

REPORT NUMBER: 214D-CAL-23-005

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

**Honda Development & Manufacturing of America LLC
2023 Acura Integra
5 Door Hatchback**

NHTSA No: C20235303

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



May 15, 2023

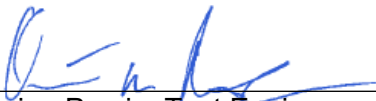
FINAL REPORT

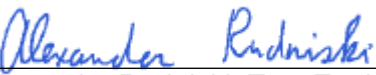
**PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE. S.E.
WEST Bldg. (NVS-220)
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-17-D-00078.

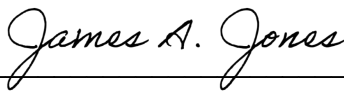
This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department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

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

Prepared by:  Date: May 15, 2023
Quinn Porzio, Test Engineer

Approved by:  Date: May 15, 2023
Alexander Rudniski, Test Engineer

FINAL REPORT ACCEPTANCE BY OVSC:


Accepted by

Date: 5-15-2023

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. 214D-CAL-23-005		2. Government Accession No.		3. Recipient's Catalog No.																								
4. Title and Subtitle Final Report of 214P Compliance Test Side Impact Protection Testing of a 2023 Acura Integra 5 Door Hatchback NHTSA No.: C20235303				5. Report Date May 15, 2023																								
				6. Performing Organization Code CAL																								
7. Author(s) Quinn Porzio, Test Engineer Alexander Rudniski, Test Engineer				8. Performing Organization Report No. CAL-DOT-2023-005																								
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. DTNH22-17-D-00078																								
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE Washington, D.C. 20590				13. Type of Report and Period Covered: Final Test Report May 1, 2023 - May 15, 2023																								
				14. Sponsoring Agency Code NEF-240																								
15. Supplementary Notes																												
16. Abstract A 31.00 km/h (19.3 mph), 285° oblique compliance test was conducted on the subject 2023 Acura Integra 5 Door Hatchback 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 May 1, 2023. The impact velocity of the vehicle was 31.02 km/h, and the ambient temperature at the struck (passenger's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was -241 mm located at level 5. The test vehicle's occupant performance data is as follows:																												
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Front Passenger 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>242.872</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>44</td> <td>30.762</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>1033.253</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>2965.600</td> </tr> </tbody> </table>						Measurement Description	Front Passenger ATD (ES-2re)			Units	IARV	Result	Head Injury Criteria (HIC36)		1000	242.872	Maximum Thoracic Rib Deflection	mm	44	30.762	Total Abdominal Force	N	2500	1033.253	Pubic Symphysis Force	N	6000	2965.600
Measurement Description	Front Passenger ATD (ES-2re)																											
	Units	IARV	Result																									
Head Injury Criteria (HIC36)		1000	242.872																									
Maximum Thoracic Rib Deflection	mm	44	30.762																									
Total Abdominal Force	N	2500	1033.253																									
Pubic Symphysis Force	N	6000	2965.600																									
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																								
19. Security Class. (of this report) UNCLASSIFIED		20. Security Class. (of this page) UNCLASSIFIED		21. No. of Pages 109	22. Price																							

Form DOT F1700.7 (8-72)

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 Data 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 and Dummy 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 2023 FMVSS 214 Side Impact Protection Compliance Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-17-D-00078. The purpose of this test was to evaluate side impact protection in a 2023 Acura Integra 5 Door Hatchback. 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 2023 Acura Integra 5 Door Hatchback. The subject vehicle was towed into the rigid pole at an angle of 285° and a velocity of 31.02 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 1, 2023. 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 (ES2re) dummy was placed in the front passenger 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	Front Passenger ATD (ES2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	242.872
Upper Rib Deflection	mm	44	30.762
Mid Rib Deflection	mm	44	29.345
Lower Rib Deflection	mm	44	28.389
Abdominal Load (front)	N		182.463
Abdominal Load (mid)	N		375.408
Abdominal Load (rear)	N		534.593
Total Abdominal Force	N	2500	1033.253
Pubic Symphysis Force	N	6000	2965.600

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
TEST VEHICLE INFORMATION AND OPTIONS**

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

TEST VEHICLE INFORMATION AND OPTIONS

Make	Acura	Anti-Lock Brakes (ABS)	Yes
Model	Integra	All-Wheel Drive (AWD)	No
Body Style	5-Door Hatchback	Traction Control System (TCS)	Yes
VIN	19UDE4H35PA007685	Electric Stability Control (ECS)	Yes
Body Color	White	Curtain Airbags	Yes
Engine Displacement (L)	1.5	Torso Airbags – Front Seats	Yes
Type / No. Cylinders	I4	Torso Airbags – Rear Seats	Yes
Engine Placement	Transverse	Combination/Head Torso Bag	No
Transmission Type	Automatic	Pelvic Airbag – Front Seats	No
Transmission Speeds	CVT	Pelvis Airbag – Rear Seats	No
Overdrive	Yes	Knee Airbag – Driver	Yes
Final Drive	Front Wheel Drive	Knee Airbag – Front Passenger	Yes
Odometer Reading (mi)	671	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 Safety Restraint	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Honda Development & Manufacturing of America LLC	GVWR (kg)	1850
Date of Manufacture	09/22	GVWR Front (kg)	1000
Vehicle Type	Passenger Car	GVWR Rear (kg)	865

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats (Bench or Bucket)	Bucket	Split Bench	N/A	
Designated Seating Capacity (DSC)	2	3	N/A	5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				44.8

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	232	235	220	222
Tire Placard	kPa	240	240	230	230

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			Fully Loaded			As Tested		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	442	273		455	304		467	302	
Right	kg	419	270		453	320		442	312	
Ratio	%	61.3	38.7		59.3	40.7		59.7	40.3	
Totals	kg	861	543	1404	908	624	1532	909	614	1523

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1404	(A)
Weight of Test Dummy	kg	81	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1529.8	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	Fully Loaded	As Tested
Driver Door Sill Angle	Deg	-0.50	-0.40	-0.50
Front Passenger Sill Angle	Deg	-0.45	-0.35	-0.35
Front Bumper-Line Angle	Deg	-0.55	-0.40	-0.55
Rear Bumper-Line Angle	Deg	-0.45	-0.45	-0.45

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

CALCULATION OF VERTICAL IMPACT REFFERENCE LINE

Measured Parameter	Units	Value
Test Vehicle Wheelbase	mm	2735
Vertical Impact Reference Line Aft of Front Axle	mm	1342

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting & Tire Repair Kit	10
Rear Window, Rear Bumper Facia & LR Tail Light	13
Ballast (if any)	0

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
Test Facility: Calspan

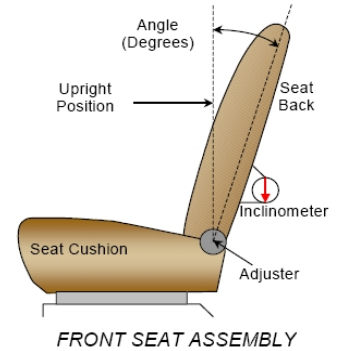
NHTSA No.: C20235303
Test Date: 05/01/2023

SEAT BACK ANGLE ADJUSTMENT

The driver and passenger seat backs are positioned to the manufacturer's designated angle provided in the Form1.

	Units	Seat Back Angle
Driver Seat	Deg.	4.0
Front Passenger Seat	Deg.	2.6

*Measurement taken on seatback



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	17.1	Max	54	67	80
		Mid	27.5	40.5	53.5
		Min	1	14	27
Front Passenger Seat	Fixed	Max	Fixed	Fixed	Fixed
		Mid	Fixed	Fixed	Fixed
		Min	Fixed	Fixed	Fixed

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Placed in Position #	
	mm	Detents	mm	Detents
Driver Seat	240	Power	120	Power
Front Passenger Seat	210	22 (0-21)	205	11

SEAT BELT ANCHORAGE ADJUSTMENT

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

HEAD RESTRAINT ADJUSTMENT

Seat	Total # of Positions	Placed in Position #
Front Passenger Seat	5 (0-4)	Uppermost

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

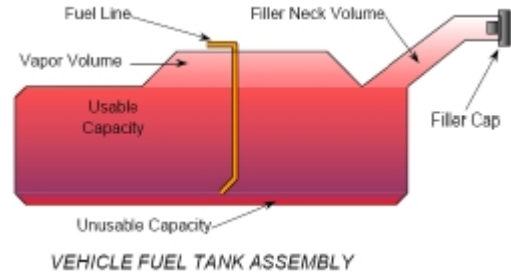
FUEL TANK CAPACITY

Description	Liters
Usable Capacity of (Form No.1)	46.86
Usable Capacity of (Owner's Manual)	46.90
92 - 94% of Usable Capacity	43.15 - 44.09
Actual Amount of Solvent Used in Test	43.60

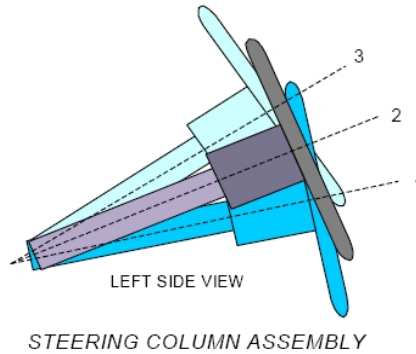
FUEL PUMP

Describe the operation of the fuel pump.

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



STEERING COLUMN POSITIONS

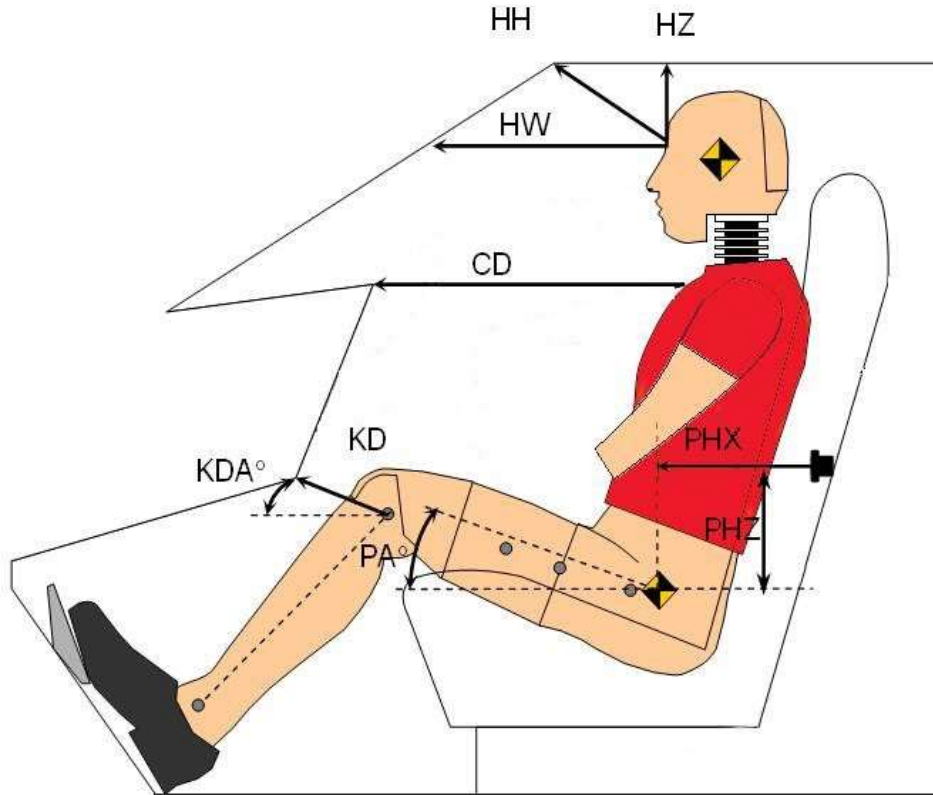


	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	16.4	
Geometric center - Position No. 2	19.5	
Uppermost - Position No. 3	22.6	
Telescoping Steering Wheel Travel		55
Test Position	19.5	22.5

**DATA SHEET NO. 6
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023



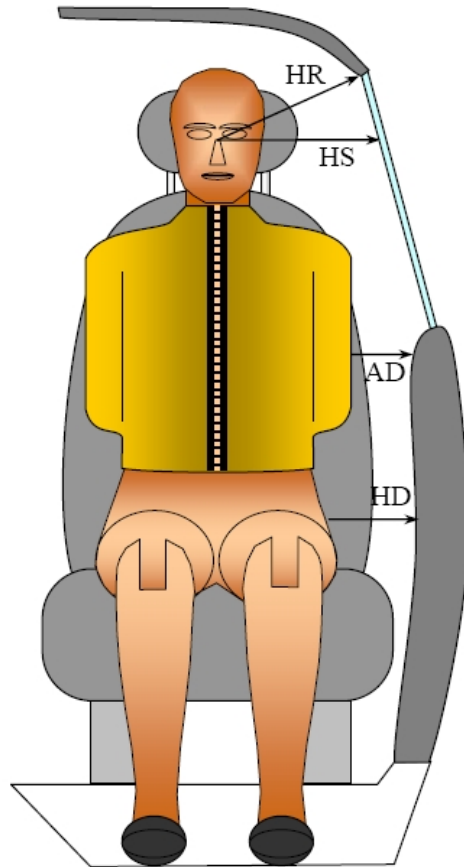
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Front Passenger	
		Length (mm)	Angle (°)
HH	Head to Header	440	
HW	Head to Windshield	639	
HZ	Head to Roof Liner	144	
CD	Chest to Dash	549	
KD(L) / KDA(L)°	Left Knee to Dash	198	47.1
KD(R) / KDA(R)°	Right Knee to Dash	208	45.2
PAX°	Pelvic Tilt Angle (X-Axis)		24.1
PAY°	Pelvic Tilt Angle (Y-Axis)		0.8
PHX	Hip Point to Striker (X-Axis)	194	
PHZ	Hip Point to Striker (Z-Axis)	238	

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023



FRONT VIEW OF DUMMY

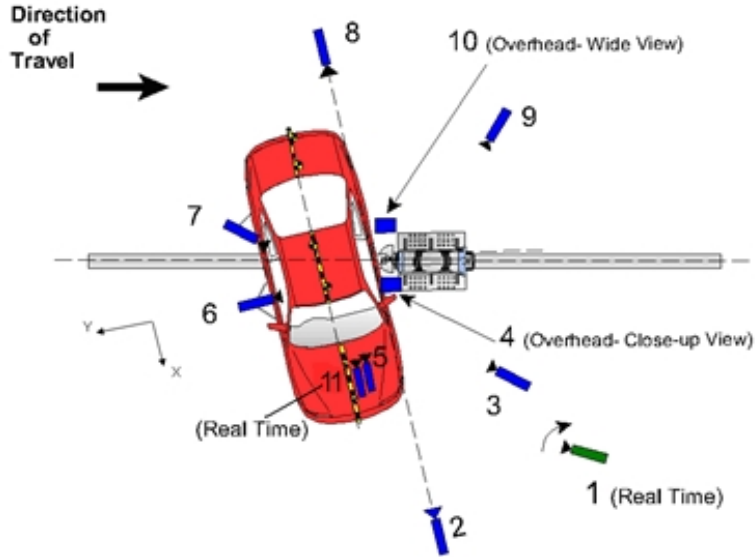
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Front Passenger
HR	Head to Side Header	mm	201
HS	Head to Side Window	mm	330
AD	Arm to Door	mm	106
HD	H-Point to Door	mm	151

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023



CAMERA LOCATIONS AND DATA

CAMERA LOCATIONS AND DATA

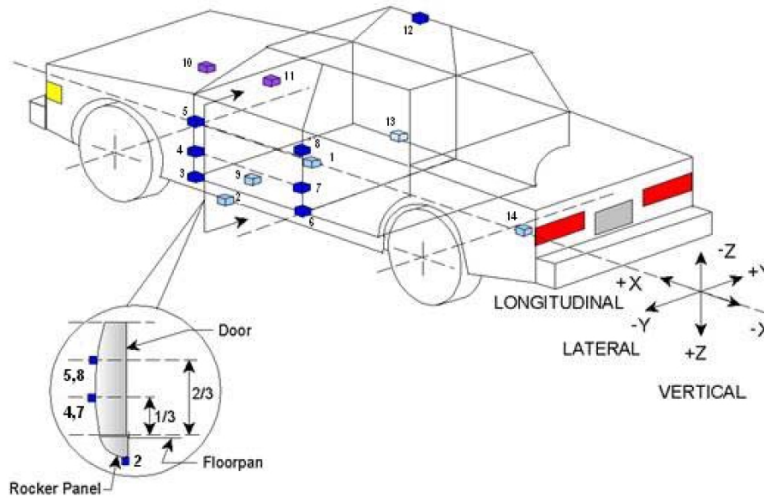
No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	30
2	Front ground level - impact view	485	-6959	-1532	24	1000
3	Impact side 45° - forward pole view	2198	-5710	-1512	28	1000
4	Overhead Close-up view of impact	0	0	-9200	24	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-737	7331	-1428	24	1000
9	Impact side 45° - rearward pole view	3833	6130	-1523	28	1000
10	Overhead wide - view of impact	0	0	-9200	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: 2023 Acura Integra 5 Door Hatchback
Test Facility: Calspan

NHTSA No.: C20235303
Test Date: 05/01/2023



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2099	-6	97
2	Left Floor Sill	2767	682	99
3	A-Pillar Sill	3316	641	97
4	A-Pillar Low	3338	642	-54
5	A-Pillar Mid	3131	661	-497
6	B-Pillar Sill	2198	671	81
7	B-Pillar Low	2216	682	-96
8	B-Pillar Mid	2145	675	-426
9	Seat	2395	-568	161
10	Engine	4005	246	-368
11	Firewall	3495	162	-199
12	Roof	2317	-601	-928
13	Right Floor Sill	2811	-688	93
14	Rear Deck	523	10	162

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: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

Loc. No	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	X	g	3.64	83.95	-6.59	35.55
	Vehicle CG	Y	g	0.90	152.20	-24.94	15.00
	Vehicle CG	Z	g	11.88	17.00	-8.97	13.20
	Vehicle CG Resultant	N/A	g	25.21	14.80	0.01	-39.10
2	Floor Sill (Left)	Y	g	1.54	137.75	-23.39	15.35
3	A Pillar Sill	Y	g	1.25	136.45	-17.57	15.55
4	A Pillar Low	Y	g	23.31	67.00	-33.27	20.65
5	A Pillar Mid	Y	g	24.49	30.50	-43.91	66.80
6	B Pillar Sill	Y	g	25.41	22.55	-113.40	14.25
7	B Pillar Low	Y	g	69.49	12.75	-111.76	15.85
8	B Pillar Mid	Y	g	83.55	14.95	-73.04	10.15
9	Seat	Y	g	2.04	138.40	-27.53	15.90
10	Engine Top	X	g	9.07	87.20	-19.34	52.35
	Engine Top	Y	g	4.32	181.45	-18.73	43.35
11	Firewall	Y	g	6.79	38.05	-11.82	74.25
12	Roof	Y	g	2.39	261.25	-25.37	47.25
13	Floor Sill (Right)	Y	g	10.29	41.85	-88.95	13.95
14	Rear Deck	X	g	5.29	87.65	-5.22	50.75
	Rear Deck	Y	g	3.25	221.80	-23.12	61.75

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback NHTSA No.: C20235303
 Test Facility: Calspan Test Date: 05/01/2023

Dummy Serial No. D037

Description	Axes	Positive Direction		Negative Direction	
		MAX	TIME (ms)	MAX	TIME (ms)
HEAD ACCELERATION (g)					
Longitudinal	X	12.73	122.30	-18.46	49.65
Lateral	Y	6.74	103.80	-48.14	54.30
Vertical	Z	10.65	28.25	-16.35	58.45
Resultant	N/A	51.08	54.20		
HIC36 (t1, t2)	N/A	242.87		t1 = 40.70	t2 = 66.75
THORAX DEFLECTION (mm)					
Upper Rib	Y	30.76	59.35	-5.05	85.15
Middle Rib	Y	29.34	55.00	-5.86	84.75
Lower Rib	Y	28.39	54.20	-2.69	85.25
ABDOMINAL FORCES (N)					
Front	Y	182.46	44.50	-21.02	17.30
Middle	Y	375.41	53.80	-18.83	14.05
Rear	Y	534.59	53.60	-11.85	95.10
SUM	N/A	1033.25	54.10		
PELVIS FORCES (N)					
Pubic Symphysis	Y	1179.68	63.10	-2965.60	59.80

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

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

IMPACT POINT DATA

Measured Parameter	Units	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm	1342
Actual Impact Point - Aft of Front Axle	mm	1340
Difference	mm	-2

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Passenger Seat Dummy (ES2re)
Face Contact	Curtain Airbag
Top of Head Contact	Side Header and Curtain Airbag
Left Side of Head Contact	Side Header and Curtain Airbag
Back of Head Contact	Head Restraint, Side Header and Curtain Airbag
Left Shoulder Contact	Curtain Airbag and Door
Upper Torso Contact	Seatback
Lower Torso Contact	Seatback
Left Knee Contact	Passenger Door
Left Hip Contact	Torso/Pelvis Airbag

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar, B-Pillar and C-Pillar buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Cracked throughout, but stayed laminated and fell out
Other Notable Effects	None

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

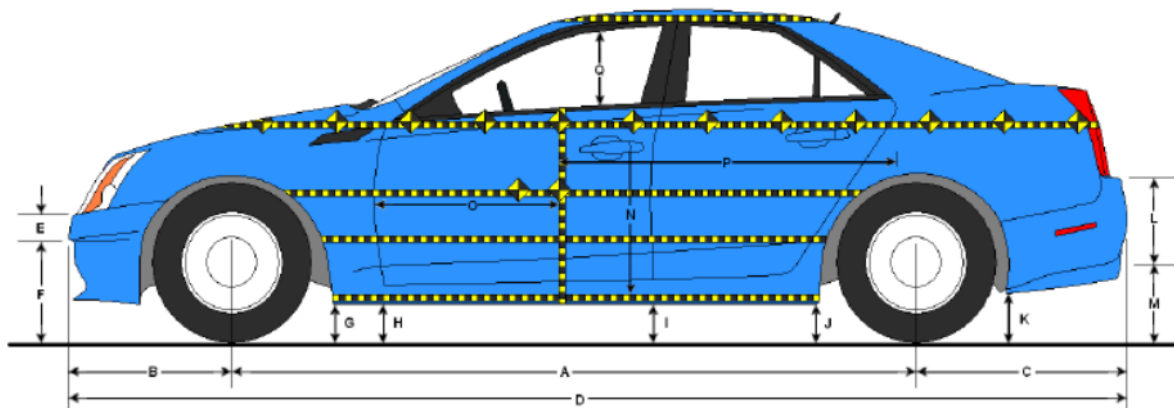
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Front Occupant	
	Mounted	Deployed
Front Airbag	Yes	Yes
Knee Airbag	Yes	Yes
Side Airbag 1 - Curtain Airbag	Yes	Yes
Side Airbag 2 - Torso Airbag	No	N/A
Side Airbag 3 - Torso/Pelvis Airbag	Yes	Yes
Seat Belt Pretensioner	Yes	Yes
Seat Belt Load Limiter	Yes	Yes
Other - Seat Cushion Airbag	N/A	N/A

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
Test Facility: Calspan

NHTSA No.: C20235303
Test Date: 05/01/2023



LEFT SIDE VIEW

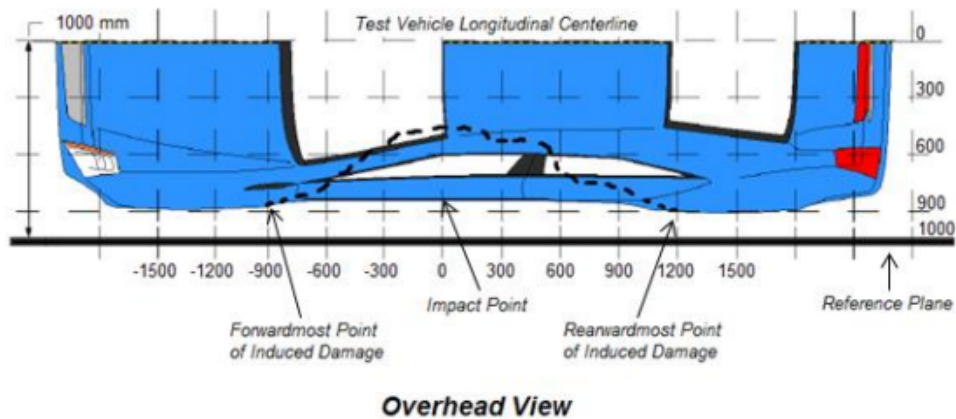
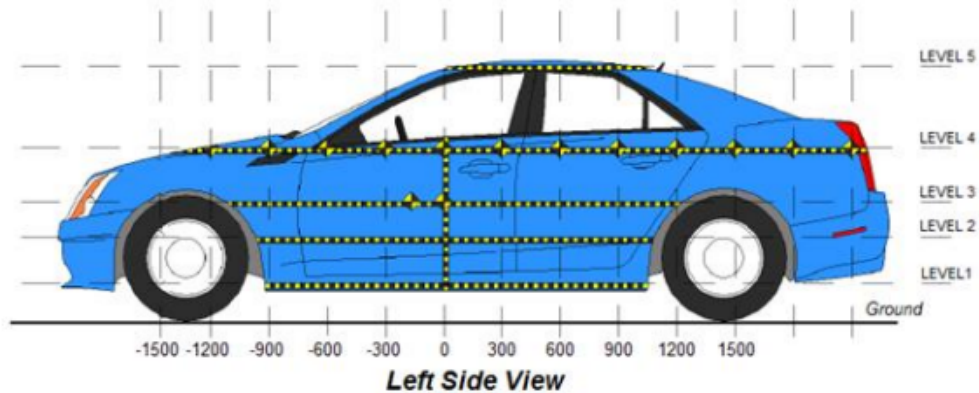
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

No.	Measurement Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2735	2748	-13
B	Front Axle to FSOV	969	941	28
C	Rear Axle to RSOV	1005	1006	-1
D	Total Vehicle Length at Centerline	4709	4696	14
E	Front Bumper Thickness	132	132	0
F	Front Bumper Bottom to Ground	381	388	-7
G	Sill Height at Front Wheel Well	161	174	-13
H	Sill Height at Front Door Leading Edge	160	176	-16
I	Sill Height at B Pillar	172	167	5
J1	Sill Height at Rear Wheel Well	175	192	-17
J2	Pinch Weld Height at Rear Wheel Well	172	185	-13
K	Sill Height Aft of Rear Wheel Well	240	238	2
L	Rear Bumper Thickness	160	160	0
M	Rear Bumper Bottom to Ground	360	350	10
N	Sill Height to Window Bottom Sill	773	777	-5
O	Front Door Leading Edge to Impact CL	806	774	32
P	Rear Door Trailing Edge to Impact CL	1272	1217	55
Q	Front Window Opening	382	384	-3
R	Right Side Length	4571	4549	21
S	Left Side Length	4571	4564	7
T	Vehicle Width at B-Pillars	1807	1694	112

DATA SHEET NO. 14
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	233	-201	0
2	Occupant H-Point	mm	484	-234	0
3	Mid-Door	mm	609	-241	0
4	Window Sill	mm	909	-190	0
5	Window Top	mm	1337	-27	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: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023

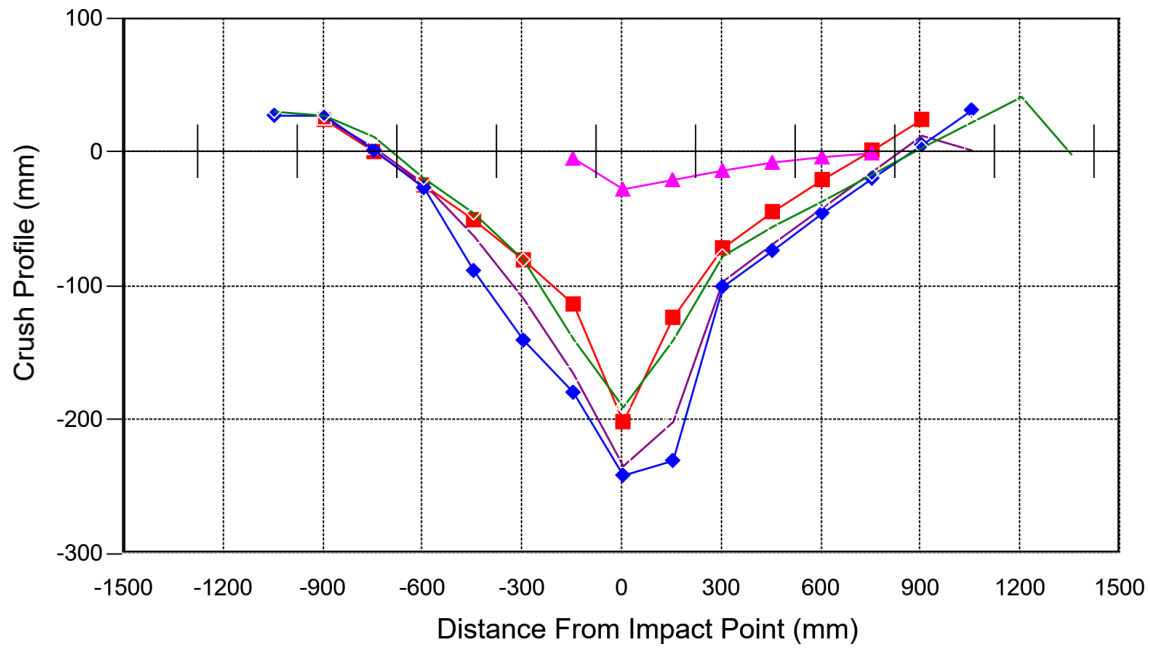
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050			-906	-776				-934	-807				28	31	
-900	-868	-896	-897	-792		-893	-922	-925	-820		25	26	28	28	
-750	-870	-890	-895	-805		-871	-894	-897	-817		1	4	2	12	
-600	-870	-891	-897	-806		-846	-868	-871	-787		-24	-23	-26	-19	
-450	-868	-893	-899	-822		-818	-831	-811	-777		-50	-62	-88	-45	
-300	-868	-895	-901	-830		-788	-786	-761	-750		-80	-109	-140	-80	
-150	-866	-897	-903	-838	-595	-753	-732	-724	-699	-591	-113	-165	-179	-139	-4
0	-866	-899	-903	-843	-609	-665	-665	-662	-653	-582	-201	-234	-241	-190	-27
150	-865	-900	-903	-847	-614	-742	-699	-673	-707	-594	-123	-201	-230	-140	-20
300	-865	-899	-901	-848	-617	-794	-803	-801	-771	-604	-71	-96	-100	-77	-13
450	-866	-898	-898	-849	-617	-822	-830	-825	-794	-610	-44	-68	-73	-55	-7
600	-868	-899	-897	-849	-611	-848	-858	-852	-813	-608	-20	-41	-45	-36	-3
750	-871	-900	-900	-852	-588	-873	-886	-881	-836	-588	2	-14	-19	-16	0
900	-875	-903	-905	-847		-900	-916	-911	-851		25	13	6	4	
1050		-903	-911	-843			-905	-943	-866			2	32	23	
1200				-847					-889					42	
1350				-846					-845					-1	
1500															

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
 Test Facility: Calspan

NHTSA No.: C20235303
 Test Date: 05/01/2023



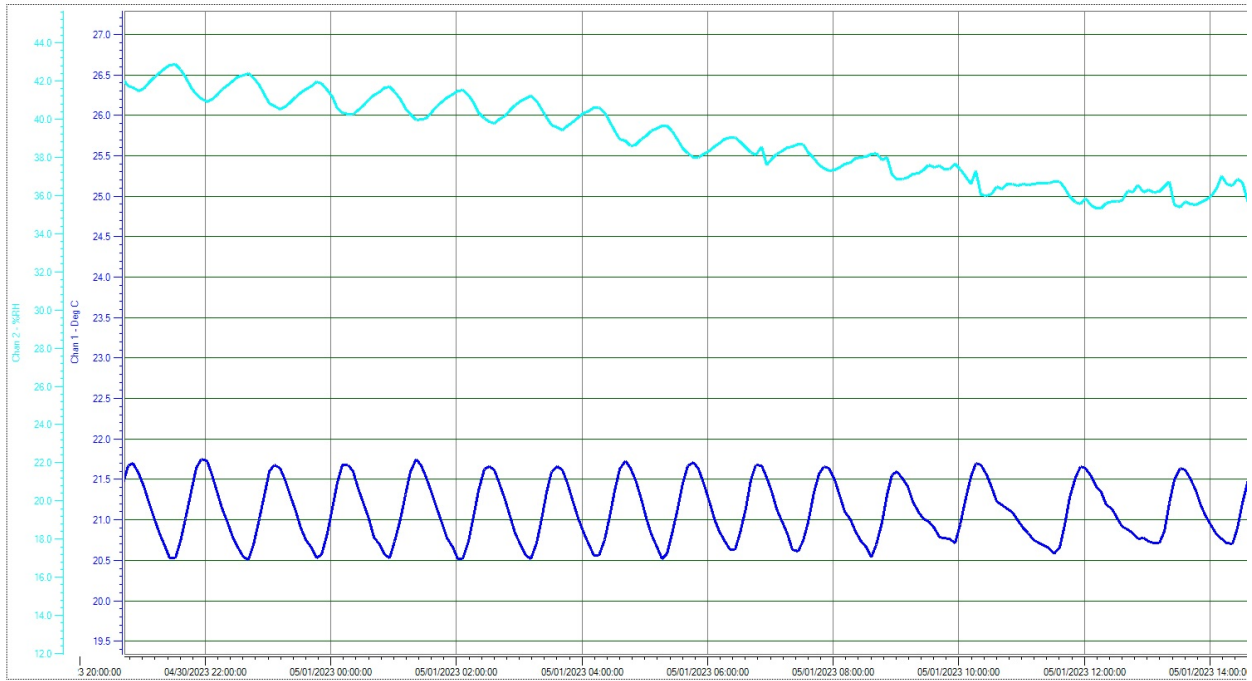
— LEVEL 1 Side Sill: -203 mm above ground	— LEVEL 2 H-Point: 48 mm above ground
— LEVEL 3 Mid Door: 173 mm above ground	— LEVEL 4 Window Sill: 473 mm above ground
— LEVEL 5 Window Top: 901 mm above ground	

Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2023 Acura Integra 5 Door Hatchback
Test Facility: Calspan

NHTSA No.: C20235303
Test Date: 05/01/2023



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

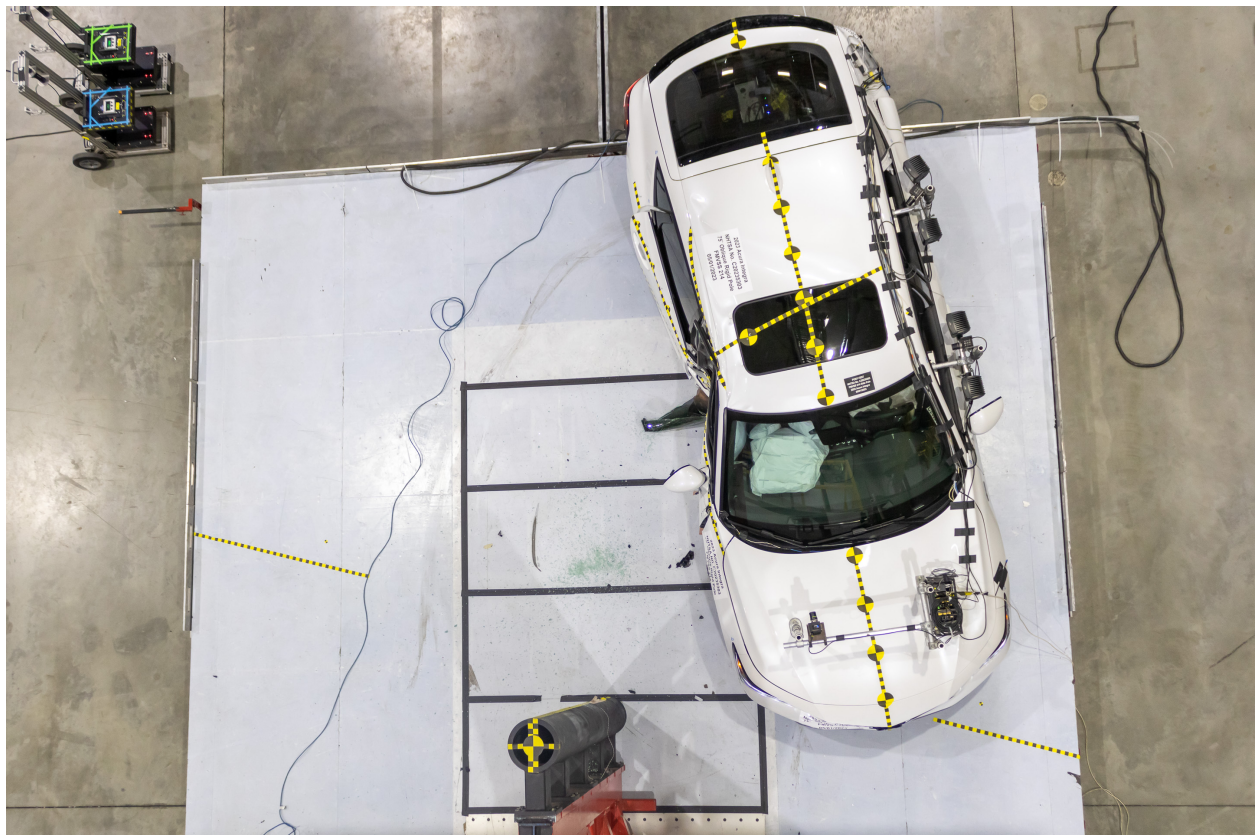


Figure A-10: Post-Test Overhead View of Test Vehicle



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

MFD. BY HONDA DEVELOPMENT & MANUFACTURING OF AMERICA, LLC 09/22
 GVWR 1850KG (4078LBS)
 GAWR F 1000KG (2204LBS)
 GAWR R 865KG (1906LBS)
 THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
 V.I.N.: 19UDE4H35PA007685 TYPE: PASSENGER CAR



3S5 P AE6 NH883PV .F .A

C20235303

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



TIRE AND LOADING INFORMATION

SEATING CAPACITY: TOTAL 5 | FRONT 2 | REAR 3

The combined weight of occupants and cargo should never exceed 385kg or 850lbs.

TIRE	SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	235/40R18 91W	240KPA, 35PSI	
REAR		230KPA, 33PSI	
SPARE	NONE		

3S5-A1

C20235303

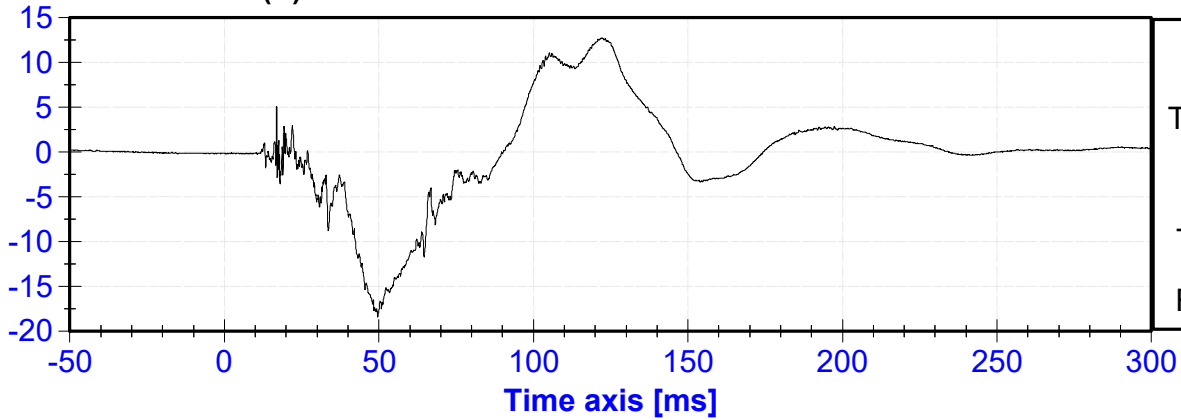
Figure A-26: Close-Up View of Vehicle's Tire Placard Label

APPENDIX II
ES-2re DUMMY RESPONSE DATA TRACES

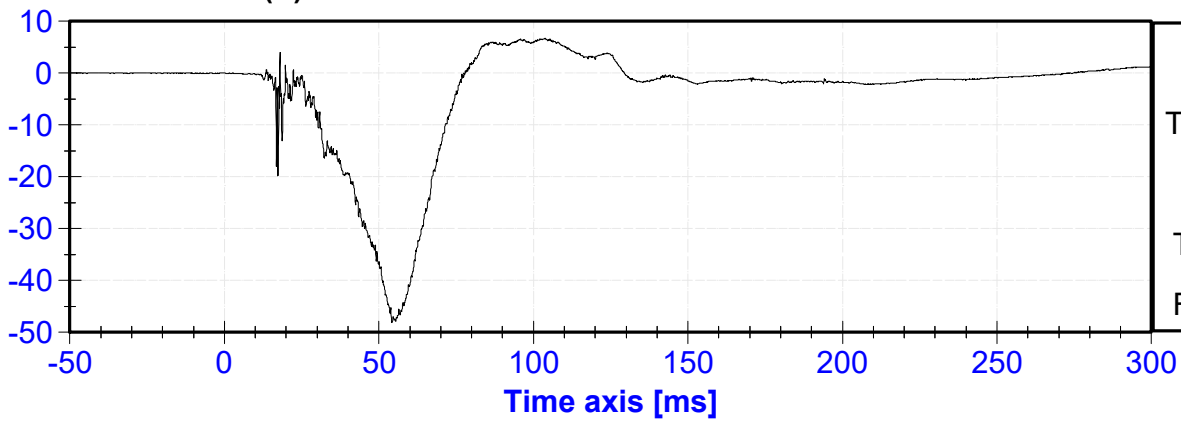
Table of Data Plots

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 Lower Thorax Rib Deflection Rate vs. Time	II-5
12	ES-2re Middle Thorax Rib Deflection (Y) 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

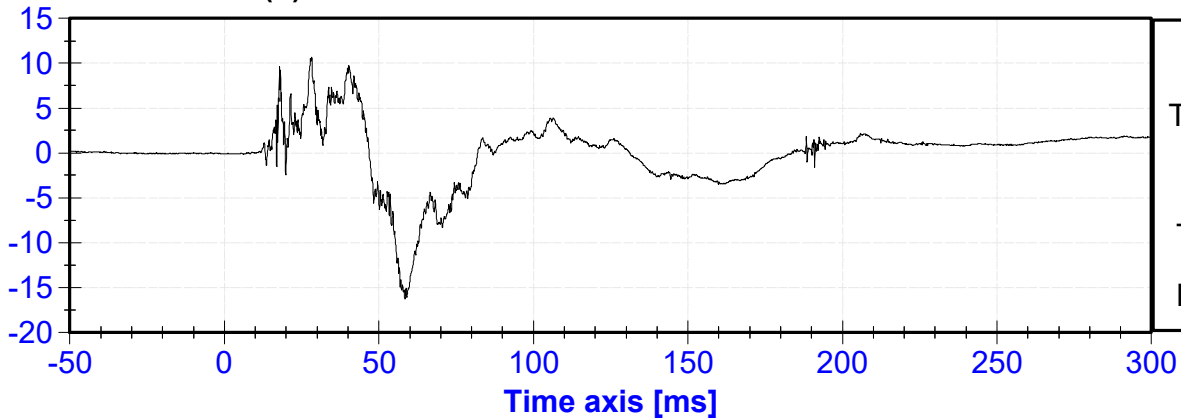
ES-2re Head (X) Acceleration vs. Time



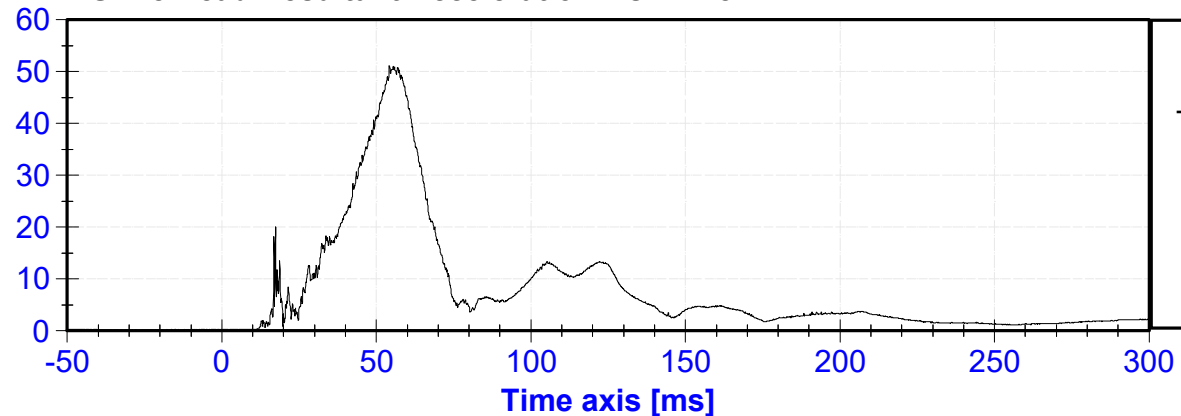
ES-2re Head (Y) Acceleration vs. Time



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

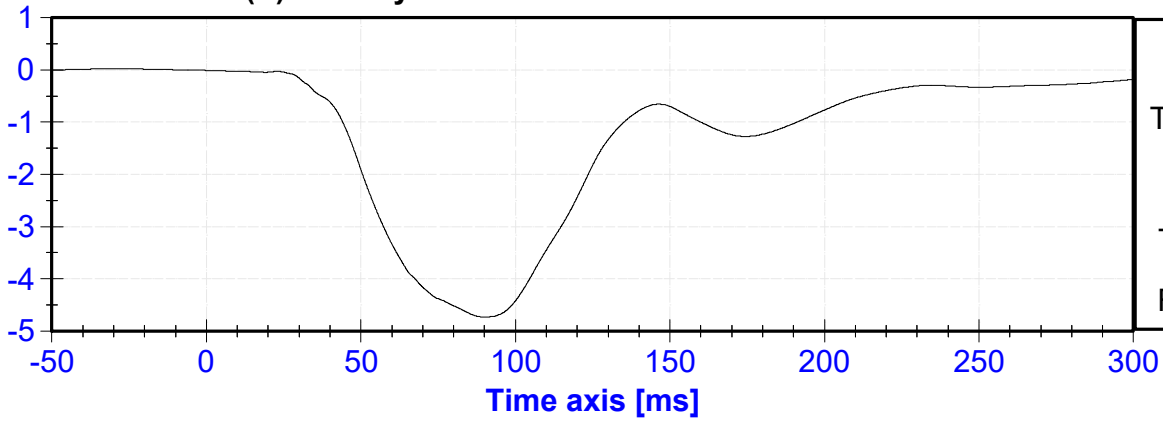


ES-2re Head Resultant Acceleration vs. Time



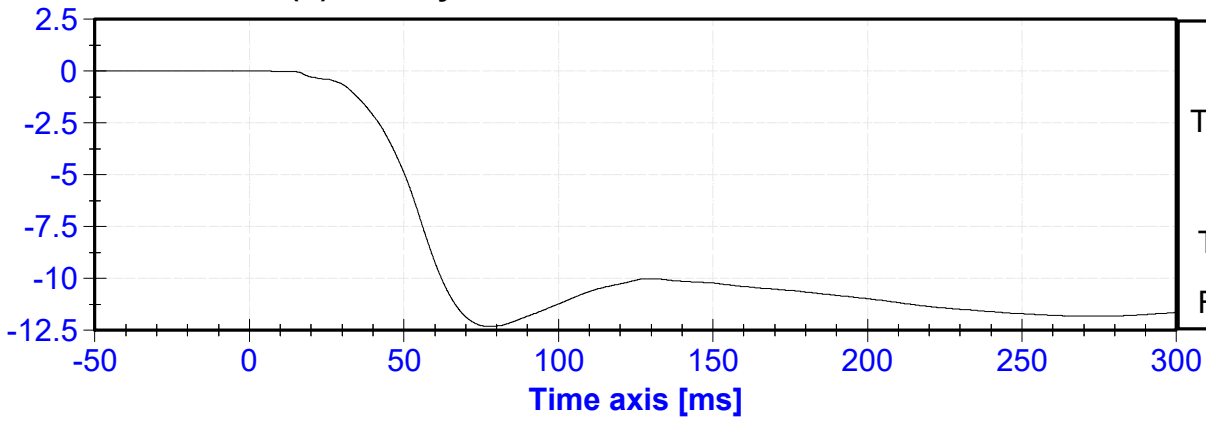
ES-2re Head (X) Velocity vs. Time

VELOCITY [m/s]



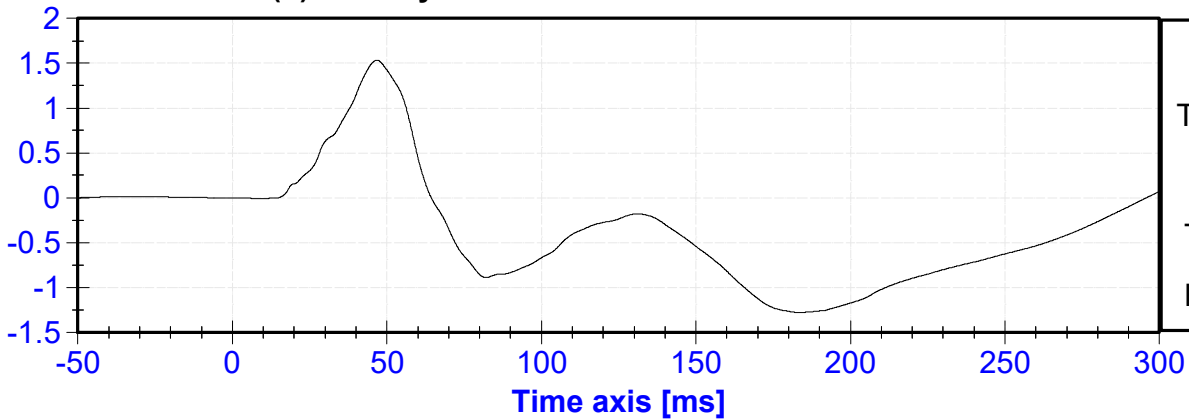
ES-2re Head (Y) Velocity vs. Time

VELOCITY [m/s]



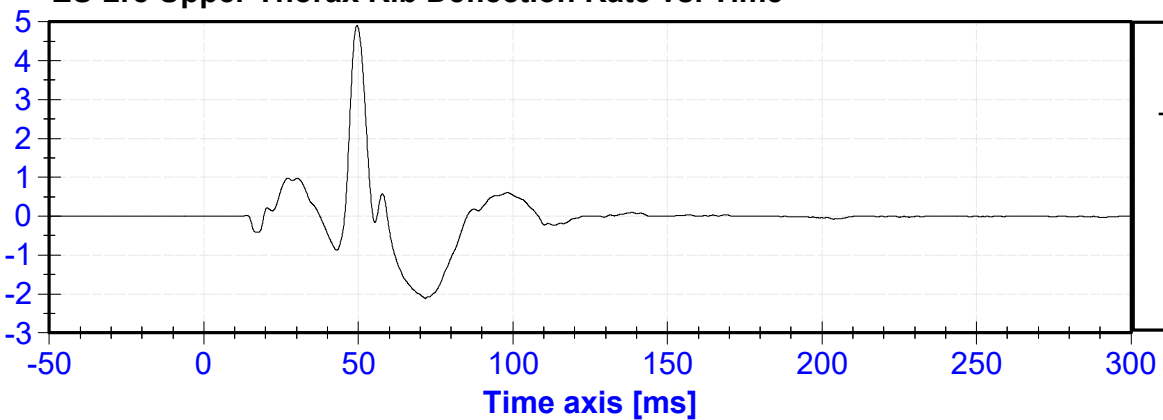
ES-2re Head (Z) Velocity vs. Time

VELOCITY [m/s]

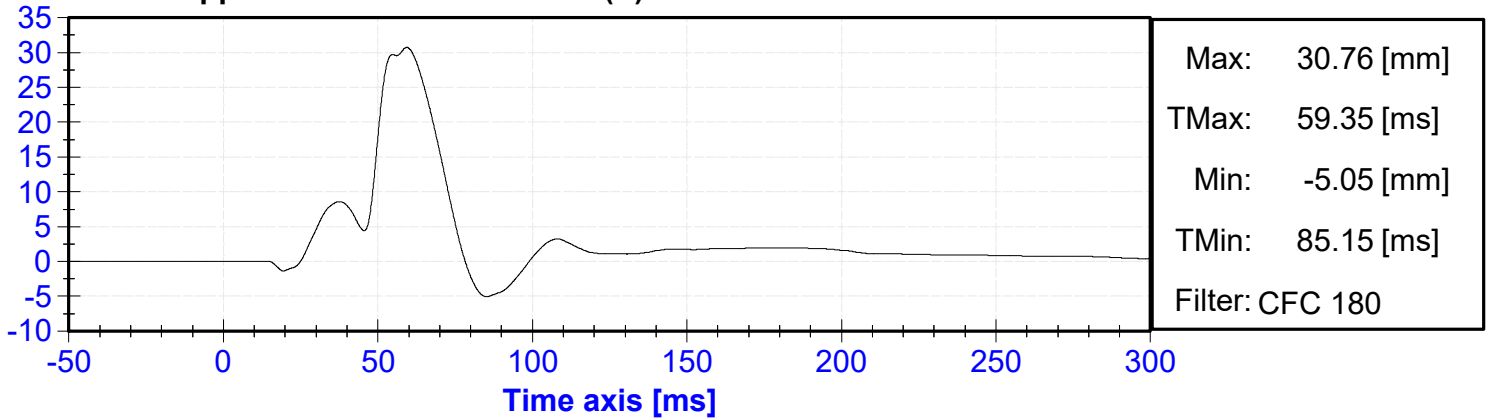


ES-2re Upper Thorax Rib Deflection Rate vs. Time

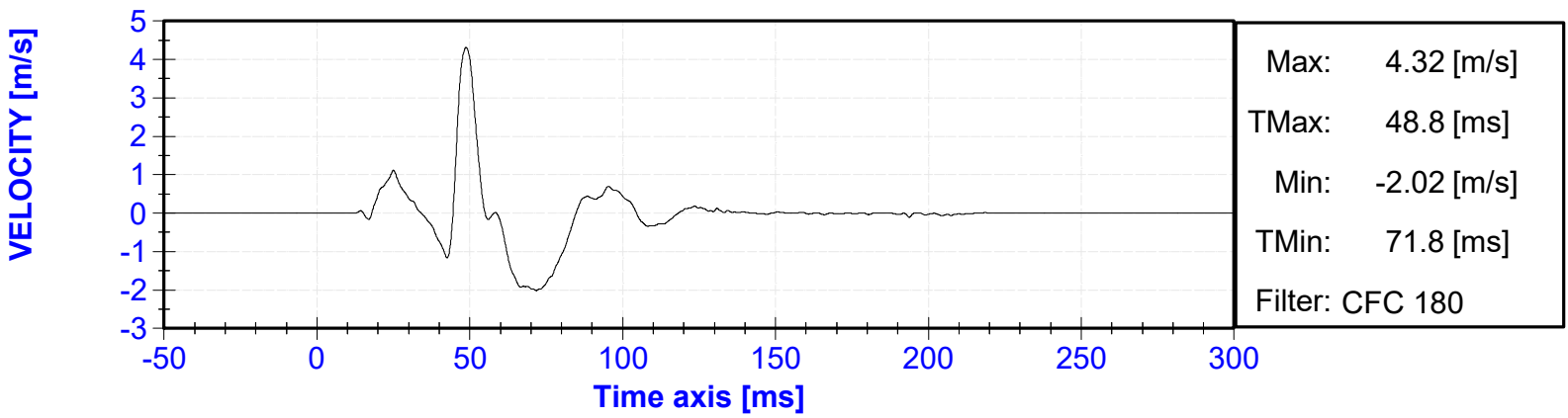
VELOCITY [m/s]



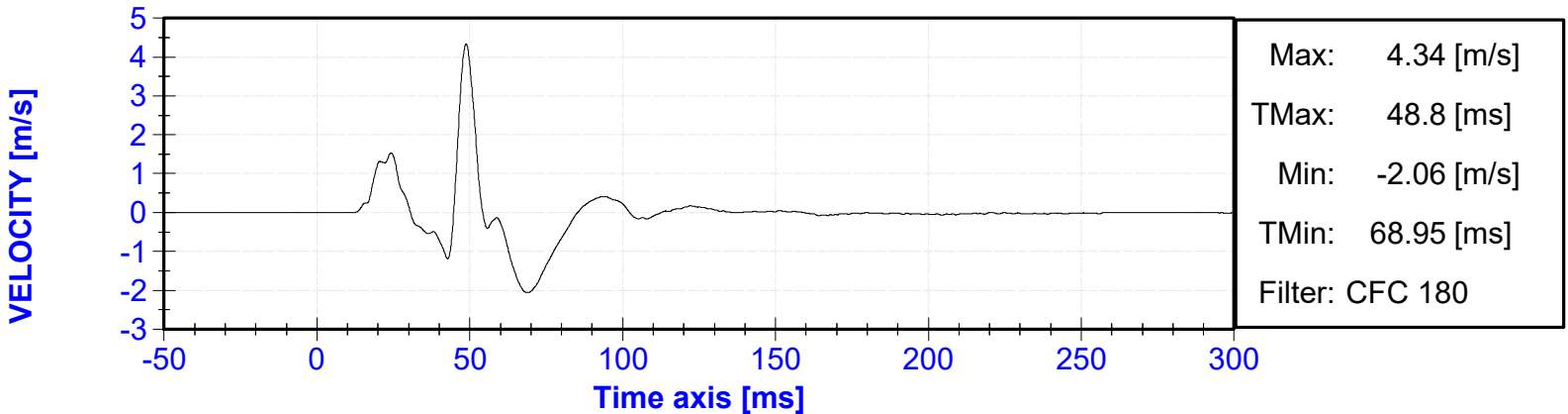
ES-2re Upper Thorax Rib Deflection (Y) vs. Time



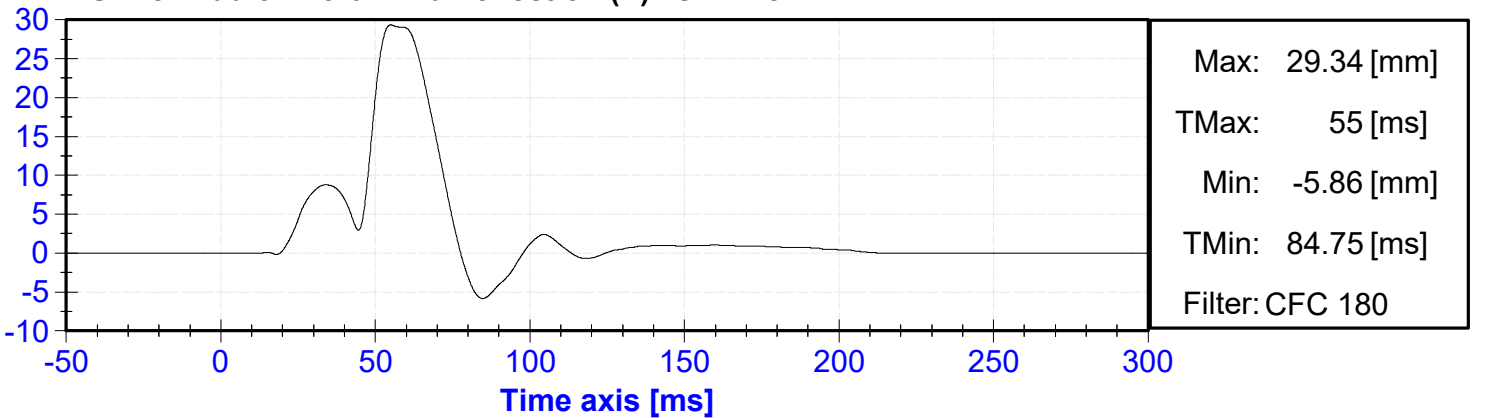
ES-2re Middle Thorax Rib Deflection Rate vs. Time



ES-2re Lower Thorax Rib Deflection Rate vs. Time

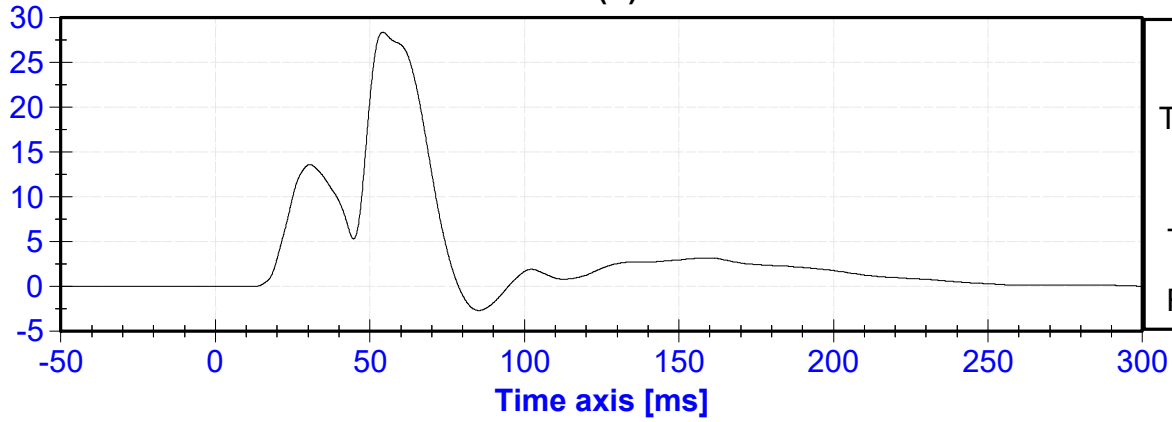


ES-2re Middle Thorax Rib Deflection (Y) vs. Time



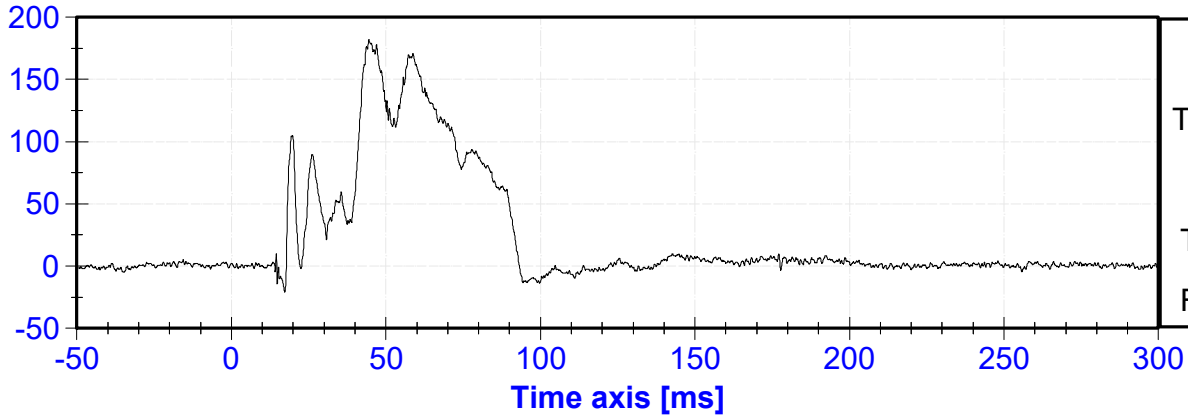
ES-2re Lower Thorax Rib Deflection (Y) vs. Time

DISPLACEMENT [mm]



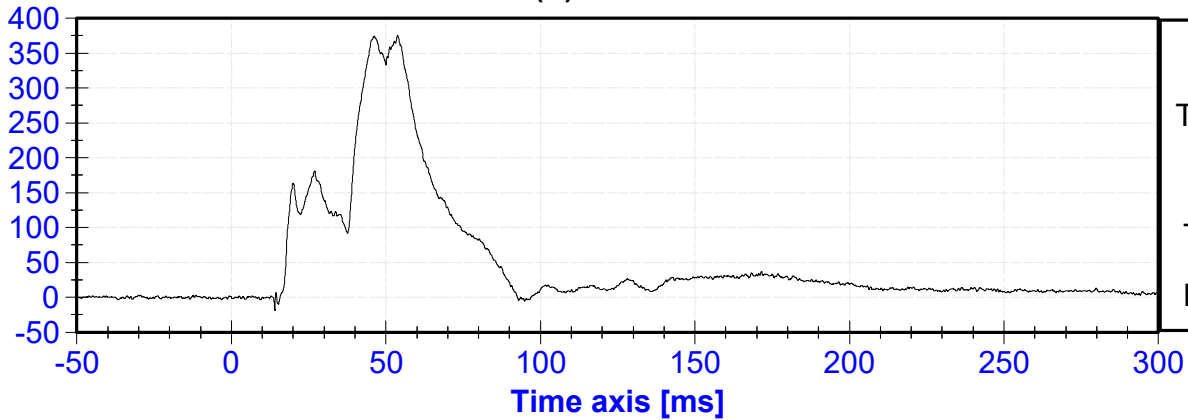
ES-2re Front Abdomen Force (Y) vs. Time

FORCE [N]



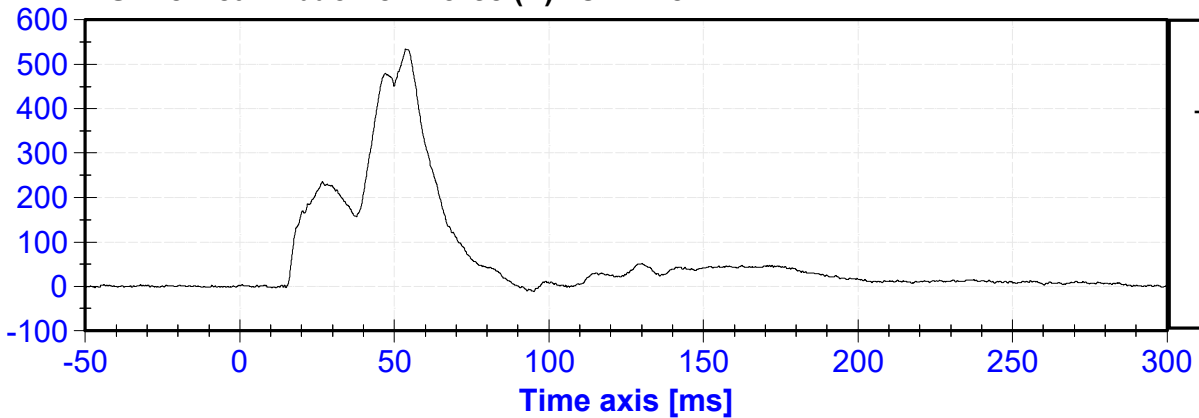
ES-2re Middle Abdomen Force (Y) vs. Time

FORCE [N]

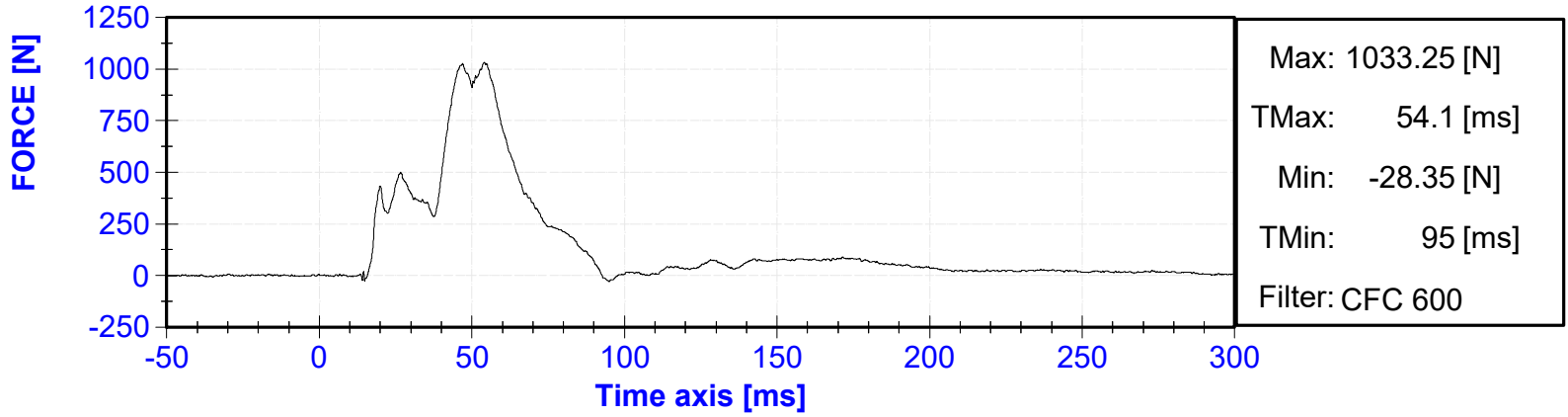


ES-2re Rear Abdomen Force (Y) vs. Time

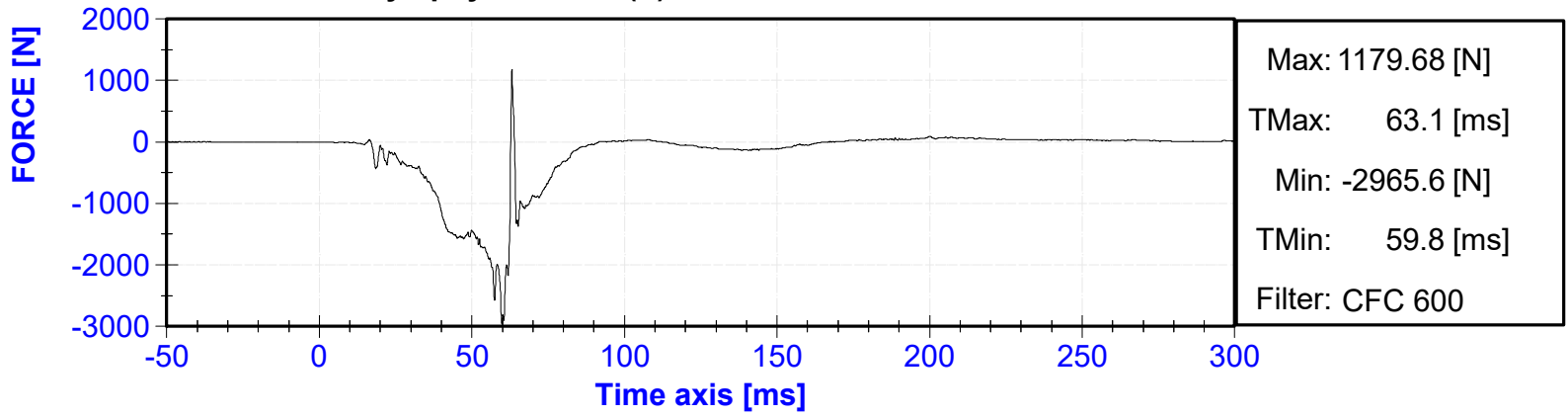
FORCE [N]



ES-2re Sum of Abdomen Forces vs. Time



ES-2re Pubic Symphysis Force (Y) vs. Time

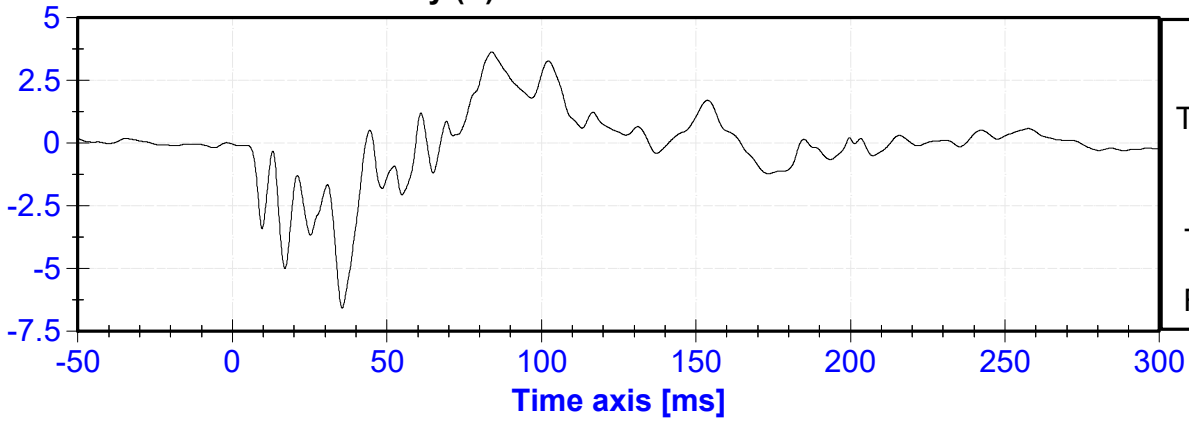


APPENDIX III
VEHICLE ACCELEROMETER RESPONSE DATA

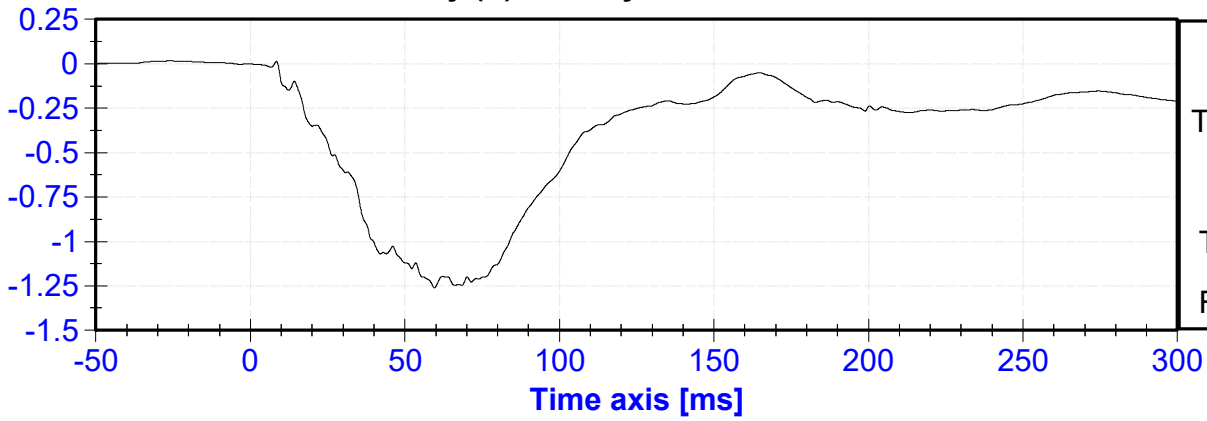
Table of Data Plots

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

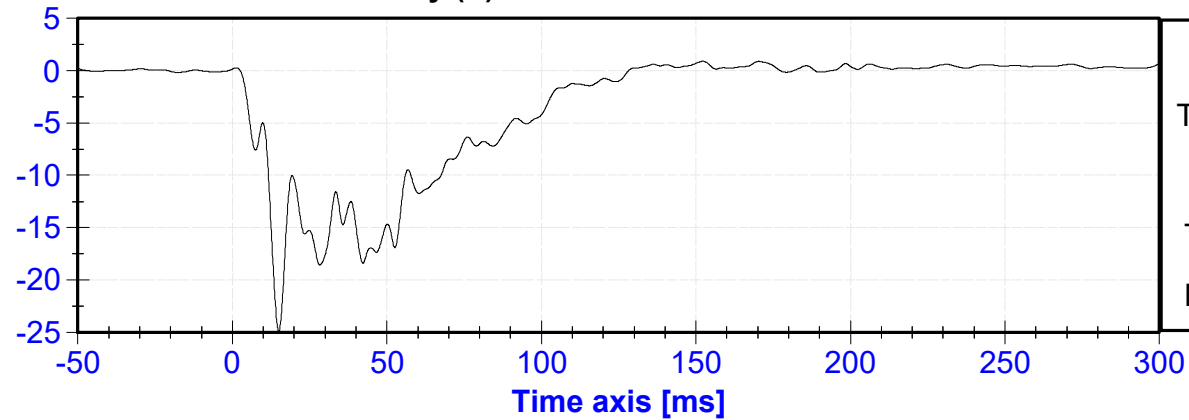
Vehicle Center of Gravity (X) Acceleration vs. Time



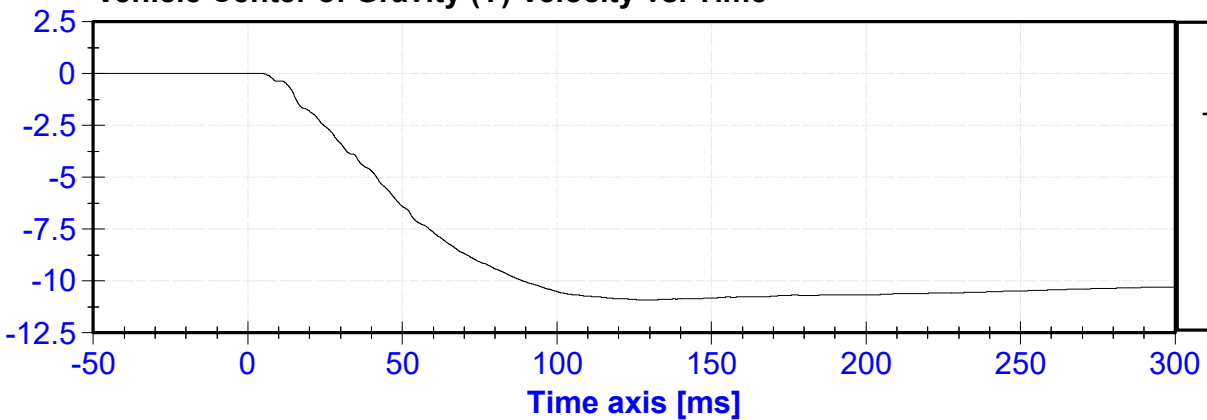
Vehicle Center of Gravity (X) Velocity vs. Time



Vehicle Center of Gravity (Y) Acceleration vs. Time

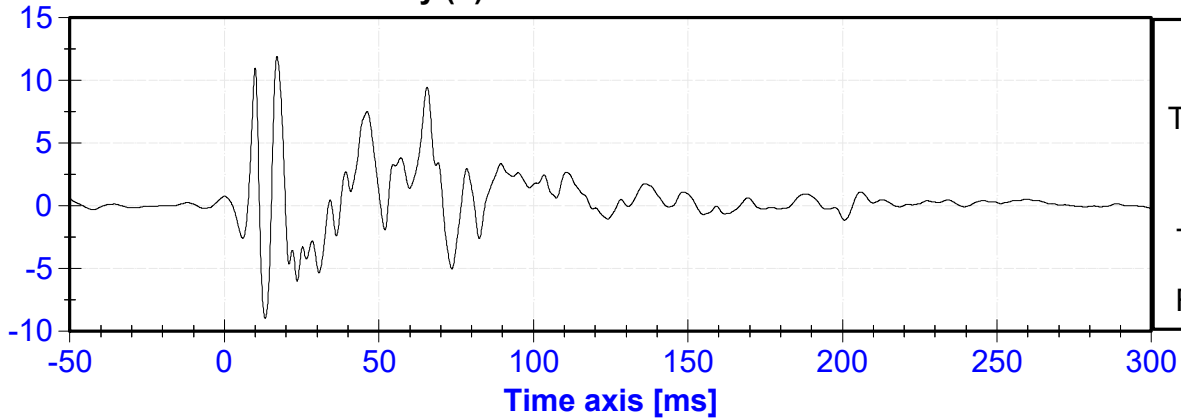


Vehicle Center of Gravity (Y) Velocity vs. Time



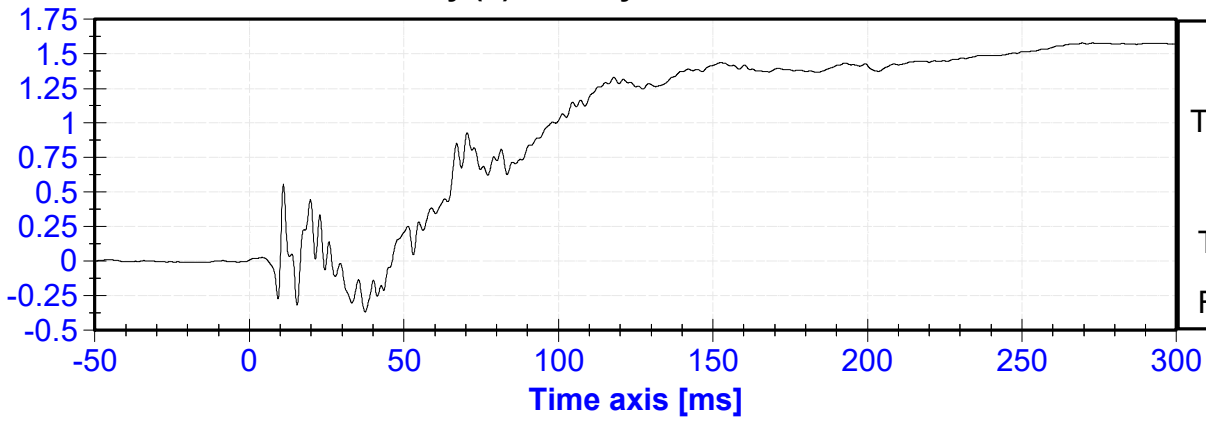
Vehicle Center of Gravity (Z) Acceleration vs. Time

ACCELERATION [g's]



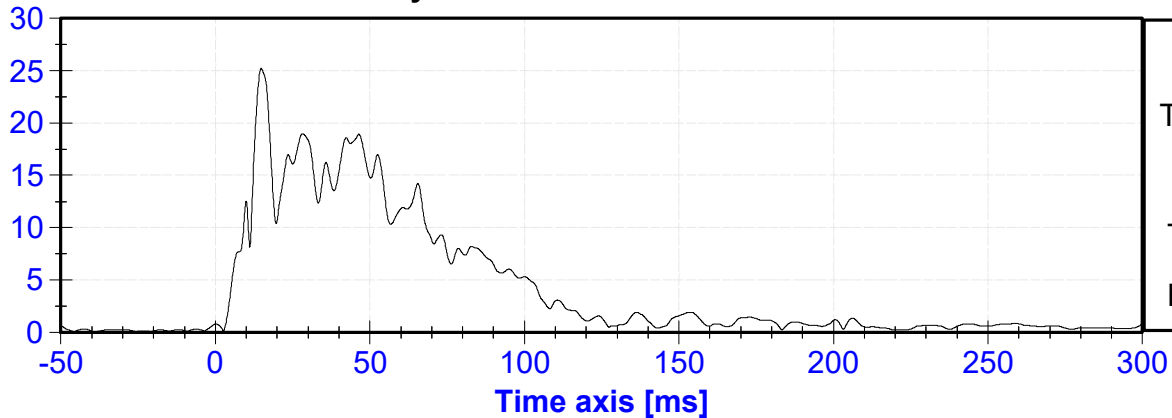
Vehicle Center of Gravity (Z) Velocity vs. Time

VELOCITY [m/s]



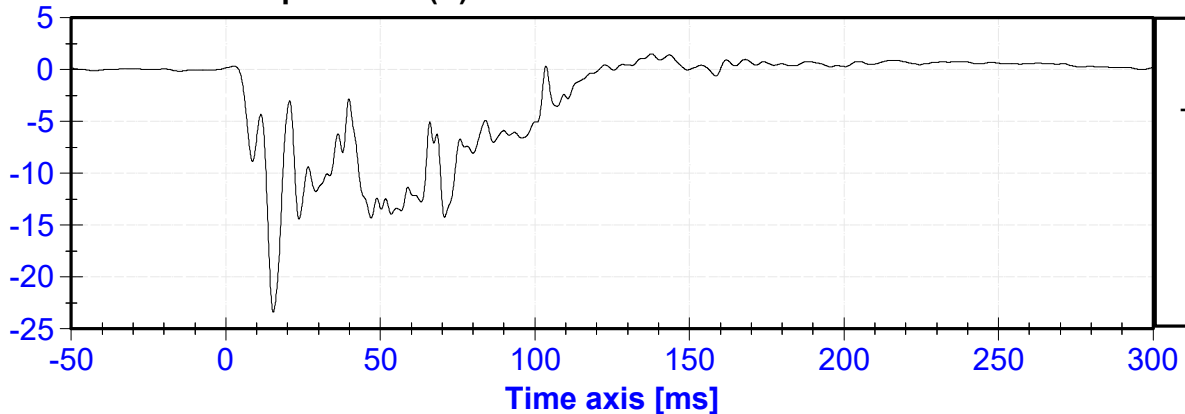
Vehicle Center of Gravity Resultant Acceleration vs. Time

ACCELERATION [g's]



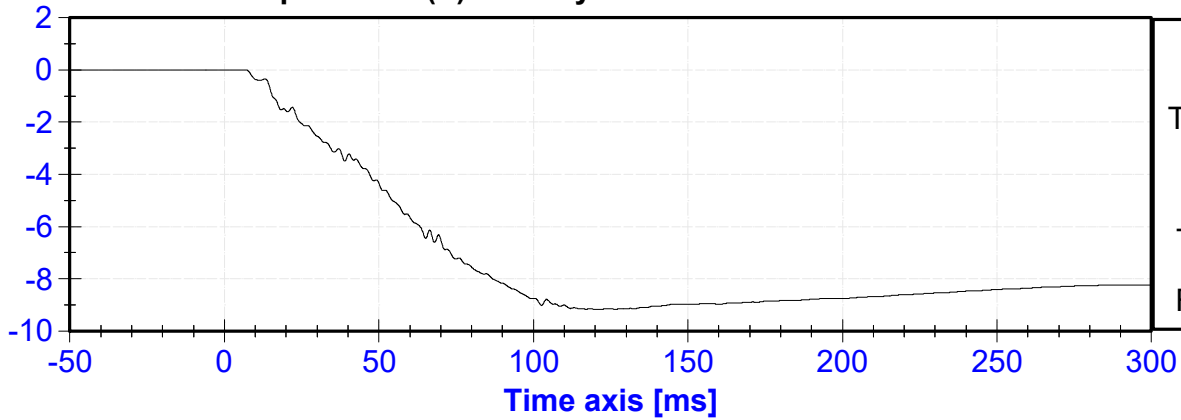
Floor Sill - Impact Side (Y) Acceleration vs. Time

ACCELERATION [g's]



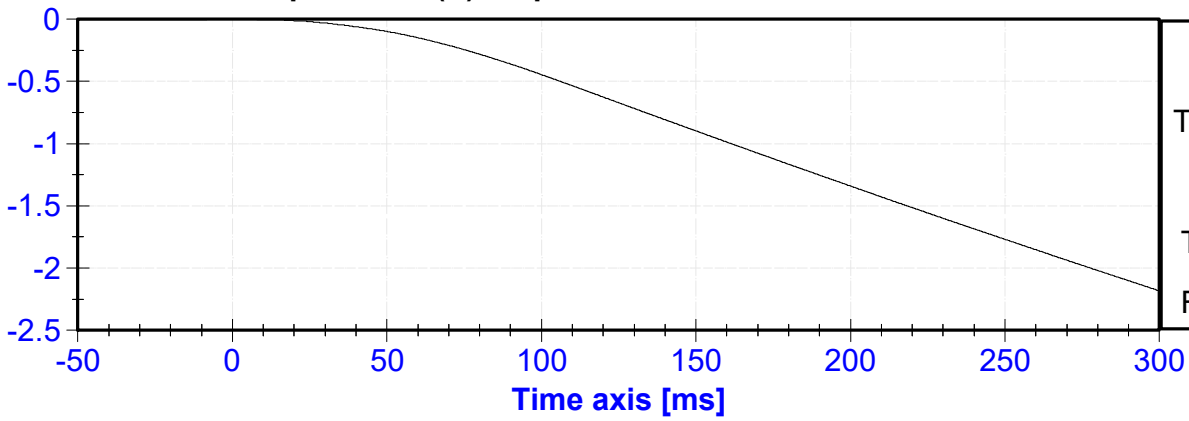
Floor Sill – Impact Side (Y) Velocity vs. Time

VELOCITY [m/s]



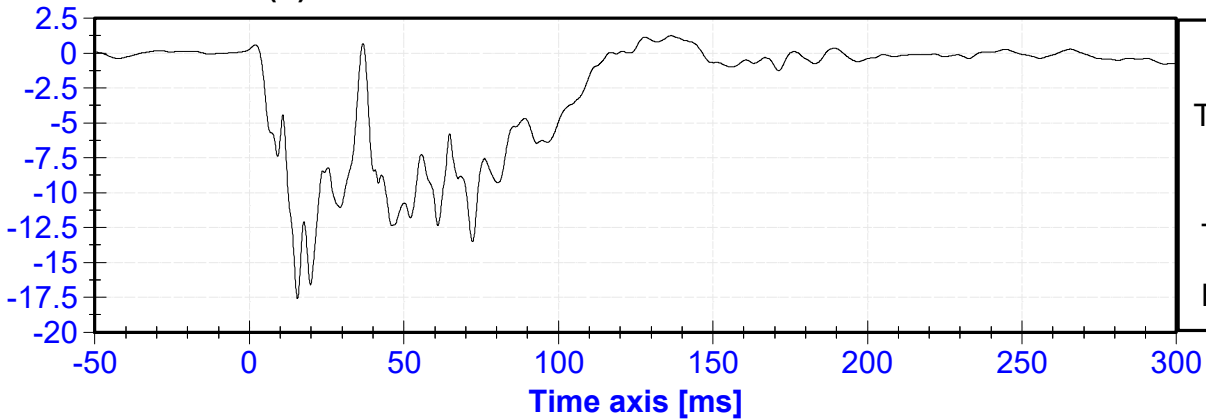
Floor Sill – Impact Side (Y) Displacement vs. Time

DISPLACEMENT [m]



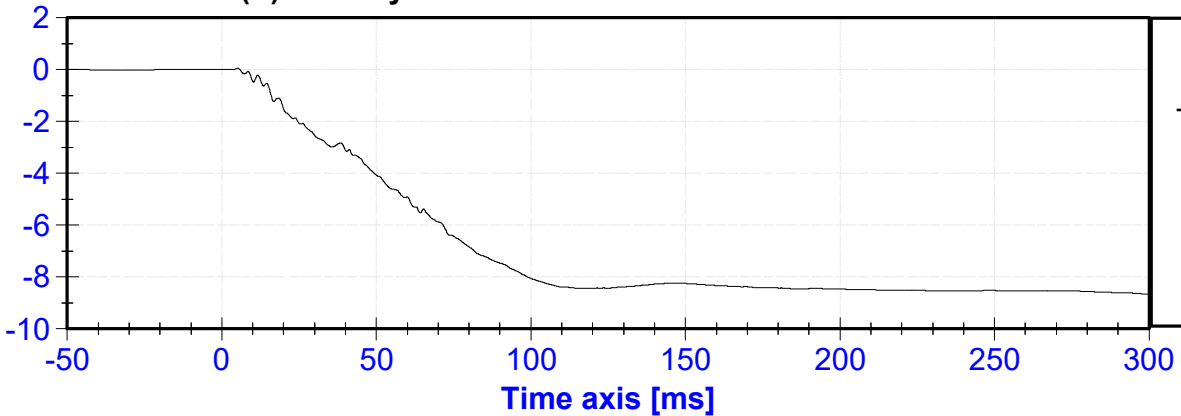
A-Pillar Sill (Y) Acceleration vs. Time

ACCELERATION [g's]

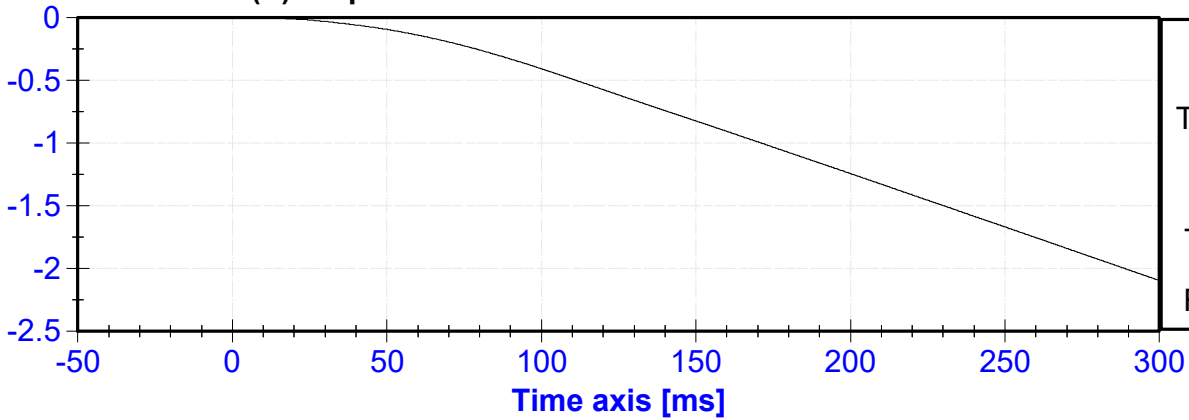


A-Pillar Sill (Y) Velocity vs. Time

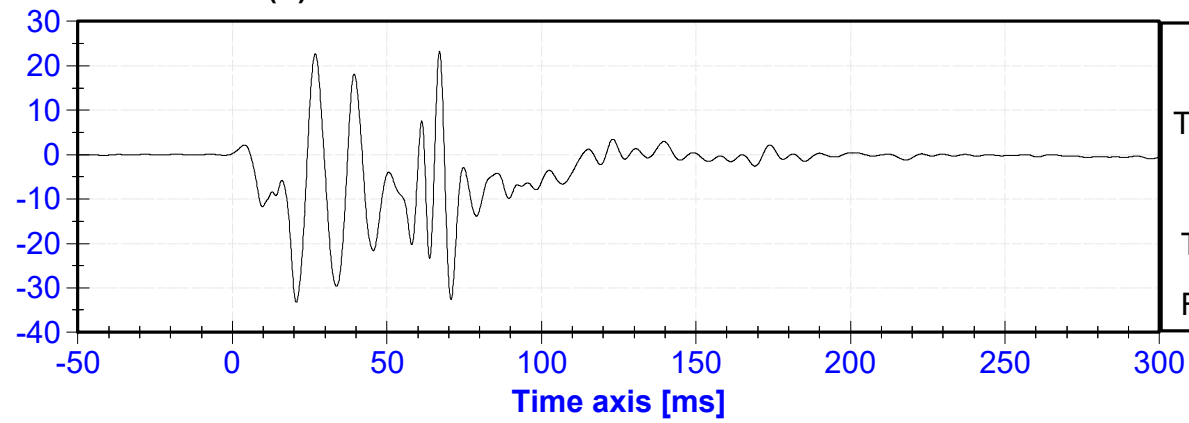
VELOCITY [m/s]



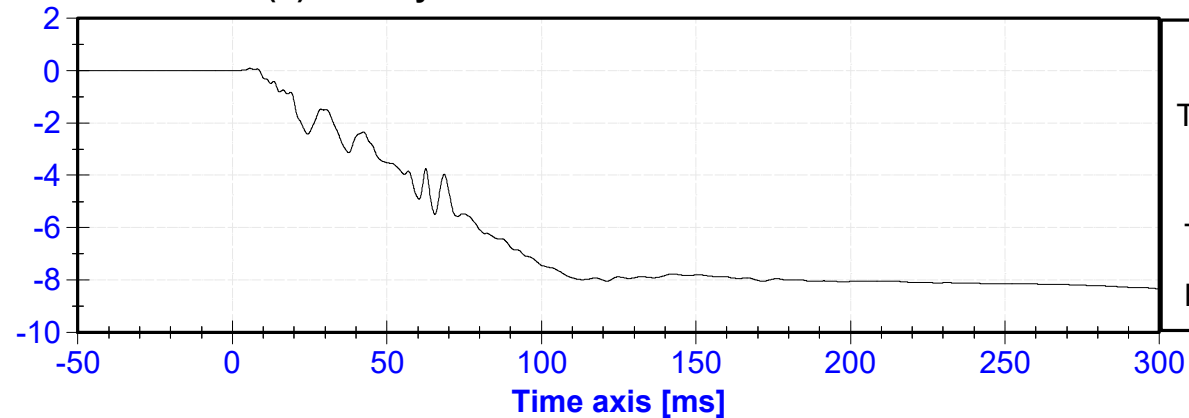
A-Pillar Sill (Y) Displacement vs. Time



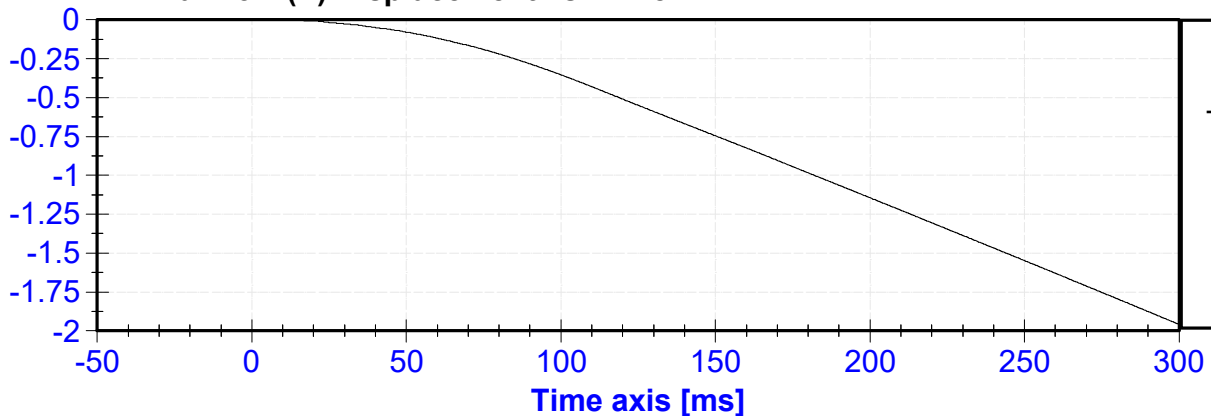
A-Pillar Low (Y) Acceleration vs. Time



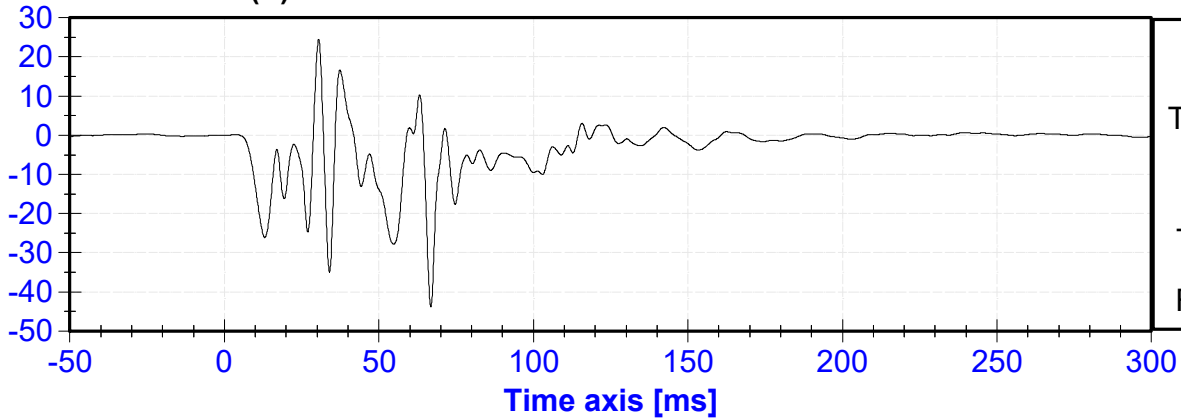
A-Pillar Low (Y) Velocity vs. Time



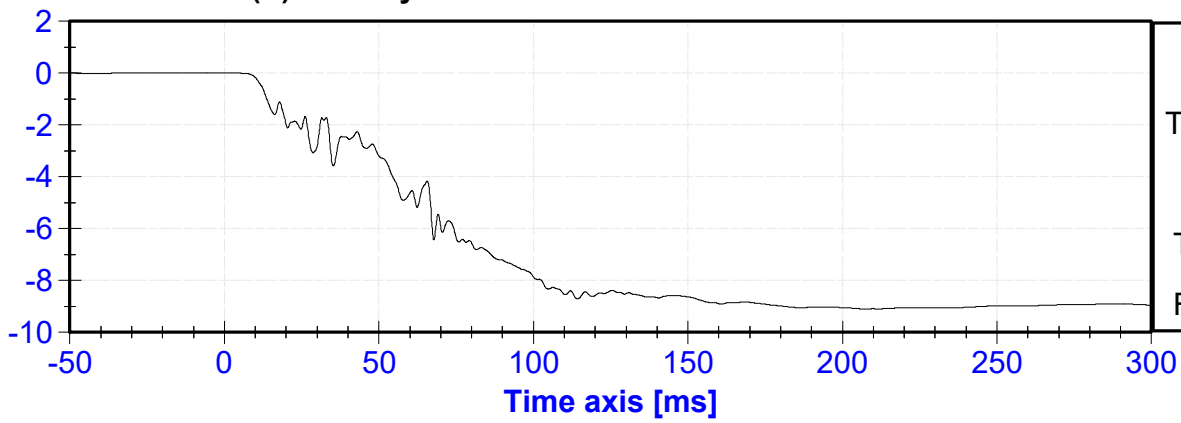
A-Pillar Low (Y) Displacement vs. Time



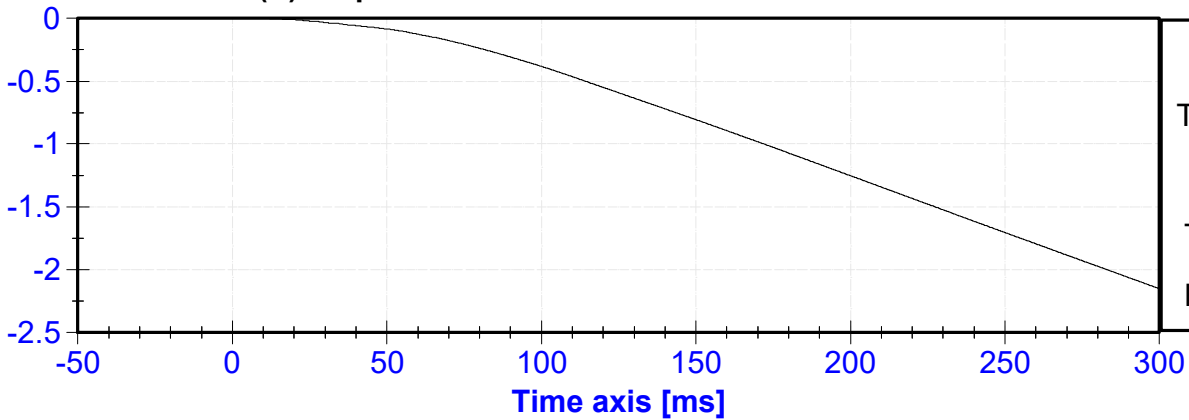
A-Pillar Mid (Y) Acceleration vs. Time



A-Pillar Mid (Y) Velocity vs. Time

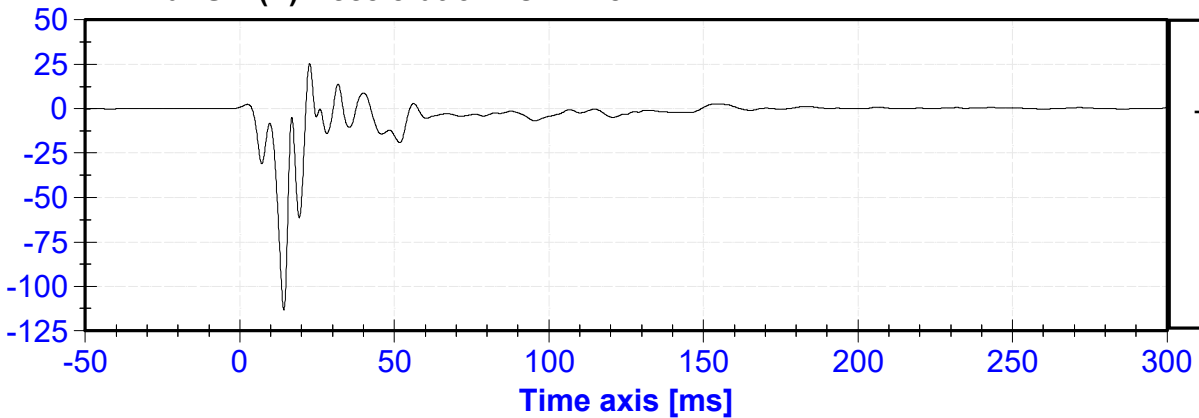


A-Pillar Mid (Y) Displacement vs. Time



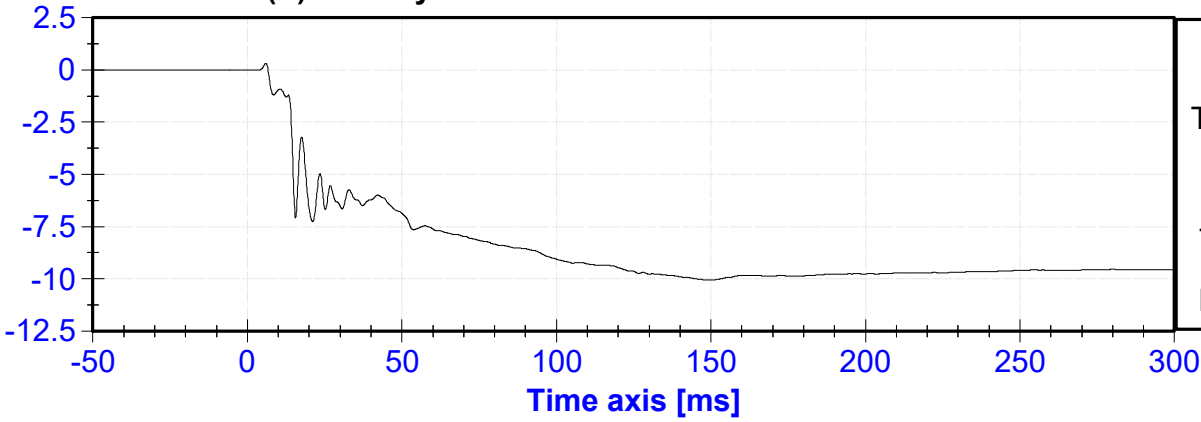
Exceeded calibration range at 15.2 ms

B-Pillar Sill (Y) Acceleration vs. Time



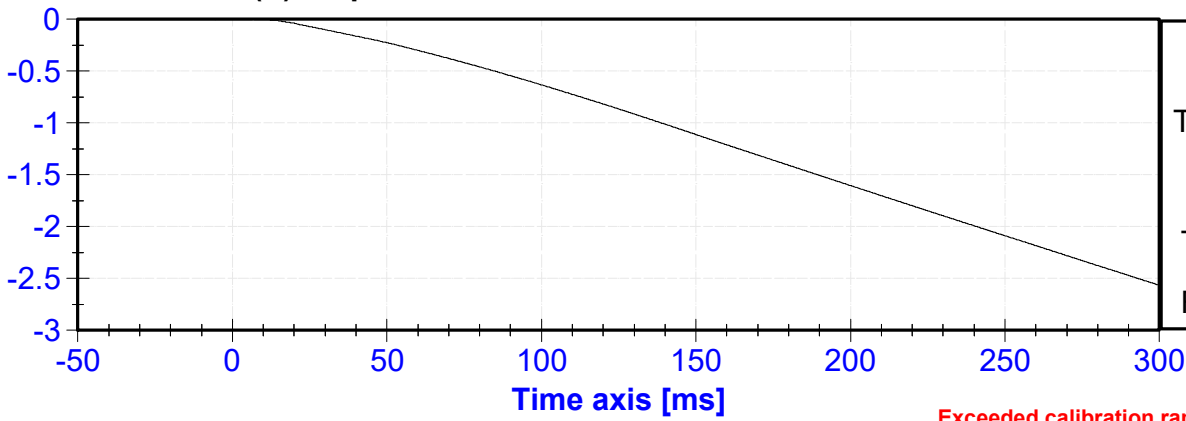
Exceeded calibration range at 15.2 ms

B-Pillar Sill (Y) Velocity vs. Time



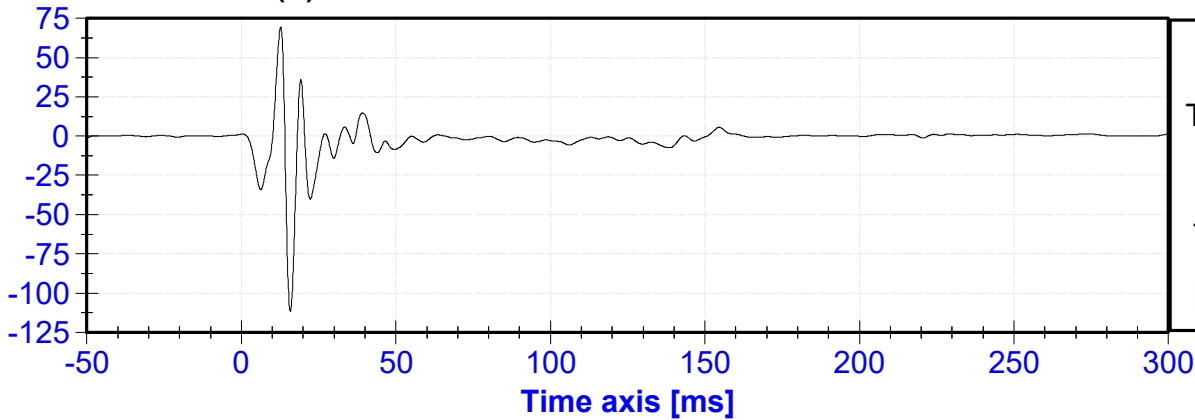
Exceeded calibration range at 15.2 ms

B-Pillar Sill (Y) Displacement vs. Time



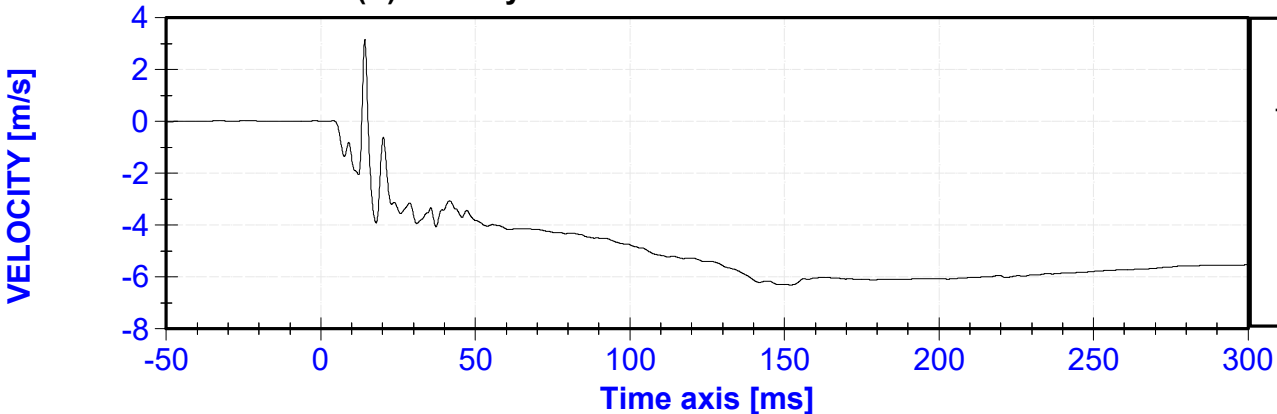
Exceeded calibration range and saturated at 14.4 ms

B-Pillar Low (Y) Acceleration vs. Time



Exceeded calibration range and saturated at 14.4 ms

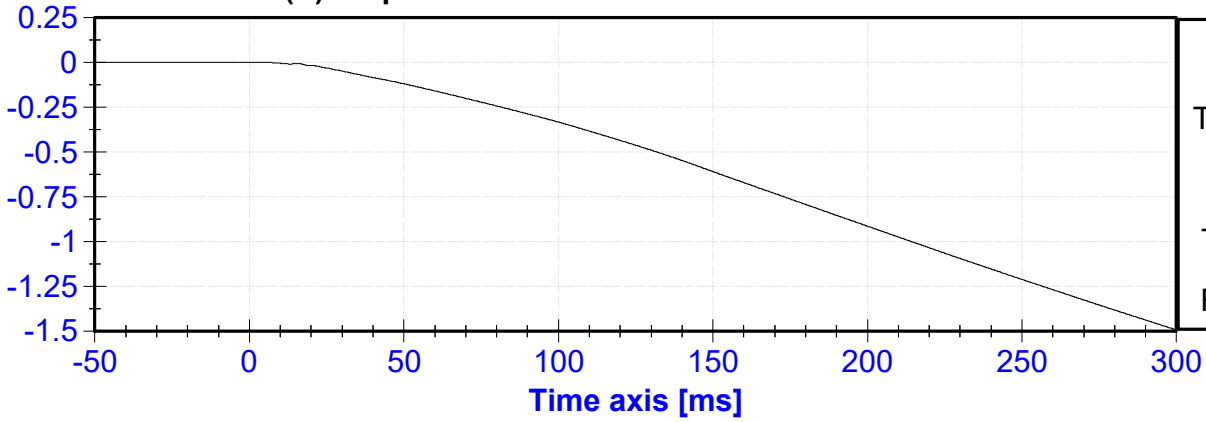
B-Pillar Low (Y) Velocity vs. Time



Exceeded calibration range and saturated at 14.4 ms

B-Pillar Low (Y) Displacement vs. Time

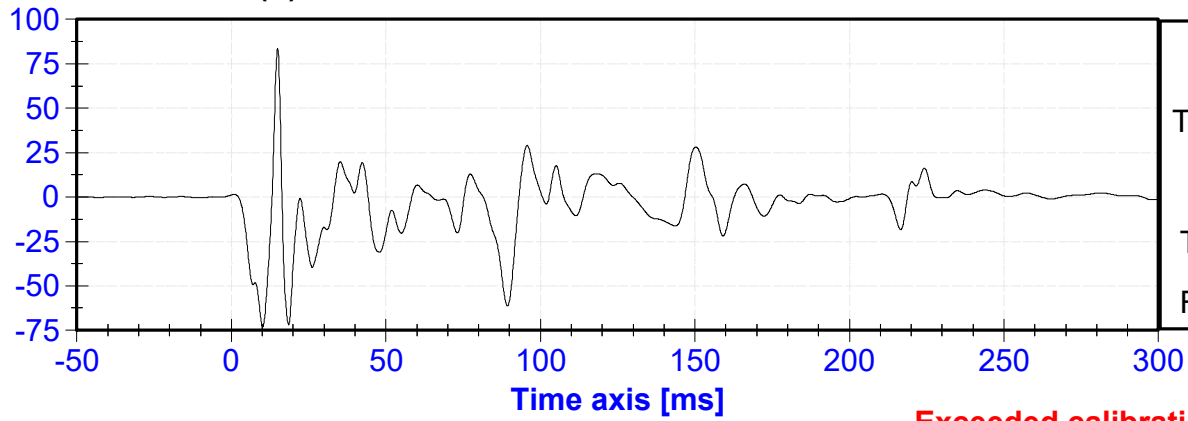
DISPLACEMENT [m]



Exceeded calibration range at 14.3 ms

B-Pillar Mid (Y) Acceleration vs. Time

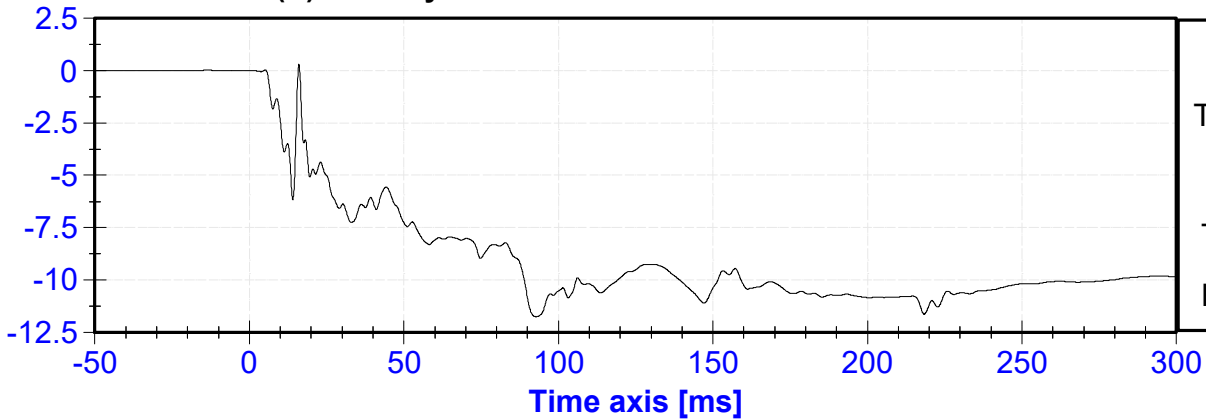
ACCELERATION [g's]



Exceeded calibration range at 14.3 ms

B-Pillar Mid (Y) Velocity vs. Time

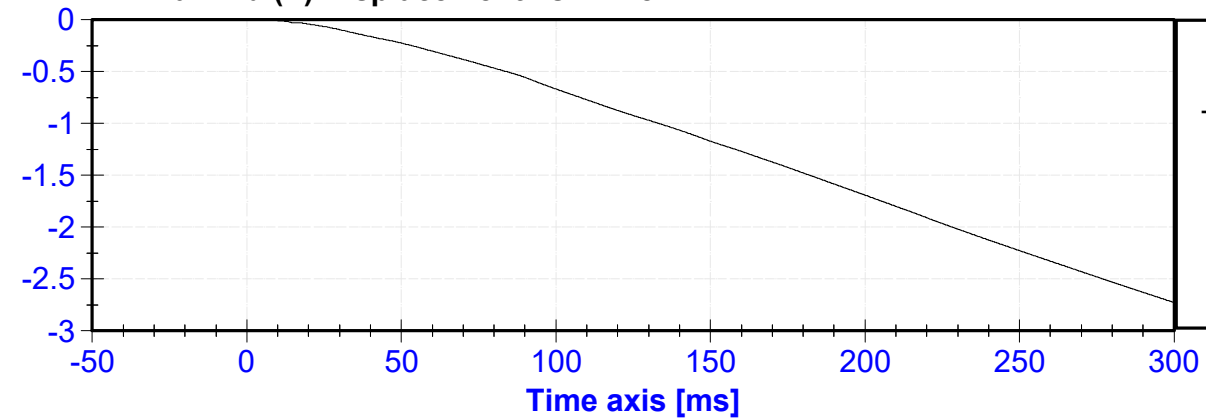
VELOCITY [m/s]



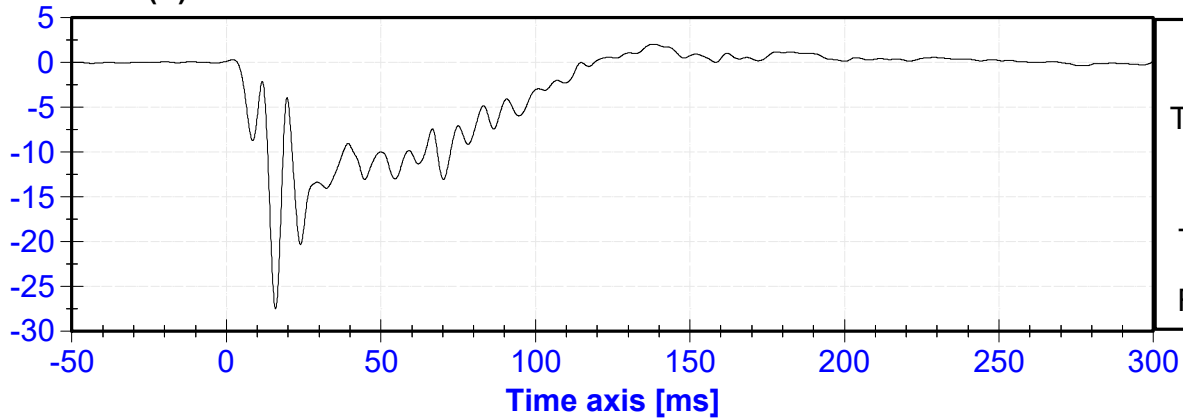
Exceeded calibration range at 14.3 ms

B-Pillar Mid (Y) Displacement vs. Time

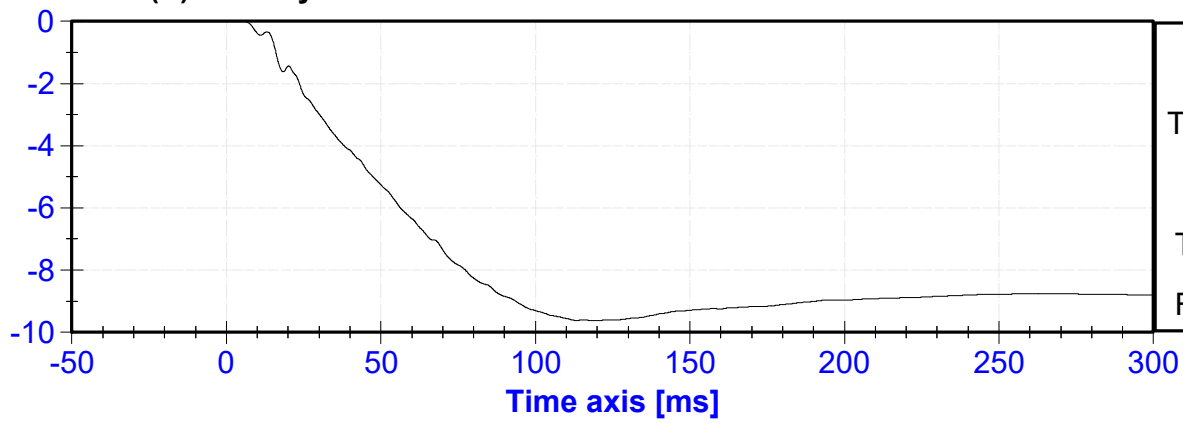
DISPLACEMENT [m]



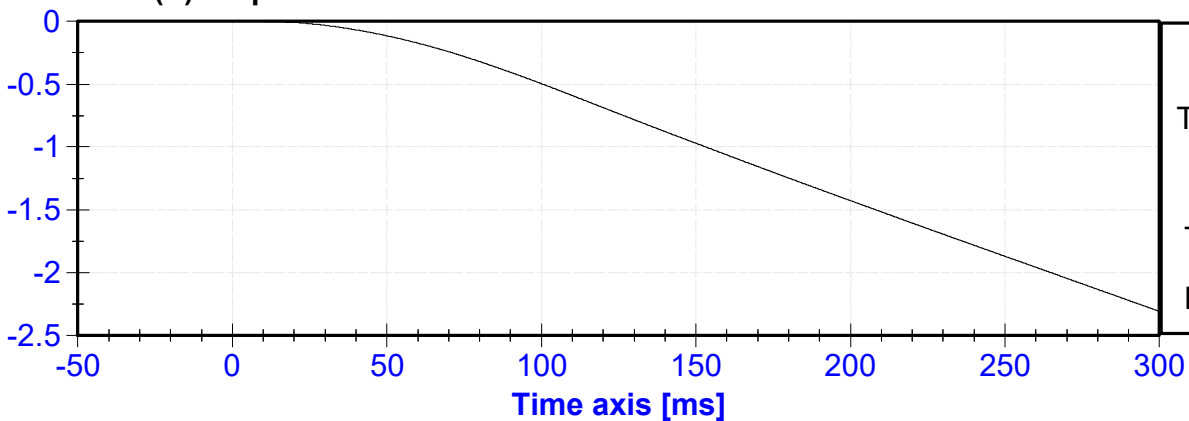
Seat (Y) Acceleration vs. Time



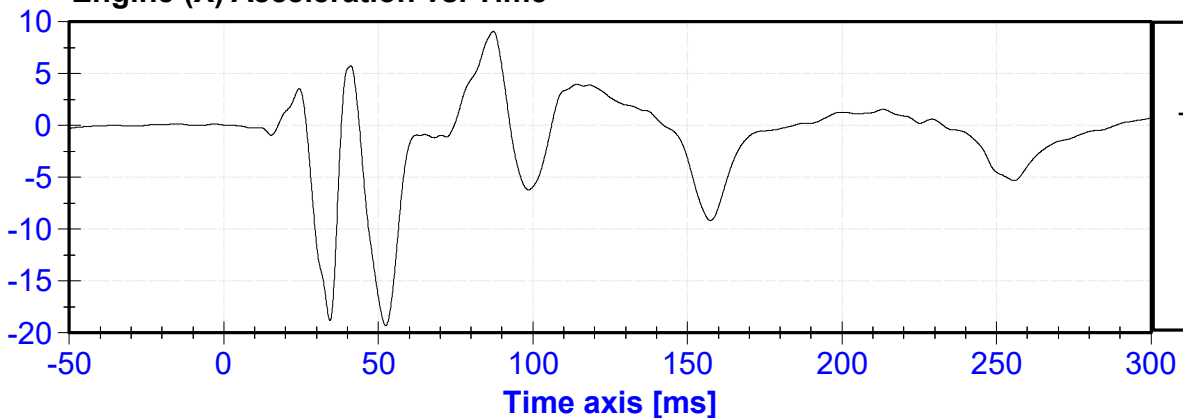
Seat (Y) Velocity vs. Time



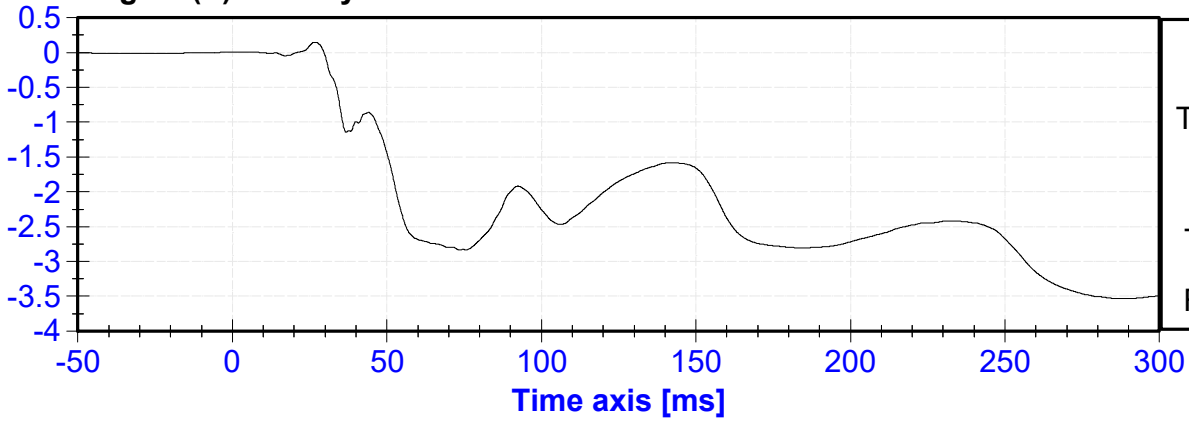
Seat (Y) Displacement vs. Time



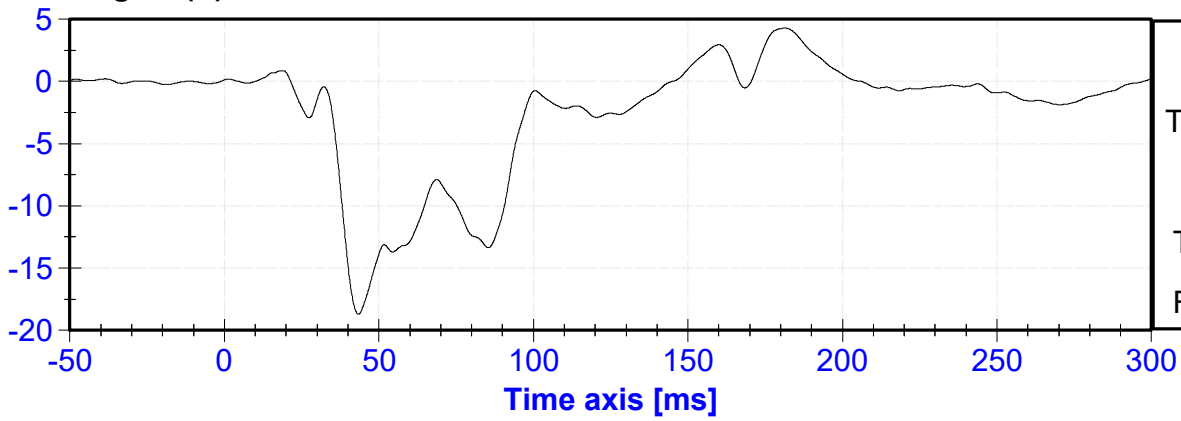
Engine (X) Acceleration vs. Time



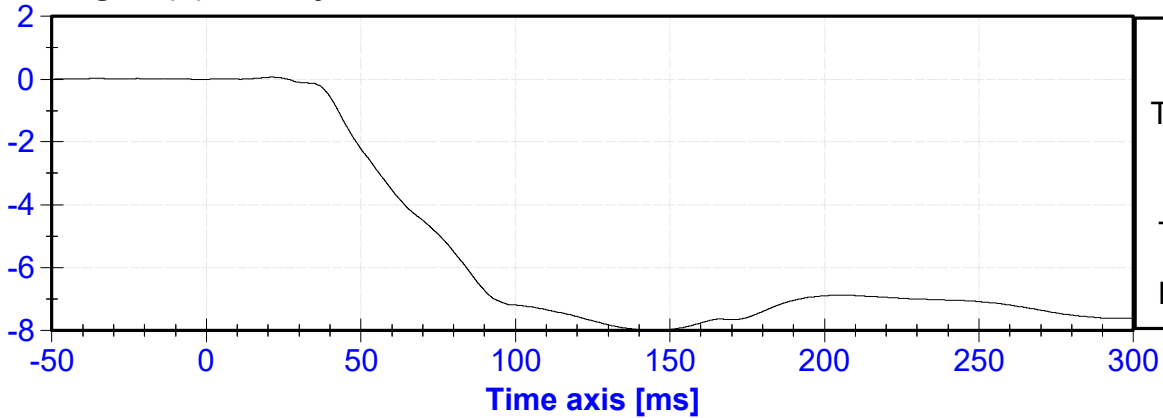
Engine (X) Velocity vs. Time



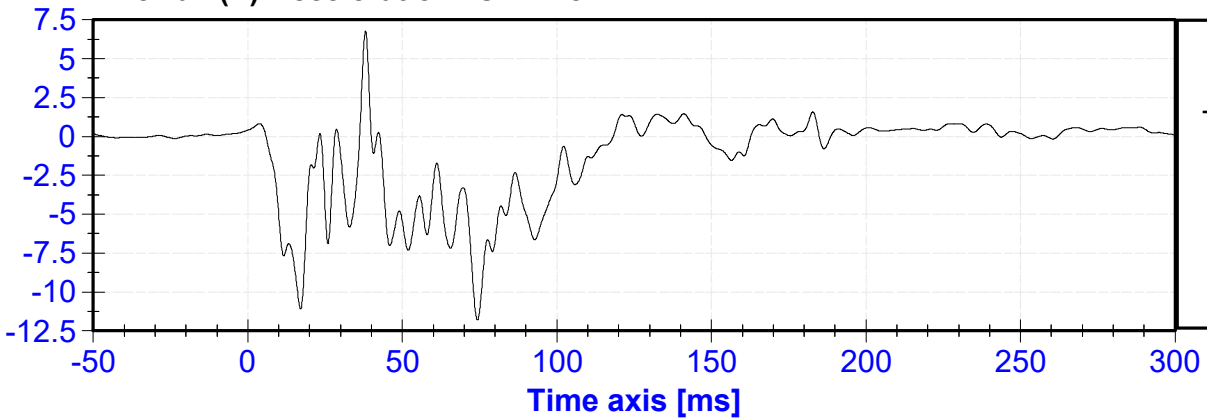
Engine (Y) Acceleration vs. Time



Engine (Y) Velocity vs. Time

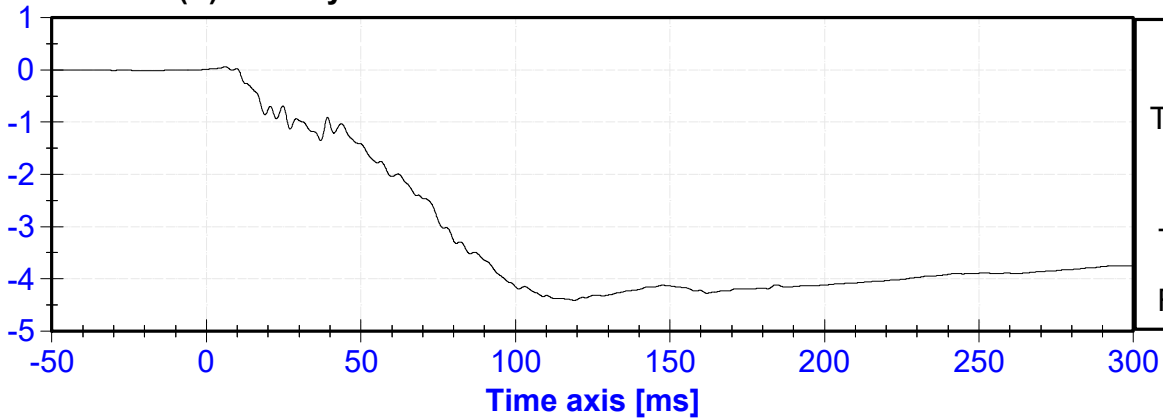


Firewall (Y) Acceleration vs. Time



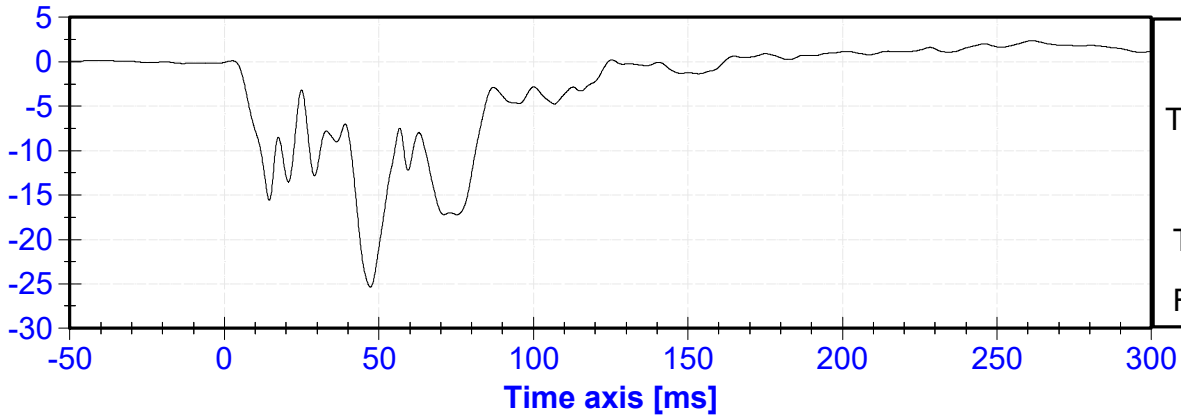
Firewall (Y) Velocity vs. Time

VELOCITY [m/s]



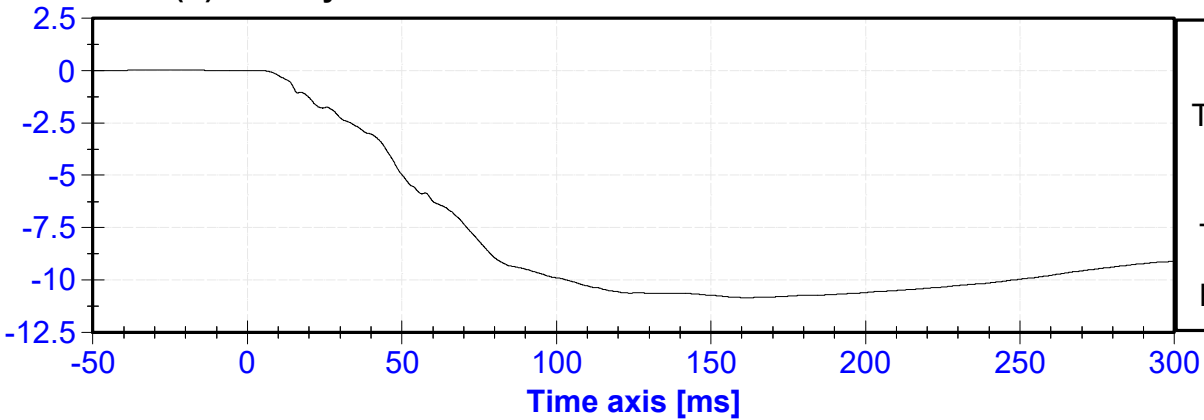
Roof (Y) Acceleration vs. Time

ACCELERATION [g's]



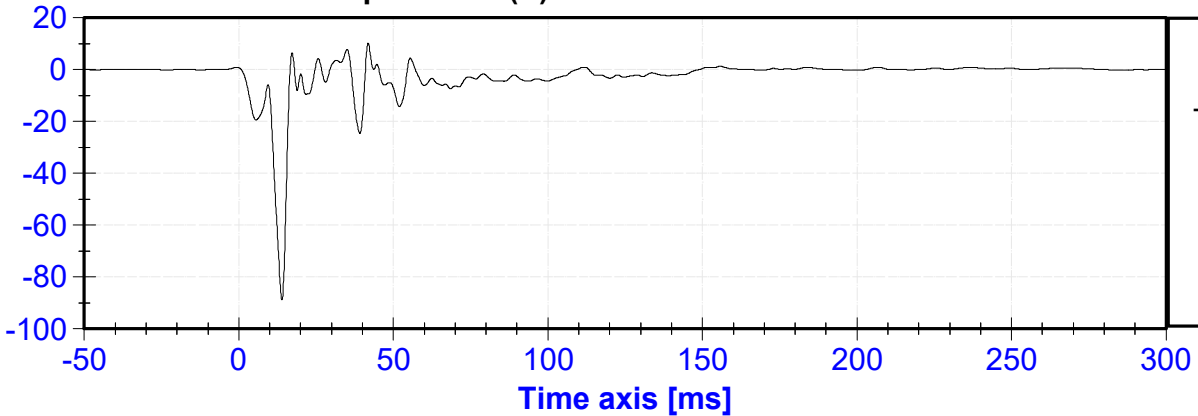
Roof (Y) Velocity vs. Time

VELOCITY [m/s]



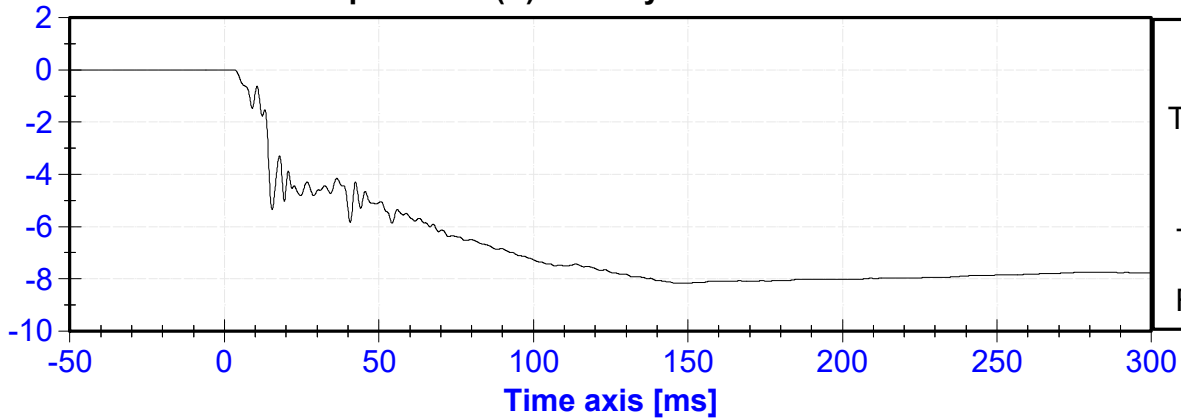
Floor Sill – Non Impact Side (Y) Acceleration vs. Time

ACCELERATION [g's]



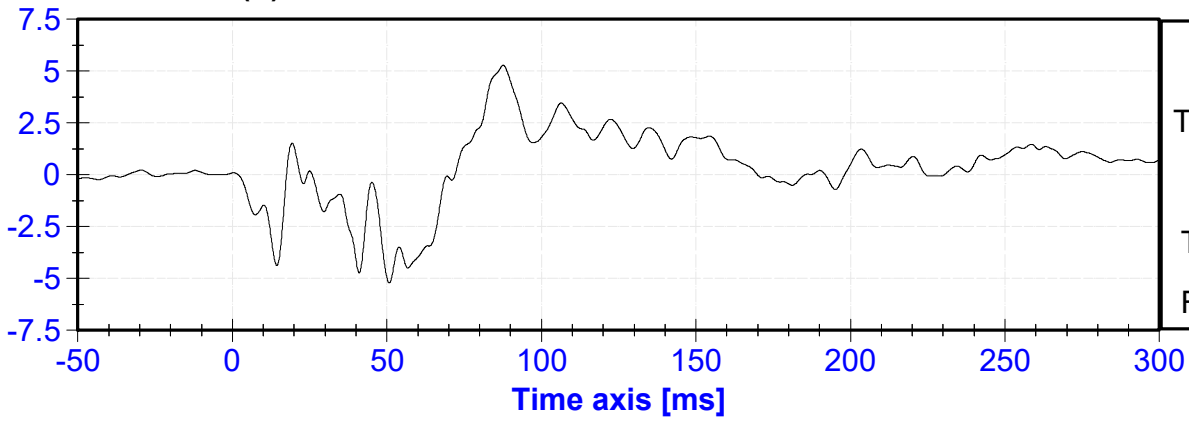
Floor Sill – Non Impact Side (Y) Velocity vs. Time

VELOCITY [m/s]



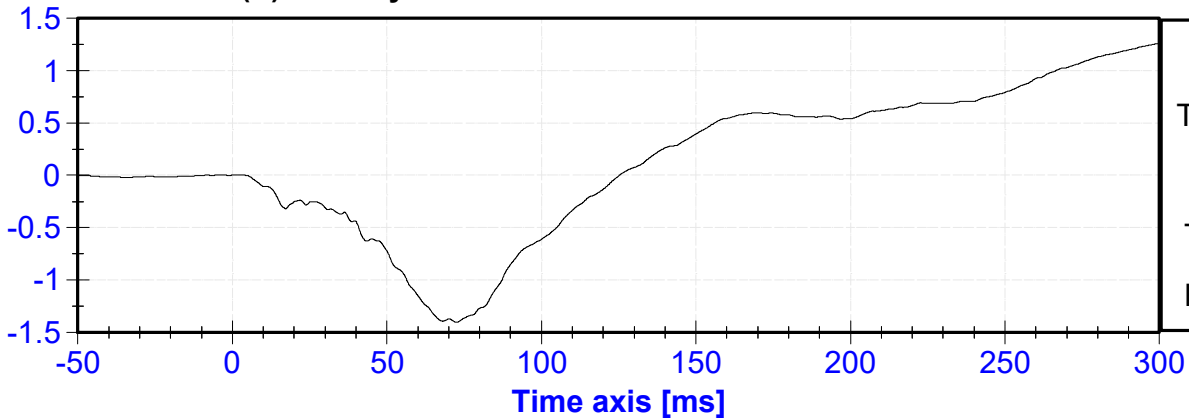
Rear Deck (X) Acceleration vs. Time

ACCELERATION [g's]



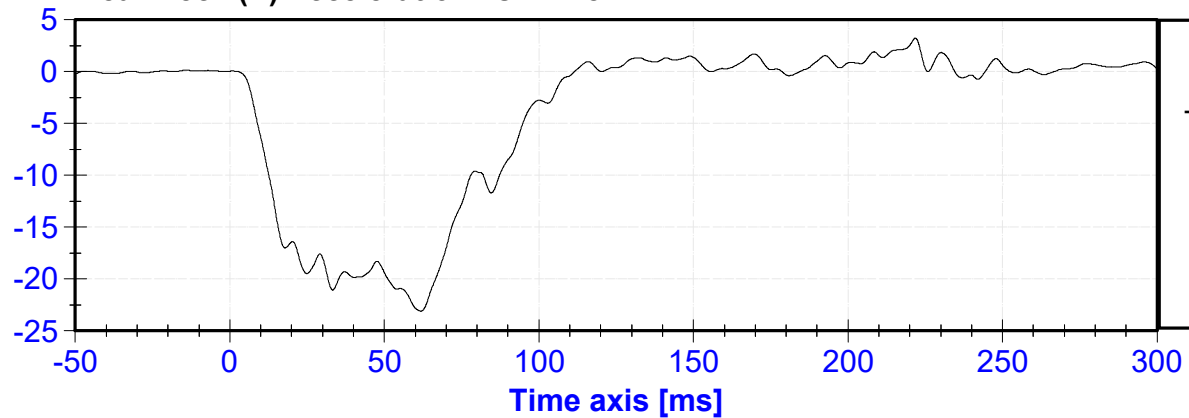
Rear Deck (X) Velocity vs. Time

VELOCITY [m/s]

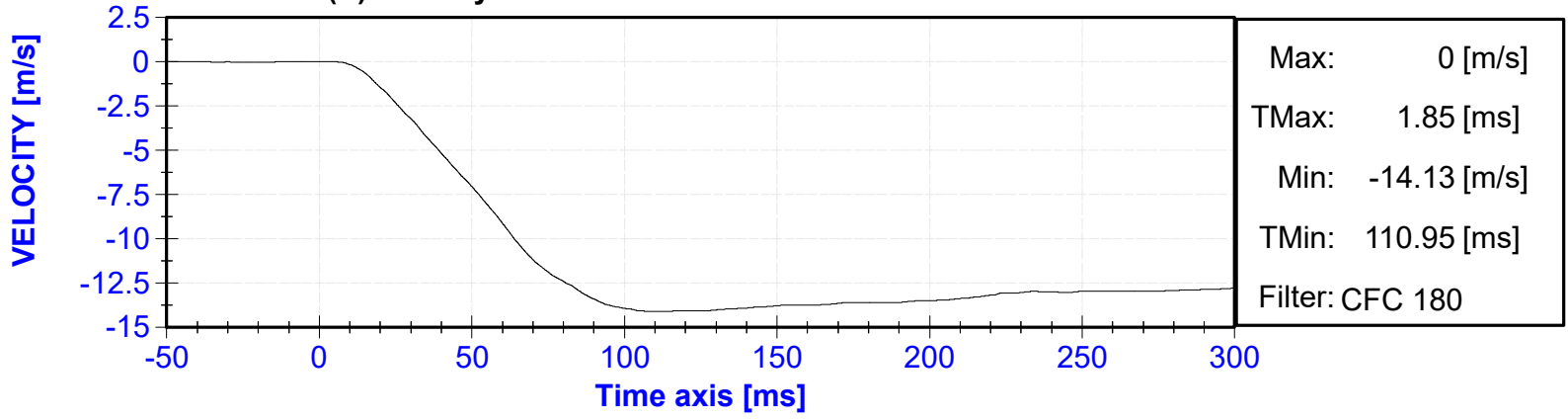


Rear Deck (Y) Acceleration vs. Time

ACCELERATION [g's]



Rear Deck (Y) Velocity vs. Time



APPENDIX IV

PRE-TEST DUMMY PERFORMANCE CALIBRATION TEST DATA

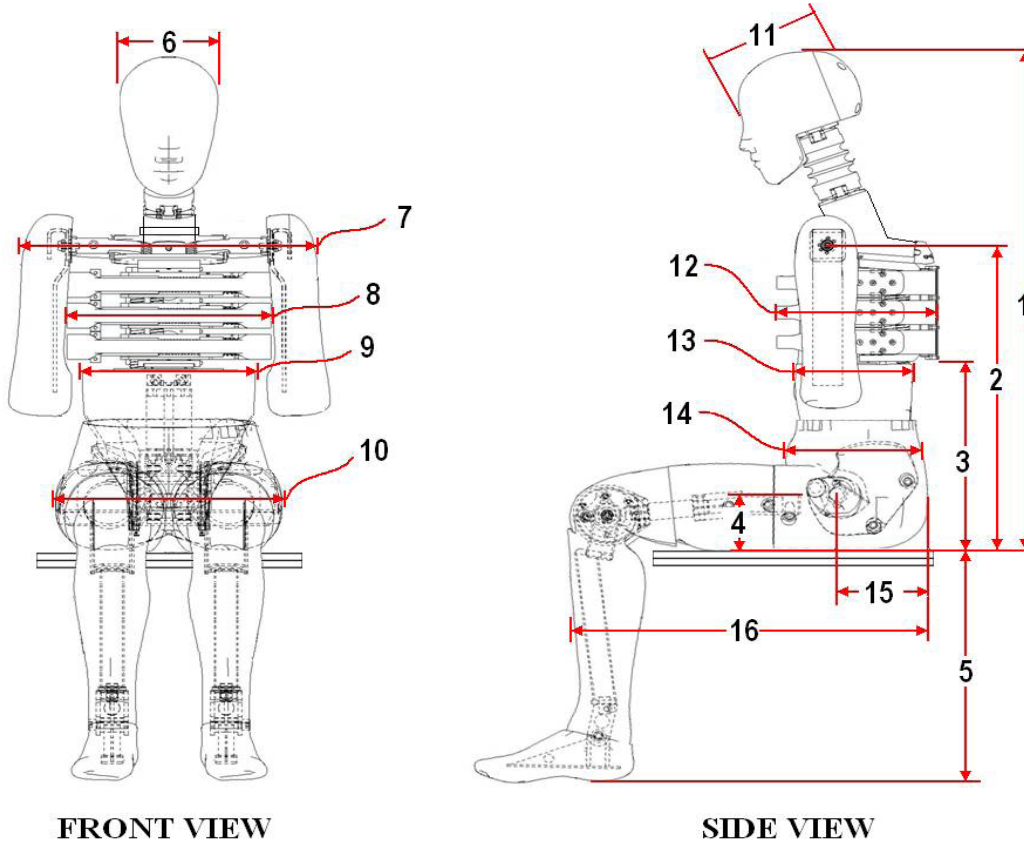
(Subpart U, ES-2re)

External Measurements - EuroSID-2re

Technician: K. Brogan

Date: 03/14/2023

Dummy Serial Number: D037



Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	912	Pass
2	Seat to Shoulder Joint	558	572	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	353	Pass
4	Seat to Hip Joint (center of bolt)	97	103	103	Pass
5	Sole to Seat, Sitting	333	451	422	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	199	Pass
12	Thorax Depth	262	272	267	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	240	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	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

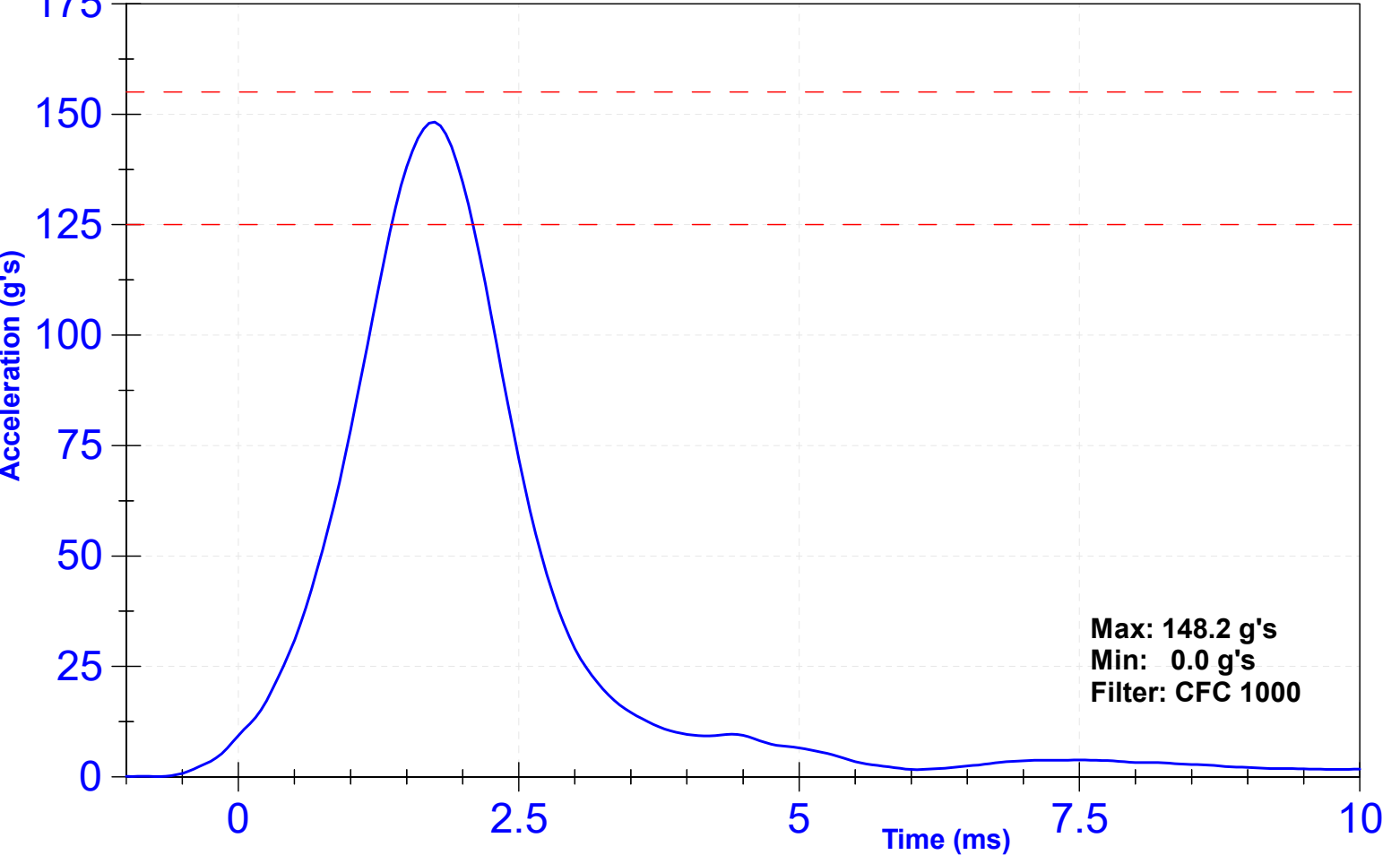
Results

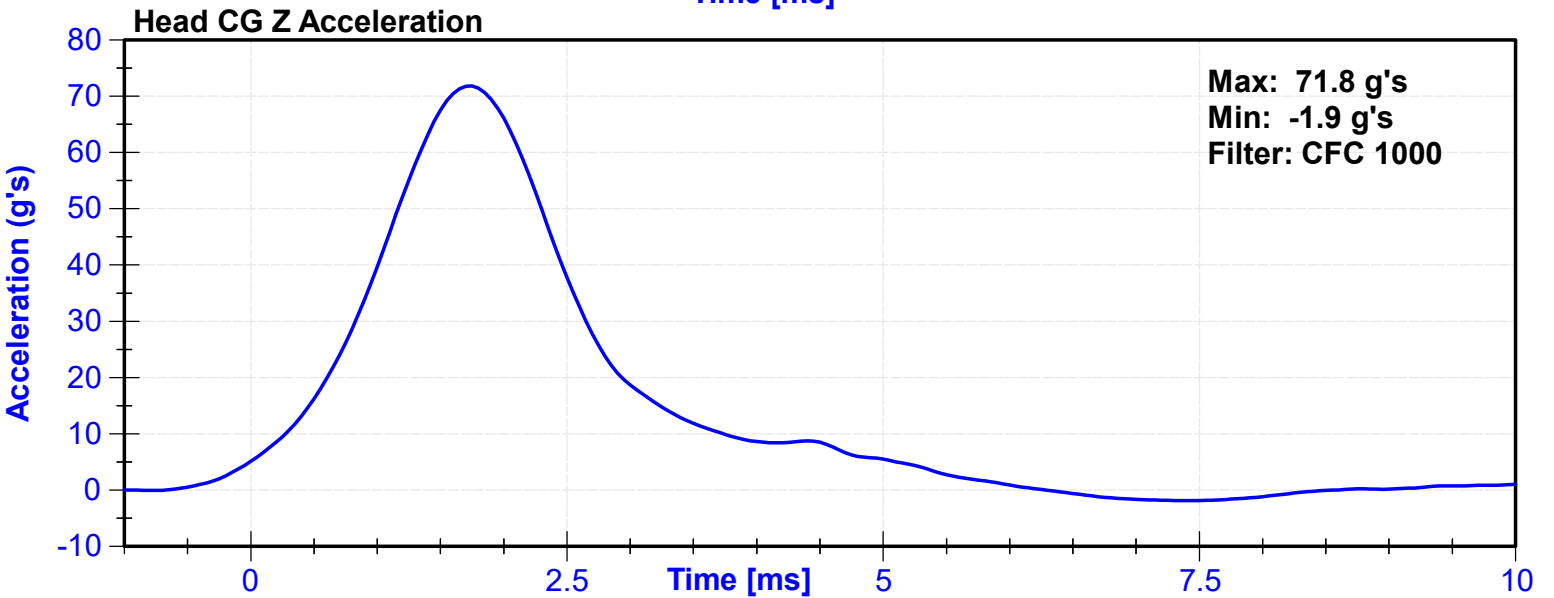
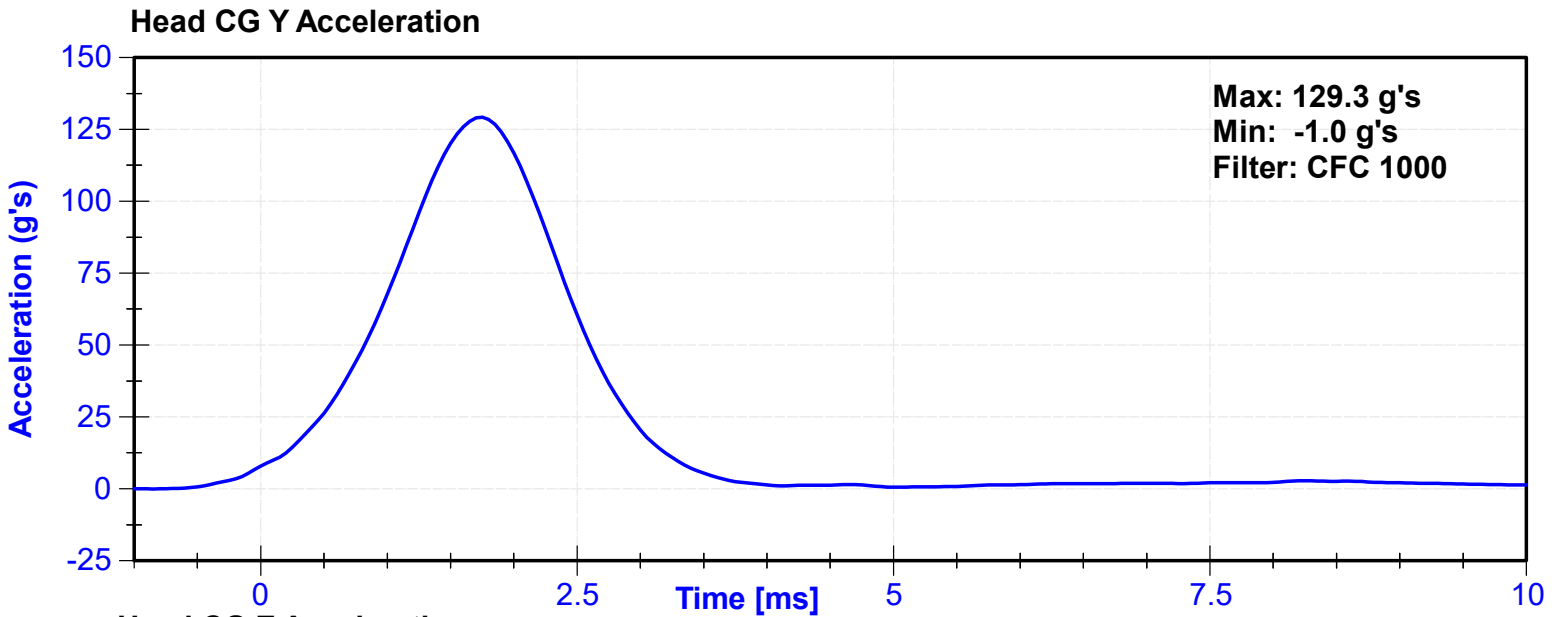
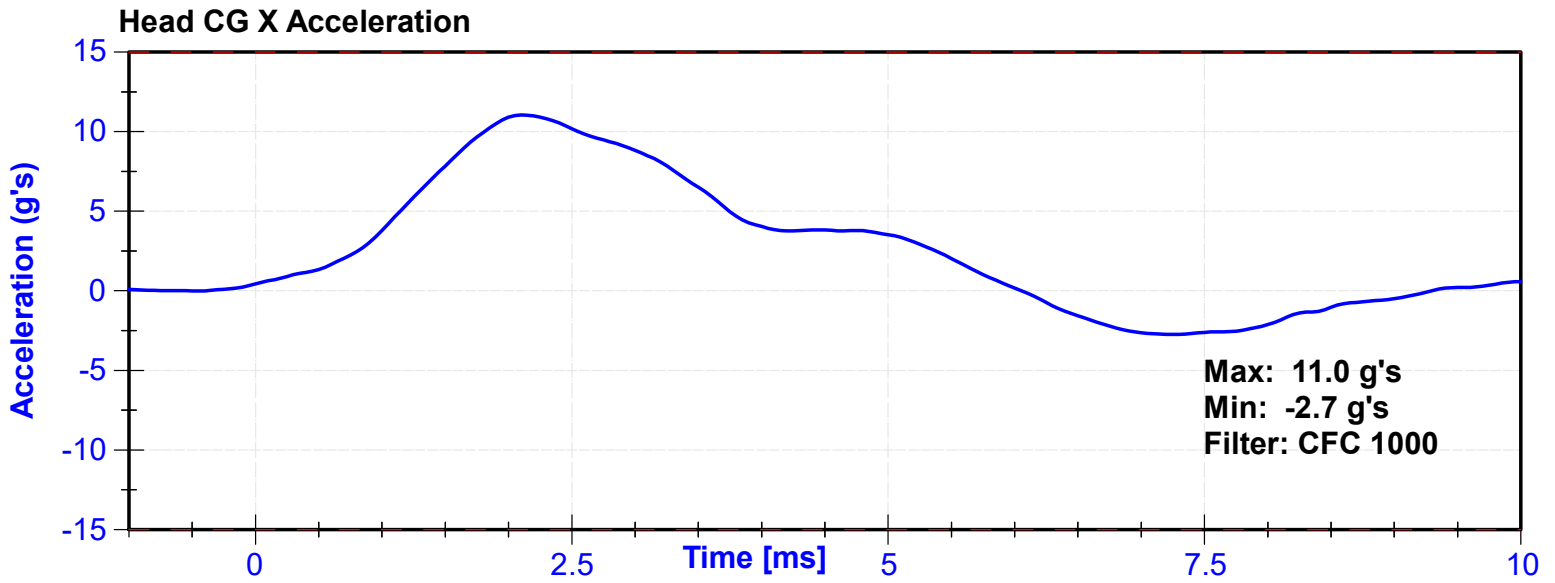
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Resultant Acceleration	125	155	g's	148.2	Pass
Oscillation	0	15	%	6.49	Pass
Fore-Aft Acceleration	-15	15	g's	11.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	T21724	2/27/2023	8/26/2023
Y Accelerometer	Endevco	T22281	2/27/2023	8/26/2023
Z Accelerometer	Endevco	T26050	2/27/2023	8/26/2023

Resultant Acceleration





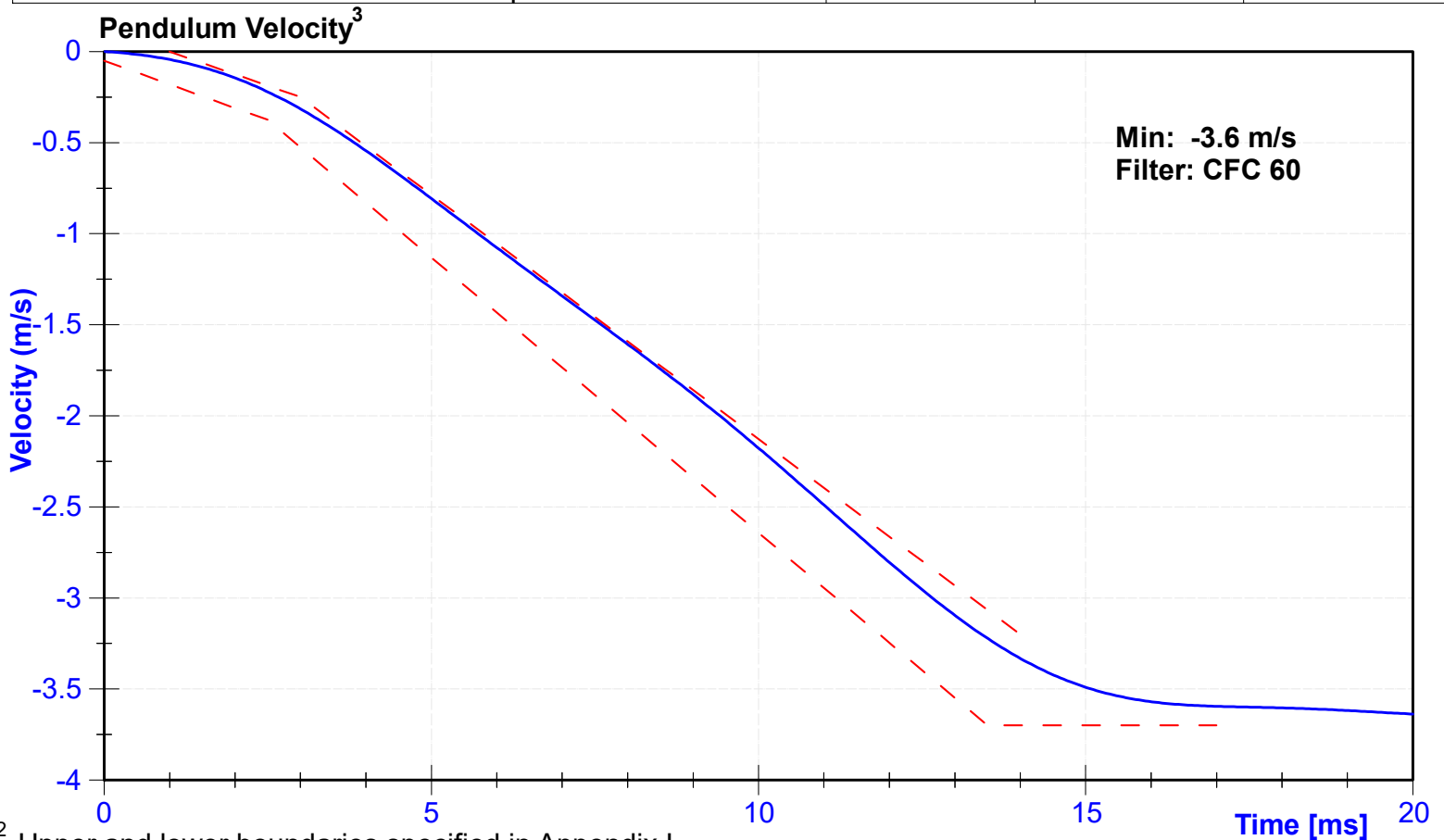
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	21.2	Pass
Velocity	3.3	3.5	m/s	3.36	Pass
Lateral Neck Rotation	49	59	deg	54.0	Pass
Time at Maximum Rotation	54	66	ms	62.9	Pass
Time of Rotation Decay from Maximum	53	88	ms	53.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

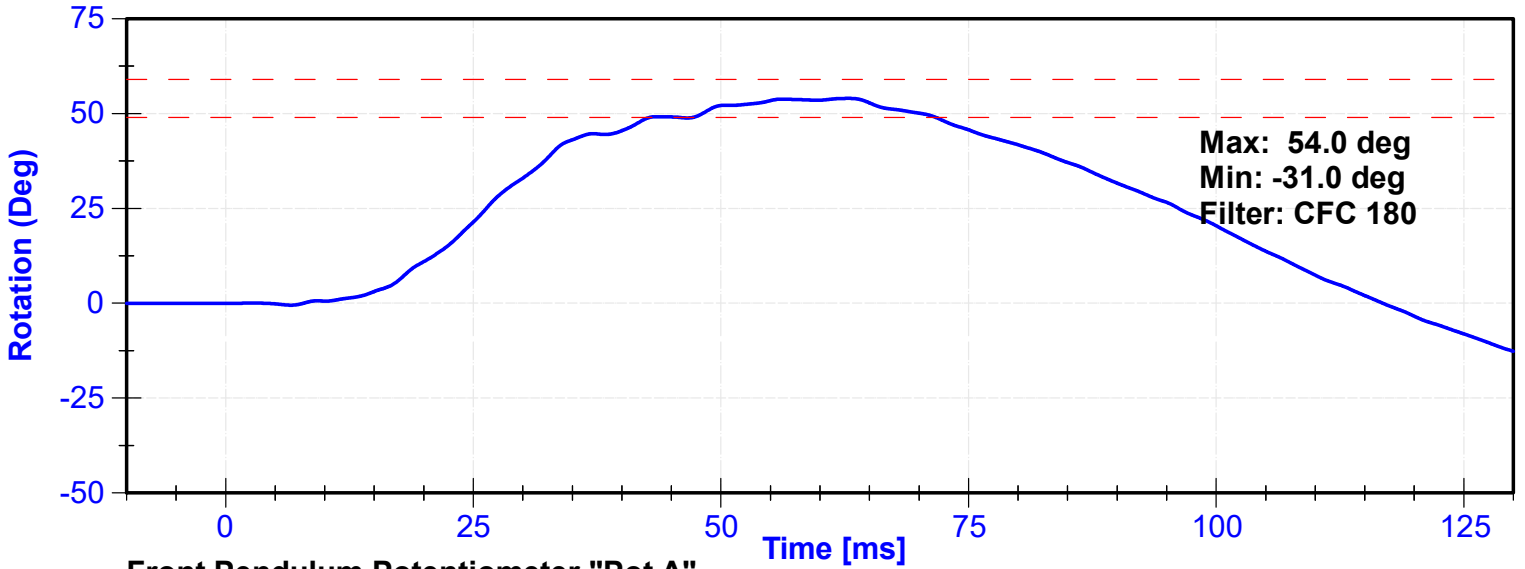
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023

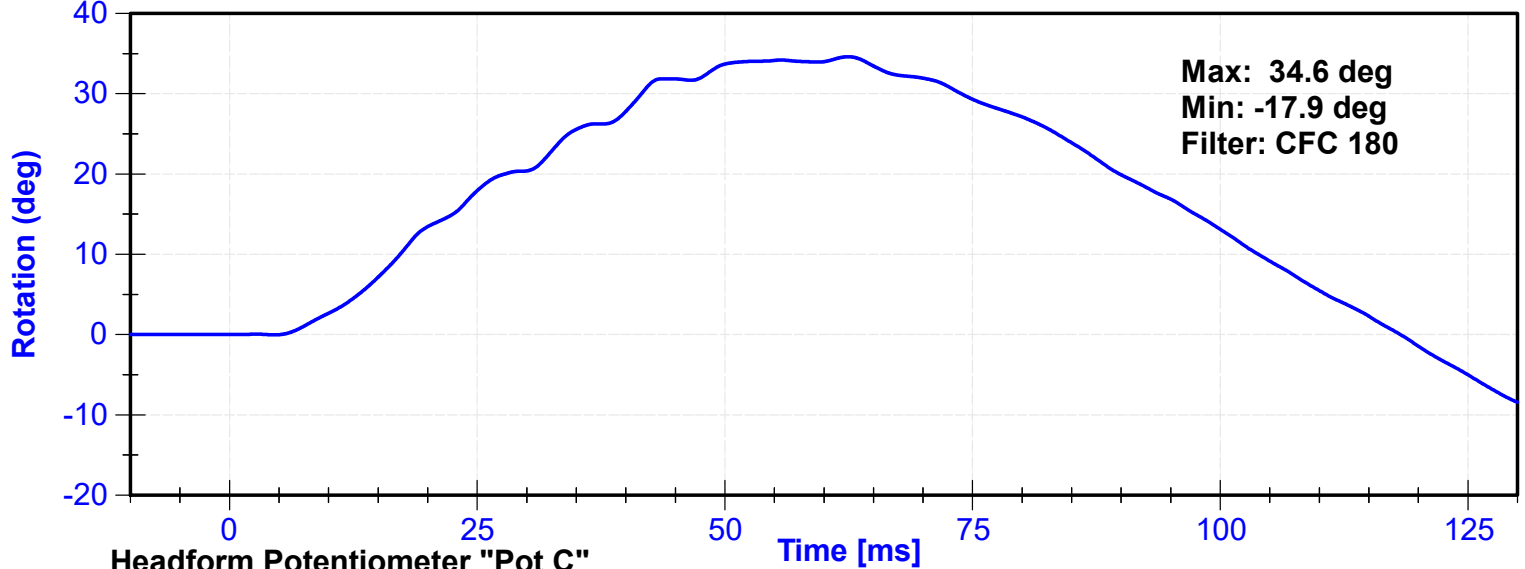


^{1,2} Upper and lower boundaries specified in Appendix I

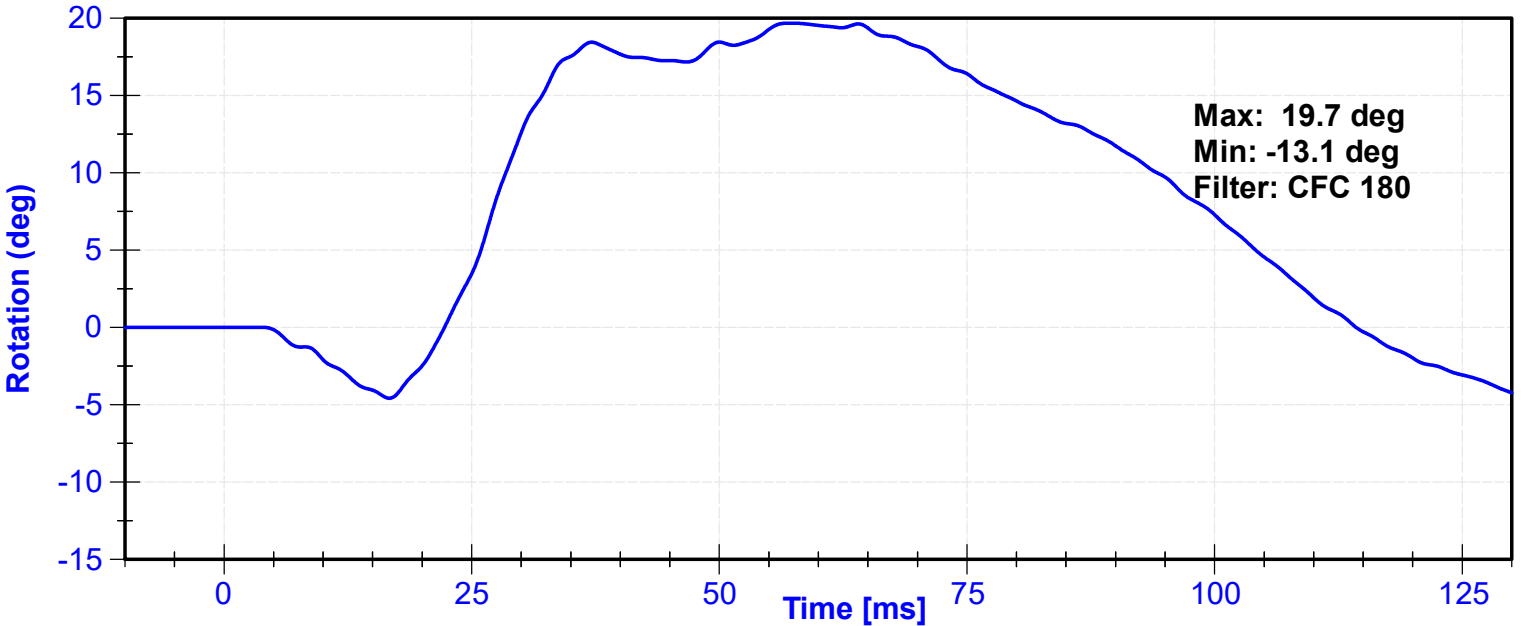
Neck Rotation



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	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

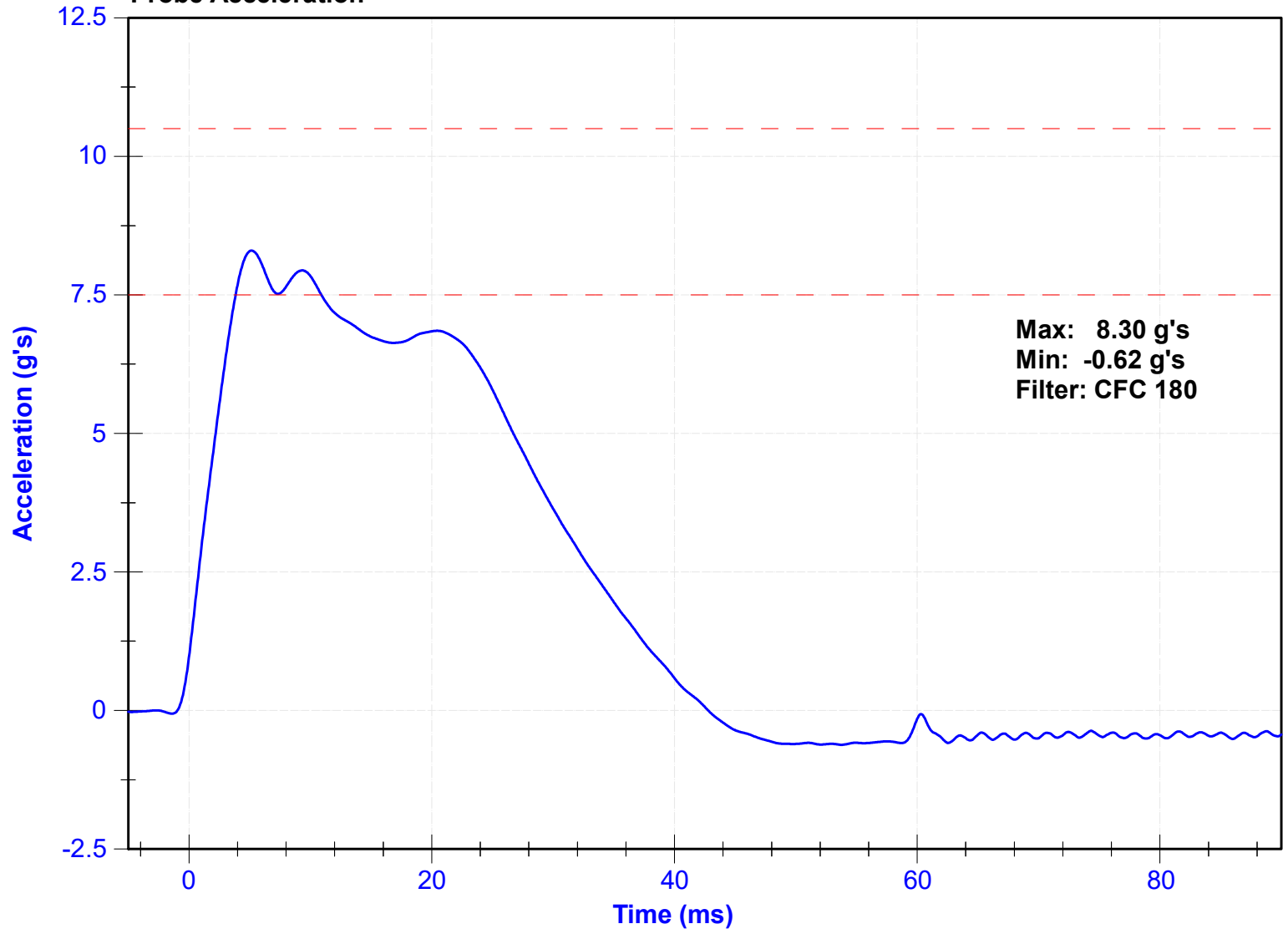
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	22.3	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	7.5	10.5	g's	8.30	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023

Probe Acceleration



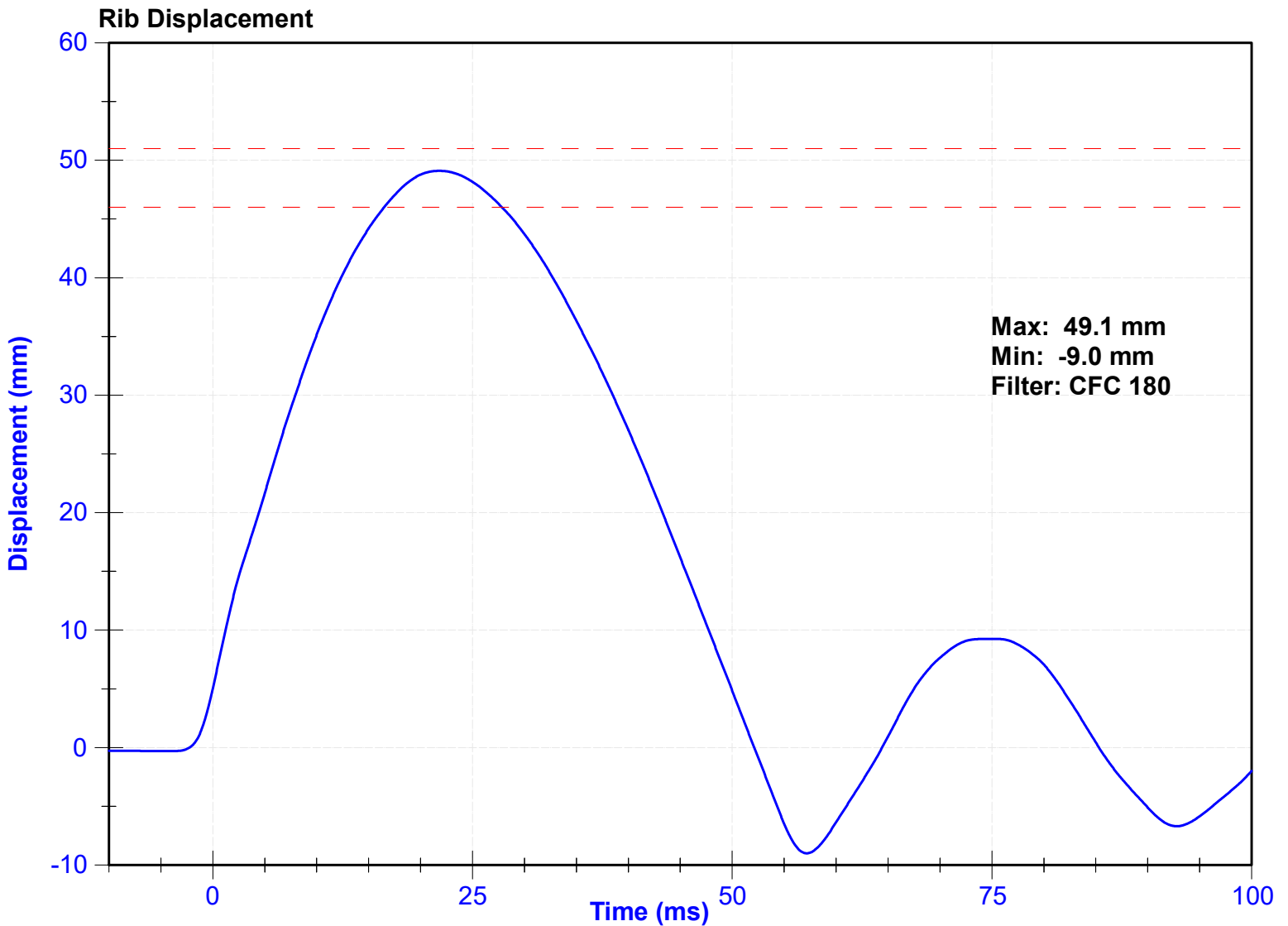
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-01	2/27/2023	8/28/2023



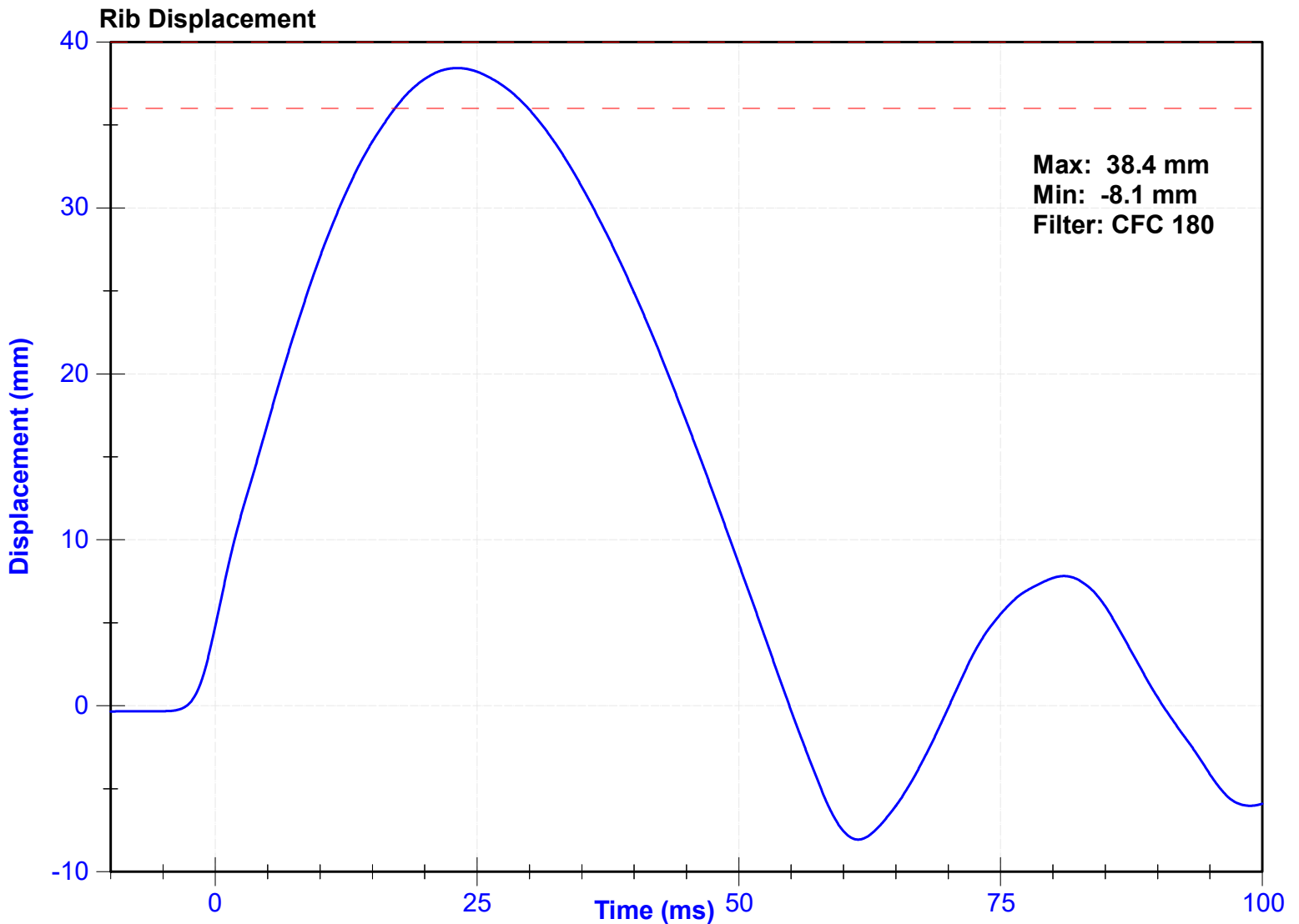
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	36	40	mm	38.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-01	2/27/2023	8/28/2023



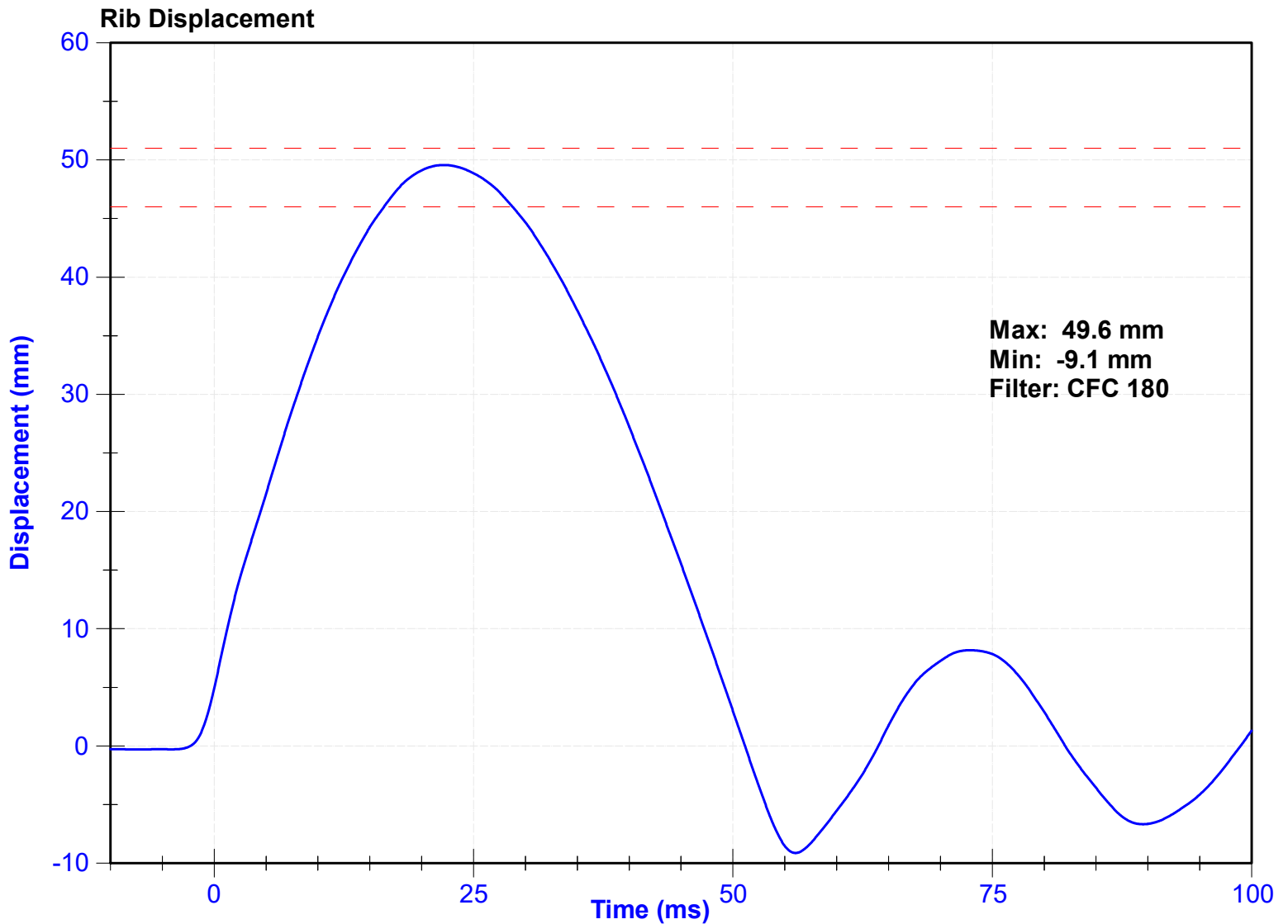
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	46	51	mm	49.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-807	2/27/2023	8/28/2023



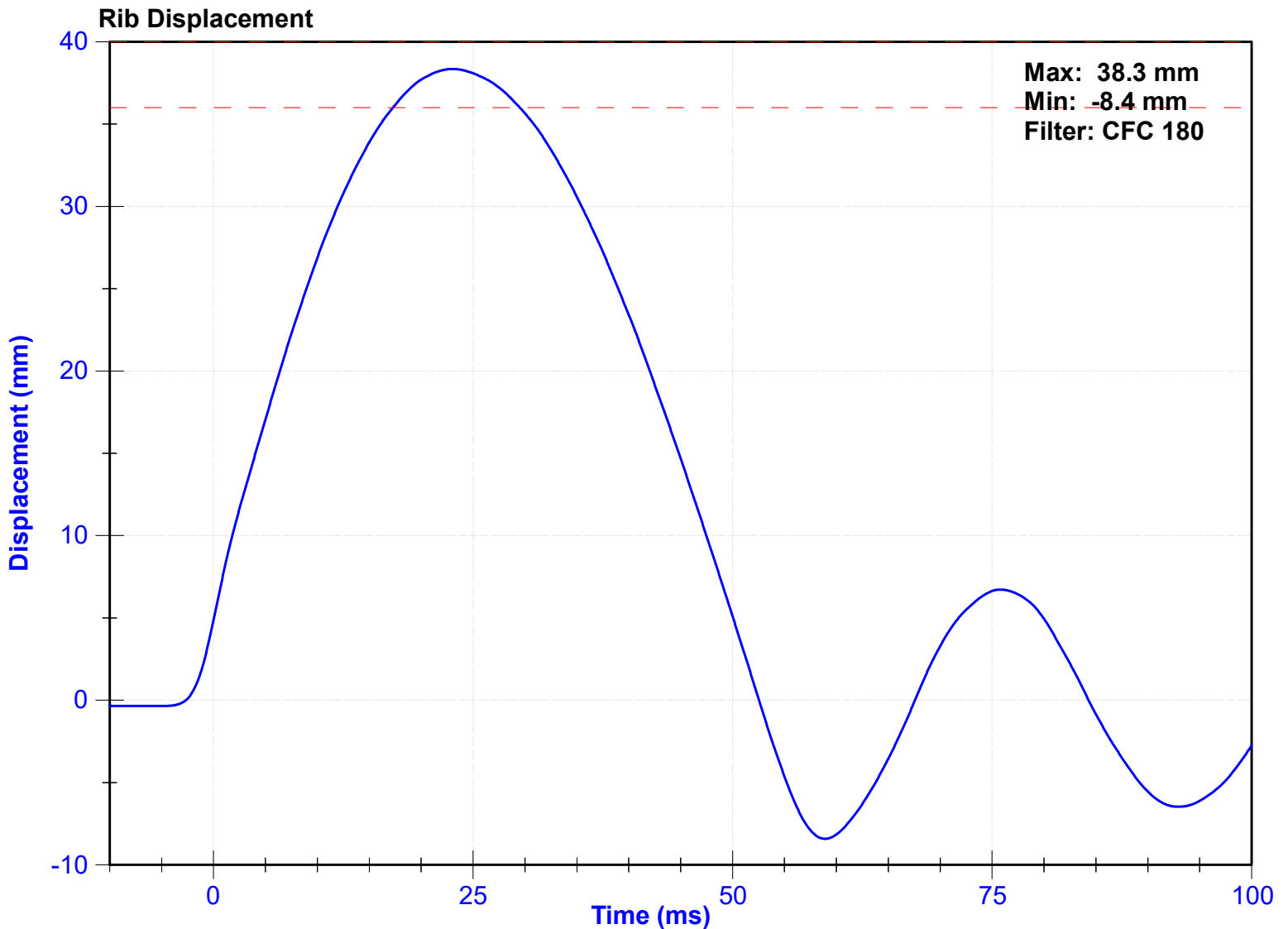
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	36	40	mm	38.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-807	2/27/2023	8/28/2023



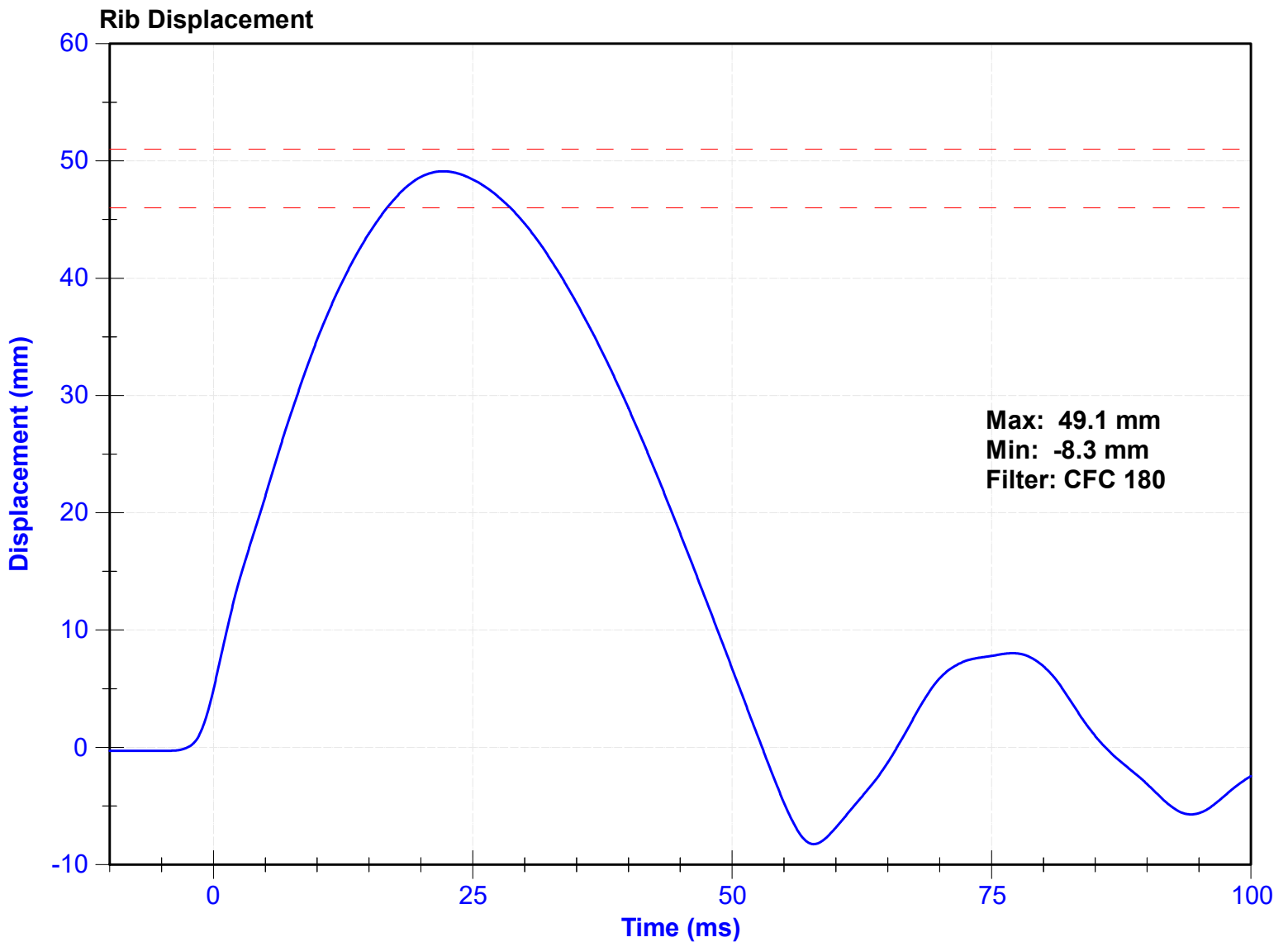
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-03	2/27/2023	8/28/2023



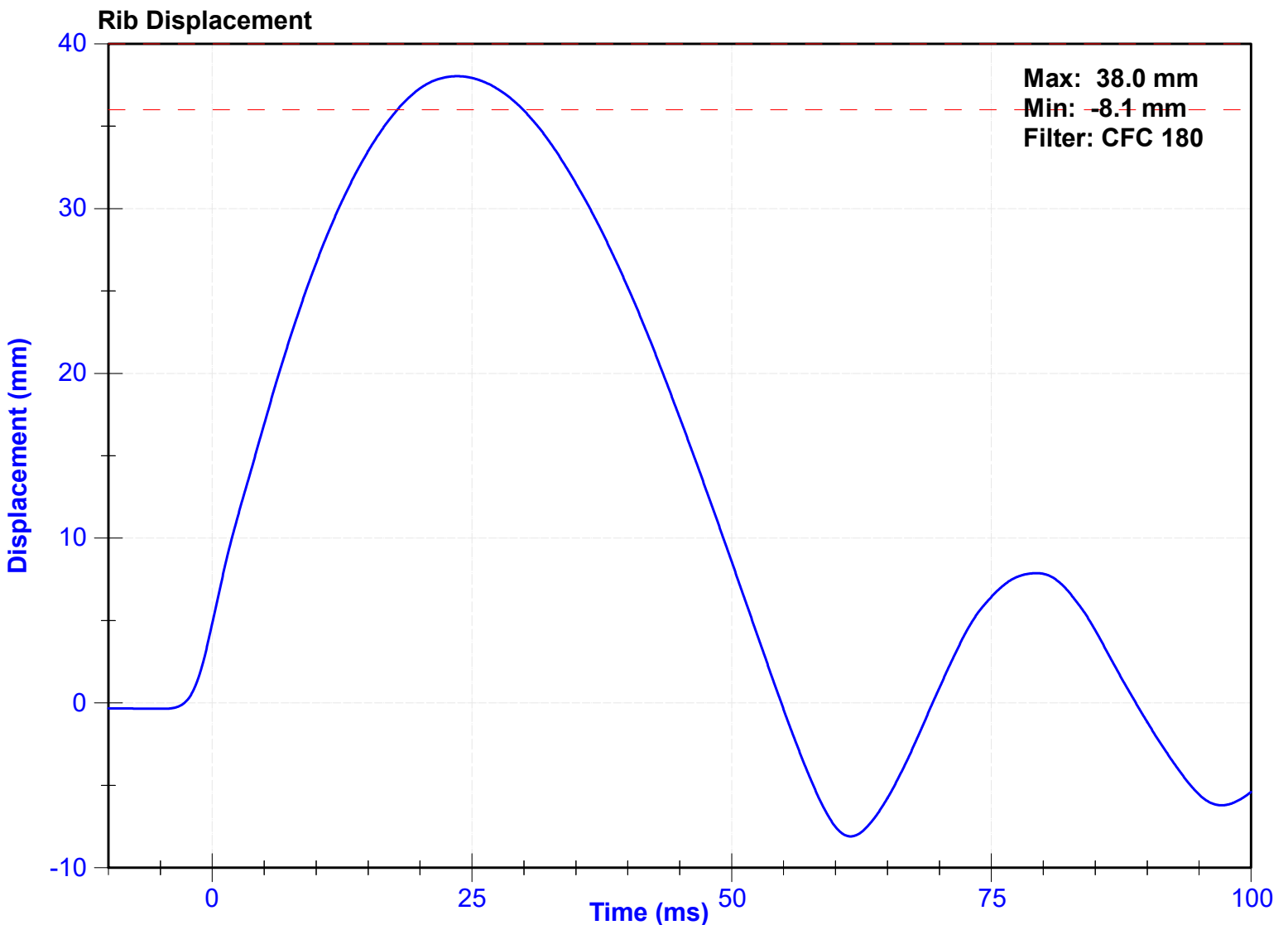
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-03	2/27/2023	8/28/2023



ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

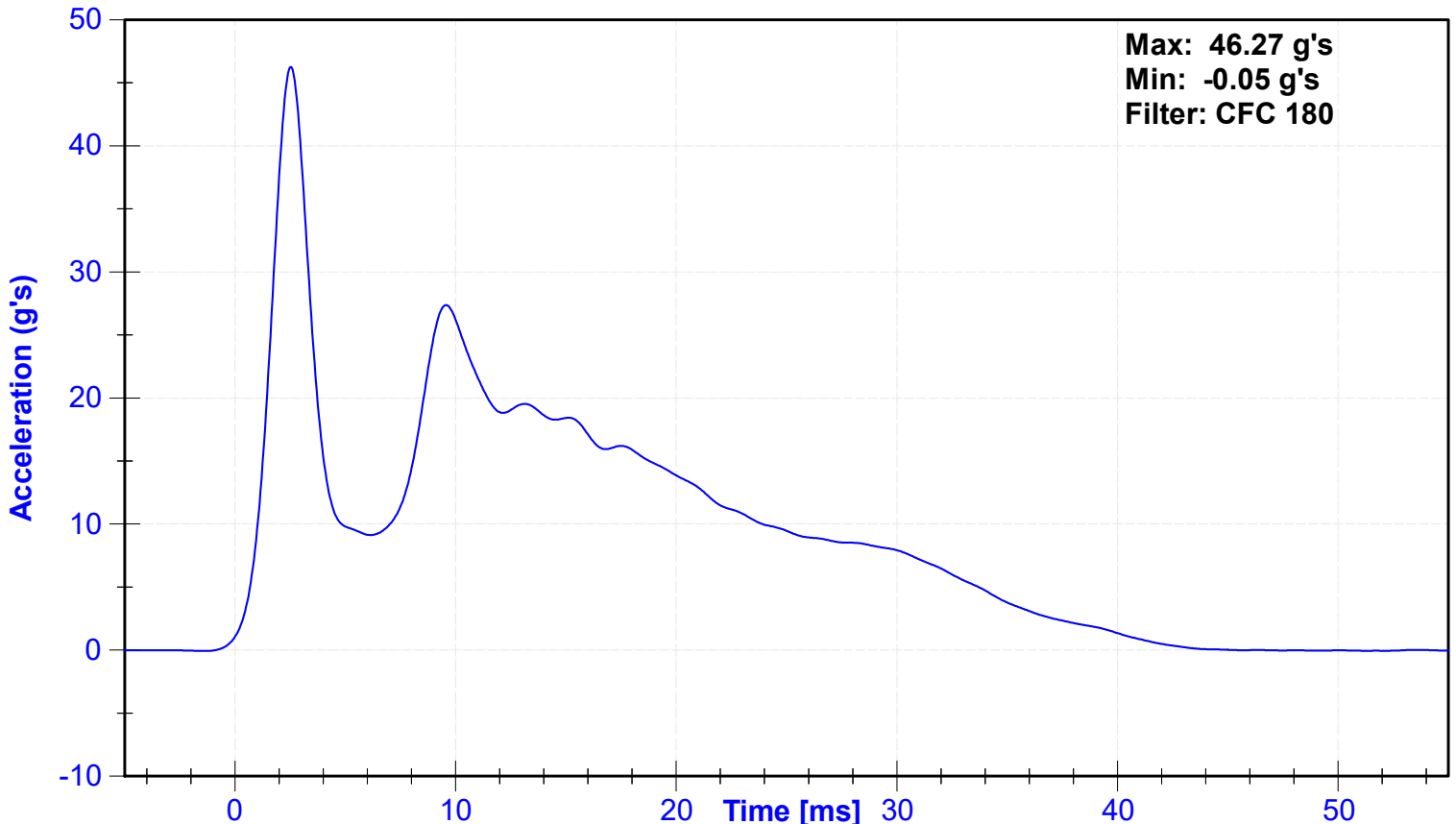
Results

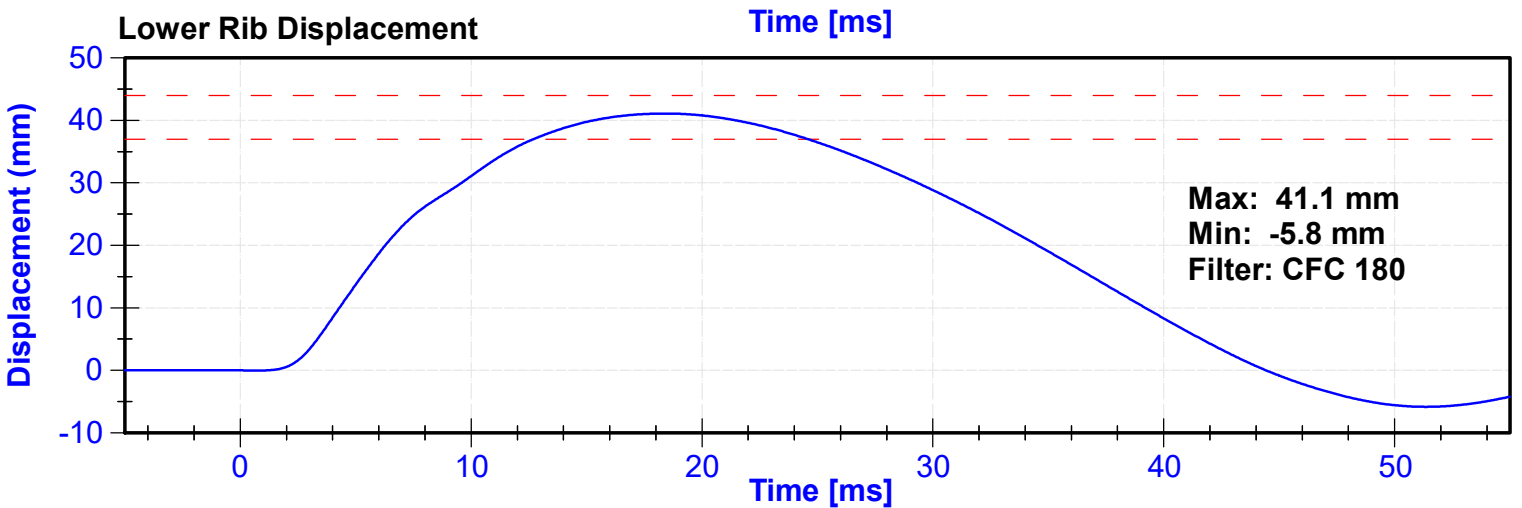
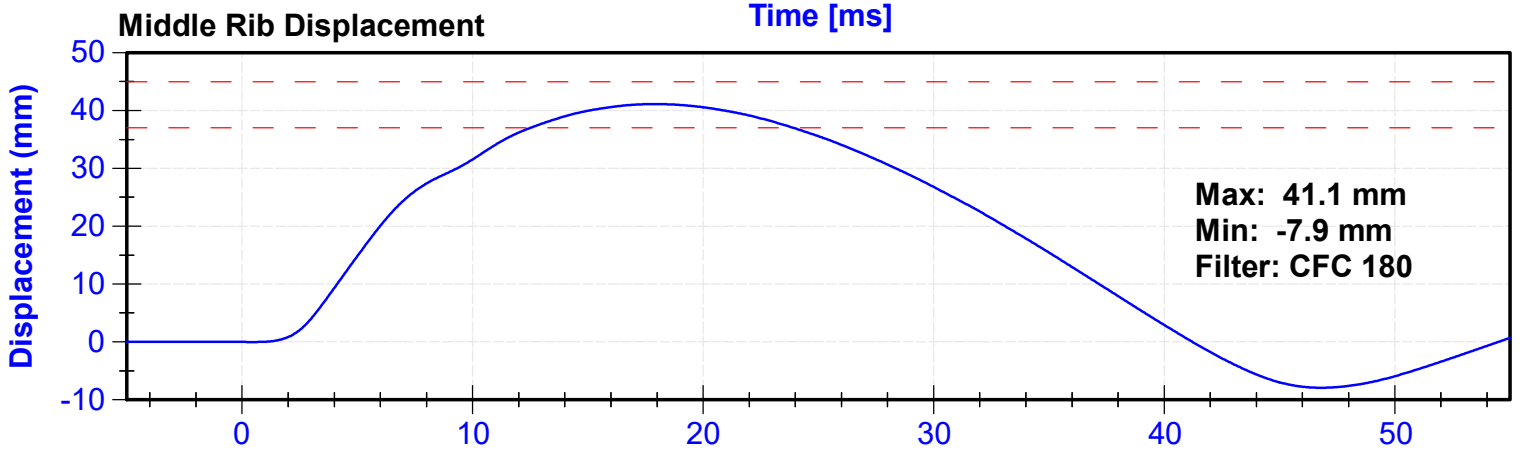
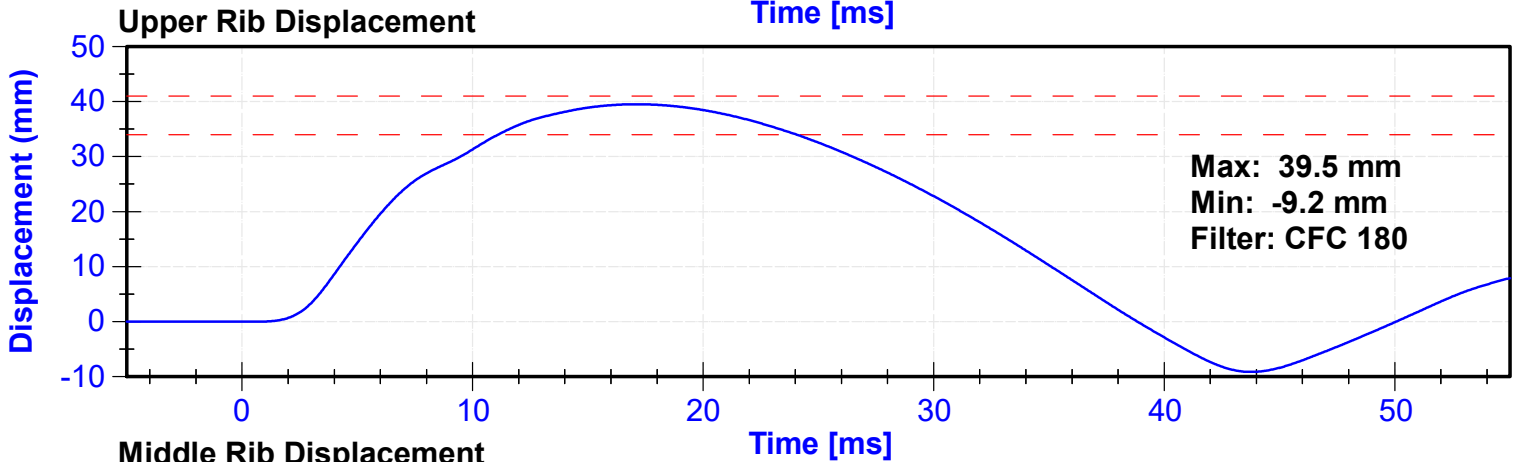
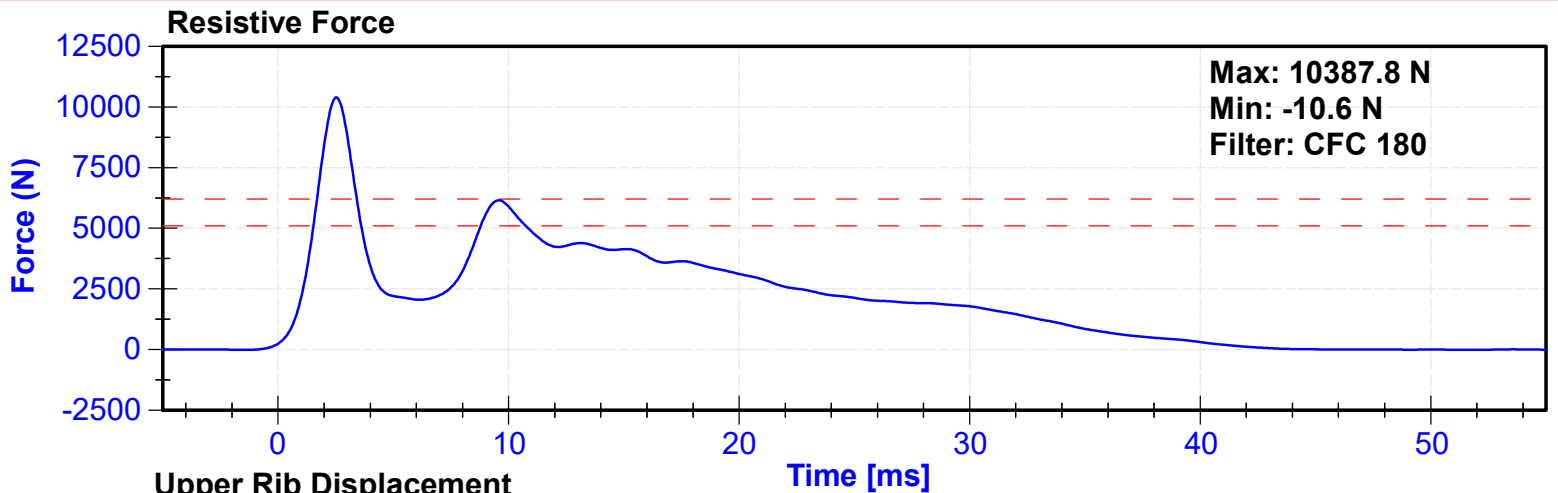
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	22.3	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	6147.7	Pass
Upper Thorax Rib Deflection	34	41	mm	39.5	Pass
Mid Thorax Rib Deflection	37	45	mm	41.1	Pass
Lower Thorax Rib Deflection	37	44	mm	41.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Thorax Rib Potentiometer	Honeywell	DS-0552-01	2/27/2023	8/28/2023
Middle Thorax Rib Potentiometer	Honeywell	DS-807	2/27/2023	8/28/2023
Lower Thorax Rib Potentiometer	Honeywell	DS-0552-03	2/27/2023	8/28/2023

Probe Acceleration





ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

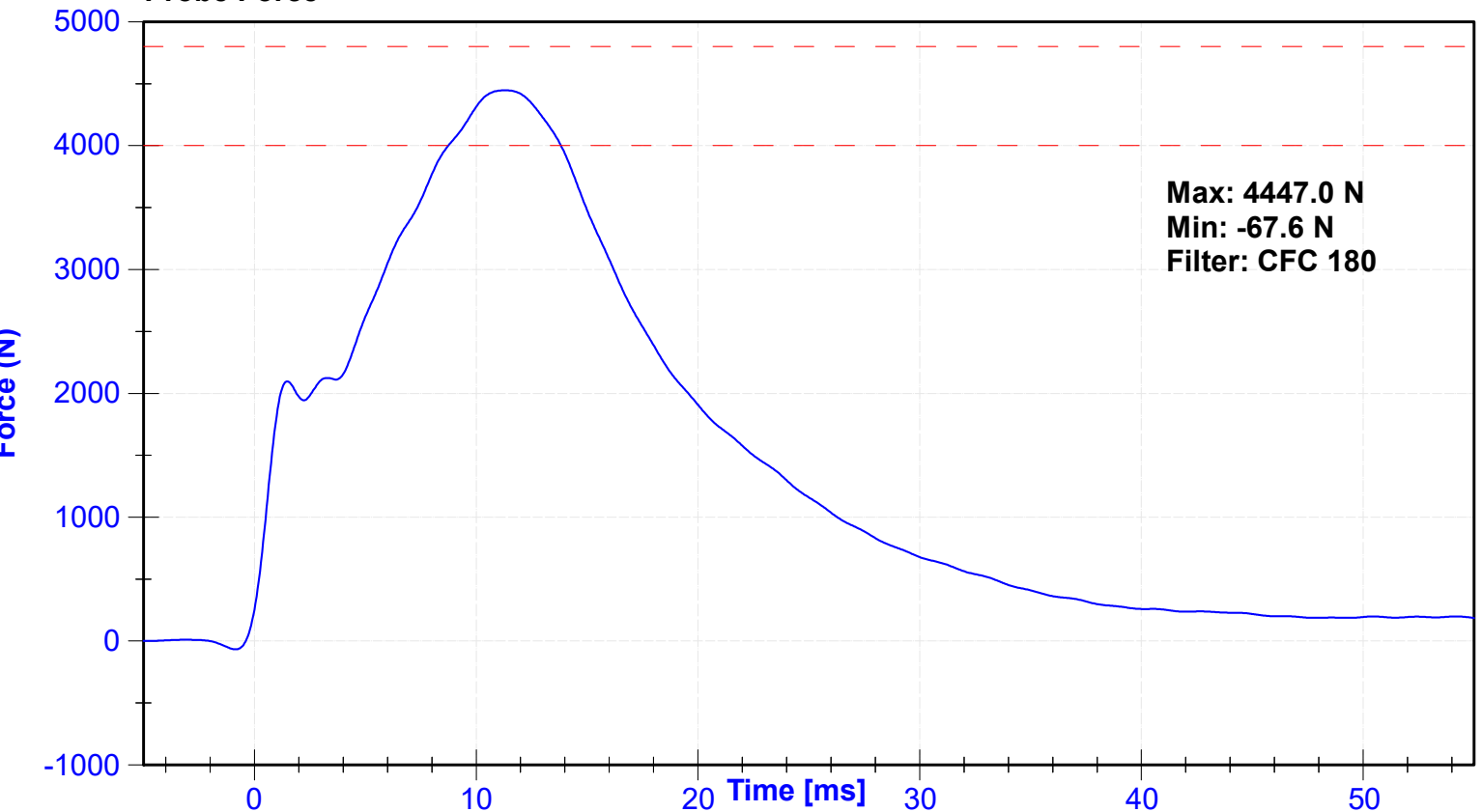
Results

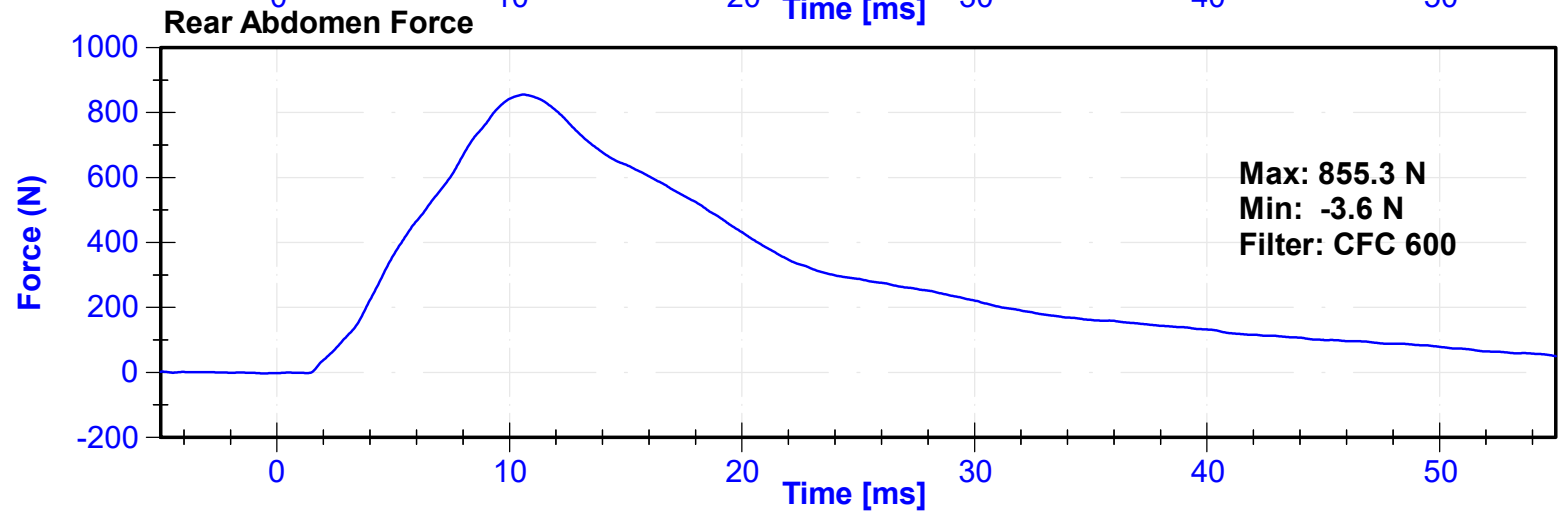
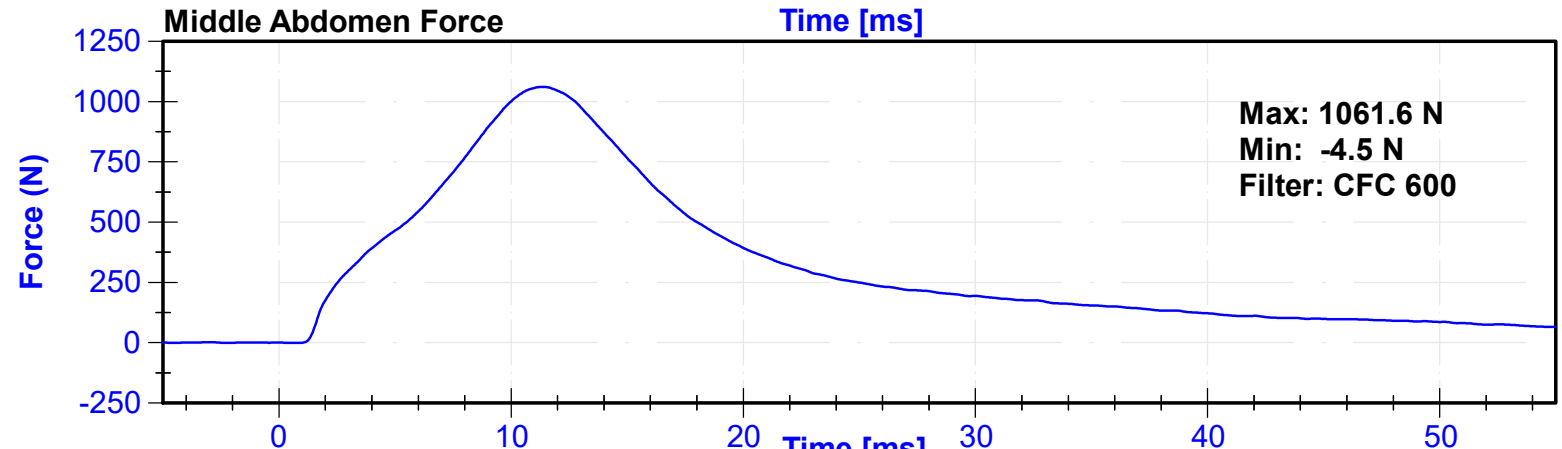
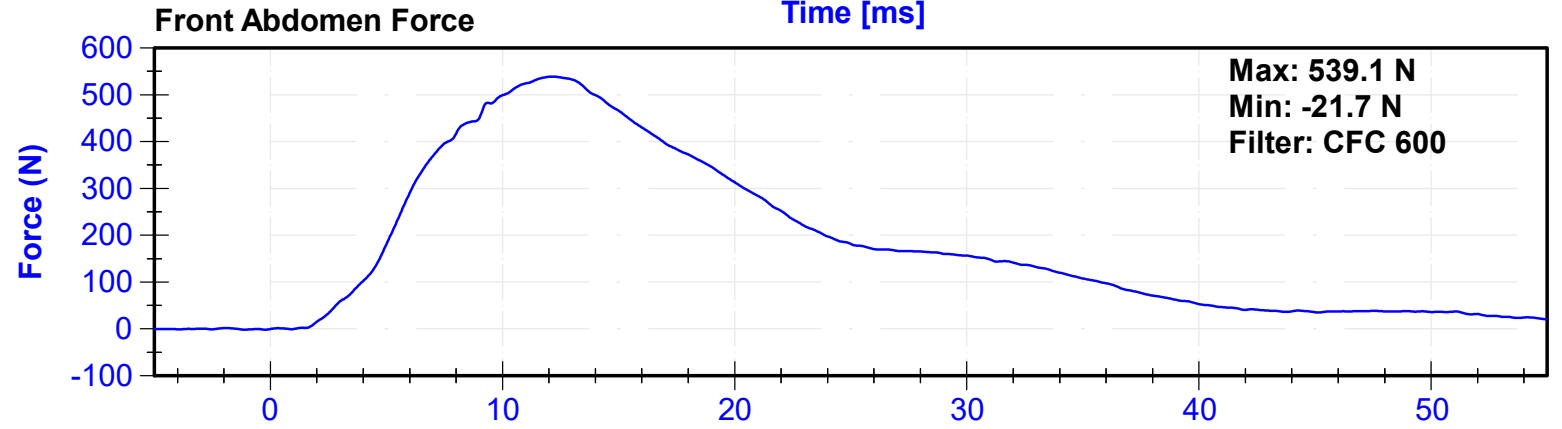
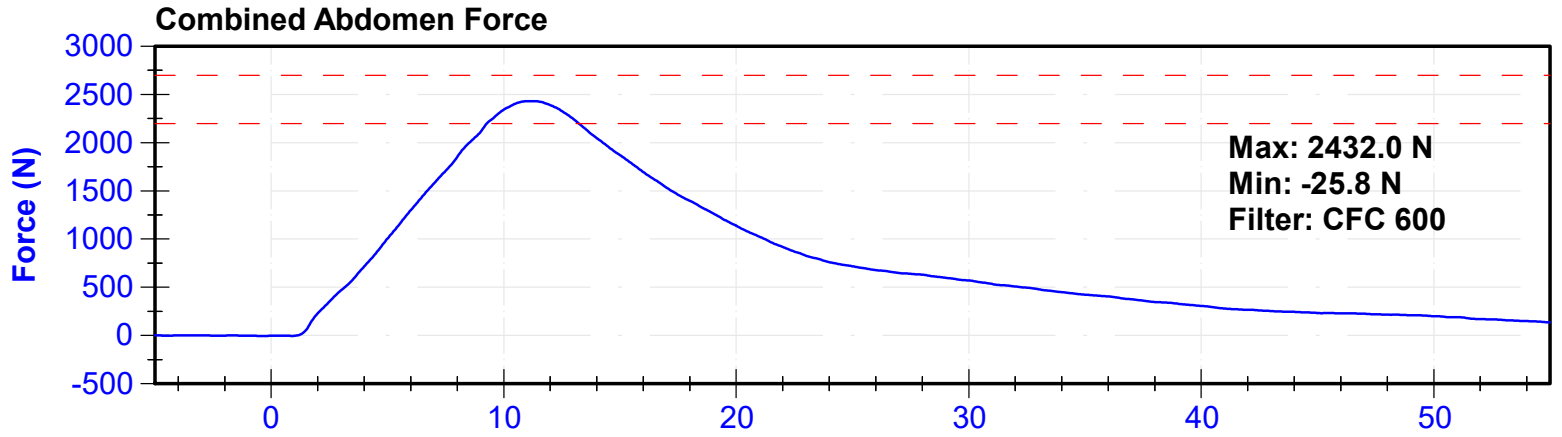
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	22.3	Pass
Velocity	3.9	4.1	m/s	4.01	Pass
Combined Abdomen Force	2200	2700	N	2432.0	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.25	Pass
Resistive Probe Force	4000	4800	N	4447.0	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.30	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Front Abdomen Load Cell	Denton	1440	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1525	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1528	8/12/2022	8/12/2023

Probe Force





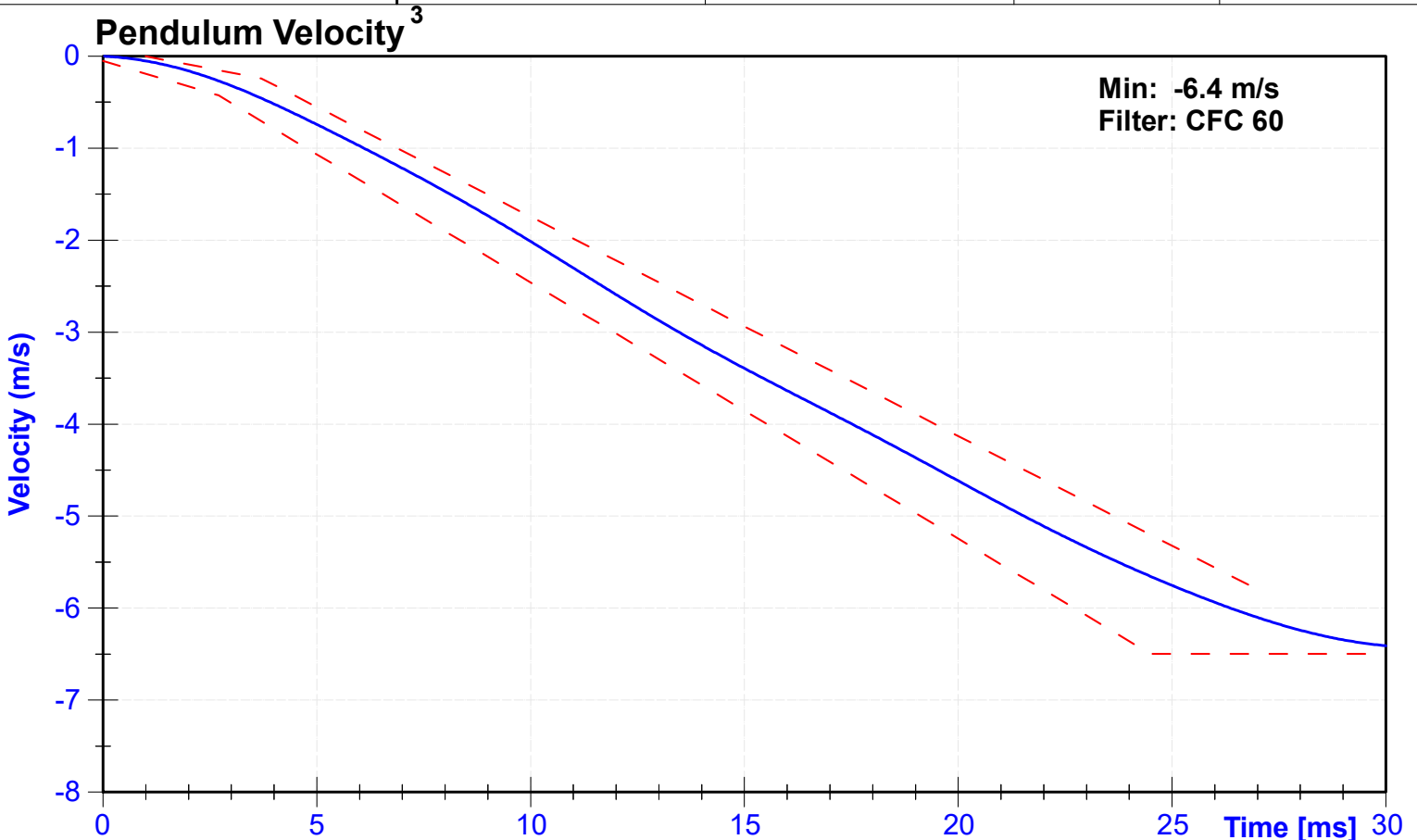
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

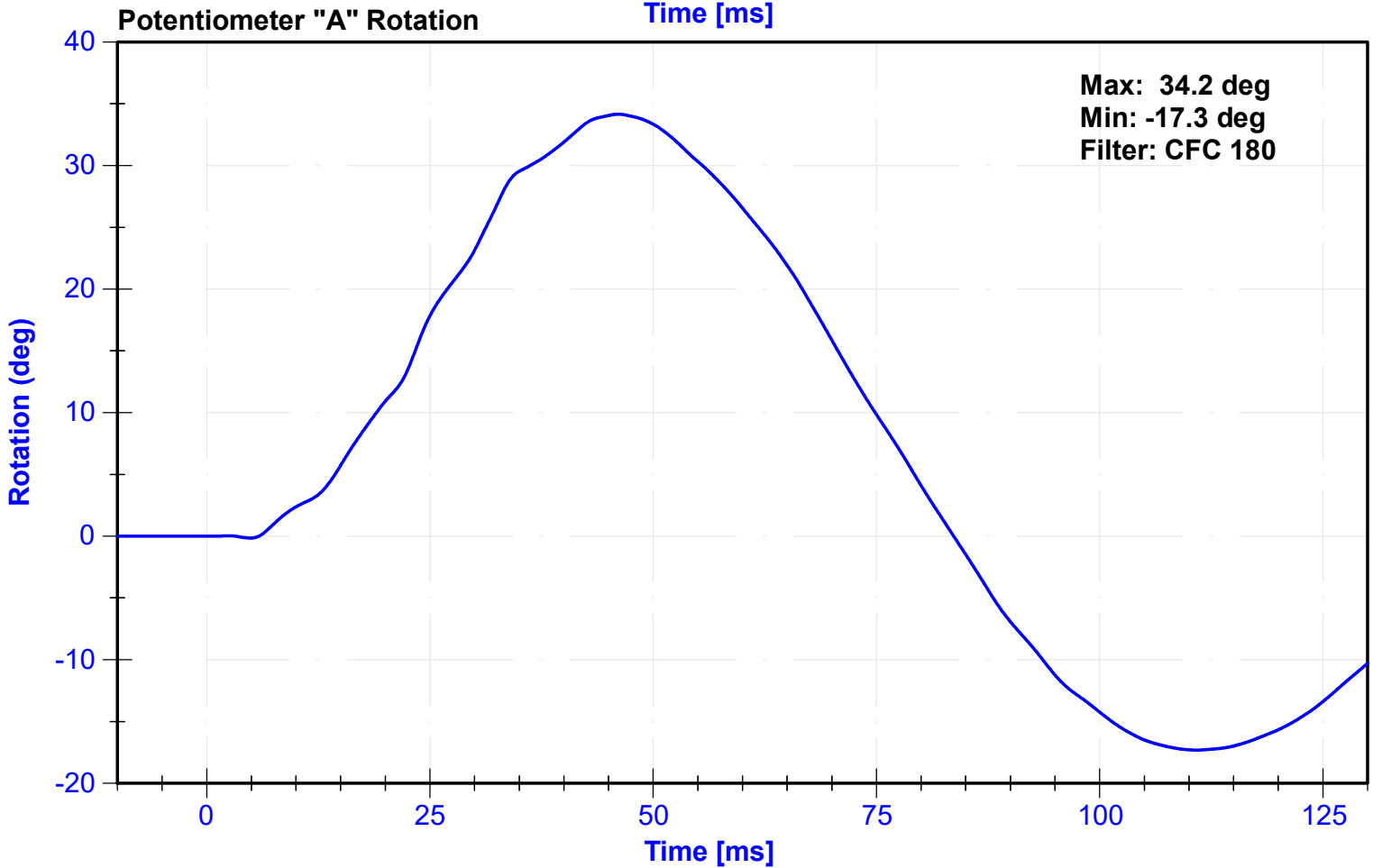
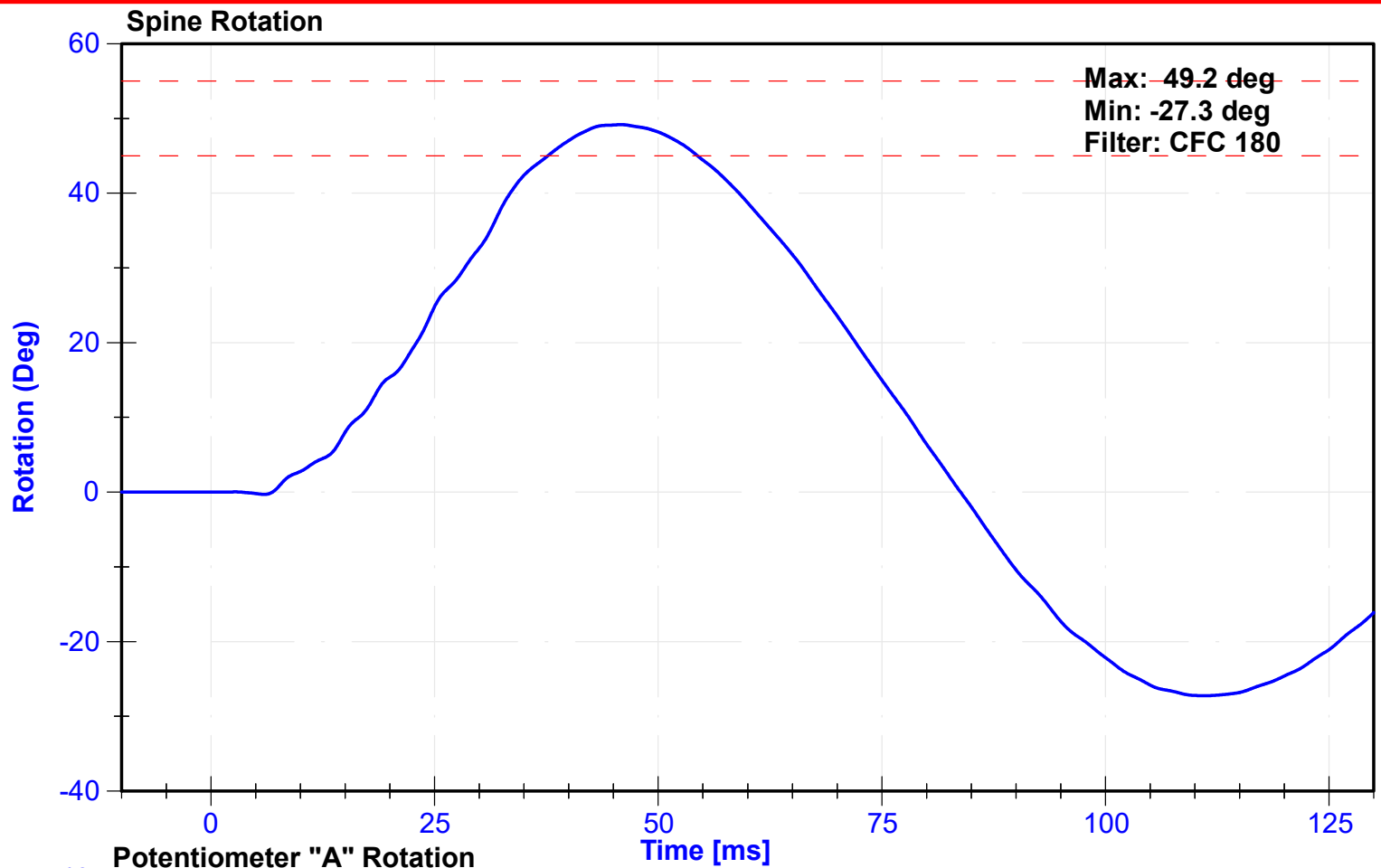
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	21.2	Pass
Velocity	5.95	6.15	m/s	6.044	Pass
Lateral Spine Rotation	45	55	deg	49.2	Pass
Time at Maximum Rotation	39	53	ms	45.8	Pass
Time of Decay to Zero Degrees	37	57	ms	37.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

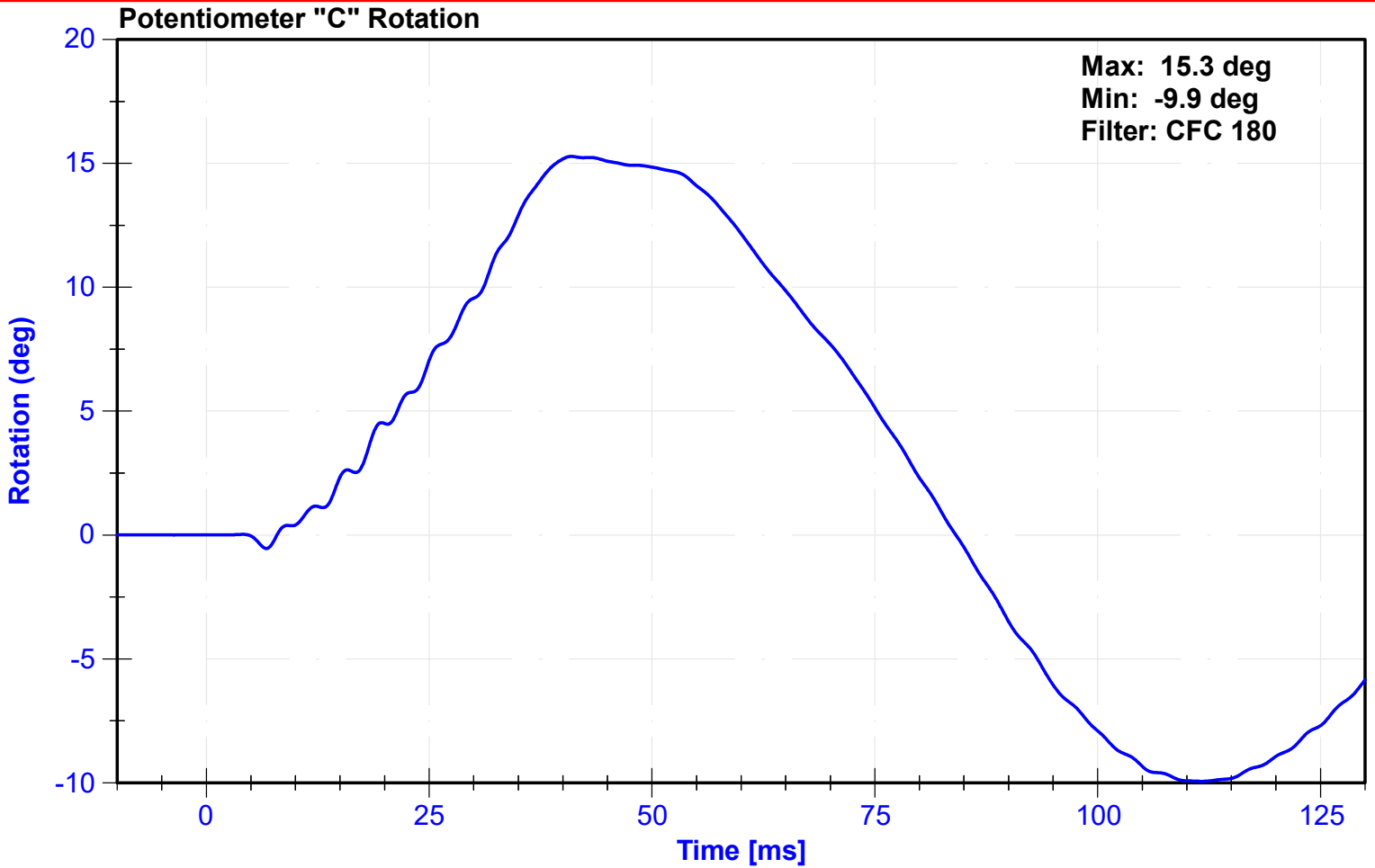
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



^{1,2} Upper and lower boundaries specified in Appendix I IV-19





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

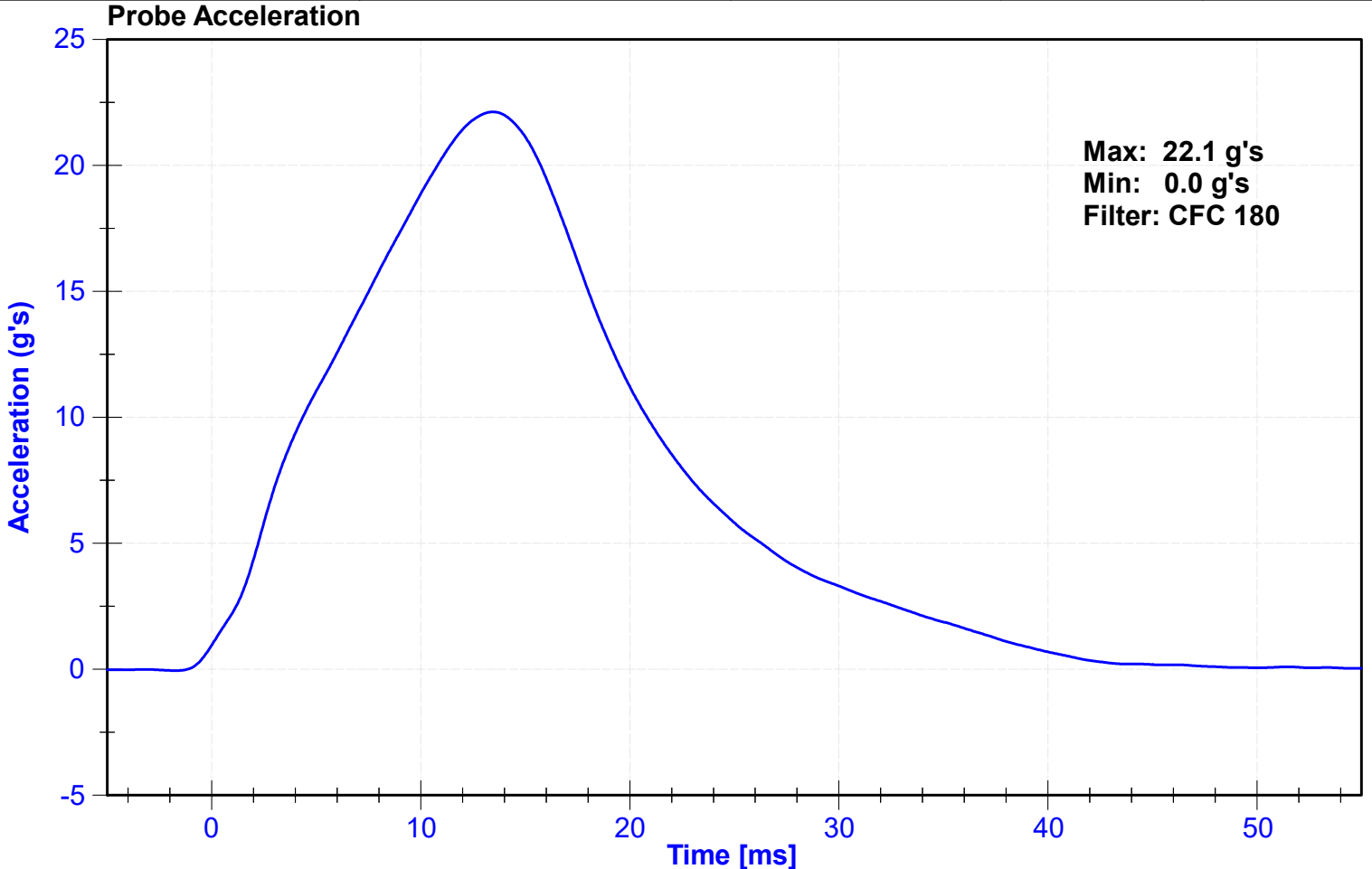
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

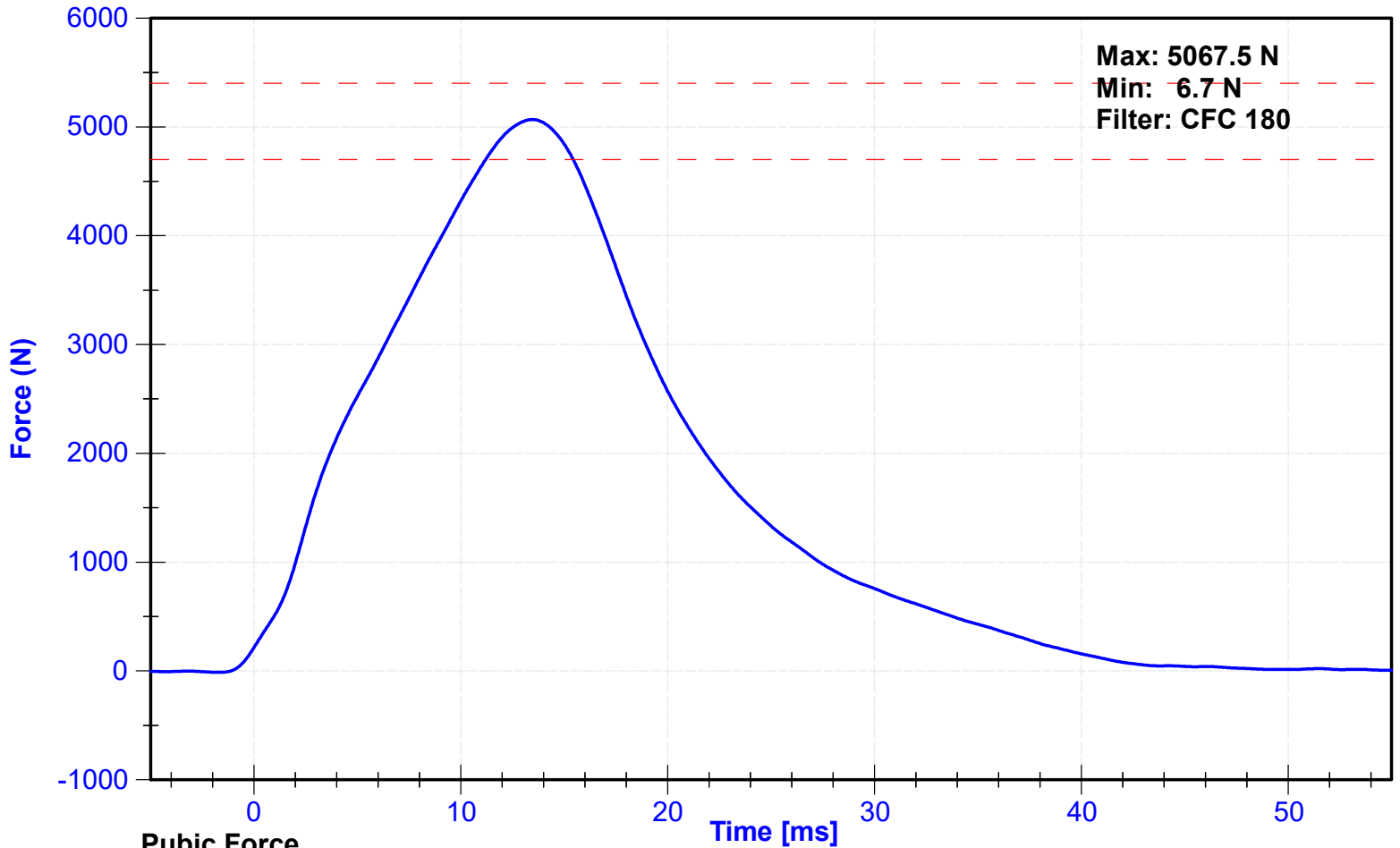
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	22.3	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Resistive Force	4700	5400	N	5067.5	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.45	Pass
Pubic Force	-1590	-1230	N	-1495.2	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.70	Pass

Transducer Calibrations

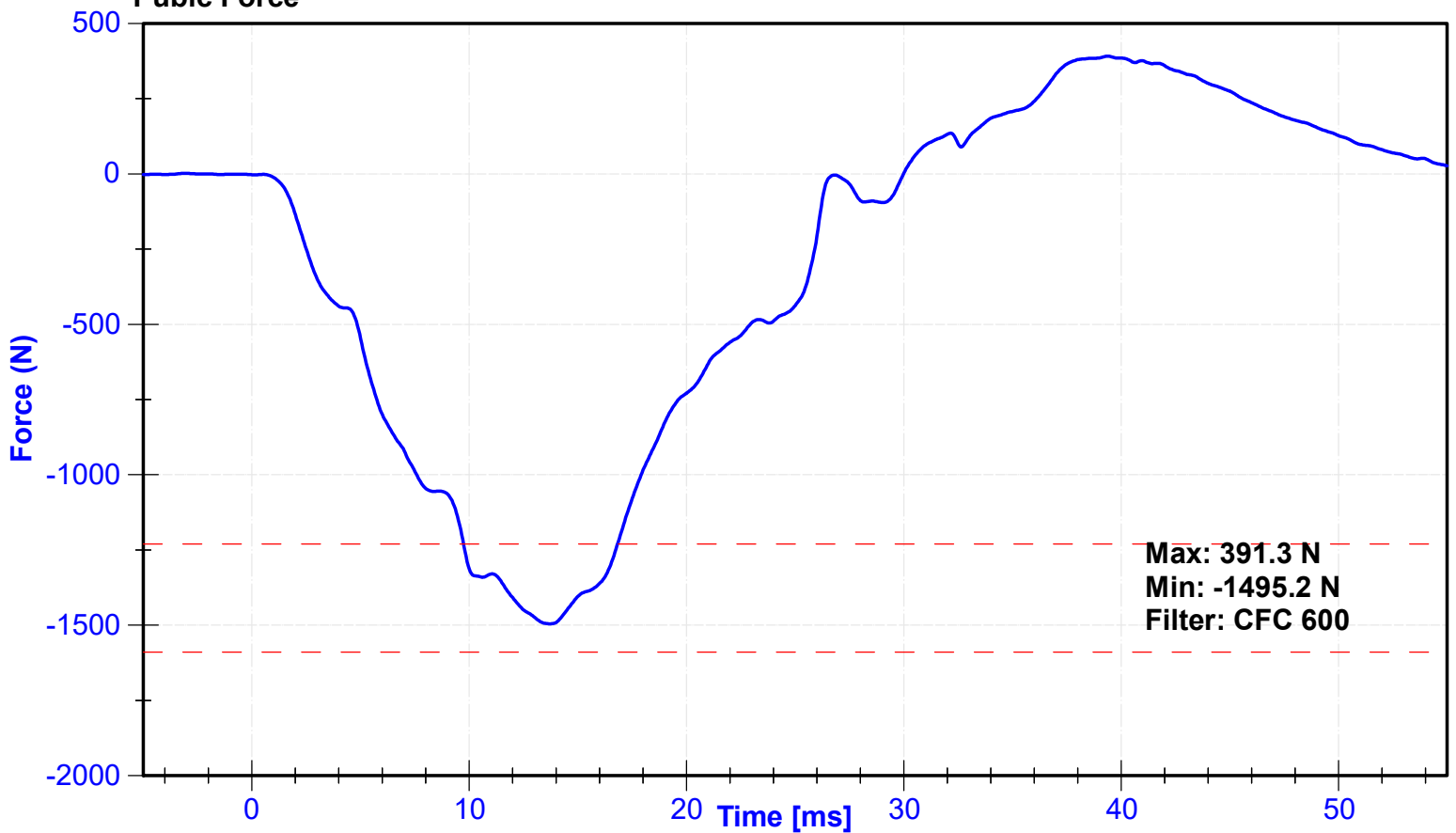
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Pubic Load Cell	Denton	3096JFL-456-FY	8/12/2022	8/12/2023



Resistive Force



Pubic Force



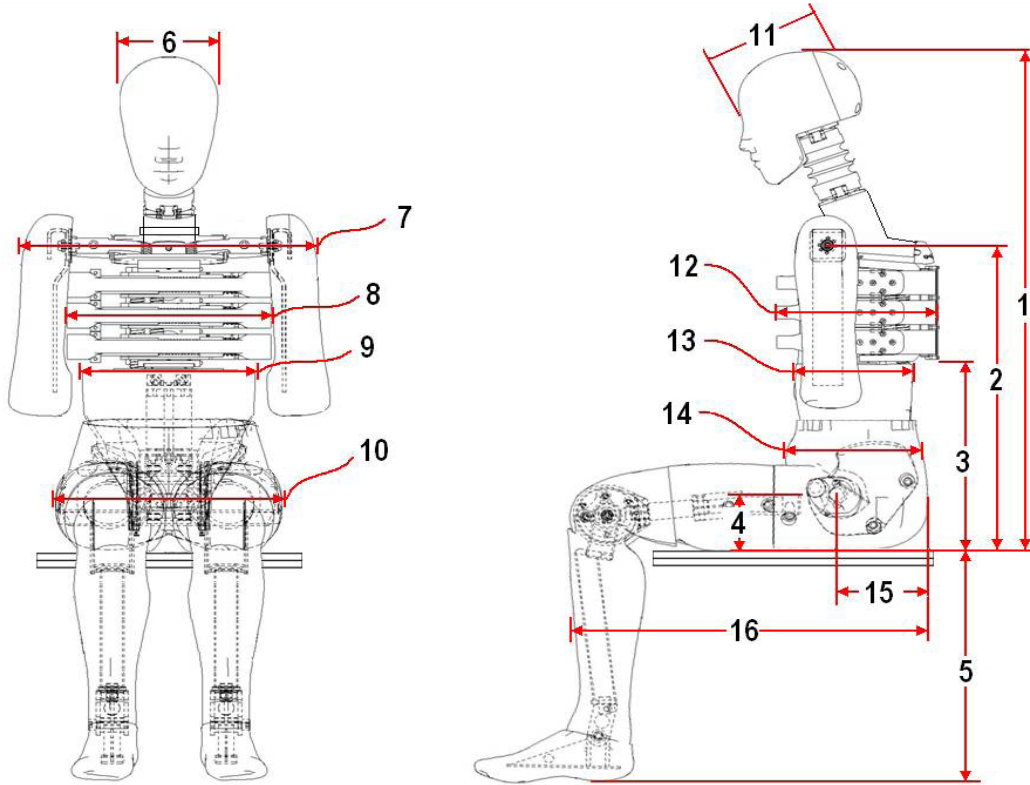
POST-TEST DUMMY PERFORMANCE CALIBRATION TEST DATA
(Subpart U, ES-2re)

External Measurements - EuroSID-2re

Technician: K. Brogan

Date: 05/02/2023

Dummy Serial Number: D037



FRONT VIEW

SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	913	Pass
2	Seat to Shoulder Joint	558	572	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	103	Pass
5	Sole to Seat, Sitting	333	451	421	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	364	Pass
11	Head Depth	196	206	199	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	604	Pass

ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

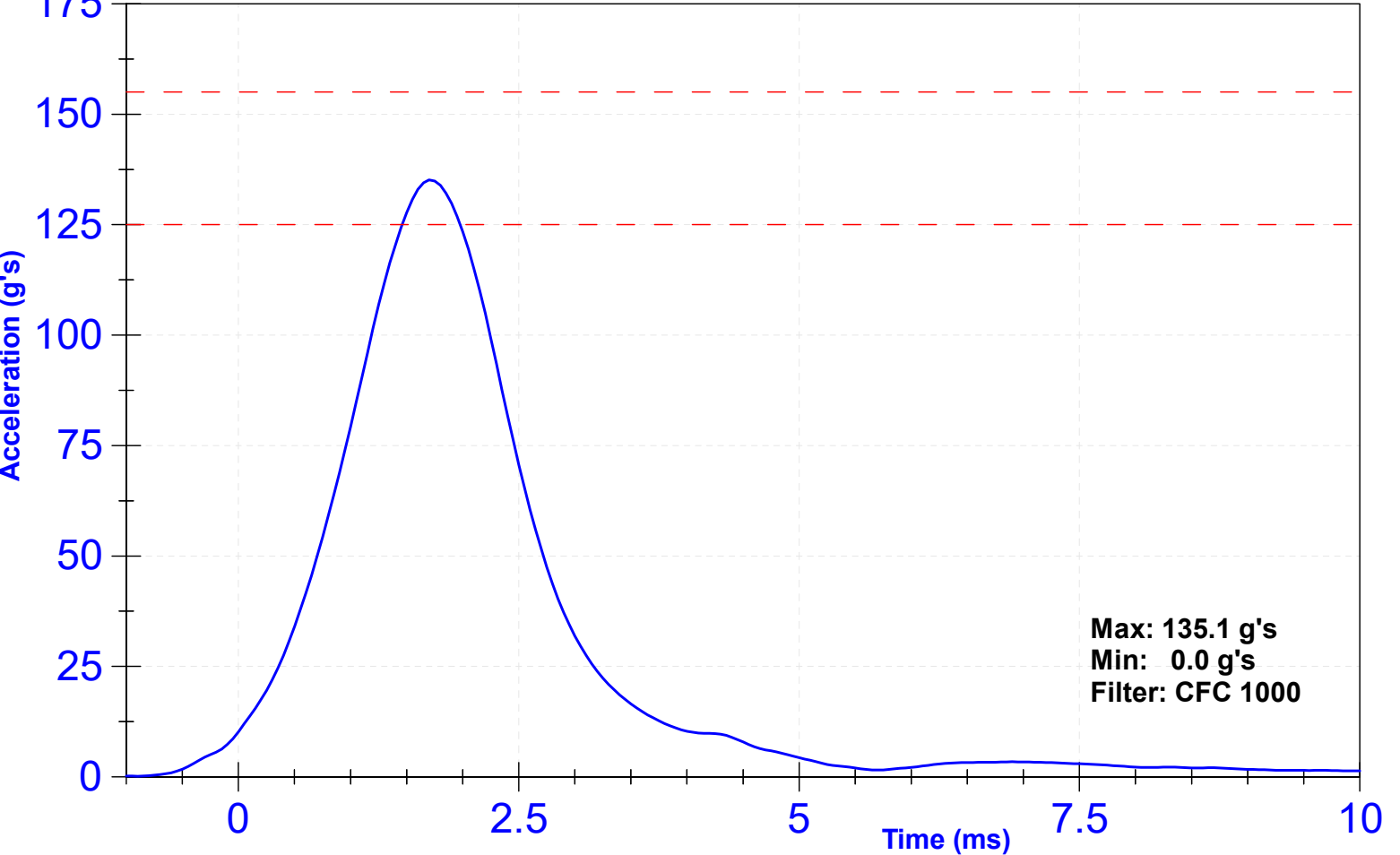
Results

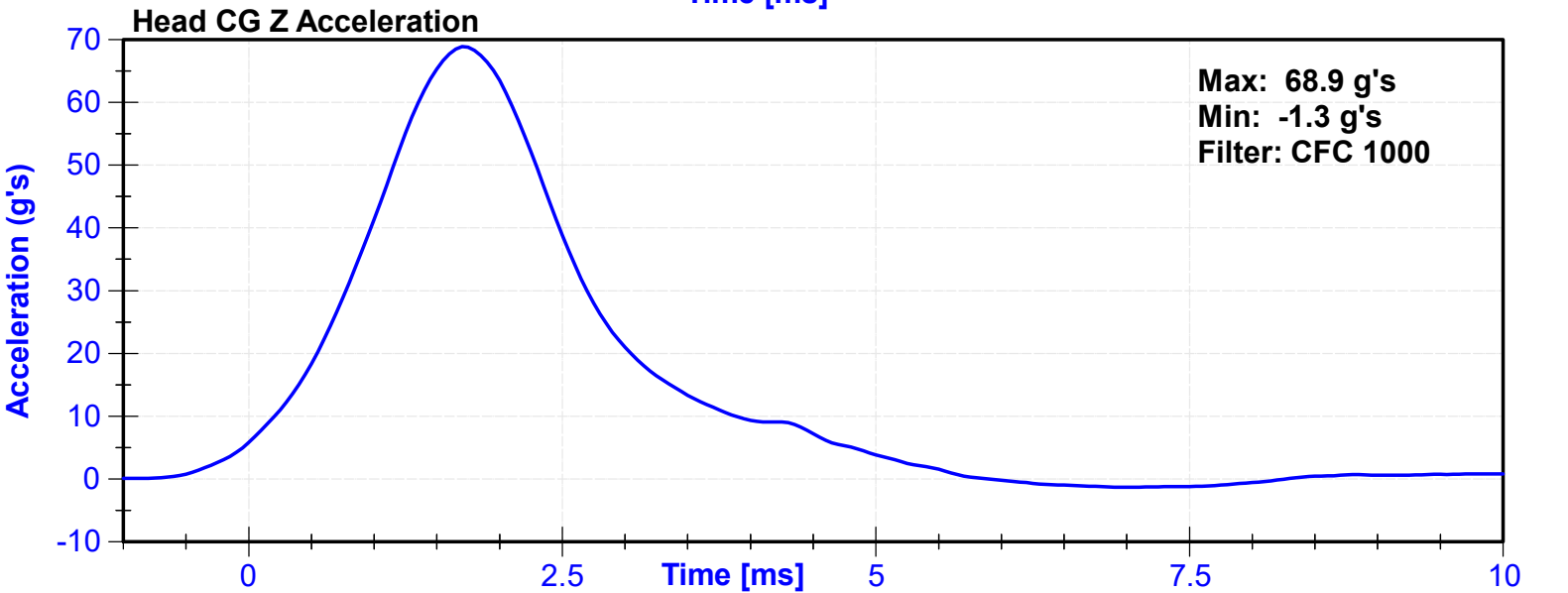
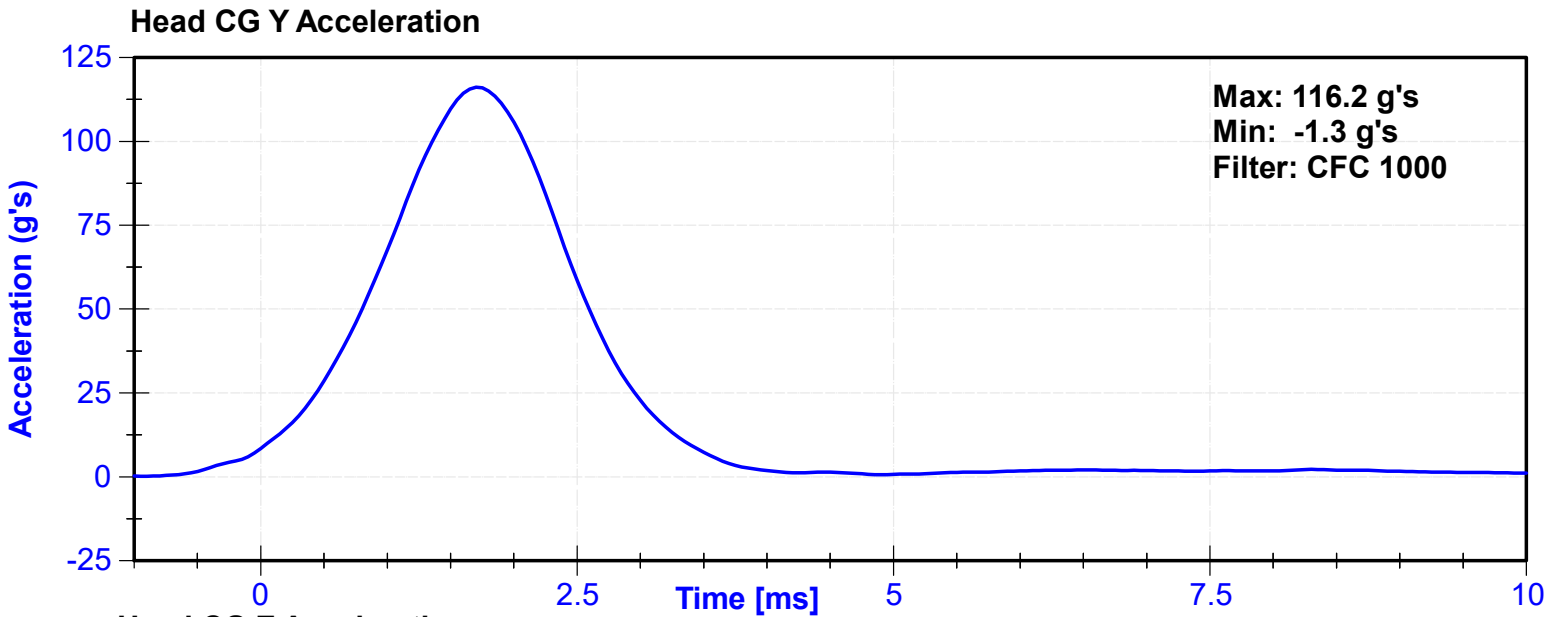
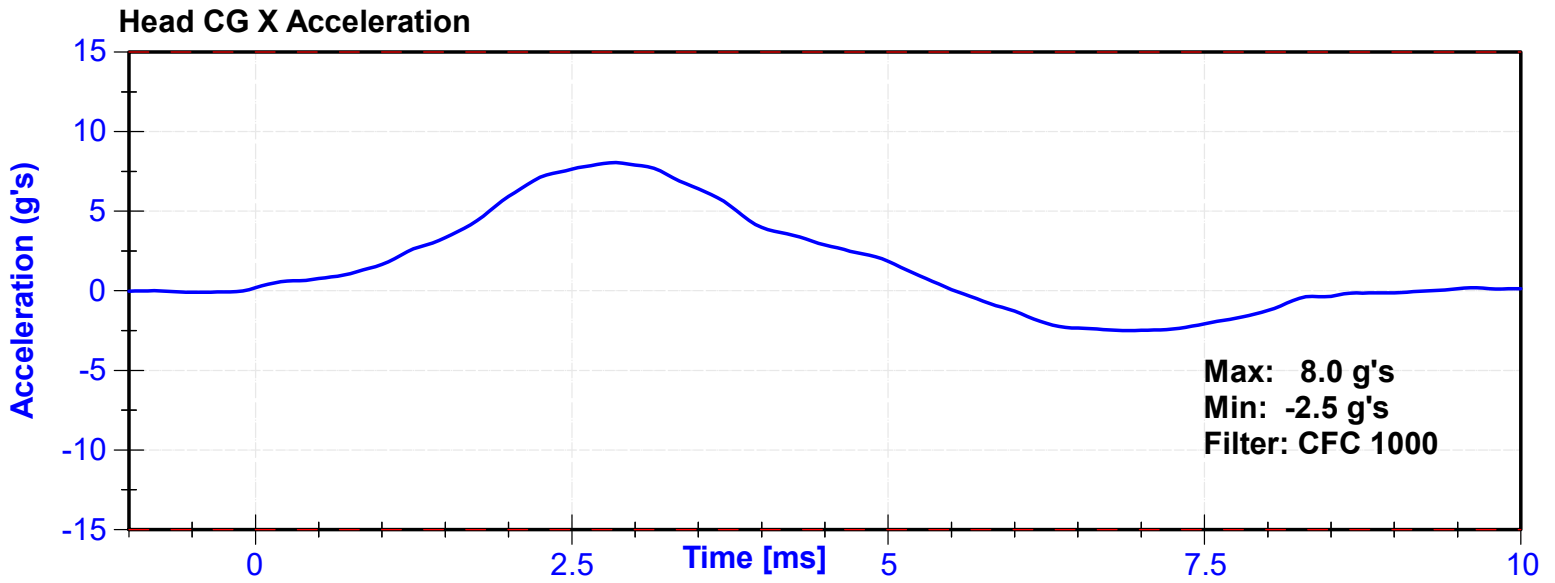
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Resultant Acceleration	125	155	g's	135.1	Pass
Oscillation	0	15	%	2.51	Pass
Fore-Aft Acceleration	-15	15	g's	8.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	T21724	2/27/2023	8/26/2023
Y Accelerometer	Endevco	T22281	2/27/2023	8/26/2023
Z Accelerometer	Endevco	T26050	2/27/2023	8/26/2023

Resultant Acceleration





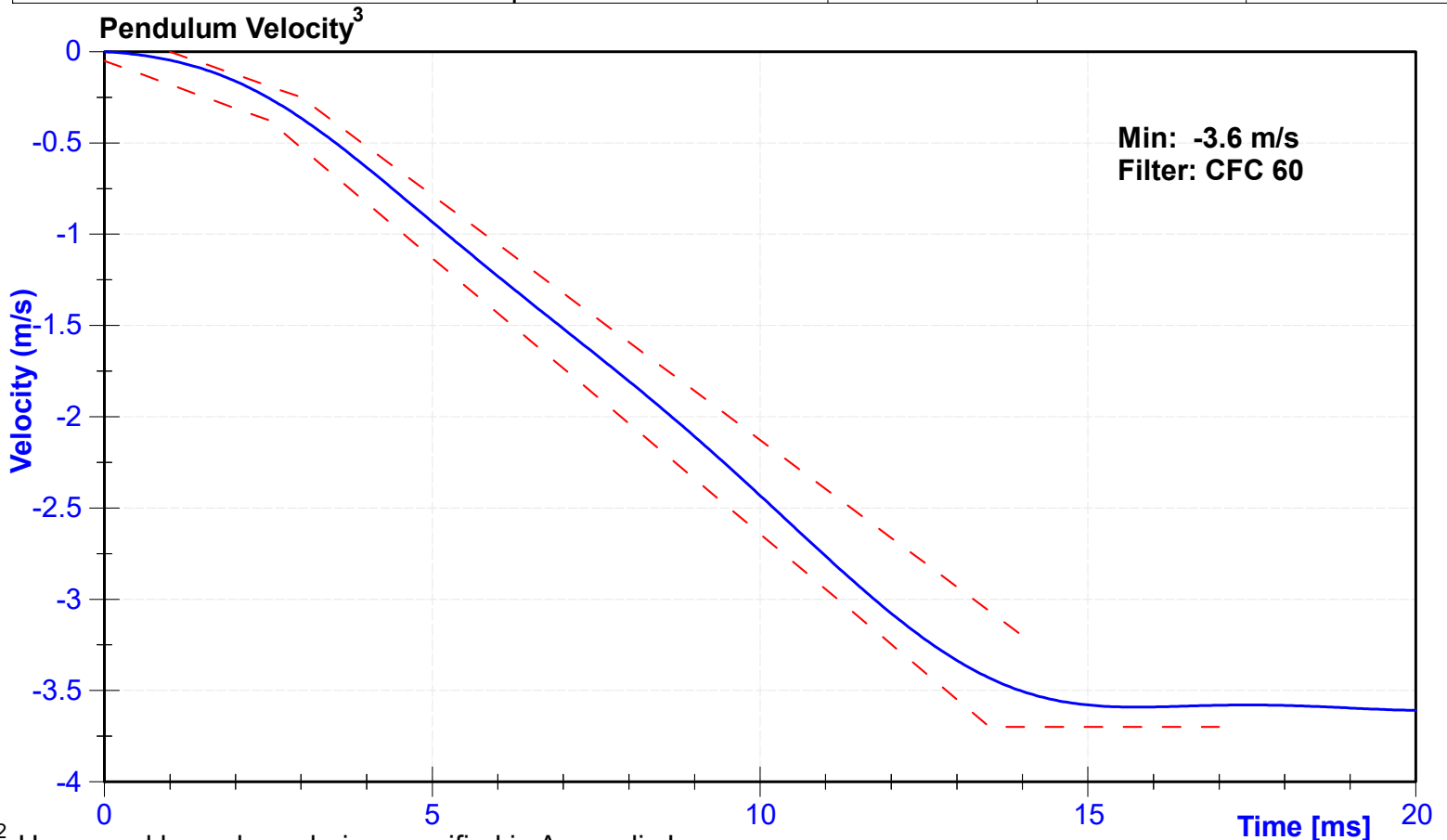
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	31.5	Pass
Velocity	3.3	3.5	m/s	3.37	Pass
Lateral Neck Rotation	49	59	deg	52.2	Pass
Time at Maximum Rotation	54	66	ms	56.0	Pass
Time of Rotation Decay from Maximum	53	88	ms	57.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

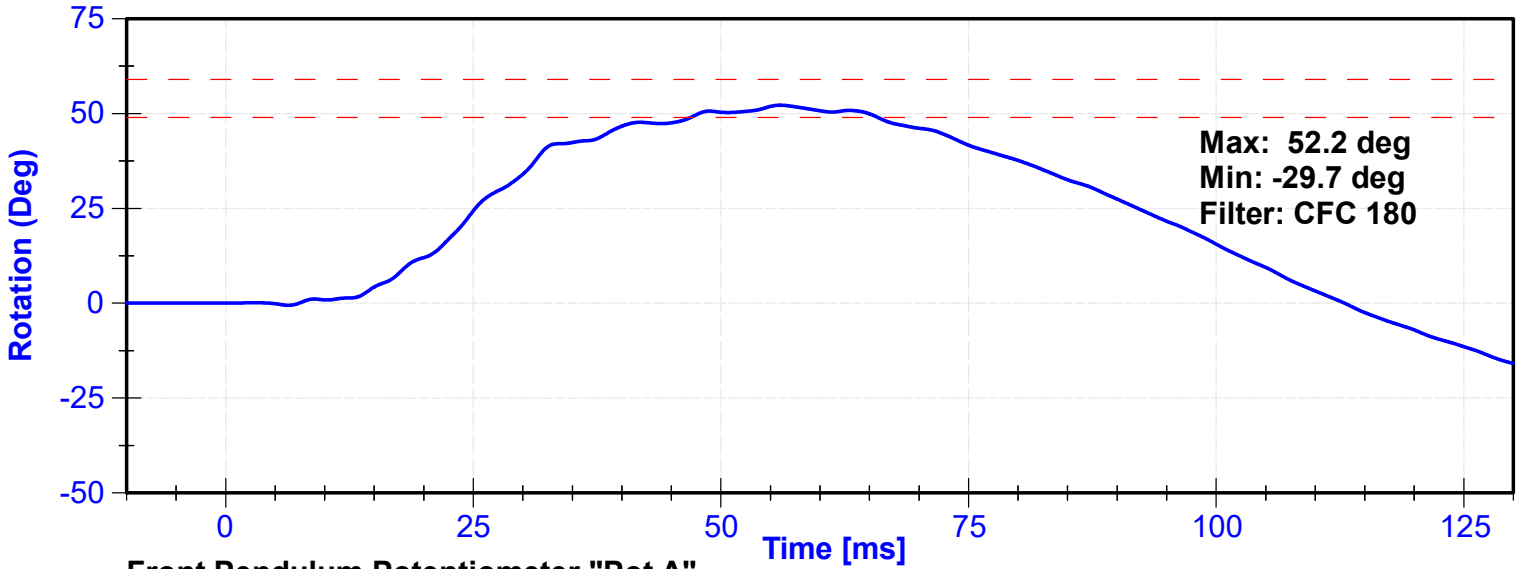
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023

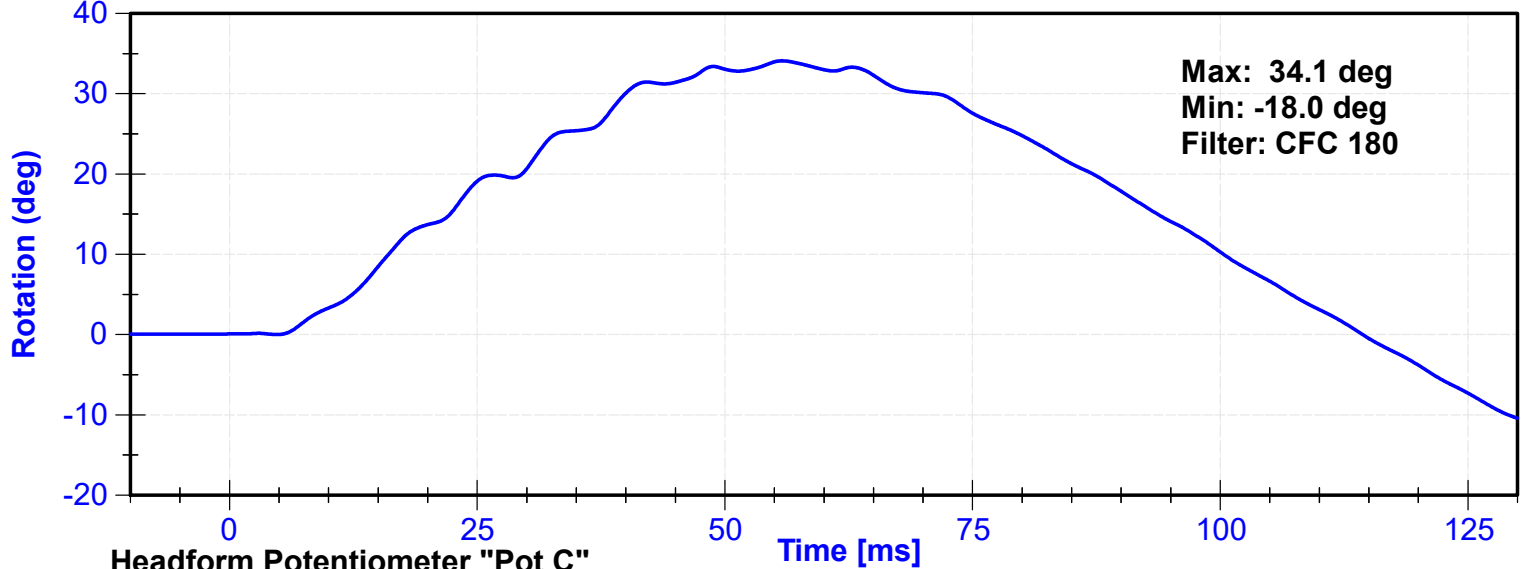


^{1,2} Upper and lower boundaries specified in Appendix I

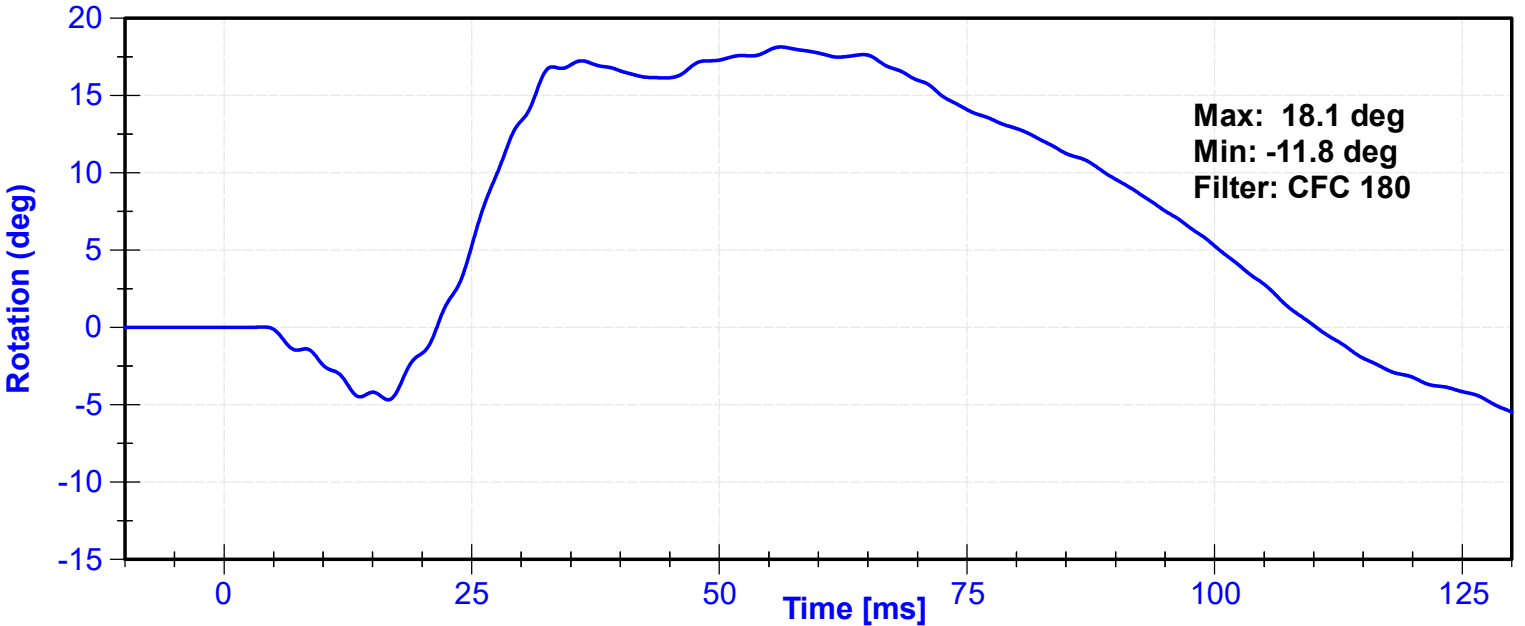
Neck Rotation



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	Denton	Test Technician	C. Mantell
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

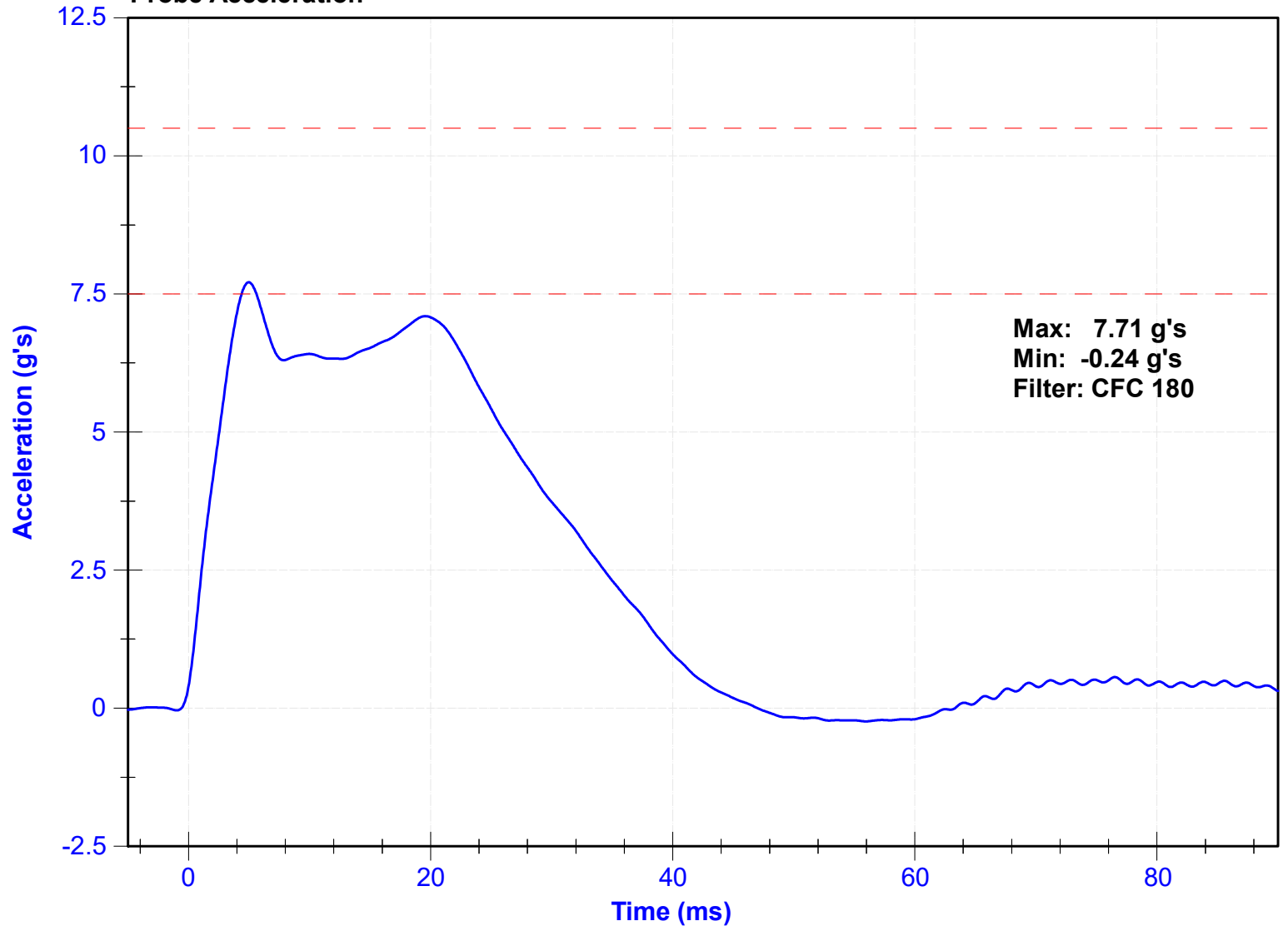
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	33.3	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	7.5	10.5	g's	7.71	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023

Probe Acceleration



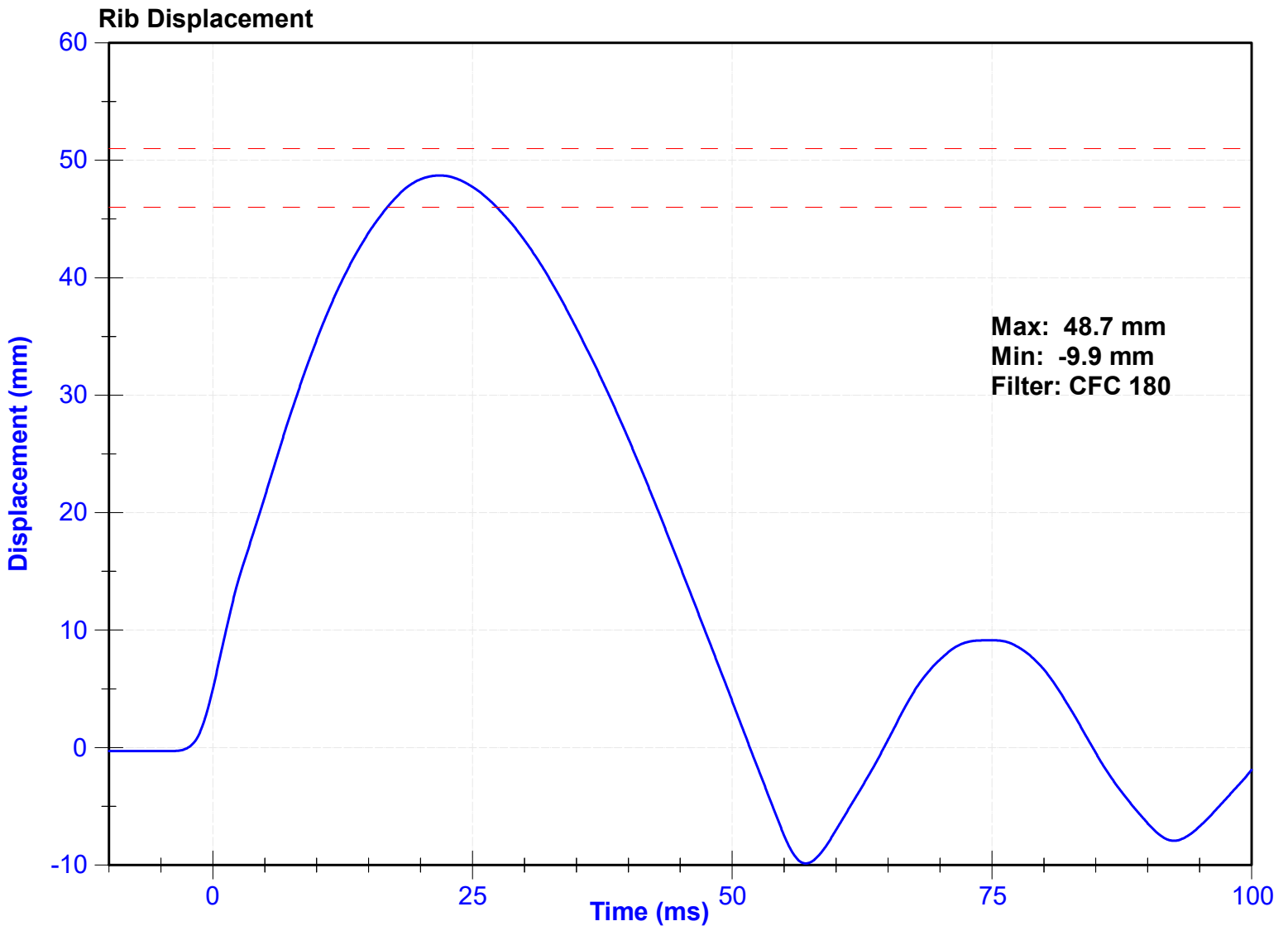
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-01	2/27/2023	8/28/2023



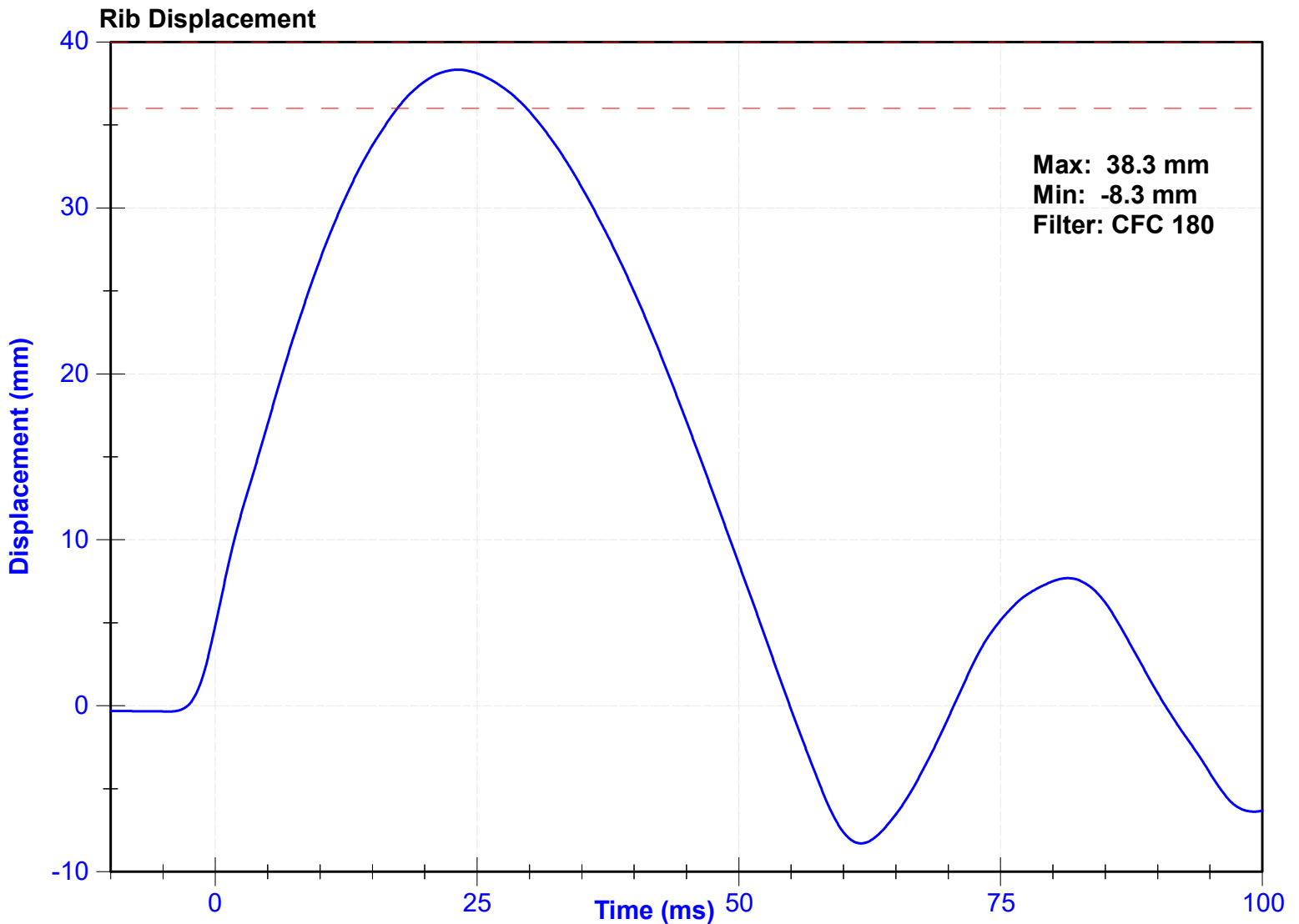
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	36	40	mm	38.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-01	2/27/2023	8/28/2023



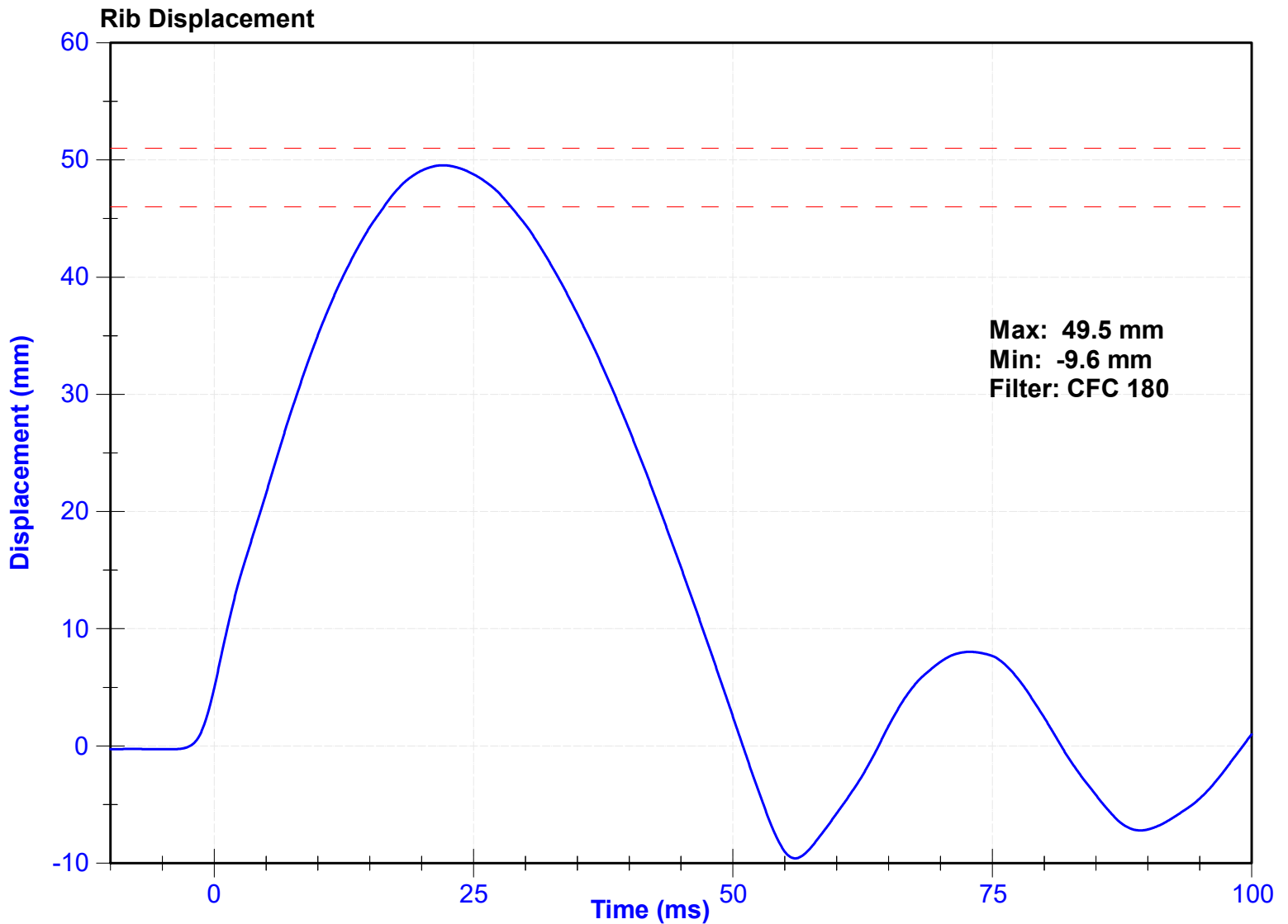
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	46	51	mm	49.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-807	2/27/2023	8/28/2023



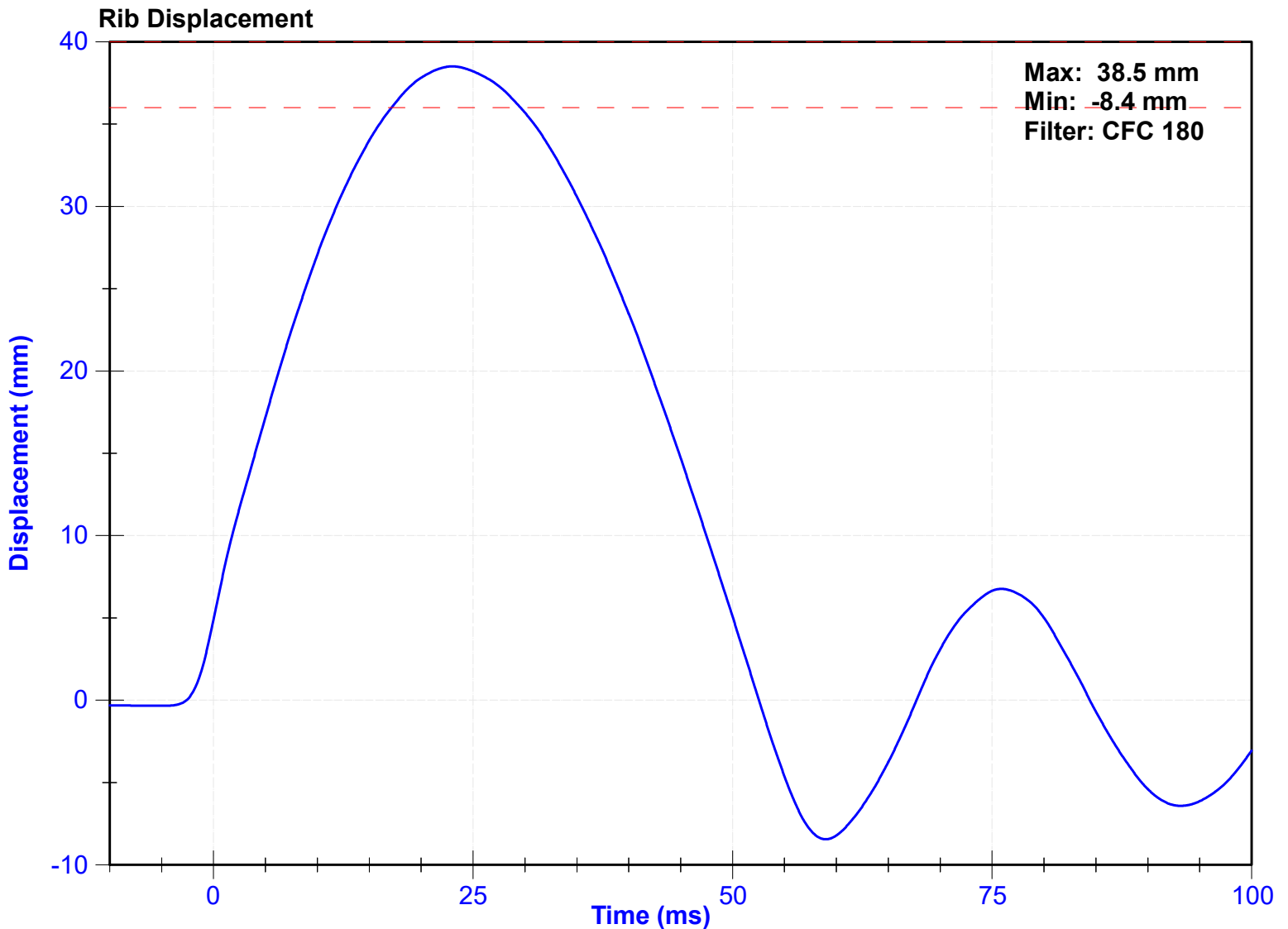
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	36	40	mm	38.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-807	2/27/2023	8/28/2023



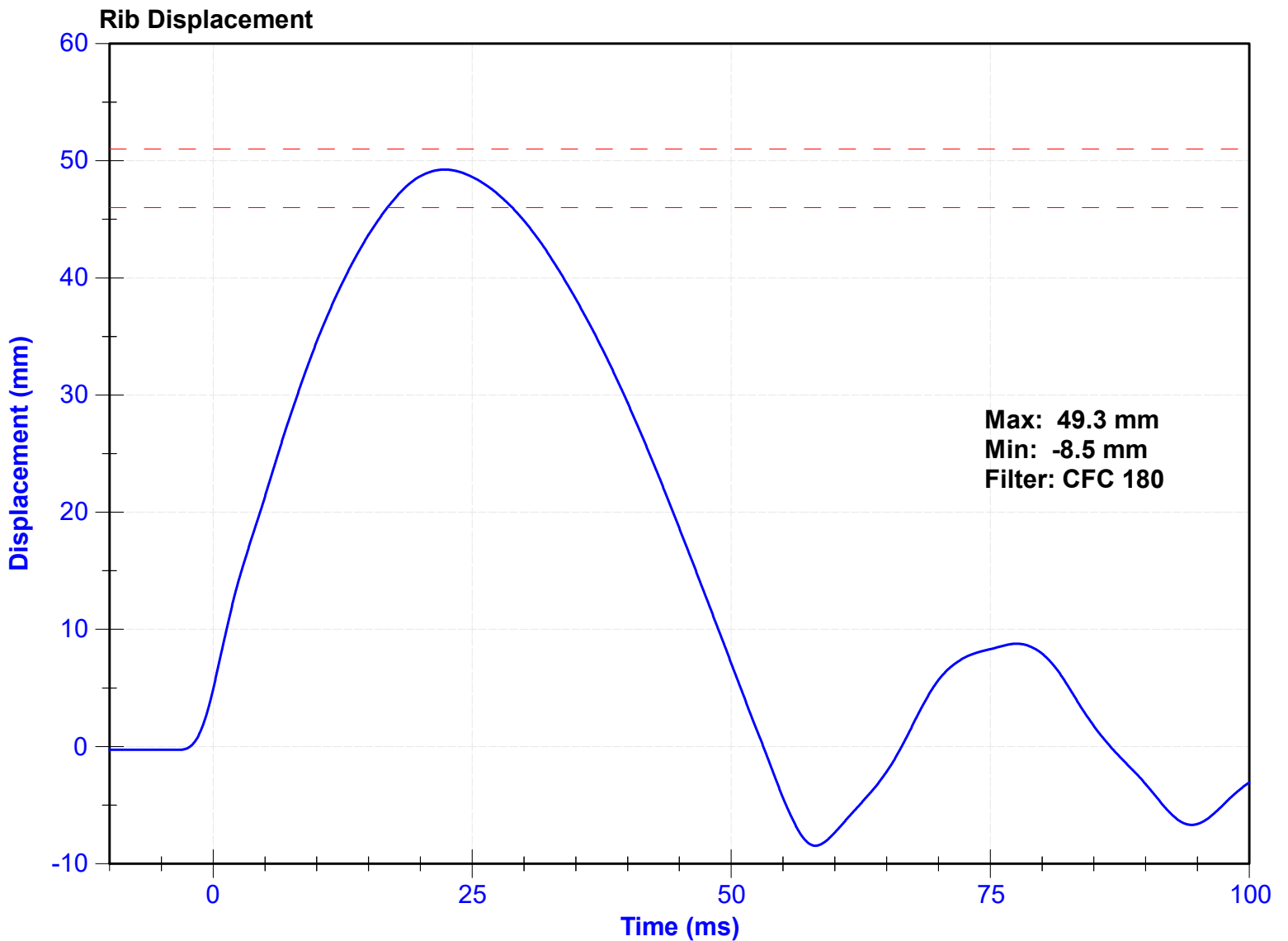
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-03	2/27/2023	8/28/2023



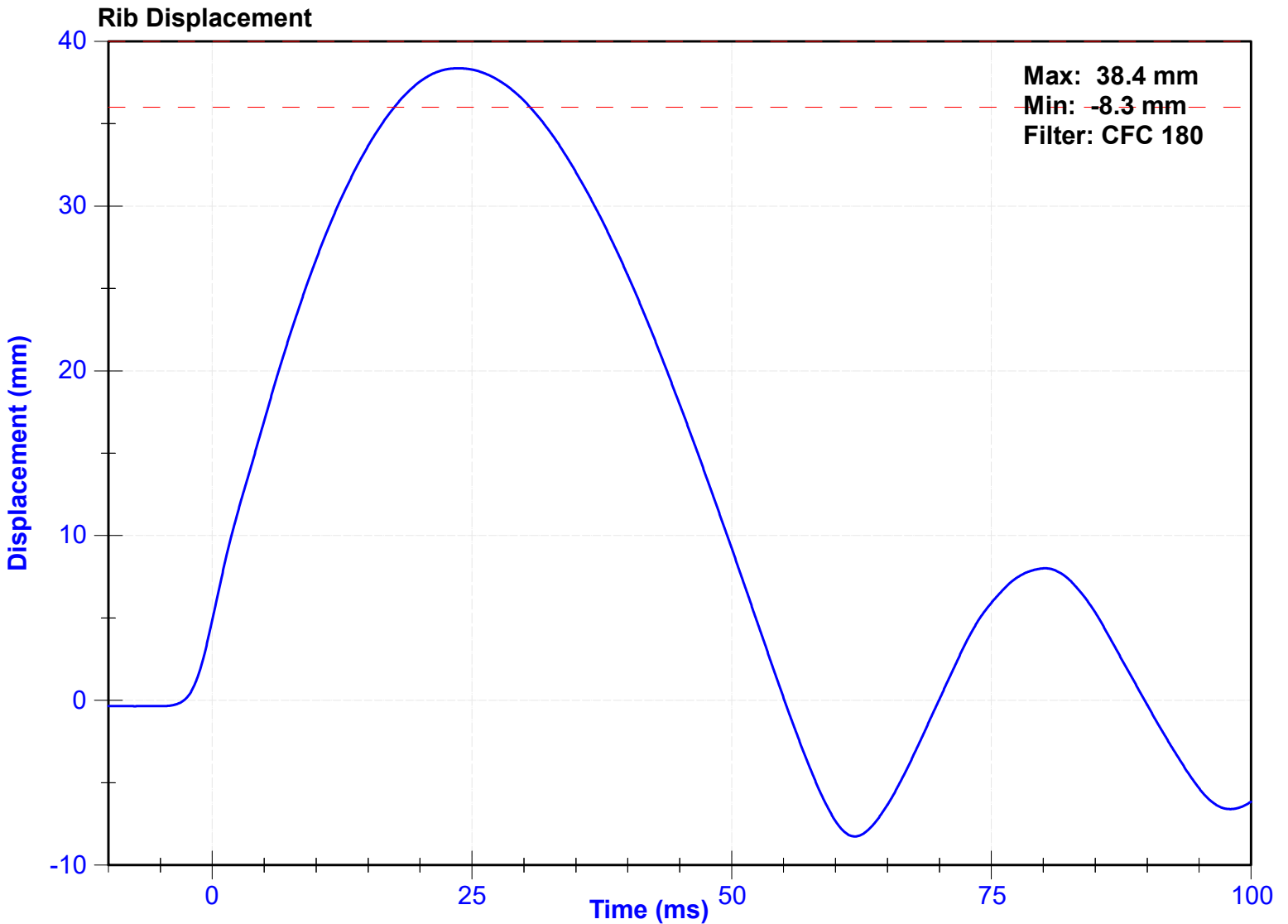
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	20.5	Pass
Rib Displacement	36	40	mm	38.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	DS-0552-03	2/27/2023	8/28/2023



ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

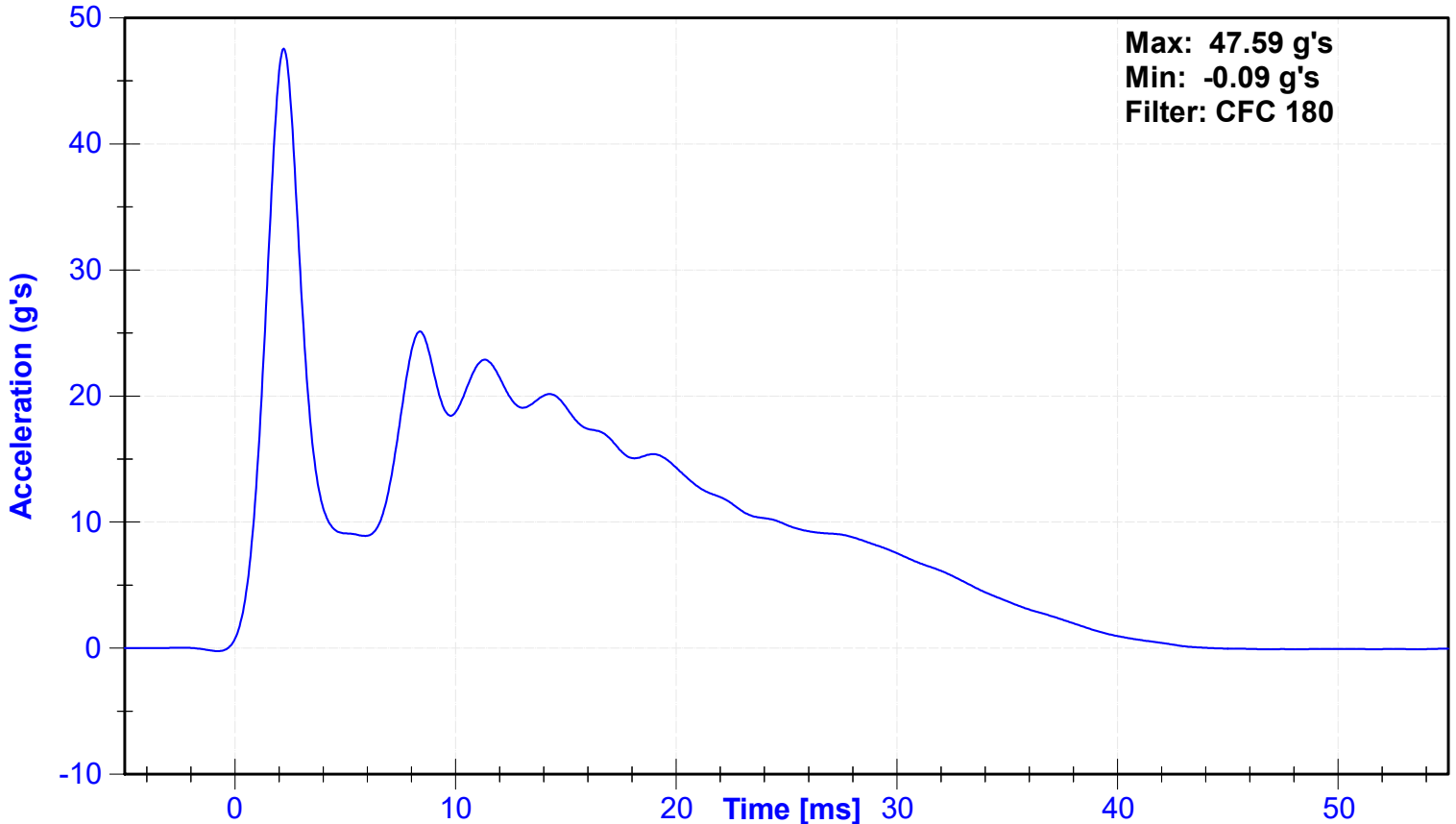
Results

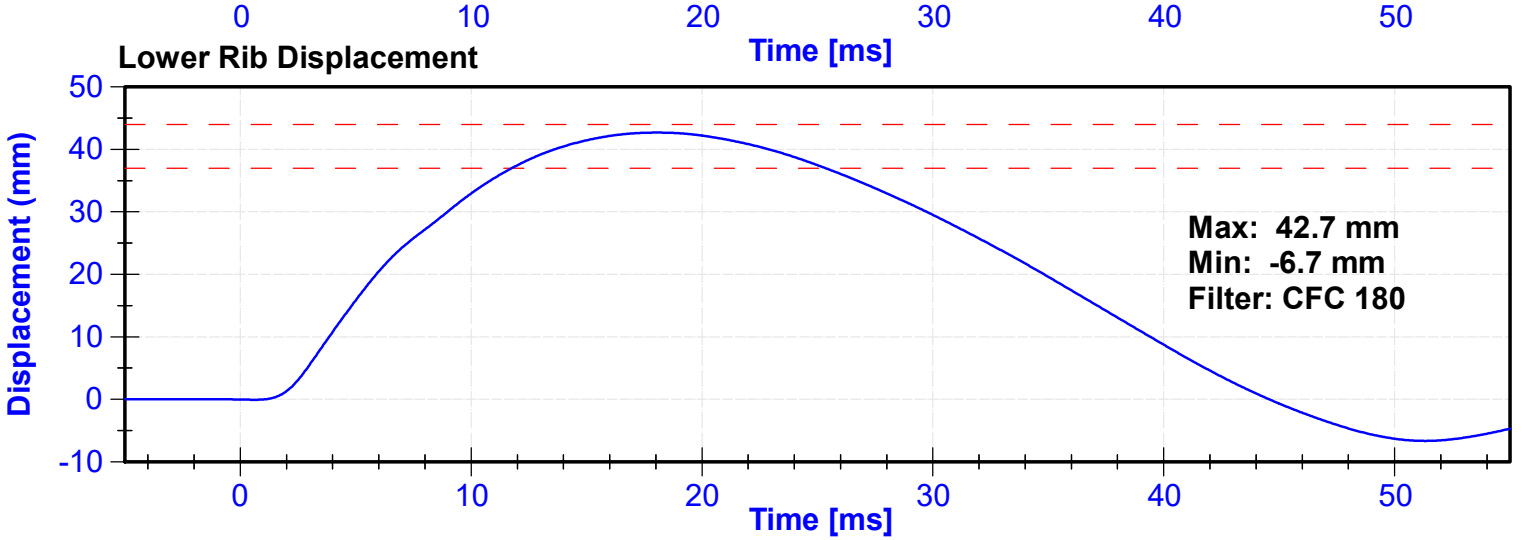
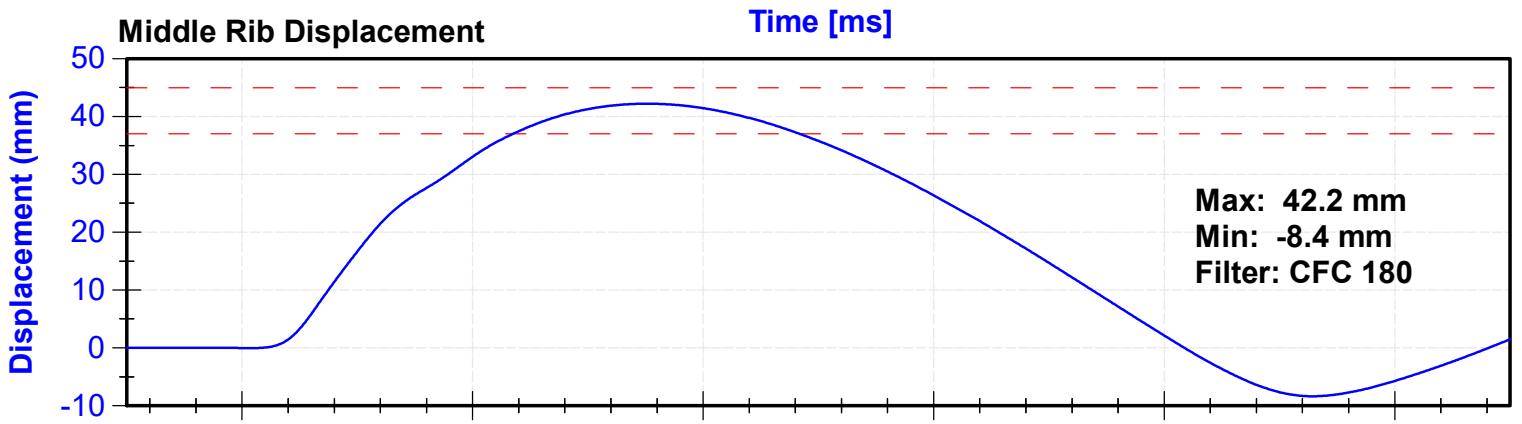
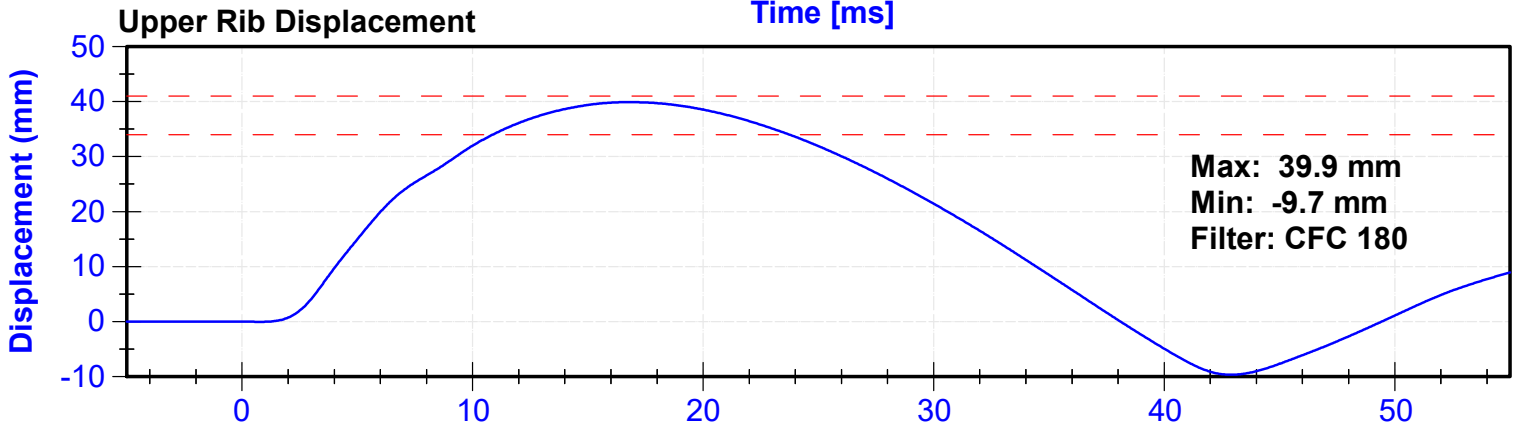
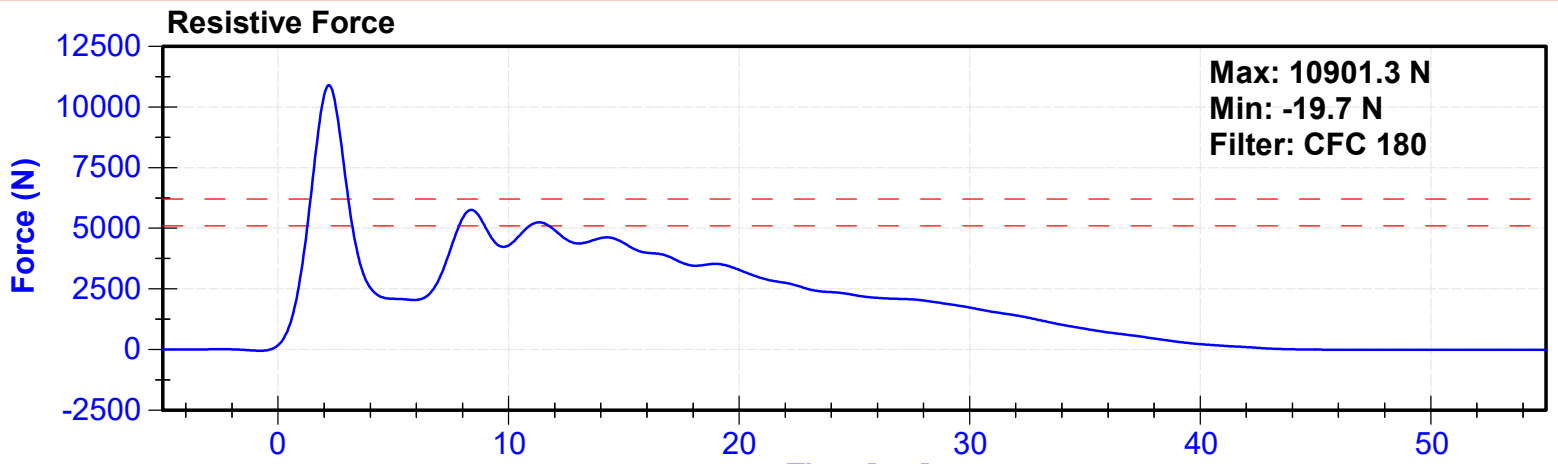
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	33.3	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	5756.3	Pass
Upper Thorax Rib Deflection	34	41	mm	39.9	Pass
Mid Thorax Rib Deflection	37	45	mm	42.2	Pass
Lower Thorax Rib Deflection	37	44	mm	42.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Thorax Rib Potentiometer	Honeywell	DS-0552-01	2/27/2023	8/28/2023
Middle Thorax Rib Potentiometer	Honeywell	DS-807	2/27/2023	8/28/2023
Lower Thorax Rib Potentiometer	Honeywell	DS-0552-03	2/27/2023	8/28/2023

Probe Acceleration





ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

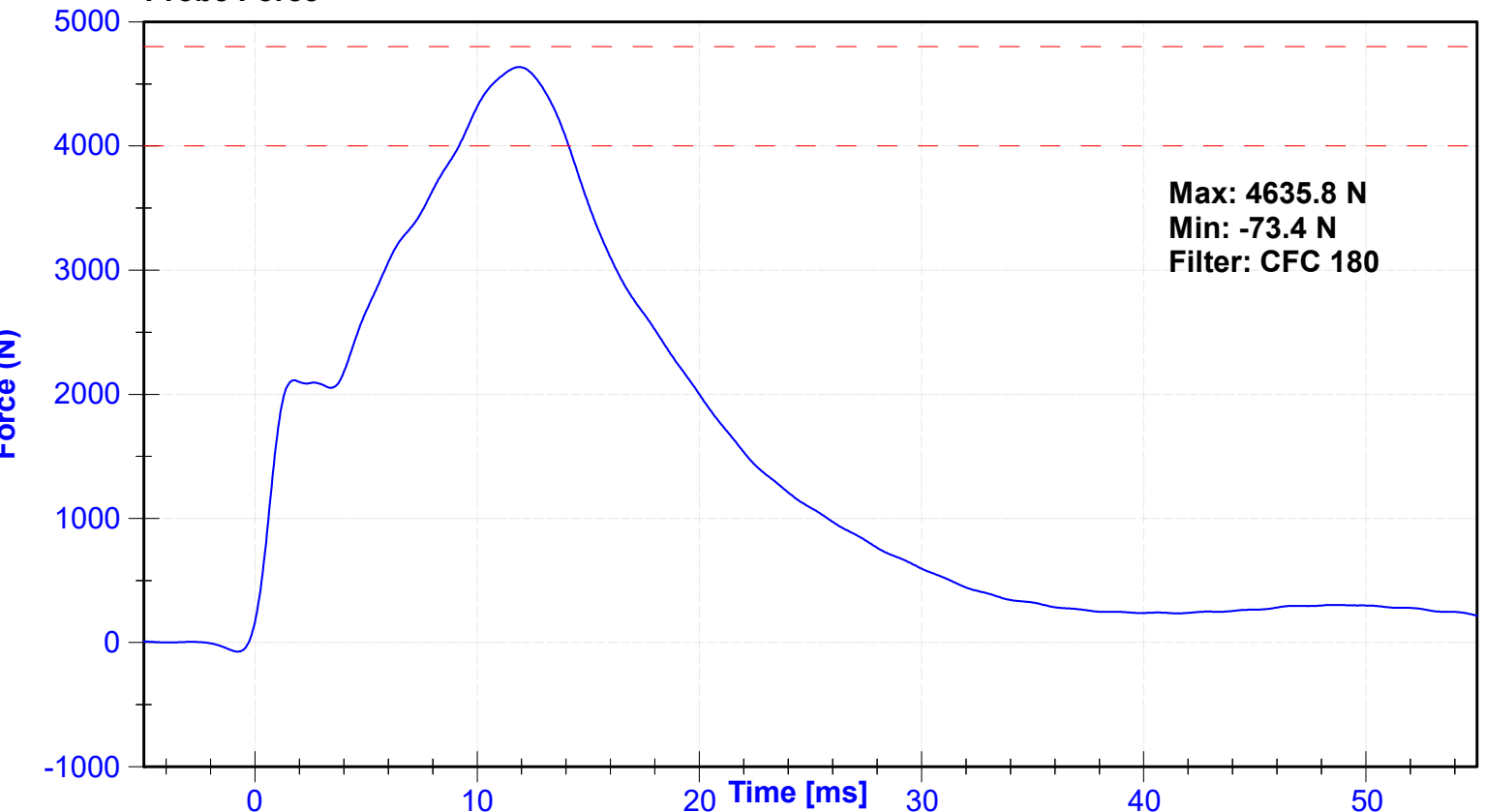
Results

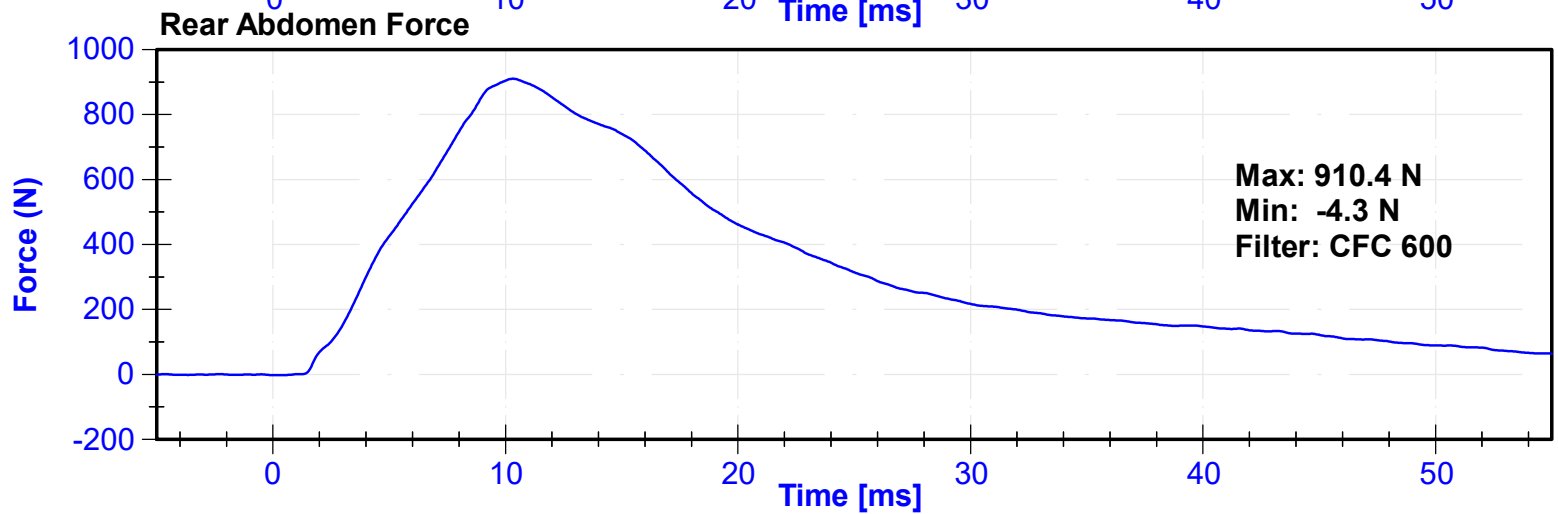
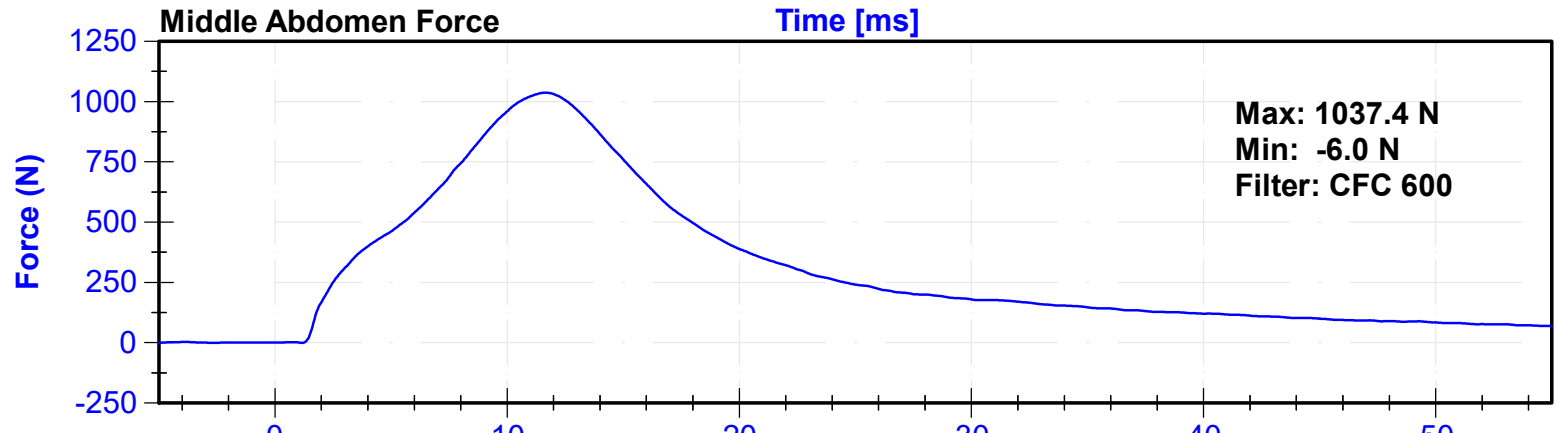
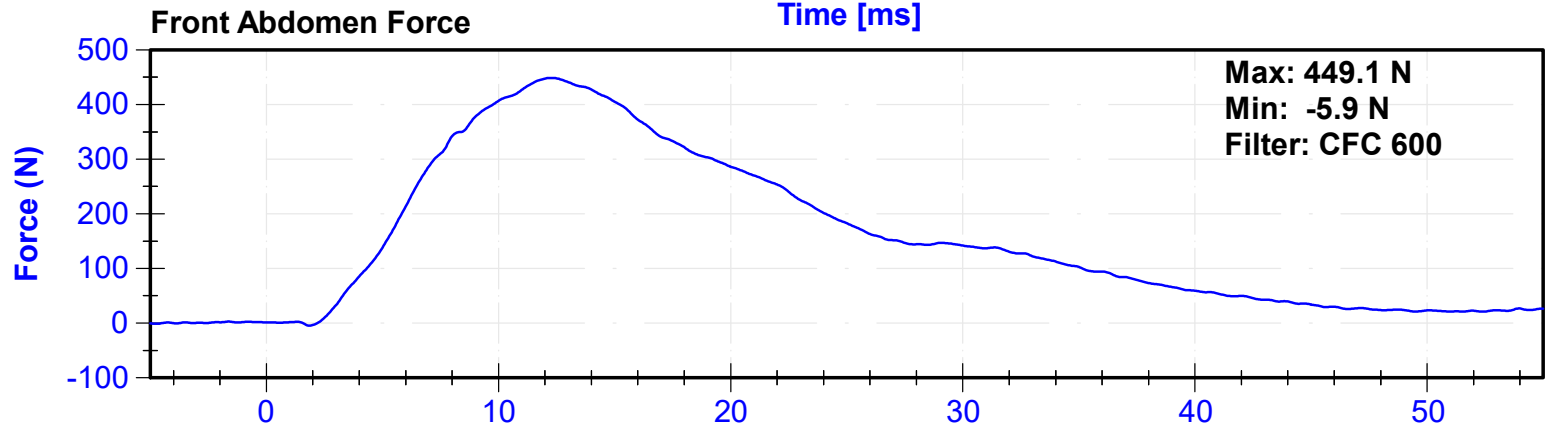
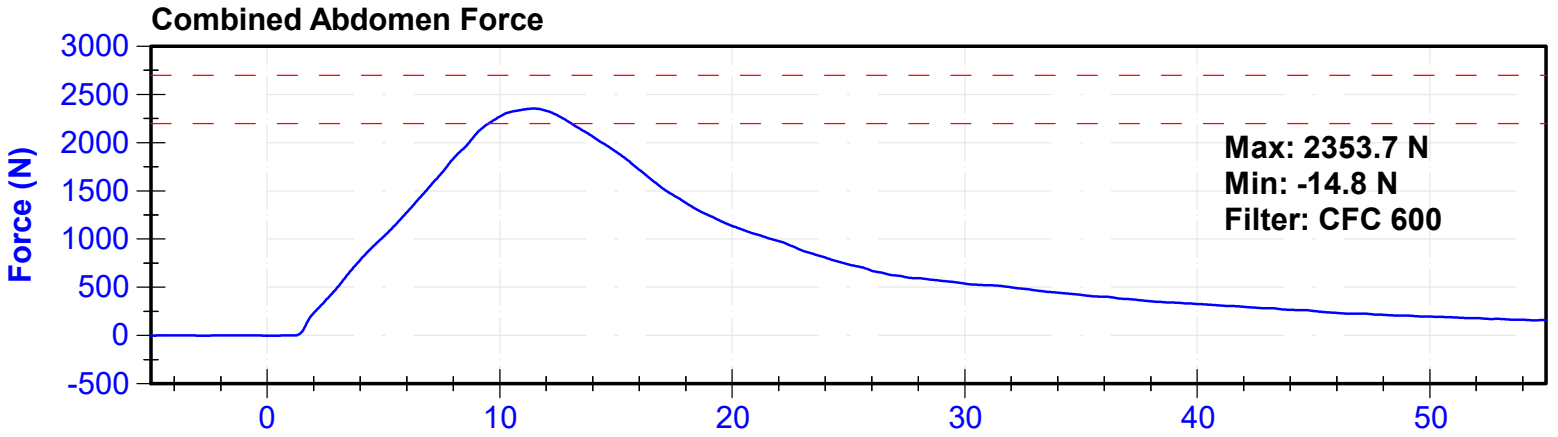
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	33.3	Pass
Velocity	3.9	4.1	m/s	4.04	Pass
Combined Abdomen Force	2200	2700	N	2353.7	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.45	Pass
Resistive Probe Force	4000	4800	N	4635.8	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.90	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Front Abdomen Load Cell	Denton	1440	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1525	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1528	8/12/2022	8/12/2023

Probe Force





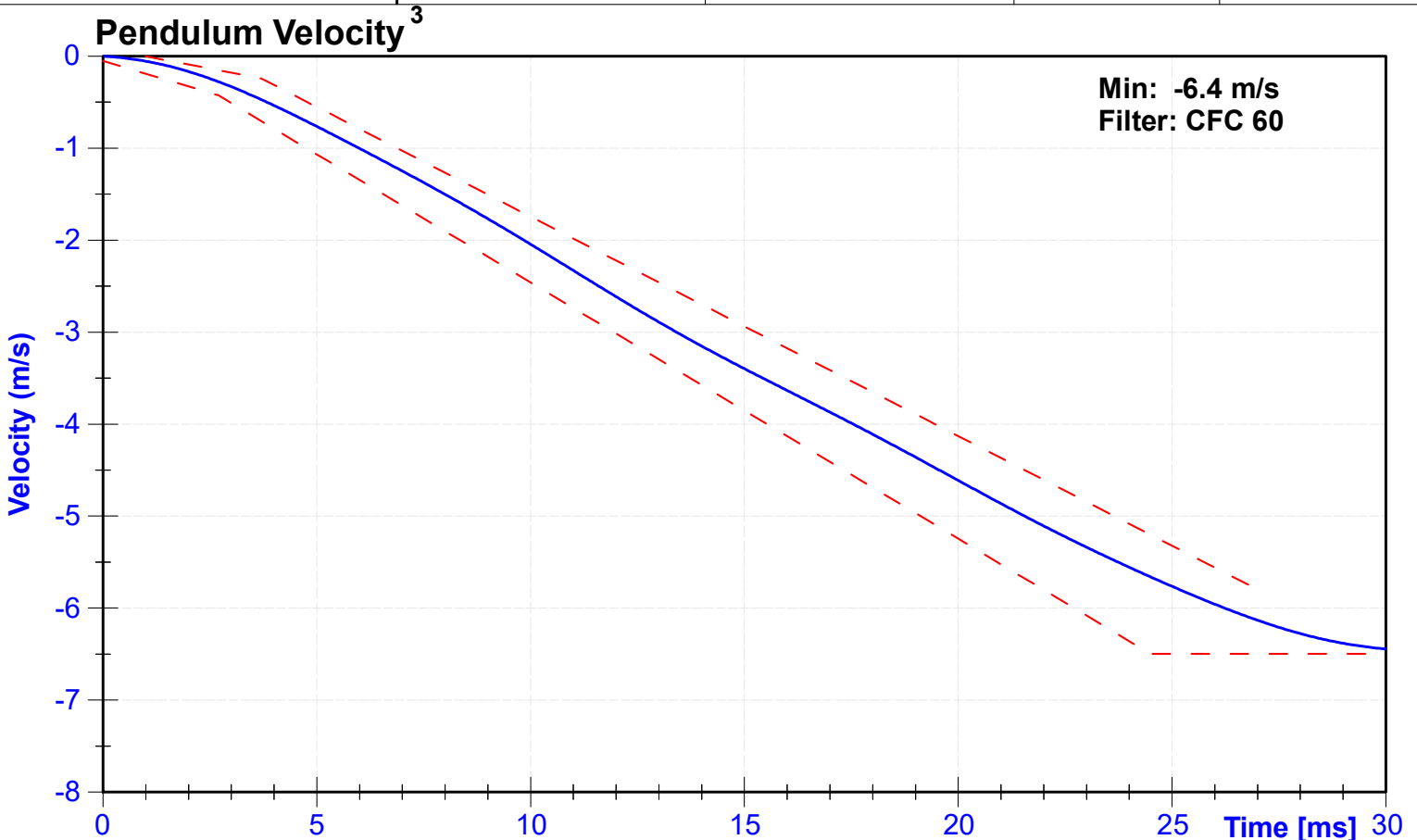
ATD Manufacturer	Denton	Test Technician	T. Roseman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

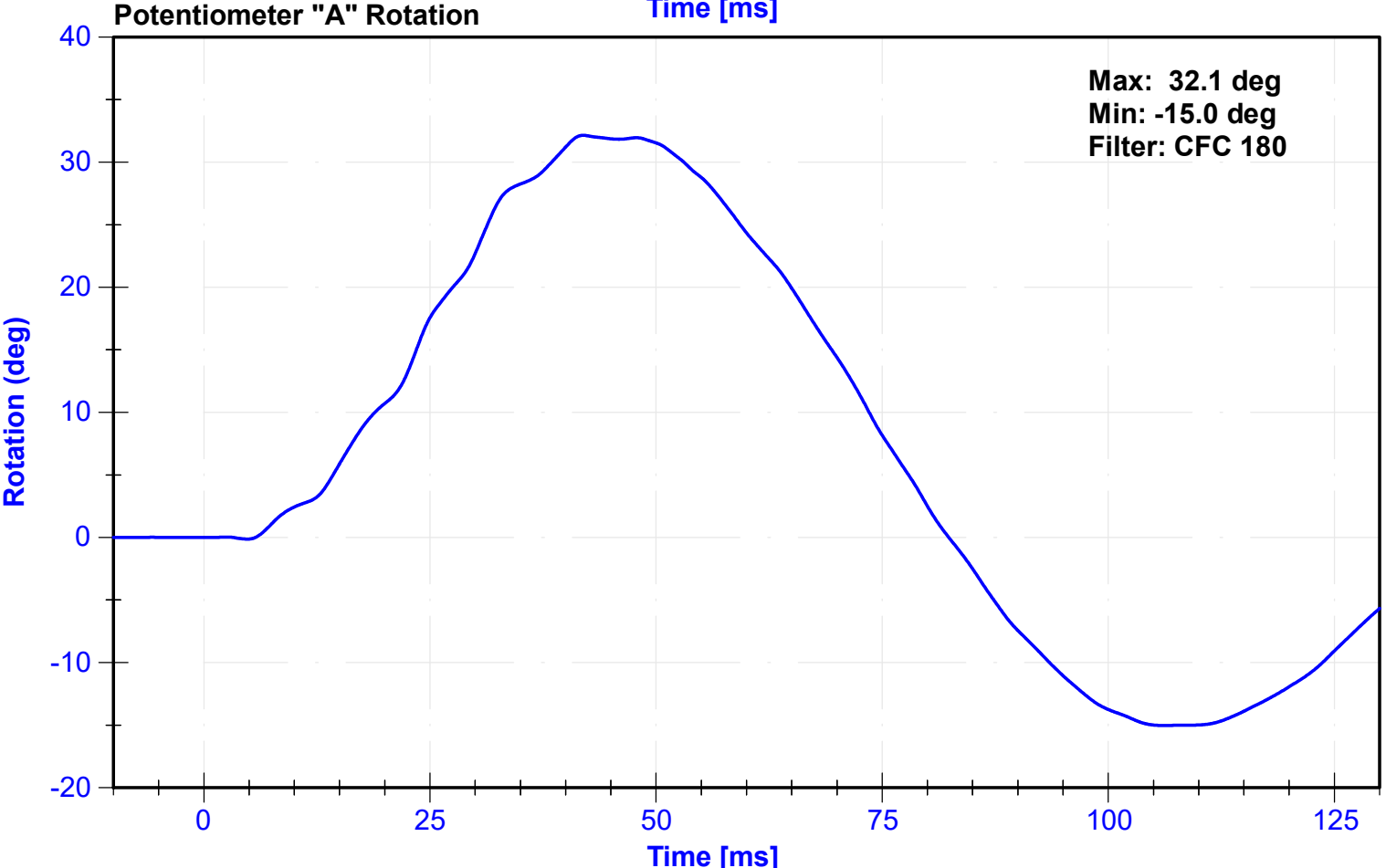
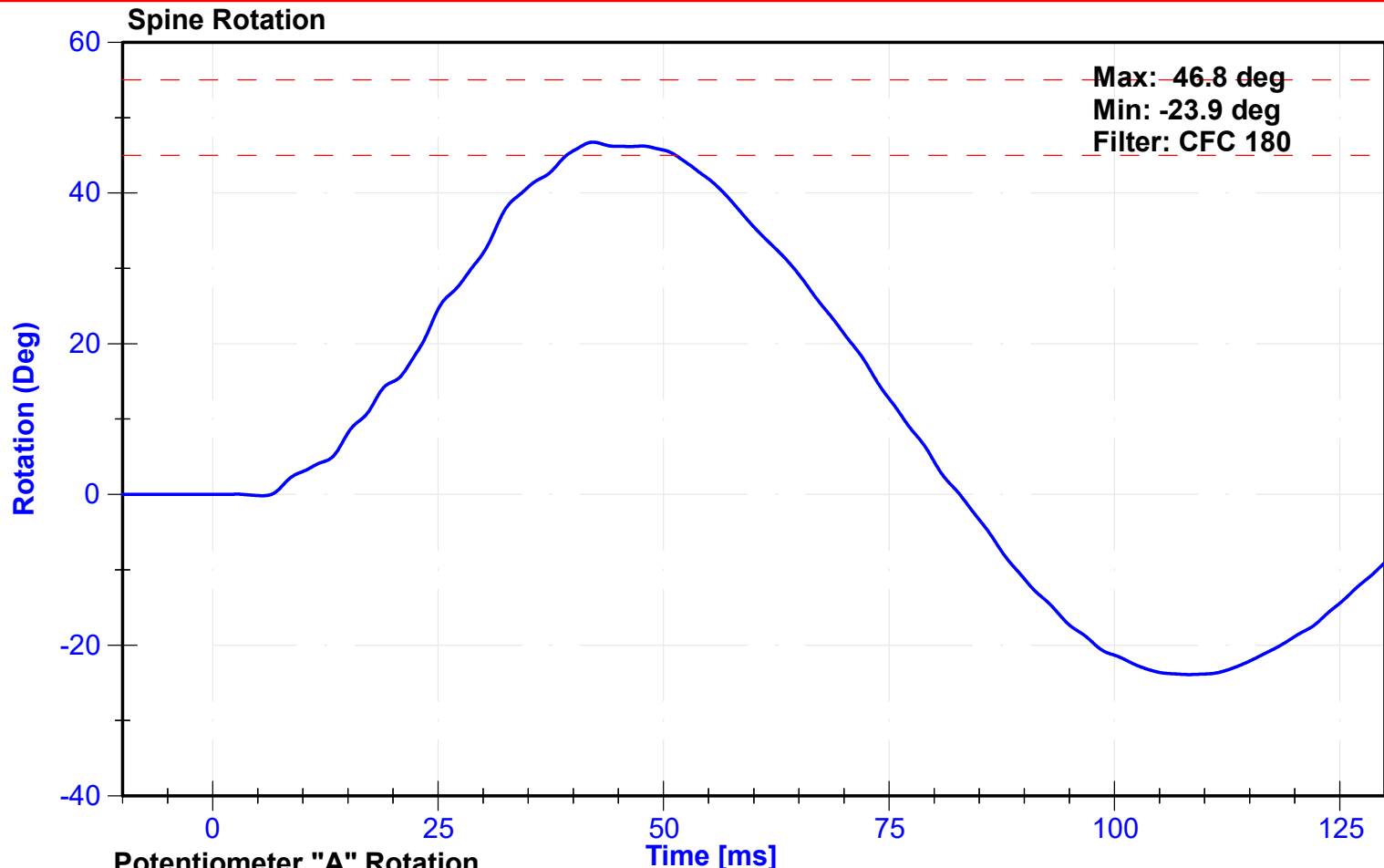
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	31.5	Pass
Velocity	5.95	6.15	m/s	6.048	Pass
Lateral Spine Rotation	45	55	deg	46.8	Pass
Time at Maximum Rotation	39	53	ms	42.1	Pass
Time of Decay to Zero Degrees	37	57	ms	40.7	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

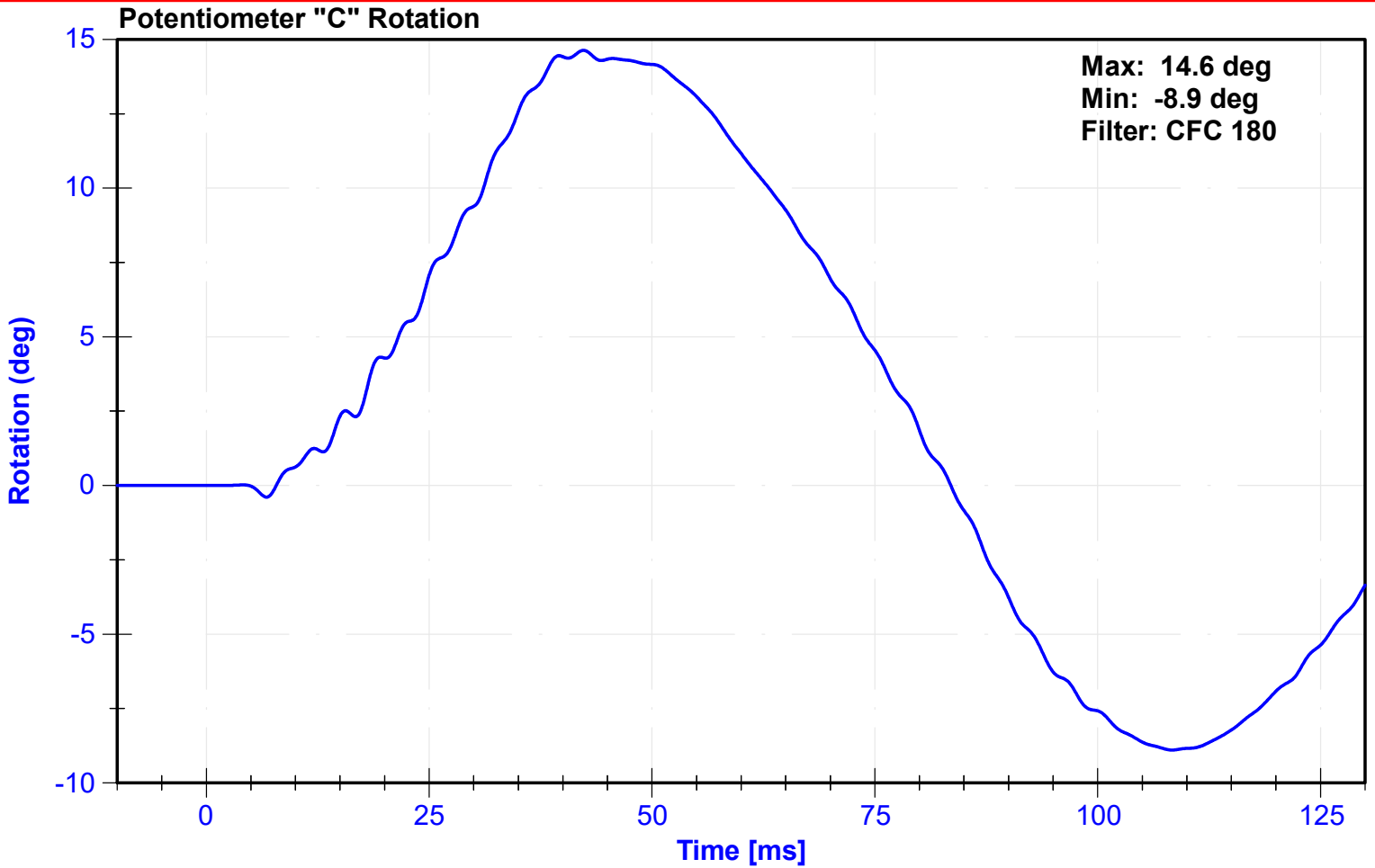
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



^{1,2} Upper and lower boundaries specified in Appendix I IV-65





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

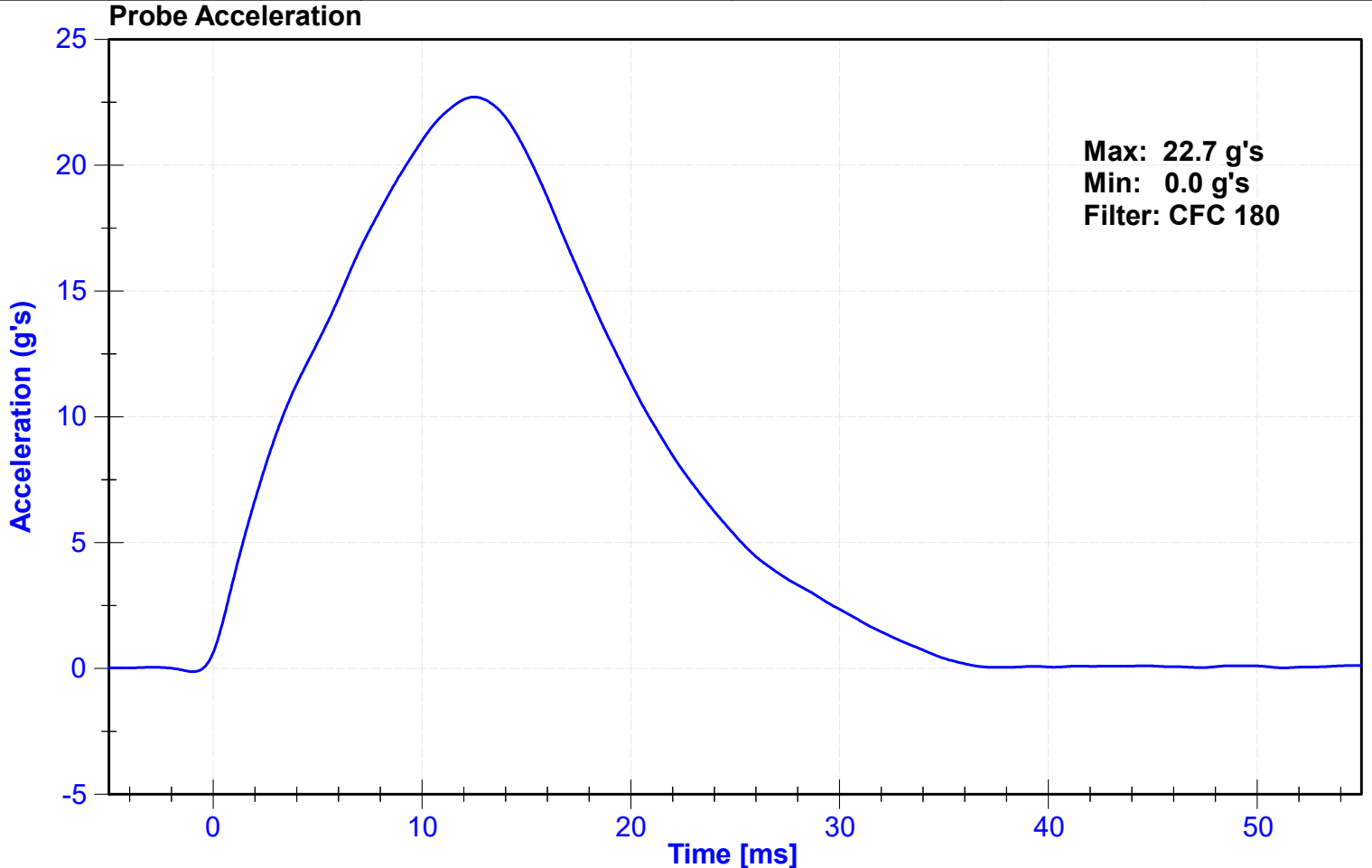
ATD Manufacturer	Denton	Test Technician	C. Mantell
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

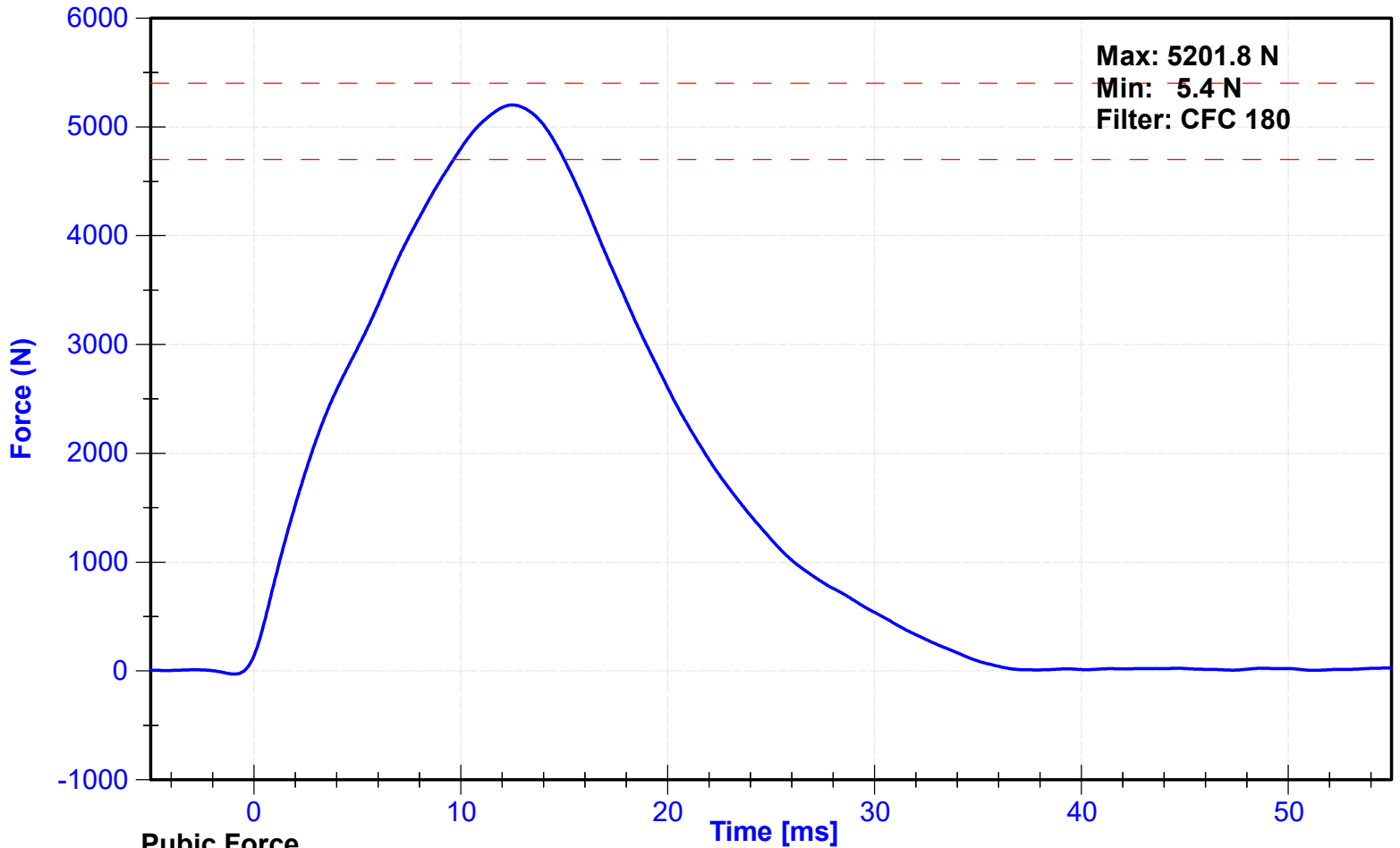
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	33.3	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Resistive Force	4700	5400	N	5201.8	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.50	Pass
Pubic Force	-1590	-1230	N	-1472.5	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.70	Pass

Transducer Calibrations

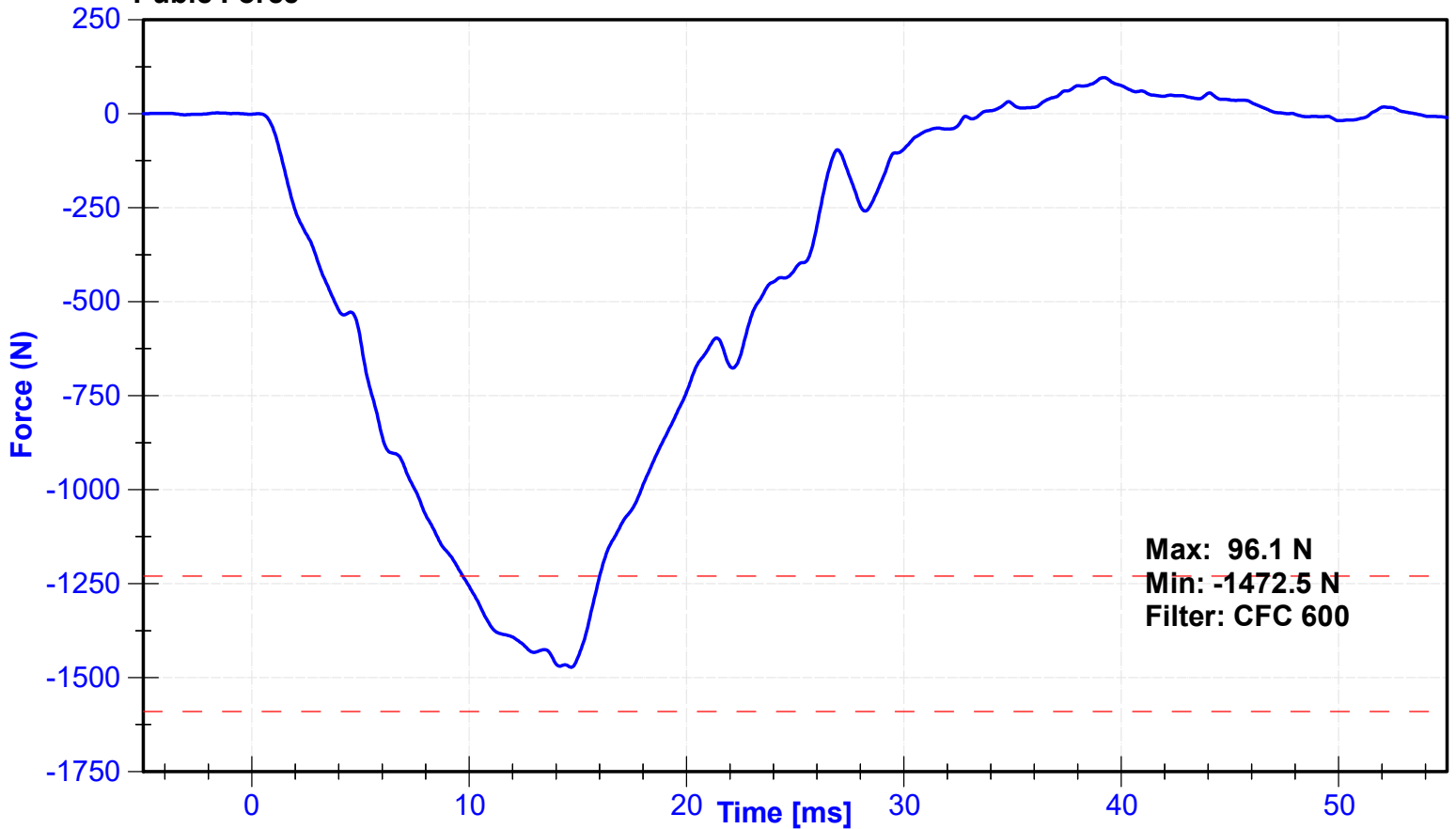
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pubic Load Cell	Denton		8/12/2022	8/12/2023



Resistive Force



Pubic Force



APPENDIX V

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: D037		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	T21724	Endevco	2/27/2023
		Y	T22281	Endevco	2/27/2023
		Z	T26050	Endevco	2/27/2023
	Redundant	X	T21682	Endevco	2/27/2023
		Y	T25989	Endevco	2/27/2023
		Z	T25864	Endevco	2/27/2023
Thorax Rib Displacement Potentiometers	Upper	Y	DS-0552-01	Honeywell	2/27/2023
	Middle	Y	DS-807	Honeywell	2/27/2023
	Lower	Y	DS-0552-03	Honeywell	2/27/2023
Abdomen Load Cells	Forward	Y	1440	Denton	8/12/2022
	Middle	Y	1525	Denton	8/12/2022
	Rear	Y	1528	Denton	8/12/2022
Lower Spine Accelerometers (T12)		X	P71278	Endevco	2/27/2023
		Y	P71276	Endevco	2/27/2023
		Z	T23573	Endevco	2/27/2023
Pubic Symphysis Load Cell		Y	3096JFL-456-FY	Denton	8/12/2022

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A283662	Measurement Specialties	2/15/2023
Vehicle Center of Gravity	Y	A350921	Measurement Specialties	2/15/2023
Vehicle Center of Gravity	Z	A352378	Measurement Specialties	2/15/2023
Left Floor Sill	Y	A431209	Measurement Specialties	2/25/2023
A-Pillar Sill	Y	A335458	Measurement Specialties	1/20/2023
A-Pillar Low	Y	A373232	Measurement Specialties	2/27/2023
A-Pillar Mid	Y	A398656	Measurement Specialties	2/27/2023
B-Pillar Sill	Y	A284324	Measurement Specialties	2/27/2023
B-Pillar Low	Y	A352411	Measurement Specialties	3/3/2023
B-Pillar Mid	Y	A398291	Measurement Specialties	11/16/2022
Driver Seat	Y	G22654	Endevco	3/23/2023
Engine Top	X	A431353	Measurement Specialties	1/16/2023
Engine Top	Y	A431371	Measurement Specialties	1/16/2023
Firewall	Y	A280970	Measurement Specialties	2/27/2023
Right Roof	Y	G22208	Endevco	3/23/2023
Right Floor Sill	Y	A405595	Measurement Specialties	3/23/2023
Rear Floorpan	X	A255837	Measurement Specialties	12/29/2022
Rear Floorpan	Y	A374217	Measurement Specialties	12/29/2022