

REPORT NUMBER: 214P-CAL-24-015

**SAFETY COMPLIANCE TESTING FOR FMVSS 214
DYNAMIC SIDE IMPACT PROTECTION
RIGID POLE TEST**

**Hyundai Motor Company
2024 Genesis GV60
5 Door SUV**

NHTSA No: C20244207

**PREPARED BY:
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December 3, 2024


FINAL REPORT

**PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE. S.E.
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number 693JJ923D000043.

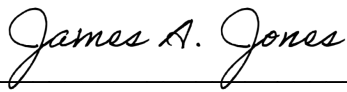
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Approved by:  Date: December 3, 2024
Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OVSC:


Accepted by

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract A 31.00 km/h (19.3 mph), 75° oblique compliance test was conducted on the subject 2024 Genesis GV60 5 Door SUV in accordance with the specifications of the Office of Vehicle Safety Compliance TP-214P-01 for the determination of FMVSS No.214 Side Impact Protection compliance. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on November 1, 2024. The impact velocity of the vehicle was 30.87 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 196 mm located at level 3. The test vehicle's occupant performance data is as follows:																												
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC36)</td> <td></td> <td>1000</td> <td>280.638</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>44</td> <td>20.851</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>1011.786</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>2997.251</td> </tr> </tbody> </table>						Measurement Description	Driver ATD (ES-2re)			Units	IARV	Result	Head Injury Criteria (HIC36)		1000	280.638	Maximum Thoracic Rib Deflection	mm	44	20.851	Total Abdominal Force	N	2500	1011.786	Pubic Symphysis Force	N	6000	2997.251
Measurement Description	Driver ATD (ES-2re)																											
	Units	IARV	Result																									
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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 Compliance Testing Side Impact Protection Pole Test ES-2re SID-IIs				18. Distribution Statement <u>Copies of this report are available from:</u> National Highway Traffic Safety Administration Technical Information Services (TIS) Room E12-100 East Bldg. 1200 New Jersey Ave. Washington, D.C. 20590 Telephone No. (202) 366-2588																								
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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Summary of the Test	1-1
2	Occupant and Vehicle Information	2-1
 <u>Data Sheet</u>		 <u>Page</u>
1	Test Vehicle Information and Options	2-2
2	Vehicle Tire Information	2-3
3	General Test and Vehicle Parameter Data	2-4
4	Seat and Seat Belt Adjustment Data	2-5
5	Fuel Systems and Steering Wheel Position Data	2-6
6	Dummy Longitudinal Clearance Dimensions	2-7
7	Dummy Lateral Clearance Dimensions	2-8
8	Location of Cameras	2-9
9	Test Vehicle Accelerometer Location	2-10
10	Test Vehicle Accelerometer Summary	2-11
11	Dummy Injury Response Data	2-12
12	Post Test Observations	2-13
13	Vehicle Pre-test and Post-test Measurements	2-15
14	Exterior Crush Measurements	2-16
15	Vehicle Exterior Crush Profiles	2-17
16	Temperature and Humidity Trace	2-19
 <u>Appendix</u>		 <u>Page</u>
I	Photographs	I-1
II	Dummy Response Data	II-1
III	Vehicle Accelerometer Response Data Plots	III-1
IV	Dummy Performance Calibration Test Data	IV-1
V	Test Equipment and Instrumentation Calibration	V-1

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This side impact test was conducted as part of the FY 2024 FMVSS 214 Side Impact Protection Compliance Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ923D000043. The purpose of this test was to evaluate side impact protection in a 2024 Genesis GV60 5 Door SUV. The side impact test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure, TP-214P-01 dated September 2012.

SUMMARY

A rigid pole side impact test was conducted on a 2024 Genesis GV60 5 Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 30.87 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on November 1, 2024. Pre-test and post-test photographs of the test vehicle and side impact dummy (ES2re) are included in Appendix I of this report.

One Part 572U (ES-2re) dummy was placed in the driver designated seating position according to instructions specified in the TP-214P-01 Test Procedure, dated September 2012. The side impact event was documented by nine High Speed Cameras and one real time camera.

The ES2re male dummy was instrumented accordingly:

- Primary and redundant head CG tri-axial accelerometers
- Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
- Abdomen forward, middle, and rear y-axis load cells
- Lower spine (T12) tri-axial accelerometers
- Public symphysis y-axis load cell

Appendix II contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix IV of this report. Appendix V 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 ES2re dummy were recorded as follows:

INJURY READINGS

Measurement Description	Driver ATD (ES2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	280.638
Upper Rib Deflection	mm	44	16.924
Mid Rib Deflection	mm	44	18.378
Lower Rib Deflection	mm	44	20.851
Abdominal Load (front)	N		222.488
Abdominal Load (mid)	N		350.889
Abdominal Load (rear)	N		455.991
Total Abdominal Force	N	2500	1011.786
Pubic Symphysis Force	N	6000	2997.251

SECTION 2

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

<u>Data Sheet</u>		<u>Page</u>
1	Test Vehicle Information and Options	2-2
2	Vehicle Tire Information	2-3
3	General Test and Vehicle Parameter Data	2-4
4	Seat and Seat Belt Adjustment Data	2-5
5	Fuel Systems and Steering Wheel Position Data	2-6
6	Dummy Longitudinal Clearance Dimensions	2-7
7	Dummy Lateral Clearance Dimensions	2-8
8	Location of Cameras	2-9
9	Test Vehicle Accelerometer Location	2-10
10	Test Vehicle Accelerometer Summary	2-11
11	Dummy Injury Response Data	2-12
12	Post Test Observations	2-13
13	Vehicle Pre-test and Post-test Measurements	2-15
14	Exterior Crush Measurements	2-16
15	Vehicle Exterior Crush Profiles	2-17
16	Temperature and Humidity Trace	2-19

**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

TEST VEHICLE INFORMATION AND OPTIONS

Make	Genesis	Anti-Lock Brakes (ABS)	Yes
Model	GV60	All-Wheel Drive (AWD)	Yes
Body Style	SUV	Traction Control System (TCS)	Yes
VIN	KMUKCDSC7RU022319	Electric Stability Control (ECS)	Yes
Body Color	Savile Silver	Curtain Airbags	Yes
Engine Displacement (L)	N/A	Torso Airbags – Front Seats	Yes
Type / No. Cylinders	N/A	Torso Airbags – Rear Seats	Yes
Engine Placement	N/A	Combination/Head Torso Bag	No
Transmission Type	Automatic	Pelvic Airbag – Front Seats	No
Transmission Speeds	Direct Drive	Pelvis Airbag – Rear Seats	No
Overdrive	No	Knee Airbag – Driver	Yes
Final Drive	All Wheel Drive	Knee Airbag – Front Passenger	No
Odometer Reading (mi)	172 mi	Seat Belt Pretensioners – Front Seats	Yes
		Seat Belt Pretensioners – Rear Seats	Yes
		Seat Belt Load Limiter – Front Seats	Yes
		Seat Belt Load Limiter – Rear Seats	Yes
		Tire Pressure Monitoring System (TPMS)	Yes
		Tilt Steering Wheel	Yes
		Automatic Door Locks (ADL)	Yes
		Power Window Auto-reverse	Yes
		Power Seats	Yes
		Other - Driver Center Seat Airbag	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company	GVWR (kg)	2595
Date of Manufacture	SEP/2023	GAWR Front (kg)	1265
Vehicle Type	MPV	GAWR Rear (kg)	1420

VEHICLE SEATING AND WEIGHT CAPACITY DATA

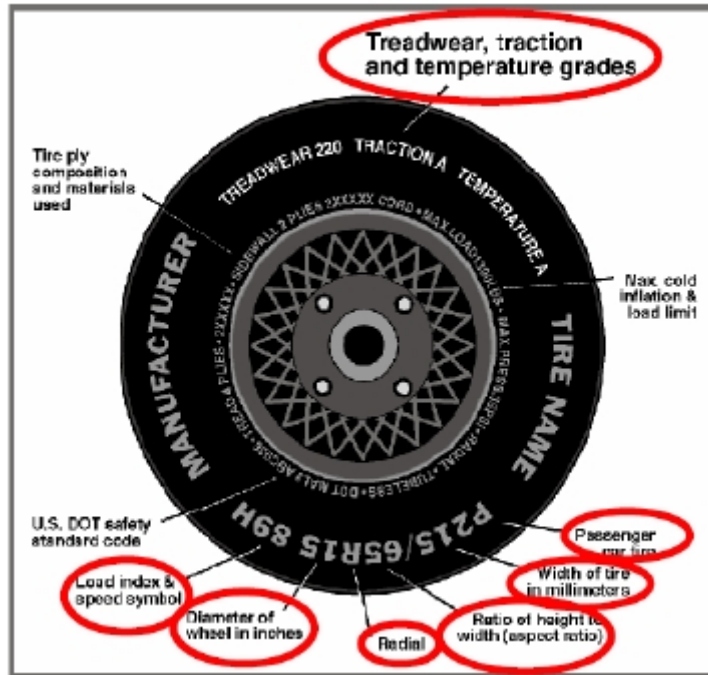
Measured Parameter	Front	Rear	Third	Total
Type of Seats (Bench or Bucket)	Bucket	Split Bench	N/A	5
Designated Seating Capacity (DSC)	2	3	N/A	
Capacity Weight (VCW) (kg)				390
Cargo Weight (RCLW) (kg)				49.8

**DATA SHEET NO. 2
VEHICLE TIRE INFORMATION**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

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



VEHICLE TIRE INFORMATION

Tire Placard	Front	Rear
Recommended Cold Pressure (kPa)	250	250
Recommended Tire Size	255/45R20	255/45R20
Tire Sidewall	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Tire Size on Vehicle	255/45R20	255/45R20
Tire Manufacturer Model	Michelin	Michelin
Tire Name	Primacy Tour	Primacy Tour
Tire Type	All Season	All Season
Tire Width	255	255
Aspect Ratio	45	45
Radial	Yes	Yes
Wheel Diameter	20"	20"
Load Index / Speed Symbol	105V	105V
Treadwear	540	540
Traction Grade	A	A
Temperature Grades	A	A

**DATA SHEET NO. 3
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	240	242	242
Tire Placard	kPa	250	250	250	250

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			Fully Loaded			As Tested		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	542	540		571.5	597		564	590.5	
Right	kg	537	526.5		550	562		572.5	542	
Ratio	%	50.3	49.7		49.2	50.8		50.1	49.9	
Totals	kg	1079	1066.5	2145.5	1121.5	1159	2280.5	1136.5	1132.5	2269

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2145.5	(A)
Weight of Test Dummy	kg	81	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	49.8	(C)
Calculated Vehicle Target Weight (TVT _W)	kg	2276.3	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	Fully Loaded	As Tested
Driver Door Sill Angle	Deg	+0.15	+0.20	+0.15
Front Passenger Sill Angle	Deg	+0.10	+0.40	+0.35
Front Bumper-Line Angle	Deg	+0.30	+0.50	+0.30
Rear Bumper-Line Angle	Deg	+0.60	+0.85	+0.65

ND = Nose Down (-), NU = Nose Up (+), LD = Left Down (-), LU = Left Up (+)

CALCULATION OF VERTICAL IMPACT REFERENCE LINE

Measured Parameter	Units	Value
Test Vehicle Wheelbase	mm	2906
Vertical Impact Reference Line Aft of Front Axle	mm	1322

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVT_W

Component Description	Weight (kg)
Trunk Carpeting	26
Passenger Front Door Panel	6
Passenger Rear Door Panel	5.5
Brake Light Assembly	1.5
Rear Speaker	3.5
Ballast (if any)	0

DATA SHEET NO. 4
SEAT AND SEAT BELT ANCHORAGE ADJUSTMENT DATA

Test Vehicle: 2024 Genesis GV60 5 Door SUV
Test Facility: Calspan

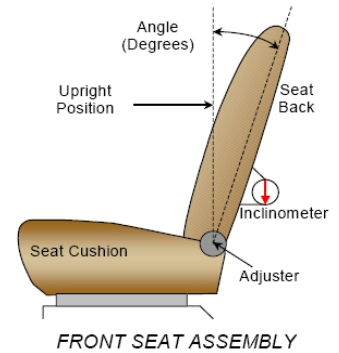
NHTSA No.: C20244207
Test Date: 11/01/2024

SEAT BACK ANGLE ADJUSTMENT

The driver and passenger seat backs are positioned to the manufacturer's designated angle provided in the Form 1.

	Units	Seat Back Angle
Driver Seat	Degrees	-0.3
Front Passenger Seat	Degrees	0.0

*Measurement taken on headrest post.



SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	SCR P Height Position	SCR P Height (mm)		
			Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	18.8	Max	60	67	74
		Mid	34	41	48
		Min	9	15	22
Front Passenger Seat	19.0	Max	55	63	70
		Mid	30	36	44
		Min	6	13	20

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Placed in Position #	
	mm	Detents*	mm	Detents*
Driver Seat	260	Power	130	Power
Front Passenger Seat	255	Power	127.5	Power

SEAT BELT ANCHORAGE ADJUSTMENT

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

HEAD RESTRAINT ADJUSTMENT

Seat	Total # of Positions	Placed in Position #
Driver Seat	6 (0-5)	Uppermost

**DATA SHEET NO. 5
FUEL SYSTEMS AND STEERING WHEEL POSITION DATA**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

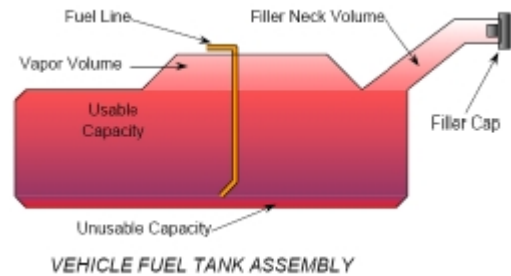
FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of (Form No.1)	
Usable Capacity of (Owner's Manual)	
92 - 94% of Usable Capacity	
Actual Amount of Solvent Used in Test	Electric Vehicle

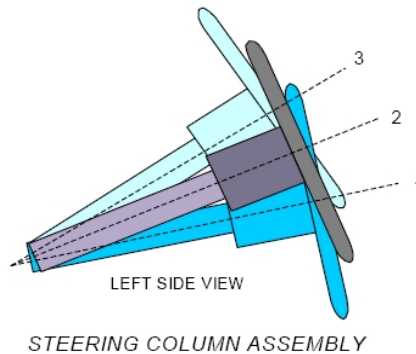
FUEL PUMP

Describe the operation of the fuel pump.

The charging port is located on the right rear of the vehicle.



STEERING COLUMN POSITIONS

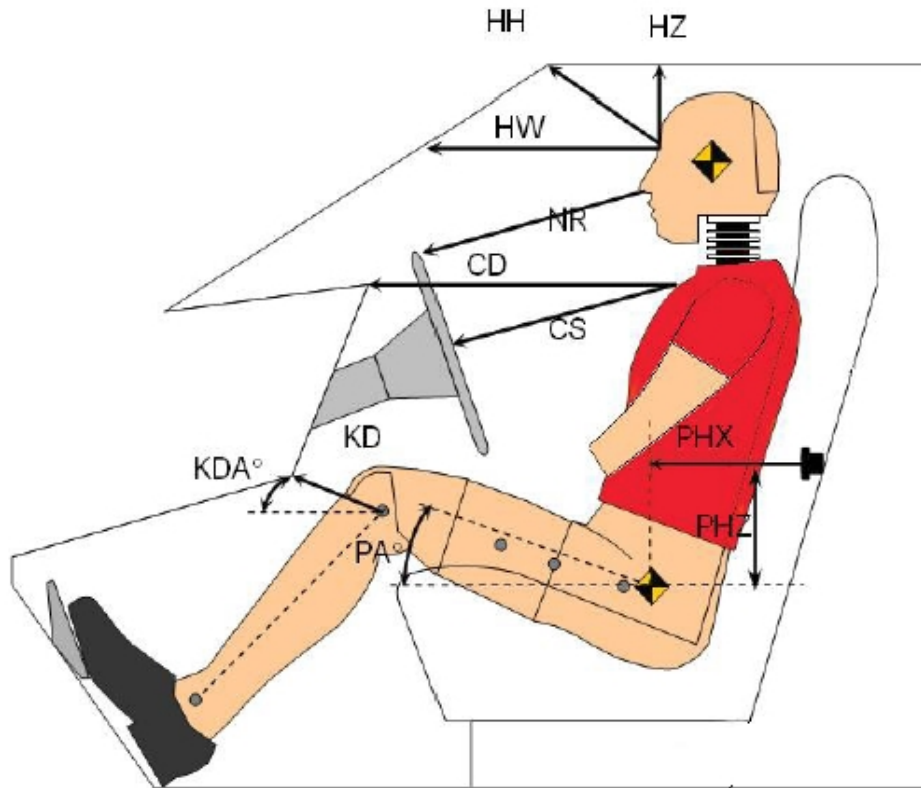


	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	19.5	
Geometric center - Position No. 2	22.0	
Uppermost - Position No. 3	24.4	
Telescoping Steering Wheel Travel		52
Test Position	22.0	26

DATA SHEET NO. 6
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Genesis GV60 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20244207
Test Date: 11/01/2024



Left Side View

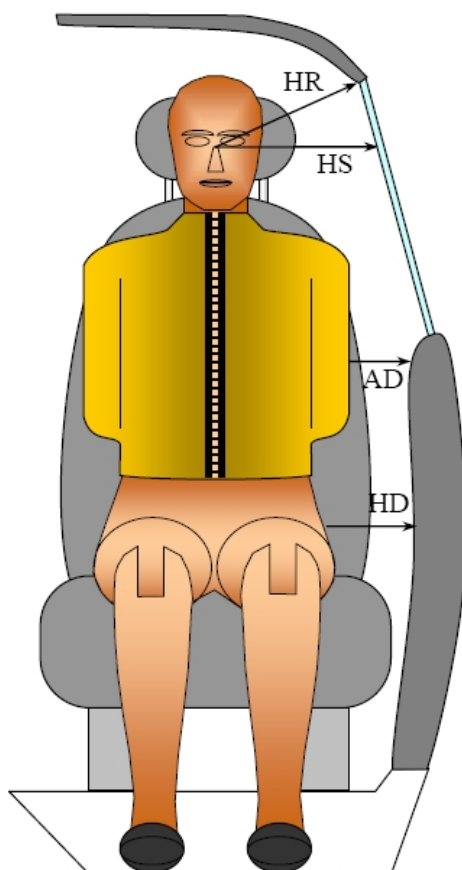
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	378	
HW	Head to Windshield	579	
HZ	Head to Roof Liner	173	
NR	Nose to Rim	384	
CD	Chest to Dash	605	
CS	Chest to Steering Wheel	354	
KD(L) / KDA(L)°	Left Knee to Dash	229	24.5
KD(R) / KDA(R)°	Right Knee to Dash	199	24.2
PAX°	Pelvic Tilt Angle (X-Axis)		20.6
PAY°	Pelvic Tilt Angle (Y-Axis)		0.1
PHX	Hip Point to Striker (X-Axis)	180	
PHZ	Hip Point to Striker (Z-Axis)	215	

**DATA SHEET NO. 7
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024



FRONT VIEW OF DUMMY

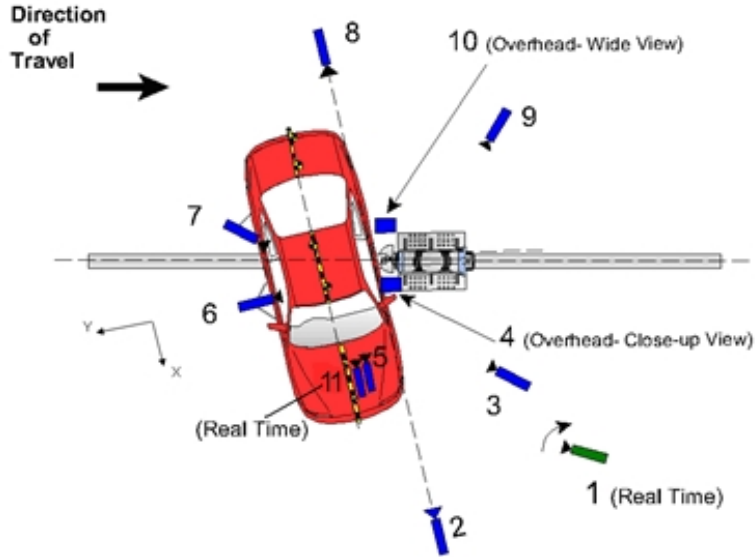
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	231
HS	Head to Side Window	mm	374
AD	Arm to Door	mm	117
HD	H-Point to Door	mm	148

**DATA SHEET NO. 8
LOCATION OF CAMERA**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024



CAMERA LOCATIONS AND DATA

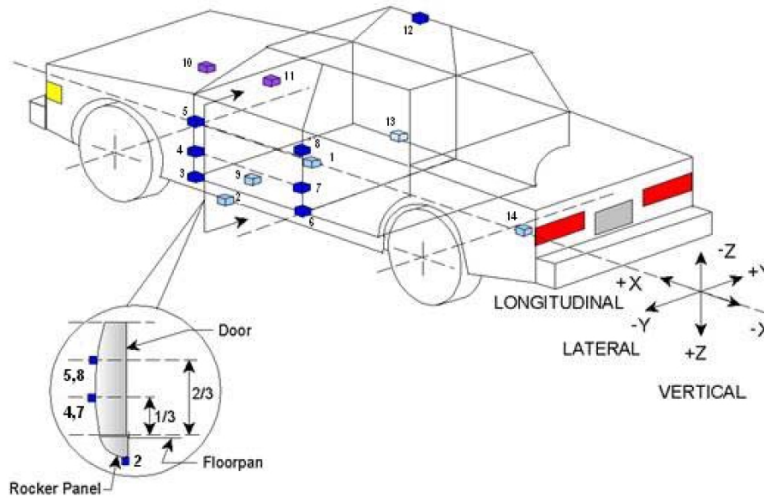
No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	30
2	Front ground level - impact view	7765	0	-1498	28	1000
3	Impact side 45° - forward pole view	5031	-722	-1412	24	1000
4	Overhead Close-up view of impact	0	0	-9375	28	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-8900	0	-1482	28	1000
9	Impact side 45° - rearward pole view	-3924	-4125	-1572	24	1000
10	Overhead wide - view of impact	0	0	-9375	12.5	1000

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

DATA SHEET NO. 9
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2024 Genesis GV60 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20244207
Test Date: 11/01/2024



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2218	-1	36
2	Left Floor Sill	2614	-658	300
3	A-Pillar Sill	3094	-651	270
4	A-Pillar Low	3122	-653	39
5	A-Pillar Mid	3015	-671	-392
6	B-Pillar Sill	2055	-660	292
7	B-Pillar Low	2053	-661	-5
8	B-Pillar Mid	2010	-671	-310
9	Seat	2294	-574	315
10	Engine	3810	16	-133
11	Firewall	3388	-136	-144
12	Roof	1902	616	-864
13	Right Floor Sill	2619	656	301
14	Rear Deck	697	11	103

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

DATA SHEET NO. 10
TEST VEHICLE ACCELEROMETER DATA SUMMARY

Test Vehicle: 2024 Genesis GV60
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

Loc. No	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	X	g	10.88	40.00	-27.85	54.35
	Vehicle CG	Y	g	62.56	38.90	-51.77	55.70
	Vehicle CG	Z	g	17.70	45.40	-27.37	57.95
	Vehicle CG Resultant	N/A	g	63.99	39.00	0.04	-47.20
2	Floor Sill (Left)	Y	g	135.95	27.65	-73.41	23.90
3	A Pillar Sill	Y	g	83.94	63.80	-2138.99	54.35
4	A Pillar Low	Y	g	52.09	47.20	-38.21	43.20
5	A Pillar Mid	Y	g	64.35	24.40	-37.52	30.45
6	B Pillar Sill	Y	g	85.51	17.75	-15.95	21.25
7	B Pillar Low	Y	g	125.07	15.60	-80.62	20.55
8	B Pillar Mid	Y	g	60.10	18.65	-28.02	13.60
9	Seat	Y	g	44.35	25.05	-1.90	136.65
10	Engine Top	X	g	3.75	61.85	-14.58	48.00
	Engine Top	Y	g	38.38	50.30	-6.55	83.20
11	Firewall	Y	g	26.92	39.40	-0.92	269.45
12	Roof	Y	g	56.92	39.35	-9.34	47.85
13	Floor Sill (Right)	Y	g	41.89	24.15	-2.65	104.40
14	Rear Deck	X	g	1.10	92.20	-13.24	43.25
	Rear Deck	Y	g	34.99	38.30	-1.69	102.50

DATA SHEET NO. 11
DUMMY INJURY RESPONSE DATA
(Subpart U, ES-2re)

Test Vehicle: 2024 Genesis GV60
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

Dummy Serial No. DG5348

Description	Axes	Positive Direction		Negative Direction	
		MAX	TIME (ms)	MAX	TIME (ms)
HEAD ACCELERATION (g)					
Longitudinal	X	5.02	107.45	-22.53	63.35
Lateral	Y	44.60	58.30	-12.81	103.75
Vertical	Z	10.60	46.05	-10.81	68.40
Resultant	N/A	47.97	58.30		
HIC36 (t1, t2)	N/A	280.64		t1 = 38.25	t2 = 71.35
THORAX DEFLECTION (mm)					
Upper Rib	Y	16.92	46.35	-1.13	20.00
Middle Rib	Y	18.38	45.35	-1.03	92.10
Lower Rib	Y	20.85	51.80	-0.74	209.30
ABDOMINAL FORCES (N)					
Front	Y	222.49	51.90	-16.72	15.50
Middle	Y	350.89	47.50	-2.99	101.15
Rear	Y	455.99	47.35	-6.72	97.60
SUM	N/A	1011.79	47.40		
PELVIS FORCES (N)					
Pubic Symphysis	Y	63.54	188.10	-2997.25	50.25

Reference: Positive Direction - Longitudinal (X) = forward
 - Lateral (Y) = to right
 - Vertical (Z) = down

**DATA SHEET NO. 12
POST-TEST OBSERVATIONS**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

IMPACT POINT DATA

Measured Parameter	Units	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm	1322
Actual Impact Point - Aft of Front Axle	mm	1323
Difference	mm	1

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (ES2-re)
Head Contact	Curtain Airbag & Head Restraint
Upper Torso Contact	Seatback & Torso/Pelvis Airbag
Lower Torso Contact	Seatback
Left Knee Contact	Door Trim
Right Knee Contact	Left Knee

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar and C-Pillar Separated
Sill Separation	None
Windshield Damage	Cracked Throughout and Separated Along A-Pillar
Side Window Damage	Shattered, but Stayed Laminated
Other Notable Effects	Rear seatback ripped apart due to seat airbag deployment

**DATA SHEET NO. 12 ... (CONTINUED)
POST-TEST OBSERVATIONS**

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

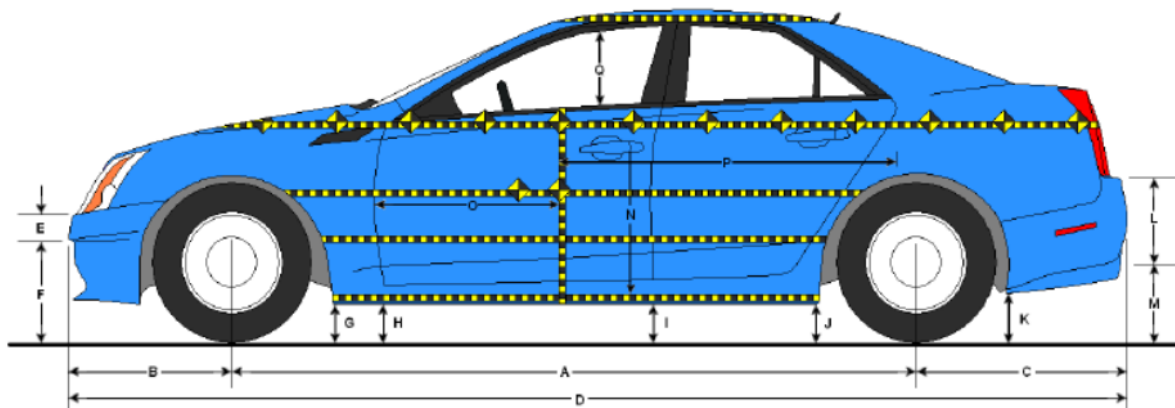
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 13
VEHICLE PRE TEST AND POST TEST MEASUREMENTS

Test Vehicle: 2024 Genesis GV60 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20244207
Test Date: 11/01/2024



LEFT SIDE VIEW

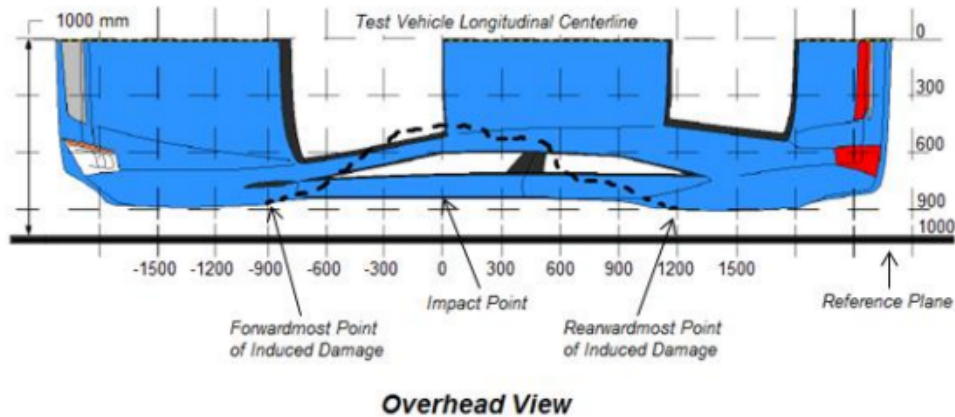
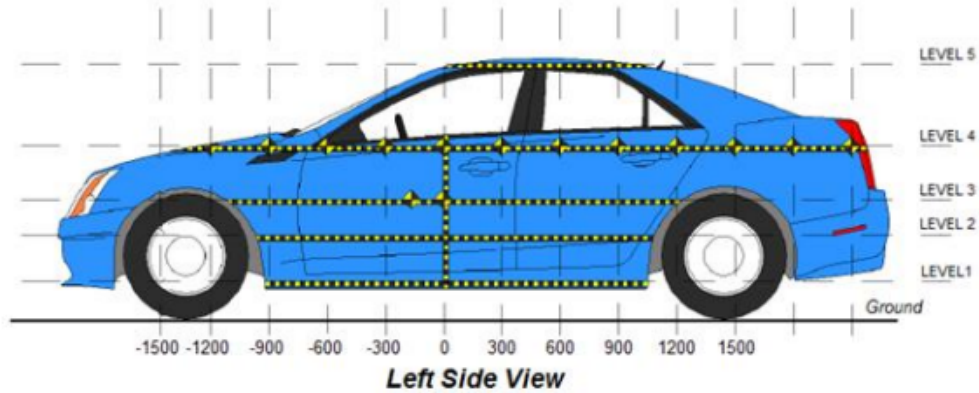
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

No.	Measurement Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2906	2871	-35
B	Front Axle to FSOV	827	859	31
C	Rear Axle to RSOV	783	774	-9
D	Total Vehicle Length at Centerline	4517	4505	-12
E	Front Bumper Thickness	143	143	0
F	Front Bumper Bottom to Ground	422	428	6
G	Sill Height at Front Wheel Well	165	169	4
H	Sill Height at Front Door Leading Edge	172	160	-12
I	Sill Height at B Pillar	189	170	-19
J1	Sill Height at Rear Wheel Well	193	203	10
J2	Pinch Weld Height at Rear Wheel Well	183	185	2
K	Sill Height Aft of Rear Wheel Well	255	245	-10
L	Rear Bumper Thickness	180	180	0
M	Rear Bumper Bottom to Ground	451	443	-8
N	Sill Height to Window Bottom Sill	834	832	-2
O	Front Door Leading Edge to Impact CL	834	809	-25
P	Rear Door Trailing Edge to Impact CL	1301	1270	-31
Q	Front Window Opening	387	390	3
R	Right Side Length	4441	4443	2
S	Left Side Length	4442	4429	-13
T	Vehicle Width at B-Pillars	1828	1788	-40

DATA SHEET NO. 14
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Genesis GV60 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20244207
Test Date: 11/01/2024



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	270	46	300
2	Occupant H-Point	mm	601	188	0
3	Mid-Door	mm	653	196	0
4	Window Sill	mm	1023	160	0
5	Window Top	mm	1491	36	0

NOTE: The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 14
VEHICLE EXTERIOR CRUSH MEASUREMENTS (CONTINUED)

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024

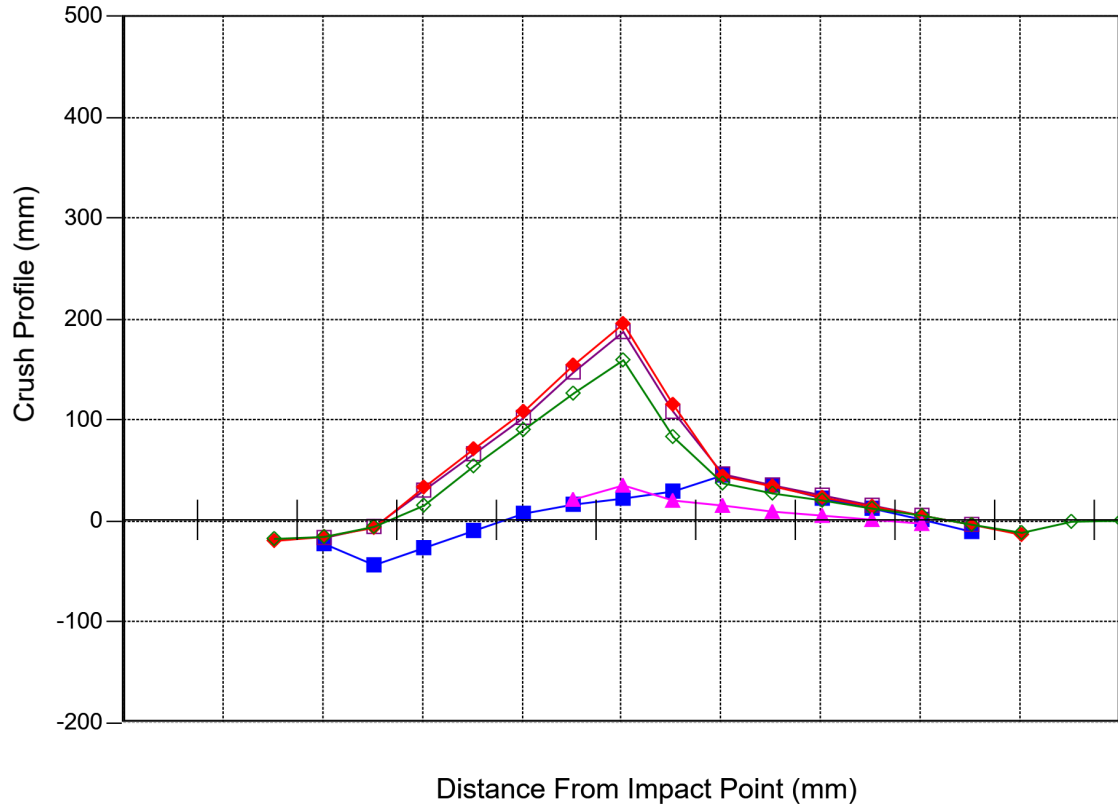
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050			943	822				962	839				-19	-17	
-900	915	937	936	830		937	953	951	845		-22	-16	-15	-15	
-750	905	921	922	836		948	926	928	841		-43	-5	-6	-5	
-600	899	914	917	841		925	883	883	825		-26	31	34	16	
-450	897	910	914	846		906	843	842	791		-9	67	72	55	
-300	896	907	912	851		888	804	803	760		8	103	109	91	
-150	894	906	910	854	636	877	758	755	727	614	17	148	155	127	22
0	892	905	909	857	654	869	717	713	697	618	23	188	196	160	36
150	890	903	908	858	655	860	794	792	774	634	30	109	116	84	21
300	889	902	906	858	653	843	855	861	820	637	46	47	45	38	16
450	888	902	905	856	649	852	866	870	828	639	36	36	35	28	10
600	888	904	907	856	643	865	878	883	835	637	23	26	24	21	6
750	892	910	912	856	633	879	894	897	843	631	13	16	15	13	2
900	898	922	923	865	615	896	916	917	859	617	2	6	6	6	-2
1050	908	937	937	879		918	940	940	882		-10	-3	-3	-3	
1200			944	894				957	905				-13	-11	
1350				904					904					0	
1500				906					905					1	

DATA SHEET NO. 14
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS (CONTINUED)

Test Vehicle: 2024 Genesis GV60 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20244207
 Test Date: 11/01/2024



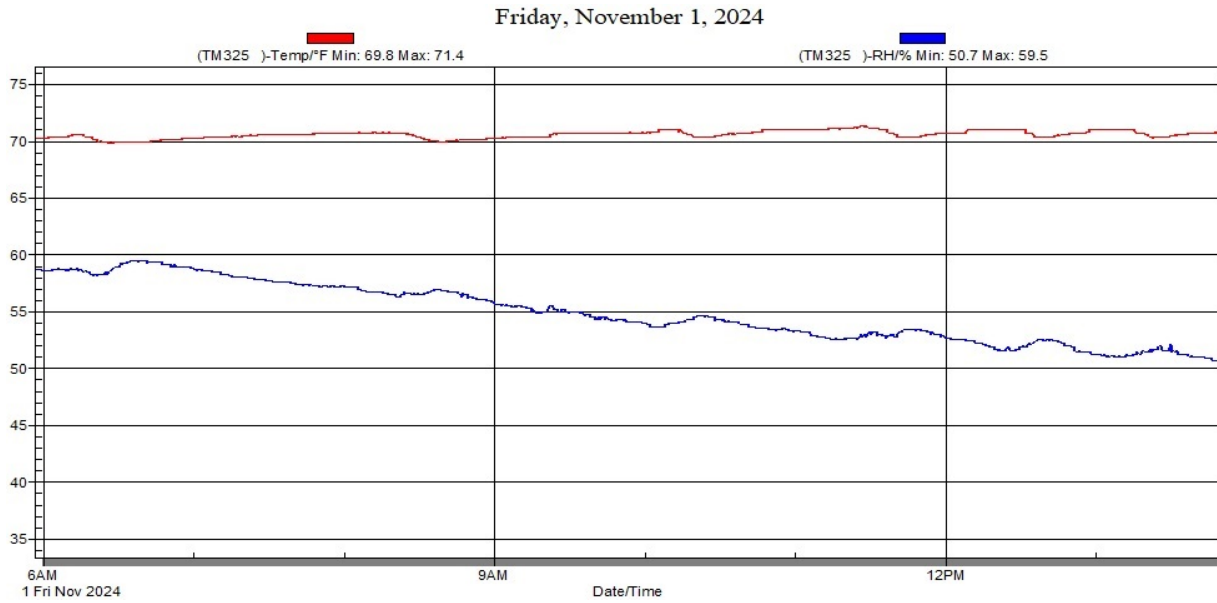
— LEVEL 1 Side Sill: 270 mm above ground	— LEVEL 2 H-Point: 601 mm above ground
— LEVEL 3 Mid Door: 653 mm above ground	— LEVEL 4 Window Sill: 1023 mm above ground
— LEVEL 5 Window Top: 1491 mm above ground	

Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 16
DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2024 Genesis GV60 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20244207
Test Date: 11/01/2024



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

APPENDIX I
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	Pre-Test Frontal View of Test Vehicle	I-3
2	Post Test Frontal View of Test Vehicle	I-3
3	Pre-Test Rear View of Test Vehicle	I-4
4	Post-Test Rear View of Test Vehicle	I-4
5	Pre-Test Impacted Side View of Test Vehicle	I-5
6	Post-Test Impacted Side View of Test Vehicle	I-5
7	Pre-Test Left $\frac{3}{4}$ Front View of Vehicle and Pole	I-6
8	Pre-Test Left $\frac{3}{4}$ Rear View of Vehicle and Pole	I-6
9	Pre-Test Overhead View of Test Vehicle	I-7
10	Post-Test Overhead View of Test Vehicle	I-7
11	Pre-Test Dummy Through Opposite Window	I-8
12	Post-Test Dummy Through Opposite Window	I-8
13	Pre-Test Close-Up of Dummy with Door Closed (Impact Side)	I-9
14	Post-Test Close-Up of Dummy with Door Closed (Impact Side)	I-9
15	Pre-Test Dummy with Door Open	I-10
16	Pre-Test Dummy Shoulder and Door Top View	I-10
17	Post-Test Dummy Shoulder and Door Top View	I-11
18	Pre-Test Interior of Front Door Closed (through opposite window)	I-11
19	Post-Test Interior of Front Door Showing Dummy Impact Locations	I-12
20	Impact Event	I-12
21	Post-Test Impact Zone Close-Up View	I-13
22	Post-Test $\frac{3}{4}$ Front View of Impact Zone	I-13
23	Post-Test $\frac{3}{4}$ Rear View of Impact Zone	I-14
24	Post-Test Close-Up View of Impact Point Target	I-14
25	Close-Up View of Vehicle's Certification Label	I-15
26	Close-Up View of Vehicle's Tire Placard Label	I-15



Figure A-1: Pre-Test Frontal View of Test Vehicle



Figure A-2: Post Test Frontal View of Test Vehicle

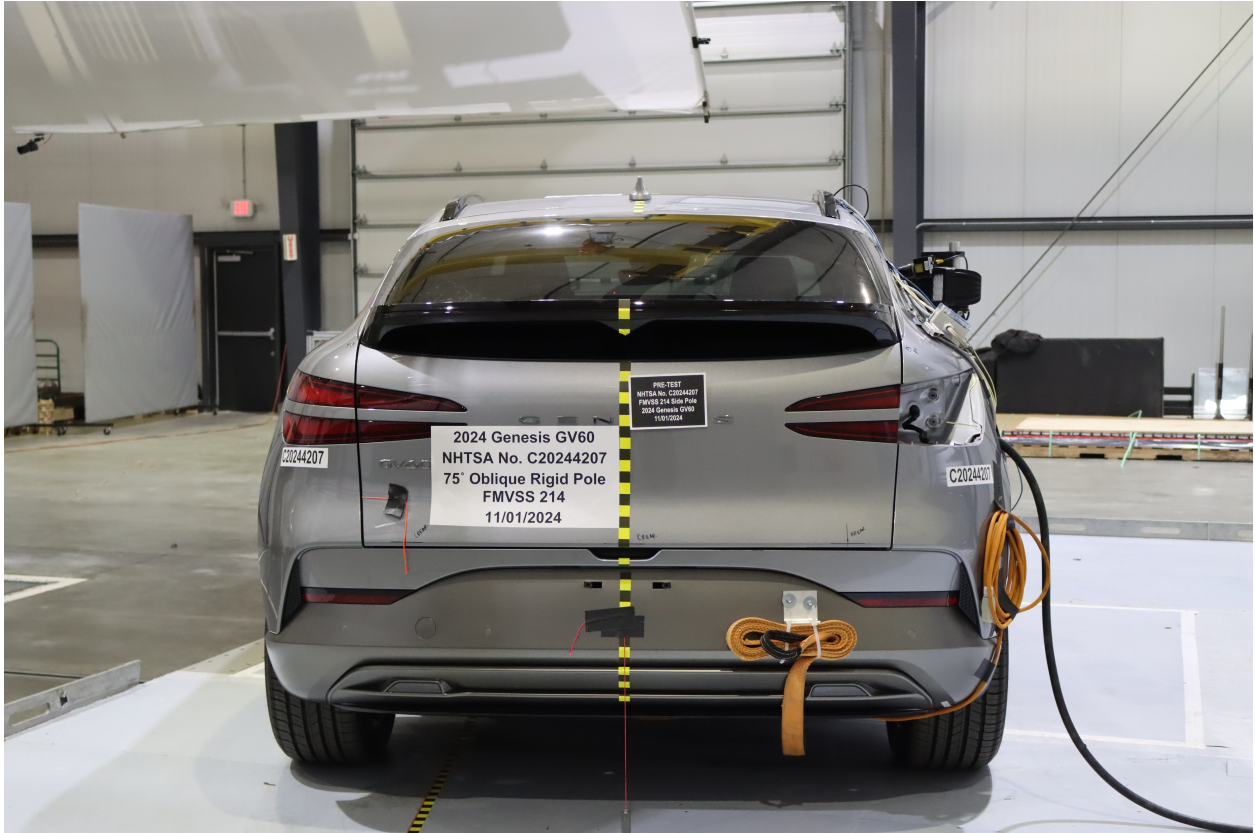


Figure A-3: Pre-Test Rear View of Test Vehicle



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



Figure A-5: Pre-Test Impacted Side View of Test Vehicle



Figure A-6: Post-Test Impacted Side View of Test Vehicle



Figure A-7: Pre-Test Left $\frac{3}{4}$ Front View of Vehicle and Pole



Figure A-8: Pre-Test Left $\frac{3}{4}$ Rear View of Vehicle and Pole



Figure A-9: Pre-Test Overhead View of Test Vehicle

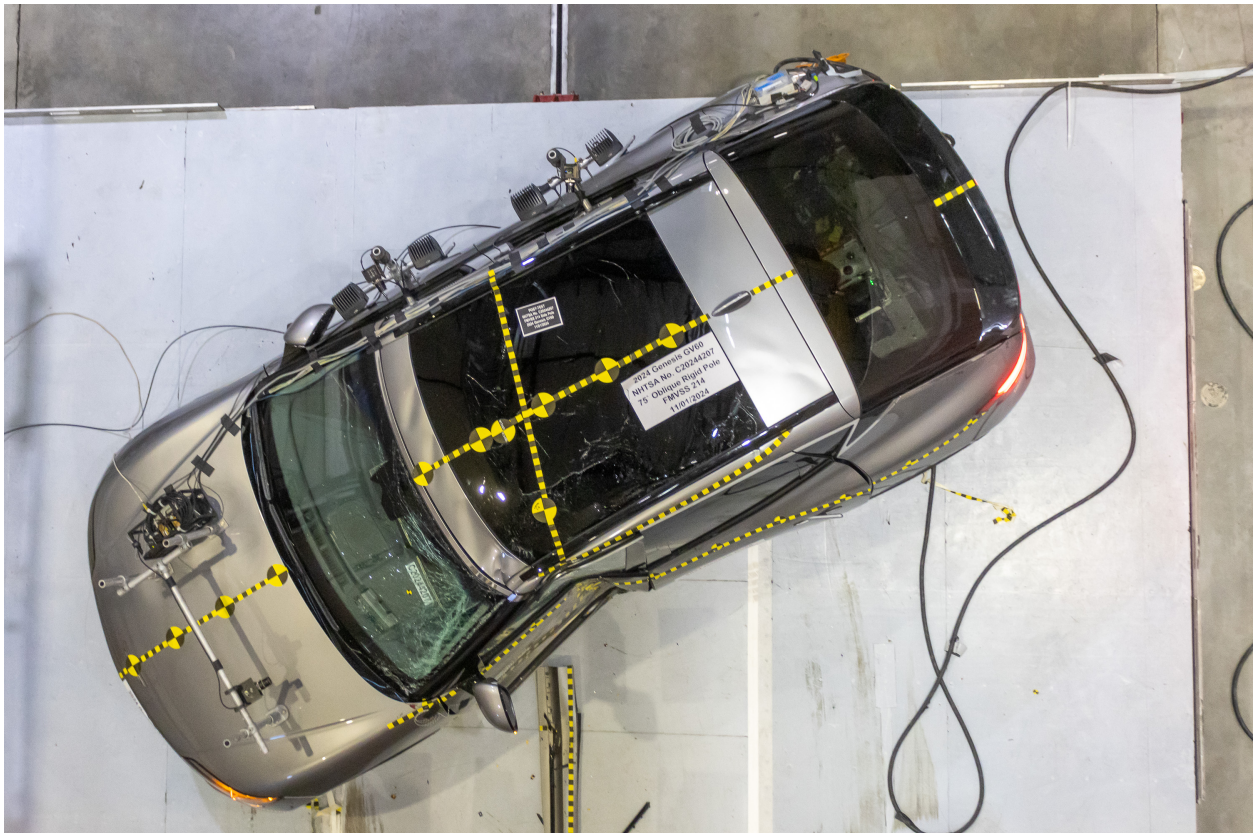


Figure A-10: Post-Test Overhead View of Test Vehicle



Figure A-11: Pre-Test Dummy Through Opposite Window



Figure A-12: Post-Test Dummy Through Opposite Window



Figure A-13: Pre-Test Close-Up of Dummy with Door Closed (Impact Side)



Figure A-14: Post-Test Close-Up of Dummy with Door Closed (Impact Side)



Figure A-15: Pre-Test Dummy with Door Open



Figure A-16: Pre-Test Dummy Shoulder and Door Top View



Figure A-17: Post-Test Dummy Shoulder and Door Top View



Figure A-18: Pre-Test Interior of Front Door Closed (through opposite window)



Figure A-19: Post-Test Interior of Front Door Showing Dummy Impact Locations



Figure A-20: Impact Event



Figure A-21: Post-Test Impact Zone Close-Up View



Figure A-22: Post-Test 3/4 Front View of Impact Zone



Figure A-23: Post-Test ¾ Rear View of Impact Zone



Figure A-24: Post-Test Close-Up View of Impact Point Target

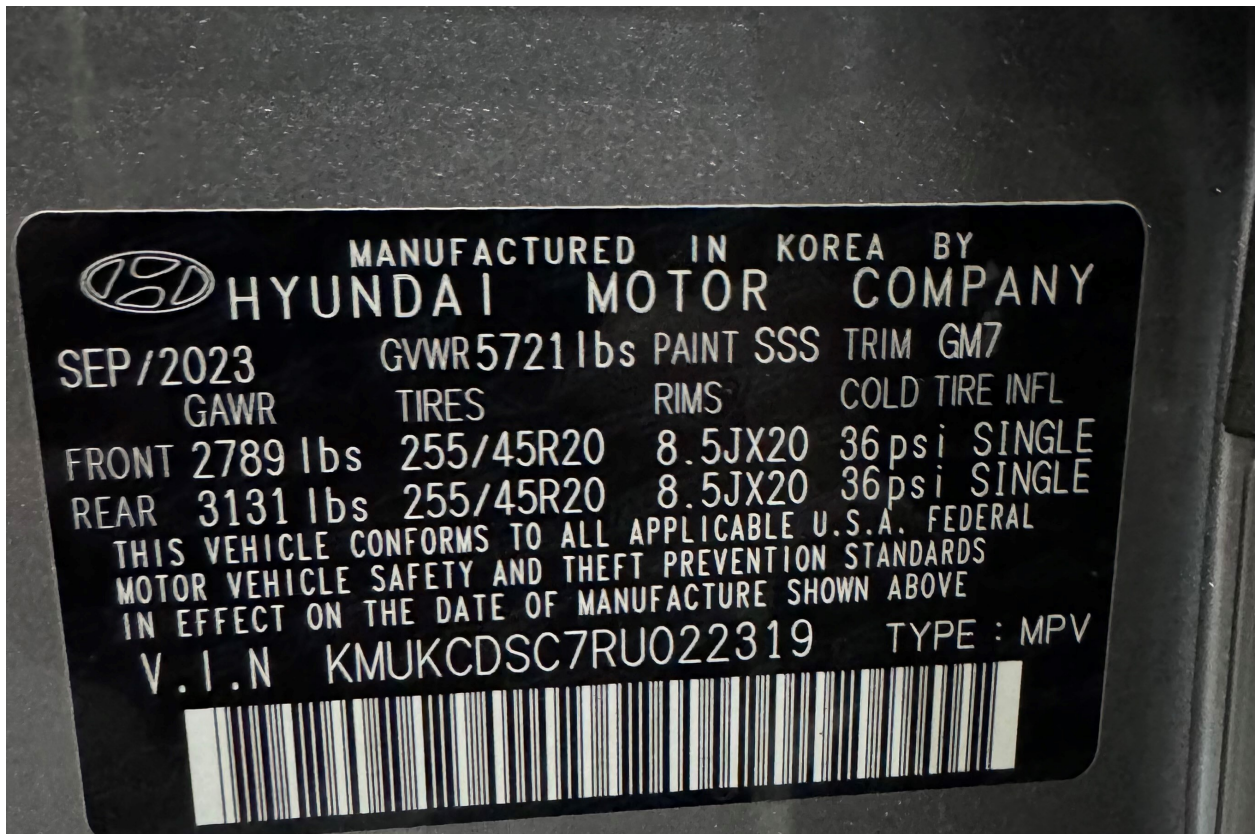


Figure A-25: Close-Up View of Vehicle's Certification Label



Figure A-26: Close-Up View of Vehicle's Tire Placard Label

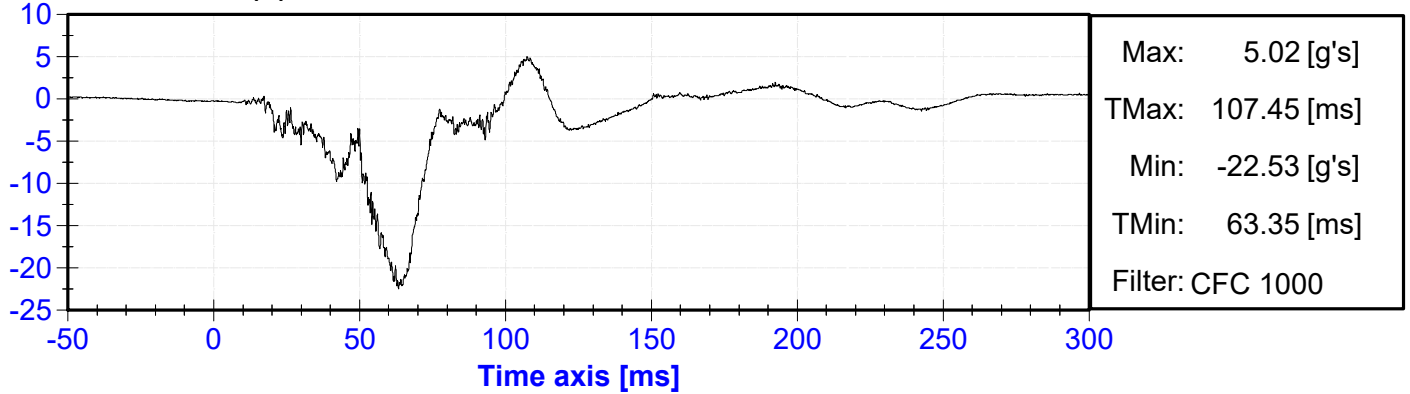
APPENDIX II
ES-2re DUMMY RESPONSE DATA TRACES

Table of Data Plots

No.	Description	Page
1	ES-2re Head (X) Acceleration vs. Time	II-3
2	ES-2re Head (Y) Acceleration vs. Time	II-3
3	ES-2re Head (Z) Acceleration vs. Time	II-3
4	ES-2re Head Resultant Acceleration vs. Time	II-3
5	ES-2re Head (X) Velocity vs. Time	II-4
6	ES-2re Head (Y) Velocity vs. Time	II-4
7	ES-2re Head (Z) Velocity vs. Time	II-4
8	ES-2re Upper Thorax Rib Deflection Rate vs. Time	II-4
9	ES-2re Upper Thorax Rib Deflection (Y) vs. Time	II-5
10	ES-2re Middle Thorax Rib Deflection Rate vs. Time	II-5
11	ES-2re Middle Thorax Rib Deflection (Y) vs. Time	II-5
12	ES-2re Lower Thorax Rib Deflection Rate vs. Time	II-5
13	ES-2re Lower Thorax Rib Deflection (Y) vs. Time	II-6
14	ES-2re Front Abdomen Force (Y) vs. Time	II-6
15	ES-2re Middle Abdomen Force (Y) vs. Time	II-6
16	ES-2re Rear Abdomen Force (Y) vs. Time	II-6
17	ES-2re Sum of Abdomen Forces vs. Time	II-7
18	ES-2re Pubic Symphysis Force (Y) vs. Time	II-7

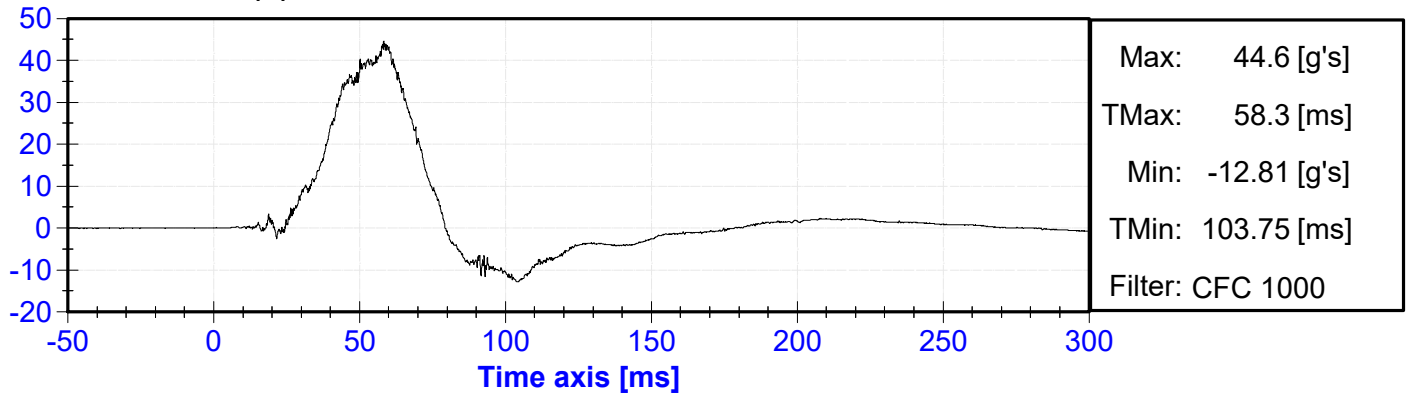
ACCELERATION [g's]

ES-2re Head (X) Acceleration vs. Time



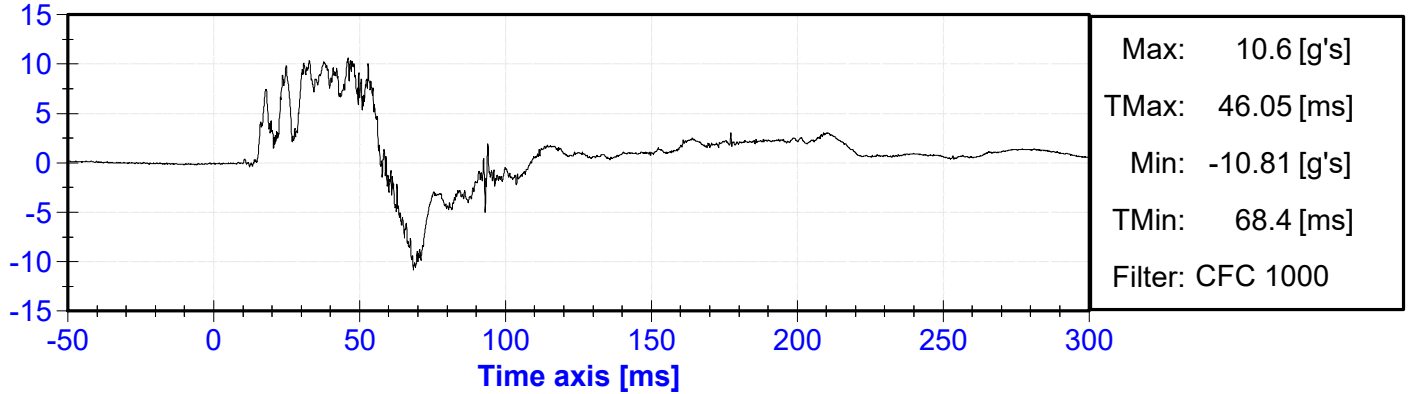
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ES-2re Head (Y) Acceleration vs. Time



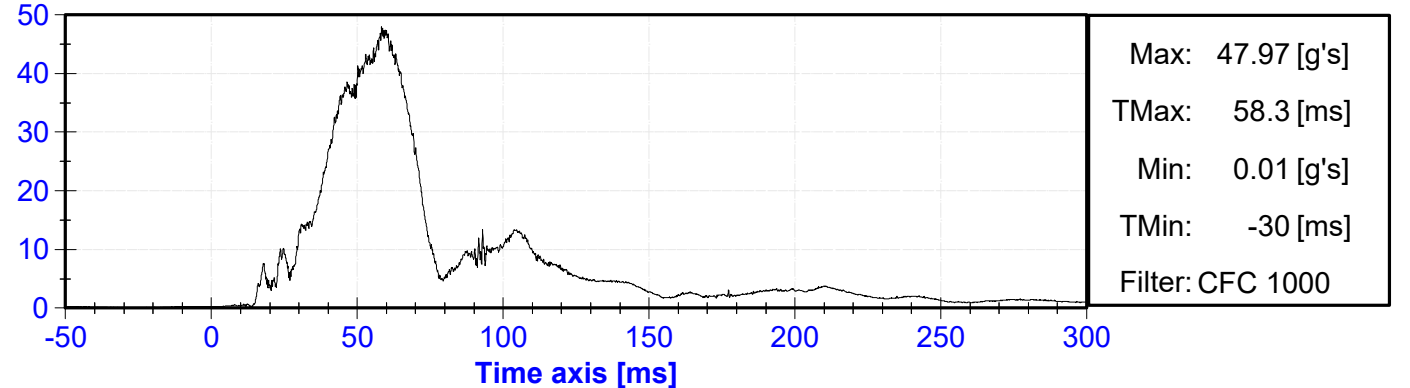
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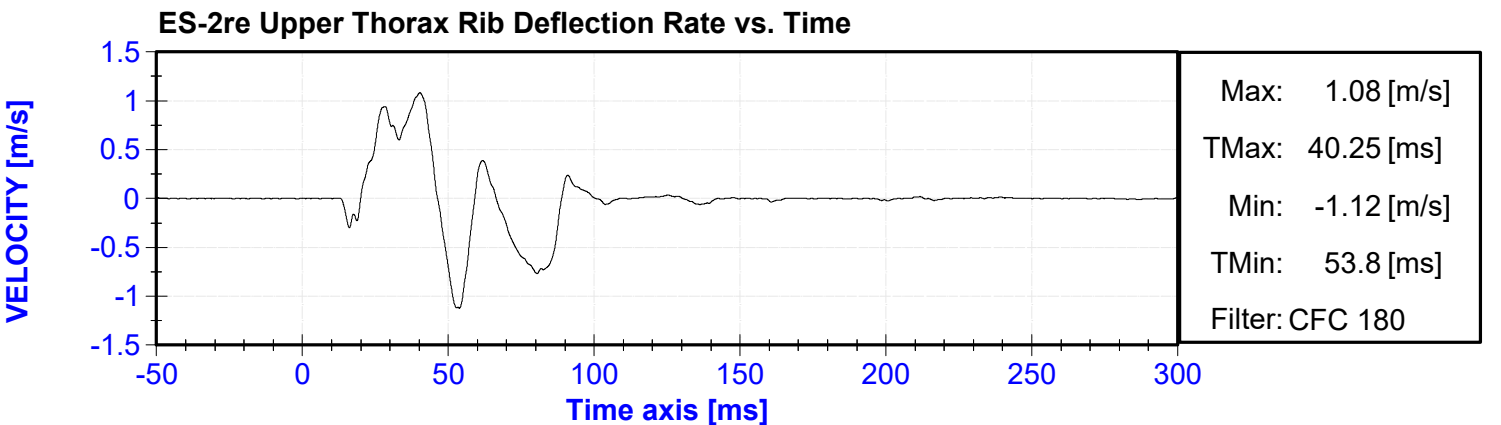
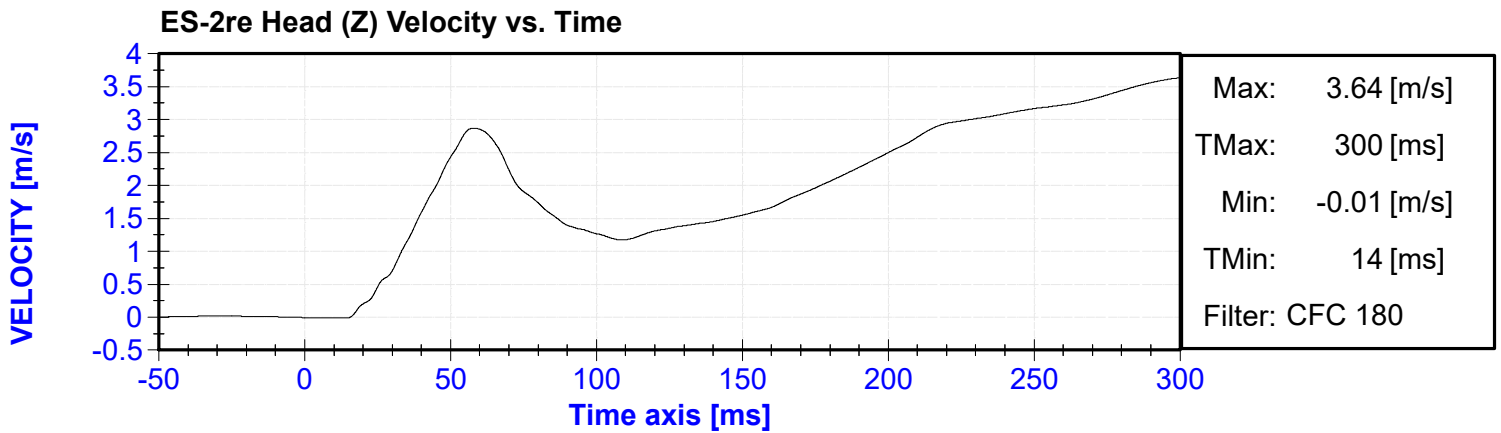
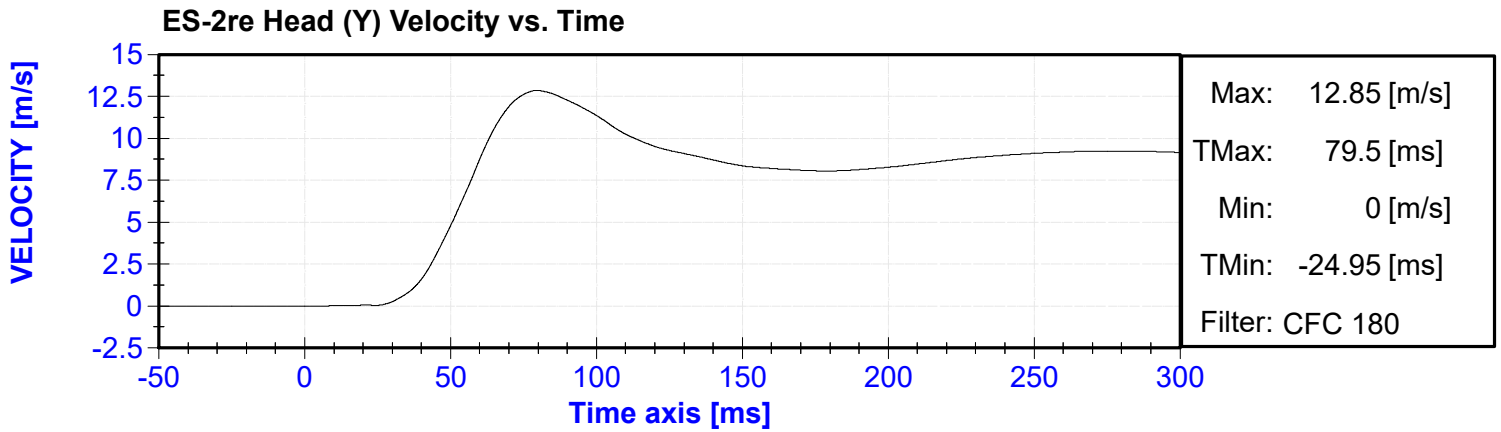
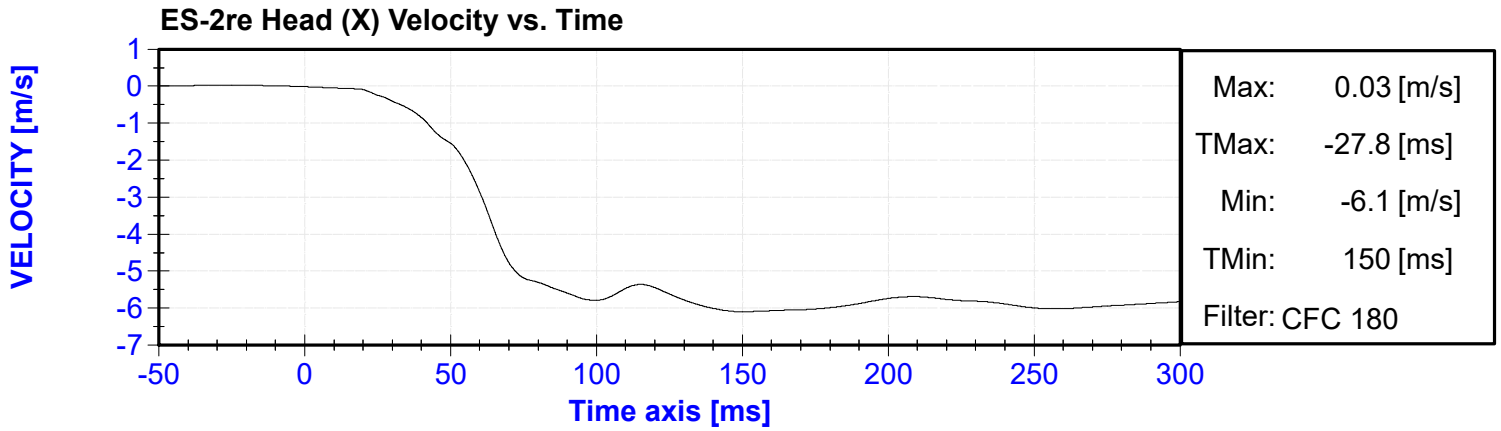
ES-2re Head (Z) Acceleration vs. Time

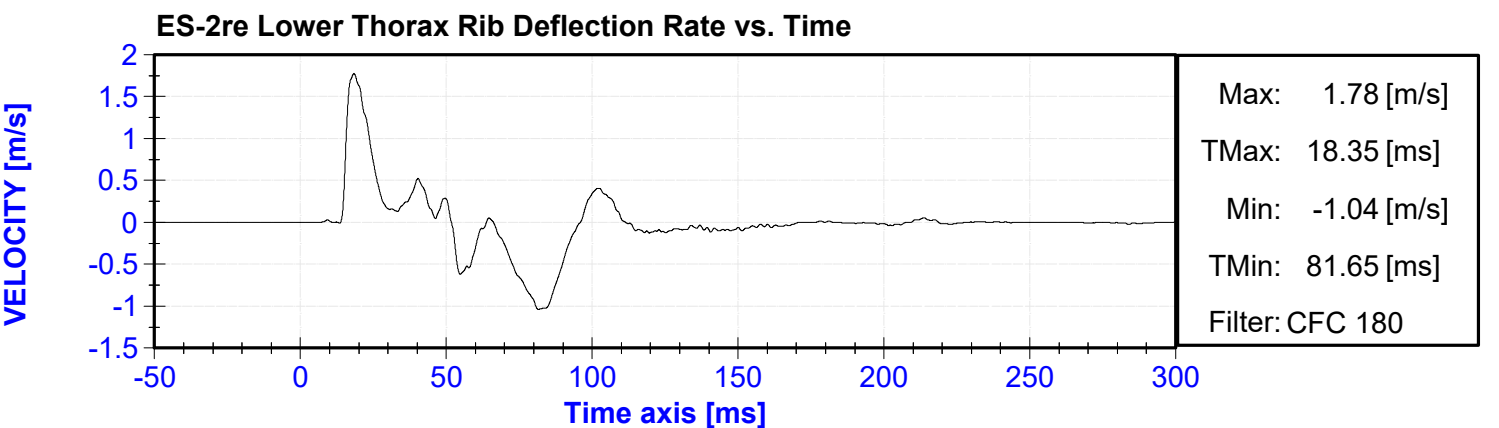
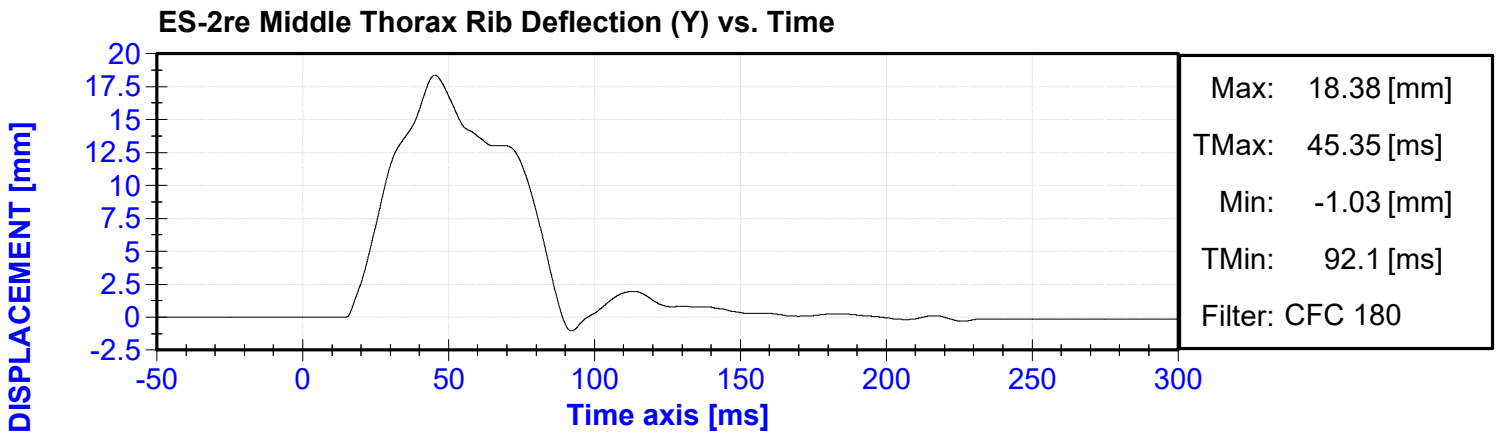
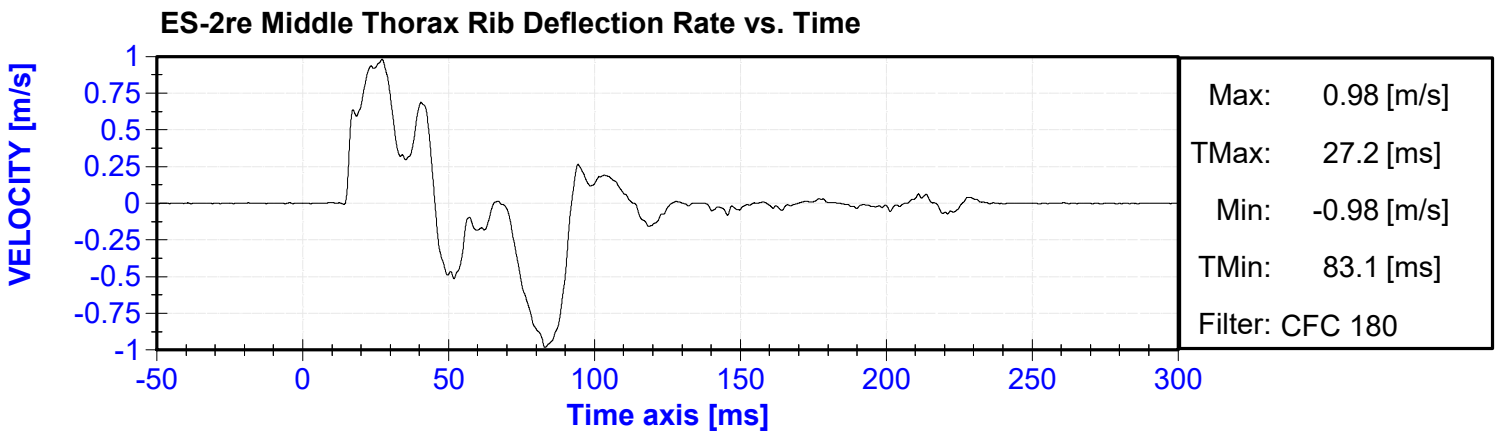
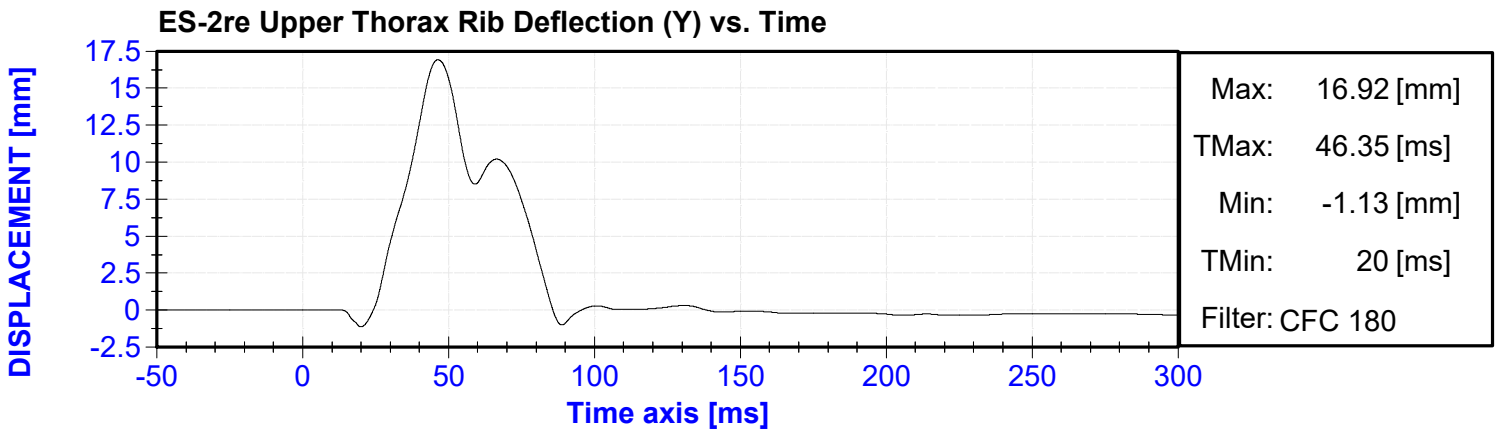


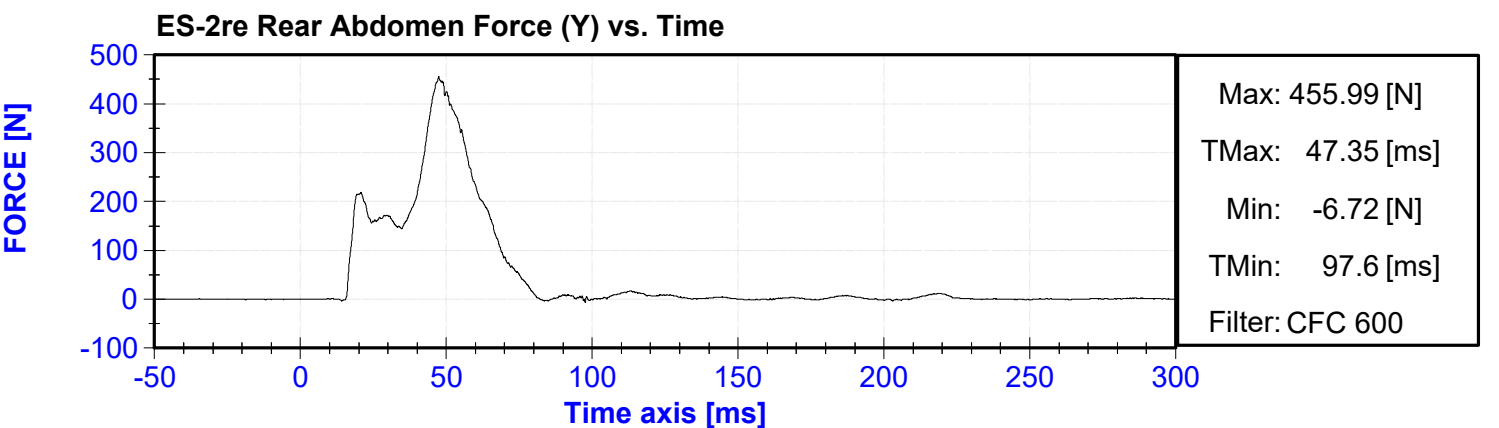
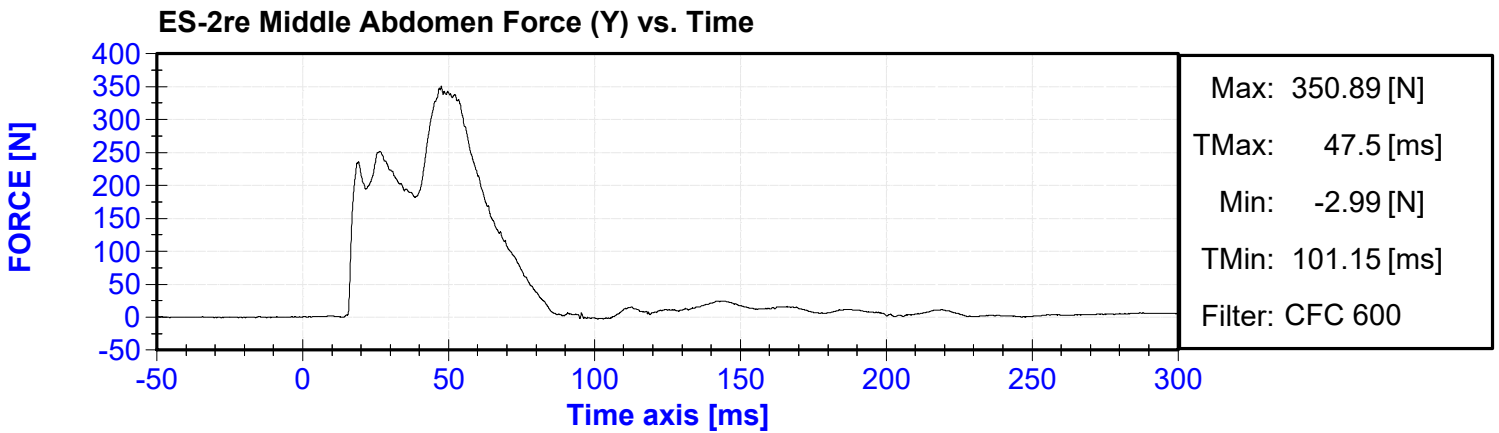
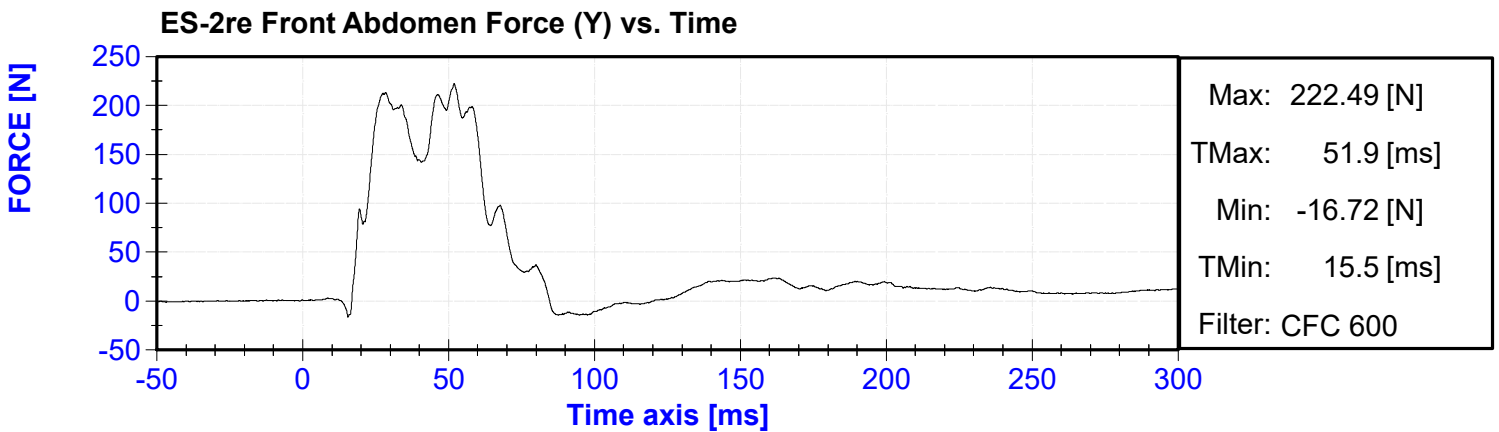
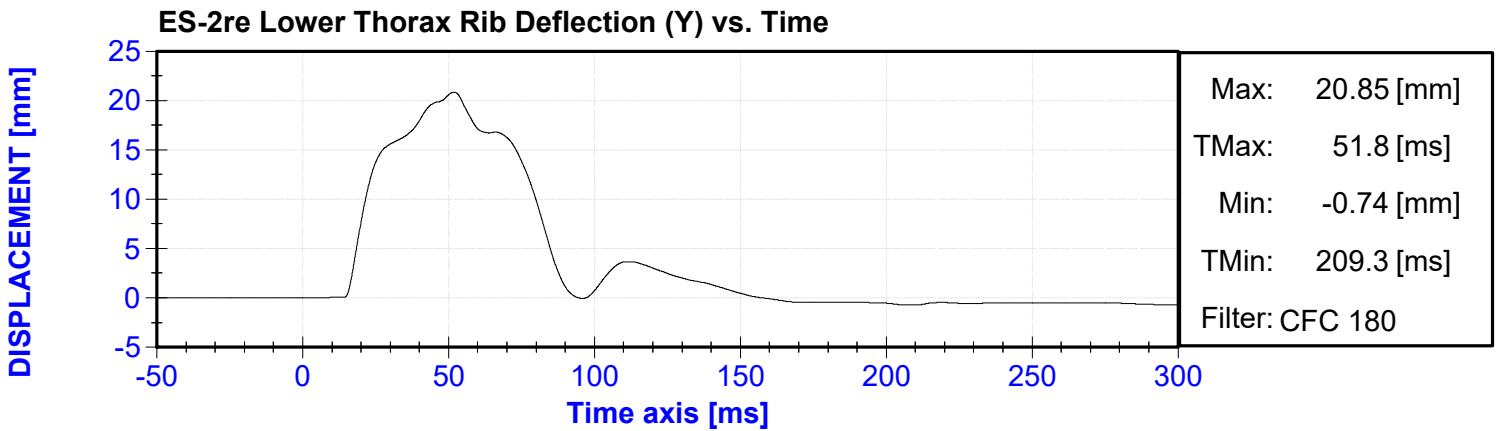
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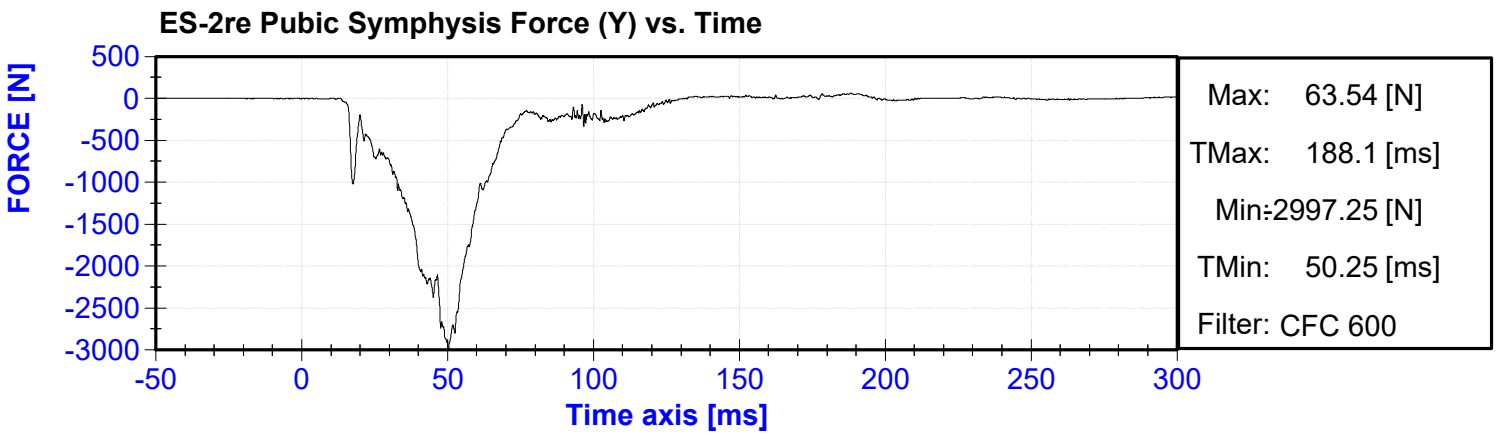
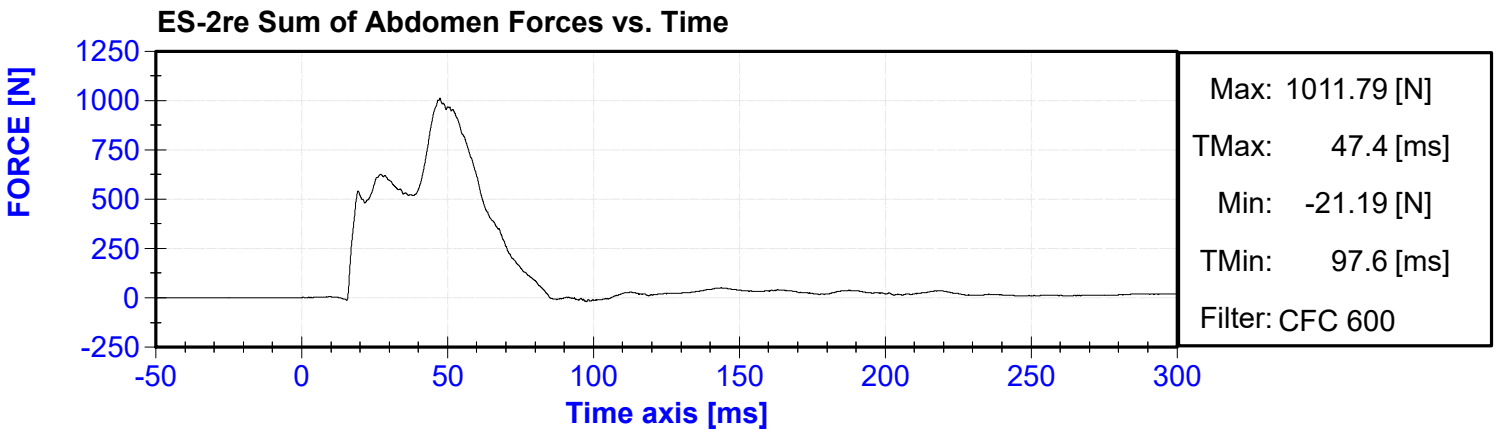
ES-2re Head Resultant Acceleration vs. Time







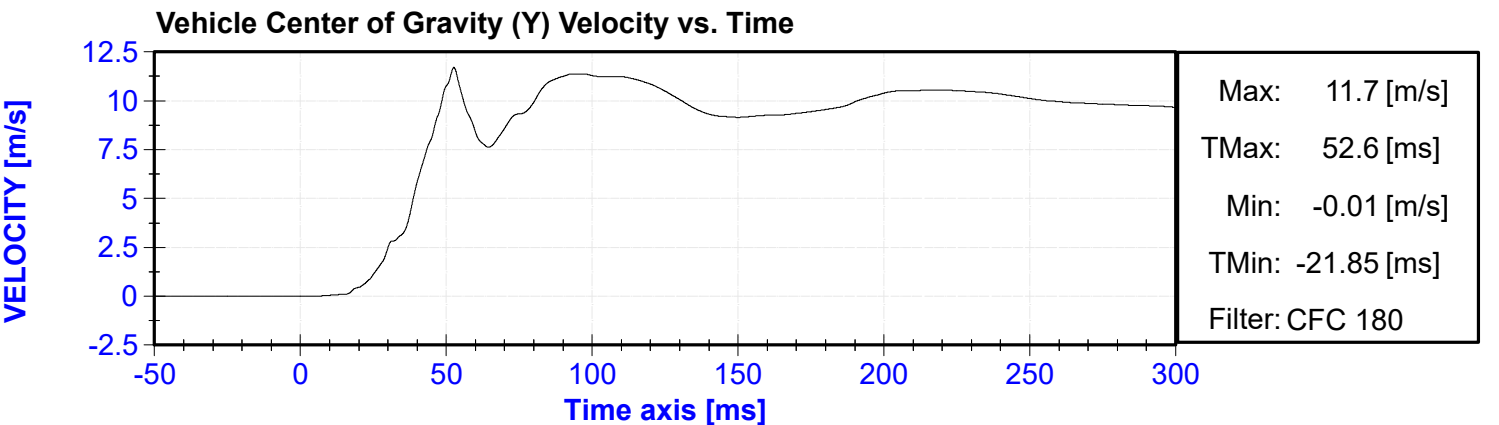
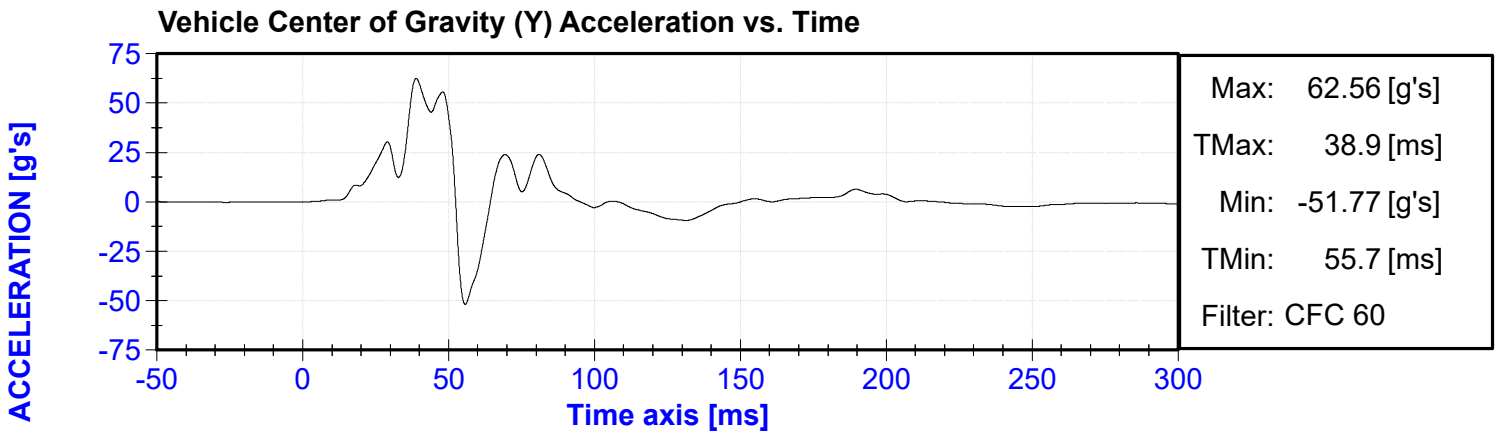
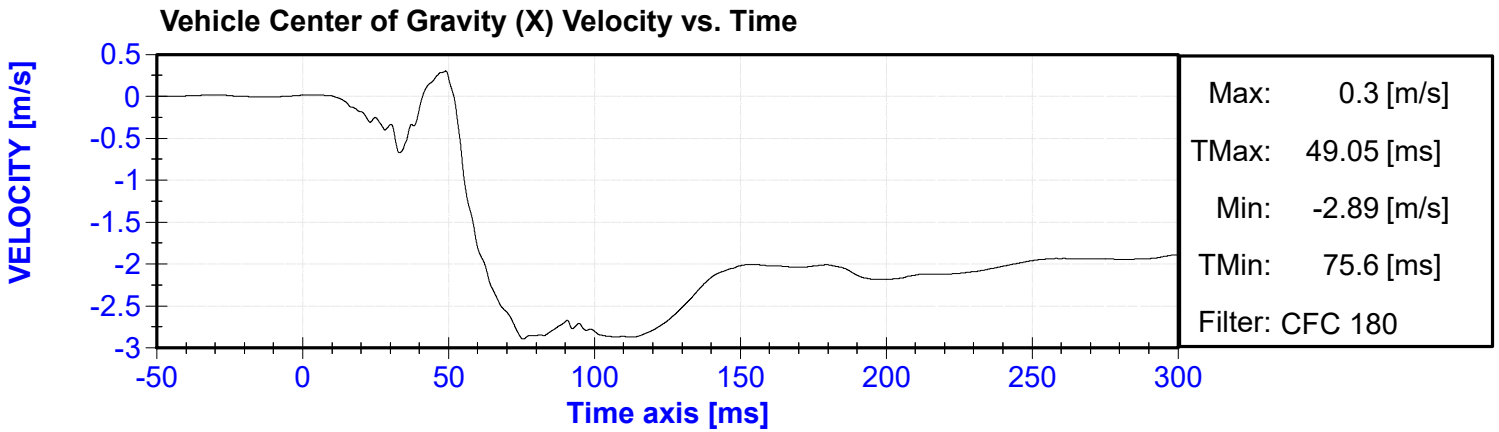
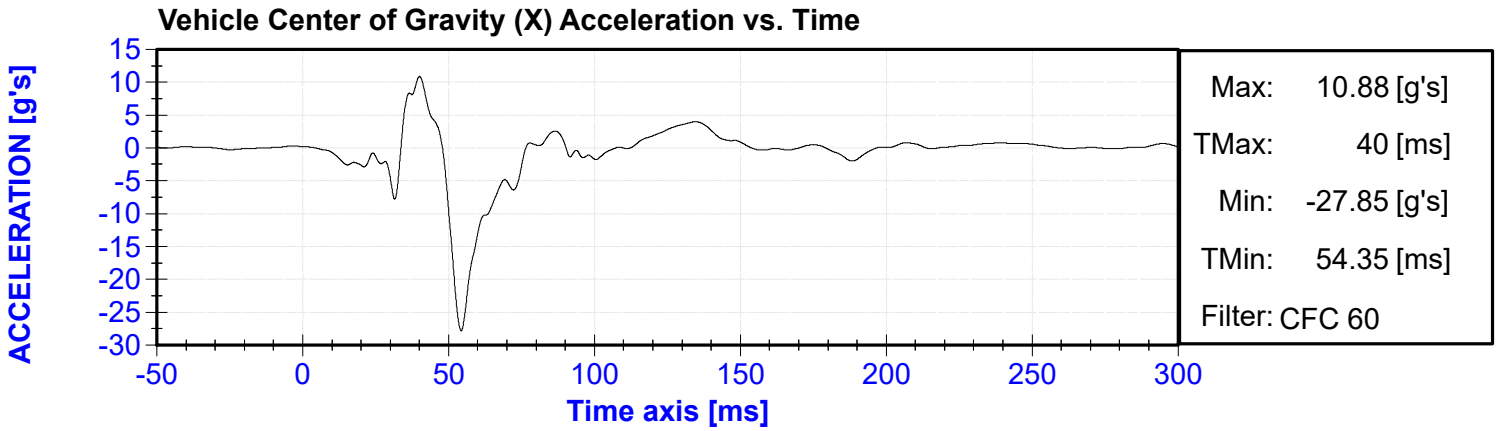


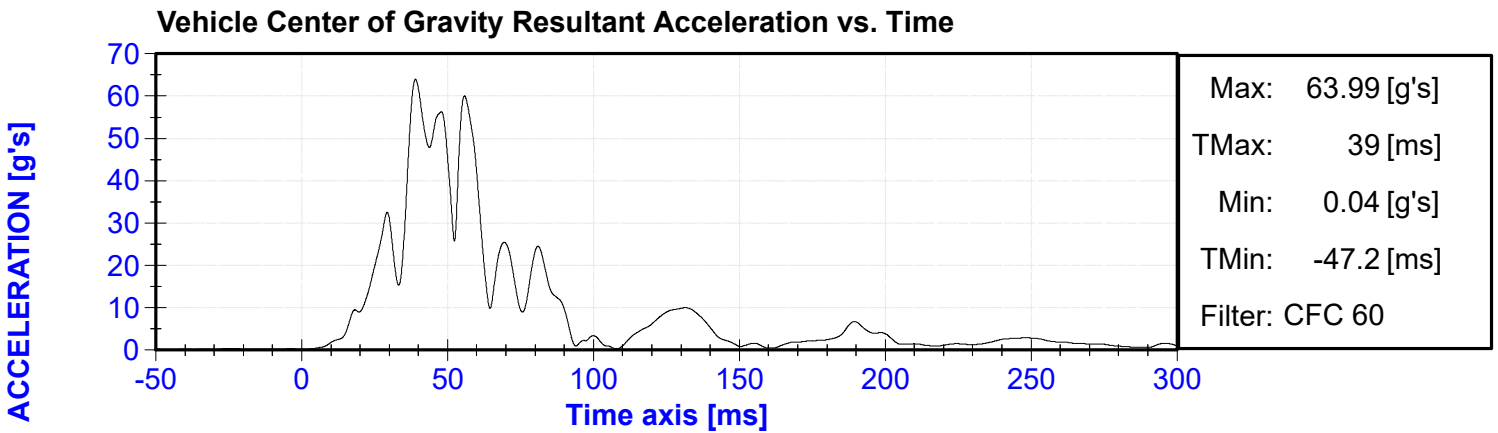
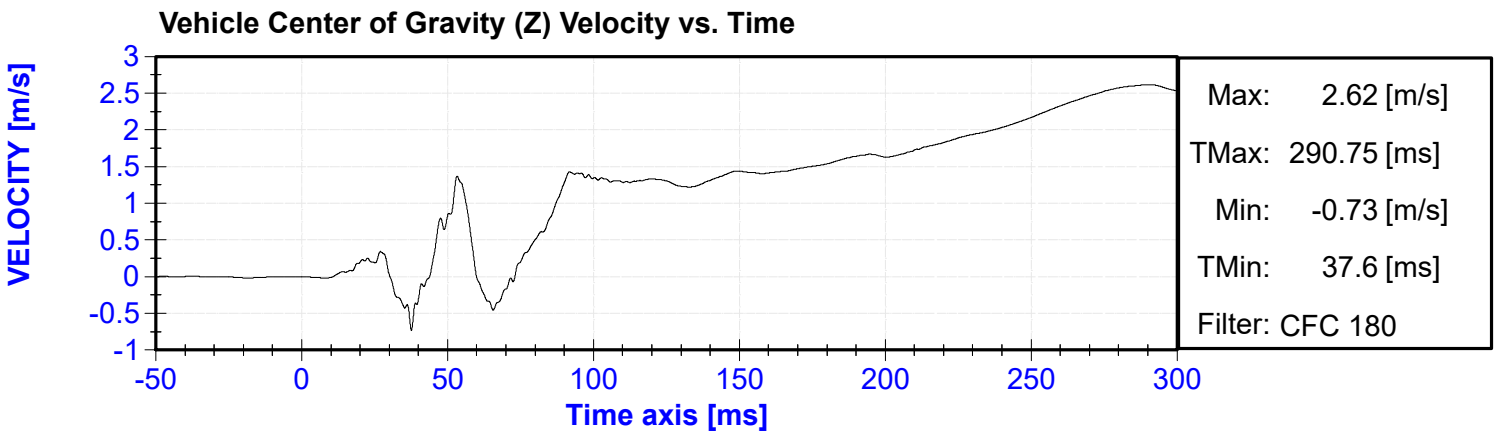
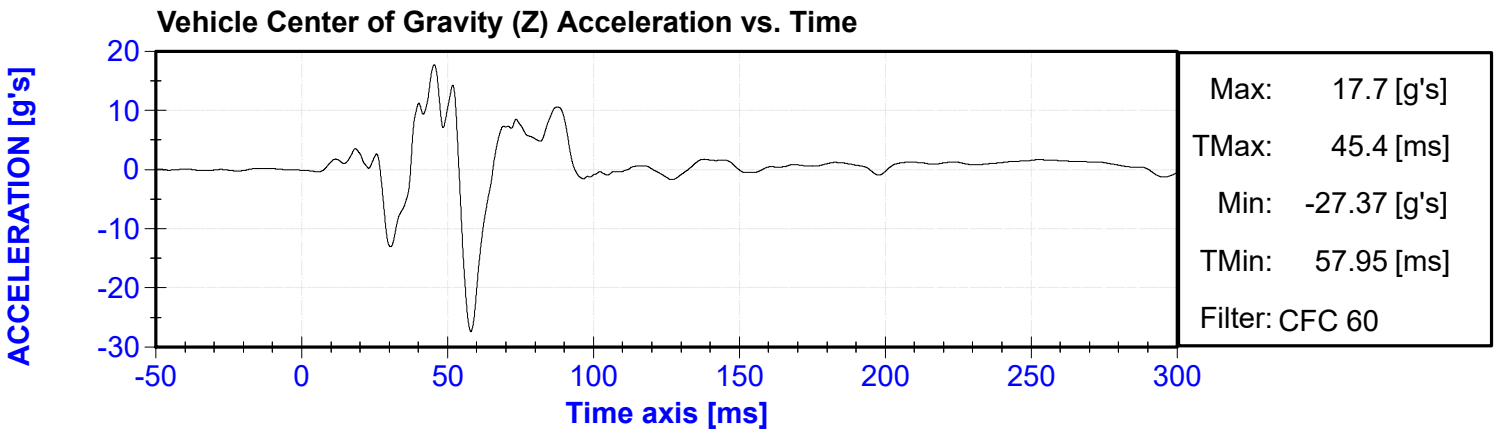


APPENDIX III
VEHICLE ACCELEROMETER RESPONSE DATA

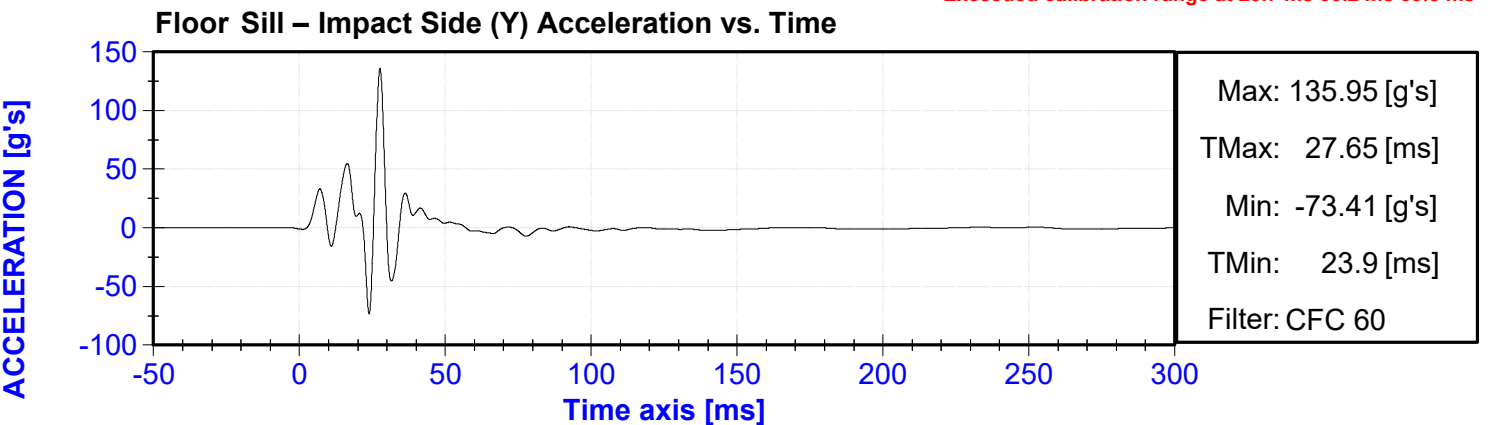
Table of Data Plots

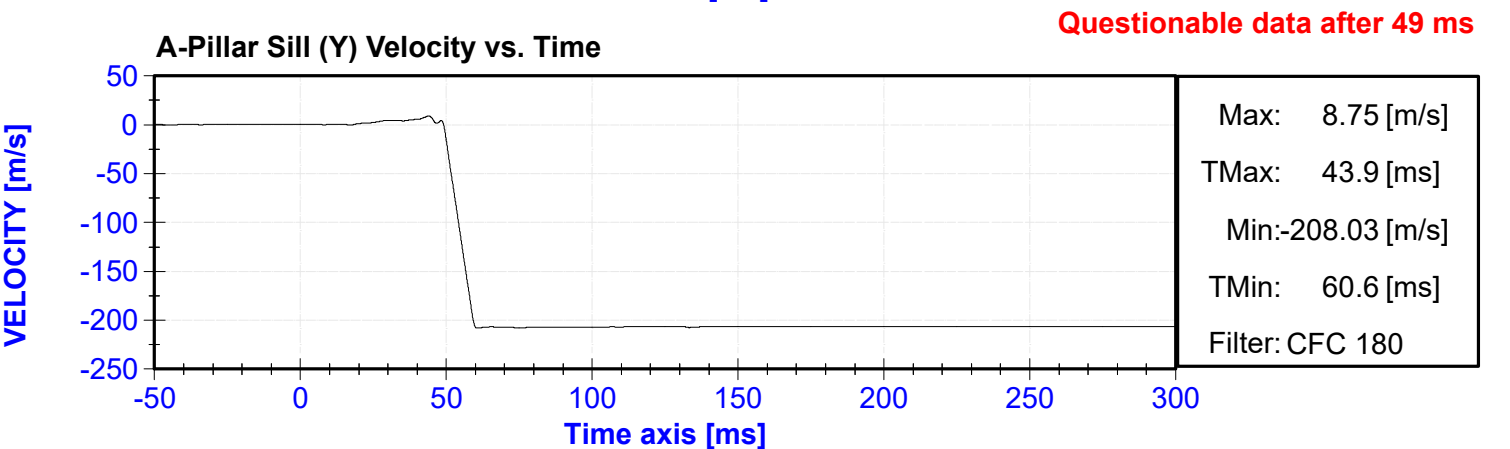
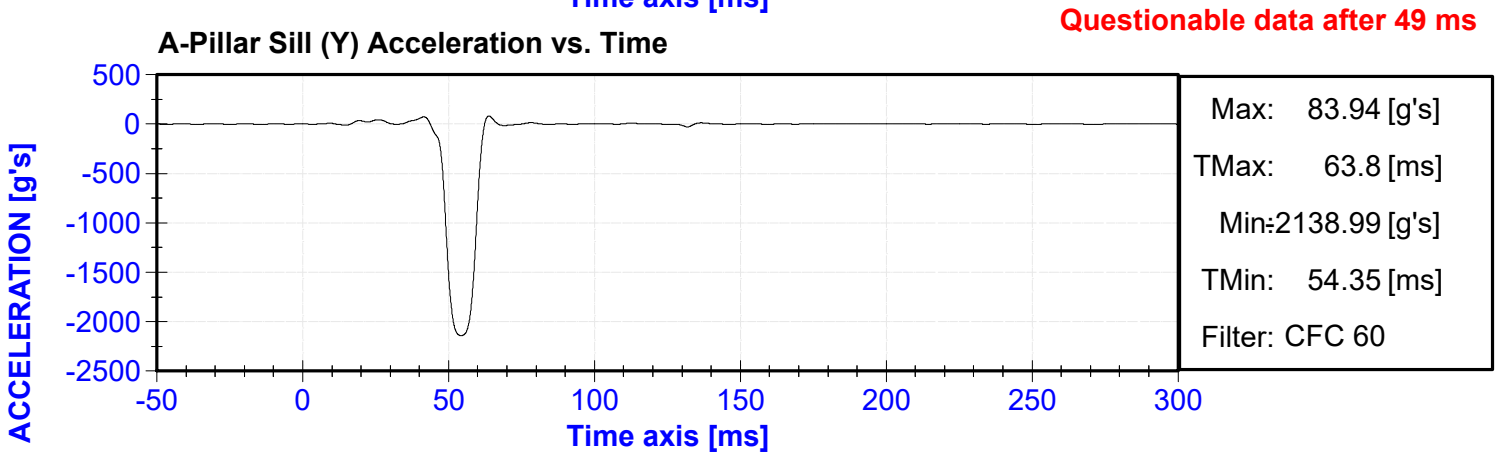
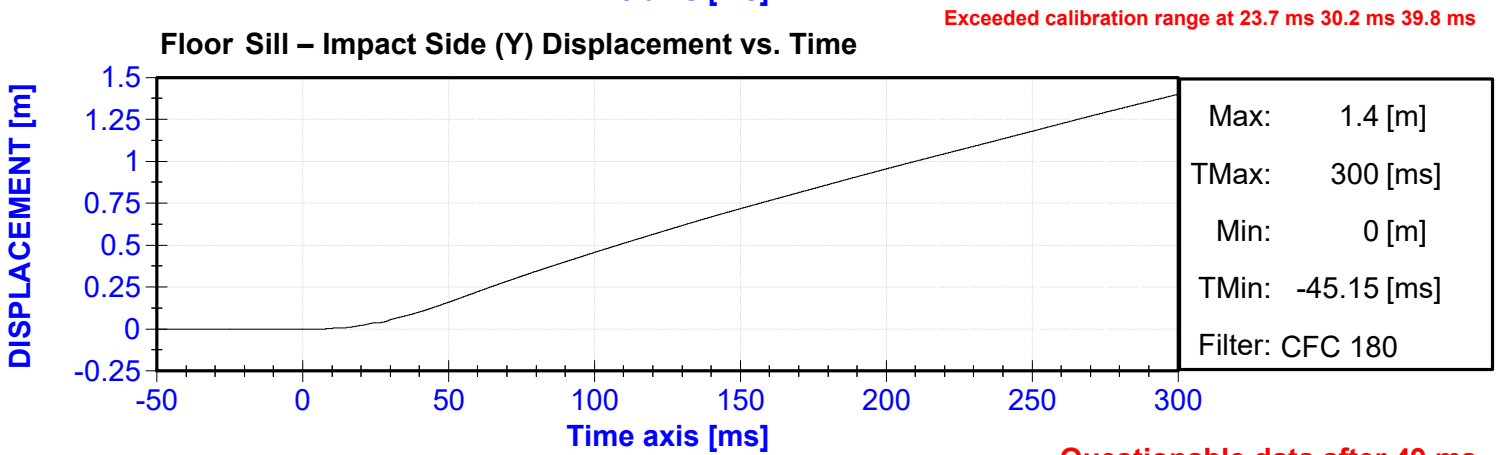
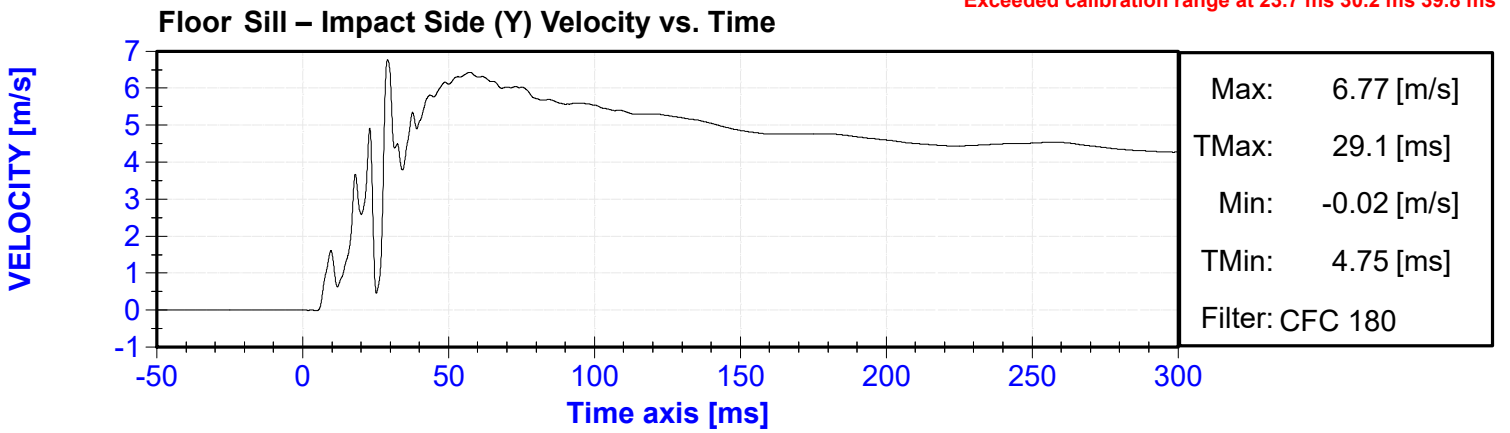
No.	Description	Page
1	Vehicle Center of Gravity (X) Acceleration vs. Time	III-3
2	Vehicle Center of Gravity (X) Velocity vs. Time	III-3
3	Vehicle Center of Gravity (Y) Acceleration vs. Time	III-3
4	Vehicle Center of Gravity (Y) Velocity vs. Time	III-3
5	Vehicle Center of Gravity (Z) Acceleration vs. Time	III-4
6	Vehicle Center of Gravity (Z) Velocity vs. Time	III-4
7	Vehicle Center of Gravity Resultant Acceleration vs. Time	III-4
8	Floor Sill – Impact Side (Y) Acceleration vs. Time	III-4
9	Floor Sill – Impact Side (Y) Velocity vs. Time	III-5
10	Floor Sill – Impact Side (Y) Displacement vs. Time	III-5
11	A-Pillar Sill (Y) Acceleration vs. Time	III-5
12	A-Pillar Sill (Y) Velocity vs. Time	III-5
13	A-Pillar Sill (Y) Displacement vs. Time	III-6
14	A-Pillar Low (Y) Acceleration vs. Time	III-6
15	A-Pillar Low (Y) Velocity vs. Time	III-6
16	A-Pillar Low (Y) Displacement vs. Time	III-6
17	A-Pillar Mid (Y) Acceleration vs. Time	III-7
18	A-Pillar Mid (Y) Velocity vs. Time	III-7
19	A-Pillar Mid (Y) Displacement vs. Time	III-7
20	B-Pillar Sill (Y) Acceleration vs. Time	III-7
21	B-Pillar Sill (Y) Velocity vs. Time	III-8
22	B-Pillar Sill (Y) Displacement vs. Time	III-8
23	B-Pillar Low (Y) Acceleration vs. Time	III-8
24	B-Pillar Low (Y) Velocity vs. Time	III-8
25	B-Pillar Low (Y) Displacement vs. Time	III-9
26	B-Pillar Mid (Y) Acceleration vs. Time	III-9
27	B-Pillar Mid (Y) Velocity vs. Time	III-9
28	B-Pillar Mid (Y) Displacement vs. Time	III-9
29	Seat (Y) Acceleration vs. Time	III-10
30	Seat (Y) Velocity vs. Time	III-10
31	Seat (Y) Displacement vs. Time	III-10
32	Engine (X) Acceleration vs. Time	III-10
33	Engine (X) Velocity vs. Time	III-11
34	Engine (Y) Acceleration vs. Time	III-11
35	Engine (Y) Velocity vs. Time	III-11
36	Firewall (Y) Acceleration vs. Time	III-11
37	Firewall (Y) Velocity vs. Time	III-12
38	Roof (Y) Acceleration vs. Time	III-12
39	Roof (Y) Velocity vs. Time	III-12
40	Floor Sill – Non Impact Side (Y) Acceleration vs. Time	III-12
41	Floor Sill – Non Impact Side (Y) Velocity vs. Time	III-13
42	Rear Deck (X) Acceleration vs. Time	III-13
43	Rear Deck (X) Velocity vs. Time	III-13
44	Rear Deck (Y) Acceleration vs. Time	III-13
45	Rear Deck (Y) Velocity vs. Time	III-14



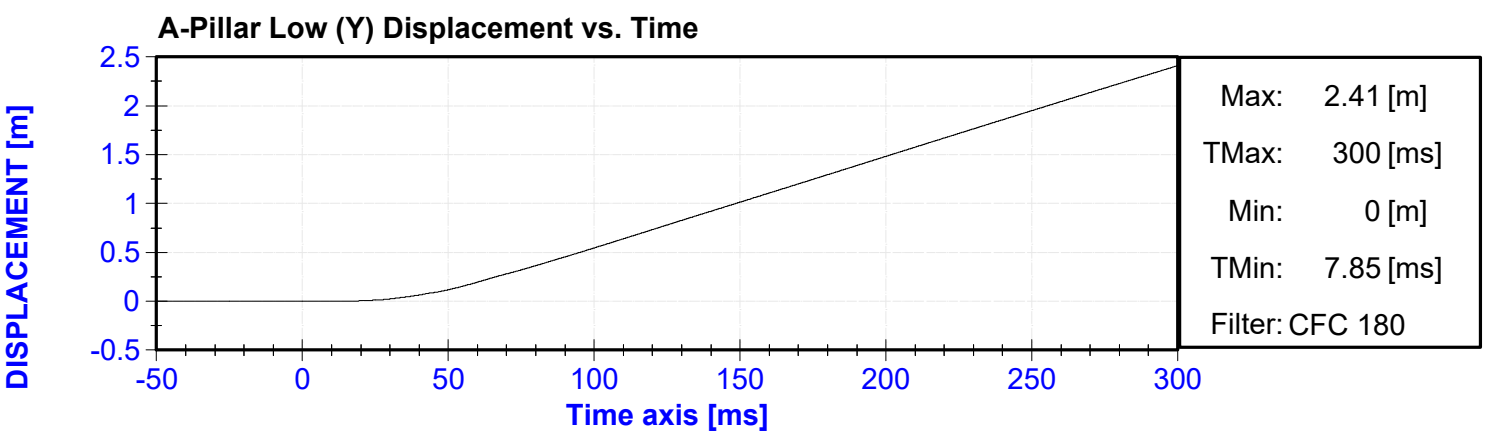
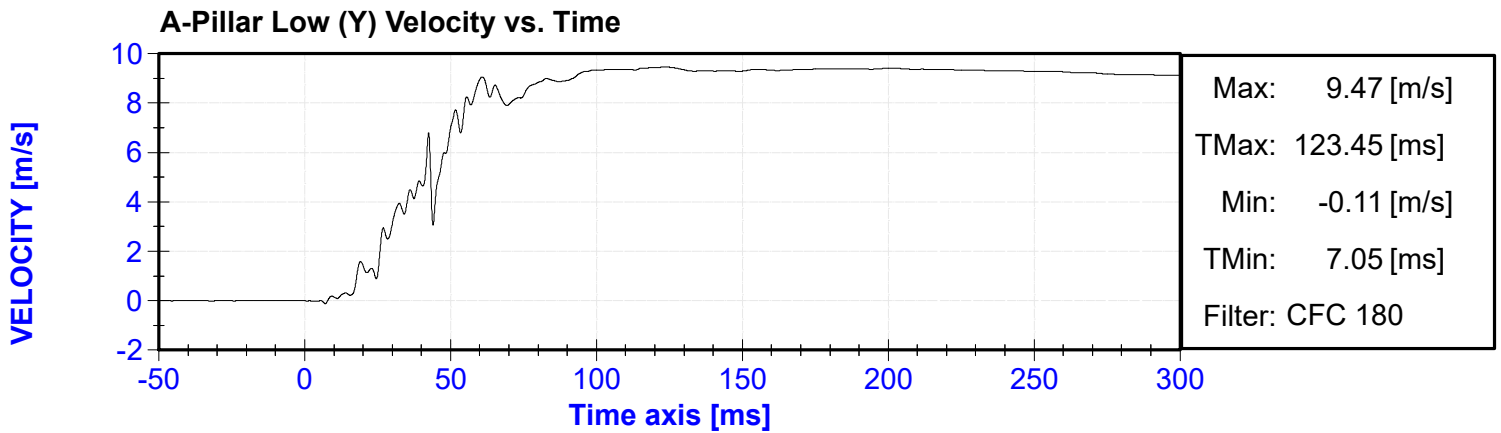
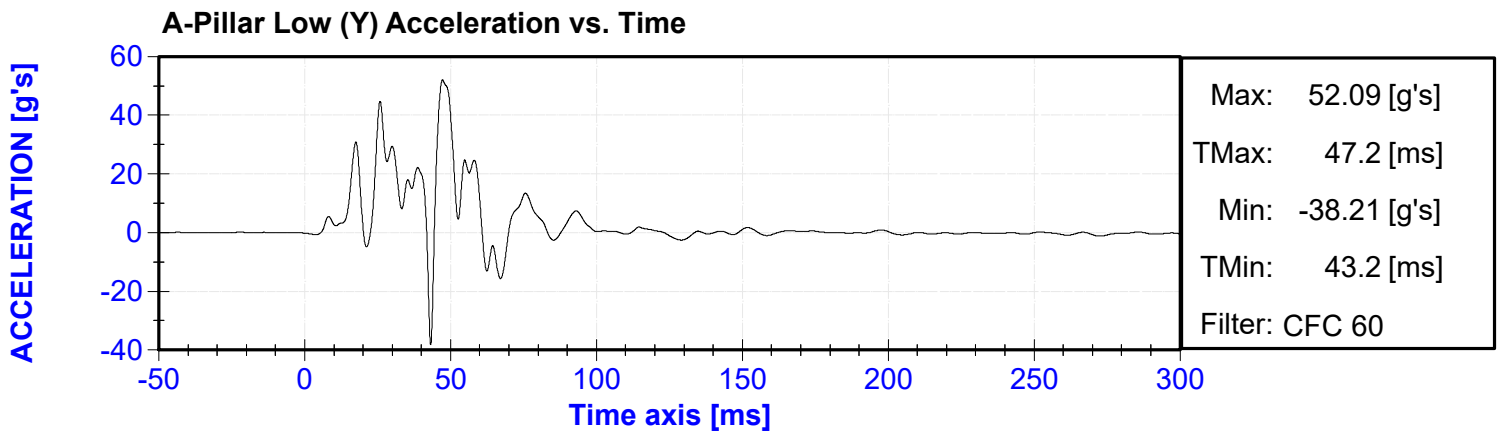
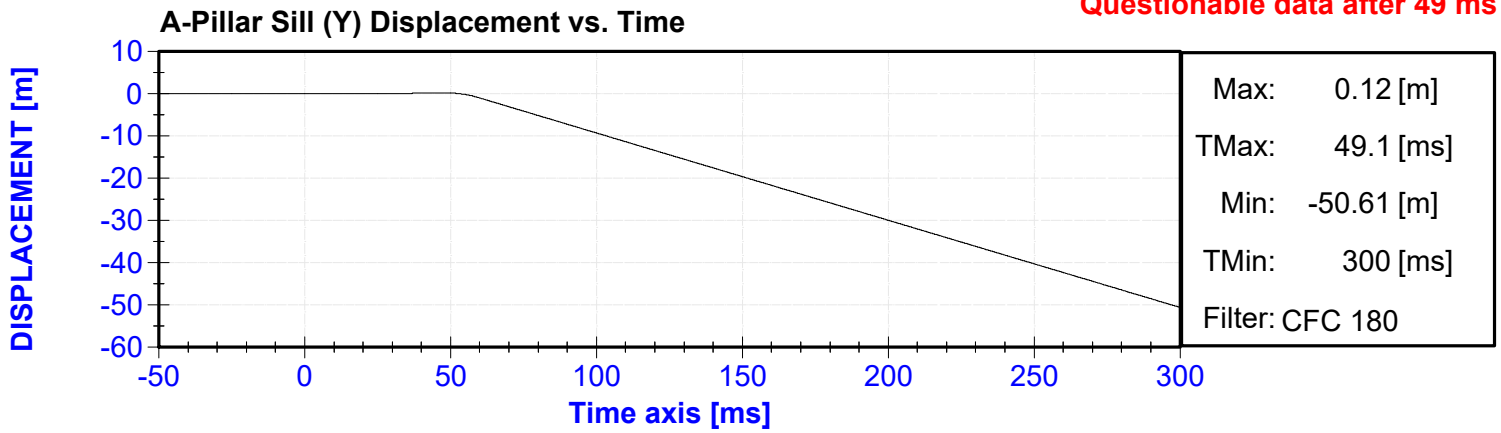


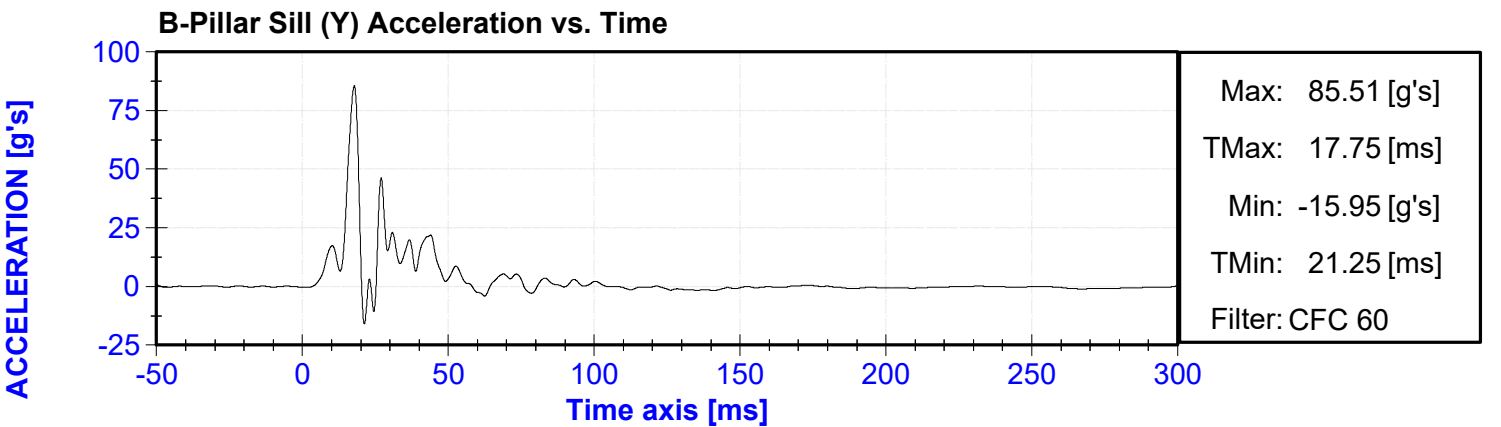
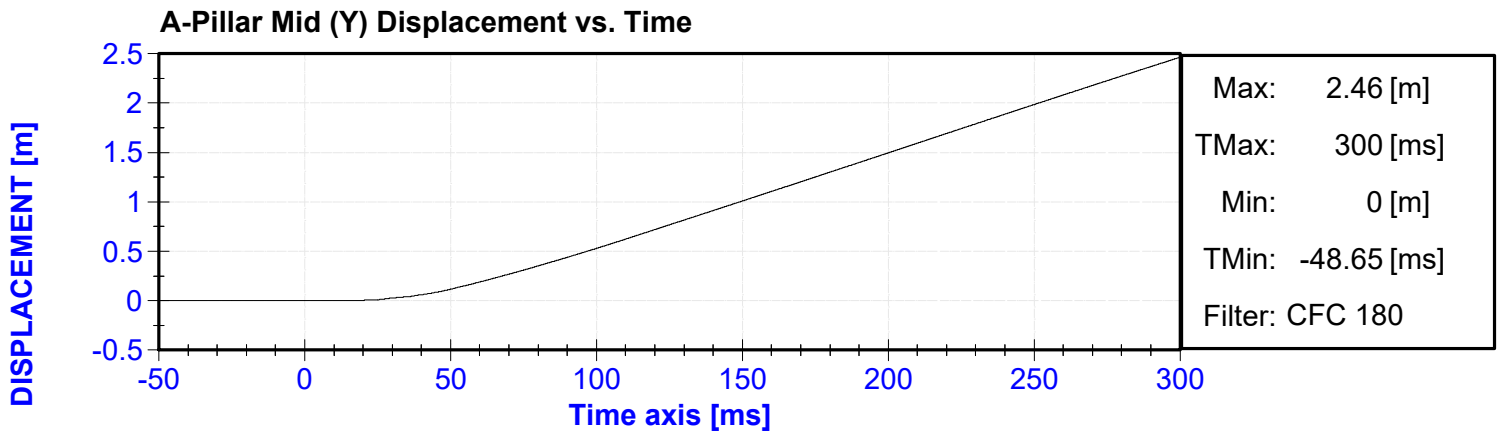
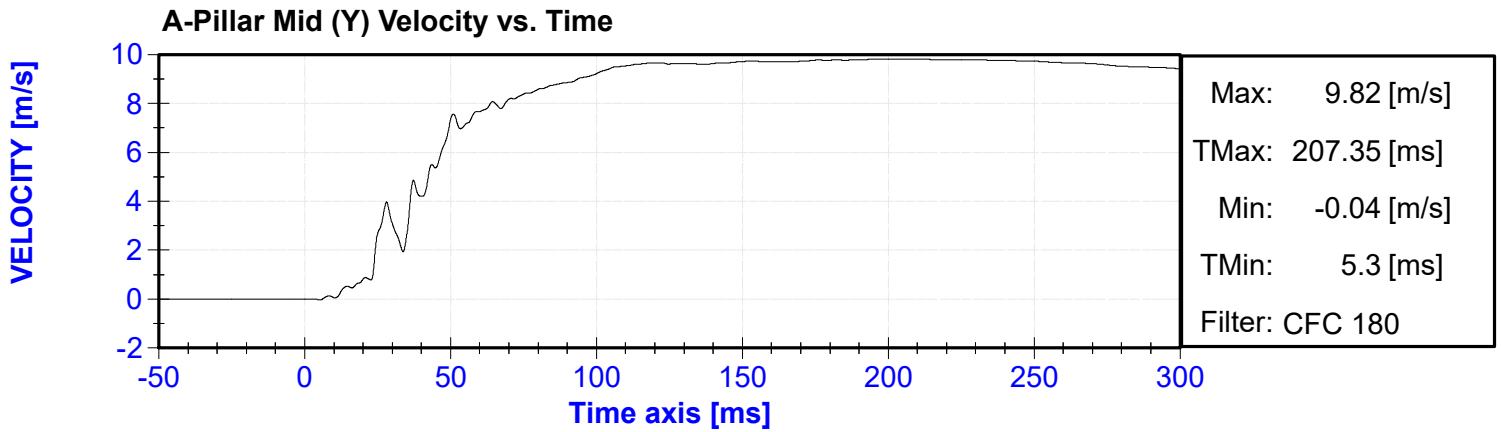
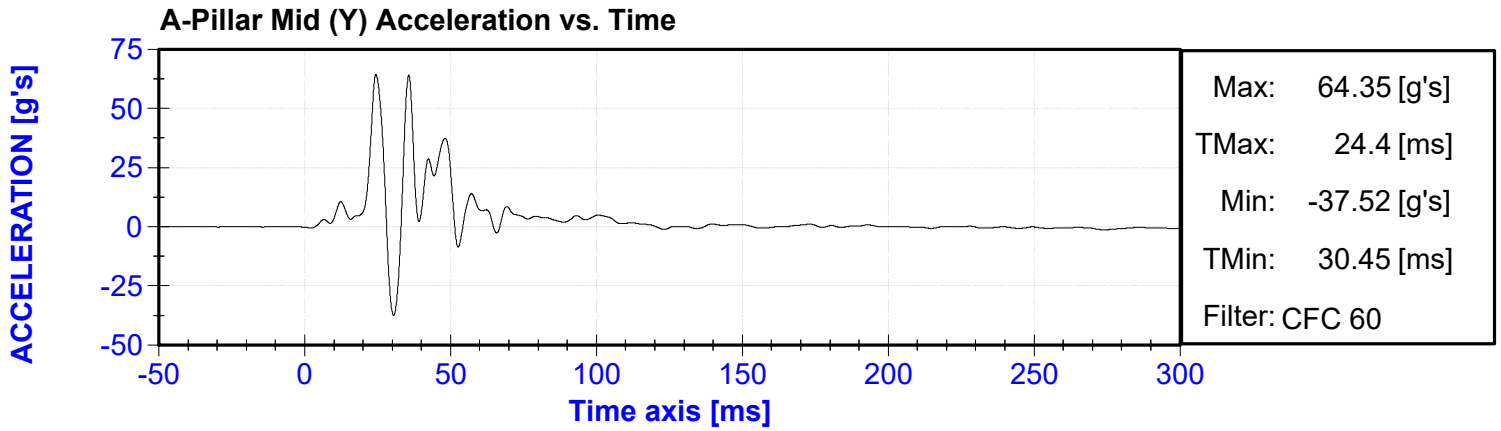
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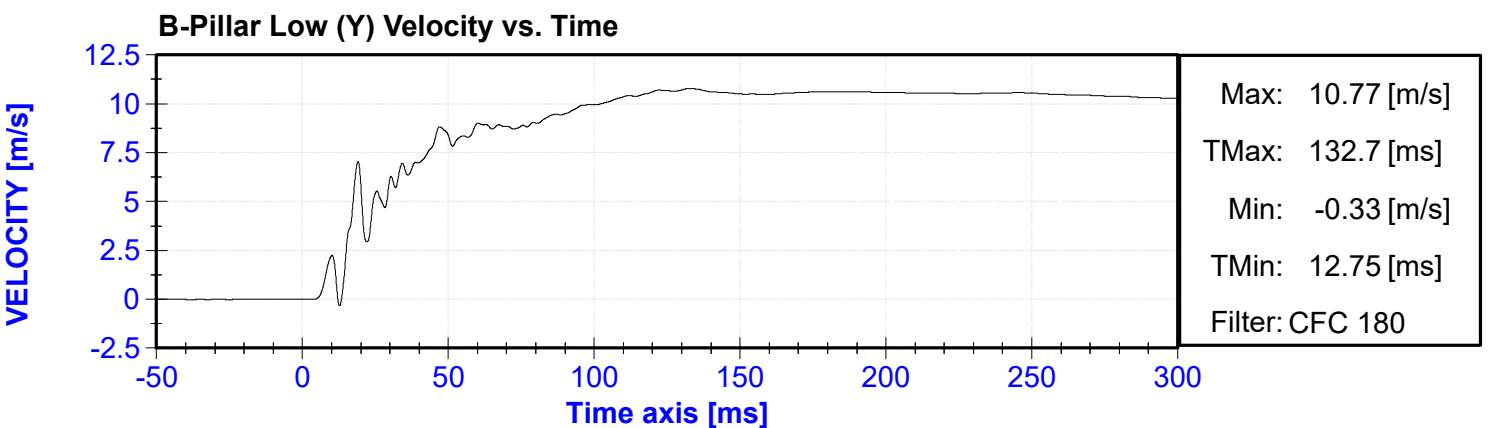
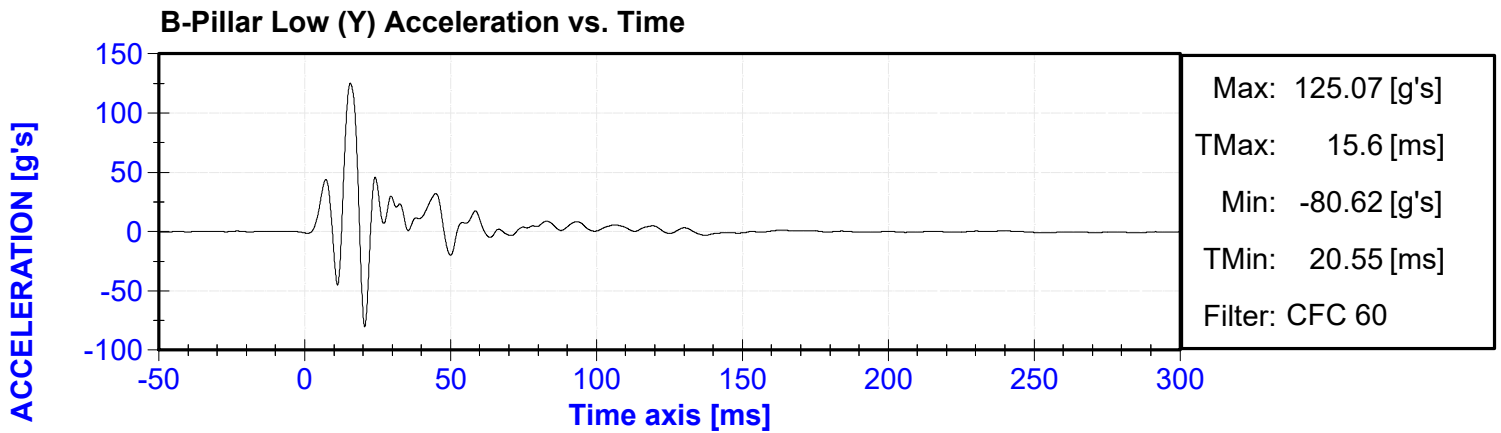
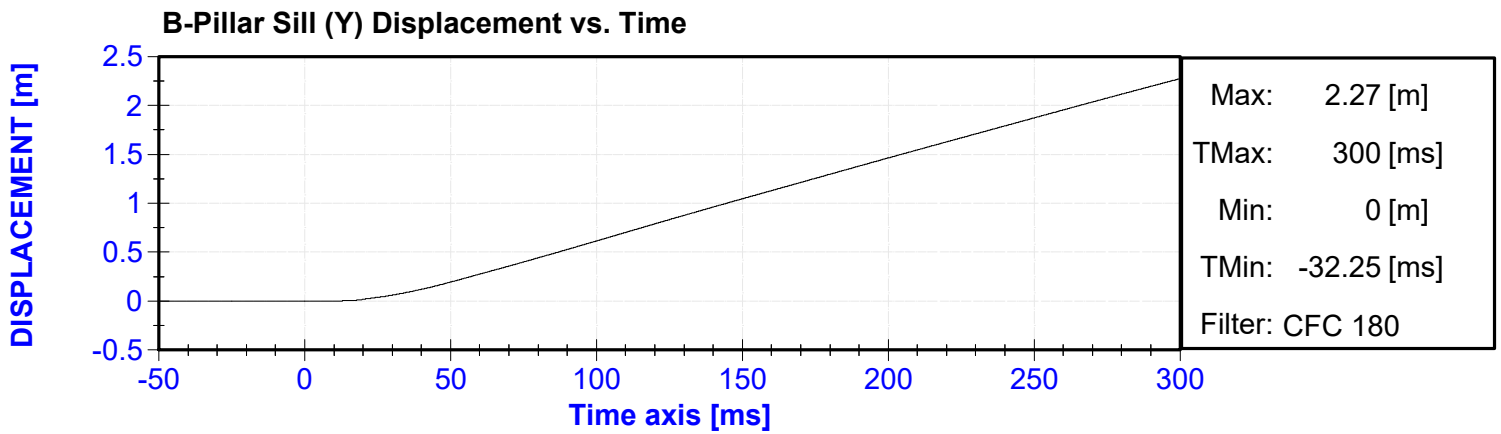
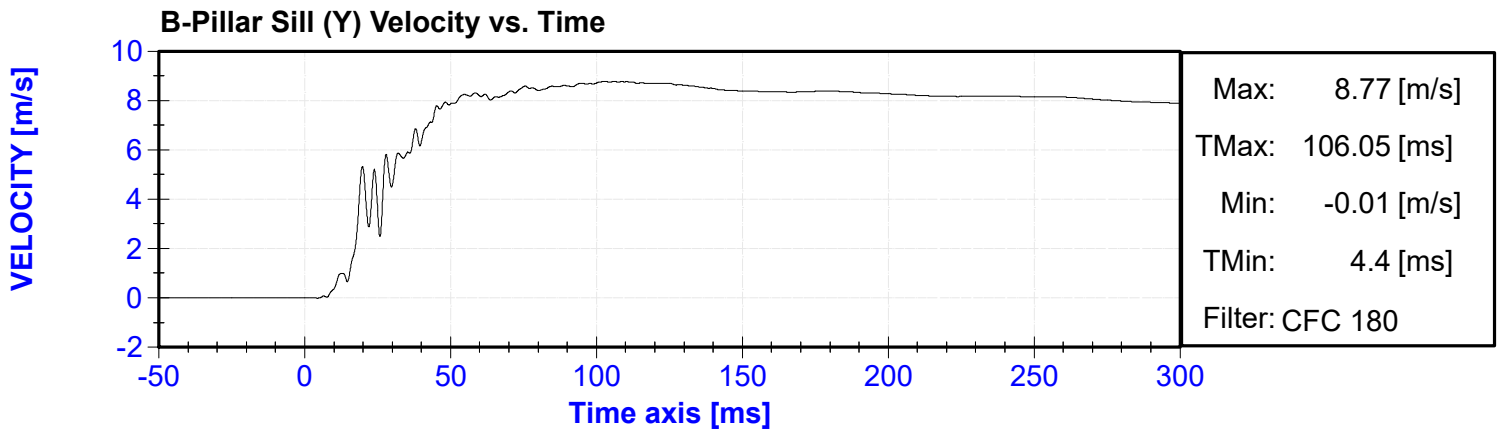


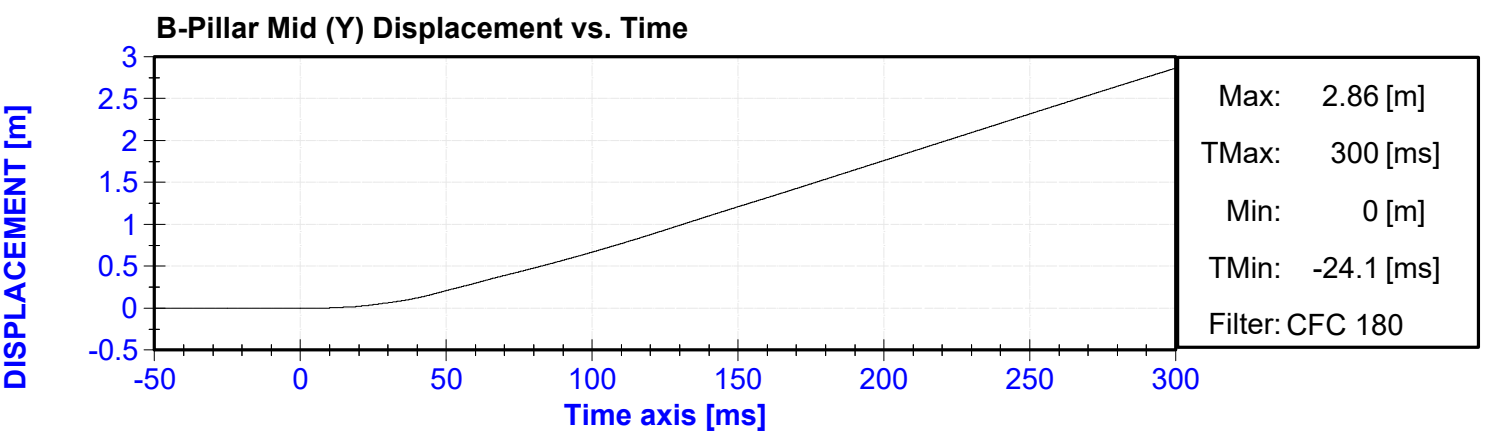
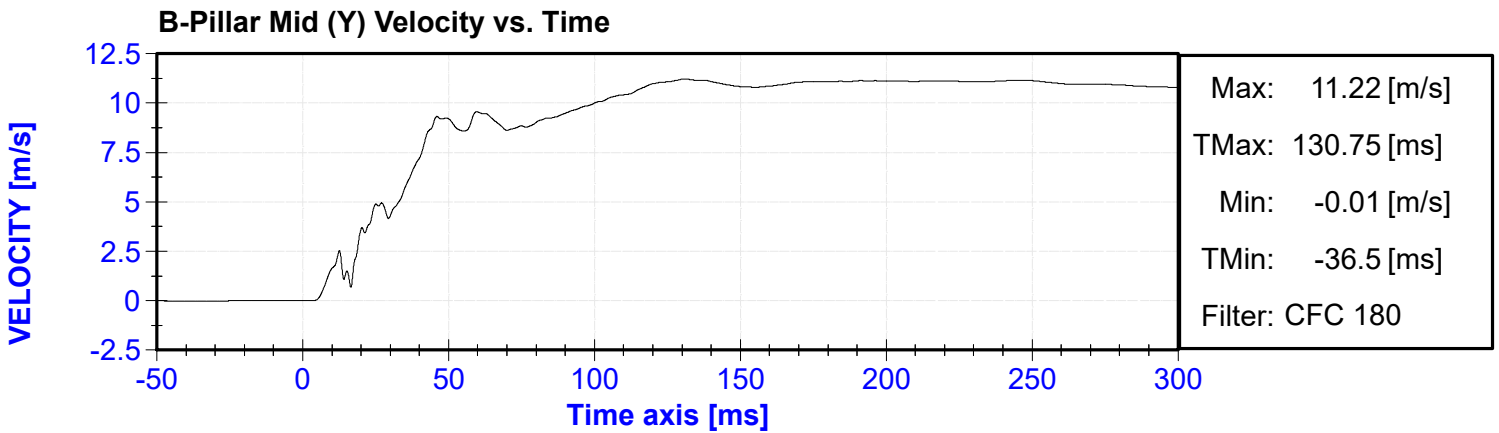
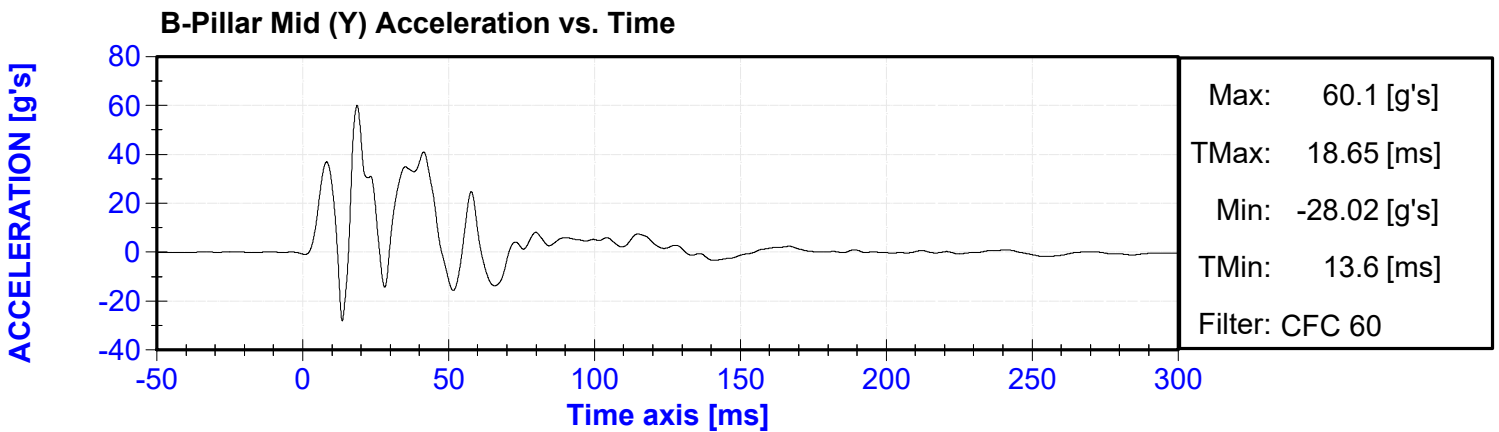
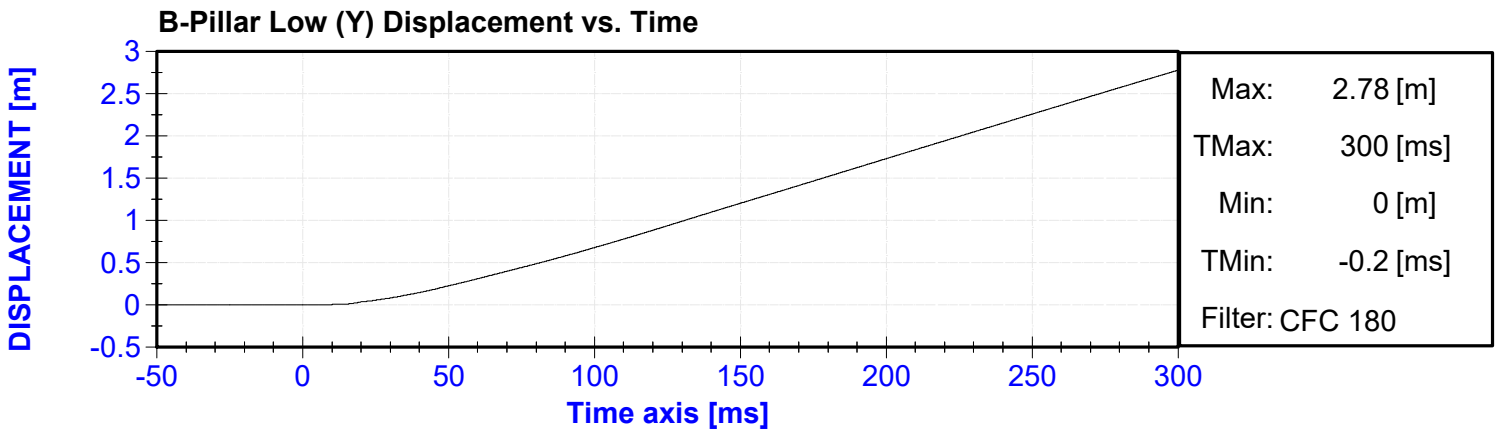


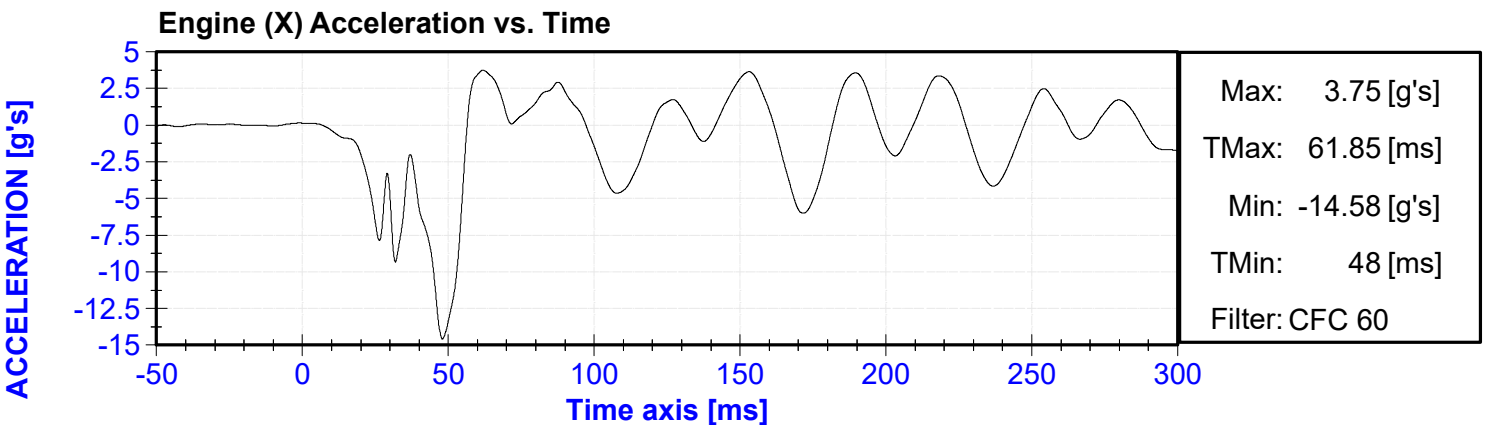
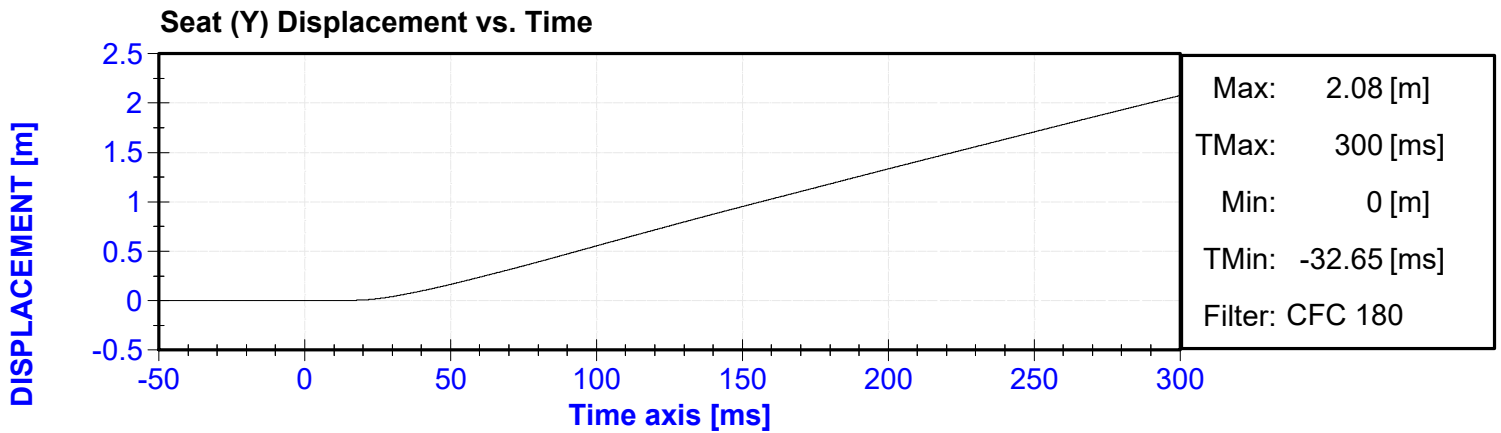
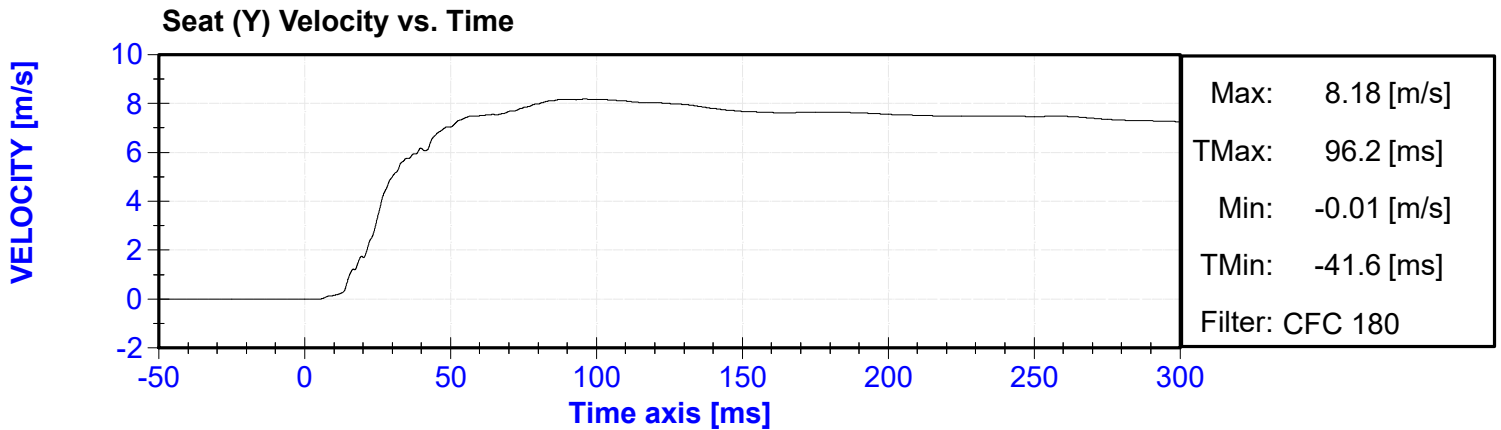
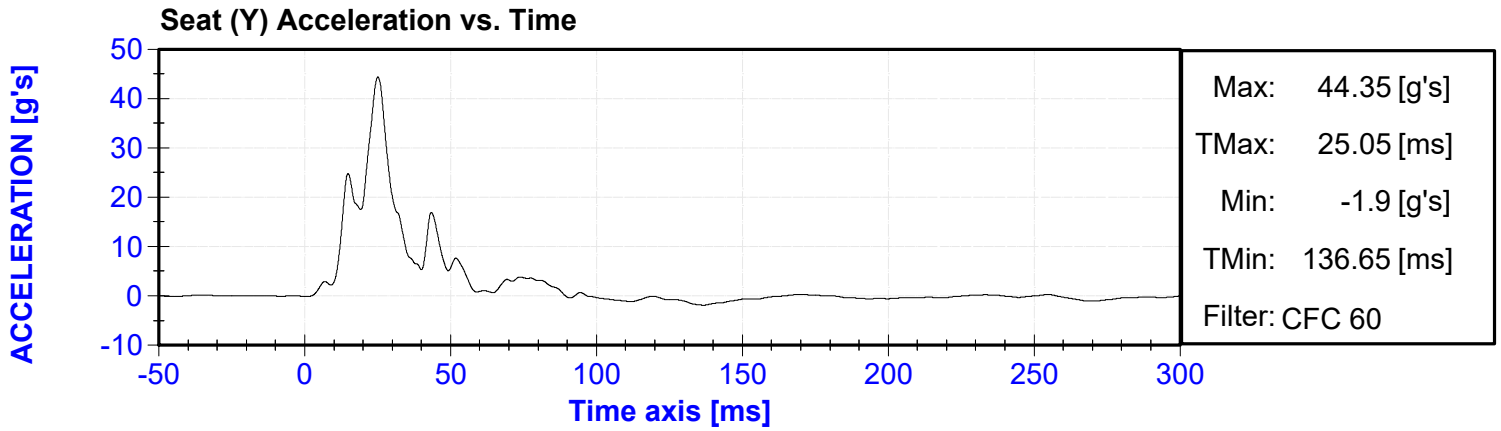
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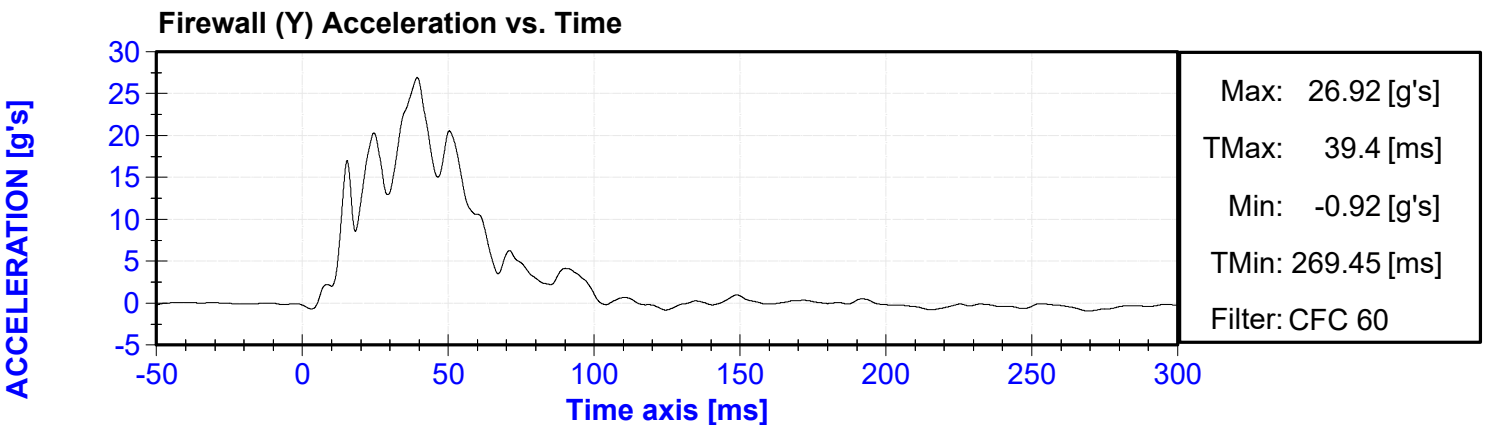
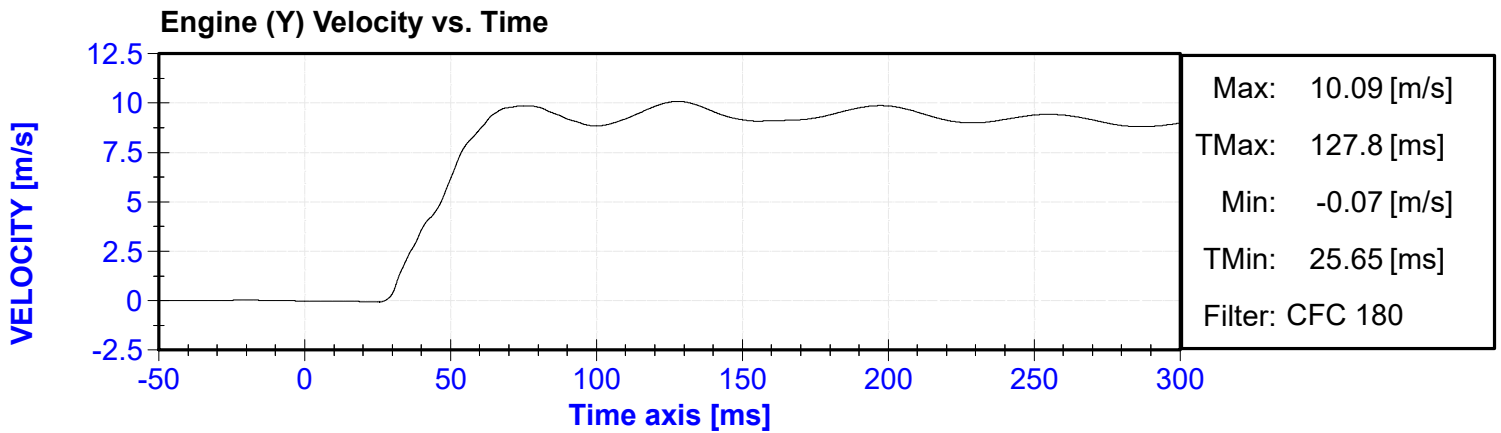
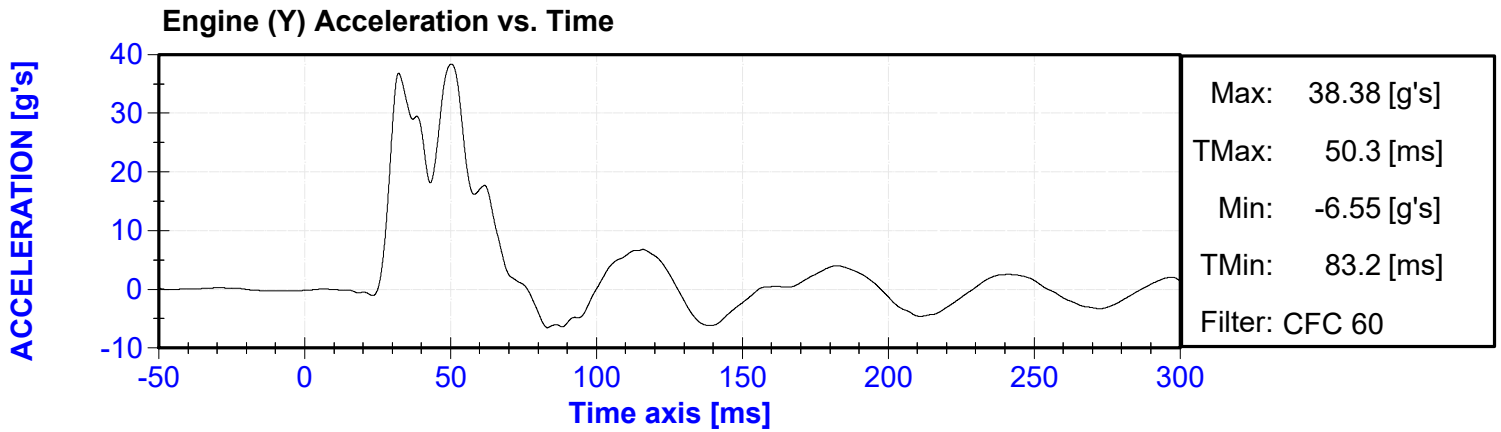
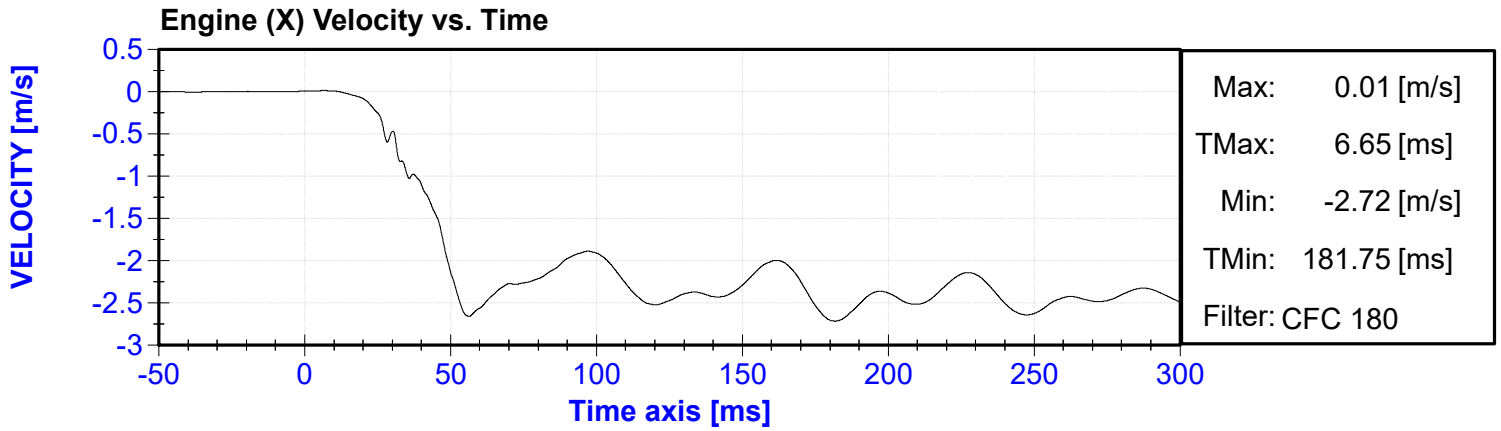


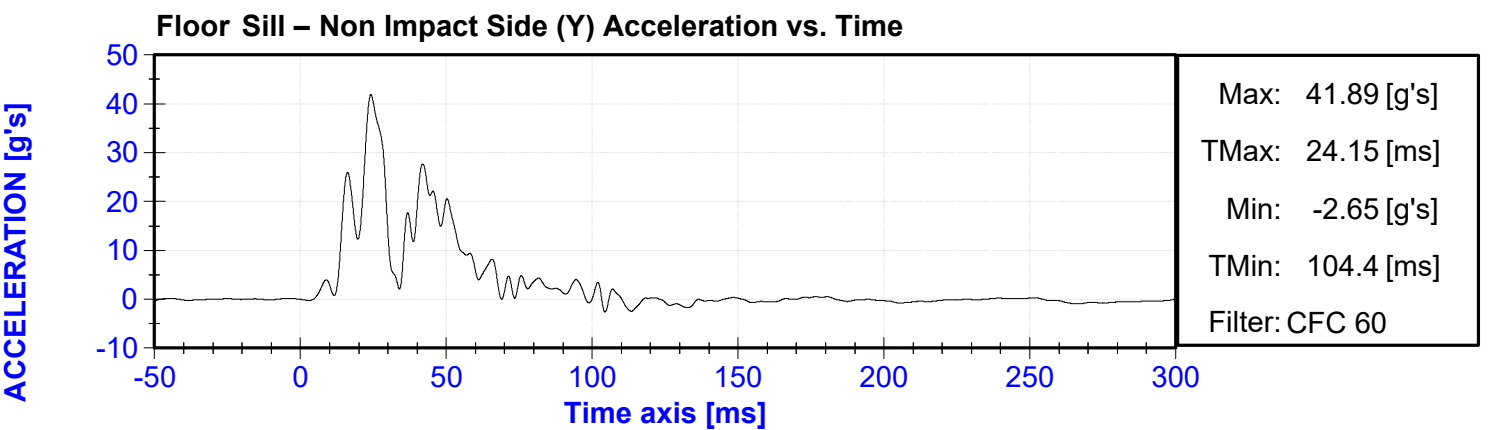
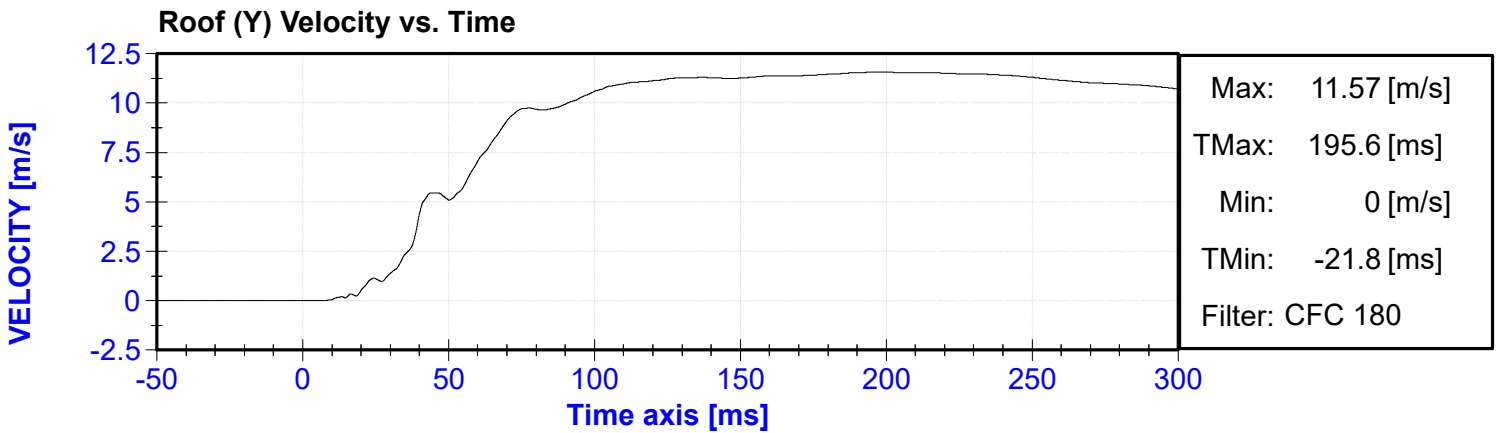
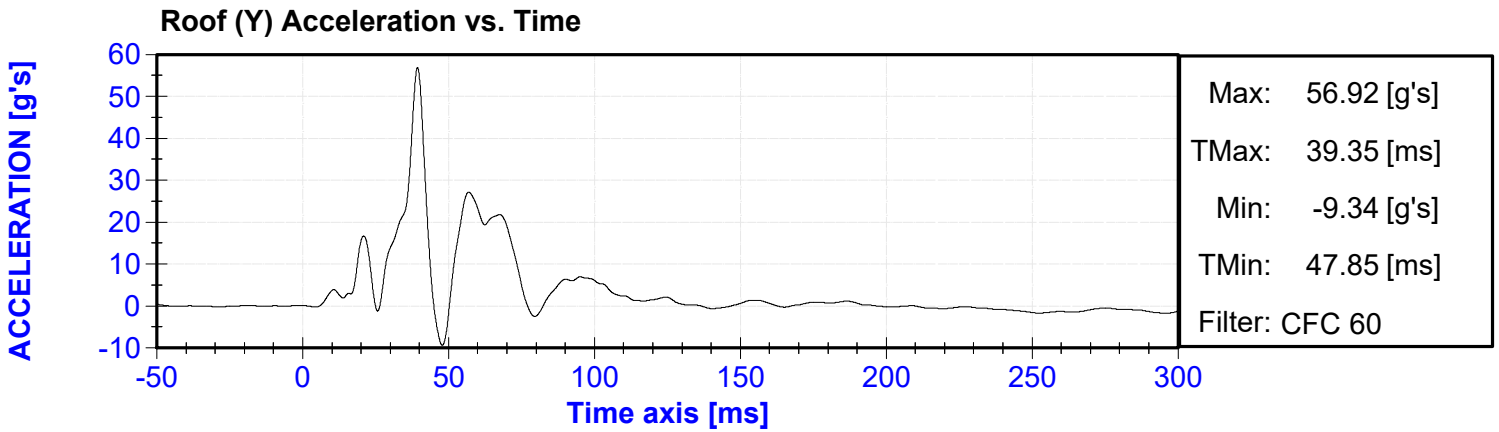
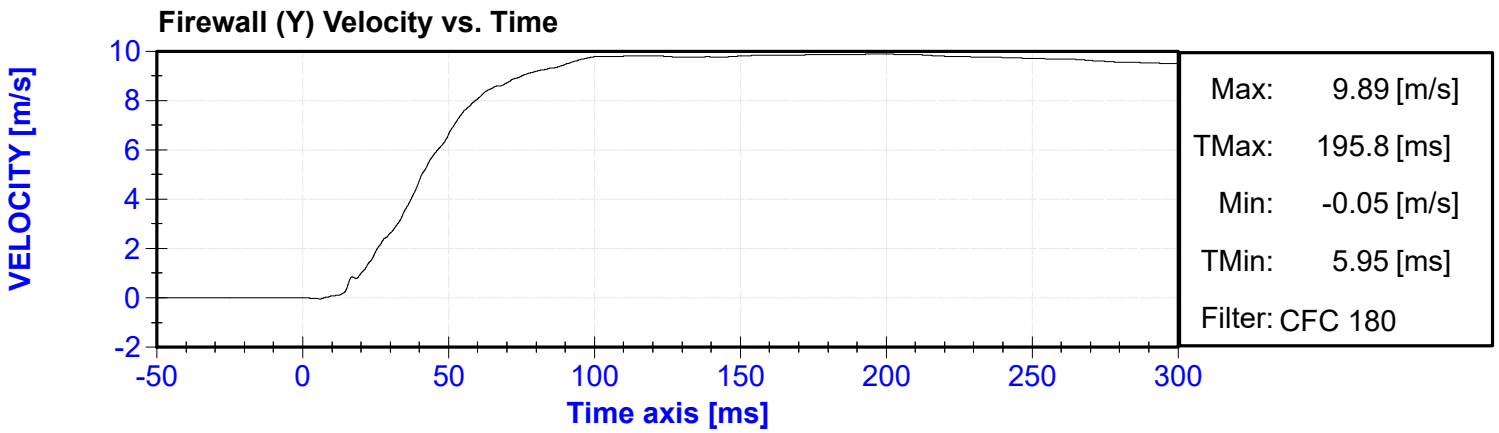




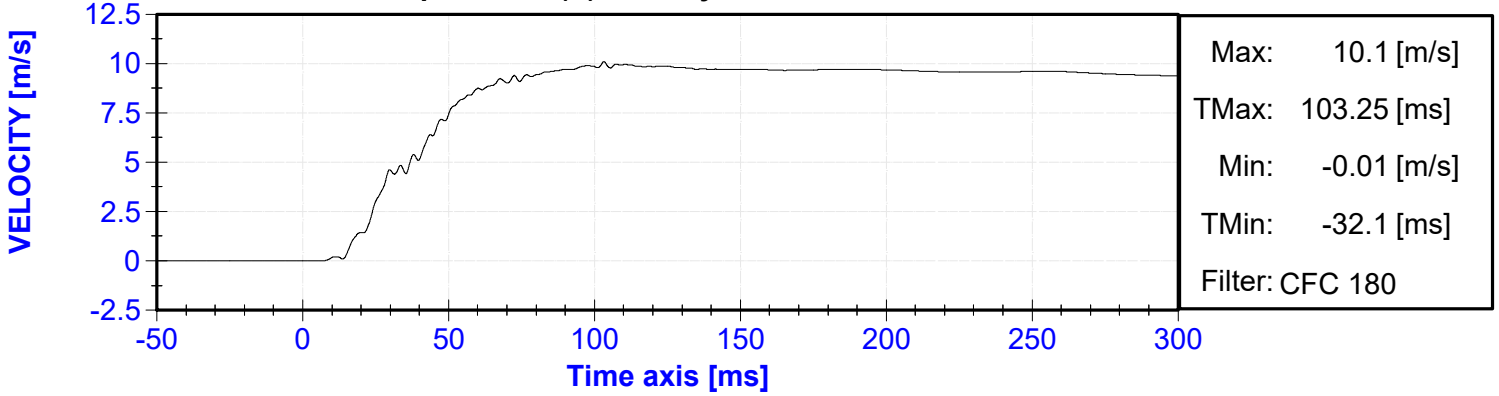




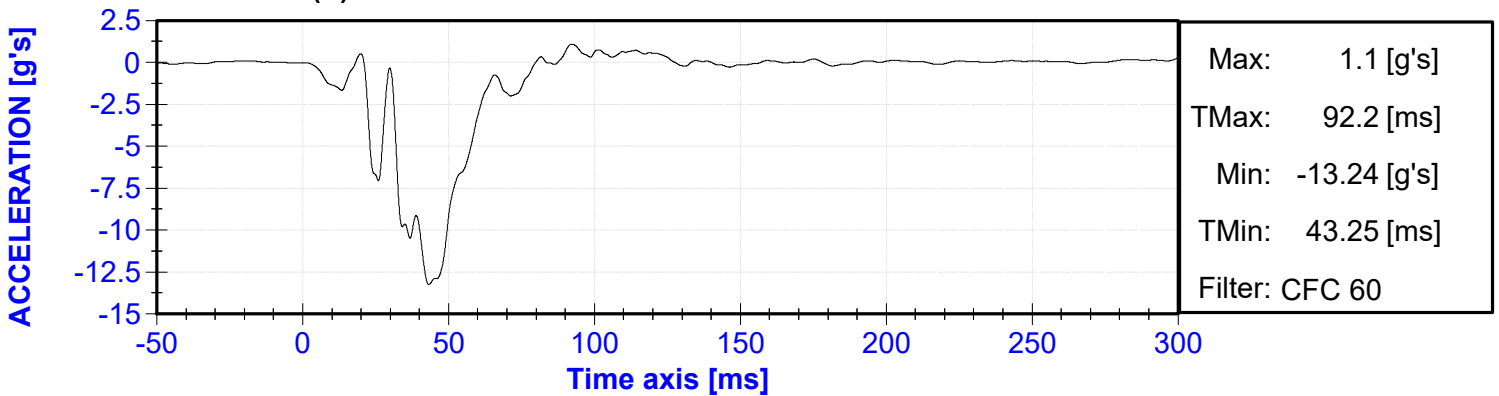




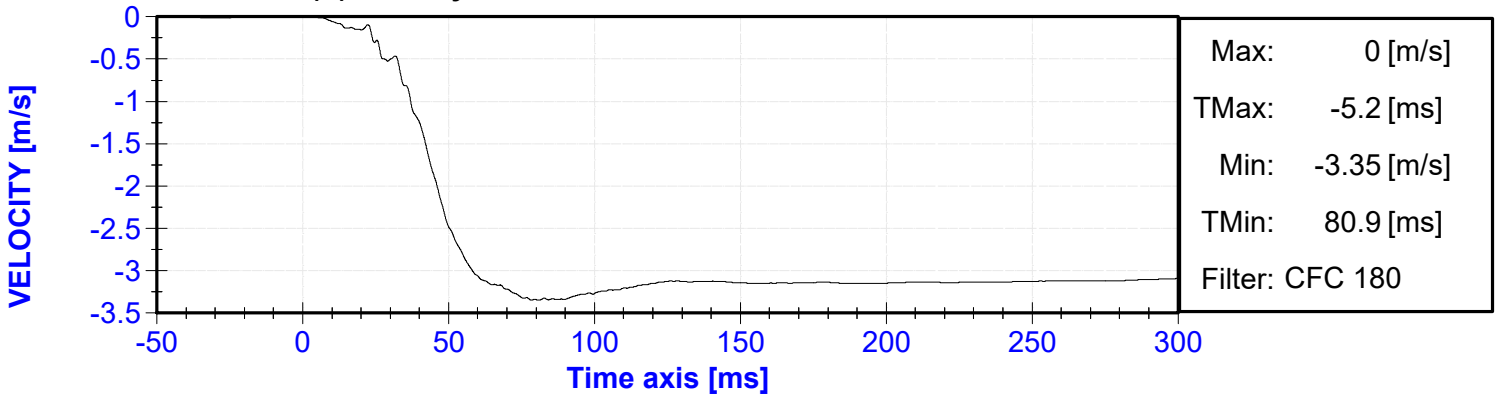
Floor Sill – Non Impact Side (Y) Velocity vs. Time



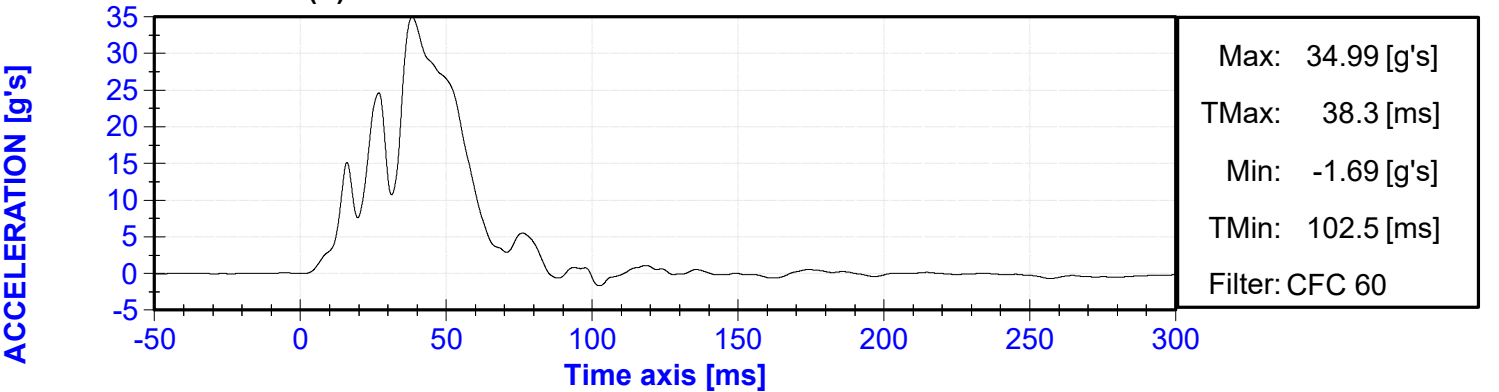
Rear Deck (X) Acceleration vs. Time

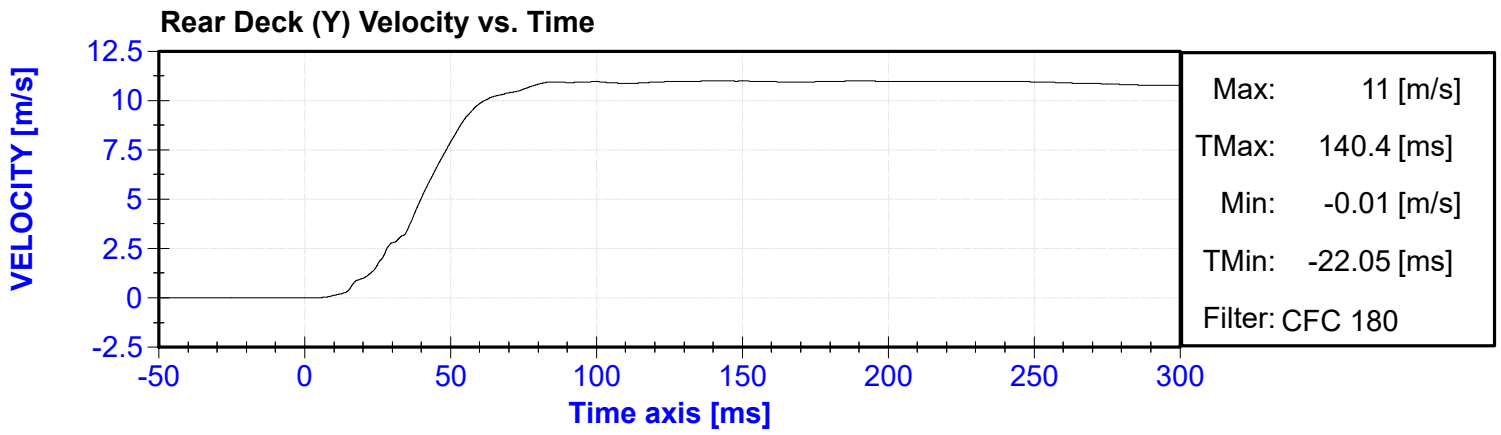


Rear Deck (X) Velocity vs. Time



Rear Deck (Y) Acceleration vs. Time





APPENDIX IV

PRE-TEST DUMMY PERFORMANCE CALIBRATION TEST DATA

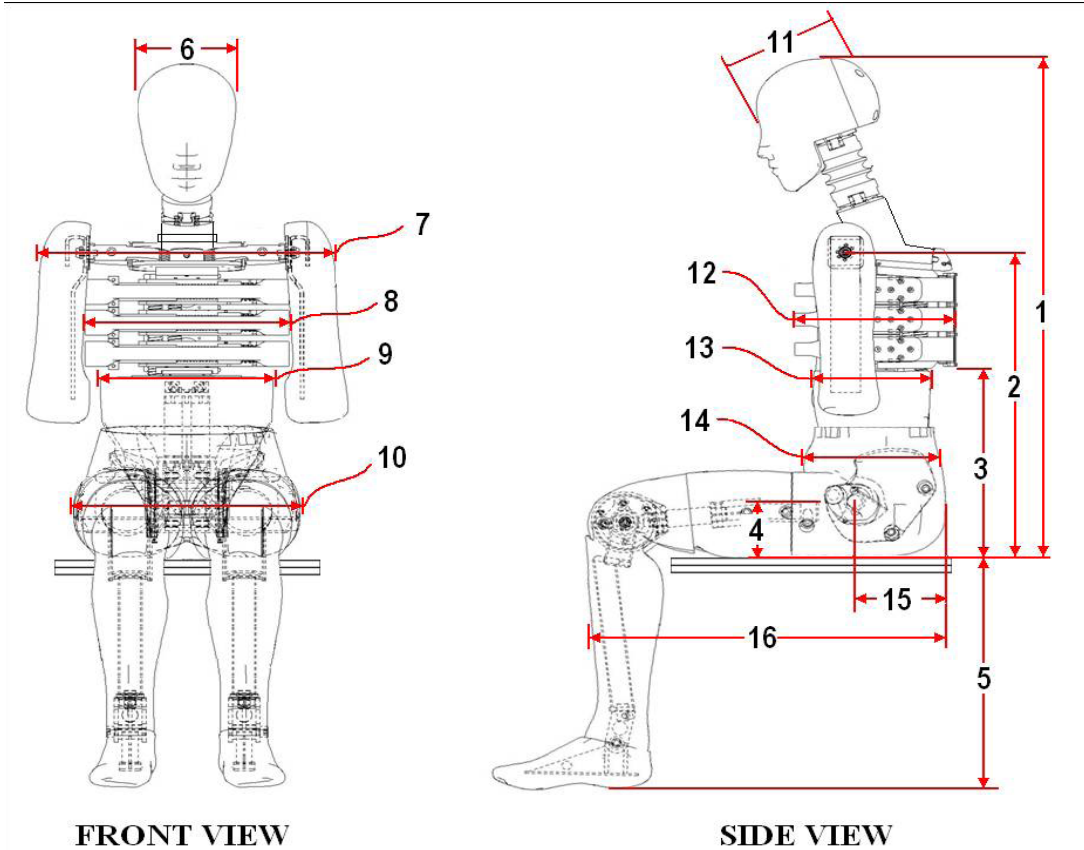
(Subpart U, ES-2re)

External Measurements - EuroSID-2re

Technician: J. Rios

Date: 10/23/2024

Dummy Serial Number: DG5348



Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	902	Pass
2	Seat to Shoulder Joint	558	572	561	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	405	Pass
6	Head Width	152	158	154	Pass
7	Shoulder/Arm Width	461	479	469	Pass
8	Thorax Width	322	332	326	Pass
9	Abdomen Width	273	287	277	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	266	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	239	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	153	Pass
16	Back of Buttocks to Front Knee	597	615	604	Pass

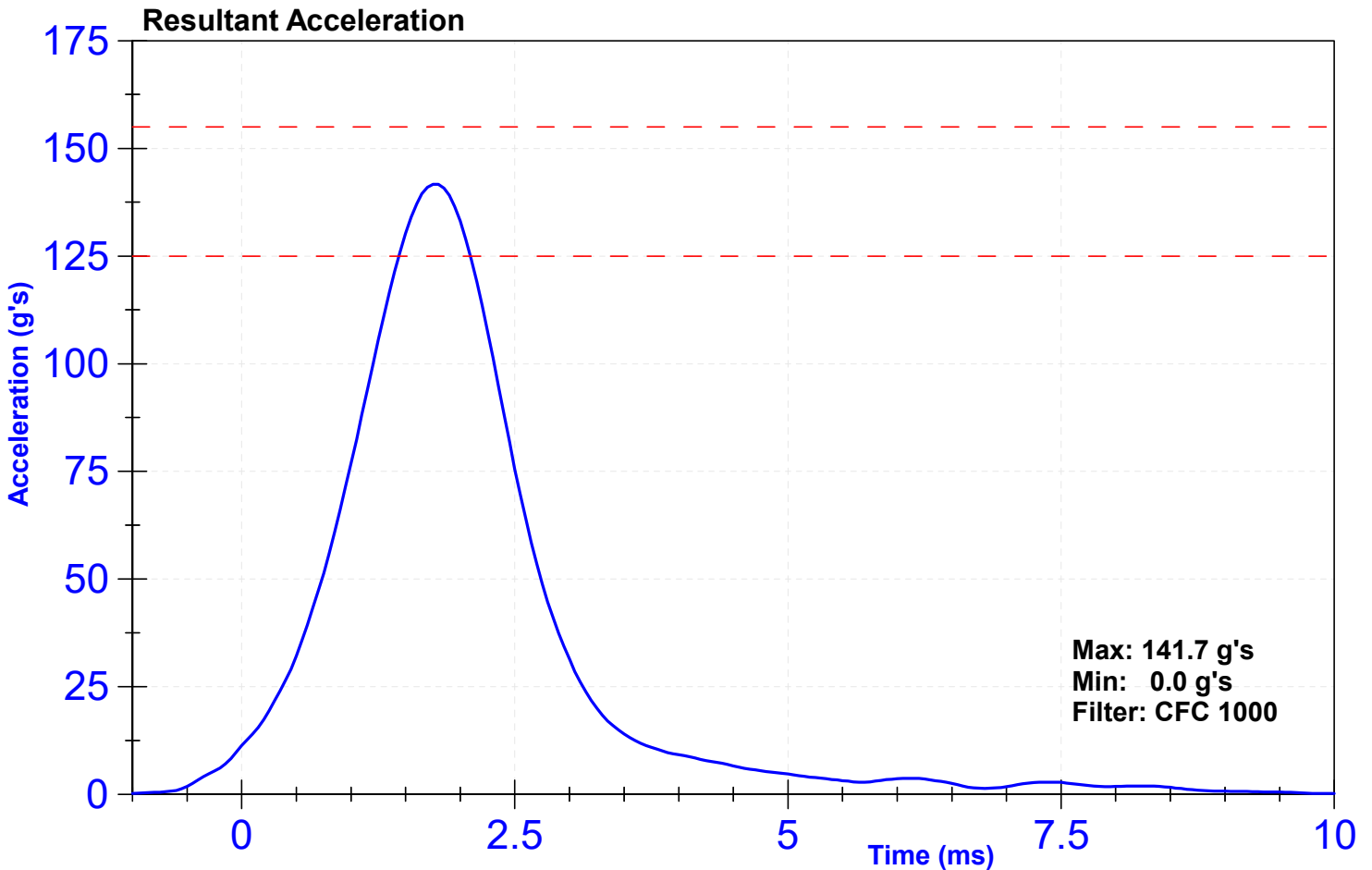
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

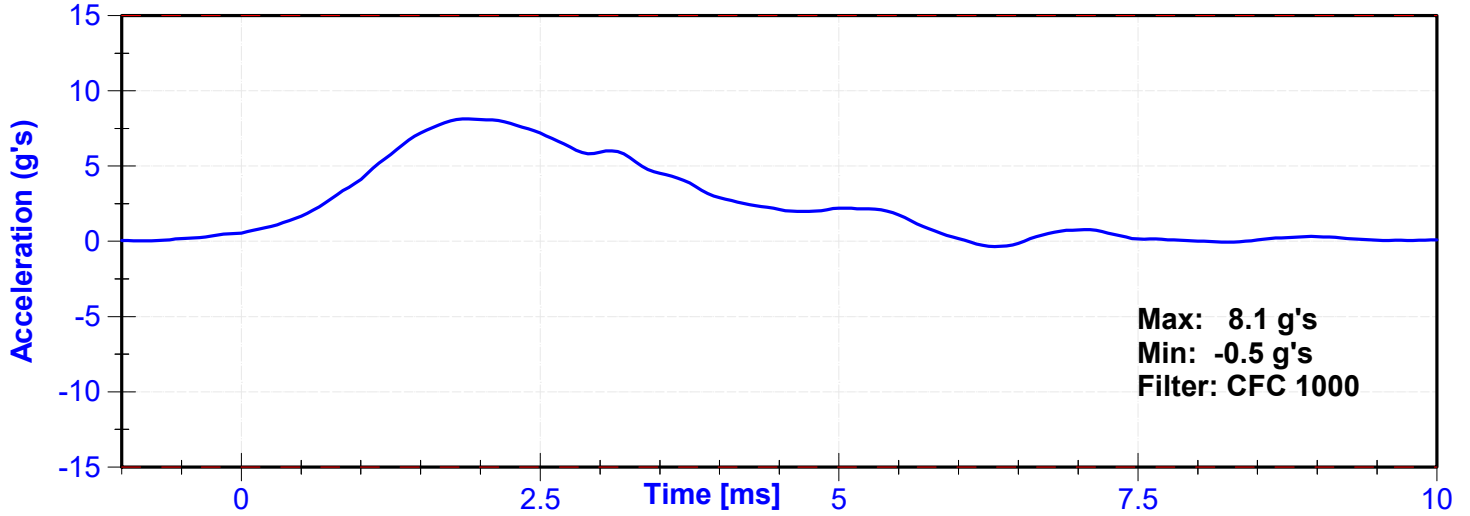
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Resultant Acceleration	125	155	g's	141.7	Pass
Oscillation	0	15	%	2.63	Pass
Fore-Aft Acceleration	-15	15	g's	8.1	Pass

Transducer Calibrations

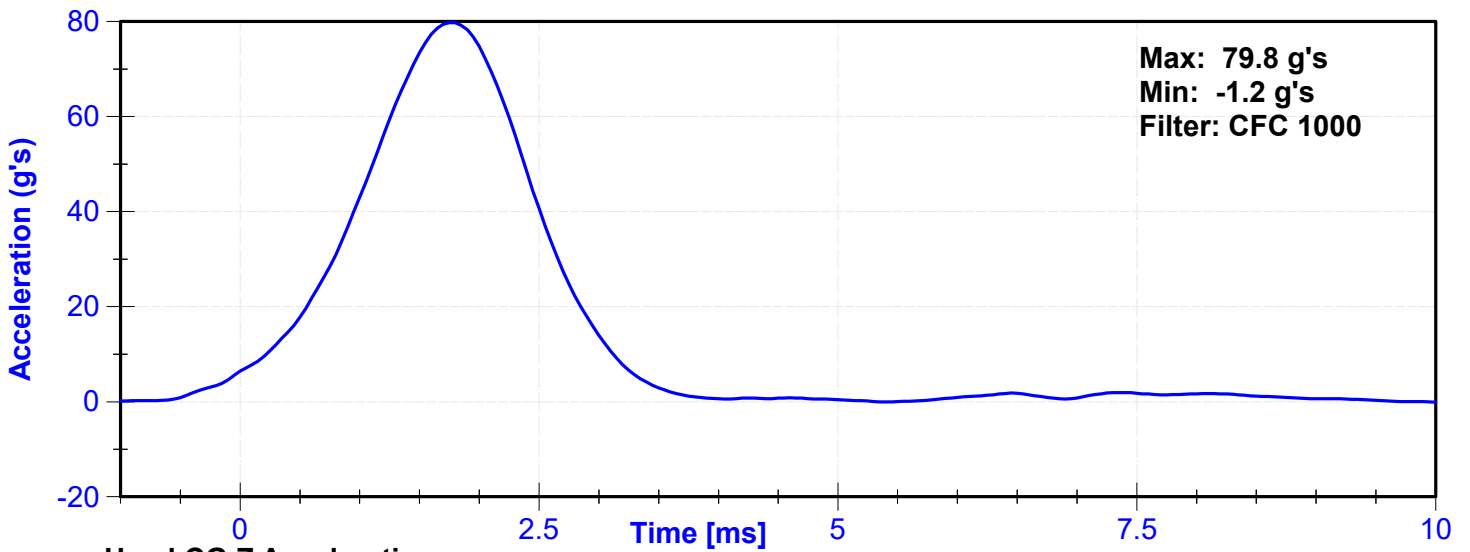
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	18613	7/30/2024	1/26/2025
Y Accelerometer	Endevco	18472	7/30/2024	1/26/2025
Z Accelerometer	Endevco	18663	7/30/2024	1/26/2025



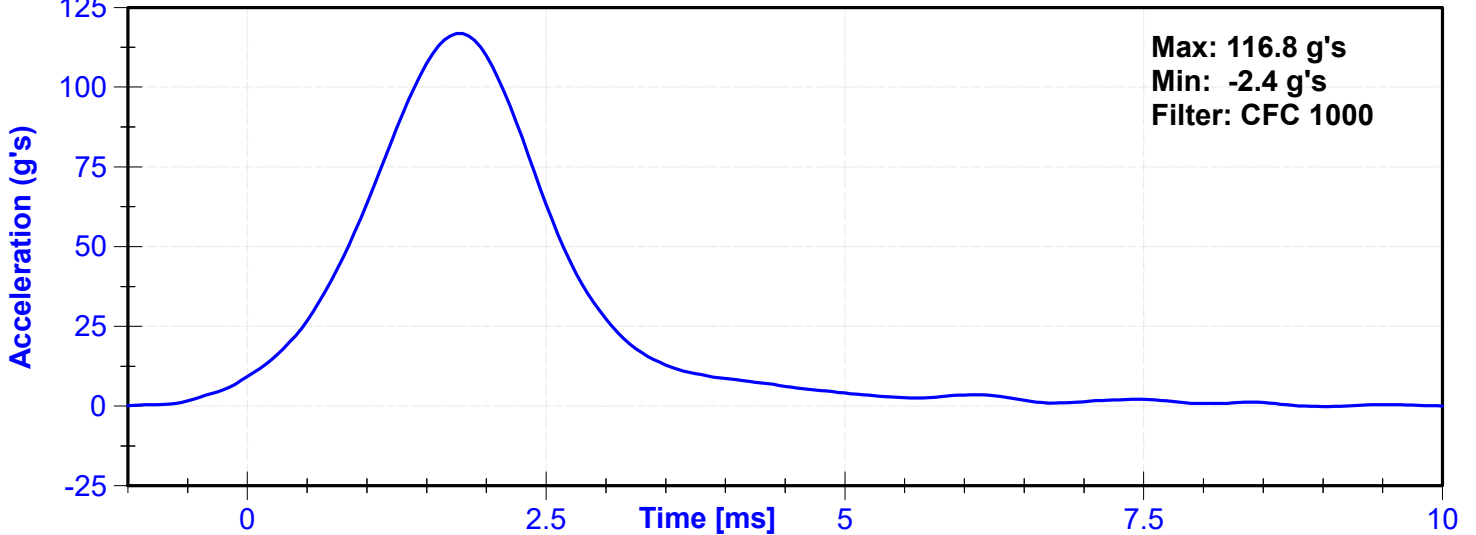
Head CG X Acceleration



Head CG Y Acceleration



Head CG Z Acceleration



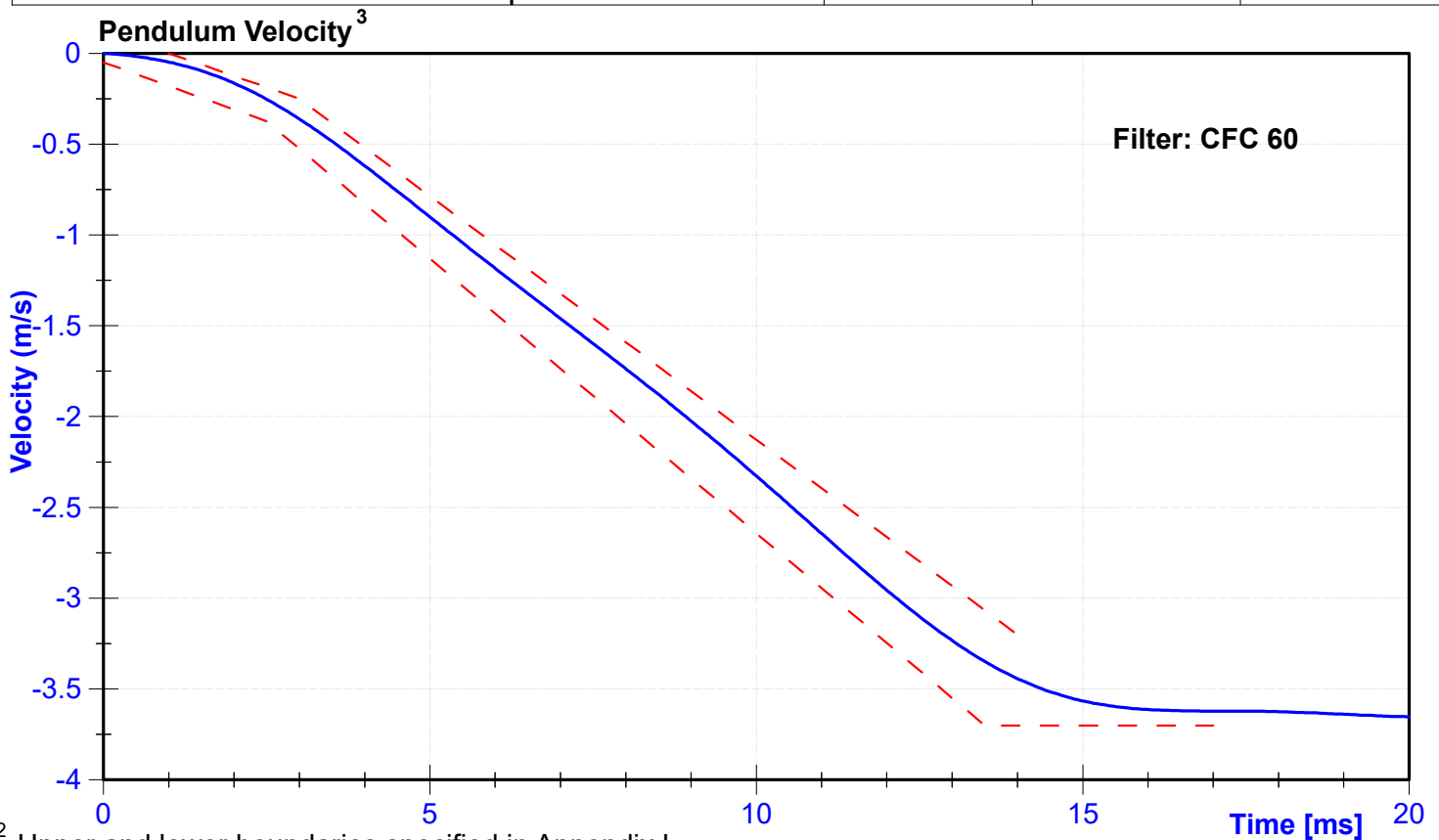
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

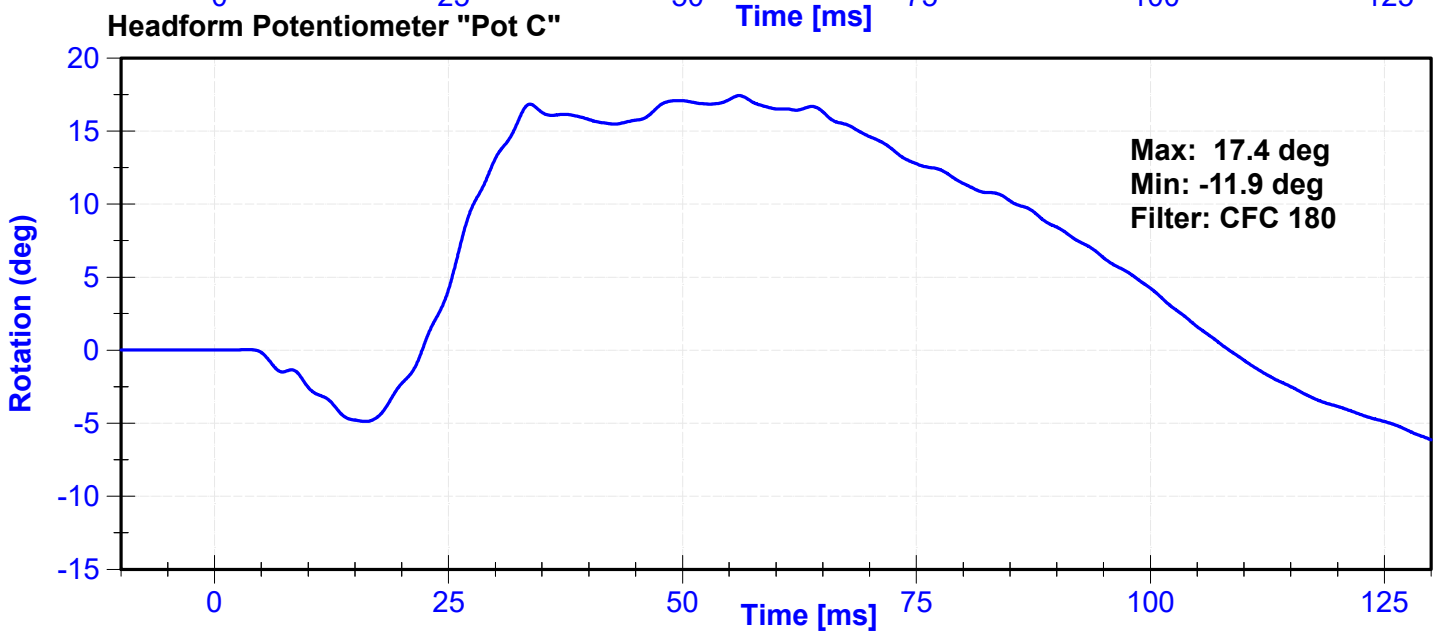
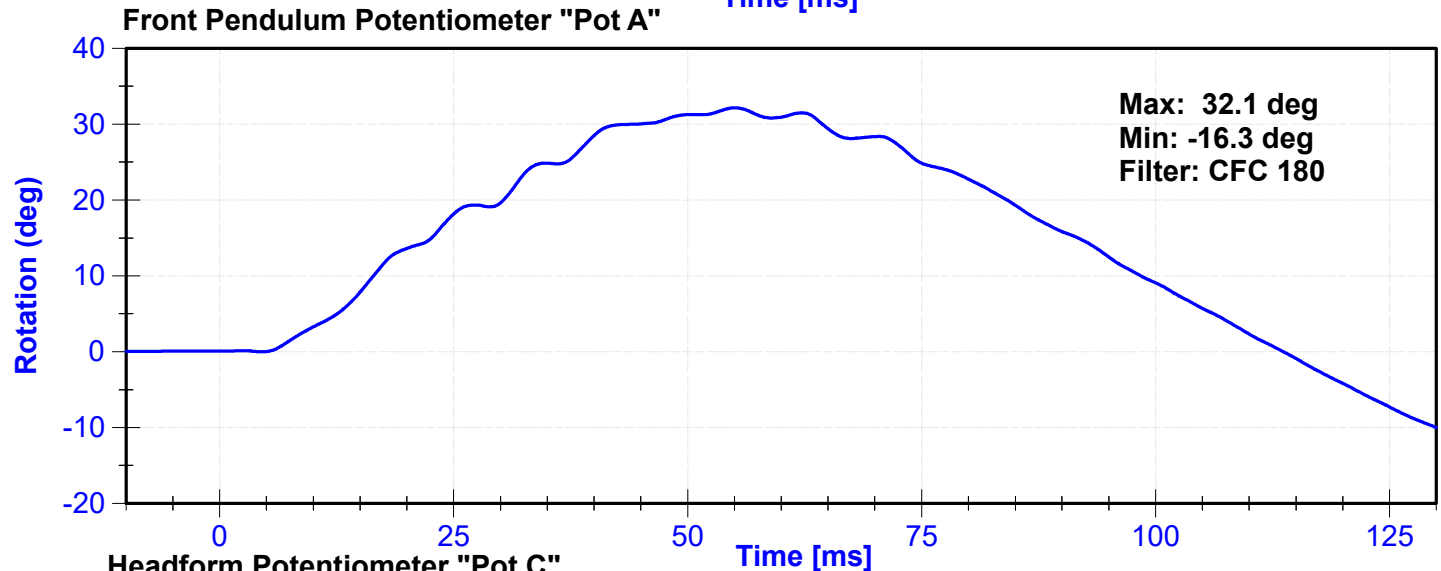
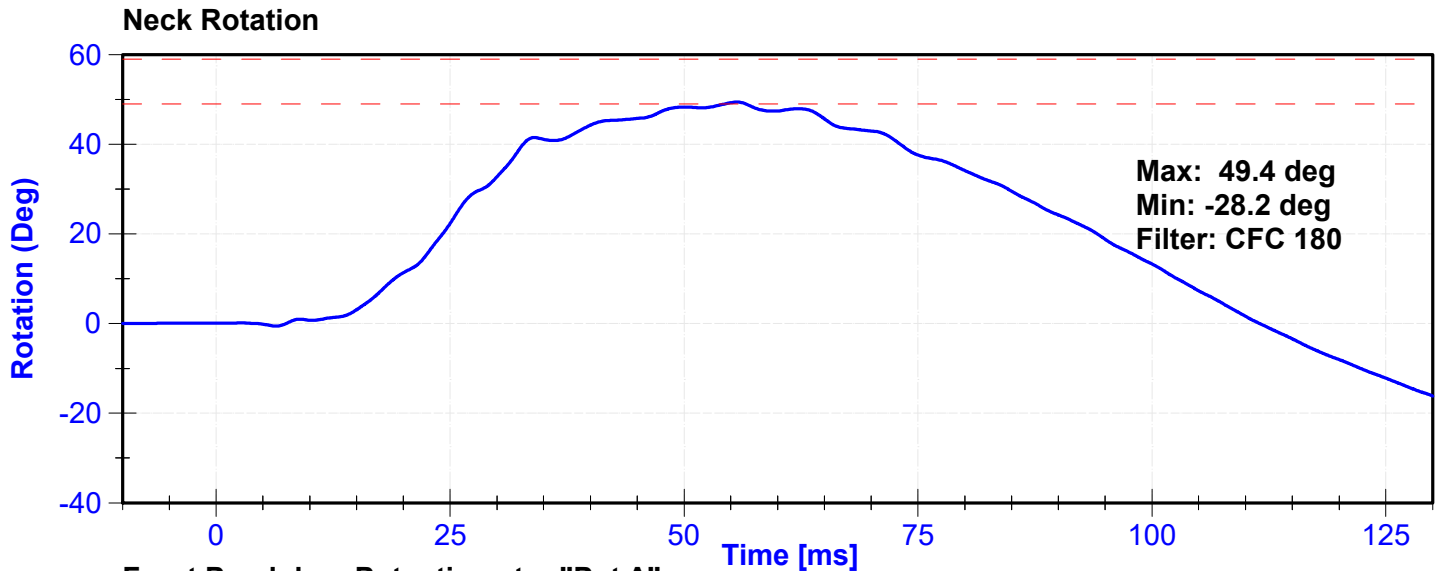
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Velocity	3.3	3.5	m/s	3.44	Pass
Lateral Neck Rotation	49	59	deg	49.4	Pass
Time at Maximum Rotation	54	66	ms	55.7	Pass
Time of Rotation Decay from Maximum	53	88	ms	55.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	4/29/2024	10/26/2024
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025



^{1,2} Upper and lower boundaries specified in Appendix I



Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

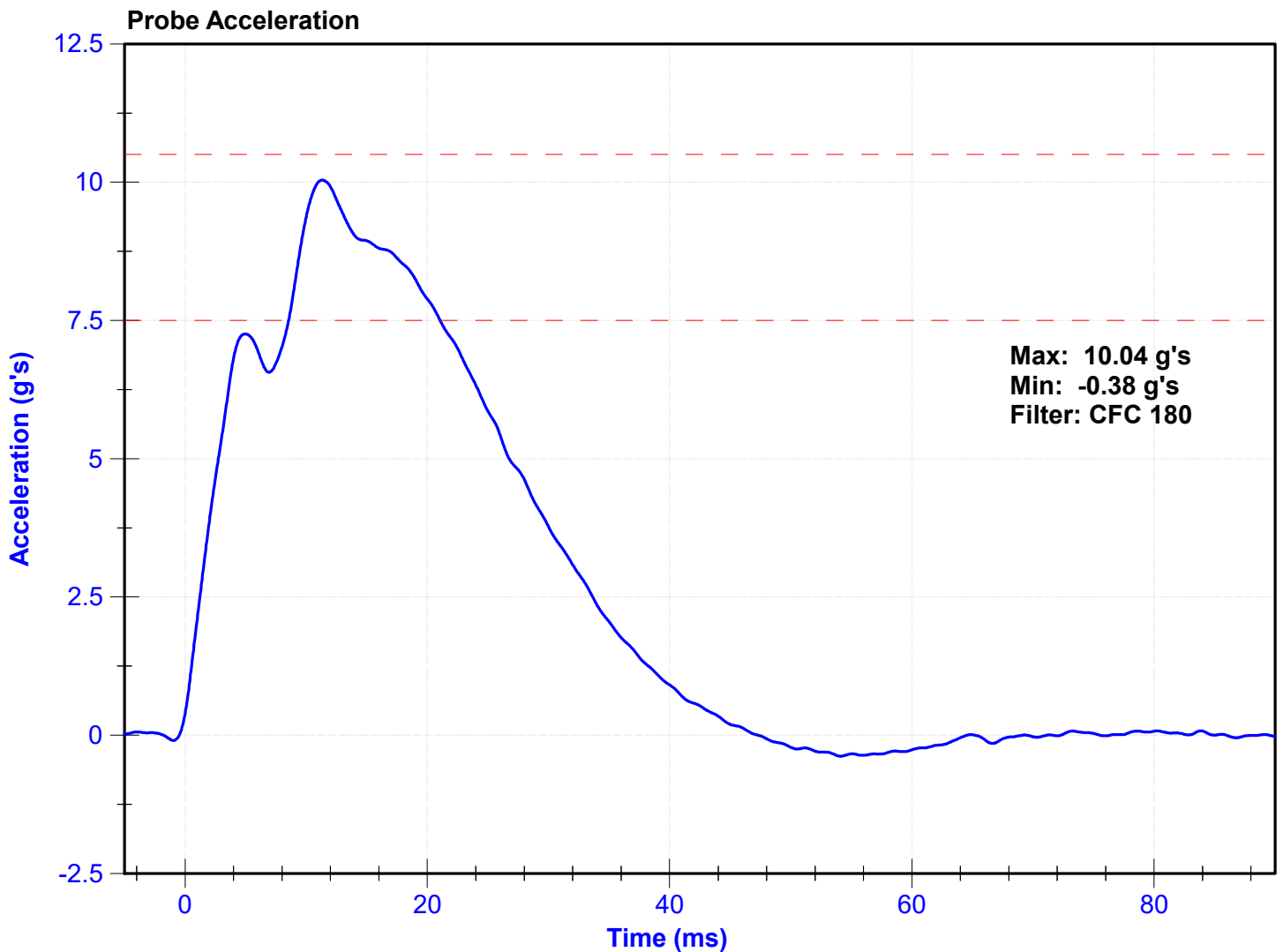
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	7.5	10.5	g's	10.04	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025



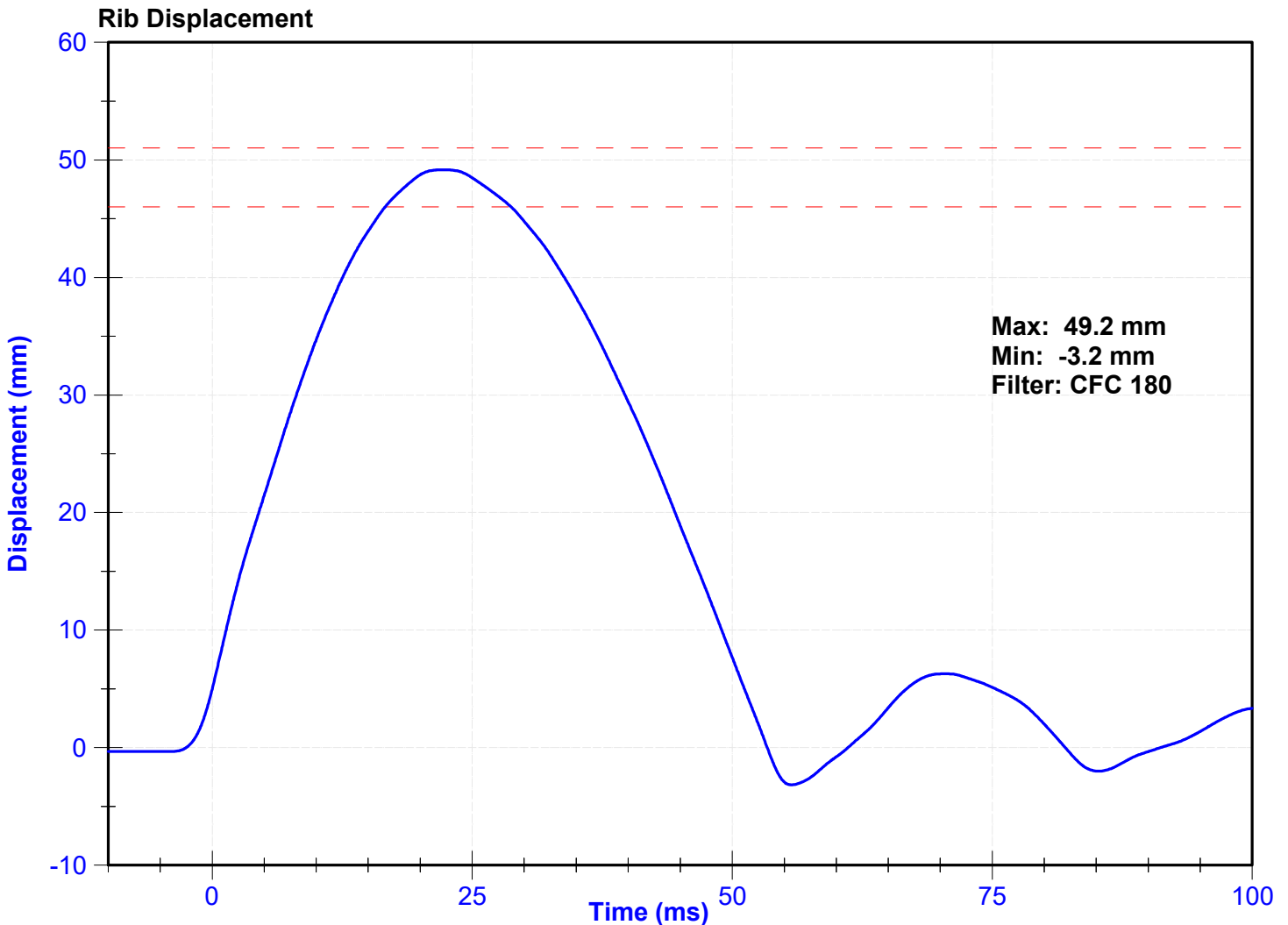
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Rib Displacement	46	51	mm	49.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	268GFE	7/30/2024	1/28/2025



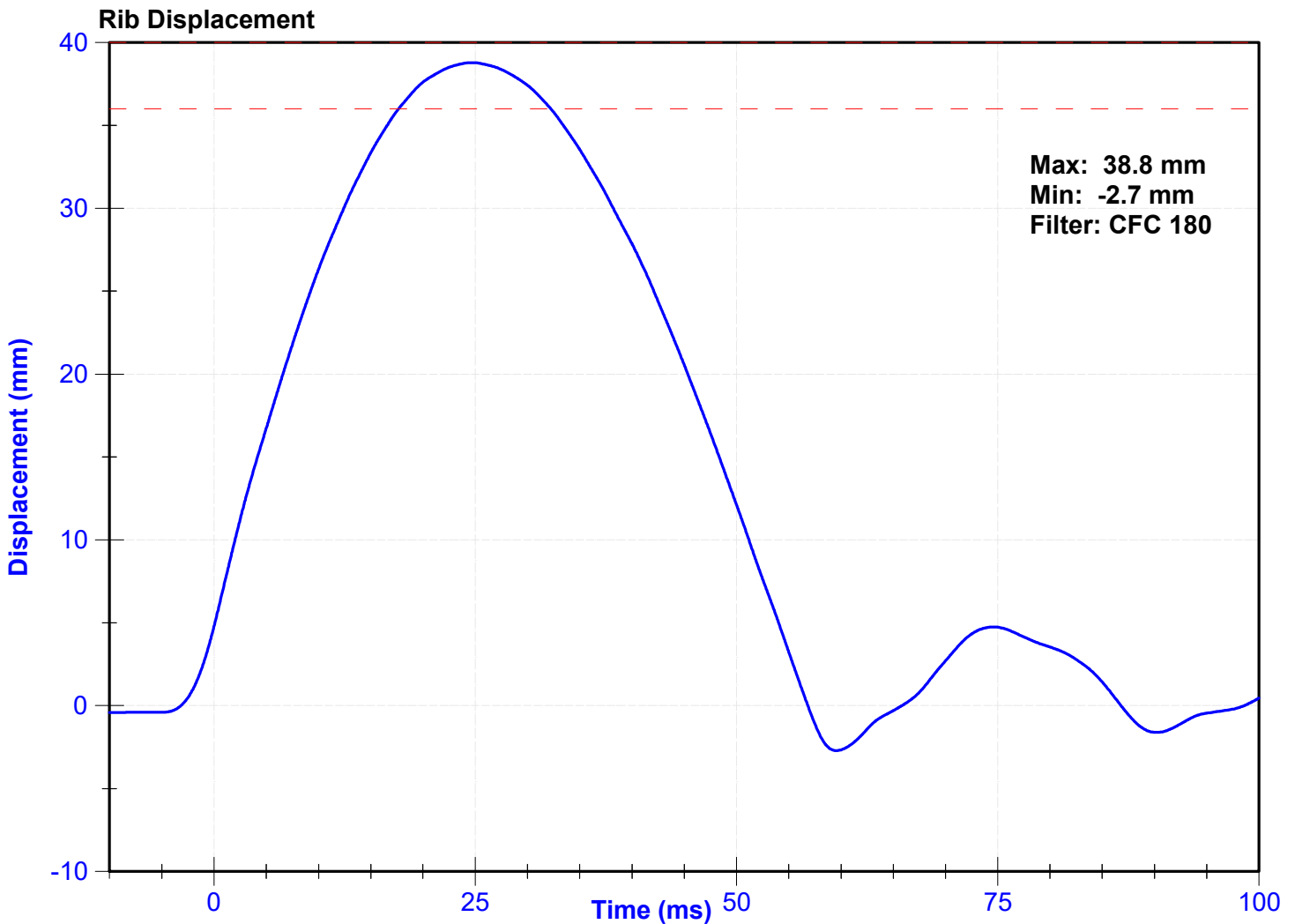
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Rib Displacement	36	40	mm	38.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	268GFE	7/30/2024	1/28/2025



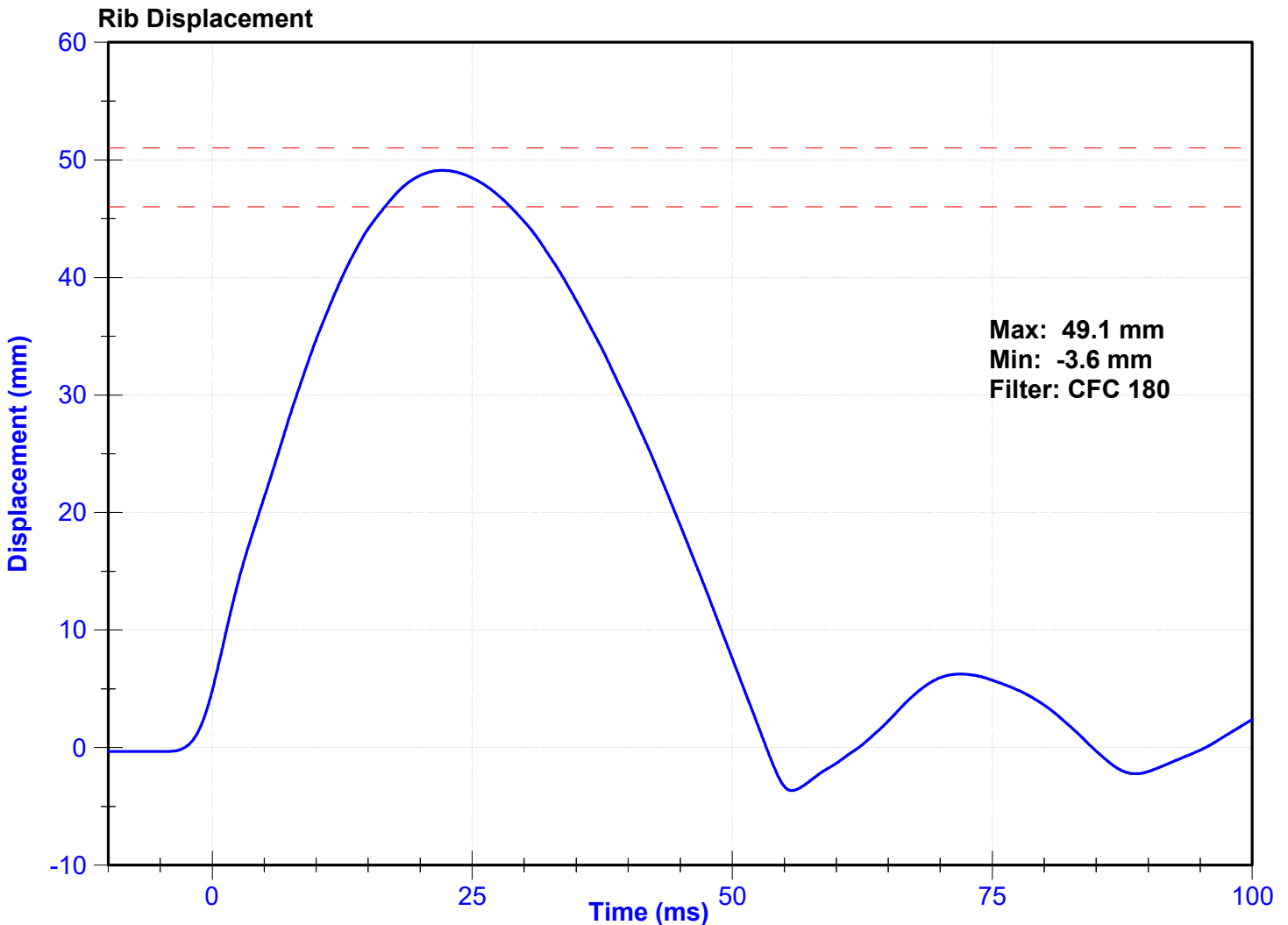
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	269GFE	7/30/2024	1/28/2025



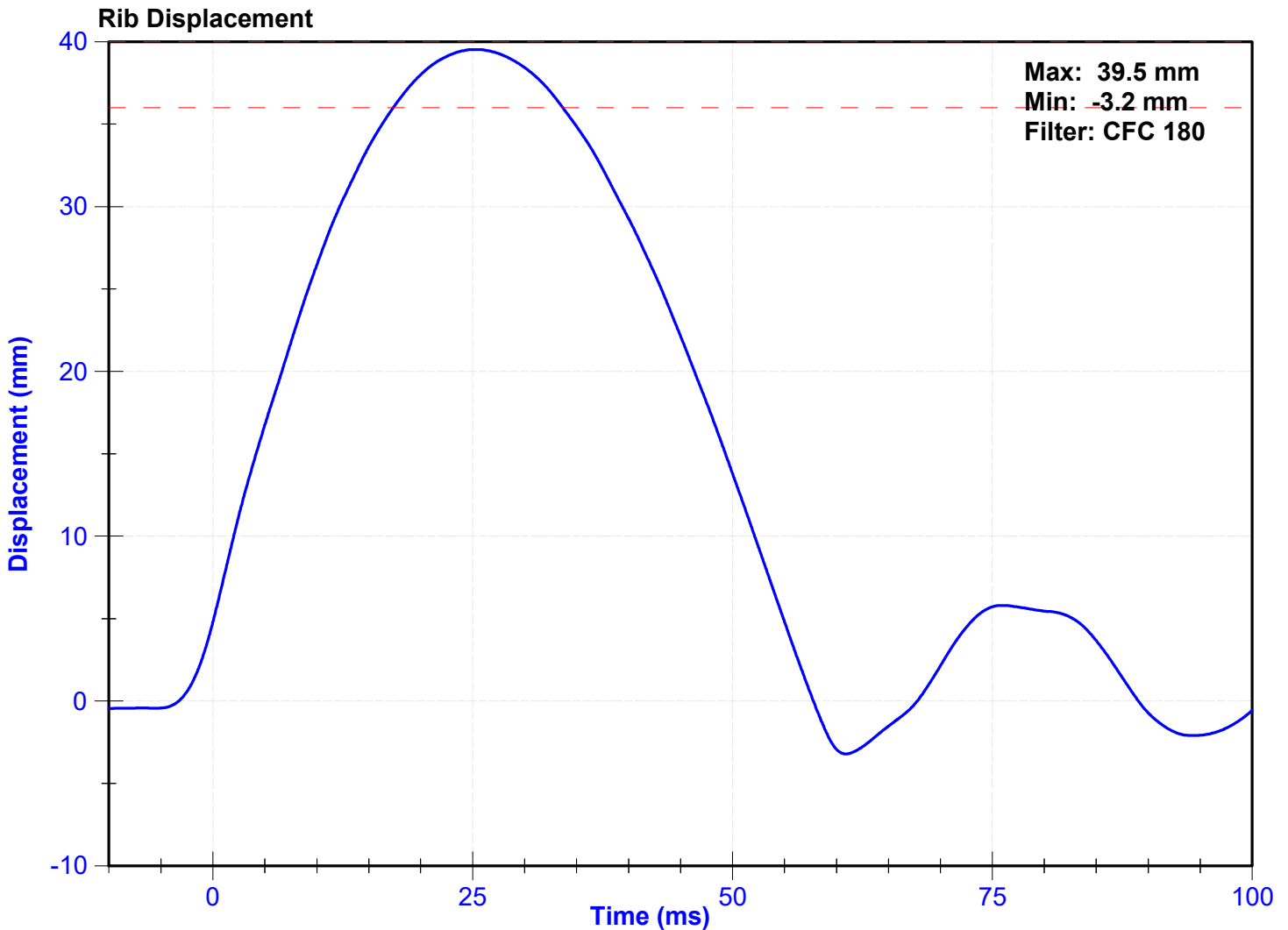
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Rib Displacement	36	40	mm	39.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	269GFE	7/30/2024	1/28/2025



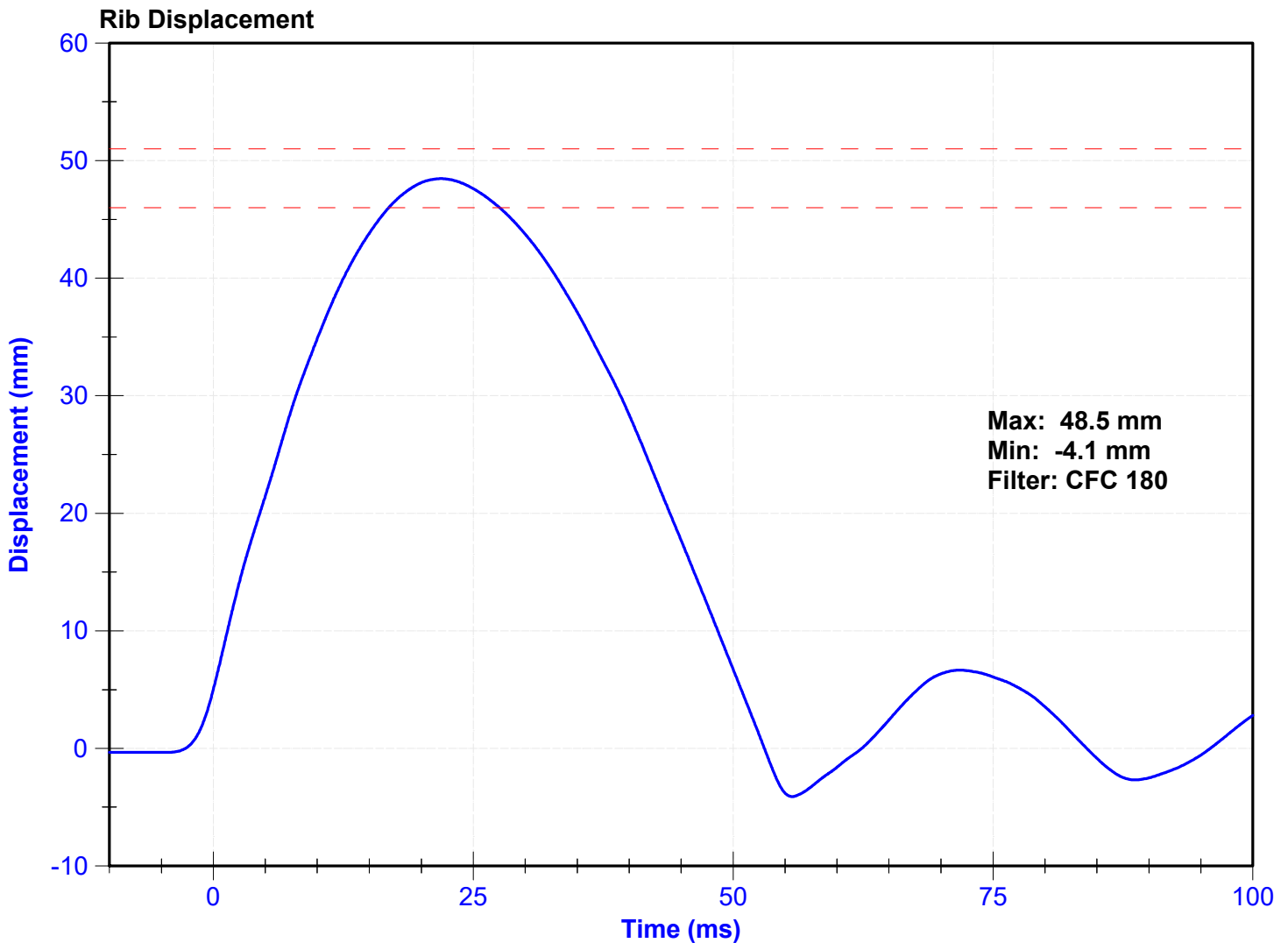
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	270GFE	7/30/2024	1/28/2025



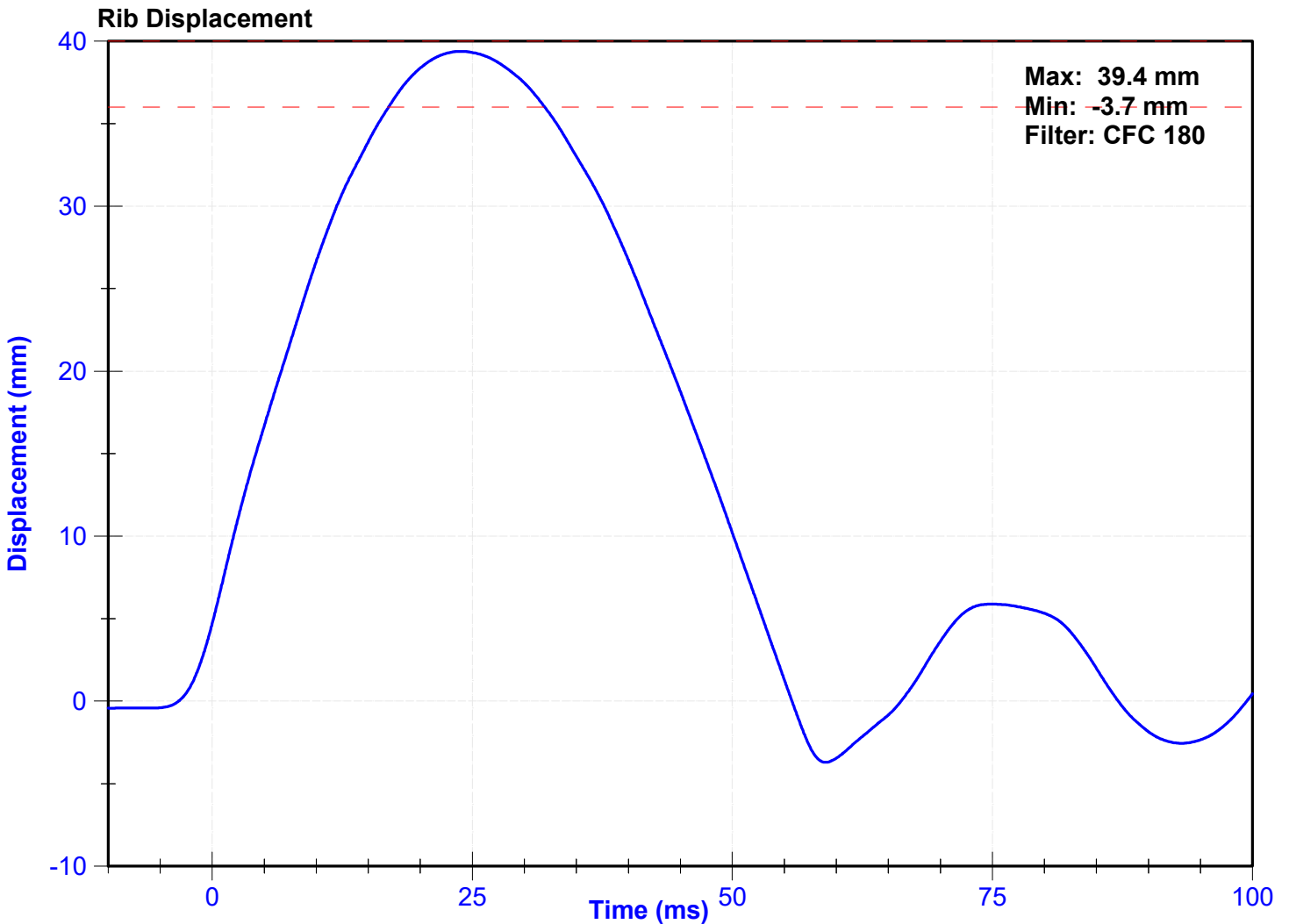
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Rib Displacement	36	40	mm	39.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	270GFE	7/30/2024	1/28/2025



ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

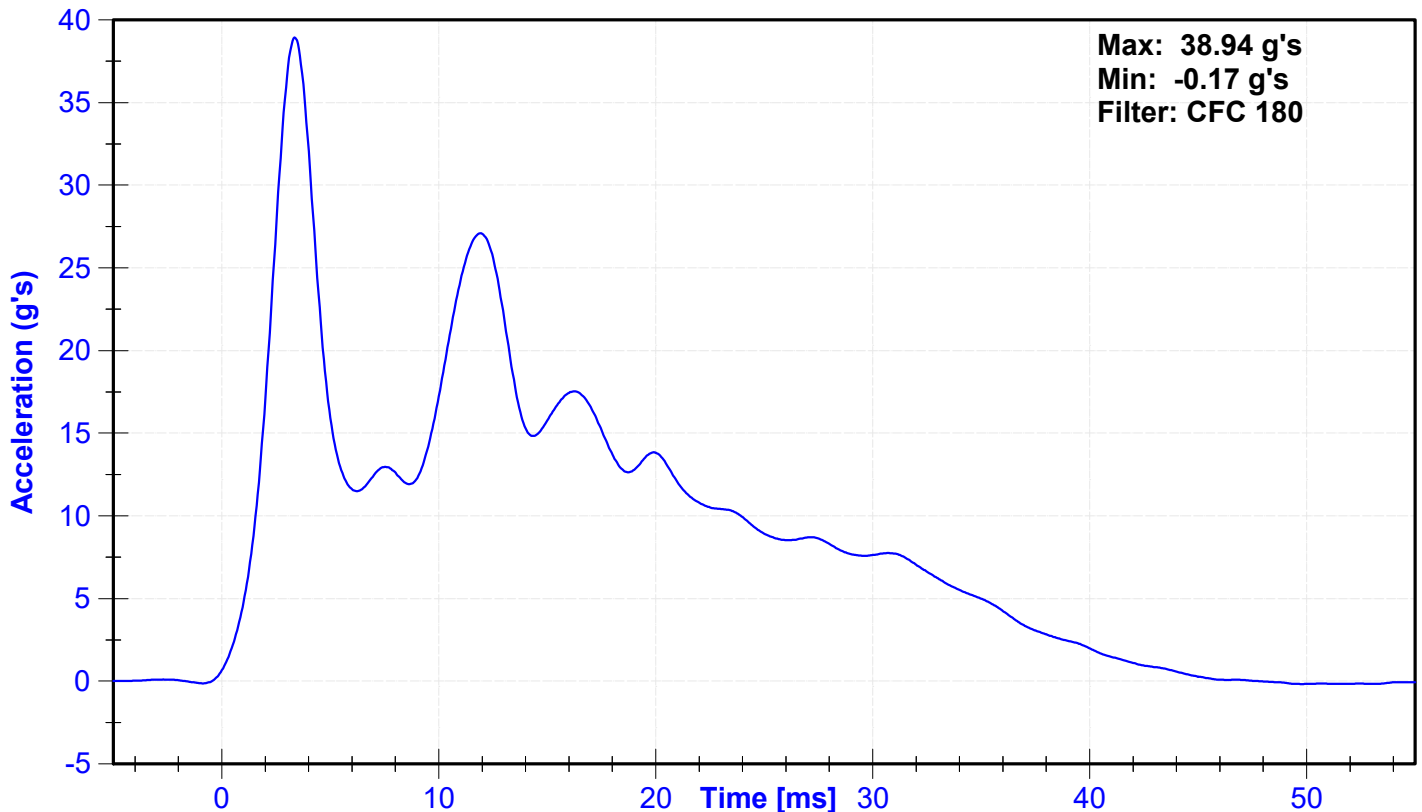
Results

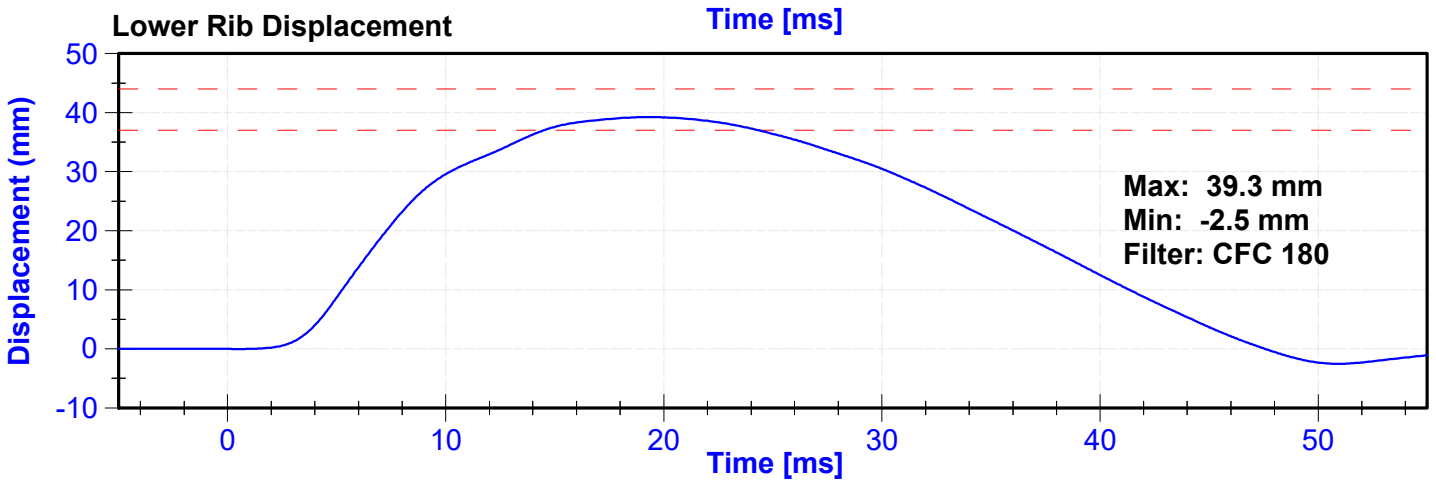
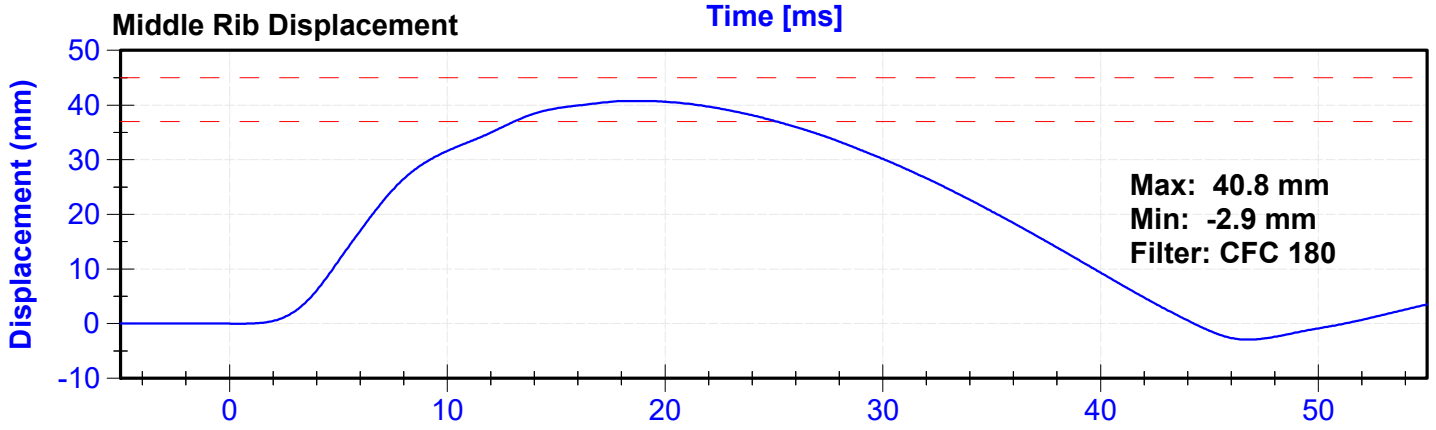
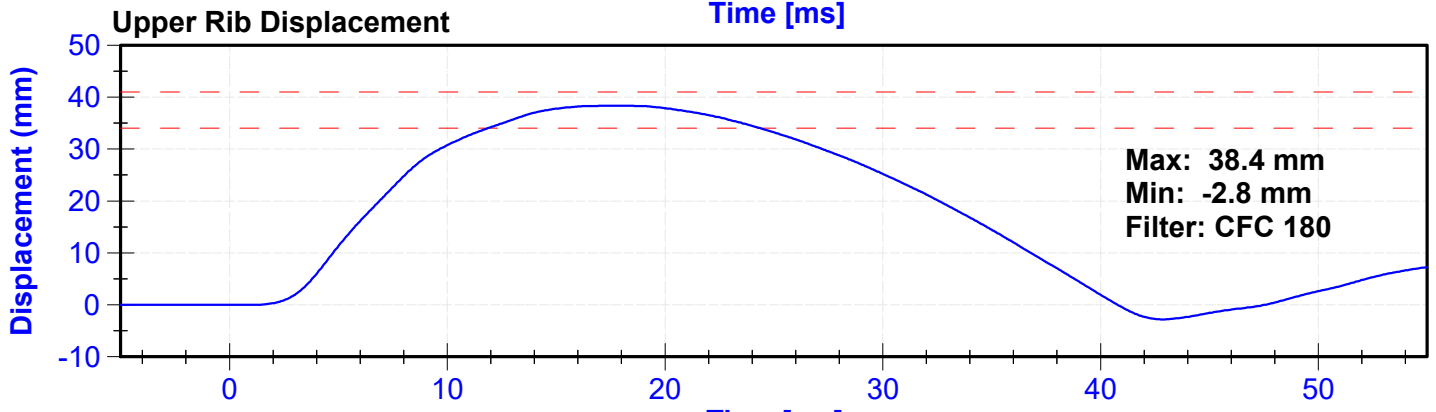
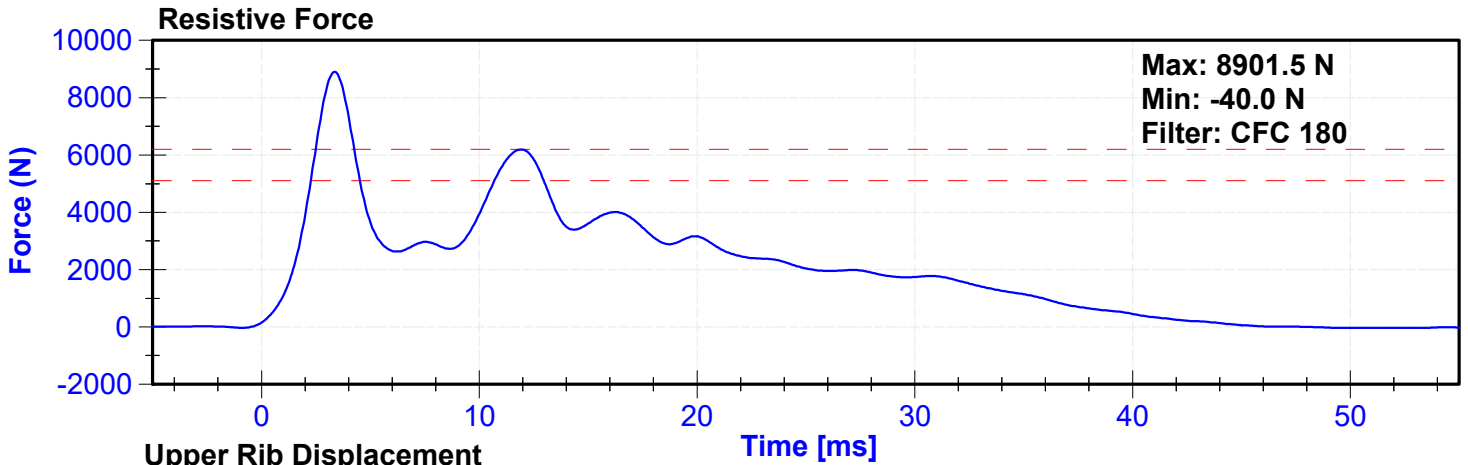
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	6192.9	Pass
Upper Thorax Rib Deflection	34	41	mm	38.4	Pass
Mid Thorax Rib Deflection	37	45	mm	40.8	Pass
Lower Thorax Rib Deflection	37	44	mm	39.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Upper Thorax Rib Potentiometer	Honeywell	268GFE	7/30/2024	1/28/2025
Middle Thorax Rib Potentiometer	Honeywell	269GFE	7/30/2024	1/28/2025
Lower Thorax Rib Potentiometer	Honeywell	270GFE	7/30/2024	1/28/2025

Probe Acceleration





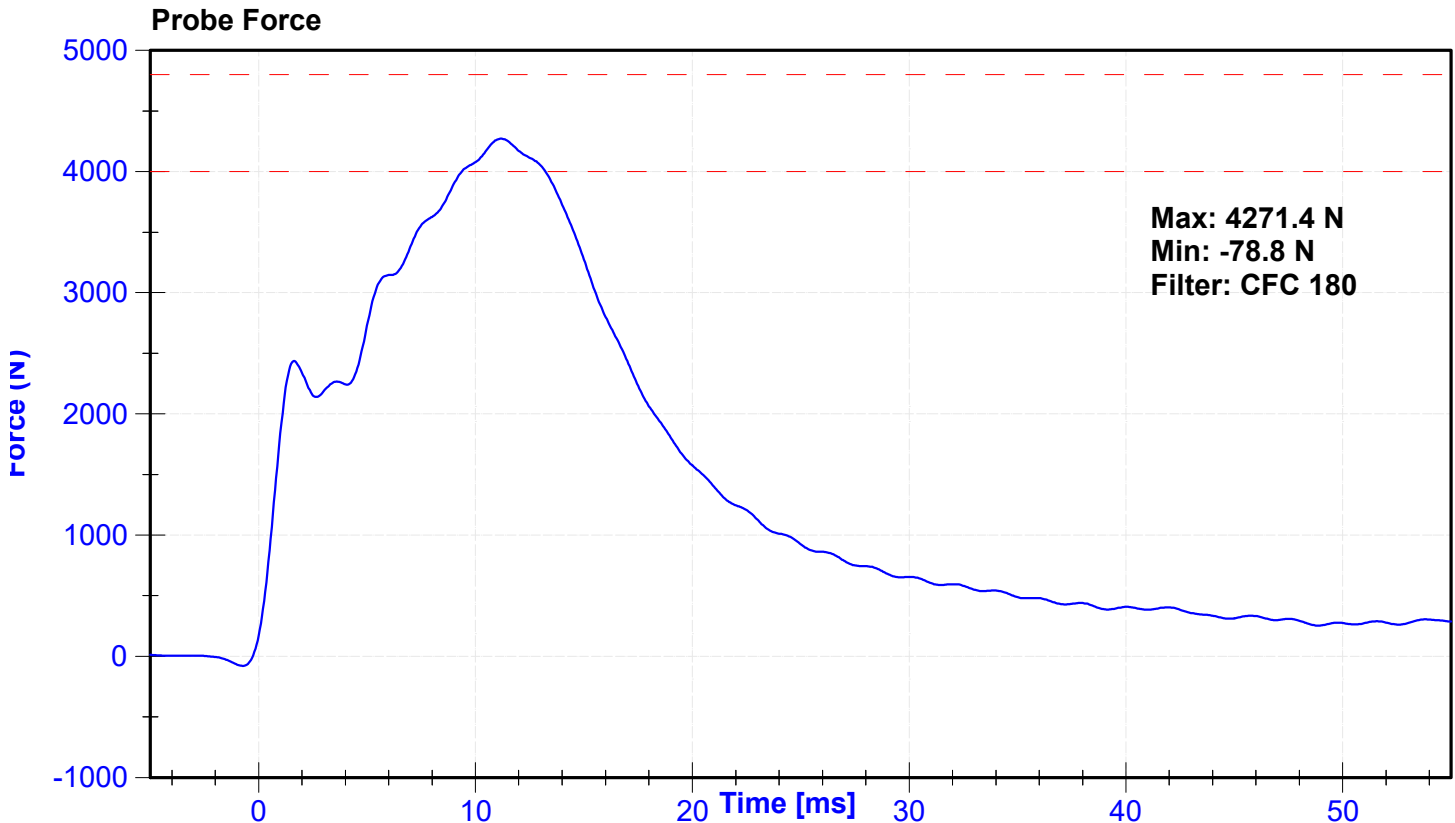
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

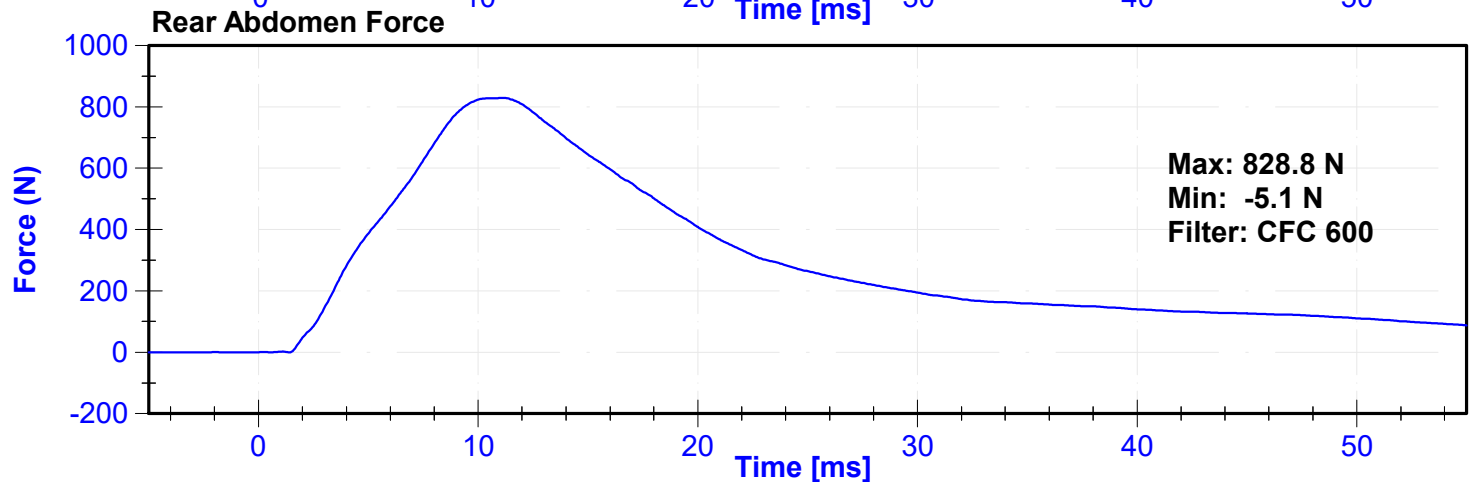
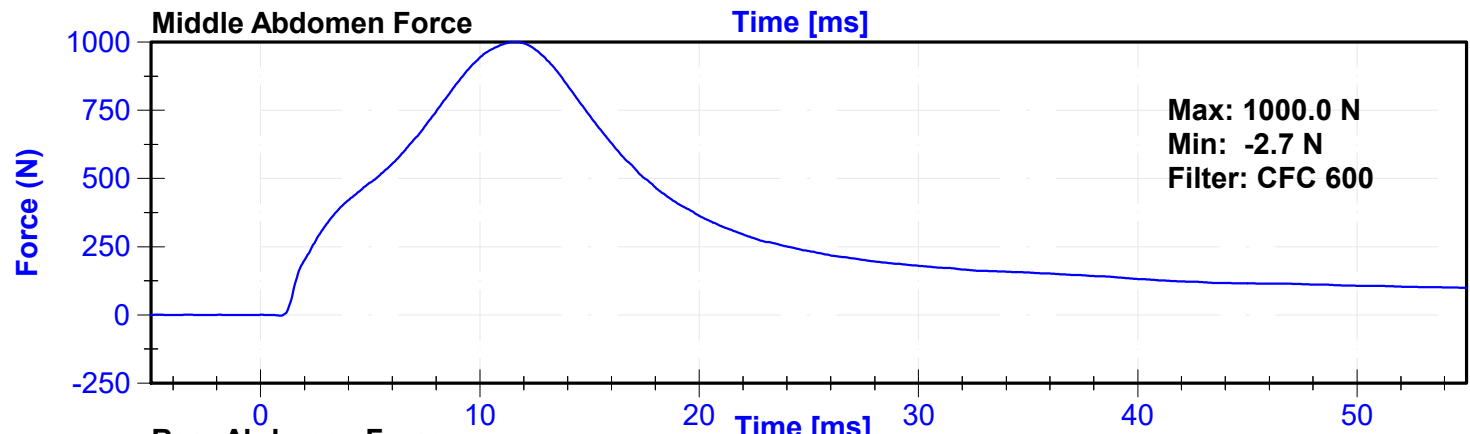
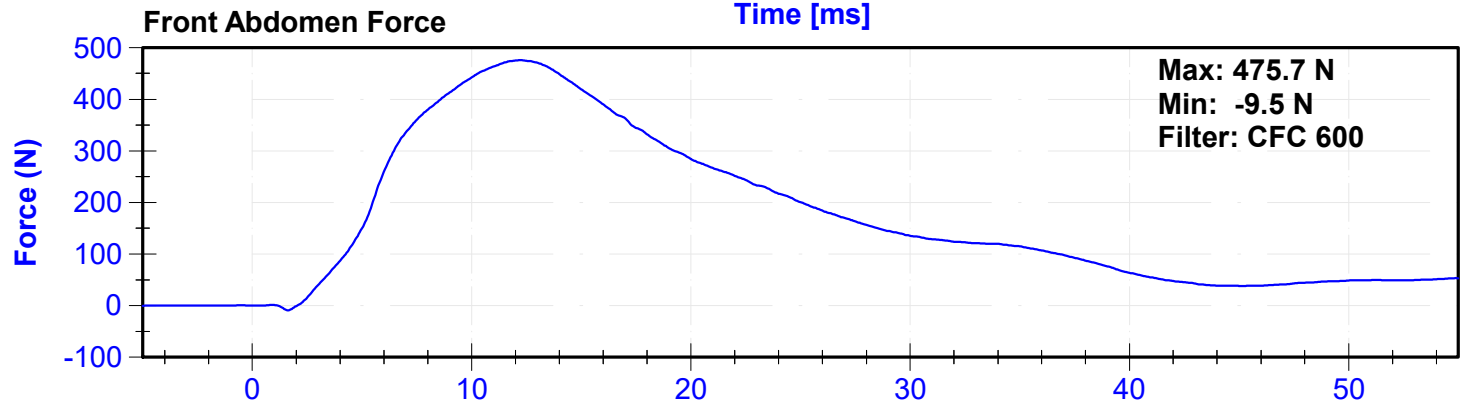
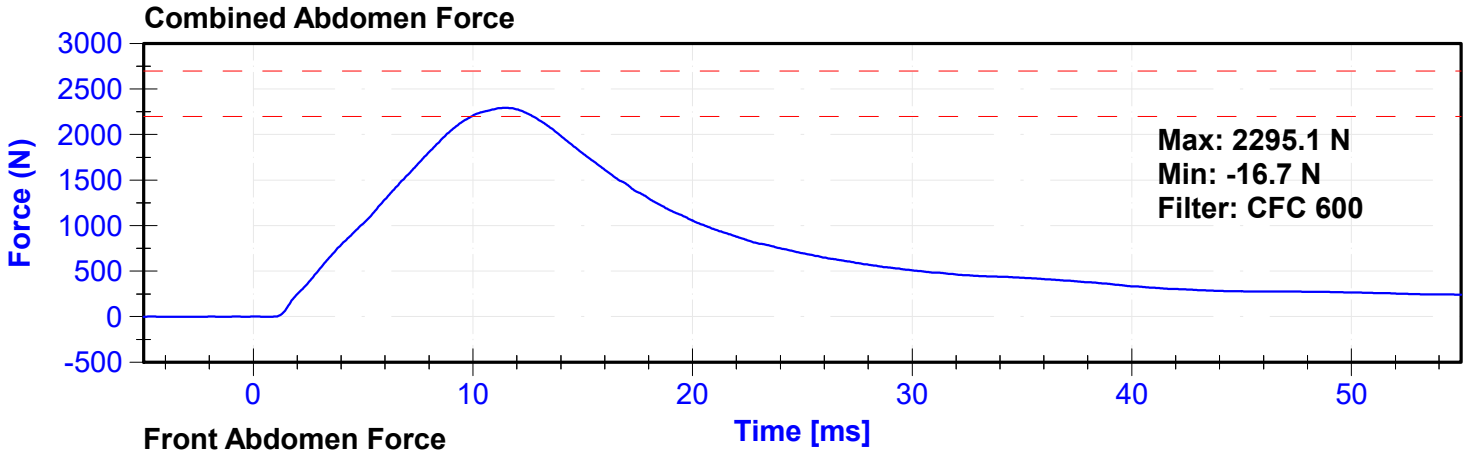
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Velocity	3.9	4.1	m/s	4.01	Pass
Combined Abdomen Force	2200	2700	N	2295.1	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.50	Pass
Resistive Probe Force	4000	4800	N	4271.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.20	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Front Abdomen Load Cell	Denton	DM5846	5/22/2024	5/22/2025
Middle Abdomen Load Cell	Denton	1529	5/22/2024	5/22/2025
Rear Abdomen Load Cell	Denton	1533	5/22/2024	5/22/2025





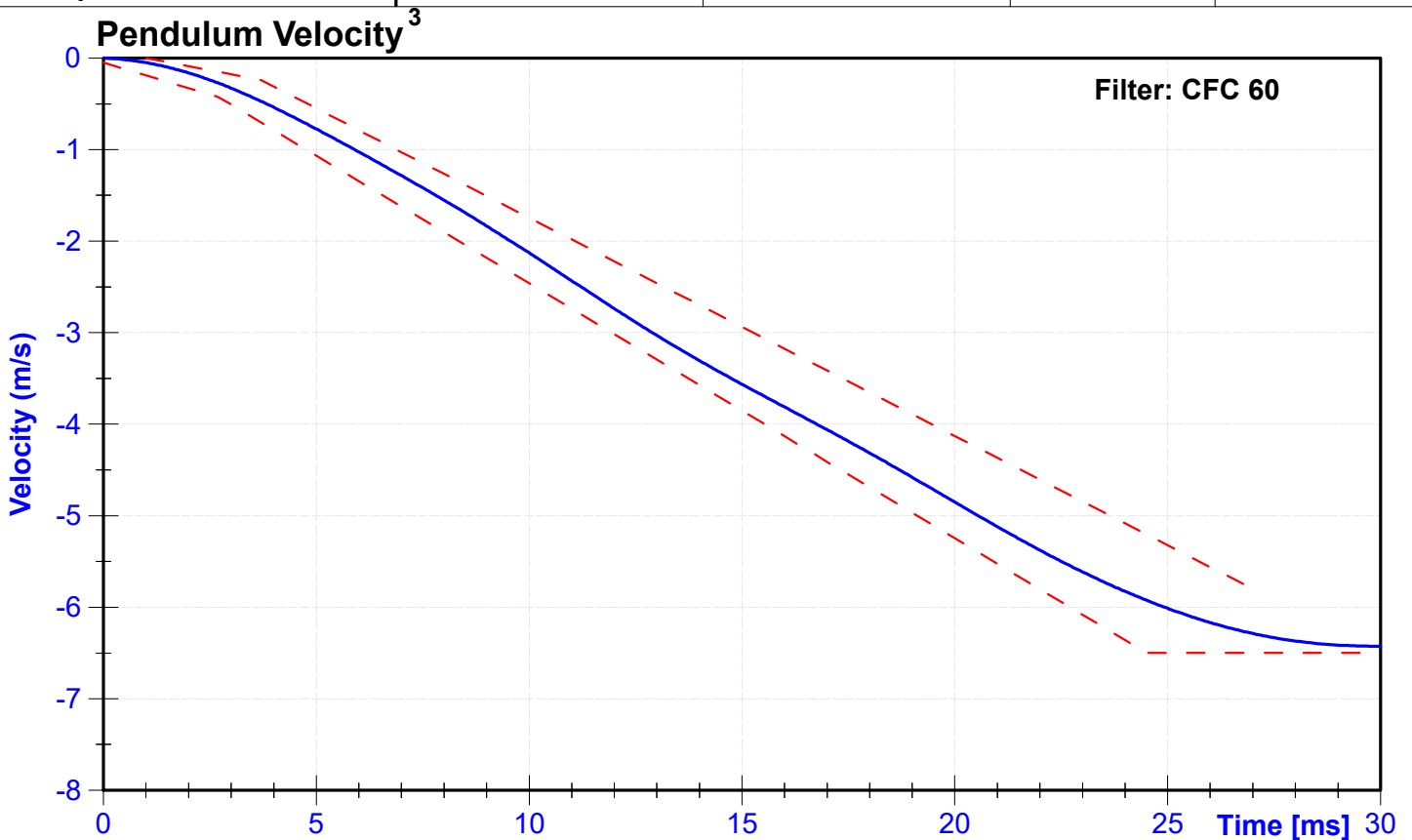
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

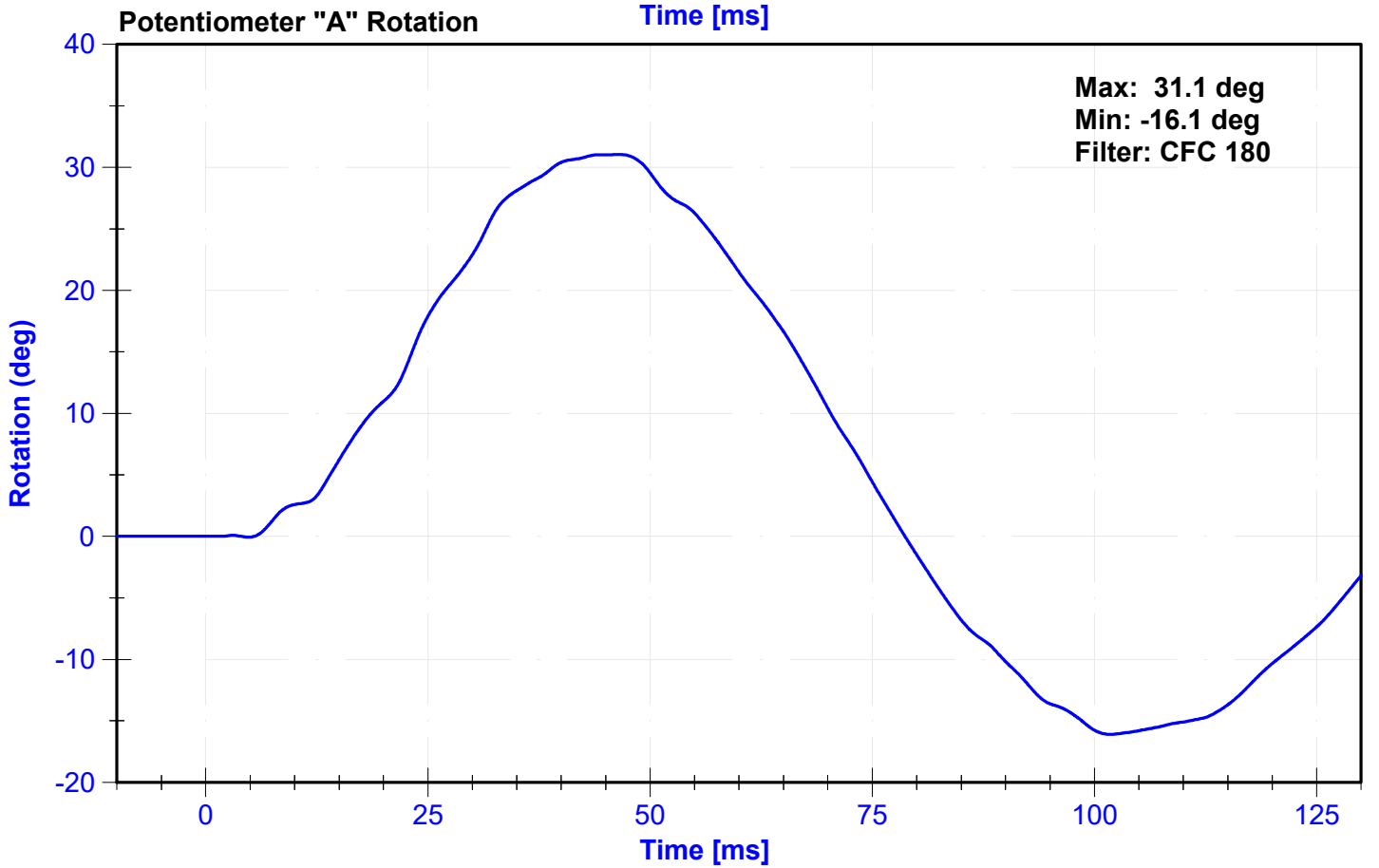
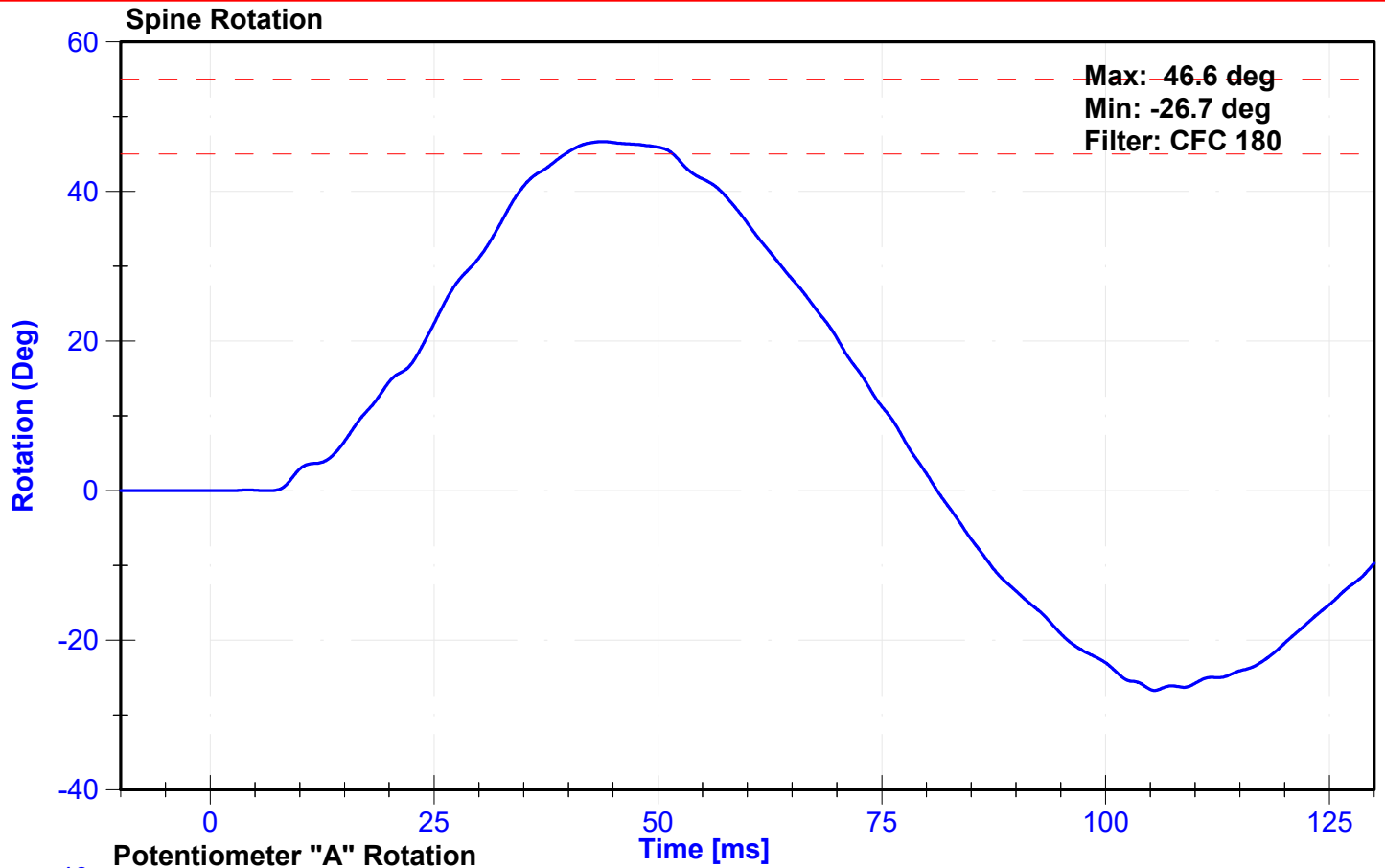
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Velocity	5.95	6.15	m/s	6.105	Pass
Lateral Spine Rotation	45	55	deg	46.6	Pass
Time at Maximum Rotation	39	53	ms	43.8	Pass
Time of Decay to Zero Degrees	37	57	ms	37.4	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

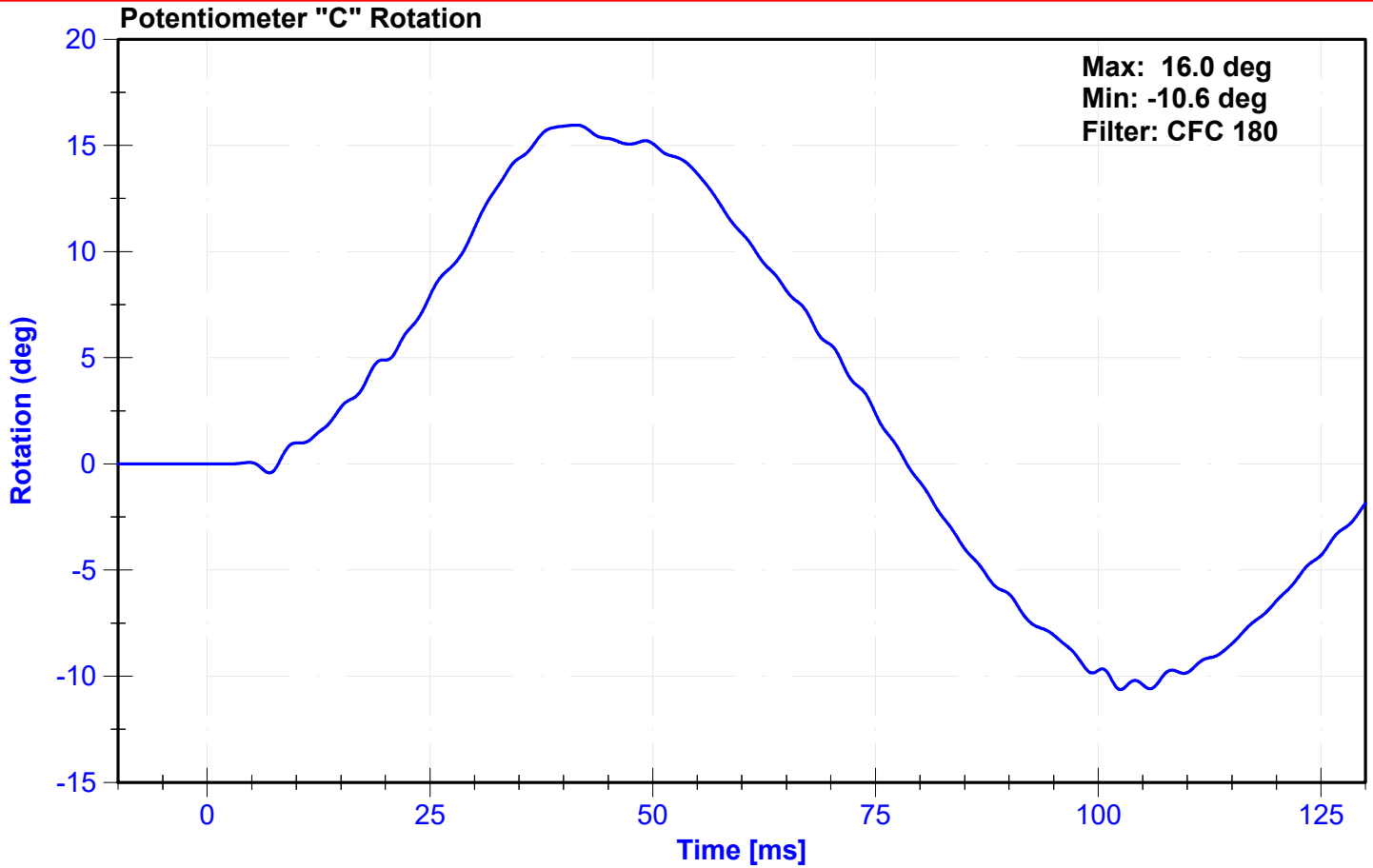
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	4/29/2024	10/26/2024
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025



^{1,2} Upper and lower boundaries specified in Appendix I





Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.5
		30.0	-6.5

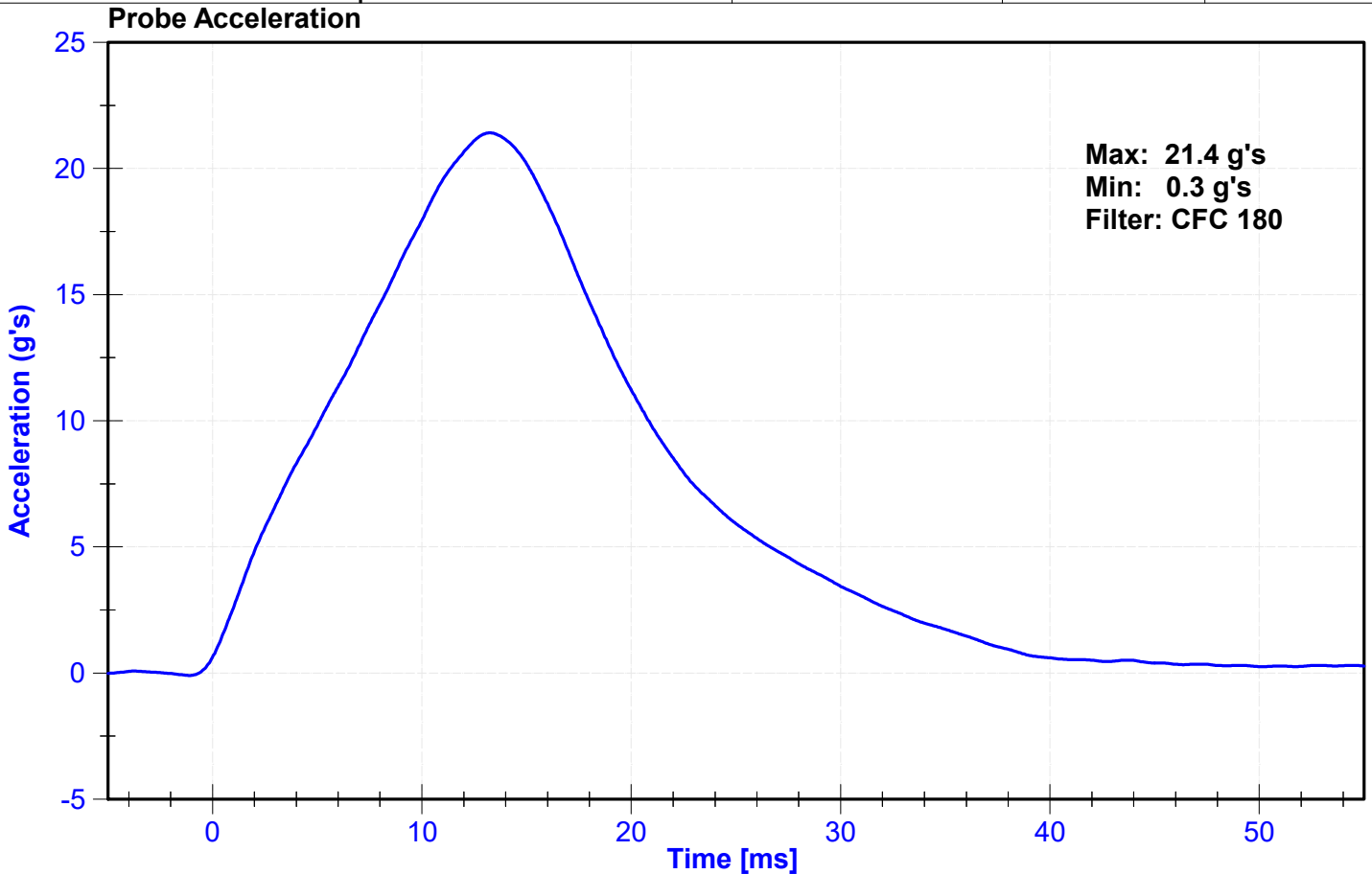
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

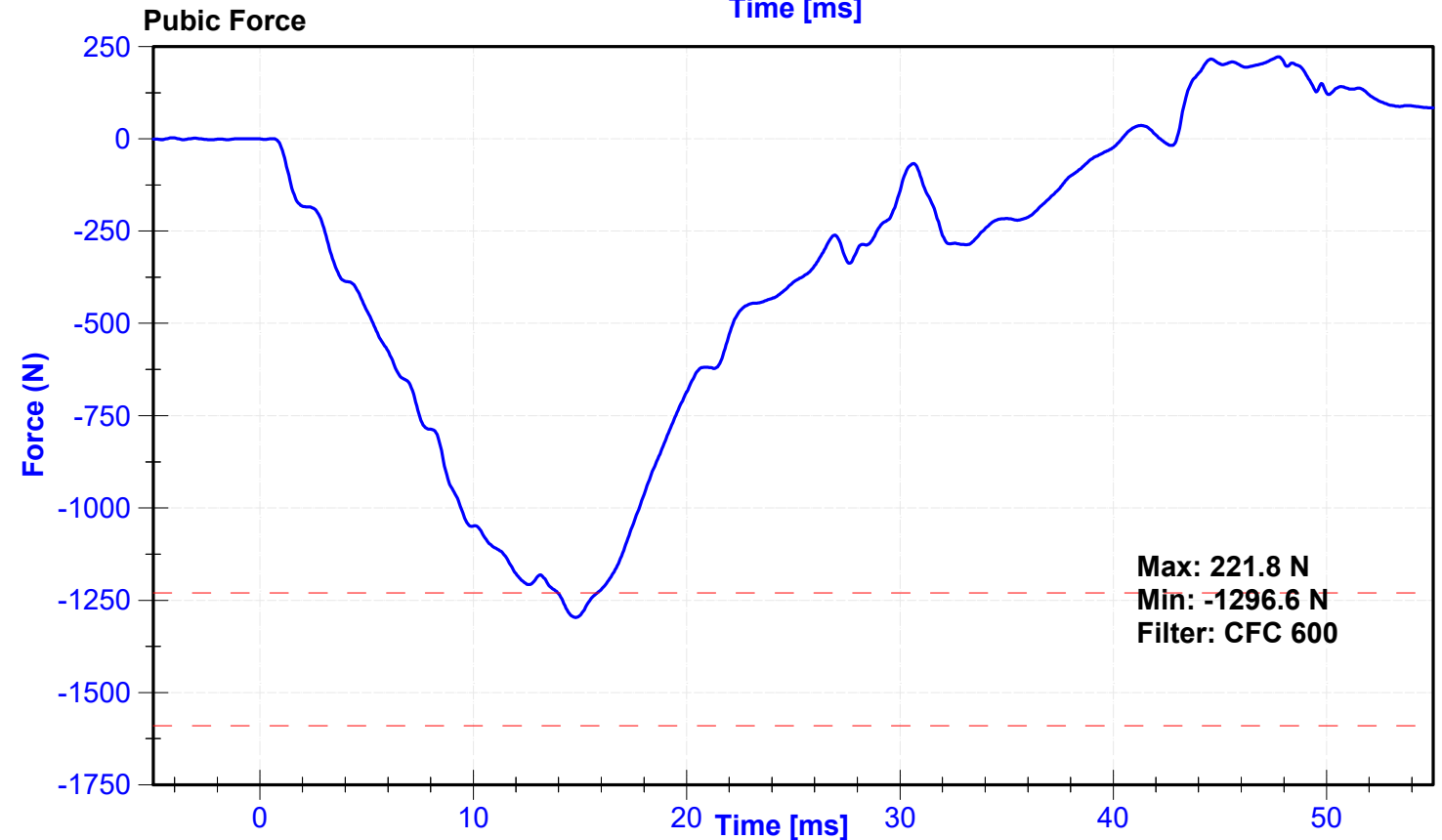
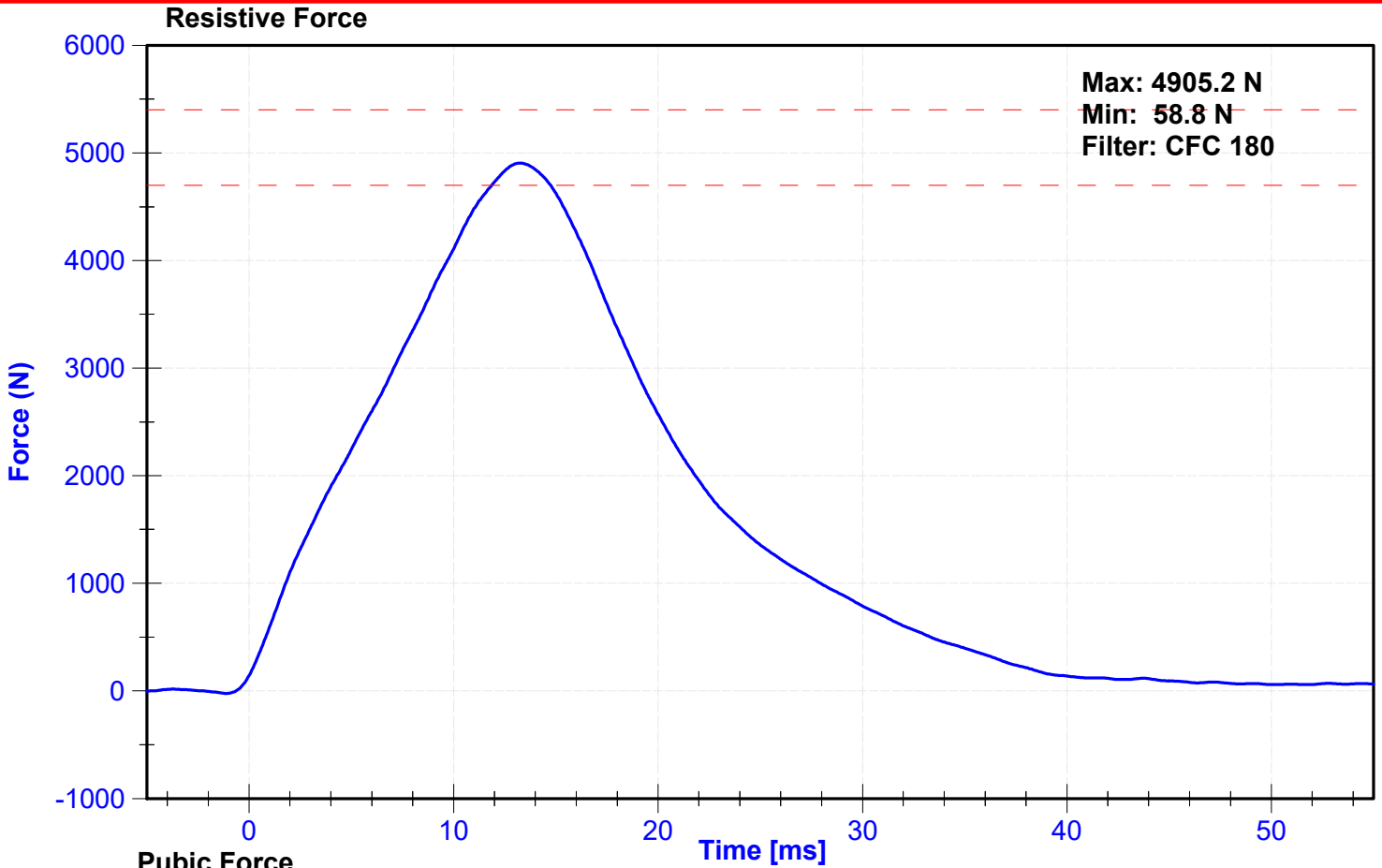
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	40	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Resistive Force	4700	5400	N	4905.2	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.25	Pass
Pubic Force	-1590	-1230	N	-1296.6	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.80	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Pubic Load Cell	Denton	459-FY	7/12/2024	7/12/2025





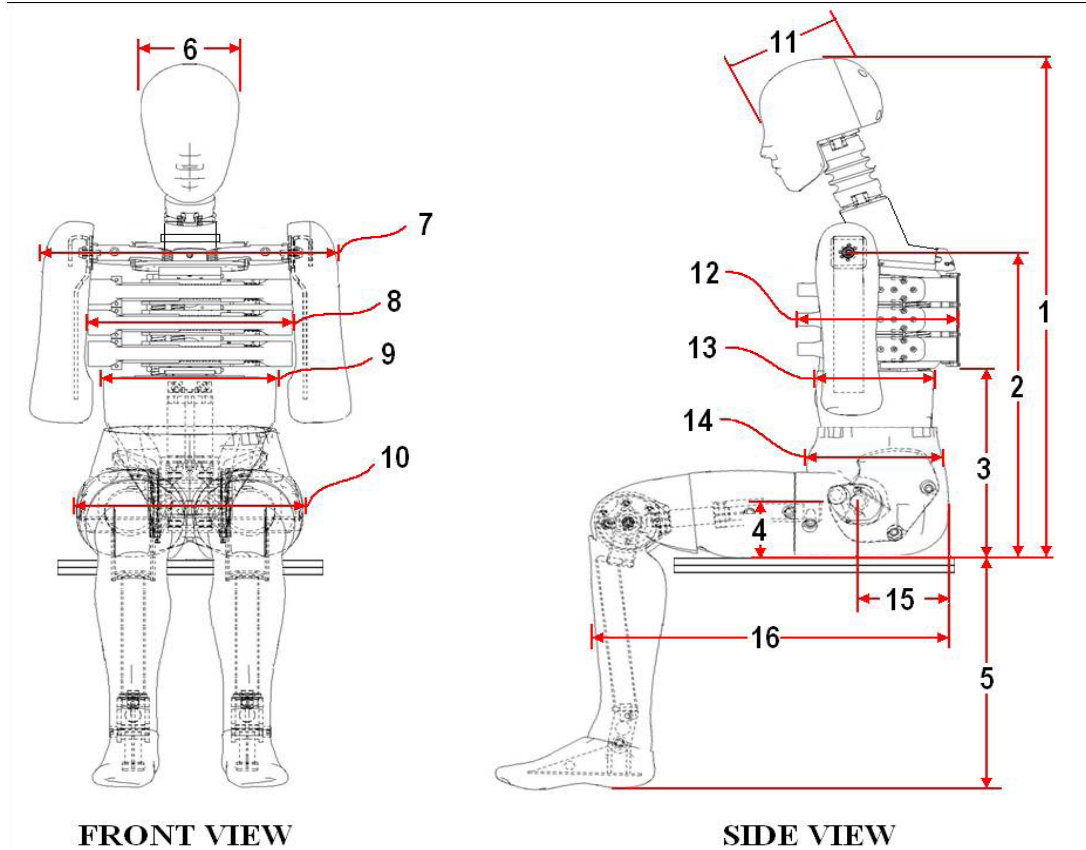
POST-TEST DUMMY PERFORMANCE CALIBRATION TEST DATA
(Subpart U, ES-2re)

External Measurements - EuroSID-2re

Technician: J. Rios

Date: 11/12/2024

Dummy Serial Number: DG5348



Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	904	Pass
2	Seat to Shoulder Joint	558	572	561	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	350	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	411	Pass
6	Head Width	152	158	154	Pass
7	Shoulder/Arm Width	461	479	468	Pass
8	Thorax Width	322	332	326	Pass
9	Abdomen Width	273	287	279	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	266	Pass
13	Abdomen Depth	194	204	199	Pass
14	Pelvis Depth	235	245	239	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	605	Pass

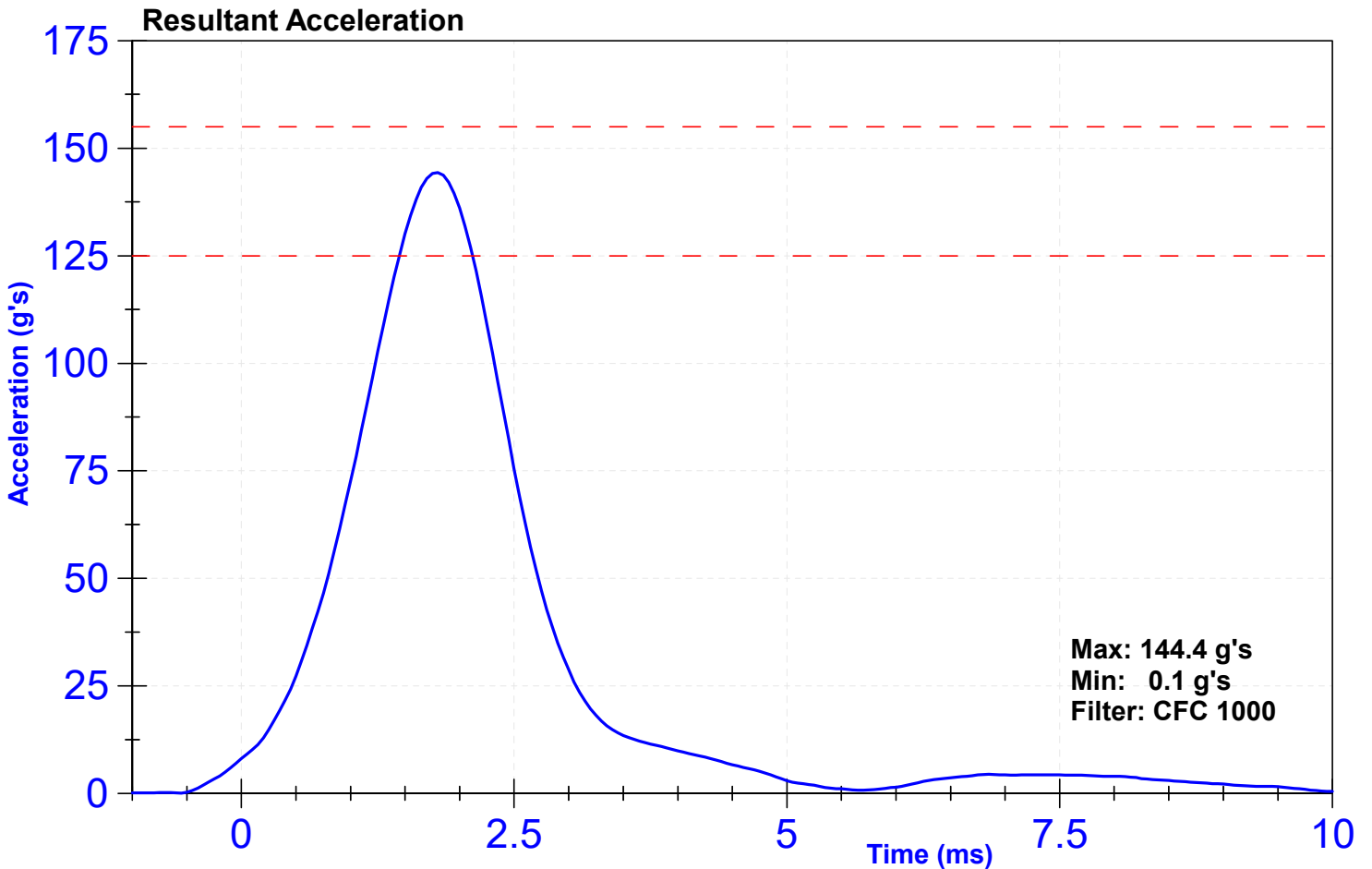
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

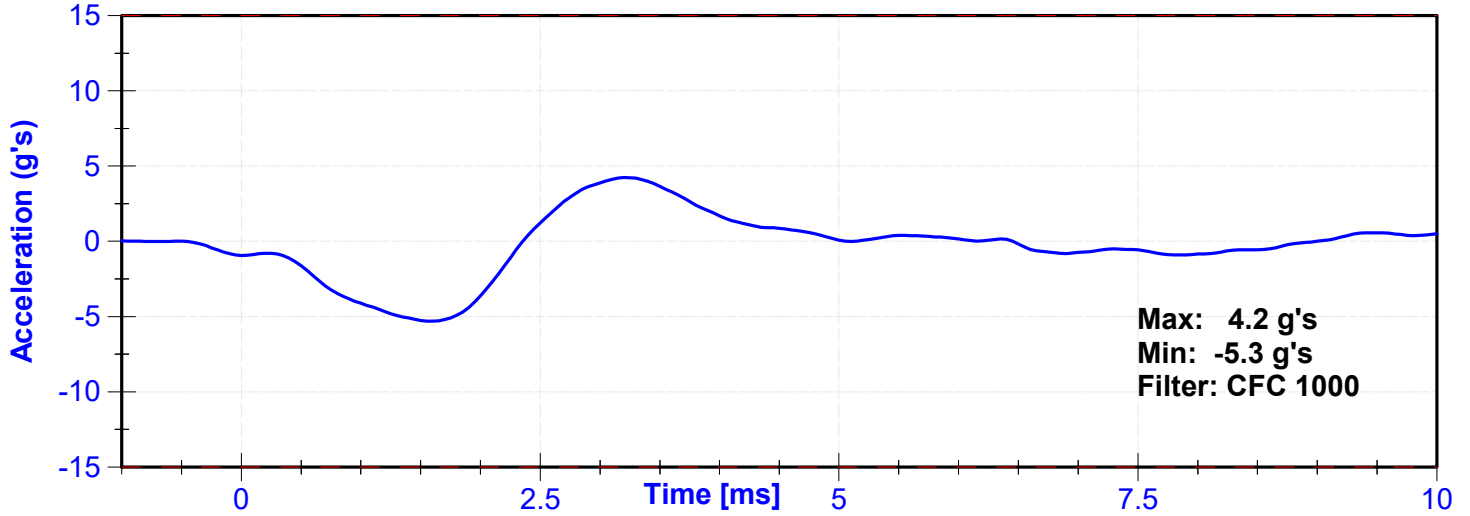
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	41	Pass
Resultant Acceleration	125	155	g's	144.4	Pass
Oscillation	0	15	%	3.07	Pass
Fore-Aft Acceleration	-15	15	g's	-5.3	Pass

Transducer Calibrations

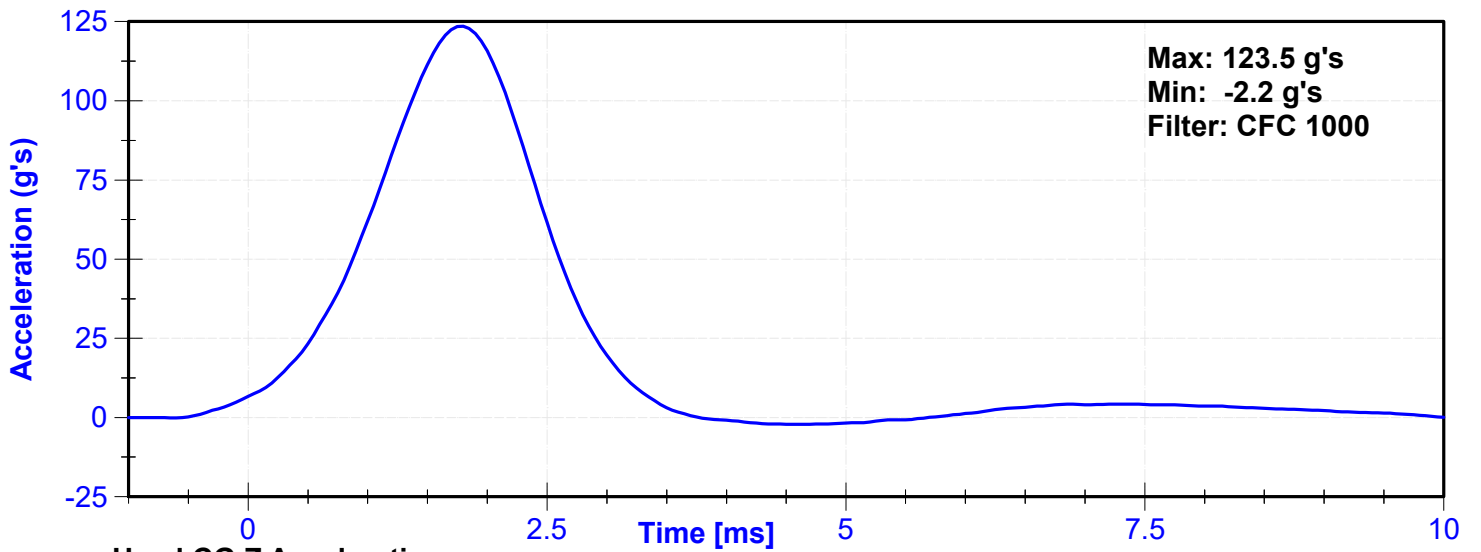
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	18613	7/30/2024	1/26/2025
Y Accelerometer	Endevco	18472	7/30/2024	1/26/2025
Z Accelerometer	Endevco	18663	7/30/2024	1/26/2025



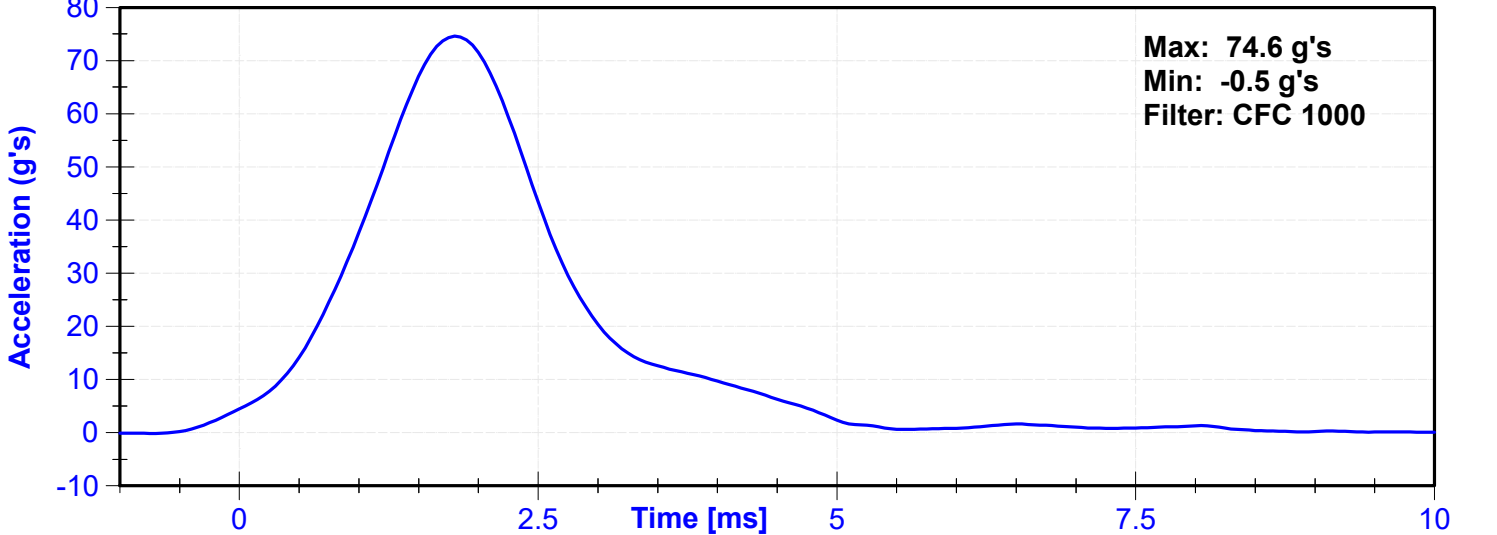
Head CG X Acceleration



Head CG Y Acceleration



Head CG Z Acceleration



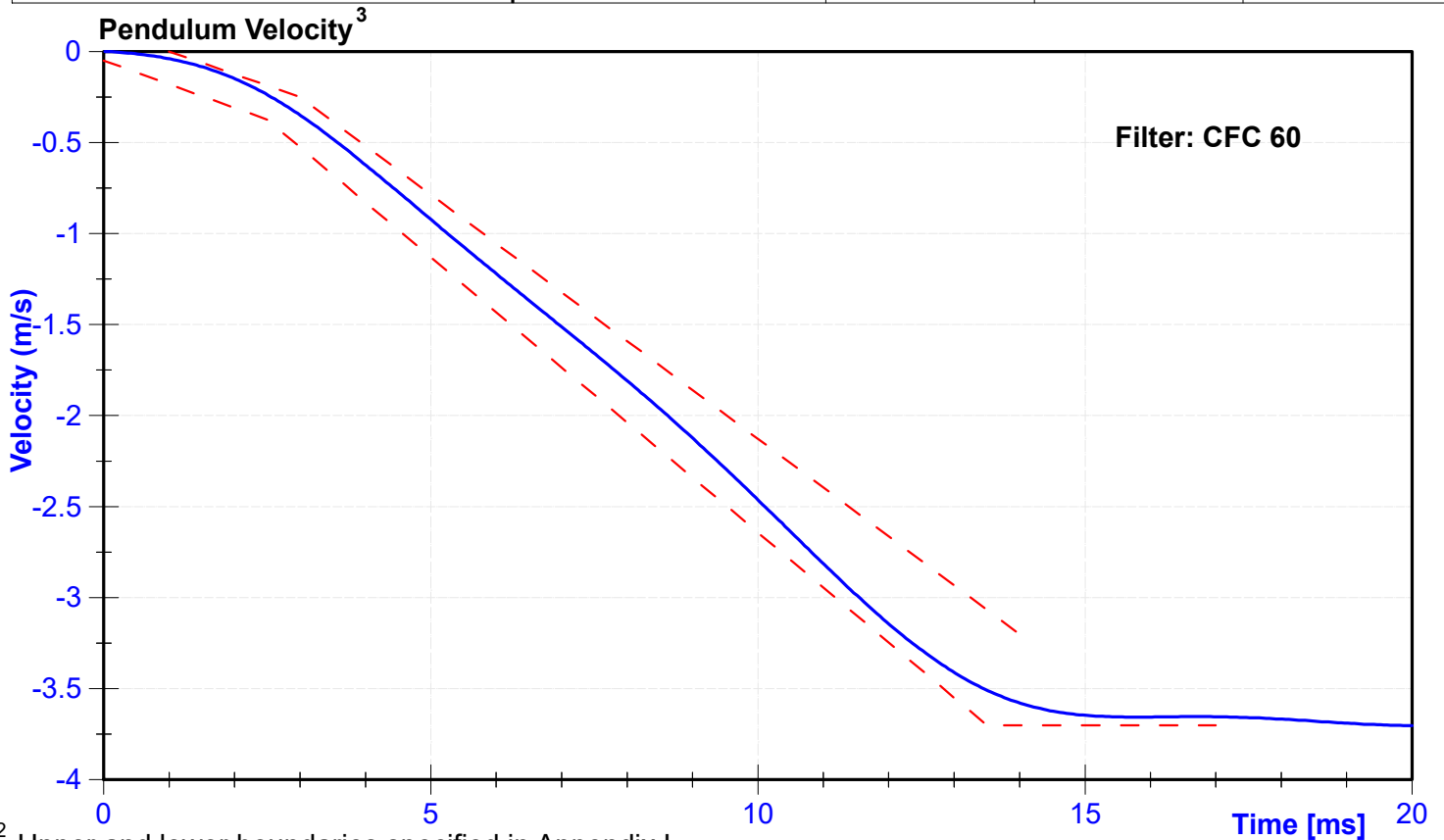
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	395	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	41	Pass
Velocity	3.3	3.5	m/s	3.45	Pass
Lateral Neck Rotation	49	59	deg	50.3	Pass
Time at Maximum Rotation	54	66	ms	55.8	Pass
Time of Rotation Decay from Maximum	53	88	ms	58.8	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

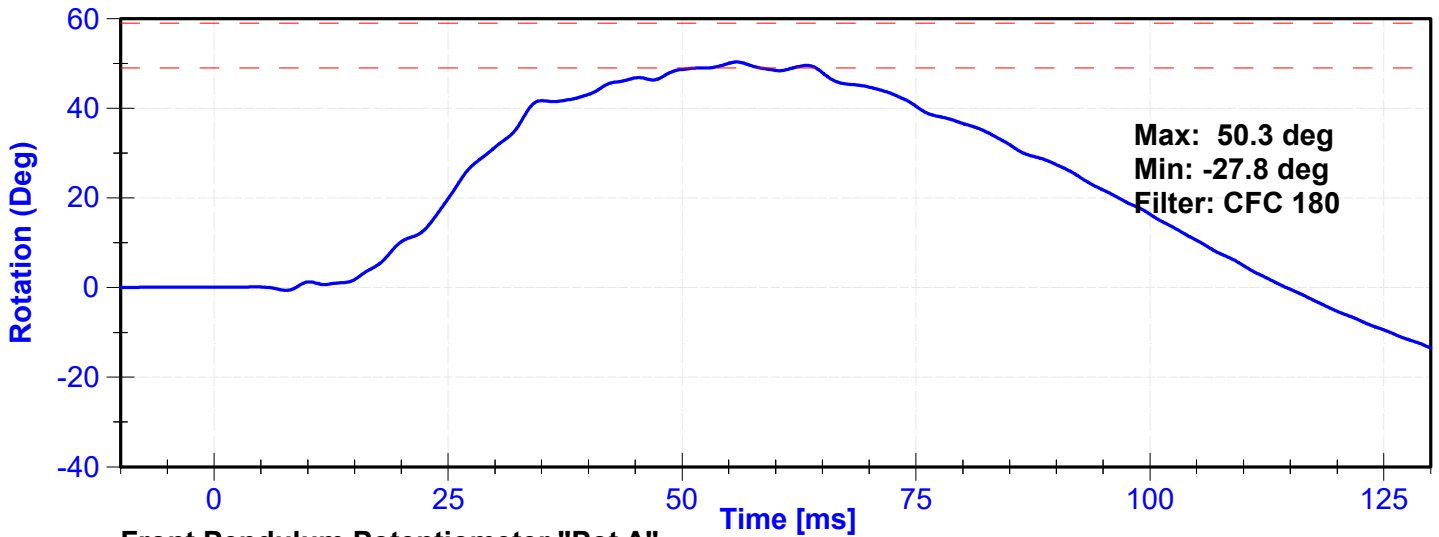
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025

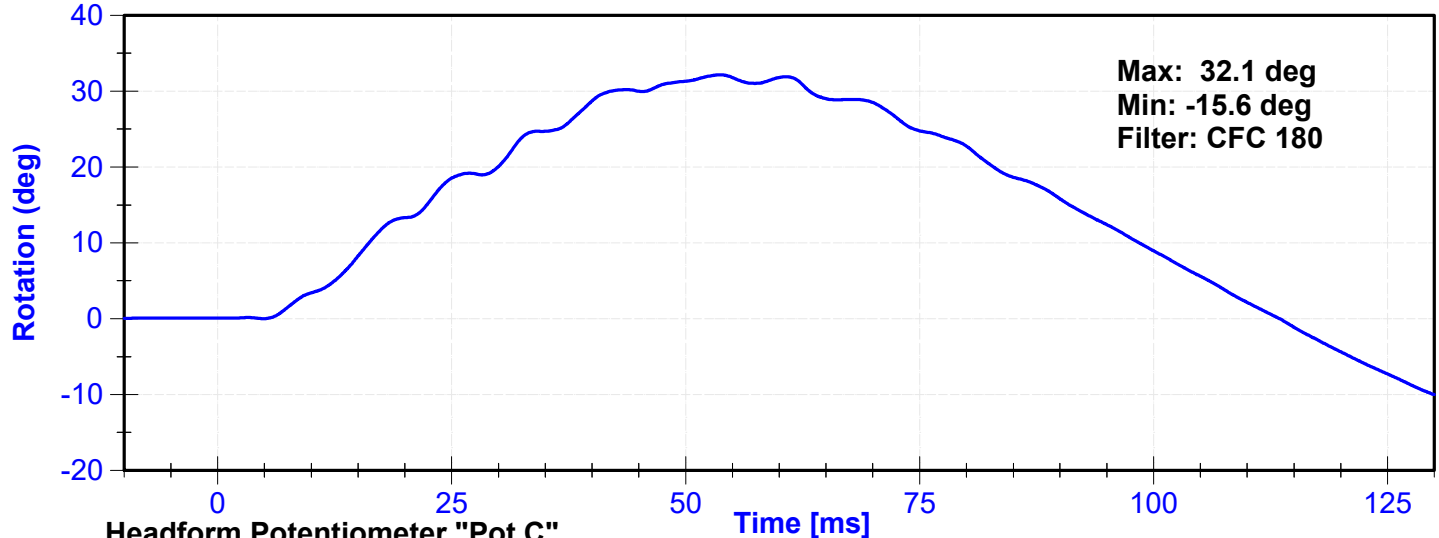


^{1,2} Upper and lower boundaries specified in Appendix I

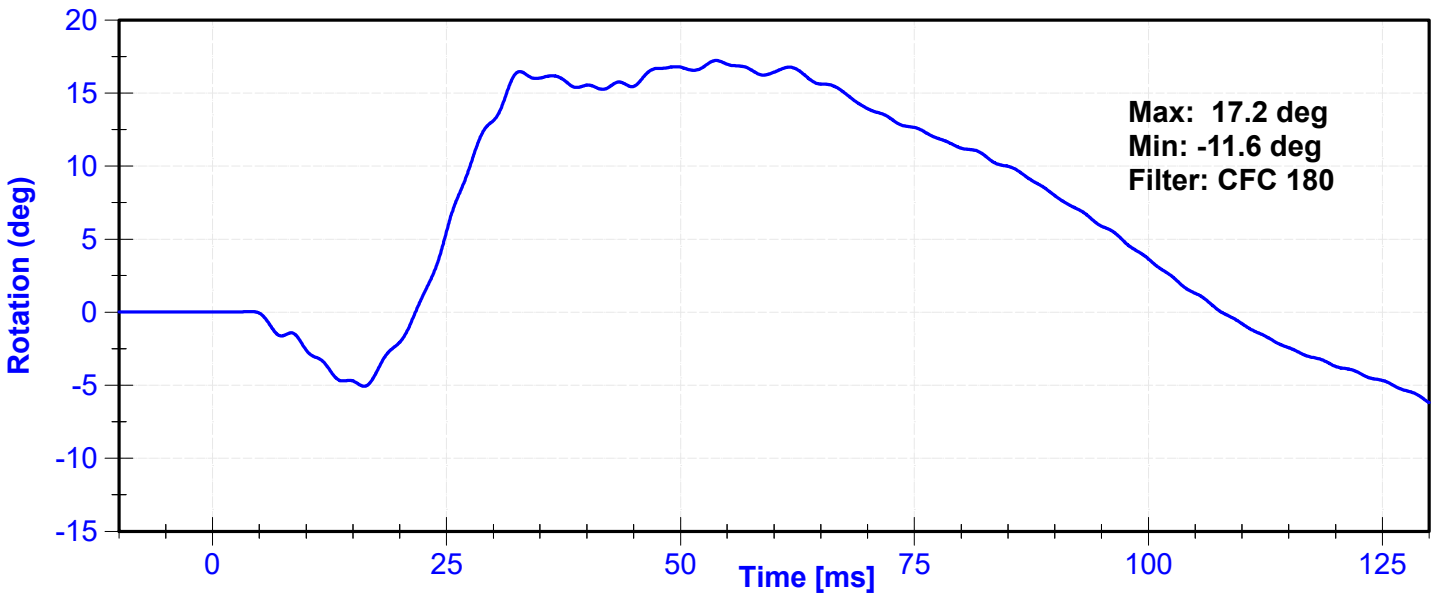
Neck Rotation



Front Pendulum Potentiometer "Pot A"



Headform Potentiometer "Pot C"



Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

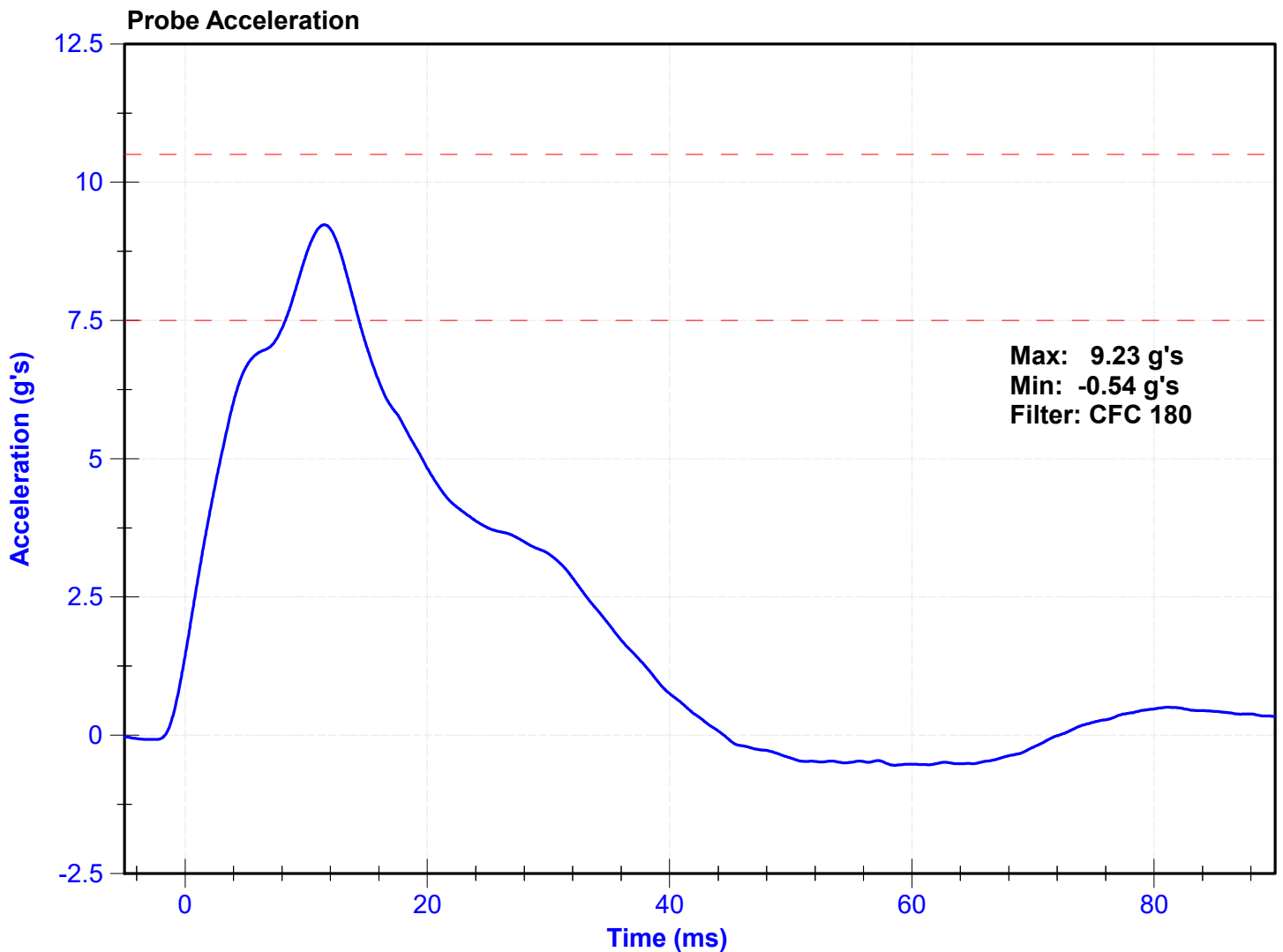
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	33	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	7.5	10.5	g's	9.23	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025



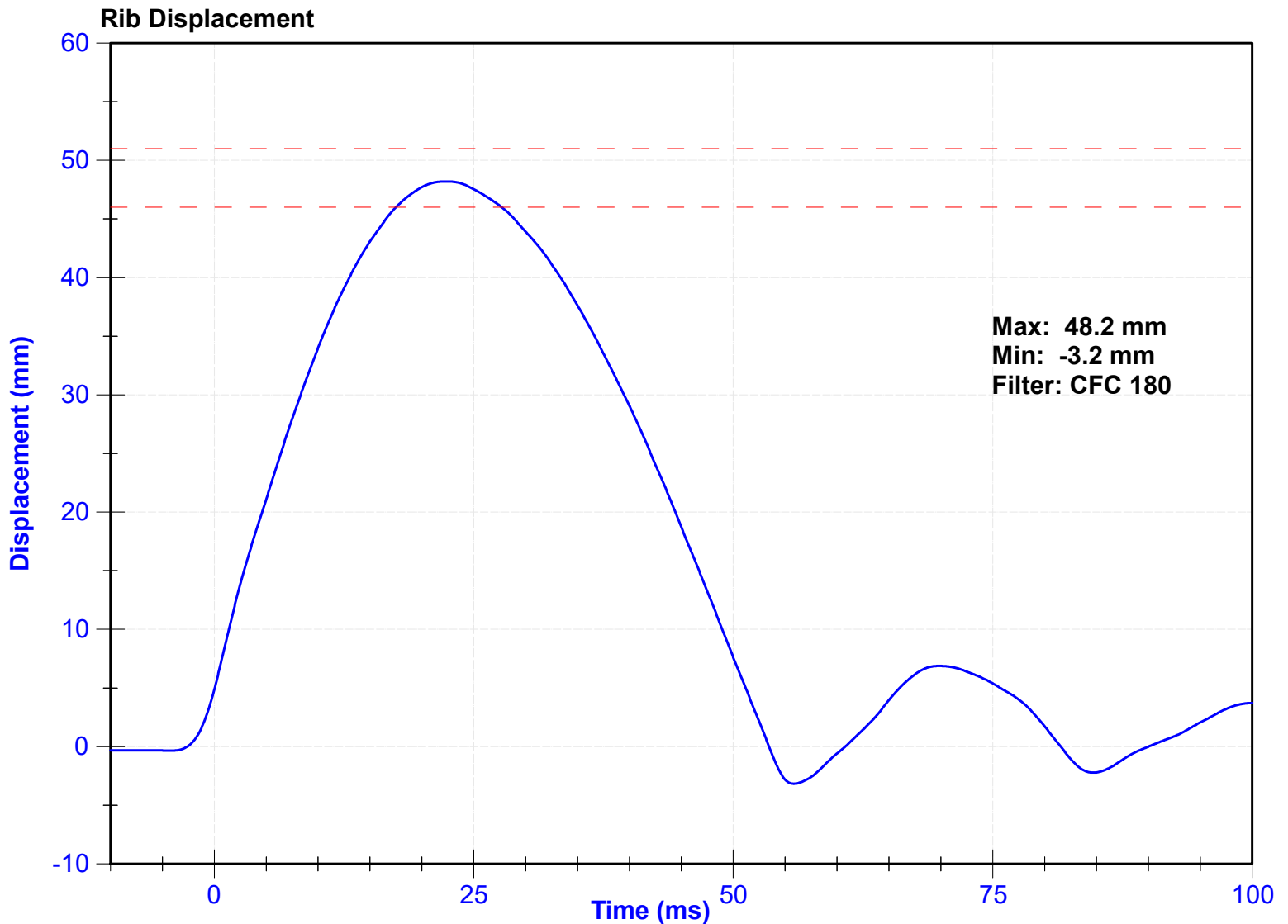
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	34	Pass
Rib Displacement	46	51	mm	48.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	268GFE	7/30/2024	1/28/2025



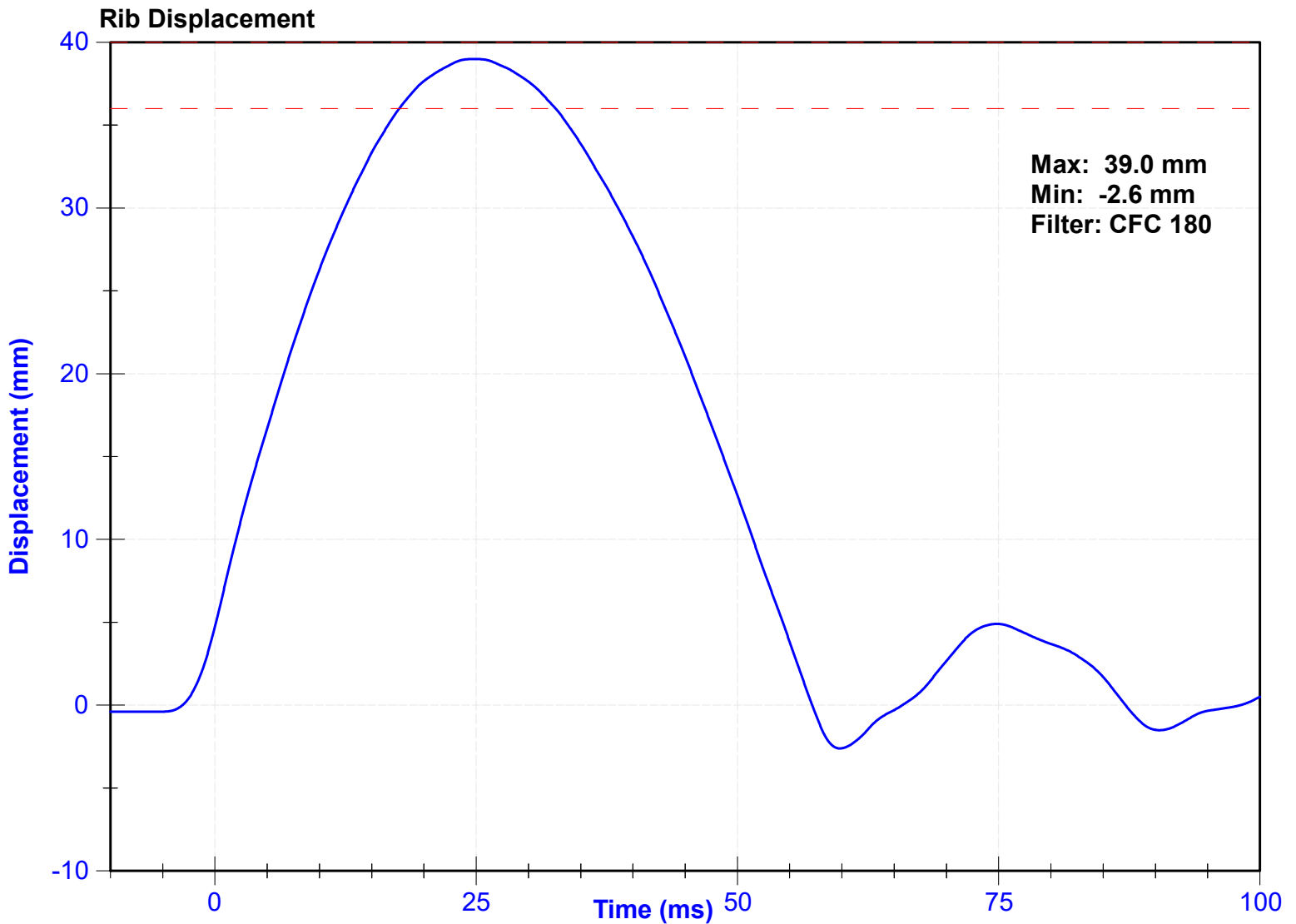
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	34	Pass
Rib Displacement	36	40	mm	39.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	268GFE	7/30/2024	1/28/2025



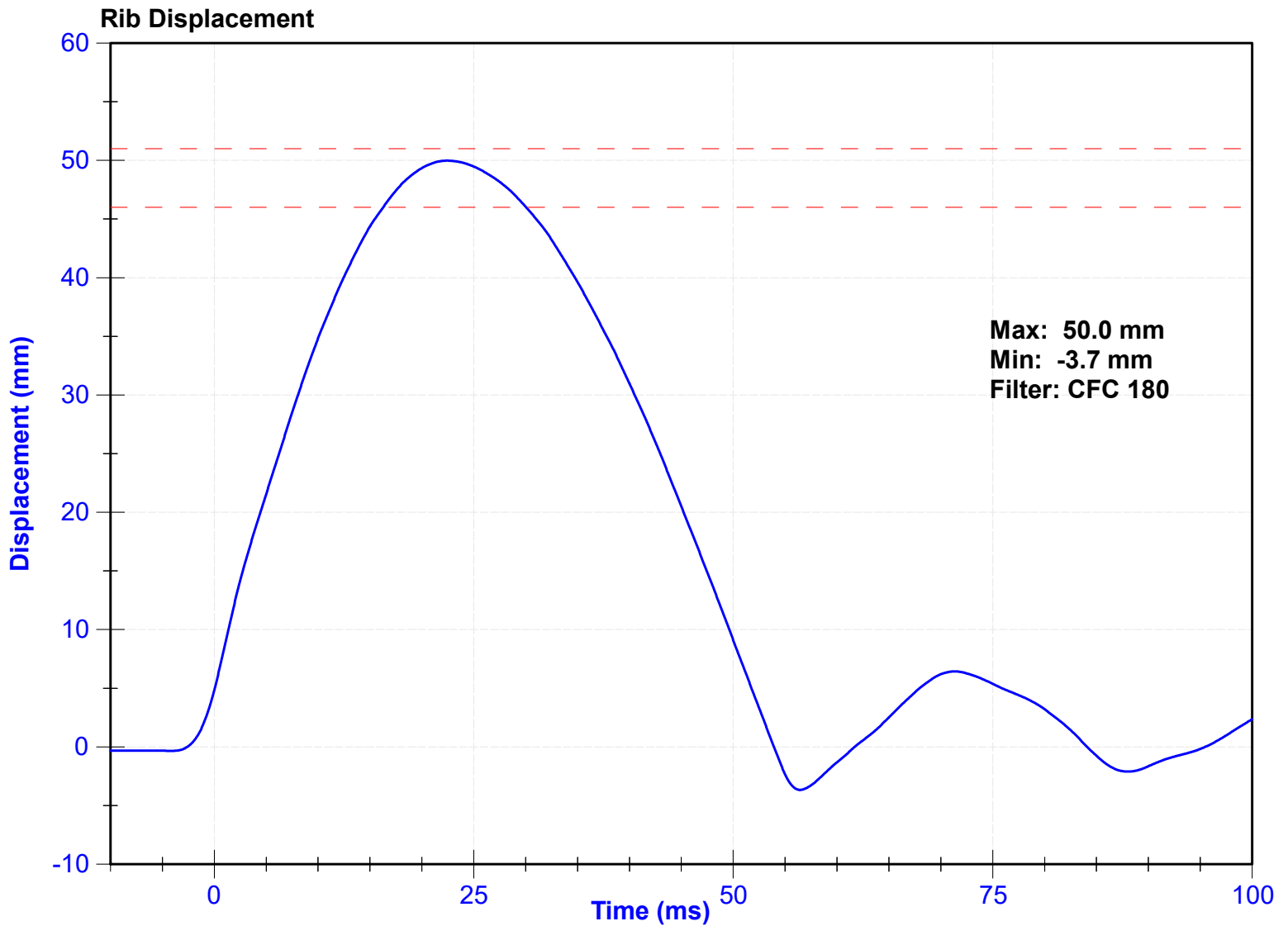
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	34	Pass
Rib Displacement	46	51	mm	50.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	269GFE	7/30/2024	1/28/2025



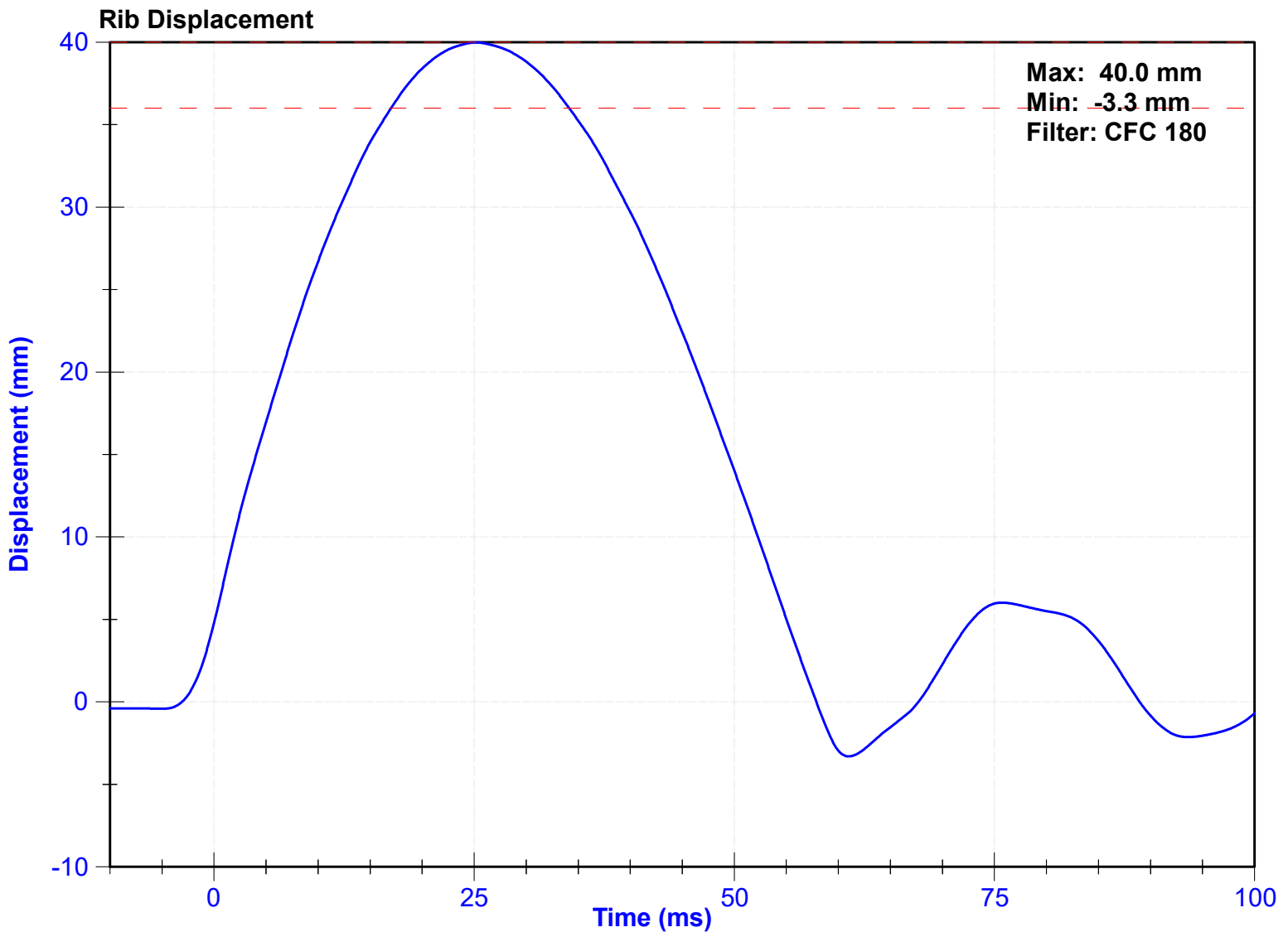
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	34	Pass
Rib Displacement	36	40	mm	40.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	269GFE	7/30/2024	1/28/2025



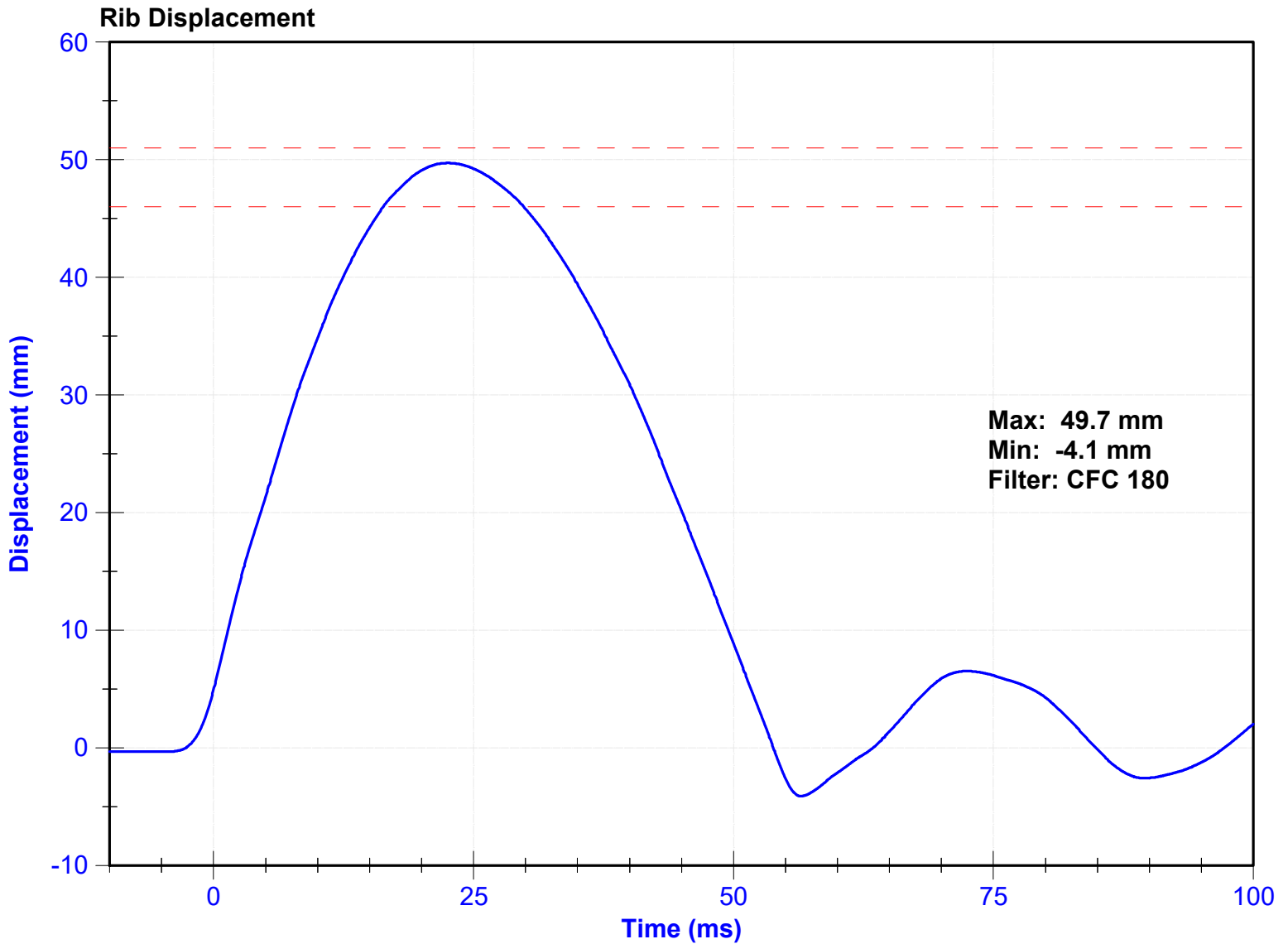
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	34	Pass
Rib Displacement	46	51	mm	49.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	270GFE	7/30/2024	1/28/2025



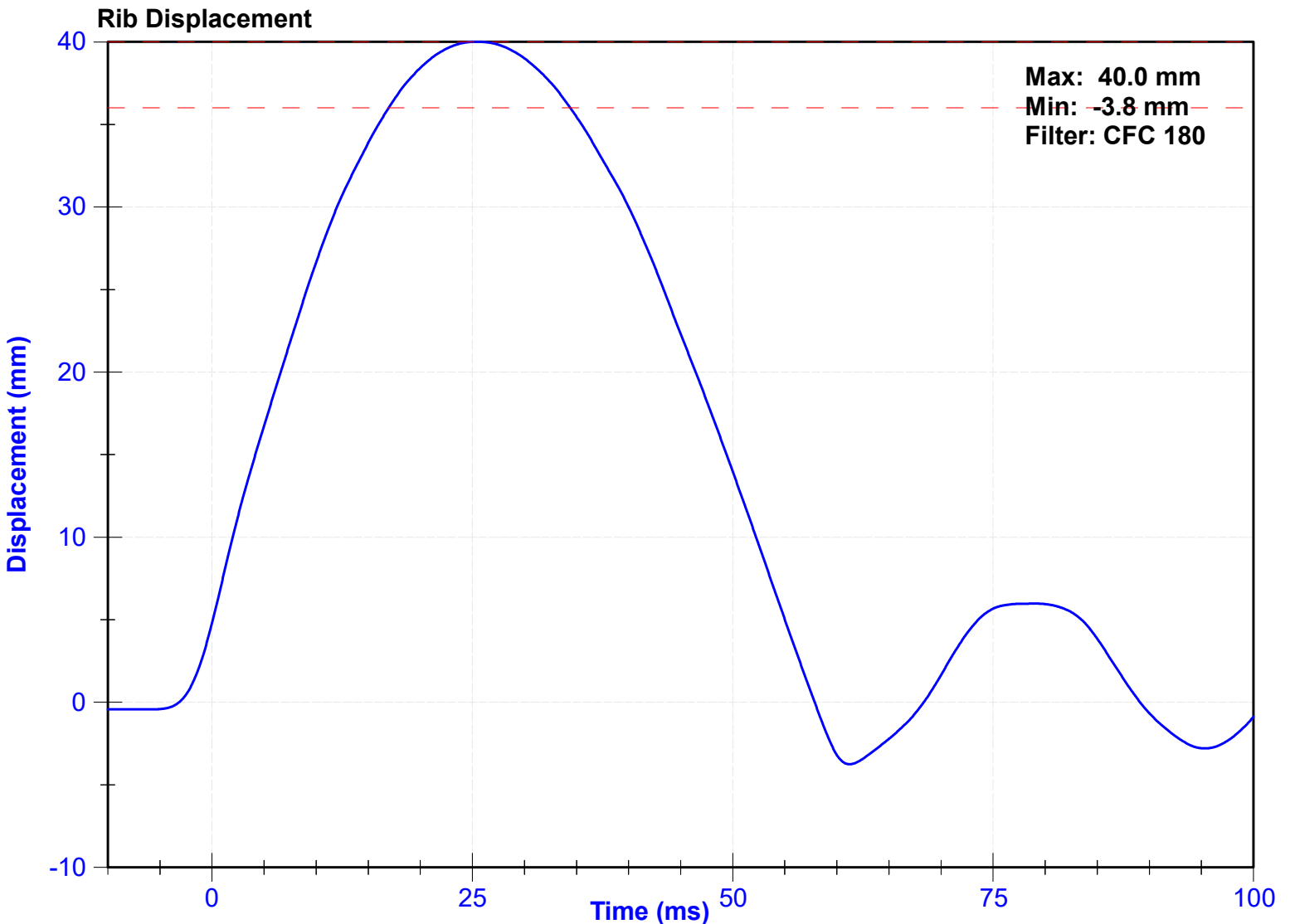
ATD Manufacturer	FTSS	Test Technician	J. Miller
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	34	Pass
Rib Displacement	36	40	mm	40.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	270GFE	7/30/2024	1/28/2025



ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

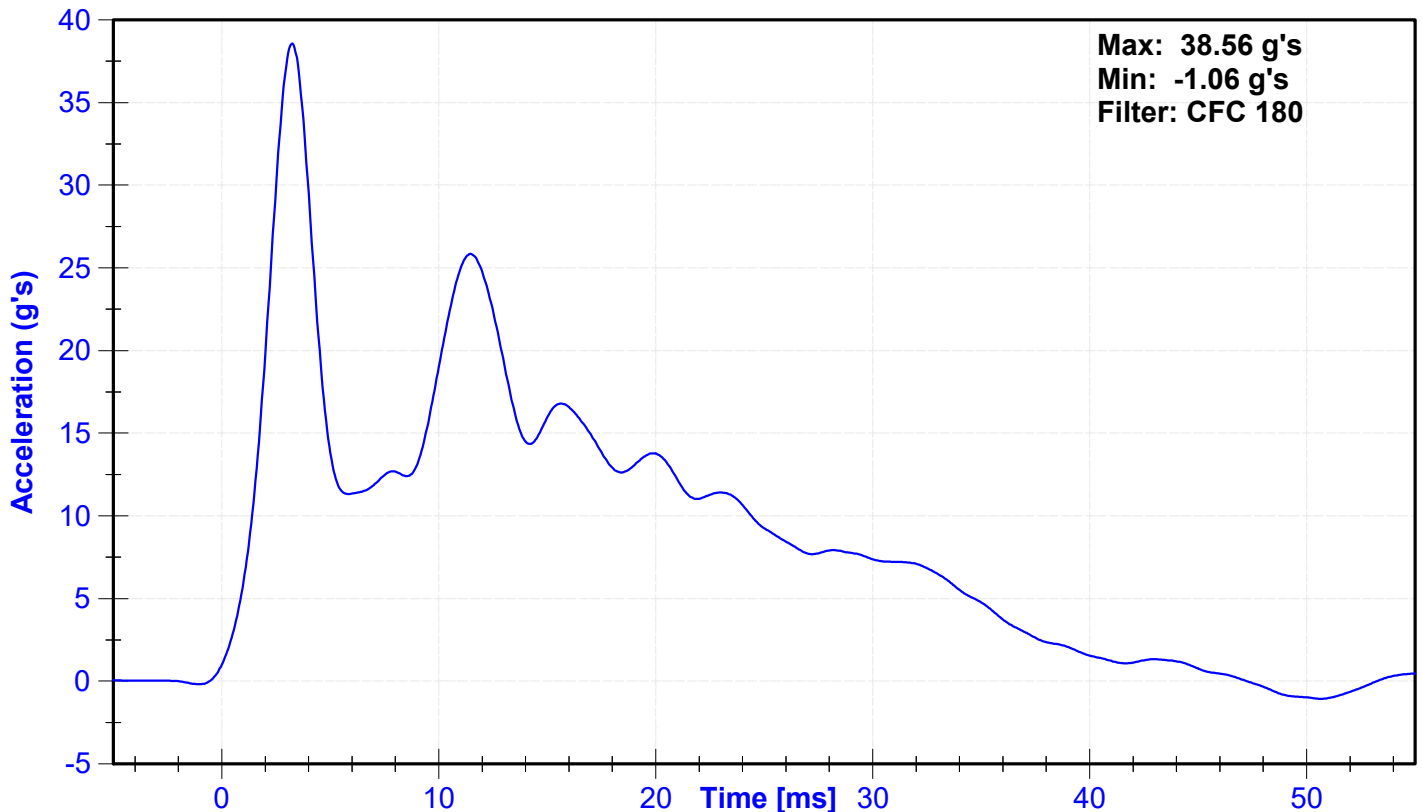
Results

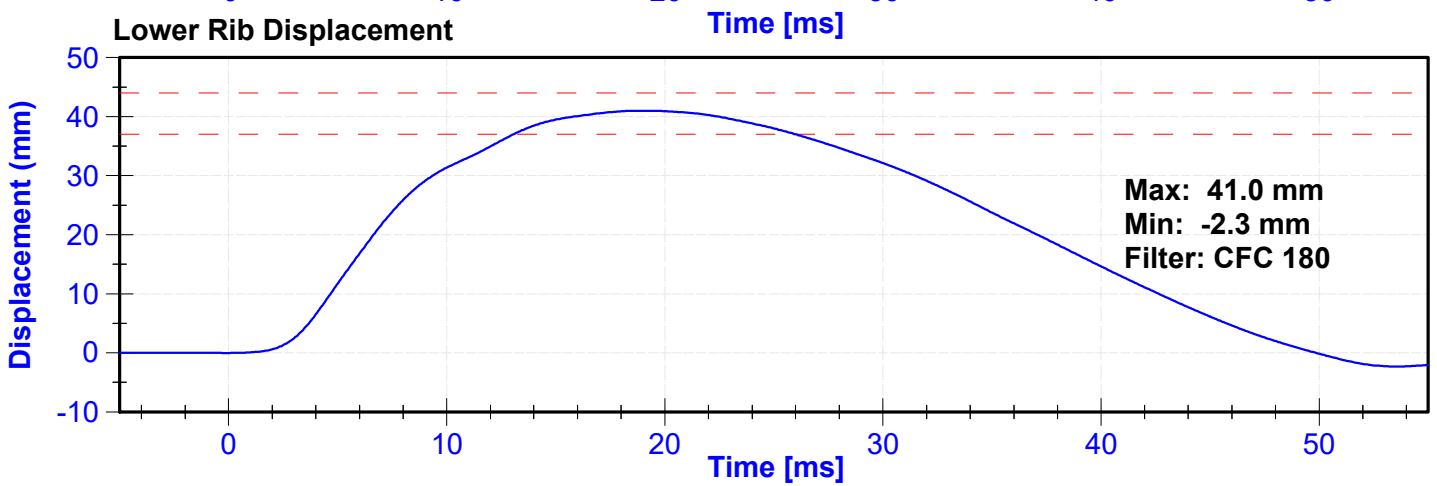
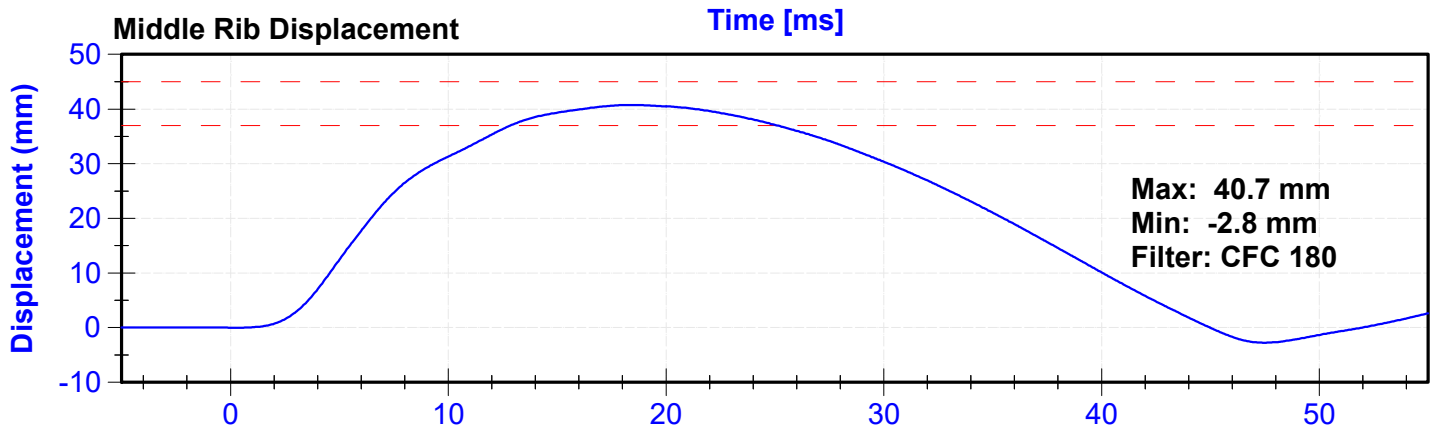
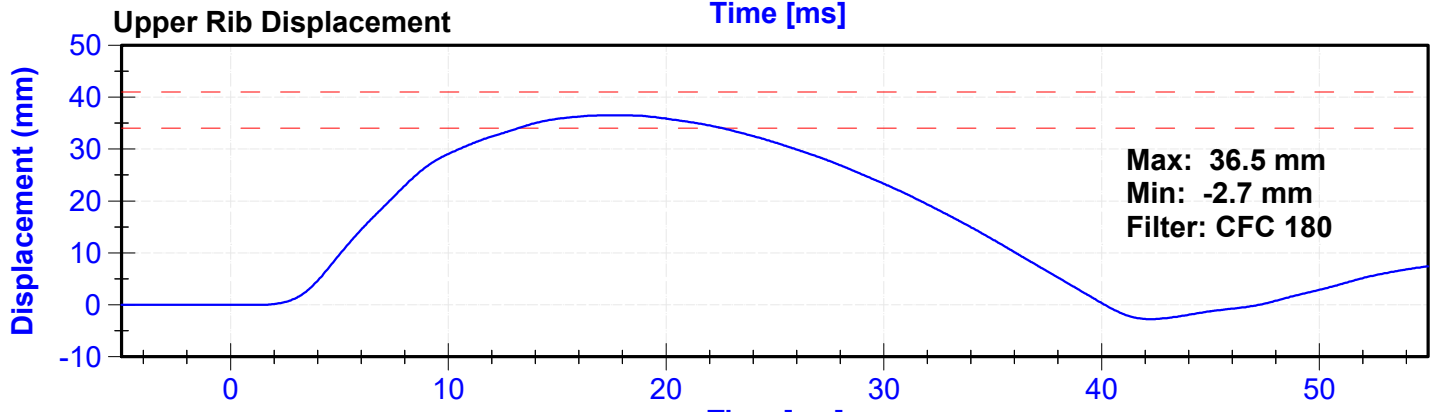
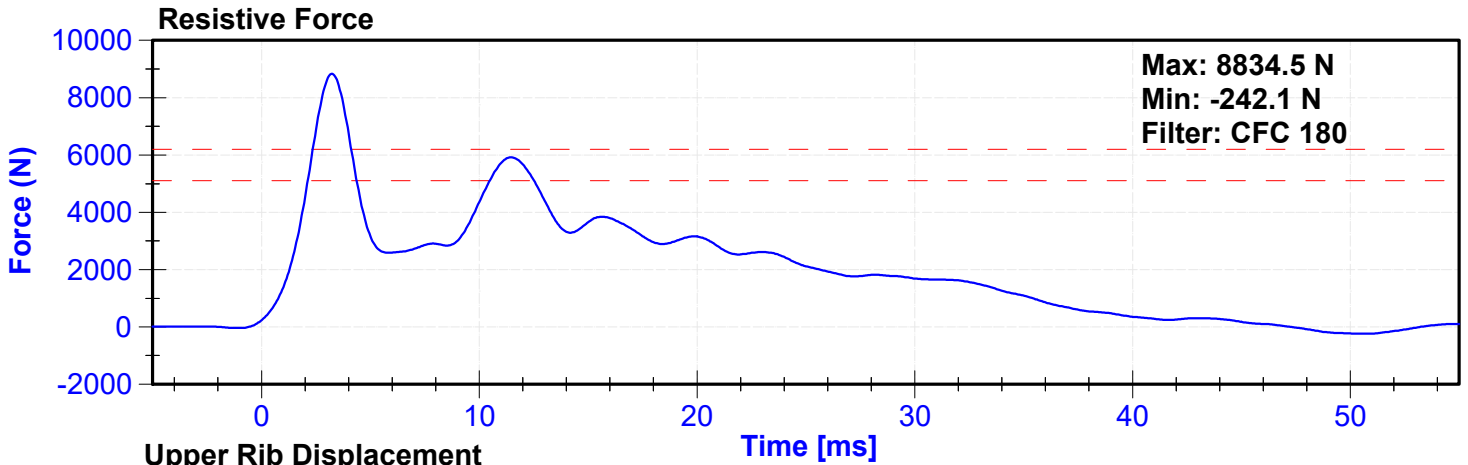
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	33	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	5919.4	Pass
Upper Thorax Rib Deflection	34	41	mm	36.5	Pass
Mid Thorax Rib Deflection	37	45	mm	40.7	Pass
Lower Thorax Rib Deflection	37	44	mm	41.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Upper Thorax Rib Potentiometer	Honeywell	268GFE	7/30/2024	1/28/2025
Middle Thorax Rib Potentiometer	Honeywell	269GFE	7/30/2024	1/28/2025
Lower Thorax Rib Potentiometer	Honeywell	270GFE	7/30/2024	1/28/2025

Probe Acceleration





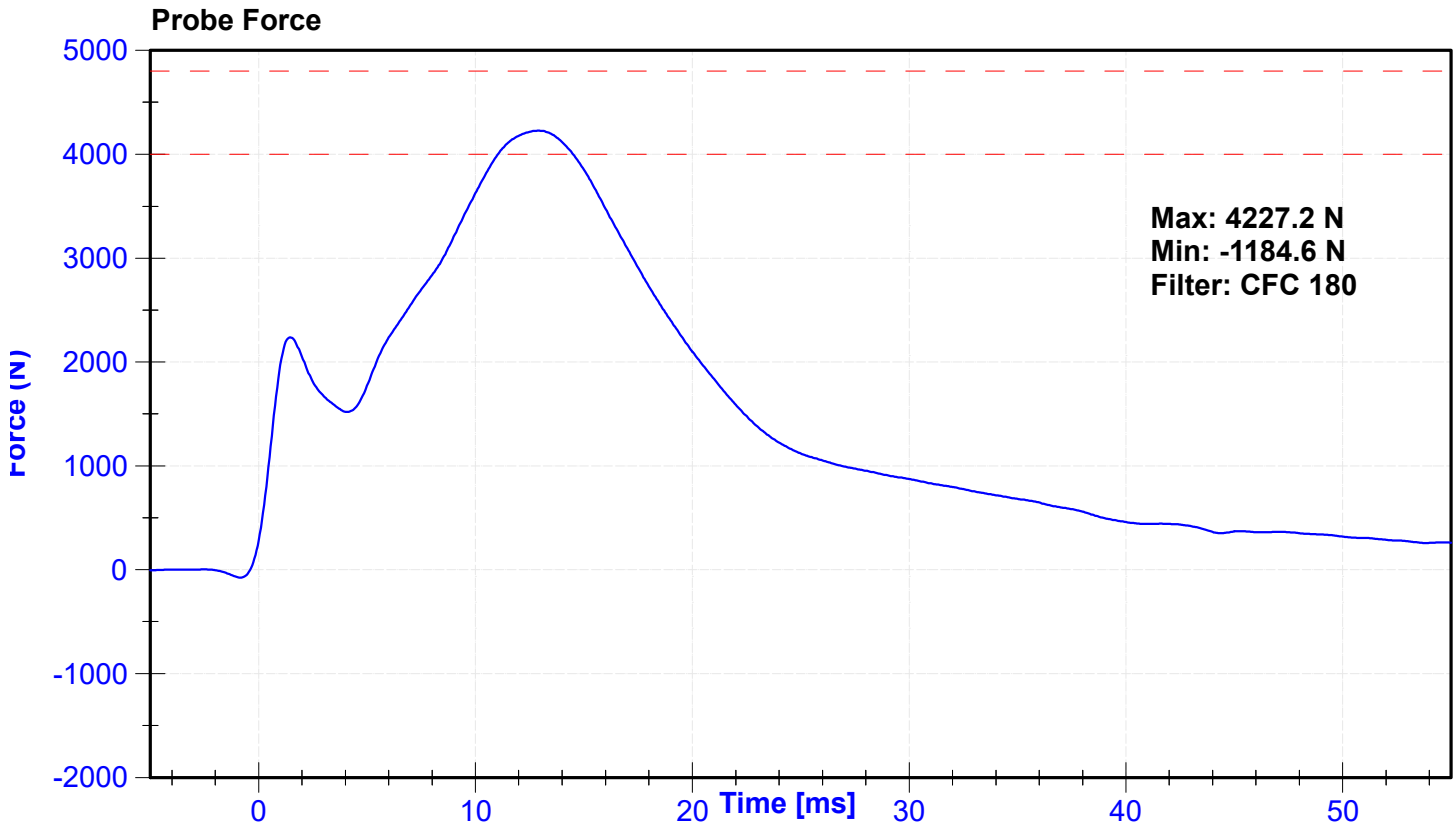
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

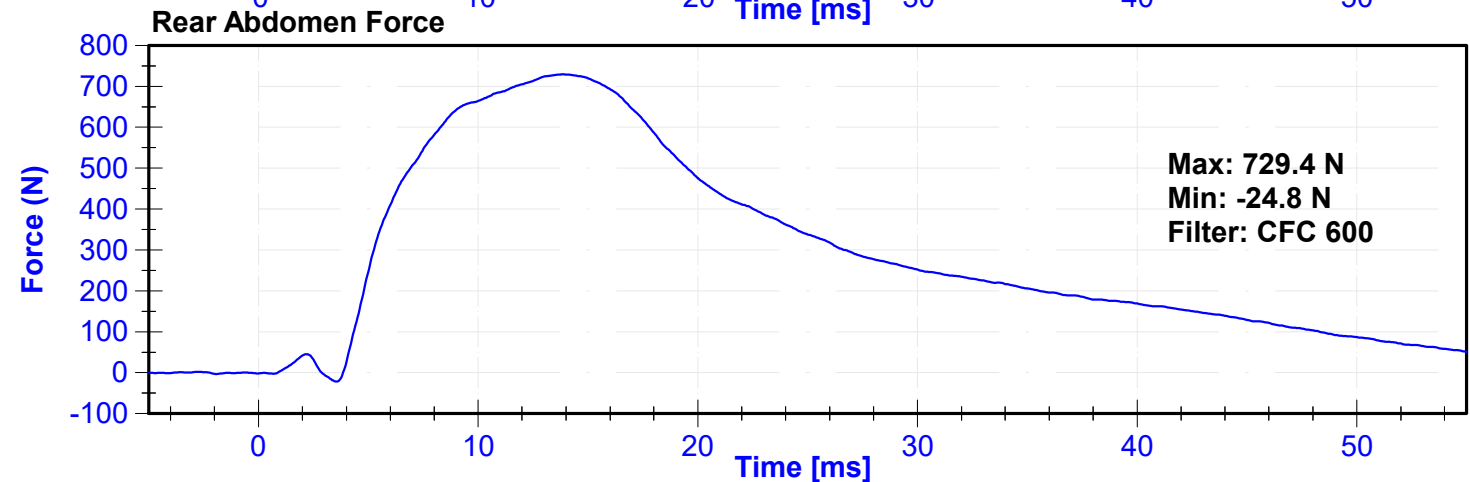
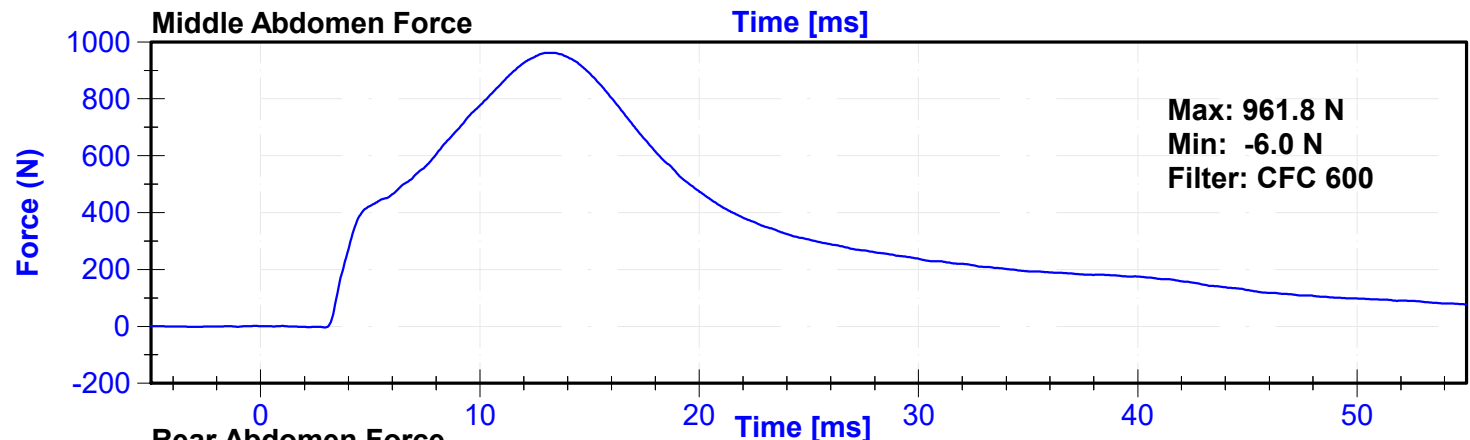
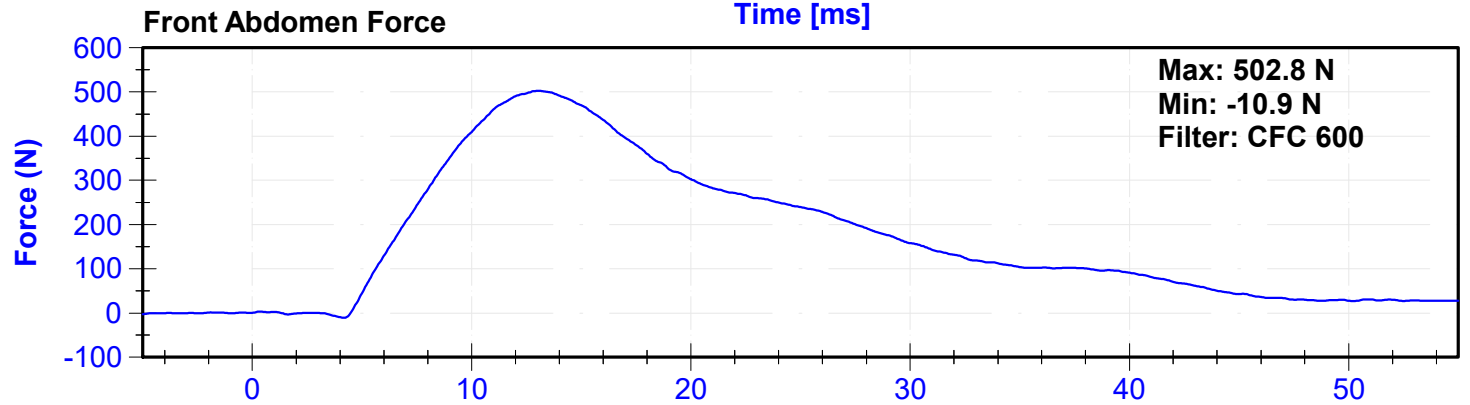
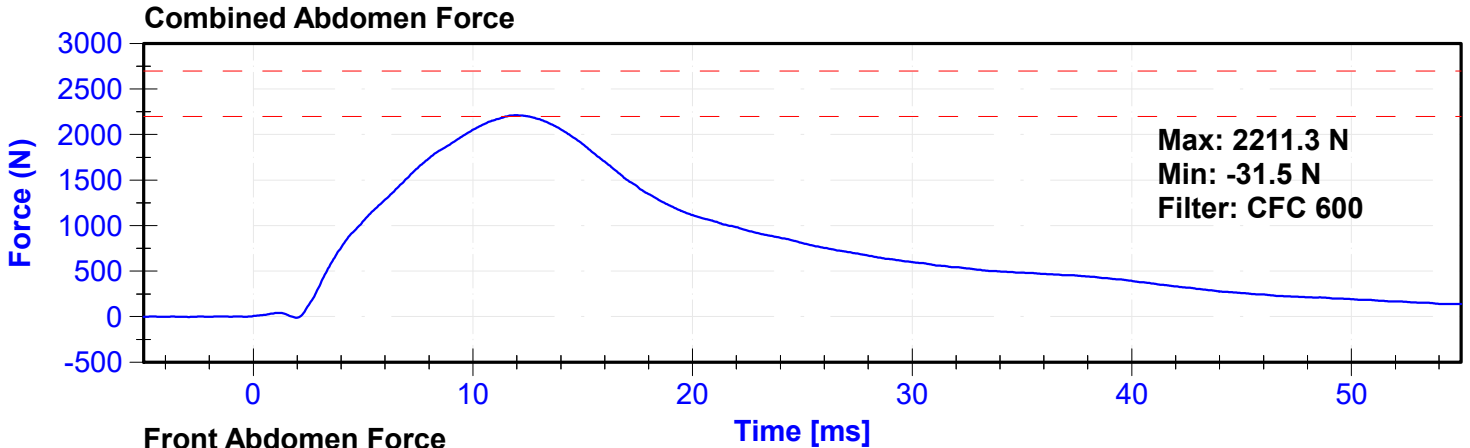
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	33	Pass
Velocity	3.9	4.1	m/s	4.01	Pass
Combined Abdomen Force	2200	2700	N	2211.3	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.94	Pass
Resistive Probe Force	4000	4800	N	4227.2	Pass
Time at Peak Resistive Force	10.6	13.0	ms	12.90	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Front Abdomen Load Cell	Denton	DM5846	5/22/2024	5/22/2025
Middle Abdomen Load Cell	Denton	1529	5/22/2024	5/22/2025
Rear Abdomen Load Cell	Denton	1533	5/22/2024	5/22/2025





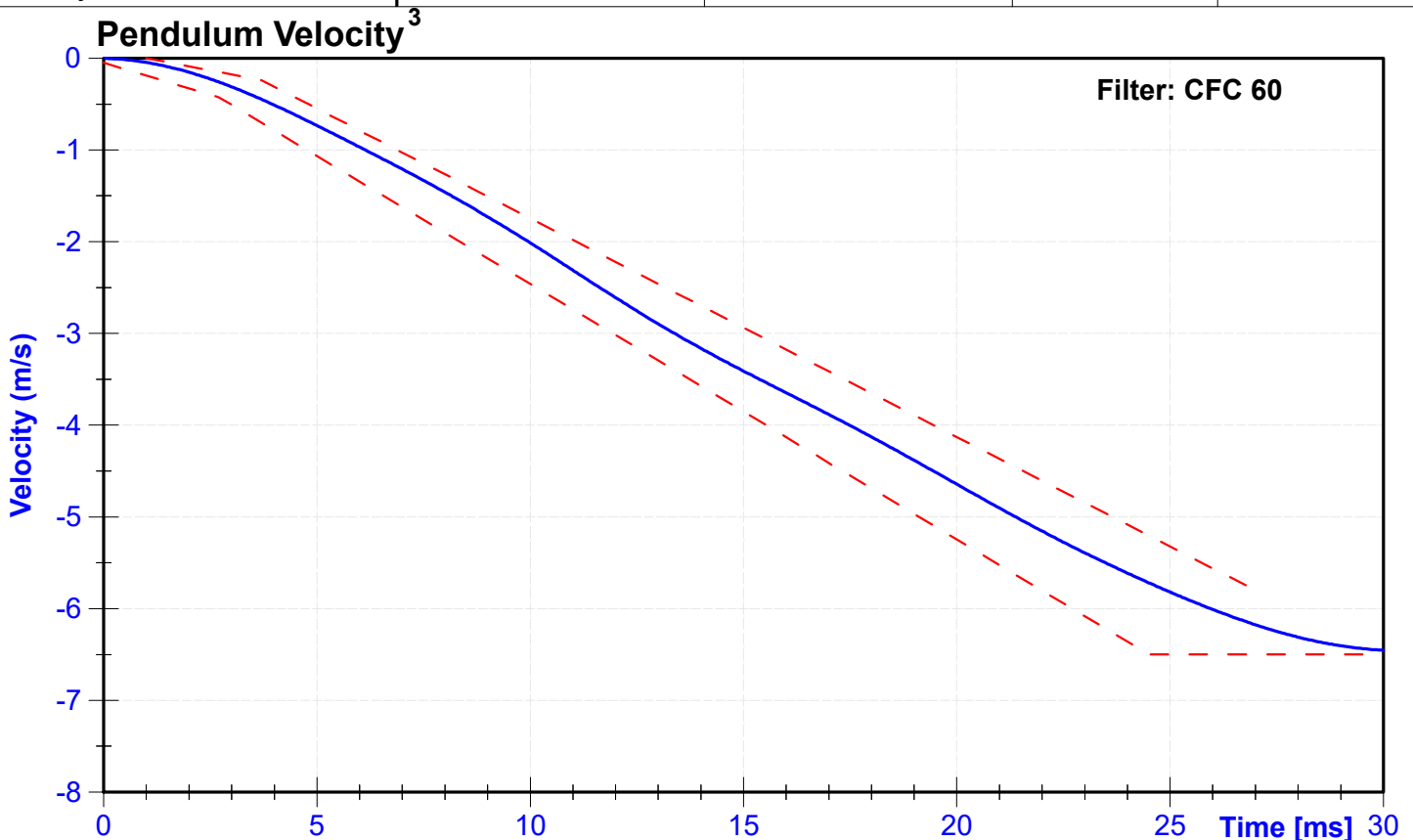
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ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

Results

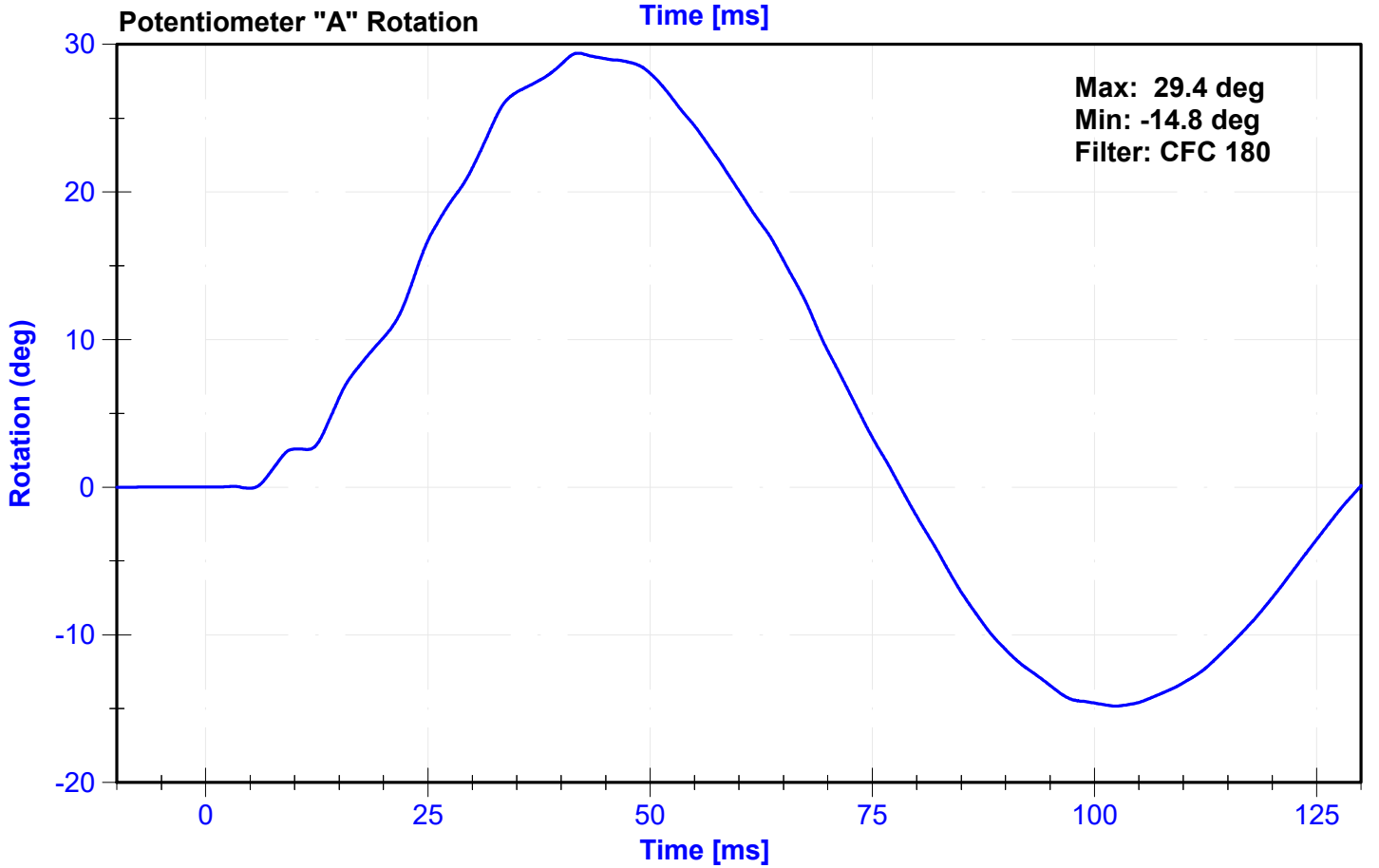
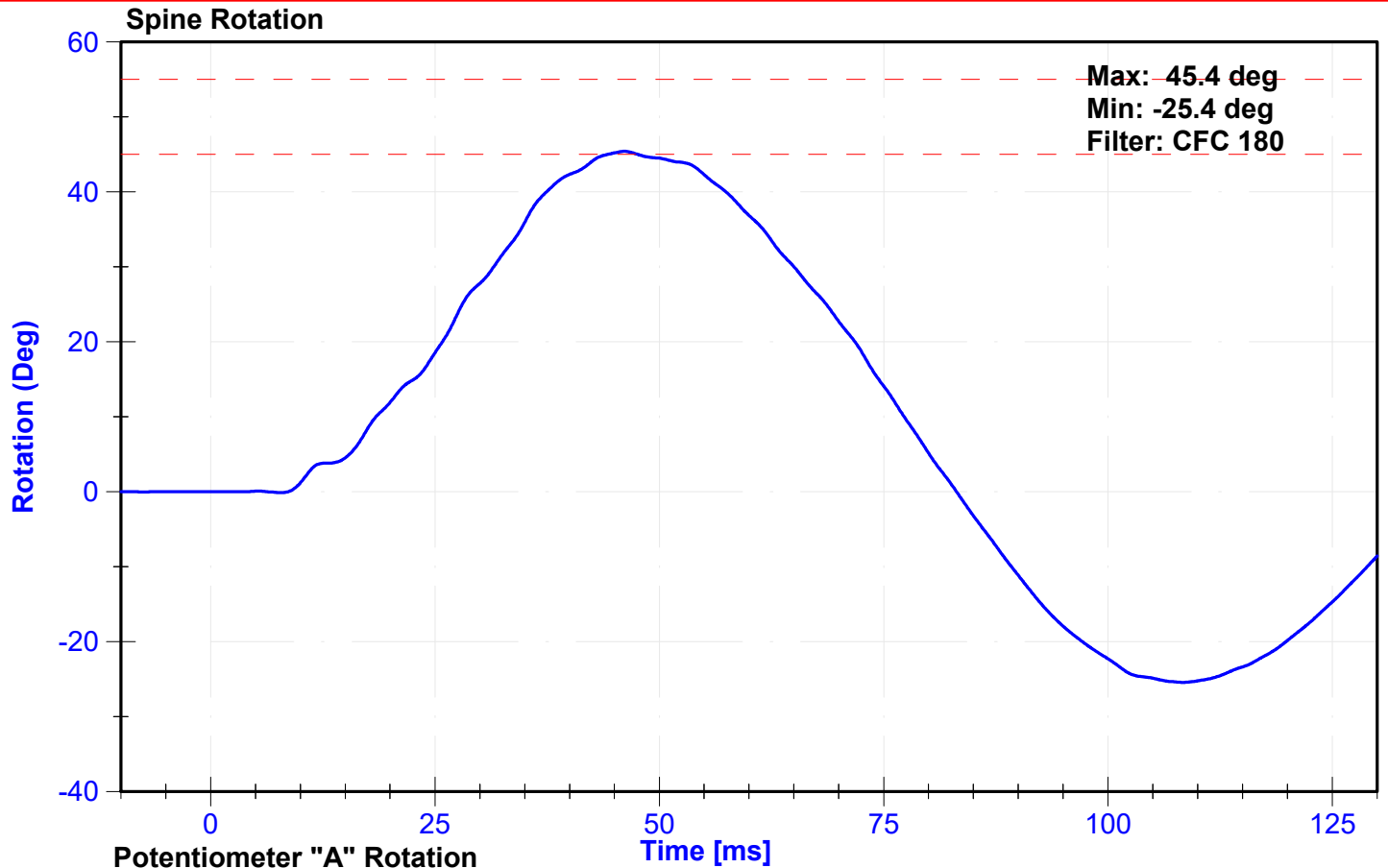
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	37	Pass
Velocity	5.95	6.15	m/s	6.117	Pass
Lateral Spine Rotation	45	55	deg	45.4	Pass
Time at Maximum Rotation	39	53	ms	46.1	Pass
Time of Decay to Zero Degrees	37	57	ms	37.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

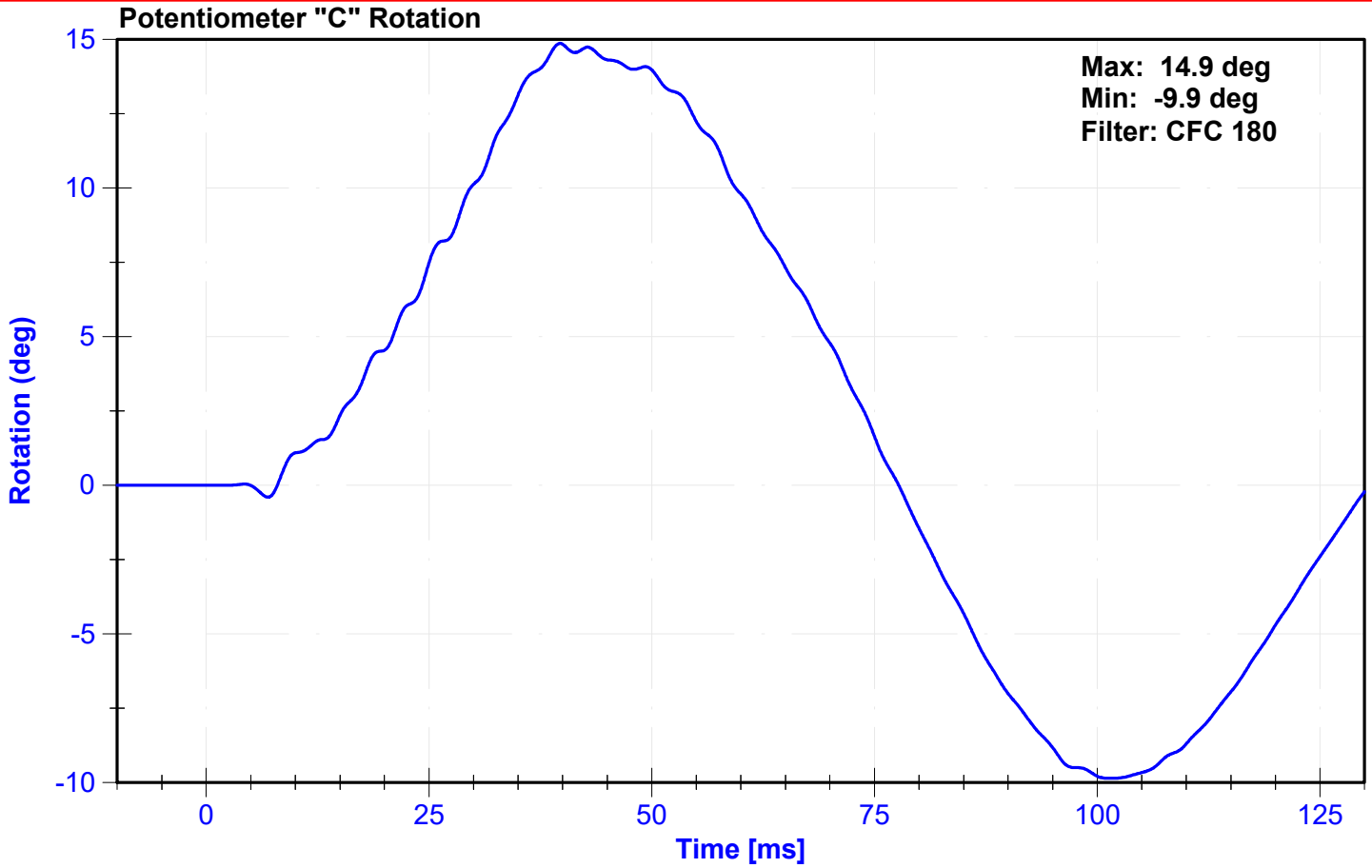
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025



^{1,2} Upper and lower boundaries specified in Appendix I





Appendix I

² Upper Boundary Corridor		¹ Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.5
		30.0	-6.5

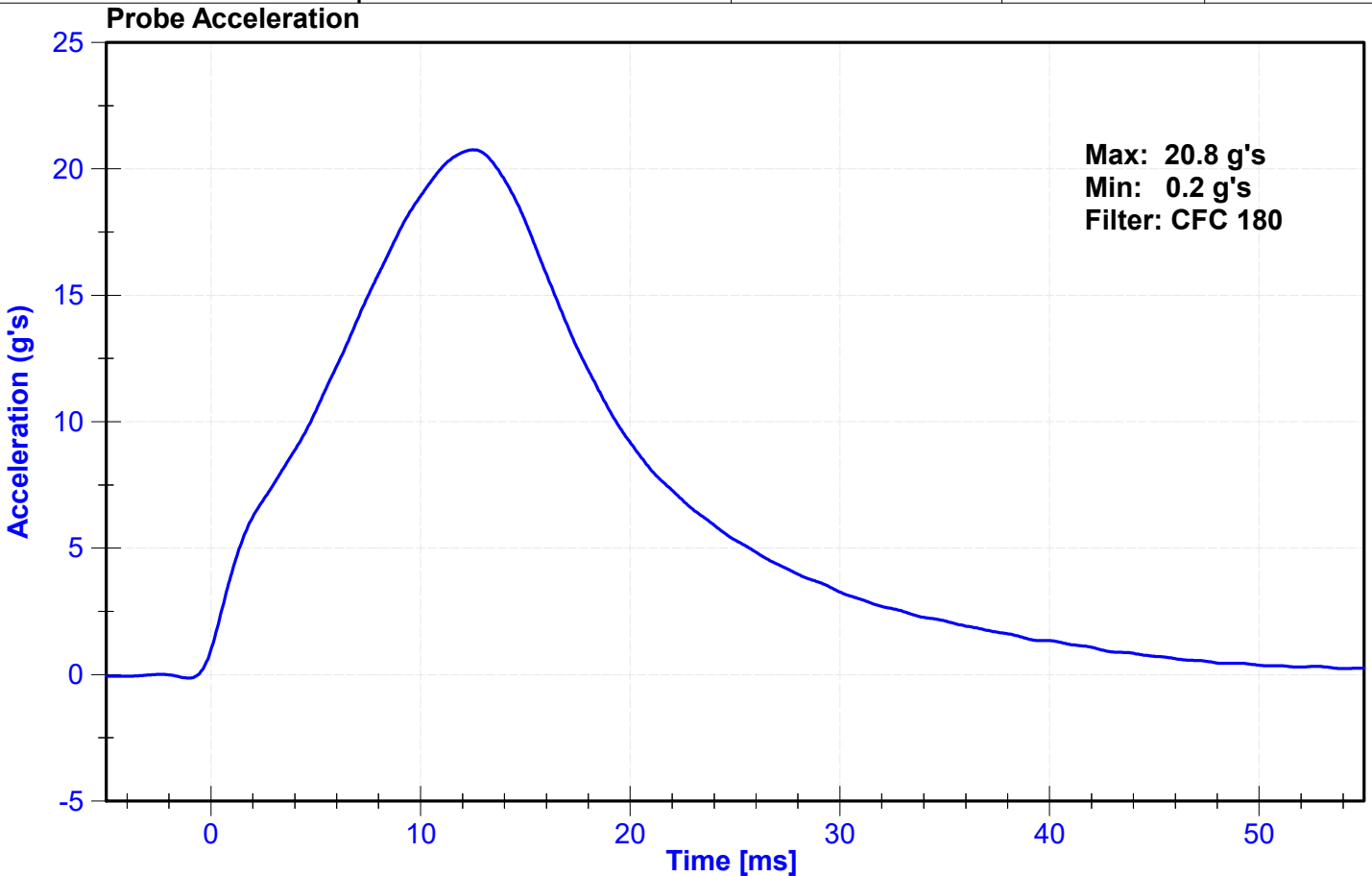
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	DG5348	Laboratory Supervisor	C. Mantell

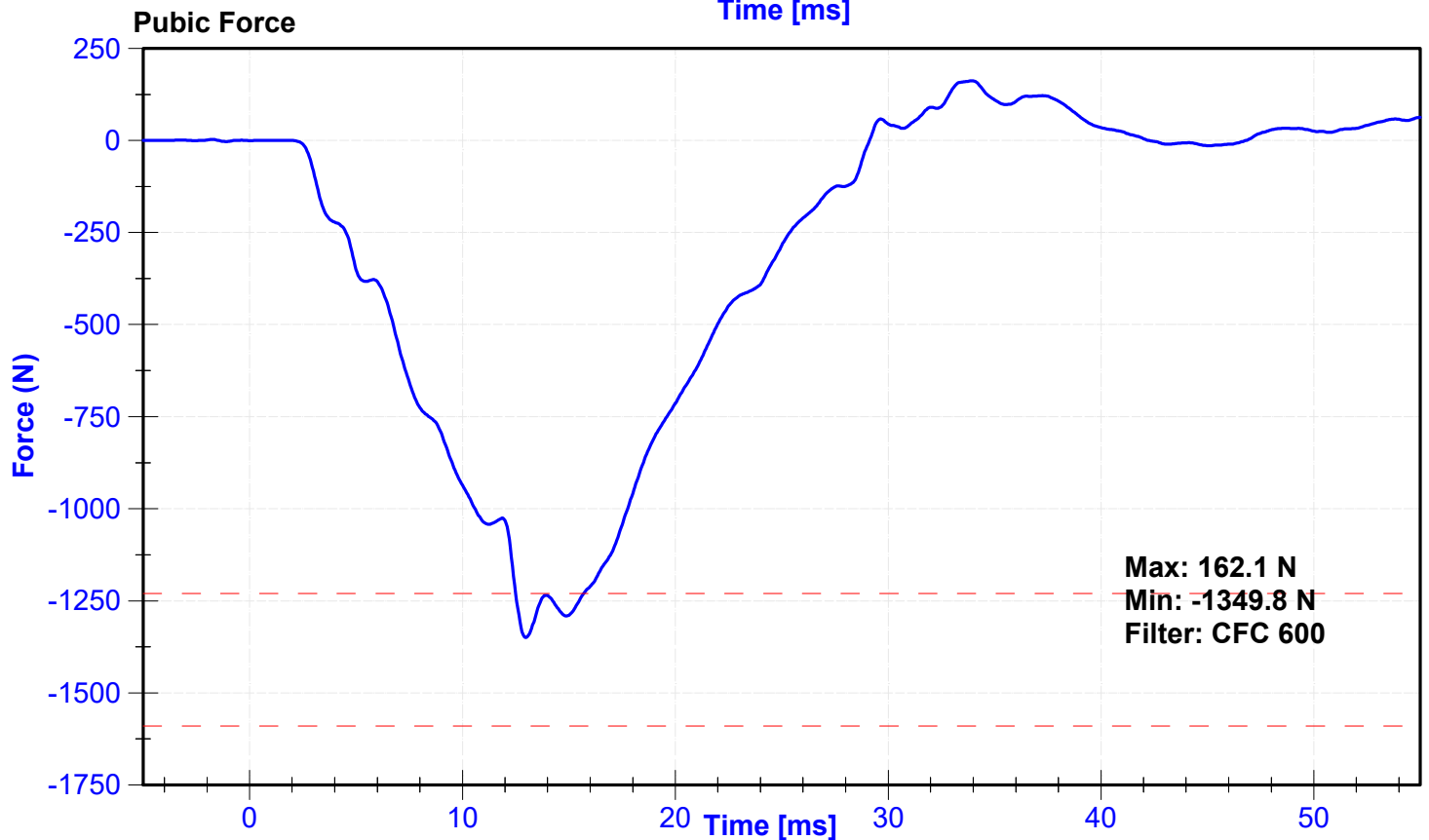
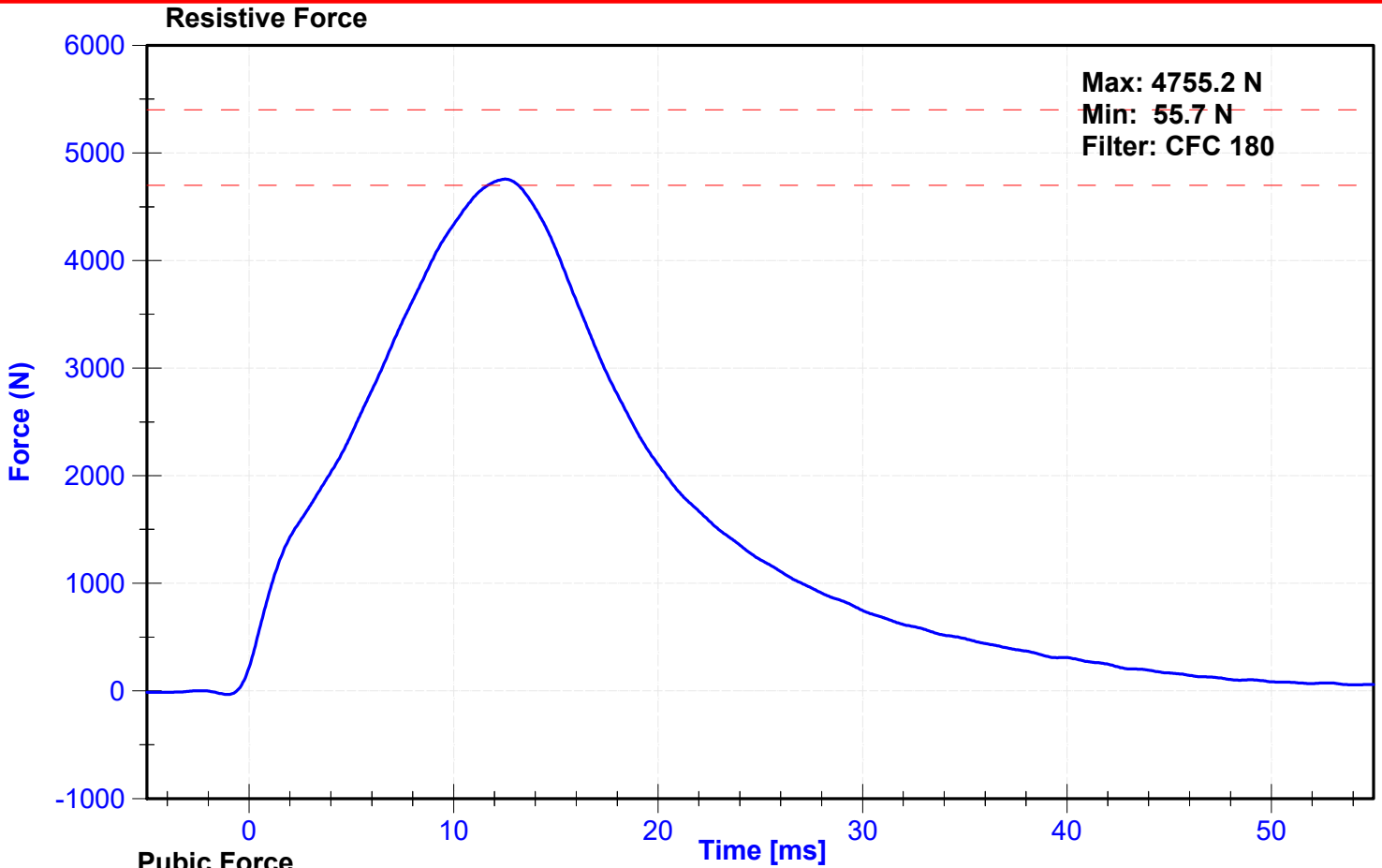
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	34	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Resistive Force	4700	5400	N	4755.2	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.50	Pass
Pubic Force	-1590	-1230	N	-1349.8	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.95	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Pubic Load Cell	Denton	459-FY	7/12/2024	7/12/2025





APPENDIX V

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N DG5348		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	18613	Endevco	07/30/2024
		Y	18472	Endevco	07/30/2024
		Z	18663	Endevco	07/30/2024
	Redundant	X	18666	Endevco	07/30/2024
		Y	18664	Endevco	07/30/2024
		Z	18675	Endevco	07/30/2024
Thorax Rib Displacement Potentiometers	Upper	Y	268GFE	Honeywell	07/30/2024
	Middle	Y	269GFE	Honeywell	07/30/2024
	Lower	Y	270GFE	Honeywell	07/30/2024
Abdomen Load Cells	Forward	Y	DM5846	Denton	05/22/2024
	Middle	Y	1529	Denton	05/22/2024
	Rear	Y	1533	Denton	05/22/2024
Lower Spine Accelerometers (T12)		X	T30049	Endevco	07/30/2024
		Y	18573	Endevco	07/30/2024
		Z	18657	Endevco	07/30/2024
Pubic Symphysis Load Cell		Y	459-FY	Denton	07/12/2024

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A405546	Measurement Specialties	09/26/2024
Vehicle Center of Gravity	Y	A413593	Measurement Specialties	09/26/2024
Vehicle Center of Gravity	Z	A413602	Measurement Specialties	09/26/2024
Left Floor Sill	Y	G23854	Endevco	10/11/2024
A-Pillar Sill	Y	A352421	Measurement Specialties	08/21/2024
A-Pillar Low	Y	G22116	Endevco	10/11/2024
A-Pillar Mid	Y	G25281	Endevco	10/14/2024
B-Pillar Sill	Y	A431347	Measurement Specialties	08/21/2024
B-Pillar Low	Y	G22912	Endevco	10/14/2024
B-Pillar Mid	Y	A400017	Measurement Specialties	10/15/2024
Driver Seat	Y	A400752	Measurement Specialties	08/21/2024
Engine Top	X	G23418	Endevco	10/03/2024
Engine Top	Y	G24032	Endevco	10/03/2024
Firewall	Y	A374307	Measurement Specialties	08/21/2024
Right Roof	Y	A370934	Measurement Specialties	06/20/2024
Right Floor Sill	Y	A315965	Measurement Specialties	08/21/2024
Rear Floorpan	X	G23832	Endevco	06/26/2024
Rear Floorpan	Y	G23847	Endevco	06/26/2024