

REPORT NUMBER: SideNCAPMDB-MGA-24-008

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Moving Deformable Barrier Side Impact Test**

**HYUNDAI MOTOR COMPANY
2024 Hyundai Elantra SEL 4-Door Sedan
NHTSA No.: O20244205**

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



Test Date: February 5, 2024

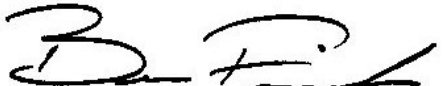
Final Report Date: October 29, 2024

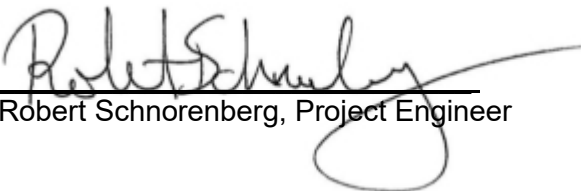
FINAL REPORT

**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: 
Robert Schnorenberg, Project Engineer

Approval Date: October 29, 2024

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of 2024 Hyundai Elantra SEL 4-Door Sedan, NHTSA No.: O20244205		5. Report Date October 29, 2024																																																					
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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2024 Hyundai Elantra SEL 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP MDB Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on February 5, 2024. The impact velocity of the Moving Deformable Barrier (MDB) was 62.07 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.1°C. The target vehicle post-test maximum crush was 167 mm at level 3. The test vehicle's performance was as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (ES-2re)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>95.818</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>32.019</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>879.291</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>1607.605</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82*</td> <td>34.035</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Passenger ATD (SID-IIs)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>228.043</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>76.495</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>2343.943</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>21.977</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>20.157</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 (ES-2re)		Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	95.818	Maximum Thorax Rib Deflection	mm	44	32.019	Total Abdominal Force	N	2500	879.291	Pubic Symphysis Force	N	6000	1607.605	Resultant Lower Spine Acceleration	g	82*	34.035	Measurement Description	Units	Passenger ATD (SID-IIs)		Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	228.043	Resultant Lower Spine Acceleration	g	82	76.495	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2343.943	Maximum Thoracic Rib Deflection	mm	38*	21.977	Maximum Abdomen Rib Deflection	mm	45*	20.157
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side 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 Hyundai Elantra SEL 4-Door Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated March 2020.

SUMMARY

A 2024 Hyundai Elantra SEL 4-Door Sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.07 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin on February 5, 2024. Pre-test and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS NCAP Side Laboratory Test Procedure dated March 2020. The side impact event was documented by eleven (11) cameras. Camera locations are included in this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

- Primary and Redundant Head CG Triaxial 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) Triaxial Accelerometers
- Pubic Symphysis Y-Axis Load Cell

PASSENGER ATD (SID-IIs)

- Primary and Redundant Head CG Triaxial Accelerometers
- Head Triaxial Angular Rate Sensors
- Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
- Abdomen Upper Rib and Lower Rib Y-Axis Displacement Potentiometers
- Lower Spine (T12) Triaxial Accelerometers
- Acetabulum and Iliac Wing Y-Axis Load Cells

Appendix B contains the 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.

Dummy Injury readings were recorded as follows:

DUMMY INJURY VALUES

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	95.818
Maximum Thorax Rib Deflection	mm	44	32.019
Total Abdominal Force	N	2500	879.291
Pubic Symphysis Force	N	6000	1607.605
Resultant Lower Spine Acceleration	g	82*	34.035

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	228.043
Resultant Lower Spine Acceleration	g	82	76.495
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2343.943
Maximum Thoracic Rib Deflection	mm	38*	21.977
Maximum Abdomen Rib Deflection	mm	45*	20.157

*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	No			
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Bag	Yes	Yes	No	
Side Torso Airbag			Yes	Yes
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 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20244205	Traction Control System (TCS)	Yes
Model Year	2024	Auto-Leveling System	No
Make	Hyundai	Automatic Door Locks (ADL)	Yes
Model	Elantra SEL	Power Window Auto-Reverse	Yes
Body Style	4-Door Sedan	Other Optional Feature	No
VIN	KMHLM4DG8RU654181	Driver Front Airbag	Yes
Body Color	Amazon Gray	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	79 km / 49 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2	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	No
Transmission Speeds	CVT	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	Yes
Roof Rack	No	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	No	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?	No
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DATA FROM CERTIFICATION LABEL

Manufactured By	HYUNDAI MOTOR COMPANY	GVWR (kg)	1750
Date of Manufacture	SEP/05/23	GAWR Front (kg)	1030
Vehicle Type	Passenger Car	GAWR Rear (kg)	950

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				385	(A)
DSC x 68 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				45	(A-B)

VEHICLE SEAT TYPE

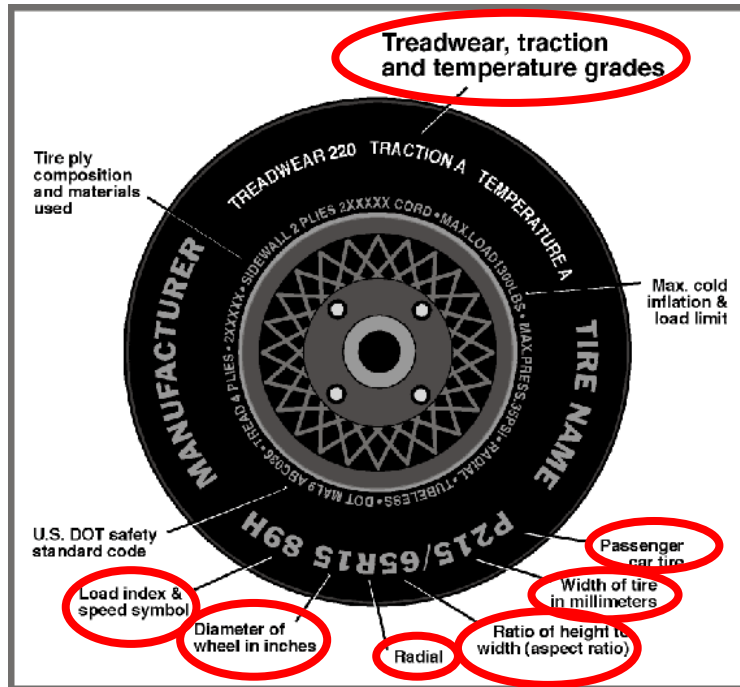
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second Row				X	X		
Third Row Seat							

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

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	235	215
Recommended Tire Size	205/55R16	205/55R16
Tire Size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus	Solus
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Left	127LM YAY1 3423	127LM YAY1 3423
DOT Safety Code Right	127LM YAY1 3423	127LM YAY1 3423

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

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024

TEST VEHICLE TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	235	235	215	215
Tire Placard	kPa	235	235	215	215
Owner's Manual	kPa	235	235	215	215
As Tested	kPa	235	235	215	215

MDB TIRE SPECIFICATIONS

	Requirement	Units	LF	RF	LR	RR
Tire Size	P205/75R15	N/A	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	200 ± 21	kPa	200	200	200	200

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	406.5	251.0		441.5	323.0		442.0	330.5	
Right	kg	394.0	253.0		400.5	305.5		398.5	307.5	
Ratio	%	61.4%	38.6%		57.3%	42.7%		56.8%	43.2%	
Totals	kg	800.5	504.0	1304.5	842.0	628.5	1470.5	840.5	638.0	1478.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1304.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	45	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1478.5	(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	Fully Loaded	As Tested	Meets Requirement*
Left Front	mm	659	659	Yes
Right Front	mm	671	661	Yes
Right Rear	mm	653	659	Yes
Left Rear	mm	647	641	Yes
Vehicle CG (Aft of Front Axle)	mm	1173	1162	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	36	32	

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

*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well.

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: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	5
Components Removed: none	kg	

TEST SURFACE MARKINGS

	Units	Distance from 63° Impact Angle Line
Fore 25 mm Target	mm	904
Aft 25 mm Target	mm	914
Pre-Impact Angle Line	mm	100

Parallel Track Target	Units	X Location	Y Location
A	mm	0	0
B	mm	1520	3085
C	mm		
D	mm	3500	0

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

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	19.4	16.2	17.8
Front Passenger Seat	Fixed	Fixed	Fixed
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 SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear-Most	Mid	Forward- Most
Driver Seat	17.8	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
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 Hyundai Elantra SEL 4-Door Sedan
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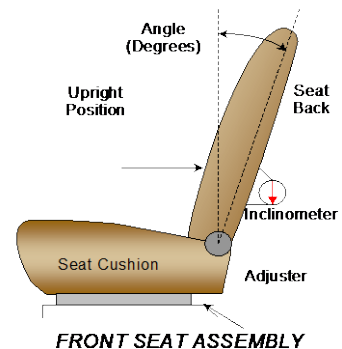
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SEAT FORE/AFT POSITIONS

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	260	41	130	20
Front Passenger Seat	260	41	130	20
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. 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 seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as 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	58.2	31	-0.4	7
Front Passenger Seat	59.7	31	0.6	6
Front Center Seat				
Struck Side Rear Seat	Fixed		N/A	
Non-Struck Side Rear Seat	Fixed		N/A	
Rear Center Seat	Fixed		N/A	

Seat back angles measured on outboard headrest post.

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

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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	3	0 (Uppermost as 0)
Rear Seat	Fixed	

HEAD RESTRAINT ADJUSTMENT

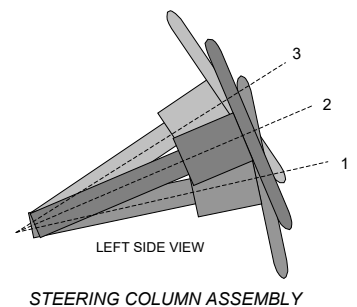
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	6	5 (Lowest as 0) / Fixed Fore-Aft
Rear Seat	Fixed	

STEERING COLUMN ADJUSTMENT

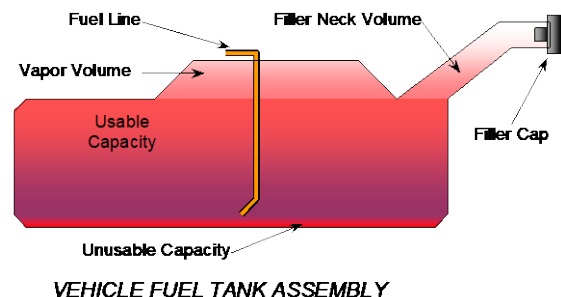
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	70.2	
Geometric Center, Position 2	67.6	
Uppermost, Position 3	64.9	
Telescoping Steering Wheel Travel		50
Test Position	67.6	25



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.



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

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
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FUEL TANK CAPACITY DATA

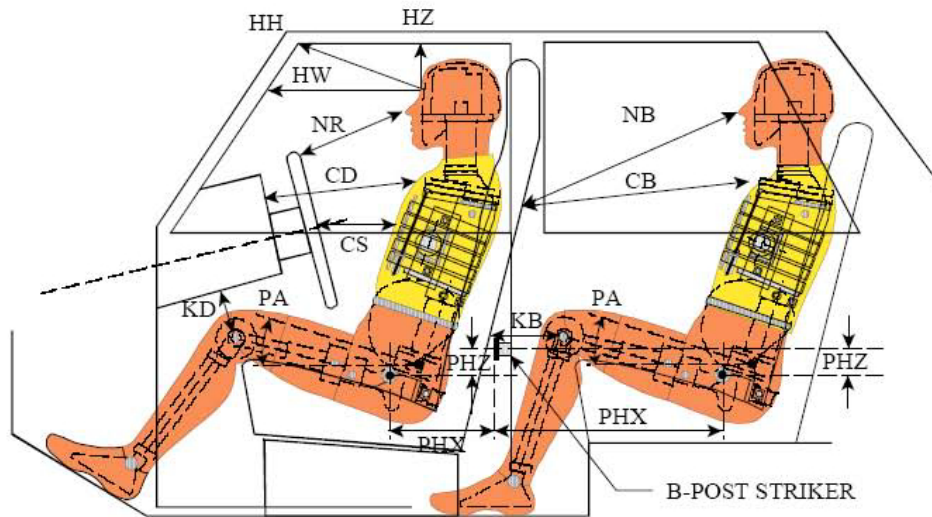
	Liters
Usable Capacity of Standard Tank (see S1 - Vehicle Setup Information)	46.9
Usable Capacity of Optional Tank (see S1 - Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	46.9
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	43.7
Actual Amount of Solvent Used	43.7
1/3 of Usable Capacity	15.6

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 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024



LEFT SIDE VIEW

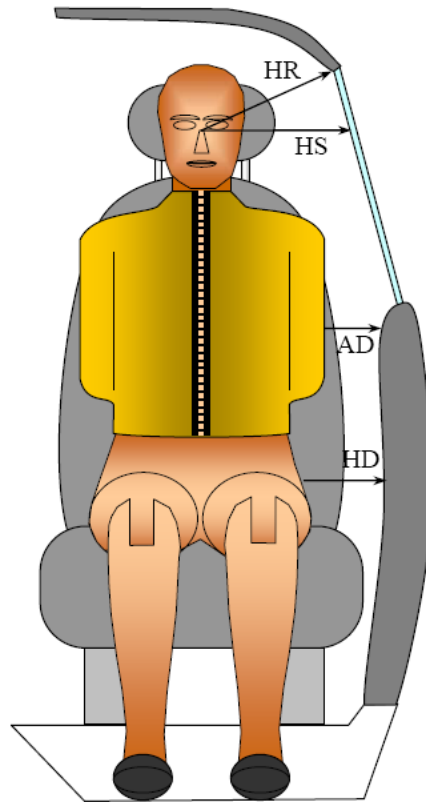
NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	364	14.5		
HW		Head to Windshield	601	0		
HZ	HZ	Head to Roof Liner	144	90	242	90
NR	NB	Nose to Rim/Seat Back	445	12.7	594	5.4
CD	CB	Chest to Dashboard/Seat Back	584	9.0	577	7.2
CS		Chest to Steering Wheel	383	8.3		
KDL	KBL	Left Knee to Dash/Seat Back	207	28.4	299	7.1
KDR	KBR	Right Knee to Dash/Seat Back	209	28.4	299	11.7
PAX	PAX	Pelvic Tilt Angle X		15.1		25.7
PAY	PAY	Pelvic Tilt Angle Y		-1.3		0.2
PHX	PHX	Hip Point to Striker (X-Axis)	193		253	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	269		268	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024

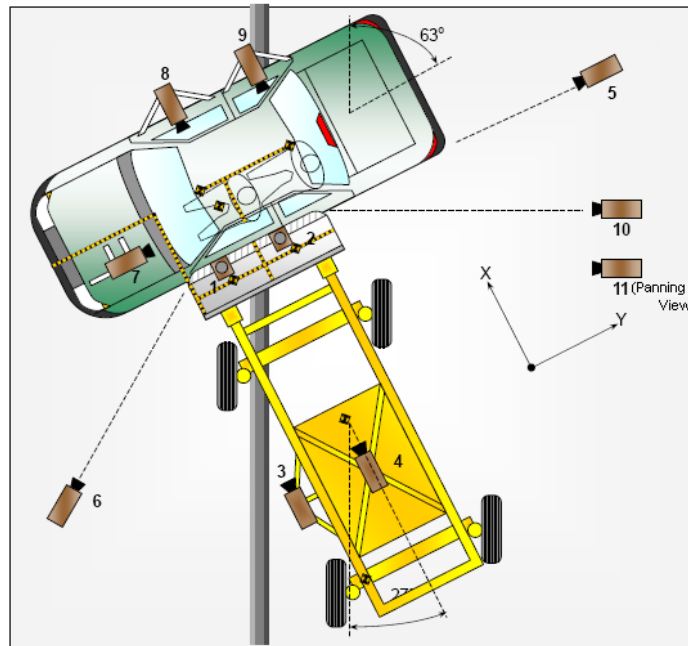


Code	Measurement Description	Driver	Passenger
		Length (mm)	
HR	Head to Side Header	202	208
HS	Head to Side Window	327	330
AD	Arm to Door	115	170
HD	Hip Point to Door	152	173

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	790	1350	-4775	8.5	1000
2	Overhead Close-Up	220	825	-4815	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-15	6880	-1470	24	1000
6	Left Front	1990	-5205	-1505	24	1000
7	Driver Front (OB)				16	1000
8	Driver Side (OB)				8	1000
9	Passenger Side (OB)				8	1000
10	Real Time Left Rear					30
11	Real Time Inrun					30

Reference: Impact Point projected to Ground; +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

*All measurements accurate to ± 6 mm

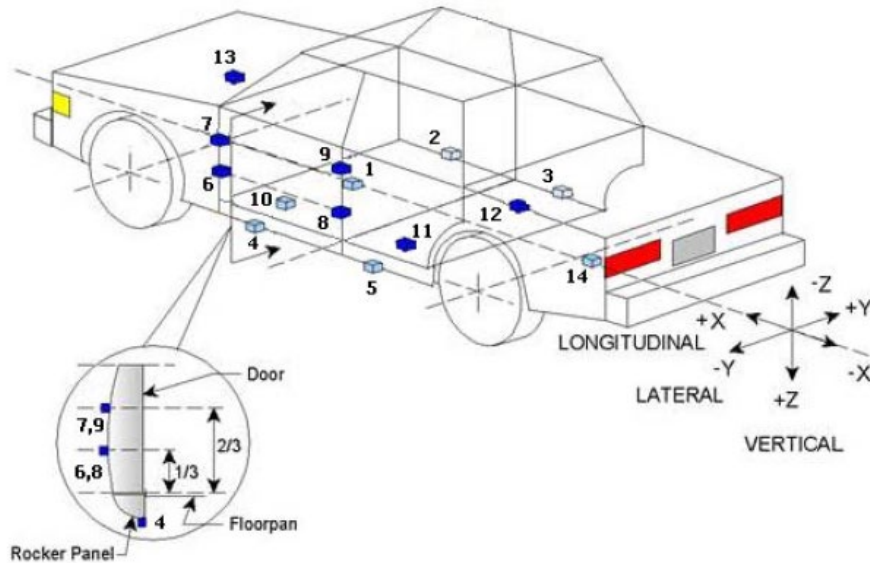
INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Passenger Dummy	19
Vehicle Structure	23
MDB Accelerometers	5
Total	63

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024



TEST VEHICLE ACCELEROMETER LOCATIONS

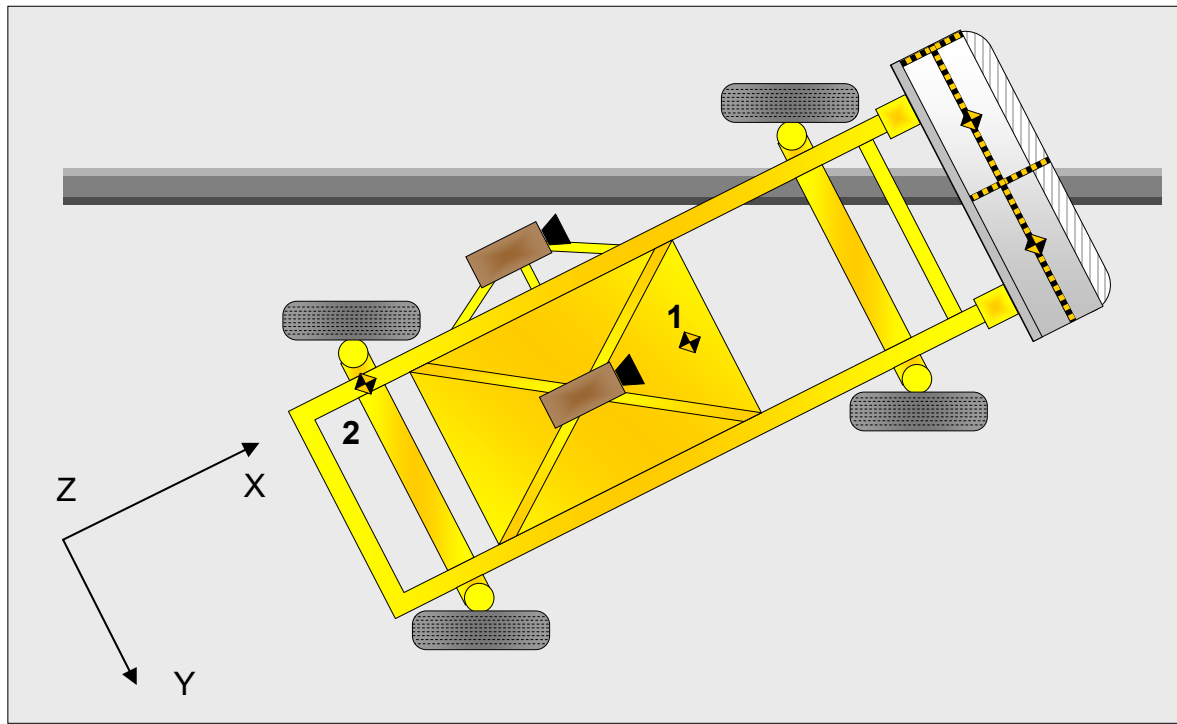
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2730	-22	-293
2	Right Sill at Front Seat	2882	714	-166
3	Right Sill at Rear Seat	1821	716	-166
4	Left Sill at Front Door	2885	-713	-166
5	Left Sill at Rear Door	1812	-717	-165
6	Left Lower A-Post	3319	-826	-474
7	Left Middle A-Post	3320	-814	-697
8	Left Lower B-Post	2170	-692	-560
9	Left Middle B-Post	2146	-692	-782
10	Front Seat Track	2339	-376	-200
11	Rear Seat Structure	1936	-380	-201
12	Rt. Rear Occ. Compartment	1947	375	-201
13	Engine Block	3976	-2	-817
14	Rear Above Axle	1117	-3	-488

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

DATA SHEET NO. 7 **MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	-1105	0	-330
2	MDB Rear	-2580	-650	-625

Reference: X – MDB Face (+ forward)
 Y – MDB Centerline (+ to right)
 Z – Ground Plane (+ down)

Width between left and right MDB contact switches	mm	1400
---	----	------

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag, Seatback
Top of Head	Curtain Airbag, Headliner	Curtain Airbag, Center Headrest
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag
Back of Head	Curtain Airbag, Headliner, Headrest	Curtain Airbag, Headrest, Seatback
Left Shoulder	Side Torso/Pelvis Airbag	Seatback
Upper Torso	Side Torso/Pelvis Airbag, Seatback	Seatback
Lower Torso	Side Torso/Pelvis Airbag, Seatback	Seatback, Door Panel
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion	Seat Cushion, Door Panel
Left Knee	Door Panel	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	
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	
Disengaged from Latched Position	No	No	No	No	
Latch Separated from Striker	No	No	No	No	
Jammed Shut	Yes	Yes	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
Sill Separation	No
Windshield Damage	No
Side Window Damage	LR window broken
Other Notable Effects	No

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

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheelbase	mm		2719
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		419
Actual Impact Point (Aft of Front Axle)	mm		419
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	0
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	-2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4119
Wheelbase of Framework Carriage	2591
CG Location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	368.2	320.6	
Right	kg	400.7	271.4	
Ratio	%	56.5	43.5	
Totals	kg	768.9	592.0	1360.9

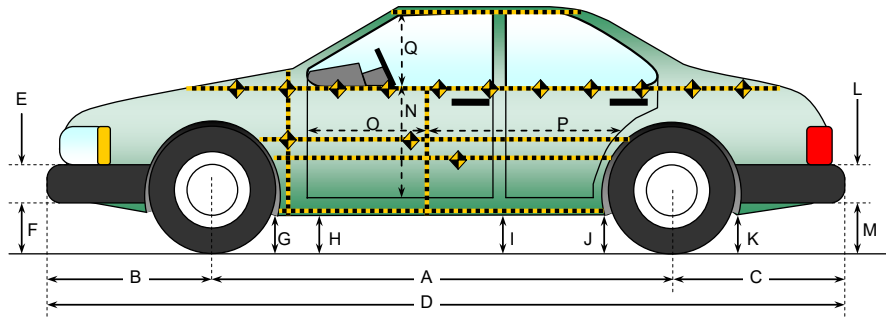
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.07
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.50
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.7
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.9
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	26.3

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
Test Date: 2/5/2024



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

LEFT SIDE VIEW

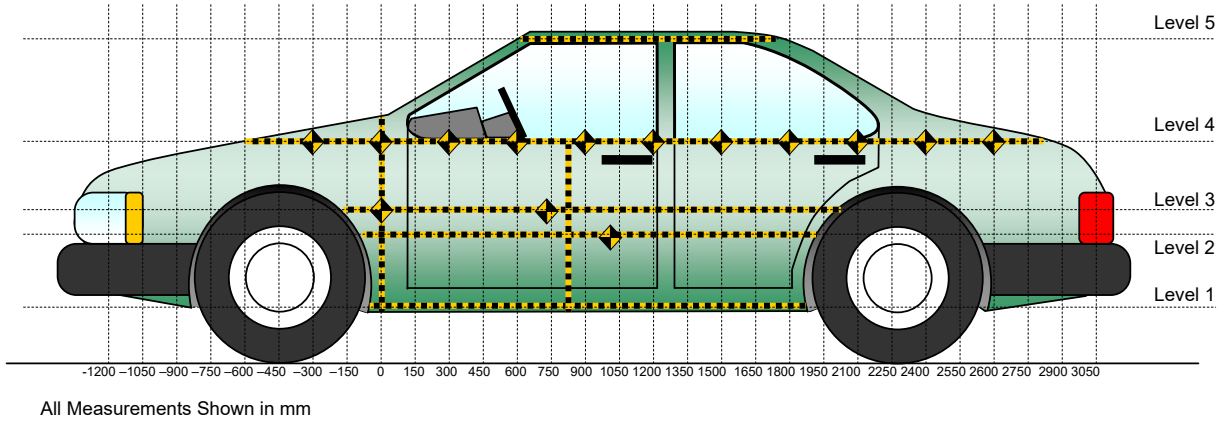
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2719	2722	3
B	Front Axle to FSOV	921	933	12
C	Rear Axle to RSOV	1060	1055	-5
D	Total Length at Centerline	4700	4710	10
E	Front Bumper Thickness	95	94	-1
F	Front Bumper Bottom to Ground	408	410	2
G	Sill Height at Front Wheel Well	152	155	3
H	Sill Height at Front Door Leading Edge	152	154	2
I	Sill Height at B Pillar	154	153	-1
J1	Sill Height at Rear Wheel Well	148	151	3
J2	Pinch Weld Height at Rear Wheel Well	149	152	3
K	Sill Height Aft of Rear Wheel Well	166	177	11
L	Rear Bumper Thickness	92	92	0
M	Rear Bumper Bottom to Ground	402	413	11
N	Sill Height to Window Bottom Sill	668	594	-74
O	Front Door Leading Edge to Impact CL	825	795	-30
P	Rear Door Trailing Edge to Impact CL	1184	1151	-33
Q	Front Window Opening	354	373	19
R	Right Side Length	3960	3960	0
S	Left Side Length	3959	3950	-9
T	Vehicle Width at B Post	1796	1560	-236
U	Front Wheel Track Width	1587		
V	Rear Wheel Track Width	1589		

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	300	130	300
2	Occupant H-Point	500	165	1650
3	Mid Door	591	167	1350
4	Window Sill	846	124	1800
5	Window Top	1324	7	1350

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

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024

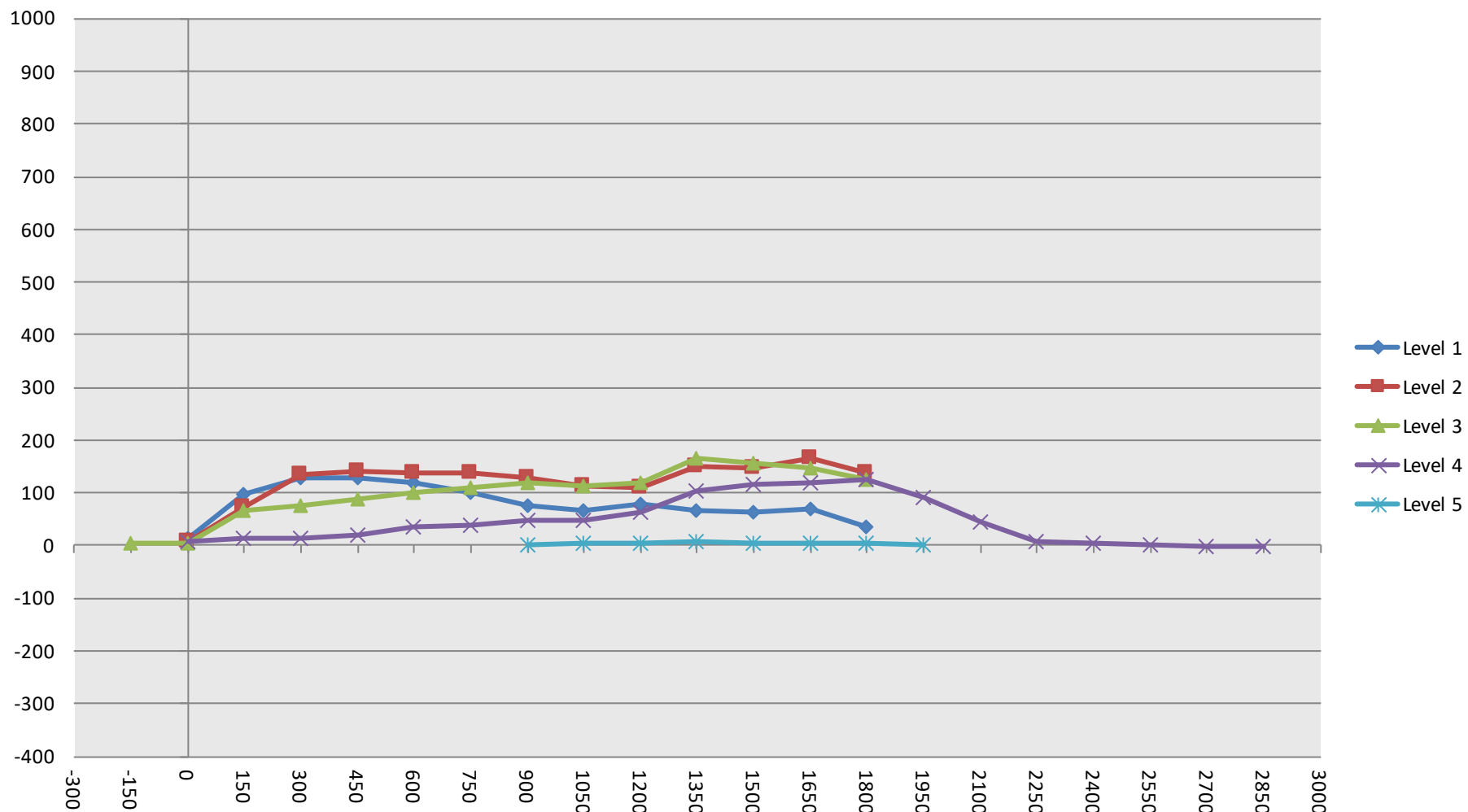
	Pre-Test					Post-Test					Exterior Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600															
-450															
-300															
-150			908					903					5		
0	895	904	903	826		882	896	899	819		13	8	4	7	
150	887	899	900	838		788	827	833	824		99	72	67	14	
300	885	898	898	847		755	763	822	834		130	135	76	13	
450	885	897	896	854		756	756	808	833		129	141	88	21	
600	882	896	895	863		764	757	793	829		118	139	102	34	
750	879	895	892	867		777	756	783	827		102	139	109	40	
900	876	893	892	871	624	800	765	772	824	623	76	128	120	47	1
1050	873	892	895	872	627	808	780	781	825	624	65	112	114	47	3
1200	870	890	898	878	624	791	779	780	815	619	79	111	118	63	5
1350	866	893	899	878	622	801	743	732	775	615	65	150	167	103	7
1500	862	895	901	880	618	799	747	744	764	612	63	148	157	116	6
1650	861	898	902	878	608	792	733	754	758	604	69	165	148	120	4
1800	875	901	903	877	595	841	764	778	753	592	34	137	125	124	3
1950				869	557				778	557				91	0
2100				866					821					45	
2250				865					856					9	
2400				857					854					3	
2550				845					845					0	
2700				828					830					-2	
2850				808					810					-2	
3000															
3150															
3300															
3450															
3600															
3750															
3900															

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

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

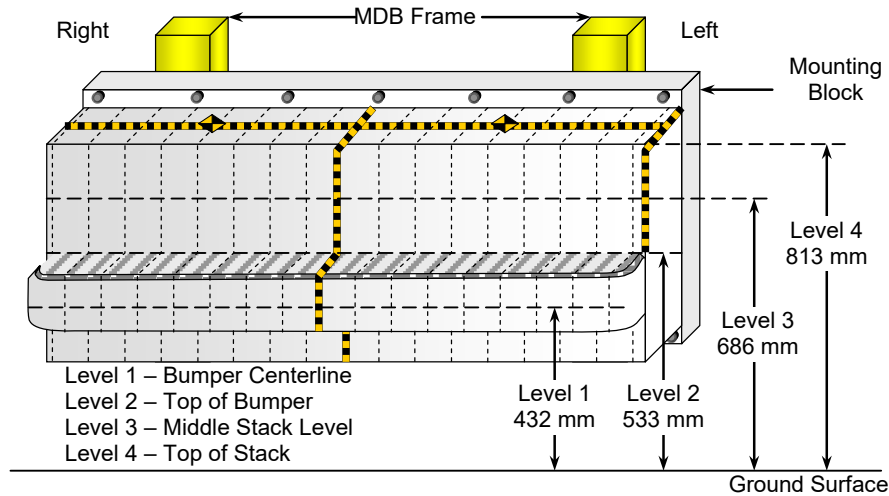
NHTSA No.: O20244205
Test Date: 2/5/2024



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	213
B	Top of Bumper	533	800	Left	154
C	Mid-Level	686	800	Left	183
D	Top of Stack	813	800	Left	177

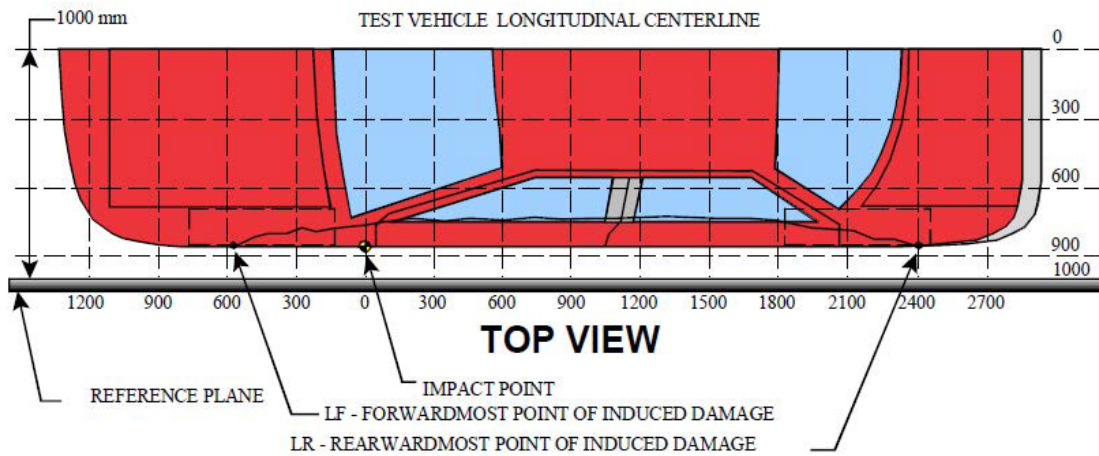
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C _L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
4	32	34	43	49	60	105	125	106	101	113	121	113	116	128	146	164	177
3	57	39	32	38	51	81	95	70	61	56	55	60	68	82	100	136	183
2	69	45	49	52	61	90	86	79	62	48	40	40	41	48	64	95	154
1	164	161	163	167	174	198	188	184	171	155	146	142	143	145	157	181	213

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	1800	3	221	97	125
2	1424	3	265	100	165
3	1066	3	221	105	117
4	705	3	214	107	107
5	338	3	181	103	79
6	0	3	103	97	5

MDB DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	800 mm right of center	1	640	476	164
2	480 mm right of center	1	638	463	175
3	160 mm right of center	1	649	463	186
4	160 mm left of center	1	600	463	137
5	480 mm left of center	1	627	463	164
6	800 mm left of center	1	689	476	213

DATA SHEET NO. 14
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

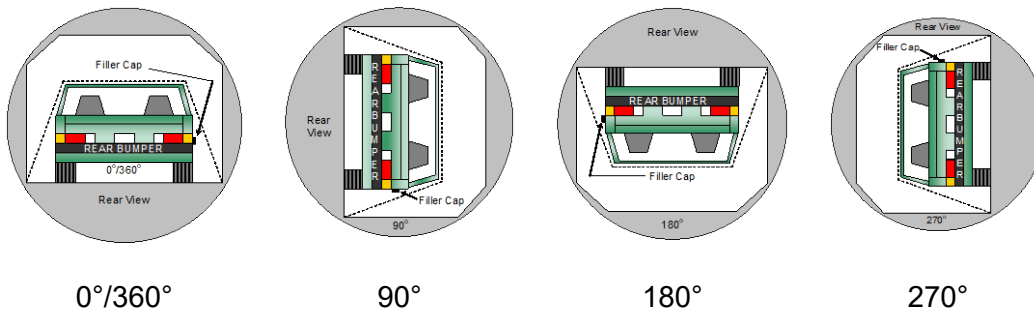
NHTSA No.: O20244205
Test Date: 2/5/2024

Test Time: 11:52 am

Temperature: 21.1°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°	92	300	392
90° to 180°	90	300	390
180° to 270°	87	300	387
270° to 360°	91	300	391

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	

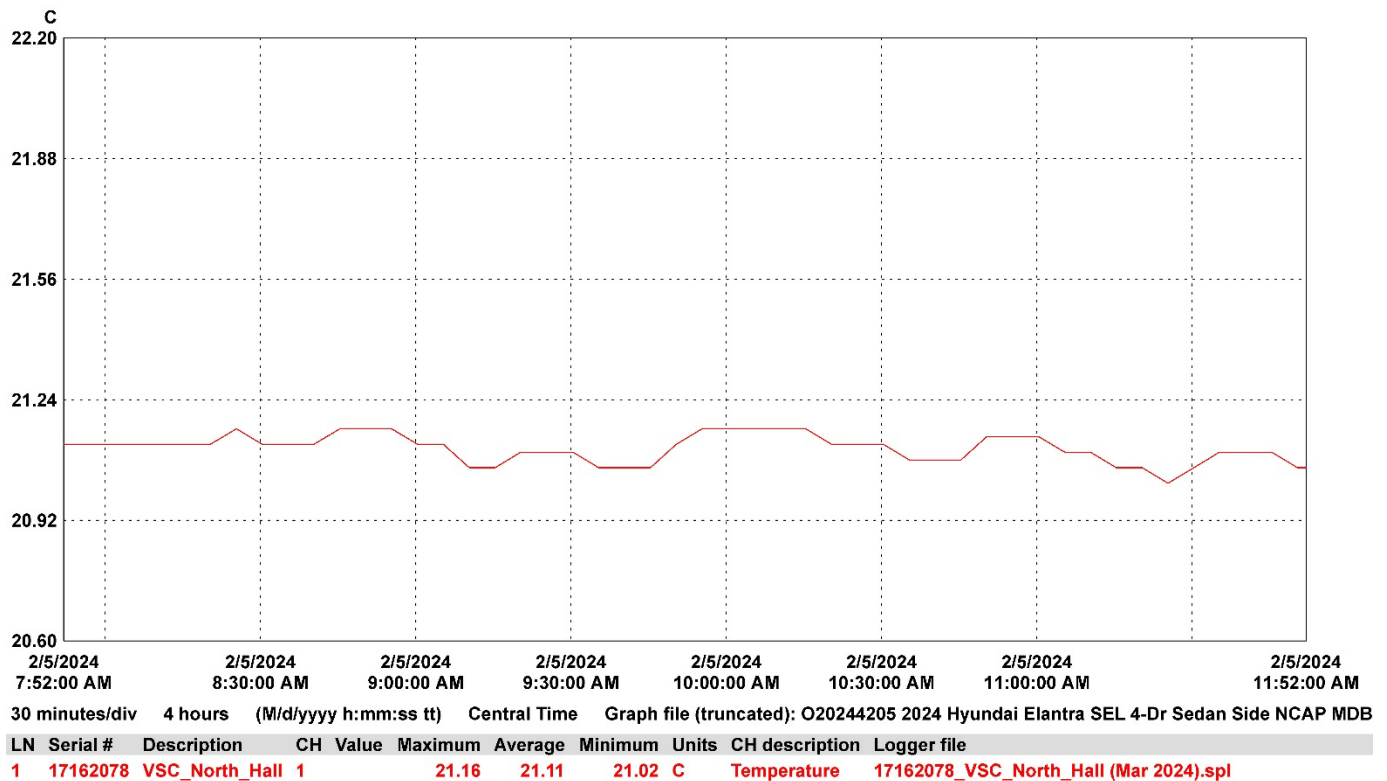
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15 **DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA**

Test Vehicle: 2024 Hyundai Elantra SEL 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20244205
 Test Date: 2/5/2024



APPENDIX A
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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

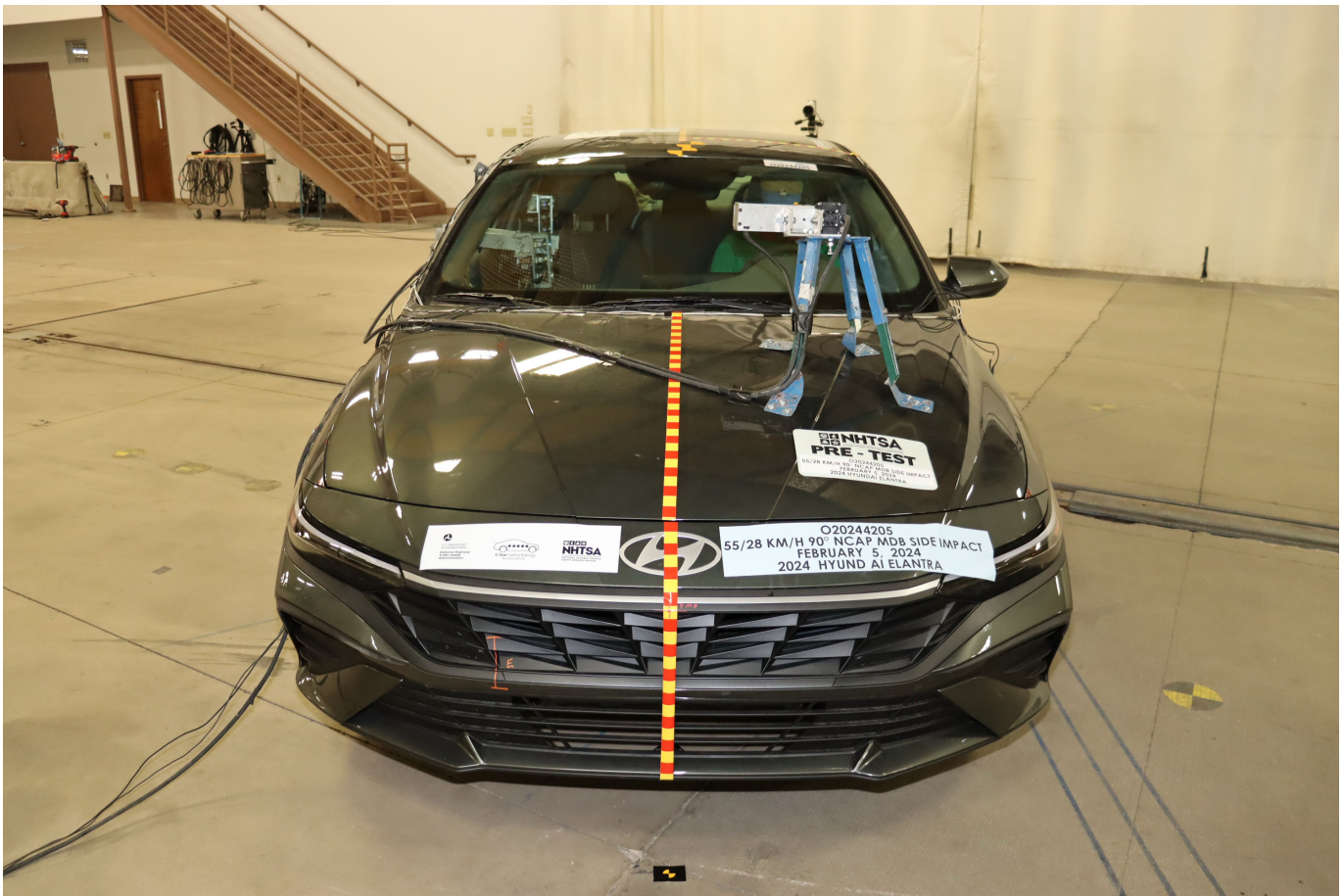


Photo No. 003 - Pre-Test Frontal View of Test Vehicle



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 Three-Quarter Rear View of Test Vehicle



Photo No. 010 - Post-Test Left Three-Quarter Rear 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

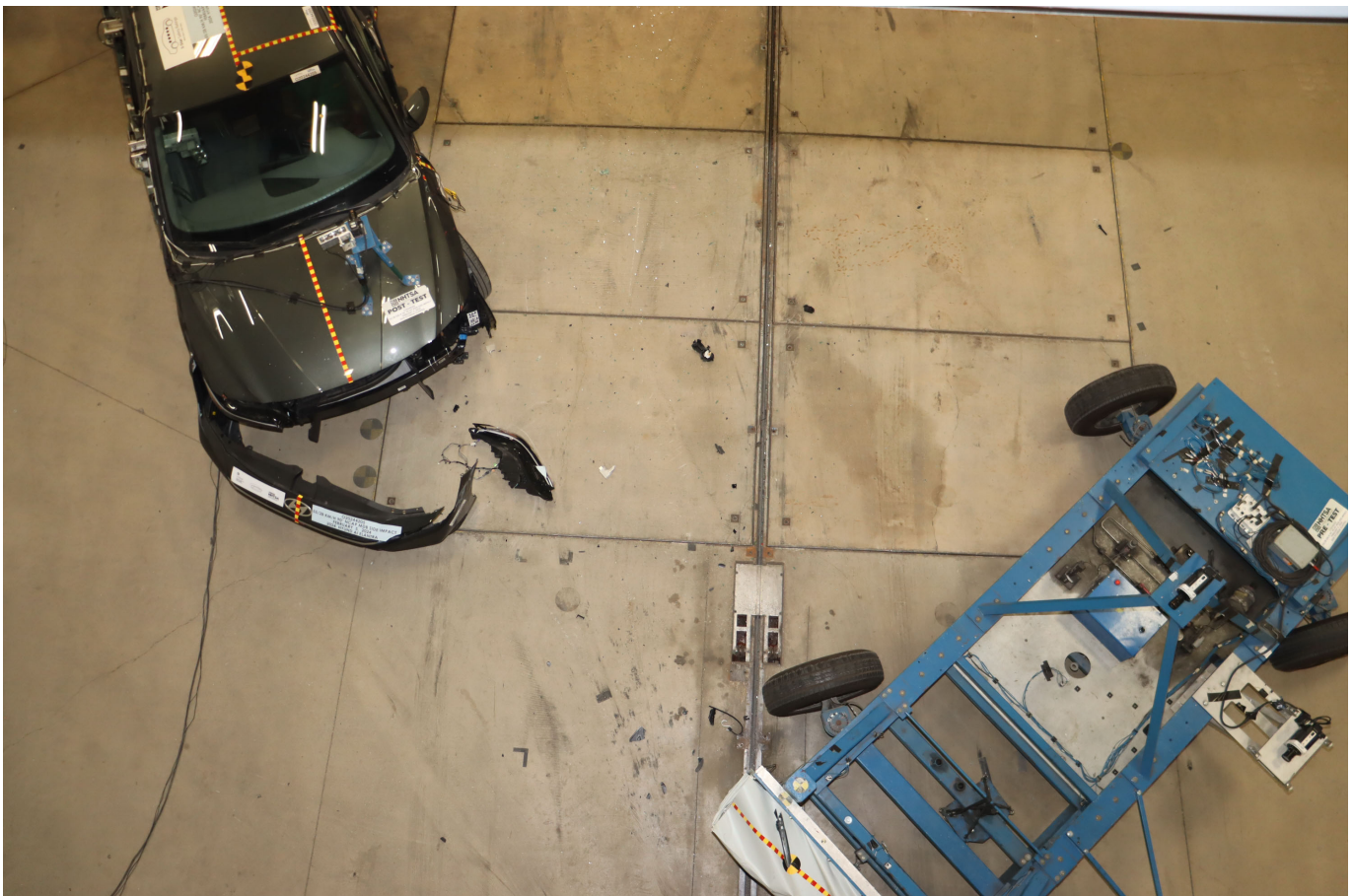


Photo No. 016 - Post-Test Overhead View of Test Area



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



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



Photo No. 021 - Pre-Test Left Front Door Latch Close-Up



Photo No. 022 - Post-Test Left Front Door Latch Close-Up



Photo No. 023 - Pre-Test Left Rear Door Latch Close-Up



Photo No. 024 - Post-Test Left Rear Door Latch Close-Up



Photo No. 025 - Pre-Test Front Close-Up View of Driver Dummy



Photo No. 026 - Post-Test Front Close-Up View of Driver Dummy



Photo No. 027 - Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking



Photo No. 028 - Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



Photo No. 029 - Post-Test Left Side View of Driver Dummy Shoulder and Door Top View



Photo No. 030 - Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



Photo No. 031 - Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 032 - Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning



Photo No. 033 - Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



Photo No. 034 - Pre-Test Placement of Driver Dummy's Feet

PHOTOGRAPH NOT AVAILABLE

Photo No. 035 - Pre-Test View of Belt Anchorage for Driver Dummy



Photo No. 036 - Pre-Test Left Side View of Steering Wheel



Photo No. 037 - Pre-Test View of Disengaged Parking Brake



Photo No. 038 - Pre-Test View of Parking Brake



Photo No. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track



Photo No. 040 - Pre-Test Close-Up Left Side View of Driver Seat Back



Photo No. 041 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Photo No. 042 - Pre-Test Driver Dummy and Door Clearance View



Photo No. 043 - Post-Test Driver Dummy and Door Clearance View



Photo No. 044 - Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Photo No. 045 - Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Photo No. 046 - Pre-Test Driver Inner Door Panel View



Photo No. 047 - Post-Test Driver Inner Door Panel View



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



Photo No. 049 - Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View



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



Photo No. 051 - Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View



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



Photo No. 053 - Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View



Photo No. 054 - Post-Test Driver Dummy Close-Up Knee Contact View



Photo No. 055 - Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking



Photo No. 056 - Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



Photo No. 057 - Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



Photo No. 058 - Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



Photo No. 059 - Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 060 - Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Photo No. 061 - Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



Photo No. 062 - Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket



Photo No. 063 - Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



Photo No. 064 - Pre-Test Placement of Rear Passenger Dummy's Feet



Photo No. 065 - Pre-Test View of Belt Anchorage for Rear Passenger Dummy



Photo No. 066 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

PHOTOGRAPH NOT APPLICABLE

Photo No. 067 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

PHOTOGRAPH NOT APPLICABLE

Photo No. 068 - Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



Photo No. 069 - Pre-Test Rear Passenger Dummy and Door Clearance View

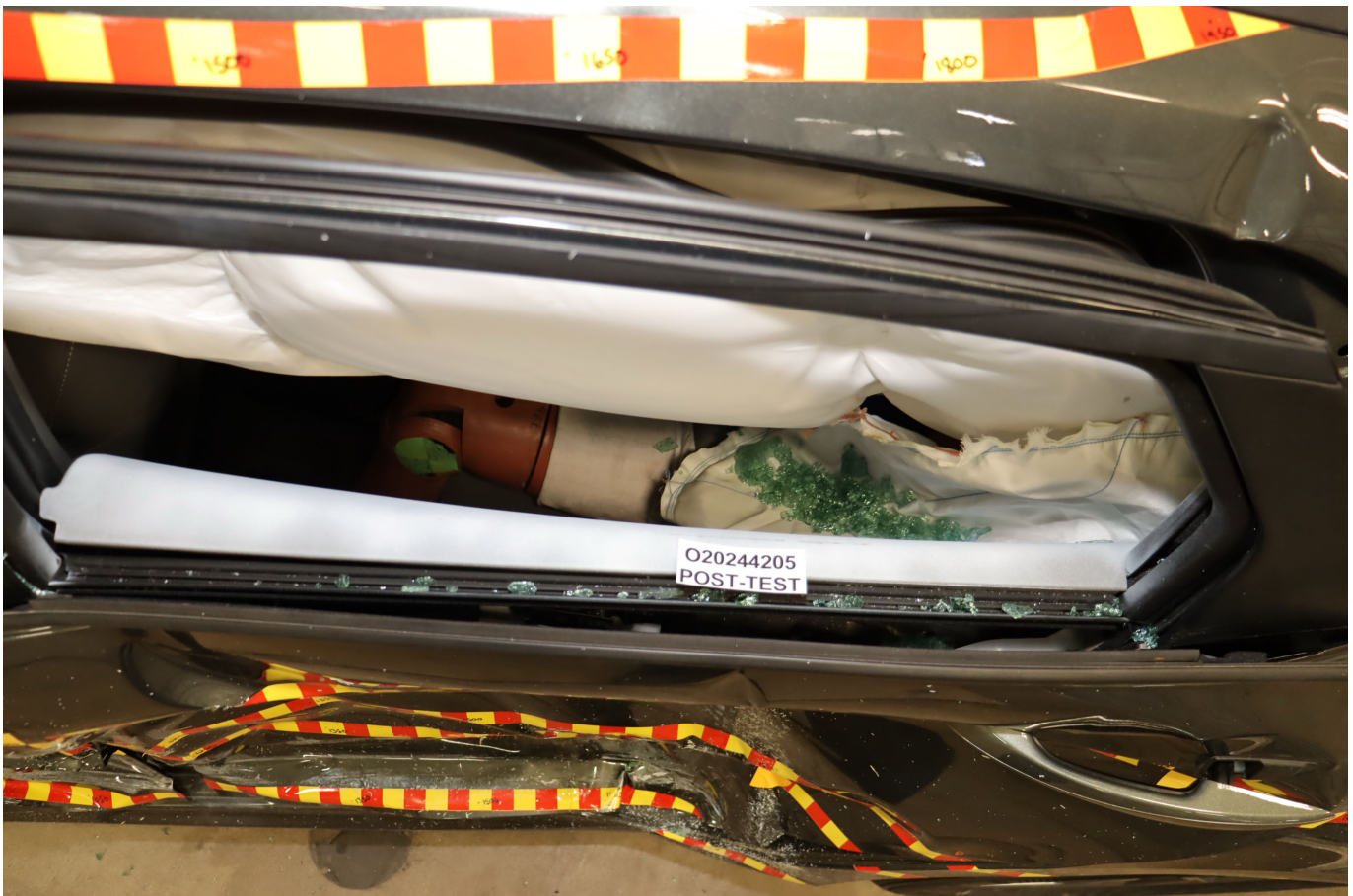


Photo No. 070 - Post-Test Rear Passenger Dummy and Door Clearance View



Photo No. 071 - Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Photo No. 072 - Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Photo No. 073 - Pre-Test Rear Passenger Inner Door Panel View



Photo No. 074 - Post-Test Rear Passenger Inner Door Panel View



Photo No. 075 - Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle Interior View



Photo No. 076 - Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View



Photo No. 077 - Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View



Photo No. 078 - Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View



Photo No. 079 - Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Vehicle Interior View

PHOTOGRAPH NOT APPLICABLE

Photo No. 080 - Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View



Photo No. 081 - Post-Test Rear Passenger Dummy Close-Up Knee Contact View



Photo No. 082 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 083 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 084 - Pre-Test Front View of MDB Impactor Face



Photo No. 085 - Post-Test Front View of MDB Impactor Face



Photo No. 086 - Pre-Test Top View of MDB Impactor Face



Photo No. 087 - Post-Test Top View of MDB Impactor Face



Photo No. 088 - Pre-Test Left Side View of MDB Impactor Face



Photo No. 089 - Post-Test Left Side View of MDB Impactor Face



Photo No. 090 - Pre-Test Right Side View of MDB Impactor Face



Photo No. 091 - Post-Test Right Side View of MDB Impactor Face



Photo No. 092 - Close-Up View of Vehicle's Certification Label



Photo No. 093 - Close-Up View of Vehicle's Tire Information Placard or Label

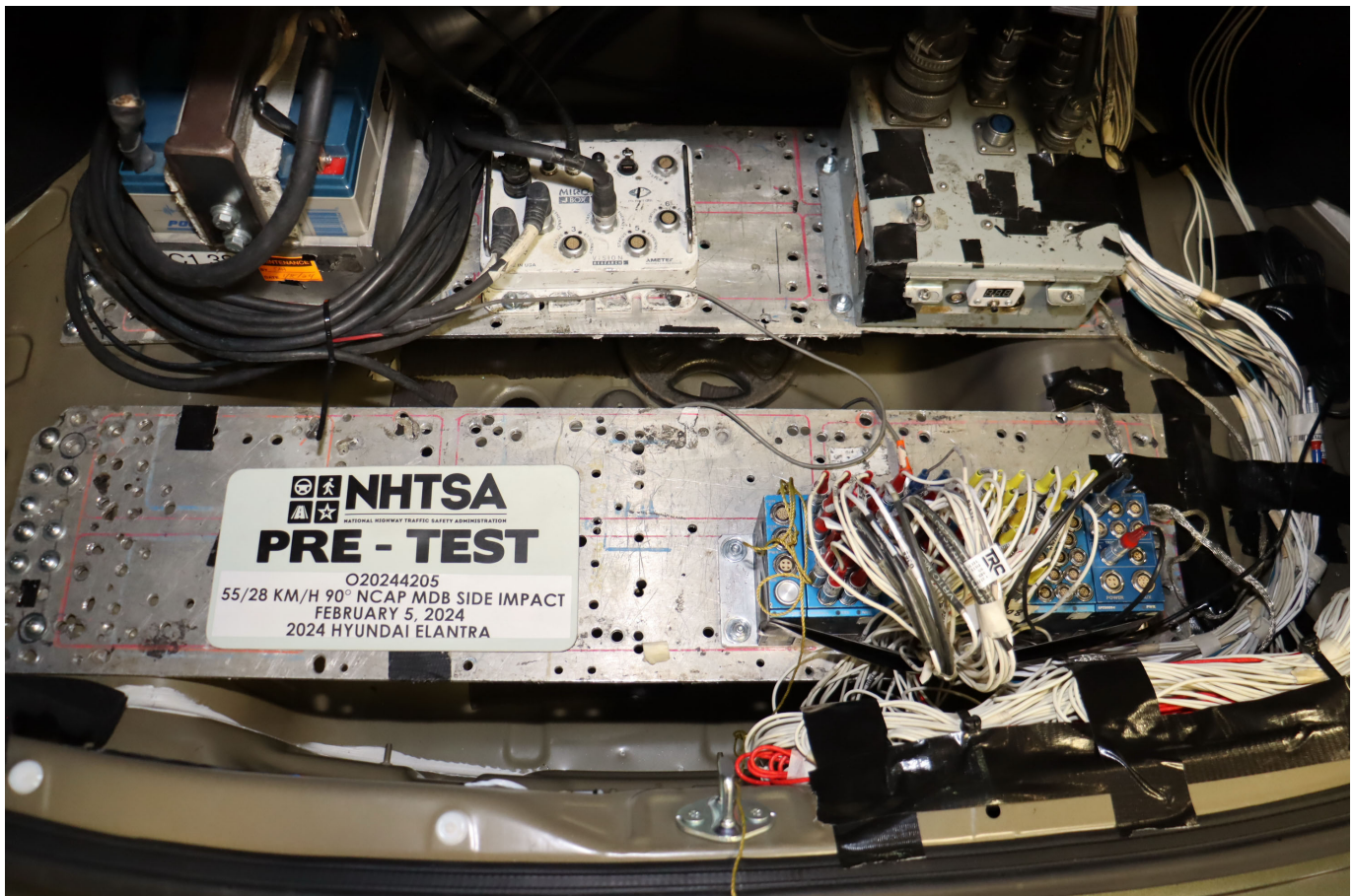


Photo No. 094 - Pre-Test Ballast View



Photo No. 095 - Post-Test Primary and Redundant Speed Trap Read-Out



Photo No. 096 - FMVSS Photo No. 301 Static Rollover 0 Degrees



Photo No. 097 - FMVSS Photo No. 301 Static Rollover 90 Degrees



Photo No. 098 - FMVSS Photo No. 301 Static Rollover 180 Degrees

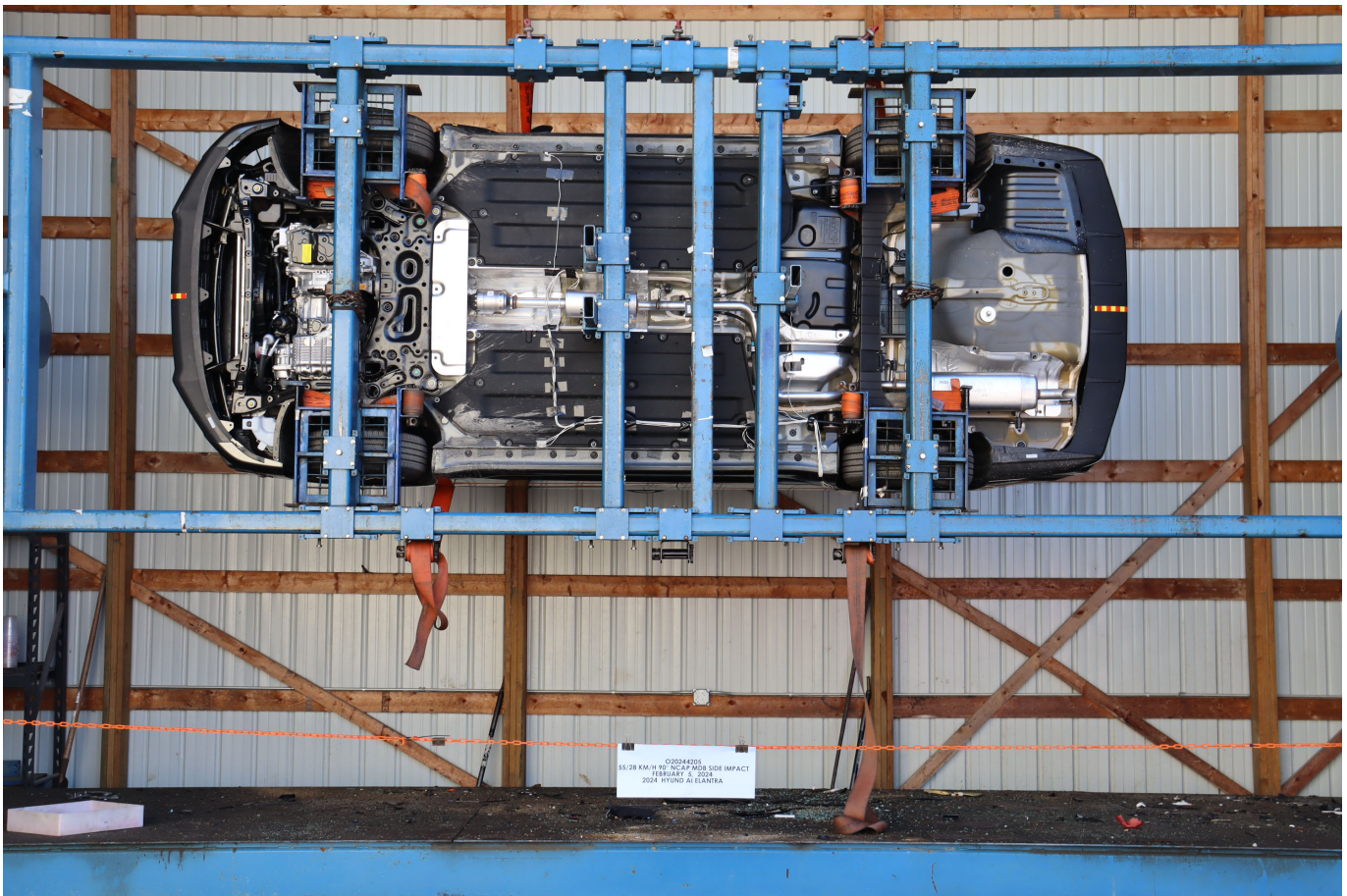


Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees



Photo No. 100 - FMVSS Photo No. 301 Static Rollover 360 Degrees

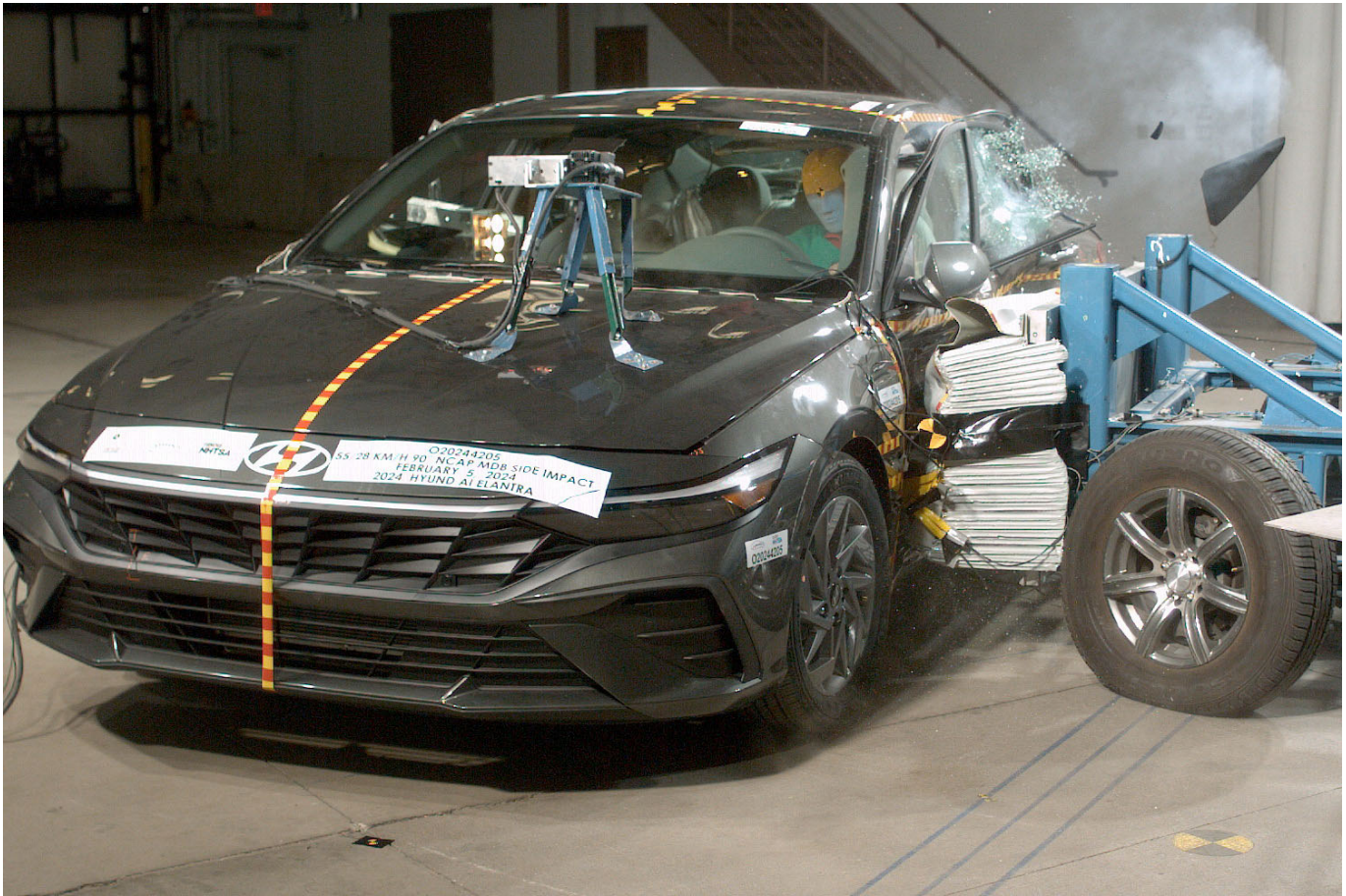


Photo No. 101 - Impact Event



2024 ELANTRA SEL

SOLD TO: W1014
BOUCHER HYUNDAI
1537 EAST MORELAND BOULEVARD
WAUKESHA WI 53186

SHIPPED TO: W1014
48mi²

VIN: KMHLM4DG8RU654181
MODEL: 494G2F4S
ENGINE: G4NSPU996130
PORT OF ENTRY: TC
EXTERIOR COLOR: AMAZON GRAY
INTERIOR/SEAT COLOR: GRAY/GRAY
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 17 lbs / 8 kgs.
EMISSIONS: This vehicle meets California Emissions regulations and is Certified as a Super Ultra Low Emission Vehicle (SULEV)

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score		Not Rated
Based on the combined rating of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		
Frontal	Driver	★★★★★
Crash	Passenger	★★★★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side	Front seat	Not Rated
Crash	Rear seat	Not Rated
Based on the risk of injury in a side impact.		
Rollover		★★★★★
Based on the risk of rollover in a single-vehicle crash.		

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

STANDARD FEATURES:

AMERICA'S BEST WARRANTY
5-year/60,000-mile New Vehicle Warranty*
10-year/100,000-mile Powertrain Warranty*
7-year/Unlimited-mile Anti-perforation Warranty*
3-year/36,000-mile Complimentary Maintenance*
5-year/Unlimited-mile Roadside Assistance*
*Limited warranties, see dealer for details

ADVANCED SAFETY TECHNOLOGY
Forward Collision-Avoidance Assist
Blind-Spot Collision Warning
Rear Cross-Traffic Collision-Avoidance Assist
Lane Following Assist & Lane Keeping Assist
Safe Exit Warning & Driver Attention Warning
High Beam Assist

POWERTRAIN TECHNOLOGY
2.0L 4-Cylinder Engine
Intelligent Variable Transmission

EXTERIOR
16-inch Alloy Wheels
LED Headlights w/ Daytime Running Lights

COMFORT & CONVENIENCE
Apple CarPlay (TM) & Android Auto (TM)
10.25-inch Navigation System with High Resolution Touchscreen
10.25-inch Fully Digital TFT LCD Instrument Cluster
SiriusXM® Radio w/90 Day Platinum trial subscription;
Not Available in AK & HI
Proximity Key w/ Push Button Start
Dual Automatic Temperature Control
Rearview Camera w/ Dynamic Guidelines
Single 12V Outlet & Front/Rear USB Ports
Map Lights w/ Dome Lamp & Trunk Lamp
Bluetooth Hands-free Phone System
Steering Wheel Mounted Audio & Cruise Controls
Automatic Headlamp Control
Driver Seat Height Adjustment
Bench Folding Rear Seatback
Front Seat Center Armrest w/ Flip-up Storage Compartment
Driver's Auto up/down Window
Illuminated Vanity Mirrors
BlueLink® All-Inclusive Connected Services (enrollment required)
BlueLink® Map & Multimedia Over-the-Air Updates (3-yr Complimentary Service)
Full Tank of Gas

Manufacturer's Suggested Retail Price:

ADDED FEATURES:	
*Carpeted Floor Mats	\$210.00
*Cargo Tray	\$120.00
*First Aid Kit	\$30.00
*Cargo Trunk Hook	\$30.00
*Cargo Side Bins	\$80.00
*Alloy Wheel Locks	\$70.00

Inland Freight & Handling: \$1,115.00
Total Price: \$25,880.00

EPA DOT Fuel Economy and Environment

Fuel Economy

34 MPG combined city/hwy
2.9 gallons per 100 miles

Midsize Cars range from 15 to 132 MPG. The best vehicle rates 140 MPG.

You save \$1,750 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,600

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

Smog Rating (tailpipe only)

This vehicle emits 257 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

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. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

Smartphone QR Code

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service, Gasoline license and title fees, state and local taxes and dealer installed options and accessories are not included in the manufacturer's suggested retail price. This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements of 15 U.S.C. 1231 et seq. which prohibits its removal or alteration prior to delivery to the ultimate purchaser.

PARTS CONTENT INFORMATION FOR VEHICLE IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 1 %
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 95 %

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: ULSAN, KOREA
COUNTRY OF ORIGIN: KOREA
ENGINE: KOREA
TRANSMISSION: KOREA

270 A 2714TGLOVI

Photo No. 102 - Monroney Label

Armrest



The armrest is located in the center of the rear seat. Pull the armrest down from the seatback to use it.

Head restraints

The vehicle's front and rear seats have adjustable head restraints. The head restraints are designed to help protect passengers from whiplash and other neck and spinal injuries during a collision, especially a rear impact collision. When there are no occupants in the rear seats, adjust the rear head restraints to the lowest height to increase the driver's visibility.

WARNING

To help reduce the risk of serious injury or death in an accident, take the following precautions when adjusting your head restraints:

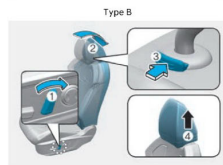
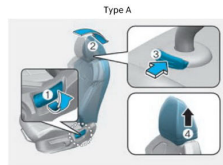
- Always adjust the head restraints properly for all passengers BEFORE starting the vehicle.
- Never let anyone ride in a seat with the head restraints removed or reversed.
- Adjust the head restraints so that the middle of the head restraint is at the same height as the top of the eyes.



- Never adjust the driver's head restraint when the vehicle is moving.
- Make sure the head restraint is locked in place after adjustment.

3-13

Removal/Reinstallation



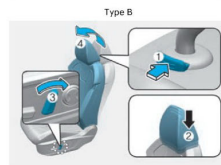
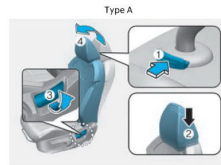
To remove the head restraint:

1. Recline the seatback (2) with the seatback angle lever or switch (1).
2. Raise the head restraint as far as it can go.
3. Press the head restraint release button (3) while pulling the head restraint up (4).

WARNING

Never allow anyone to travel in a seat with the head restraint removed.

To reinstall the head restraint:



1. Recline the seatback.

2. Put the head restraint poles (2) into the holes while pressing the release button (1).
3. Adjust the head restraint to the appropriate height.
4. Return the seatback (4) with the seatback angle lever or switch (3).

WARNING

Always make sure the head restraint is locked in place and properly adjusted for the passenger.

3-15

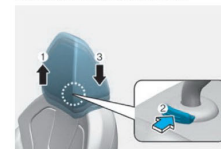
Seats & safety system

Front seat head restraints



The driver's and front passenger's seats are equipped with adjustable head restraint for the passengers safety and comfort.

Adjusting the height up and down



To raise the head restraint:

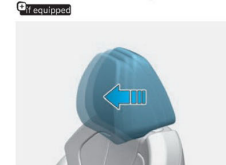
1. Pull it up to the desired position (1).

To lower the head restraint:

1. Press and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

3-14

Forward and rearward adjustment



The head restraint can be adjusted forward to 3 different positions by pulling the head restraint forward to the desired detent. To adjust the head restraint to its furthest rearward position, pull it fully forward to the farthest position and release it.

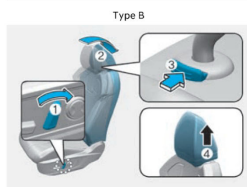
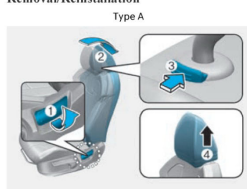


NOTICE

If you recline the seatback towards the front with the head restraint and seat cushion raised, the head restraint may come in contact with the survivor or other parts of the vehicle.

Photo No. 103 - Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Removal/Reinstallation



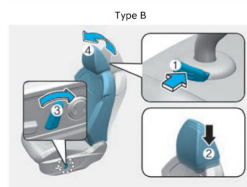
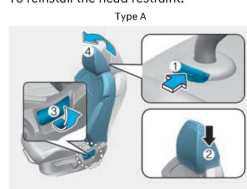
To remove the head restraint:

1. Recline the seatback (2) with the seatback angle lever or switch (1).
2. Raise the head restraint as far as it can go.
3. Press the head restraint release button (3) while pulling the head restraint up (4).

WARNING

Never allow anyone to travel in a seat with the head restraint removed.

To reinstall the head restraint:



1. Recline the seatback.

2. Put the head restraint poles (2) into the holes while pressing the release button (1).
3. Adjust the head restraint to the appropriate height.
4. Return the seatback (4) with the seatback angle lever or switch (3).

WARNING

Always make sure the head restraint is locked in place and properly adjusted for the passenger.

3-15

Seats & safety system

Rear seat head restraint



The rear seats are equipped with head restraint in all the seating positions for the passenger's safety and comfort.

Adjusting the height up and down



To raise the head restraint:

1. Pull it up to the desired position (1).

To lower the head restraint:

1. Press and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

3-16

Photo No. 104 - Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

<u>No.</u>	<u>Description</u>	<u>Page No.</u>
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Figure No. 2.	Driver Head Acceleration (Y) Primary vs. Time	B-1
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Figure No. 4.	Driver Head Resultant Acceleration Primary vs. Time	B-1
Figure No. 5.	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 6.	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 8.	Driver Thorax Rib Deflection Maximum vs. Time	B-2
Figure No. 9.	Driver Anterior Abdomen Force (Y) vs. Time	B-3
Figure No. 10.	Driver Middle Abdomen Force (Y) vs. Time	B-3
Figure No. 11.	Driver Posterior Abdomen Force (Y) vs. Time	B-3
Figure No. 12.	Driver Total Abdominal Force (Y) vs. Time	B-3
Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
Figure No. 14.	Passenger Head Acceleration (X) Primary vs. Time	B-5
Figure No. 15.	Passenger Head Acceleration (Y) Primary vs. Time	B-5
Figure No. 16.	Passenger Head Acceleration (Z) Primary vs. Time	B-5
Figure No. 17.	Passenger Head Resultant Acceleration Primary vs. Time	B-5
Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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 & Passenger Dummy Instrumentation Data

Passenger Head Angular Velocity (X)
Passenger Head Angular Velocity (Y)
Passenger Head Angular Velocity (Z)
Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Right Side Sill at Front Seat Acceleration (X)

Right Side Sill at Front Seat Acceleration (Y)

Right Side Sill at Front Seat Acceleration (Z)

Right Side Sill at Rear Seat Acceleration (X)

Right Side Sill at Rear Seat Acceleration (Y)

Right Side Sill at Rear Seat Acceleration (Z)

Left Side Sill at Front Seat Acceleration (Y)

Left Side Sill at Rear Seat Acceleration (Y)

Lower A-Post Acceleration (Y)

Middle A-Post Acceleration (Y)

Lower B-Post Acceleration (Y)

Middle B-Post Acceleration (Y)

Front Seat Track Acceleration (Y)

Rear Seat Track Acceleration (Y)

Right Rear Occupant Compartment Acceleration (Y)

Engine Block (X)

Engine Block (Y)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

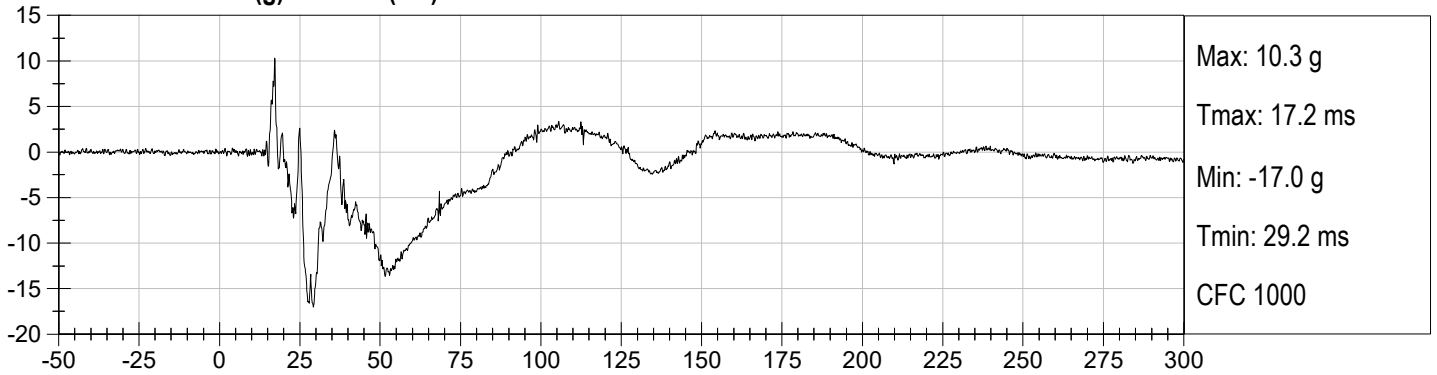
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

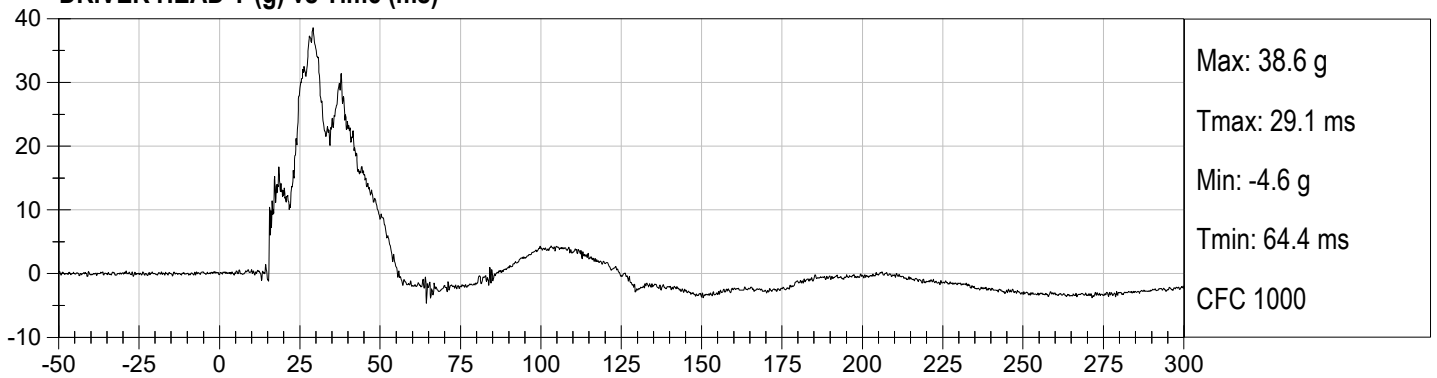
Left MDB Contact Switch

Right MDB Contact Switch

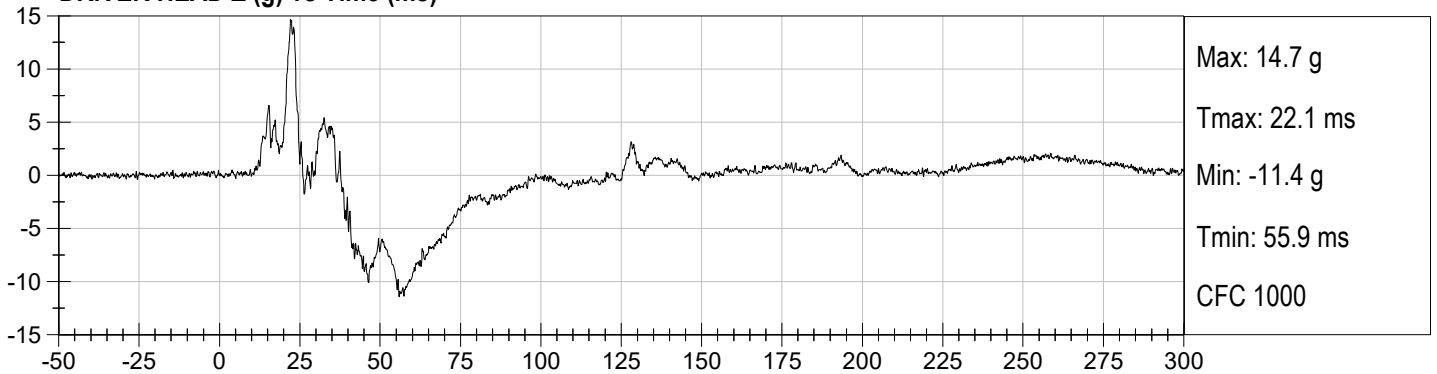
DRIVER HEAD X (g) vs Time (ms)



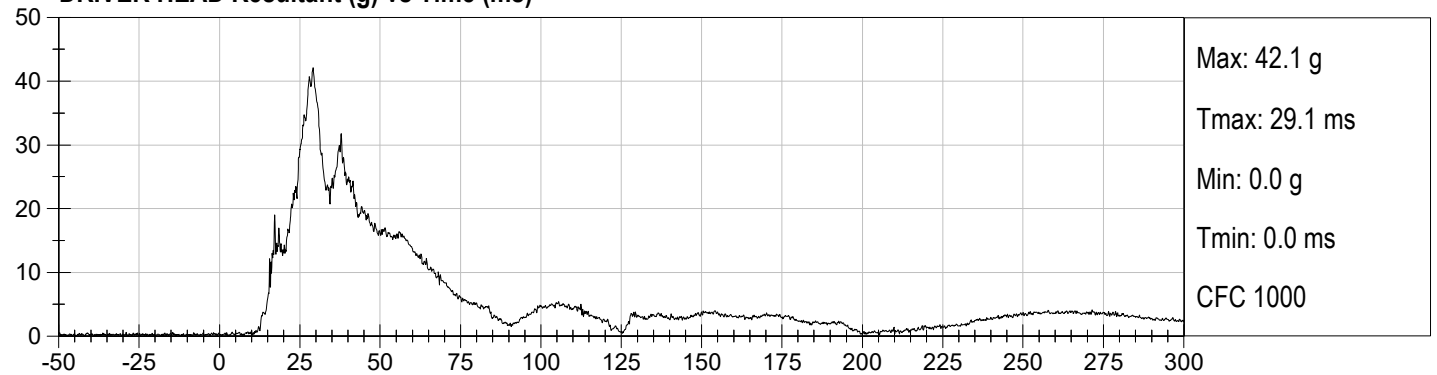
DRIVER HEAD Y (g) vs Time (ms)



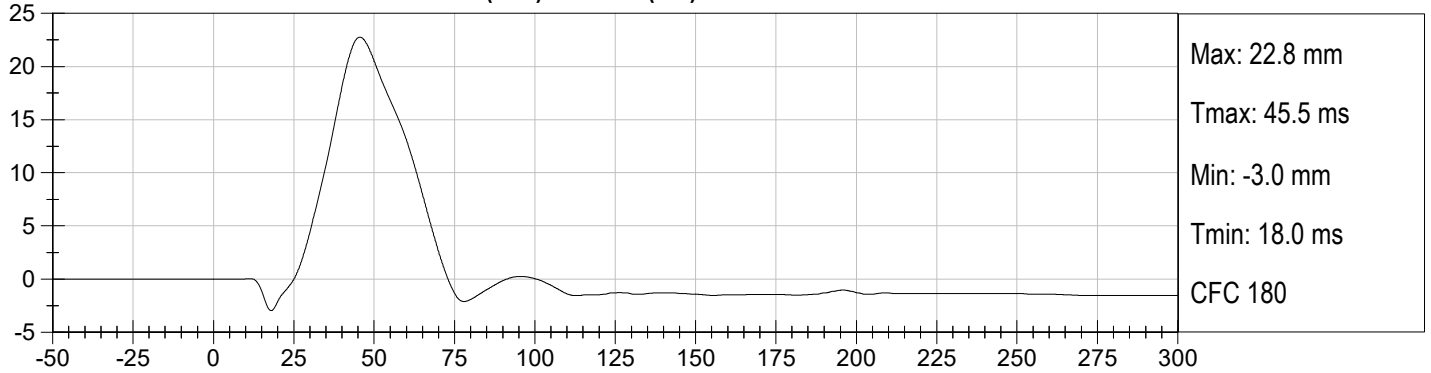
DRIVER HEAD Z (g) vs Time (ms)



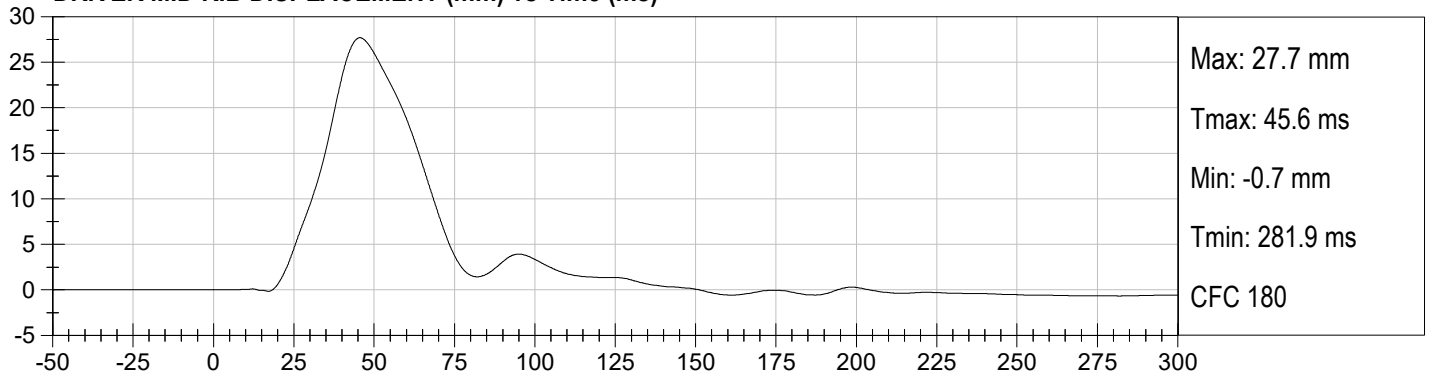
DRIVER HEAD Resultant (g) vs Time (ms)



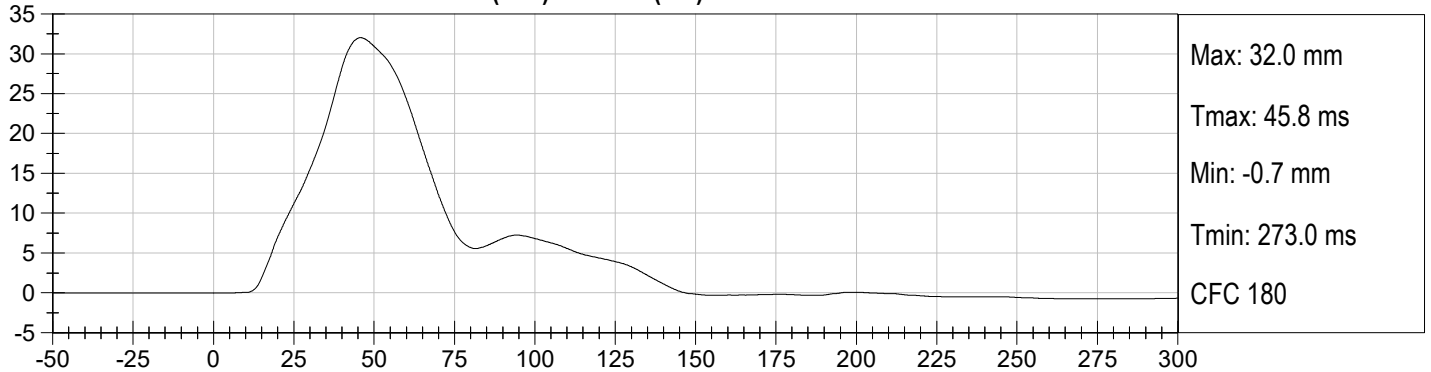
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



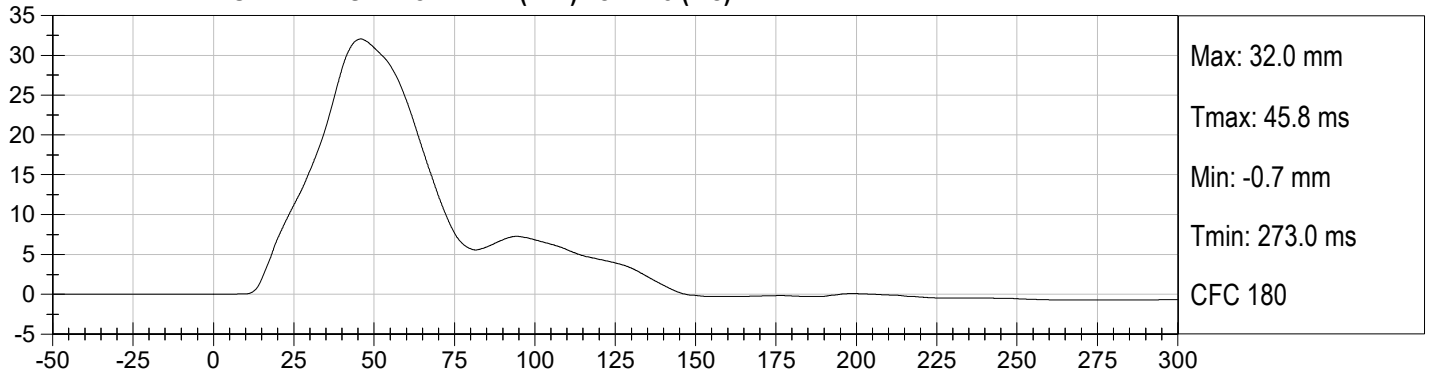
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



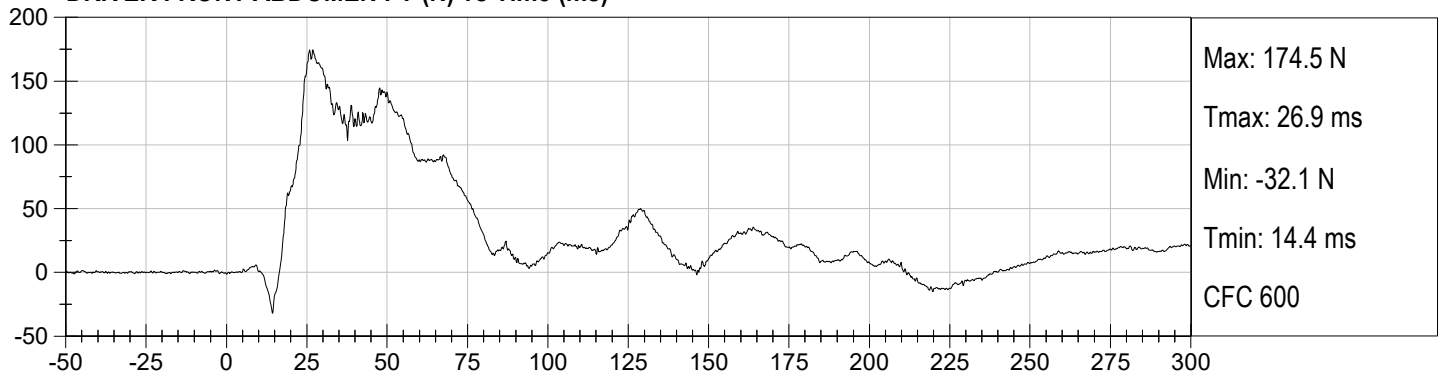
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



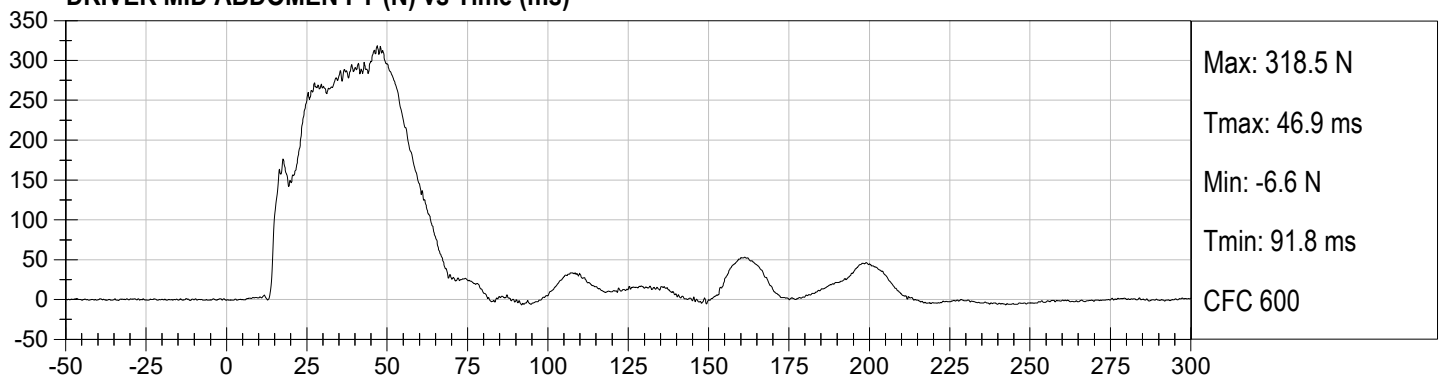
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



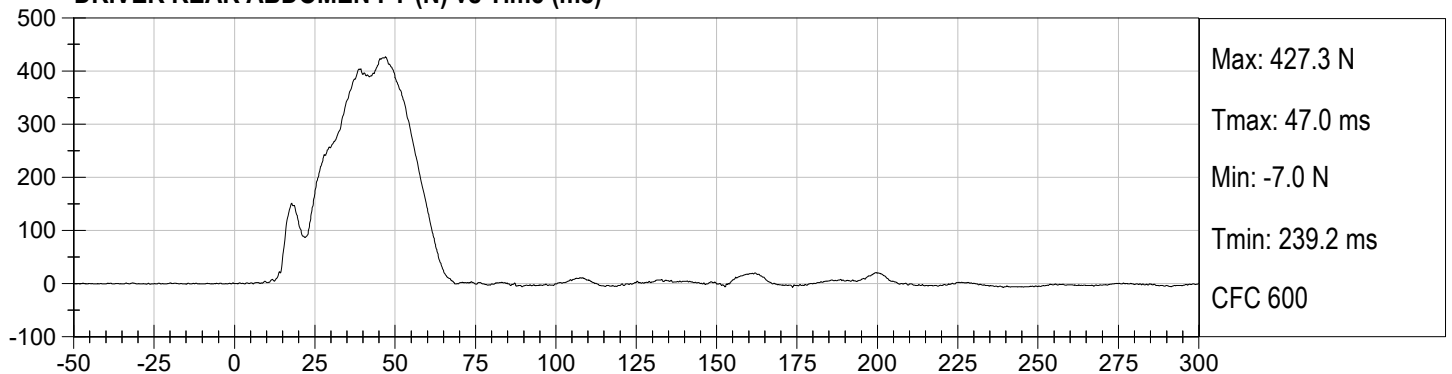
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



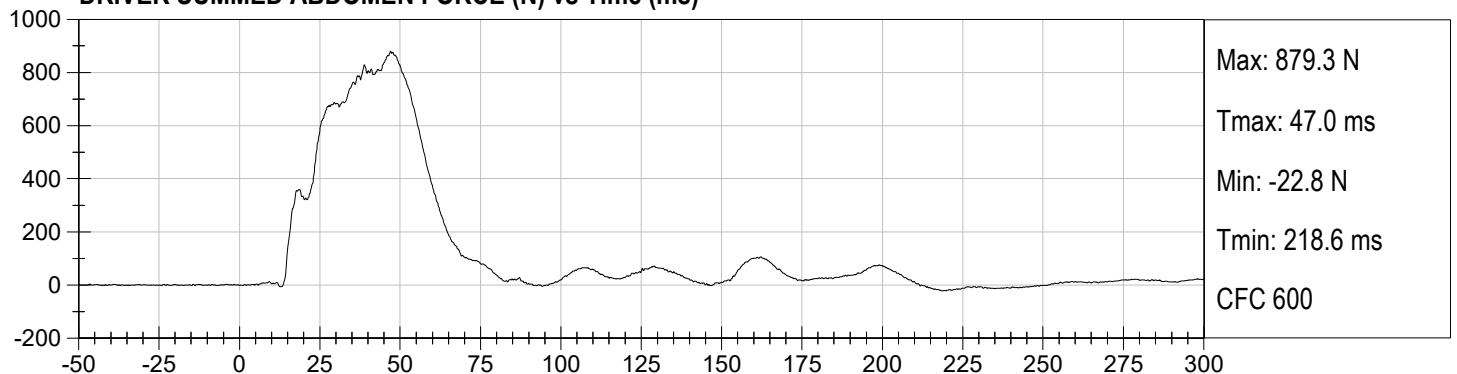
DRIVER MID ABDOMEN FY (N) vs Time (ms)

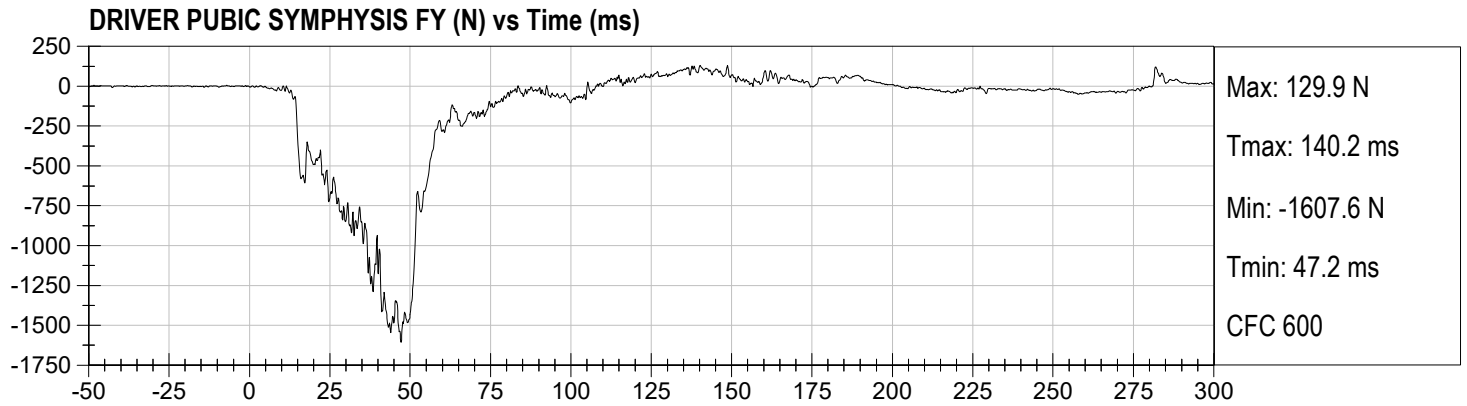


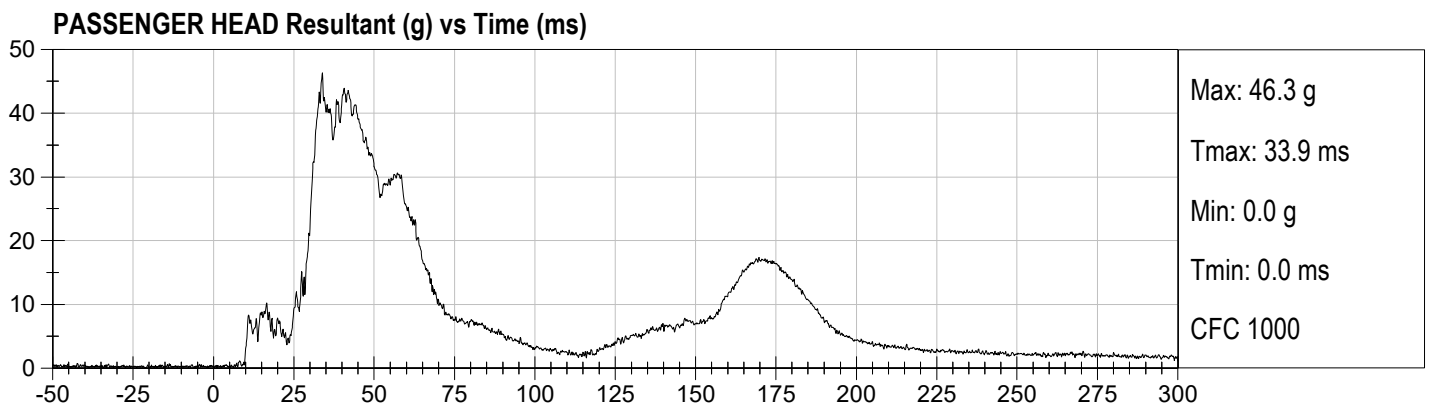
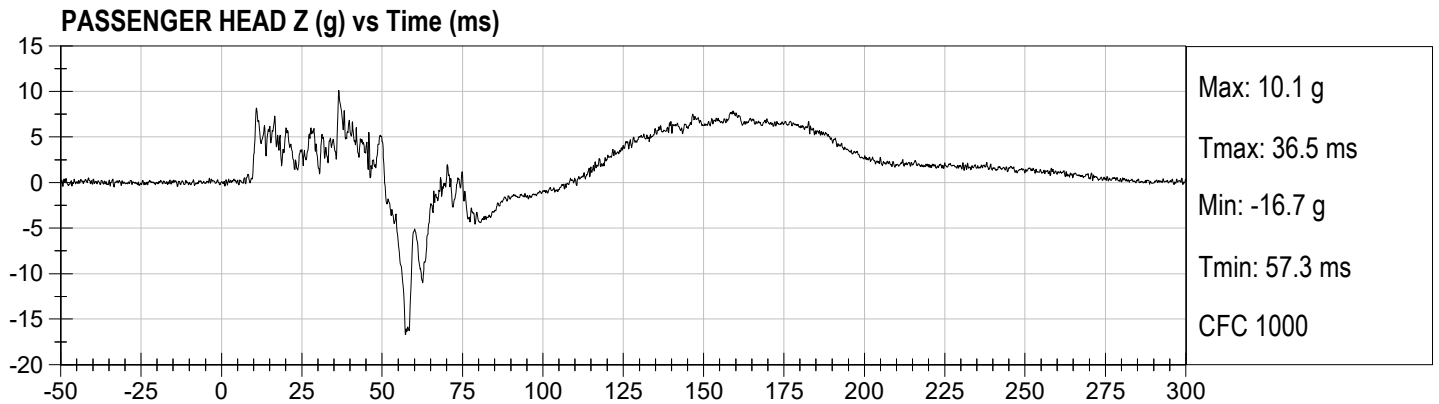
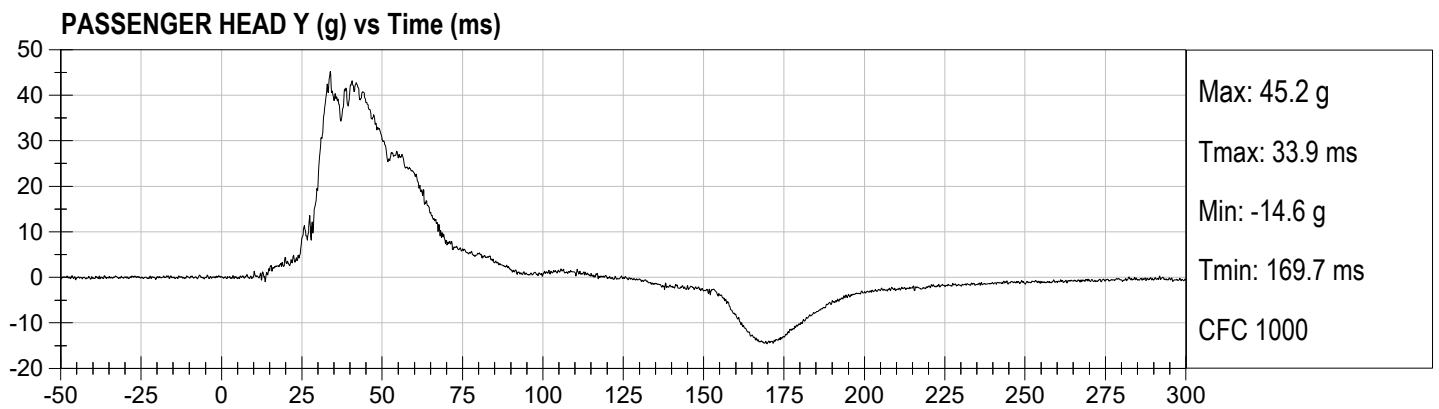
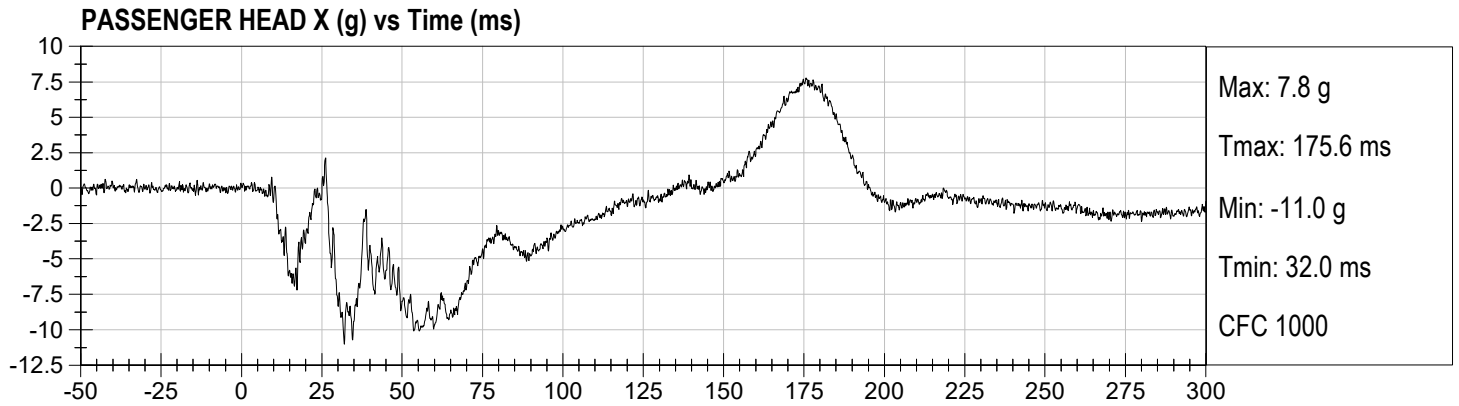
DRIVER REAR ABDOMEN FY (N) vs Time (ms)

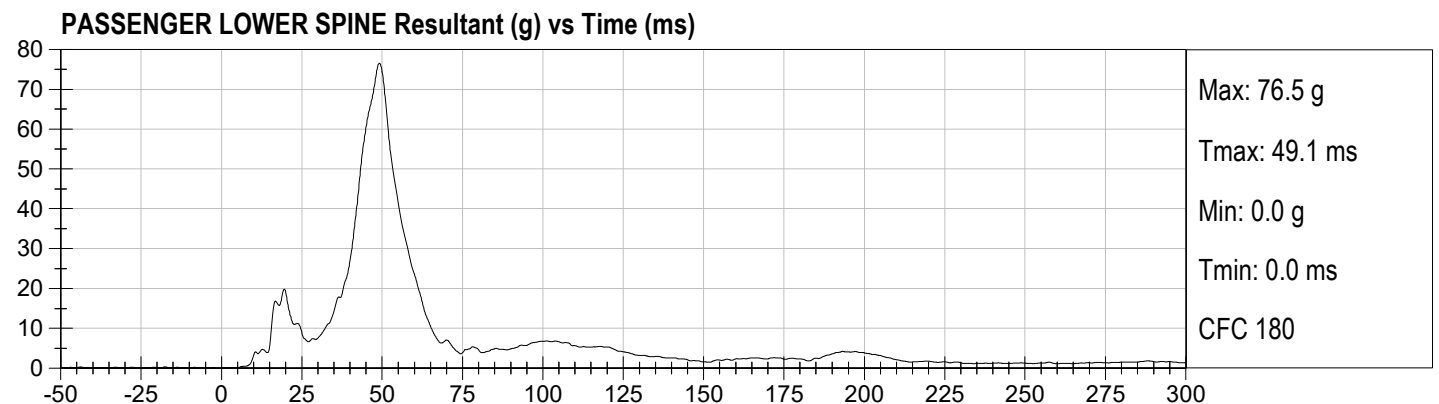
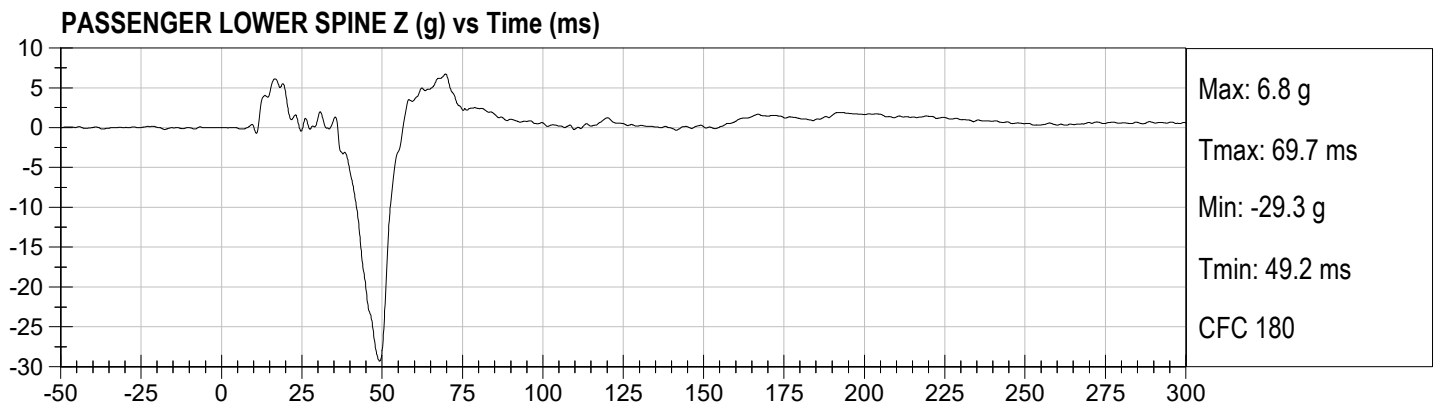
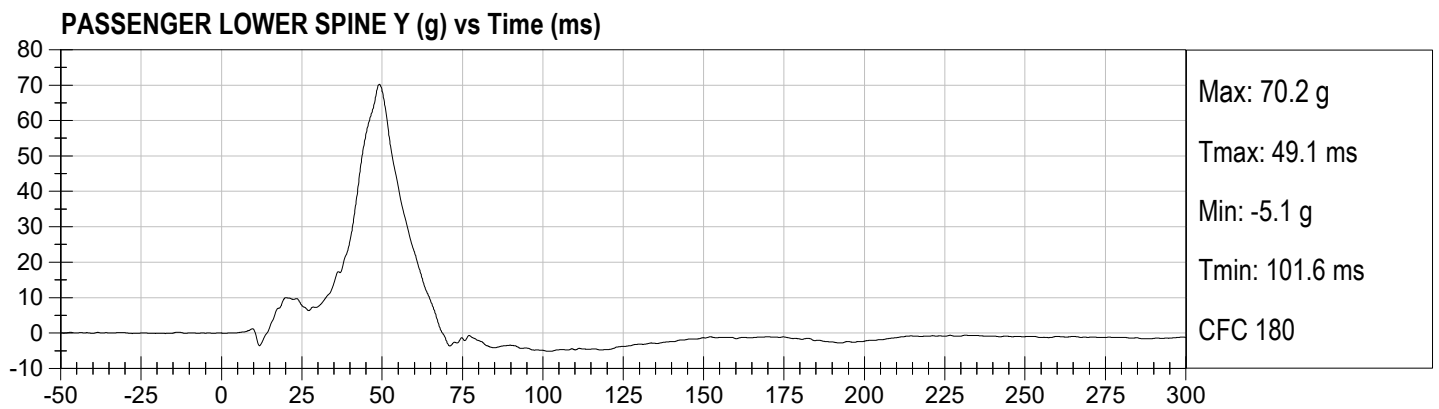
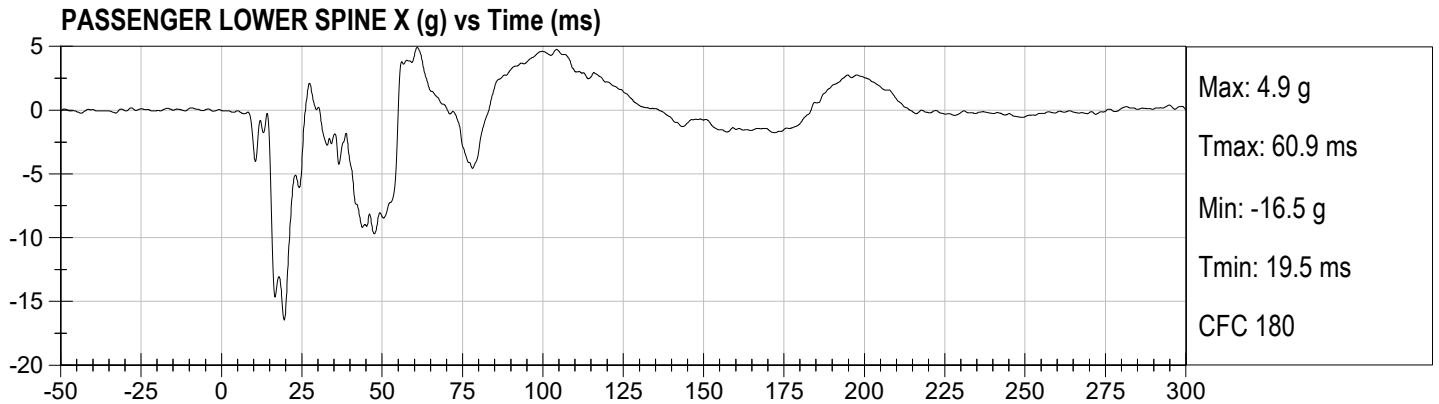


DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)

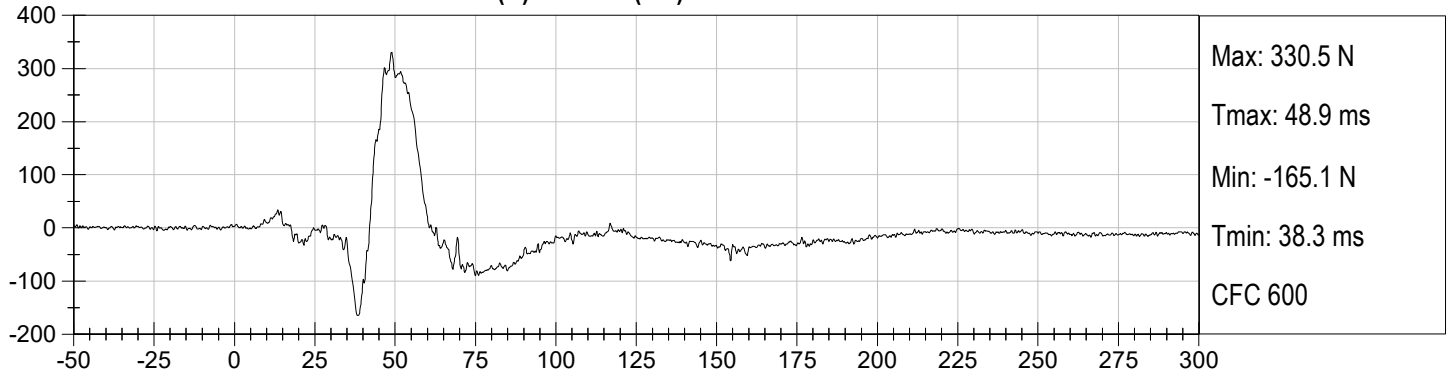




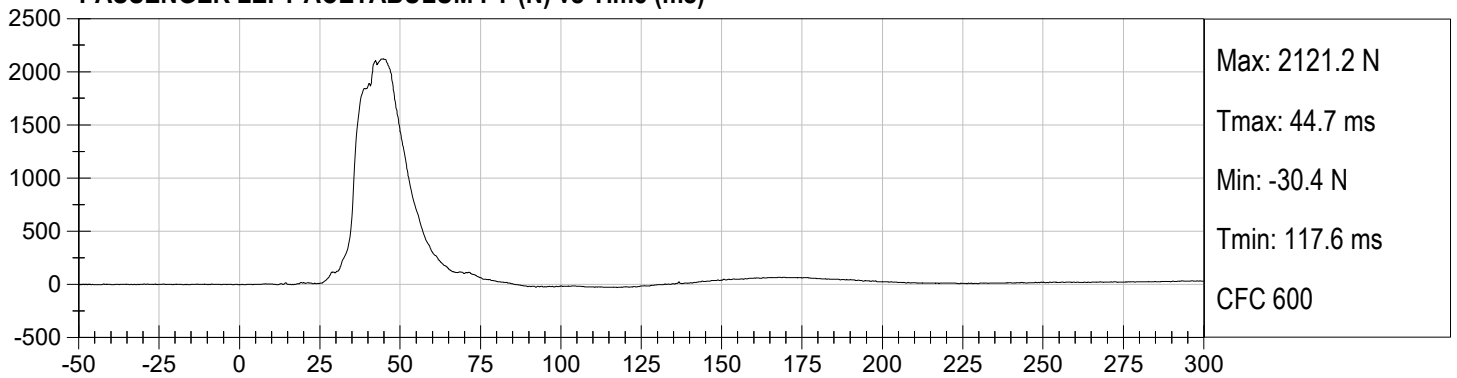




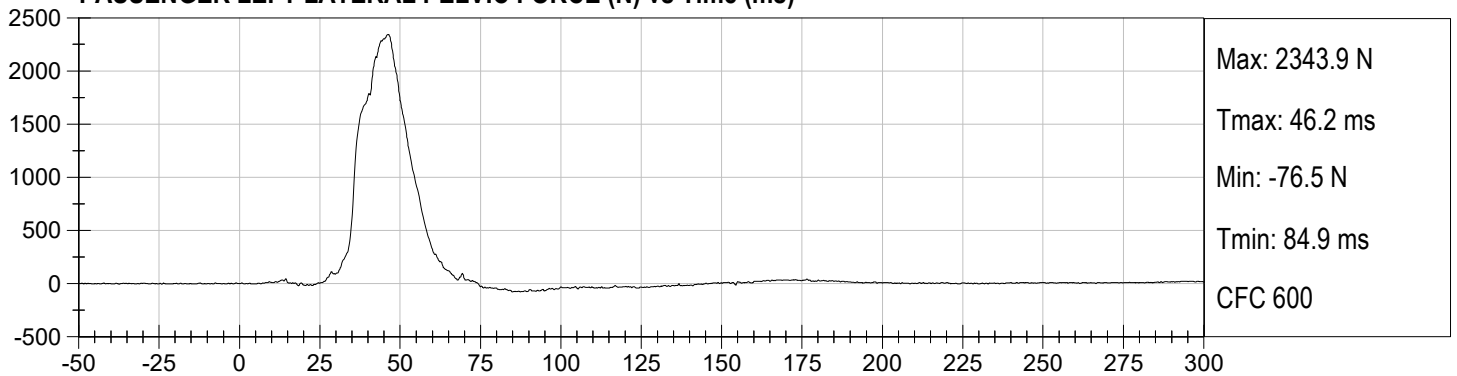
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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



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



APPENDIX C
DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION

QUALIFICATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: F032

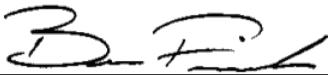
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

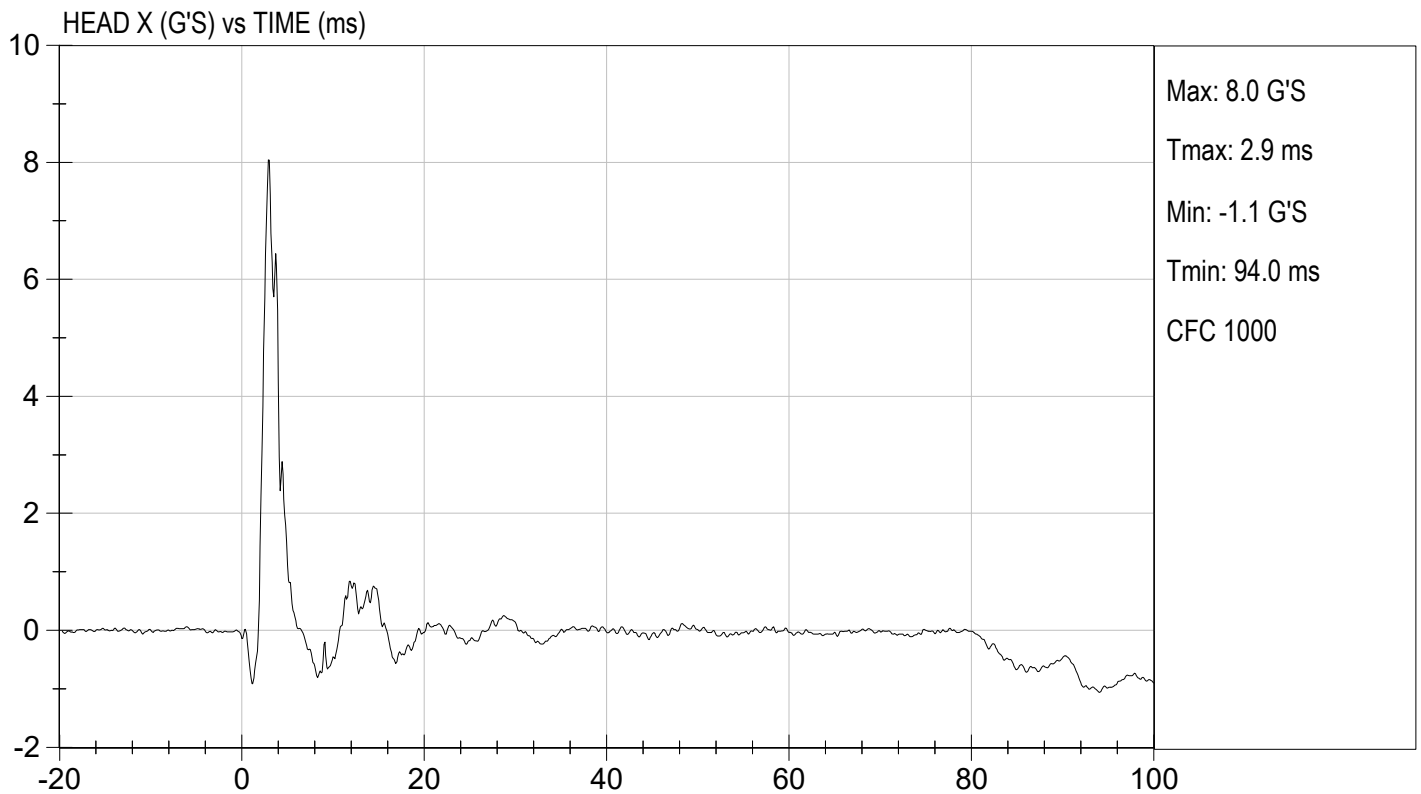
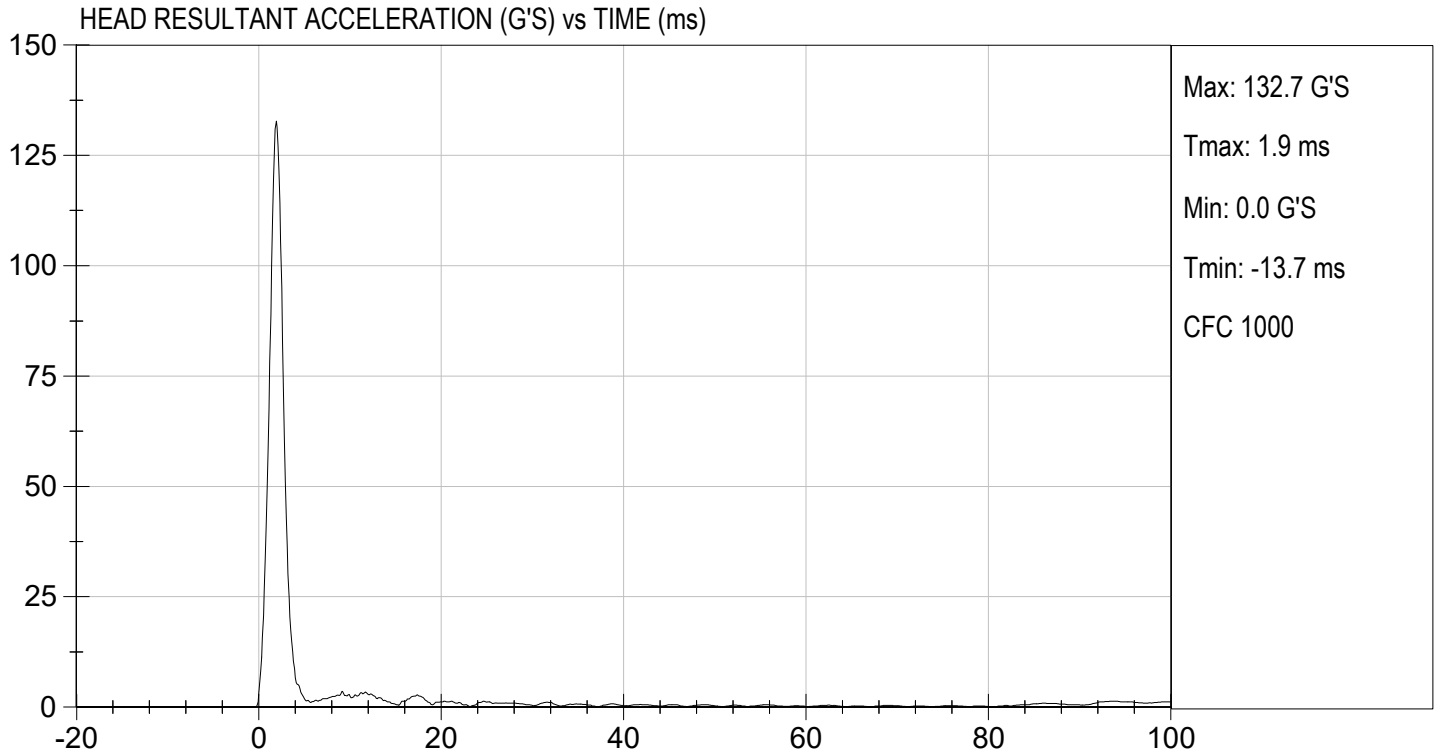
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY**ATD Serial No: F032Test ID: D240281

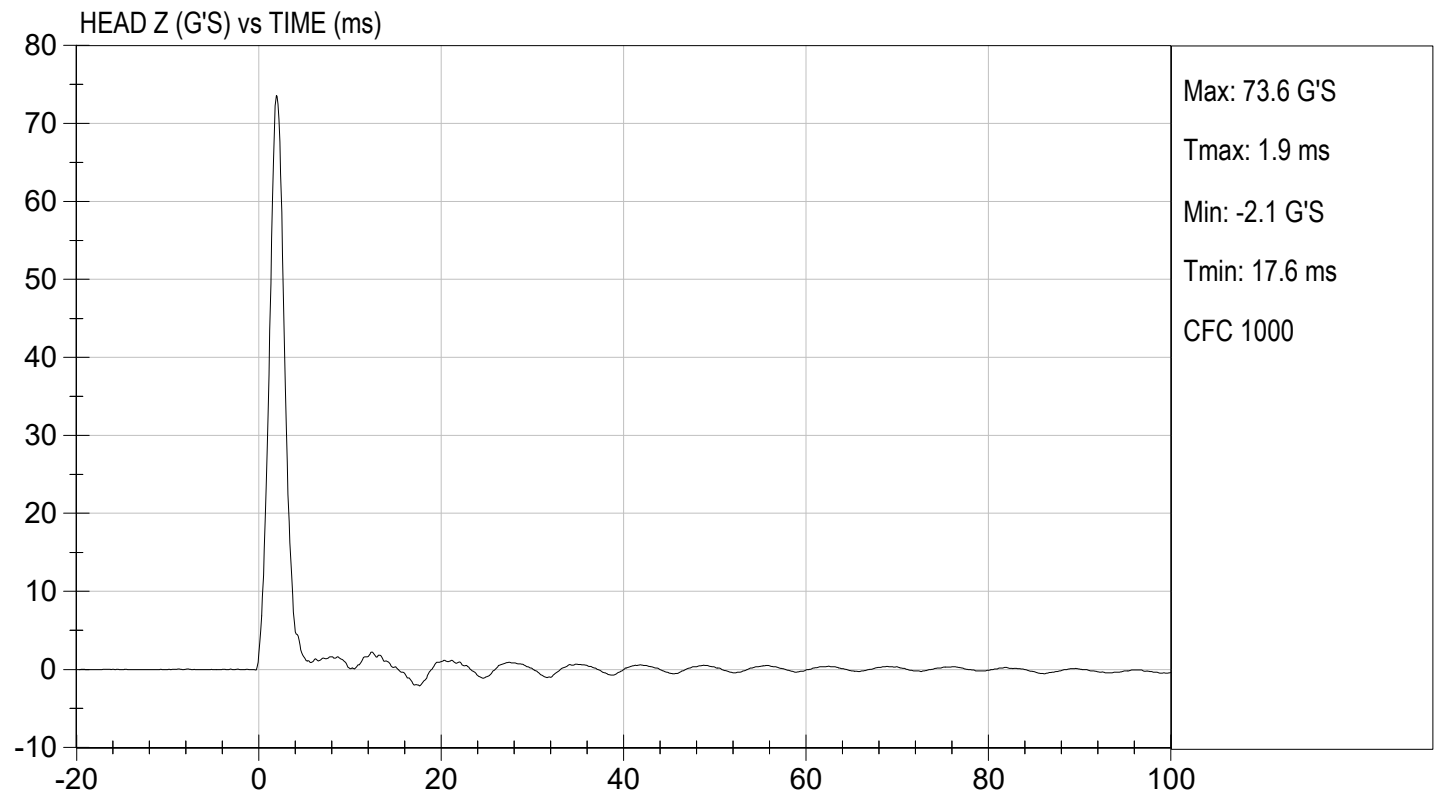
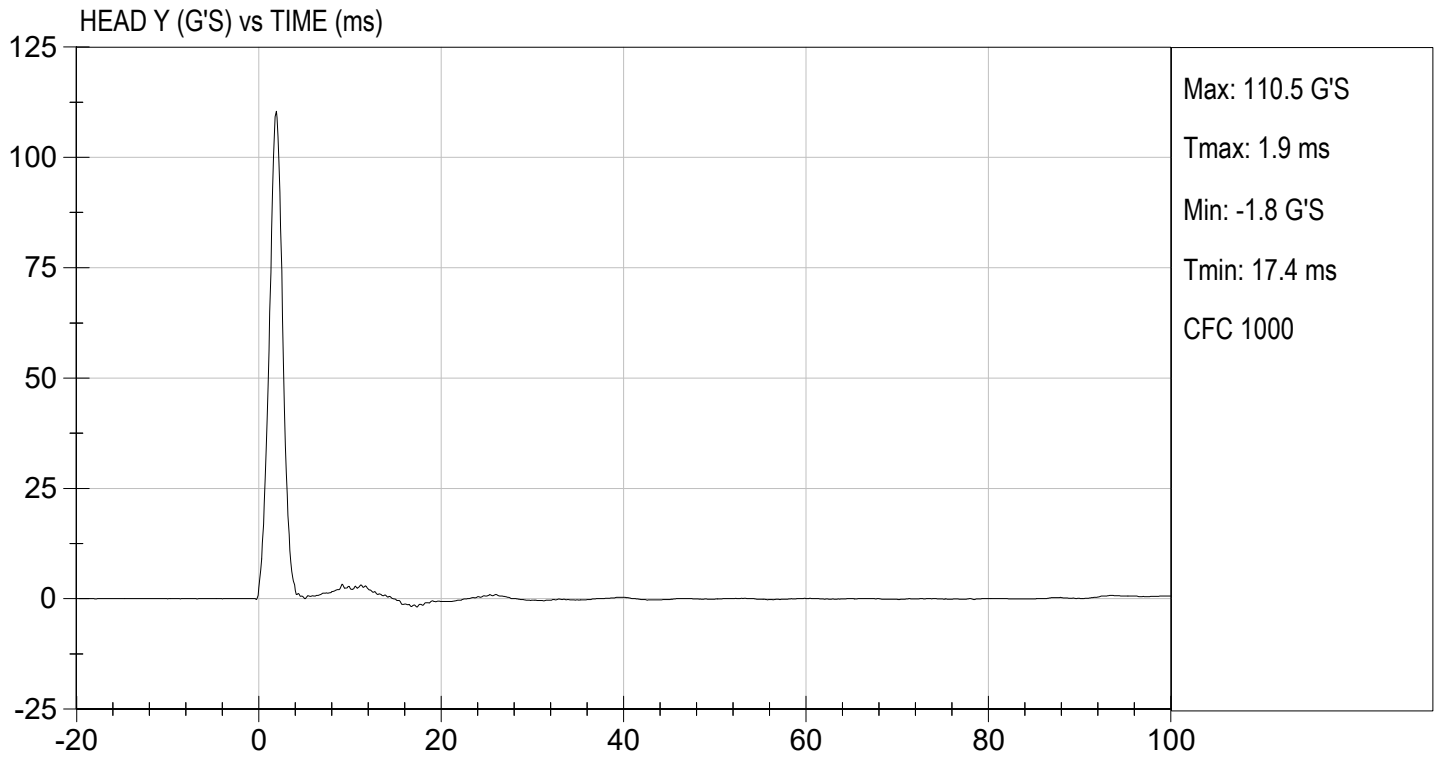
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	125 to 155	133	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	8.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

01/24/2024
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

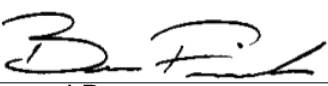
ATD Serial No: F032

Test I.D: D240282

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	31	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.46	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.54	Pass
	17 ms	m/s	>= -3.70	-3.59	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.0	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	60.2	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	55.2	Pass
Overall Results					Pass


 Laboratory Technician

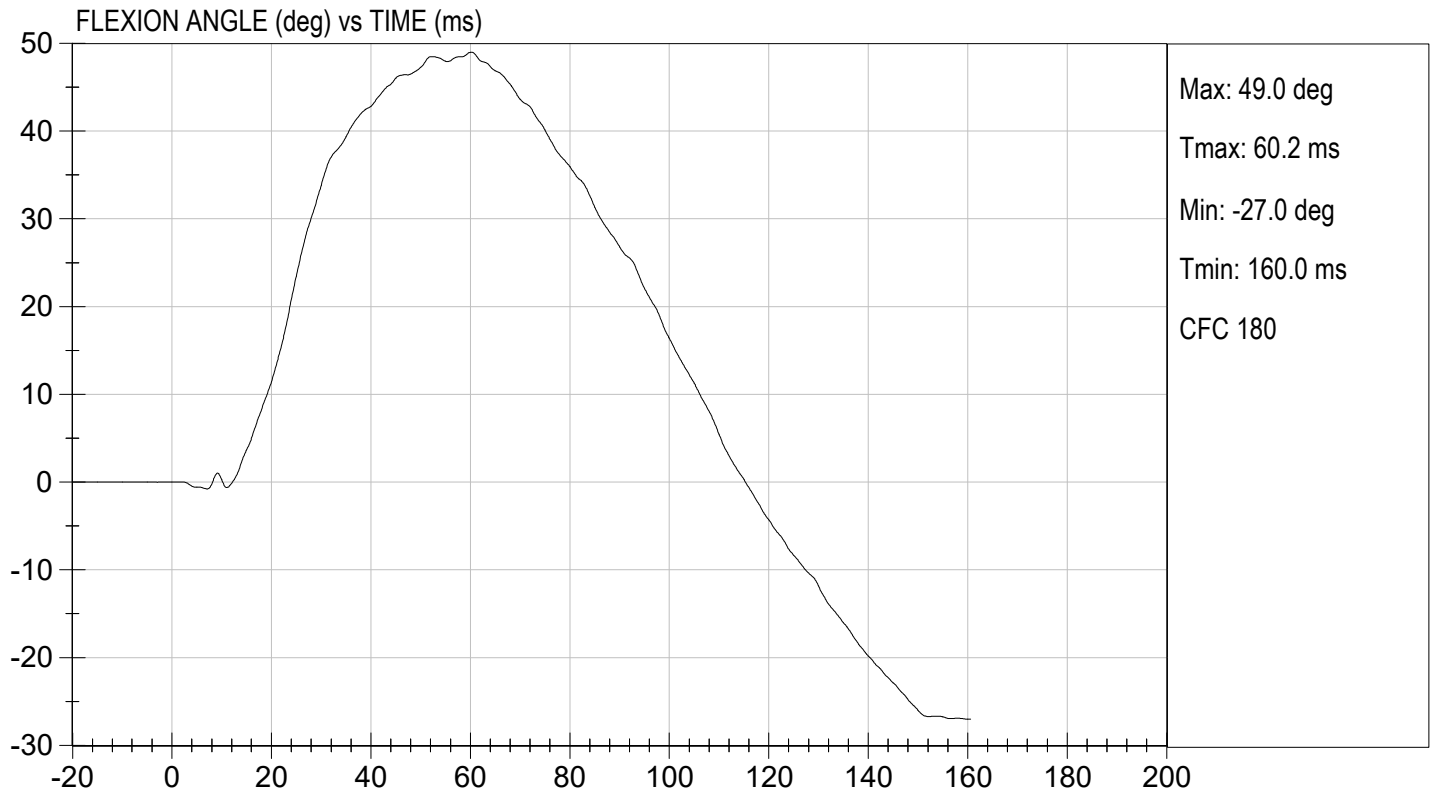
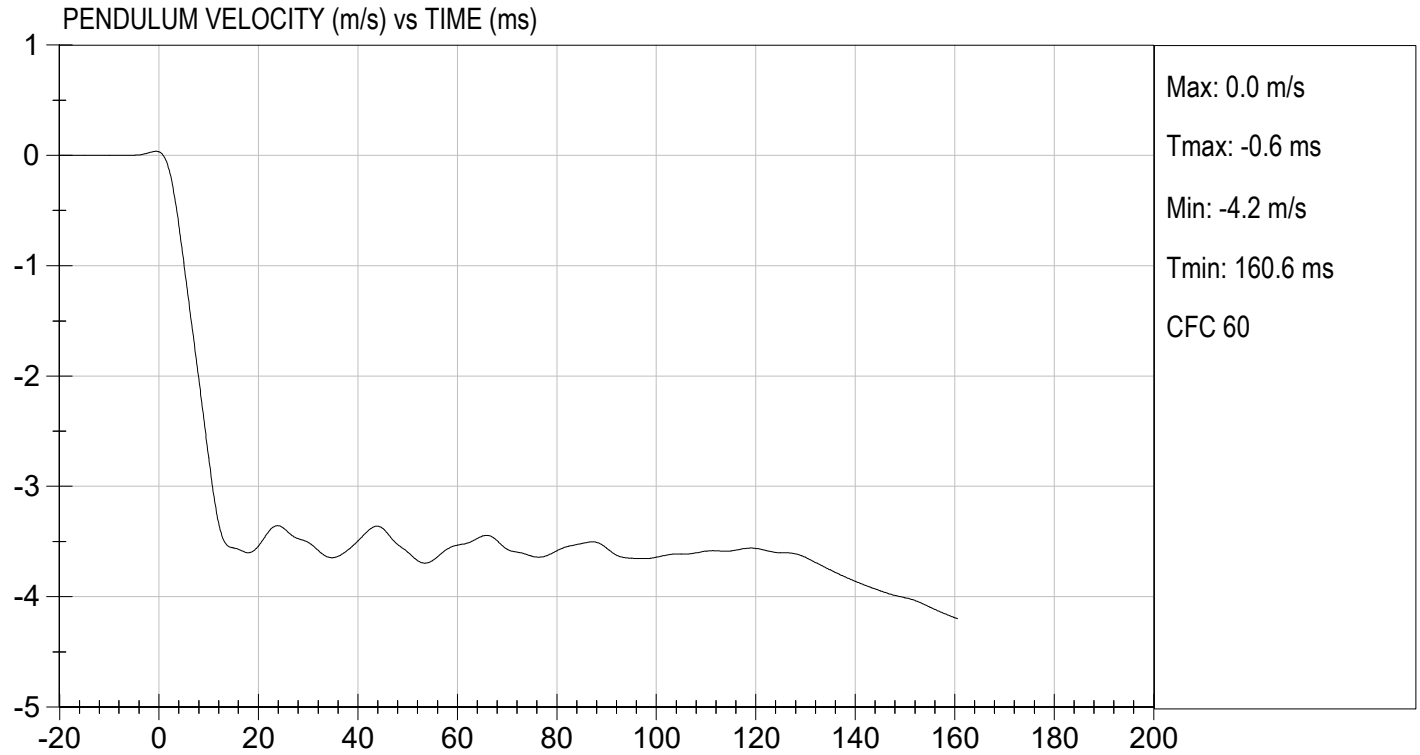
01/24/2024
 Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

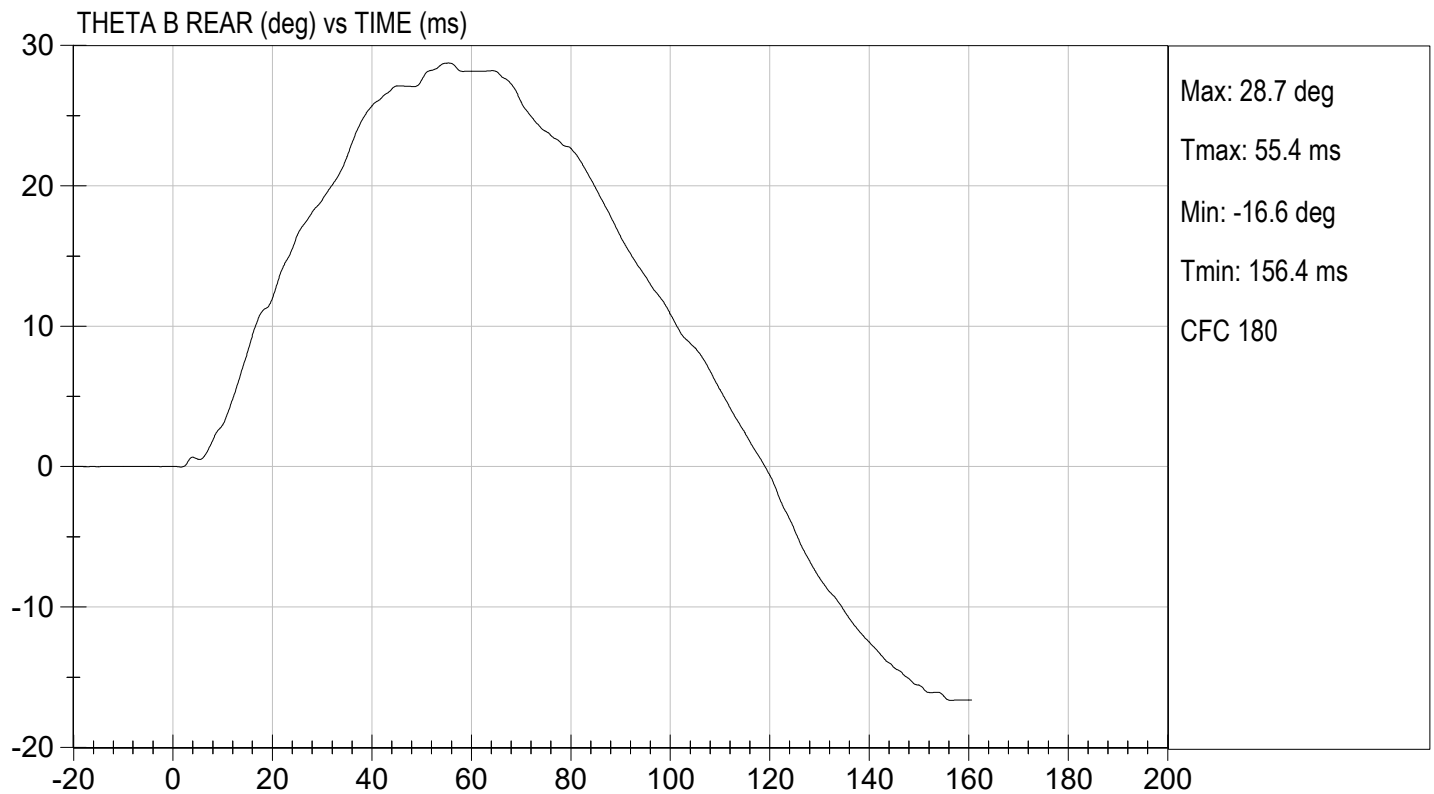
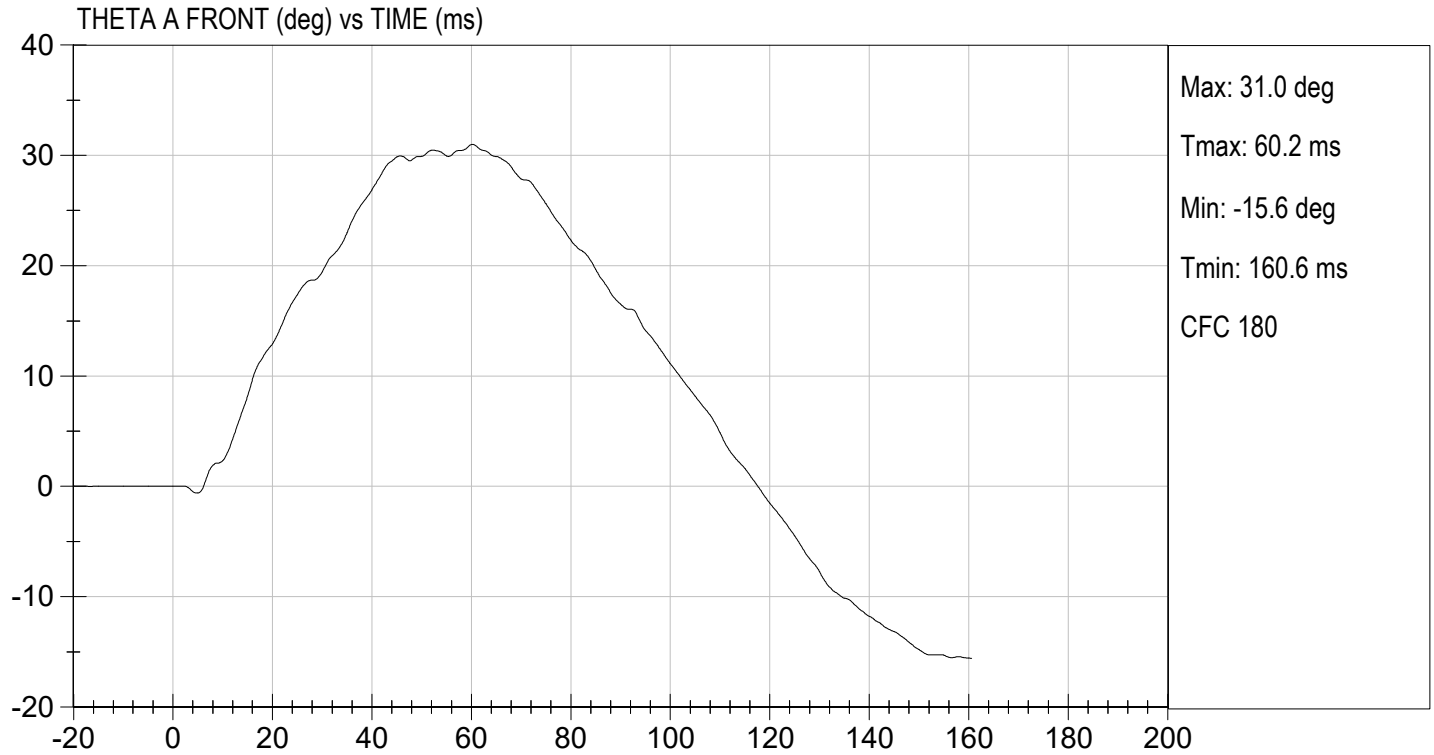
TEST DATE: 01/24/2024
TEST #: D240282





TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

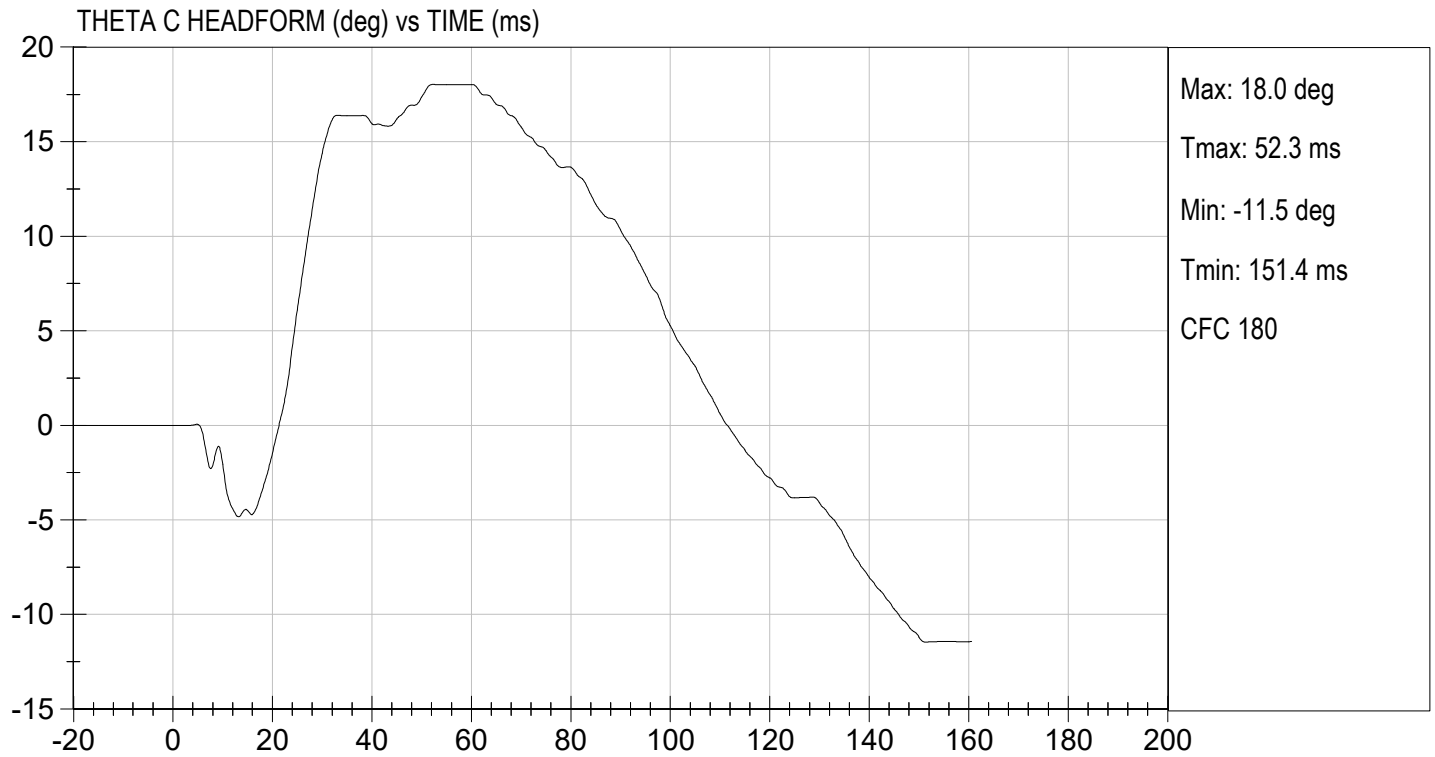
TEST DATE: 01/24/2024
TEST #: D240282





TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

TEST DATE: 01/24/2024
TEST #: D240282



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

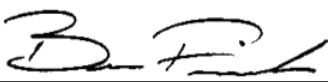
ATD Serial No: F032

Test I.D: D240283

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	33	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.2	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.7	Pass
Overall Test Results				Pass


Laboratory Technician

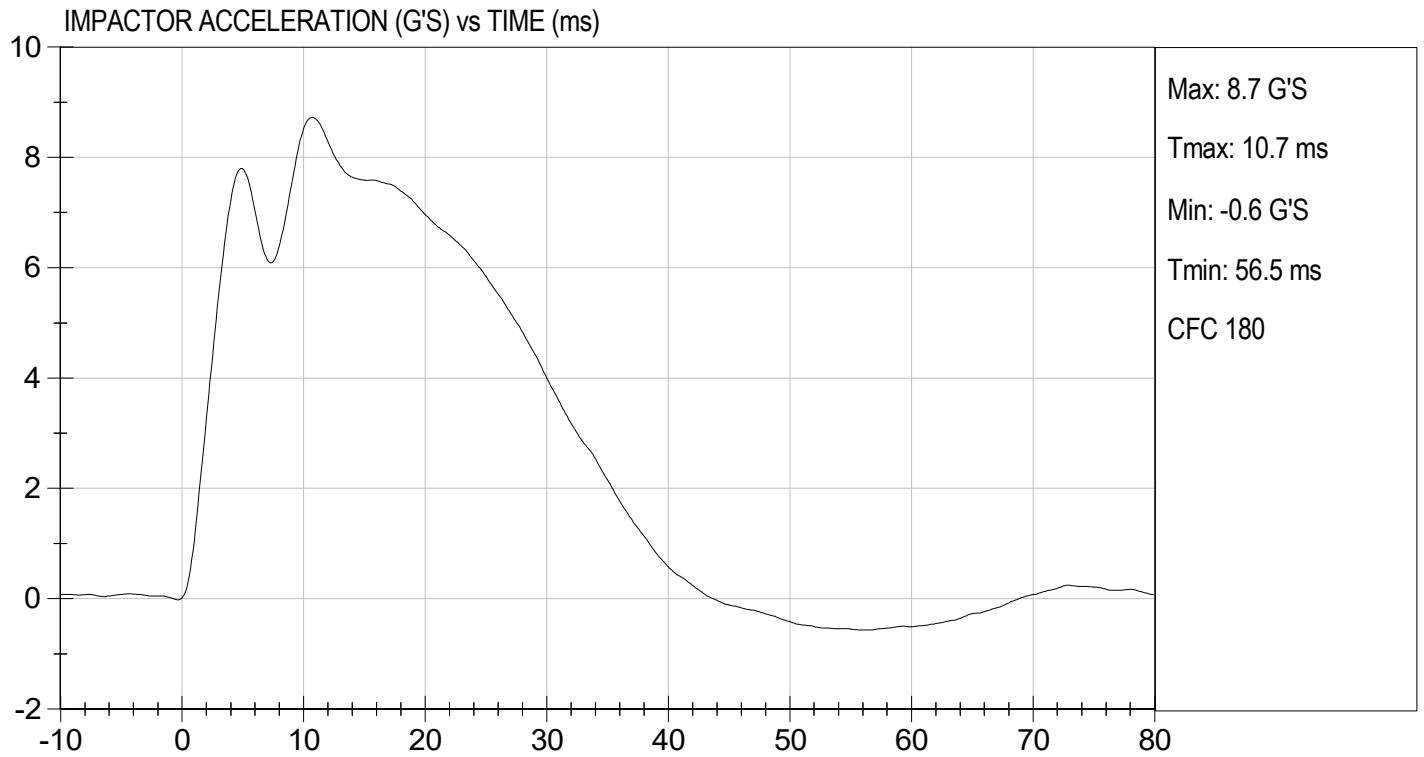
01/24/2024
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 13.77 ft/s, 4.2 m/s

TEST DATE: 01/24/2024
TEST #: D240283



MGA RESEARCH CORPORATION

UPPER RIB TEST

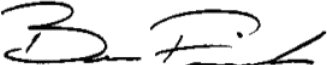
ES-2re DUMMY

ATD Serial No: F032

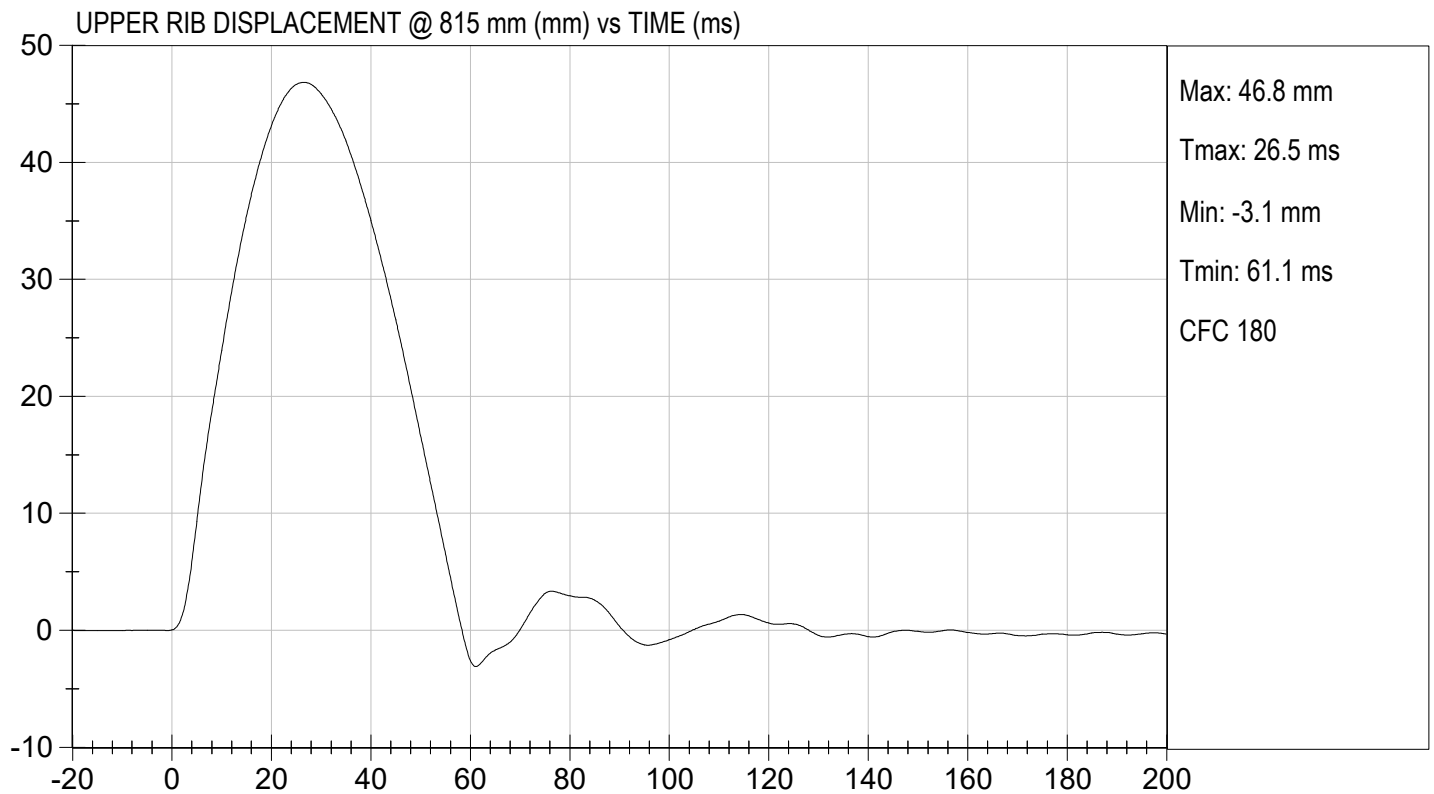
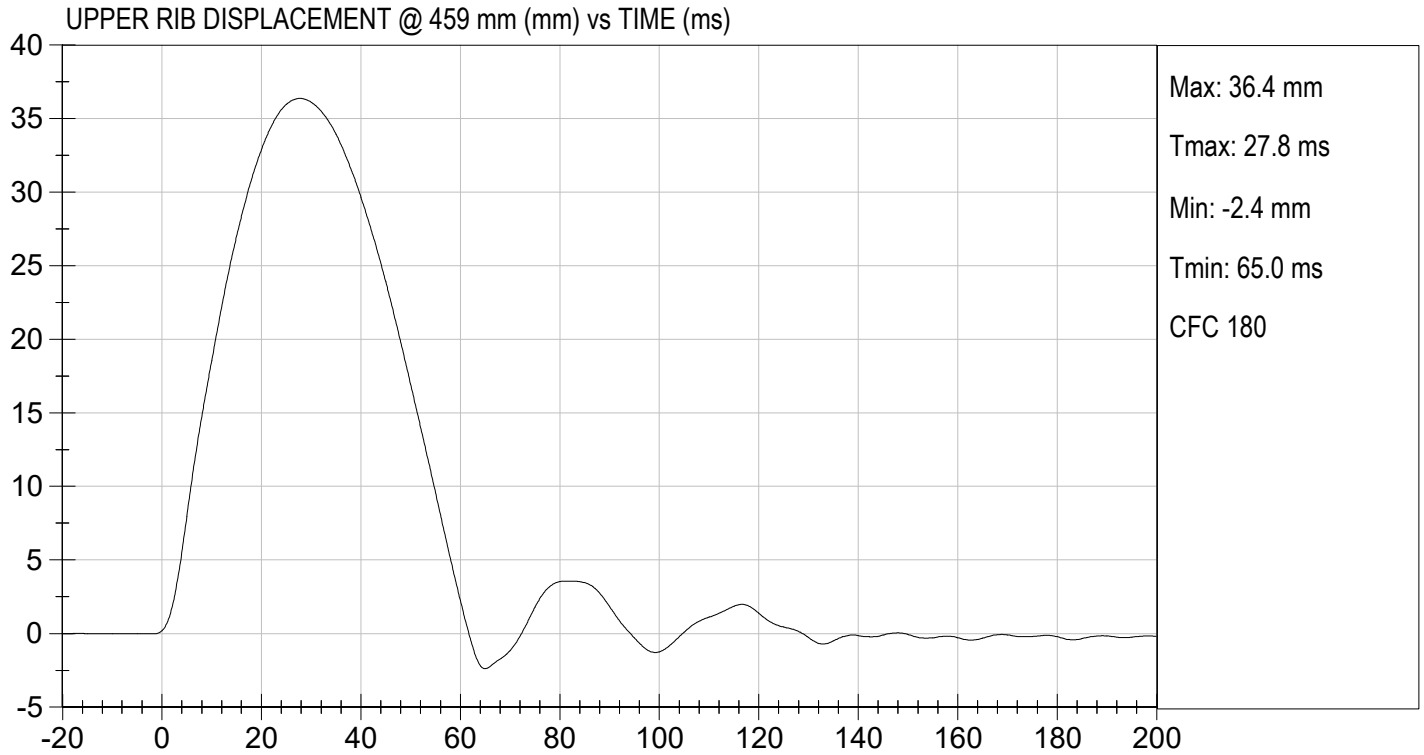
Test I.D: D240284

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	30	Pass
Displacement at 459 mm	mm	36.0 to 40.0	36.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	46.8	Pass
			Overall Test Results	Pass


Laboratory Technician


Approved By

01/24/2024
Test Date



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

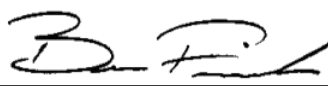
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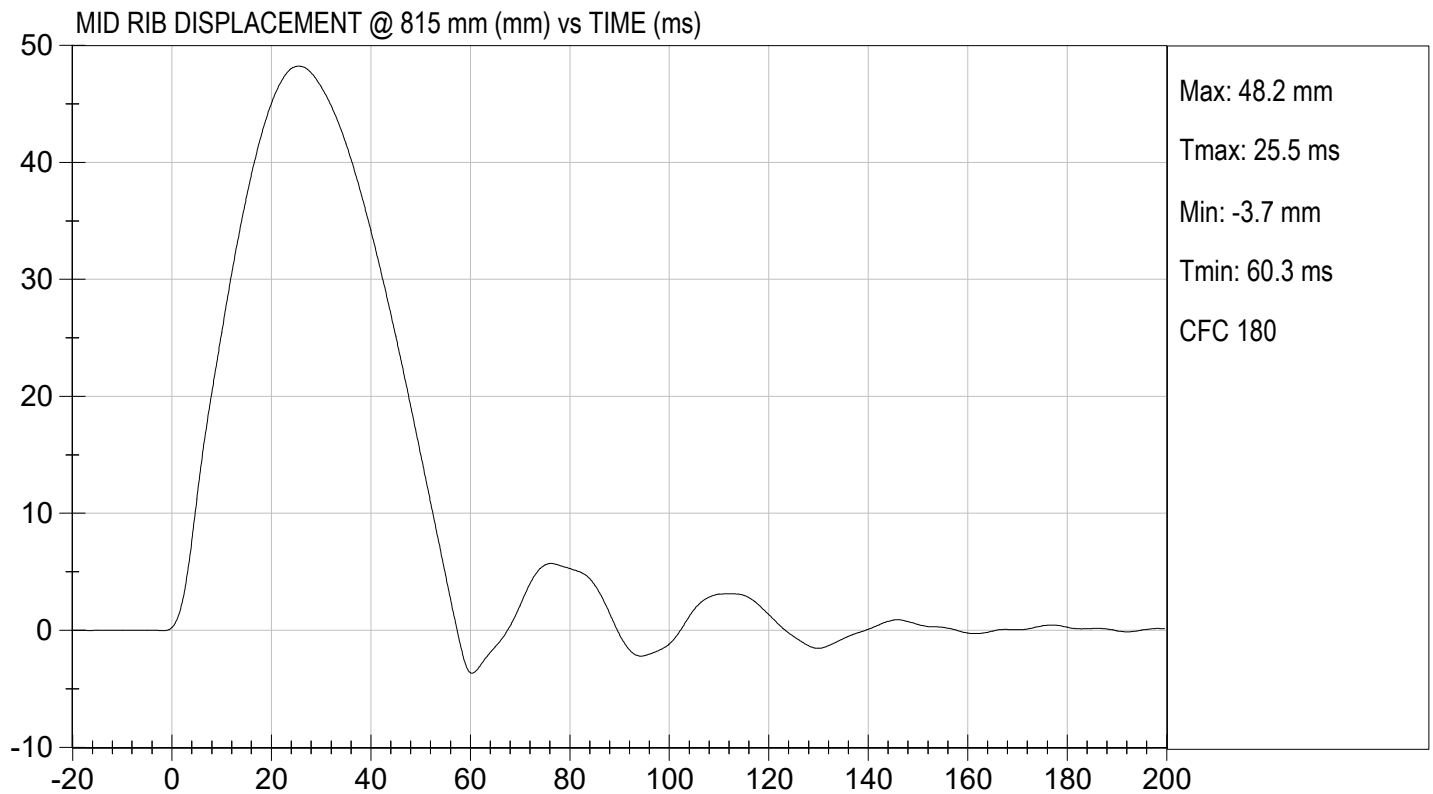
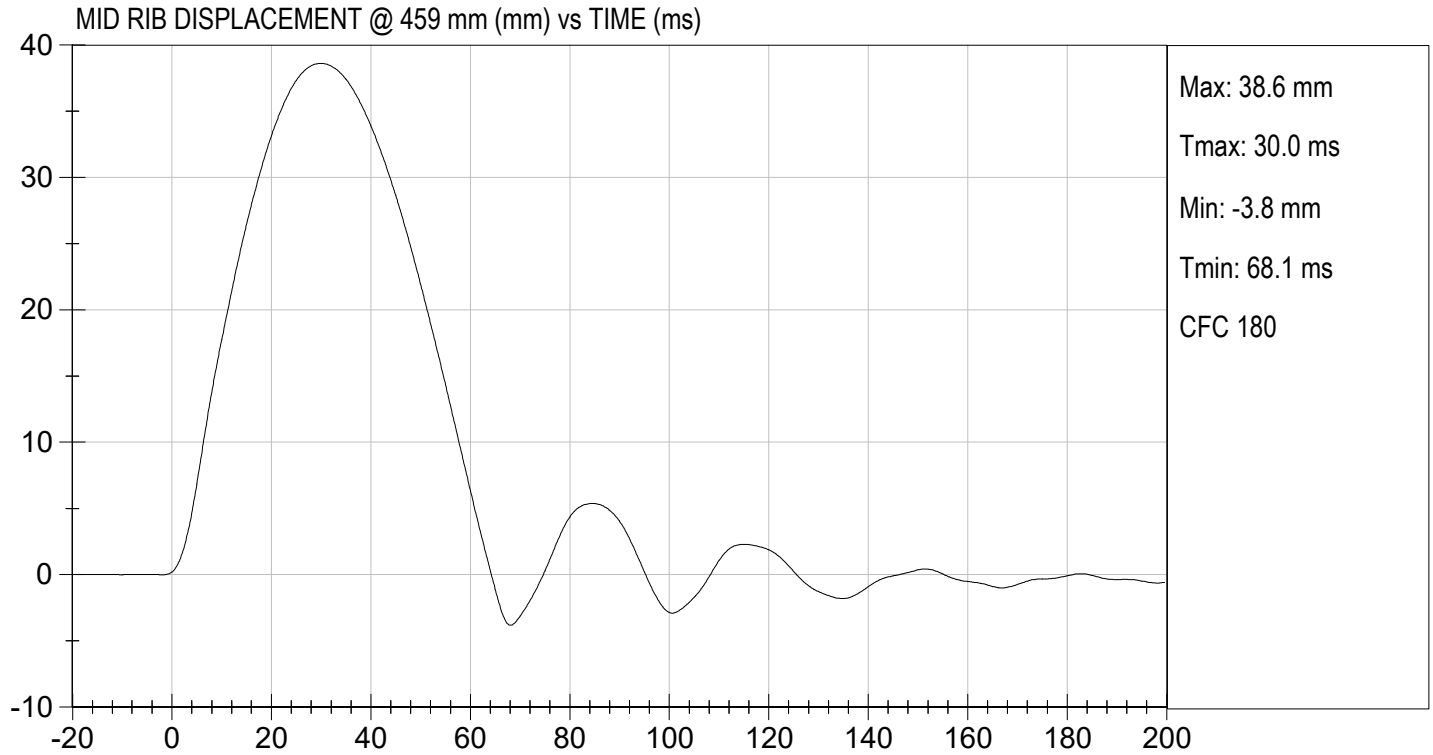
Test I.D: D240285

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	30	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.2	Pass
Overall Test Results				Pass


Laboratory Technician

01/24/2024
Test Date


Approved By



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

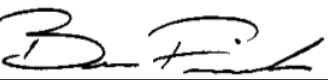
ATD Serial No: F032

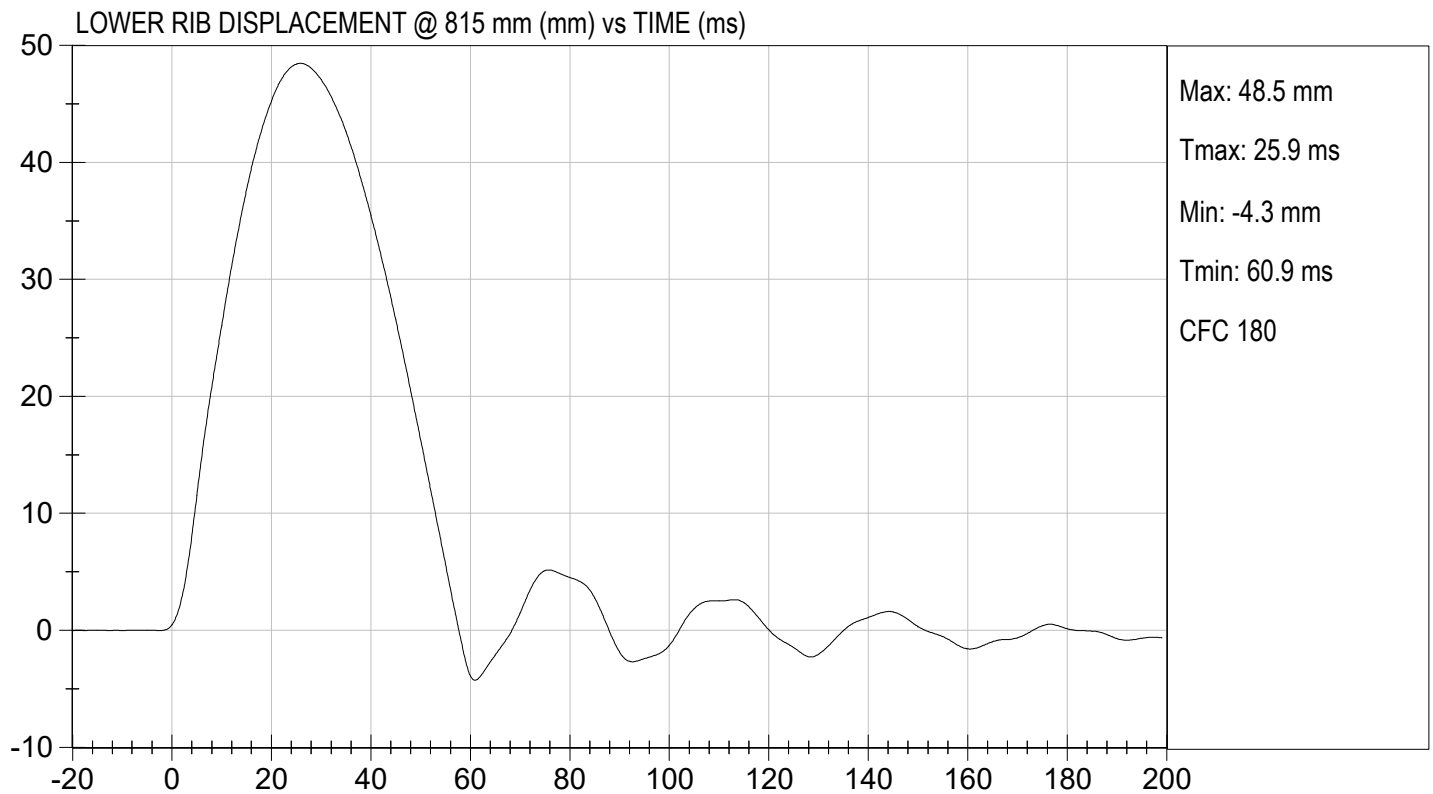
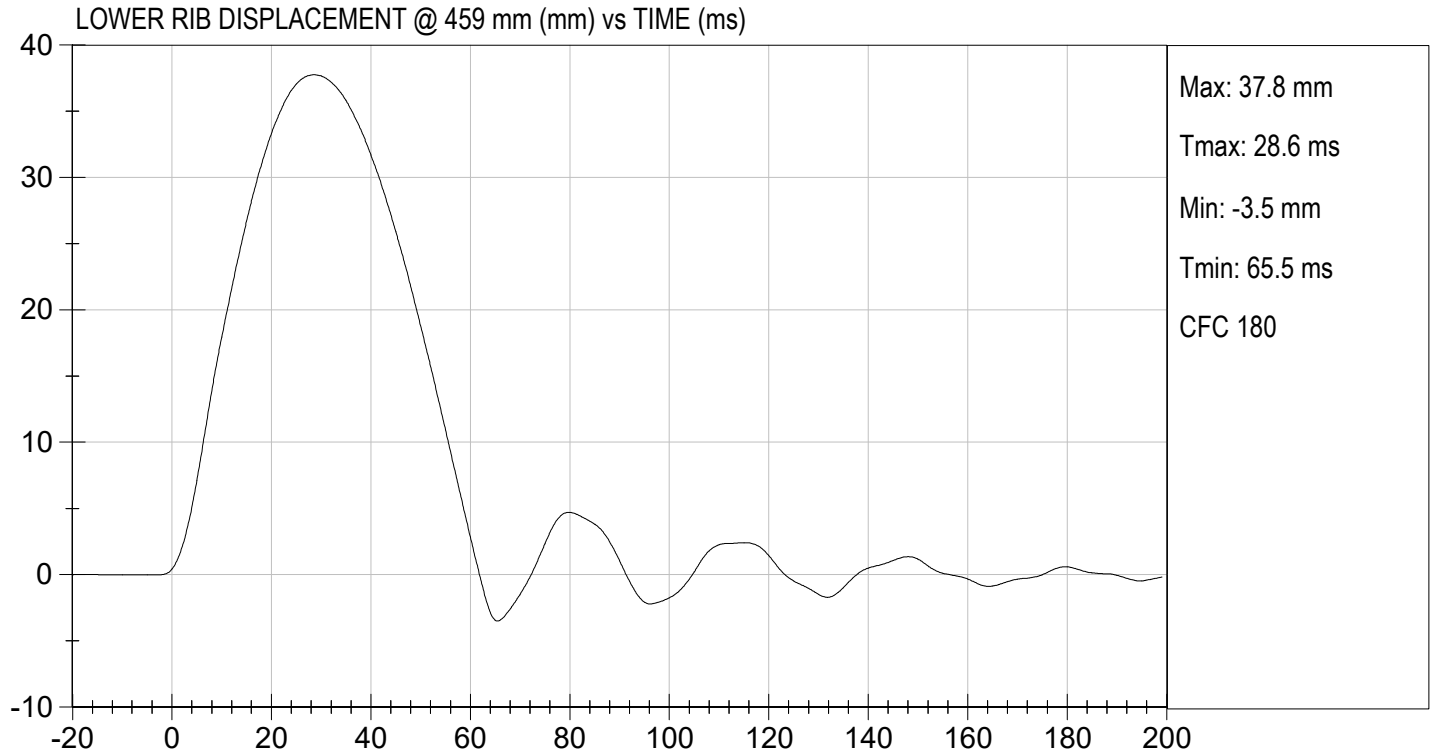
Test I.D: D240286

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	30	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.5	Pass
Overall Test Results				Pass


Laboratory Technician

01/24/2024
Test Date


Approved By

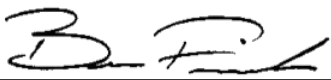


MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY**ATD Serial No: F032Test I.D: D240287

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	33	Pass
Probe Speed	m/s	3.90 to 4.10	4.08	Pass
Maximum Impactor Force	N	4000 to 4800	4107	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.0	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2476	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.6	Pass
Overall Test Results				Pass


Laboratory Technician

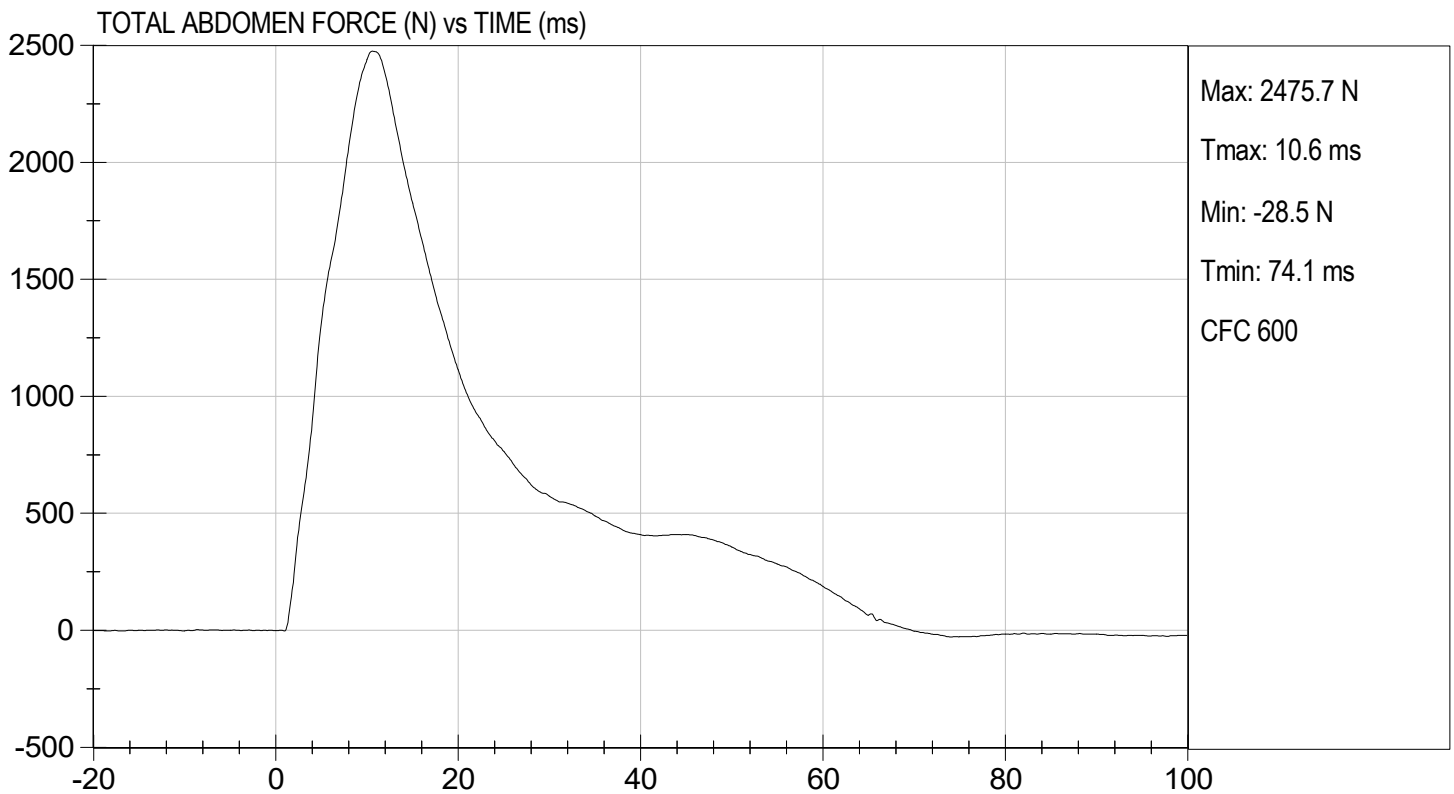
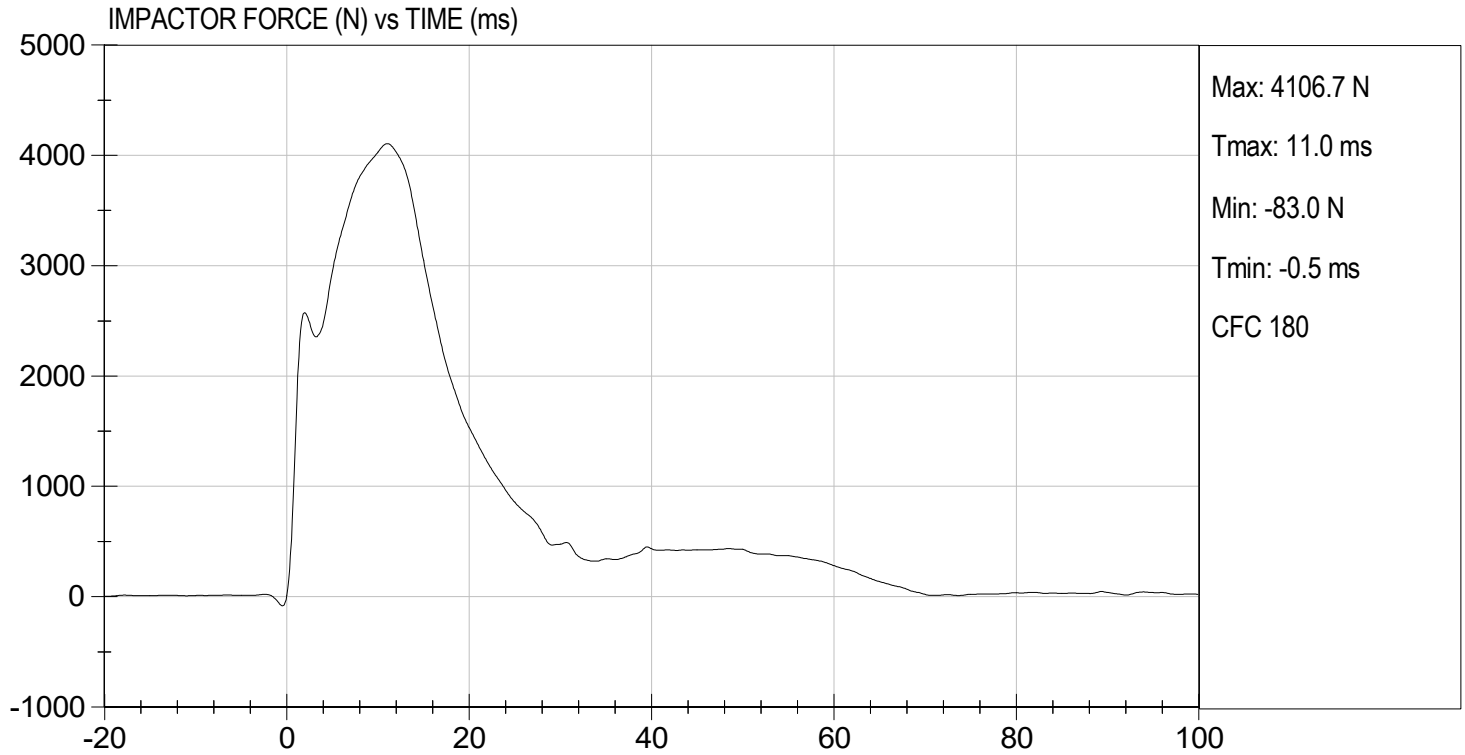
01/24/2024
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.39 ft/s, 4.08 m/s

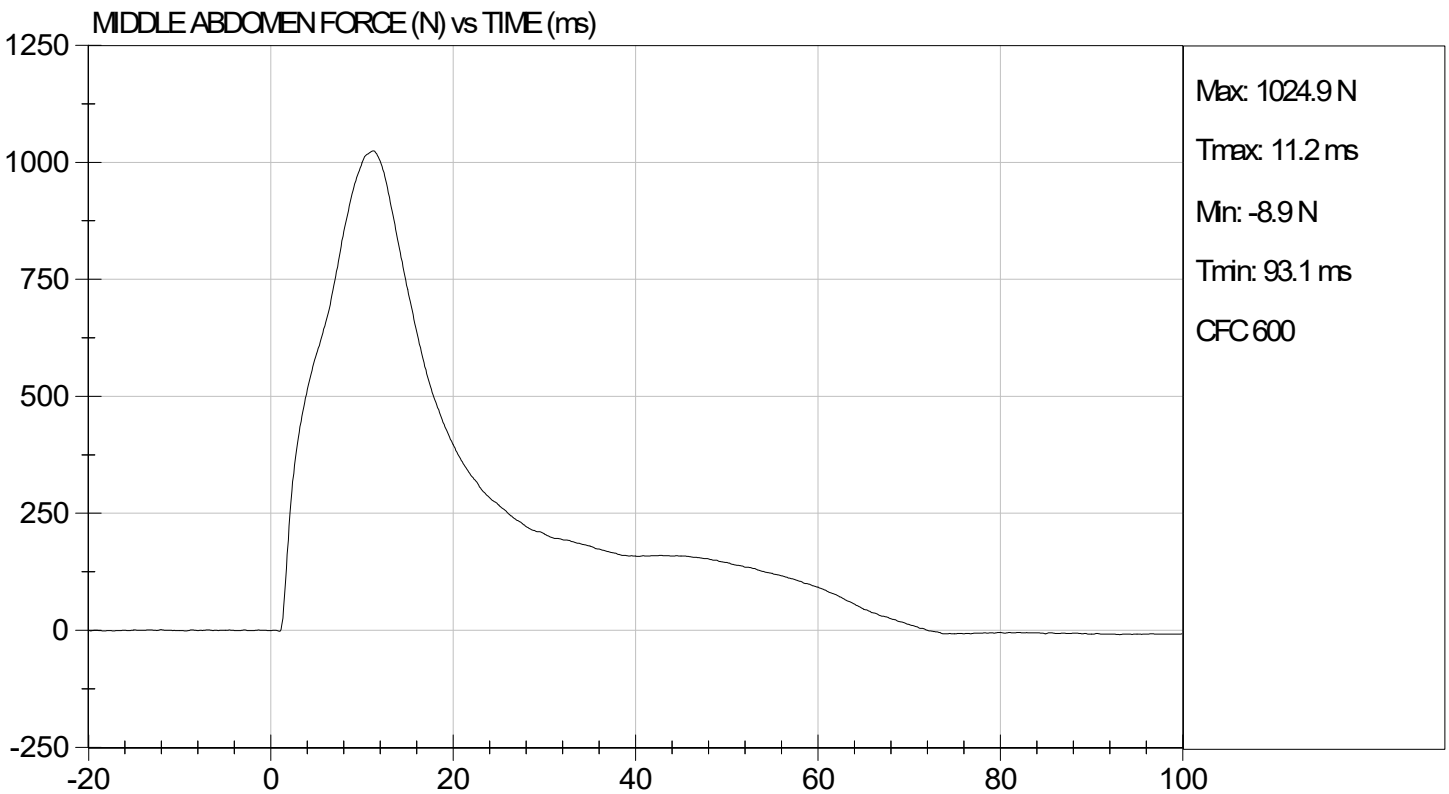
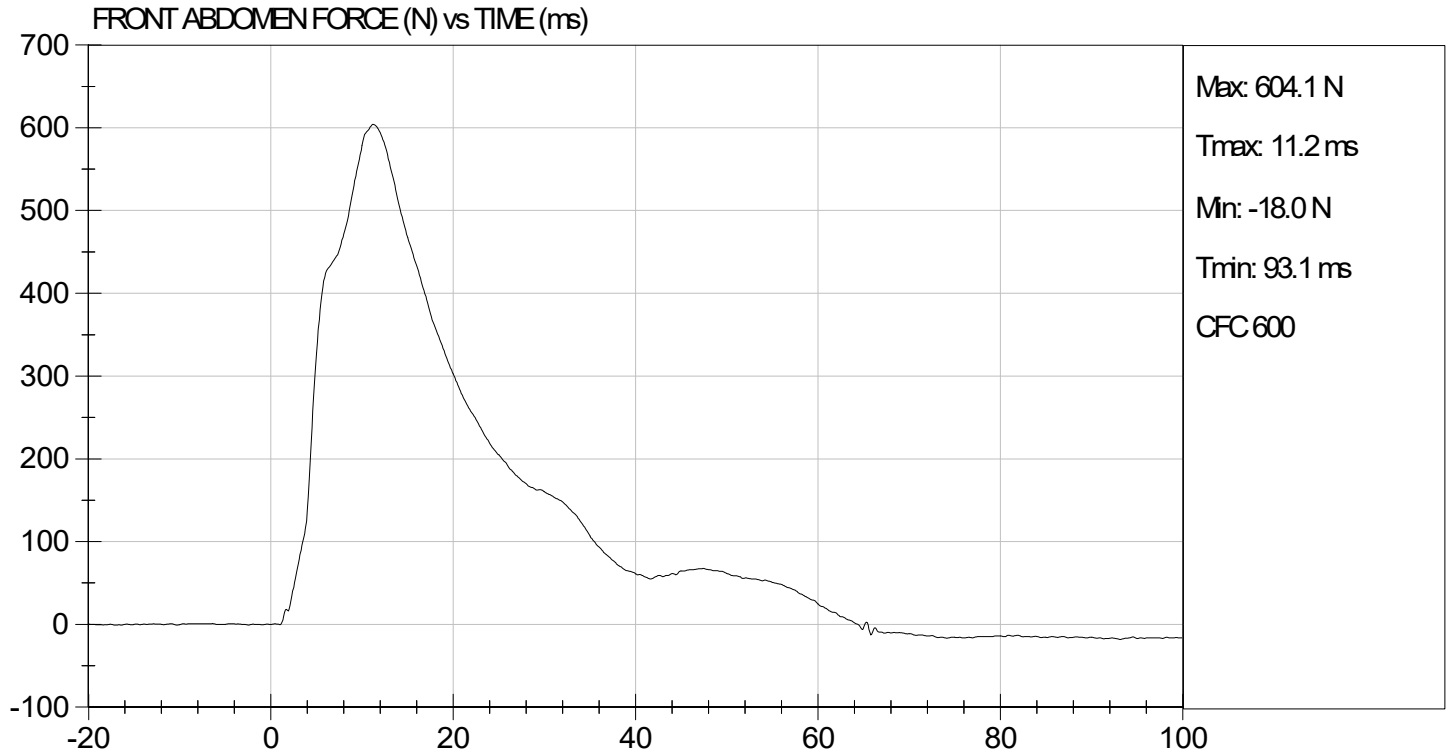
TEST DATE: 01/24/2024
TEST #: D240287





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.39 ft/s, 4.08 m/s

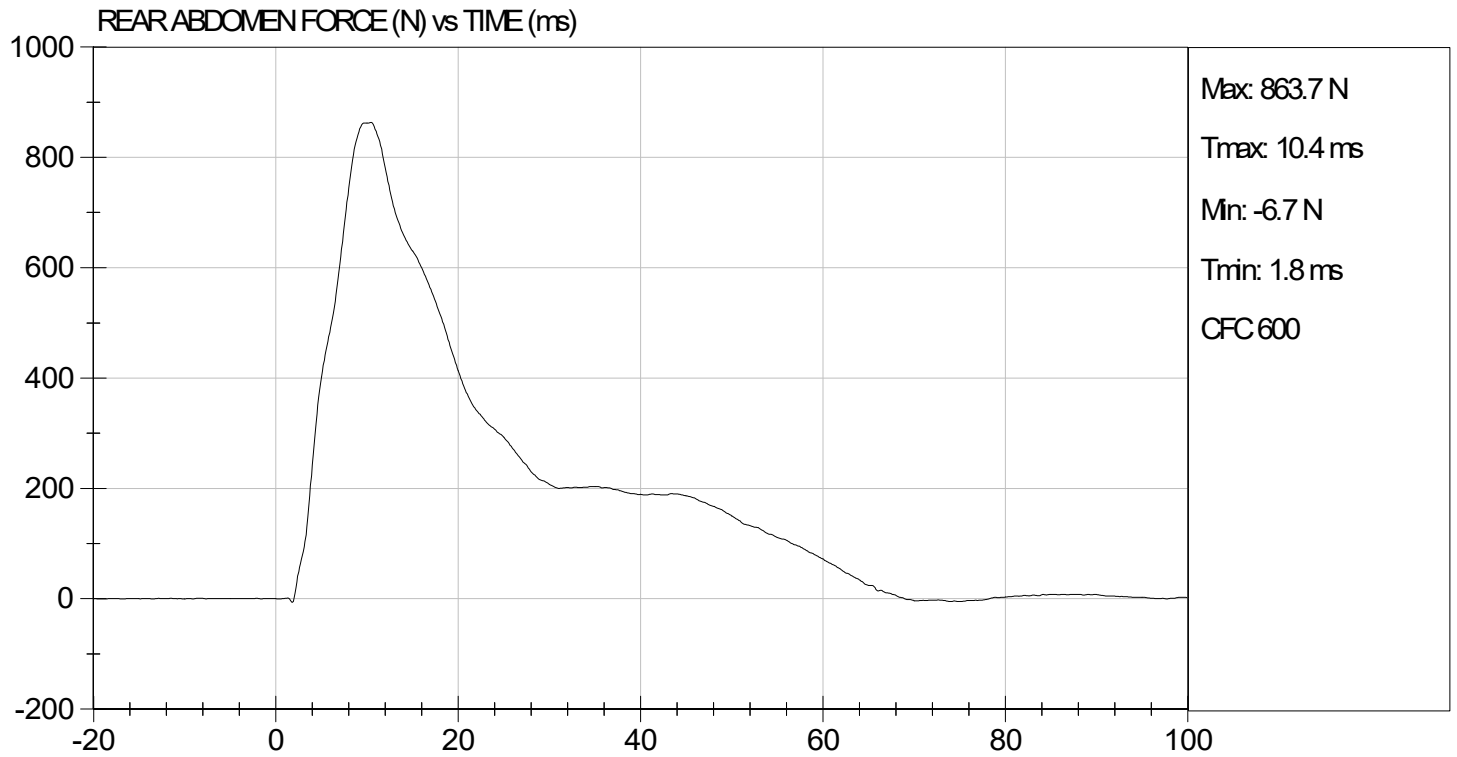
TEST DATE: 01/24/2024
TEST #: D240287





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.39 ft/s, 4.08 m/s

TEST DATE: 01/24/2024
TEST #: D240287



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

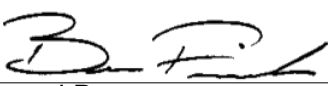
ATD Serial No: F032

Test I.D: D240288

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	31	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.414	Pass
	27 ms	m/s	-6.50 to -5.80	-5.98	Pass
	30 ms	m/s	>= -6.50	-6.31	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	54.9	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	47.6	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	39	Pass
Overall Results					Pass


 Laboratory Technician

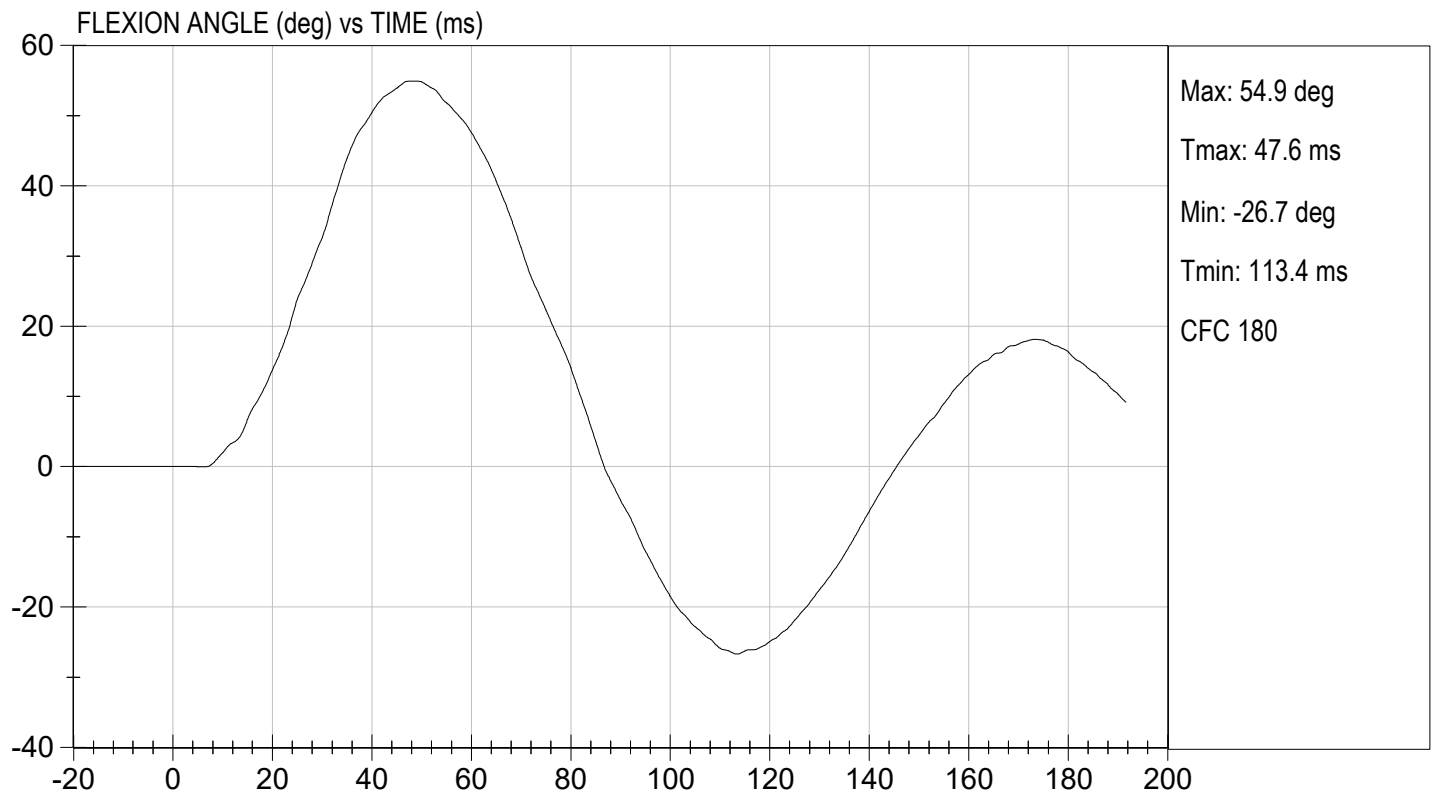
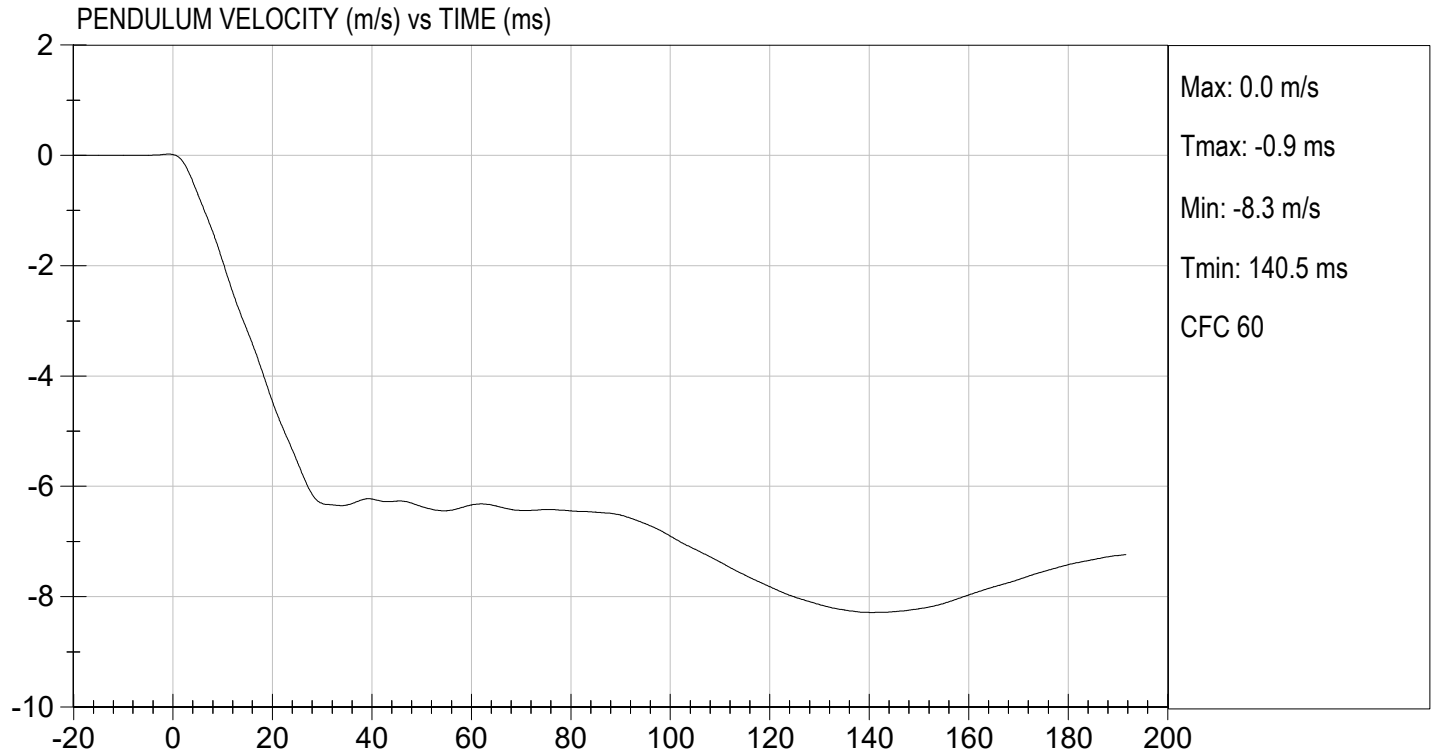
01/24/2024
 Test Date


 Approved By



TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

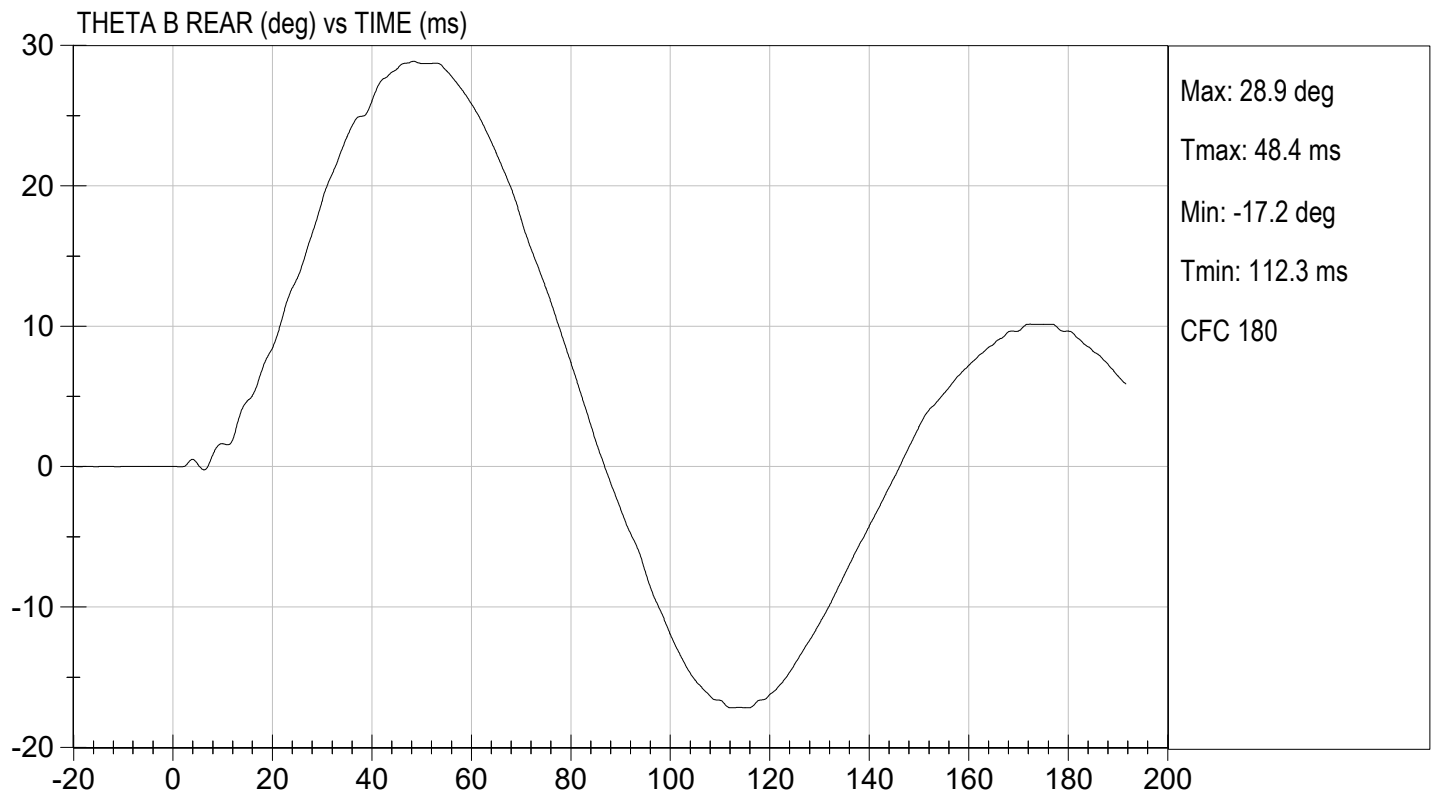
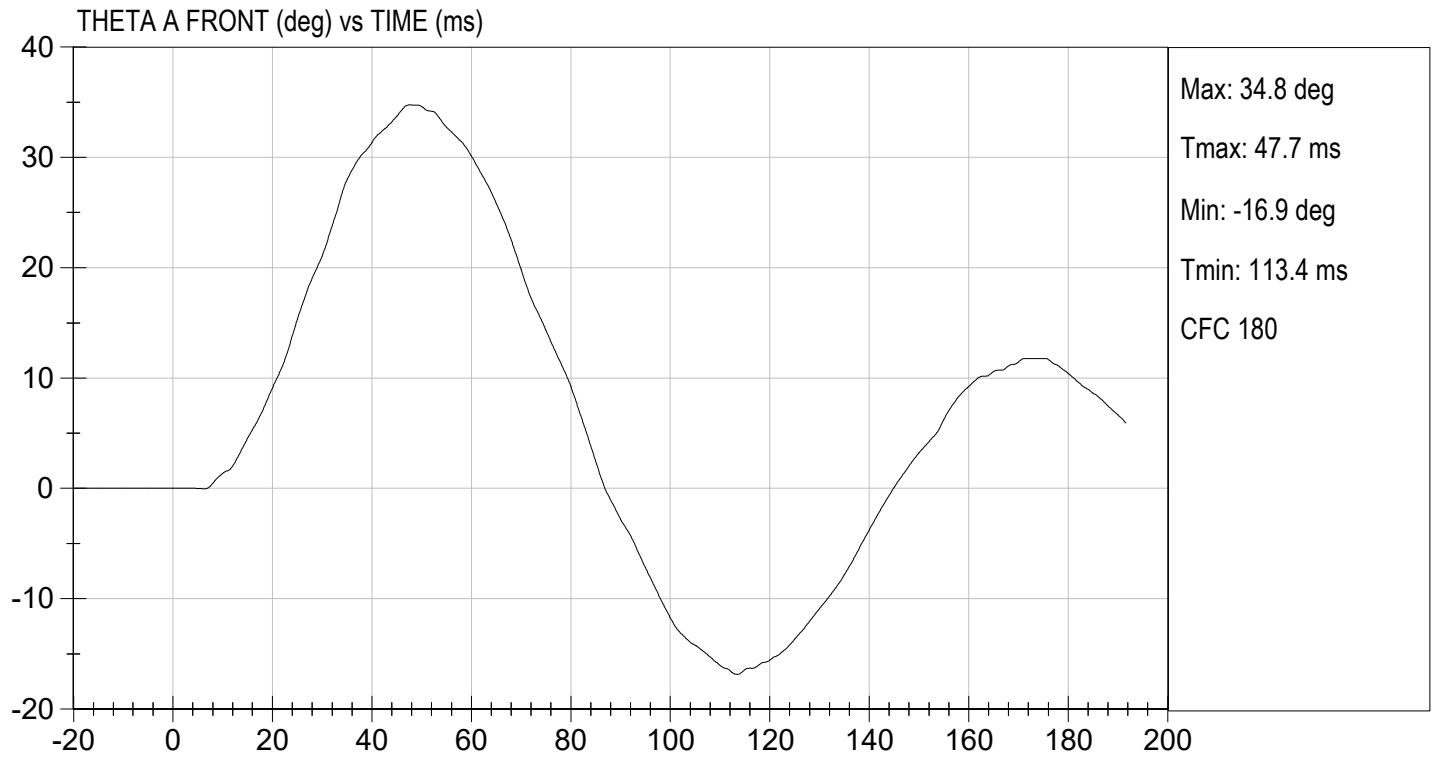
TEST DATE: 01/24/2024
TEST #: D240288





TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

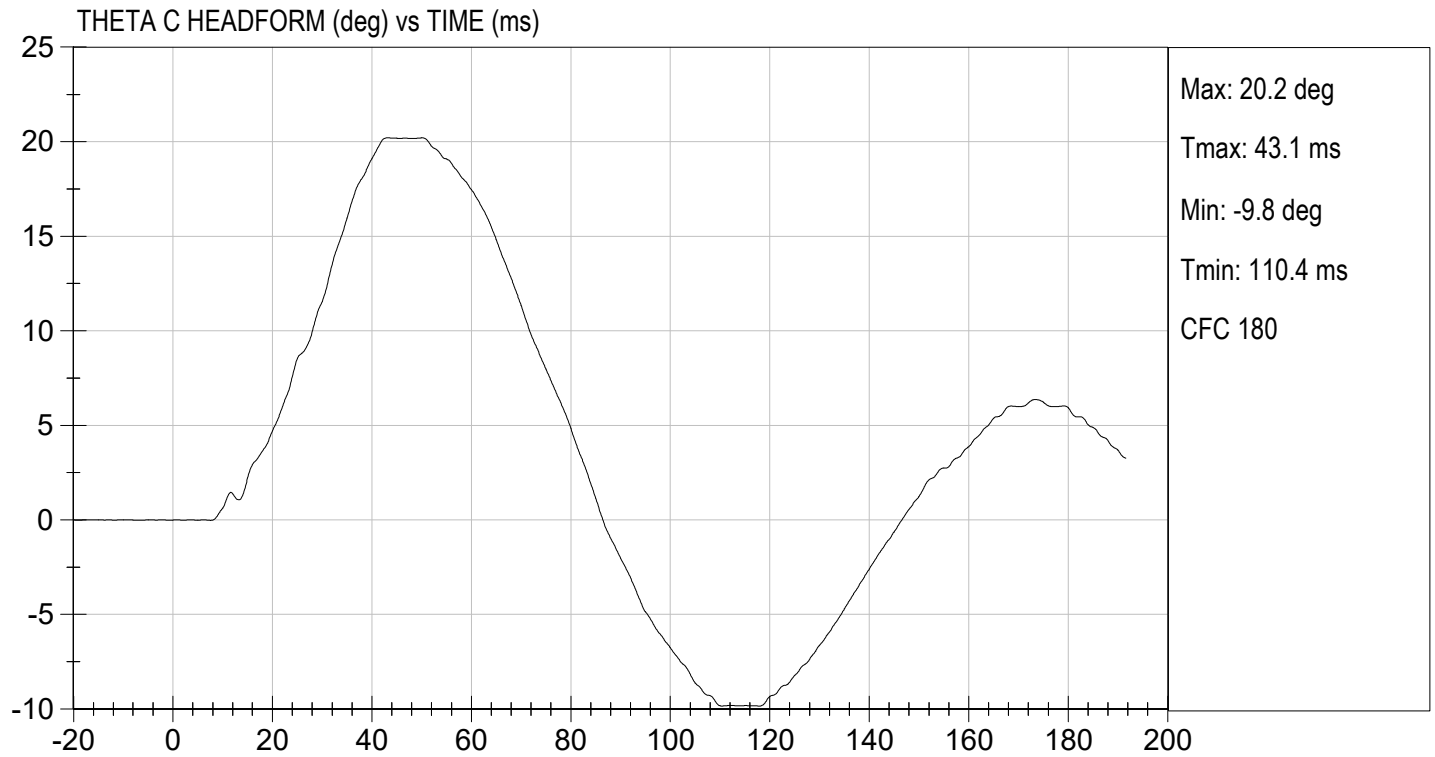
TEST DATE: 01/24/2024
TEST #: D240288





TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 01/24/2024
TEST #: D240288

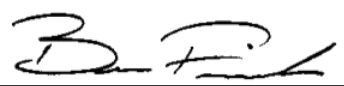


MGA RESEARCH CORPORATION**PELVIS TEST
ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D240289

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	33	Pass
Probe Speed	m/s	4.20 to 4.40	4.34	Pass
Maximum Impactor Force	N	4700 to 5400	5114	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.6	Pass
Maximum Pubic Force	N	1230 to 1590	1369	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.4	Pass
Overall Test Results				Pass


Laboratory Technician

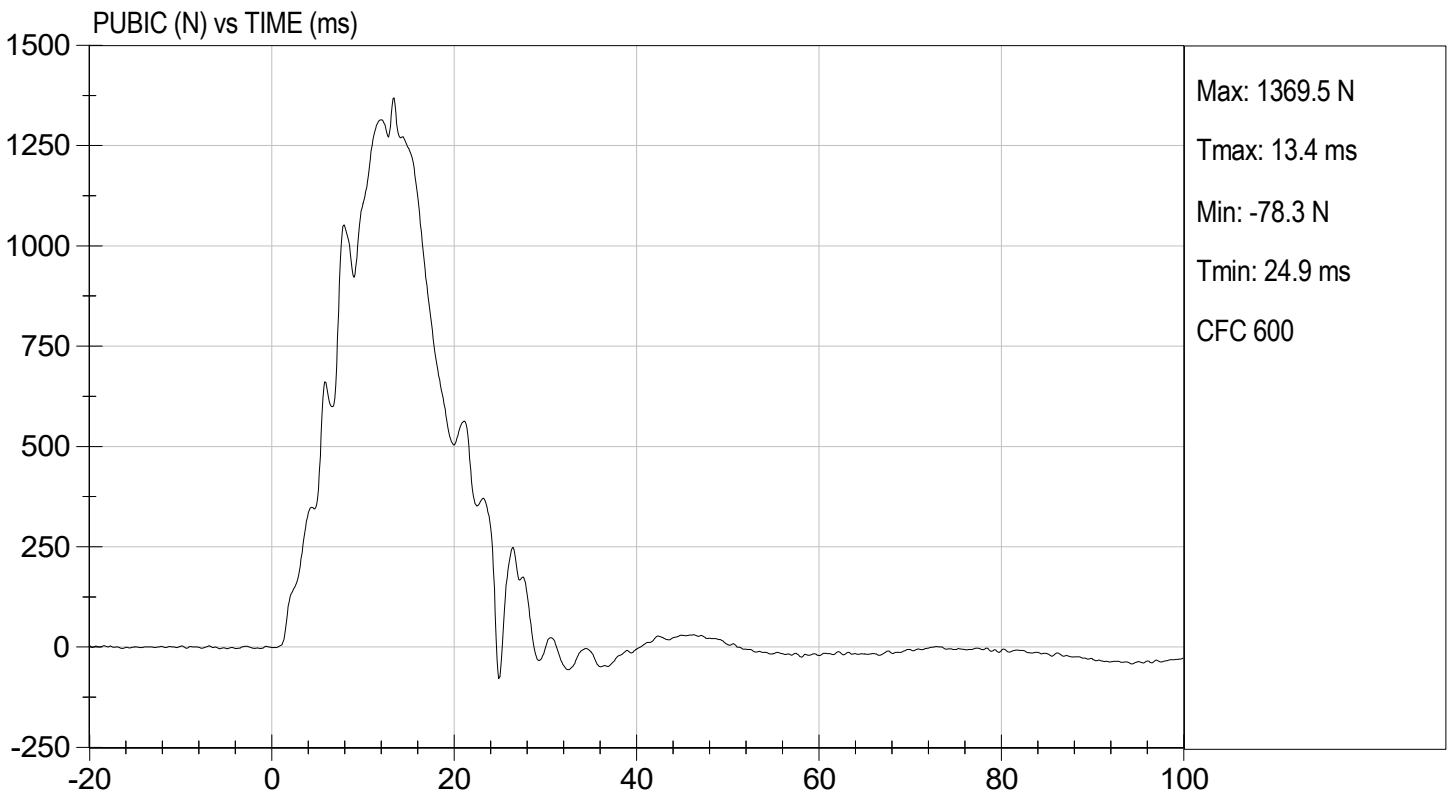
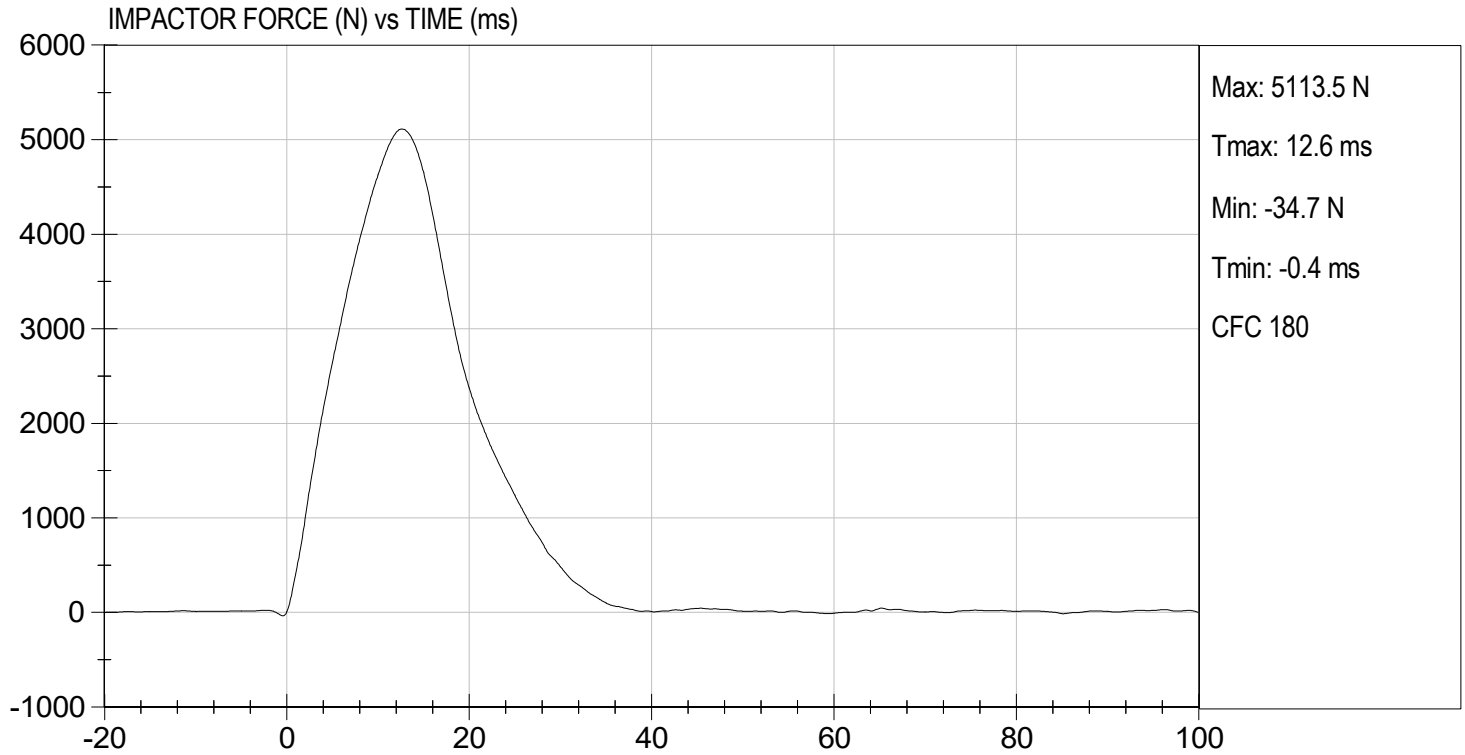
01/24/2024
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 14.24 ft/s, 4.34 m/s

TEST DATE: 01/24/2024
TEST #: D240289

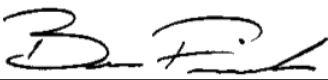


MGA RESEARCH CORPORATION**THORAX IMPACT TEST****ES-2re DUMMY**ATD Serial No: F032Test I.D: D240280

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	33	Pass
Probe Speed	m/s	5.40 to 5.60	5.40	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5769	Pass
Upper Rib Displacement	mm	34.0 to 41.0	37.4	Pass
Middle Rib Displacement	mm	37.0 to 45.0	38.8	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.2	Pass
Overall Test Results				Pass


Laboratory Technician

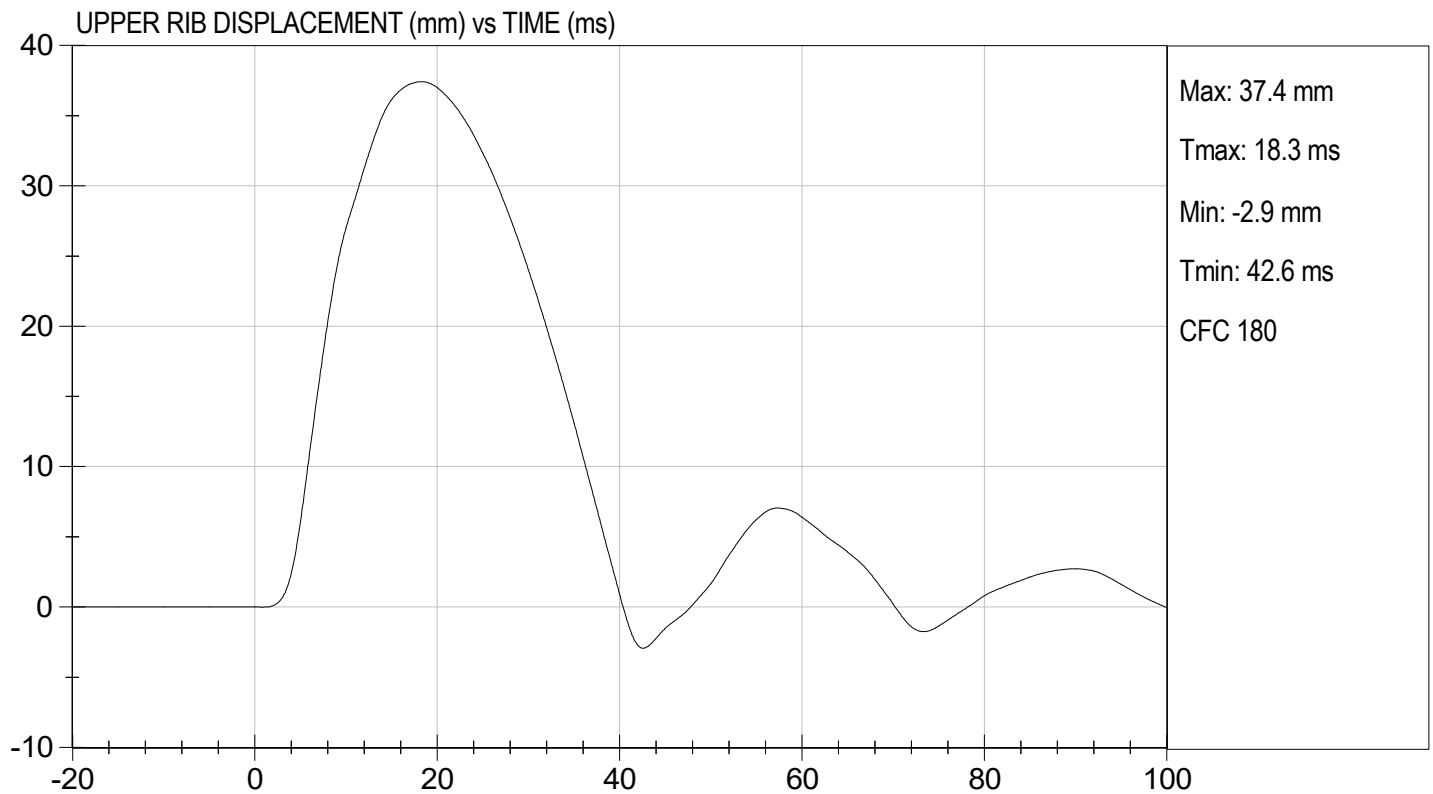
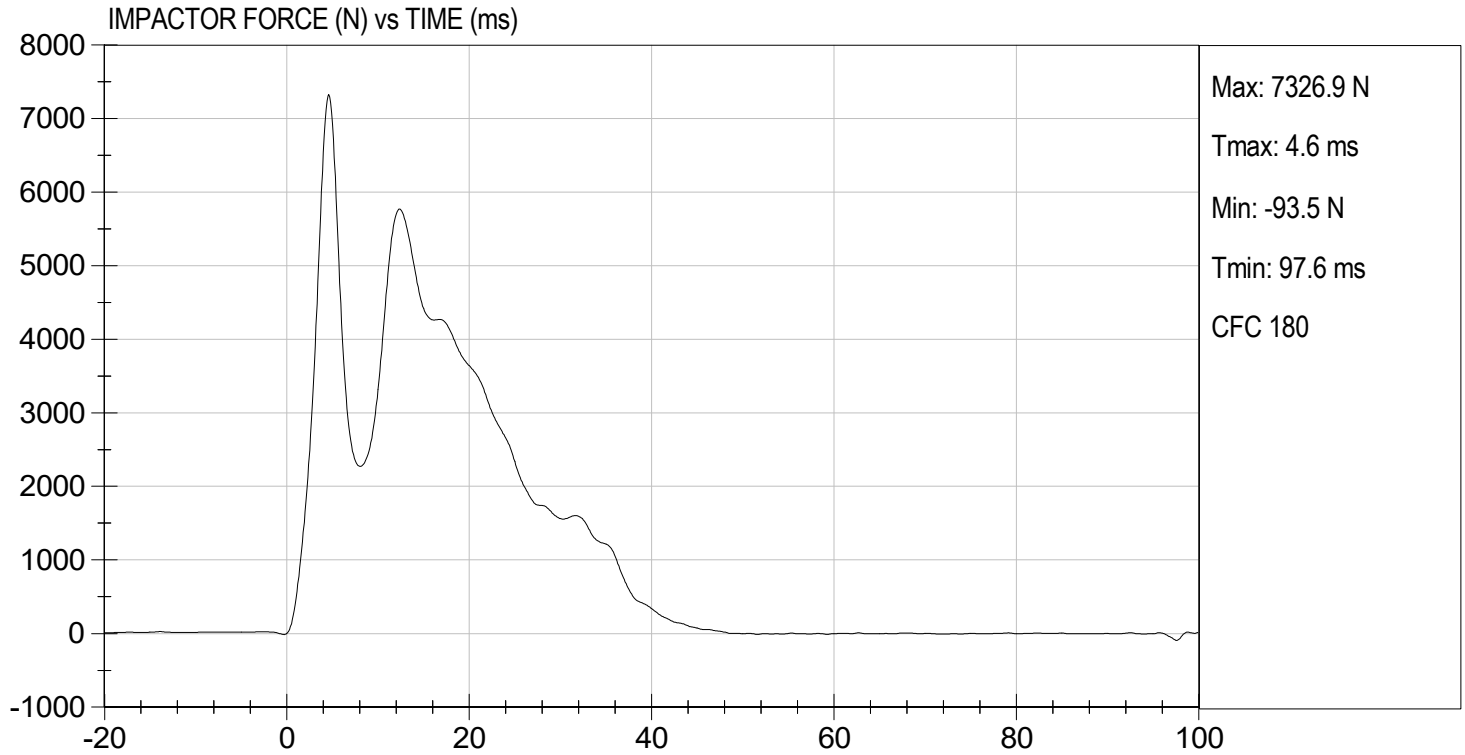
01/24/2024
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 17.73 ft/s, 5.40 m/s

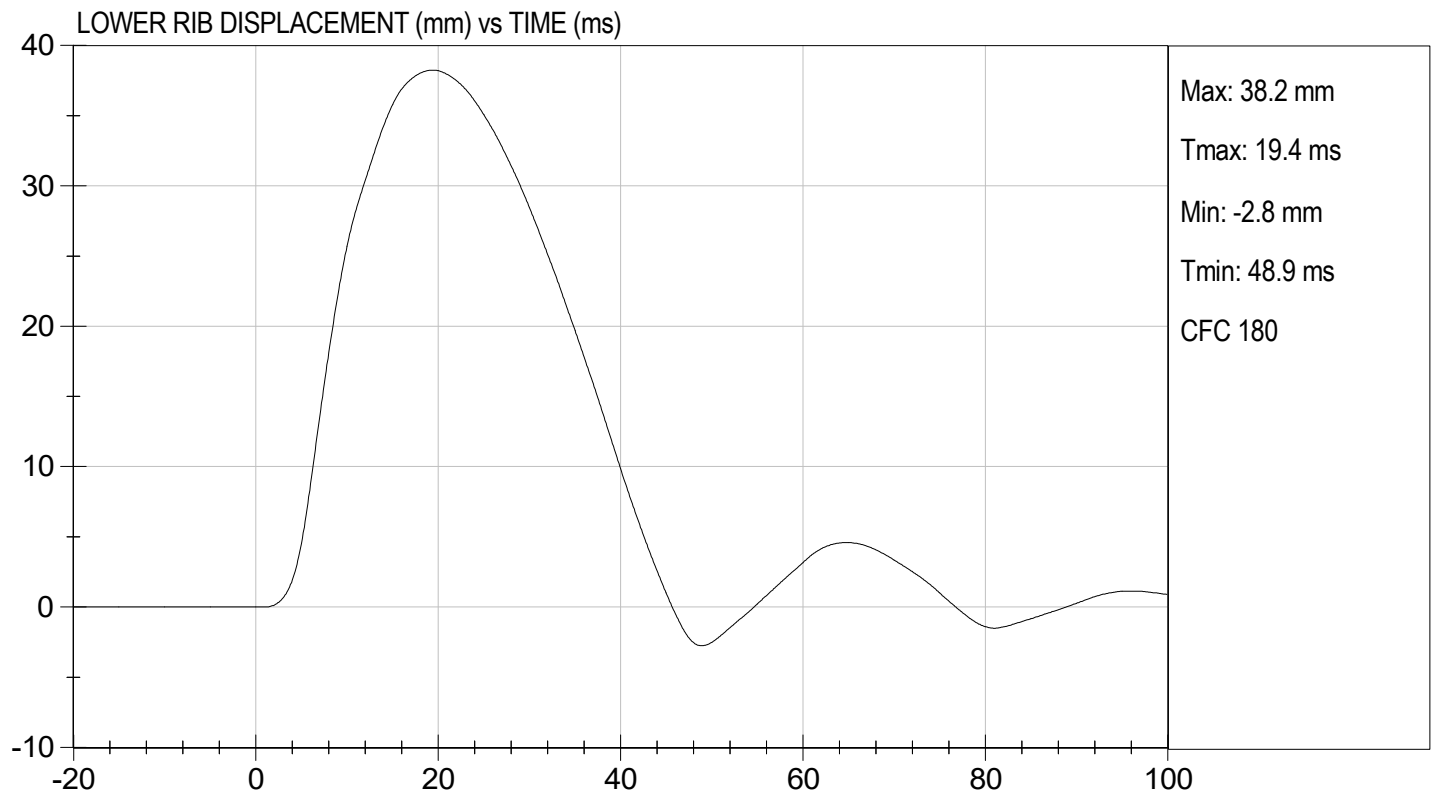
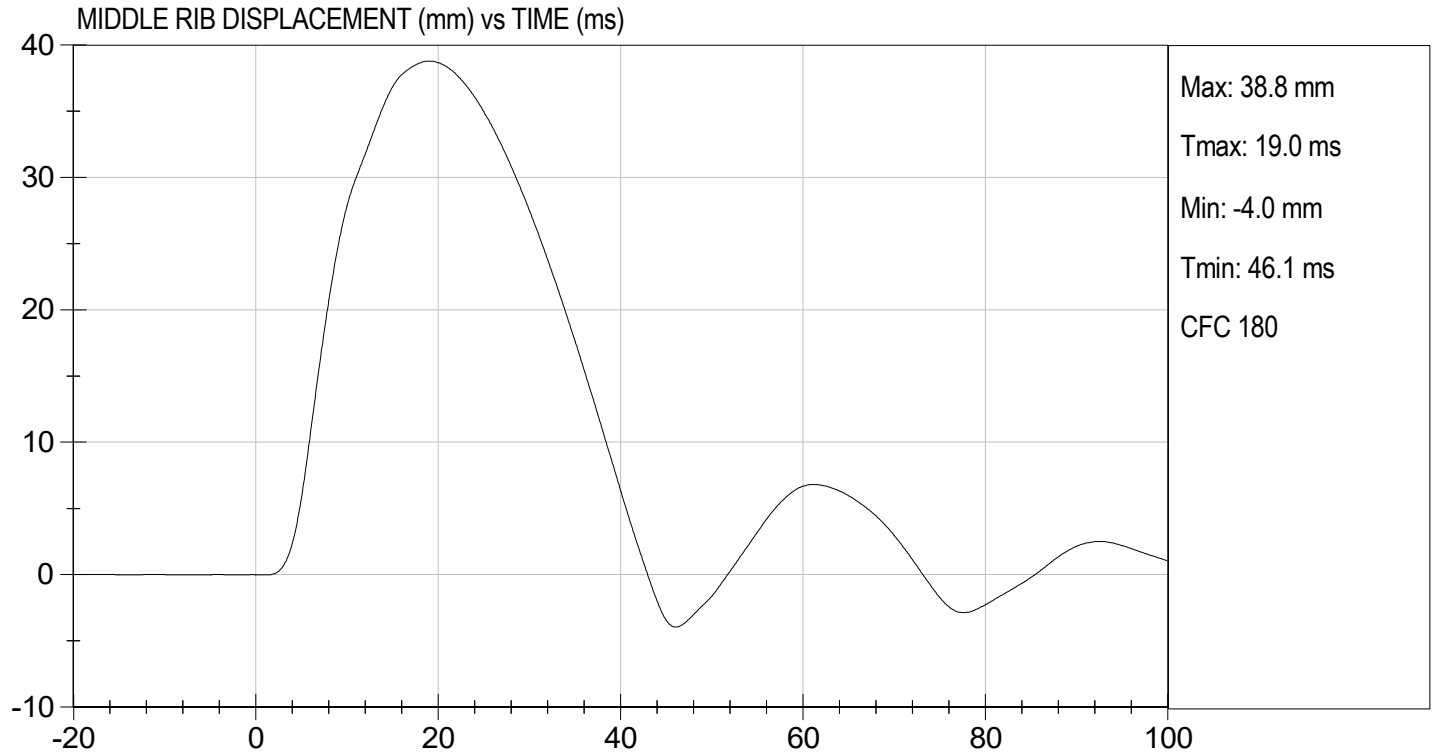
TEST DATE: 01/24/2024
TEST #: D240280





TEST DESC: THORAX IMPACT
VELOCITY: 17.73 ft/s, 5.40 m/s

TEST DATE: 01/24/2024
TEST #: D240280



QUALIFICATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: F032

No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

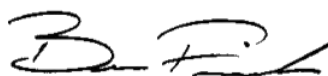
ATD Serial No: F032

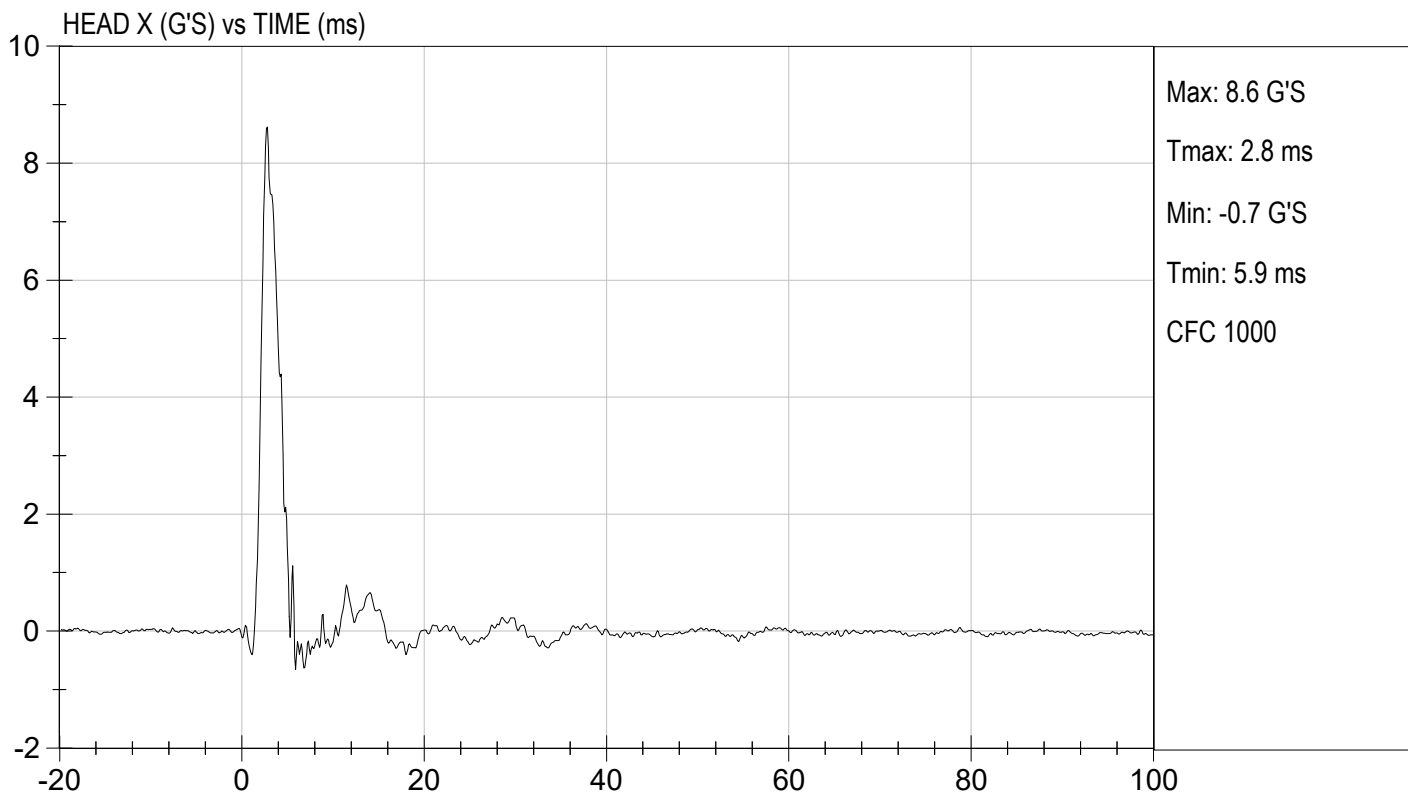
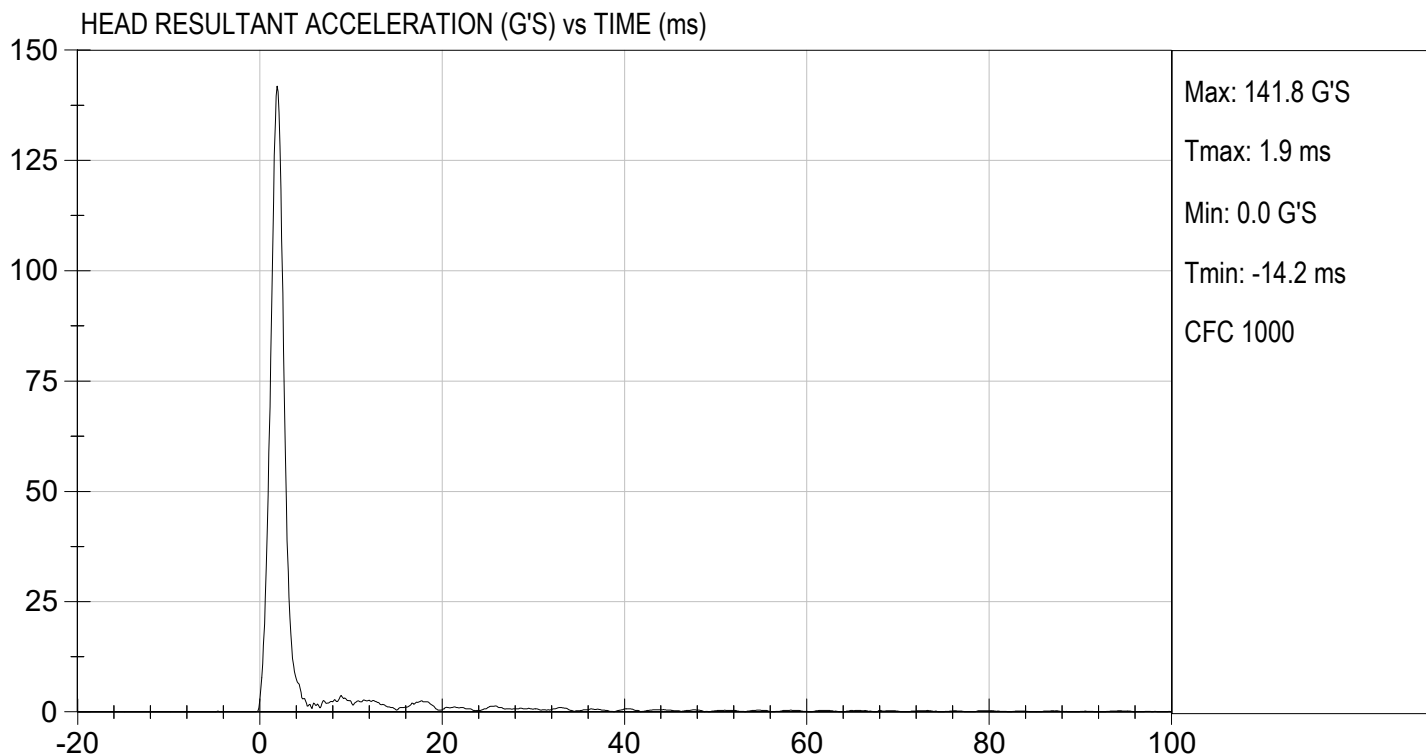
Test ID: D240381

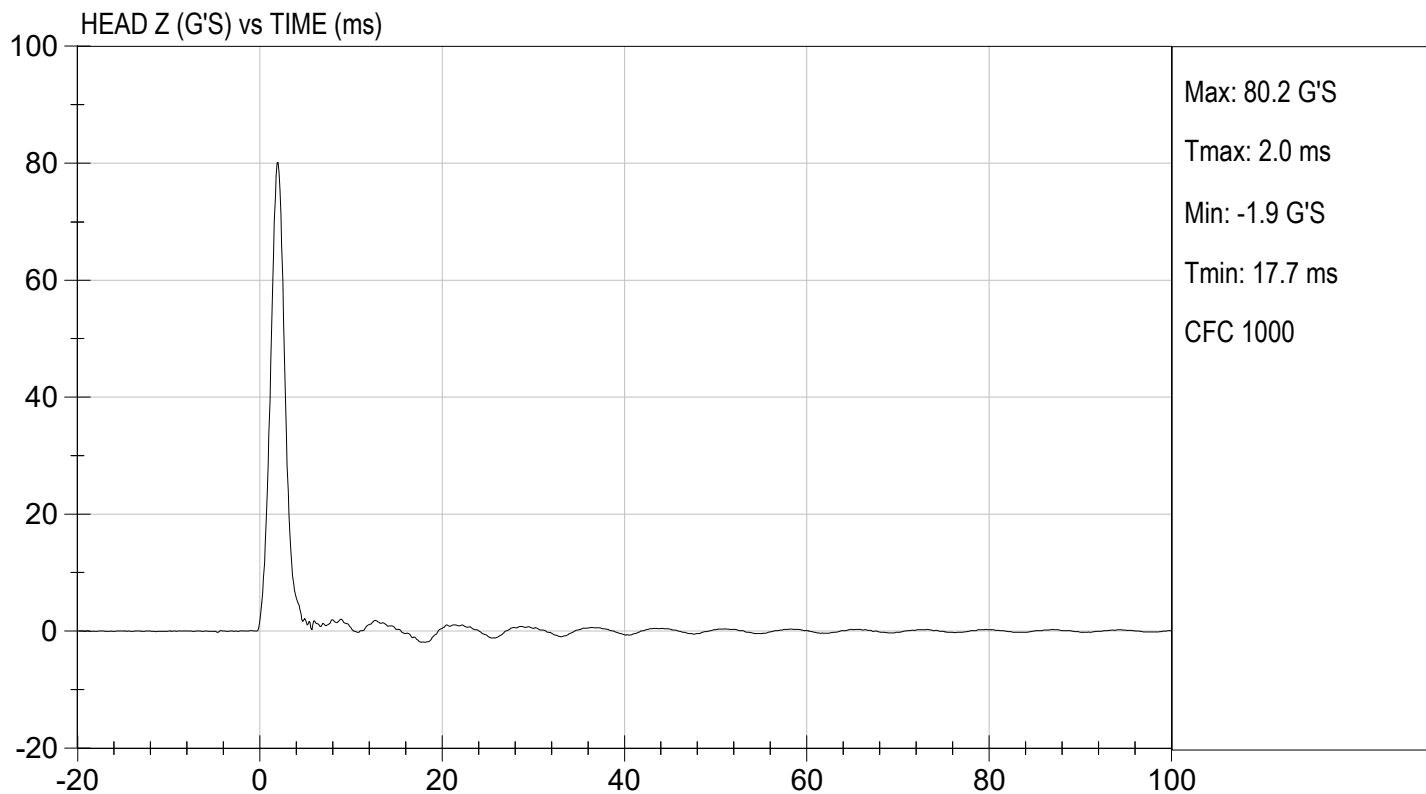
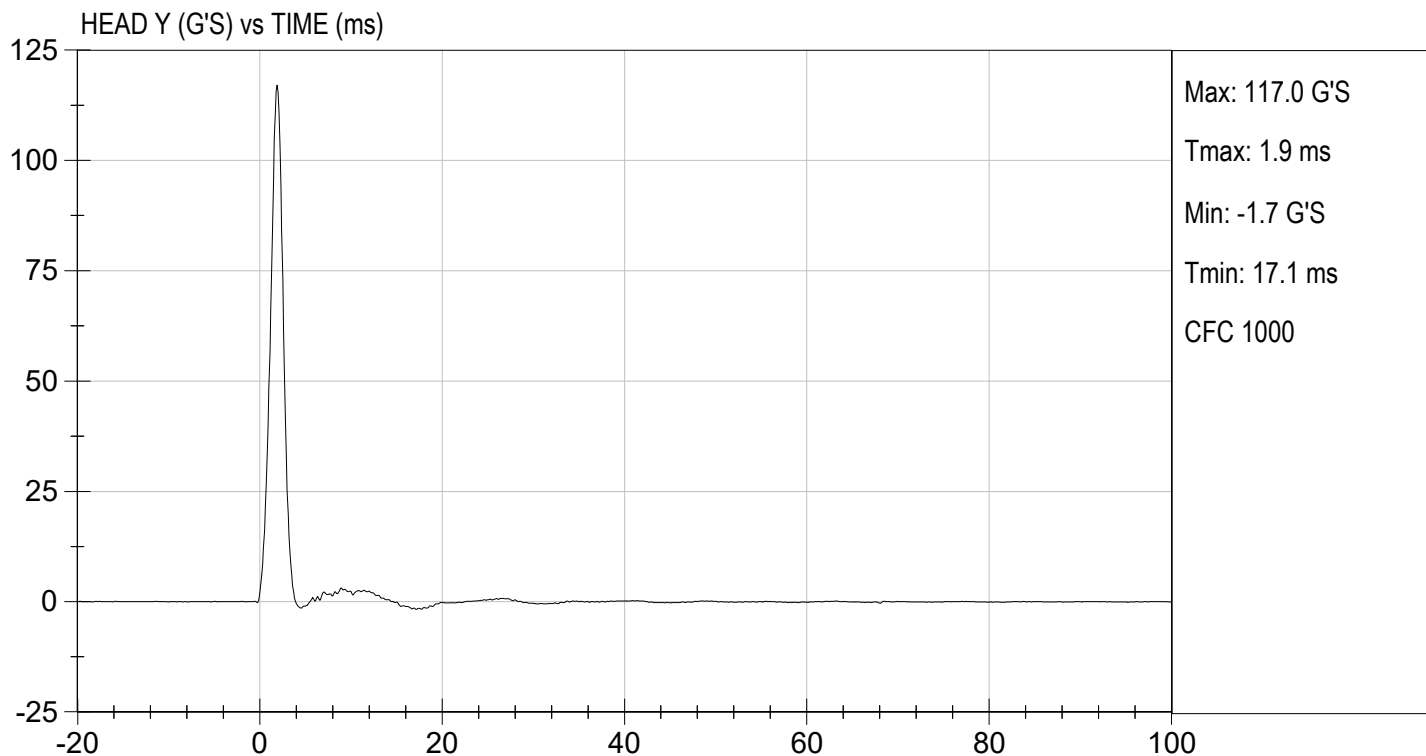
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	G's	125 to 155	142	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	8.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

02/06/2024
Test Date


Approved By





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

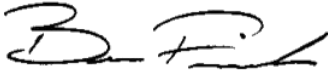
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D240382

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.48	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.58	Pass
	17 ms	m/s	>= -3.70	-3.63	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.1	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	65.2	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	53.0	Pass
Overall Results					Pass


 Laboratory Technician

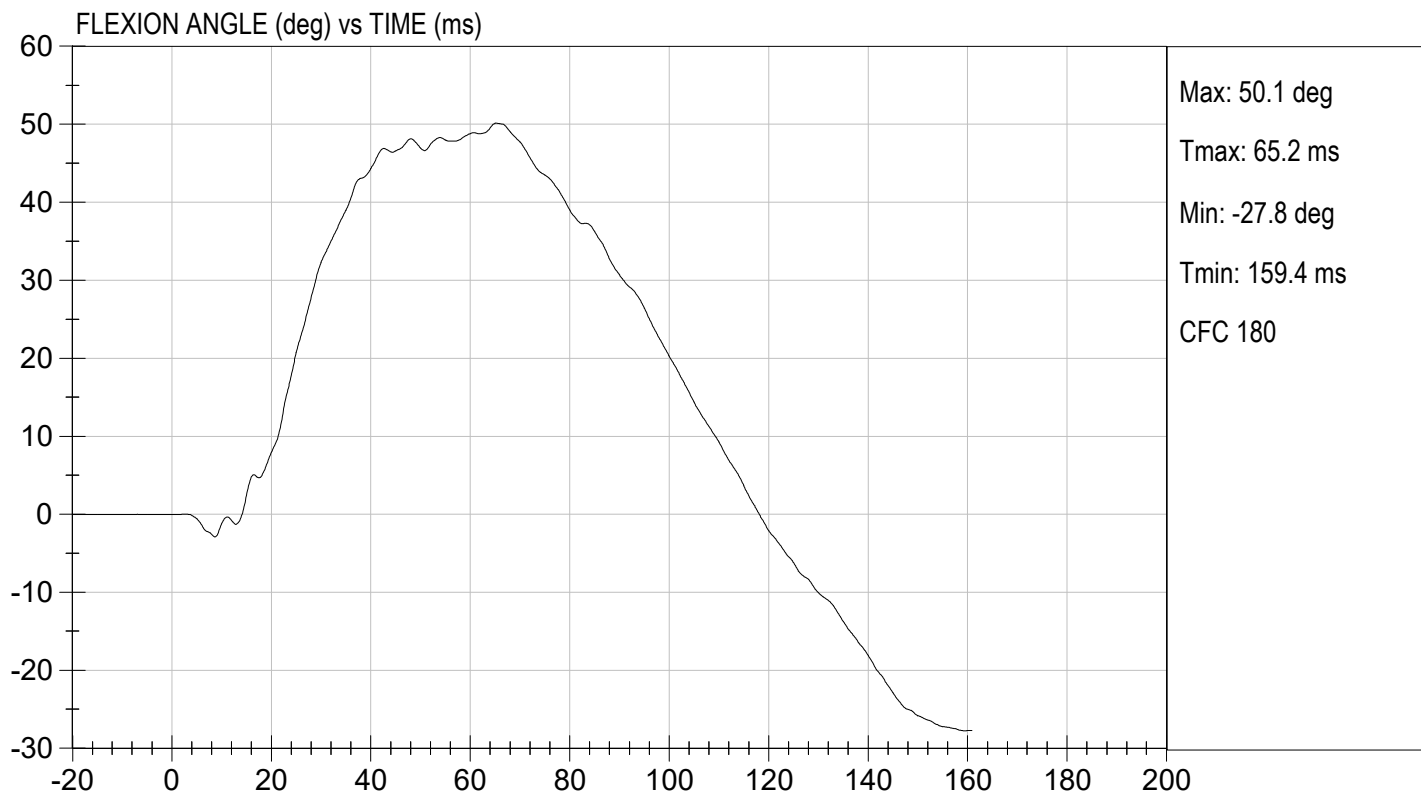
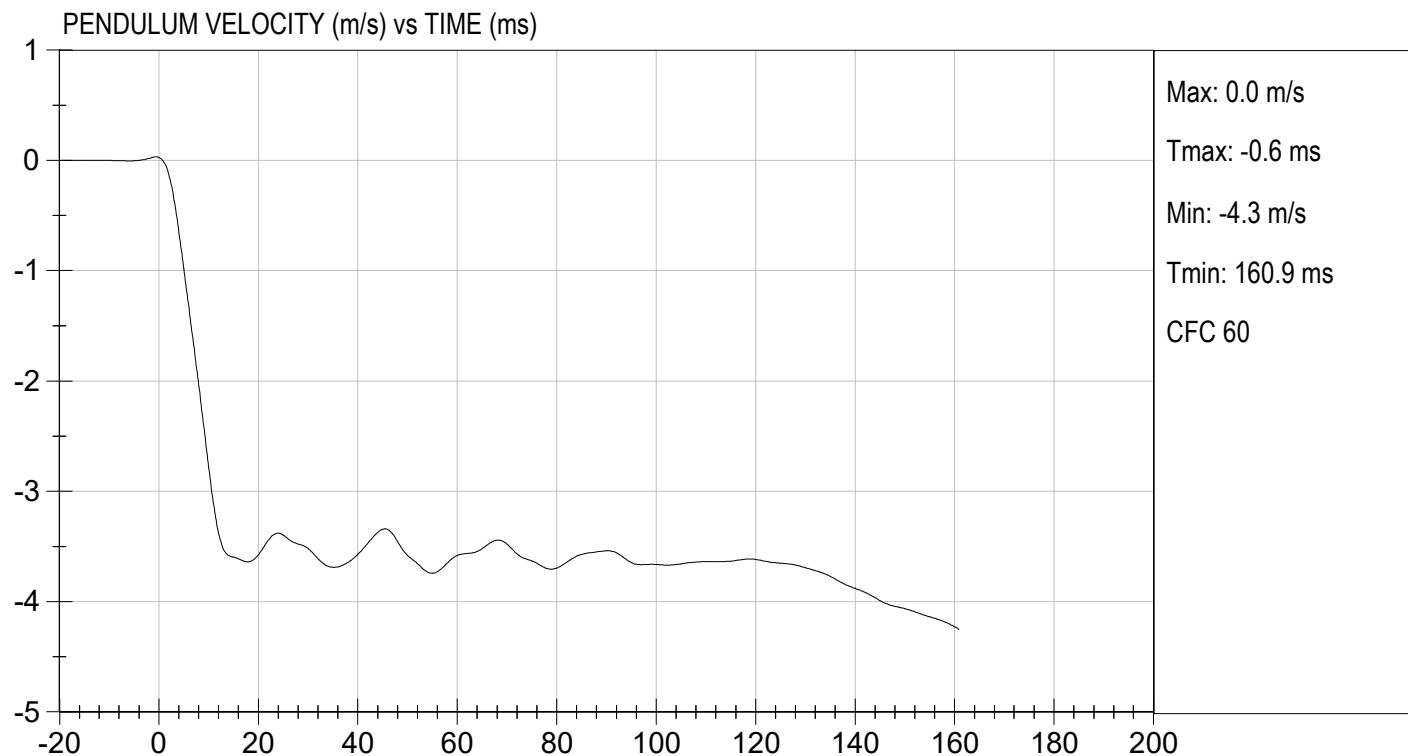

 Approved By

02/06/2024
 Test Date



TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

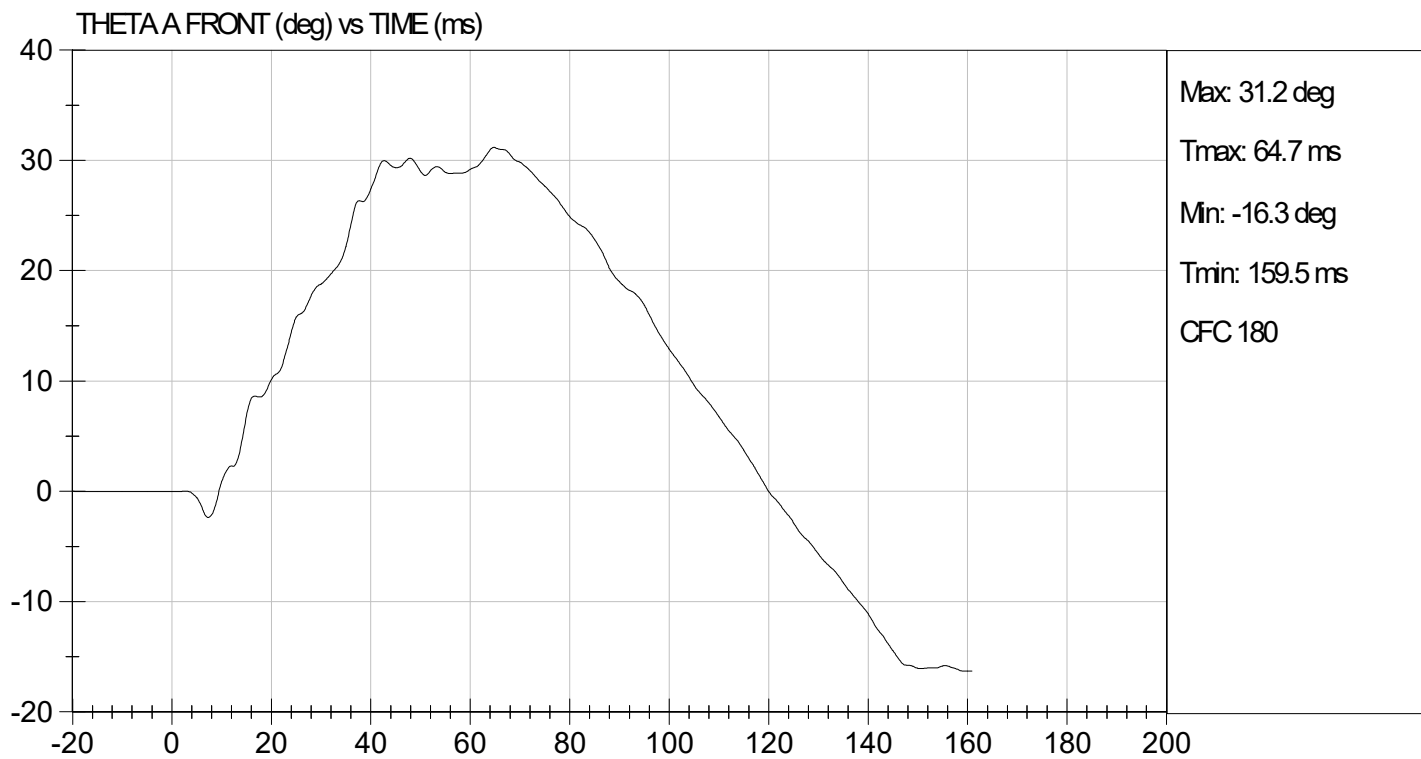
TEST DATE: 02/06/2024
TEST #: D240382





TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

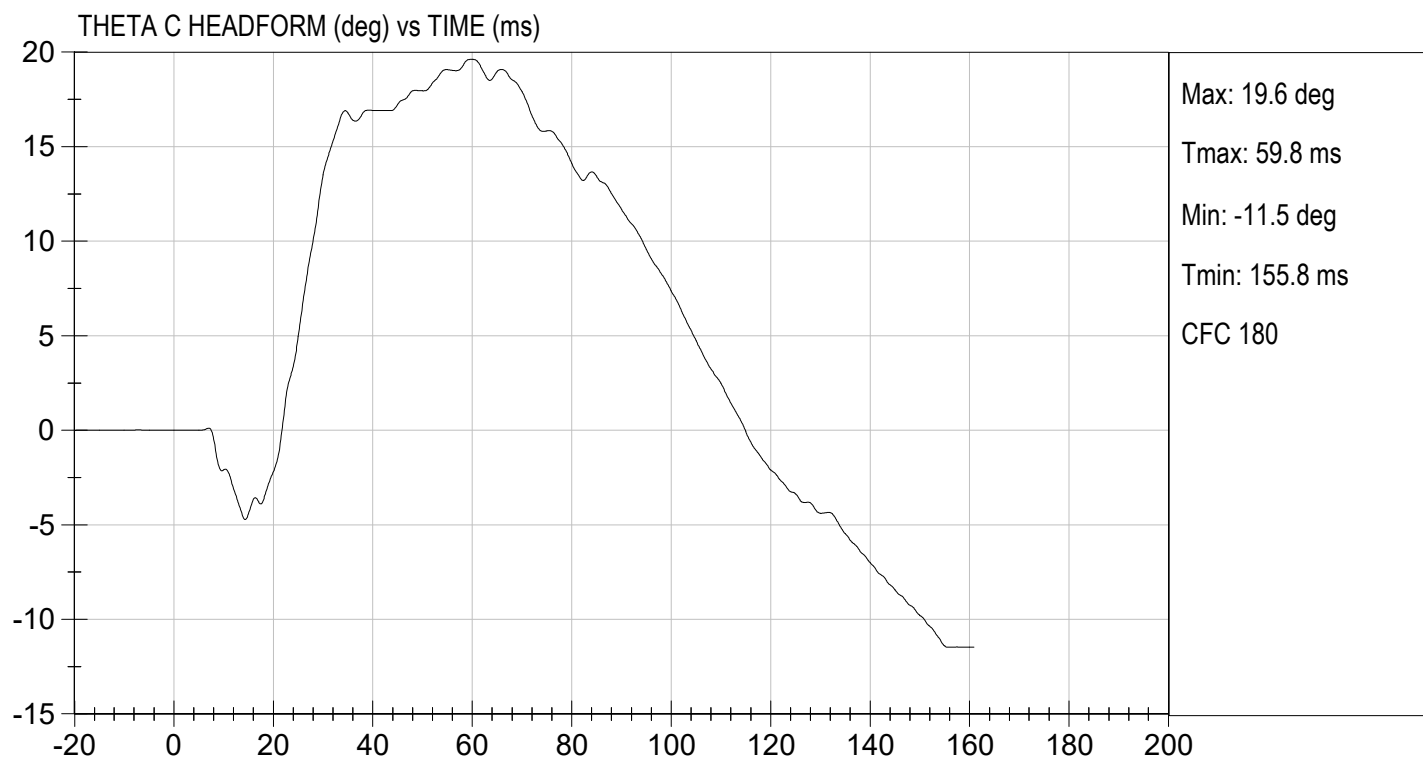
TEST DATE: 02/06/2024
TEST #: D240382





TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

TEST DATE: 02/06/2024
TEST #: D240382



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

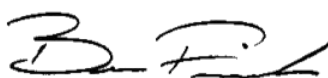
ATD Serial No: F032

Test I.D: D240383

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	27	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.3	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.2	Pass
Overall Test Results				Pass


Laboratory Technician

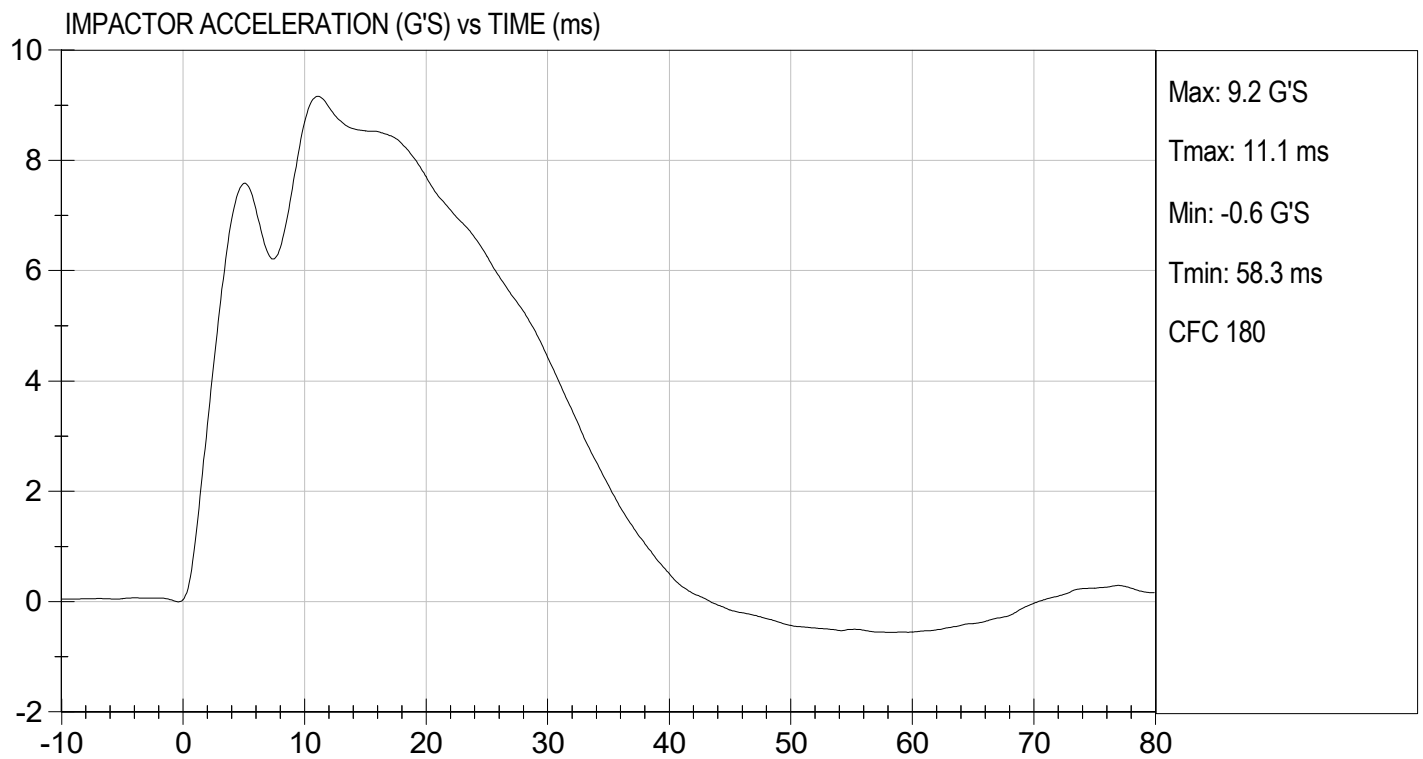
02/06/2024
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.10 ft/s, 4.3 m/s

TEST DATE: 02/06/2024
TEST #: D240383



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

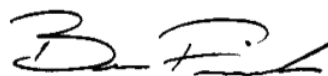
ATD Serial No: F032

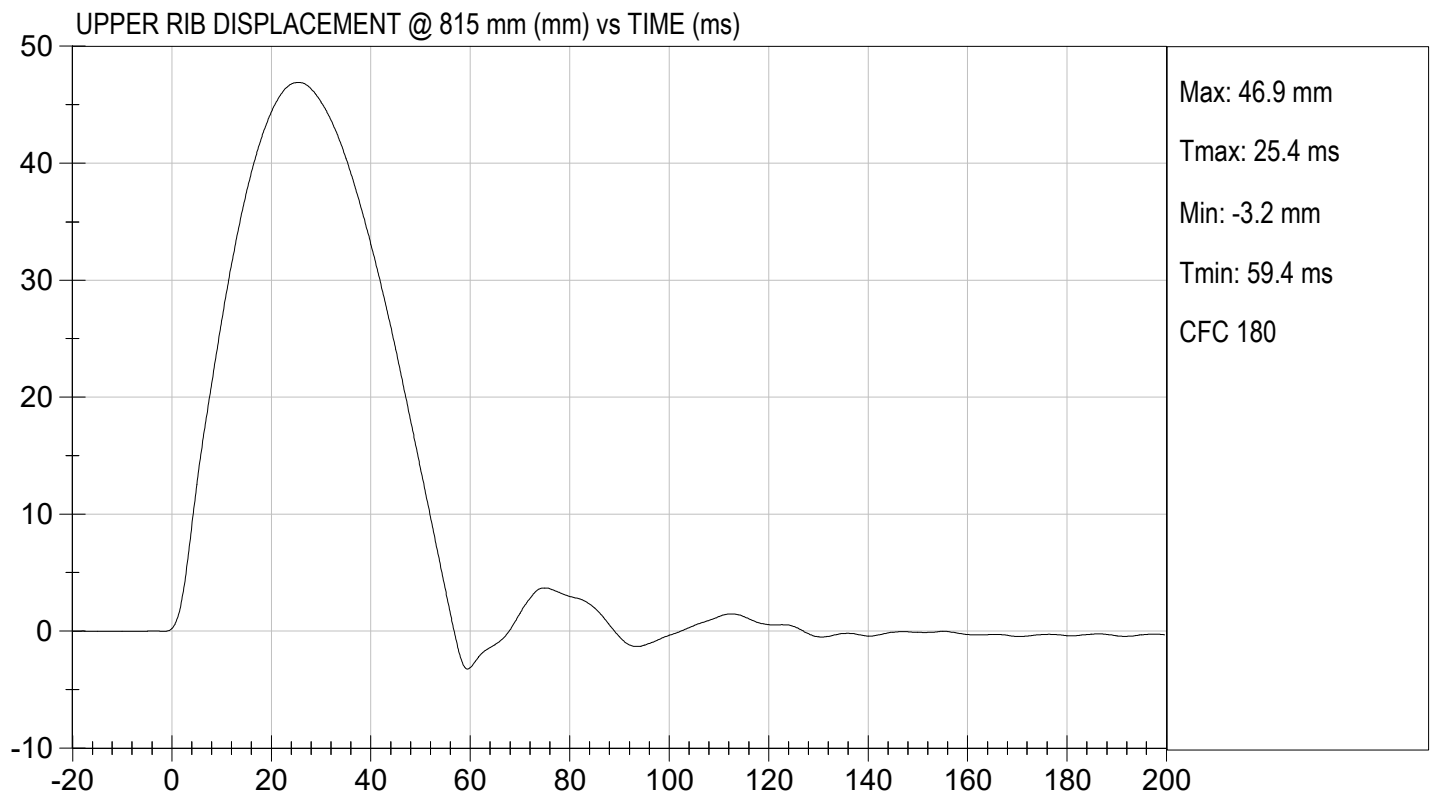
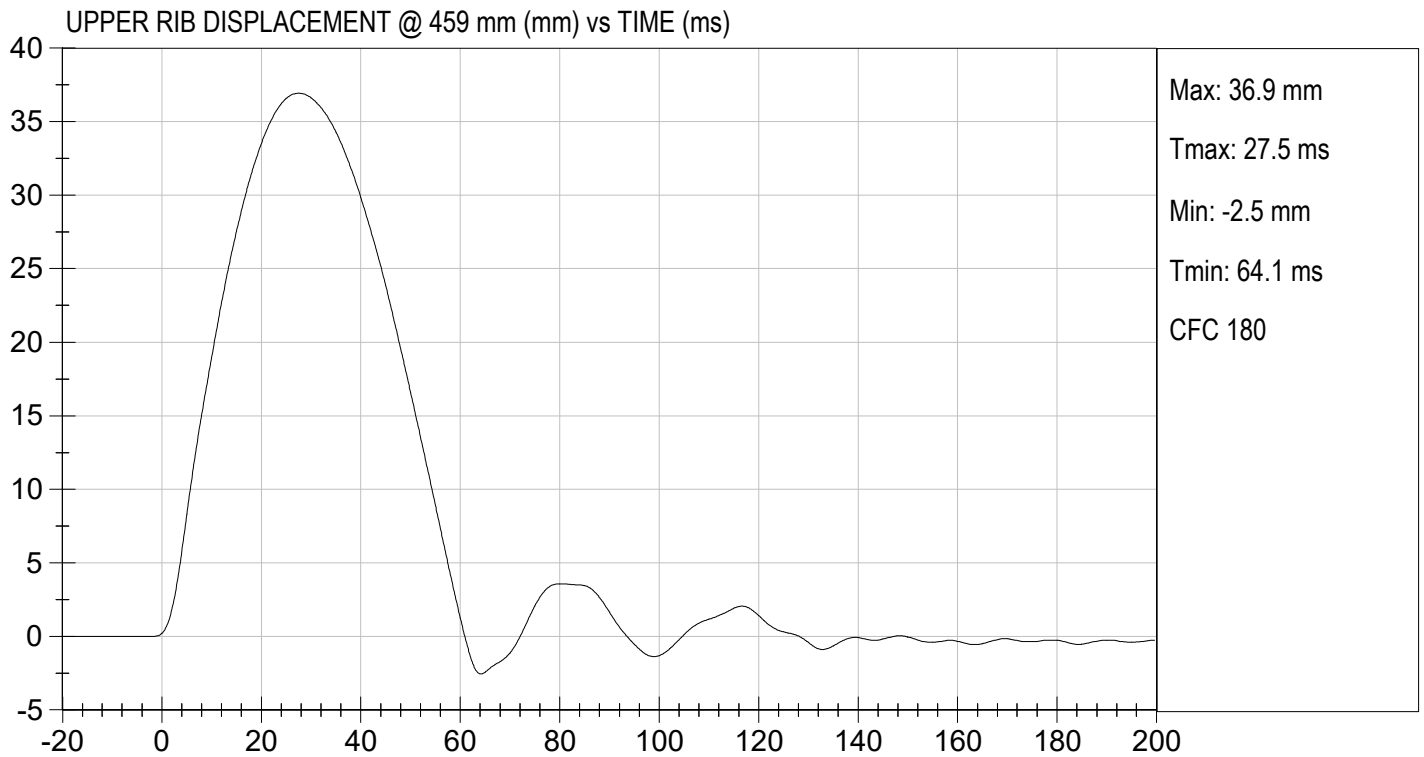
Test I.D: D240384

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Displacement at 459 mm	mm	36.0 to 40.0	36.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	46.9	Pass
Overall Test Results				Pass


Laboratory Technician

02/06/2024
Test Date


Approved By



MGA RESEARCH CORPORATION

MID RIB TEST

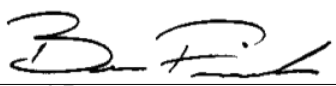
ES-2re DUMMY

ATD Serial No: F032

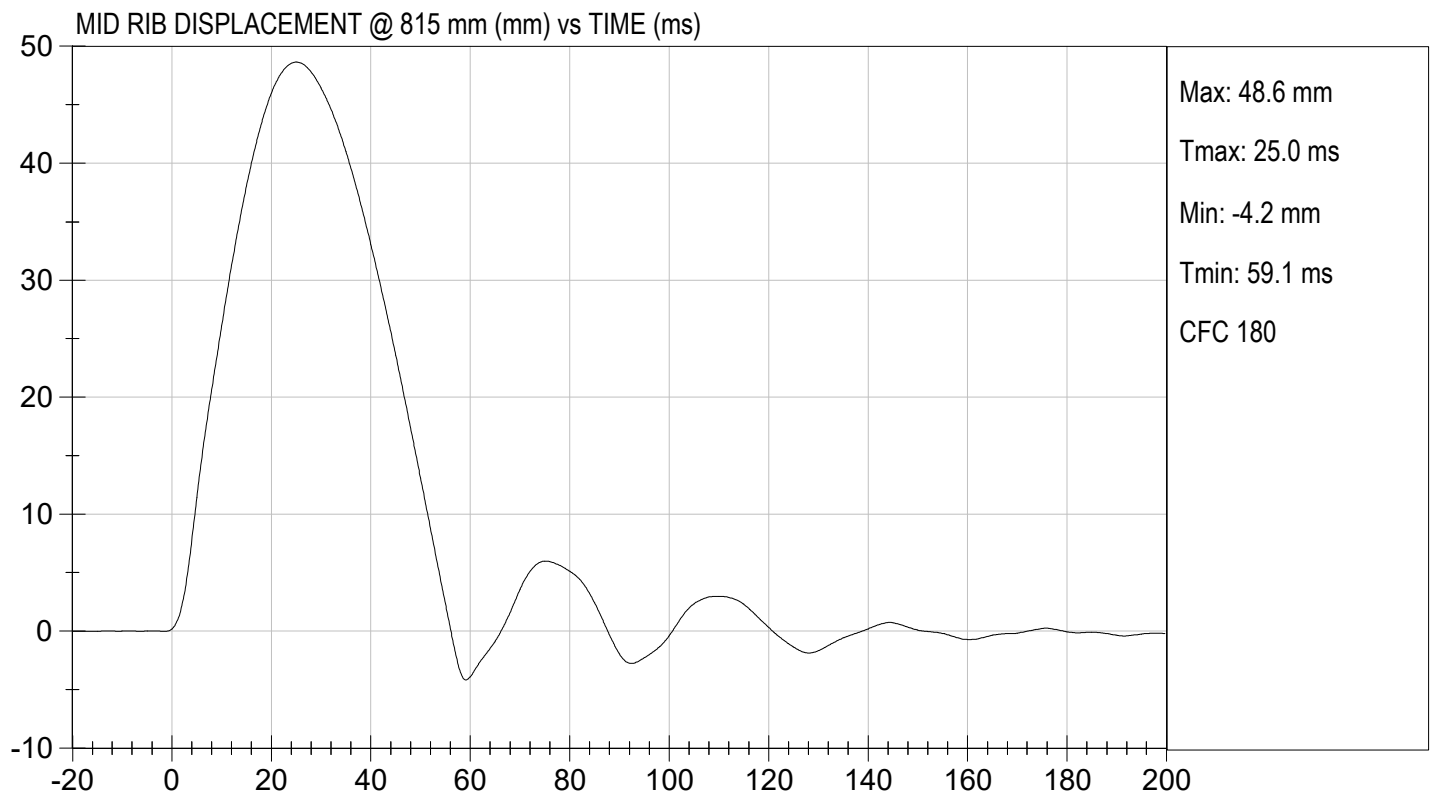
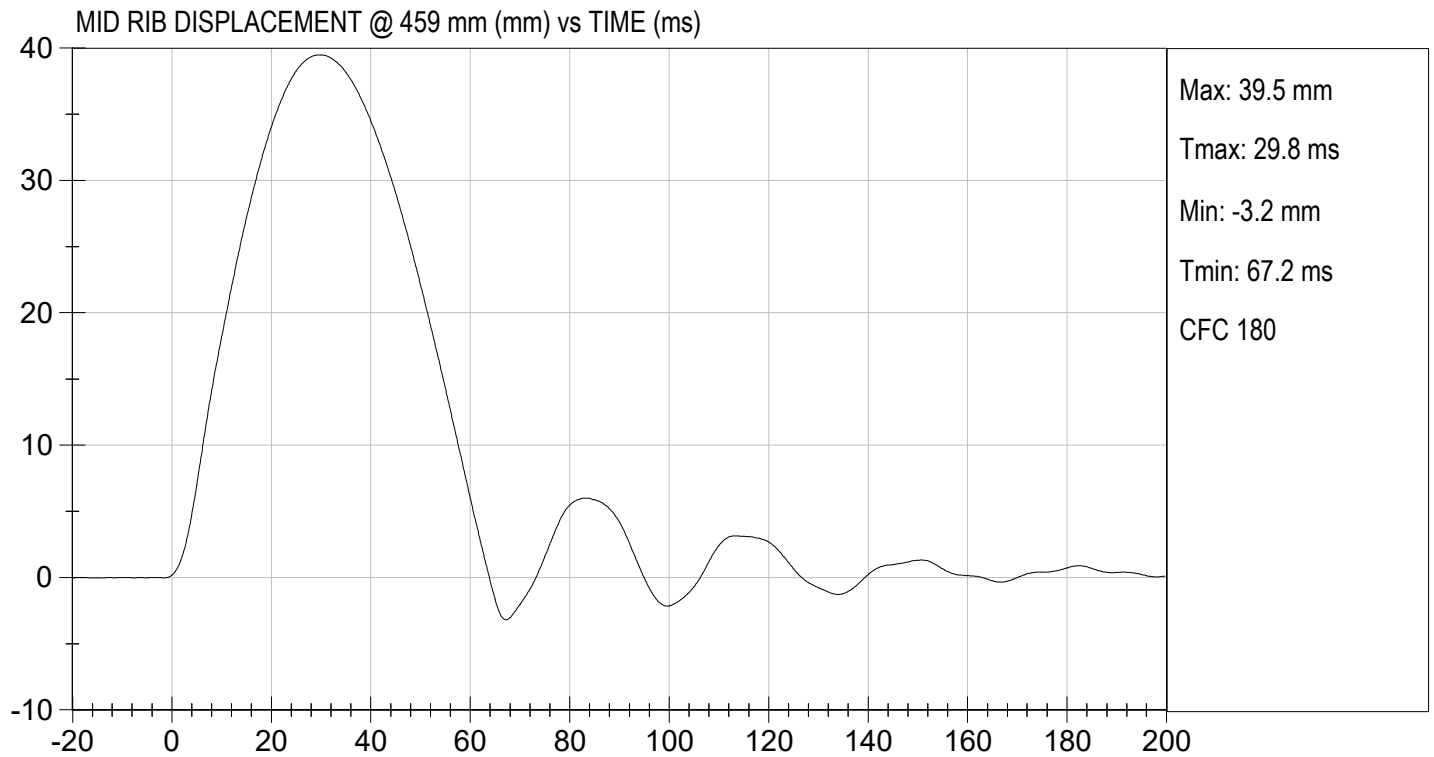
Test I.D: D240385

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.5	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.6	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

02/06/2024
Test Date



MGA RESEARCH CORPORATION

LOWER RIB TEST

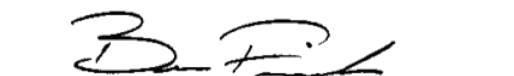
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D240386

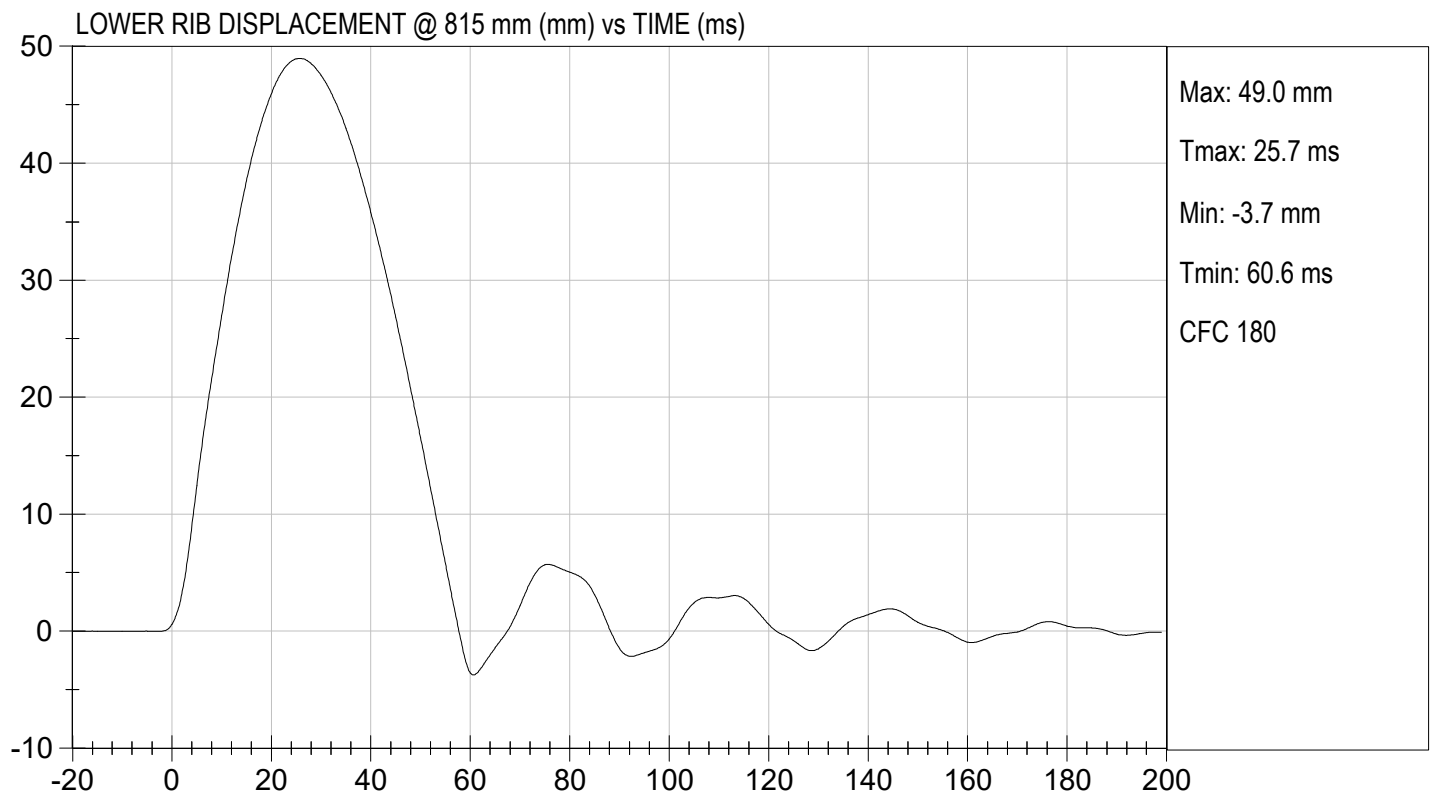
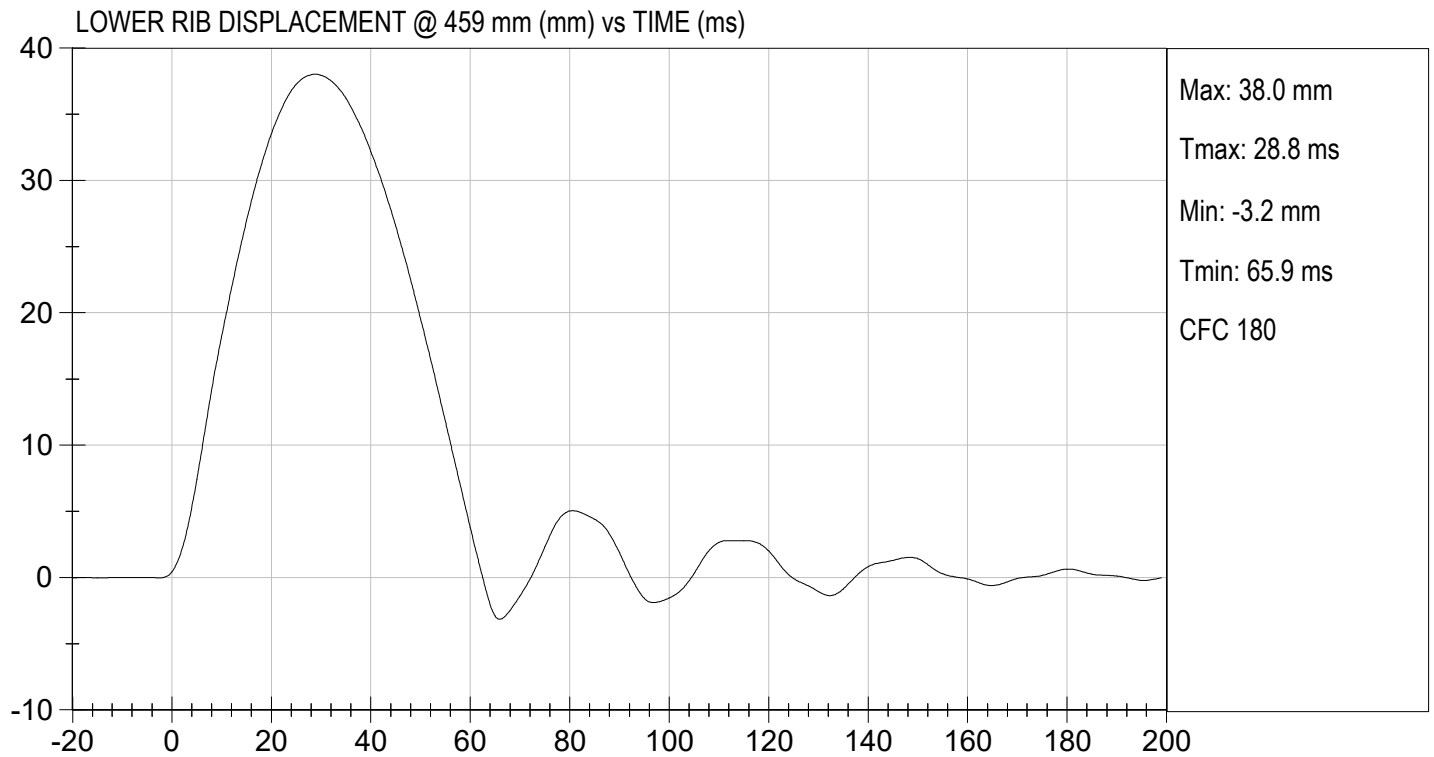
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.0	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

02/06/2024

Test Date



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

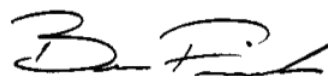
ATD Serial No: F032

Test I.D: D240387

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4178	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.1	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2464	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.4	Pass
Overall Test Results				Pass


Laboratory Technician

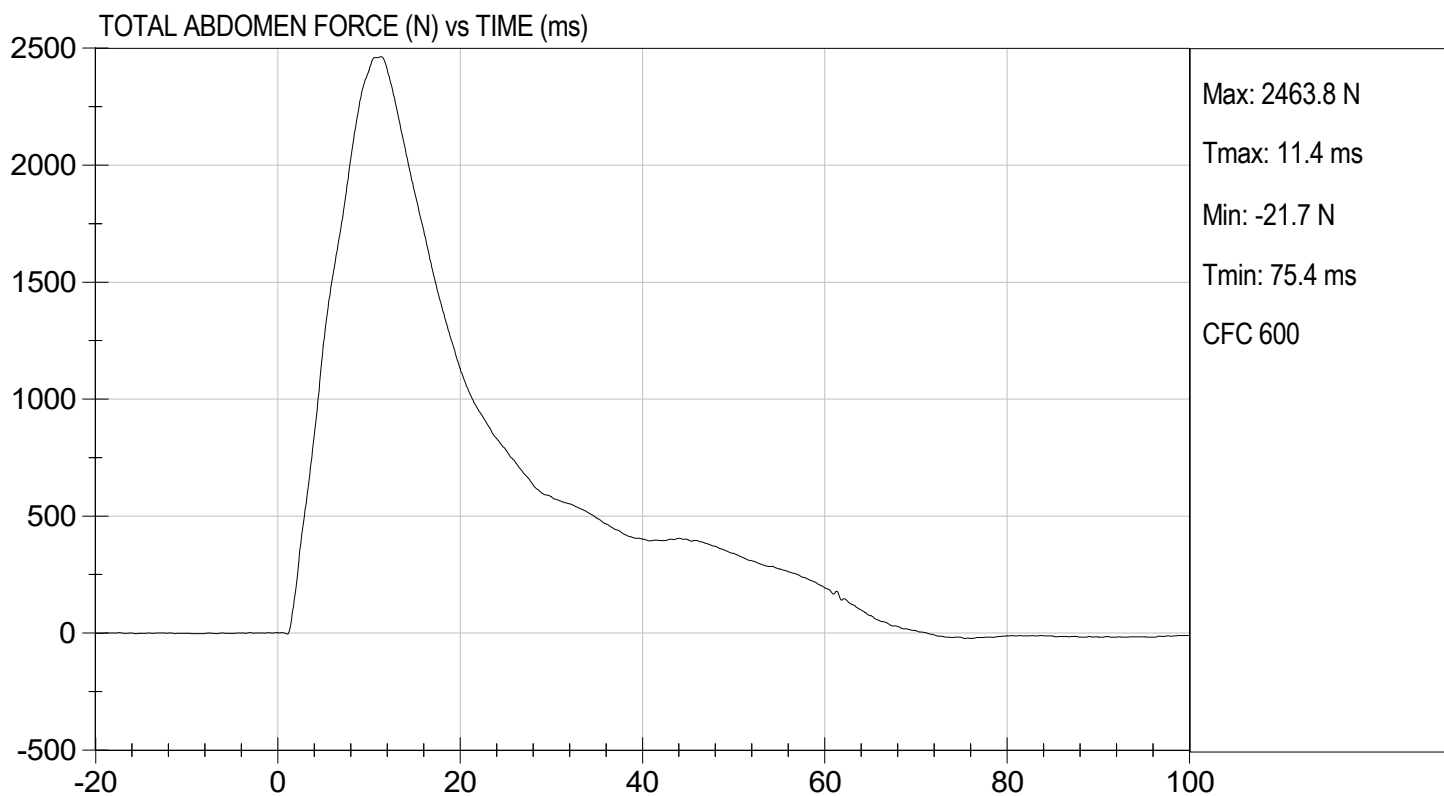
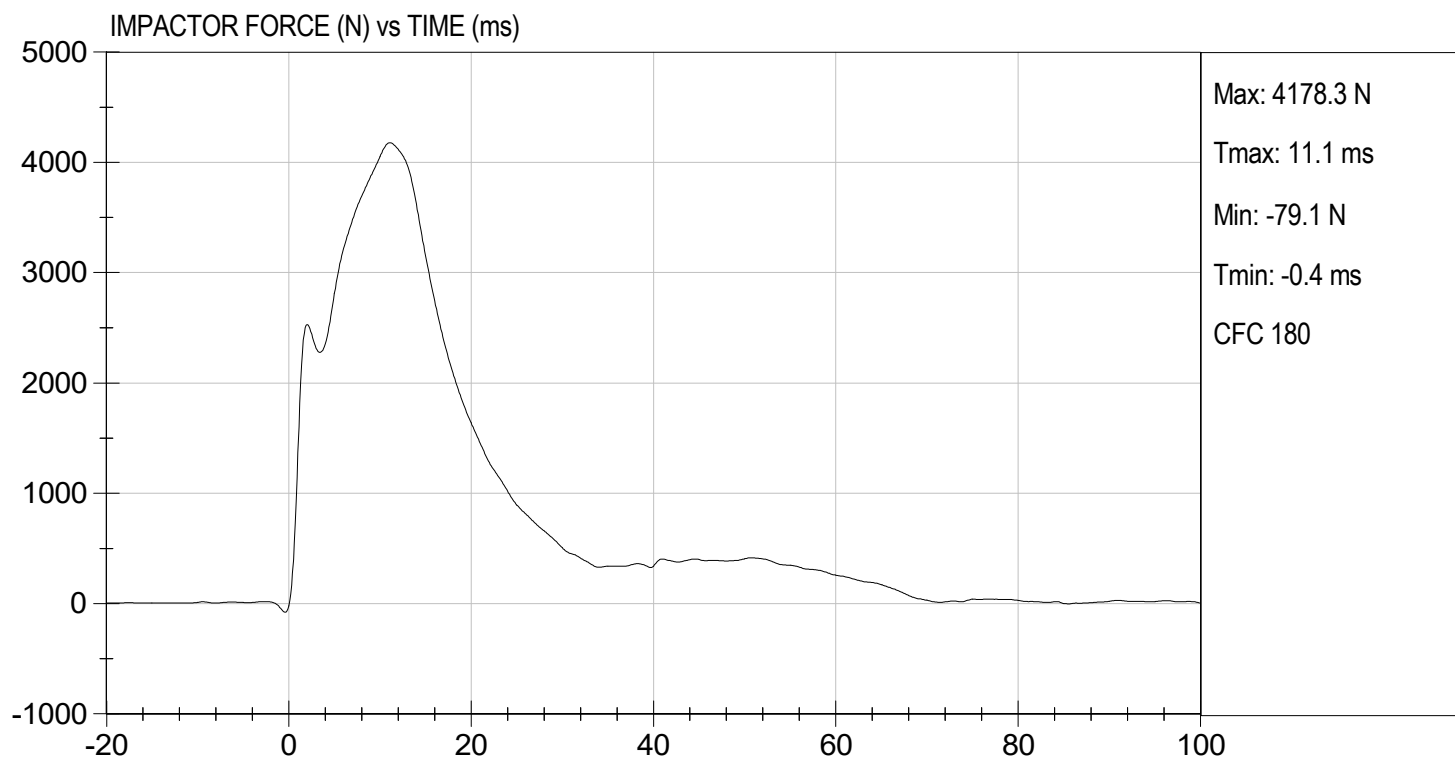
02/06/2024
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

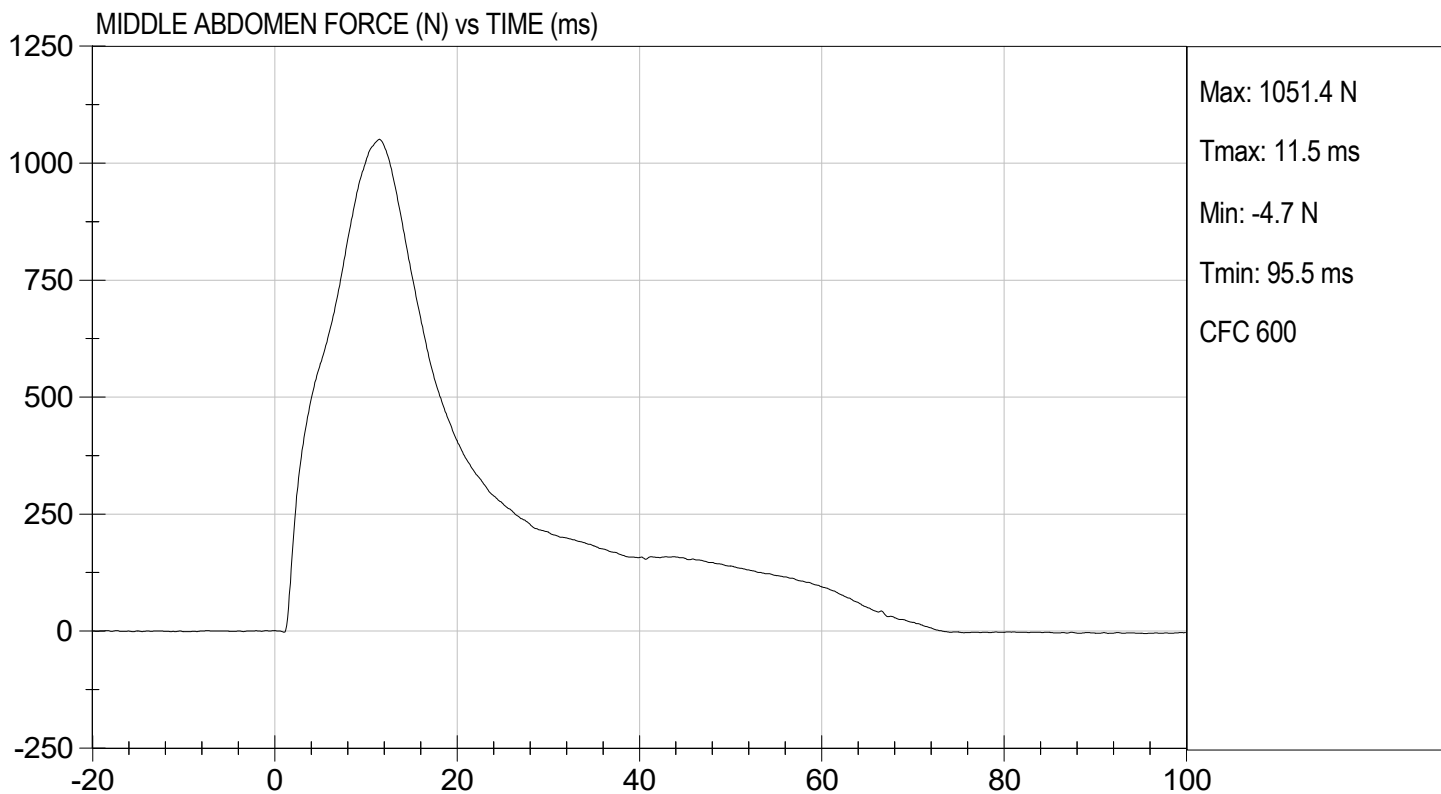
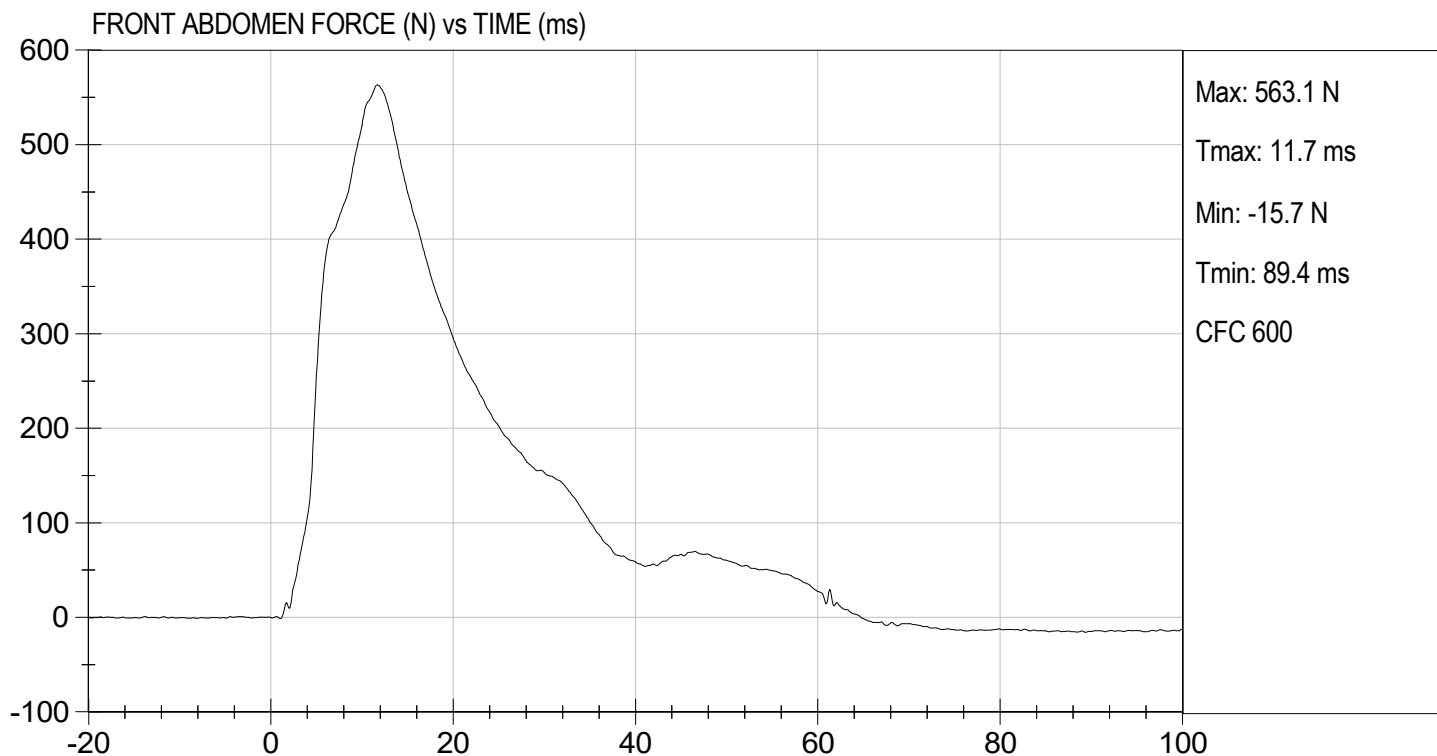
TEST DATE: 02/06/2024
TEST #: D240387





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

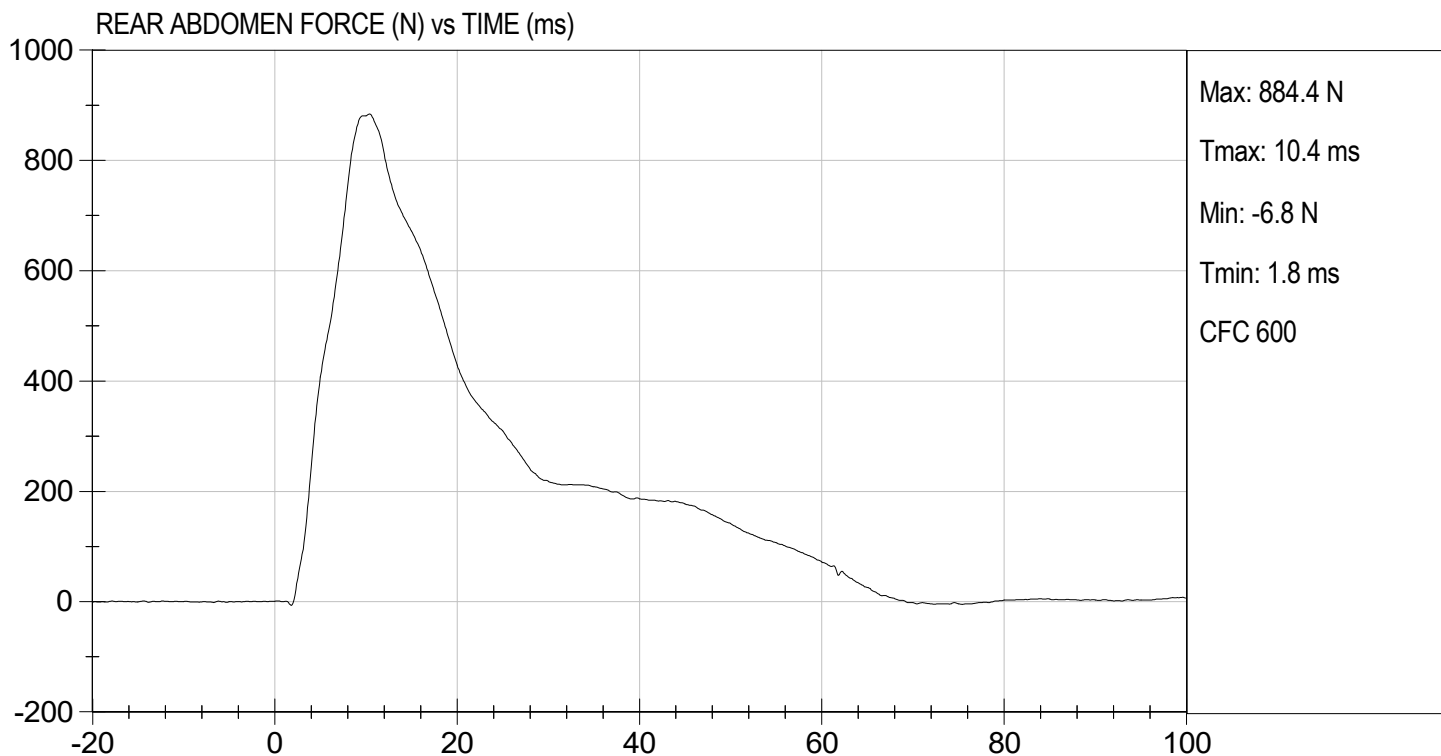
TEST DATE: 02/06/2024
TEST #: D240387





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 02/06/2024
TEST #: D240387



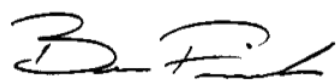
MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D240388

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.05	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.398	Pass
	27 ms	m/s	-6.50 to -5.80	-5.97	Pass
	30 ms	m/s	>= -6.50	-6.27	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	49.2	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	44.8	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	41	Pass
Overall Results					Pass


 Laboratory Technician

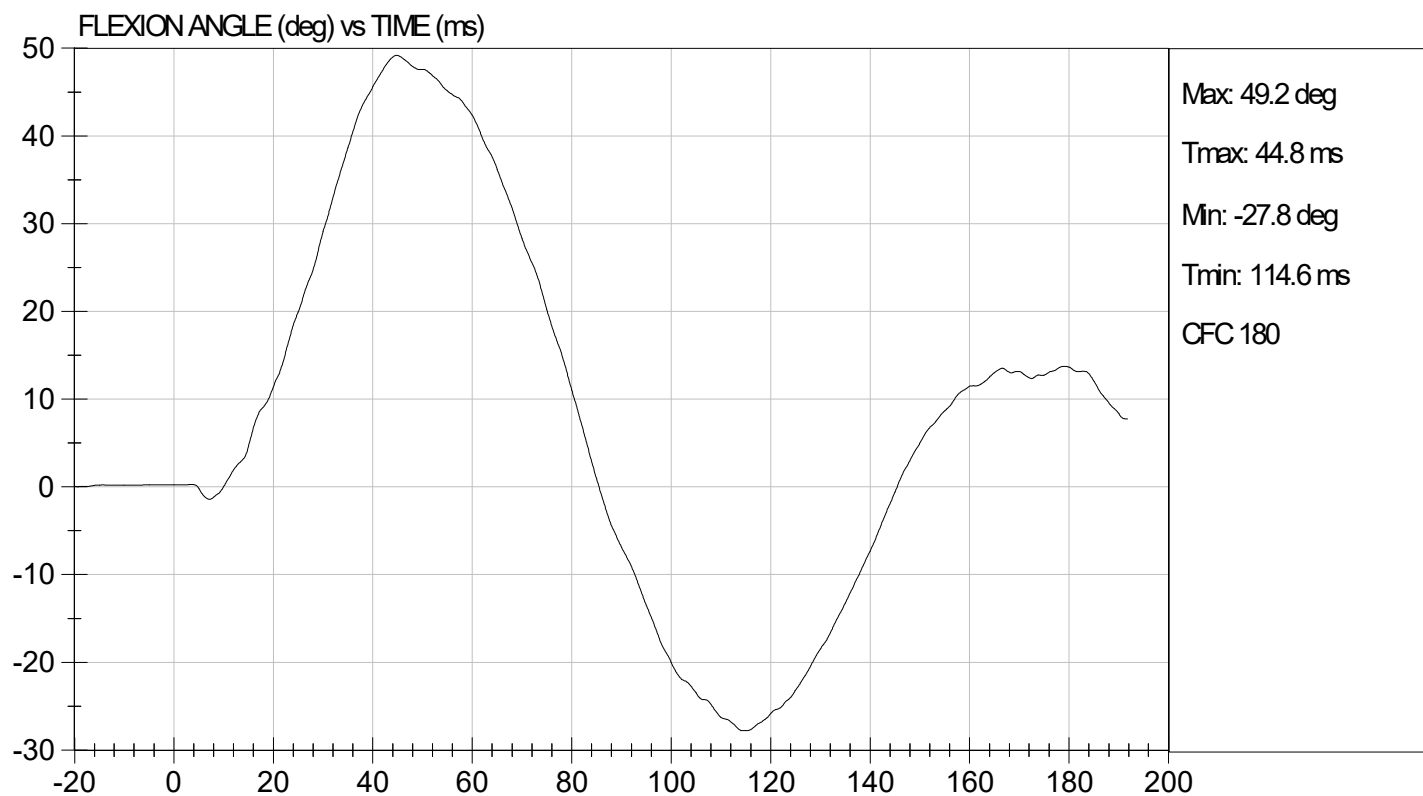
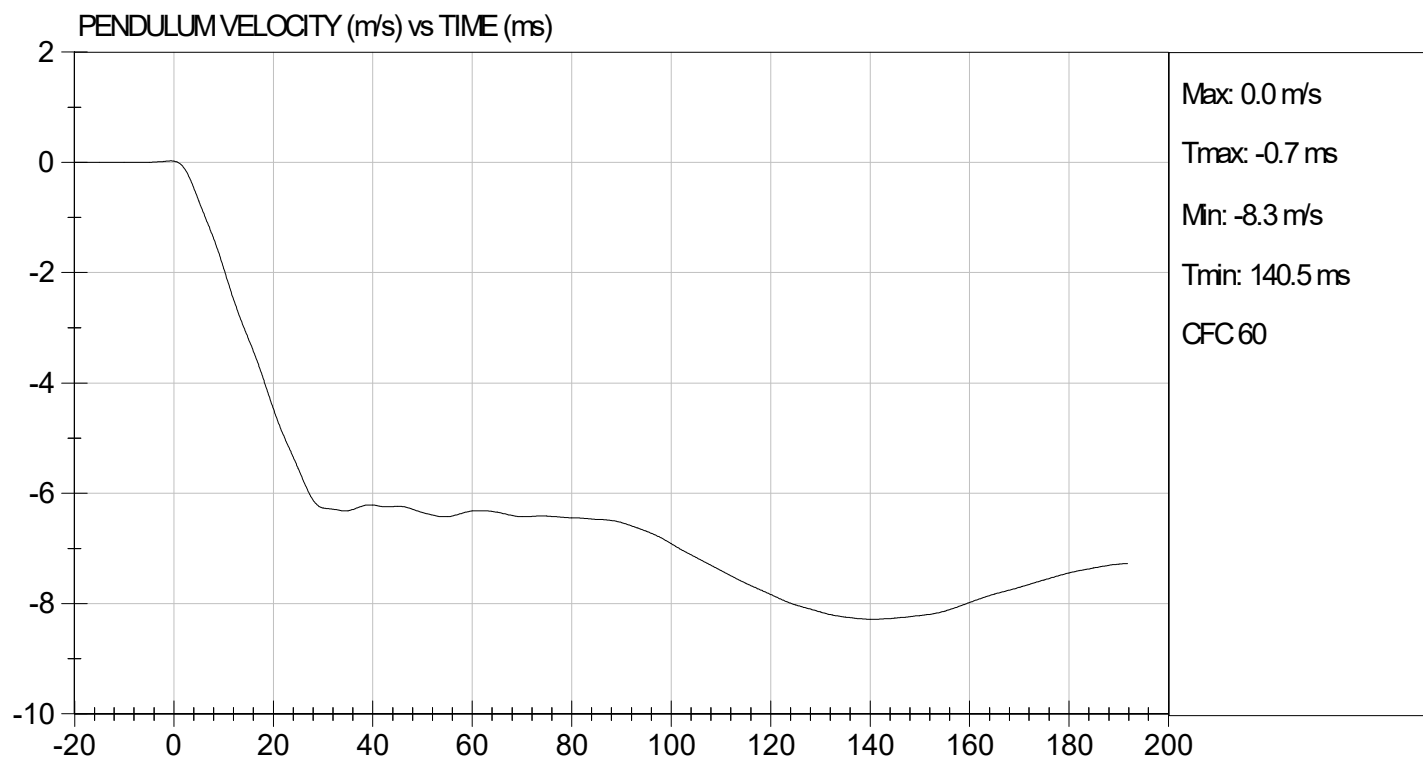

 Approved By

02/06/2024
 Test Date



TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

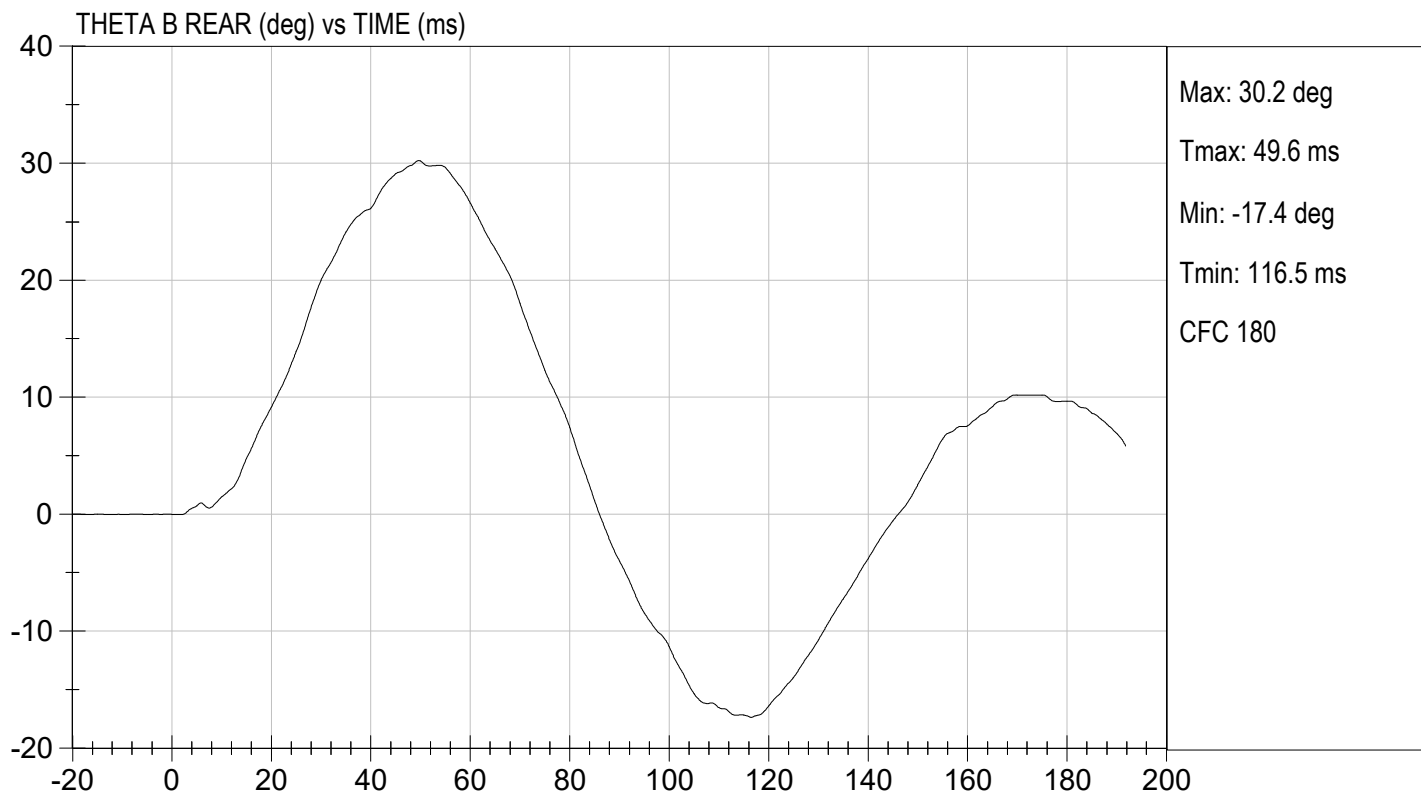
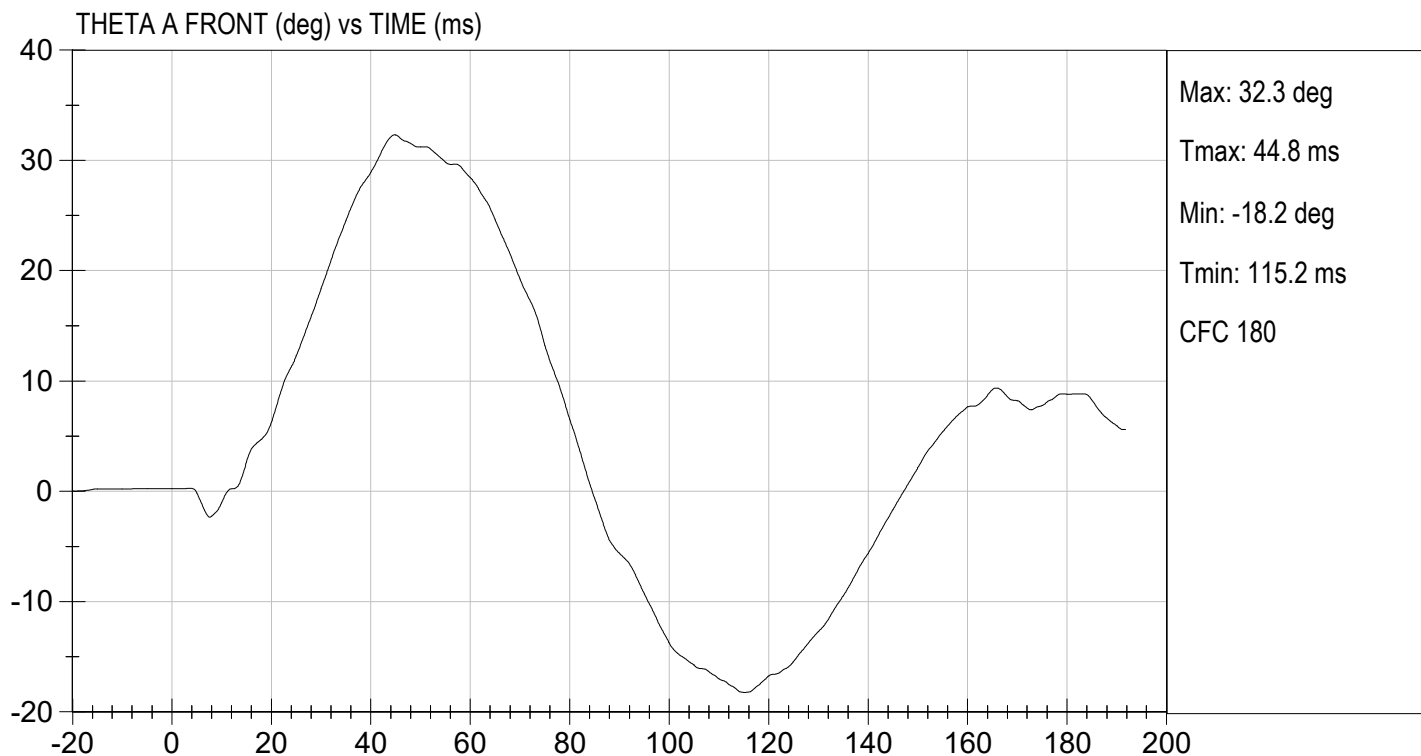
TEST DATE: 02/06/2024
TEST #: D240388





TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

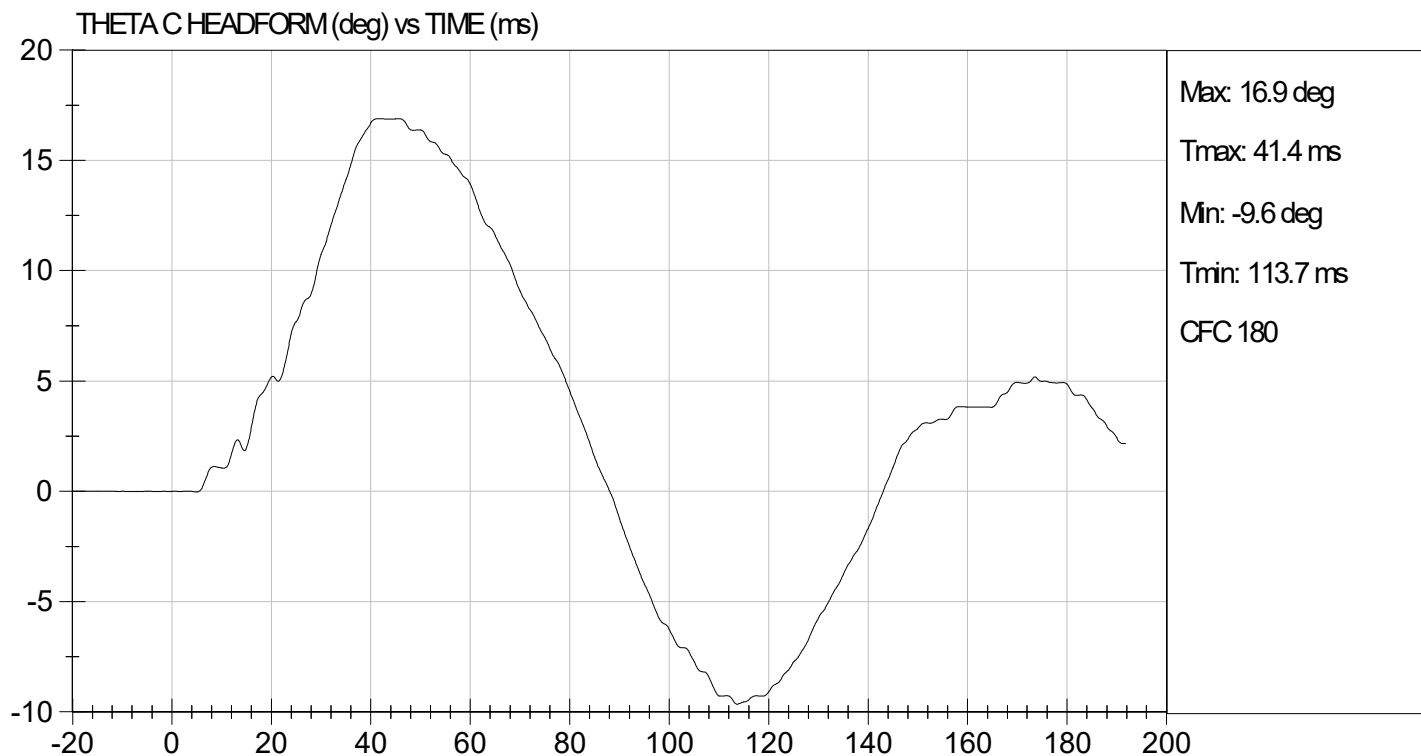
TEST DATE: 02/06/2024
TEST #: D240388





TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 02/06/2024
TEST #: D240388



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

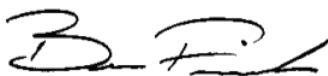
ATD Serial No: F032

Test I.D: D240389

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	28	Pass
Probe Speed	m/s	4.20 to 4.40	4.34	Pass
Maximum Impactor Force	N	4700 to 5400	5248	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.4	Pass
Maximum Pubic Force	N	1230 to 1590	1346	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	12.8	Pass
Overall Test Results				Pass


Laboratory Technician

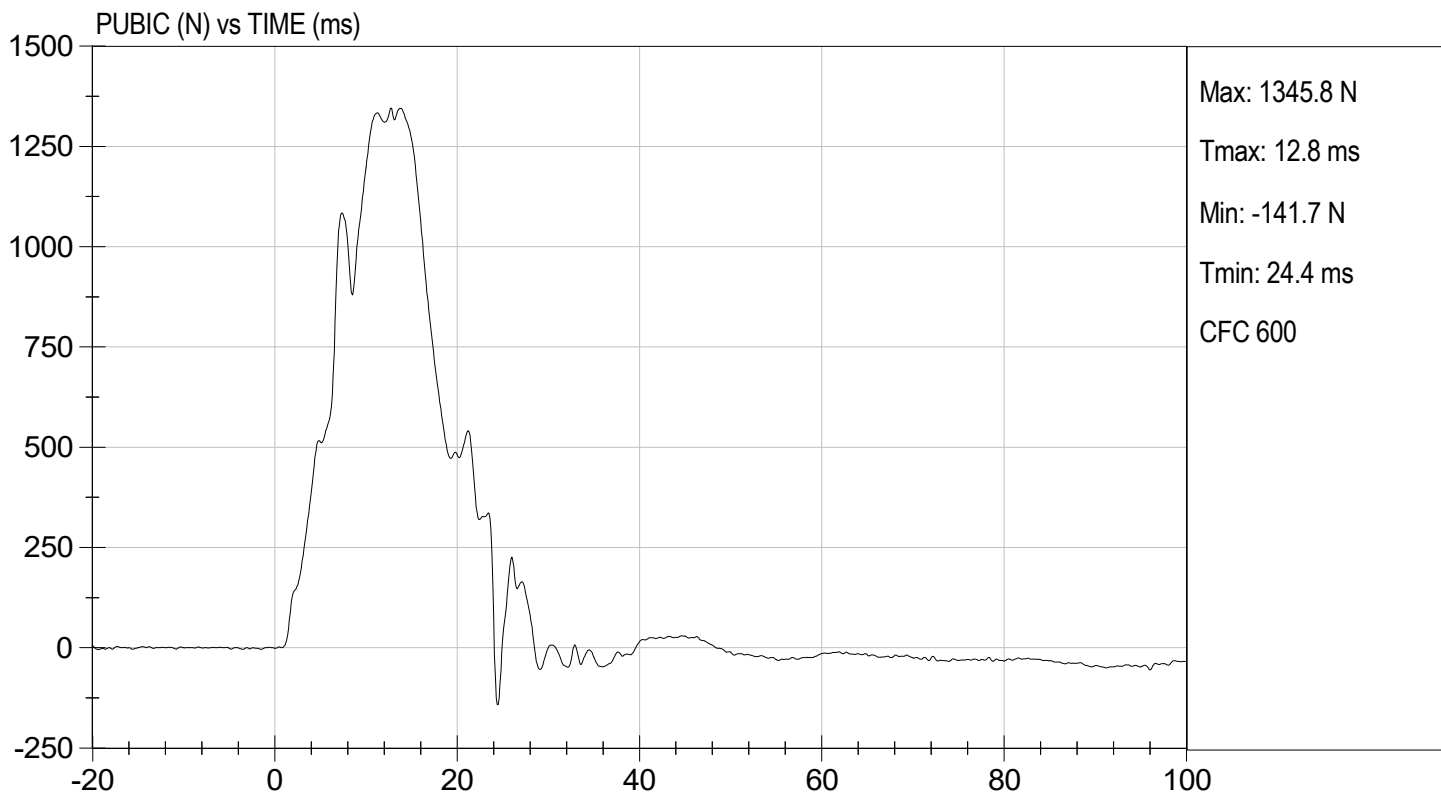
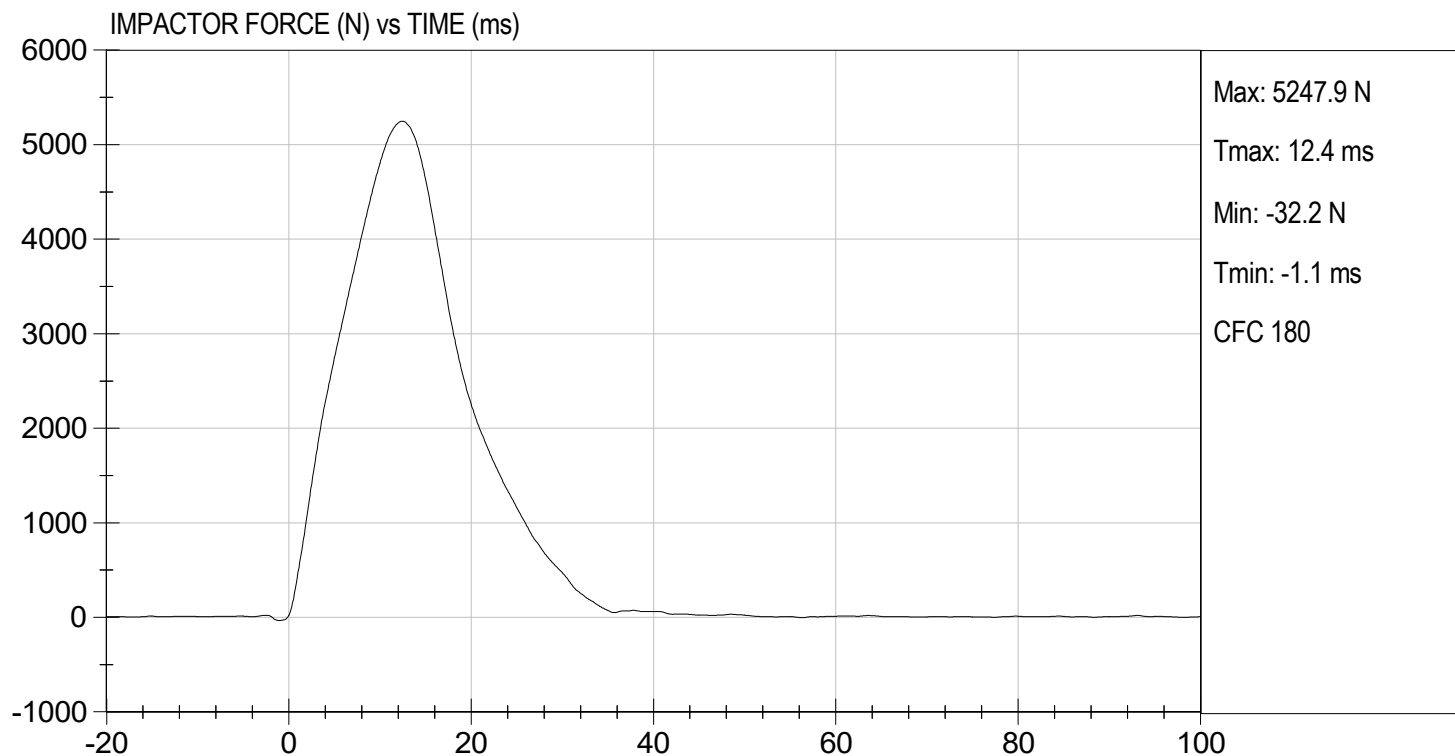
02/06/2024
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/06/2024
TEST #: D240389



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

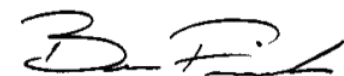
ATD Serial No: F032

Test I.D: D240380

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	28	Pass
Probe Speed	m/s	5.40 to 5.60	5.50	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5583	Pass
Upper Rib Displacement	mm	34.0 to 41.0	37.4	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.8	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.3	Pass
Overall Test Results			Pass	


Laboratory Technician

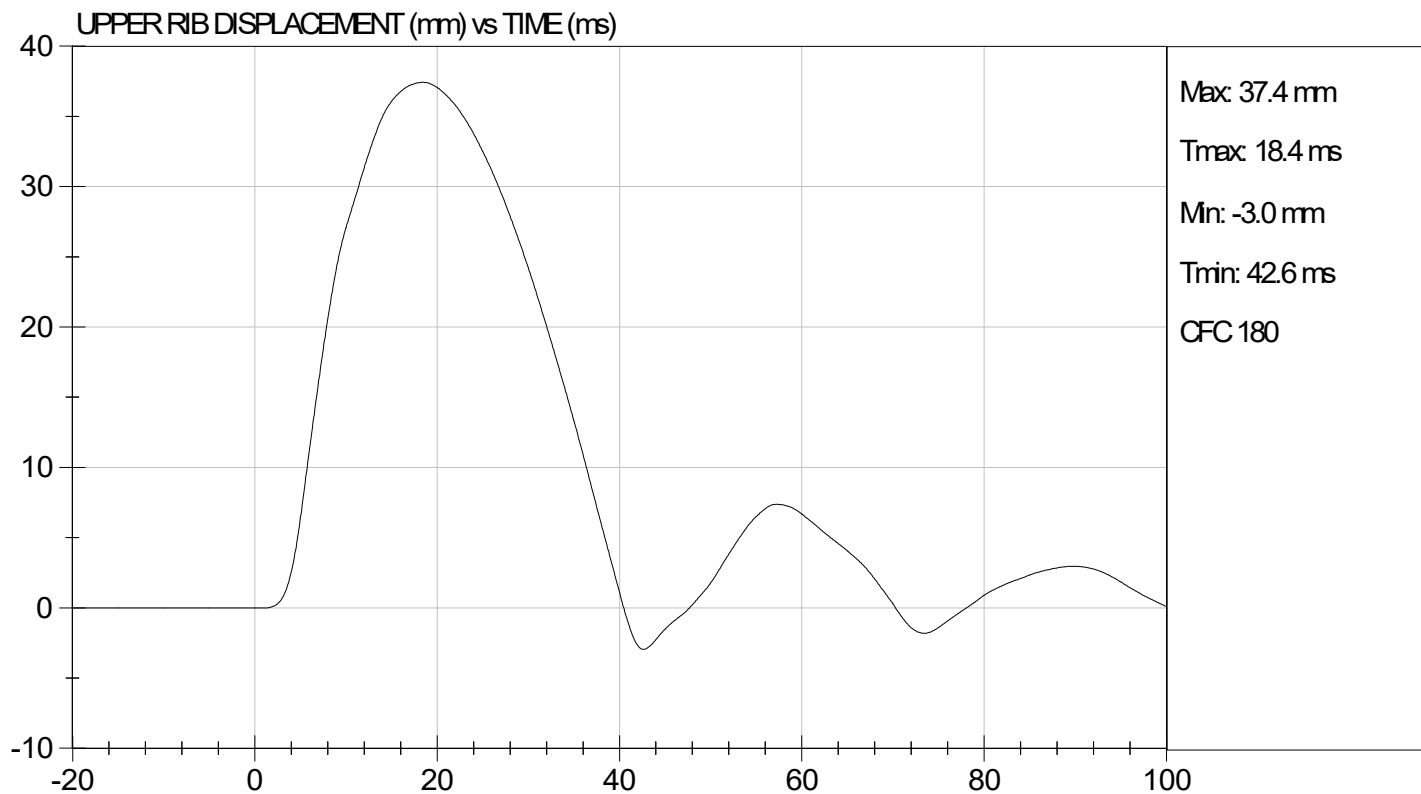
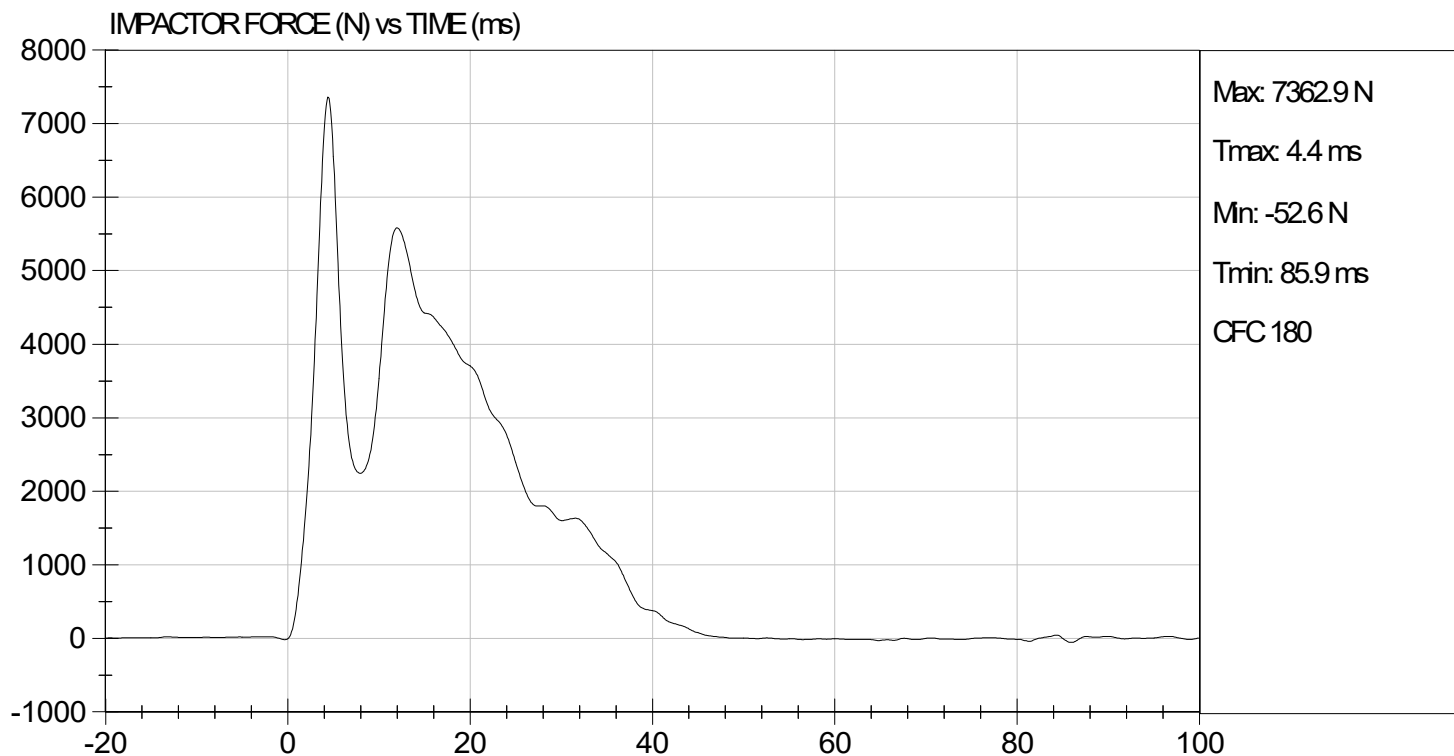
02/06/2024
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.04 ft/s, 5.50 m/s

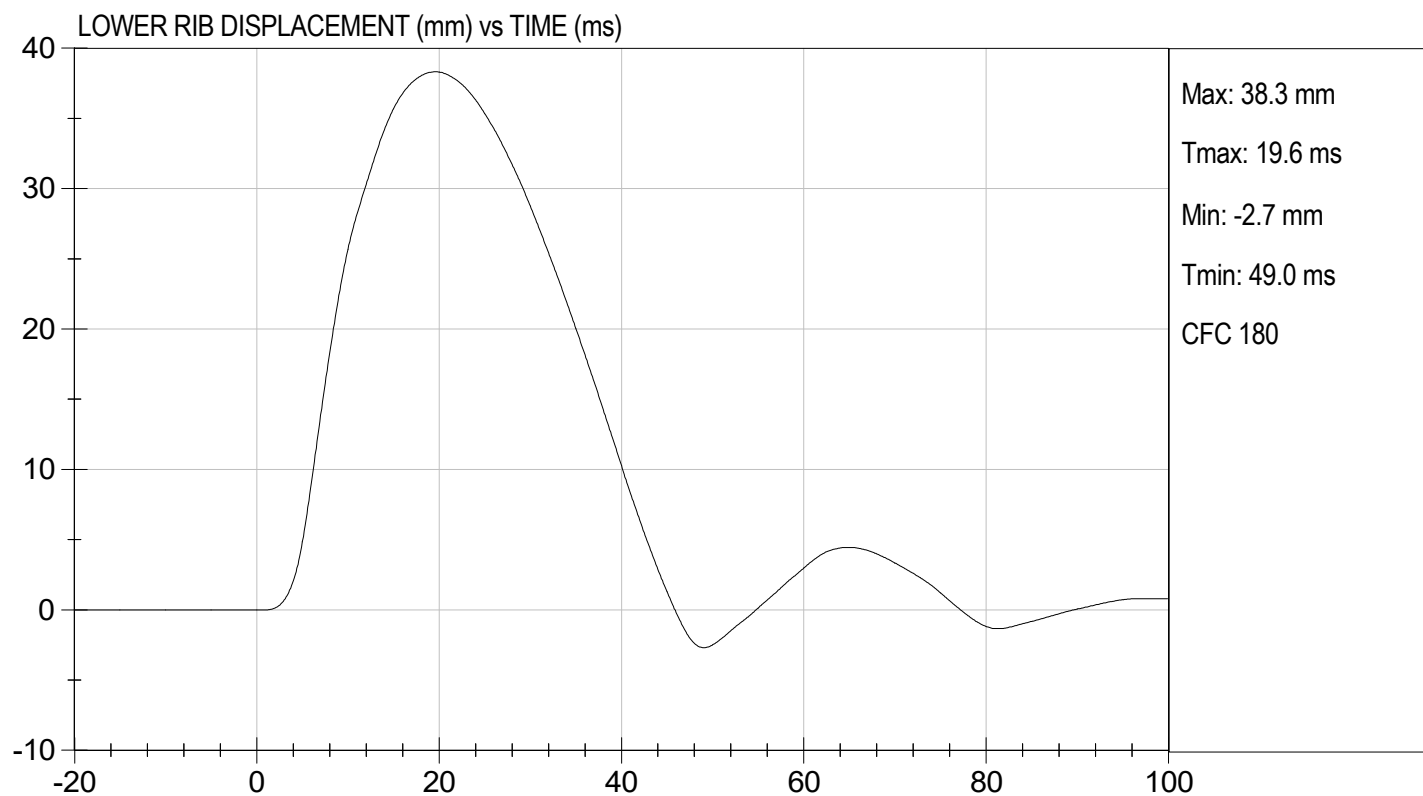
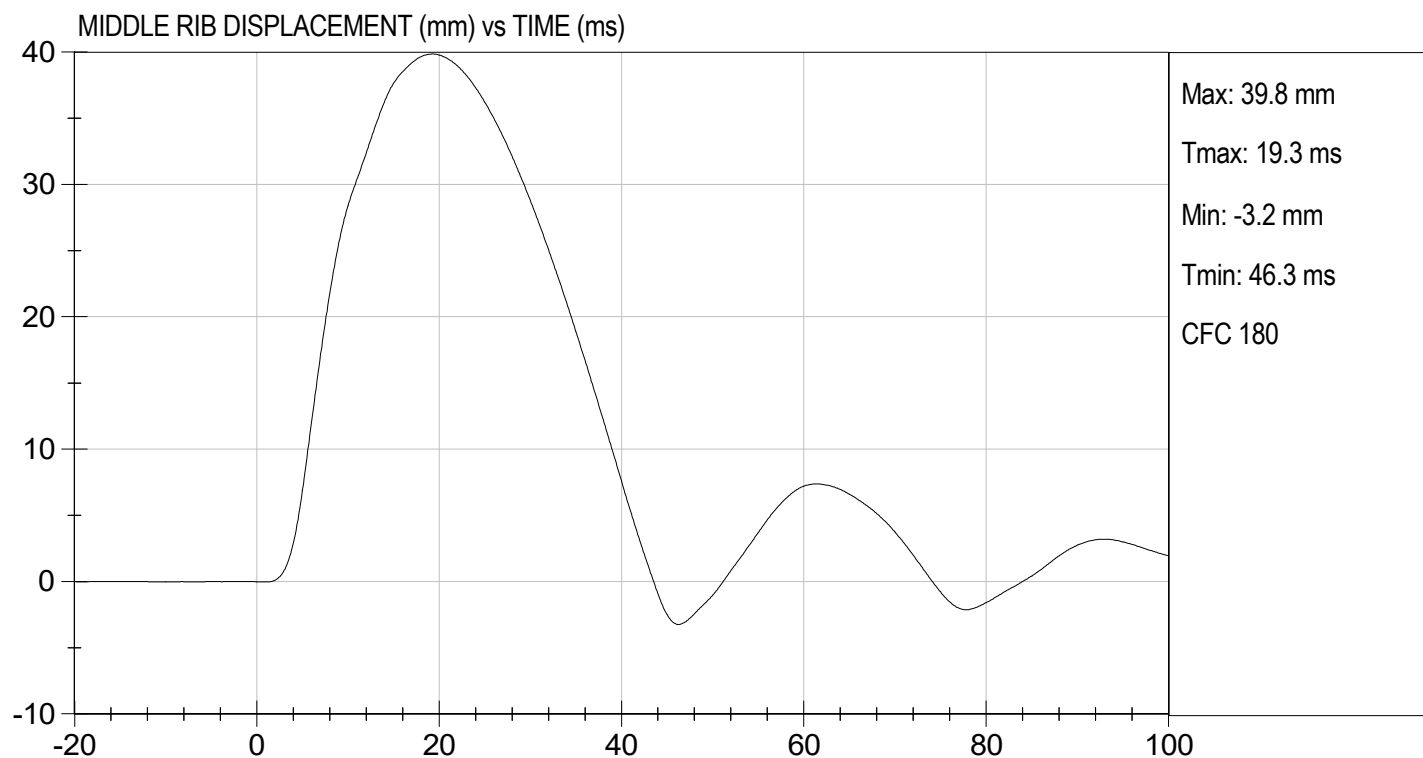
TEST DATE: 02/06/2024
TEST #: D240380





TEST DESC: THORAX IMPACT
VELOCITY: 18.04 ft/s, 5.50 m/s

TEST DATE: 02/06/2024
TEST #: D240380



QUALIFICATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER 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

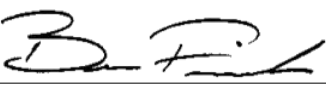
Test ID: D240271

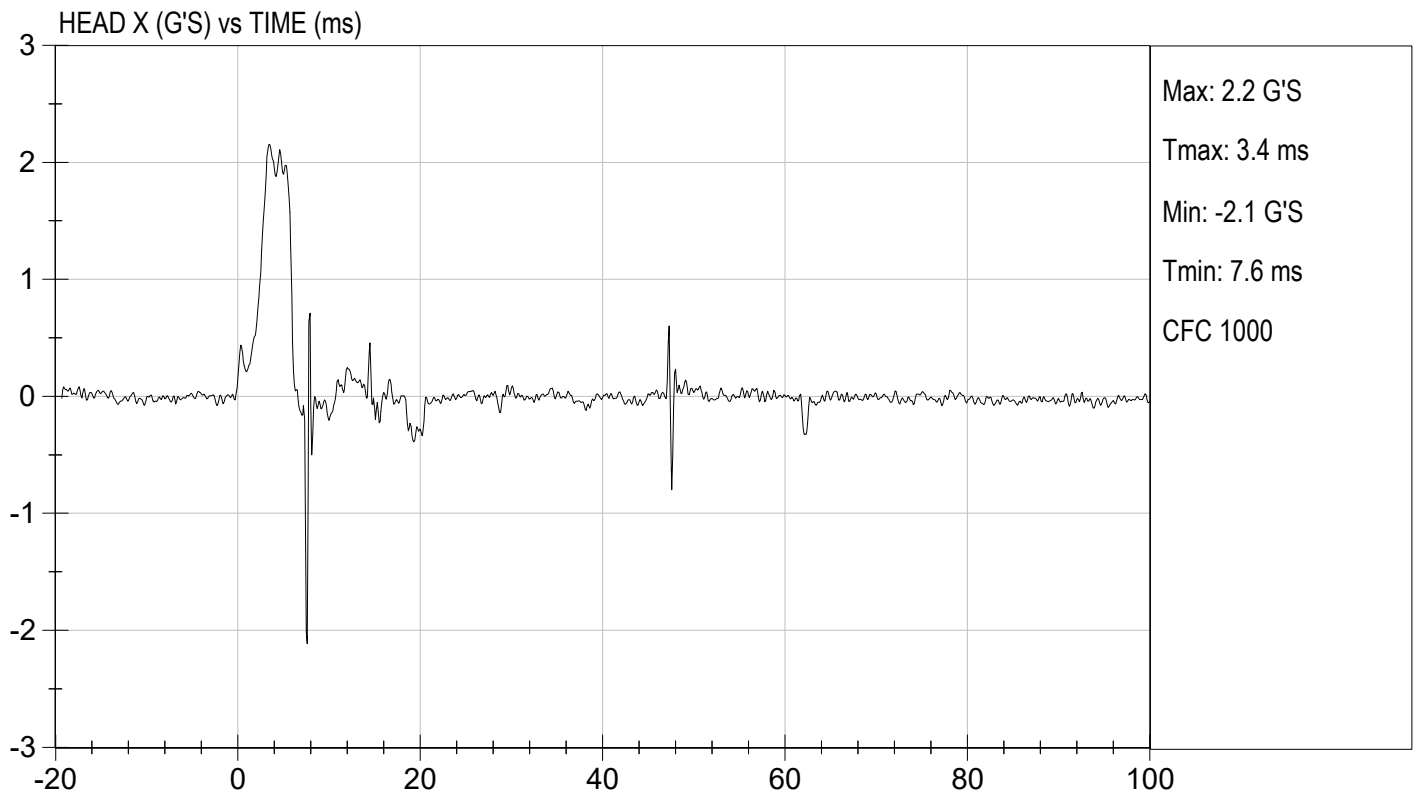
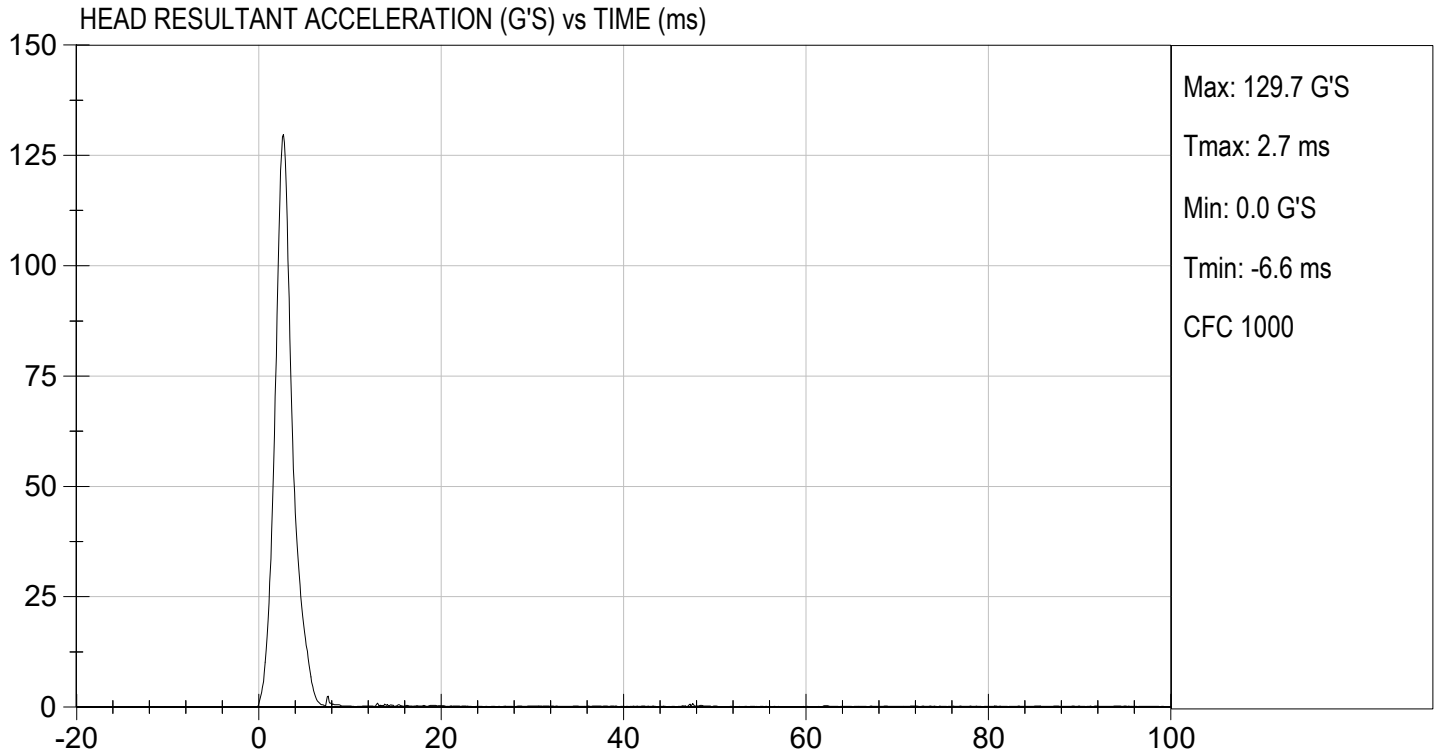
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Peak Resultant Acceleration	G's	115 to 137	130	Pass
Peak Longitudinal Acceleration	G's	+/- 15	2.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	

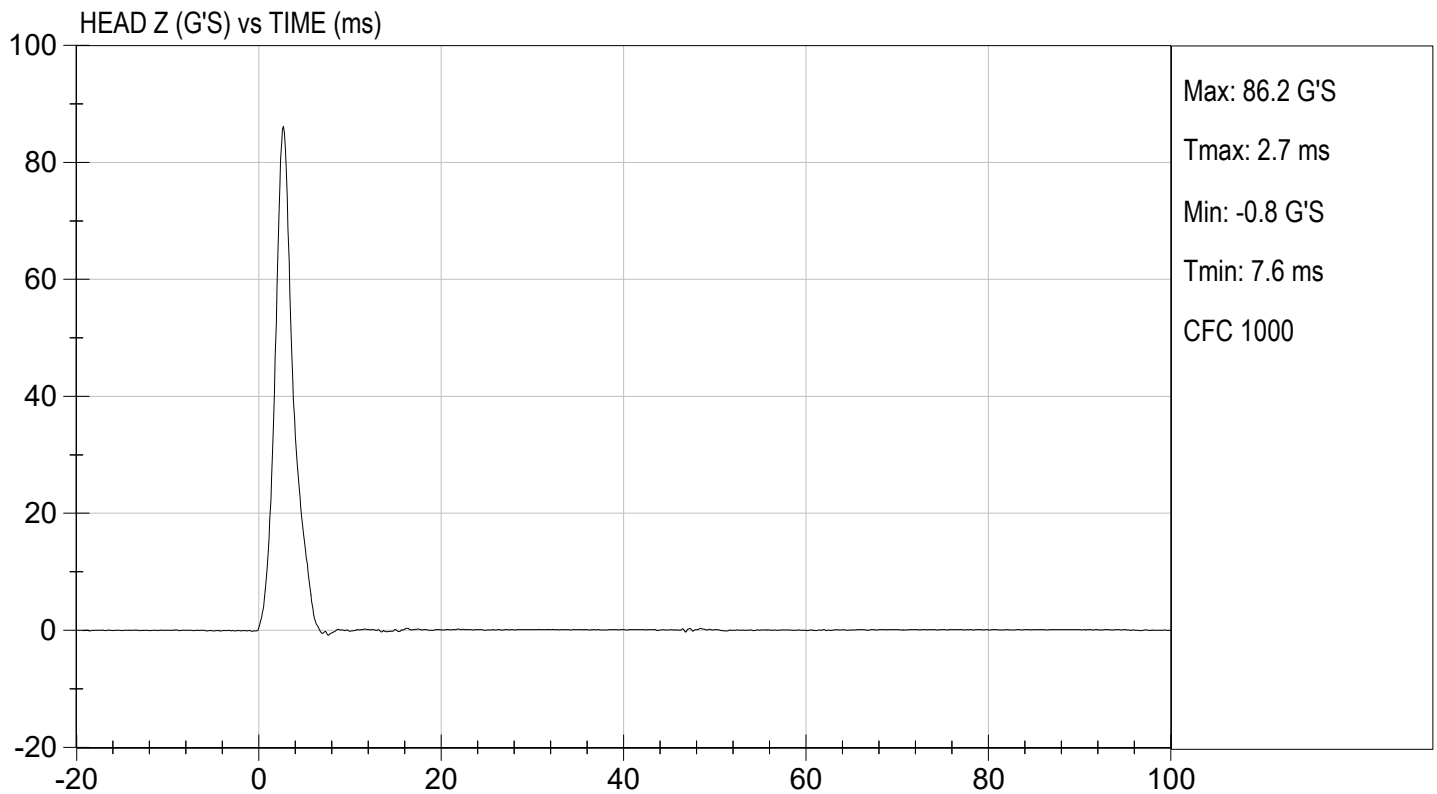
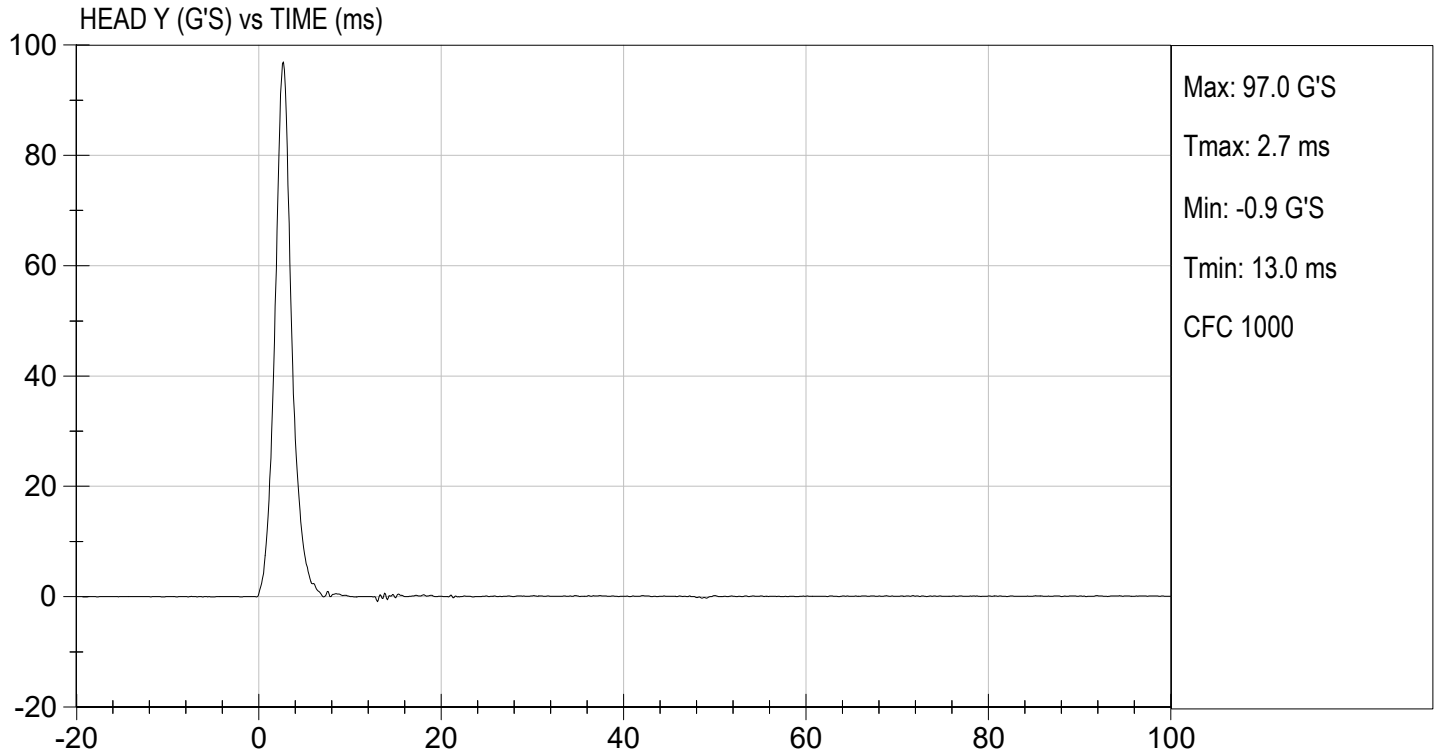

Laboratory Technician

01/24/2024

Test Date


Approved By





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

ATD Serial No: 296

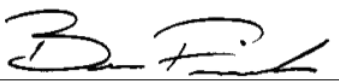
Test I.D: D240272

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	5.51 to 5.63	5.53	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.37	Pass
	15 ms	m/s	3.30 to 4.10	3.54	Pass
	20 ms	m/s	4.40 to 5.40	5.13	Pass
	25 ms	m/s	5.40 to 6.10	5.86	Pass
	25-100 ms	m/s	5.50 to 6.20	5.88	Pass
Maximum D-Plane Rotation		deg	71 to 81	74	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	64	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-38	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	119	Pass
Overall Test Results				Pass	


 Laboratory Technician

01/24/2024

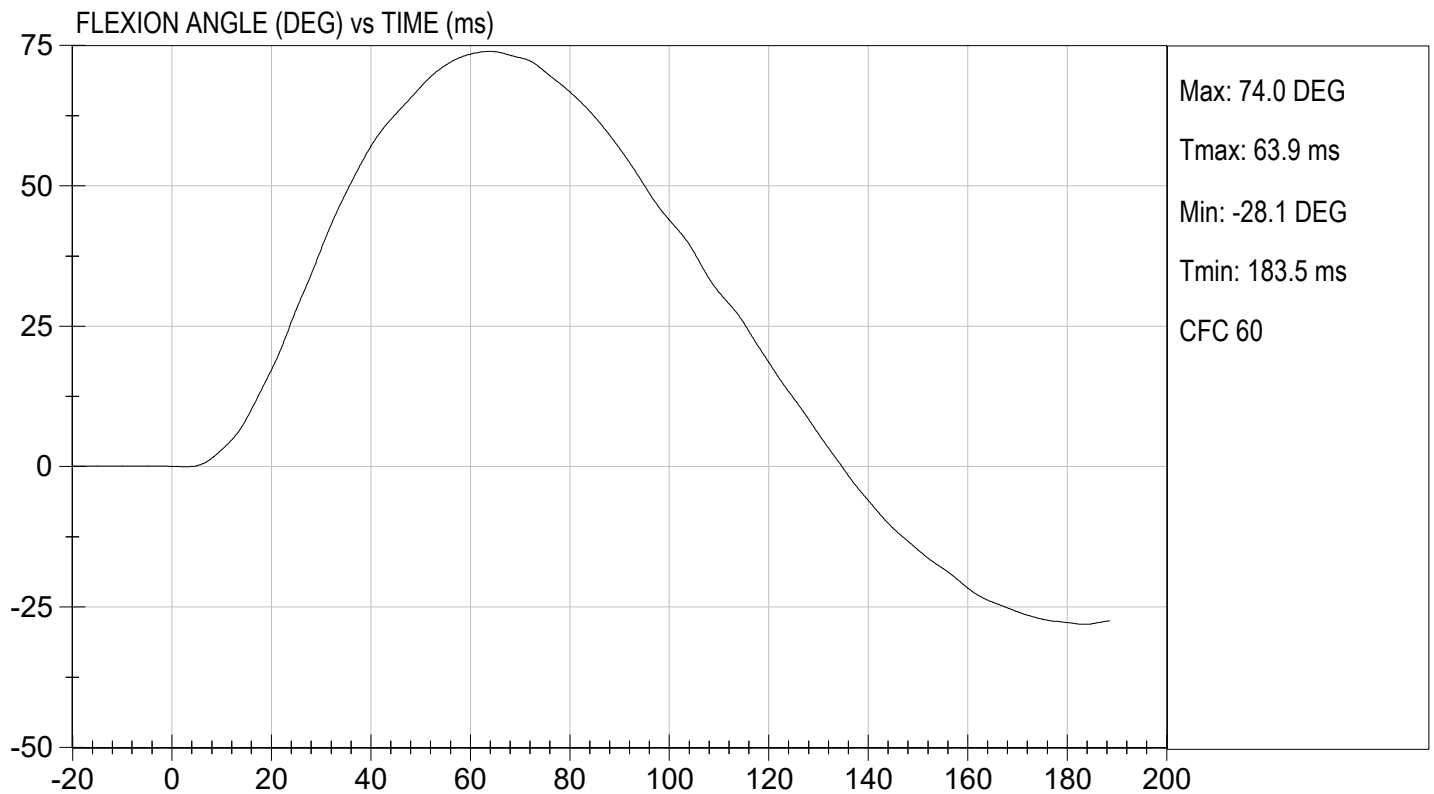
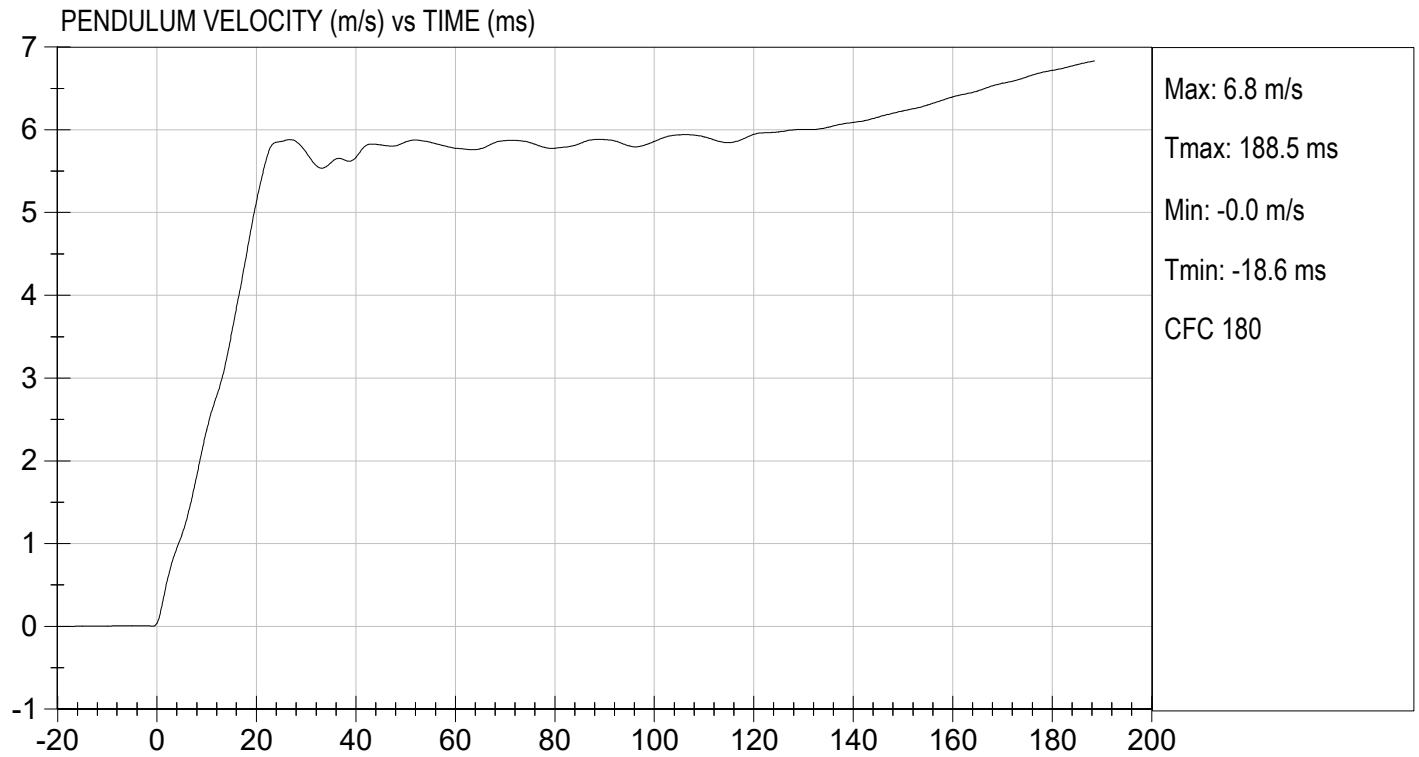
Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.15 ft/s, 5.53 m/s

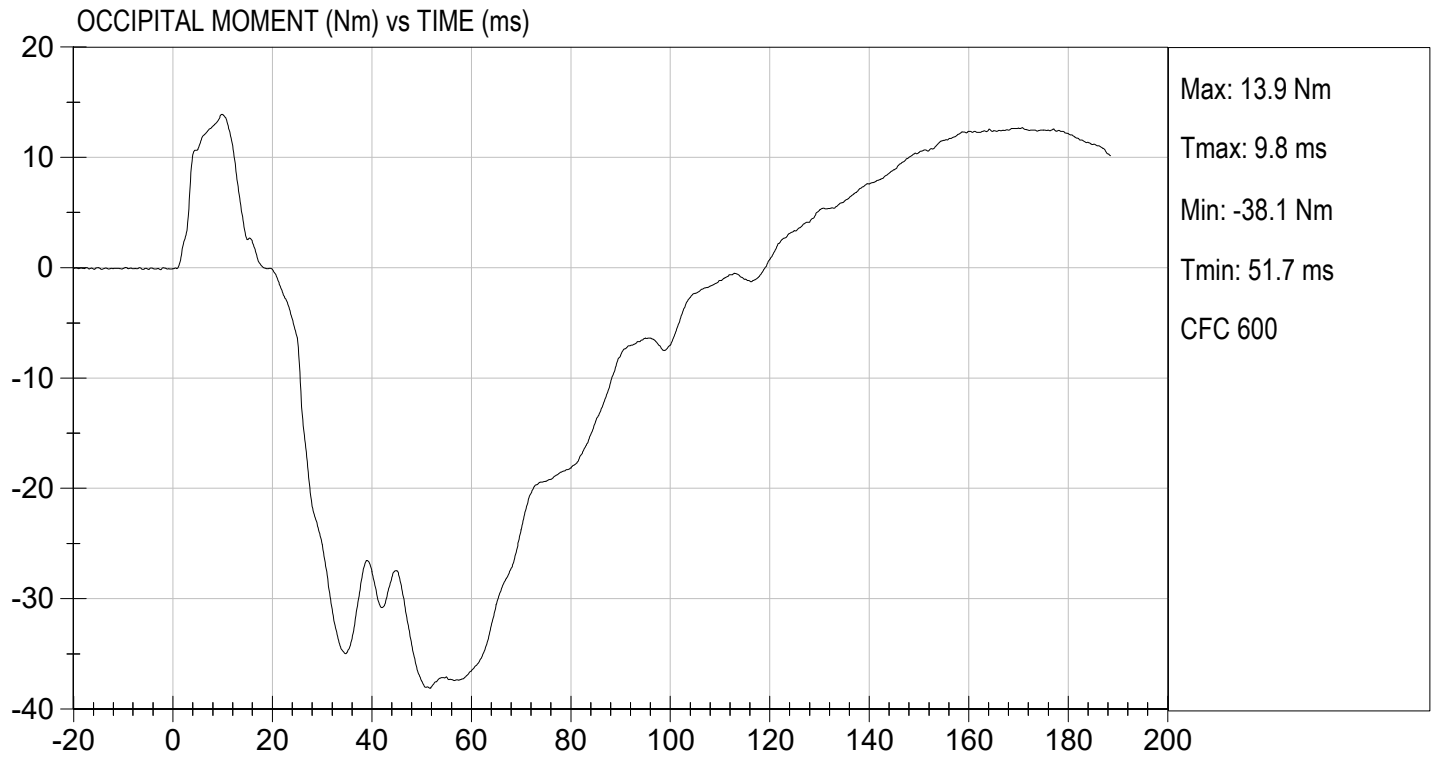
TEST DATE: 01/24/2024
TEST #: D240272





TEST DESC: NECK BENDING
VELOCITY: 18.15 ft/s, 5.53 m/s

TEST DATE: 01/24/2024
TEST #: D240272



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

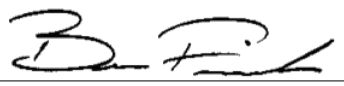
ATD Serial No: 296

Test ID: D240273

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	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	13 to 18	16	Pass
Shoulder Displacement	mm	28 to 37	30	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	20	Pass
			Overall Test Results	Pass


Laboratory Technician

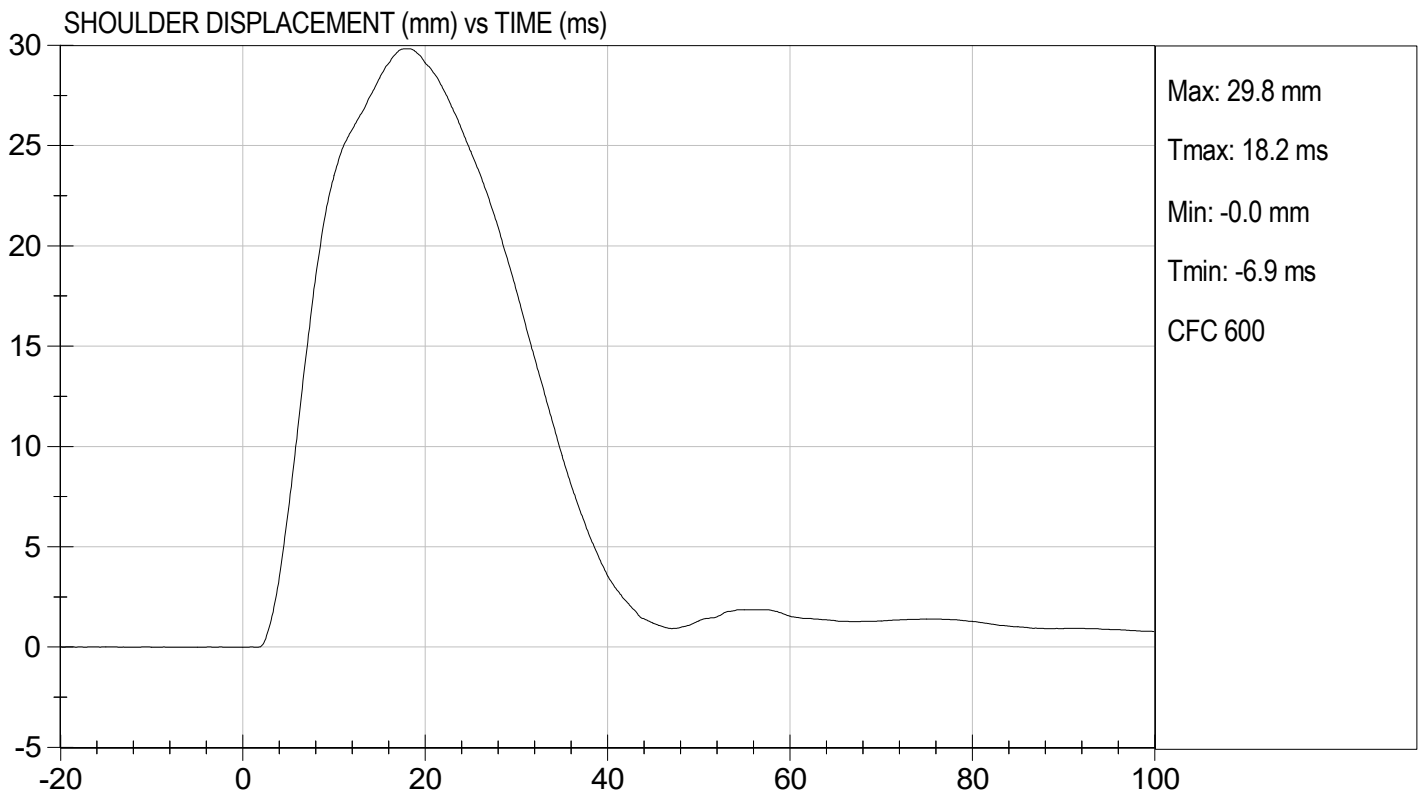
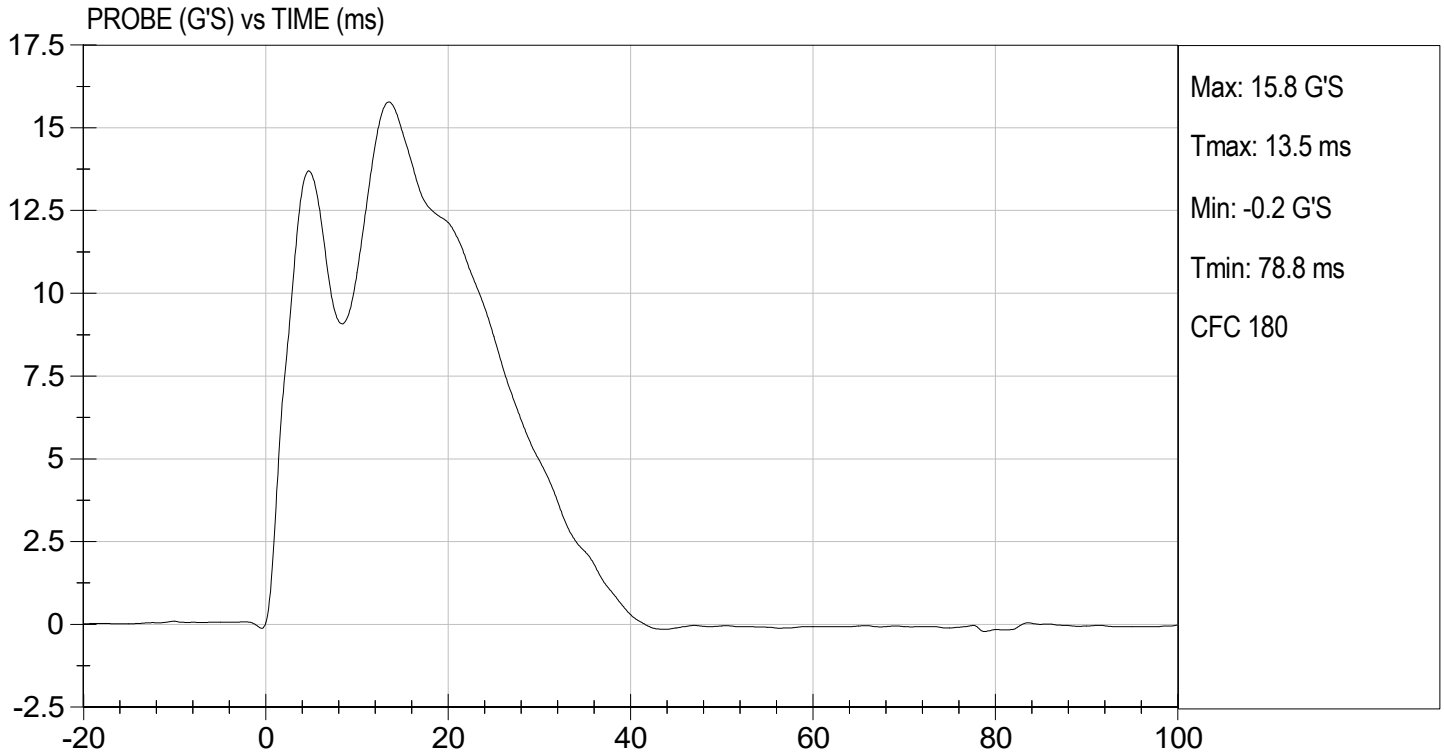
01/24/2024
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

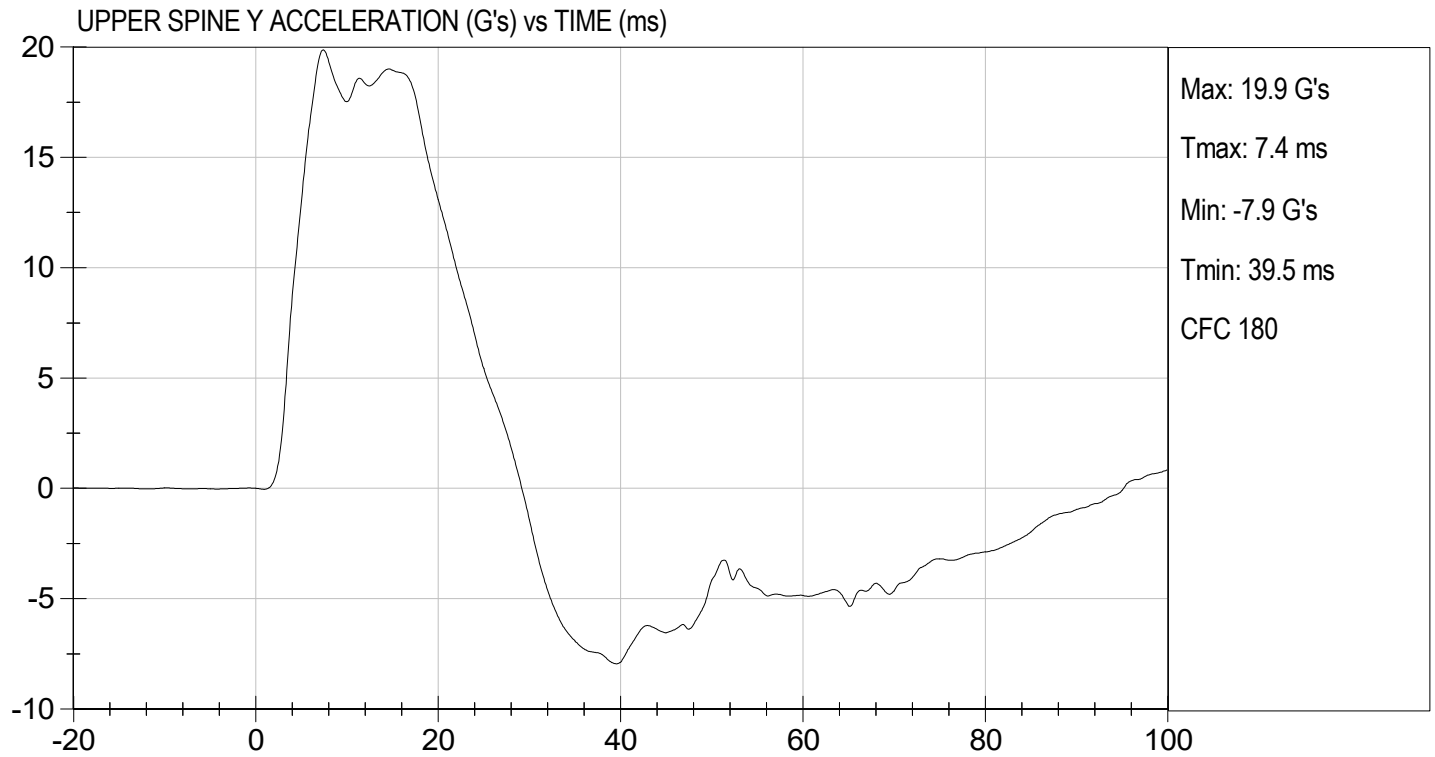
TEST DATE: 01/24/2024
TEST #: D240273





TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/24/2024
TEST #: D240273



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

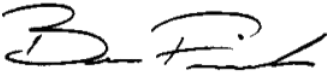
ATD Serial No: 296

Test I.D: D240274

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	33	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	37	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	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	36	Pass
			Overall Test Results	Pass


Laboratory Technician

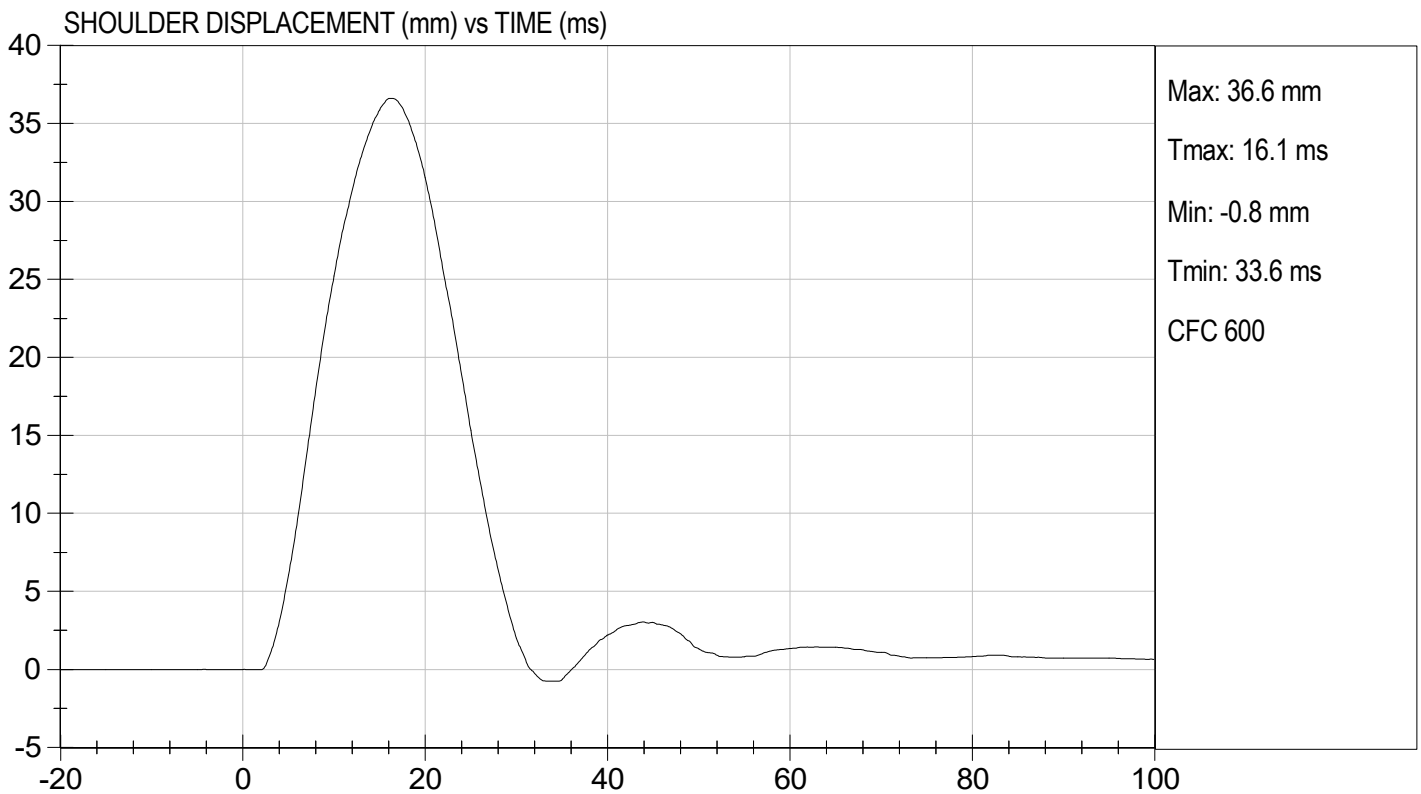
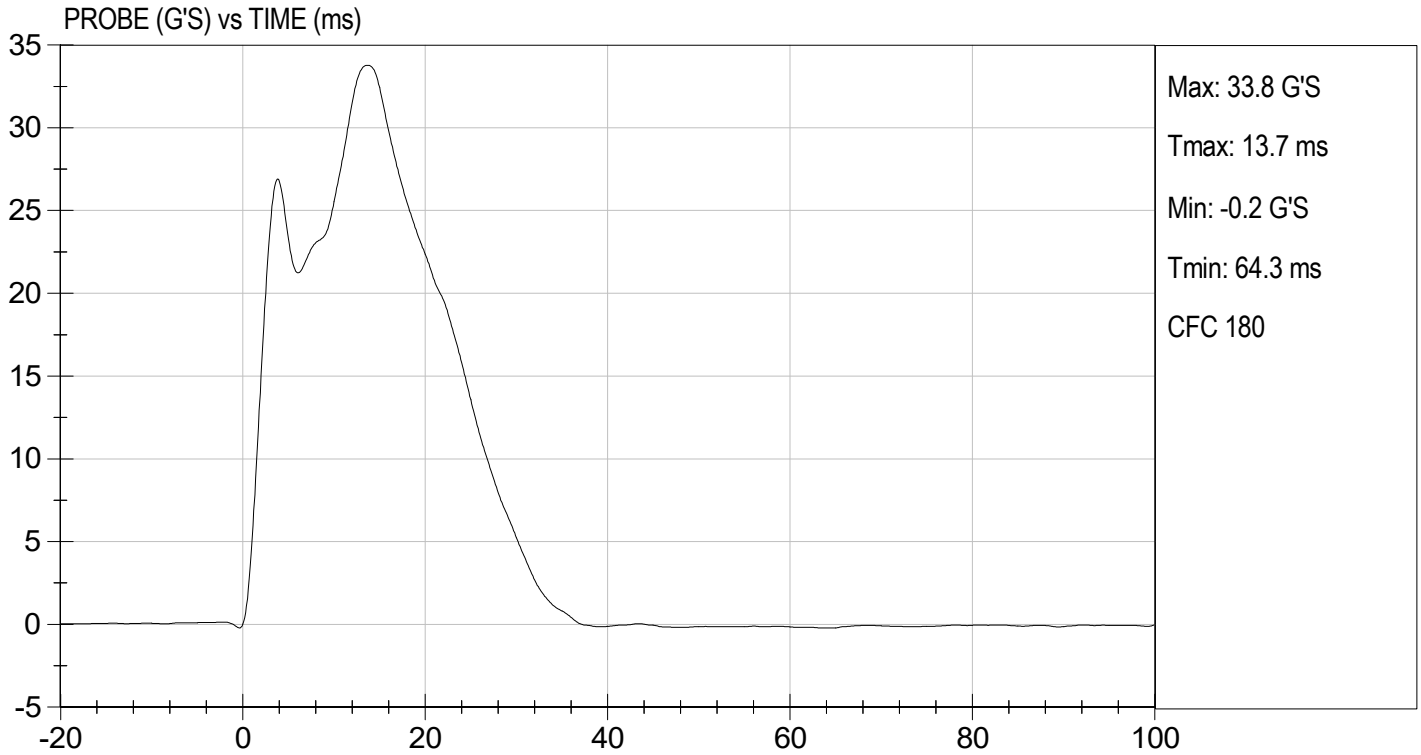
01/24/2024
Test Date


Approved By



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

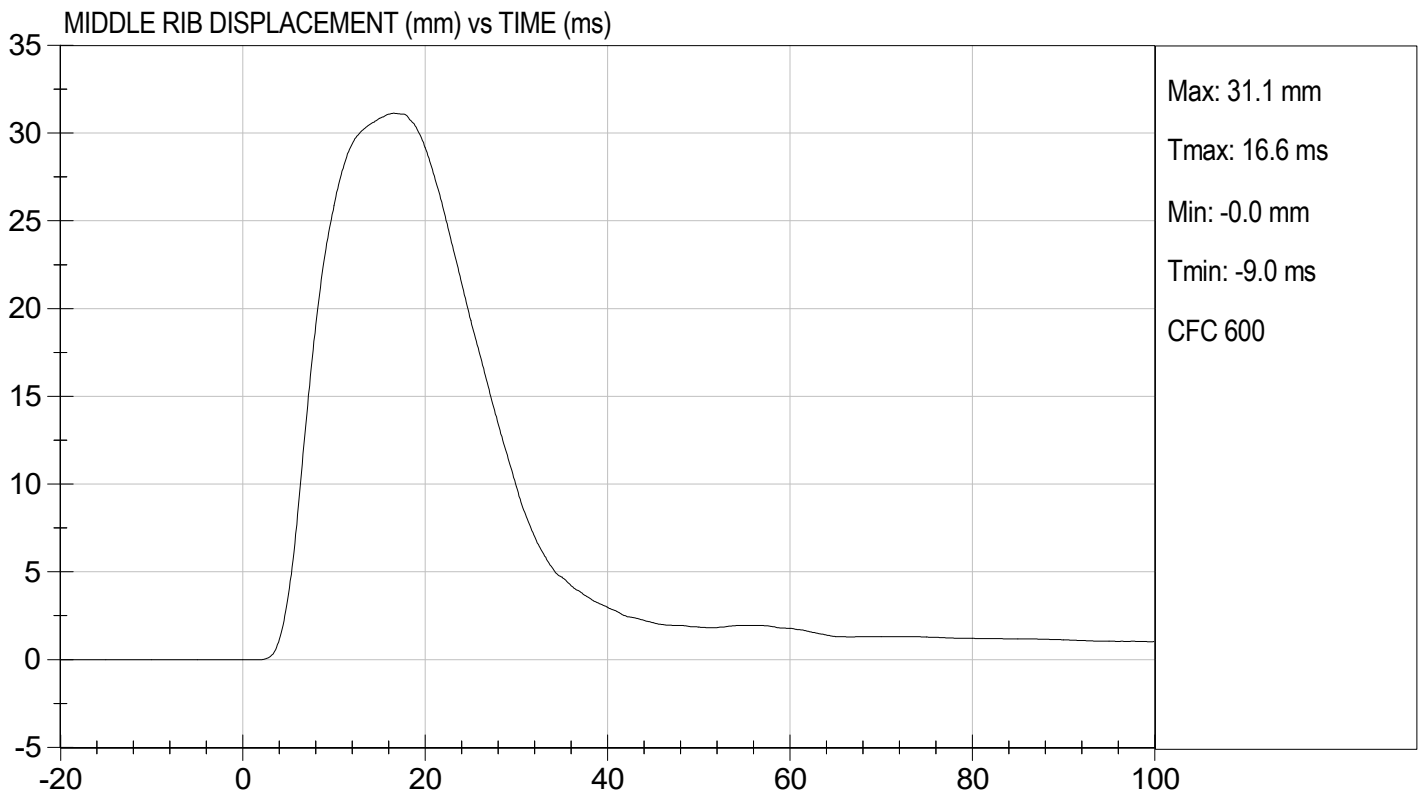
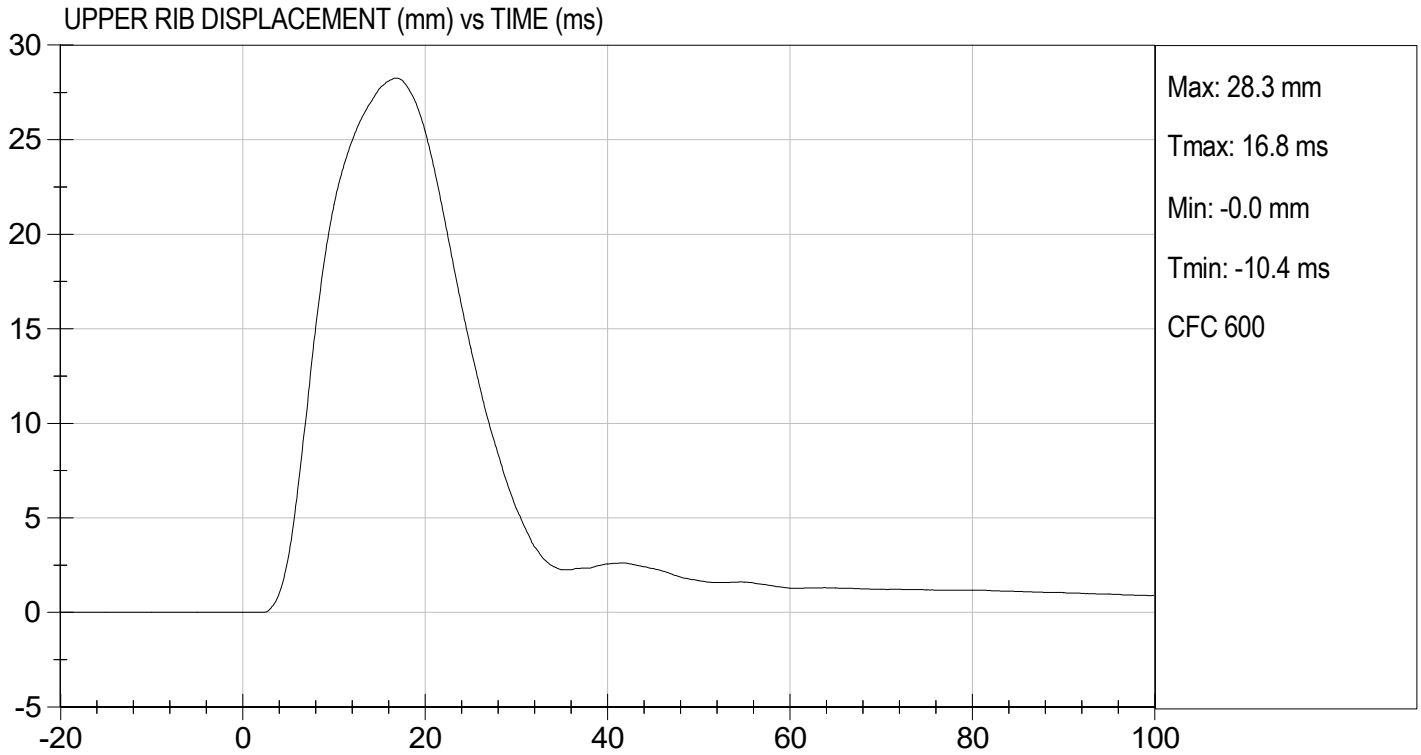
TEST DATE: 01/24/2024
TEST #: D240274





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

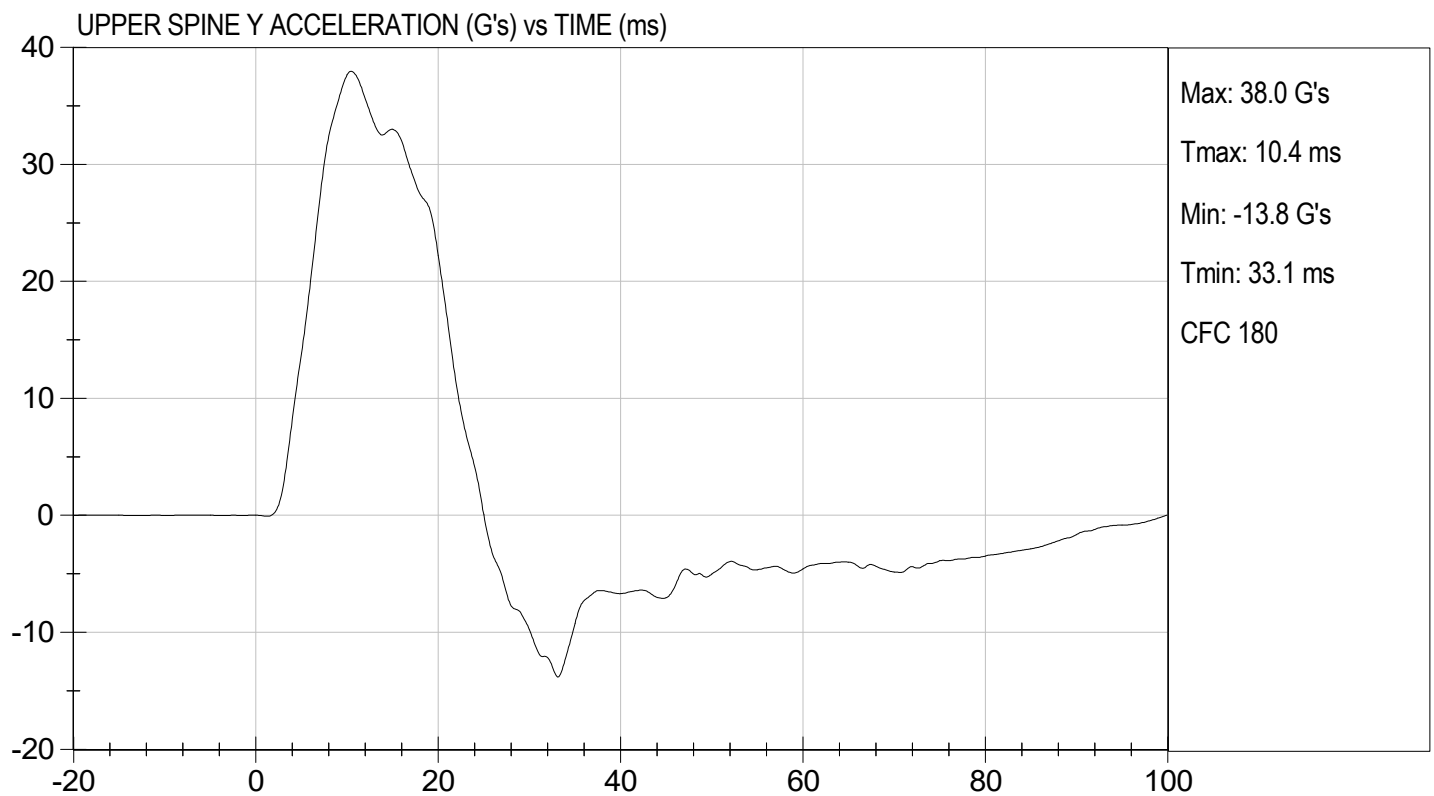
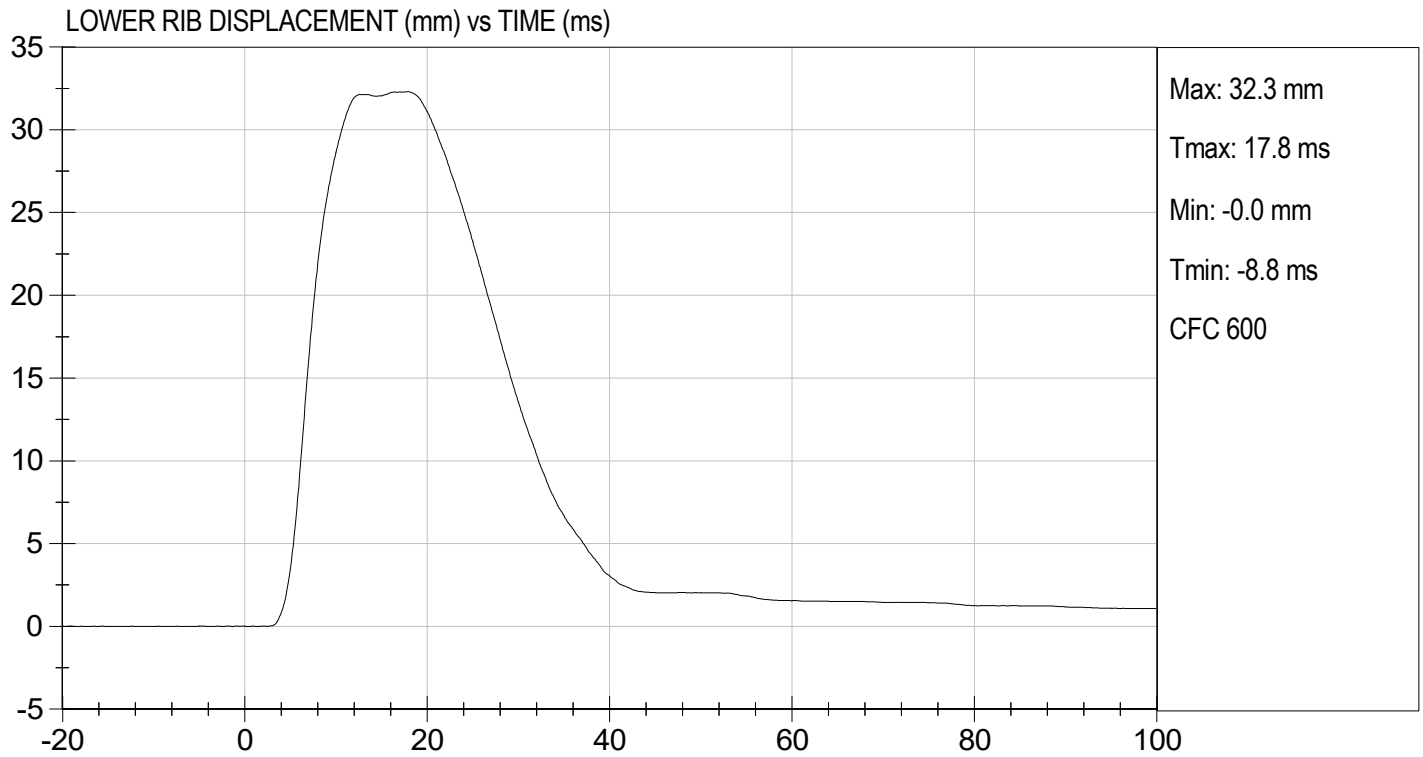
TEST DATE: 01/24/2024
TEST #: D240274





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

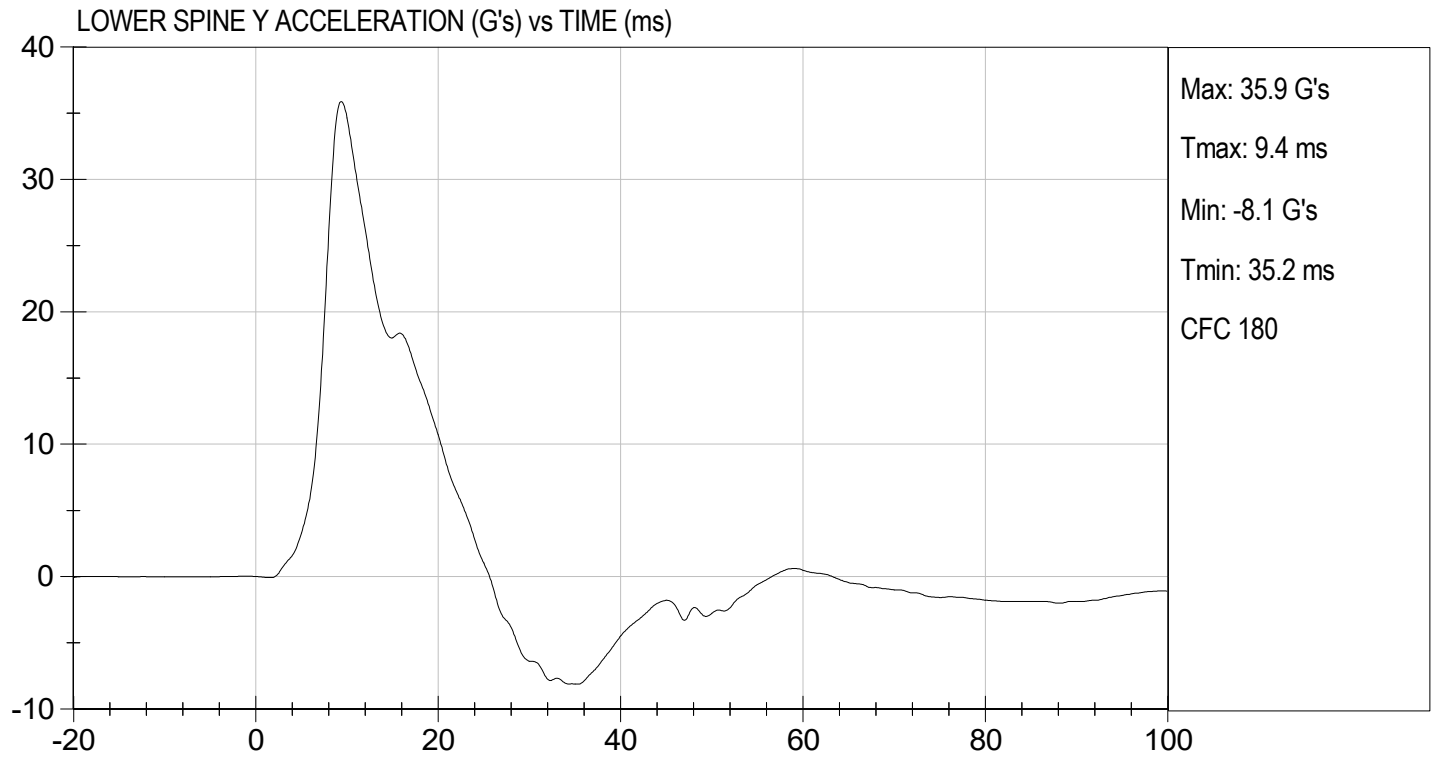
TEST DATE: 01/24/2024
TEST #: D240274





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

TEST DATE: 01/24/2024
TEST #: D240274



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

ATD Serial No: 296

Test I.D: D240275

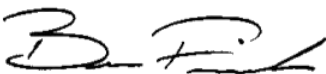
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
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

01/24/2024

Test Date

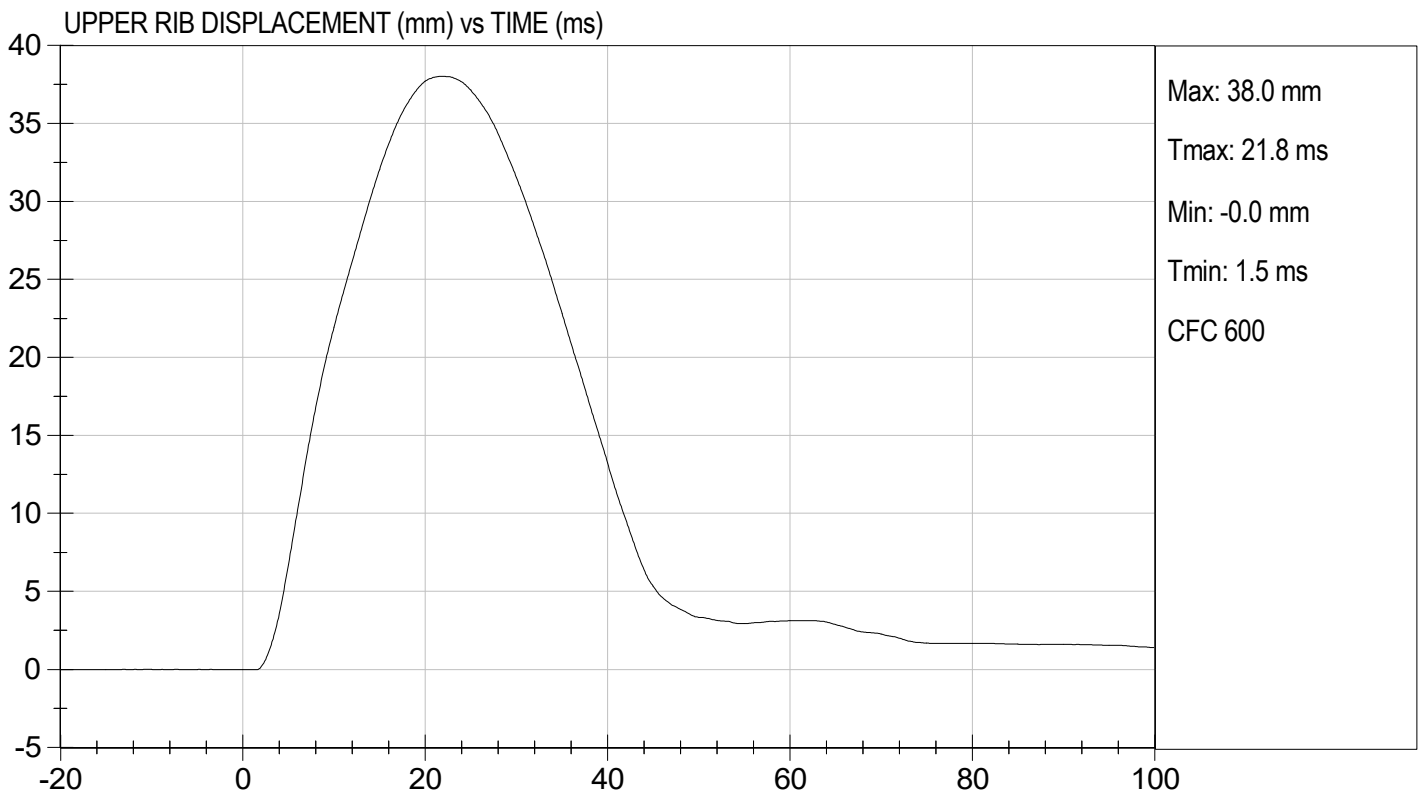
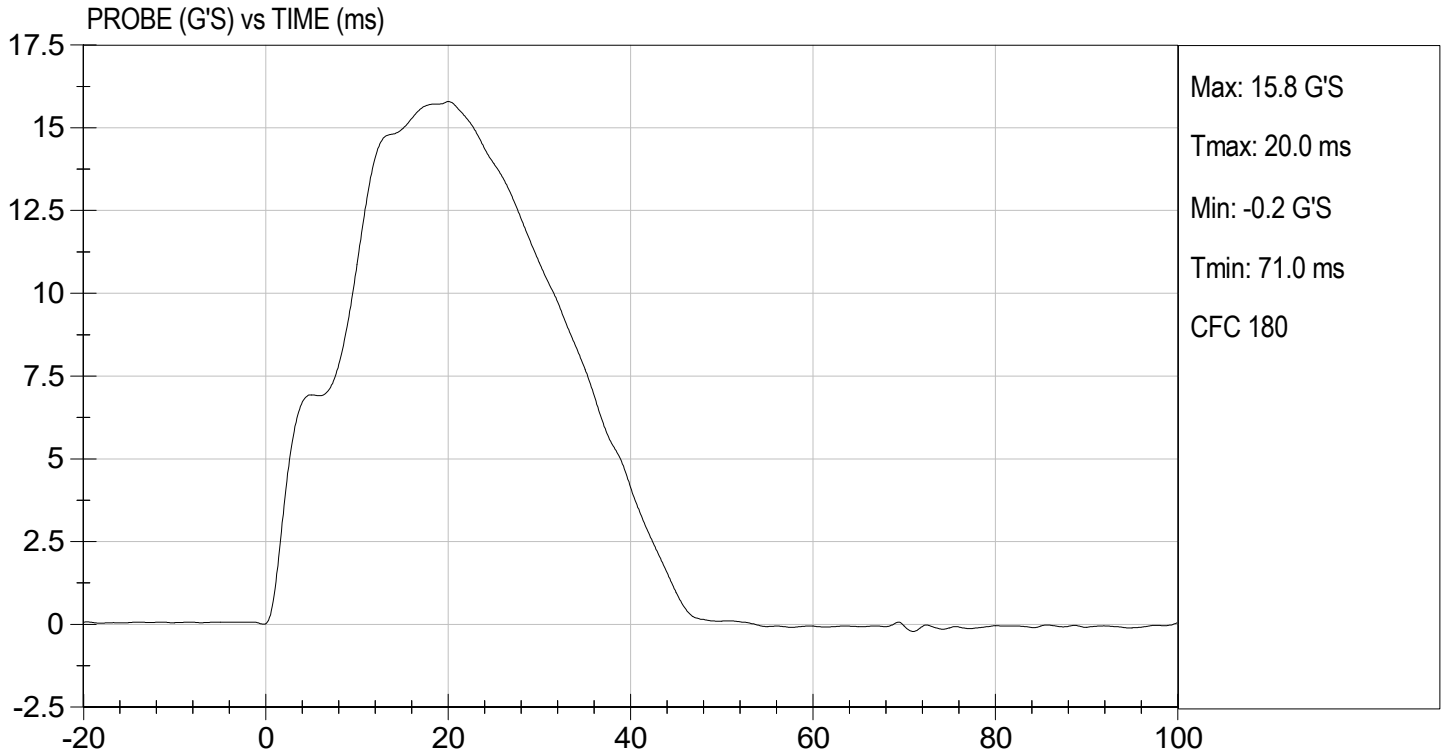


Approved By



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

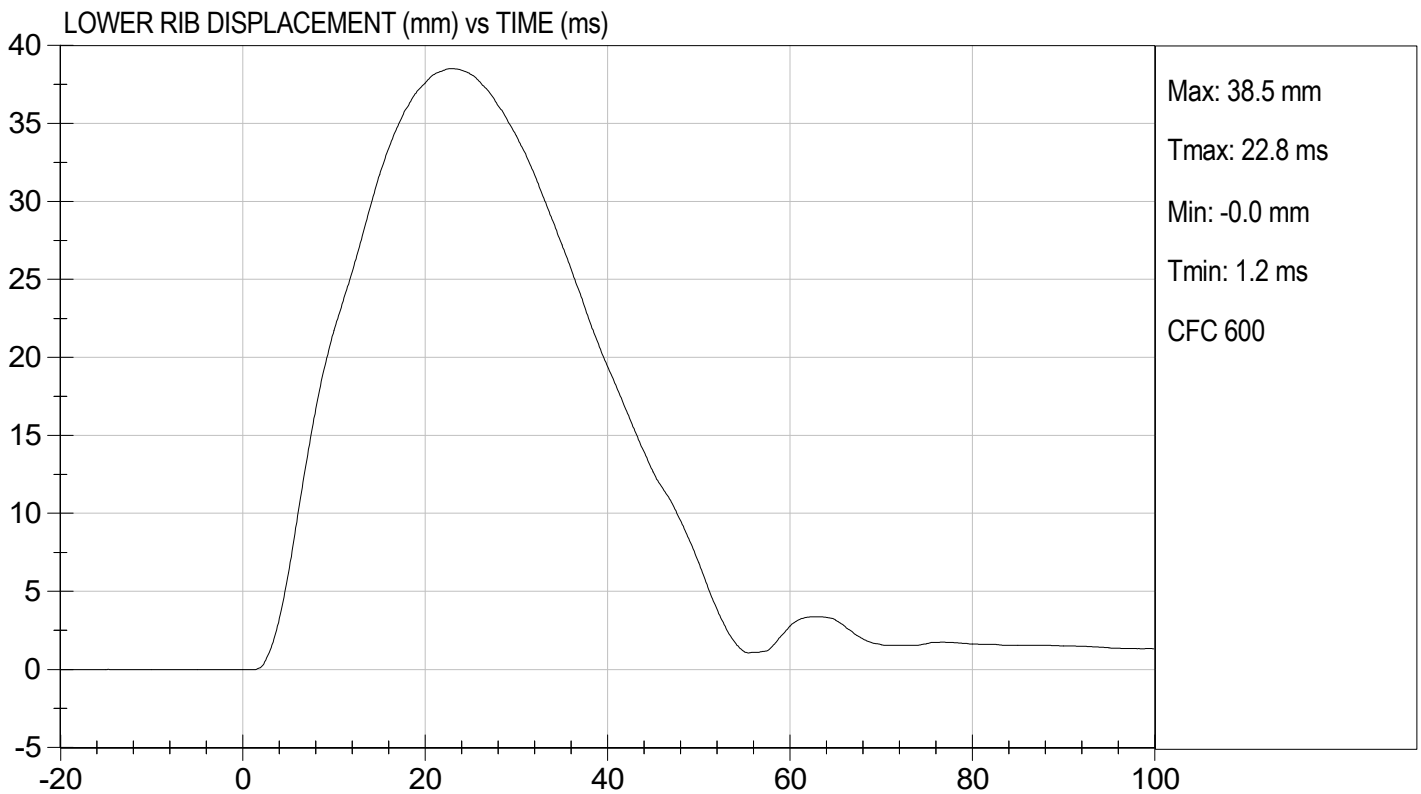
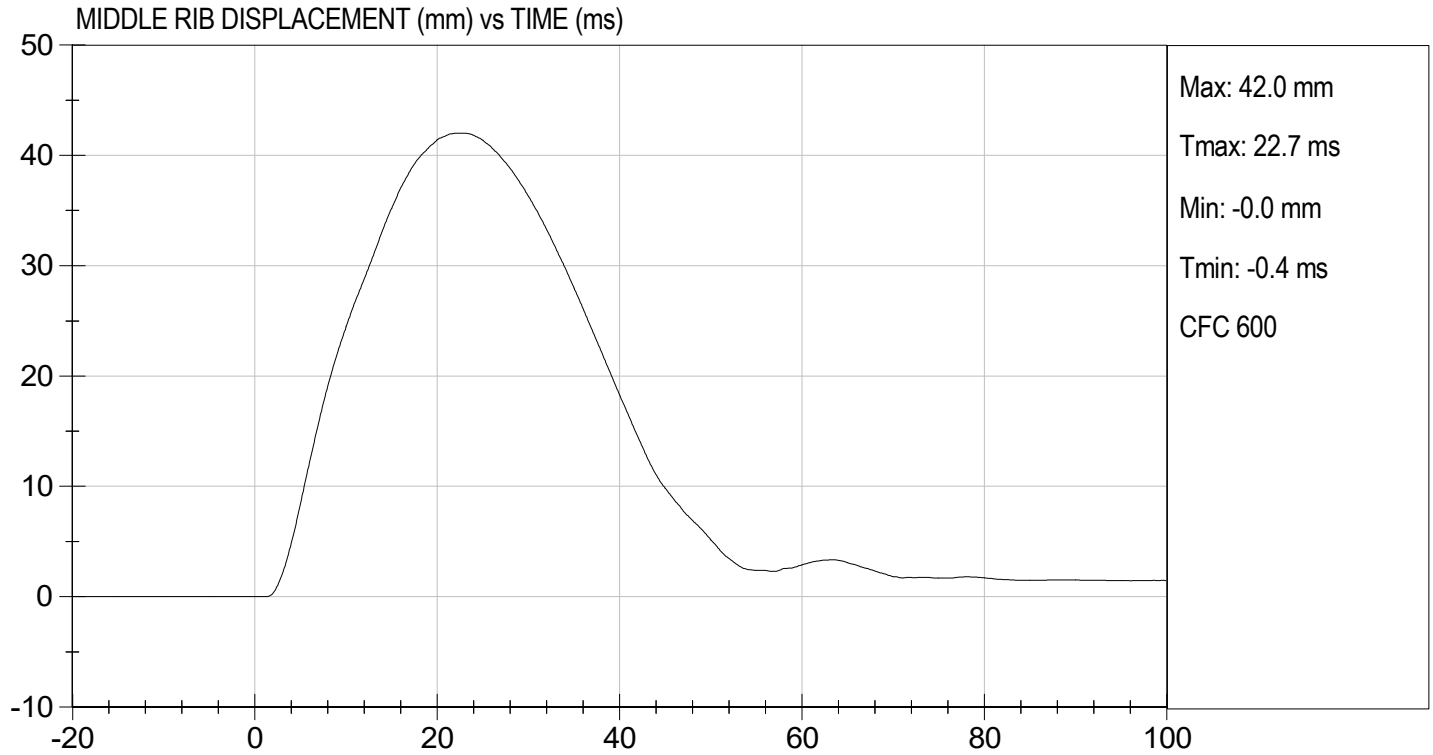
TEST DATE: 01/24/2024
TEST #: D240275





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

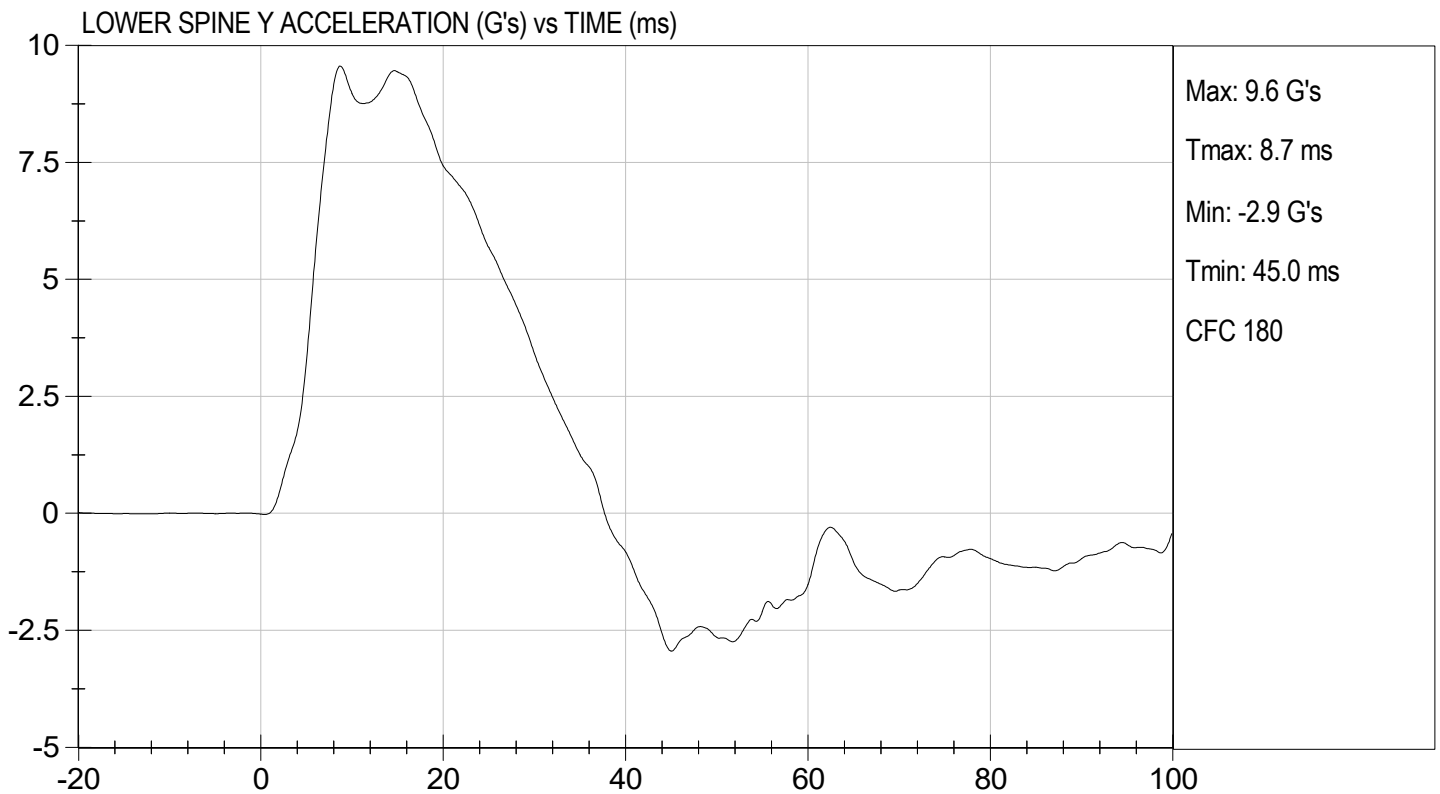
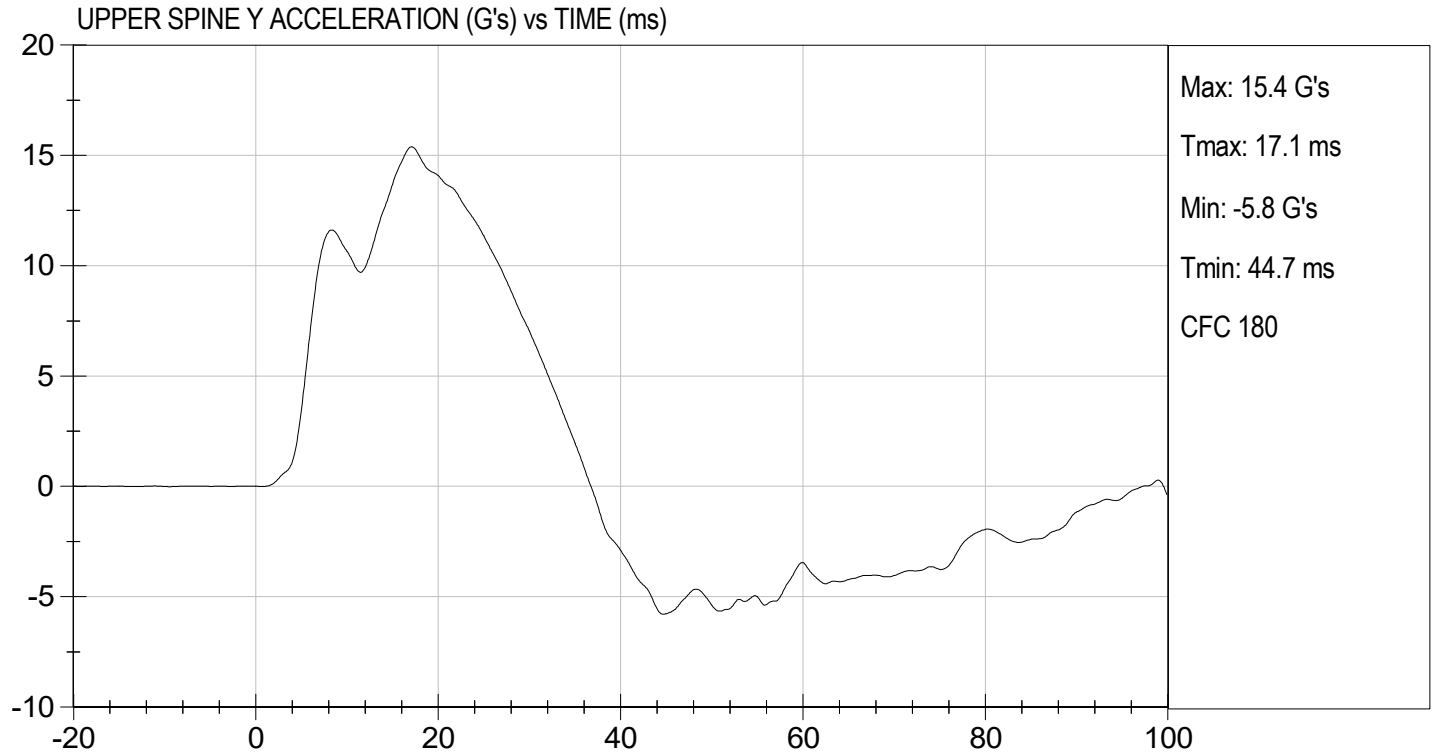
TEST DATE: 01/24/2024
TEST #: D240275





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

TEST DATE: 01/24/2024
TEST #: D240275



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

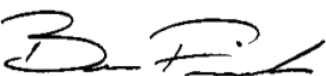
Test I.D: D240276

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	34	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
Overall Test Results				Pass


Laboratory Technician

01/24/2024

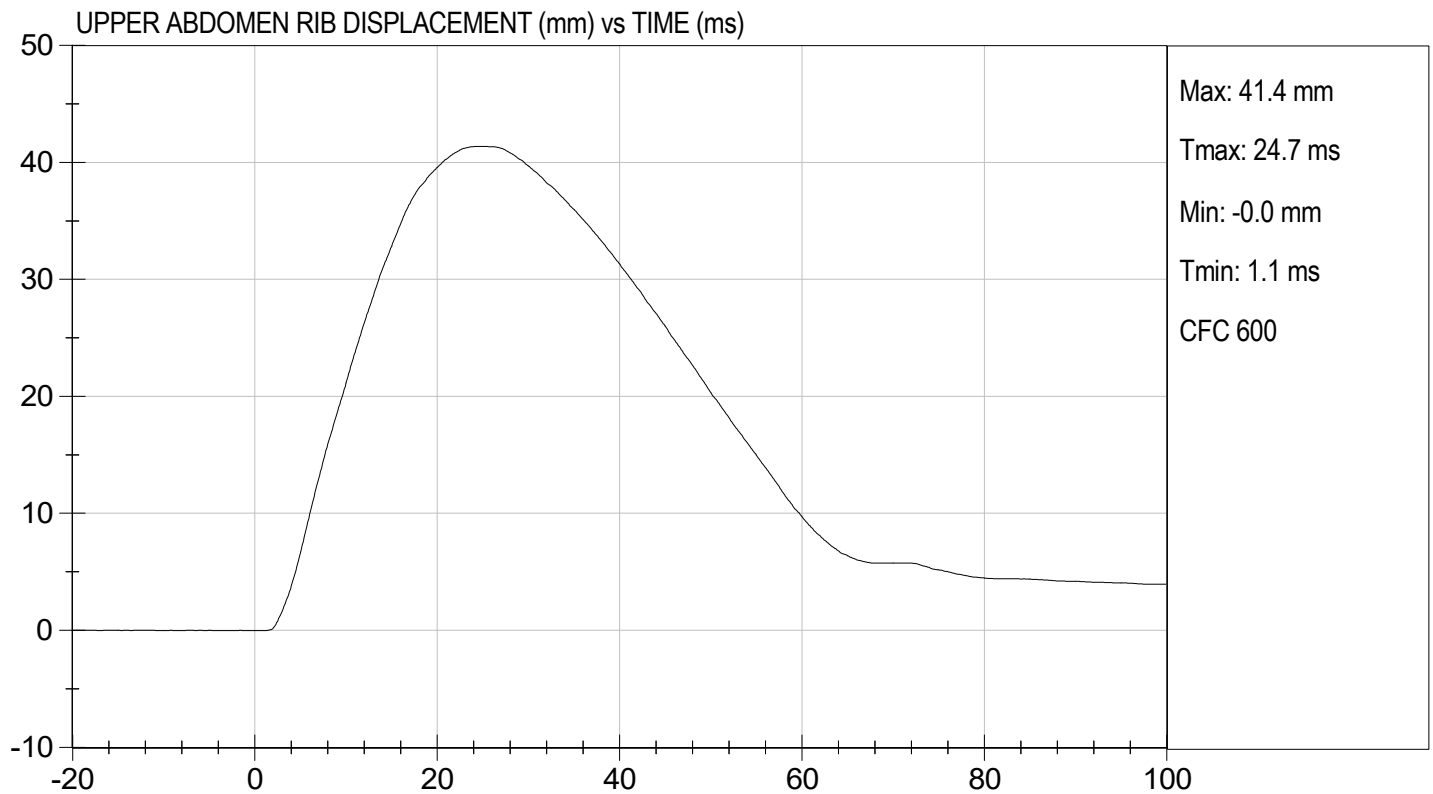
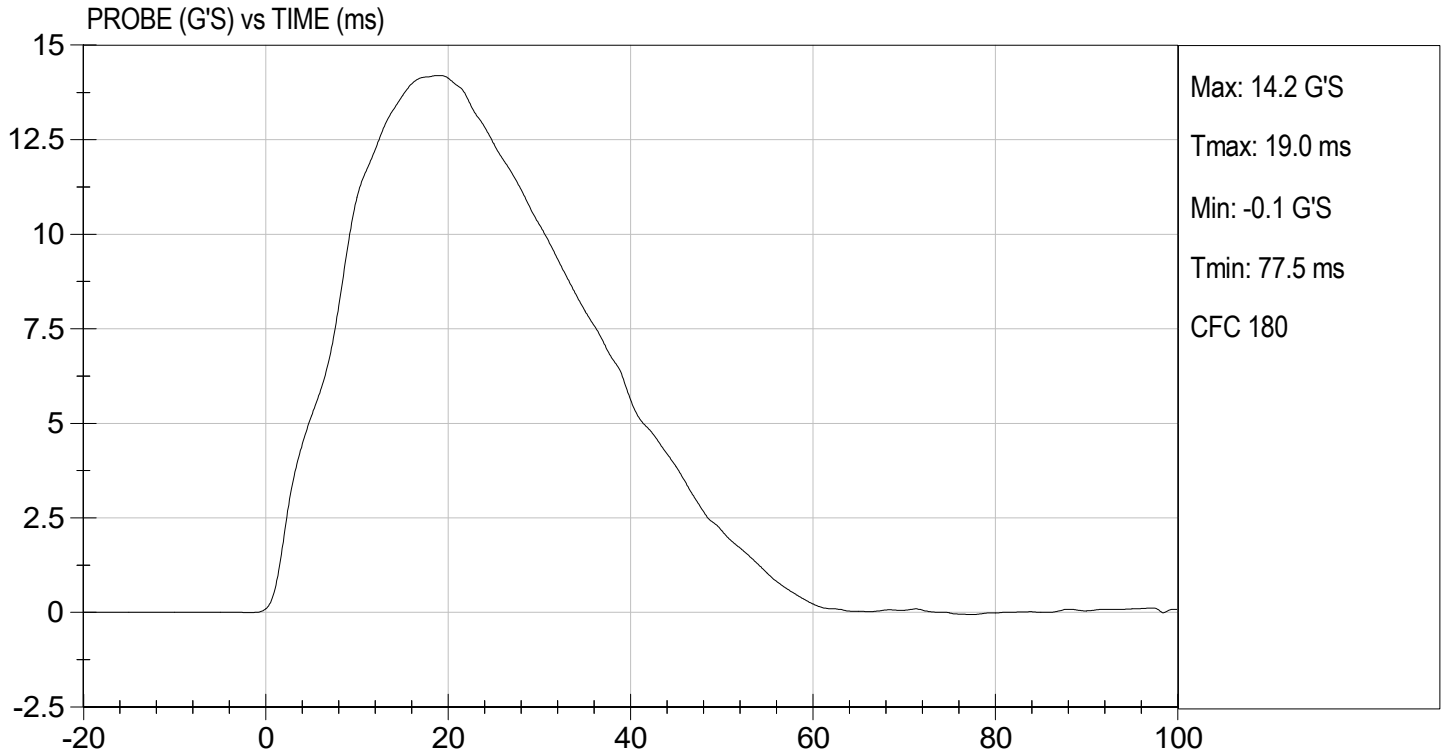
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.24 ft/s, 4.34 m/s

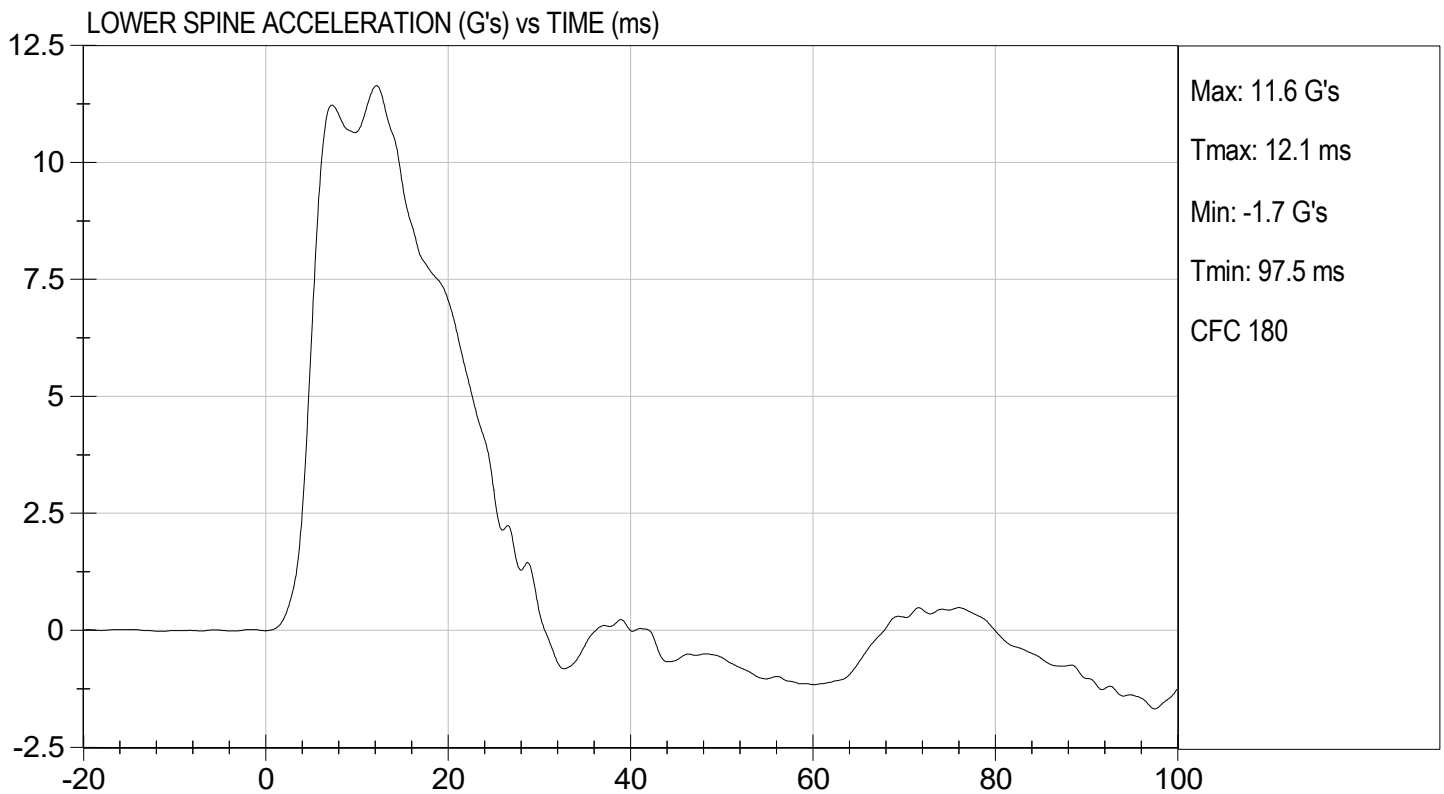
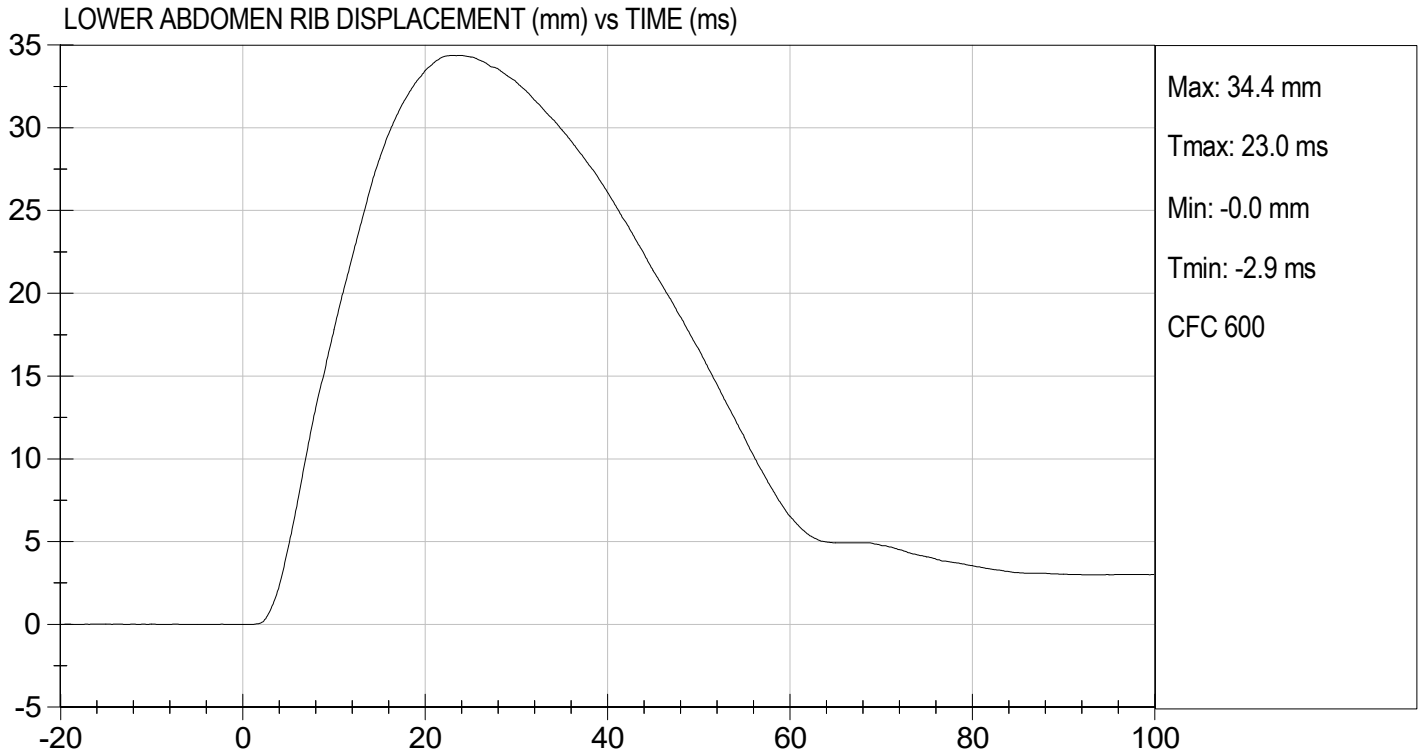
TEST DATE: 01/24/2024
TEST #: D240276





TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.24 ft/s, 4.34 m/s

TEST DATE: 01/24/2024
TEST #: D240276



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

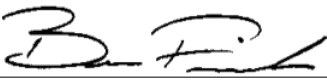
Test I.D: D240277

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	41.0	Pass
Peak Acetabulum Force	N	3600 to 4300	4,094	Pass
Overall Test Results				Pass


Laboratory Technician

01/24/2024

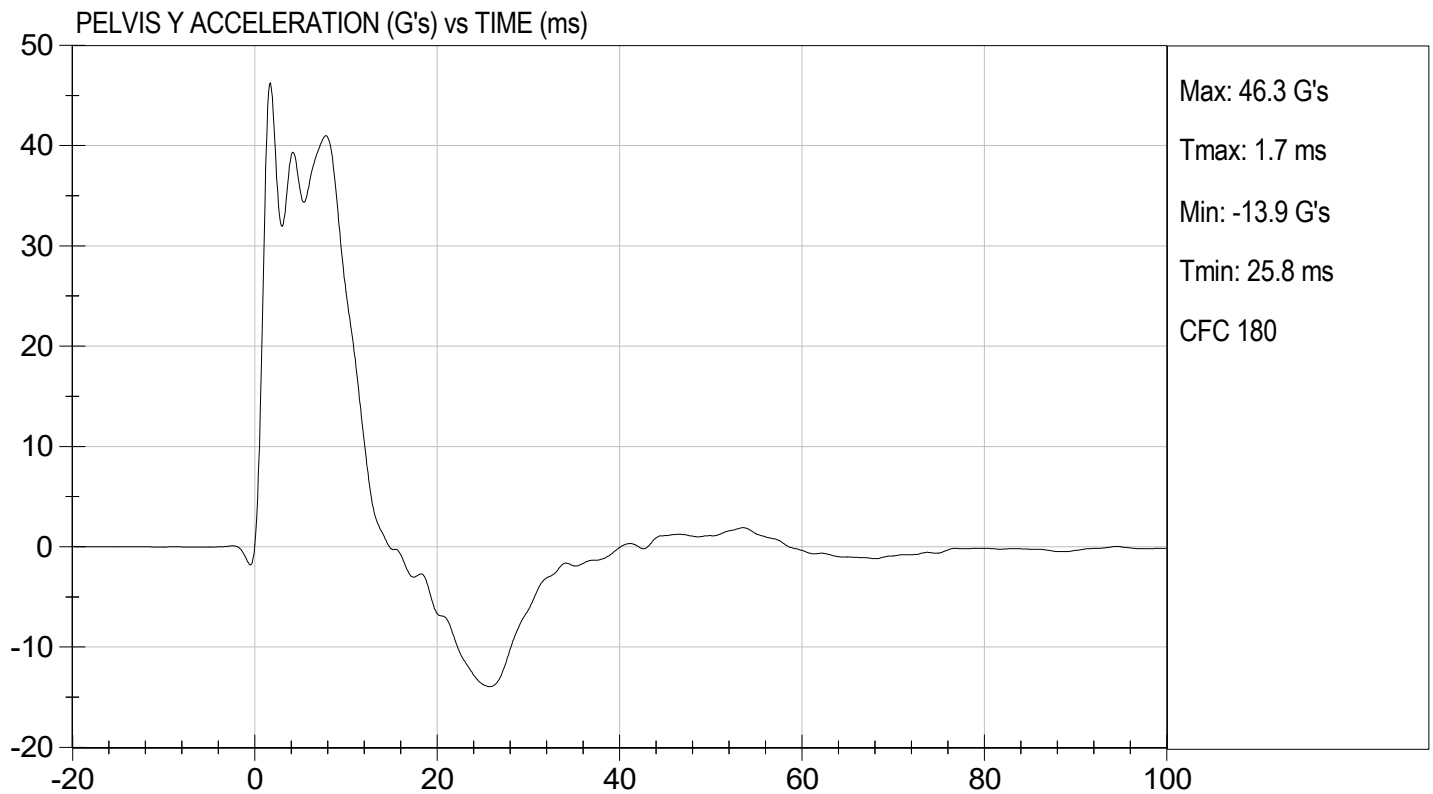
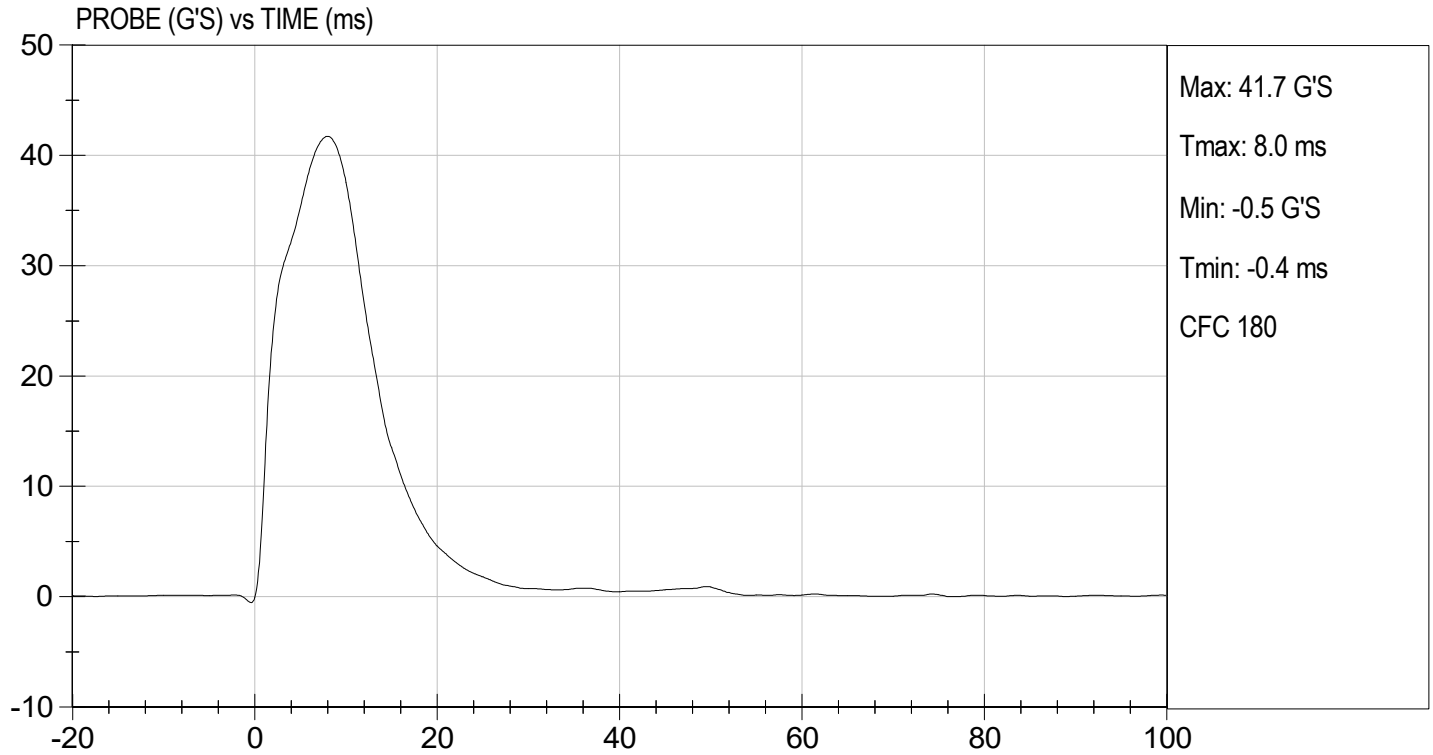
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

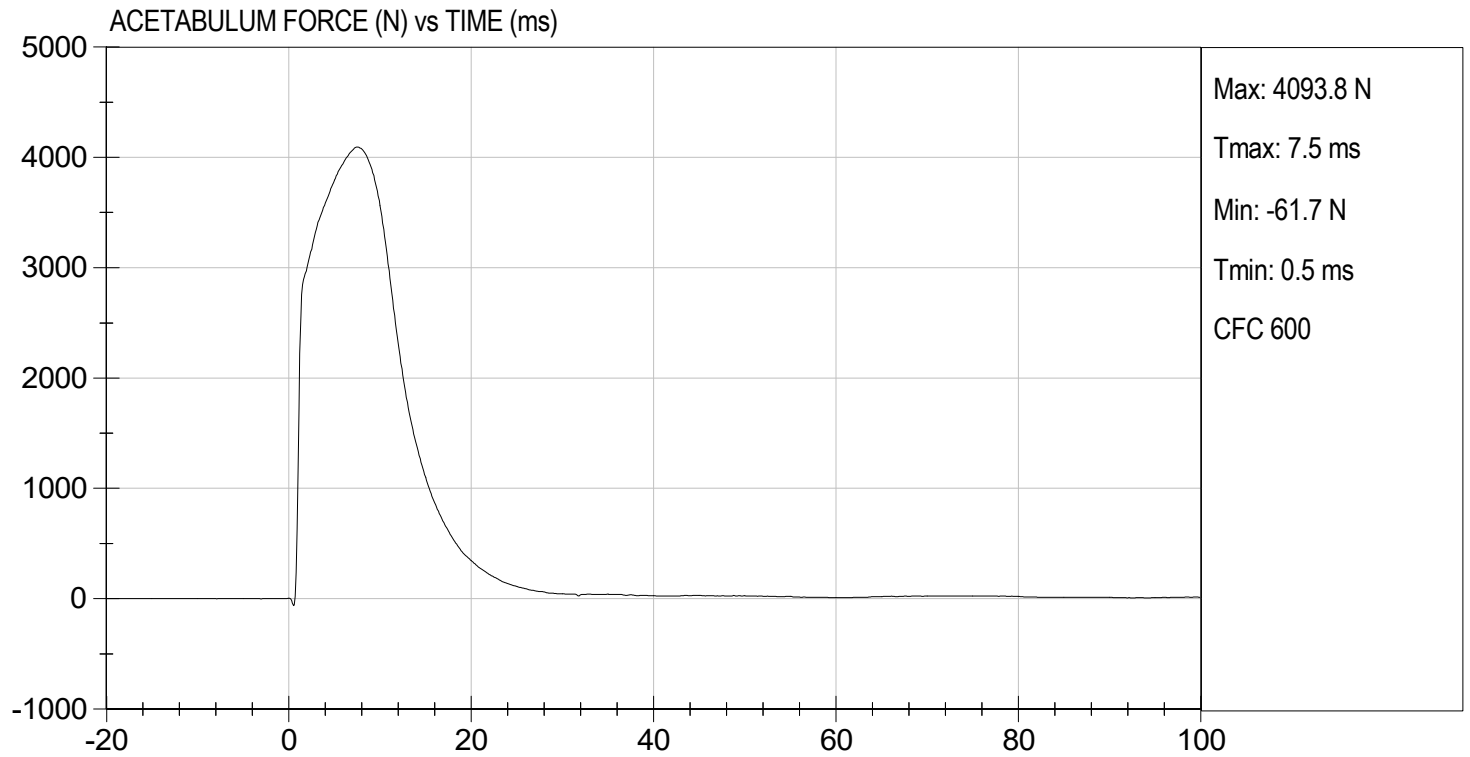
TEST DATE: 01/24/2024
TEST #: D240277





TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 01/24/2024
TEST #: D240277



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

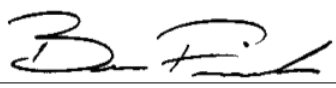
Test I.D: D240278

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	32	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,785	Pass
Overall Test Results				Pass


Laboratory Technician

01/24/2024

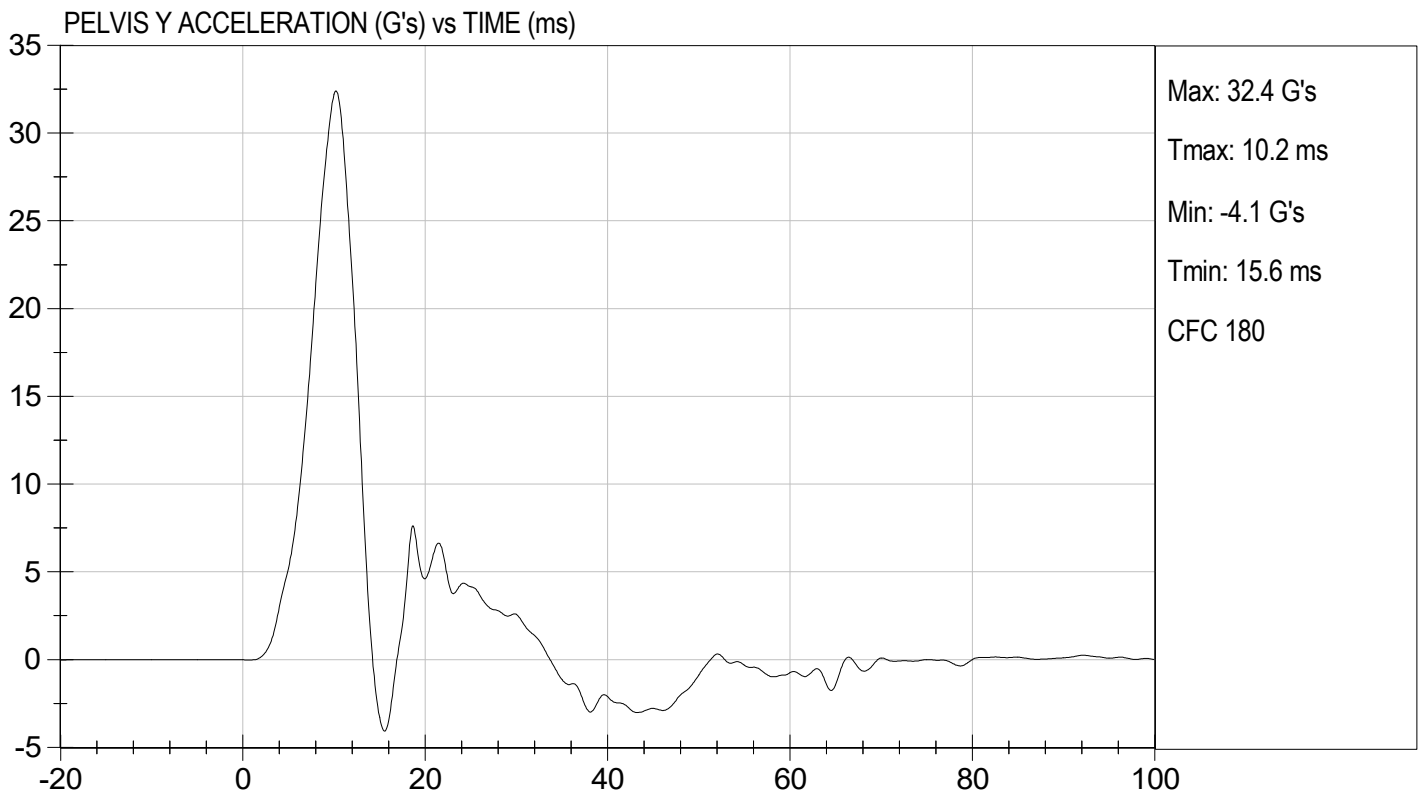
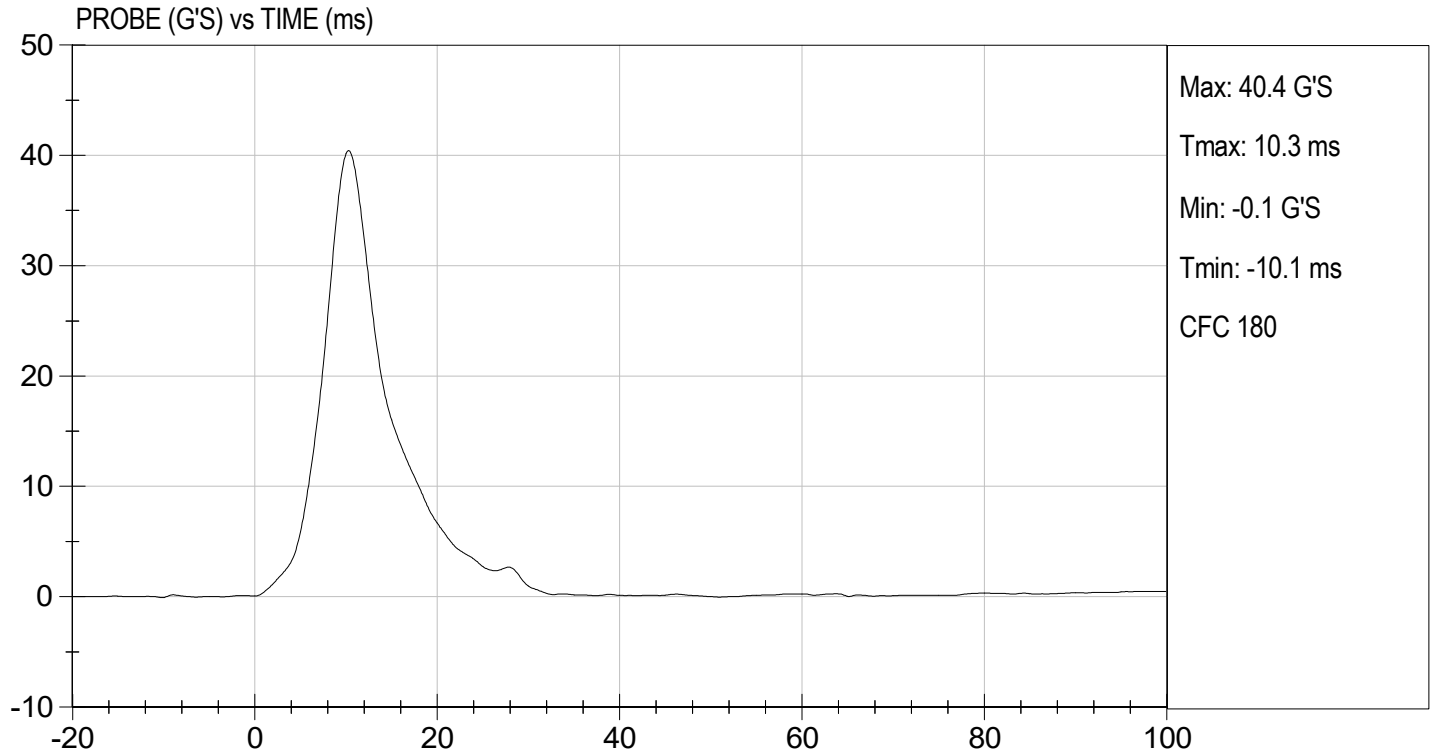
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.25 ft/s, 4.34 m/s

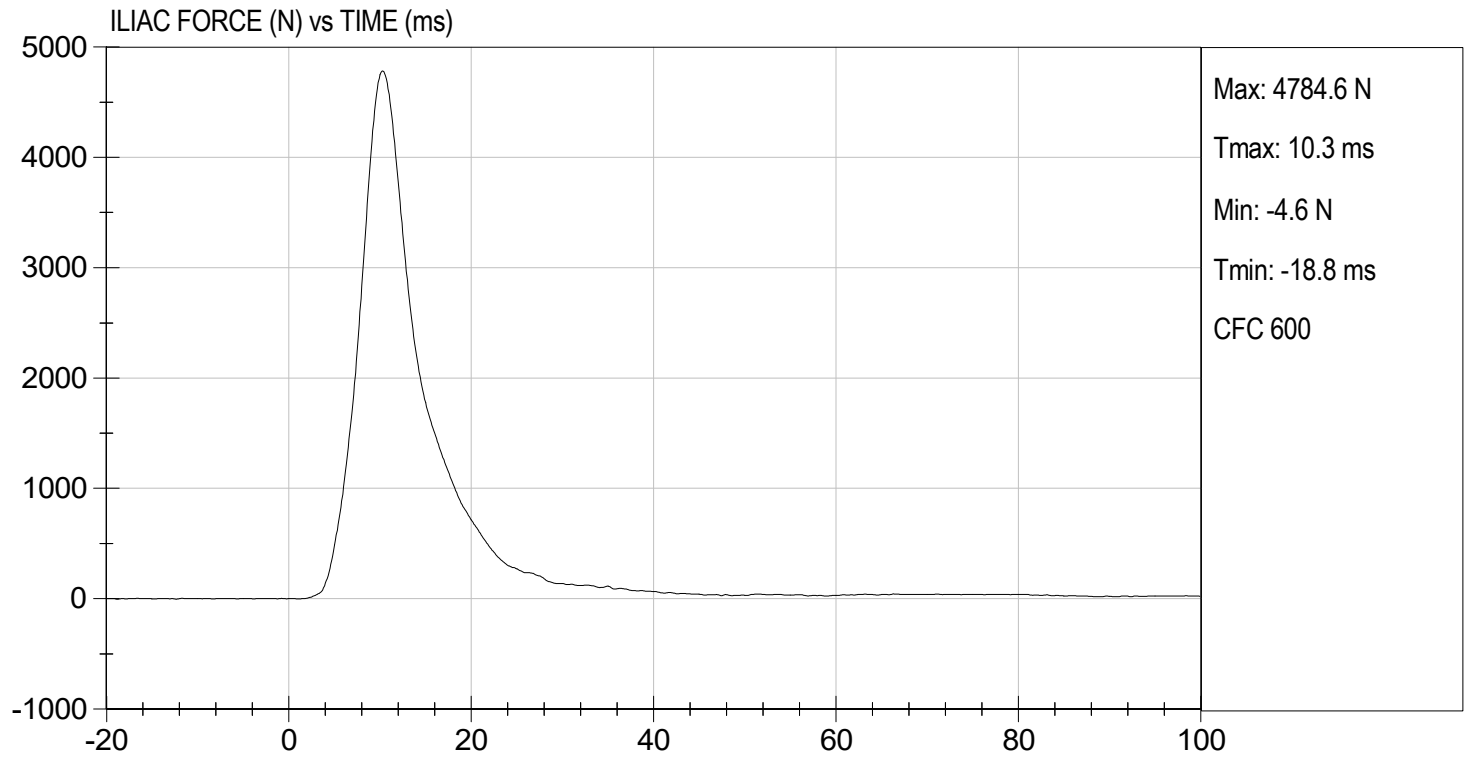
TEST DATE: 01/24/2024
TEST #: D240278





TEST DESC: ILLIAC
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/24/2024
TEST #: D240278



QUALIFICATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER 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

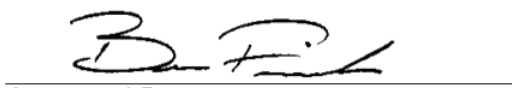
Test ID: D240391

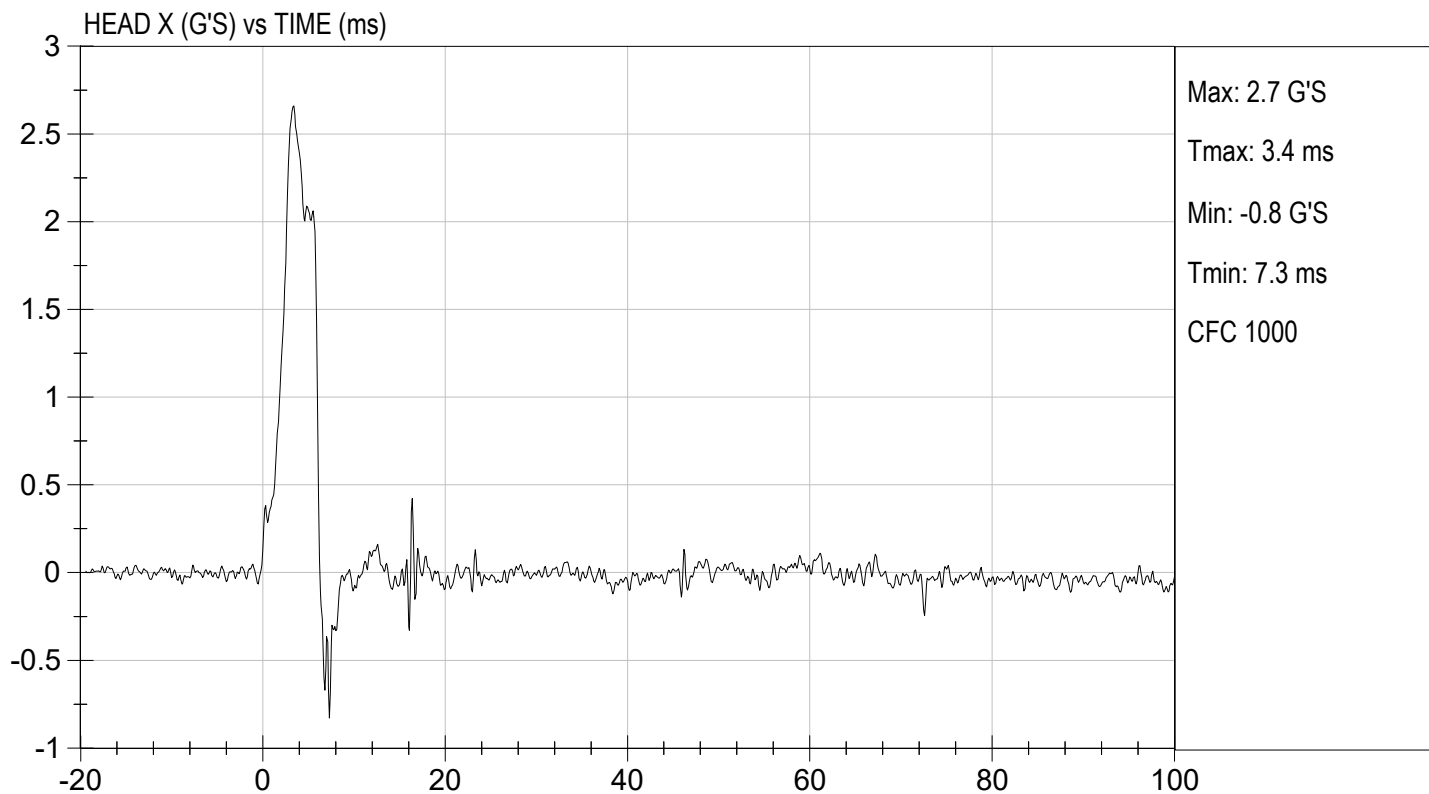
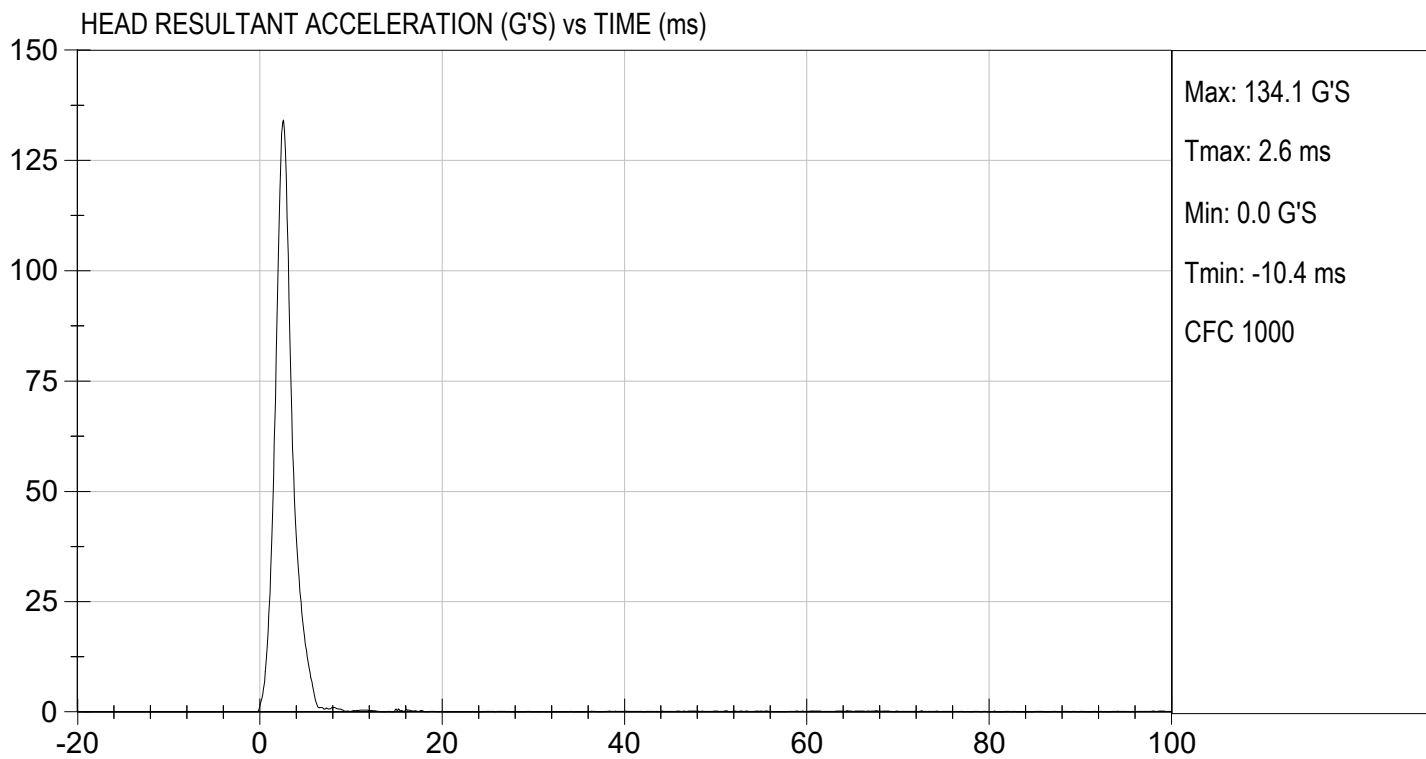
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	115 to 137	134	Pass
Peak Longitudinal Acceleration	G's	+/- 15	2.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	

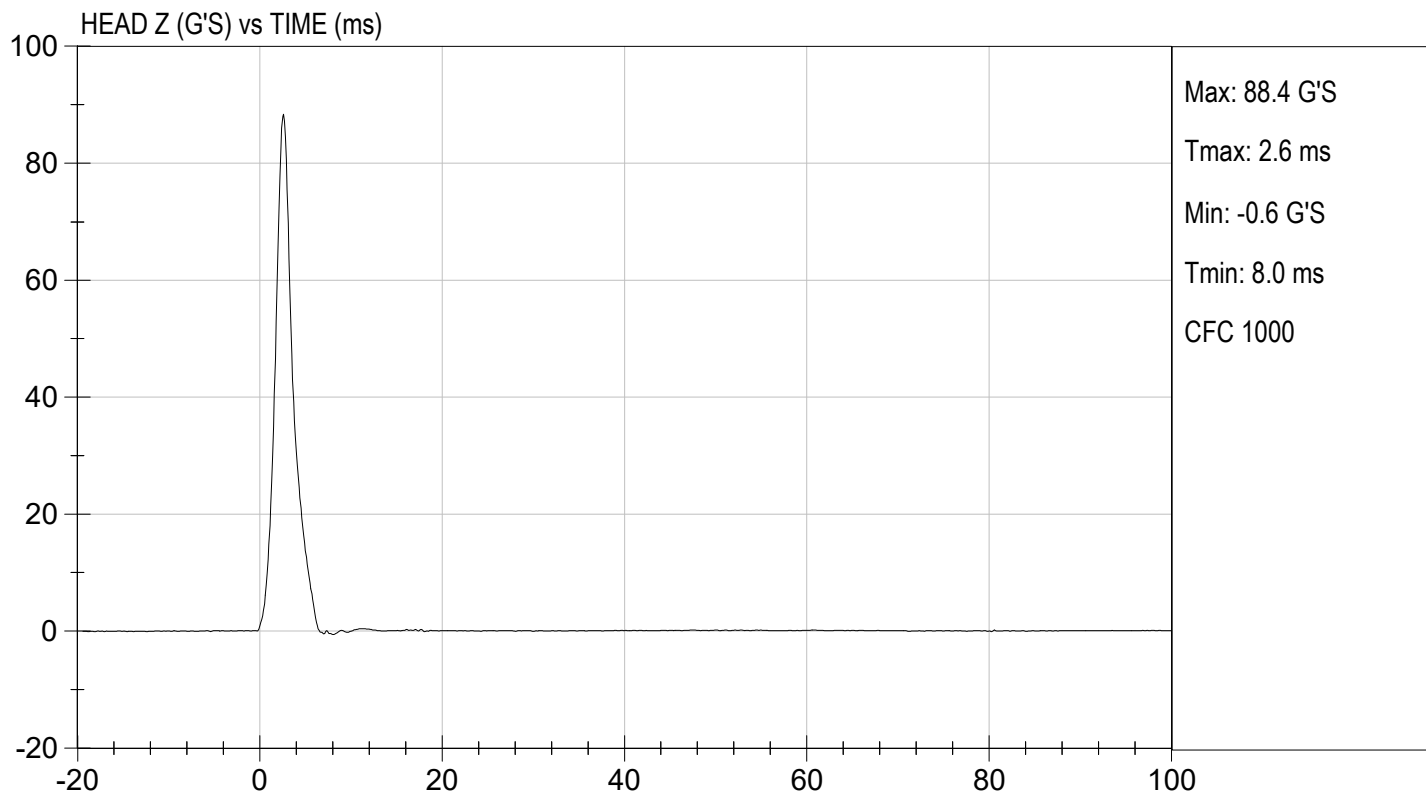
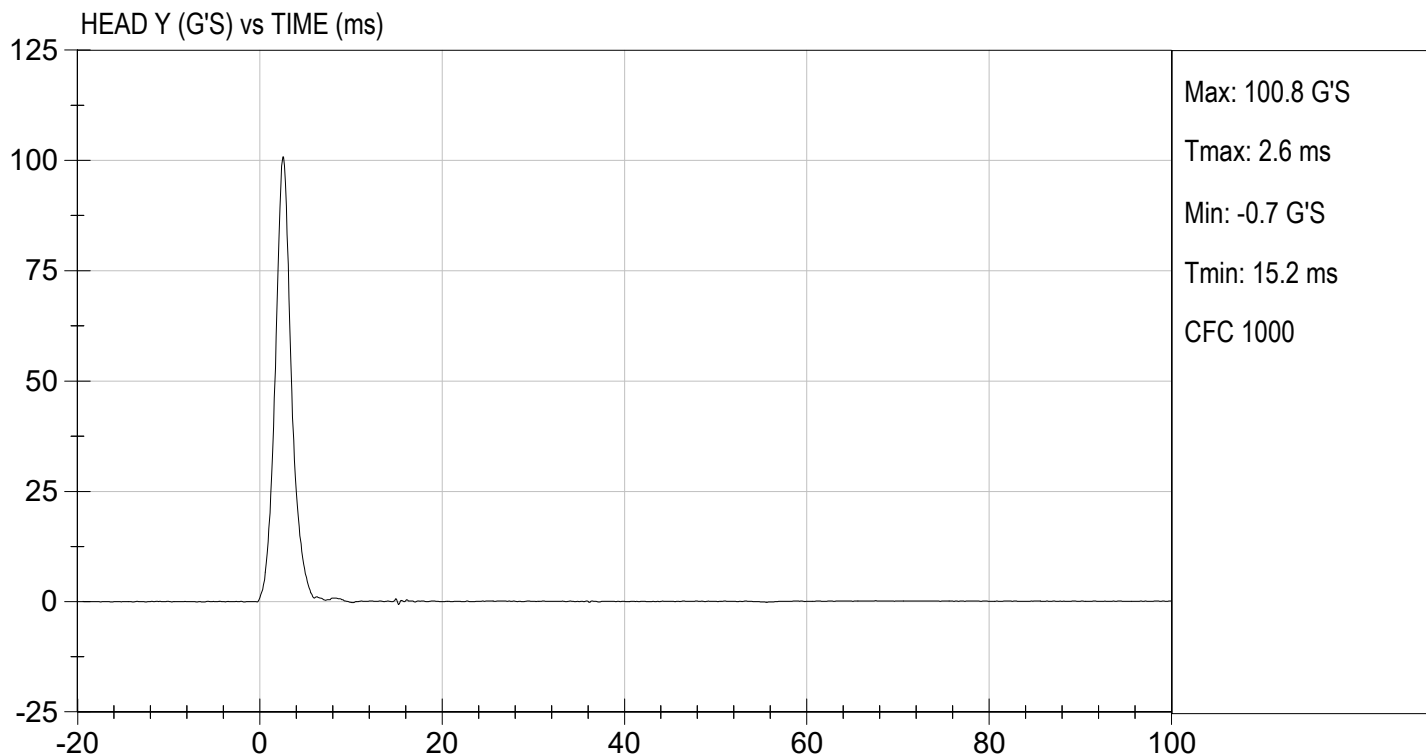

Laboratory Technician

02/06/2024

Test Date


Approved By





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

ATD Serial No: 296

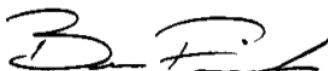
Test I.D: D240392

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.5	Pass
Humidity		%	10 to 70	30	Pass
Impact Velocity		m/s	5.51 to 5.63	5.53	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.28	Pass
	15 ms	m/s	3.30 to 4.10	3.59	Pass
	20 ms	m/s	4.40 to 5.40	5.15	Pass
	25 ms	m/s	5.40 to 6.10	5.77	Pass
	25-100 ms	m/s	5.50 to 6.20	5.82	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	112	Pass
Overall Test Results				Pass	


 Laboratory Technician

02/06/2024

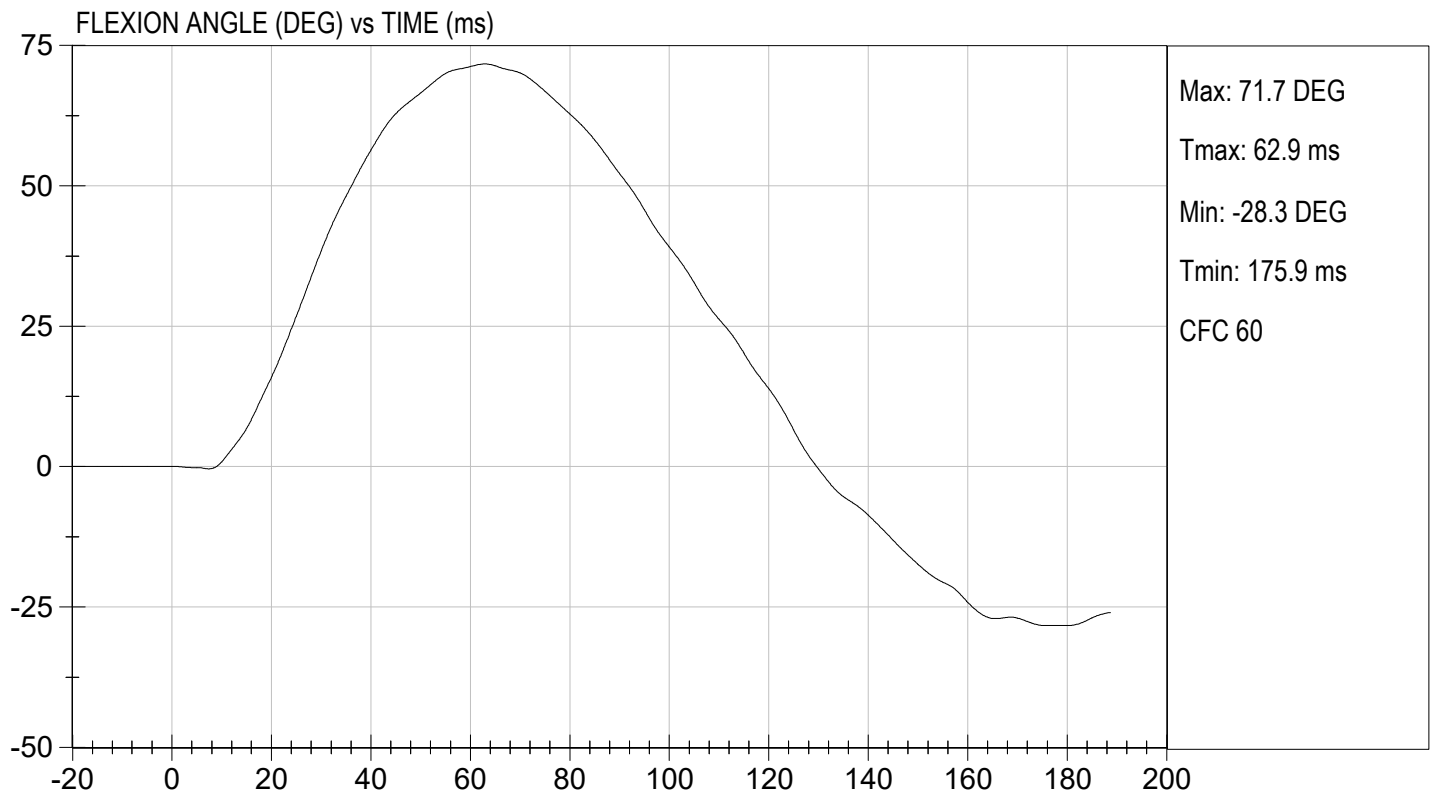
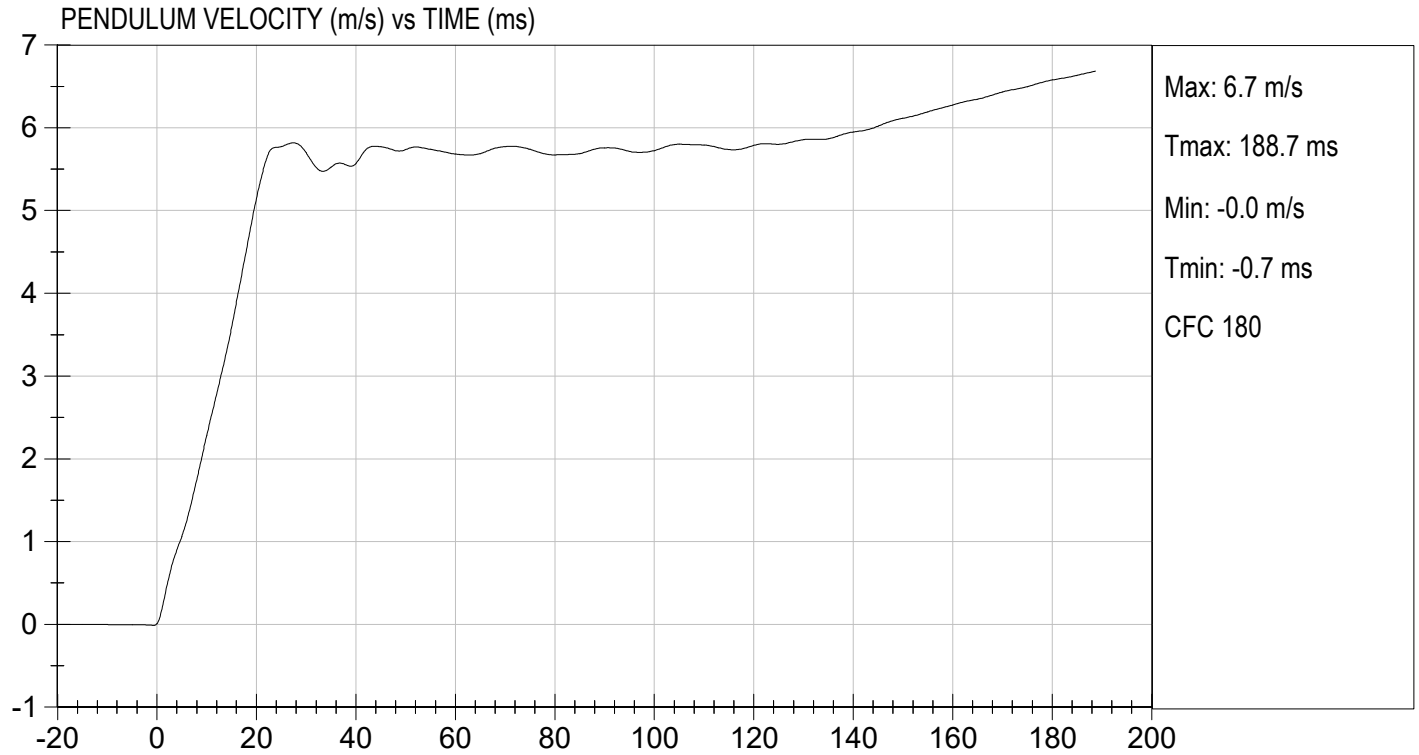
Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.15 ft/s, 5.53 m/s

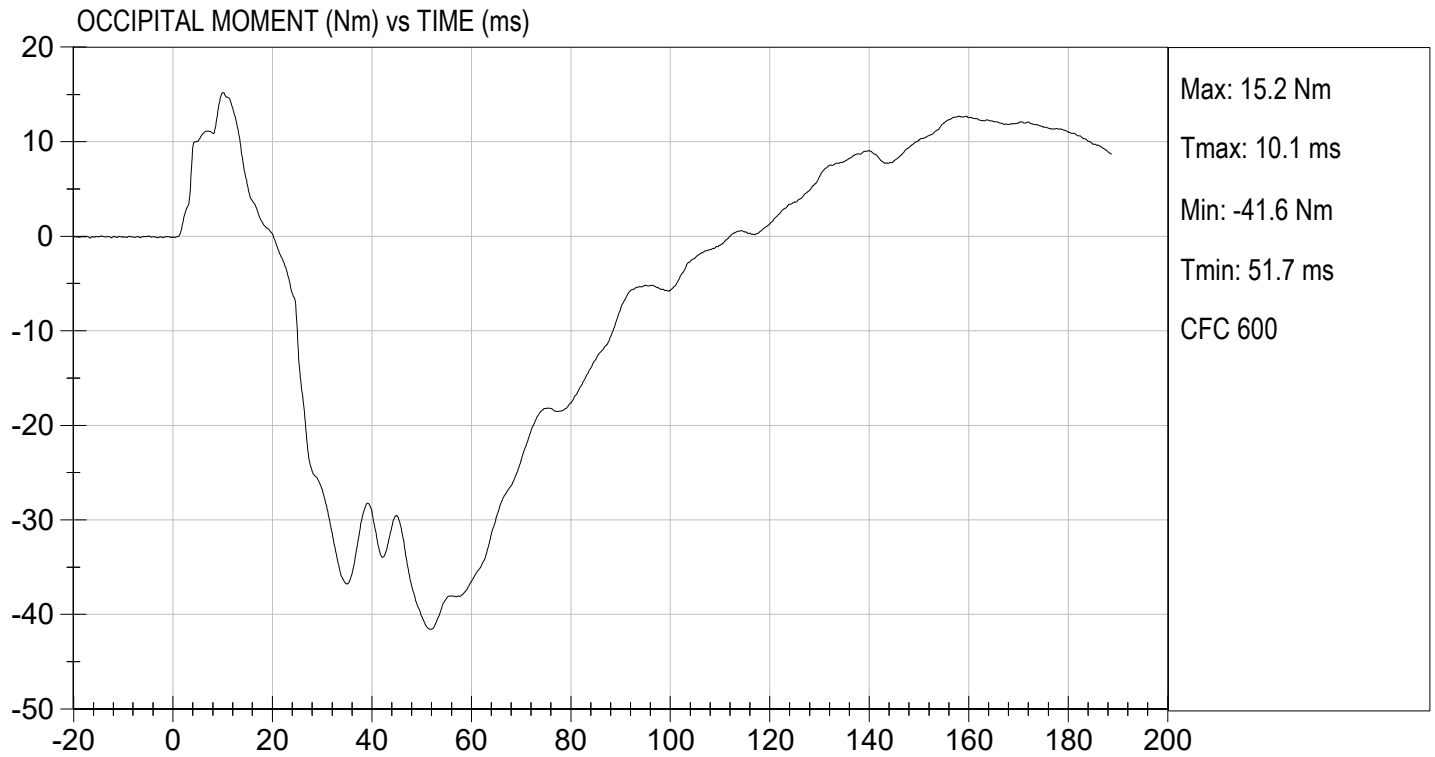
TEST DATE: 02/06/2024
TEST #: D240392





TEST DESC: NECK BENDING
VELOCITY: 18.15 ft/s, 5.53 m/s

TEST DATE: 02/06/2024
TEST #: D240392



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

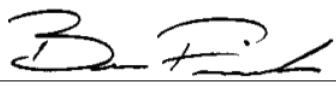
ATD Serial No: 296

Test ID: D240393

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	31	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	13 to 18	16	Pass
Shoulder Displacement	mm	28 to 37	30	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	20	Pass
Overall Test Results			Pass	


Laboratory Technician

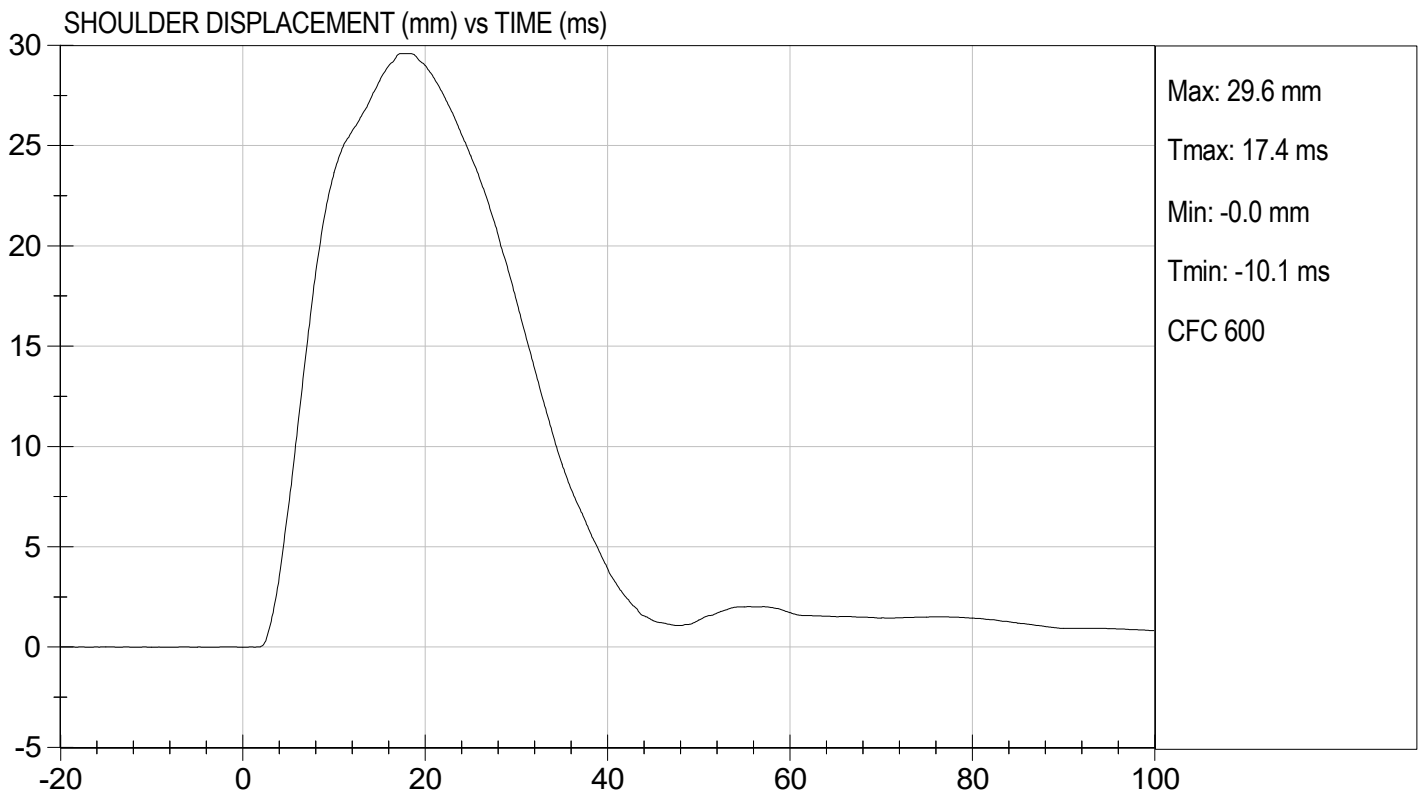
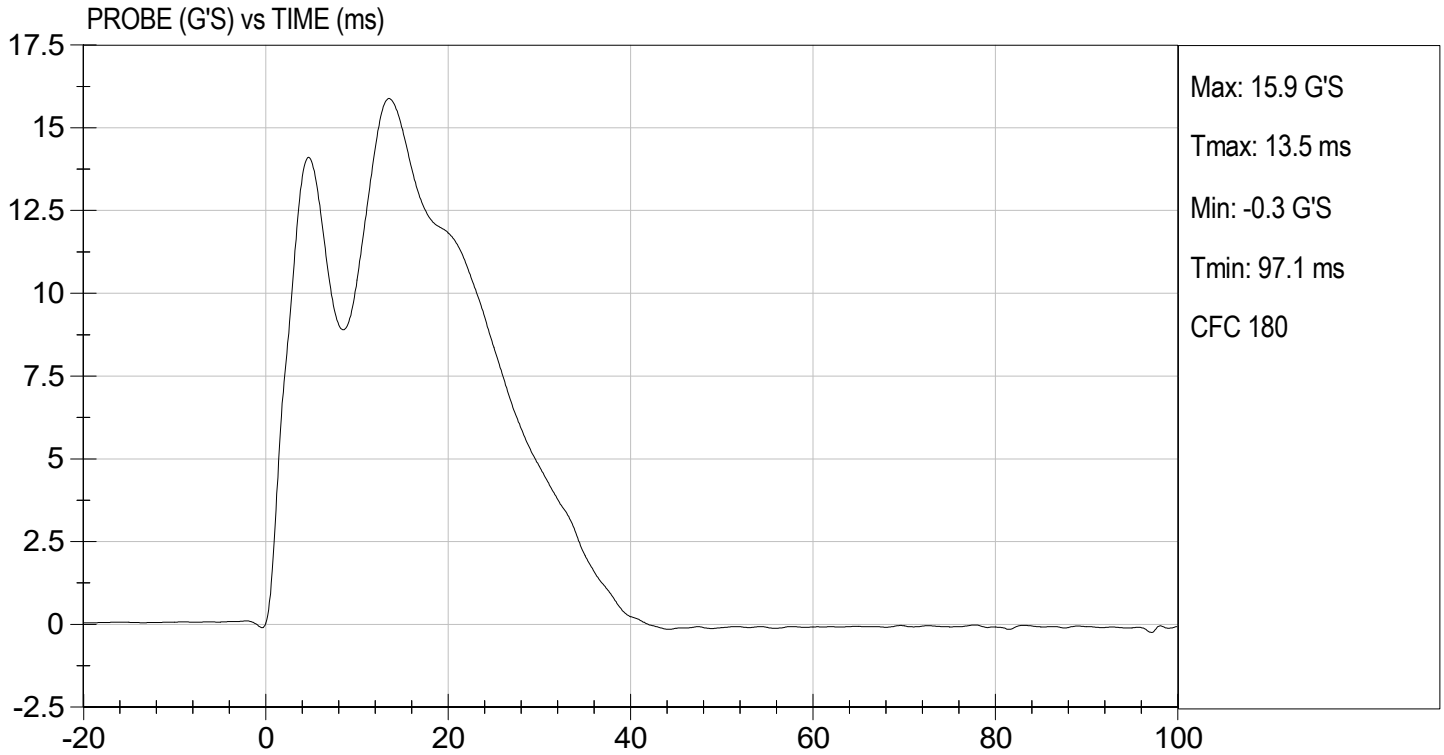
02/06/2024
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

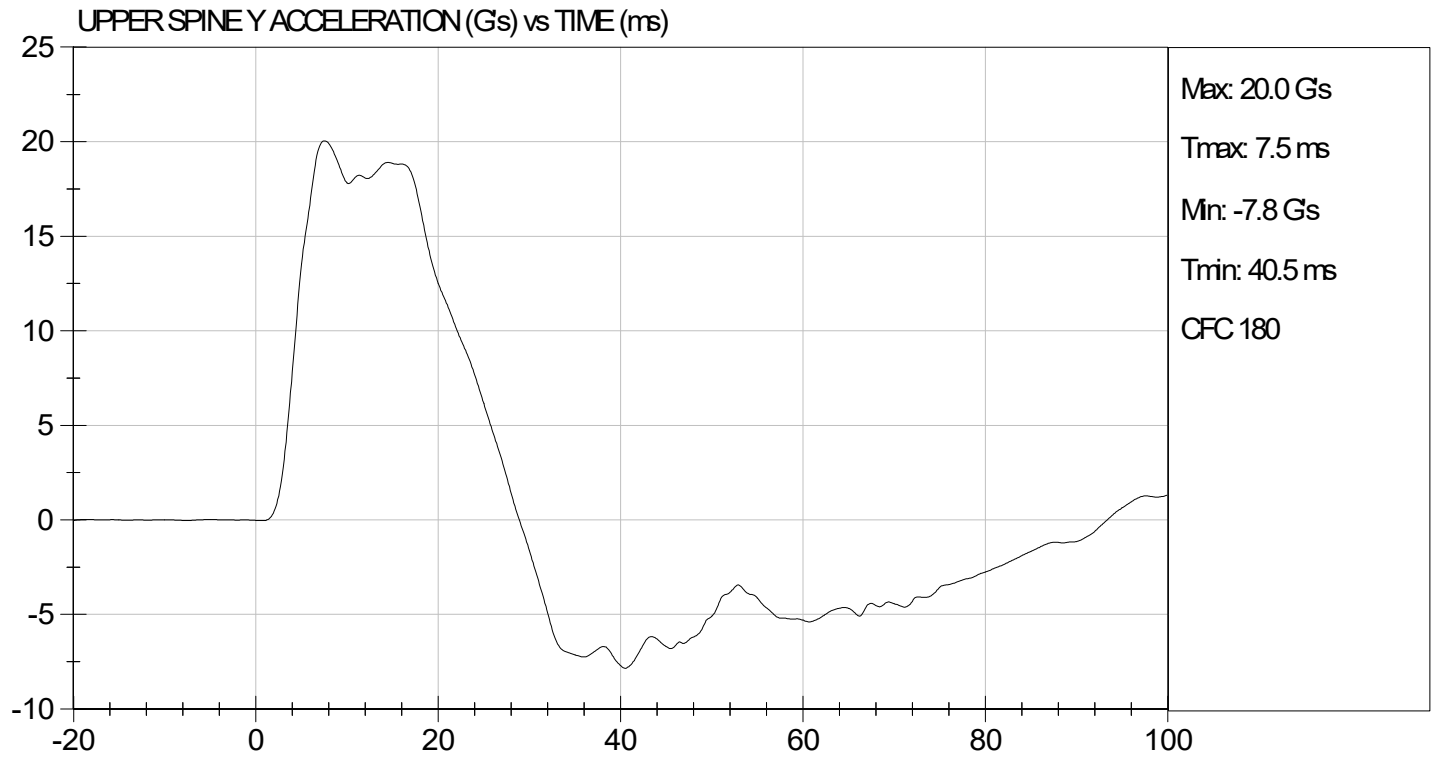
TEST DATE: 02/06/2024
TEST #: D240393





TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/06/2024
TEST #: D240393



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

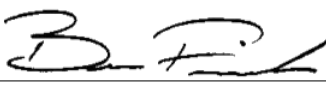
ATD Serial No: 296

Test I.D: D240394

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	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	34	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
Overall Test Results				Pass


Laboratory Technician

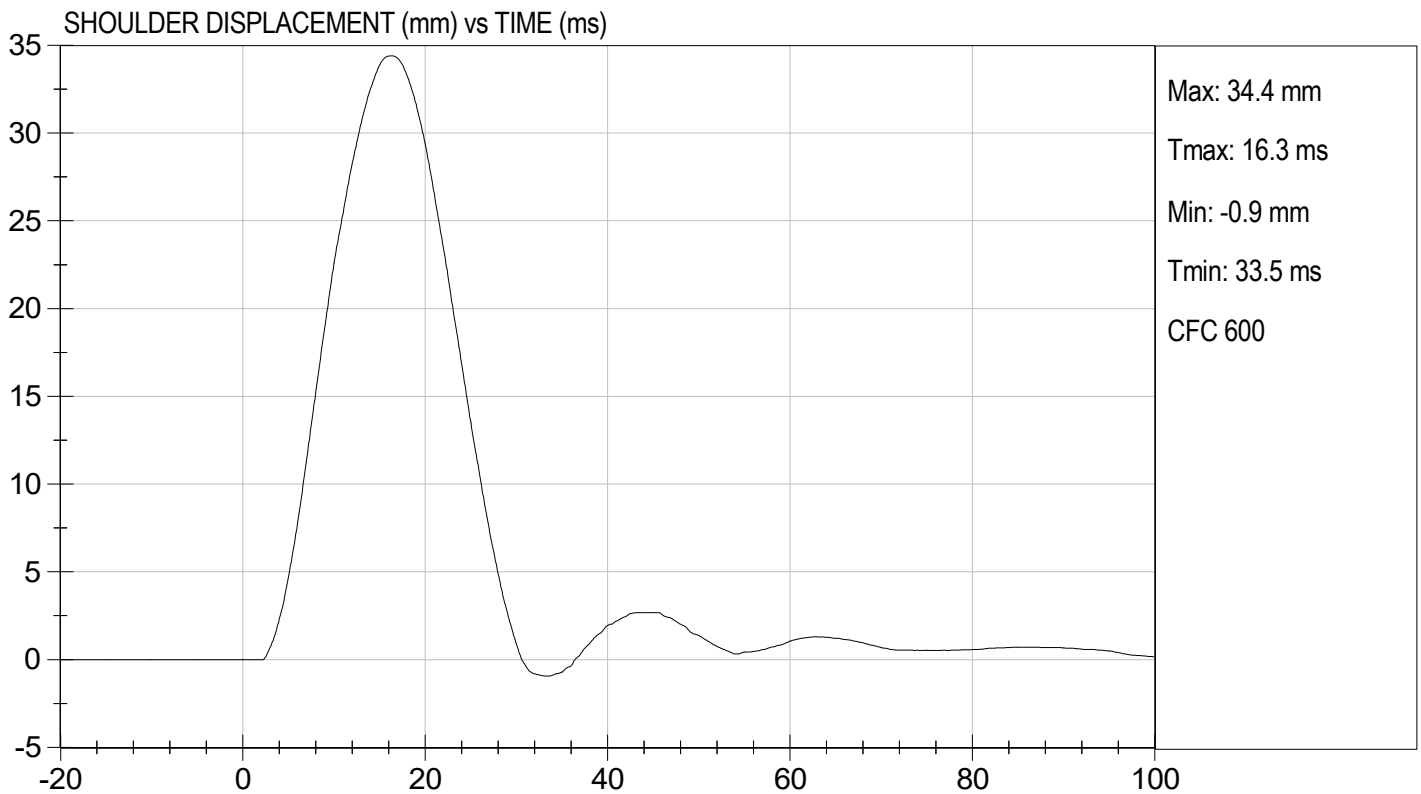
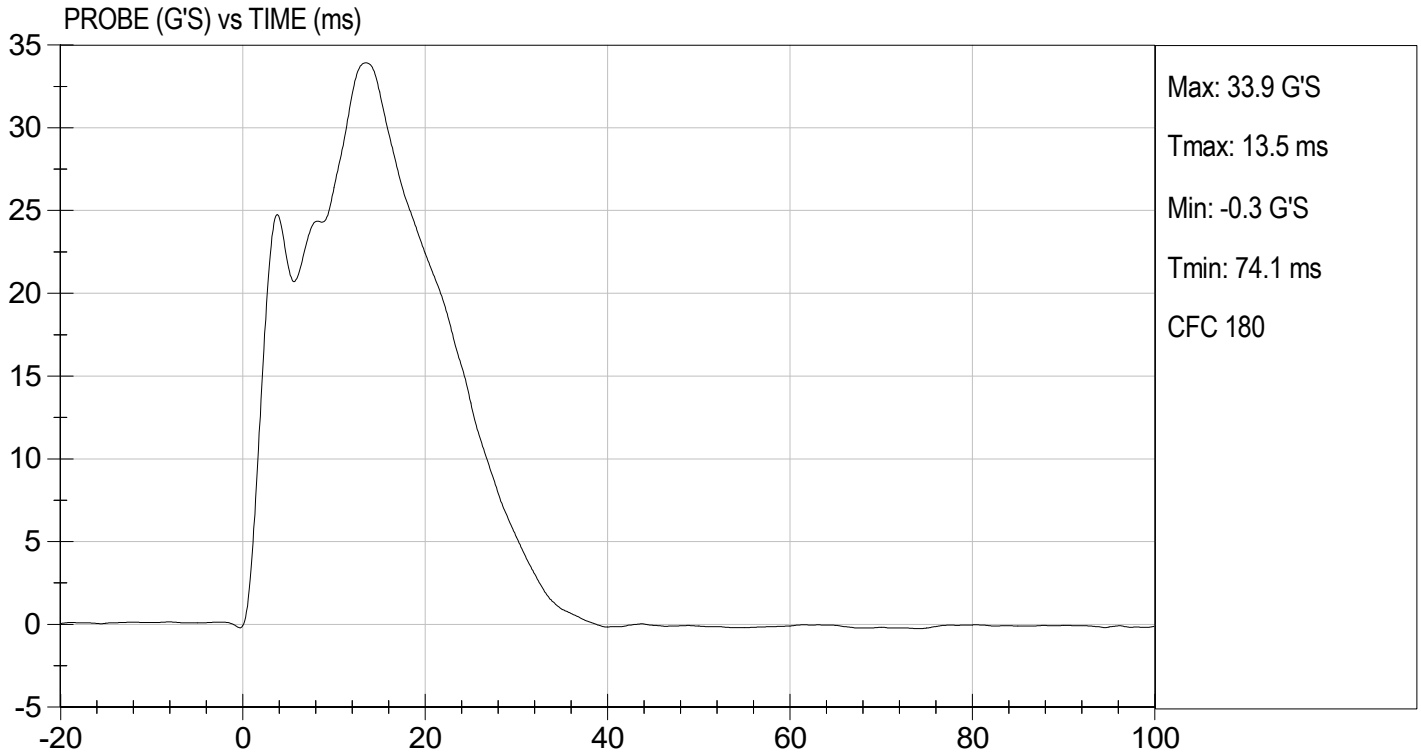
02/06/2024
Test Date


Approved By



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

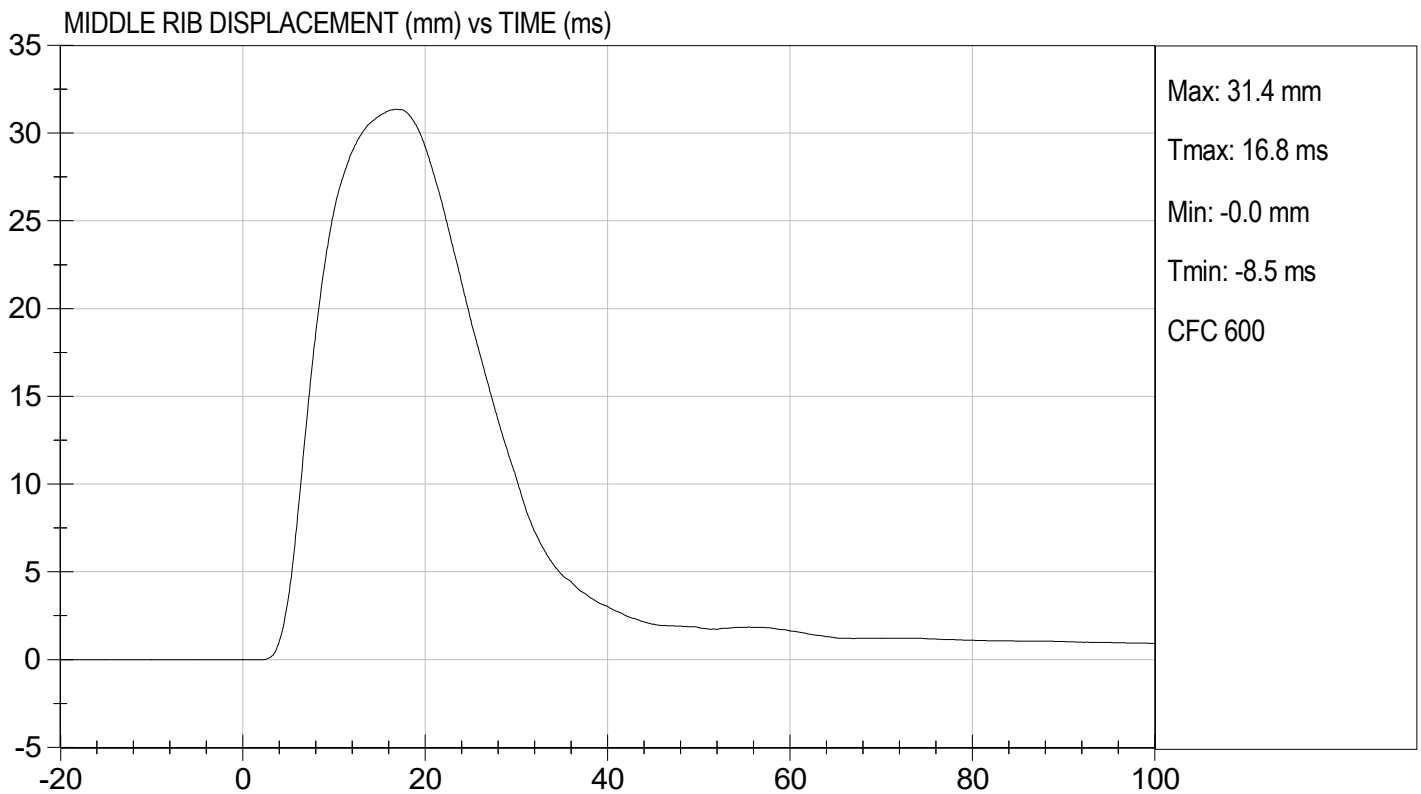
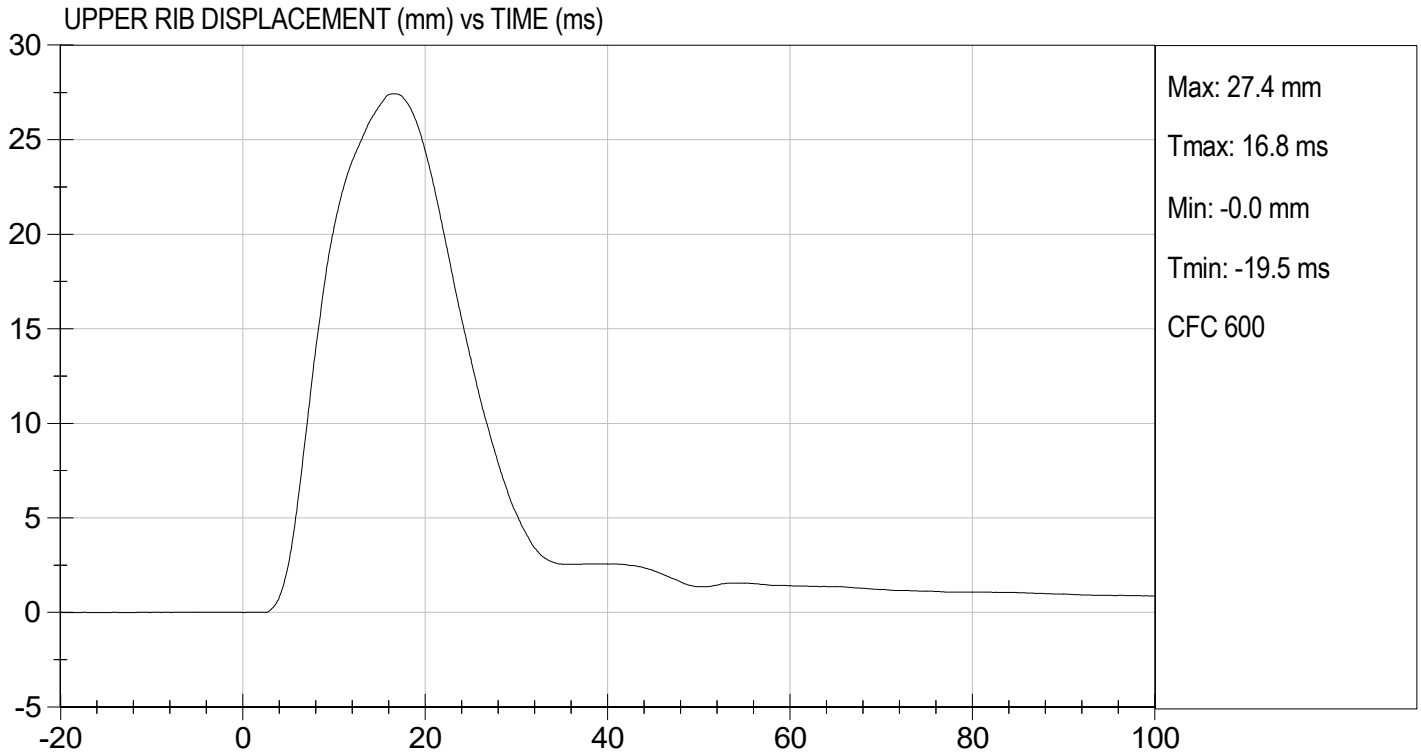
TEST DATE: 02/06/2024
TEST #: D240394





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

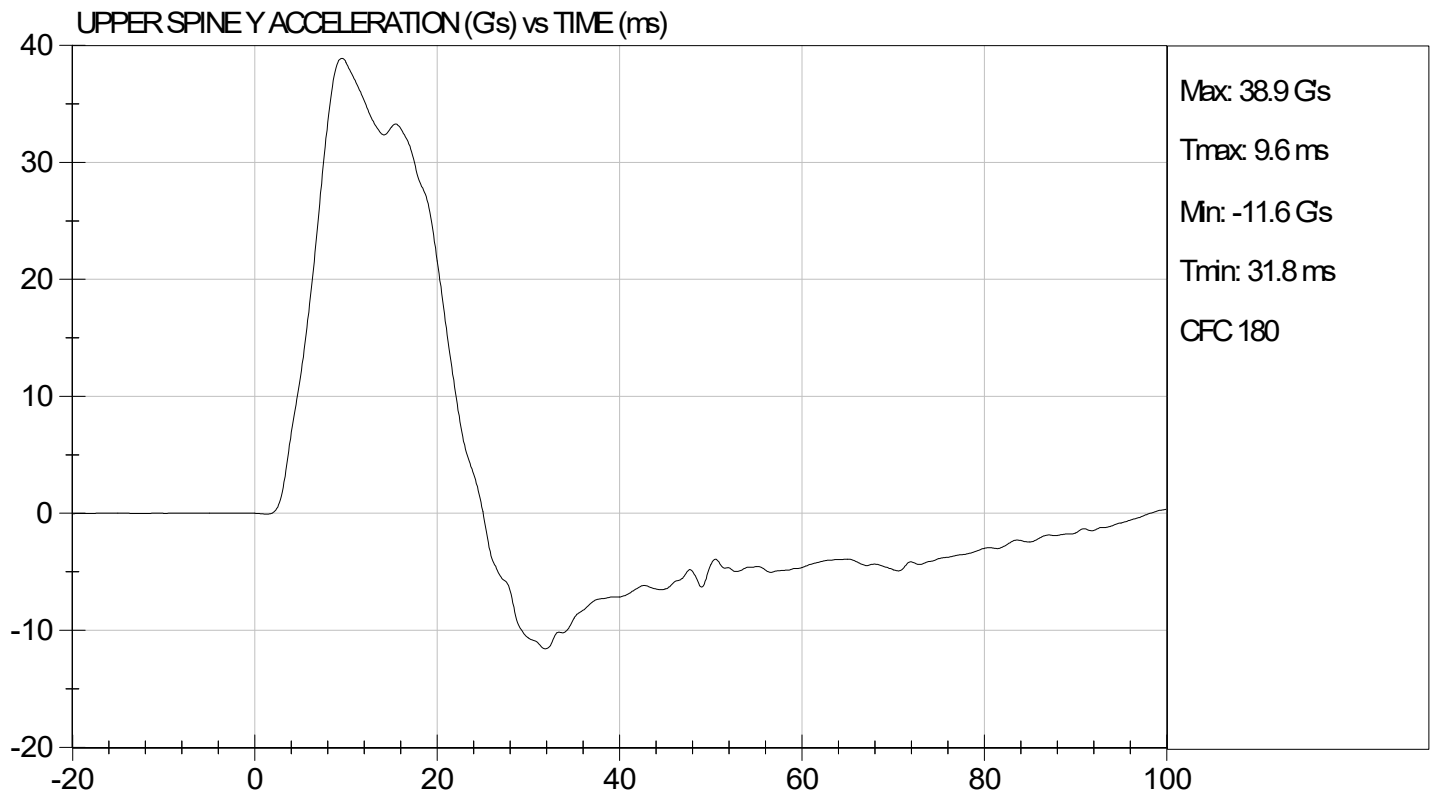
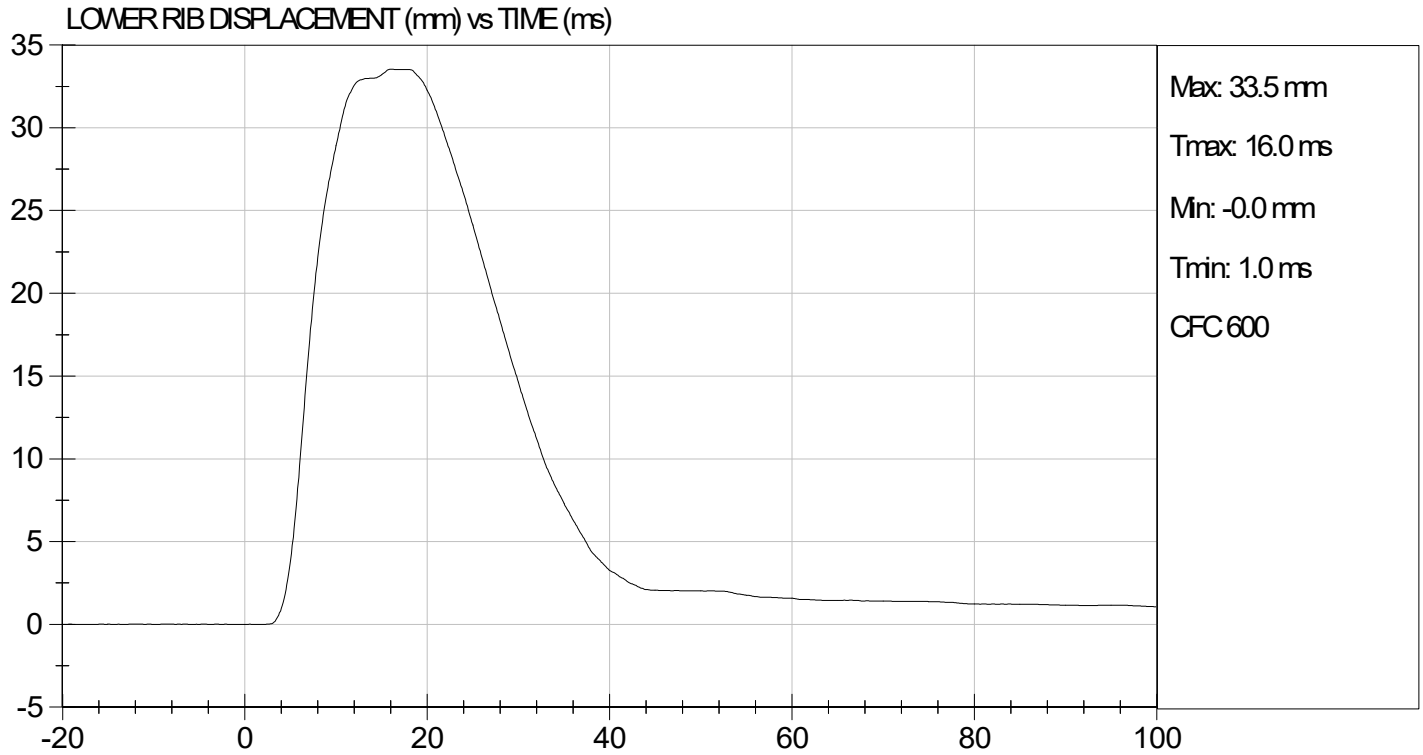
TEST DATE: 02/06/2024
TEST #: D240394





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

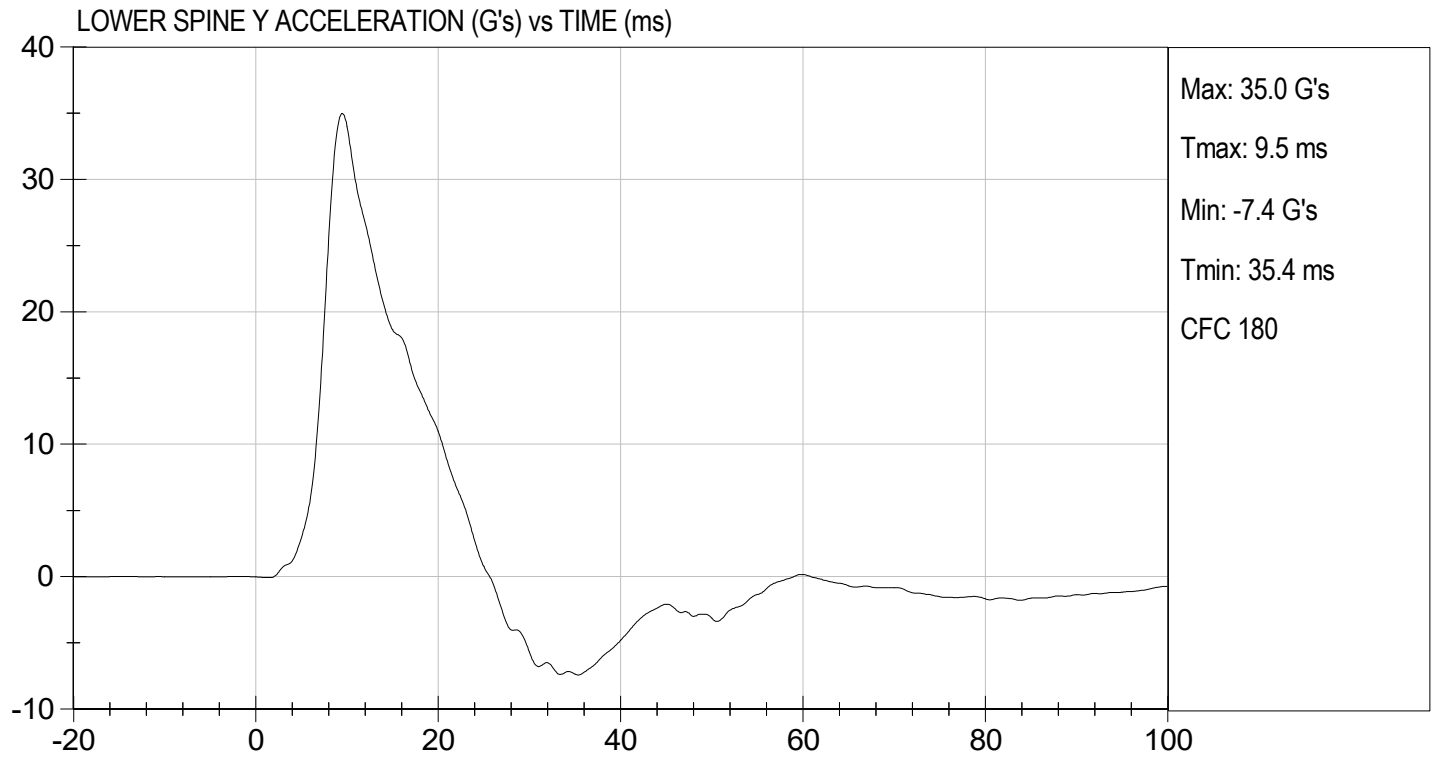
TEST DATE: 02/06/2024
TEST #: D240394





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 02/06/2024
TEST #: D240394



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

ATD Serial No: 296

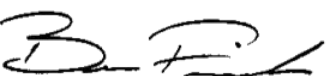
Test I.D: D240395

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	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	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

02/06/2024

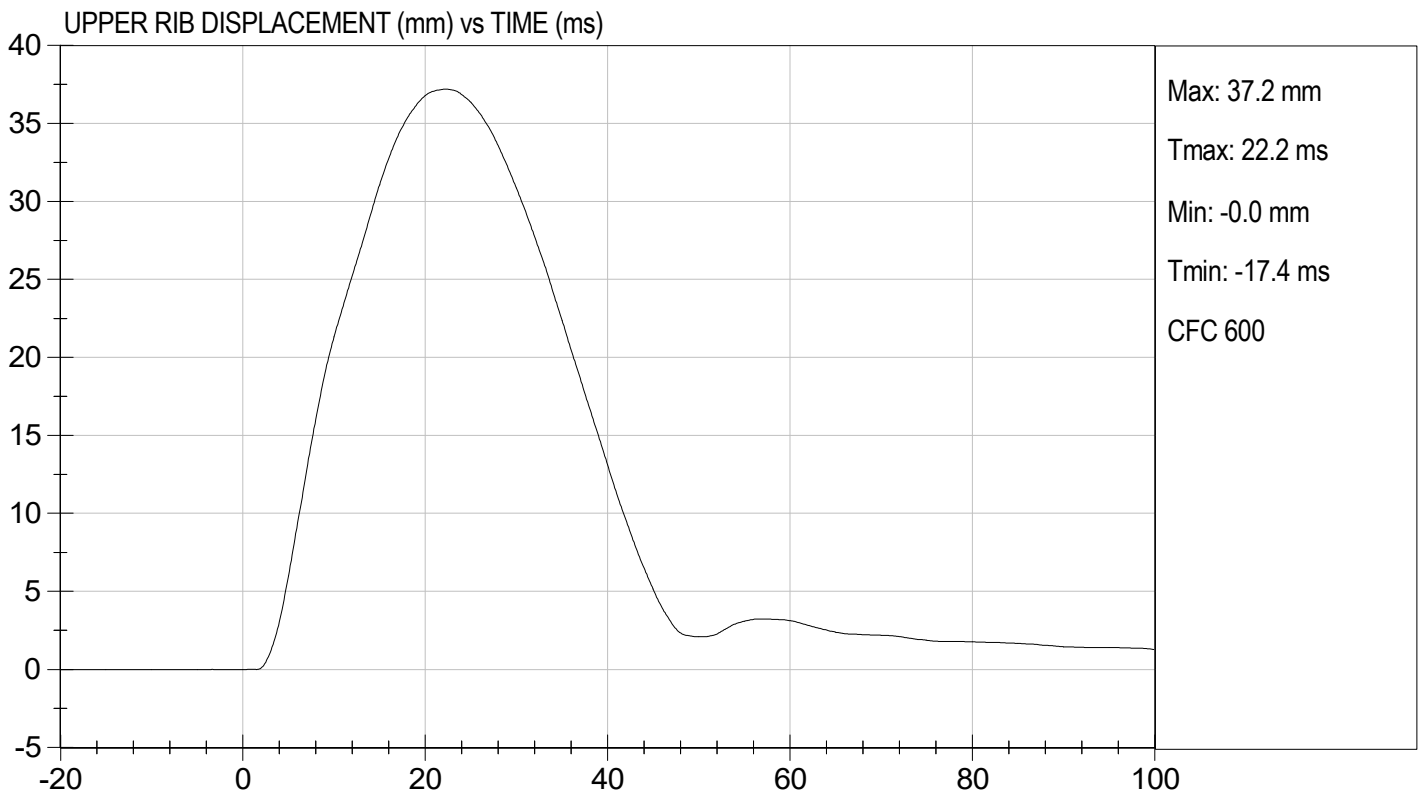
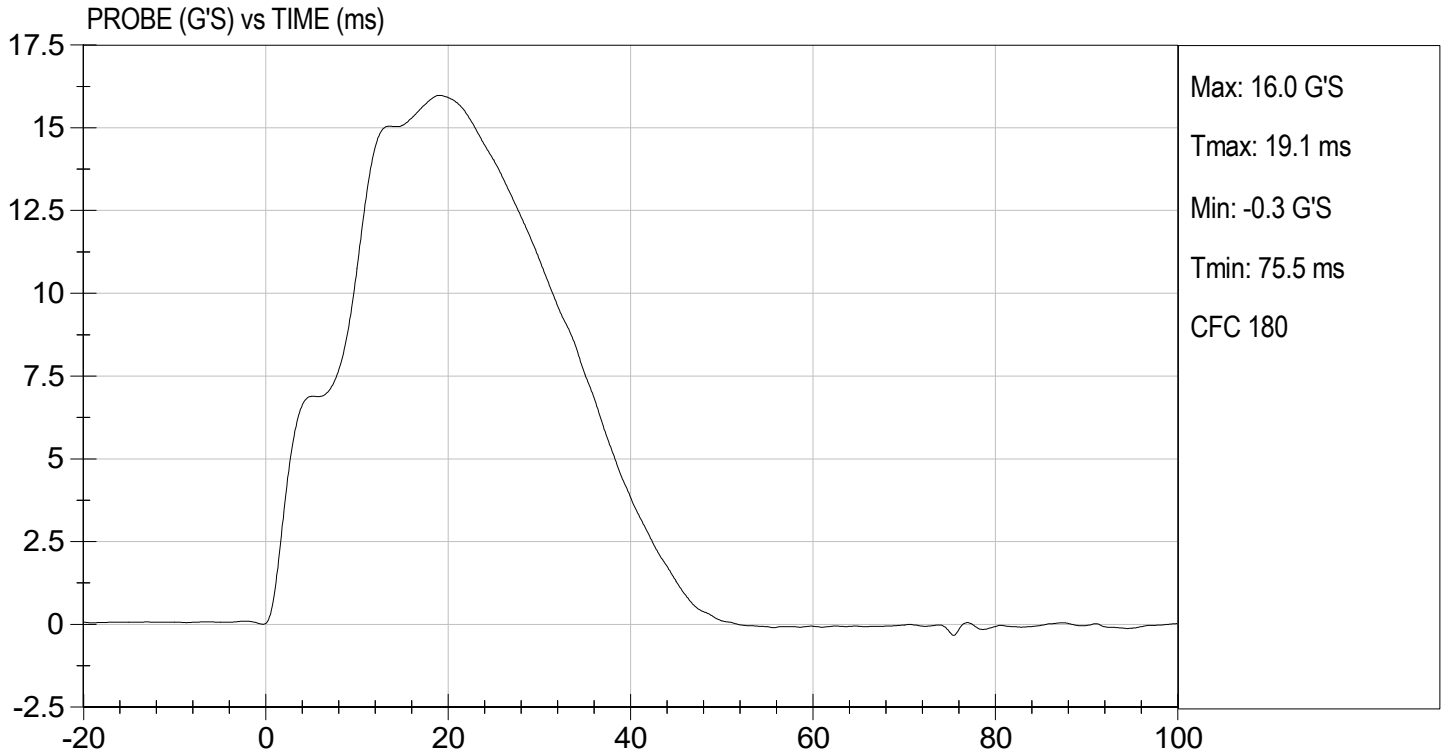
Test Date


Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

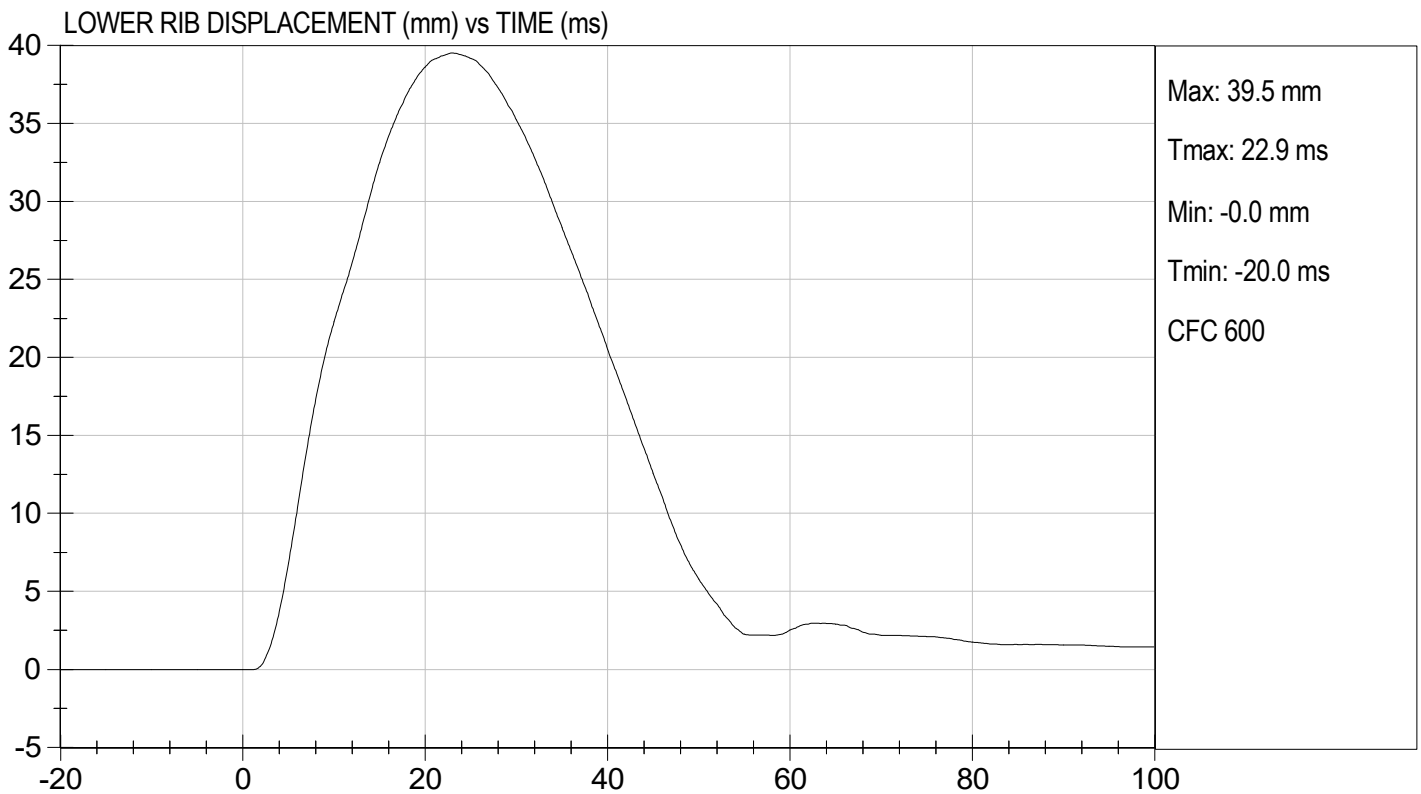
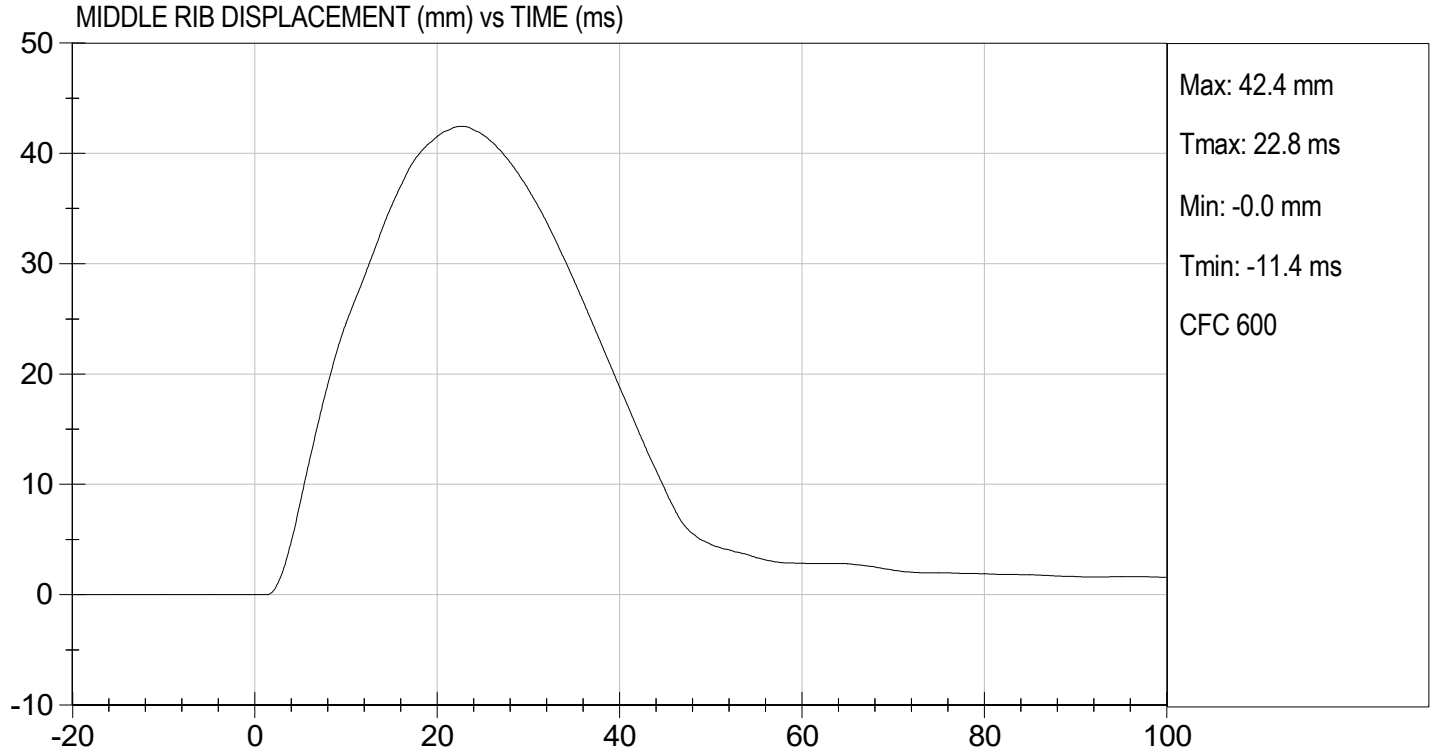
TEST DATE: 02/06/2024
TEST #: D240395





TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

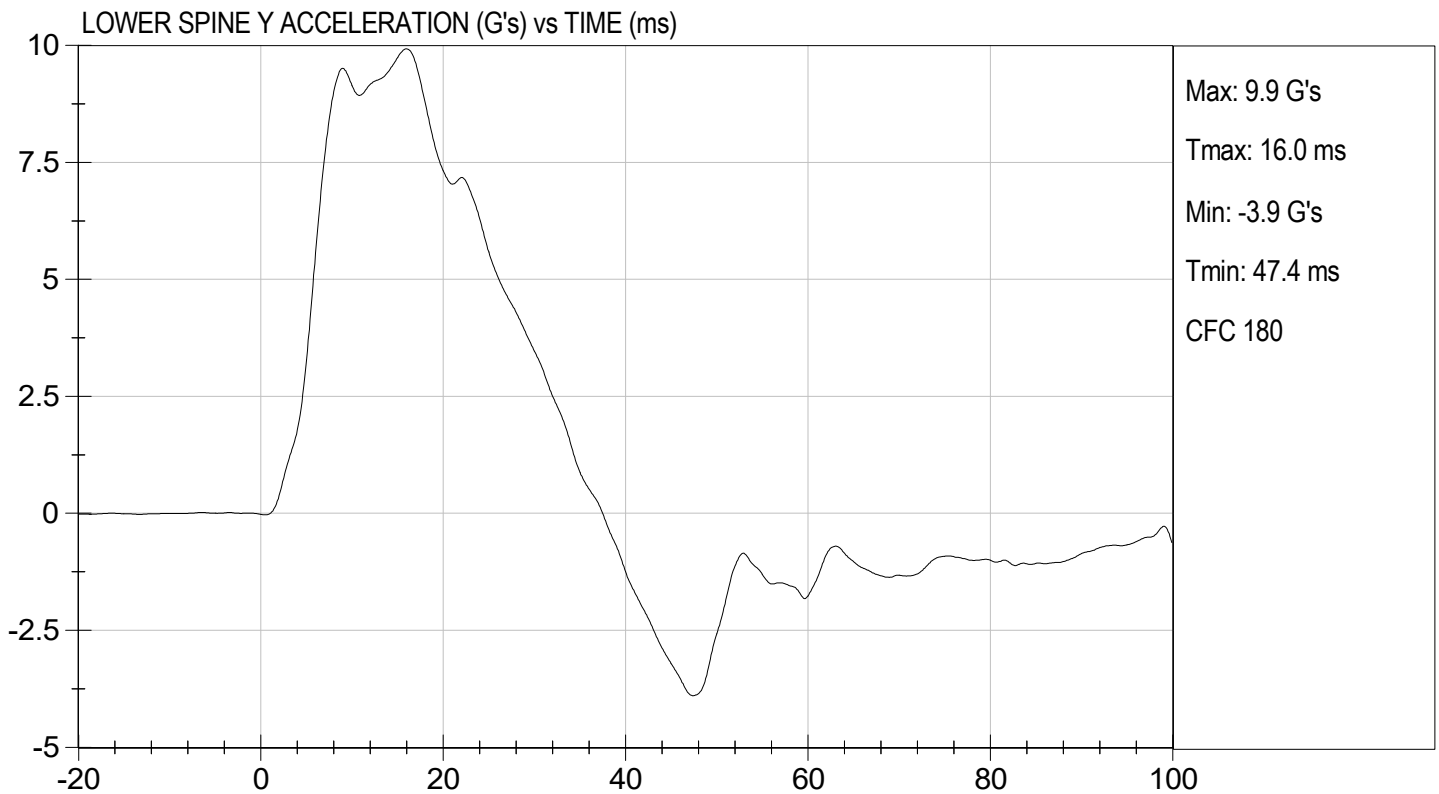
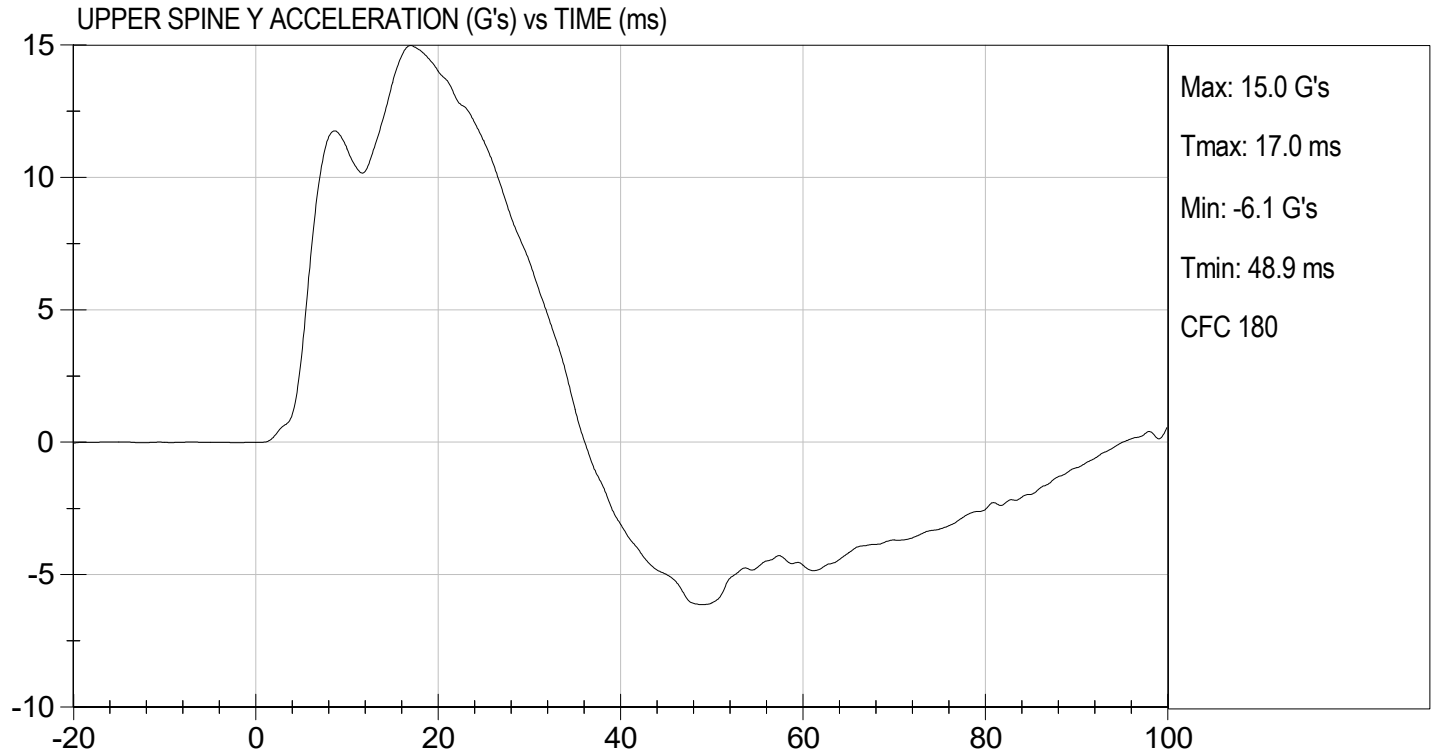
TEST DATE: 02/06/2024
TEST #: D240395





TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 02/06/2024
TEST #: D240395



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

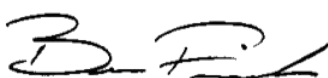
Test I.D: D240396

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	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	34	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
Overall Test Results				Pass


Laboratory Technician

02/06/2024

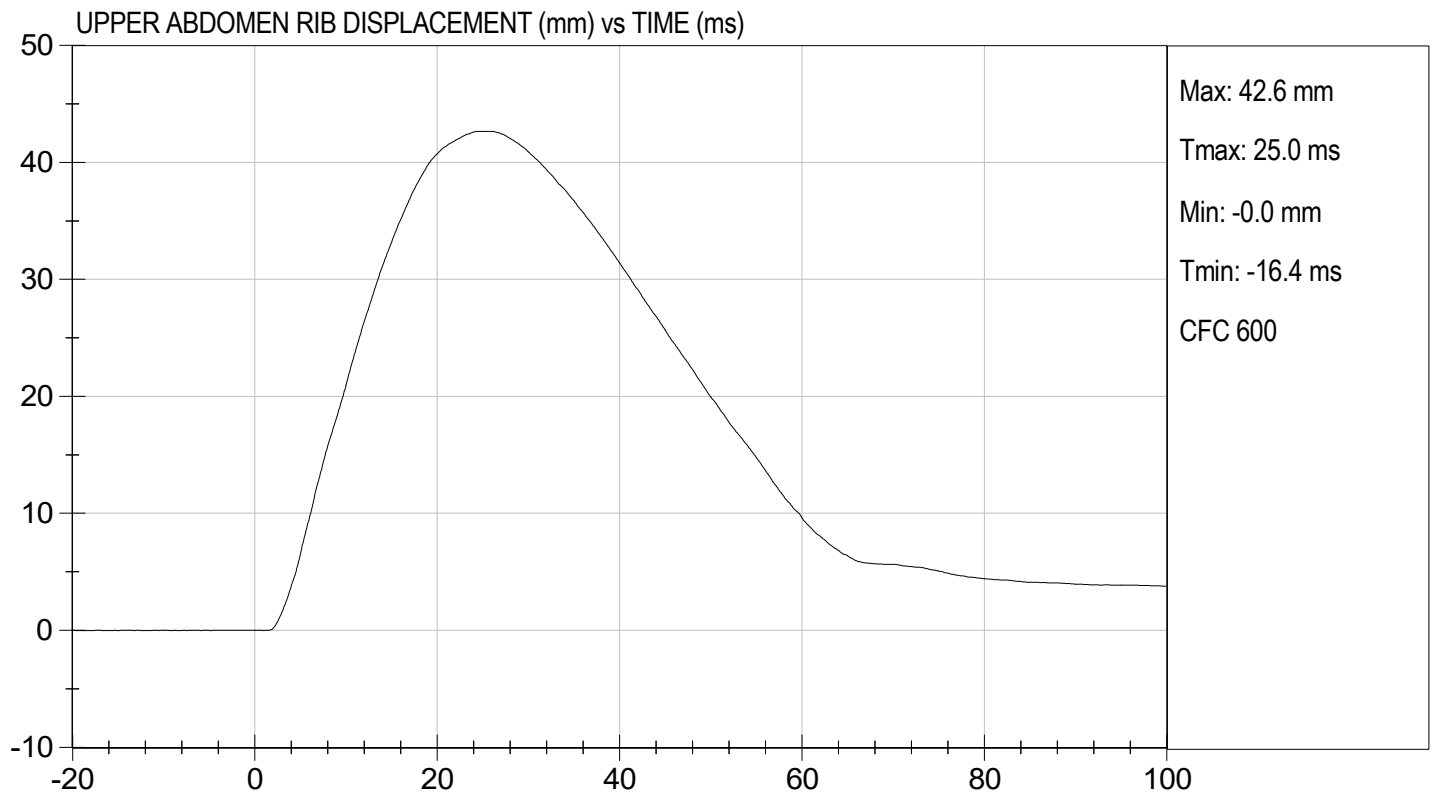
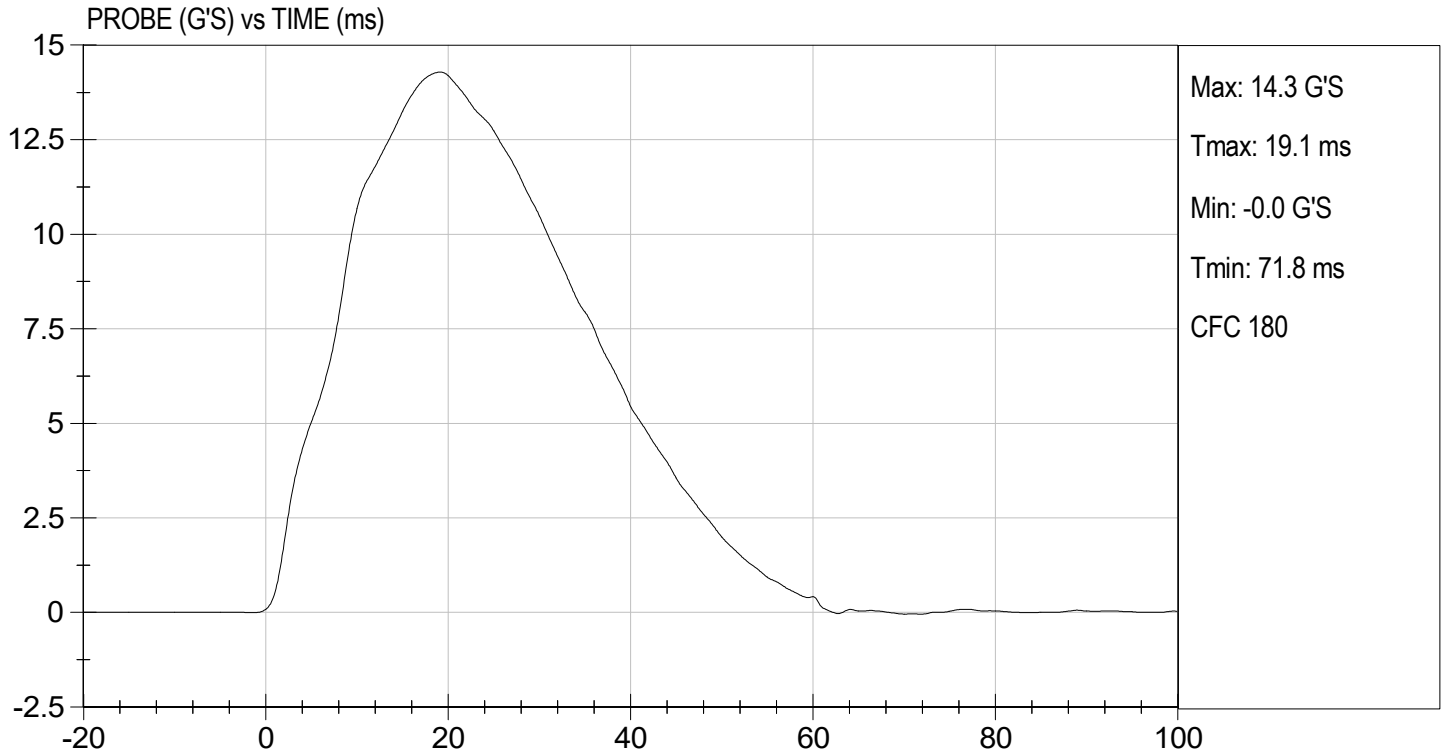
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.24 ft/s, 4.34 m/s

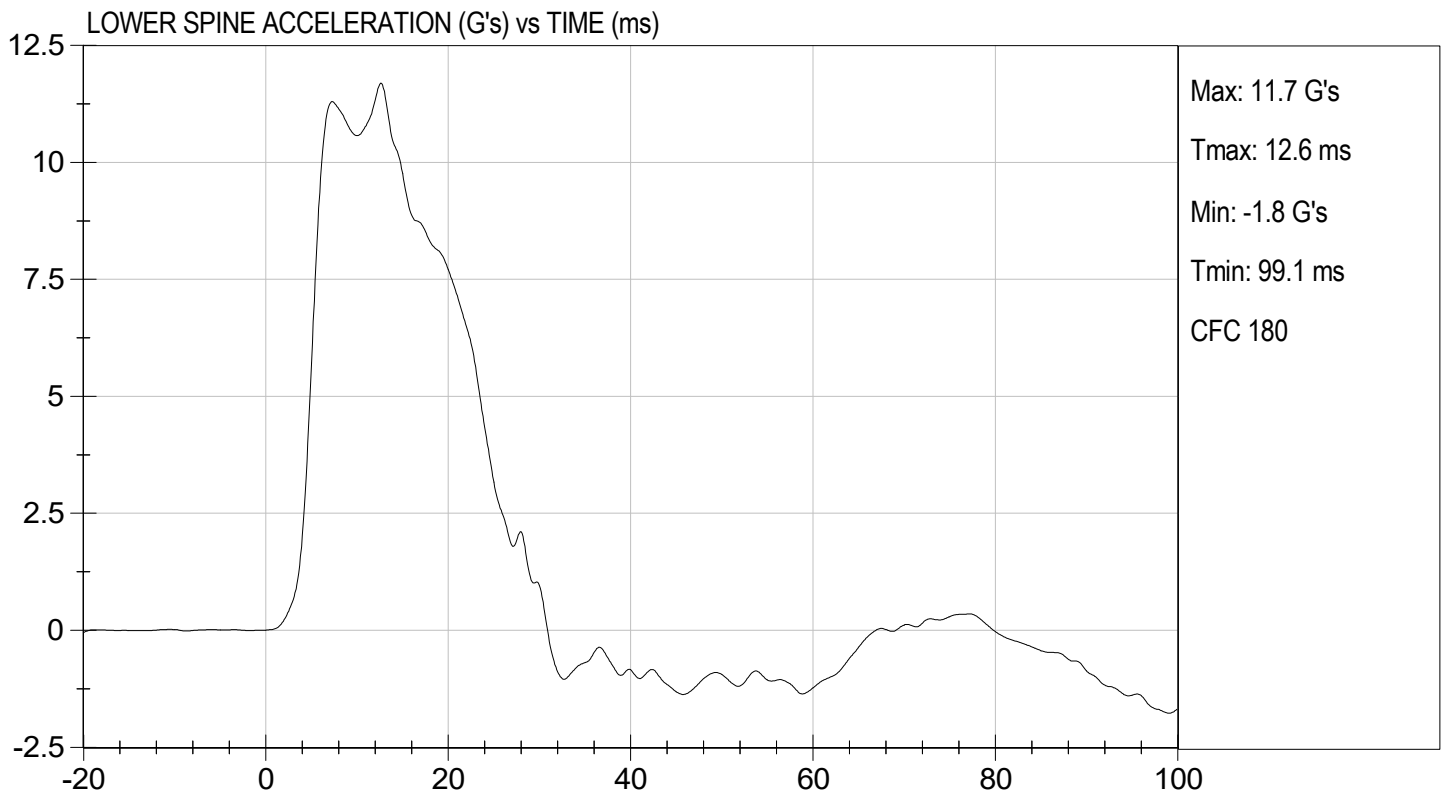
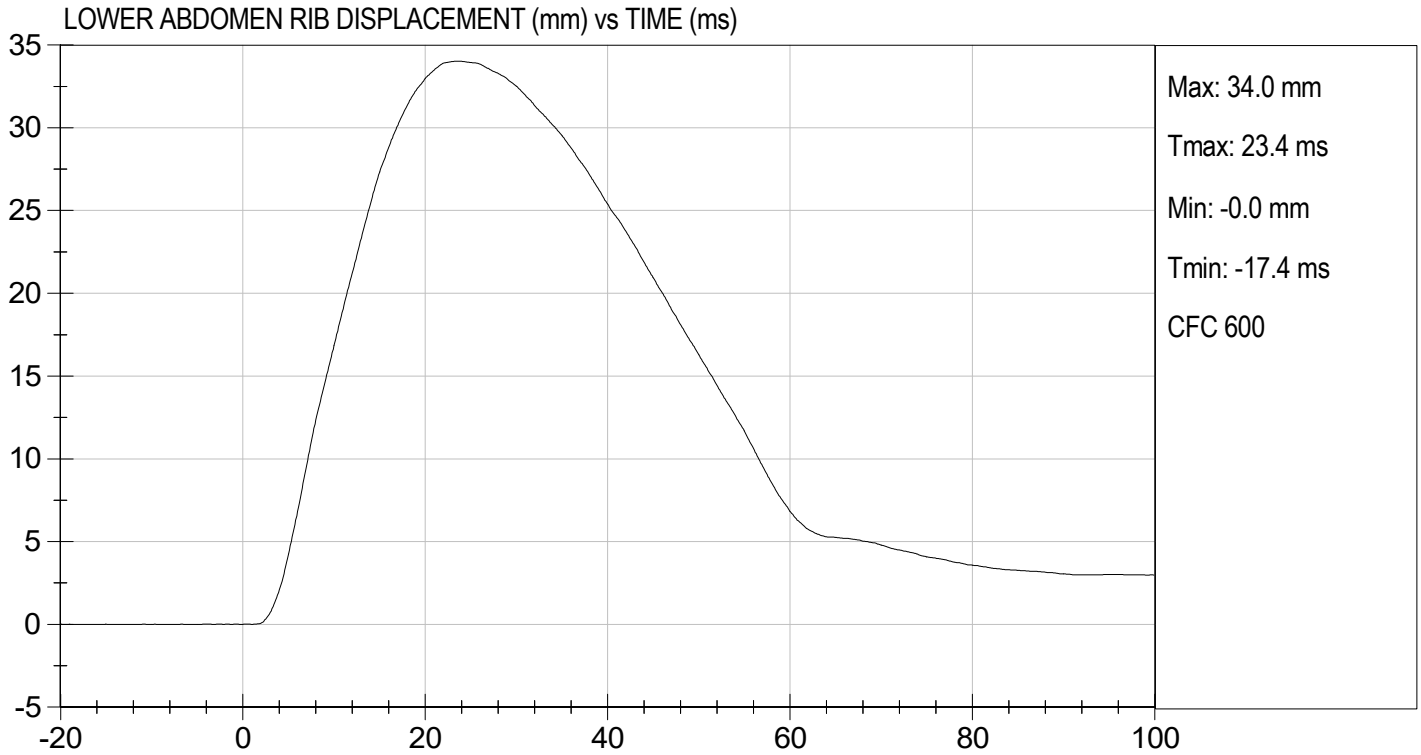
TEST DATE: 02/06/2024
TEST #: D240396





TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.24 ft/s, 4.34 m/s

TEST DATE: 02/06/2024
TEST #: D240396



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

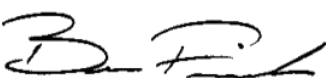
Test I.D: D240397

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	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	41	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40.4	Pass
Peak Acetabulum Force	N	3600 to 4300	3,905	Pass
Overall Test Results				Pass


Laboratory Technician

02/06/2024

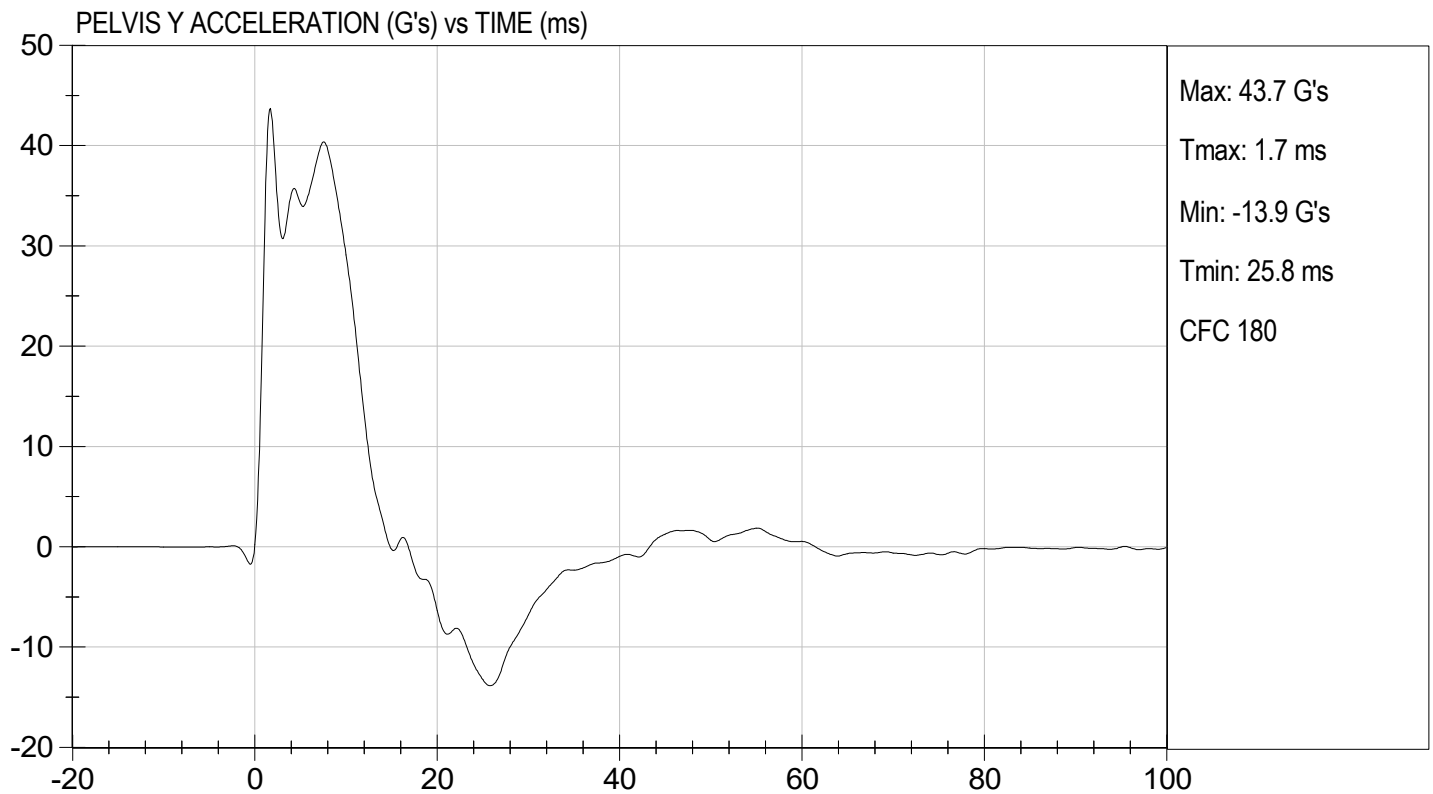
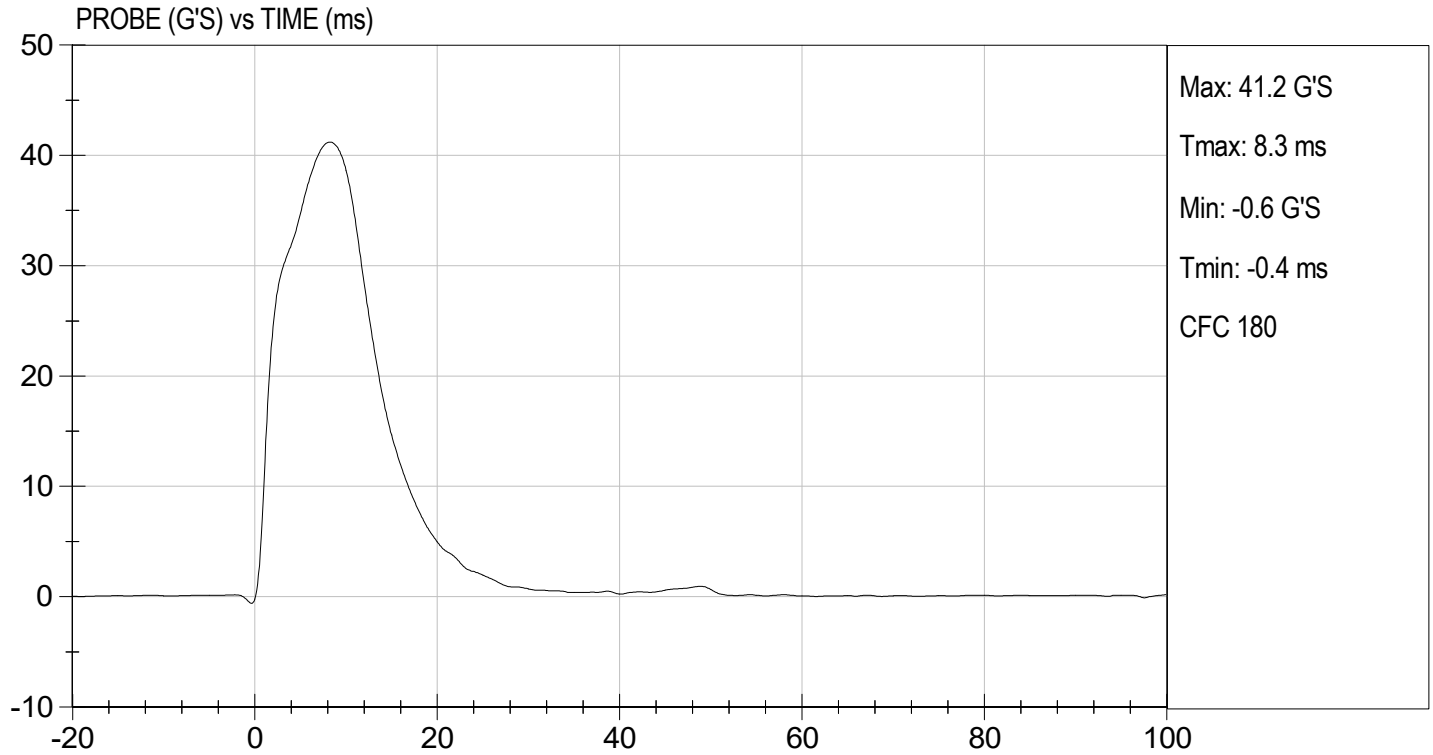
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

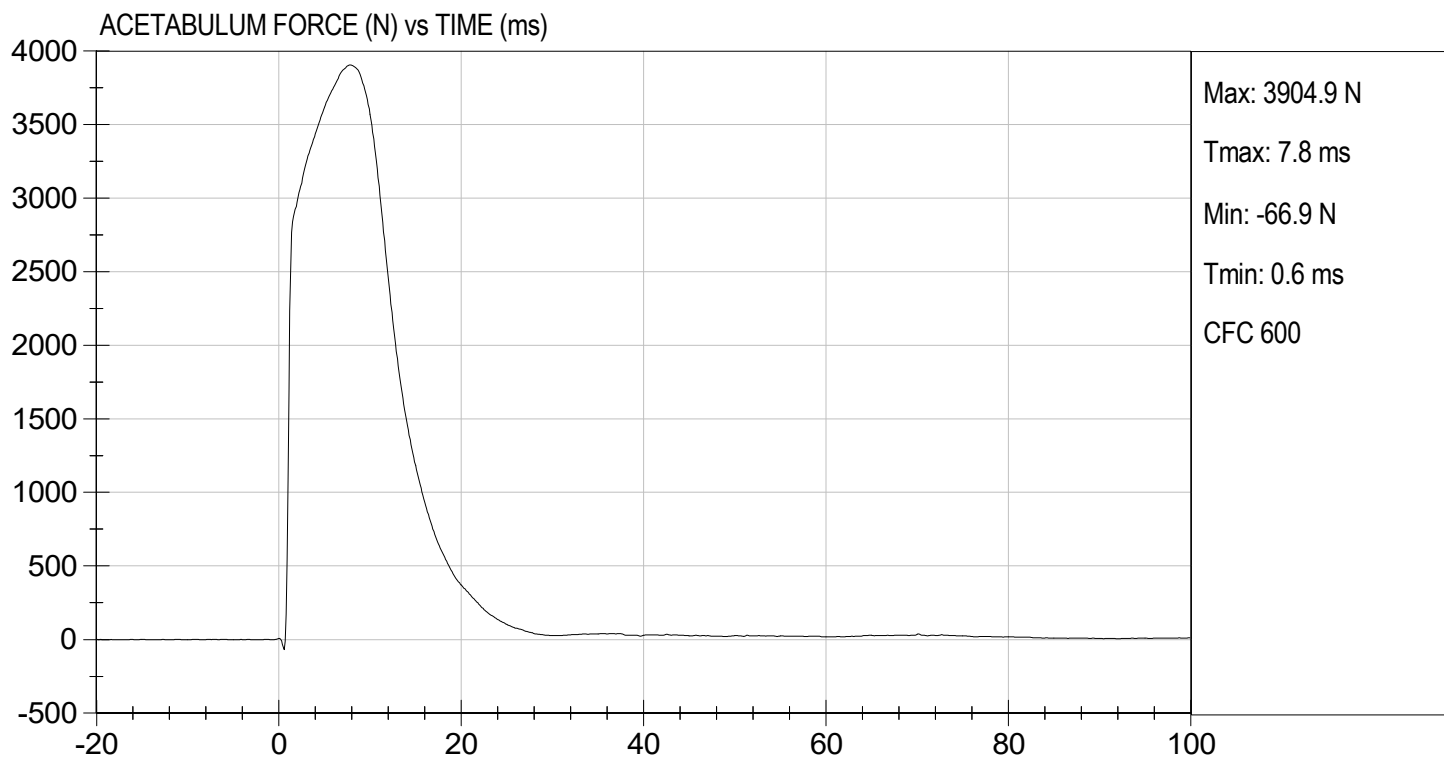
TEST DATE: 02/06/2024
TEST #: D240397





TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 02/06/2024
TEST #: D240397



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

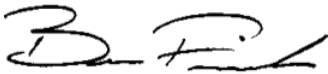
Test I.D: D240398

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	28	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	36 to 45	36	Pass
Pelvis Y Acceleration	G's	28 to 39	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,135	Pass
Overall Test Results			Pass	


Laboratory Technician

02/06/2024

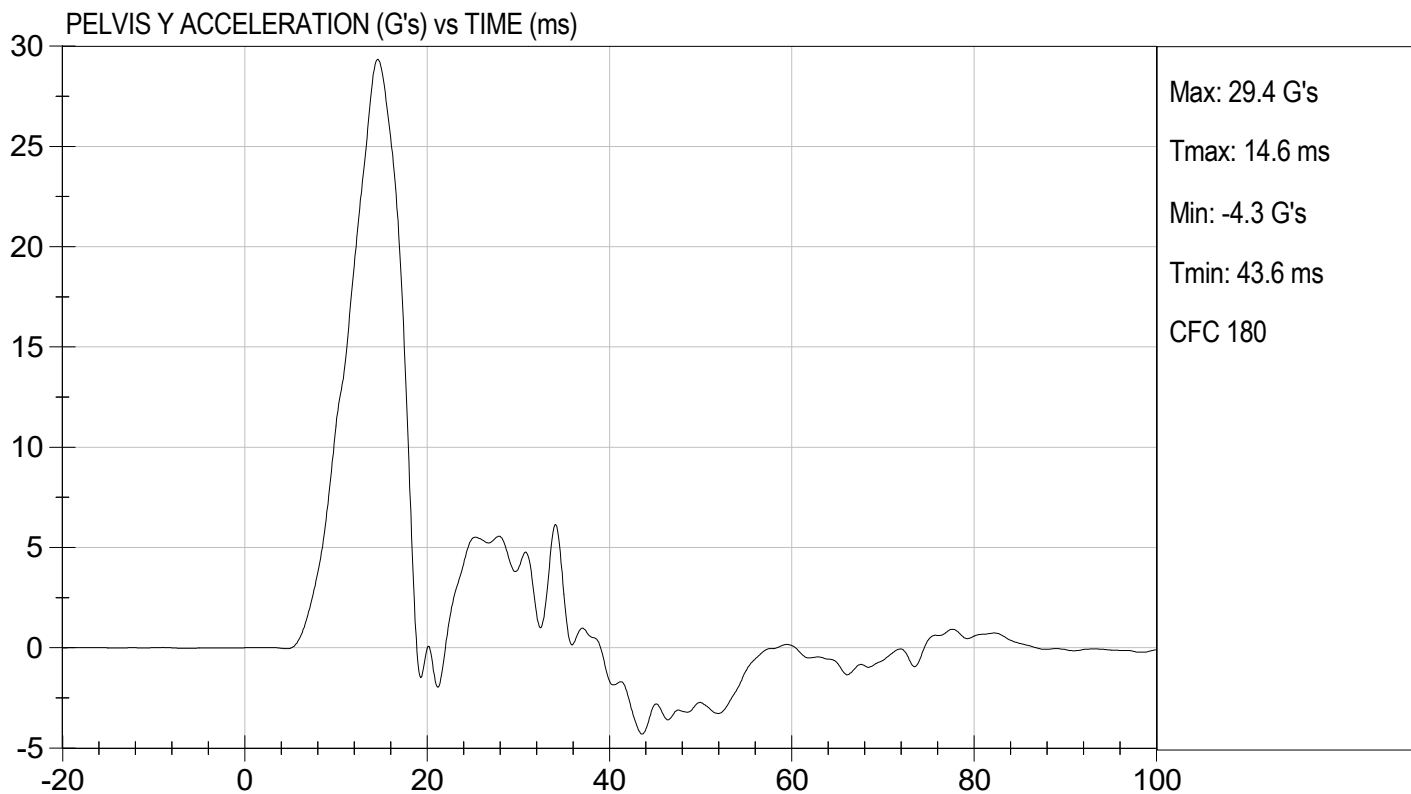
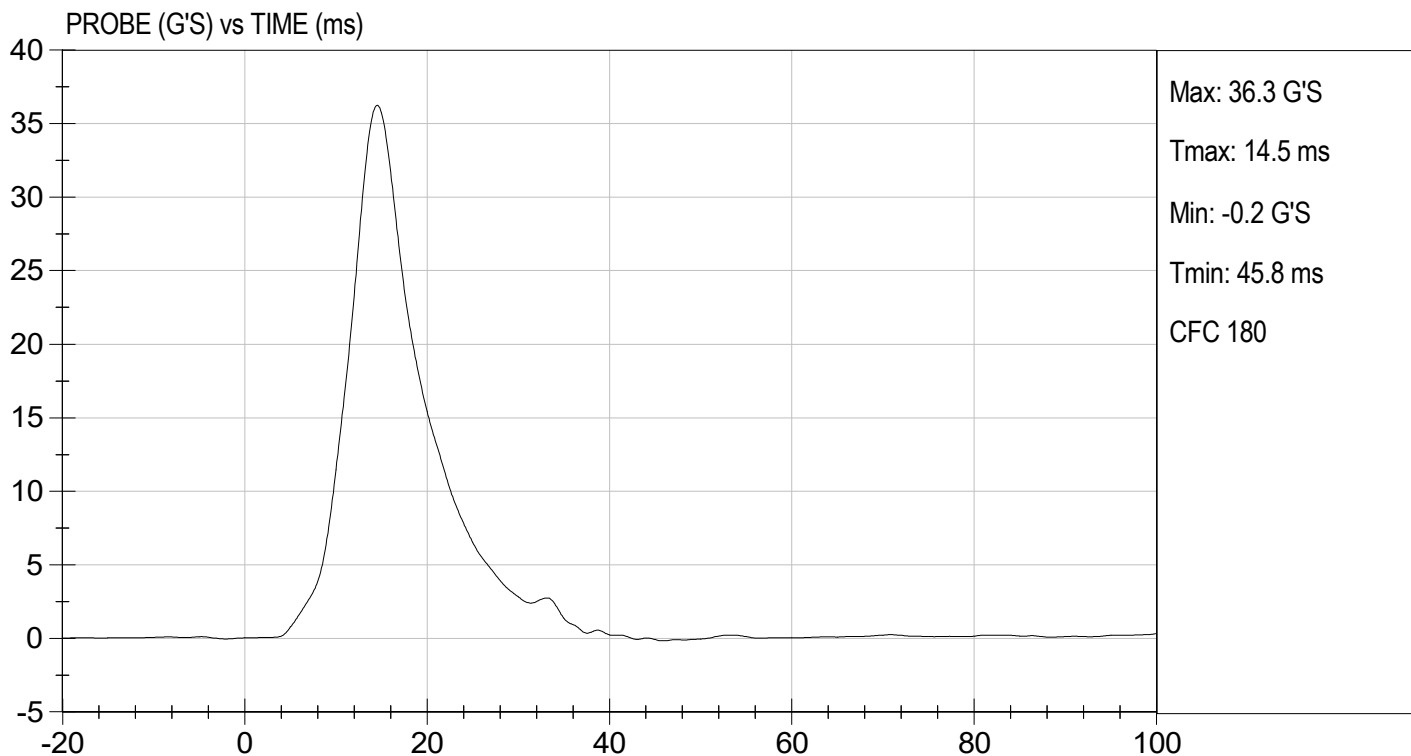
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.01 ft/s, 4.27 m/s

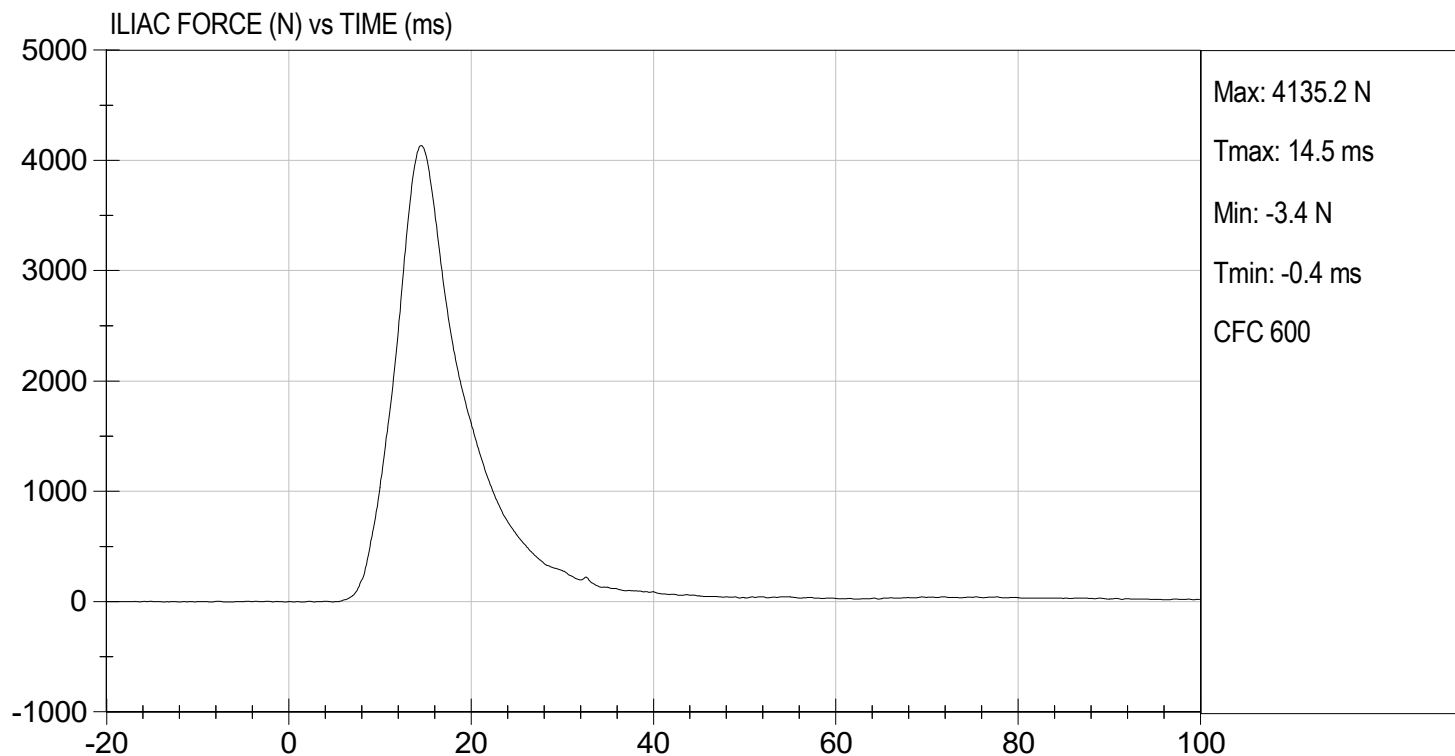
TEST DATE: 02/06/2024
TEST #: D240398





TEST DESC: ILLIAC
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/06/2024
TEST #: D240398





SID-IIs Pelvis Plug Certification Test

Plug S/N 14819

Test Number 17251

Report Number 17297

Test Date 1/28/2021 10:42:25 AM

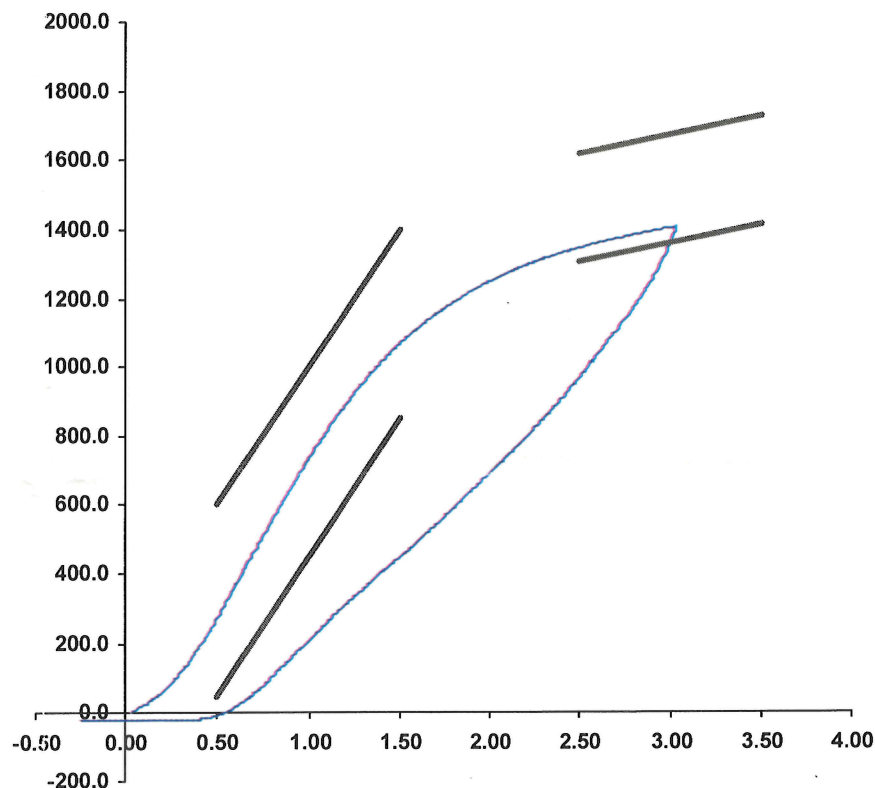
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	280	50	600
Force @ 1.5 mm (N)	1,070	850	1,400
Force @ 2.5 mm (N)	1,348	1,306	1,618
Force @ 3.0 mm (N)	1,407	1,361	1,673

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
SACO Research

28-Jan-21

By : DC Date : 1/28/2021

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

C-119



SID-IIs Pelvis Plug Certification Test

Plug S/N 14306

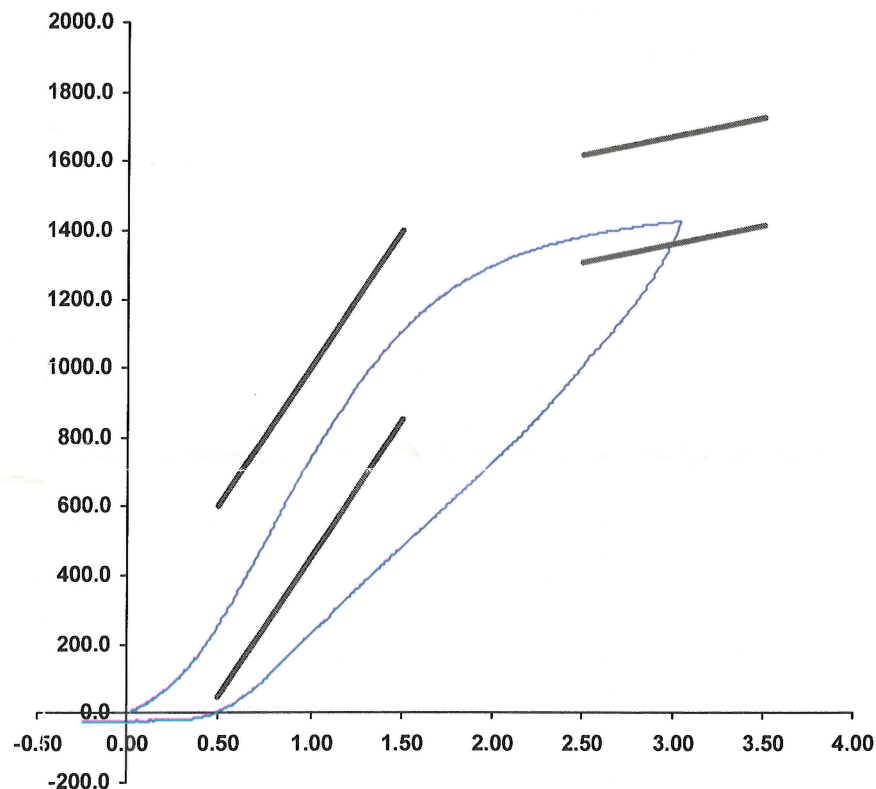
Test Number 14484

Report Number 14528

Test Date 7/5/2020 12:24:29 PM

Force (-N) vs Extension (-mm)

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	264.02	50.00	600.00
Force @ 1.5 mm (N)	1,109.20	850.00	1,400.00
Force @ 2.5 mm (N)	1,382.39	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,425.70	1,361.00	1,673.00



Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000

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

Notes:

Operator

Part Number 180-4450

Template No 107

05-Jul-20

SACO Research

By :

DC

Date :

7-5-2020

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N F032		
			Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers		X	P79568	Endevco	11/20/2023
		Y	P79569	Endevco	11/20/2023
		Z	P79570	Endevco	11/20/2023
		Xr	P86797	Endevco	11/20/2023
		Yr	P94957	Endevco	11/20/2023
		Zr	P97381	Endevco	11/20/2023
Thorax Rib Displacement Potentiometers	Upper	Y	G236	Honeywell	11/20/2023
	Middle	Y	G368	Honeywell	11/20/2023
	Lower	Y	G164	Honeywell	11/20/2023
Abdomen Load Cells	Forward	Y	ABG1532	Denton	04/20/2023
	Middle	Y	ABG1534	Denton	04/20/2023
	Rear	Y	ABG1535	Denton	04/20/2023
Lower Spine Accelerometers (T12)		X	P79574	Endevco	11/20/2023
		Y	T14094	Endevco	11/20/2023
		Z	P82603	Endevco	11/20/2023
Public Symphysis Load Cell		Y	PG461	Denton	04/20/2023

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P82109	Endevco	12/21/2023
				Y	P94783	Endevco	12/21/2023
				Z	P94786	Endevco	12/21/2023
				Xr	P94938	Endevco	12/21/2023
				Yr	P96854	Endevco	12/21/2023
				Zr	P97386	Endevco	12/21/2023
Head Angular Rate Sensors				X	ARS15213	DTS	04/07/2023
				Y	ARS15229	DTS	04/07/2023
				Z	ARS15231	DTS	04/07/2023
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	12/21/2023	
		Middle	Y	G1163	FTSS	12/21/2023	
		Lower	Y	G1158	FTSS	12/21/2023	
	Abdominal Rib	Upper	Y	G1146	FTSS	12/21/2023	
		Lower	Y	G1126	FTSS	12/21/2023	
Lower Spine Accelerometers (T12)				X	P79614	Endevco	12/21/2023
				Y	P79439	Endevco	12/21/2023
				Z	P79418	Endevco	12/21/2023
Acetabulum Load Cell				Y	ACG269	Denton	04/20/2023
Iliac Wing Load Cell				Y	IWG282	Denton	04/20/2023
Pelvis Plug (struck side)					14819	SACO	01/22/2021
Pelvis Plug (non-struck side)					14306	SACO	07/05/2020

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	T39234	Endevco	10/31/2023
	Vehicle Center of Gravity	Y	T39269	Endevco	11/07/2023
	Vehicle Center of Gravity	Z	T39230	Endevco	10/31/2023
2	Right Sill at Front Seat	X	T37973	Endevco	10/26/2023
	Right Sill at Front Seat	Y	T39216	Endevco	10/31/2023
	Right Sill at Front Seat	Z	T39236	Endevco	11/02/2023
3	Right Sill at Rear Seat	X	T39252	Endevco	11/02/2023
	Right Sill at Rear Seat	Y	T39331	Endevco	11/06/2023
	Right Sill at Rear Seat	Z	T39253	Endevco	11/02/2023
4	Left Sill at Front Door	Y	T39104	Endevco	10/28/2023
5	Left Sill at Rear Door	Y	T35284	Endevco	01/10/2024
6	Left A-Post Lower	Y	T39025	Endevco	10/21/2023
7	Left A-Post Middle	Y	A405208	MSI	09/15/2023
8	Left B-Post Lower	Y	T32696	Endevco	12/22/2023
9	Left B-Post Middle	Y	T35295	Endevco	12/22/2023
10	Front Seat Track	Y	T32196	Endevco	08/29/2023
11	Rear Seat Track or Structure	Y	T39054	Endevco	10/24/2023
12	Right Rear Occ. Compartment	Y	T39032	Endevco	10/21/2023
13	Engine Block	X	T33471	Endevco	11/17/2023
	Engine Block	Y	T33480	Endevco	11/17/2023
14	Rear Floorpan Above Axle	X	R11468	Endevco	01/09/2024
	Rear Floorpan Above Axle	Y	R10298	Endevco	01/09/2024
	Rear Floorpan Above Axle	Z	R11045	Endevco	01/09/2024

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB1183D	PCB	01/10/2023
MDB Center of Gravity	Y	PCB1822D	PCB	01/10/2023
MDB Center of Gravity	Z	PCB1753D	PCB	01/10/2023
Left Frame at Rear Axle Centerline	X	PCB1438D	PCB	01/10/2023
Left Frame at Rear Axle Centerline	Y	PCB1653D	PCB	01/10/2023