

REPORT NUMBER: SideNCAPMDB-MGA-23-054

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

**HYUNDAI MOTOR COMPANY
2023 Hyundai Palisade Calligraphy 5-Door SUV
NHTSA No.: O20234204**

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



Test Date: January 11, 2024

Final Report Date: October 18, 2024

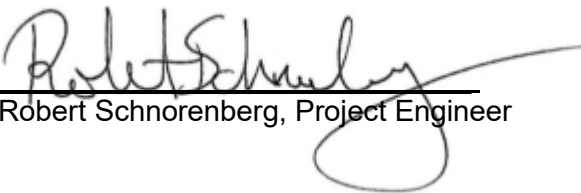
FINAL REPORT

**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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Prepared by: 
Ben Fischer, Program Manager

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: October 18, 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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15. Supplementary Notes																																																							
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2023 Hyundai Palisade Calligraphy 5-Door SUV 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 January 11, 2024. The impact velocity of the Moving Deformable Barrier (MDB) was 62.01 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 20.9°C. The target vehicle post-test maximum crush was 222 mm at level 2. 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>29.482</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>14.511</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>393.459</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>927.653</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82*</td> <td>17.267</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>60.738</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>35.126</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>1844.227</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>12.242</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>14.476</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	29.482	Maximum Thorax Rib Deflection	mm	44	14.511	Total Abdominal Force	N	2500	393.459	Pubic Symphysis Force	N	6000	927.653	Resultant Lower Spine Acceleration	g	82*	17.267	Measurement Description	Units	Passenger ATD (SID-IIs)		Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	60.738	Resultant Lower Spine Acceleration	g	82	35.126	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1844.227	Maximum Thoracic Rib Deflection	mm	38*	12.242	Maximum Abdomen Rib Deflection	mm	45*	14.476
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2023 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 2023 Hyundai Palisade Calligraphy 5-Door SUV. 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 2023 Hyundai Palisade Calligraphy 5-Door SUV 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 62.01 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 January 11, 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	29.482
Maximum Thorax Rib Deflection	mm	44	14.511
Total Abdominal Force	N	2500	393.459
Pubic Symphysis Force	N	6000	927.653
Resultant Lower Spine Acceleration	g	82*	17.267

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	60.738
Resultant Lower Spine Acceleration	g	82	35.126
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1844.227
Maximum Thoracic Rib Deflection	mm	38*	12.242
Maximum Abdomen Rib Deflection	mm	45*	14.476

*Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Side Torso Airbag			Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20234204	Traction Control System (TCS)	Yes
Model Year	2023	Auto-Leveling System	No
Make	Hyundai	Automatic Door Locks (ADL)	Yes
Model	Palisade Calligraphy	Power Window Auto-Reverse	No
Body Style	5-Door SUV	Other Optional Feature	No
VIN	KM8R74GE9PU583002	Driver Front Airbag	Yes
Body Color	Sierra Burgundy	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	79 km / 49 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	3.8	Driver Torso Airbag	No
Type/No. Cylinders	V6	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	Yes
Roof Rack	Yes	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	Driver Only	Driver Load Limiter	No
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		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)	2600
Date of Manufacture	JAN/2023	GAWR Front (kg)	1340
Vehicle Type	MPV	GAWR Rear (kg)	1450

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	2	3	7	
Capacity Weight (VCW) (kg)				532	(A)
DSC x 68 kg				476	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				56	(A-B)

VEHICLE SEAT TYPE

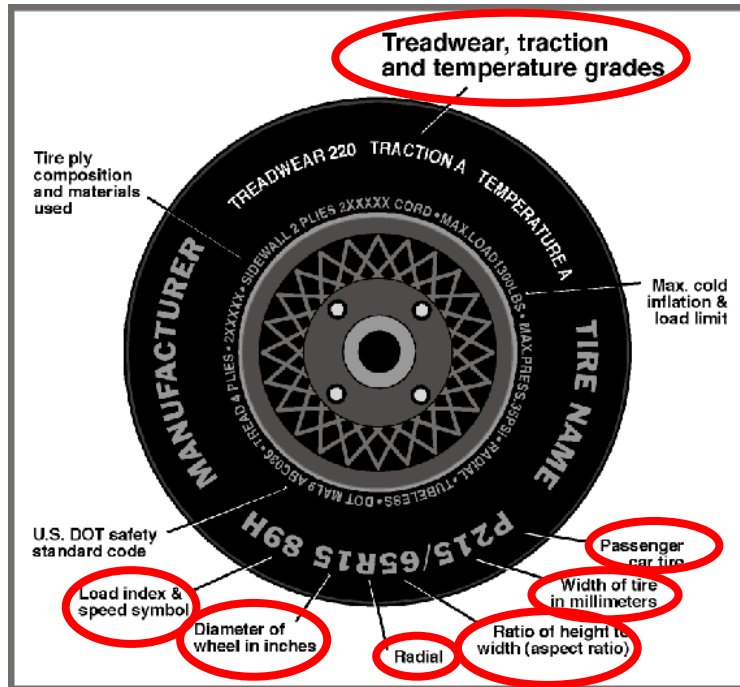
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second Row	X					X	
Third Row Seat			X		X		

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

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	245/50R20	245/50R20
Tire Size on Vehicle	245/50R20	245/50R20
Tire Manufacturer	Hankook	Hankook
Tire Model	Ventus S1 Noble2	Ventus S1 Noble2
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	102V	102V
Tire Material	Rubber	Rubber
DOT Safety Code Left	15MAO 1AHO 5222	15MAO 1AHO 5222
DOT Safety Code Right	15MAO 1AHO 5222	15MAO 1AHO 5222

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

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

TEST VEHICLE TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	170	165	180	180
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

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	580.0	420.5		616.5	511.0		625.5	506.5	
Right	kg	538.5	447.5		541.0	496.0		536.0	503.0	
Ratio	%	56.3%	43.7%		53.5%	46.5%		53.5%	46.5%	
Totals	kg	1118.5	868.0	1986.5	1157.5	1007.0	2164.5	1161.5	1009.5	2171.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1986.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	56	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2171.5	(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	802	799	Yes
Right Front	mm	796	789	Yes
Right Rear	mm	812	810	Yes
Left Rear	mm	806	796	Yes
Vehicle CG (Aft of Front Axle)	mm	1351	1352	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	37	36	

* 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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	14
Components Removed: none	kg	

TEST SURFACE MARKINGS

	Units	Distance from 63° Impact Angle Line
Fore 25 mm Target	mm	980
Aft 25 mm Target	mm	993
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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

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	14.8	8.1	11.5
Front Passenger Seat	15.9	9.5	12.7
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat			

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	11.5	0	Max	60	60	60
			Mid	30	30	30
			Min	0	0	0
Front Passenger Seat	12.7	0	Max	60	60	60
			Mid	30	30	30
			Min	0	0	0
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat			Max			
			Mid			
			Min			

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

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

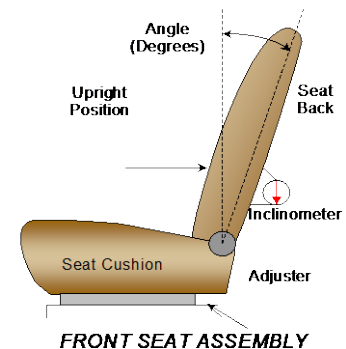
NHTSA No.: O20234204
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SEAT FORE/AFT POSITIONS

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	240		120	
Front Passenger Seat	240		120	
Front Center Seat				
Struck Side Rear Seat	135	10	135	9
Non-Struck Side Rear Seat	135	10	135	9
Rear Center Seat				

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	75.5		1.0	
Front Passenger Seat	61.1		1.0	
Front Center Seat				
Struck Side Rear Seat	22.0	12	4.5	0
Non-Struck Side Rear Seat	22.6	12	4.5	0
Rear Center Seat				

Seat back angles measured on outboard headrest post.

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

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
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NHTSA No.: O20234204
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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	4	0 (Uppermost as 0)
Rear Seat	Fixed	

HEAD RESTRAINT ADJUSTMENT

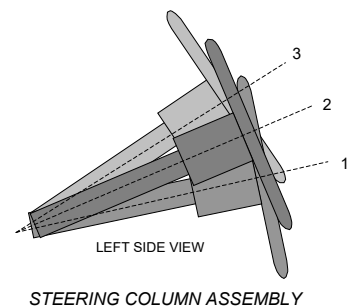
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	6	0 (Lowest as 0) / Fixed Fore-Aft
Rear Seat	4	0 (Lowest as 0) / Fixed Fore-Aft

STEERING COLUMN ADJUSTMENT

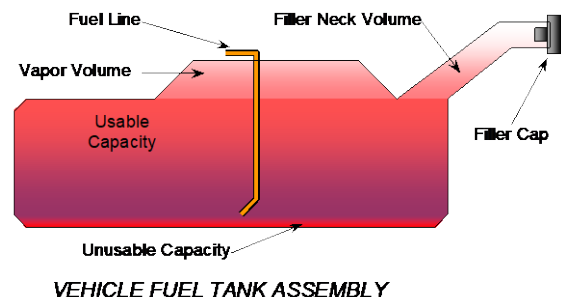
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	65.2	
Geometric Center, Position 2	62.6	
Uppermost, Position 3	59.9	
Telescoping Steering Wheel Travel		50
Test Position	62.6	25



FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump will operate when the engine system is operating normally. 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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

FUEL TANK CAPACITY DATA

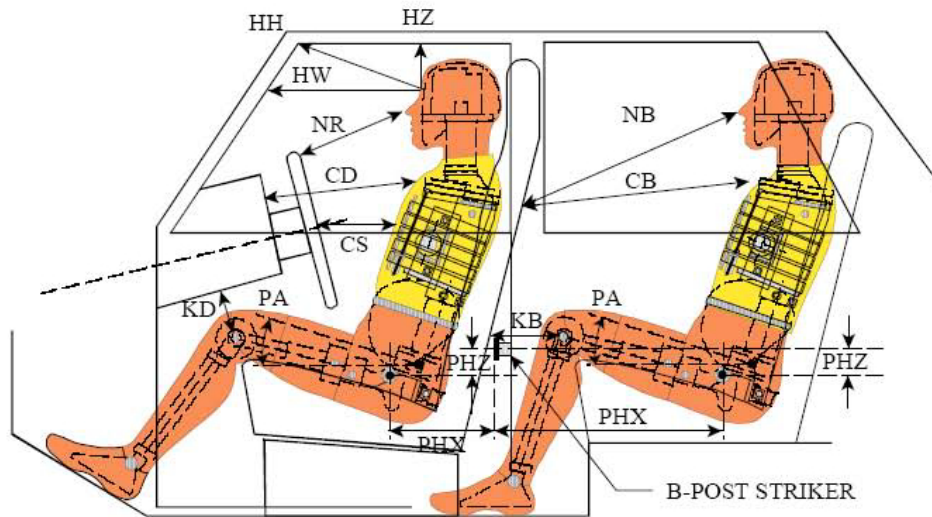
	Liters
Usable Capacity of Standard Tank (see S1 - Vehicle Setup Information)	71.0
Usable Capacity of Optional Tank (see S1 - Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	71.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	66.0
Actual Amount of Solvent Used	66.1
1/3 of Usable Capacity	23.7

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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024



LEFT SIDE VIEW

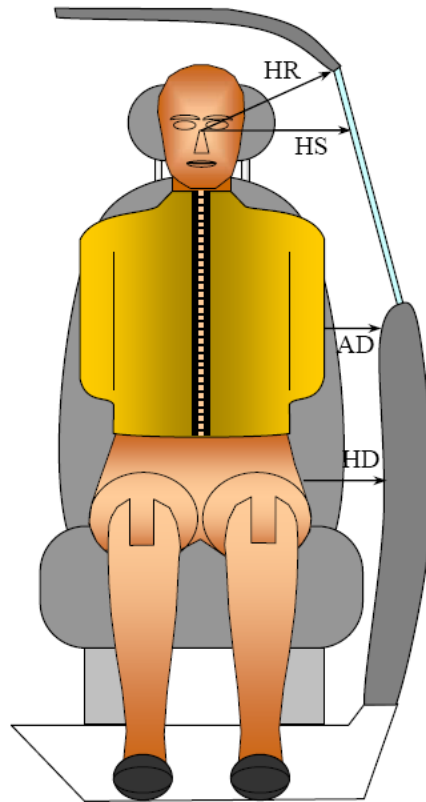
NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	388	12.1		
HW		Head to Windshield	609	0		
HZ	HZ	Head to Roof Liner	150	90	286	90
NR	NB	Nose to Rim/Seat Back	464	17.4	612	4.2
CD	CB	Chest to Dashboard/Seat Back	600	4.5	601	6.8
CS		Chest to Steering Wheel	370	7.7		
KDL	KBL	Left Knee to Dash/Seat Back	171	29.4	320	18.3
KDR	KBR	Right Knee to Dash/Seat Back	162	29.9	326	18.8
PAX	PAX	Pelvic Tilt Angle X		24.5		23.6
PAY	PAY	Pelvic Tilt Angle Y		-0.7		-1.0
PHX	PHX	Hip Point to Striker (X-Axis)	210		298	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	200		173	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

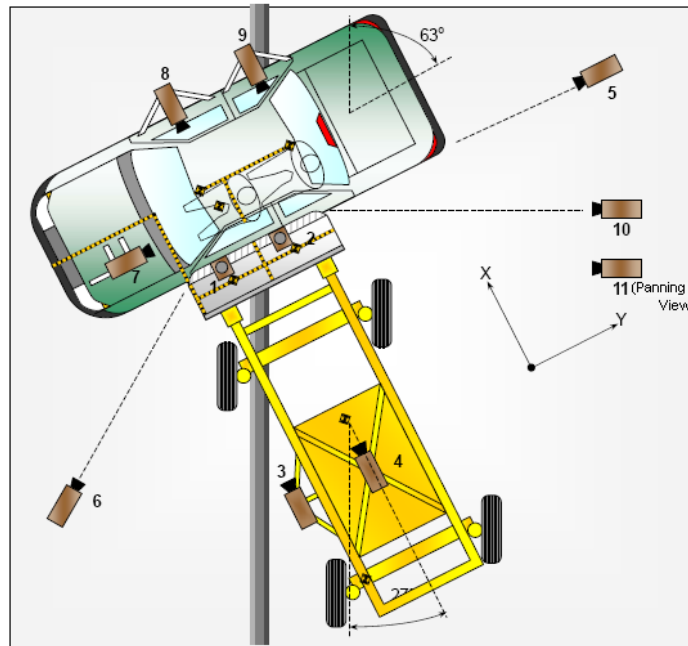


Code	Measurement Description	Driver	Passenger
		Length (mm)	
HR	Head to Side Header	210	285
HS	Head to Side Window	335	365
AD	Arm to Door	120	185
HD	Hip Point to Door	162	185

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	895	1155	-4995	8.5	1000
2	Overhead Close-Up	325	0	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	30	7590	-1525	24	1000
6	Left Front	-1730	-6065	-1605	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

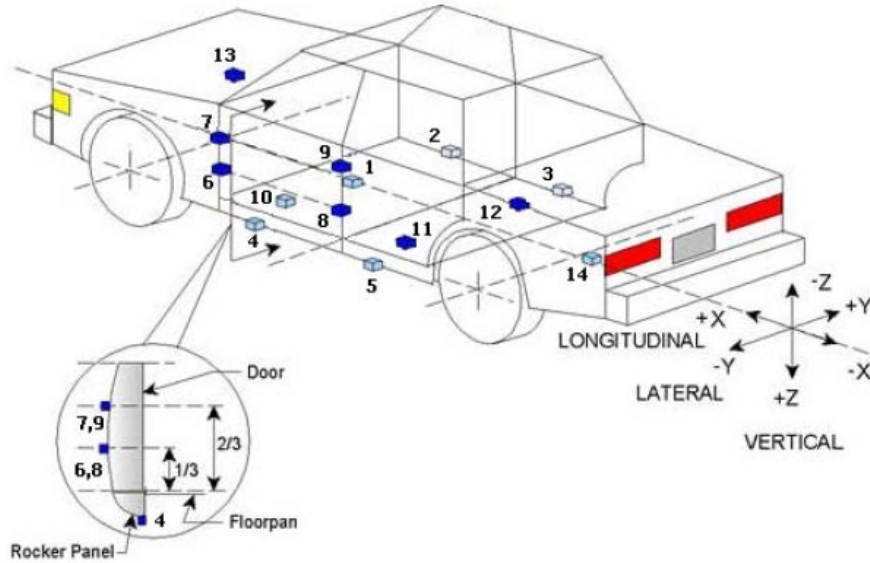
INSTRUMENTATION

	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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024



TEST VEHICLE ACCELEROMETER LOCATIONS

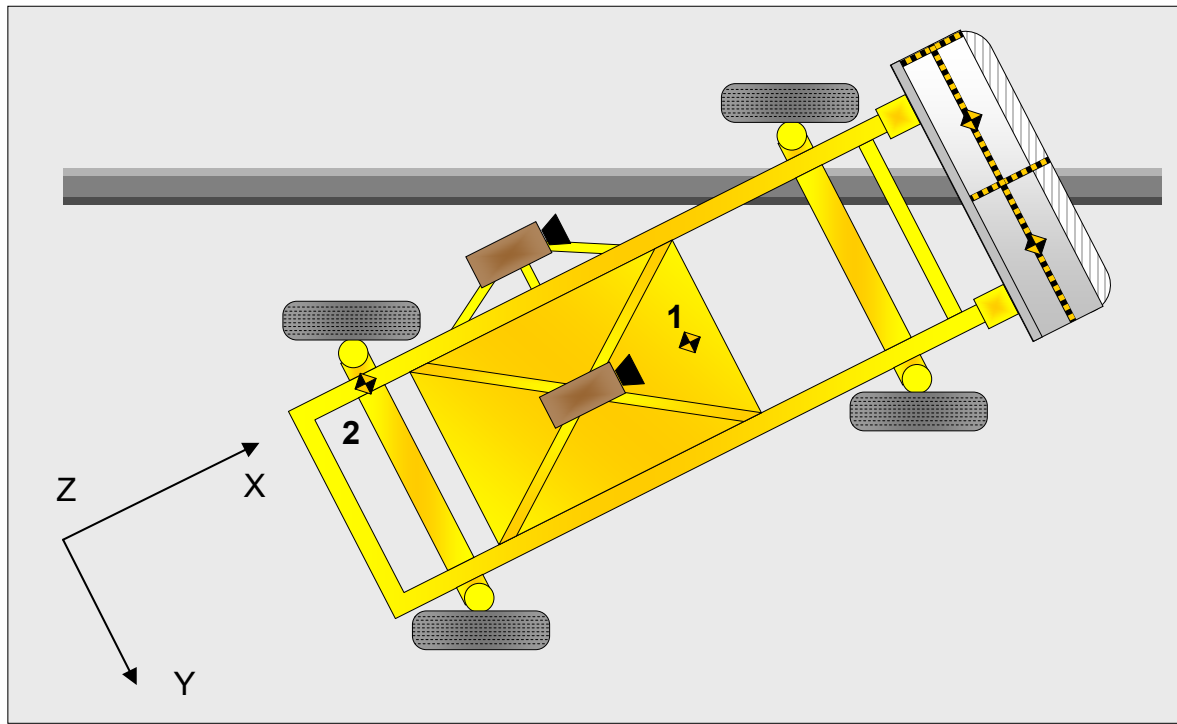
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2749	7	-427
2	Right Sill at Front Seat	2671	792	-243
3	Right Sill at Rear Seat	1665	792	-233
4	Left Sill at Front Door	2992	-796	-248
5	Left Sill at Rear Door	1951	-797	-236
6	Left Lower A-Post	3478	-900	-674
7	Left Middle A-Post	3487	-883	-911
8	Left Lower B-Post	2387	-780	-688
9	Left Middle B-Post	2367	-775	-917
10	Front Seat Track	2604	-414	-360
11	Rear Seat Structure	1590	-362	-509
12	Rt. Rear Occ. Compartment	1555	376	-507
13	Engine Block	4153	37	-952
14	Rear Above Axle	841	-16	-534

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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024



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	1401
---	----	------

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag, Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Headrest
Left Shoulder	Side Torso/Pelvis Airbag	Side Torso Airbag, Seat Back
Upper Torso	Side Torso/Pelvis Airbag, Seat Back	Side Torso Airbag, Seat Back
Lower Torso	Side Torso/Pelvis Airbag, Seat Back	Side Torso Airbag, Seat Back
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion	Seat Cushion, Door Panel
Left Knee	Door Panel	Seat Cushion, Door Panel

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	19.5°	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 cracked
Other Notable Effects	None

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

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheelbase	mm		2906
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		508
Actual Impact Point (Aft of Front Axle)	mm		504
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	4
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	1

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024

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

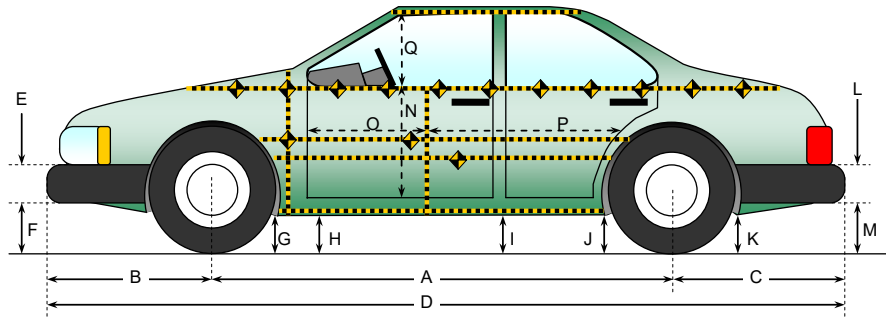
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.01
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.52
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.6
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	26.4

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
Test Date: 1/11/2024



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

LEFT SIDE VIEW

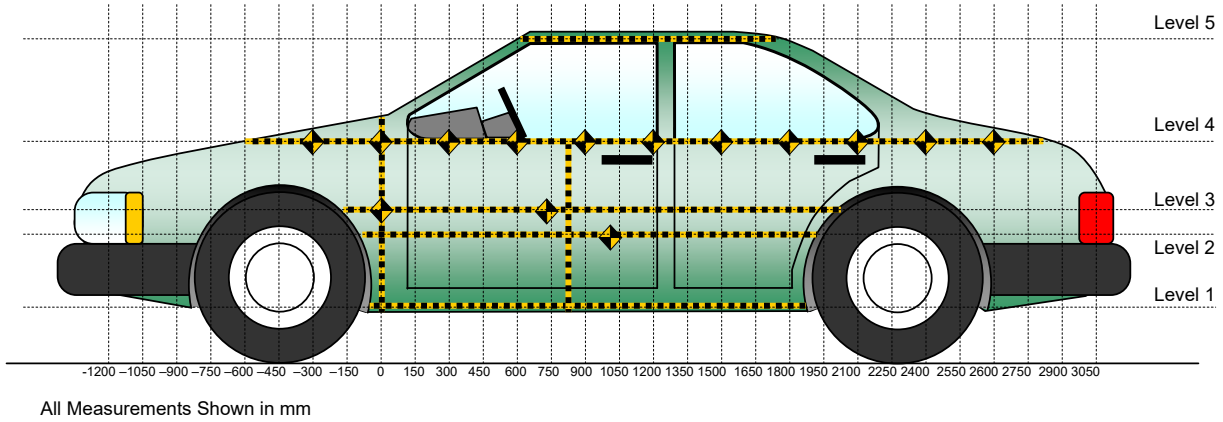
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2906	2902	-4
B	Front Axle to FSOV	956	953	-3
C	Rear Axle to RSOV	1135	1141	6
D	Total Length at Centerline	4997	4995	-2
E	Front Bumper Thickness	86	86	0
F	Front Bumper Bottom to Ground	463	480	17
G	Sill Height at Front Wheel Well	247	248	1
H	Sill Height at Front Door Leading Edge	247	251	4
I	Sill Height at B Pillar	250	244	-6
J1	Sill Height at Rear Wheel Well	248	244	-4
J2	Pinch Weld Height at Rear Wheel Well	249	242	-7
K	Sill Height Aft of Rear Wheel Well	278	277	-1
L	Rear Bumper Thickness	65	65	0
M	Rear Bumper Bottom to Ground	454	454	0
N	Sill Height to Window Bottom Sill	770	719	-51
O	Front Door Leading Edge to Impact CL	837	733	-104
P	Rear Door Trailing Edge to Impact CL	1218	1168	-50
Q	Front Window Opening	456	479	23
R	Right Side Length	4213	4210	-3
S	Left Side Length	4204	4203	-1
T	Vehicle Width at B Post	1934	1630	-304
U	Front Wheel Track Width	1712		
V	Rear Wheel Track Width	1712		

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	426	85	750
2	Mid Door	711	222	1650
3	Occupant H-Point	740	221	1650
4	Window Sill	1118	70	1350
5	Window Top	1651	4	1200

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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024

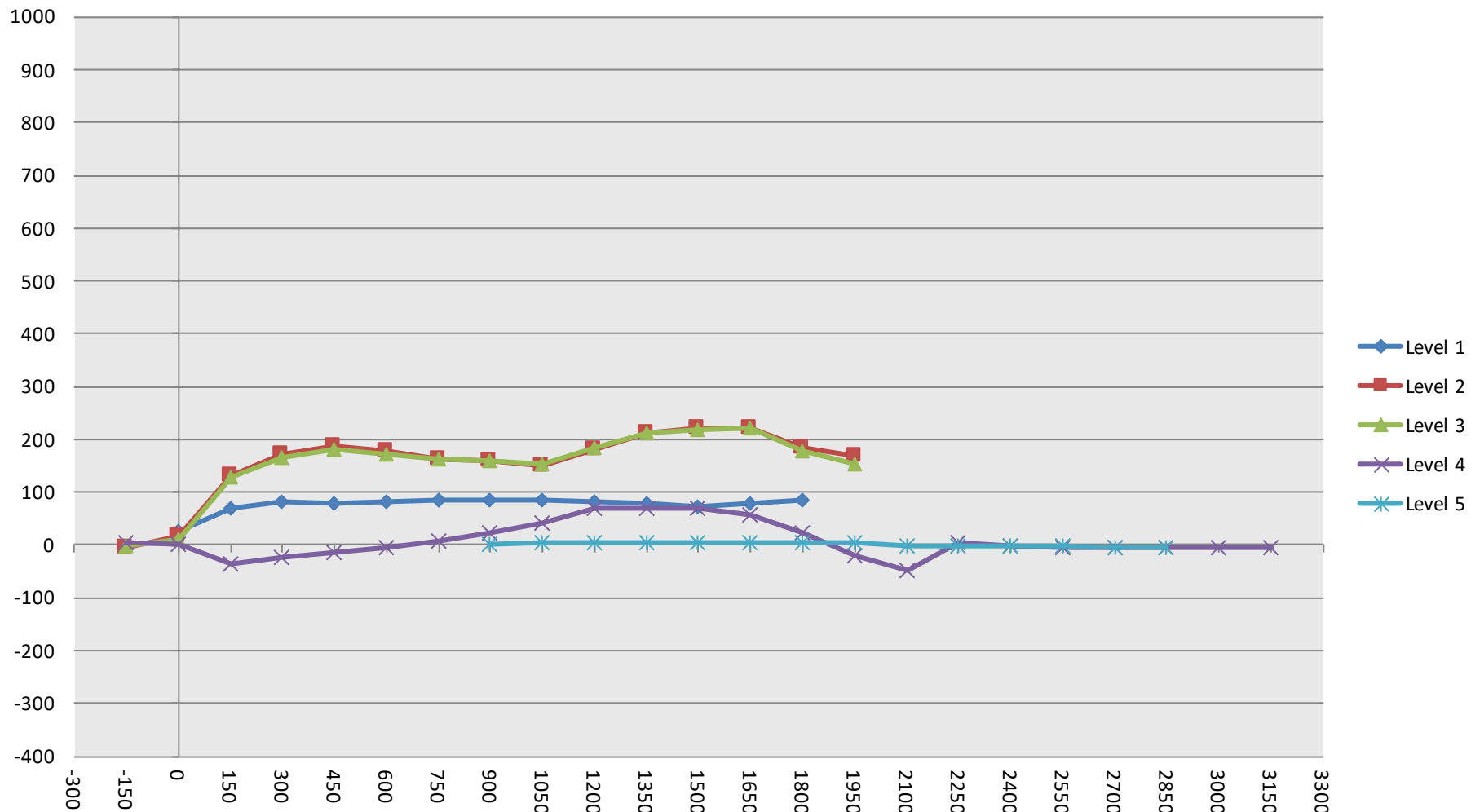
	Pre-Test					Post-Test					Exterior Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600															
-450															
-300															
-150		986	983	859			991	986	856			-5	-3	3	
0	966	984	982	873		941	968	971	873		25	16	11	0	
150	964	965	966	872		893	833	838	909		71	132	128	-37	
300	944	961	964	890		863	788	798	913		81	173	166	-23	
450	940	961	965	897		861	775	783	912		79	186	182	-15	
600	939	963	966	905		858	784	793	909		81	179	173	-4	
750	938	963	966	908		853	799	802	900		85	164	164	8	
900	937	964	967	911	660	852	804	809	889	659	85	160	158	22	1
1050	935	963	967	911	667	850	813	815	869	664	85	150	152	42	3
1200	932	962	965	910	668	850	780	782	841	664	82	182	183	69	4
1350	927	960	963	909	667	849	748	752	839	663	78	212	211	70	4
1500	923	958	961	908	666	849	737	742	839	662	74	221	219	69	4
1650	927	959	961	905	665	849	737	740	847	661	78	222	221	58	4
1800	950	969	969	903	663	865	785	792	879	660	85	184	177	24	3
1950		984	984	900	662		815	831	919	659		169	153	-19	3
2100				897	652				946	654				-49	-2
2250				894	647				889	649				5	-2
2400				889	639				890	642				-1	-3
2550				884	628				889	631				-5	-3
2700				877	609				881	613				-4	-4
2850				872	578				877	582				-5	-4
3000				862					866					-4	
3150				848					852					-4	
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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
Test Program: NCAP Side MDB Impact Test

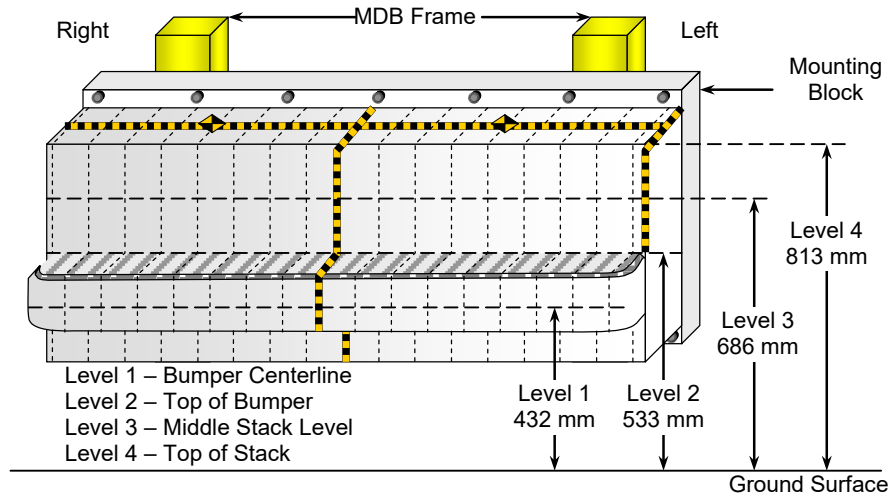
NHTSA No.: O20234204
Test Date: 1/11/2024



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024



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	700	Left	283
B	Top of Bumper	533	800	Left	139
C	Mid-Level	686	100	Right	95
D	Top of Stack	813	800	Left	181

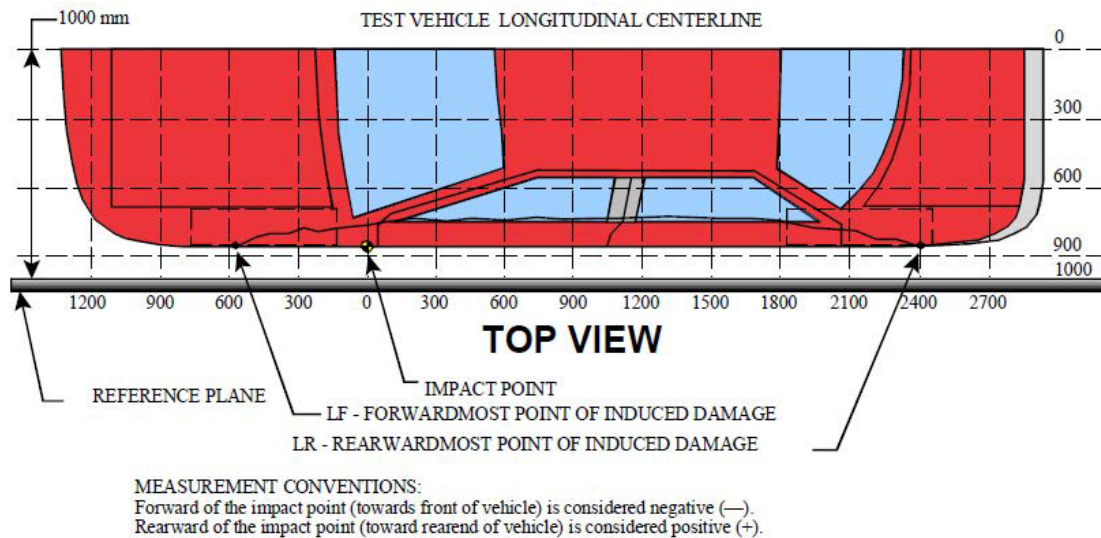
DEFORMABLE BARRIER STATIC CRUSH

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	122	87	52	57	69	85	101	119	125	110	101	107	111	115	137	157	181
3	72	32	25	29	41	51	69	95	94	85	78	65	59	61	66	76	92
2	95	87	87	89	92	103	119	102	104	101	102	102	105	106	108	112	139
1	246	253	255	257	260	262	265	267	269	270	271	273	276	278	280	283	279

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	1950	3	831	984	153
2	1510	3	740	961	221
3	1089	3	809	966	157
4	673	3	798	966	168
5	246	3	805	965	160
6	-150	3	986	983	-3

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	722	476	246
2	480 mm right of center	1	722	463	259
3	160 mm right of center	1	728	463	265
4	160 mm left of center	1	733	463	270
5	480 mm left of center	1	742	463	279
6	800 mm left of center	1	755	476	279

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

Test Vehicle: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

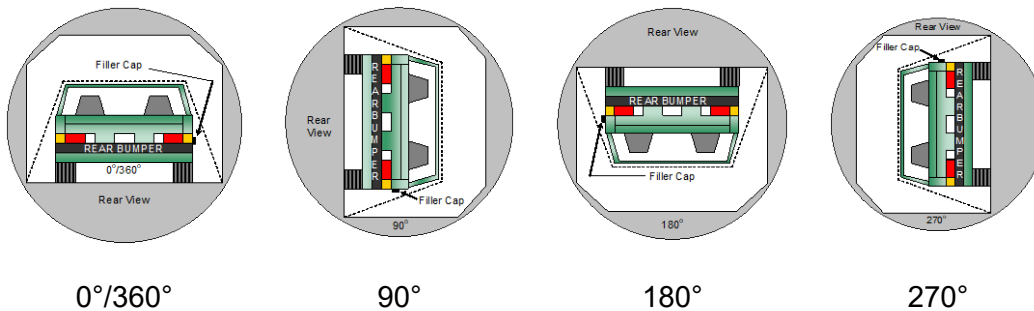
NHTSA No.: O20234204
 Test Date: 1/11/2024

Test Time: 12:08 pm

Temperature: 20.9°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°	88	300	388
180° to 270°	86	300	386
270° to 360°	90	300	390

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	

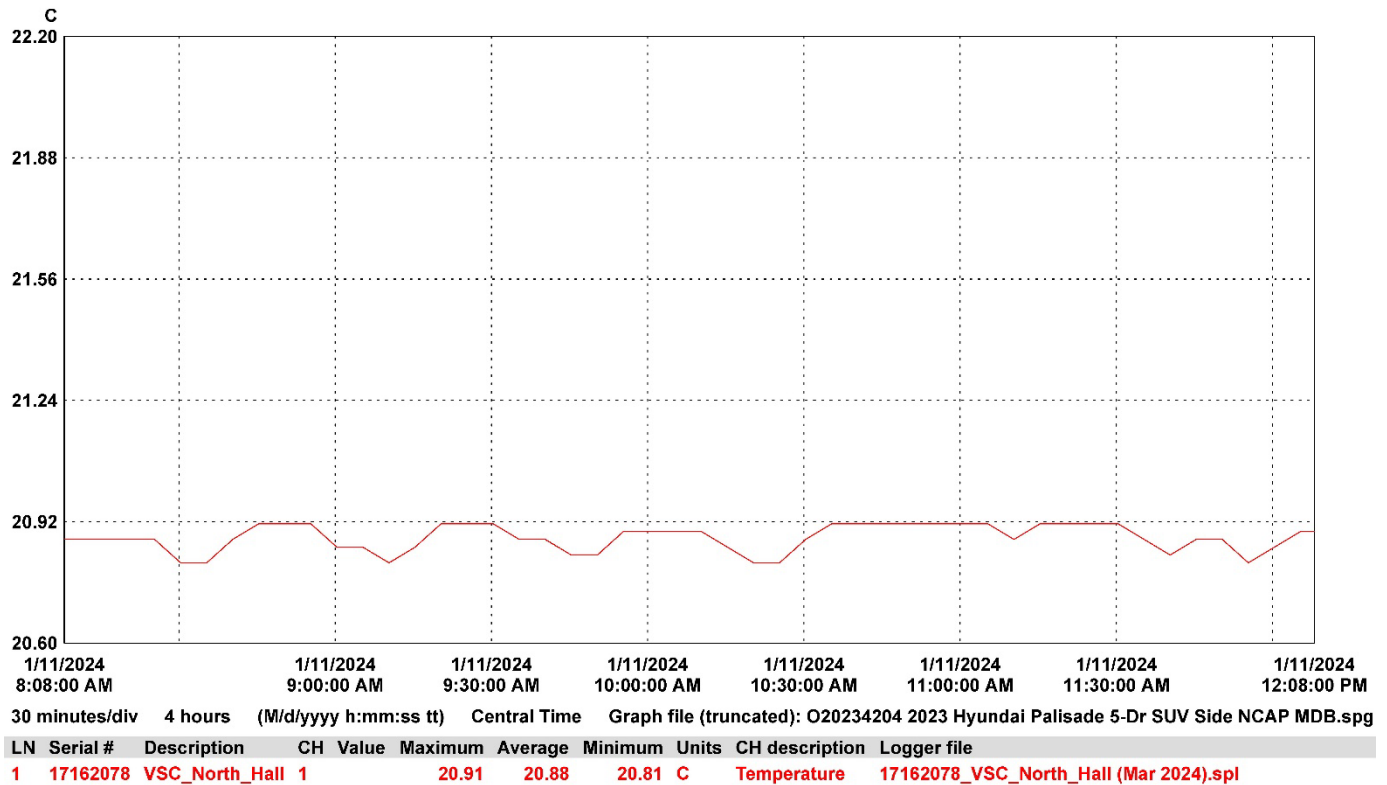
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2023 Hyundai Palisade Calligraphy 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20234204
 Test Date: 1/11/2024



APPENDIX A
PHOTOGRAPHS

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



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



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



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



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



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



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



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



Photo No. 009 - Pre-Test Left 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



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



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

PHOTOGRAPH NOT AVAILABLE

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



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





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

PHOTOGRAPH NOT AVAILABLE

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



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



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

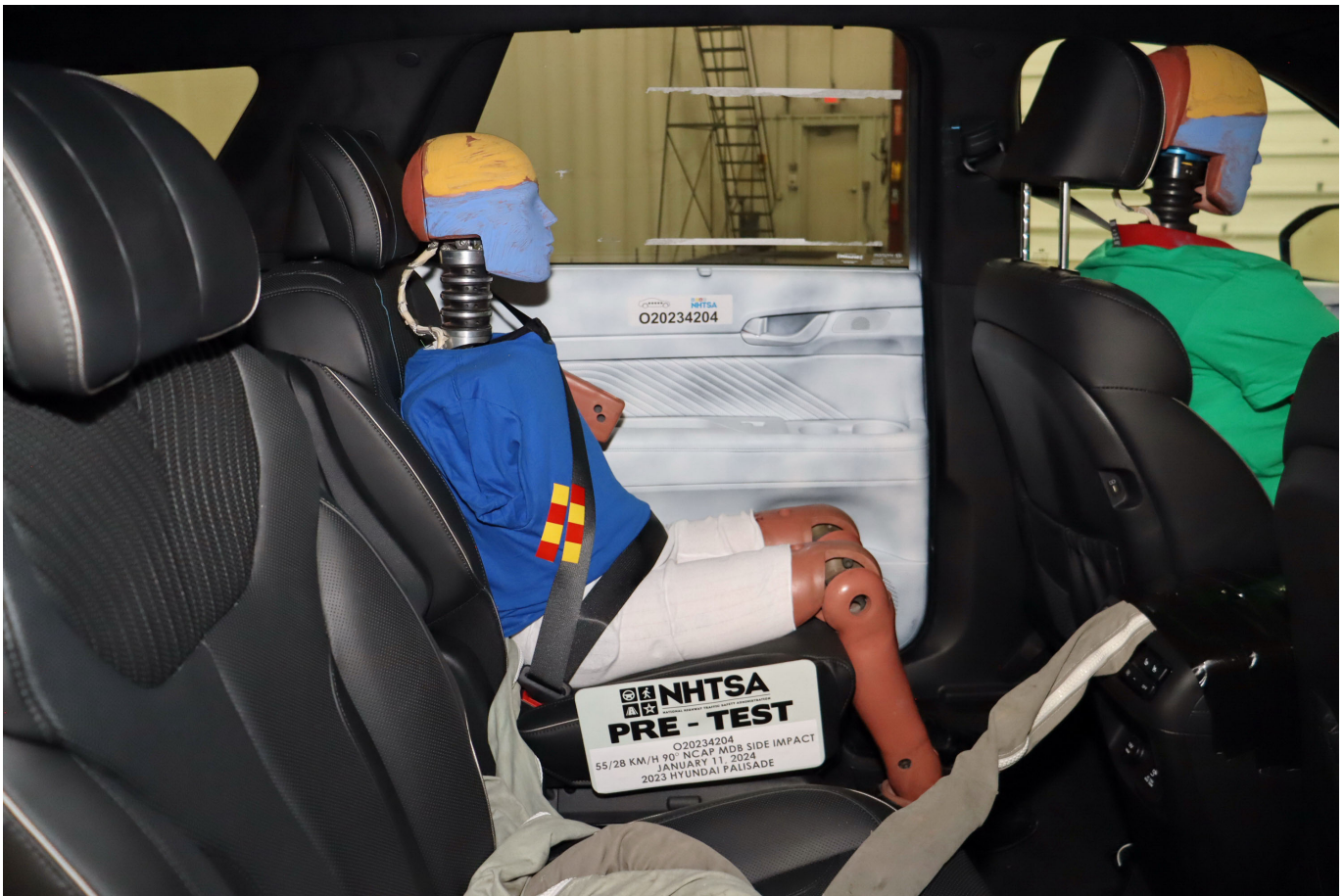


Photo No. 071 - Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



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

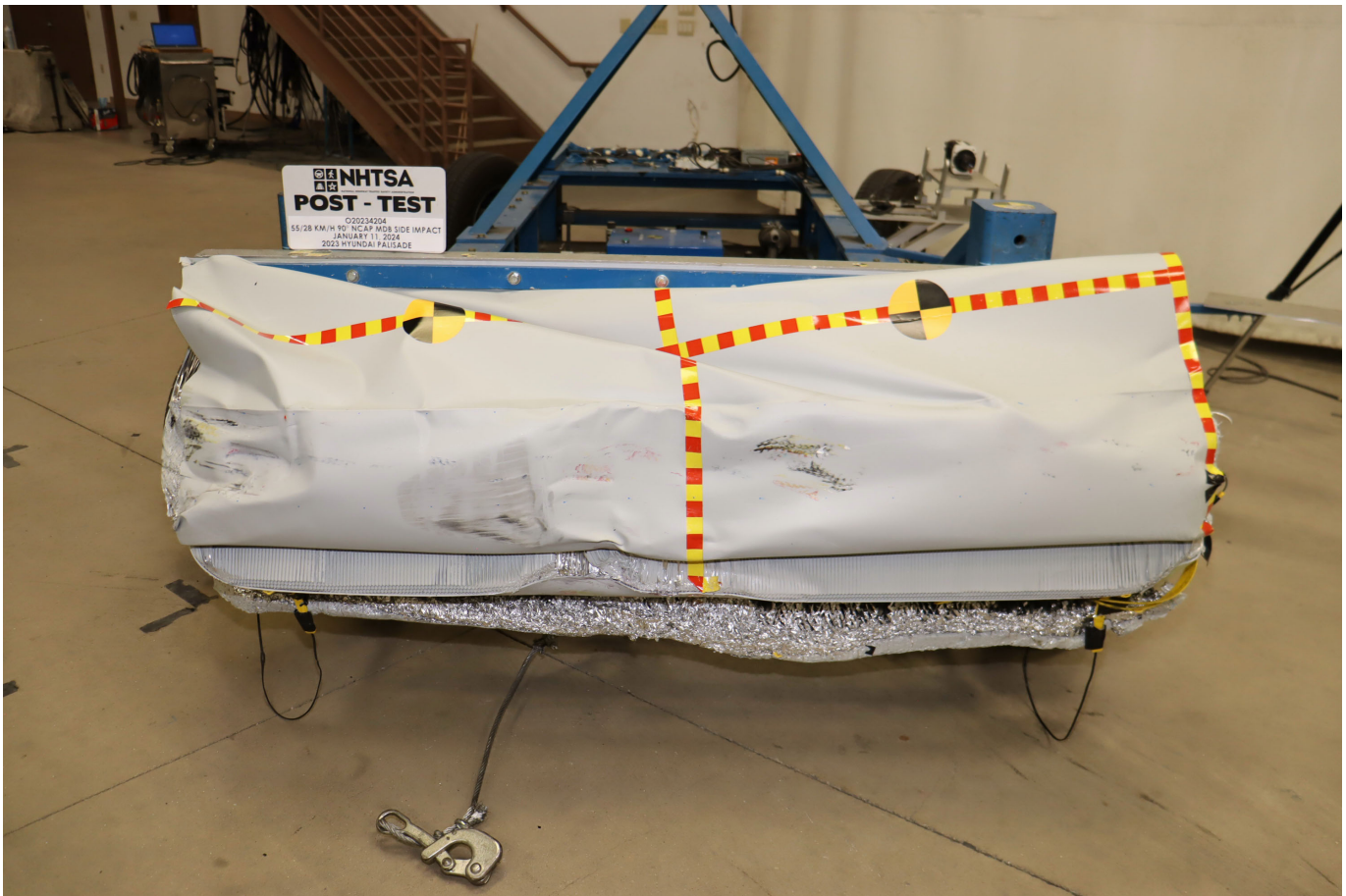


Photo No. 085 - Post-Test Front View of MDB Impactor Face

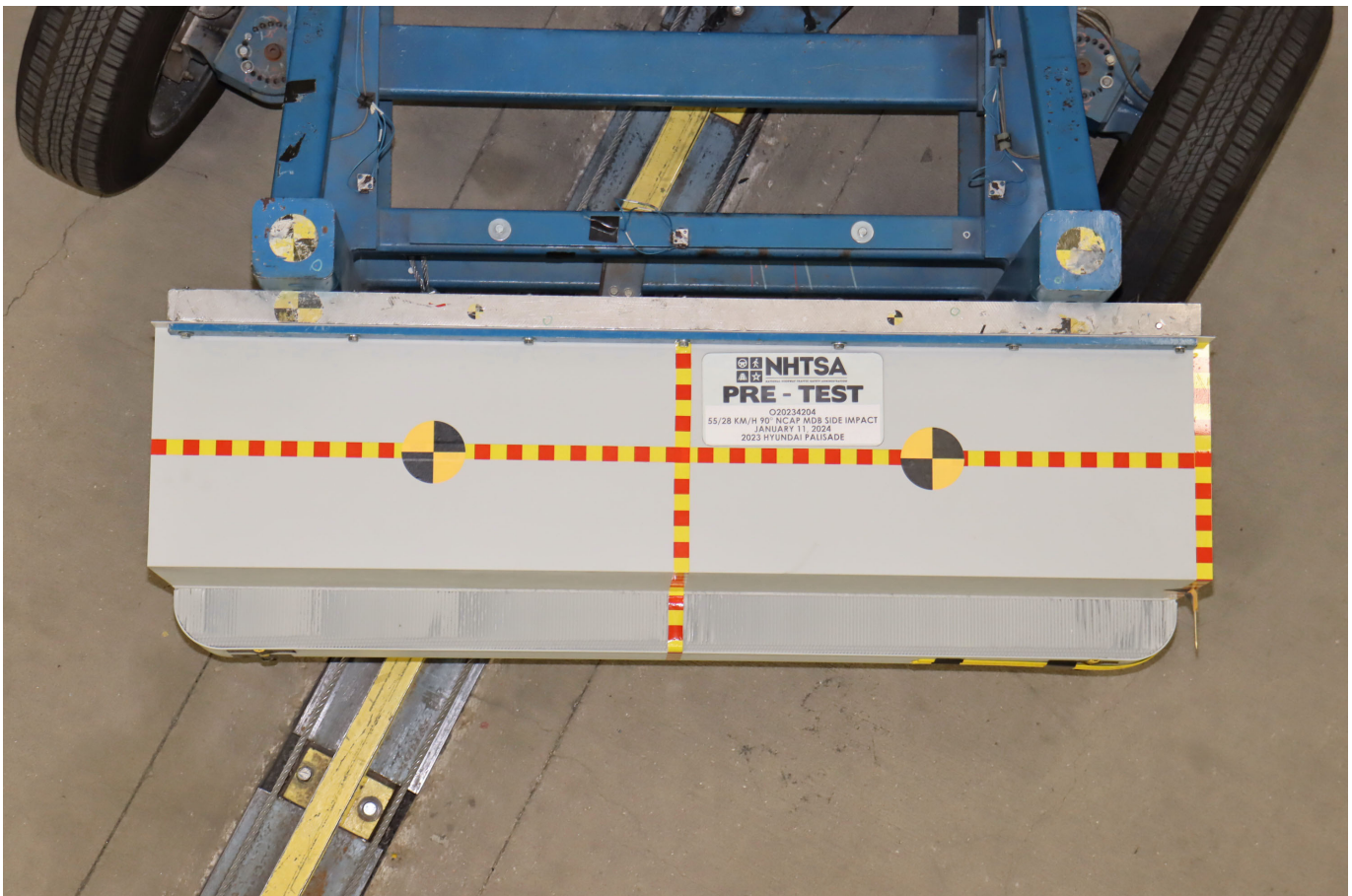


Photo No. 086 - Pre-Test Top View of MDB Impactor Face



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

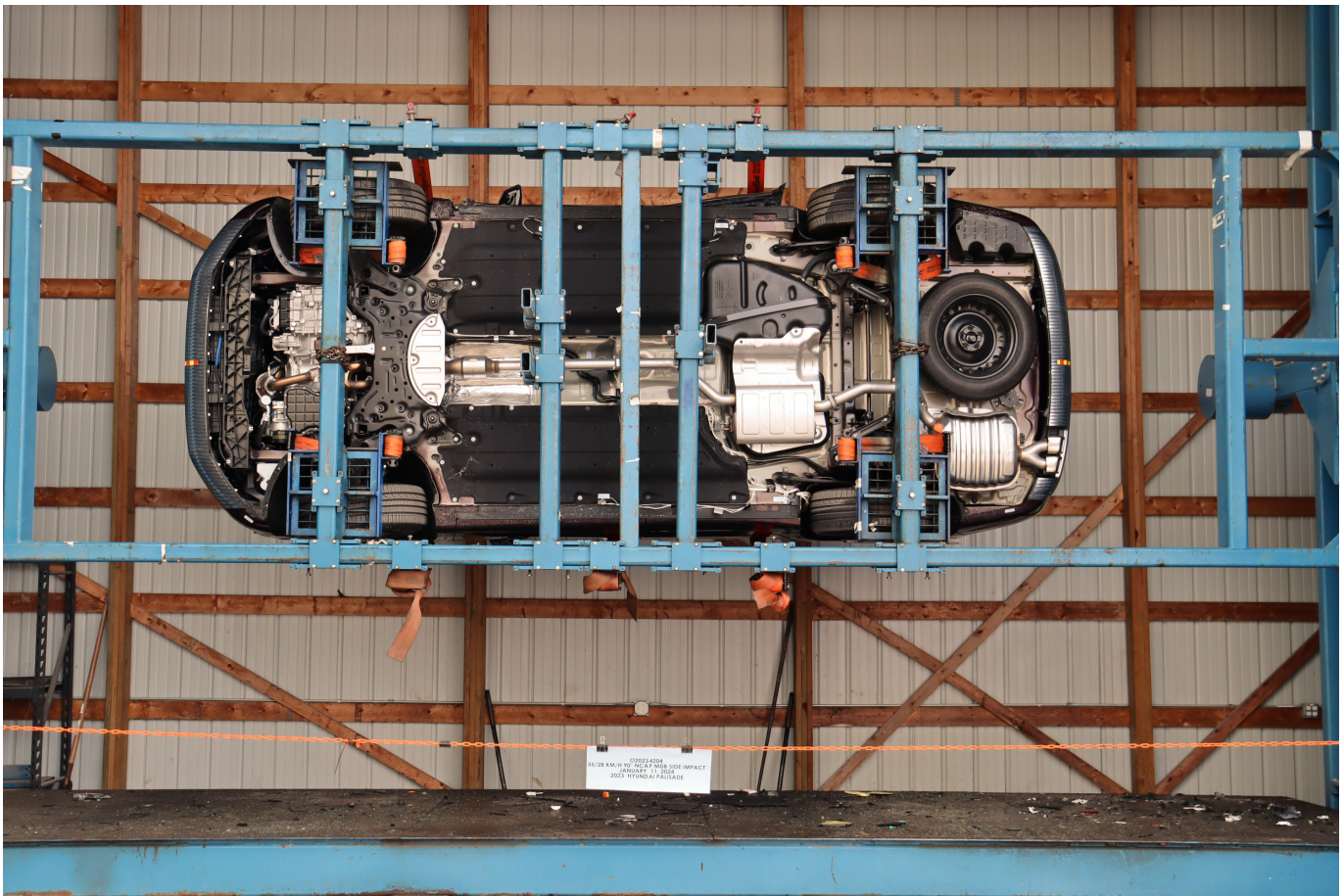


Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees



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



Photo No. 101 - Impact Event



2023 PALISADE CALLIGRAPHY FWD

SOLD TO: TX187
HYUNDAI OF LUFKIN
101 S. MEDFORD DRIVE
LUFKIN TX 75901

SHIPPED TO: TX187

VIN: KM8R74GE9PU583002
MODEL: J1472F65
ENGINE: G6DNPA088161
PORT OF ENTRY: NC
EXTERIOR COLOR: SIERRA BURGUNDY
INTERIOR/SEAT COLOR: BLACK/BLACK
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 25 lbs./ 11 kgs.
MISSIONS: This vehicle is certified to meet emission requirements in all 50 states

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

- year/60,000-mile New Vehicle Warranty*
- year/100,000-mile Powertrain Warranty*
- year/Unlimited-mile Anti-perforation Warranty*
- year/Unlimited-mile Roadside Assistance
- year/36,000-mile Complimentary Maintenance
- *limited warranties, see dealer for details

ADVANCED SAFETY TECHNOLOGY

- front, Front & 2nd Row Side, Side-Curtain & Driver's Knee Airbags
- forward Collision-Avoidance Assist
- blind-spot Collision Warning
- rear Cross-Traffic Collision-Avoidance Assist
- parking Collision-Avoidance Assist - Reverse
- lane Following Assist
- driver Attention Warning
- remobilizer

POWERTRAIN TECHNOLOGY

- 8L V6 Engine w/ Idle Stop & Go
- 8-Speed Automatic Transmission w/ Paddle Shifters

EXTERIOR

- 0" Calligraphy Exclusive Alloy Wheels
- LED Headlights, Tail Lights, & Day Time Running Lights
- auto-Dimming Heated Side Mirrors
- roof Pane Sunroof
- roof Side Rails
- temporary Spare Tire
- COMFORT & CONVENIENCE**
- proximity Key with Push Button Start / Digital Key
- hands-free Smart Liftgate w/ Auto Open
- remote Smart Parking Assist
- surround View Monitor / Blind-Spot View Monitor
- parking Distance Warning - Forward & Reverse
- highway Driving Assist
- heads-Up Display
- 2.3" Digital Instrument Cluster
- leather Leather Seating Surfaces
- power Front Seats
- driver's Ergo-Motion Seat
- integrated Memory Driver's Seat
- 2nd Row Captain's Chairs
- manual Rear Side Window Sunshade
- power 3rd Row Seats
- heated Front, 2nd, 3rd Row Seats
- ventilated Front and 2nd Row Seats

COMFORT & CONVENIENCE(cont.)

- Heated Steering Wheel
- Auto Temperature Control
- Digital Rearview Mirror w/ HomeLink®
- Ambient Lighting
- Wireless Phone Charger / AC Power Outlet
- Front, 2nd, 3rd Row USB Charging Ports
- 12.3" Touchscreen Navigation/Infotainment System
- Harman Kardon Premium Audio
- Android Auto (TM) & Apple CarPlay (TM)
- Wi-Fi Hotspot (trial included with BlueLink®)
- BlueLink® Connected Services 3-years Standard (enrollment req)
- BlueLink® Remote Start (3-year Complimentary Service)
- SiriusXM® w/ 90-Day Platinum trial subscription;
- Not Available in AK & HI
- Full Tank of Fuel

Manufacturer's Suggested Retail Price:

\$49,500.00

ADDED FEATURES:

- *Carpets Floor Mats \$215.00
- *Cargo Net \$55.00
- *Roof Rack Cross Rails \$315.00
- *Rear Bumper Applique \$75.00
- *Wheel Locks \$70.00

Inland Freight & Handling:

\$1,335.00

Total Price:

\$51,565.00

Our three-row, upscale SUV



EPA DOT

Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy

22 MPG

Standard SUVs range from 13 to 102 MPG. The best vehicle rates 132 MPG.

You spend

\$2,000

more in fuel costs over 5 years compared to the average new vehicle.

19 city

27 highway

4.5 gallons per 100 miles

Annual fuel cost

\$2,000

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

Smog Rating (tailpipe only)

1

5

10

1

5

10

This vehicle emits 406 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

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: 85 %

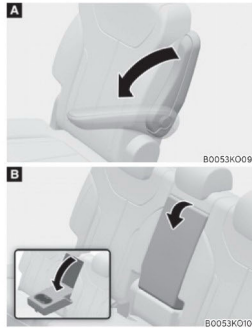
Note: Parts content does not include final assembly, distribution, or other non-parts costs.

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

26 A 0373VTORE 12



Photo No. 102 - Monroney Label

Armrest (Second row seat)

Ⓐ: 7-seater
Ⓑ: 8-seater

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

To adjust the armrest at a convenient angle, lower the armrest from the highest position to the lowest position, and lift it up to fixed on it.

Since it cannot be adjusted downward after fixing, lift the armrest slightly more than the highest position, then lower it to the lowest position and adjust while lift it up.

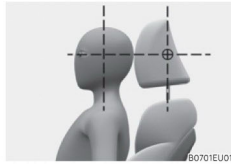
Head Restraint

The vehicle's front and rear seats have adjustable head restraints. The head restraints provide comfort for passengers, but more importantly they are designed to help protect passengers from whiplash and other neck and spinal injuries during an accident, especially in a rear impact collision.

WARNING

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

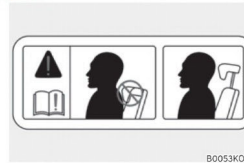
- Always properly adjust the head restraints for all passengers **BEFORE** starting the vehicle.
- **NEVER** let anyone ride in a seat with the head restraint removed or reversed.



Adjust the head restraints so the middle of the head restraint is at the same height as the height of the top of the eyes.

- **NEVER** adjust the head restraint position of the driver's seat when the vehicle is in motion.
- Adjust the head restraint as close to the passenger's head as possible. Do not use a seat cushion that holds the body away from the seatback.
- Make sure the head restraint locks into position after adjusting it.

3-26

WARNING

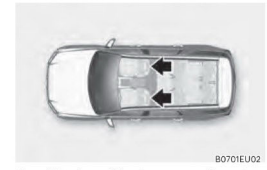
When sitting on the rear seat, do not adjust the height of the head restraint to the lowest position.

CAUTION

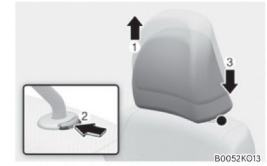
When there is no occupant in the rear seats, adjust the height of the head restraint to the lowest position. The rear seat head restraint can reduce the visibility of the rear area.

NOTICE

To prevent damage, **NEVER** hit or pull on the head restraints.

Front seat head restraints

The driver's and front passenger's seats are equipped with adjustable head restraints 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:

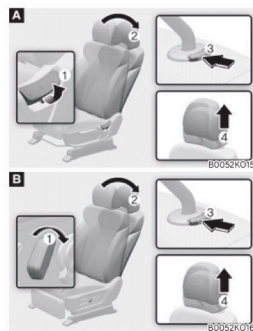
1. Push and hold the release button ② on the head restraint support.
2. Lower the head restraint to the desired position ③.

3-27

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

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 sunvisor or other parts of the vehicle.



Ⓐ: Manual seat
Ⓑ: Power seat

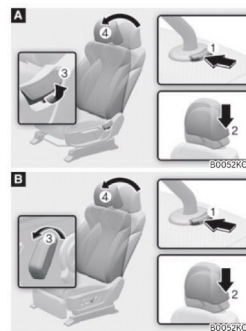
Removal/Reinstall

To remove the head restraint:

1. Recline the seatback ① with the seatback angle switch ②.
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.



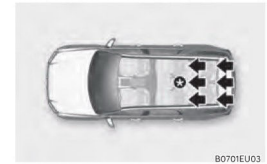
Ⓐ: Manual seat
Ⓑ: Power seat

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. Recline the seatback ④ with the seatback angle switch ③.

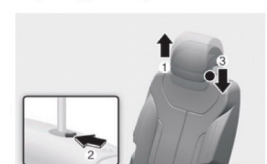
WARNING

Always make sure the head restraint locks into position after reinstalling and adjusting it properly.

Rear seat head restraints

*: If equipped

The rear seats are equipped with head restraints 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. Push and hold the release button ② on the head restraint support.
2. Lower the head restraint to the desired position ③.

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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

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Figure No. 15.	Passenger Head Acceleration (Y) Primary vs. Time	B-5
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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
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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)

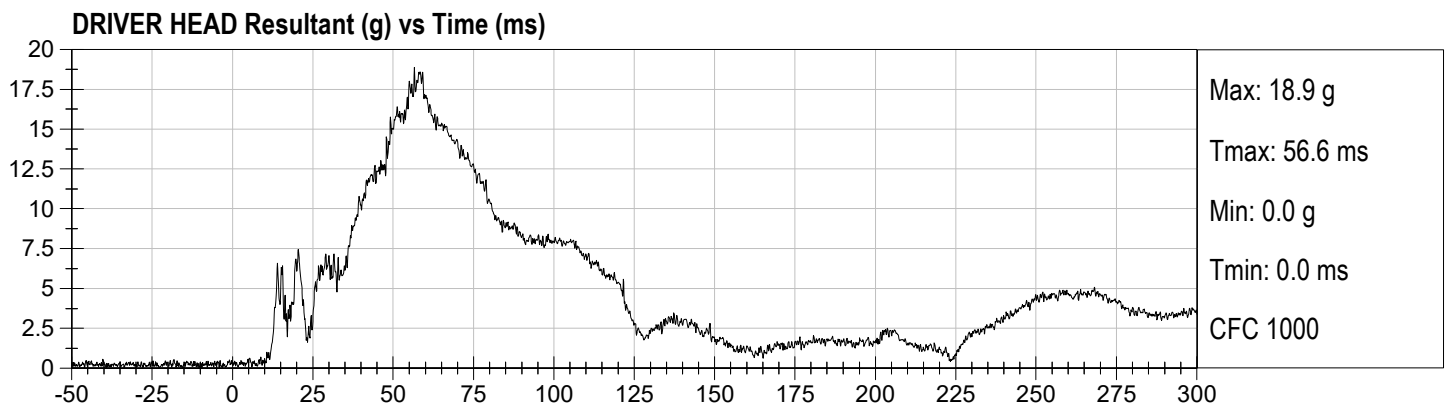
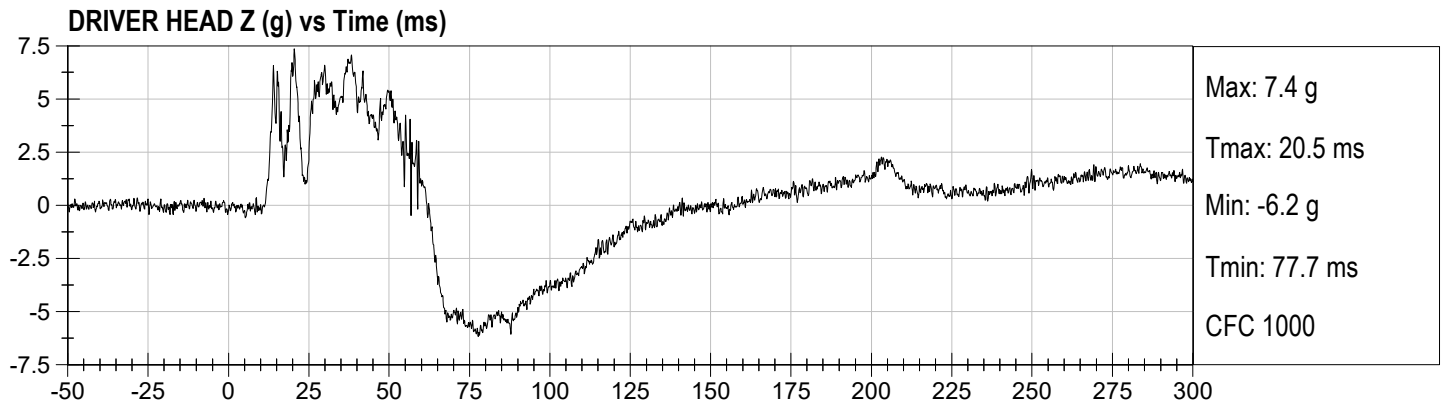
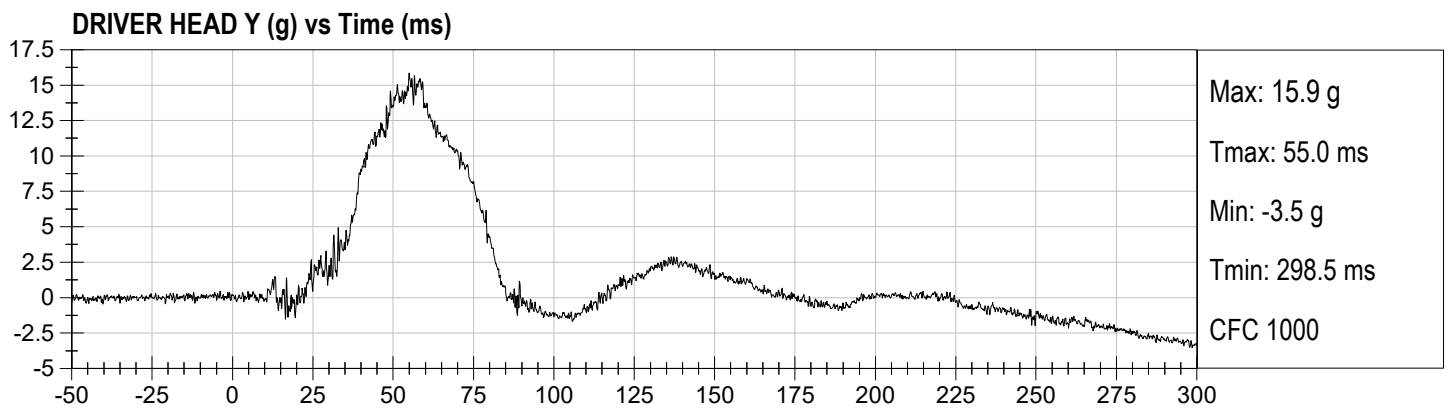
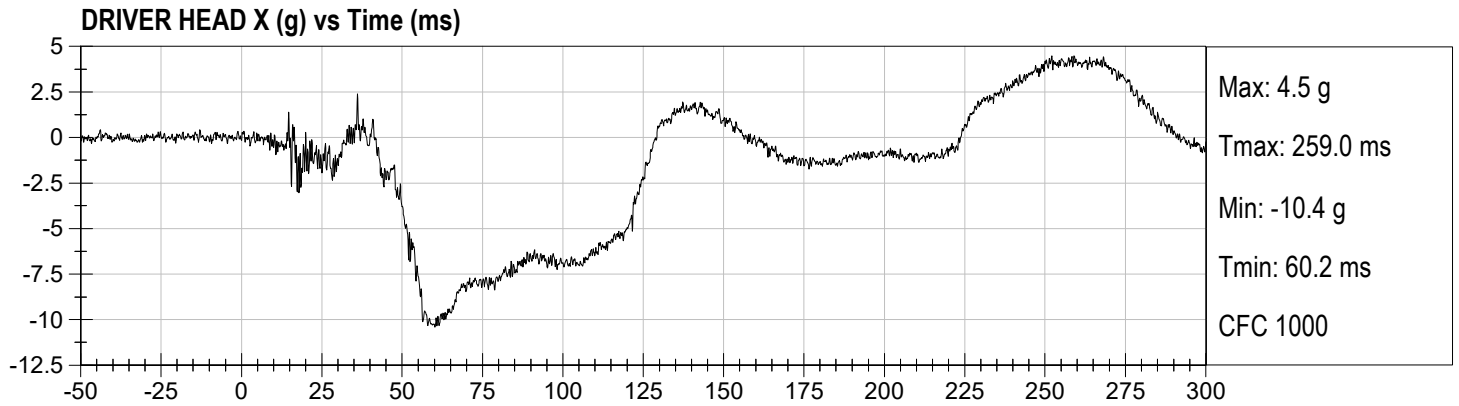
MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

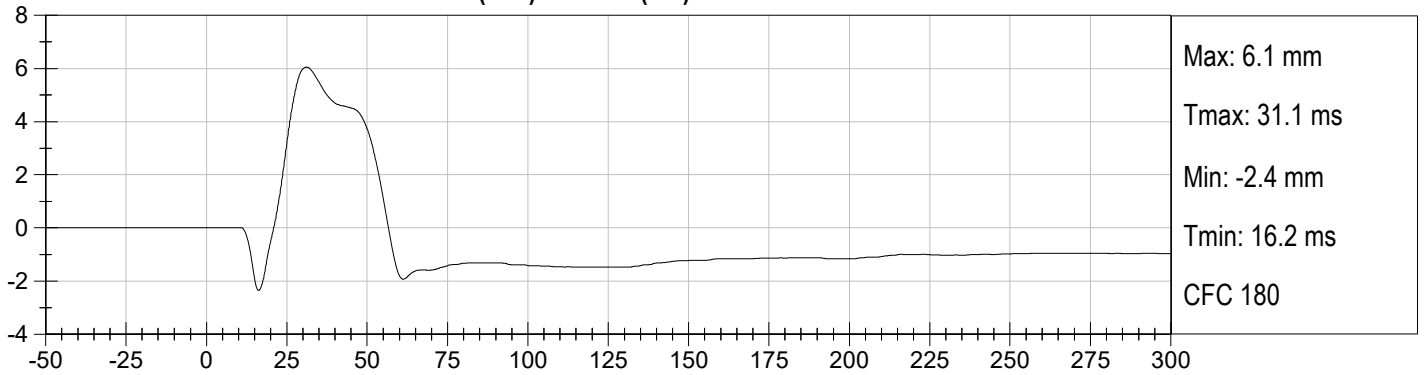
MDB Rear Acceleration (Y)

Left MDB Contact Switch

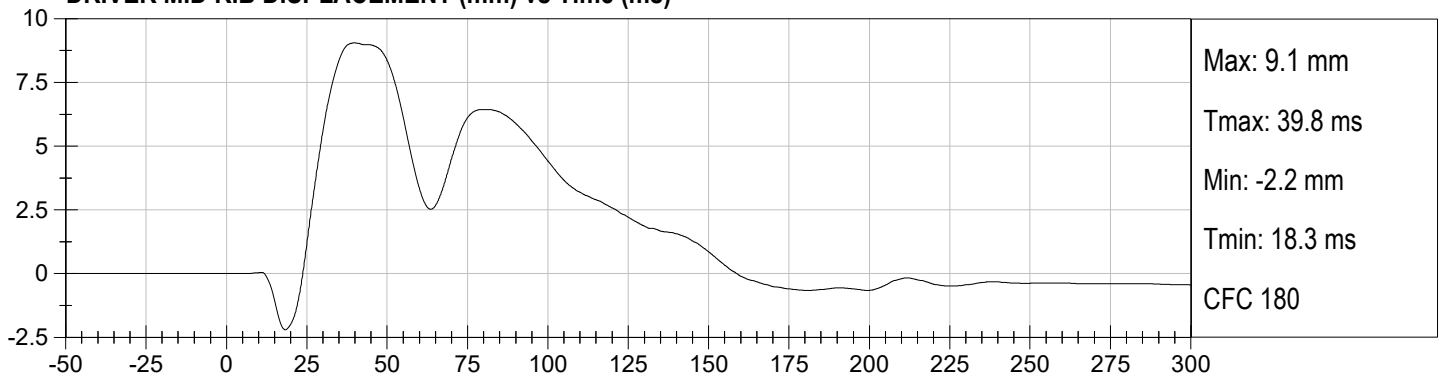
Right MDB Contact Switch



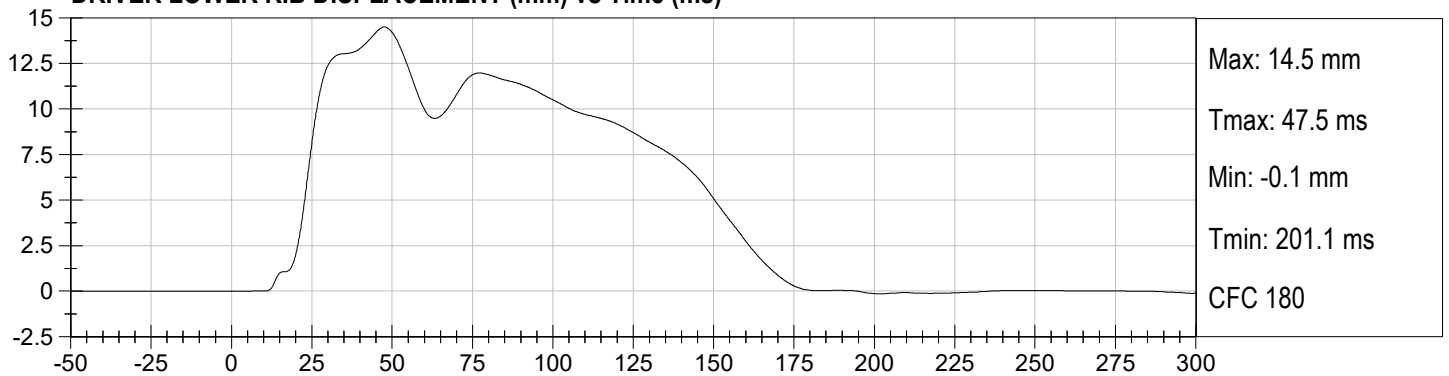
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



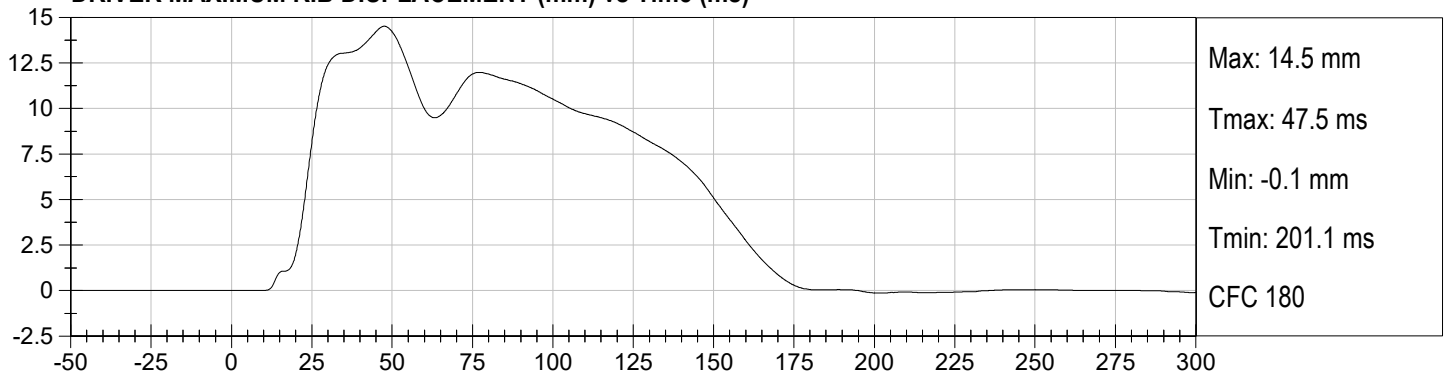
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



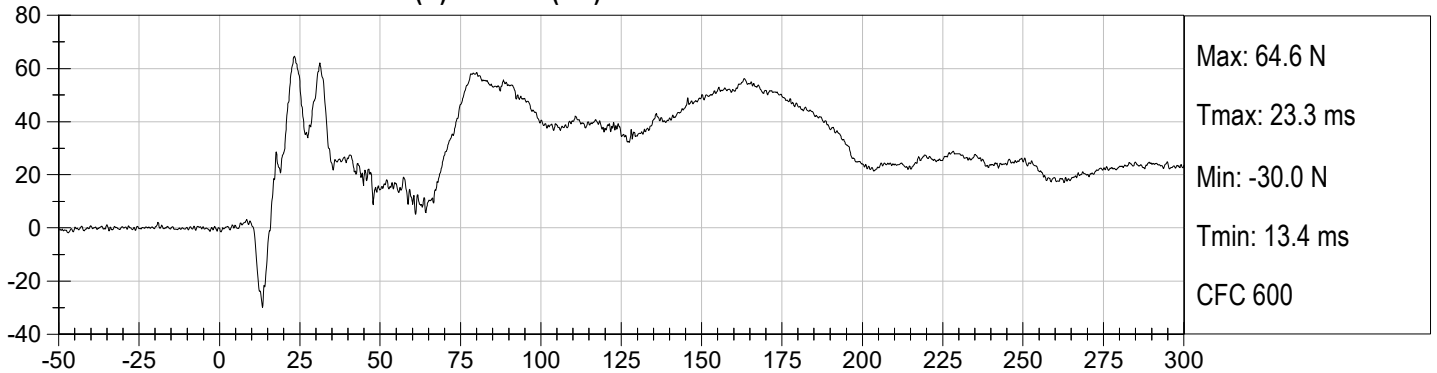
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



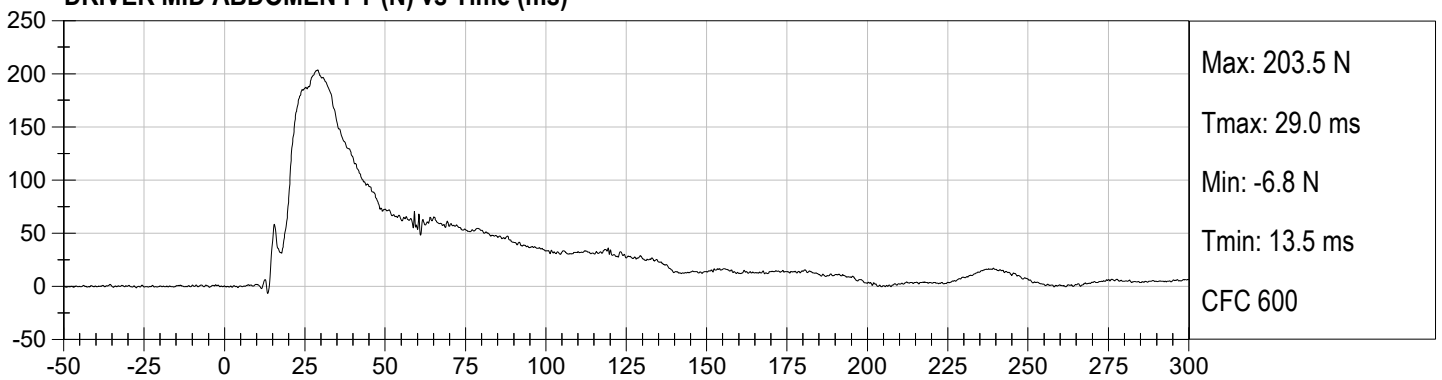
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



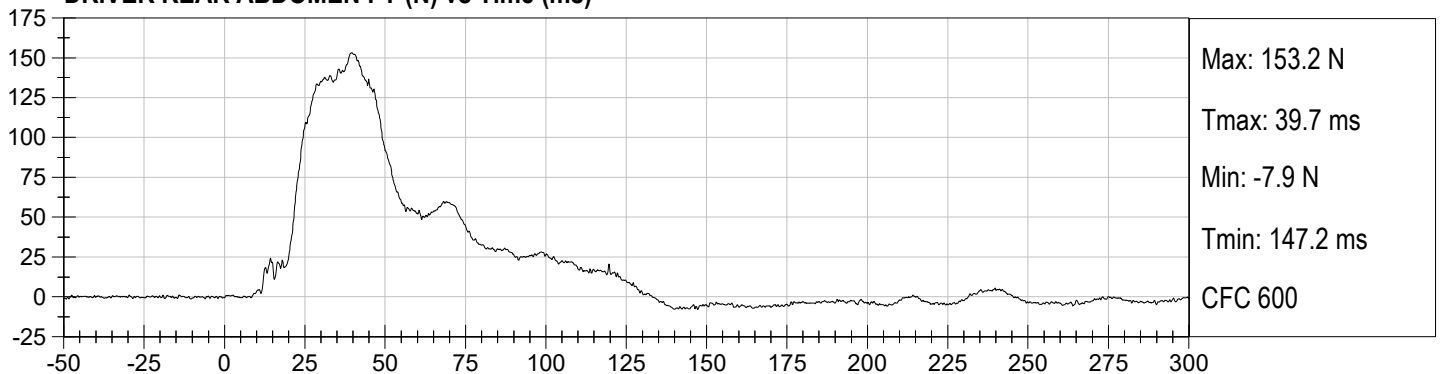
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



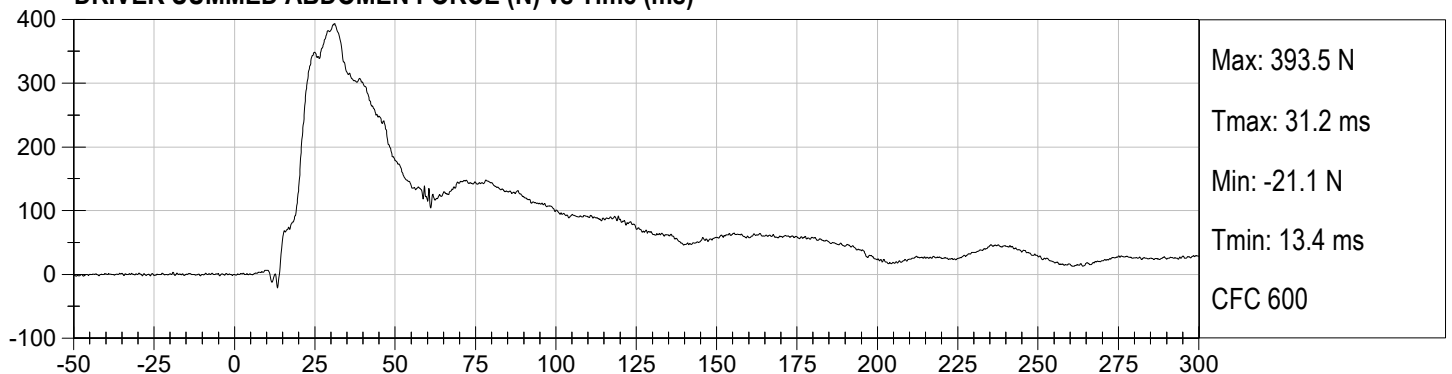
DRIVER MID ABDOMEN FY (N) vs Time (ms)

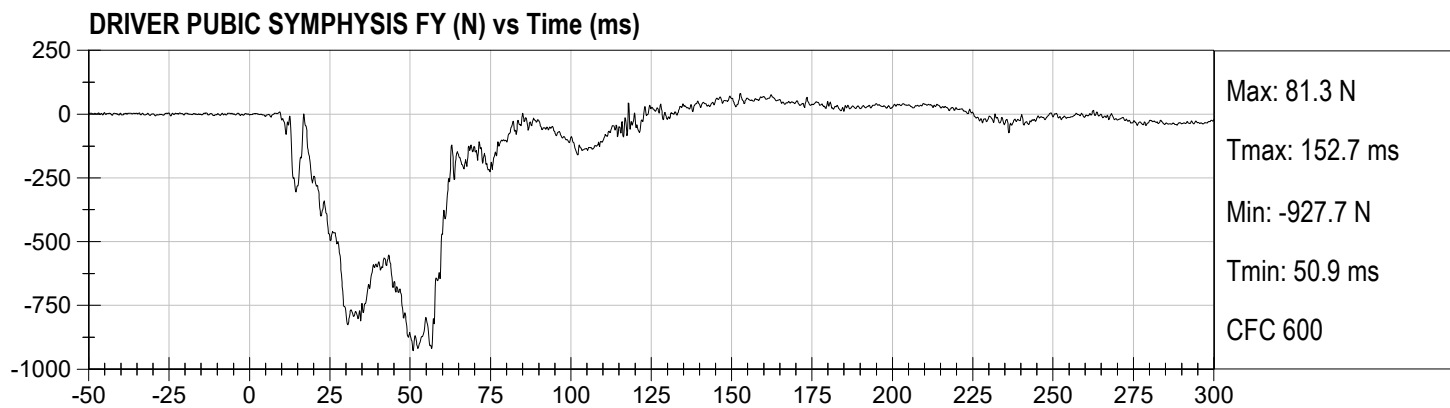


DRIVER REAR ABDOMEN FY (N) vs Time (ms)

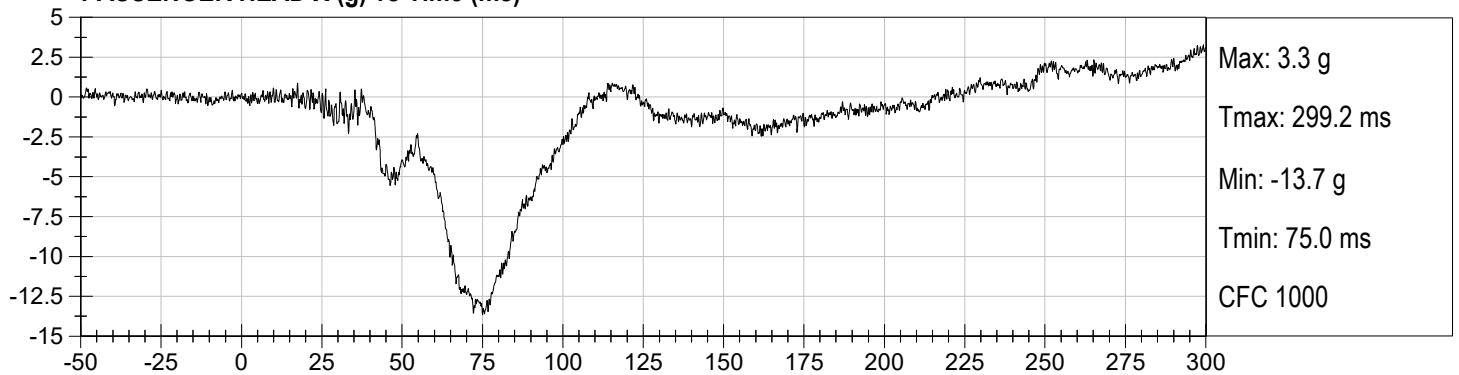


DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)

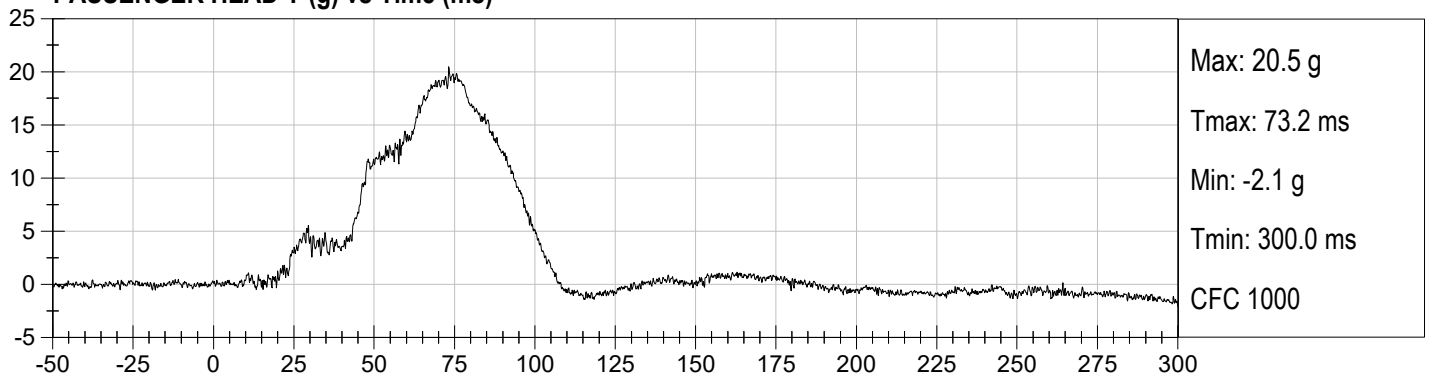




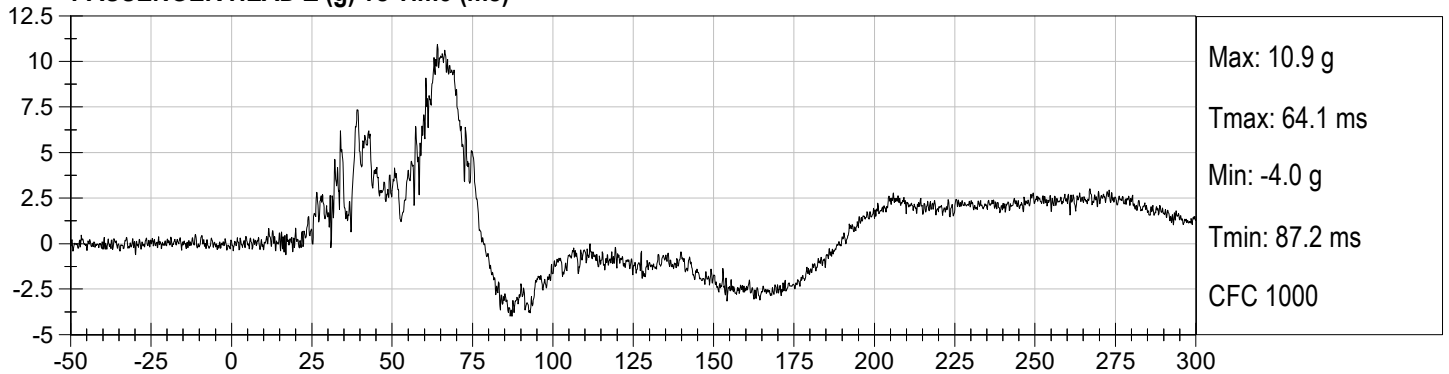
PASSENGER HEAD X (g) vs Time (ms)



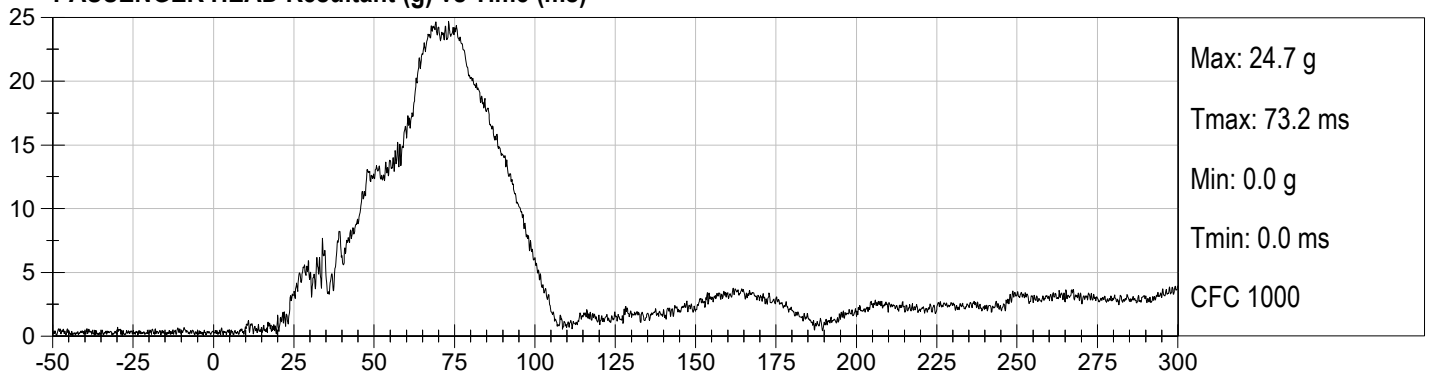
PASSENGER HEAD Y (g) vs Time (ms)



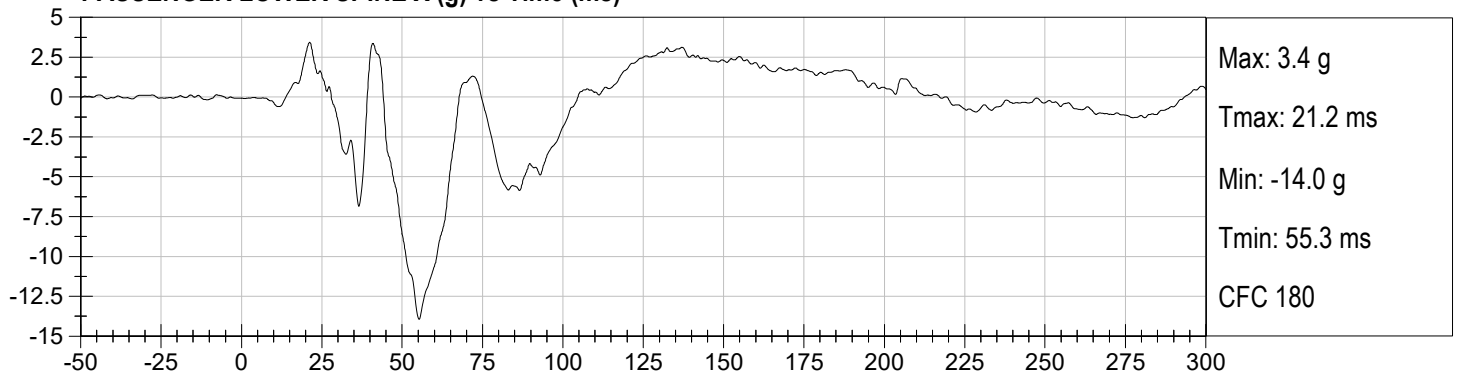
PASSENGER HEAD Z (g) vs Time (ms)



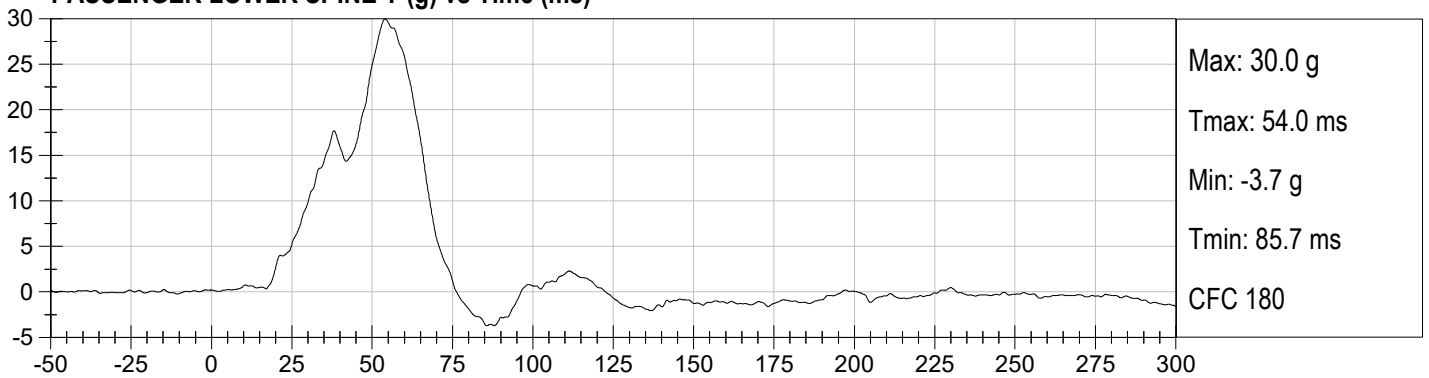
PASSENGER HEAD Resultant (g) vs Time (ms)



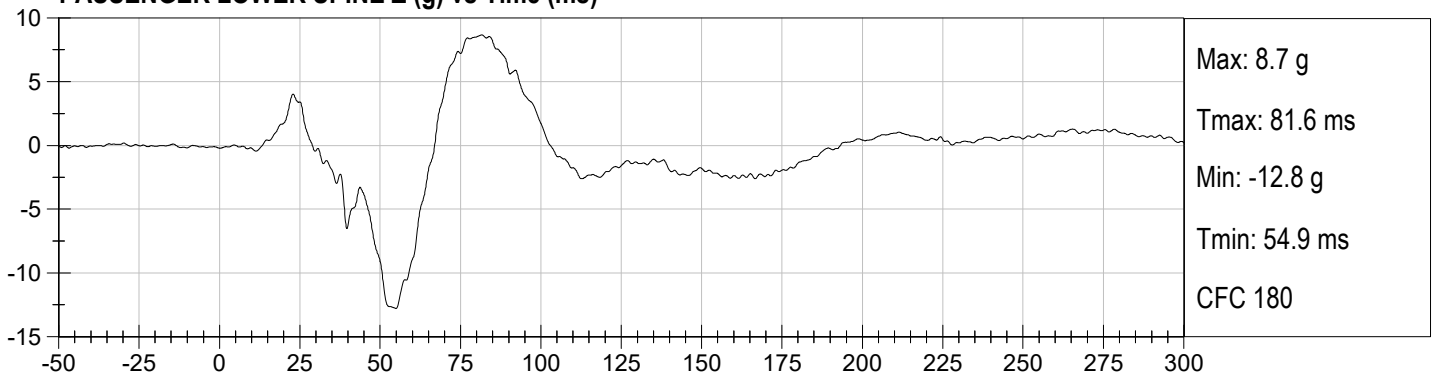
PASSENGER LOWER SPINE X (g) vs Time (ms)



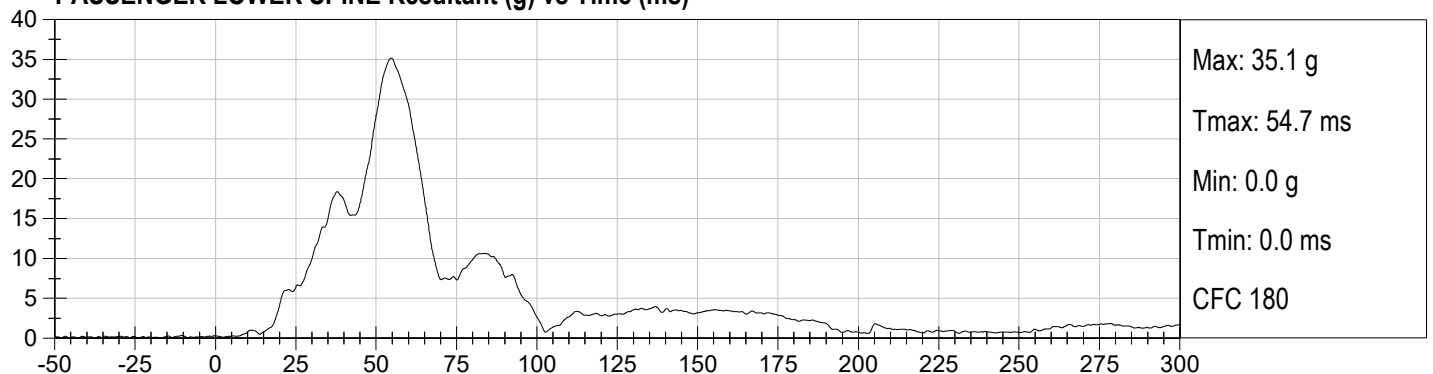
PASSENGER LOWER SPINE Y (g) vs Time (ms)



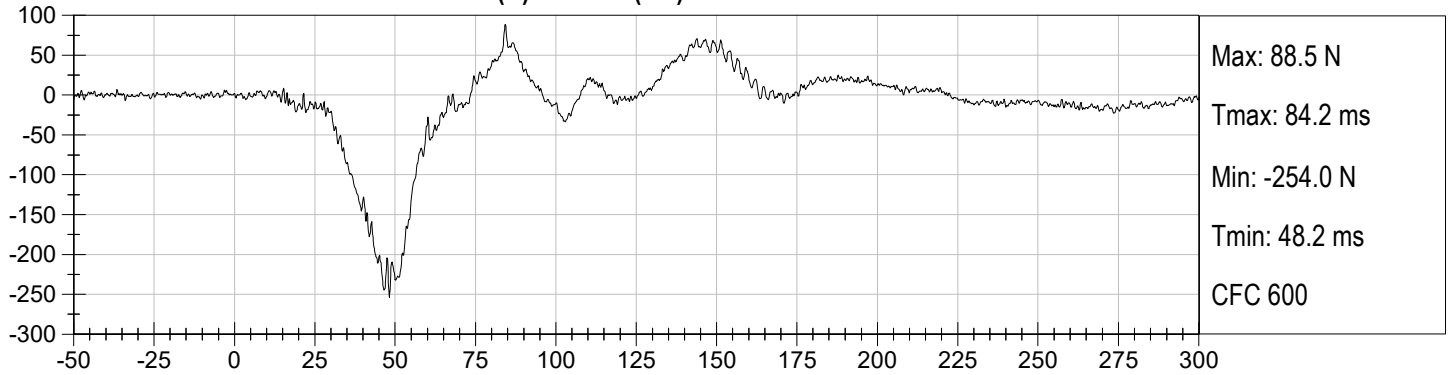
PASSENGER LOWER SPINE Z (g) vs Time (ms)



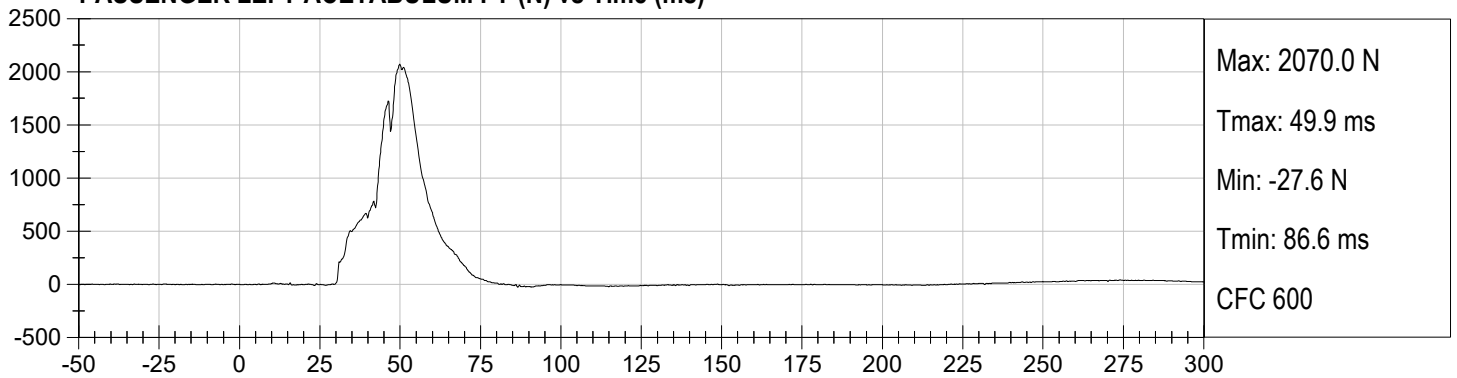
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



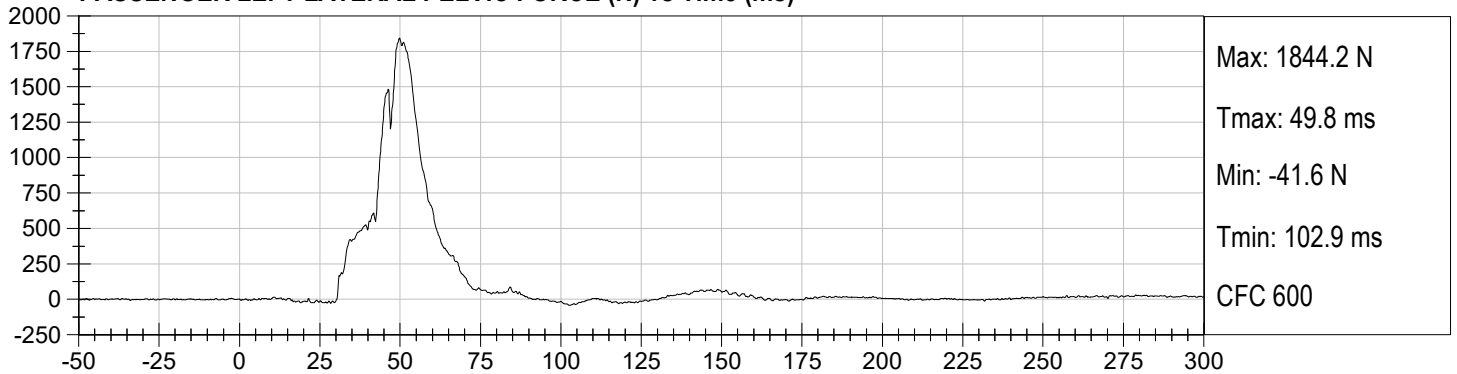
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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

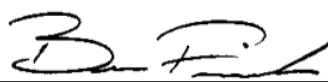
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	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

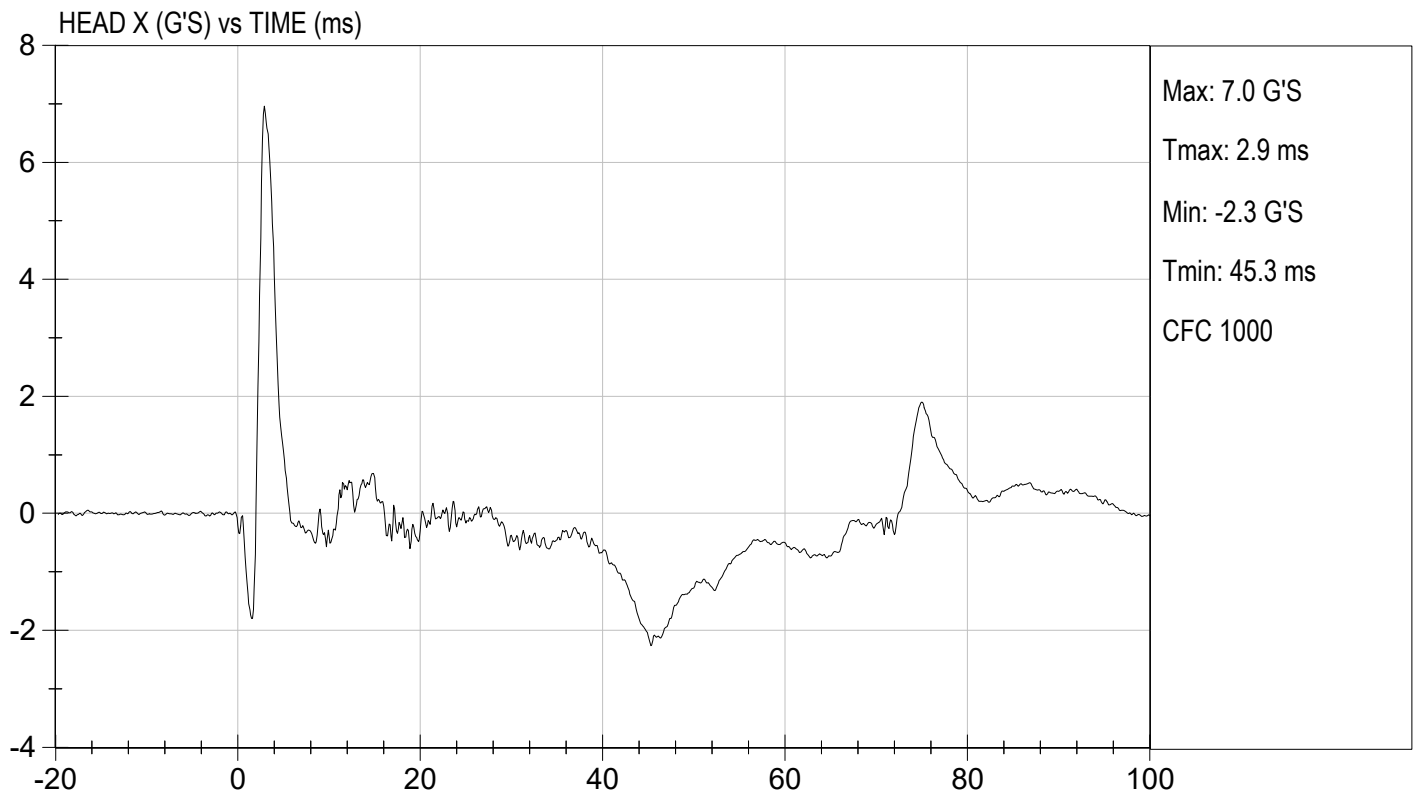
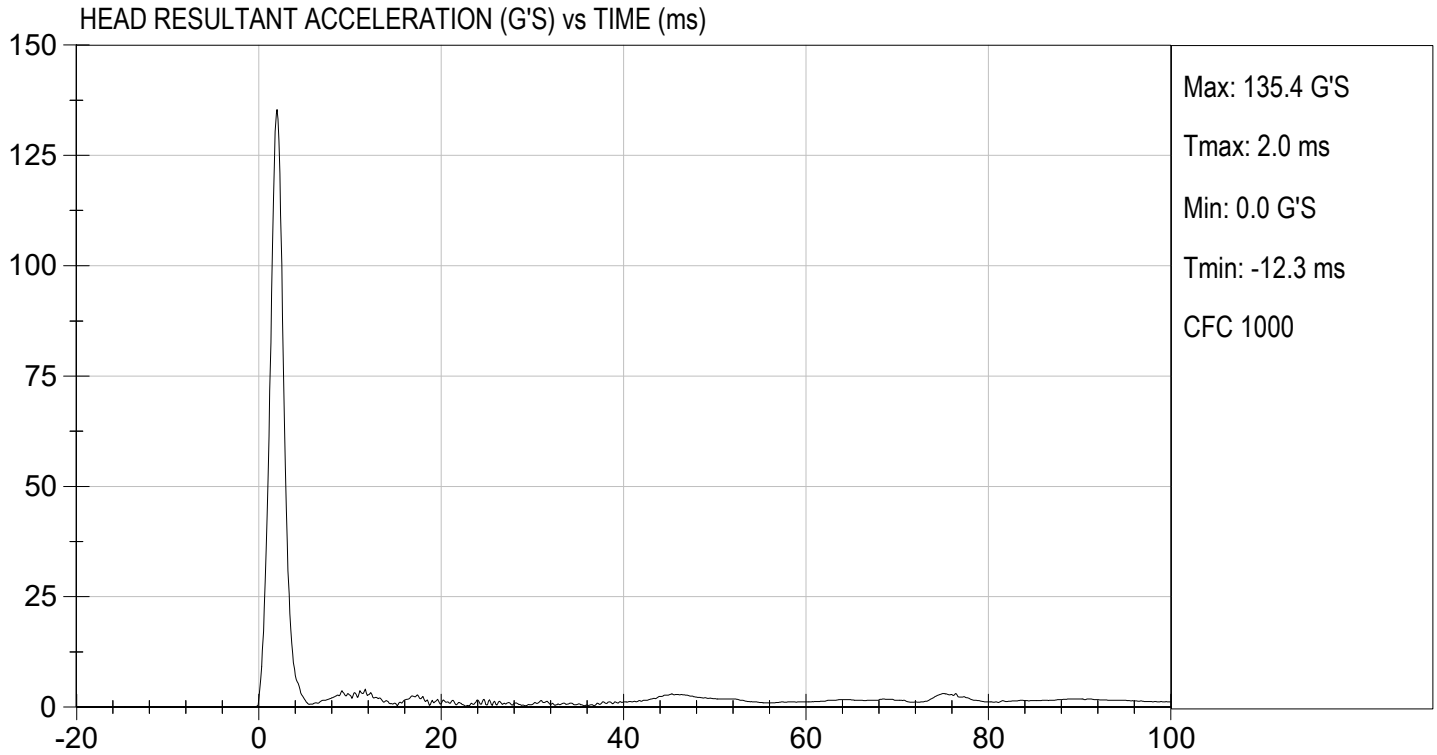
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY**ATD Serial No: F032Test ID: D233361

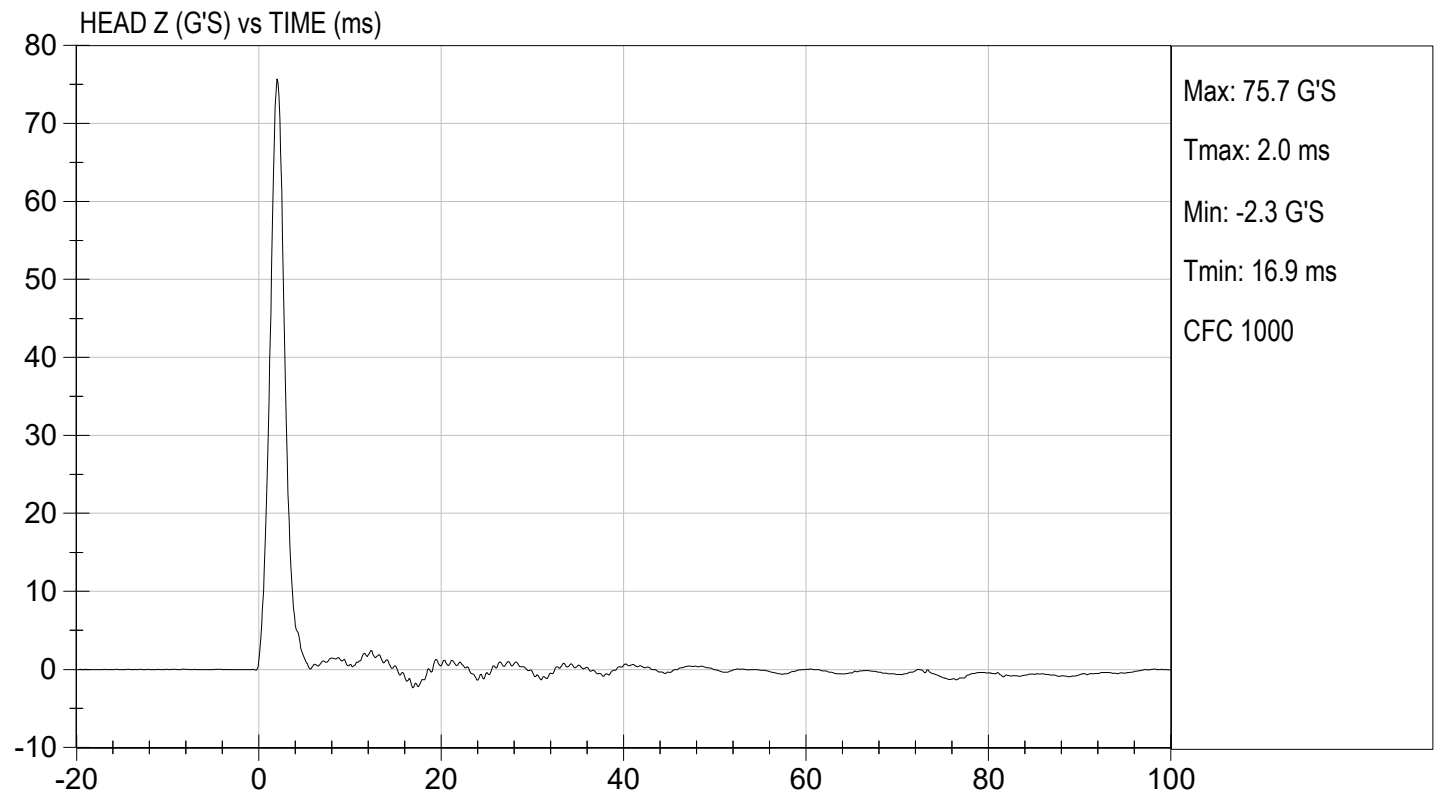
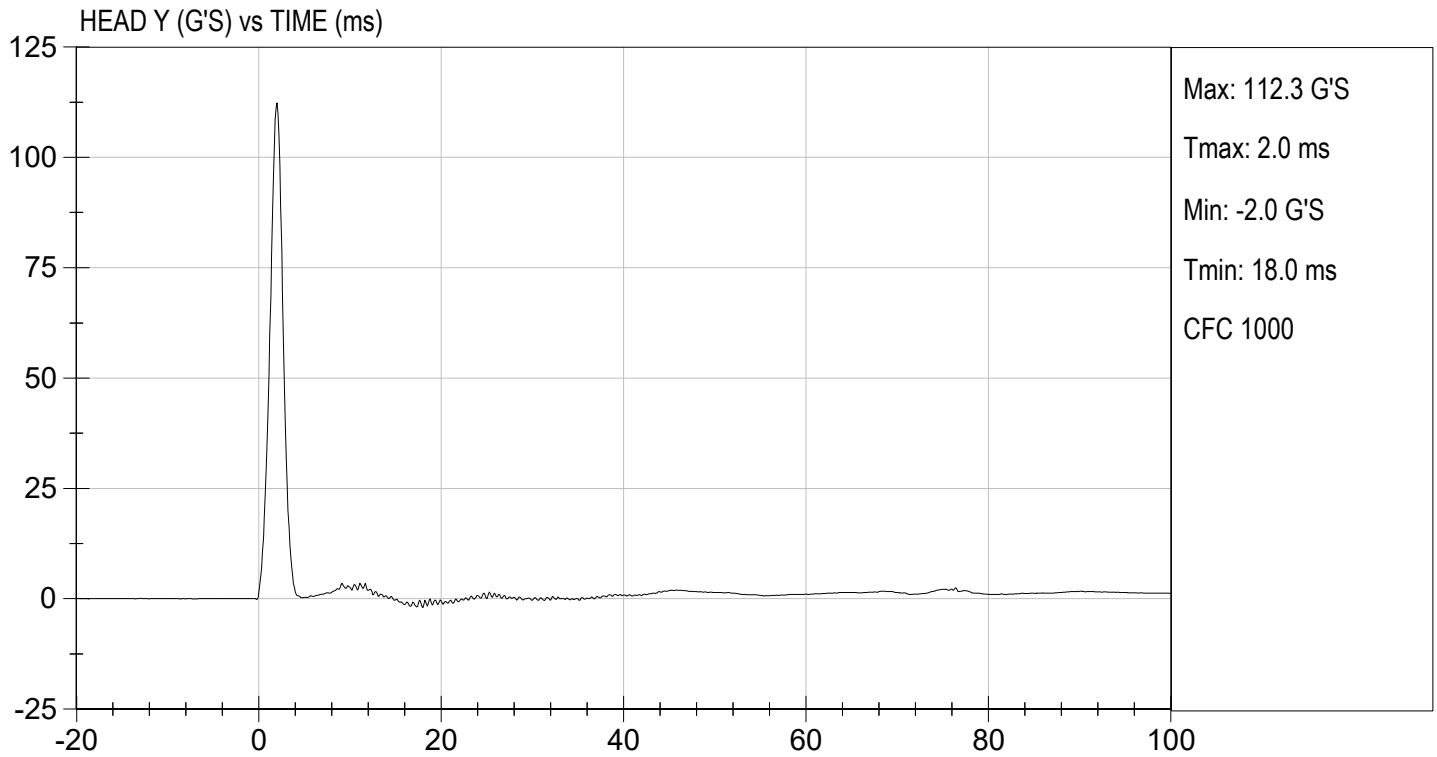
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	125 to 155	135	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

12/18/2023
Test Date


Approved By





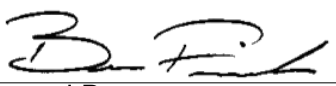
MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D233362

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	26	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.41	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.52	Pass
	17 ms	m/s	>= -3.70	-3.57	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.8	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	61.1	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	55.4	Pass
Overall Results					Pass


 Laboratory Technician

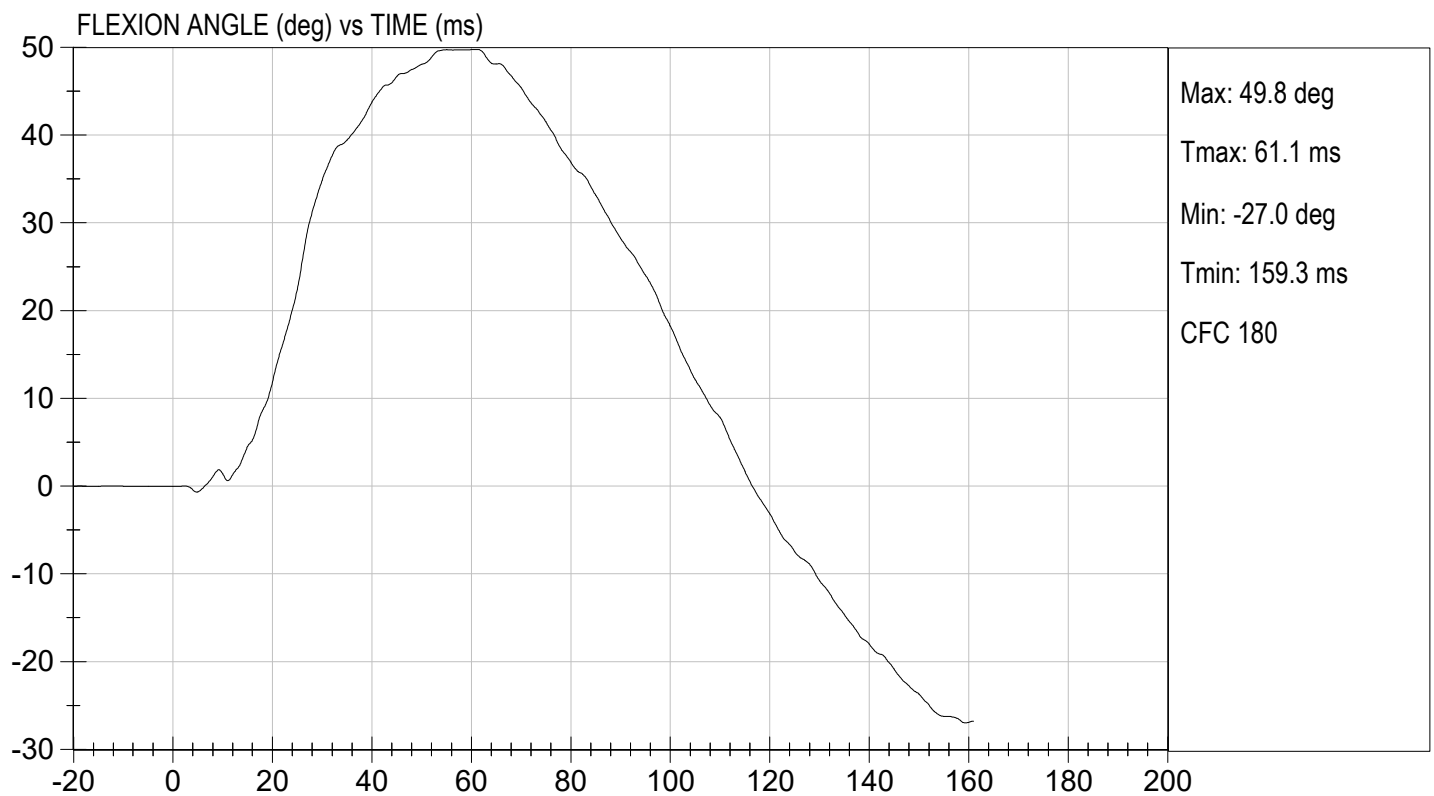
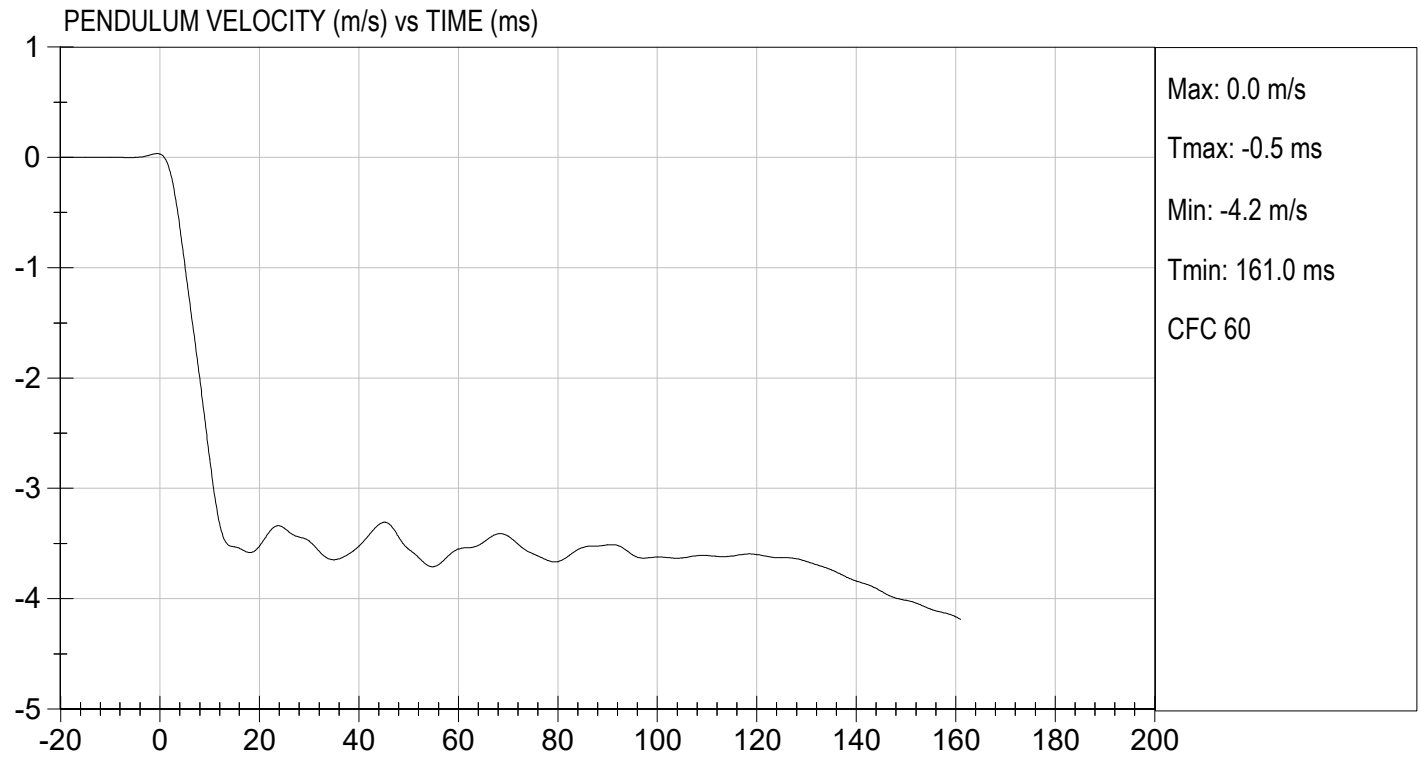

 Approved By

12/18/2023
 Test Date



TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

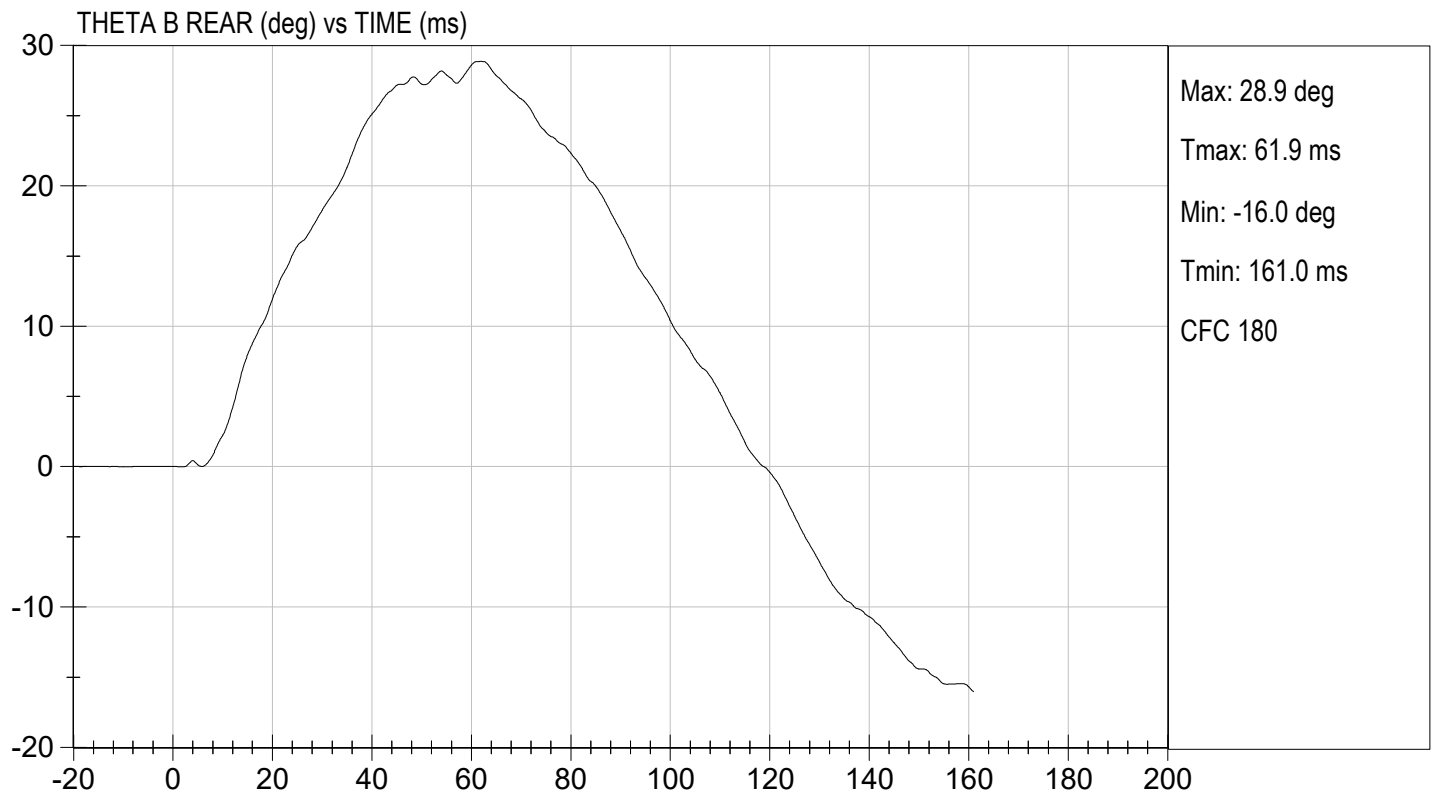
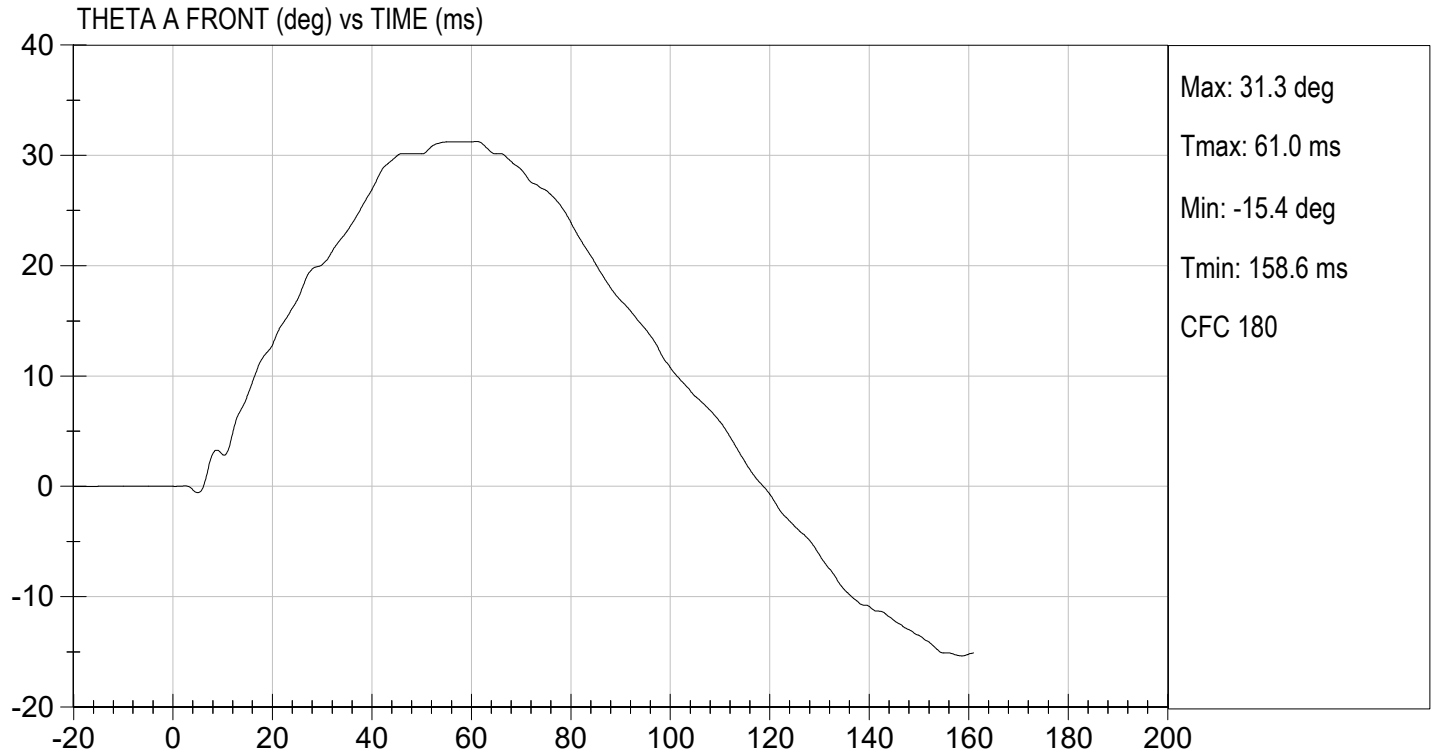
TEST DATE: 12/18/2023
TEST #: D233362





TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

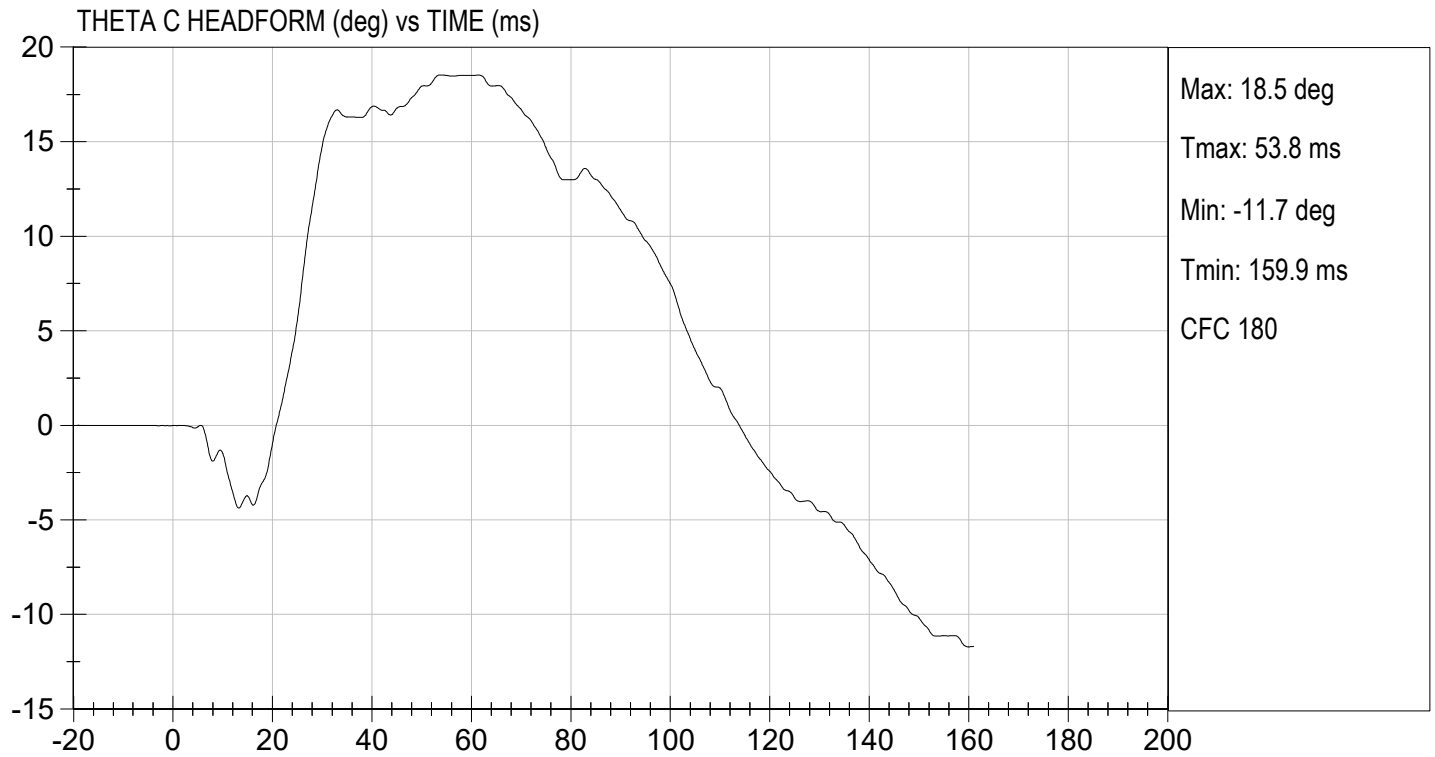
TEST DATE: 12/18/2023
TEST #: D233362





TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

TEST DATE: 12/18/2023
TEST #: D233362



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D233363

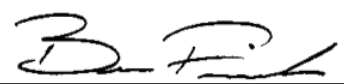
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.2	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.0	Pass
Overall Test Results				Pass



Laboratory Technician

12/18/2023

Test Date

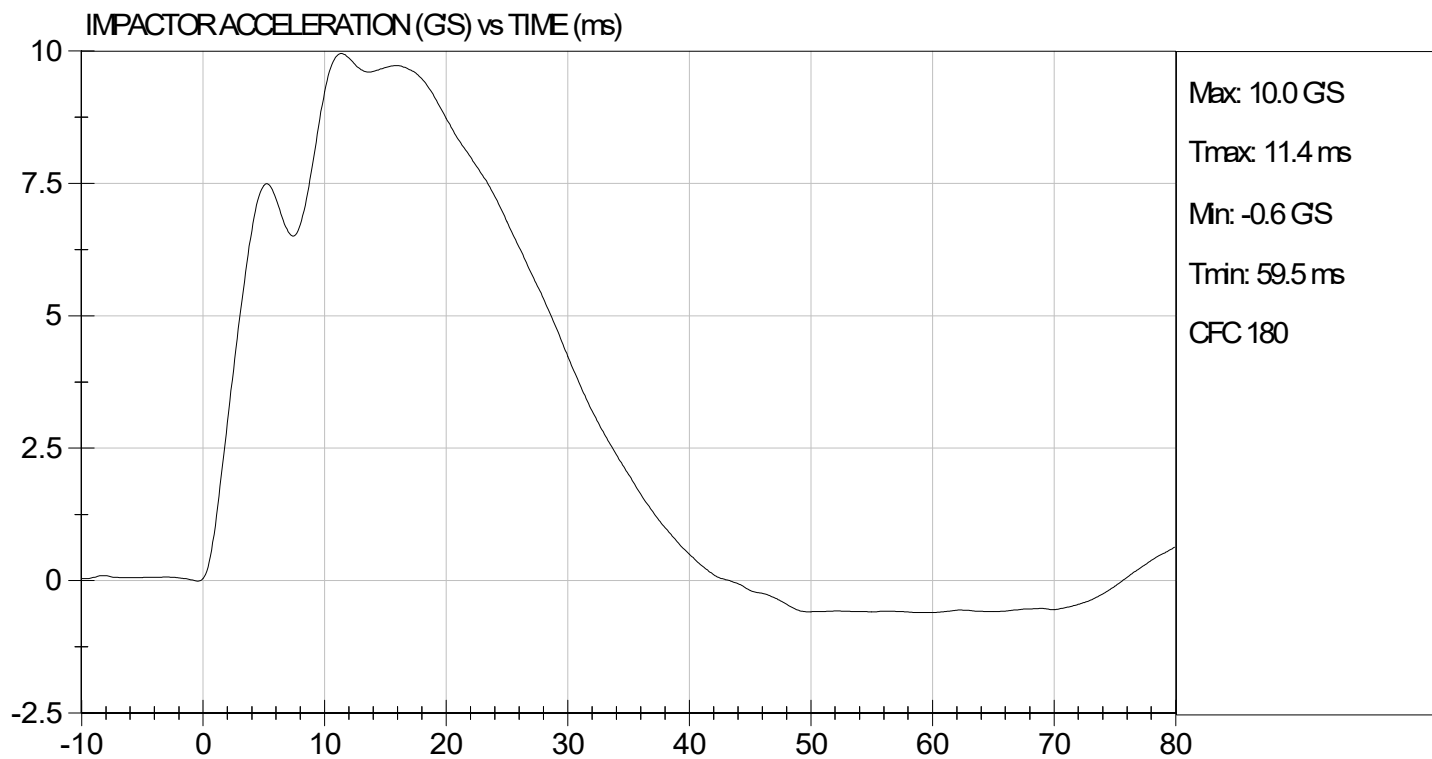


Approved By



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

TEST DATE: 12/18/2023
TEST #: D233363



MGA RESEARCH CORPORATION

UPPER RIB TEST

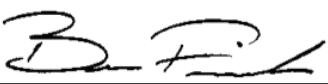
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D233364

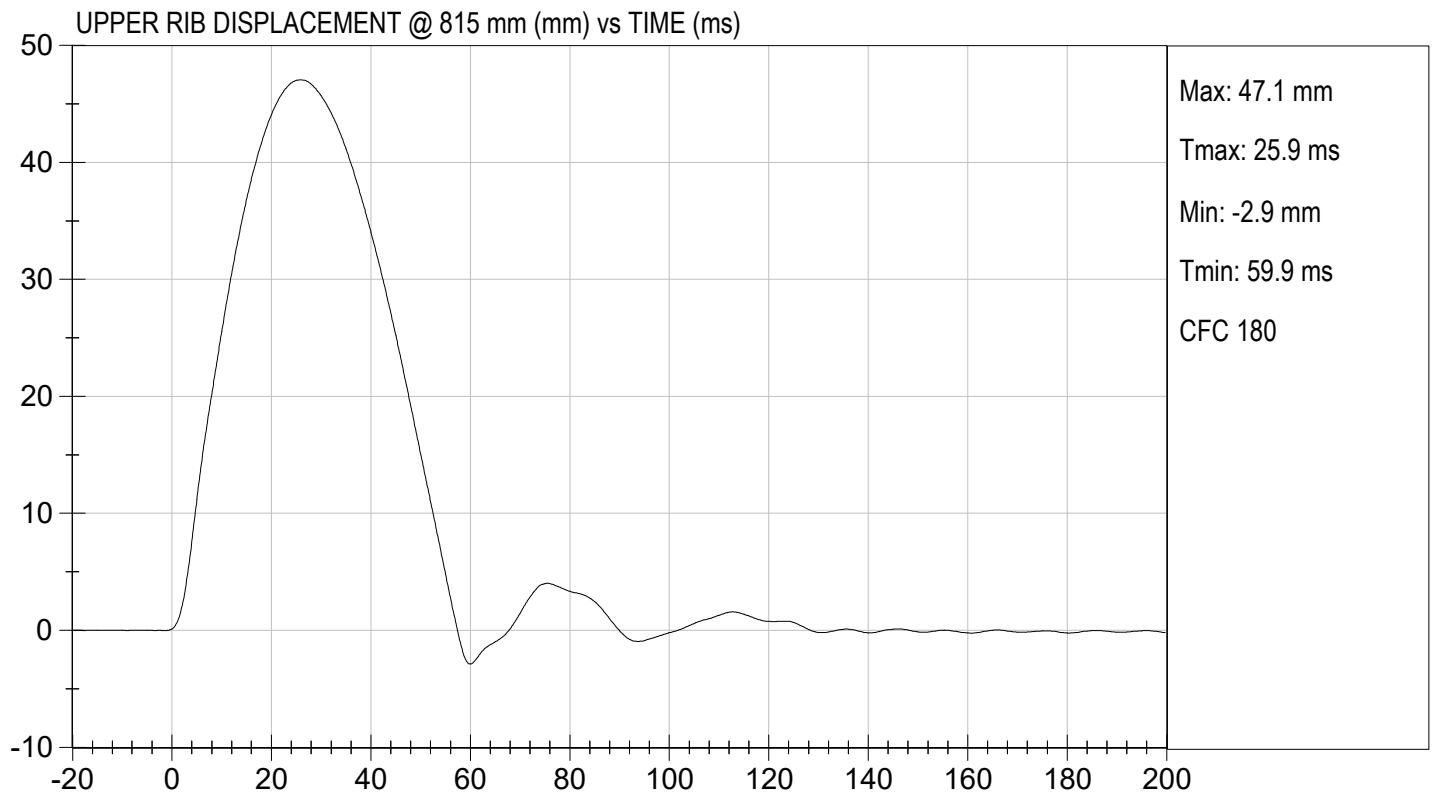
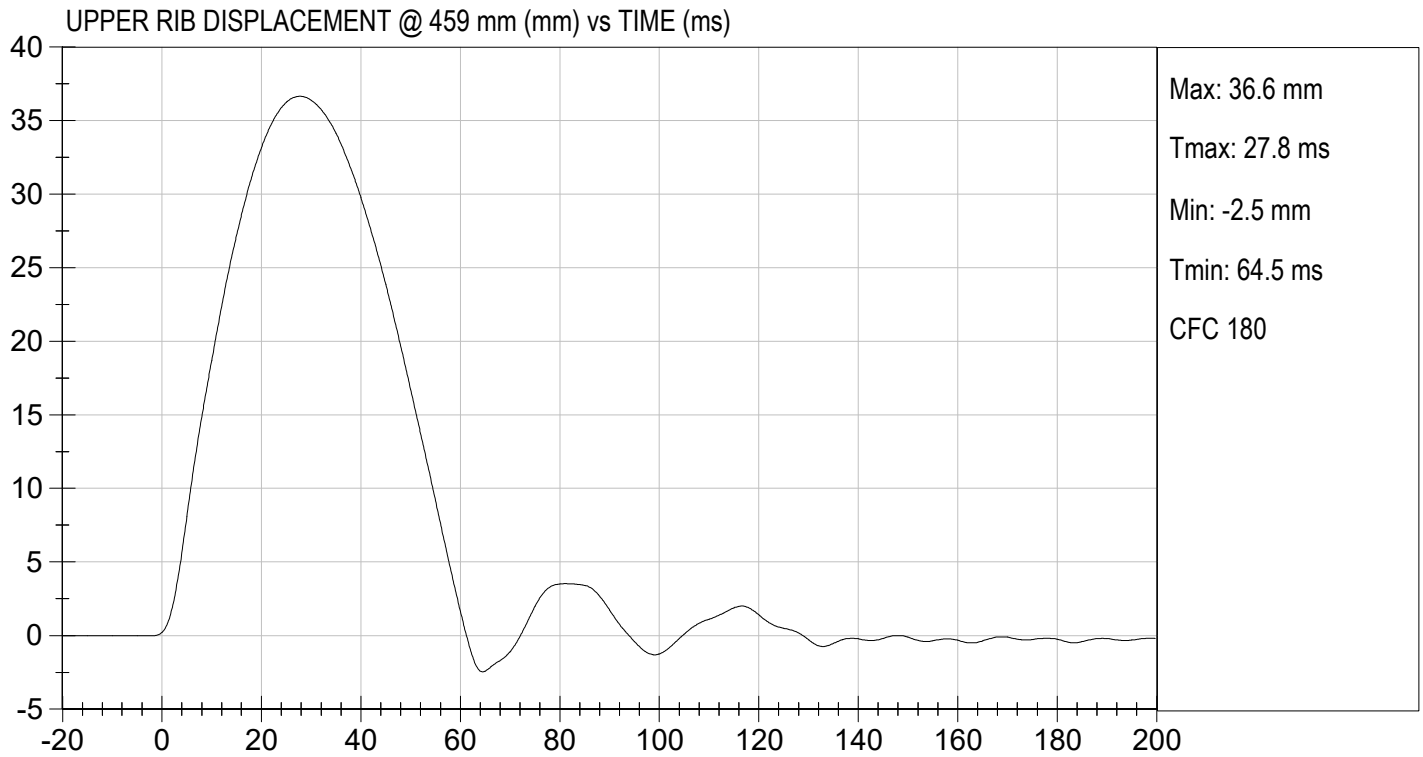
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Displacement at 459 mm	mm	36.0 to 40.0	36.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.1	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

12/18/2023

Test Date



MGA RESEARCH CORPORATION

MID RIB TEST

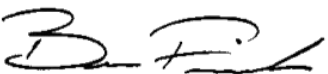
ES-2re DUMMY

ATD Serial No: F032

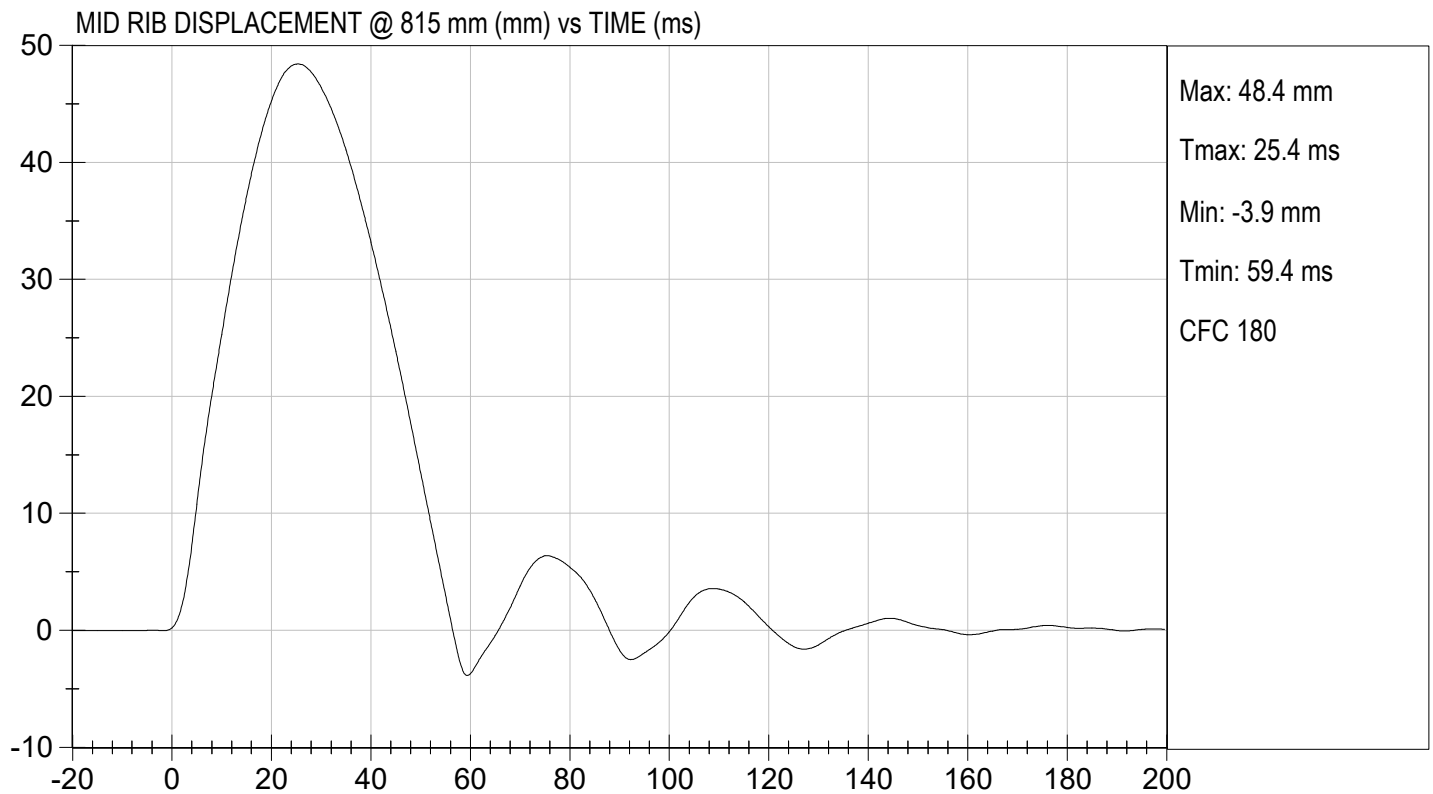
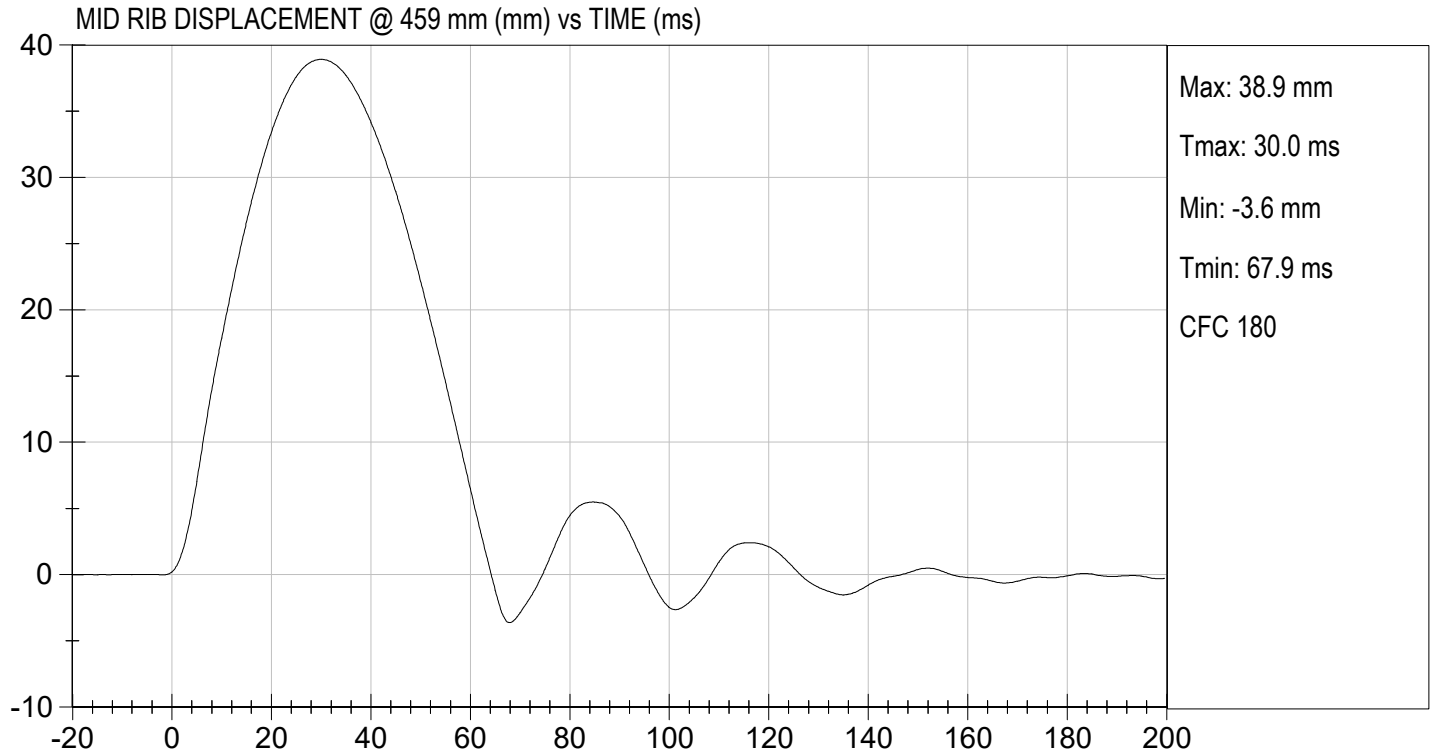
Test I.D: D233365

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
Displacement at 459 mm	mm	36.0 to 40.0	38.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.4	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

12/18/2023
Test Date



MGA RESEARCH CORPORATION

LOWER RIB TEST

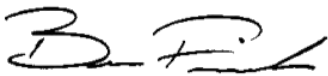
ES-2re DUMMY

ATD Serial No: F032

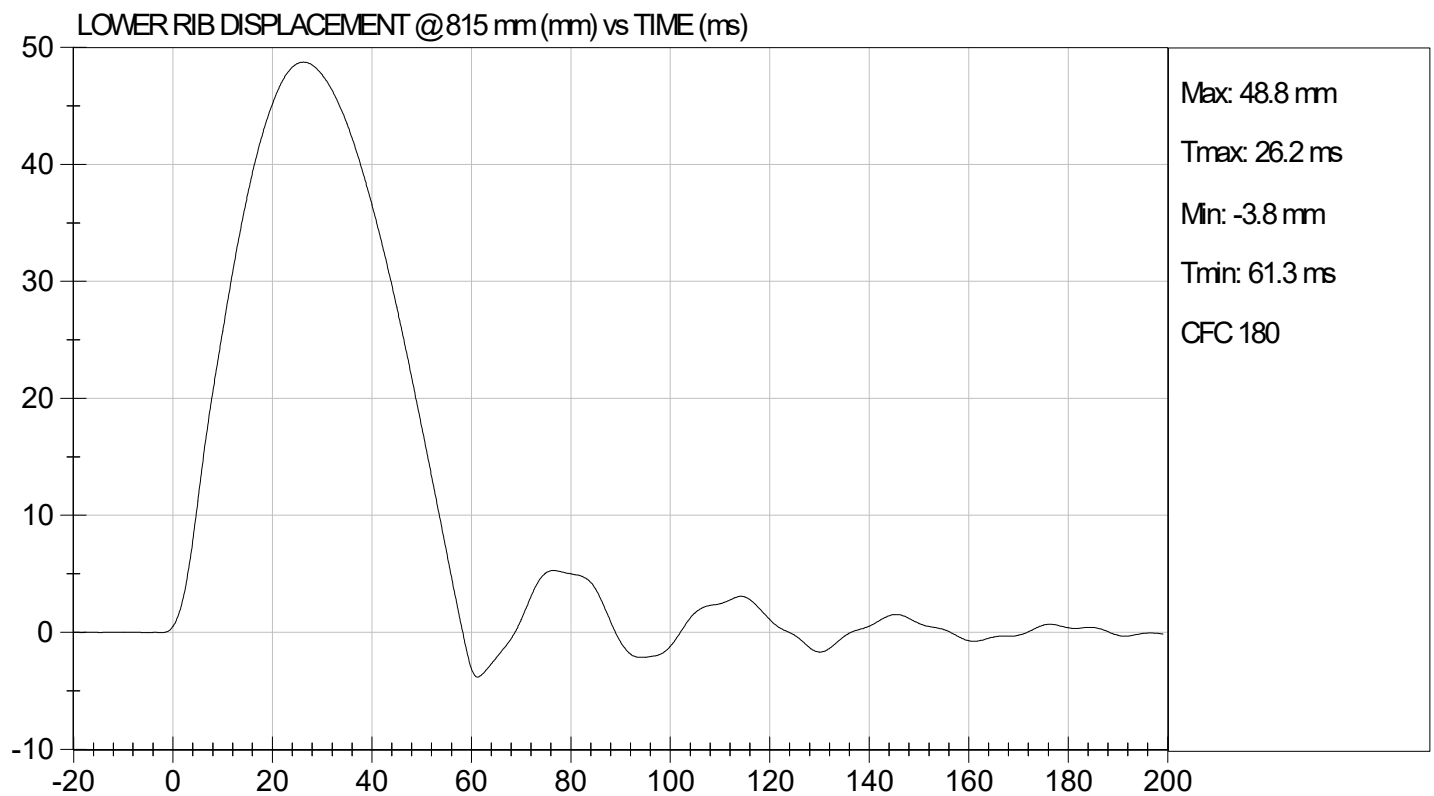
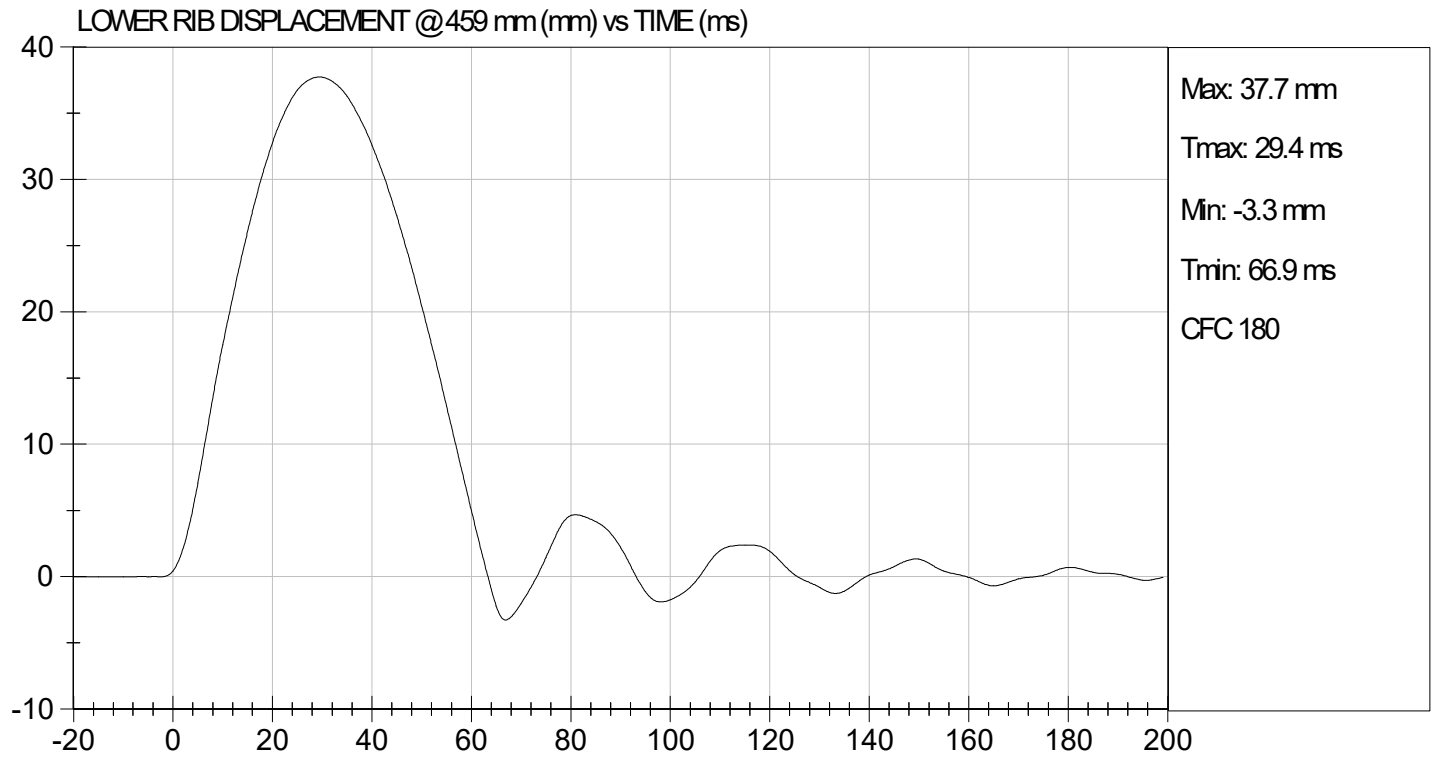
Test I.D: D233366

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
Displacement at 459 mm	mm	36.0 to 40.0	37.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.8	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

12/18/2023
Test Date

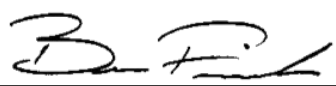


MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY**ATD Serial No: F032Test I.D: D233367

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	26	Pass
Probe Speed	m/s	3.90 to 4.10	4.01	Pass
Maximum Impactor Force	N	4000 to 4800	4102	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.5	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2464	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.7	Pass
Overall Test Results				Pass


Laboratory Technician

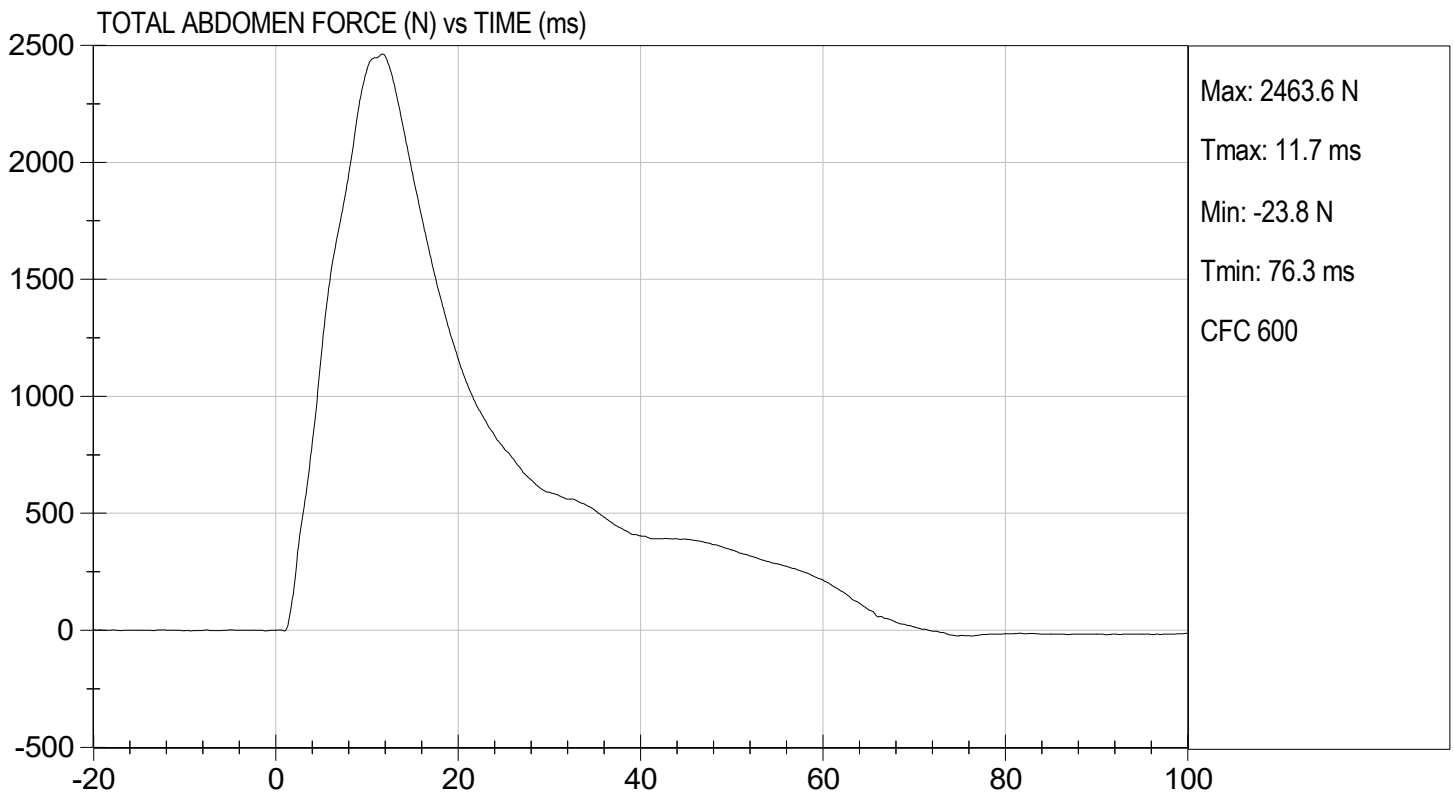
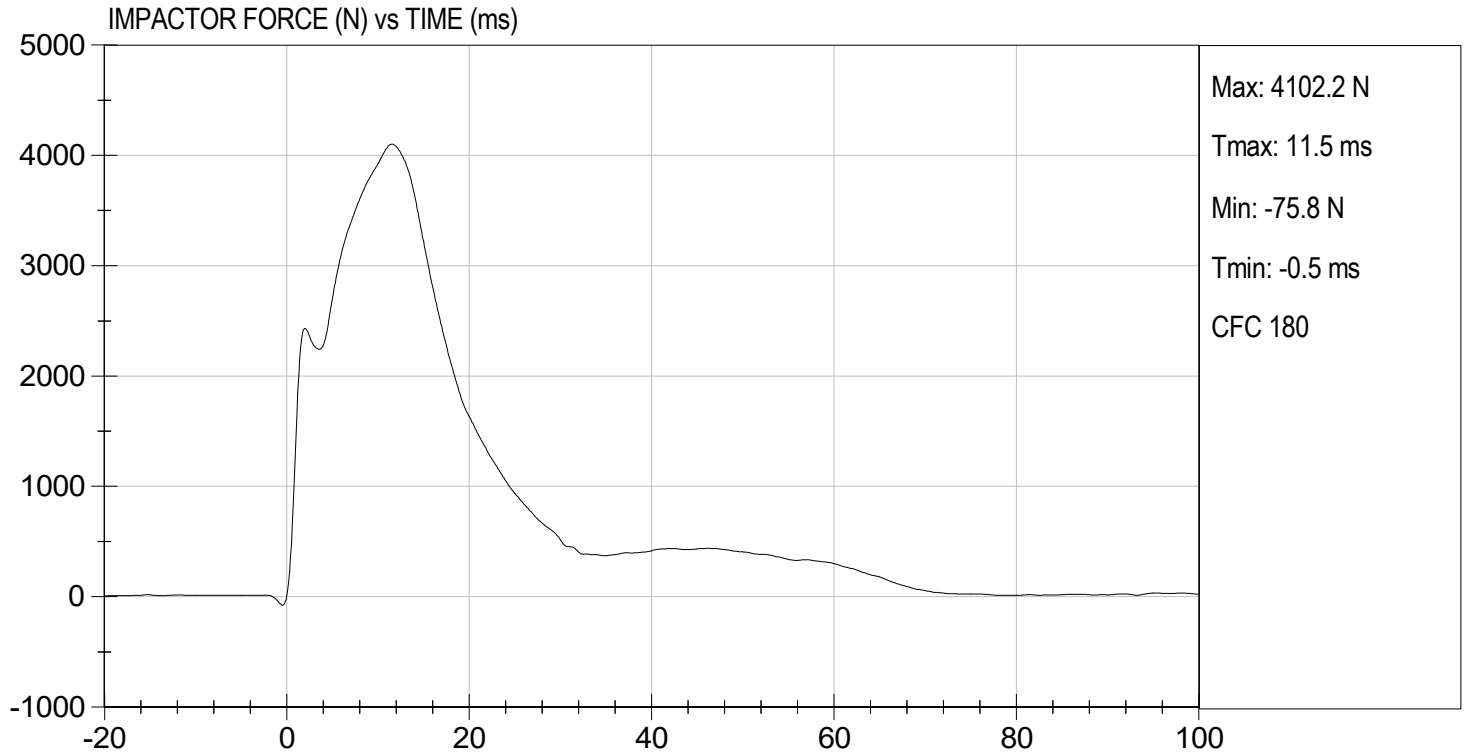
12/18/2023
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.15 ft/s, 4.01 m/s

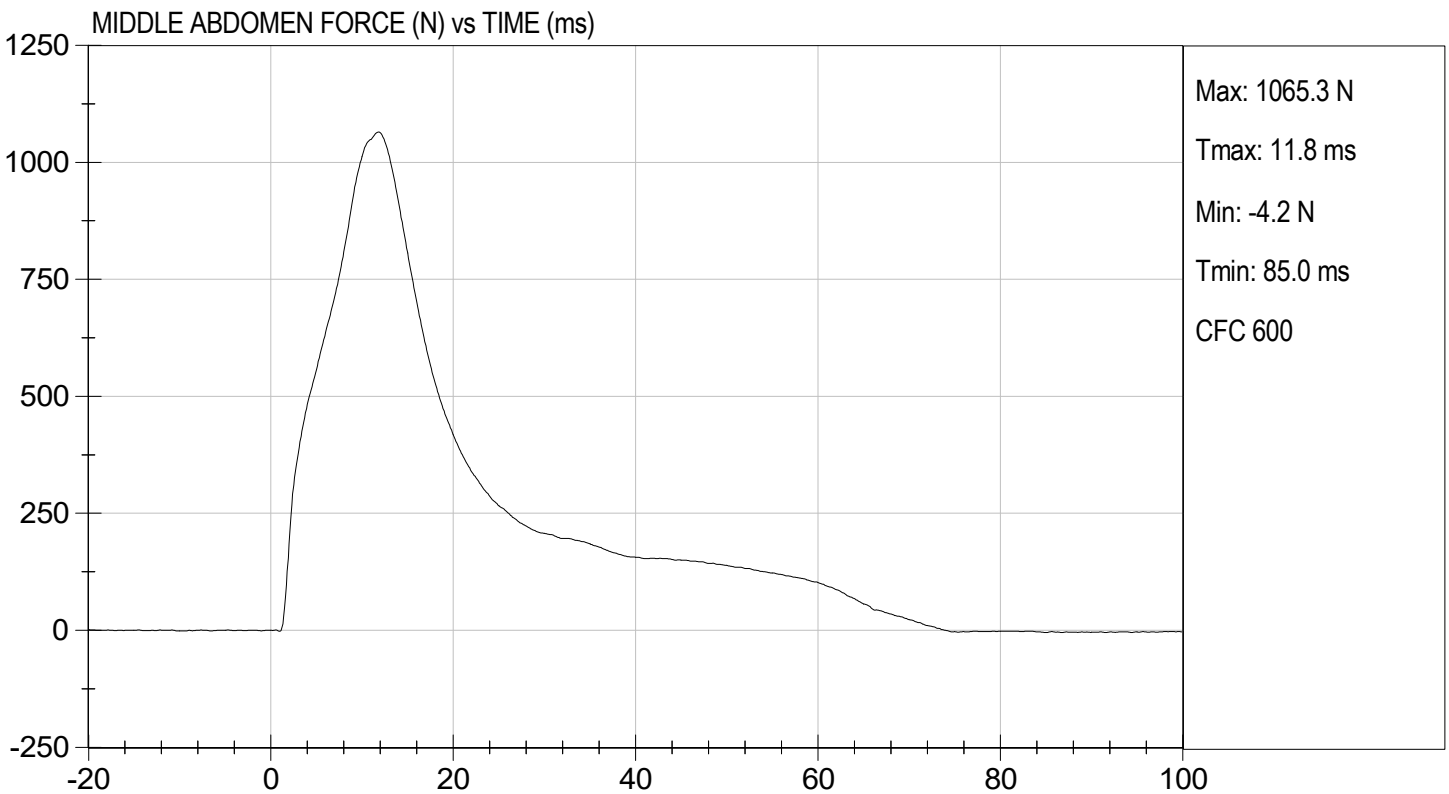
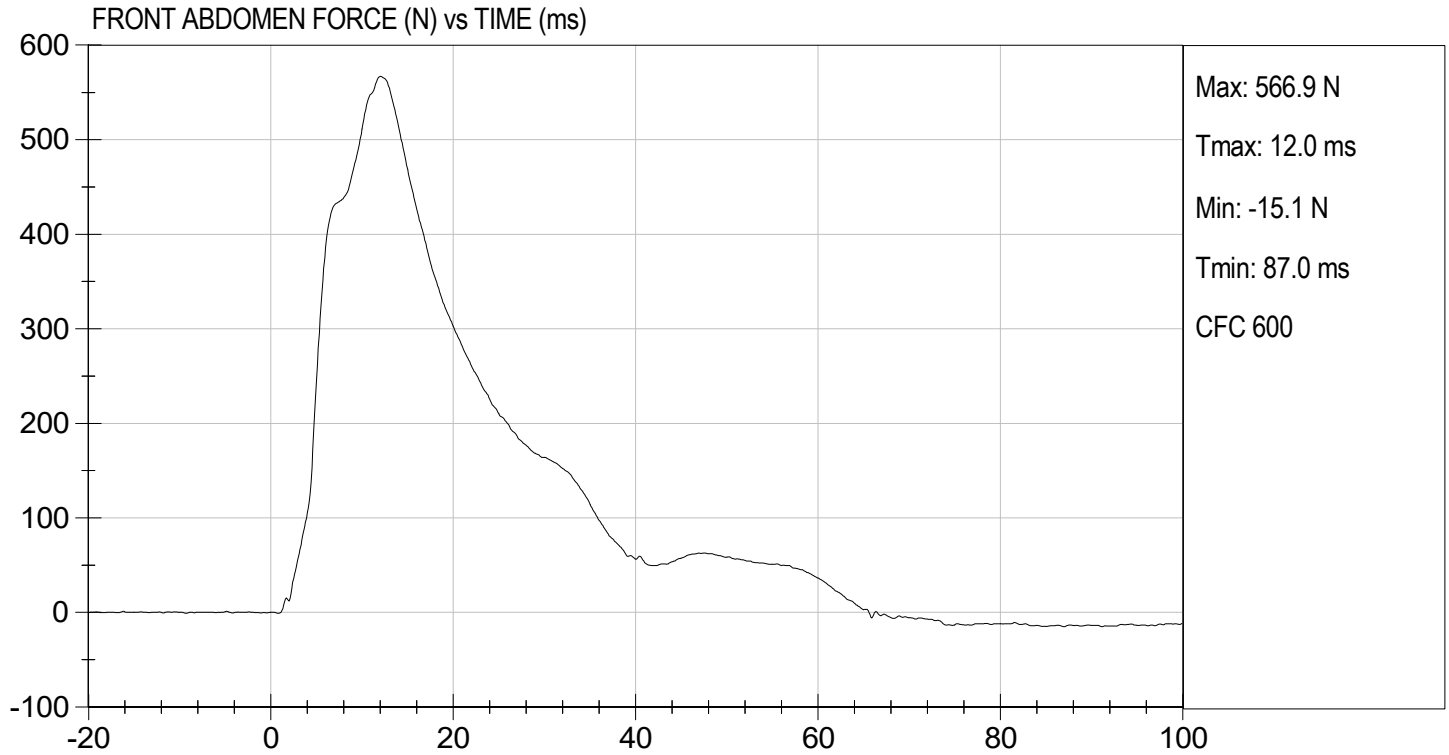
TEST DATE: 12/18/2023
TEST #: D233367





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.15 ft/s, 4.01 m/s

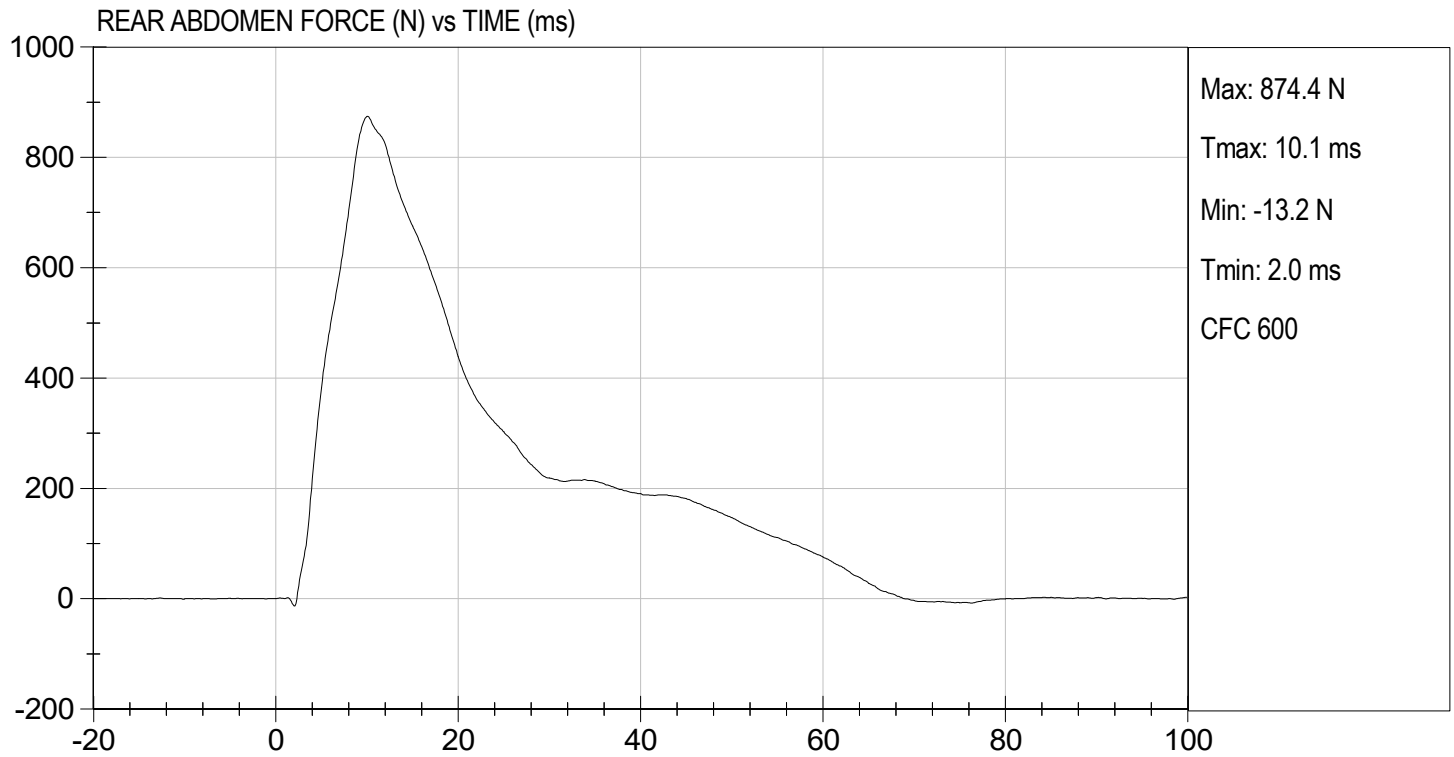
TEST DATE: 12/18/2023
TEST #: D233367





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.15 ft/s, 4.01 m/s

TEST DATE: 12/18/2023
TEST #: D233367



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

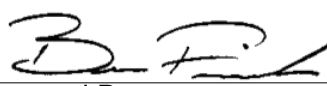
ATD Serial No: F032

Test I.D: D233368

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	26	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	-0.417	Pass
	27 ms	m/s	-6.50 to -5.80	-5.97	Pass
	30 ms	m/s	>= -6.50	-6.29	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	49.5	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	47.0	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	40	Pass
Overall Results					Pass


 Laboratory Technician

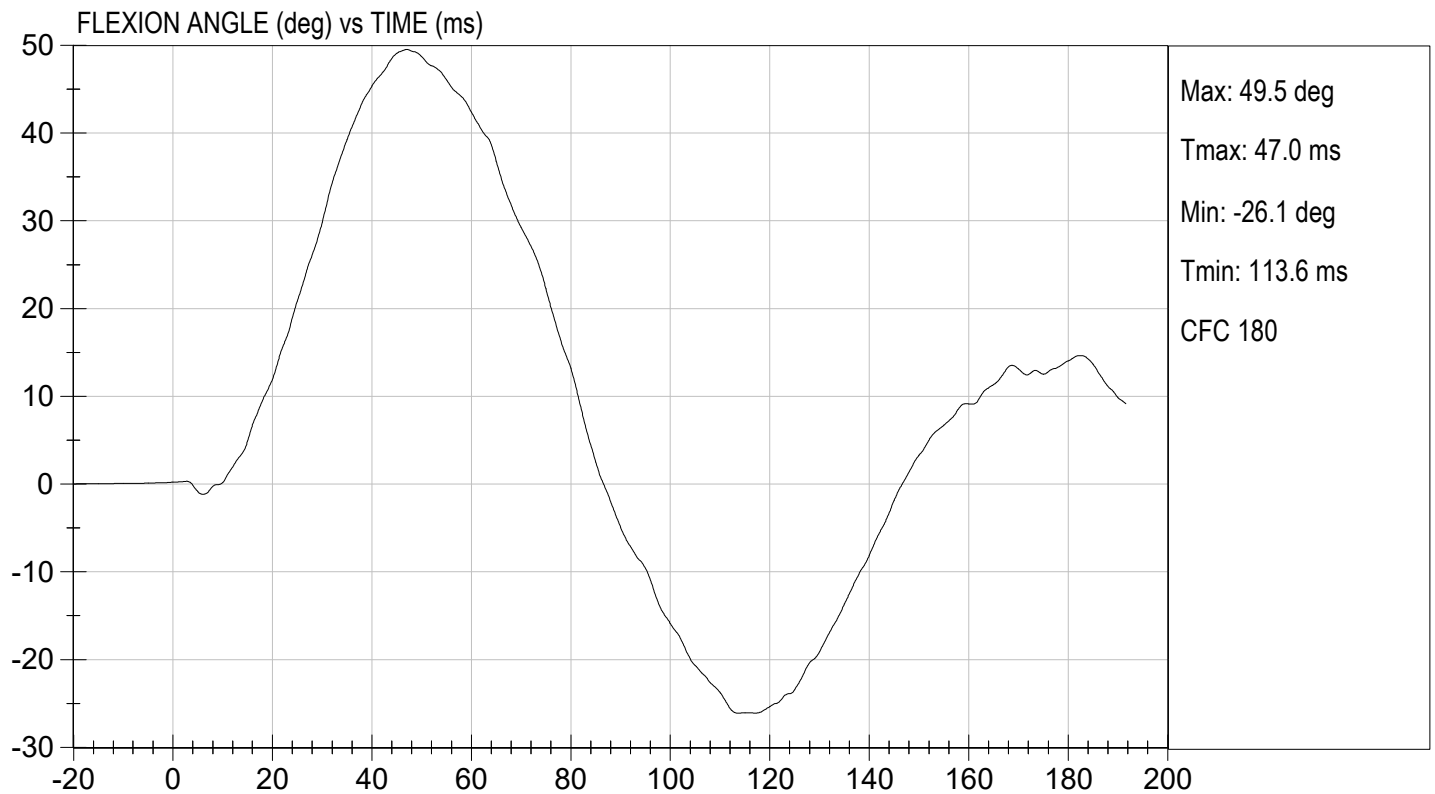
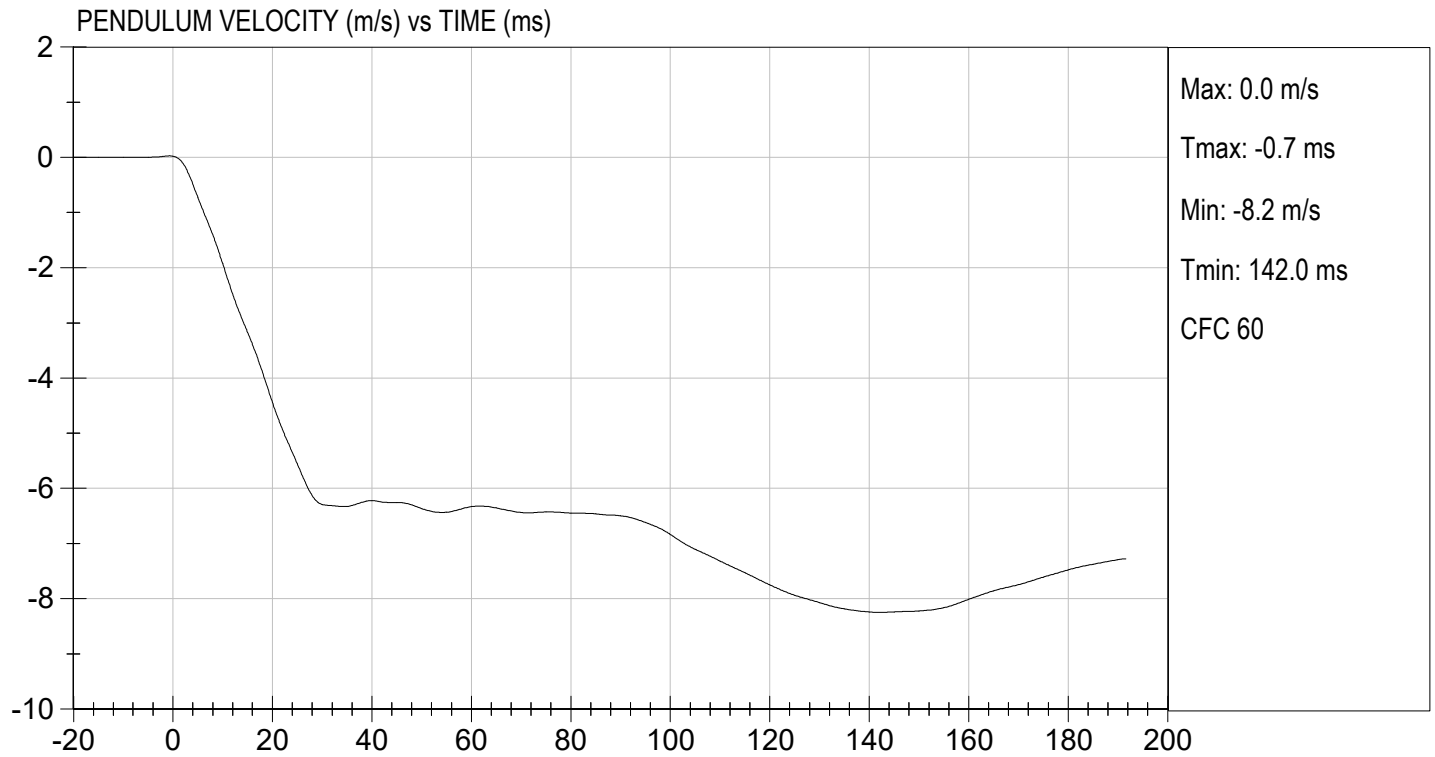
12/18/2023
 Test Date


 Approved By



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

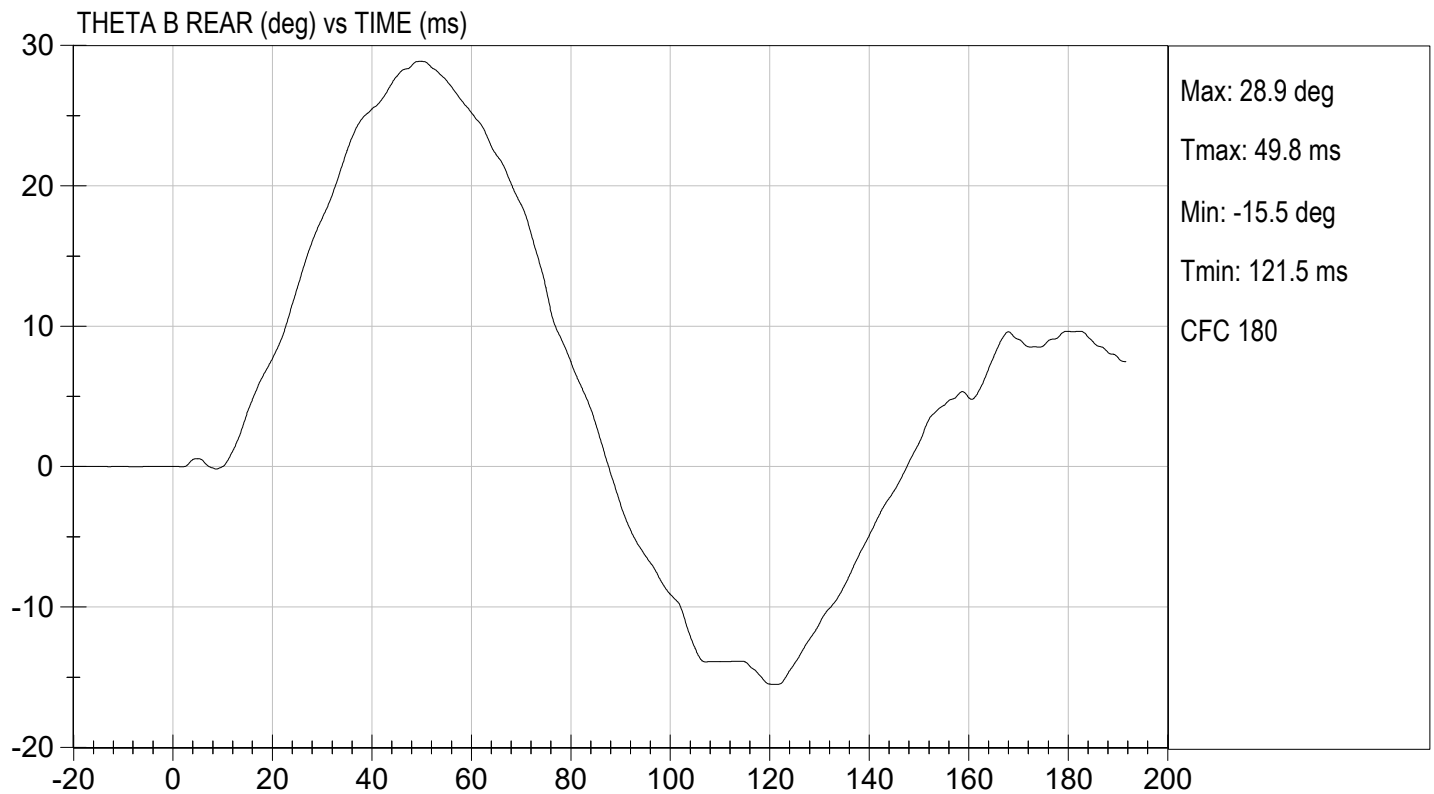
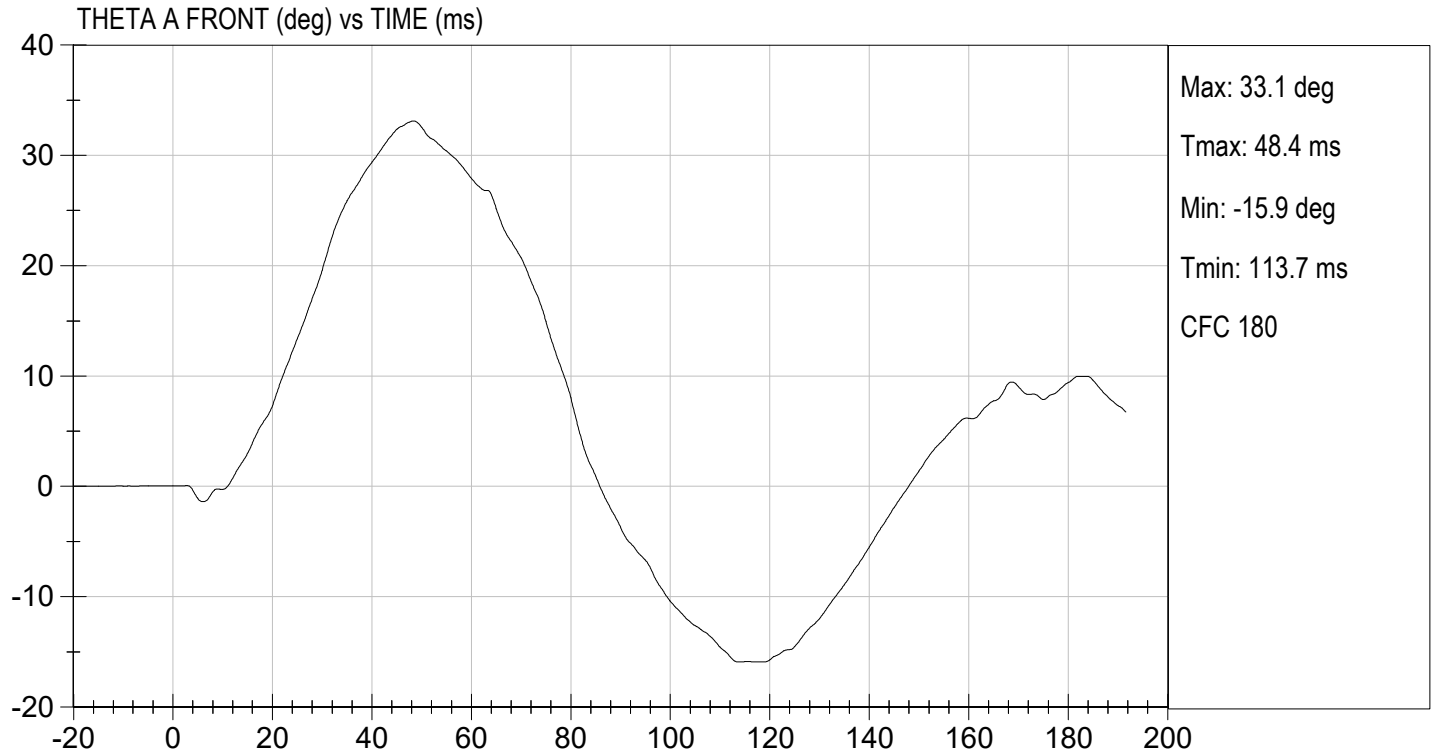
TEST DATE: 12/18/2023
TEST #: D233368





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

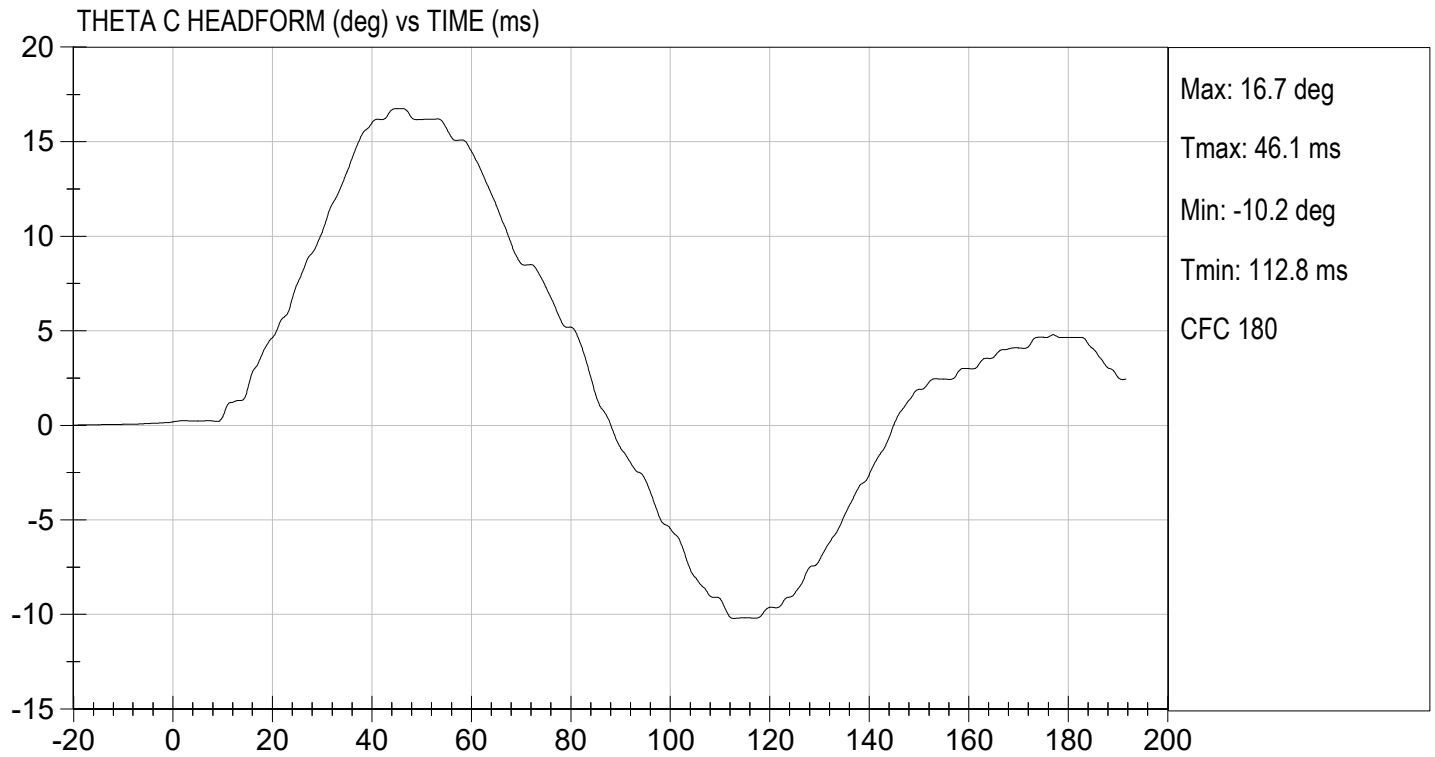
TEST DATE: 12/18/2023
TEST #: D233368





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

TEST DATE: 12/18/2023
TEST #: D233368

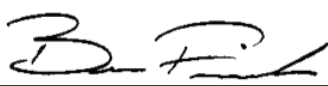


MGA RESEARCH CORPORATION**PELVIS TEST
ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D233369

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	26	Pass
Probe Speed	m/s	4.20 to 4.40	4.34	Pass
Maximum Impactor Force	N	4700 to 5400	5127	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.7	Pass
Maximum Pubic Force	N	1230 to 1590	1348	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.3	Pass
Overall Test Results				Pass


Laboratory Technician

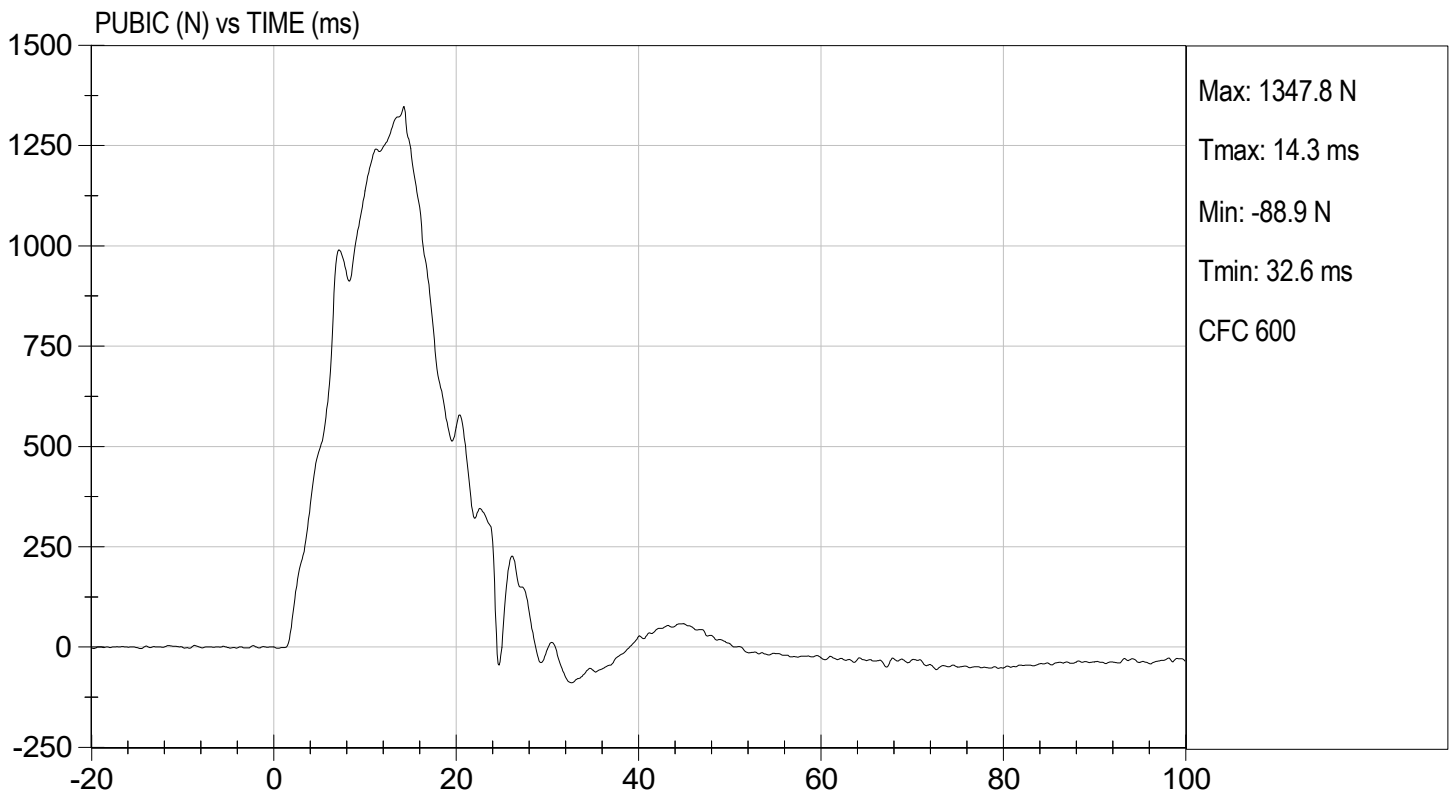
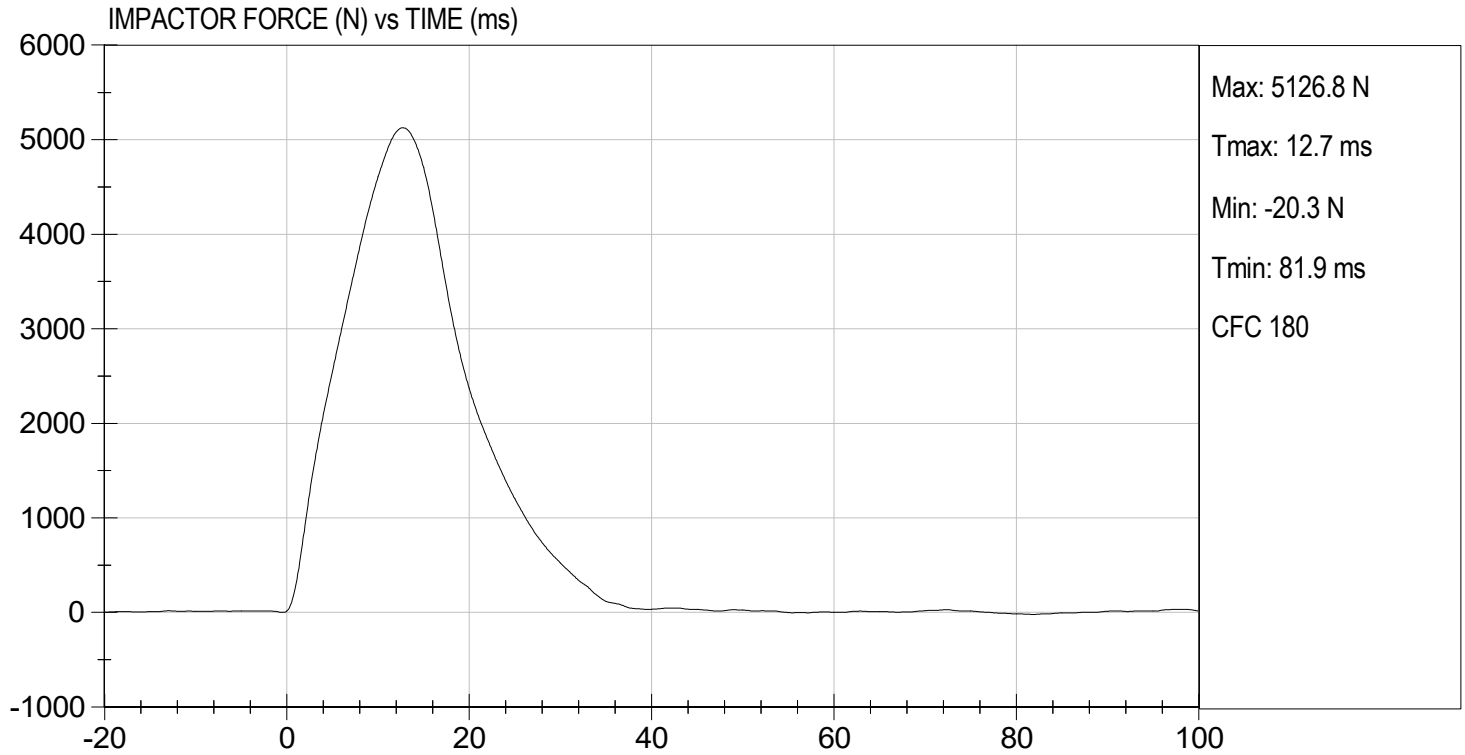
12/18/2023
Test Date


Approved By



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

TEST DATE: 12/18/2023
TEST #: D233369



MGA RESEARCH CORPORATION**THORAX IMPACT TEST****ES-2re DUMMY**ATD Serial No: F032Test I.D: D233360

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	26	Pass
Probe Speed	m/s	5.40 to 5.60	5.40	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5689	Pass
Upper Rib Displacement	mm	34.0 to 41.0	37.1	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.1	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.9	Pass
Overall Test Results				Pass


Laboratory Technician

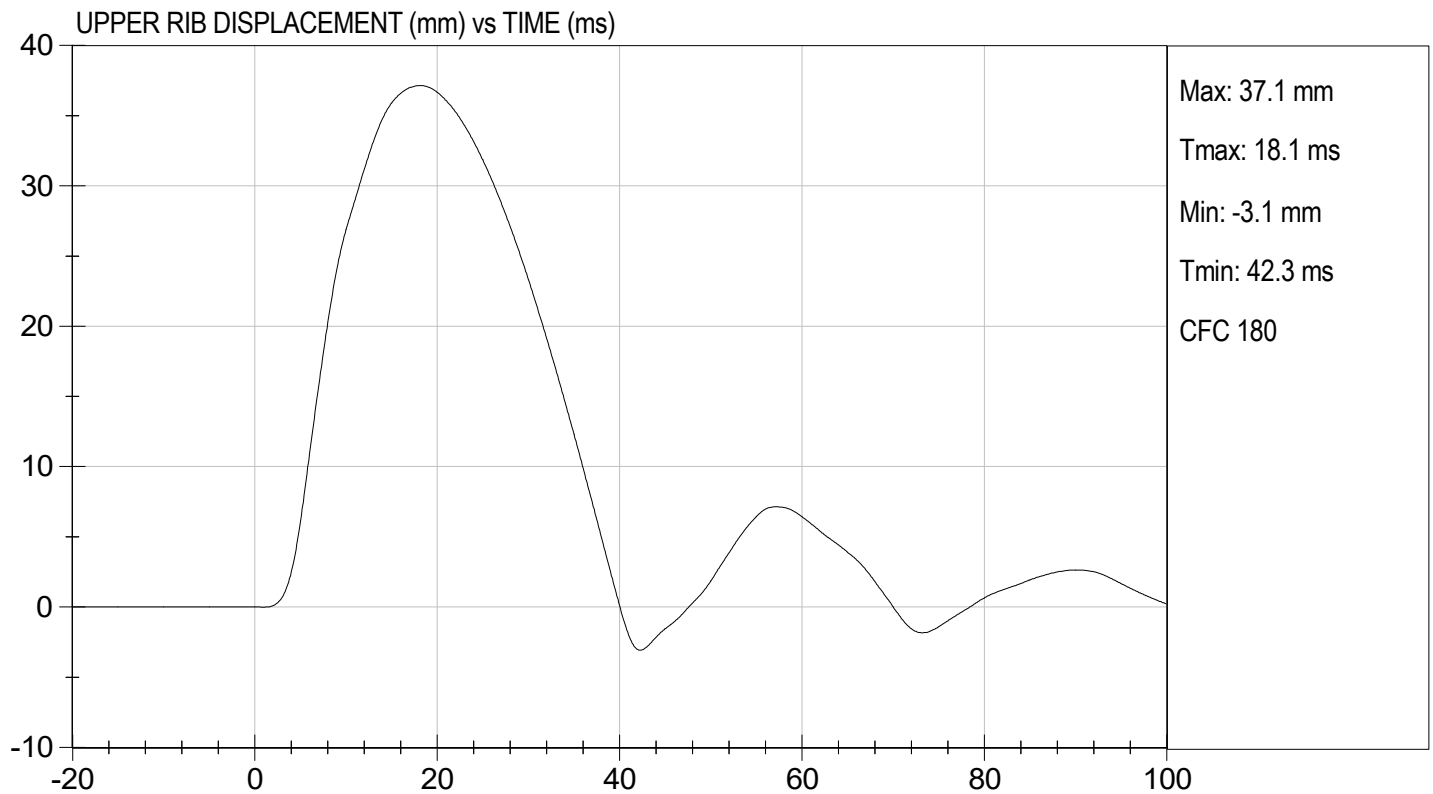
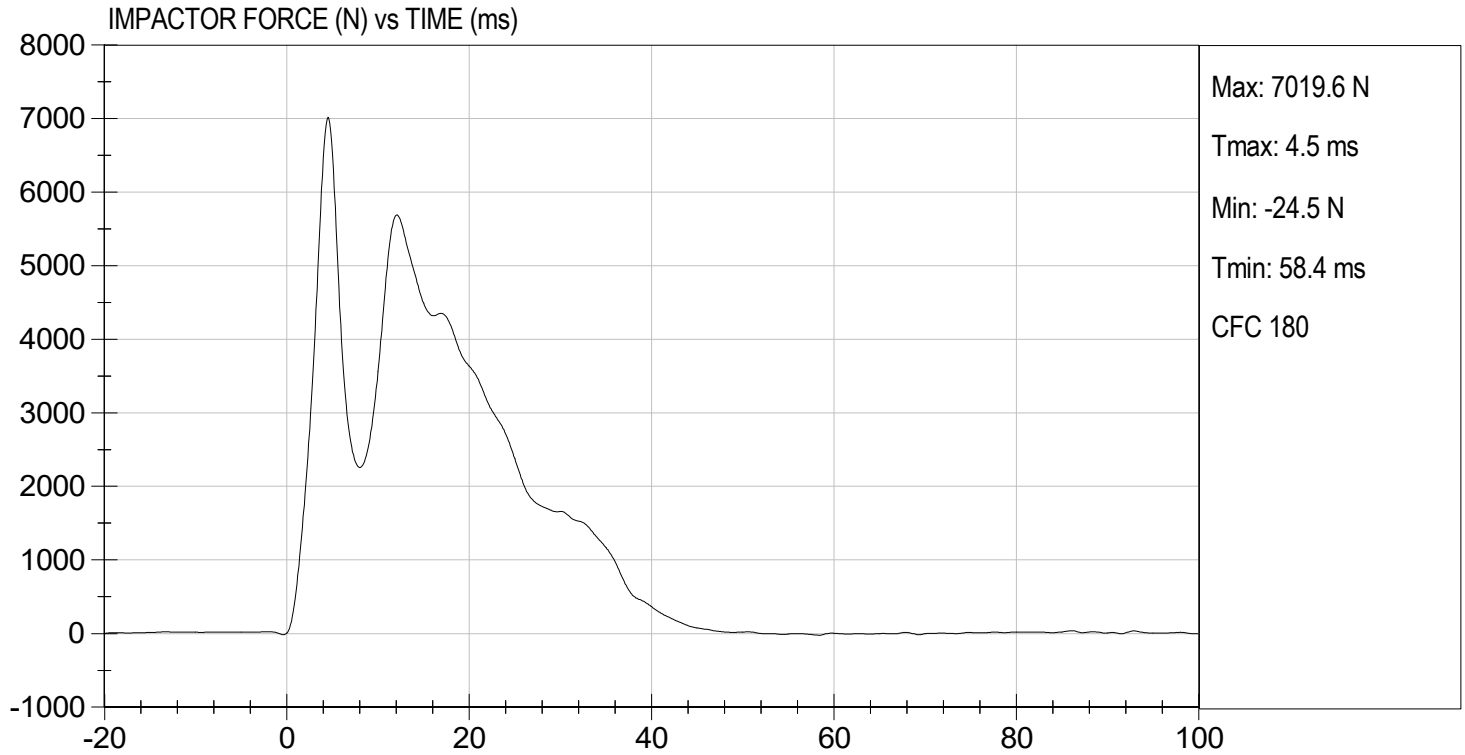
12/18/2023
Test Date


Approved By



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

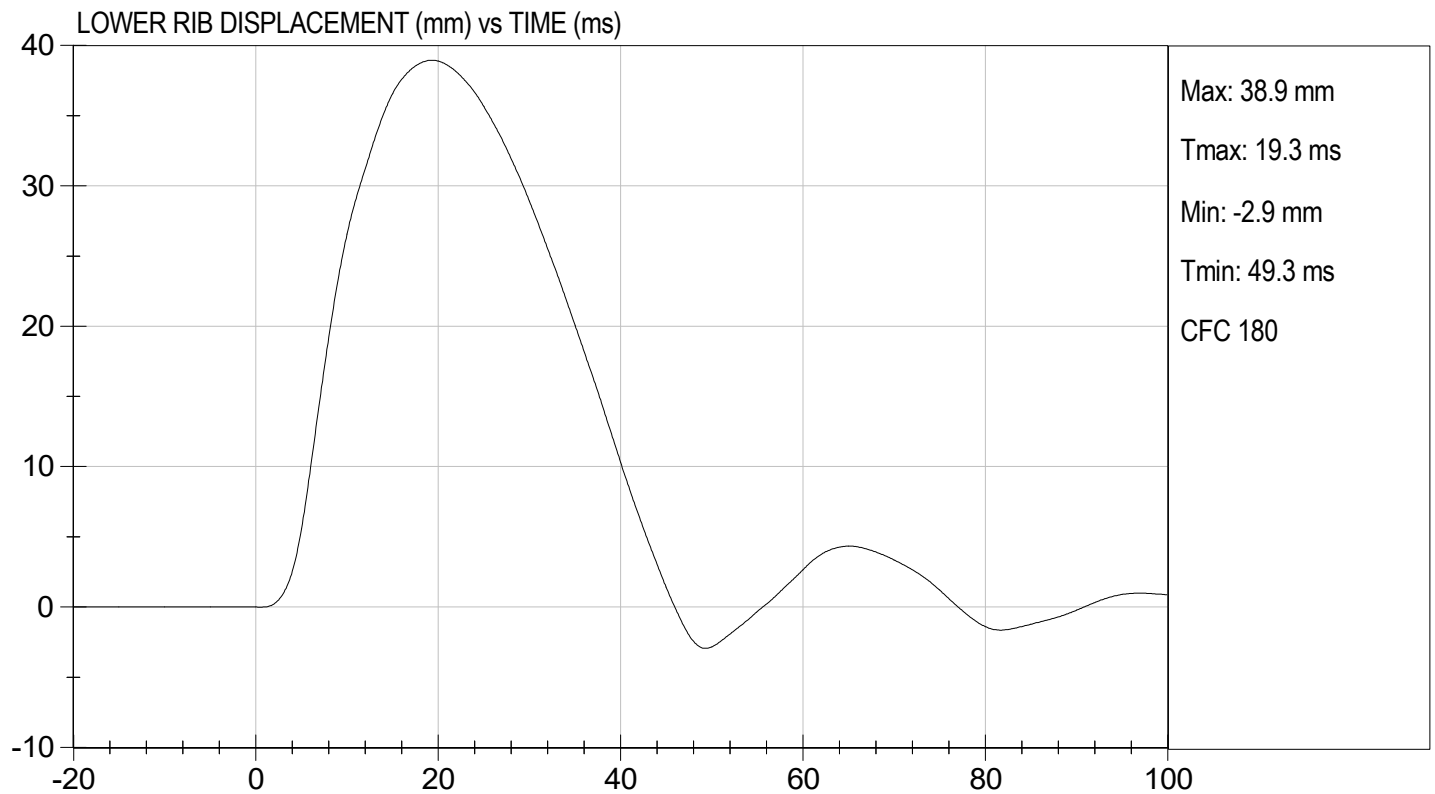
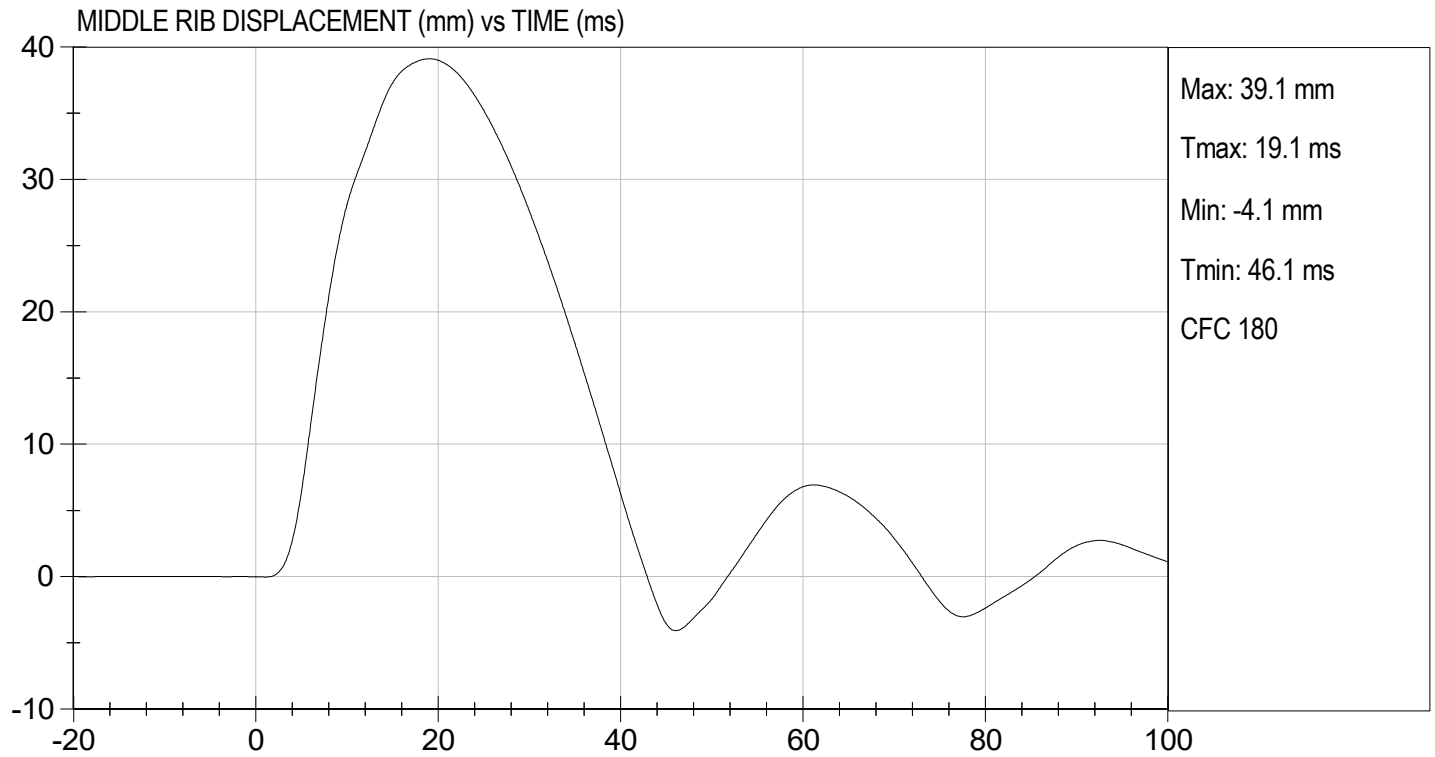
TEST DATE: 12/18/2023
TEST #: D233360





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

TEST DATE: 12/18/2023
TEST #: D233360



QUALIFICATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: F032

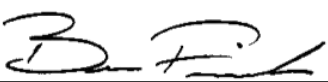
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	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

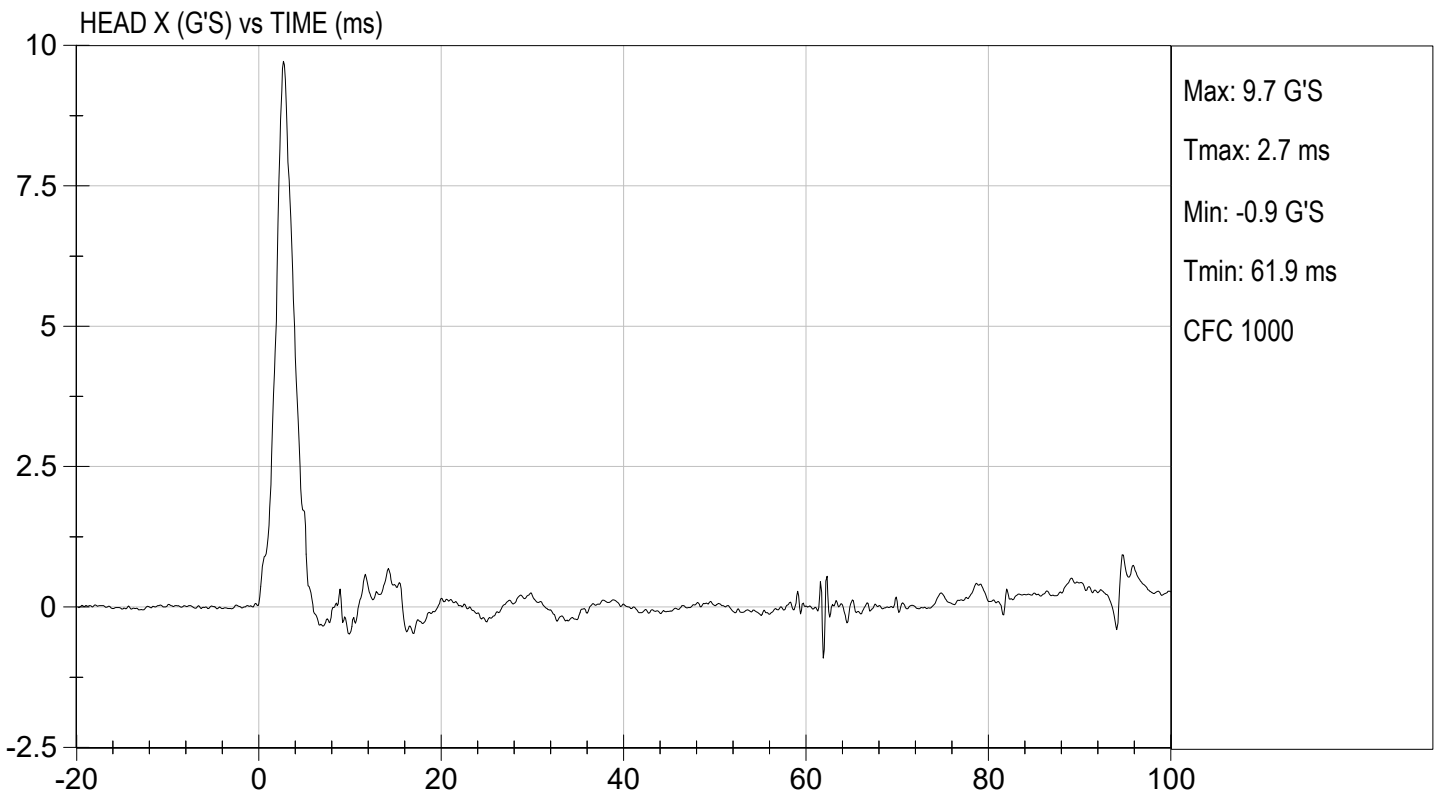
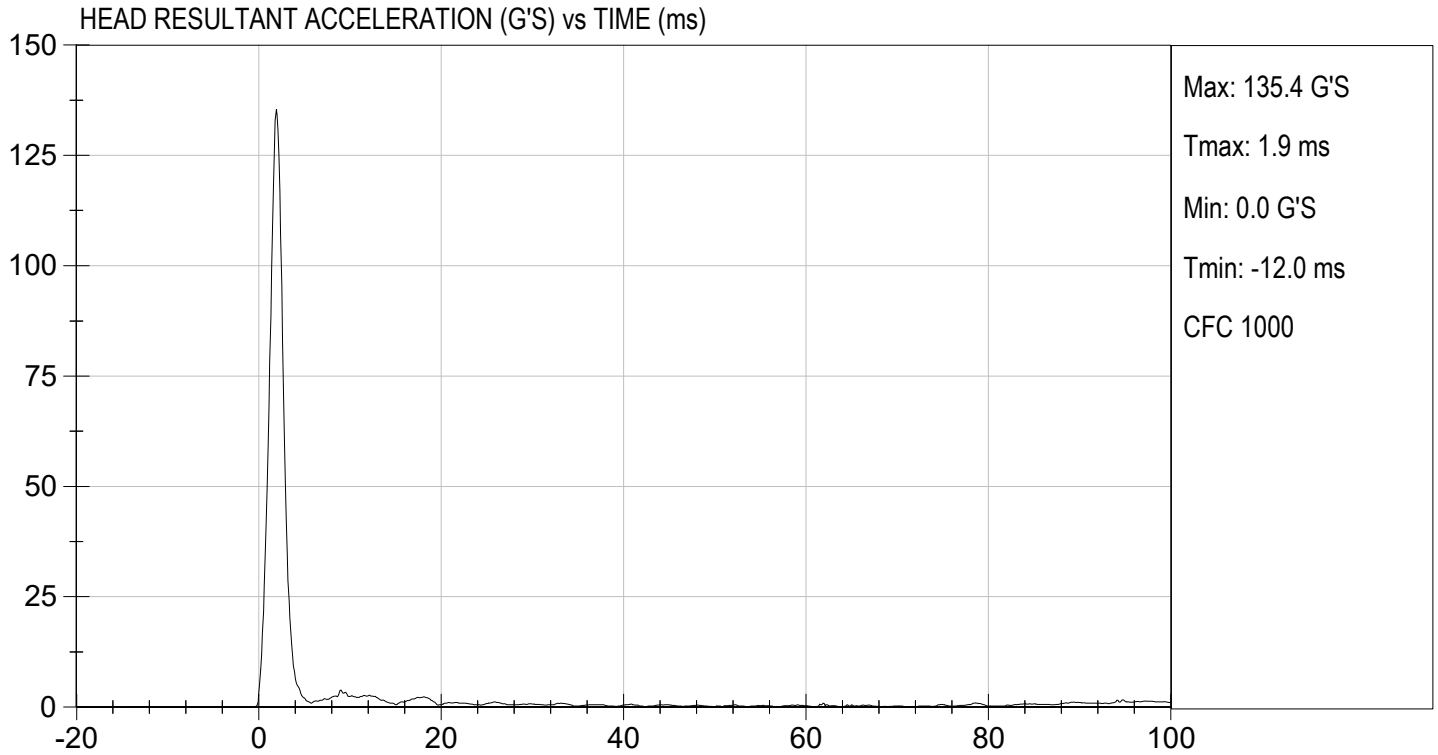
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY**ATD Serial No: F032Test ID: D240121

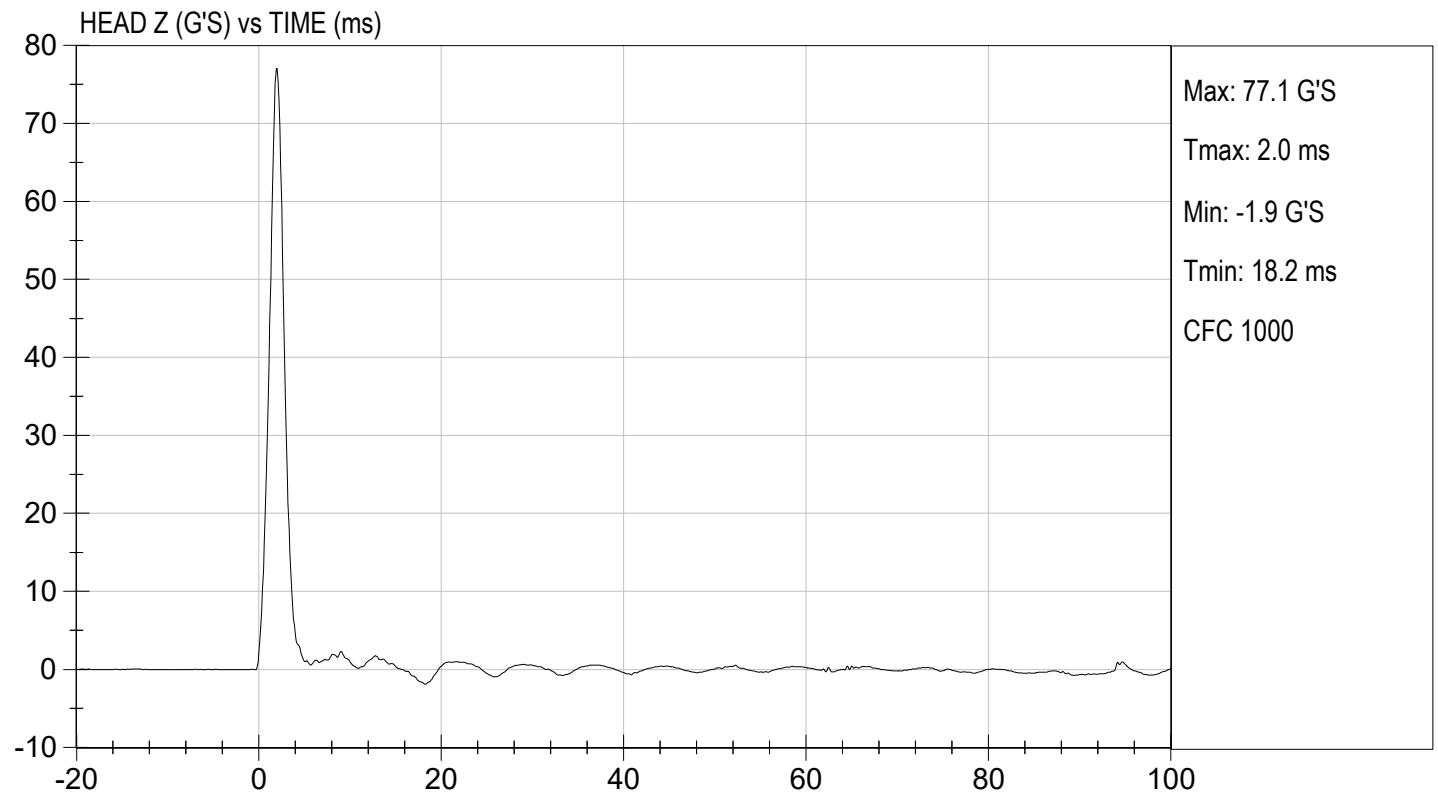
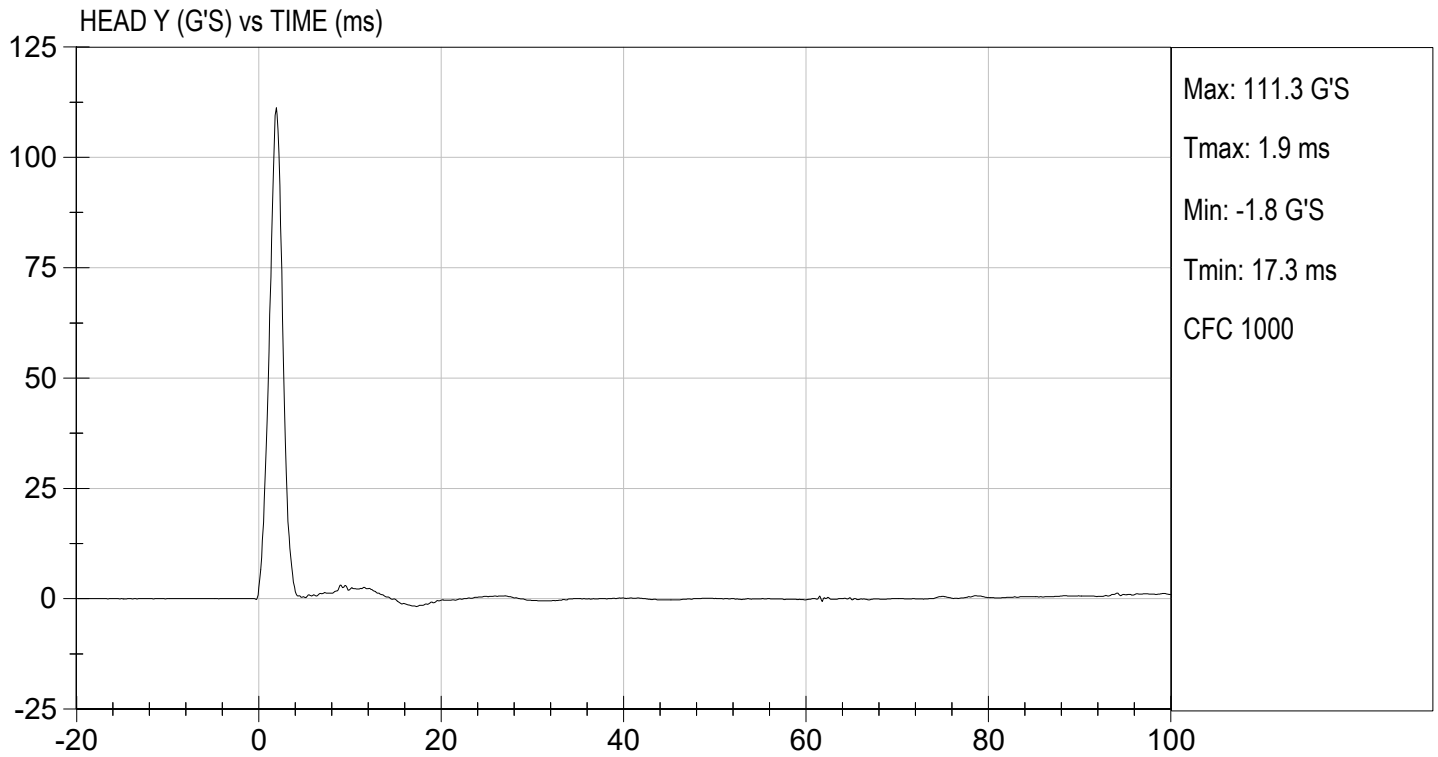
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Peak Resultant Acceleration	G's	125 to 155	135	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	9.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

01/12/2024
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

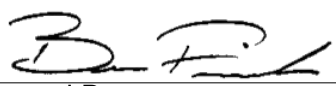
ATD Serial No: F032

Test I.D: D240122

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	27	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	-0.35	Pass
	14 ms	m/s	-3.20 to -3.70	-3.55	Pass
	17 ms	m/s	>= -3.70	-3.54	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.5	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	59.1	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	57.4	Pass
Overall Results					Pass


 Laboratory Technician

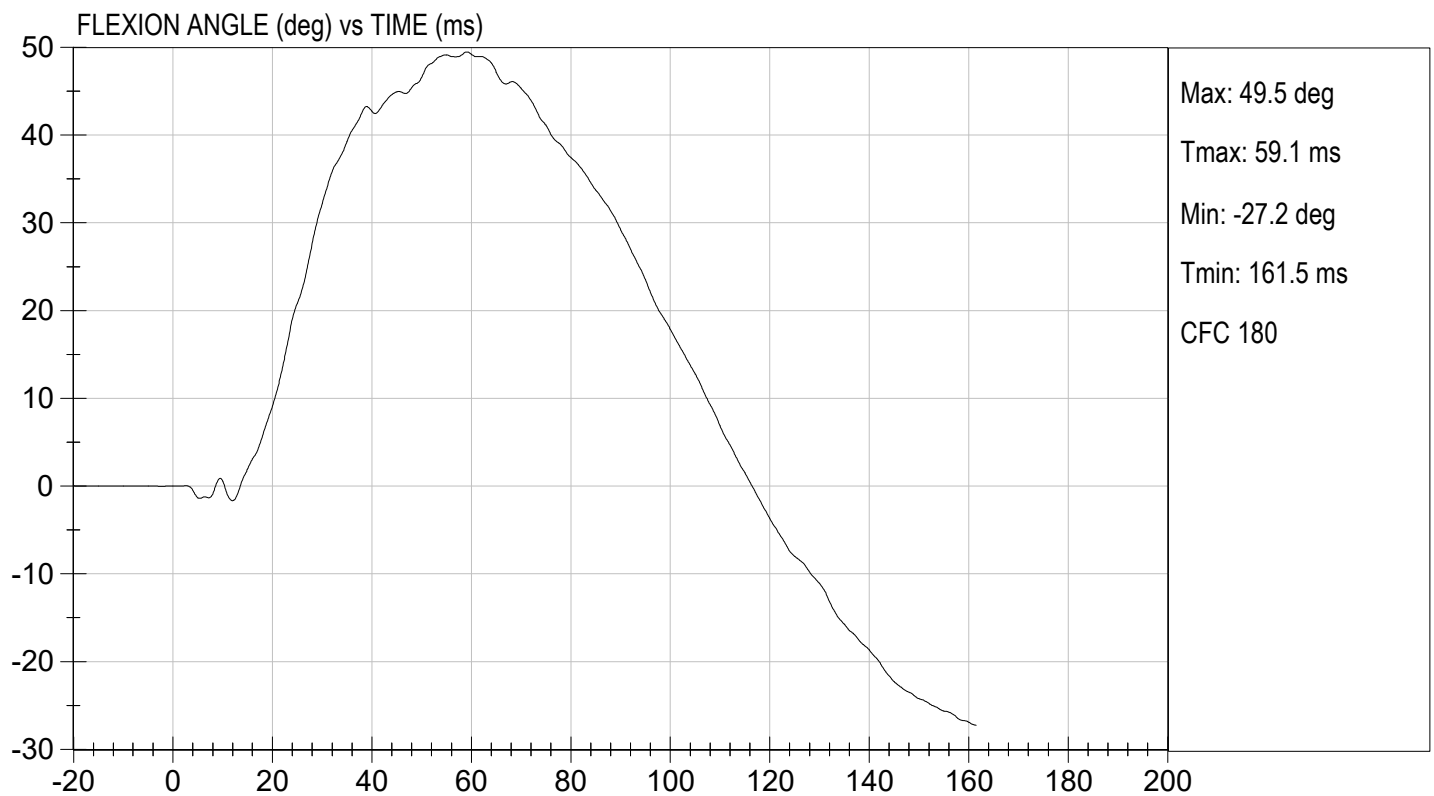
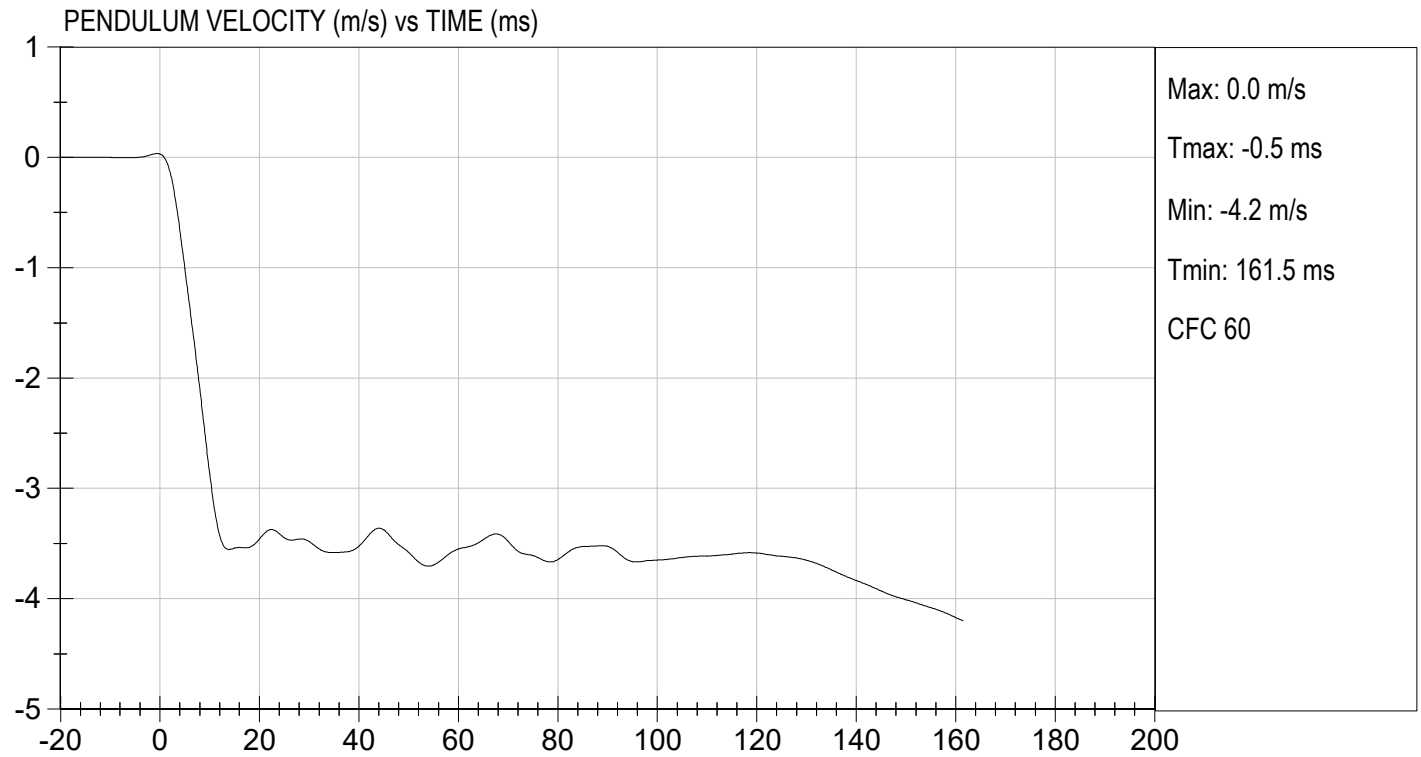
01/12/2024
 Test Date


 Approved By



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

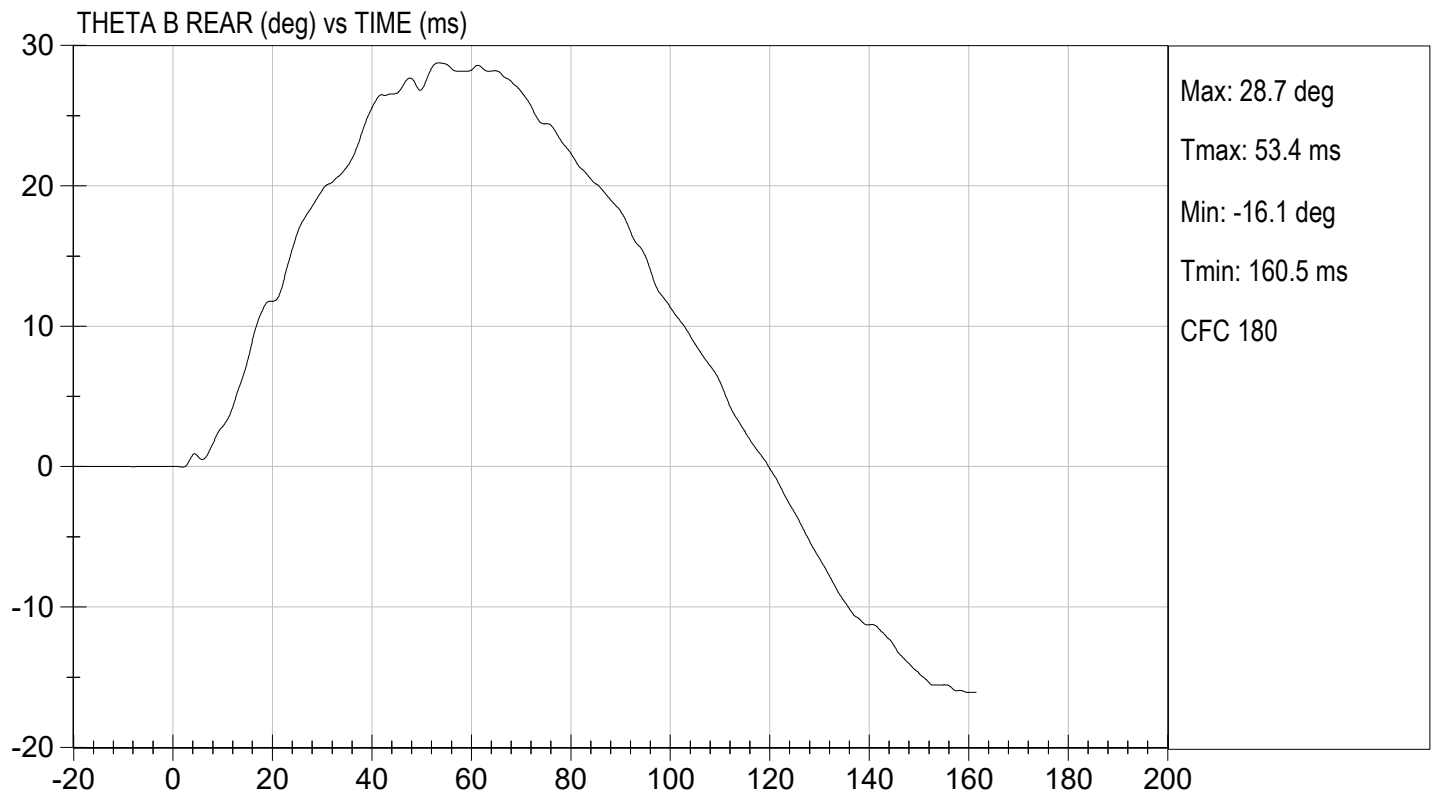
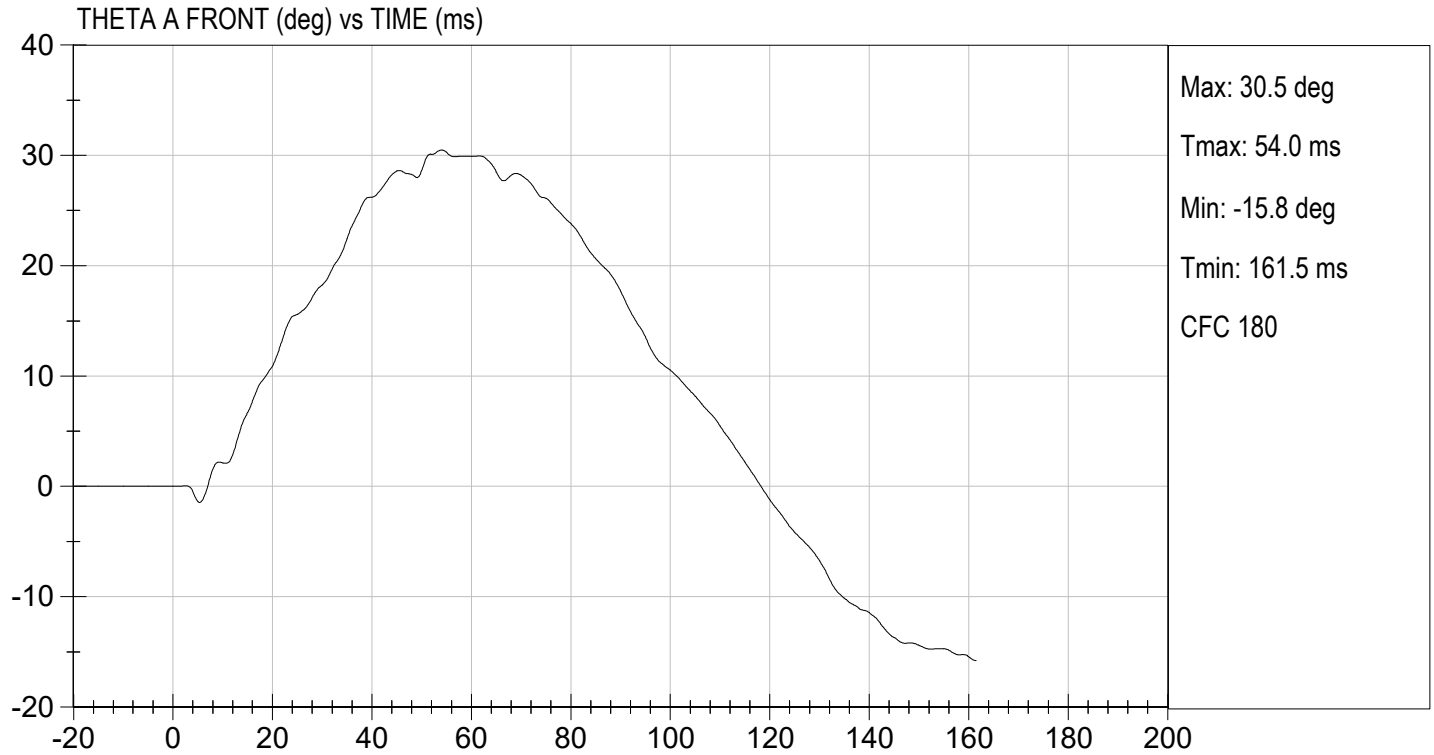
TEST DATE: 01/12/2024
TEST #: D240122





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

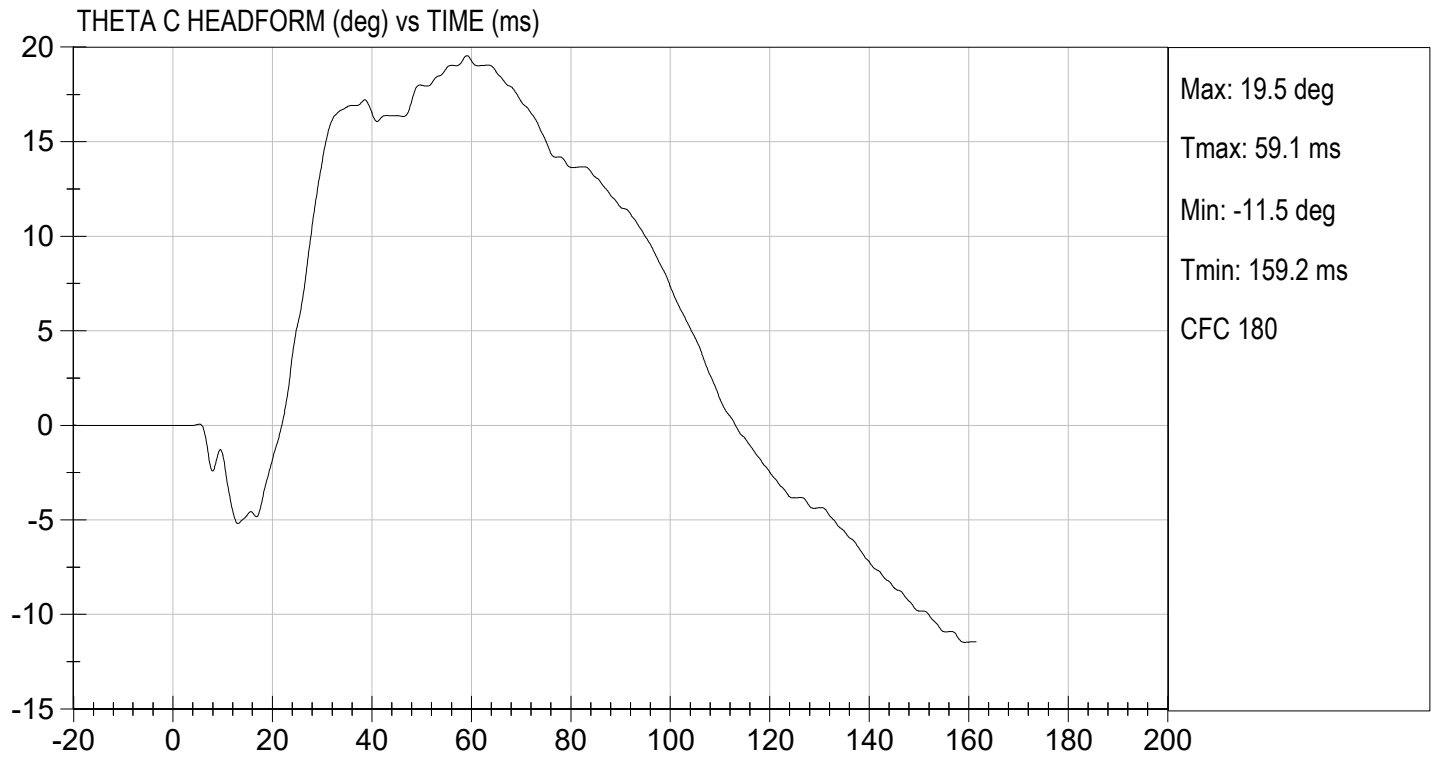
TEST DATE: 01/12/2024
TEST #: D240122





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

TEST DATE: 01/12/2024
TEST #: D240122



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

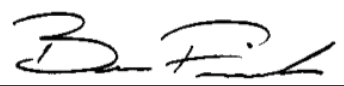
ATD Serial No: F032

Test I.D: D240123

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
Pendulum Speed	m/s	4.20 to 4.40	4.2	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.8	Pass
Overall Test Results				Pass


Laboratory Technician

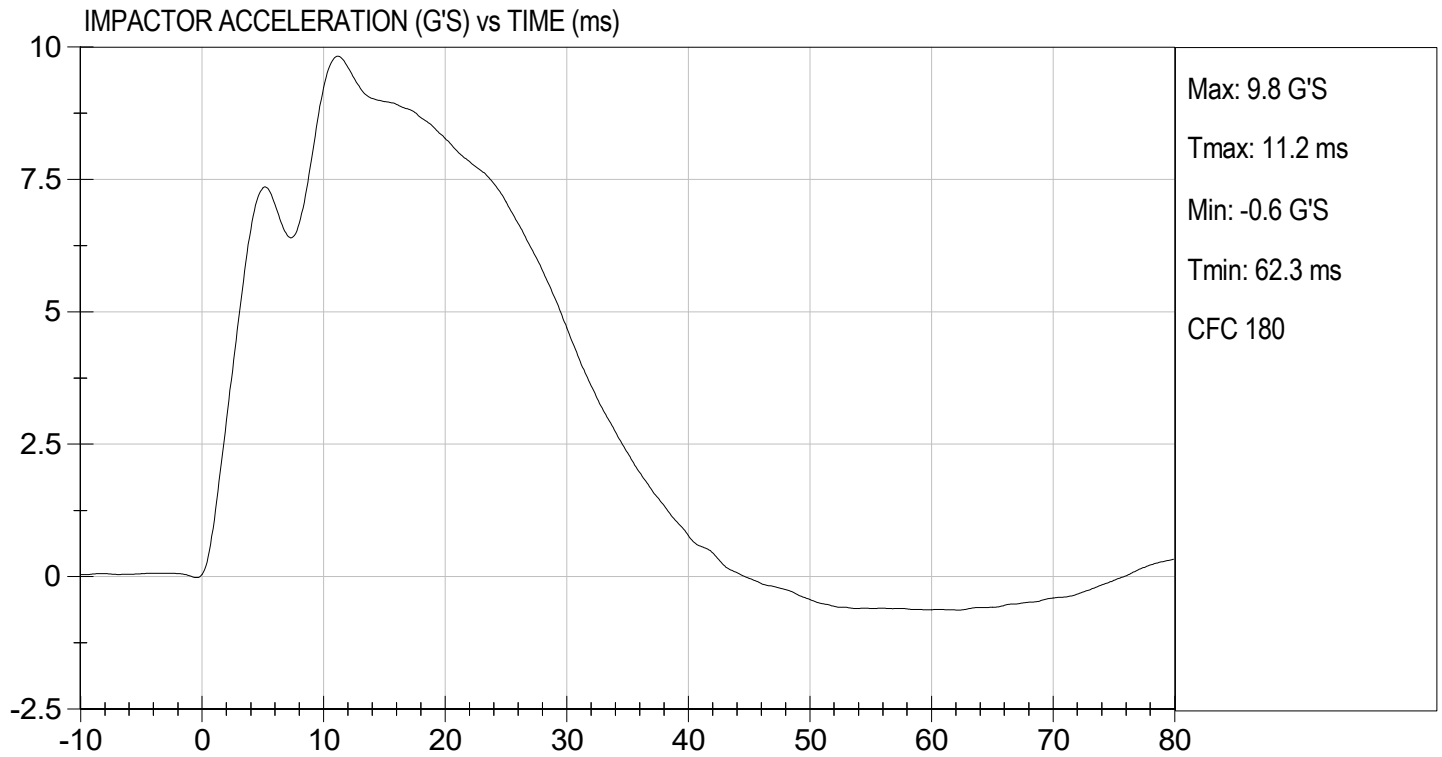
01/12/2024
Test Date


Approved By



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

TEST DATE: 01/12/2024
TEST #: D240123



MGA RESEARCH CORPORATION

UPPER RIB TEST

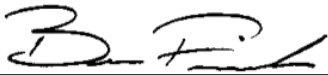
ES-2re DUMMY

ATD Serial No: F032

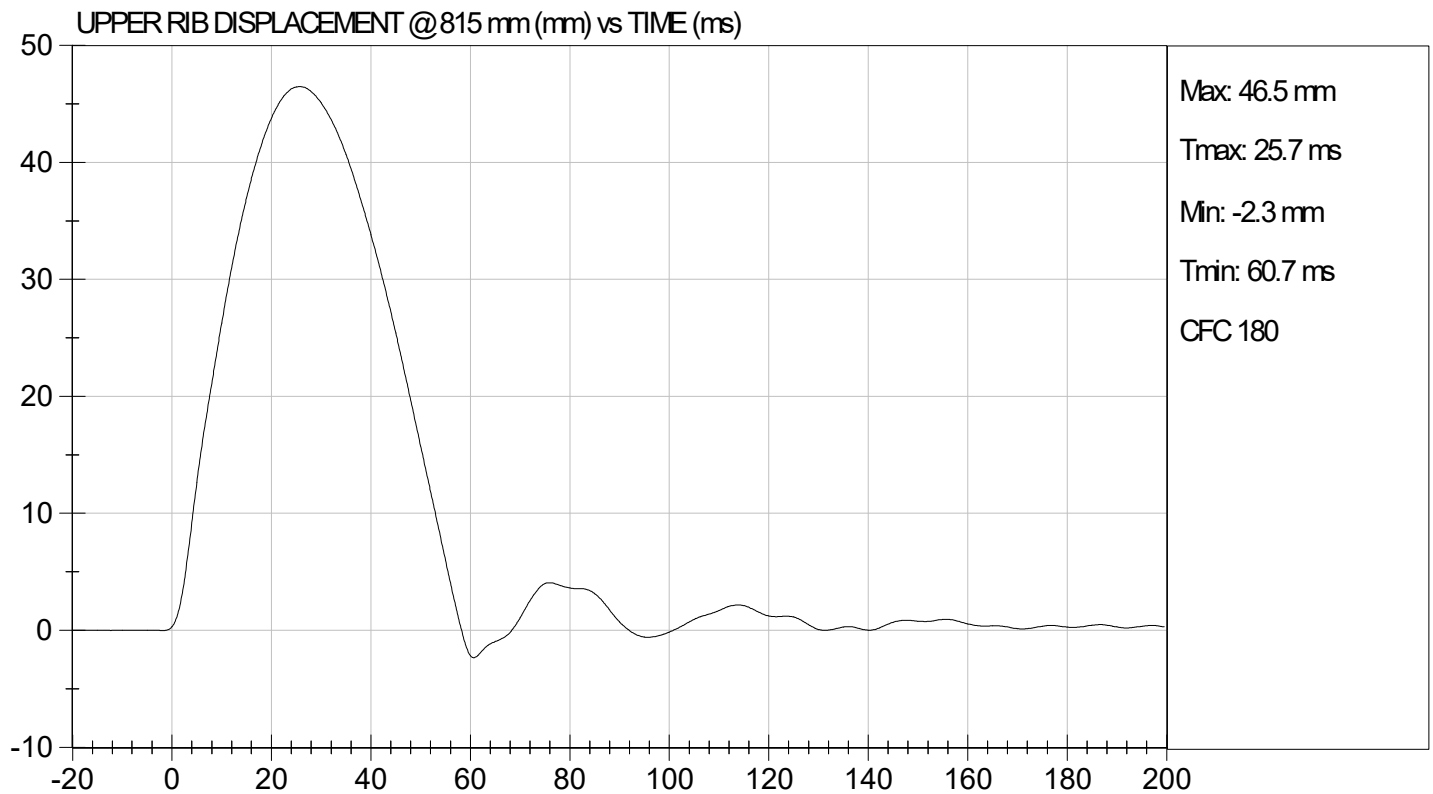
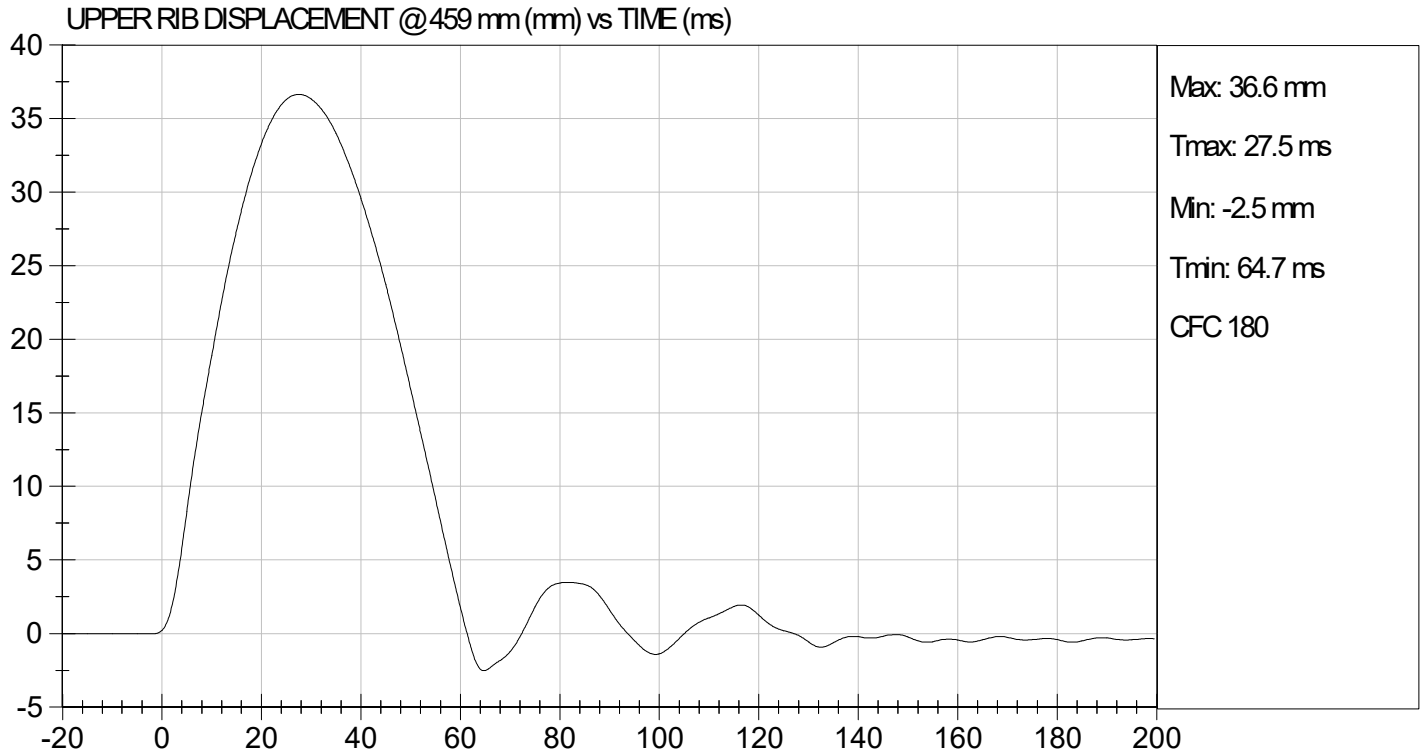
Test I.D: D240124

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
Displacement at 459 mm	mm	36.0 to 40.0	36.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	46.5	Pass
			Overall Test Results	Pass


Laboratory Technician


Approved By

01/12/2024
Test Date



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

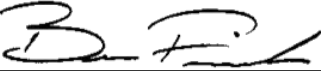
ATD Serial No: F032

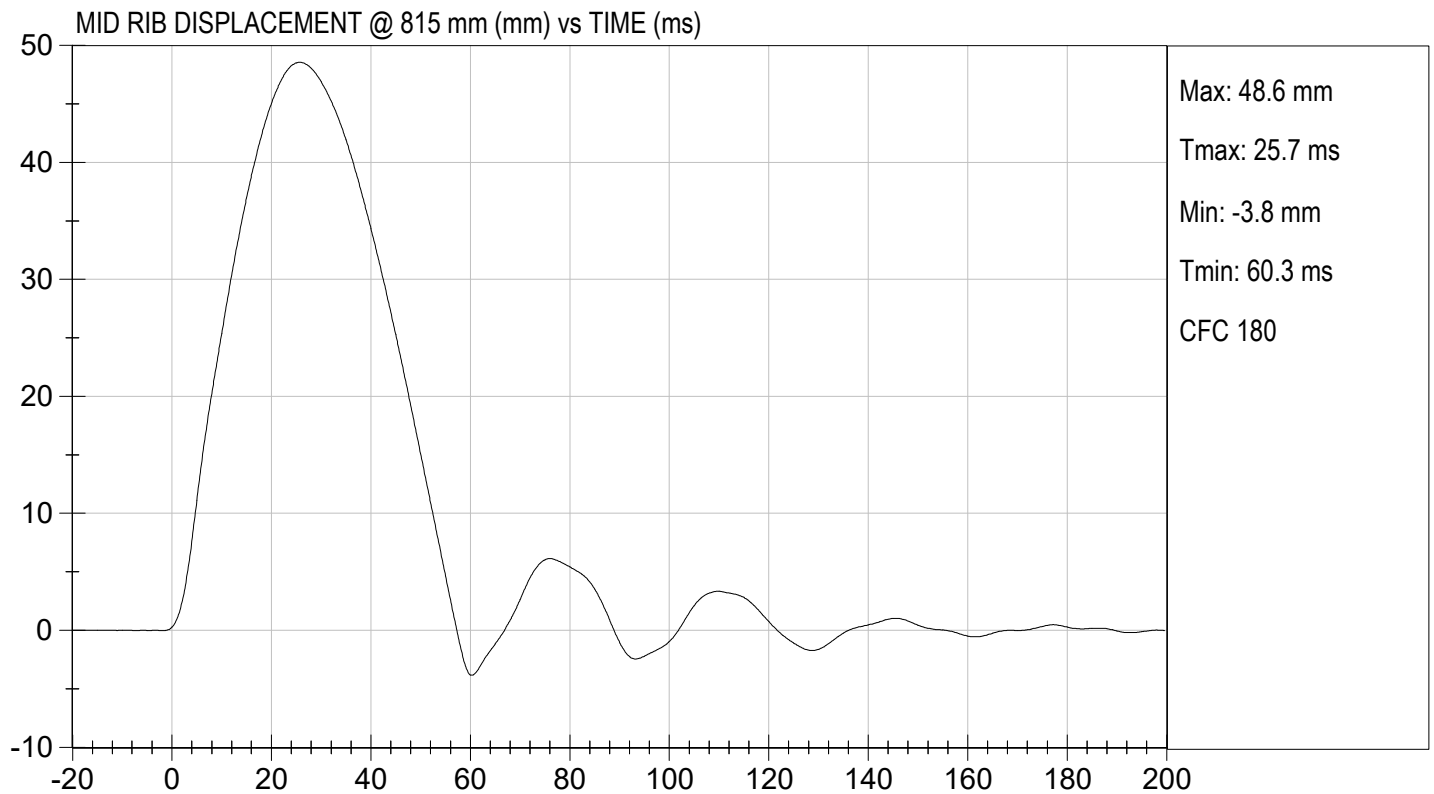
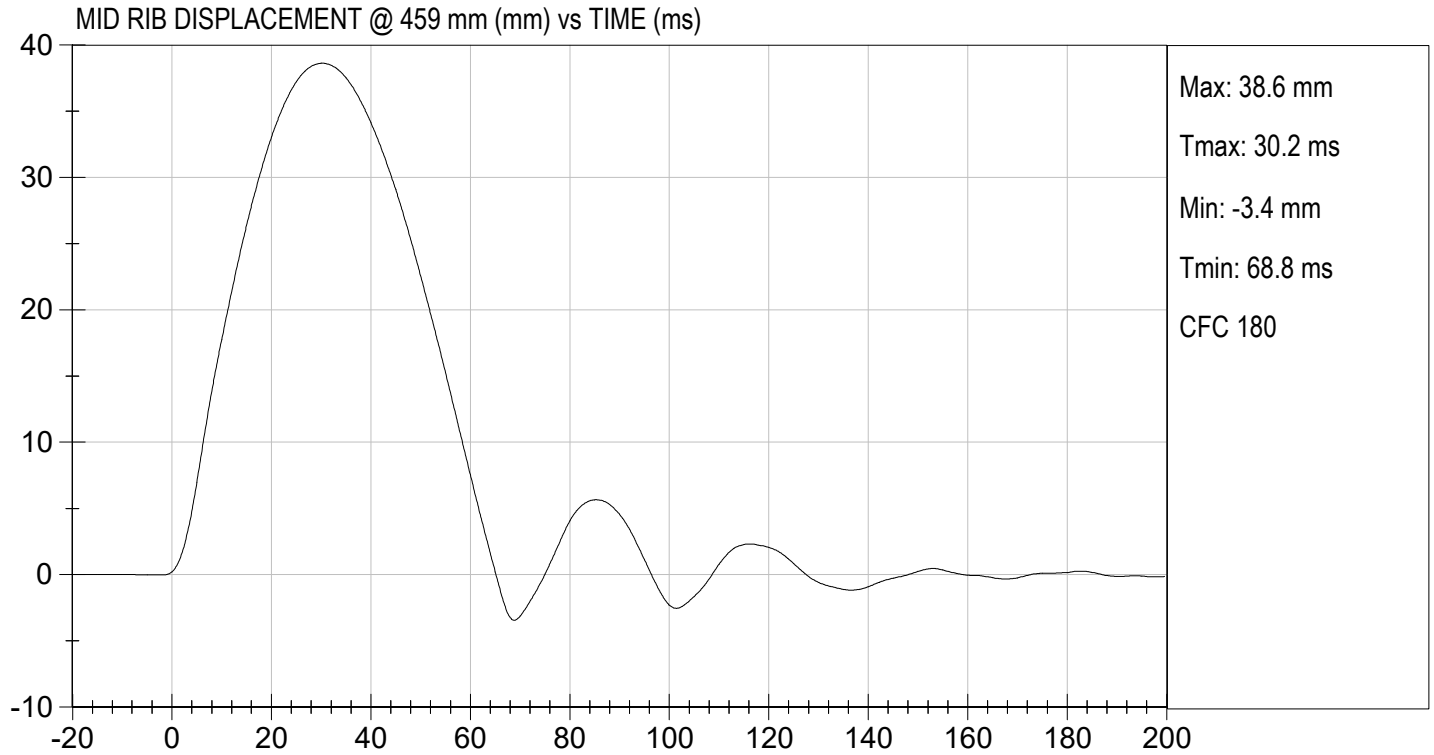
Test I.D: D240125

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
Displacement at 459 mm	mm	36.0 to 40.0	38.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.6	Pass
Overall Test Results				Pass


Laboratory Technician

01/12/2024
Test Date


Approved By



MGA RESEARCH CORPORATION

LOWER RIB TEST

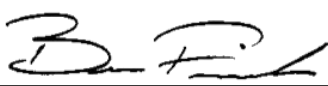
ES-2re DUMMY

ATD Serial No: F032

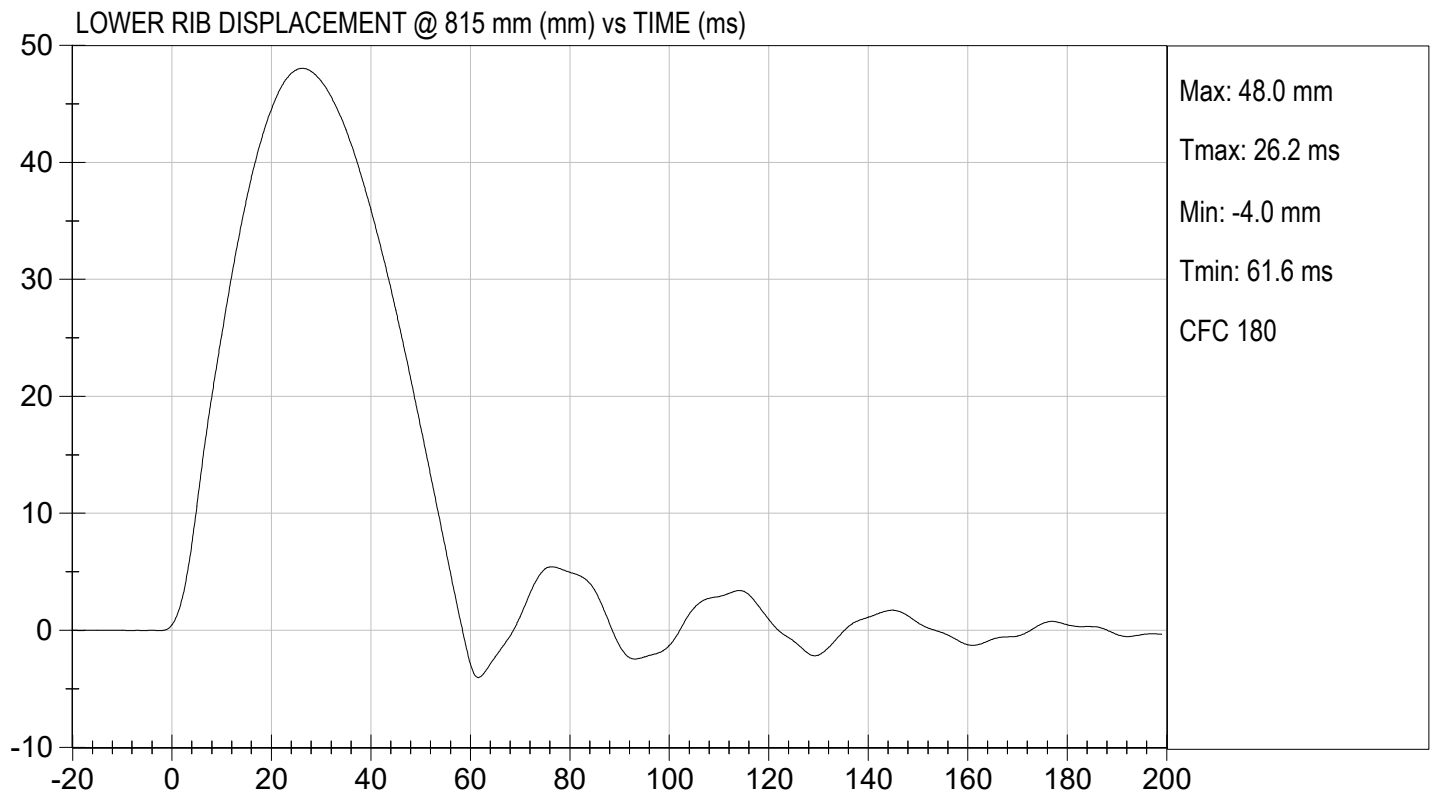
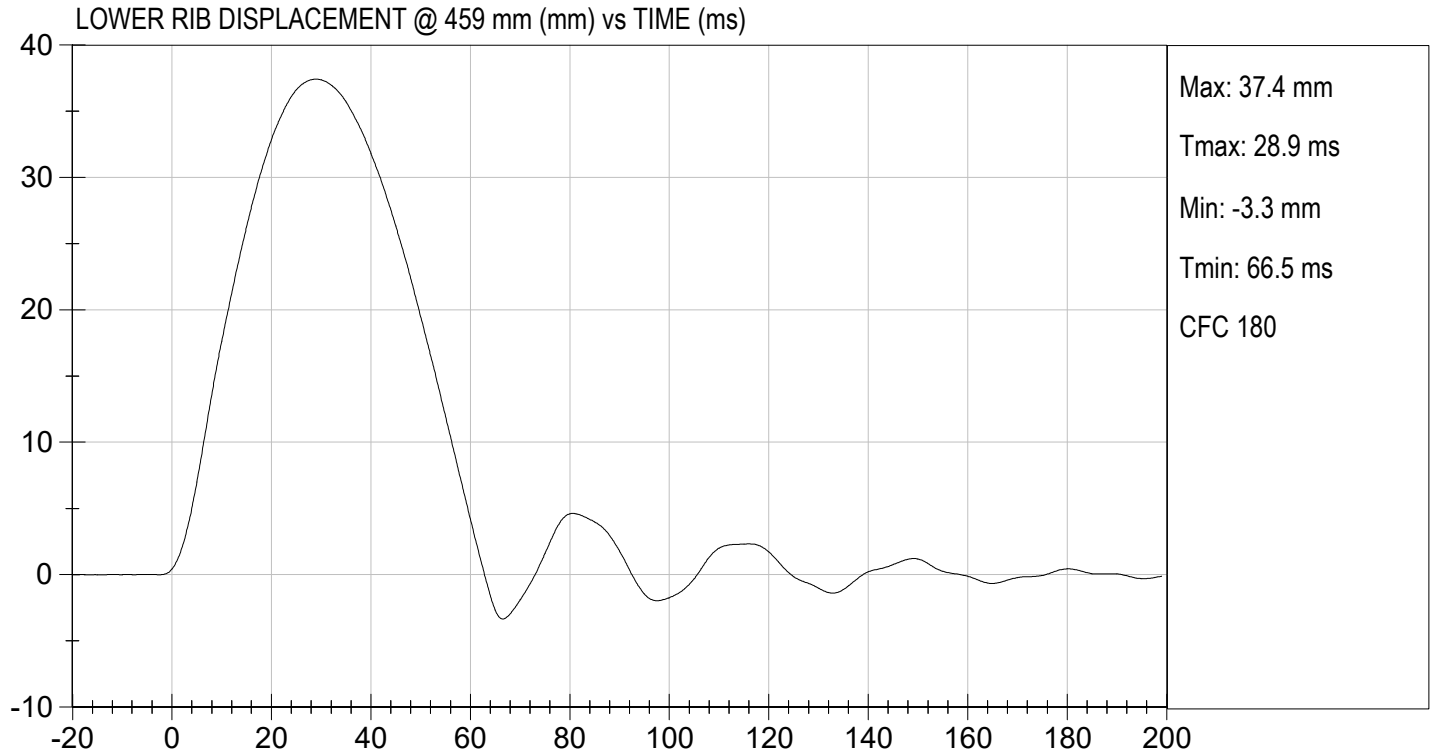
Test I.D: D240126

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
Displacement at 459 mm	mm	36.0 to 40.0	37.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

01/12/2024
Test Date

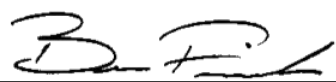


MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY**ATD Serial No: F032Test I.D: D240127

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	28	Pass
Probe Speed	m/s	3.90 to 4.10	4.08	Pass
Maximum Impactor Force	N	4000 to 4800	4085	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.1	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2436	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.9	Pass
Overall Test Results				Pass


Laboratory Technician

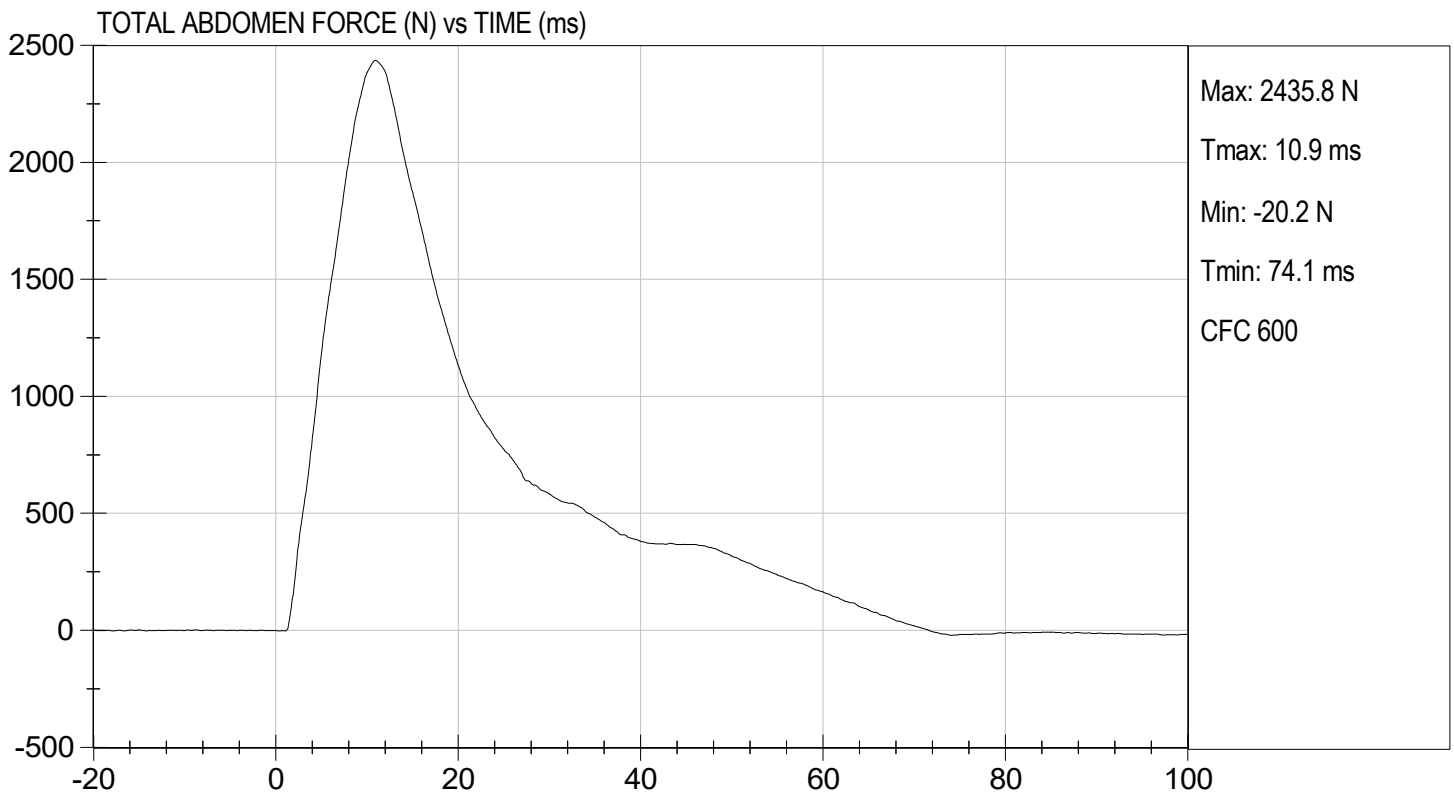
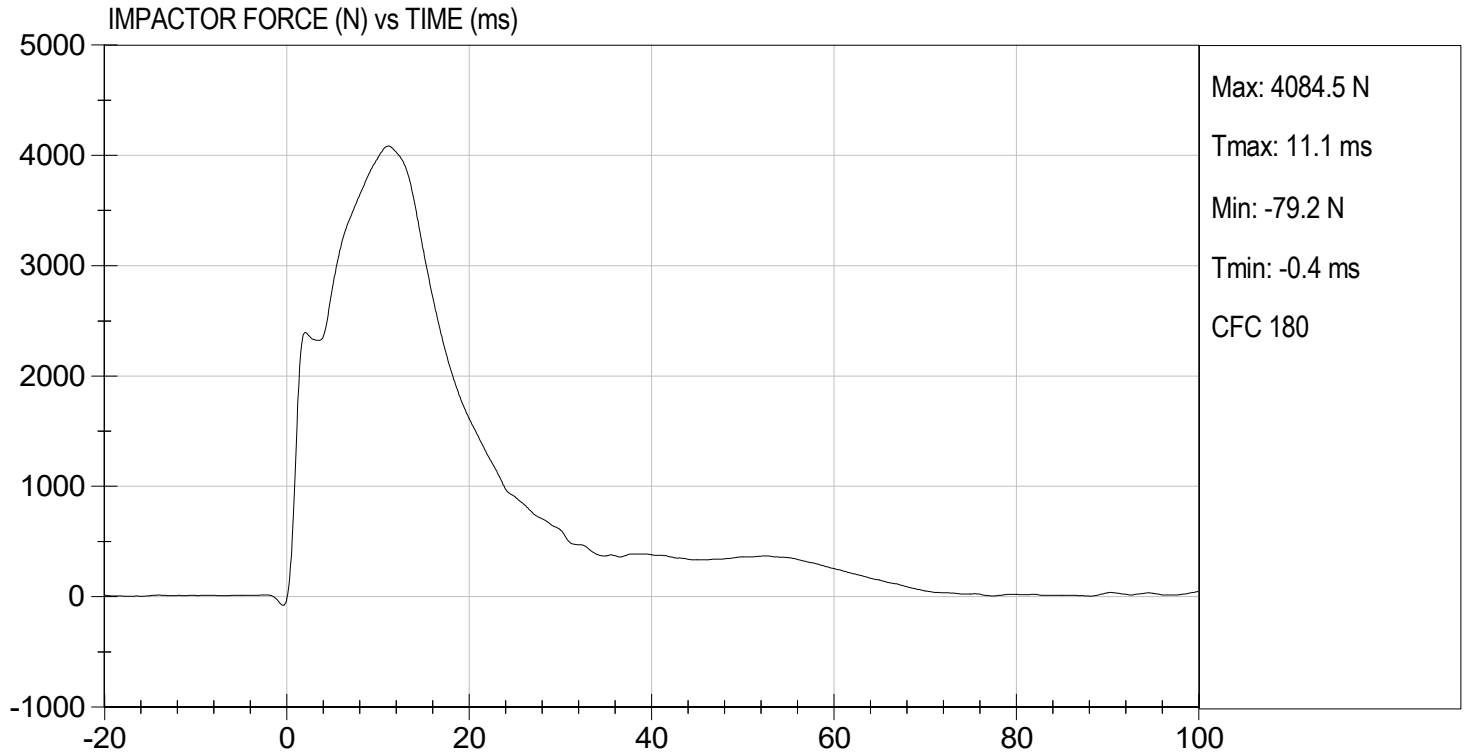
01/12/2024
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

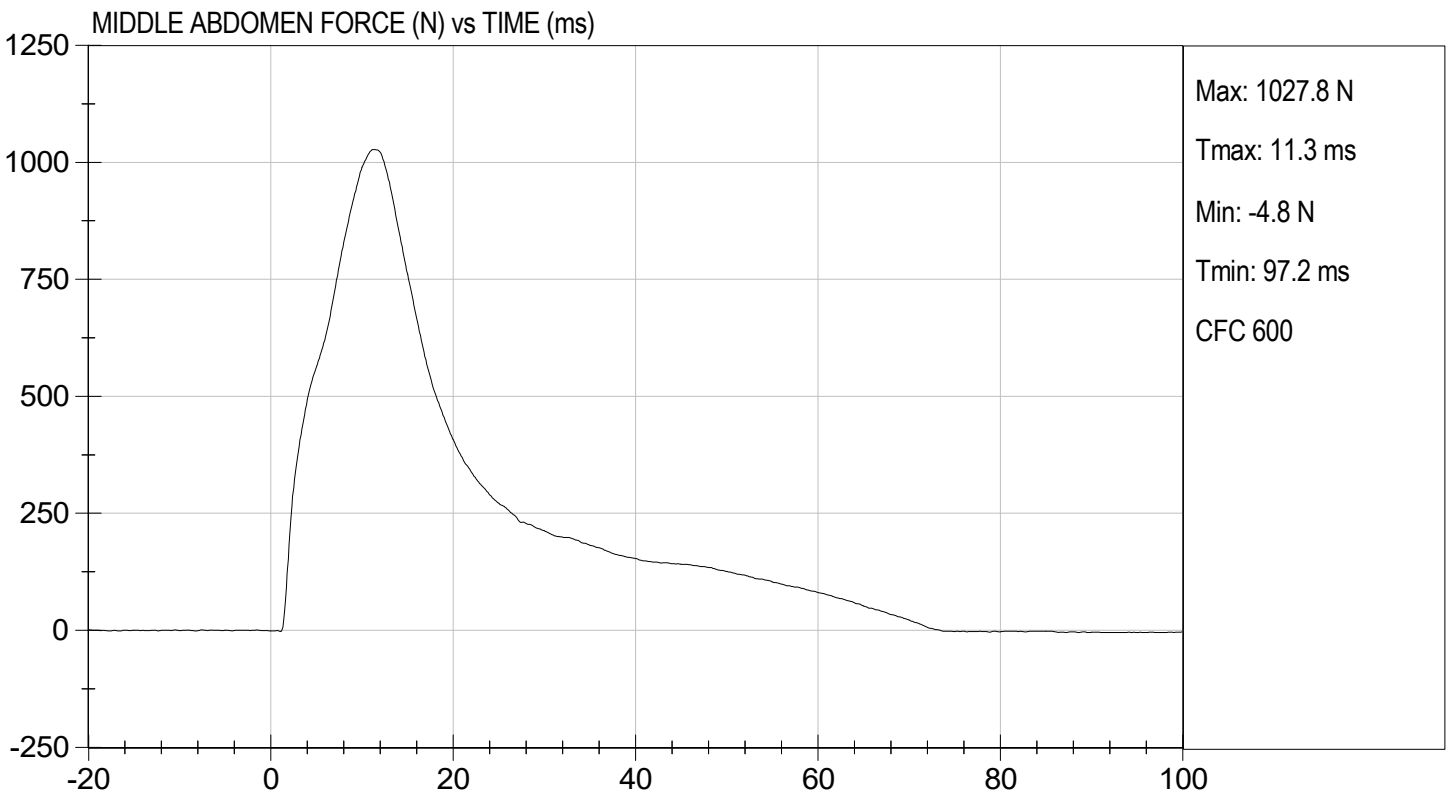
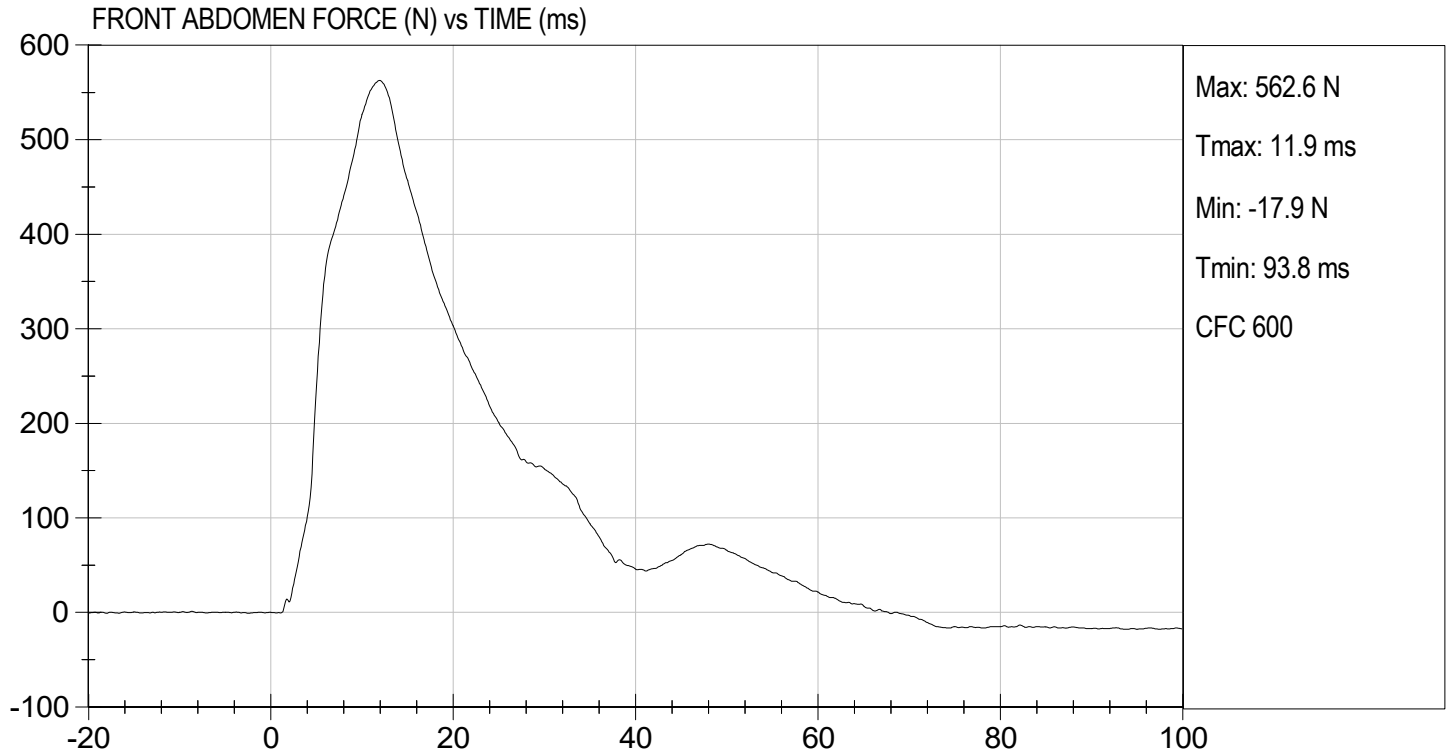
TEST DATE: 01/12/2024
TEST #: D240127





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

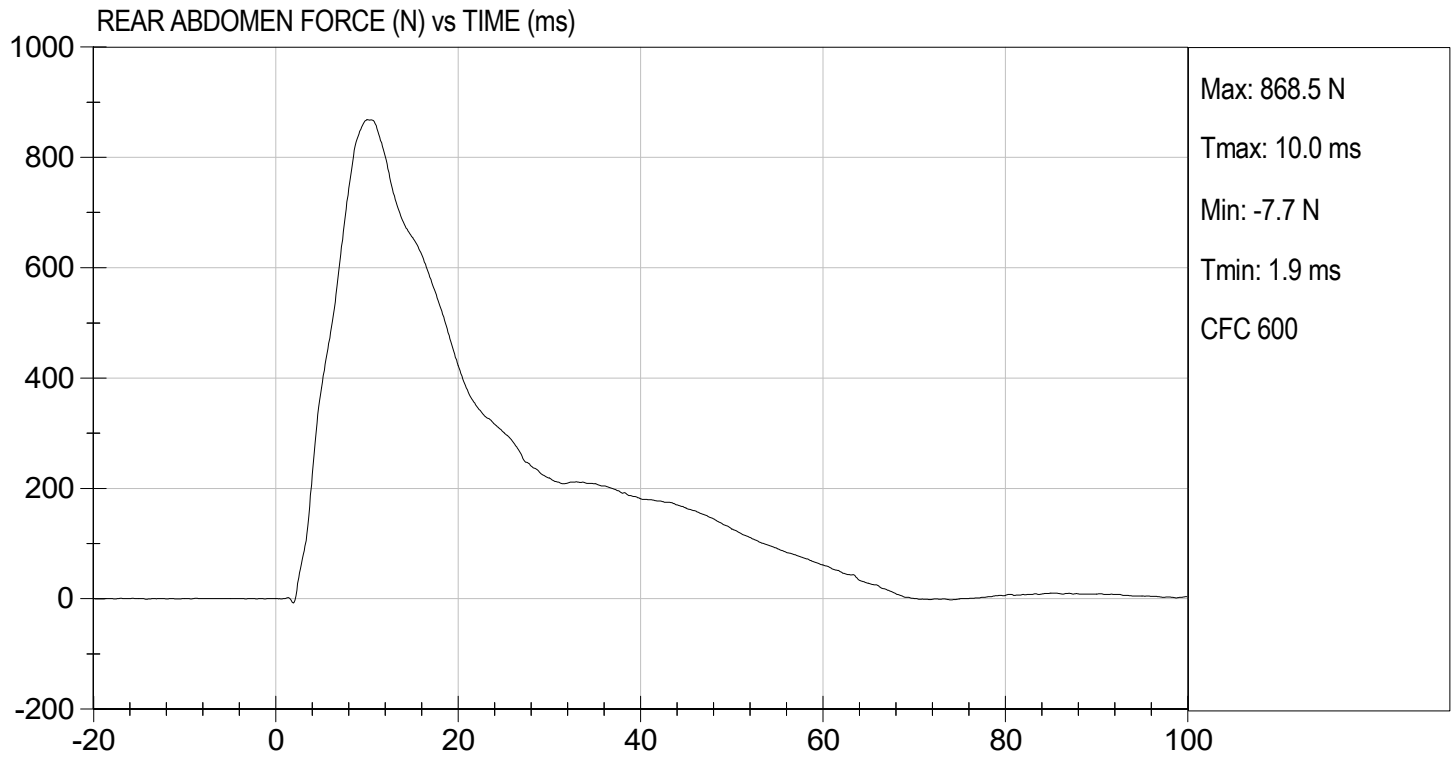
TEST DATE: 01/12/2024
TEST #: D240127





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

TEST DATE: 01/12/2024
TEST #: D240127



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

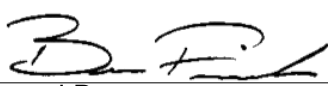
ATD Serial No: F032

Test I.D: D240128

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	26	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	-0.413	Pass
	27 ms	m/s	-6.50 to -5.80	-6.00	Pass
	30 ms	m/s	>= -6.50	-6.31	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.2	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	49.4	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	38	Pass
Overall Results					Pass


 Laboratory Technician

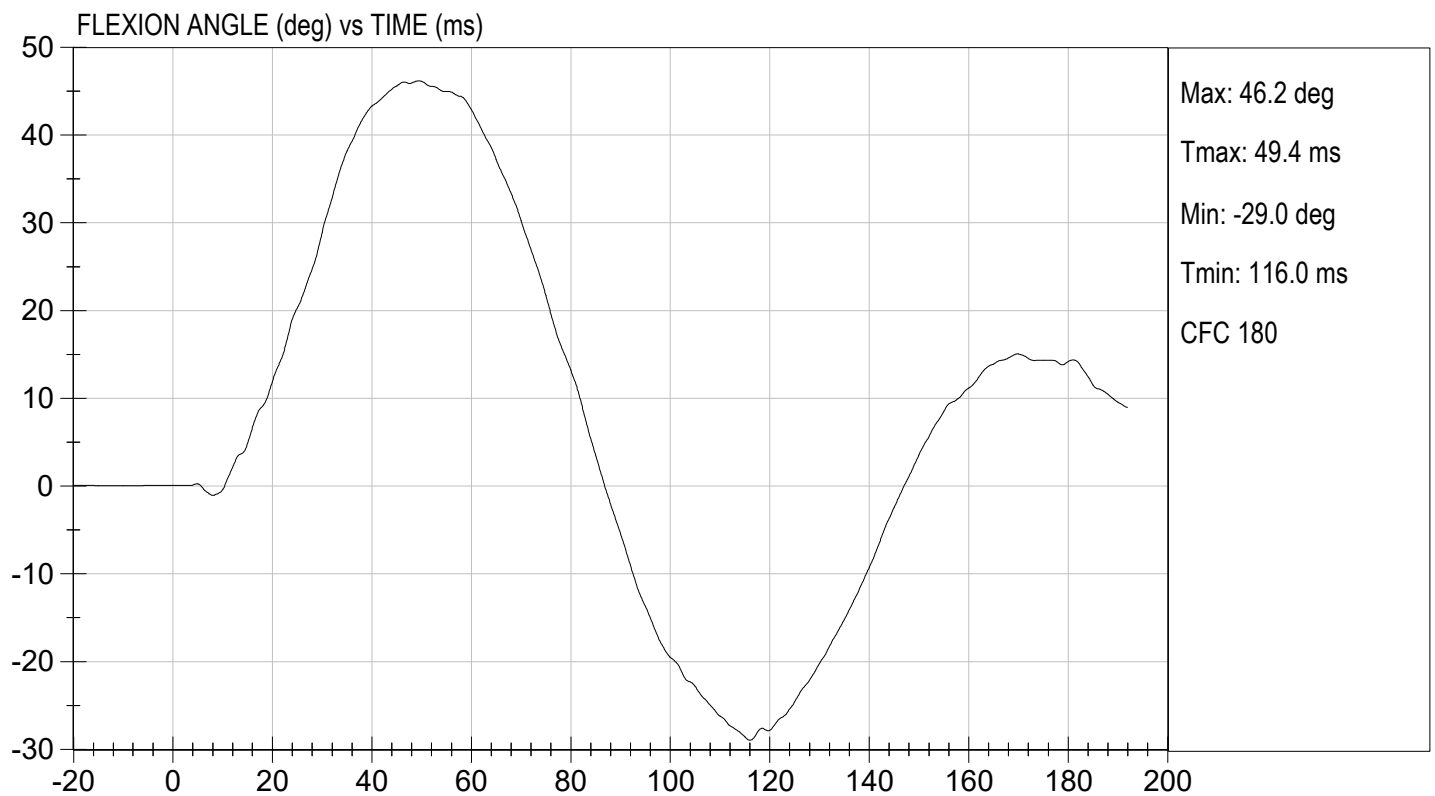
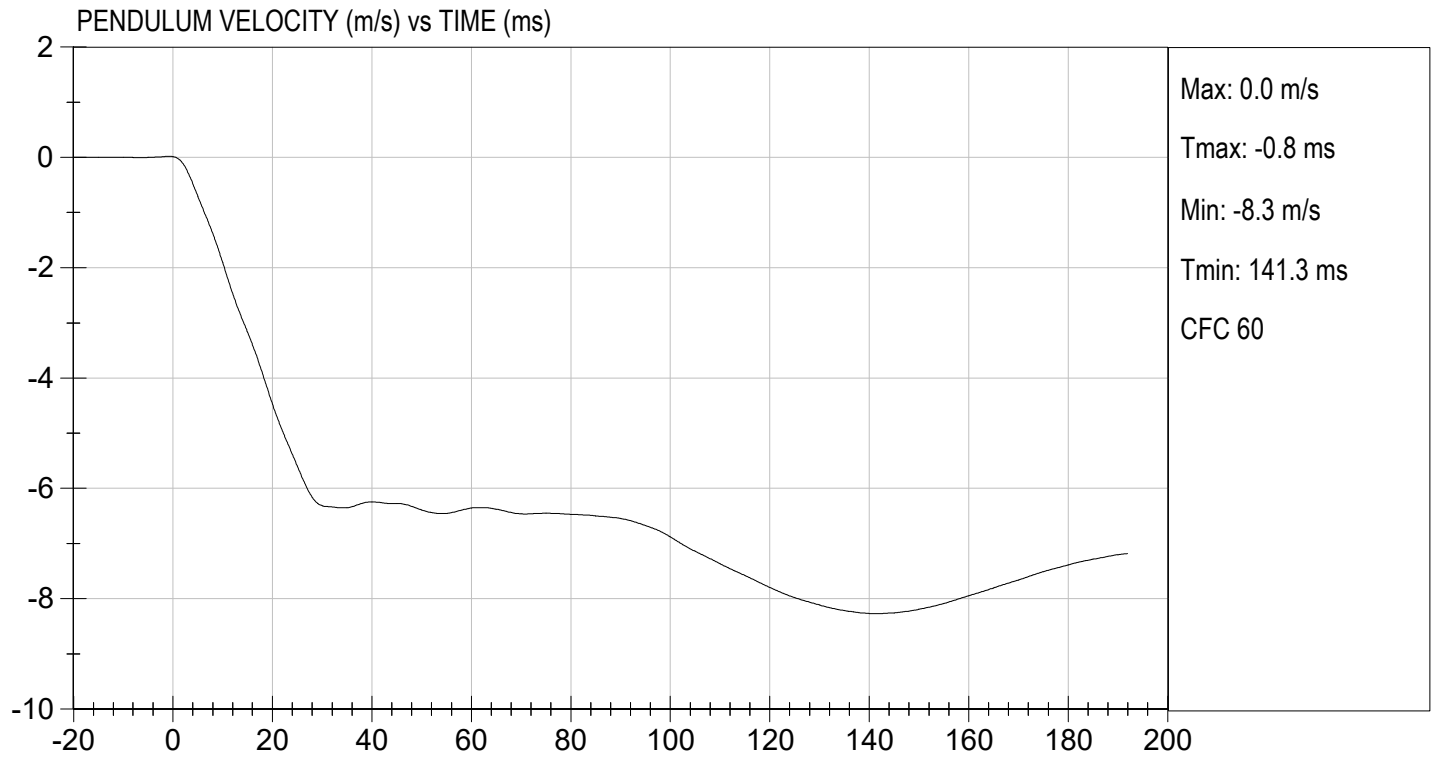
01/12/2024
 Test Date


 Approved By



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

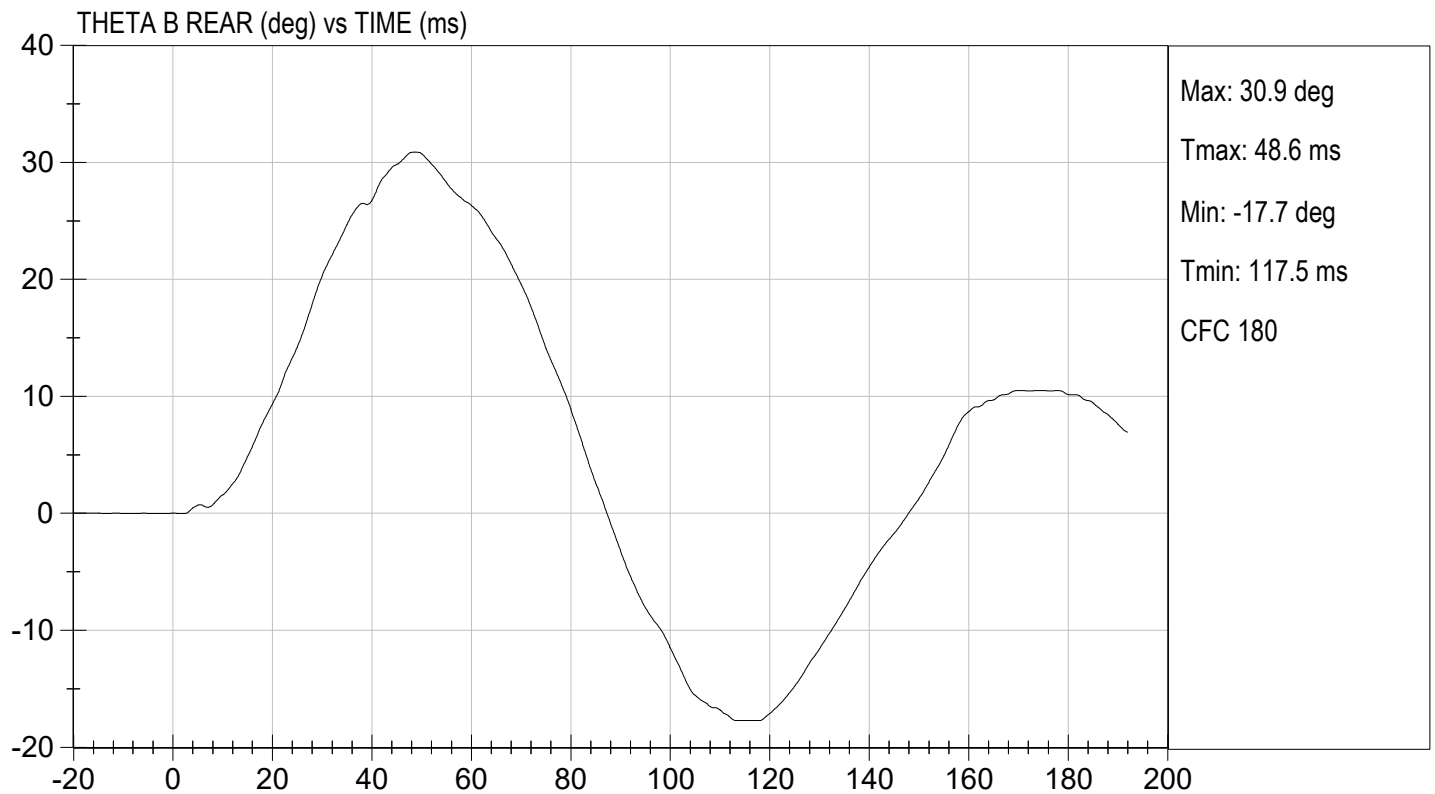
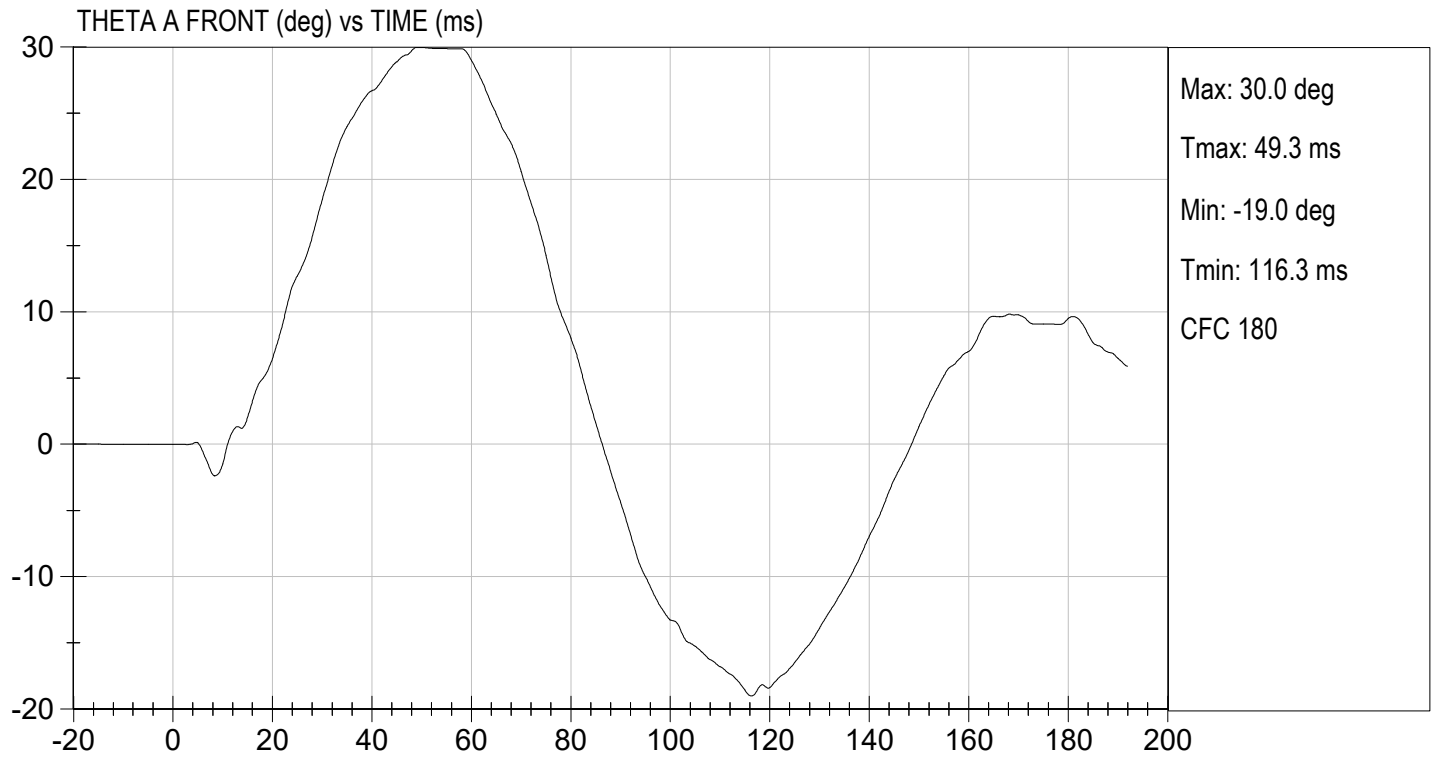
TEST DATE: 01/12/2024
TEST #: D240128





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

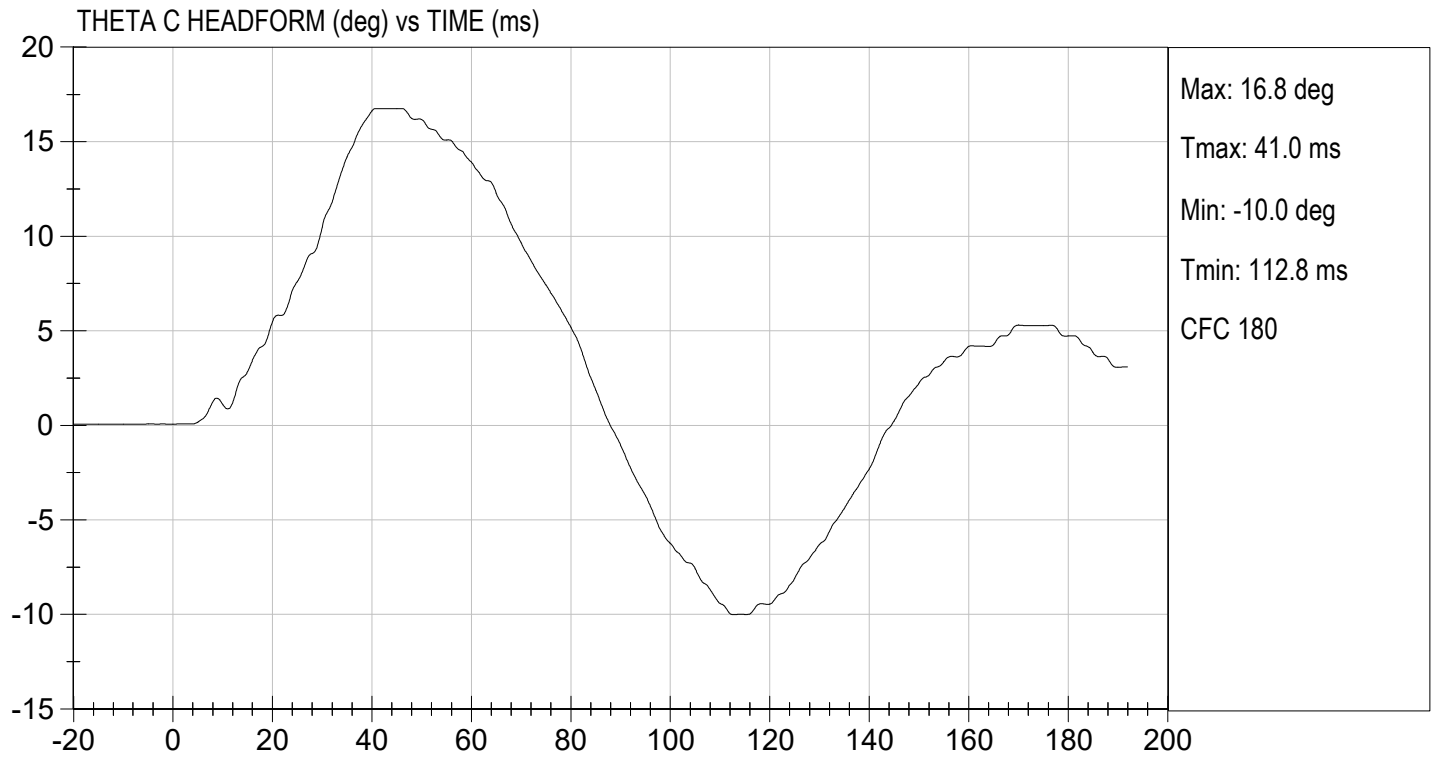
TEST DATE: 01/12/2024
TEST #: D240128





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

TEST DATE: 01/12/2024
TEST #: D240128

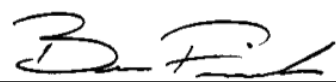


MGA RESEARCH CORPORATION**PELVIS TEST
ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D240129

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	28	Pass
Probe Speed	m/s	4.20 to 4.40	4.38	Pass
Maximum Impactor Force	N	4700 to 5400	5078	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.6	Pass
Maximum Pubic Force	N	1230 to 1590	1353	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.0	Pass
Overall Test Results				Pass


Laboratory Technician

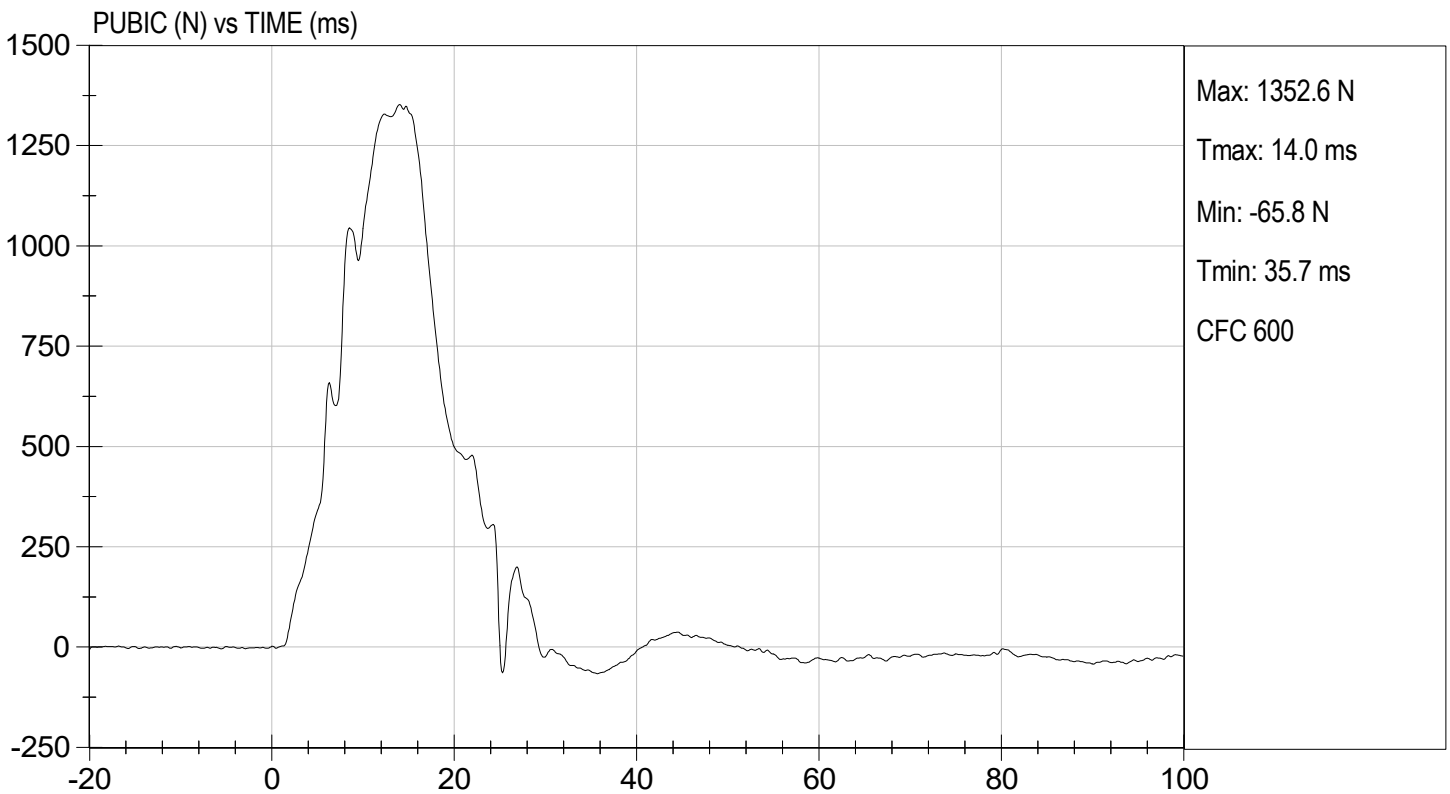
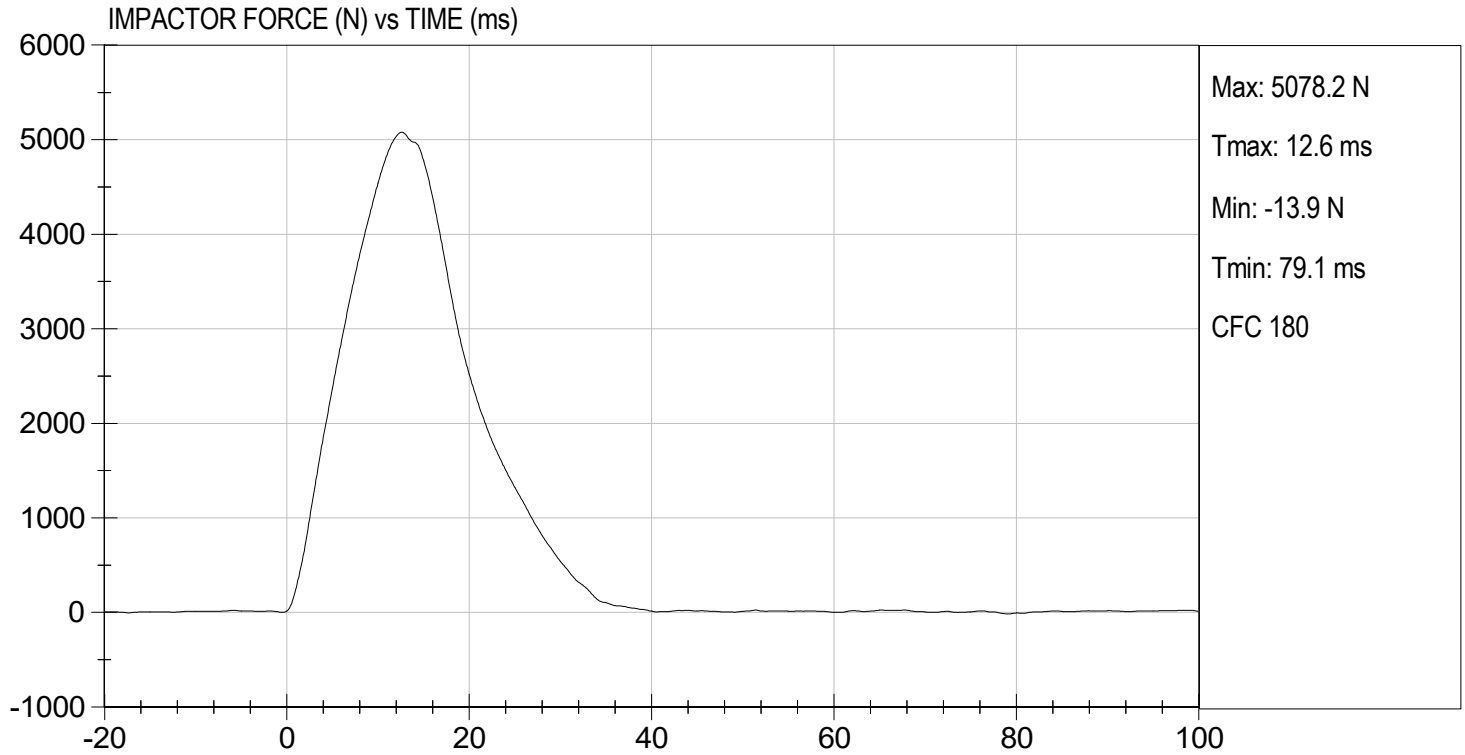
01/12/2024
Test Date


Approved By



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

TEST DATE: 01/12/2024
TEST #: D240129

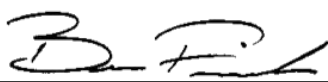


MGA RESEARCH CORPORATION**THORAX IMPACT TEST****ES-2re DUMMY**ATD Serial No: F032Test I.D: D240120

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	28	Pass
Probe Speed	m/s	5.40 to 5.60	5.40	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5398	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.5	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.1	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.8	Pass
Overall Test Results				Pass


Laboratory Technician

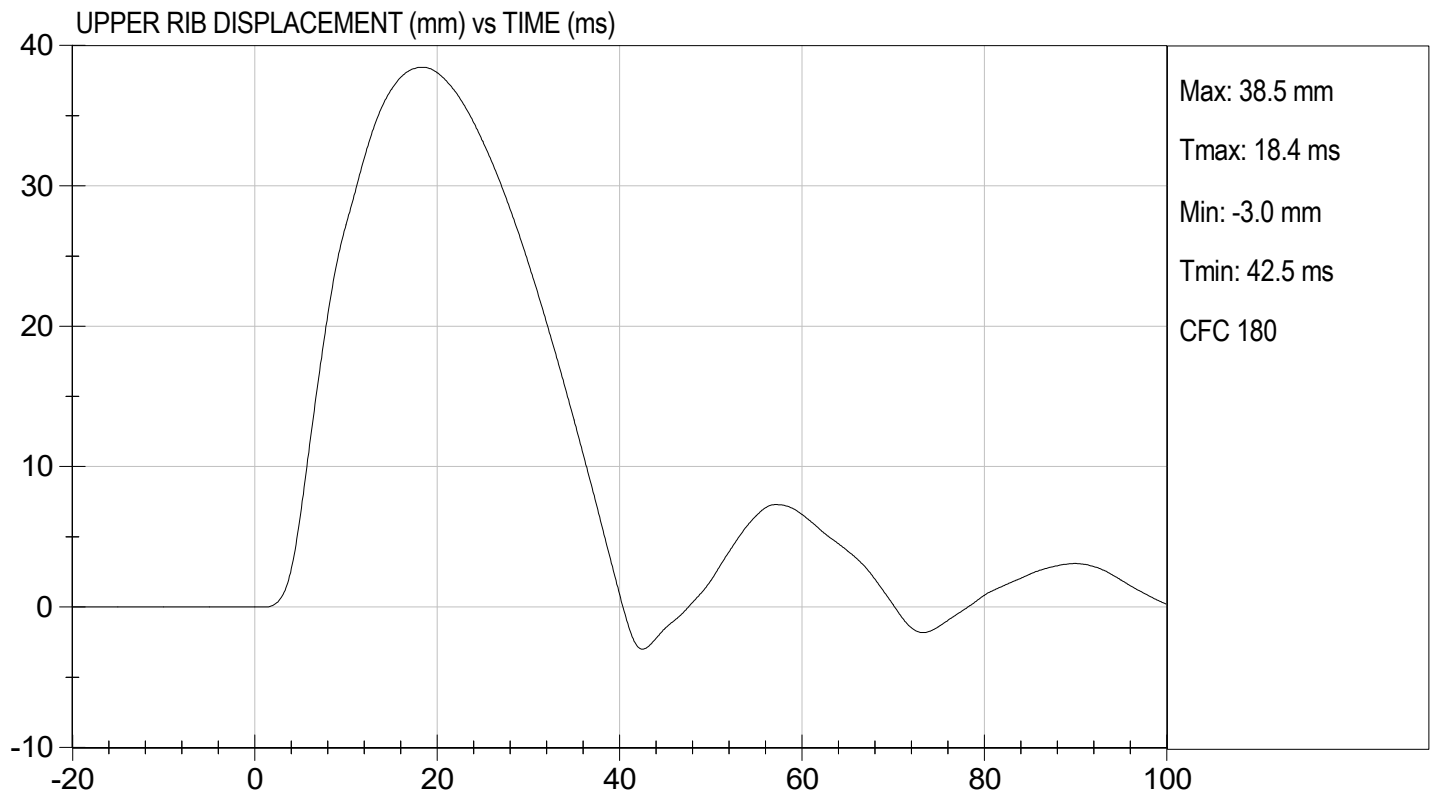
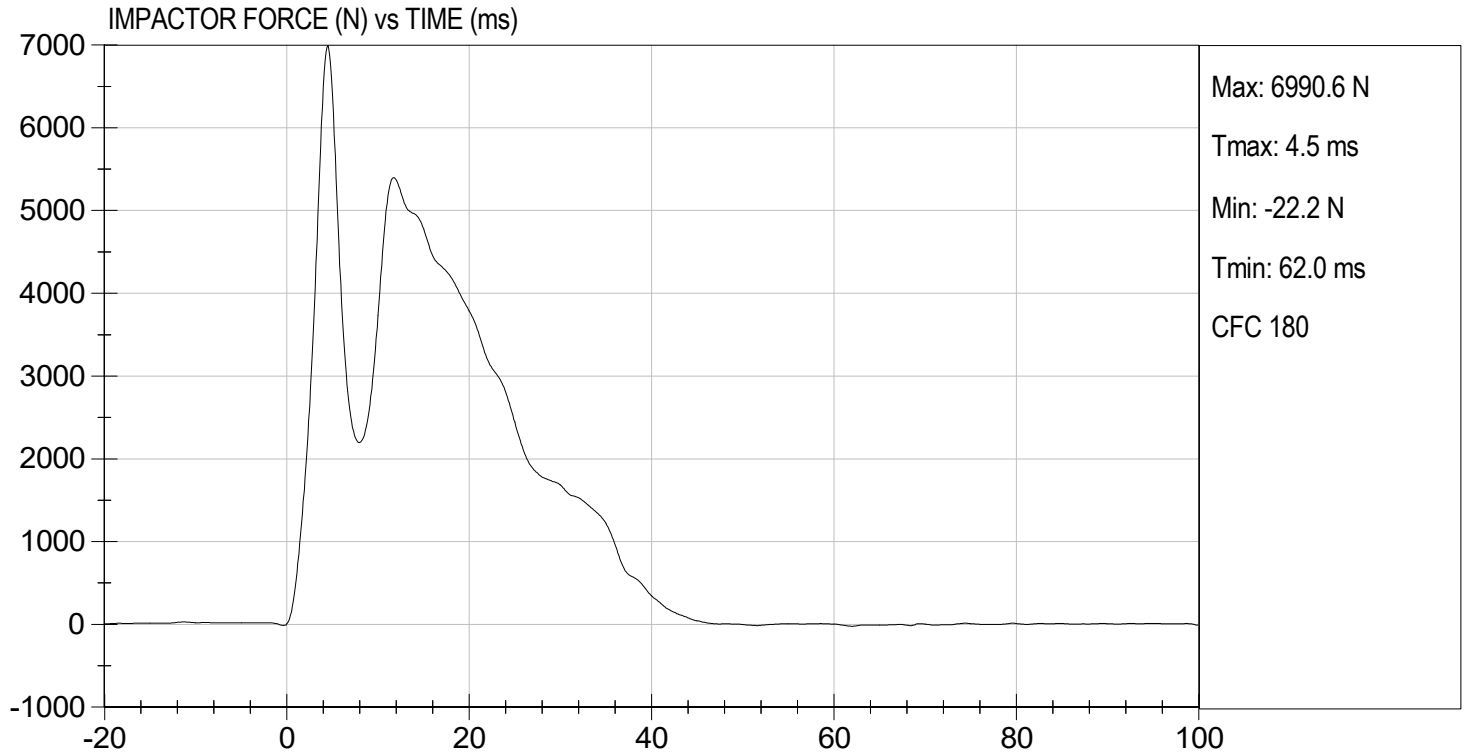
01/12/2024
Test Date


Approved By



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

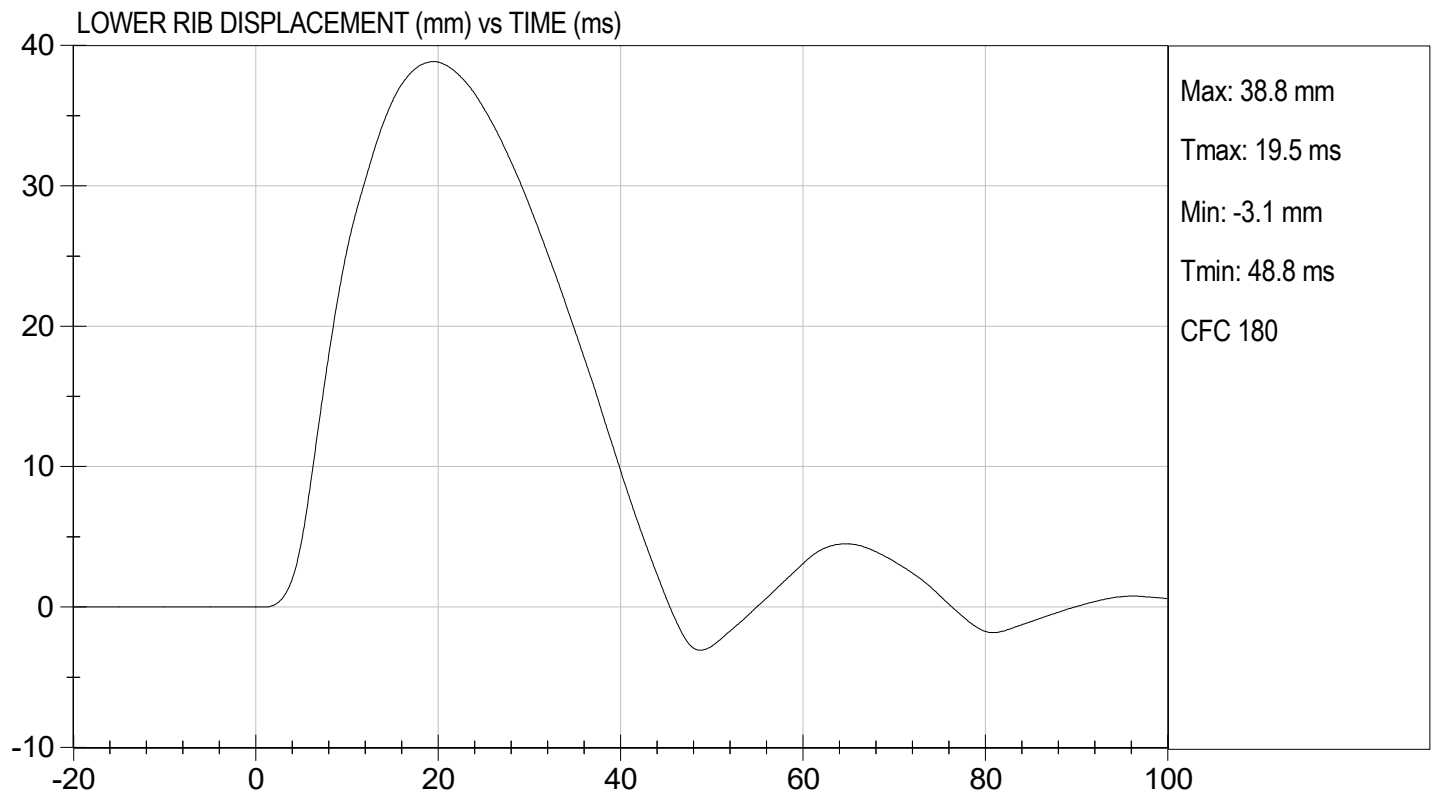
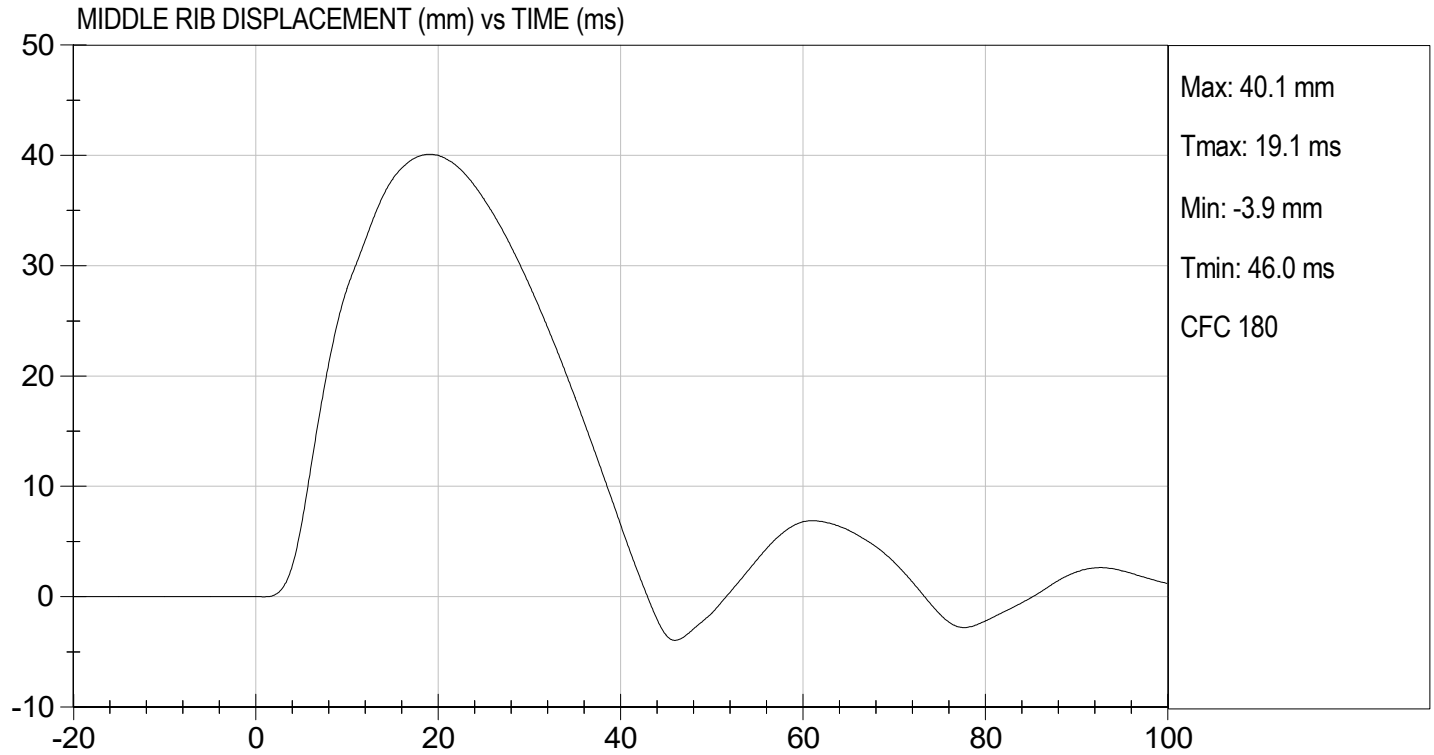
TEST DATE: 01/12/2024
TEST #: D240120





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

TEST DATE: 01/12/2024
TEST #: D240120



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

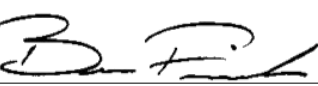
Test ID: D233321

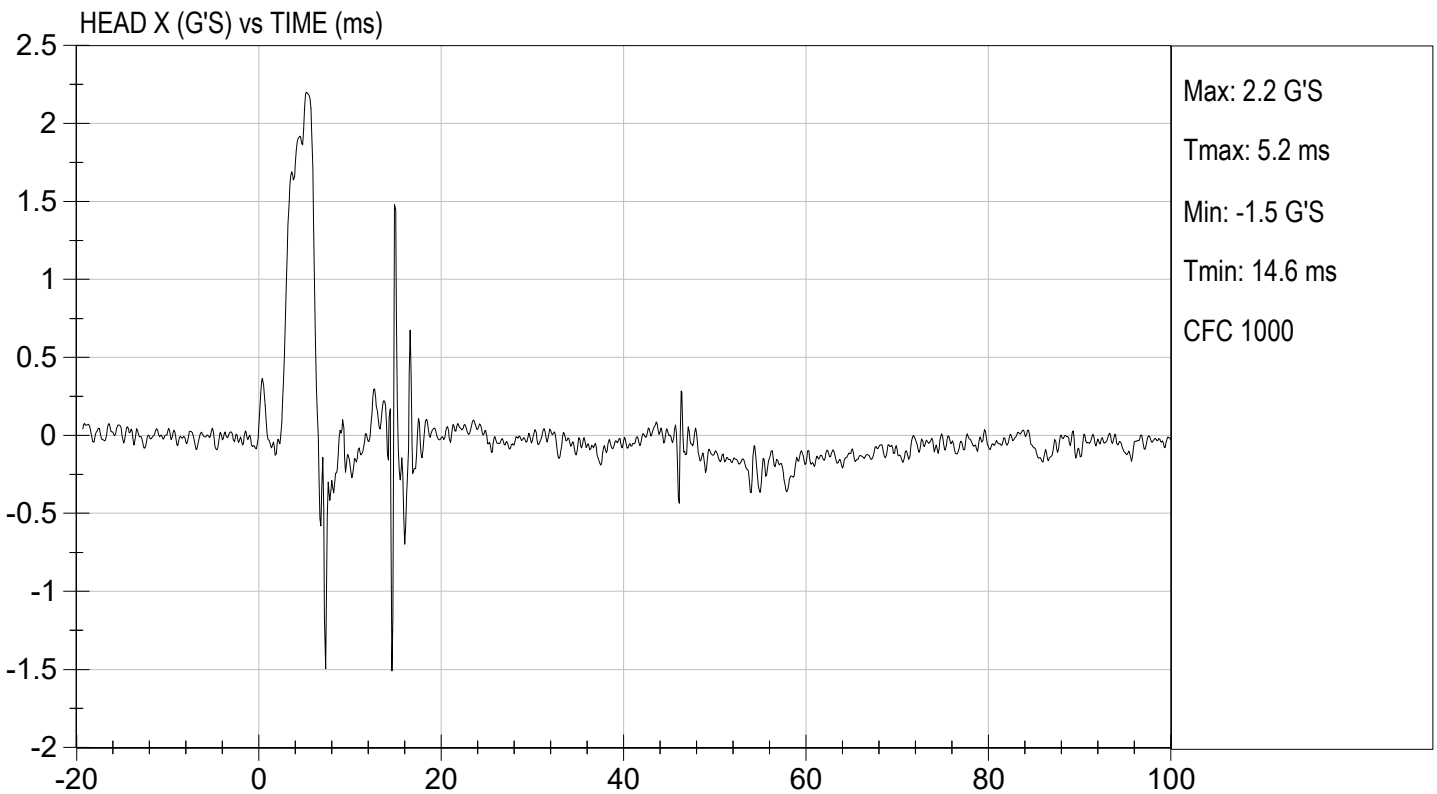
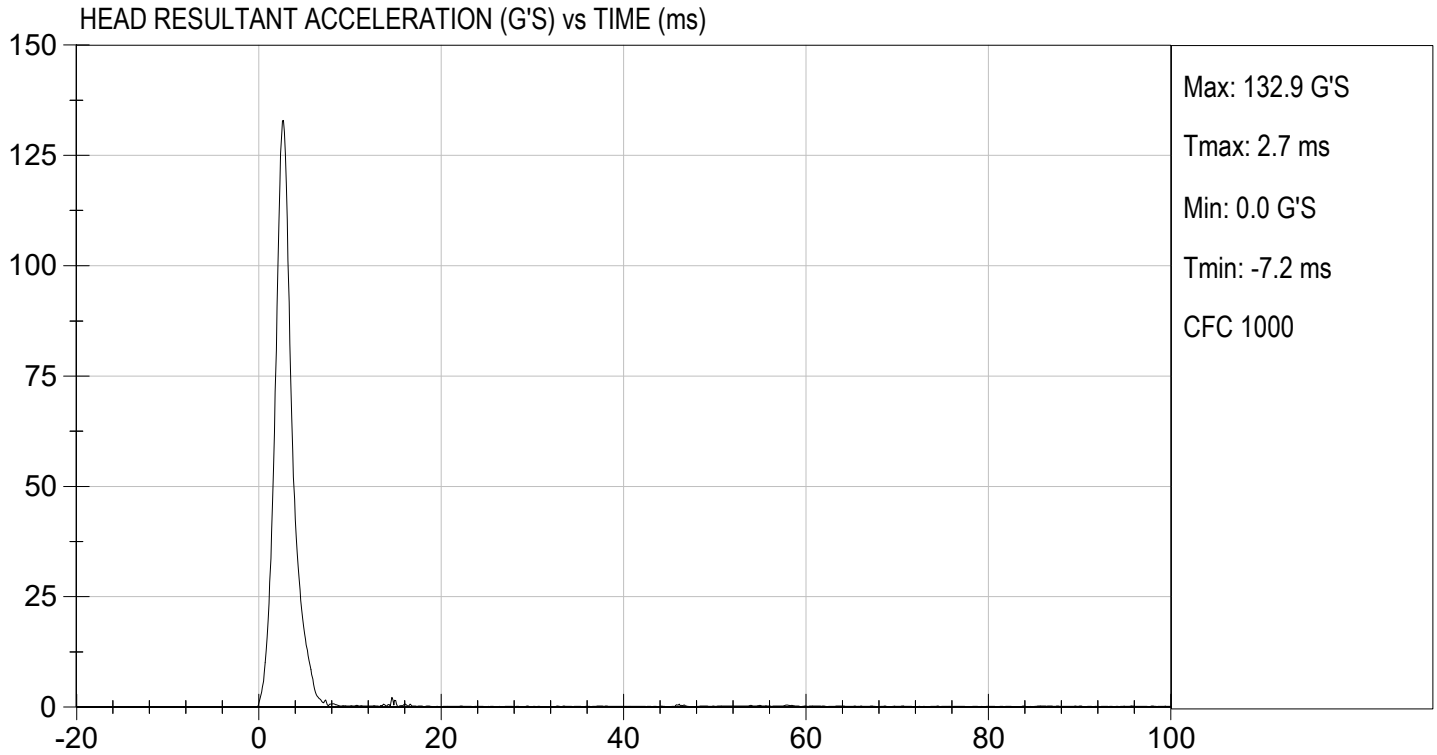
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	115 to 137	133	Pass
Peak Longitudinal Acceleration	G's	+/- 15	2.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass

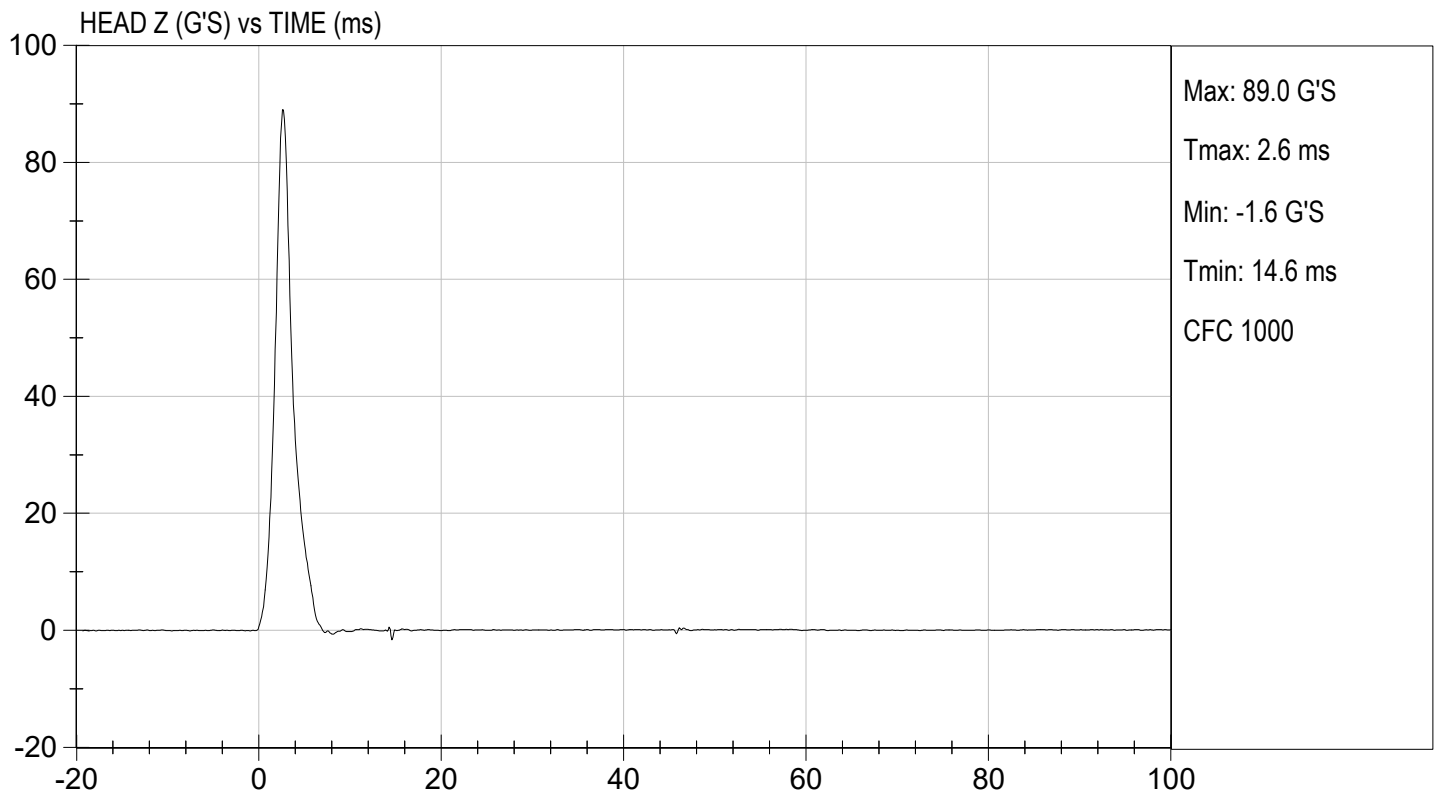
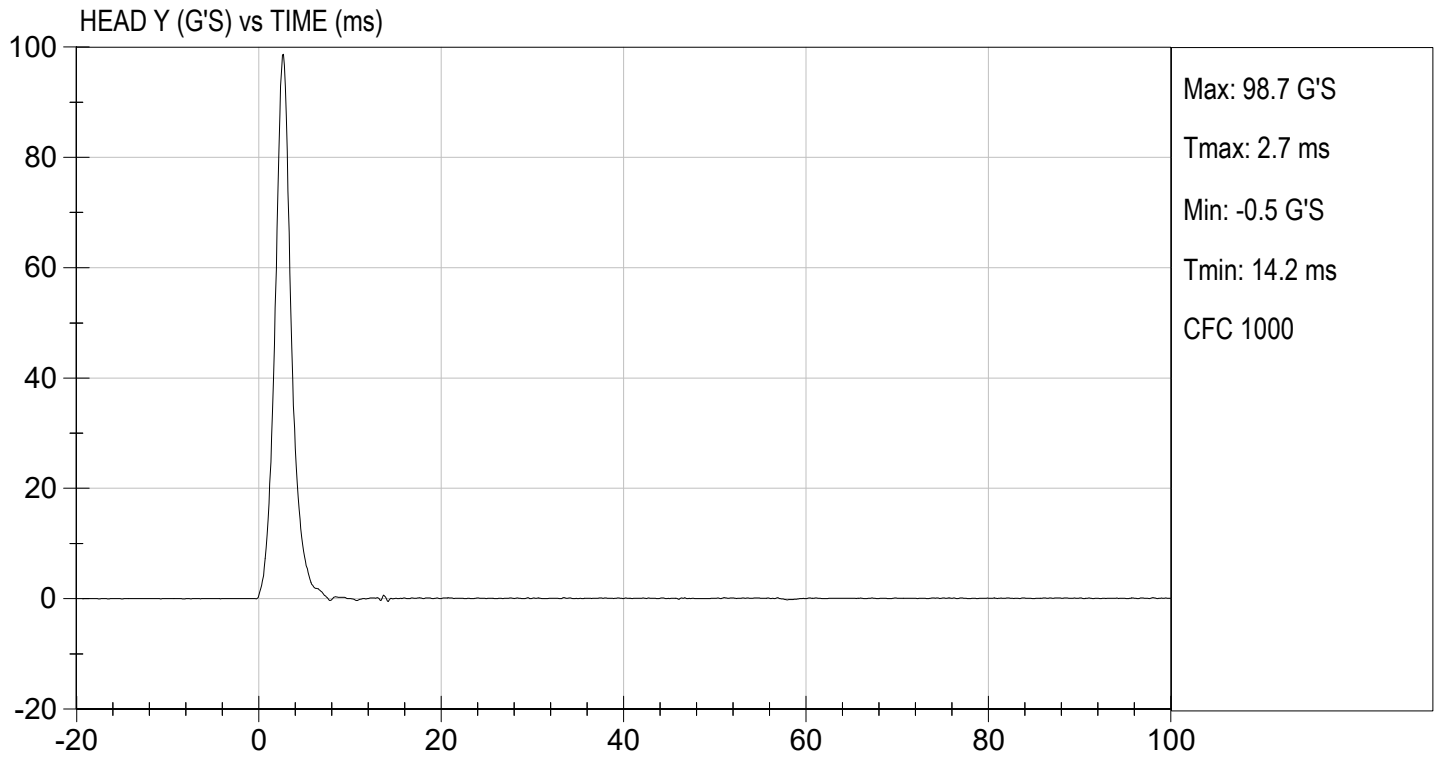

Laboratory Technician

12/14/2023

Test Date


Approved By





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

ATD Serial No: 296

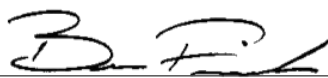
Test I.D: D233322

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	25	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.47	Pass
	15 ms	m/s	3.30 to 4.10	3.75	Pass
	20 ms	m/s	4.40 to 5.40	5.32	Pass
	25 ms	m/s	5.40 to 6.10	5.79	Pass
	25-100 ms	m/s	5.50 to 6.20	5.81	Pass
Maximum D-Plane Rotation		deg	71 to 81	75	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
Overall Test Results				Pass	


 Laboratory Technician

12/14/2023

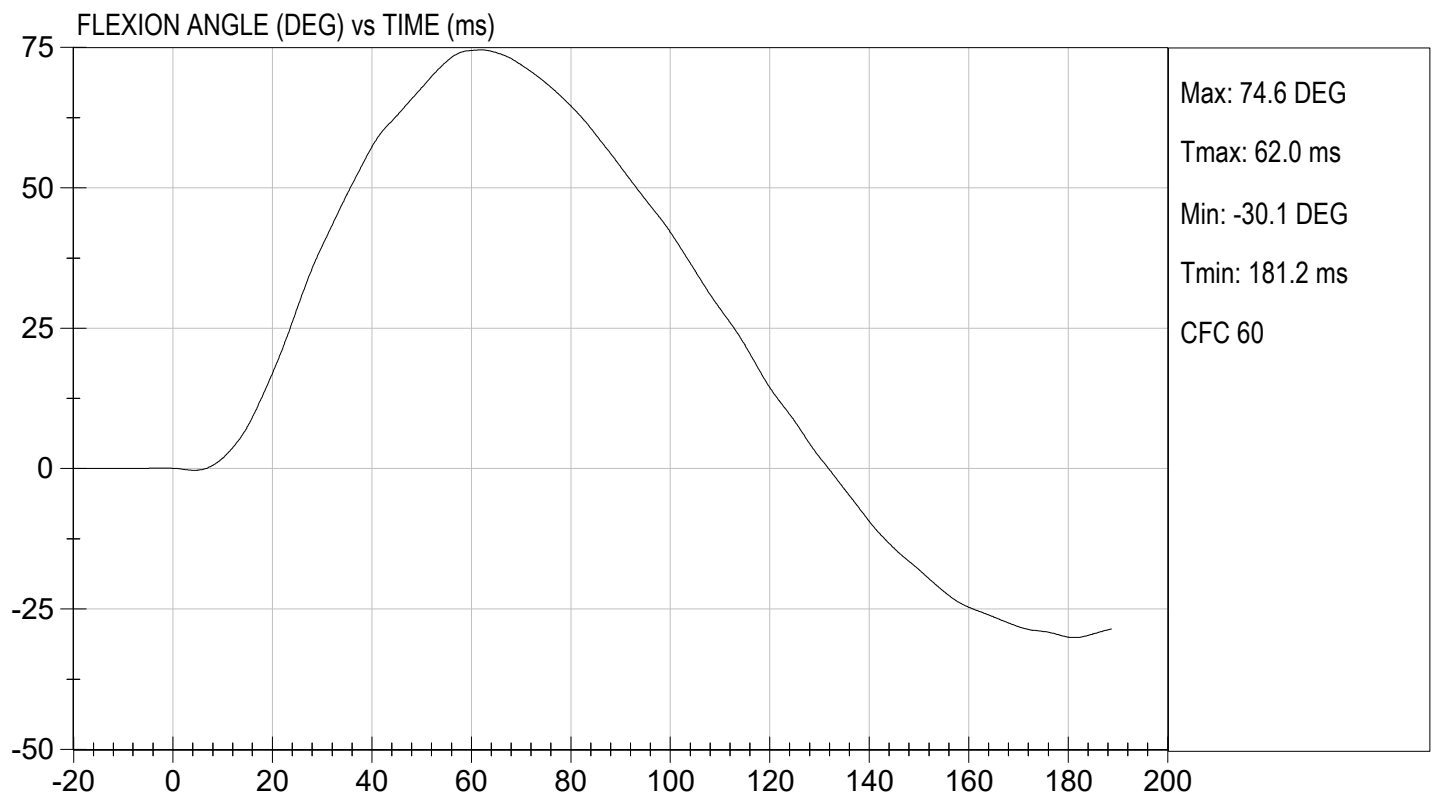
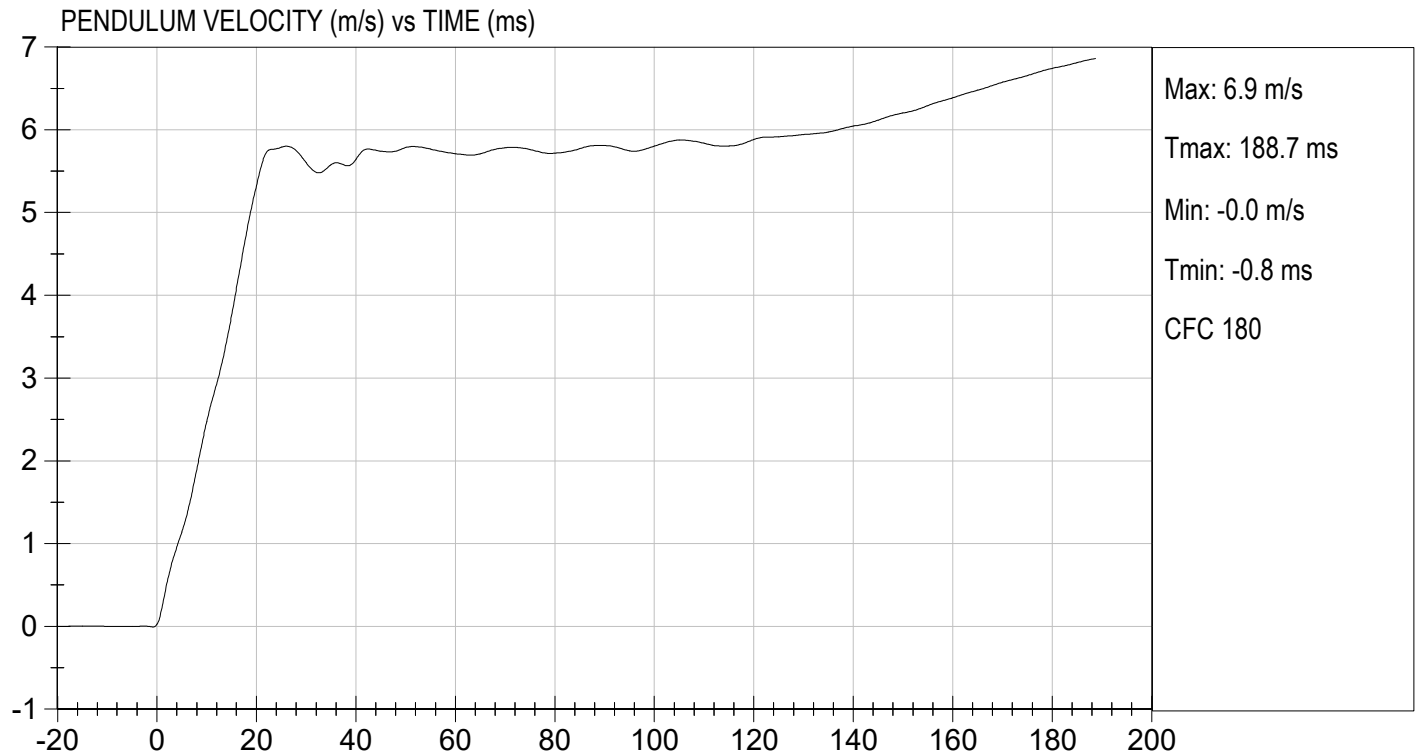
Test Date


 Approved By



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

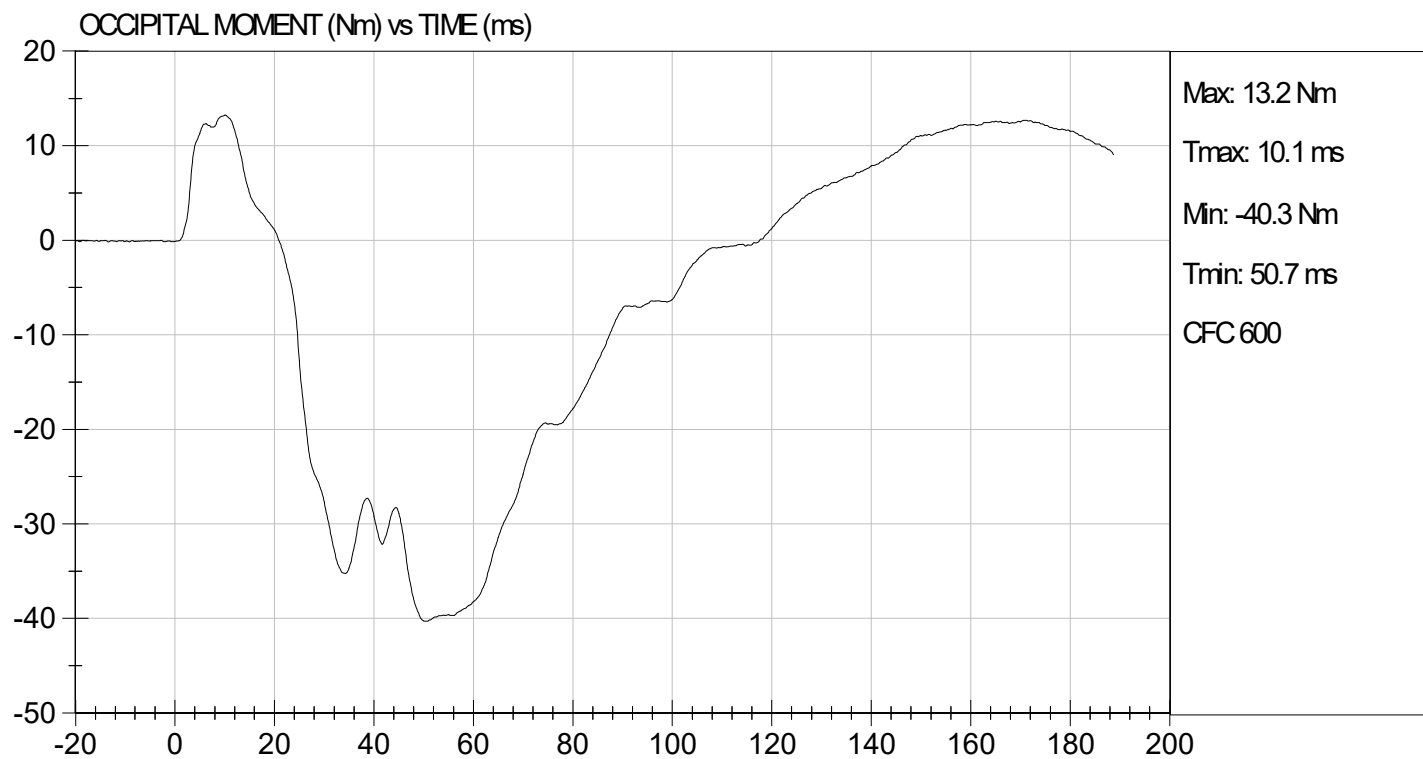
TEST DATE: 12/14/2023
TEST #: D233322





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

TEST DATE: 12/14/2023
TEST #: D233322



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

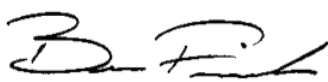
ATD Serial No: 296

Test ID: D233323

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	22	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	19	Pass
			Overall Test Results	Pass


Laboratory Technician

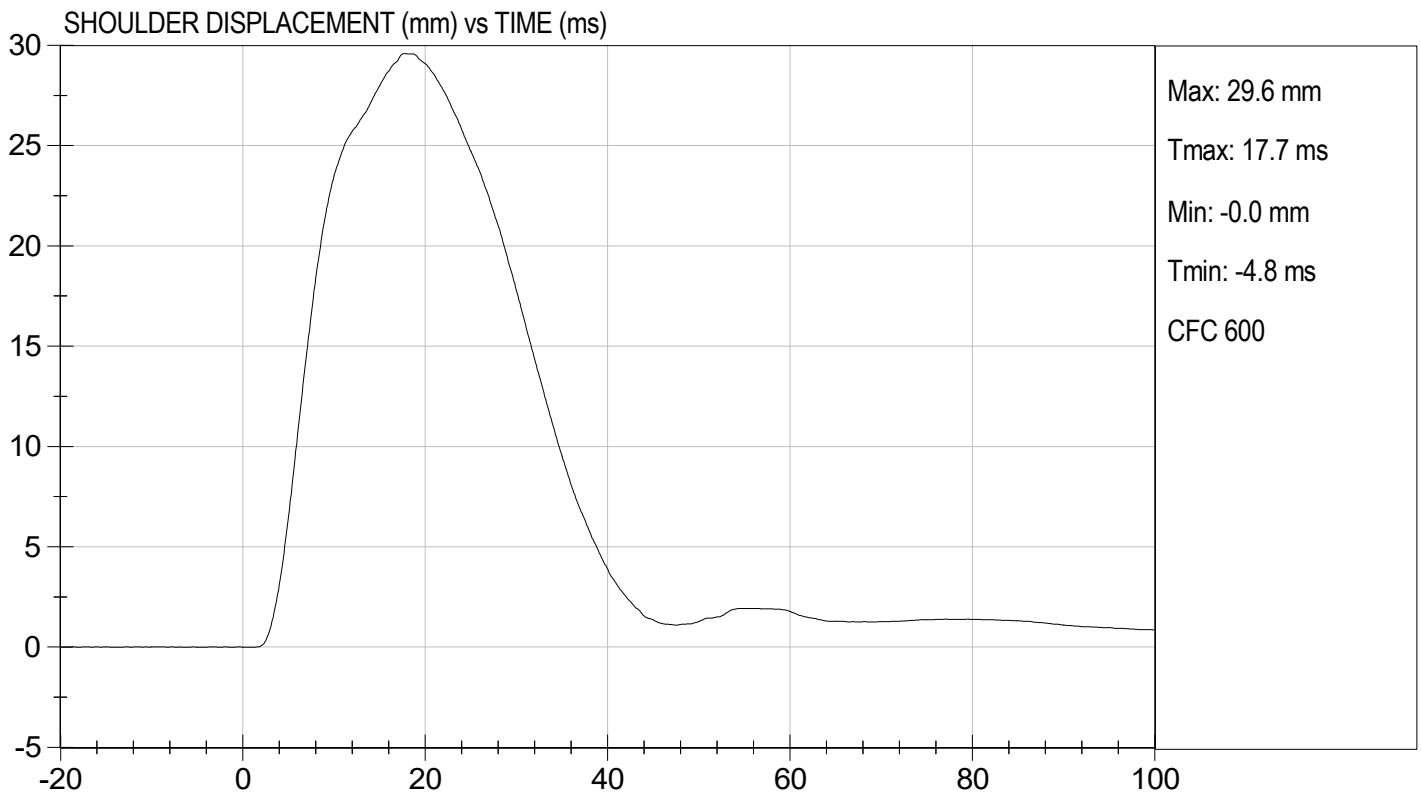
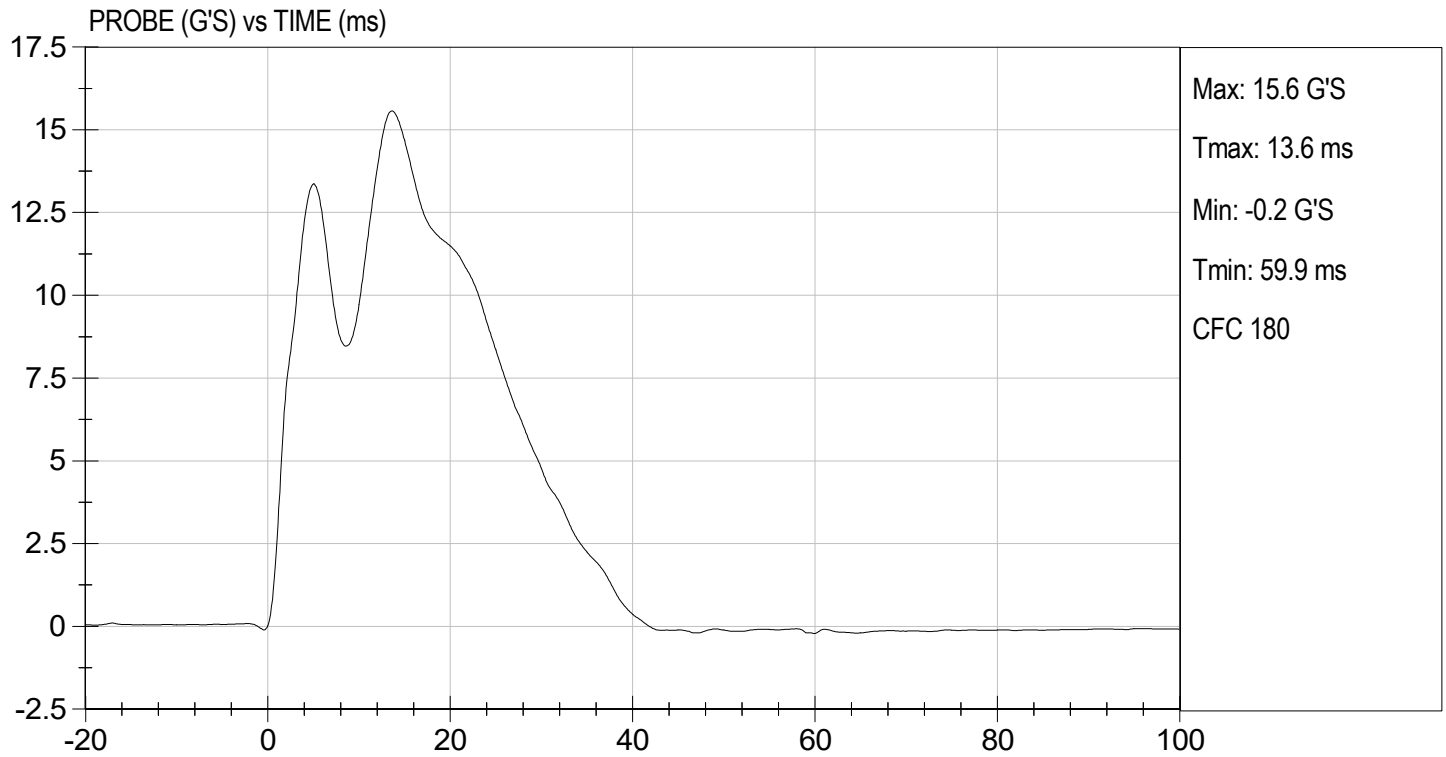
12/14/2023
Test Date


Approved By



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

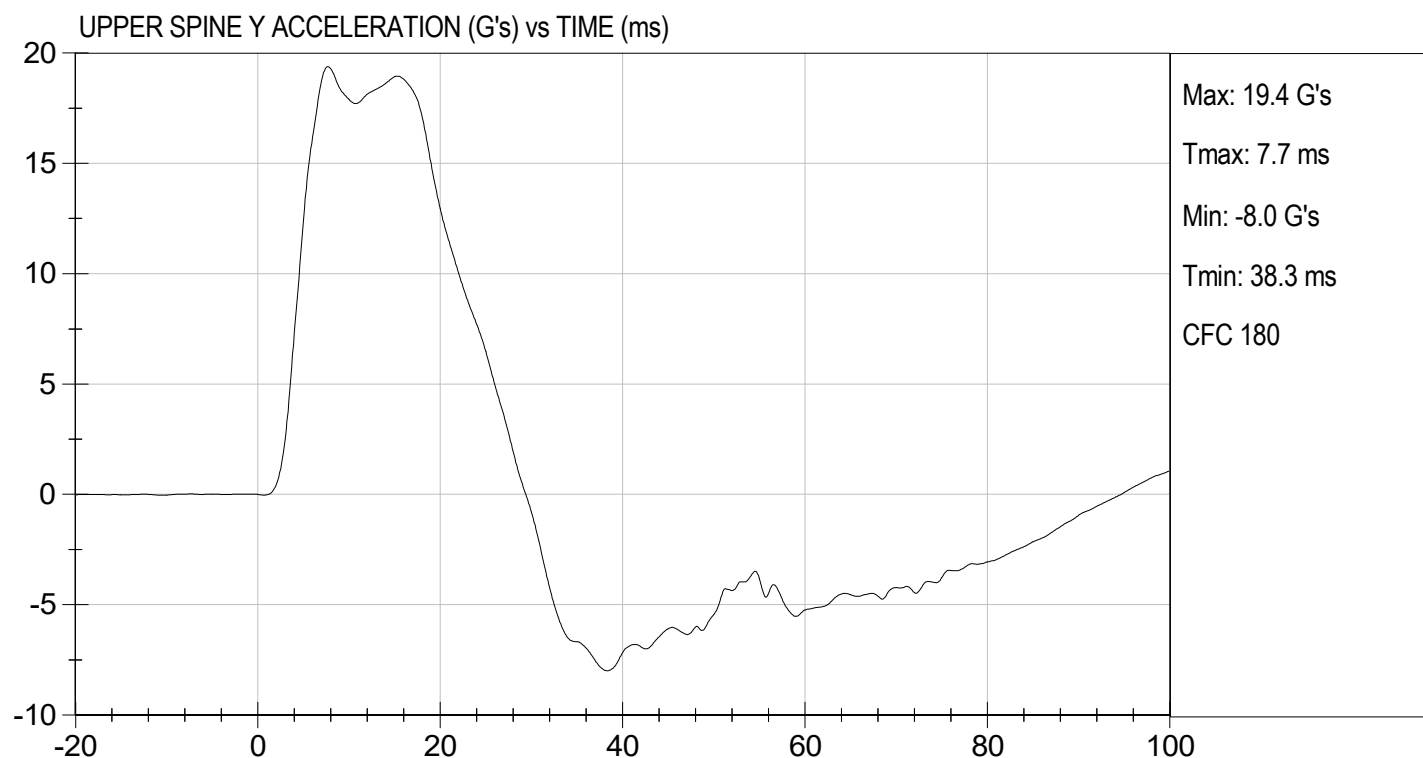
TEST DATE: 12/14/2023
TEST #: D233323





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

TEST DATE: 12/14/2023
TEST #: D233323



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

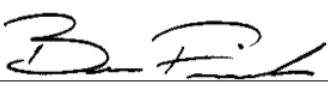
ATD Serial No: 296

Test I.D: D233324

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	24	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	35	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	33	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

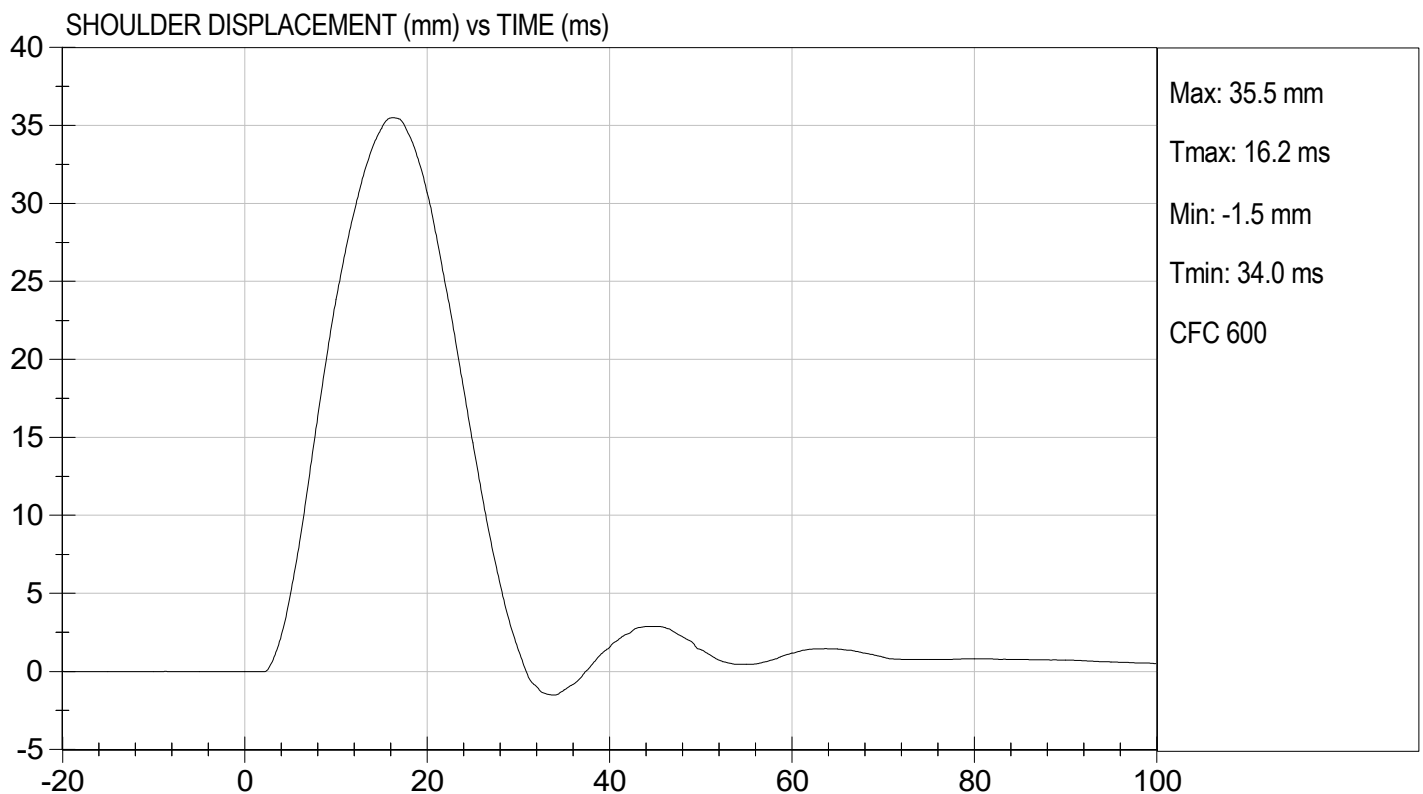
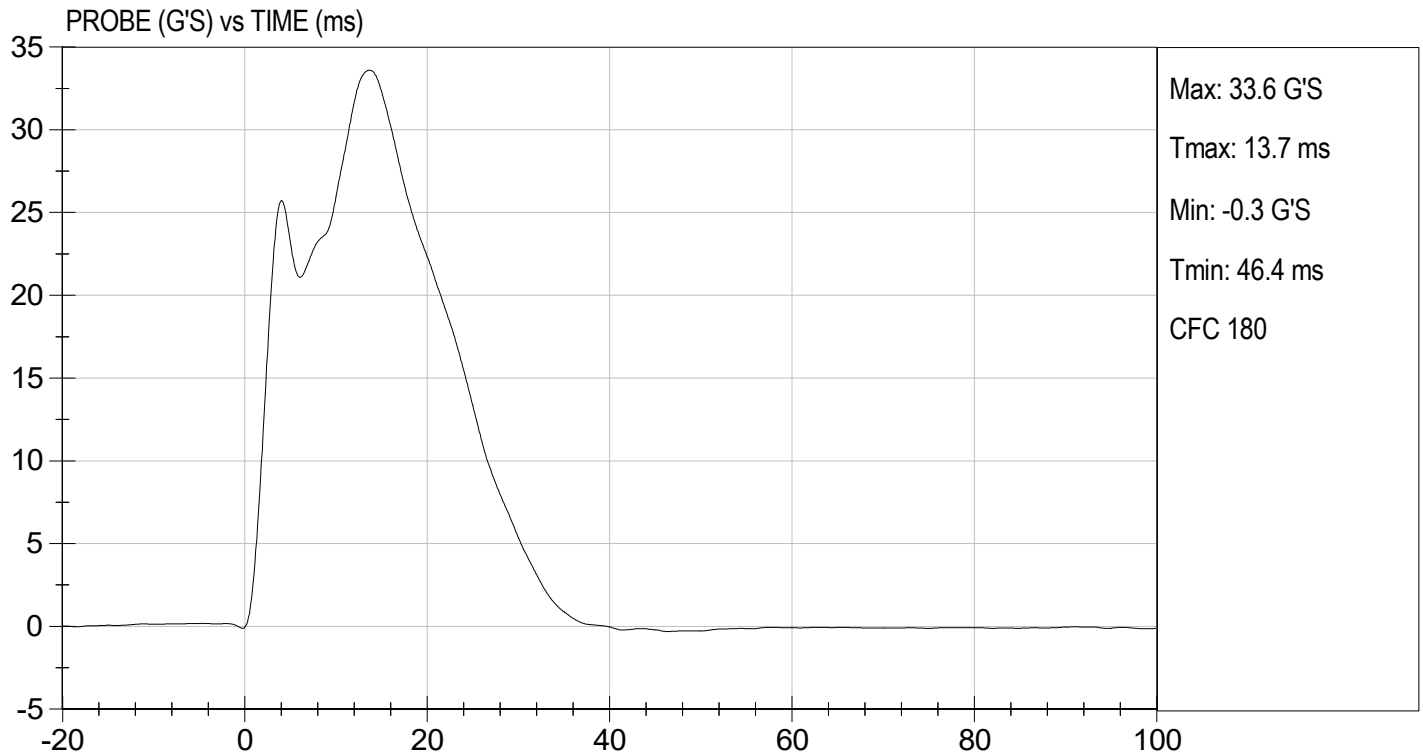
12/14/2023
Test Date


Approved By



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

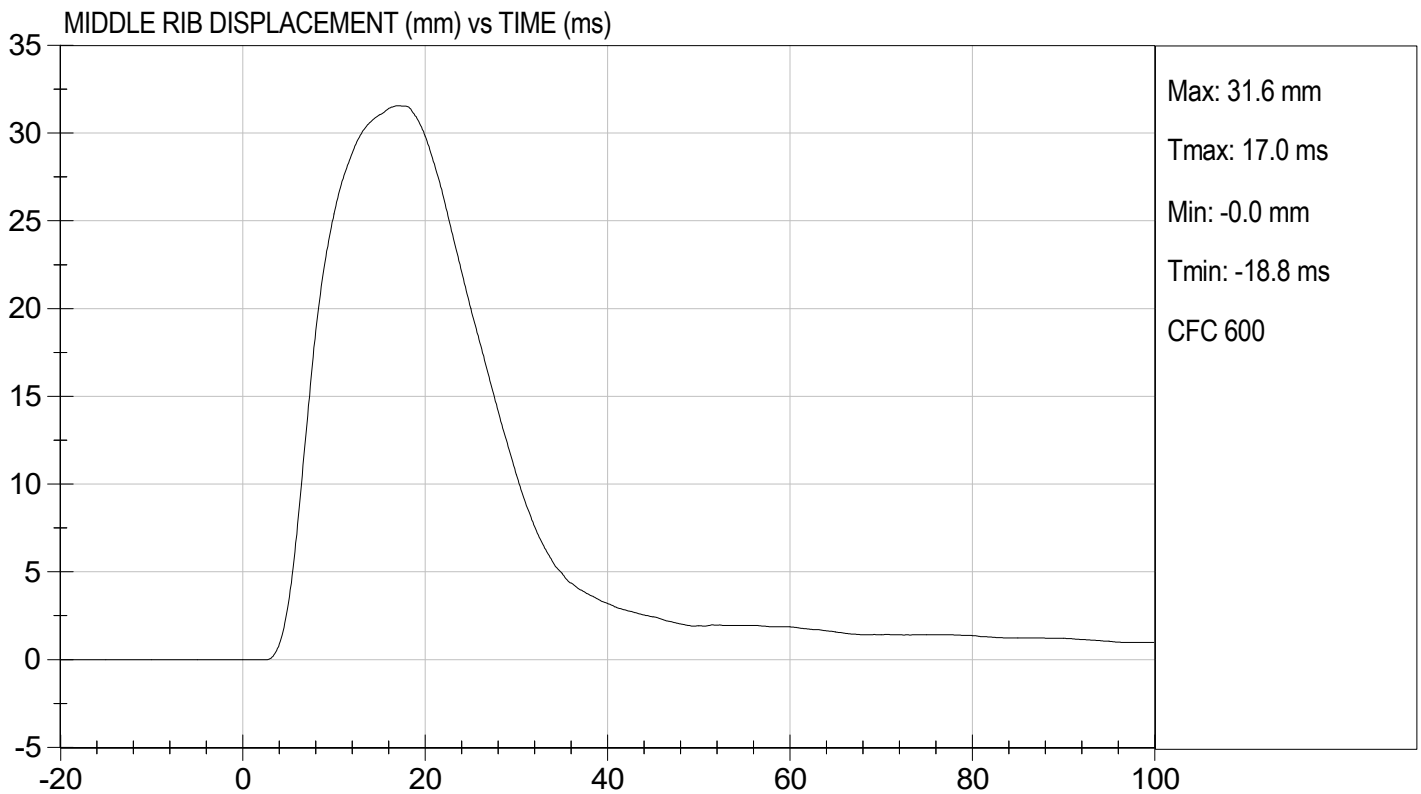
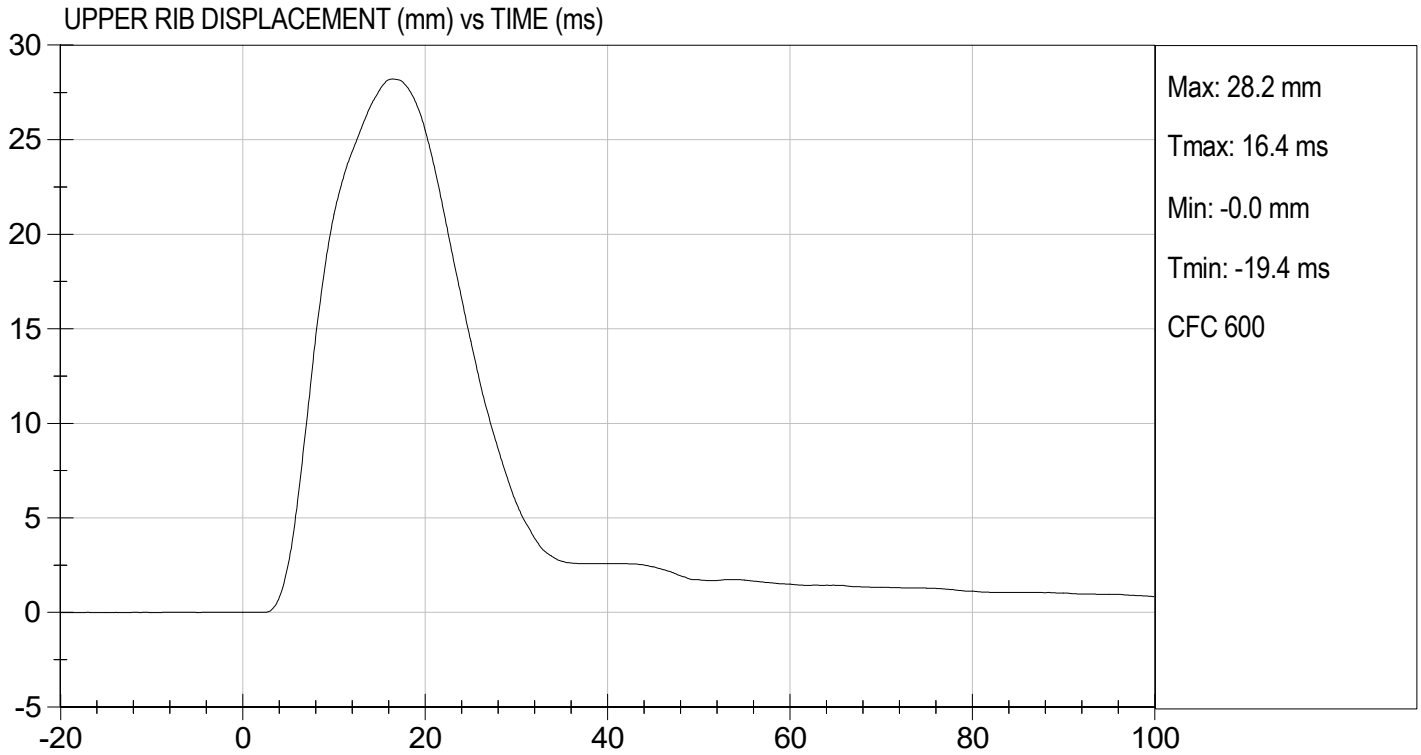
TEST DATE: 12/14/2023
TEST #: D233324





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

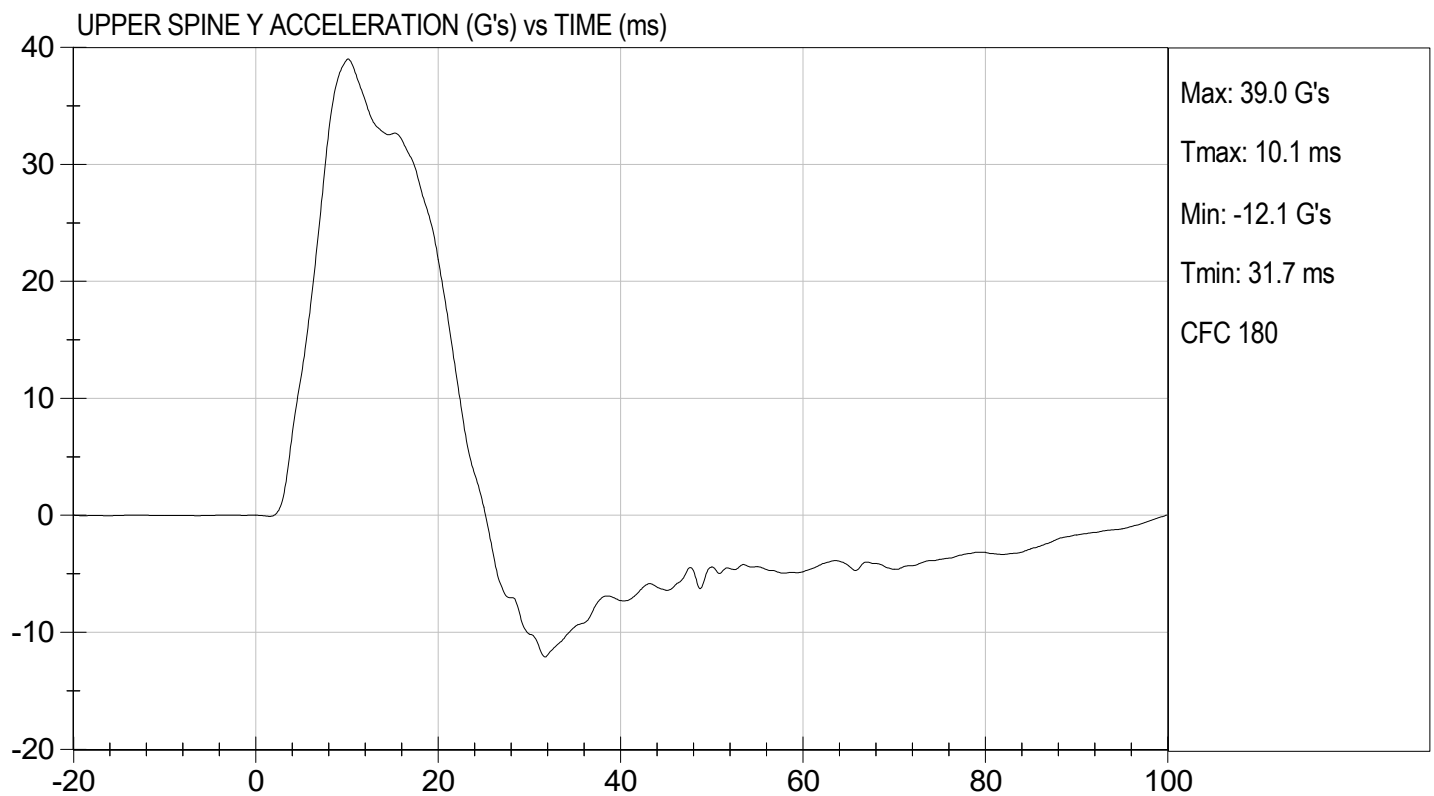
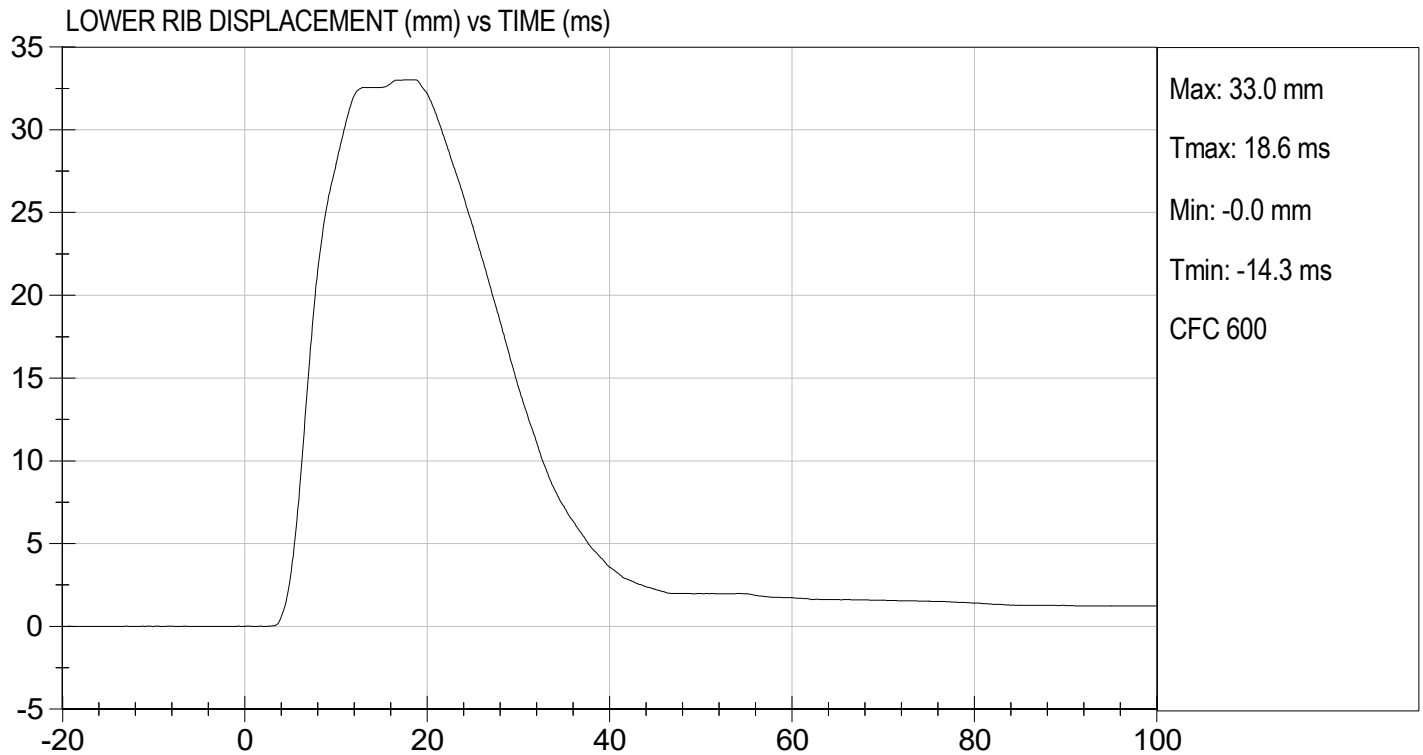
TEST DATE: 12/14/2023
TEST #: D233324





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

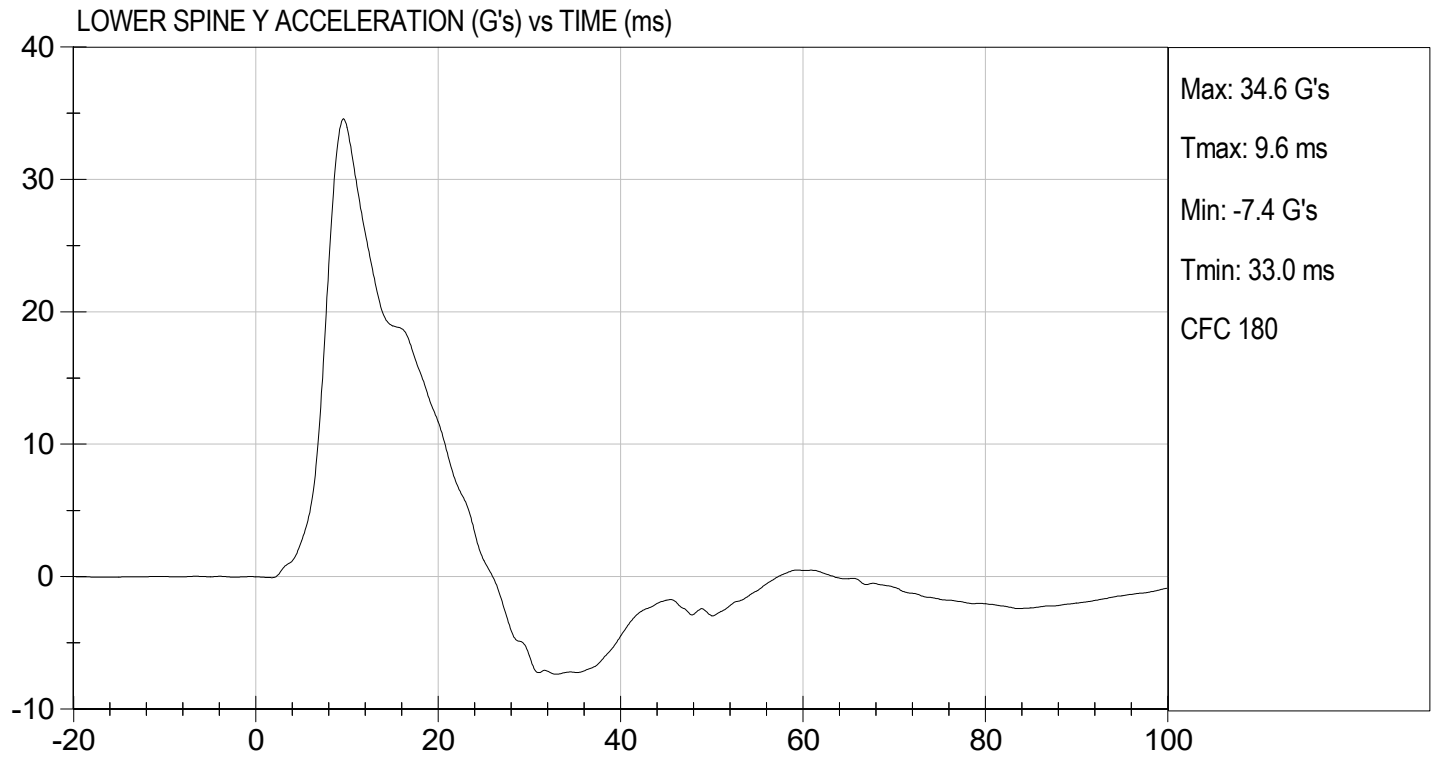
TEST DATE: 12/14/2023
TEST #: D233324





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

TEST DATE: 12/14/2023
TEST #: D233324



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

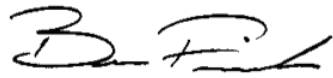
ATD Serial No: 296

Test I.D: D233325

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	22	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	37	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

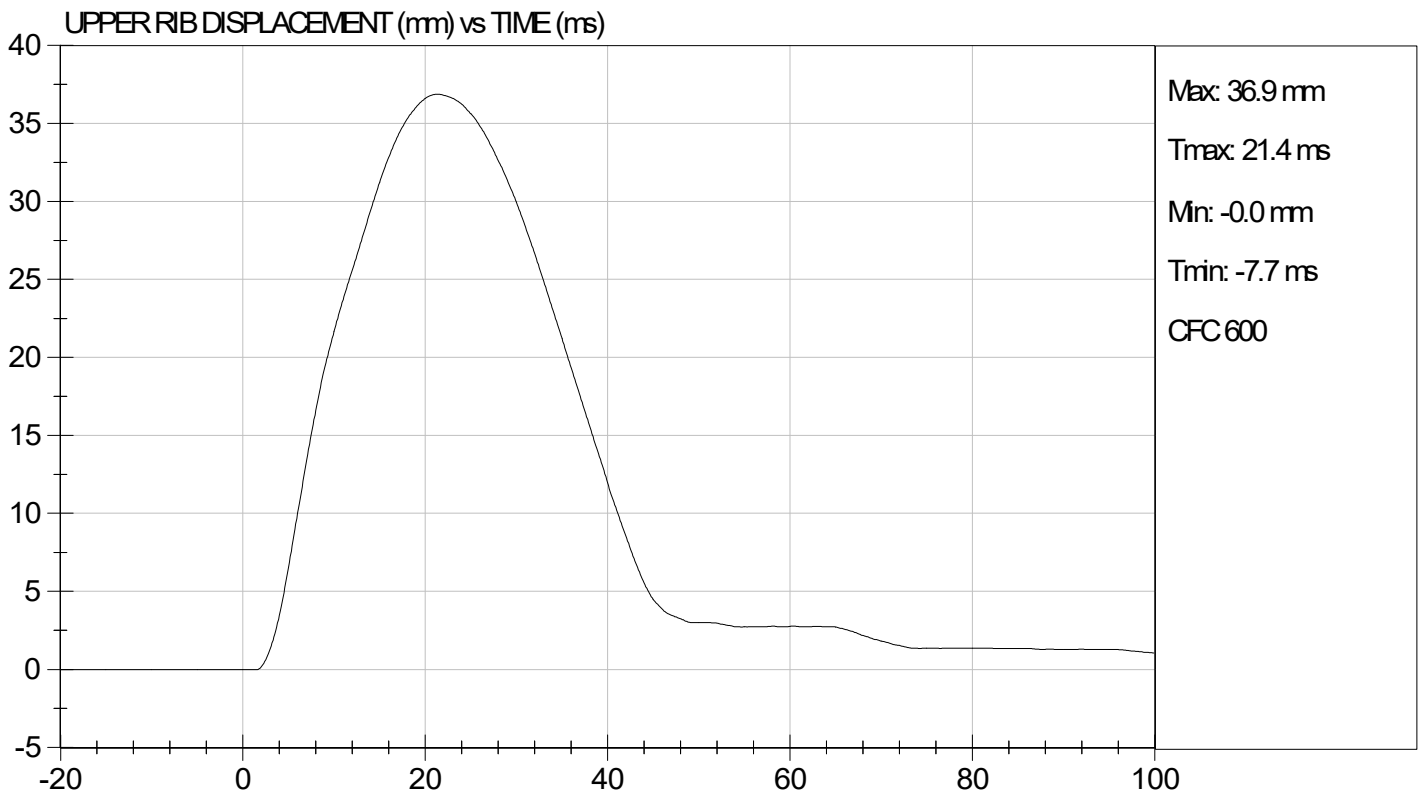
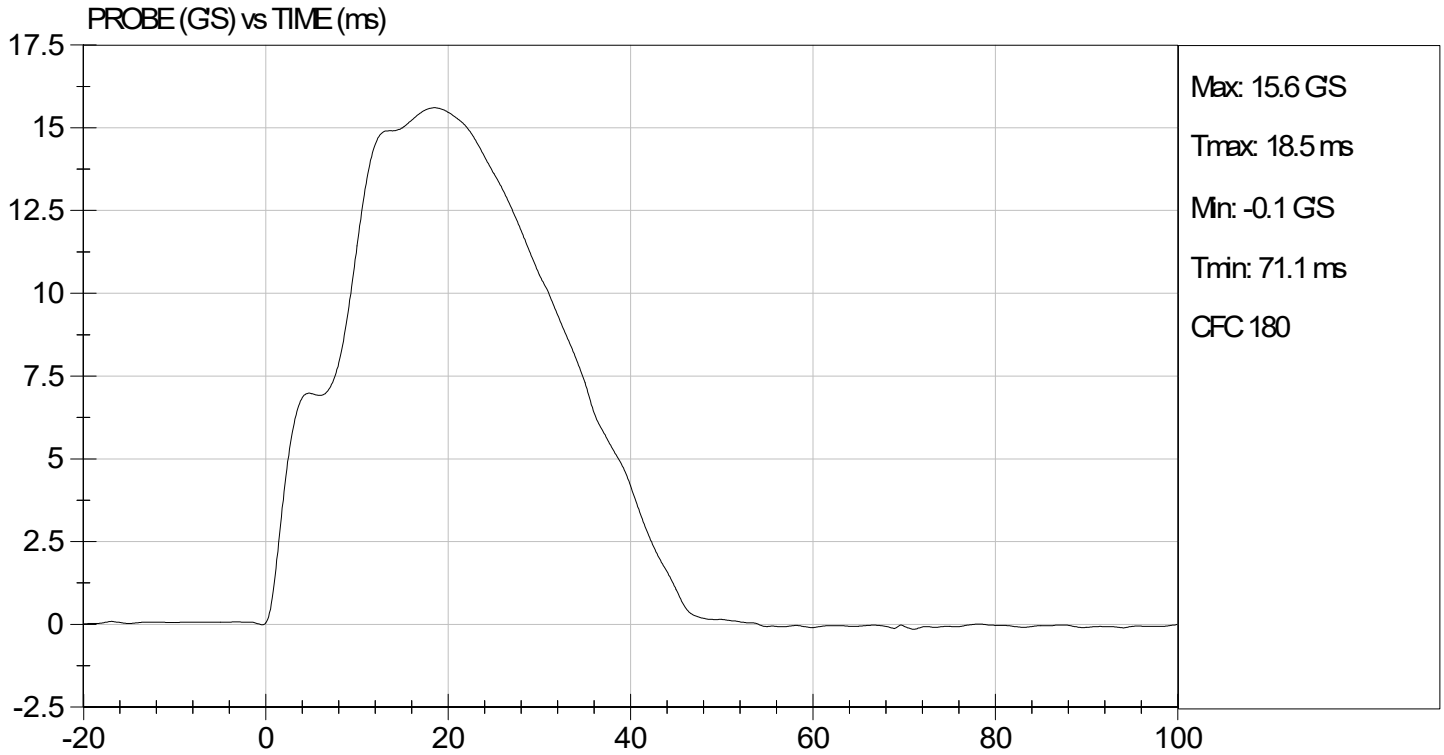
12/14/2023
Test Date


Approved By



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

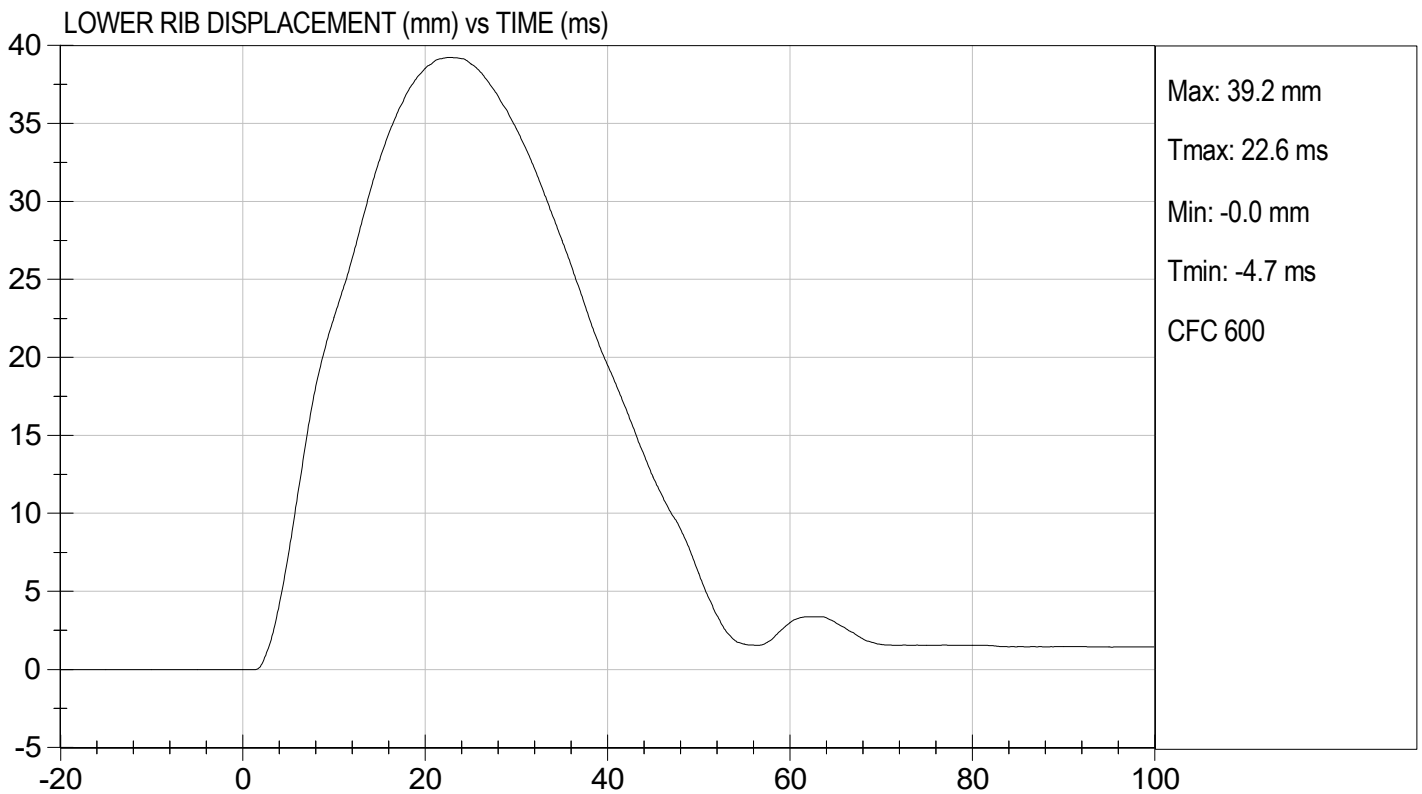
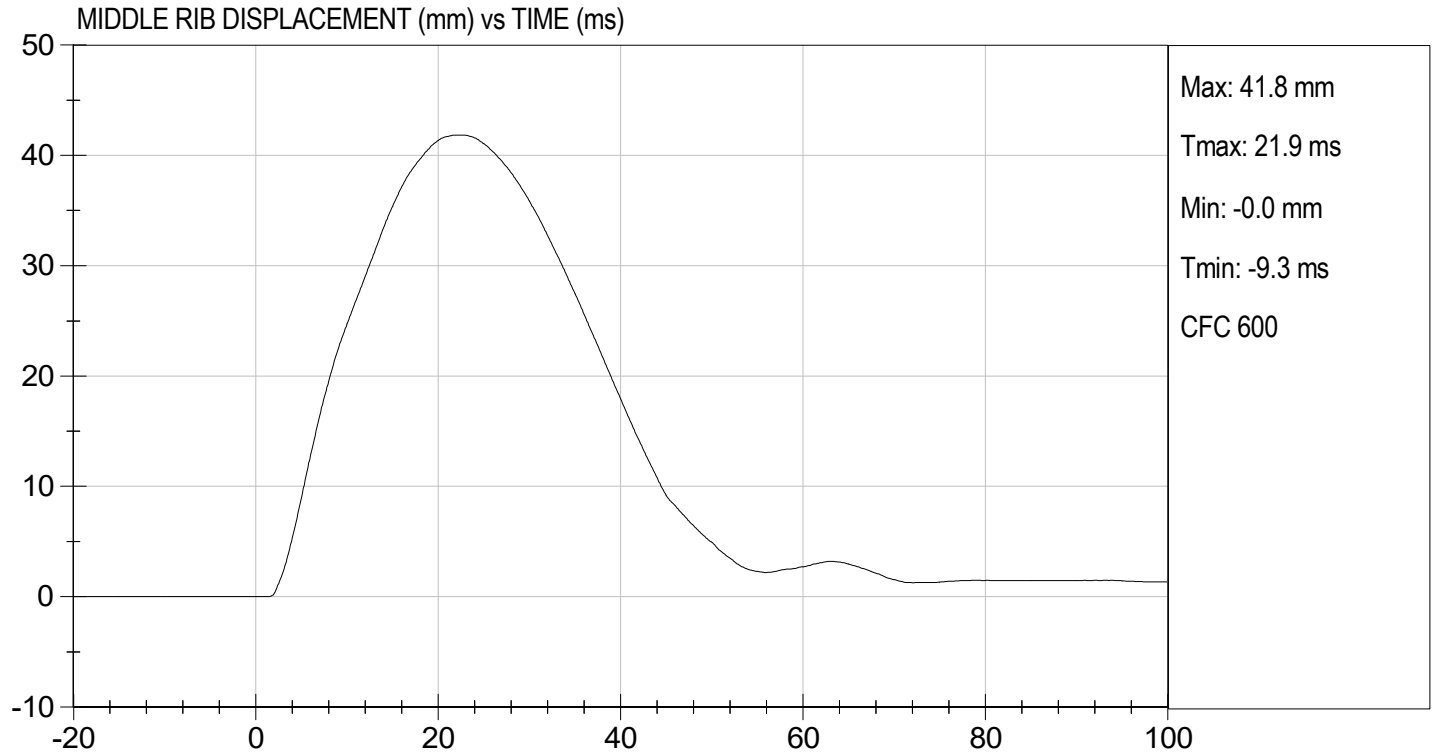
TEST DATE: 12/14/2023
TEST #: D233325





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

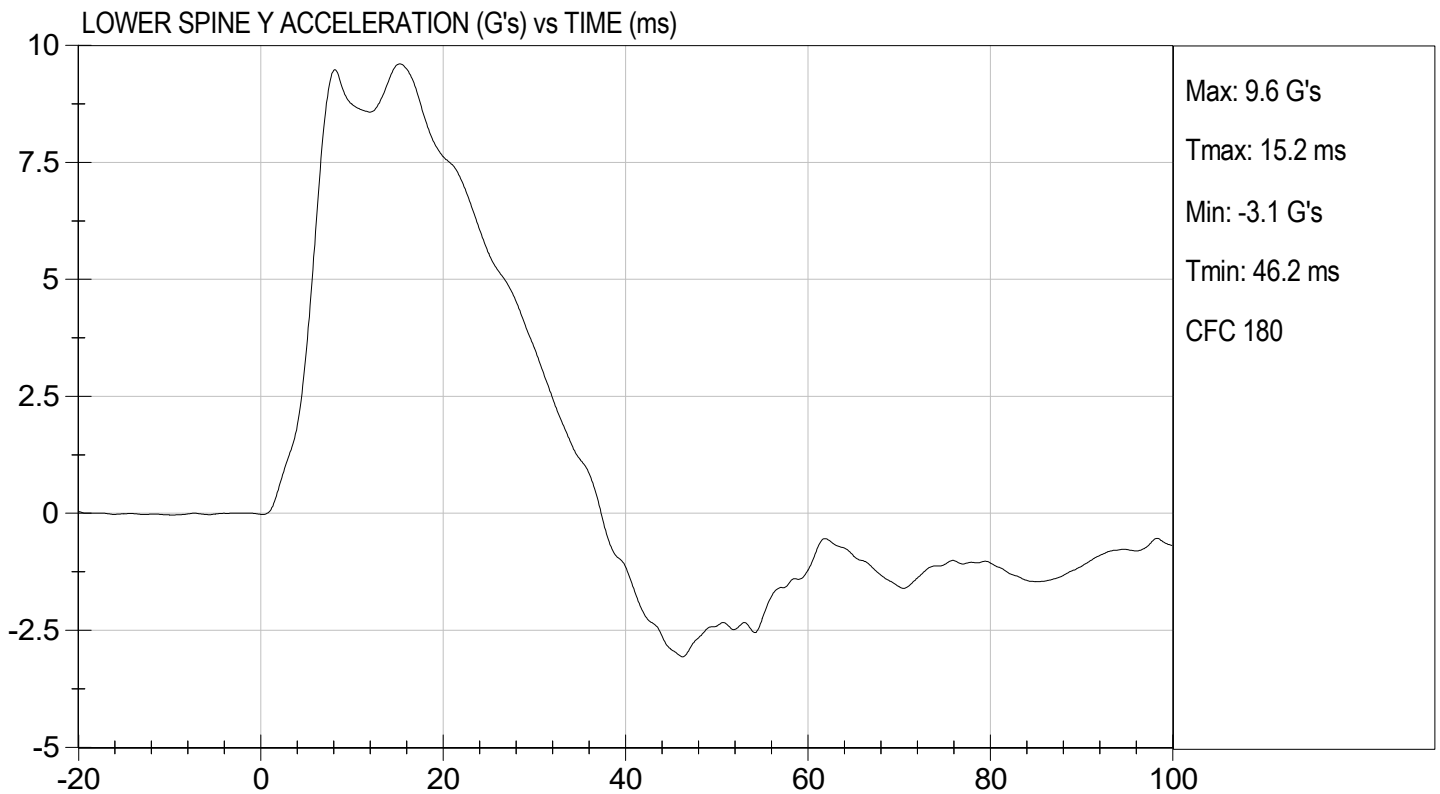
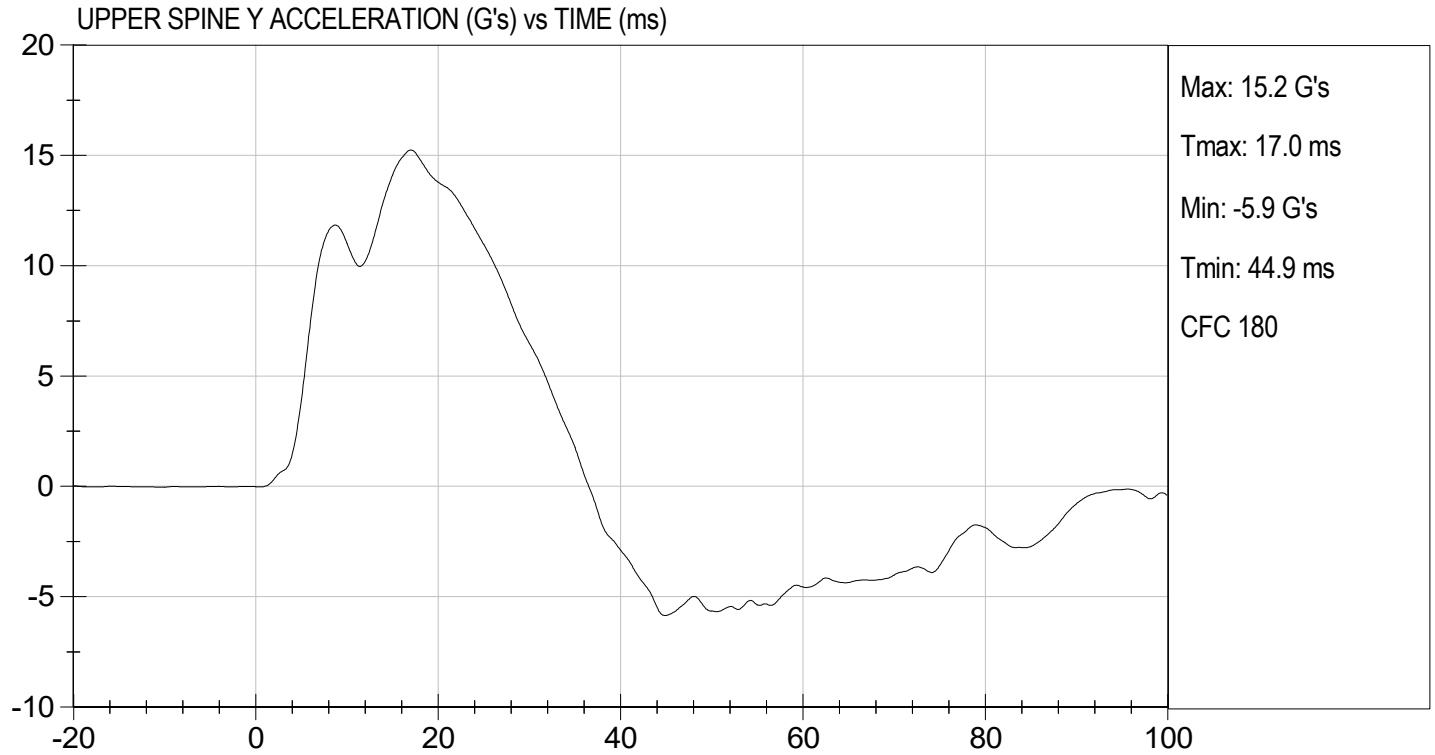
TEST DATE: 12/14/2023
TEST #: D233325





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

TEST DATE: 12/14/2023
TEST #: D233325



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-11s BUILD LEVEL D DUMMY

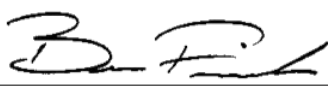
ATD Serial No: 296

Test I.D: D233326

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	23	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	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	35	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
Overall Test Results				Pass


Laboratory Technician

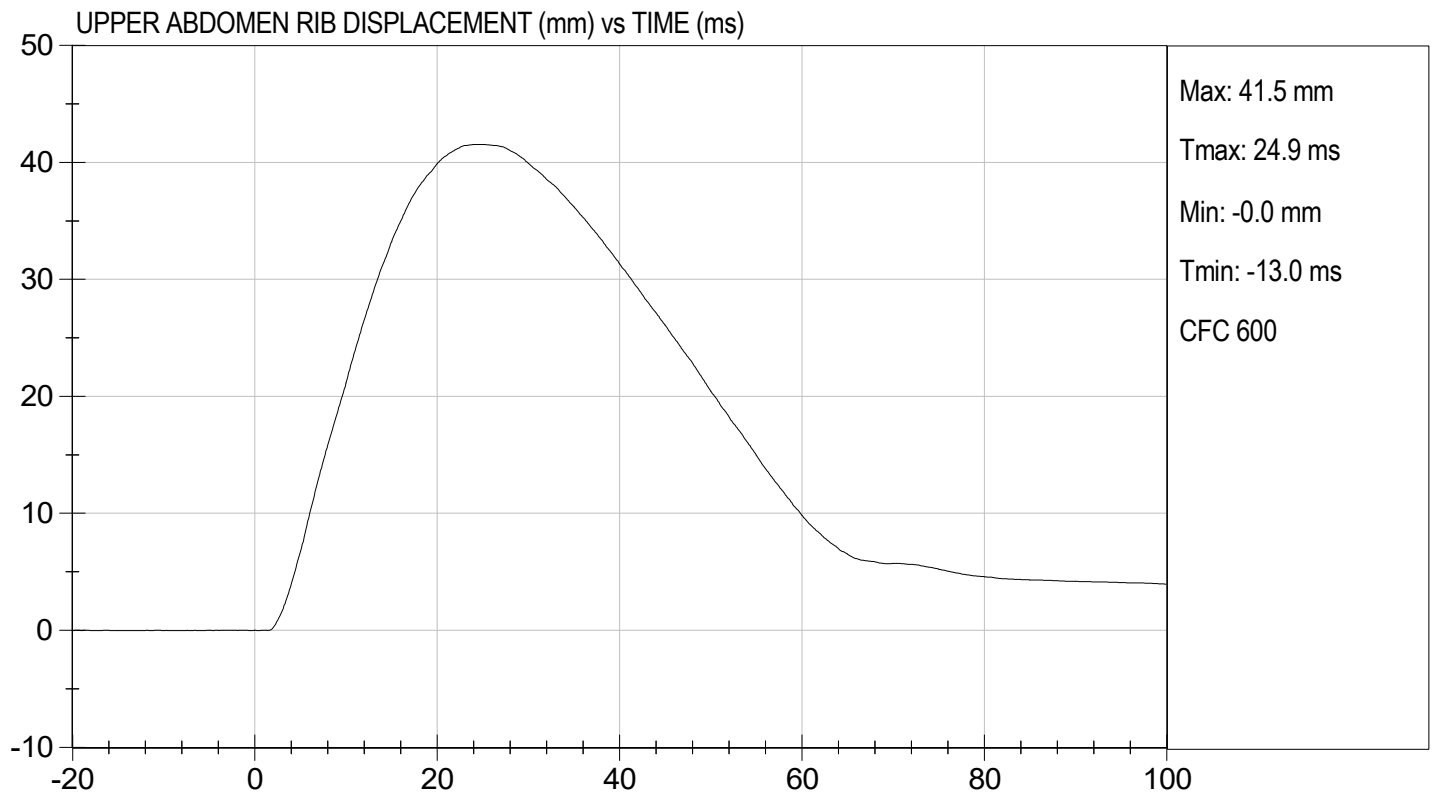
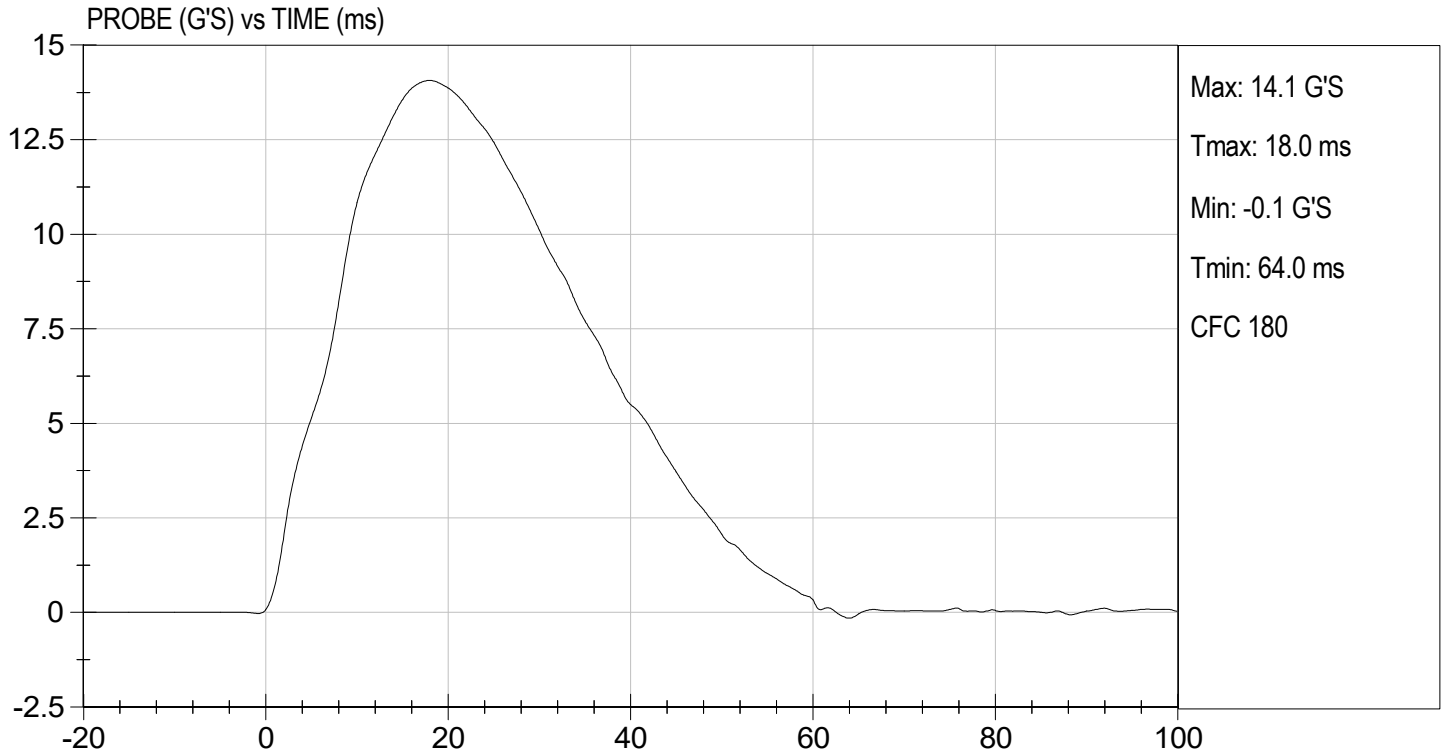
12/14/2023
Test Date


Approved By



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

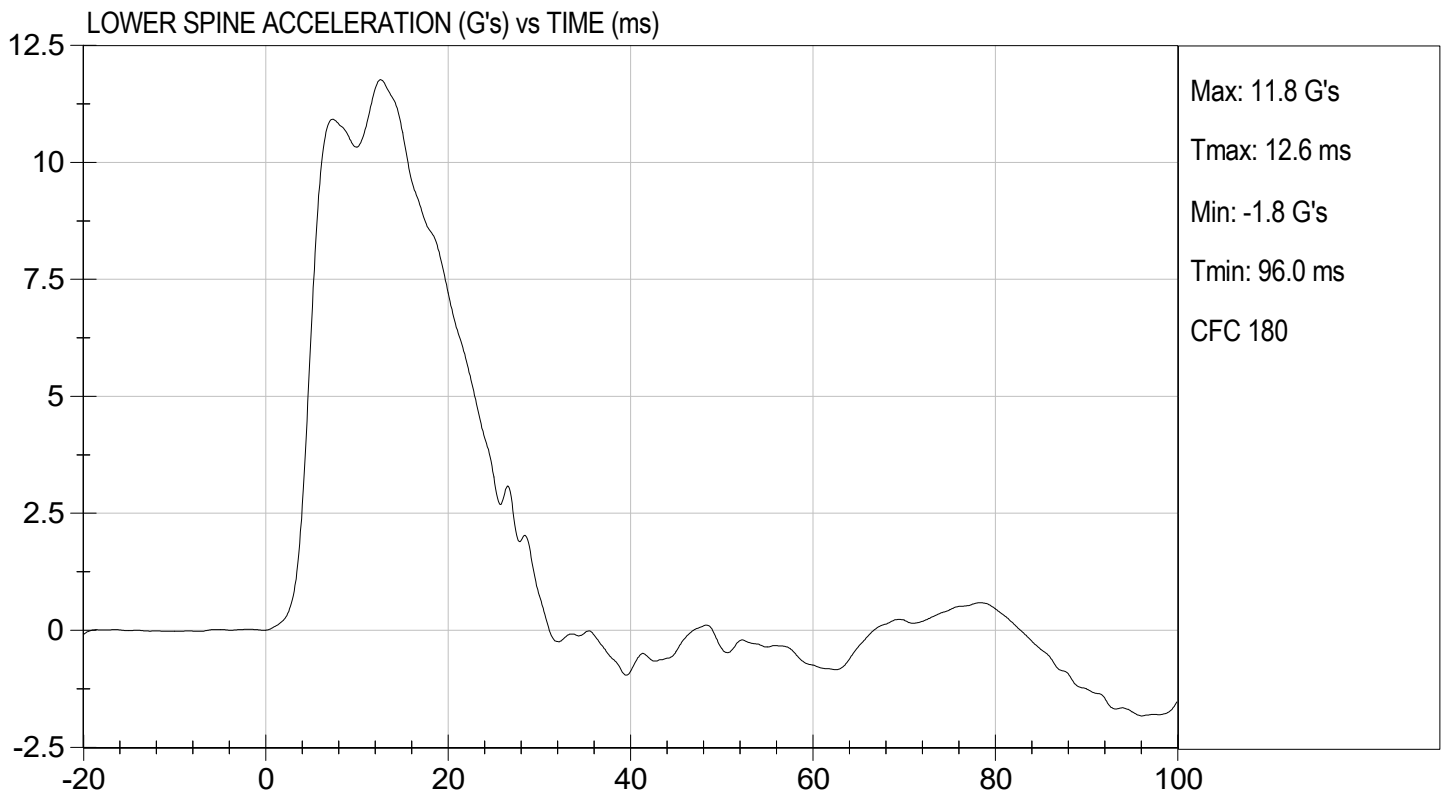
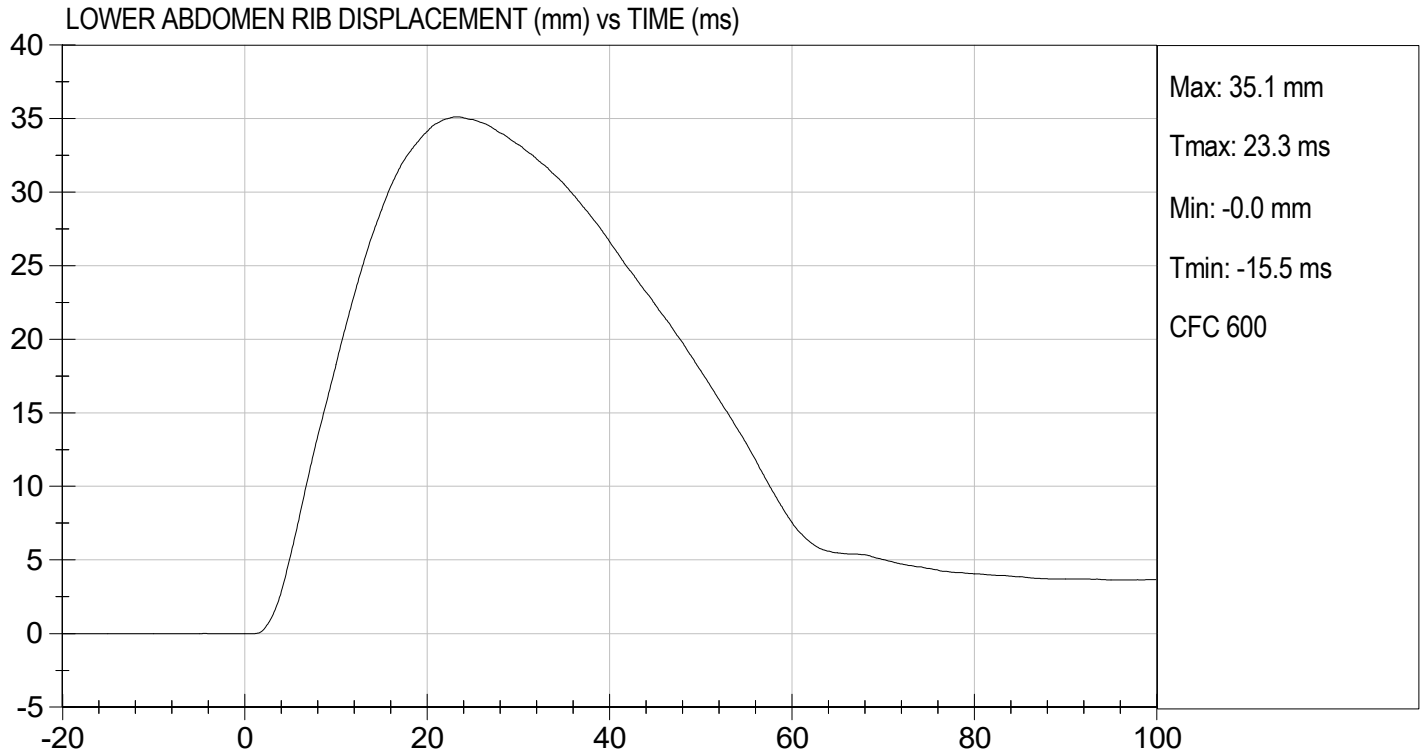
TEST DATE: 12/14/2023
TEST #: D233326





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

TEST DATE: 12/14/2023
TEST #: D233326



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

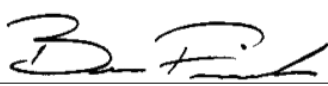
ATD Serial No: 296

Test I.D: D233327

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	21	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	40.5	Pass
Peak Acetabulum Force	N	3600 to 4300	4,007	Pass
Overall Test Results				Pass


Laboratory Technician

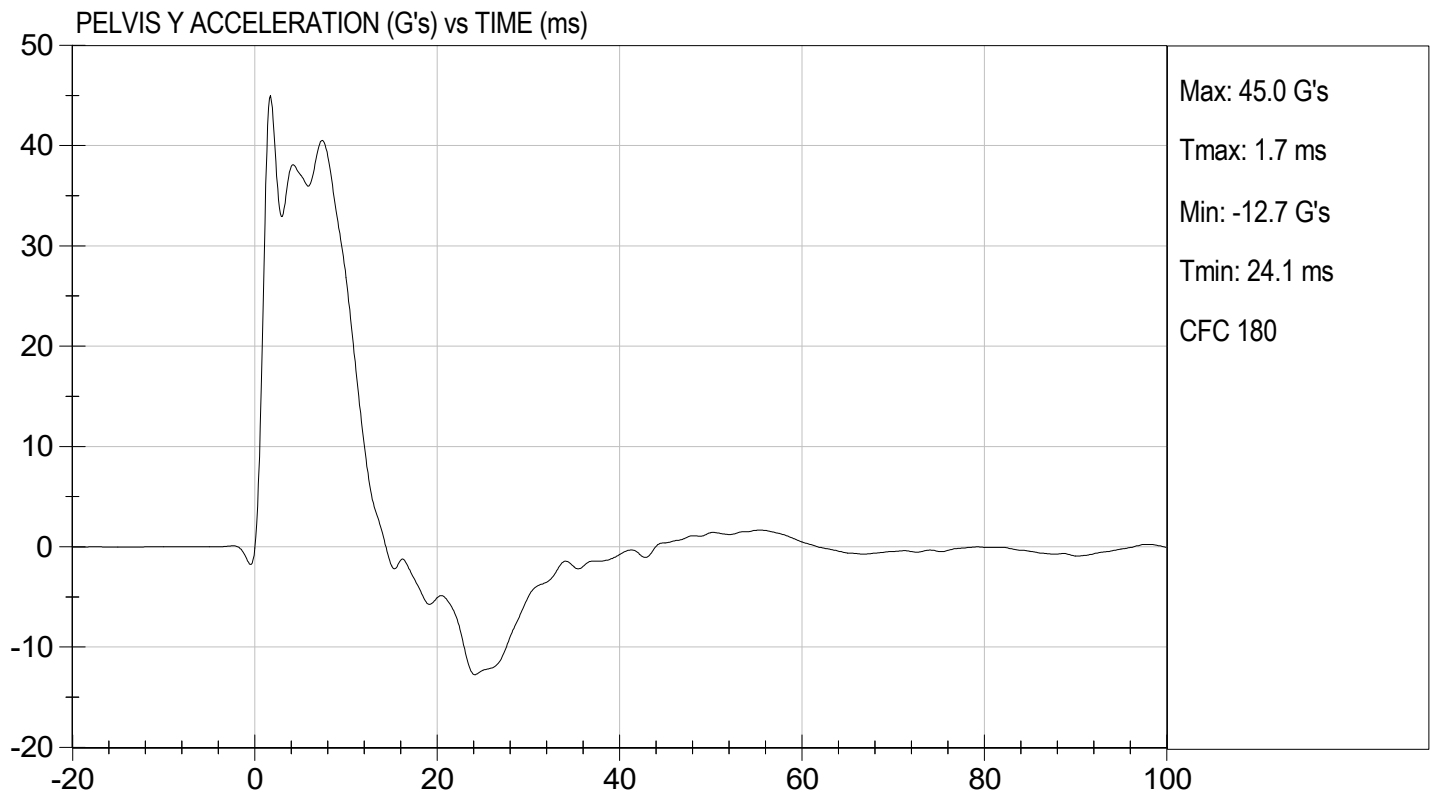
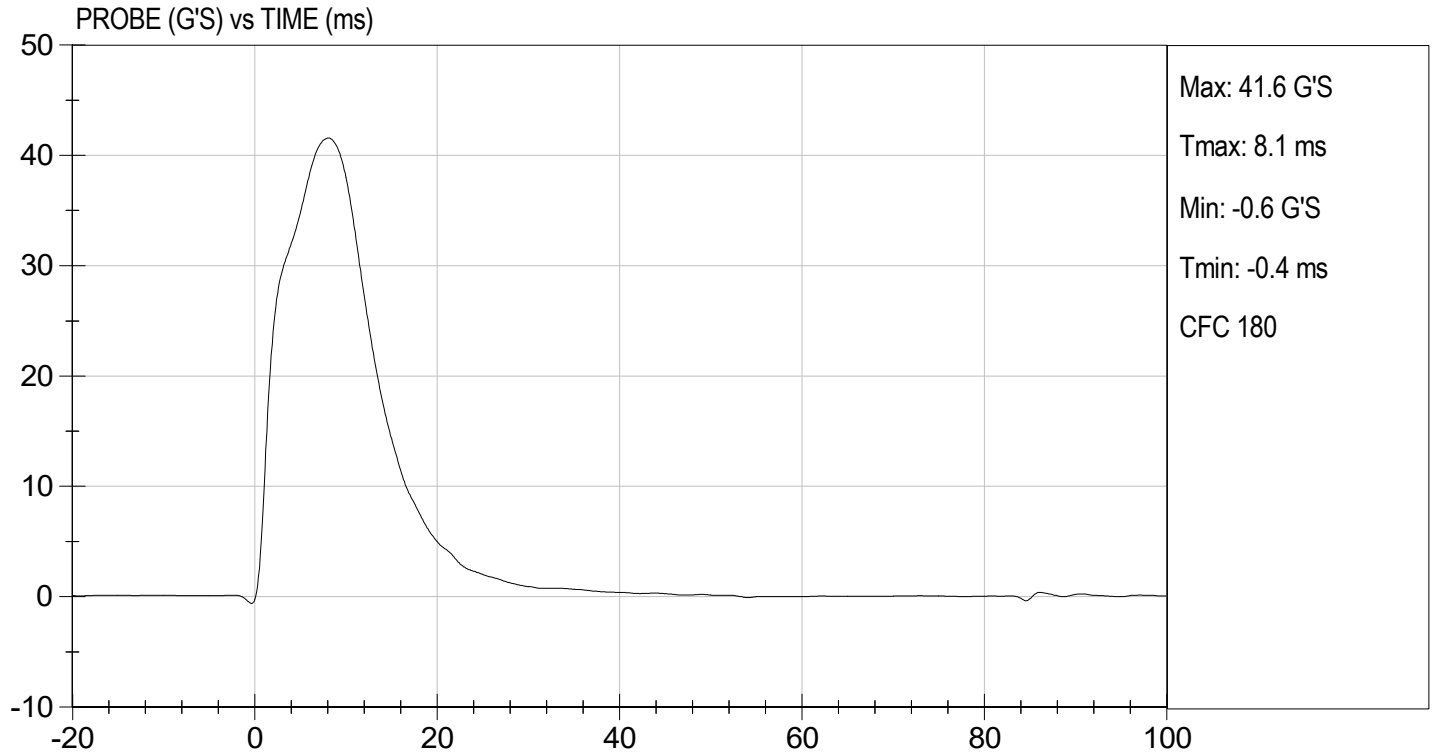
12/14/2023
Test Date


Approved By



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

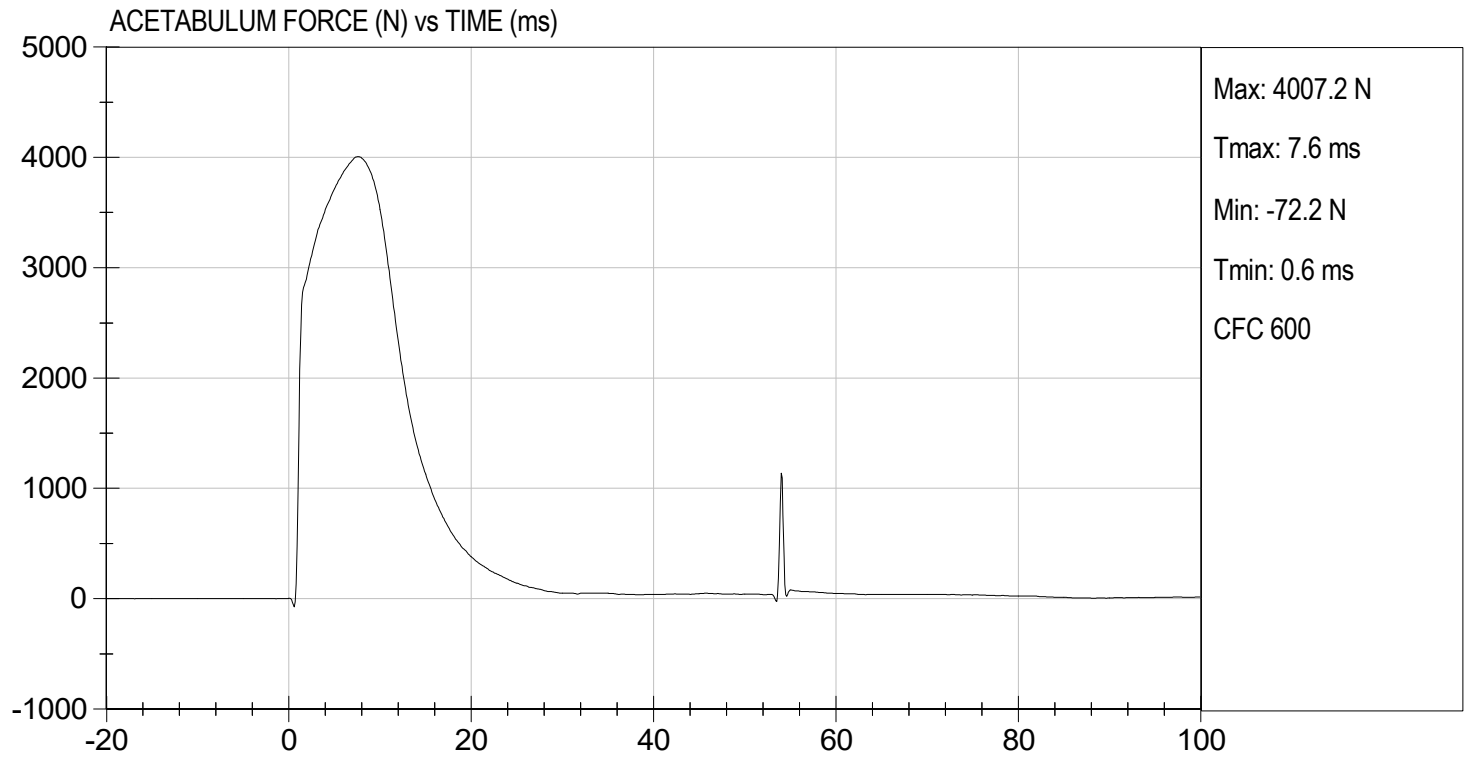
TEST DATE: 12/14/2023
TEST #: D233327





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

TEST DATE: 12/14/2023
TEST #: D233327



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

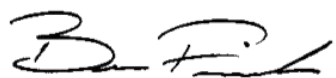
Test I.D: D233328

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	28	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,693	Pass
Overall Test Results				Pass


Laboratory Technician

12/14/2023

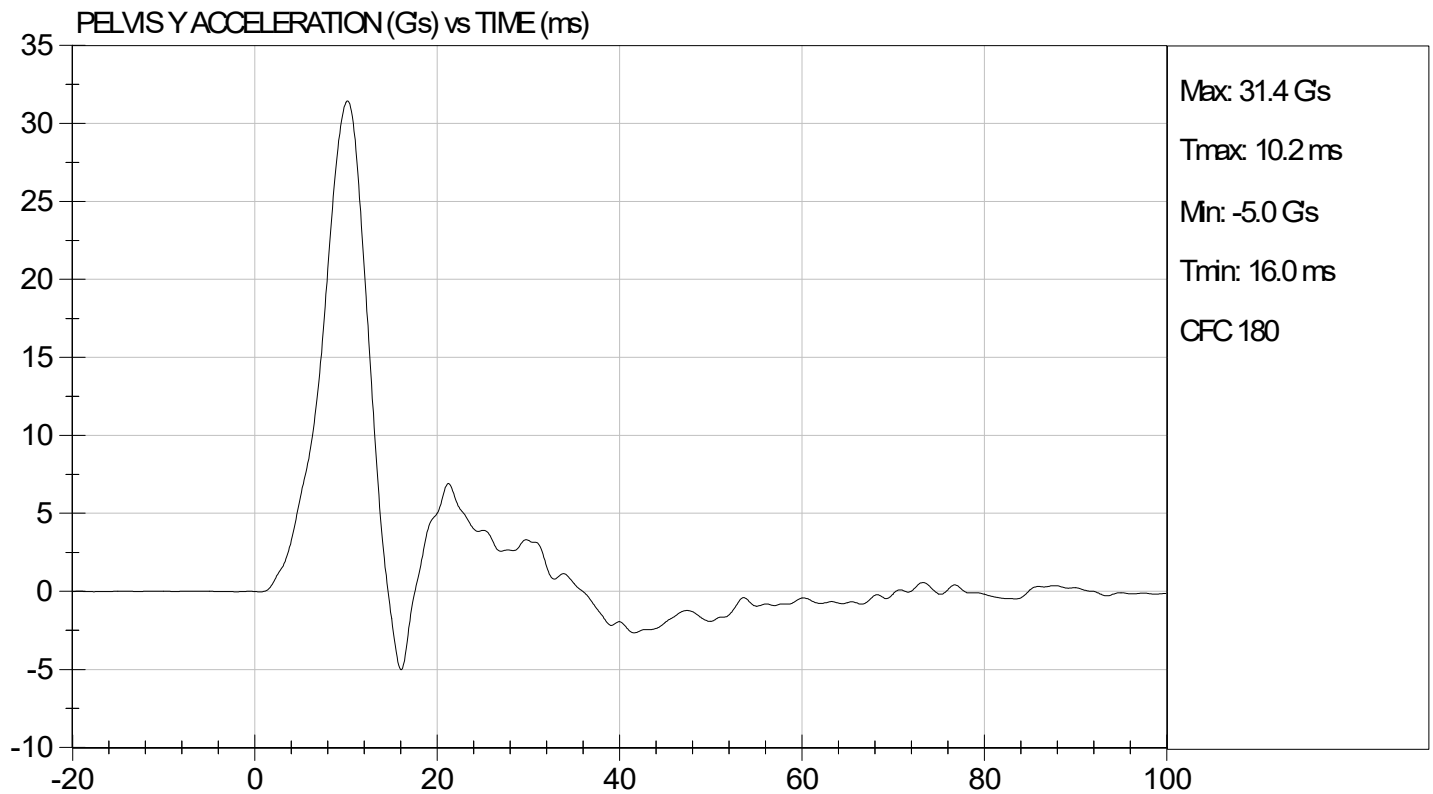
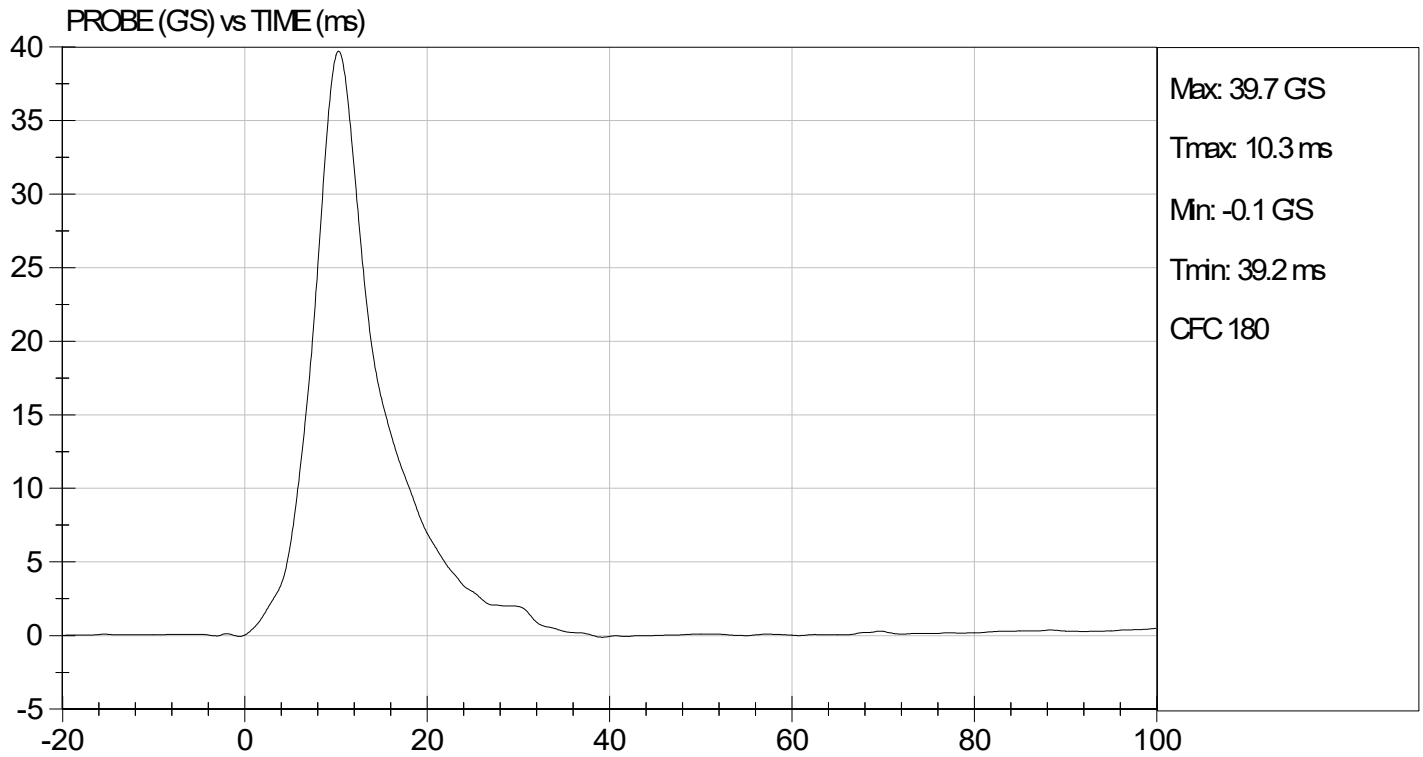
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

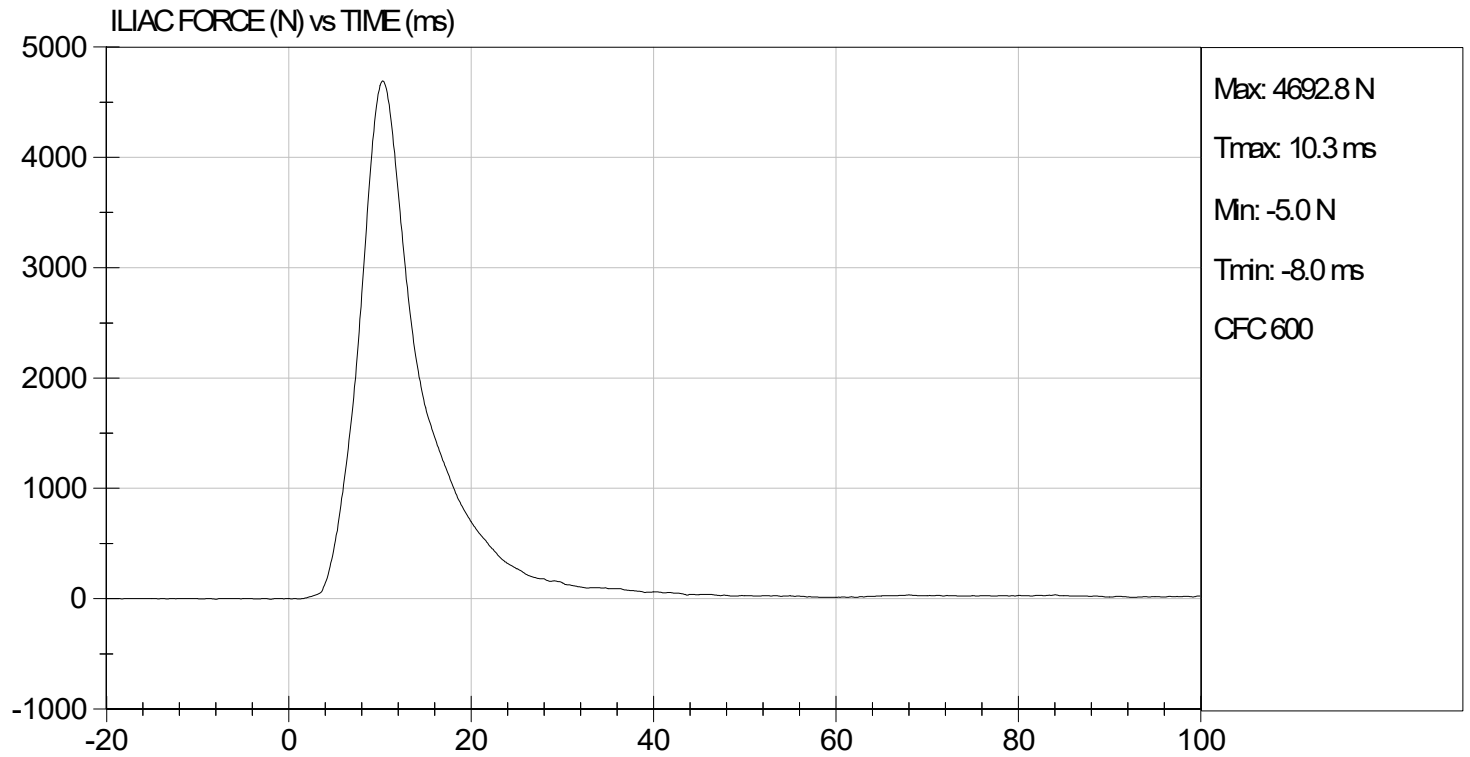
TEST DATE: 12/14/2023
TEST #: D233328





TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 12/14/2023
TEST #: D233328



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

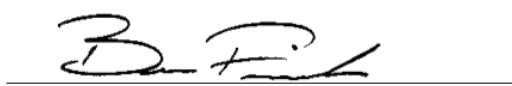
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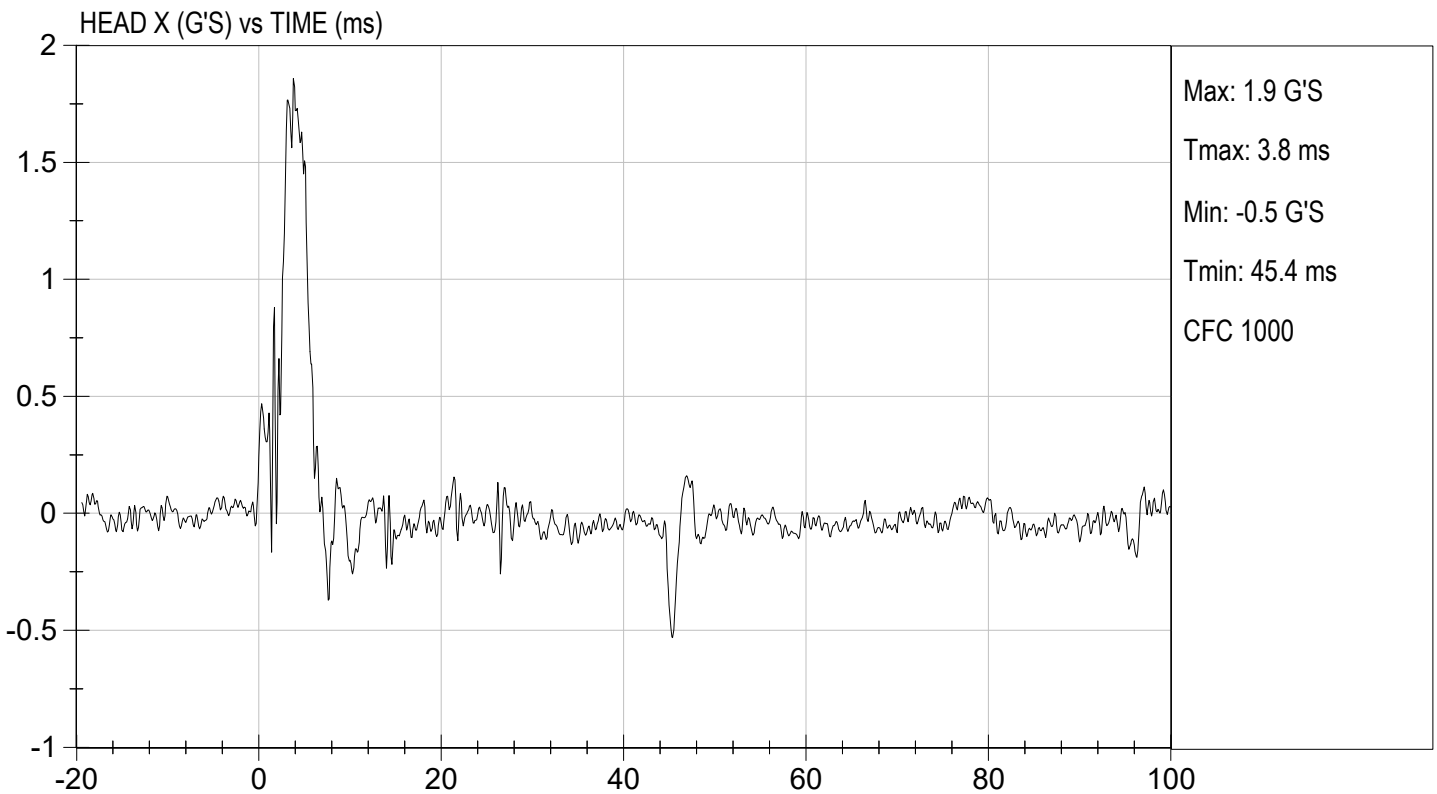
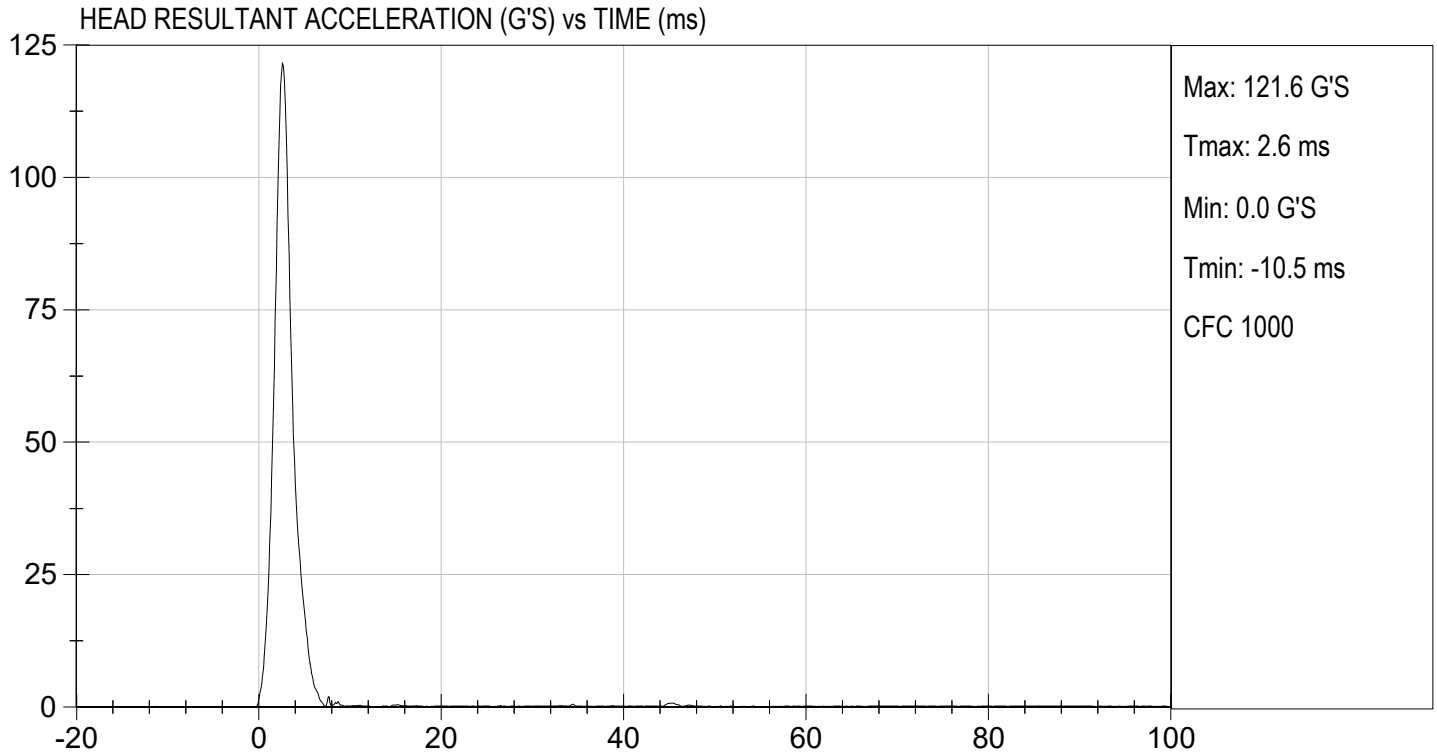
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	G's	115 to 137	122	Pass
Peak Longitudinal Acceleration	G's	+/- 15	1.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass

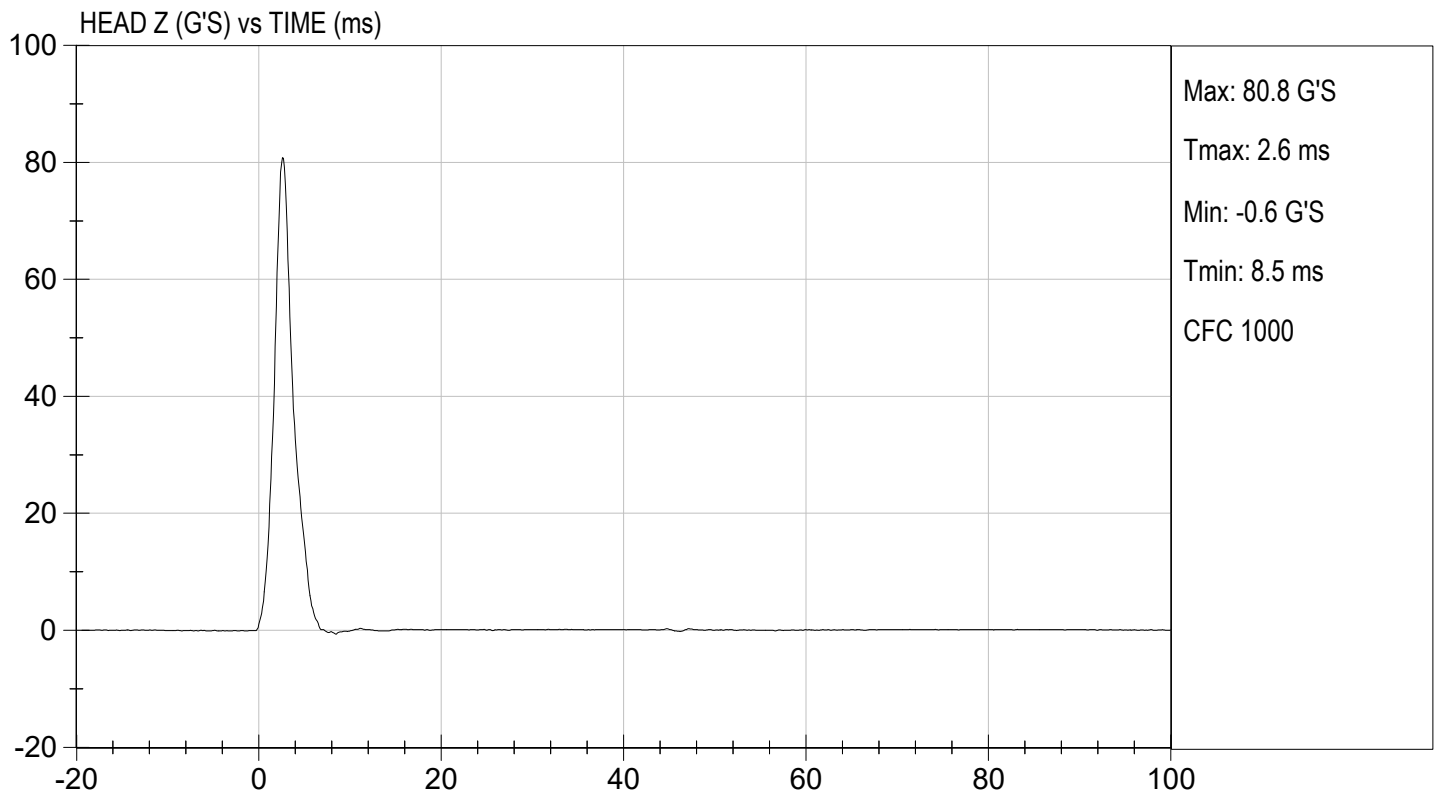
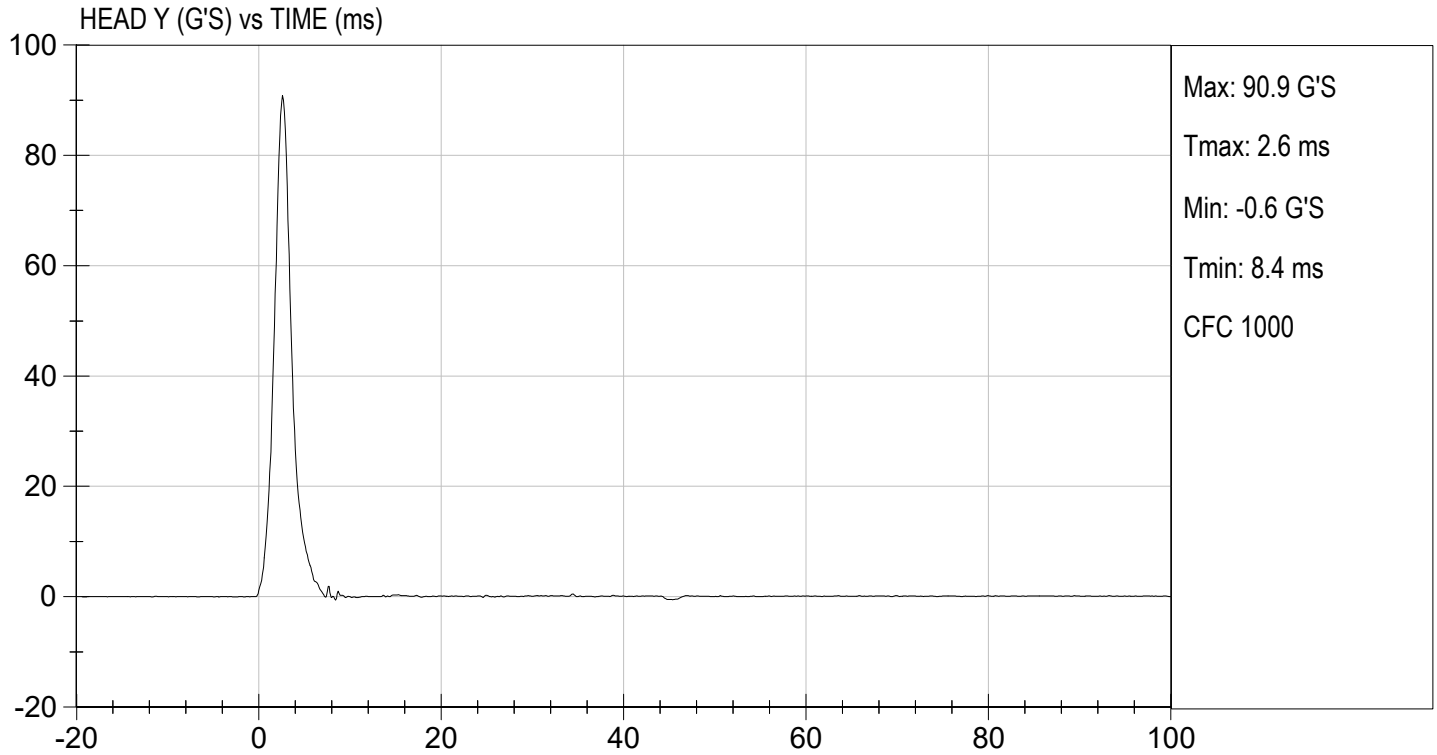

Laboratory Technician

01/12/2024

Test Date


Approved By





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

ATD Serial No: 296

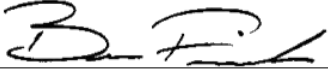
Test I.D: D240112

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	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.38	Pass
	15 ms	m/s	3.30 to 4.10	3.72	Pass
	20 ms	m/s	4.40 to 5.40	5.26	Pass
	25 ms	m/s	5.40 to 6.10	5.80	Pass
	25-100 ms	m/s	5.50 to 6.20	5.82	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	116	Pass
Overall Test Results				Pass	


 Laboratory Technician

01/12/2024

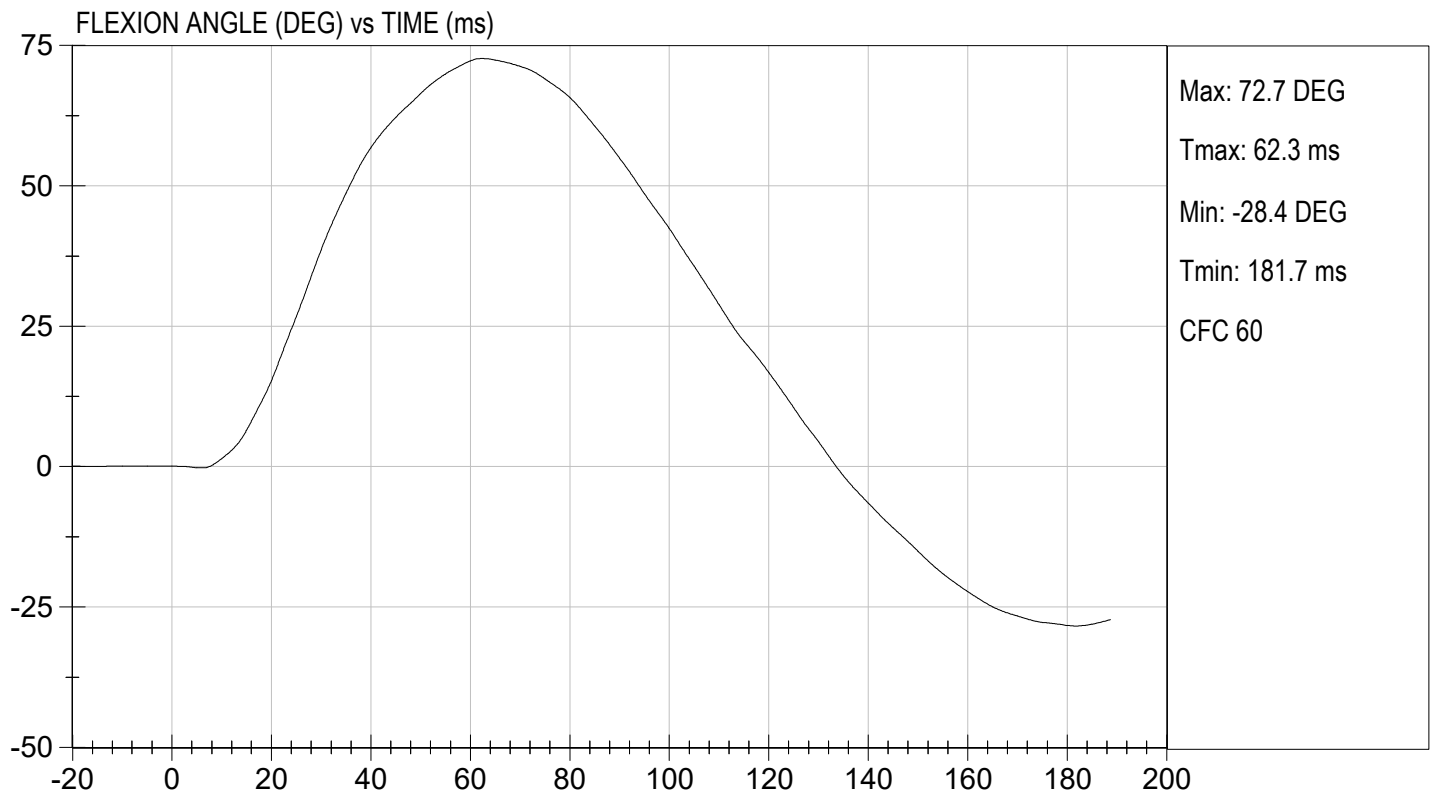
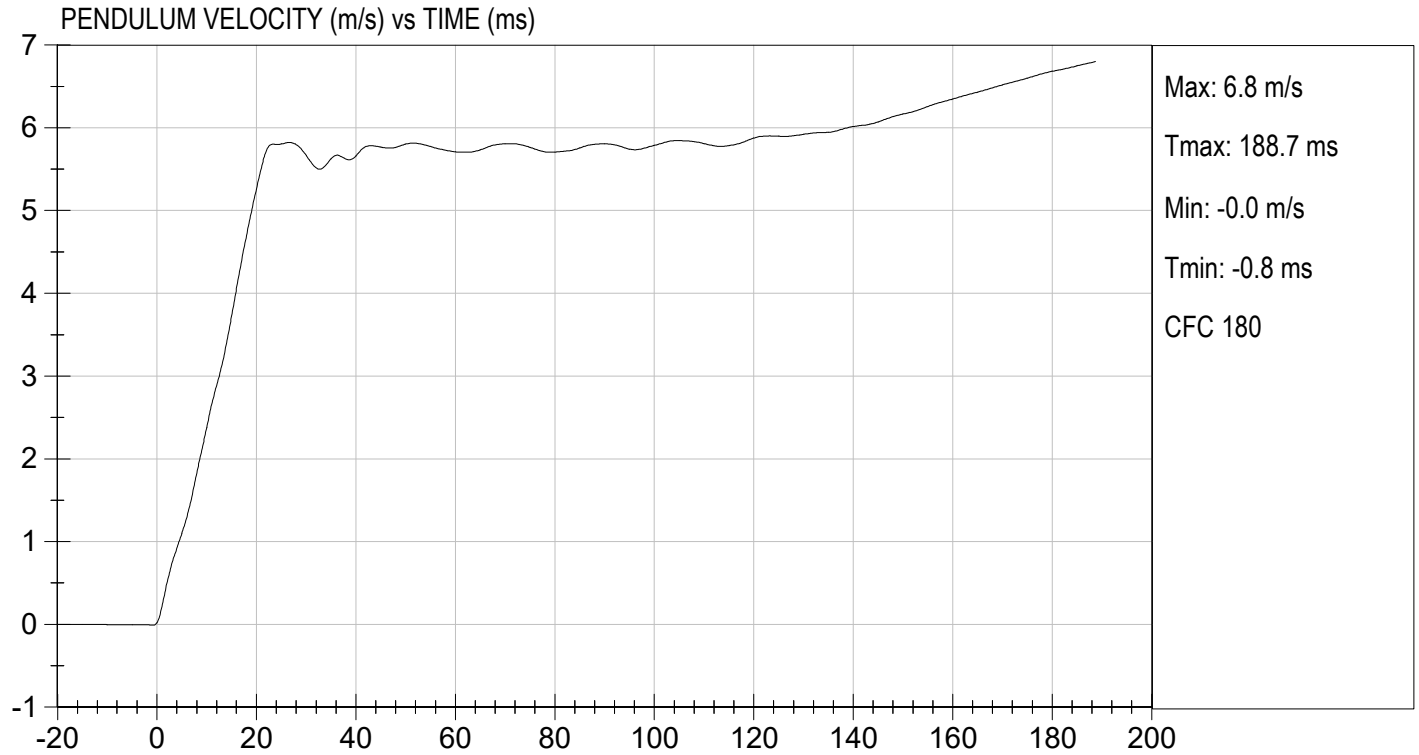
Test Date


 Approved By



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

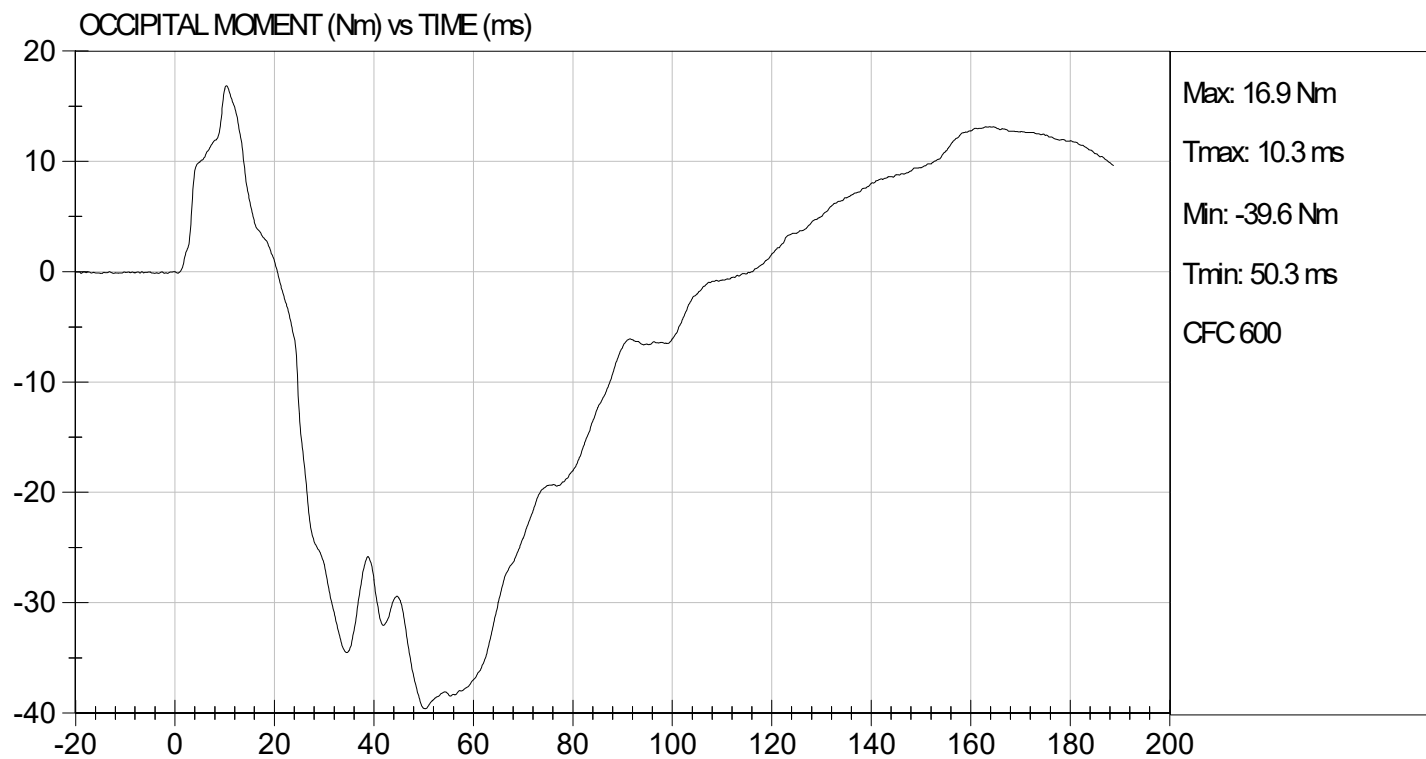
TEST DATE: 01/12/2024
TEST #: D240112





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

TEST DATE: 01/12/2024
TEST #: D240112



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

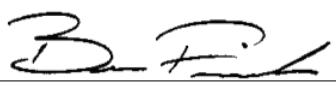
ATD Serial No: 296

Test ID: D240113

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	27	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	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	20	Pass
			Overall Test Results	Pass


Laboratory Technician

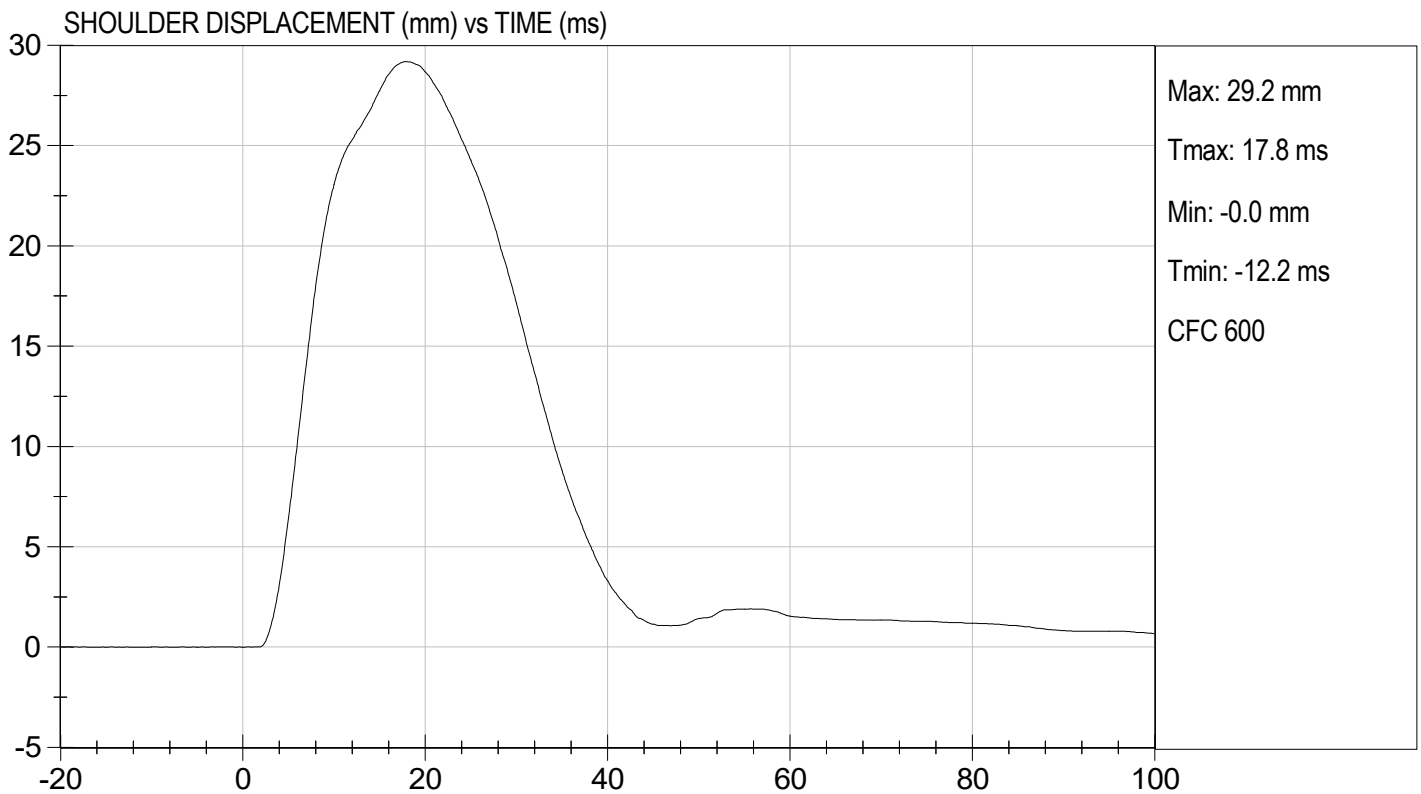
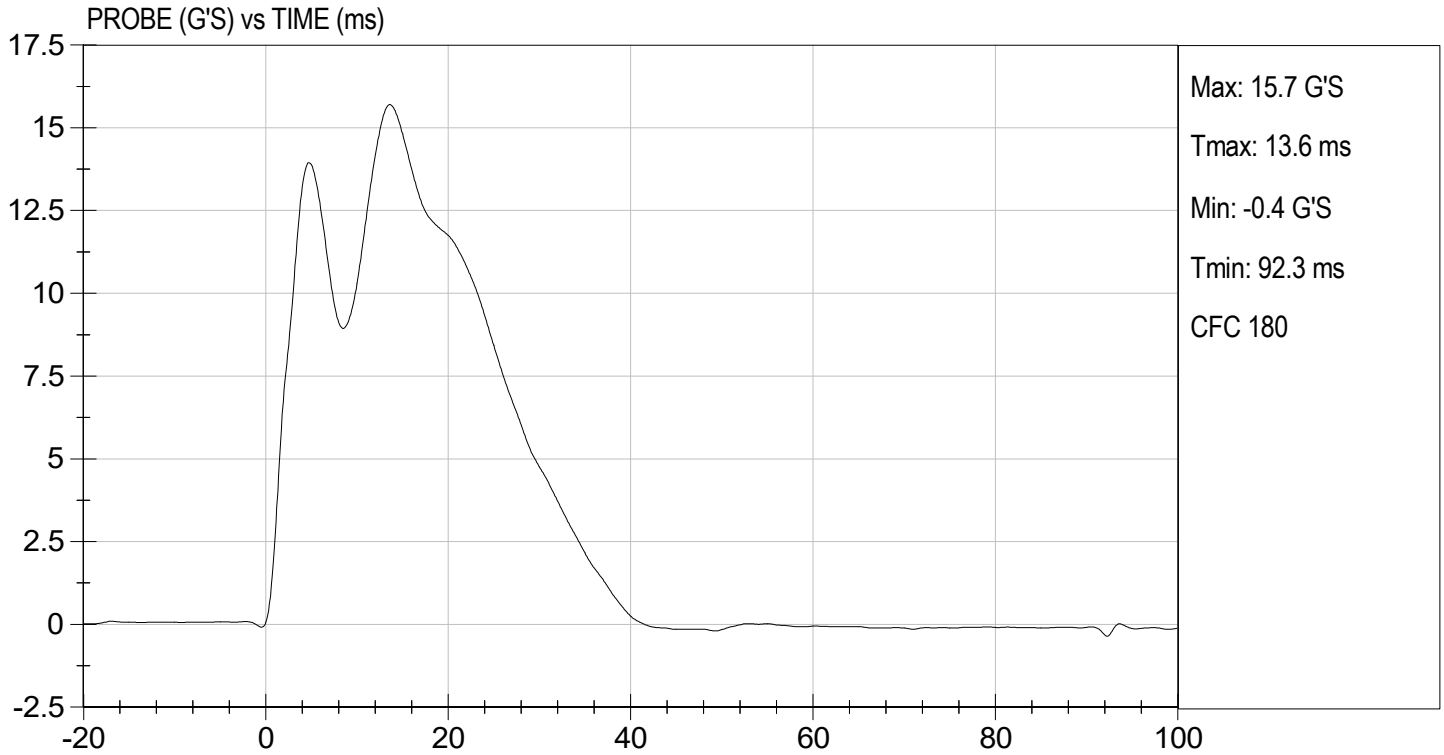
01/12/2024
Test Date


Approved By



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

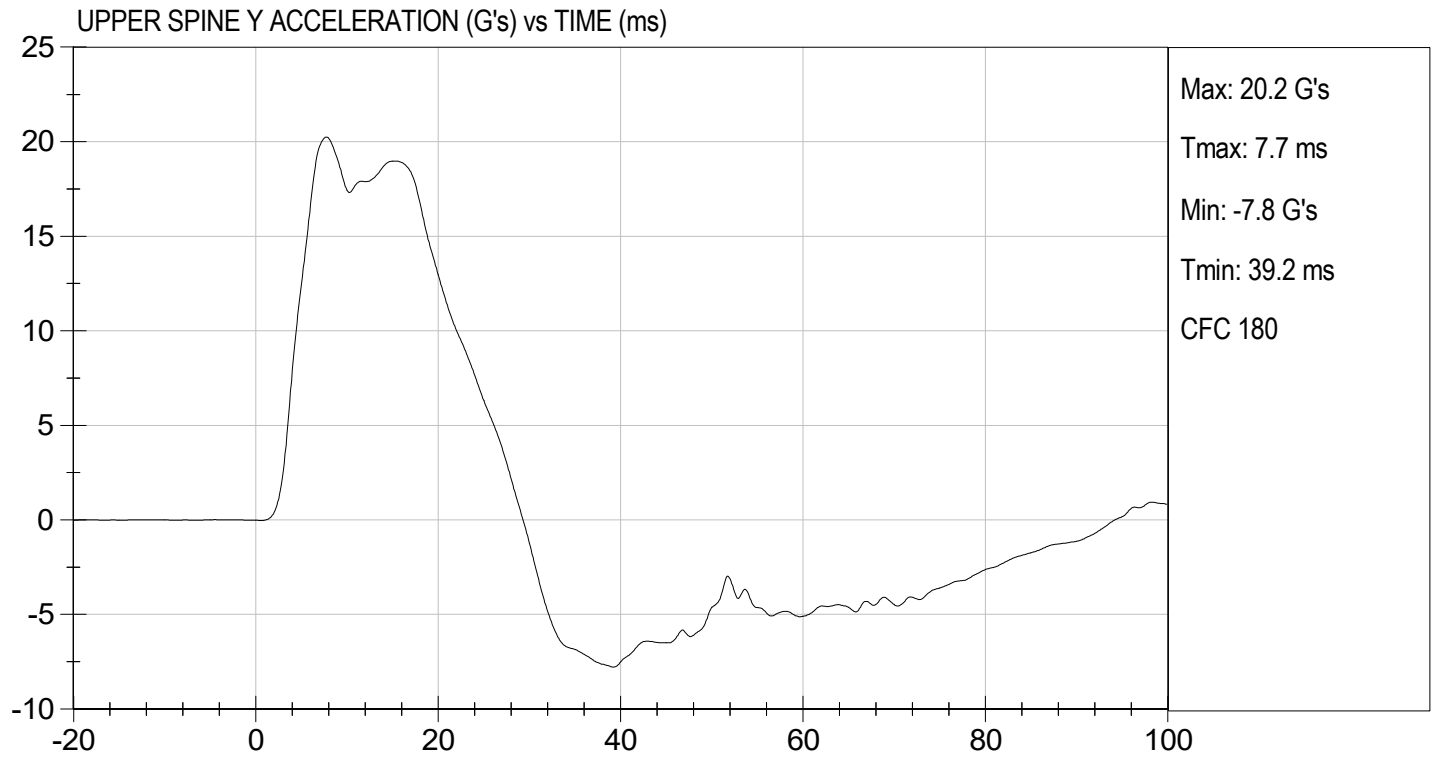
TEST DATE: 01/12/2024
TEST #: D240113





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

TEST DATE: 01/12/2024
TEST #: D240113



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

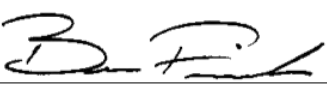
ATD Serial No: 296

Test I.D: D240114

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	26	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	36	Pass
Overall Test Results				Pass


Laboratory Technician

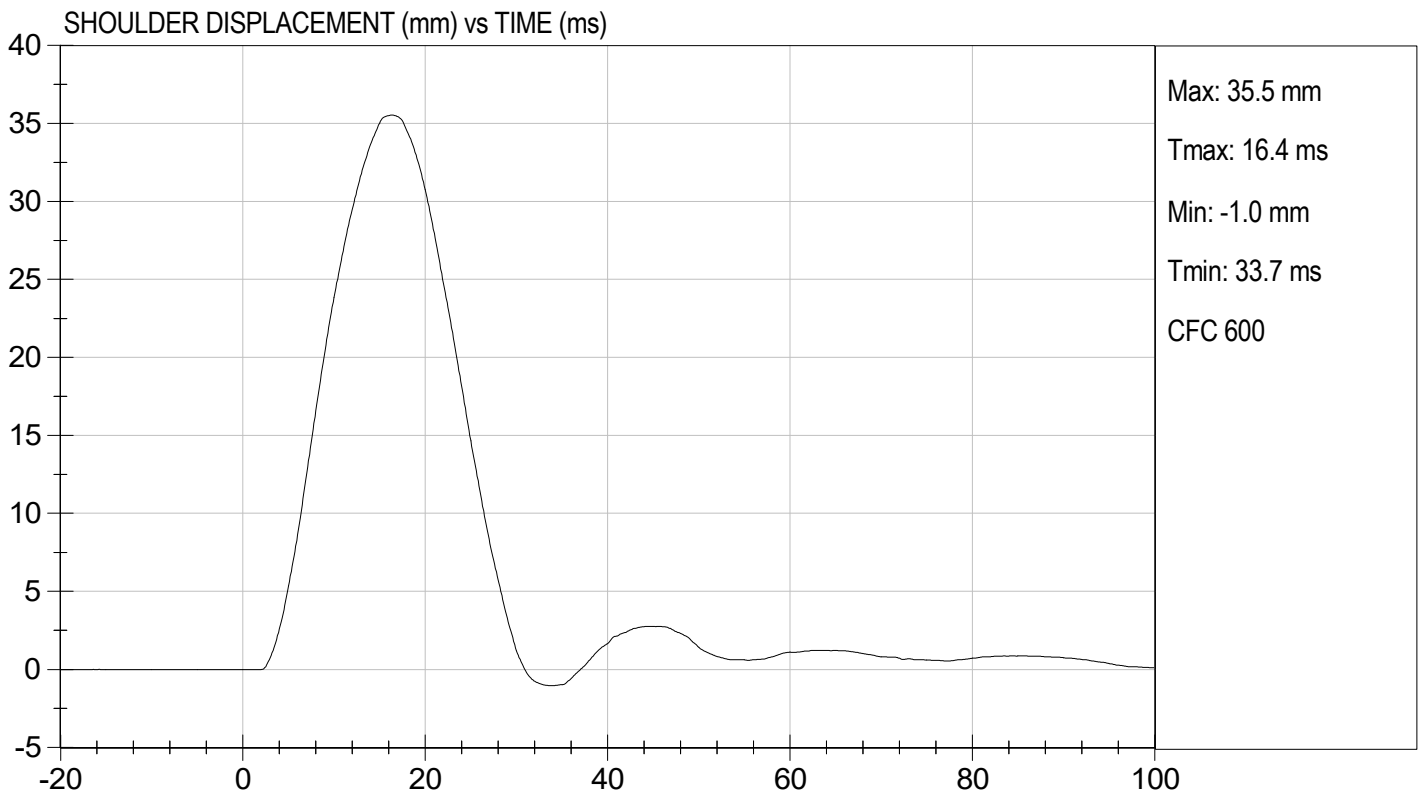
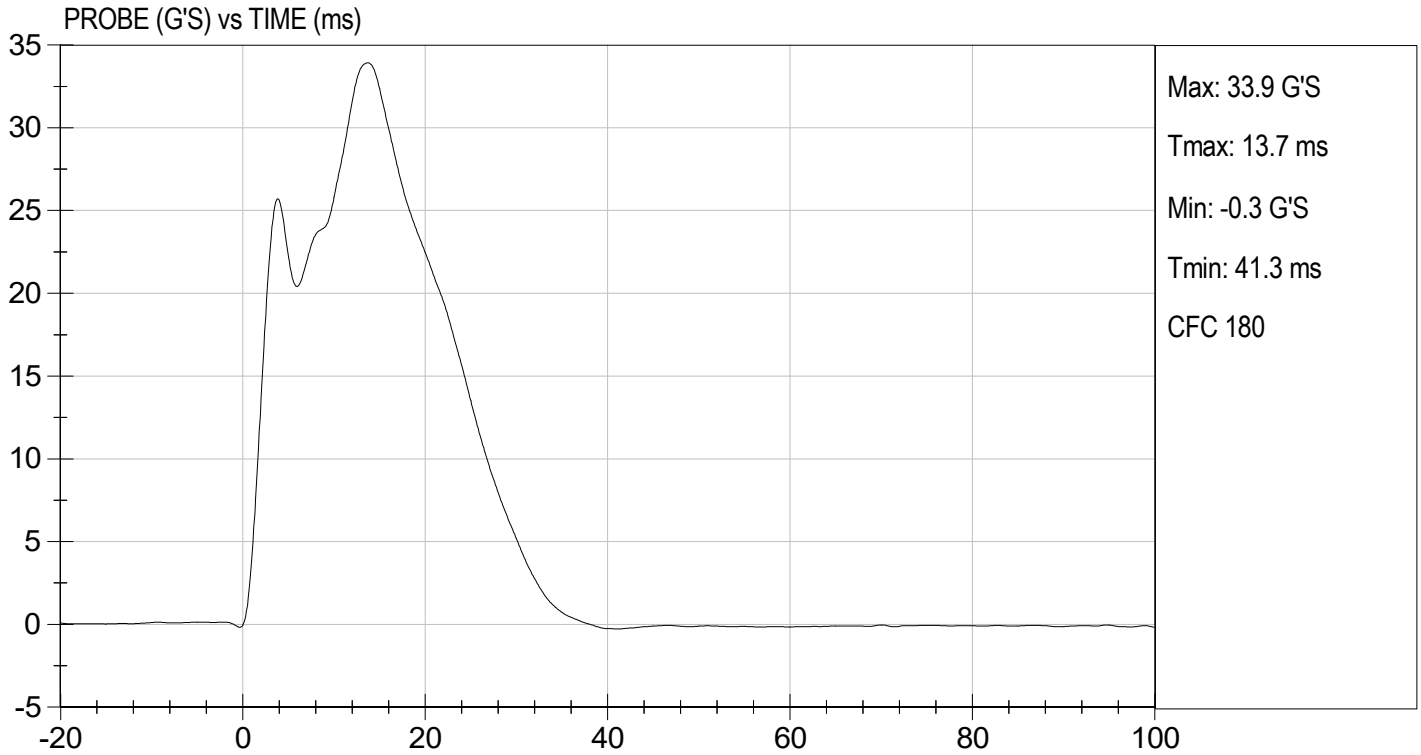
01/12/2024
Test Date


Approved By



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

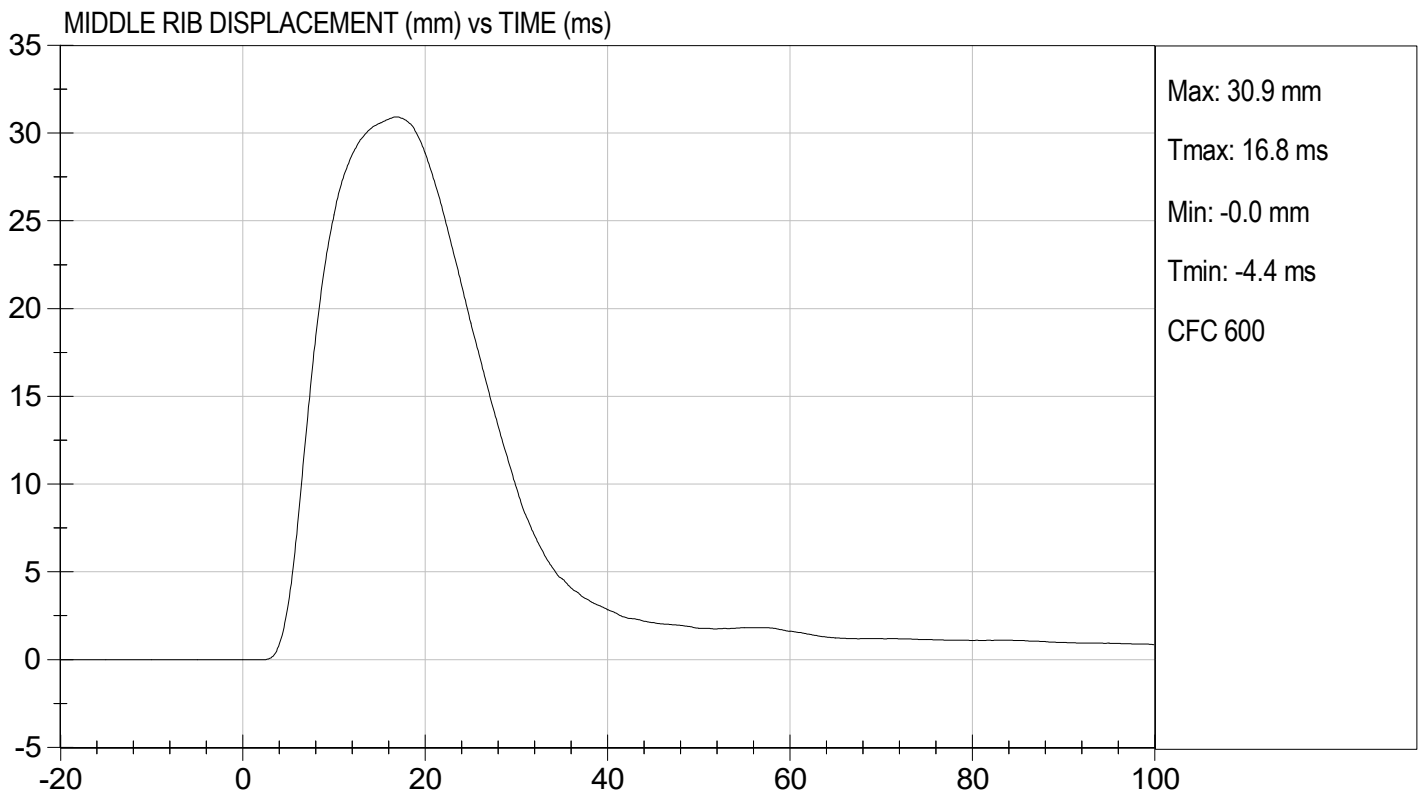
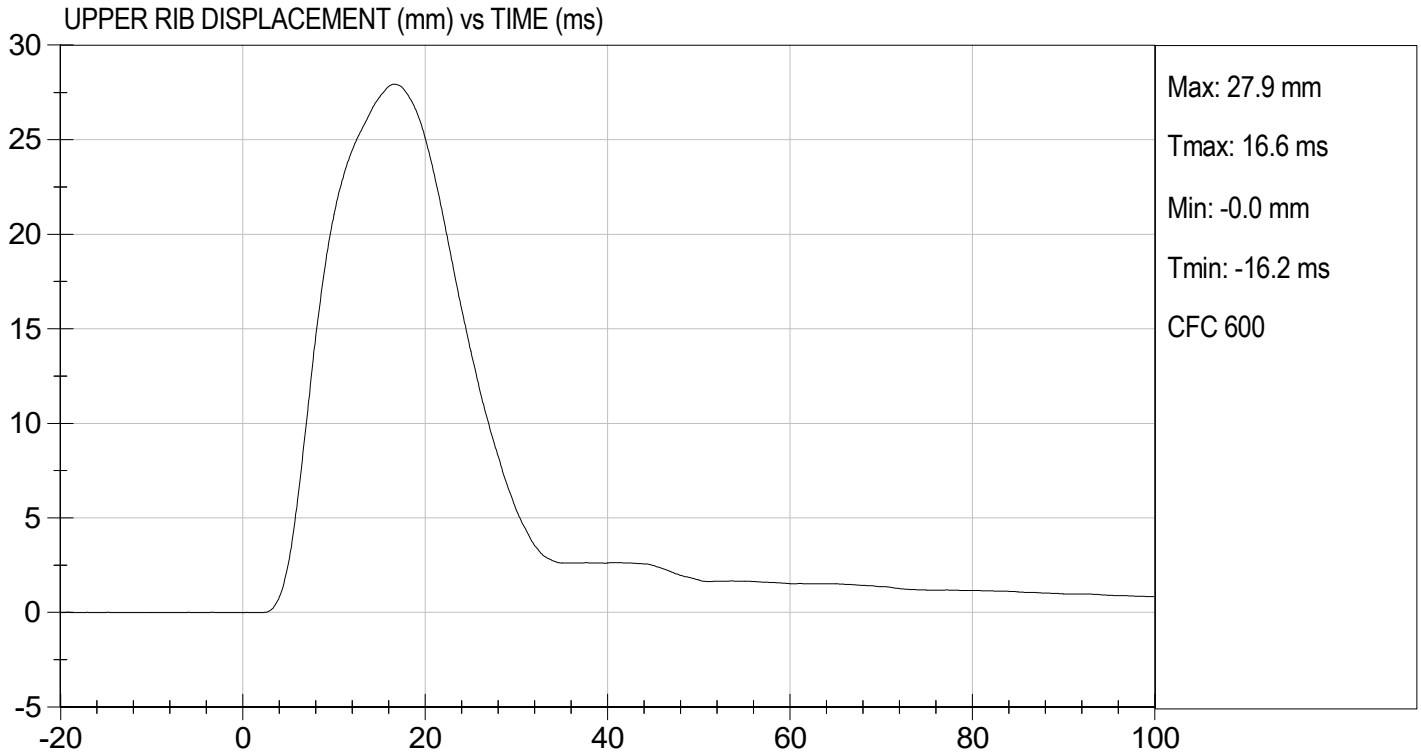
TEST DATE: 01/12/2024
TEST #: D240114





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

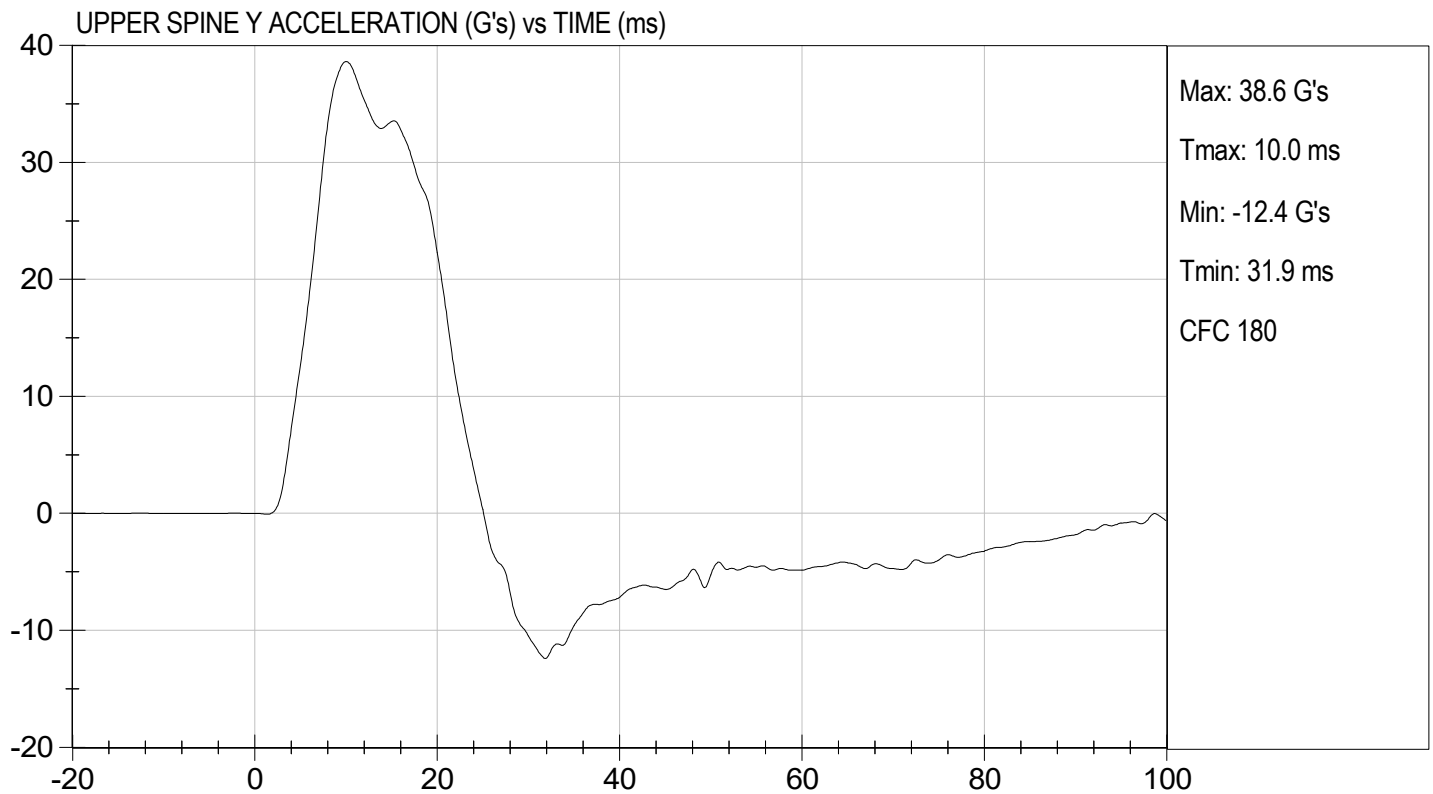
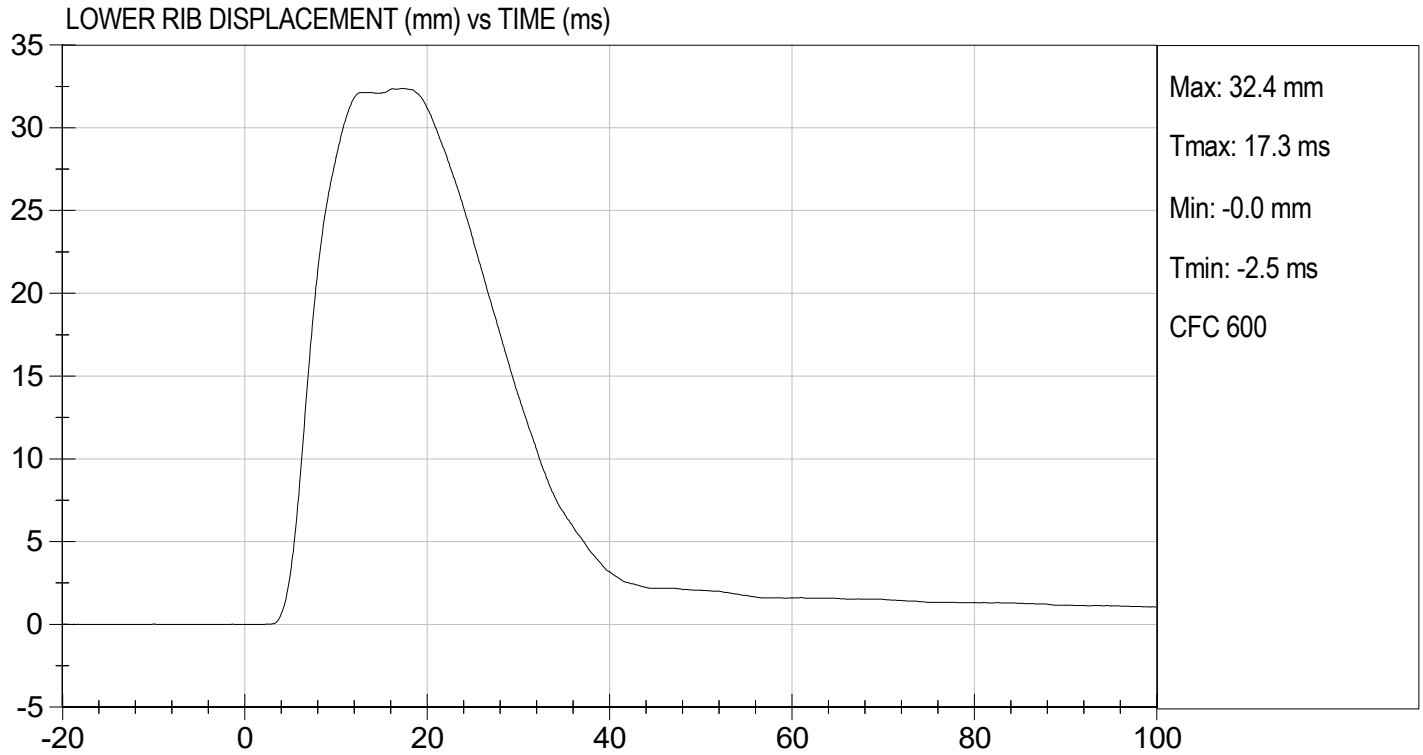
TEST DATE: 01/12/2024
TEST #: D240114





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

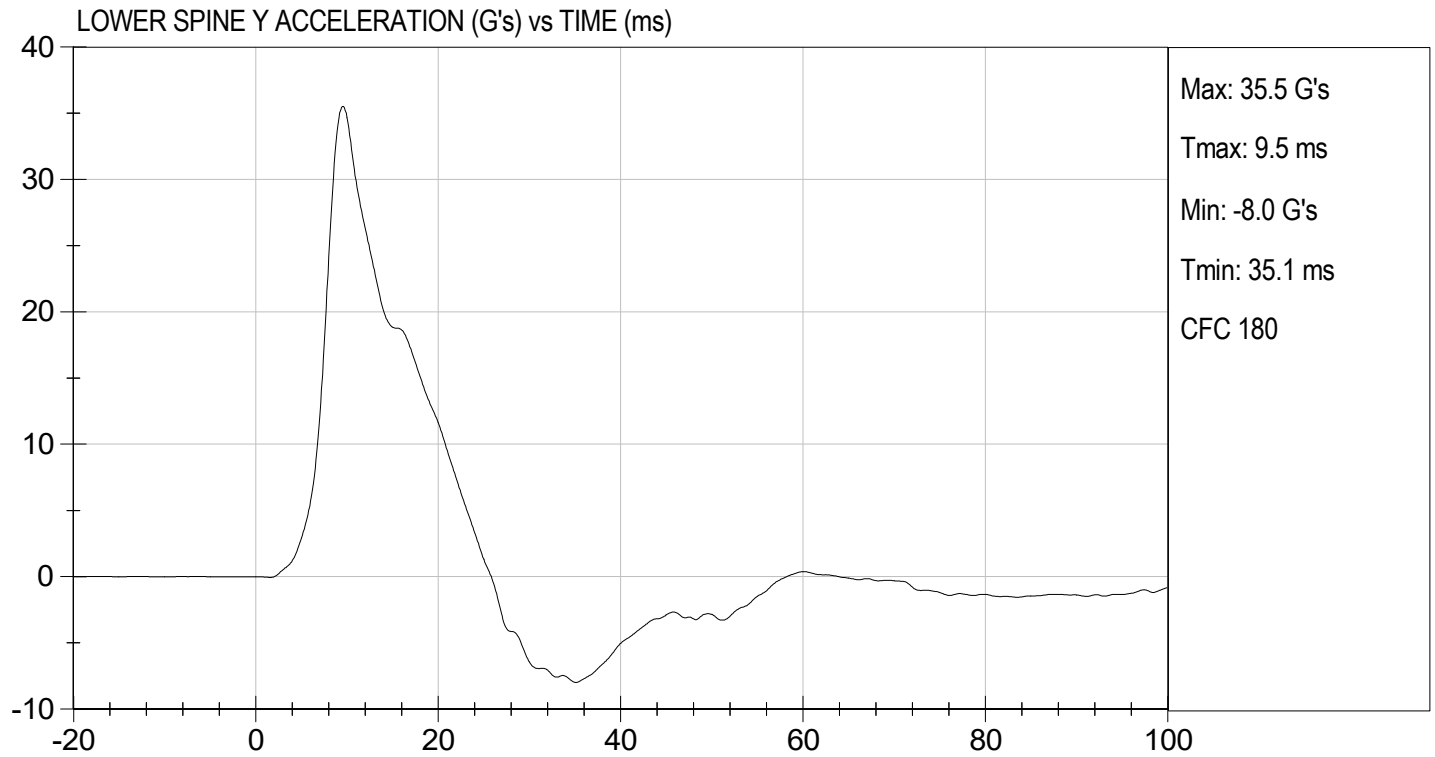
TEST DATE: 01/12/2024
TEST #: D240114





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

TEST DATE: 01/12/2024
TEST #: D240114



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

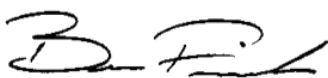
ATD Serial No: 296

Test I.D: D240115

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	27	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

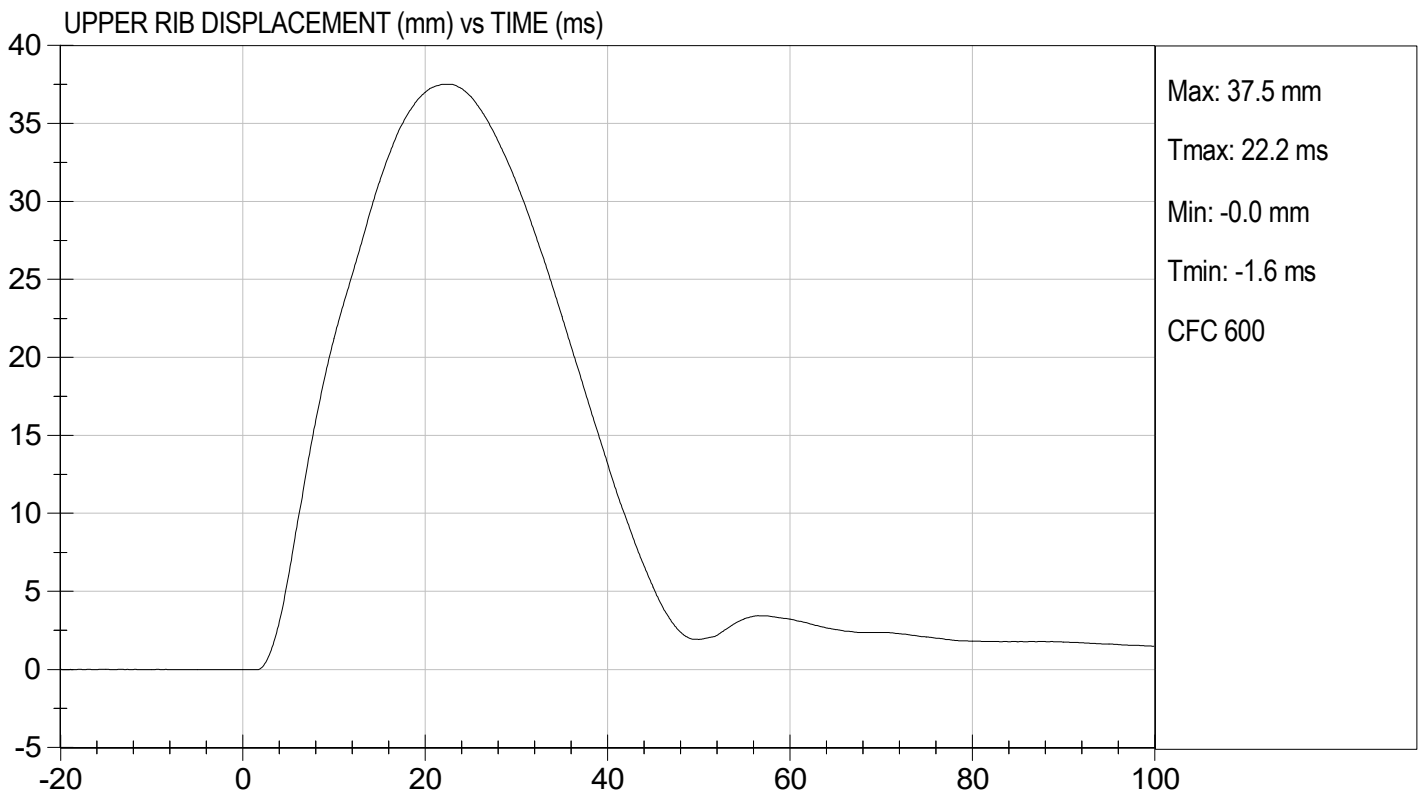
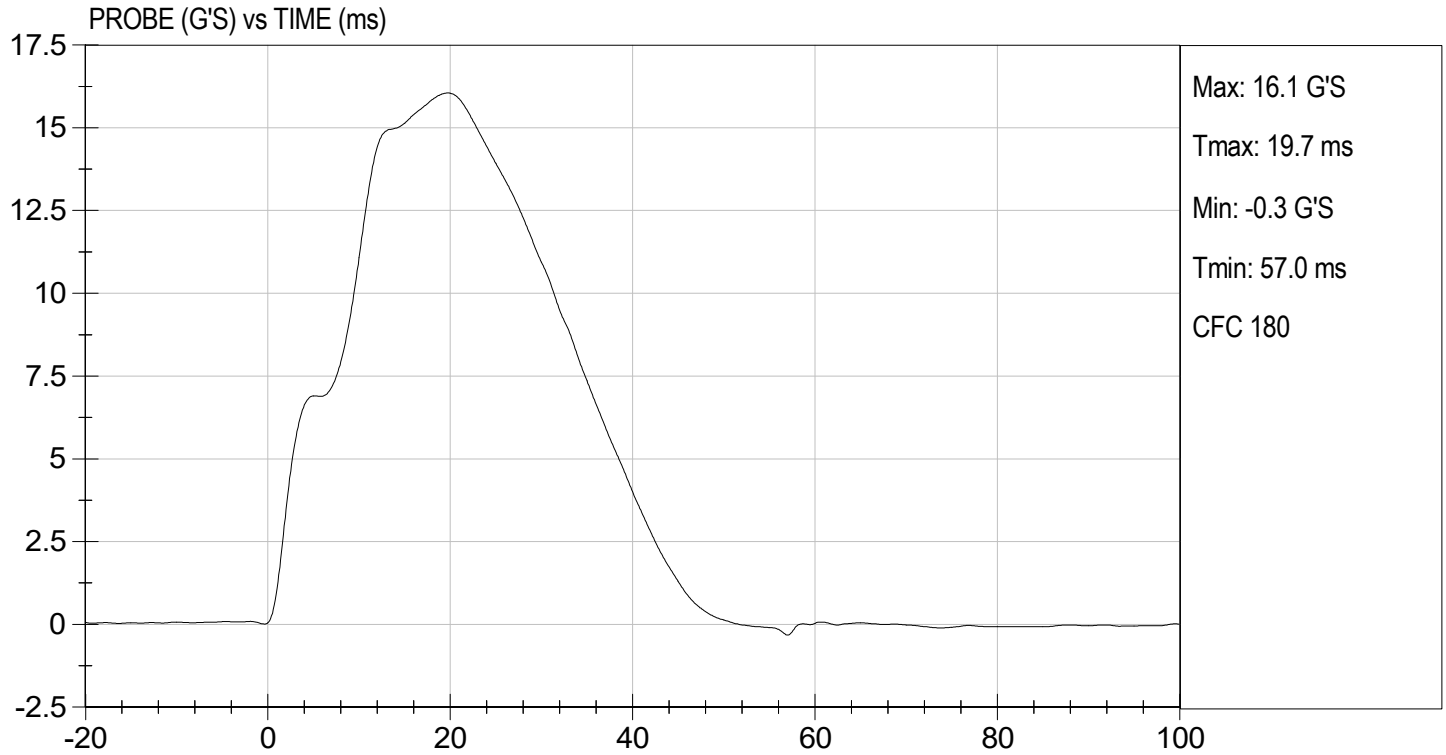
01/12/2024
Test Date


Approved By



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

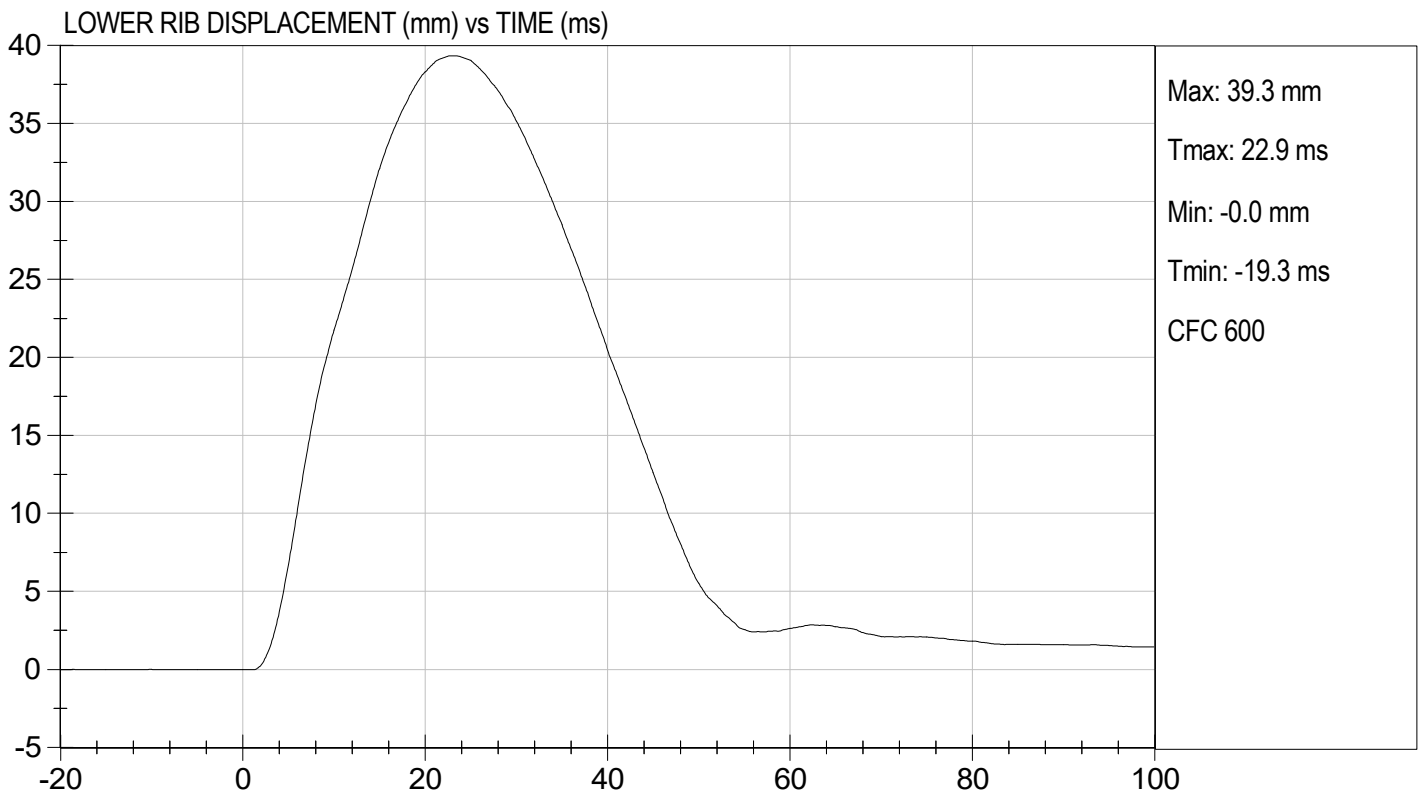
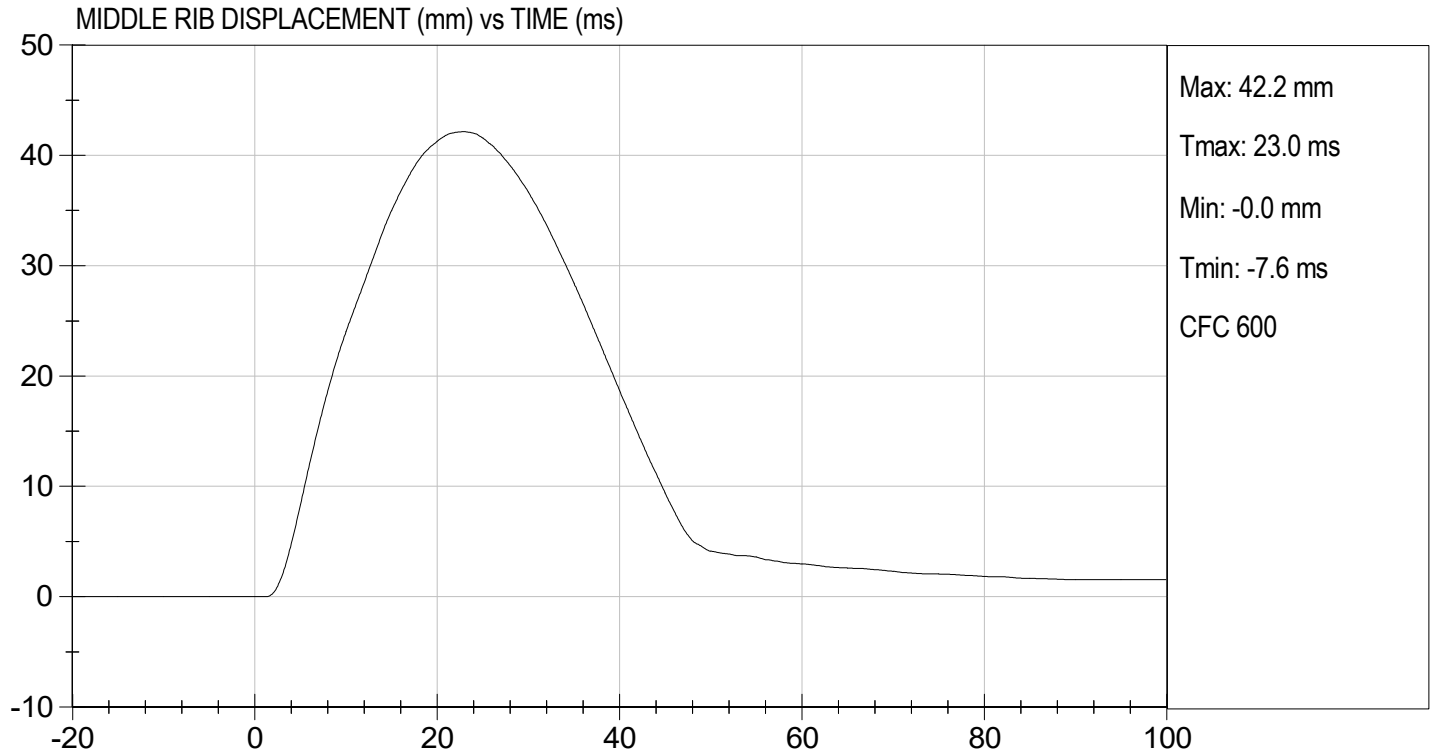
TEST DATE: 01/12/2024
TEST #: D240115





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

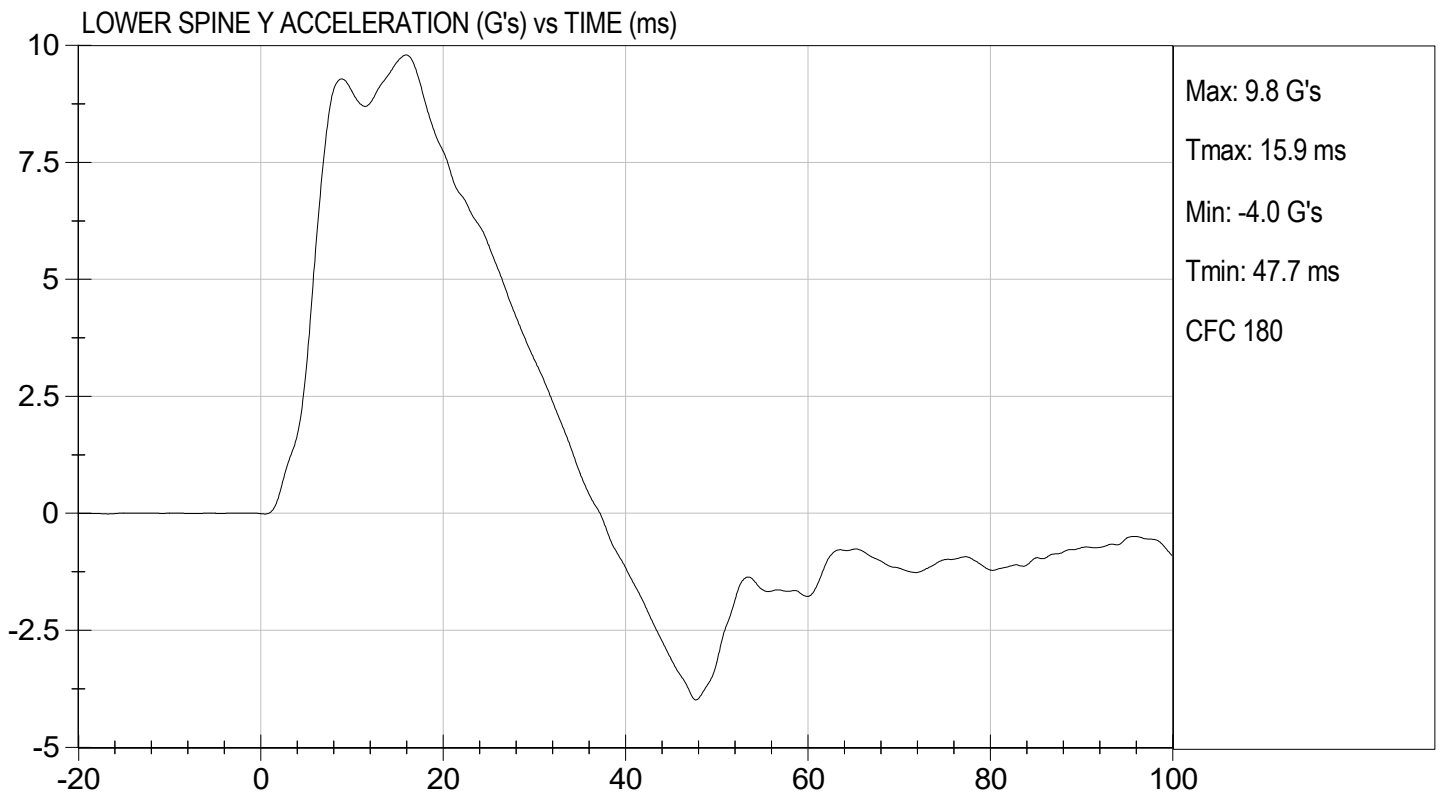
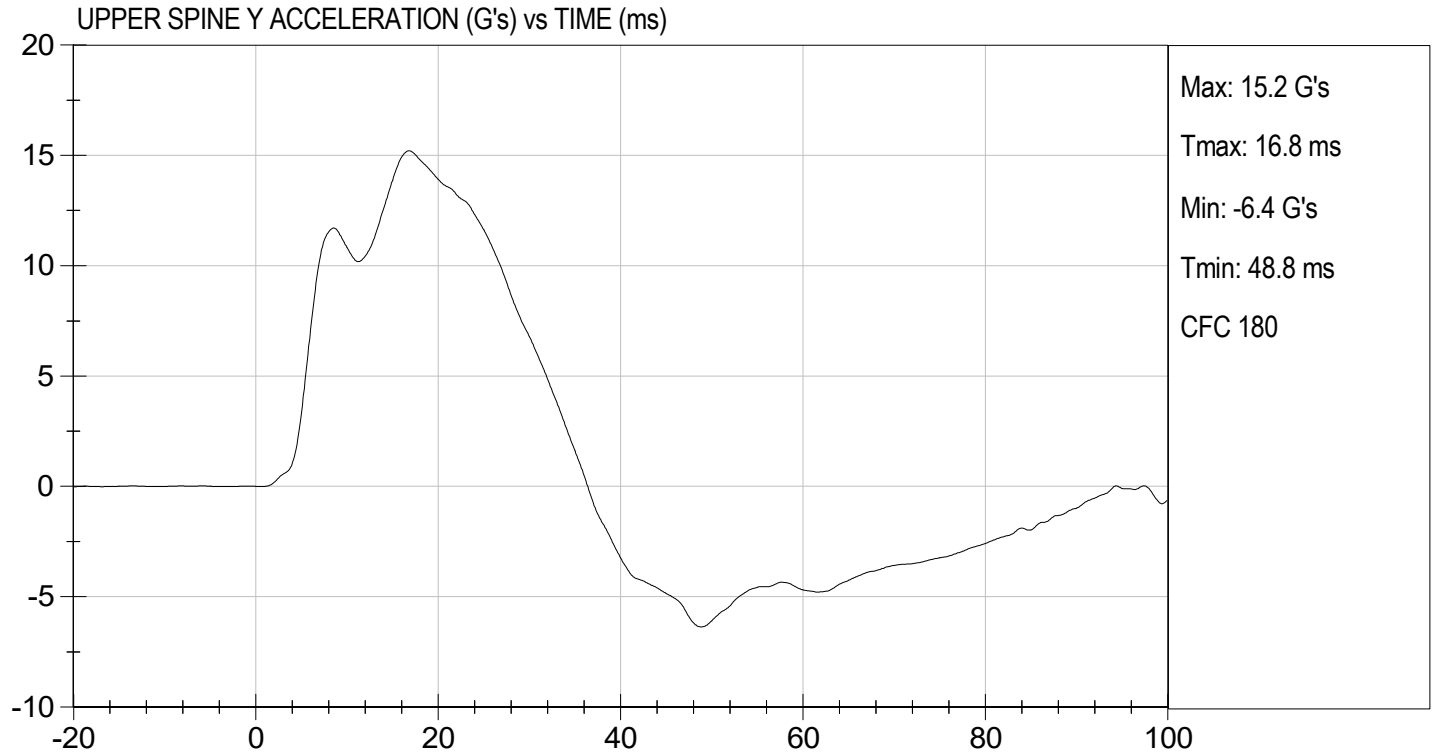
TEST DATE: 01/12/2024
TEST #: D240115





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

TEST DATE: 01/12/2024
TEST #: D240115



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

ATD Serial No: 296

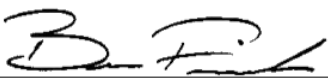
Test I.D: D240116

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	27	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	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	35	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

01/12/2024

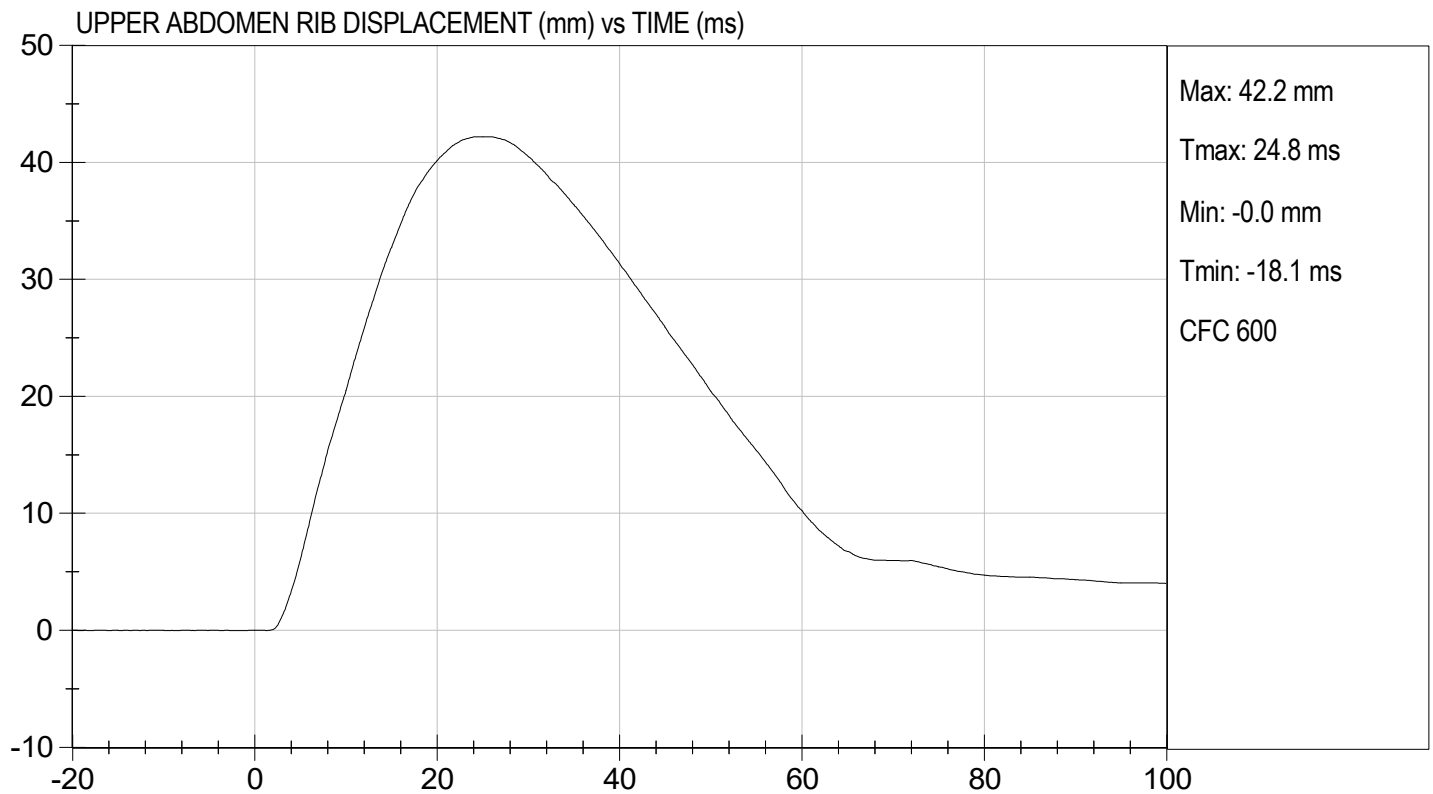
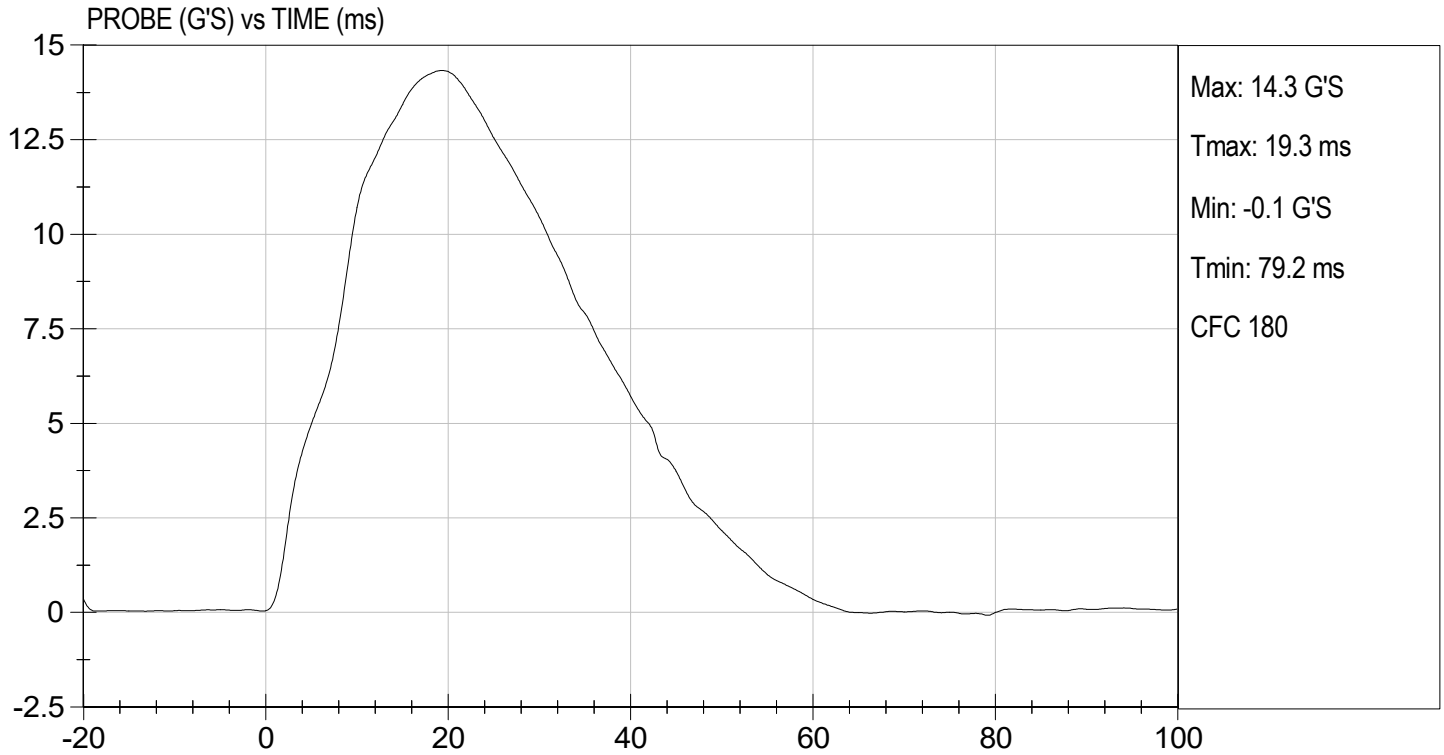
Test Date


Approved By



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

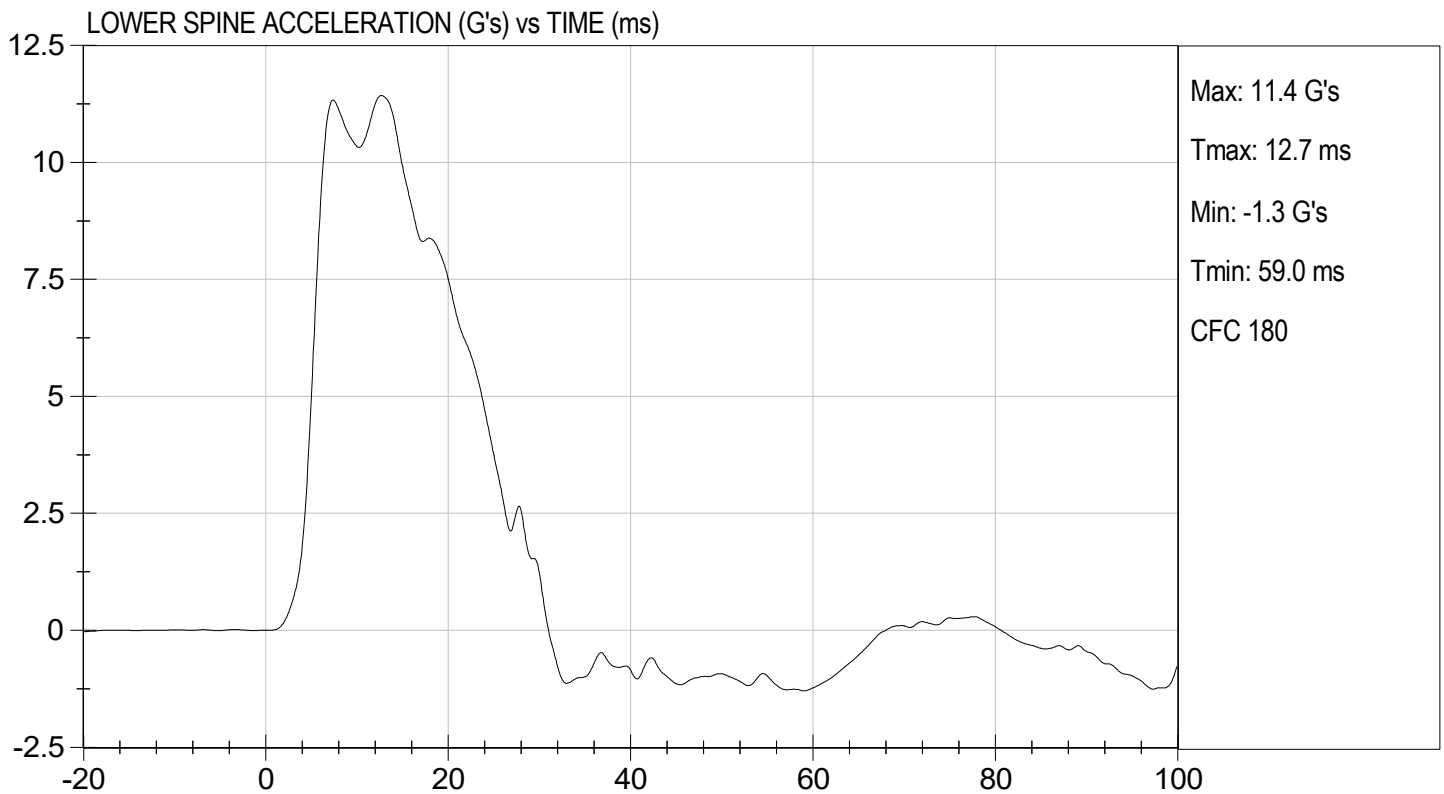
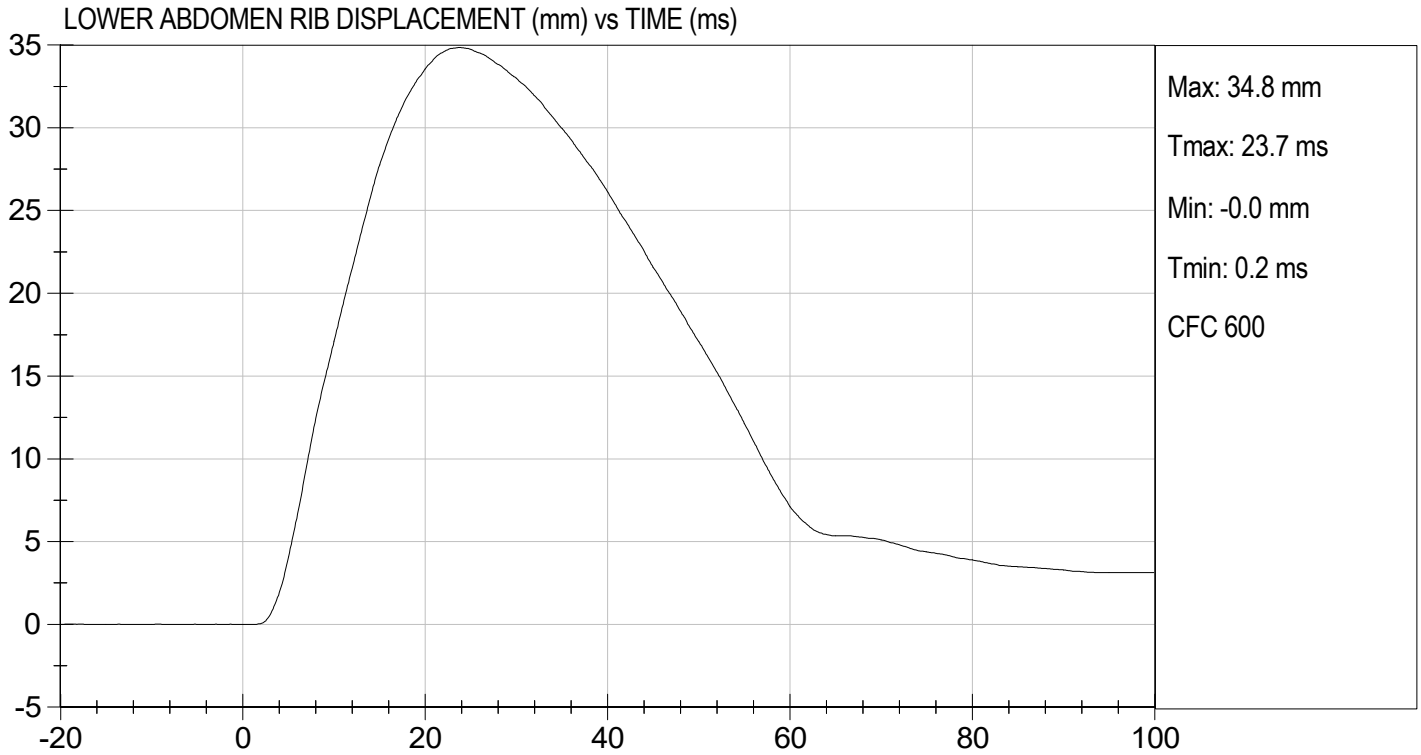
TEST DATE: 01/12/2024
TEST #: D240116





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

TEST DATE: 01/12/2024
TEST #: D240116



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

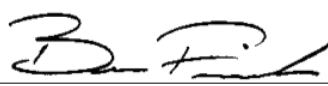
Test I.D: D240117

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	26	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	38.2	Pass
Peak Acetabulum Force	N	3600 to 4300	3,880	Pass
Overall Test Results				Pass


Laboratory Technician

01/12/2024

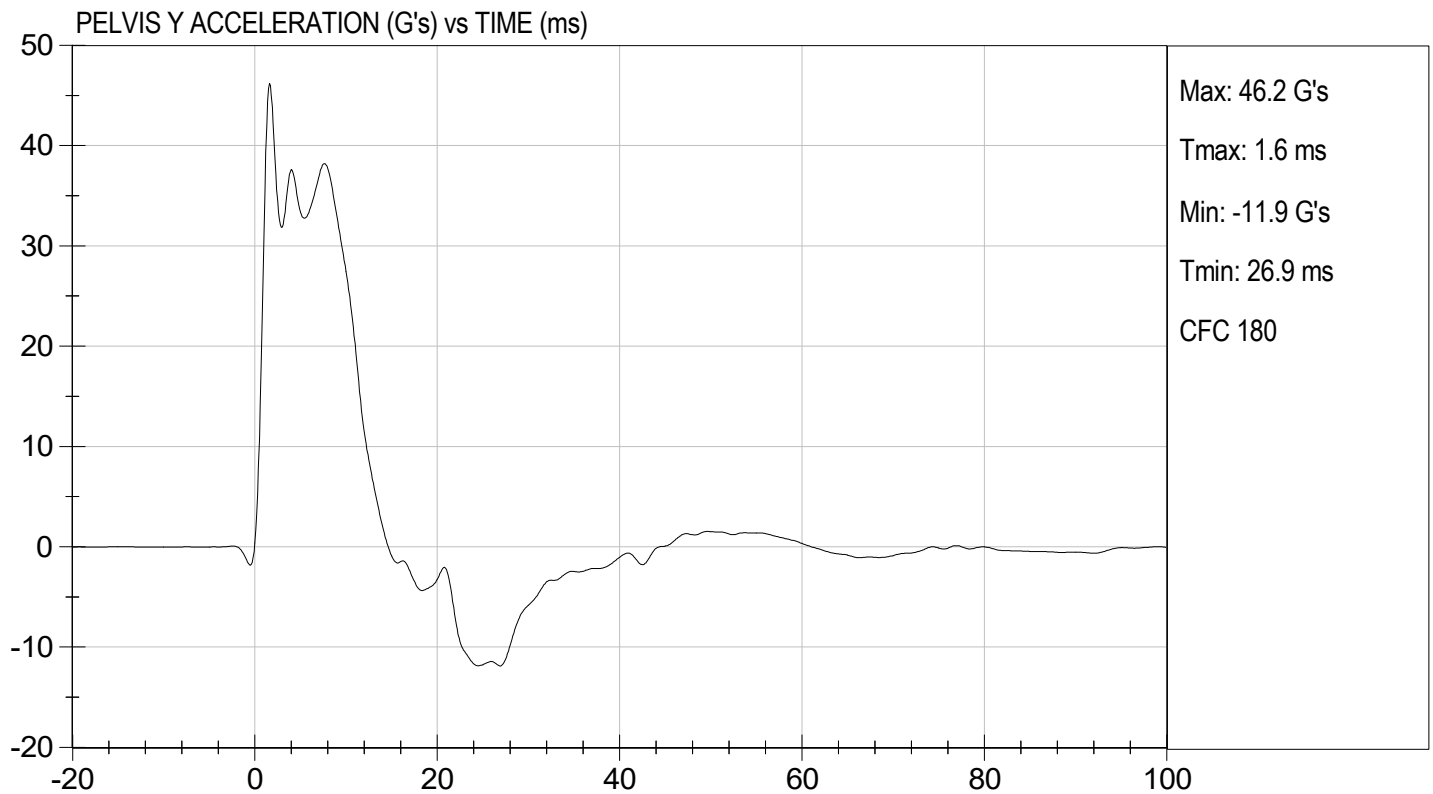
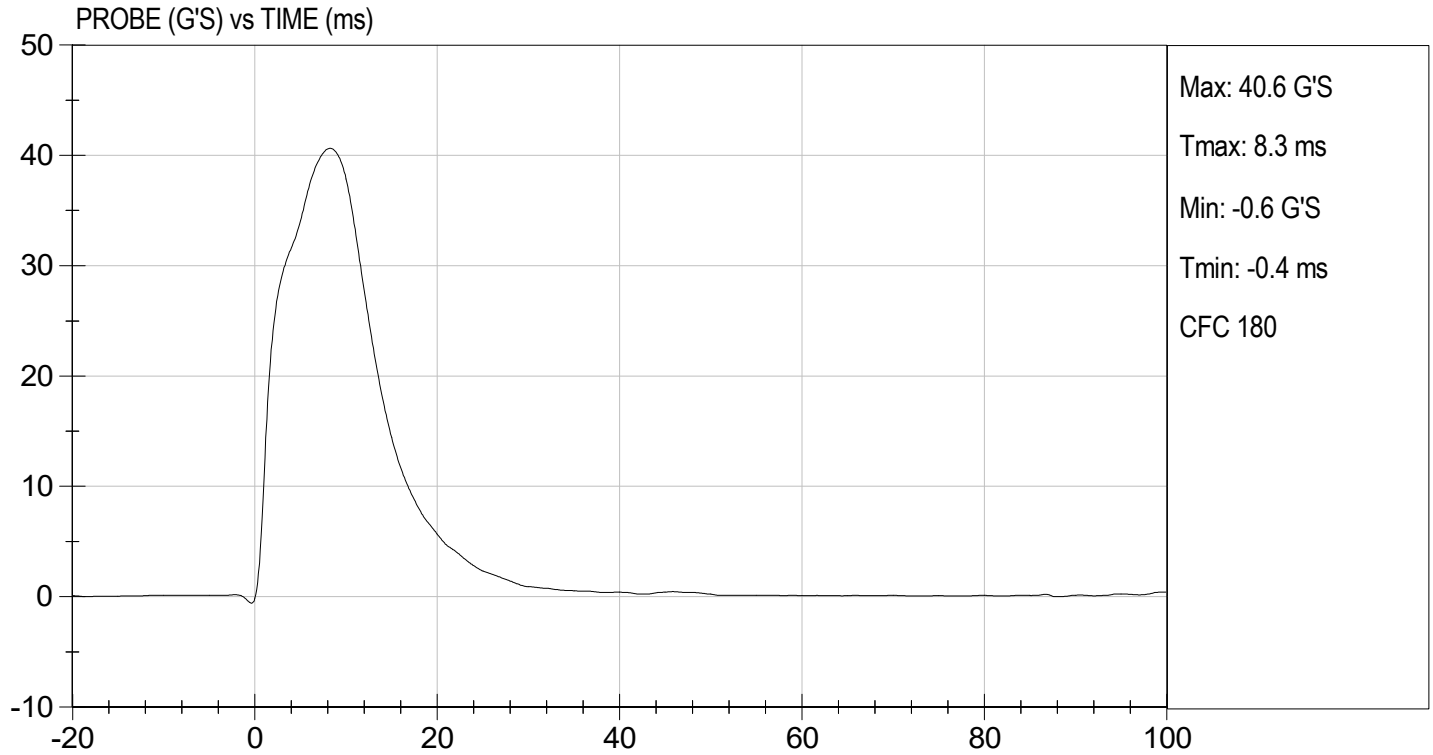
Test Date


Approved By



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

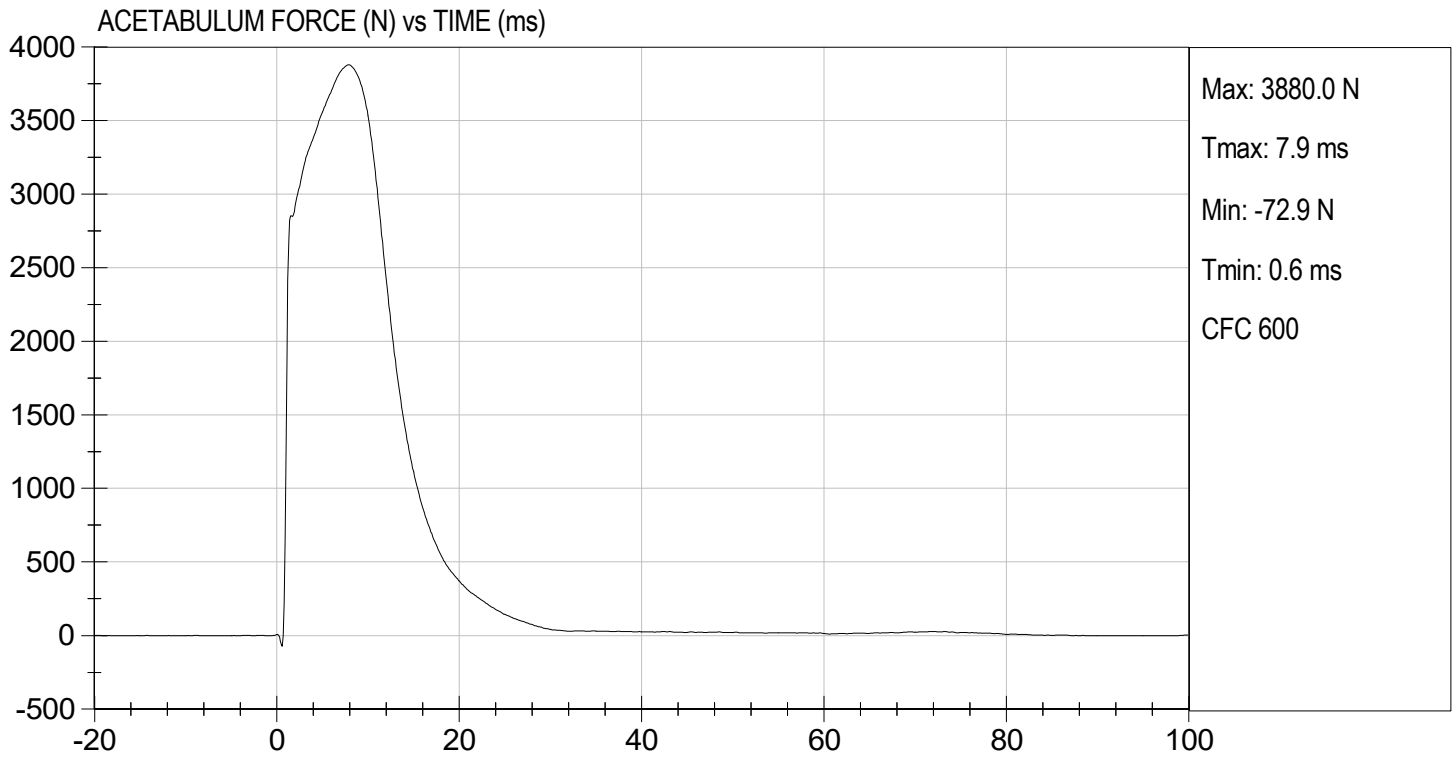
TEST DATE: 01/12/2024
TEST #: D240117





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

TEST DATE: 01/12/2024
TEST #: D240117



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

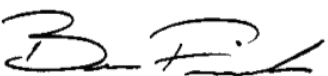
Test I.D: D240118

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	28	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	38	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,463	Pass
Overall Test Results				Pass


Laboratory Technician

01/12/2024

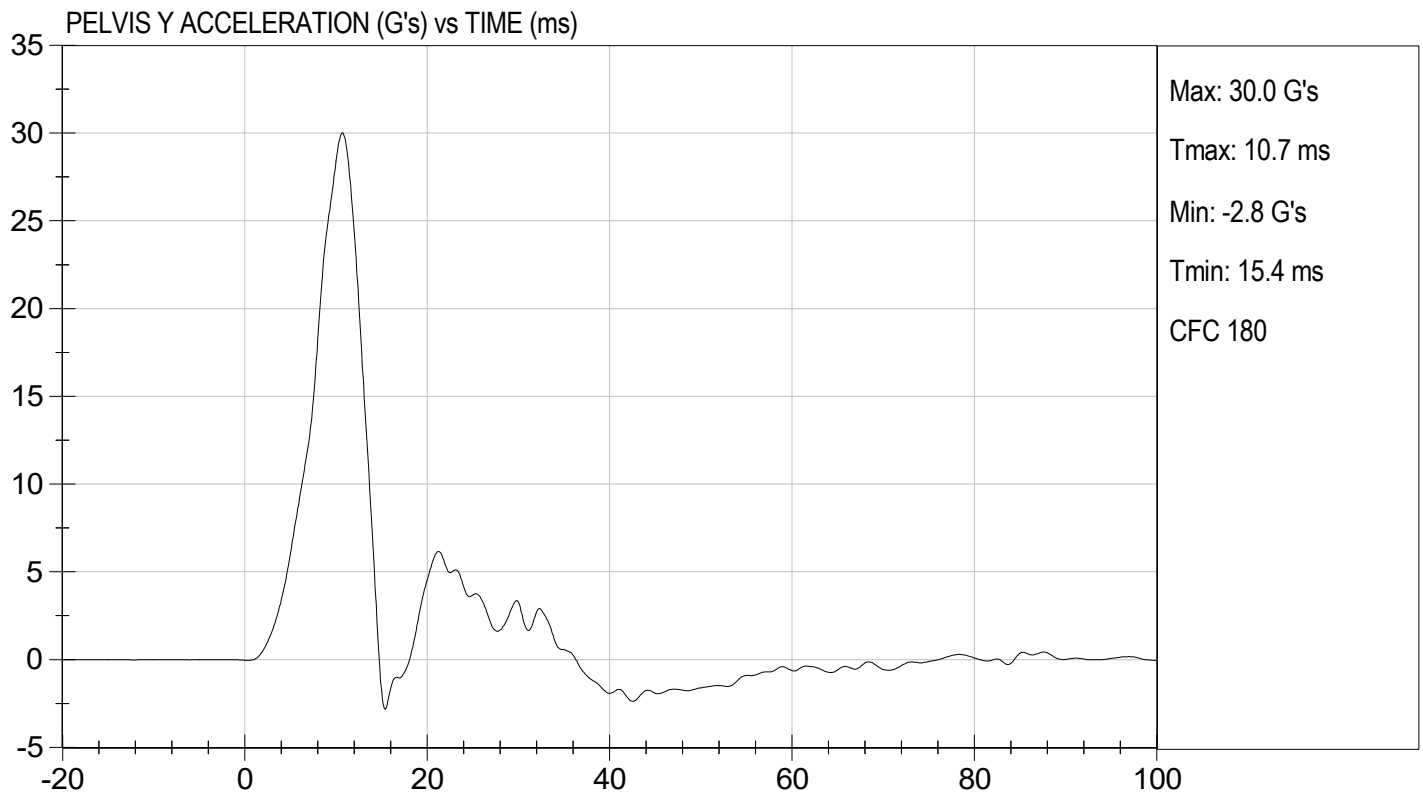
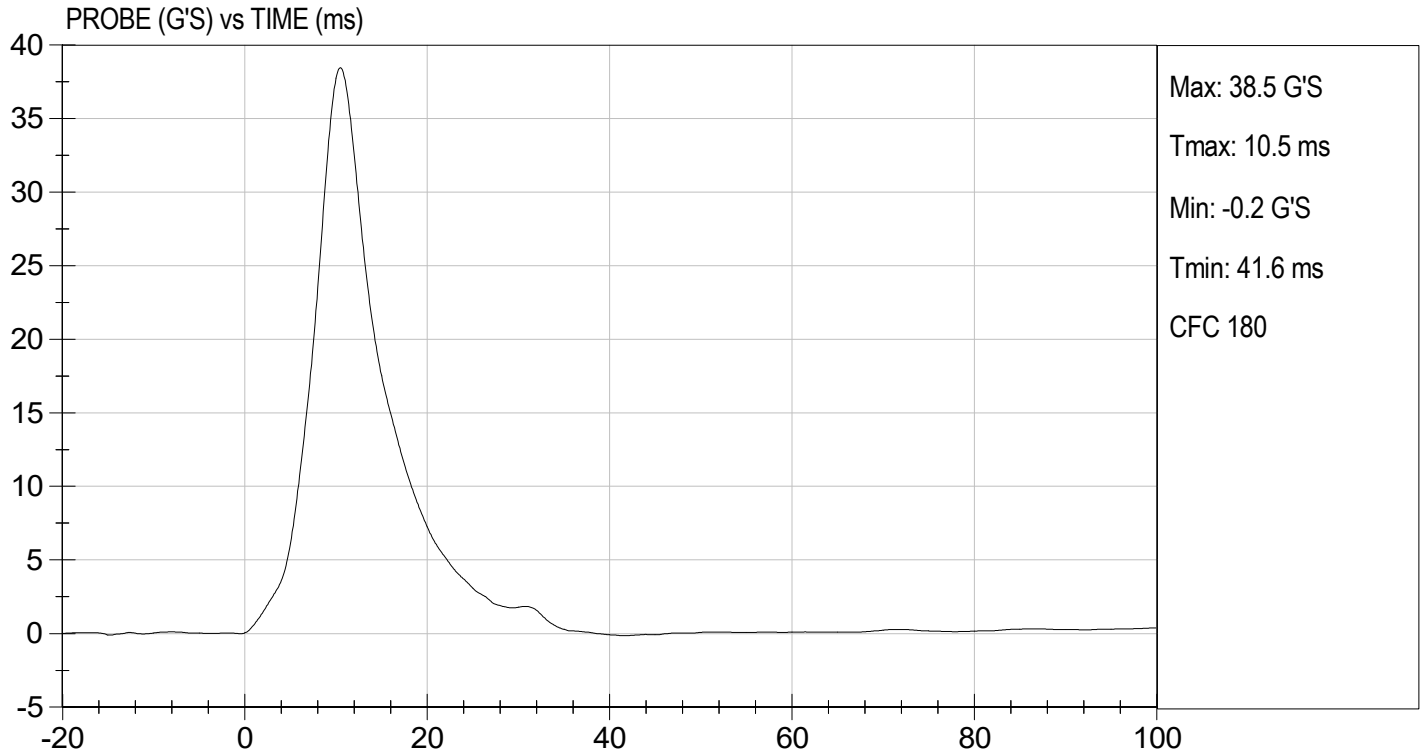
Test Date


Approved By



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

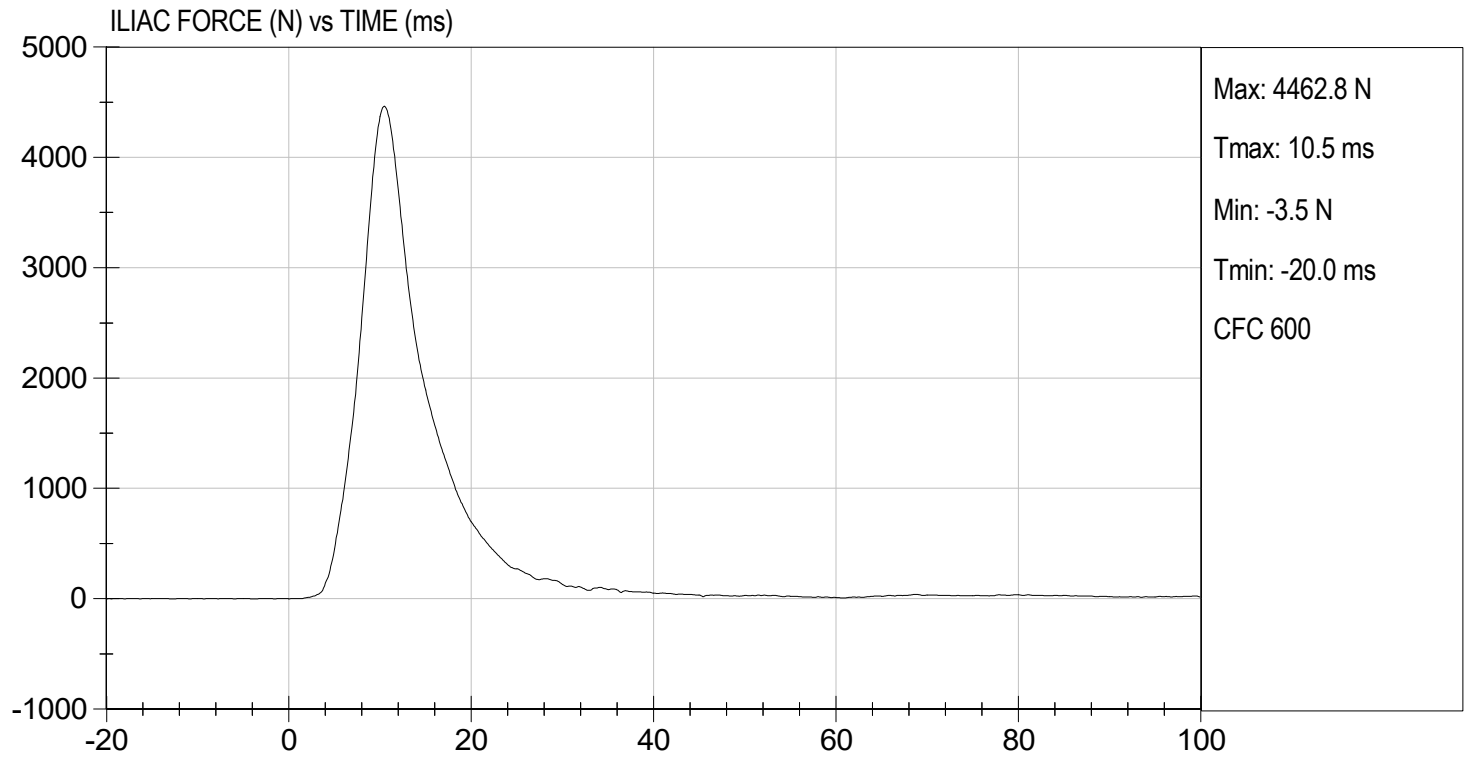
TEST DATE: 01/12/2024
TEST #: D240118





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

TEST DATE: 01/12/2024
TEST #: D240118





SID-IIs Pelvis Plug Certification Test

Plug S/N 14891

Test Number 17360

Report Number 17407

Test Date 1/31/2021 11:41:04 AM

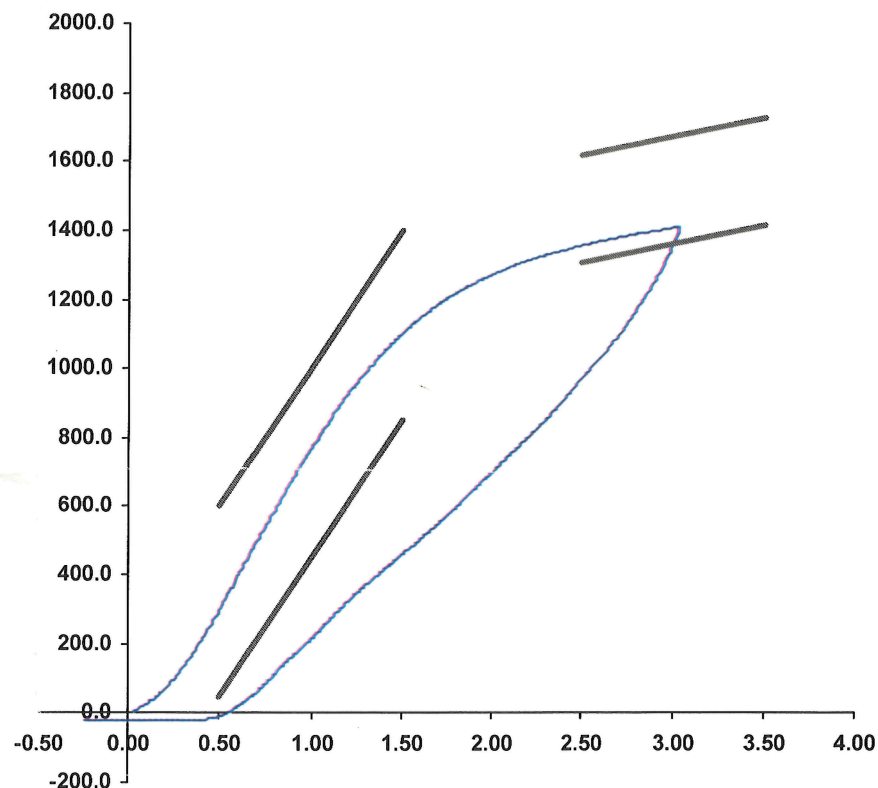
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	303	50	600
Force @ 1.5 mm (N)	1,103	850	1,400
Force @ 2.5 mm (N)	1,358	1,306	1,618
Force @ 3.0 mm (N)	1,410	1,361	1,673

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

31-Jan-21

By : DC

Date : 1/31/2021



SID-IIs Pelvis Plug Certification Test

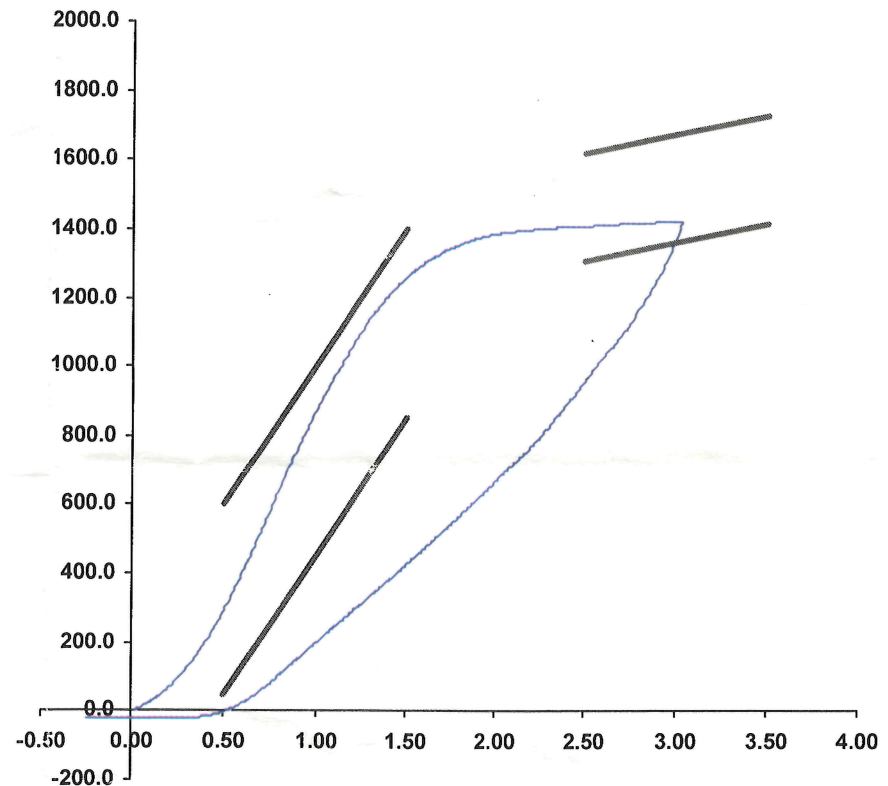
Plug S/N 14214

Test Number 14354

Report Number 14398

Test Date 7/3/2020 9:02:04 AM

Force (-N) vs Extension (-mm)



Test Results

Spec Min

Spec Max

Force @ 0.5 mm (N)	291.07	50.00	600.00
Force @ 1.5 mm (N)	1,255.98	850.00	1,400.00
Force @ 2.5 mm (N)	1,407.56	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,423.06	1,361.00	1,673.00

Testing Machine STM-20 5965542

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

Crosshead Speed (mm / min) or Rat 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator

Part Number 180-4450

Template No 107

03-Jul-20

SACO Research

By : DC

Date : 7/3/2020

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)					14891	SACO	01/31/2021
Pelvis Plug (non-struck side)					14214	SACO	07/03/2020

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	T39211	Endevco	10/31/2023
	Vehicle Center of Gravity	Y	T38285	Endevco	10/26/2023
	Vehicle Center of Gravity	Z	A390895	MSI	11/08/2023
2	Right Sill at Front Seat	X	T39329	Endevco	11/06/2023
	Right Sill at Front Seat	Y	T39242	Endevco	11/02/2023
	Right Sill at Front Seat	Z	T39055	Endevco	10/24/2023
3	Right Sill at Rear Seat	X	T39240	Endevco	11/02/2023
	Right Sill at Rear Seat	Y	T39251	Endevco	11/02/2023
	Right Sill at Rear Seat	Z	T39210	Endevco	10/31/2023
4	Left Sill at Front Door	Y	T32717	Endevco	12/15/2023
5	Left Sill at Rear Door	Y	T29894	Endevco	12/15/2023
6	Left A-Post Lower	Y	A383794	MSI	12/15/2023
7	Left A-Post Middle	Y	T37943	Endevco	10/26/2023
8	Left B-Post Lower	Y	T33465	Endevco	11/17/2023
9	Left B-Post Middle	Y	T33453	Endevco	11/17/2023
10	Front Seat Track	Y	T39039	Endevco	10/25/2023
11	Rear Seat Track or Structure	Y	T39057	Endevco	10/24/2023
12	Right Rear Occ. Compartment	Y	T39266	Endevco	11/06/2023
13	Engine Block	X	T34154	Endevco	12/15/2023
	Engine Block	Y	T33444	Endevco	12/15/2023
14	Rear Floorpan Above Axle	X	A383118	MSI	12/15/2023
	Rear Floorpan Above Axle	Y	T29884	Endevco	06/08/2023
	Rear Floorpan Above Axle	Z	T34161	Endevco	12/15/2023

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