

REPORT NUMBER: SideNCAPPole-MGA-24-033

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test**

**TOYOTA MOTOR MANUFACTURING, INDIANA, INC.
2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
NHTSA No.: M20245101**

**MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105**



Test Date: February 19, 2025

Final Report Date: April 8, 2025

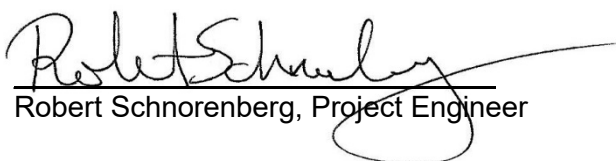
FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-100
1200 New Jersey Ave, SE
Washington, DC 20590**

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Approved by: 
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Approval Date: April 8, 2025

FINAL REPORT ACCEPTANCE BY OCWS:

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

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

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on February 19, 2025. The impact velocity was 32.29 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.3°C. The test vehicle post-test maximum crush was 440 mm at level 1. The test vehicle's performance was as follows: <table border="1" style="margin: 10px auto; width: 80%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Measurement Description</th> <th rowspan="2" style="text-align: center;">Units</th> <th colspan="2" style="text-align: center;">Driver ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td style="text-align: center;">1000</td> <td style="text-align: center;">343.521</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">g</td> <td style="text-align: center;">82</td> <td style="text-align: center;">47.784</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">3662.454</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38*</td> <td style="text-align: center;">15.905</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45*</td> <td style="text-align: center;">24.974</td> </tr> </tbody> </table> *Proposed IARV The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite door(s) did not open during the side impact event.				Measurement Description	Units	Driver ATD (SID-IIs)		Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	343.521	Resultant Lower Spine Acceleration	g	82	47.784	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3662.454	Maximum Thoracic Rib Deflection	mm	38*	15.905	Maximum Abdomen Rib Deflection	mm	45*	24.974
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590																											
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This side pole impact test is part of the MY 2024 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000017. The purpose of this test is to generate comparative side impact performance in a 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SUMMARY

A rigid pole side impact test was conducted on a 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.29 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on February 19, 2025. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure dated March 2020. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

- Primary and Redundant Head CG Triaxial Accelerometers
- Head Triaxial Angular Rate Sensors
- Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
- Abdomen Upper Rib and Lower Rib Displacement Potentiometers
- Lower Spine (T12) Triaxial Accelerometers
- Iliac Load Cell
- Acetabulum Load Cell

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Units	Driver ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC36)		1000	343.521
Resultant Lower Spine Acceleration	g	82	47.784
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3662.454
Maximum Thoracic Rib Deflection	mm	38*	15.905
Maximum Abdomen Rib Deflection	mm	45*	24.974

*Proposed IARV

Supplemental restraint information is given below:

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

The test data can be found on the NHTSA website at www.nhtsa.gov

GENERAL COMMENTS

None.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20245101	Traction Control System (TCS)	Yes
Model Year	2024	Auto-Leveling System	No
Make	Toyota	Automatic Door Locks (ADL)	Yes
Model	Grand Highlander 4WD	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	No
VIN	5TDAAAB55RS029875	Driver Front Airbag	Yes
Body Color	Storm Cloud	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	68 km / 42 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.4	Driver Torso Airbag	No
Type/No. Cylinders	Inline 4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	AWD	Rear Pass. Torso Airbag	No
Roof Rack	Yes	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	Driver	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

Does owner's manual provide instruction to turn off automatic door locks?	Yes
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DATA FROM CERTIFICATION LABEL

Manufactured By	TOYOTA MOTOR MANUFACTURING,	GVWR (kg)	2810
Date of Manufacture	11/23	GAWR Front (kg)	1345
Vehicle Type	MPV	GAWR Rear (kg)	1615

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	3	8	
Capacity Weight (VCW) (kg)				640	(A)
DSC x 68 kg				544	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				84	(A-B)

* Rated Cargo and Luggage Weight (RCLW) reduced by 12 kg to account for Load Carrying Capacity Reduction Label.

VEHICLE SEAT TYPE

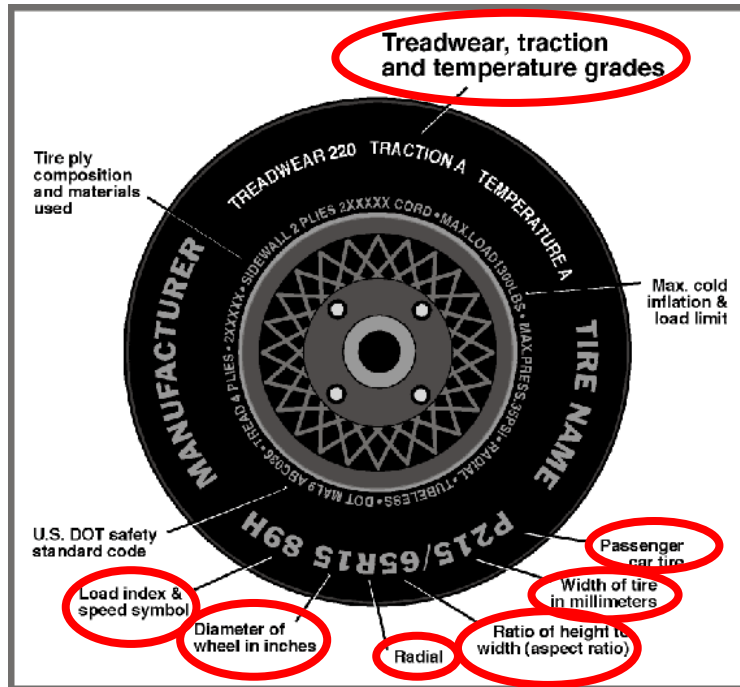
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second Row				X	X		
Third Row Seat							

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
 Test Date: 2/19/2025

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	255/55R20	255/55R20
Tire Size on Vehicle	255/55R20	255/55R20
Tire Manufacturer	Continental	Continental
Tire Model	CrossContact LX20	CrossContact LX20
Treadwear	680	680
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 2 Polyamide	1 Polyester, 2 Steel, 2 Polyamide
Load Index/Speed Symbol	107N	107N
Tire Material	Rubber	Rubber
DOT Safety Code Left	1A30F BJCU 4423	1A30F BJCU 4423
DOT Safety Code Right	1A30F BJCU 4423	1A30F BJCU 4423

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
 Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	255	255	250	255
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

TEST AXLE VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	567.5	484.0		572.0	546.5		578.0	553.0	
Right	kg	561.0	447.5		574.5	494.5		561.0	503.5	
Ratio	%	54.8%	45.2%		52.4%	47.6%		51.9%	48.1%	
Totals	kg	1128.5	931.5	2060.0	1146.5	1041.0	2187.5	1139.0	1056.5	2195.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2060.0	(A)
Actual Weight of 1 P572 ATD (SID-IIs) Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	84	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2196.0	(A+B+C)

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 kg)? **YES**

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement
Driver Door Sill Angle (front-to-back)*	deg	-1.1	-0.9	-0.9	Yes
Front Pass. Door Sill Angle (front-to-back)*	deg	-0.9	-0.8	-0.8	Yes
Front Bumper Angle (left-to-right)**	deg	-0.1	-0.1	-0.1	Yes
Rear Bumper Angle (left-to-right)**	deg	-0.1	-0.2	-0.3	Yes
Vehicle CG (Aft of Front Axle)	mm	1331	1401	1416	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	18	19	26	

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

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements.

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	56
Components Removed: none	kg	

Test height adjustable suspension setting, if applicable:	Not Applicable
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DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	<u>2024 Toyota Grand Highlander 4WD Limited 5-Door SUV</u>	NHTSA No.:	<u>M20245101</u>
Test Program:	<u>NCAP Side Pole Impact Test</u>	Test Date:	<u>2/19/2025</u>

TEST SURFACE MARKINGS

	Distance from 75° Impact Location Line (mm)
Fore 25 mm Target	985
Aft 25 mm Target	988

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	17.6	6.1	11.9
Front Passenger Seat	16.1	5.6	10.9
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid) (°)	As-Tested SCRIP Height (mm)	SCRIP Height Position	SCRIP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	11.9	26	Max	52	52	52
			Mid	26	26	26
			Min	0	0	0
Front Passenger Seat	10.9	28	Max	56	56	56
			Mid	28	28	28
			Min	0	0	0
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

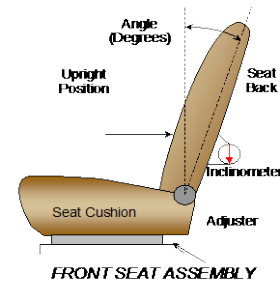
NHTSA No.: M20245101
 Test Date: 2/19/2025

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1 st as 1)	mm	Detent (1 st as 0)
Driver Seat	240		0	
Front Passenger Seat	240		0	
Front Center Seat				
Struck Side Rear Seat	160	17	160	16
Non-Struck Side Rear Seat	160	17	160	16
Rear Center Seat	160	17	160	16

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on S1 – Vehicle Setup Information for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1 st as 1)	Degrees	Detent (1 st as 0)
Driver Seat	51.7		-5.4	
Front Passenger Seat	52.2		-5.4	
Front Center Seat				
Struck Side Rear Seat	16.0	9	6.0	0
Non-Struck Side Rear Seat	16.0	9	6.0	0
Rear Center Seat	16.0	9	6.0	0

All seat back angles measured on outboard headrest post.

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on S1 – Vehicle Setup Information.

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

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	4	0 (Lowest as 0) / Fixed Fore-Aft

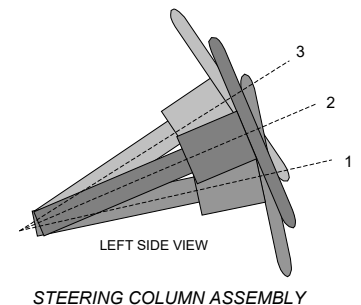
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
 Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

STEERING COLUMN ADJUSTMENT

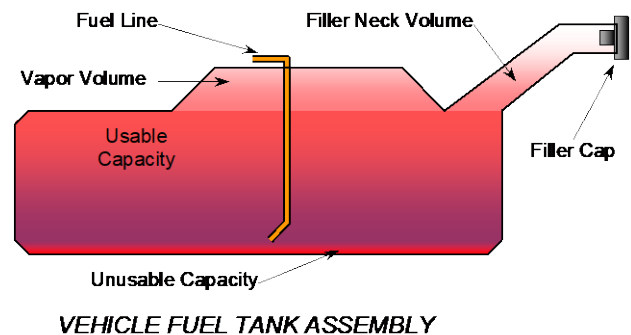
Steering wheel and column adjustments are made so that the steering wheel geometric locus is described when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	66.8	
Geometric Center, Position 2	64.7	
Uppermost, Position 3	62.6	
Telescoping Steering Wheel Travel		58
Test Position	64.7	29



FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump will run when the engine is running. The pump will also briefly run when the ignition key is turned to the “on” position. The filler neck is located on the driver’s side.



FUEL TANK CAPACITY DATA

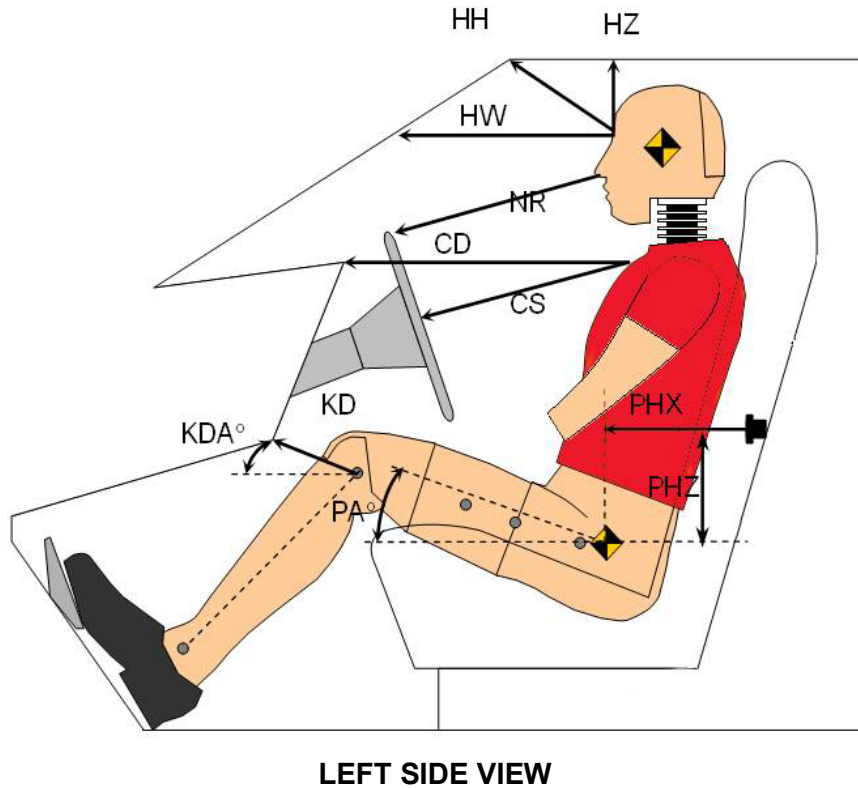
	Liters
Usable Capacity of Standard Tank (see S1 – Vehicle Setup Information)	66.6
Usable Capacity of Optional Tank (see S1 – Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner’s Manual	66.6
Usable Capacity of Optional Tank as Specified in Owner’s Manual	
93% of Usable Capacity	62.0
Actual Amount of Solvent Used	62.5
1/3 of Usable Capacity	22.2

Is the actual amount of solvent used in the test equal to 93% $\pm$ 1%
 of the Usable Capacity stated in S1 – Vehicle Setup Information? **YES**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
 Test Date: 2/19/2025

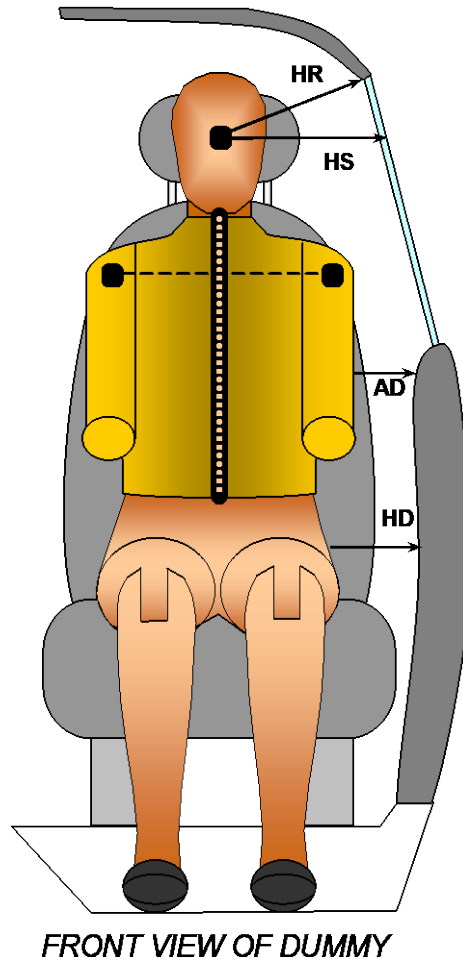


Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	253	
HW	Head to Windshield	545	
HZ	Head to Roof Liner	201	
NR	Nose to Rim/Seat Back	229	
CD	Chest to Dashboard/Seat Back	406	
CS	Chest to Steering Wheel	157	
KDL / KDAL	Left Knee to Dash/Seat Back	120	39.1
KDR / KDAL	Right Knee to Dash/Seat Back	108	40.8
PAX	Pelvic Tilt Angle X		19.2
PAY	Pelvic Tilt Angle Y		-1.0
PHX	Hip Point to Striker (X-Axis)	353	
PHZ	Hip Point to Striker (Z-Axis)	177	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
 Test Date: 2/19/2025

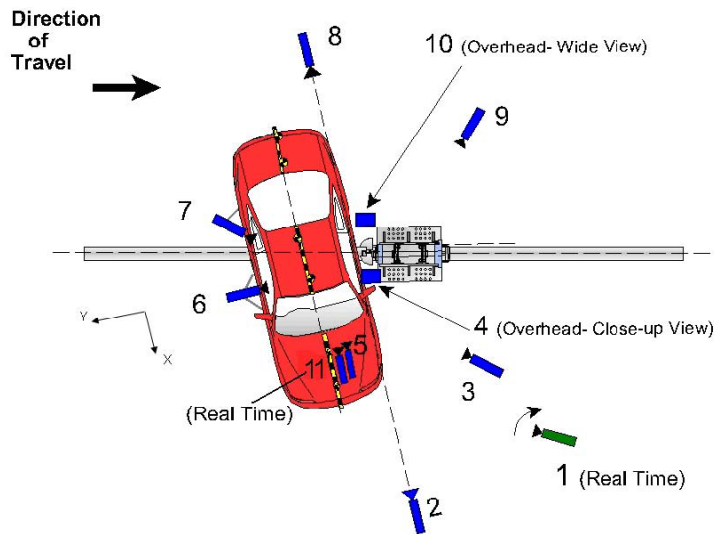


Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	268
HS	Head to Side Window	379
AD	Arm to Door	184
HD	Hip Point to Door	171

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
Test Date: 2/19/2025



Reference: (from Point of Impact for X and Y; from Ground for Z):
+X = Forward of Impact, + Y = Right of Impact, +Z = Down

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Real-Time Pan View					30
2	Front Ground Level	5795	-15	-1645	24	1000
3	Impact Side 45° Forward	4465	-1950	-1680	12	1000
4	Overhead Closeup	0	0	-6700	85	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	-6795	-10	-1675	24	1000
9	Impact Side 45° Rearward	-2970	-3670	-1680	12	1000
10	Overhead Wide View	65	530	-6700	12	1000
11	Real-Time Dummy Front View					30

*All measurements accurate to ± 6 mm

Note: Vehicle was positioned at a 75° angle to the rigid pole.

Explain why camera(s) did not operate as intended: None

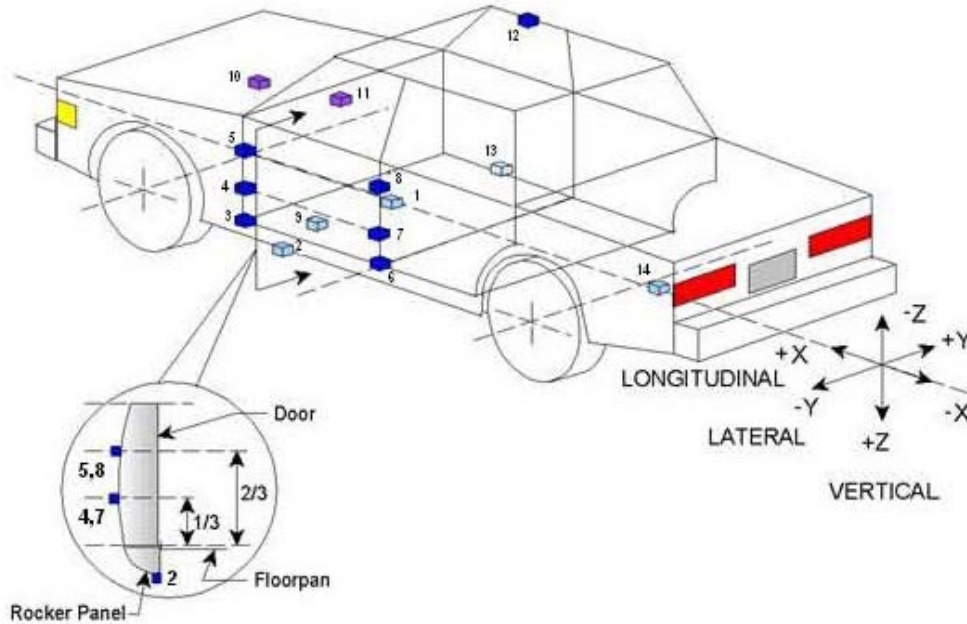
INSTRUMENTATION

	Number of Channels
Driver Dummy	19
Vehicle Structure	18
Pole Load Cells	8
Total	45

DATA SHEET NO. 6 **TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
Test Date: 2/19/2025



TEST VEHICLE ACCELEROMETER LOCATIONS

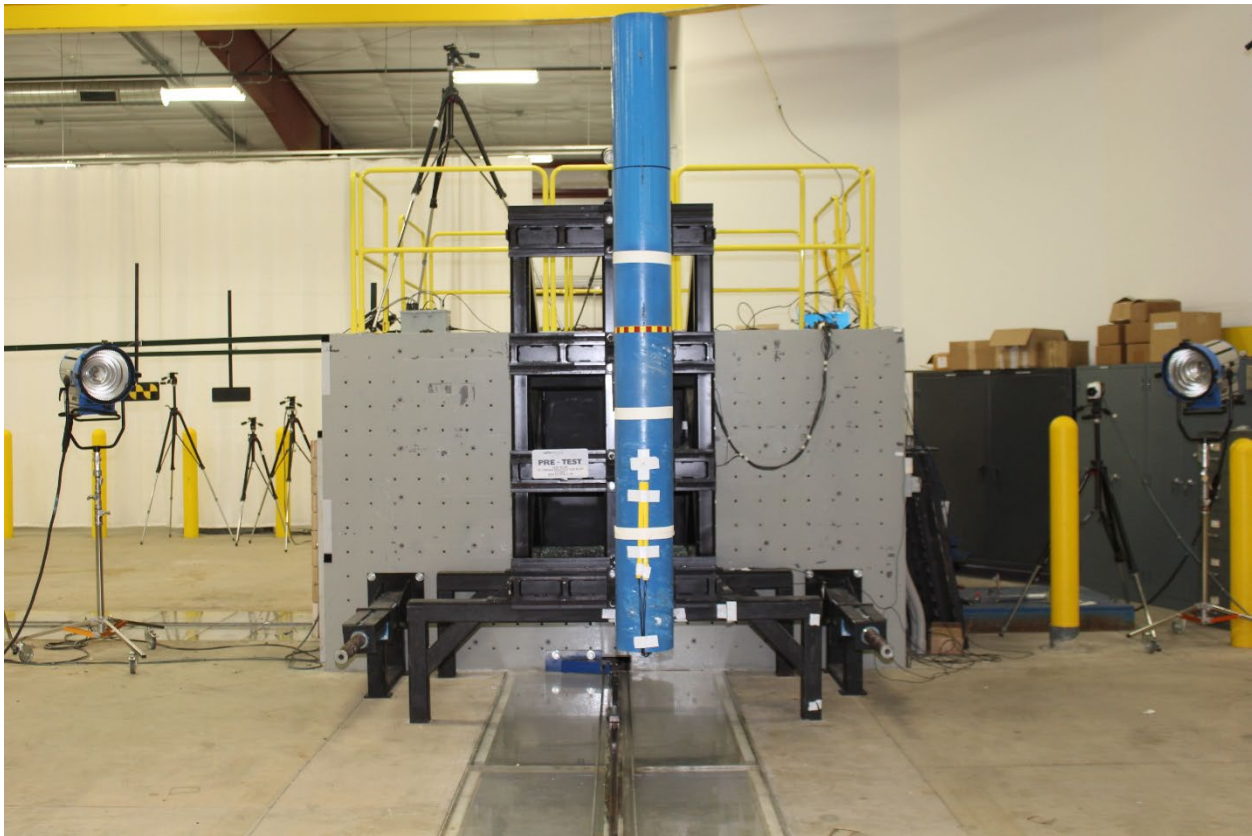
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2700	382	-366
2	Left Floor Sill	3458	-744	-304
3	A Pillar Sill	3577	-745	-309
4	A Pillar Low	3496	-907	-574
5	A Pillar Mid	3515	-883	-861
6	B Pillar Sill	2493	-742	-311
7	B Pillar Low	2443	-748	-662
8	B Pillar Mid	2427	-756	-881
9	Driver Seat Track	2628	-405	-402
10	Engine Top	4288	-5	-902
11	Firewall	4018	-30	-1060
12	Right Roof	2525	551	-1751
13	Right Sill	3466	753	-302
14	Rear Floorpan	786	-11	-486

Reference: X – Test Vehicle Rear Bumper (+forward)
Y – Test Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
Test Date: 2/19/2025



254 mm Diameter Rigid Pole

Load Cell Locations	
ID	Height from Impact Surface (mm)
1	182
2	470
3	698
4	986
5	1212
6	1641
7	1854
8	2053

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver Dummy (SID-IIs)
Face	None
Top of Head	Curtain Airbag, Headrest, Seatback
Left Side of Head	Curtain Airbag, Seatback
Back of Head	Curtain Airbag, Headrest, Seatback
Left Shoulder	Side Torso/Pelvis Airbag, Seatback
Upper Torso	Seatback
Lower Torso	Side Torso/Pelvis Airbag, Seatback
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion
Left Knee	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch
	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, Record Width of Opening at Striker (mm)					

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	No Separation
Windshield Damage	Cracked
Side Window Damage	LF window cracked
Other Notable Effects	Windshield separated from a-pillar

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
Test Date: 2/19/2025

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side		Struck Side	
	Driver		Left Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Side Airbag (Other)				
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	
Other:				

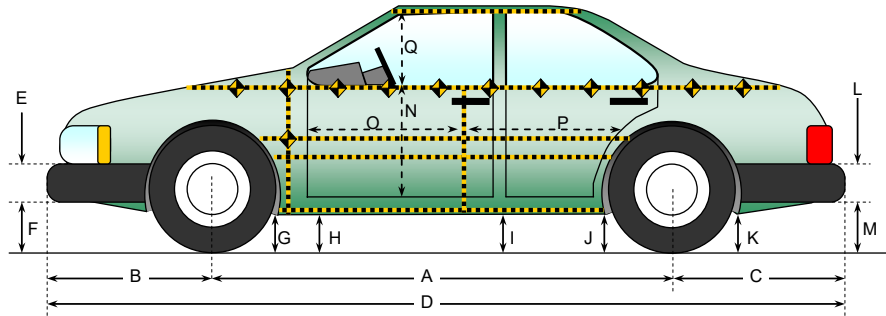
SPEED, ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1078
Actual Impact Point (Aft of Front Axle)	mm		1083
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-5
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	74.6
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.29
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.18

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
Test Date: 2/19/2025



All measurements in (mm) with tolerance of ± 3 mm

LEFT SIDE VIEW

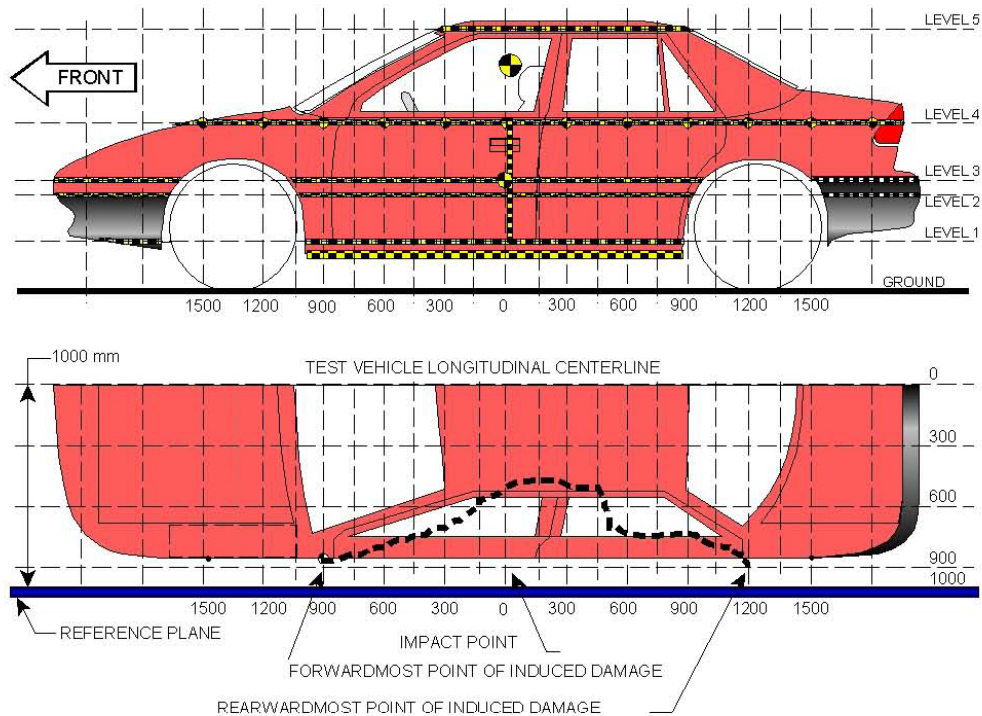
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2943	2862	-81
B	Front Axle to FSOV	1011	1029	18
C	Rear Axle to RSOV	1132	1136	4
D	Total Vehicle Length at Centerline	5086	5028	-58
E	Front Bumper Thickness	162	164	2
F	Front Bumper Bottom to Ground	484	520	36
G	Sill Height at Front Wheel Well	298	277	-21
H	Sill Height at Front Door Leading Edge	298	276	-22
I	Sill Height at B-Pillar	294	246	-48
J1	Sill Height at Rear Wheel Well	306	325	19
J2	Pinch Weld Height at Rear Wheel Well	306	323	17
K	Sill Height Aft of Rear Wheel Well	326	330	4
L	Rear Bumper Thickness	129	128	-1
M	Rear Bumper Bottom to Ground	533	523	-10
N	Sill Height to Bottom of Front Window Sill	773	809	36
O	Front Door Leading Edge to Impact CL	550	330	-220
P	Rear Door Trailing Edge to Impact CL	1539	1425	-114
Q	Front Window Opening	370	352	-18
R	Right Side Length	4566	4568	2
S	Left Side Length	4566	4452	-114
T	Vehicle Width at B-Pillars	1932	1859	-73
U	Front Wheel Track Width	1690		
V	Rear Wheel Track Width	1691		

DATA SHEET NO. 10 **TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
Test Date: 2/19/2025



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

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	479	440	75
2	Mid Door	754	420	75
3	Occupant H-Point	805	424	75
4	Window Sill	1170	369	75
5	Window Top	1716	111	300

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
 Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

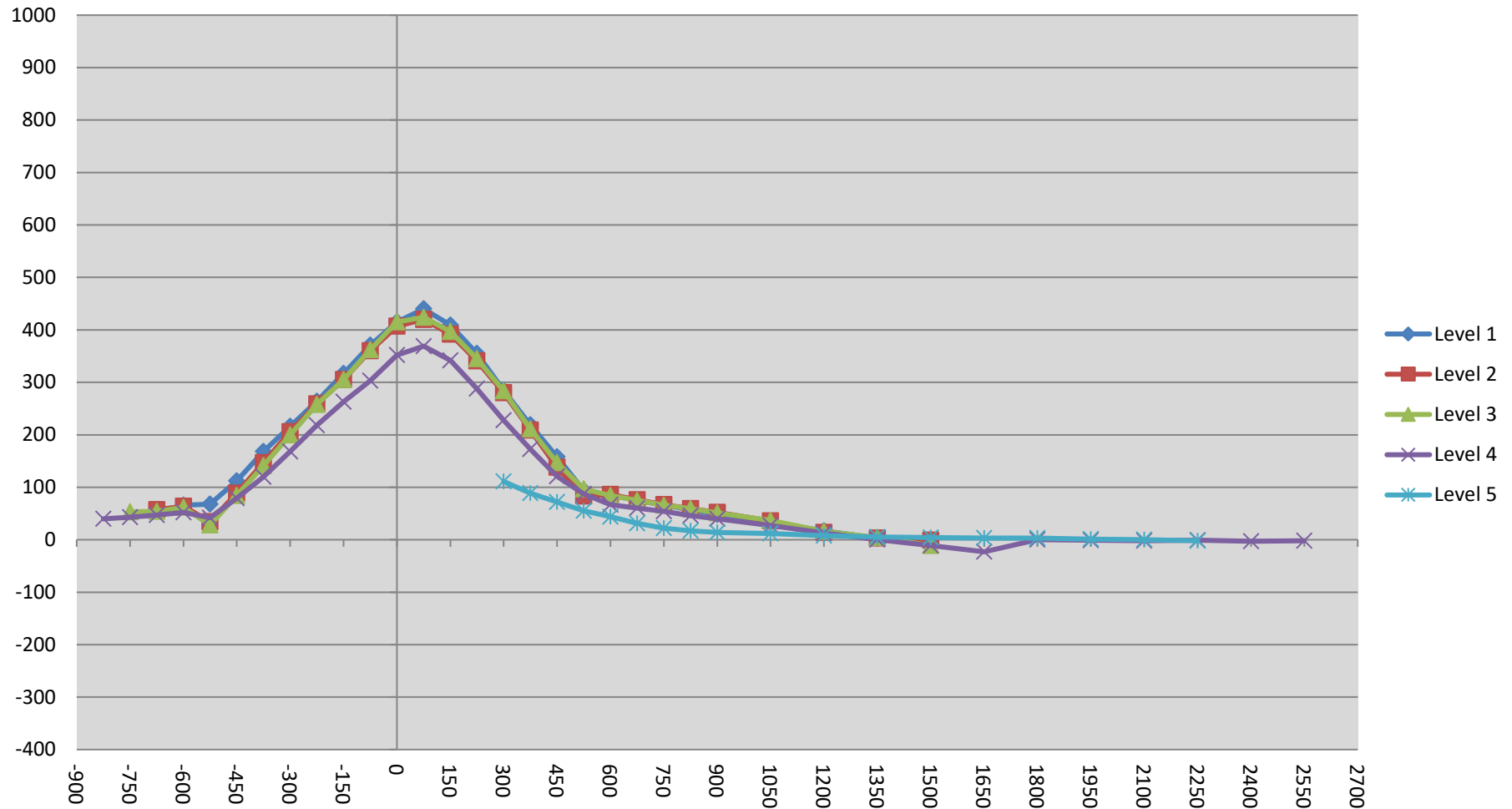
Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point.

	Pre-Test					Post-Test					Exterior Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2700															
-2550															
-2400															
-2250															
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-825				848					808					40	
-750			994	851				941	808				53	43	
-675		990	987	854			933	933	807			57	54	47	
-600	981	991	992	859		915	927	930	807		66	64	62	52	
-525	977	988	987	860		909	954	959	818		68	34	28	42	
-450	977	978	978	862		865	889	894	783		112	89	84	79	
-375	977	970	971	867		809	823	830	747		168	147	141	120	
-300	977	965	967	872		761	759	767	704		216	206	200	168	
-225	977	962	965	879		713	703	707	661		264	259	258	218	
-150	978	961	964	886		661	656	659	623		317	305	305	263	
-75	978	961	964	892		607	601	602	589		371	360	362	303	
0	978	961	965	899		563	554	550	547		415	407	415	352	
75	979	961	965	901		539	541	541	532		440	420	424	369	
150	979	961	965	906		570	569	568	564		409	392	397	342	
225	978	962	965	910		623	621	620	622		355	341	345	288	
300	978	962	965	915	640	693	682	681	687	529	285	280	284	228	111
375	978	962	966	918	649	759	753	755	745	560	219	209	211	173	89
450	977	962	966	921	659	819	824	819	800	587	158	138	147	121	72
525	976	964	966	925	665	882	881	869	838	610	94	83	97	87	55
600	975	963	966	926	670	890	877	882	859	626	85	86	84	67	44
675	974	962	966	928	671	899	886	891	868	640	75	76	75	60	31
750	973	963	966	929	672	907	896	900	875	650	66	67	66	54	22
825	971	964	967	930	673	914	905	908	884	656	57	59	59	46	17
900	969	965	967	932	672	921	913	916	892	658	48	52	51	40	14
1050	965	969	971	932	673	932	933	934	905	661	33	36	37	27	12
1200	961	977	978	932	671	944	963	962	919	663	17	14	16	13	8
1350	970	989	990	929	669	967	986	986	929	664	3	3	4	0	5
1500		989	991	926	667		990	1002	937	663		-1	-11	-11	4
1650				921	663				944	660				-23	3
1800				920	659				920	656				0	3
1950				916	654				917	653				-1	1
2100				913	648				915	648				-2	0
2250				903	634				904	636				-1	-2
2400				895					898					-3	
2550				880					882					-2	
2700															

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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
Test Program: NCAP Side Pole Impact Test

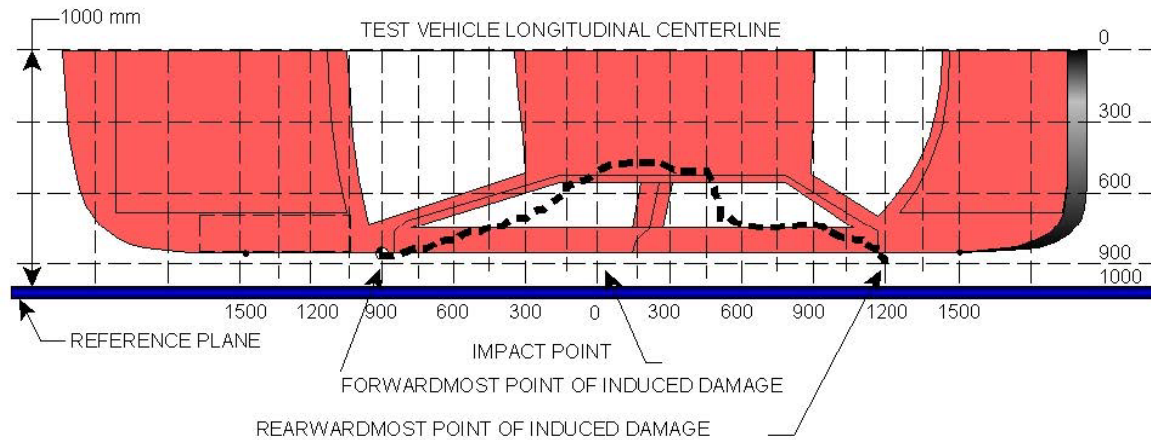
NHTSA No.: M20245101
Test Date: 2/19/2025



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

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20245101
 Test Date: 2/19/2025



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	525	3	131	34	97
2	302	3	305	35	270
3	92	3	455	35	420
4	-132	3	354	36	318
5	-346	3	200	31	169
6	-525	3	41	13	28

DATA SHEET NO. 11
FMVSS NO. 301 STATIC ROLLOVER RESULTS

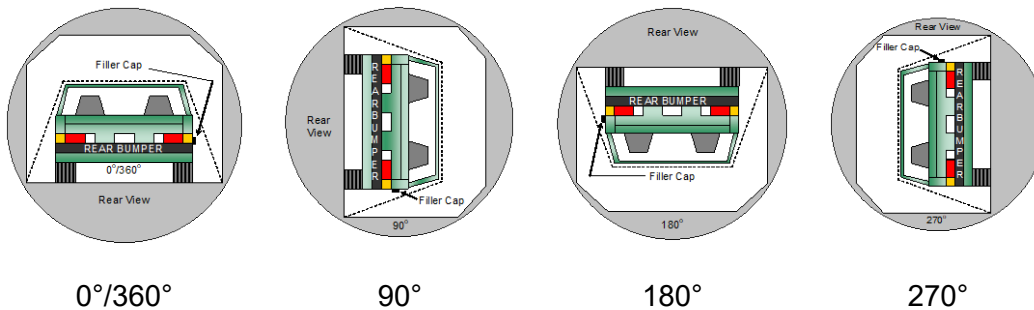
Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
 Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025

Test Time: 1:10 pm

Temperature: 21.3°C

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None
 D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	111	300	411
90° to 180°	110	300	410
180° to 270°	108	300	408
270° to 360°	110	300	410

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

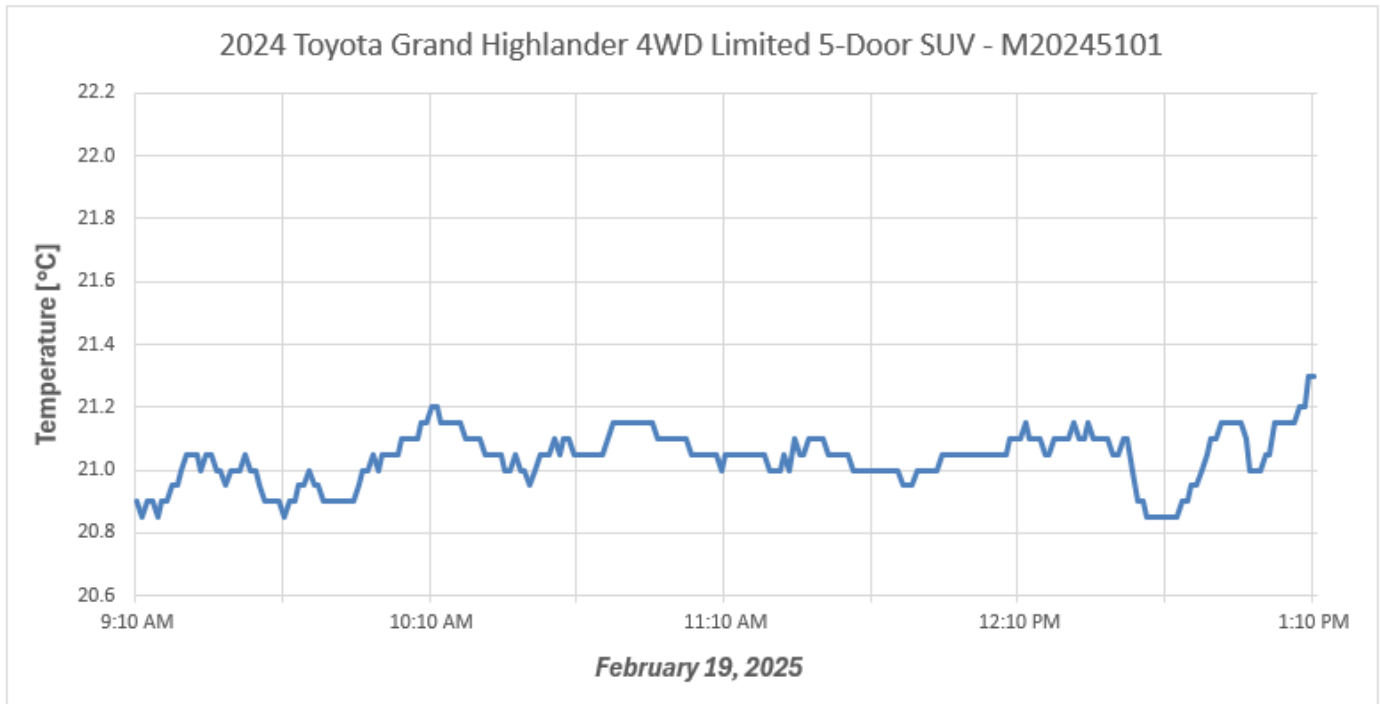
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0.0	0.0	0.0	
90° to 180°	0.0	0.0	0.0	
180° to 270°	0.0	0.0	0.0	
270° to 360°	0.0	0.0	0.0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 12
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2024 Toyota Grand Highlander 4WD Limited 5-Door SUV NHTSA No.: M20245101
Test Program: NCAP Side Pole Impact Test Test Date: 2/19/2025



Serial #	Description	Maximum	Average	Minimum	Units
W2922089	VSC South Hall - Temp (3018)	21.30	21.04	20.85	°C

APPENDIX A
PHOTOGRAPHS

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Photo No. 001 - As Delivered Right Front Three-Quarter View of Test Vehicle



Photo No. 002 - As Delivered Left Rear Three-Quarter View of Test Vehicle



Photo No. 003 - Pre-Test Frontal View of Test Vehicle



Photo No. 004 - Post-Test Frontal View of Test Vehicle



Photo No. 005 - Pre-Test Left Front Three-Quarter View of Test Vehicle



Photo No. 006 - Post-Test Left Front Three-Quarter View of Test Vehicle



Photo No. 007 - Pre-Test Left Side View of Test Vehicle

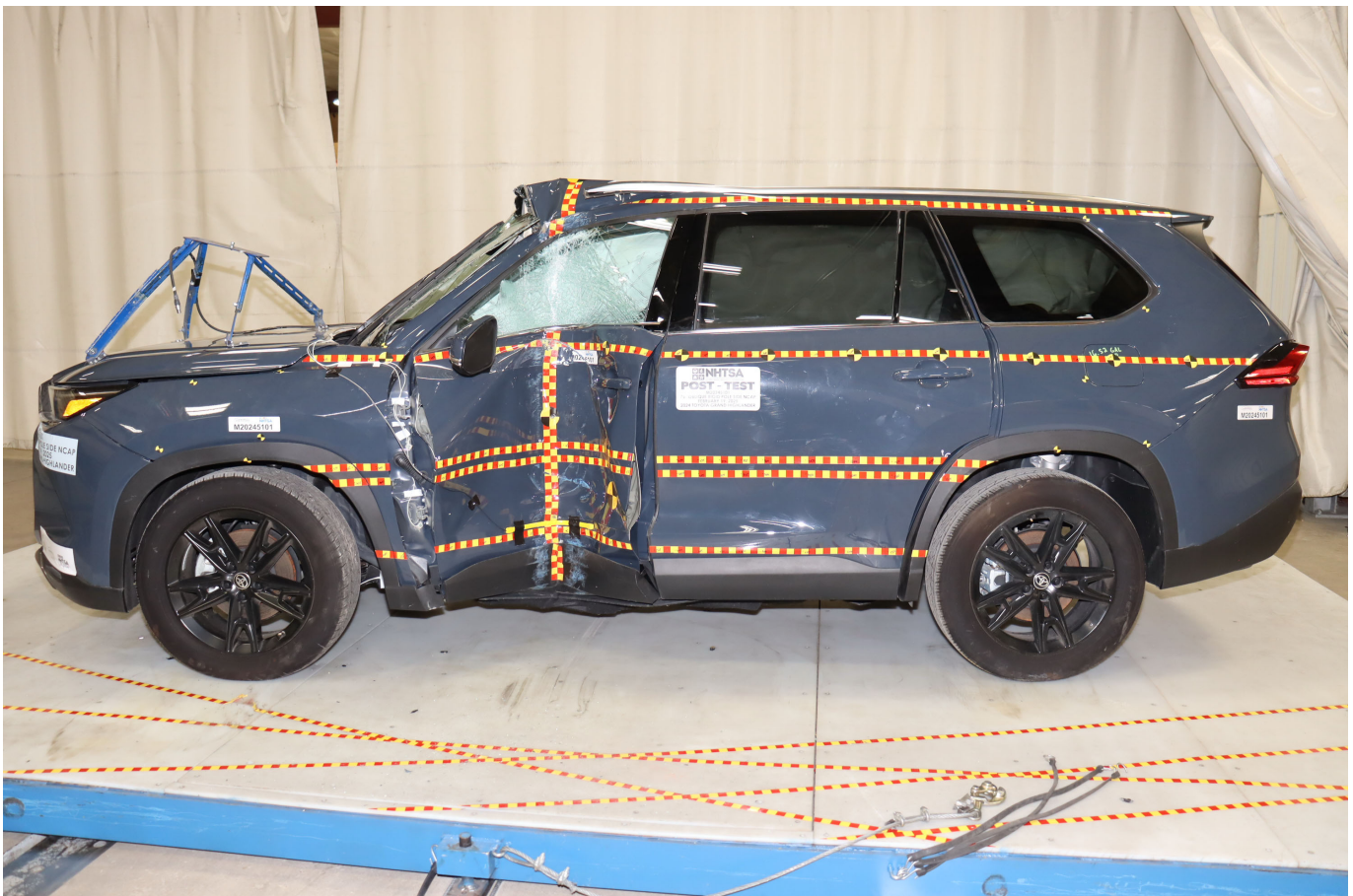


Photo No. 008 - Post-Test Left Side View of Test Vehicle



Photo No. 009 - Pre-Test Left Rear Three-Quarter View of Test Vehicle



Photo No. 010 - Post-Test Left Rear Three-Quarter View of Test Vehicle



Photo No. 011 - Pre-Test Rear View of Test Vehicle



Photo No. 012 - Post-Test Rear View of Test Vehicle



Photo No. 013 - Pre-Test Right Side View of Test Vehicle



Photo No. 014 - Post-Test Right Side View of Test Vehicle

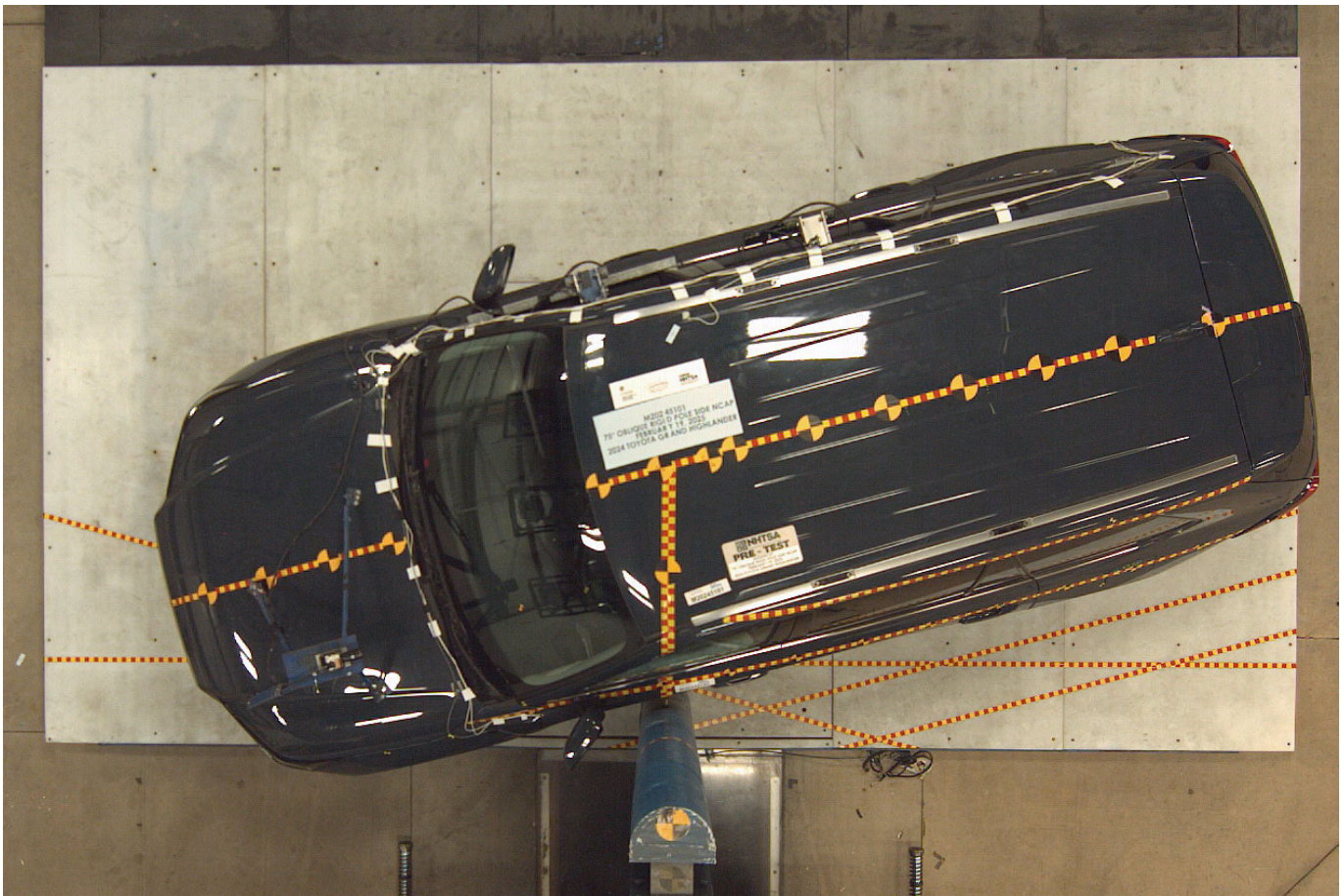


Photo No. 015 - Pre-Test Overhead View of Test Area

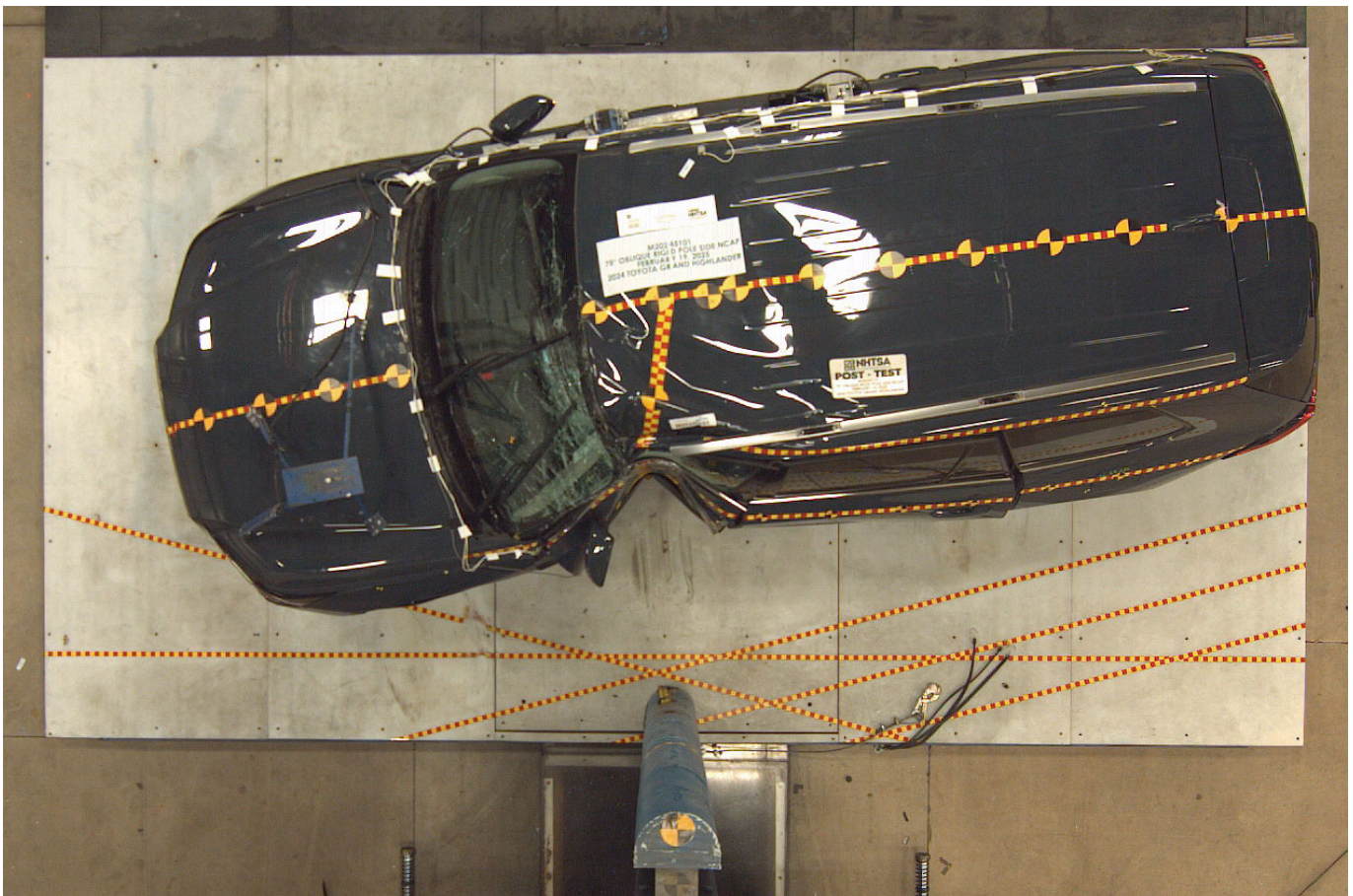


Photo No. 016 - Post-Test Overhead View of Test Area



Photo No. 017 - Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Photo No. 018 - Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



Photo No. 019 - Pre-Test Close-Up View of Impact Point Target



Photo No. 020 - Post-Test Close-Up View of Impact Point Target Showing Impact Location



Photo No. 021 - Pre-Test Front Close-Up View of Dummy Head and Chest



Photo No. 022 - Post-Test Front Close-Up View of Dummy



Photo No. 023 - Pre-Test Left Side View of Dummy Showing Belt and Chalking



Photo No. 024 - Pre-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 025 - Post-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 026 - Pre-Test Front View of Seat Back Prior to Dummy Positioning



Photo No. 027 - Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 028 - Pre-Test Front View of Seat Pan Prior to Dummy Positioning



Photo No. 029 - Pre-Test Overhead View of Dummy Thighs on Seat Pan



Photo No. 030 - Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Photo No. 031 - Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Photo No. 032 - Pre-Test Placement of Dummy's Feet



Photo No. 033 - Pre-Test View of Belt Anchorage for Dummy



Photo No. 034 - Pre-Test Left Side View of Steering Wheel



Photo No. 035 - Pre-Test View of Disengaged Parking Brake



Photo No. 036 - Pre-Test View of Parking Brake



Photo No. 037 - Pre-Test Close-Up Left Side View of Driver Seat Track



Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back



Photo No. 039 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Photo No. 040 - Pre-Test Dummy and Door Clearance View



Photo No. 041 - Post-Test Dummy and Door Clearance View



Photo No. 042 - Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 043 - Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 044 - Pre-Test Inner Door Panel View



Photo No. 045 - Post-Test Inner Door Panel View Showing Dummy Contact Location



Photo No. 046 - Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Photo No. 047 - Post-Test Dummy Close-Up Head Contact with Side Air Bag View



Photo No. 048 - Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Photo No. 049 - Post-Test Dummy Close-Up Torso Contact with Side Air Bag View



Photo No. 050 - Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Photo No. 051 - Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View



Photo No. 052 - Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Photo No. 053 - Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment

PHOTOGRAPH NOT APPLICABLE

Photo No. 054 - Post-Test Inner Rear Passenger Torso Air Bag Deployment View



Photo No. 055 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 056 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 057 - Close-Up View of Vehicle's Certification Label



Photo No. 058 - Close-Up View of Vehicle's Tire Information Placard or Label



Photo No. 058a - Close-Up View of Vehicle Load Carrying Capacity Reduction Label



Photo No. 059 - Pre-Test Pole Barrier Front View



Photo No. 060 - Post-Test Pole Barrier Front View



Photo No. 061 - Pre-Test Pole Barrier Side View



Photo No. 062 - Post-Test Pole Barrier Side View



Photo No. 063 - Pre-Test Ballast View



Photo No. 064 - Post-Test Primary and Redundant Speed Trap Read-Out



Photo No. 065 - FMVSS Photo No. 301 Static Rollover 0 Degrees



Photo No. 066 - FMVSS Photo No. 301 Static Rollover 90 Degrees



Photo No. 067 - FMVSS Photo No. 301 Static Rollover 180 Degrees



Photo No. 068 - FMVSS Photo No. 301 Static Rollover 270 Degrees



Photo No. 069 - FMVSS Photo No. 301 Static Rollover 360 Degrees



Photo No. 070 - Impact Event



TOYOTA

DESC.: **GRAND HIGHLANDER 4WD LIMITED**

VIN: **5TDAAB55RS029875**

YR/MDL: 2024/6710A

CLR: STORM CLOUD/BLACK/ALPI (01L6/20)

FINAL ASSEMBLY POINT: PRINCETON, INDIANA, U.S.A.

STANDARD EQUIPMENT

UNLESS REPLACED BY OPTIONAL EQUIPMENT

MECHANICAL & PERFORMANCE

- 2.4L 4-cyl Turbo Engine; 8 Speed Auto
- 5,000-lb Tow Capacity
- AWD w/Multi-Terrain Select

SAFETY & CONVENIENCE

- Toyota Safety Sense 3.0: w/Pre-Collision
- Frt & Rear Parking Assist w/ Auto Brake
- Blind Spot Monitor
- w/Rear Cross Traffic Alert
- Star Safety System
- Connected Services Capable, 4G Network
- Dependent. See Toyota.com for Details.
- LATCH-Lower Anchor & Tether for Children

EXTERIOR

- 20-in. Alloy Wheels
- LED Headlights, Taillights & Fog lights
- 5-Door Smart Key w/ Push
- Button Start
- Heated Power Outside Mirrors
- Hands-free Power Liftgate
- Rain-Sensing Wipers

INTERIOR

- 12.3-in. Toyota Audio Multimedia w/ 11 JBL Speakers, Wireless Apple CarPlay & Android Auto Compatibility
- SiriusXM w/3-Month Platinum Plan Trial
- Seating for 7
- Leather Trimmed Heated, Ventilated & Power Front Seats
- Heated Steering Wheel
- Heated 2nd Row Outboard Seats
- 3rd Row 60/40 Split Fold-Flat Seats
- Integrated 2nd Row Window Sunshades
- 3-Zone Auto Climate Control
- Qi Wireless Smartphone Charger
- USB Media Port, 6 USB-C
- 12.3-in. Color Multi-Info Display
- 100W Inverter with 120V AC Outlet
- Toyota.com/GrandHighlander
- **Full Tank of Gas**

BASE MANUFACTURER'S SUGGESTED RETAIL PRICE \$49,460.00

OPTIONAL EQUIPMENT

FE	50 STATE EMISSION	
BS	8 PASSENGER SEATING	600.00
SB	PANORAMIC VIEW CAMERA	
43	Rear Hatch Cargo Lamps	350.00
3T	Cross Bars	325.00
3J	Black Emblem Overlays	129.00
2T	All Weather Floor Liners / Cargo Tray	358.00
PL	Logo Side Puddle Lamp	175.00
G4	Illuminated Door Sills	345.00
FL	20" Black Wheels	1,600.00
D5	Door Edge Guards	155.00

GOVERNMENT 5-STAR SAFETY RATINGS

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

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.

Source: National Highway Traffic Safety Administration (NHTSA)

www.safercar.gov or 1-888-327-4236

EPA DOT Fuel Economy and Environment

Fuel Economy

22 MPG

combined city/hwy

4.5 gallons per 100 miles

Standard SUVs range from 13 to 102 MPG. The best vehicle rates 140 MPG.

You spend \$2,500 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,450

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **Smog Rating** (tailpipe only)

1 **5** **10** **1** **7** **10**

Best

This vehicle emits 400 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions. Learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$9,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.60 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles

Smartphone QR Code

MANUFACTURER'S SUGGESTED RETAIL PRICE \$53,497.00

DELIVERY, PROCESSING AND HANDLING FEE 1,395.00

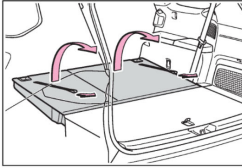
TOTAL SUGGESTED RETAIL PRICE \$54,892.00

Delivered by Truck to 31141

LUV TOYOTA 215 EAST FAIRMOUNT AVENUE LAKEWOOD NY14750

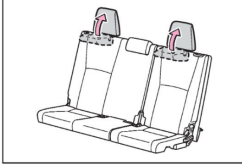
TMLEIN150F0W0

Photo No. 071 - Monroney Label



2 Returning the outer head restraints.

Remove the secured seat belts from the seat belt hangers before using them.



Head restraints

Head restraints are provided for all seats.

WARNING

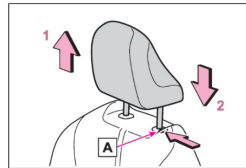
Head restraint precautions

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.
- When sitting on the third seat, make sure that the head restraint is not folded.

Adjusting a head restraint vertically

Front seats



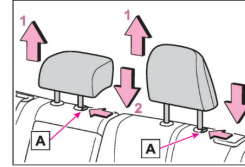
1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pressing the lock release button **A**.

Second seats



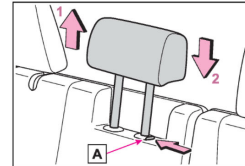
1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pressing the lock release button **A**.

Third center seat



1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pressing the lock release button **A**.

Adjusting the height of the head restraints



Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

Adjusting the rear center seat head restraints

Always raise the head restraint one level from the stowed position when using.

Removing the head restraints

Pull the head restraint up while pressing the lock release button **A**.

If the head restraint touches the ceiling, making the removal difficult, change the seat height or angle. (→P.159, 160)

Front seats

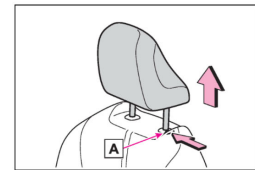


Photo No. 072 - Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



Photo No. 073 - Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

		<u>Page No.</u>
Figure No. 1.	Driver Head CG Acceleration (X) vs. Time	B-1
Figure No. 2.	Driver Head CG Acceleration (Y) vs. Time	B-1
Figure No. 3.	Driver Head CG Acceleration (Z) vs. Time	B-1
Figure No. 4.	Driver Head CG Resultant Acceleration (X) vs. Time	B-1
Figure No. 5.	Driver Lower Spine T12 Acceleration (X) vs. Time	B-2
Figure No. 6.	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-2
Figure No. 8.	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-2
Figure No. 9.	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-3
Figure No. 10.	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-3
Figure No. 11.	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-3

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.nhtsa.gov

Additional Driver Dummy Instrumentation Data

Driver Head CG Redundant Acceleration (X) vs. Time
Driver Head CG Redundant Acceleration (Y) vs. Time
Driver Head CG Redundant Acceleration (Z) vs. Time
Driver Head Angular Velocity X (Deg/Sec) vs. Time
Driver Head Angular Velocity Y (Deg/Sec) vs. Time
Driver Head Angular Velocity Z (Deg/Sec) vs. Time
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy Hip Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

Right Sill at Vertical Impact Reference Line Acceleration (Y)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)

Load Cell Pole Barrier #2 Force (Y)

Load Cell Pole Barrier #3 Force (Y)

Load Cell Pole Barrier #4 Force (Y)

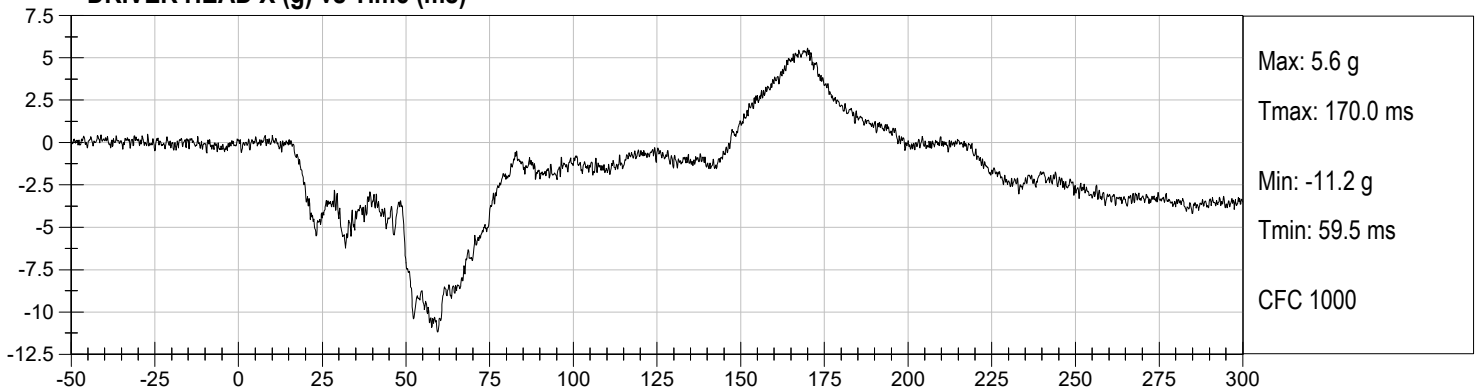
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

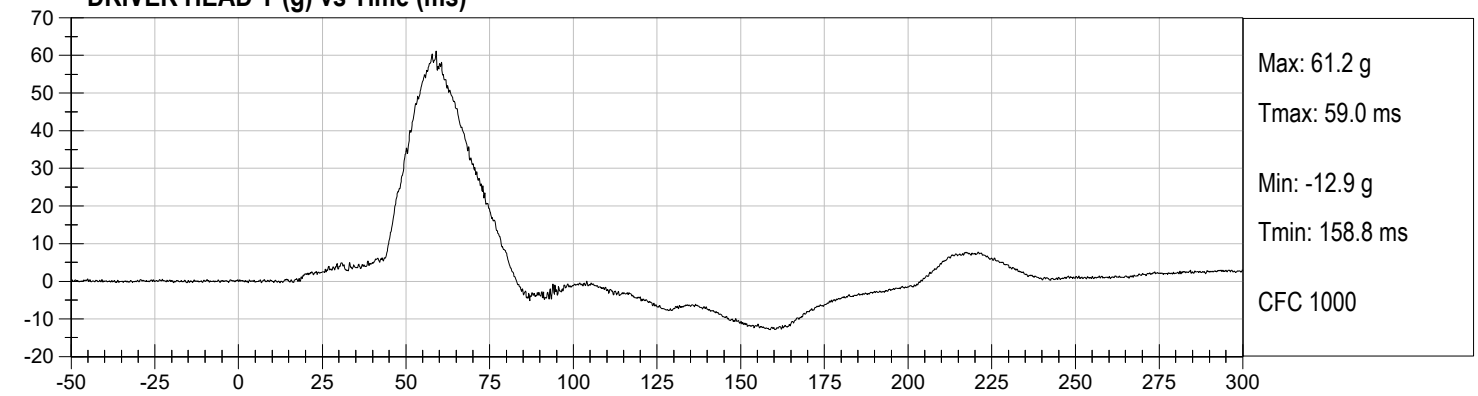
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

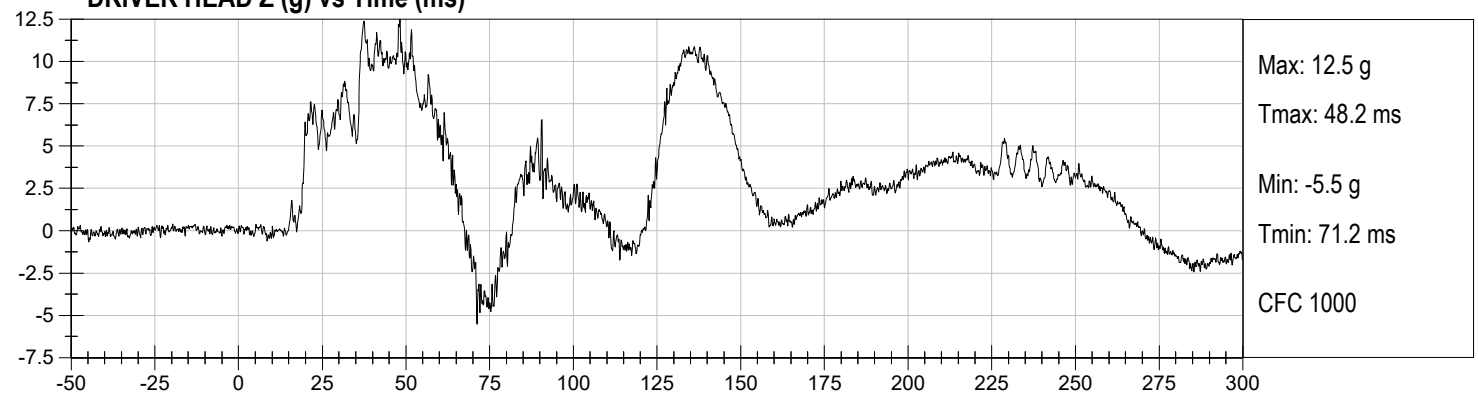
DRIVER HEAD X (g) vs Time (ms)



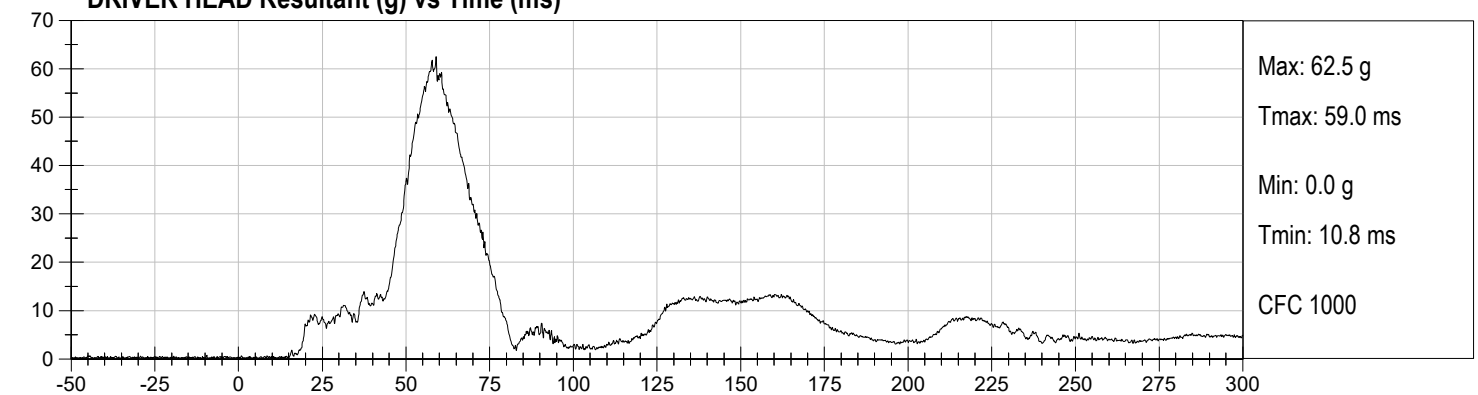
DRIVER HEAD Y (g) vs Time (ms)



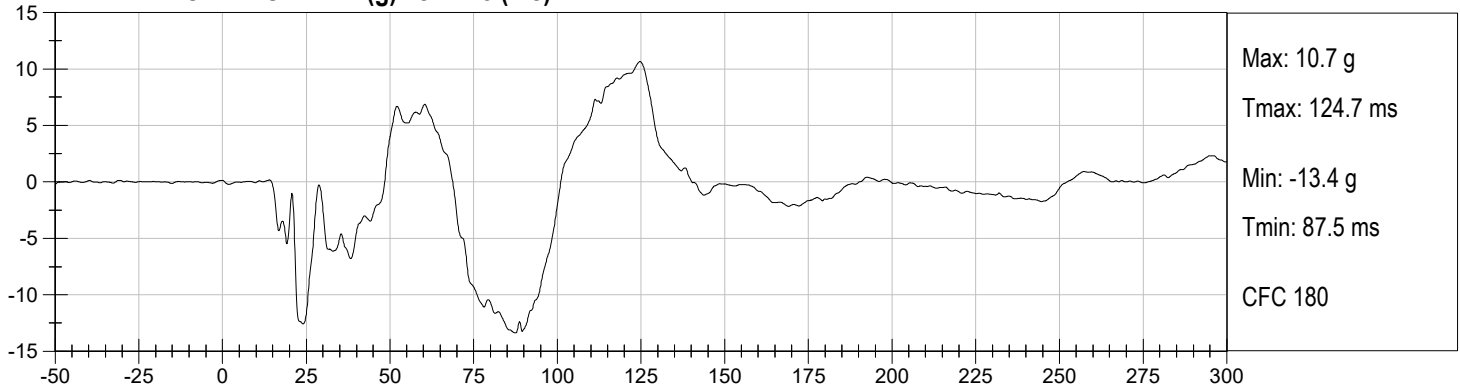
DRIVER HEAD Z (g) vs Time (ms)



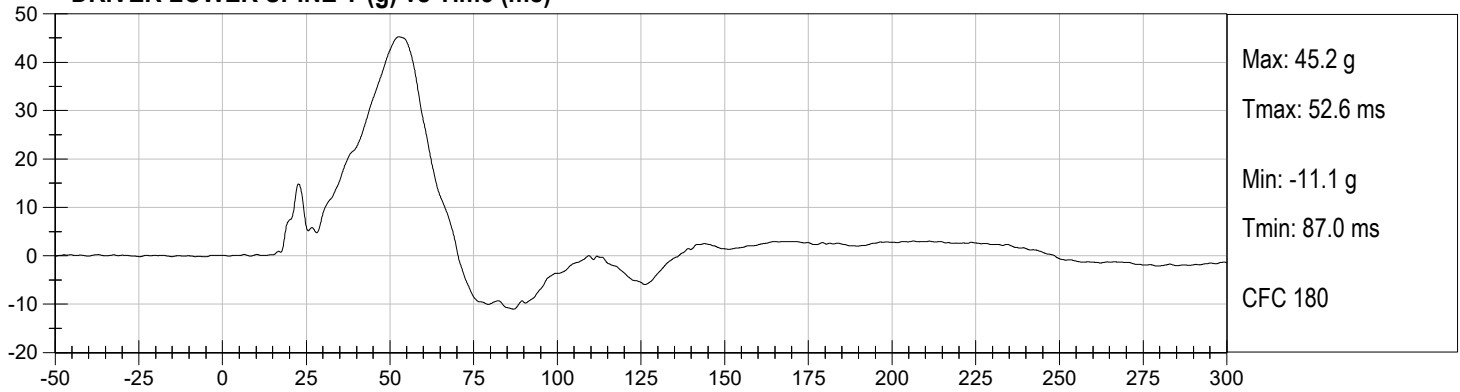
DRIVER HEAD Resultant (g) vs Time (ms)



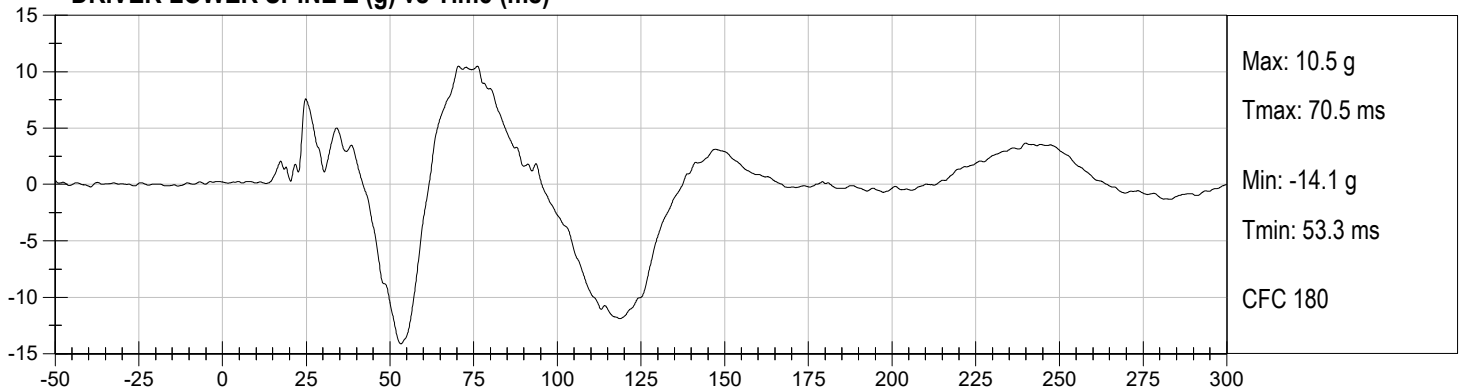
DRIVER LOWER SPINE X (g) vs Time (ms)



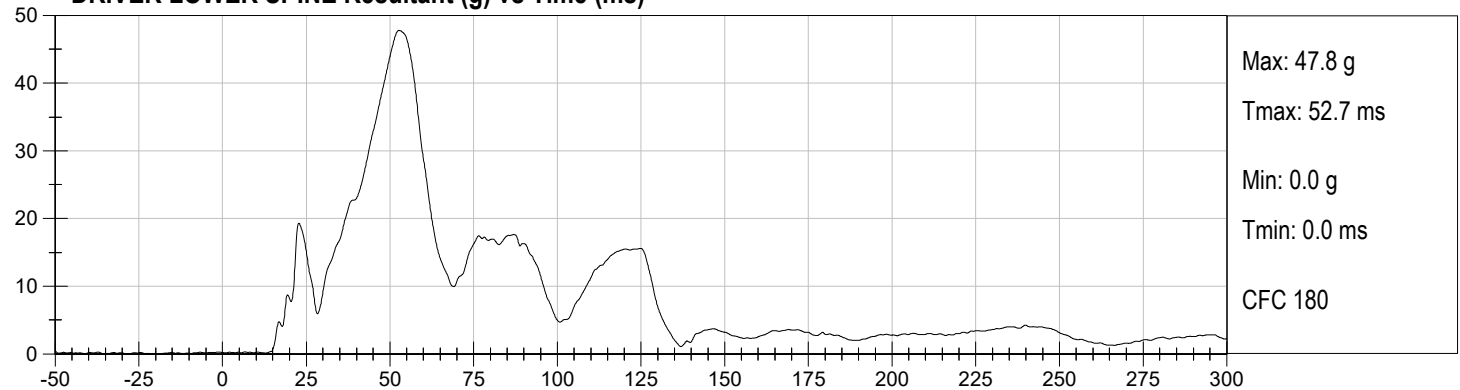
DRIVER LOWER SPINE Y (g) vs Time (ms)



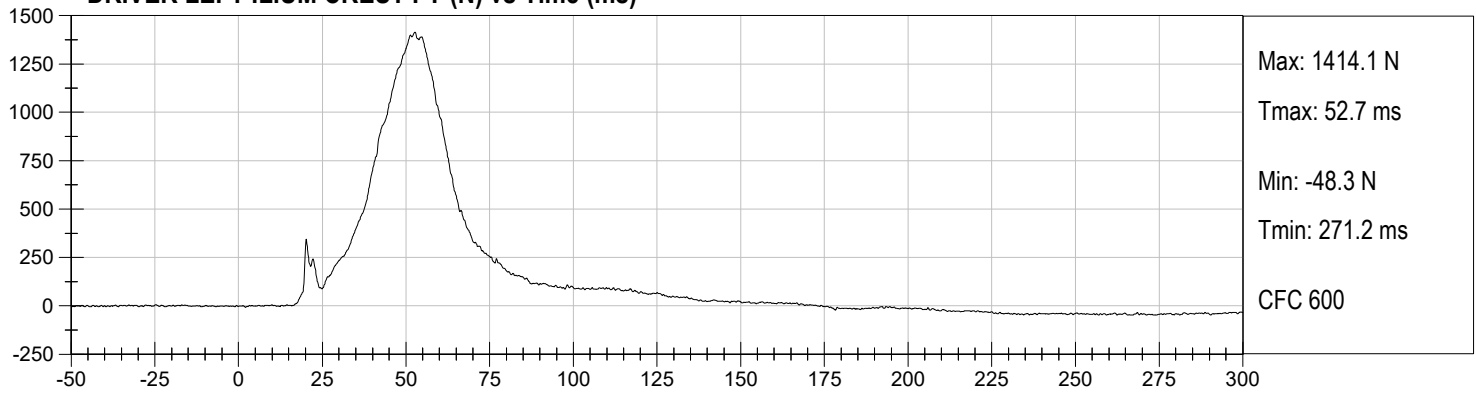
DRIVER LOWER SPINE Z (g) vs Time (ms)



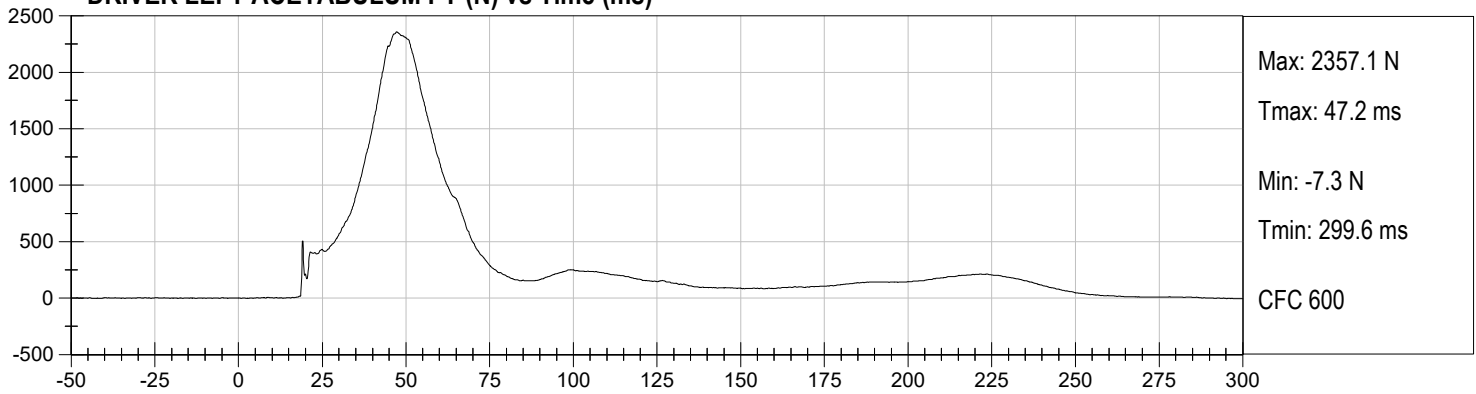
DRIVER LOWER SPINE Resultant (g) vs Time (ms)



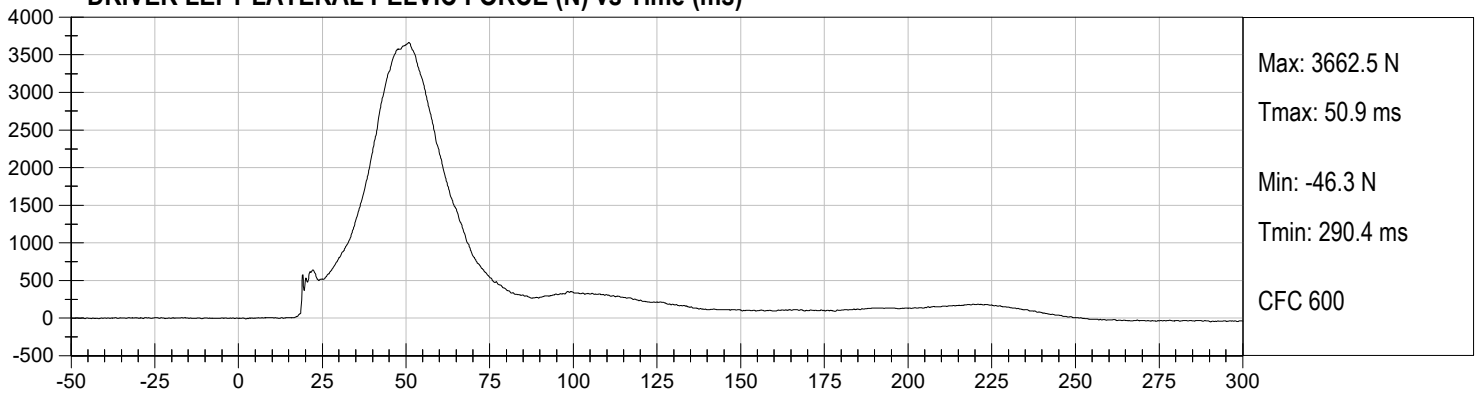
DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)



DRIVER LEFT ACETABULUM FY (N) vs Time (ms)



DRIVER LEFT LATERAL PELVIC FORCE (N) vs Time (ms)



APPENDIX C
DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION

QUALIFICATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SID-IIsD External Measurements
SN: 296

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	142	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	180	Pass
J	Head Circumference	541 - 551	548	Pass
K	Buttock to Knee Length	514 - 540	535	Pass
L	Popliteal Height	343 - 369	358	Pass
M	Knee Pivot to Floor Height	392 - 409	404	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	206	Pass
P	Foot Length	216 - 232	219	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	316	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	481	Pass
V	Shoulder Width	341 - 357	346	Pass
W	Foot Width	78 - 94	85	Pass
Y	Chest Circumference w/ jacket	851 - 881	870	Pass
Z	Waist Circumference	761 - 791	772	Pass

MGA RESEARCH CORPORATION
HEAD DROP TEST
SID-IIs BUILD LEVEL D DUMMY

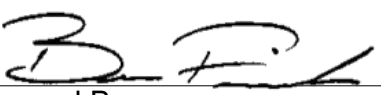
ATD Serial No: 296

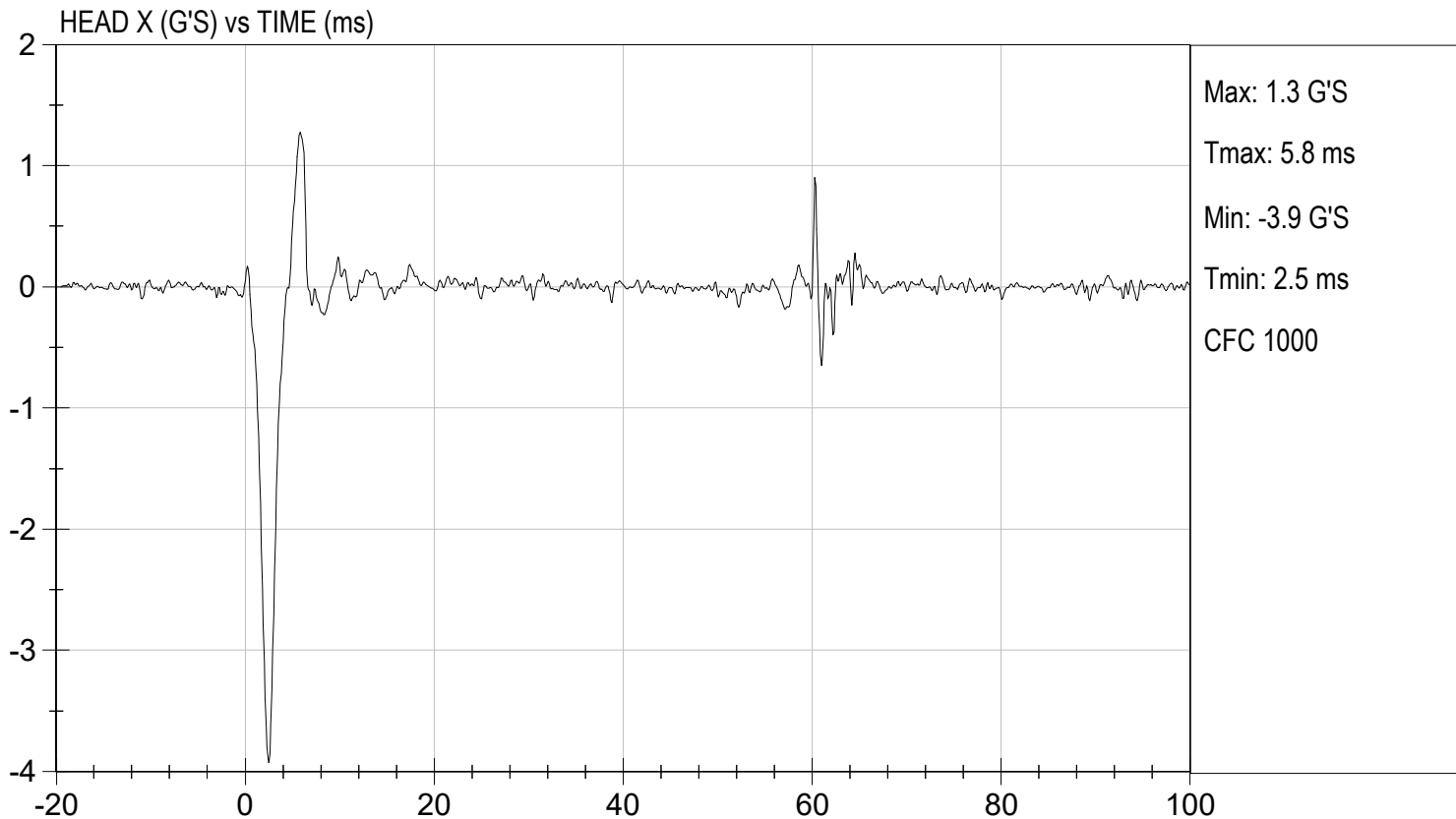
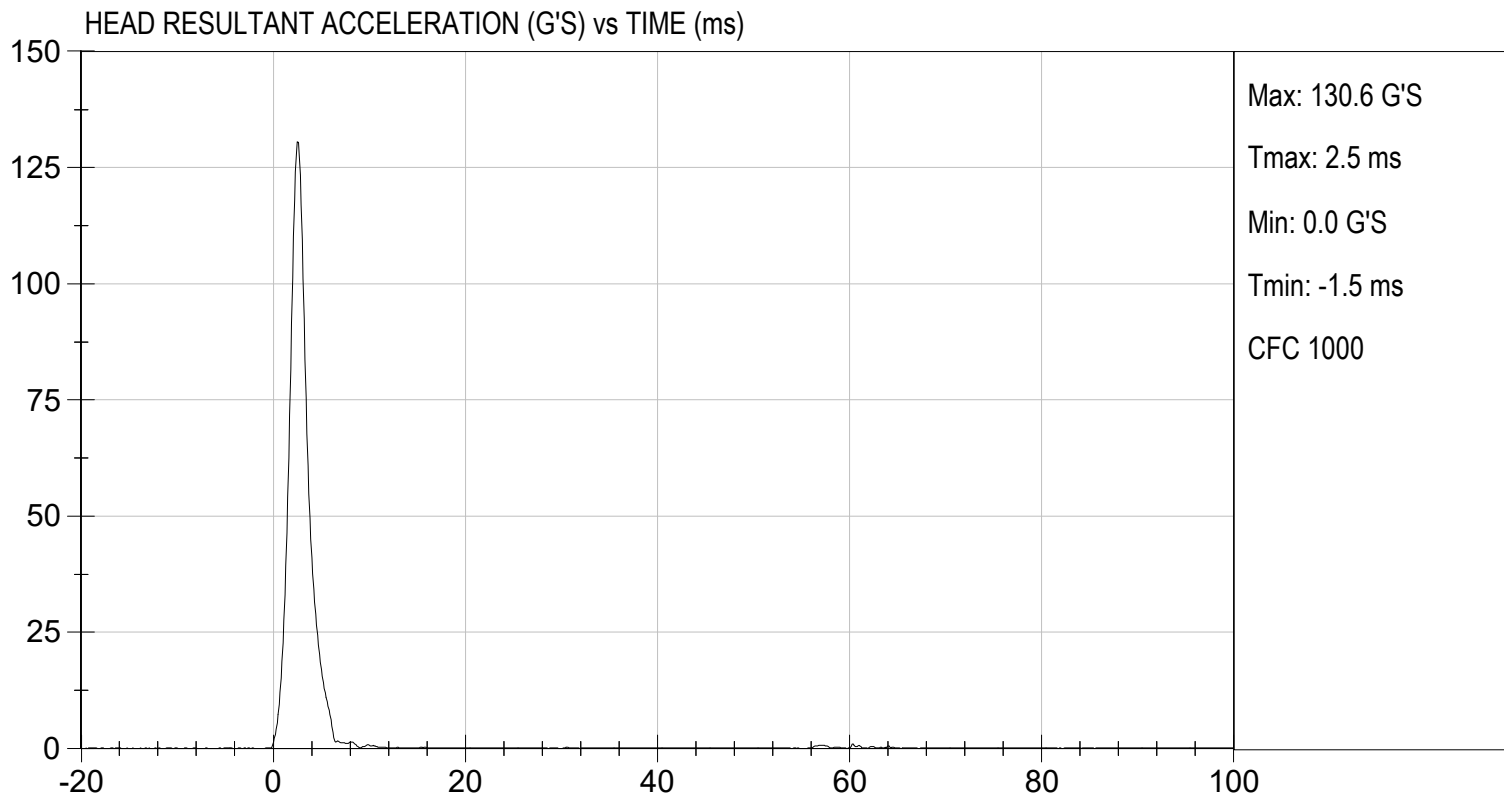
Test ID: D250101

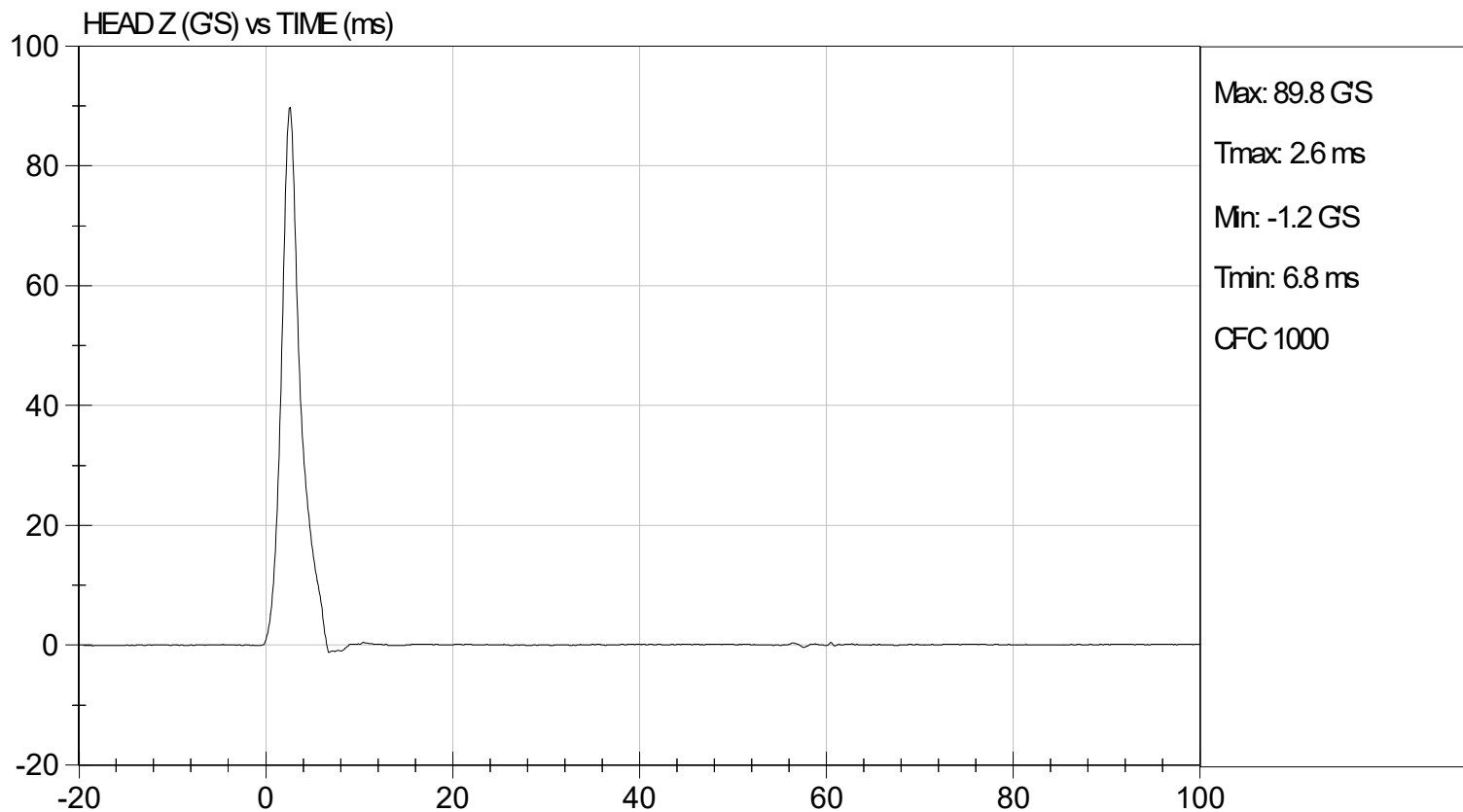
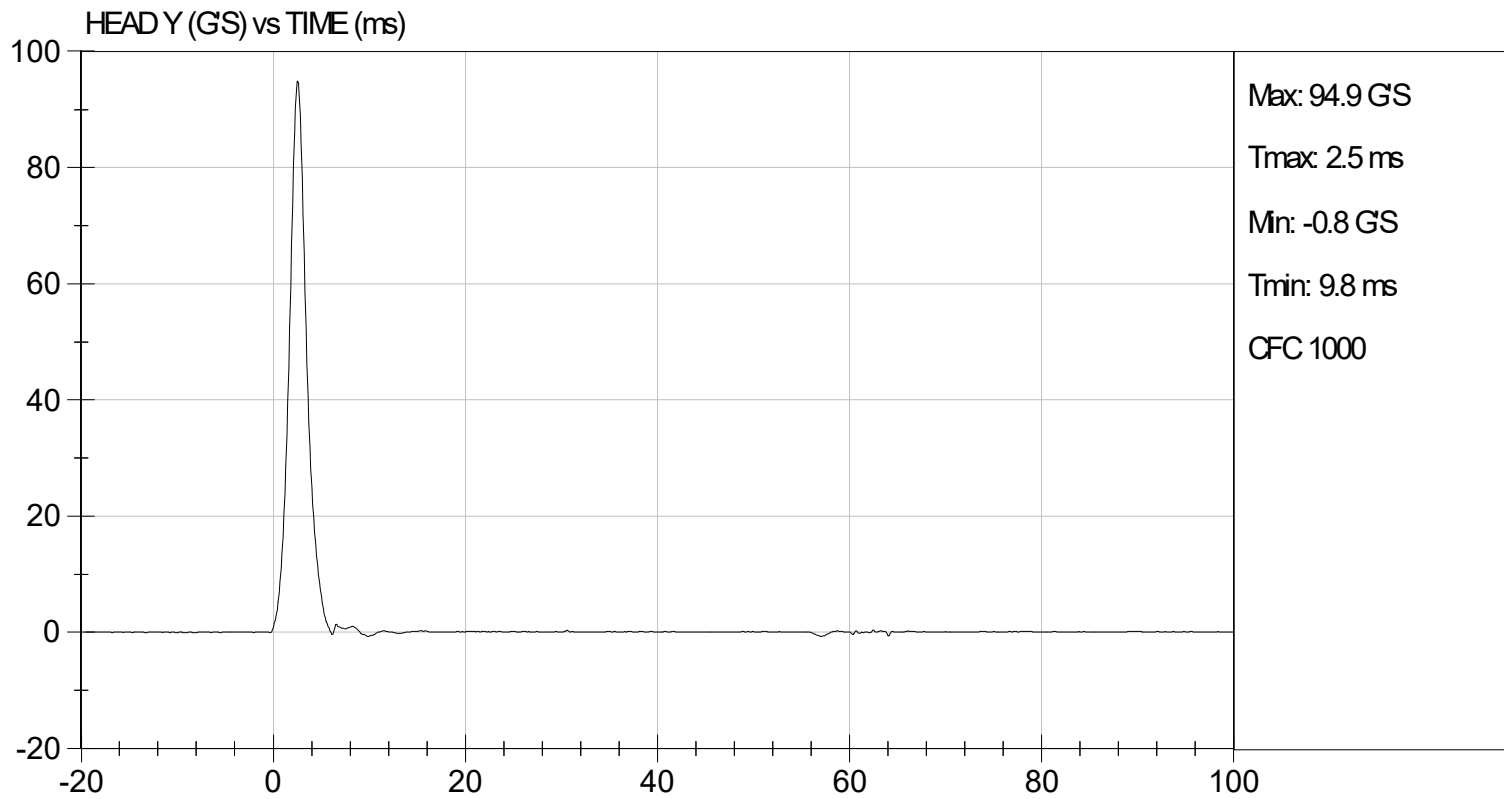
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Peak Resultant Acceleration	G's	115 to 137	131	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-3.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

01/10/2025
Test Date


Approved By





MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-Its BUILD LEVEL D DUMMY

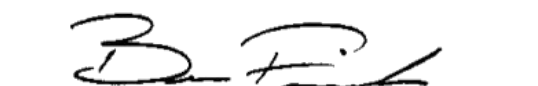
ATD Serial No: 296

Test I.D: D250102

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.4	Pass
Humidity		%	10 to 70	31	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.35	Pass
	15 ms	m/s	3.30 to 4.10	3.59	Pass
	20 ms	m/s	4.40 to 5.40	5.10	Pass
	25 ms	m/s	5.40 to 6.10	5.71	Pass
	25-100 ms	m/s	5.50 to 6.20	5.73	Pass
Maximum D-Plane Rotation		deg	71 to 81	75	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	64	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-37	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	120	Pass
Overall Test Results					Pass


Laboratory Technician

01/10/2025
Test Date

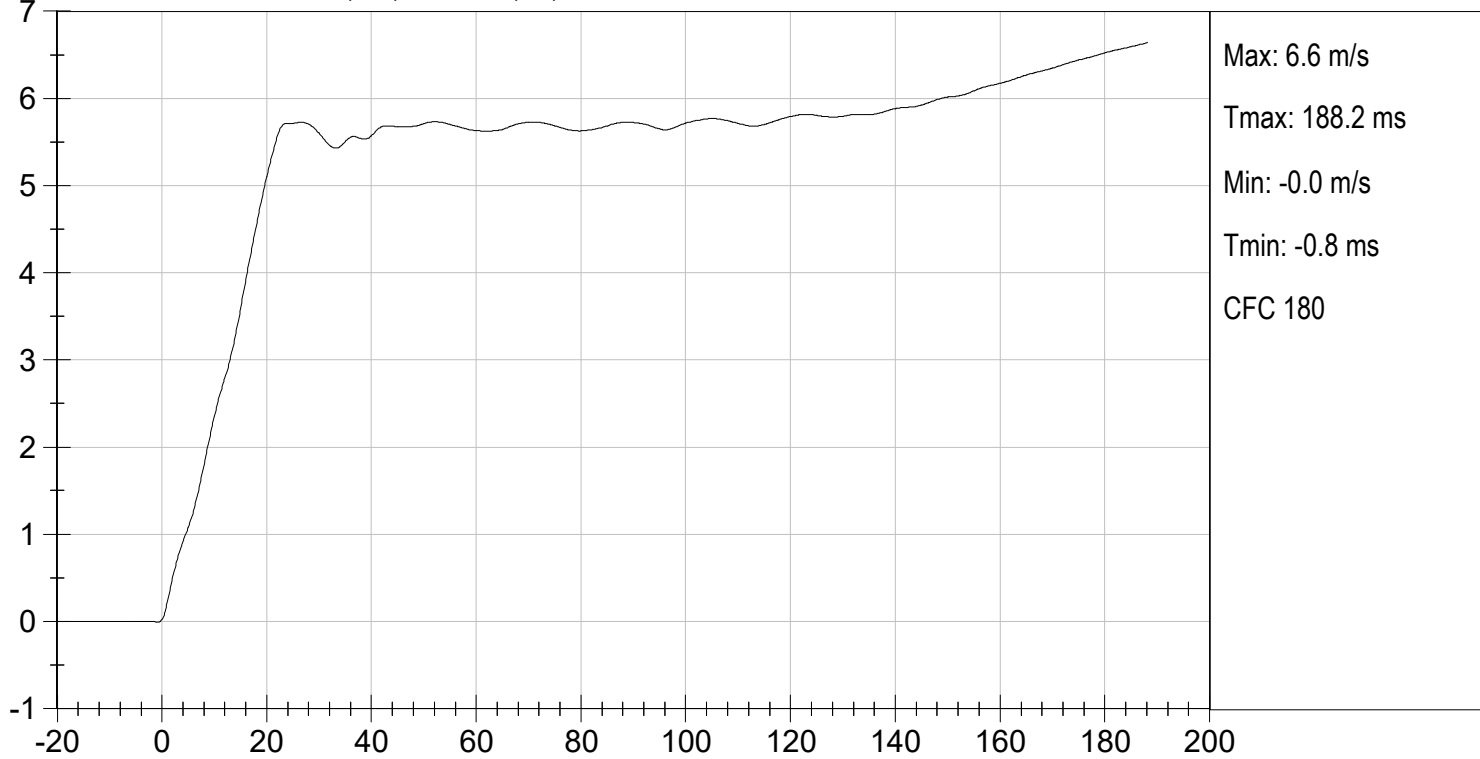

Approved By



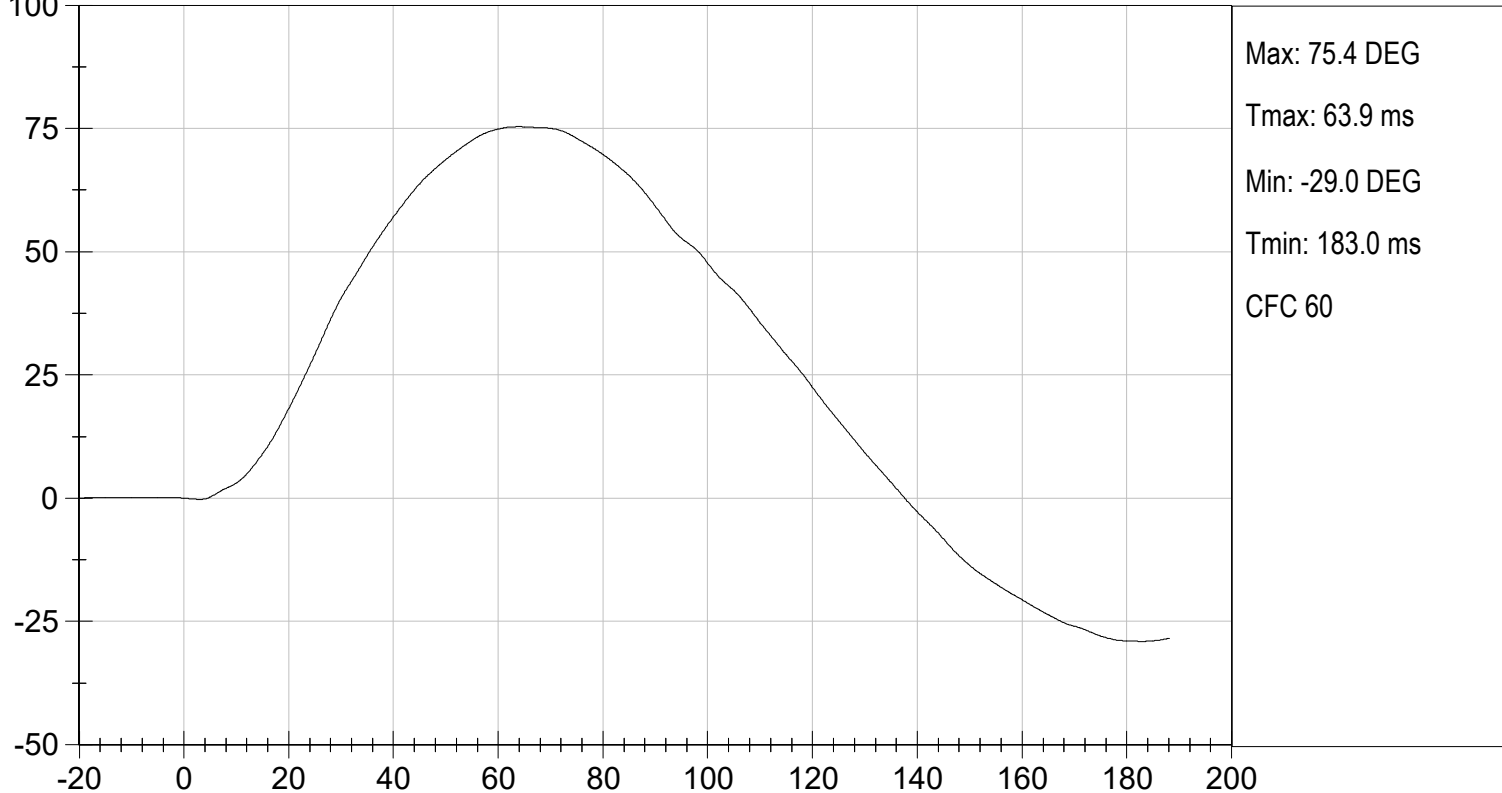
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 01/10/2025
TEST #: D250102

PENDULUM VELOCITY (m/s) vs TIME (ms)



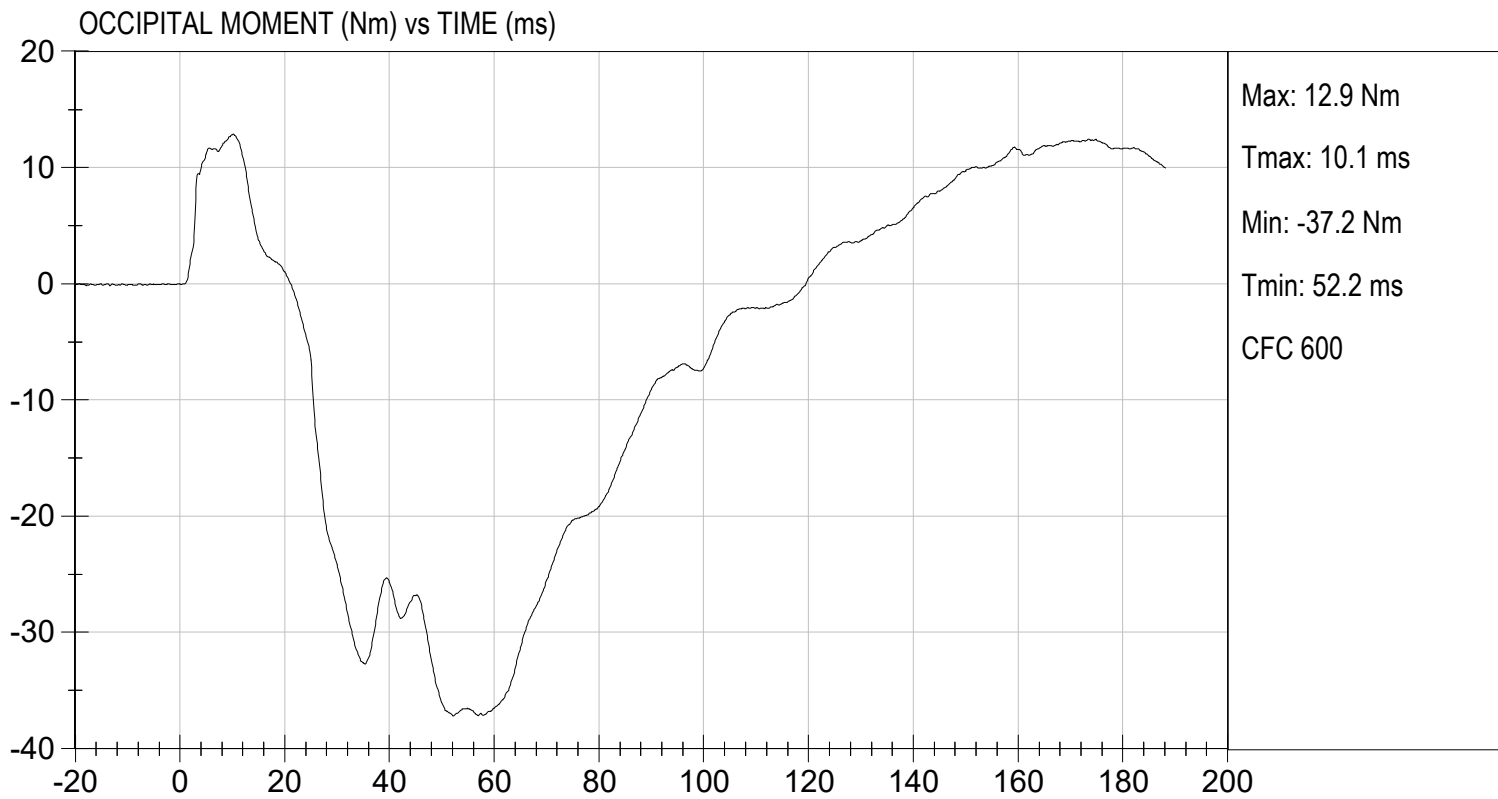
FLEXION ANGLE (DEG) vs TIME (ms)





TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 01/10/2025
TEST #: D250102



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-Its BUILD LEVEL D DUMMY

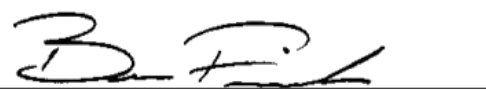
ATD Serial No: 296

Test ID: D250103

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results			Pass	


Laboratory Technician

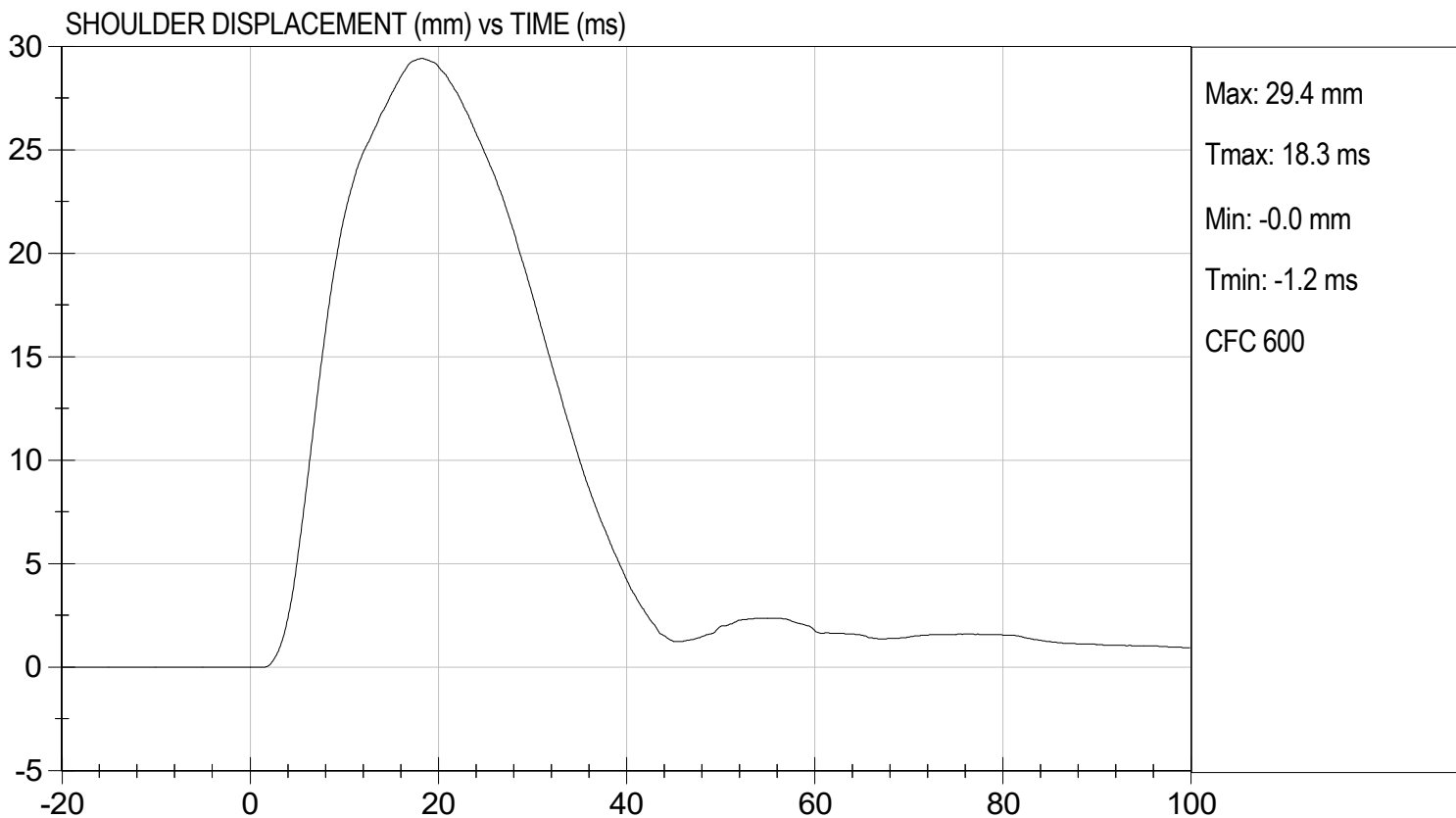
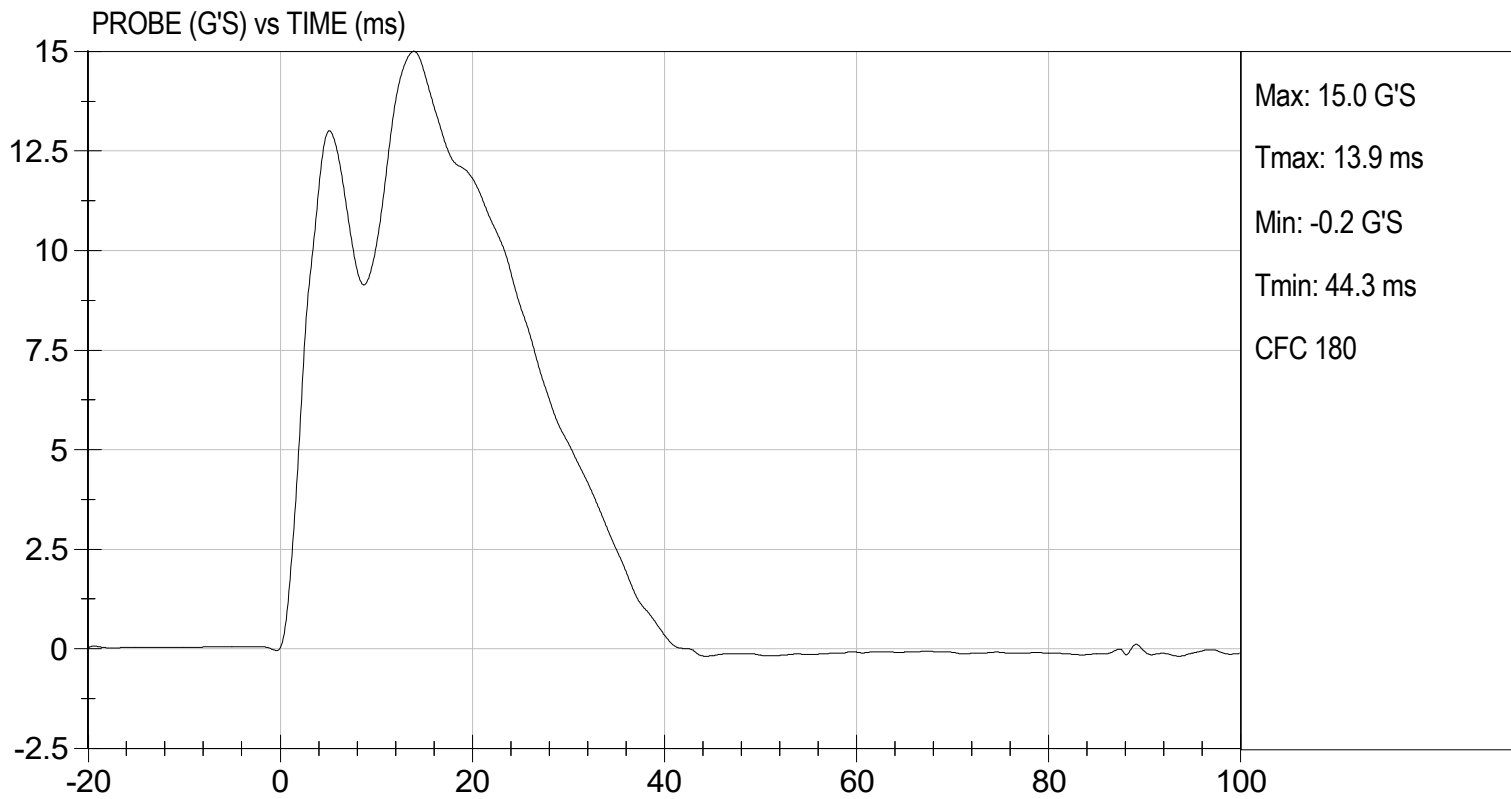
01/10/2025
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

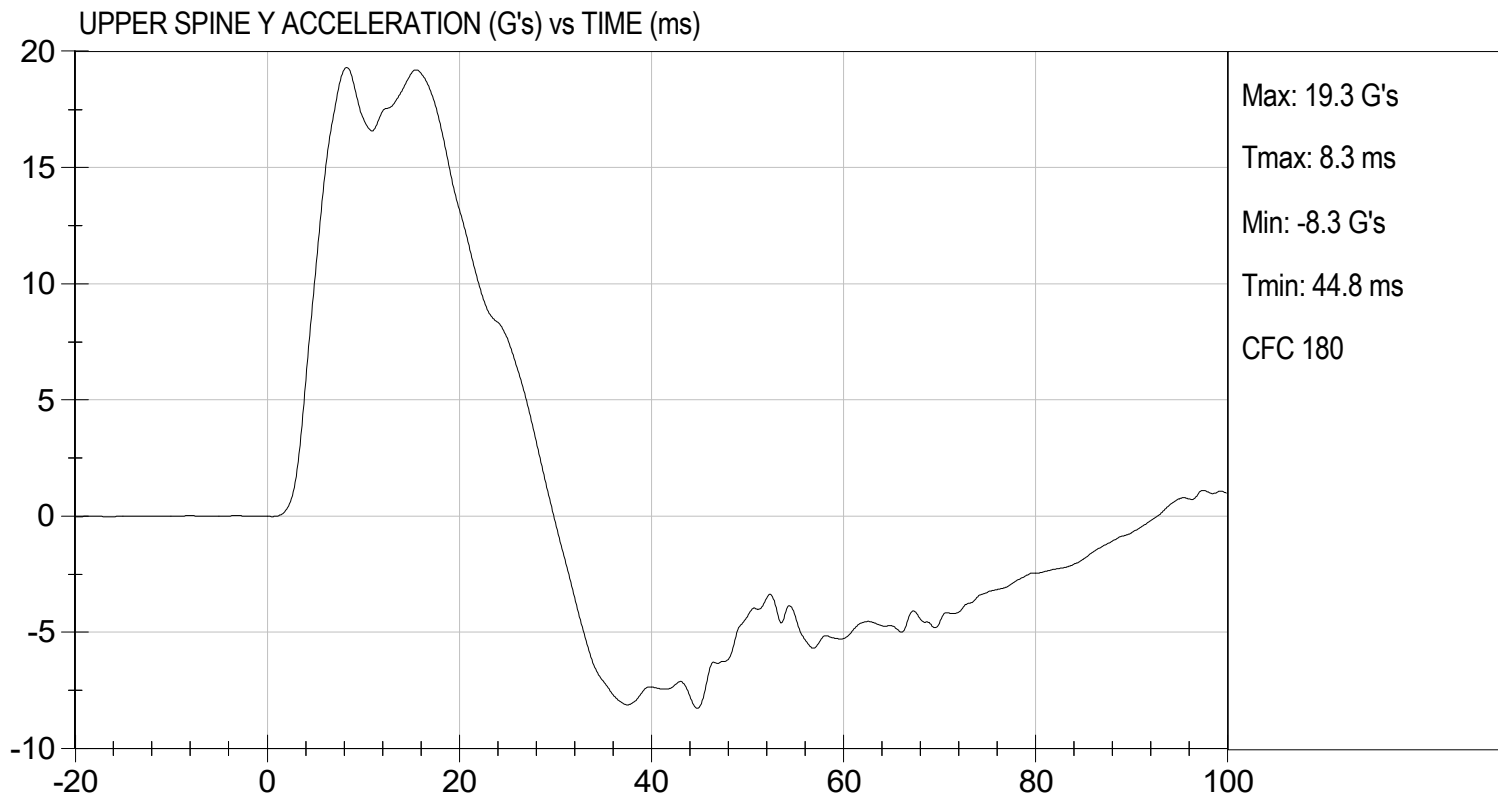
TEST DATE: 01/10/2025
TEST #: D250103





TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/10/2025
TEST #: D250103

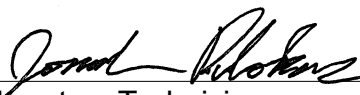


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-Its BUILD LEVEL D DUMMY

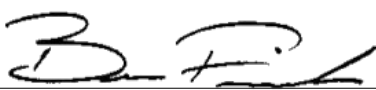
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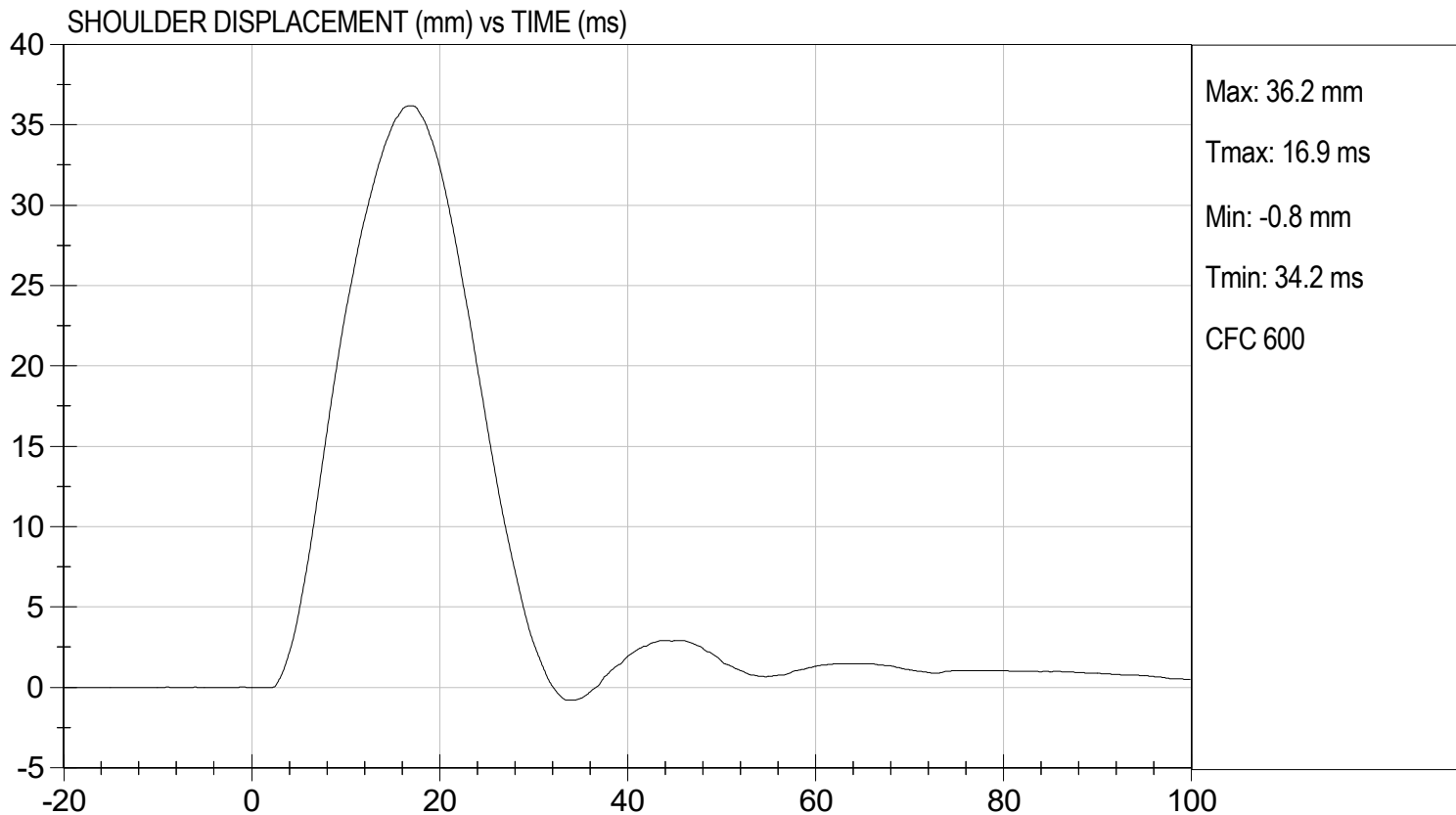
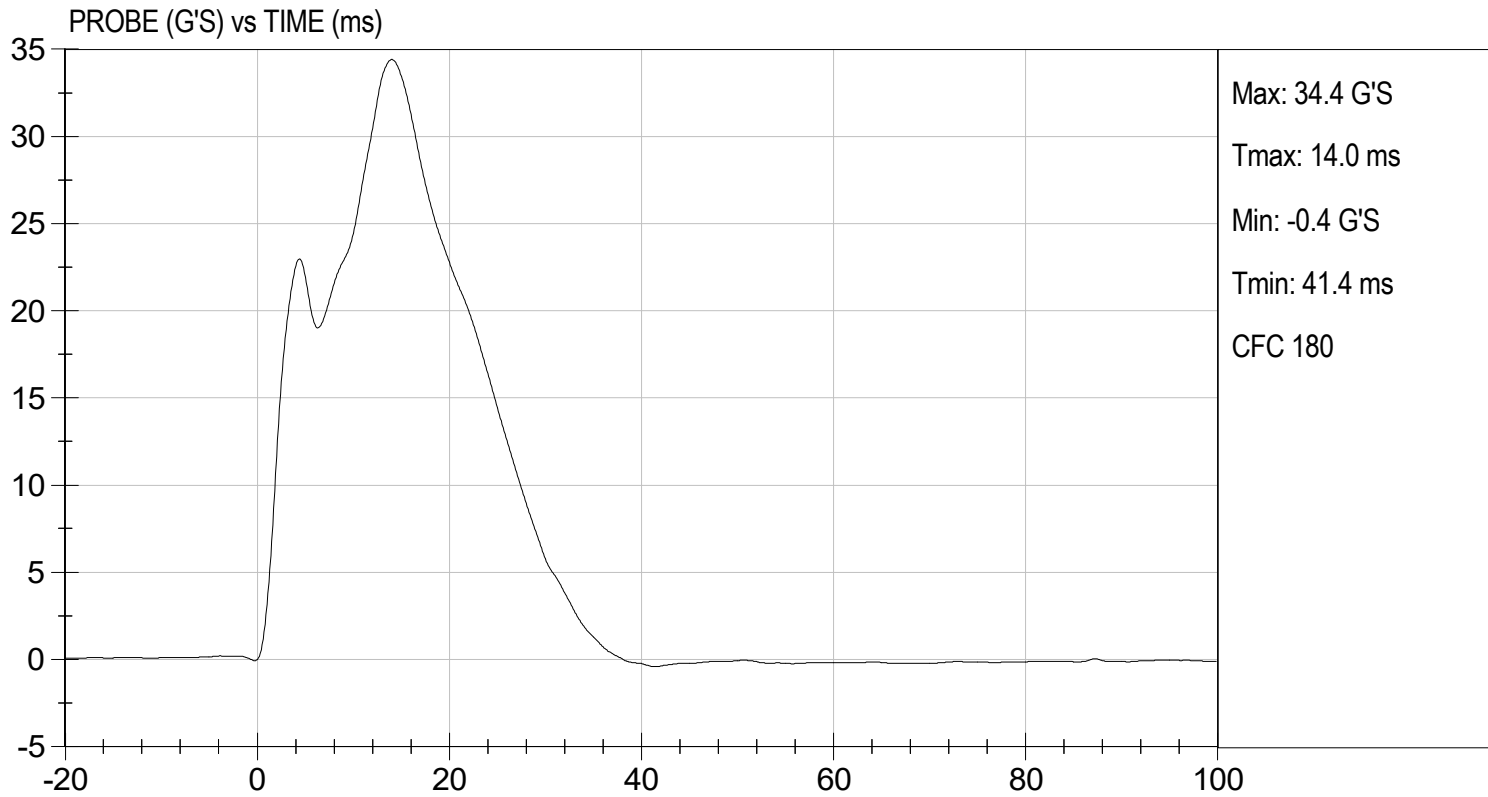
Test I.D: D250104

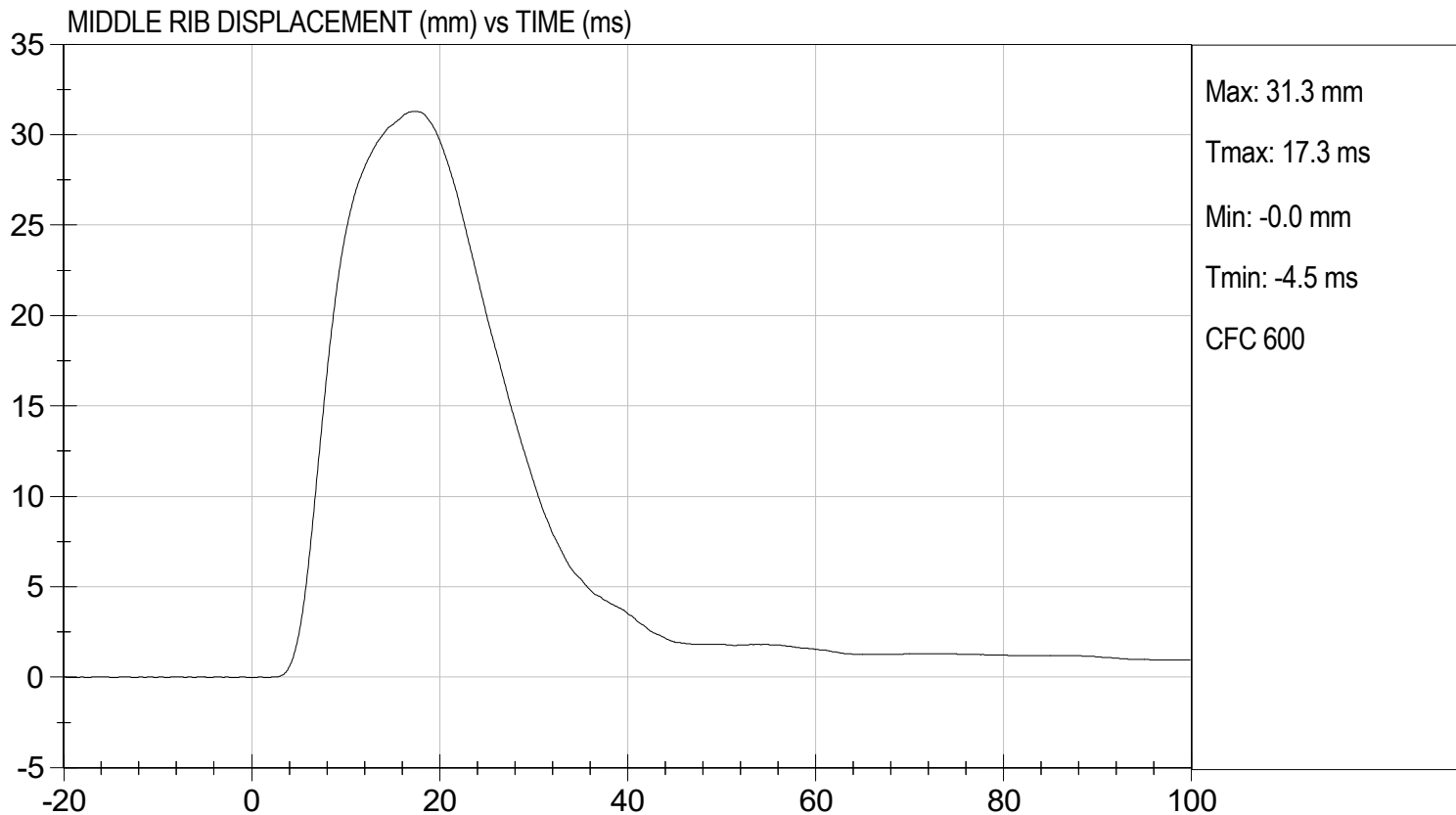
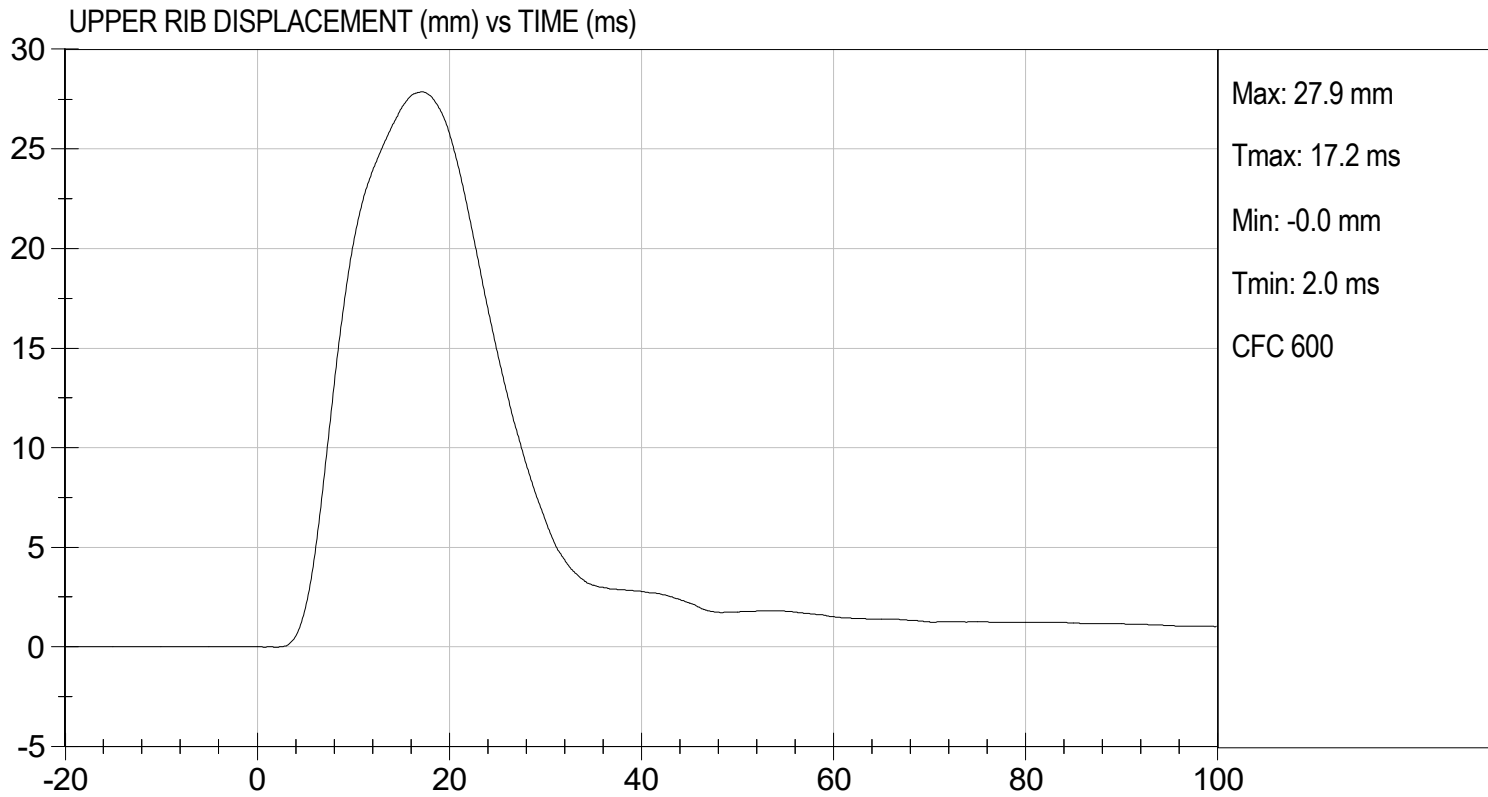
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
Overall Test Results				Pass


Laboratory Technician

01/10/2025
Test Date


Approved By

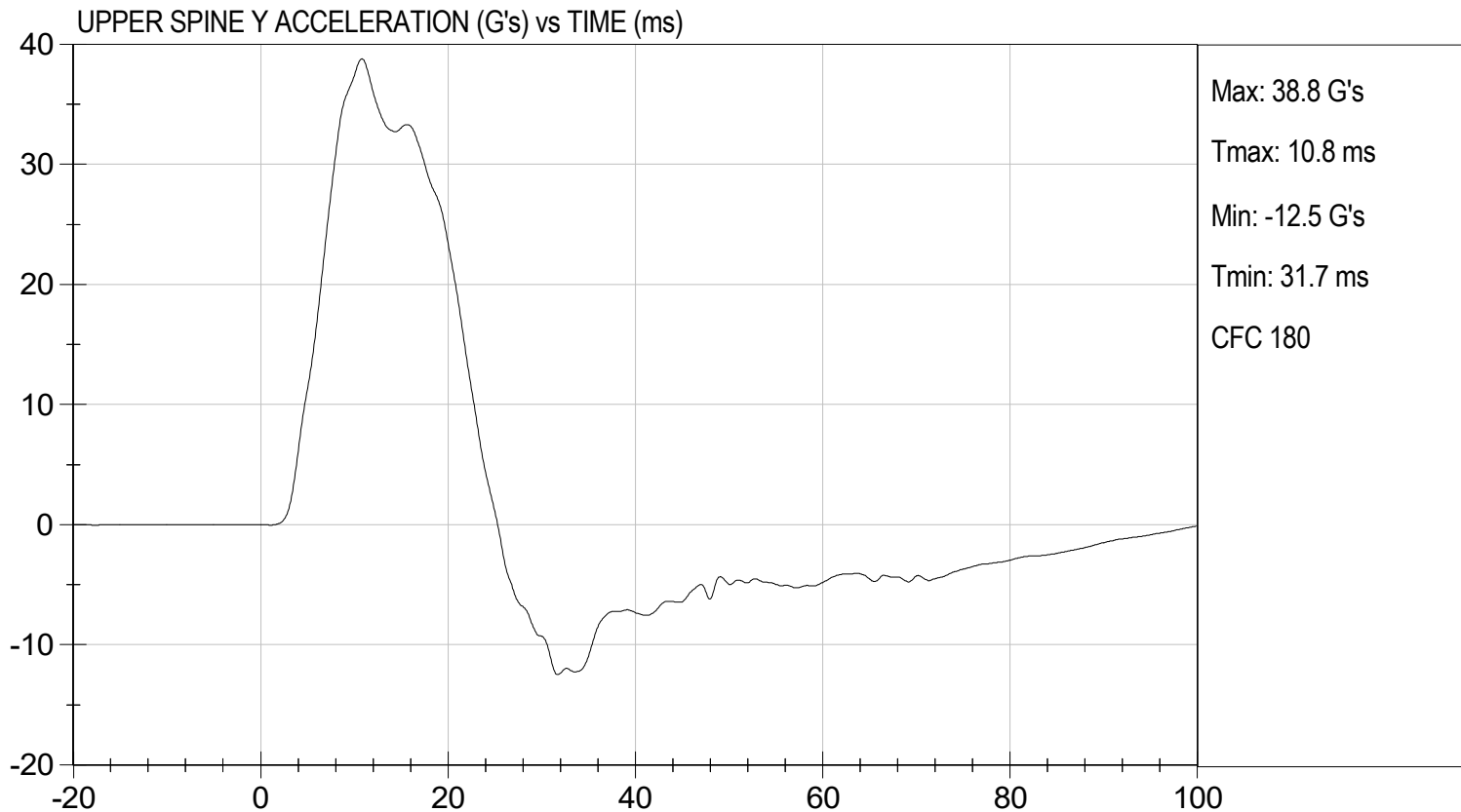
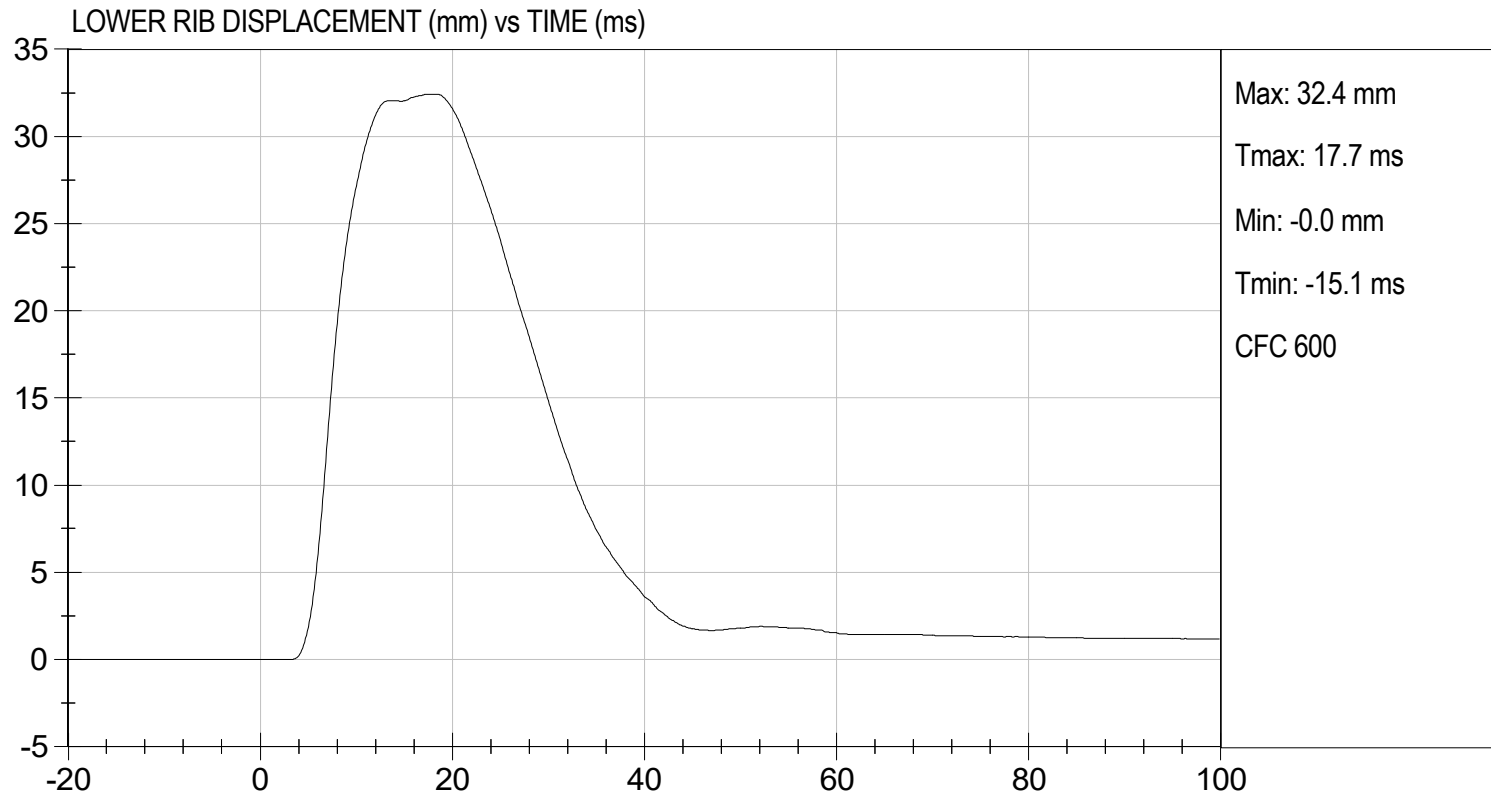






TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

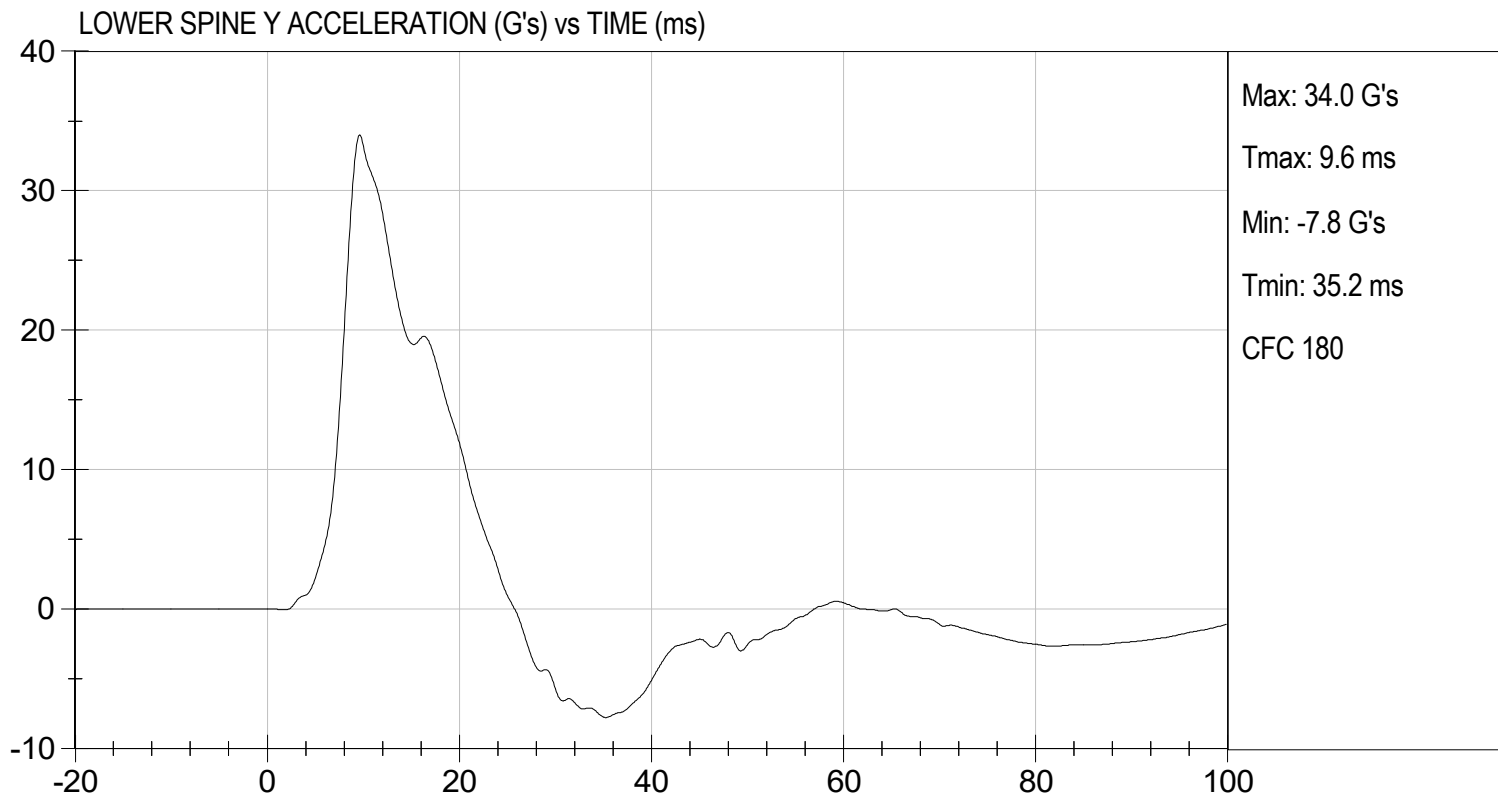
TEST DATE: 01/10/2025
TEST #: D250104





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/10/2025
TEST #: D250104



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-Its BUILD LEVEL D DUMMY

ATD Serial No: 296

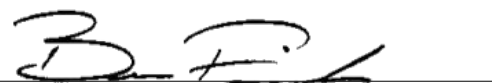
Test I.D: D250105

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	31	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	10	Pass
Overall Test Results				Pass


Laboratory Technician

01/10/2025

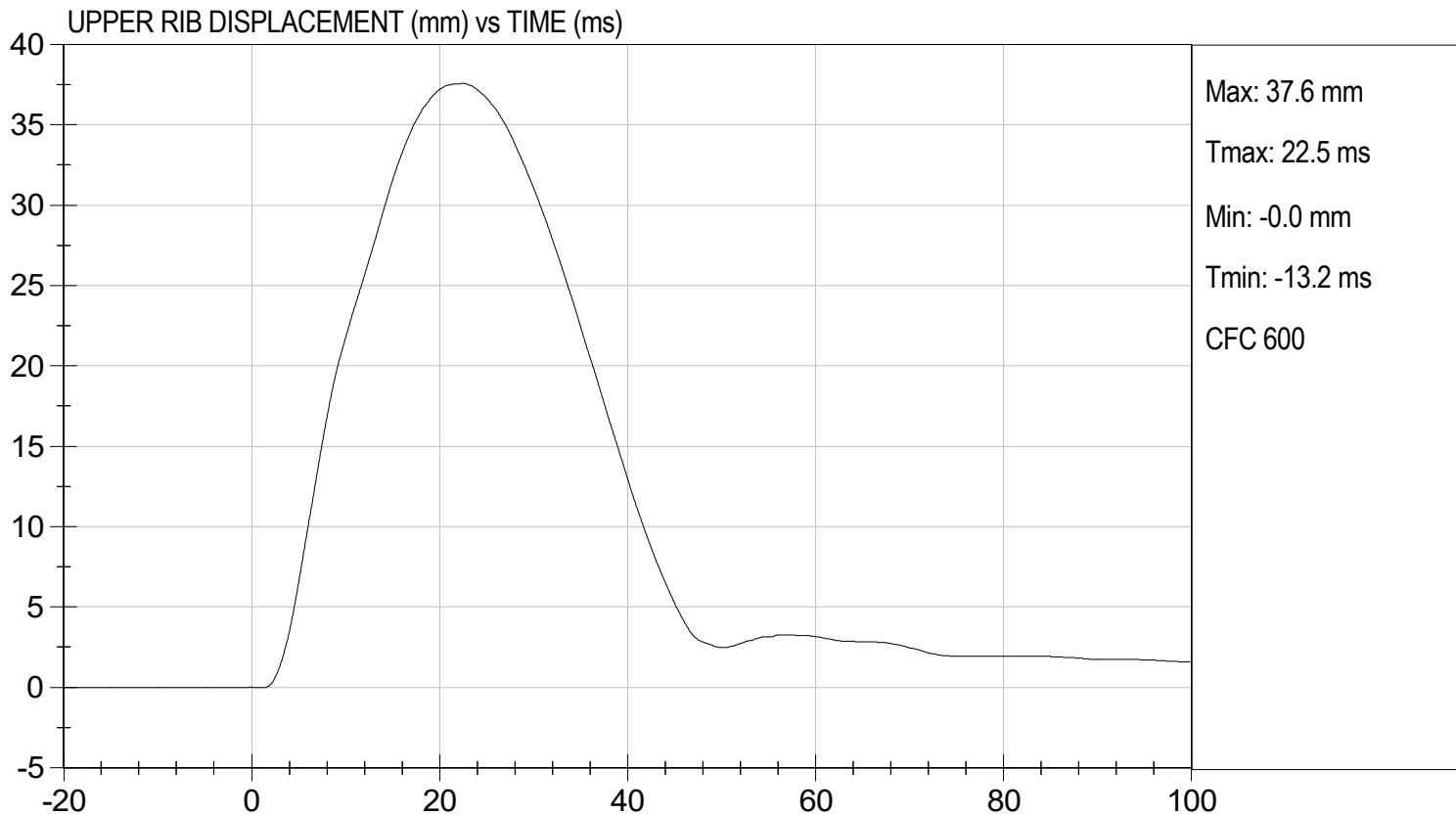
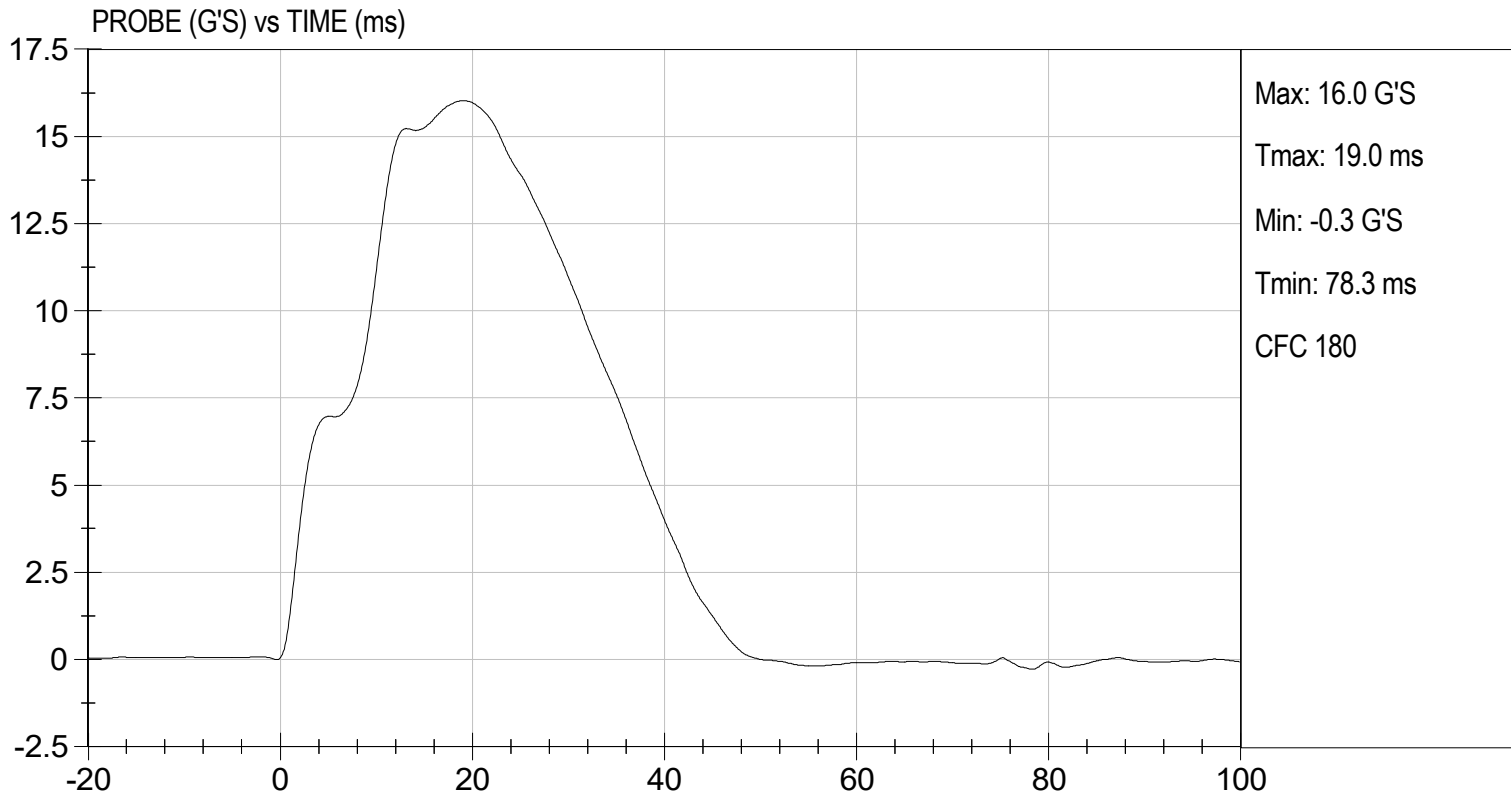
Test Date

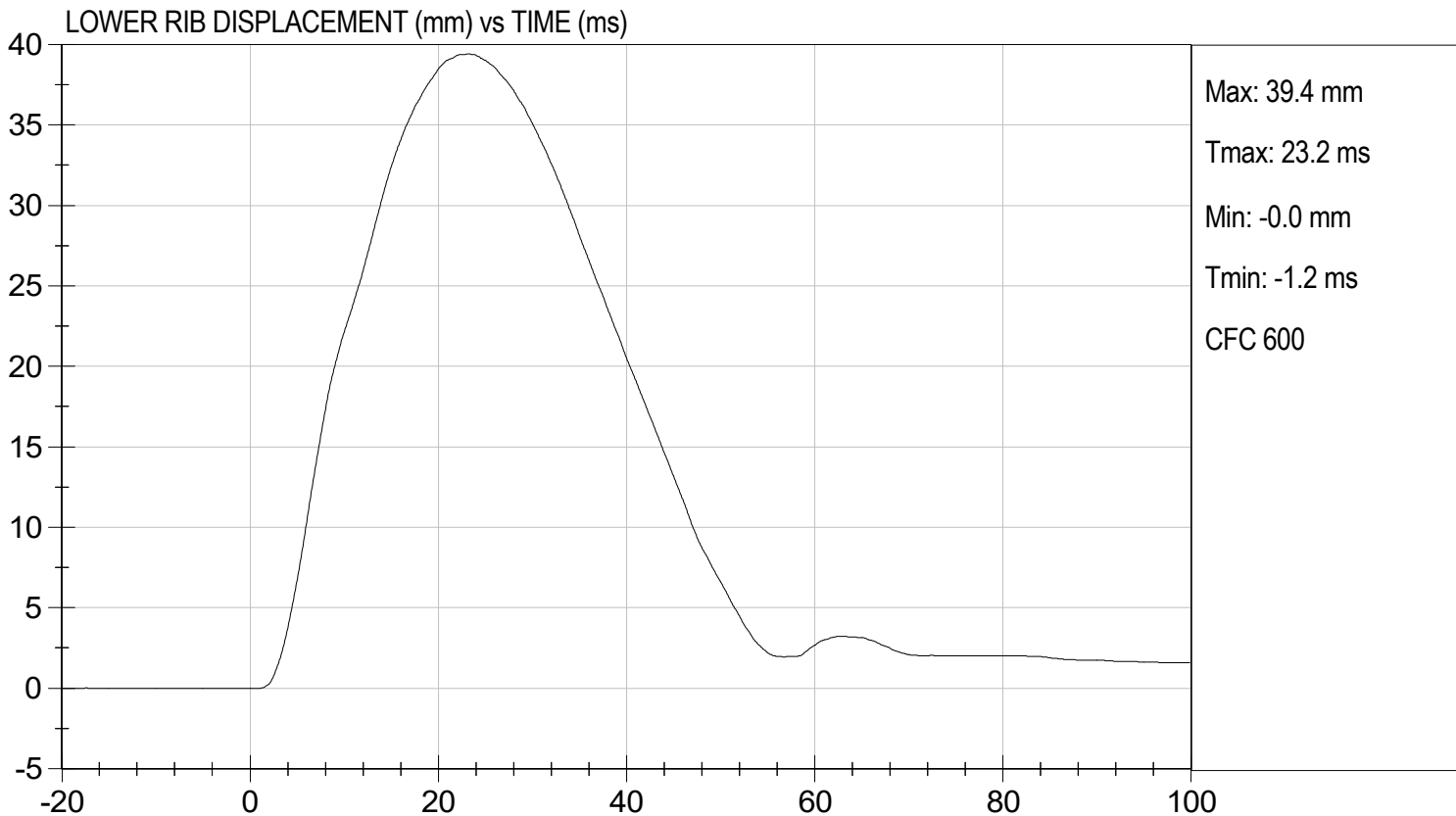
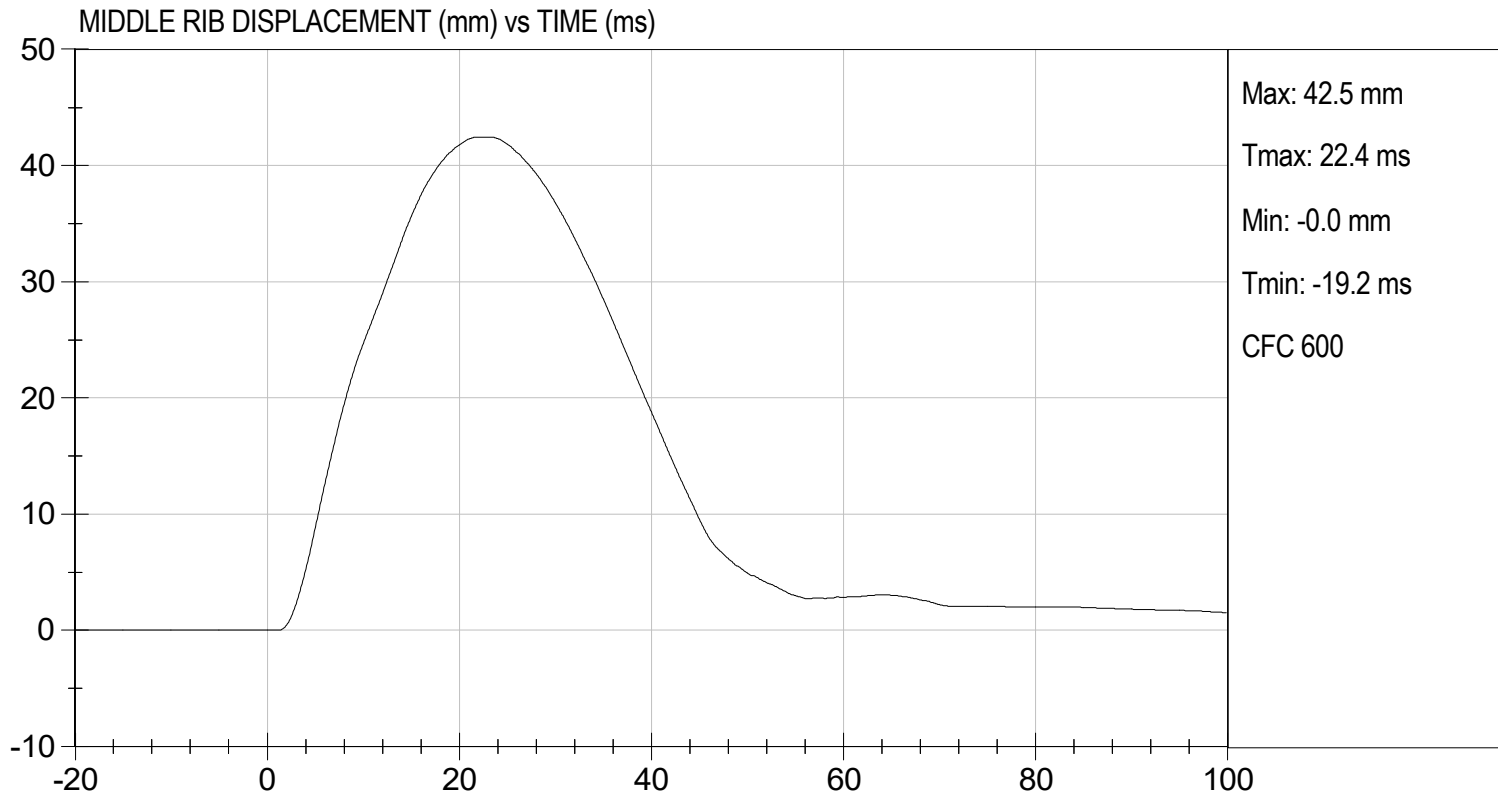

Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/10/2025
TEST #: D250105

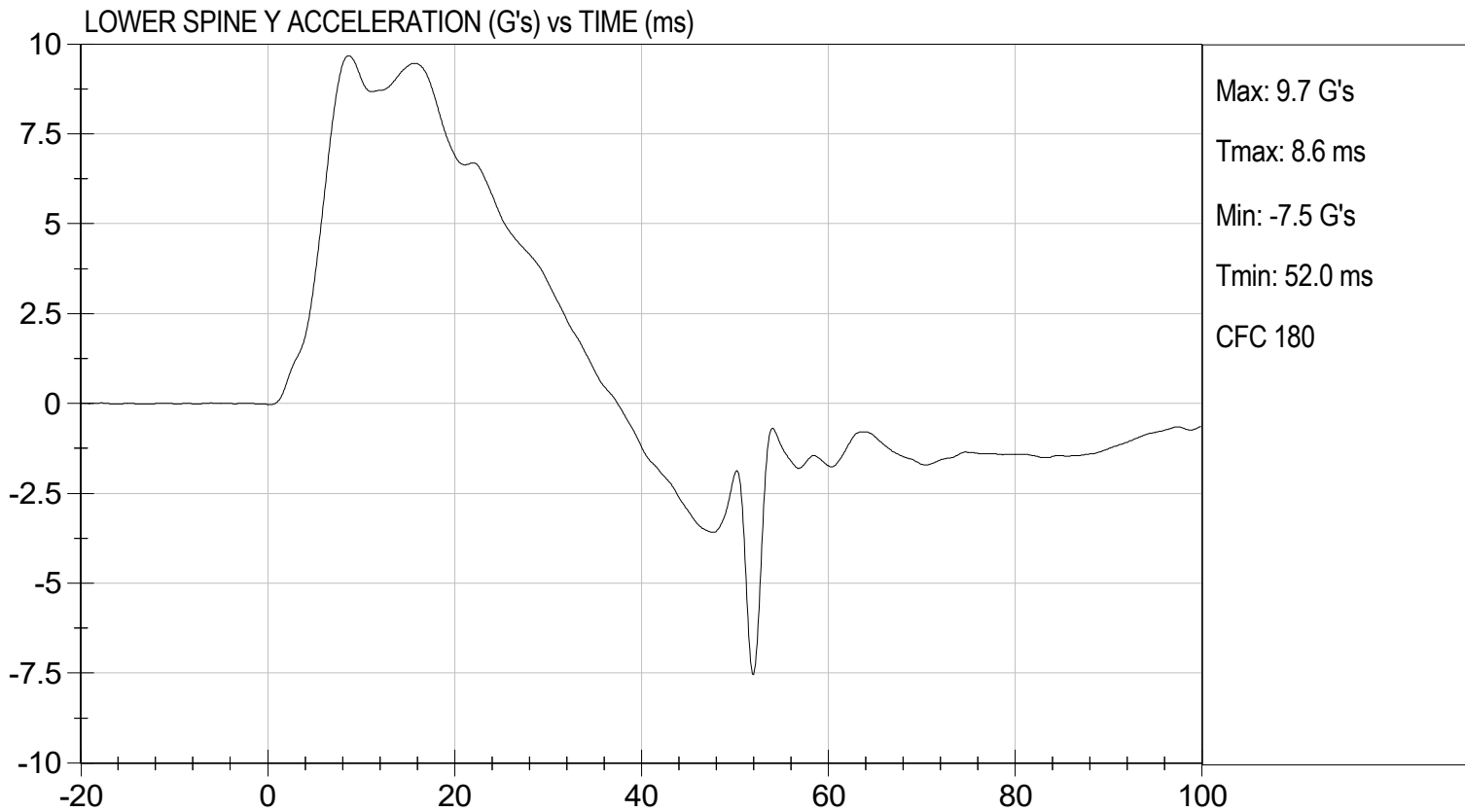
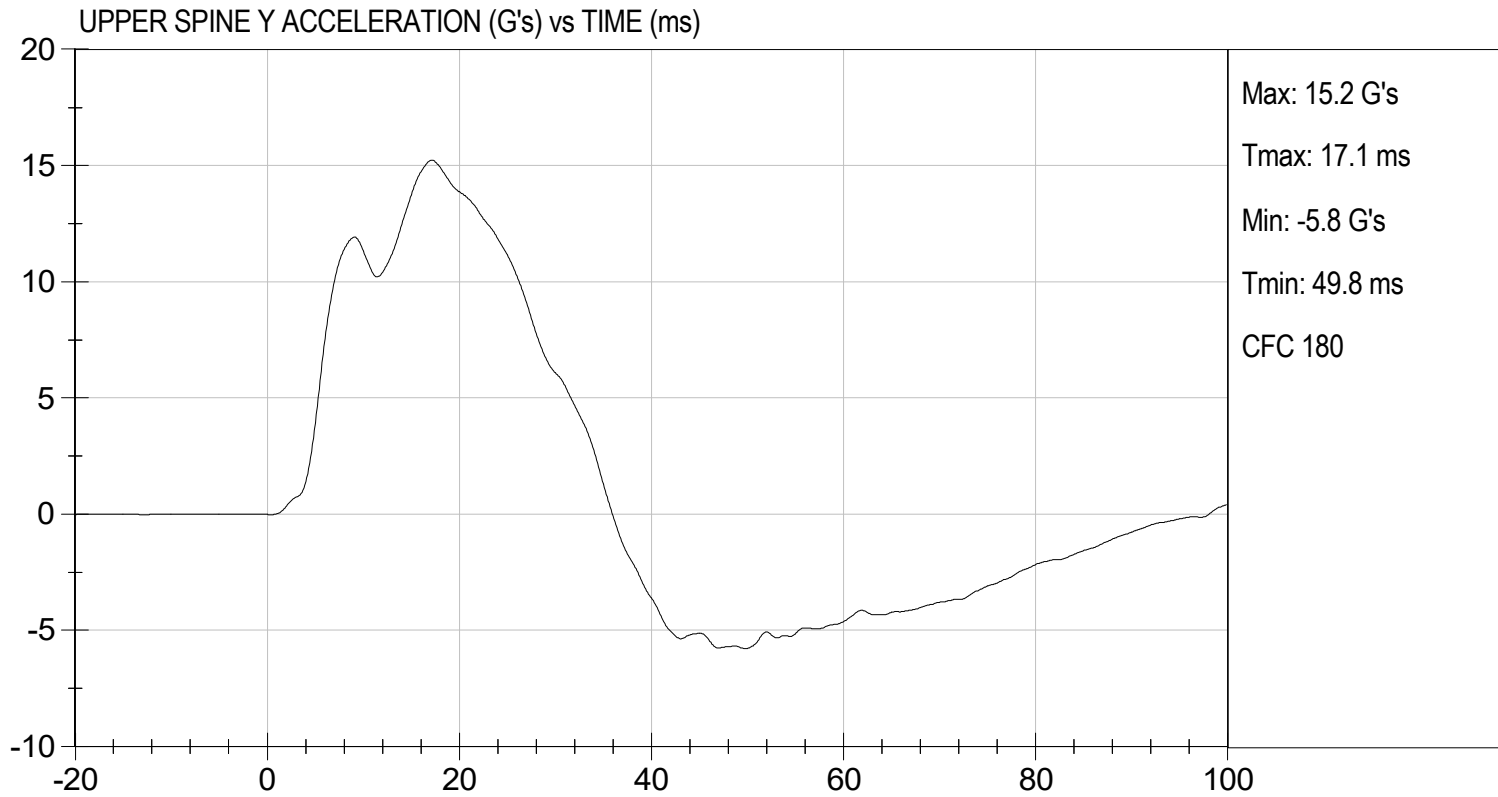






TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/10/2025
TEST #: D250105



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

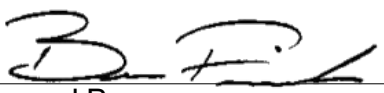
ATD Serial No: 296

Test I.D: D250106

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
Overall Test Results			Pass	


Laboratory Technician

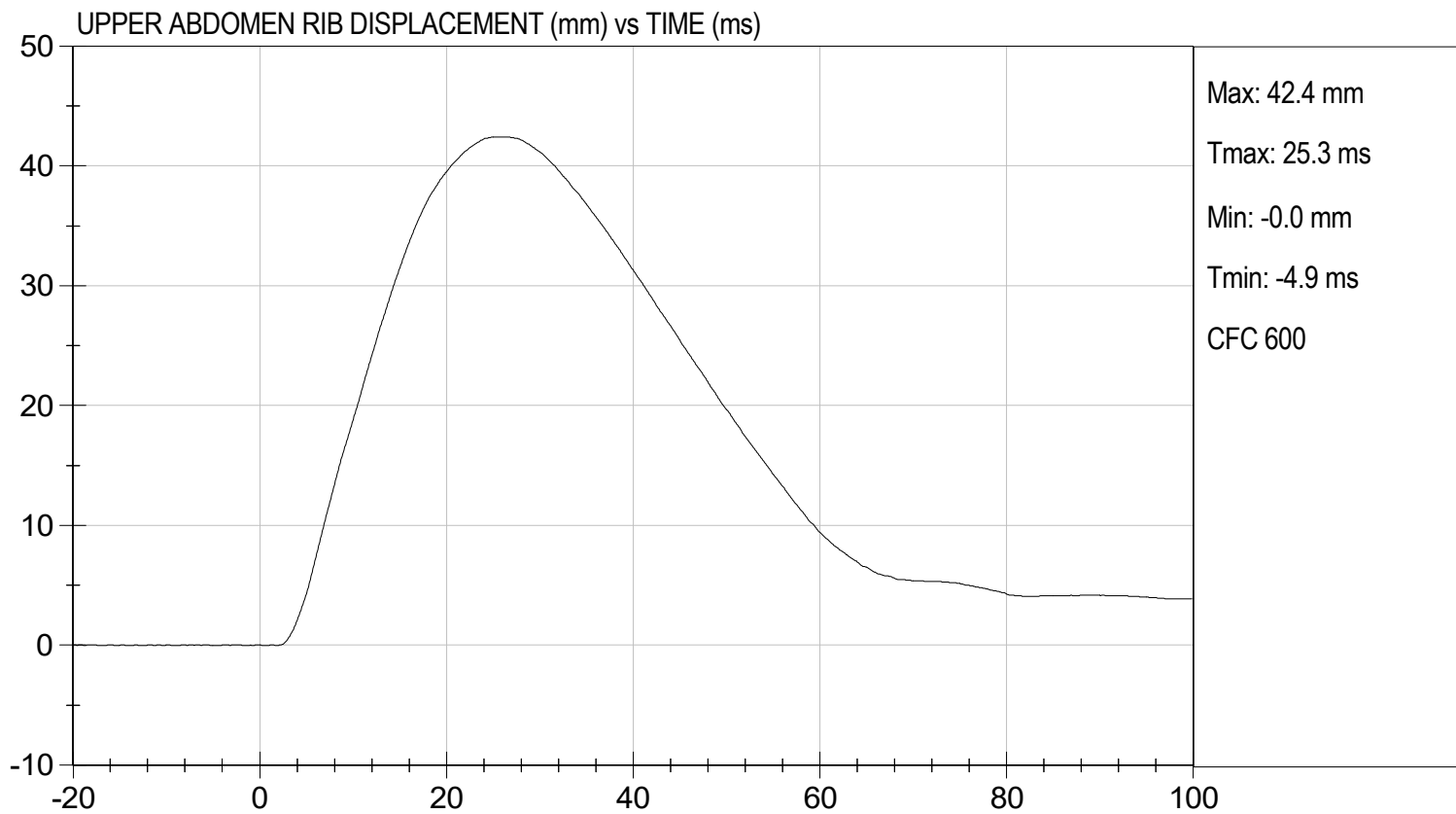
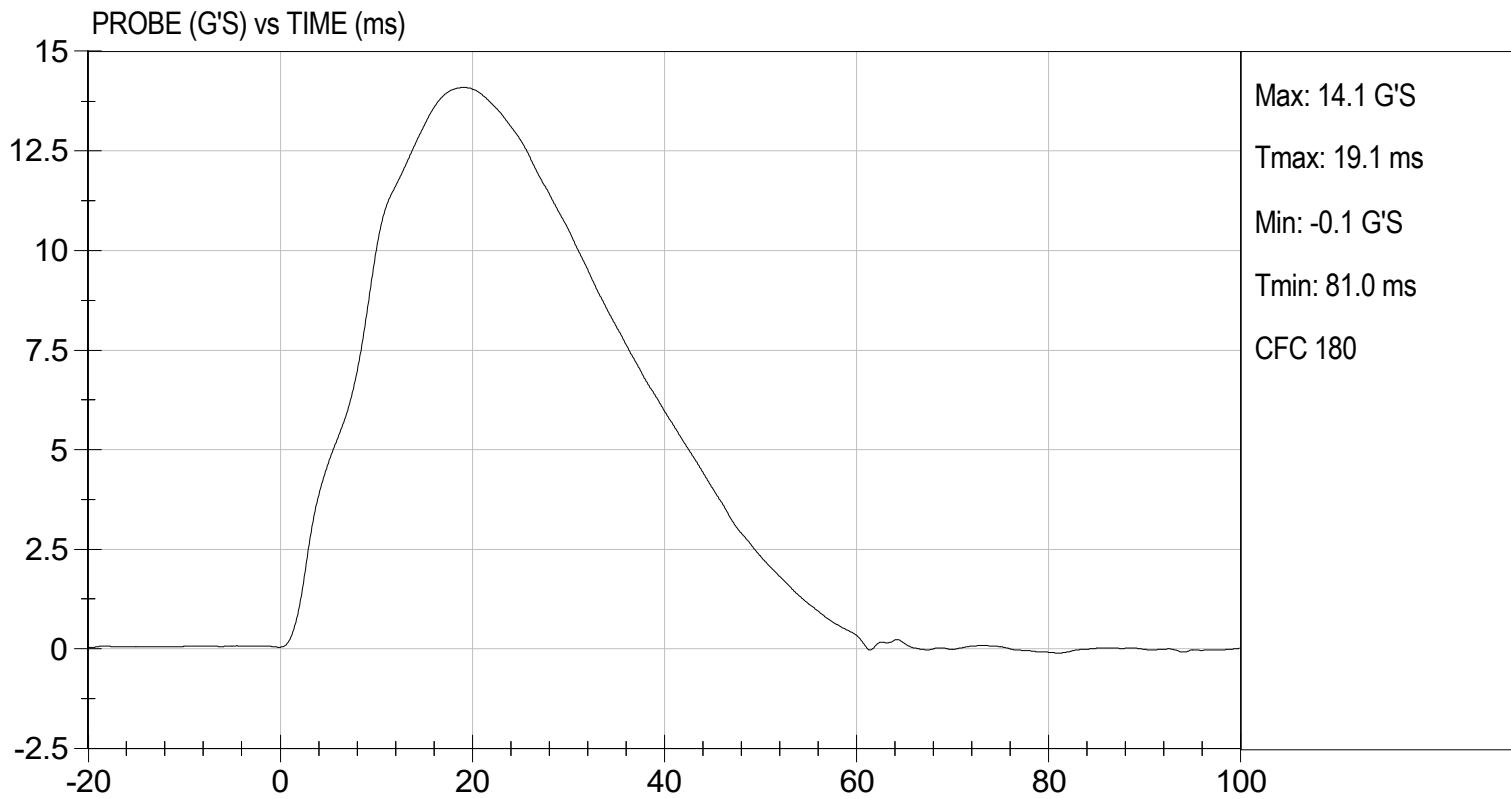
01/10/2025
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/10/2025
TEST #: D250106

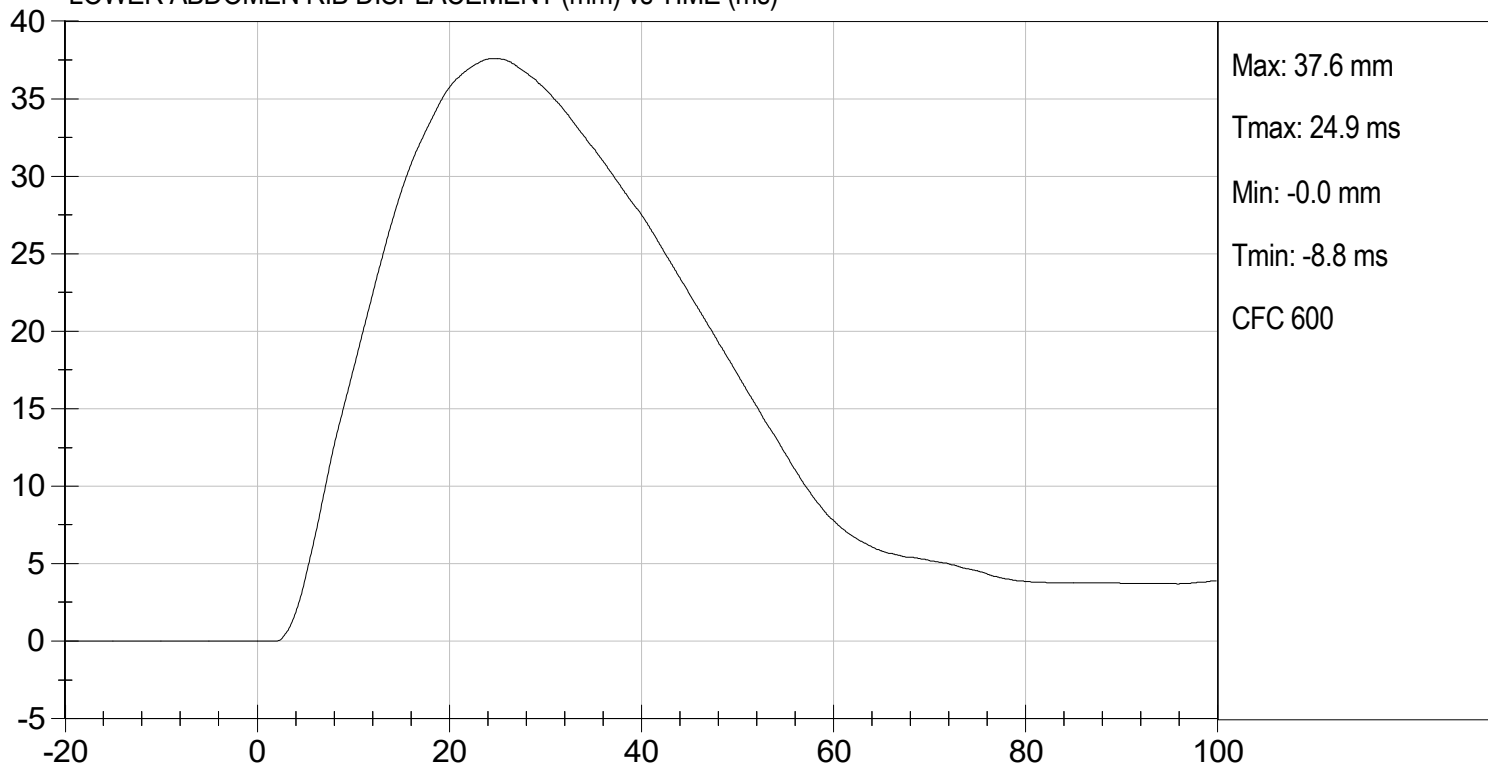




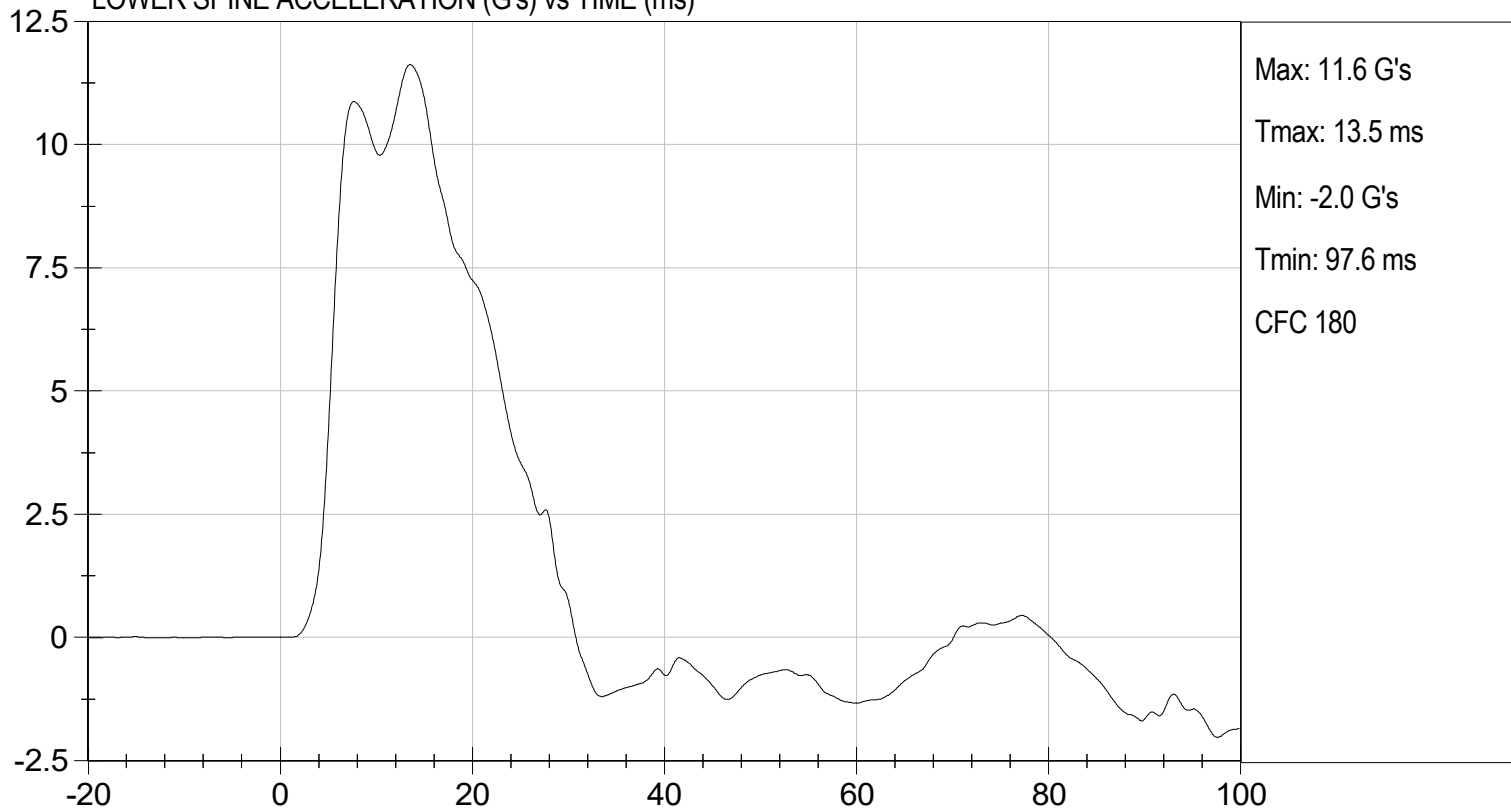
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/10/2025
TEST #: D250106

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER SPINE ACCELERATION (G's) vs TIME (ms)

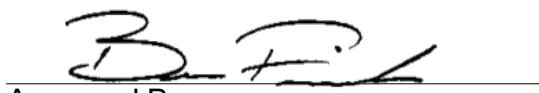


MGA RESEARCH CORPORATION**PELVIS IMPACT TEST****SID-Its BUILD LEVEL D DUMMY****ATD Serial No:** 296**Test I.D:** D250107

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	31	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40.4	Pass
Peak Acetabulum Force	N	3600 to 4300	4,213	Pass
Overall Test Results			Pass	


Laboratory Technician

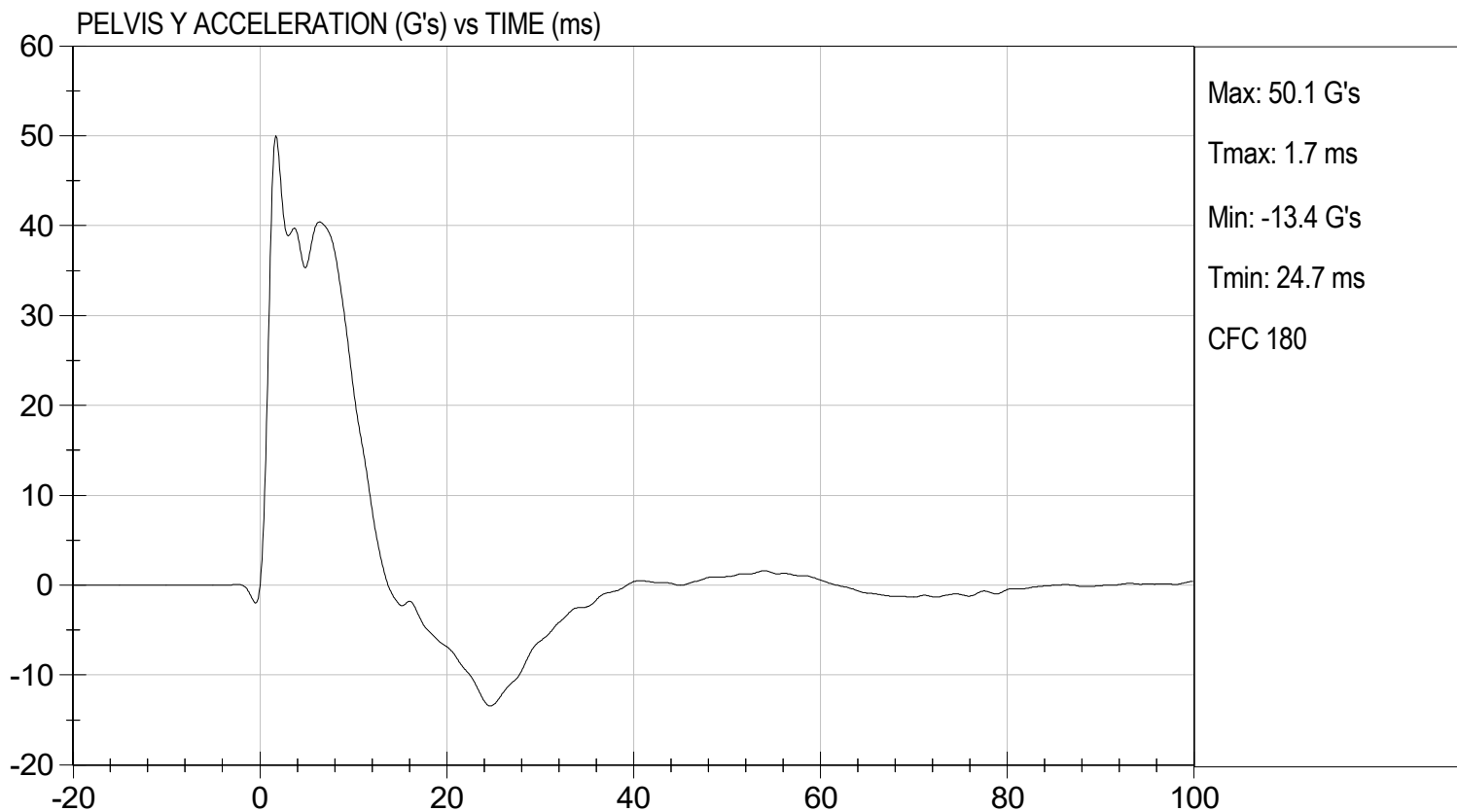
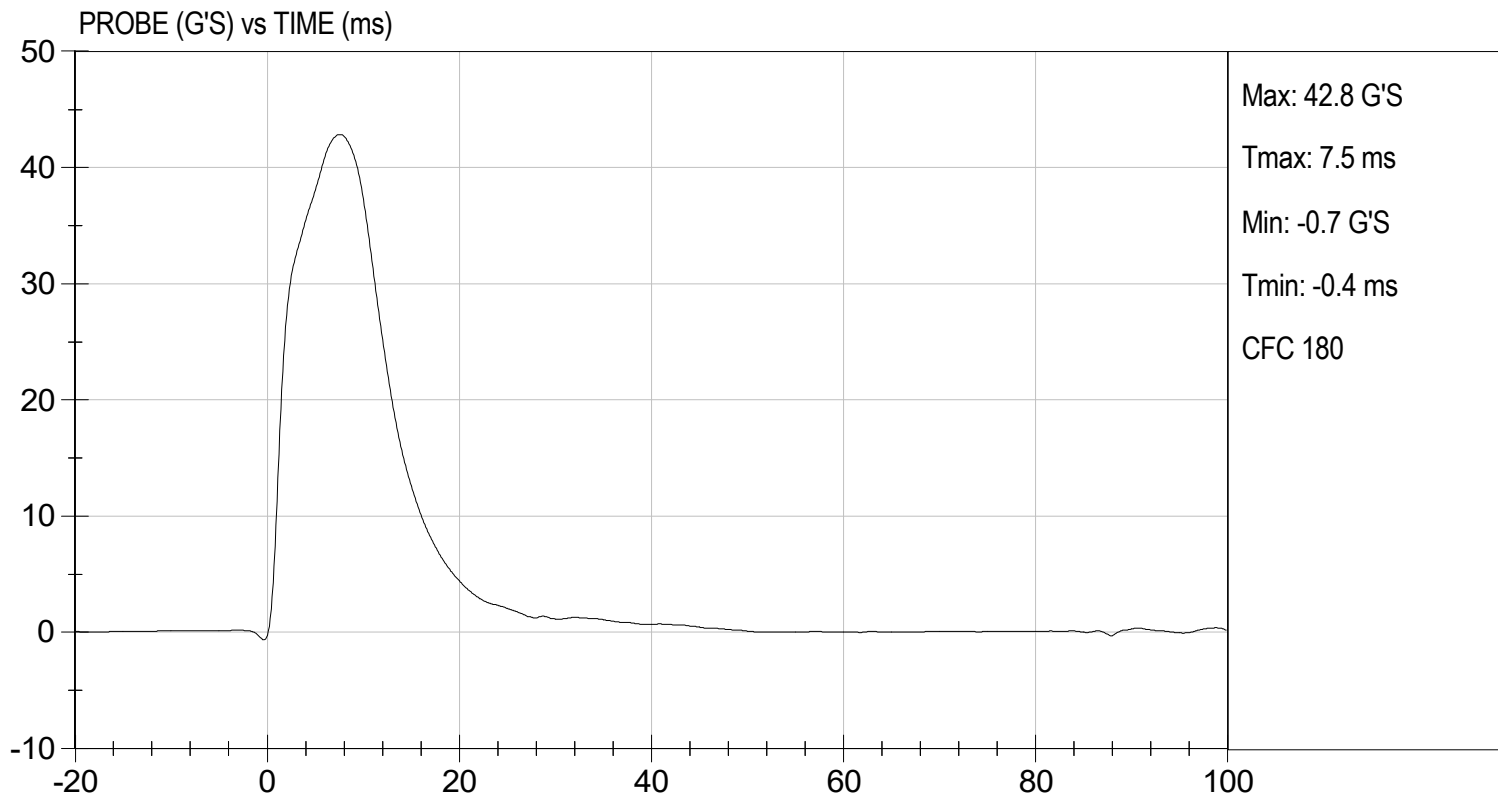
01/10/2025
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

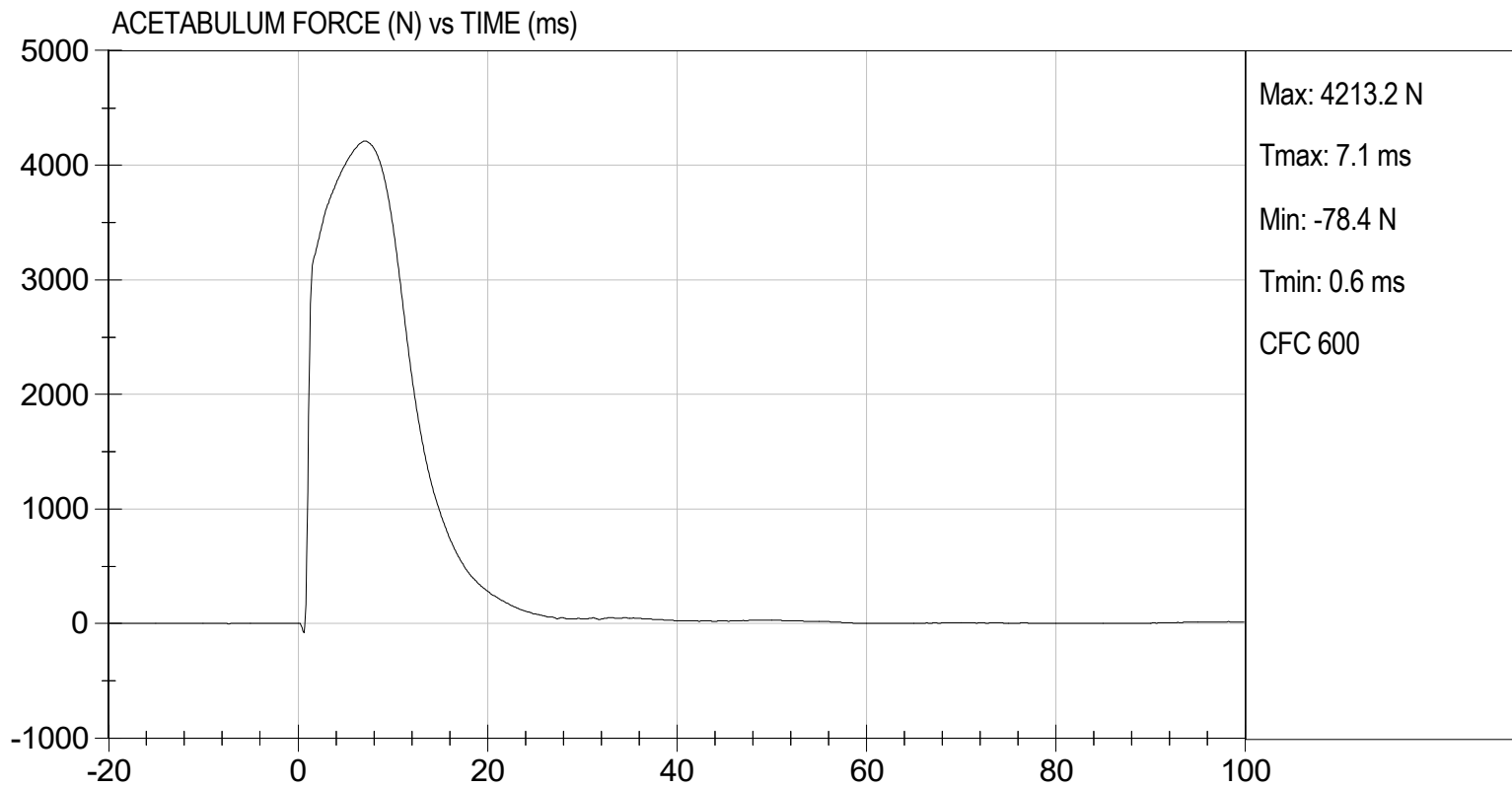
TEST DATE: 01/10/2025
TEST #: D250107





TEST DESC: PELVIS IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/10/2025
TEST #: D250107



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-Its BUILD LEVEL D DUMMY

ATD Serial No: 296

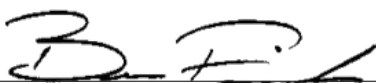
Test I.D: D250108

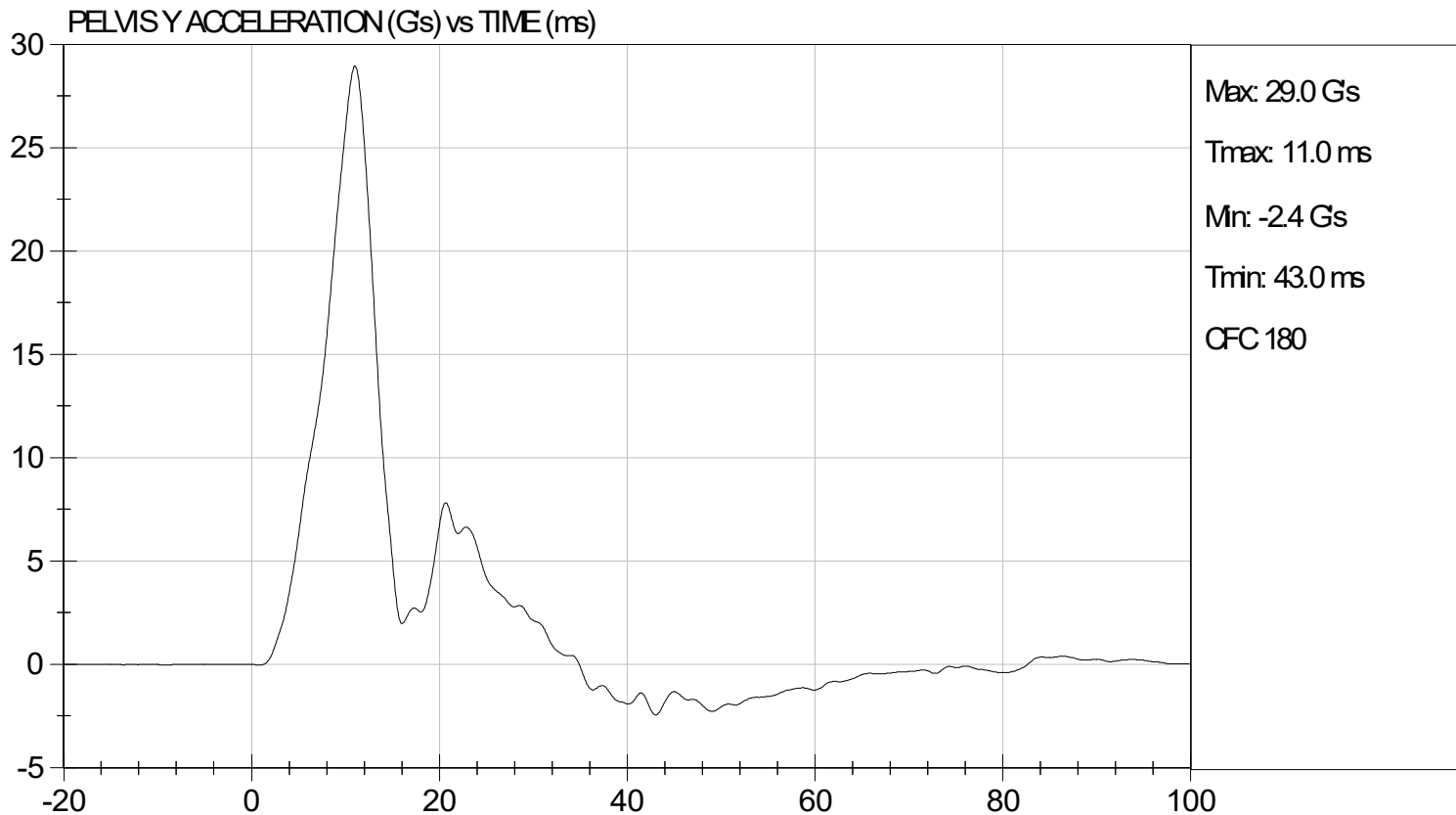
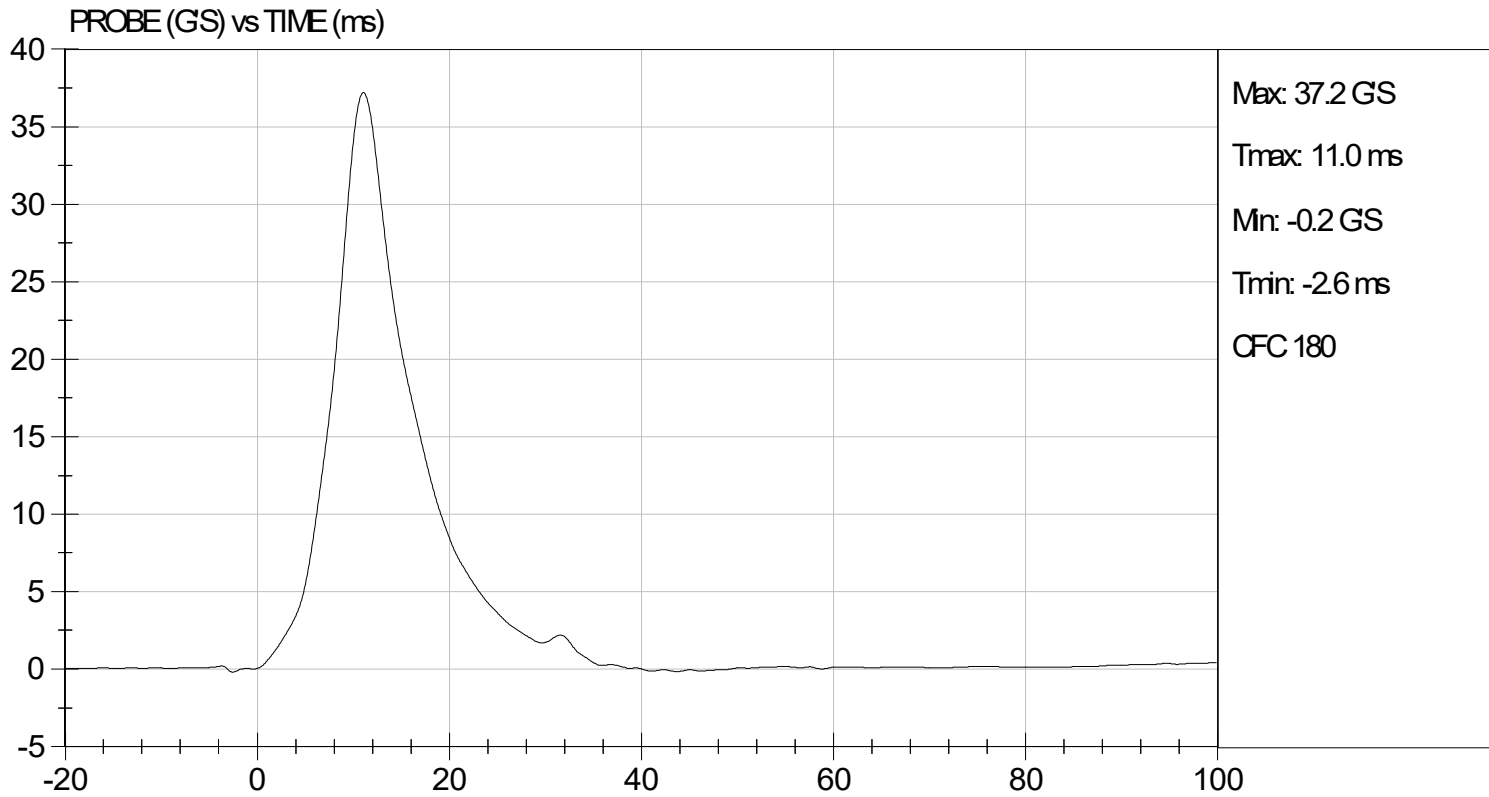
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,179	Pass
Overall Test Results			Pass	


Laboratory Technician

01/10/2025

Test Date

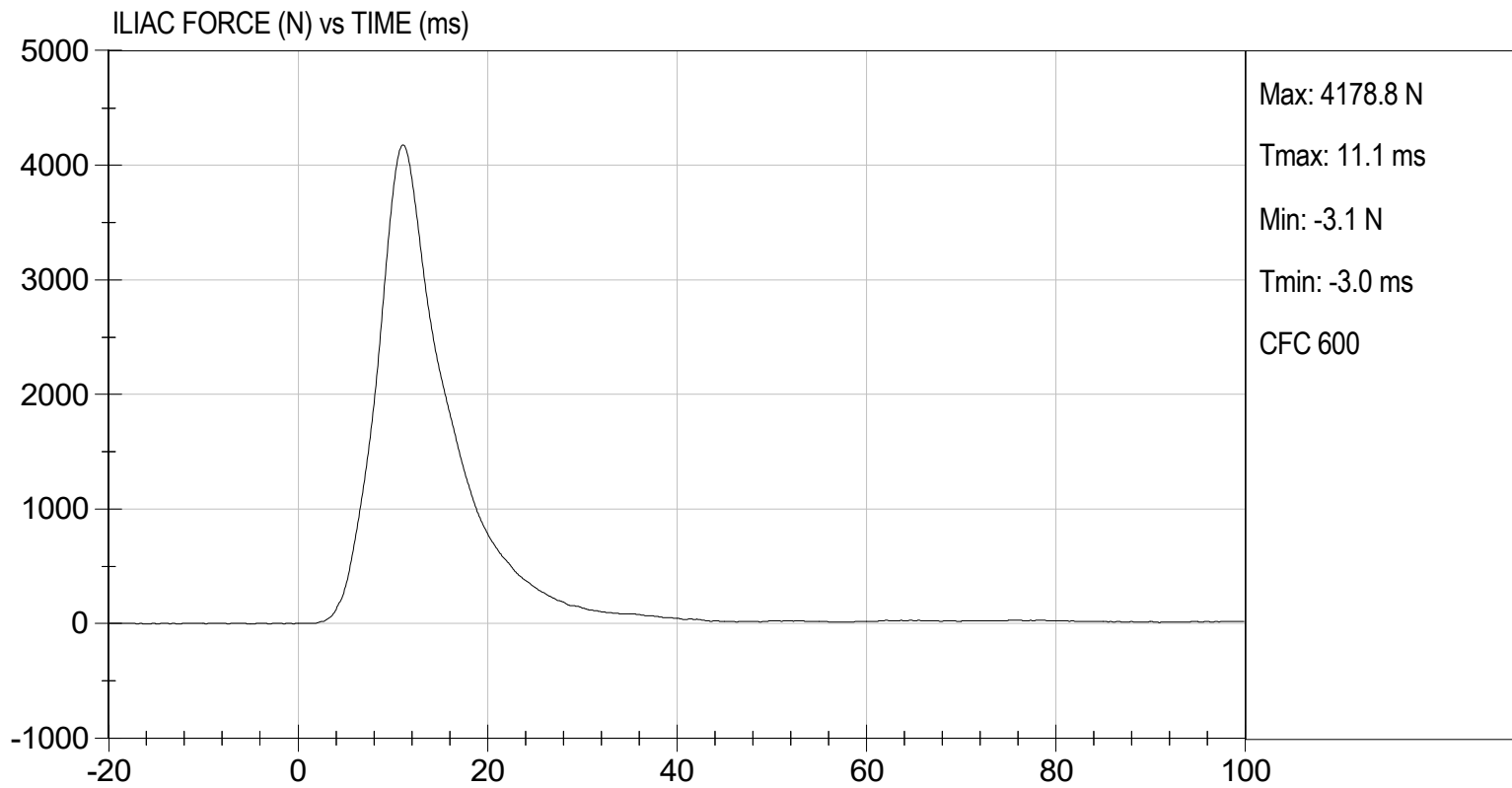

Approved By





TEST DESC: ILLIAC
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/10/2025
TEST #: D250108



QUALIFICATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

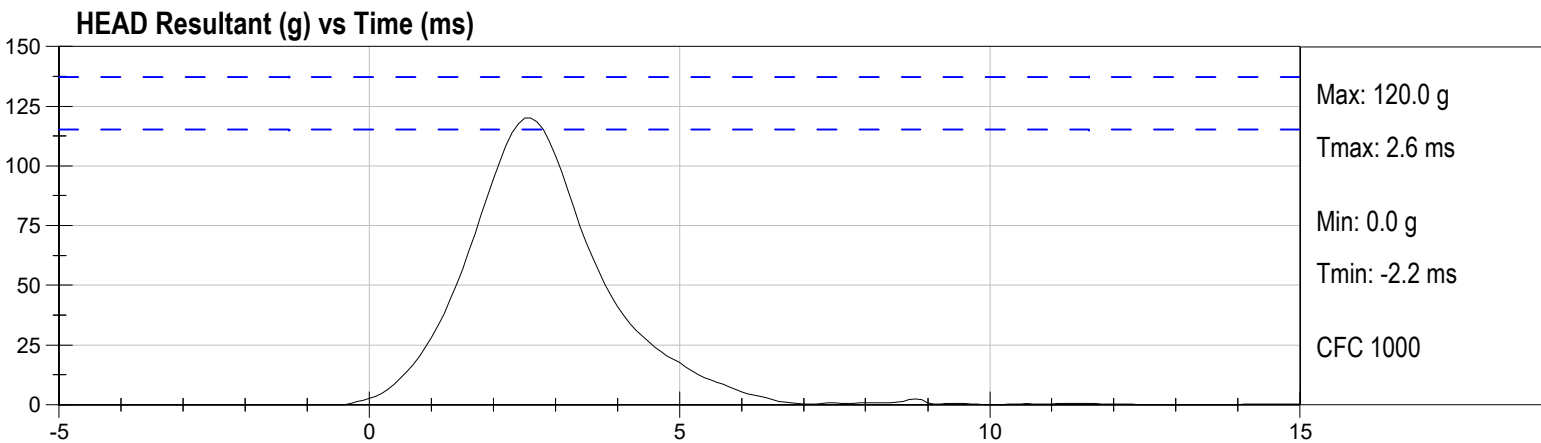
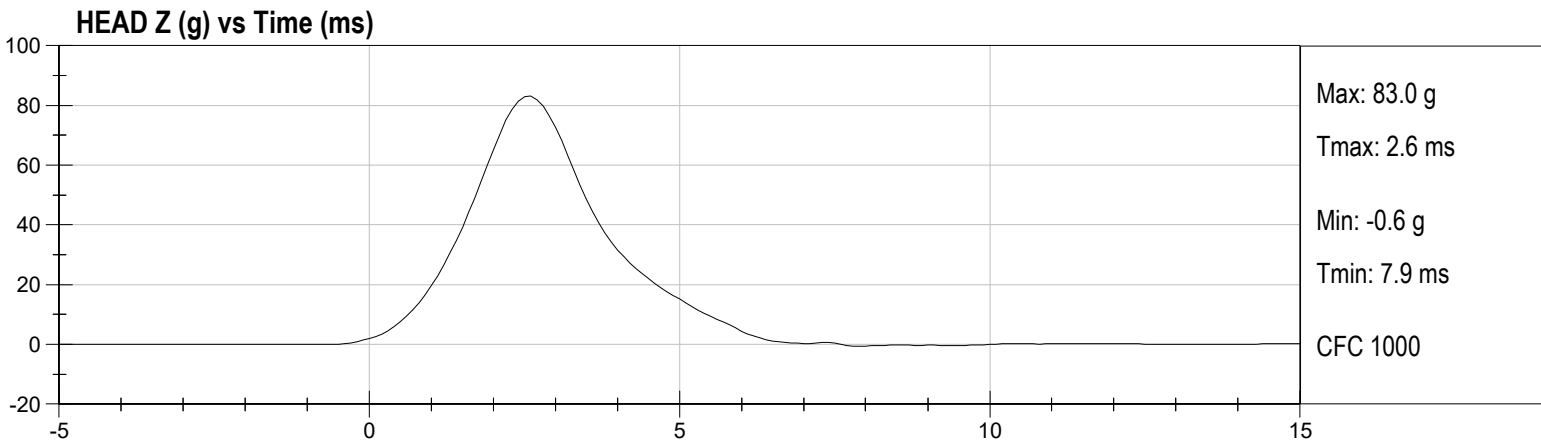
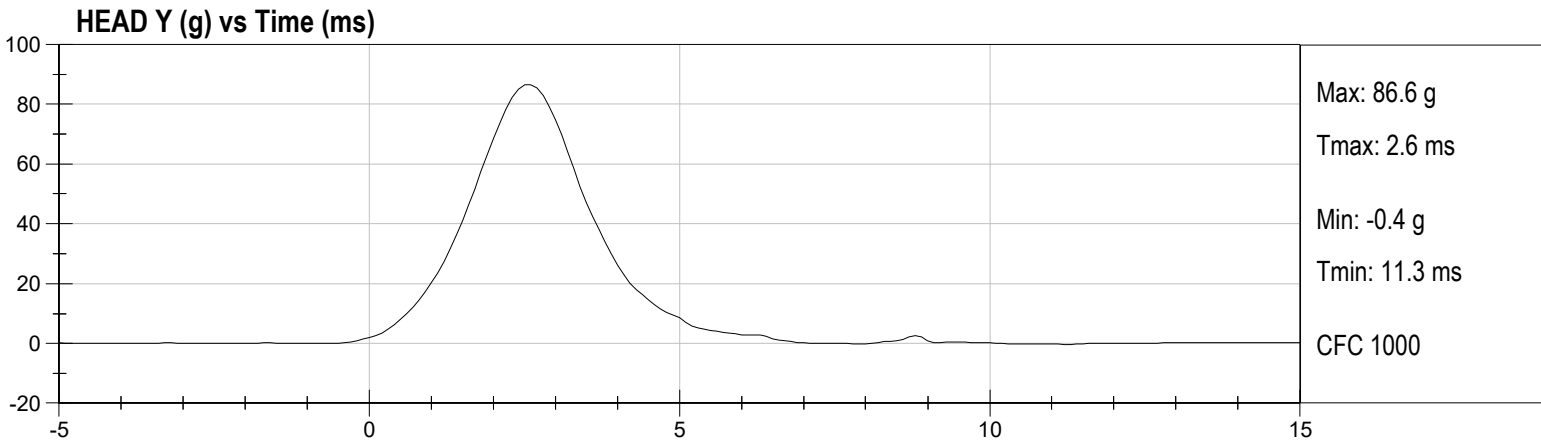
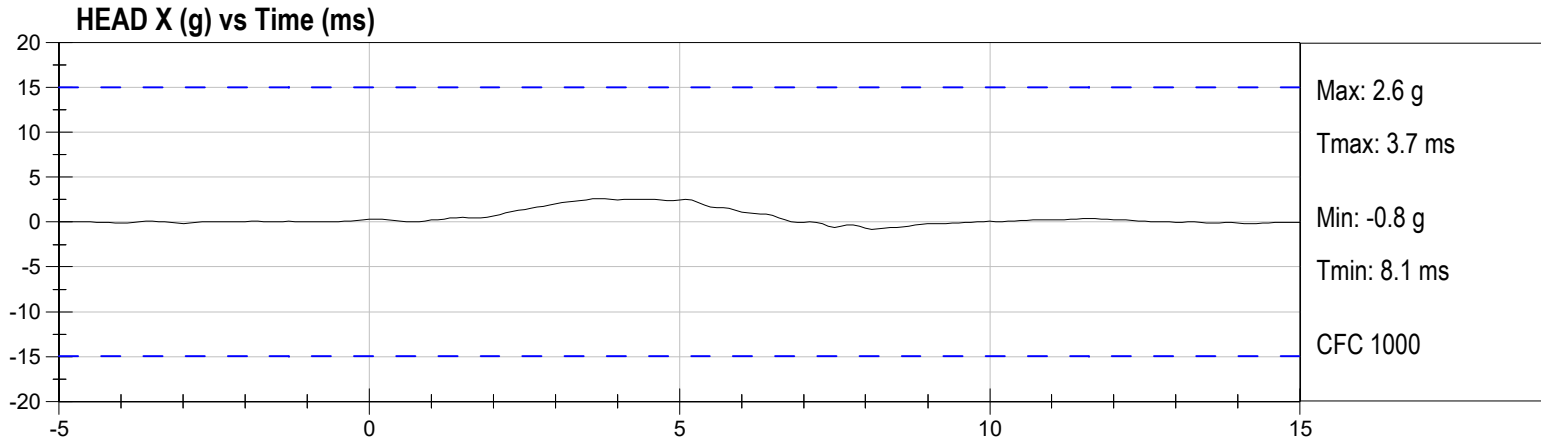
SID-IIsD External Measurements
SN: 296

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	142	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	180	Pass
J	Head Circumference	541 - 551	548	Pass
K	Buttock to Knee Length	514 - 540	535	Pass
L	Popliteal Height	343 - 369	358	Pass
M	Knee Pivot to Floor Height	392 - 409	404	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	206	Pass
P	Foot Length	216 - 232	219	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	316	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	481	Pass
V	Shoulder Width	341 - 357	346	Pass
W	Foot Width	78 - 94	85	Pass
Y	Chest Circumference w/ jacket	851 - 881	870	Pass
Z	Waist Circumference	761 - 791	772	Pass



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	g	115 to 137	120	Pass
Peak Longitudinal Acceleration	g	-15.0 to 15.0	2.6	Pass
Unimodal	%	within 15% of peak	2	Pass

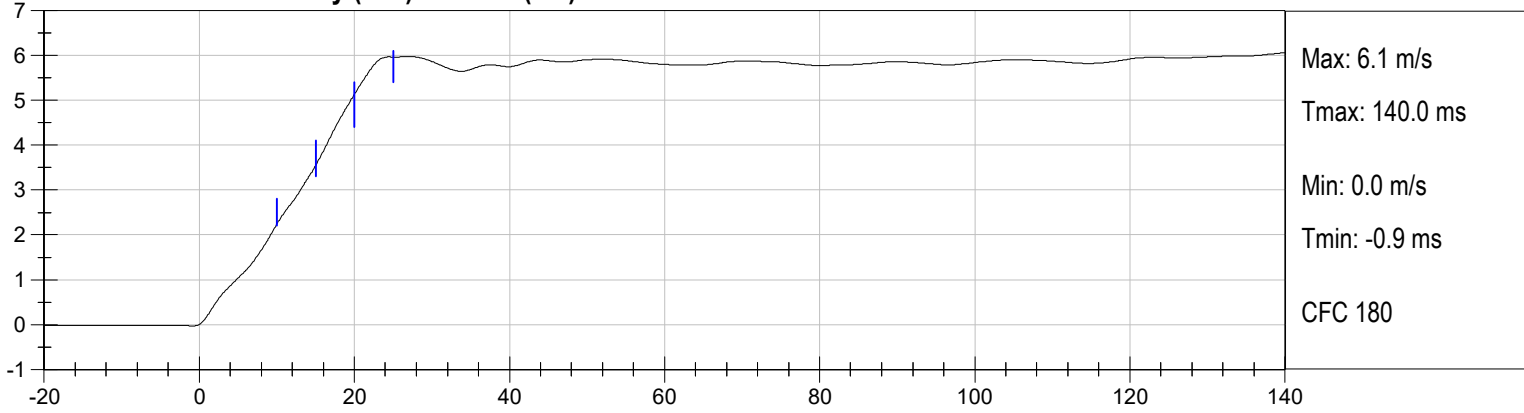
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
HEAD Y	Endevco	T30974	11/25/2024	5/27/2025
HEAD X	Endevco	T30975	11/25/2024	5/27/2025
HEAD Z	Endevco	T30976	11/25/2024	5/27/2025



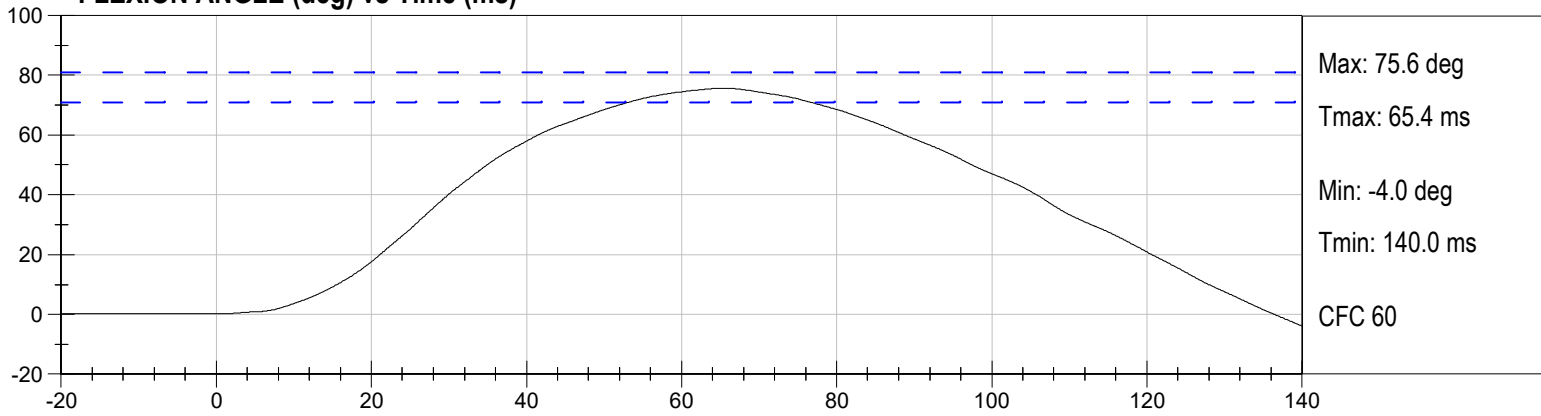
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Impact Velocity	m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity at 10 ms	m/s	2.2 to 2.8	2.21	Pass
Pendulum Velocity at 15 ms	m/s	3.30 to 4.10	3.51	Pass
Pendulum Velocity at 20 ms	m/s	4.40 to 5.40	5.11	Pass
Pendulum Velocity at 25 ms	m/s	5.40 to 6.10	5.97	Pass
Peak Pendulum Velocity from 25 to 100 ms	m/s	5.50 to 6.20	5.98	Pass
Maximum "D" Plane Rotation	deg	71 to 81	76	Pass
Time of Maximum "D" Plane Rotation	ms	50 to 70	65	Pass
Maximum Moment About Occipital Condyle	Nm	-44 to -36	-38	Pass
Time of Moment Decay Time To 0 Nm	ms	102 to 126	120	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE Y	Denton	N252FY	02/05/2025	8/7/2025
NECK MOMENT X	Denton	N252MX	02/05/2025	8/7/2025
POT. A - FRONT	Servo	2732	01/09/2025	7/11/2025
POT. C - HEADFORM	Servo	2204	01/09/2025	7/11/2025

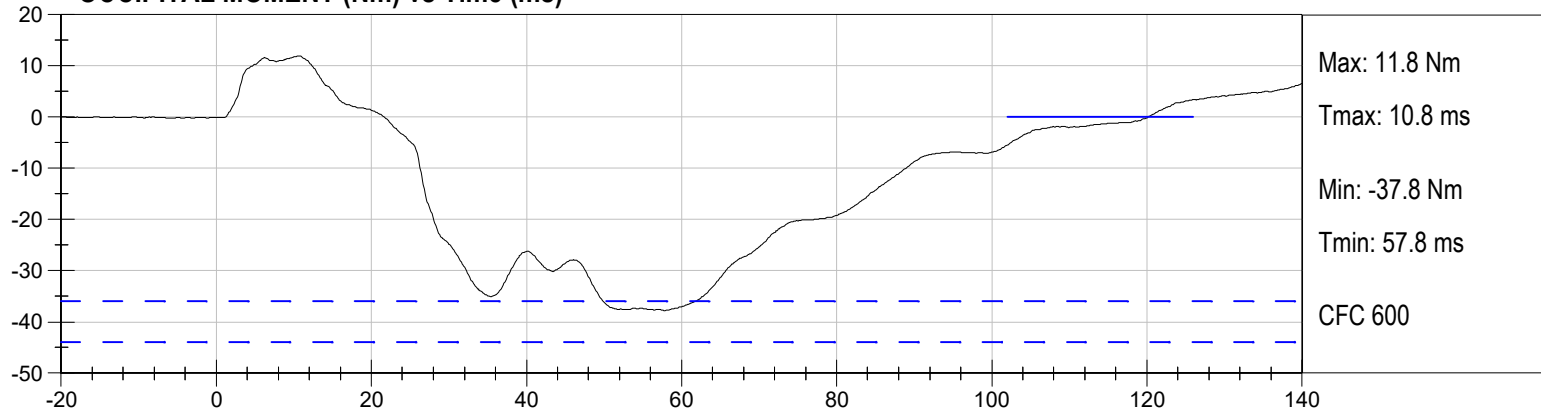
PEND. ACCEL. Velocity (m/s) vs Time (ms)



FLEXION ANGLE (deg) vs Time (ms)

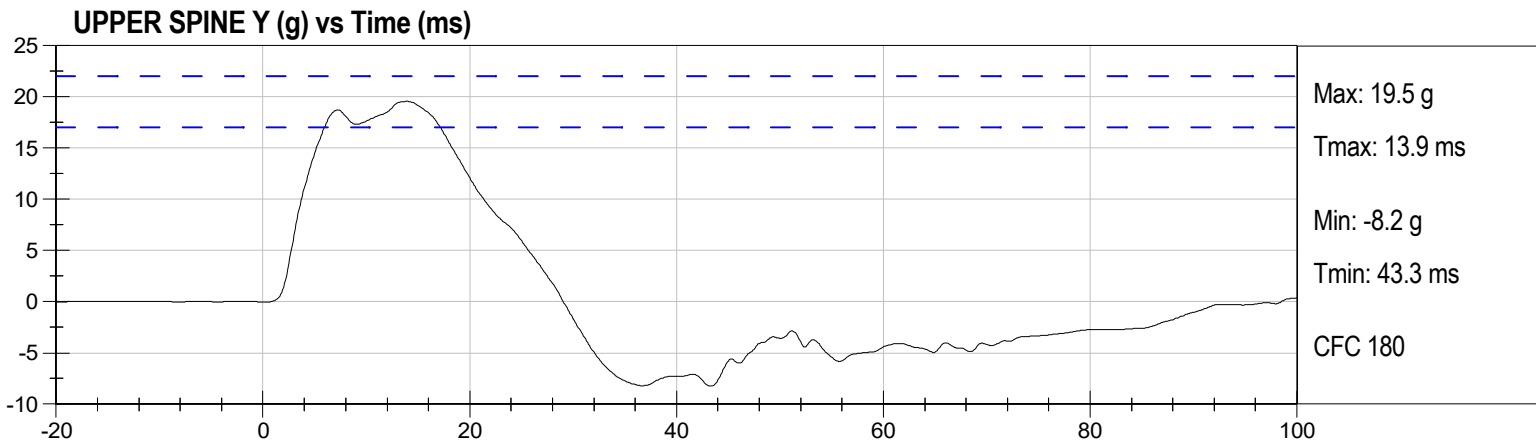
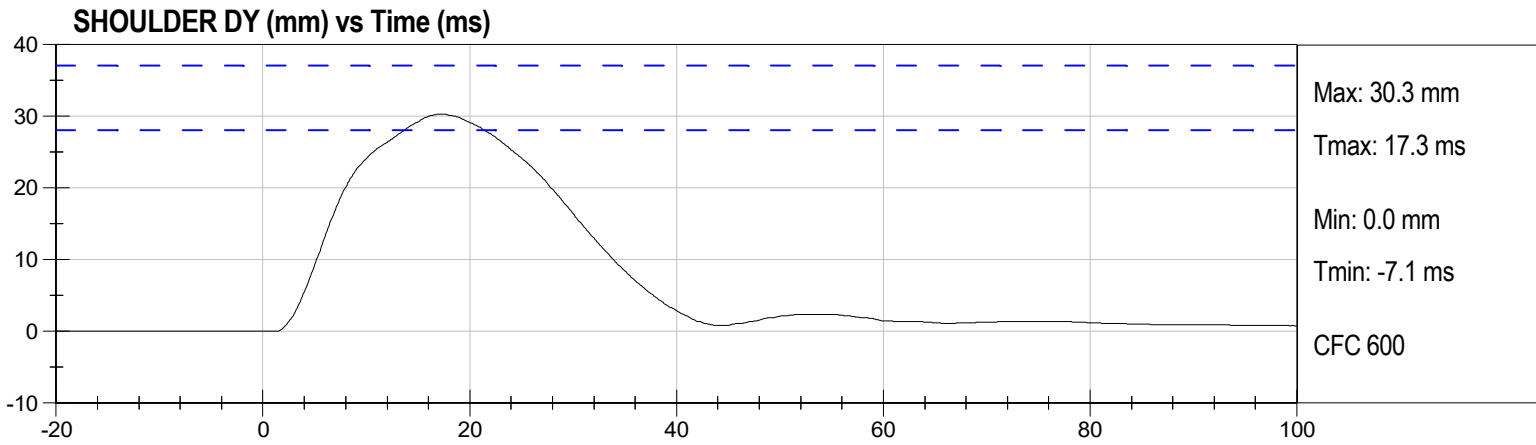
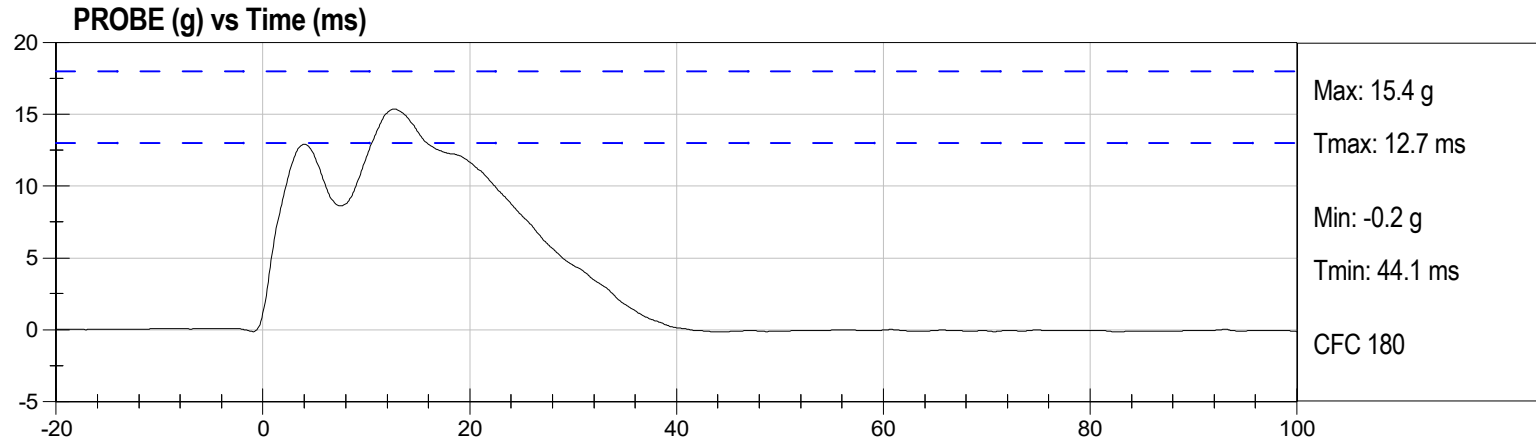


OCCIPITAL MOMENT (Nm) vs Time (ms)



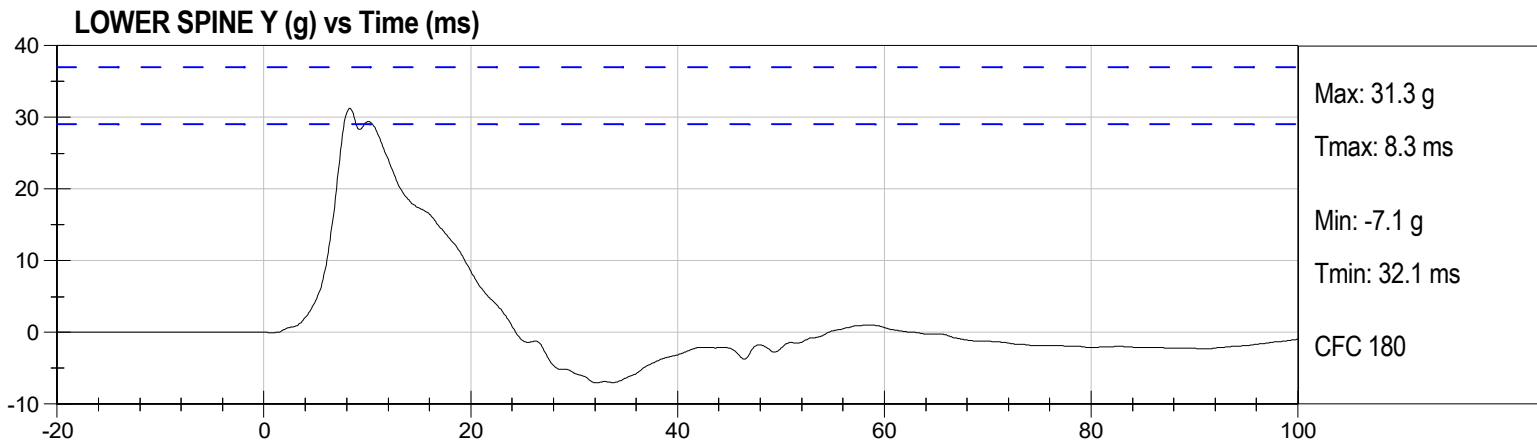
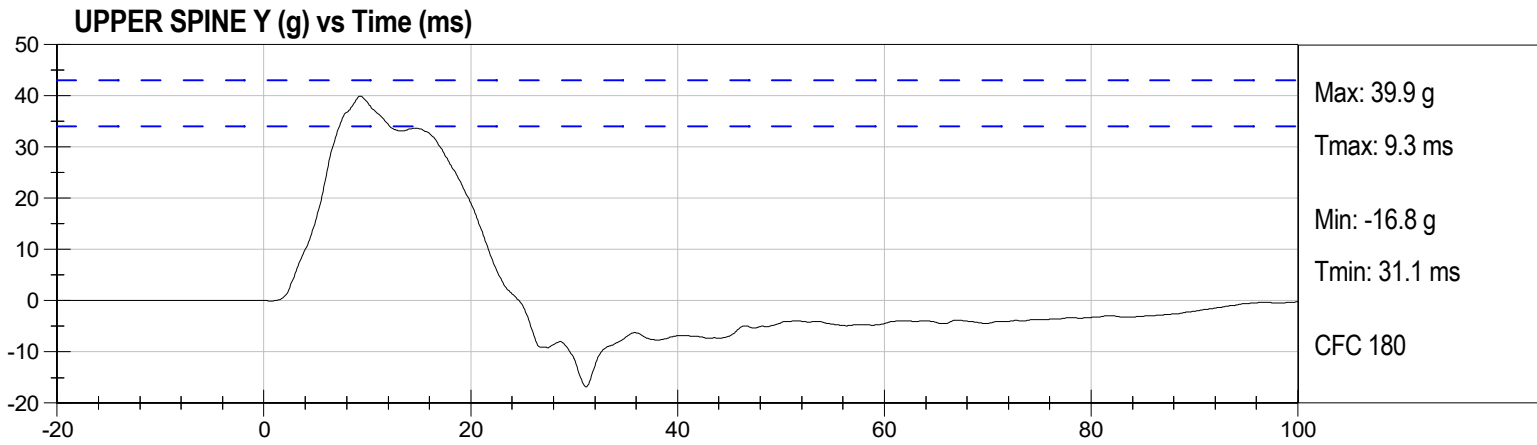
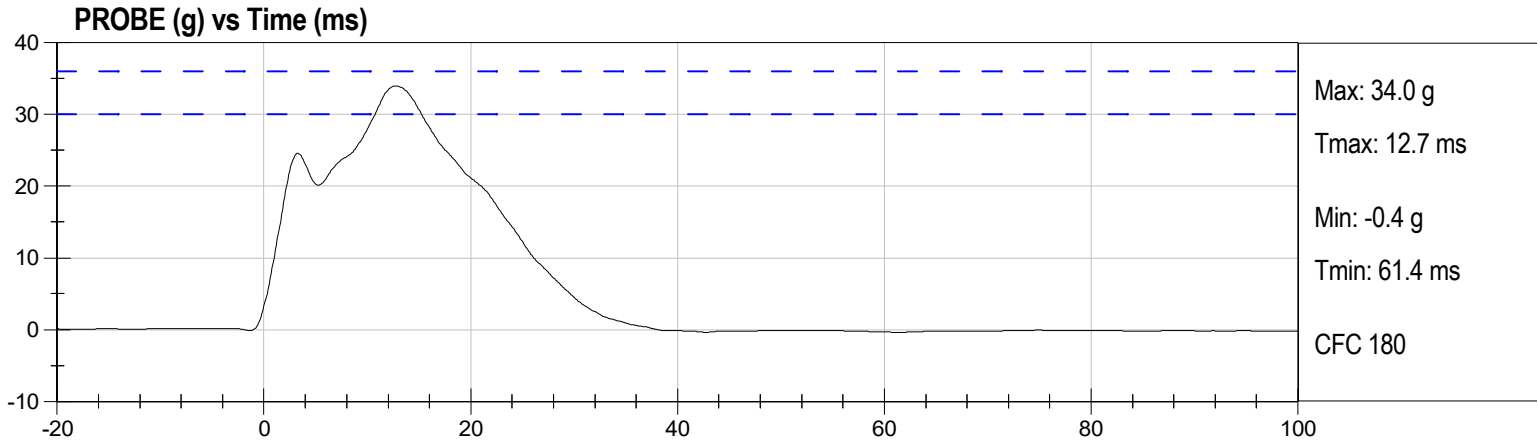
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Probe Acceleration	g	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	30	Pass
Upper Spine (T1) Y Acceleration	g	17 to 22	20	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	09/18/2024	3/20/2025
UPPER SPINE Y	Endevco	P88675	12/12/2024	6/13/2025
SHOULDER DY	FTSS	G1223	12/12/2024	6/13/2025

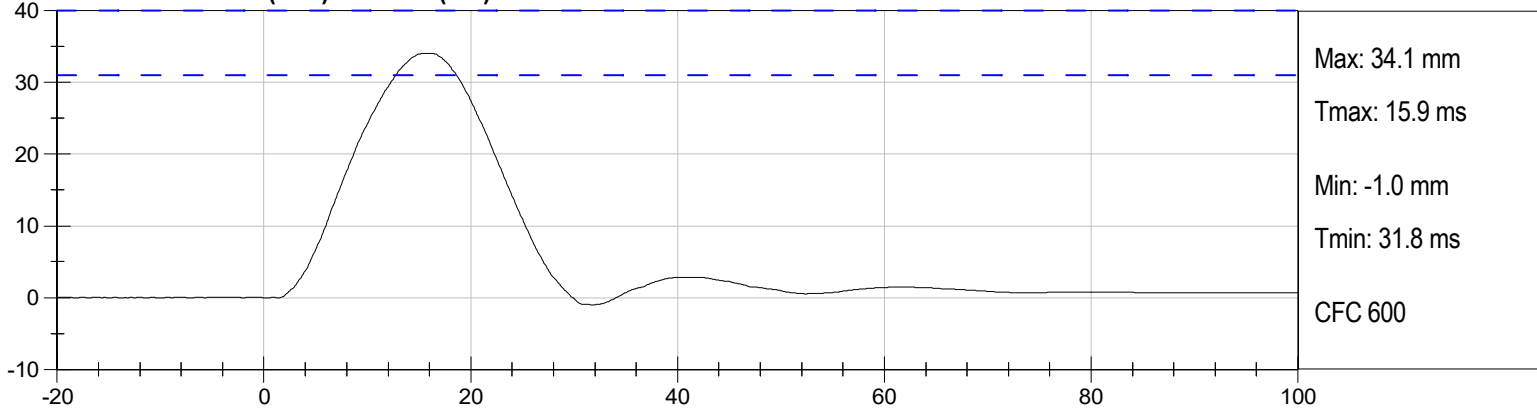


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	6.6 to 6.8	6.77	Pass
Peak Probe Acceleration after 5 ms	g	30 to 36	34	Pass
Upper Spine (T1) Y Acceleration	g	34 to 43	40	Pass
Lower Spine (T12) Y Acceleration	g	29 to 37	31	Pass
Shoulder Displacement	mm	31 to 40	34	Pass
Upper Thorax Rib Displacement	mm	25 to 32	27	Pass
Middle Thorax Rib Displacement	mm	30 to 36	32	Pass
Lower Thorax Rib Displacement	mm	32 to 38	34	Pass

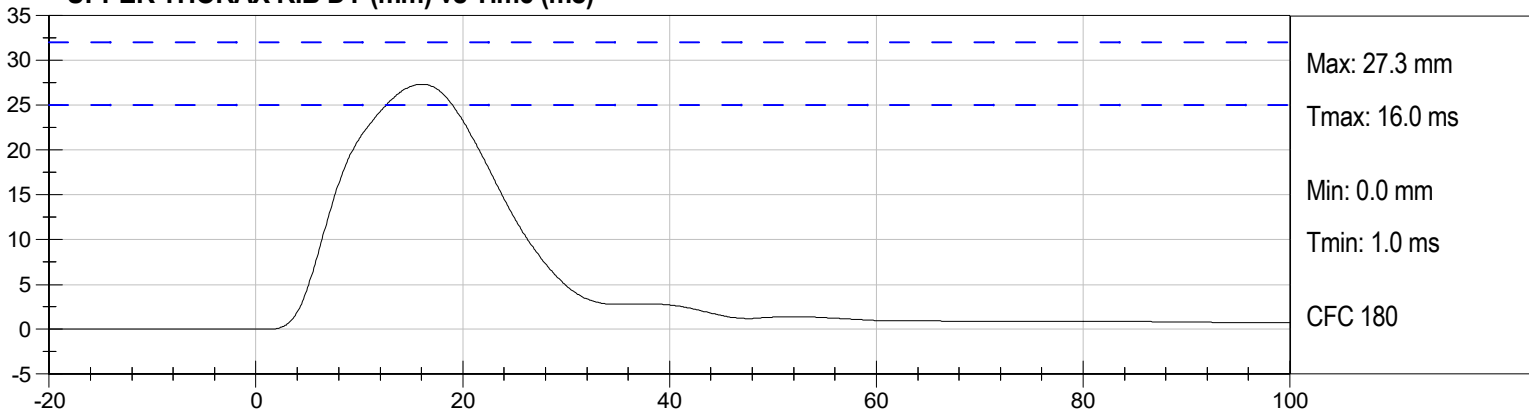
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	09/18/2024	3/20/2025
UPPER SPINE Y	Endevco	P88675	12/12/2024	6/13/2025
LOWER SPINE Y	Endevco	P79439	12/12/2024	6/13/2025
SHOULDER DY	FTSS	G1223	12/12/2024	6/13/2025
UPPER THORAX RIB DY	Servo	G012	12/12/2024	6/13/2025
MID THORAX RIB DY	FTSS	G1163	12/12/2024	6/13/2025
LOWER THORAX RIB DY	FTSS	G1158	12/12/2024	6/13/2025



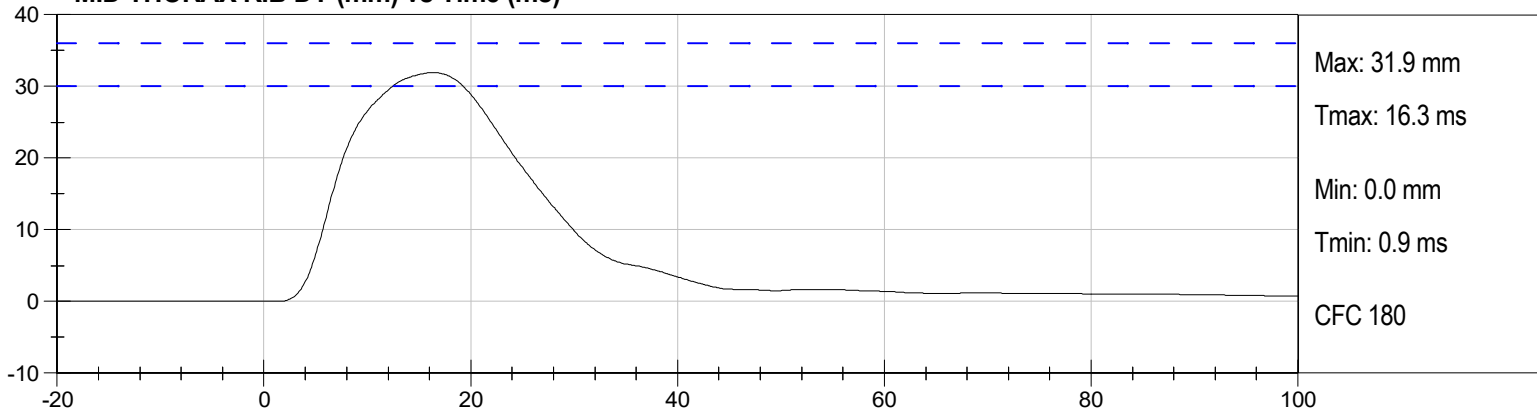
SHOULDER DY (mm) vs Time (ms)



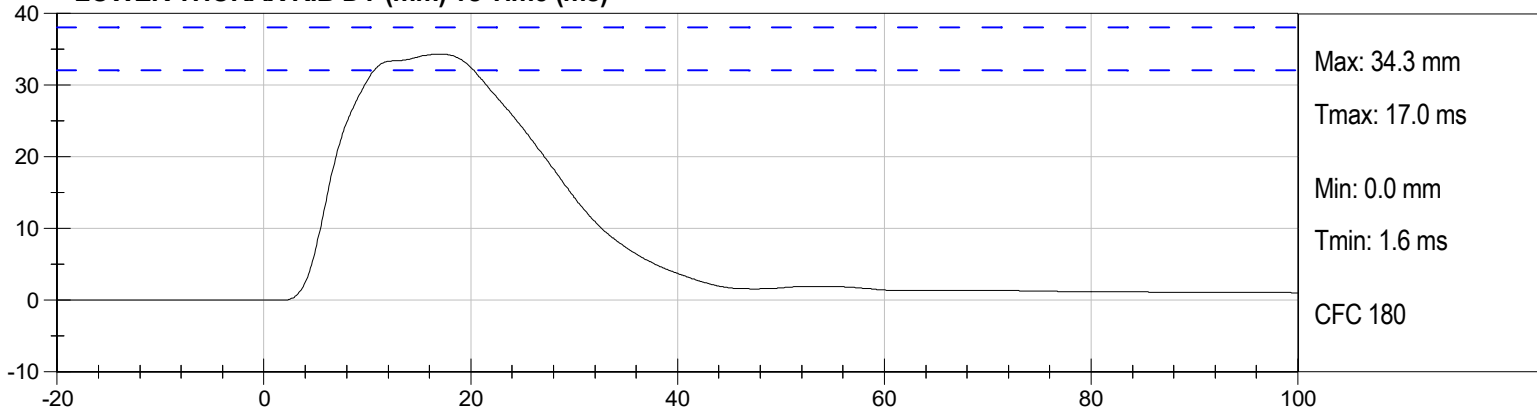
UPPER THORAX RIB DY (mm) vs Time (ms)



MID THORAX RIB DY (mm) vs Time (ms)



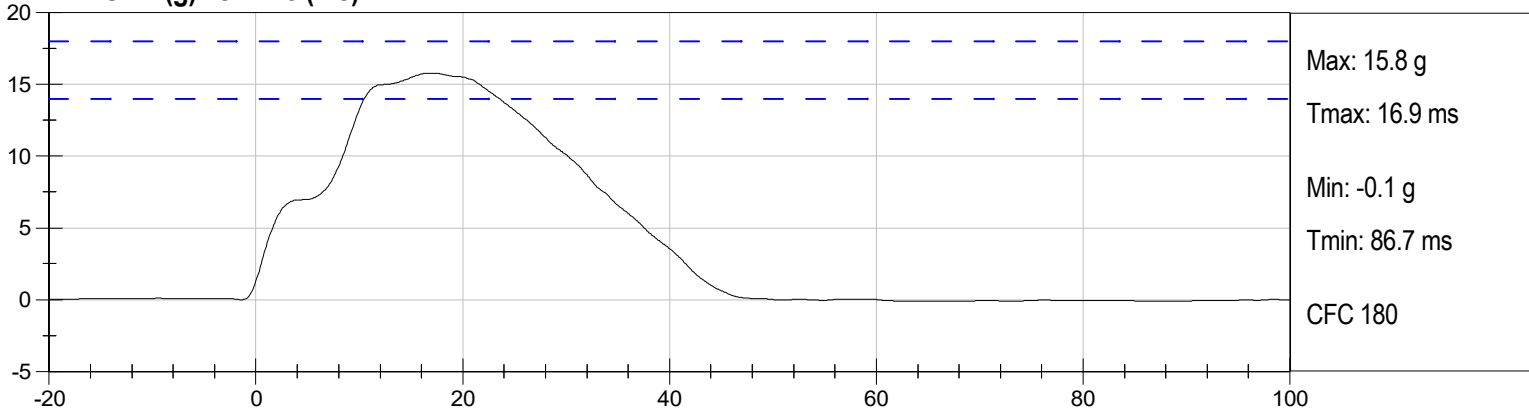
LOWER THORAX RIB DY (mm) vs Time (ms)



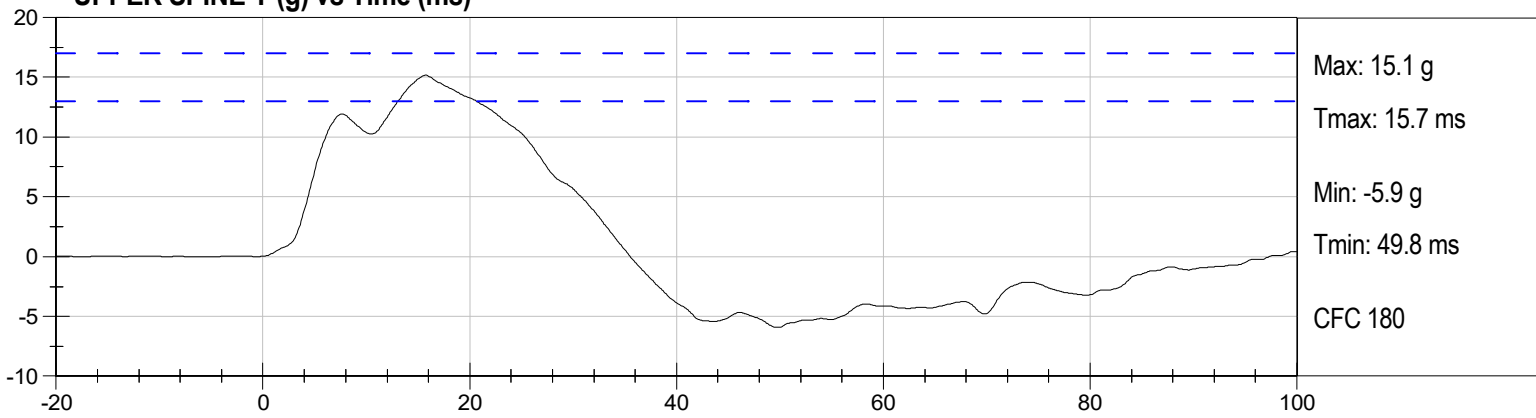
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.2 to 4.4	4.27	Pass
Peak Probe Acceleration	g	14 to 18	16	Pass
Upper Spine (T1) Y Acceleration	g	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	g	7 to 11	10	Pass
Upper Thorax Rib Displacement	mm	32 to 40	36	Pass
Middle Thorax Rib Displacement	mm	39 to 45	42	Pass
Lower Thorax Rib Displacement	mm	35 to 43	40	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	09/18/2024	3/20/2025
UPPER SPINE Y	Endevco	P88675	12/12/2024	6/13/2025
LOWER SPINE Y	Endevco	P79439	12/12/2024	6/13/2025
UPPER THORAX RIB DY	Servo	G012	12/12/2024	6/13/2025
MID THORAX RIB DY	FTSS	G1163	12/12/2024	6/13/2025
LOWER THORAX RIB DY	FTSS	G1158	12/12/2024	6/13/2025

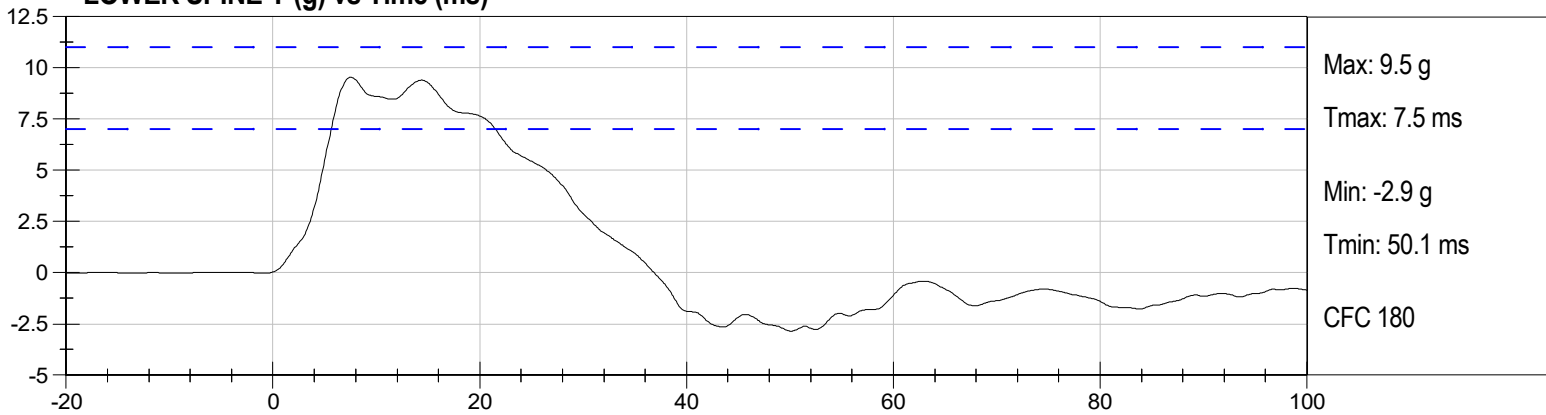
PROBE (g) vs Time (ms)



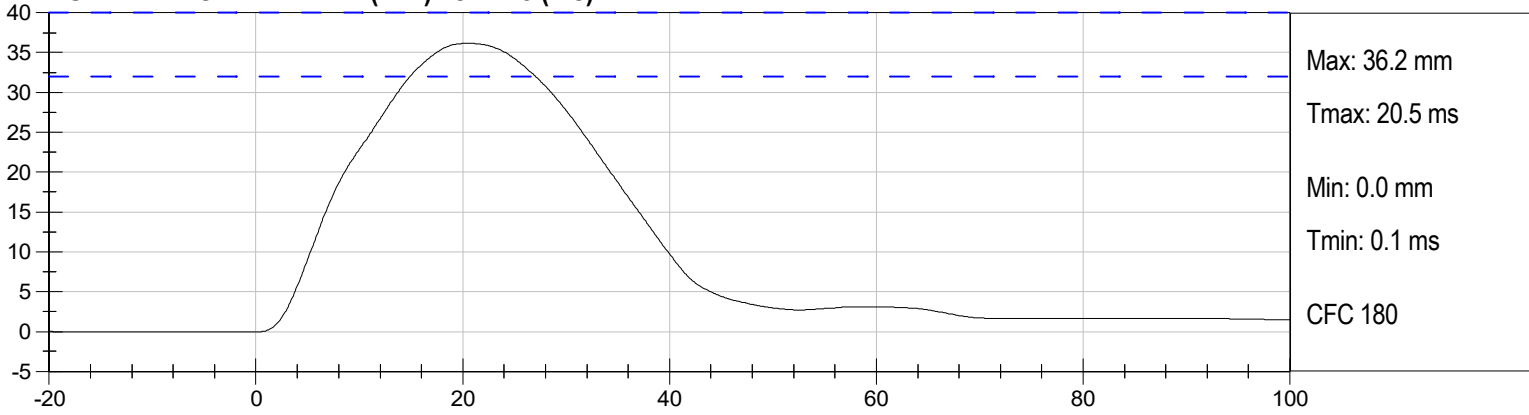
UPPER SPINE Y (g) vs Time (ms)



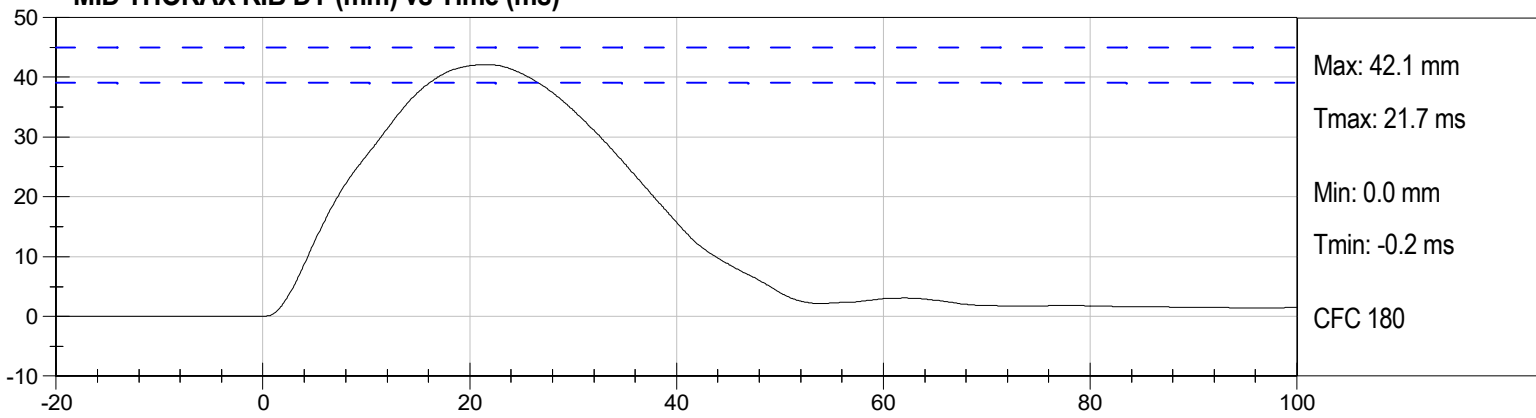
LOWER SPINE Y (g) vs Time (ms)



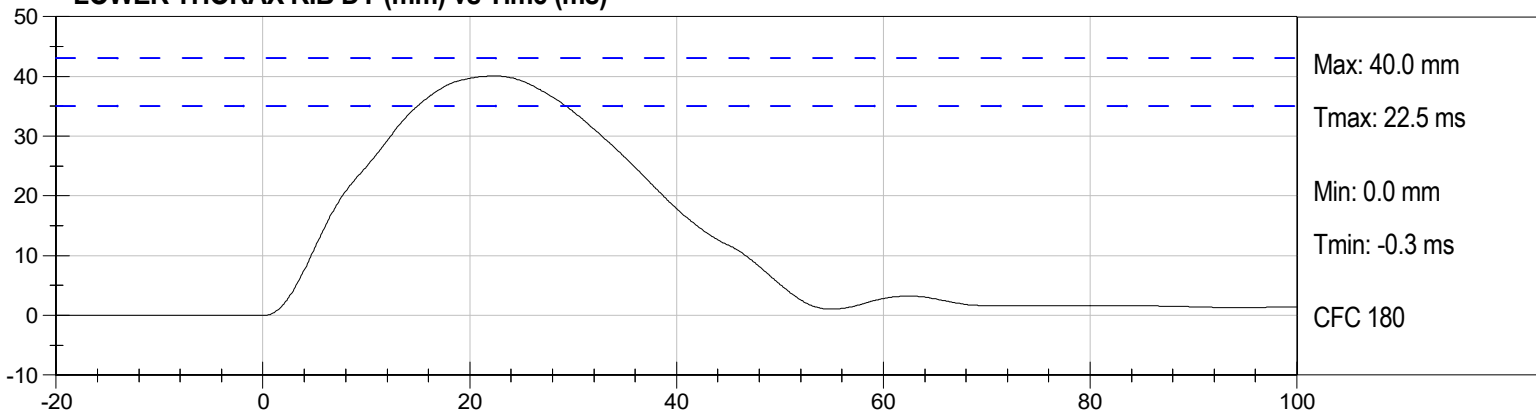
UPPER THORAX RIB DY (mm) vs Time (ms)



MID THORAX RIB DY (mm) vs Time (ms)



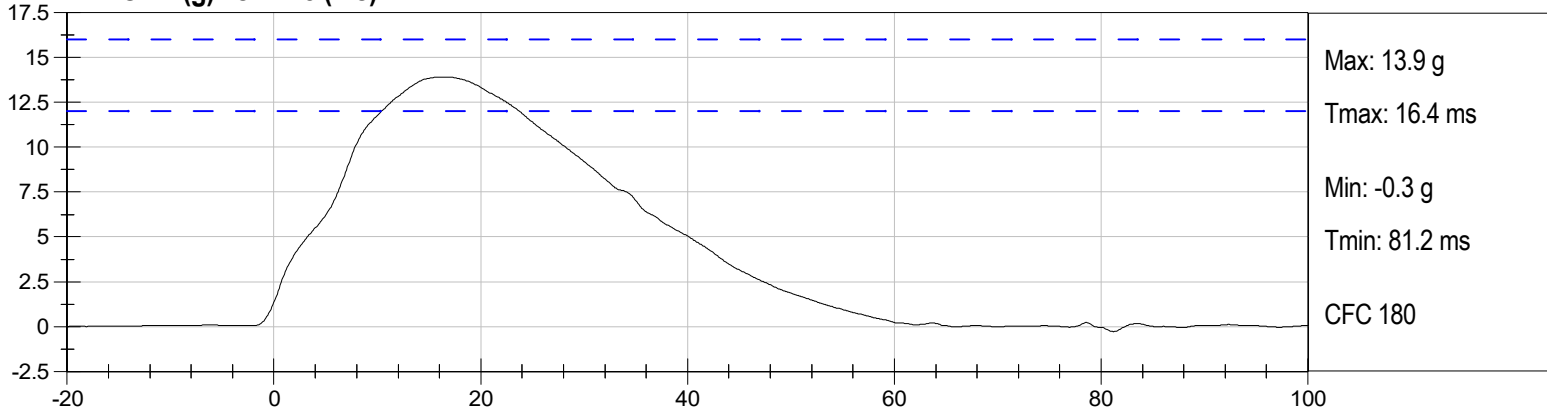
LOWER THORAX RIB DY (mm) vs Time (ms)



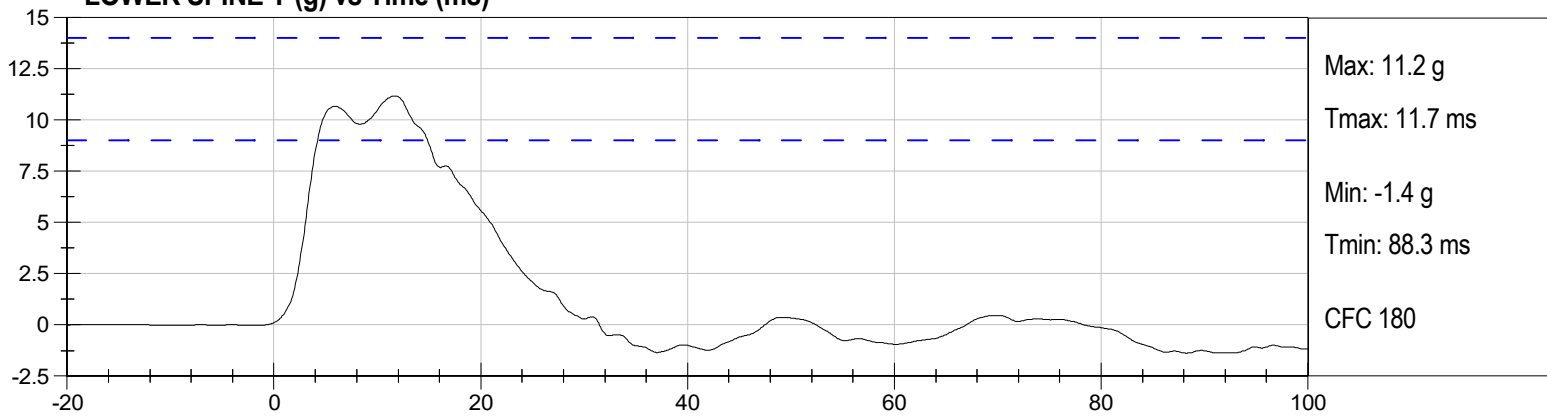
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.2 to 4.4	4.30	Pass
Peak Probe Acceleration	g	12 to 16	14	Pass
Lower Spine (T12) Y Acceleration	g	9 to 14	11	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	09/18/2024	3/20/2025
LOWER SPINE Y	Endevco	P79439	12/12/2024	6/13/2025
UPPER ABDOMINAL RIB DY	FTSS	G1146	12/12/2024	6/13/2025
LOWER ABDOMINAL RIB DY	FTSS	G1126	12/12/2024	6/13/2025

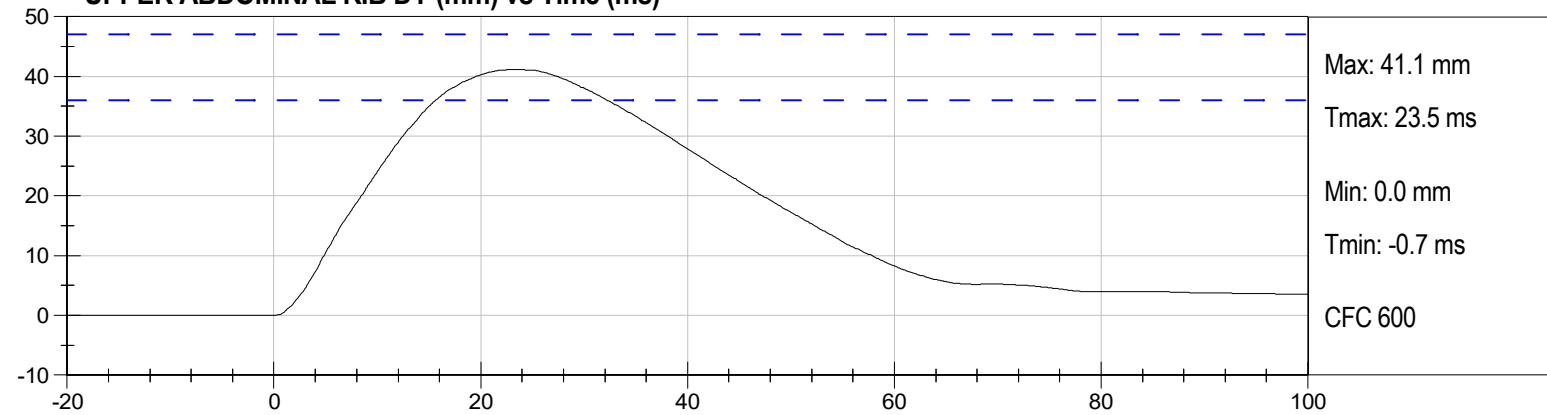
PROBE (g) vs Time (ms)



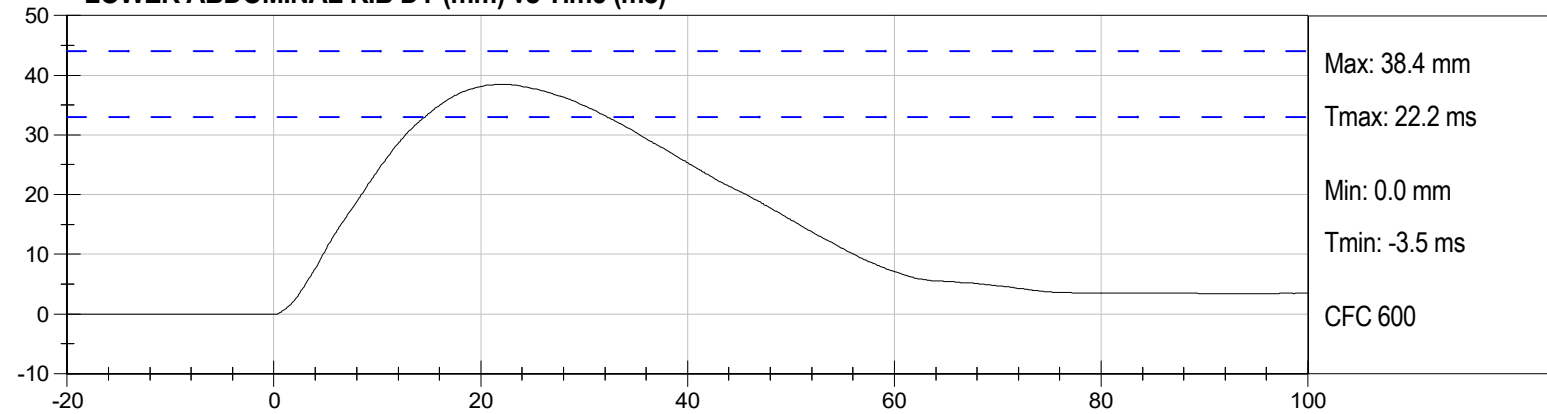
LOWER SPINE Y (g) vs Time (ms)



UPPER ABDOMINAL RIB DY (mm) vs Time (ms)



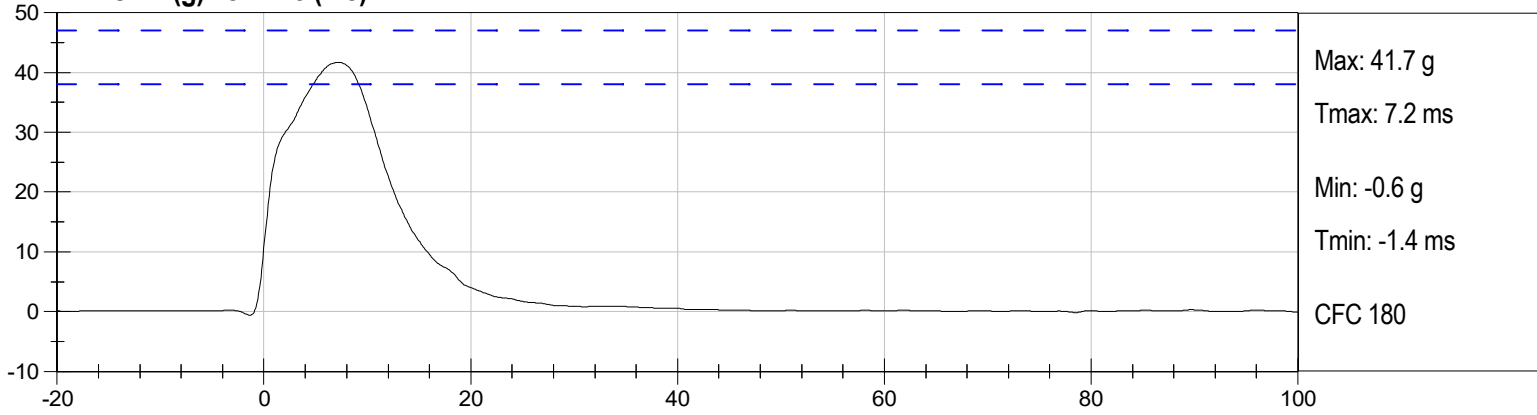
LOWER ABDOMINAL RIB DY (mm) vs Time (ms)



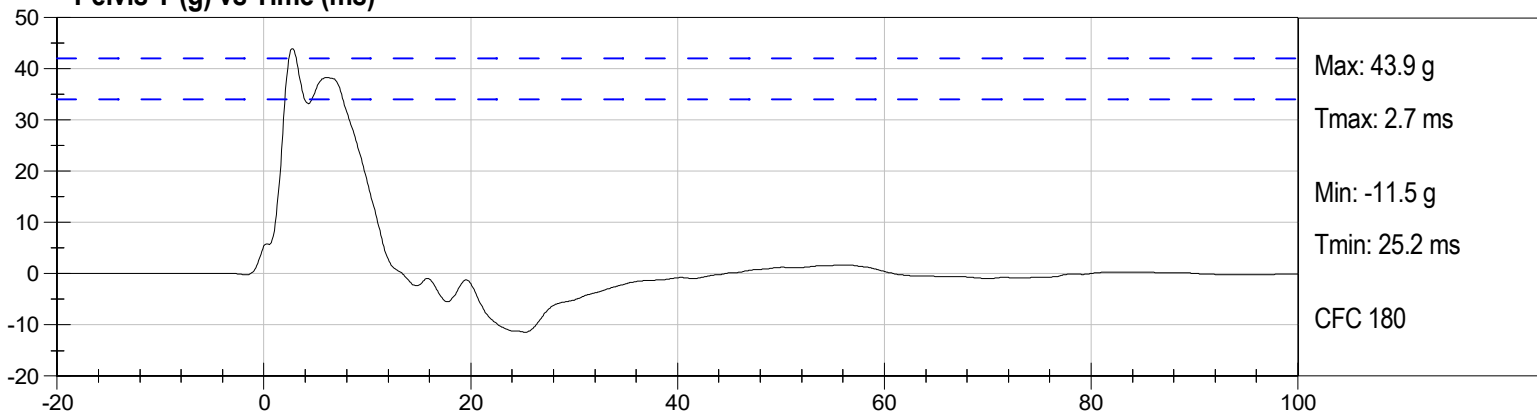
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	6.6 to 6.8	6.77	Pass
Peak Probe Acceleration	g	38 to 47	42	Pass
Peak Pelvis Y Acceleration after 6 ms	g	34 to 42	38	Pass
Acetabulum Force	N	3600 to 4300	4012	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	09/18/2024	3/20/2025
Pelvis Y	Endevco	T22504	12/13/2024	6/14/2025
ACETABULUM FY	Denton	ACG269FY	01/20/2025	1/20/2026

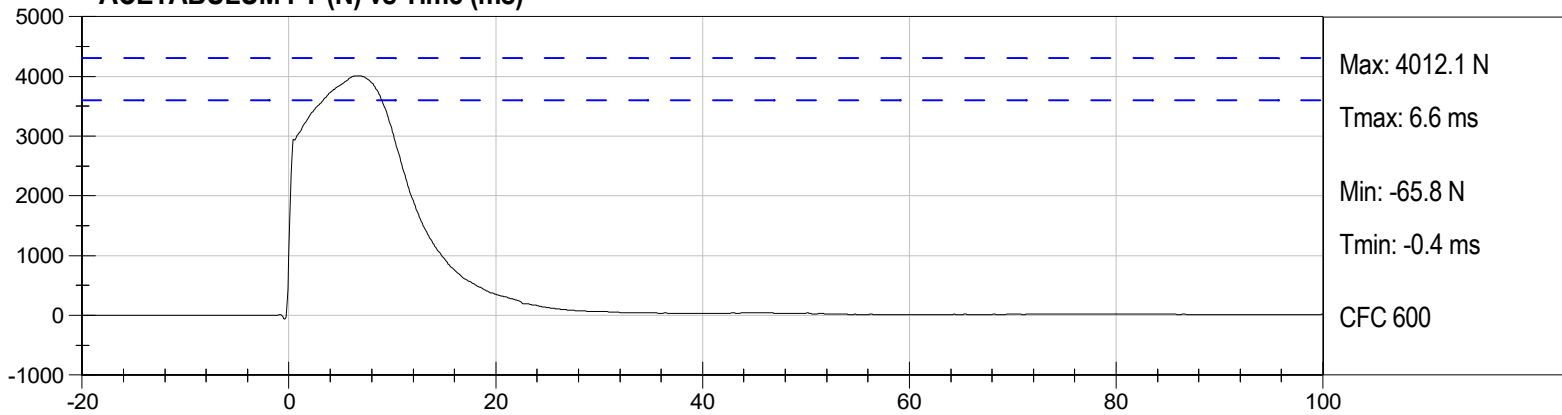
PROBE (g) vs Time (ms)



Pelvis Y (g) vs Time (ms)



ACETABULUM FY (N) vs Time (ms)





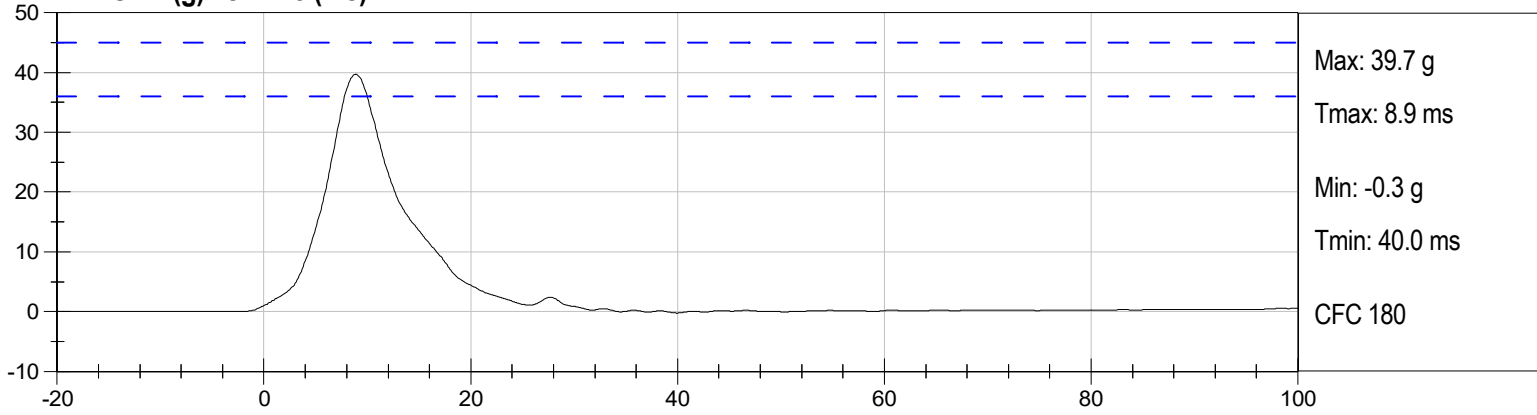
Iliac Impact Test
SID IIs
ATD Serial No: 296

Test Date: 02/20/2025
Test ID: D250558
Test Technician: Jonah Pulokas

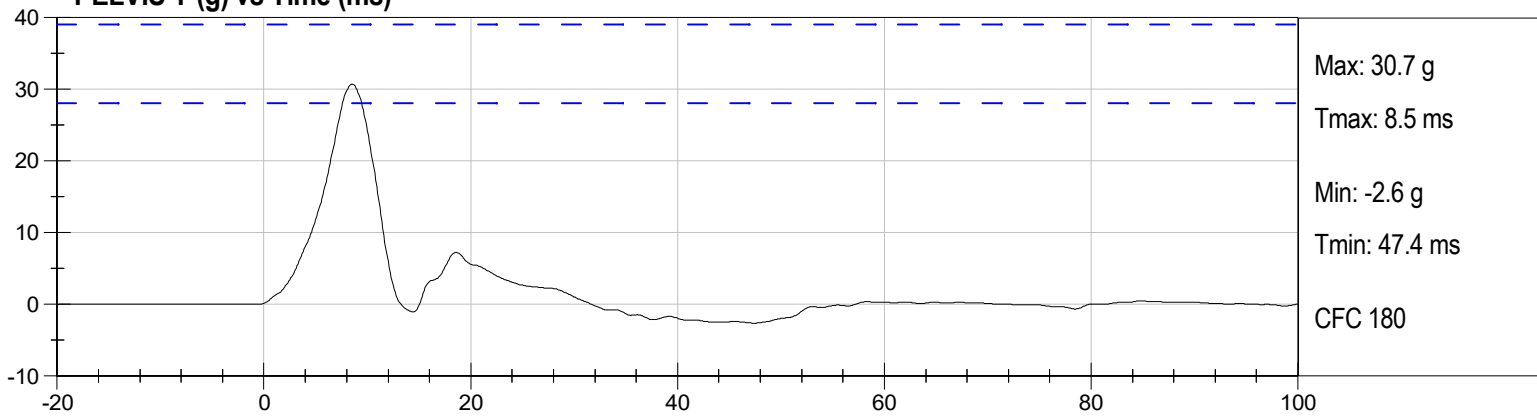
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	4.2 to 4.4	4.37	Pass
Peak Probe Acceleration	g	36 to 45	40	Pass
Peak Pelvis Y Acceleration	g	28 to 39	31	Pass
Iliac Force	N	4100 to 5100	4608	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	09/18/2024	3/20/2025
PELVIS Y	Endevco	T22504	12/13/2024	6/14/2025
ILIUM CREST FY	Denton	IWG282FY	01/20/2025	1/20/2026

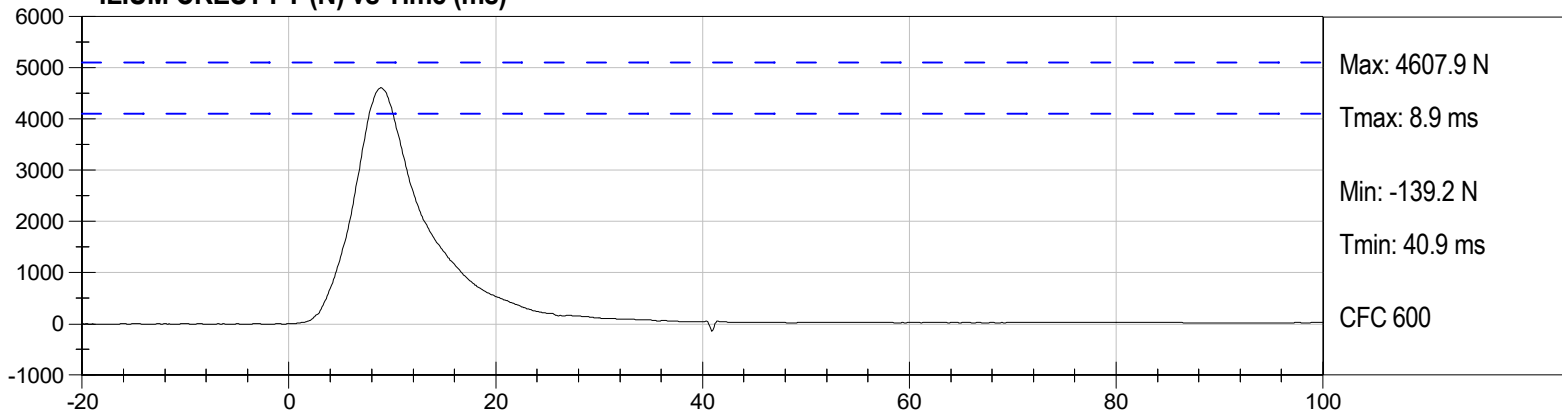
PROBE (g) vs Time (ms)



PELVIS Y (g) vs Time (ms)



ILIUM CREST FY (N) vs Time (ms)





SID-IIs Pelvis Plug Certification Test

Plug S/N 16555

Test Number 23339

Report Number 23396

Test Date 7/15/2022 9:40:17 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	257	50	600
Force @ 1.5 mm (N)	1,075	850	1,400
Force @ 2.5 mm (N)	1,433	1,306	1,618
Force @ 3.0 mm (N)	1,506	1,361	1,673

Testing Machine STM-20 5965542

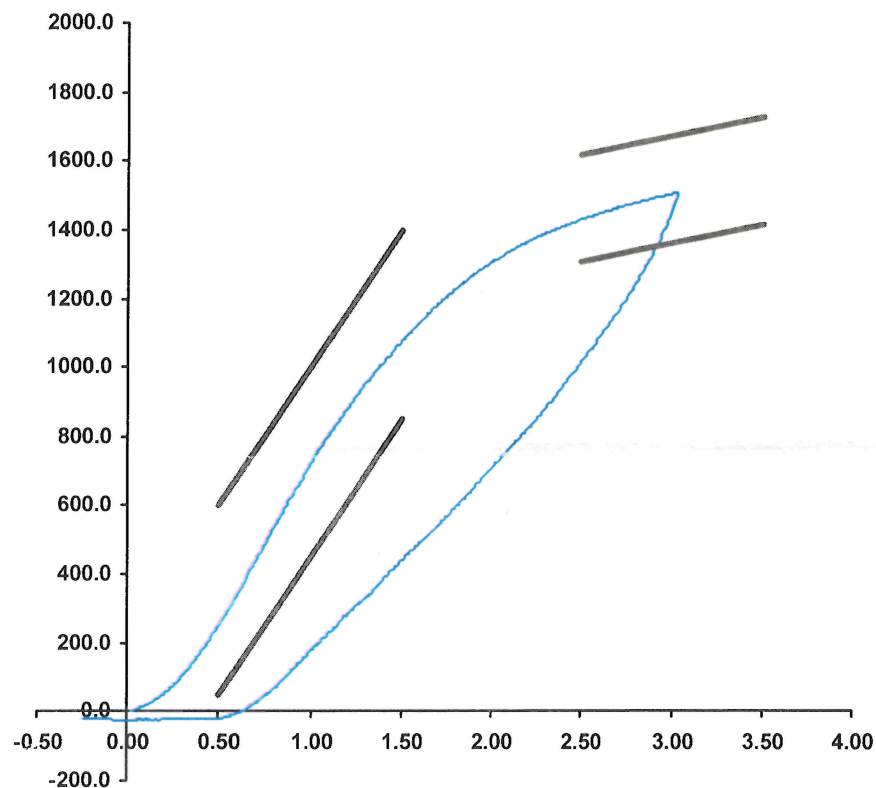
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107

15-Jul-22

SACO Research

By :

DC

Date :

7/15/22

SACO Research 41735 Elm St, #401 Murrieta, CA 92562

Tel 310-694-2082 FAX

C-50



SID-IIs Pelvis Plug Certification Test

Plug S/N 16462

Test Number 23031

Report Number 23089

Test Date 5/23/2022 12:56:27 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	245	50	600
Force @ 1.5 mm (N)	1,132	850	1,400
Force @ 2.5 mm (N)	1,425	1,306	1,618
Force @ 3.0 mm (N)	1,469	1,361	1,673

Testing Machine STM-20 5965542

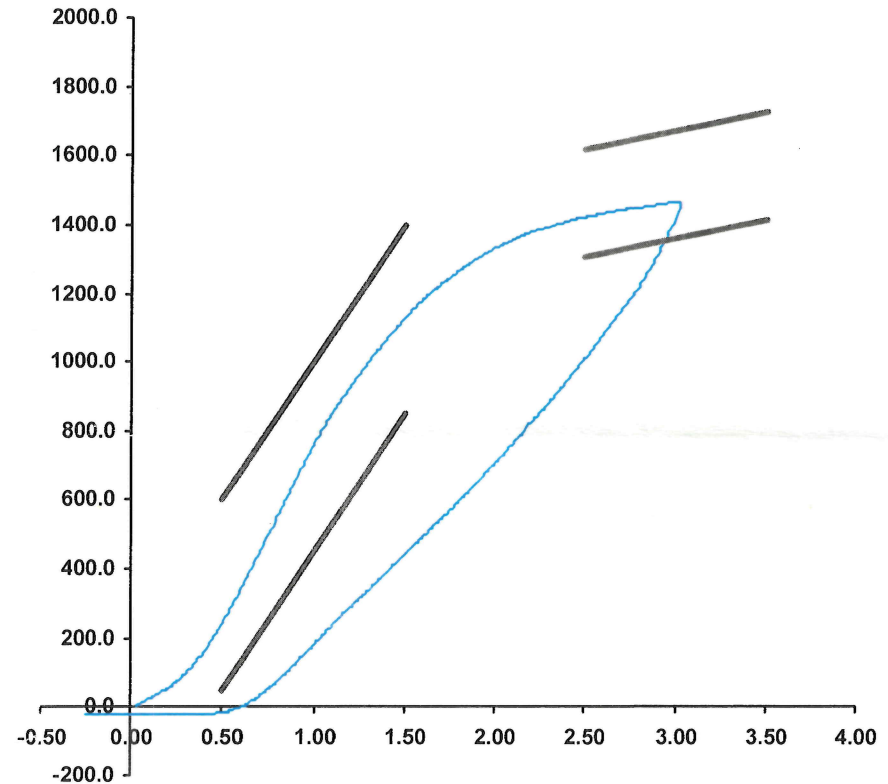
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107

23-May-22

SACO Research

By :

Date :

5/23/2022

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

Table 1 – Dummy Instrumentation

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P82109	Endevco	12/12/2024
				Y	P94783	Endevco	12/12/2024
				Z	P94786	Endevco	12/12/2024
				Xr	P94938	Endevco	12/12/2024
				Yr	P96854	Endevco	12/12/2024
				Zr	P97386	Endevco	12/12/2024
Head Angular Rate Sensors				X	ARS15213	DTS	07/31/2024
				Y	ARS15229	DTS	07/31/2024
				Z	ARS15231	DTS	07/31/2024
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	12/12/2024	
		Middle	Y	G1163	FTSS	12/12/2024	
		Lower	Y	G1158	FTSS	12/12/2024	
	Abdominal Rib	Upper	Y	G1146	FTSS	12/12/2024	
		Lower	Y	G1126	FTSS	12/12/2024	
Lower Spine Accelerometers (T12)				X	P79614	Endevco	12/12/2024
				Y	P79439	Endevco	12/12/2024
				Z	P79418	Endevco	12/12/2024
Acetabulum Load Cell				Y	ACG269	Denton	01/20/2025
Iliac Wing Load Cell				Y	IWG282	Denton	01/20/2025
Pelvis Plug (struck side)					16555	SACO	07/15/2022
Pelvis Plug (non-struck side)					16462	SACO	05/23/2022

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	T44123	Endevco	10/25/2024
Vehicle Center of Gravity	Y	T44180	Endevco	12/13/2024
Vehicle Center of Gravity	Z	T39117	Endevco	11/05/2024
Left Floor Sill	Y	T44437	Endevco	02/14/2025
A-Pillar Sill	Y	T45079	Endevco	02/14/2025
A-Pillar Low	Y	T43951	Endevco	02/14/2025
A-Pillar Mid	Y	T44598	Endevco	02/14/2025
B-Pillar Sill	Y	T45007	Endevco	02/14/2025
B-Pillar Low	Y	T44021	Endevco	02/14/2025
B-Pillar Mid	Y	T44510	Endevco	02/14/2025
Driver Seat	Y	T45078	Endevco	02/14/2025
Engine Top	X	T29904	Endevco	01/27/2025
Engine Top	Y	T43997	Endevco	02/14/2025
Firewall	Y	T43504	Endevco	02/14/2025
Right Roof	Y	T44439	Endevco	02/14/2025
Right Floor Sill	Y	T45014	Endevco	02/14/2025
Rear Floorpan	X	T39050	Endevco	02/16/2025
Rear Floorpan	Y	T40698	Endevco	02/16/2025

Table 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DG6277	FTSS	07/30/2018
Load Cell 2	DG6278	FTSS	07/30/2018
Load Cell 3	DG6279	FTSS	07/30/2018
Load Cell 4	DG6280	FTSS	07/30/2018
Load Cell 5	DG6281	FTSS	07/30/2018
Load Cell 6	DG6283	FTSS	07/30/2018
Load Cell 7	DG6284	FTSS	07/30/2018
Load Cell 8	DG6582	FTSS	07/30/2018