REPORT NUMBER: SideNCAPPole-MGA-24-004

NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test

MAZDA MOTOR CORPORATION
2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV
NHTSA No.: O20245404

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: December 13, 2023

Final Report Date: October 28, 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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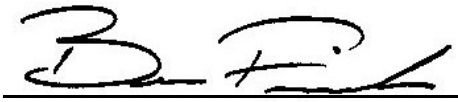
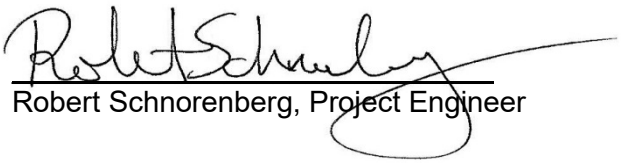
Prepared by: 
Ben Fischer, Program Manager

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: October 28, 2024

FINAL REPORT ACCEPTANCE BY OCWS:

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

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

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SideNCAPPole-MGA-24-004		

4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing and FMVSS No. 305 Indicant Testing of a 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV, NHTSA No.: O20245404	**5. Report Date** October 28, 2024
	6. Performing Organization Code MGA
7. Author(s) Ben Fischer, Program Manager	**8. Performing Organization Report No.** SideNCAPPole-MGA-24-004
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105	**10. Work Unit No.**
	11. Contract or Grant No. 693JJ920D000017
12. Sponsoring Agency Name and Address United States Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards Mail Code: NRM-100 1200 New Jersey Ave, SE Washington, DC 20590	**13. Type of Report and Period Covered:** Final Test Report December 13, 2023 to October 28, 2024
	14. Sponsoring Agency Code NRM-100

15. Supplementary Notes

16. Abstract

A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on December 13, 2023.

The impact velocity was 32.22 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.1°C. The test vehicle post-test maximum crush was 313 mm at level 1. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	409.656
Resultant Lower Spine Acceleration	g	82	30.921
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1952.295
Maximum Thoracic Rib Deflection	mm	38*	23.475
Maximum Abdomen Rib Deflection	mm	45*	19.724

*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.

17. Key Words	18. Distribution Statement
New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs	Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590

19. Security Classification of Report	20. Security Classification of Page	21. No. of Pages	22. Price
Unclassified	Unclassified	176	

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This side pole impact test is part of the MY 2024 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000017. The purpose of this test is to generate comparative side impact performance in a 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SUMMARY

A rigid pole side impact test was conducted on a 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.22 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on December 13, 2023. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in this report.

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

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

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

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

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

Measurement Description	Units	Driver ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	409.656
Resultant Lower Spine Acceleration	g	82	30.921
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1952.295
Maximum Thoracic Rib Deflection	mm	38*	23.475
Maximum Abdomen Rib Deflection	mm	45*	19.724

*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	Yes	Yes
Side Airbag (Other)				
Seat Belt Pretensioner	Yes	Yes	Yes	No
Seat Belt Load Limiter	Yes		Yes	
Other:	No		No	

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

GENERAL COMMENTS

Photo No 305-01, 305-02, 305-05, 305-06, 305-07, 305-08, 305-09, 305-16, 305-18, 305-20, 305-22, and 305-23 are missing test identification label (NHTSA #O20245404).

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20245404	Traction Control System (TCS)	Yes
Model Year	2024	Auto-Leveling System	No
Make	Mazda	Automatic Door Locks (ADL)	Yes
Model	CX-90 PHEV Premium Plus	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	No
VIN	JM3KKEHA8R1123816	Driver Front Airbag	Yes
Body Color	Artisan Red Premium	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	134 km / 83 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.5 L	Driver Torso Airbag	No
Type/No. Cylinders	Inline 4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	AWD	Rear Pass. Torso Airbag	No
Roof Rack	Yes	Rear Pass. Torso/Pelvis Airbag	Yes
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	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

Does owner's manual provide instruction to turn off automatic door locks?	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	MAZDA MOTOR CORPORATION
Date of Manufacture	07/23
Vehicle Type	MPV

GVWR (kg)	3109
GAWR Front (kg)	1313
GAWR Rear (kg)	1797

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	2	3	7	
Capacity Weight (VCW) (kg)				539	(A)
DSC x 68 kg				476	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				63	(A-B)

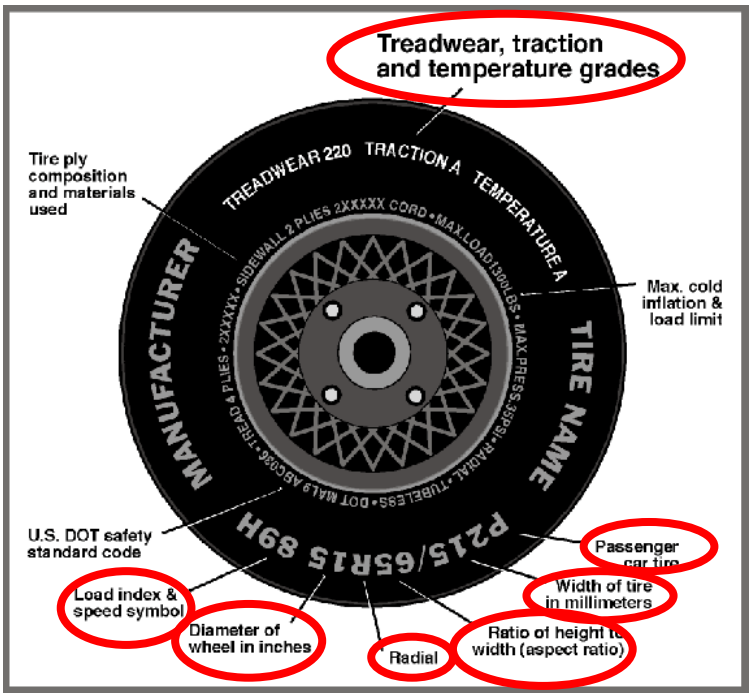
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable w/ Lever	Adjustable 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: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	250	270
Recommended Tire Size	275/45R21	275/45R21
Tire Size on Vehicle	275/45R21	275/45R21
Tire Manufacturer	Falken	Falken
Tire Model	Ziex	Ziex
Treadwear	800	800
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	110W	110W
Tire Material	Rubber	Rubber
DOT Safety Code Left	1V4V6 AMAR 2823	1V4V6 AMAR 2823
DOT Safety Code Right	1V4V6 AMAR 2823	1V4V6 AMAR 2823

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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	250	250	250	250
Tire Placard	kPa	250	250	270	270
Owner's Manual	kPa	250	250	270	270
As Tested	kPa	250	250	270	270

TEST AXLE VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	590.0	601.5		611.5	642.5		603.5	660.0	
Right	kg	563.5	622.0		578.5	653.0		563.0	665.5	
Ratio	%	48.5%	51.5%		47.9%	52.1%		46.8%	53.2%	
Totals	kg	1153.5	1223.5	2377.0	1190.0	1295.5	2485.5	1166.5	1325.5	2492.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2377.0	(A)
Actual Weight of 1 P572 ATD (SID-IIs) Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	63	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2492.0	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement
Driver Door Sill Angle (front-to-back)*	deg	0.4	0.5	0.5	Yes
Front Pass. Door Sill Angle (front-to-back)*	deg	0.5	0.7	0.8	Yes
Front Bumper Angle (left-to-right)**	deg	0.0	-0.1	-0.1	Yes
Rear Bumper Angle (left-to-right)**	deg	-0.3	-0.3	-0.3	Yes
Vehicle CG (Aft of Front Axle)	mm	1604	1624	1657	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	2	8	12	

* ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements.

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	23
Components Removed: none	kg	

Test height adjustable suspension setting, if applicable:	Not Applicable

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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

TEST SURFACE MARKINGS

	Distance from 75° Impact Location Line (mm)
Fore 25 mm Target	982
Aft 25 mm Target	975

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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	19.8	11.6	15.7
Front Passenger Seat	20.4	12.8	16.6
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 SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	15.7	25	Max	50	50	50
			Mid	25	25	25
			Min	0	0	0
Front Passenger Seat	16.6	22	Max	43	43	43
			Mid	22	22	22
			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

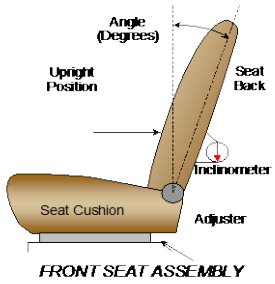
Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1st as 1)	mm	Detent (1st as 0)
Driver Seat	255		0	
Front Passenger Seat	216		0	
Front Center Seat				
Struck Side Rear Seat	120	13	120	12
Non-Struck Side Rear Seat	120	13	120	12
Rear Center Seat				

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1st as 1)	Degrees	Detent (1st as 0)
Driver Seat	82.6		-3.2	
Front Passenger Seat	81.7		-3.2	
Front Center Seat				
Struck Side Rear Seat	17.9	10	2.1	0
Non-Struck Side Rear Seat	17.9	10	2.1	0
Rear Center Seat				

All seat back angles measured on outboard headrest post.

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

HEAD RESTRAINT ADJUSTMENT

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

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

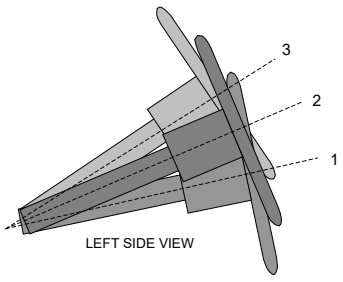
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

STEERING COLUMN ADJUSTMENT

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

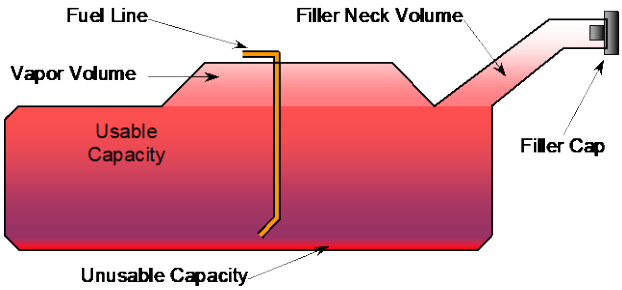
	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	68.0	
Geometric Center, Position 2	65.8	
Uppermost, Position 3	63.5	
Telescoping Steering Wheel Travel		70
Test Position	65.8	35



STEERING COLUMN ASSEMBLY

FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump operates during engine running and cranking. The filler neck is located on the driver's side.



VEHICLE FUEL TANK ASSEMBLY

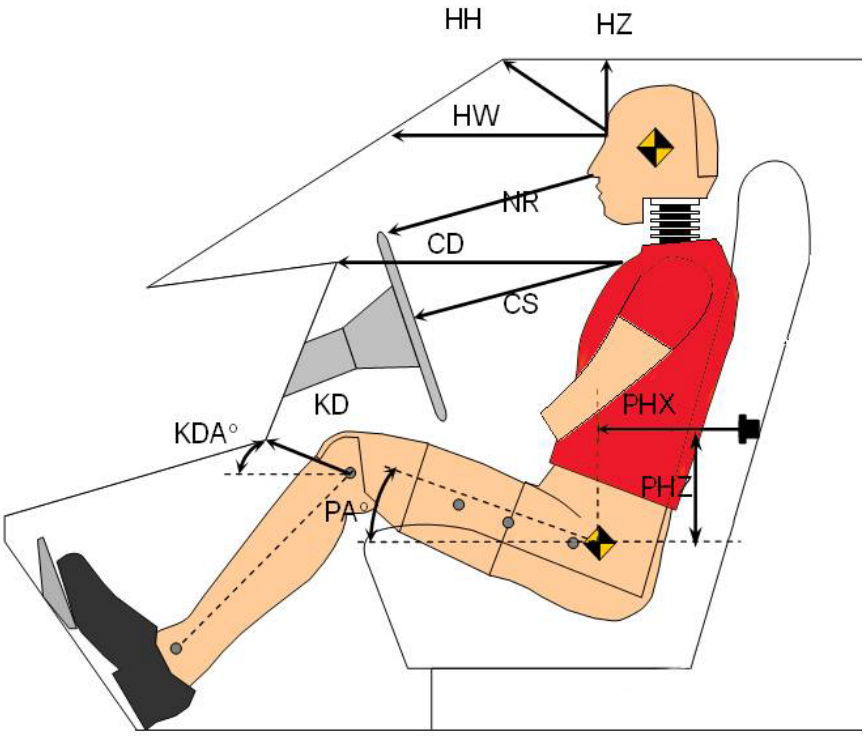
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see S1 – Vehicle Setup Information)	70.0
Usable Capacity of Optional Tank (see S1 – Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	70.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	65.1
Actual Amount of Solvent Used	65.1
1/3 of Usable Capacity	23.3

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

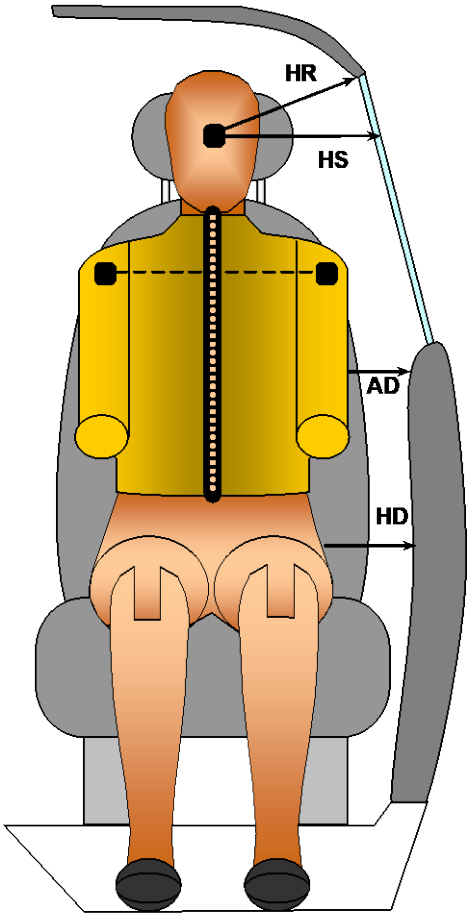


LEFT SIDE VIEW

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	232	
HW	Head to Windshield	487	
HZ	Head to Roof Liner	180	
NR	Nose to Rim/Seat Back	202	
CD	Chest to Dashboard/Seat Back	379	
CS	Chest to Steering Wheel	140	
KDL / KDAL	Left Knee to Dash/Seat Back	103	36.0
KDR / KDAL	Right Knee to Dash/Seat Back	102	35.9
PAX	Pelvic Tilt Angle X		19.8
PAY	Pelvic Tilt Angle Y		0.0
PHX	Hip Point to Striker (X-Axis)	351	
PHZ	Hip Point to Striker (Z-Axis)	112	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

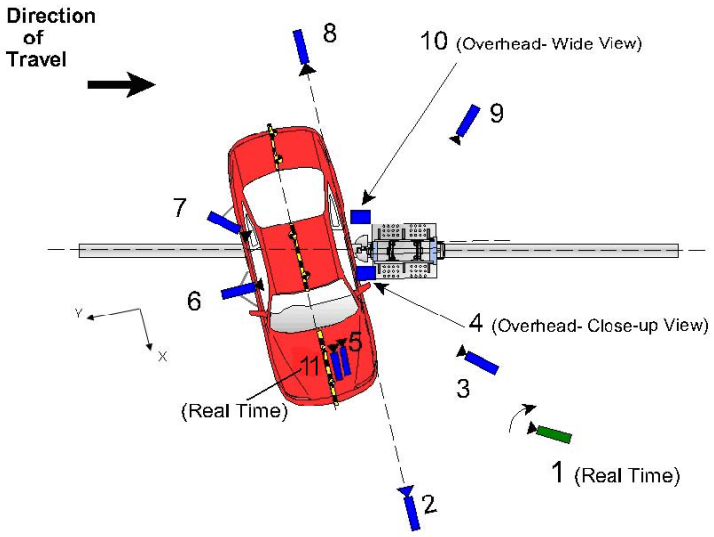


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	230
HS	Head to Side Window	360
AD	Arm to Door	162
HD	Hip Point to Door	220

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023



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

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Real-Time Pan View					30
2	Front Ground Level	5805	-10	-1700	24	1000
3	Impact Side 45° Forward	4445	-1975	-1730	12	1000
4	Overhead Closeup	0	0	-6700	85	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	-6880	-5	-1685	24	1000
9	Impact Side 45° Rearward	-2995	-3665	-1695	12	1000
10	Overhead Wide View	70	535	-6700	12	1000
11	Real-Time Dummy Front View					30

*All measurements accurate to ±6 mm
Note: Vehicle was positioned at a 75° angle to the rigid pole.

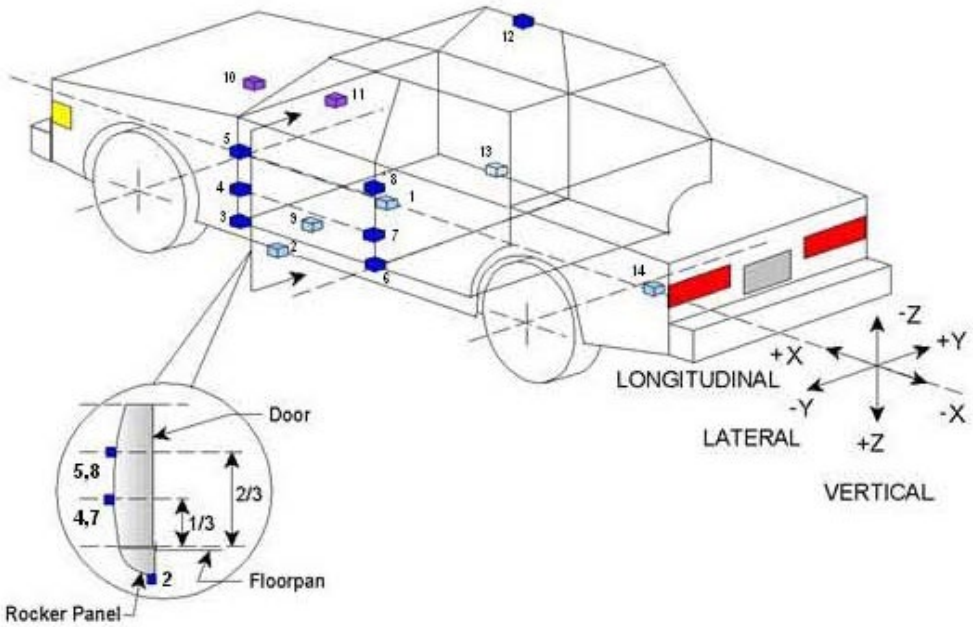
Explain why camera(s) did not operate as intended: None

INSTRUMENTATION

	Number of Channels
Driver Dummy	21
Vehicle Structure	18
Pole Load Cells	8
Total	47

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023



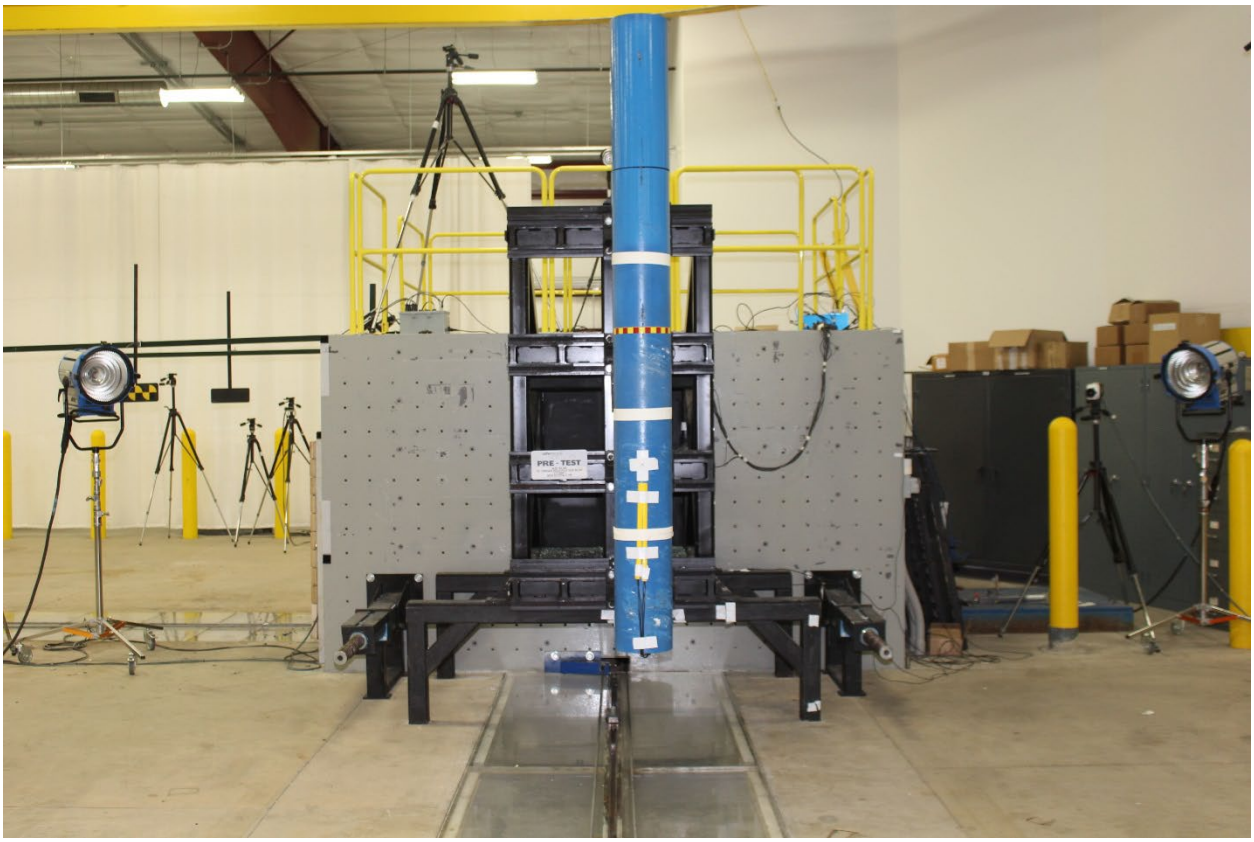
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2661	150	-307
2	Left Floor Sill	3282	-760	-301
3	A Pillar Sill	3680	-760	-298
4	A Pillar Low	3419	-865	-685
5	A Pillar Mid	3419	-865	-890
6	B Pillar Sill	2383	-760	-303
7	B Pillar Low			
8	B Pillar Mid			
9	Driver Seat Track	2457	-405	-430
10	Engine Top	4068	50	-960
11	Firewall	3828	0	-1064
12	Right Roof	2401	510	-1751
13	Right Floor Sill	3281	760	-298
14	Rear Floorpan	870	0	-470

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

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20245404
Test Date: 12/13/2023



254 mm Diameter Rigid Pole

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

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag, Headrest
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Headrest
Left Shoulder	Side Torso/Pelvis Airbag, Seatback
Upper Torso	Side Torso/Pelvis Airbag, Seatback
Lower Torso	Side Torso/Pelvis Airbag, Seatback
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion
Left Knee	Door Panel

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	None
Windshield Damage	Cracked
Side Window Damage	LF window cracked
Other Notable Effects	None

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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

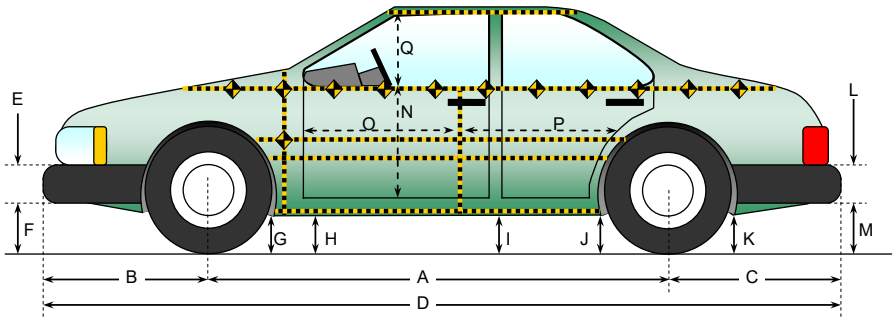
Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Side Airbag (Other)				
Seat Belt Pretensioner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

SPEED, ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1328
Actual Impact Point (Aft of Front Axle)	mm		1324
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	4
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	75.5
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.22
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.25

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023



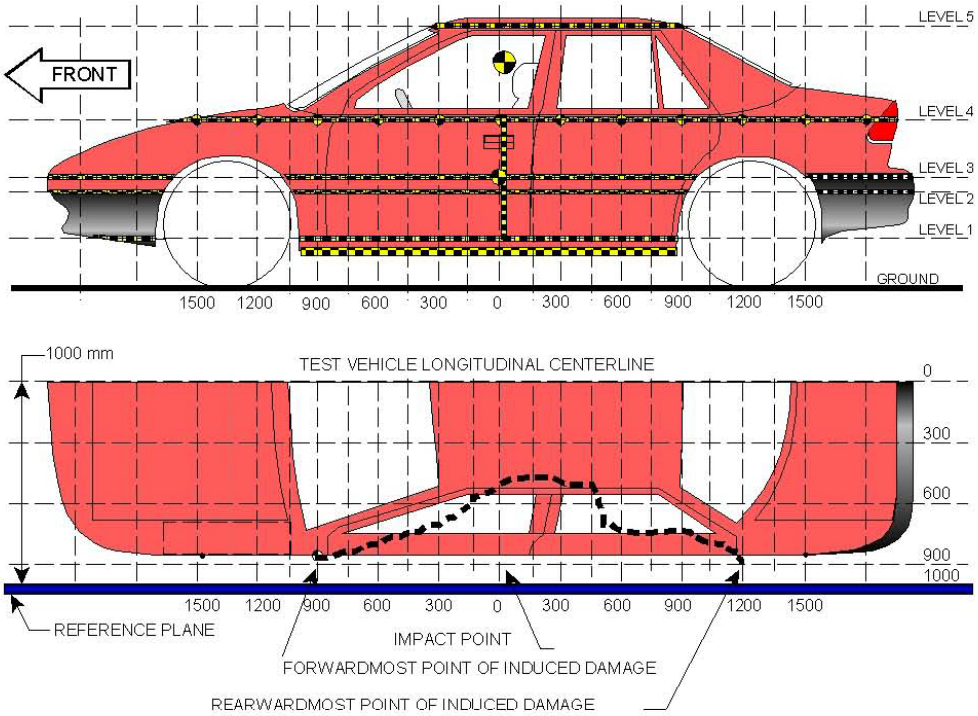
All measurements in (mm) with tolerance of ± 3 mm
LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	3116	3084	-32
B	Front Axle to FSOV	859	897	38
C	Rear Axle to RSOV	1129	1116	-13
D	Total Vehicle Length at Centerline	5104	5097	-7
E	Front Bumper Thickness	150	150	0
F	Front Bumper Bottom to Ground	455	486	31
G	Sill Height at Front Wheel Well	267	252	-15
H	Sill Height at Front Door Leading Edge	268	253	-15
I	Sill Height at B-Pillar	269	277	8
J1	Sill Height at Rear Wheel Well	276	288	12
J2	Pinch Weld Height at Rear Wheel Well	276	285	9
K	Sill Height Aft of Rear Wheel Well	282	287	5
L	Rear Bumper Thickness	123	123	0
M	Rear Bumper Bottom to Ground	488	468	-20
N	Sill Height to Bottom of Front Window Sill	773	788	15
O	Front Door Leading Edge to Impact CL	582	546	-36
P	Rear Door Trailing Edge to Impact CL	1392	1312	-80
Q	Front Window Opening	383	367	-16
R	Right Side Length	4478	4434	-44
S	Left Side Length	4478	4412	-66
T	Vehicle Width at B-Pillars	1960	1998	38
U	Front Wheel Track Width	1705		
V	Rear Wheel Track Width	1706		

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV	NHTSA No.:	O20245404
Test Program:	NCAP Side Pole Impact Test	Test Date:	12/13/2023



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

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	464	313	75
2	Mid Door	470	299	75
3	Occupant H-Point	765	295	75
4	Window Sill	1132	271	75
5	Window Top	1685	48	150

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

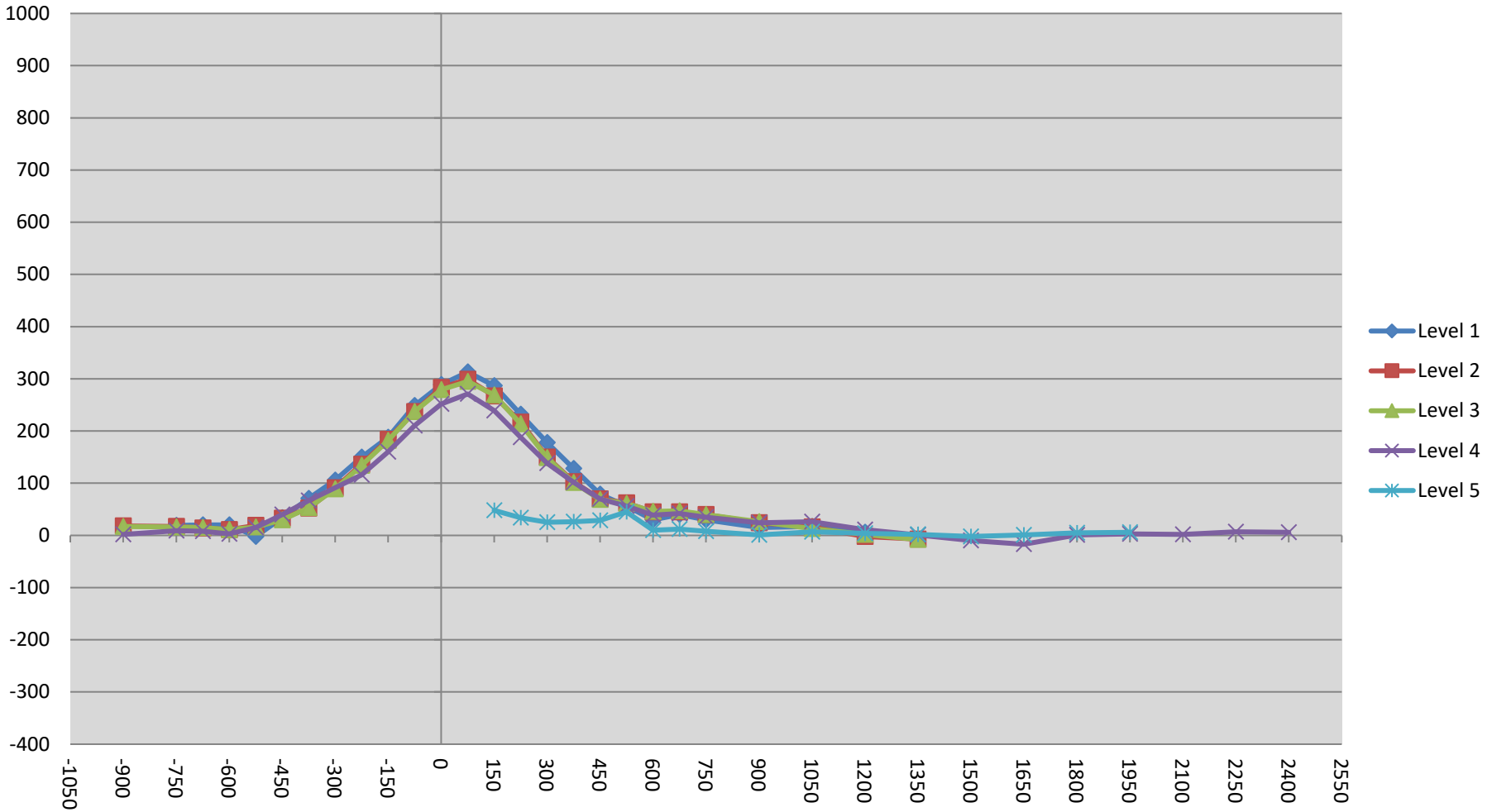
Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

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

	Pre-Test					Post-Test					Exterior Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2700															
-2550															
-2400															
-2250															
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900		122	123	272			140	140	274			18	17	2	
-825															
-750	125	145	147	260		144	162	163	269		19	17	16	9	
-675	131	154	155	254		151	168	170	262		20	14	15	8	
-600	135	160	161	250		155	171	172	253		20	11	11	3	
-525	140	163	165	246		138	182	181	261		-2	19	16	15	
-450	141	166	167	240		175	199	197	280		34	33	30	40	
-375	143	168	168	236		214	220	221	303		71	52	53	67	
-300	145	169	170			251	260	259			106	91	89		
-225	147	170	170	224		297	306	304	340		150	136	134	116	
-150	148	170	170	219		336	354	352	379		188	184	182	160	
-75	150	170	170	214		399	407	407	424		249	237	237	210	
0	150	170	170	210		439	453	449	462		289	283	279	252	
75	151	171	170	208		464	470	465	479		313	299	295	271	
150	150	170	171	205	465	437	437	440	444	513	287	267	269	239	48
225	150	170	171	203	458	382	387	385	391	492	232	217	214	188	34
300	150	170	171	202	452	328	320	320	340	477	178	150	149	138	25
375	150	171	171	200	452	278	274	272	302	478	128	103	101	102	26
450	151	170	171	198	451	230	240	240	268	480	79	70	69	70	29
525	152	170	171	198	450	208	232	232	254	495	56	62	61	56	45
600	152	170	170	198	451	182	215	216	237	461	30	45	46	39	10
675	152	170	170	196	451	192	215	217	238	463	40	45	47	42	12
750	152	168	169	195	451	182	208	209	230	459	30	40	40	35	8
825															
900	150	166	167	196	450	165	190	193	220	451	15	24	26	24	1
1050	144	160	162	196	452	161	176	175	222	459	17	16	13	26	7
1200	133	145	144	199	452	139	143	146	210	456	6	-2	2	11	4
1350		121	122	199	453		114	114	200	455		-7	-8	1	2
1500				200	456				190	454				-10	-2
1650				202	466				185	467				-17	1
1800				203	486				204	491				1	5
1950				205	515				208	521				3	6
2100				210					212					2	
2250				215					222					7	
2400				225					231					6	
2550															
2700															

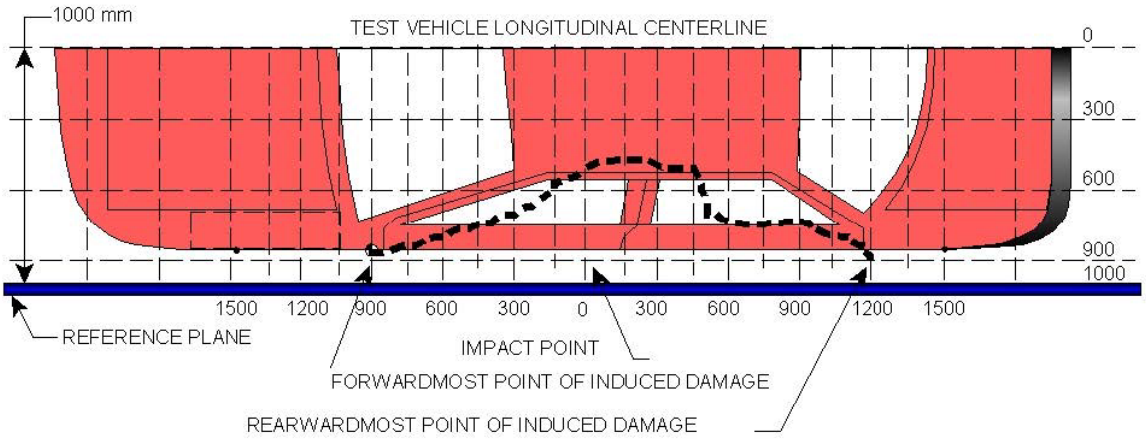
DATA SHEET NO. 10 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023



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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	500	3	171	235	64
2	280	3	171	345	174
3	60	3	170	469	299
4	-160	3	170	343	173
5	-380	3	168	217	49
6	-600	3	161	177	16

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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

Test Time: 1:07 pm Temperature: 22.1°C

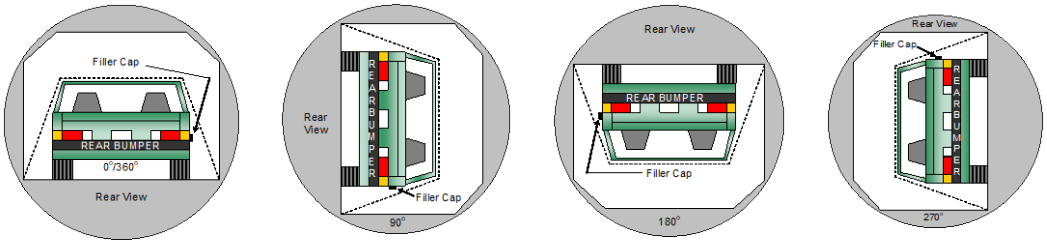
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.

B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.

C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None

D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



0°/360° 90° 180° 270°

ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	110	300	410
90° to 180°	111	300	411
180° to 270°	107	300	407
270° to 360°	111	300	411

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

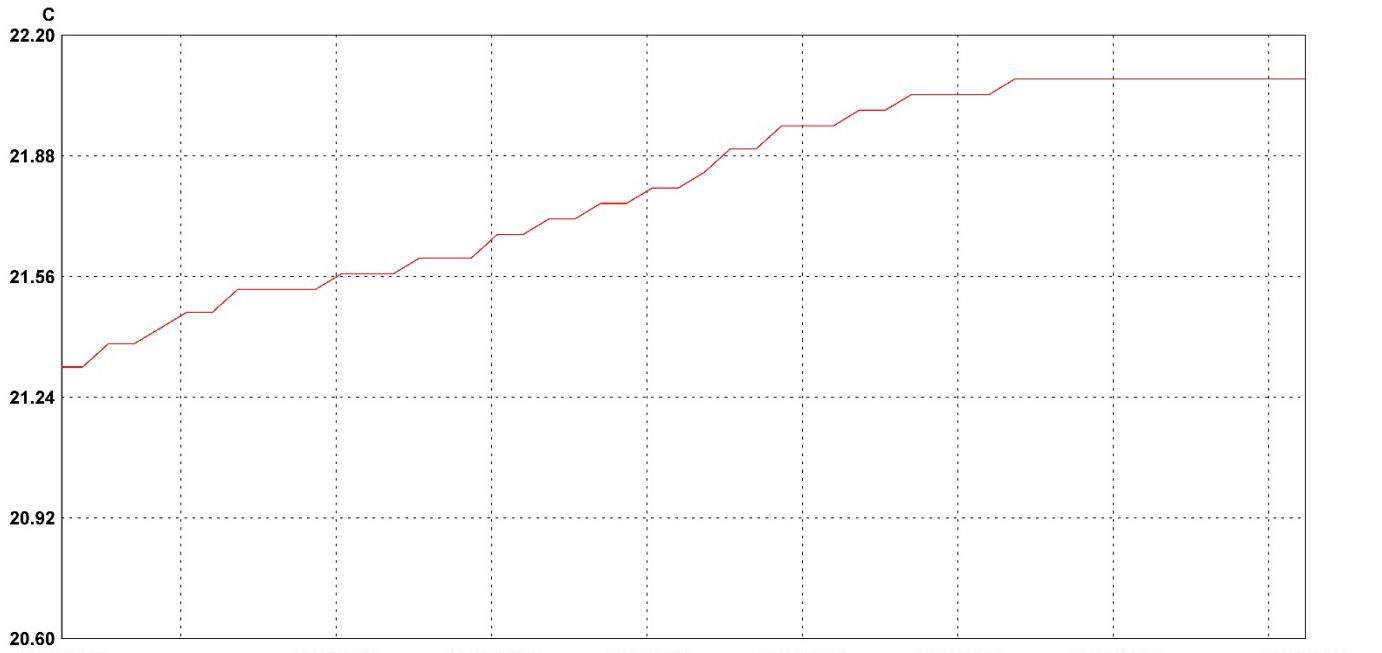
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0.0	0.0	0.0	
90° to 180°	0.0	0.0	0.0	
180° to 270°	0.0	0.0	0.0	
270° to 360°	0.0	0.0	0.0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352041	VSC_South_Hall	1		22.08	21.80	21.32	C	Temperature	18352041_VSC_South_Hall (Mar 2024).spl

DATA SHEET NO. 305-1
GENERAL TEST AND VEHICLE PARAMETER DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

ELECTRIC VEHICLE PROPULSION SYSTEM

	Units	Observations and Conclusions
Type of Electric Vehicle		Gas-Electric Hybrid
Propulsion Battery Type		Lithium-ion Battery
Nominal Voltage	V	355
Physical Location of Automatic Propulsion Battery Disconnect		Automatic Propulsion Battery Disconnect is In Lithium-ion battery.
Auxiliary Battery Type		Lead Battery

PROPULSION BATTERY SYSTEM DATA

	Units		Observations and Conclusions
Electrolyte Fluid Type			Class 4 Second petroleum
Electrolyte Fluid Specific Gravity	g/cm3		1.25
Electrolyte Fluid Kinematic Viscosity			No Data
Electrolyte Fluid Color			Colorless
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable)			Refrigerant, Green
Location of Battery Modules			Inside Passenger Compartment
		X	Outside Passenger Compartment
			The high-voltage battery is located on the underside of the vehicle.

PROPULSION BATTERY STATE OF CHARGE

For all battery types:	
Voltage range corresponding to **useable energy** of the battery:	
Minimum State of Charge	332.3
Maximum State of Charge	397.4
95% of Maximum State of Charge	377.5
Test Voltage - No less than 95% of maximum State of Charge	N/A
For batteries that are rechargeable ONLY by an energy source on the vehicle:	
Voltage range corresponding to **useable energy** of the battery:	
Minimum State of Charge	
Maximum State of Charge	
Test Voltage – Maximum practicable State of Charge within Normal Operating Range	

DATA SHEET NO. 305-2
PRE-IMPACT DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV	NHTSA No.:	O20245404
Test Program:	NCAP Side Pole Impact Test	Test Date:	12/13/2023

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Location(s)	Body structure

PROPULSION BATTERY SYSTEM

Details of Electric Energy Storage/Conversion System Test Points	Connected at + and – terminal ends of propulsion system
Additional Comments	None

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		
Model		
Serial Number		
Internal Impedance Value	MΩ	
Resolution	V	
Last Calibration Date		

PROPULSION BATTERY VOLTAGE

Measurement shall be made with Energy Storage/Conversion System connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion system energized) position.

NOTE: If voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.

Vb	V	

ELECTRIC ISOLATION MEASUREMENTS
PROPULSION BATTERY TO VEHICLE CHASSIS

Vehicle chassis point(s) determined and supplied to contractor by COR.

V1	V	
V2	V	

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

The known resistance Ro (in ohms) should be approximately 500 times the normal operating voltage of the vehicle (in volts) per SAE J1766.

Ro	Ω	

V1' Pre-Impact	V	
V2' Pre-Impact	V	

DATA SHEET NO. 305-3 (CONTINUED)
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV	NHTSA No.:	O20245404
Test Program:	NCAP Side Pole Impact Test	Test Date:	12/13/2023

ELECTRICAL ISOLATION CALCULATIONS

NOTE: If measured voltage is zero and results in a division by zero, record “Zero Volts”.
This “zero voltage” condition is considered as being compliant.

Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’]		
Ri1 Pre-Impact	Ω	
Ri2 = Ro (1 + V1/V2) [(V2-V2’)/V2’]		
Ri2 Pre-Impact	Ω	
Ri = The lesser of Ri1 and Ri2		
Ri Pre-Impact	Ω	
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage		
Ri / Vb Pre-Impact	Ω	

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?		
Additional Comments	Not Applicable, vehicle was certified to FMVSS No. 305 S5.3(c).	

DATA SHEET NO. 305-4
POST-IMPACT DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		
Model		
Serial Number		
Internal Impedance Value	MΩ	
Resolution	V	
Last Calibration Date		

ELECTRICAL ISOLATION MEASUREMENTS

Vb Post-Impact	V	

V1 Post-Impact	V		Impact Time		Minutes		Seconds
V2 Post-Impact	V				Minutes		Seconds
V1' Post-Impact	V				Minutes		Seconds
V2' Post-Impact	V				Minutes		Seconds

DATA SHEET NO. 305-4 (CONTINUED)
POST-IMPACT DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV	NHTSA No.:	O20245404
Test Program:	NCAP Side Pole Impact Test	Test Date:	12/13/2023

ELECTRICAL ISOLATION CALCULATIONS

NOTE: If measured voltage is zero and results in a division by zero, record “Zero Volts”. This “zero voltage” condition is considered as being compliant.

Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’]							
Ri1 Post-Impact	Ω		Impact Time		Minutes		Seconds
Ri2 = Ro (1 + V1/V2) [(V2-V2’)/V2’]							
Ri2 Post-Impact	Ω		Impact Time		Minutes		Seconds
Ri = The lesser of Ri1 and Ri2							
Ri Post-Impact	Ω		Impact Time		Minutes		Seconds
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage							
Ri / Vb Post-Impact	Ω		Impact Time		Minutes		Seconds

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?		
Additional Comments	Not Applicable, vehicle was certified to FMVSS No. 305 S5.3(c).	

DATA SHEET NO. 305-4 (CONTINUED)
POST-IMPACT DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV	NHTSA No.:	O20245404
Test Program:	NCAP Side Pole Impact Test	Test Date:	12/13/2023

PROPULSION BATTERY SYSTEM COMPONENTS

Describe any Propulsion Battery Module movement within the passenger compartment [Supply photographs as appropriate]:
Not Applicable

	Yes (Fail)	No
Has the Propulsion Battery Module moved within the passenger compartment?		X

Describe intrusion of an outside Propulsion Battery Component into the passenger compartment [Supply photographs as appropriate]:
No Intrusion

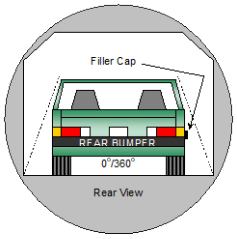
	Yes (Fail)	No
Has an outside Propulsion Battery Component intruded into the passenger compartment?		X

	Yes (Fail)	No
Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?		X

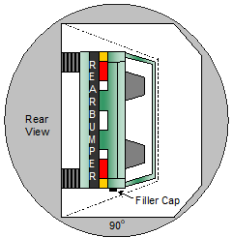
DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

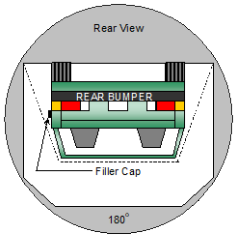
PROPULSION BATTERY SYSTEM COMPONENTS



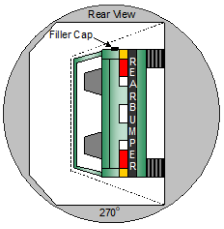
0°/360°



90°



180°



270°

PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time (spec. 1-3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0° - 90°	1	min	50	sec	5	min	6	min	50	sec	7	min
90° - 180°	1	min	51	sec	5	min	6	min	51	sec	7	min
180° - 270°	1	min	47	sec	5	min	6	min	47	sec	7	min
270° - 360°	1	min	51	sec	5	min	6	min	51	sec	7	min

TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

NOTE: The maximum allowable Propulsion Battery Electrolyte Spillage is 5.0 Liters.

Test Phase	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0° to 90°	0	Not Applicable
90° to 180°	0	Not Applicable
180° to 270°	0	Not Applicable
270° to 360°	0	Not Applicable
Total Spillage	0	

	Yes (Fail)	No
Is the total Propulsion Battery Electrolyte Spillage greater than 5.0 Liters?		X
Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?		X

DATA SHEET NO. 305-5 (CONTINUED)
STATIC ROLLOVER TEST DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		
Model		
Serial Number		
Internal Impedance Value	MΩ	
Resolution	V	
Last Calibration Date		

ELECTRICAL ISOLATION MEASUREMENTS

Vb Post-Impact	V	

Record V1, V2, V1', V2' voltage measurements at the start of each successive increment of 90°, 180°, 270°, and 360° of the static rollover test.

	Voltage	Units	Test Phase	Time			
V1		V	0°		min		sec
			90°				
			180°				
			270°				
			360°				
V2		V	0°		min		sec
			90°				
			180°				
			270°				
			360°				
V1'		V	0°		min		sec
			90°				
			180°				
			270°				
			360°				
V2'		V	0°		min		sec
			90°				
			180°				
			270°				
			360°				

DATA SHEET NO. 305-5 (CONTINUED)
STATIC ROLLOVER TEST DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

ELECTRICAL ISOLATION CALCULATIONS

NOTE: If measured voltage is zero and results in a division by zero, record "Zero Volts". This "zero voltage" condition is considered as being compliant.

	Voltage	Units	Test Phase	Time			
Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']							
Ri1		Ω	0°		min		sec
			90°				
			180°				
			270°				
			360°				
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2		Ω	0°		min		sec
			90°				
			180°				
			270°				
			360°				
Ri = The lesser of Ri1 and Ri2							
Ri		Ω	0°		min		sec
			90°				
			180°				
			270°				
			360°				
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage							
Ri / Vb		Ω/V	0°		min		sec
			90°				
			180°				
			270°				
			360°				

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?		
Additional Comments	Not Applicable, vehicle was certified to FMVSS No. 305 S5.3(c).	

DATA SHEET NO. 305A-1
EVALUATE PROTECTION FROM DIRECT CONTACT WITH HIGH VOLTAGES SOURCES FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For each data point where the IPXXB probe is used to evaluate electrical protection from direct contact with high voltage sources, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the direct contact between probe and the high voltage source and/or the probe lamp being illuminated.

POST-CRASH / PRE-ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
High-Voltage Battery Case to Electrical Ground		X		X
Electric Propulsion Drive Motor to Electrical Ground		X		X
DC Converter to Electrical Ground		X		X
Inverter to Electrical Ground		X		X
Inverter to Electric Propulsion Drive Motor		X		X
Inverter to DC Converter		X		X
Inverter to High-Voltage Battery Case		X		X
Electric Propulsion Drive Motor to DC Converter		X		X
Electric Propulsion Drive Motor to High-Voltage Battery Case		X		X
DC Converter to High-Voltage Battery Case		X		X

STATIC ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
High-Voltage Battery Case to Electrical Ground		X		X
Electric Propulsion Drive Motor to Electrical Ground		X		X
DC Converter to Electrical Ground		X		X
Inverter to Electrical Ground		X		X
Inverter to Electric Propulsion Drive Motor		X		X
Inverter to DC Converter		X		X
Inverter to High-Voltage Battery Case		X		X
Electric Propulsion Drive Motor to DC Converter		X		X
Electric Propulsion Drive Motor to High-Voltage Battery Case		X		X
DC Converter to High-Voltage Battery Case		X		X

DATA SHEET NO. 305A-1 (CONTINUED)
EVALUATE PROTECTION FROM DIRECT CONTACT WITH HIGH VOLTAGES SOURCES FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For each data point where the IPXXB probe is used to evaluate electrical protection from direct contact with high voltage sources, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the direct contact between probe and the high voltage source and/or the probe lamp being illuminated.

POST-ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
High-Voltage Battery Case to Electrical Ground		X		X
Electric Propulsion Drive Motor to Electrical Ground		X		X
DC Converter to Electrical Ground		X		X
Inverter to Electrical Ground		X		X
Inverter to Electric Propulsion Drive Motor		X		X
Inverter to DC Converter		X		X
Inverter to High-Voltage Battery Case		X		X
Electric Propulsion Drive Motor to DC Converter		X		X
Electric Propulsion Drive Motor to High-Voltage Battery Case		X		X
DC Converter to High-Voltage Battery Case		X		X

DATA SHEET NO. 305A-2
EVALUATE PROTECTION AGAINST INDIRECT CONTACT WITH HIGH VOLTAGE SOURCES USING A RESISTANCE TESTER OR DC POWER SUPPLY, VOLTMETER AND AMMETER FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For any measuring points where protection against indirect contact with high voltage sources is evaluated, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the locations in question and the related measured values. If the resistance is calculated using separately measured resistances, describe each measurement and the final calculation as separate entries in the table below.

Measuring Path	Pass	Fail
BC: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and the electrical chassis.*	< 0.1 Ω	≥ 0.1 Ω
BB: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and any other simultaneously reachable exposed conductive parts of the electrical protection barriers within 2.5 meters.*	< 0.2 Ω	≥ 0.2 Ω

POST-CRASH / PRE-ROLLOVER

Description of Evaluated Location	Measuring Path	Method 2 ONLY		Methods 1 & 2	Pass *or* Fail
	BC *or* **BB**	**Voltage** (V) Volts	**Current** (I) Amps	**Resistance** (R=V/I) Ω	
High-Voltage Battery Case to Electrical Ground	BC			0.012	Pass
Electric Propulsion Drive Motor to Electrical Ground	BC			0.010	Pass
DC Converter to Electrical Ground	BC			0.000	Pass
Inverter to Electrical Ground	BC			0.011	Pass
Inverter to Electric Propulsion Drive Motor	BB			0.017	Pass
Inverter to DC Converter	BB			0.000	Pass
Inverter to High-Voltage Battery Case	BB			0.017	Pass
Electric Propulsion Drive Motor to DC Converter	BB			0.000	Pass
Electric Propulsion Drive Motor to High-Voltage Battery Case	BB			0.015	Pass
DC Converter to High-Voltage Battery Case	BB			0.000	Pass

DATA SHEET NO. 305A-2 (CONTINUED)
EVALUATE PROTECTION AGAINST INDIRECT CONTACT WITH HIGH VOLTAGE SOURCES USING A RESISTANCE TESTER OR DC POWER SUPPLY, VOLTMETER AND AMMETER FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For any measuring points where protection against indirect contact with high voltage sources is evaluated, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the locations in question and the related measured values. If the resistance is calculated using separately measured resistances, describe each measurement and the final calculation as separate entries in the table below.

Measuring Path	Pass	Fail
BC: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and the electrical chassis.*	< 0.1 Ω	≥ 0.1 Ω
BB: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and any other simultaneously reachable exposed conductive parts of the electrical protection barriers within 2.5 meters.*	< 0.2 Ω	≥ 0.2 Ω

STATIC ROLLOVER

Description of Evaluated Location	Measuring Path	Method 2 ONLY		Methods 1 & 2	Pass *or* Fail
	BC *or* **BB**	**Voltage** (V) Volts	**Current** (I) Amps	**Resistance** (R=V/I) Ω	
High-Voltage Battery Case to Electrical Ground	BC			0.011	Pass
Electric Propulsion Drive Motor to Electrical Ground	BC			0.011	Pass
DC Converter to Electrical Ground	BC			0.000	Pass
Inverter to Electrical Ground	BC			0.012	Pass
Inverter to Electric Propulsion Drive Motor	BB			0.016	Pass
Inverter to DC Converter	BB			0.000	Pass
Inverter to High-Voltage Battery Case	BB			0.017	Pass
Electric Propulsion Drive Motor to DC Converter	BB			0.000	Pass
Electric Propulsion Drive Motor to High-Voltage Battery Case	BB			0.015	Pass
DC Converter to High-Voltage Battery Case	BB			0.000	Pass

* Final resistance values reported after subtracting the resistance of the measurement device extensions.

DATA SHEET NO. 305A-2 (CONTINUED)
EVALUATE PROTECTION AGAINST INDIRECT CONTACT WITH HIGH VOLTAGE SOURCES USING A RESISTANCE TESTER OR DC POWER SUPPLY, VOLTMETER AND AMMETER FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For any measuring points where protection against indirect contact with high voltage sources is evaluated, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the locations in question and the related measured values. If the resistance is calculated using separately measured resistances, describe each measurement and the final calculation as separate entries in the table below.

Measuring Path	Pass	Fail
BC: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and the electrical chassis.*	< 0.1 Ω	≥ 0.1 Ω
BB: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and any other simultaneously reachable exposed conductive parts of the electrical protection barriers within 2.5 meters.*	< 0.2 Ω	≥ 0.2 Ω

POST-ROLLOVER

Description of Evaluated Location	Measuring Path	Method 2 ONLY		Methods 1 & 2	Pass *or* Fail
	BC *or* **BB**	**Voltage** (V) Volts	**Current** (I) Amps	**Resistance** (R=V/I) Ω	
High-Voltage Battery Case to Electrical Ground	BC			0.011	Pass
Electric Propulsion Drive Motor to Electrical Ground	BC			0.010	Pass
DC Converter to Electrical Ground	BC			0.000	Pass
Inverter to Electrical Ground	BC			0.012	Pass
Inverter to Electric Propulsion Drive Motor	BB			0.016	Pass
Inverter to DC Converter	BB			0.000	Pass
Inverter to High-Voltage Battery Case	BB			0.017	Pass
Electric Propulsion Drive Motor to DC Converter	BB			0.000	Pass
Electric Propulsion Drive Motor to High-Voltage Battery Case	BB			0.014	Pass
DC Converter to High-Voltage Battery Case	BB			0.000	Pass

* Final resistance values reported after subtracting the resistance of the measurement device extensions.

DATA SHEET NO. 305A-3
DETERMINE VOLTAGE BETWEEN EXPOSED CONDUCTIVE PARTS OF ELECTRICAL PROTECTION BARRIERS AND THE ELECTRICAL CHASSIS AND BETWEEN EXPOSED PARTS OF ELECTRICAL PROTECTION BARRIERS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For each data point where the voltage between exposed conductive parts of electrical protection barriers and the electrical chassis and between exposed conductive parts of electrical protection barriers is determined, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the locations in question and the related measured values.

Measuring Path	Pass	Fail
BC: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and the electrical chassis.*	≤ 30 VAC ≤ 60 VDC	> 30 VAC > 60 VDC
BB: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and any other simultaneously reachable exposed conductive parts of the electrical protection barriers within 2.5 meters.*	≤ 30 VAC ≤ 60 VDC	> 30 VAC > 60 VDC

POST-CRASH / PRE-ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass *or* Fail
	BC *or* **BB**	**VAC** (V) Volts	**VDC** (V) Volts	
High-Voltage Battery Case to Electrical Ground	BC	0.0	0.0	Pass
Electric Propulsion Drive Motor to Electrical Ground	BC	0.0	0.0	Pass
DC Converter to Electrical Ground	BC	0.0	0.0	Pass
Inverter to Electrical Ground	BC	0.0	0.0	Pass
Inverter to Electric Propulsion Drive Motor	BB	0.0	0.0	Pass
Inverter to DC Converter	BB	0.0	0.0	Pass
Inverter to High-Voltage Battery Case	BB	0.0	0.0	Pass
Electric Propulsion Drive Motor to DC Converter	BB	0.0	0.0	Pass
Electric Propulsion Drive Motor to High-Voltage Battery Case	BB	0.0	0.0	Pass
DC Converter to High-Voltage Battery Case	BB	0.0	0.0	Pass

STATIC ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass *or* Fail
	BC *or* **BB**	**VAC** (V) Volts	**VDC** (V) Volts	
High-Voltage Battery Case to Electrical Ground	BC	0.0	0.0	Pass
Electric Propulsion Drive Motor to Electrical Ground	BC	0.0	0.0	Pass
DC Converter to Electrical Ground	BC	0.0	0.0	Pass
Inverter to Electrical Ground	BC	0.0	0.0	Pass
Inverter to Electric Propulsion Drive Motor	BB	0.0	0.0	Pass
Inverter to DC Converter	BB	0.0	0.0	Pass
Inverter to High-Voltage Battery Case	BB	0.0	0.0	Pass
Electric Propulsion Drive Motor to DC Converter	BB	0.0	0.0	Pass
Electric Propulsion Drive Motor to High-Voltage Battery Case	BB	0.0	0.0	Pass
DC Converter to High-Voltage Battery Case	BB	0.0	0.0	Pass

DATA SHEET NO. 305A-3 (CONTINUED)
DETERMINE VOLTAGE BETWEEN EXPOSED CONDUCTIVE PARTS OF ELECTRICAL PROTECTION BARRIERS AND THE ELECTRICAL CHASSIS AND BETWEEN EXPOSED PARTS OF ELECTRICAL PROTECTION BARRIERS

Test Vehicle: 2024 Mazda CX-90 PHEV Premium Plus 5-Door SUV NHTSA No.: O20245404
Test Program: NCAP Side Pole Impact Test Test Date: 12/13/2023

For each data point where the voltage between exposed conductive parts of electrical protection barriers and the electrical chassis and between exposed conductive parts of electrical protection barriers is determined, provide a thumbnail photo and be as descriptive of the locations as possible. If an apparent failure is detected, include a photograph showing the locations in question and the related measured values.

Measuring Path	Pass	Fail
BC: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and the electrical chassis.*	≤ 30 VAC ≤ 60 VDC	> 30 VAC > 60 VDC
BB: *Between exposed conductive parts of the electrical protection barrier of the high voltage source and any other simultaneously reachable exposed conductive parts of the electrical protection barriers within 2.5 meters.*	≤ 30 VAC ≤ 60 VDC	> 30 VAC > 60 VDC

POST-ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass *or* Fail
	BC *or* **BB**	**VAC** (V) Volts	**VDC** (V) Volts	
High-Voltage Battery Case to Electrical Ground	BC	0.0	0.0	Pass
Electric Propulsion Drive Motor to Electrical Ground	BC	0.0	0.0	Pass
DC Converter to Electrical Ground	BC	0.0	0.0	Pass
Inverter to Electrical Ground	BC	0.0	0.0	Pass
Inverter to Electric Propulsion Drive Motor	BB	0.0	0.0	Pass
Inverter to DC Converter	BB	0.0	0.0	Pass
Inverter to High-Voltage Battery Case	BB	0.0	0.0	Pass
Electric Propulsion Drive Motor to DC Converter	BB	0.0	0.0	Pass
Electric Propulsion Drive Motor to High-Voltage Battery Case	BB	0.0	0.0	Pass
DC Converter to High-Voltage Battery Case	BB	0.0	0.0	Pass

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

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

PHOTOGRAPH NOT AVAILABLE

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

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

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

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

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

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

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

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

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

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

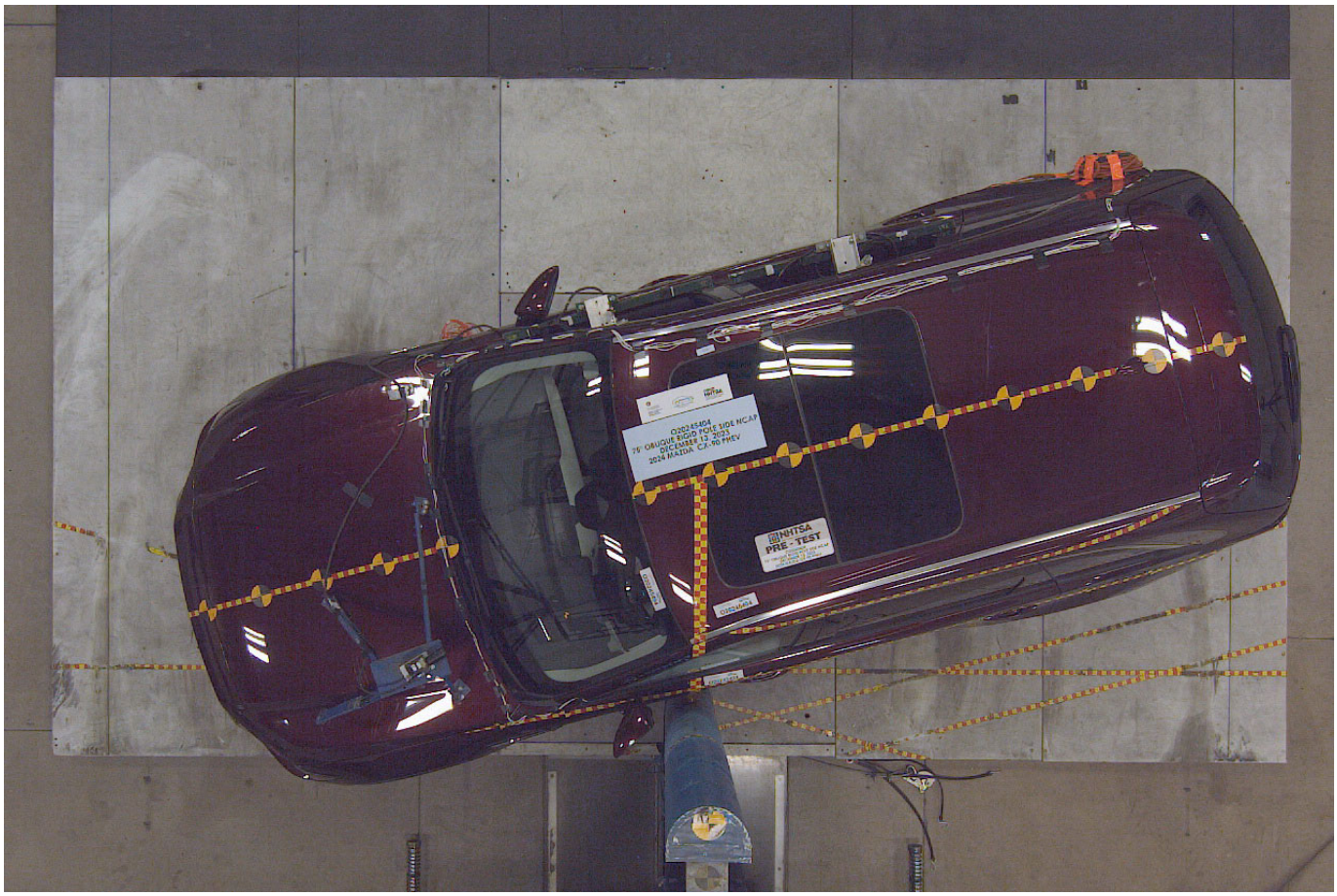


Photo No. 015 - Pre-Test Overhead View of Test Area

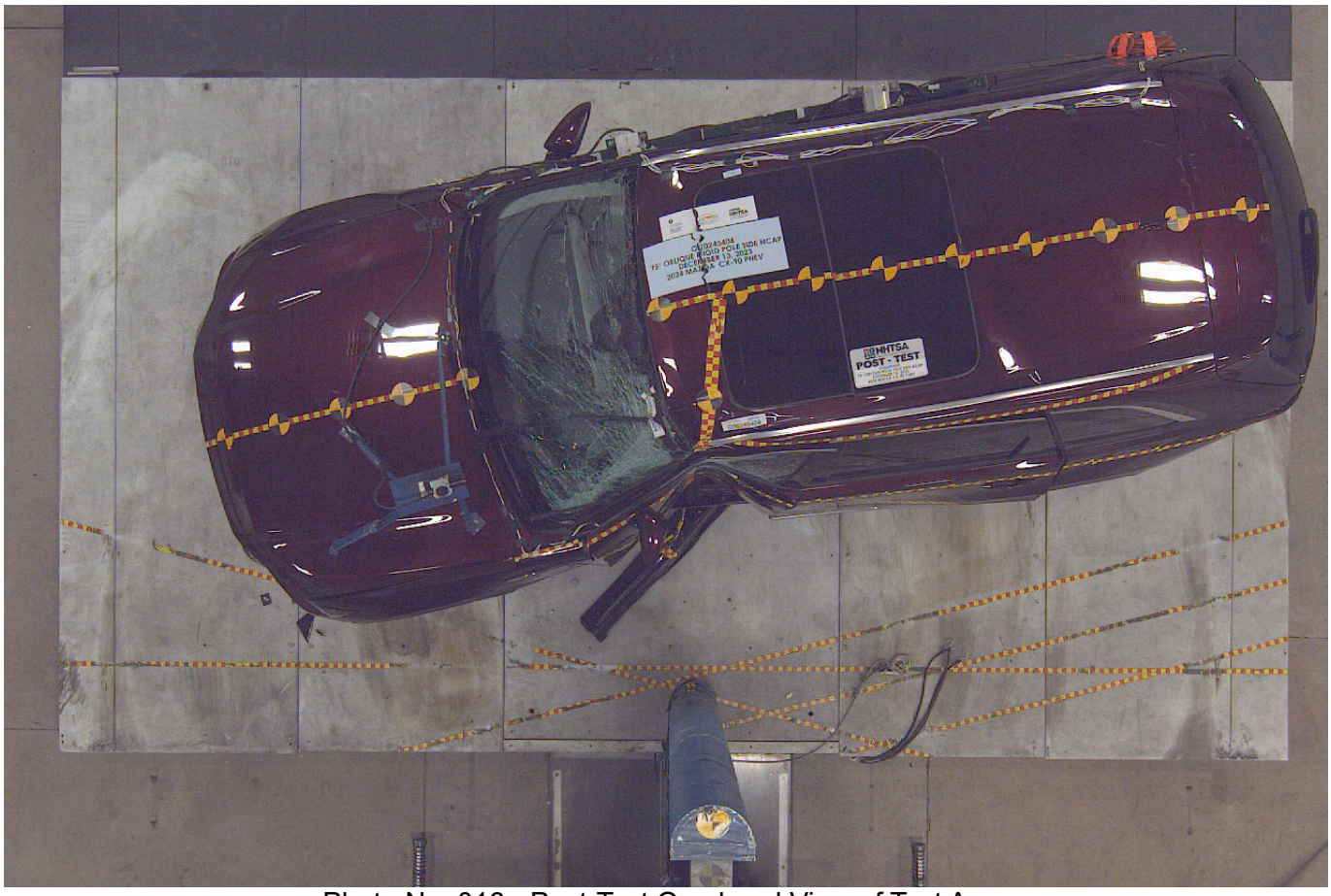


Photo No. 016 - Post-Test Overhead View of Test Area

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

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

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

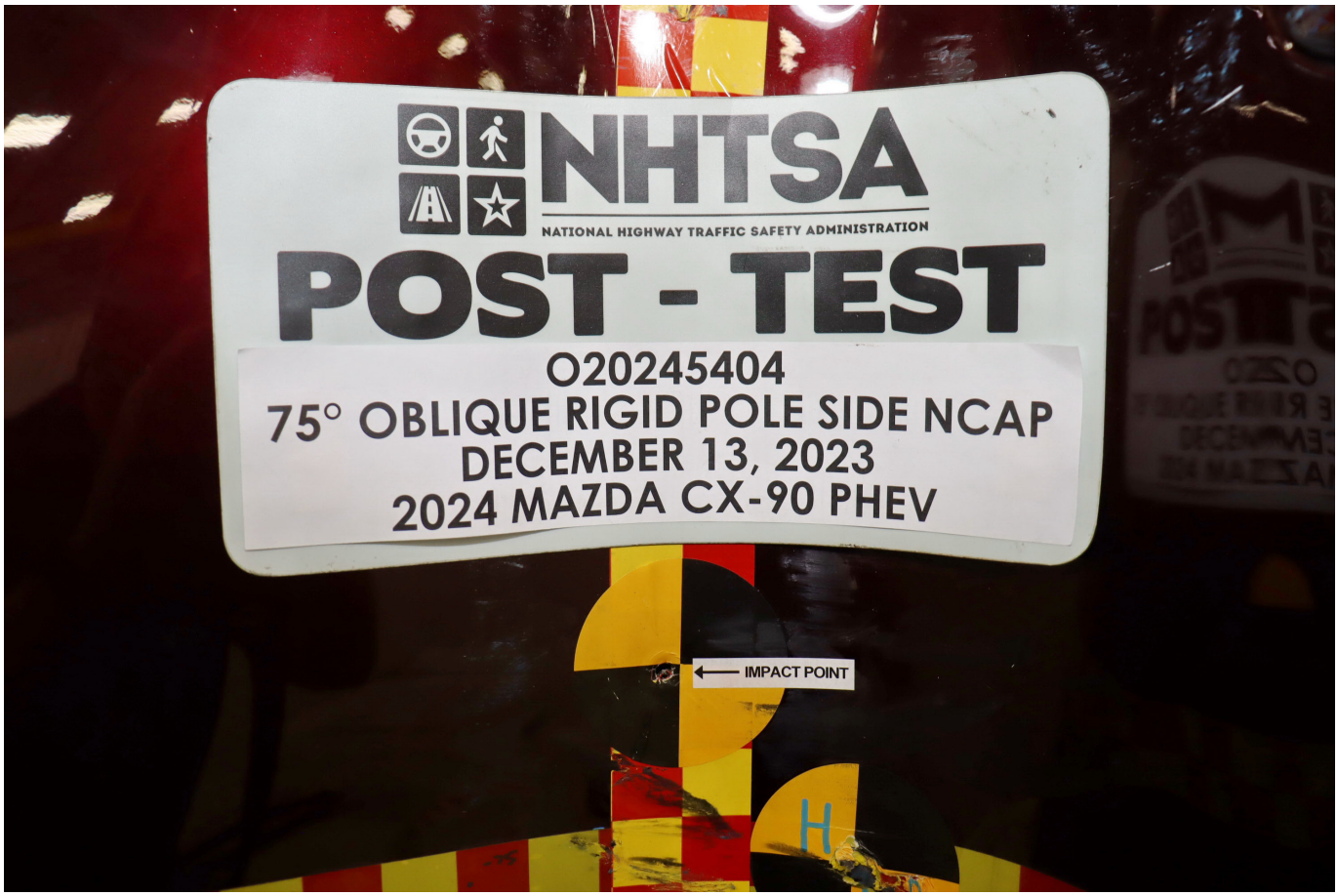


Photo No. 020 - Post-Test Close-Up View of Impact Point Target Showing Impact Location

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

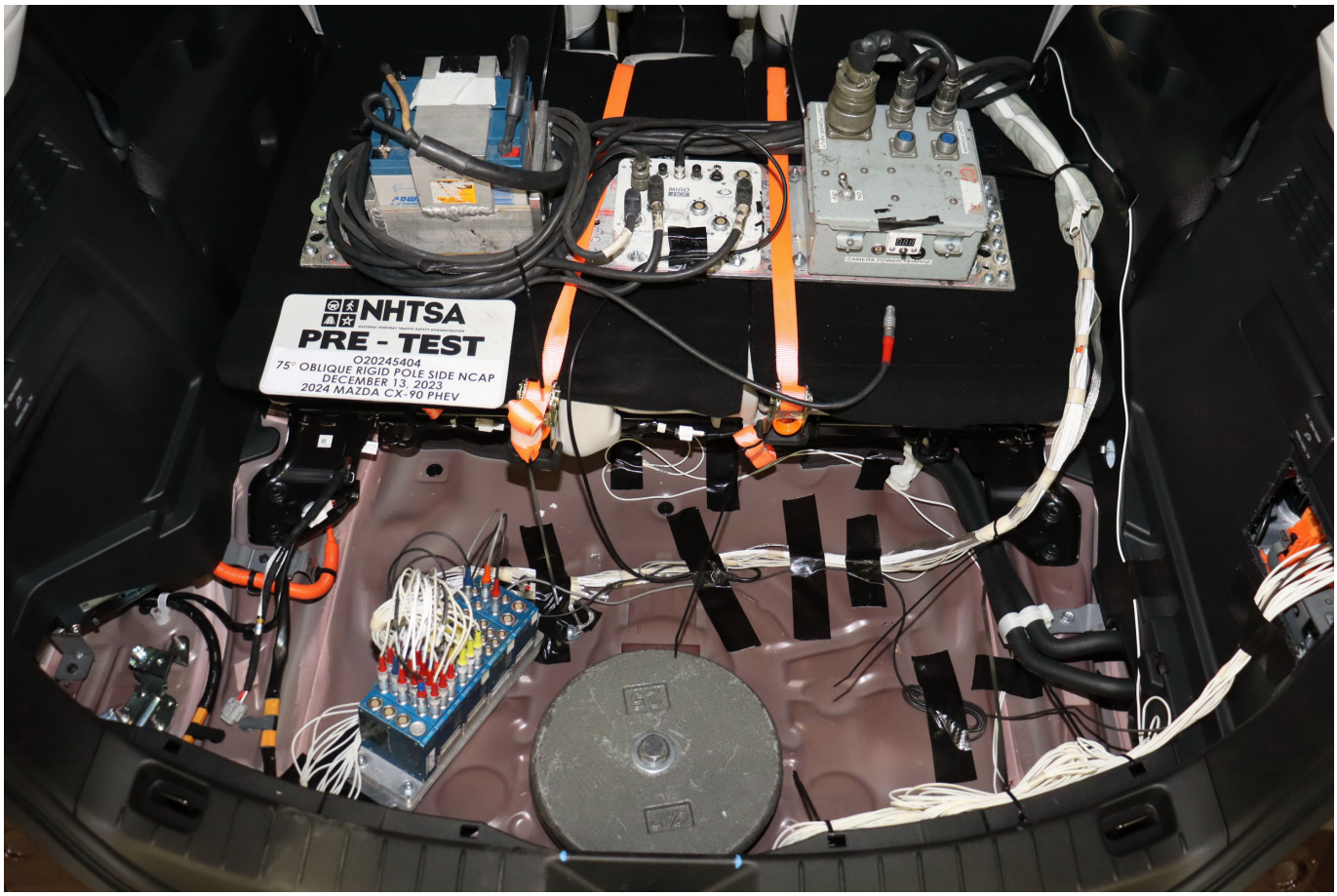


Photo No. 063 - Pre-Test Ballast View

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

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

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

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

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

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

Photo No. 070 - Impact Event

mazda

2024 MAZDA CX-90

Model: 2024 CX-90 PHEV PREMIUM PLUS
Exterior Color: ARTISAN RED PREMIUM
Interior Color: WHITE NAPPA LEATHER

EPA DOT Fuel Economy and Environment

Plug-In Hybrid Vehicle
Electricity-Gasoline

Fuel Economy Standard SUVs range from 13 to 102 MPGe. The best vehicle rates 140 MPGe.

Electricity + Gasoline (ChargeTime: 2 hours (240V)): **56** MPGe, 0.1 gallons per 100 miles, 58 kW-hrs per 100 miles — combined city/highway

Gasoline Only: **25** MPG, 4.0 gallons per 100 miles — combined city/highway

Driving Range

Electricity + Gasoline: 0 – 8 – 16 All Electric Range = 0 - 25 miles

Gasoline only: 26 miles — 34 — 490

You **save $250** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $1,900

Fuel Economy & Greenhouse Gas Rating (tailpipe only): MPG 7; CO2 8 (1 – 10, Best)

Smog Rating (tailpipe only): 7 (1 – 10, Best)

This vehicle emits 168 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel & electricity also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $9,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $ 4.30 per gallon and $0.15 per kW-hr. This is a dual fueled automobile. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

PARTS CONTENT INFORMATION:

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 0%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN 90%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: HOFU, JAPAN
COUNTRY OF ORIGIN:
ENGINE: JAPAN
TRANSMISSION: JAPAN

This label is affixed pursuant to the Federal Automobile Disclosure Act. Gasoline, License and Title fees, State and Local taxes, and Dealer installed options are not included.

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score		**Not Rated**

Based on the combined ratings of frontal, side and rollover.
Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver	**Not Rated**
	Passenger	**Not Rated**

Based on the risk of injury in a frontal impact.
Should ONLY be compared to other vehicles of similar size and weight.

Side Crash	Front seat	**Not Rated**
	Rear seat	**Not Rated**

Based on the risk of injury in a side impact.

Rollover	**Not Rated**

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

C8
50/W

SOLD TO: 61449
FRANK BOUCHER MAZDA RACINE
9601 WASHINGTON AVENUE #300
RACINE, WI 53406

SHIP TO: 61449 DY
FRANK BOUCHER MAZDA RACINE
9601 WASHINGTON AVENUE #300
RACINE, WI 53406

JM3KKEHA8R1123816

C9P--PP-XA---KMV7NAC-TA---TA---20230905

MazdaUSA.com

STANDARD EQUIPMENT

ENGINE/MECHANICAL FEATURES
- E-SKYACTIV PHEV
- 323 HORSEPOWER, 369 LB-FT TORQUE WITH PREMIUM GASOLINE
- SKYACTIV-DRIVE 8-SPEED AT
- HILL LAUNCH ASSIST
- I-ACTIV AWD
- ABS WITH EBD
- MI-DRIVE - SPORT/OFF-ROAD/ TOWING/EV MODE
- 3500 LB TOWING CAPACITY

EXTERIOR FEATURES
- 21-INCH ALLOY WHEELS
- P275/45 R21 ALL-SEASON TIRES
- HANDS-FREE POWER REAR LIFTGATE
- BODY-COLORED REAR ROOF SPOILER
- RAIN-SENSING WINDSHIELD WIPERS
- POWER PANORAMIC MOONROOF
- LED HEADLIGHTS W/ AUTO ON/OFF
- HIGH BEAM CONTROL
- ALUMINUM ROOF RAILS
- HEATED POWER MIRRORS W/TURN LAMPS

INTERIOR FEATURES
- 7-PASSENGER SEATING
- 8-WAY PWR DRIVER'S SEAT W/LUMBAR
- DRIVER SEAT MEMORY W/ 2 POSITIONS
- HEATED FRONT SEATS
- LEATHER STEERING WHEEL
- PADDLE SHIFTERS
- 3-ZONE AUTOMATIC CLIMATE CONTROL
- 3RD ROW AC VENTS
- MAZDA ADVANCED KEYLESS ENTRY
- 2ND-ROW WINDOW SUNSHADES
- 1500W AC POWER OUTLET
- ACTIVE DRIVING DISPLAY
- MAZDA NAVIGATION SYSTEM
- BOSE® AM/FM/HD RADIO® 12-SPEAKERS
- SIRIUSXM® 3 MOS. TRIAL N/A AK&HI
- WIRELESS ANDROID AUTO™
- WIRELESS APPLE CARPLAY™
- WIRELESS PHONE CHARGER
- BLUETOOTH® / USB INPUTS (6)
- FRAMELESS AUTO DIMMING REAR VIEW MIRROR WITH HOMELINK®
- MAZDA CONNECTED SERVICES

SAFETY AND SECURITY FEATURES
- 96MO/100K MI HIGH VOLTAGE BATTERY LIMITED WARRANTY
- 24-HOUR ROADSIDE ASSISTANCE
- BLIND SPOT MONITORING
- LANE DEPARTURE WARNING SYSTEM
- DRIVER ATTENTION ALERT
- REAR SEAT ALERT
- ANTI-THEFT ENGINE IMMOBILIZER
- TRAFFIC SIGN RECOGNITION
- FRONTAL, KNEE, CURTAIN & SIDE IMPACT AIRBAGS
- SMART BRAKE SUPPORT
- REAR CROSS TRAFFIC ALERT
- LANE KEEP ASSIST
- EMERGENCY LANE KEEPING
- MAZDA RADAR CRUISE CONTROL
- SECONDARY COLLISION REDUCTION
- FRONT & REAR PARKING SENSORS

MSRP $56,950

OPTIONAL EQUIPMENT

JCN	ARTISAN RED PAINT CHARGE	$595
PSP	SPECTRUM SET	$450
1CC	2ND - ROW CAPTAIN'S CHAIRS	NO CHARGE
1PP	PREMIUM PLUS PACKAGE	NO CHARGE

- 7 PASSENGER SEATING
- NAPPA LEATHER-TRIMMED SEATS
- 8-WAY POWER FRONT PASSENGER SEAT
- HEATED 2ND-ROW CAPTAIN'S CHAIRS
- HEATED LEATHER STEERING WHEEL
- VENTILATED FRONT SEATS
- WINDSHIELD WIPER DE-ICER
- 12.3" FULLY DIGITAL LCD METER
- 12.3" COLOR CENTER DISPLAY
- FRONT CROSS TRAFFIC ALERT/BRAKING
- 360 DEGREE VIEW MONITOR
- SMART BRAKE SUPPORT REVERSE

Total Vehicle and Options	$57,995
Delivery, Processing and Handling Fee	$1,375
Total MSRP	**$59,370**

Photo No. 071 - Monroney Label

Head Restraints

Your vehicle is equipped with head restraints on all outboard seats and the second-row/third-row center seat*. The head restraints are intended to help protect you and the passengers from neck injury.

Warnings and Cautions for Using the Head Restraints

⚠ WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly adjusted.
Driving with the head restraints adjusted too low or removed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

After installing a head restraint, try lifting it to make sure that it does not pull out.
Driving with an unsecured head restraint is dangerous as the effectiveness of the head restraint will be compromised which could cause it to unexpectedly detach from the seat. **(Third-row seat)**

Always drive with the head restraints in their upright positions when the third-row seats are occupied, and make sure they are securely locked in place.
Driving with the head restraints folded down is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

*Some models.

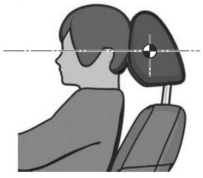
⚠ CAUTION

- When installing a head restraint, make sure that it is installed correctly with the front of the head restraint facing forward. If the head restraint is installed incorrectly, it could detach from the seat during a collision and result in injury.
- The head restraints on each of the front and second-row/third-row seats are specialized to each seat. Do not switch around the head restraint positions. If a head restraint is not installed to its correct seat position, the effectiveness of the head restraint during a collision will be compromised which could cause injury.

How to Use the Head Restraints

Adjusting the Head Restraints

Adjust the head restraint so that the center is even with the top of the passenger's ears.



To Raise a Head Restraint

Pull up a head restraint.

To Lower a Head Restraint

Lower a head restraint while pressing the lock knob.

Front seats

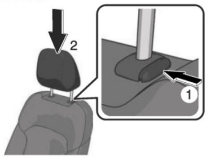


Photo No. 072 - Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

PHOTOGRAPH NOT APPLICABLE

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

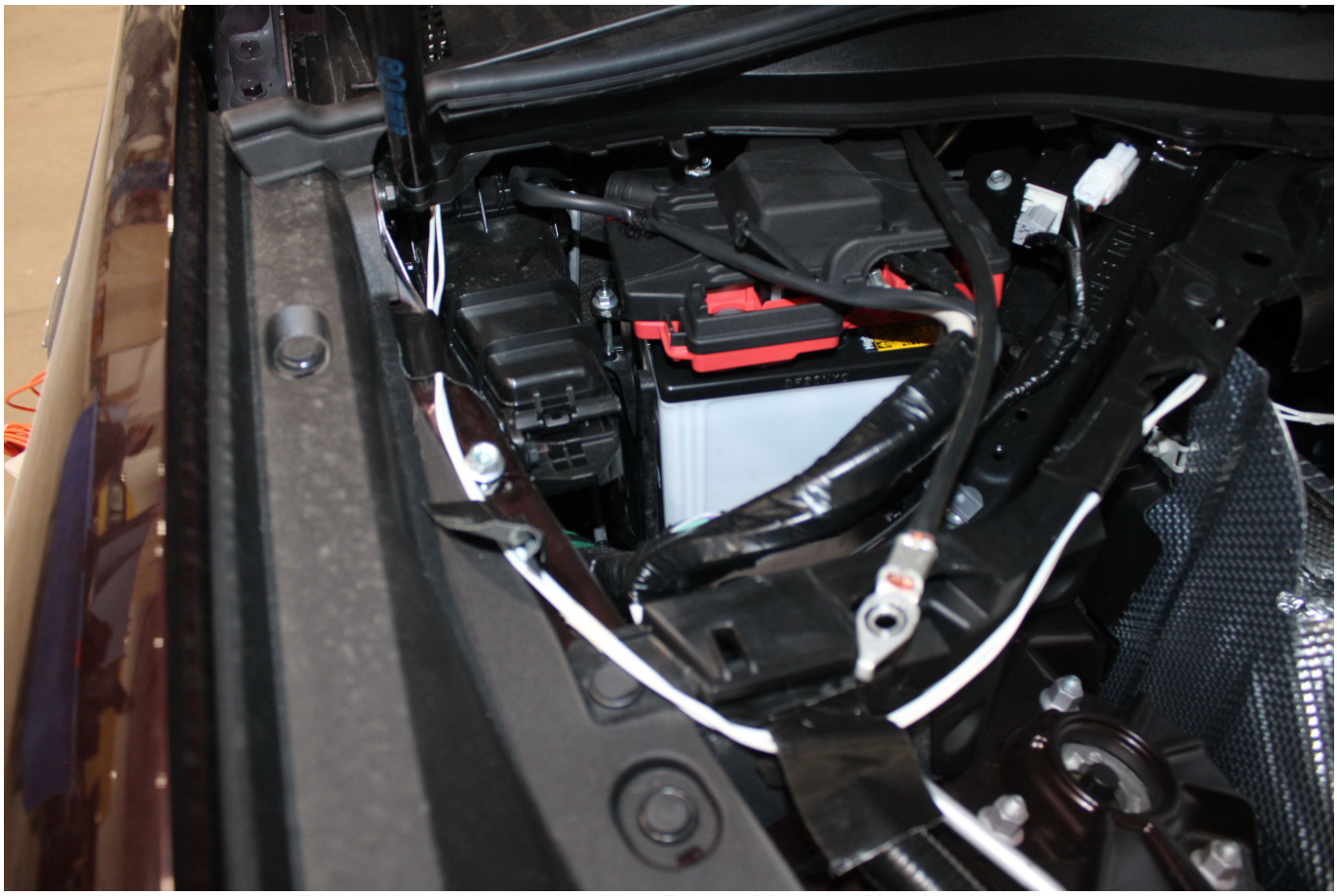


Photo No. 305-01 - Auxiliary Power Module Warning Label

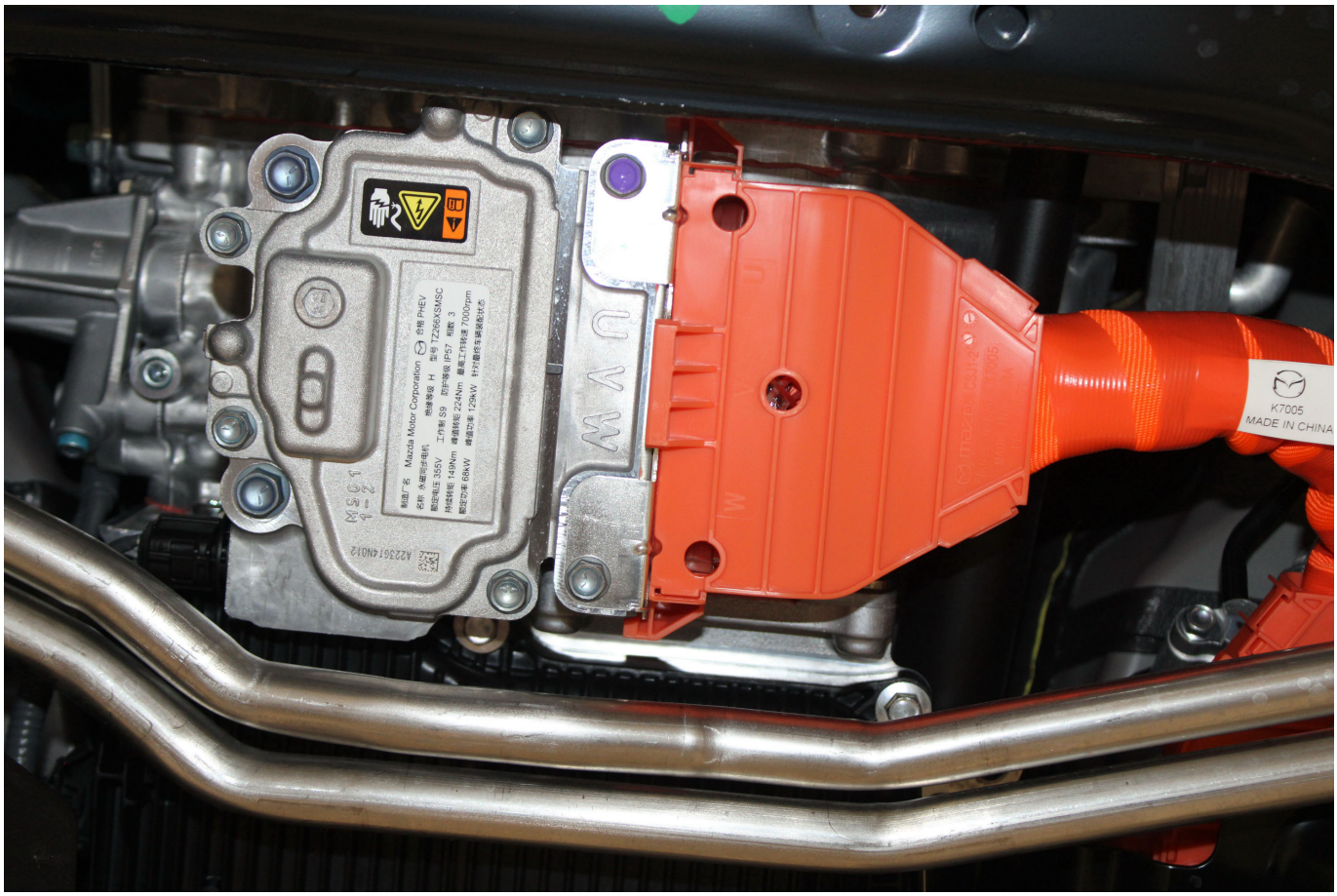


Photo No. 305-02 - Power Inverter Warning Label

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-03 - First Responder Warning Label

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-04 - First Responder Warning Location

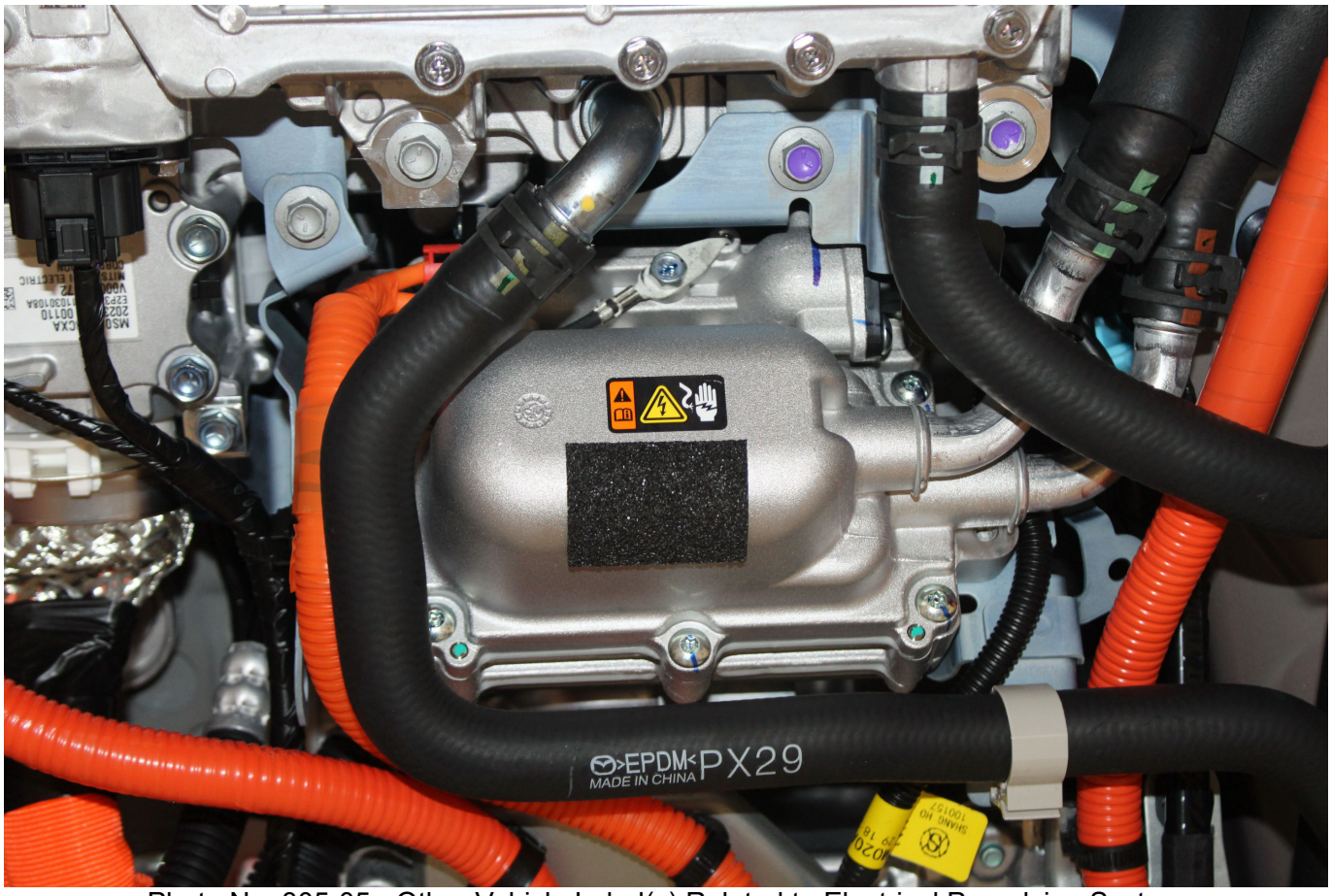


Photo No. 305-05 - Other Vehicle Label(s) Related to Electrical Propulsion System

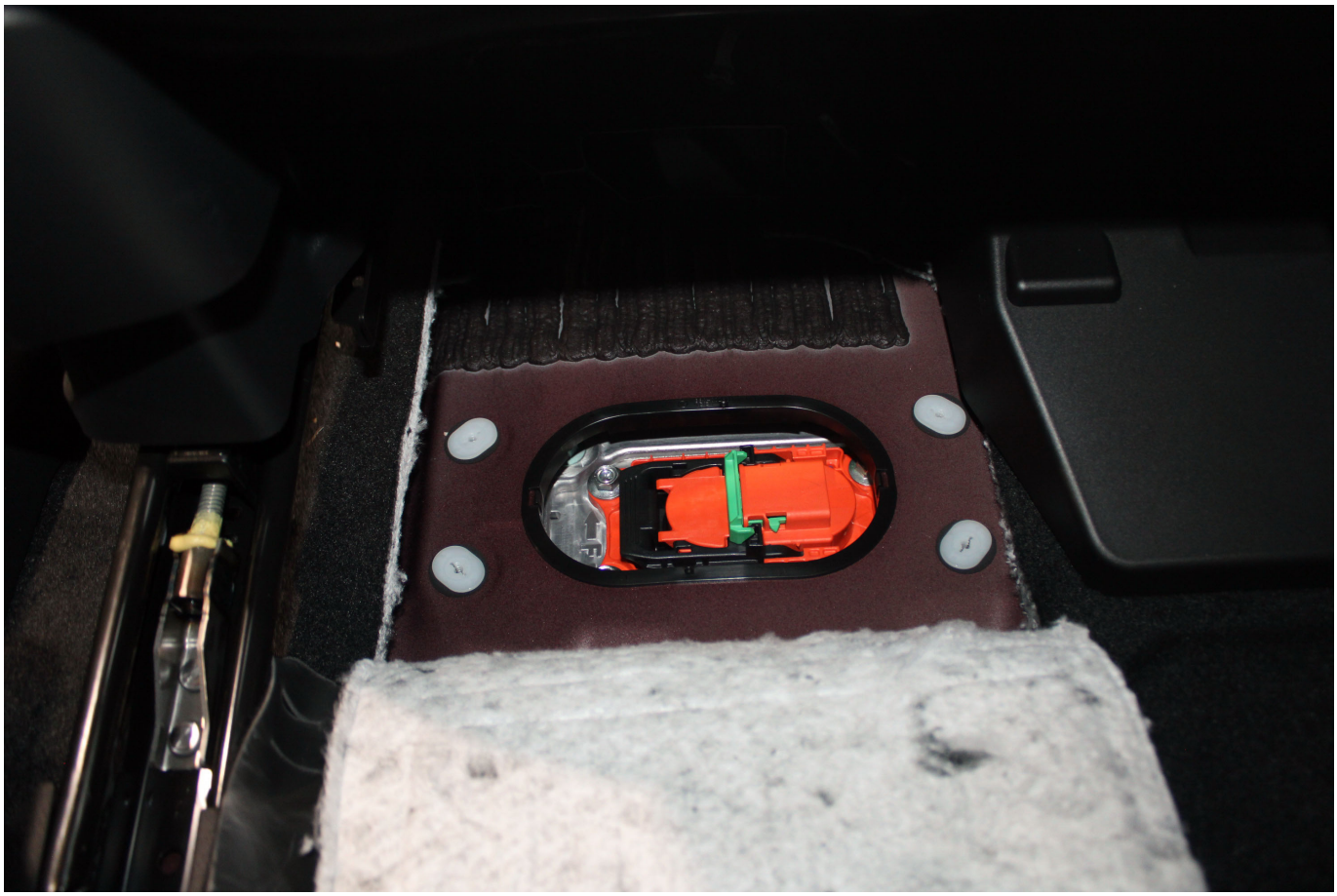


Photo No. 305-06 - Manual High Voltage Service Disconnect in Place

Photo No. 305-07 - Manual High Voltage Service Disconnect Removed

Photo No. 305-08 - Manual High Voltage Service Disconnect Removed

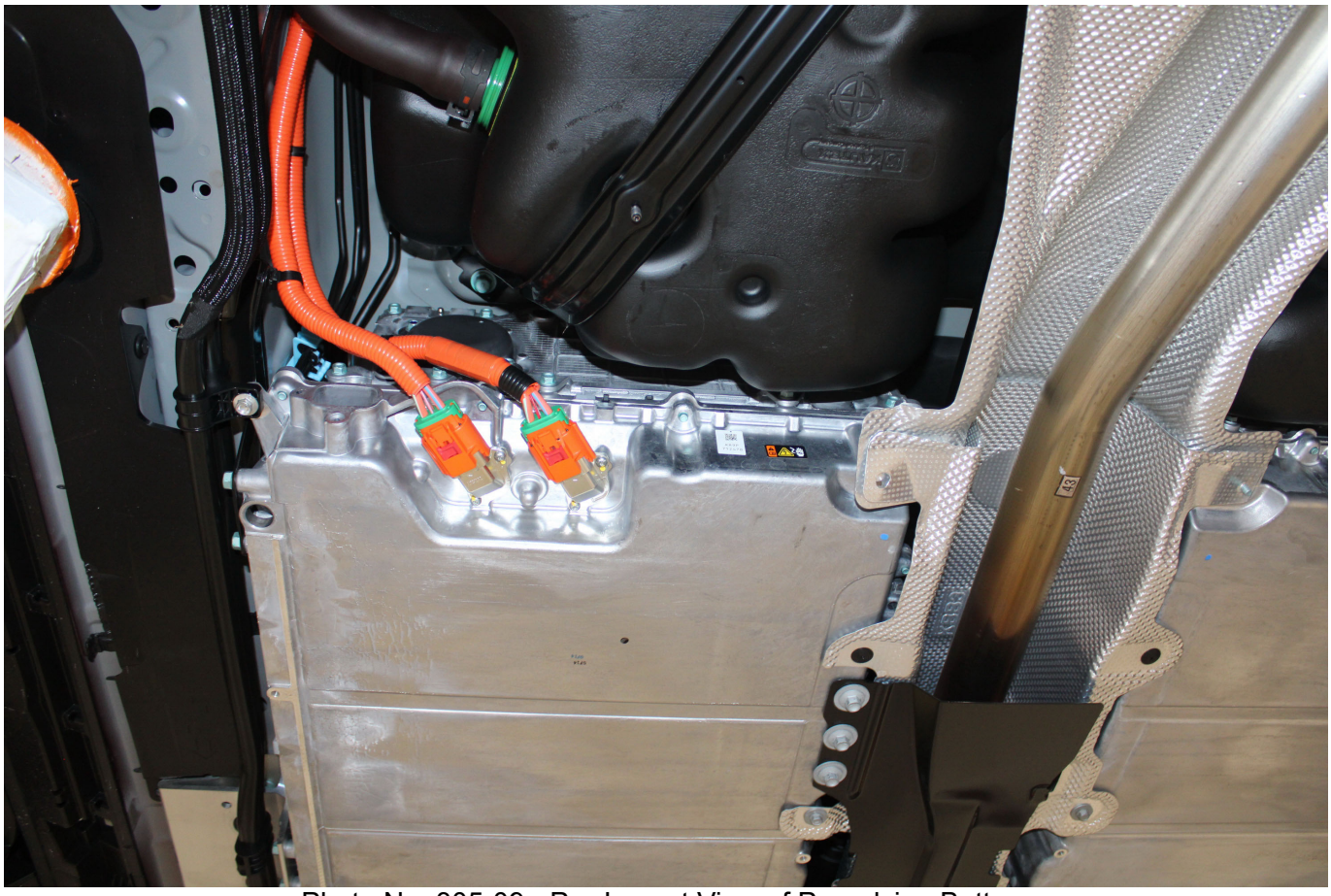


Photo No. 305-09 - Pre-Impact View of Propulsion Battery

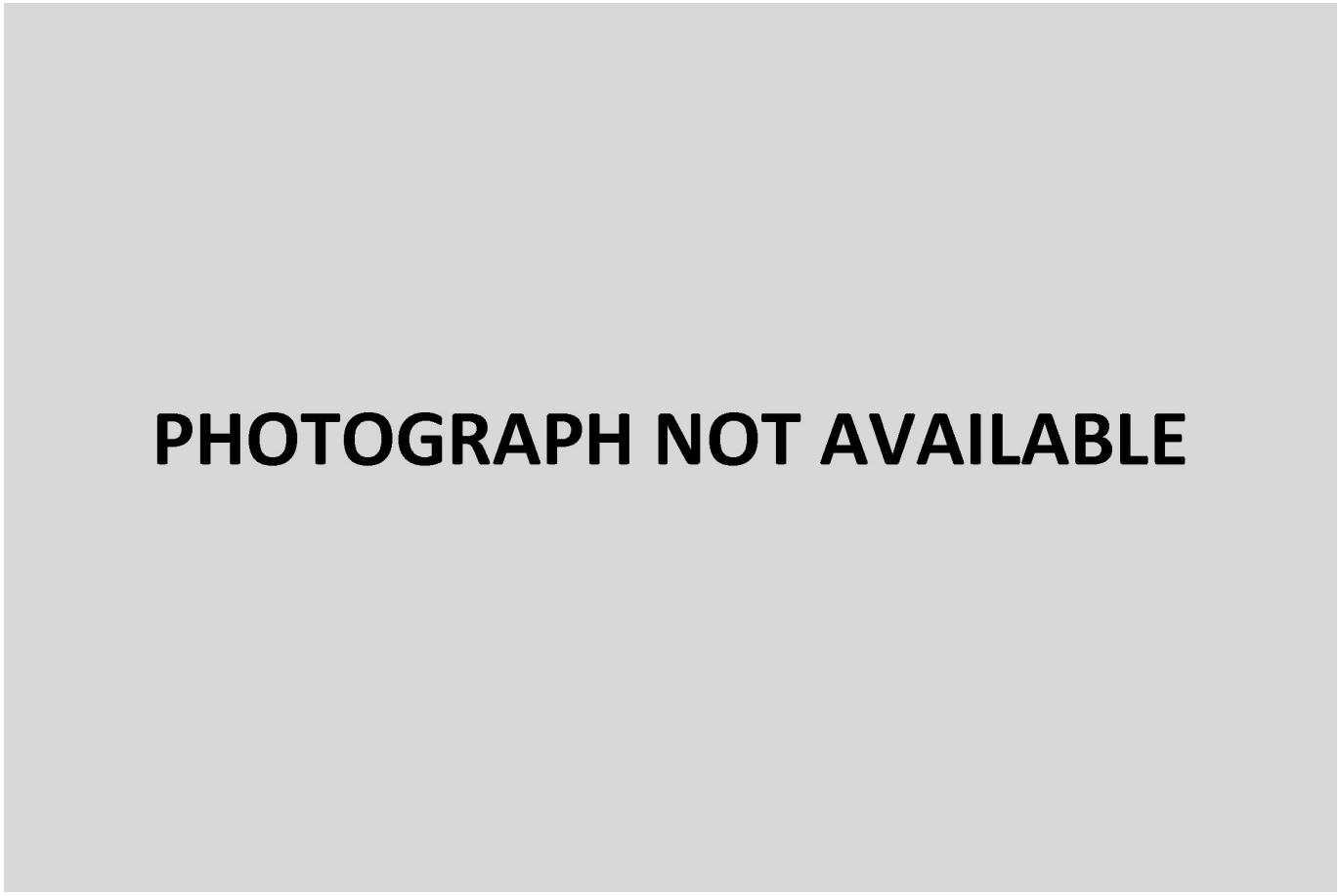


Photo No. 305-10 - Post-Impact Front View of Propulsion Battery

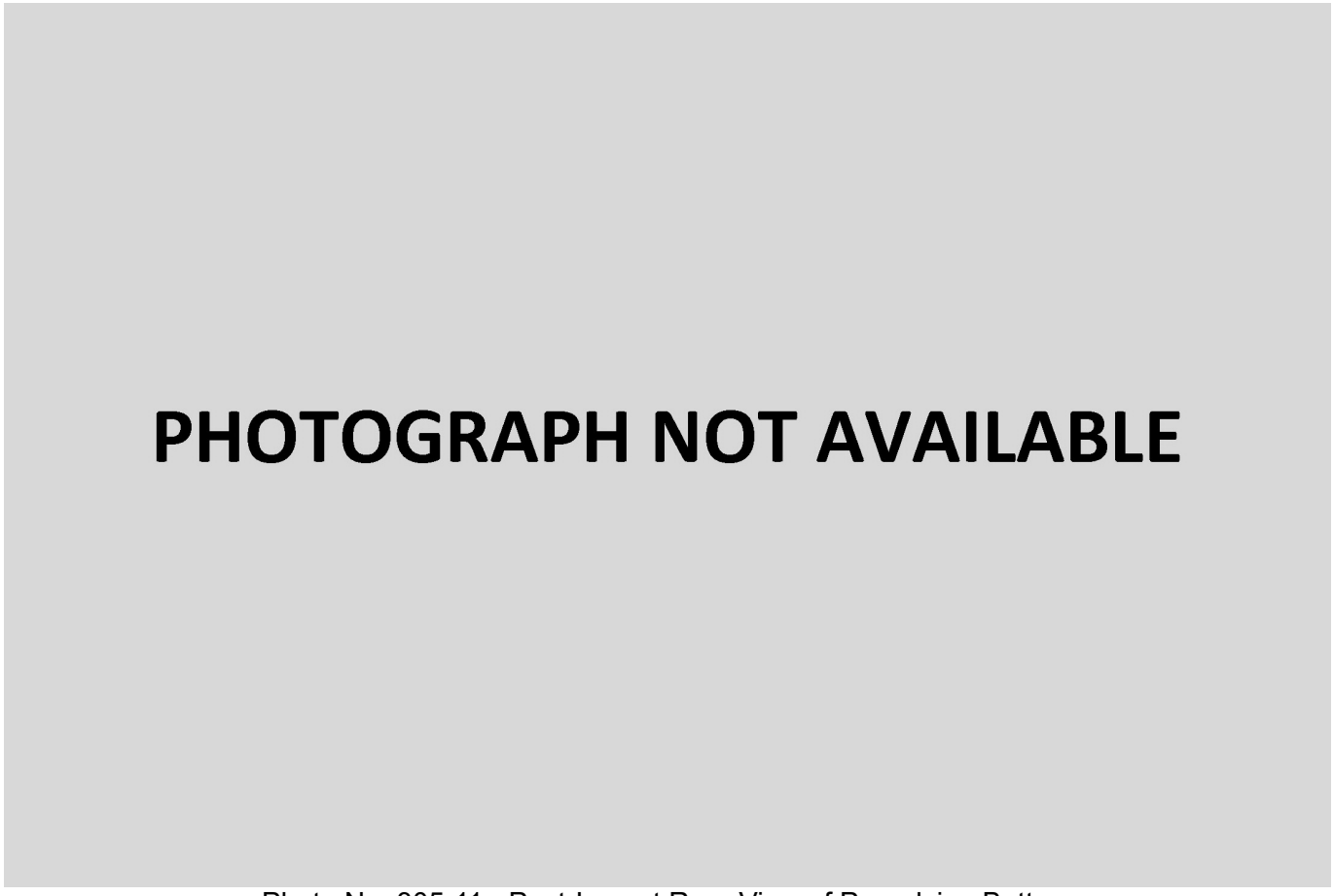


Photo No. 305-11 - Post-Impact Rear View of Propulsion Battery

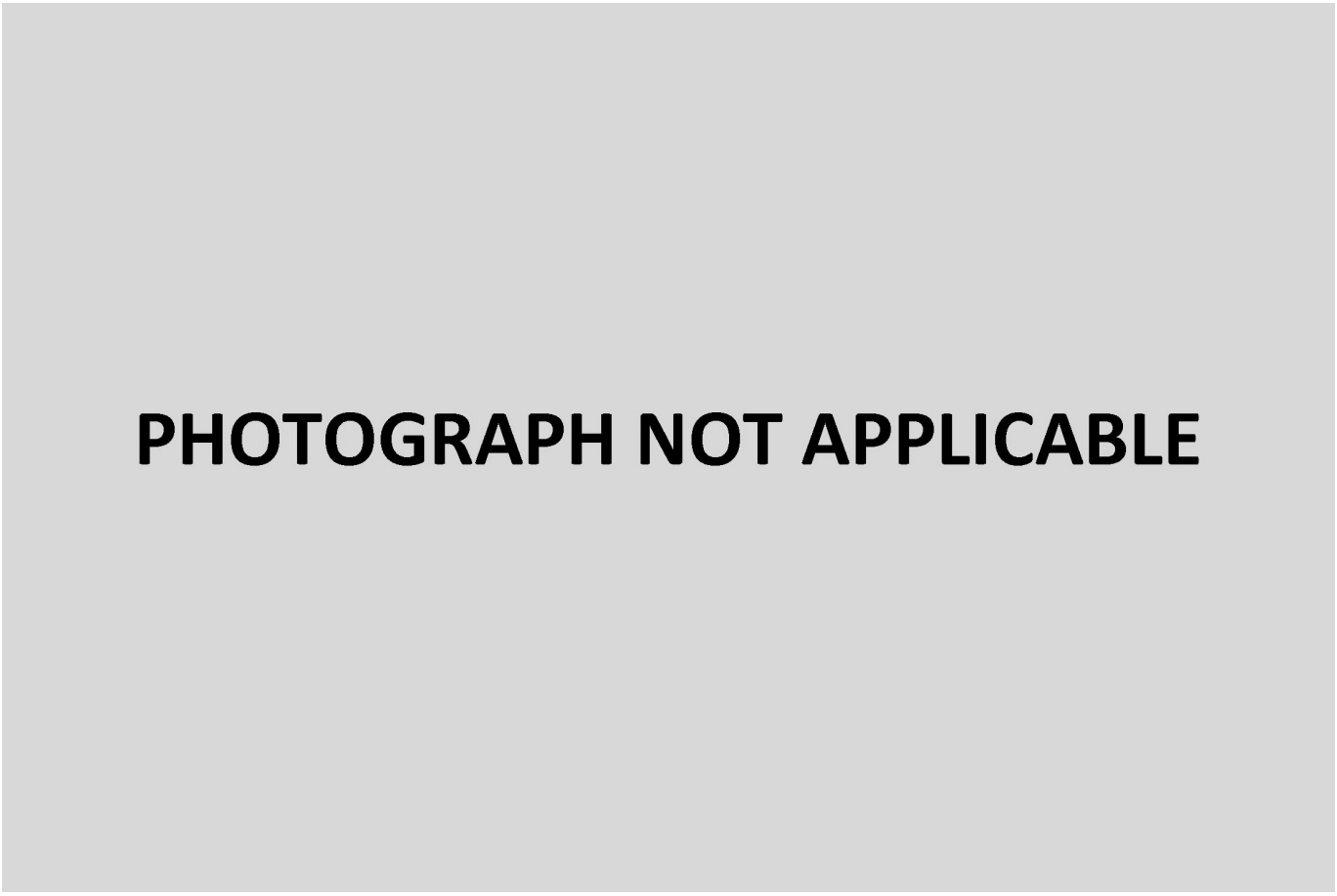


Photo No. 305-12 - Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

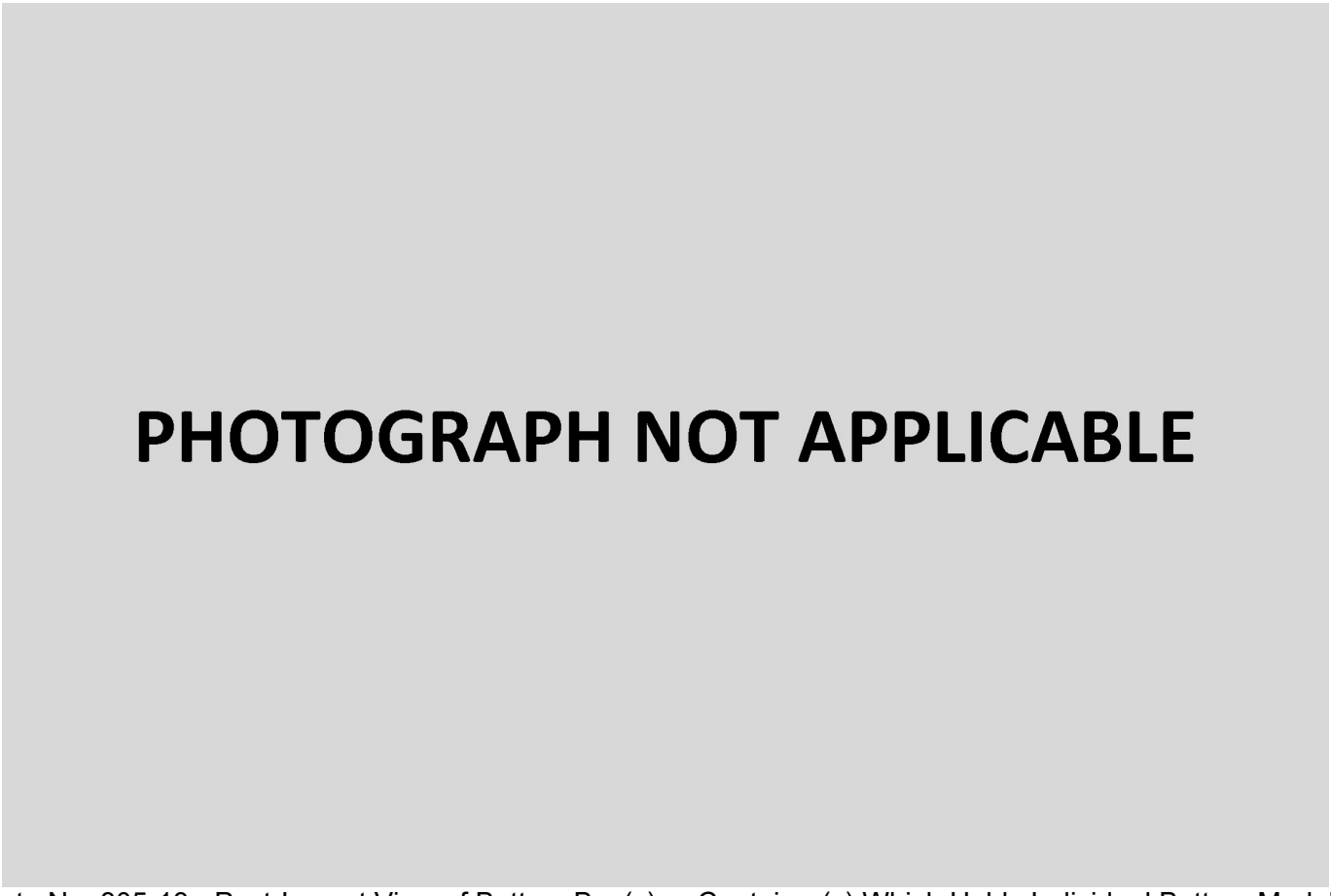


Photo No. 305-13 - Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

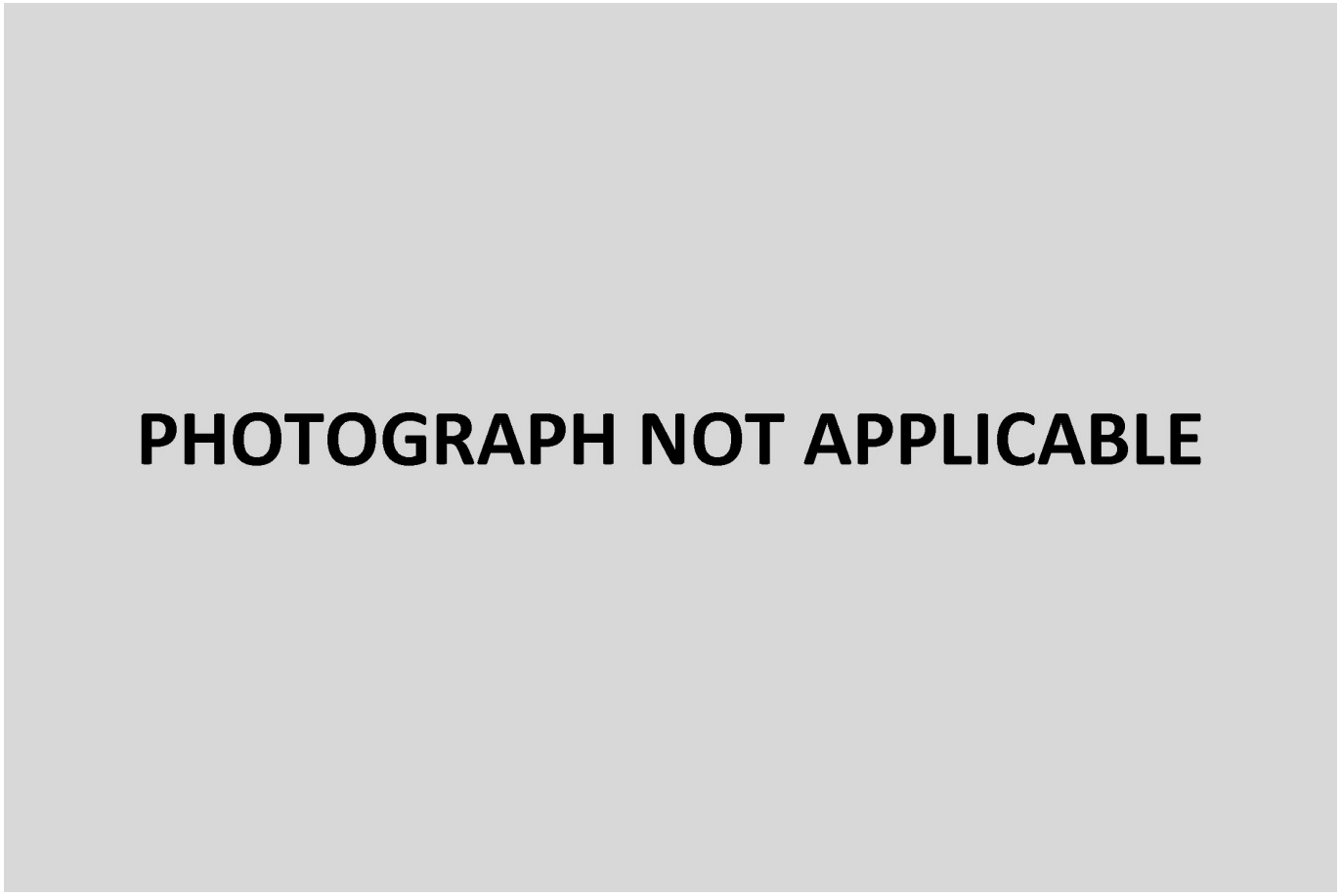


Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

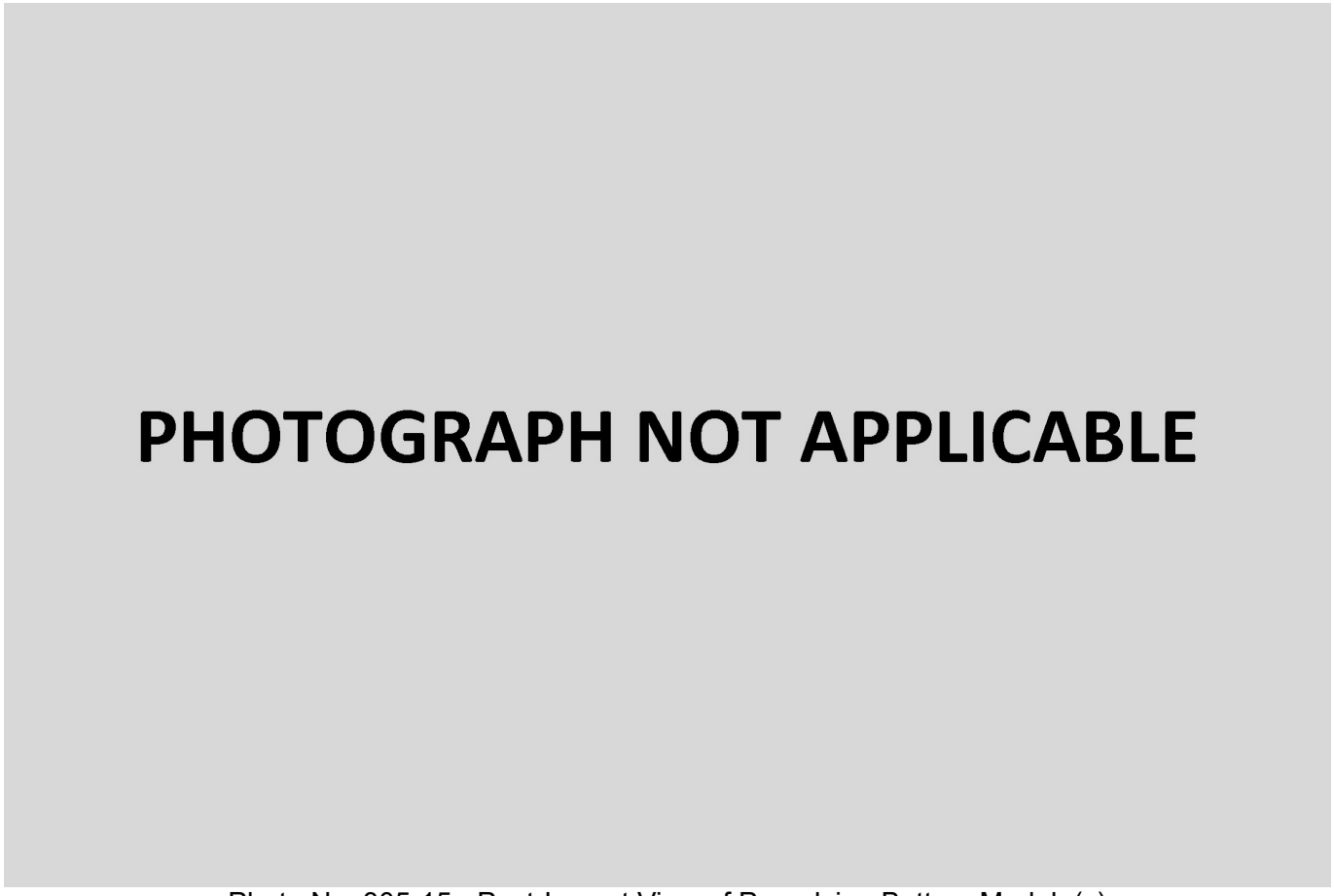


Photo No. 305-15 - Post-Impact View of Propulsion Battery Module(s)

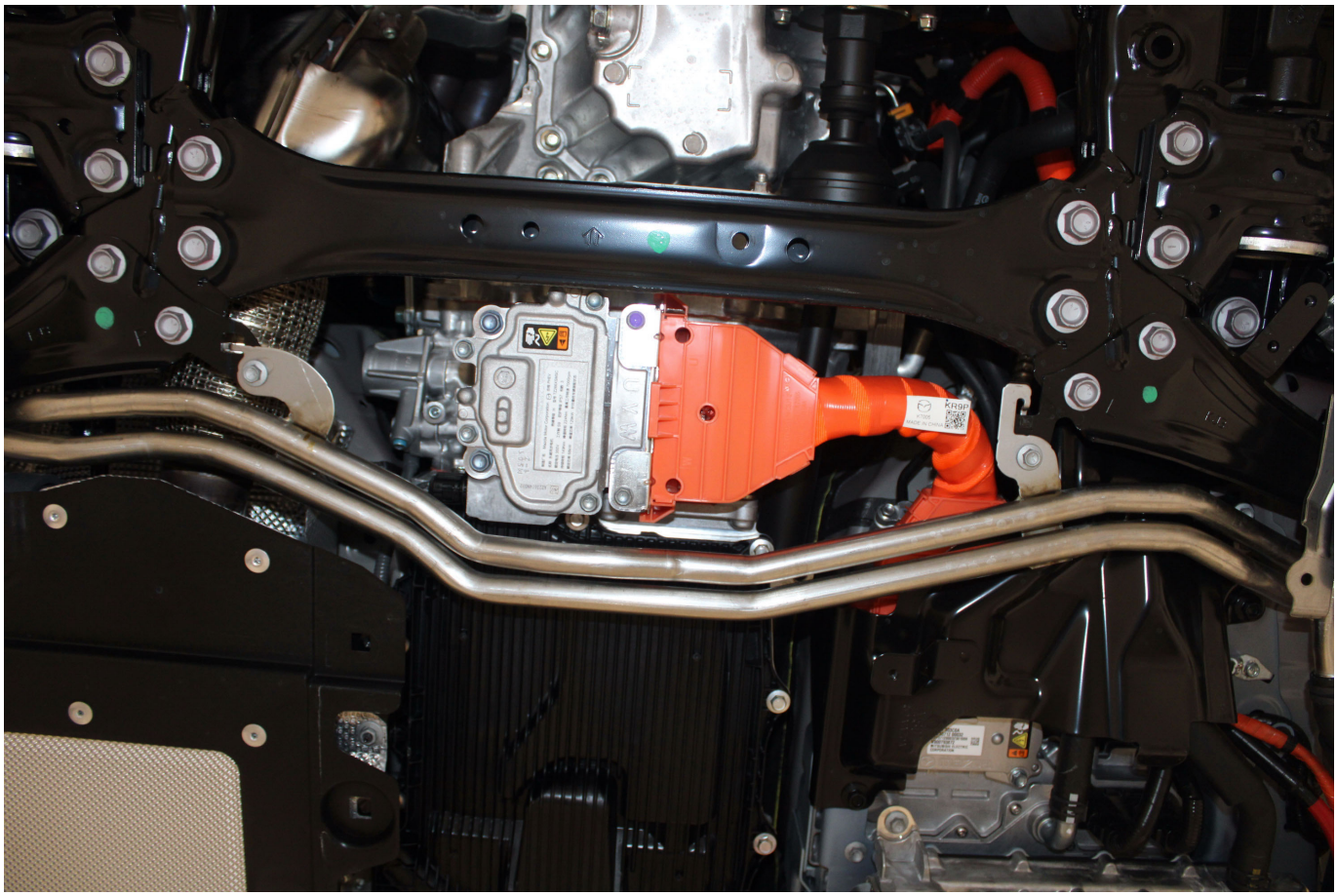


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

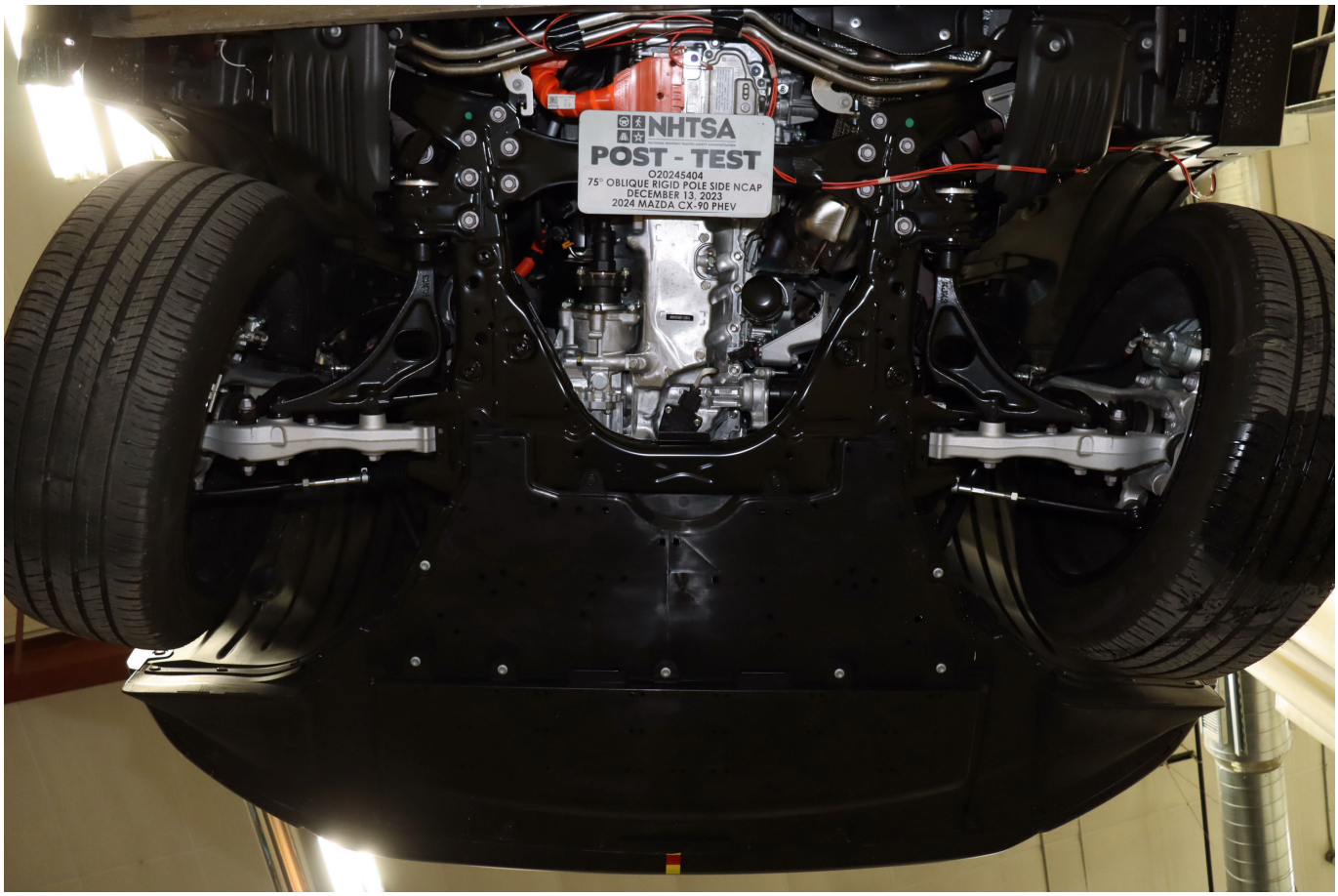


Photo No. 305-17 - Post-Impact View of Electric Propulsion Drive

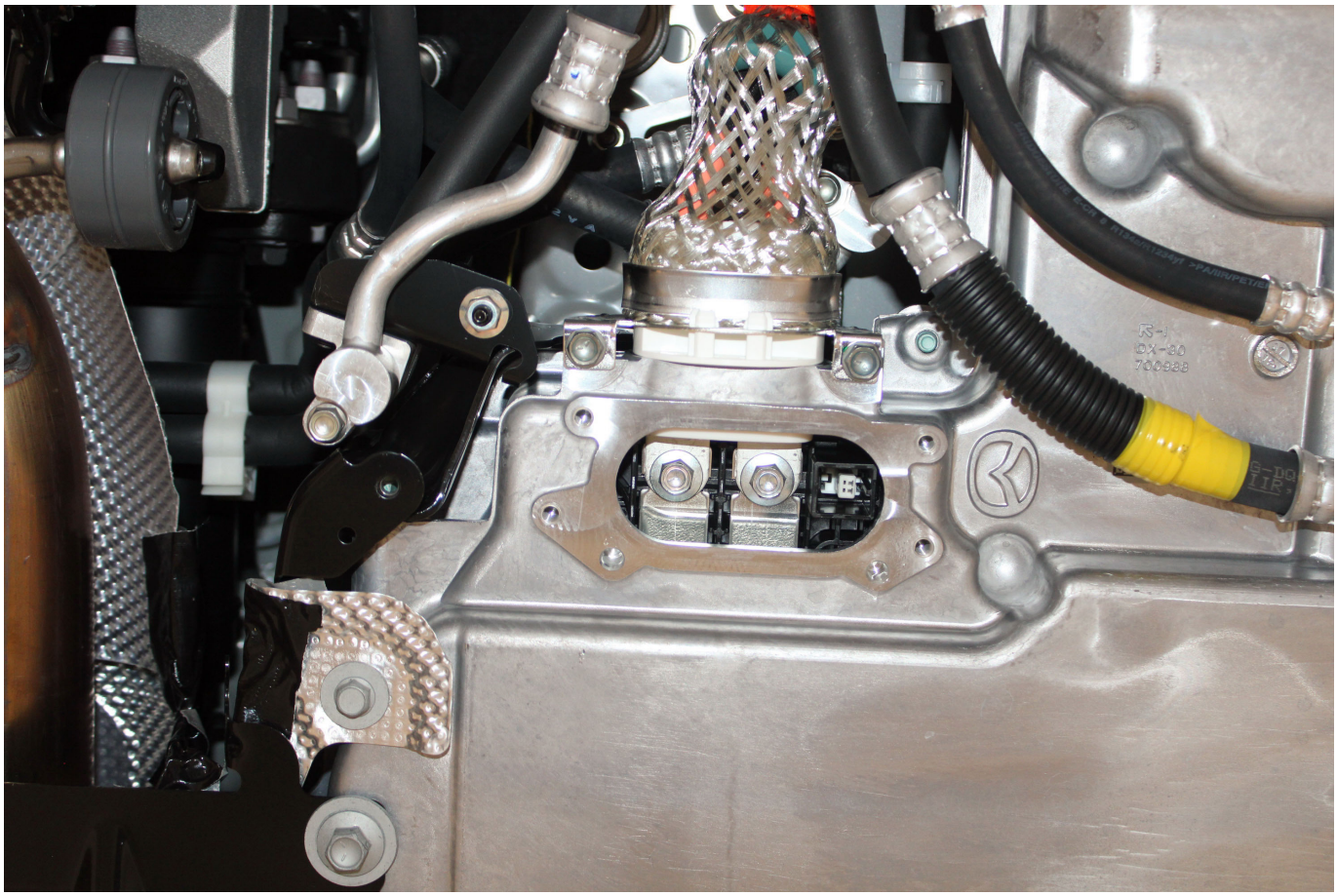


Photo No. 305-18 - Pre-Impact View of High Voltage Interconnect(s)

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-19 - Pre-Impact View Propulsion Battery Venting System(s)

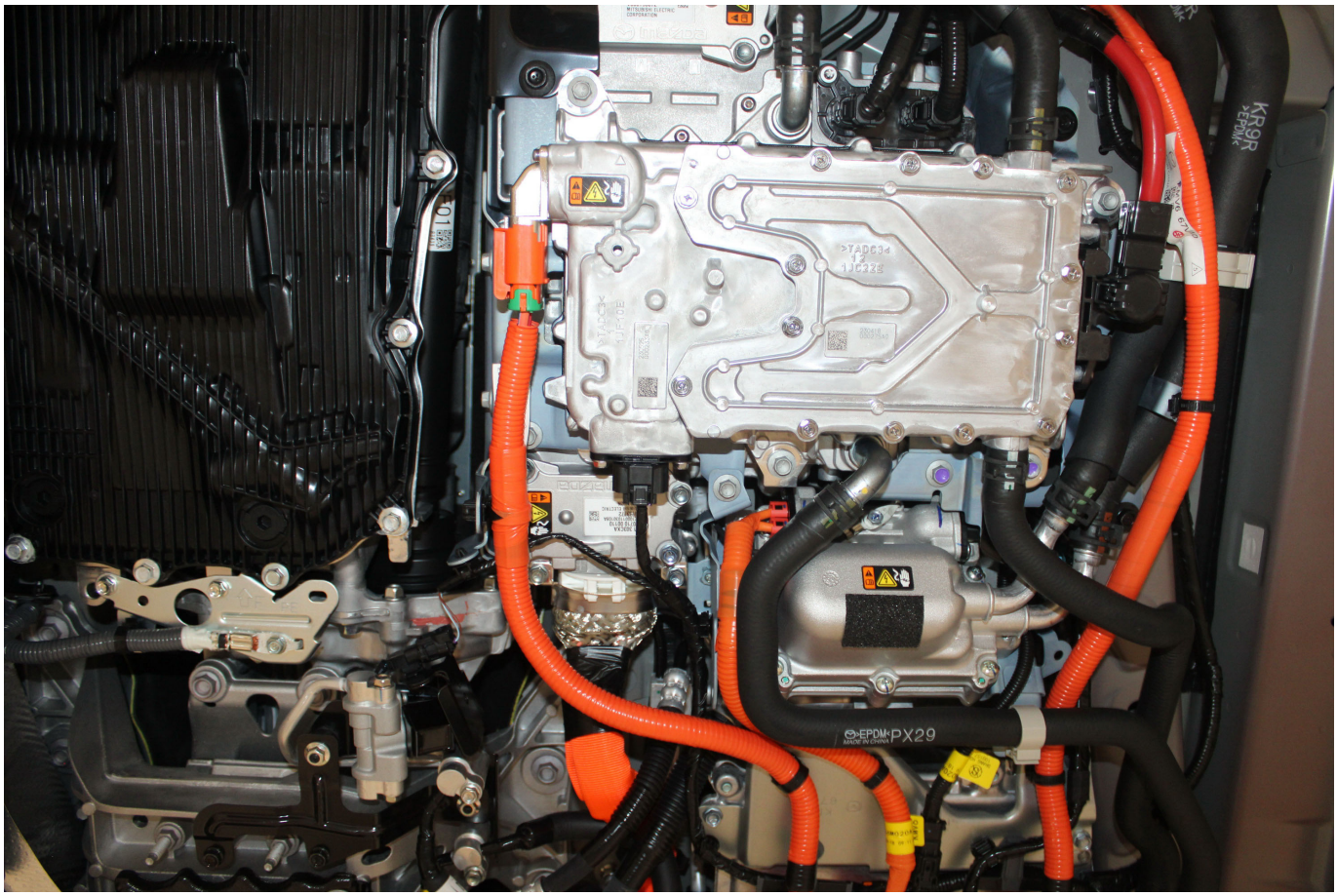


Photo No. 305-20 - Pre-Impact View of Other Visible Electric Propulsion Components

Photo No. 305-21 - Pre-Impact View of Ground Lead Attached

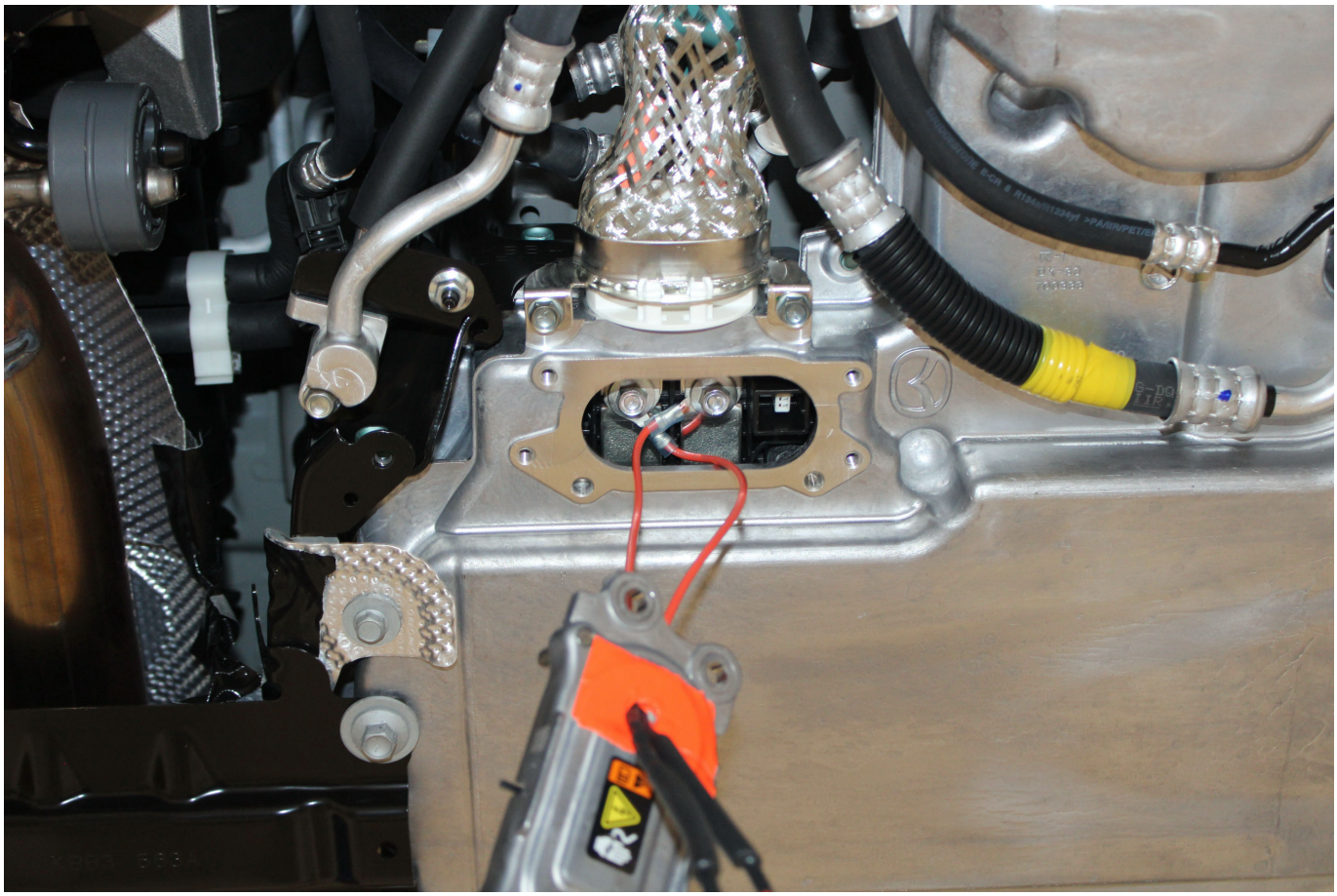


Photo No. 305-22 - Pre-Impact View of High Voltage Leads Attached

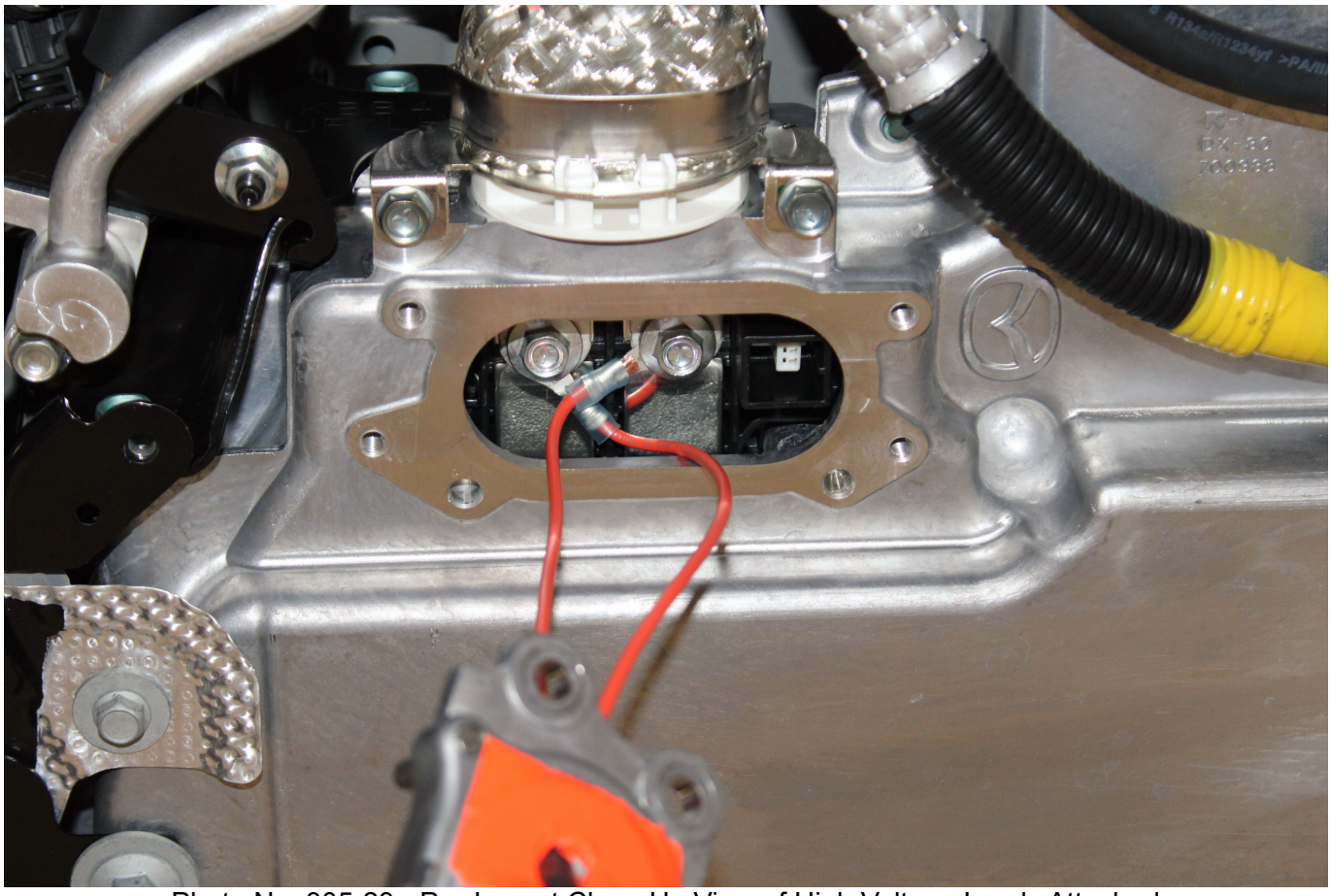


Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached

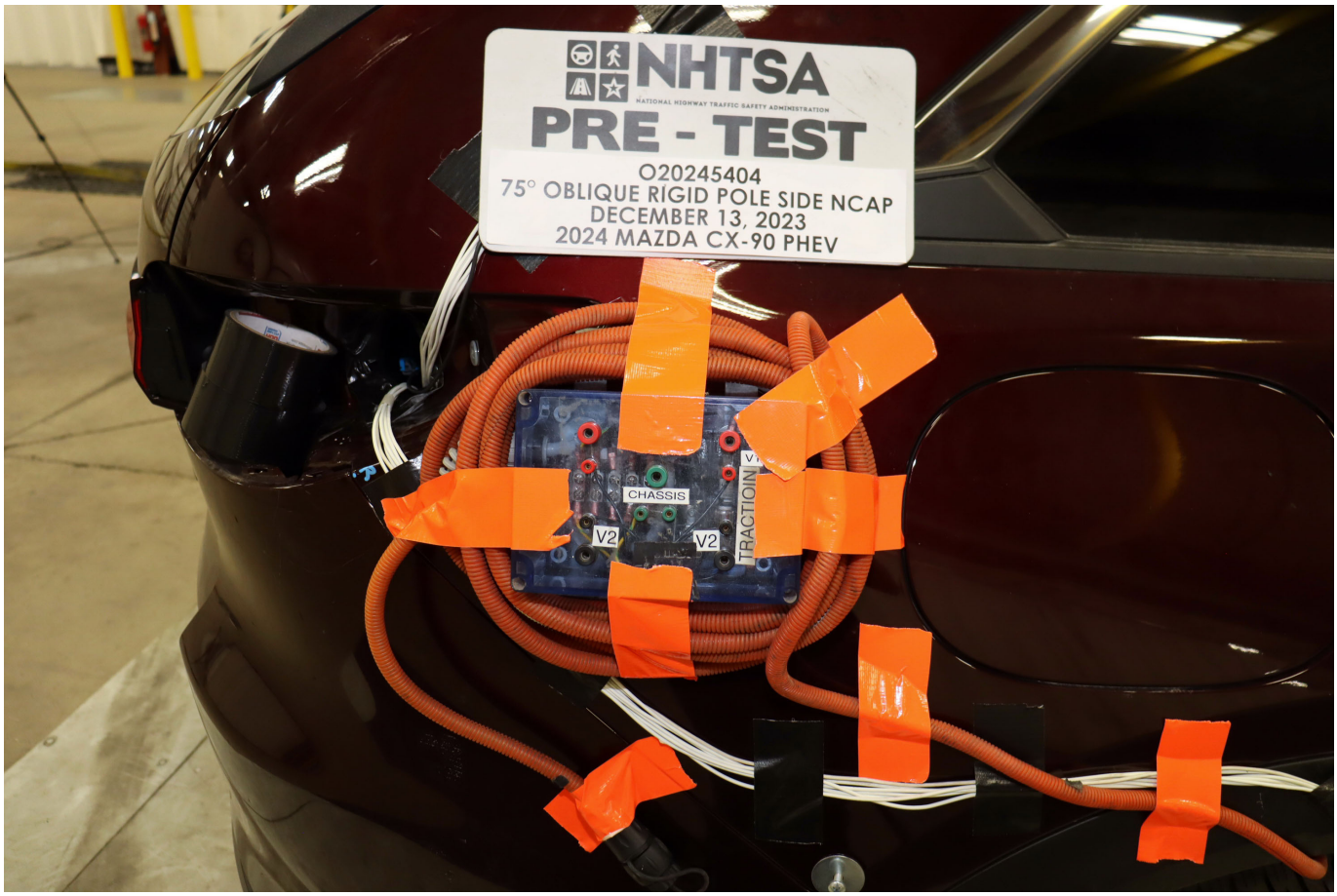


Photo No. 305-24 - Pre-Impact View of Installed Test Interface Port

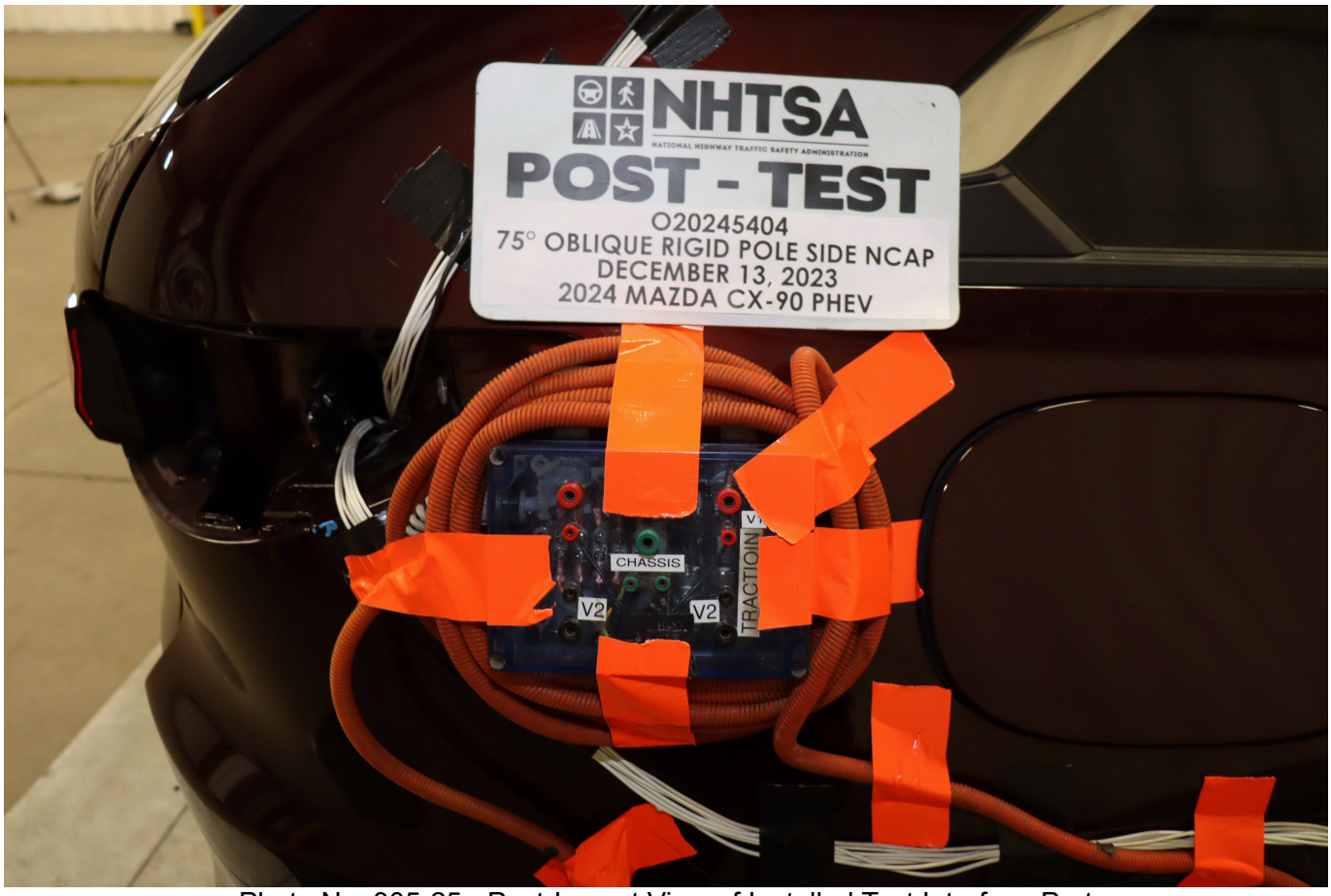


Photo No. 305-25 - Post-Impact View of Installed Test Interface Port

Photo No. 305-26 - Pre-Impact View of Other Test Devices

Photo No. 305-27 - Post-Impact View of Other Test Devices

Photo No. 305-28 - FMVSS No. 305 Static Rollover at 90 Degrees

Photo No. 305-29 - FMVSS No. 305 Static Rollover at 180 Degrees

Photo No. 305-30 - FMVSS No. 305 Static Rollover at 270 Degrees

Photo No. 305-31 - FMVSS No. 305 Static Rollover at 360 Degrees

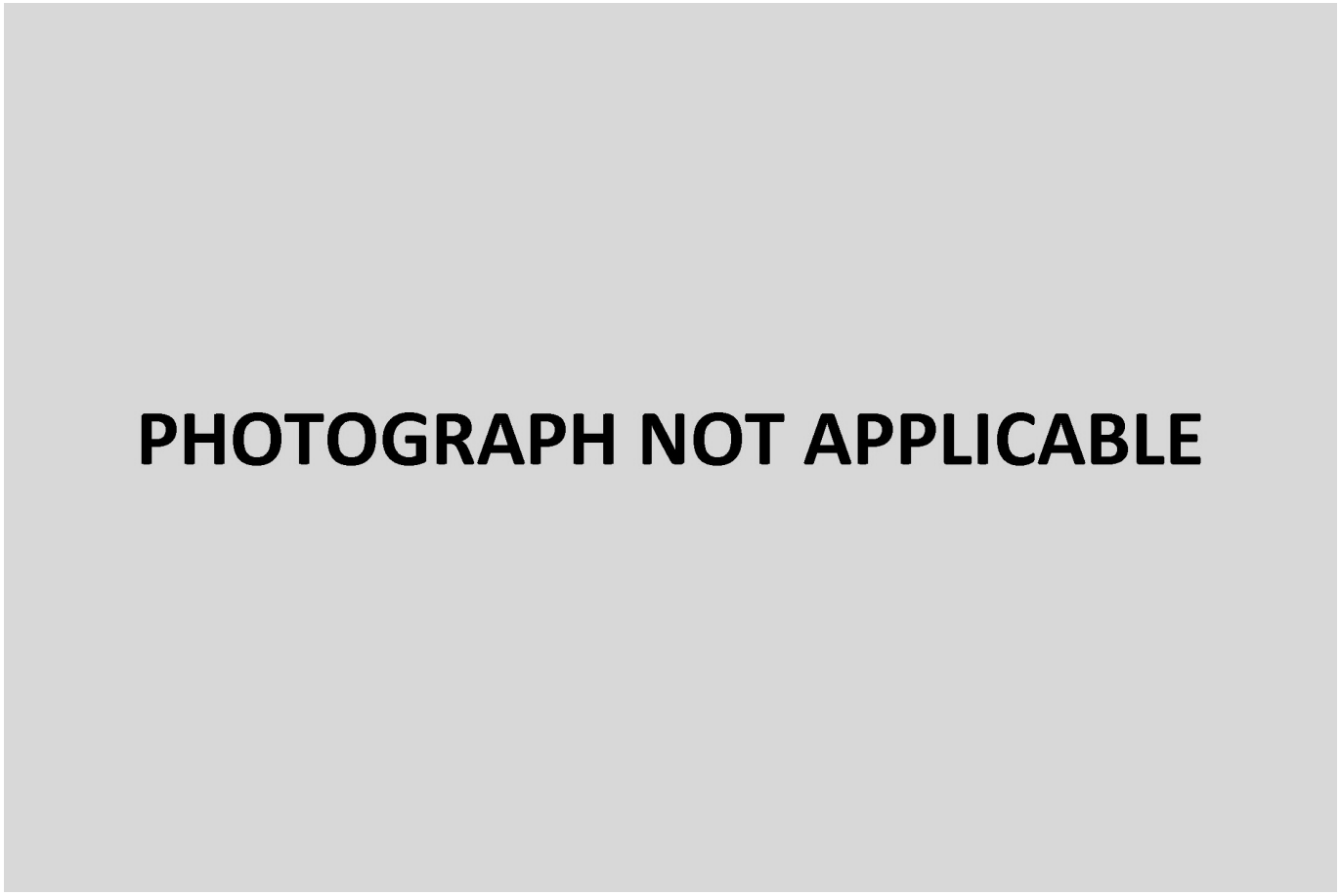


Photo No. 305-32 - Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

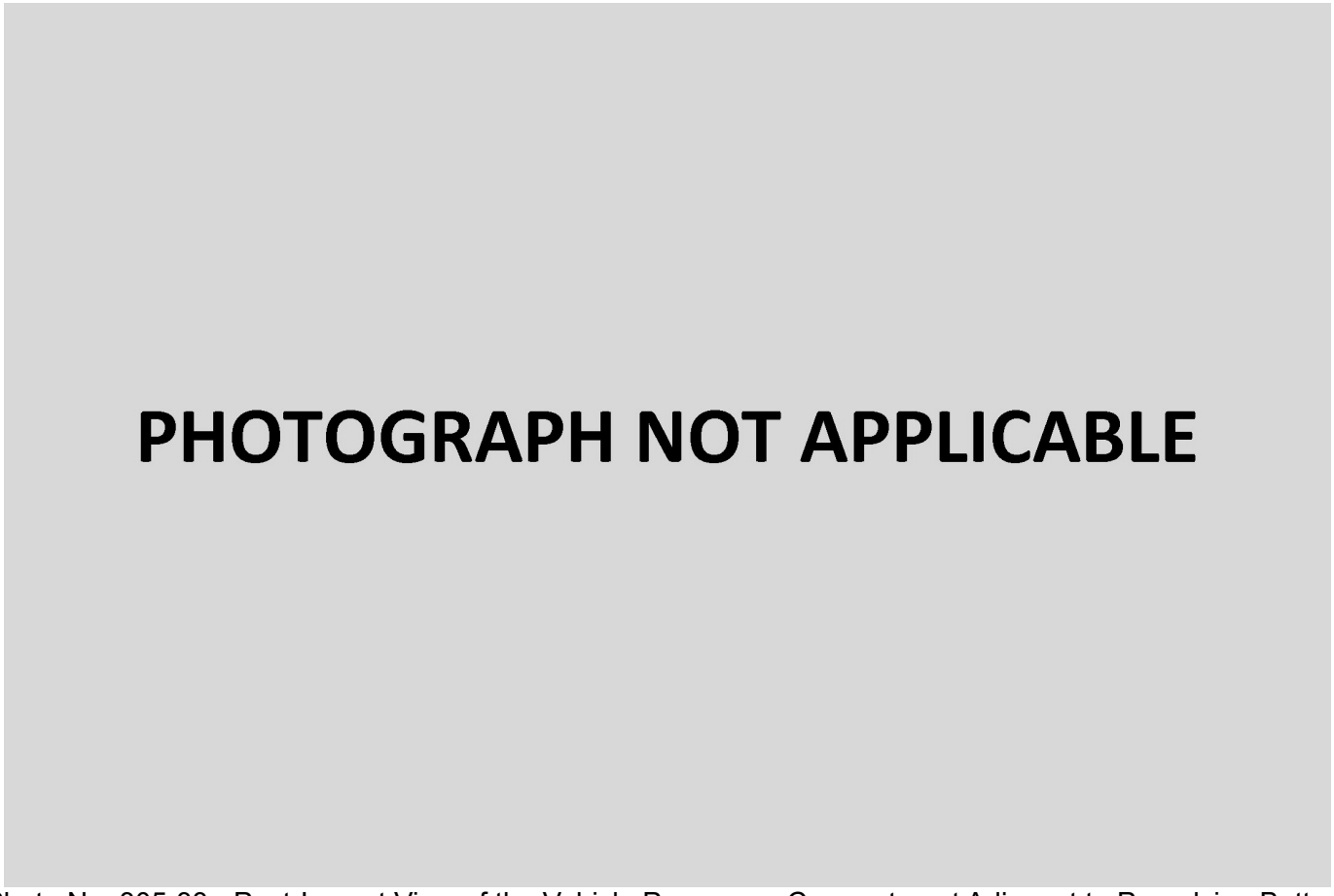


Photo No. 305-33 - Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

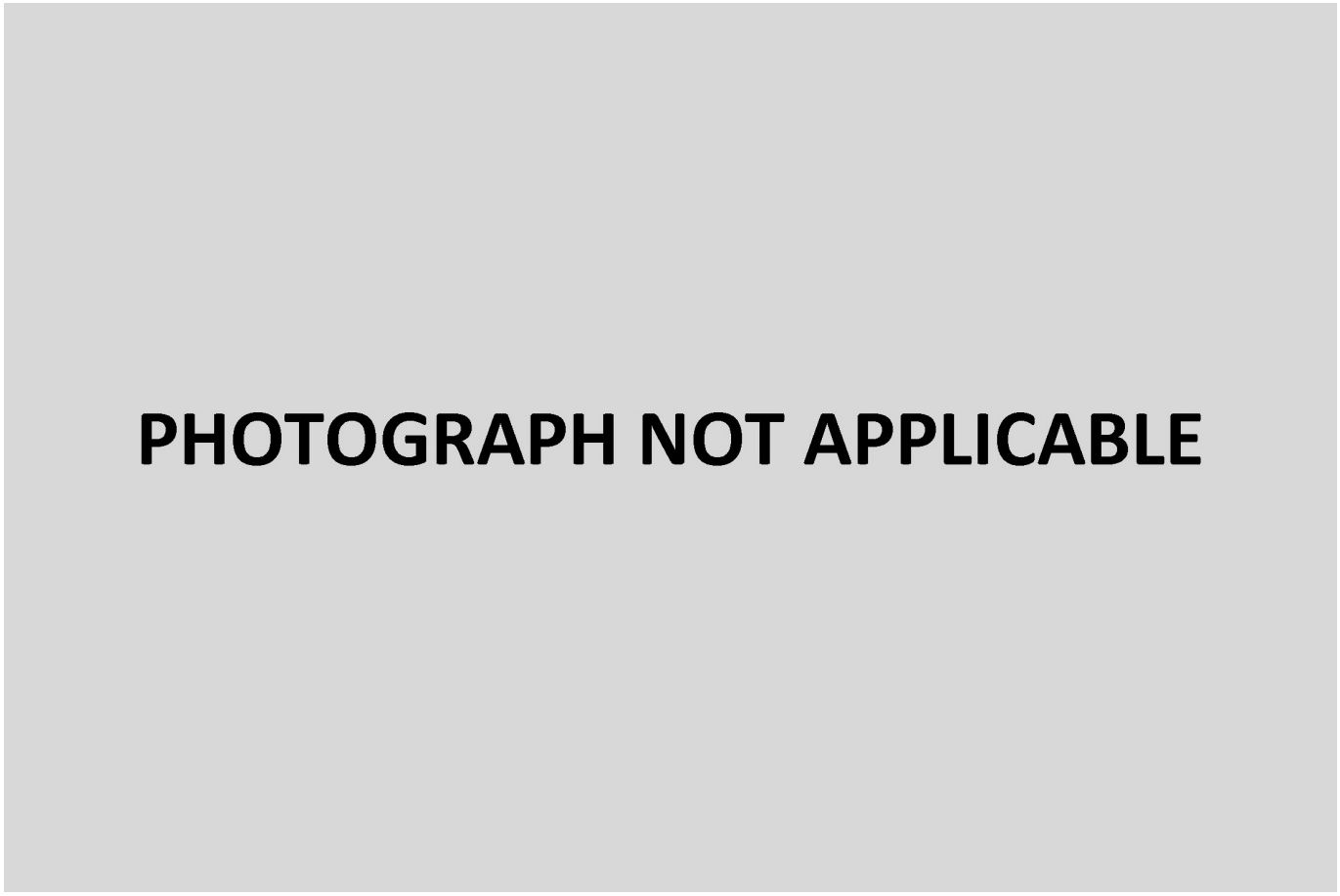


Photo No. 305-34 - Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

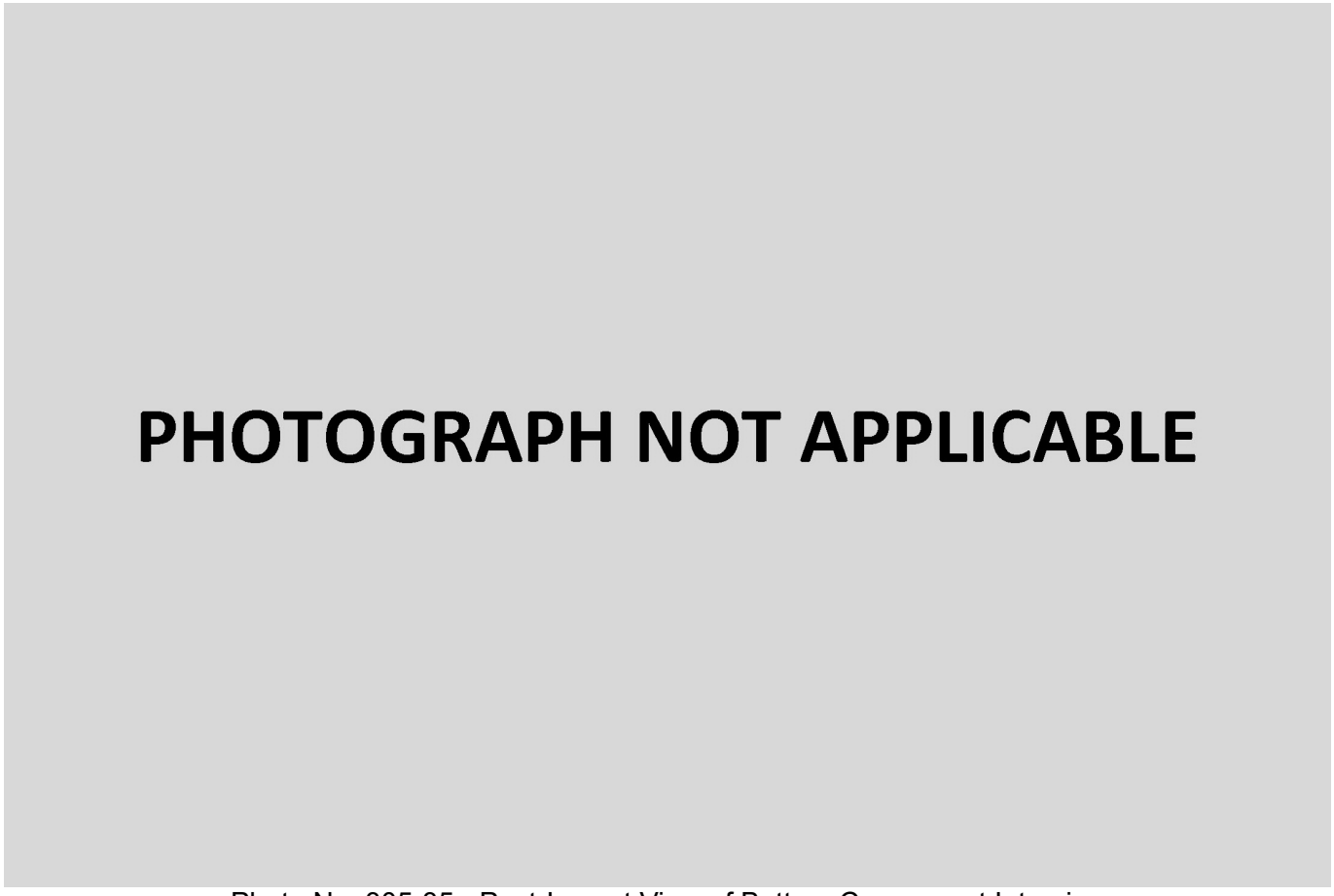


Photo No. 305-35 - Post-Impact View of Battery Component Intrusion

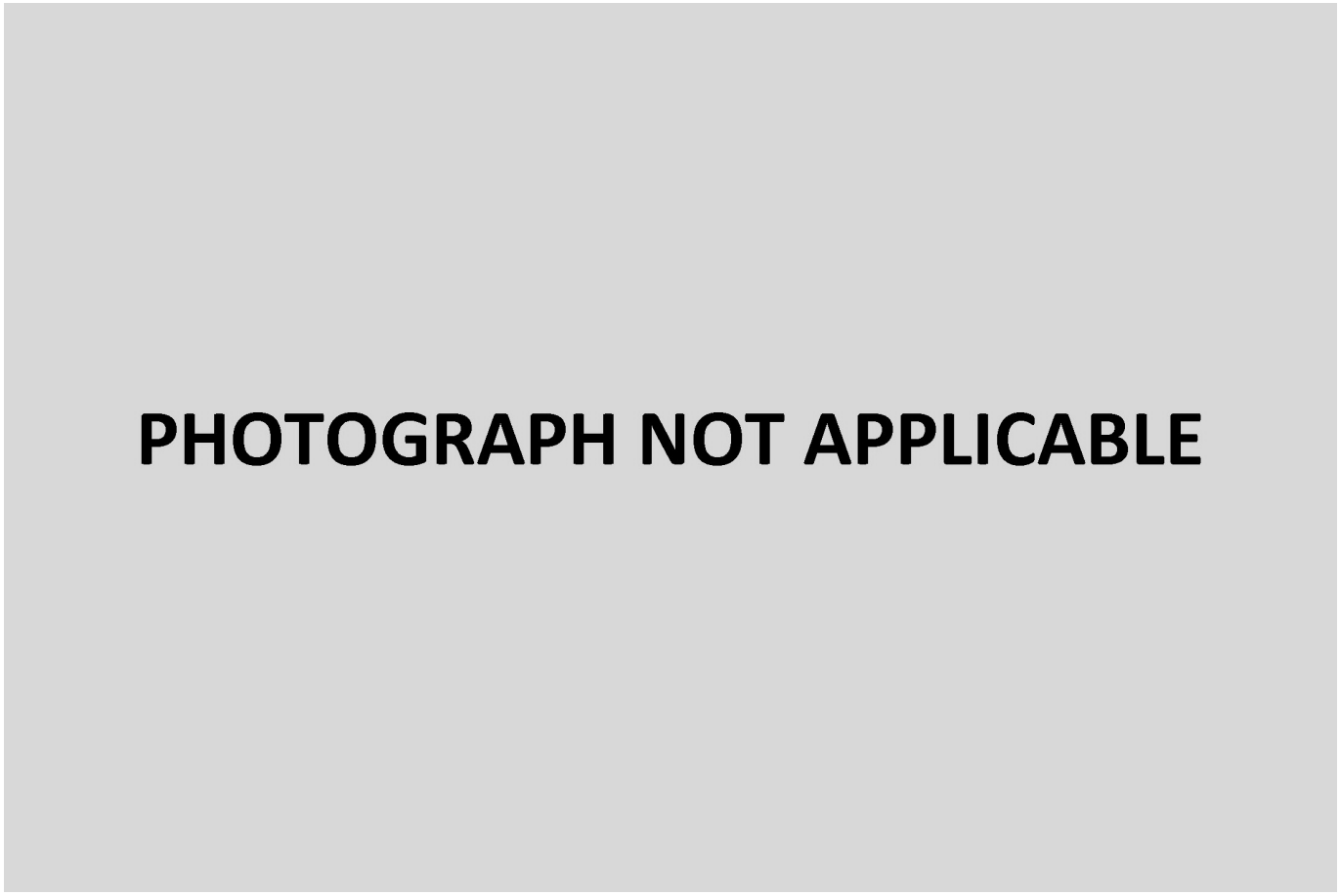


Photo No. 305-36 - Post-Impact View of Battery Module Movement or Retention Loss

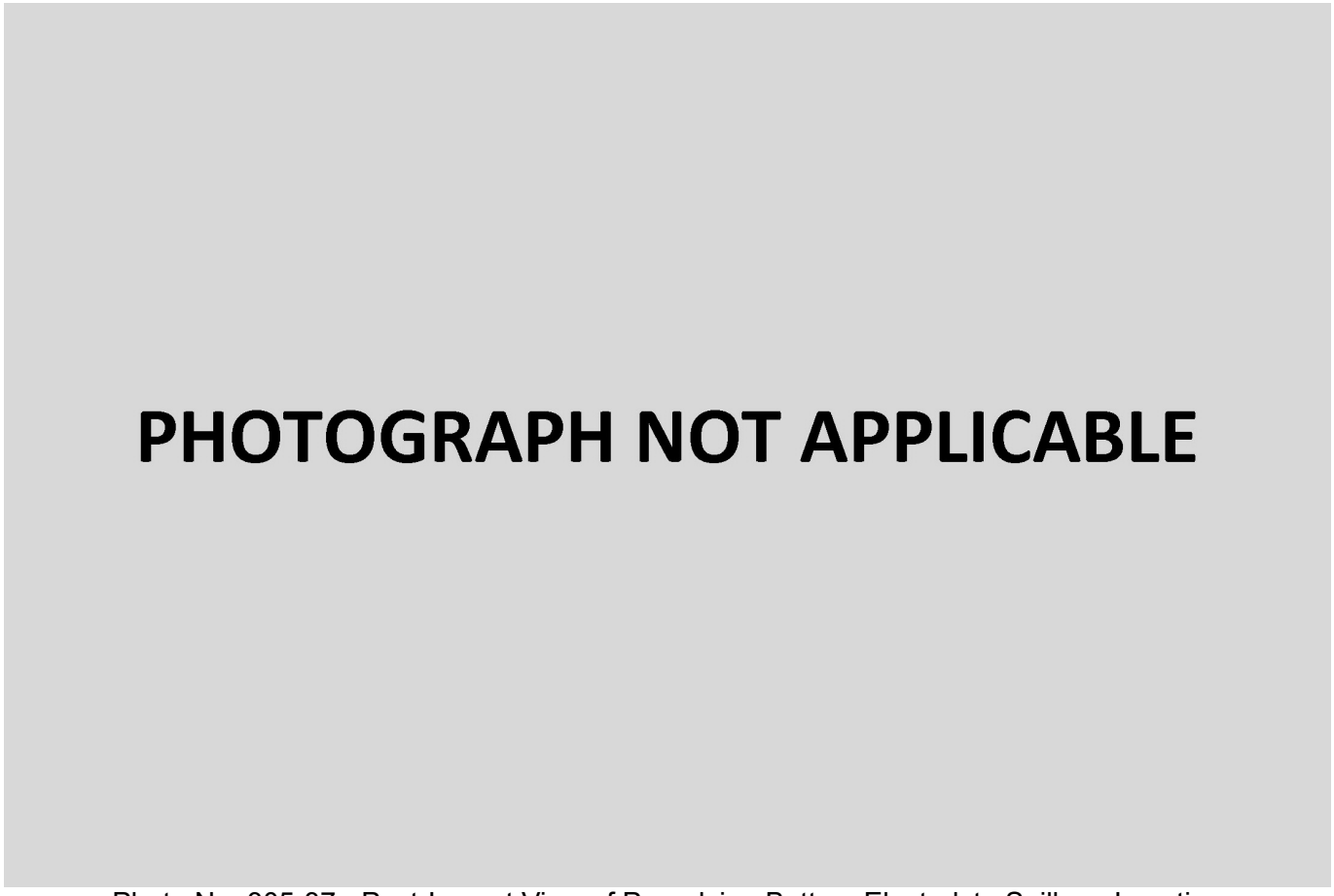


Photo No. 305-37 - Post-Impact View of Propulsion Battery Electrolyte Spillage Location

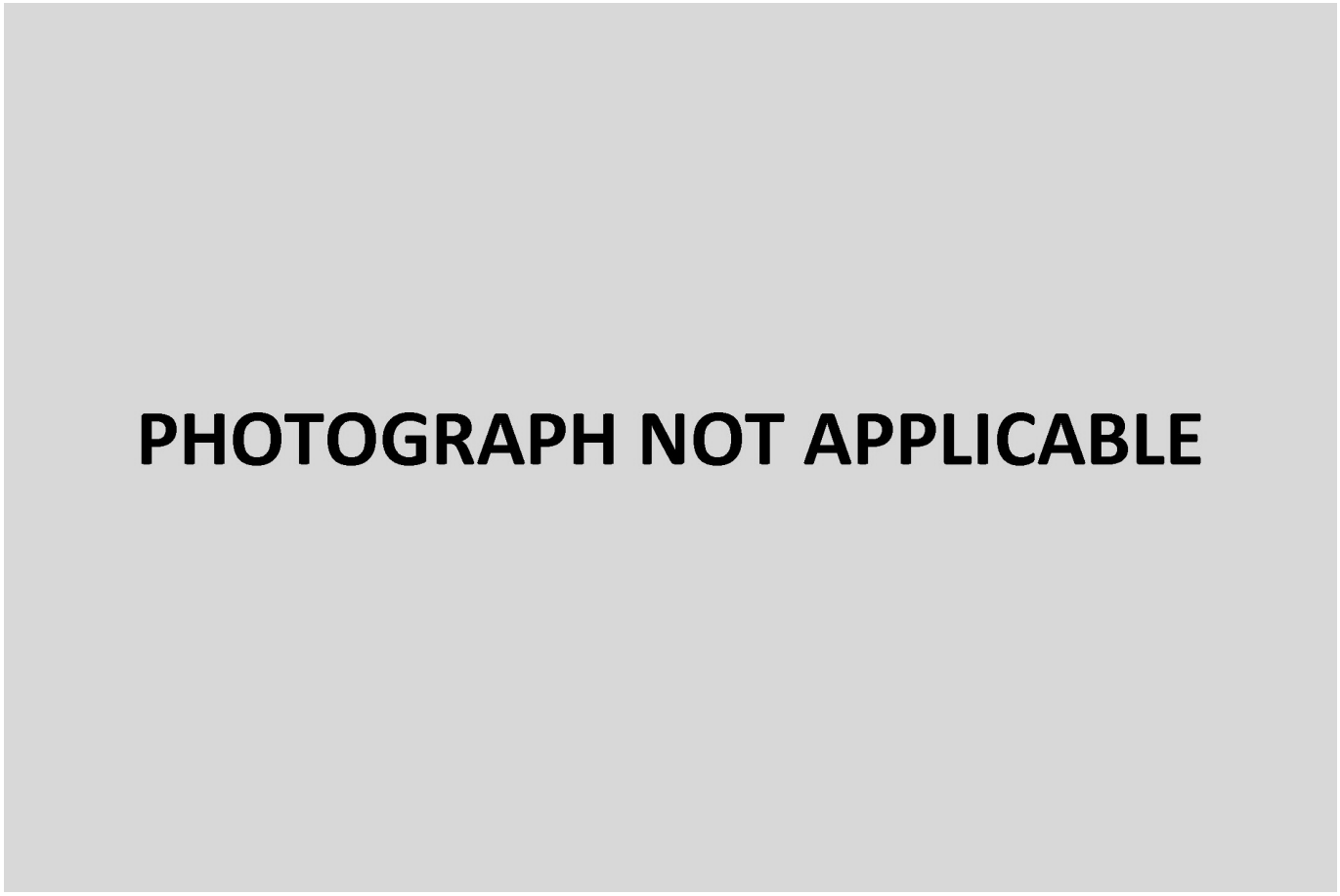


Photo No. 305-38 - Post-Test View of Propulsion Battery Electrolyte Spillage Location

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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

Additional Driver Dummy Instrumentation Data

Driver Head CG Redundant Acceleration (X) vs. Time

Driver Head CG Redundant Acceleration (Y) vs. Time

Driver Head CG Redundant Acceleration (Z) vs. Time

Driver Head Angular Velocity X (Deg/Sec) vs. Time

Driver Head Angular Velocity Y (Deg/Sec) vs. Time

Driver Head Angular Velocity Z (Deg/Sec) vs. Time

Driver Upper Thorax Rib Deflection (Y)

Driver Middle Thorax Rib Deflection (Y)

Driver Lower Thorax Rib Deflection (Y)

Driver Upper Abdomen Rib Deflection (Y)

Driver Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy Hip Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

Right Sill at Vertical Impact Reference Line Acceleration (Y)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)

Load Cell Pole Barrier #2 Force (Y)

Load Cell Pole Barrier #3 Force (Y)

Load Cell Pole Barrier #4 Force (Y)

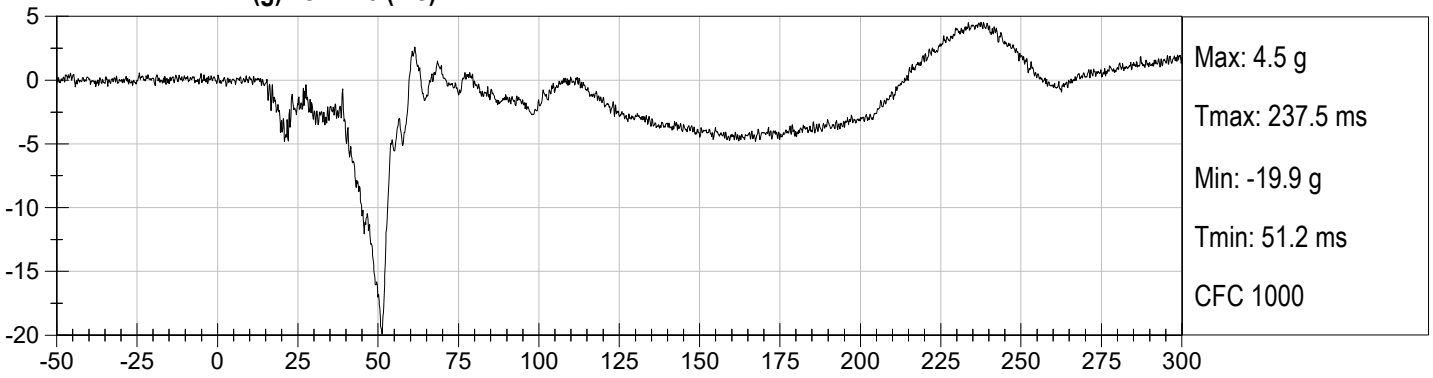
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

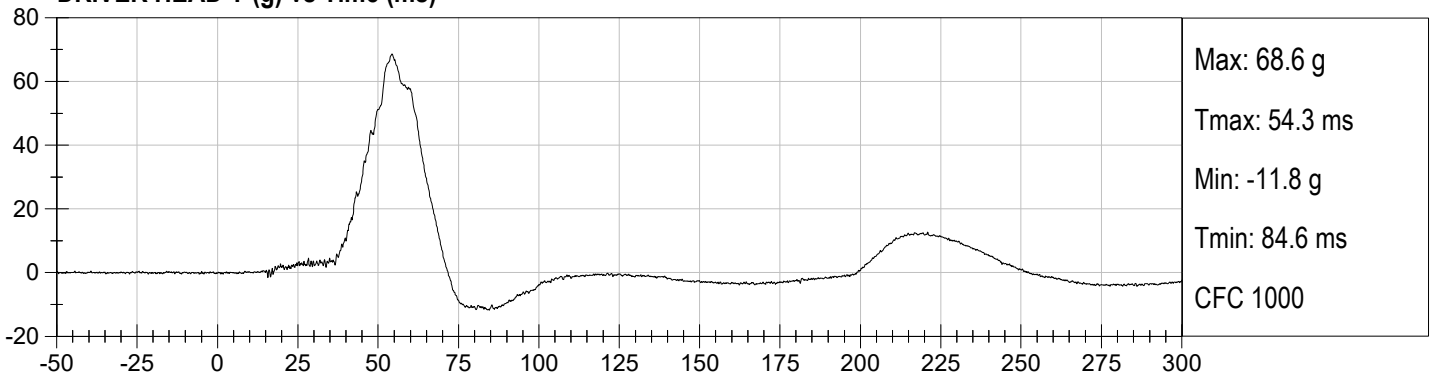
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

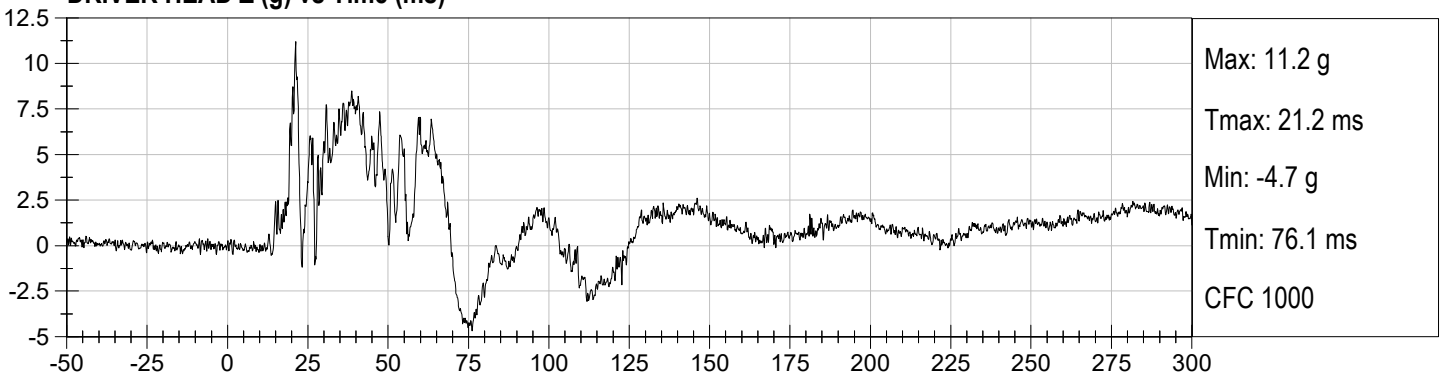
DRIVER HEAD X (g) vs Time (ms)



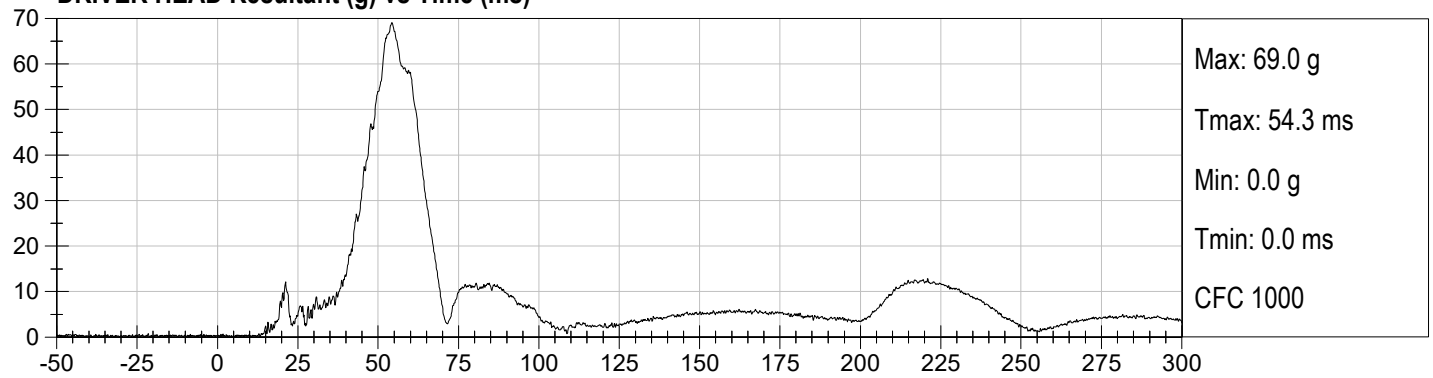
DRIVER HEAD Y (g) vs Time (ms)



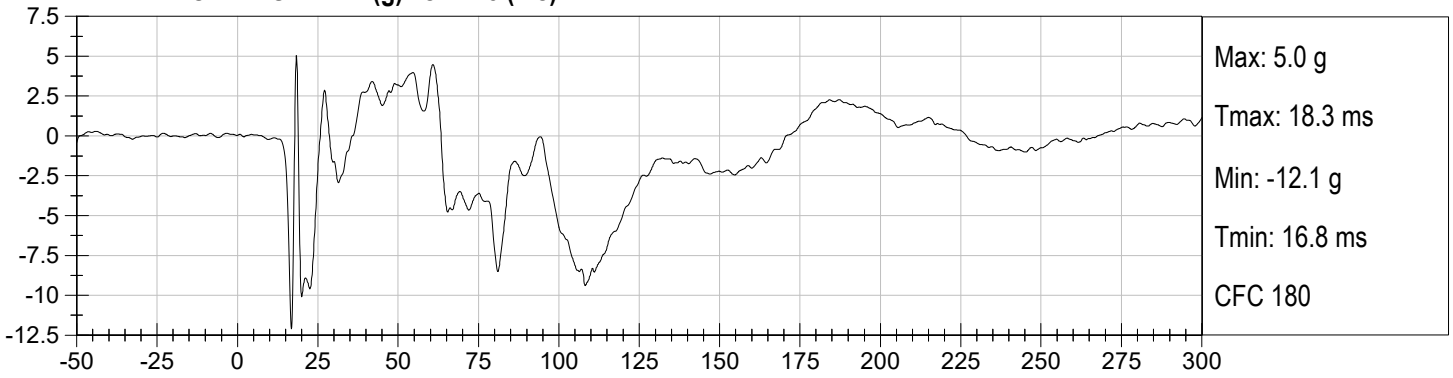
DRIVER HEAD Z (g) vs Time (ms)



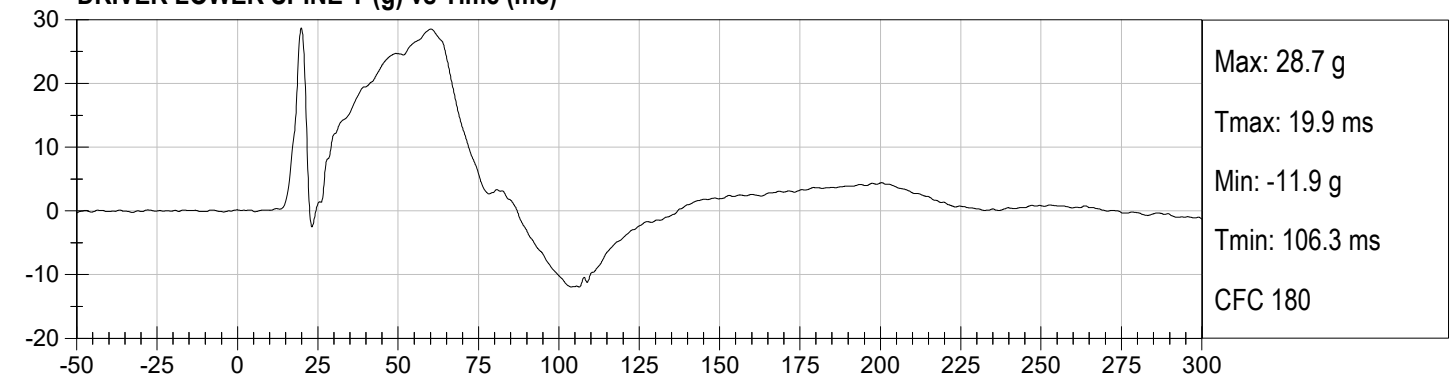
DRIVER HEAD Resultant (g) vs Time (ms)



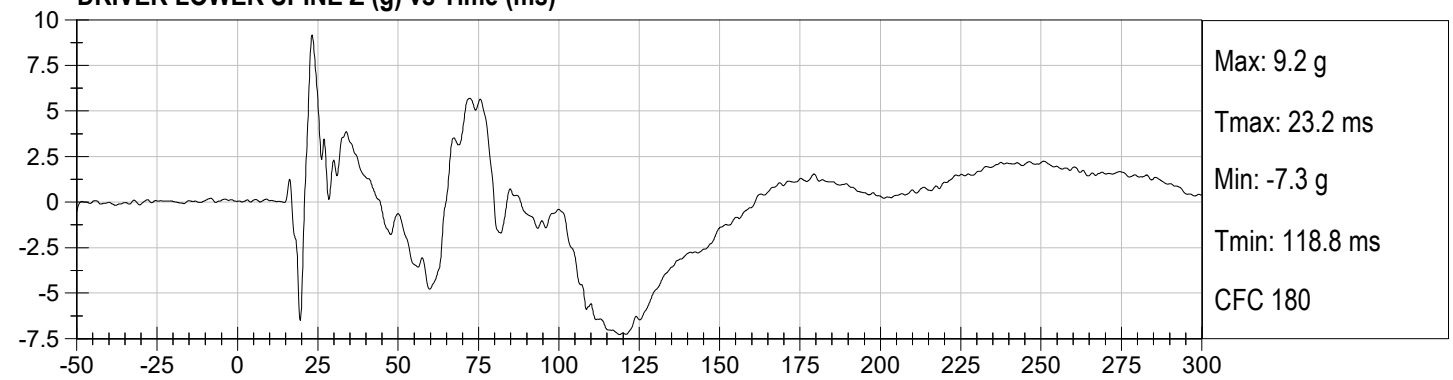
DRIVER LOWER SPINE X (g) vs Time (ms)



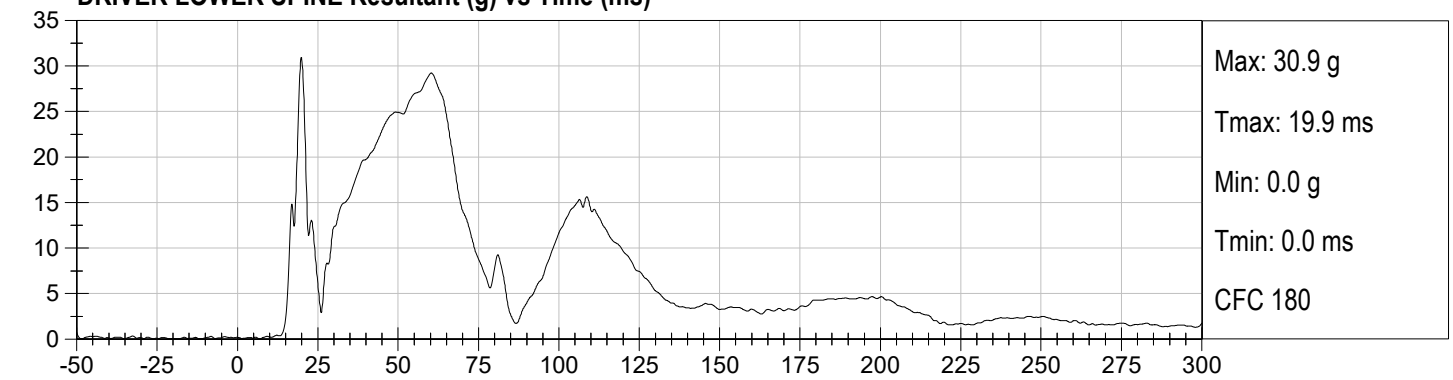
DRIVER LOWER SPINE Y (g) vs Time (ms)



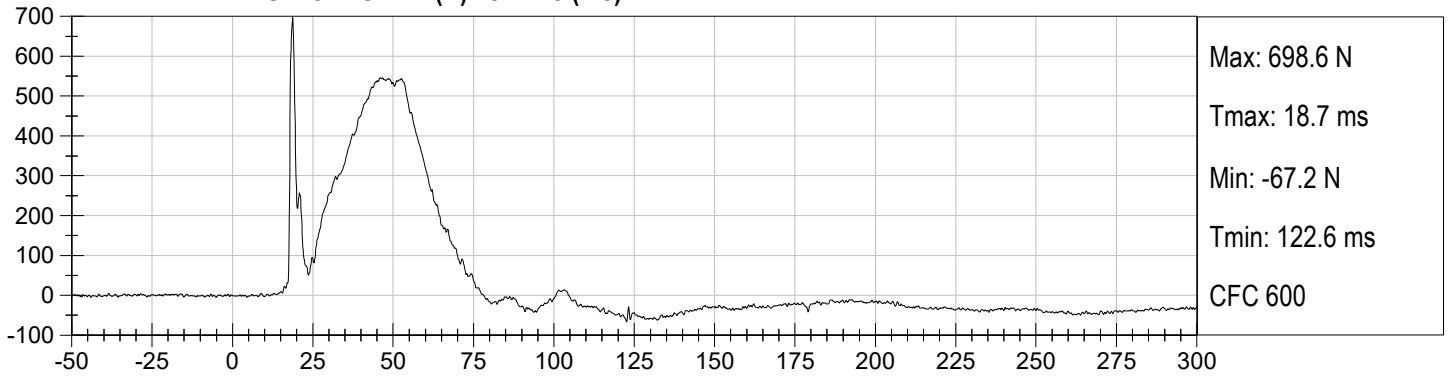
DRIVER LOWER SPINE Z (g) vs Time (ms)



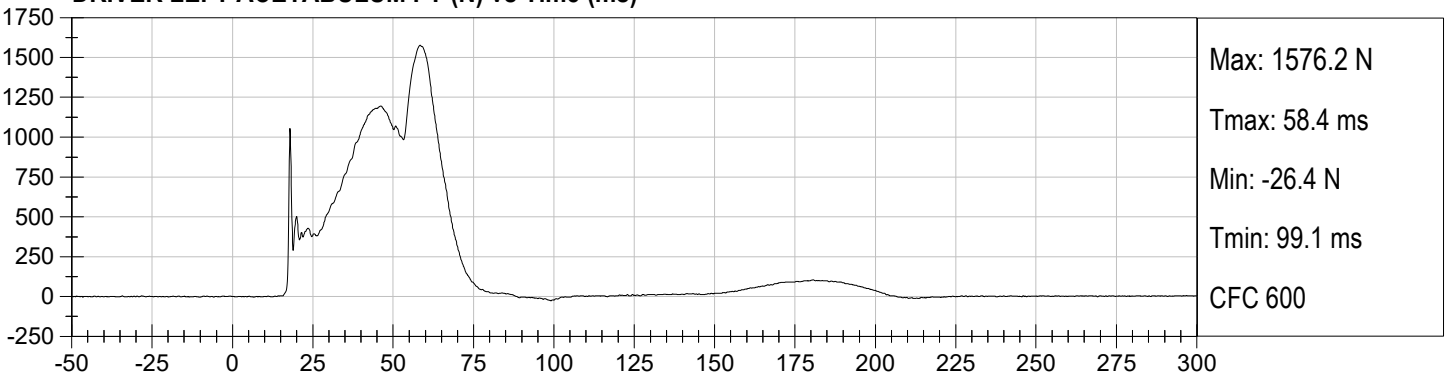
DRIVER LOWER SPINE Resultant (g) vs Time (ms)



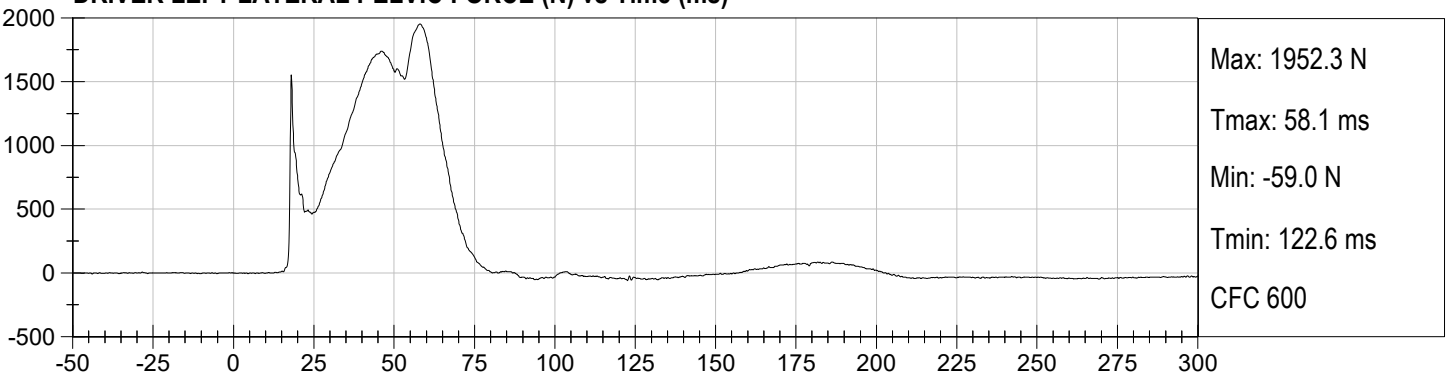
DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)



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



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



APPENDIX C
DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION

QUALIFICATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SID-IIsD External Measurements
SN: 296

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

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D233211

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	24	Pass
Peak Resultant Acceleration	G's	115 to 137	124	Pass
Peak Longitudinal Acceleration	G's	+/- 15	8.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

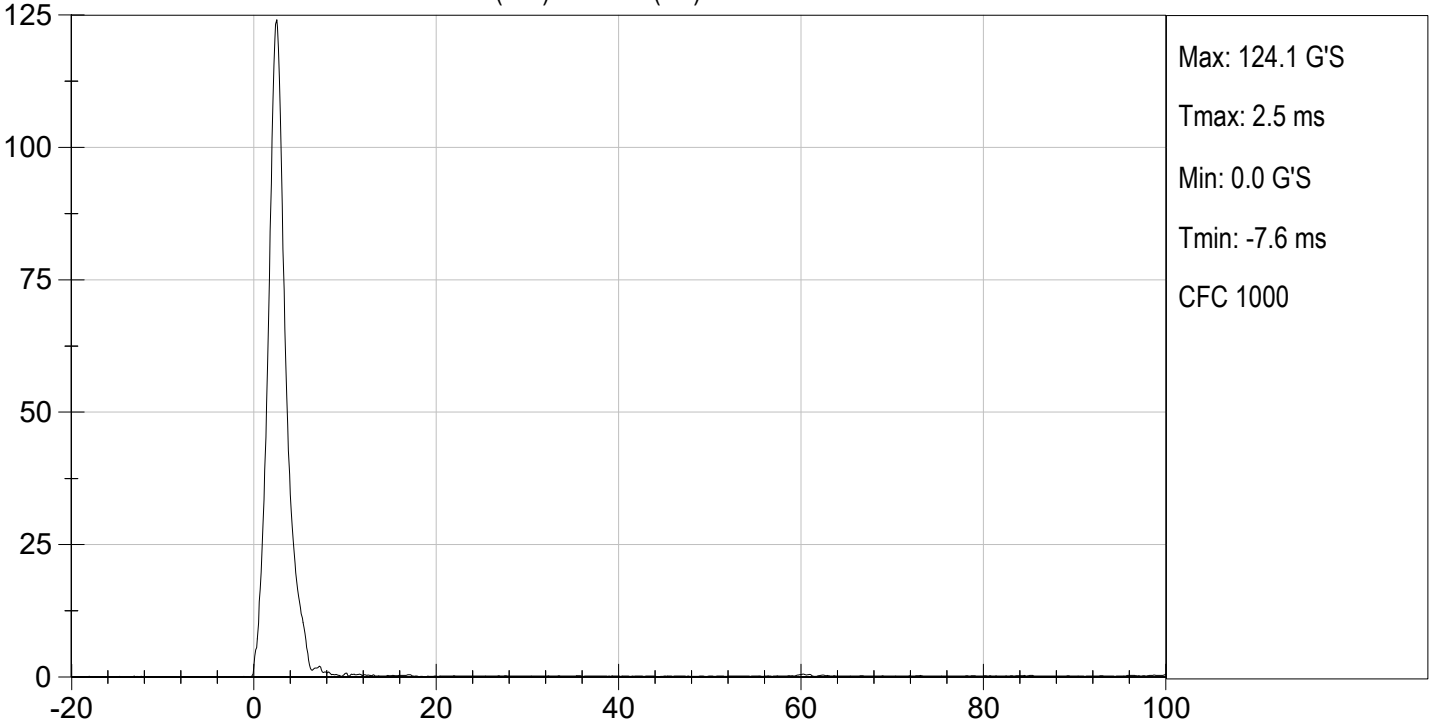
12/06/2023
Test Date

Approved By

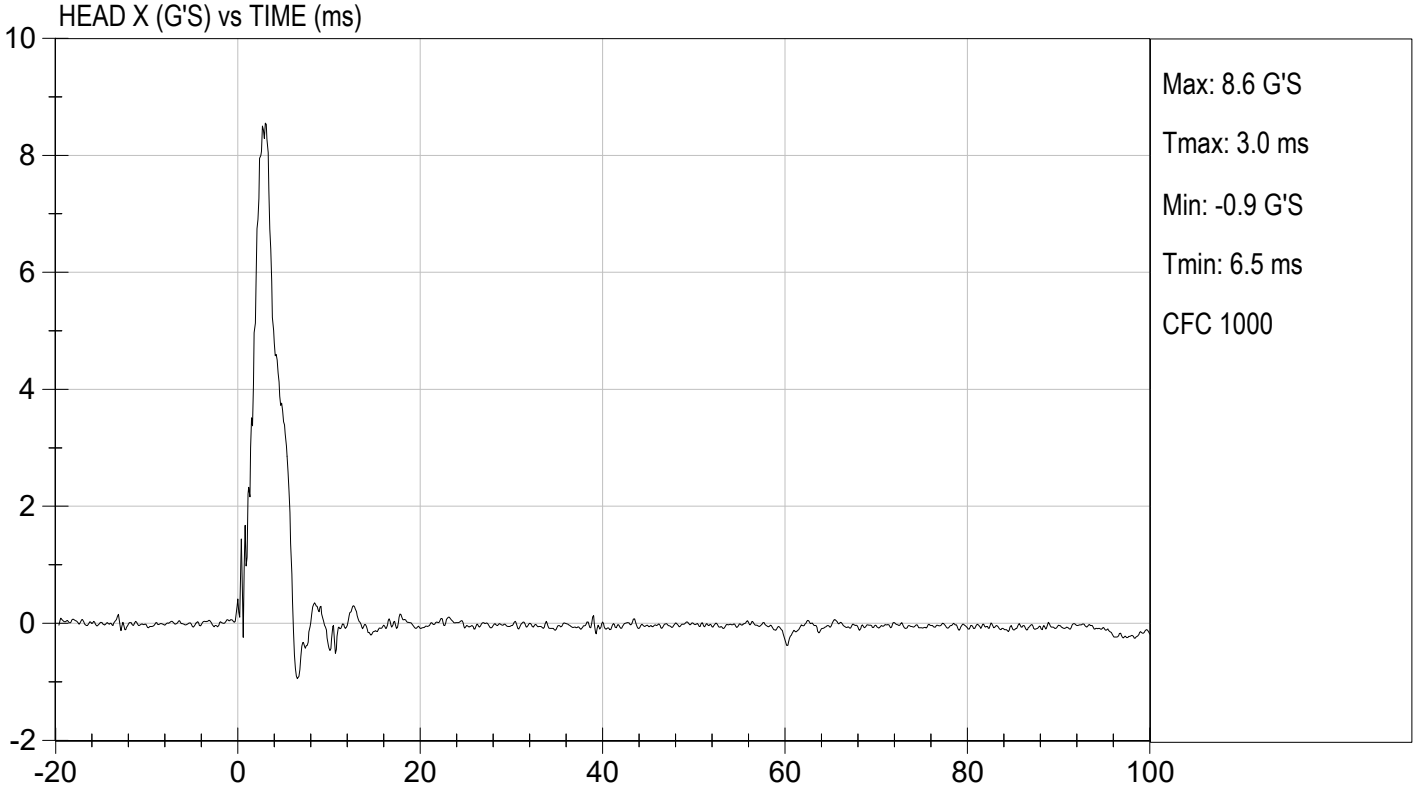
TEST DESC: HEAD DROP

TEST DATE: 12/06/2023
TEST #: D233211

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)



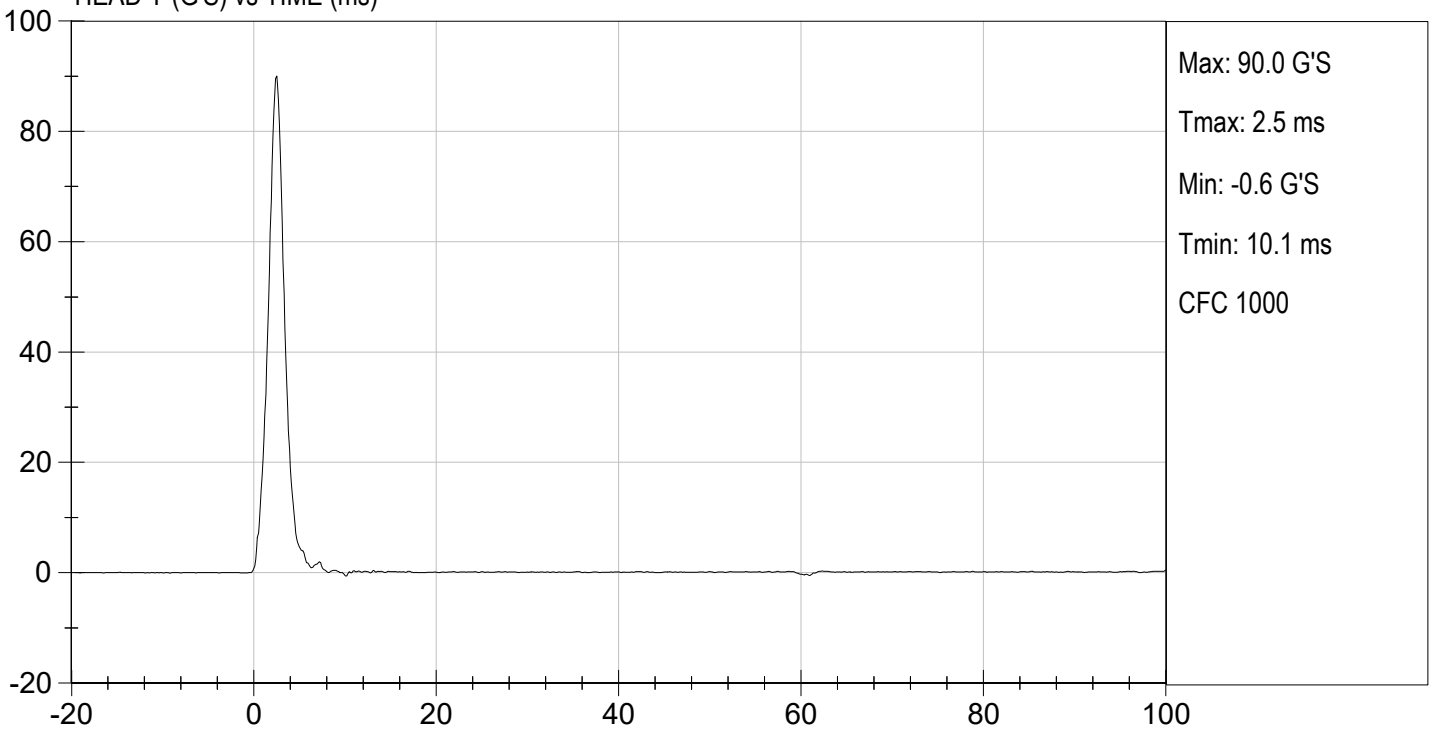
HEAD X (G'S) vs TIME (ms)



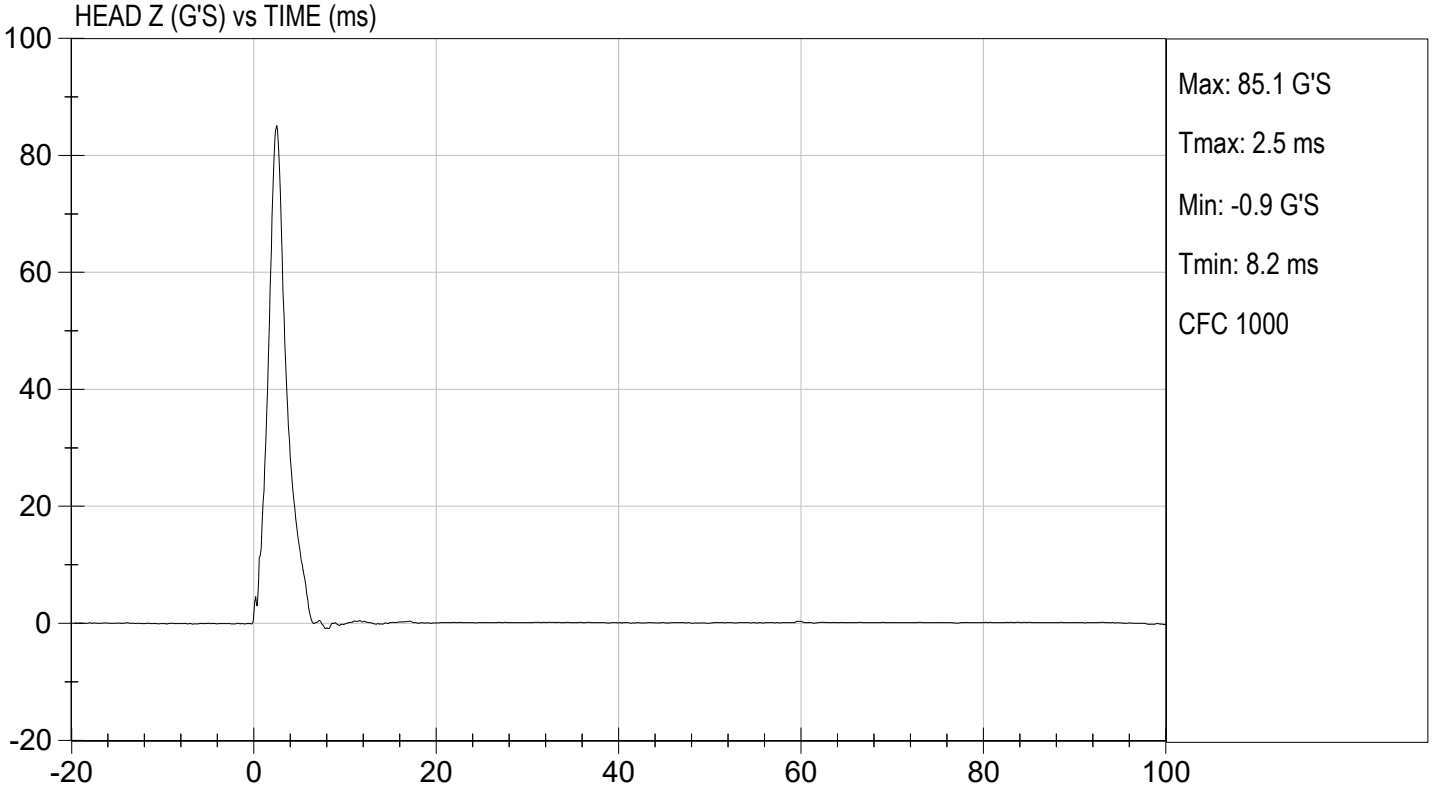
TEST DESC: HEAD DROP

TEST DATE: 12/06/2023
TEST #: D233211

HEAD Y (G'S) vs TIME (ms)



HEAD Z (G'S) vs TIME (ms)



MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D233212

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.8	Pass
Humidity		%	10 to 70	26	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.35	Pass
	15 ms	m/s	3.30 to 4.10	3.63	Pass
	20 ms	m/s	4.40 to 5.40	5.18	Pass
	25 ms	m/s	5.40 to 6.10	5.81	Pass
	25-100 ms	m/s	5.50 to 6.20	5.86	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-41	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
			Overall Test Results		Pass

Laboratory Technician

12/06/2023

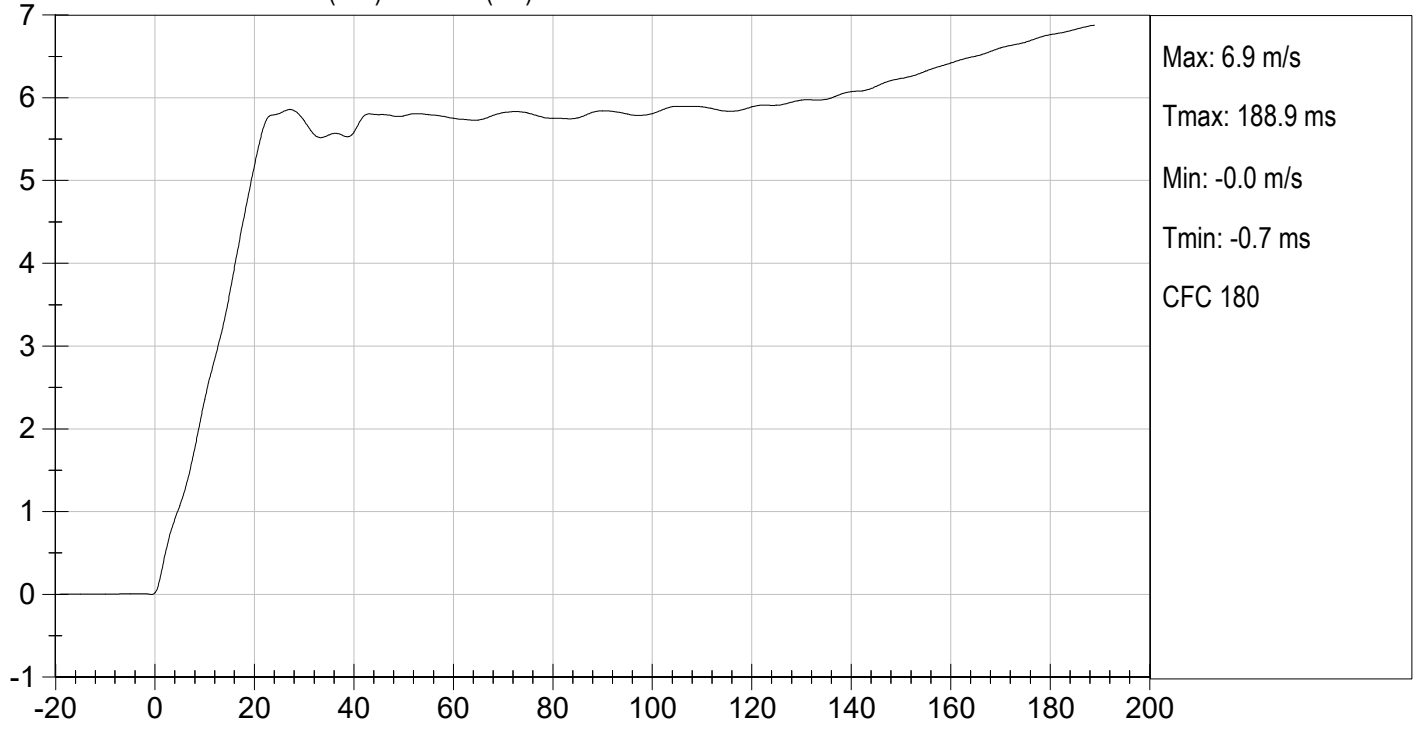
Test Date

Approved By

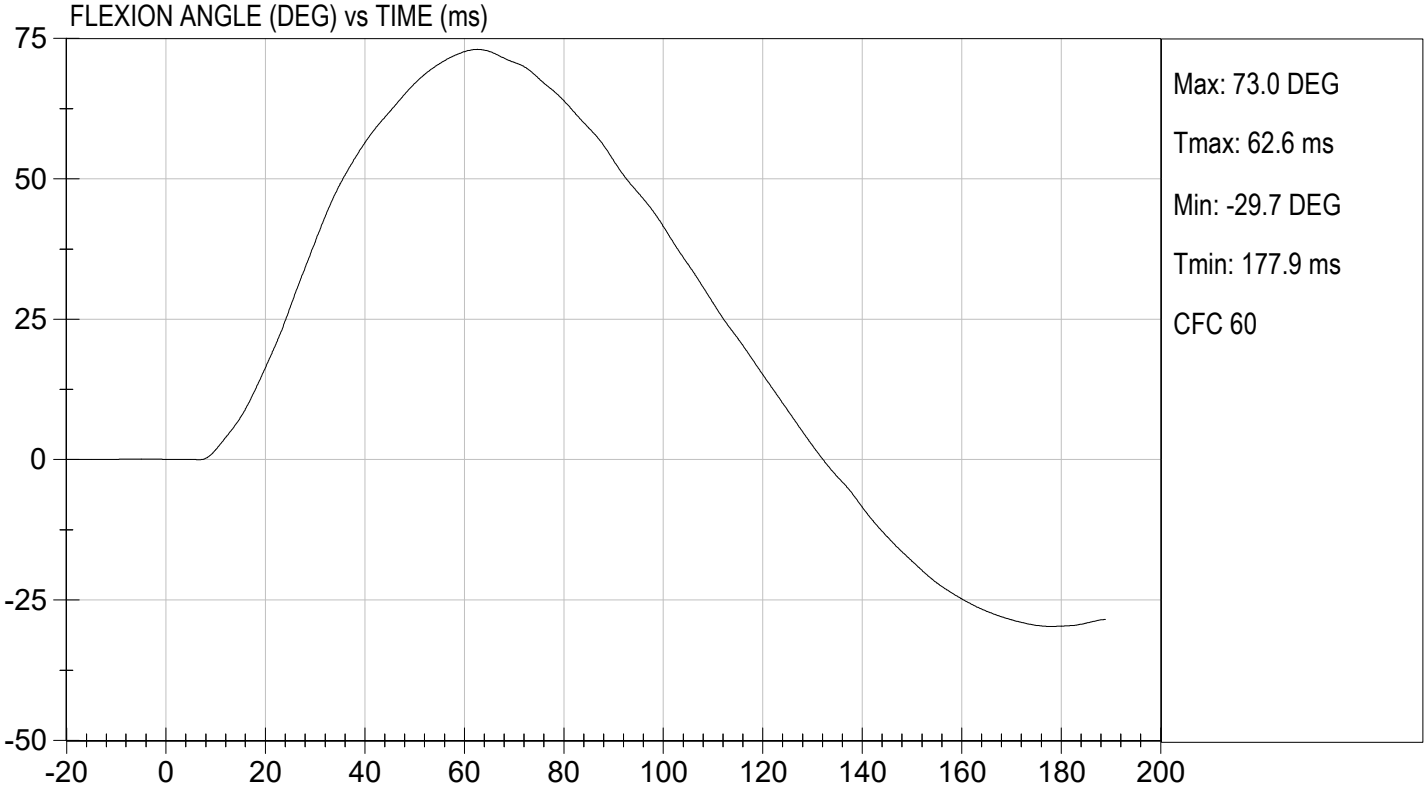
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 12/06/2023
TEST #: D233212

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

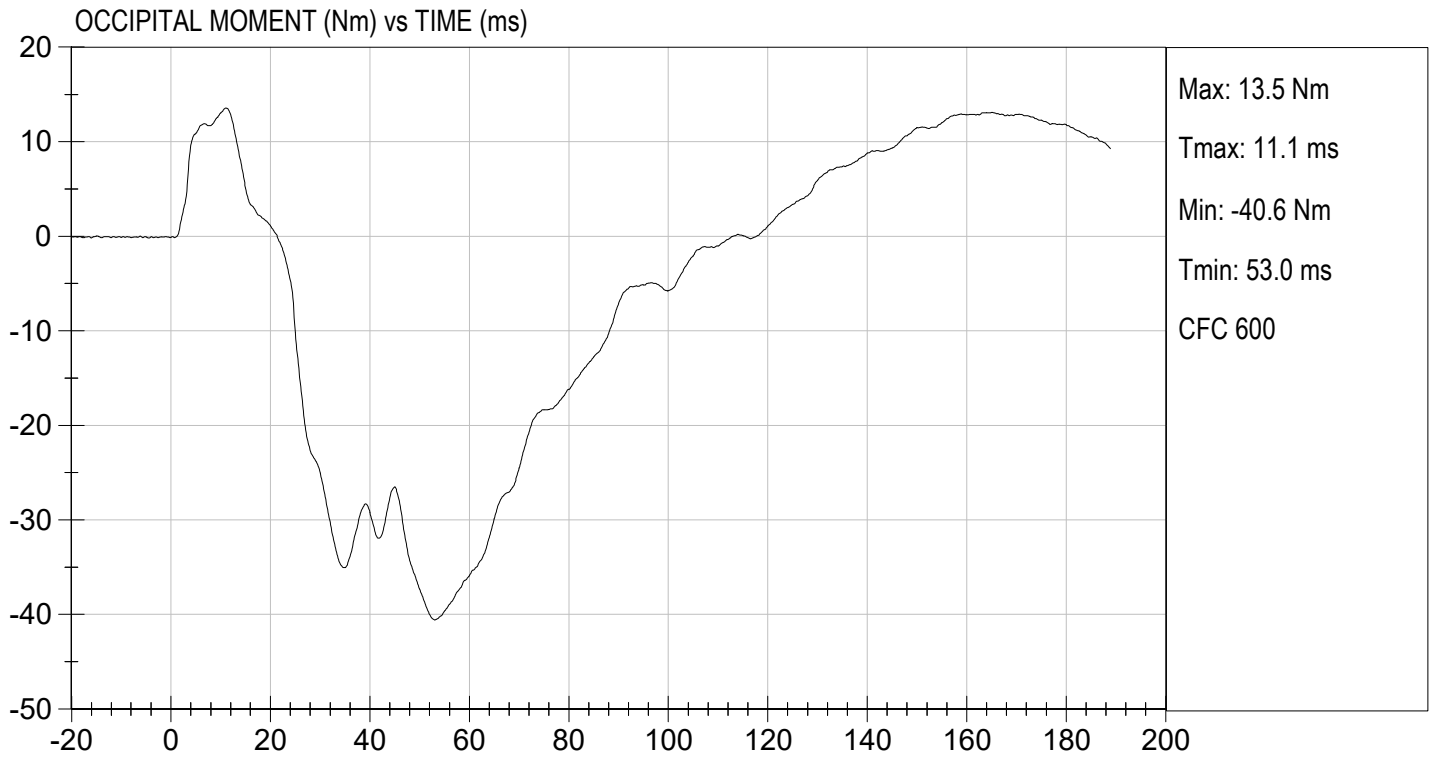


FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 12/06/2023
TEST #: D233212



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D233213

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	27	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	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	19	Pass
		Overall Test Results		Pass

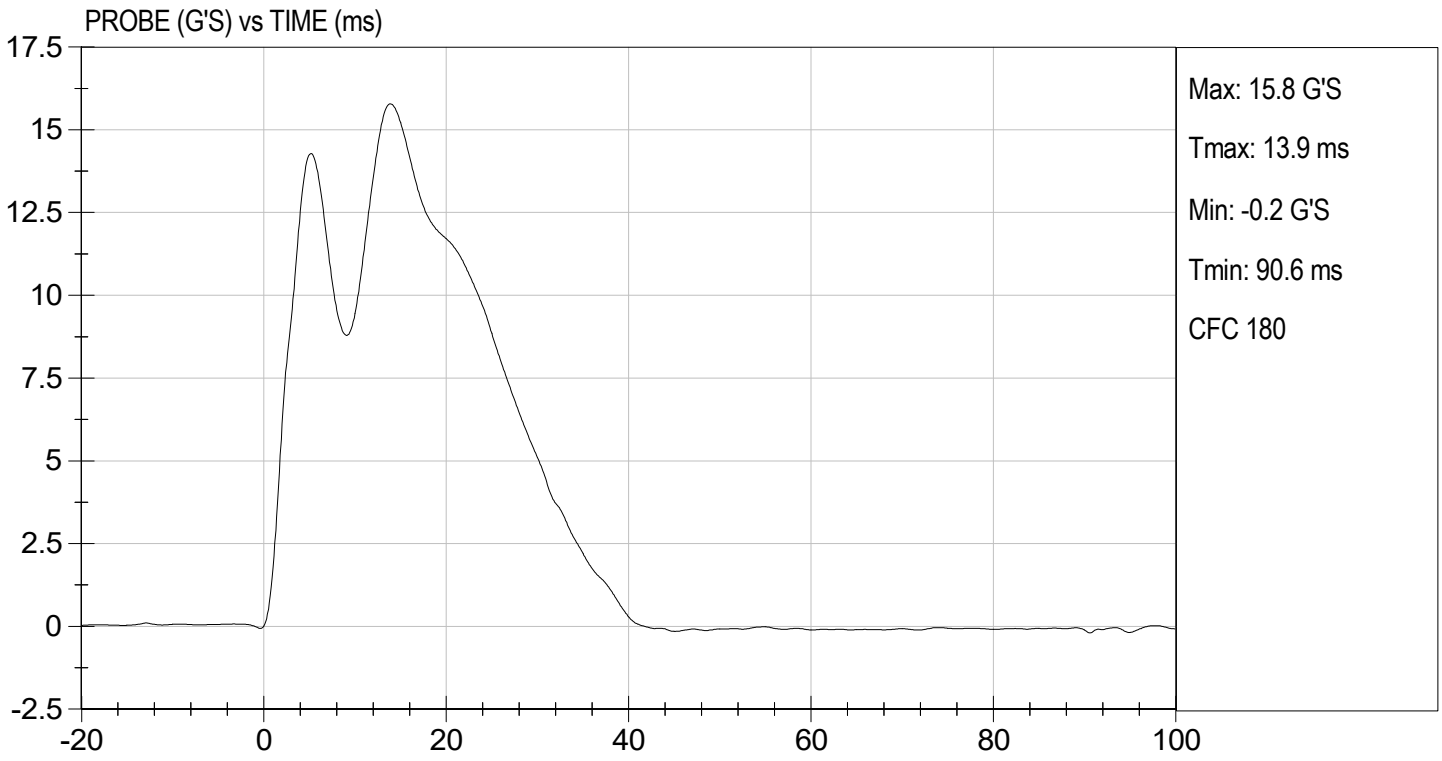
Laboratory Technician

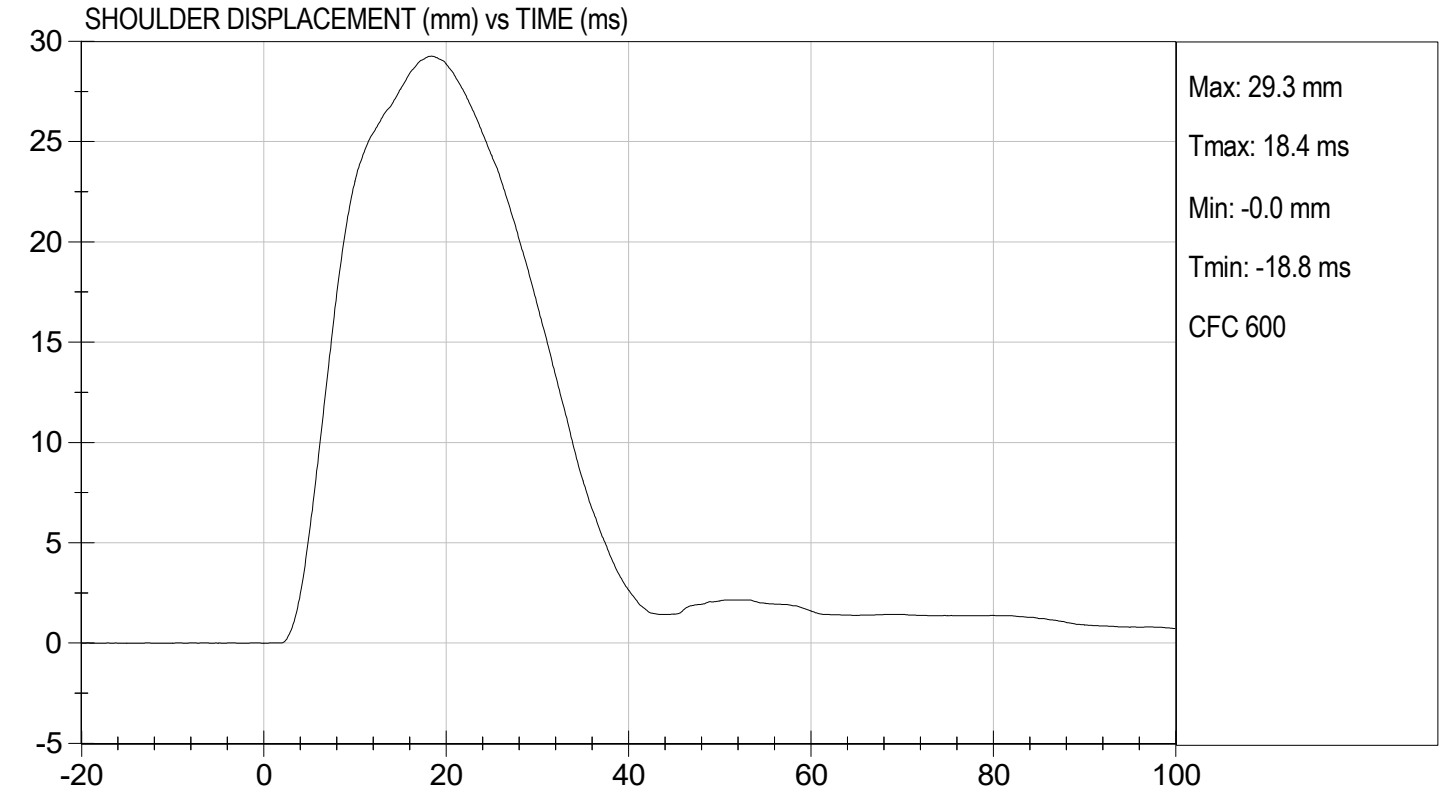
12/06/2023
Test Date

Approved By

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

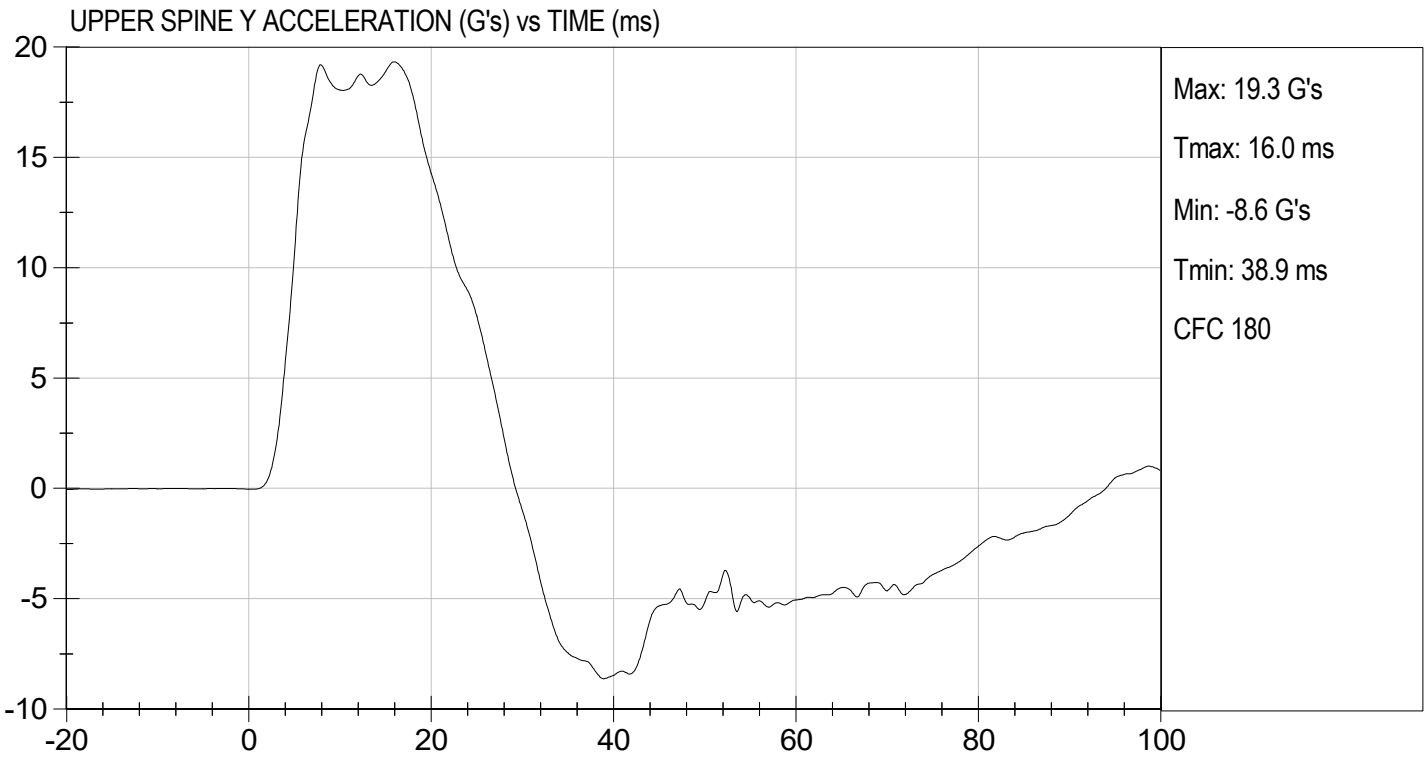
TEST DATE: 12/06/2023
TEST #: D233213





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

TEST DATE: 12/06/2023
TEST #: D233213



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D233214

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	28	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	29	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	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
		Overall Test Results		Pass

Laboratory Technician

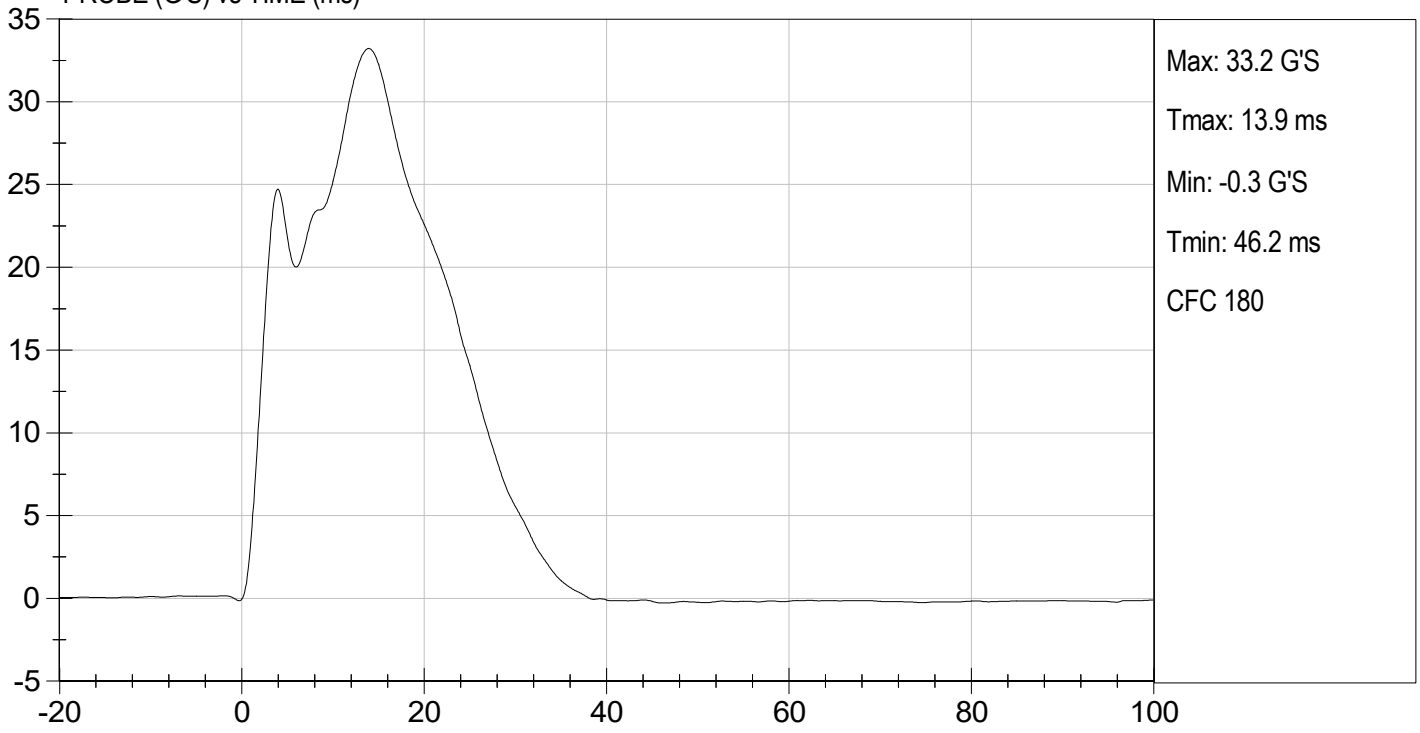
12/06/2023
Test Date

Approved By

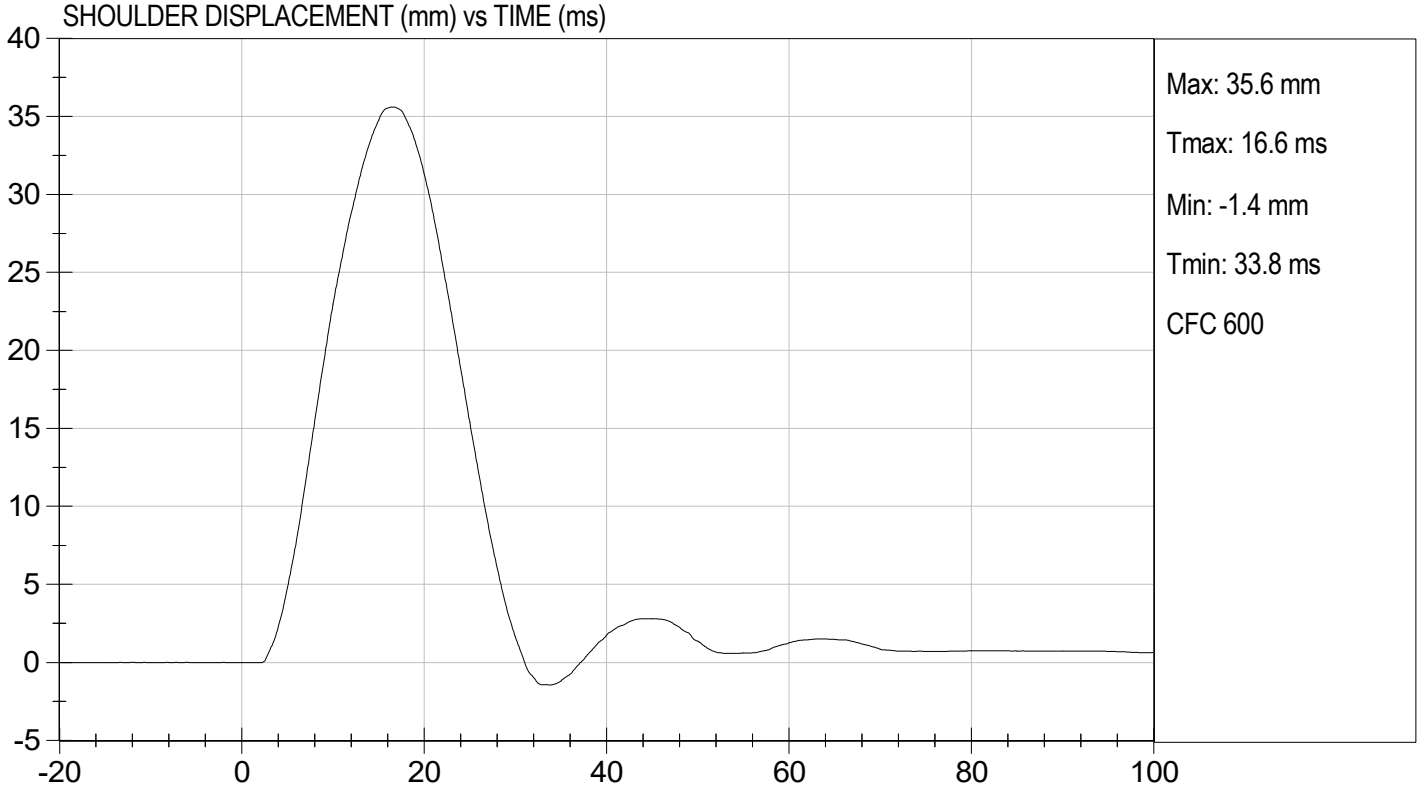
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

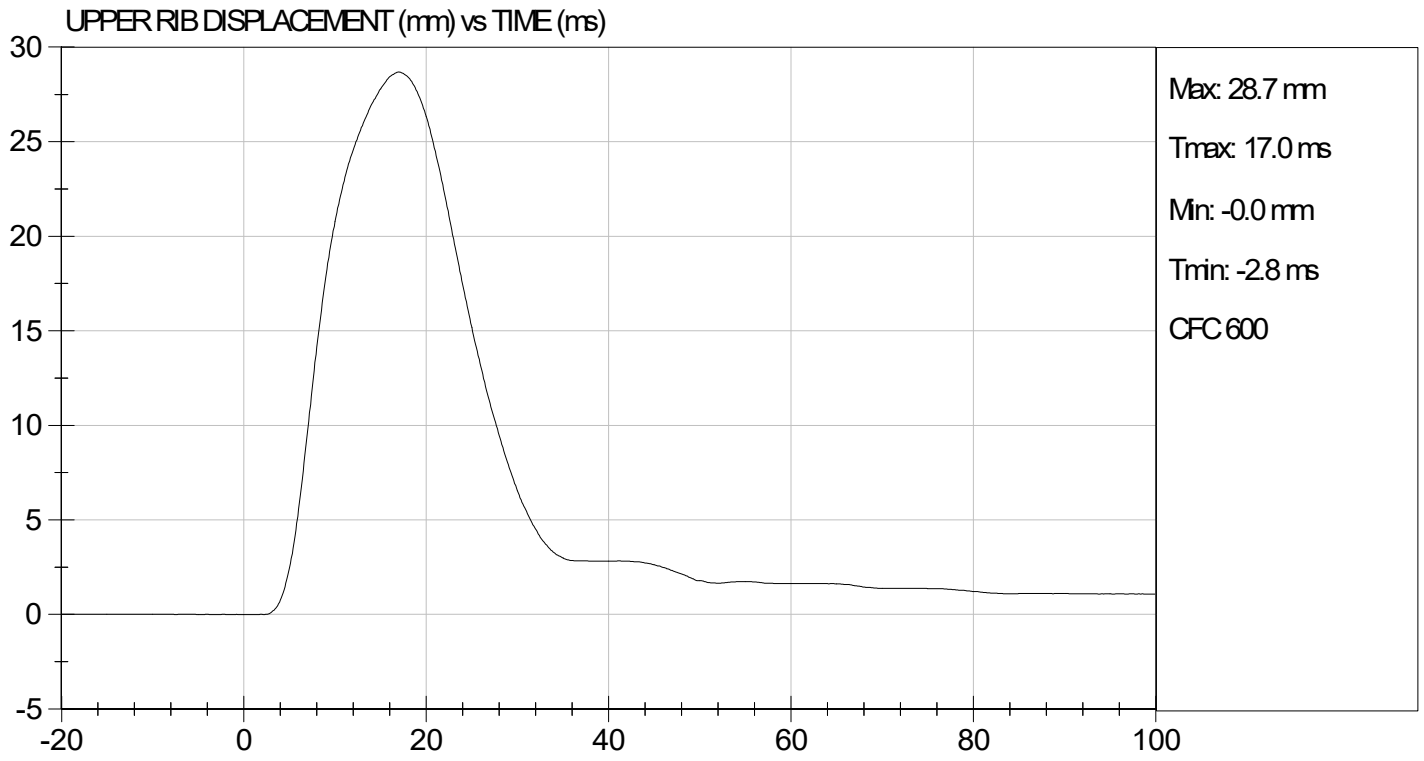
TEST DATE: 12/06/2023
TEST #: D233214

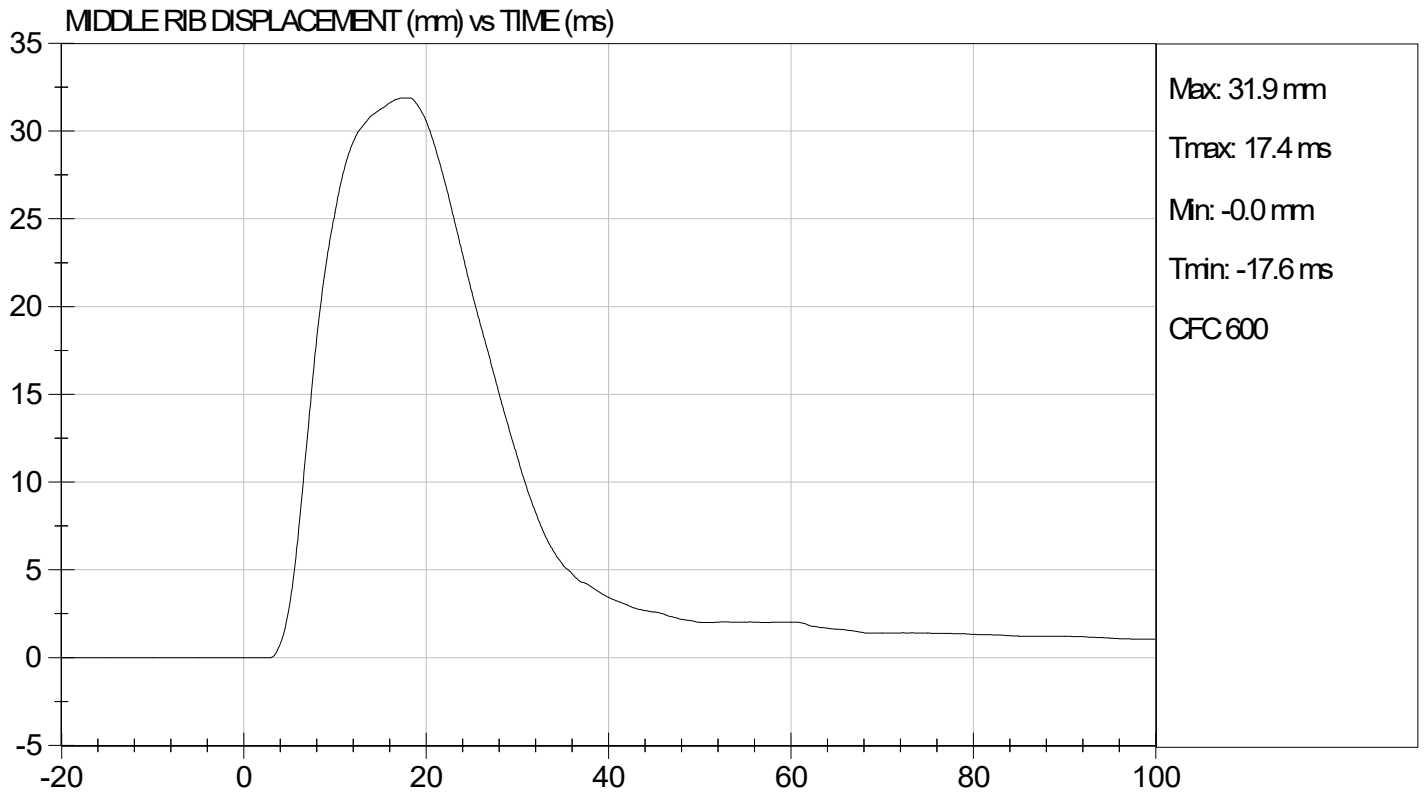
PROBE (G'S) vs TIME (ms)



SHOULDER DISPLACEMENT (mm) vs TIME (ms)



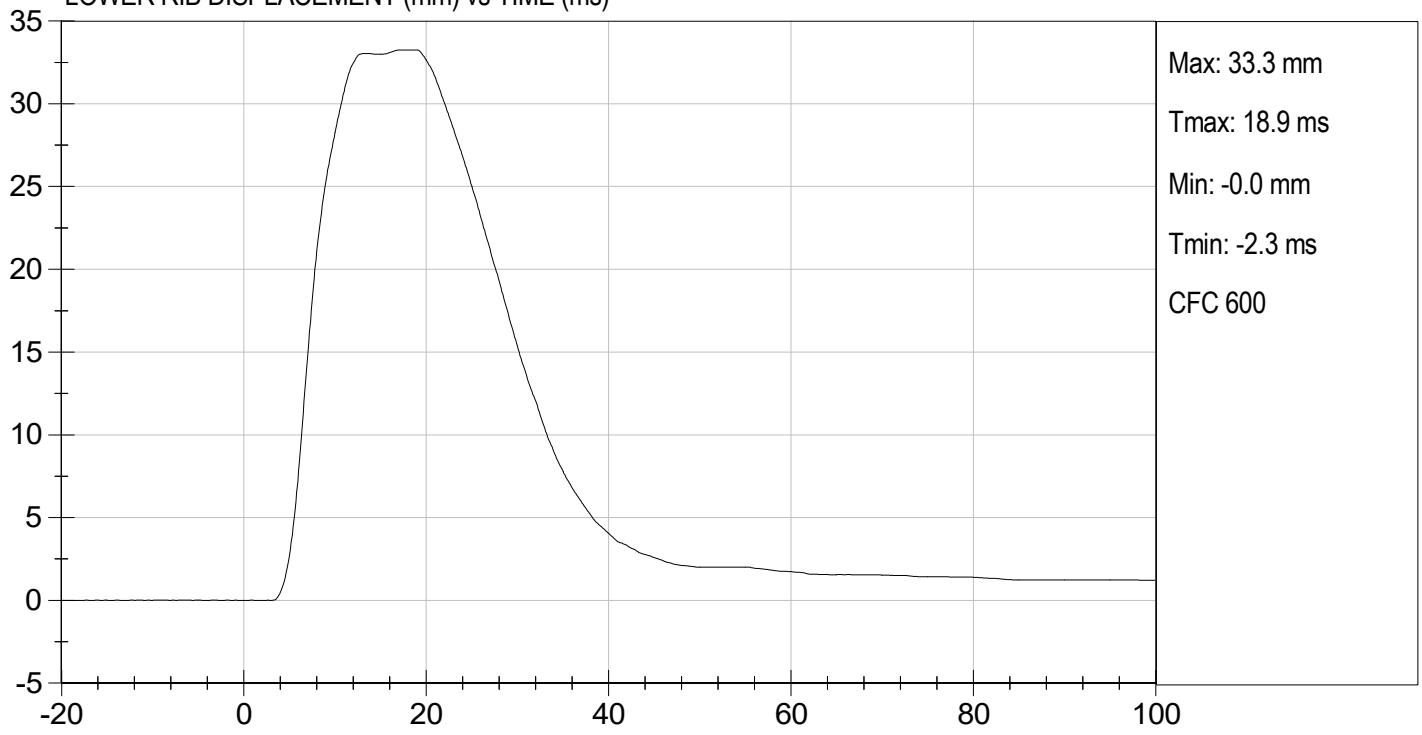

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)
30
25
20
15
10
5
0
-5
-20
0
20
40
60
80
100
Max: 28.7 mm
Tmax: 17.0 ms
Min: -0.0 mm
Tmin: -2.8 ms
CFC 600


MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)
35
30
25
20
15
10
5
0
-5
-20
0
20
40
60
80
100
Max: 31.9 mm
Tmax: 17.4 ms
Min: -0.0 mm
Tmin: -17.6 ms
CFC 600

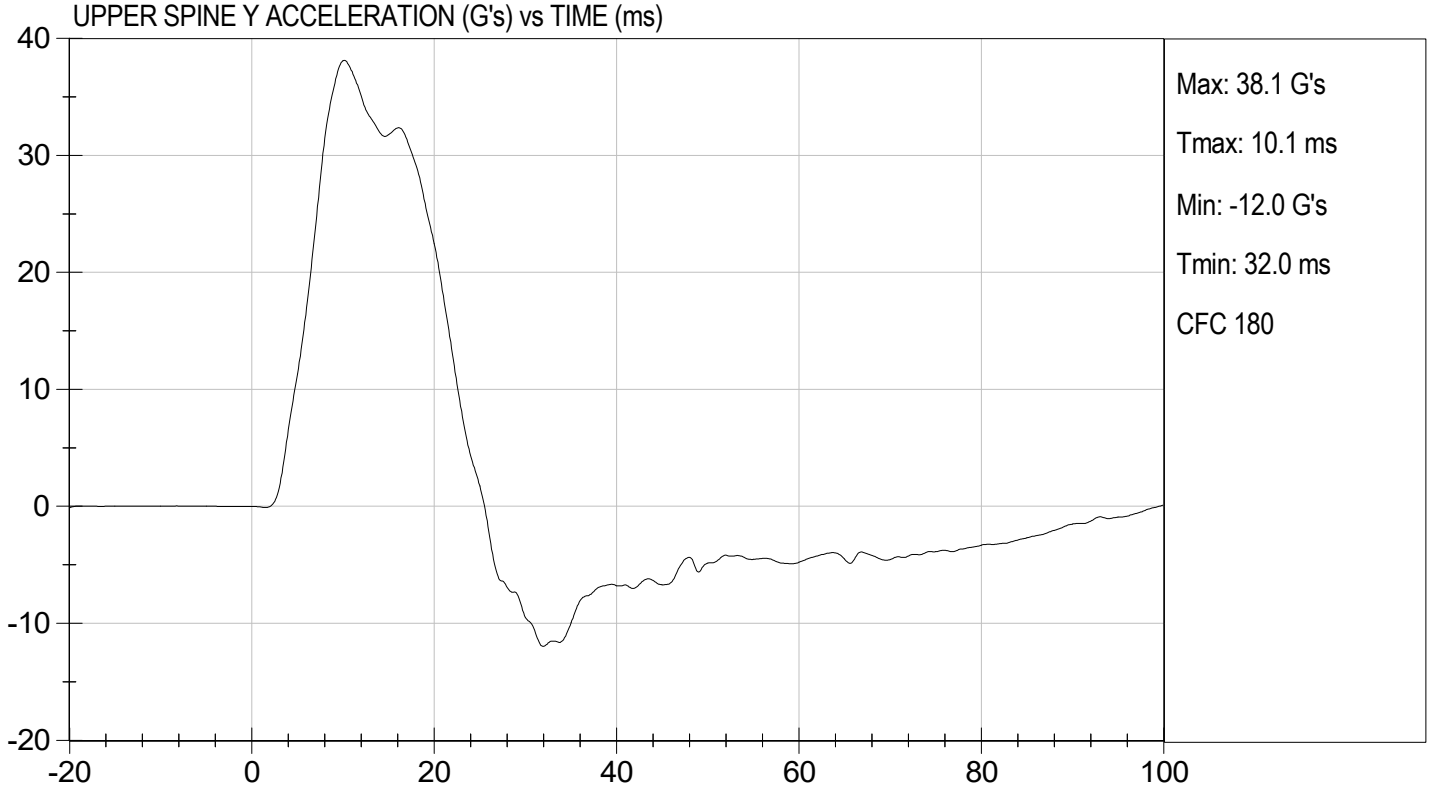
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 12/06/2023
TEST #: D233214

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

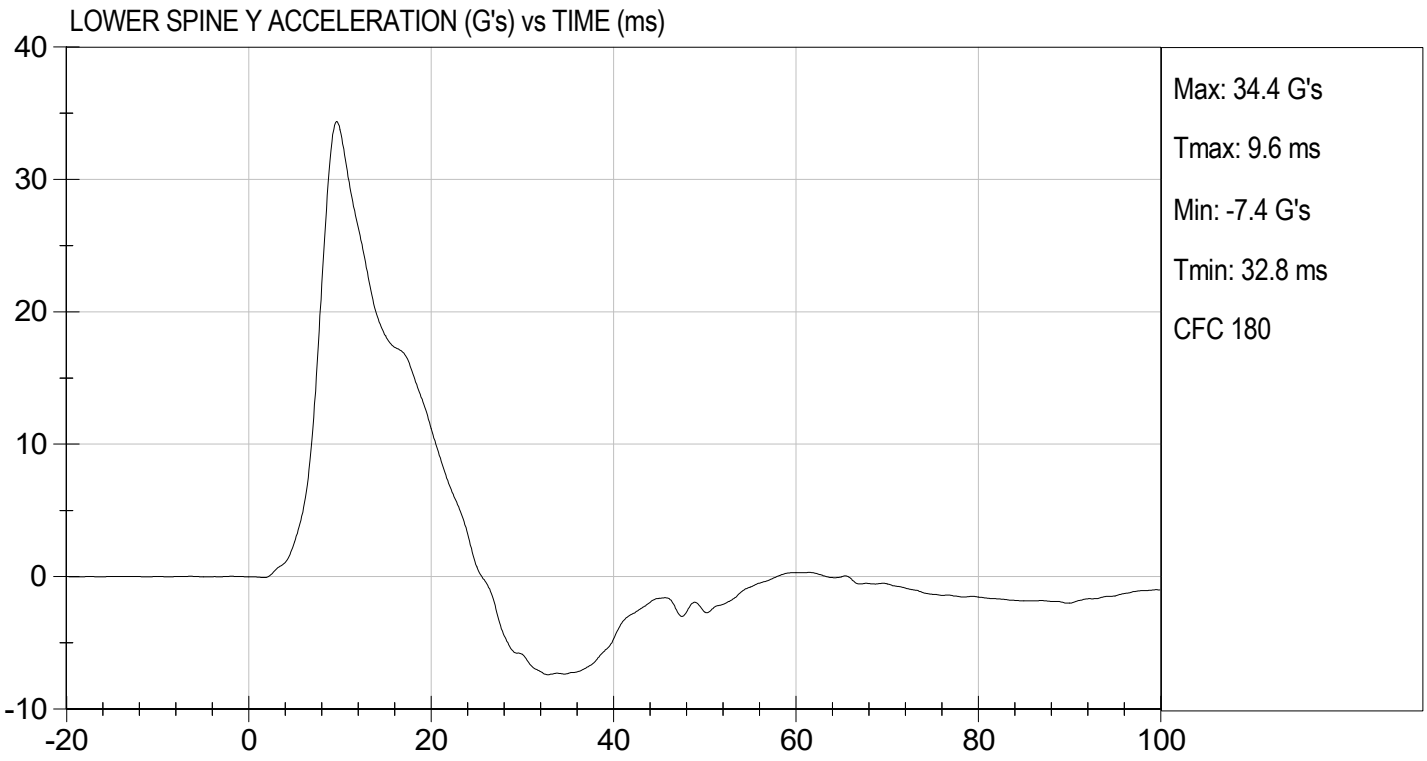


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 12/06/2023
TEST #: D233214



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D233215

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	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	43	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

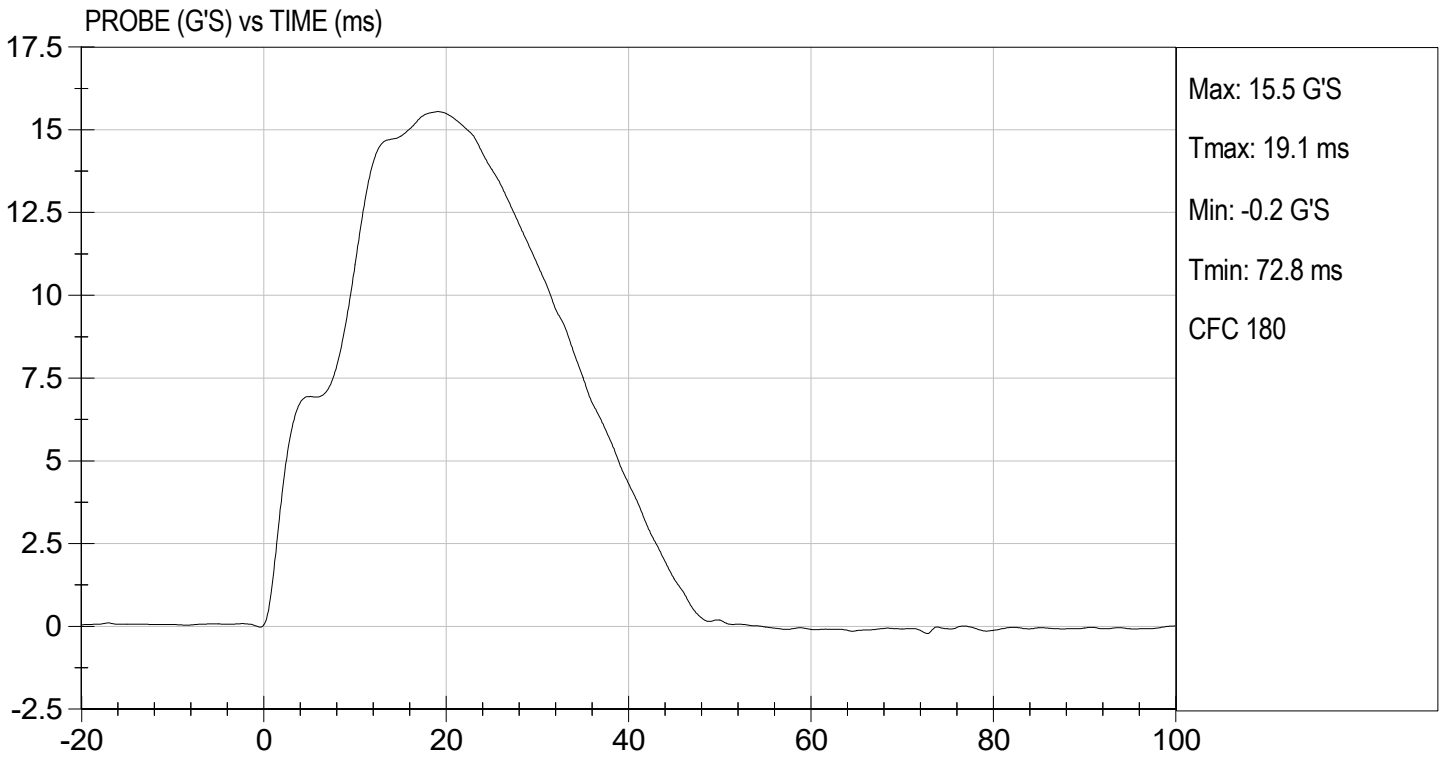
Laboratory Technician

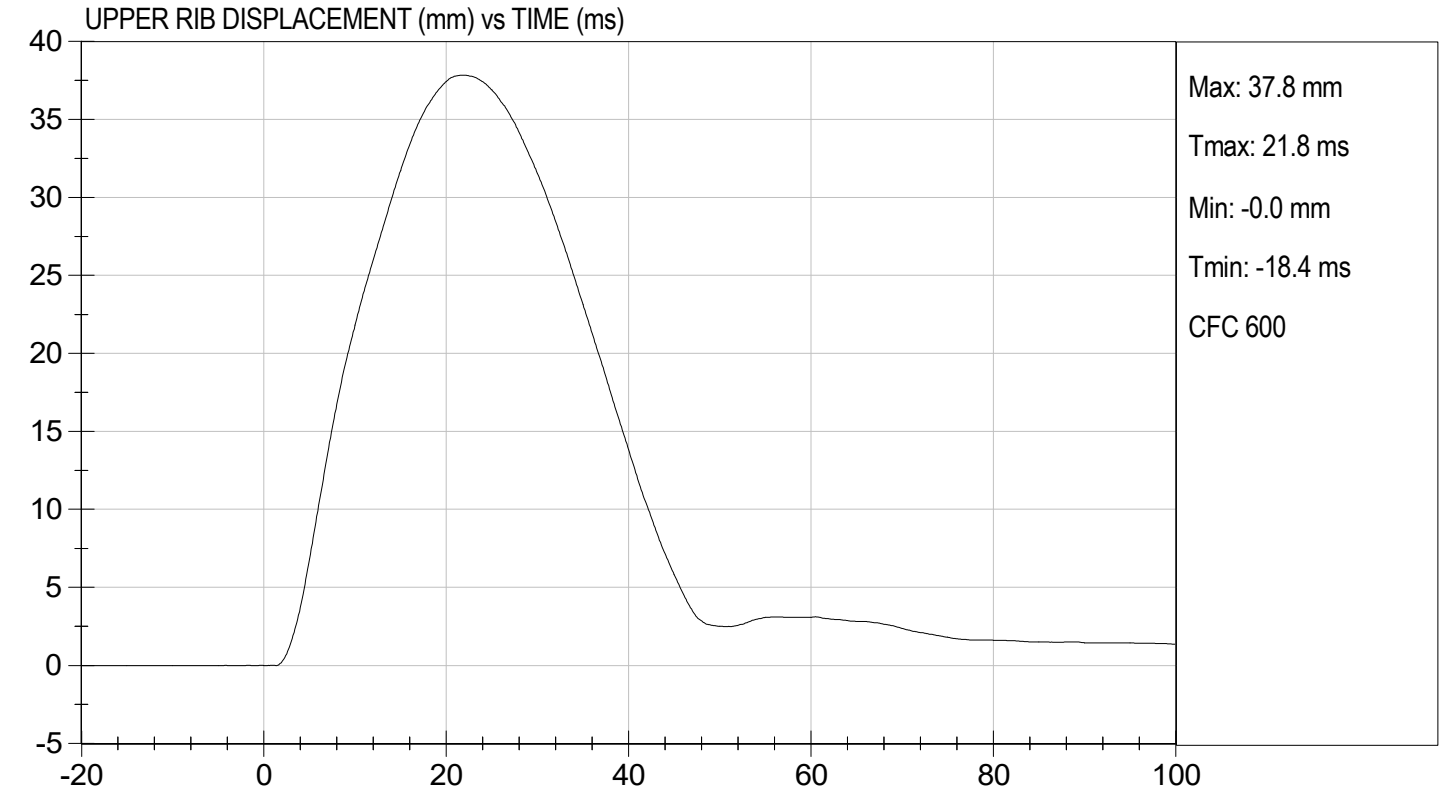
12/06/2023
Test Date

Approved By

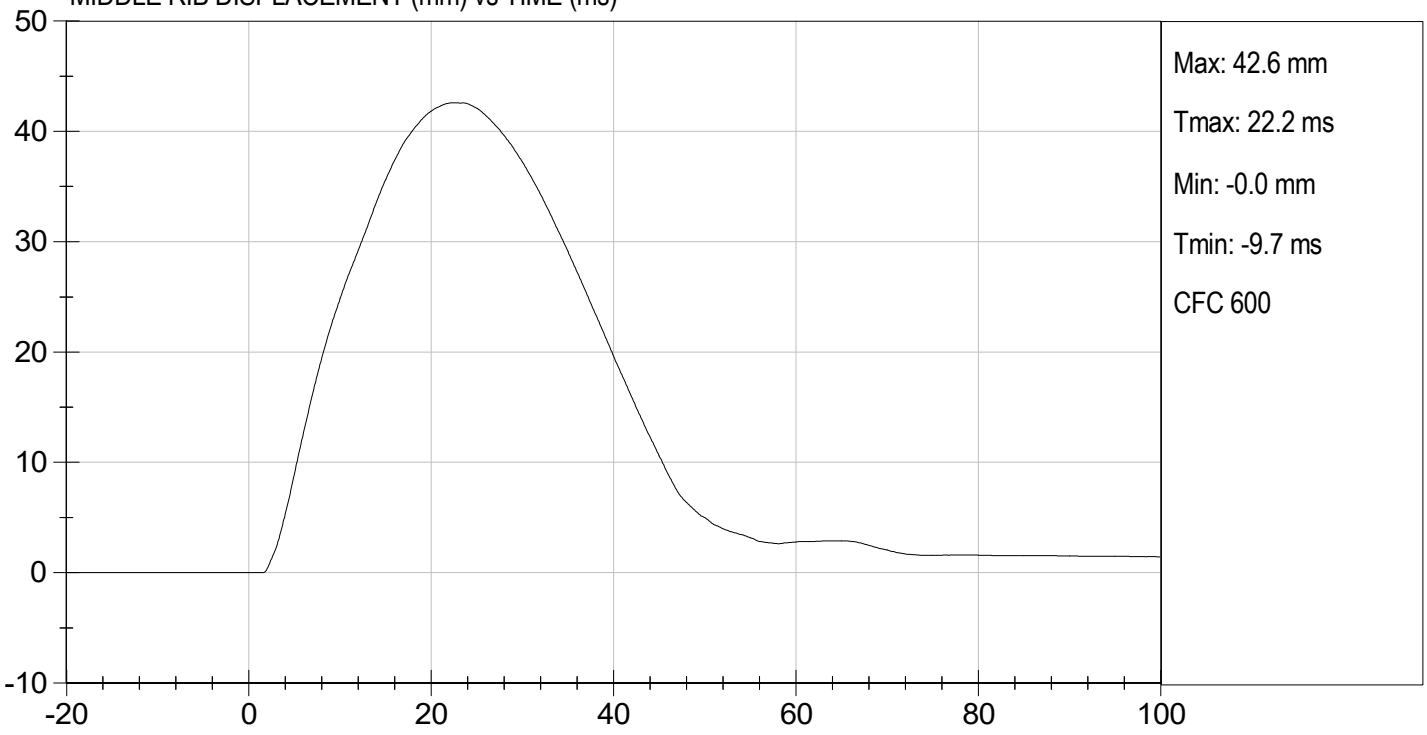
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 12/06/2023
TEST #: D233215

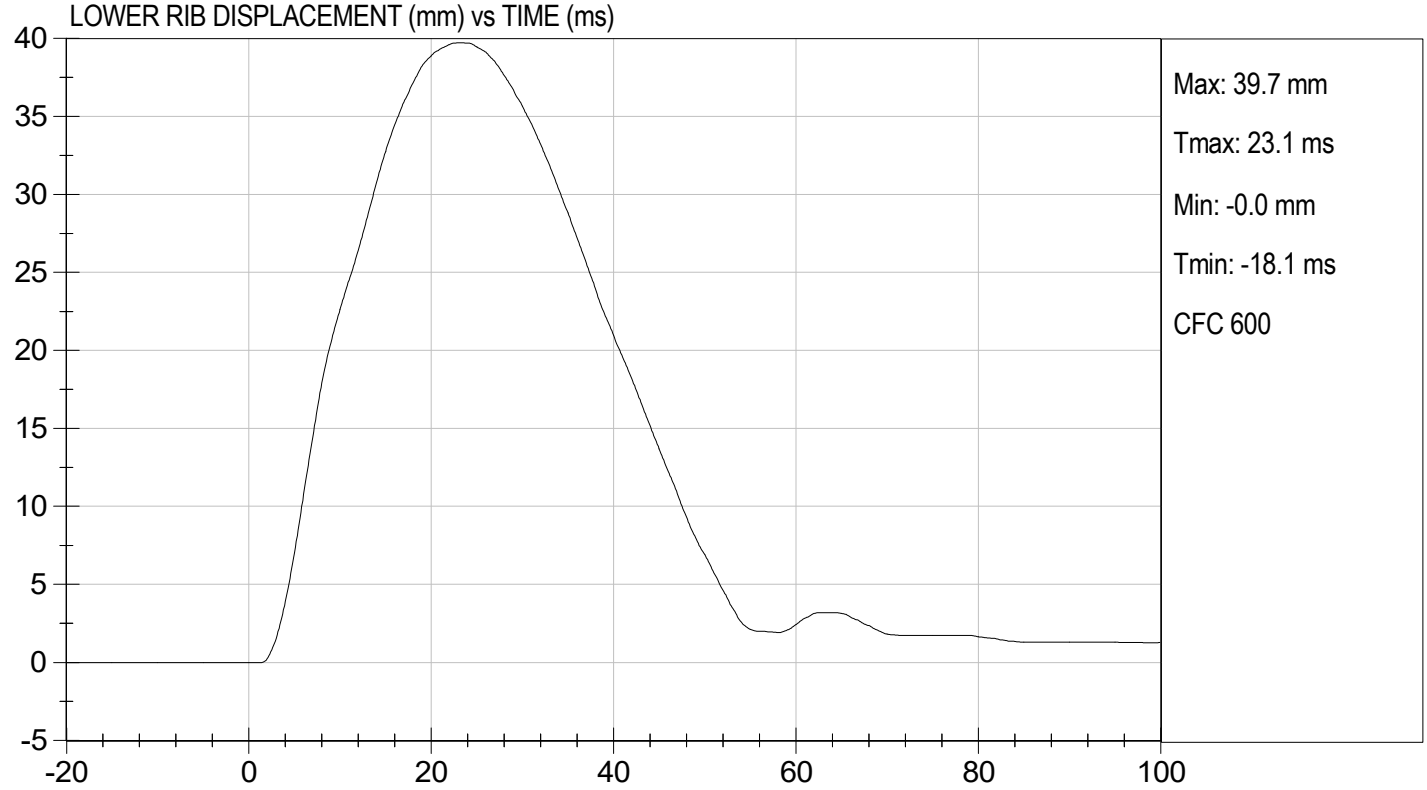




MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



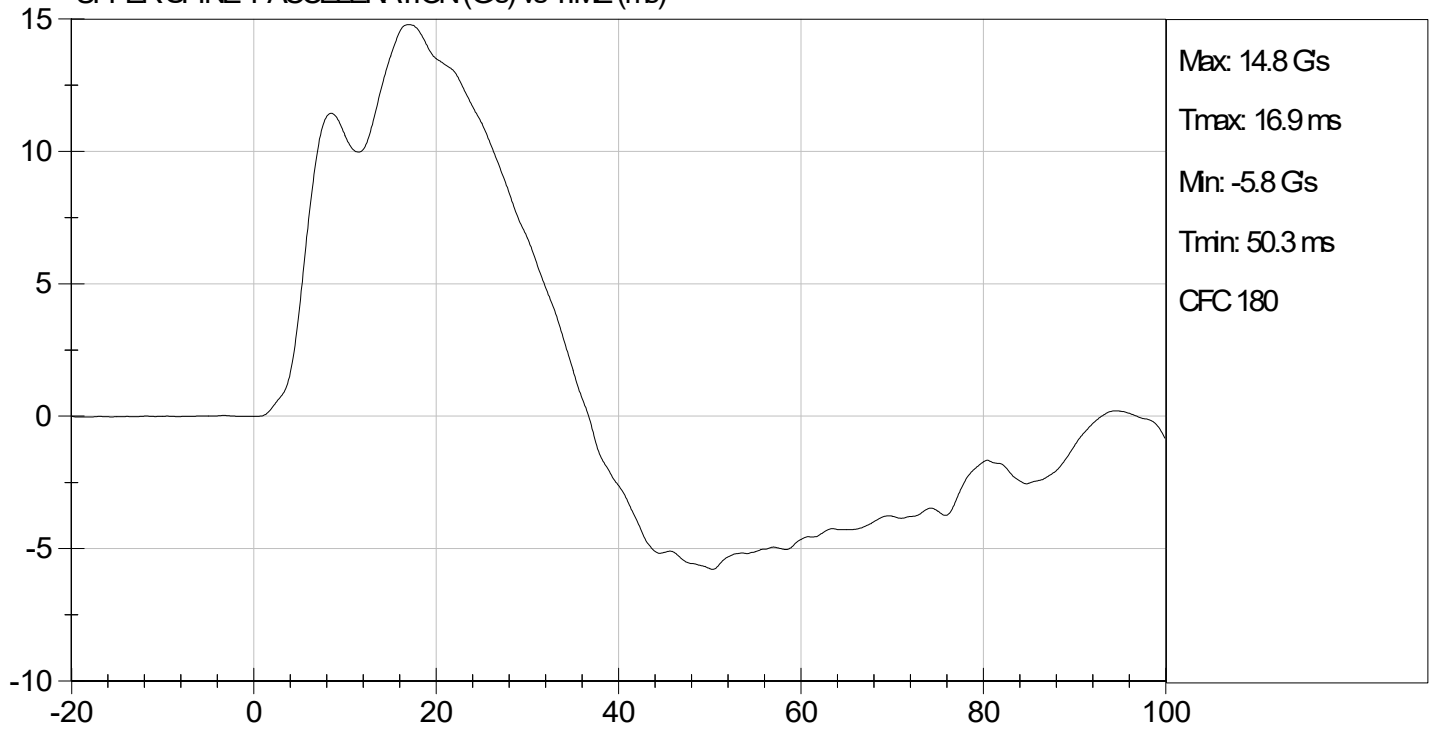
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



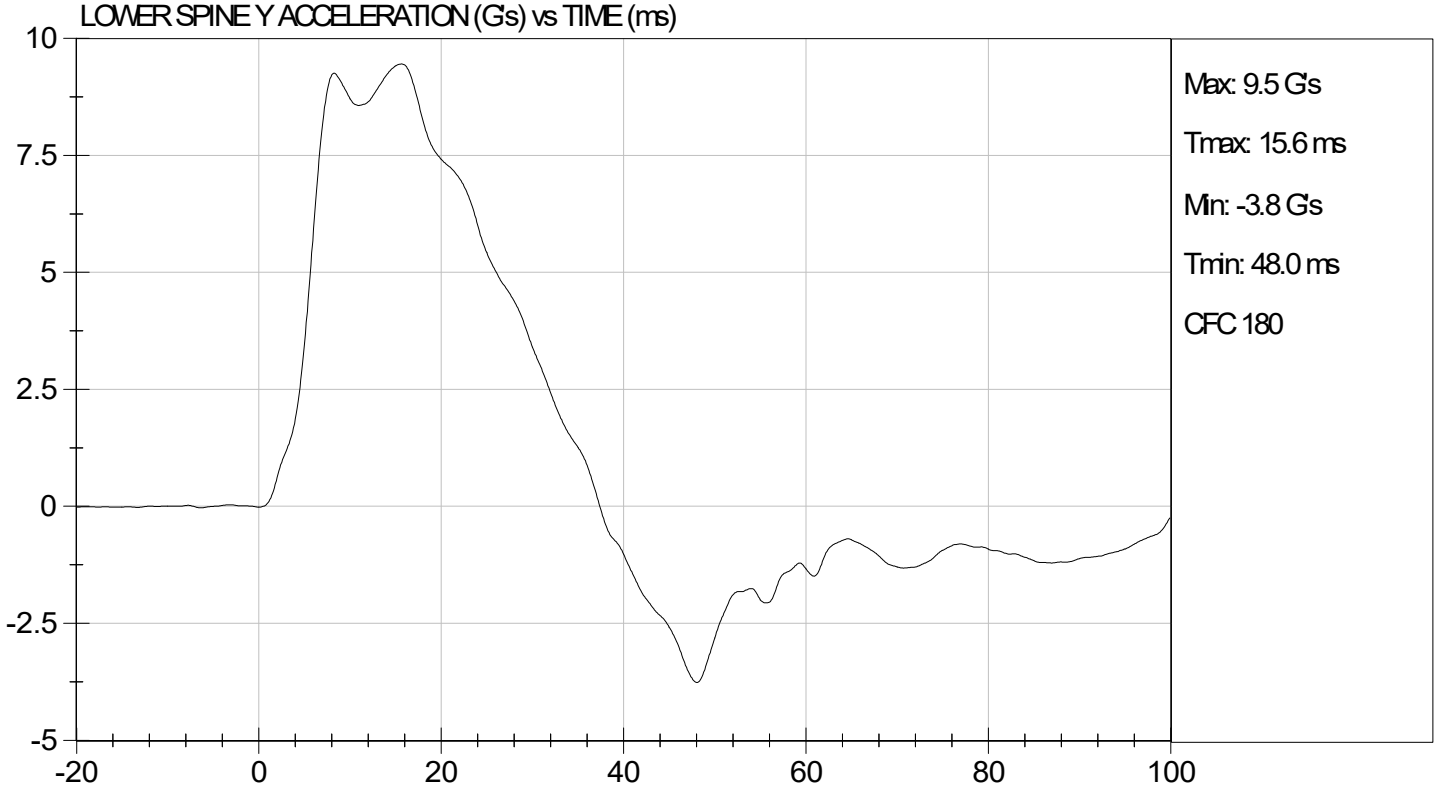
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 12/06/2023
TEST #: D233215

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D233216

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	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	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
		Overall Test Results		Pass

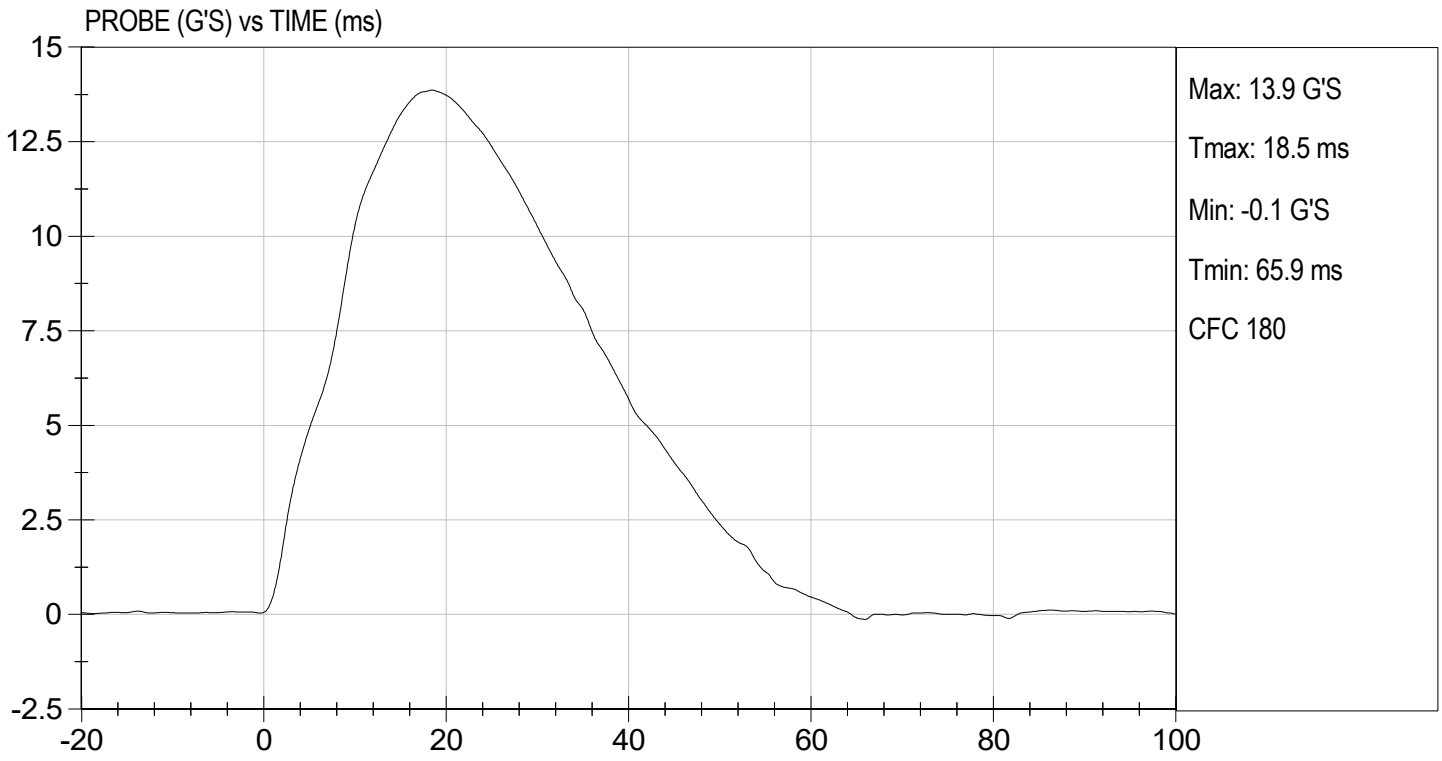
Laboratory Technician

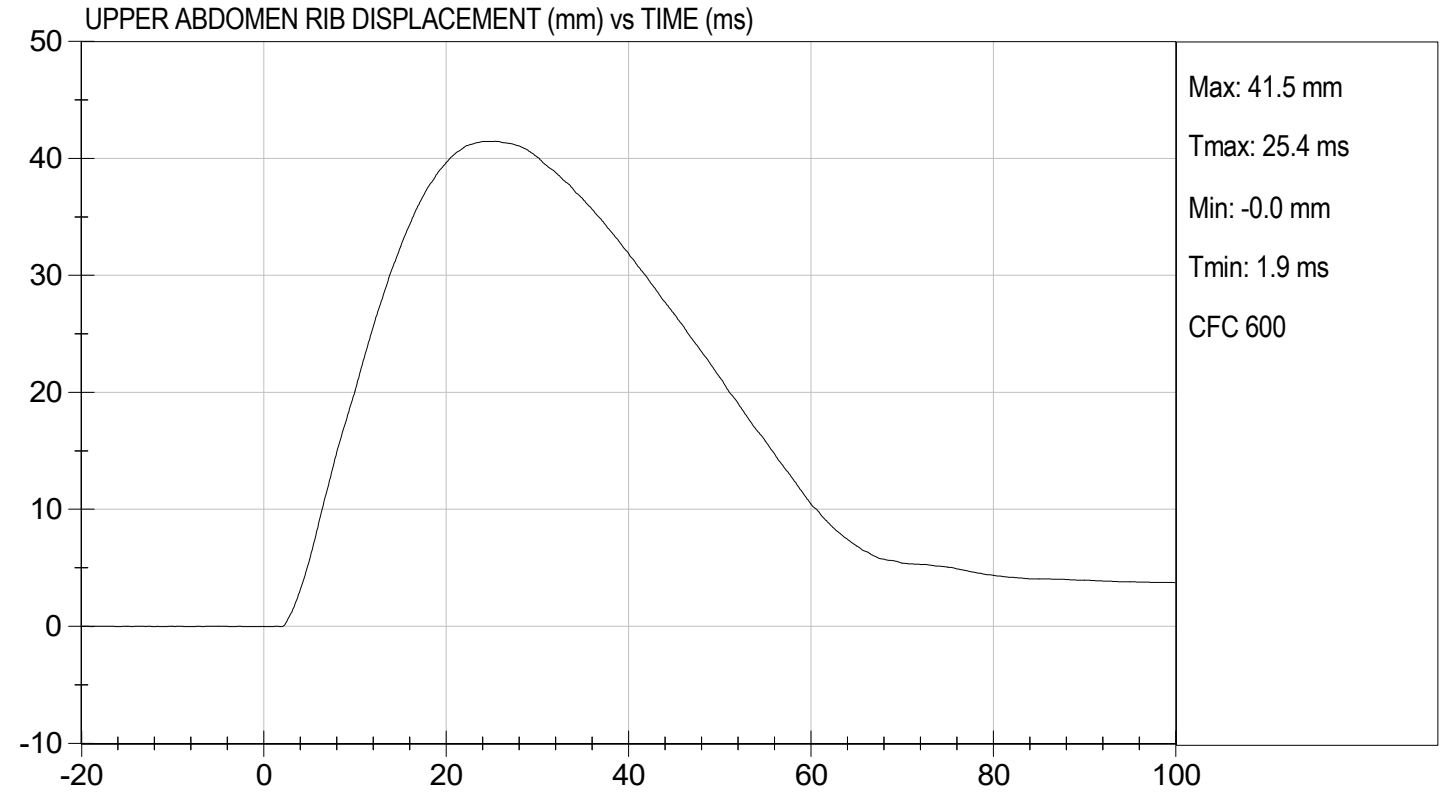
12/06/2023
Test Date

Approved By

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

TEST DATE: 12/06/2023
TEST #: D233216

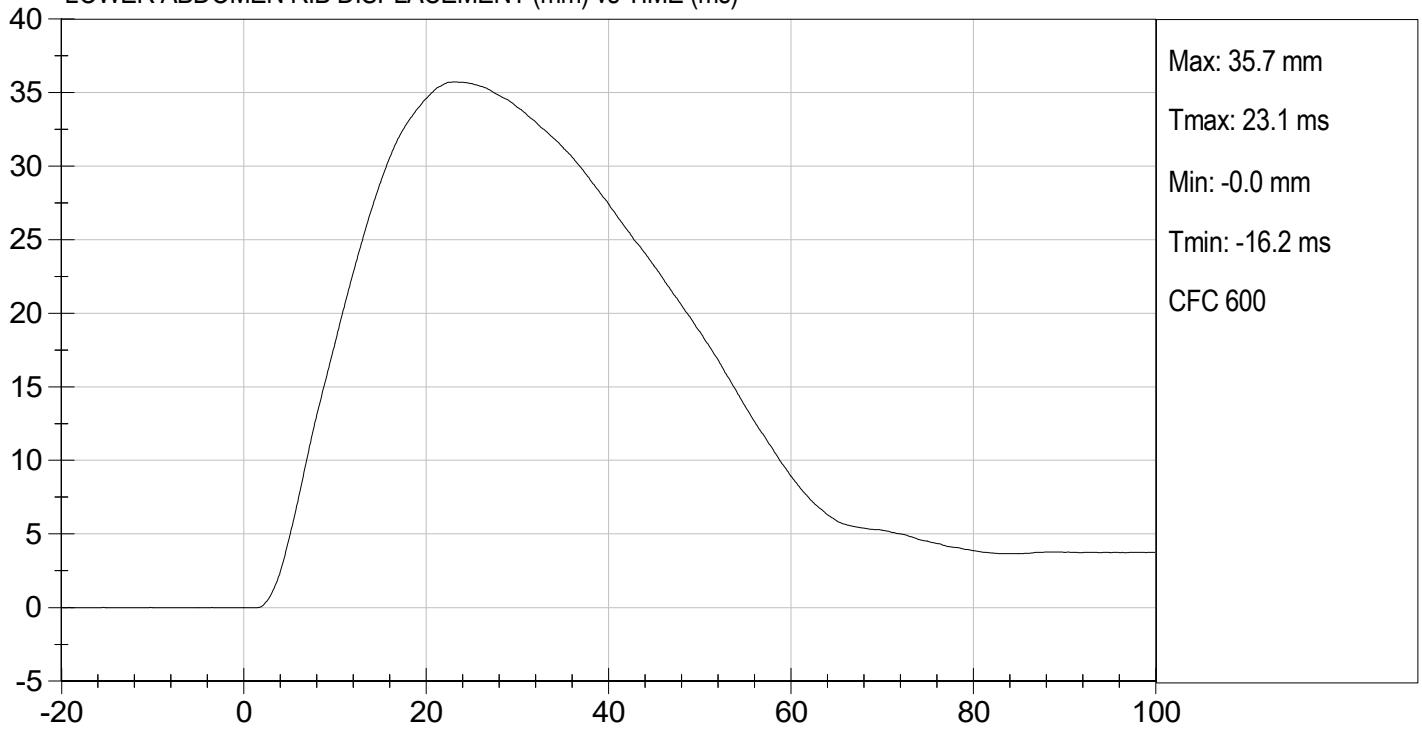




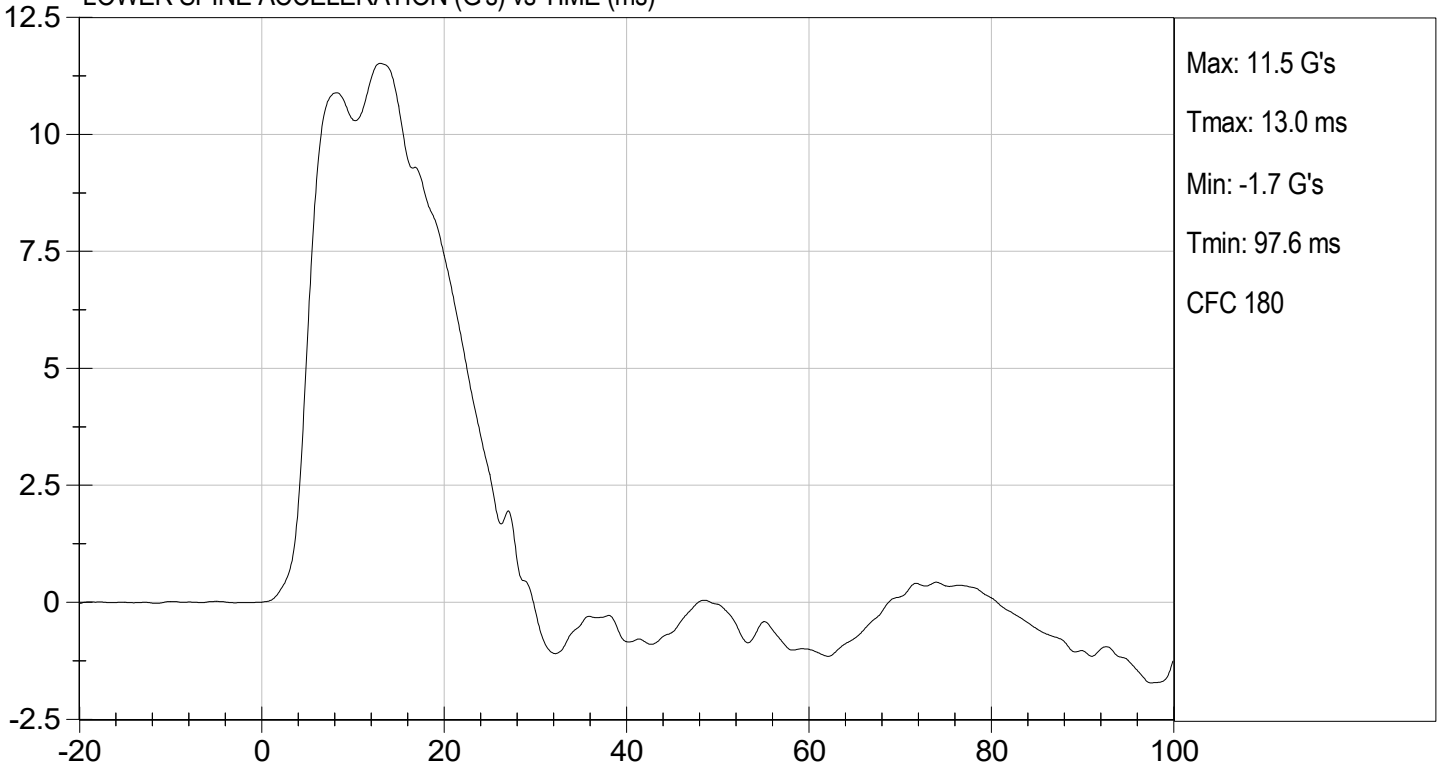
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 12/06/2023
TEST #: D233216

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



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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D233217

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	27	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	38.6	Pass
Peak Acetabulum Force	N	3600 to 4300	4,064	Pass
		Overall Test Results		Pass

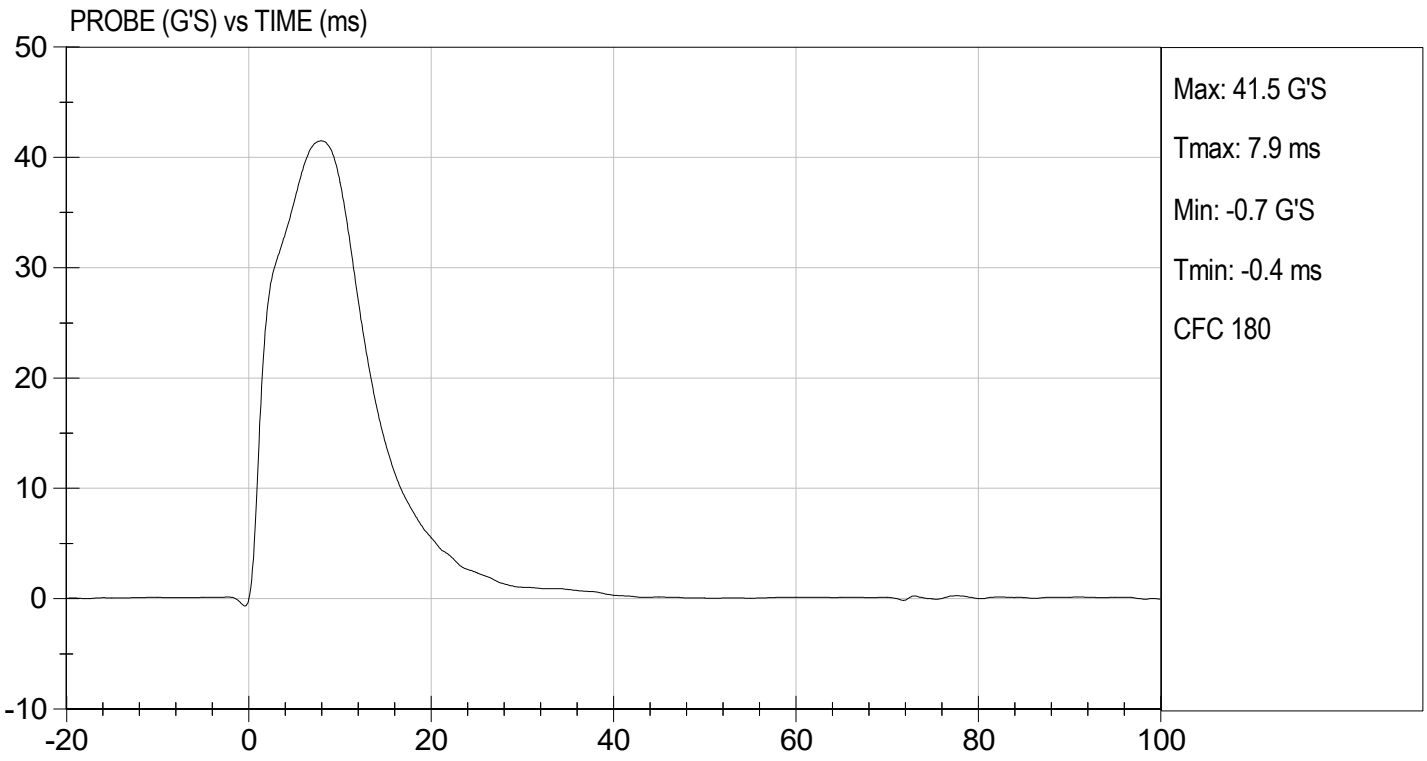
Laboratory Technician

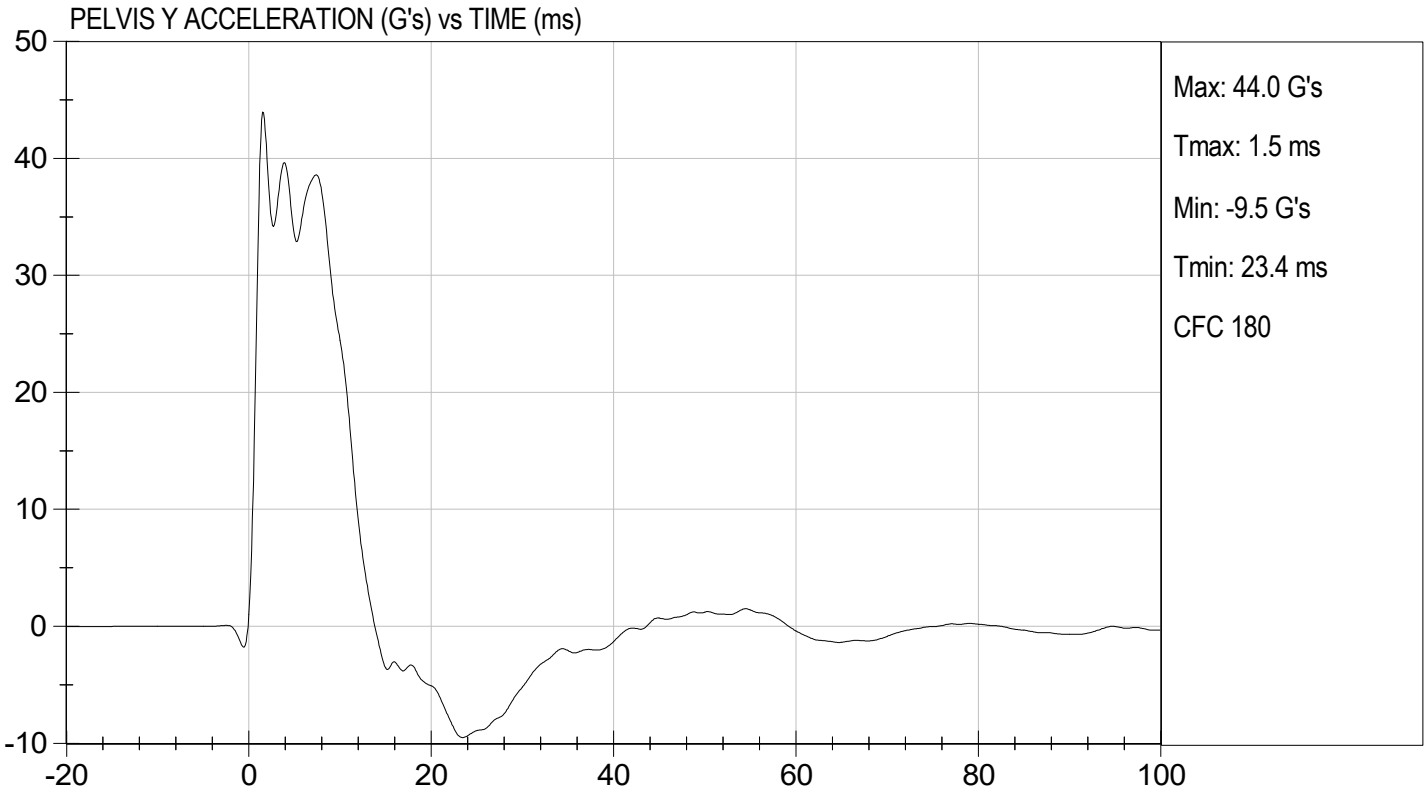
12/06/2023
Test Date

Approved By

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

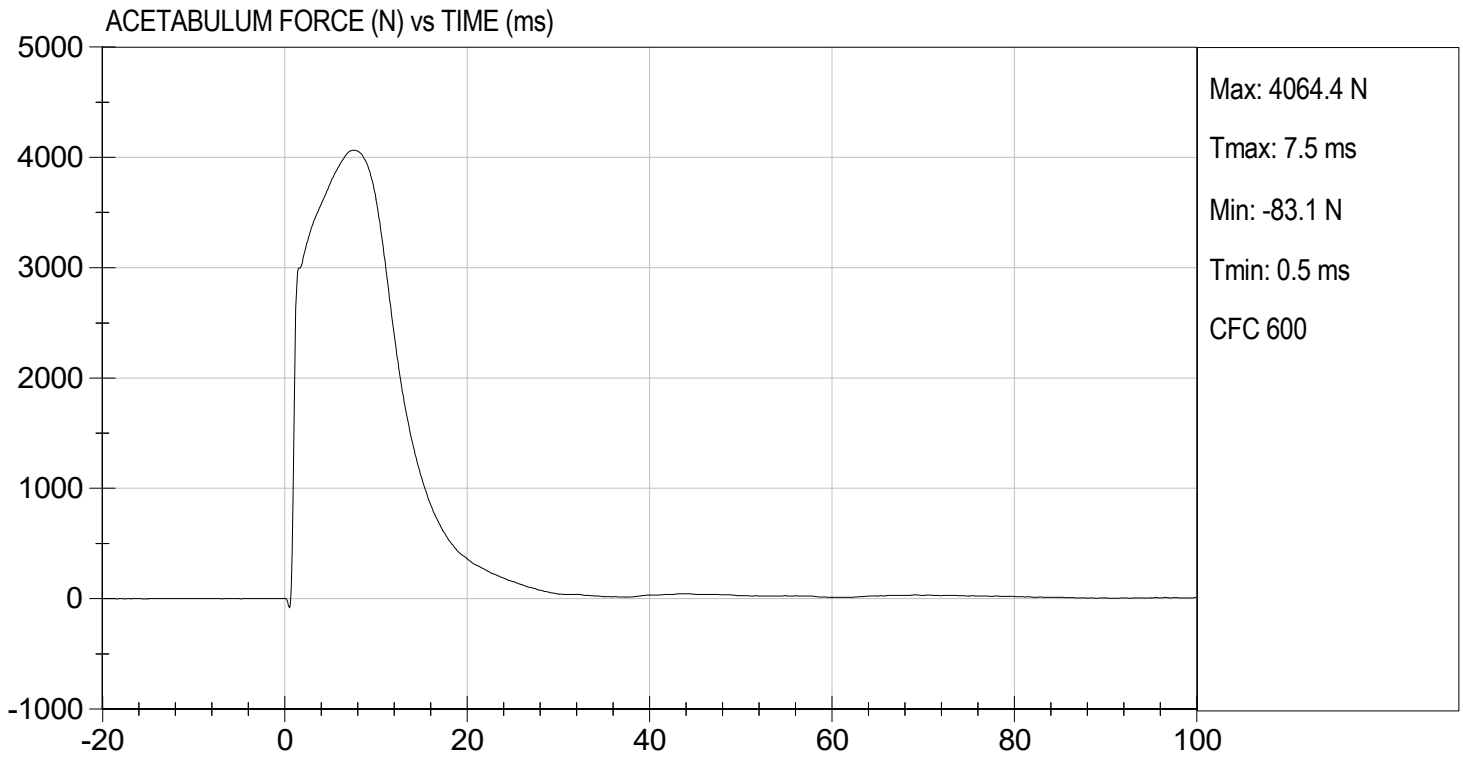
TEST DATE: 12/06/2023
TEST #: D233217





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

TEST DATE: 12/06/2023
TEST #: D233217



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D233218

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	24	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	32	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,679	Pass
		Overall Test Results		Pass

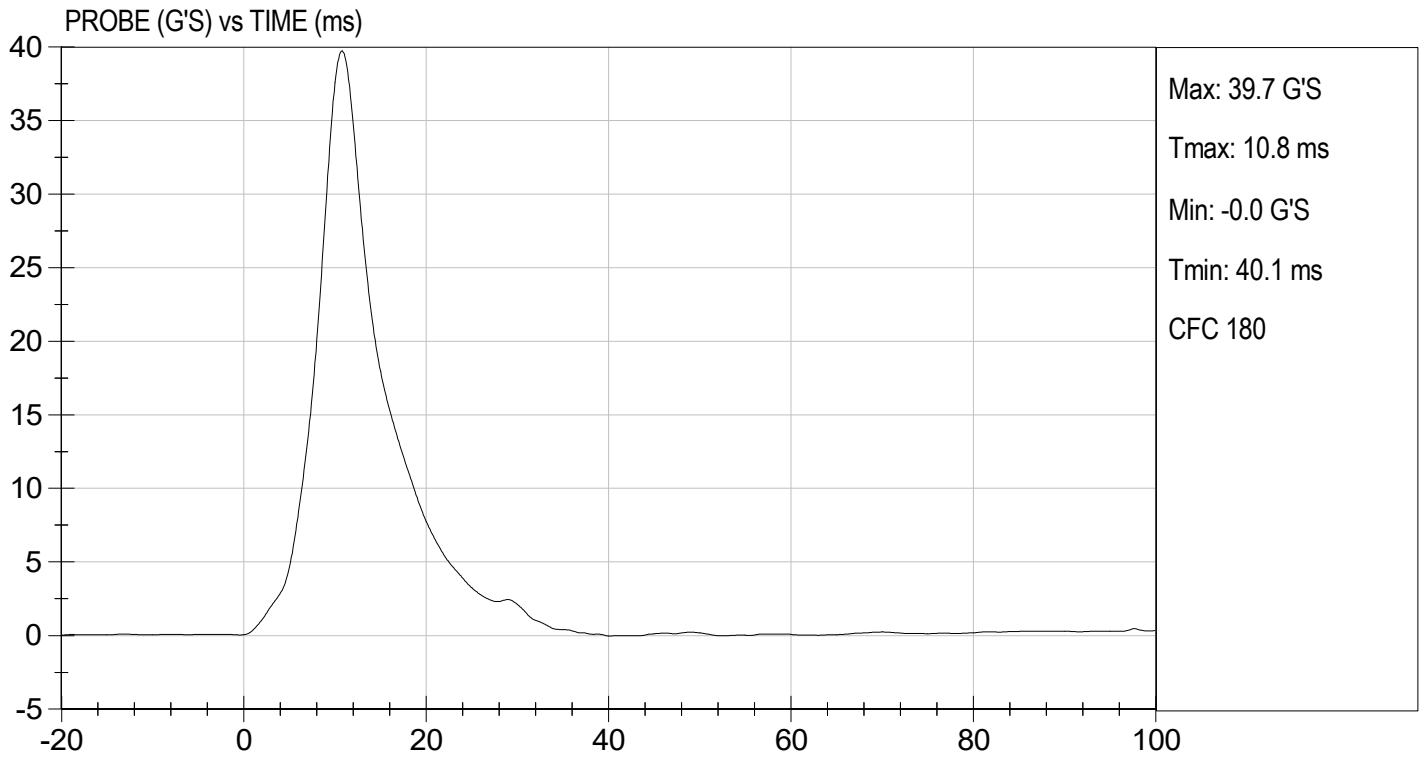
Laboratory Technician

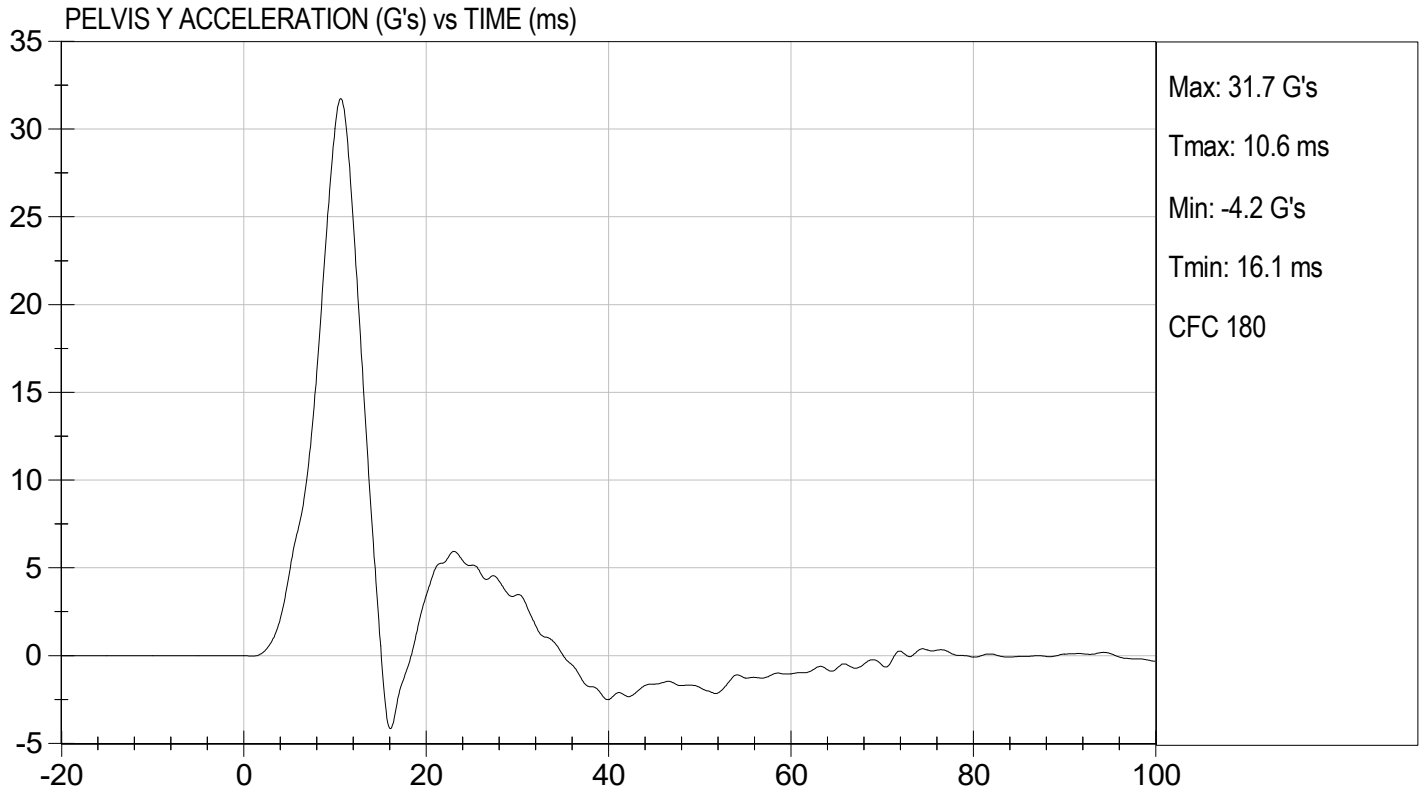
12/06/2023
Test Date

Approved By

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

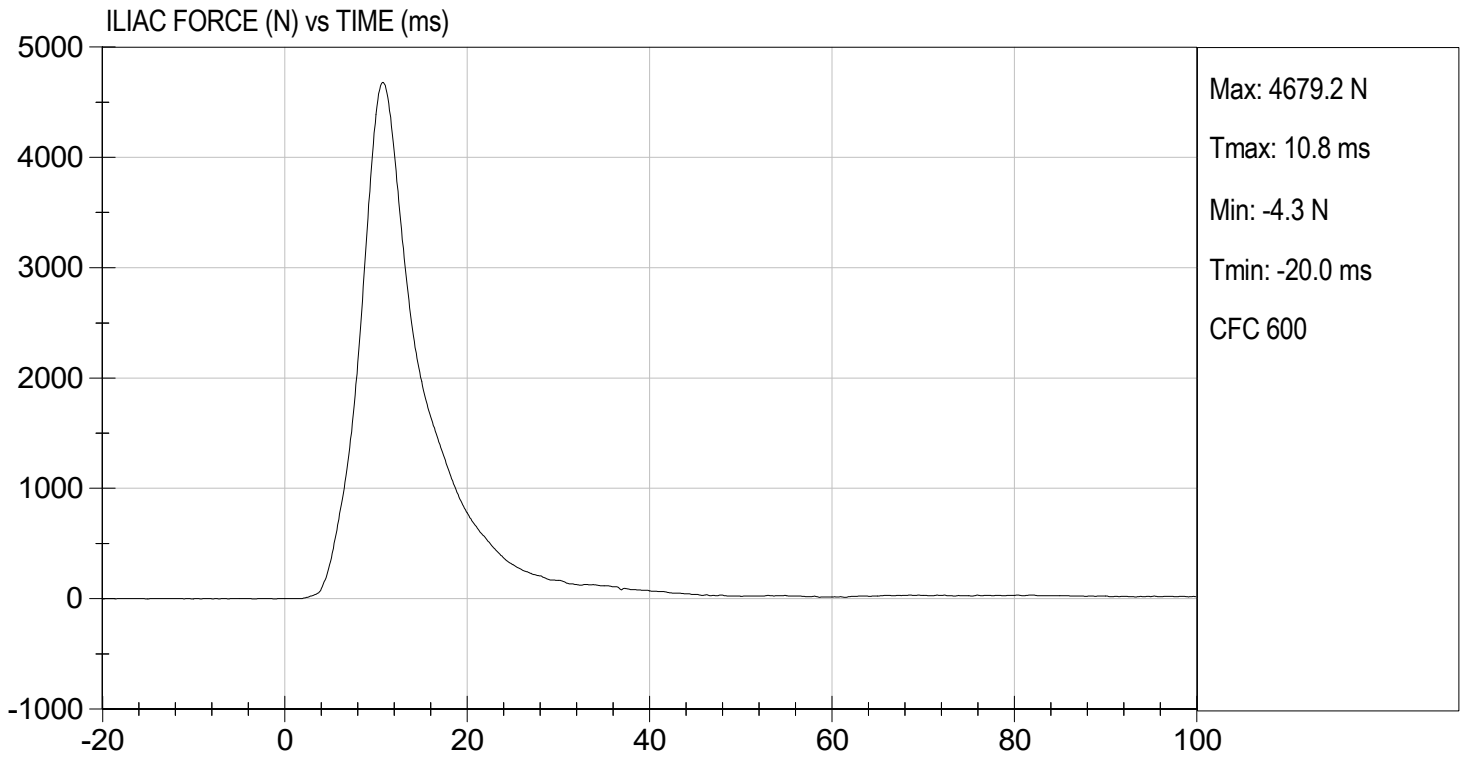
TEST DATE: 12/06/2023
TEST #: D233218





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

TEST DATE: 12/06/2023
TEST #: D233218



QUALIFICATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SID-IIsD External Measurements
SN: 296

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

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

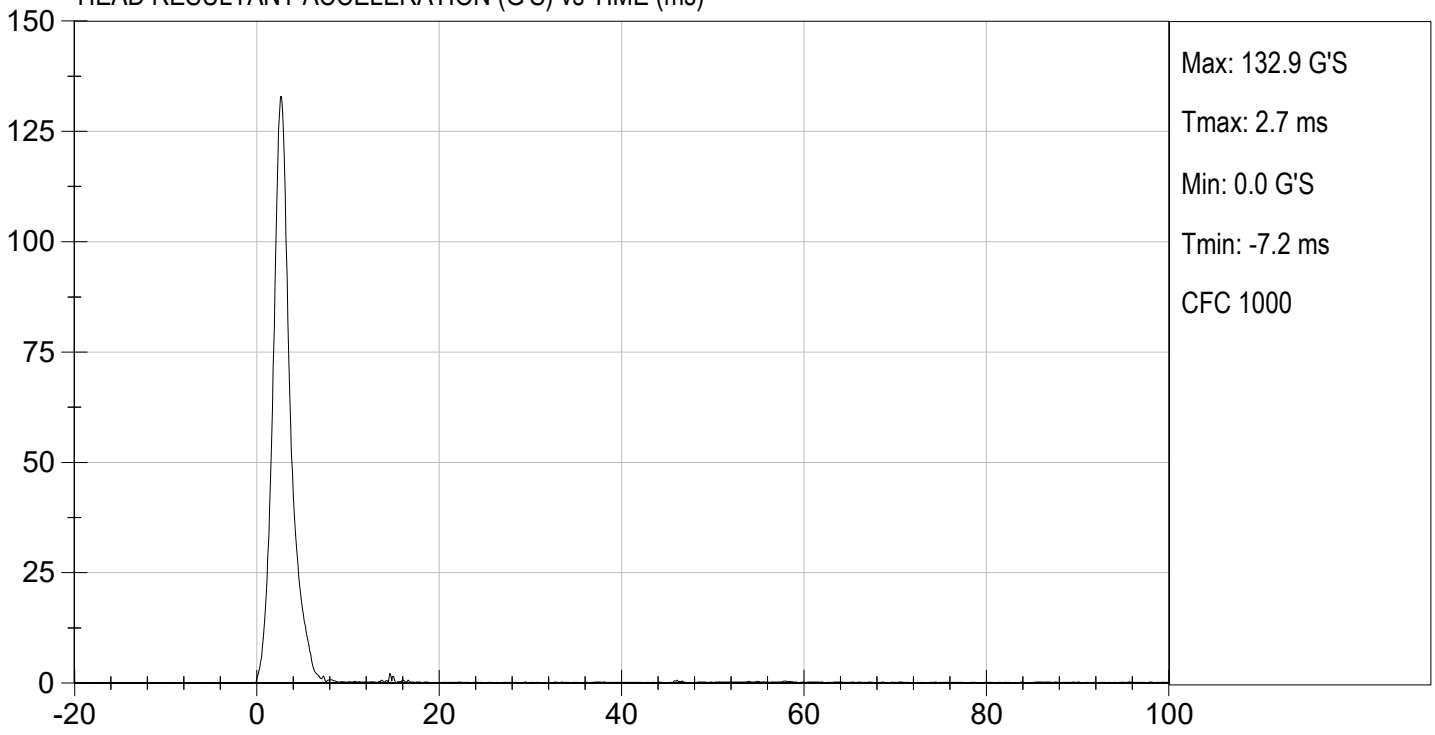
12/14/2023
Test Date

Approved By

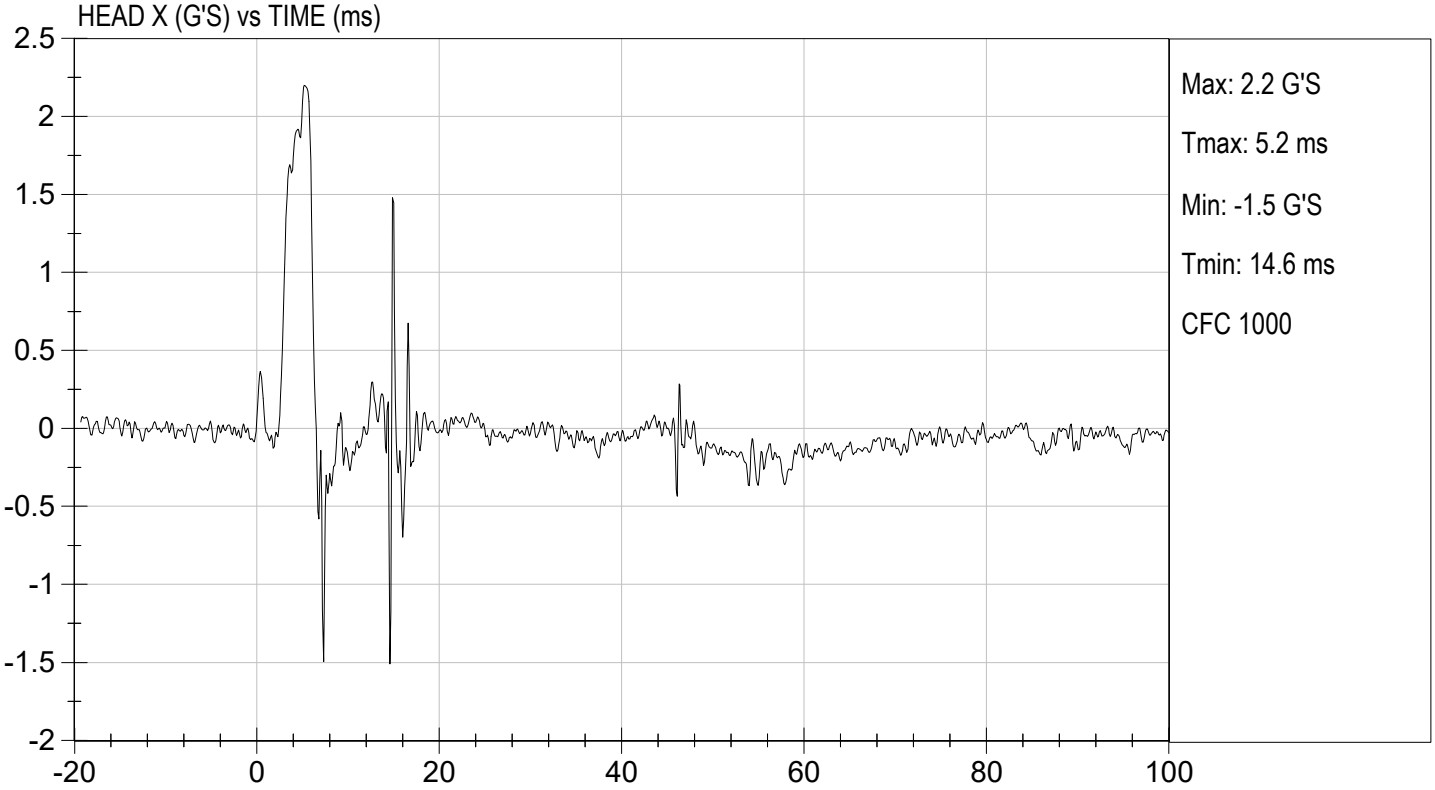
TEST DESC: HEAD DROP

TEST DATE: 12/14/2023
TEST #: D233321

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)

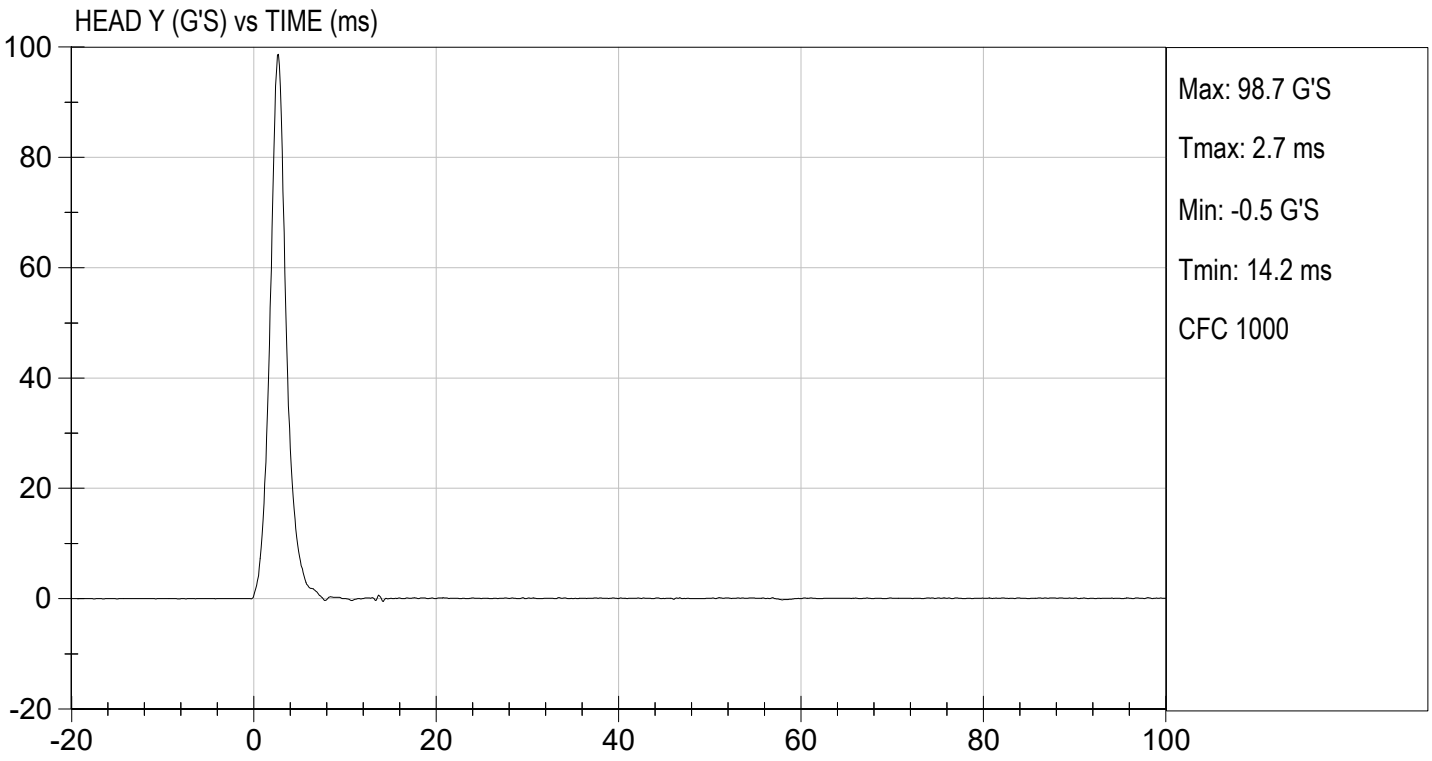


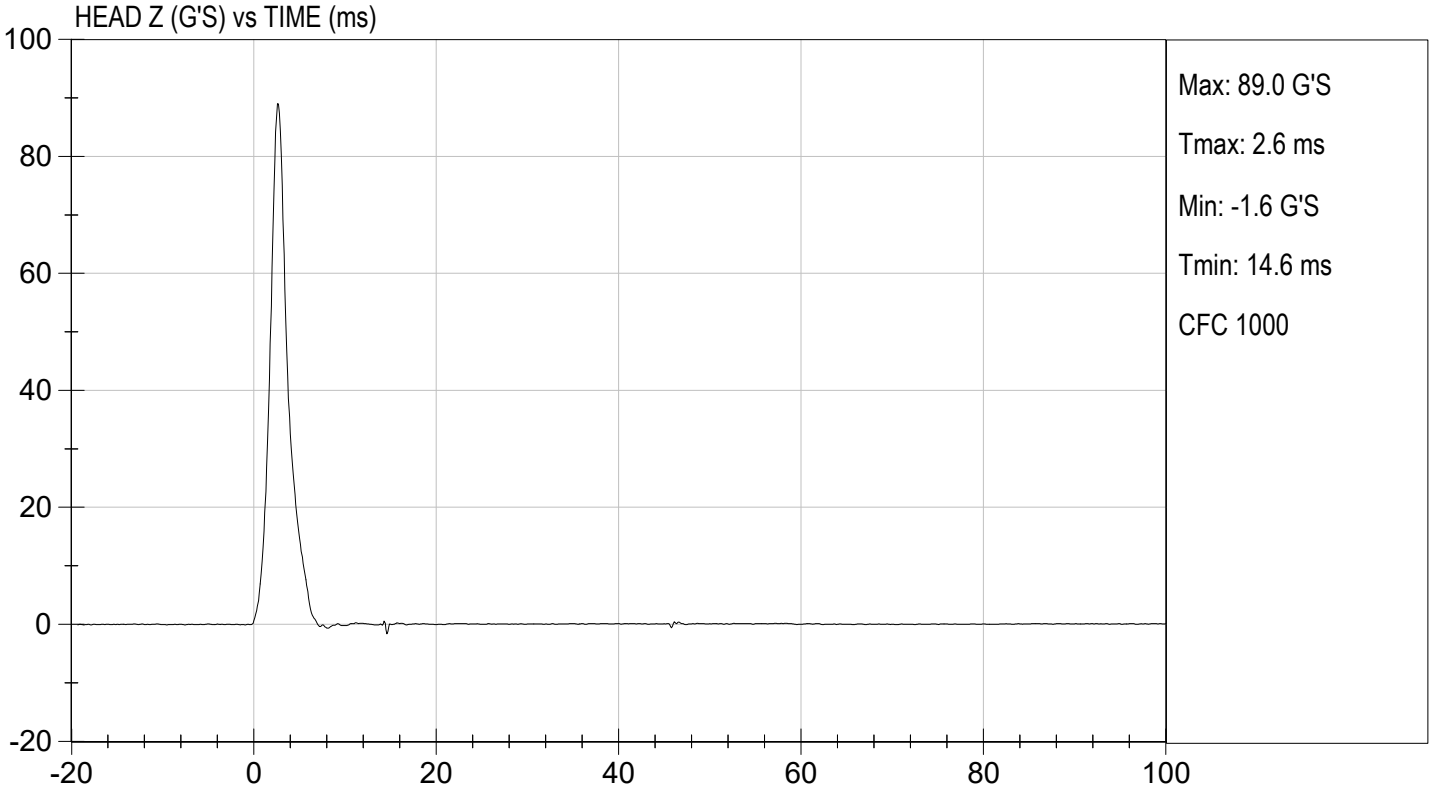
HEAD X (G'S) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 12/14/2023
TEST #: D233321





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

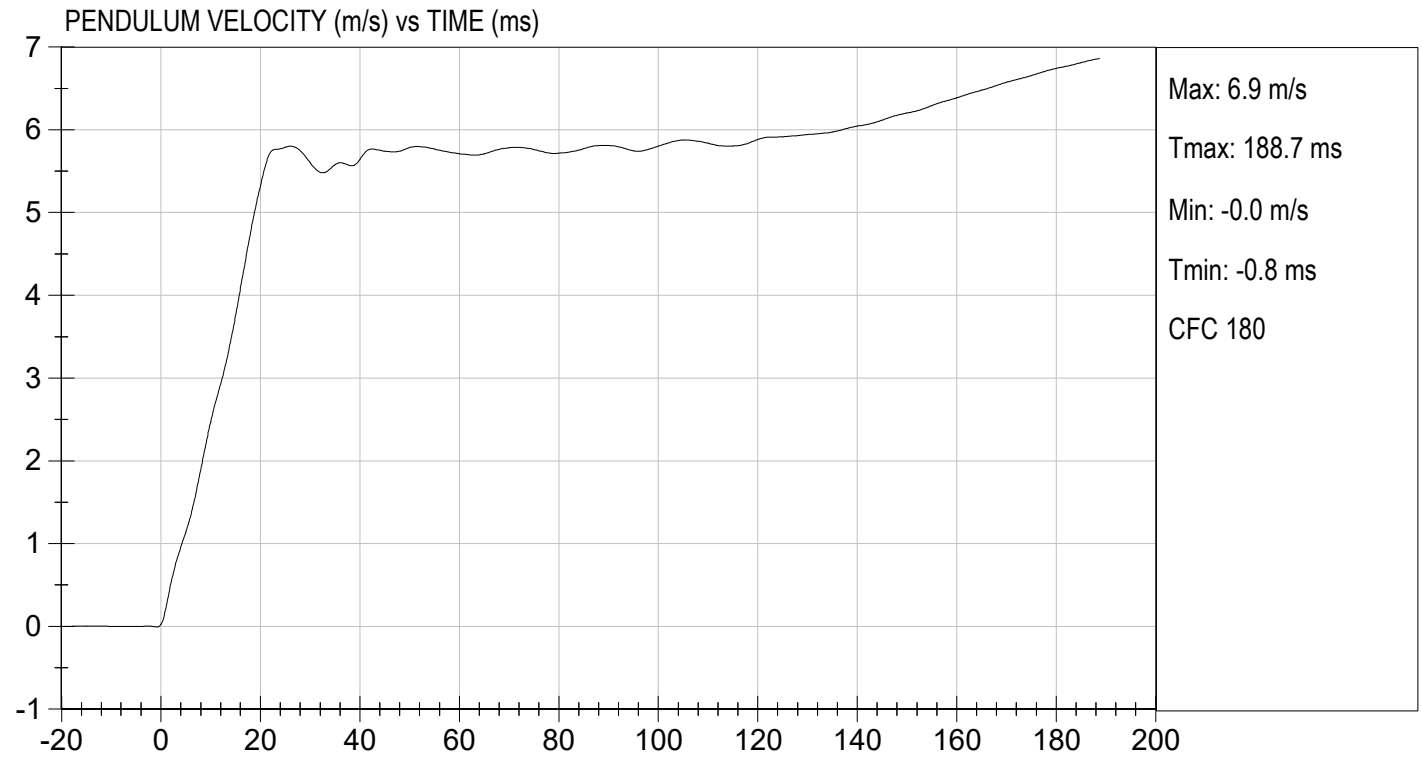
Laboratory Technician

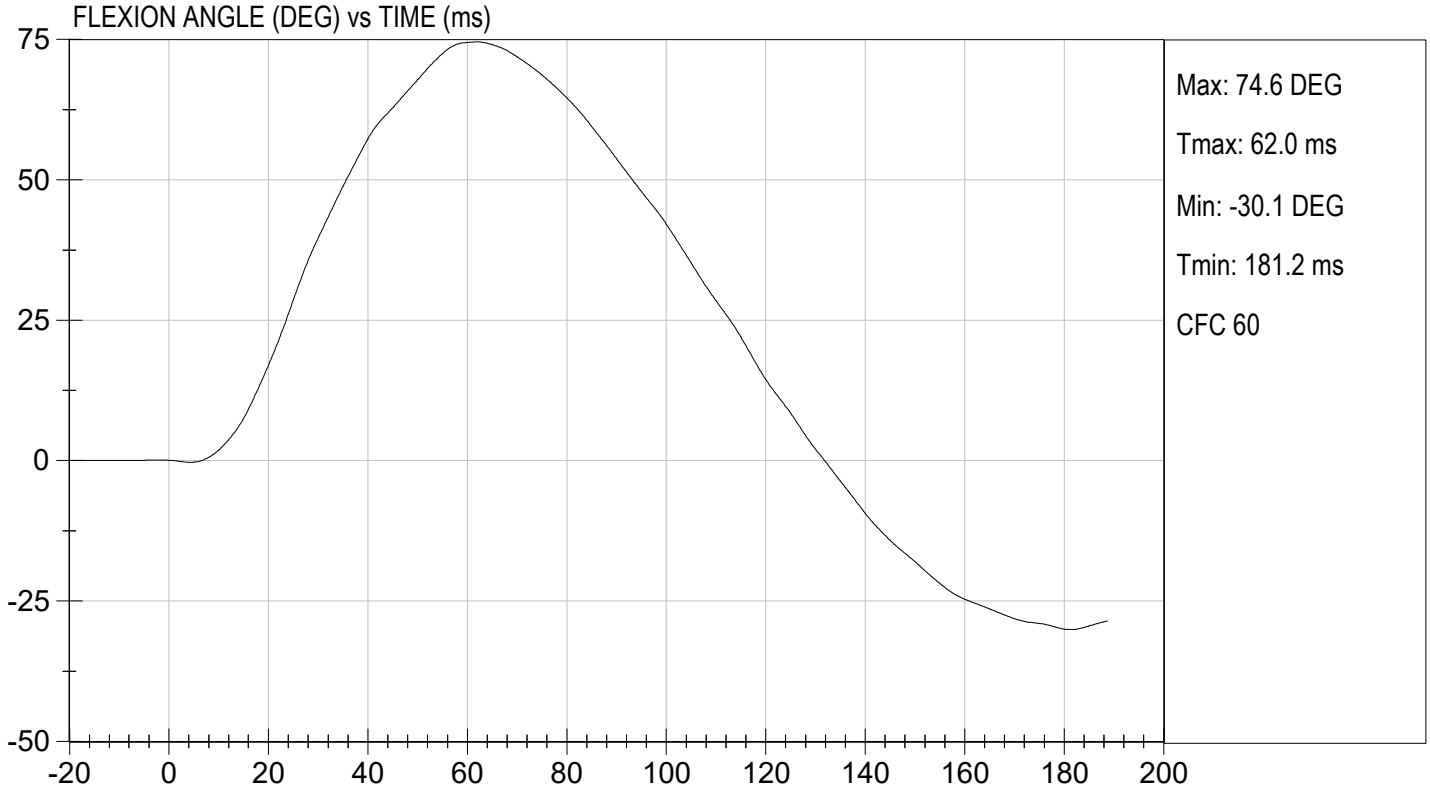
12/14/2023
Test Date

Approved By

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

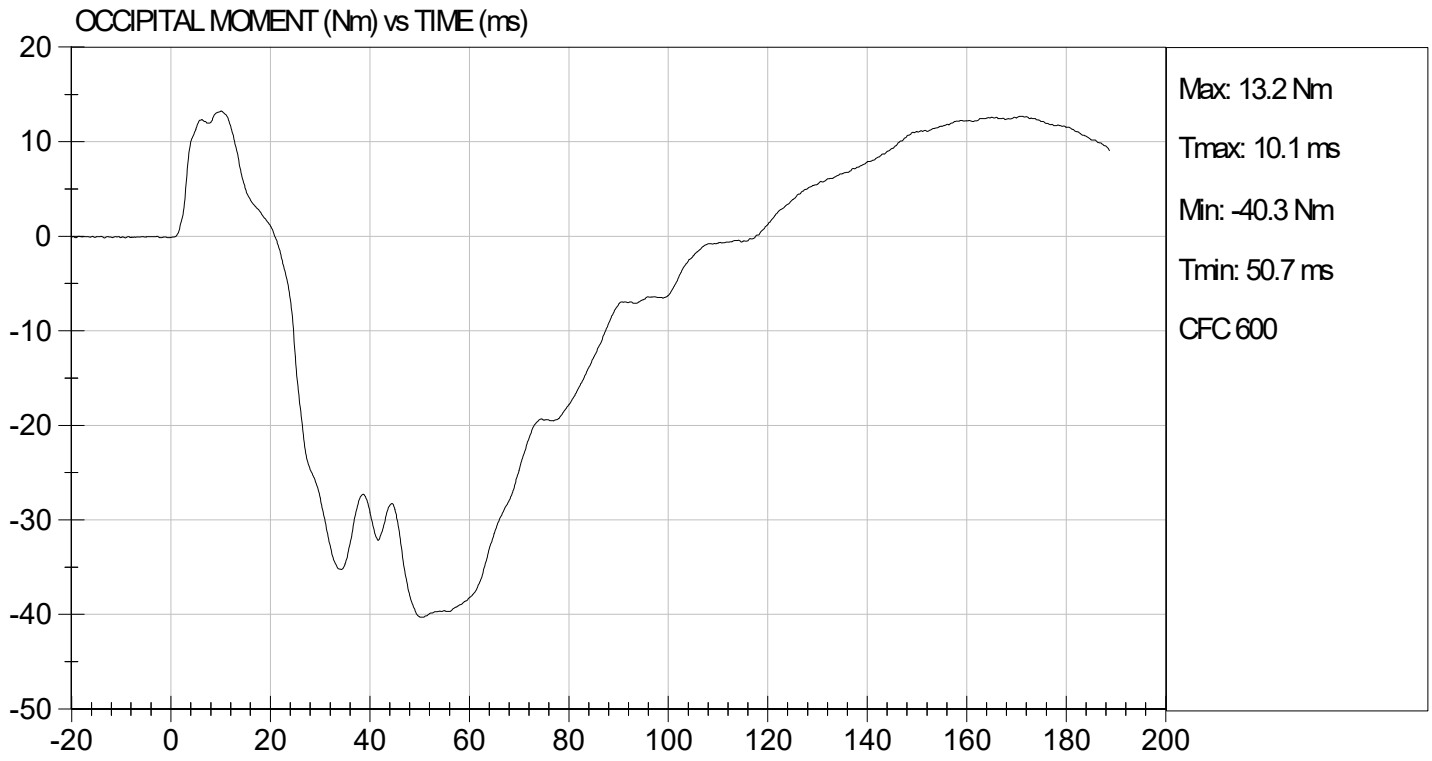
TEST DATE: 12/14/2023
TEST #: D233322





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-IIs 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

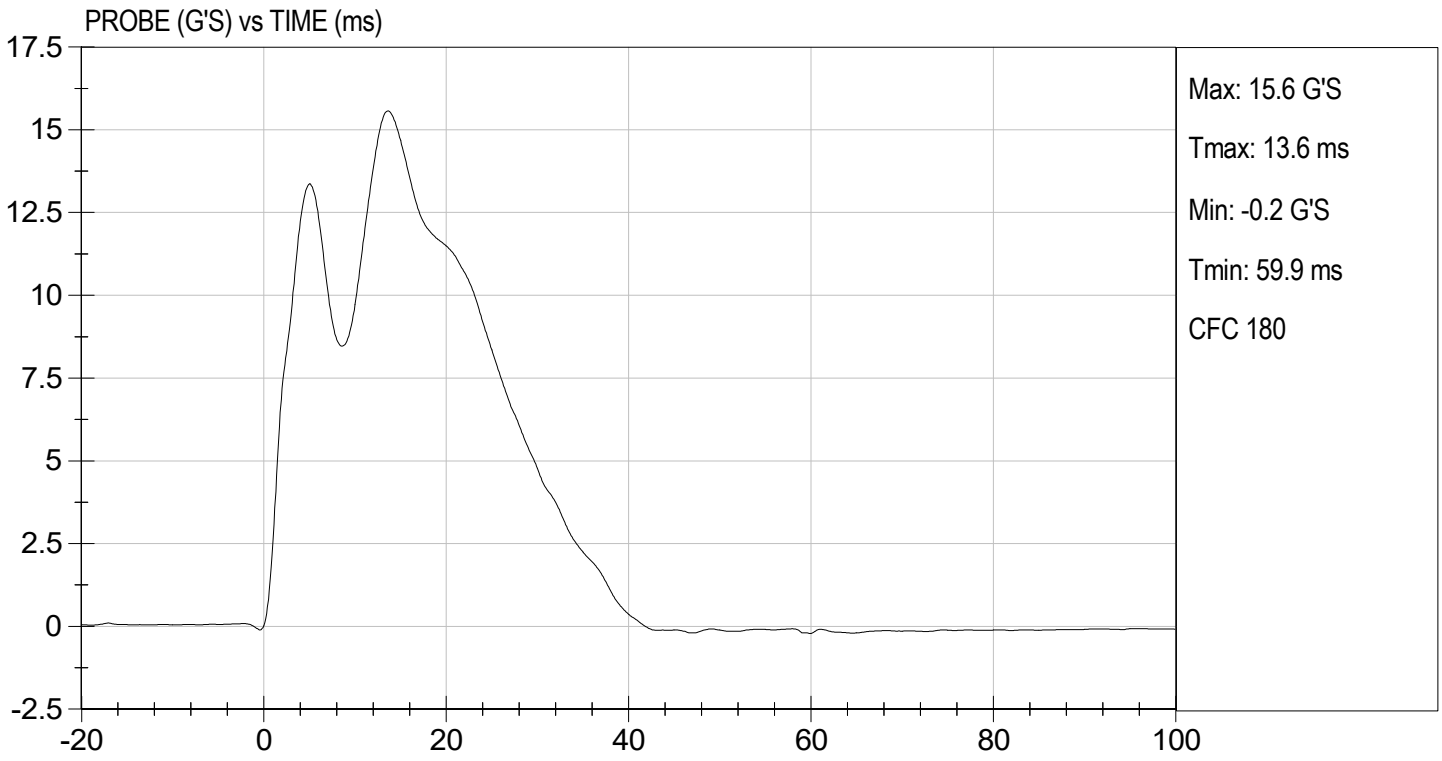
Laboratory Technician

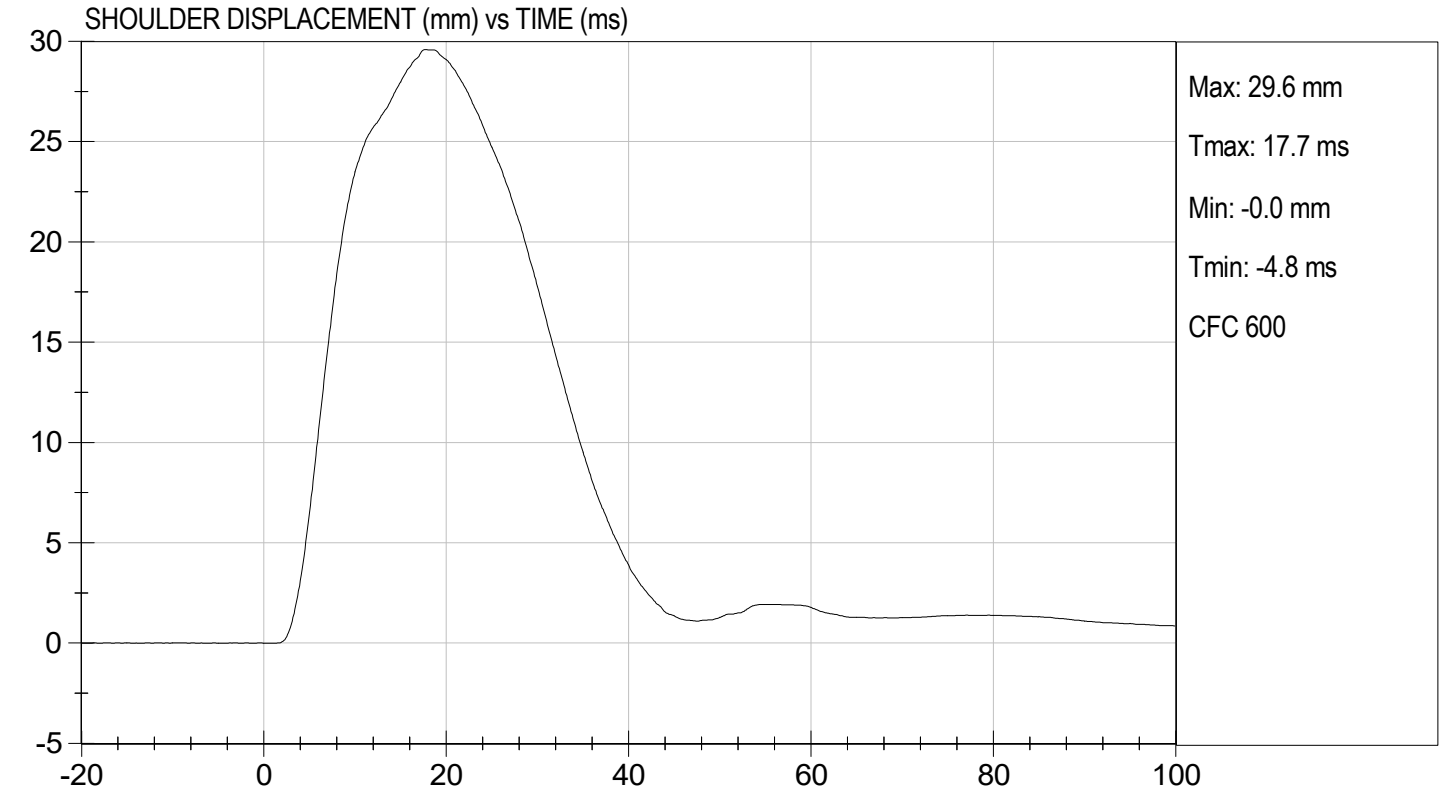
12/14/2023
Test Date

Approved By

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

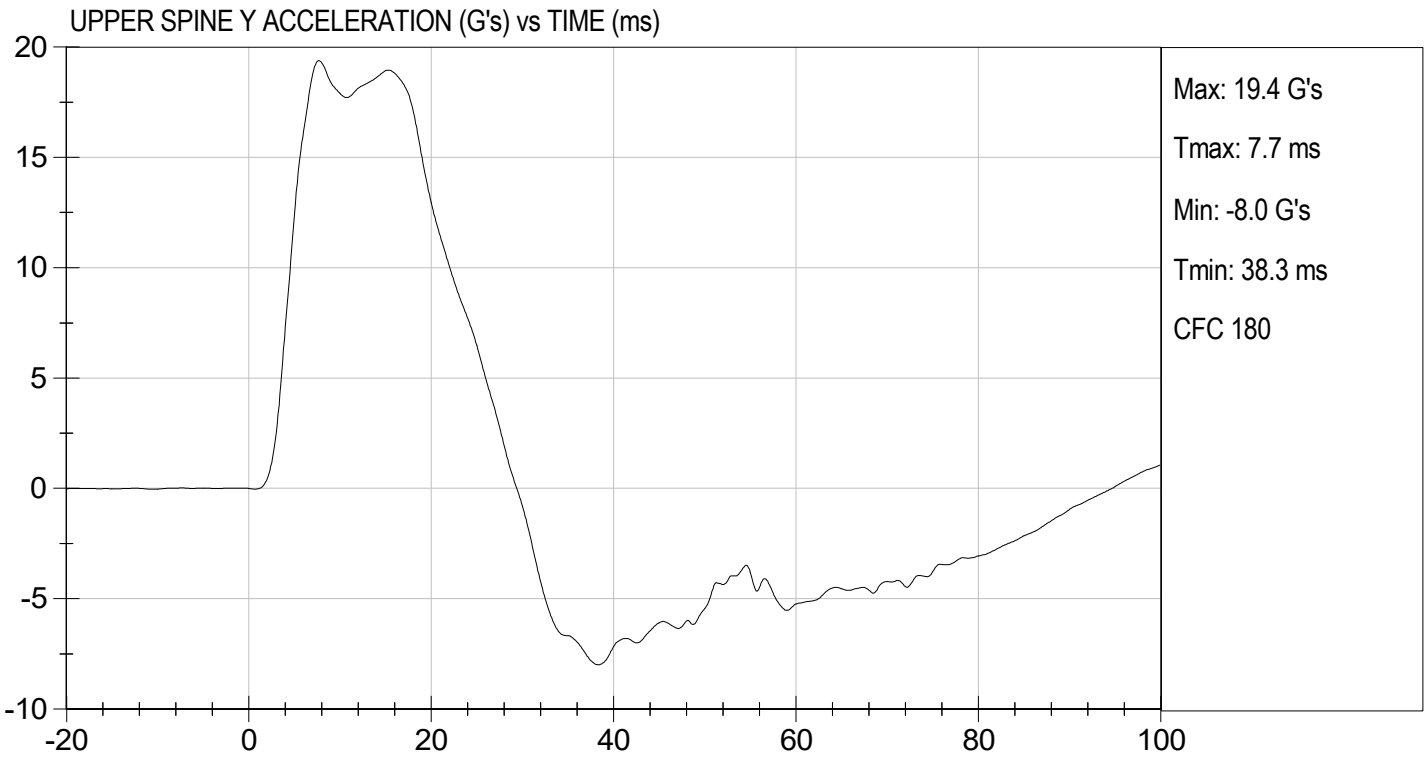
TEST DATE: 12/14/2023
TEST #: D233323





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

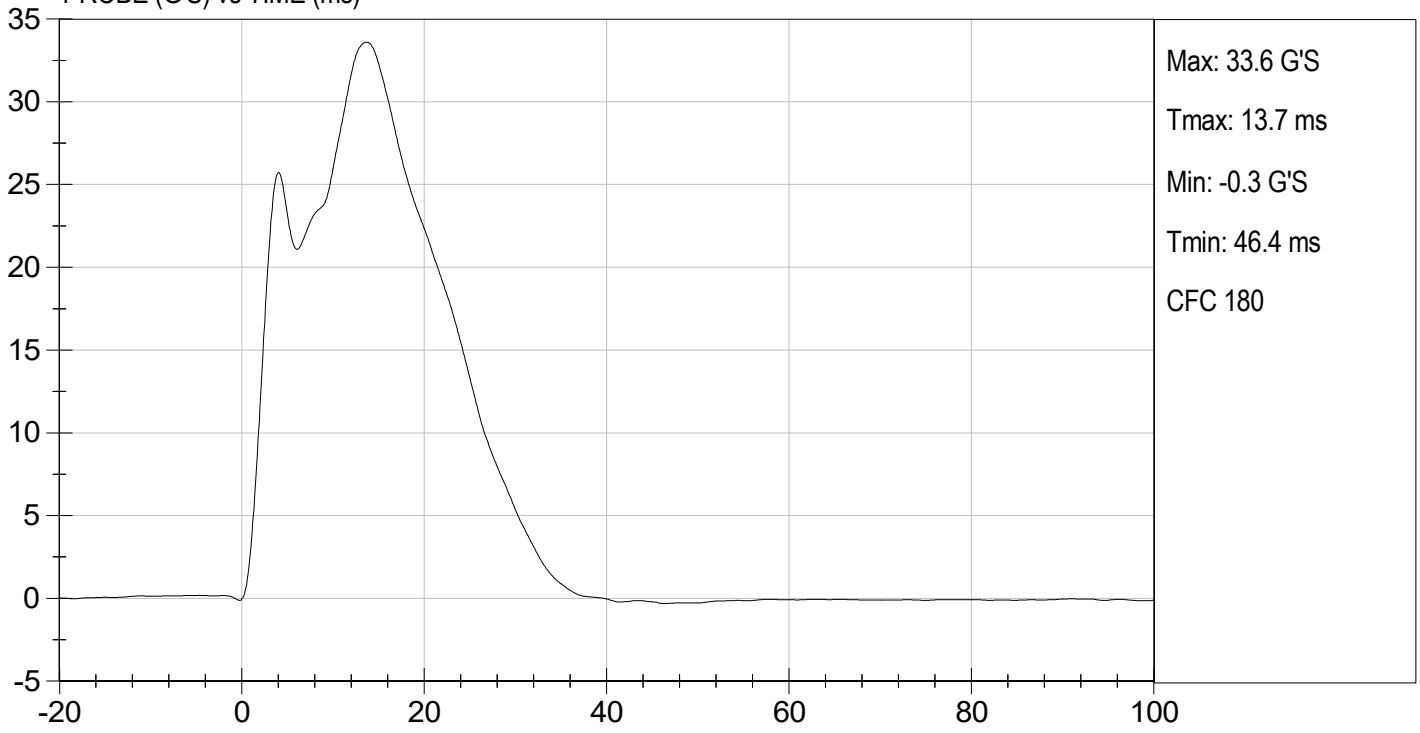
12/14/2023
Test Date

Approved By

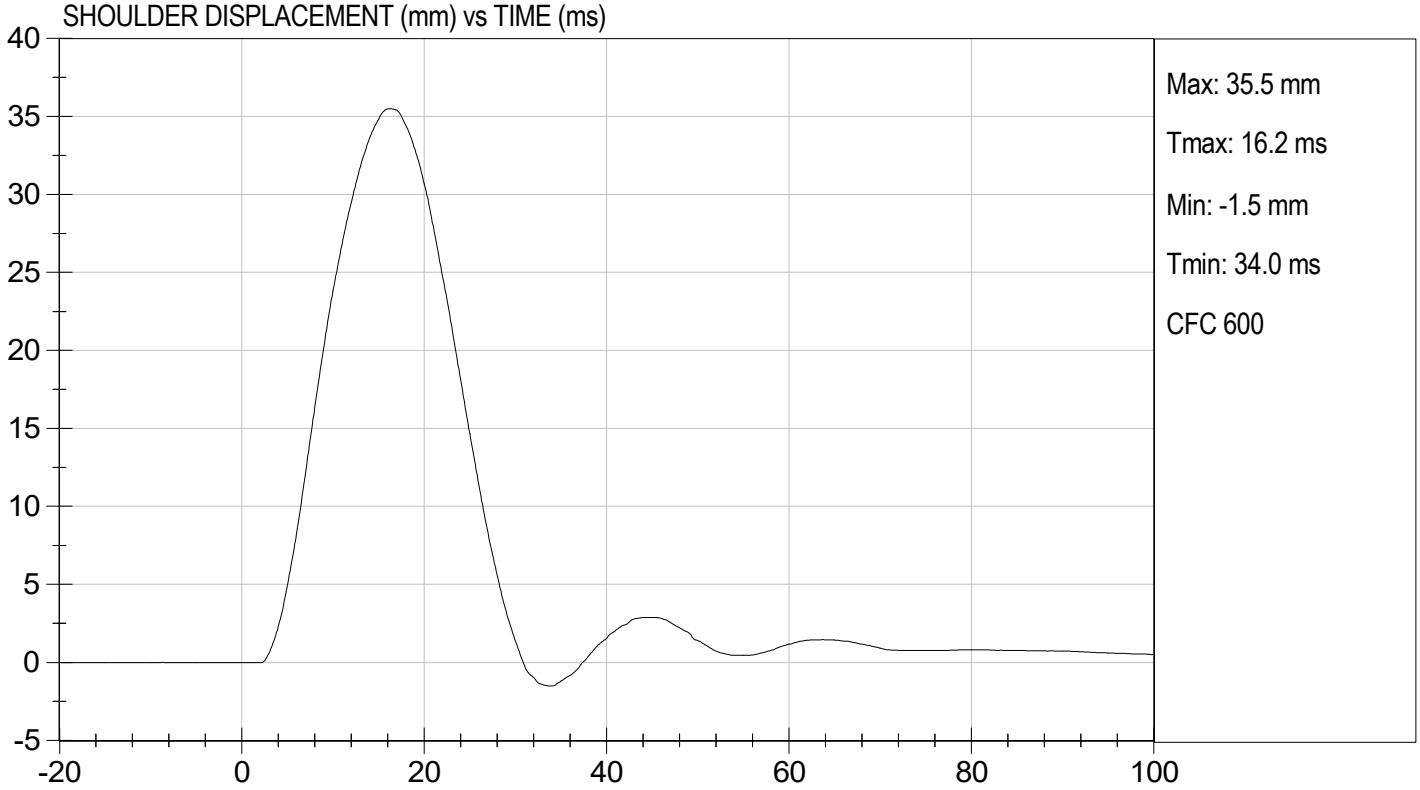
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

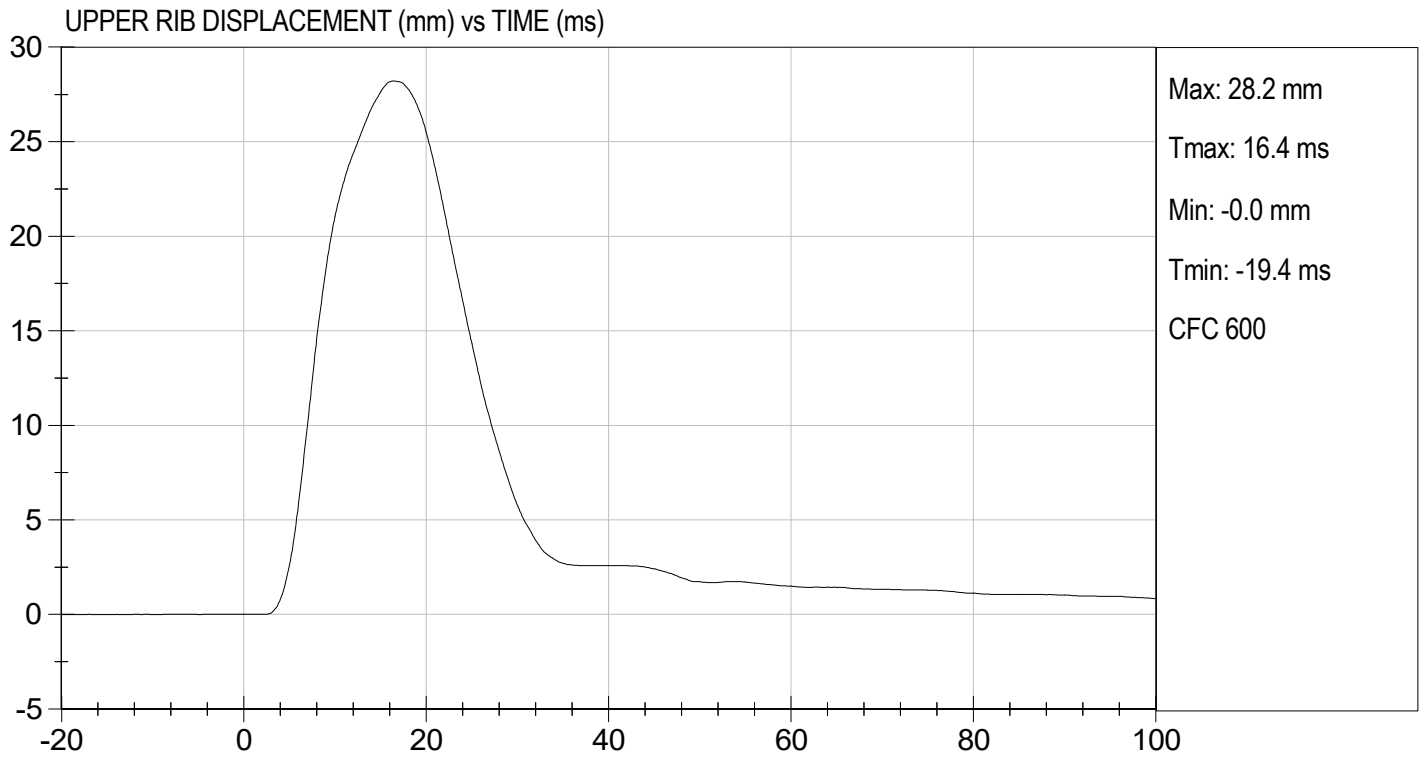
TEST DATE: 12/14/2023
TEST #: D233324

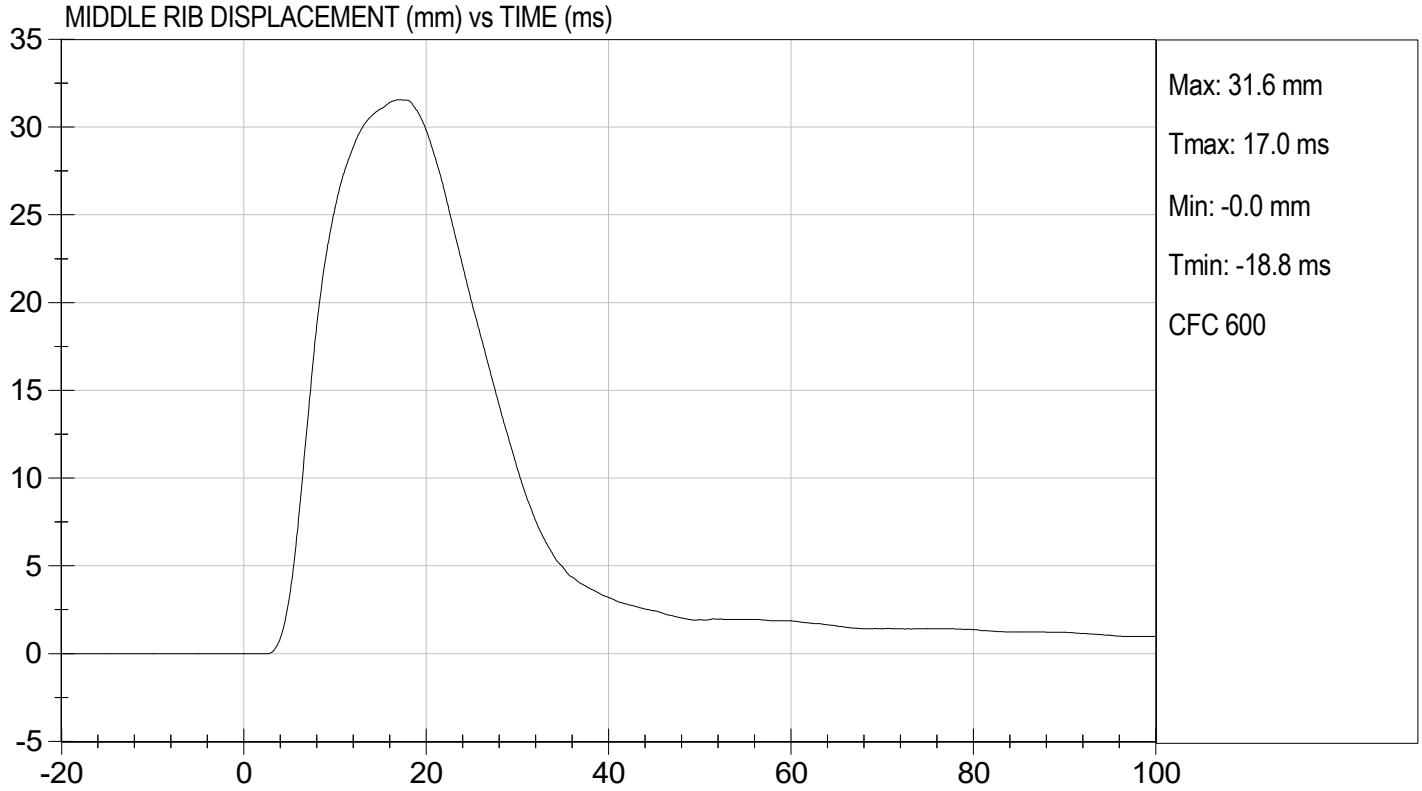
PROBE (G'S) vs TIME (ms)



SHOULDER DISPLACEMENT (mm) vs TIME (ms)



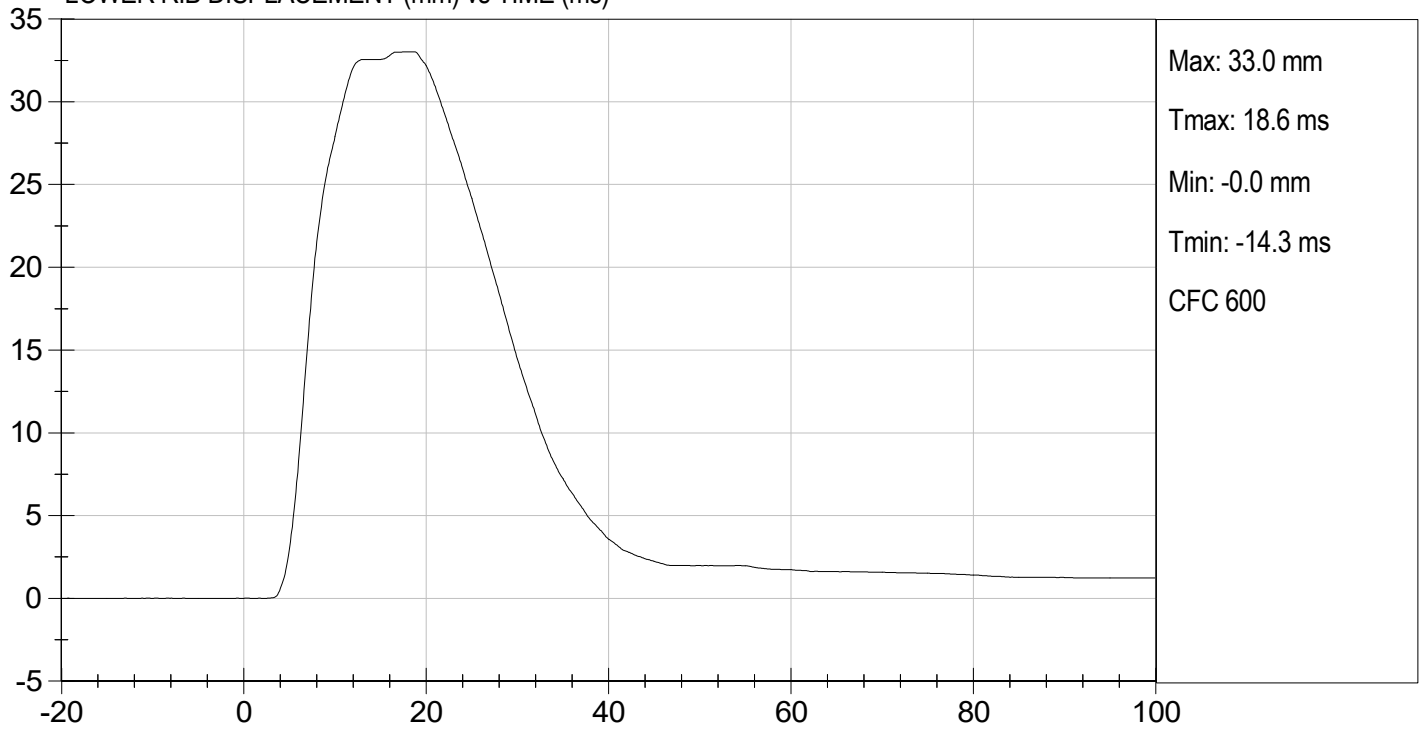

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)
30
25
20
15
10
5
0
-5
-20
0
20
40
60
80
100
Max: 28.2 mm
Tmax: 16.4 ms
Min: -0.0 mm
Tmin: -19.4 ms
CFC 600


MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)
35
30
25
20
15
10
5
0
-5
-20
0
20
40
60
80
100
Max: 31.6 mm
Tmax: 17.0 ms
Min: -0.0 mm
Tmin: -18.8 ms
CFC 600

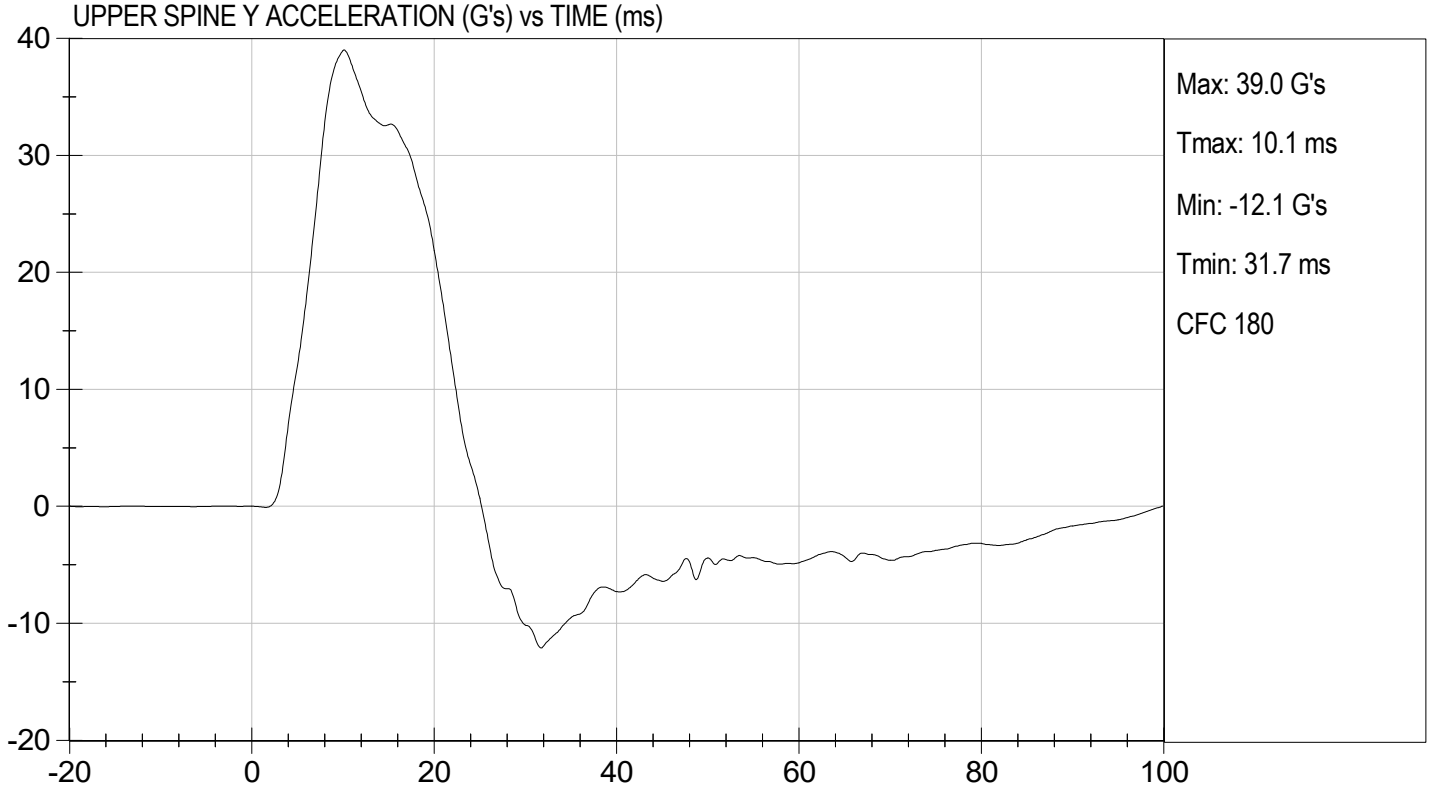
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

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

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

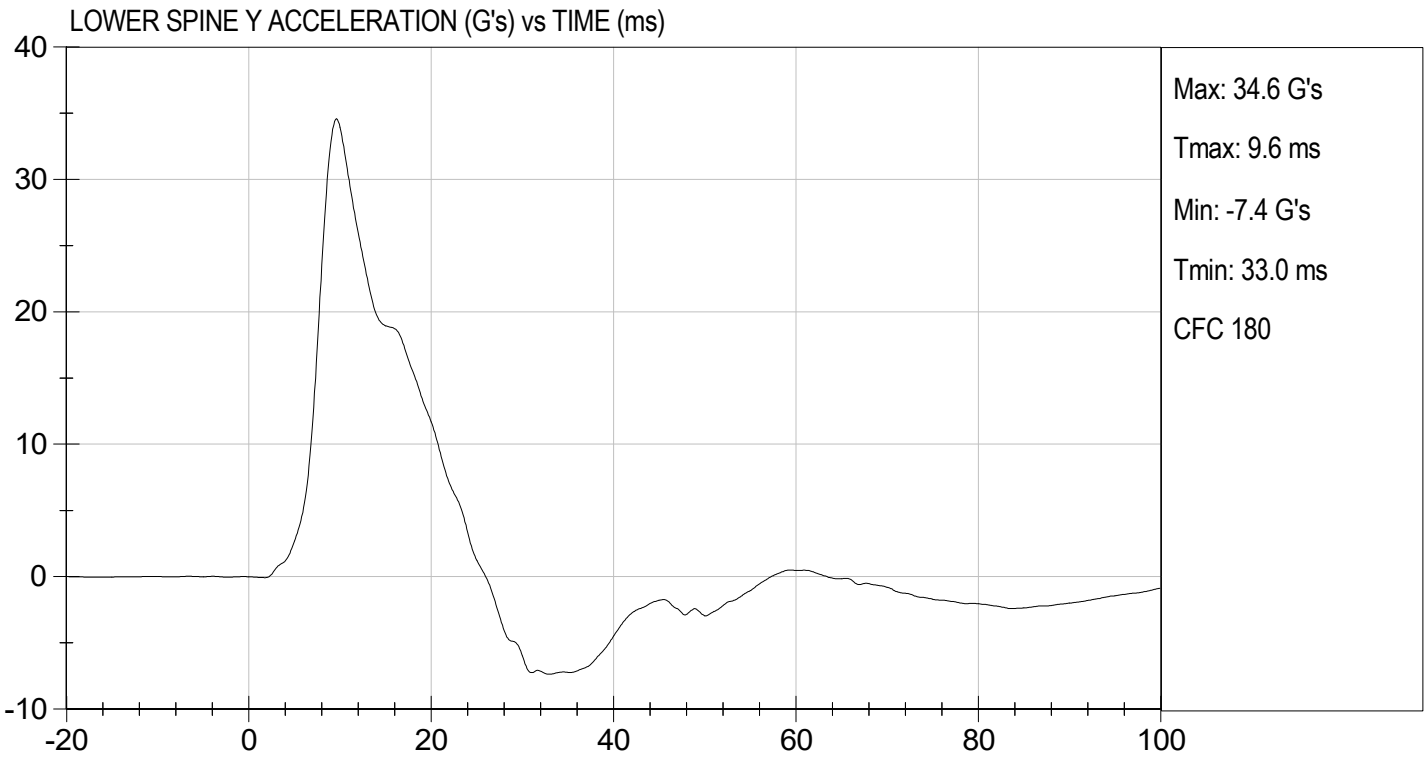


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

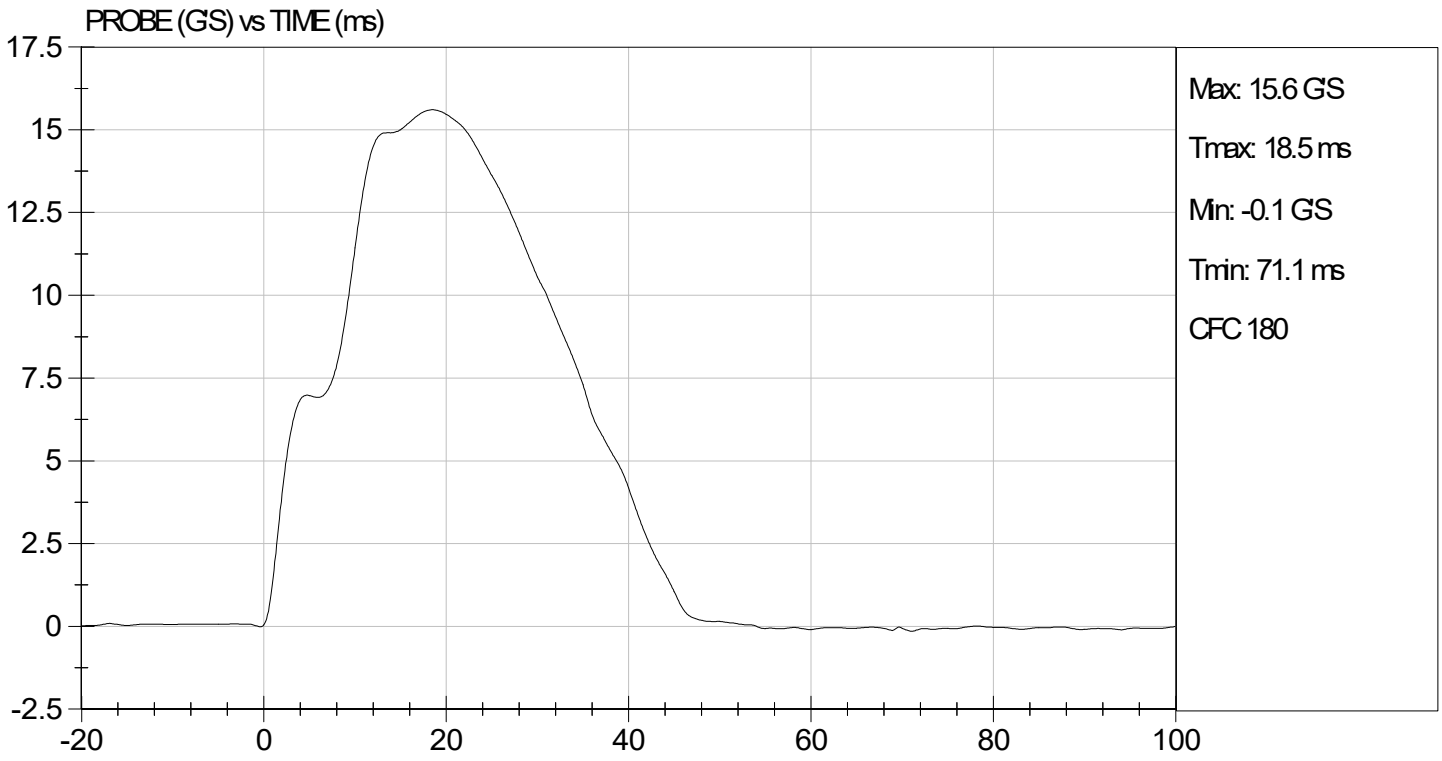
Laboratory Technician

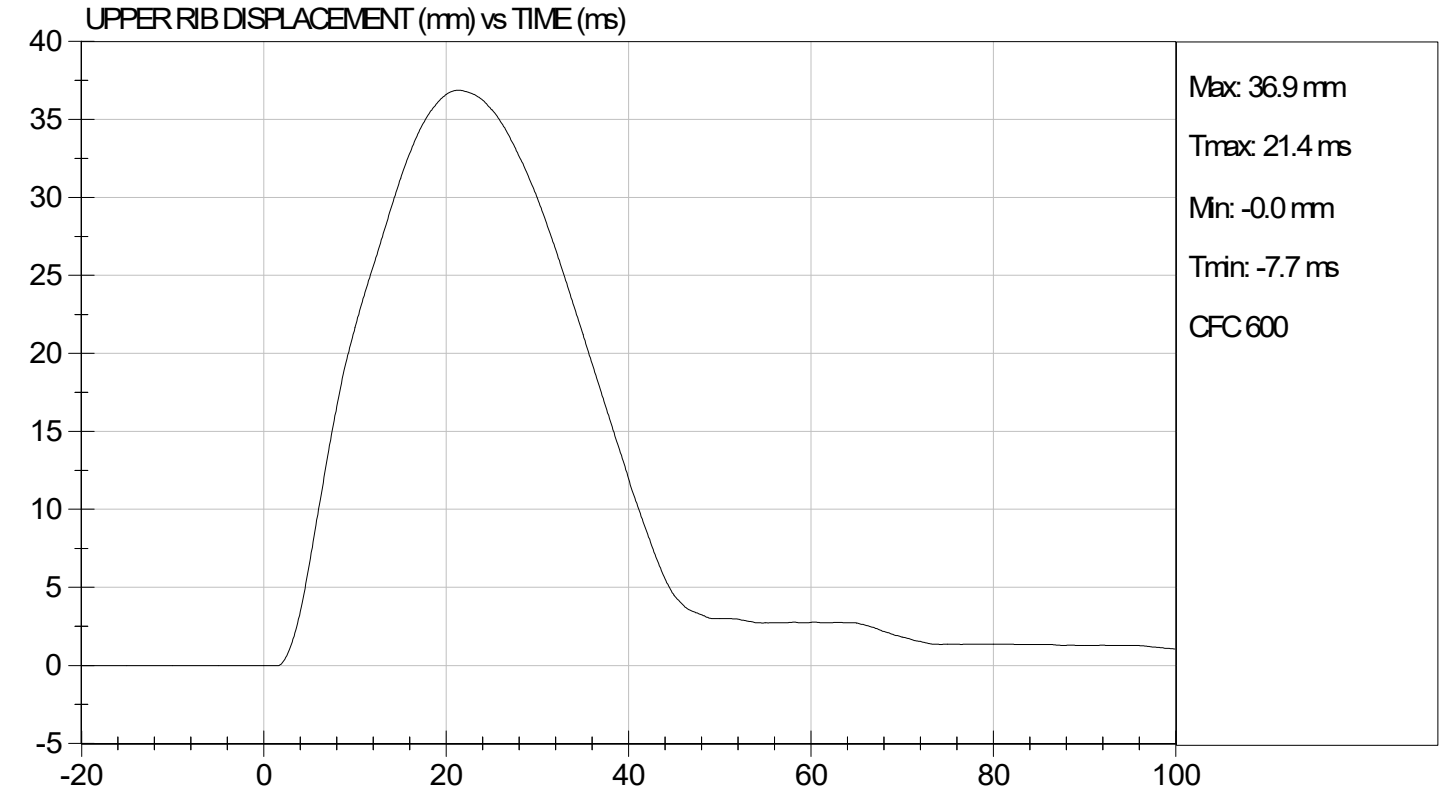
12/14/2023
Test Date

Approved By

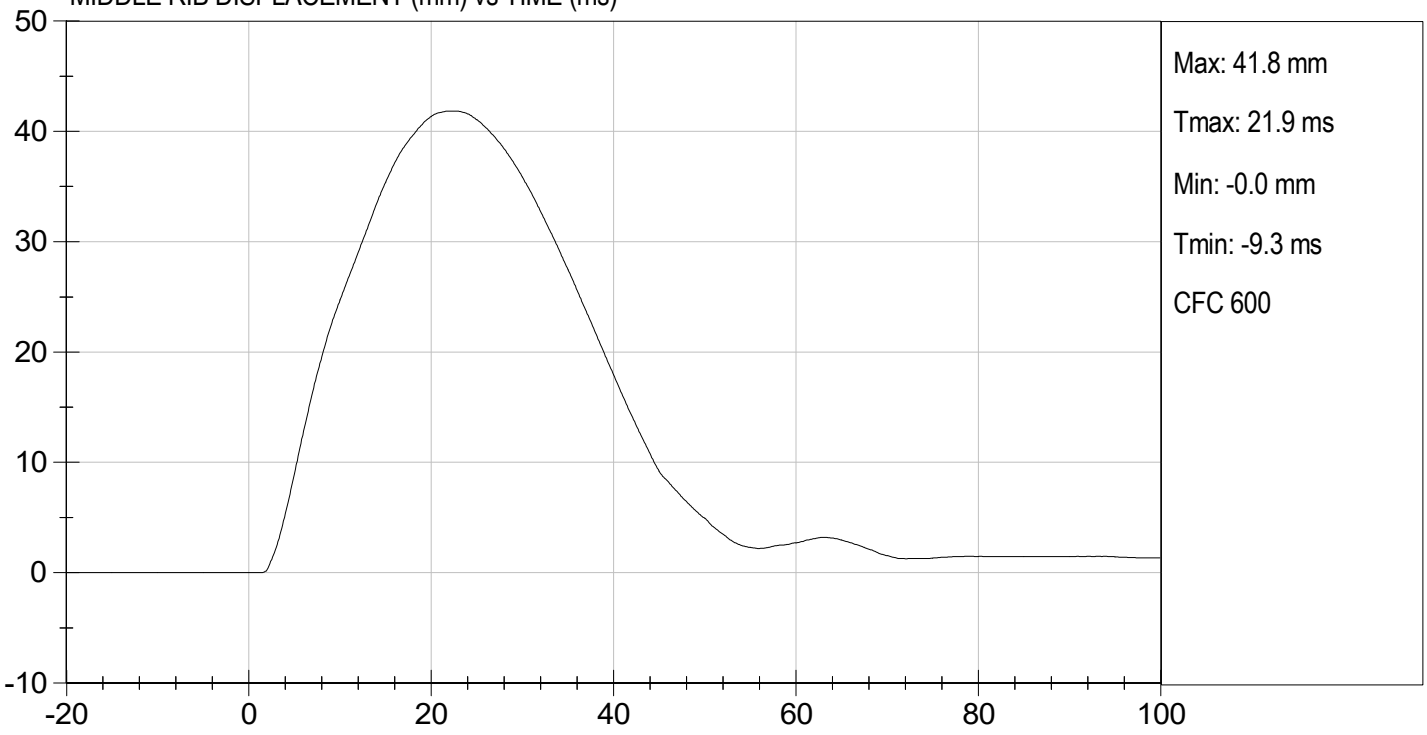
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

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

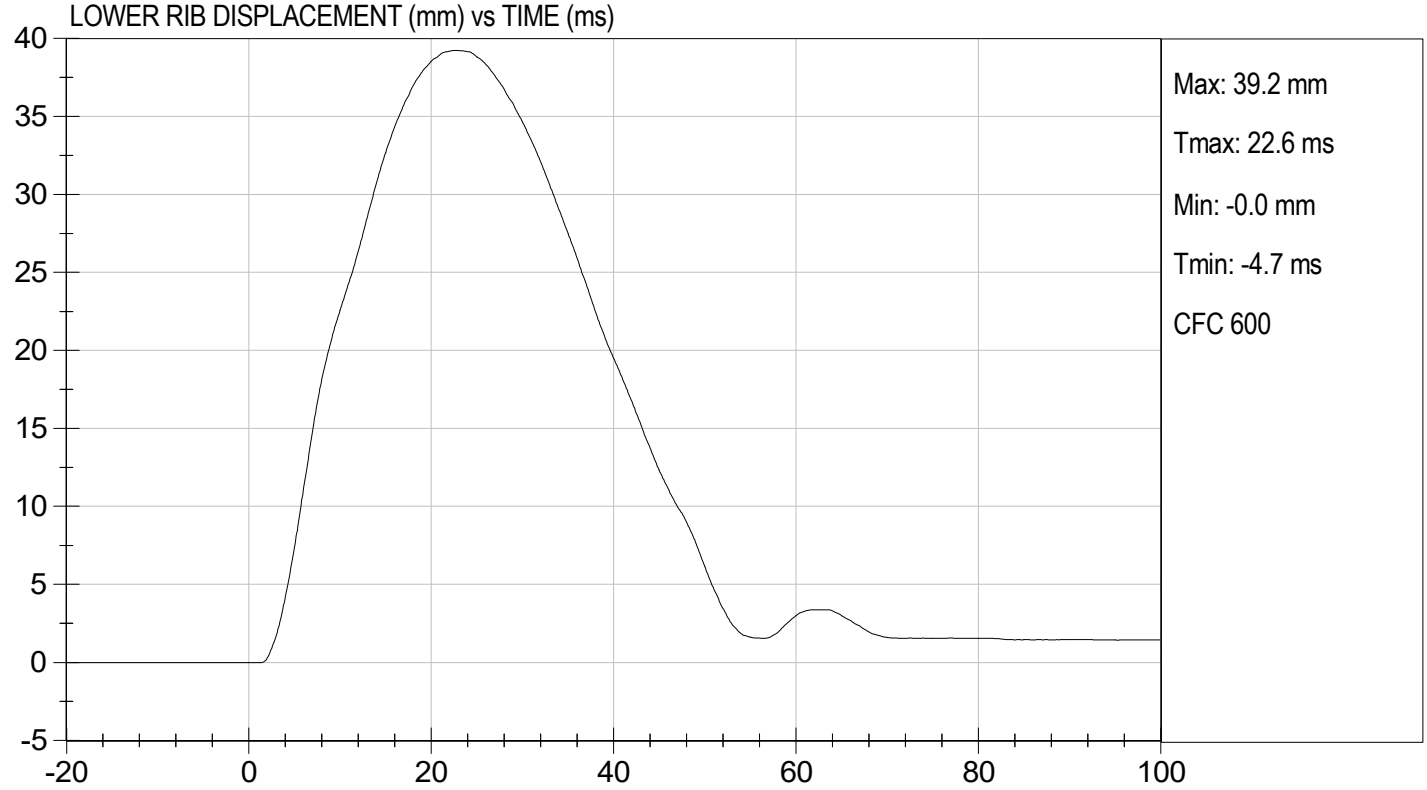




MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)

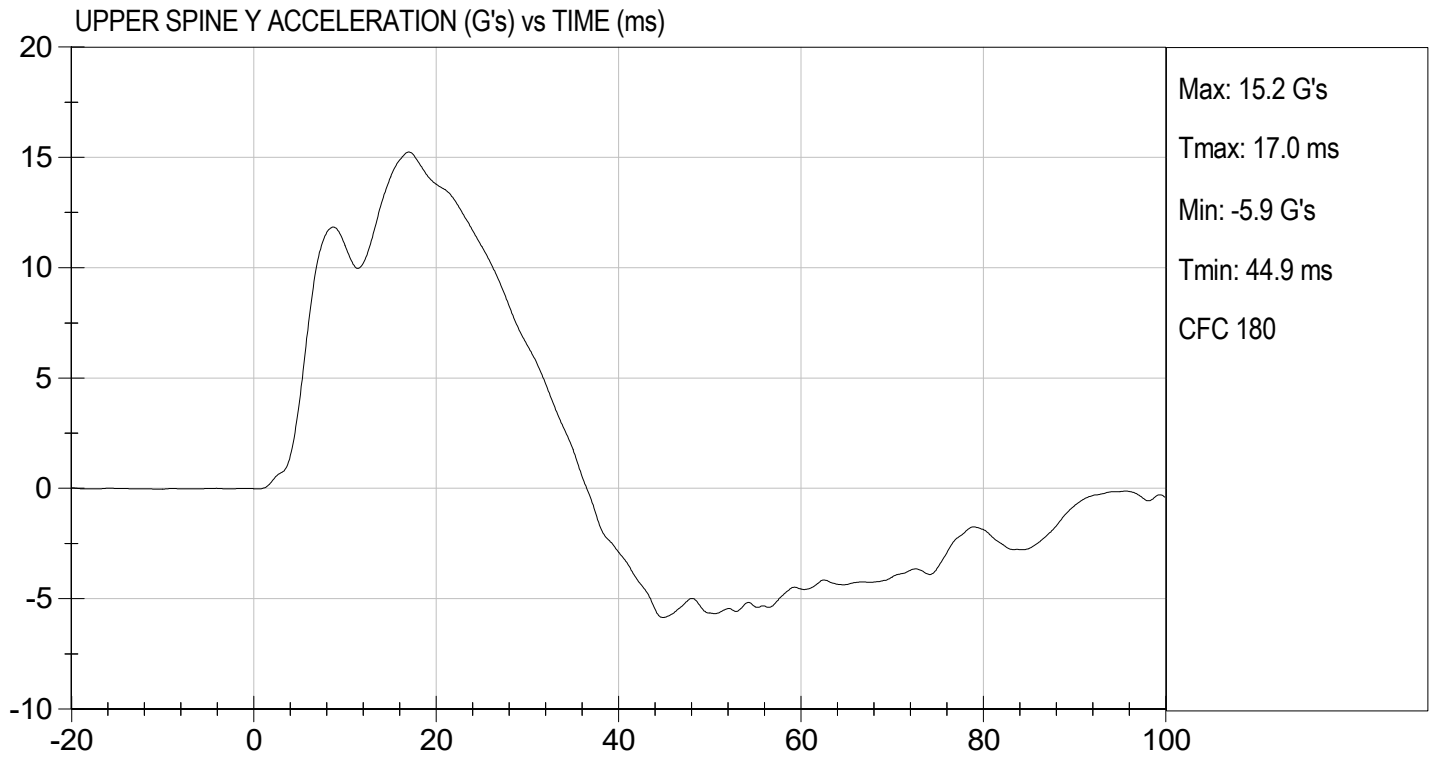


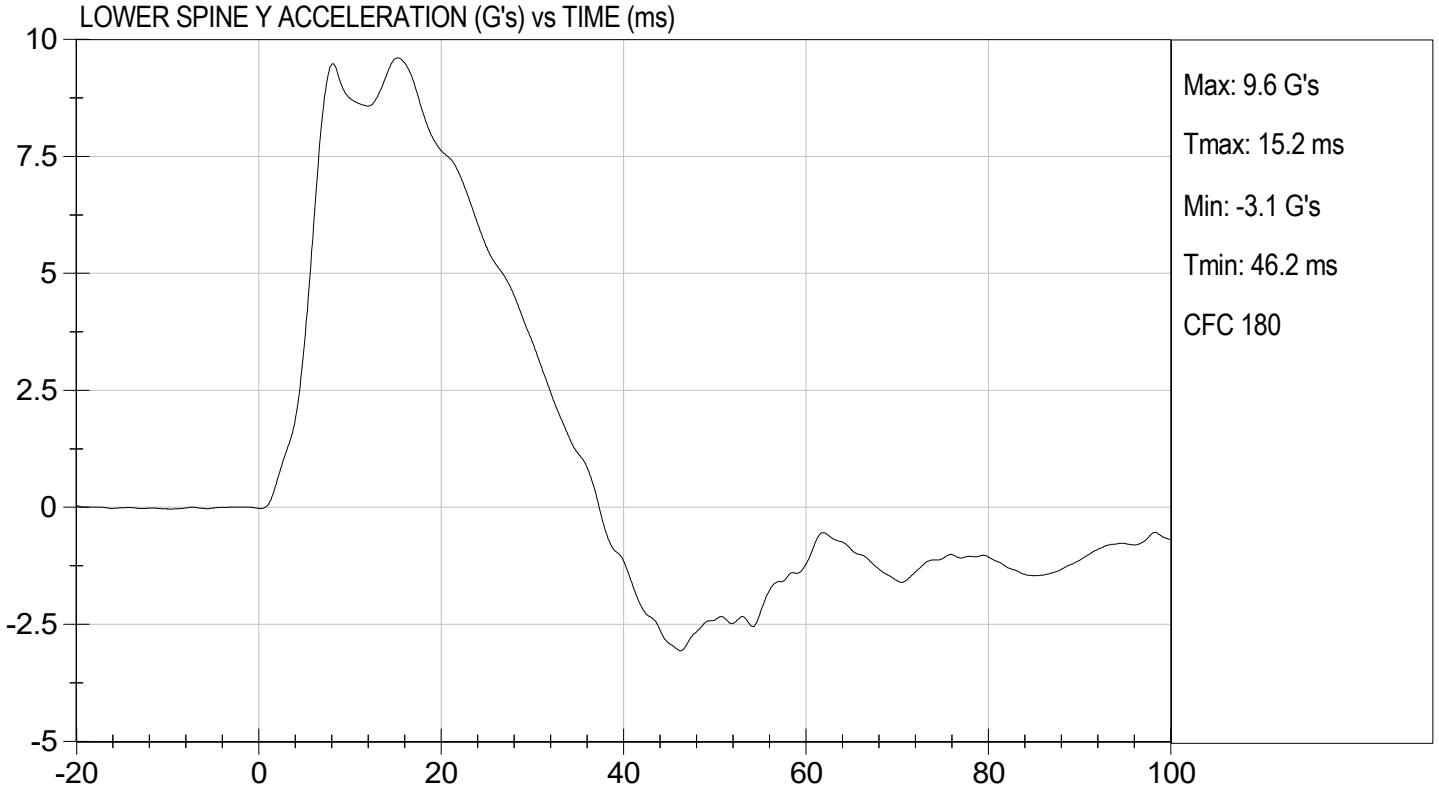
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



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-IIs 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

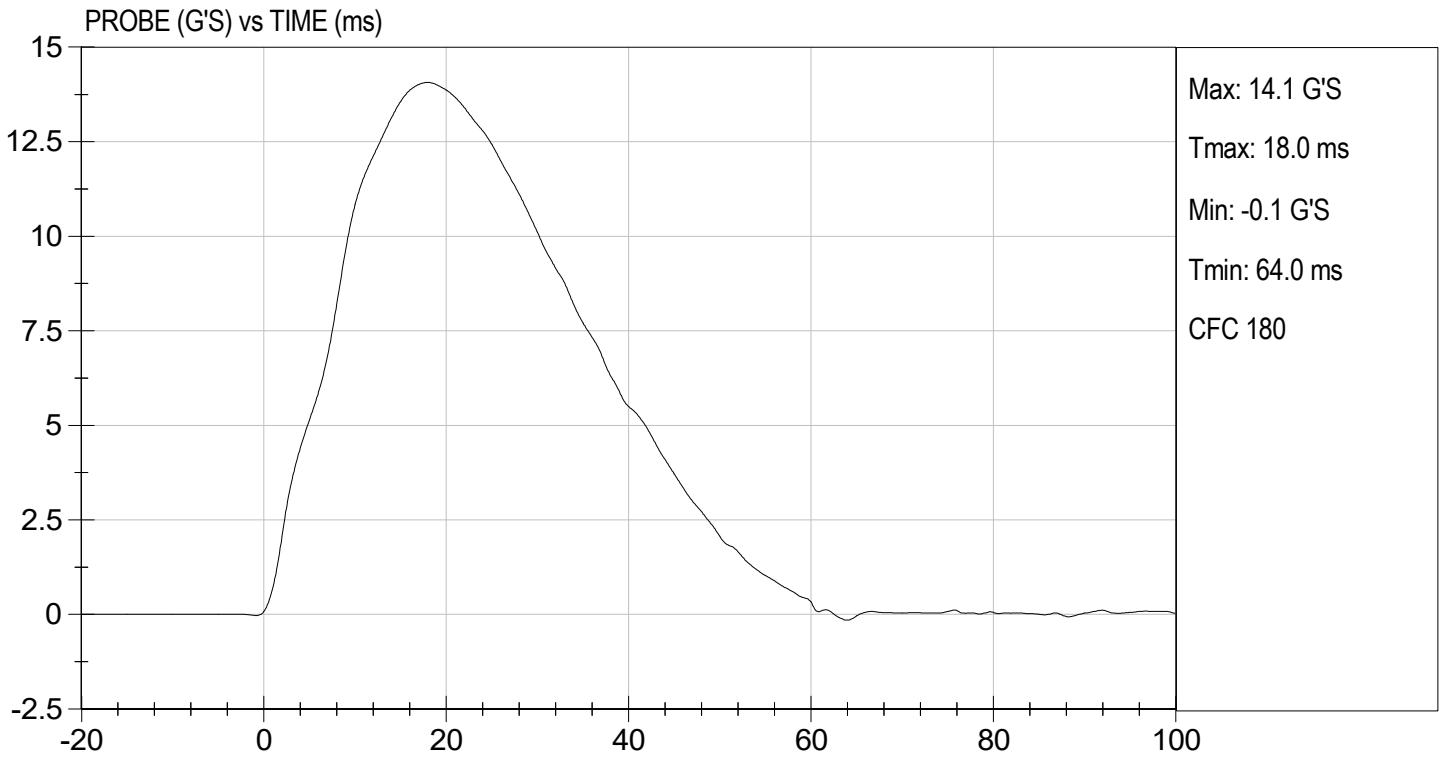
Laboratory Technician

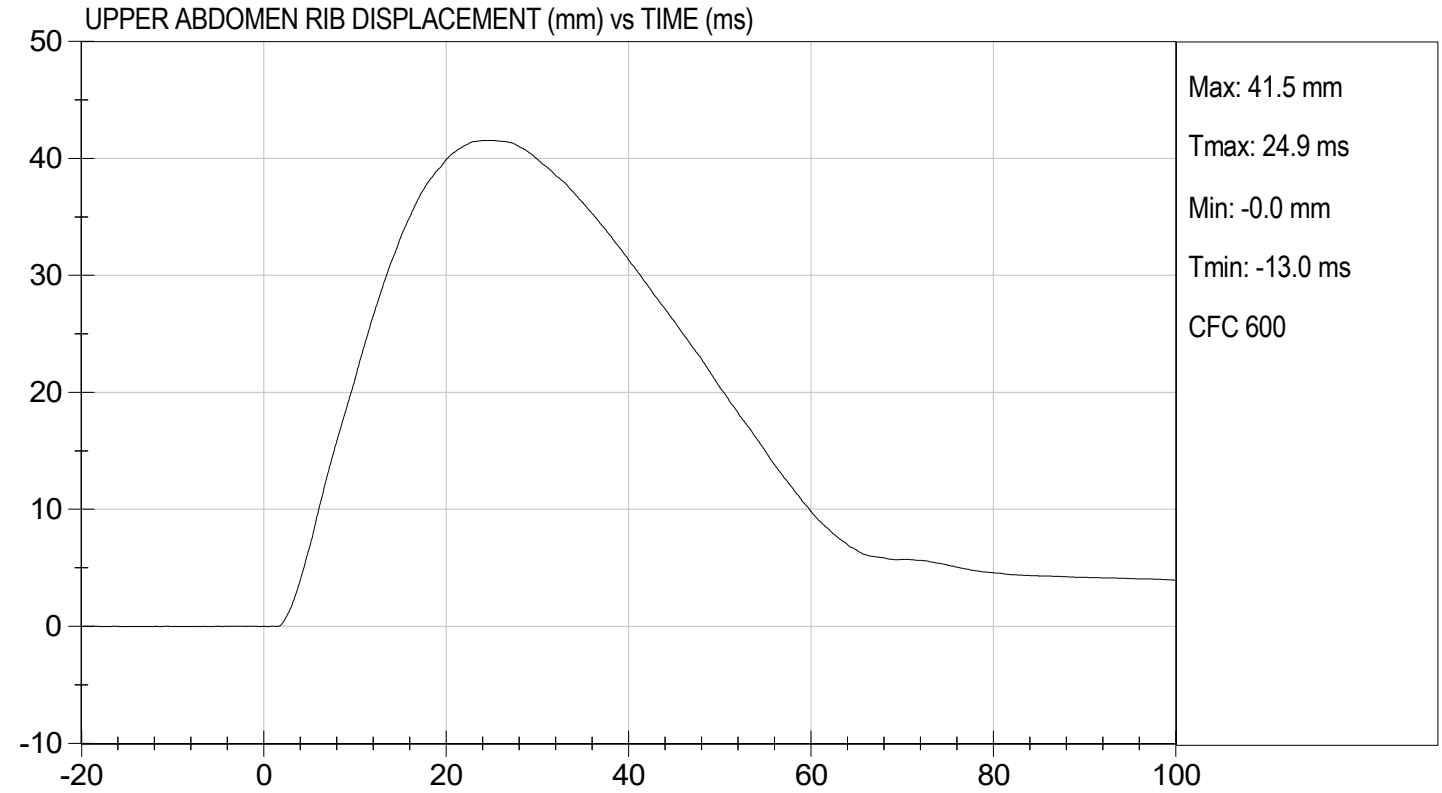
12/14/2023
Test Date

Approved By

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

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

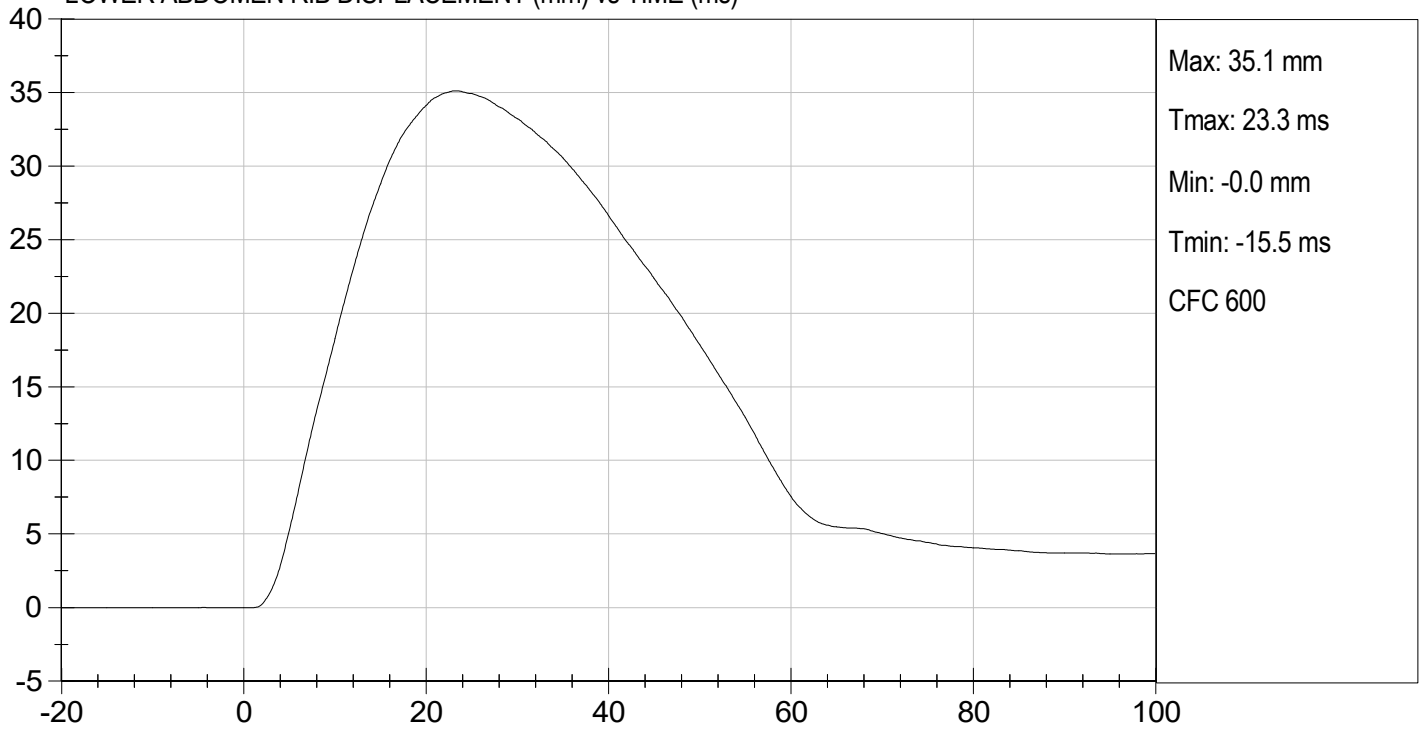




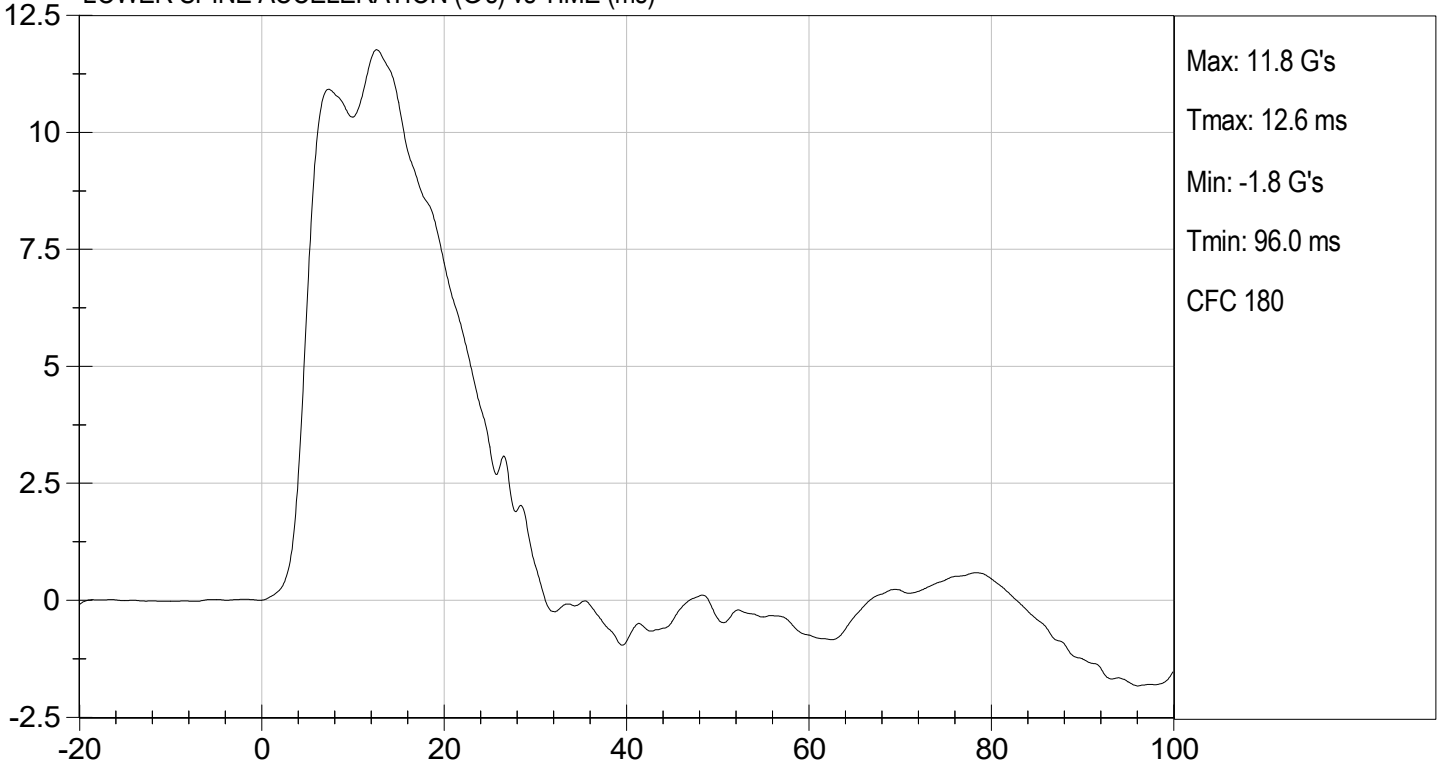
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.24 ft/s, 4.34 m/s

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

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



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



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

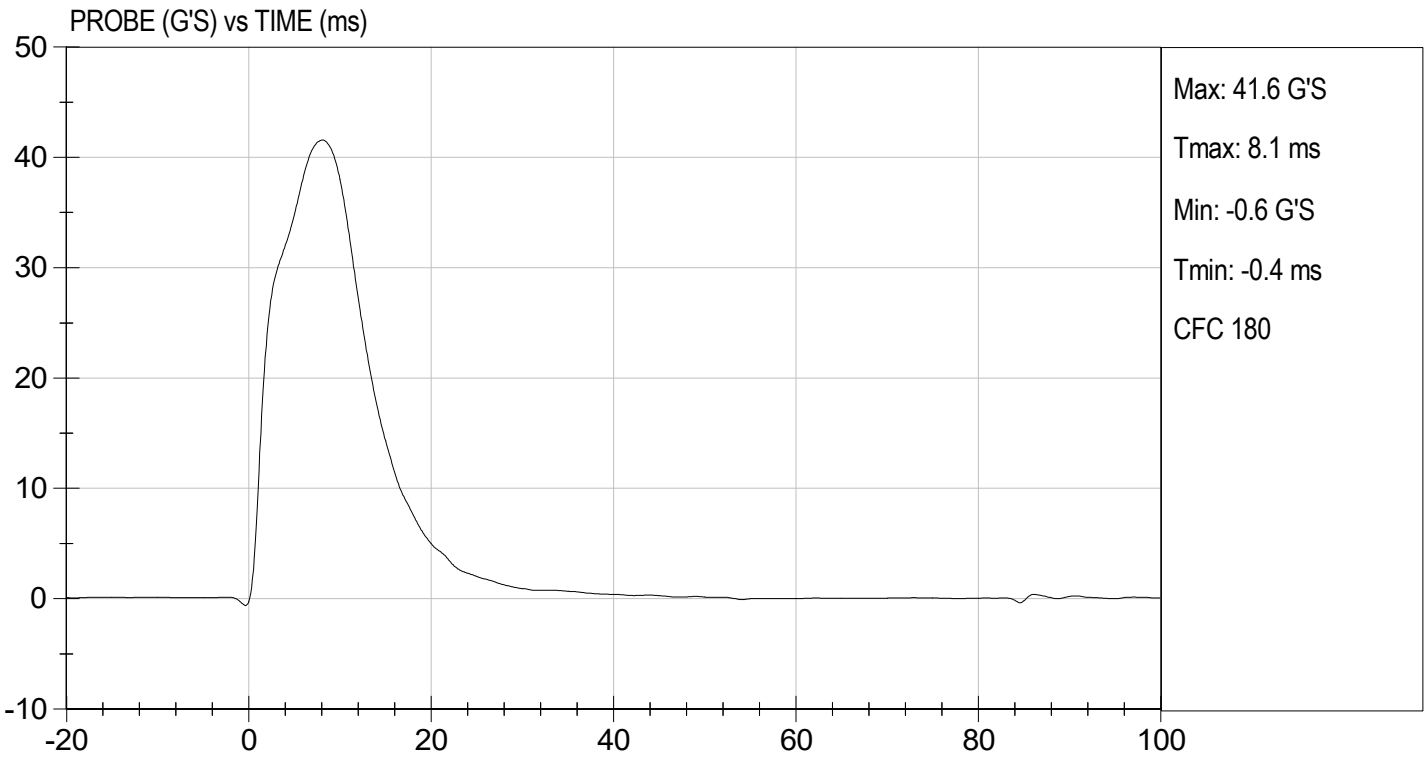
Laboratory Technician

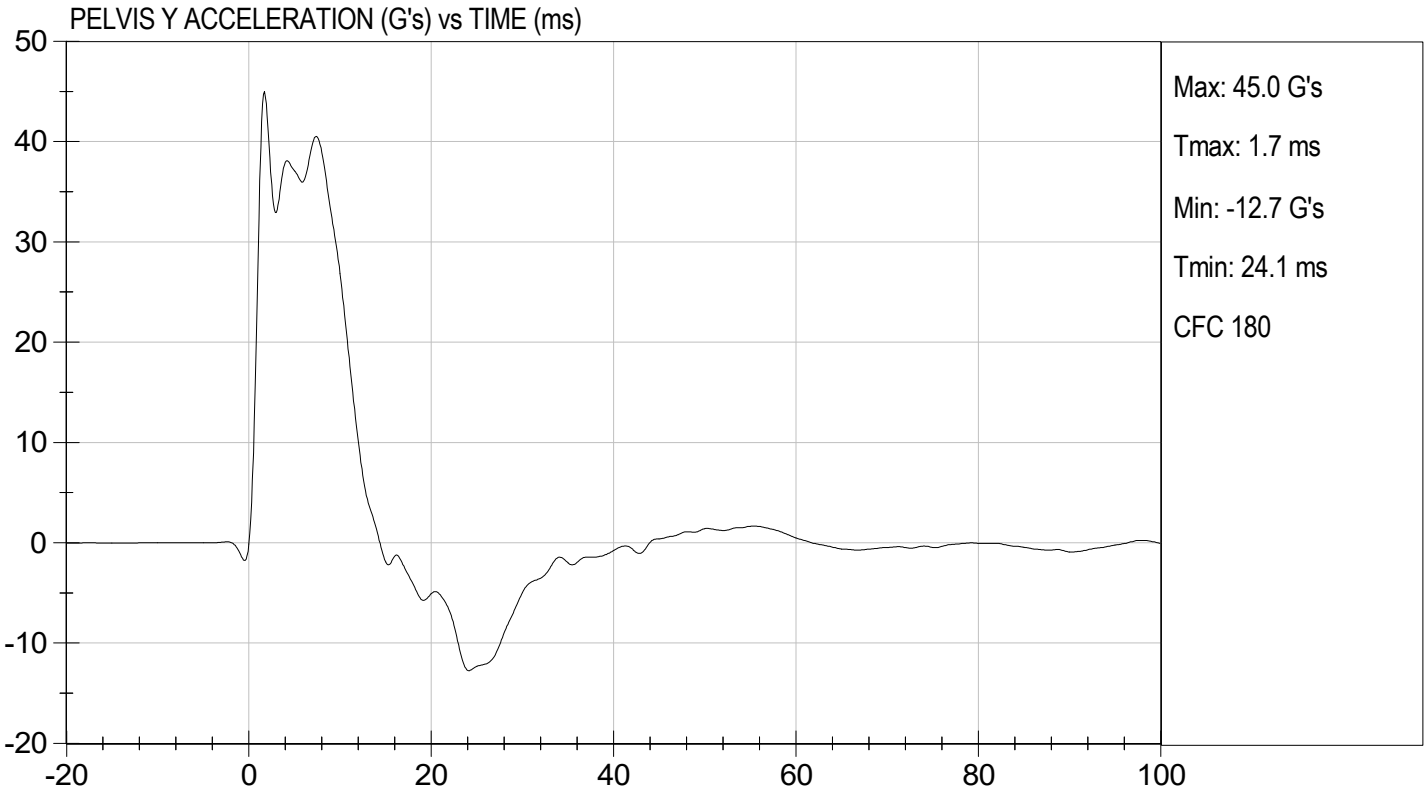
12/14/2023
Test Date

Approved By

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

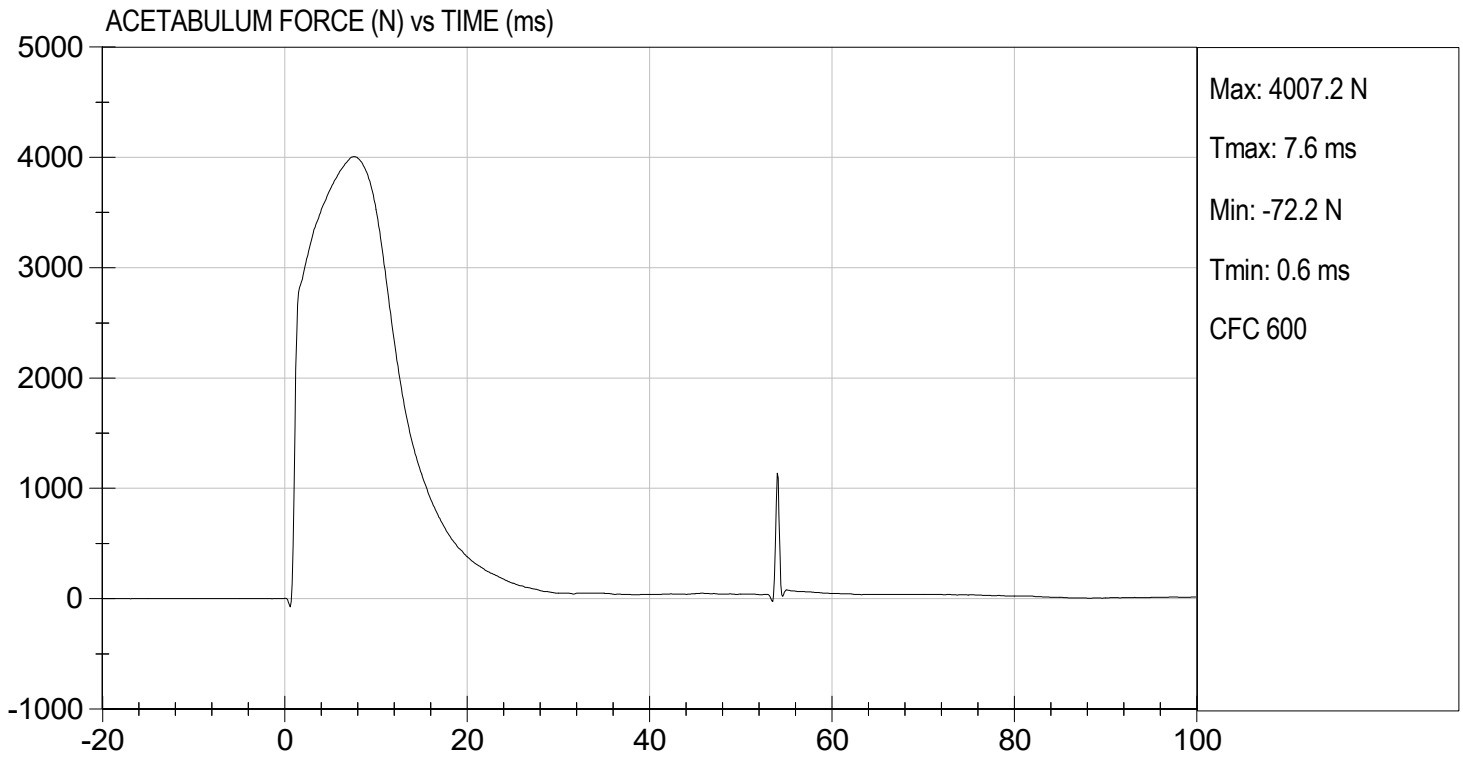
TEST DATE: 12/14/2023
TEST #: D233327





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

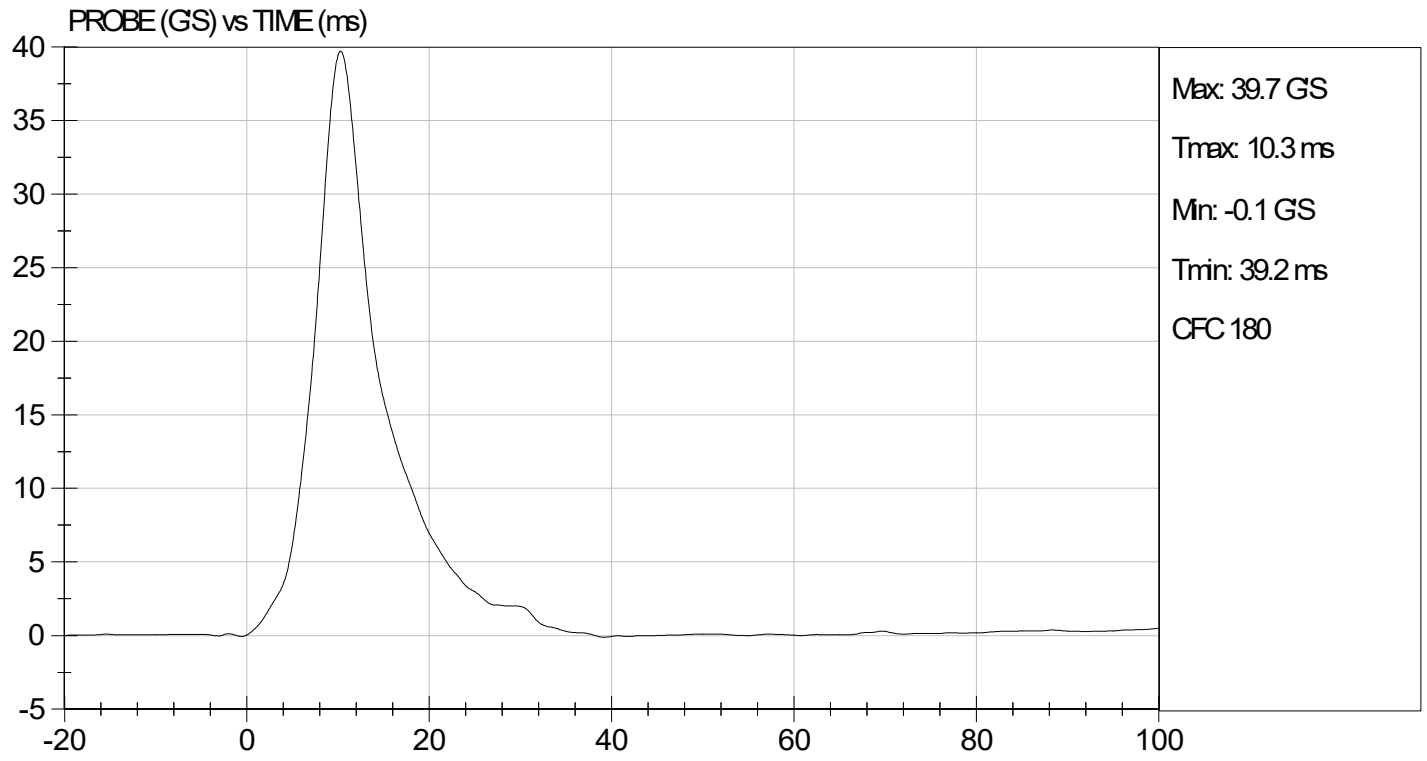
Laboratory Technician

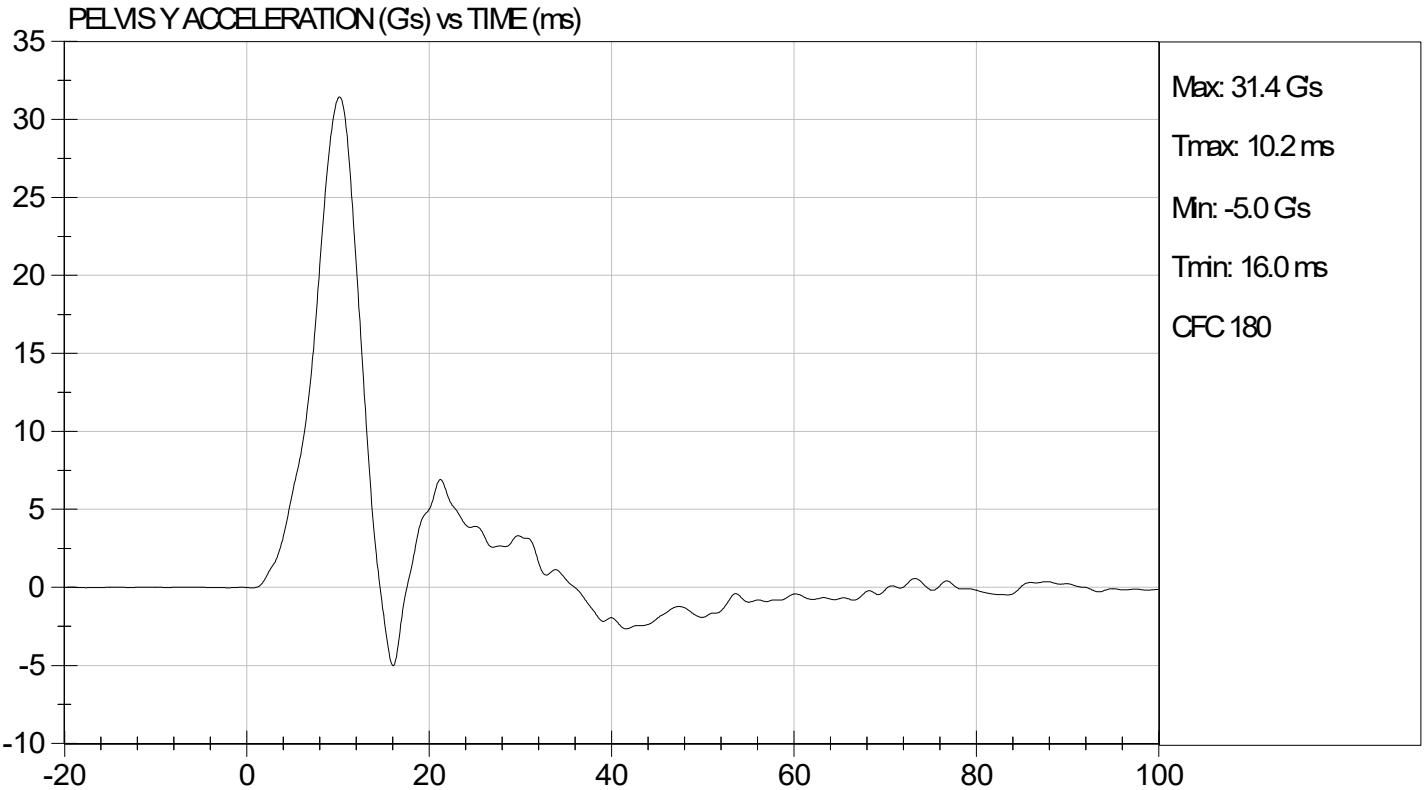
12/14/2023
Test Date

Approved By

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

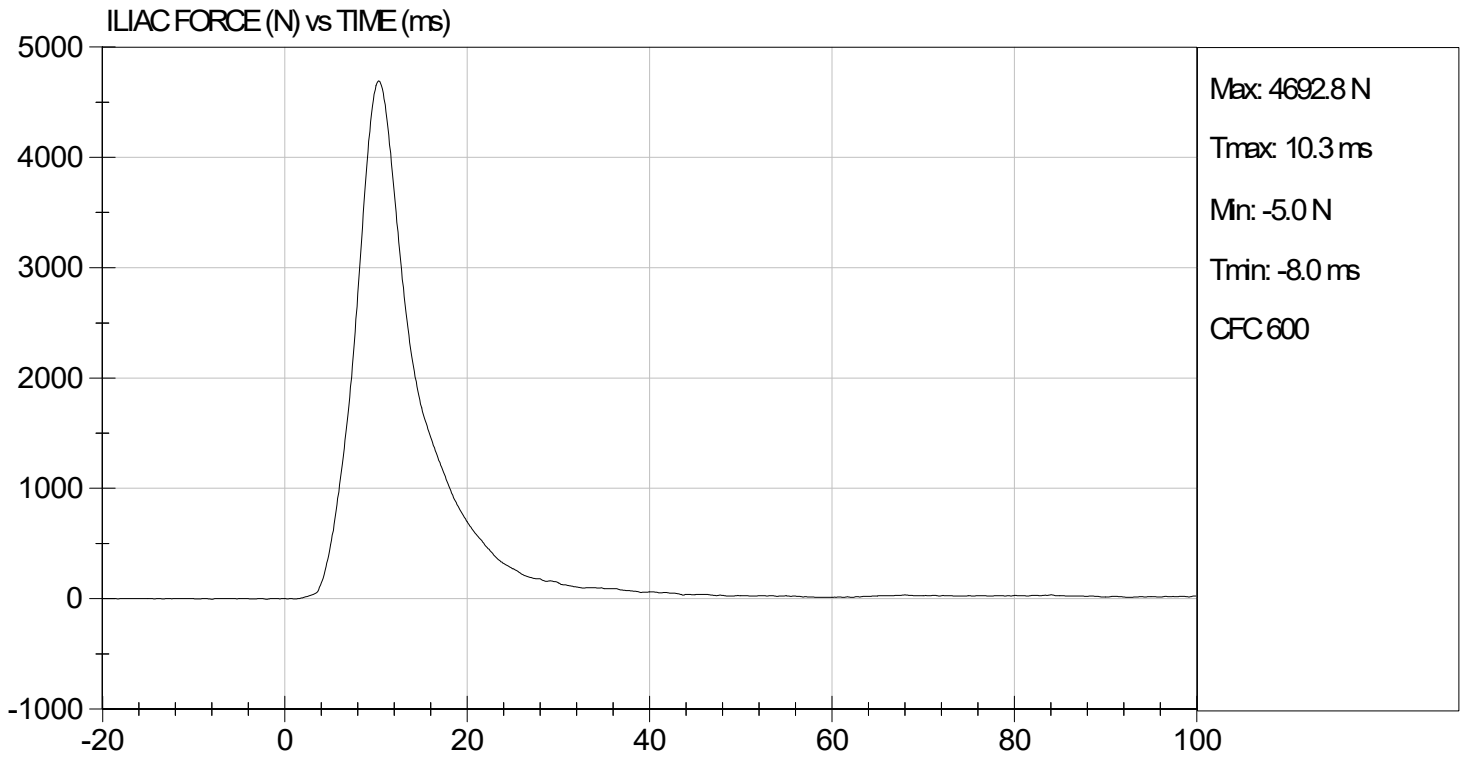
TEST DATE: 12/14/2023
TEST #: D233328





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

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

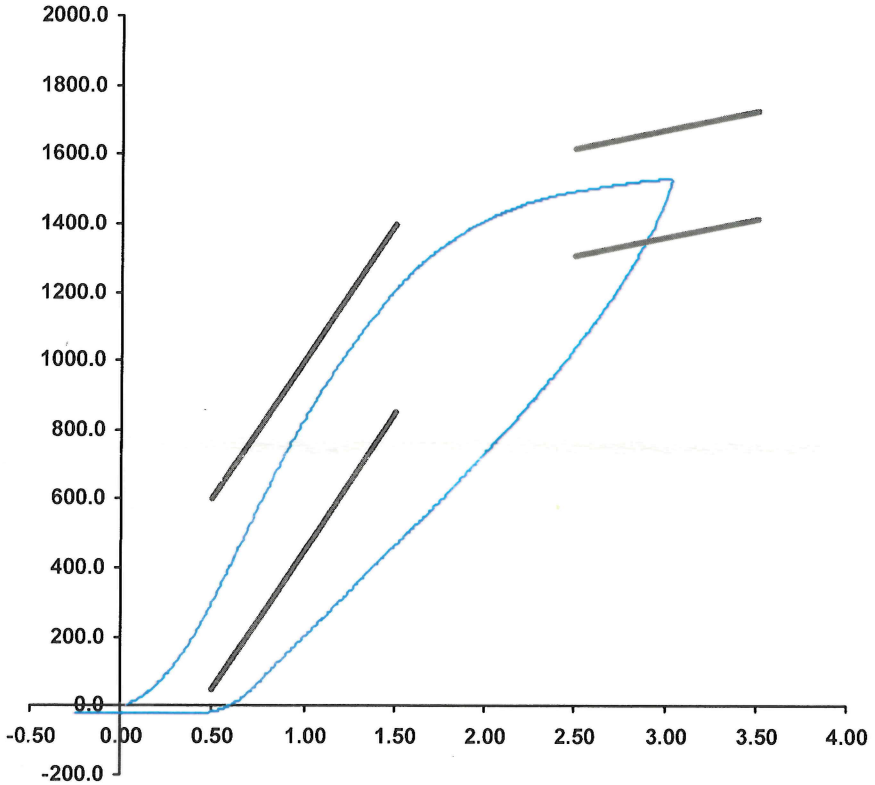


SID-IIs Pelvis Plug Certification Test

Plug S/N 16853
Test Number 23689
Report Number 23746
Test Date 8/1/2022 9:51:10 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	316	50	600
Force @ 1.5 mm (N)	1,213	850	1,400
Force @ 2.5 mm (N)	1,496	1,306	1,618
Force @ 3.0 mm (N)	1,533	1,361	1,673

Force (-N) vs Extension (-mm)



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:

Operator

Part Number 180-4450

Template No 107 01-Aug-22
SACO Research

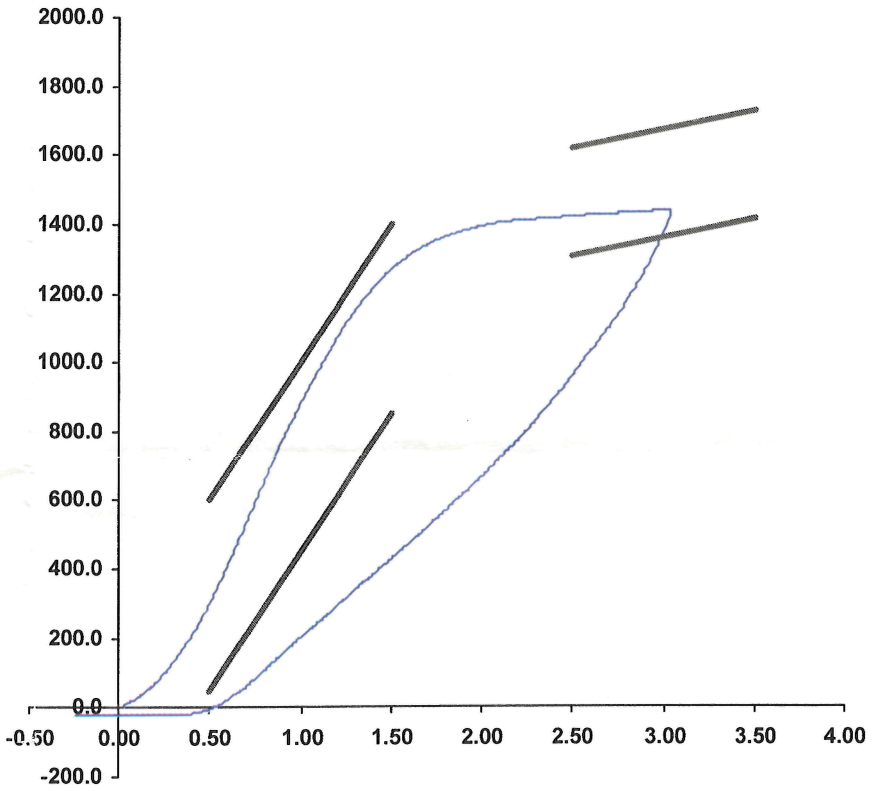
By : DC Date : 8/1/22

SID-IIs Pelvis Plug Certification Test

Plug S/N 14226
Test Number 14366
Report Number 14410
Test Date 7/3/2020 9:17:57 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	307.98	50.00	600.00
Force @ 1.5 mm (N)	1,271.90	850.00	1,400.00
Force @ 2.5 mm (N)	1,423.29	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,440.07	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

				SID-IIs S/N 296		
				Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers			X	P82109	Endevco	07/06/2023
			Y	P94783	Endevco	07/06/2023
			Z	P94786	Endevco	07/06/2023
			Xr	P94938	Endevco	07/06/2023
			Yr	P96854	Endevco	07/06/2023
			Zr	P97386	Endevco	07/06/2023
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	07/06/2023
		Middle	Y	G1163	FTSS	07/06/2023
		Lower	Y	G1158	FTSS	07/06/2023
	Abdominal Rib	Upper	Y	G1146	FTSS	07/06/2023
		Lower	Y	G1126	FTSS	07/06/2023
Lower Spine Accelerometers (T12)			X	P79614	Endevco	07/06/2023
			Y	P79439	Endevco	07/06/2023
			Z	P79418	Endevco	07/06/2023
Acetabulum Load Cell			Y	ACG269	Denton	04/20/2023
Iliac Wing Load Cell			Y	IWG282	Denton	04/20/2023
Pelvis Plug (struck side)				16853	SACO	08/01/2022
Pelvis Plug (non-struck side)				14226	SACO	07/03/2020

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	T39112	Endevco	10/30/2023
Vehicle Center of Gravity	Y	T39135	Endevco	10/30/2023
Vehicle Center of Gravity	Z	T39076	Endevco	10/30/2023
Left Floor Sill	Y	T33142	Endevco	11/22/2023
A-Pillar Sill	Y	T39206	Endevco	10/30/2023
A-Pillar Low	Y	T39049	Endevco	10/25/2023
A-Pillar Mid	Y	T39053	Endevco	10/25/2023
B-Pillar Sill	Y	T39054	Endevco	10/24/2023
B-Pillar Low	Y			
B-Pillar Mid	Y			
Driver Seat	Y	T39156	Endevco	11/01/2023
Engine Top	X	T39074	Endevco	10/30/2023
Engine Top	Y	T39093	Endevco	10/30/2023
Firewall	Y	T39067	Endevco	10/30/2023
Right Roof	Y	T39080	Endevco	10/30/2023
Right Floor Sill	Y	T39079	Endevco	10/30/2023
Rear Floorpan	X	T39078	Endevco	10/30/2023
Rear Floorpan	Y	T39117	Endevco	10/30/2023

Table 3 – Pole Instrumentation

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