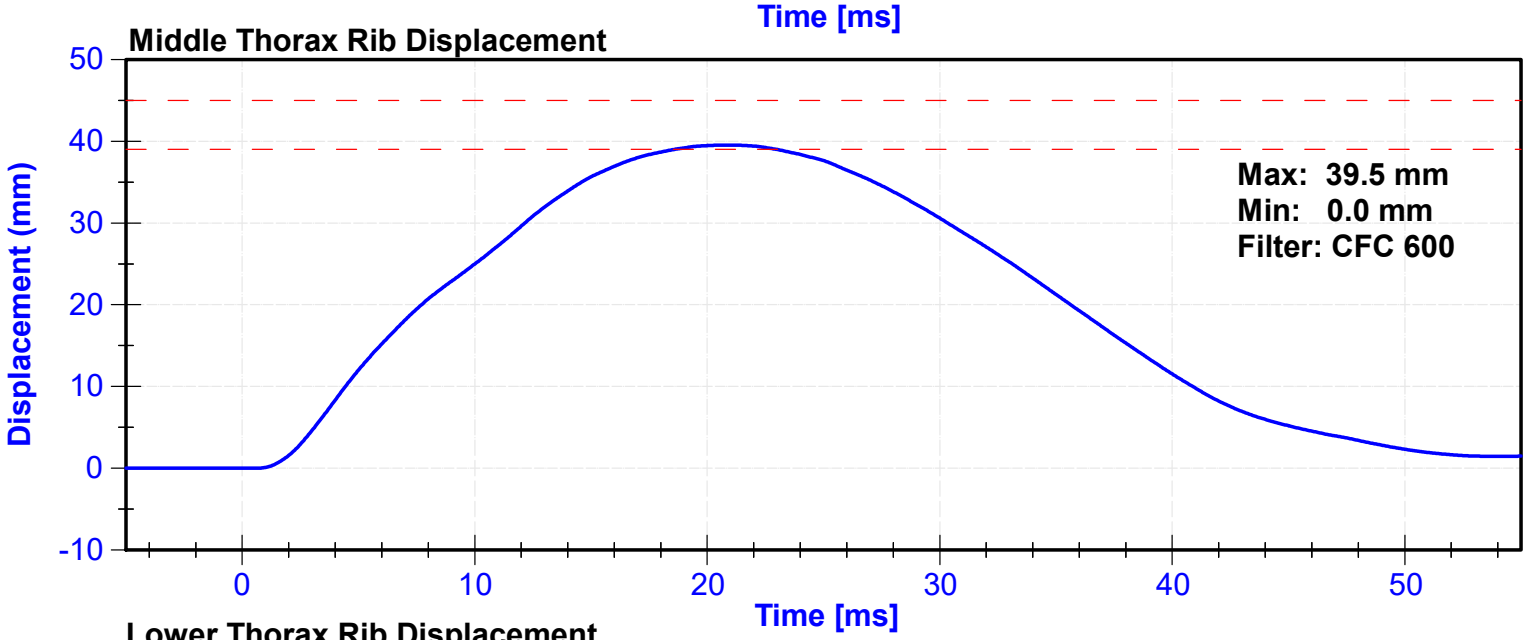
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.2	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.3	Pass
Upper Thorax Rib Deflection	32	40	mm	32.9	Pass
Middle Thorax Rib Deflection	39	45	mm	39.5	Pass
Lower Thorax Rib Deflection	35	43	mm	39.6	Pass

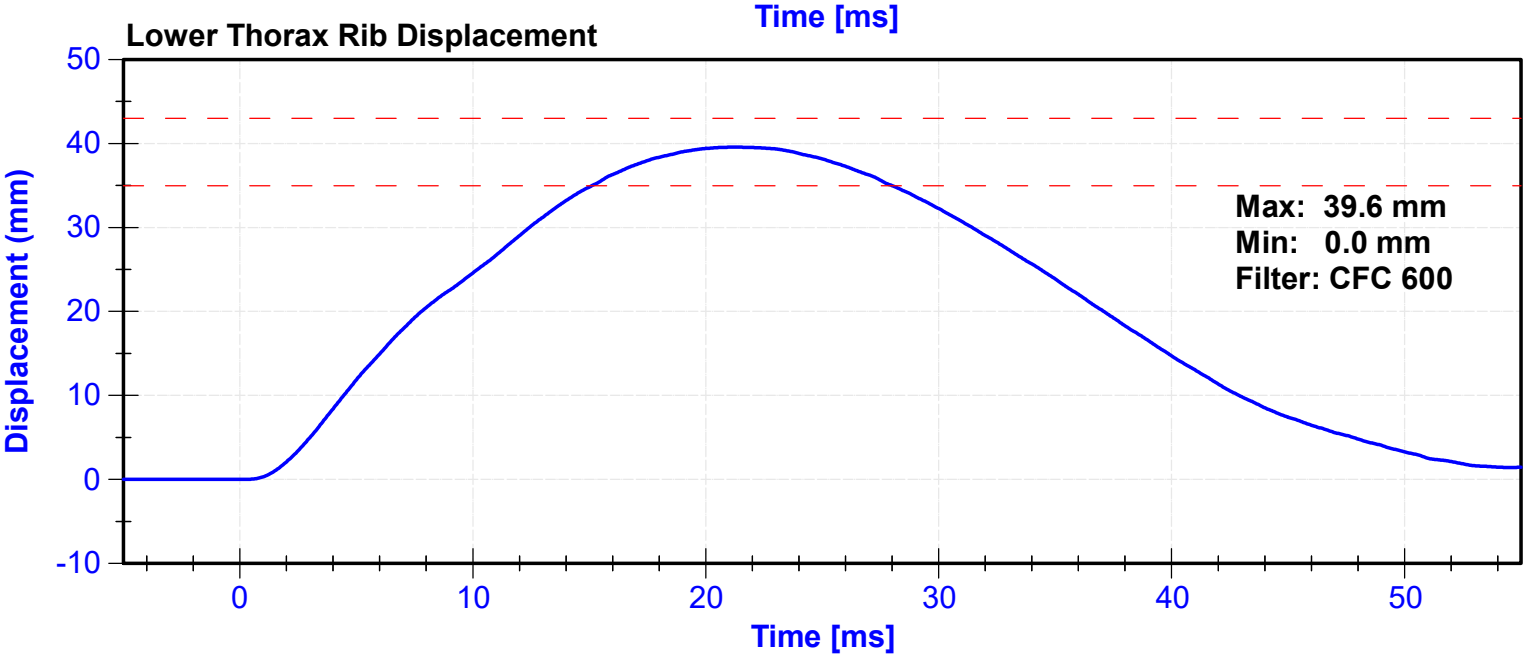
Transducer Calibrations

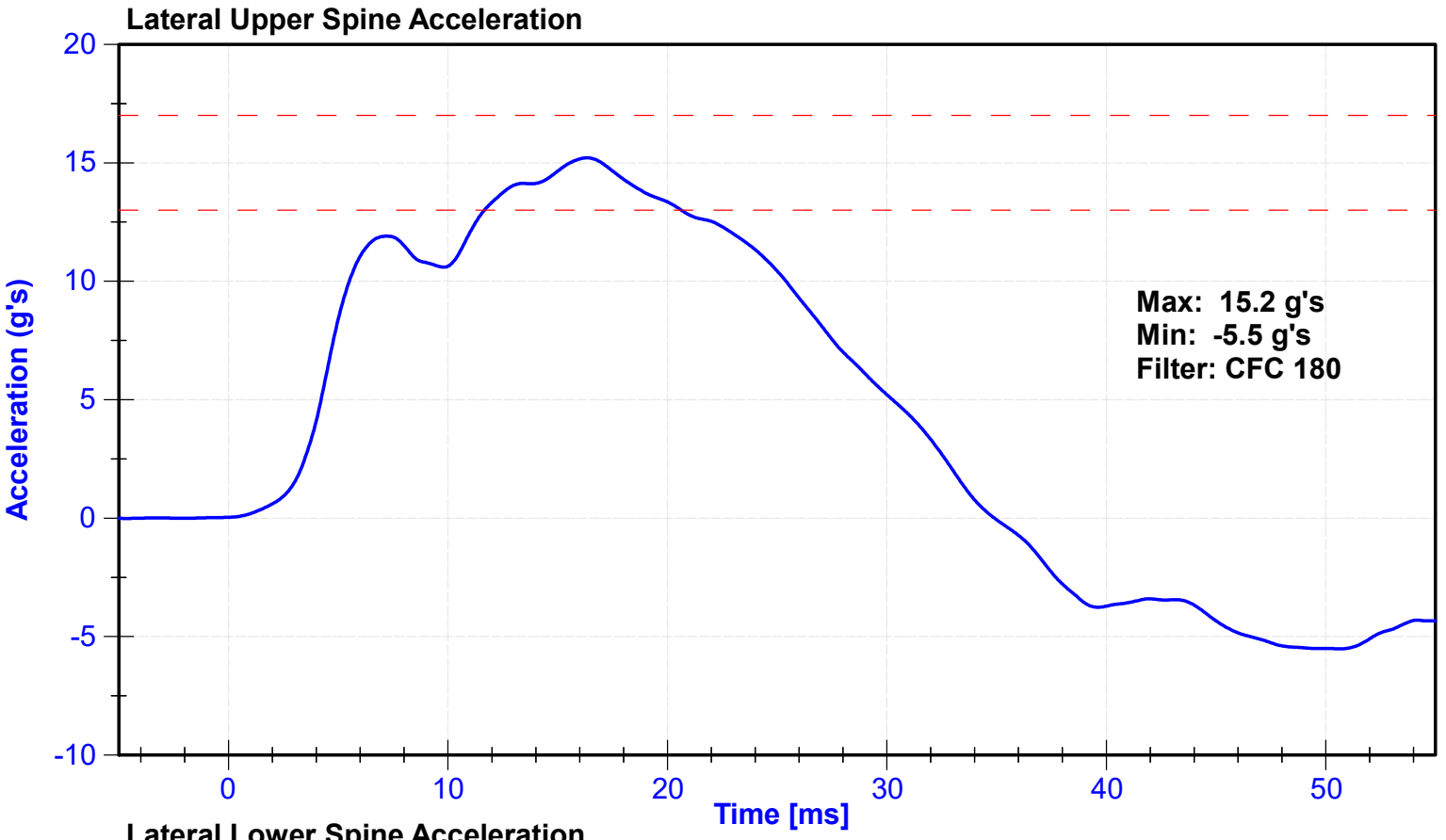
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	T20880	10/3/2022	4/1/2023
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/4/2022	4/4/2023
Middle Thorax Rib Potentiometer	Servo	040GFE	10/4/2022	4/4/2023
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/4/2022	4/4/2023

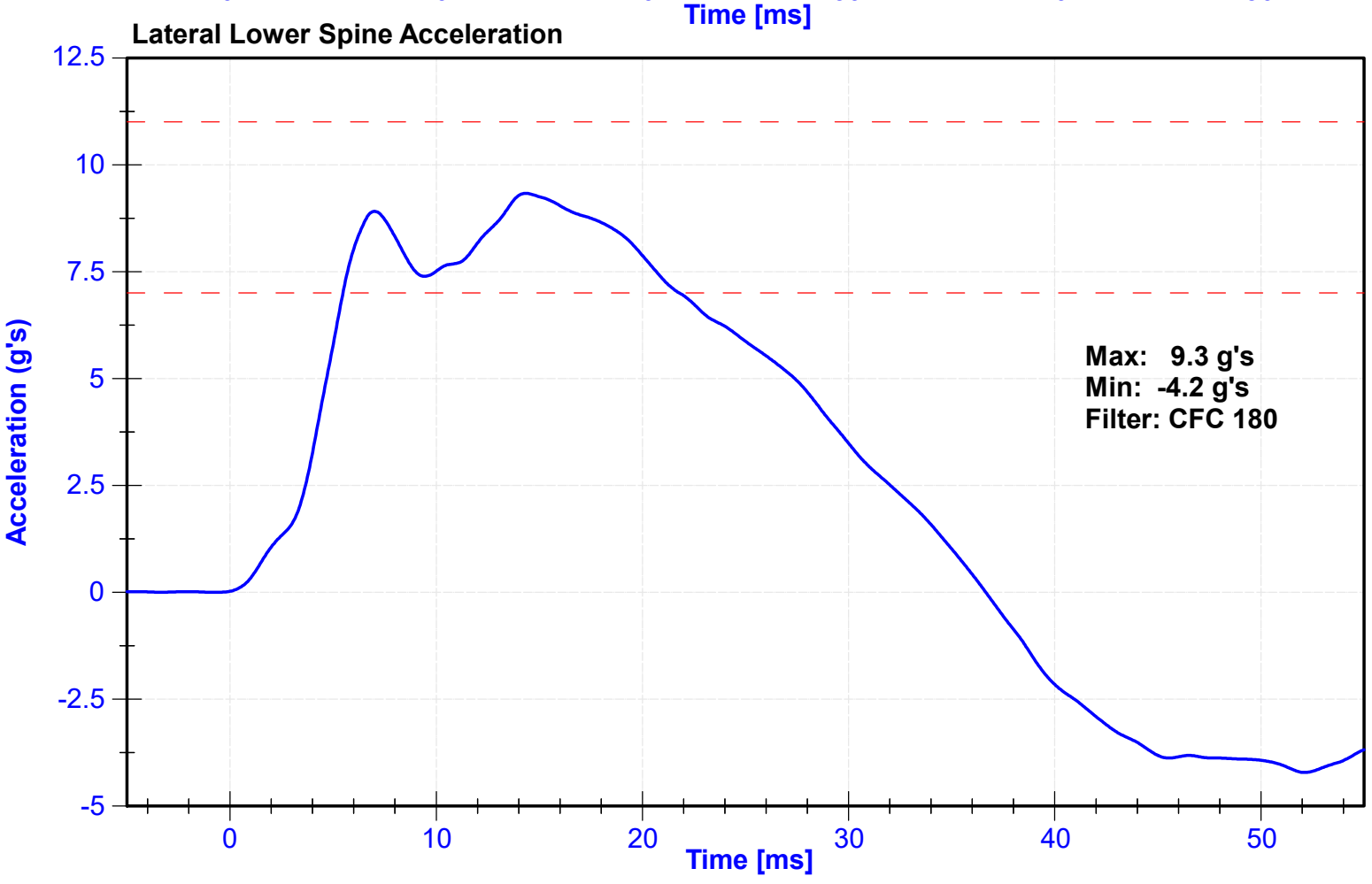



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.9 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.5 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.6 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.2 g's
Min: -5.5 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.3 g's
Min: -4.2 g's
Filter: CFC 180

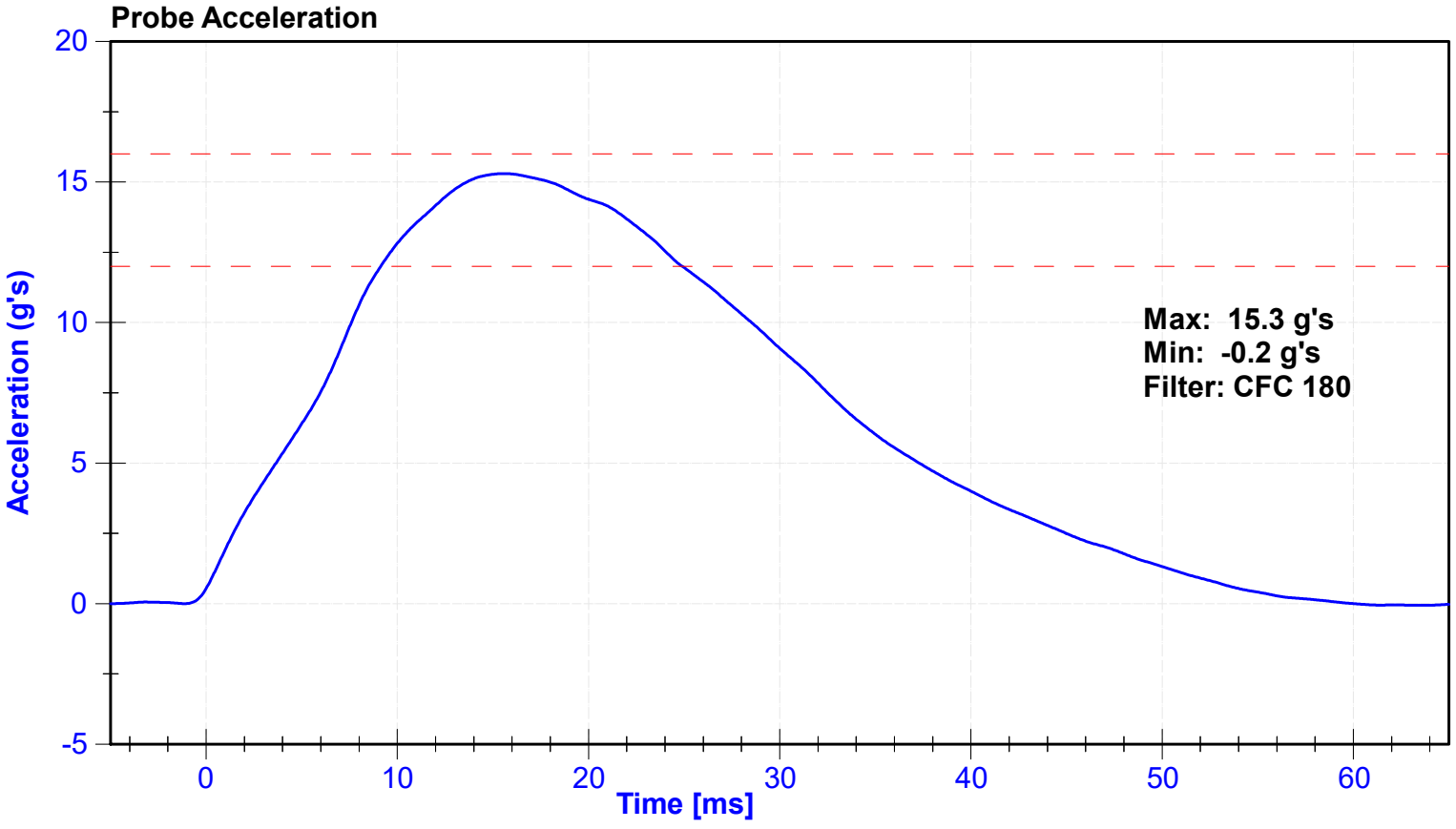
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

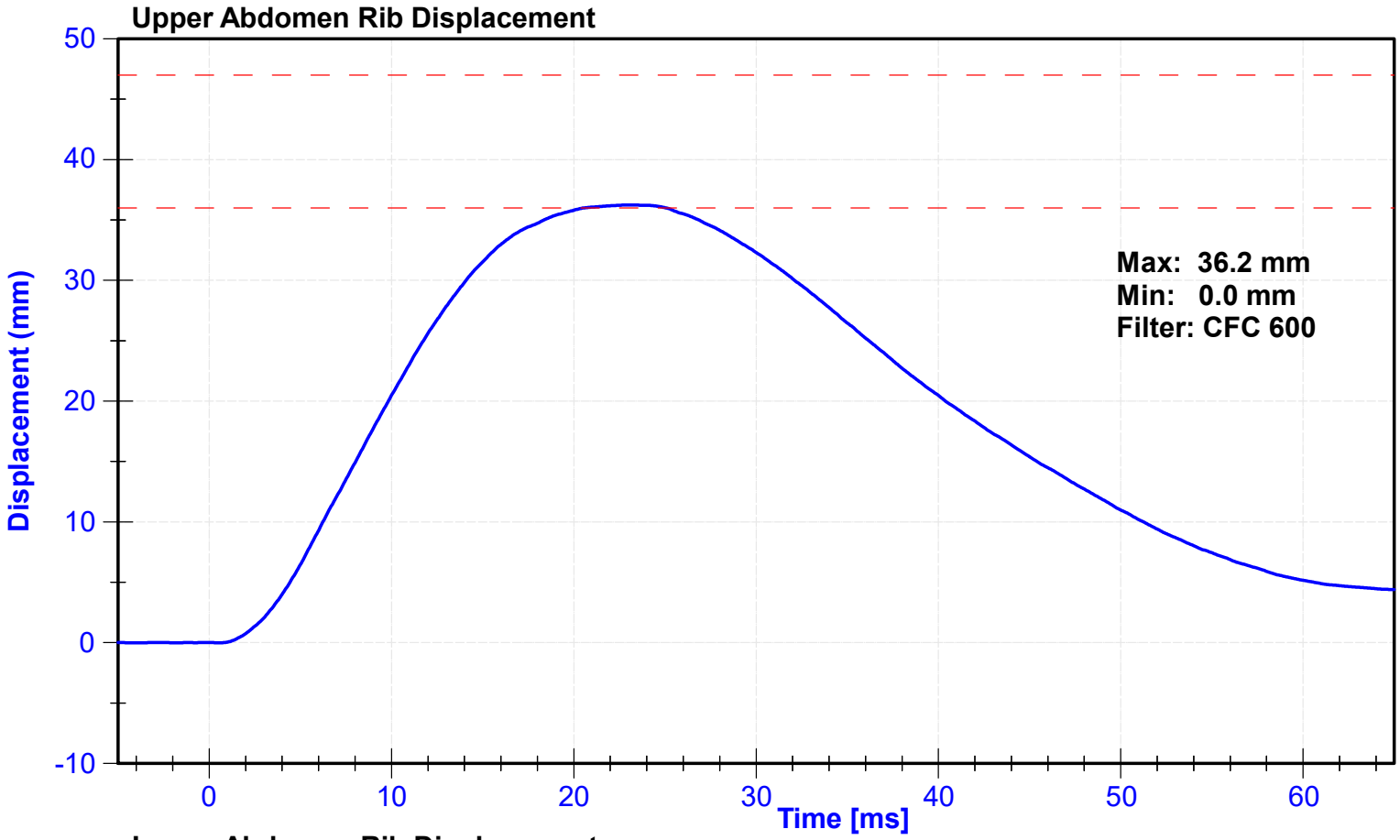
Results

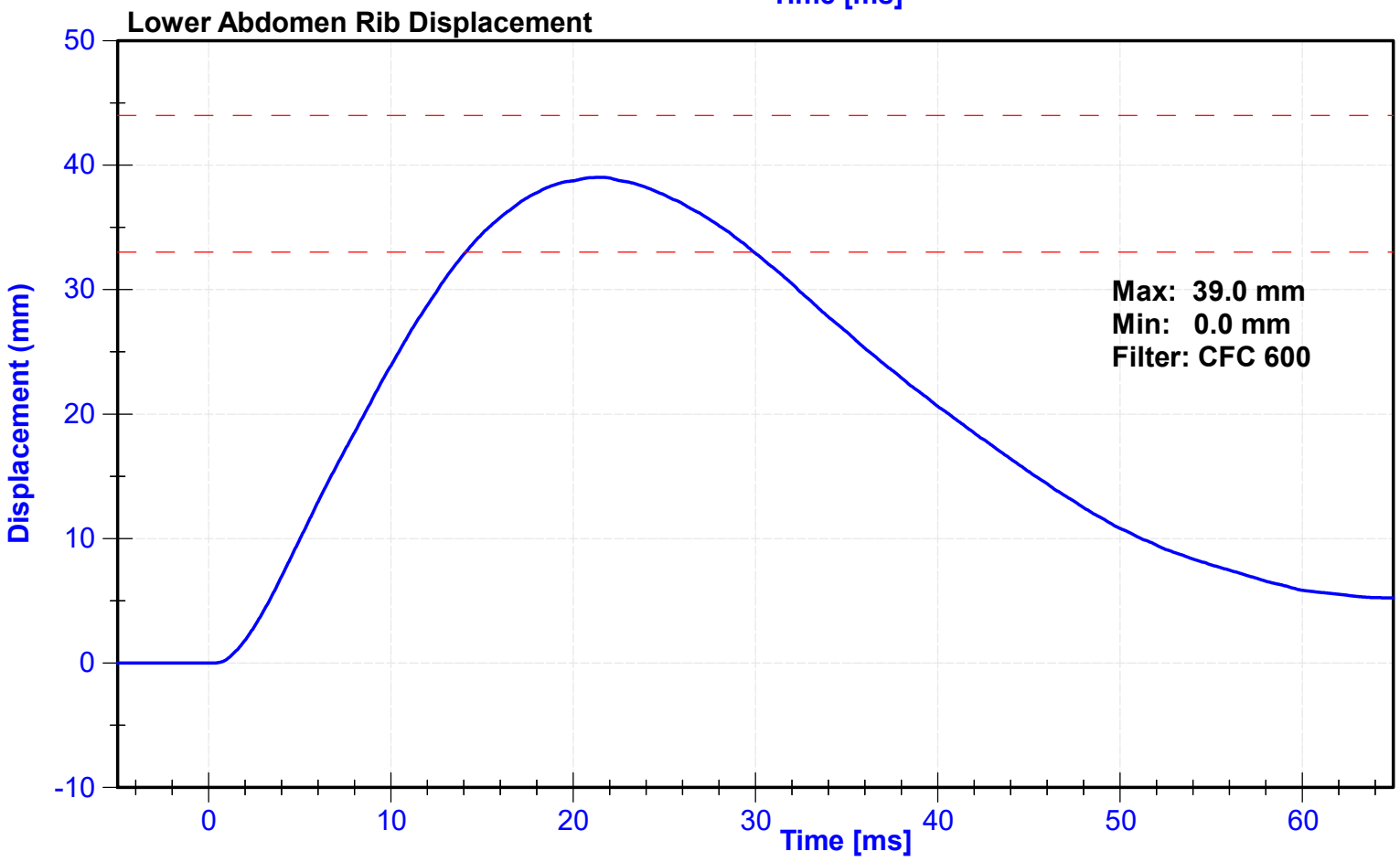
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	15.3	Pass
Lateral Lower Spine Acceleration	9	14	g's	12.1	Pass
Upper Abdomen Rib Deflection	36	47	mm	36.2	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.0	Pass

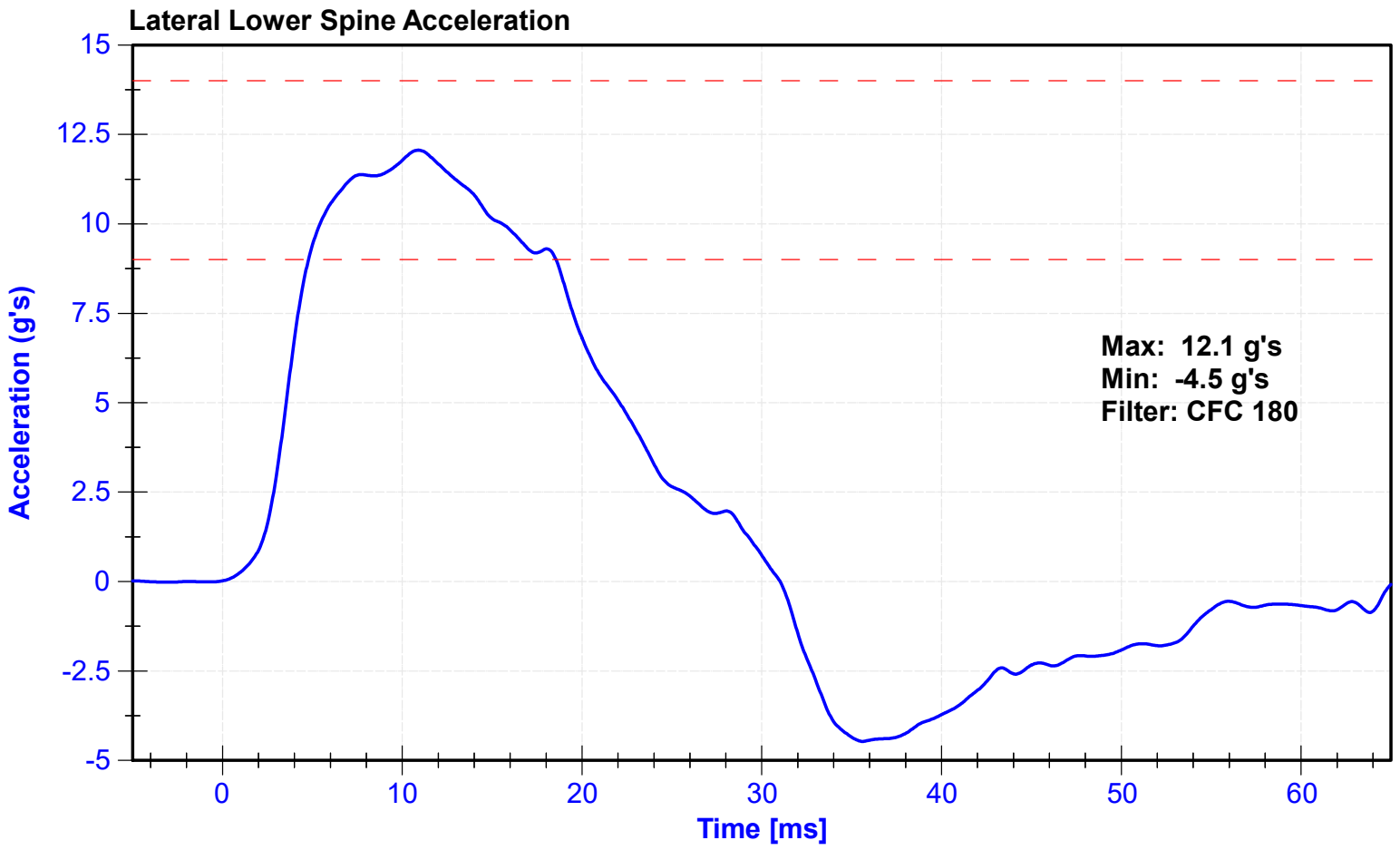
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Lower Spine Y Accelerometer	Endevco	P52071	10/3/2022	4/1/2023
Upper Abdomen Rib Potentiometer	Servo	307GFE	10/4/2022	4/4/2023
Lower Abdomen Rib Potentiometer	Servo	308GFE	10/4/2022	4/4/2023




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 36.2 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: 39.0 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: 12.1 g's
Min: -4.5 g's
Filter: CFC 180

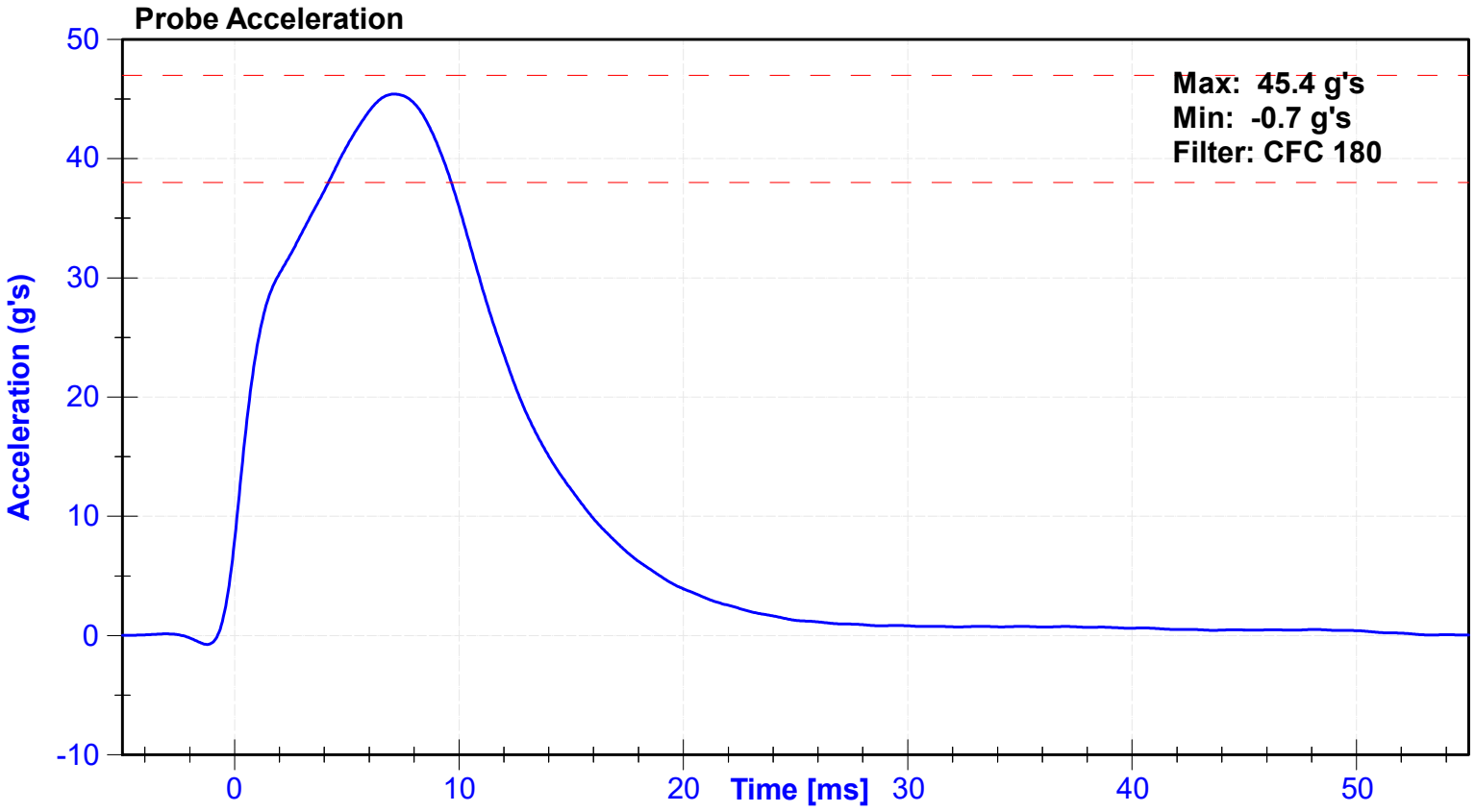
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

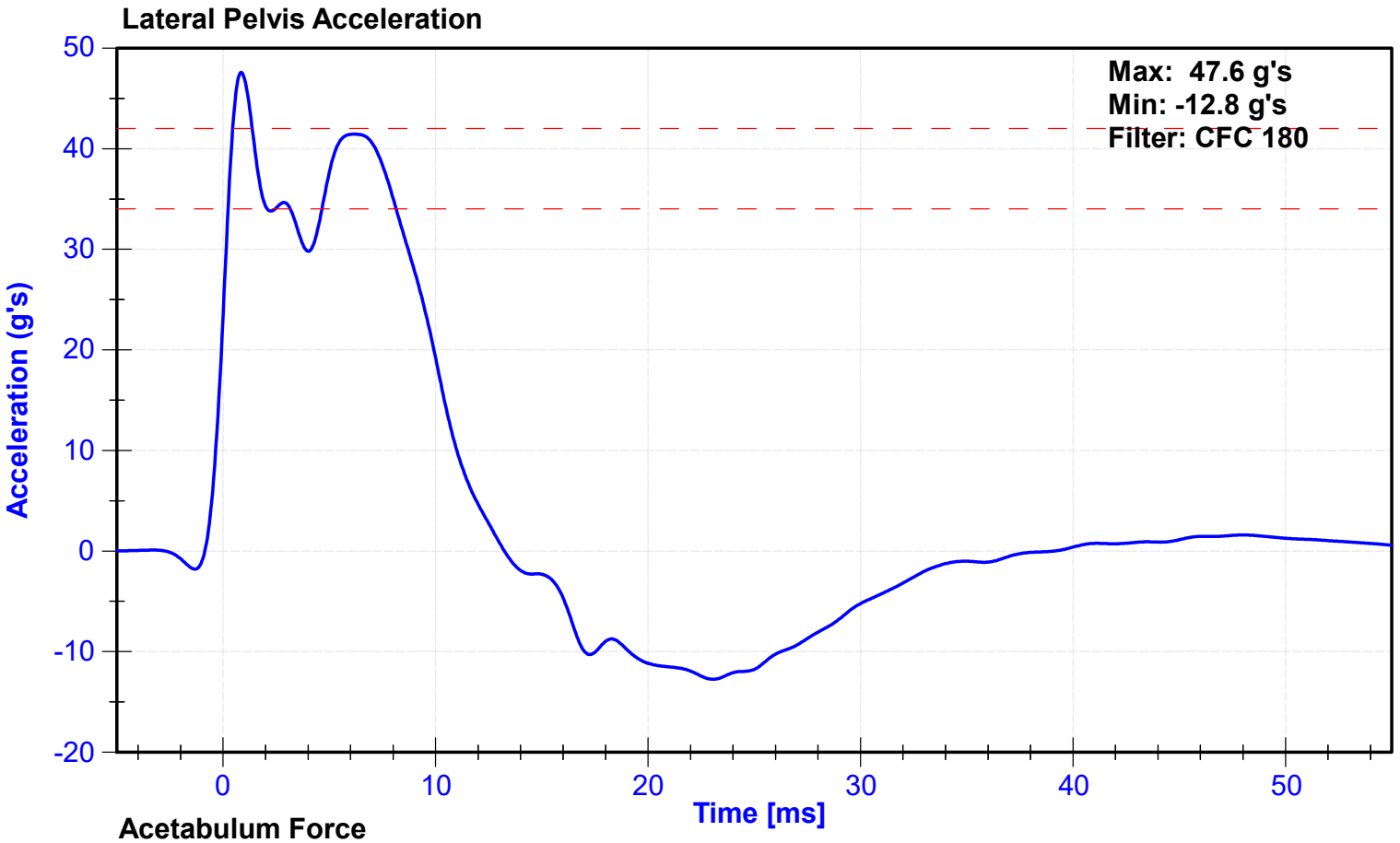
Results

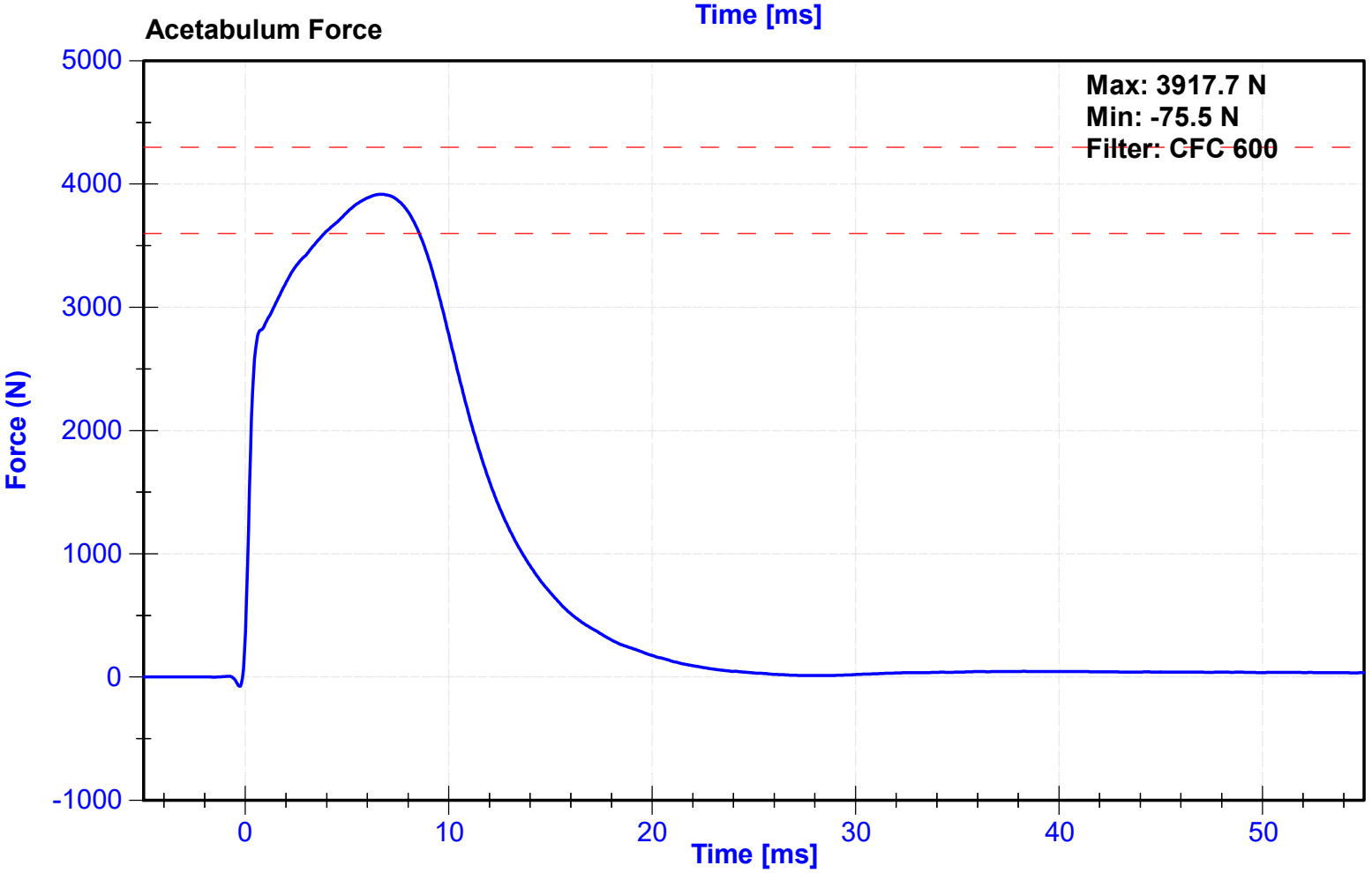
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	6.6	6.8	m/s	6.74	Pass
Probe Acceleration	38	47	g's	45.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.4	Pass
Acetabulum Force	3600	4300	N	3917.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Acetabulum Load Cell	Denton	267-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 47.6 g's
Min: -12.8 g's
Filter: CFC 180
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3917.7 N
Min: -75.5 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

SACO RESEARCH

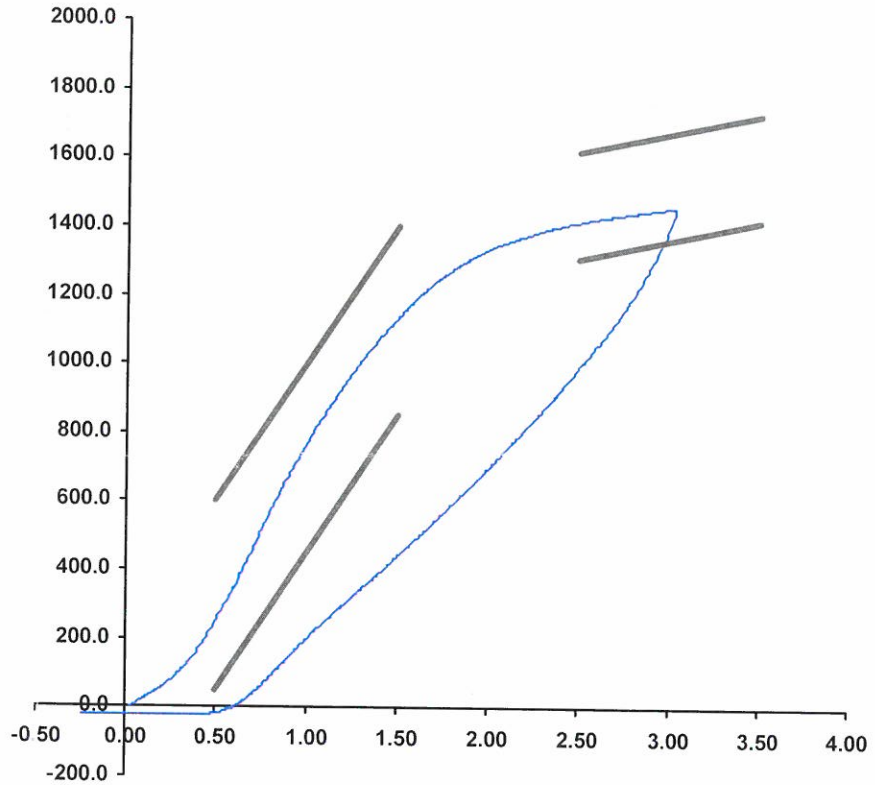
CERT
300 2-25-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15422
Test Number 20082
Report Number 20136
Test Date 9/9/2021 9:50:16 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	258	50	600
Force @ 1.5 mm (N)	1,138	850	1,400
Force @ 2.5 mm (N)	1,414	1,306	1,618
Force @ 3.0 mm (N)	1,457	1,361	1,673

Force (-N) vs Extension (-mm)



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

Notes:

Operator

Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By : DC Date : 9/9/2021

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

SACO RESEARCH

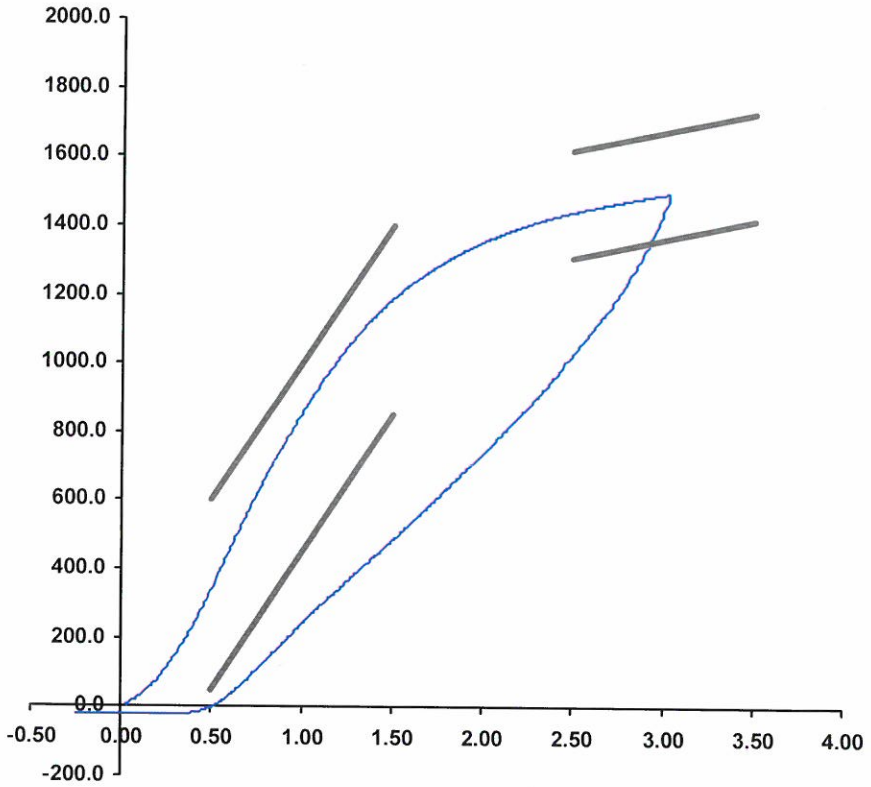
Impact
300 7-25-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15240
Test Number 17991
Report Number 18040
Test Date 3/10/2021 1:09:49 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	344	50	600
Force @ 1.5 mm (N)	1,189	850	1,400
Force @ 2.5 mm (N)	1,441	1,306	1,618
Force @ 3.0 mm (N)	1,494	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 10-Mar-21
SACO Research

By : DC Date : 3/10/2021

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

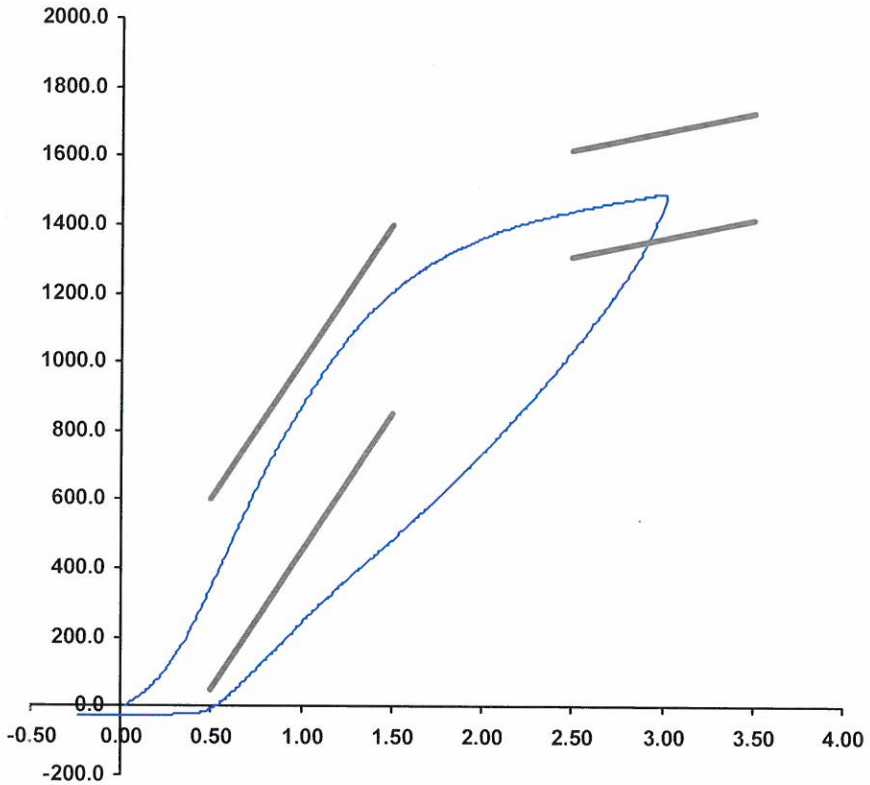
NON-IMPACT
300 2-25-2023

SID-IIs Pelvis Plug Certification Test

Plug S/N 15172
Test Number 17888
Report Number 17937
Test Date 3/8/2021 12:09:30 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	352	50	600
Force @ 1.5 mm (N)	1,209	850	1,400
Force @ 2.5 mm (N)	1,445	1,306	1,618
Force @ 3.0 mm (N)	1,493	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 08-Mar-21
SACO Research

By : DC Date : 3/8/2021

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

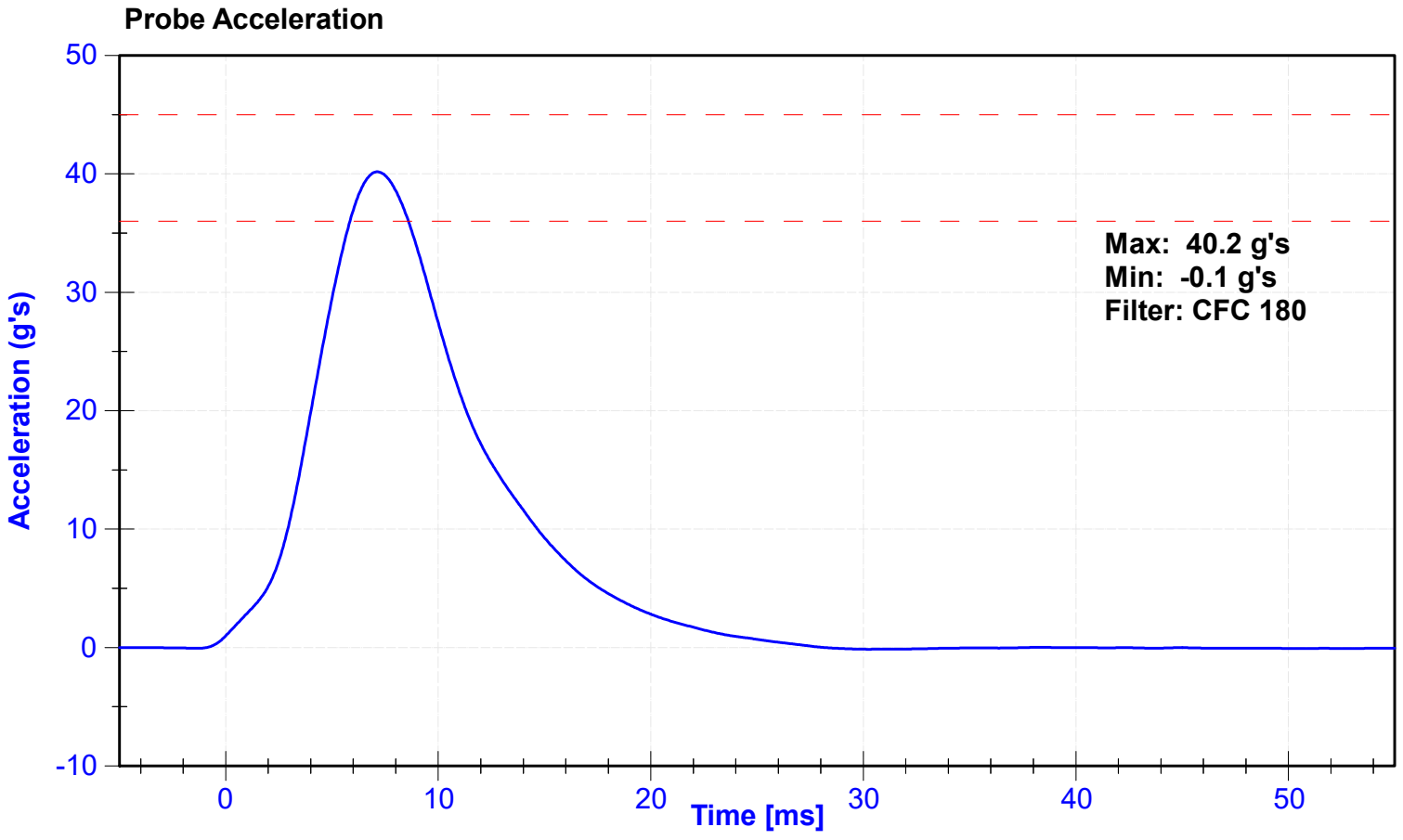
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

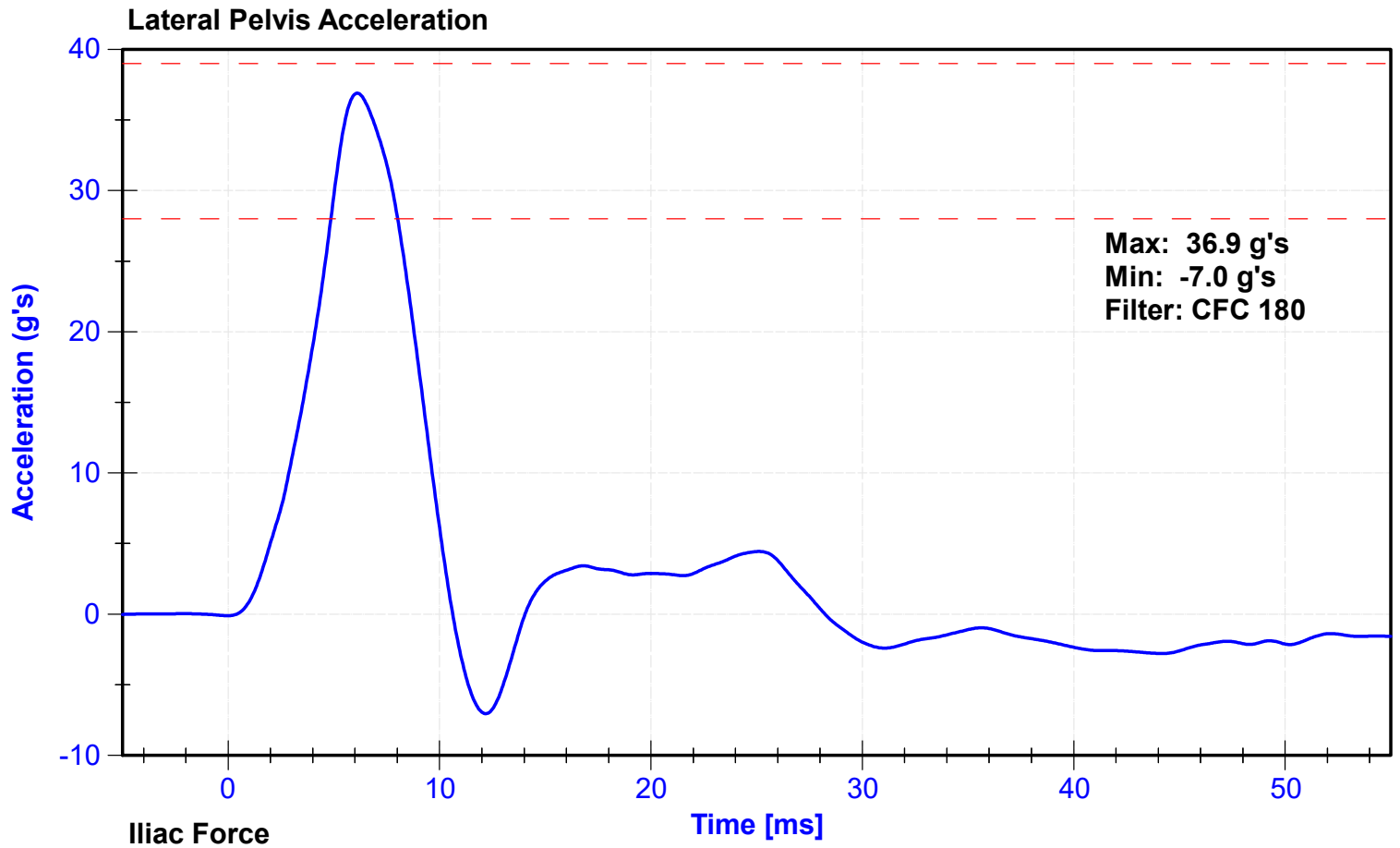
Results

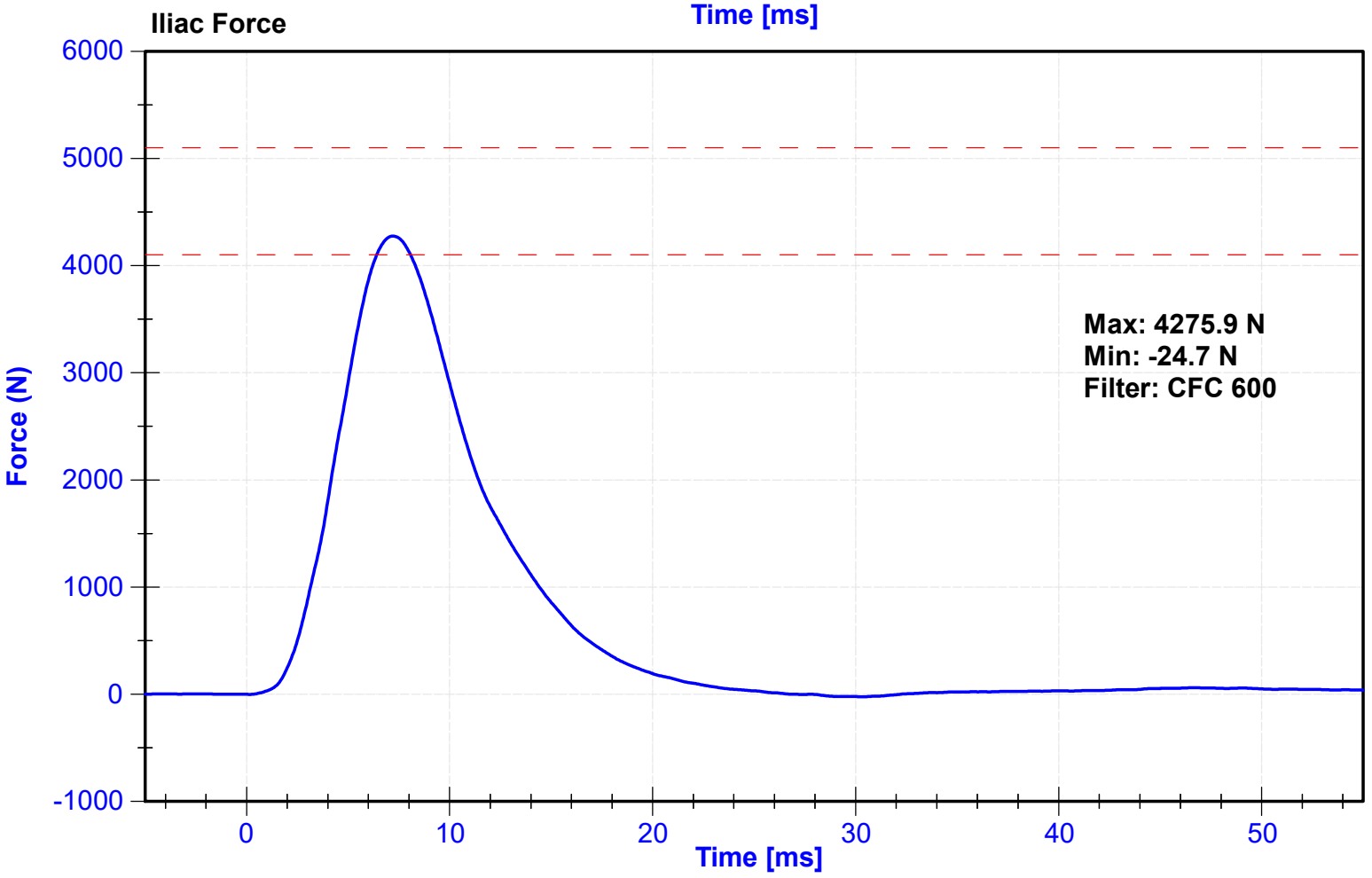
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	15.3	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	40.2	Pass
Lateral Pelvis Acceleration	28	39	g's	36.9	Pass
Iliac Force	4100	5100	N	4275.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51731	10/3/2022	4/1/2023
Iliac Load Cell	Denton	280-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: 36.9 g's
Min: -7.0 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: 4275.9 N
Min: -24.7 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	P59018	Endevco	10/3/2022
			Y	P79189	Endevco	10/3/2022
			Z	P58777	Endevco	10/3/2022
Head Accelerometers - Redundant			X	P68057	Endevco	10/3/2022
			Y	P58986	Endevco	10/3/2022
			Z	P52025	Endevco	10/3/2022
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	2316GFE	Servo	10/4/2022
		Middle	Y	040GFE	Servo	10/4/2022
		Lower	Y	1156GFE	Servo	10/4/2022
	Abdominal Rib	Upper	Y	307GFE	Servo	10/4/2022
		Lower	Y	308GFE	Servo	10/4/2022
Lower Spine Accelerometers (T12)			X	P64003	Endevco	10/3/2022
			Y	P52071	Endevco	10/3/2022
			Z	P17283	Endevco	10/3/2022
Acetabulum Load Cell			Y	267-FY	Denton	8/11/2022
Lilac Wing Load Cell			Y	280-FY	Denton	8/11/2022
Pelvis Plug (Struck Side)				15211	SACO	3/10/2021
Pelvis Plug (Non-Struck Side)				15442	SACO	9/9/2021

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A262064	Measurement Specialties	11/17/2022
Vehicle Center of Gravity	Y	A280309	Measurement Specialties	11/17/2022
Vehicle Center of Gravity	Z	A370887	Measurement Specialties	11/17/2022
Left Floor Sill	Y	A431368	Measurement Specialties	1/16/2023
A-Pillar Sill	Y	G21387	Endevco	1/16/2023
A-Pillar Low	Y	G22652	Endevco	11/24/2022
A-Pillar Mid	Y	A405545	Measurement Specialties	11/8/2022
B-Pillar Sill	Y	A428028	Measurement Specialties	10/10/2022
B-Pillar Low	Y	A315932	Measurement Specialties	9/20/2022
B-Pillar Mid	Y	A370921	Measurement Specialties	10/3/2022
Driver Seat	Y	A352408	Measurement Specialties	9/28/2022
Engine Top	X	A280971	Measurement Specialties	11/14/2022
Engine Top	Y	A396614	Measurement Specialties	11/14/2022
Firewall	Y	G22650	Endevco	11/24/2022
Right Roof	Y	A398292	Measurement Specialties	11/8/2022
Right Floor Sill	Y	G22609	Endevco	11/2/2022
Rear Floorpan	X	A399971	Measurement Specialties	11/28/2022
Rear Floorpan	Y	G21409	Endevco	11/28/2022

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