

REPORT NUMBER: 214D-CAL-24-006

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

**Volkswagen De Mexico S.A. De C.V. Mexico
2024 Volkswagen Tiguan
5 Door SUV**

NHTSA No: C20245800

**PREPARED BY:
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February 26, 2024

FINAL REPORT

**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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WASHINGTON, D.C. 20590**

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16. Abstract A 31.00 km/h (19.3 mph), 75° oblique compliance test was conducted on the subject 2024 Volkswagen Tiguan 5 Door SUV in accordance with the specifications of the Office of Vehicle Safety Compliance TP-214P-01 for the determination of FMVSS No.214 Side Impact Protection compliance. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 9, 2024. The impact velocity of the vehicle was 30.82 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 318 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC36)</td> <td></td> <td>1000</td> <td>349.084</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>44</td> <td>27.241</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>1021.676</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>2622.279</td> </tr> </tbody> </table> The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.						Measurement Description	Driver ATD (ES-2re)			Units	IARV	Result	Head Injury Criteria (HIC36)		1000	349.084	Maximum Thoracic Rib Deflection	mm	44	27.241	Total Abdominal Force	N	2500	1021.676	Pubic Symphysis Force	N	6000	2622.279
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17. Key Words Compliance Testing Side Impact Protection Pole Test ES-2re SID-IIs				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services (TIS) Room E12-100 East Bldg. 1200 New Jersey Ave. Washington, D.C. 20590 Telephone No. (202) 366-2588																								
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Form DOT F1700.7 (8-72)

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

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

SUMMARY

A rigid pole side impact test was conducted on a 2024 Volkswagen Tiguan 5 Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 30.82 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 9, 2024. Pre-test and post-test photographs of the test vehicle and side impact dummy (ES2re) are included in Appendix I of this report.

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

The ES2re male dummy was instrumented accordingly:

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

Appendix II contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix IV of this report. Appendix V identifies all serial numbers, manufacturers, and calibration dates for test equipment, dummy sensors, potentiometers, and load cells used to collect data during the test.

Injury readings for the ES2re dummy were recorded as follows:

INJURY READINGS

Measurement Description	Driver ATD (ES2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	349.084
Upper Rib Deflection	mm	44	24.834
Mid Rib Deflection	mm	44	24.621
Lower Rib Deflection	mm	44	27.241
Abdominal Load (front)	N		231.326
Abdominal Load (mid)	N		337.253
Abdominal Load (rear)	N		453.234
Total Abdominal Force	N	2500	1021.676
Pubic Symphysis Force	N	6000	2622.279

SECTION 2
OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024

TEST VEHICLE INFORMATION AND OPTIONS

Make	Volkswagen	Anti-Lock Brakes (ABS)	Yes
Model	Tiguan	All-Wheel Drive (AWD)	No
Body Style	5 Door SUV	Traction Control System (TCS)	Yes
VIN	3VVRB7AX0RM009363	Electric Stability Control (ECS)	Yes
Body Color	Pyrite Silver Metallic	Curtain Airbags	Yes
Engine Displacement (L)	2.0	Torso Airbags – Front Seats	Yes
Type / No. Cylinders	I4	Torso Airbags – Rear Seats	No
Engine Placement	Transverse	Combination/Head Torso Bag	No
Transmission Type	Automatic	Pelvic Airbag – Front Seats	No
Transmission Speeds	8-Speed	Pelvis Airbag – Rear Seats	No
Overdrive	Yes	Knee Airbag – Driver	No
Final Drive	Front Wheel Drive	Knee Airbag – Front Passenger	No
Odometer Reading (mi)	527	Seat Belt Pretensioners – Front Seats	Yes
		Seat Belt Pretensioners – Rear Seats	No
		Seat Belt Load Limiter – Front Seats	Yes
		Seat Belt Load Limiter – Rear Seats	No
		Tire Pressure Monitoring System (TPMS)	Yes
		Tilt Steering Wheel	Yes
		Automatic Door Locks (ADL)	Yes
		Power Window Auto-reverse	Yes
		Power Seats	No
		Other Safety Restraint	N/A

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen De Mexico S.A. De C.V. Mexico	GVWR (kg)	2340
Date of Manufacture	08/23	GVWR Front (kg)	1140
Vehicle Type	MPV	GVWR Rear (kg)	1250

VEHICLE SEATING AND WEIGHT CAPACITY DATA

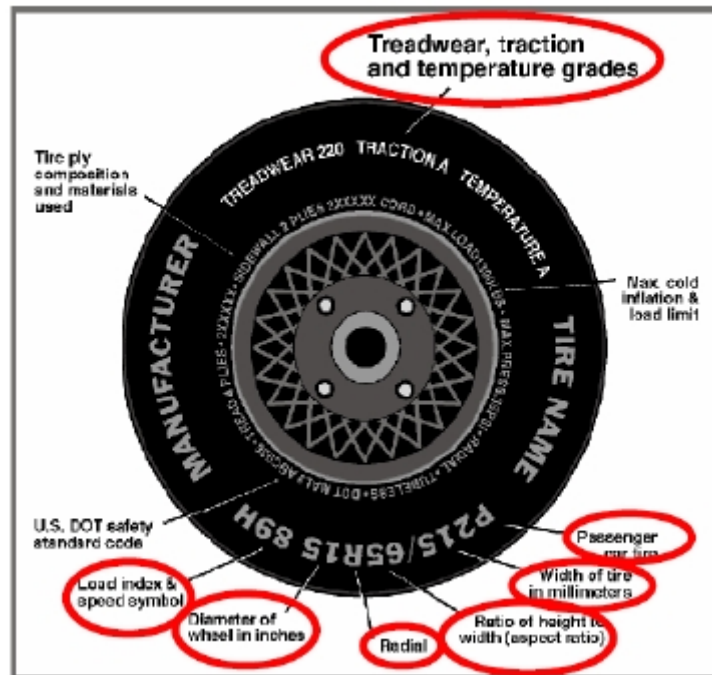
Measured Parameter	Front	Rear	Third	Total
Type of Seats (Bench or Bucket)	Bucket	Split Bench	Split Bench	
Designated Seating Capacity (DSC)	2	3	2	7
Capacity Weight (VCW) (kg)				590
Cargo Weight (RCLW) (kg)				113.72

DATA SHEET NO. 2 VEHICLE TIRE INFORMATION

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024

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



VEHICLE TIRE INFORMATION

Tire Placard	Front	Rear
Recommended Cold Pressure (kPa)	260	260
Recommended Tire Size	215/65R17	215/65R17
Tire Sidewall	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Tire Size on Vehicle	215/65R17	215/65R17
Tire Manufacturer Model	Bridgestone	Bridgestone
Tire Name	Ecopia H/L 422 Plus	Ecopia H/L 422 Plus
Tire Type	All Season	All Season
Tire Width	215	215
Aspect Ratio	65	65
Radial	Yes	Yes
Wheel Diameter	17"	17"
Load Index / Speed Symbol	99H	99H
Treadwear	700	700
Traction Grade	A	A
Temperature Grades	A	A

DATA SHEET NO. 3
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	211	250	208	210
Tire Placard	kPa	260	260	260	260

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			Fully Loaded			As Tested		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	489	370		520	456		522	444	
Right	kg	467	381		473	450		485	444	
Ratio	%	56.0	44.0		52.3	47.7		53.1	46.9	
Totals	kg	956	751	1707	993	906	1899	1007	888	1895

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1707	(A)
Weight of Test Dummy	kg	81	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	113.72	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1901.72	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	Fully Loaded	As Tested
Driver Door Sill Angle	Deg	-0.55	-0.75	-0.55
Front Passenger Sill Angle	Deg	-0.70	-0.20	-0.55
Front Bumper-Line Angle	Deg	-0.35	-0.30	-0.35
Rear Bumper-Line Angle	Deg	+0.10	-0.15	+0.05

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

CALCULATION OF VERTICAL IMPACT REFERENCE LINE

Measured Parameter	Units	Value
Test Vehicle Wheelbase	mm	2789
Vertical Impact Reference Line Aft of Front Axle	mm	1253

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	7
Spare Tire	18
Jack	2
Tail Light	1
Ballast (if any)	78

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

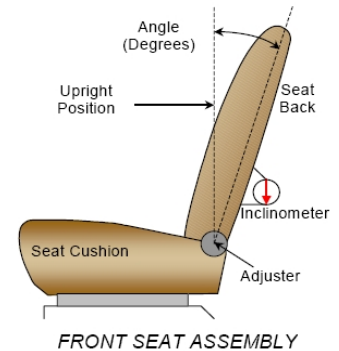
NHTSA No.: C20245800
Test Date: 02/09/2024

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	degrees	17.9
Front Passenger Seat	degrees	21.3

*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	16.4	Max	-	-	-
		Mid	-	-	-
		Min	17	17	17
Front Passenger Seat	15.8	Max	-	-	-
		Mid	-	-	-
		Min	16	16	16

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Placed in Position #	
	mm	Detents*	mm	Detents*
Driver Seat	254	40 (0-39)	157	19
Front Passenger Seat	214	40 (0-39)	107	19

SEAT BELT ANCHORAGE ADJUSTMENT

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

HEAD RESTRAINT ADJUSTMENT

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

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024

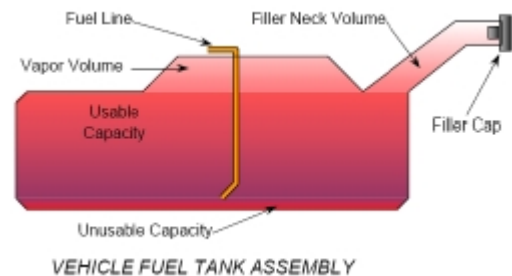
FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of (Form No.1)	57.9
Usable Capacity of (Owner's Manual)	60
92 - 94% of Usable Capacity	55.2 - 56.4
Actual Amount of Solvent Used in Test	55.8

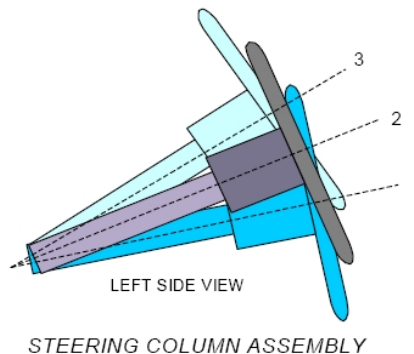
FUEL PUMP

Describe the operation of the fuel pump.

The vehicle is equipped with an electric fuel pump. The fuel filler neck is on the right 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

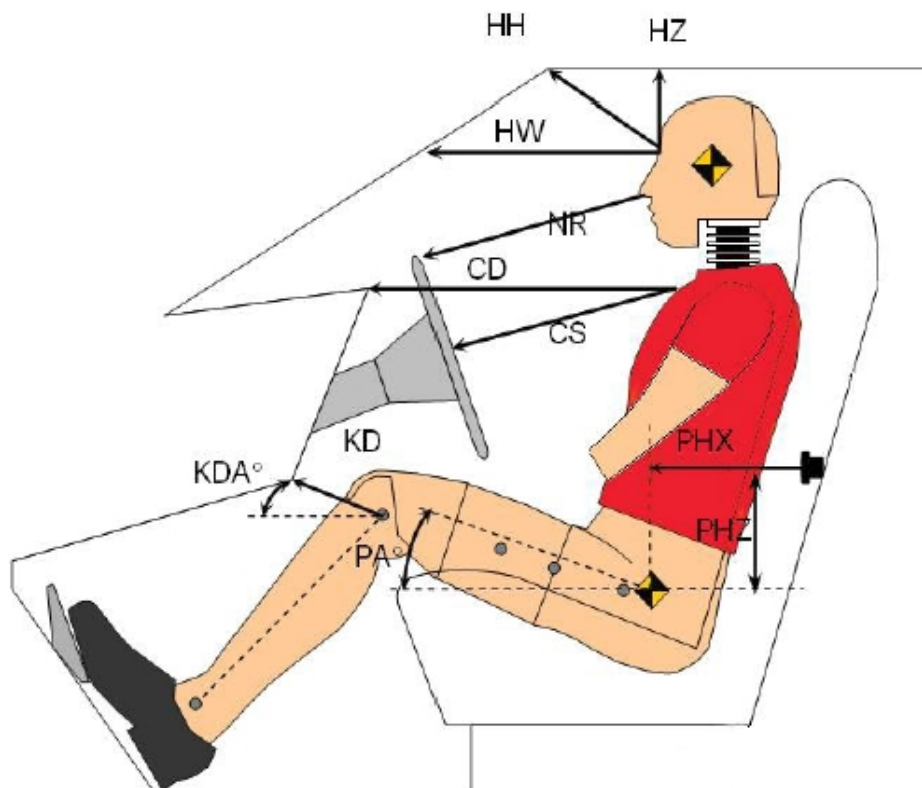


	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	22.5	
Geometric center - Position No. 2	25.3	
Uppermost - Position No. 3	28.0	
Telescoping Steering Wheel Travel		56
Test Position	25.4	28

DATA SHEET NO. 6
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024



Left Side View

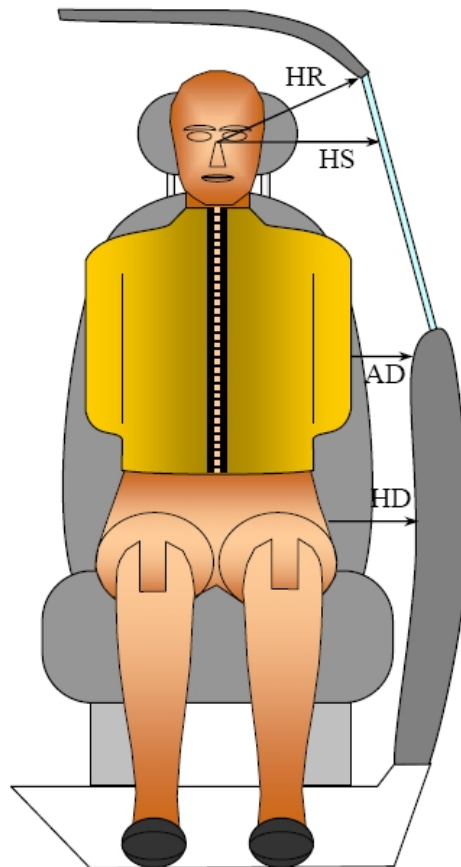
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	398	
HW	Head to Windshield	610	
HZ	Head to Roof Liner	188	
NR	Nose to Rim	455	
CD	Chest to Dash	580	
CS	Chest to Steering Wheel	372	
KD(L) / KDA(L)°	Left Knee to Dash	203	21.5
KD(R) / KDA(R)°	Right Knee to Dash	200	19.8
PAX°	Pelvic Tilt Angle (X-Axis)		21.1
PAY°	Pelvic Tilt Angle (Y-Axis)		-1.4
PHX	Hip Point to Striker (X-Axis)	197	
PHZ	Hip Point to Striker (Z-Axis)	221	

DATA SHEET NO. 7
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024



FRONT VIEW OF DUMMY

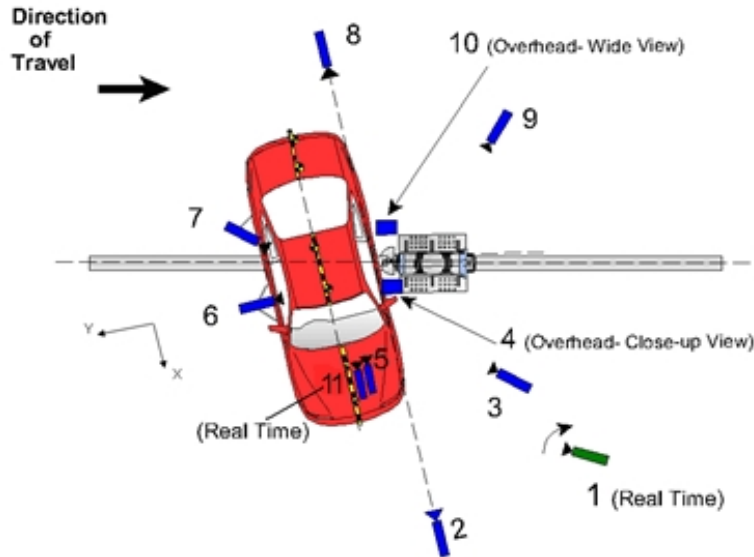
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	212
HS	Head to Side Window	mm	343
AD	Arm to Door	mm	95
HD	H-Point to Door	mm	167

DATA SHEET NO. 8 LOCATION OF CAMERA

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024



CAMERA LOCATIONS AND DATA

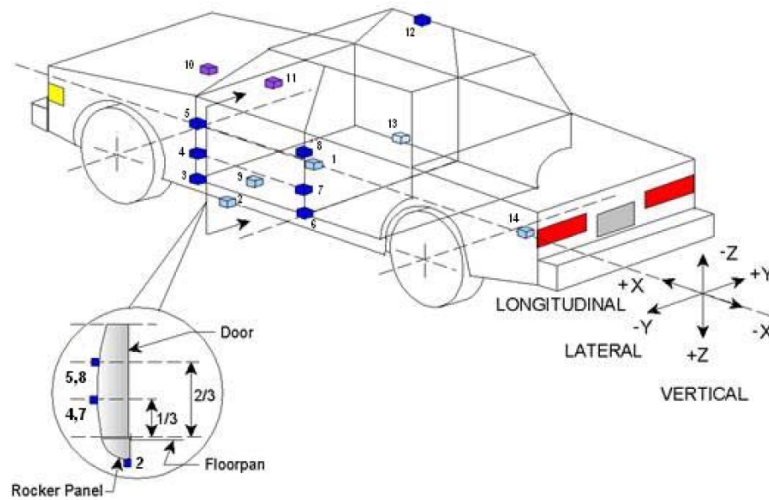
No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	60
2	Front ground level - impact view	7231	0	-1521	28	1000
3	Impact side 45° - forward pole view	4636	986	-1463	24	1000
4	Overhead Close-up view of impact	0	0	-8992	28	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-7868	0	-1533	28	1000
9	Impact side 45° - rearward pole view	-5998	3605	-1525	24	1000
10	Overhead wide - view of impact	0	-132	-8992	16	1000

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

DATA SHEET NO. 9 **TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2177	0	96
2	Left Floor Sill	3006	-663	172
3	A-Pillar Sill	3259	-626	169
4	A-Pillar Low	3410	-612	-68
5	A-Pillar Mid	3206	-673	-578
6	B-Pillar Sill	2237	-656	161
7	B-Pillar Low	2275	-687	-55
8	B-Pillar Mid	2205	-678	-468
9	Seat	2532	-596	139
10	Engine	4005	240	-244
11	Firewall	3698	22	-387
12	Roof	2563	622	-1012
13	Right Floor Sill	3002	658	170
14	Rear Deck	999	-4	86

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

DATA SHEET NO. 10
TEST VEHICLE ACCELEROMETER DATA SUMMARY

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024

Loc. No	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	X	g	3.78	16.90	-13.47	25.30
	Vehicle CG	Y	g	32.50	47.20	-3.06	27.00
	Vehicle CG	Z	g	24.17	25.55	-31.39	17.30
	Vehicle CG Resultant	N/A	g	44.40	17.75	0.04	-45.80
2	Floor Sill (Left)	Y	g	69.43	16.00	-4.22	46.90
3	A Pillar Sill	Y	g	40.98	38.15	-32.85	34.00
4	A Pillar Low	Y	g	30.89	19.85	-11.53	39.80
5	A Pillar Mid	Y	g	28.02	31.60	-22.95	34.75
6	B Pillar Sill	Y	g	118.76	17.10	-32.83	50.35
7	B Pillar Low	Y	g	150.34	18.40	-94.96	23.90
8	B Pillar Mid	Y	g	101.77	18.40	-32.28	25.95
9	Seat	Y	g	78.13	16.15	-8.53	38.60
10	Engine Top	X	g	2.33	104.00	-9.69	38.75
	Engine Top	Y	g	15.83	73.10	-4.50	171.55
11	Firewall	Y	g	15.40	64.75	-1.07	3.85
12	Roof	Y	g	26.75	35.75	-2.12	300.00
13	Floor Sill (Right)	Y	g	22.85	20.50	-2.19	153.70
14	Rear Deck	X	g	1.93	46.05	-7.74	18.55
	Rear Deck	Y	g	20.04	18.50	-1.25	170.00

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV NHTSA No.: C20245800
Test Facility: Calspan Test Date: 02/09/2024

Dummy Serial No. D037

Description	Axes	Positive Direction		Negative Direction	
		MAX	TIME (ms)	MAX	TIME (ms)
HEAD ACCELERATION (g)					
Longitudinal	X	3.10	120.30	-20.42	61.95
Lateral	Y	51.17	56.30	-11.71	104.40
Vertical	Z	16.82	59.65	-2.01	165.10
Resultant	N/A	55.37	56.35		
HIC36 (t1, t2)	N/A	349.08		t1 = 45.55	t2 = 72.25
THORAX DEFLECTION (mm)					
Upper Rib	Y	24.83	55.85	-7.02	27.25
Middle Rib	Y	24.62	55.25	-3.18	107.80
Lower Rib	Y	27.24	55.15	-3.06	112.10
ABDOMINAL FORCES (N)					
Front	Y	231.33	50.55	-20.83	189.95
Middle	Y	337.25	50.70	-11.46	172.75
Rear	Y	453.23	50.65	-13.09	175.65
SUM	N/A	1021.68	50.65		
PELVIS FORCES (N)					
Pubic Symphysis	Y	140.71	108.35	-2622.28	58.30

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

DATA SHEET NO. 12
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024

IMPACT POINT DATA

Measured Parameter	Units	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm	1253
Actual Impact Point - Aft of Front Axle	mm	1252
Difference	mm	1

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024

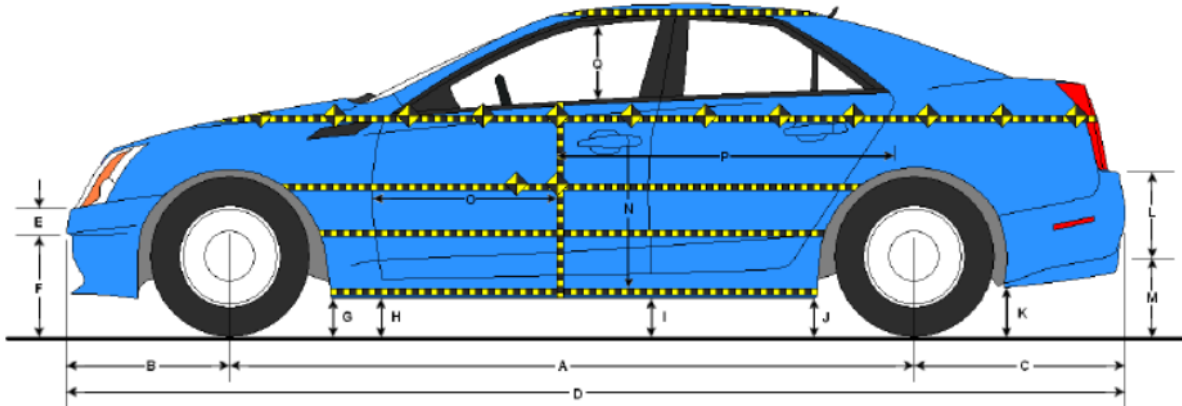
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024



LEFT SIDE VIEW

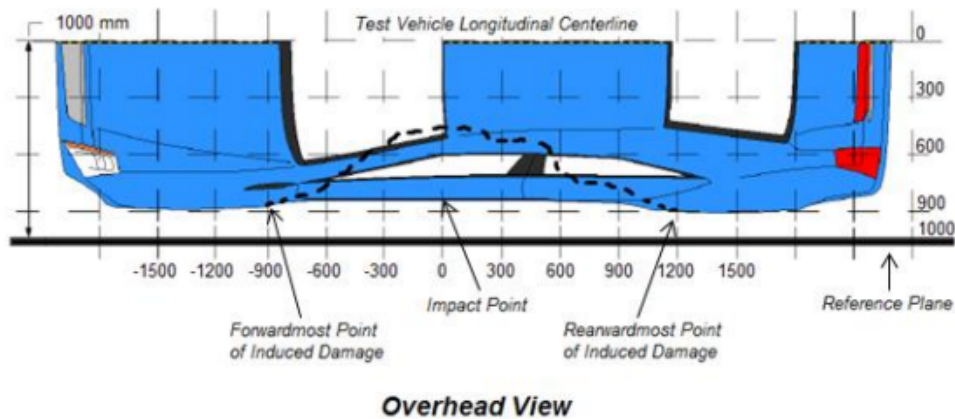
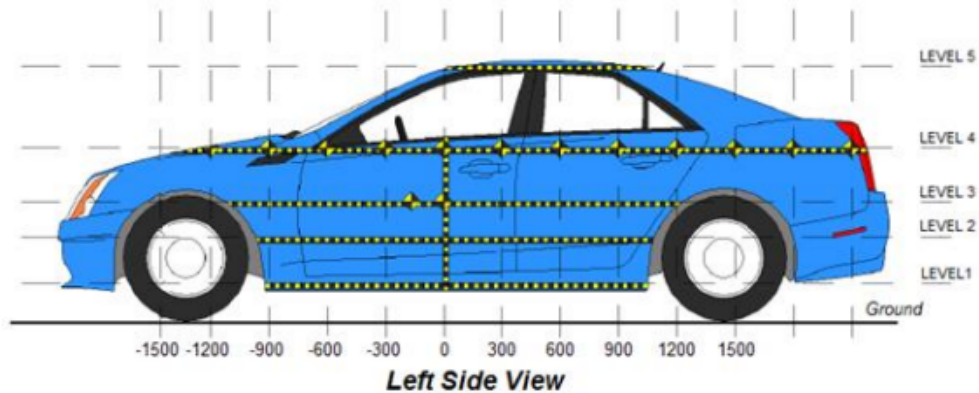
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

No.	Measurement Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2789	2782	-7
B	Front Axle to FSOV	922	917	-5
C	Rear Axle to RSOV	1016	1017	1
D	Total Vehicle Length at Centerline	4727	4717	-11
E	Front Bumper Thickness	93	94	1
F	Front Bumper Bottom to Ground	425	444	19
G	Sill Height at Front Wheel Well	252	251	-1
H	Sill Height at Front Door Leading Edge	253	252	-1
I	Sill Height at B Pillar	256	264	8
J1	Sill Height at Rear Wheel Well	256	250	-6
J2	Pinch Weld Height at Rear Wheel Well	235	234	-1
K	Sill Height Aft of Rear Wheel Well	248	231	-17
L	Rear Bumper Thickness	94	94	0
M	Rear Bumper Bottom to Ground	431	423	-8
N	Sill Height to Window Bottom Sill	850	853	4
O	Front Door Leading Edge to Impact CL	757	699	-58
P	Rear Door Trailing Edge to Impact CL	1417	1362	-55
Q	Front Window Opening	423	417	-6
R	Right Side Length	4629	4627	-1
S	Left Side Length	4629	4598	-31
T	Vehicle Width at B-Pillars	1842	1712	-130

DATA SHEET NO. 14
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	391	290	0
2	Occupant H-Point	mm	679	311	0
3	Mid-Door	mm	752	318	0
4	Window Sill	mm	1055	282	0
5	Window Top	mm	1578	84	0

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

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024

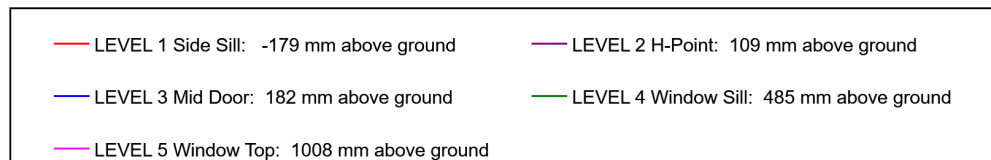
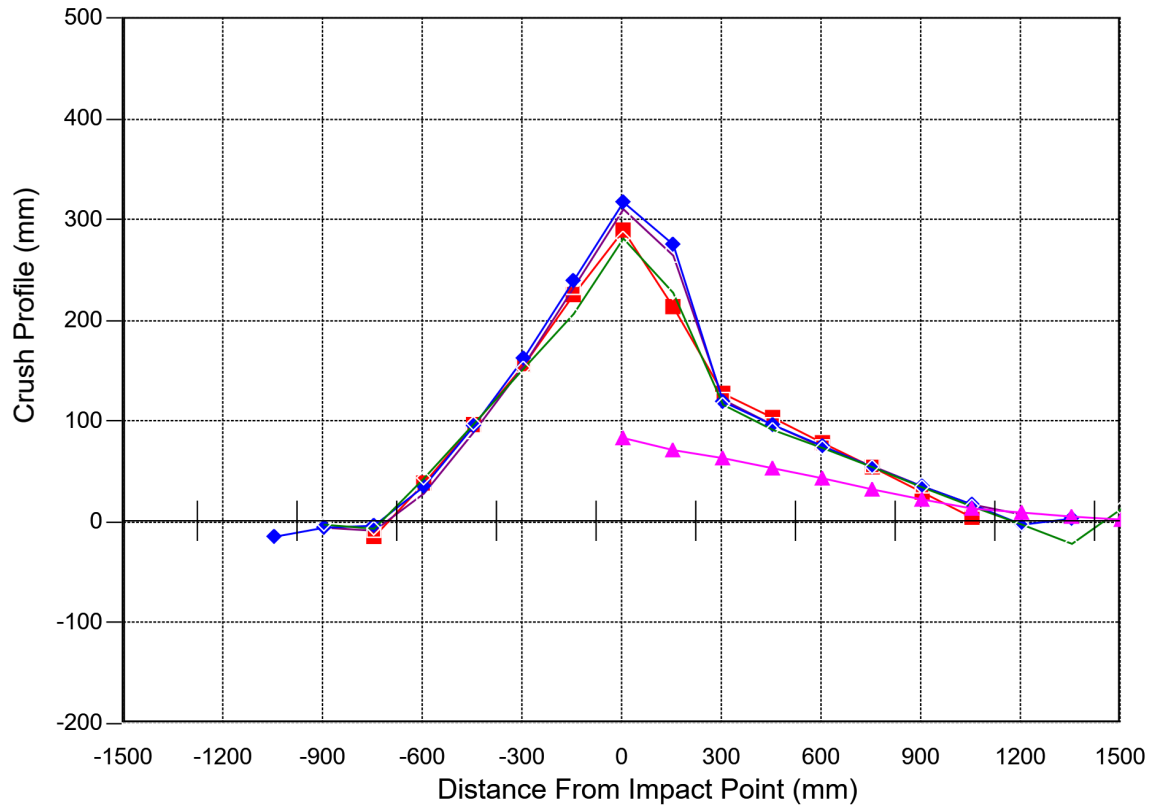
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050			919					933					-14		
-900		917	918	819			922	923	821			-5	-5	-2	
-750	903	913	913	833		917	921	916	839		-14	-8	-3	-6	
-600	907	911	913	851		868	882	877	807		39	29	36	44	
-450	910	912	914	844		813	822	818	746		97	90	96	98	
-300	912	913	916	851		756	757	753	698		156	156	163	153	
-150	913	913	917	855		687	680	677	648		226	233	240	207	
0	913	913	916	861	615	623	602	598	579	531	290	311	318	282	84
150	913	912	916	863	622	699	647	640	635	550	214	265	276	228	72
300	911	910	914	866	625	783	788	794	749	561	128	122	120	117	64
450	909	909	913	865	624	805	812	816	773	570	104	97	97	92	54
600	905	907	911	867	620	826	832	835	793	576	79	75	76	74	44
750	901	903	907	865	615	846	847	852	810	582	55	56	55	55	33
900	896	901	904	864	607	866	865	868	829	584	30	36	36	35	23
1050	891	903	905	859	596	886	885	887	843	582	5	18	18	16	14
1200		909	909	876	583		901	911	878	573		8	-2	-2	10
1350			909	852	566			905	873	560			4	-21	6
1500				835	545				821	542				14	3

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
 Test Facility: Calspan

NHTSA No.: C20245800
 Test Date: 02/09/2024

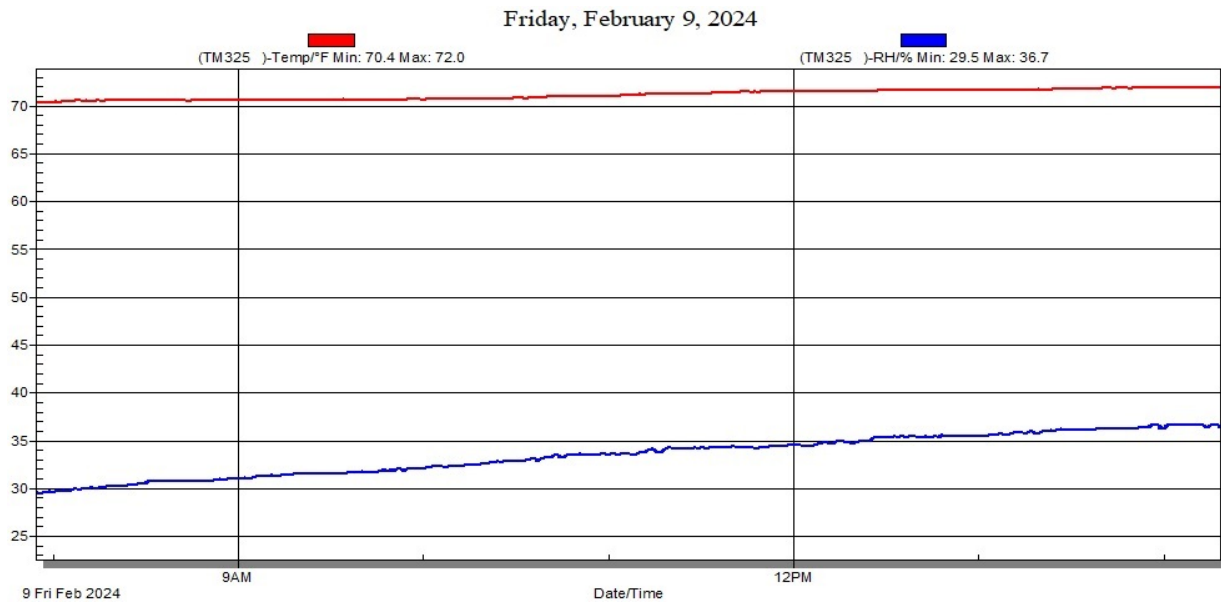


Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2024 Volkswagen Tiguan 5 Door SUV
Test Facility: Calspan

NHTSA No.: C20245800
Test Date: 02/09/2024



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

APPENDIX I
PHOTOGRAPHS

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26	Close-Up View of Vehicle's Tire Placard Label	I-15



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

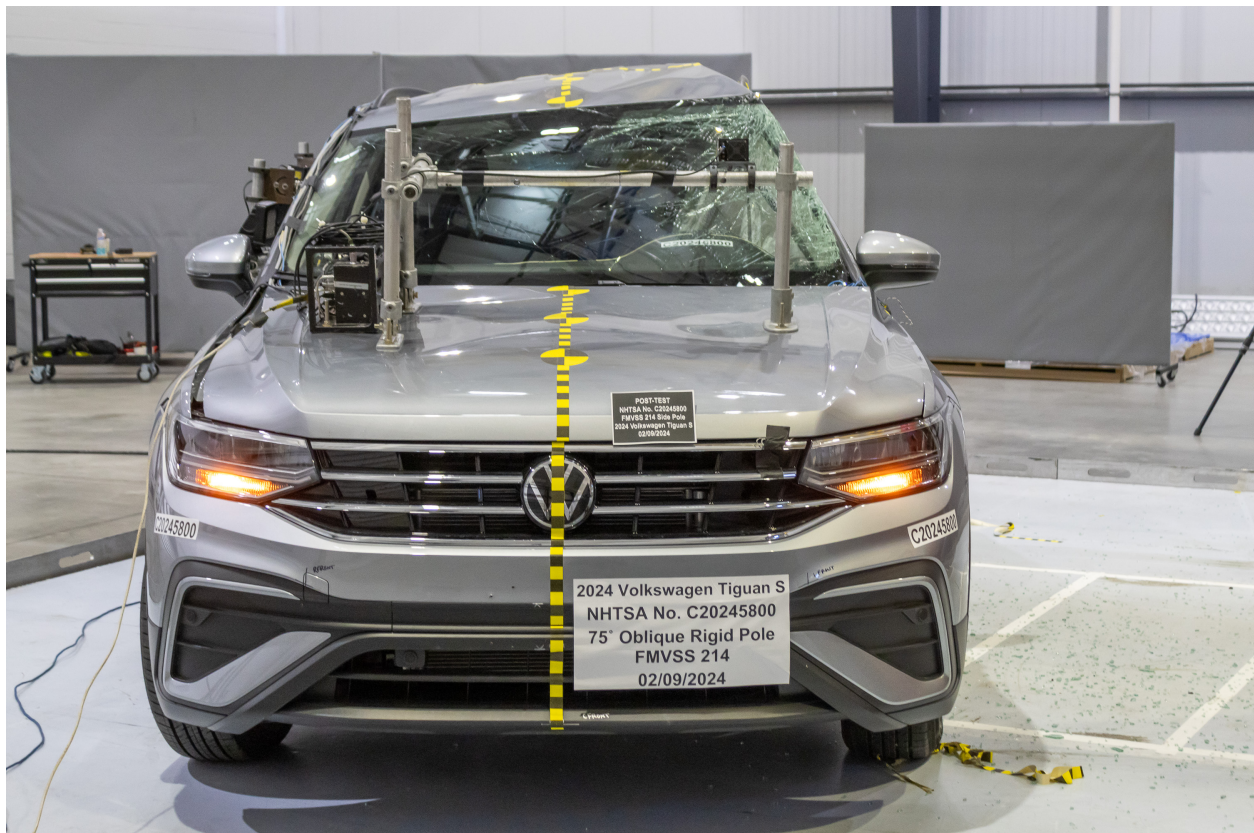


Figure A-2: Post Test Frontal View of Test Vehicle



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

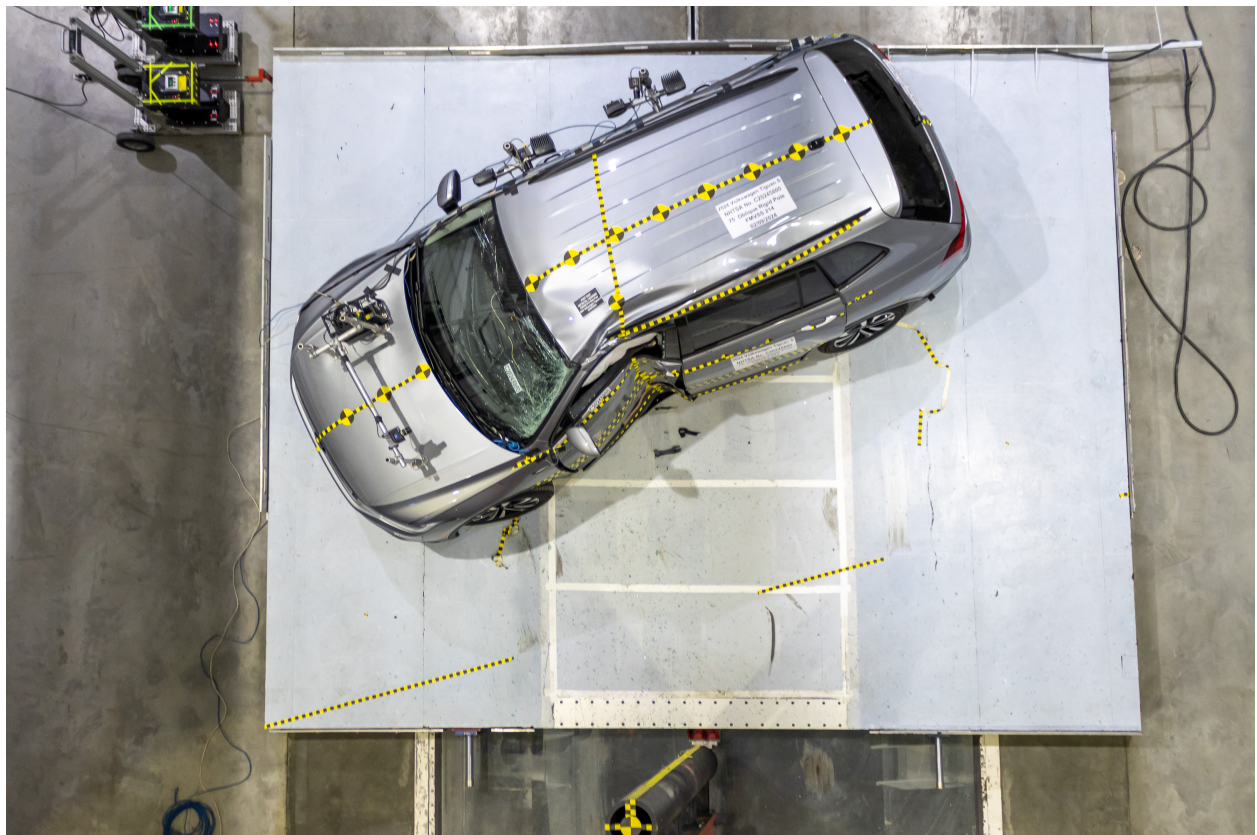


Figure A-10: Post-Test Overhead View of Test Vehicle



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

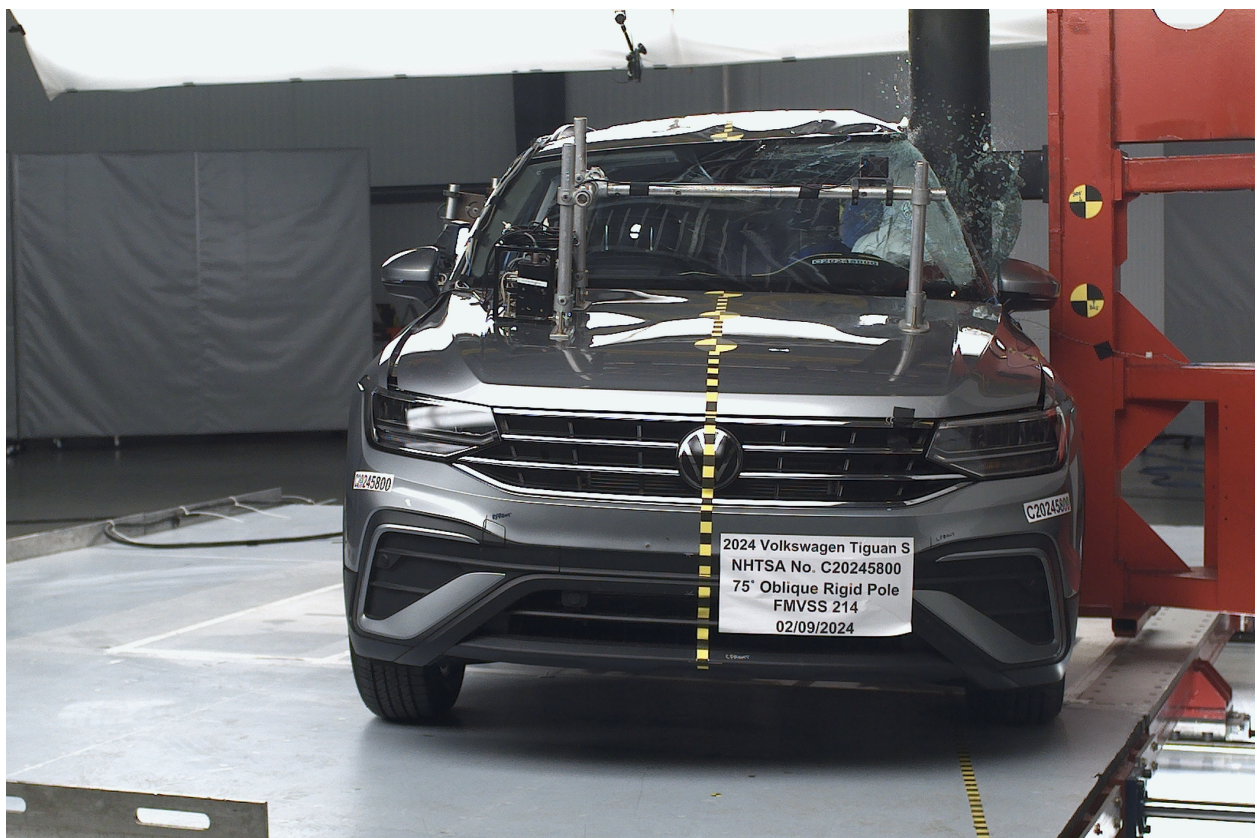


Figure A-20: Impact Event



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



Figure A-22: Post-Test $\frac{3}{4}$ Front View of Impact Zone



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



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



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



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

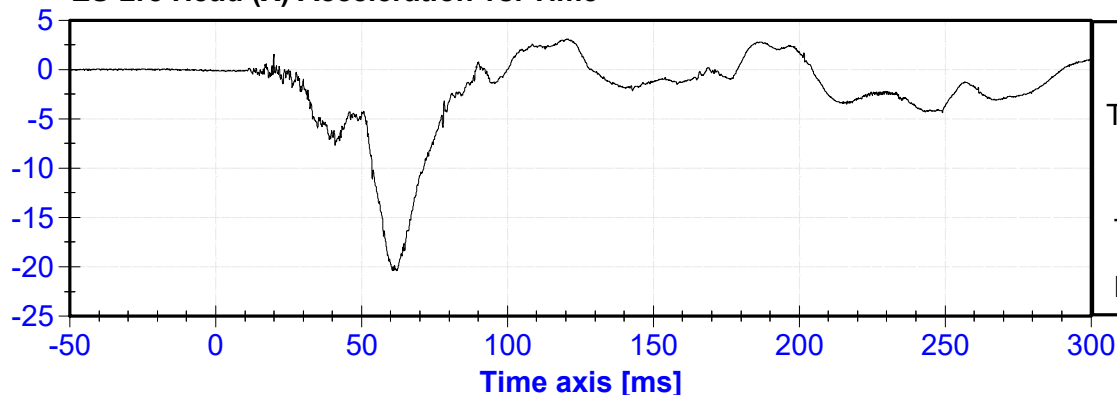
APPENDIX II
ES-2re DUMMY RESPONSE DATA TRACES

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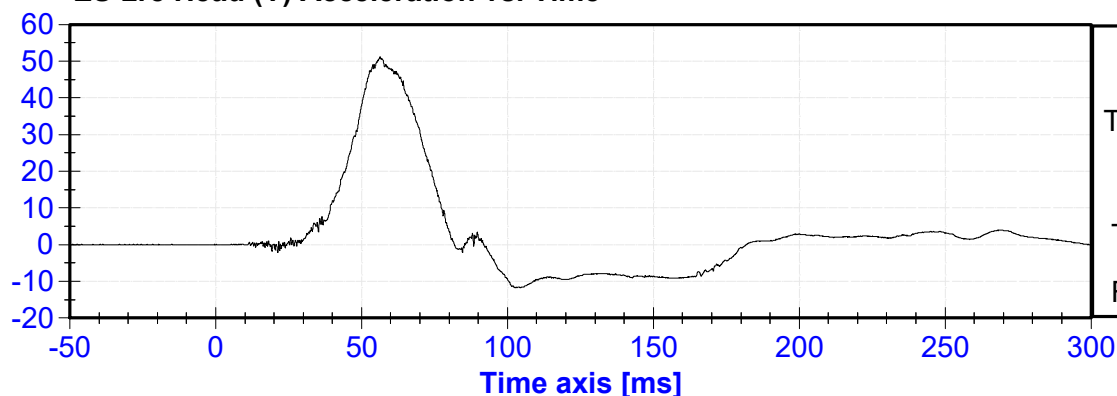
ACCELERATION [g's]

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



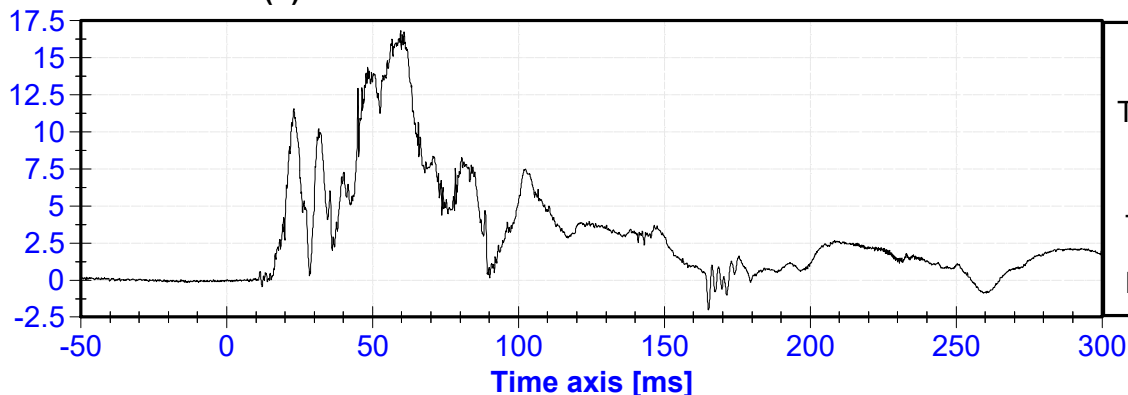
ACCELERATION [g's]

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



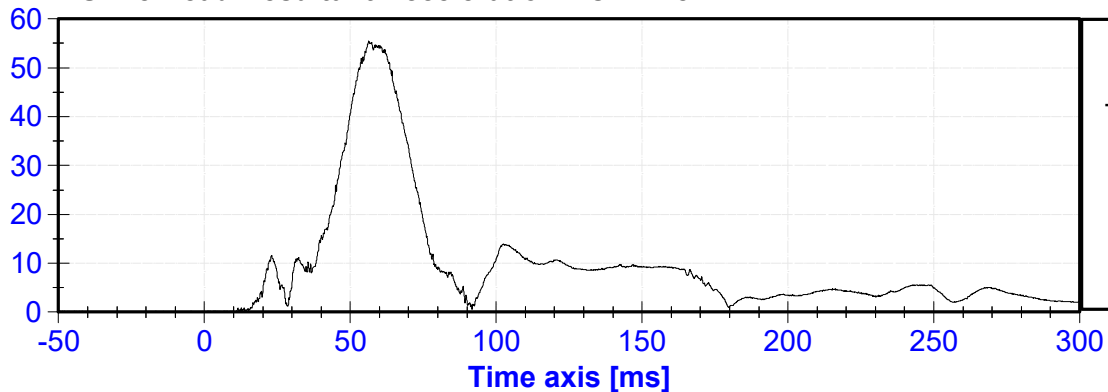
ACCELERATION [g's]

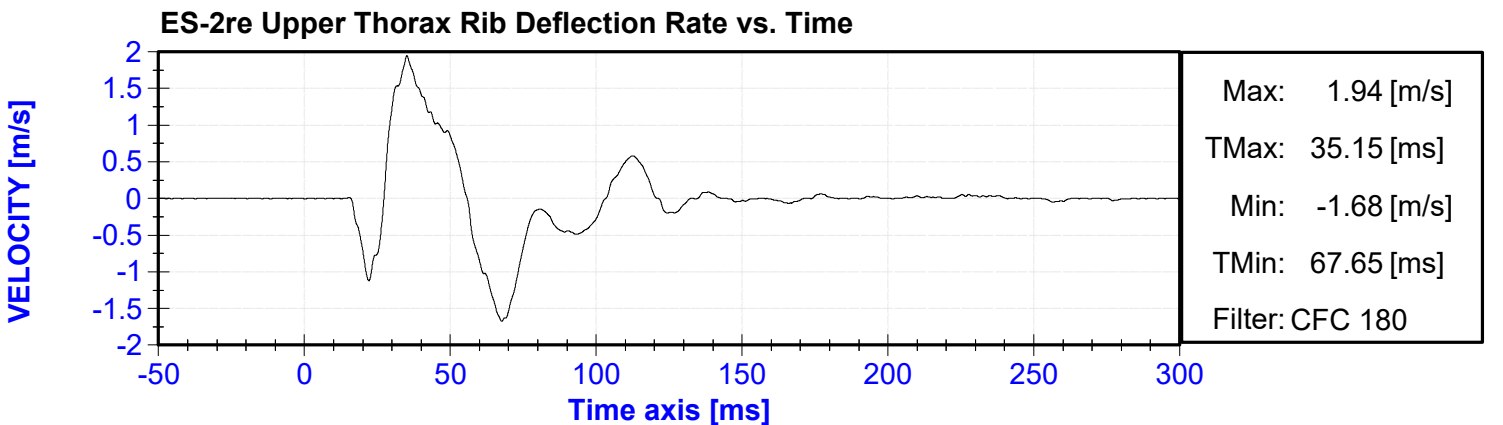
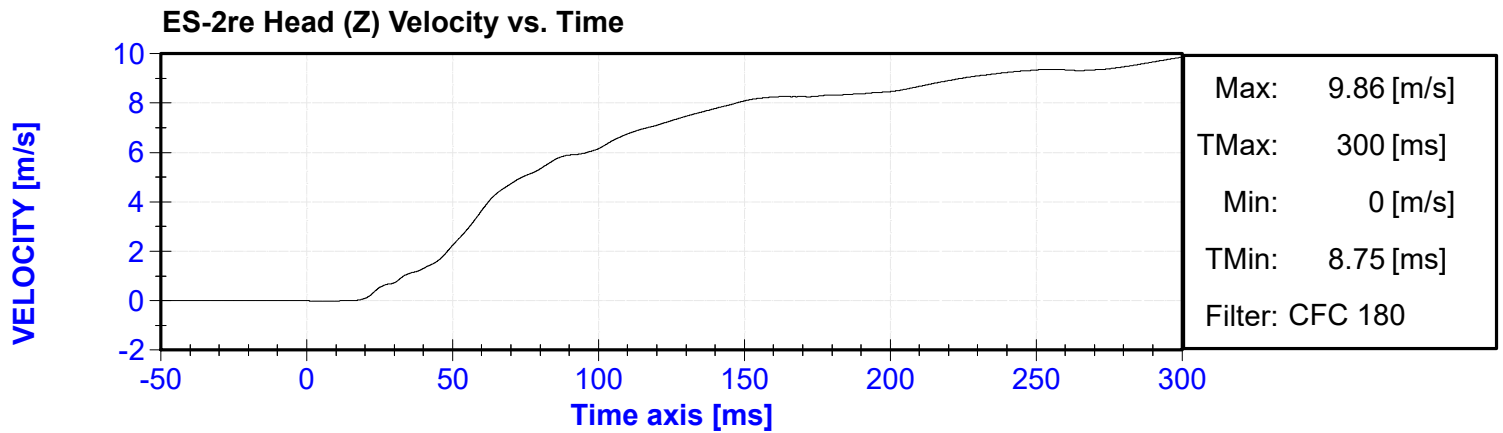
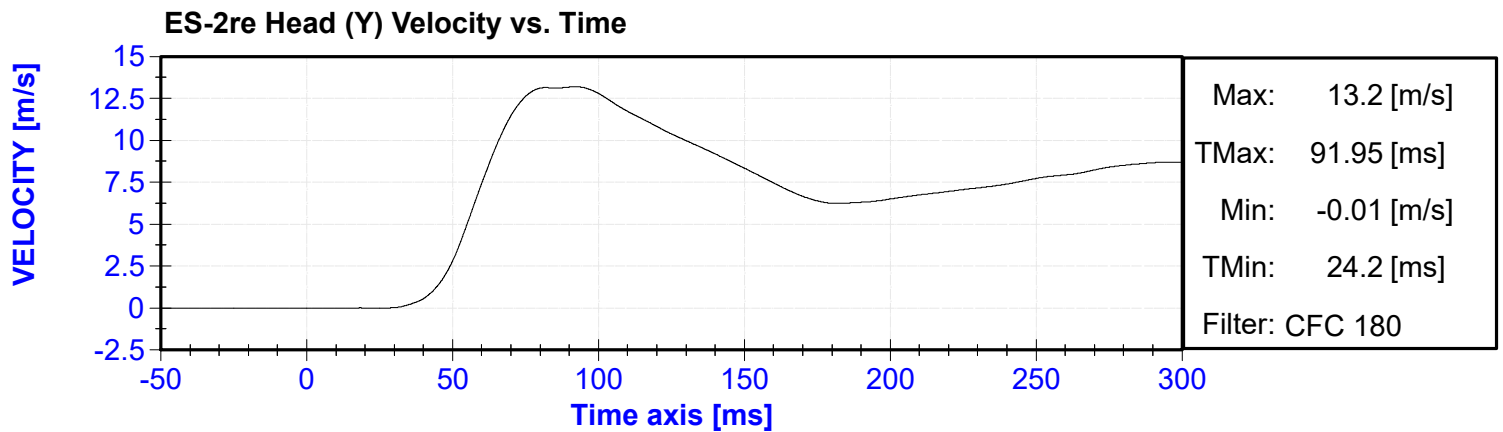
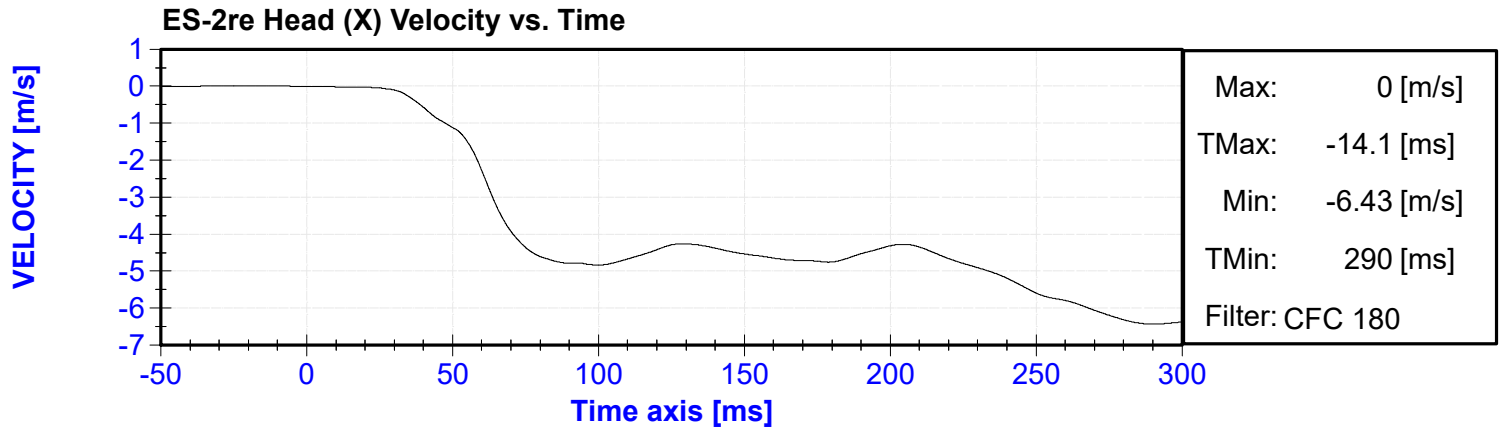
ES-2re Head (Z) Acceleration vs. Time



ACCELERATION [g's]

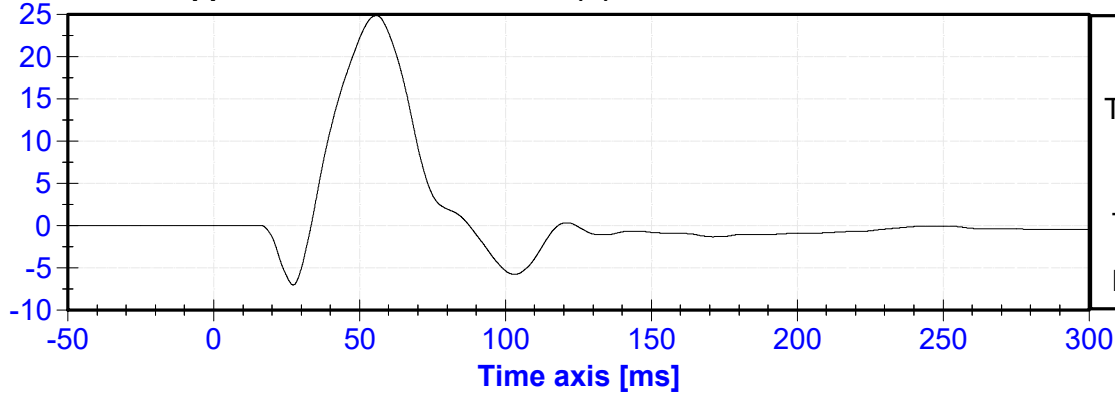
ES-2re Head Resultant Acceleration vs. Time





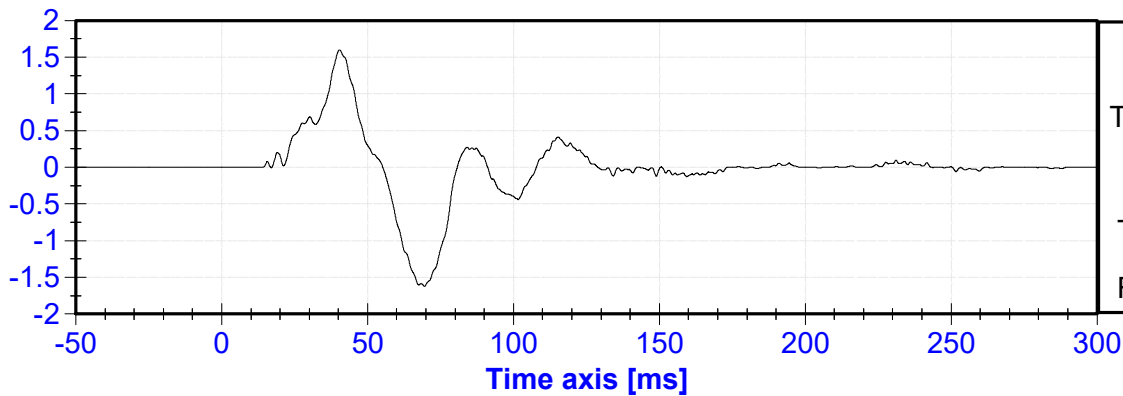
DISPLACEMENT [mm]

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



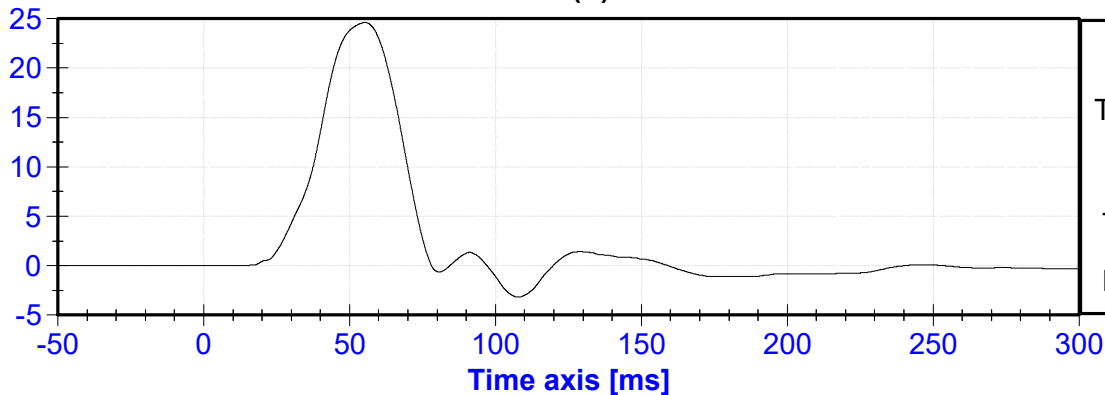
VELOCITY [m/s]

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



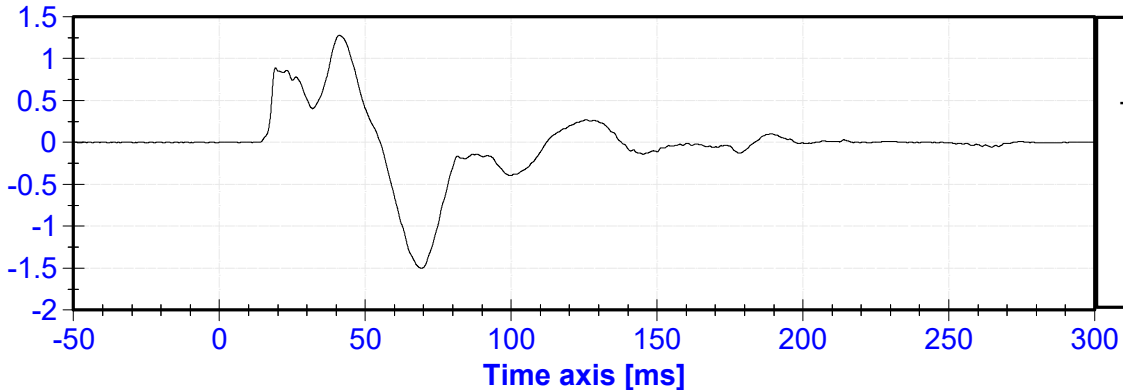
DISPLACEMENT [mm]

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



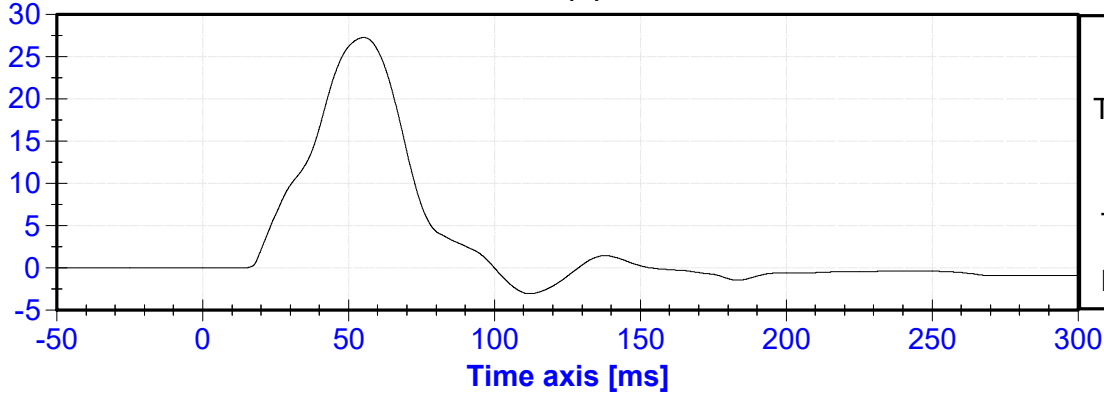
VELOCITY [m/s]

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



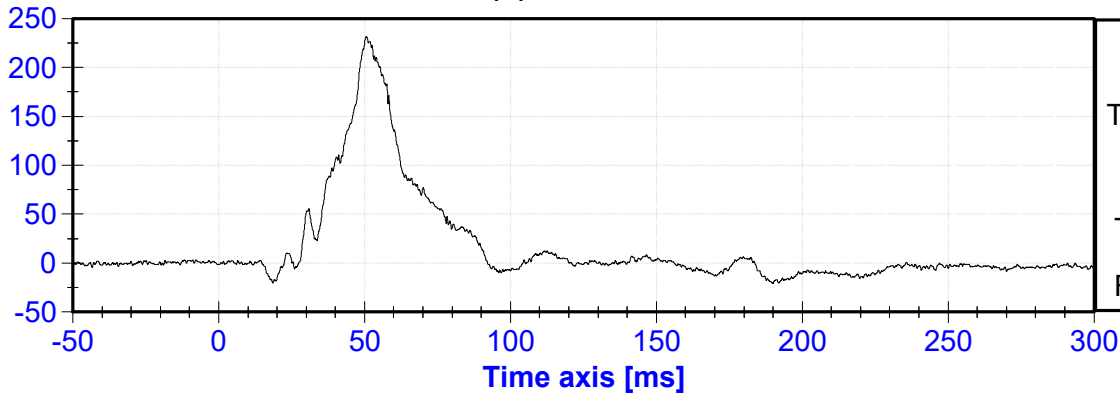
ES-2re Lower Thorax Rib Deflection (Y) vs. Time

DISPLACEMENT [mm]



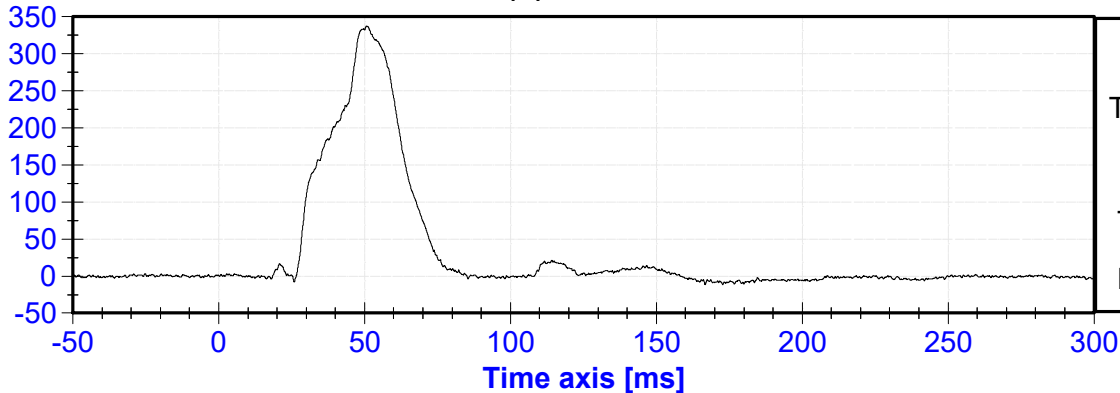
ES-2re Front Abdomen Force (Y) vs. Time

FORCE [N]



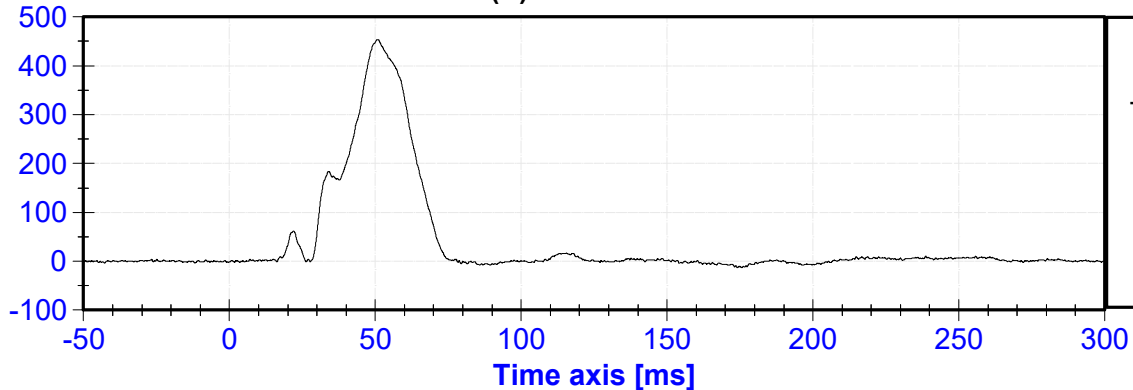
ES-2re Middle Abdomen Force (Y) vs. Time

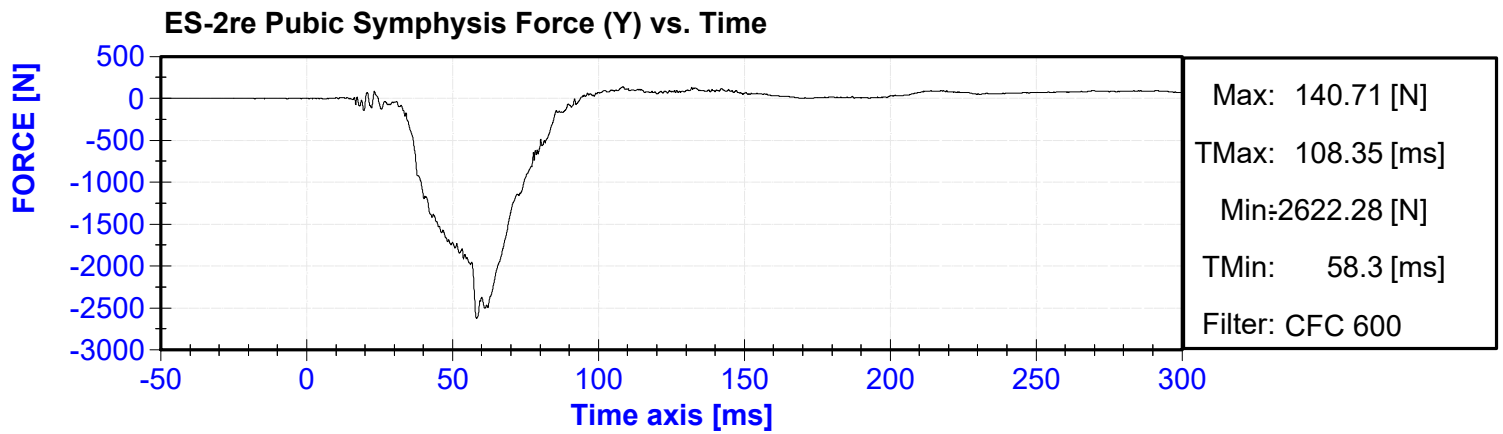
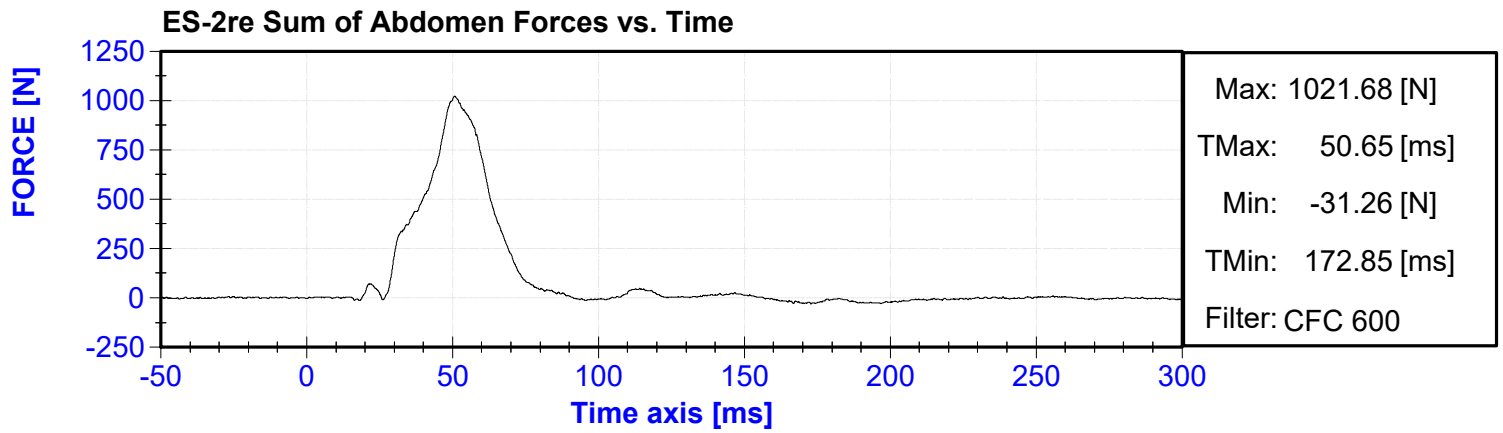
FORCE [N]



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

FORCE [N]



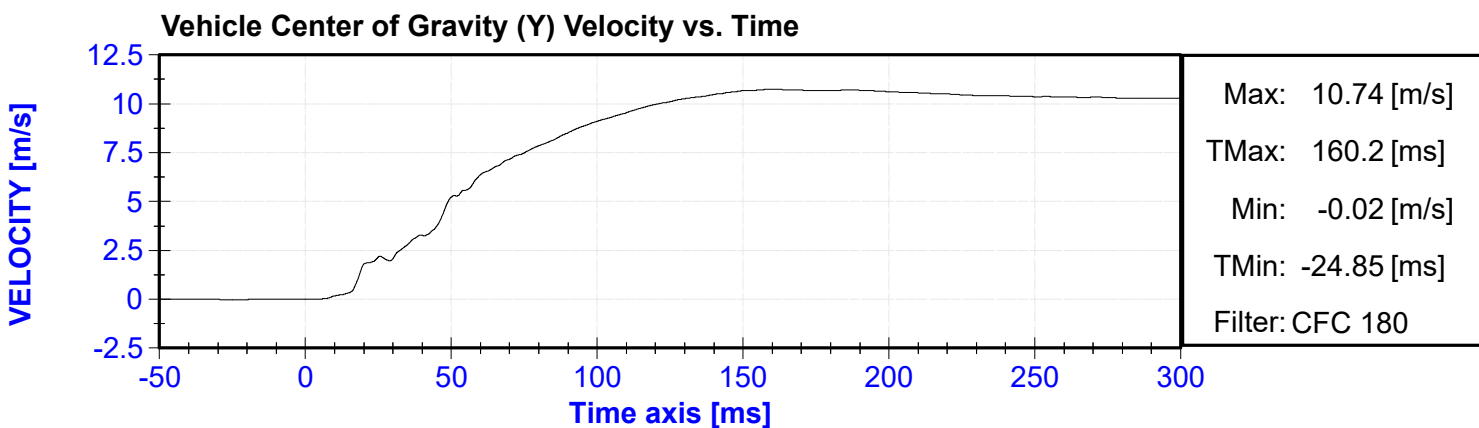
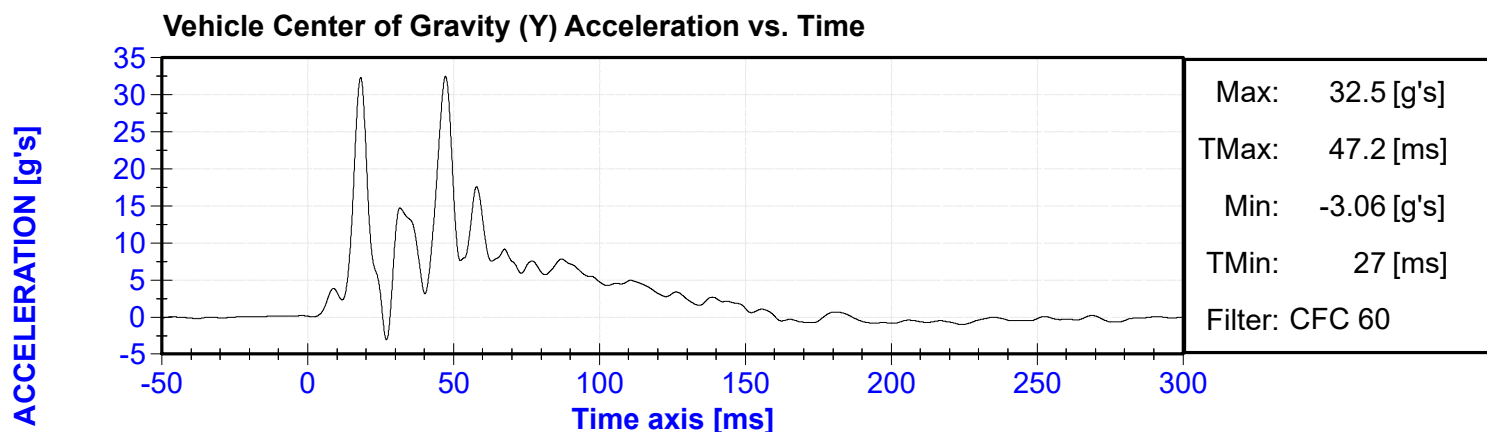
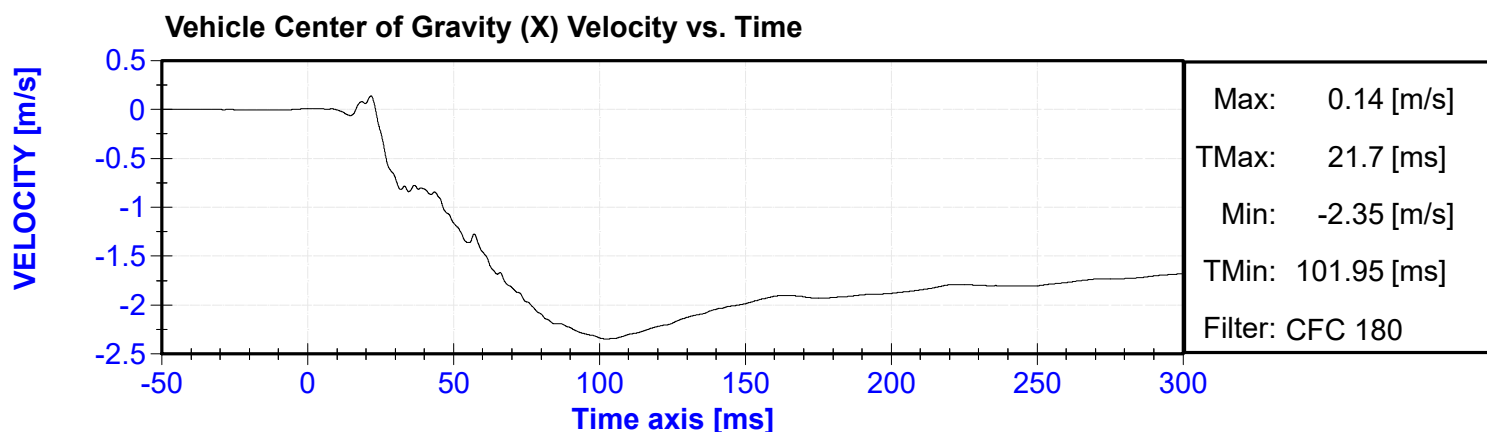
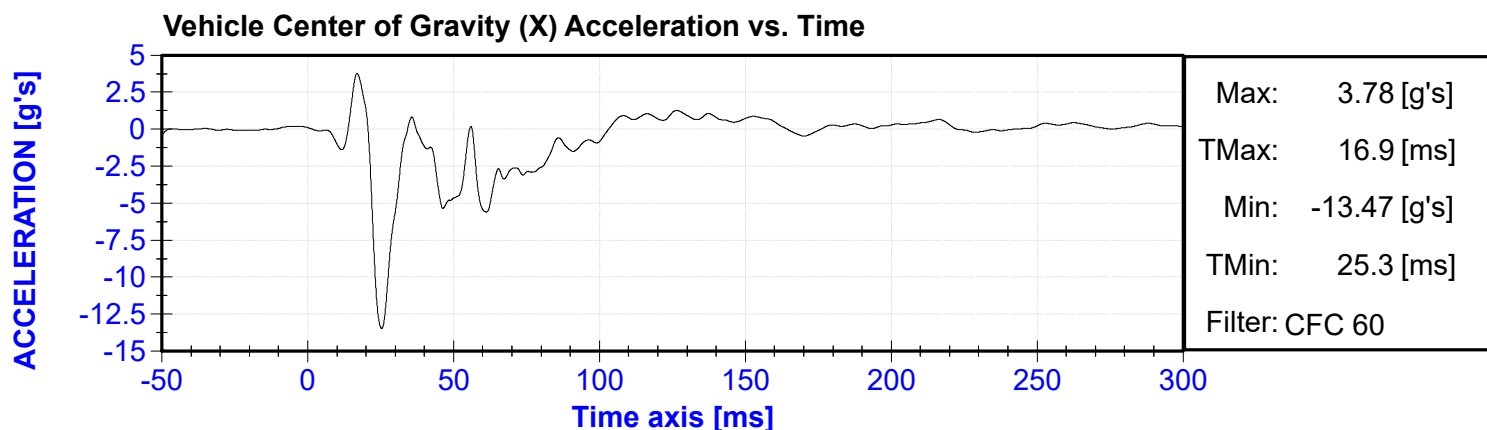


APPENDIX III

VEHICLE ACCELEROMETER RESPONSE DATA

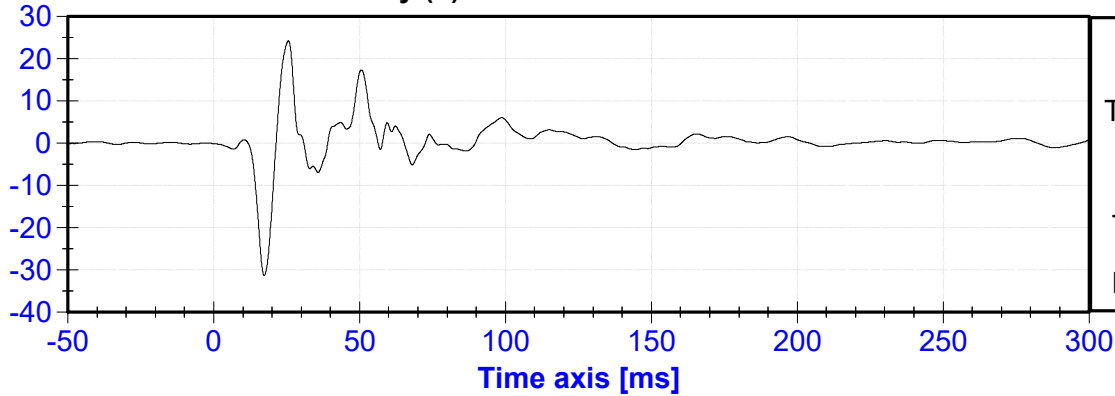
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19	A-Pillar Mid (Y) Displacement vs. Time	III-7
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43	Rear Deck (X) Velocity vs. Time	III-13
44	Rear Deck (Y) Acceleration vs. Time	III-13
45	Rear Deck (Y) Velocity vs. Time	III-14



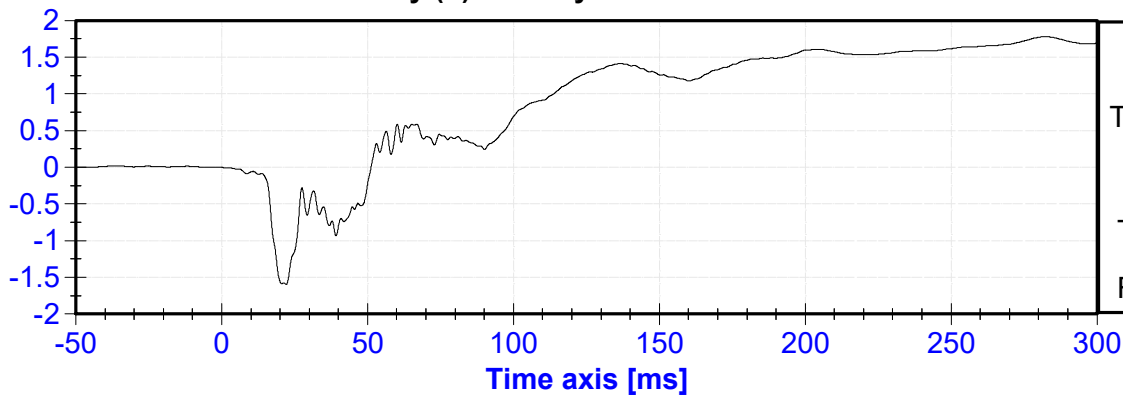
ACCELERATION [g's]

Vehicle Center of Gravity (Z) Acceleration vs. Time



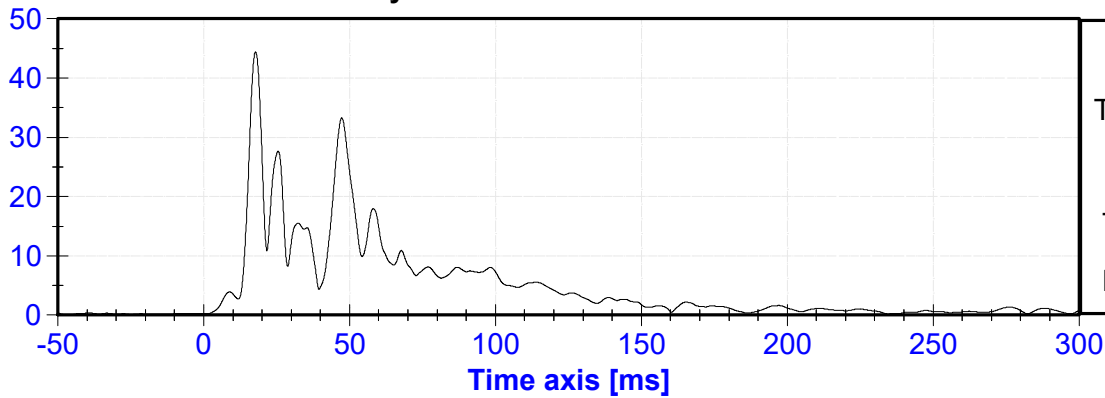
VELOCITY [m/s]

Vehicle Center of Gravity (Z) Velocity vs. Time



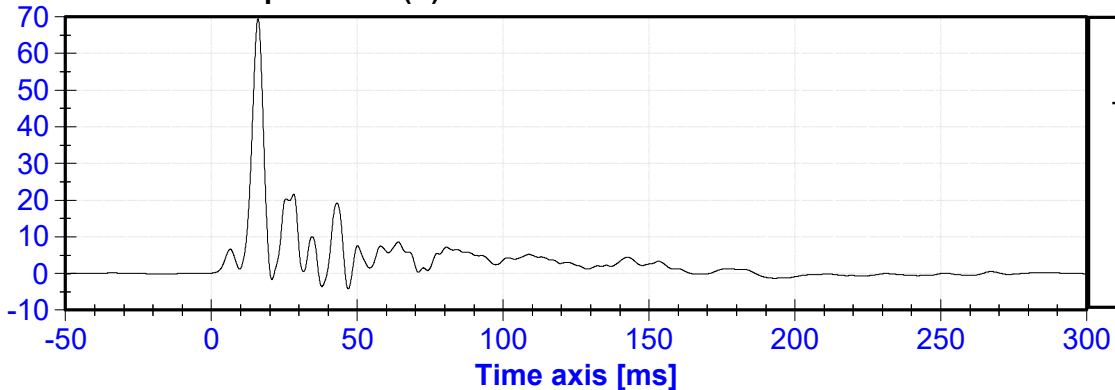
ACCELERATION [g's]

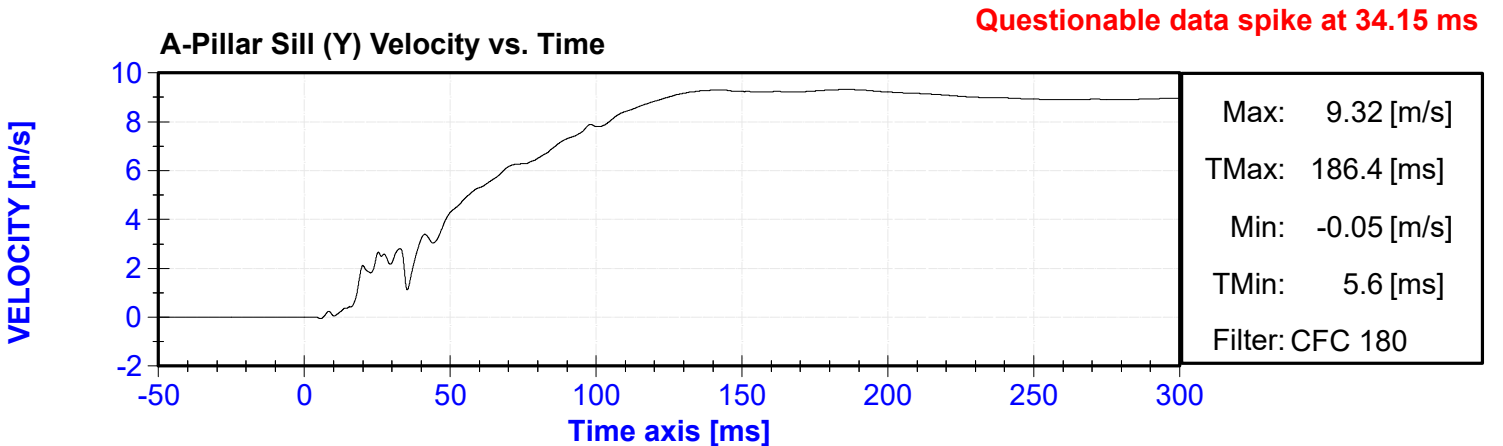
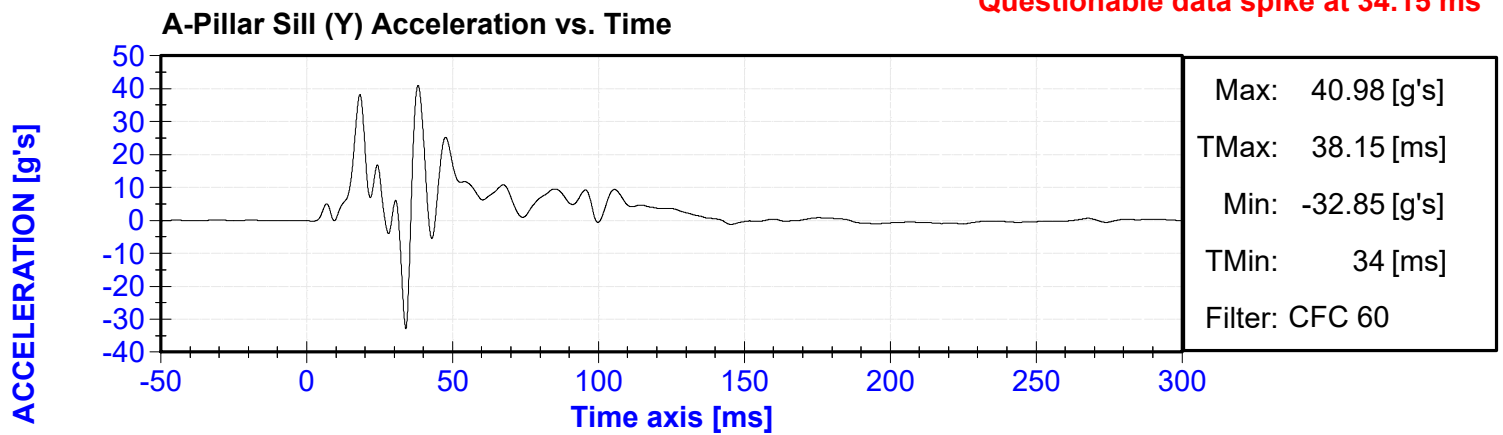
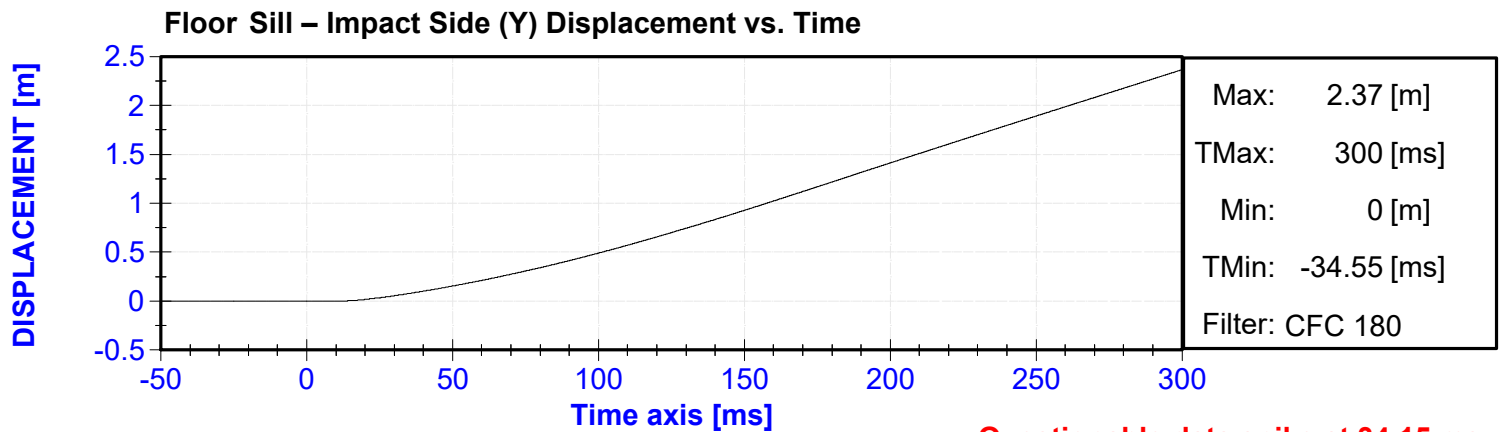
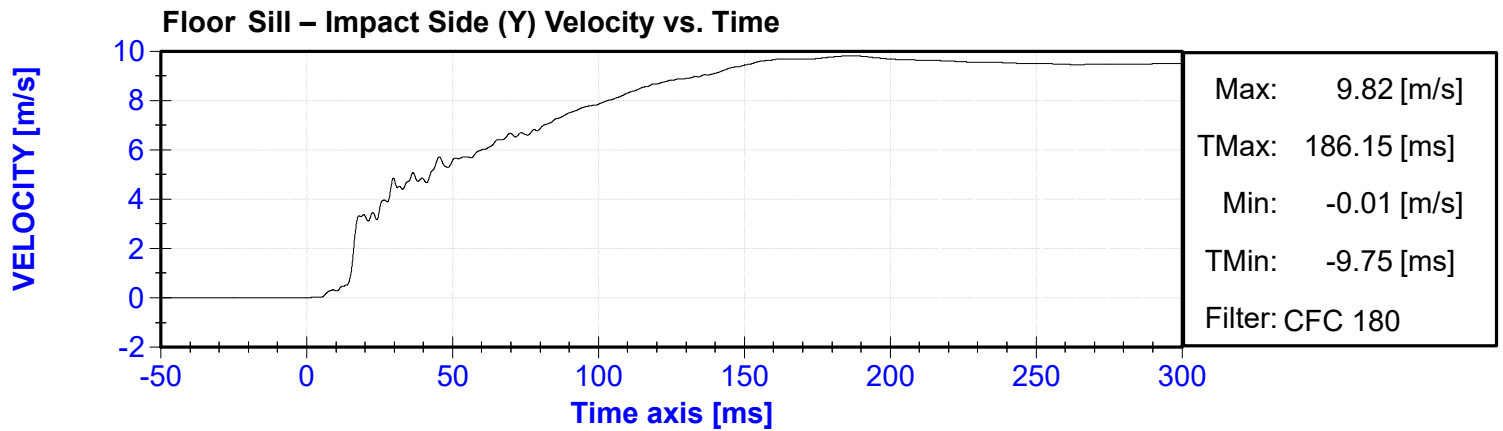
Vehicle Center of Gravity Resultant Acceleration vs. Time



ACCELERATION [g's]

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

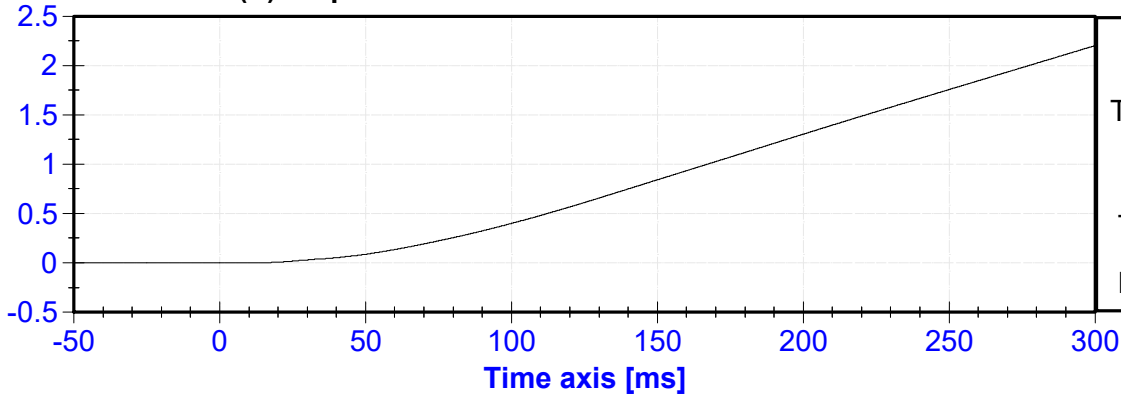




Questionable data spike at 34.15 ms

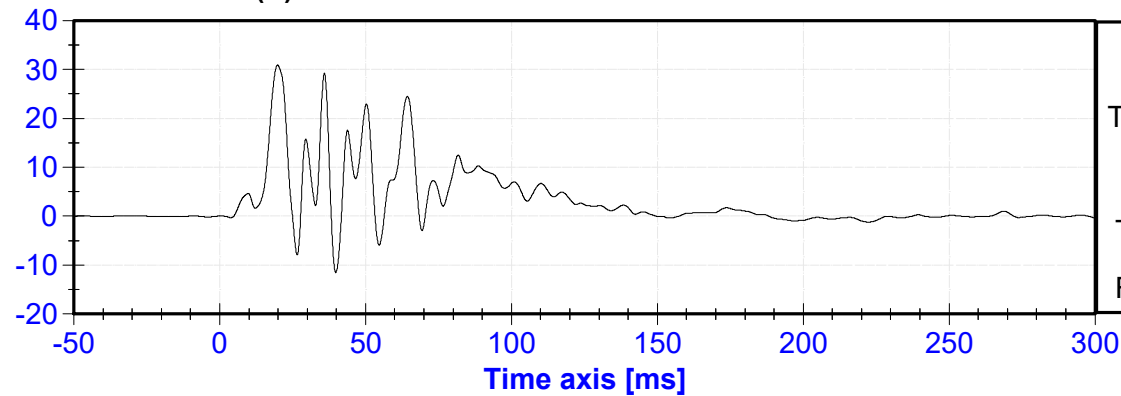
DISPLACEMENT [m]

A-Pillar Sill (Y) Displacement vs. Time



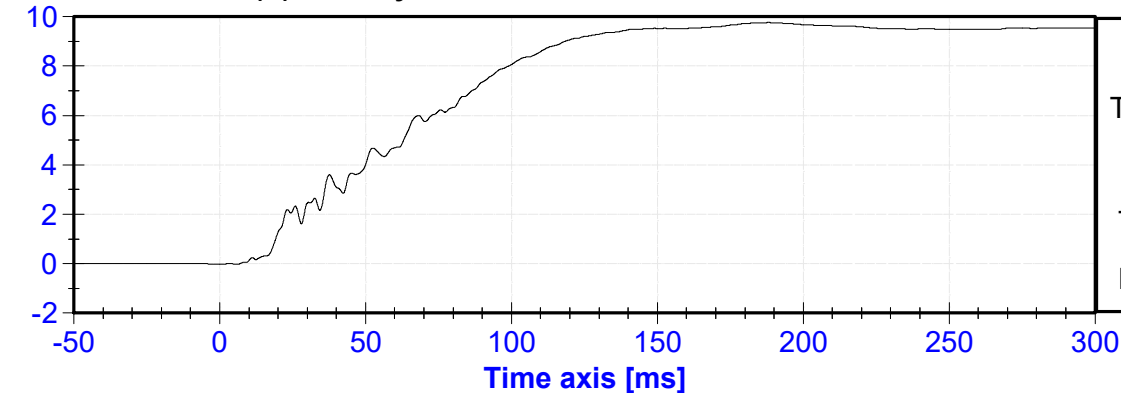
ACCELERATION [g's]

A-Pillar Low (Y) Acceleration vs. Time



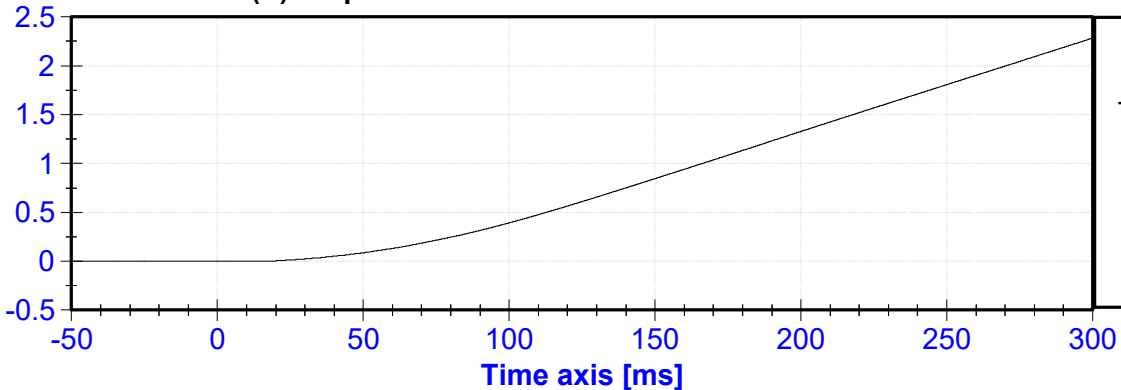
VELOCITY [m/s]

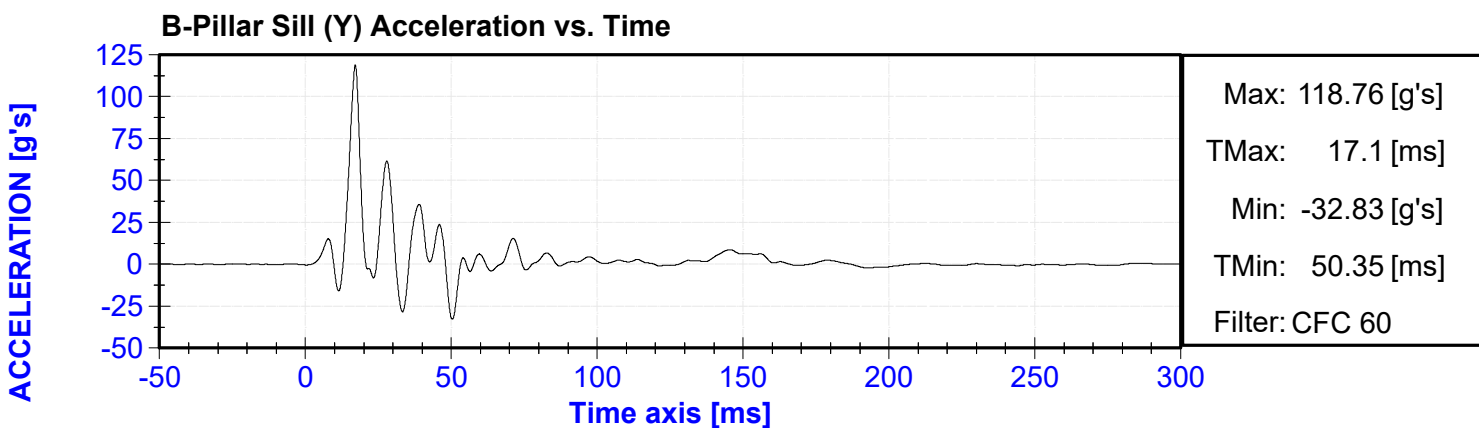
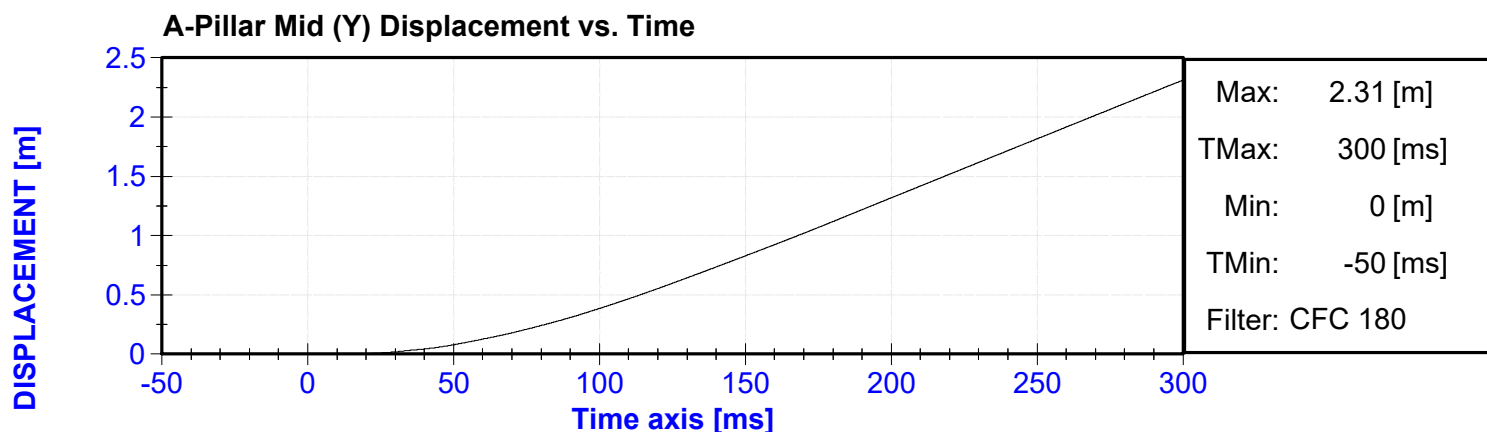
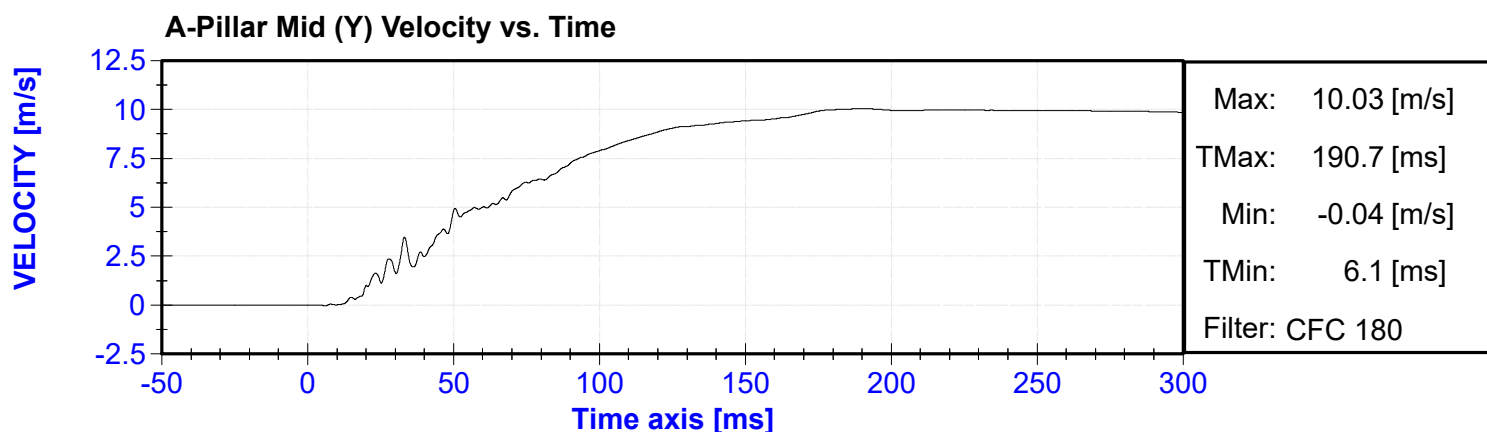
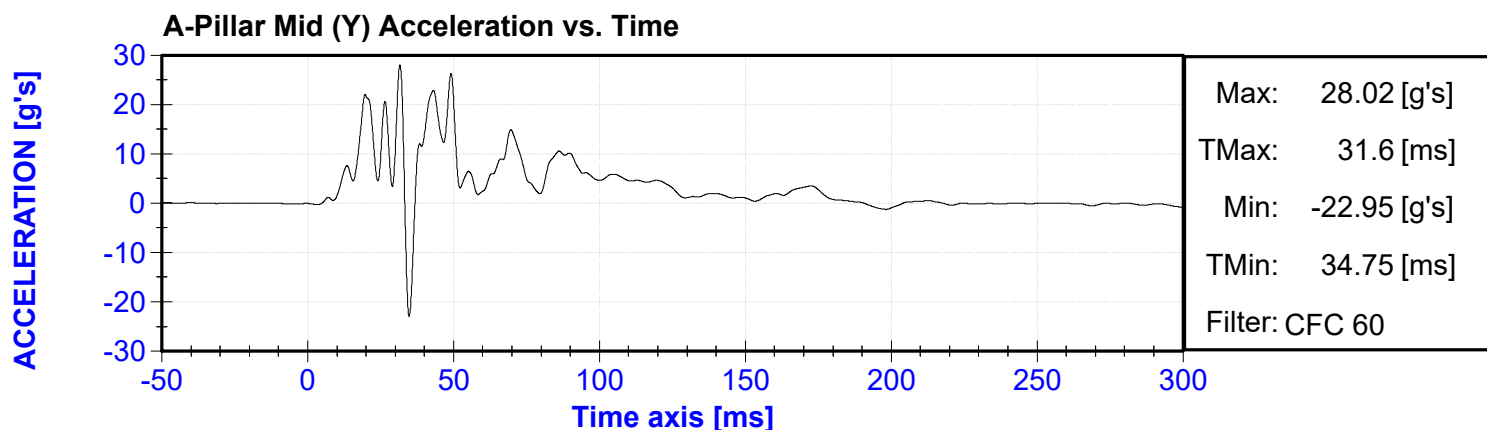
A-Pillar Low (Y) Velocity vs. Time

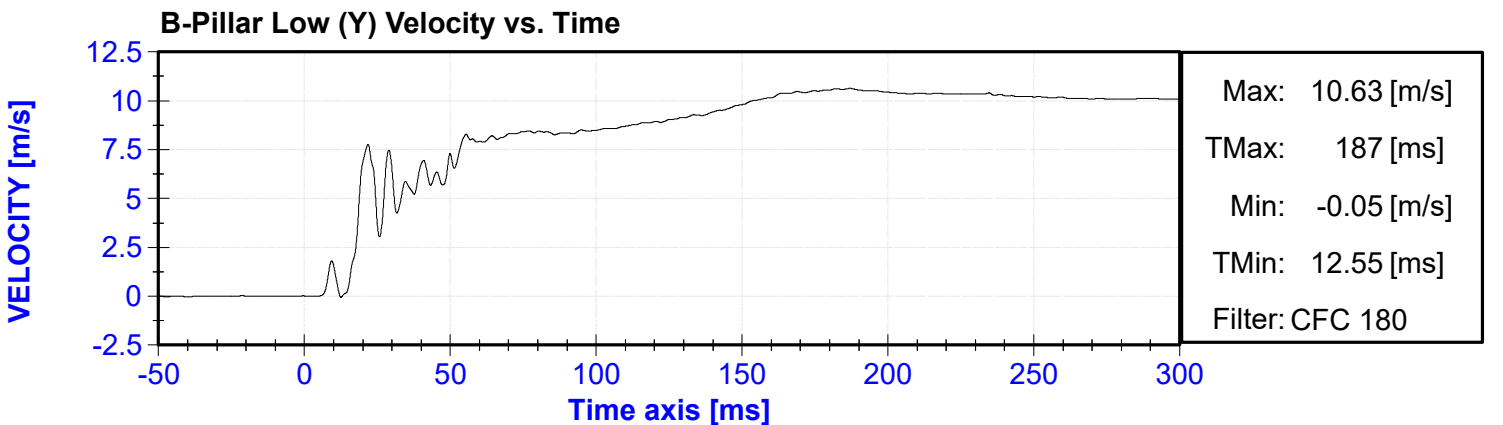
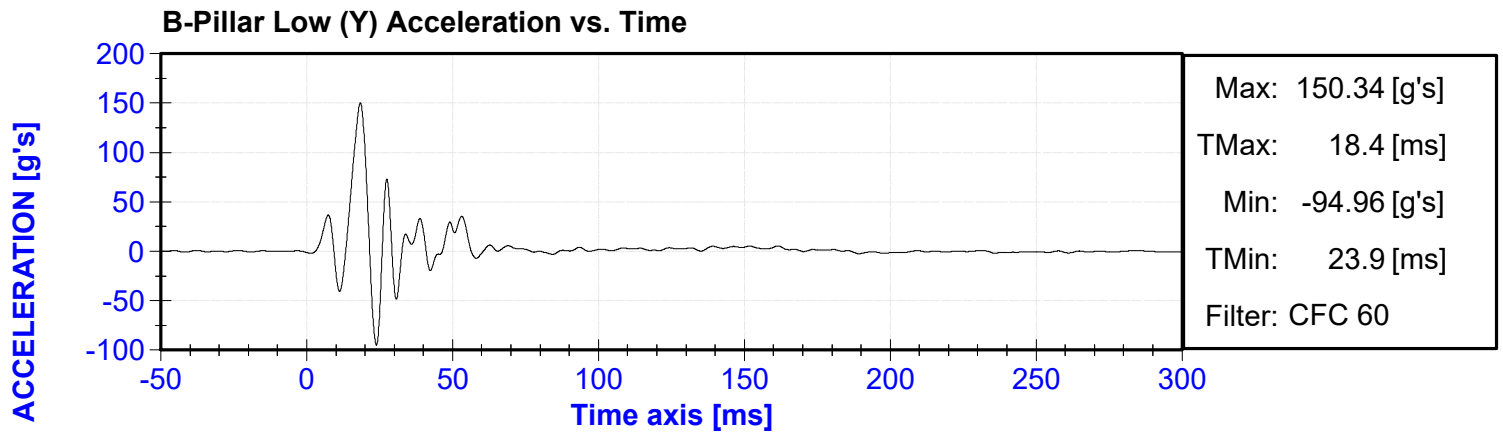
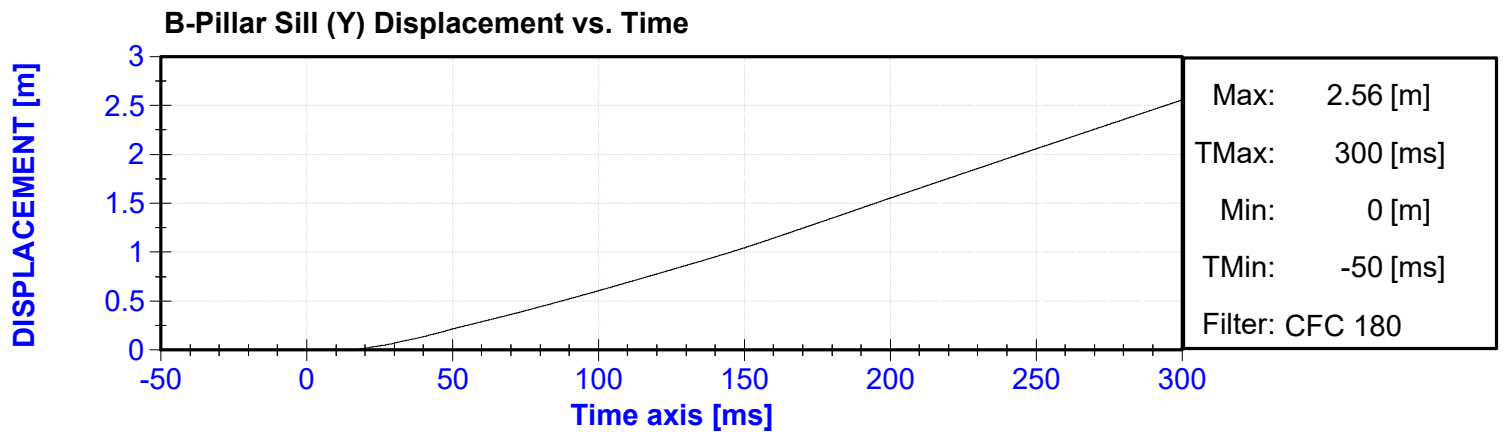
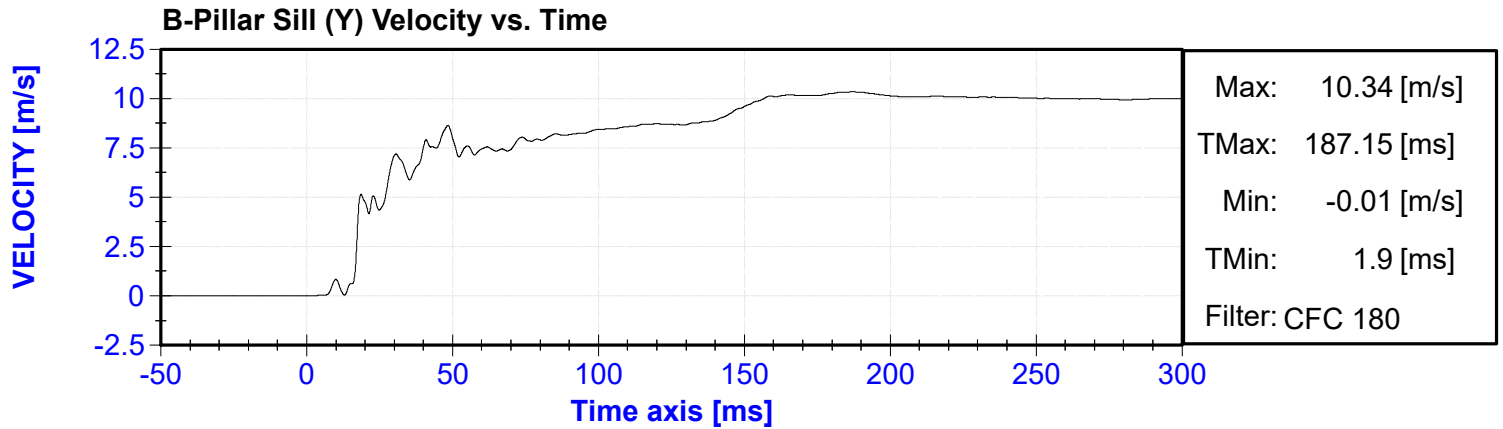


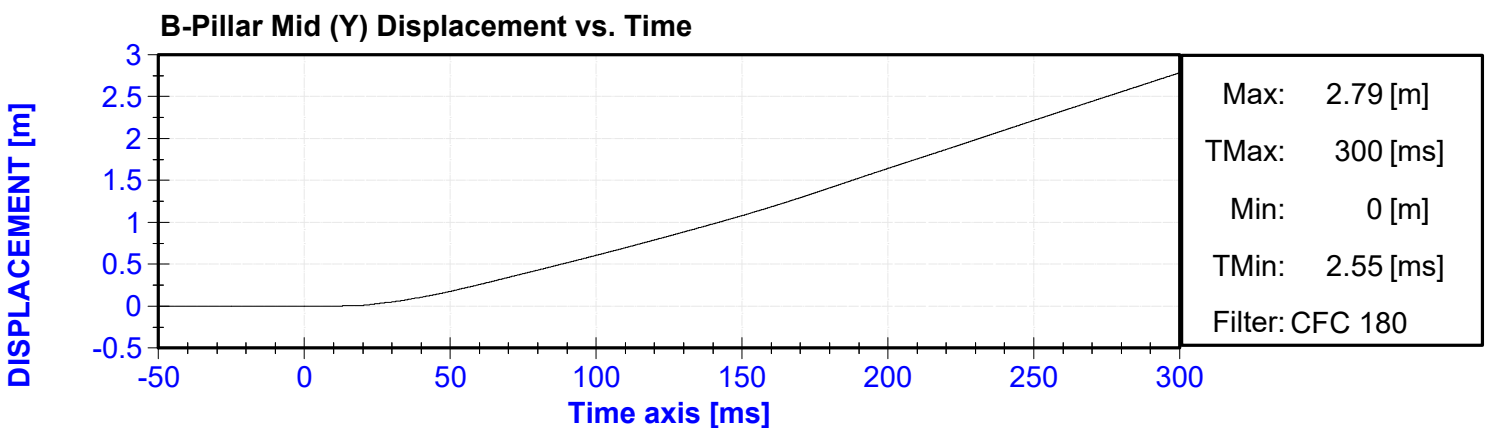
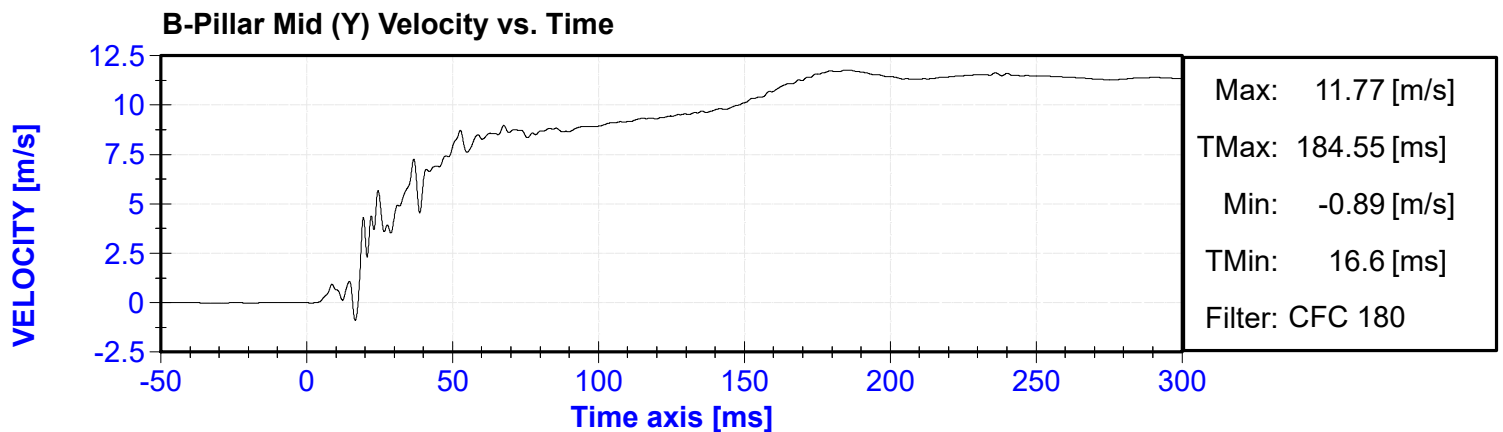
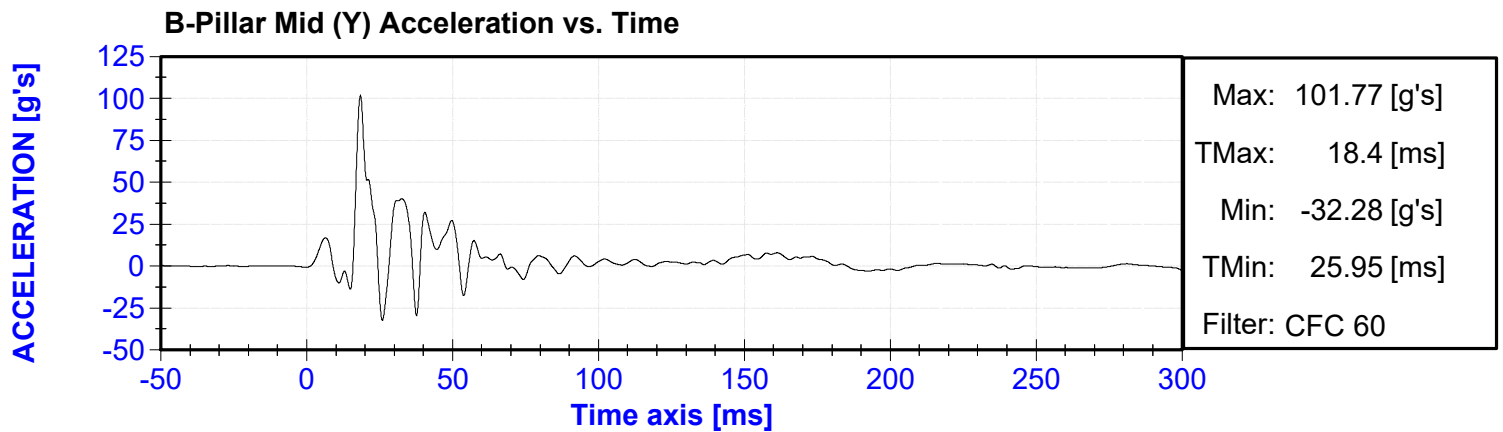
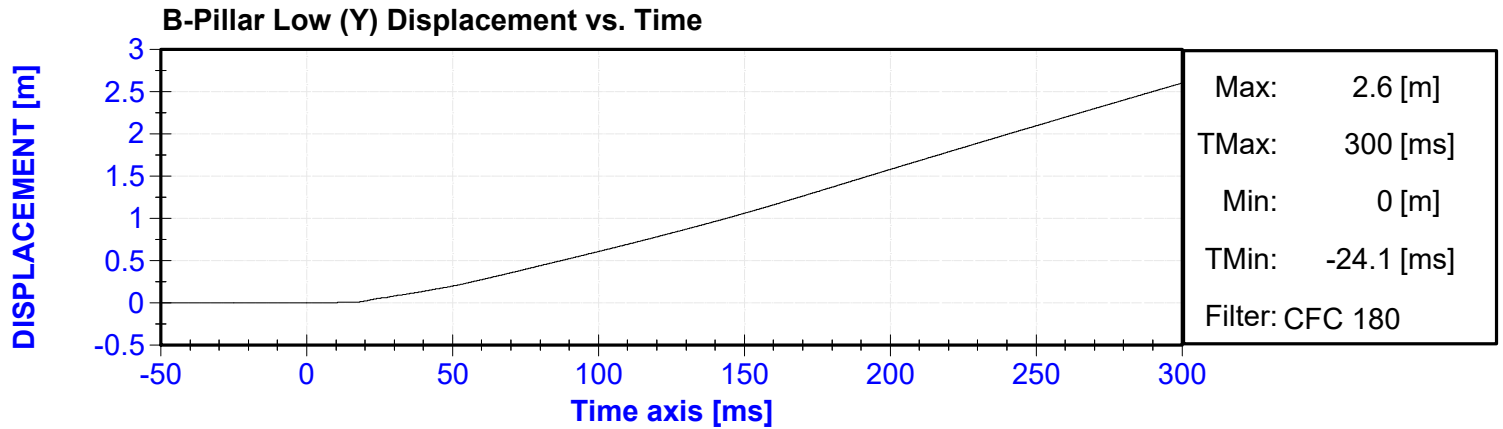
DISPLACEMENT [m]

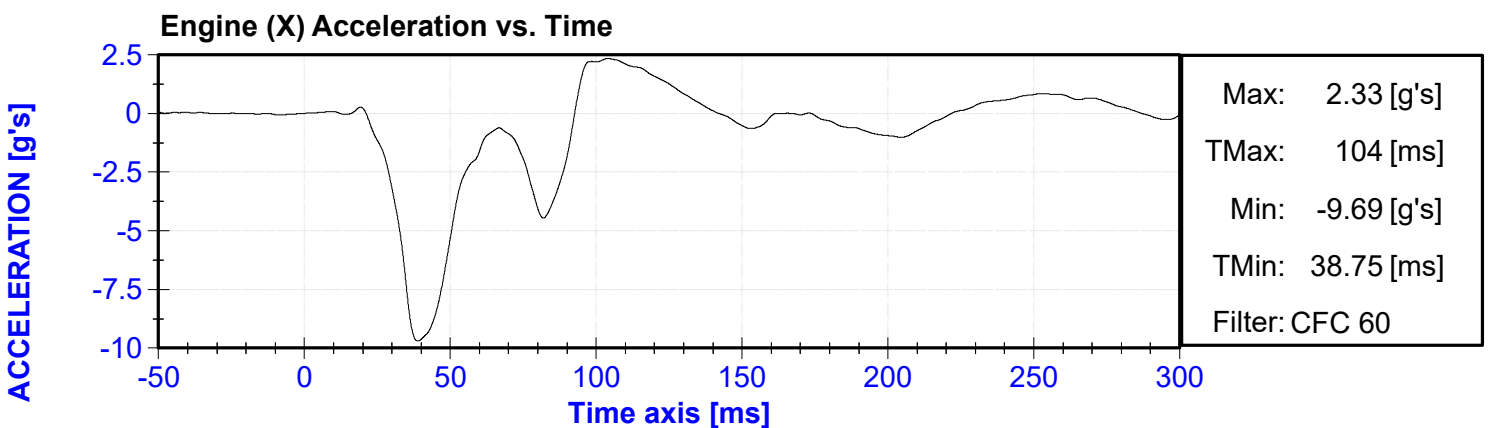
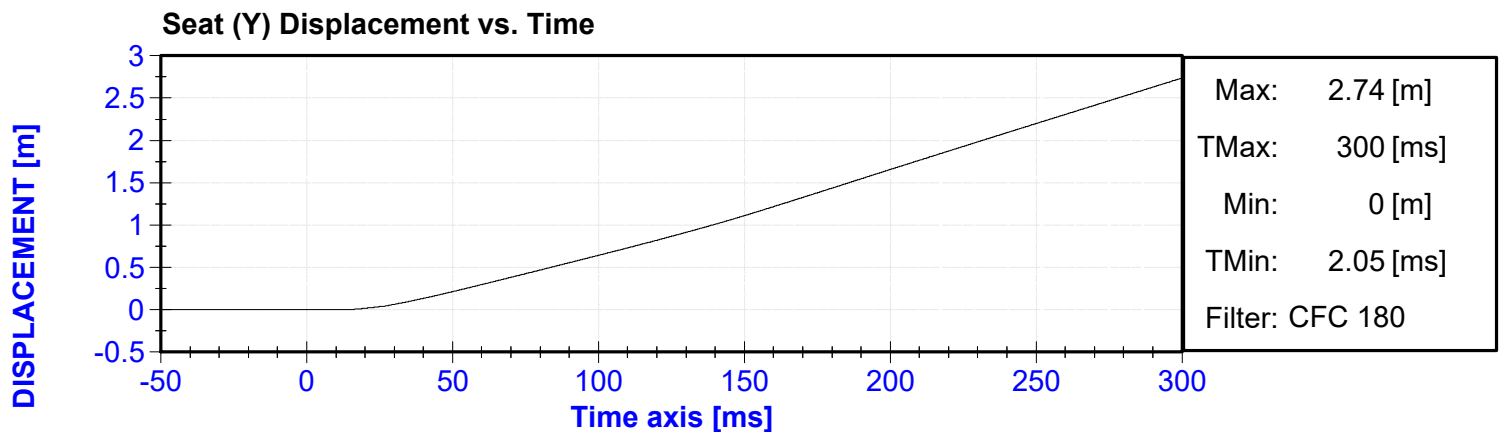
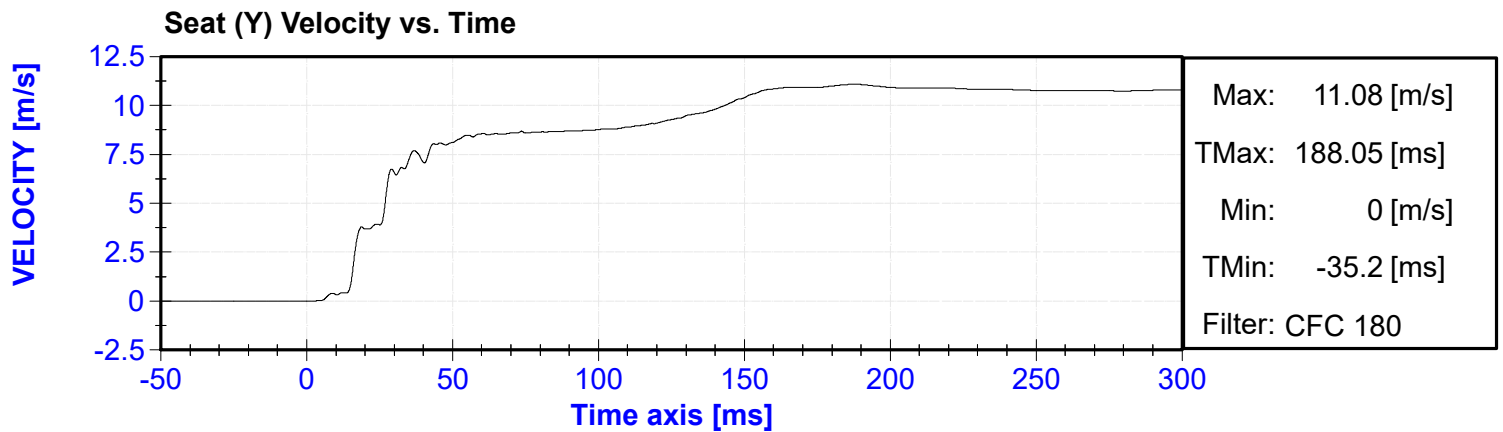
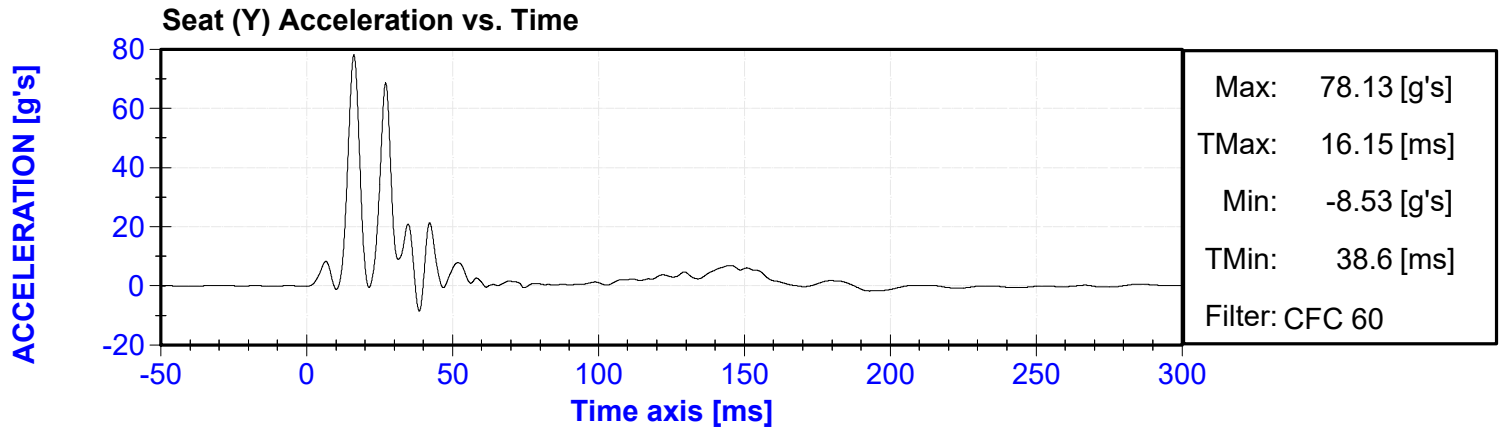
A-Pillar Low (Y) Displacement vs. Time

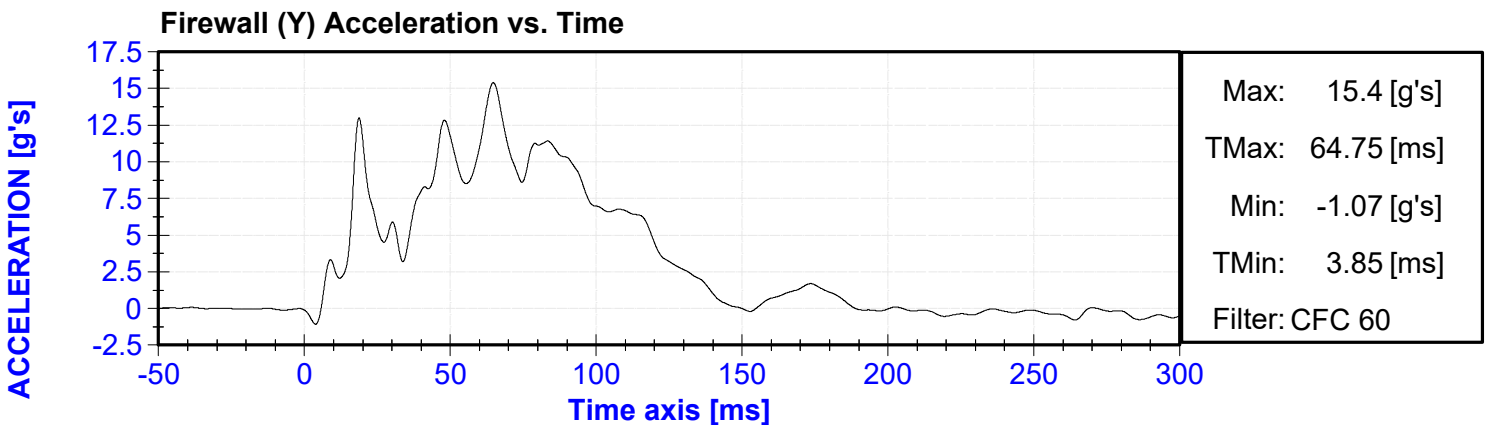
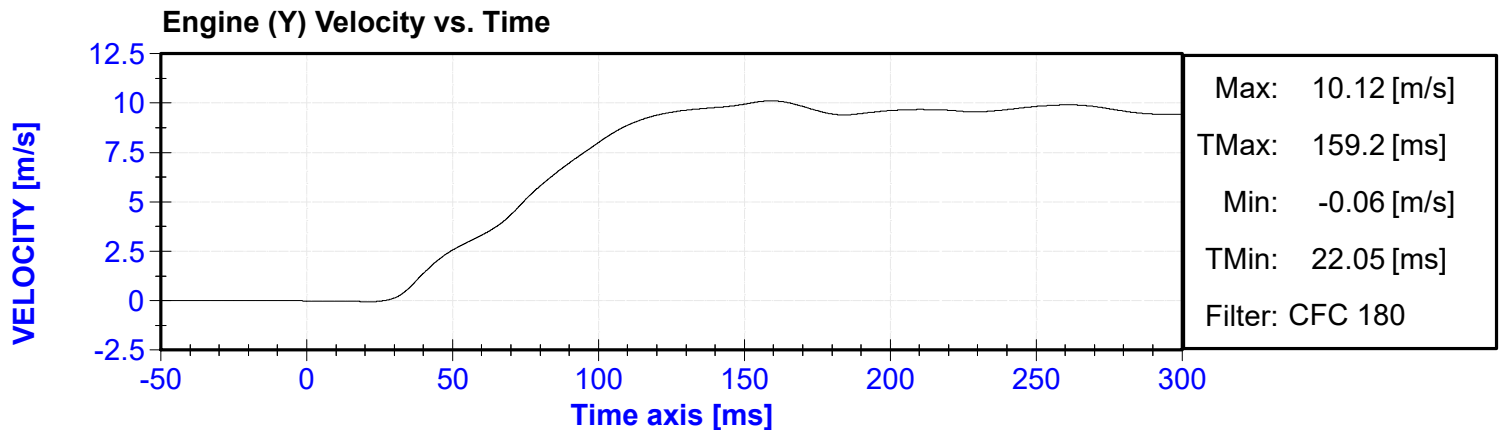
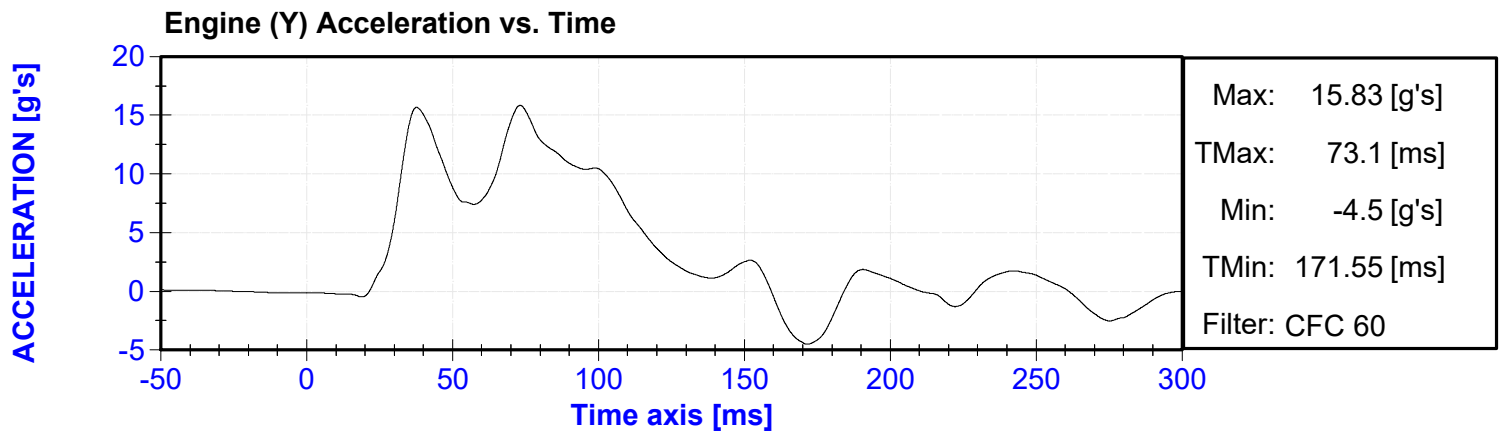
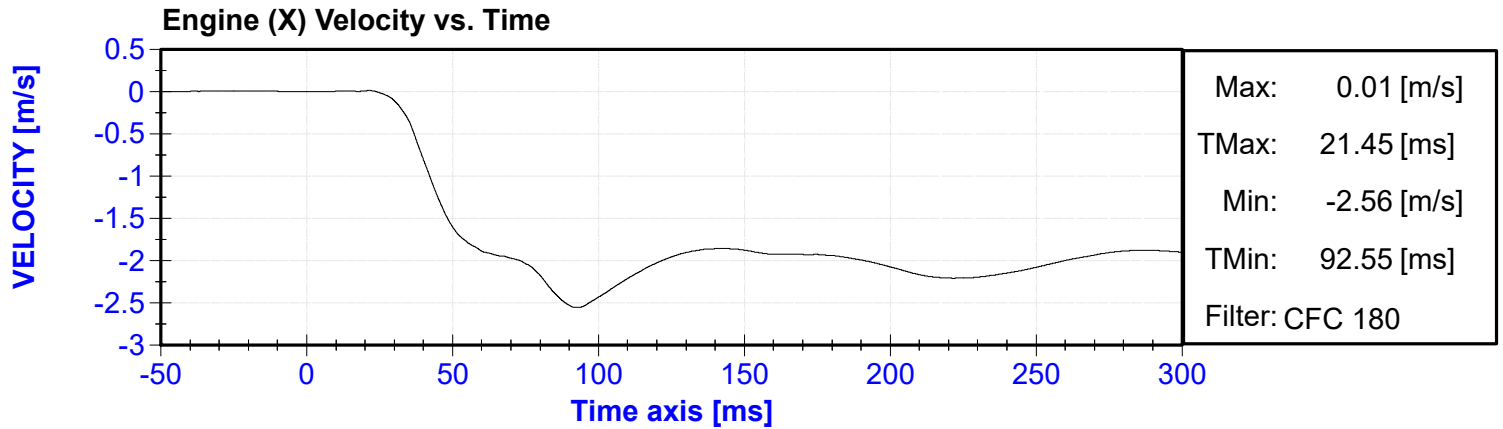


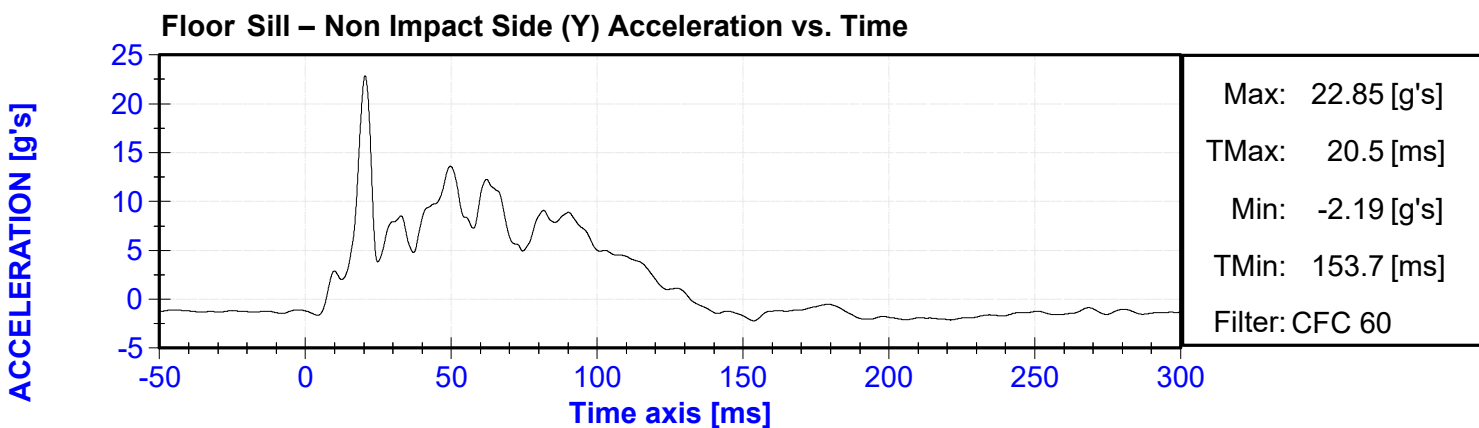
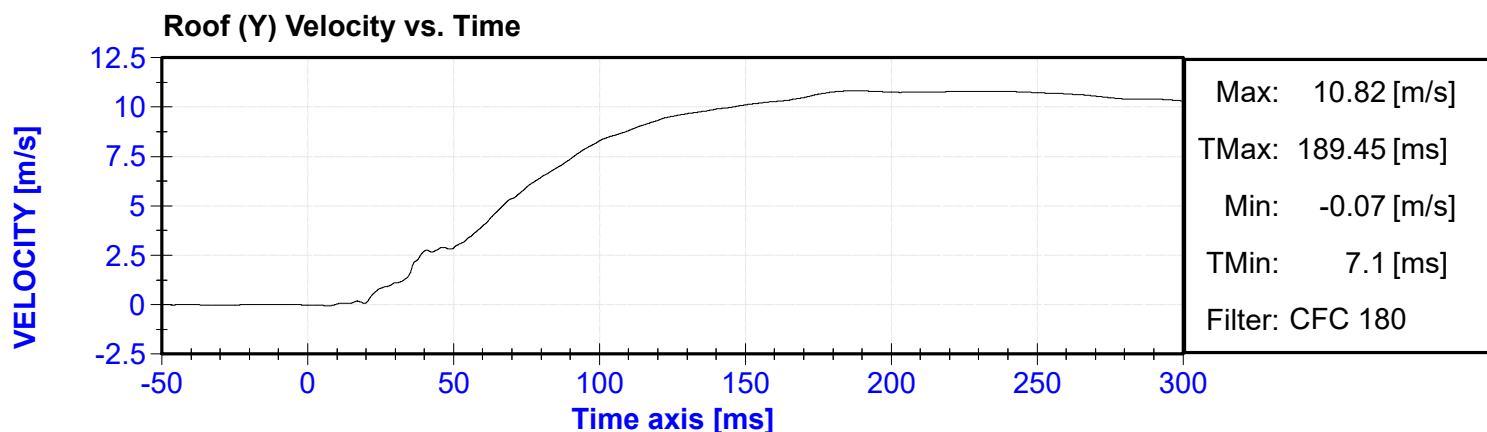
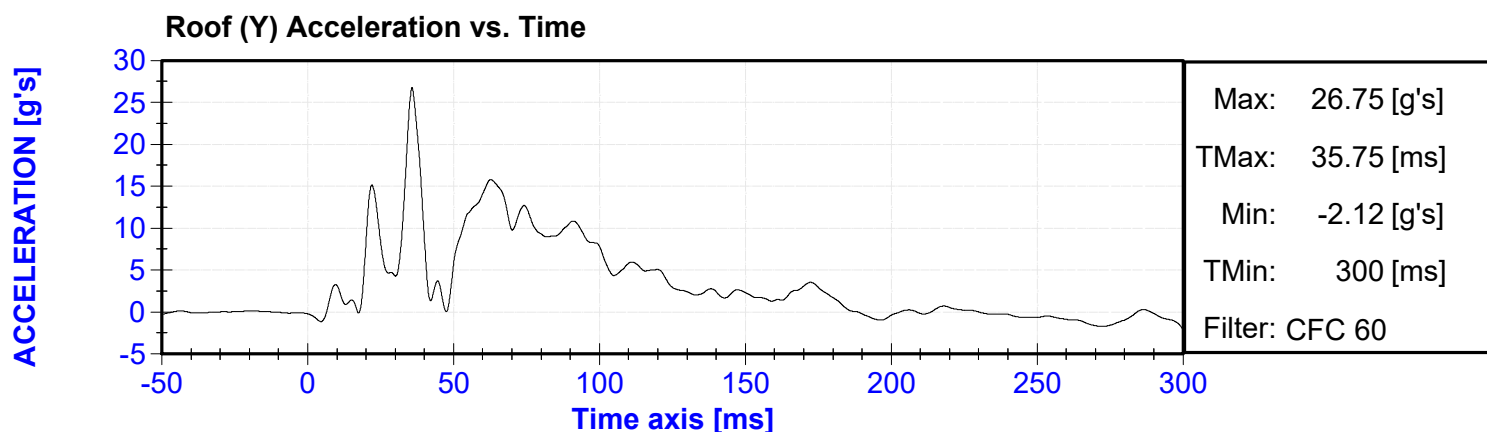
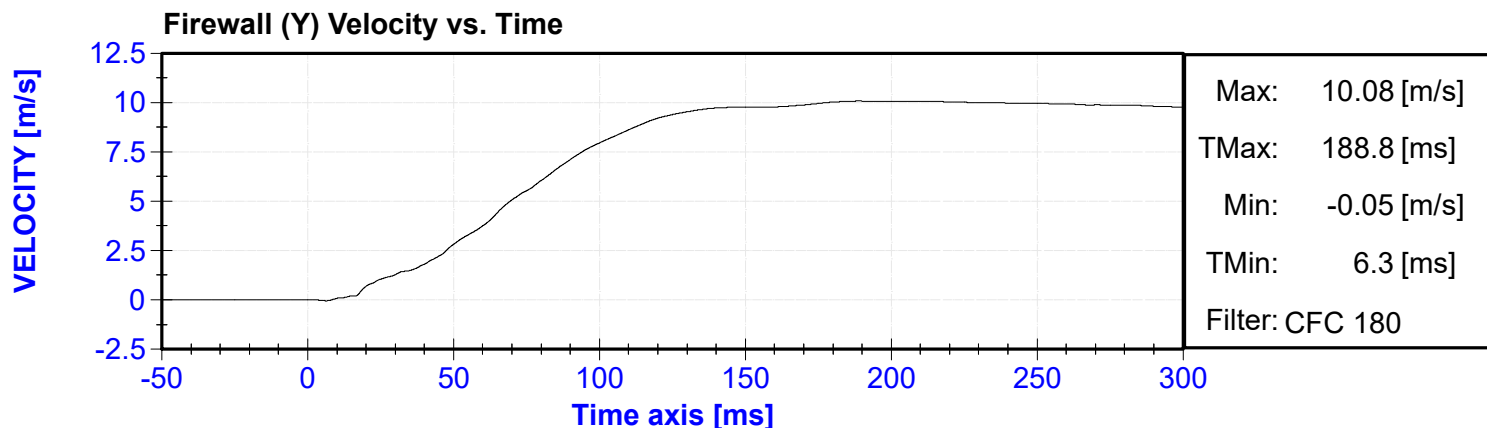




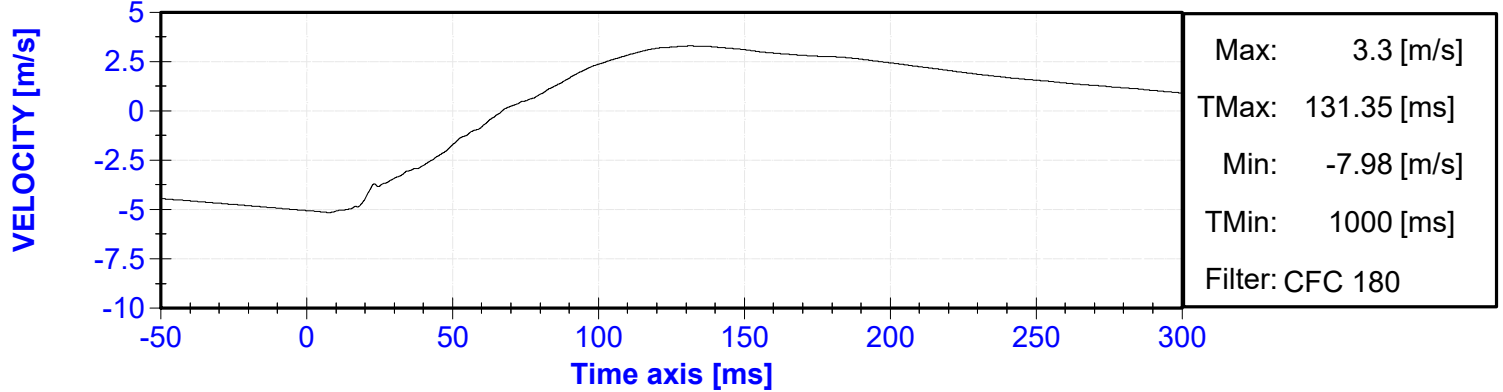




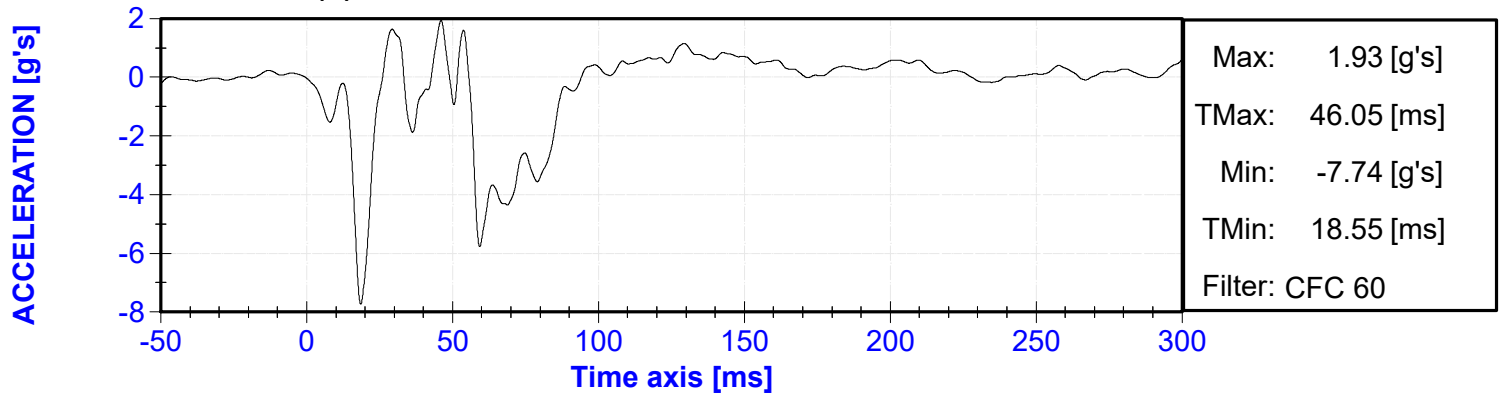




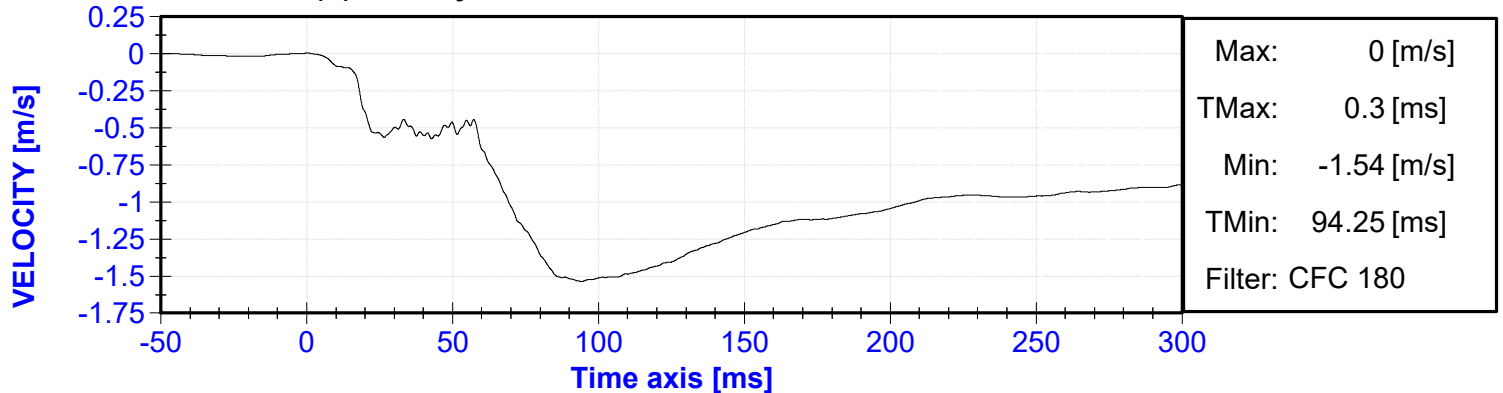
Floor Sill – Non Impact Side (Y) Velocity vs. Time



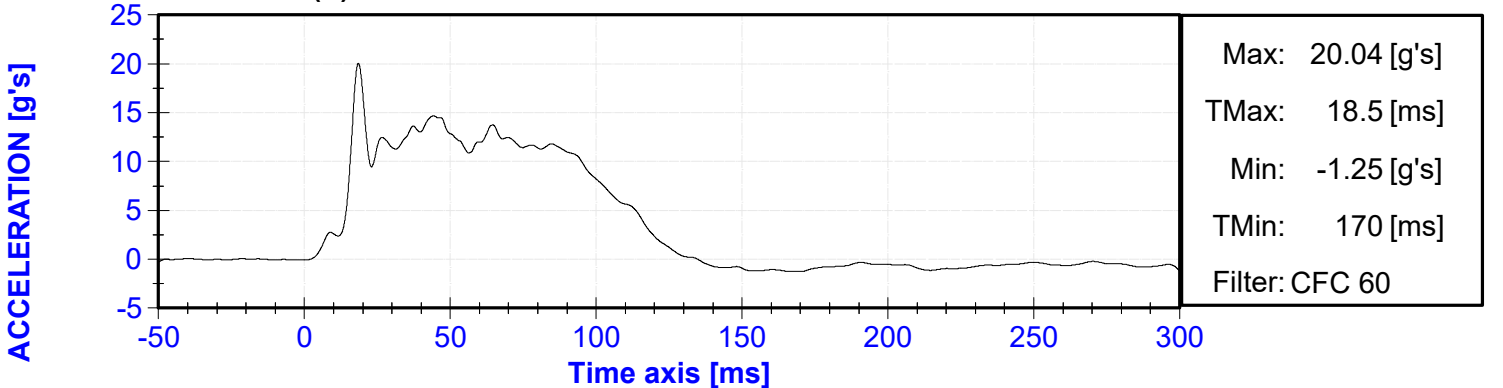
Rear Deck (X) Acceleration vs. Time

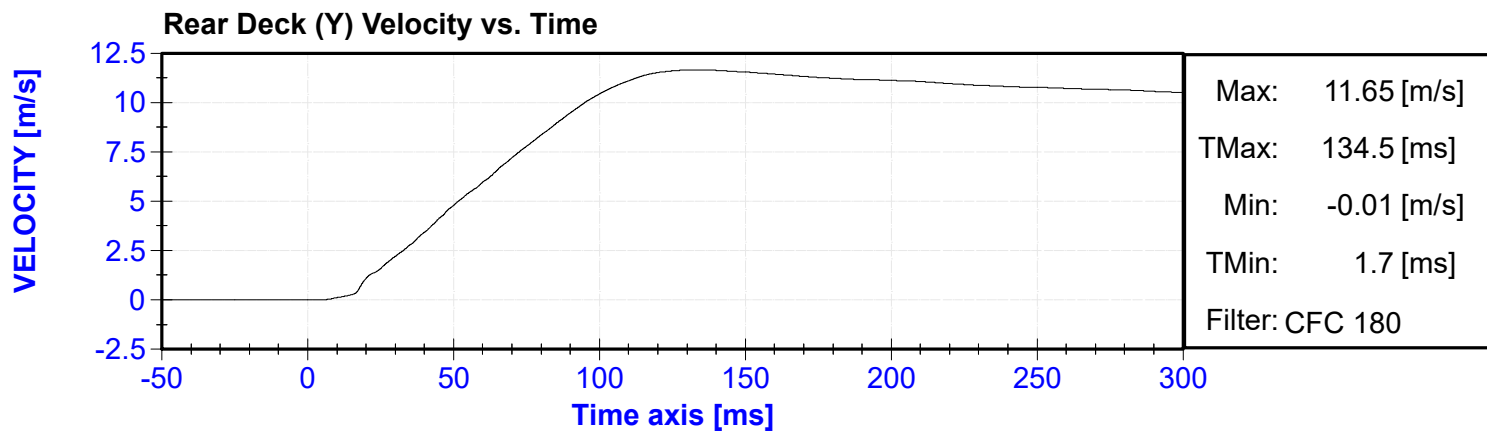


Rear Deck (X) Velocity vs. Time



Rear Deck (Y) Acceleration vs. Time





APPENDIX IV

PRE-TEST DUMMY PERFORMANCE CALIBRATION TEST DATA

(Subpart U, ES-2re)

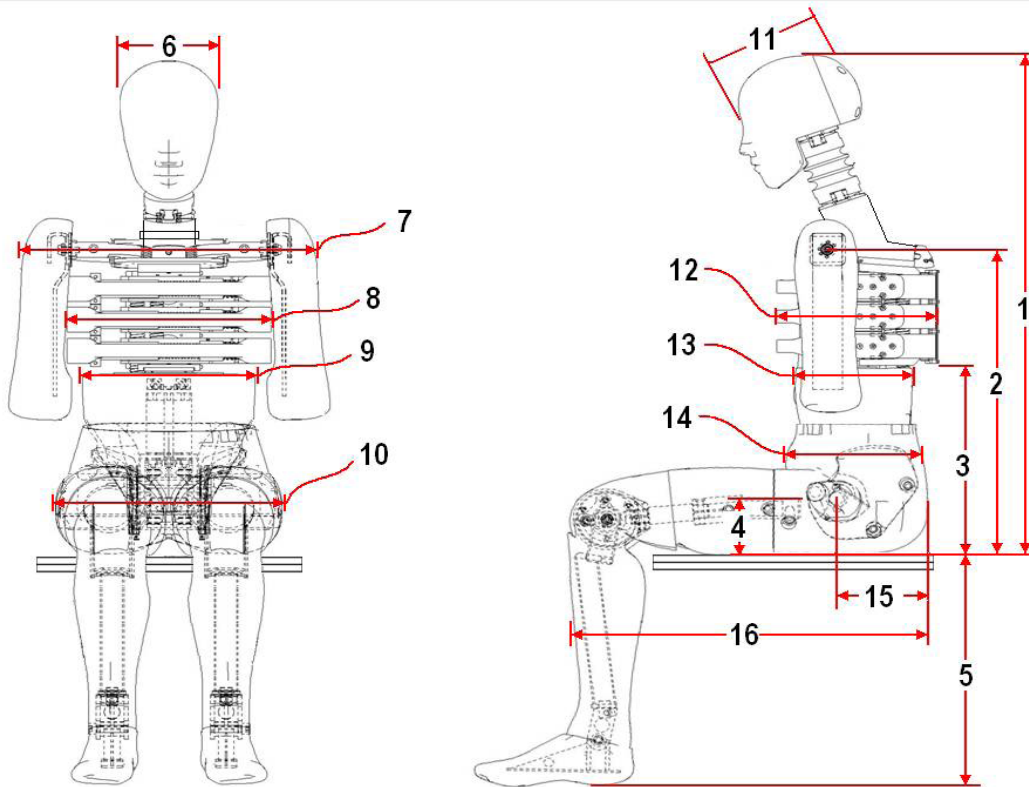


External Measurements - EuroSID-2re

Technician: T. Roseman

Date: 2/2/2024

Dummy Serial Number: D037



FRONT VIEW

SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	908	Pass
2	Seat to Shoulder Joint	558	572	562	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	354	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	421	Pass
6	Head Width	152	158	153	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	362	Pass
11	Head Depth	196	206	199	Pass
12	Thorax Depth	262	272	266	Pass
13	Abdomen Depth	194	204	197	Pass
14	Pelvis Depth	235	245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	602	Pass

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

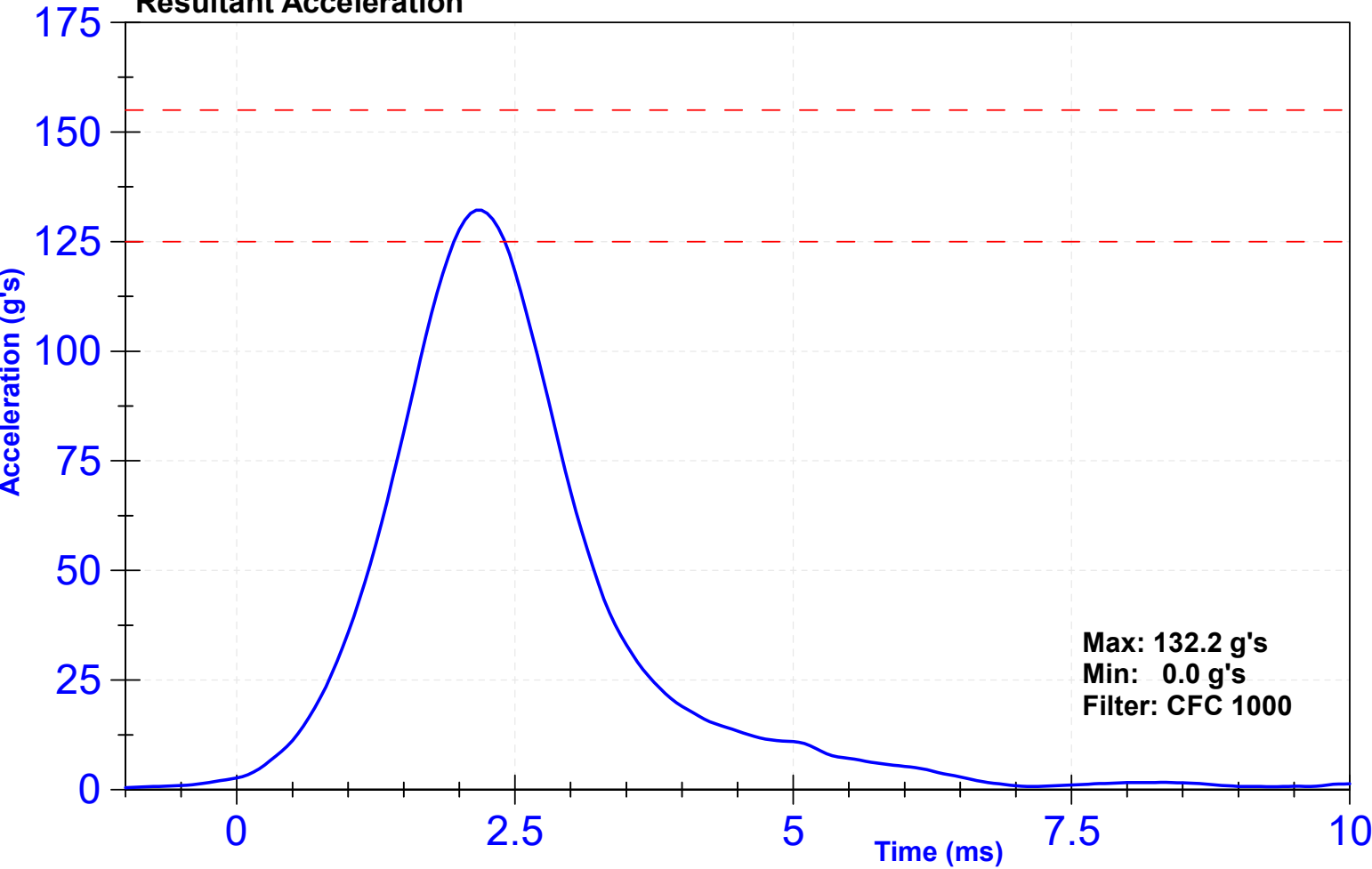
Results

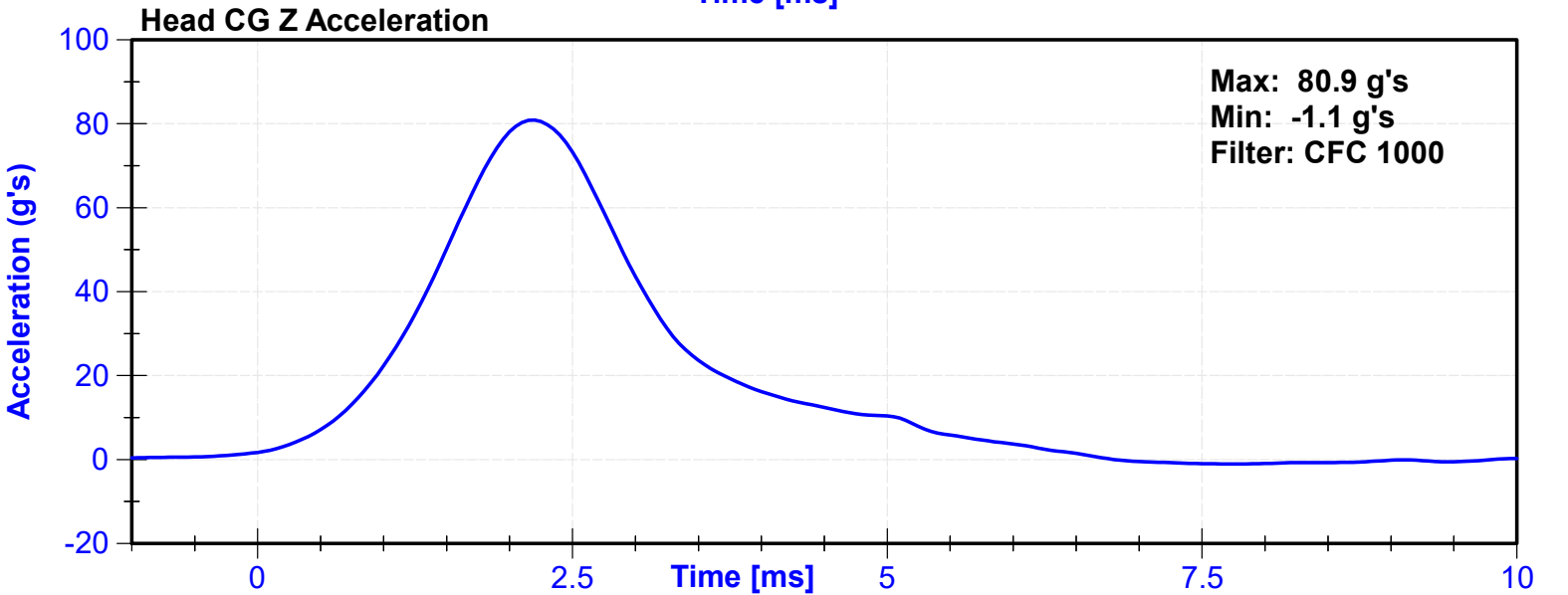
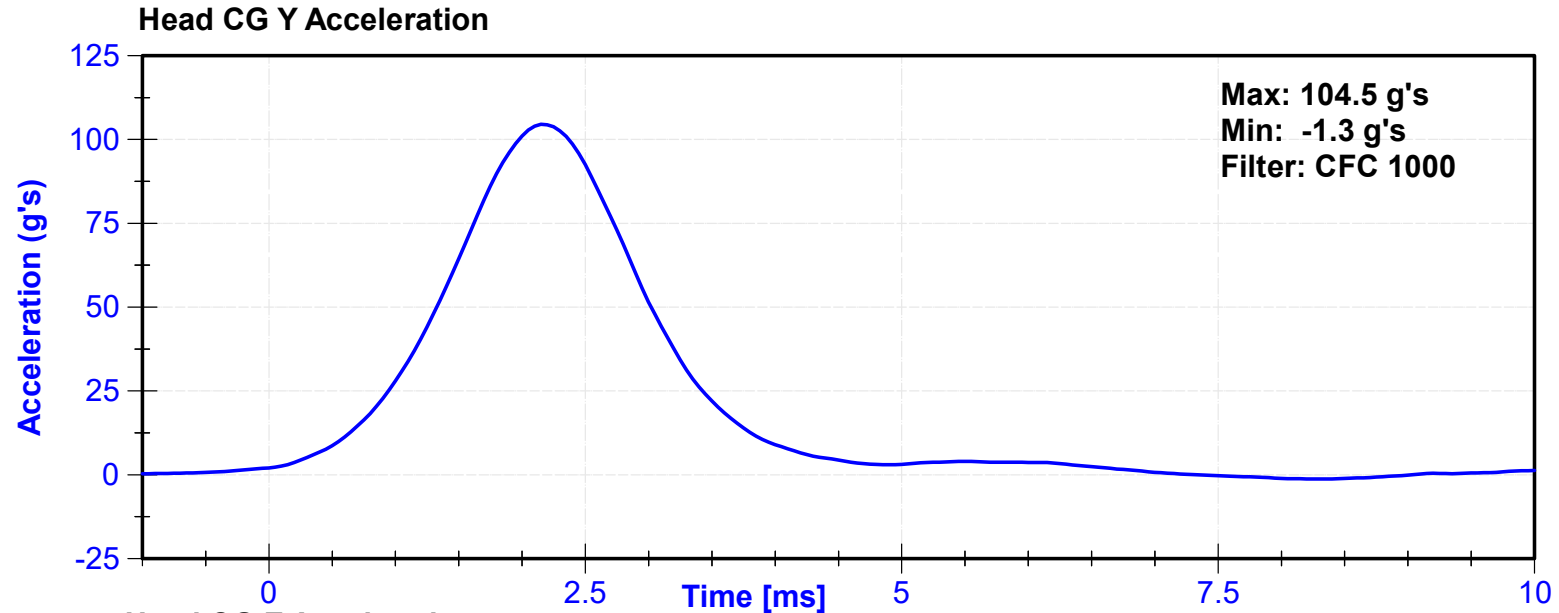
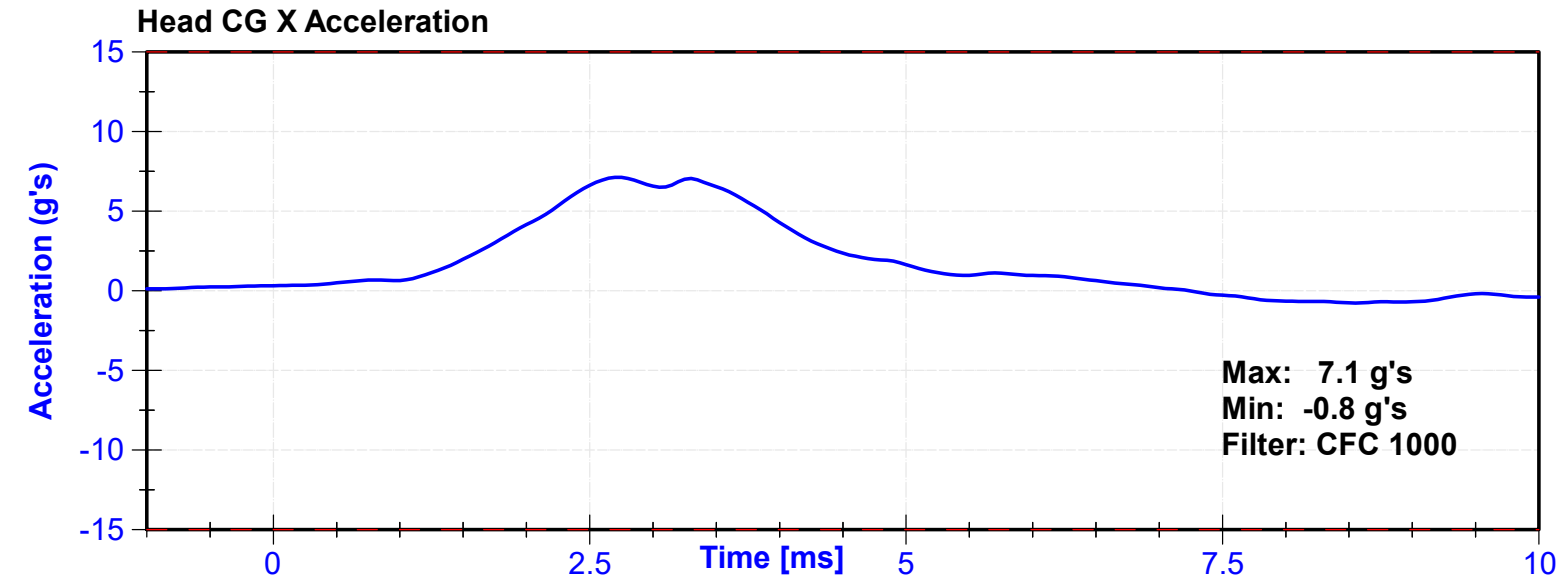
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Resultant Acceleration	125	155	g's	132.2	Pass
Oscillation	0	15	%	1.57	Pass
Fore-Aft Acceleration	-15	15	g's	7.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	T21724	2/1/2024	7/30/2024
Y Accelerometer	Endevco	T22281	2/1/2024	7/30/2024
Z Accelerometer	Endevco	T26050	2/1/2024	7/30/2024

Resultant Acceleration





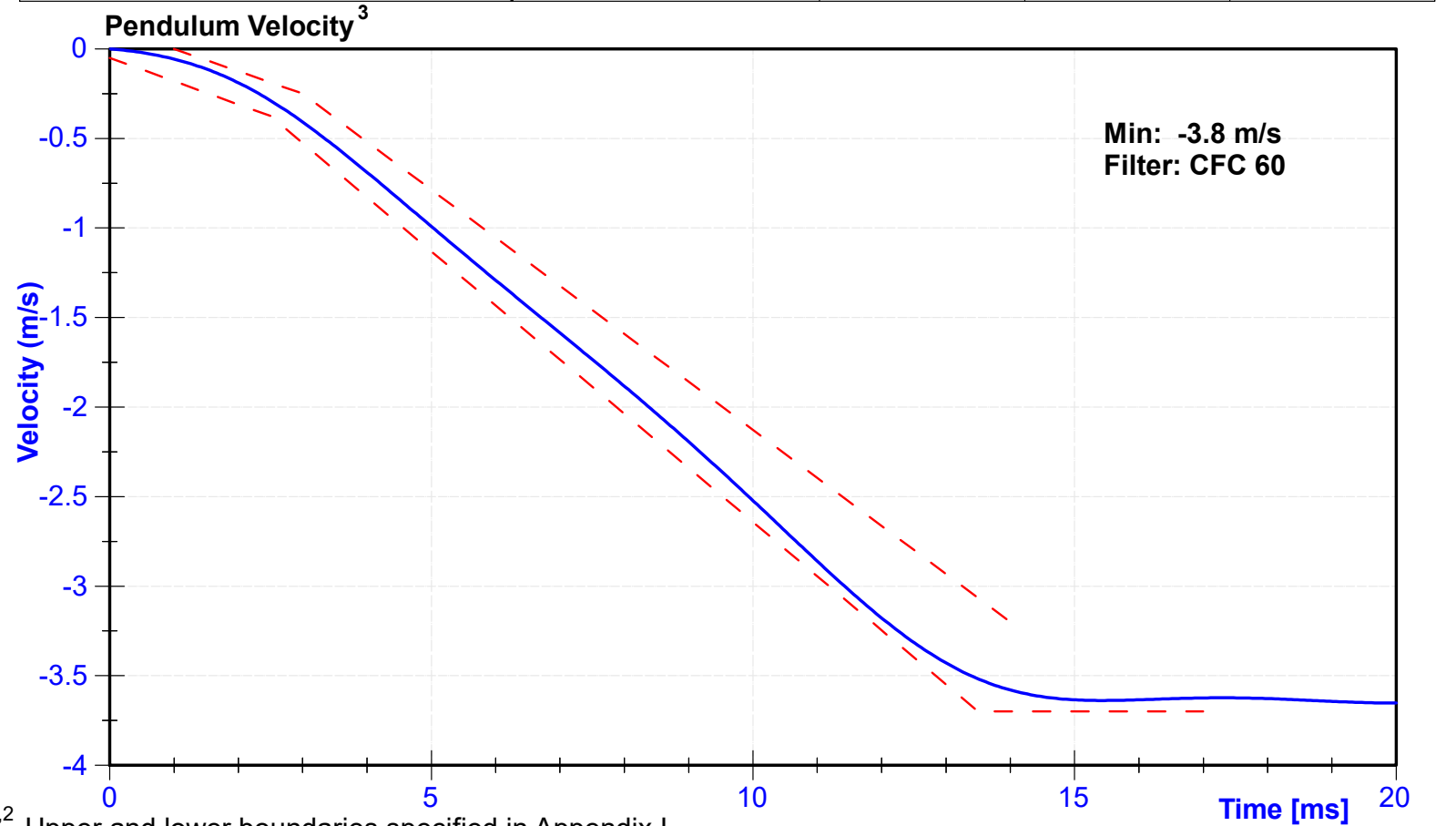
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	3.3	3.5	m/s	3.42	Pass
Lateral Neck Rotation	49	59	deg	49.3	Pass
Time at Maximum Rotation	54	66	ms	56.5	Pass
Time of Rotation Decay from Maximum	53	88	ms	55.4	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

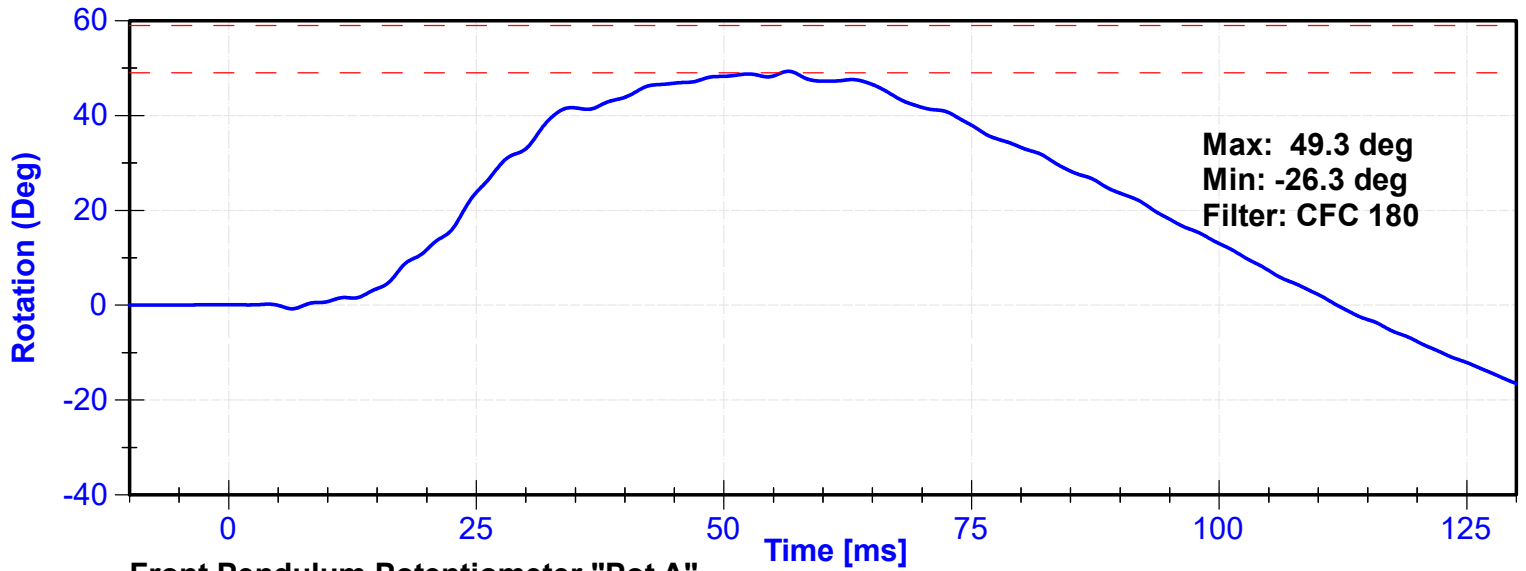
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024

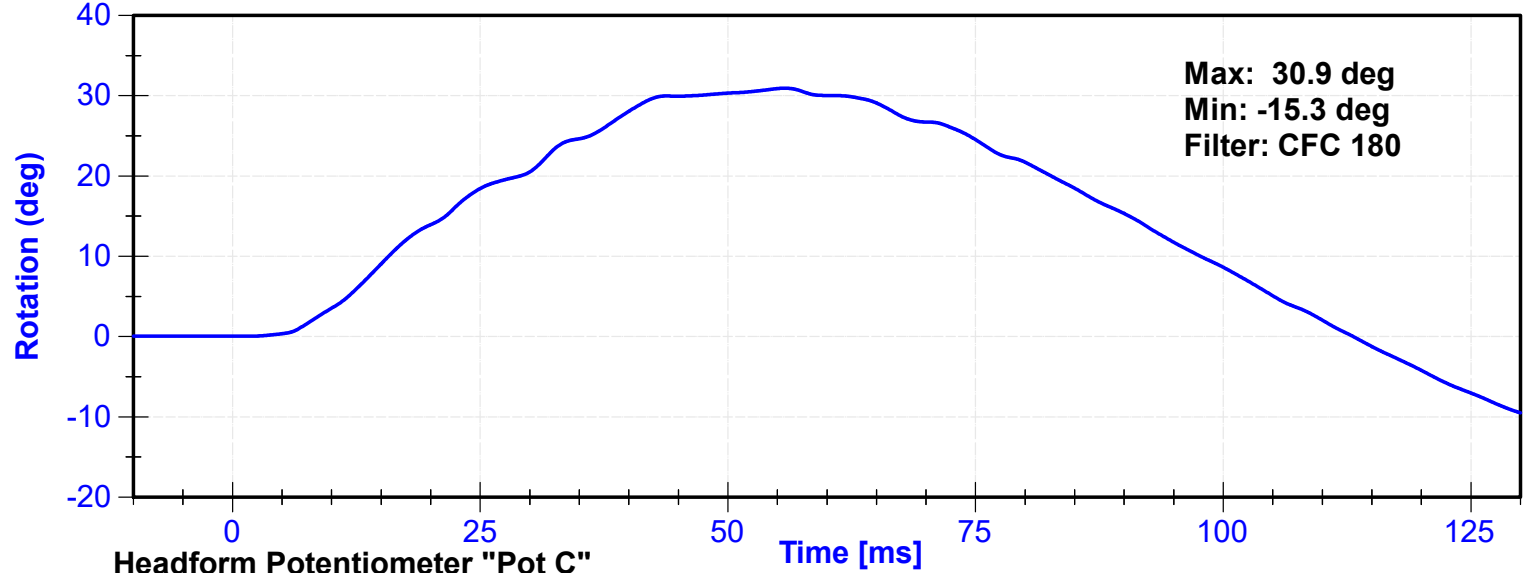


^{1,2} Upper and lower boundaries specified in Appendix I

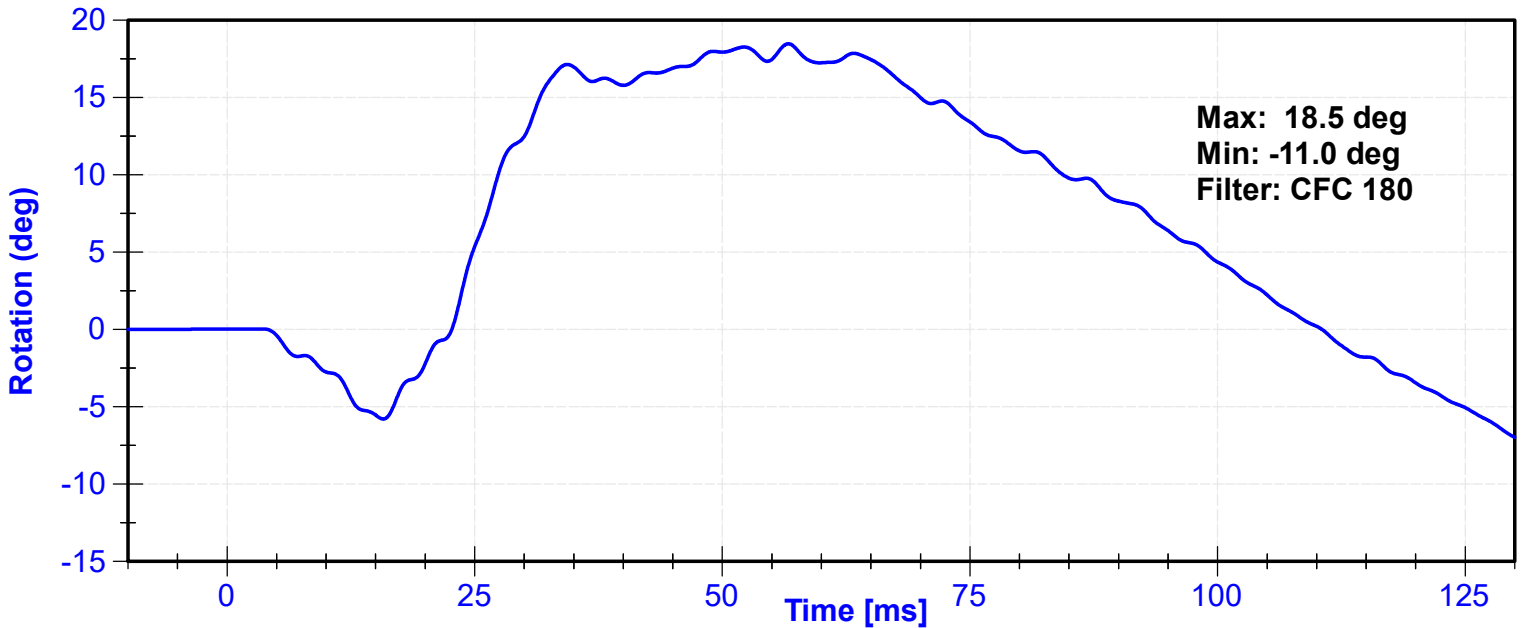
Neck Rotation



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	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

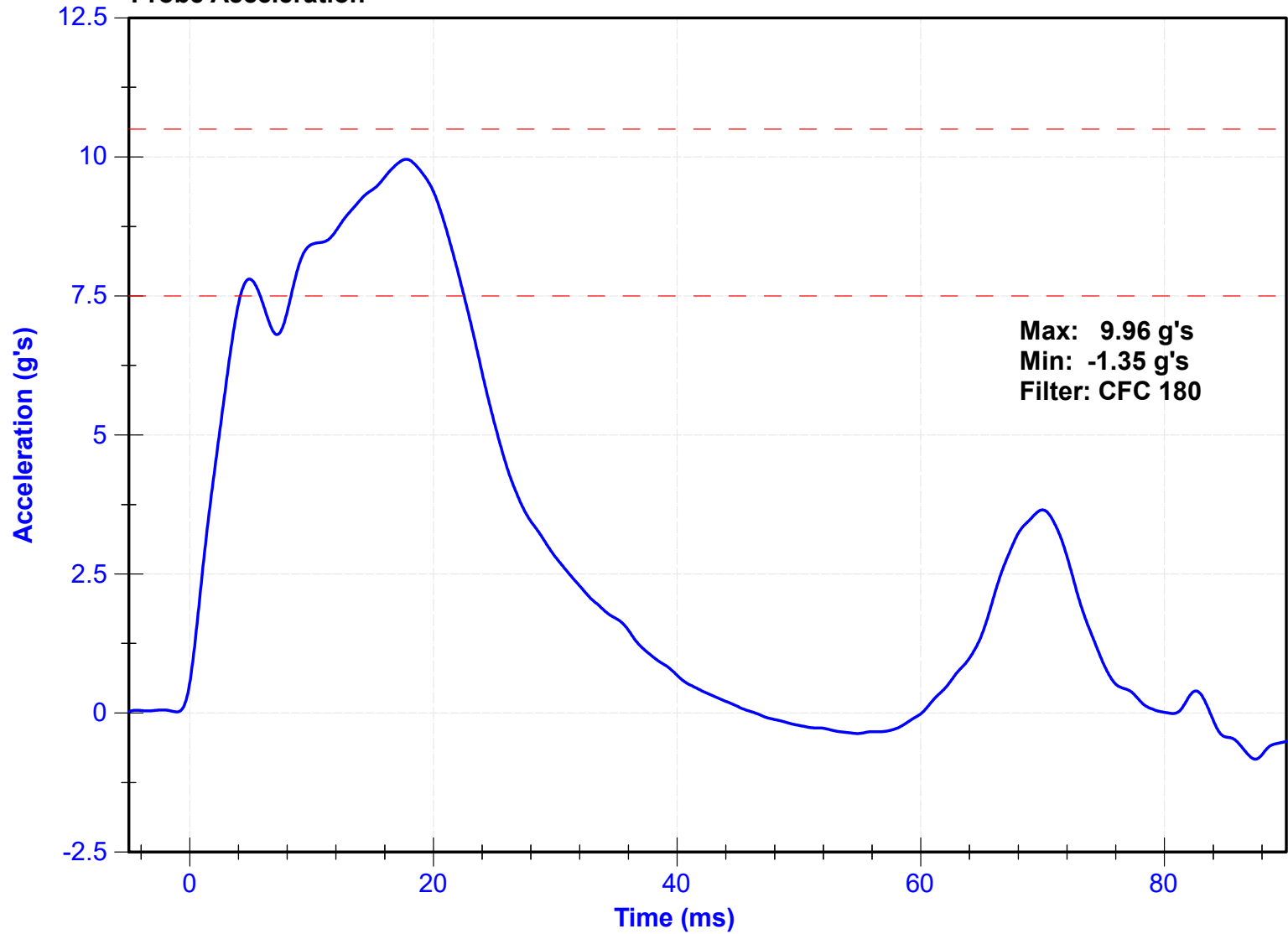
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	25	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	7.5	10.5	g's	9.96	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	9/29/2023	3/27/2024

Probe Acceleration



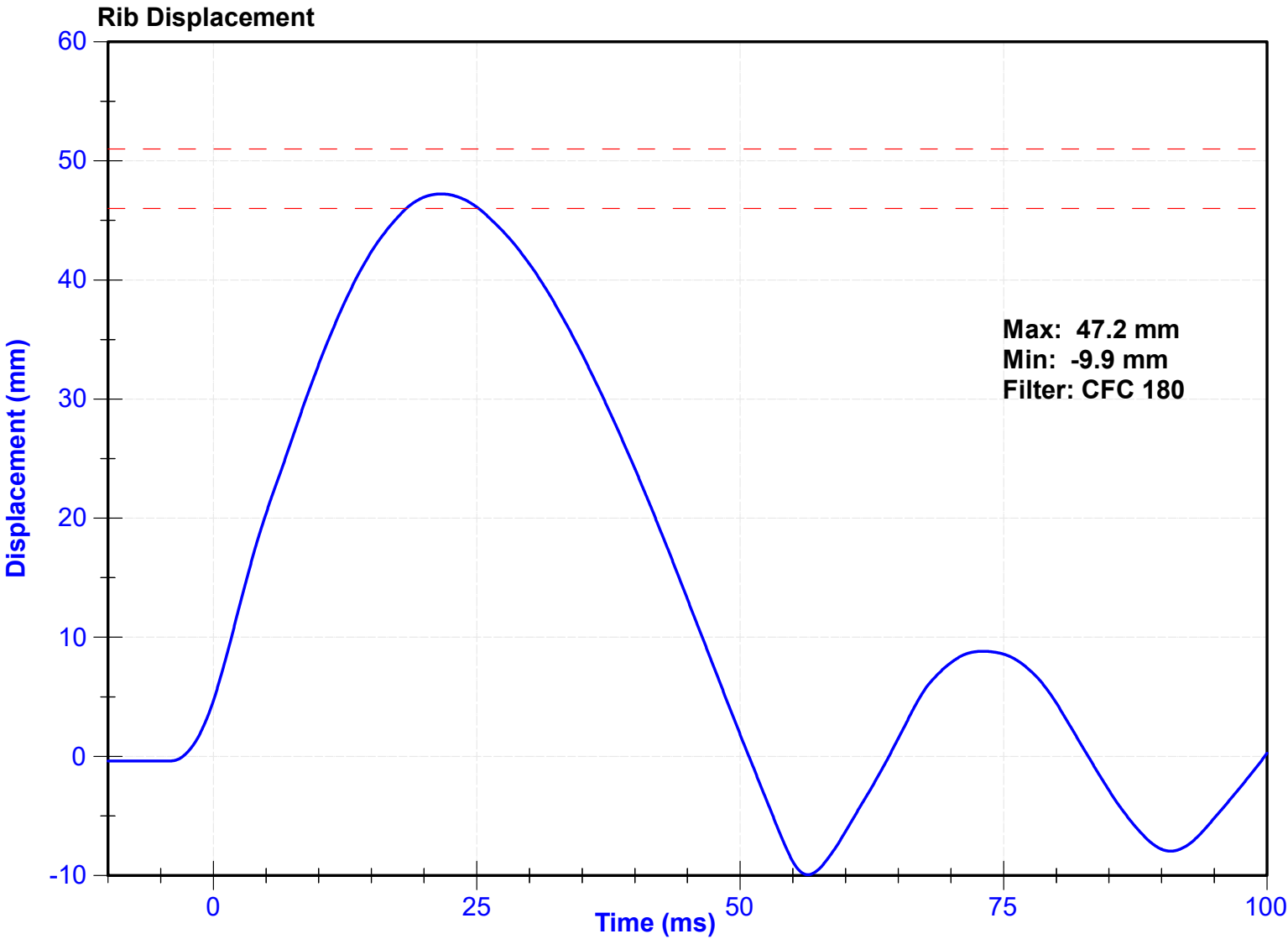
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	46	51	mm	47.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	1/31/2024	7/31/2024



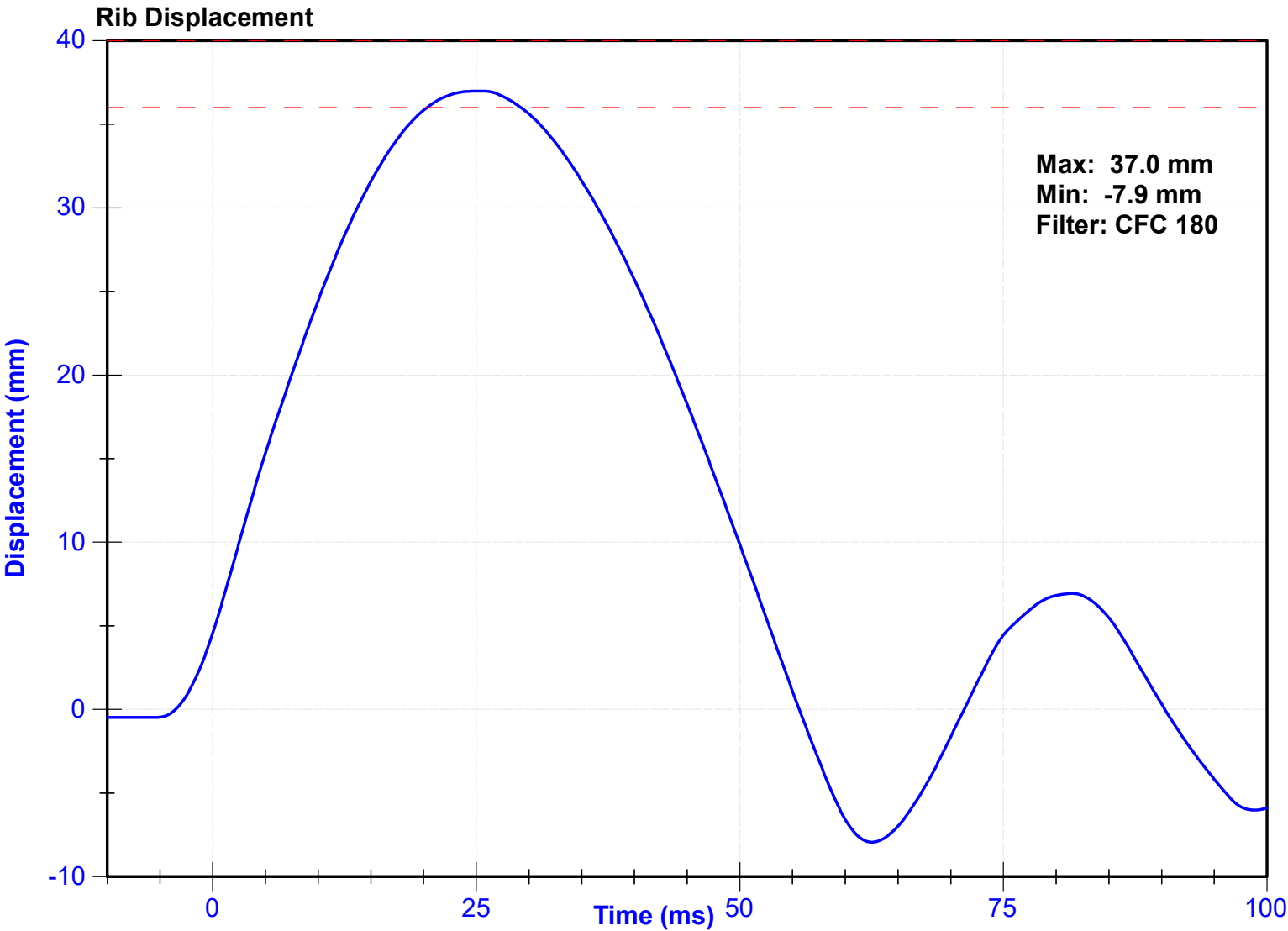
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	36	40	mm	37.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	1/31/2024	7/31/2024



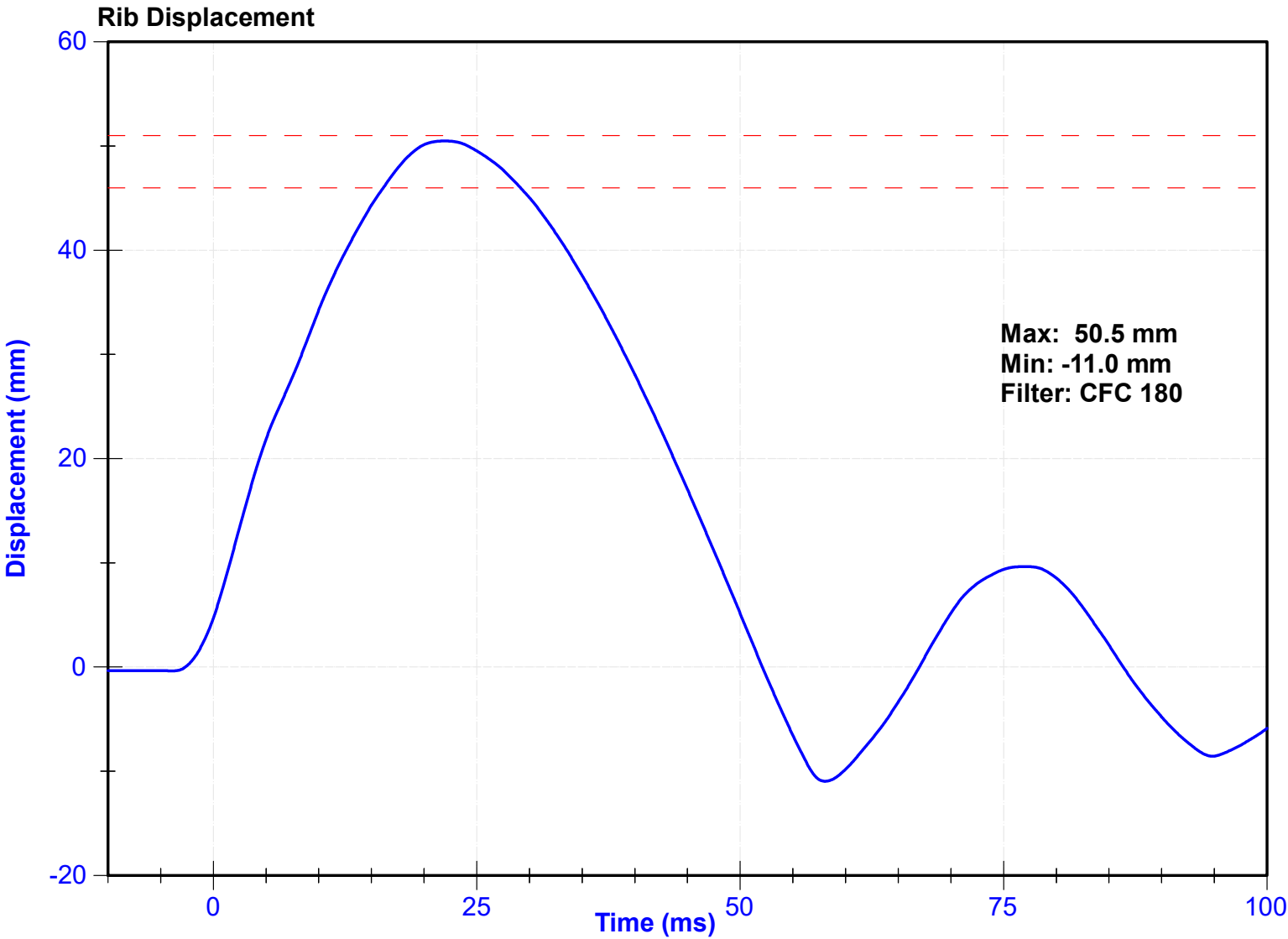
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	46	51	mm	50.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	1/31/2024	7/31/2024



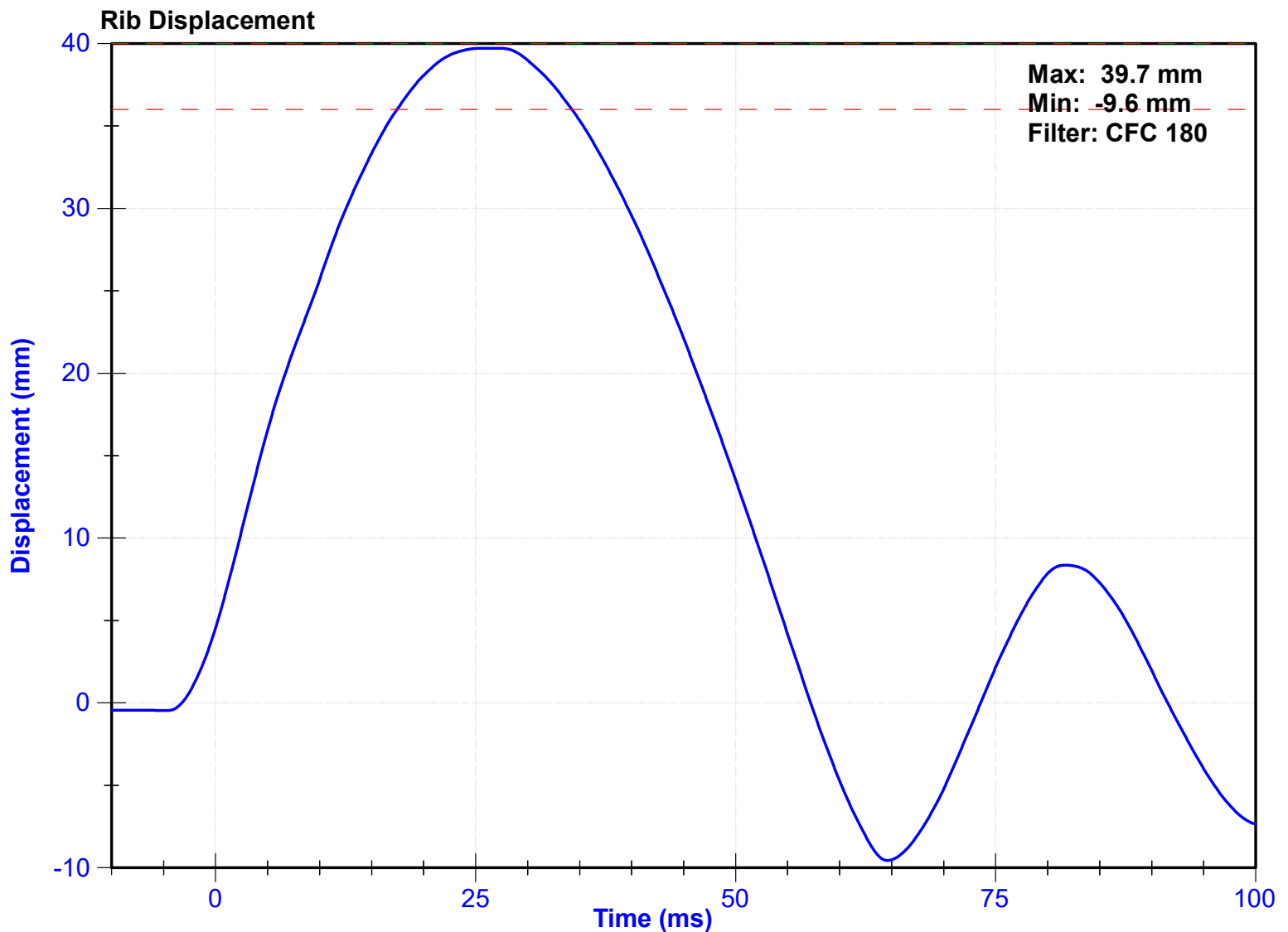
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	36	40	mm	39.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	1/31/2024	7/31/2024



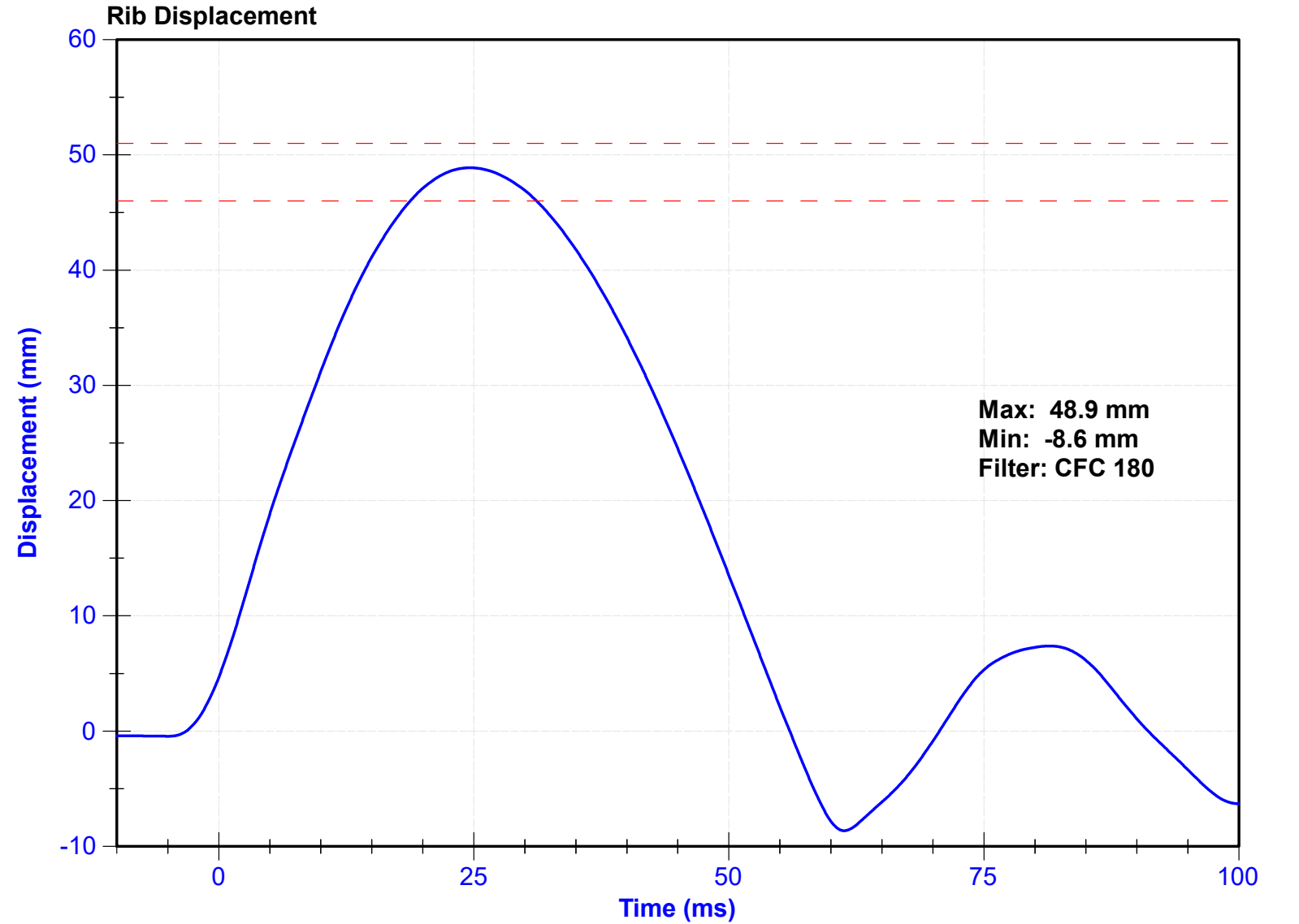
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	46	51	mm	48.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	1/31/2024	7/31/2024



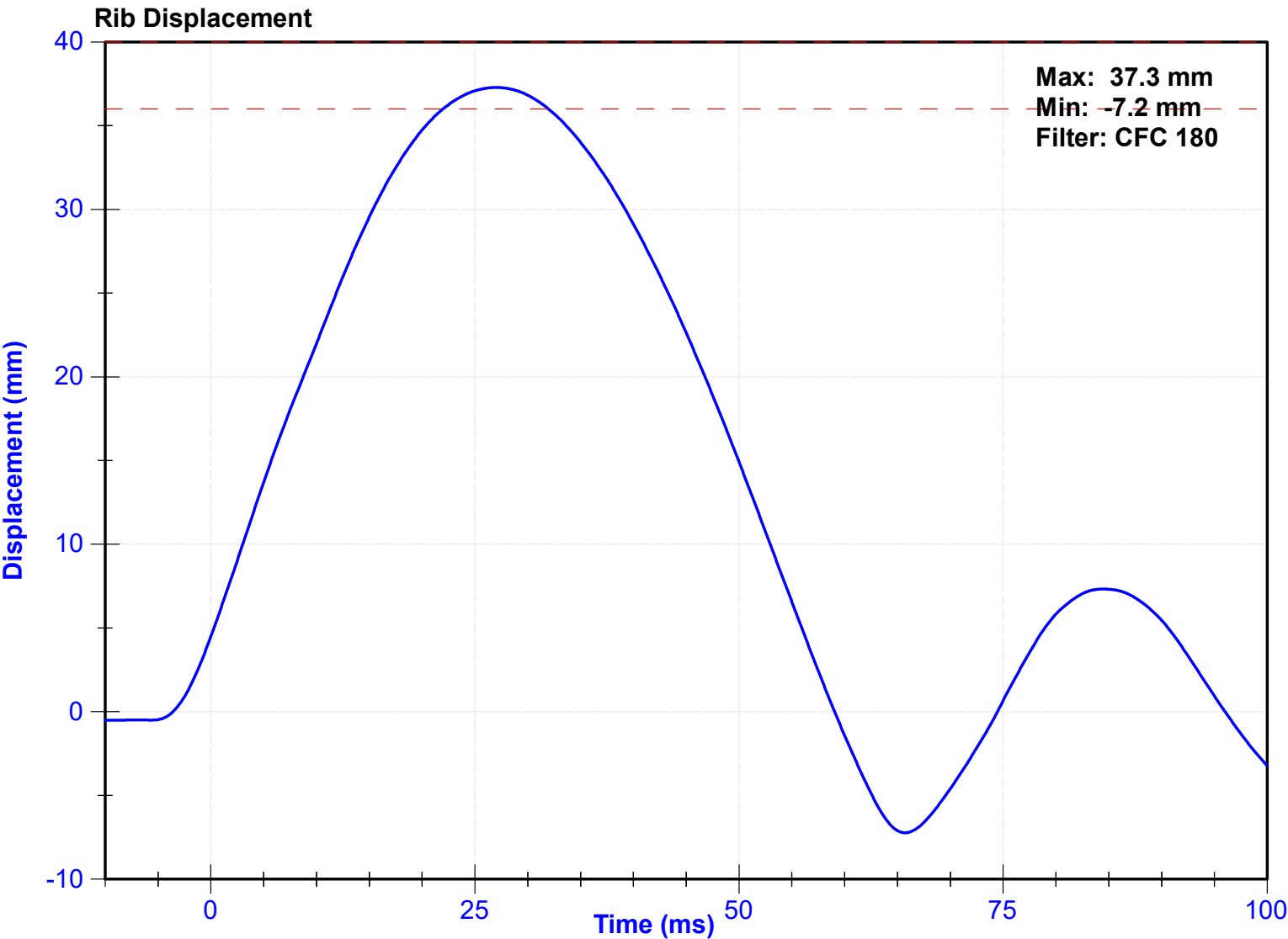
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	1/31/2024	7/31/2024



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

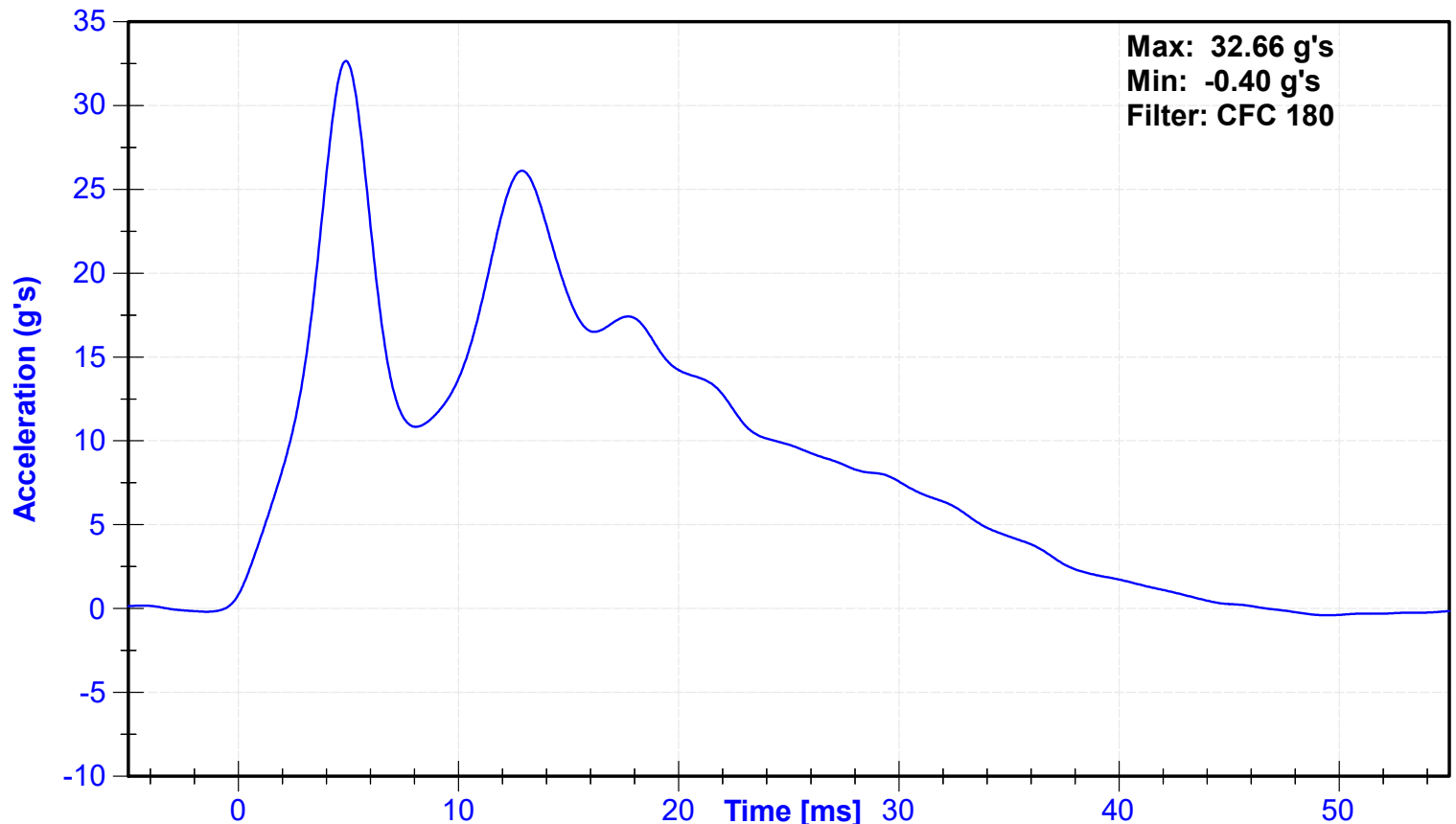
Results

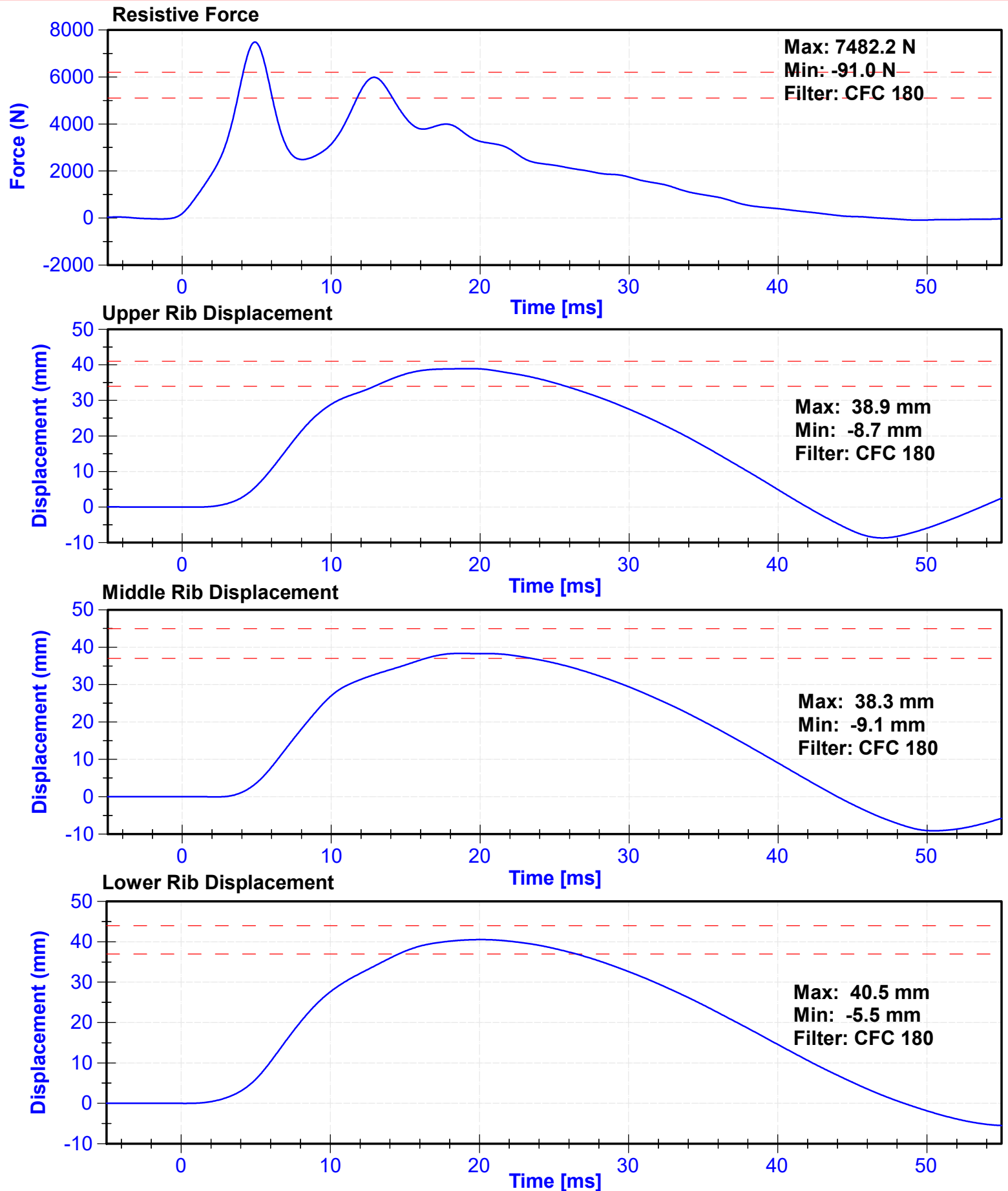
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	25	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	5983.4	Pass
Upper Thorax Rib Deflection	34	41	mm	38.9	Pass
Mid Thorax Rib Deflection	37	45	mm	38.3	Pass
Lower Thorax Rib Deflection	37	44	mm	40.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Upper Thorax Rib Potentiometer	Honeywell	0552-01	1/31/2024	7/31/2024
Middle Thorax Rib Potentiometer	Honeywell	807	1/31/2024	7/31/2024
Lower Thorax Rib Potentiometer	Honeywell	0552-03	1/31/2024	7/31/2024

Probe Acceleration





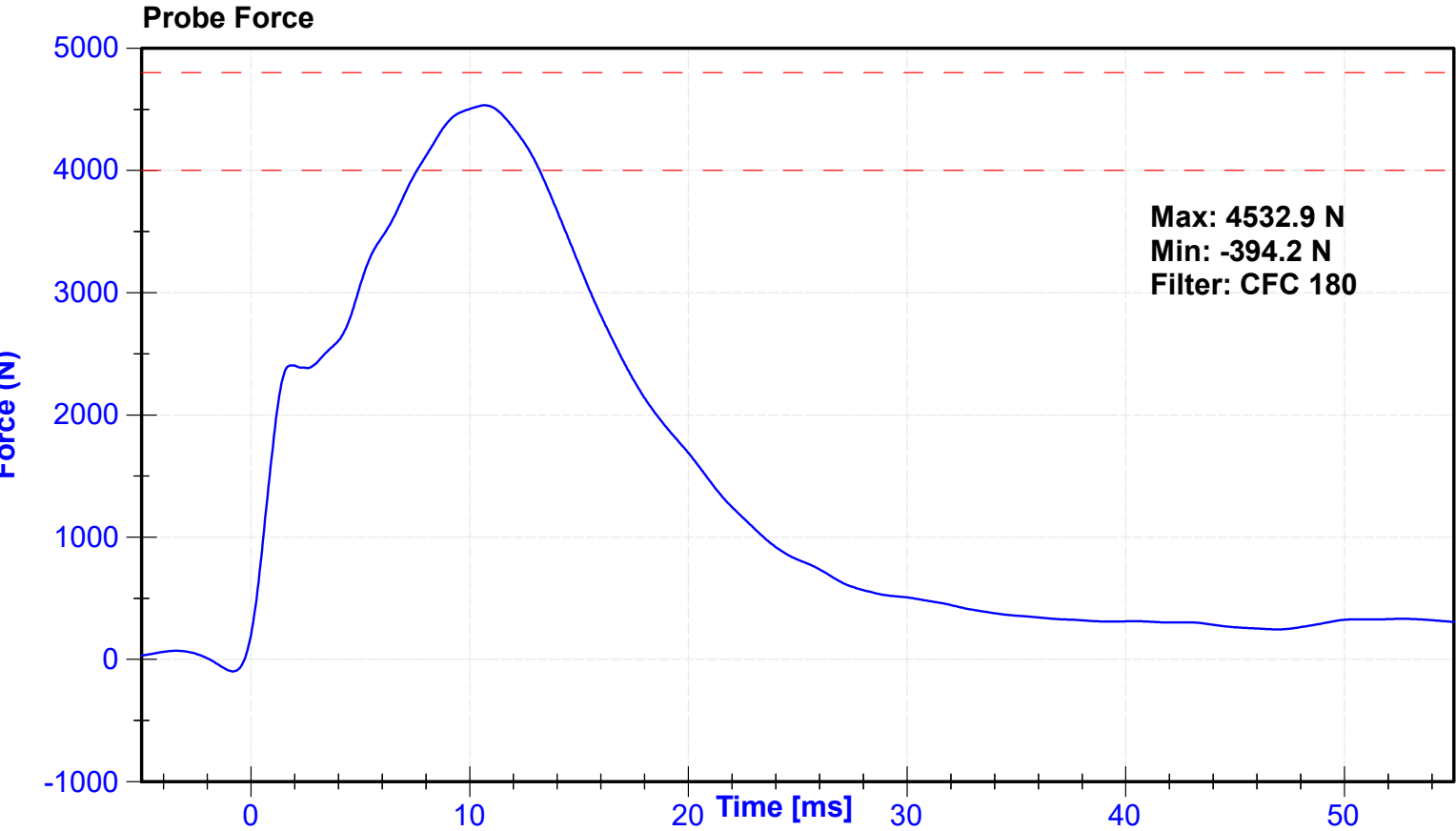
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

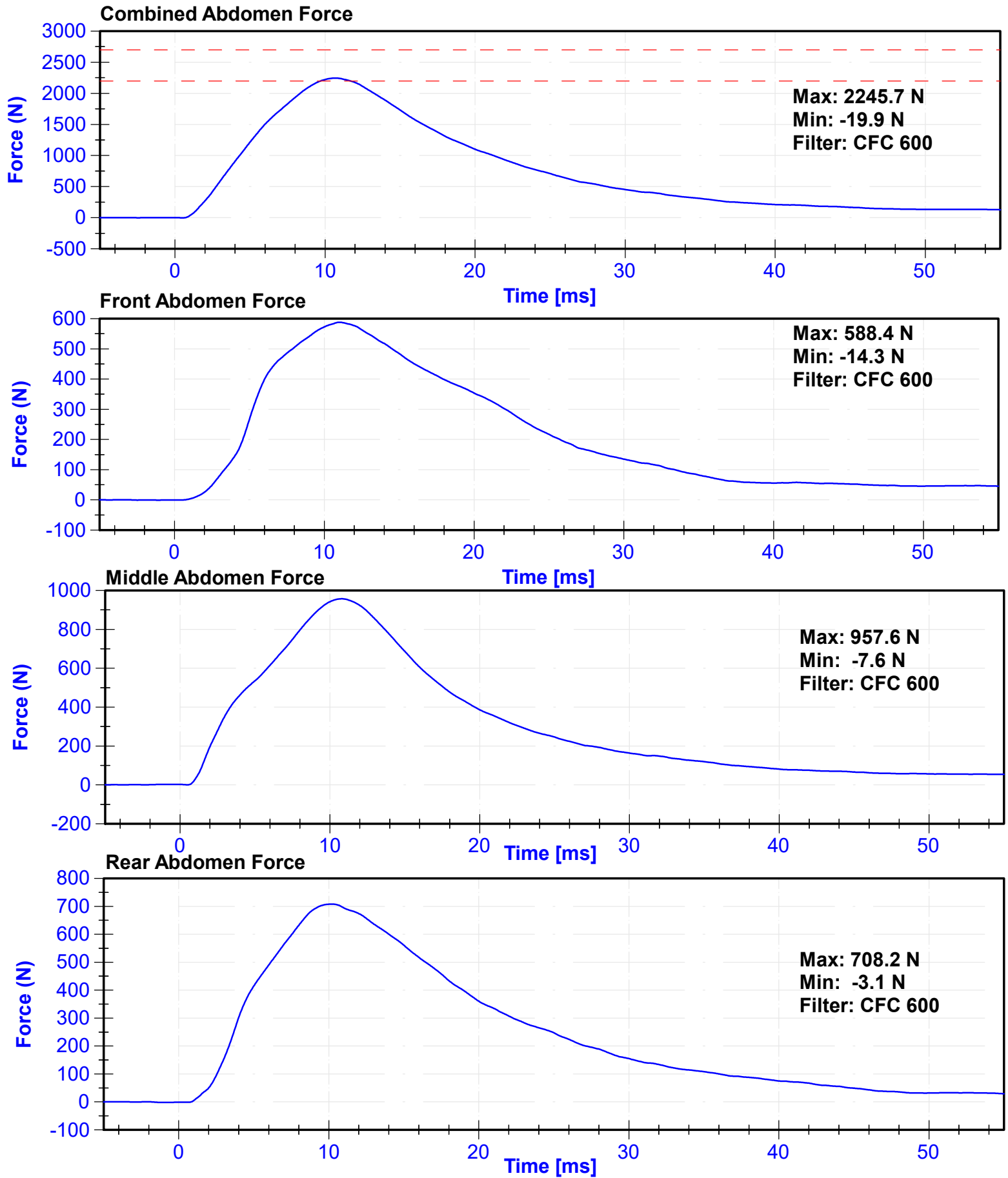
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	25	Pass
Velocity	3.9	4.1	m/s	4.03	Pass
Combined Abdomen Force	2200	2700	N	2245.7	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.65	Pass
Resistive Probe Force	4000	4800	N	4532.9	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.70	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Front Abdomen Load Cell	Denton	1440	8/8/2023	8/7/2024
Middle Abdomen Load Cell	Denton	1525	8/8/2023	8/7/2024
Rear Abdomen Load Cell	Denton	1528	8/8/2023	8/7/2024





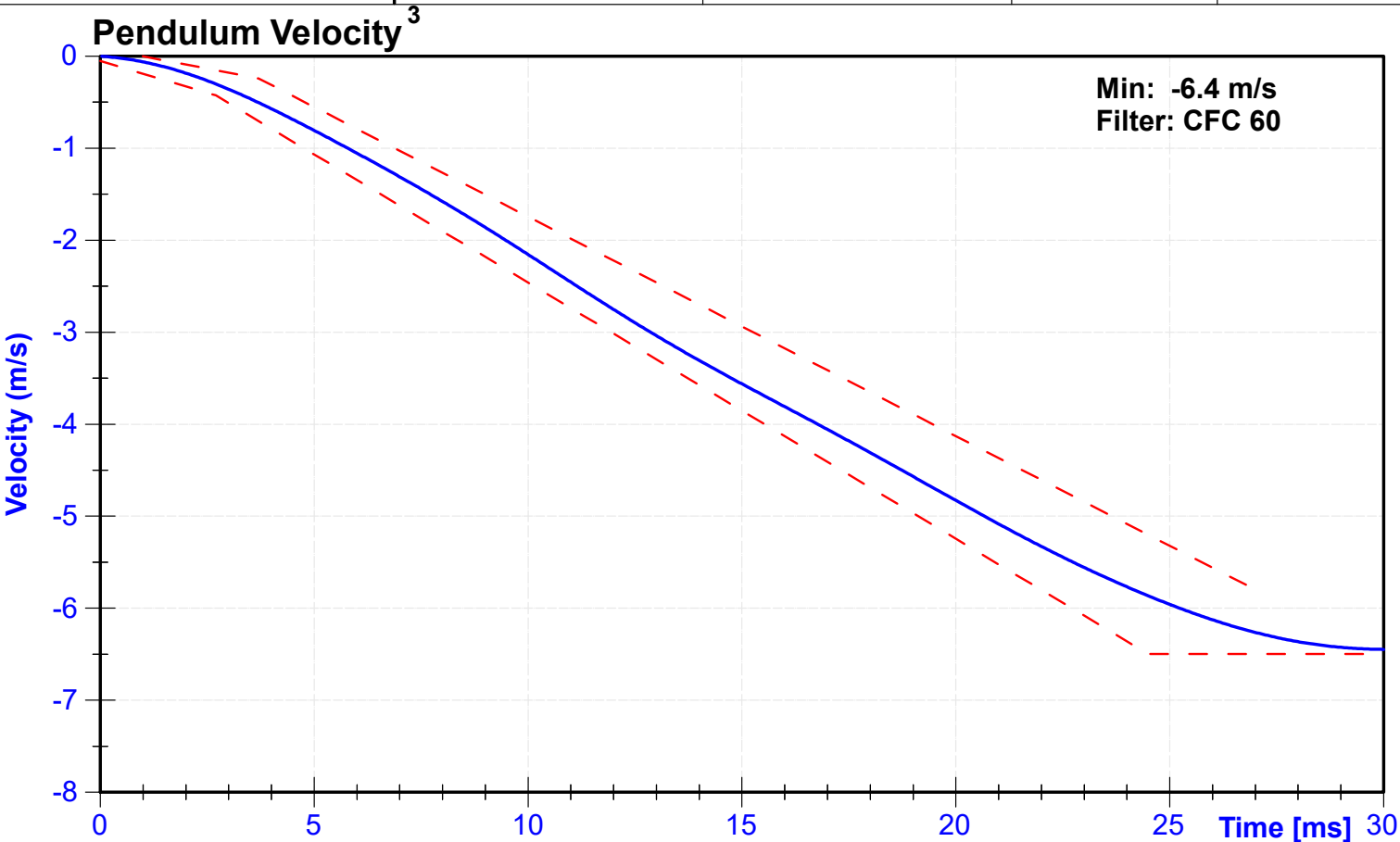
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

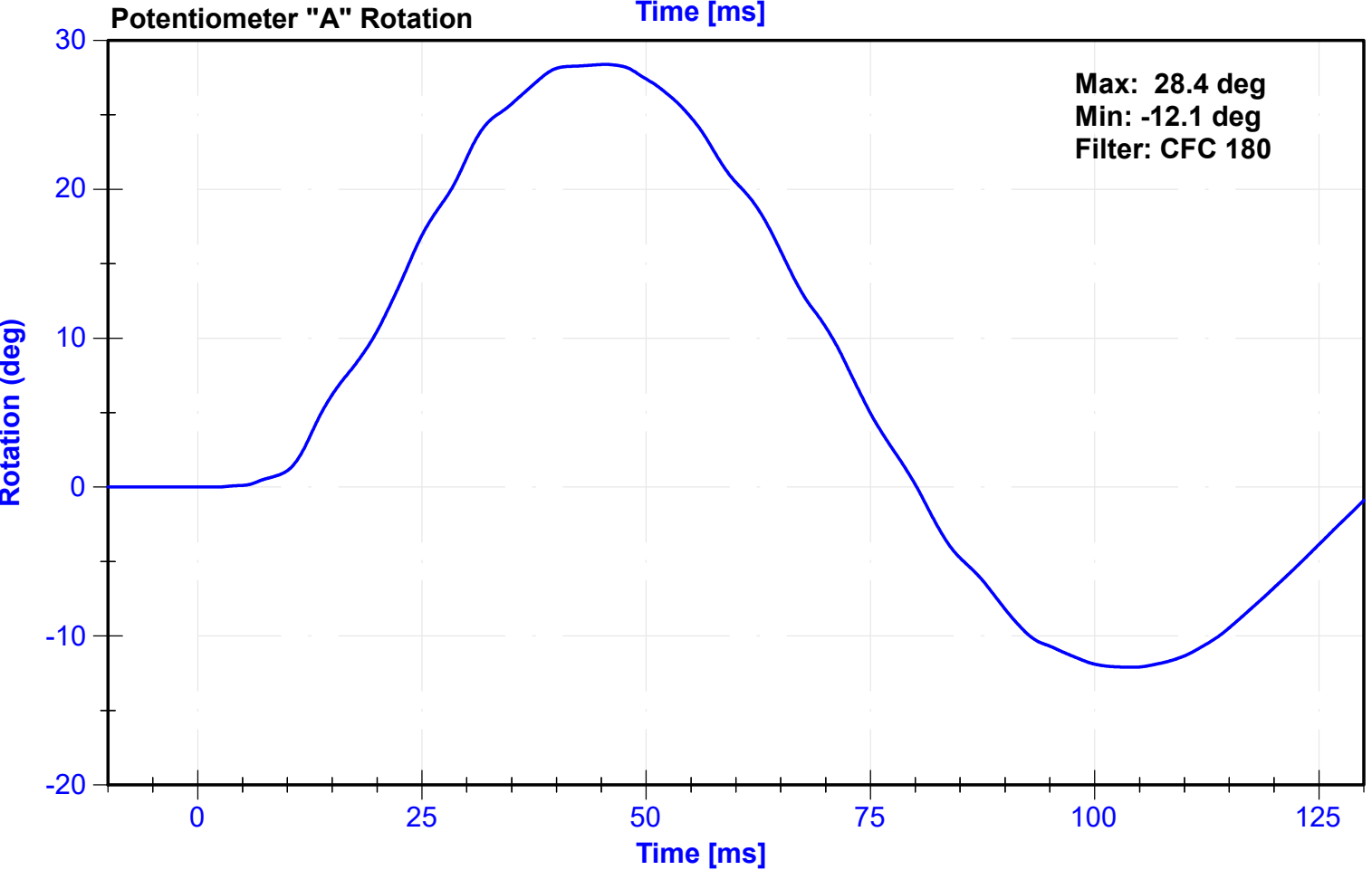
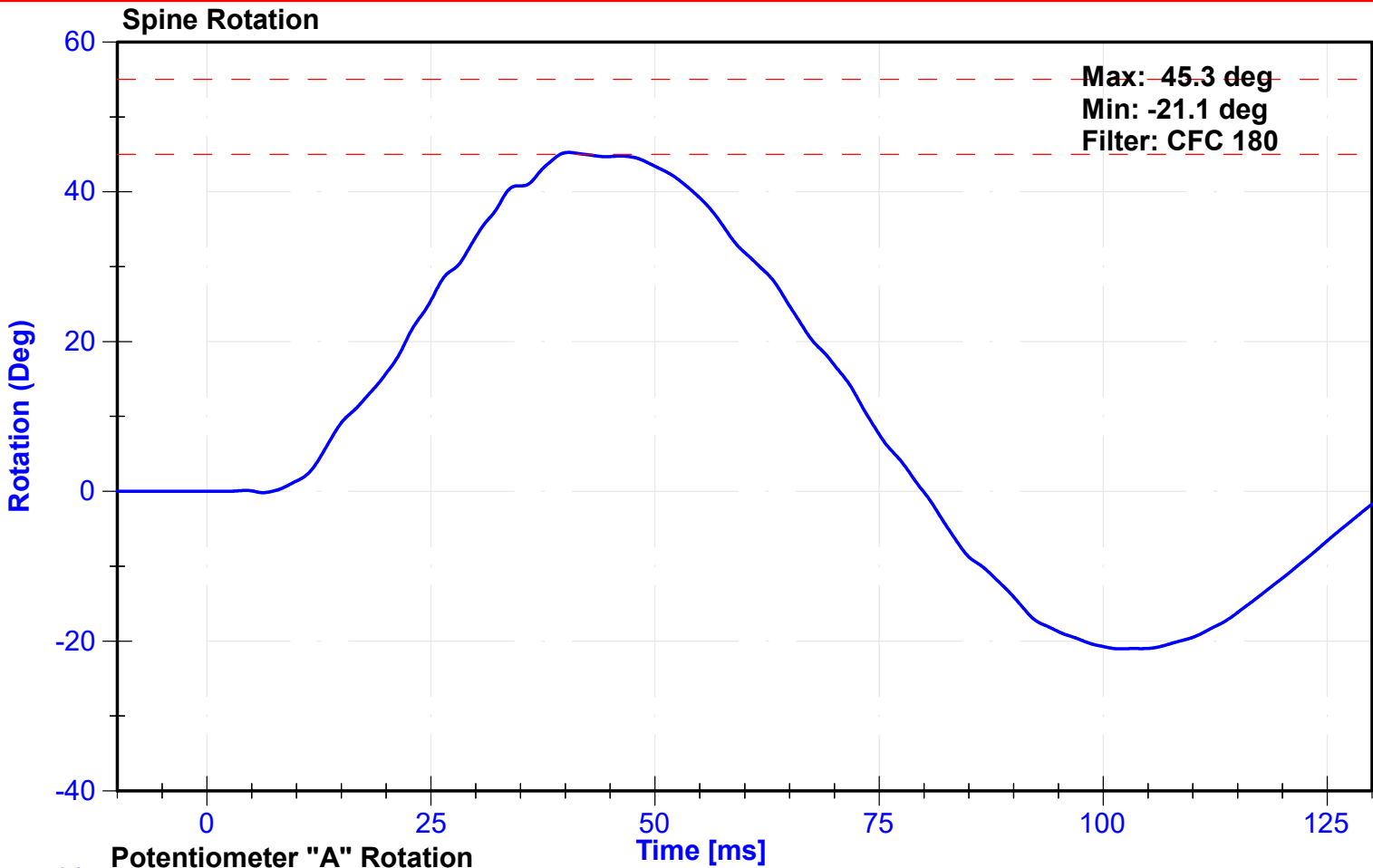
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	5.95	6.15	m/s	6.013	Pass
Lateral Spine Rotation	45	55	deg	45.3	Pass
Time at Maximum Rotation	39	53	ms	40.3	Pass
Time of Decay to Zero Degrees	37	57	ms	39.6	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

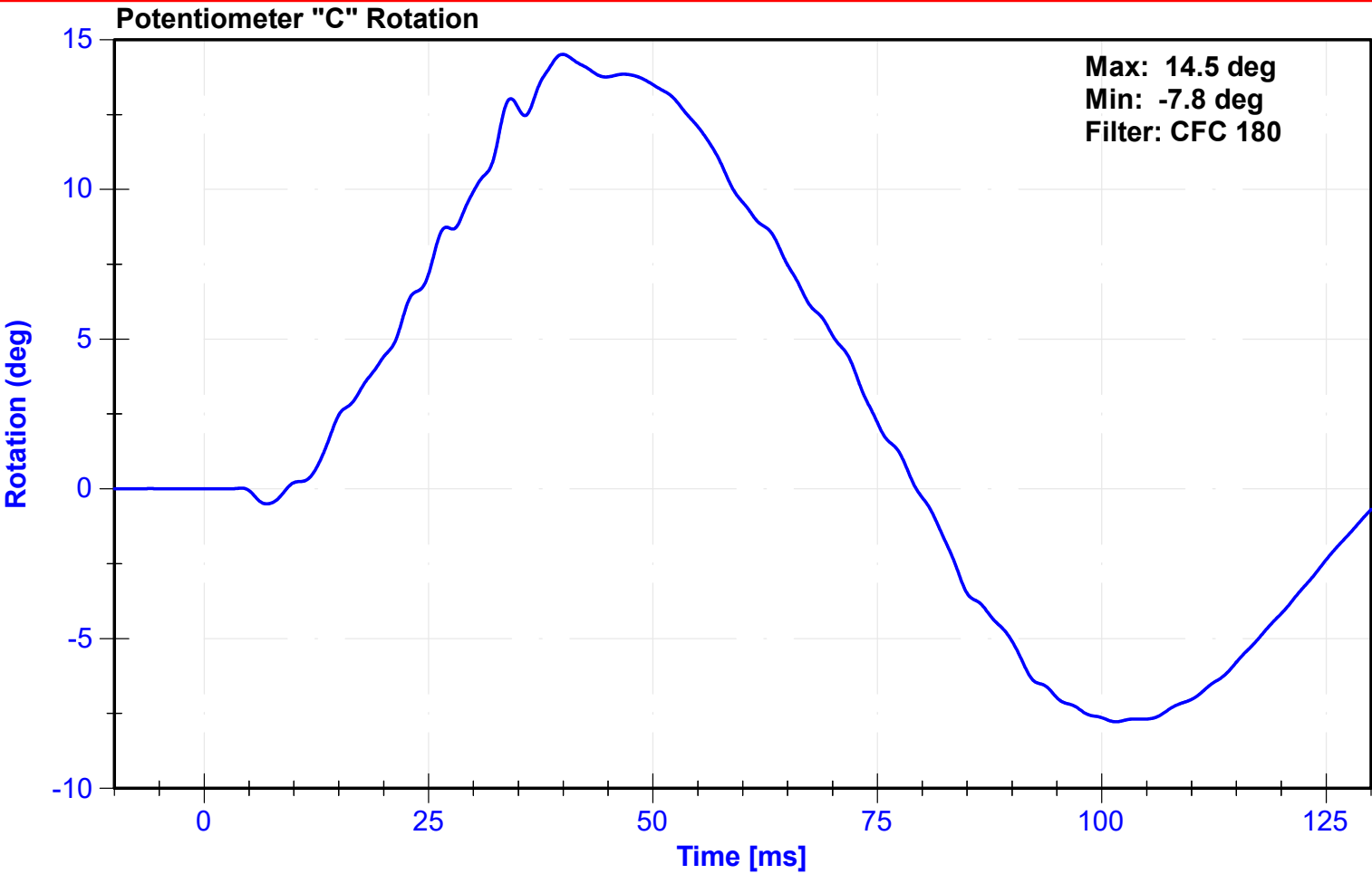
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024



^{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

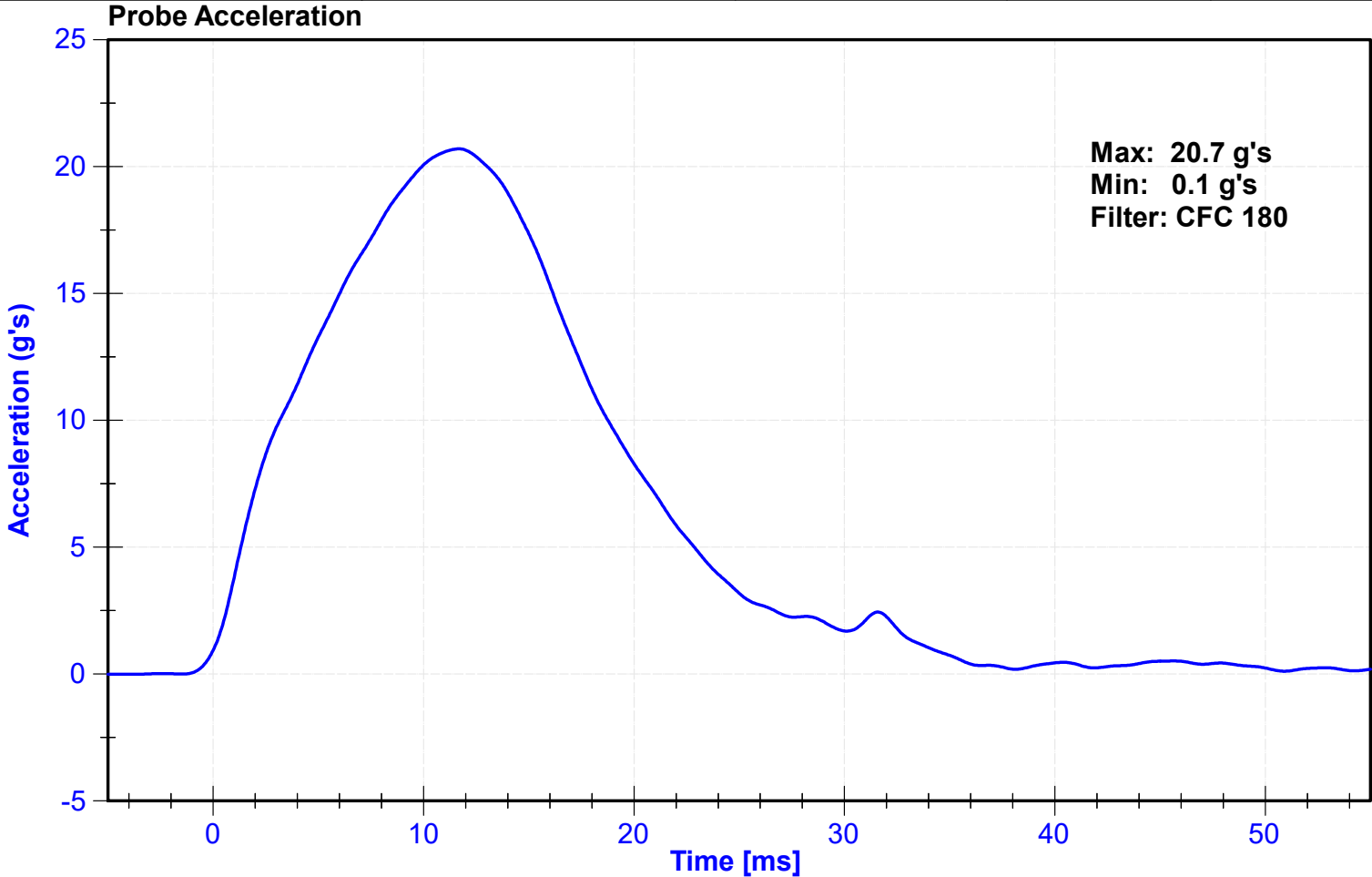
ATD Manufacturer	Denton	Test Technician	J. Rios
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

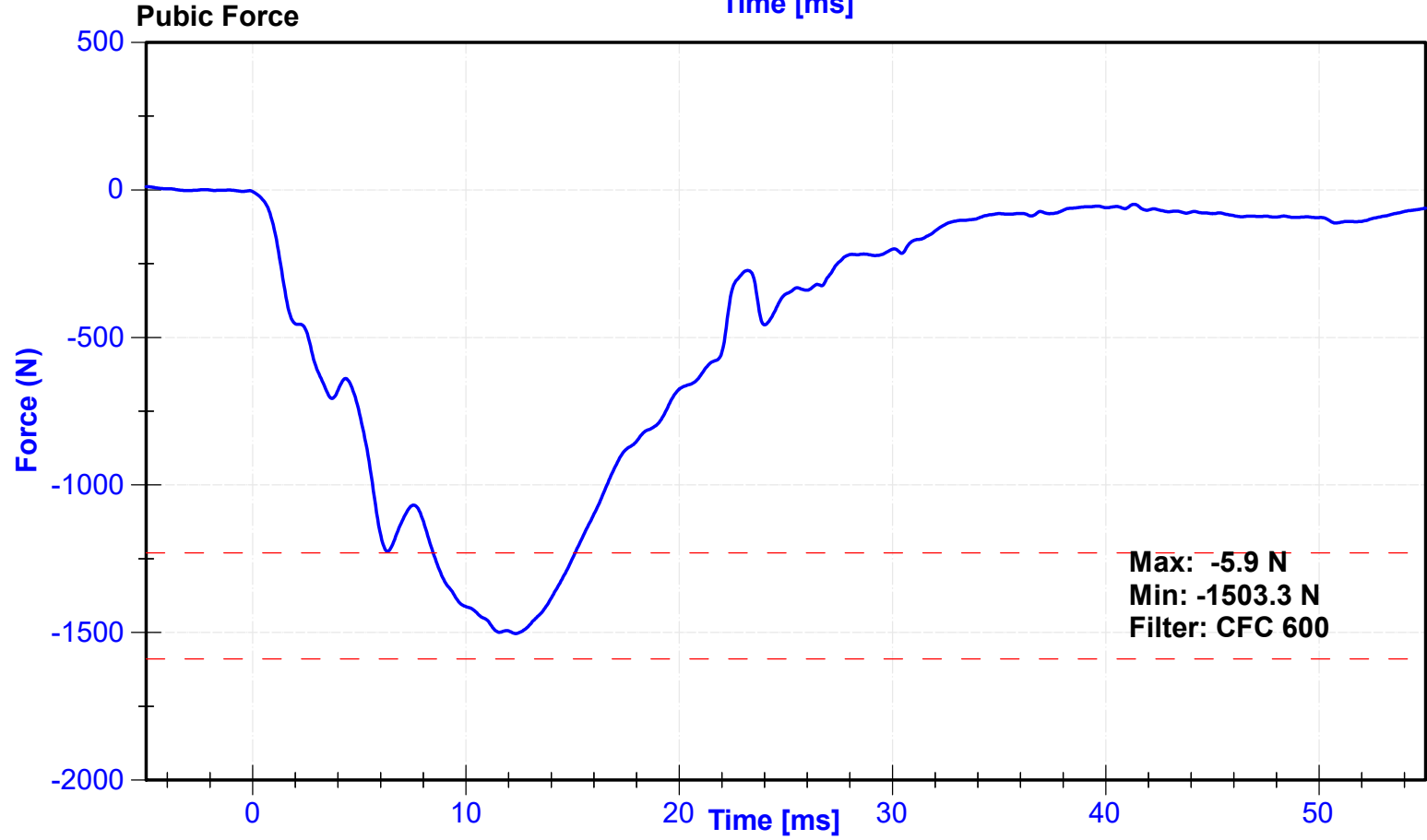
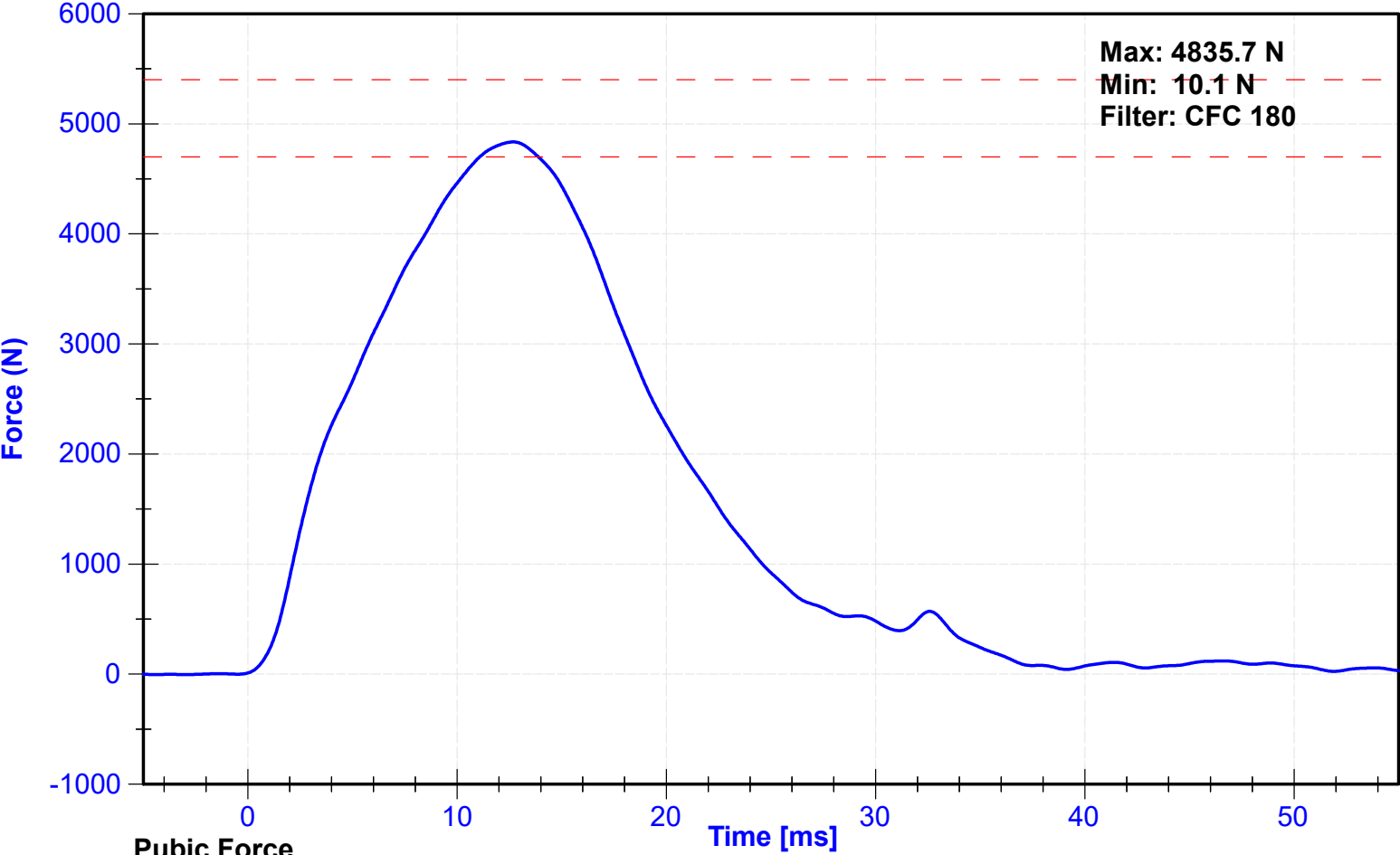
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	25	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Resistive Force	4700	5400	N	4835.7	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.65	Pass
Pubic Force	-1590	-1230	N	-1503.3	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.35	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Pubic Load Cell	Denton	456-FY	8/8/2023	8/7/2024



Resistive Force



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

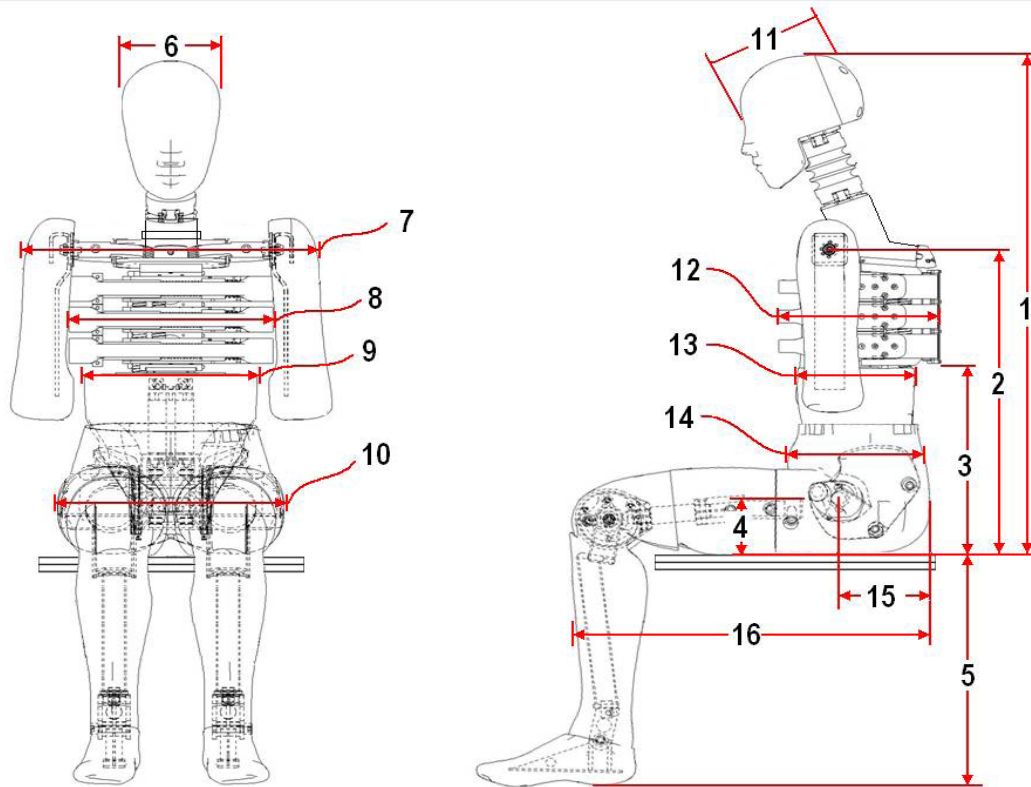


External Measurements - EuroSID-2re

Technician: T. Roseman

Date: 2/12/2024

Dummy Serial Number: D037



FRONT VIEW

SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	908	Pass
2	Seat to Shoulder Joint	558	572	562	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	354	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	421	Pass
6	Head Width	152	158	153	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	362	Pass
11	Head Depth	196	206	199	Pass
12	Thorax Depth	262	272	266	Pass
13	Abdomen Depth	194	204	197	Pass
14	Pelvis Depth	235	245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	602	Pass

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

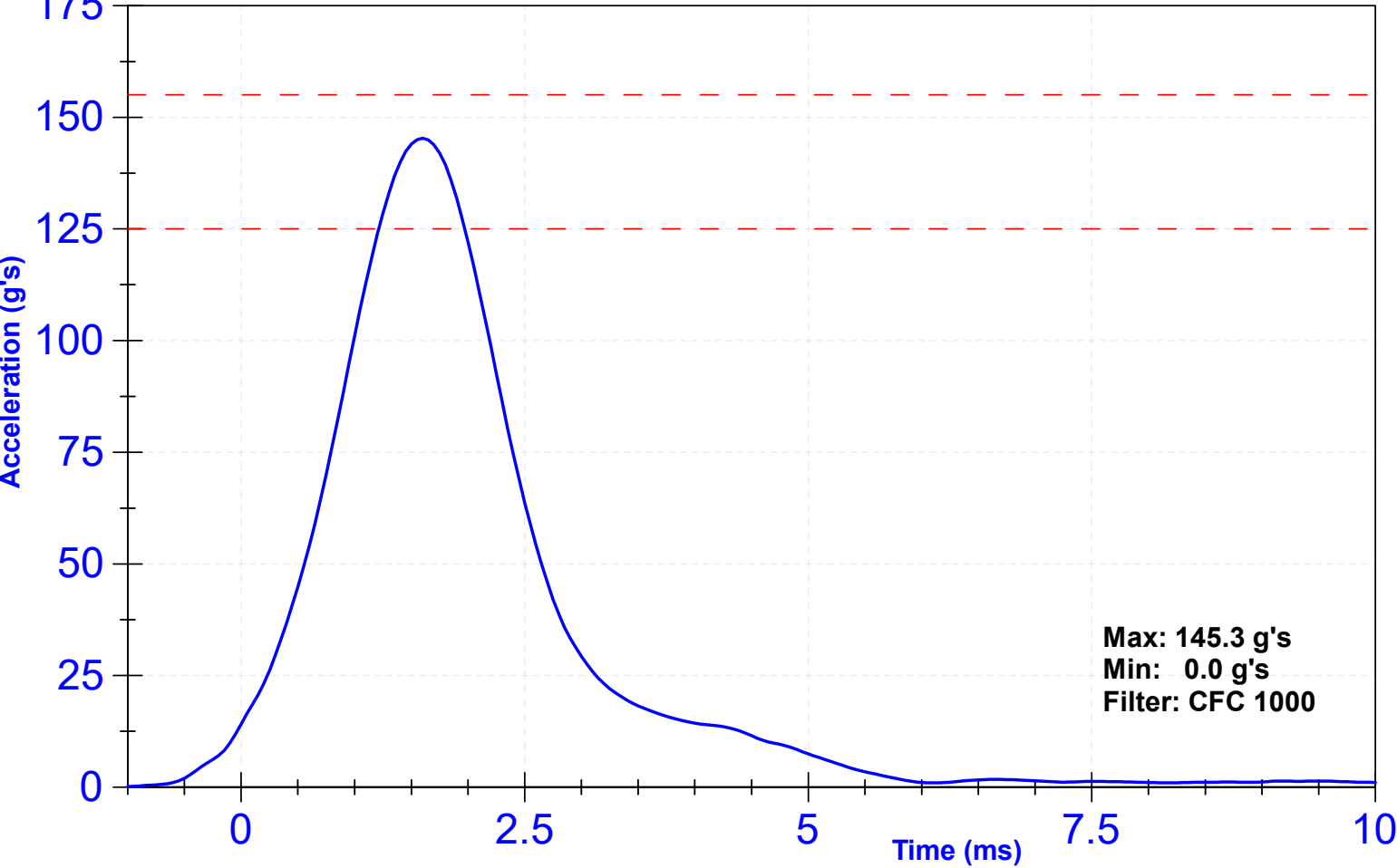
Results

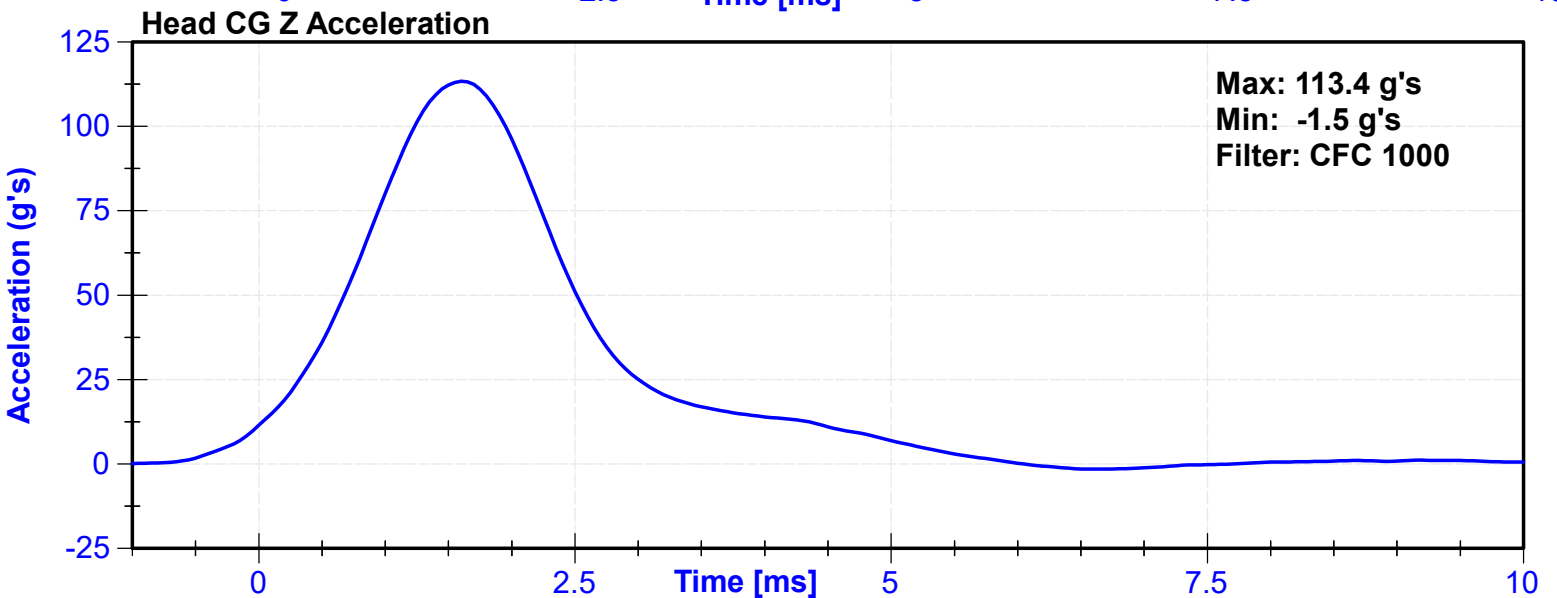
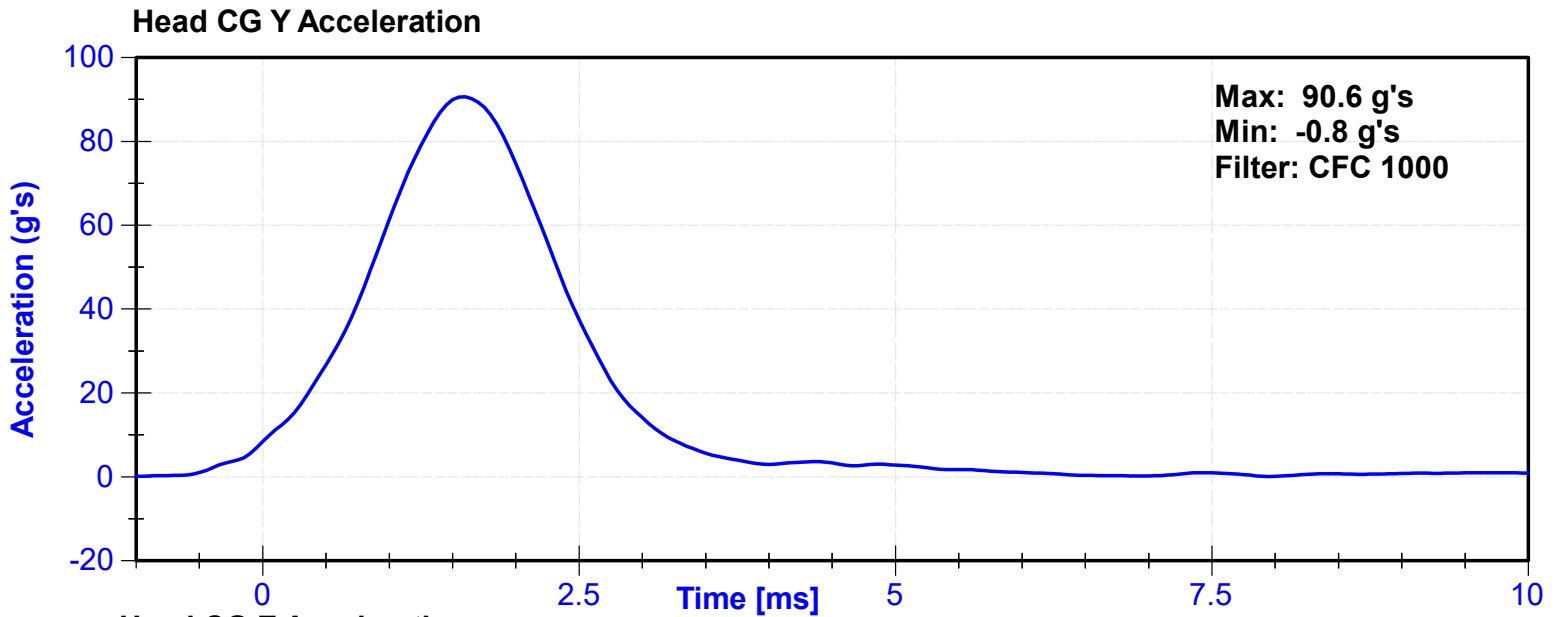
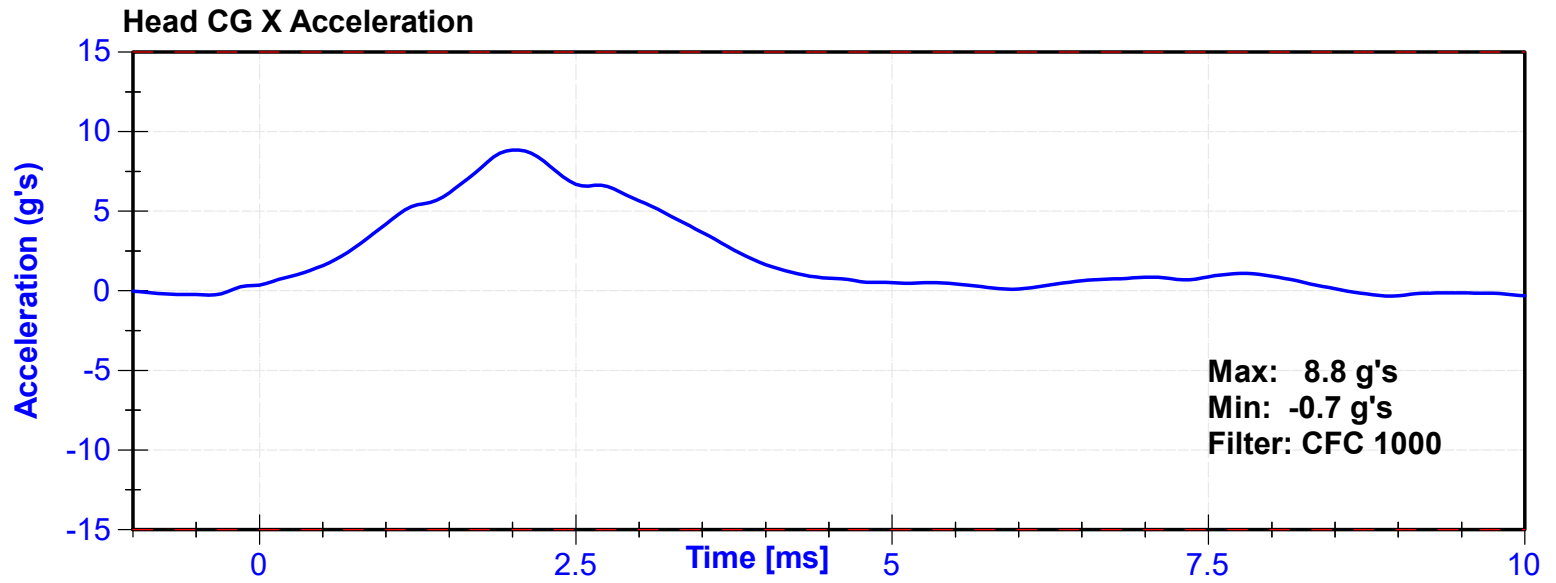
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Resultant Acceleration	125	155	g's	145.3	Pass
Oscillation	0	15	%	1.18	Pass
Fore-Aft Acceleration	-15	15	g's	8.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	T21724	2/1/2024	7/30/2024
Y Accelerometer	Endevco	T22281	2/1/2024	7/30/2024
Z Accelerometer	Endevco	T26050	2/1/2024	7/30/2024

Resultant Acceleration





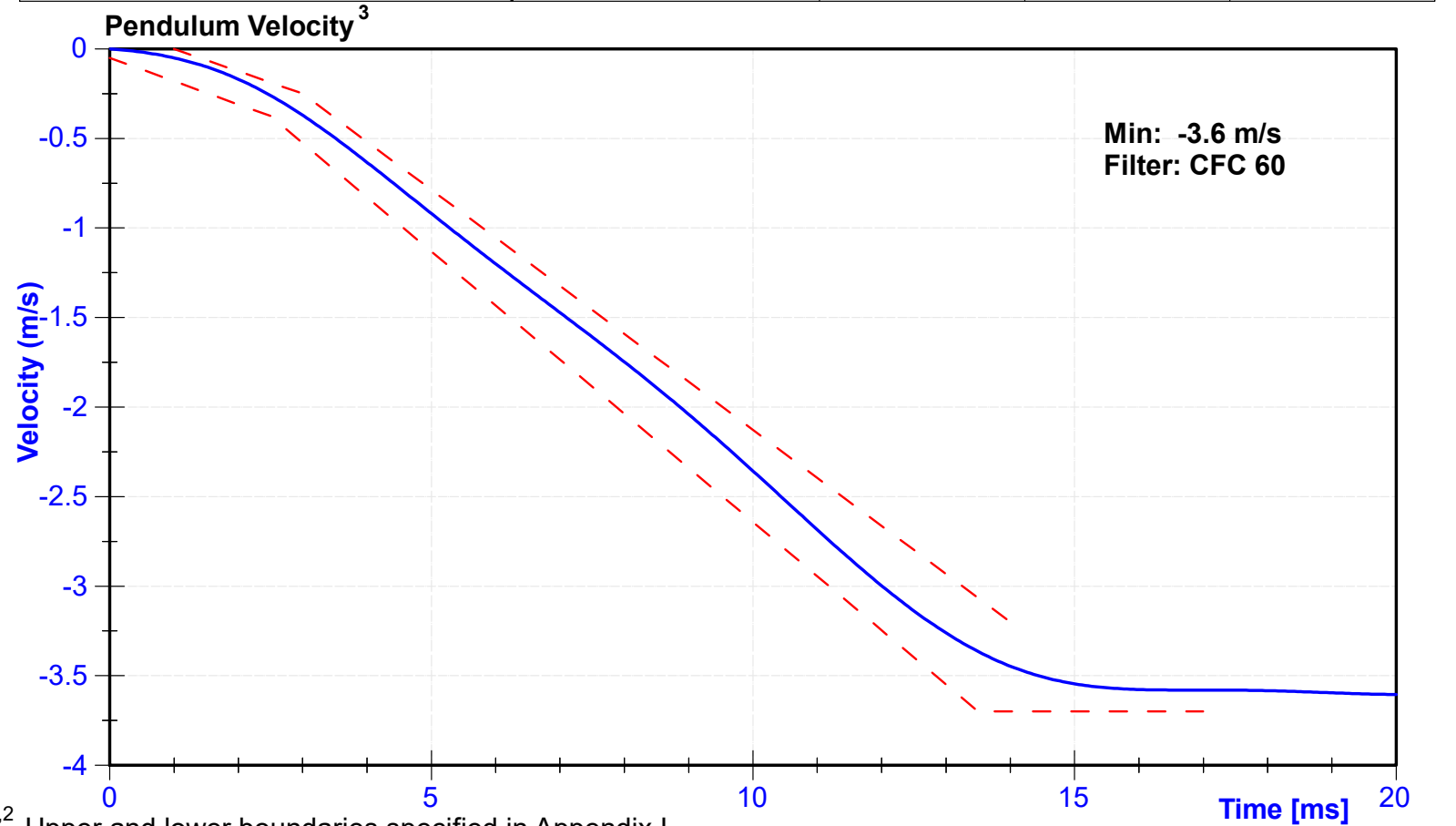
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	3.3	3.5	m/s	3.39	Pass
Lateral Neck Rotation	49	59	deg	49.2	Pass
Time at Maximum Rotation	54	66	ms	55.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	57.4	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

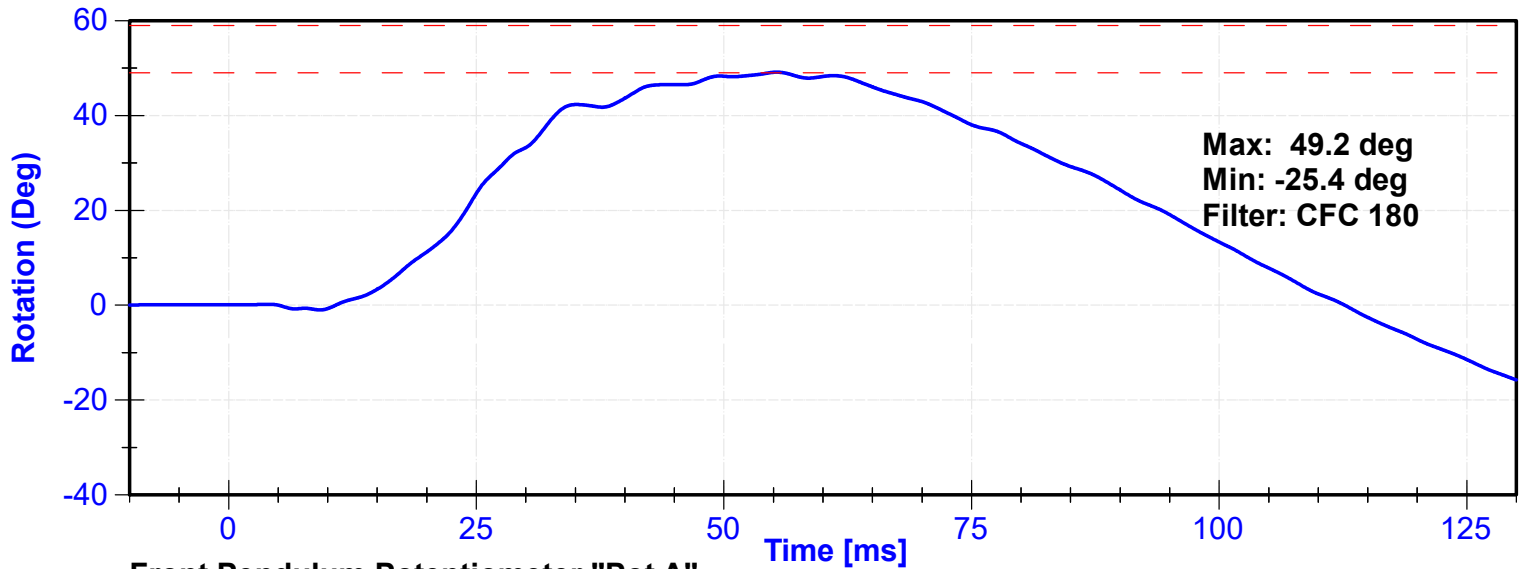
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024

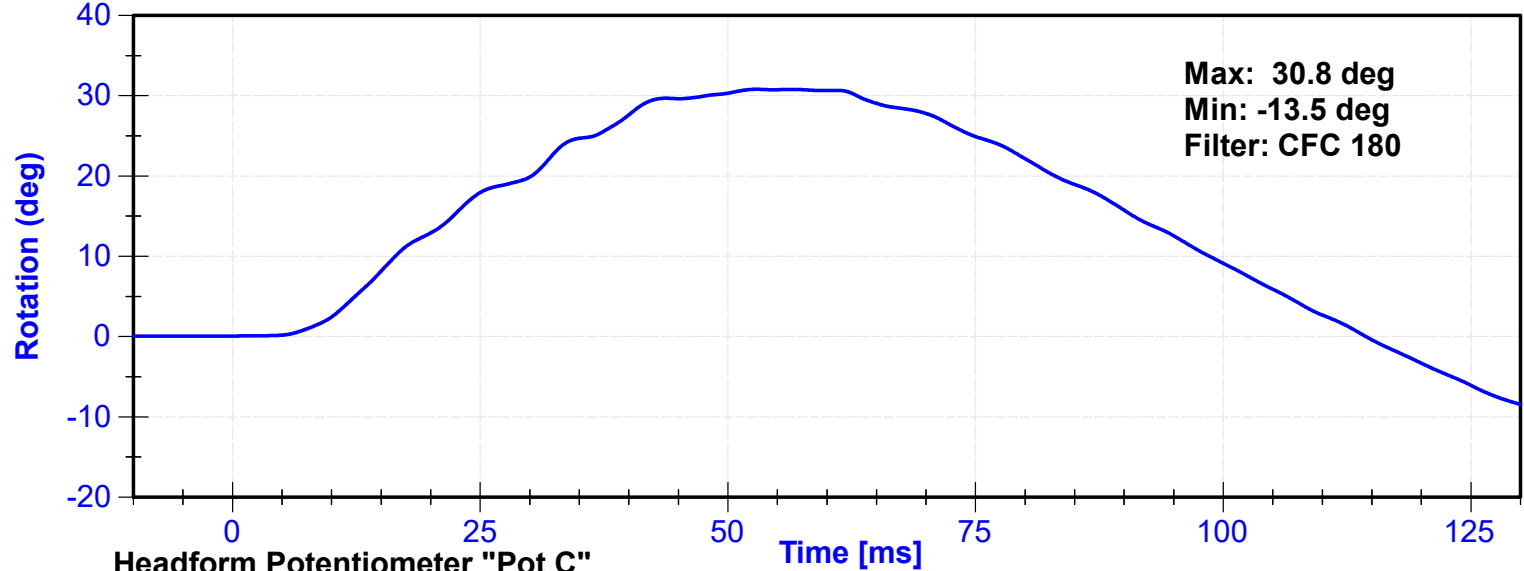


^{1,2} Upper and lower boundaries specified in Appendix I

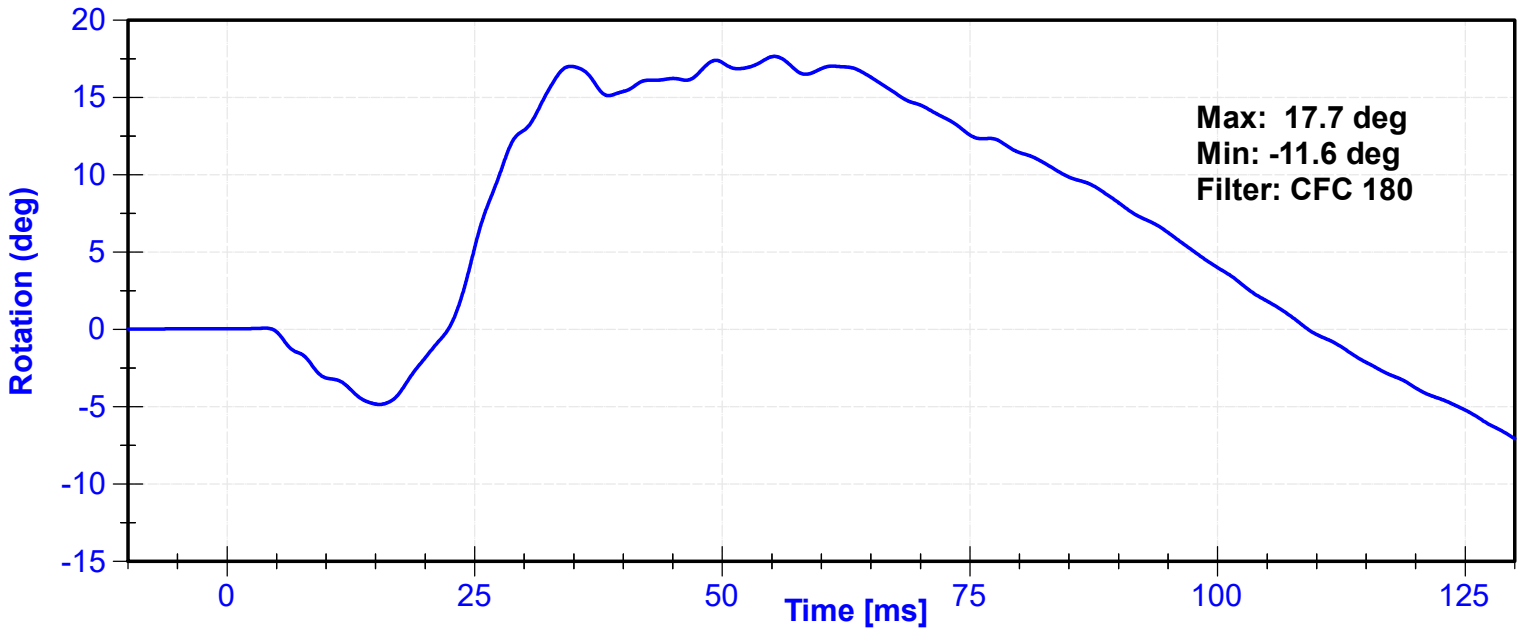
Neck Rotation



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	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

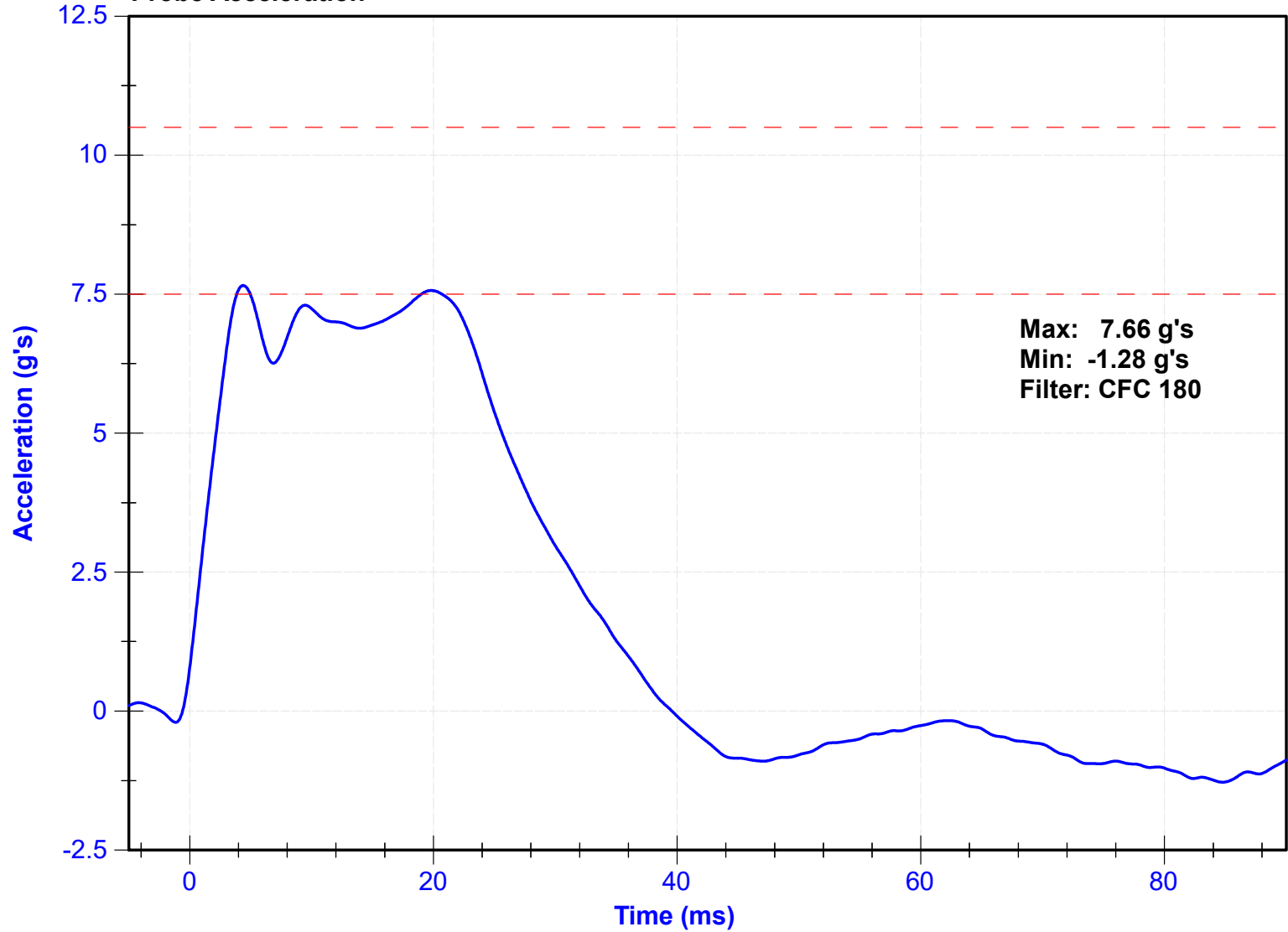
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	7.5	10.5	g's	7.66	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	9/29/2023	3/27/2024

Probe Acceleration



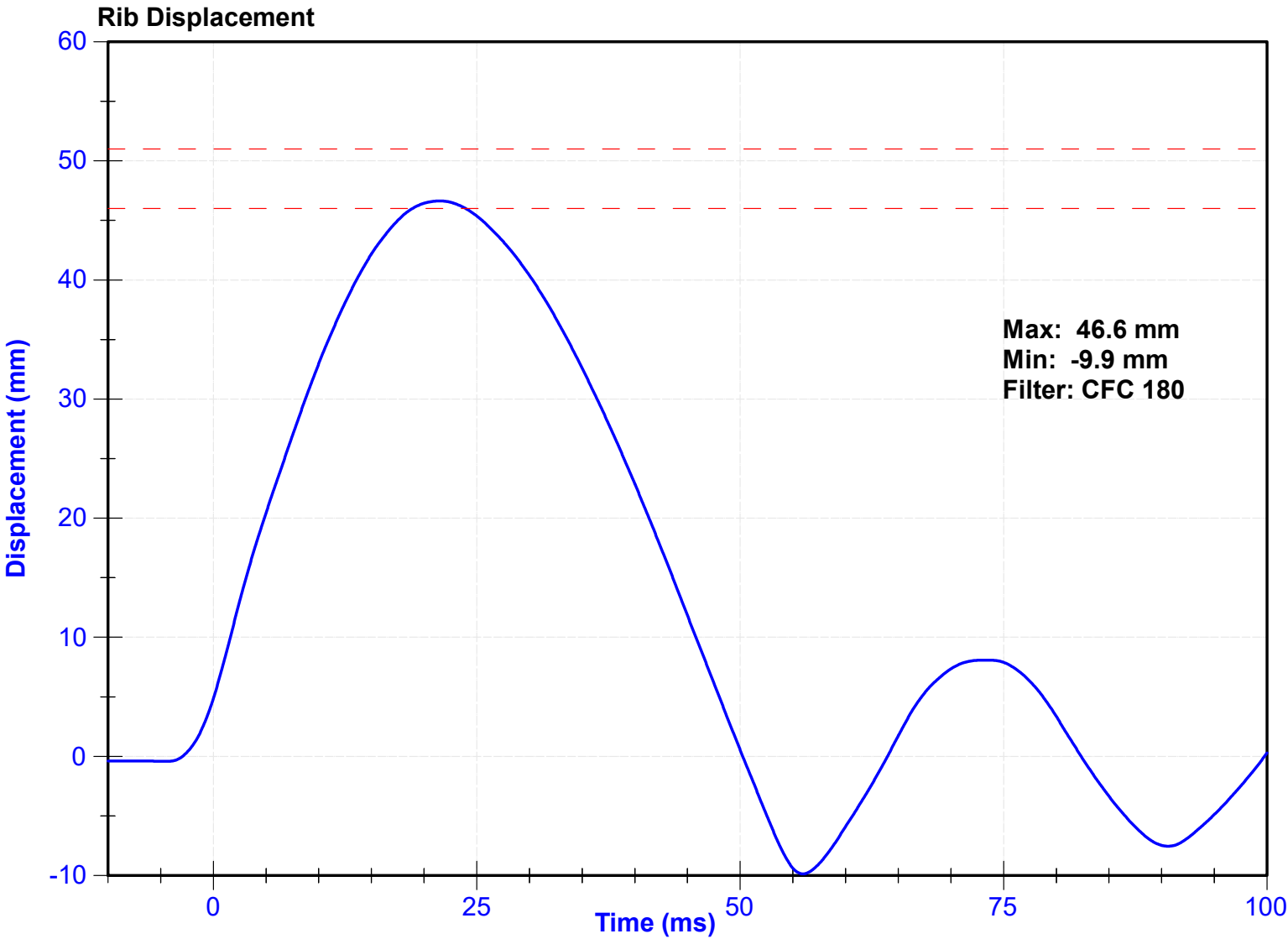
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	46	51	mm	46.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	1/31/2024	7/31/2024



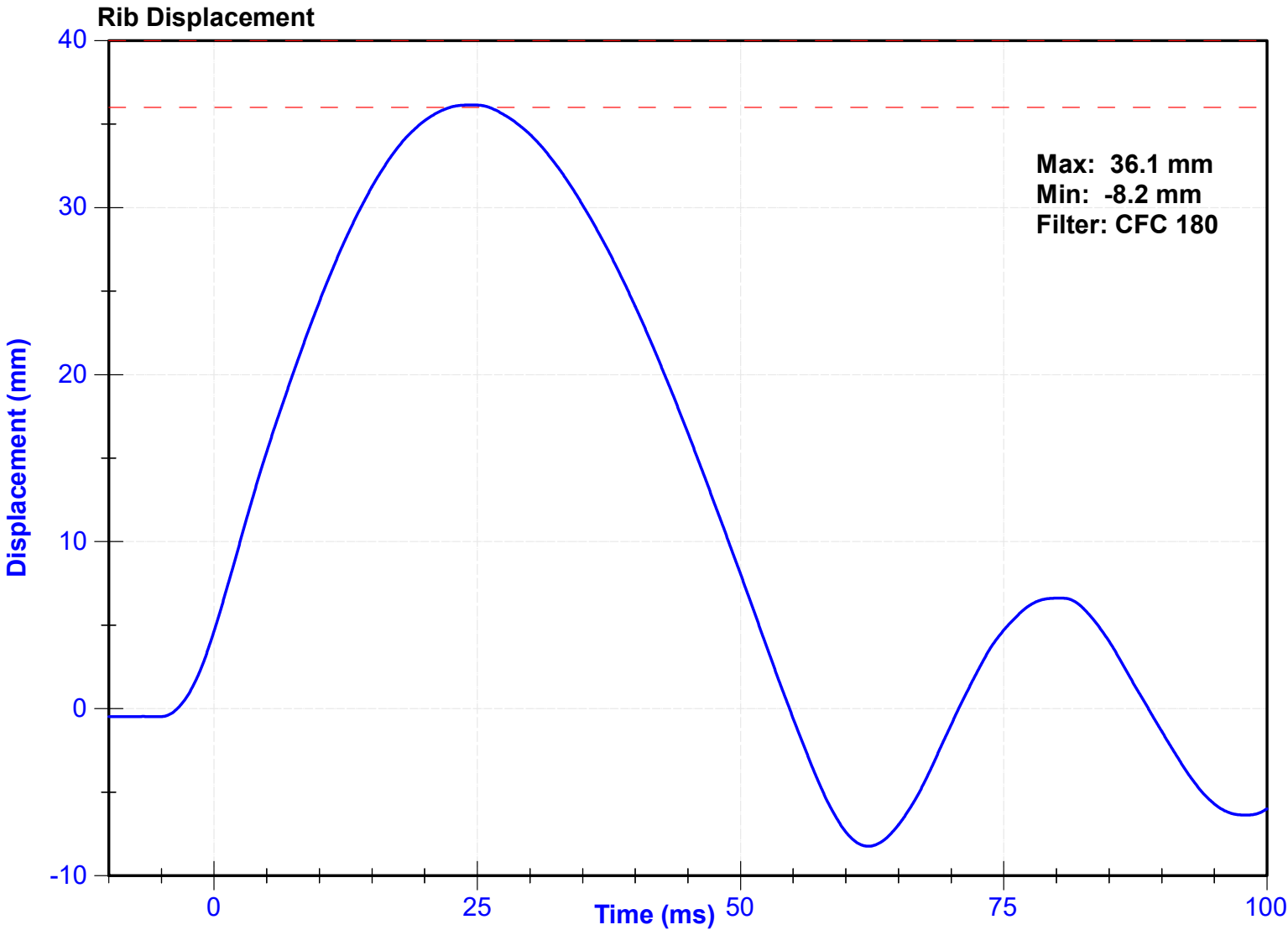
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	36	40	mm	36.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	1/31/2024	7/31/2024



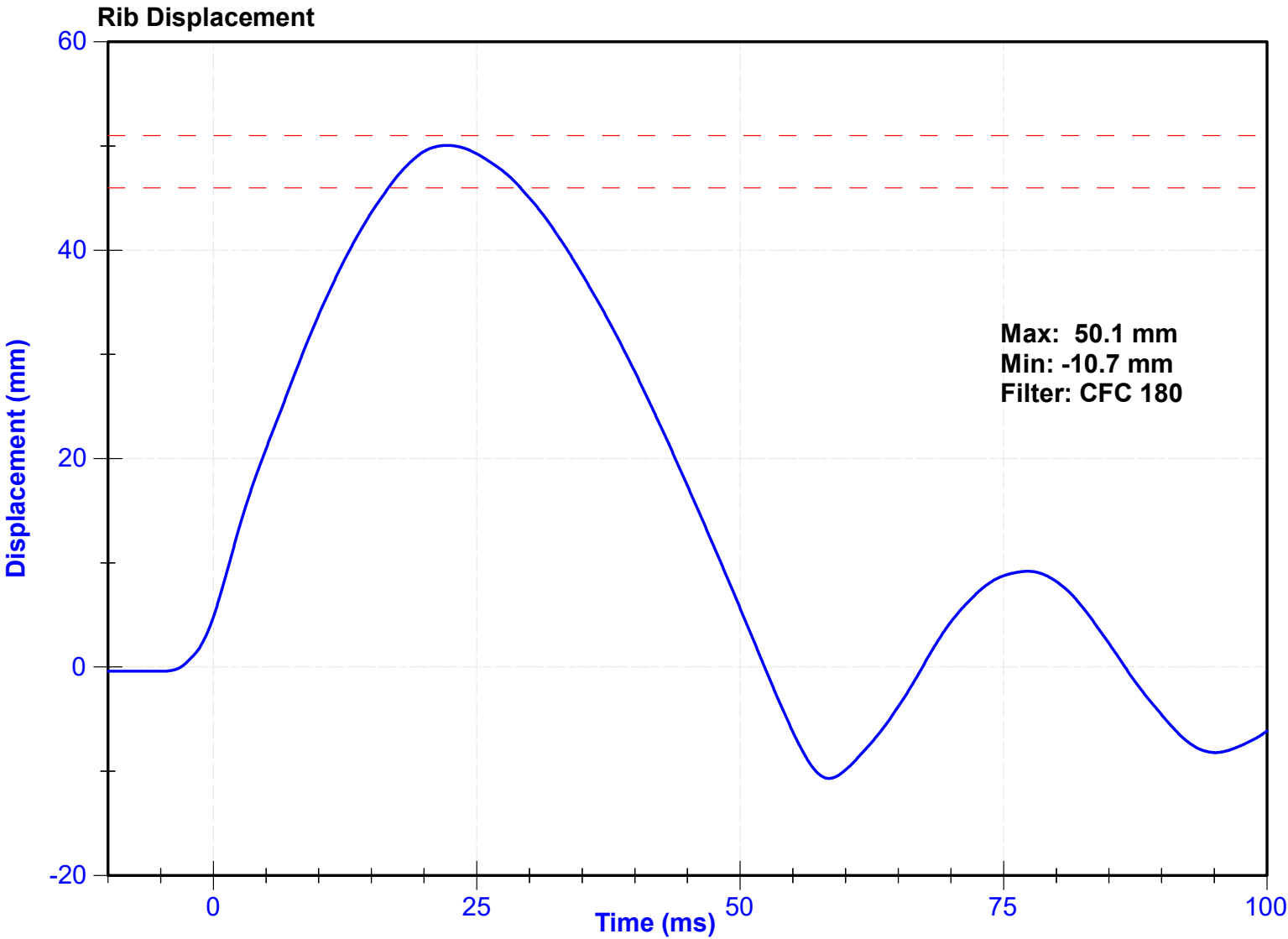
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	46	51	mm	50.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	1/31/2024	7/31/2024



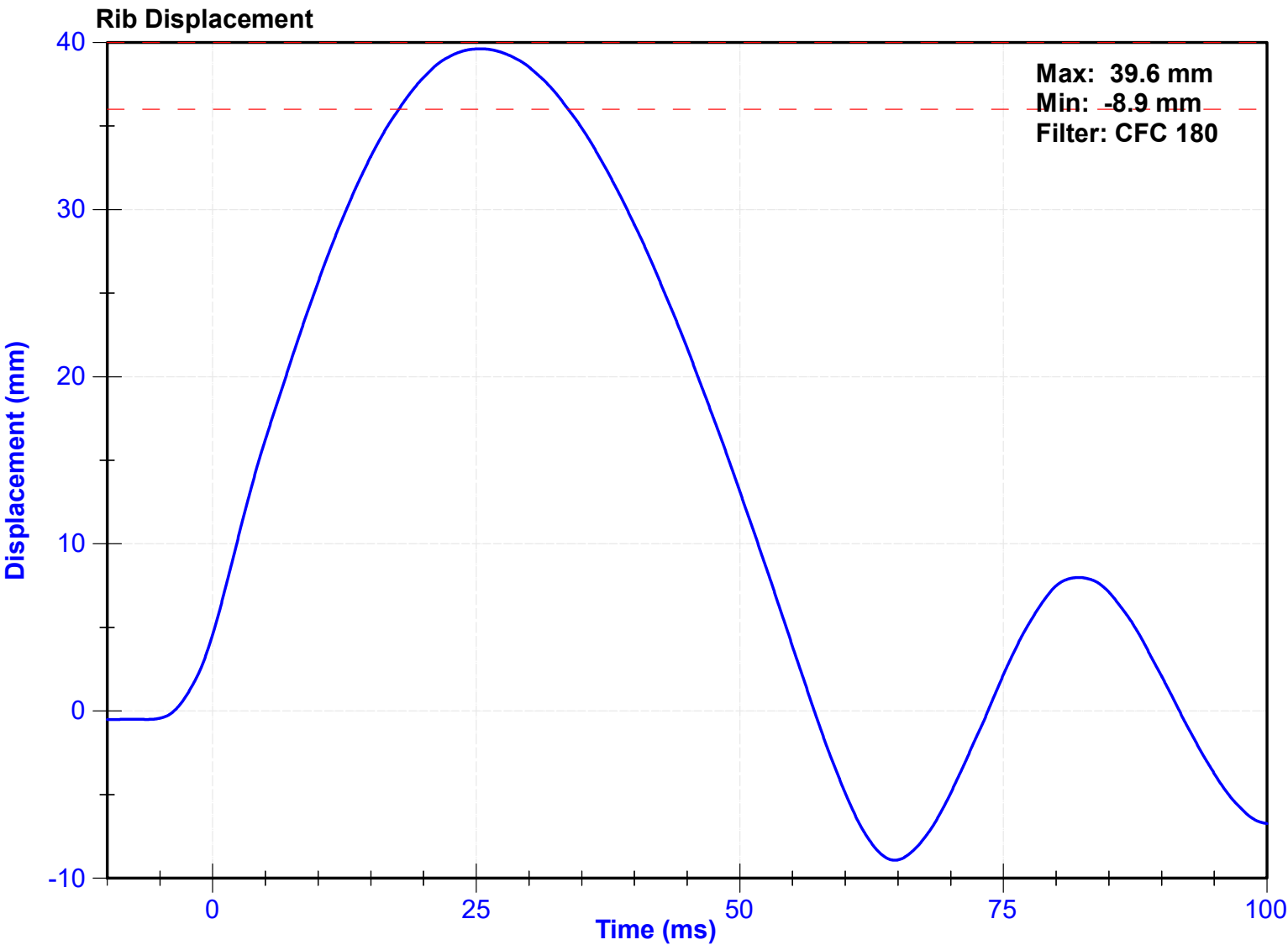
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	36	40	mm	39.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	1/31/2024	7/31/2024



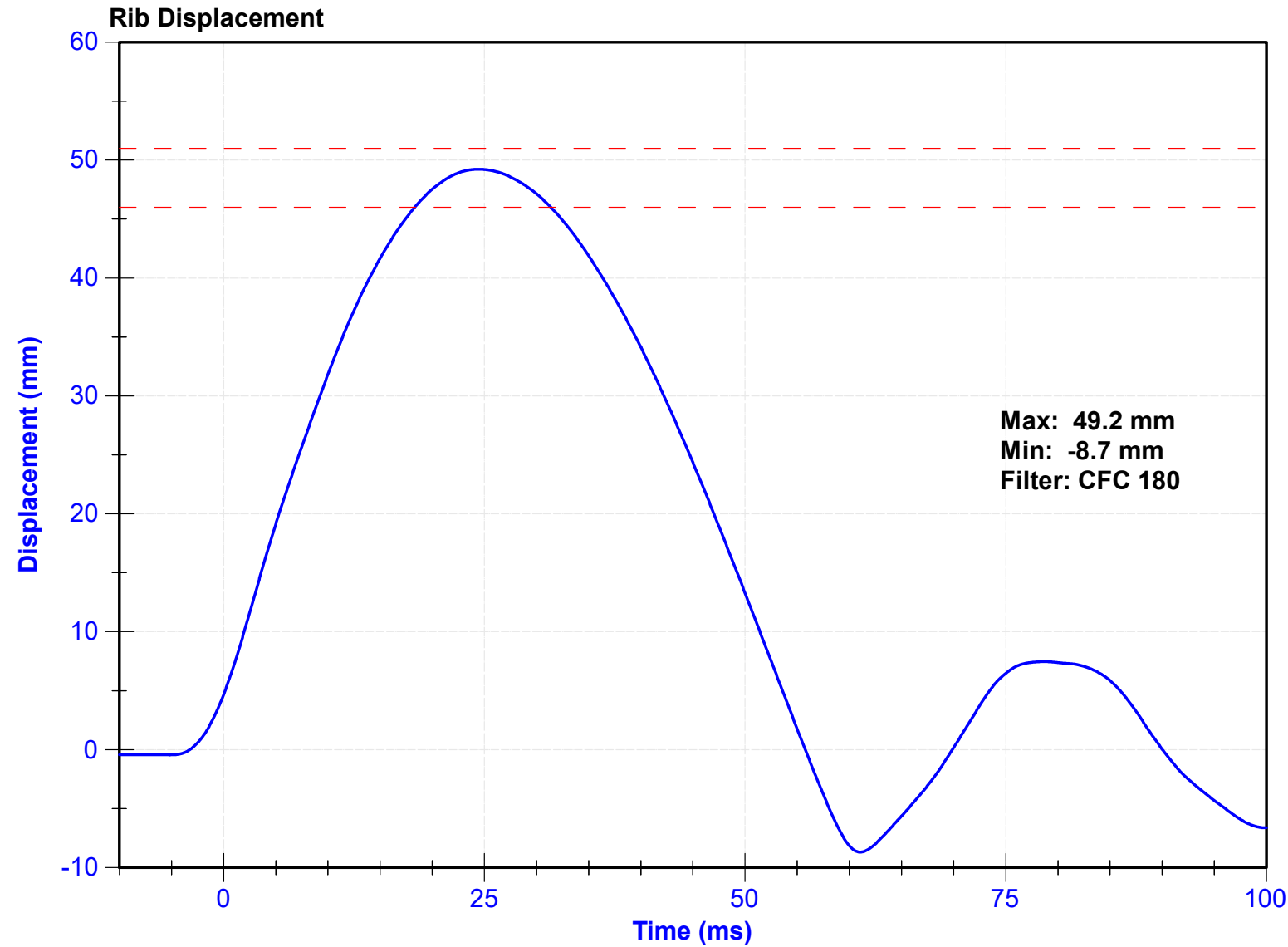
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	46	51	mm	49.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	1/31/2024	7/31/2024



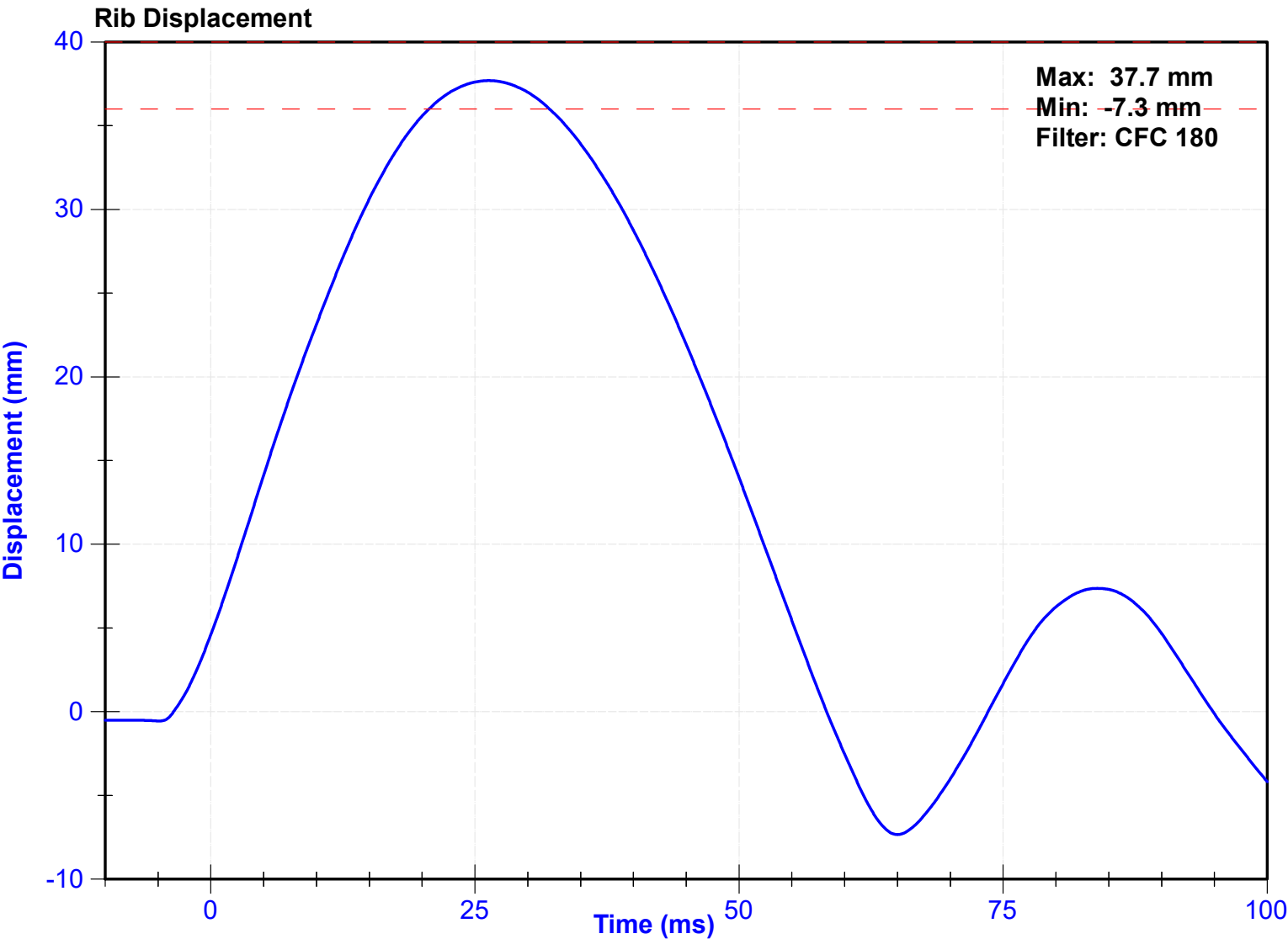
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	28	Pass
Rib Displacement	36	40	mm	37.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	1/31/2024	7/31/2024



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

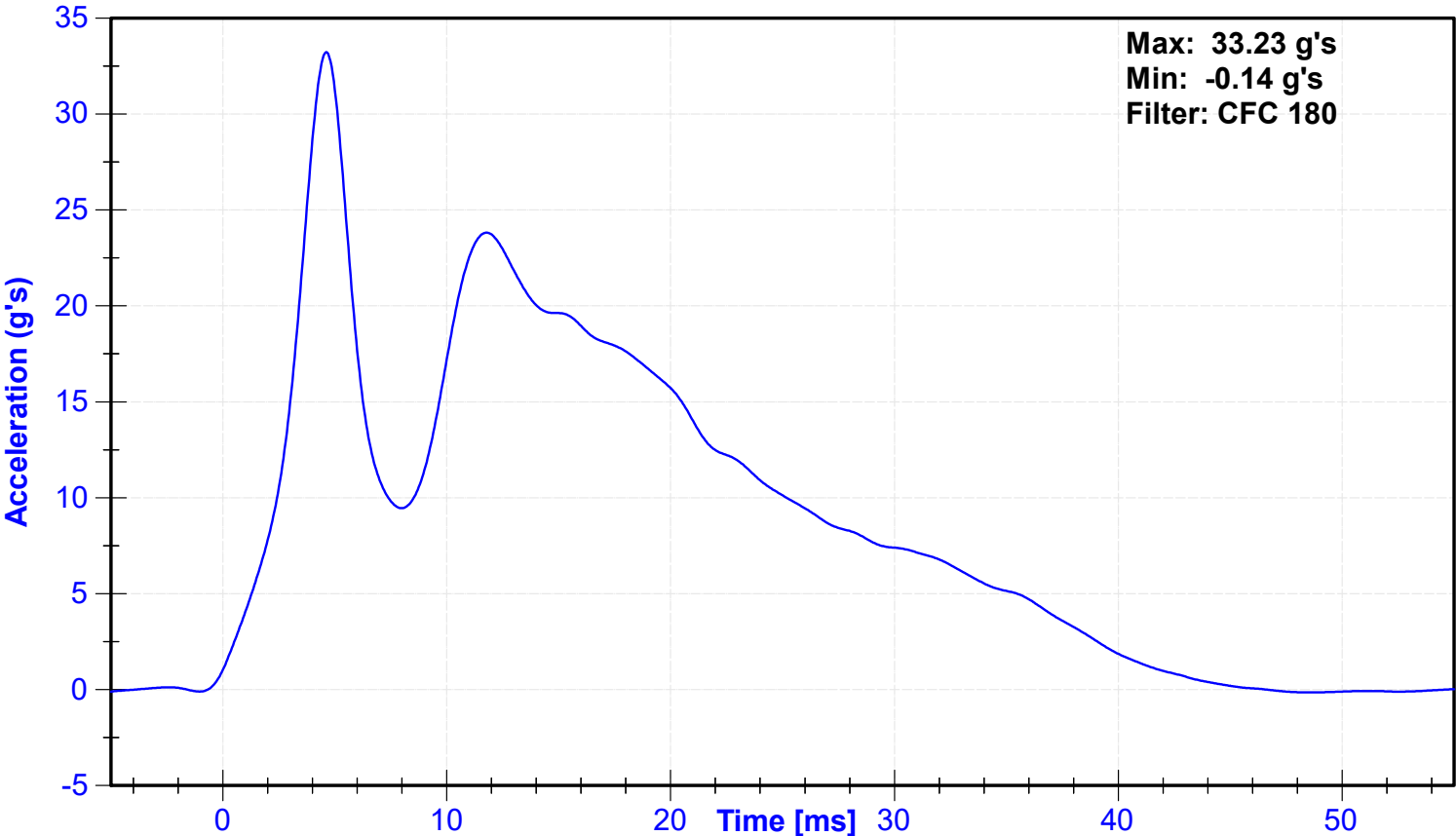
Results

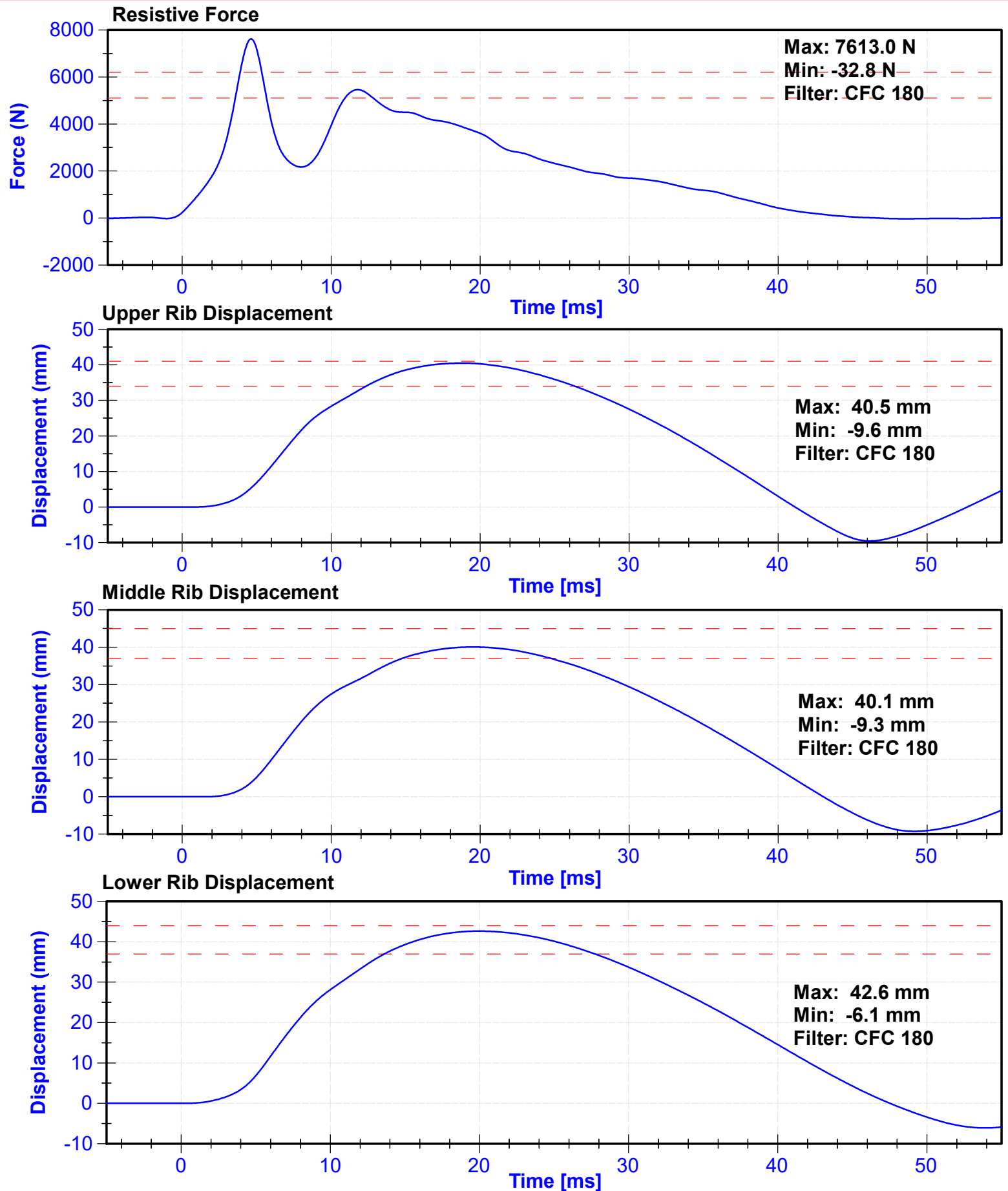
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	5457.2	Pass
Upper Thorax Rib Deflection	34	41	mm	40.5	Pass
Mid Thorax Rib Deflection	37	45	mm	40.1	Pass
Lower Thorax Rib Deflection	37	44	mm	42.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Upper Thorax Rib Potentiometer	Honeywell	0552-01	1/31/2024	7/31/2024
Middle Thorax Rib Potentiometer	Honeywell	807	1/31/2024	7/31/2024
Lower Thorax Rib Potentiometer	Honeywell	0552-03	1/31/2024	7/31/2024

Probe Acceleration





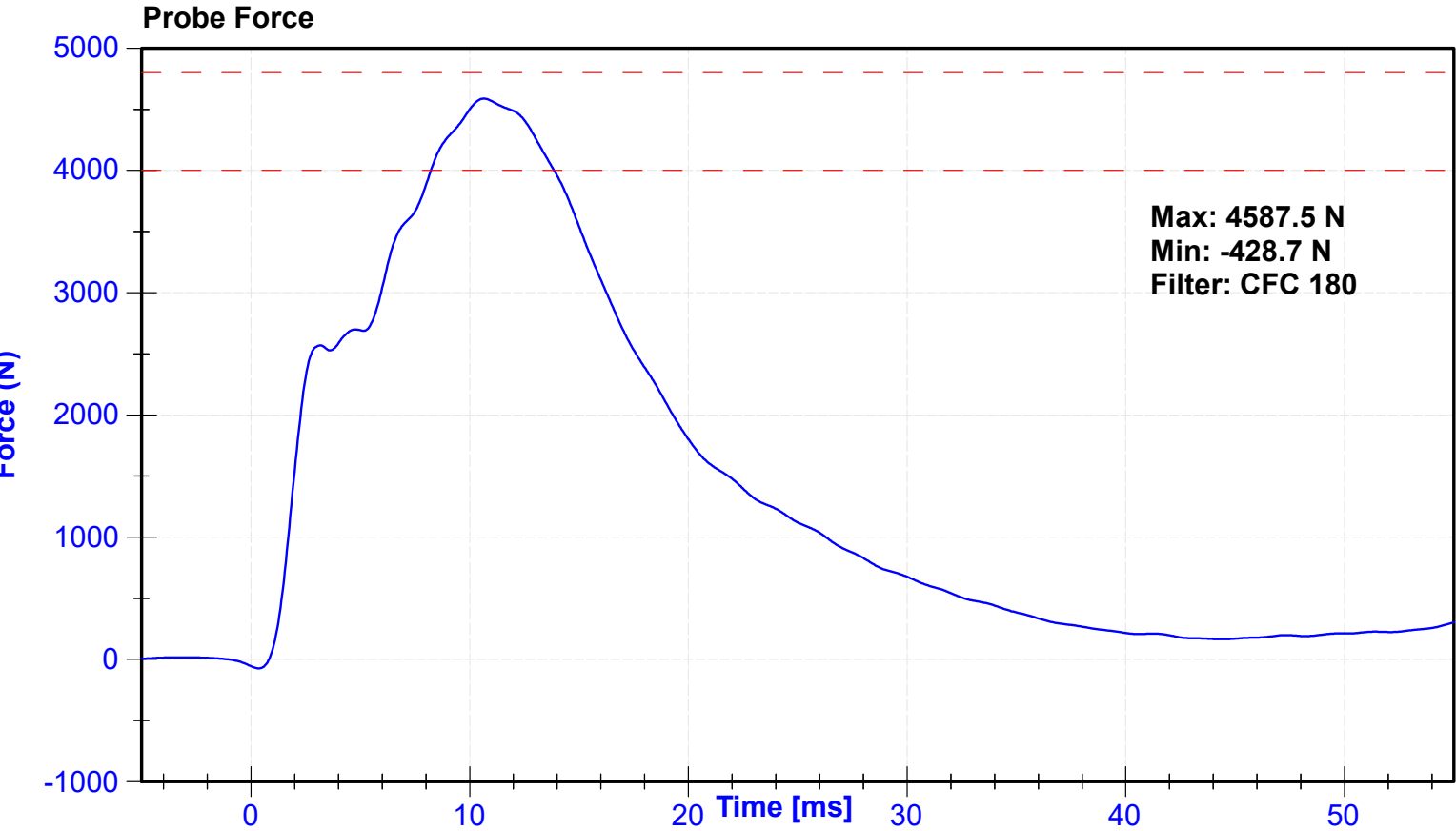
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

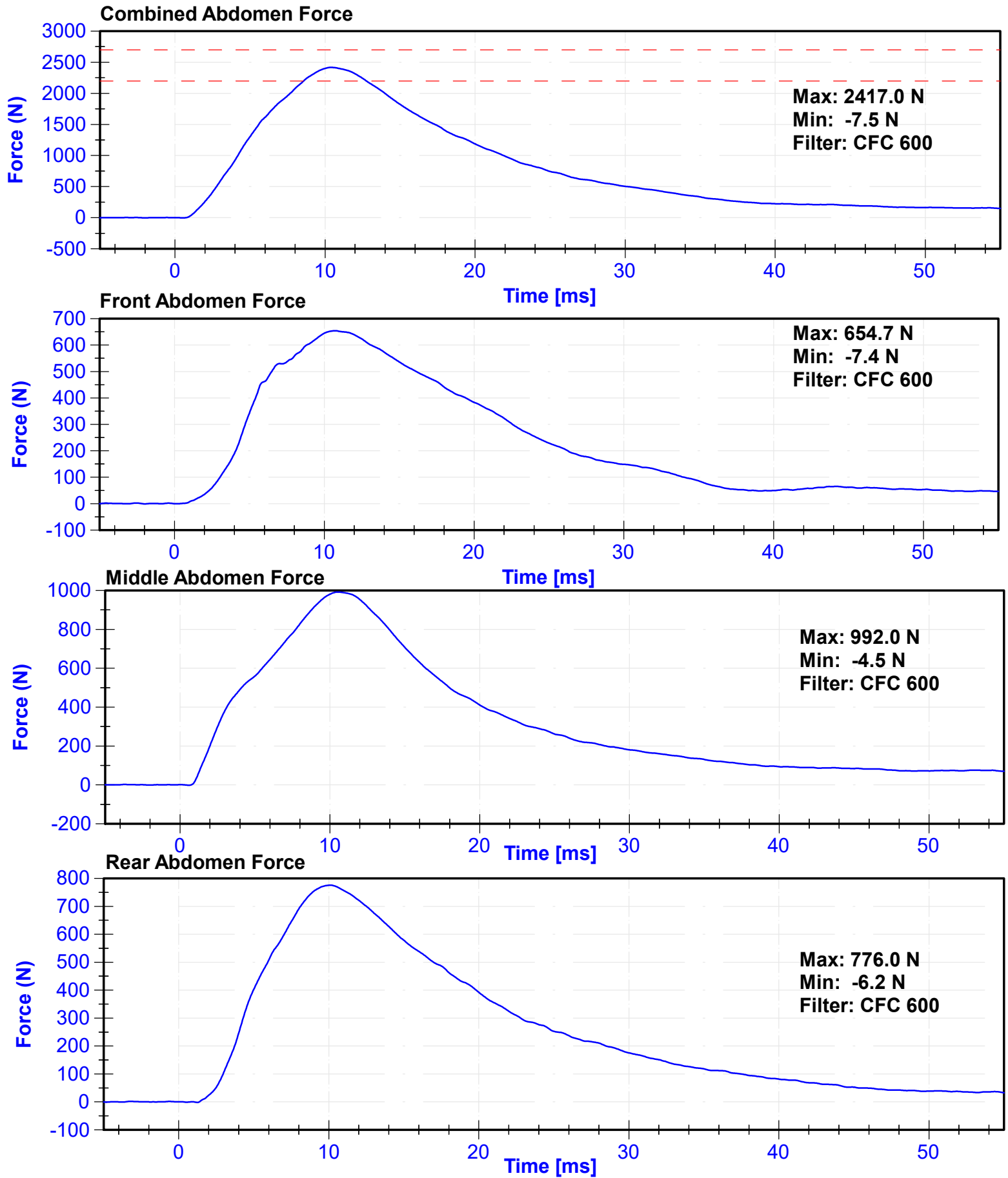
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	3.9	4.1	m/s	4.04	Pass
Combined Abdomen Force	2200	2700	N	2417.0	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.40	Pass
Resistive Probe Force	4000	4800	N	4587.5	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.65	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Front Abdomen Load Cell	Denton	1440	8/8/2023	8/7/2024
Middle Abdomen Load Cell	Denton	1525	8/8/2023	8/7/2024
Rear Abdomen Load Cell	Denton	1528	8/8/2023	8/7/2024





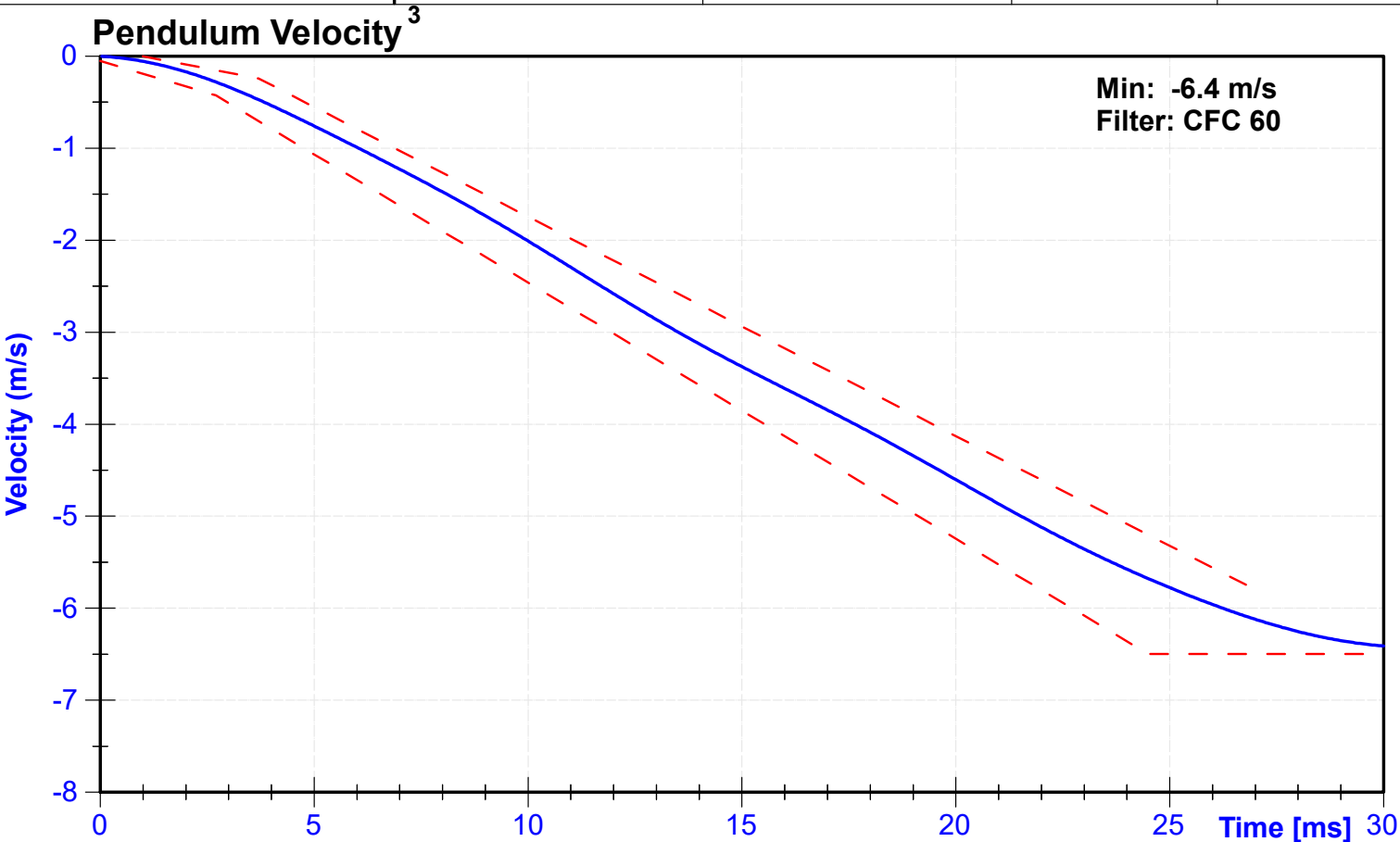
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

Results

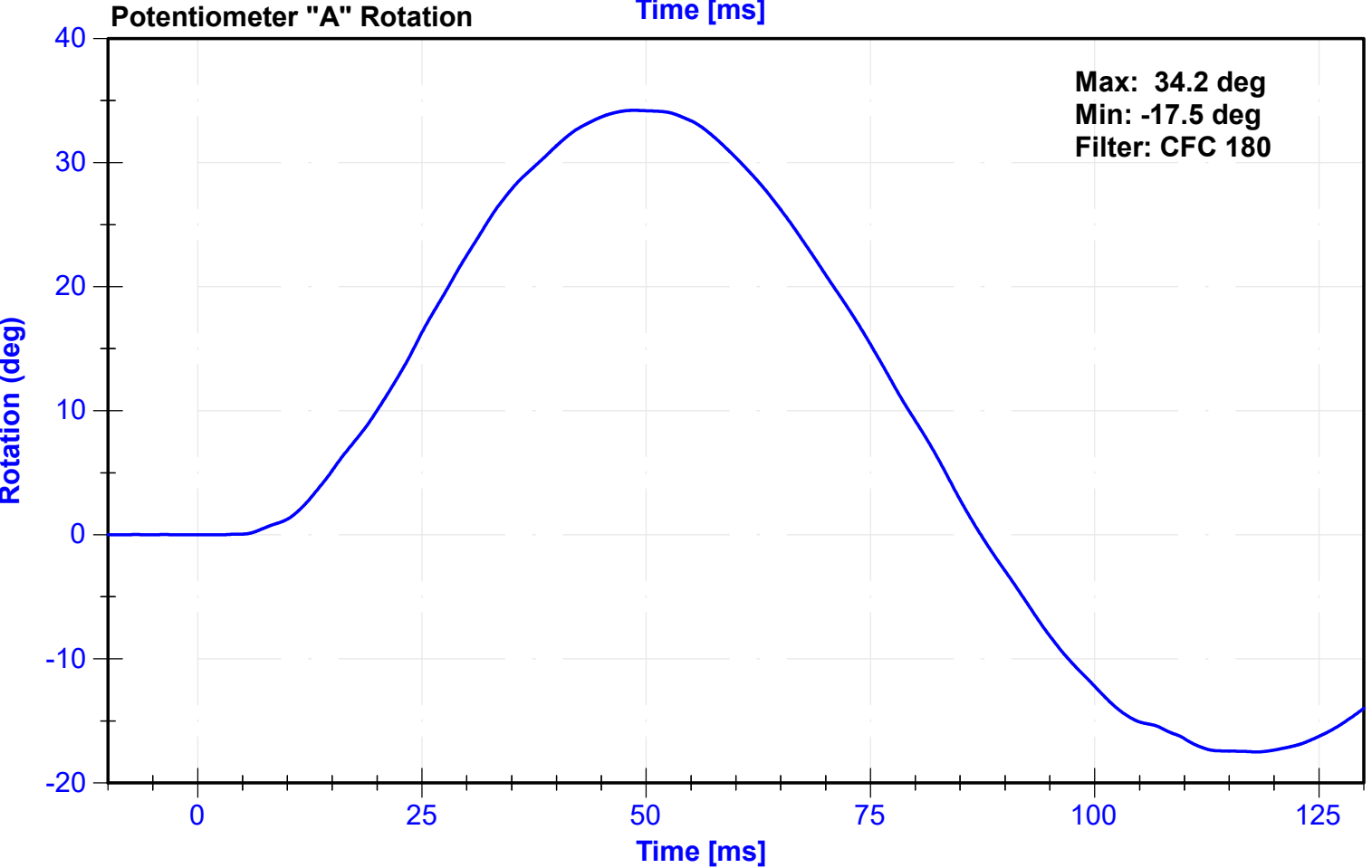
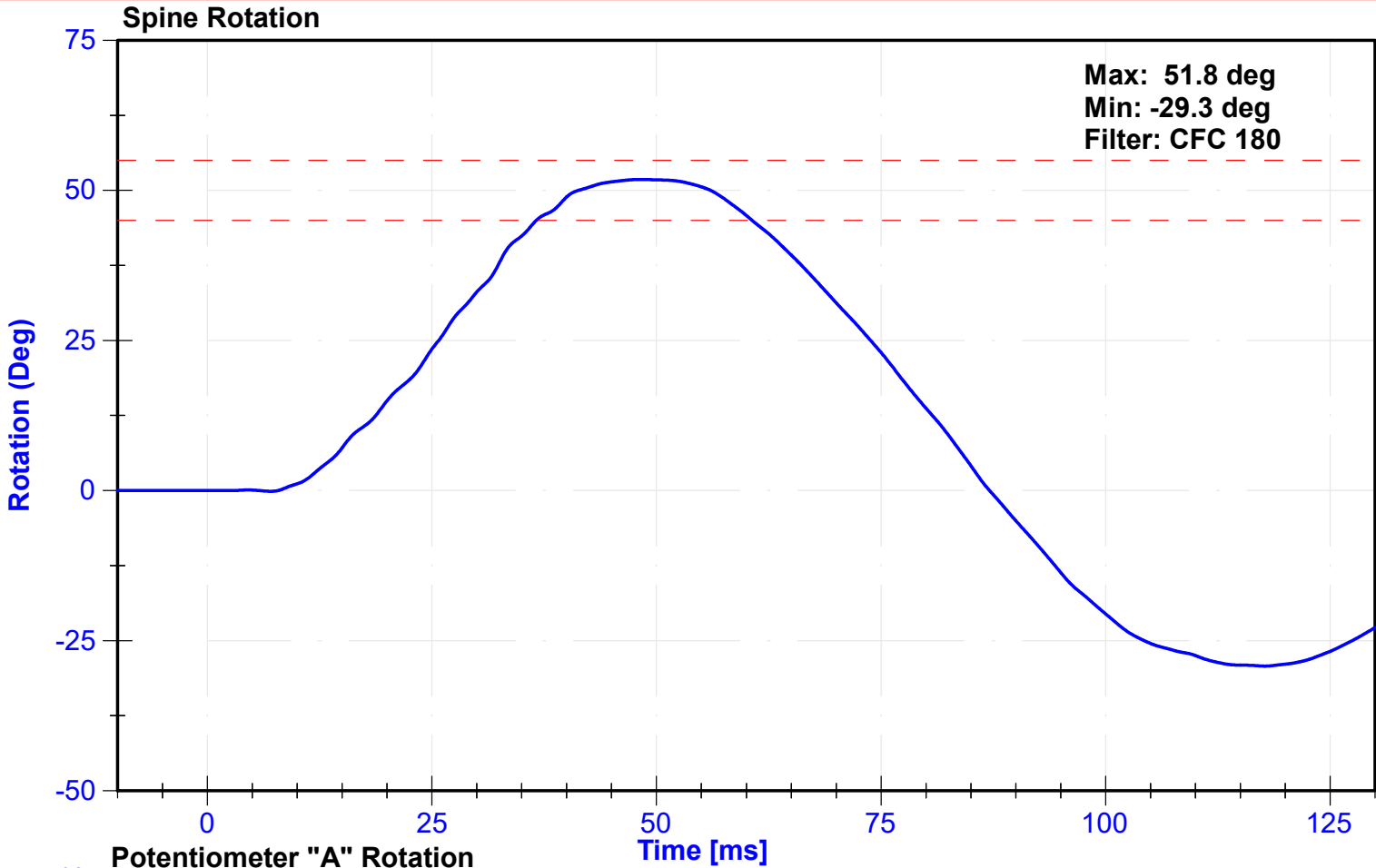
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29	Pass
Velocity	5.95	6.15	m/s	5.999	Pass
Lateral Spine Rotation	45	55	deg	51.8	Pass
Time at Maximum Rotation	39	53	ms	48.3	Pass
Time of Decay to Zero Degrees	37	57	ms	38.8	Pass
Pendulum Velocity Overall Corridor	Lower Boundary ¹	Upper Boundary ²	m/s	See Plot ³	Pass

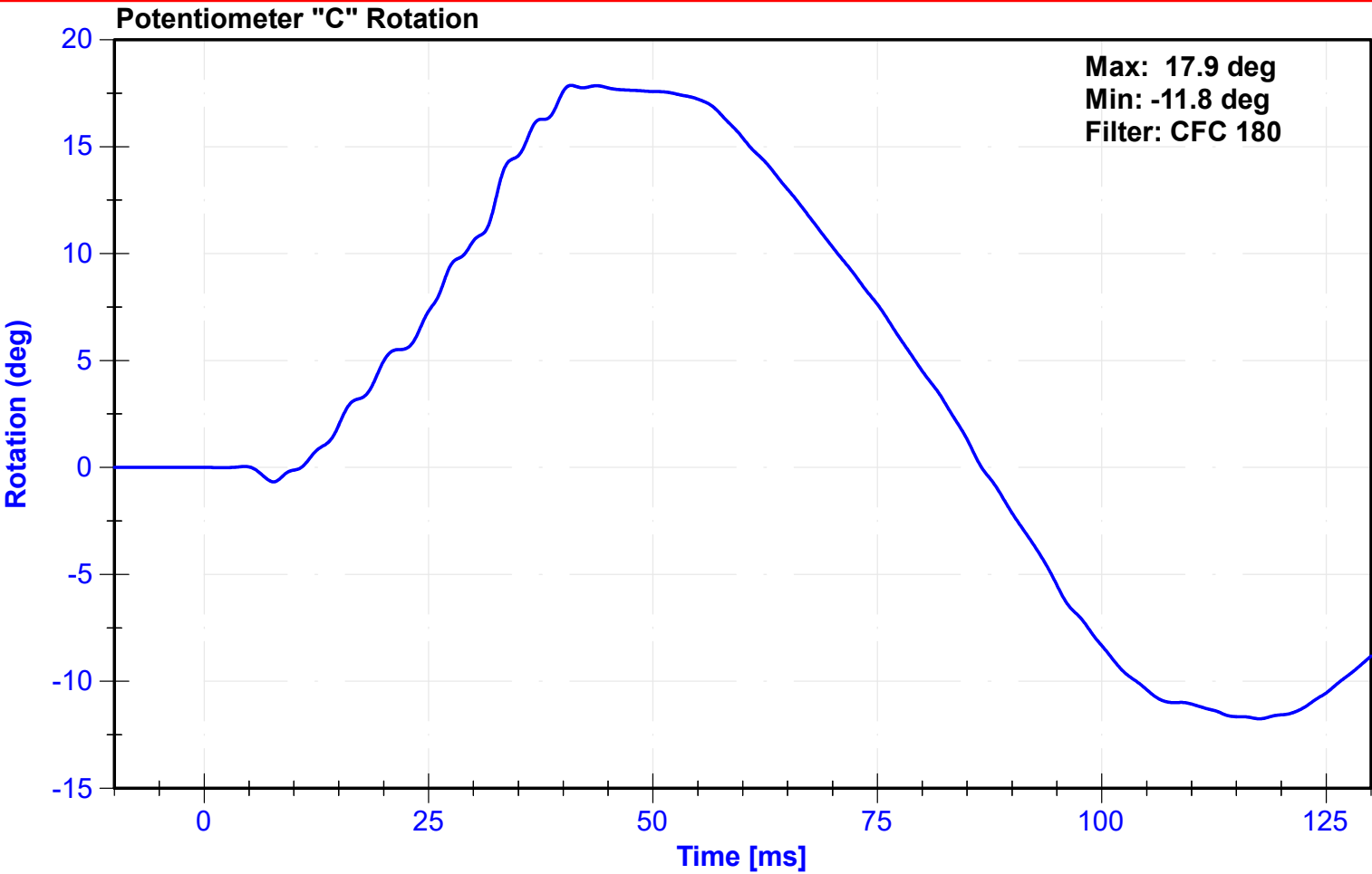
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/31/2023	4/28/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024



^{1,2} Upper and lower boundaries specified in Appendix I
IV-42





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

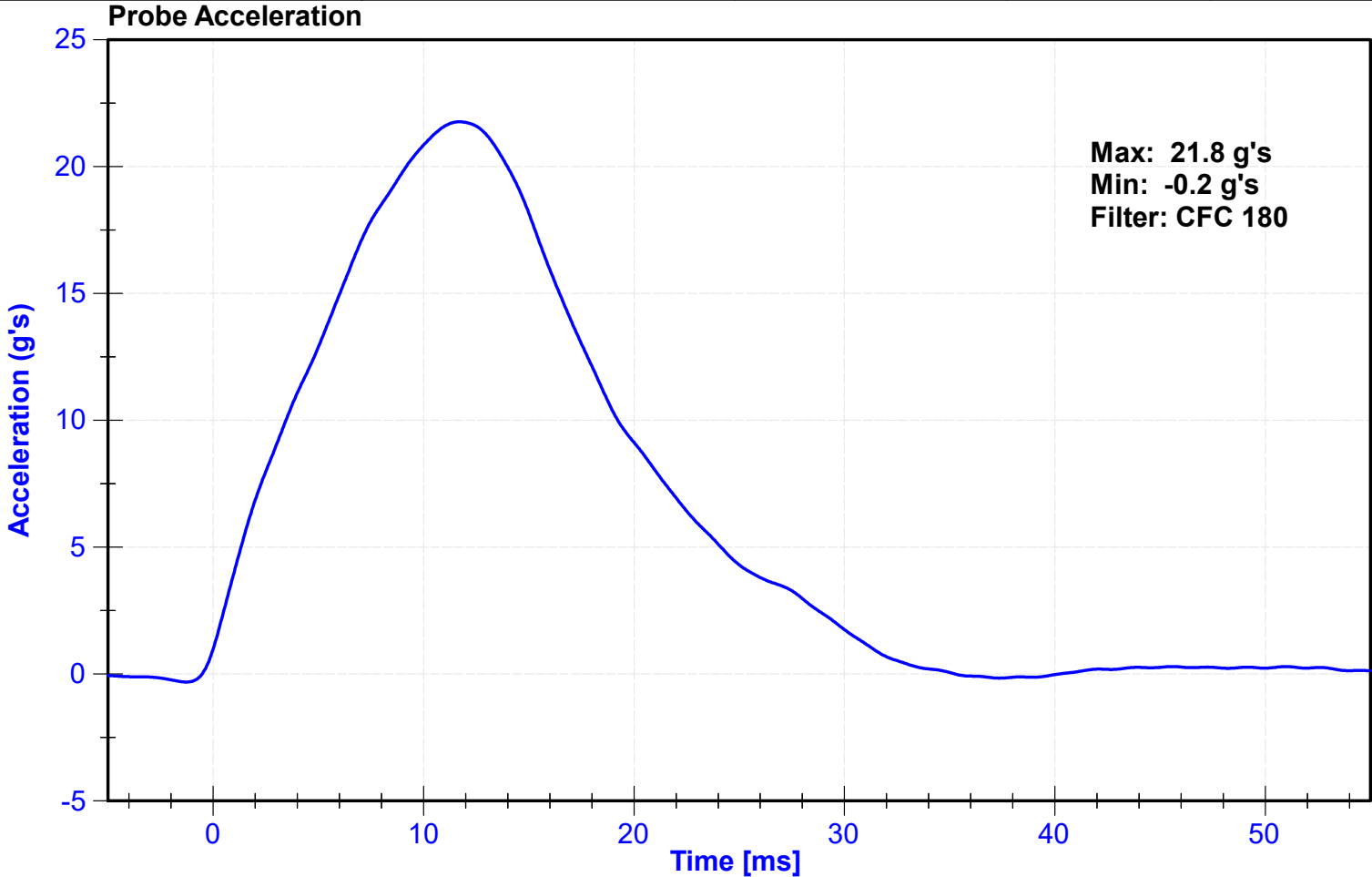
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	D037	Laboratory Supervisor	C. Mantell

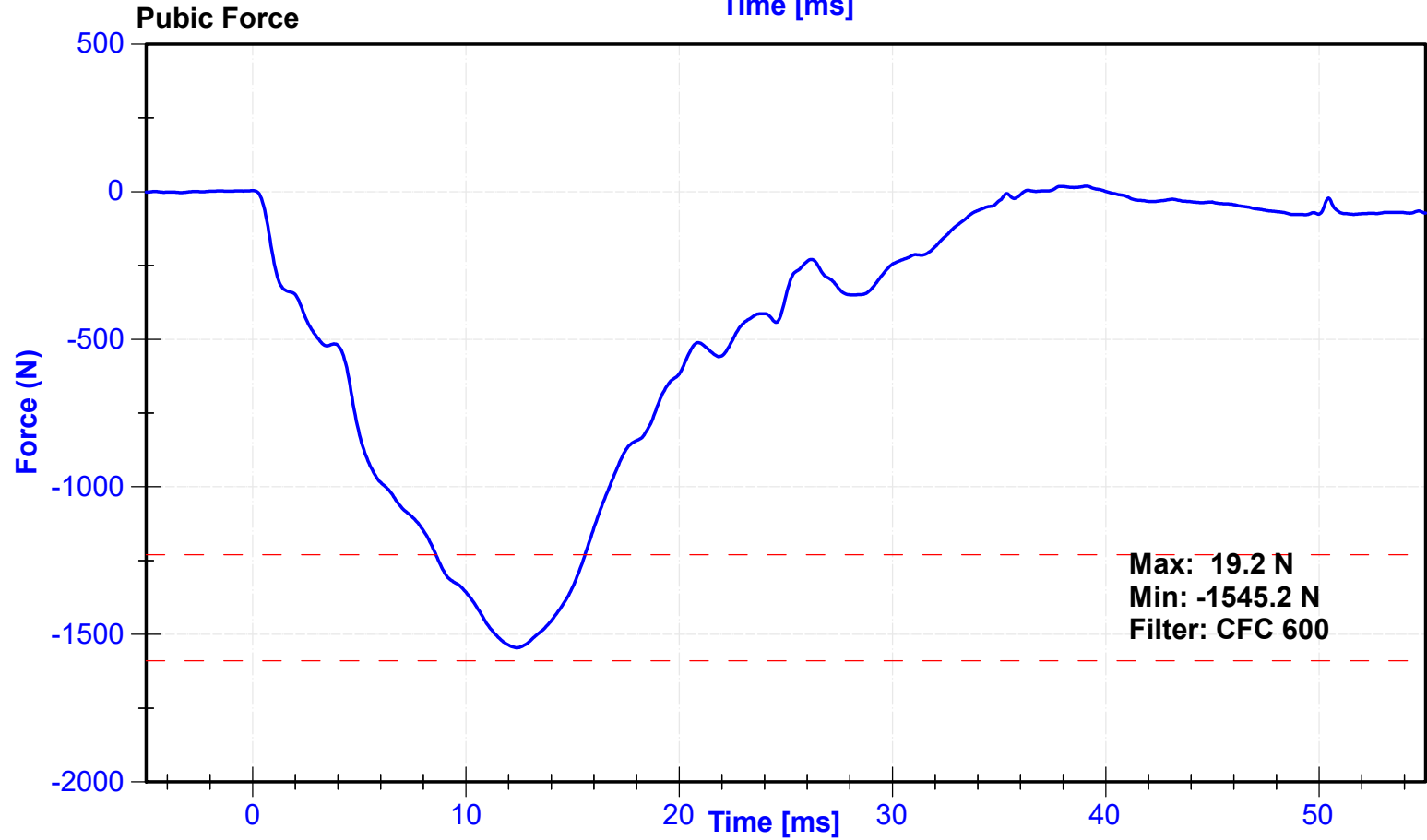
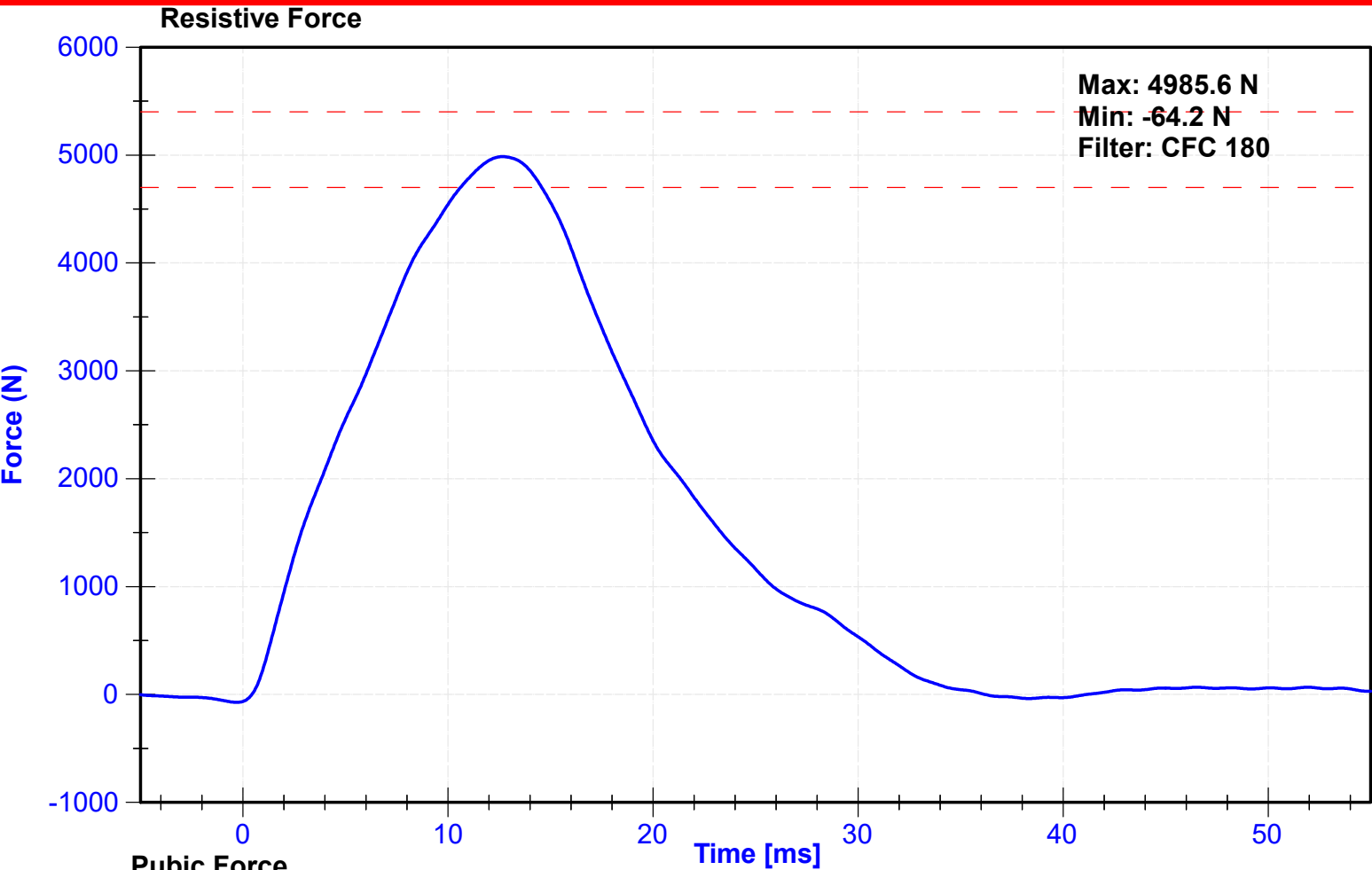
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	29	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Resistive Force	4700	5400	N	4985.6	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.65	Pass
Pubic Force	-1590	-1230	N	-1545.2	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.40	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	9/29/2023	3/27/2024
Pubic Load Cell	Denton	456-FY	8/8/2023	8/7/2024





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	02/01/2024
		Y	T22281	Endevco	02/01/2024
		Z	T26050	Endevco	02/01/2024
	Redundant	X	T21682	Endevco	02/01/2024
		Y	T25989	Endevco	02/01/2024
		Z	T25864	Endevco	02/01/2024
Thorax Rib Displacement Potentiometers	Upper	Y	0552-01	Honeywell	01/31/2024
	Middle	Y	807	Honeywell	01/31/2024
	Lower	Y	0552-03	Honeywell	01/31/2024
Abdomen Load Cells	Forward	Y	1440	Denton	08/08/2023
	Middle	Y	1525	Denton	08/08/2023
	Rear	Y	1528	Denton	08/08/2023
Lower Spine Accelerometers (T12)		X	P71278	Endevco	02/01/2024
		Y	18722	Endevco	12/29/2023
		Z	18720	Endevco	12/29/2023
Pubic Symphysis Load Cell		Y	456-FY	Denton	08/08/2023

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A280856	Measurement Specialties	10/05/2023
Vehicle Center of Gravity	Y	A290947	Measurement Specialties	10/05/2023
Vehicle Center of Gravity	Z	A315988	Measurement Specialties	10/05/2023
Left Floor Sill	Y	A400030	Measurement Specialties	11/17/2023
A-Pillar Sill	Y	A398329	Measurement Specialties	01/30/2024
A-Pillar Low	Y	G22676	Endevco	01/30/2024
A-Pillar Mid	Y	G23655	Endevco	12/08/2023
B-Pillar Sill	Y	A352366	Measurement Specialties	12/08/2023
B-Pillar Low	Y	G23670	Endevco	09/26/2023
B-Pillar Mid	Y	A373207	Measurement Specialties	01/30/2024
Driver Seat	Y	G22606	Endevco	01/25/2024
Engine Top	X	G22637	Endevco	10/31/2023
Engine Top	Y	G22917	Endevco	10/31/2023
Firewall	Y	G22768	Endevco	10/24/2023
Right Roof	Y	A405571	Measurement Specialties	10/06/2023
Right Floor Sill	Y	A283595	Measurement Specialties	01/30/2024
Rear Floorpan	X	A350920	Measurement Specialties	12/08/2023
Rear Floorpan	Y	A373220	Measurement Specialties	12/08/2023