REPORT NUMBER: NCAP-MGA-22-010

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

MAZDA MOTOR CORPORATION
2022 Mazda MX-30 5-Door Hatchback
NHTSA No.: O20225400

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: January 24, 2022

Final Report Date: April 28, 2022

FINAL REPORT

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590

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Approval Date: April 28, 2022

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Frontal Impact Testing and FMVSS No. 305 Indicant Testing of a 2022 Mazda MX-30 5-Door Hatchback, NHTSA No.: O20225400	April 28, 2022
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7. Author(s) Ben Fischer, Program Manager	**8. Performing Organization Report No.** NCAP-MGA-22-010
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105	**10. Work Unit No.**
	11. Contract or Grant No. 693JJ919D000006
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590	**13. Type of Report and Period Covered** Final Test Report January 24, 2022 to April 28, 2022
	14. Sponsoring Agency Code NRM-110

15. Supplementary Notes

16. Abstract

A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2022 Mazda MX-30 5-Door Hatchback in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on January 24, 2022.

The impact velocity of the vehicle was 56.43 km/h and the ambient temperature at the barrier face at the time of impact was 21.6°C. The target vehicle post-test maximum crush was 650 mm located to the left of the vehicle centerline. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD		Passenger ATD	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC_{15})		700	123	700	158
Maximum Chest Compression	mm	63	24	52	10
Nij		1	0.22	1	0.29
Neck Tension	N	4170	1059	2620	1119
Neck Compression	N	4000	47	2520	274
Left Femur Force	N	10008	912	6805	740
Right Femur Force	N	10008	1179	6805	746

17. Key Words	18. Distribution Statement
56.3 km/h (35 mph) Full Frontal Rigid Barrier Impact Test New Car Assessment Program (NCAP)	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	212	

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number 693JJ919D000006. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact was conducted in accordance with the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2022 Mazda MX-30 5-Door Hatchback at a velocity of 56.43 km/h. The test was performed at MGA Research Corporation on January 24, 2022. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and sixteen (16) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female test device (ATD) was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 142) were qualified previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 634 channels of data were recorded on a data acquisition system. Appendix B contains the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no battery electrolyte leakage and no loss of protection against direct or indirect contact with high-voltage sources after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 650 mm located to the left of the vehicle centerline and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee airbag.
The passenger's visible contact points were as follows: The passenger's head contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the knee airbag.

The occupant data is summarized below:

ATD position	HIC_{15}	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50^{th})	123	0.22	1059	47	35.0	24	912	1179
Passenger (5^{th})	158	0.29	1119	274	42.4	10	740	746

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

TEST NOTES

Top of Engine X recorded no valid data after 54 ms.
Barrier C-01 Fx recorded no valid data.
Barrier C-02 Fx recorded questionable data.
Barrier C-02 My recorded questionable data.
Barrier I-05 My recorded no valid data.
Barrier K-03 My recorded questionable data.
Barrier K-15 My recorded no valid data.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20225400	Traction Control System (TCS)	Yes
Model Year	2022	Power Steering	Yes
Make	Mazda	Power Window Auto-Reverse	Yes
Model	MX-30	Driver Frontal Airbag	Yes
Body Style	5-Door Hatchback	Driver Curtain Airbag	Yes
VIN	JM1DRADB4N0100327	Driver Head/Torso Airbag	No
Body Color	Polymetal Gray (3-Tone)	Driver Torso Airbag	No
Odometer (km/mi)	113 km / 70 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)		Driver Pelvis Airbag	No
Type/No. Cylinders	Electric	Driver Knee Airbag	Yes
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	1	Front Pass. Head/Torso Airbag	No
Overdrive	No	Front Pass. Torso Airbag	No
Final Drive	FWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	Yes	Front Pass. Knee Airbag	Yes
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	Yes	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	MAZDA MOTOR CORPORATION
Date of Manufacture	09/21

GVWR (kg)	2087
GAWR Front (kg)	1047
GAWR Rear (kg)	1042

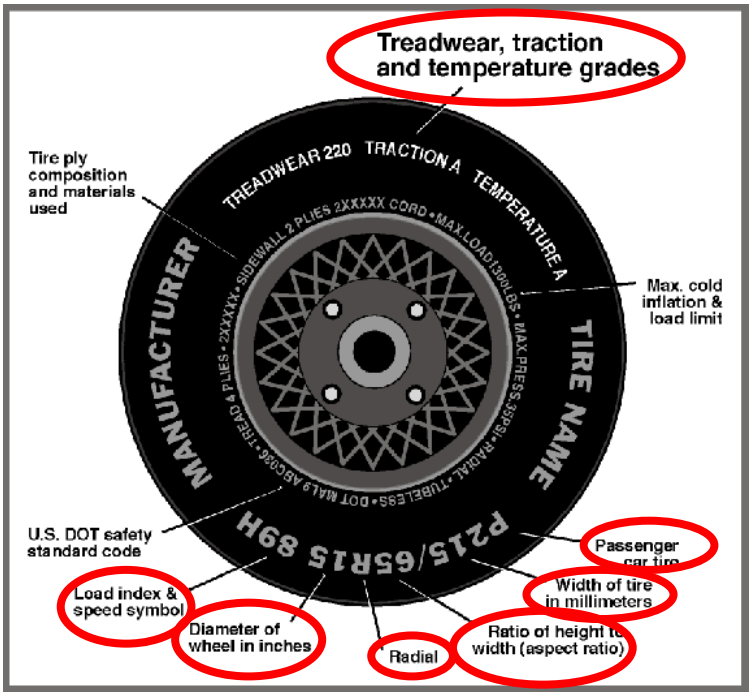
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contoured		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				45

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

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	215/55R18	215/55R18
Tire Size on Vehicle	215/55R18	215/55R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Turanza	Turanza
Treadwear	480	480
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyester	1 Polyester, 2 Steel, 1 Polyester
Load Index/Speed Symbol	95H	95H
Tire Material	Rubber	Rubber
DOT Safety Code Left	H4C9 DKM 2721	H4C9 DKM 2721
DOT Safety Code Right	H4C9 DKM 2721	H4C9 DKM 2721

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

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	434.5	385.0		477.0	439.5	
Right	kg	489.0	357.5		524.0	403.5	
Ratio	%	55.4%	44.6%		54.3%	45.7%	
Totals	kg	923.5	742.5	1666.0	1001.0	843.0	1844.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1666.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Test Vehicle Target Weight (TVTW)	kg	1852.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	775	766	803	805	1180
As Tested	mm	743	740	760	767	1211
Post Test	mm	850	870	778	758	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2648
Total Vehicle Length at Left Side	mm	4226
Total Vehicle Length at Centerline	mm	4372
Total Vehicle Length at Right Side	mm	4226
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	31
Amount of Stoddard Solvent in Fuel Tank	L	

List of components removed to meet test weight: LR/RR seat cushion.

List of components removed for instrumentation, data box, and equipment installation: Cargo area carpet/trim/divider, LR/RR floor mat, jack and tools, subwoofer, LR taillight, front underbody plastic.

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

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

TARGET VEHICLE STRUCTURAL MEASUREMENT

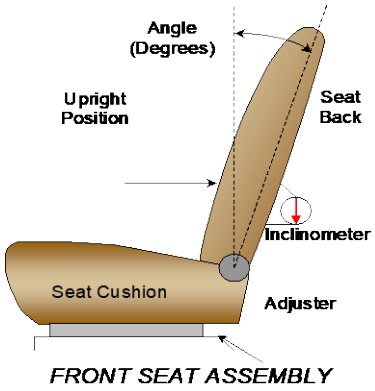
	Elements	Pre-Test (mm)
1	Total Length	4372
2	Total Width	1796
3	Bumper Top Height	624
4	Bumper Bottom Height	474
5	Longitudinal Member Top Height	604
6	Distance between Longitudinal Members	895
7	Longitudinal Member Width	65
8	Engine Top Height	845
9	Engine Bottom Height	221
10	Engine and Gearbox Width	530
11	Front Bumper-Engine Distance	391
12	Front Shock Absorber Fixing Height	893
13	Bonnet Leading Edge Height	710
14	Front Shock Absorber Fixing Width	1179
15	Front Bumper – Front Axle Distance	573
16	Front Axle – A-Pillar Distance	660
17	A-Pillar – B-Pillar Distance	1118
18	B-Pillar – Rear Axle Distance	1102
19	B-Pillar – C-Pillar Distance	700
20	Roof Sill Bottom Height	1452
21	Roof Sill Top Height	1509
22	Floor Sill Bottom Height	250
23	Floor Sill Top Height	350

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

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer's design angle. For the passenger seat back, seat back is adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.



	Degrees
Driver Seat Back Angle	6.0° on outboard headrest post
Passenger Seat Back Angle	2.7° on outboard headrest post

SEAT FORE/AFT POSITIONS

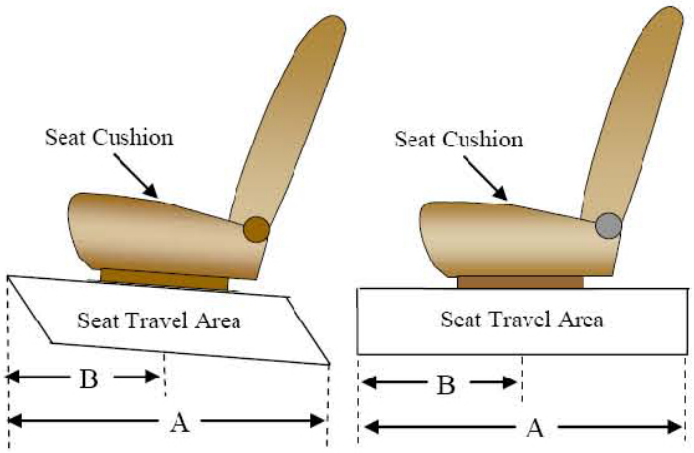
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	294 mm	147 mm
Passenger Seat	186 mm / 24 detents (1st as 1)	0 mm / 0th detent (1st as 0)

SEAT BELT UPPER ANCHORAGES

The seat belt upper anchorages are set following the manufacturer's specified position as listed in Form 1.

	Total # of Positions	Placed in Position #
Driver Seat	3 (1st as 1)	0 (1st as 0)
Passenger Seat	3 (1st as 1)	0 (1st as 0)



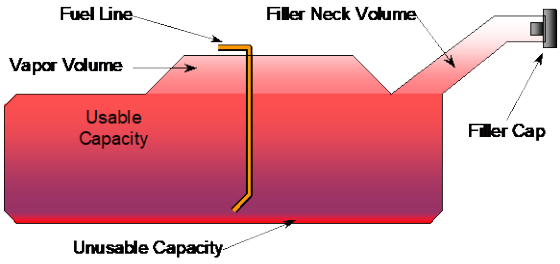
DATA SHEET NO. 2 (CONTINUED)
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

FUEL TANK CAPACITY DATA

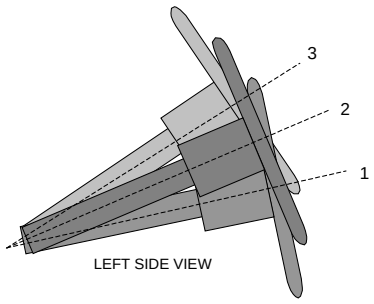
	Liters
Usable Capacity of "Standard Tank"	
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	
Actual Amount of Solvent used	
1/3 of Usable Capacity	

FUEL PUMP
Electric vehicle.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT
Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



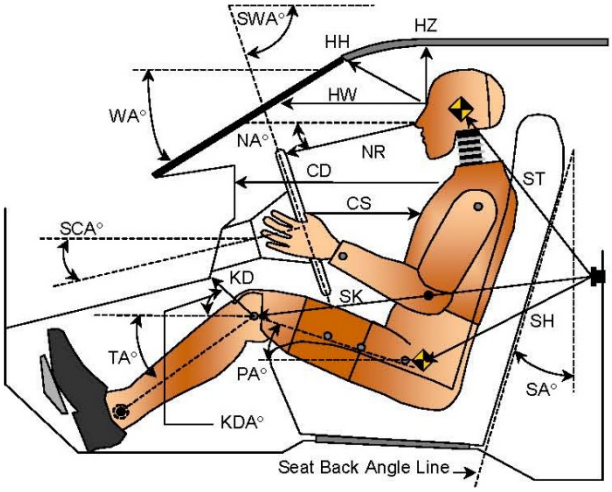
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	67.6	
Geometric Center Position 2	65.2	
Uppermost Position 3	62.7	
Telescoping Steering Wheel Travel		70
Test Position	65.2	35

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

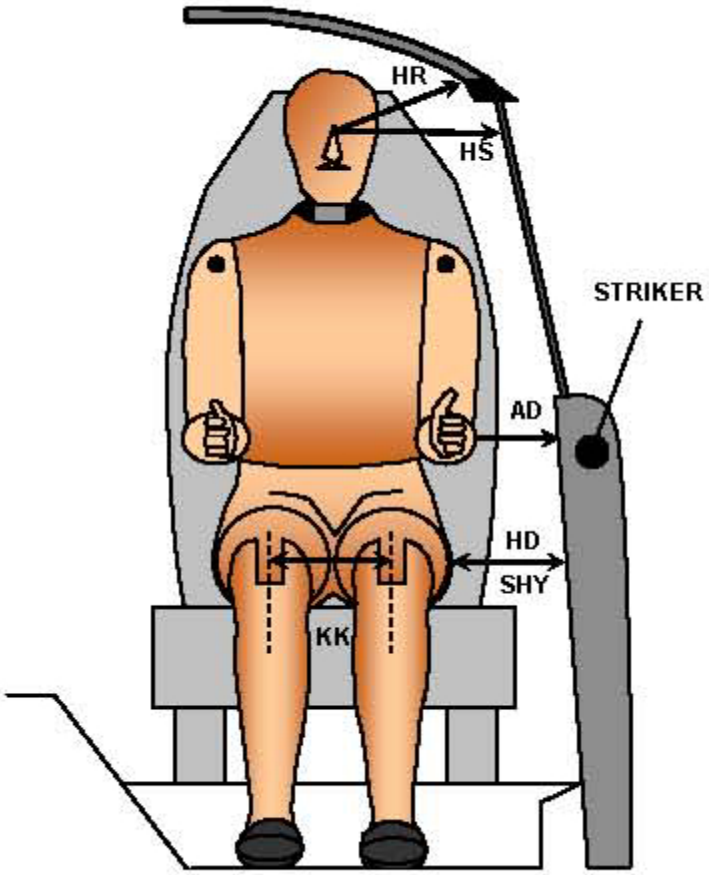


LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		27.5		
SWA°	Steering Wheel Angle		65.2		
SCA°	Steering Column Angle		24.8		
SA°	Seat Back Angle		6.0		2.7
HZ	Head to Roof (Z)	204	90	228	90
HH	Head to Header	400	17.7	328	39.9
HW	Head to Windshield	670	0	650	0
NR	Nose to Rim	385	14.7		
CD	Chest to Dash	529		377	
CS	Chest to Steering Hub	303	2.0		
RA	Rim to Abdomen	188	0		
KDL	Left Knee to Dash	170	32.6	127	35.2
KDR	Right Knee to Dash	174	32.1	130	34.8
PA°	Pelvic Angle		23.4		18.0
TA°	Tibia Angle		47.3		49.4
SK	Striker to Knee	603	98.1	679	100.5
ST	Striker to Head	420	15.8	460	26.1
SH	Striker to H-Point	299	132.0	397	115.1

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

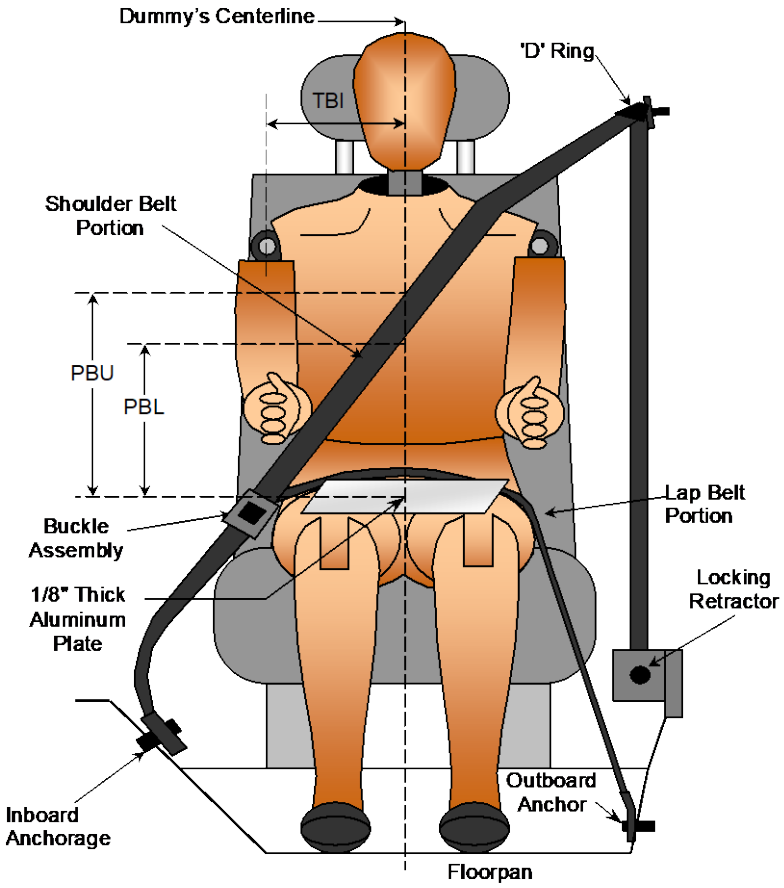


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	122	68
HD	H-Point to Door	140	248
HR	Head to Side Header	235	258
HS	Head to Side Window	345	365
KK	Knee to Knee	345	230
SHY	Striker to H-Point (Y Direction)	276	313
AA	Ankle to Ankle	330	169

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	345	320
PBL - Top surface of reference to belt lower edge	mm	270	235

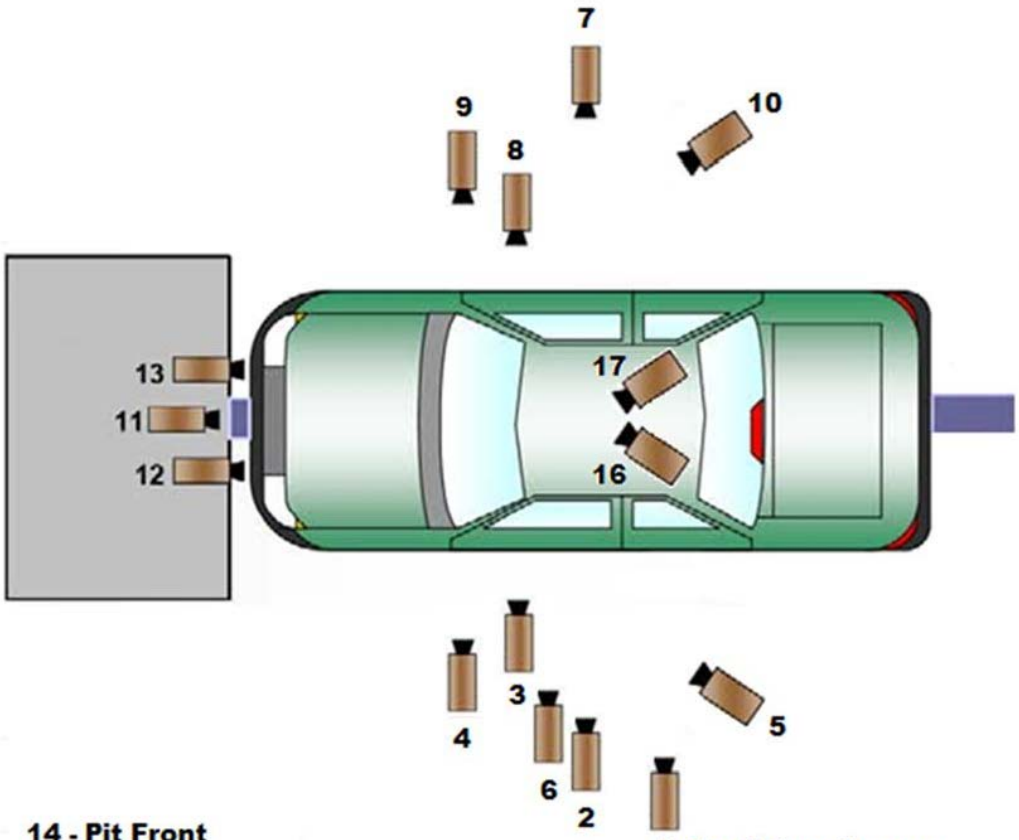
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	850	925
Lap Belt Length as measured on ATD	mm	720	800
Remainder of belt on reel	mm	750	595
Total Belt Length for Continuous Webbing Systems	mm	3120	3120

DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2022 Mazda MX-30 5-Door Hatchback	NHTSA No.:	O20225400
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	1/24/2022

CAMERA POSITIONS FOR FRONTAL IMPACTS



14 - Pit Front
15 - Pit Rear
16 & 17 - Driver and Passenger Onboard

***Camera locations are approximate and not to scale*

DATA SHEET NO. 6 (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

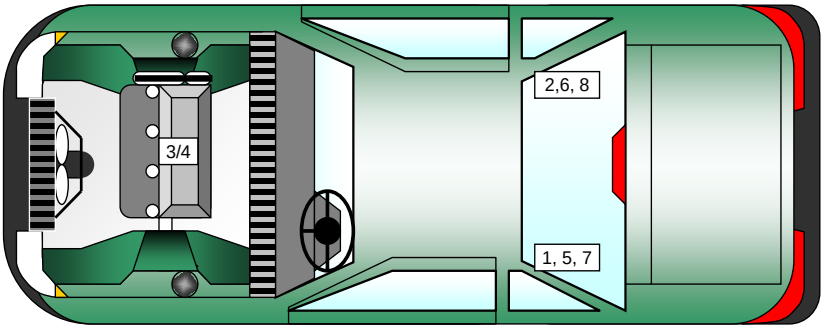
CAMERA LOCATIONS

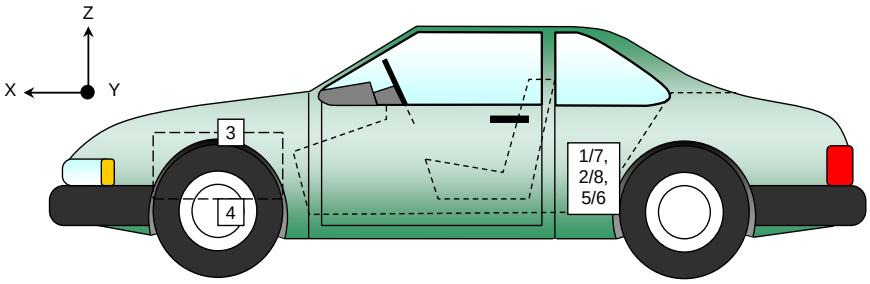
No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2060	-5680	-1320	12	1000
3	Driver Close-Up	-1630	-6470	-1860	50	1000
4	Left Front Half	-1330	-5070	-1370	24	1000
5	Left Angle	-7250	-5820	-1910	75	1000
6	Steering Column	-1000	-5530	-1260	50	1000
7	Right Overall	-1930	5590	-1440	12	1000
8	Passenger Close-Up	-1500	6690	-1970	50	1000
9	Right Front Half	-1250	5400	-1390	24	1000
10	Right Angle	-7410	5450	-1990	75	1000
11	Windshield	180	0	-2310	12	1000
12	Driver Windshield	230	-370	-2230	25	1000
13	Passenger Windshield	230	370	-2230	25	1000
14	Pit Front	-710	0	3340	24	1000
15	Pit Rear	-3030	0	3340	24	1000
16	Driver Onboard				12	1000
17	Passenger Onboard				12	1000
18	Real-Time Pan View					30

*COORDINATES:
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1715	-340	-378
2	Right Rear Crossmember Accelerometer – X Direction	1715	340	-378
3	Engine Top X	3550	85	-711
4	Engine Bottom X	3577	125	-228
5	Left Rear Crossmember Accelerometer – Z Direction	1715	-340	-378
6	Right Rear Crossmember Accelerometer – Z Direction	1715	340	-378
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1715	-300	-380
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1715	300	-380

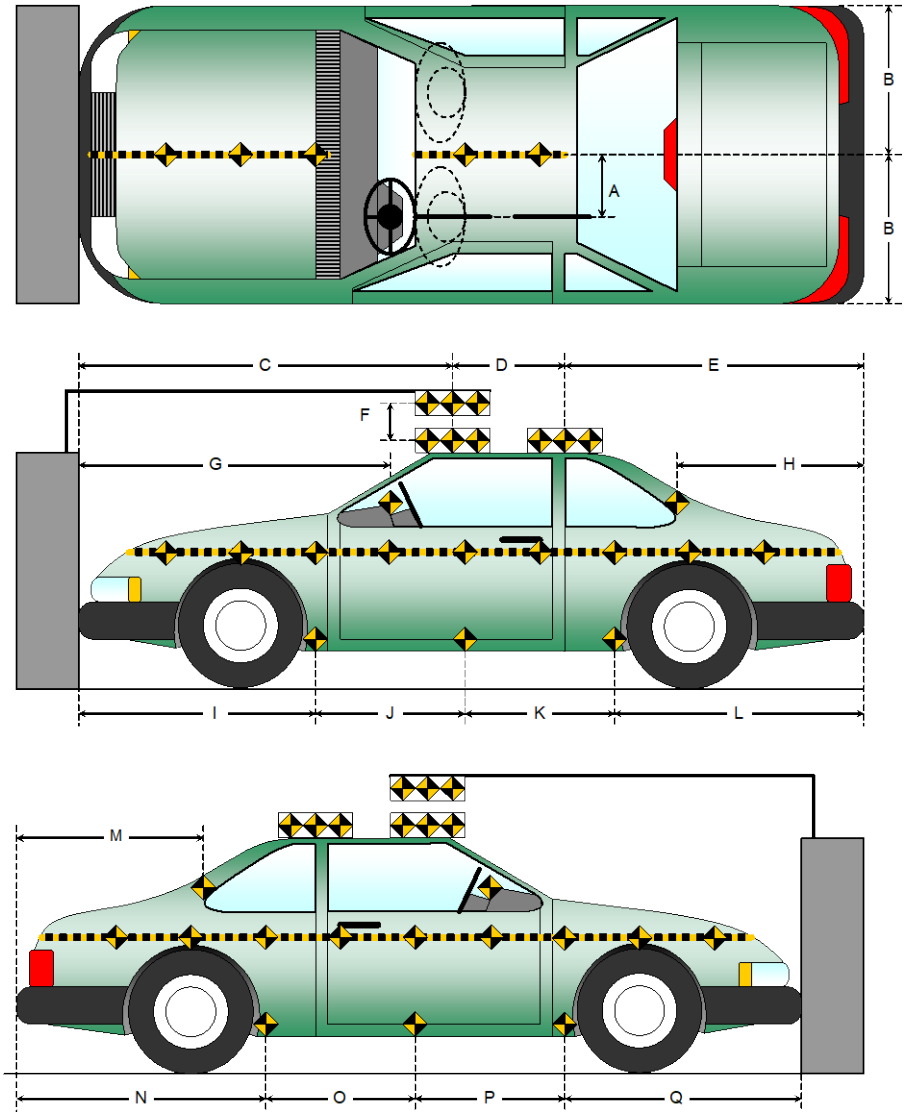
Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20225400
Test Date: 1/24/2022

Item	Value (mm)
A	360
B	898
C	2325
D	610
E	1437
F	170
G	
H	1252
I	1351
J	887
K	887
L	1247
M	1252
N	1247
O	887
P	887
Q	1351



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

ADVANCED RESEARCH LOAD CELL BARRIER

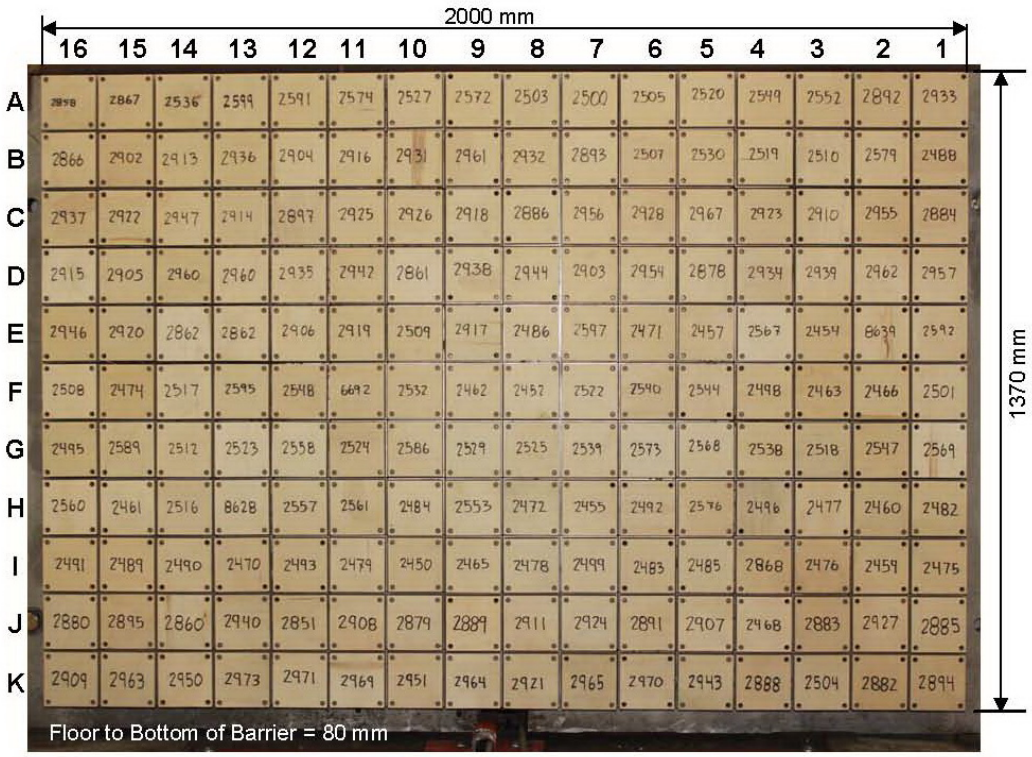


Photo for Reference Only

Centerline

A-16	A-15	A-14	A-13	A-12	A-11	A-10	A-09	A-08	A-07	A-06	A-05	A-04	A-03	A-02	A-01
B-16	B-15	B-14	B-13	B-12	B-11	B-10	B-09	B-08	B-07	B-06	B-05	B-04	B-03	B-02	B-01
C-16	C-15	C-14	C-13	C-12	C-11	C-10	C-09	C-08	C-07	C-06	C-05	C-04	C-03	C-02	C-01
D-16	D-15	D-14	D-13	D-12	D-11	D-10	D-09	D-08	D-07	D-06	D-05	D-04	D-03	D-02	D-01
E-16	E-15	E-14	E-13	E-12	E-11	E-10	E-09	E-08	E-07	E-06	E-05	E-04	E-03	E-02	E-01
F-16	F-15	F-14	F-13	F-12	F-11	F-10	F-09	F-08	F-07	F-06	F-05	F-04	F-03	F-02	F-01
G-16	G-15	G-14	G-13	G-12	G-11	G-10	G-09	G-08	G-07	G-06	G-05	G-04	G-03	G-02	G-01
H-16	H-15	H-14	H-13	H-12	H-11	H-10	H-09	H-08	H-07	H-06	H-05	H-04	H-03	H-02	H-01
I-16	I-15	I-14	I-13	I-12	I-11	I-10	I-09	I-08	I-07	I-06	I-05	I-04	I-03	I-02	I-01
J-16	J-15	J-14	J-13	J-12	J-11	J-10	J-09	J-08	J-07	J-06	J-05	J-04	J-03	J-02	J-01
K-16	K-15	K-14	K-13	K-12	K-11	K-10	K-09	K-08	K-07	K-06	K-05	K-04	K-03	K-02	K-01

Load Cells are 121 mm x 121 mm with a 7 mm gap in between each load cell.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Data Channels	49
Passenger Dummy Data Channels	49
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	634

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	14
Real-Time	2
Total	18

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 142
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Remained closed and unlocked; opened without tools	Remained closed and unlocked; opened without tools
Rear Door Opening	Remained closed and unlocked; opened without tools	Remained closed and unlocked; opened without tools
Trunk/Hatch/Tailgate Opening	Remained closed; opened without tools	
Seat Track Shift (mm)	0	0
Seat Back Movement	None	None

OTHER VEHICLE POST-TEST OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

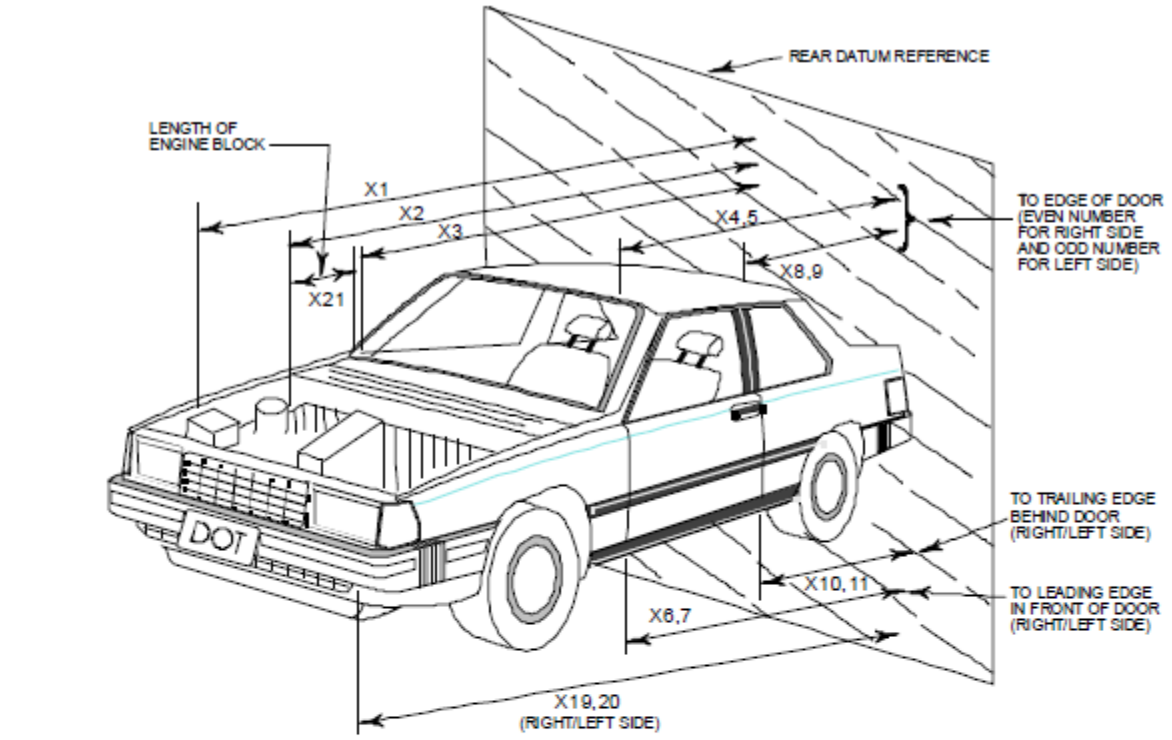
Measured Parameter	Units	Value
Left Side	mm	1295
Center	mm	1310
Right Side	mm	1245
Average	mm	1283

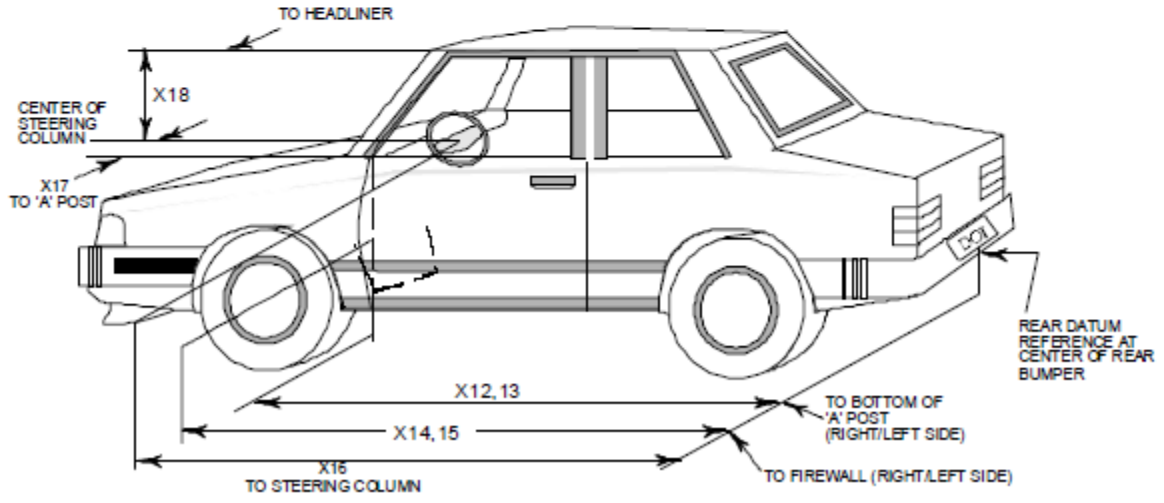
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2022 Mazda MX-30 5-Door Hatchback	NHTSA No.:	O20225400
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	1/24/2022





DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4372	3889	483
2	RSOV to Front of Engine	3768	3345	423
3	RSOV to Firewall	3321	3206	115
4	RSOV to Upper Leading Edge of Right Door	2874	2754	120
5	RSOV to Upper Leading Edge of Left Door	2872	2707	165
6	RSOV to Lower Leading Edge of Right Door	2916	2794	122
7	RSOV to Lower Leading Edge of Left Door	2914	2791	123
8	RSOV to Upper Trailing Edge of Right Door	1813	1706	107
9	RSOV to Upper Trailing Edge of Left Door	1813	1699	114
10	RSOV to Lower Trailing Edge of Right Door	1879	1771	108
11	RSOV to Lower Trailing Edge of Left Door	1876	1751	125
12	RSOV to Bottom of “A” Post of Right Side	2836	2708	128
13	RSOV to Bottom of “A” Post of Left Side	2835	2701	134
14	RSOV to Firewall, Right Side	3315	3233	82
15	RSOV to Firewall, Left Side	3310	3194	116
16	RSOV to Steering Column	2413	2513	-100
17	Center of Steering Column to “A” Post	362	320	42
18	Center of Steering Column to Headliner	426	422	4
19	RSOV to Right Side of Front Bumper	4226	3706	520
20	RSOV to Left Side of Front Bumper	4226	3710	516
21	Length of Engine Block	244	244	0
RD	RSOV to Right Side of Dash Panel	2606	2499	107
CD	RSOV to Center of Dash Panel	2600	2484	116
LD	RSOV to Left Side of Dash Panel	2604	2485	119

All dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

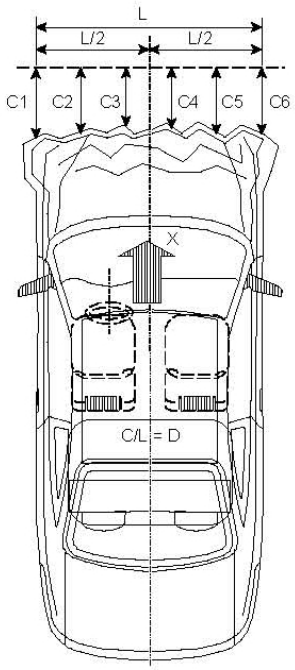
Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

VEHICLE INFORMATION

VIN: JM1DRADB4N0100327
Vehicle Size Category: Passenger Car
Wheelbase (mm): 2648
Test Weight (kg): 1844.0

ACCELEROMETER DATA

Accelerometer Locations: As per Data Sheet No. 7
Cal. Procedure/Interval: MGA Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.43
Velocity Change (km/h): 66.1
Time of Separation (msec) 108



CRUSH PROFILE

Collision Deformation Classification: 12FDEW4
Midpoint of Damage: Centerline
Damage Region Length (mm): 1152
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4226	3710	516
C2	Crush zone 2 at left side	mm	4334	3684	650
C3	Crush zone 3 at left side	mm	4335	3705	630
C4	Crush zone 4 at right side	mm	4335	3711	624
C5	Crush zone 5 at right side	mm	4334	3698	636
C6	Crush zone 6 at right side	mm	4226	3706	520
L	C1 TO C6	mm	1152	1139	13

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

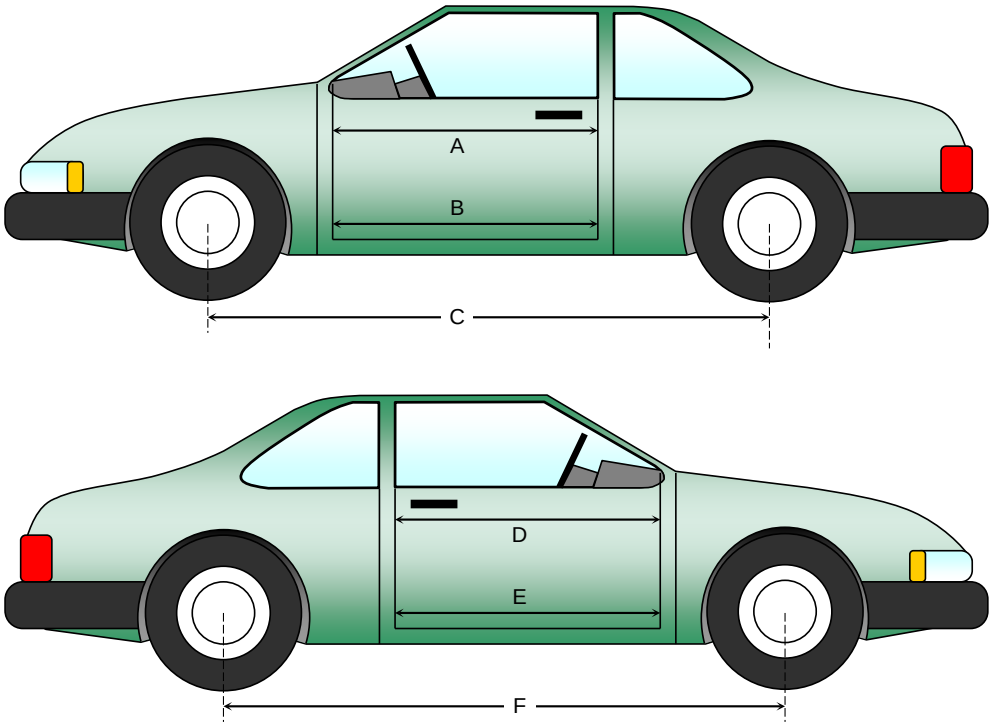
Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	964	960	4
B	Left Side Lower	mm	886	880	6
D	Right Side Upper	mm	963	960	3
E	Right Side Lower	mm	887	881	6

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2648	2573	75
F	Right Side Wheelbase	mm	2648	2584	64



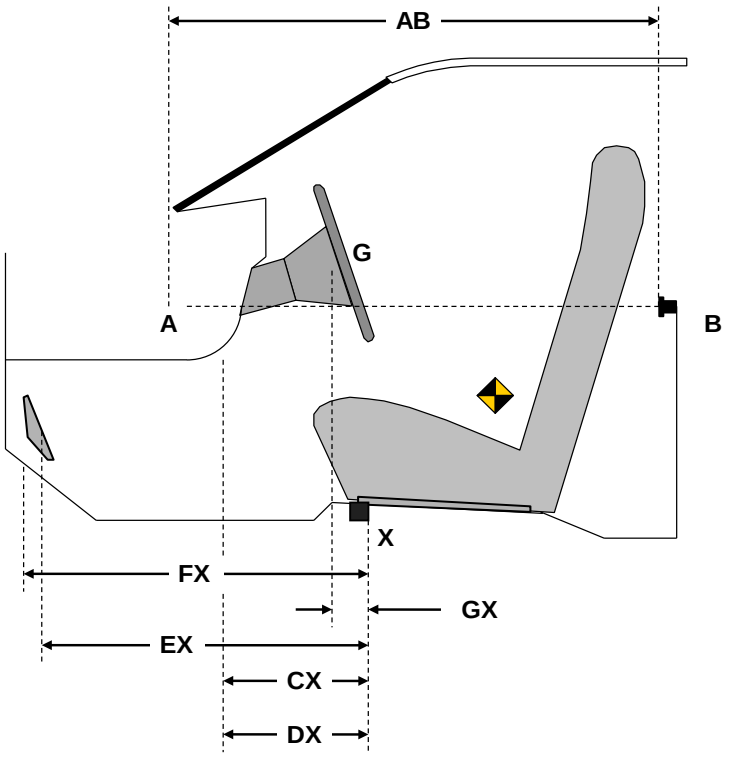
DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	775	773	2
CX	Left Knee Bolster to X	mm	324	323	1
DX	Right Knee Bolster to X	mm	327	315	12
EX	Brake Pedal to X	mm	527	511	16
FX	Foot Rest to X	mm	550	549	1
GX	Center of Steering Column Wheel Hub to X	mm	25	30	-5

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

DATA SHEET NO. 15
SUMMARY OF FMVSS 212 AND FMVSS 219 (PARTIAL) DATA

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

WINDSHIELD MOUNTING DETAILS

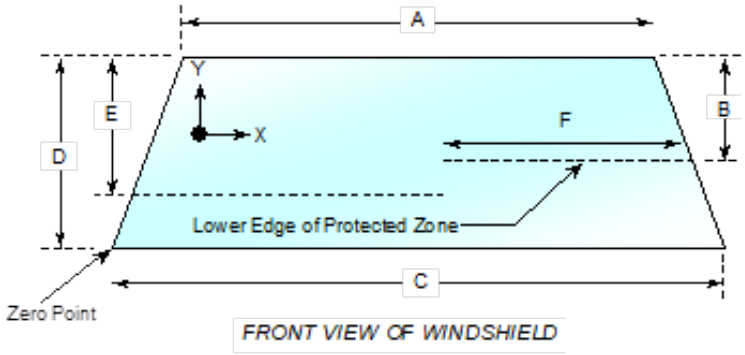
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.6°C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2137	2137	100
Right Side	2137	2137	100
Total	4274	4274	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1254
B	mm	407
C	mm	1420
D	mm	800
E	mm	447
F	mm	502

AREA OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

DATA SHEET NO. 16
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.6°C Test Time: 11:21 a.m.

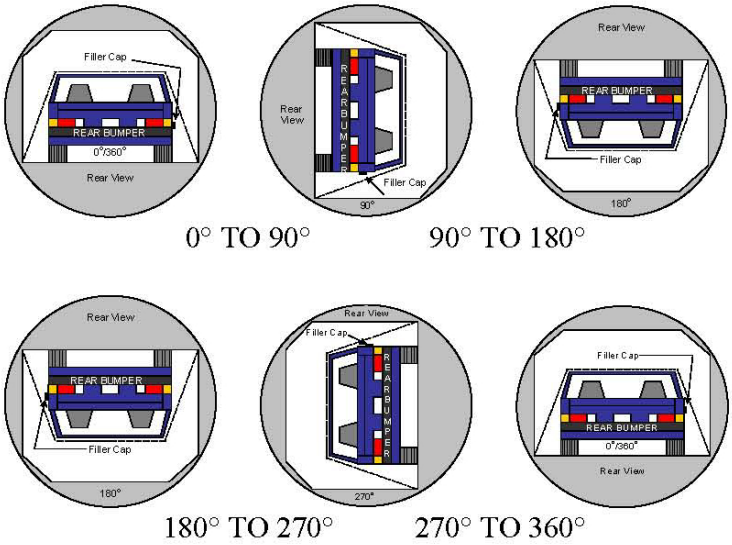
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) N/A oz.

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

C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) N/A

D. Spillage Details: N/A

FMVSS 301 STATIC ROLLOVER RESULTS



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: **None**

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°			
90° to 180°			
180° to 270°			
270° to 360°			

DATA SHEET NO. 16 (CONTINUED)
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

FMVSS 301 SPILLAGE TABLE (UNITS IN OUNCES)

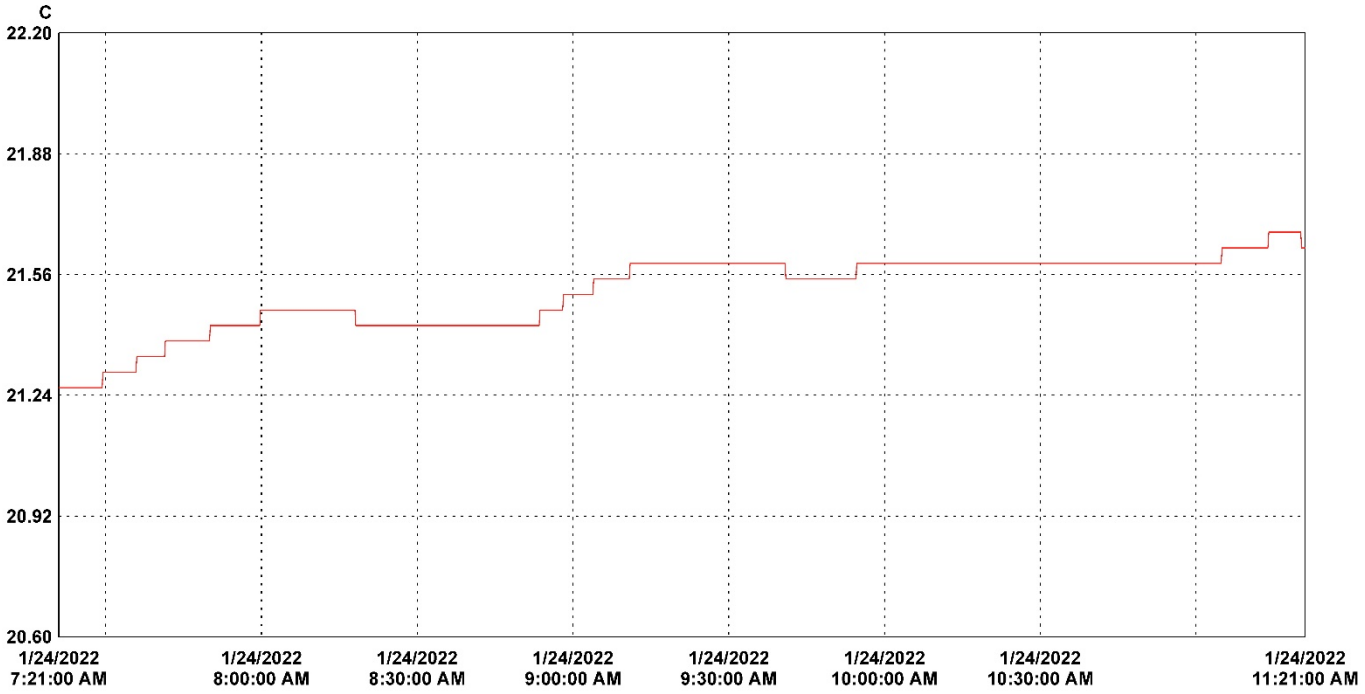
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°				
90° to 180°				
180° to 270°				
270° to 360°				

SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022



30 minutes/div 4 hours (M/d/yyyy h:mm:ss tt) Central Time Graph file (truncated): O20225400 2022 Mazda MX-30 5-Door Hatchback NCAP.spg

LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352041	VSC_Prep_Room	1		21.67	21.51	21.26	C	Temperature	18352041_VSC_Prep_Room.spl

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

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

ELECTRIC VEHICLE PROPULSION SYSTEM

	Units	Observations and Conclusions
Type of Electric Vehicle		Electric
Propulsion Battery Type		Lithium-ion Battery
Nominal Voltage	V	355
Physical Location of Automatic Propulsion Battery Disconnect		Inside the occupant compartment, between the LR and RR passenger footwells
Auxiliary Battery Type		Lead-acid

PROPULSION BATTERY SYSTEM DATA

	Units		Observations and Conclusions
Electrolyte Fluid Type			Organic Electrolyte
Electrolyte Fluid Specific Gravity	g/L		1.2
Electrolyte Fluid Kinematic Viscosity	cSt		No Data
Electrolyte Fluid Color			Colorless
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable)			Refrigerant
Location of Battery Modules			Inside Passenger Compartment
		X	Outside Passenger Compartment
			The high-voltage battery is located below the vehicle floor

PROPULSION BATTERY STATE OF CHARGE

For all battery types:	
Voltage range corresponding to **useable energy** of the battery:	
Minimum State of Charge	268.8
Maximum State of Charge	403.2
95% of Maximum State of Charge	383.0
Test Voltage - No less than 95% of maximum State of Charge	392.9
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:	2022 Mazda MX-30 5-Door Hatchback	NHTSA No.:	O20225400
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	1/24/2022

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Location(s)	Cargo area grounding location shared with auxiliary systems grounding

PROPULSION BATTERY SYSTEM

Details of Electric Energy Storage/Conversion System Test Points	Connected at + and – leads of onboard charging circuit
Additional Comments	None

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

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		17210161
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		6/30/2021

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 COTR.

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: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

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: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		17210161
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		6/30/2021

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: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

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: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

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

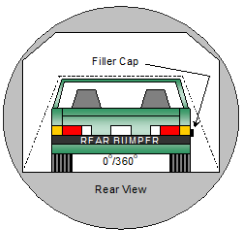
	Yes (Fail)	No
Has an outside Propulsion Battery Component intruded into the passenger compartment?		X

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

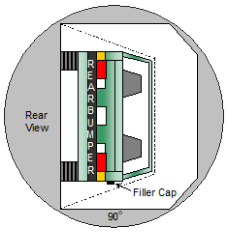
DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

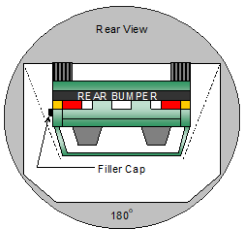
PROPULSION BATTERY SYSTEM COMPONENTS



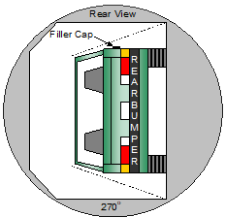
0°/360°



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	52	sec	5	min	6	min	52	sec	7	min
90° - 180°	1	min	50	sec	5	min	6	min	50	sec	7	min
180° - 270°	1	min	47	sec	5	min	6	min	47	sec	7	min
270° - 360°	1	min	50	sec	5	min	6	min	50	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: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		17210161
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		6/30/2021

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: 2022 Mazda MX-30 5-Door Hatchback
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20225400
Test Date: 1/24/2022

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
EVALUTE PROTECTION FROM DIRECT CONTACT WITH HIGH VOLTAGES SOURCES FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

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
Input Cover to Electrical Ground		X		X
Inverter to Electrical Ground		X		X
Drive Motor to Electrical Ground		X		X
Input Cover to Inverter		X		X
Input Cover to Drive Motor		X		X
Inverter to Drive Motor		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
Input Cover to Electrical Ground	Components were not readily accessible to conduct measurement activities			
Inverter to Electrical Ground				
Drive Motor to Electrical Ground				
Input Cover to Inverter				
Input Cover to Drive Motor				
Inverter to Drive Motor				

POST-ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
Input Cover to Electrical Ground		X		X
Inverter to Electrical Ground		X		X
Drive Motor to Electrical Ground		X		X
Input Cover to Inverter		X		X
Input Cover to Drive Motor		X		X
Inverter to Drive Motor		X		X

DATA SHEET NO. 305A-2
EVALUTE 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: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

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 withing 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	
Input Cover to Electrical Chassis	BC			0.0235	Pass
Inverter to Electrical Chassis	BC			0.0251	Pass
Drive Motor to Electrical Chassis	BC			0.0235	Pass
Input Cover to Inverter	BB			0.0000	Pass
Input Cover to Drive Motor	BB			0.0001	Pass
Inverter to Drive Motor	BB			0.0000	Pass

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	
Input Cover to Electrical Chassis	BC	Components were not readily accessible to conduct measurement activities			
Inverter to Electrical Chassis	BC				
Drive Motor to Electrical Chassis	BC				
Input Cover to Inverter	BB				
Input Cover to Drive Motor	BB				
Inverter to Drive Motor	BB				

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	
Input Cover to Electrical Chassis	BC			0.0074	Pass
Inverter to Electrical Chassis	BC			0.0075	Pass
Drive Motor to Electrical Chassis	BC			0.0075	Pass
Input Cover to Inverter	BB			0.0001	Pass
Input Cover to Drive Motor	BB			0.0001	Pass
Inverter to Drive Motor	BB			0.0001	Pass

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: 2022 Mazda MX-30 5-Door Hatchback NHTSA No.: O20225400
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/24/2022

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 withing 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	
Input Cover to Electrical Chassis	BC	0.0008	0.0000	Pass
Inverter to Electrical Chassis	BC	0.0005	0.0000	Pass
Drive Motor to Electrical Chassis	BC	0.0008	0.0000	Pass
Input Cover to Inverter	BB	0.0006	0.0000	Pass
Input Cover to Drive Motor	BB	0.0005	0.0000	Pass
Inverter to Drive Motor	BB	0.0007	0.0000	Pass

STATIC ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass *or* Fail
	BC *or* **BB**	**VAC** (V) Volts	**VDC** (V) Volts	
Input Cover to Electrical Chassis	BC	Components were not readily accessible to conduct measurement activities		
Inverter to Electrical Chassis	BC			
Drive Motor to Electrical Chassis	BC			
Input Cover to Inverter	BB			
Input Cover to Drive Motor	BB			
Inverter to Drive Motor	BB			

POST-ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass *or* Fail
	BC *or* **BB**	**VAC** (V) Volts	**VDC** (V) Volts	
Input Cover to Electrical Chassis	BC	0.0009	0.0000	Pass
Inverter to Electrical Chassis	BC	0.0008	0.0000	Pass
Drive Motor to Electrical Chassis	BC	0.0008	0.0000	Pass
Input Cover to Inverter	BB	0.0006	0.0000	Pass
Input Cover to Drive Motor	BB	0.0005	0.0000	Pass
Inverter to Drive Motor	BB	0.0007	0.0000	Pass

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

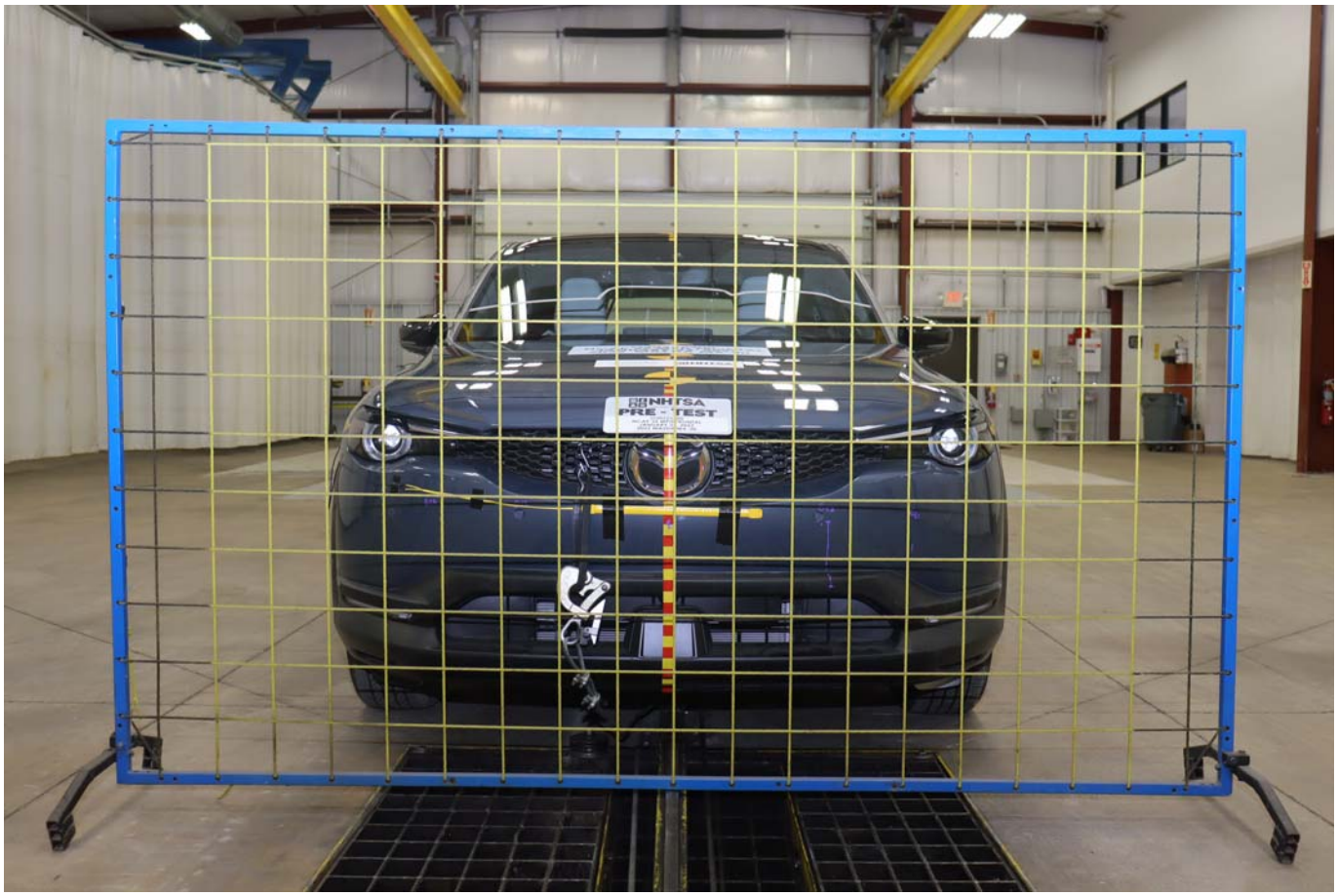


Photo No. 001 - Load Cell Location

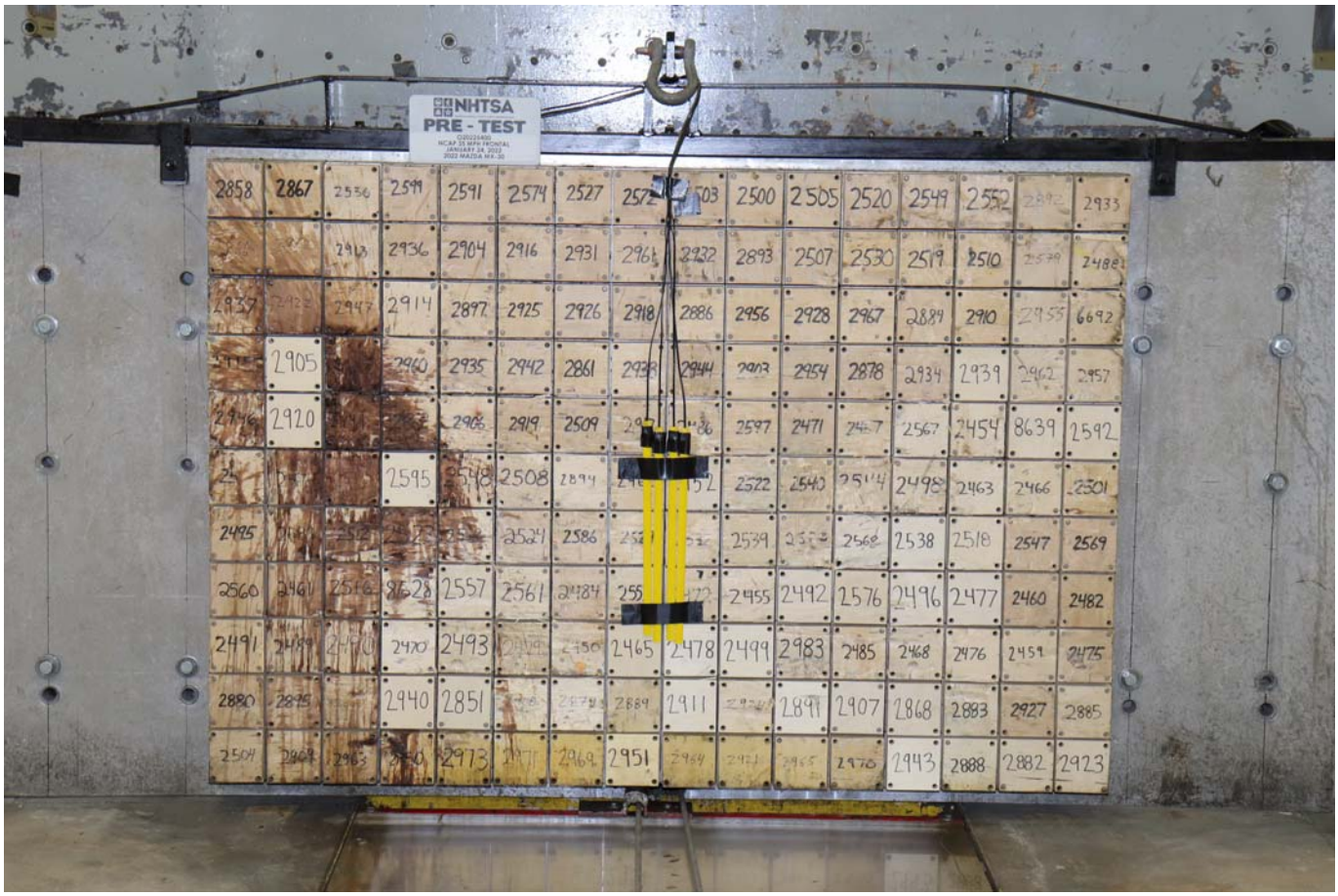


Photo No. 002 - Pre-Test Load Cell Wall

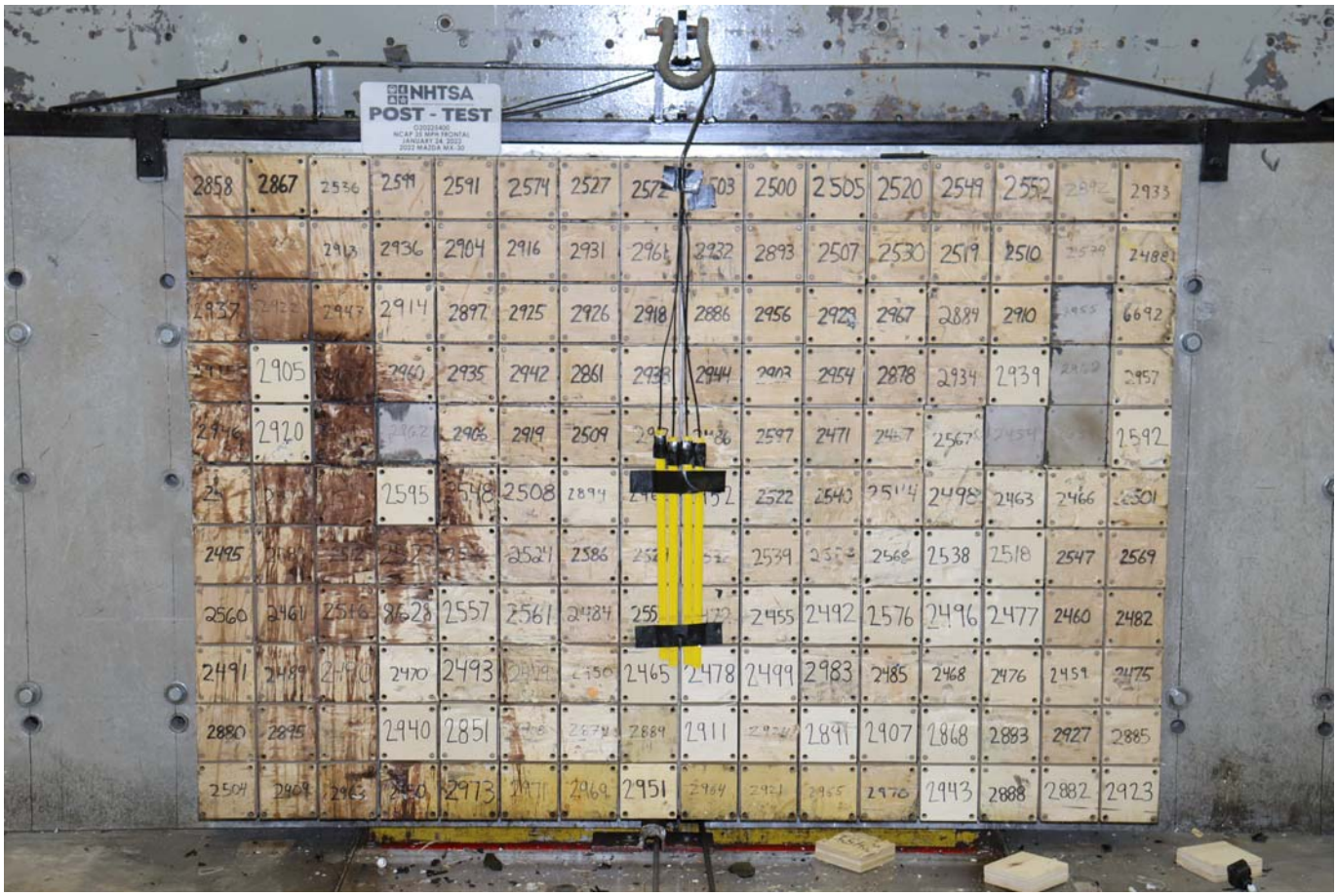


Photo No. 003 - Post-Test Load Cell Wall

Photo No. 004 - Manufacturer's Label

Photo No. 005 - Tire Placard

Photo No. 006 - 2022 Mazda MX-30 5-Door Hatchback Frontal As Delivered

Photo No. 007 - Left Rear 3-4 View, As Received

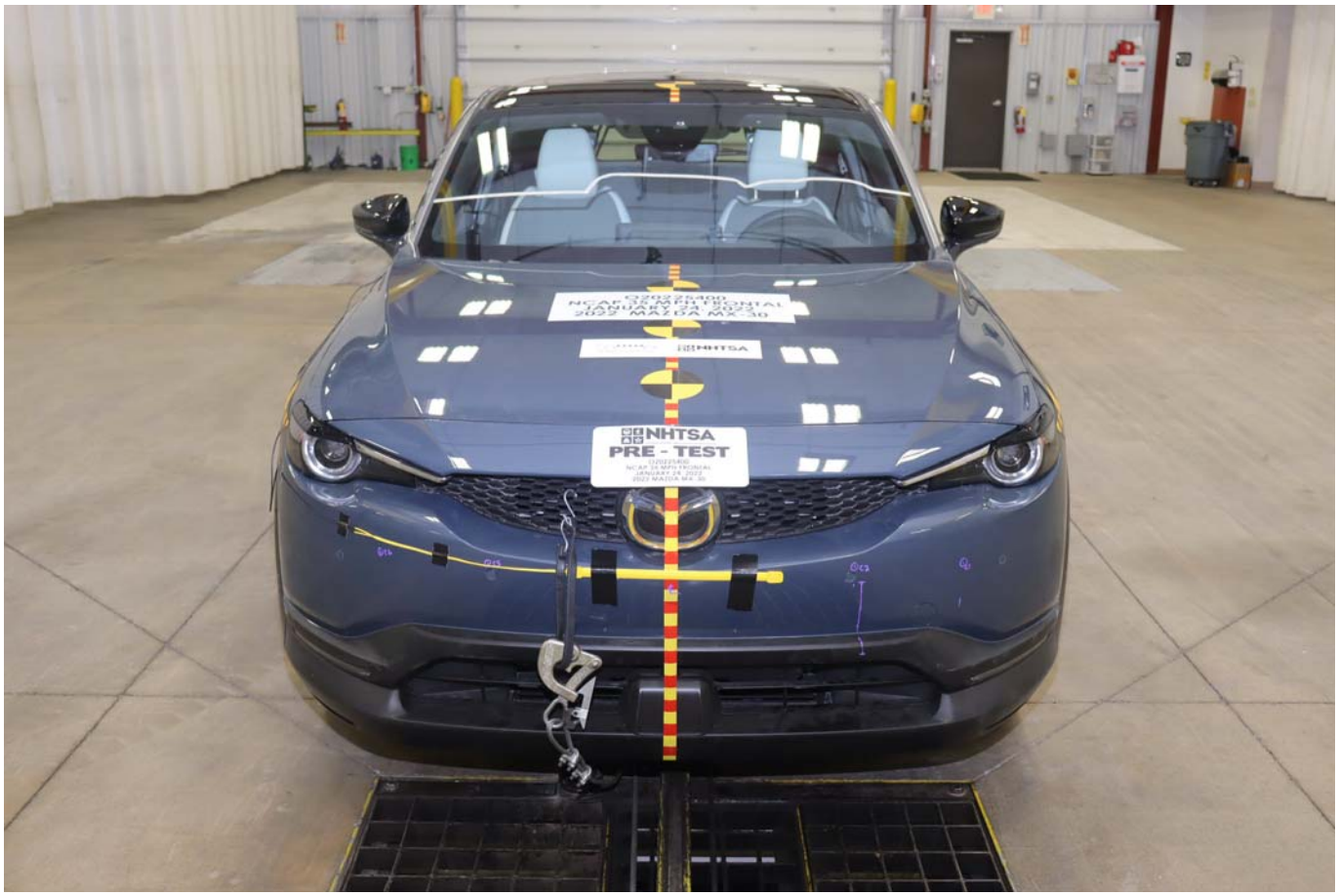


Photo No. 008 - Pre-Test Front View of Test Vehicle

Photo No. 009 - Post-Test Front View of Test Vehicle

Photo No. 010 - Pre-Test Left View of Test Vehicle

Photo No. 011 - Post-Test Left View of Test Vehicle

Photo No. 012 - Pre-Test Right View of Test Vehicle

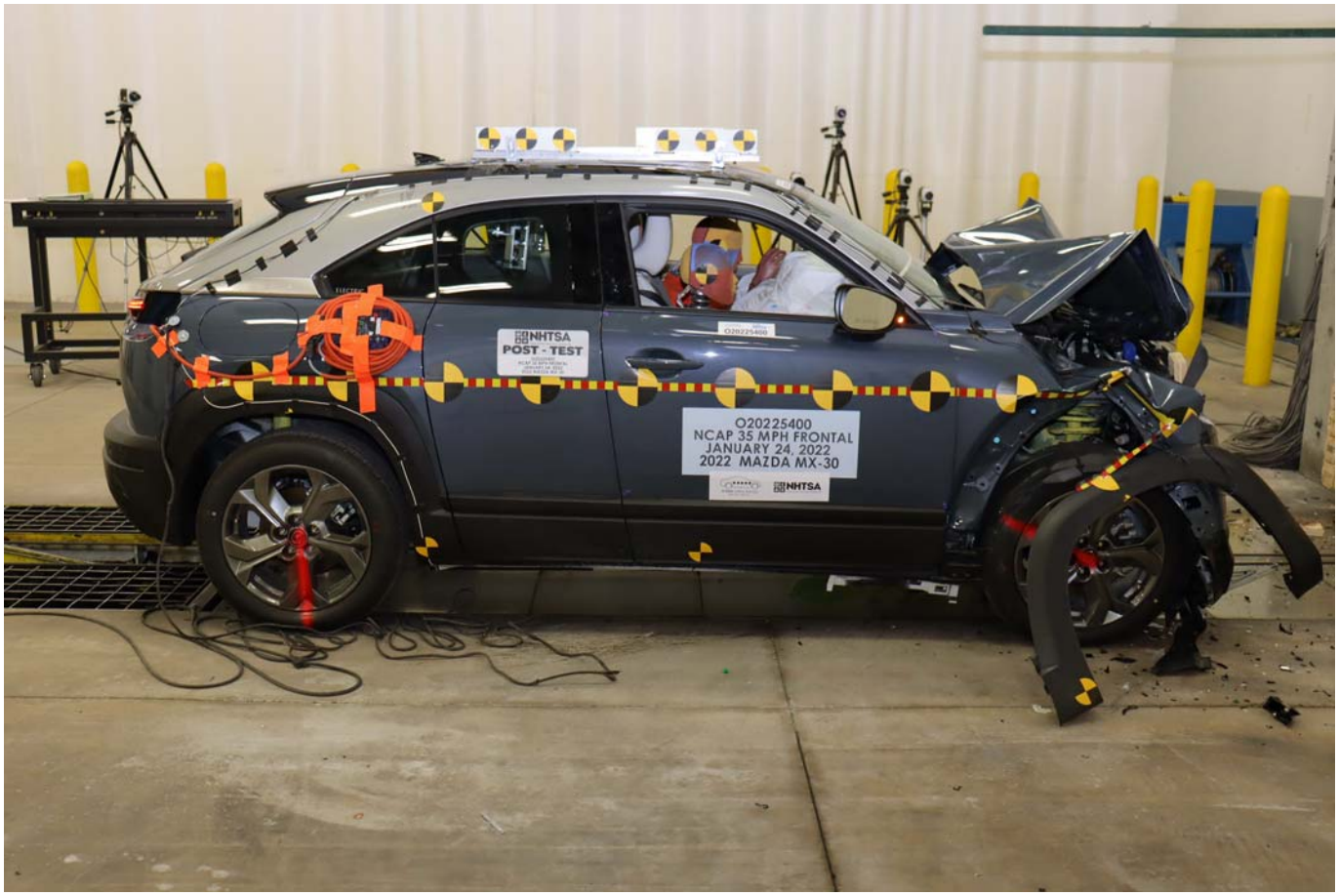


Photo No. 013 - Post-Test Right View of Test Vehicle

Photo No. 014 - Pre-Test Right Front 3-4 View

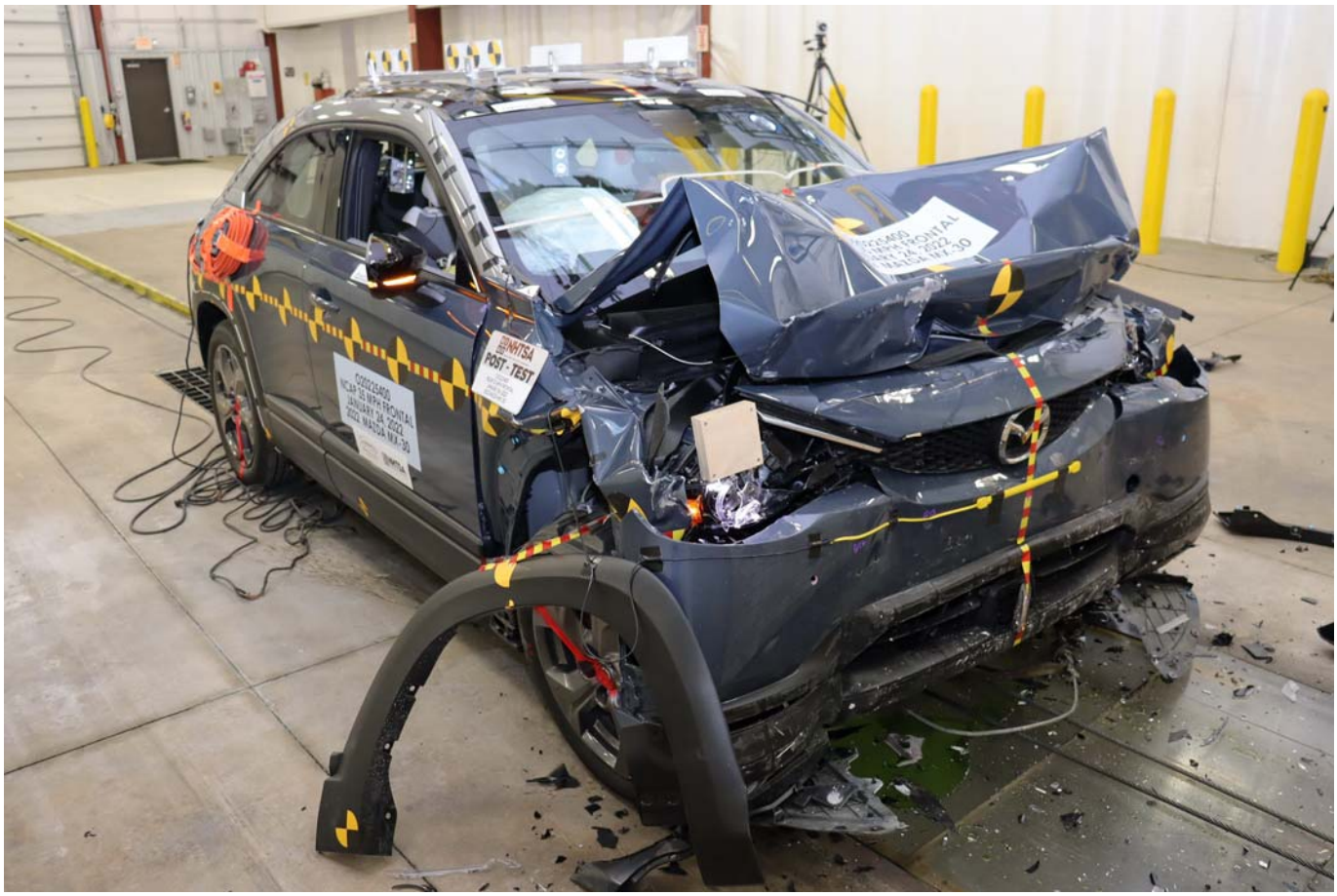


Photo No. 015 - Post-Test Right Front 3-4 View

Photo No. 016 - Pre-Test Left Rear 3-4 View

Photo No. 017 - Post-Test Left Rear 3-4 View

Photo No. 018 - Pre-Test Windshield View

Photo No. 019 - Post-Test Windshield View

Photo No. 020 - Pre-Test Engine Compartment View

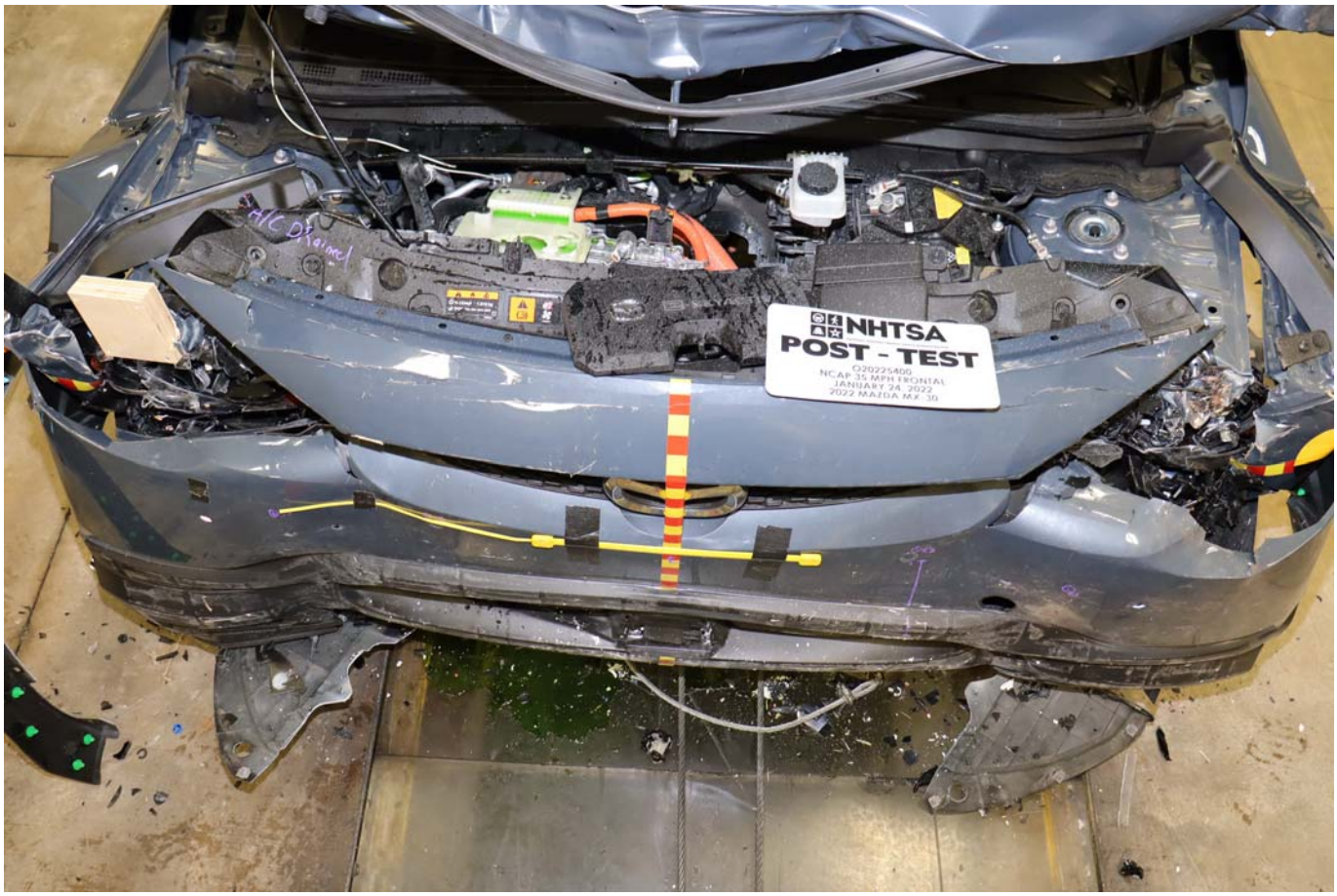


Photo No. 021 - Post-Test Engine Compartment View

PHOTOGRAPH NOT APPLICABLE

Photo No. 022 - Pre-Test Fuel Filler Cap View

PHOTOGRAPH NOT APPLICABLE

Photo No. 023 - Post-Test Fuel Filler Cap View

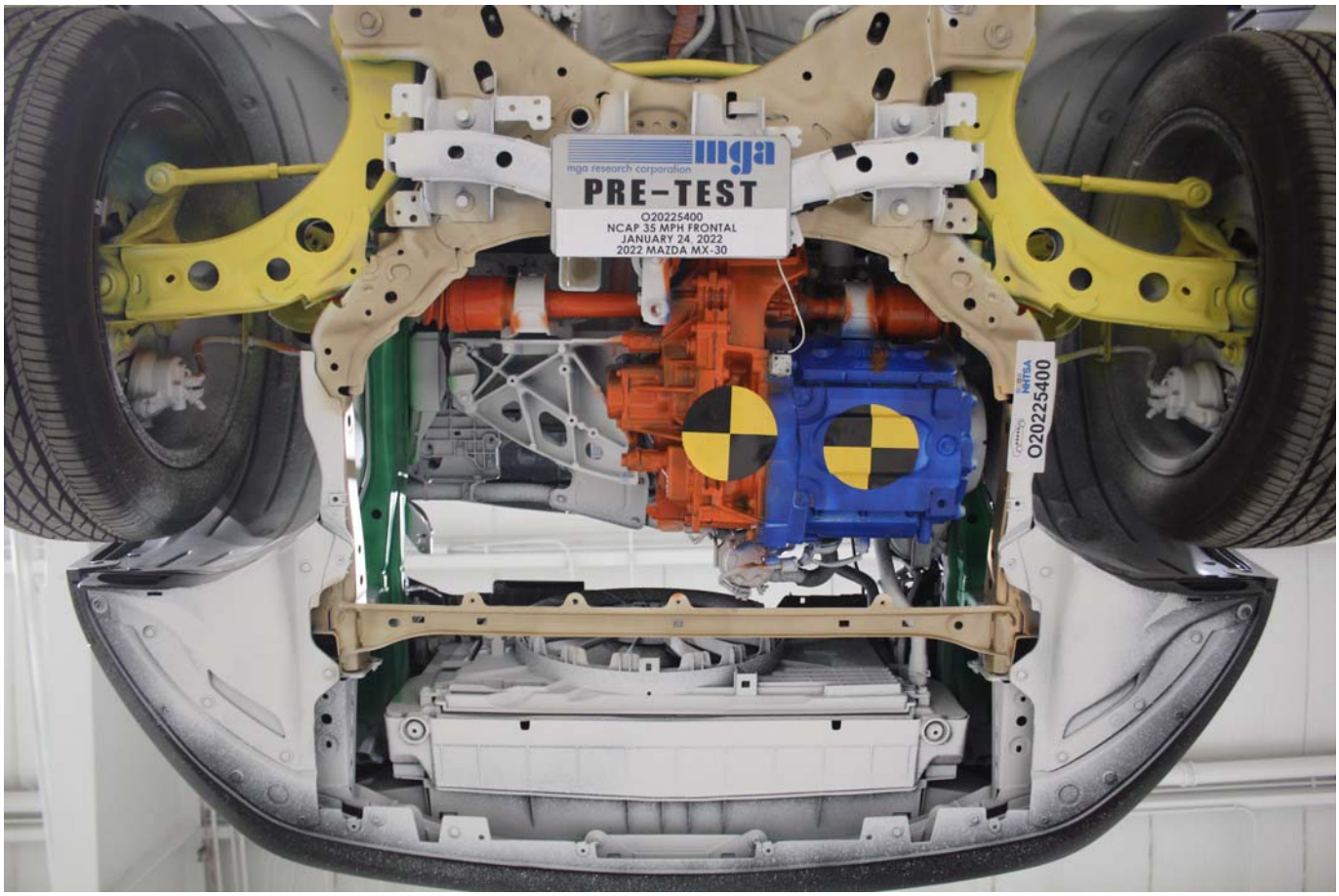


Photo No. 024 - Pre-Test Front Underbody View

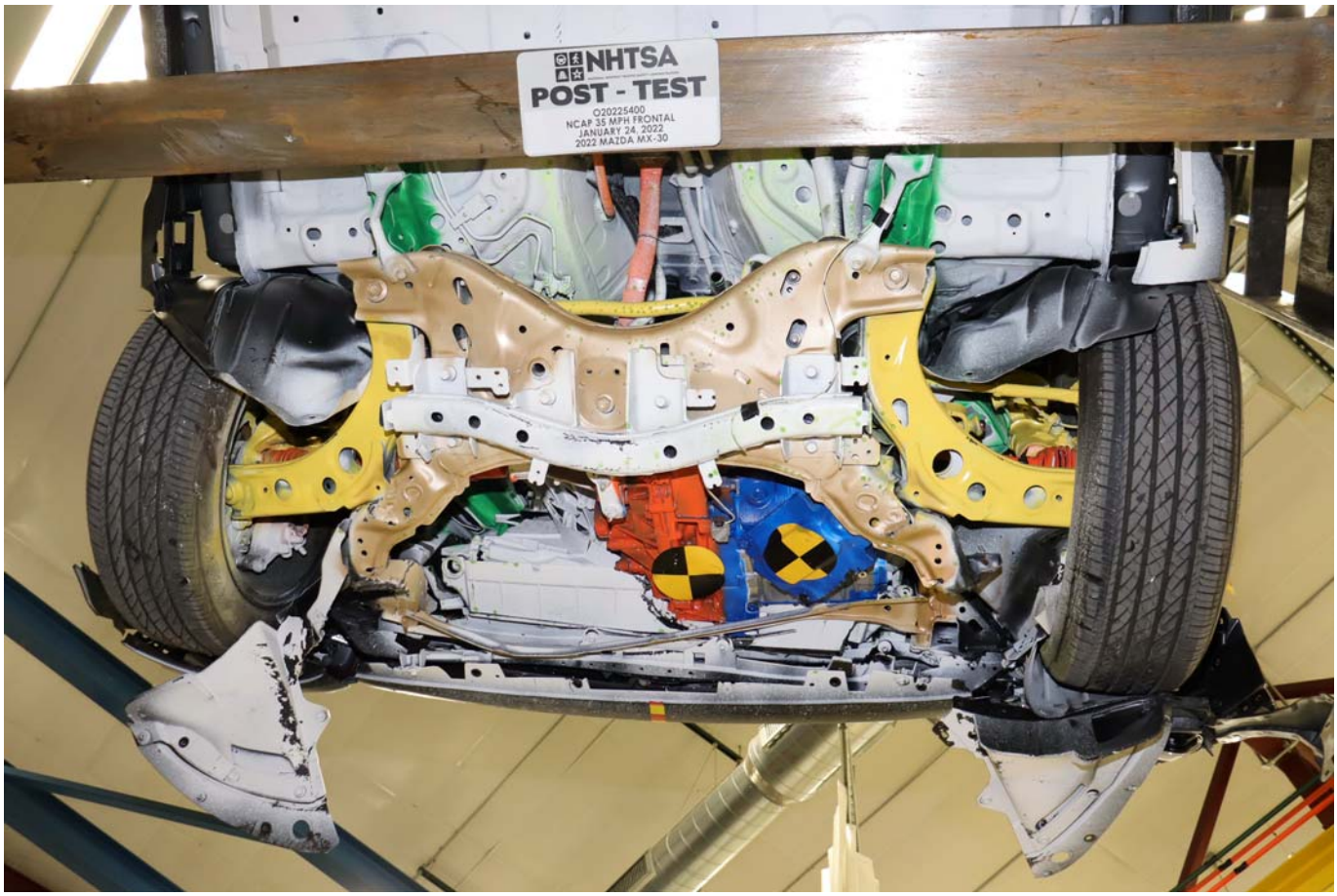


Photo No. 025 - Post-Test Front Underbody View

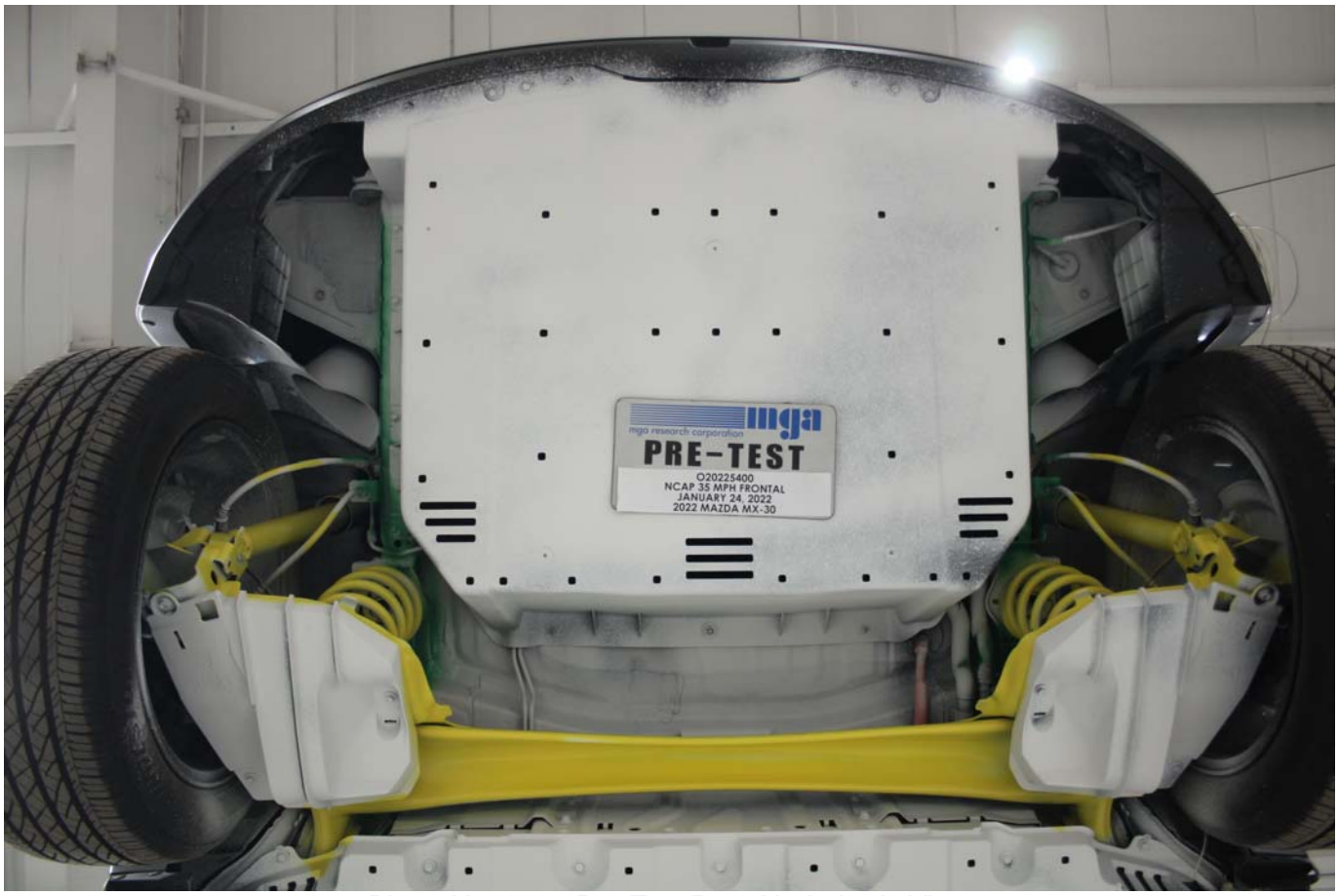


Photo No. 026 - Pre-Test Rear Underbody View

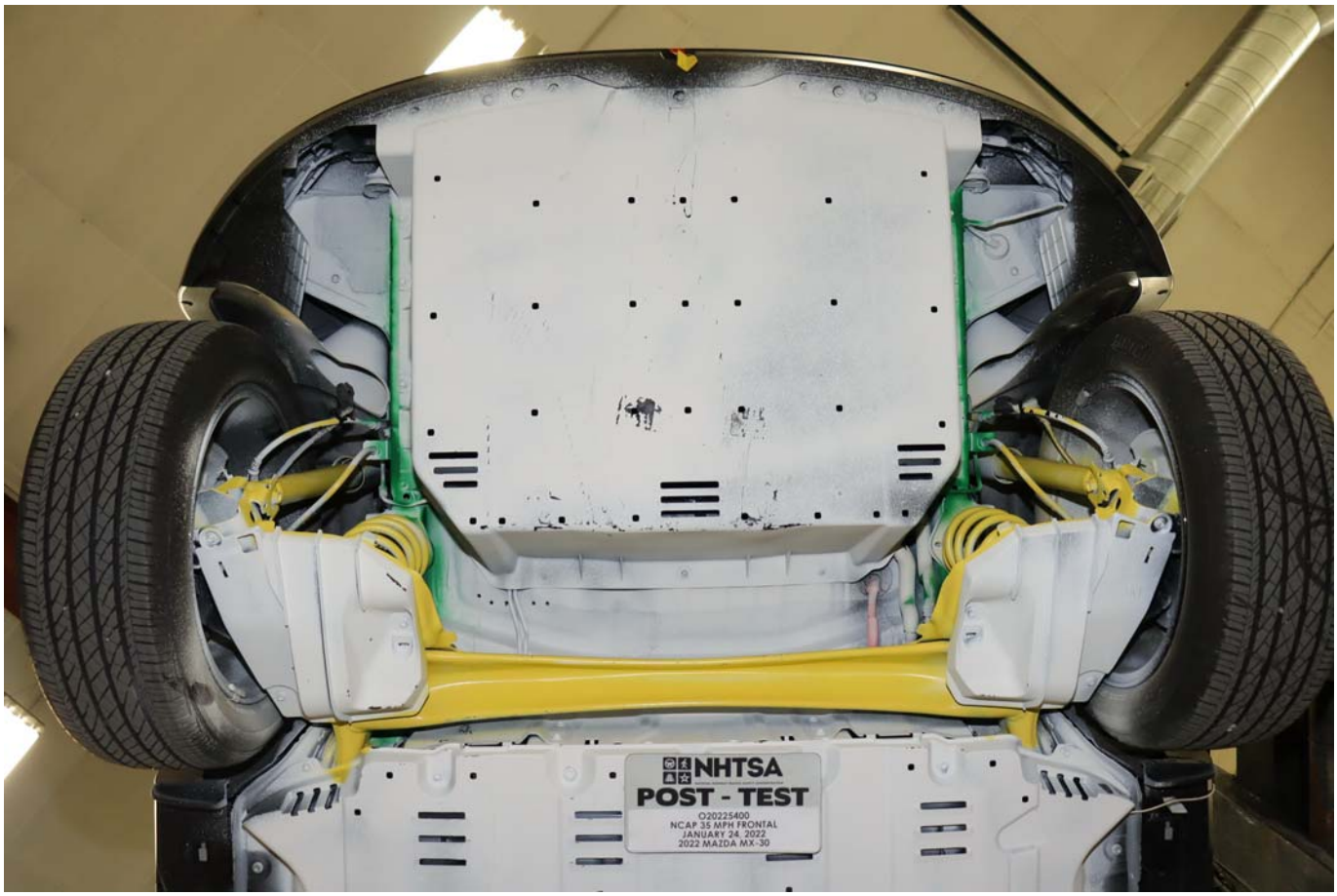


Photo No. 027 - Post-Test Rear Underbody View

Photo No. 028 - Pre-Test Dummy Cable Routing

Photo No. 029 - Post-Test Dummy Cable Routing

Photo No. 030 - Pre-Test Driver Dummy Front View

Photo No. 031 - Post-Test Driver Dummy Front View

Photo No. 032 - Pre-Test Driver Dummy Window View

Photo No. 033 - Post-Test Driver Dummy Window View

Photo No. 034 - Pre-Test Driver Dummy and Vehicle Interior View

Photo No. 035 - Post-Test Driver Dummy and Vehicle Interior View

Photo No. 036 - Pre-Test Driver's Seat Fore-Aft Markings

Photo No. 037 - Post-Test Driver's Seat Fore-Aft Markings

Photo No. 038 - Pre-Test View of Belt Anchorage for Driver Dummy

Photo No. 039 - Post-Test View of Belt Anchorage for Driver Dummy

Photo No. 040 - Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy

Photo No. 041 - Post-Test View of Belt Buckle and Latch Plate for Driver Dummy

Photo No. 042 - Pre-Test Driver Dummy Feet

Photo No. 043 - Post-Test Driver Dummy Feet

Photo No. 044 - Pre-Test Driver's Side Knee Bolster

Photo No. 045 - Post-Test Driver's Side Knee Bolster

Photo No. 046 - Pre-Test Driver's Side Floorpan

Photo No. 047 - Post-Test Driver's Side Floorpan

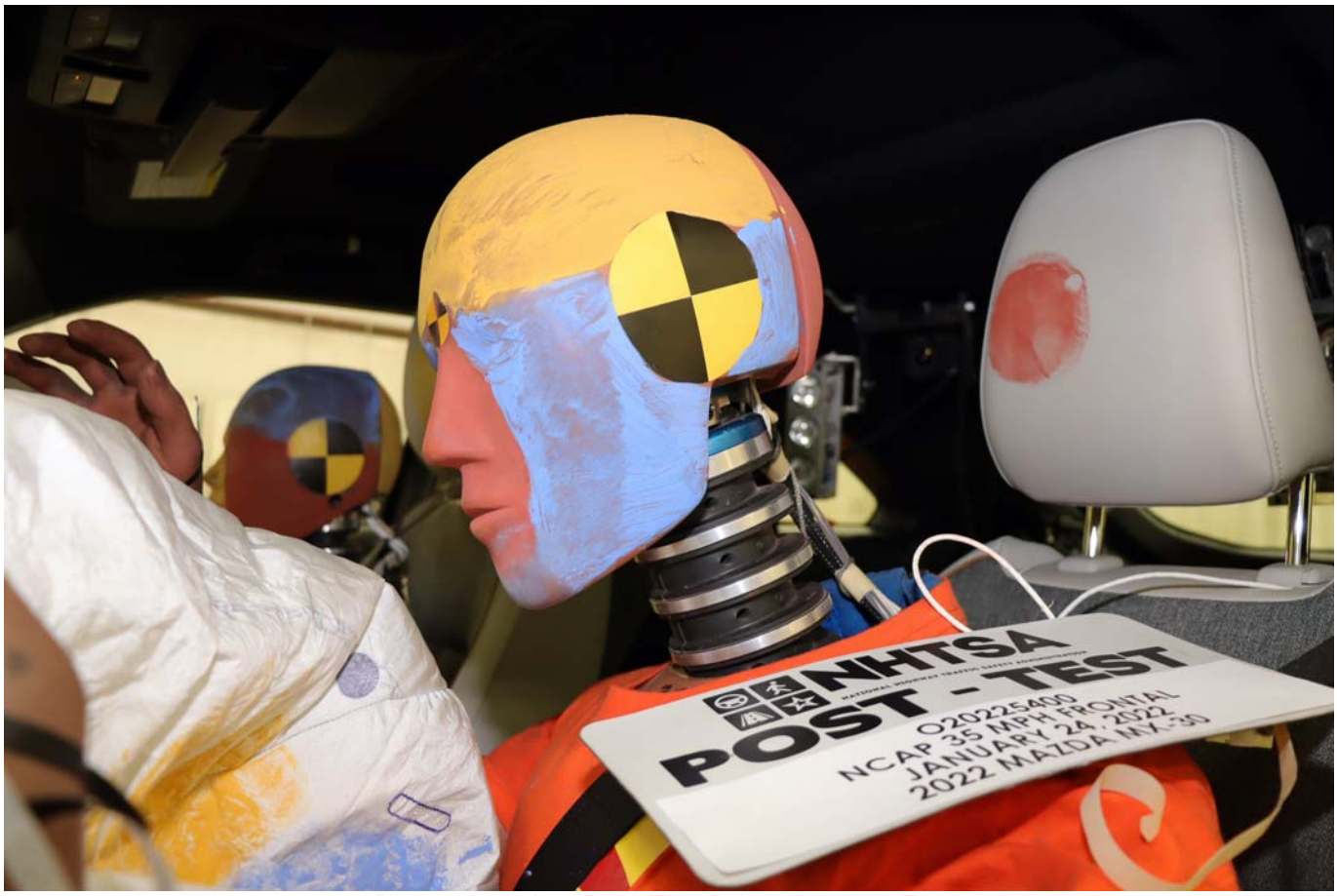


Photo No. 048 - Post-Test Driver Dummy Face

Photo No. 049 - Post-Test Driver Dummy Contact with Airbag

Photo No. 050 - Post-Test Driver Dummy Contact with Headrest

Photo No. 051 - Pre-Test View of the Steering Wheel

Photo No. 052 - Post-Test View of the Steering Wheel

Photo No. 053 - Pre-Test Passenger Dummy Front View

Photo No. 054 - Post-Test Passenger Dummy Front View

Photo No. 055 - Pre-Test Passenger Dummy Window View

Photo No. 056 - Post-Test Passenger Dummy Window View

Photo No. 057 - Pre-Test Passenger Dummy and Vehicle Interior View

Photo No. 058 - Post-Test Passenger Dummy and Vehicle Interior View

Photo No. 059 - Pre-Test Passenger's Seat Fore-Aft Markings

Photo No. 060 - Post-Test Passenger's Seat Fore-Aft Markings

Photo No. 061 - Pre-Test View of Belt Anchorage for Passenger Dummy

Photo No. 062 - Post-Test View of Belt Anchorage for Passenger Dummy

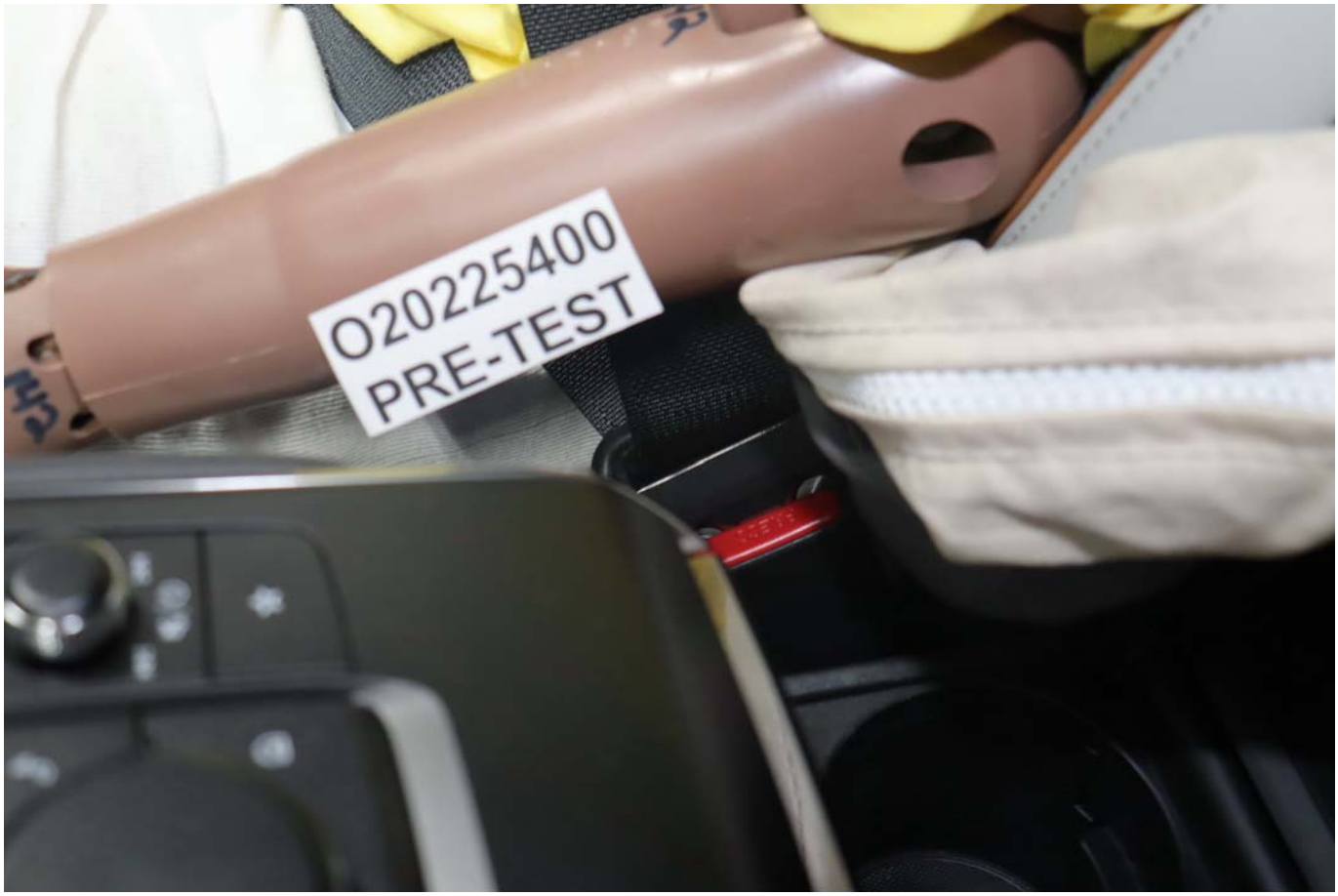


Photo No. 063 - Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy

Photo No. 064 - Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy

Photo No. 065 - Pre-Test Passenger Dummy Feet

Photo No. 066 - Post-Test Passenger Dummy Feet

Photo No. 067 - Pre-Test Passenger's Side Knee Bolster

Photo No. 068 - Post-Test Passenger's Side Knee Bolster

Photo No. 069 - Pre-Test Passenger's Side Floorpan

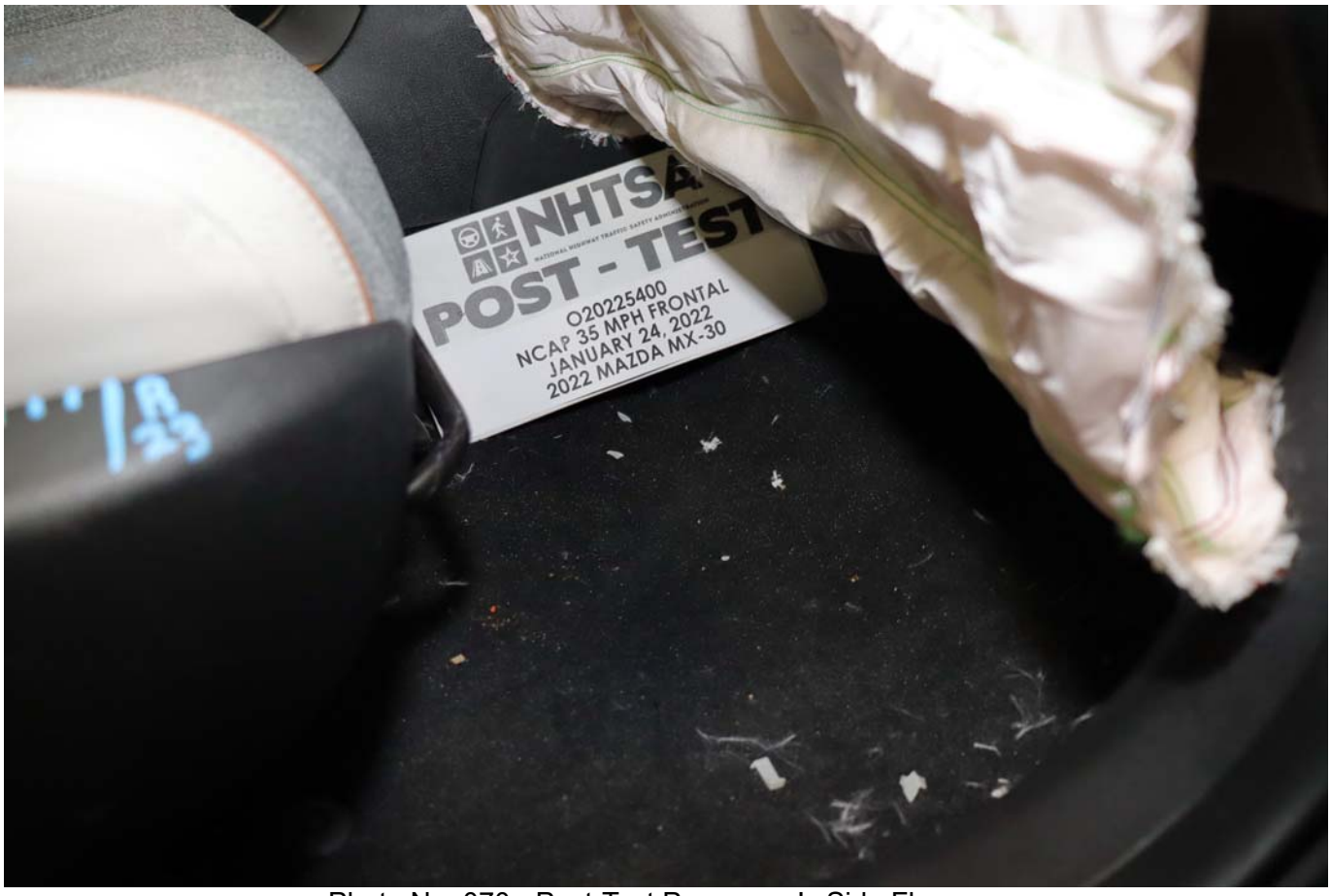


Photo No. 070 - Post-Test Passenger's Side Floorpan

Photo No. 071 - Post-Test Passenger Dummy Face

Photo No. 072 - Post-Test Passenger Dummy Contact with Airbag

Photo No. 073 - Post-Test Passenger Dummy Contact with Headrest

Photo No. 074 - Photograph of Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Photo No. 075 - Post-Test Stoddard Solvent Spillage Location View

Photo No. 076 - Post-Test Speed Trap Read-Out

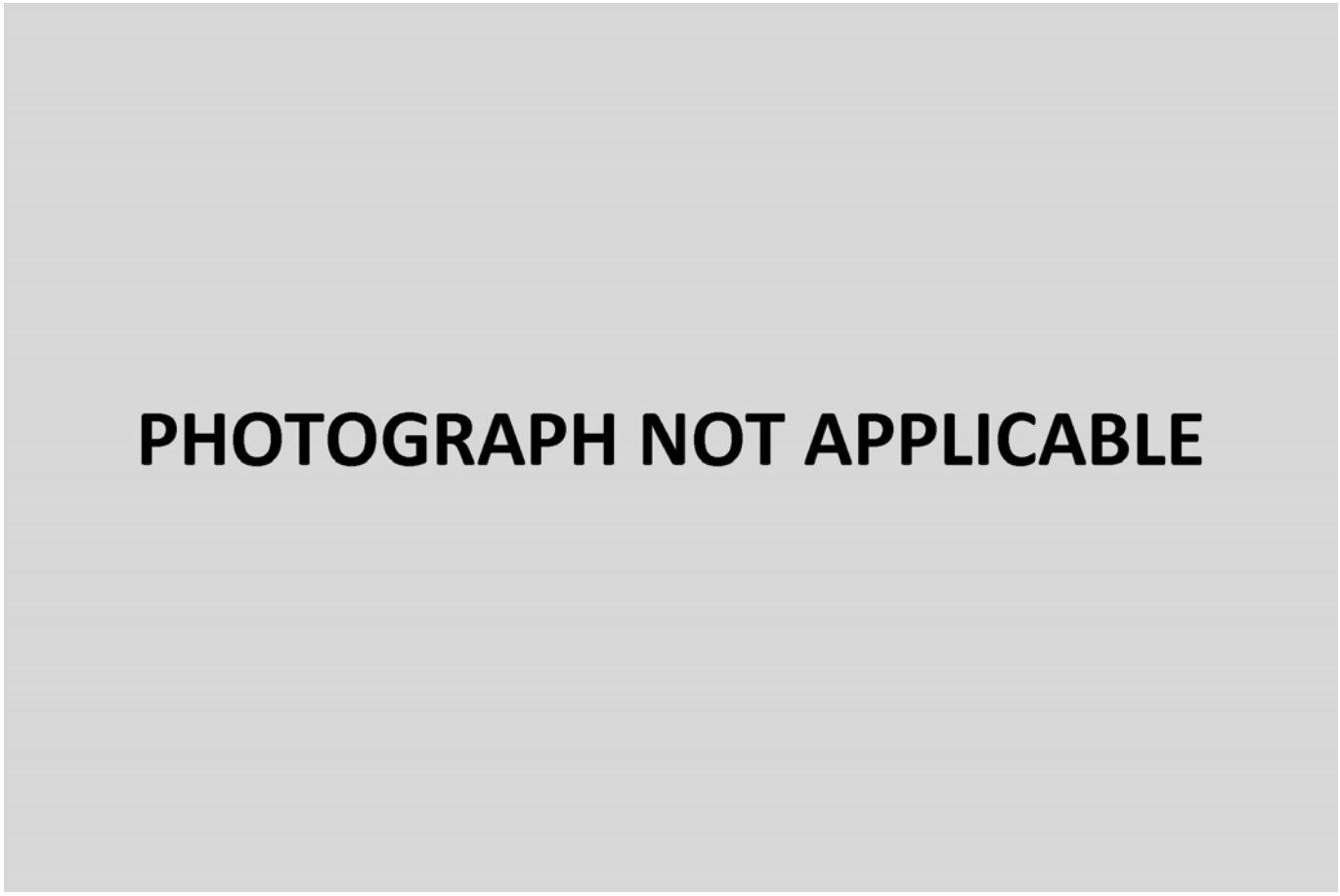


Photo No. 077 - Vehicle at 0 Degrees on Static Rollover Device

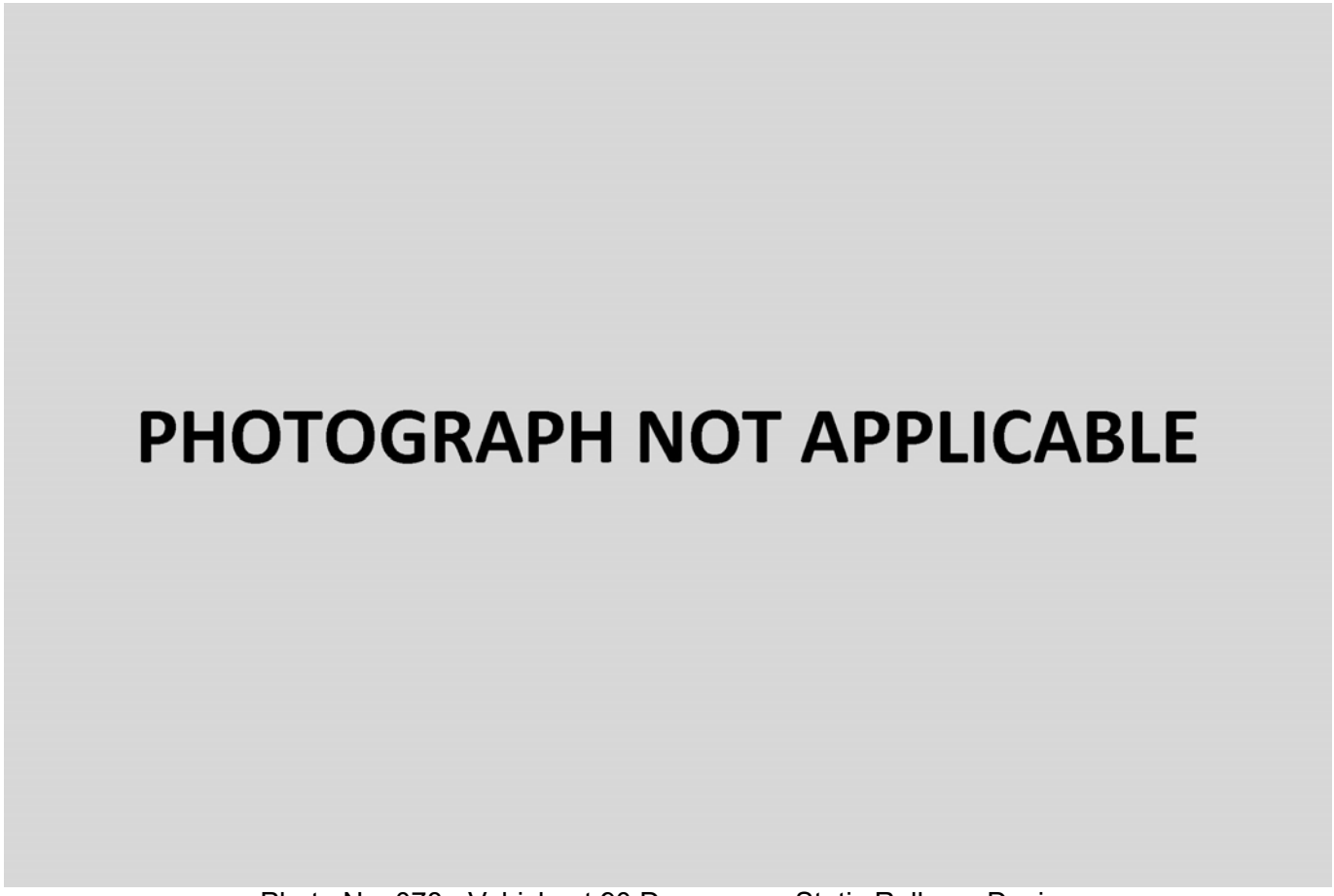


Photo No. 078 - Vehicle at 90 Degrees on Static Rollover Device

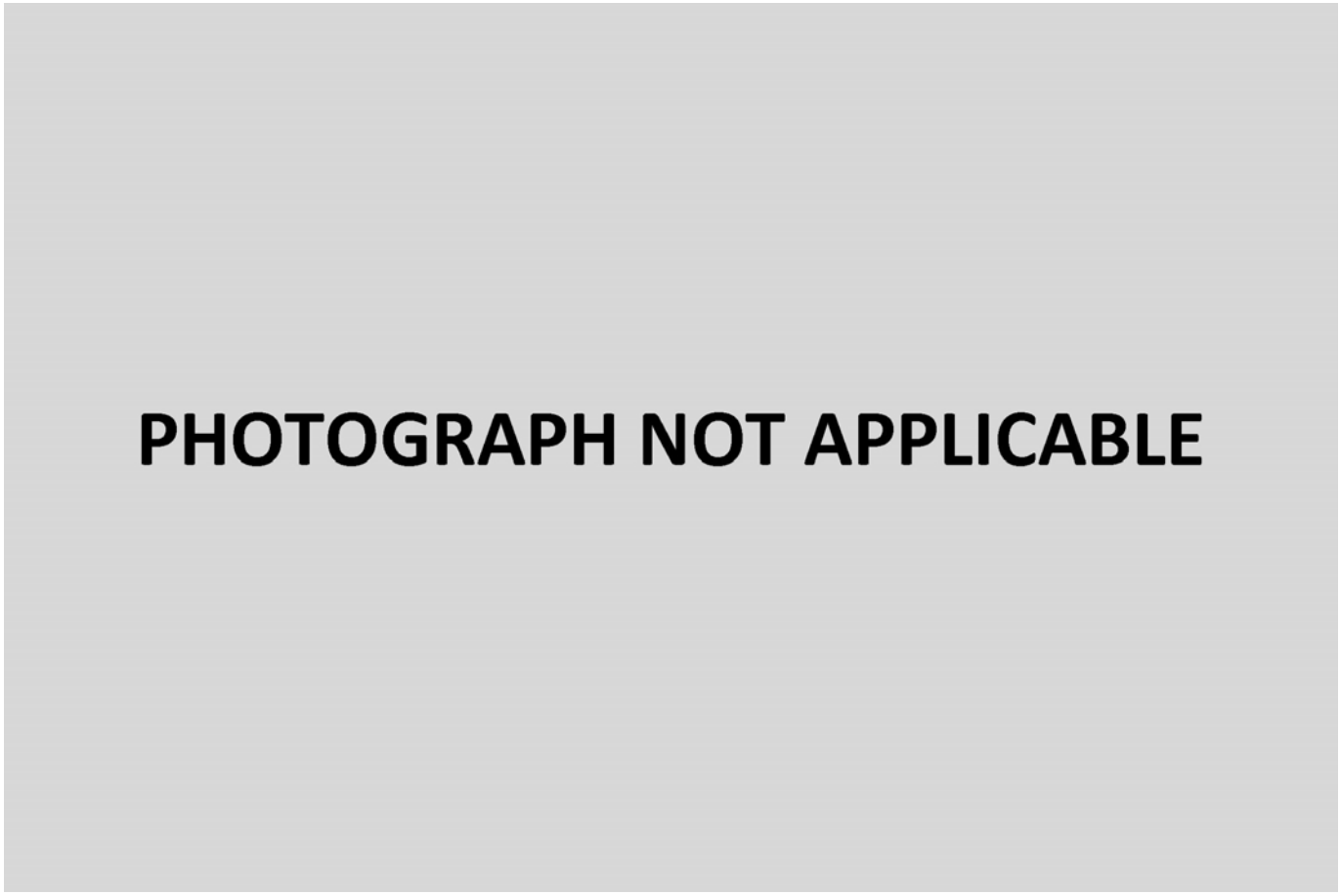


Photo No. 079 - Vehicle at 180 Degrees on Static Rollover Device

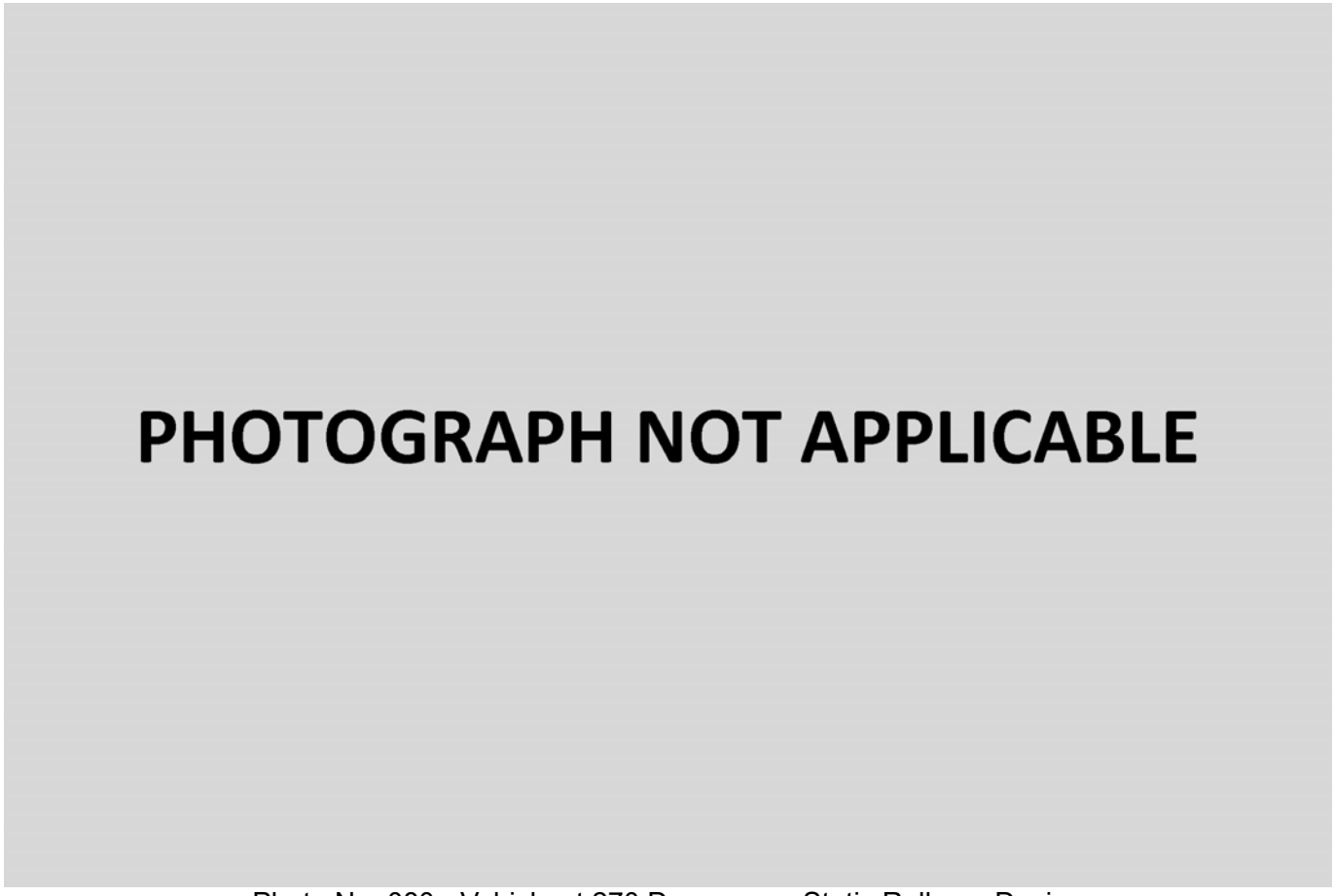


Photo No. 080 - Vehicle at 270 Degrees on Static Rollover Device

PHOTOGRAPH NOT APPLICABLE

Photo No. 081 - Vehicle at 360 Degrees on Static Rollover Device

Photo No. 082 - 2022 Mazda MX-30 5-Door Hatchback Frontal Impact Event

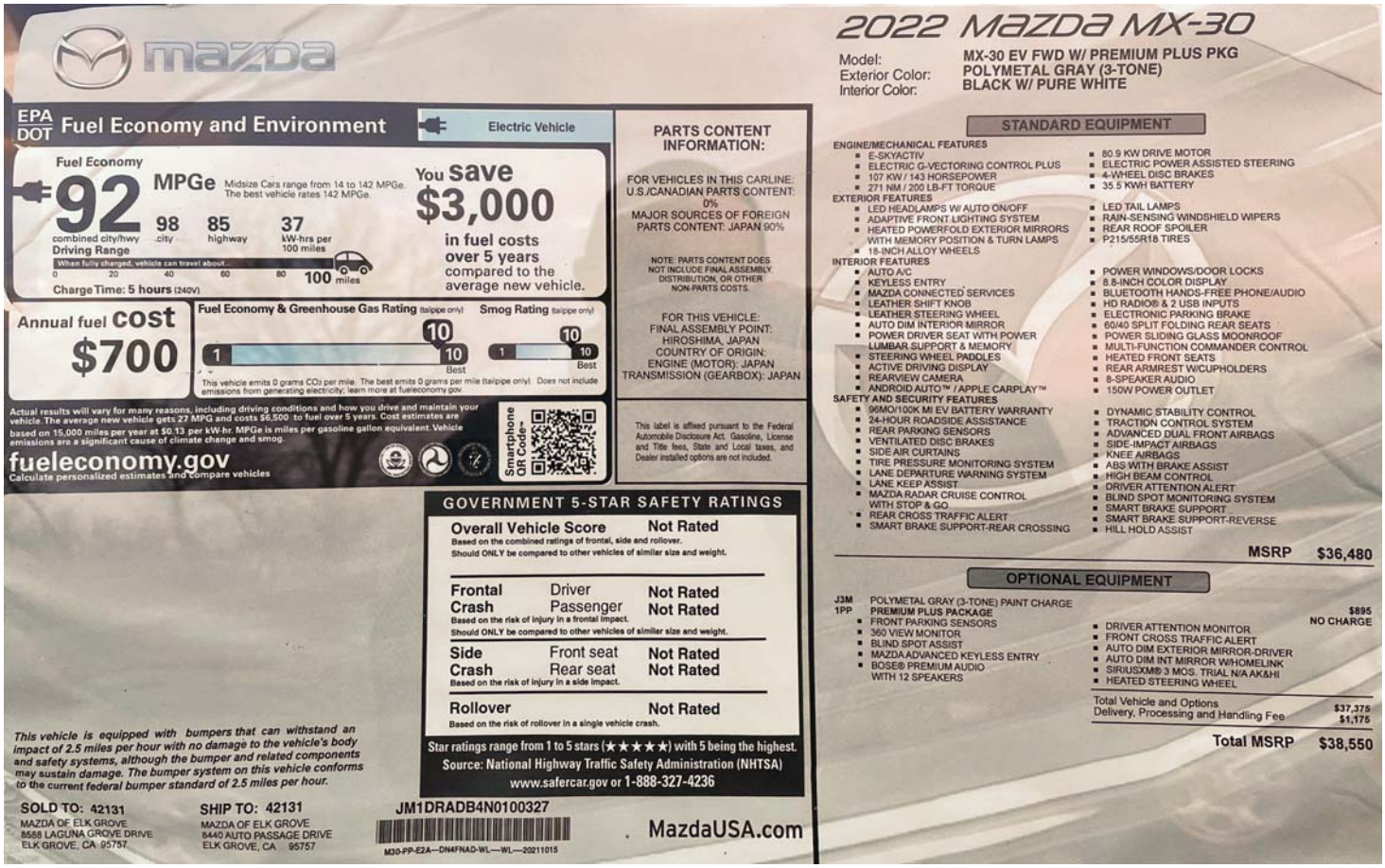


Photo No. 083 - Monroney Label Photograph

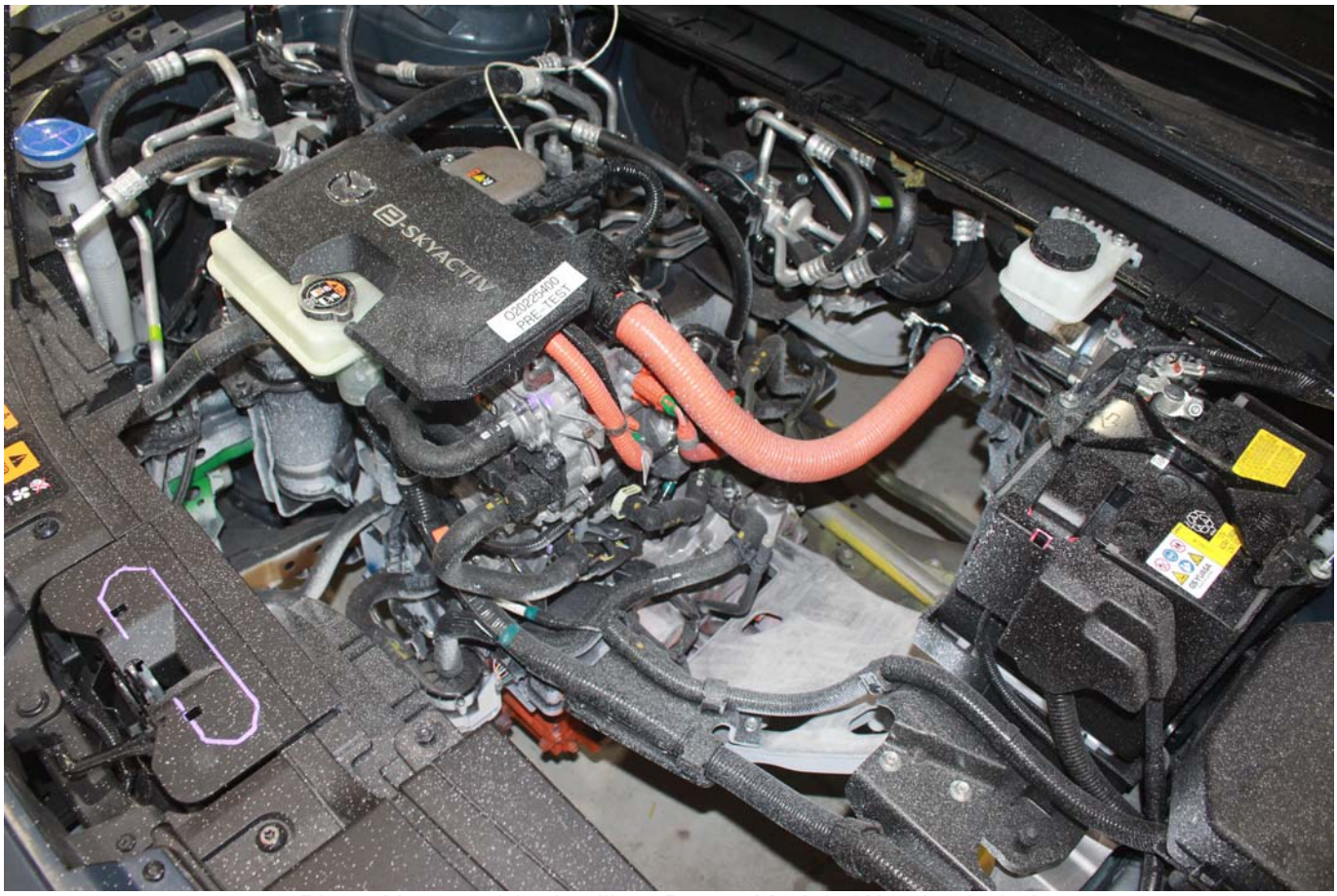


Photo No. 305-01 - Auxiliary Power Module Warning Label

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

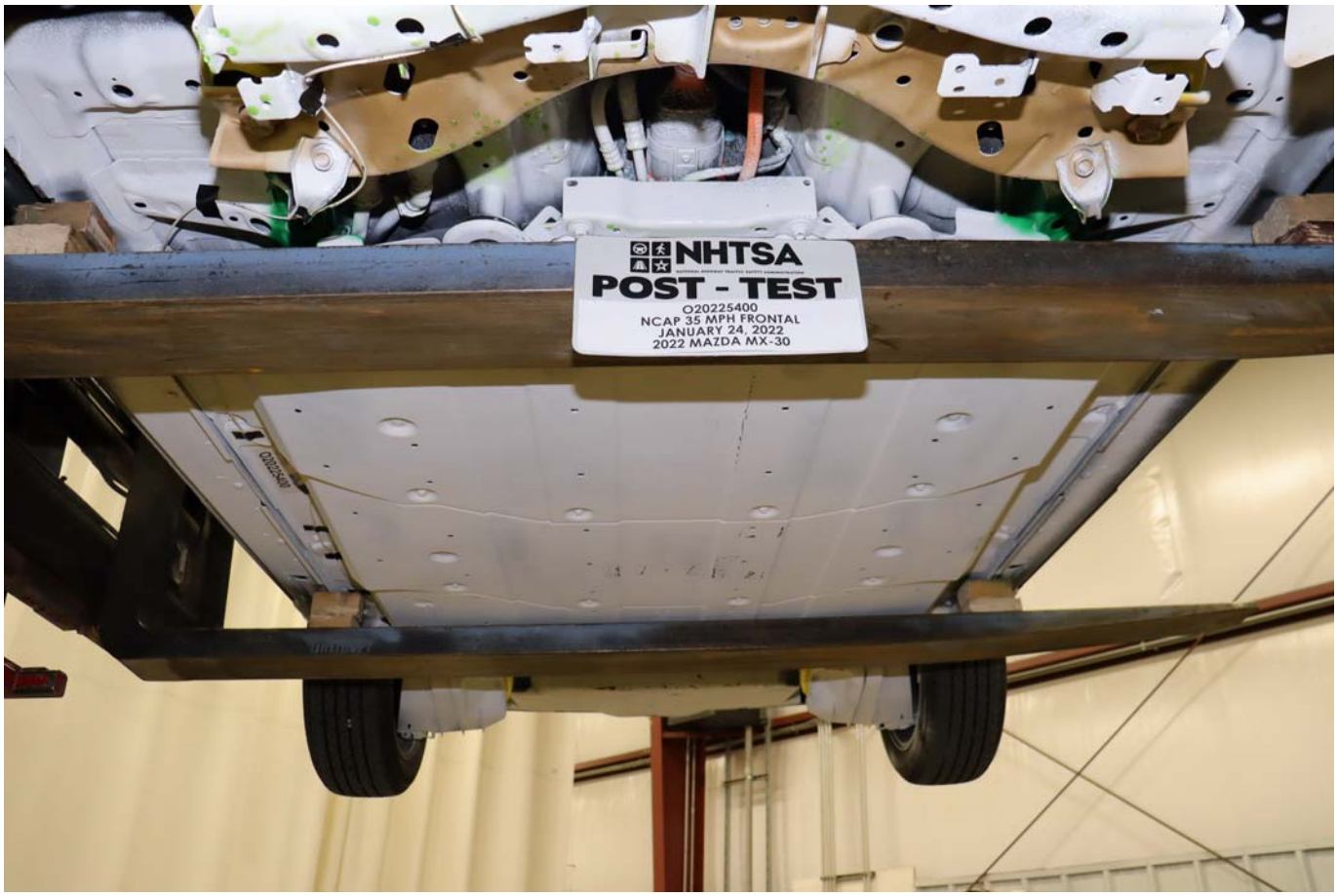


Photo No. 305-10 - Post-Impact Front View of Propulsion Battery

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

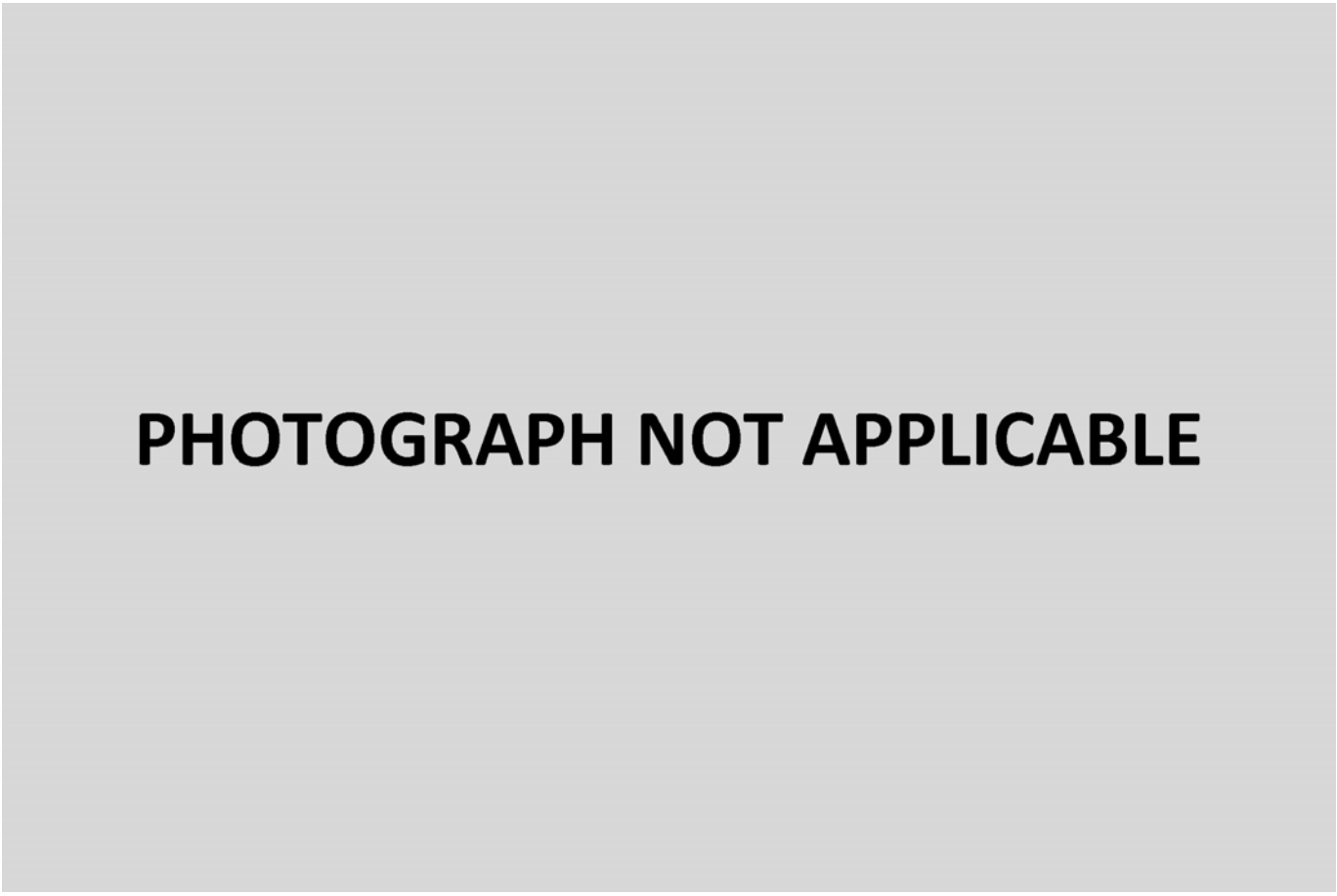


Photo No. 305-12 - Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

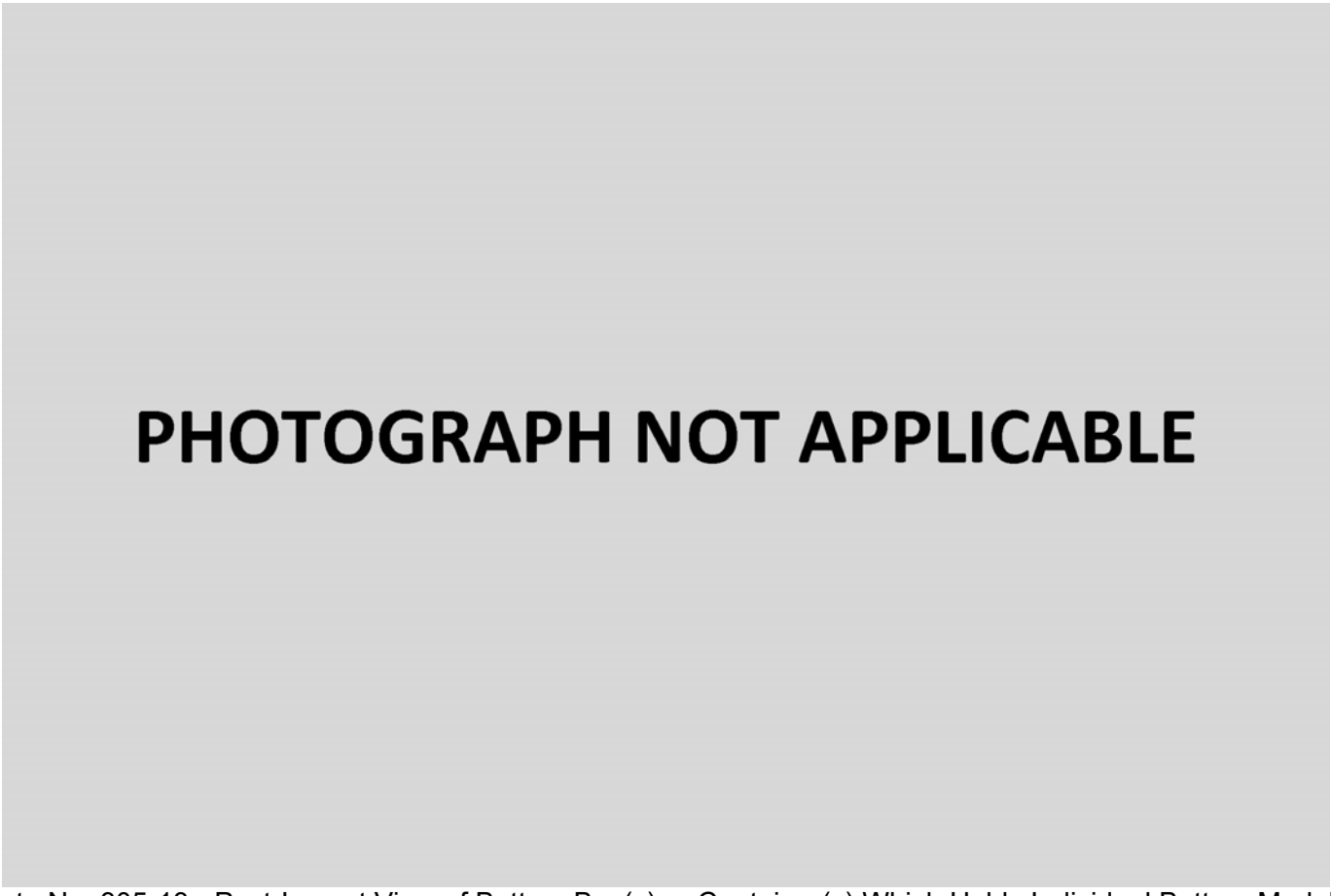


Photo No. 305-13 - Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

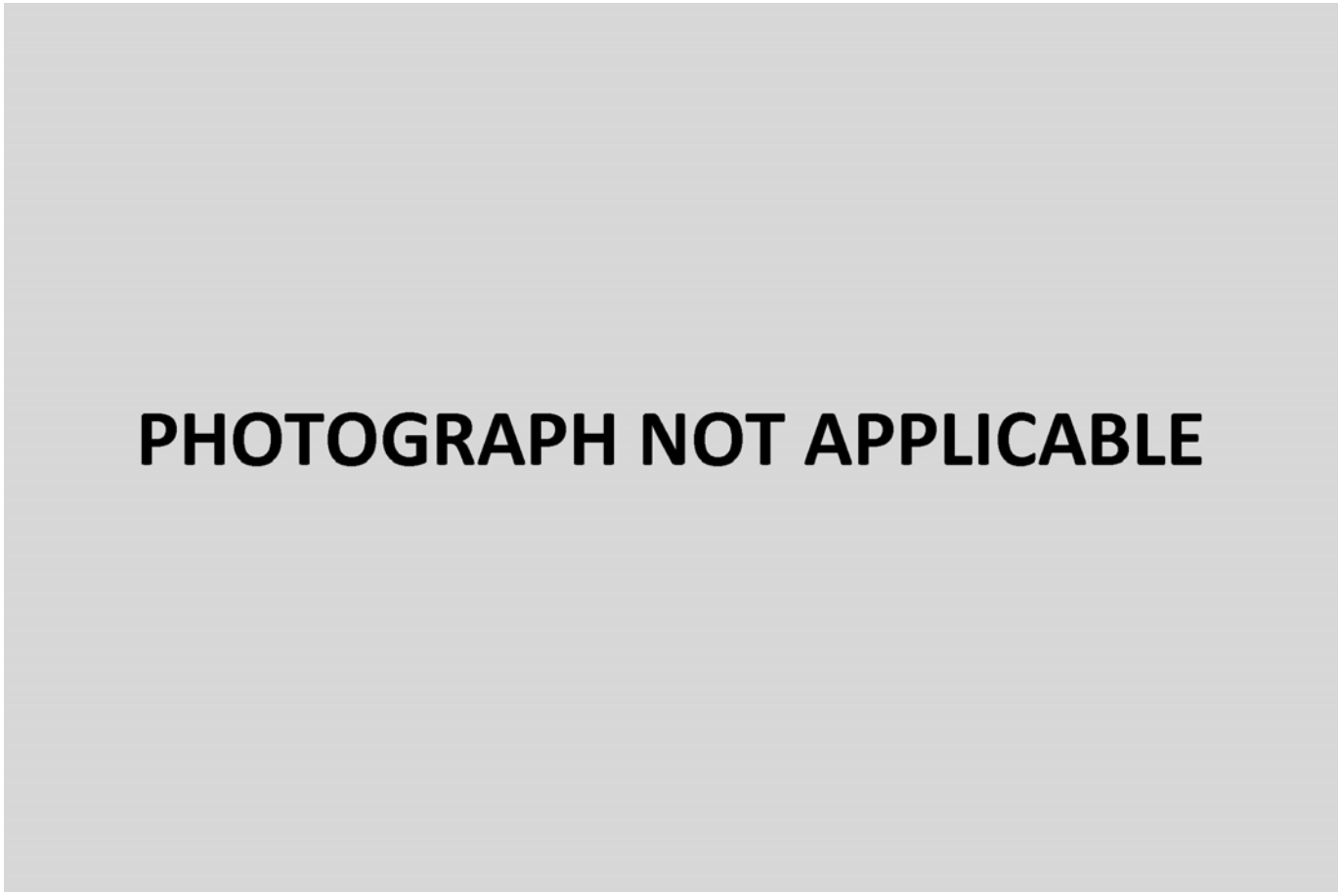


Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

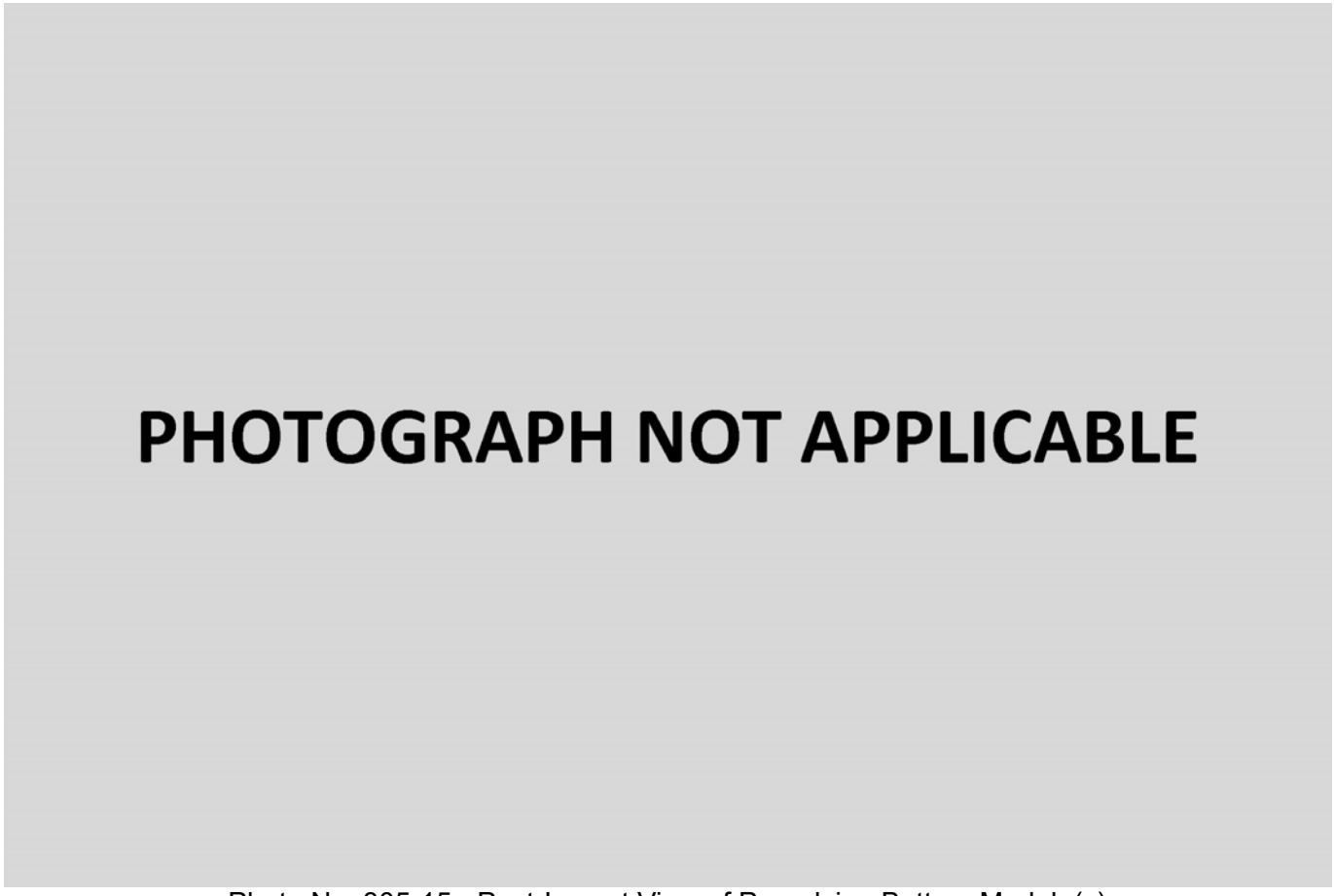


Photo No. 305-15 - Post-Impact View of Propulsion Battery Module(s)

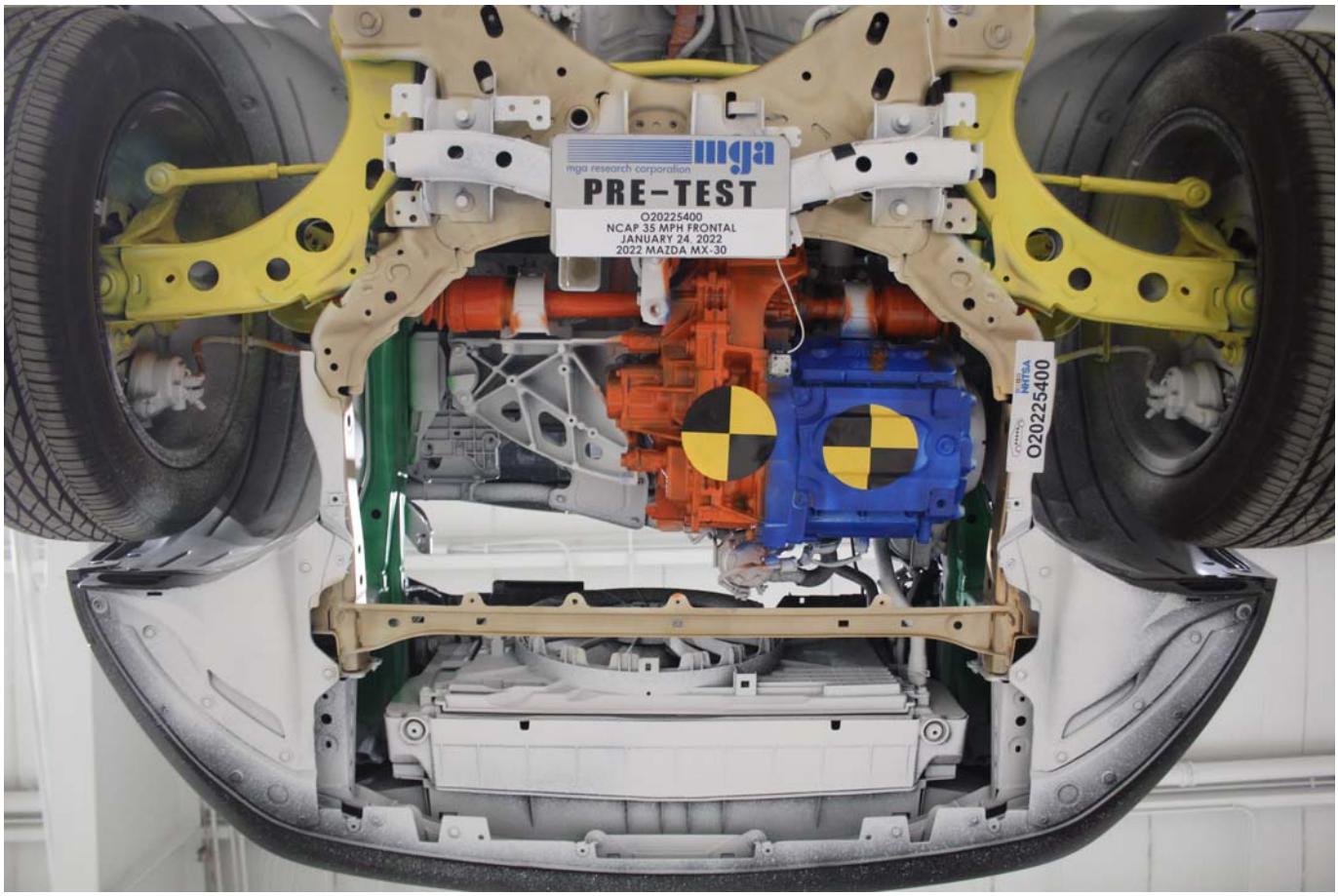


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

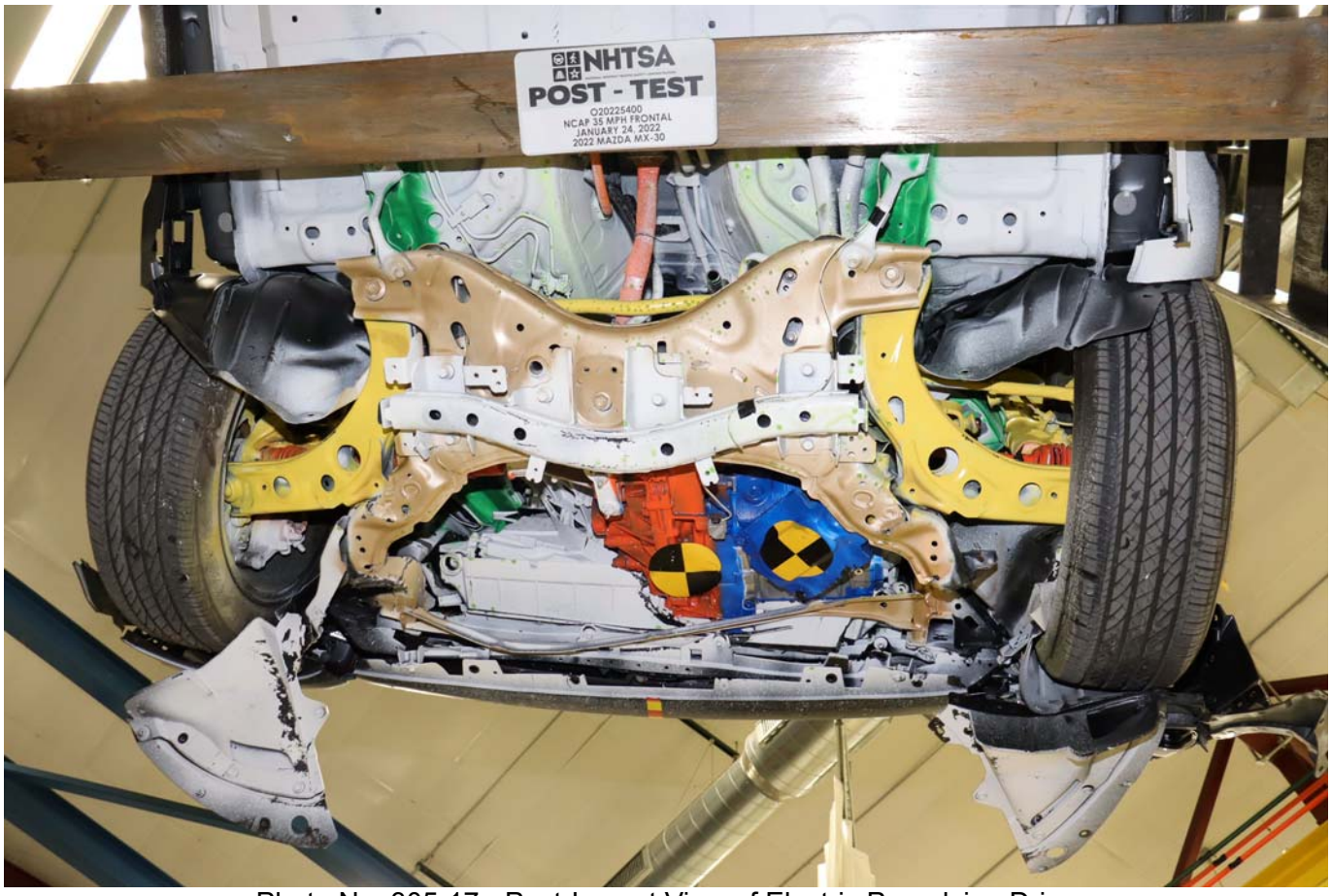


Photo No. 305-17 - Post-Impact View of Electric Propulsion Drive

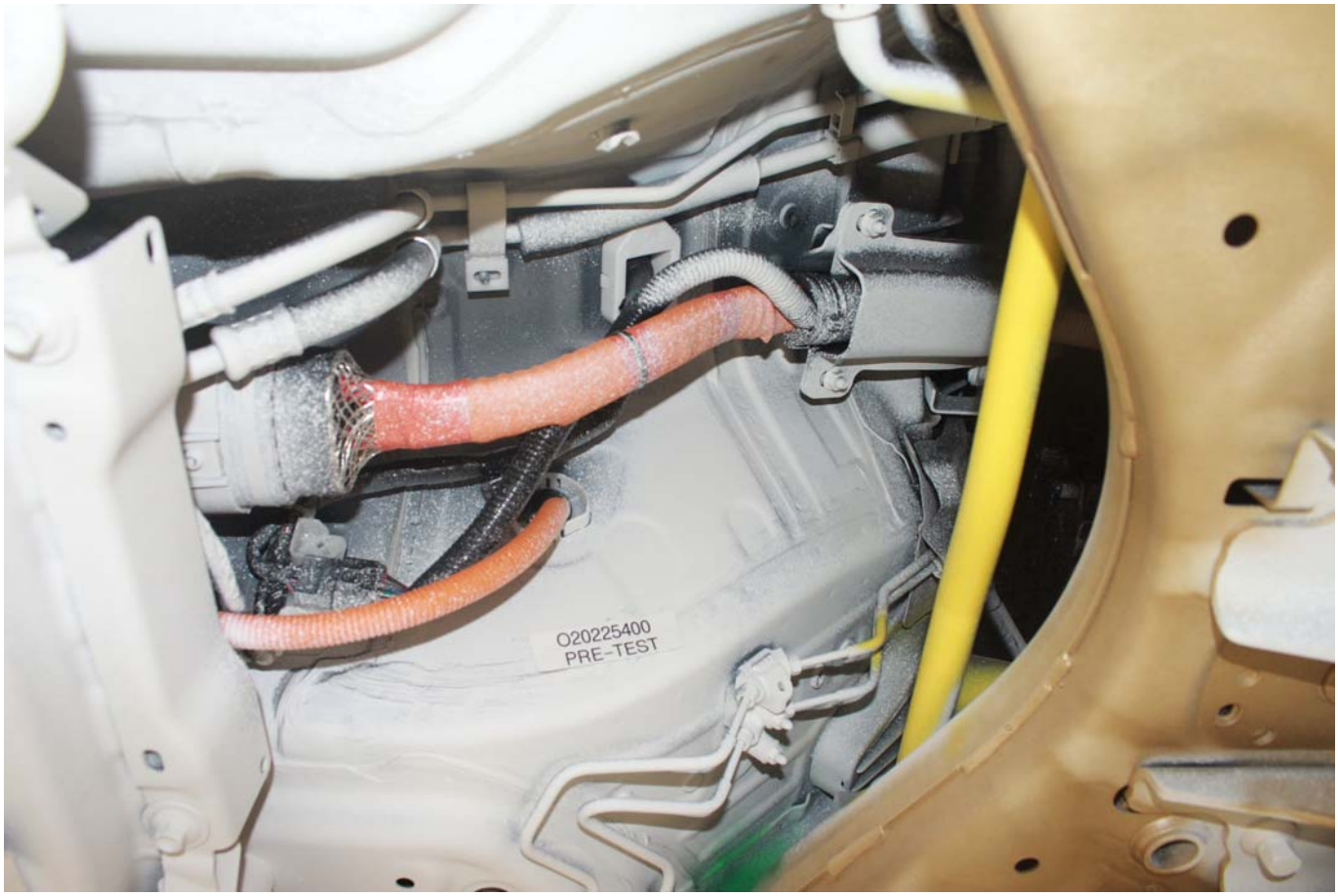


Photo No. 305-18 - Pre-Impact View of High Voltage Interconnect(s)

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

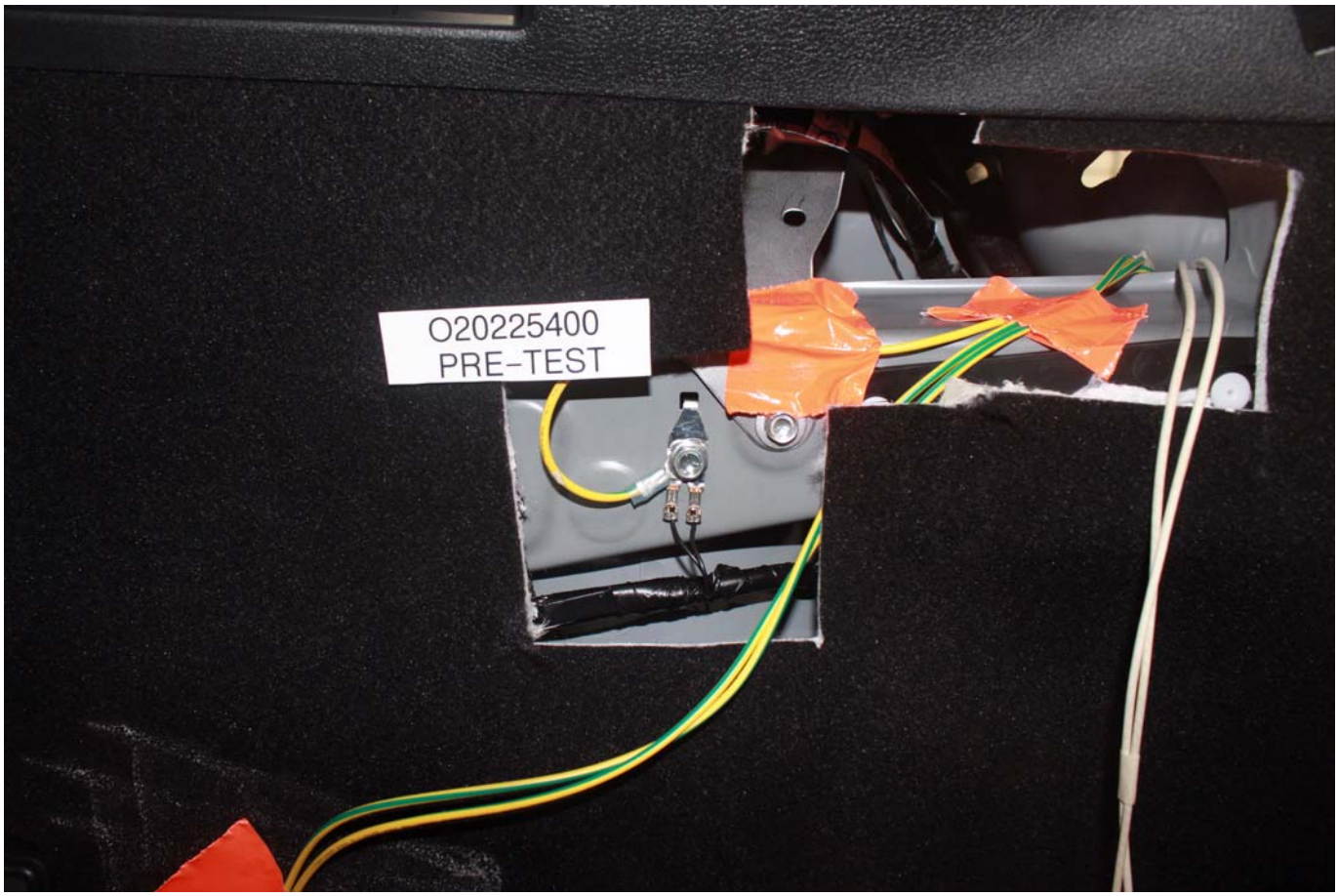


Photo No. 305-21 - Pre-Impact View of Ground Lead Attached

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

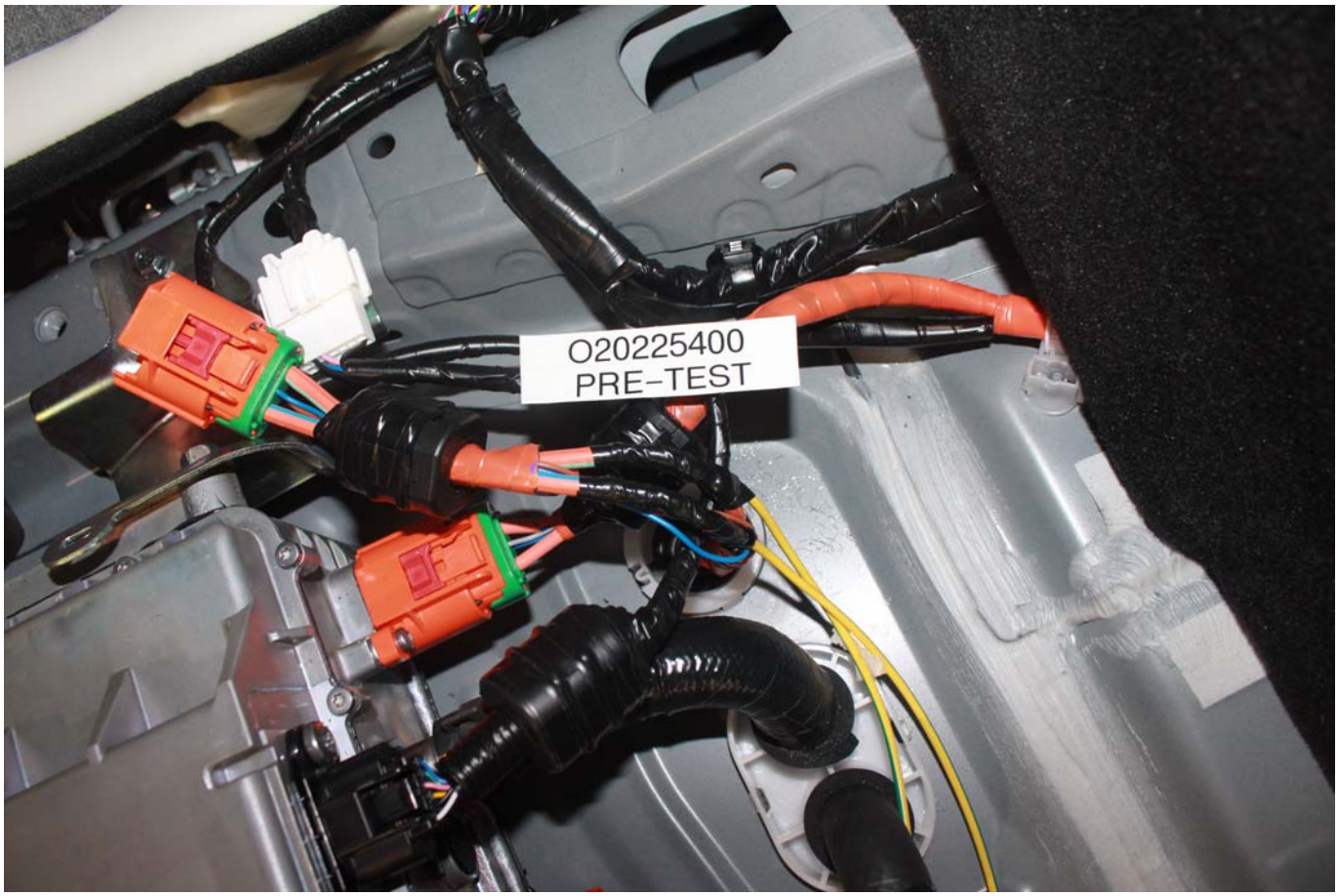


Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached

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

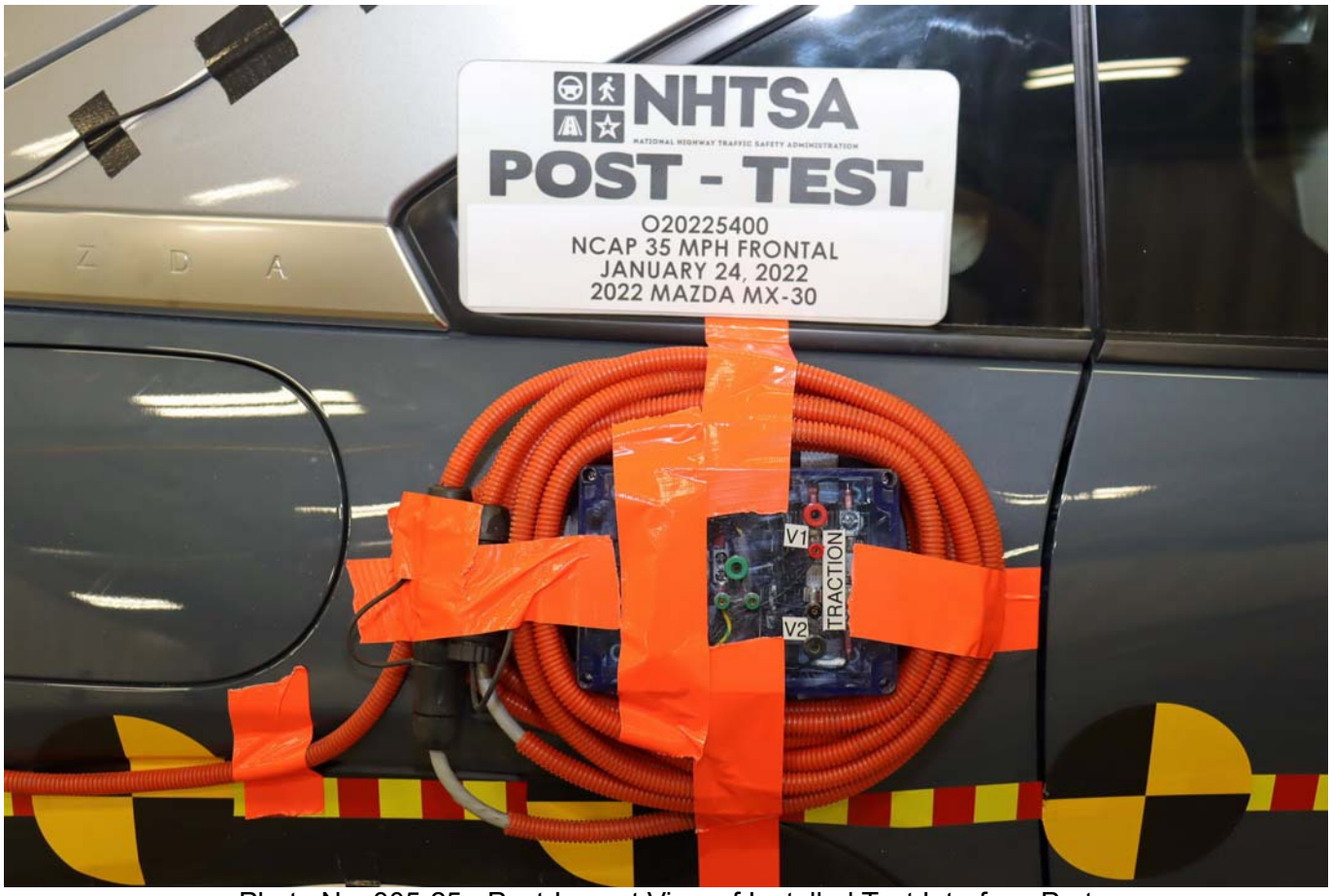


Photo No. 305-25 - Post-Impact View of Installed Test Interface Port

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

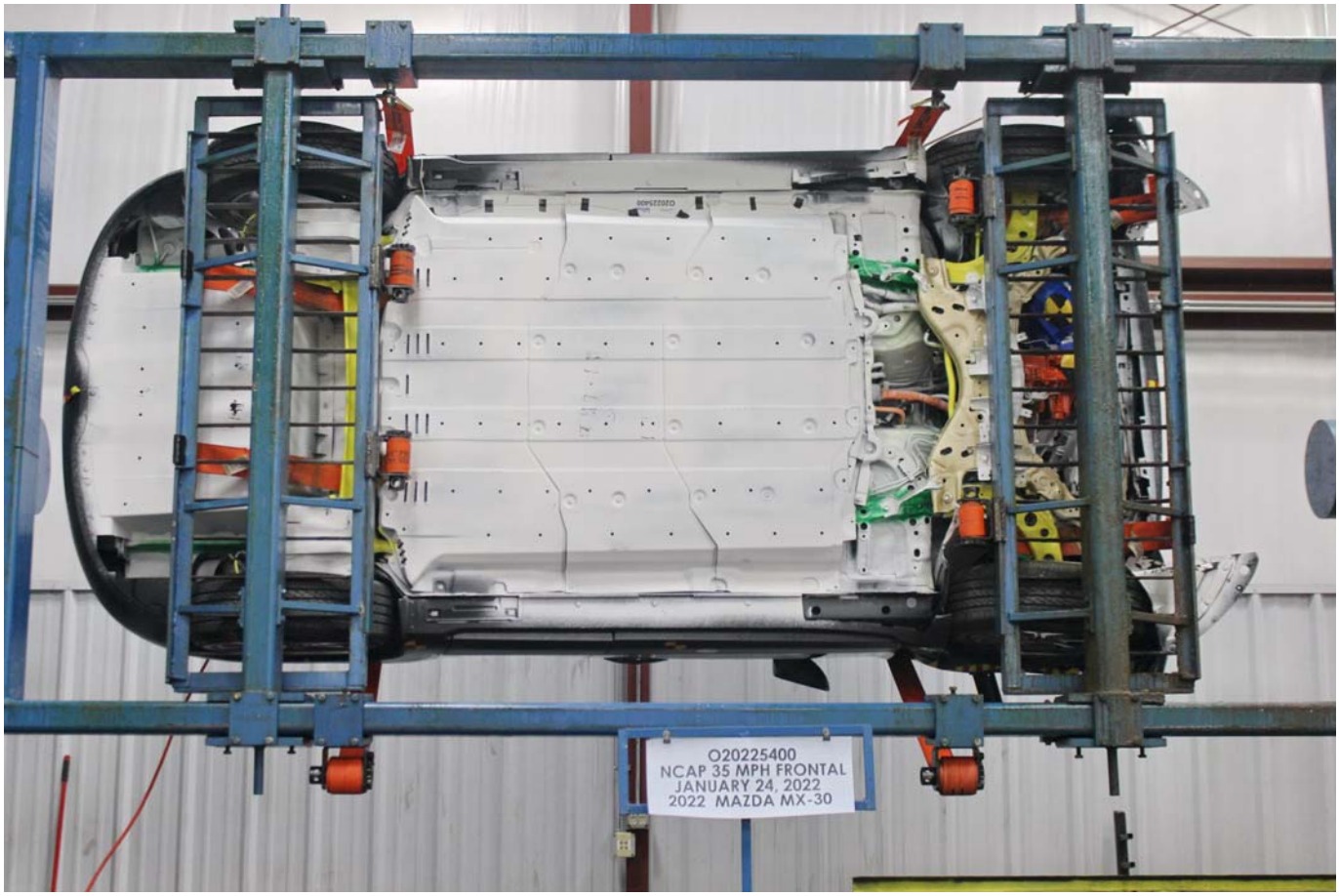


Photo No. 305-30 - FMVSS No. 305 Static Rollover at 270 Degrees

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

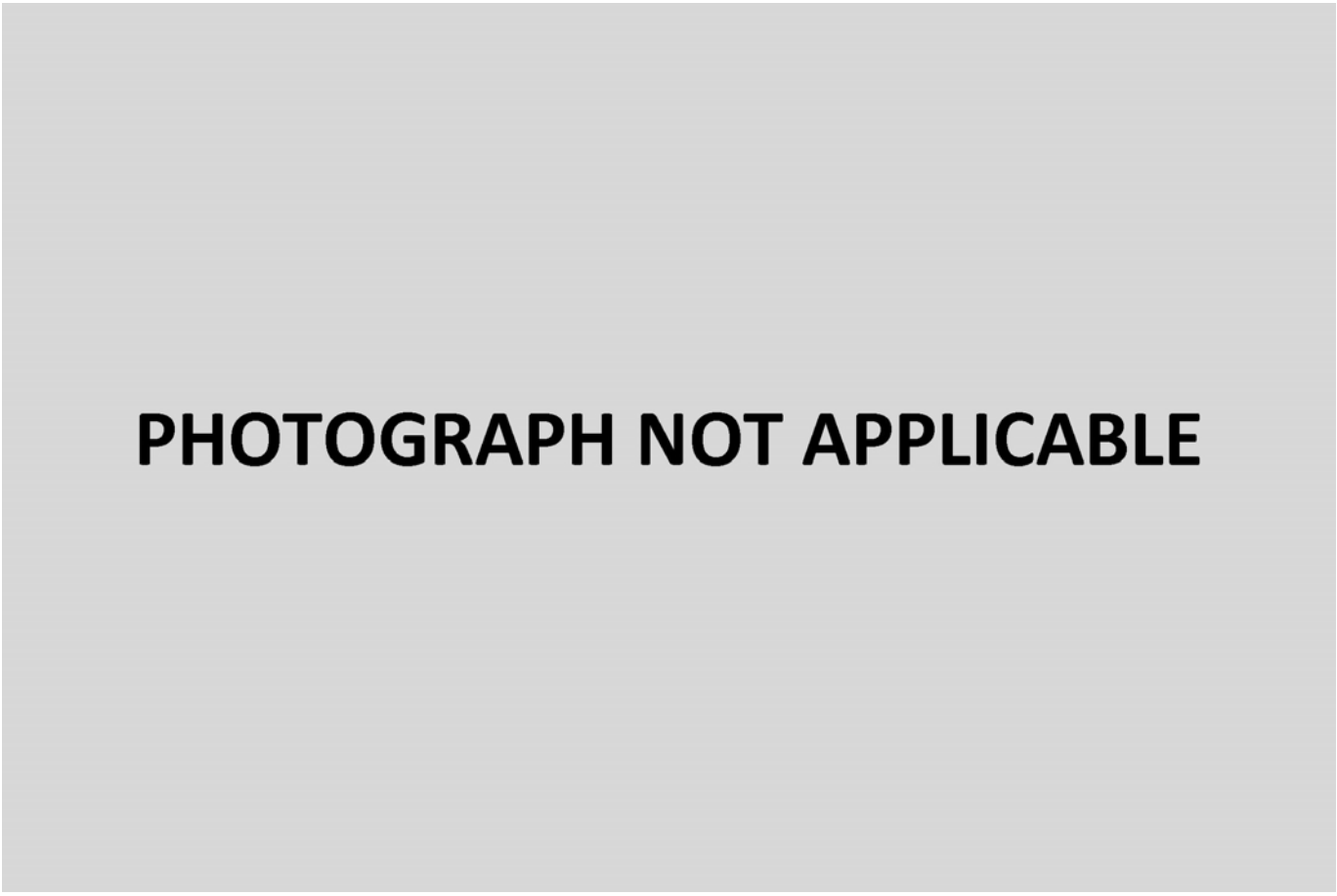


Photo No. 305-34 - Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

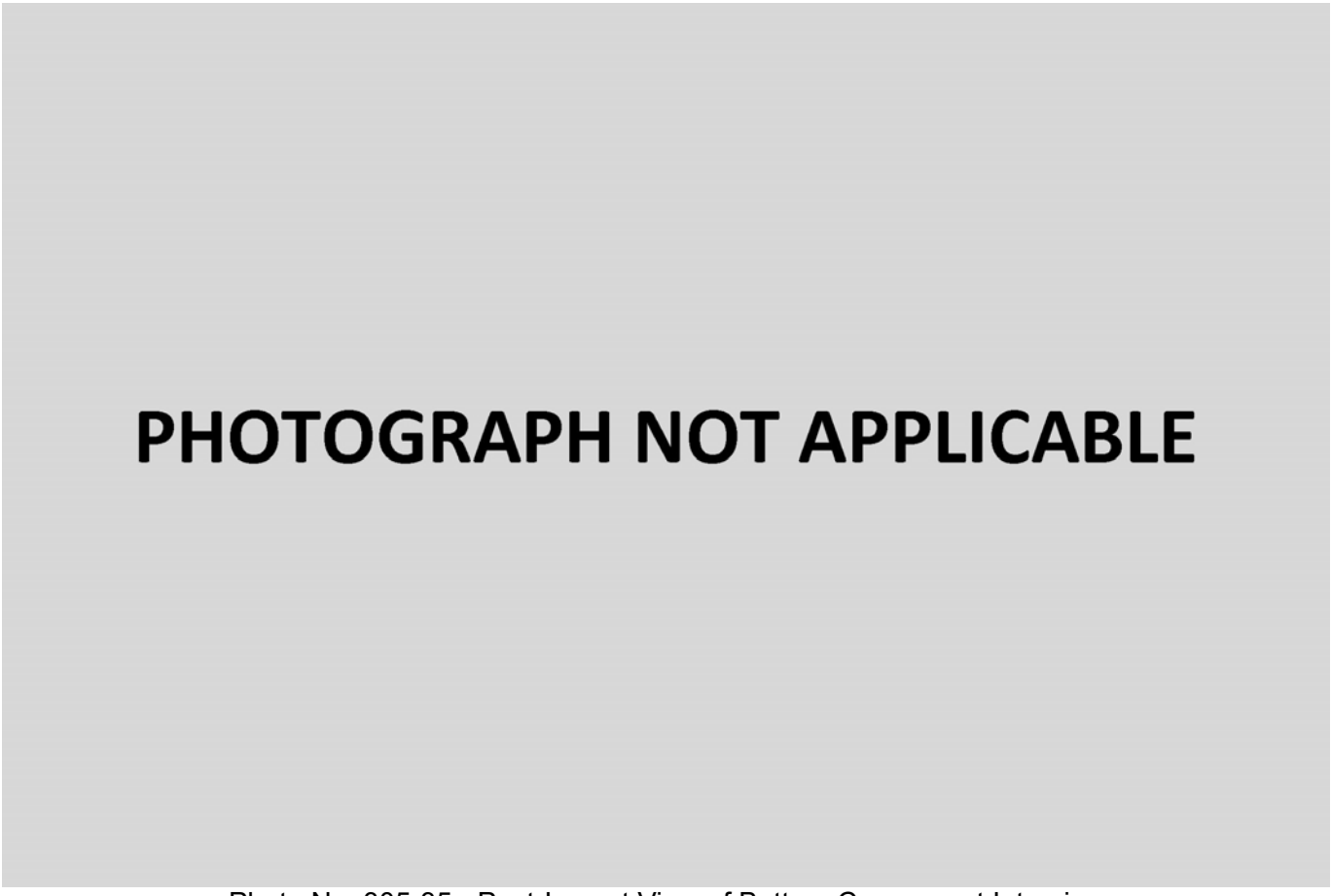


Photo No. 305-35 - Post-Impact View of Battery Component Intrusion

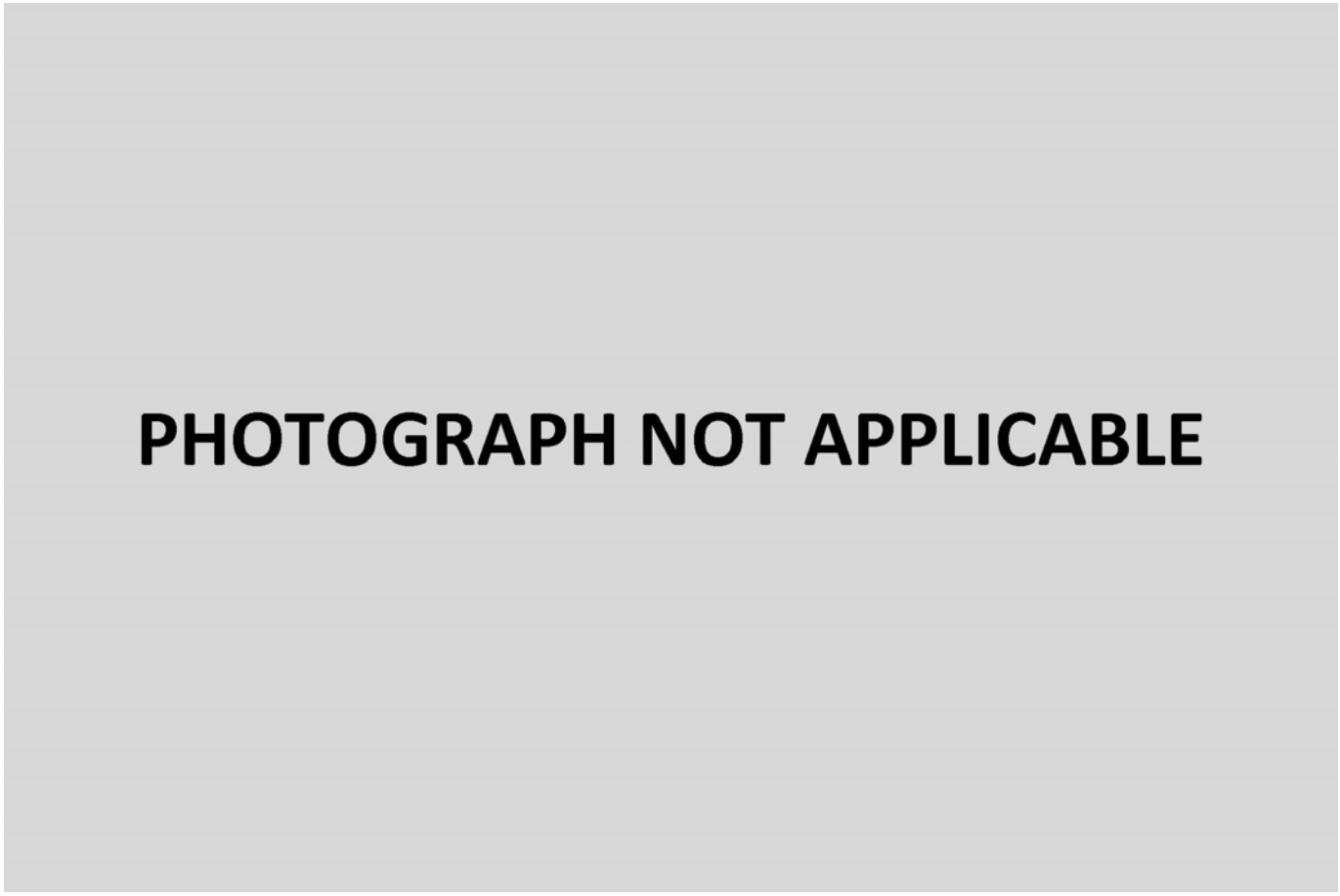


Photo No. 305-36 - Post-Impact View of Battery Module Movement or Retention Loss

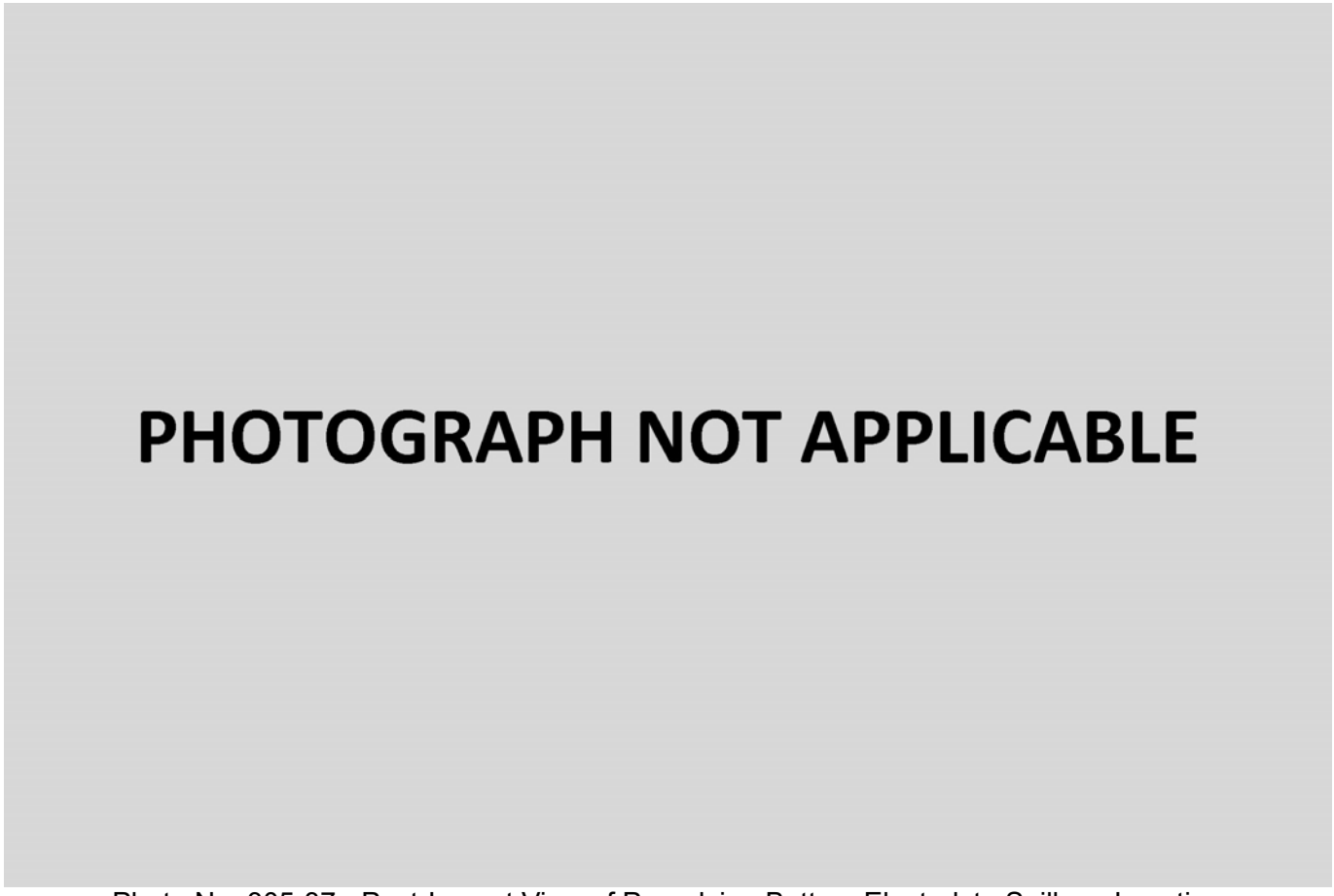


Photo No. 305-37 - Post-Impact View of Propulsion Battery Electrolyte Spillage Location

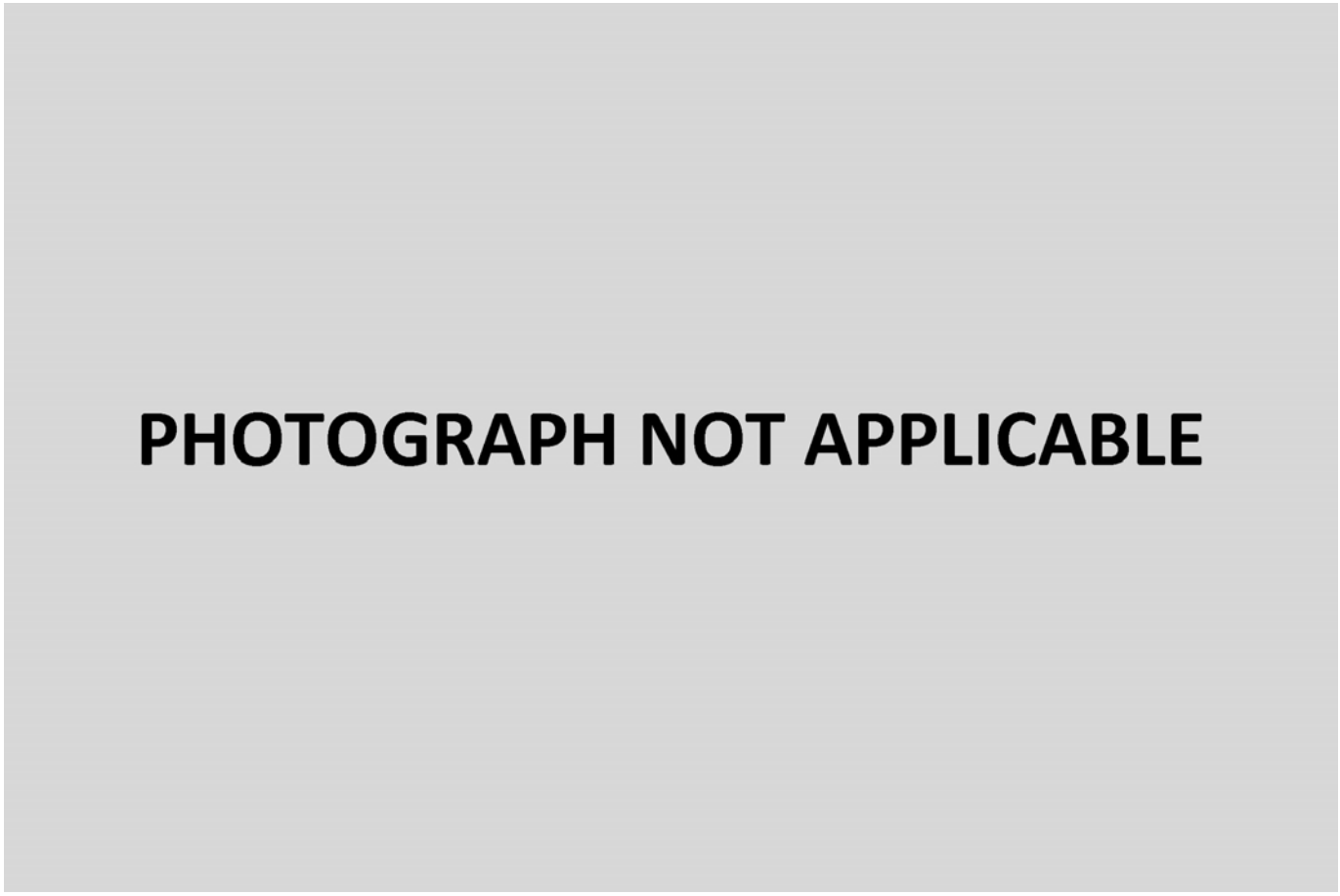


Photo No. 305-38 - Post-Test View of Propulsion Battery Electrolyte Spillage Location

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Head Angular Velocity X

Driver Head Angular Velocity Y

Driver Head Angular Velocity Z

Driver Upper Neck Force Y

Driver Upper Neck Moment X

Driver Upper Neck Moment Z

Driver Chest X Redundant

Driver Chest Y Redundant

Driver Chest Z Redundant

Driver Pelvis X

Driver Pelvis Y

Driver Pelvis Z

Driver Left Femur Redundant

Driver Right Femur Redundant

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

Driver Left Upper Tibia Force Z

Driver Left Lower Tibia Moment X

Driver Left Lower Tibia Moment Y

Driver Left Lower Tibia Force Z

Driver Right Upper Tibia Moment X

Driver Right Upper Tibia Moment Y

Driver Right Upper Tibia Force Z

Driver Right Lower Tibia Moment X

Driver Right Lower Tibia Moment Y

Driver Right Lower Tibia Force Z

Driver Left Foot Fore Z

Driver Left Foot Aft X

Driver Left Foot Aft Z

Driver Right Foot Fore Z

Driver Right Foot Aft X

Driver Right Foot Aft Z

Driver Lap Belt Force

Driver Shoulder Belt Force

Passenger Head X Redundant

Passenger Head Y Redundant

Passenger Head Z Redundant

Passenger Head Angular Velocity X

Passenger Head Angular Velocity Y

Passenger Head Angular Velocity Z

Passenger Upper Neck Force Y

Passenger Upper Neck Moment X

Passenger Upper Neck Moment Z

Passenger Chest X Redundant

Passenger Chest Y Redundant

Passenger Chest Z Redundant

Passenger Pelvis X

Passenger Pelvis Y

Passenger Pelvis Z

Passenger Left Femur Redundant

Passenger Right Femur Redundant

Passenger Left Upper Tibia Moment X

Passenger Left Upper Tibia Moment Y

Passenger Left Upper Tibia Force Z

Passenger Left Lower Tibia Moment X

Passenger Left Lower Tibia Moment Y

Passenger Left Lower Tibia Force Z

Passenger Right Upper Tibia Moment X

Passenger Right Upper Tibia Moment Y

Passenger Right Upper Tibia Force Z

Passenger Right Lower Tibia Moment X

Passenger Right Lower Tibia Moment Y

Passenger Right Lower Tibia Force Z

Passenger Left Foot Fore Z

Passenger Left Foot Aft X

Passenger Left Foot Aft Z

Passenger Right Foot Fore Z

Passenger Right Foot Aft X

Passenger Right Foot Aft Z

Passenger Lap Belt Force

Passenger Shoulder Belt Force

Left Rear Seat Crossmember X

Right Rear Seat Crossmember X

Vehicle Engine Top X

Vehicle Engine Bottom X

Left Rear Seat Crossmember Z

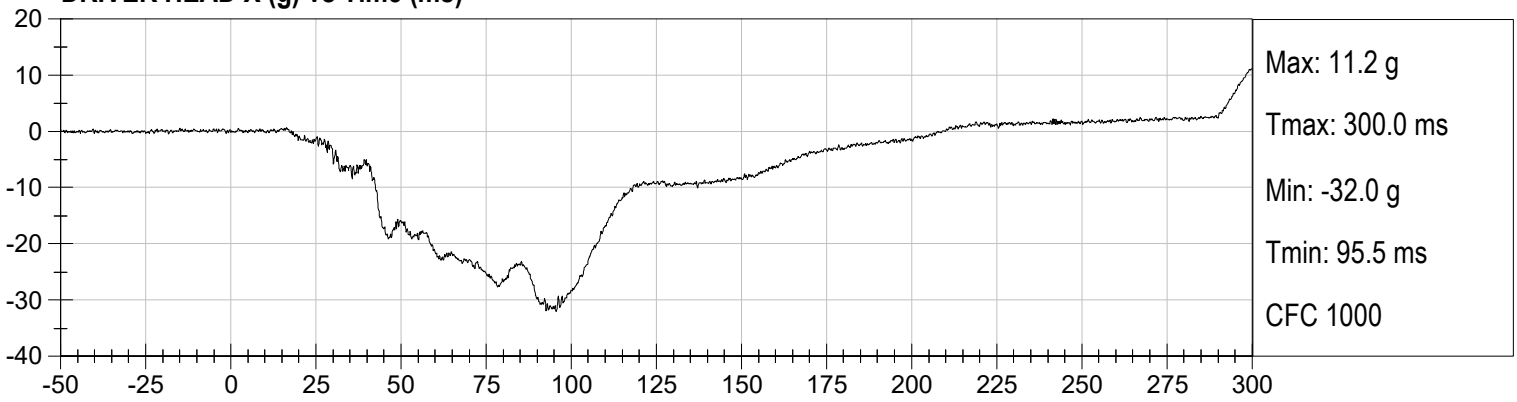
Right Rear Seat Crossmember Z

Left Rear Seat Crossmember Xr

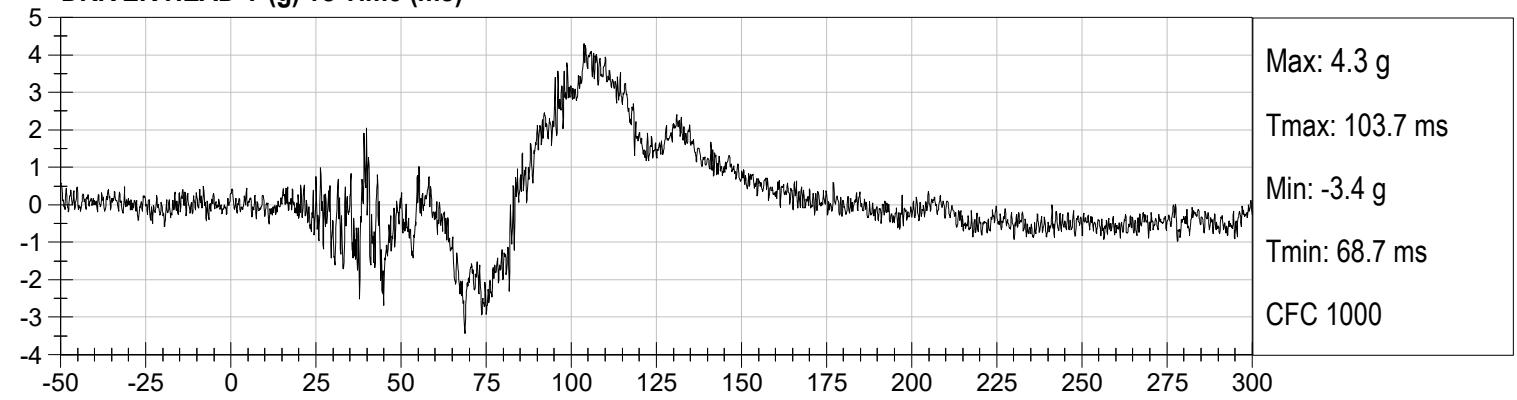
Right Rear Seat Crossmember Xr

Advanced Research Load Cell Barrier – 528 channels

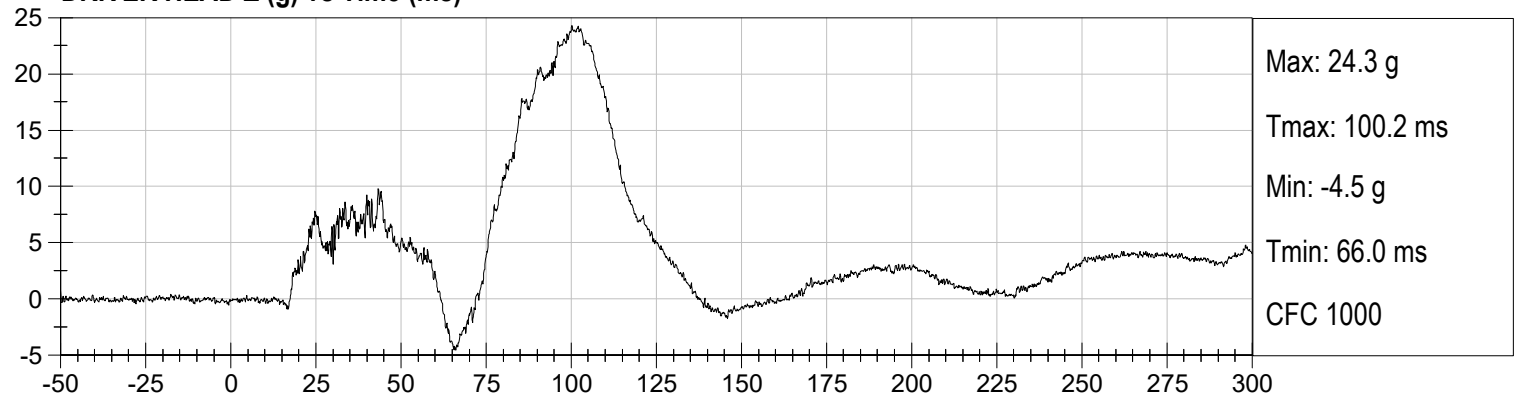
DRIVER HEAD X (g) vs Time (ms)



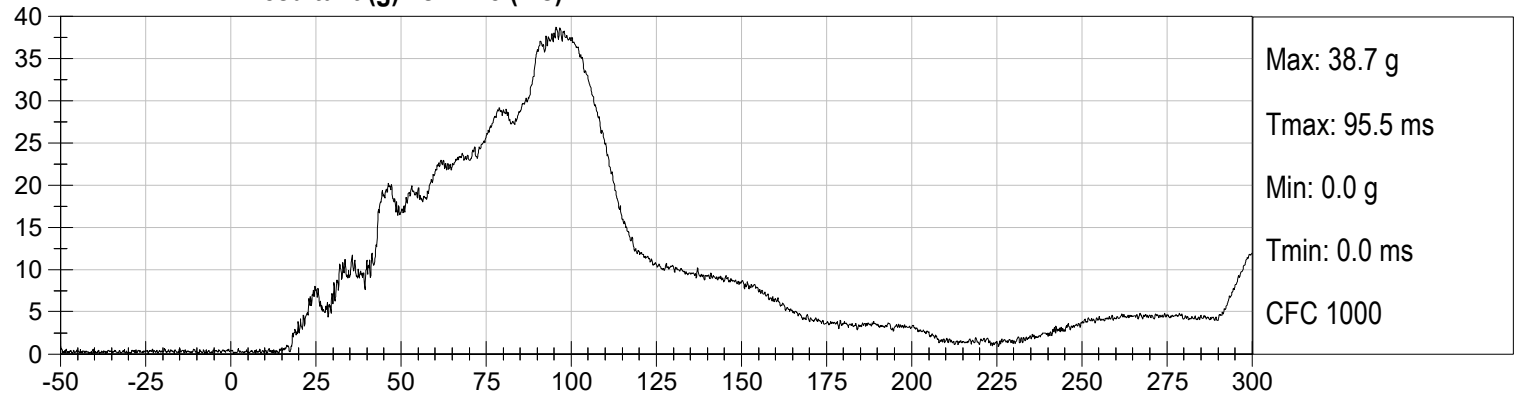
DRIVER HEAD Y (g) vs Time (ms)



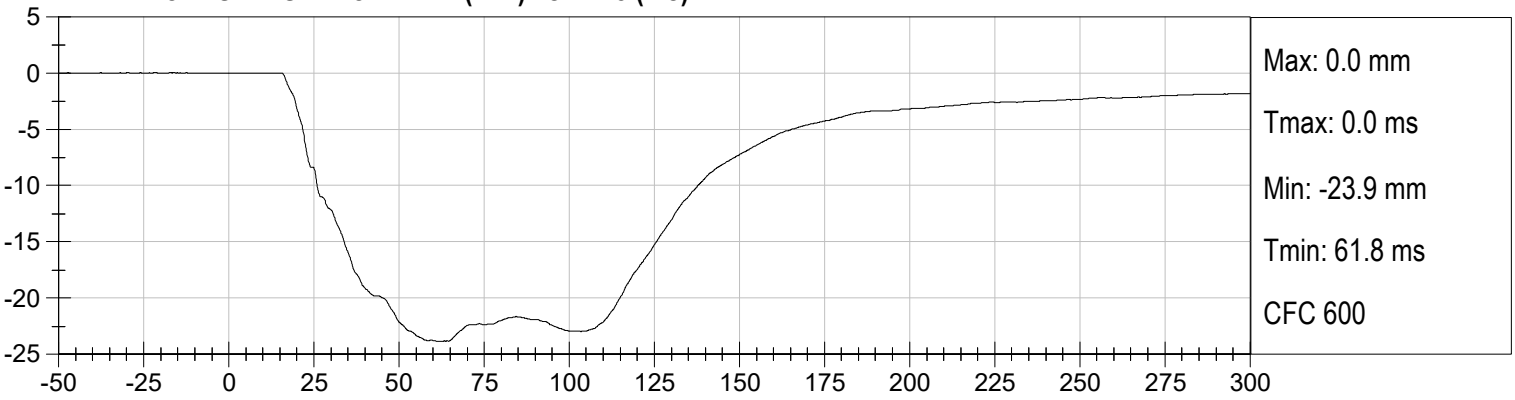
DRIVER HEAD Z (g) vs Time (ms)



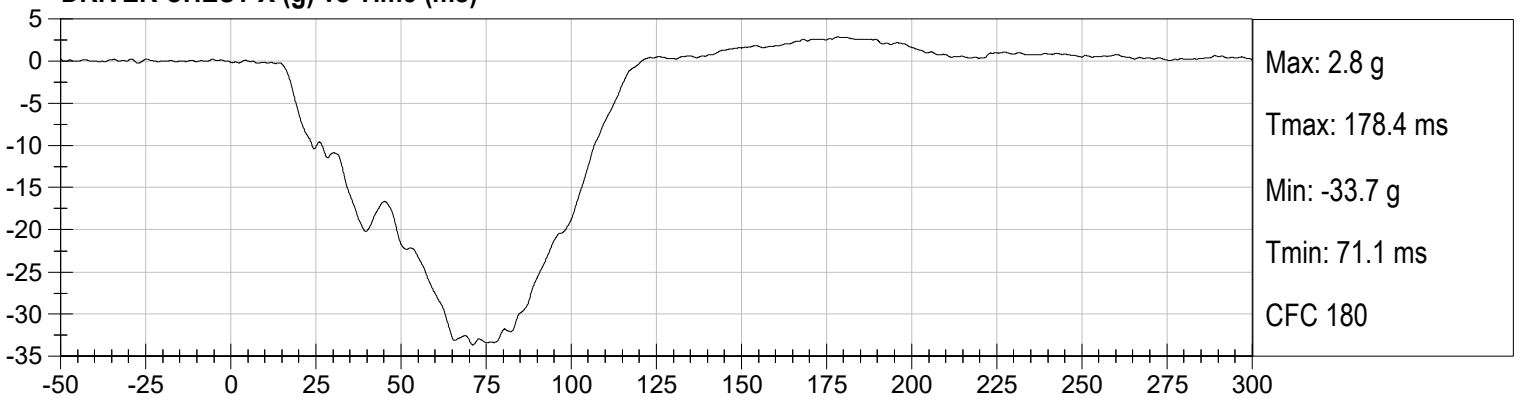
DRIVER HEAD Resultant (g) vs Time (ms)



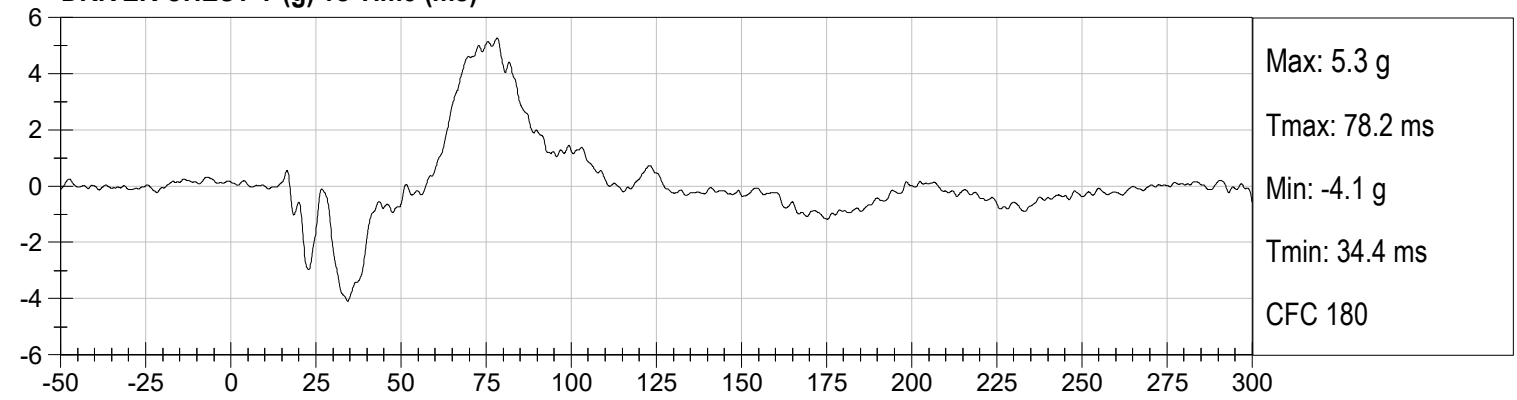
DRIVER CHEST DISPLACEMENT (mm) vs Time (ms)



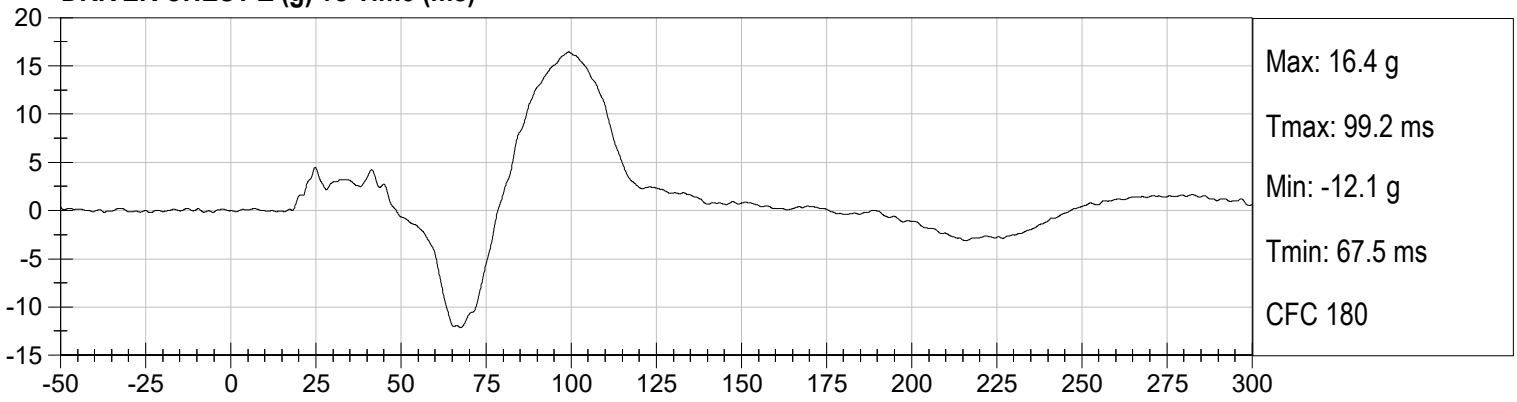
DRIVER CHEST X (g) vs Time (ms)



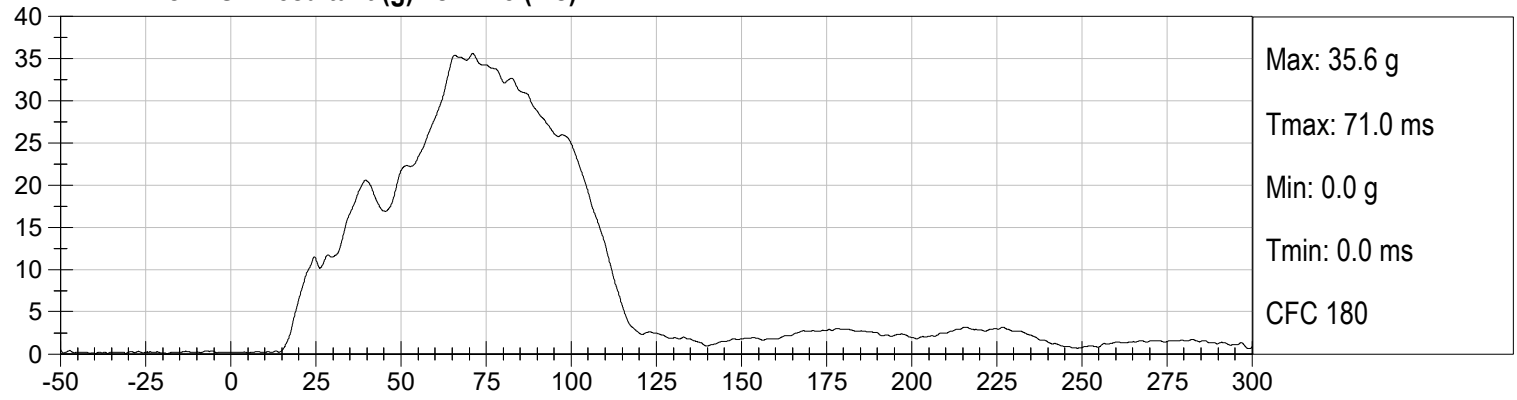
DRIVER CHEST Y (g) vs Time (ms)



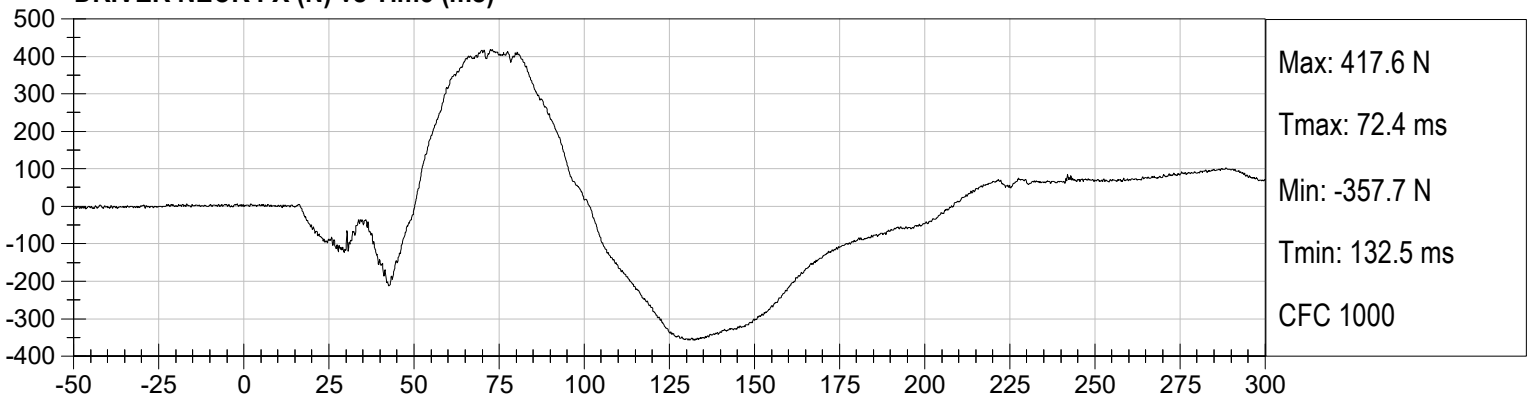
DRIVER CHEST Z (g) vs Time (ms)



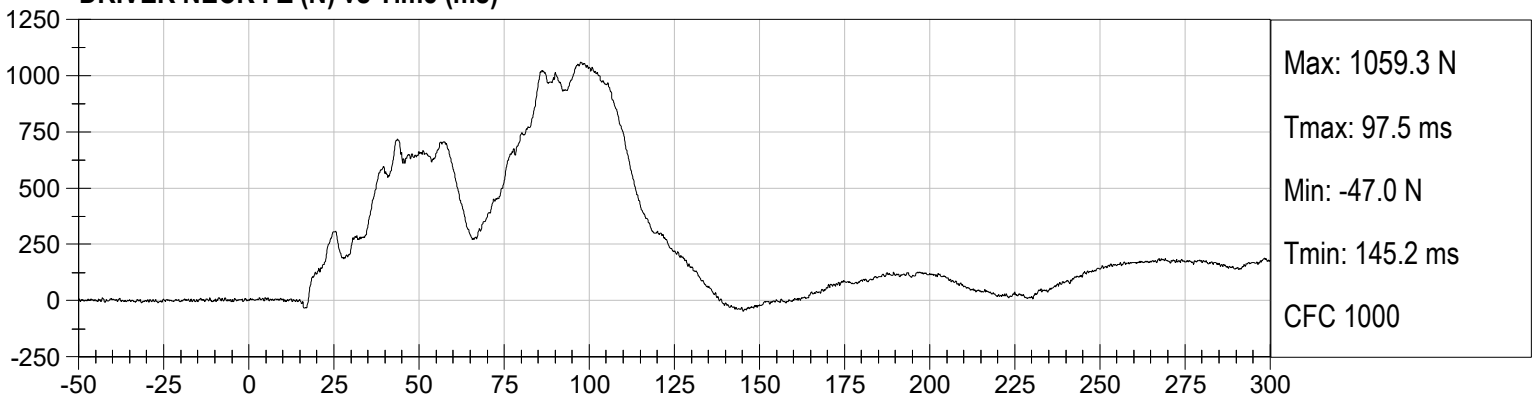
DRIVER CHEST Resultant (g) vs Time (ms)



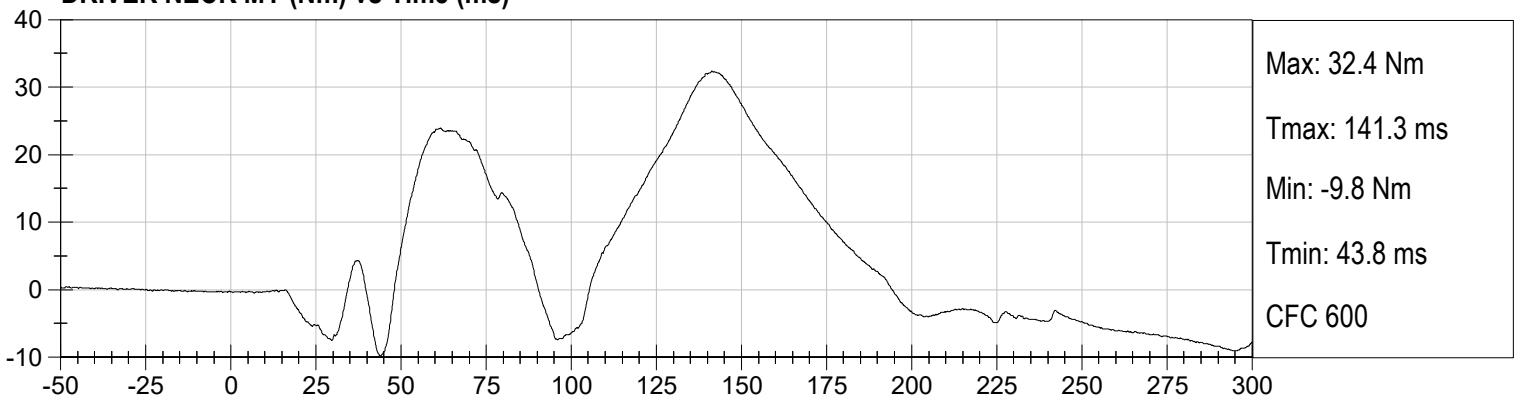
DRIVER NECK FX (N) vs Time (ms)



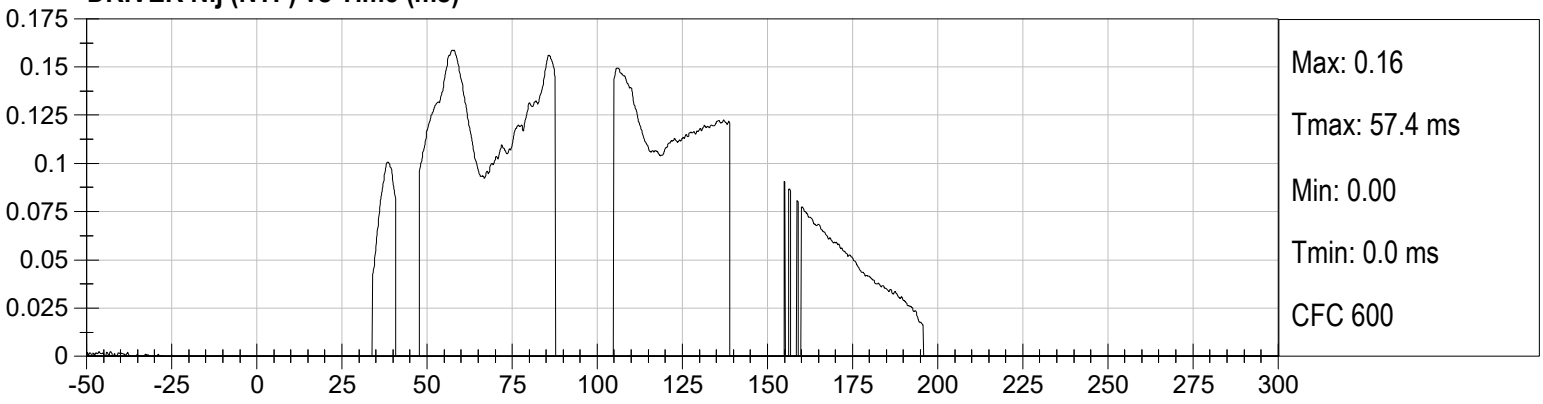
DRIVER NECK FZ (N) vs Time (ms)



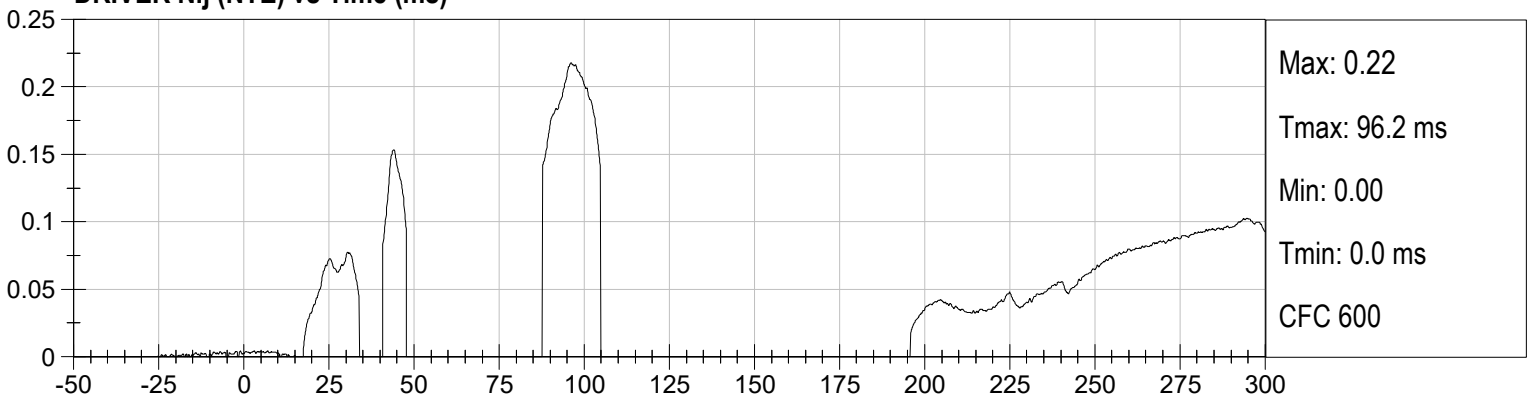
DRIVER NECK MY (Nm) vs Time (ms)



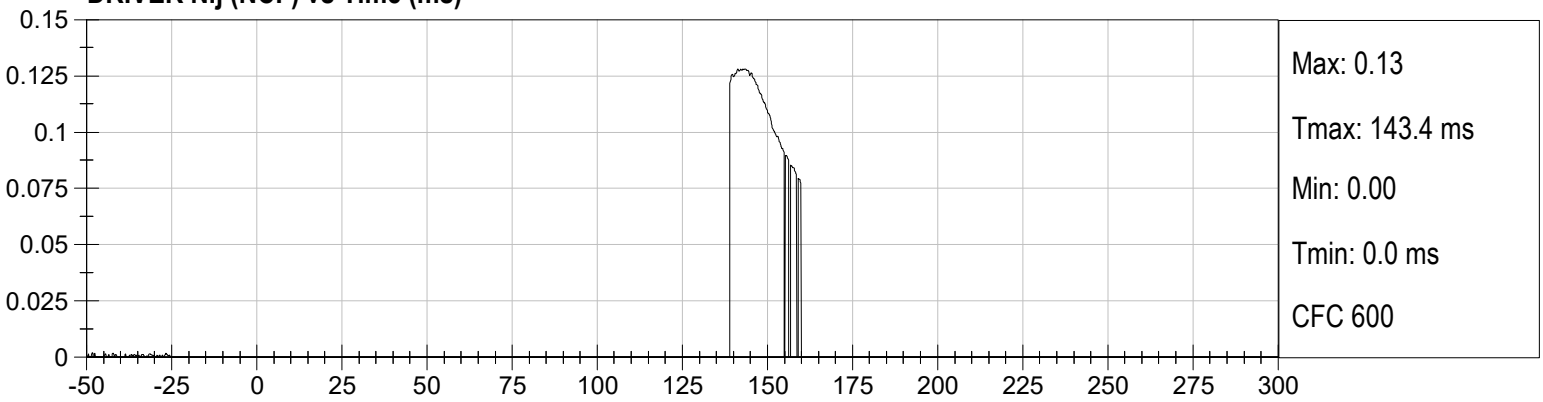
DRIVER Nij (NTF) vs Time (ms)



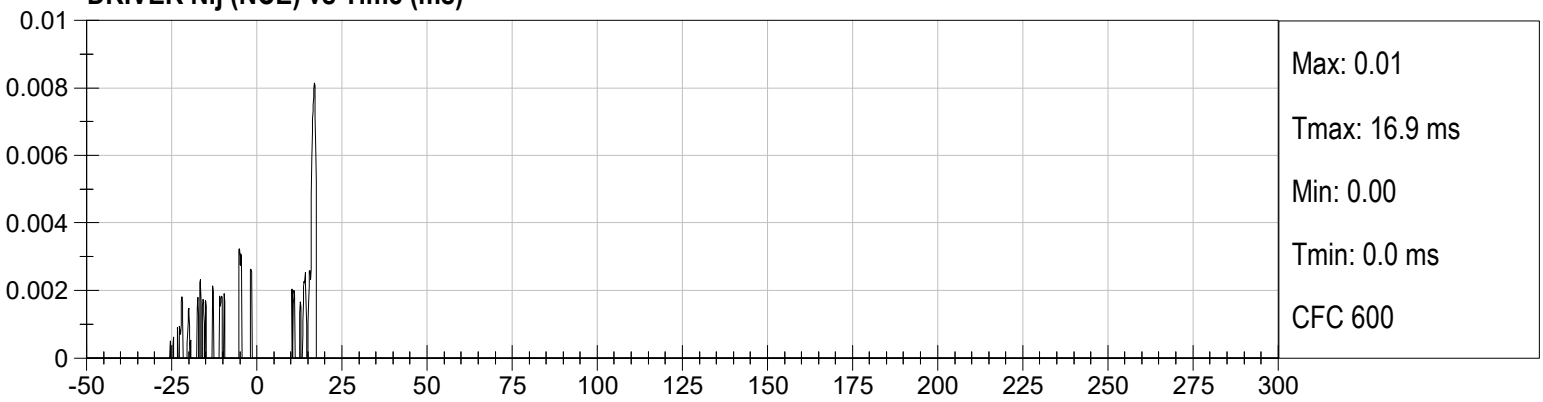
DRIVER Nij (NTE) vs Time (ms)



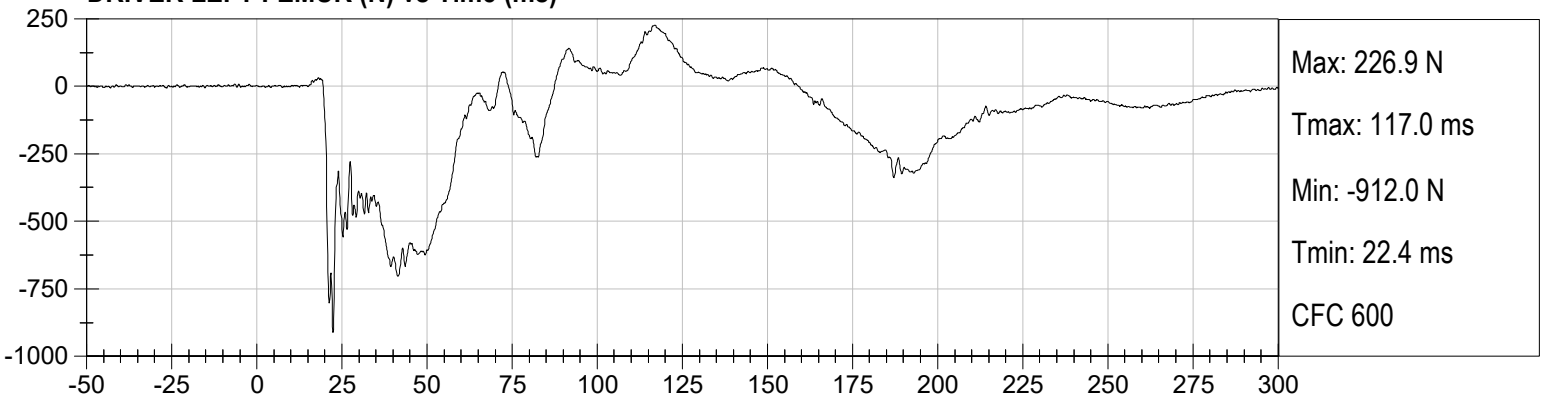
DRIVER Nij (NCF) vs Time (ms)



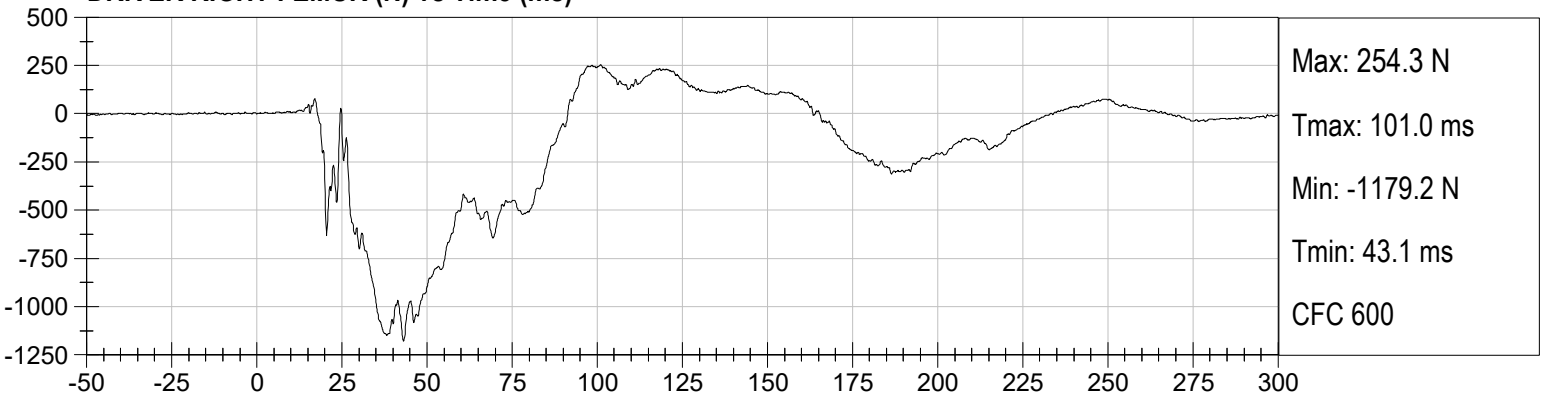
DRIVER Nij (NCE) vs Time (ms)



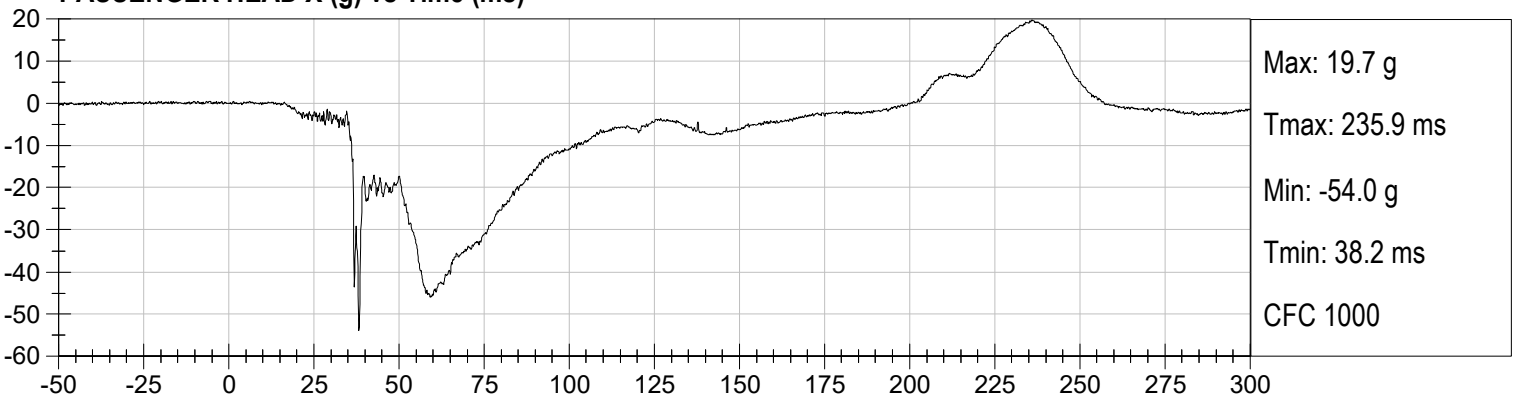
DRIVER LEFT FEMUR (N) vs Time (ms)



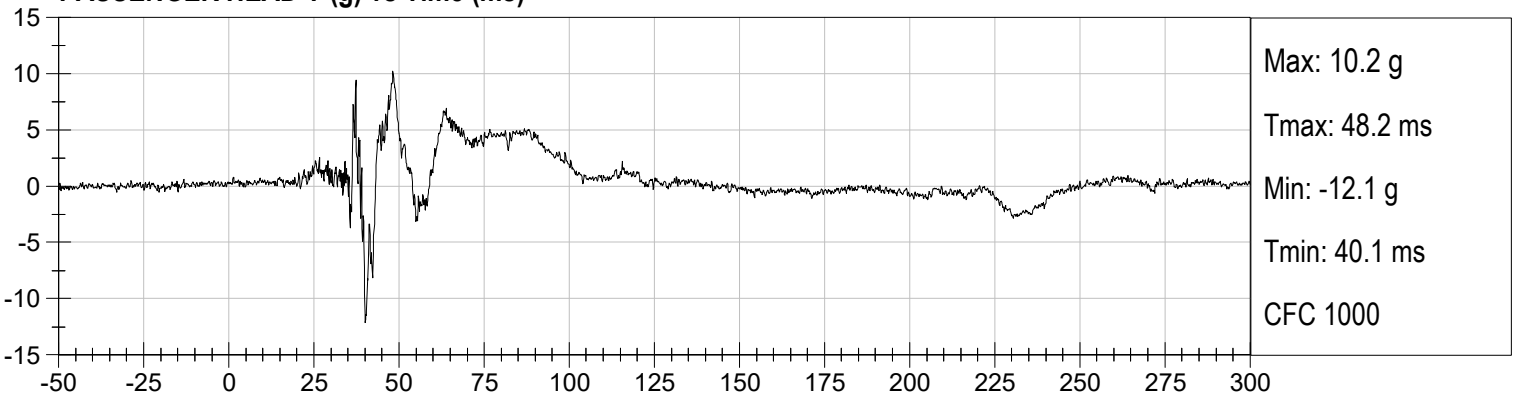
DRIVER RIGHT FEMUR (N) vs Time (ms)



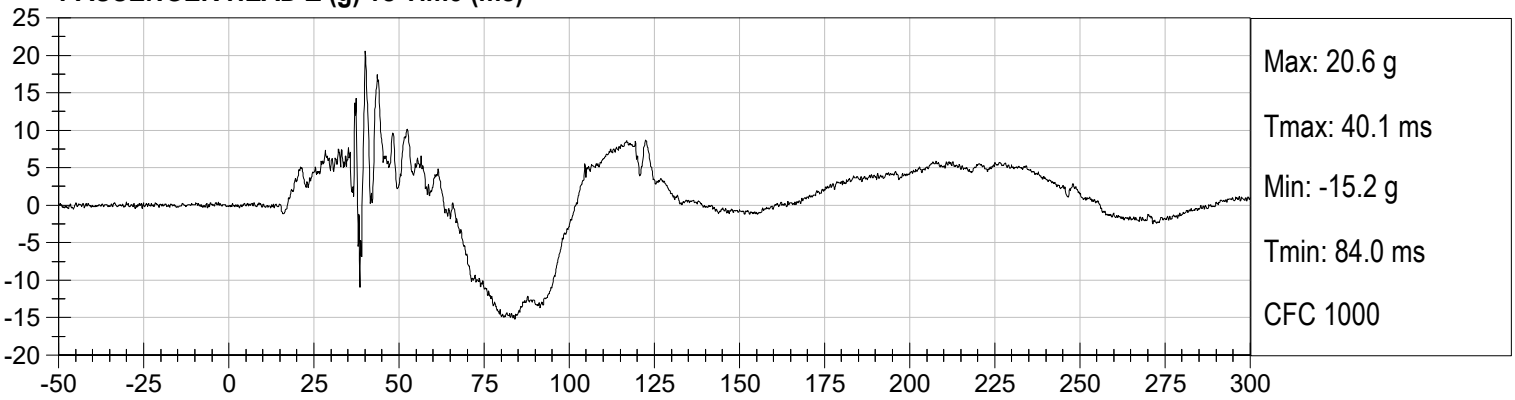
PASSENGER HEAD X (g) vs Time (ms)



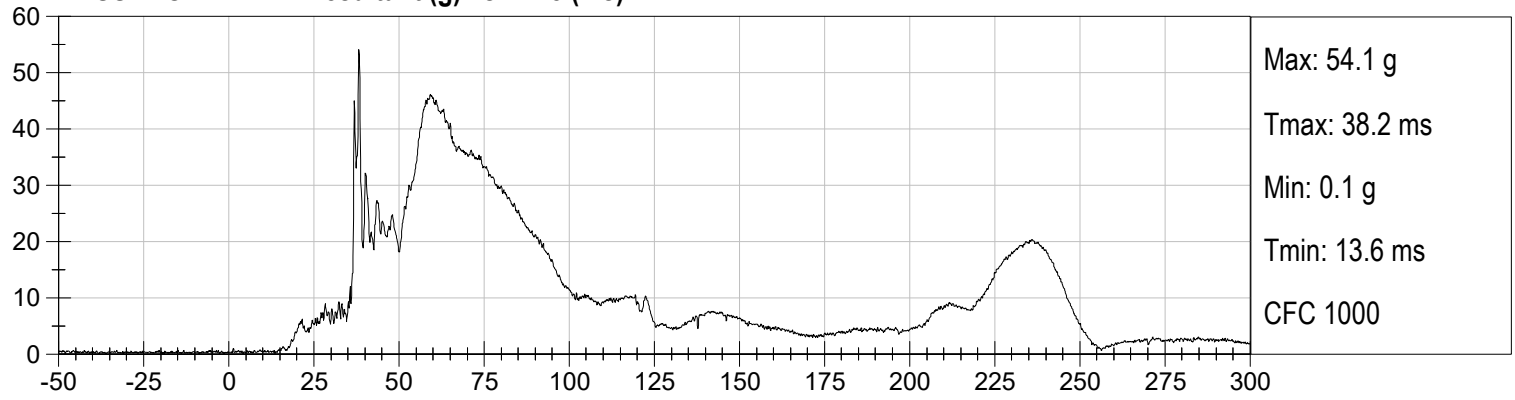
PASSENGER HEAD Y (g) vs Time (ms)



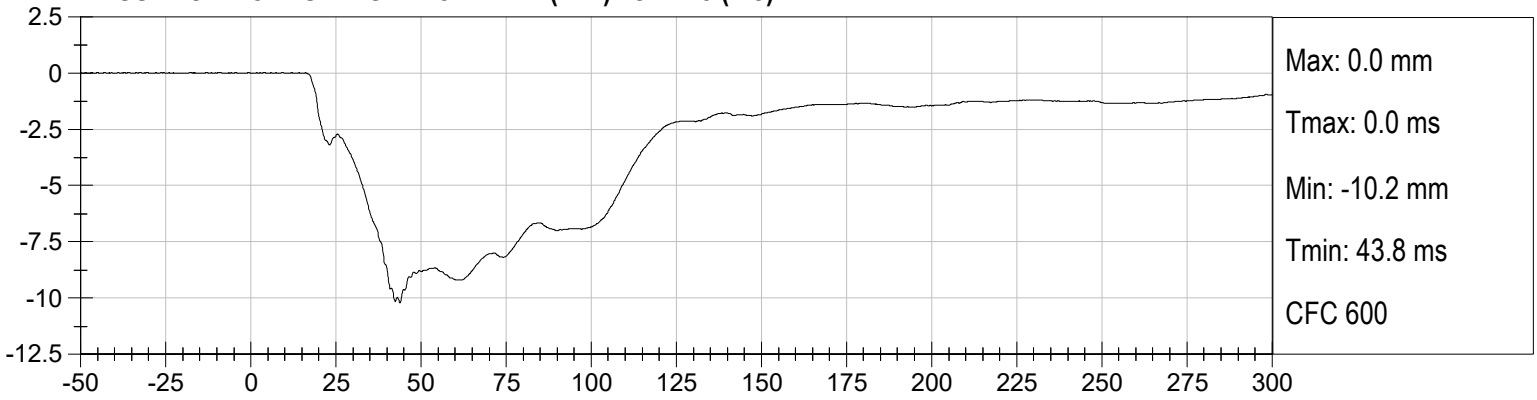
PASSENGER HEAD Z (g) vs Time (ms)



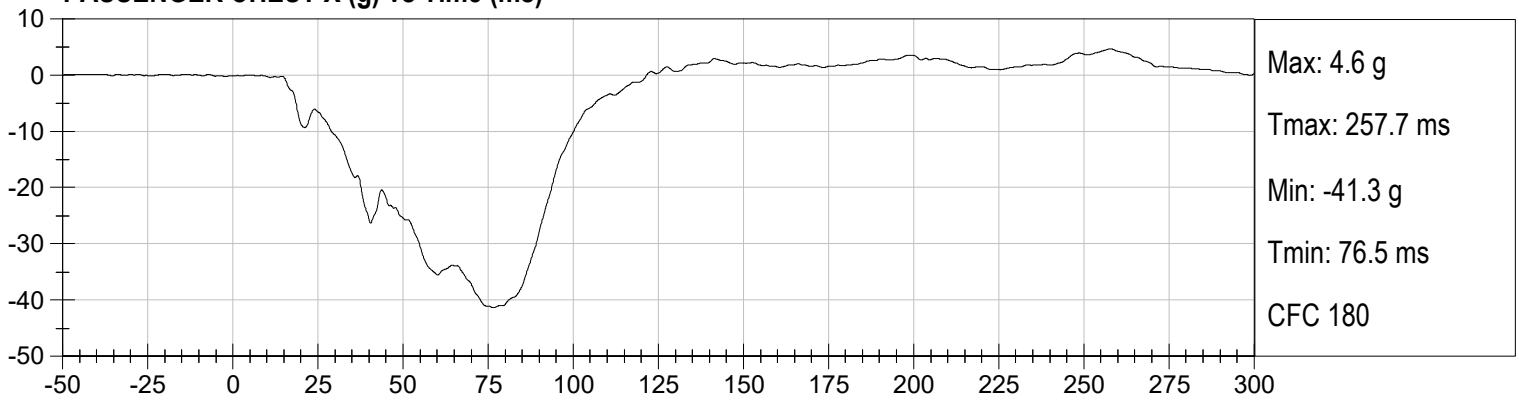
PASSENGER HEAD Resultant (g) vs Time (ms)



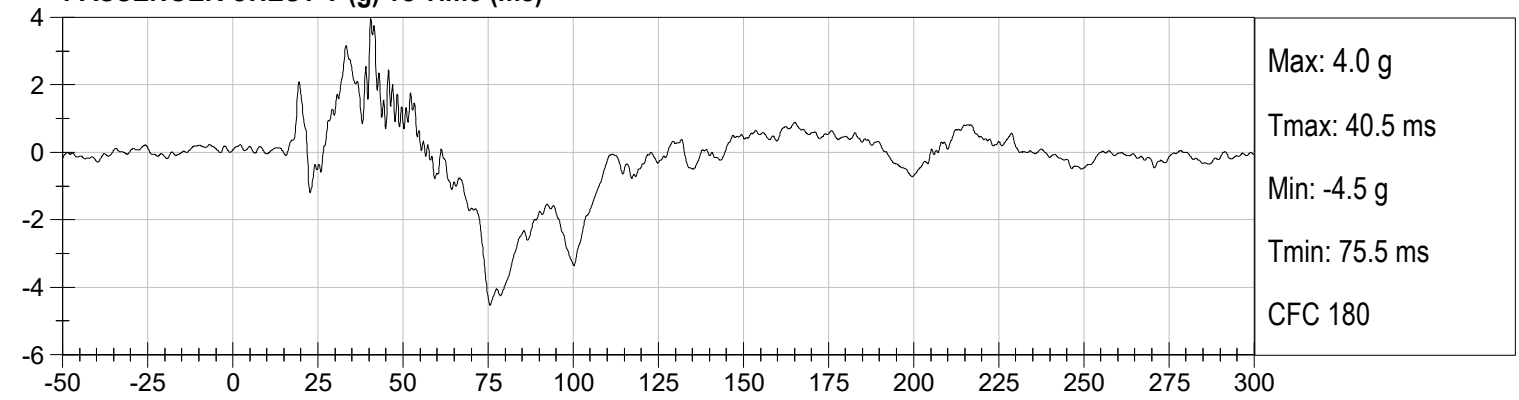
PASSENGER CHEST DISPLACEMENT (mm) vs Time (ms)



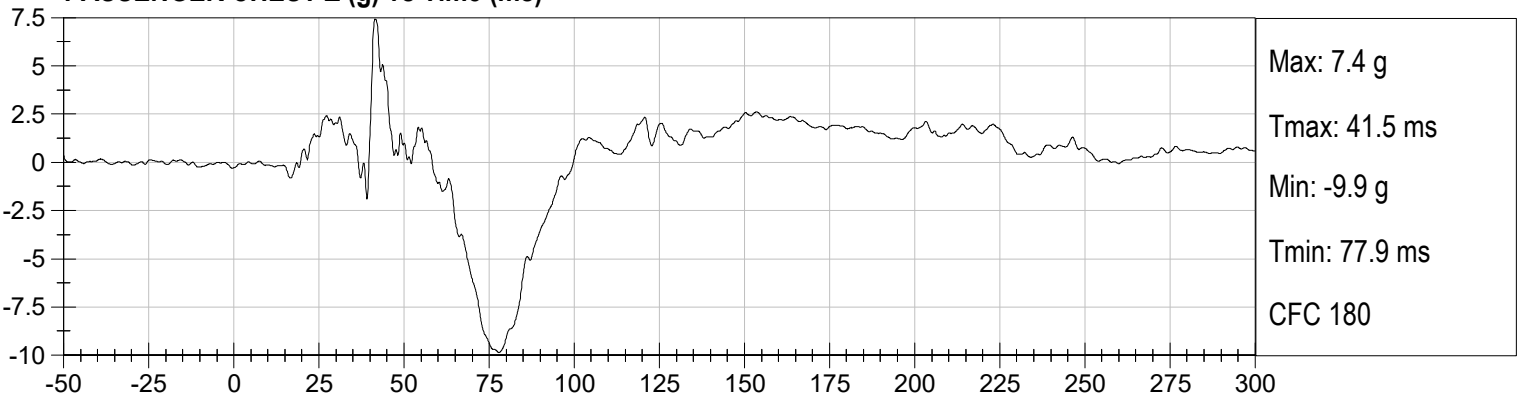
PASSENGER CHEST X (g) vs Time (ms)



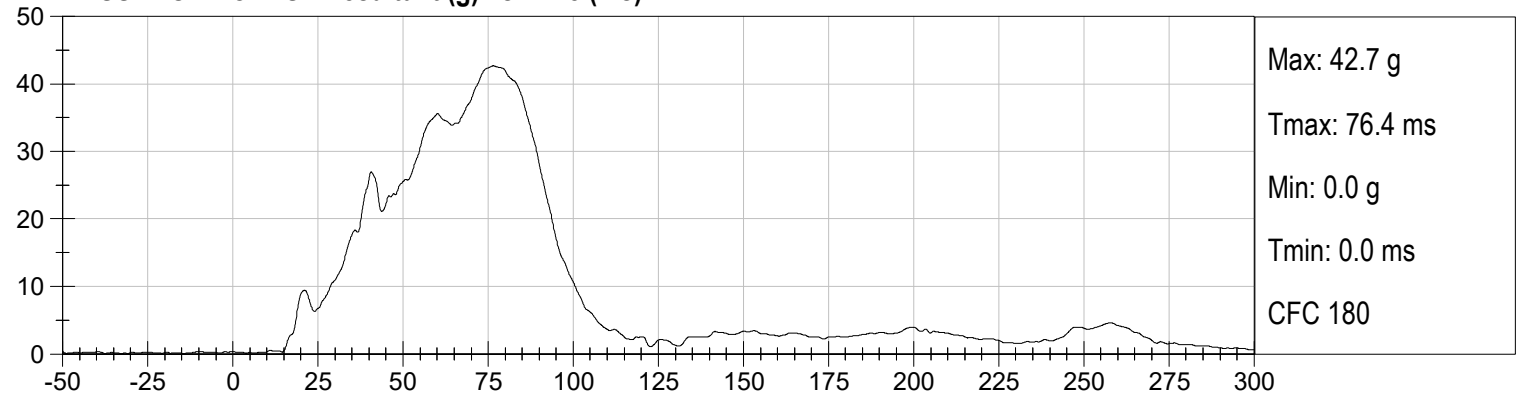
PASSENGER CHEST Y (g) vs Time (ms)



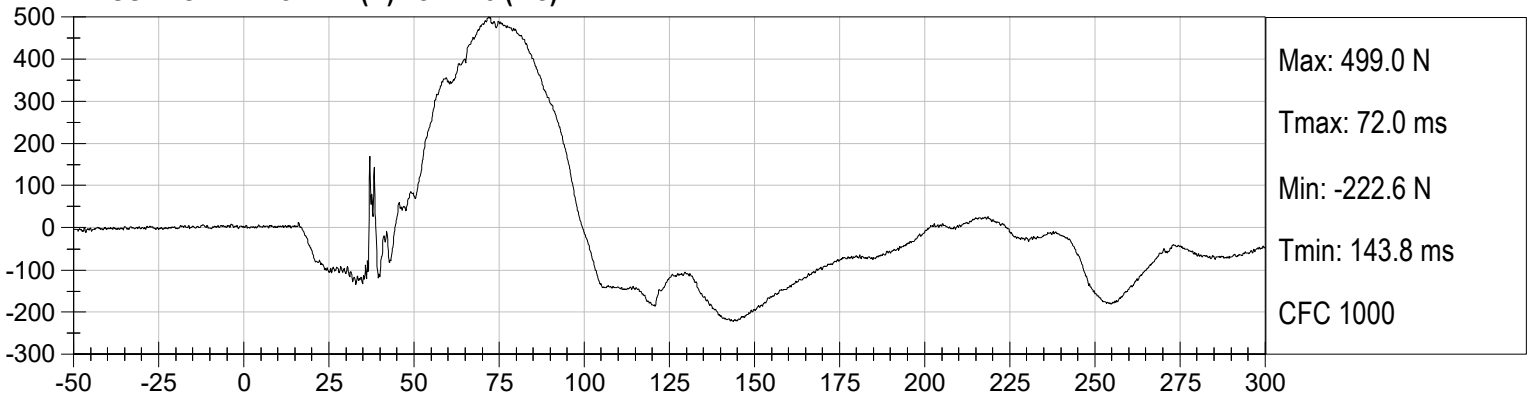
PASSENGER CHEST Z (g) vs Time (ms)



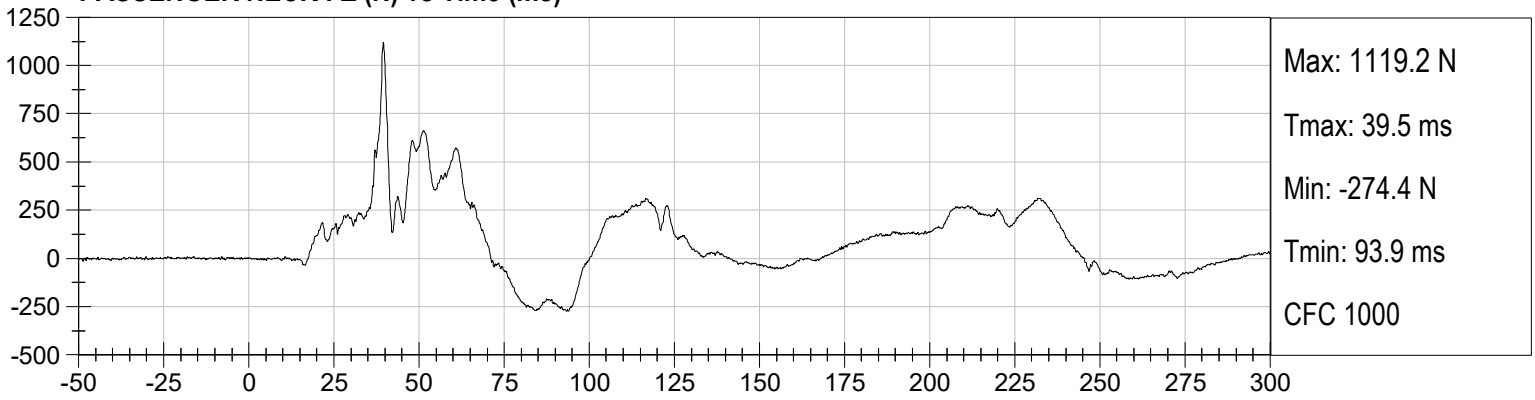
PASSENGER CHEST Resultant (g) vs Time (ms)



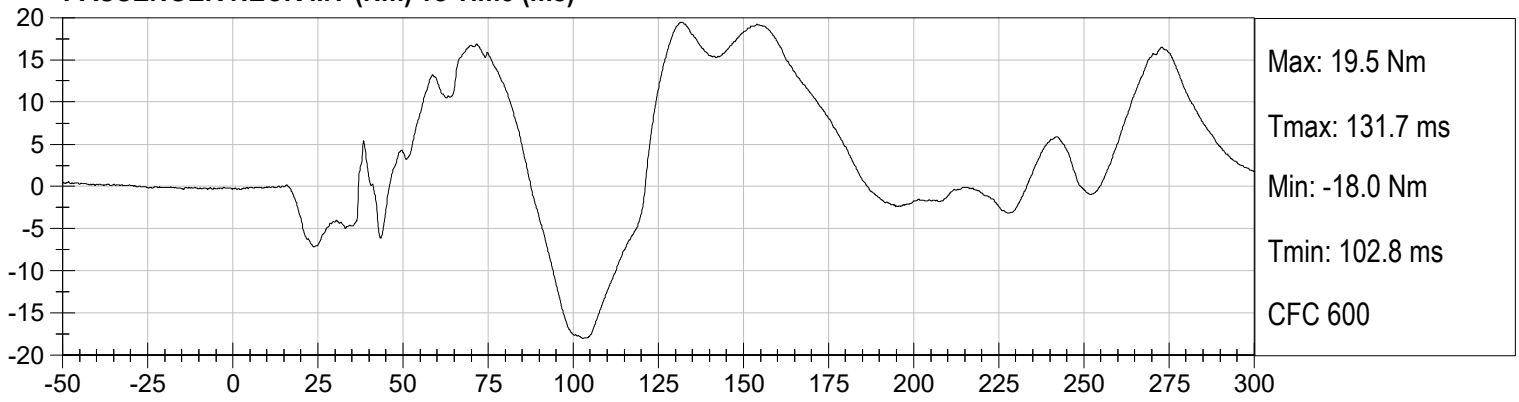
PASSENGER NECK FX (N) vs Time (ms)



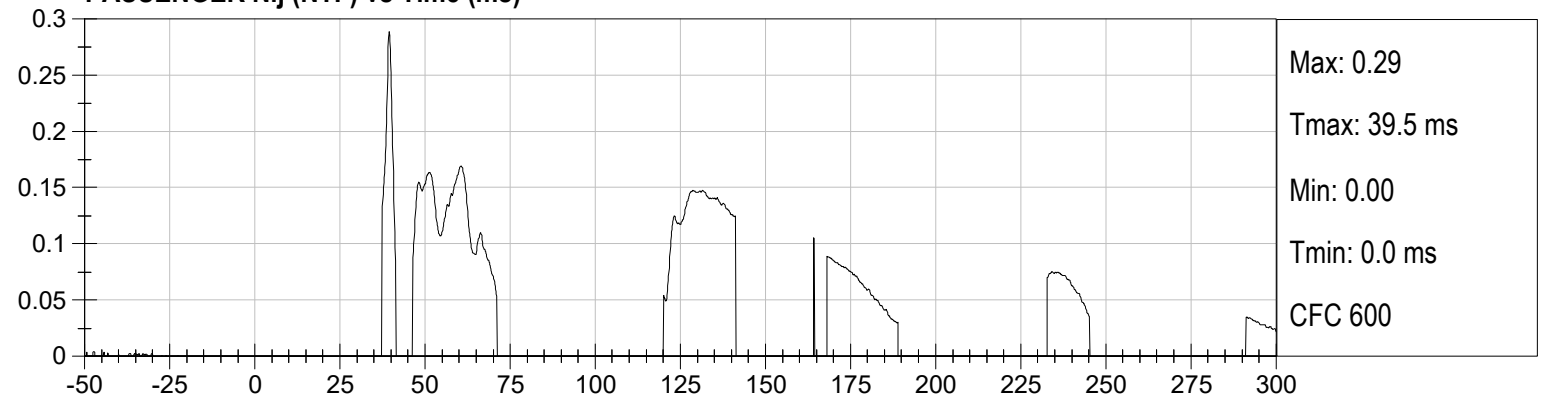
PASSENGER NECK FZ (N) vs Time (ms)



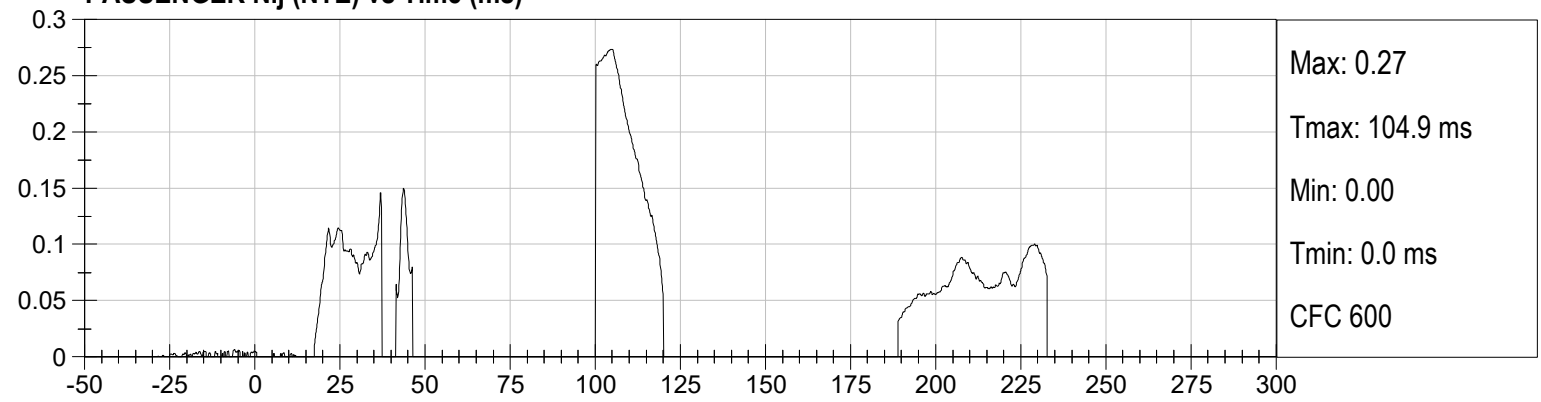
PASSENGER NECK MY (Nm) vs Time (ms)



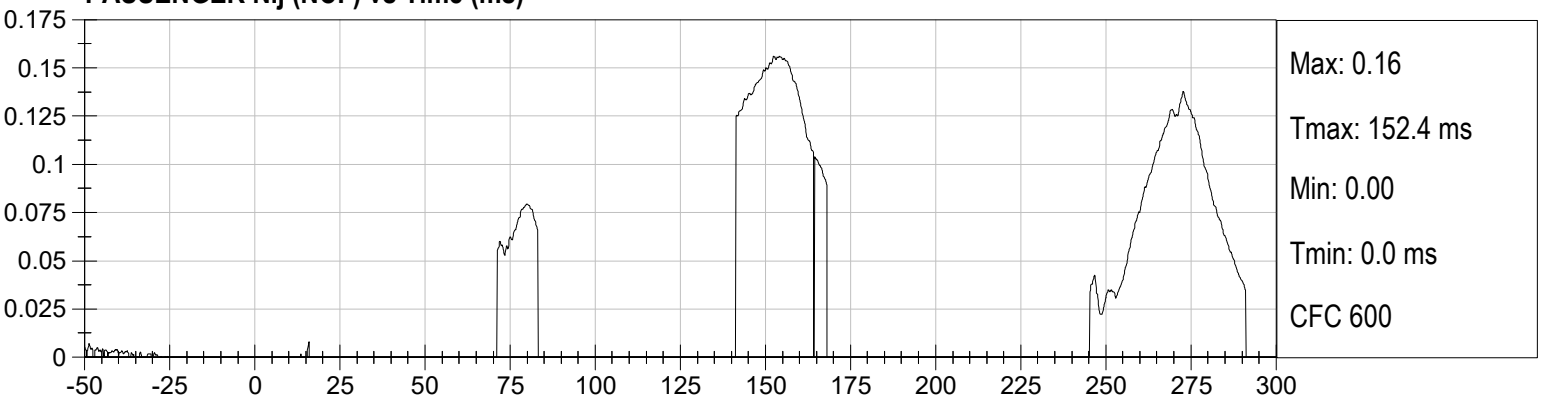
PASSENGER Nij (NTF) vs Time (ms)



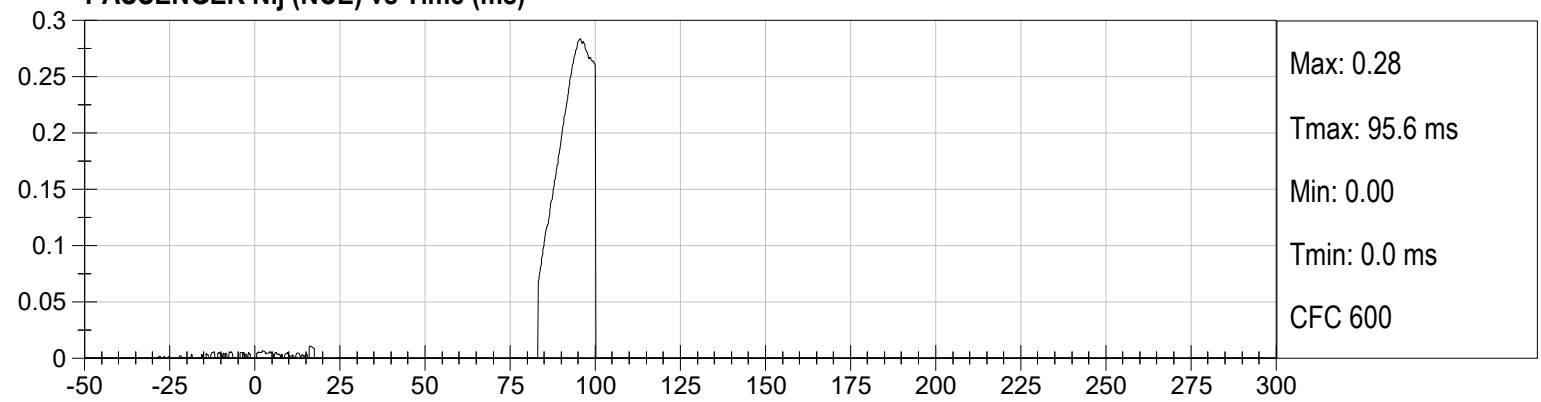
PASSENGER Nij (NTE) vs Time (ms)



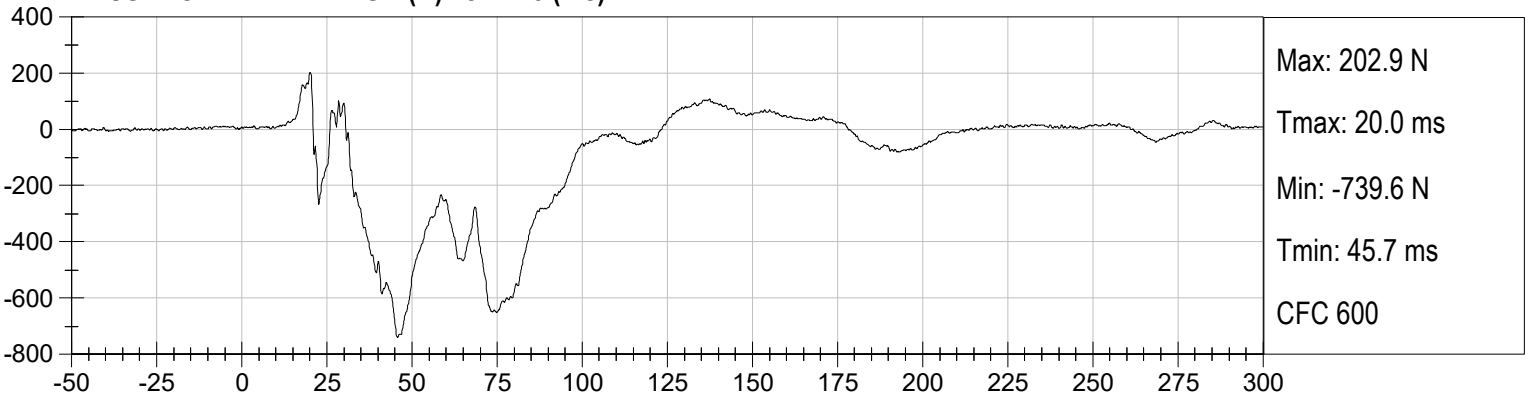
PASSENGER Nij (NCF) vs Time (ms)



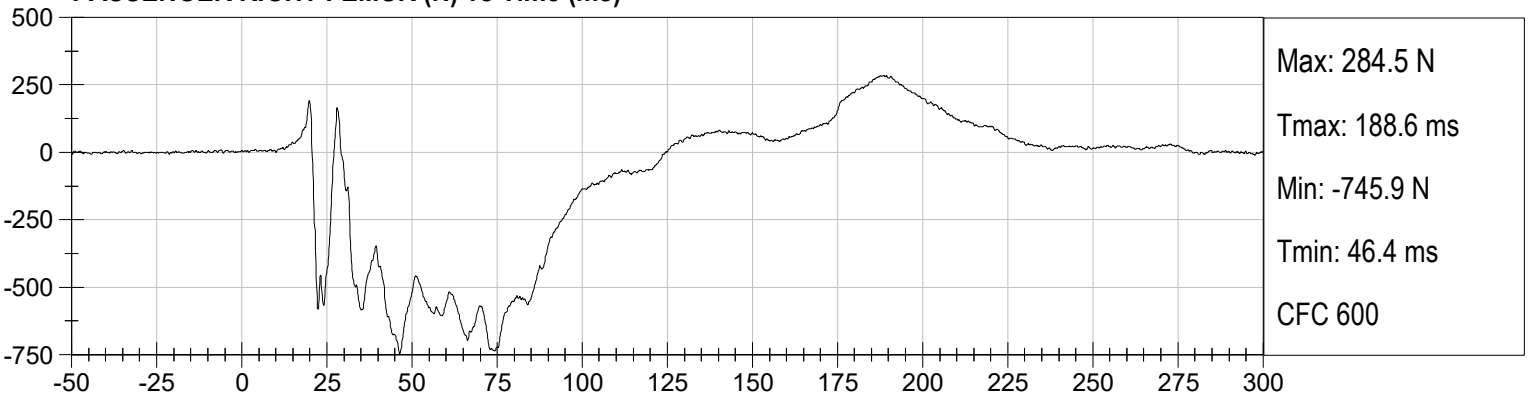
PASSENGER Nij (NCE) vs Time (ms)



PASSENGER LEFT FEMUR (N) vs Time (ms)



PASSENGER RIGHT FEMUR (N) vs Time (ms)



APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

Hybrid III, 50th External Measurements
SN: 351

HYBRID III, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6–35.0	34.8
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.0
C	H-POINT HEIGHT	Reference	3.3-3.5	3.4
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.5
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.5
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.0
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.8
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.7
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.3
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.8
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.8
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.0
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	17.8-18.8	18.8

HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.5
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.3
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.5
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	39.2
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.7
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D220051

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225 to 275	242	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

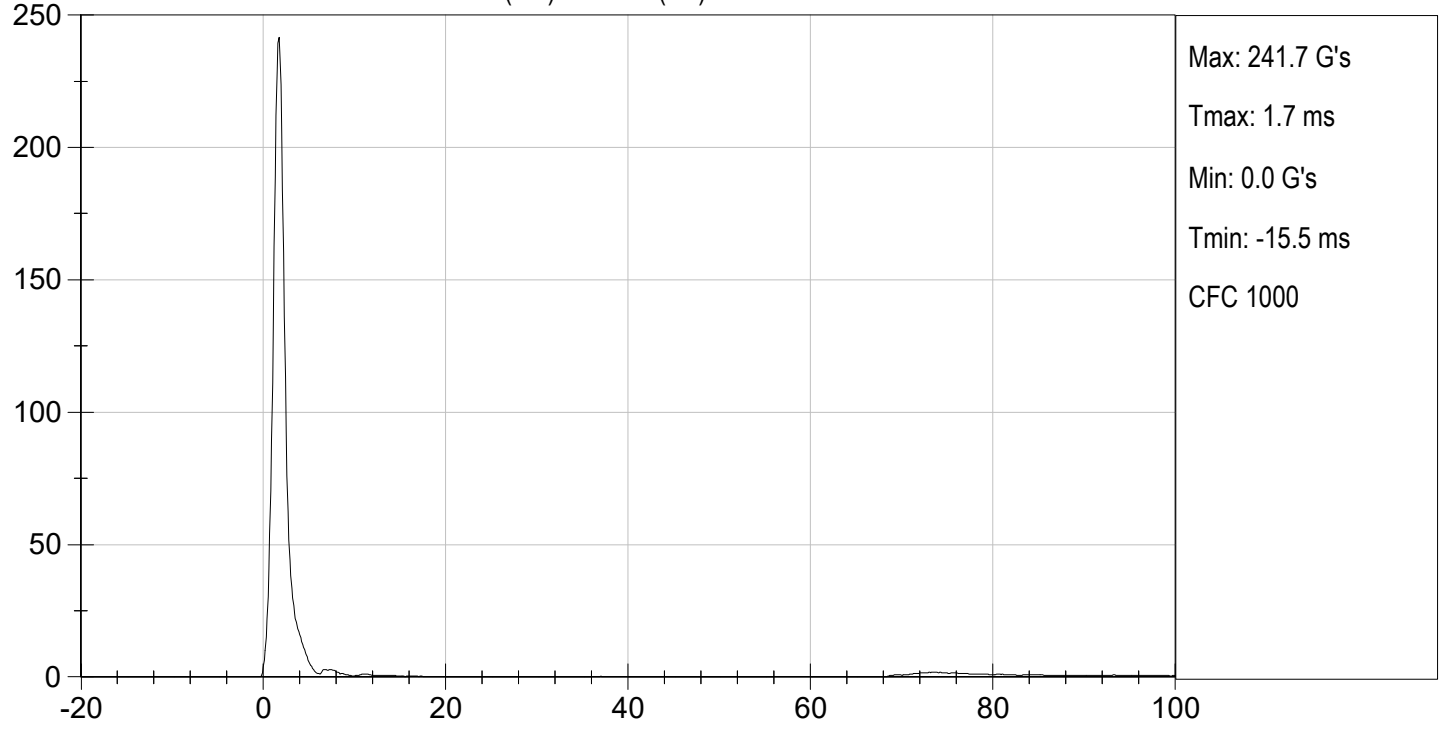
01/12/2022
Test Date

Approved By

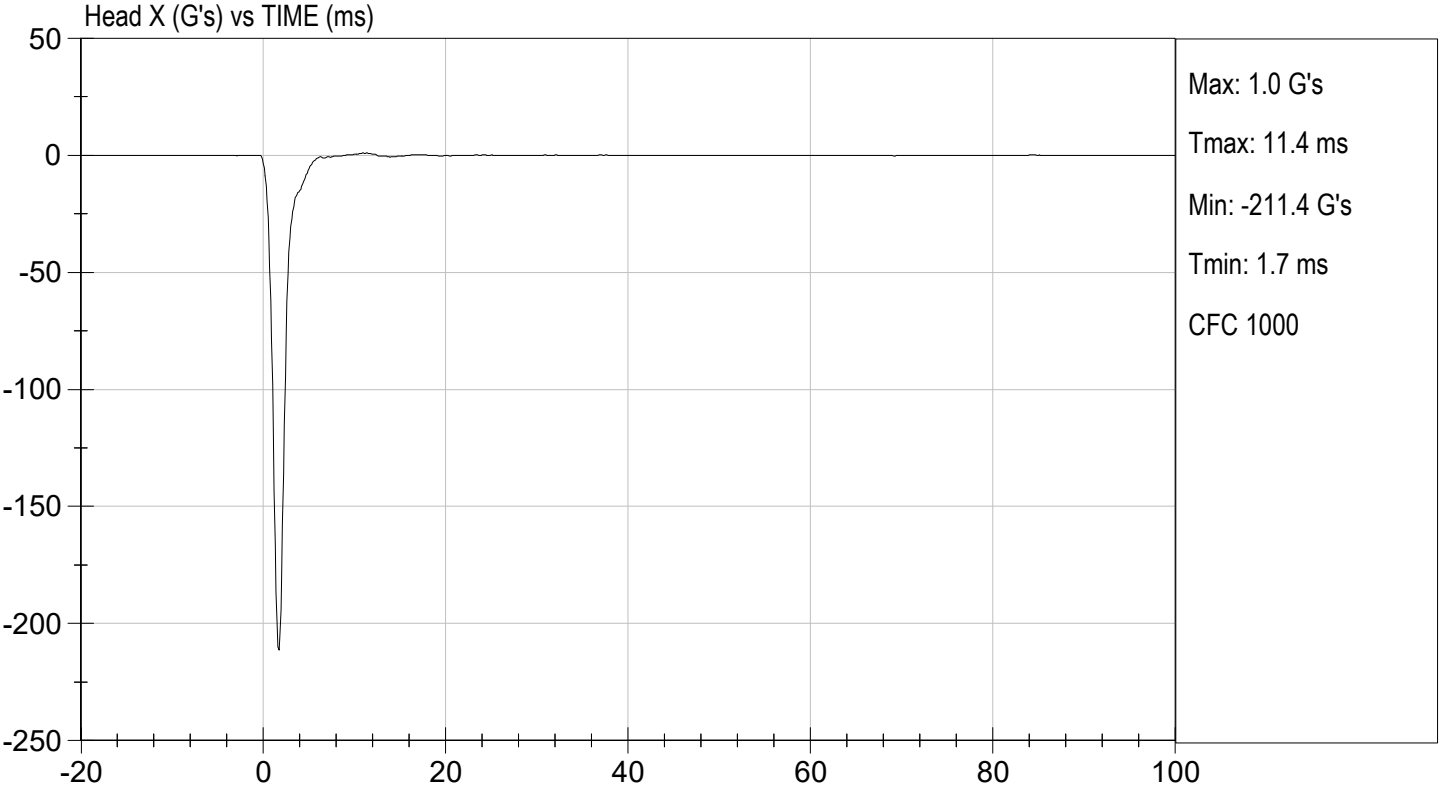
TEST DESC: HEAD DROP

TEST DATE: 01/12/2022
TEST #: D220051

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

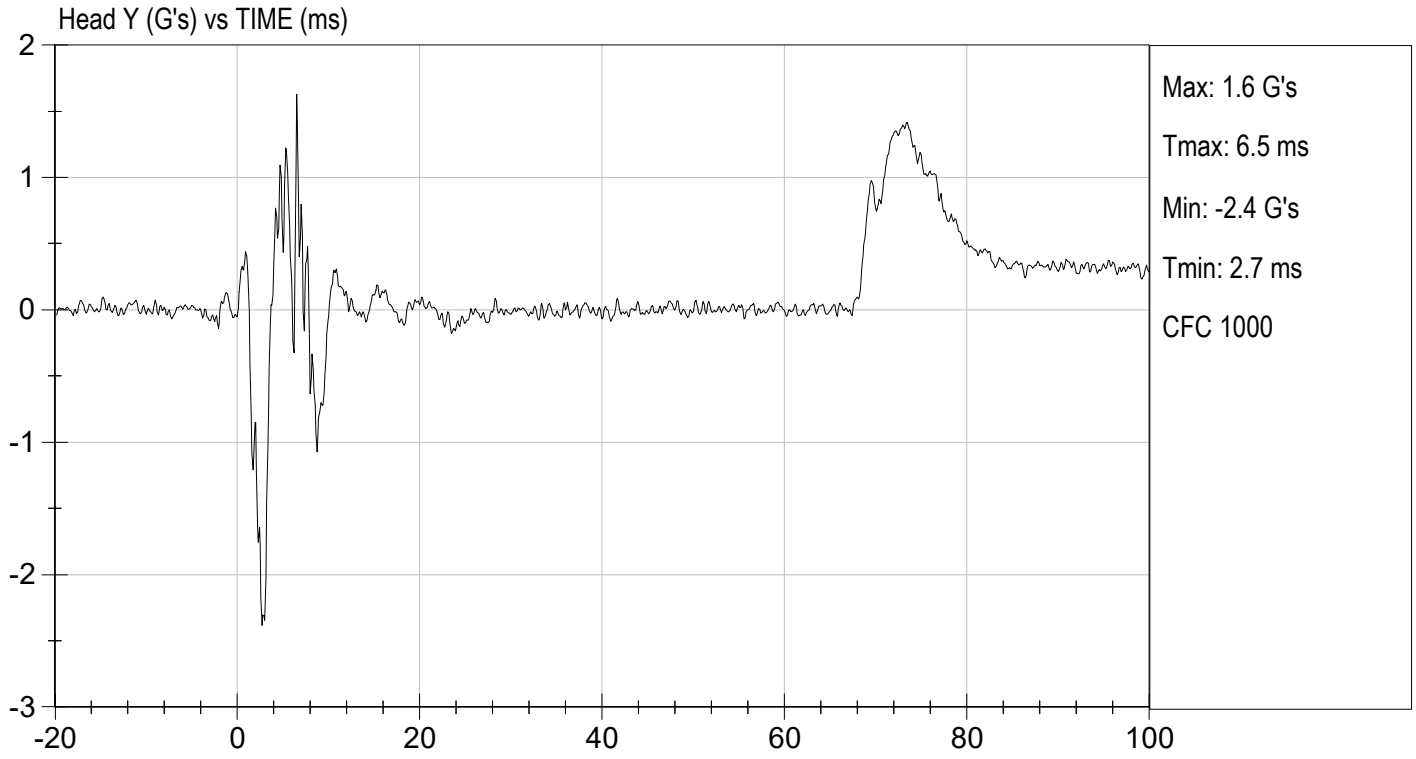


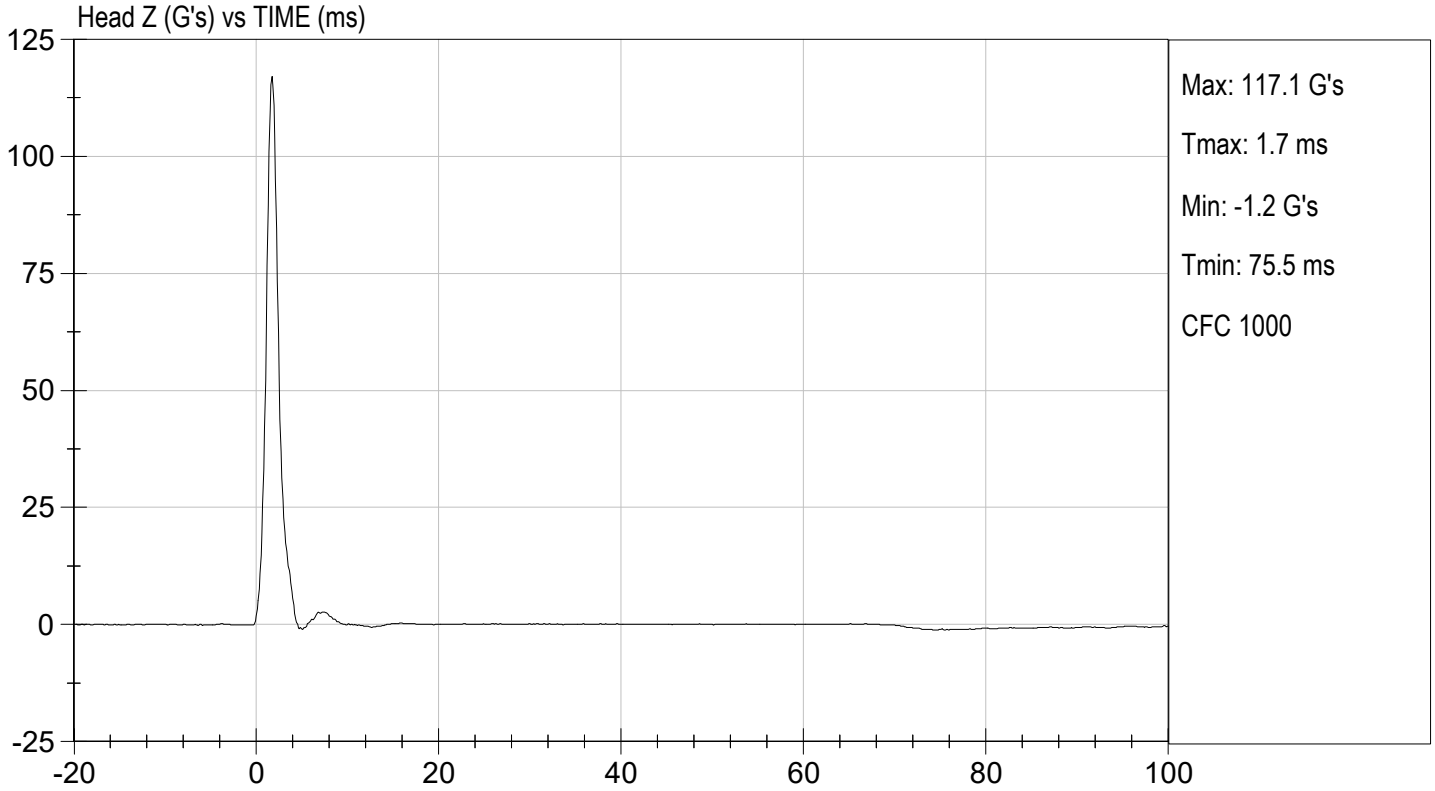
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/12/2022
TEST #: D220051





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220052

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.91	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.79	Pass
	20 ms	G's	17.60 to 22.60	20.57	Pass
	30 ms	G's	12.50 to 18.50	15.82	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.1	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.7	Pass
	Time	ms	57.0 to 64.0	59.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.4	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	93.2	Pass
	Time	ms	47.0 to 58.0	48.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.3	Pass
			Overall Test Results		Pass

Alex Thomas

Laboratory Technician

01/12/2022

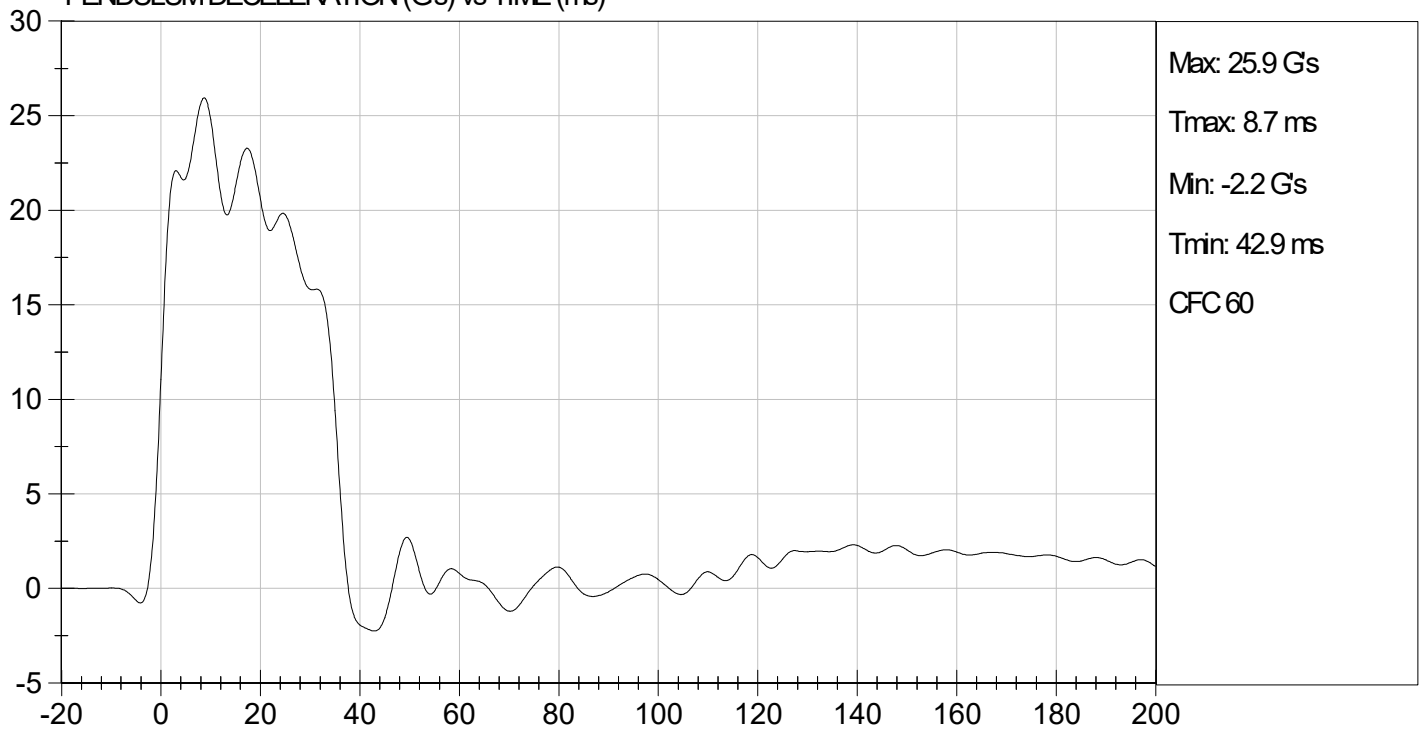
Test Date

Approved By

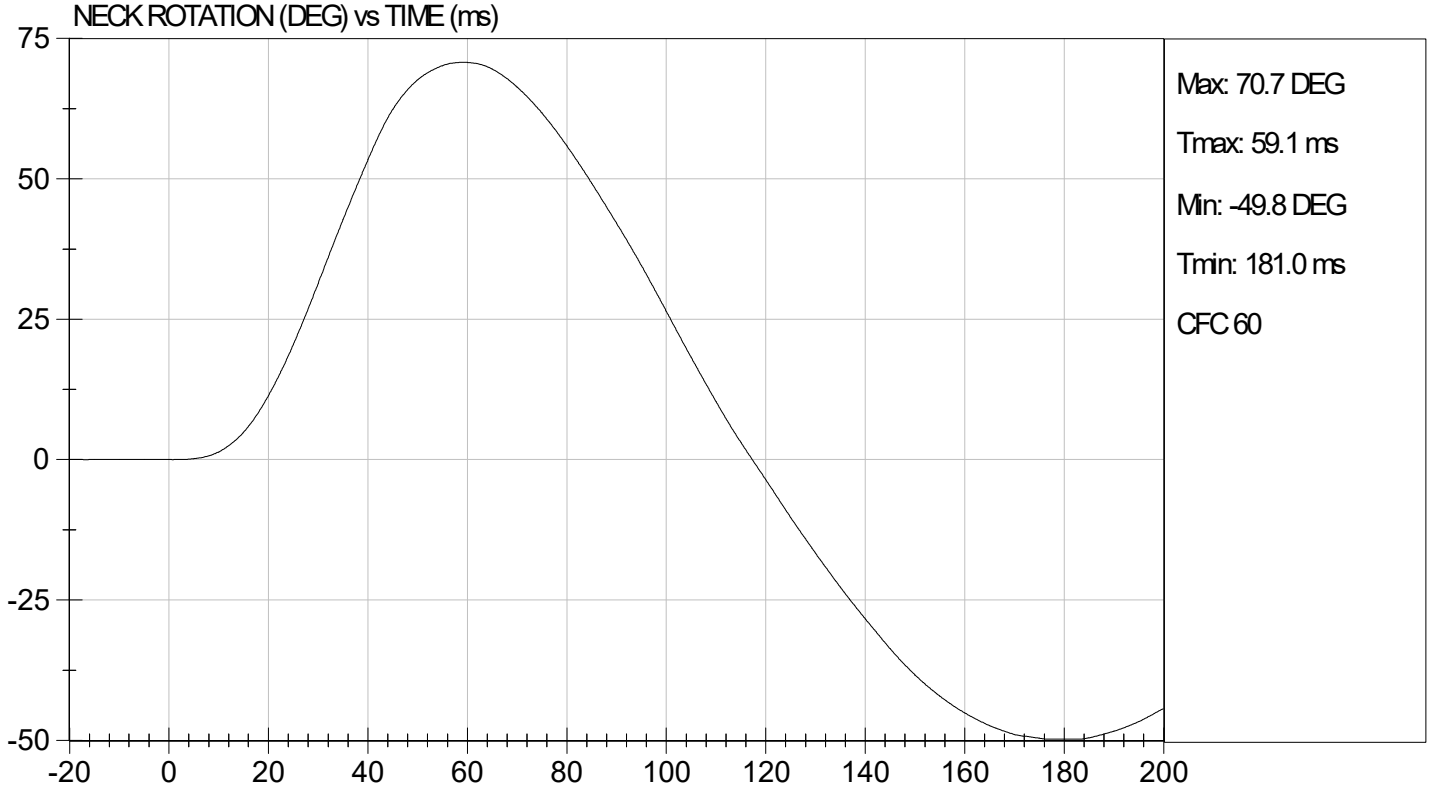
TEST DESC: NECK FLEXION
VELOCITY: 22.68 ft/s, 6.91 m/s

TEST DATE: 01/12/2022
TEST #: D220052

PENDULUM DECELERATION (G's) vs TIME (ms)

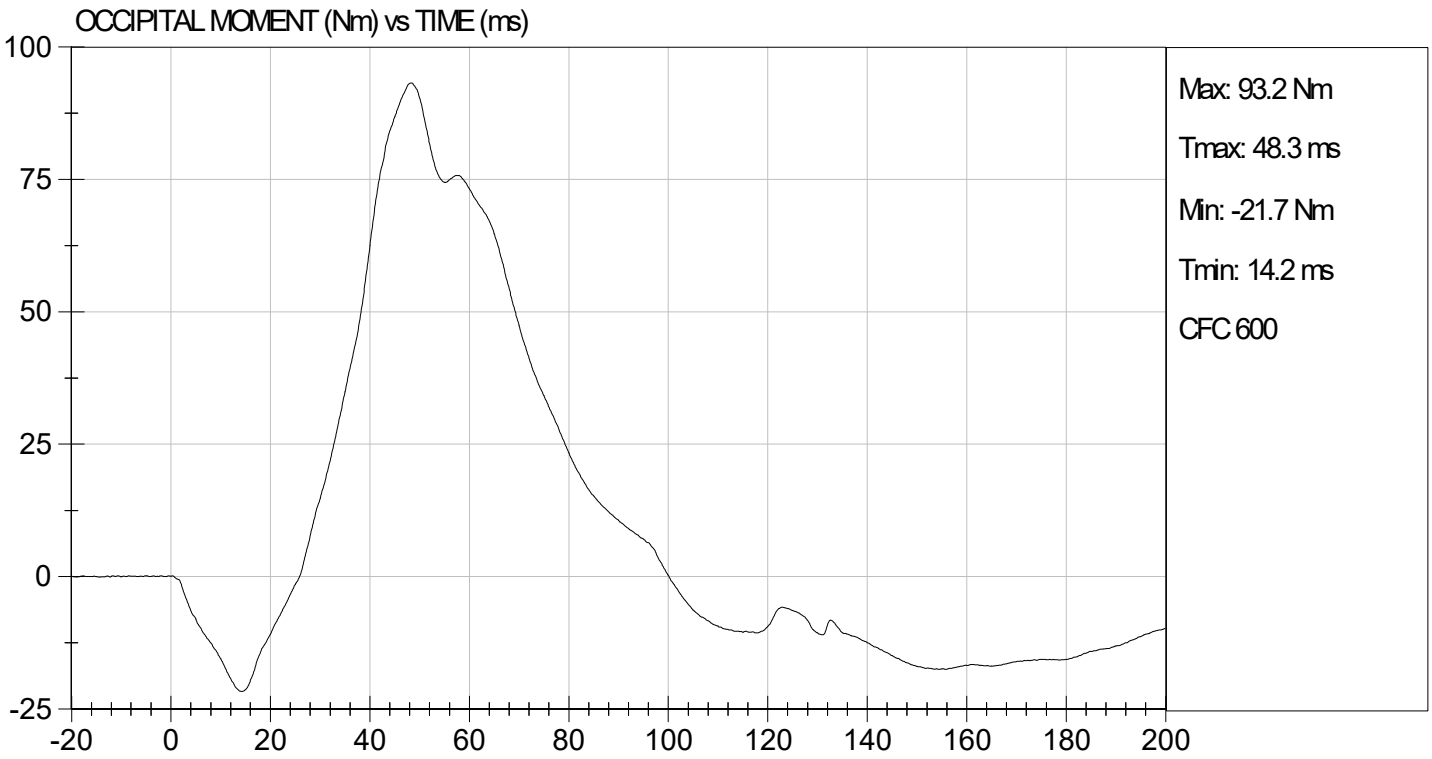


NECK ROTATION (DEG) vs TIME (ms)



TEST DESC: NECK FLEXION
VELOCITY: 22.68 ft/s, 6.91 m/s

TEST DATE: 01/12/2022
TEST #: D220052



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220053

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.53	Pass
	20 ms	G's	14.00 to 19.00	16.25	Pass
	30 ms	G's	11.00 to 16.00	14.19	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.6	Pass
	Time	ms	72.0 to 82.0	78.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	161.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-64.9	Pass
	Time	ms	65.0 to 79.0	72.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.1	Pass
			Overall Test Results		Pass

Alex Thomas

Laboratory Technician

01/12/2022

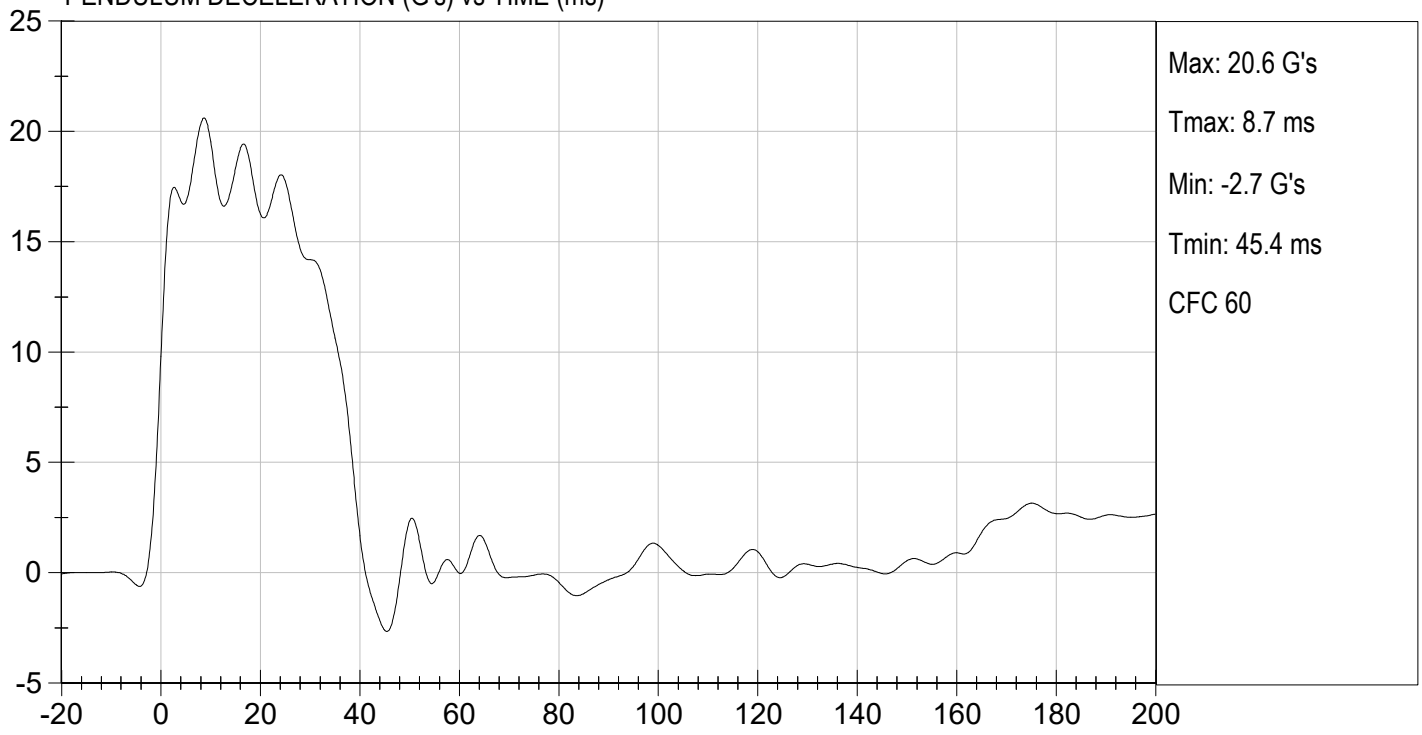
Test Date

Approved By

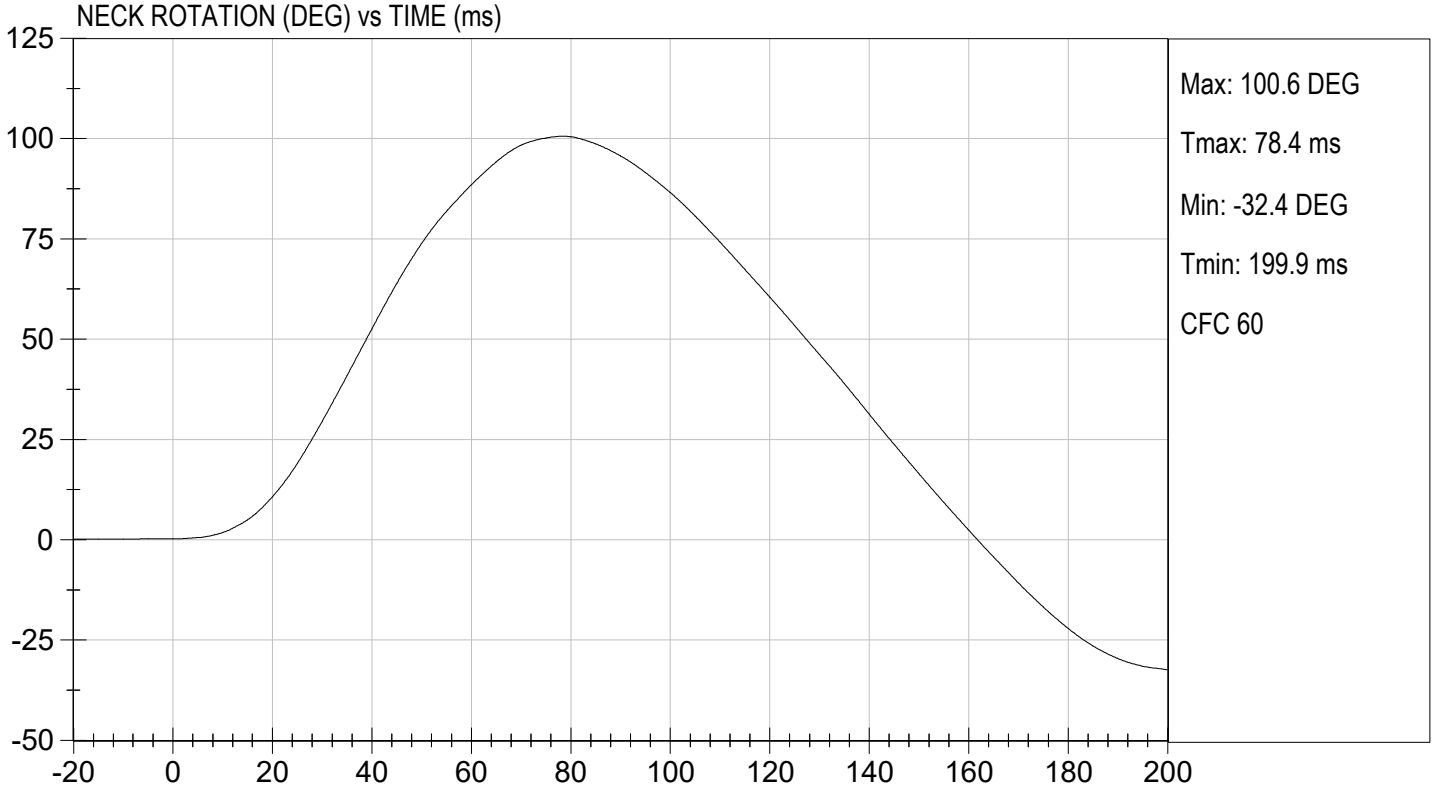
TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/12/2022
TEST #: D220053

PENDULUM DECELERATION (G's) vs TIME (ms)

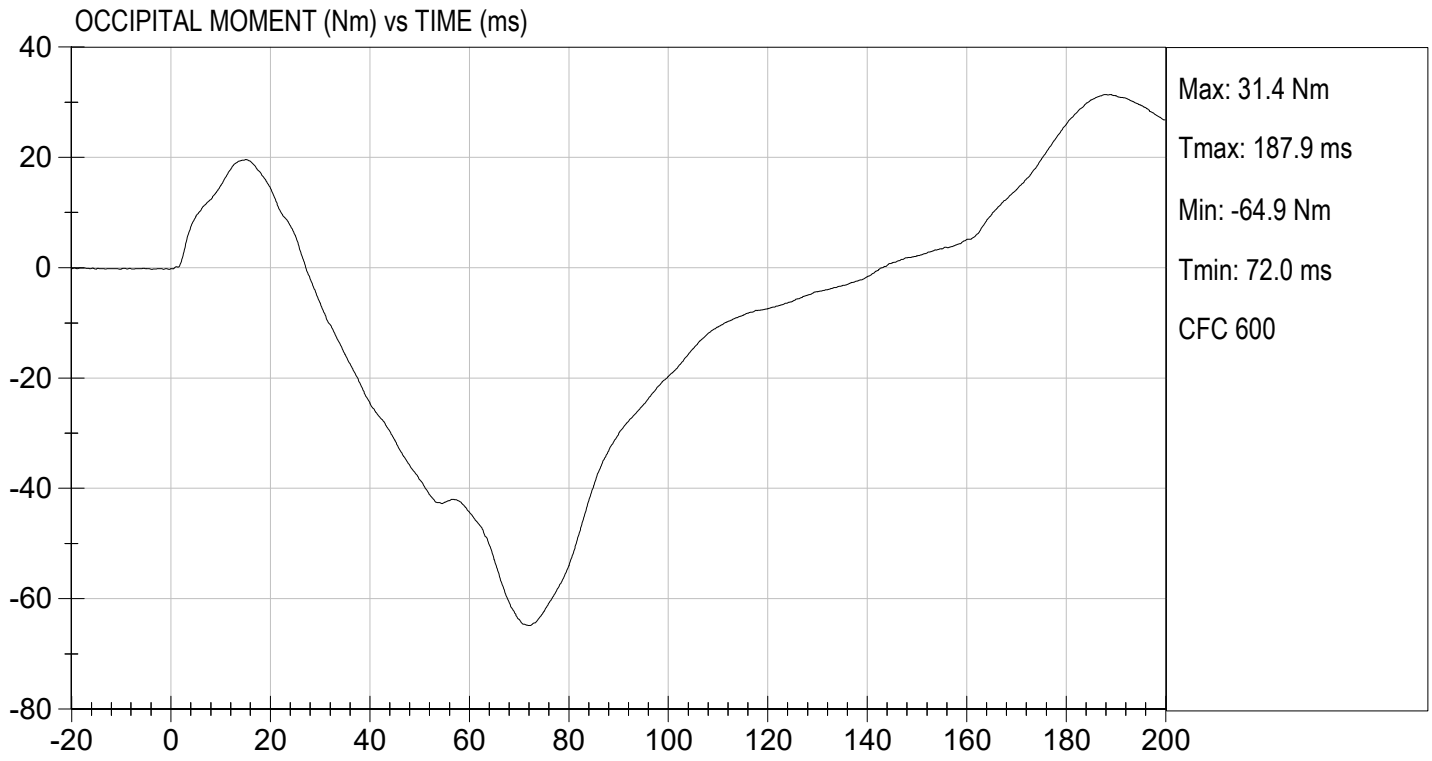


NECK ROTATION (DEG) vs TIME (ms)



TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/12/2022
TEST #: D220053



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220054

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,330	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.15	Pass
Internal Hysteresis	%	69 to 85	72	Pass
		Overall Test Results		Pass

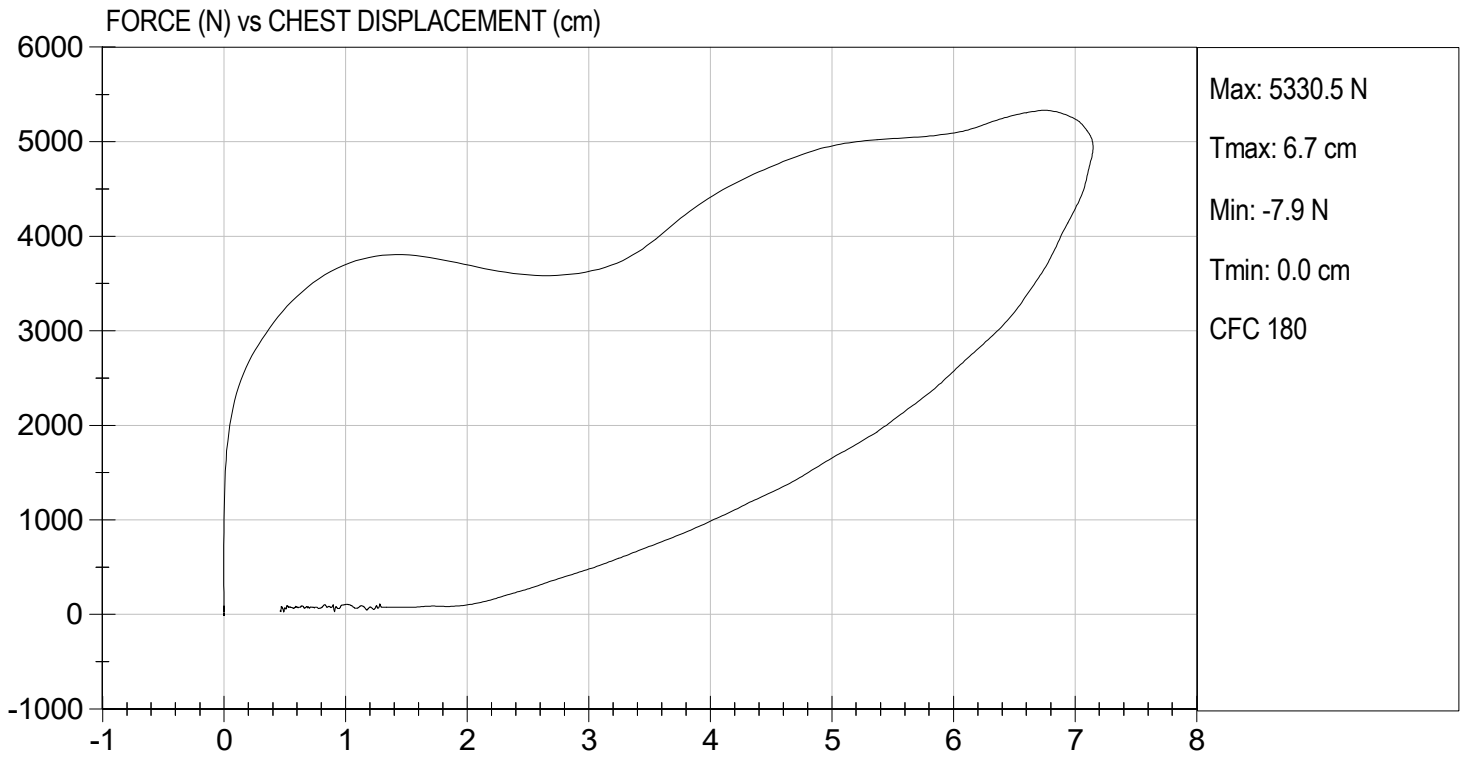
Laboratory Technician

01/12/2022
Test Date

Approved By

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

TEST DATE: 01/12/2022
TEST #: D220054



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220055

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5,430	Pass
		Overall Test Results		Pass

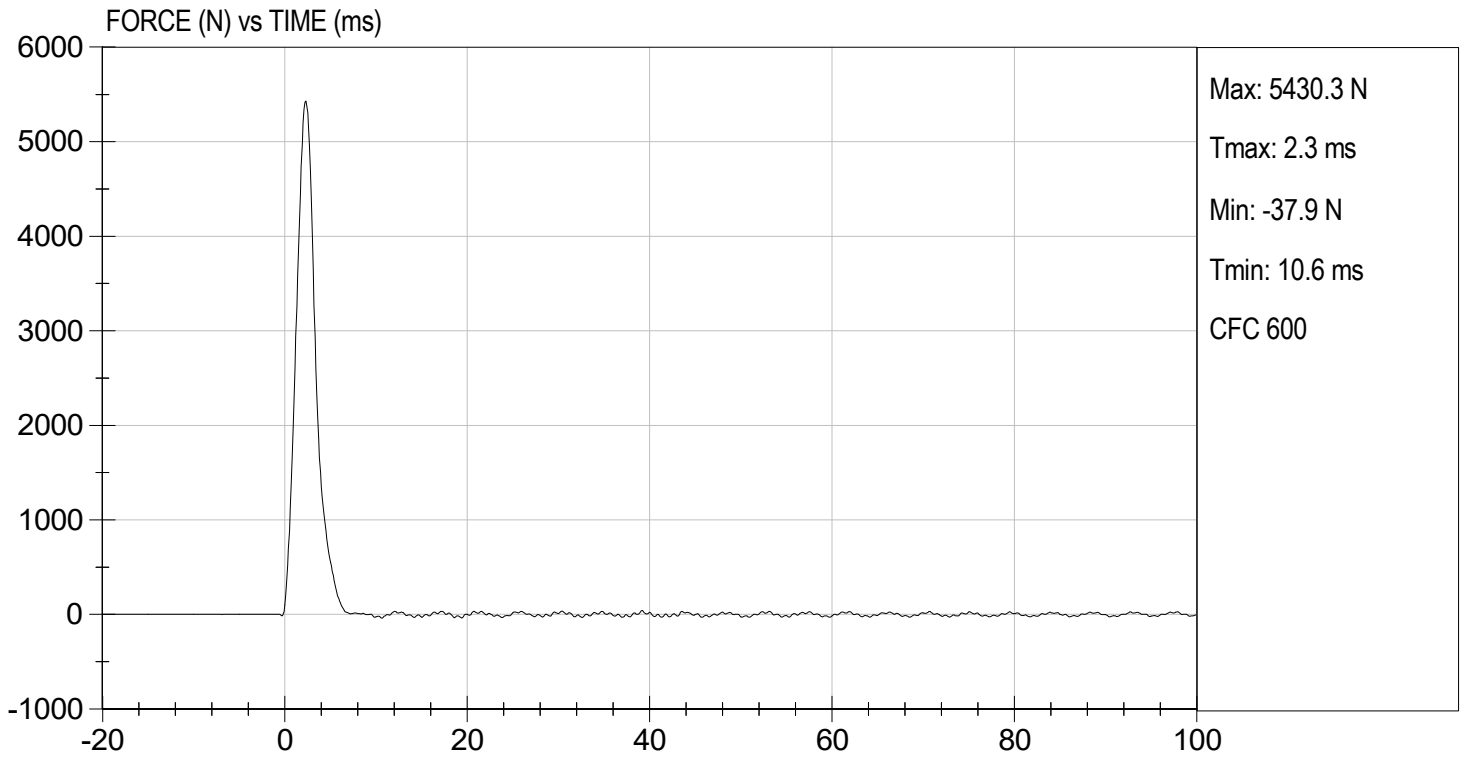
Laboratory Technician

01/13/2022
Test Date

Approved By

TEST DESC: RIGHT KNEE
VELOCITY: 6.92 ft/s, 2.11 m/s

TEST DATE: 01/13/2022
TEST #: D220055



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220056

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,326	Pass
		Overall Test Results		Pass

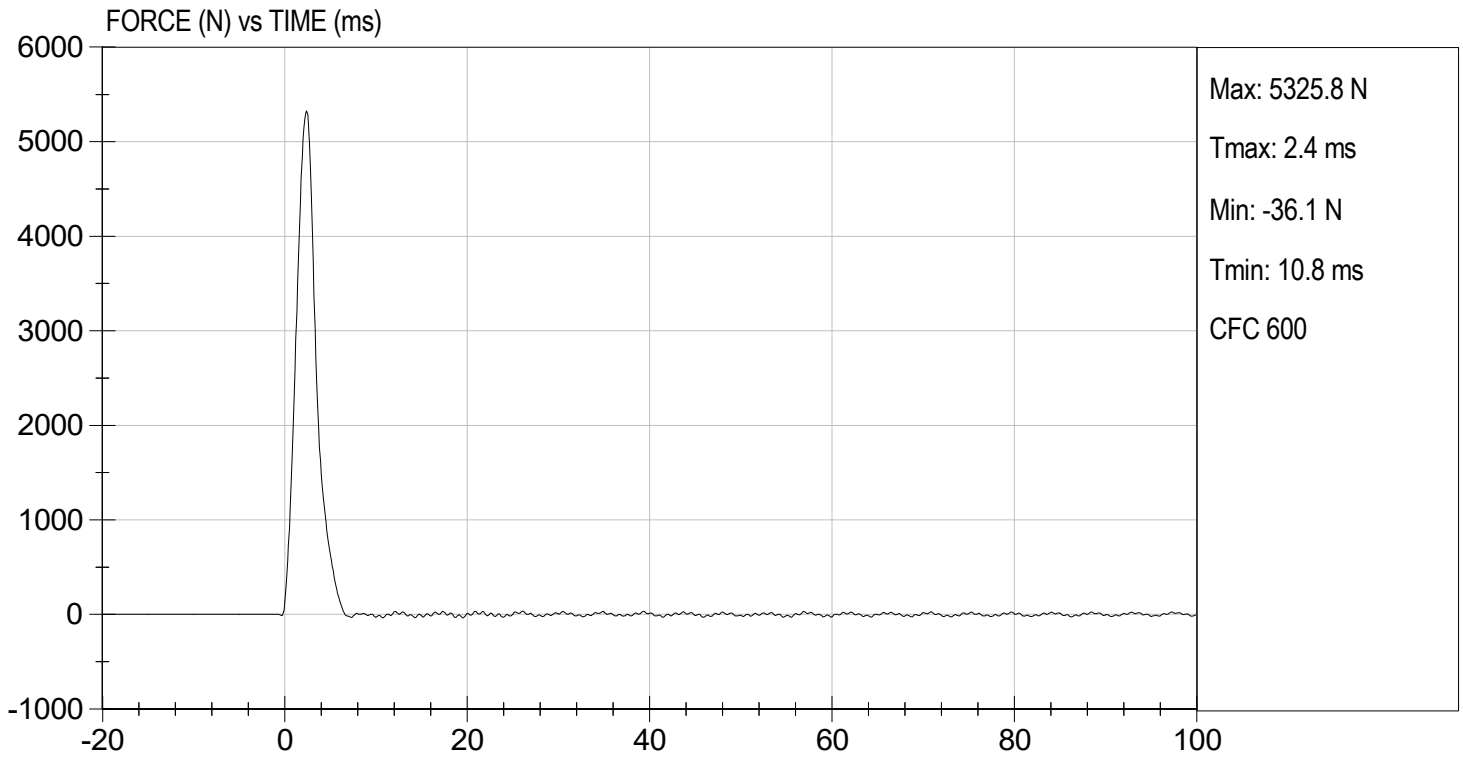
Laboratory Technician

01/13/2022
Test Date

Approved By

TEST DESC: LEFT KNEE
VELOCITY: 6.94 ft/s, 2.12 m/s

TEST DATE: 01/13/2022
TEST #: D220056



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220050

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	28	28	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	85.7	91.8	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	45.8	43.9	Pass
		Overall Test Results			Pass

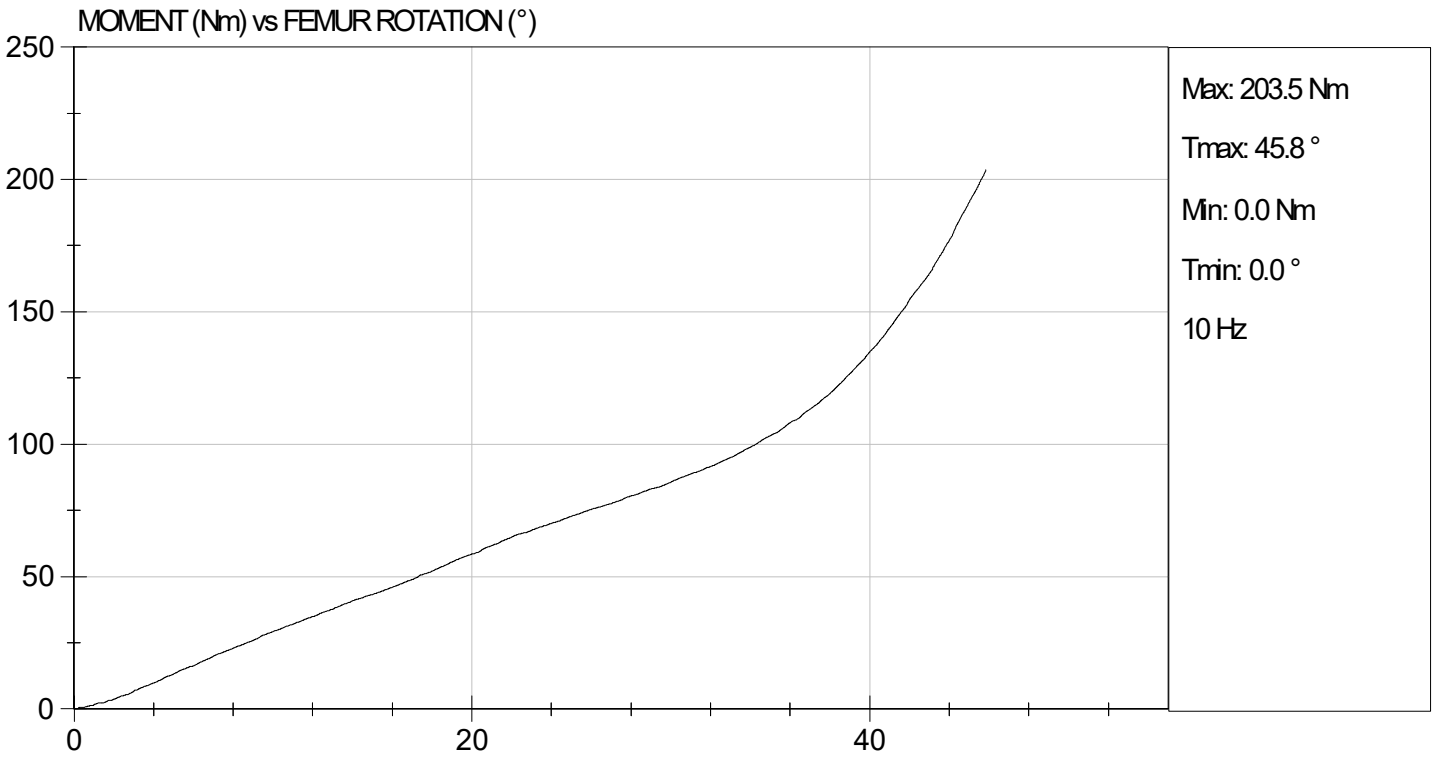
Laboratory Technician

01/12/2022
Test Date

Approved By

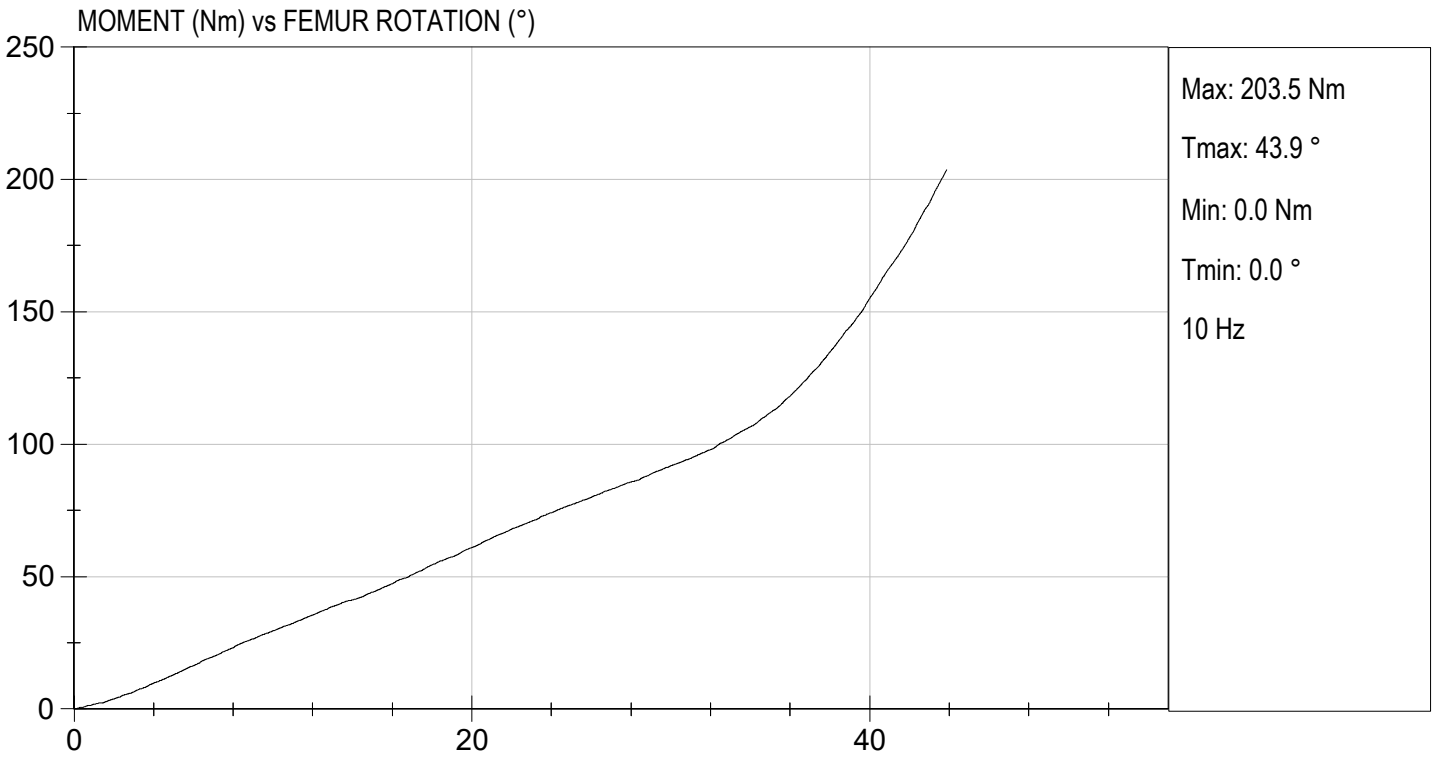
TEST DESC: RIGHT HIP FEMUR FLEXION

TEST DATE: 01/12/2022
TEST #: D220059



TEST DESC: LEFT HIP FEMUR FLEXION

TEST DATE: 01/12/2022
TEST #: D220050



CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D220181

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 to 275	261	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

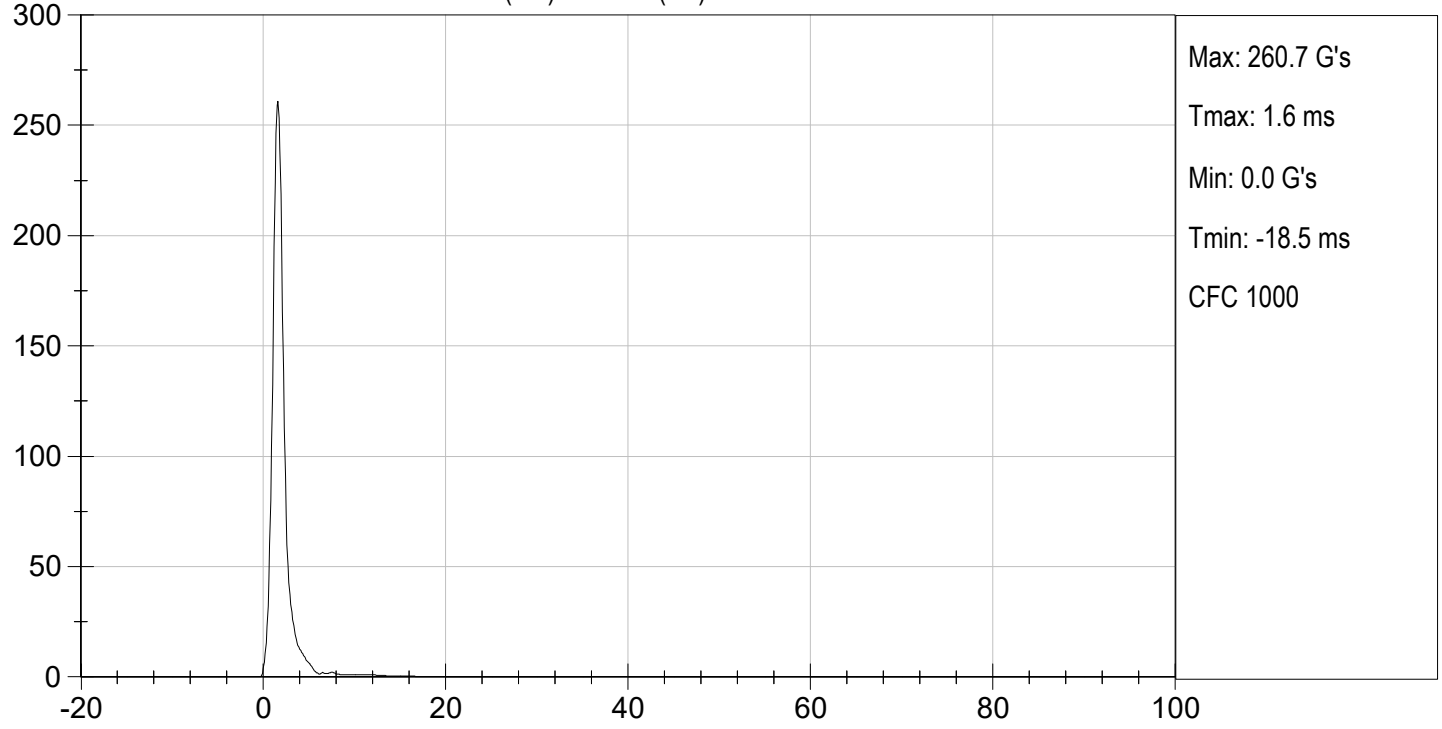
01/25/2022
Test Date

Approved By

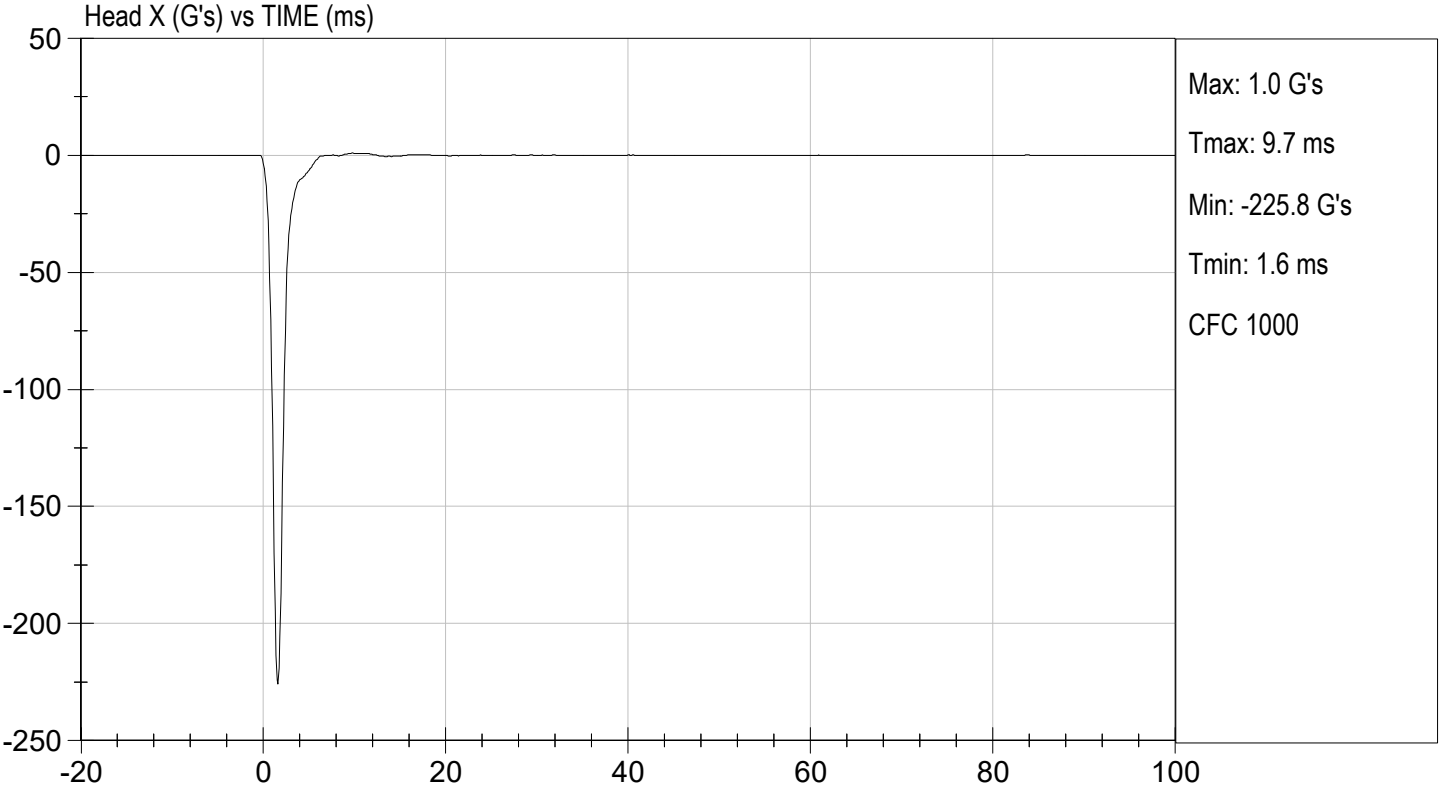
TEST DESC: HEAD DROP

TEST DATE: 01/25/2022
TEST #: D220181

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

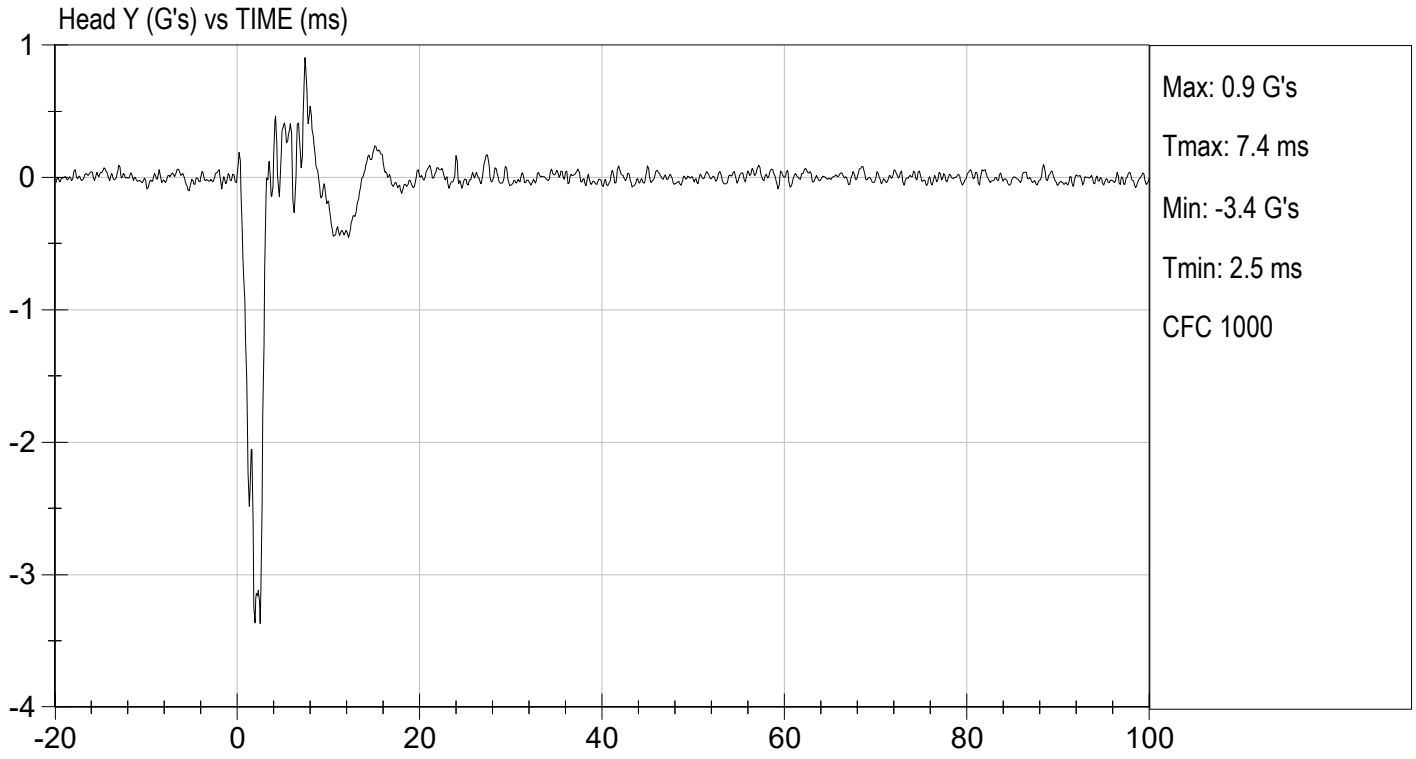


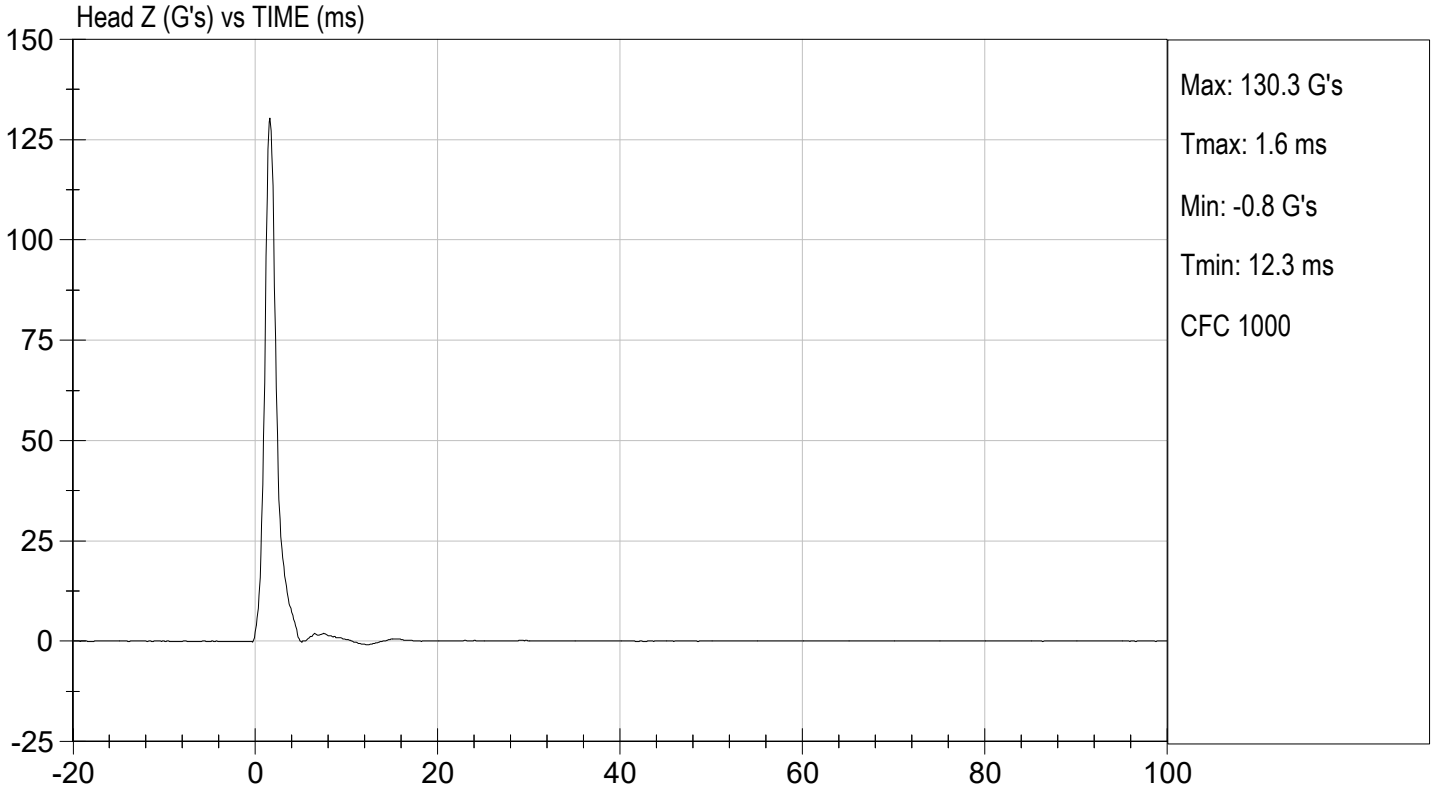
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/25/2022
TEST #: D220181





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220182

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.92	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.64	Pass
	20 ms	G's	17.60 to 22.60	19.70	Pass
	30 ms	G's	12.50 to 18.50	13.32	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	40.1	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.2	Pass
	Time	ms	57.0 to 64.0	62.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	121.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	95.6	Pass
	Time	ms	47.0 to 58.0	51.8	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	102.1	Pass
			Overall Test Results		Pass

Laboratory Technician

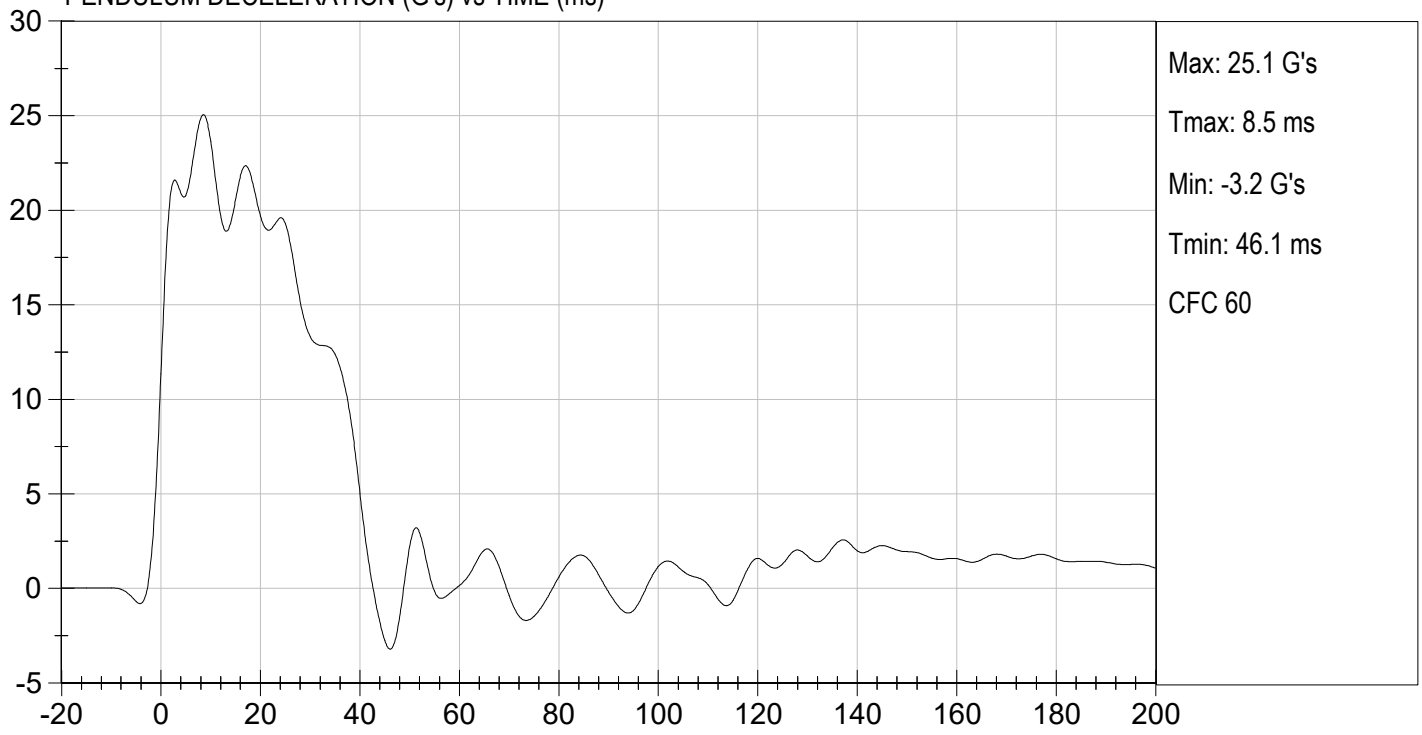
01/25/2022
Test Date

Approved By

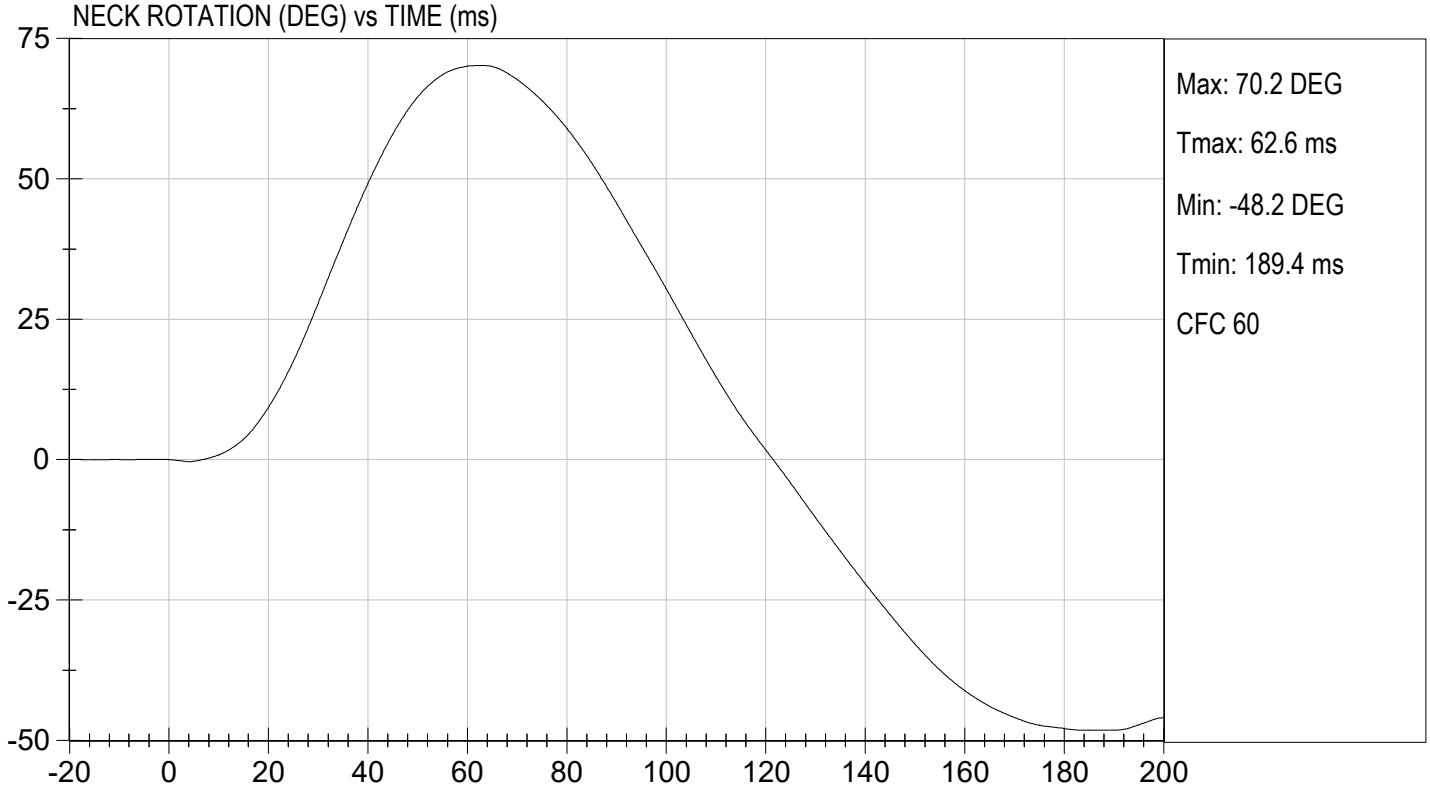
TEST DESC: NECK FLEXION
VELOCITY: 22.70 ft/s, 6.92 m/s

TEST DATE: 01/25/2022
TEST #: D220182

PENDULUM DECELERATION (G's) vs TIME (ms)

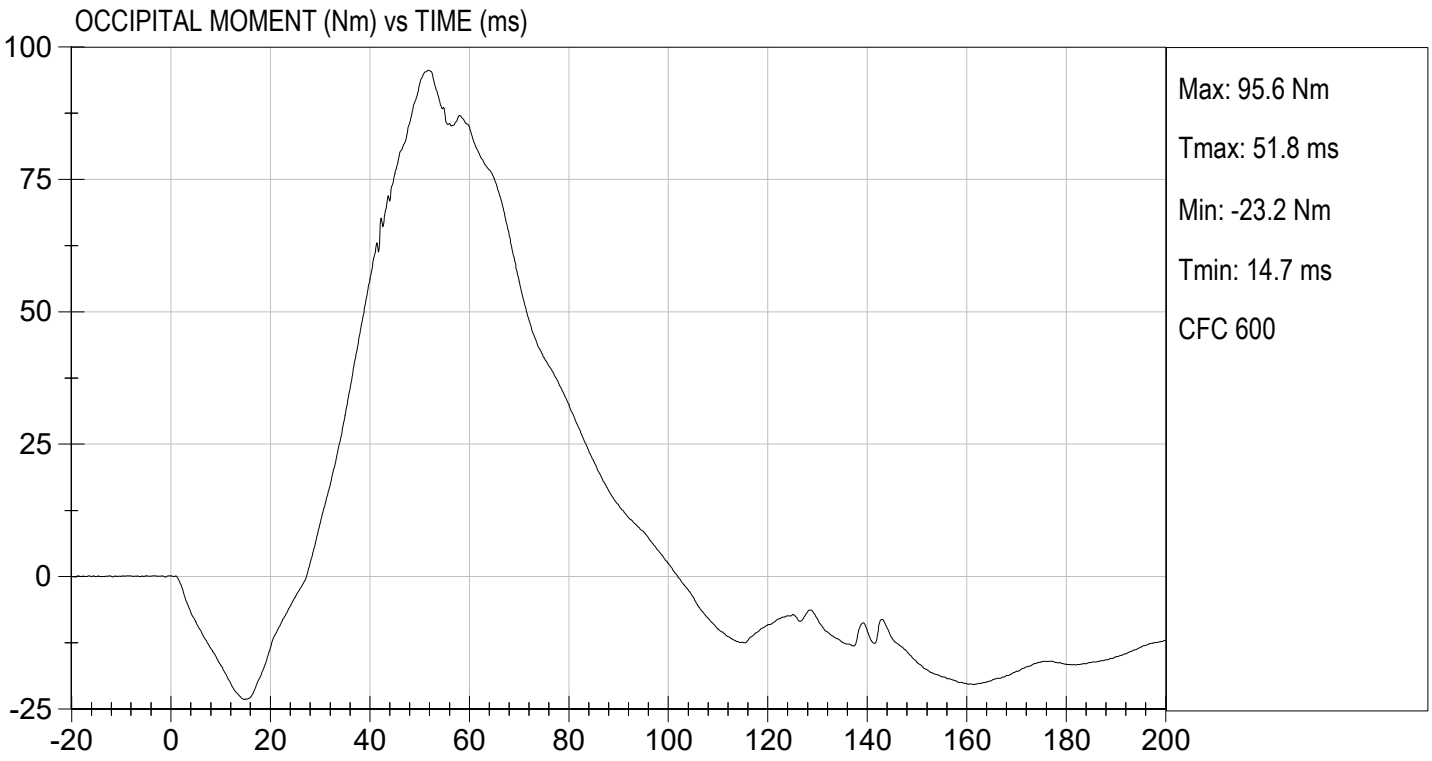


NECK ROTATION (DEG) vs TIME (ms)



TEST DESC: NECK FLEXION
VELOCITY: 22.70 ft/s, 6.92 m/s

TEST DATE: 01/25/2022
TEST #: D220182



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220183

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Velocity		m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.47	Pass
	20 ms	G's	14.00 to 19.00	17.36	Pass
	30 ms	G's	11.00 to 16.00	15.32	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	15.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.0	Pass
	Time	ms	72.0 to 82.0	75.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	161.1	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-65.0	Pass
	Time	ms	65.0 to 79.0	72.7	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.5	Pass
			Overall Test Results		Pass

Laboratory Technician

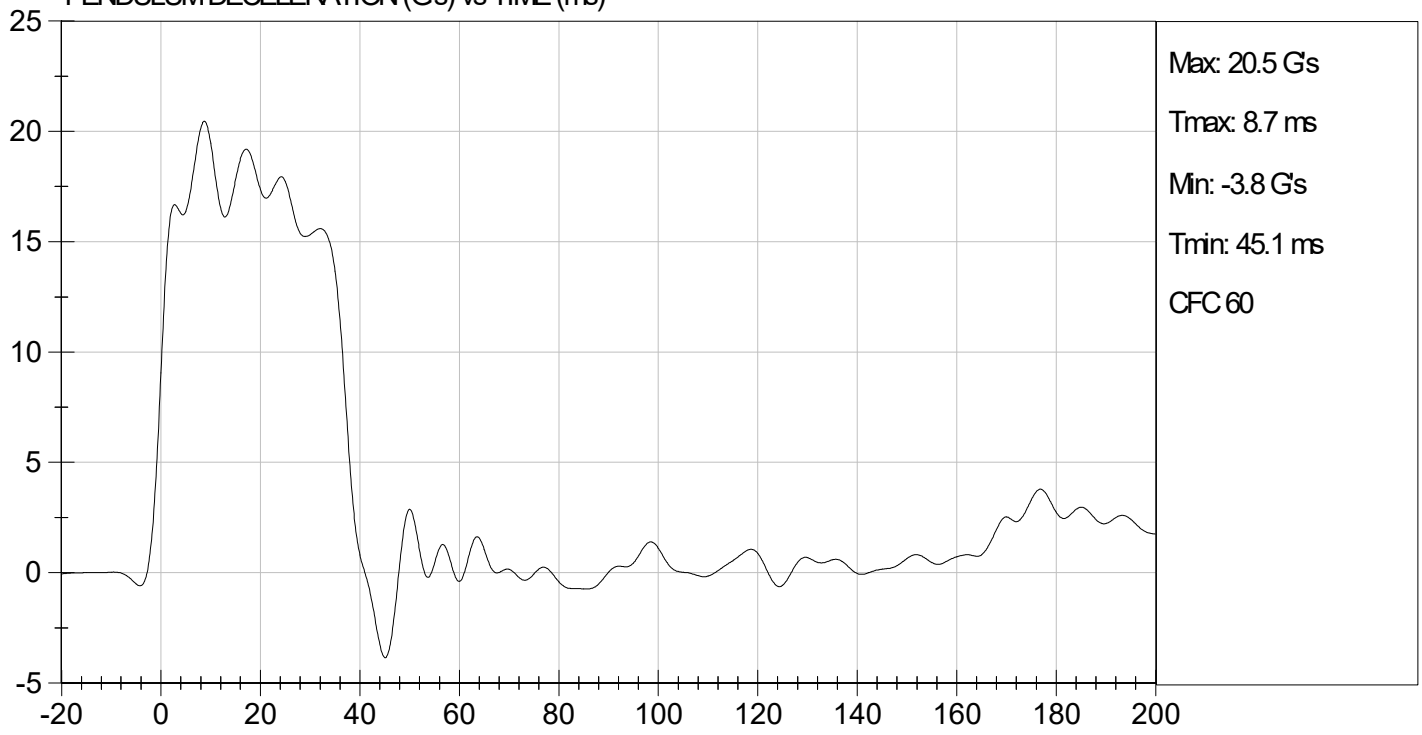
01/25/2022
Test Date

Approved By

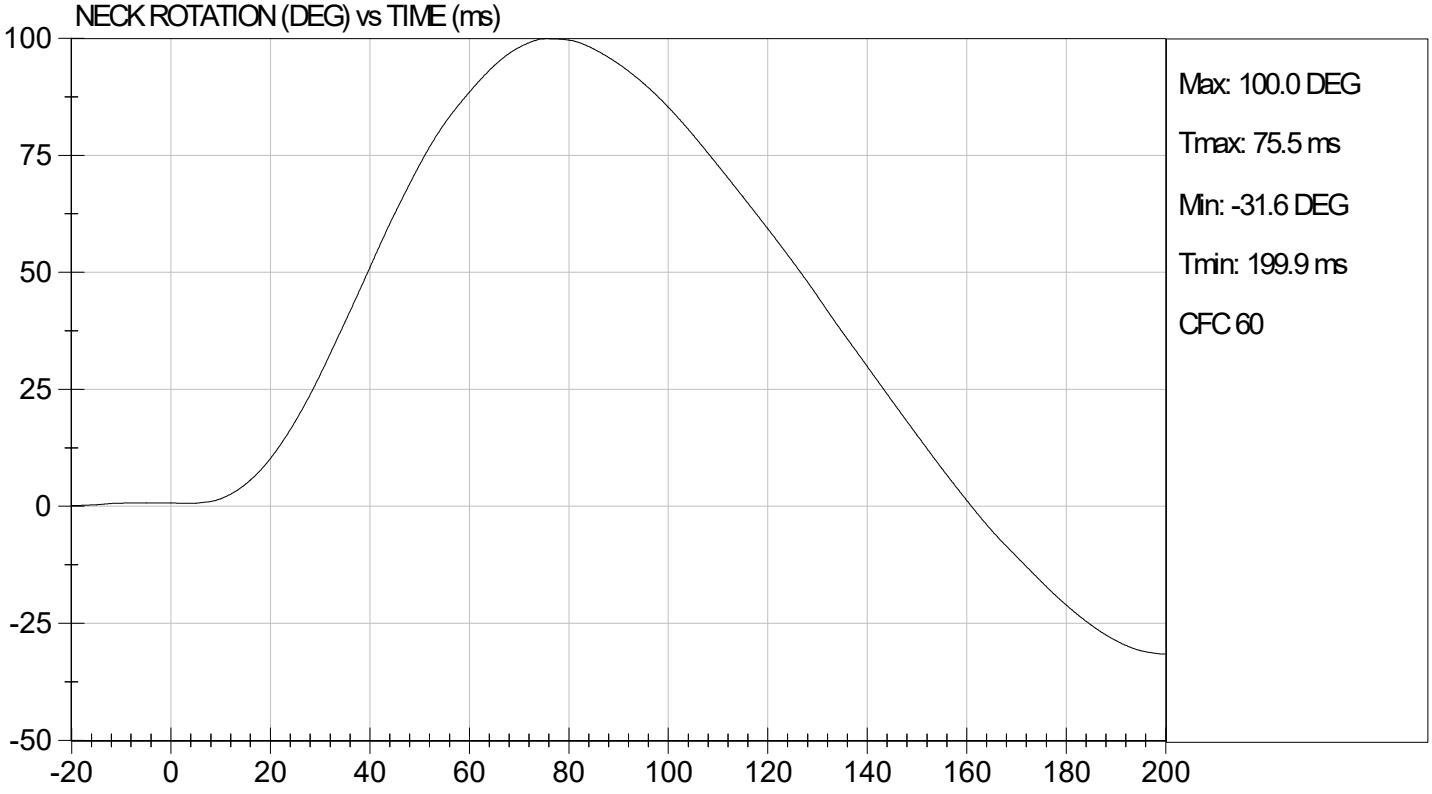
TEST DESC: NECK EXTENSION
VELOCITY: 19.61 ft/s, 5.98 m/s

TEST DATE: 01/25/2022
TEST #: D220183

PENDULUM DECELERATION (G's) vs TIME (ms)

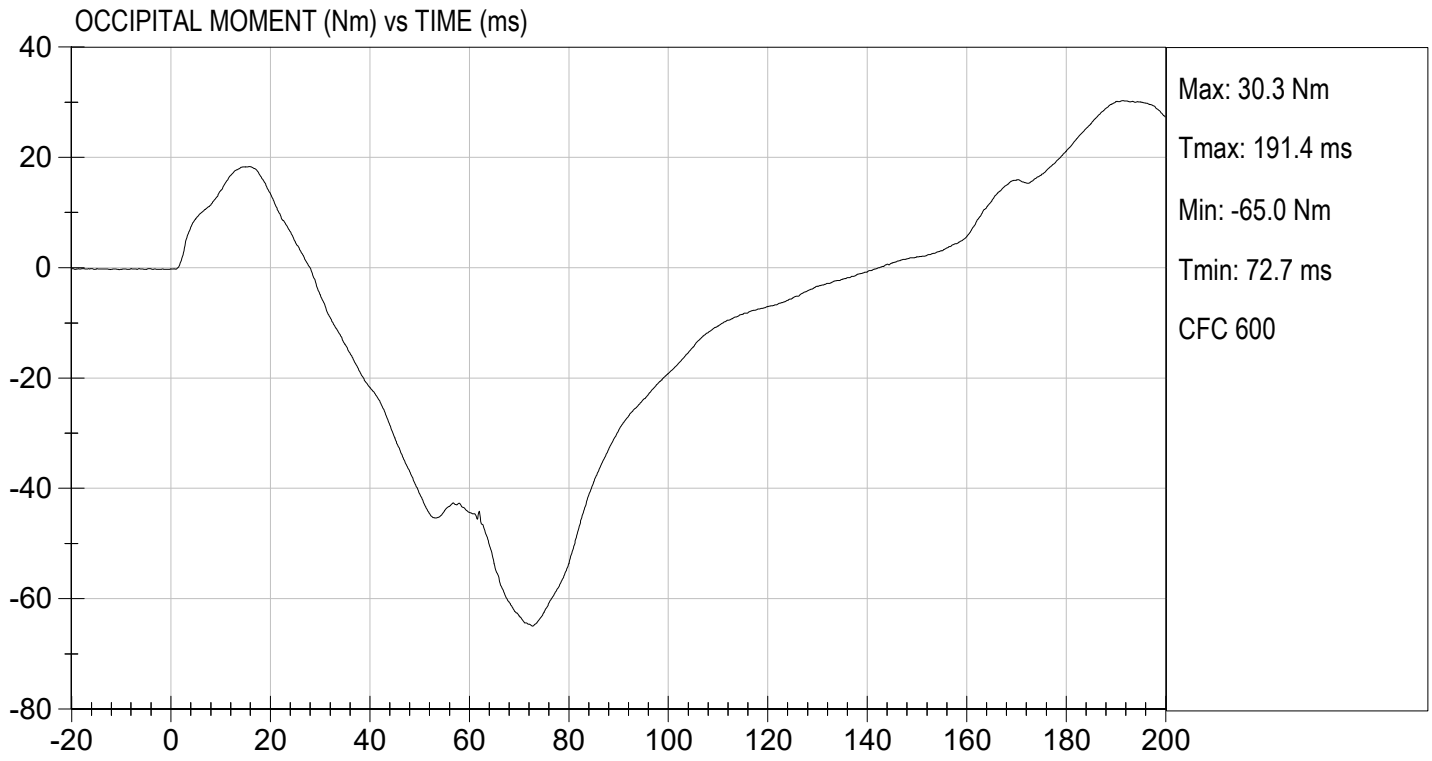


NECK ROTATION (DEG) vs TIME (ms)



TEST DESC: NECK EXTENSION
VELOCITY: 19.61 ft/s, 5.98 m/s

TEST DATE: 01/25/2022
TEST #: D220183



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220184

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,566	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.91	Pass
Internal Hysteresis	%	69 to 85	73	Pass
		Overall Test Results		Pass

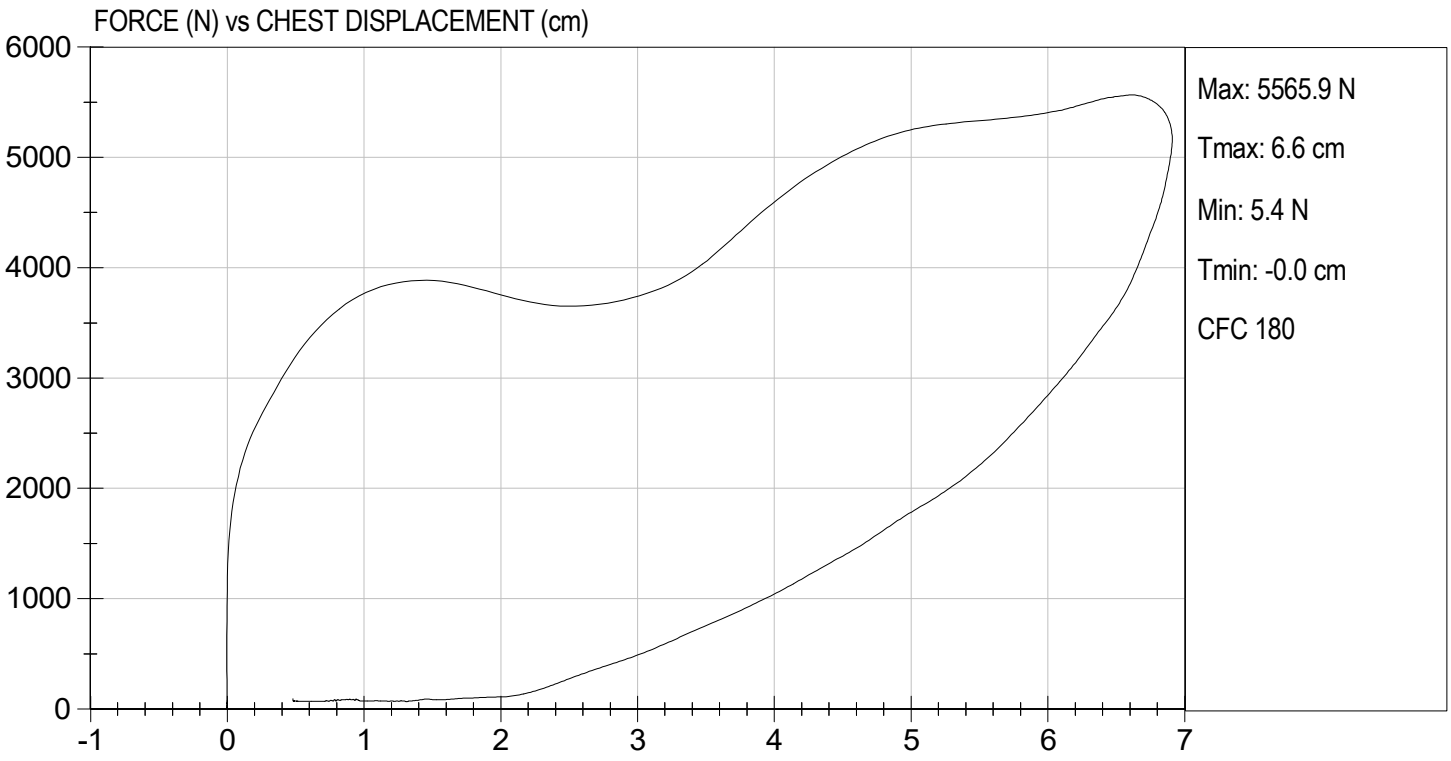
Laboratory Technician

01/25/2022
Test Date

Approved By

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

TEST DATE: 01/25/2022
TEST #: D220184



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220185

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,252	Pass
		Overall Test Results		Pass

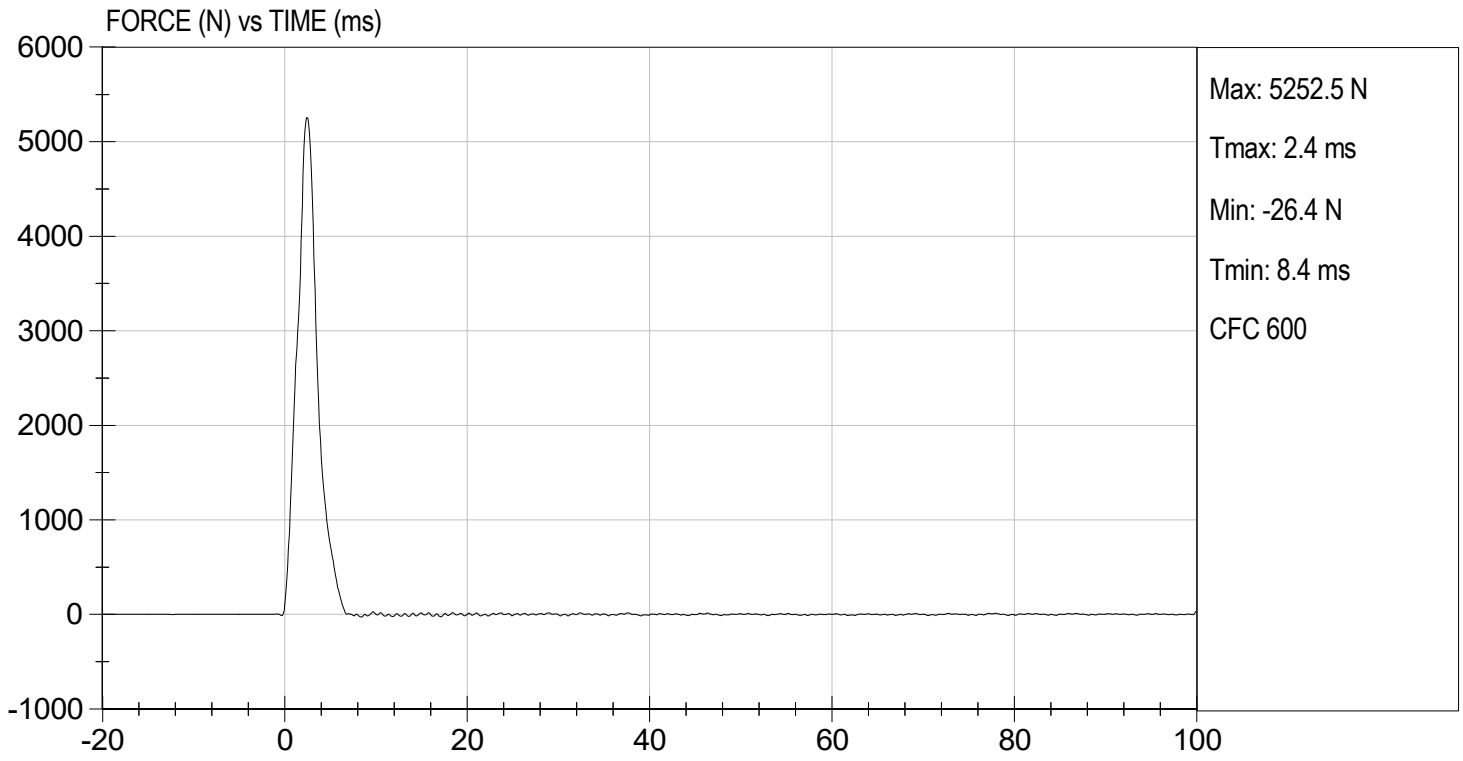
Laboratory Technician

01/25/2022
Test Date

Approved By

TEST DESC: RIGHT KNEE
VELOCITY: 6.86 ft/s, 2.09 m/s

TEST DATE: 01/25/2022
TEST #: D220185



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220186

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	4715 to 5782	5,432	Pass
		Overall Test Results		Pass

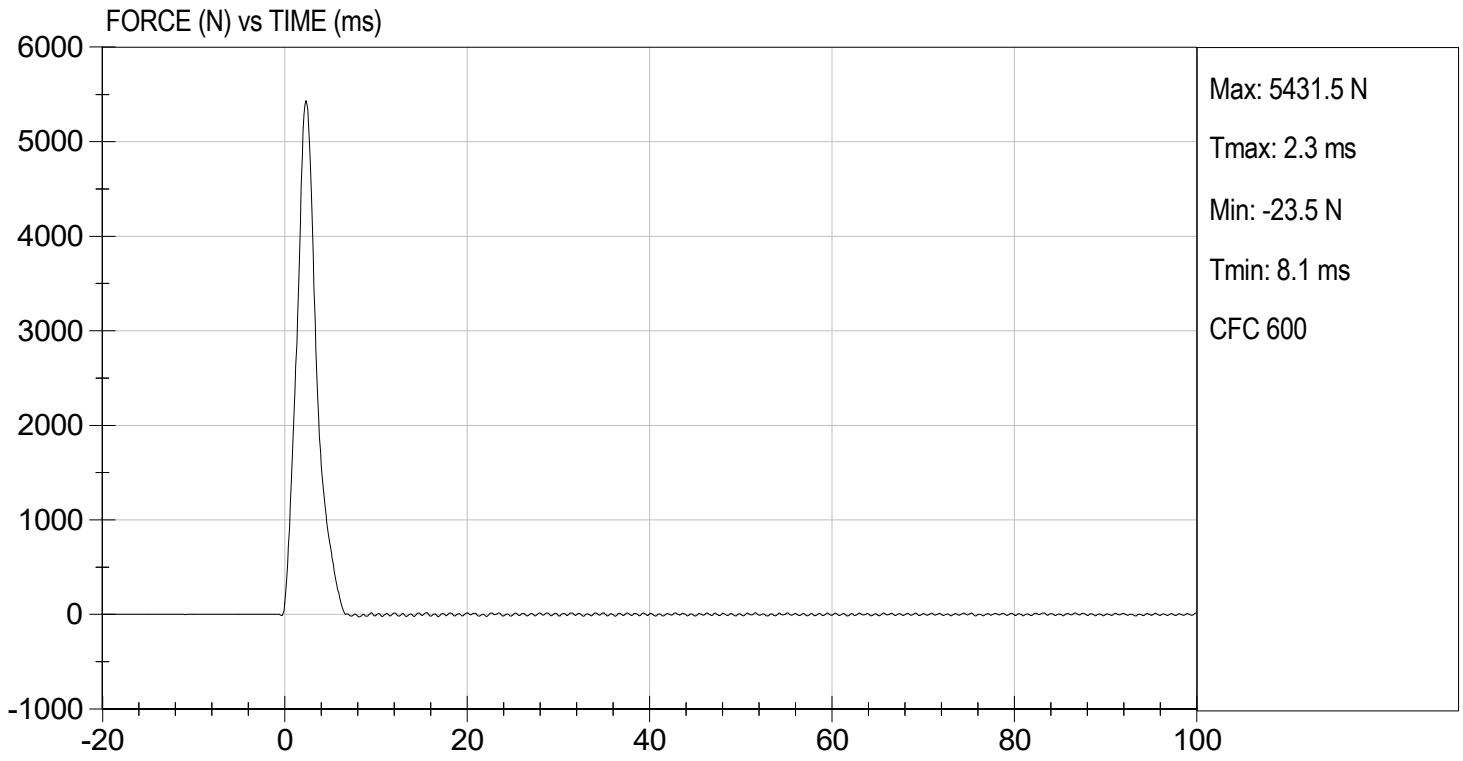
Laboratory Technician

01/25/2022
Test Date

Approved By

TEST DESC: LEFT KNEE
VELOCITY: 6.83 ft/s, 2.08 m/s

TEST DATE: 01/25/2022
TEST #: D220186



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D220180

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	19	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	6.4	Pass
30 Degrees	Nm	94.9 Nm Max	82.8	89.0	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.6	44.0	Pass
		Overall Test Results			Pass

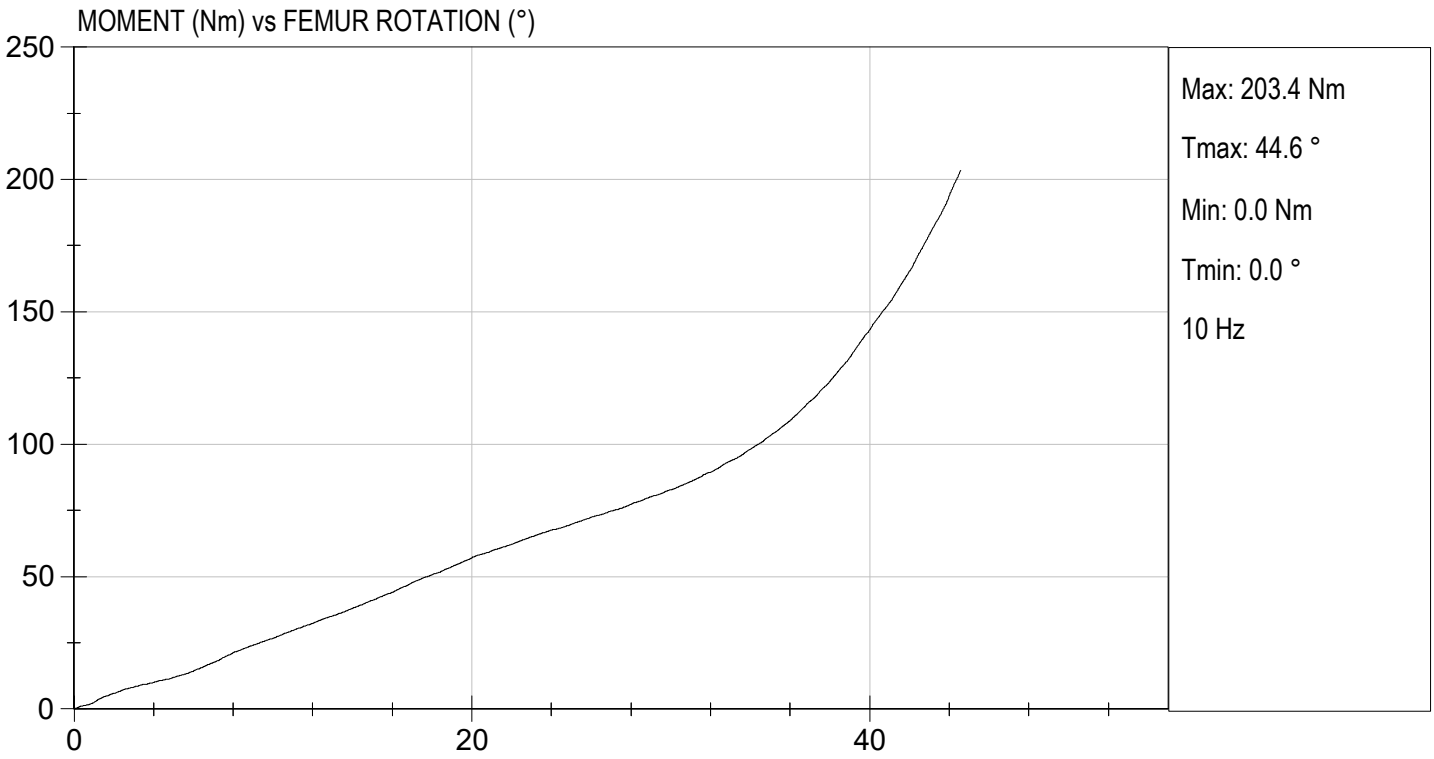
Laboratory Technician

01/25/2022
Test Date

Approved By

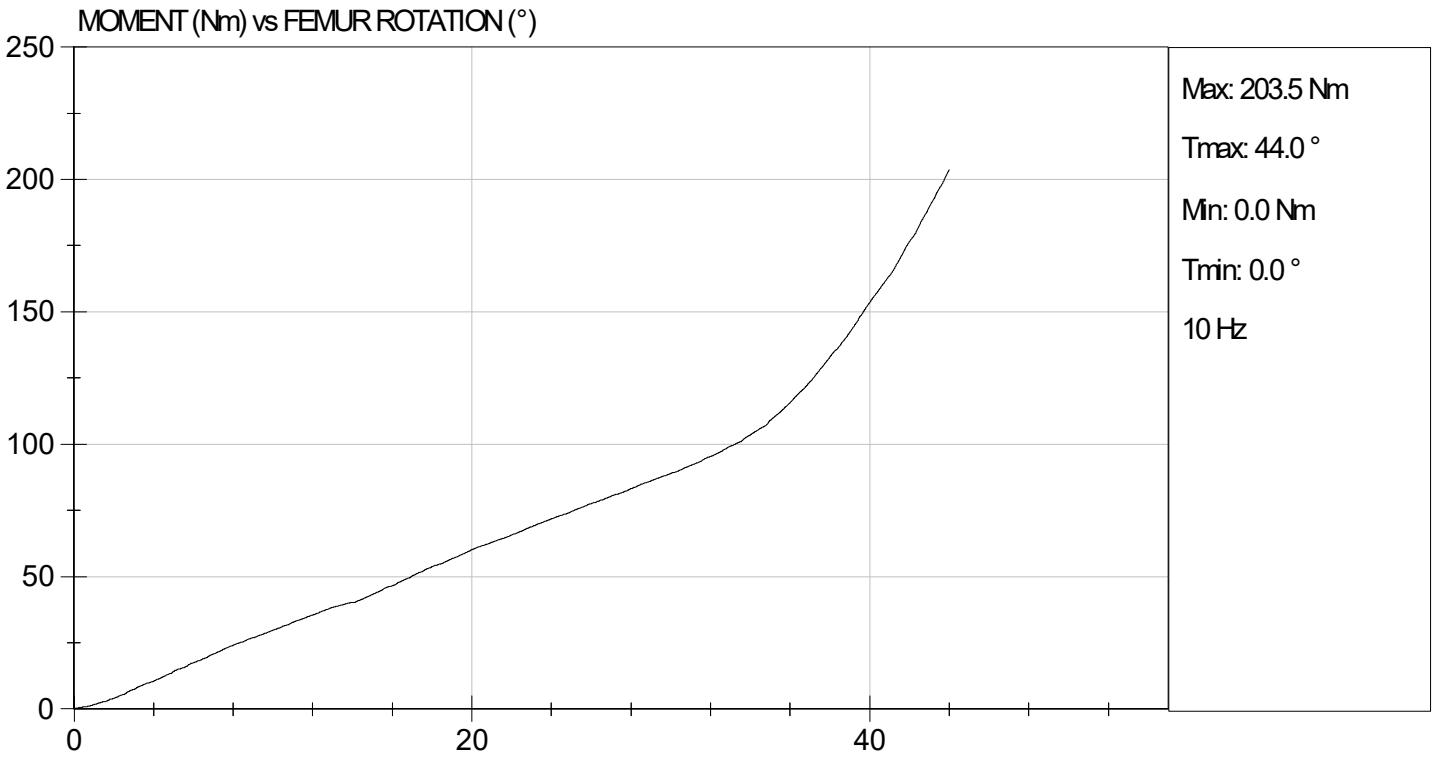
TEST DESC: RIGHT HIP FEMUR FLEXION

TEST DATE: 01/25/2022
TEST #: D220189



TEST DESC: LEFT HIP FEMUR FLEXION

TEST DATE: 01/25/2022
TEST #: D220180



CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

EXTERNAL DIMENSIONS

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	775.0
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	438.2
C	H-POINT HEIGHT	Reference	81.3-86.3	81.8
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	148.3
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	83.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	124.4
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	245.2
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	43.4
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	281.1
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	197.2
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	537.2
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376	358.8
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	403.1
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	414-439.4	435.2

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	181.2
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	227.3
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	475.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	138.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188	181.0
U	HIP BREADTH	The widest part of the hip	299.7-314.9	308.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	362.1
W	FOOT BREADTH	The widest part of the foot	78.8-94	82.8
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	545.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	870.7
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	779.9
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	350.1
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	170.0

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test ID:** D220061

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	250 to 300	269	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	2.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

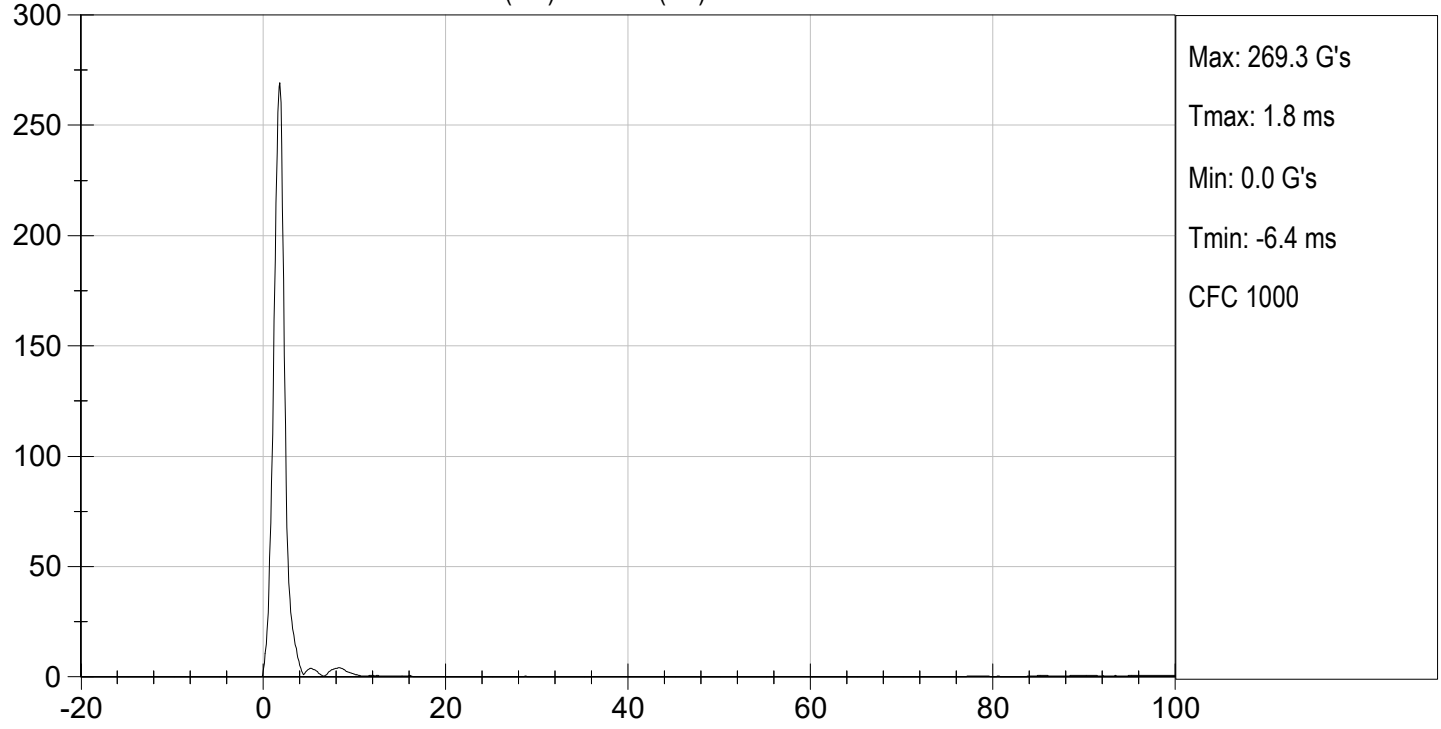
01/13/2022
Test Date

Approved By

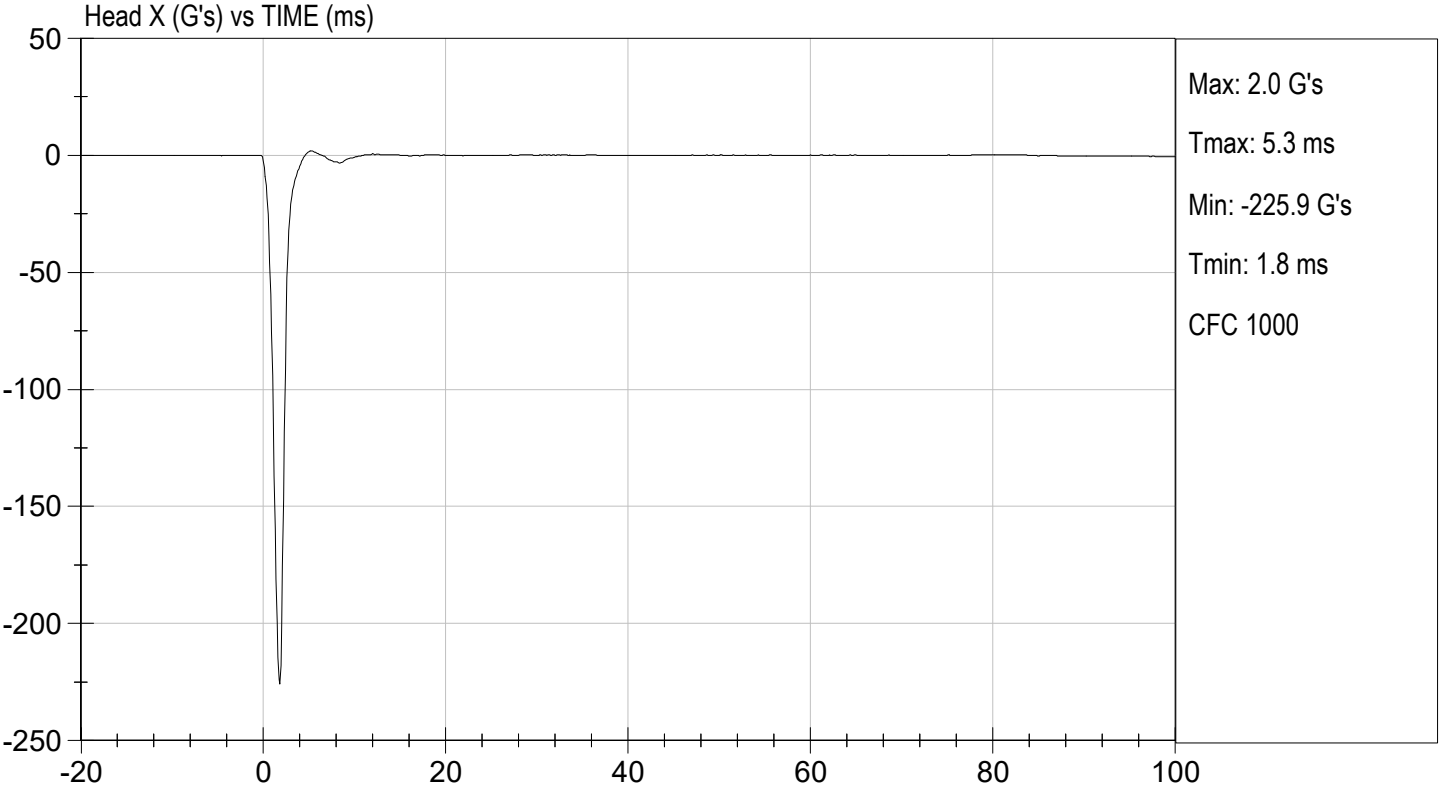
TEST DESC: HEAD DROP

TEST DATE: 01/13/2022
TEST #: D220061

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

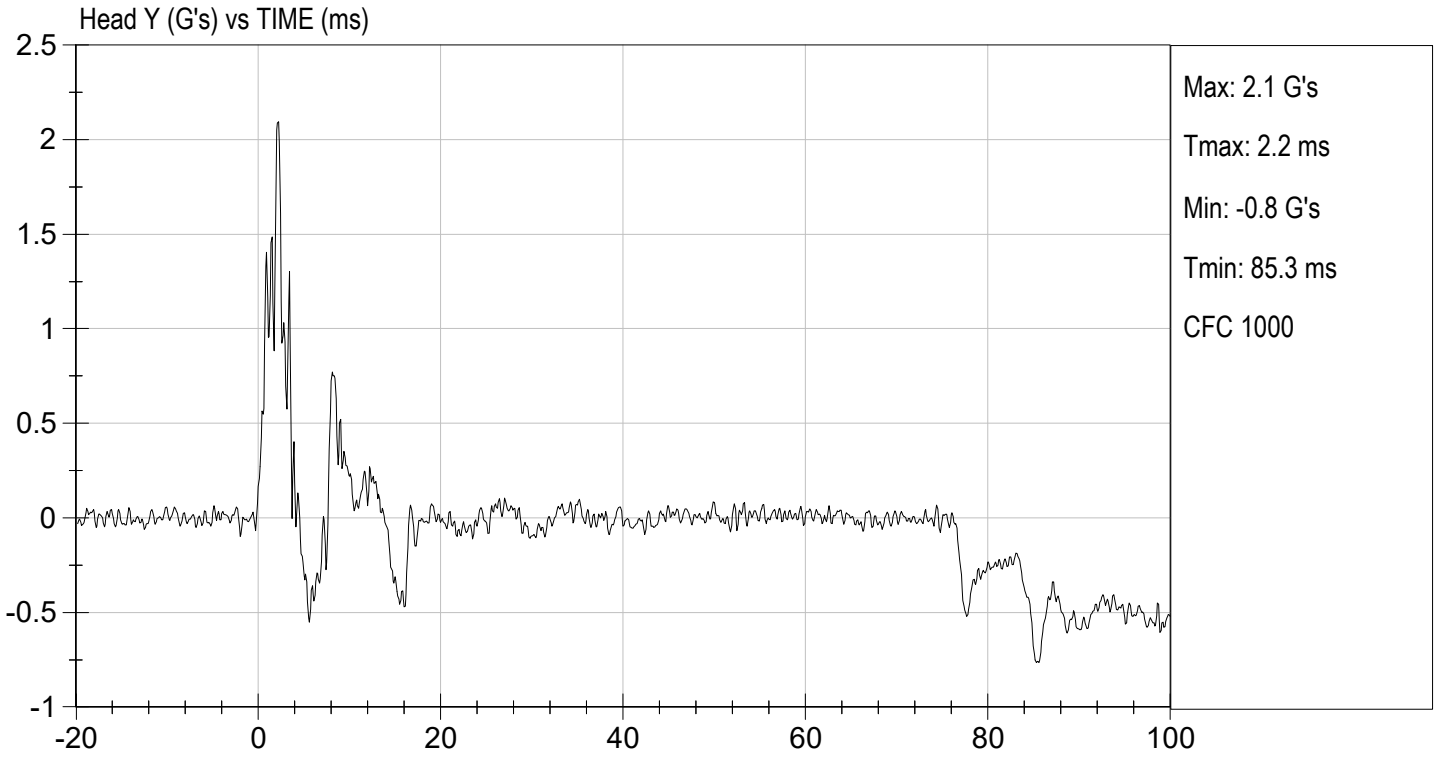


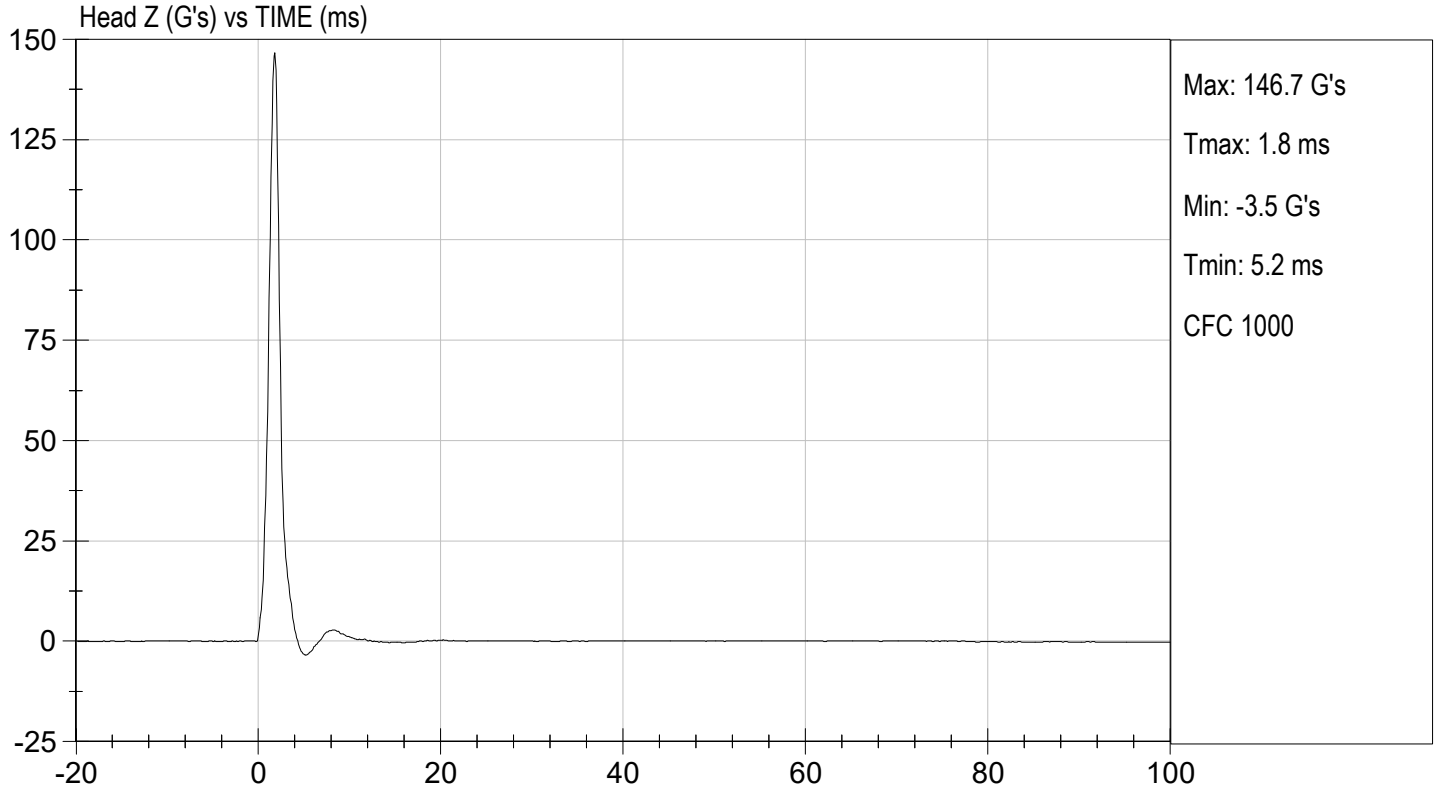
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/13/2022
TEST #: D220061





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220062

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/s	6.89 to 7.13	6.96	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
			Overall Results		Pass

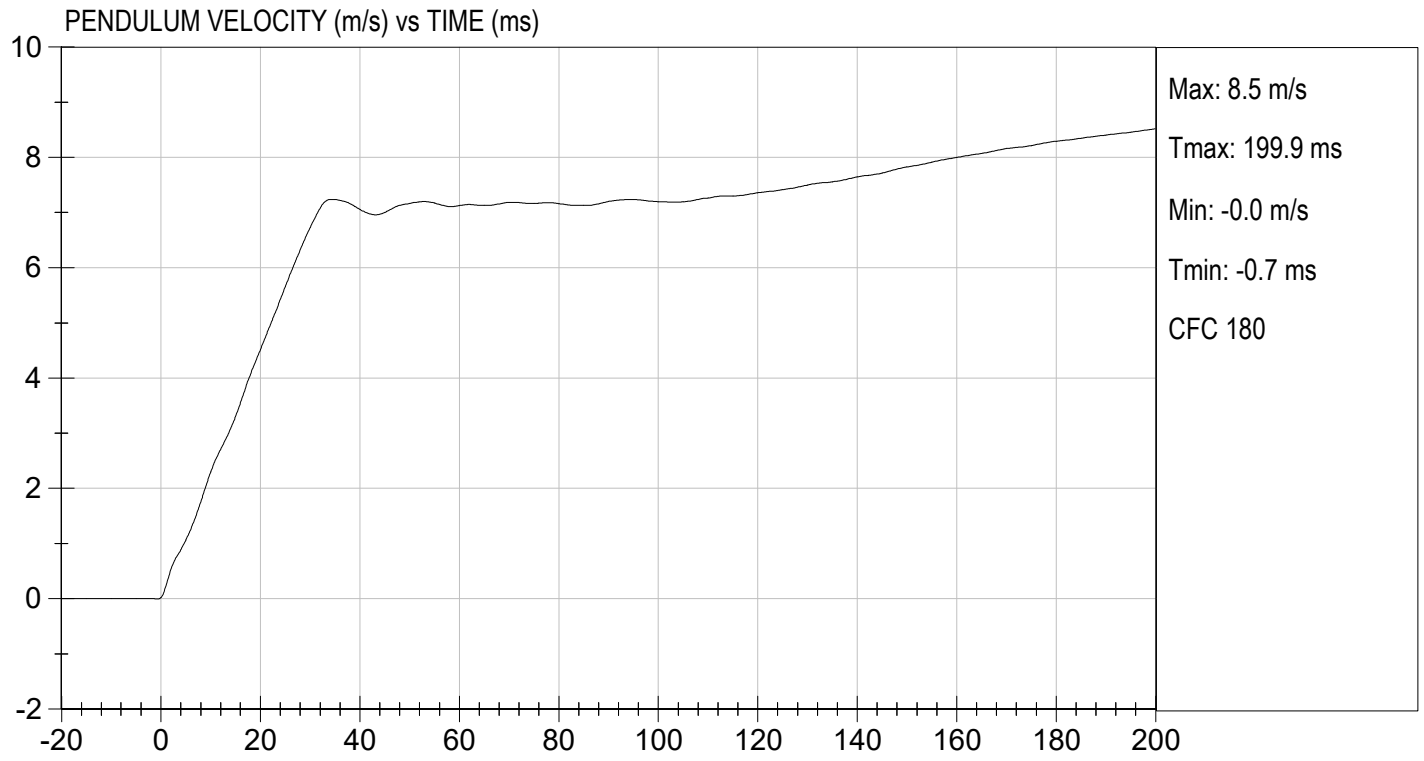
Laboratory Technician

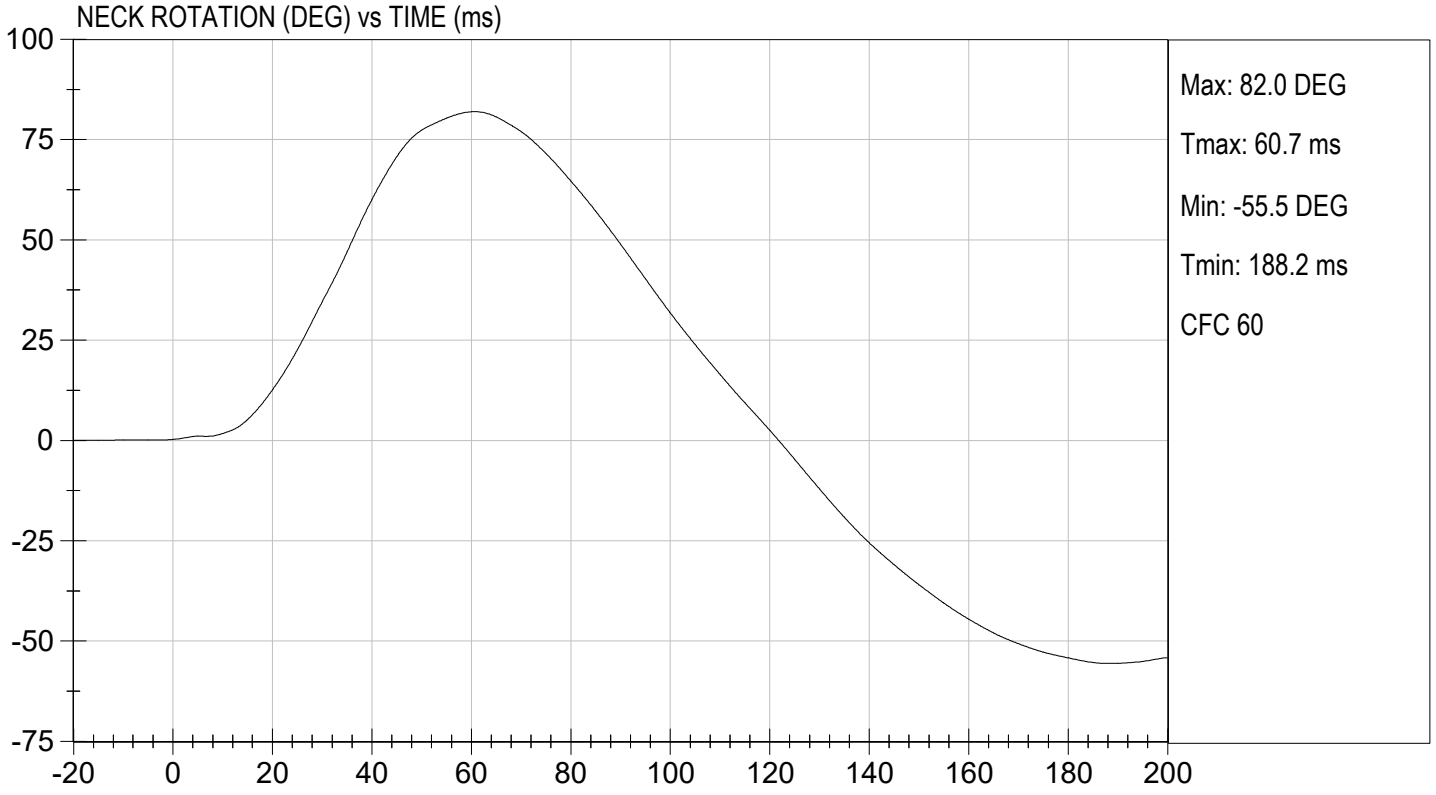
01/13/2022
Test Date

Approved By

TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

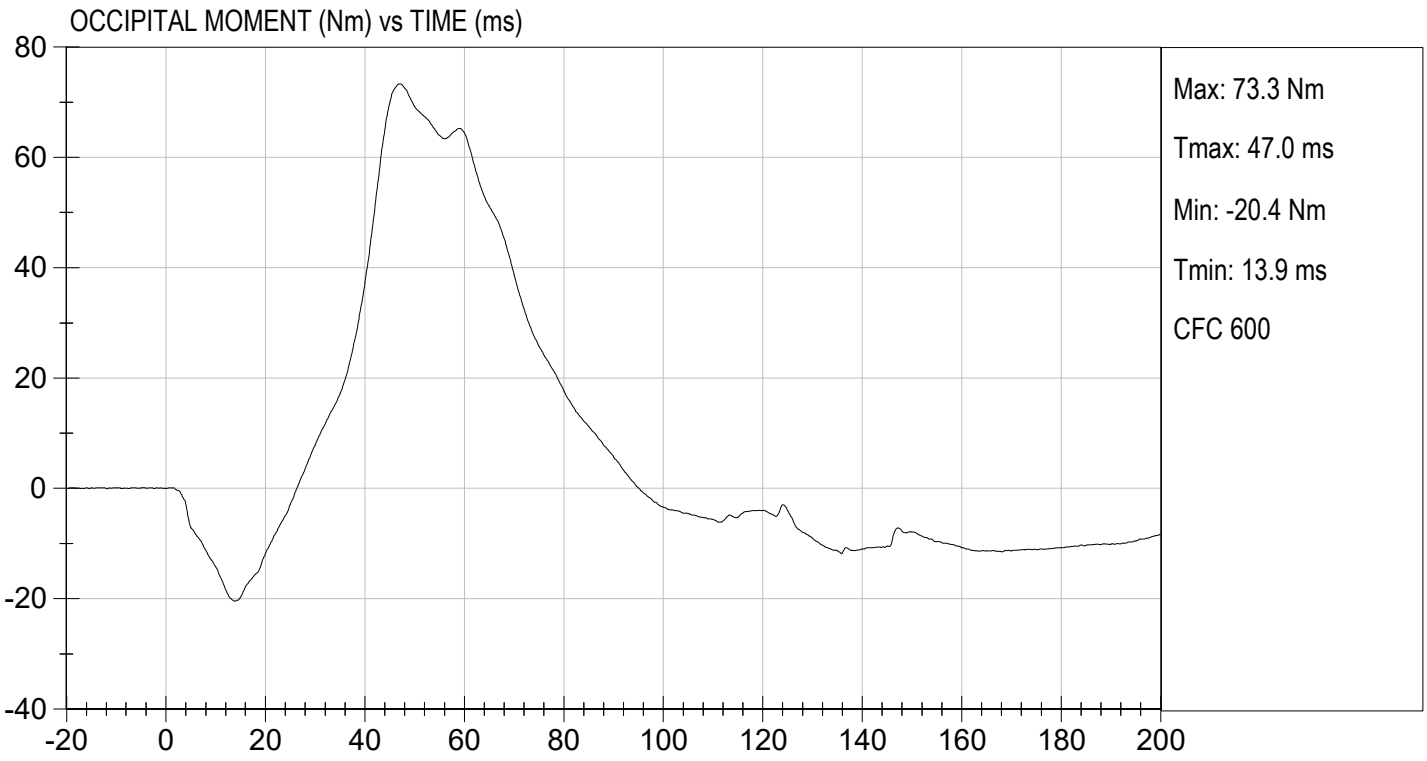
TEST DATE: 01/13/2022
TEST #: D220062





TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

TEST DATE: 01/13/2022
TEST #: D220062



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220063

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.05	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	112	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
			Overall Results		Pass

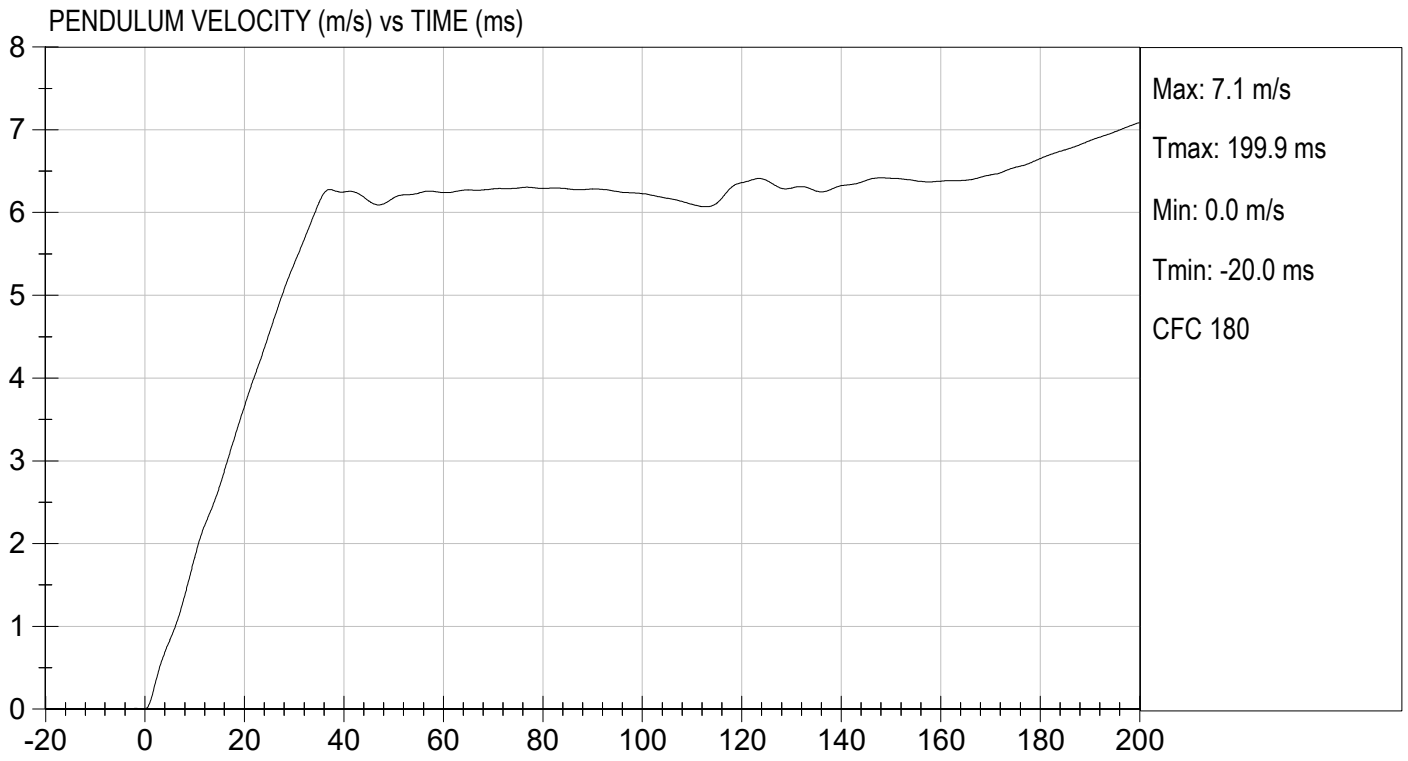
Laboratory Technician

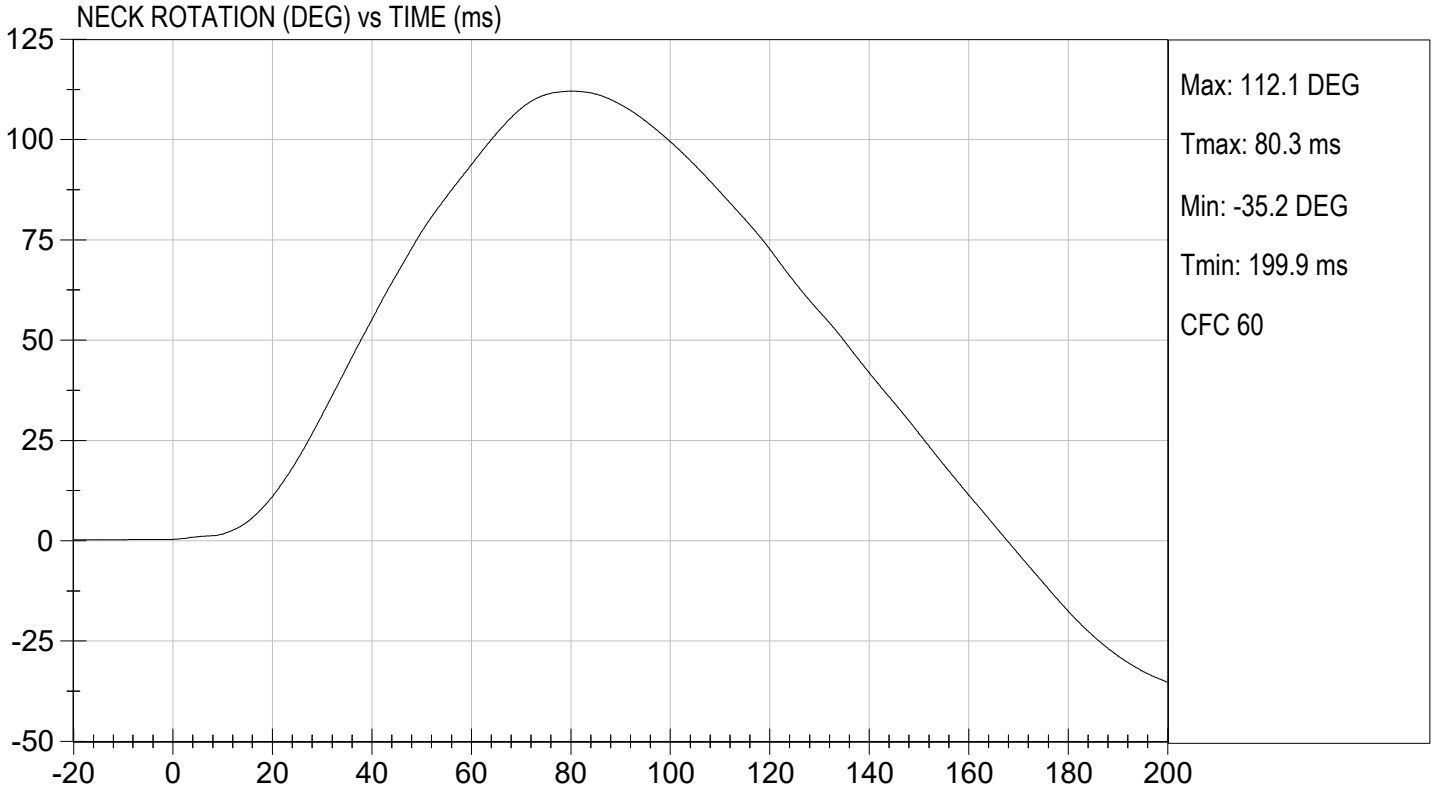
01/13/2022
Test Date

Approved By

TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

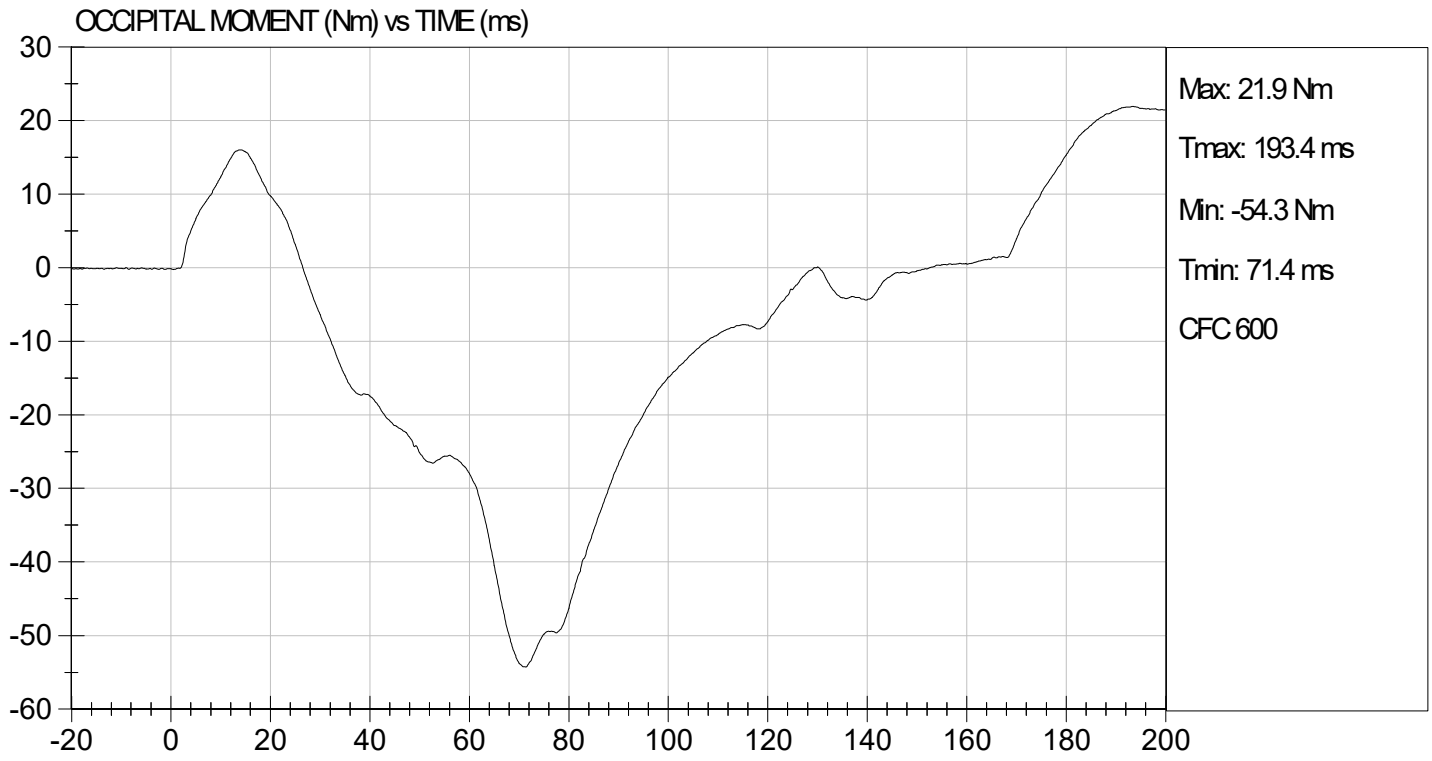
TEST DATE: 01/13/2022
TEST #: D220063





TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/13/2022
TEST #: D220063



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220064

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4343	Pass
Internal Hysteresis	%	69 to 85	76	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4375	Pass
		Overall Test Results		Pass

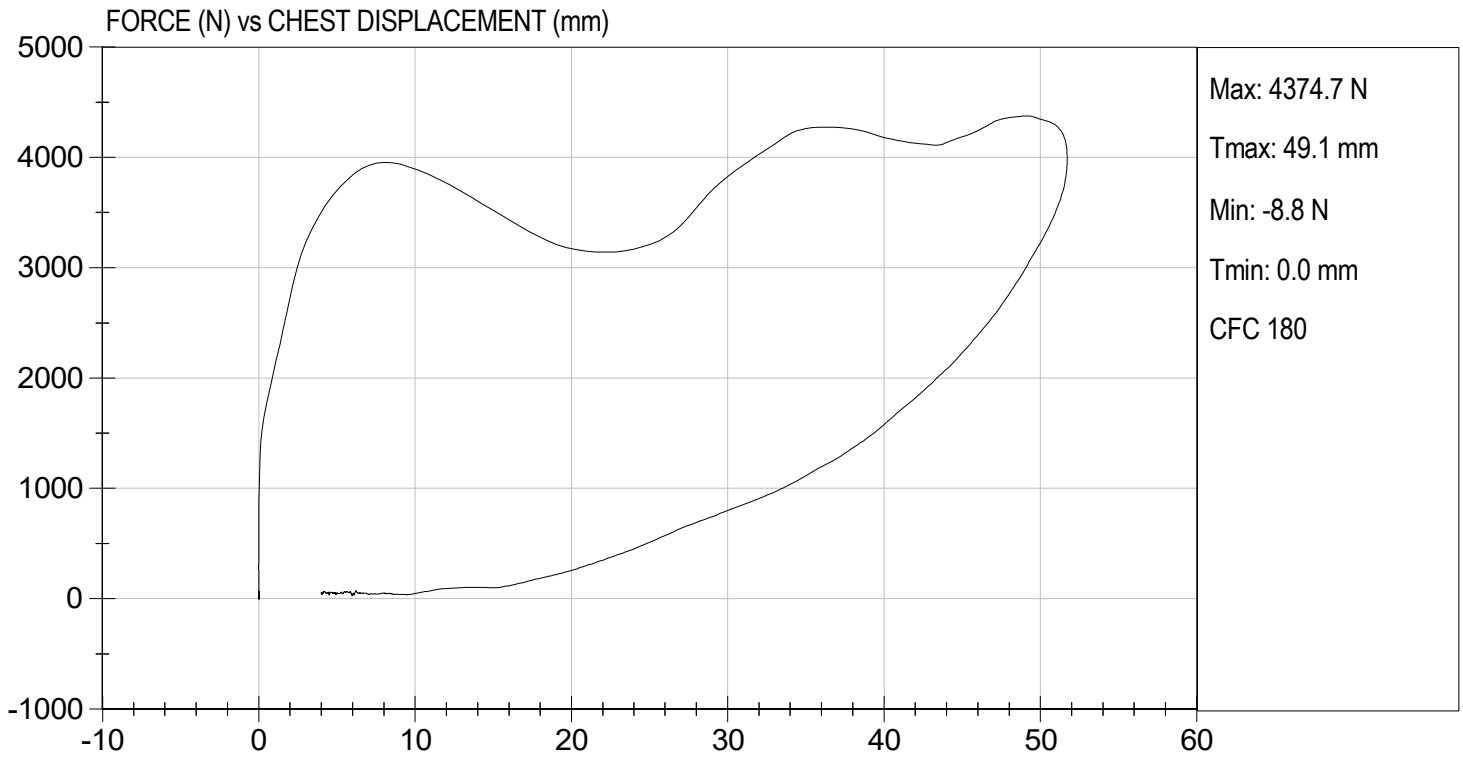
Laboratory Technician

01/12/2022
Test Date

Approved By

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

TEST DATE: 01/12/2022
TEST #: D220064



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220065

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3866	Pass
		Overall Test Results		Pass

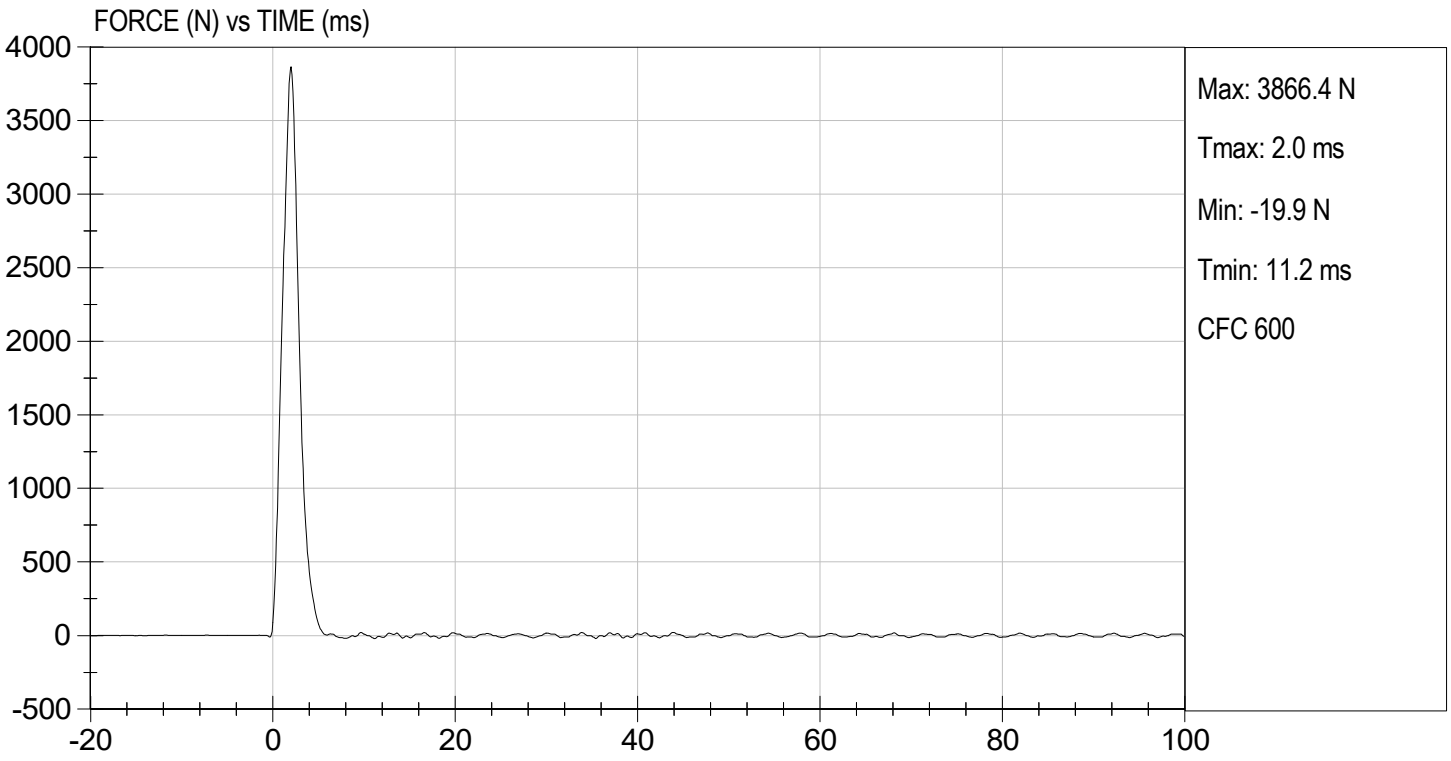
Laboratory Technician

01/13/2022
Test Date

Approved By

TEST DESC: RIGHT KNEE
VELOCITY: 6.92 ft/s, 2.11 m/s

TEST DATE: 01/13/2022
TEST #: D220065



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220066

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3733	Pass
		Overall Test Results		Pass

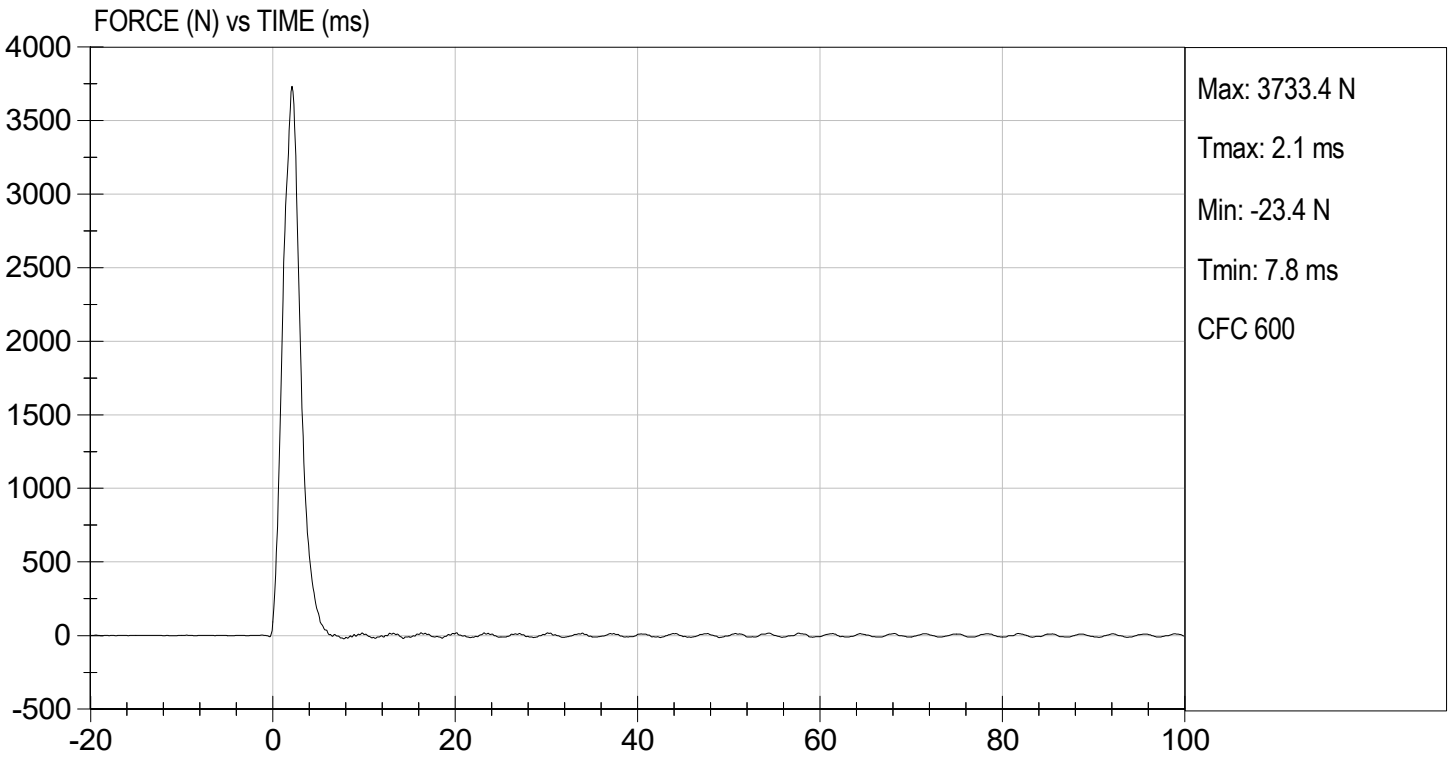
Laboratory Technician

01/13/2022
Test Date

Approved By

TEST DESC: LEFT KNEE
VELOCITY: 6.97 ft/s, 2.12 m/s

TEST DATE: 01/13/2022
TEST #: D220066



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220067

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	363	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
		Overall Result		Pass

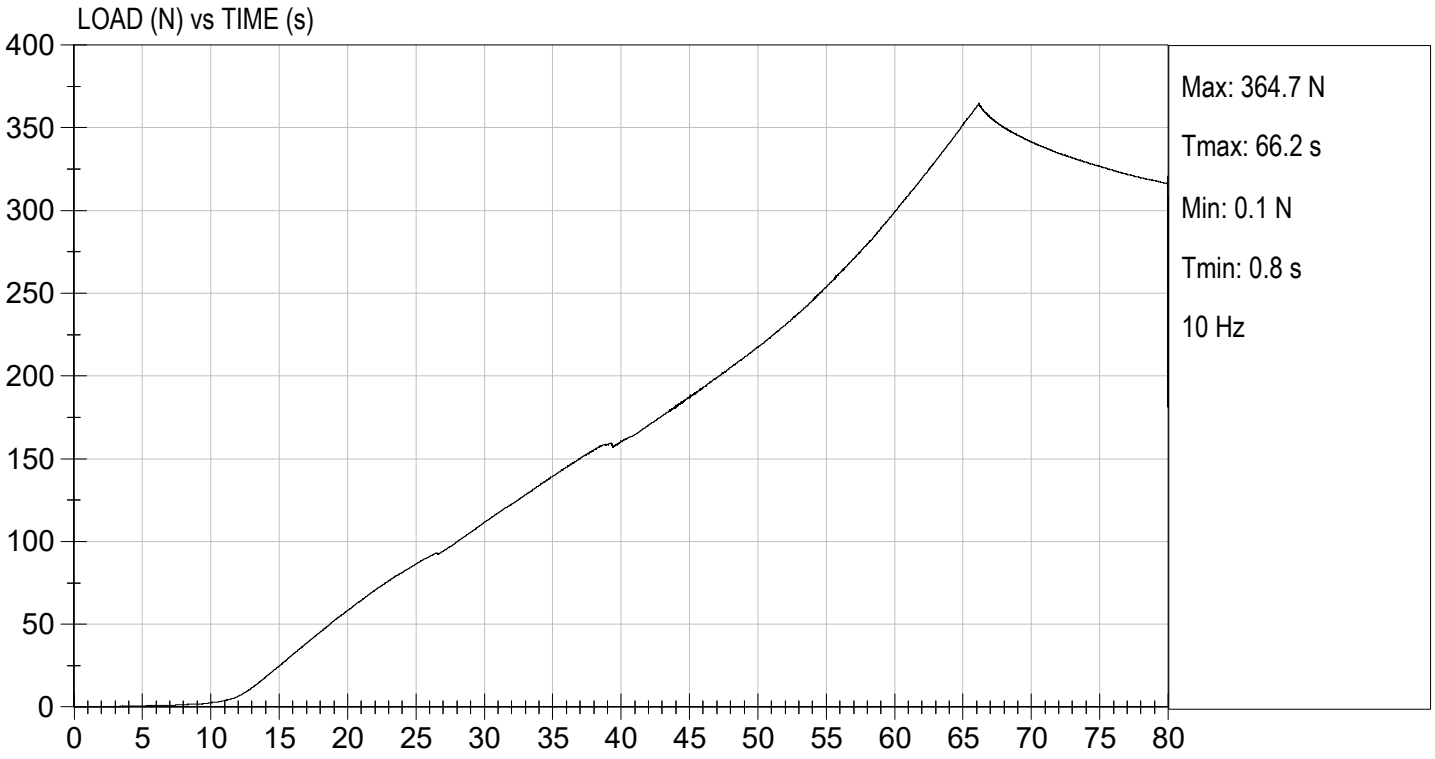
Laboratory Technician

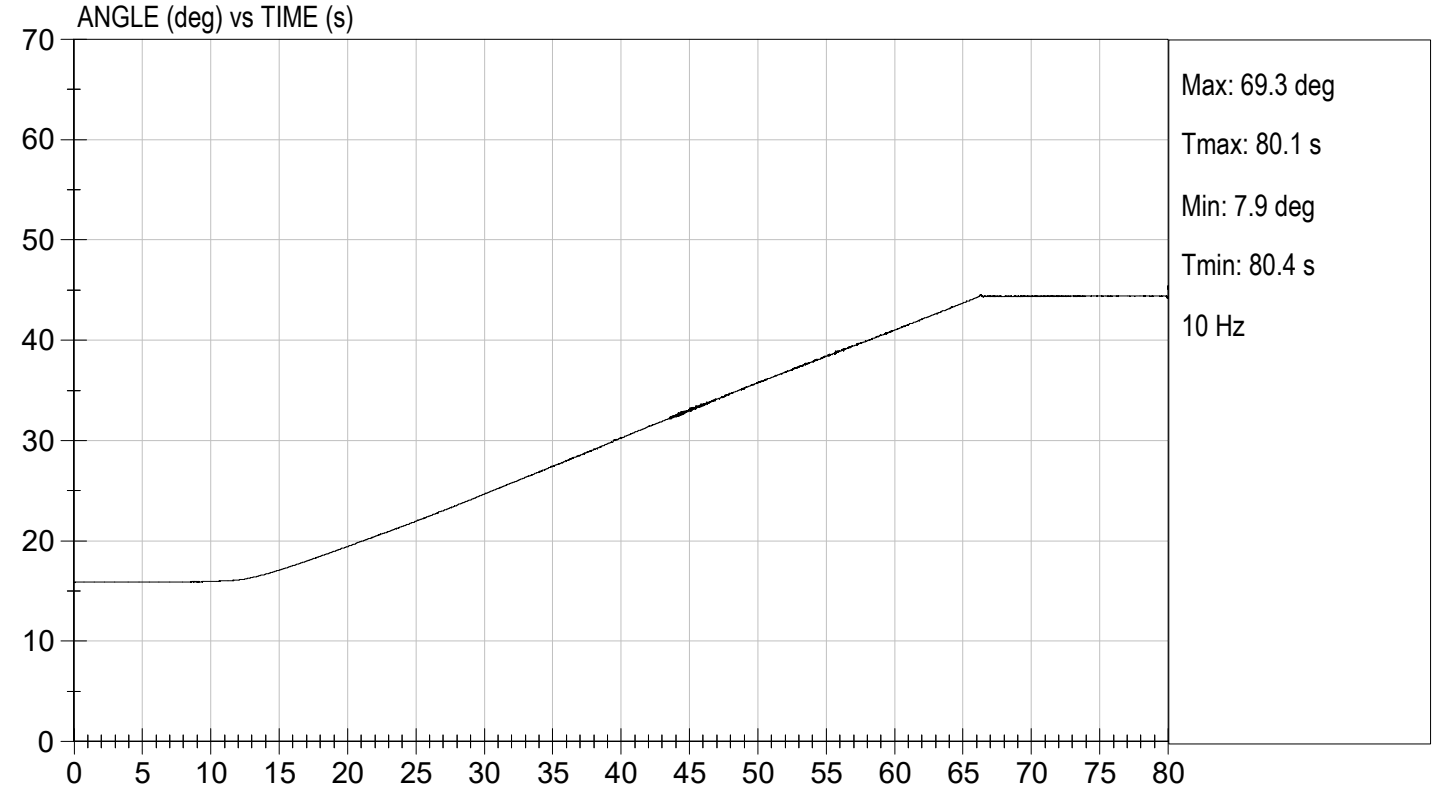
01/13/2022
Test Date

Approved By

TEST DESC: LUMBAR FLEXION

TEST DATE: 01/13/2022
TEST #: D220067





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test ID:** D220191

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	250 to 300	297	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	6.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

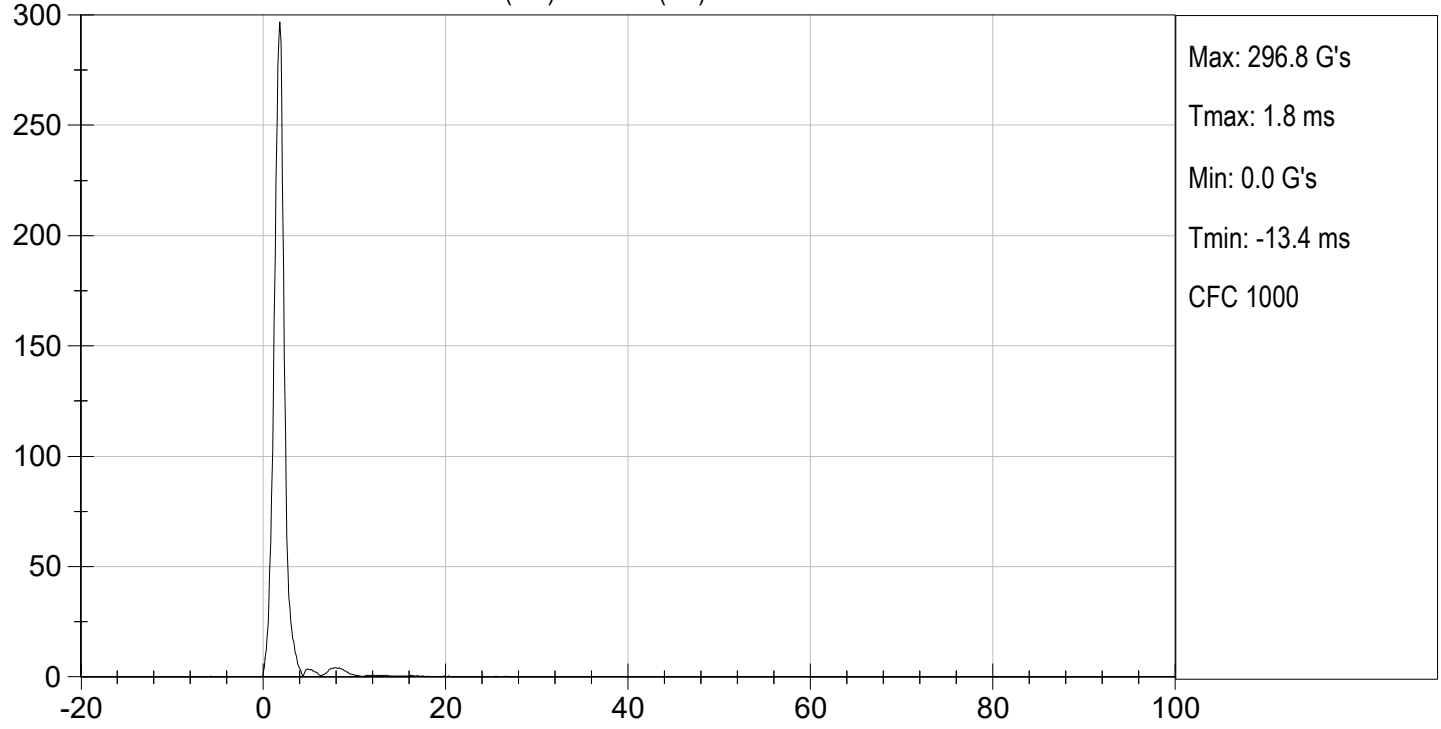
01/24/2022
Test Date

Approved By

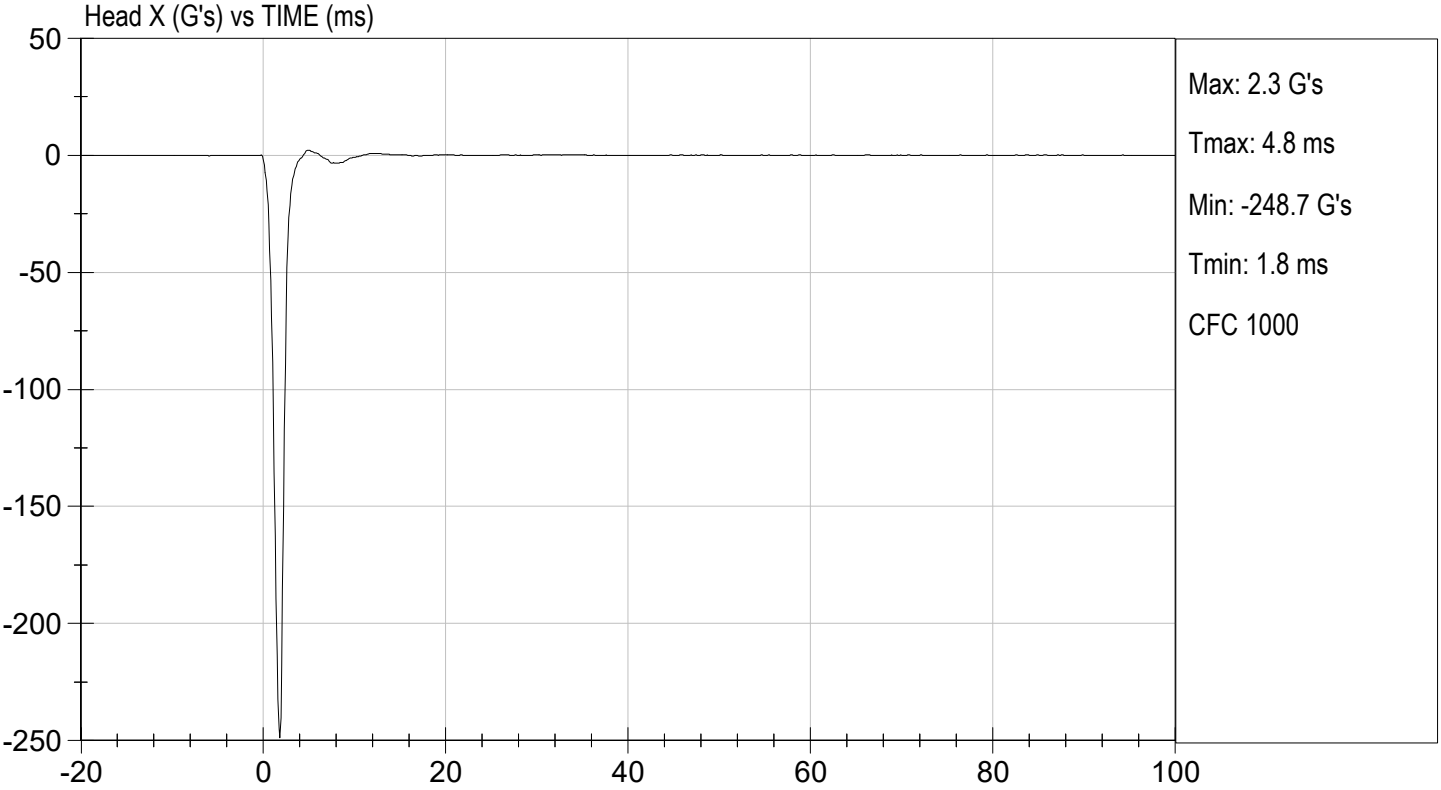
TEST DESC: HEAD DROP

TEST DATE: 01/24/2022
TEST #: D220191

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

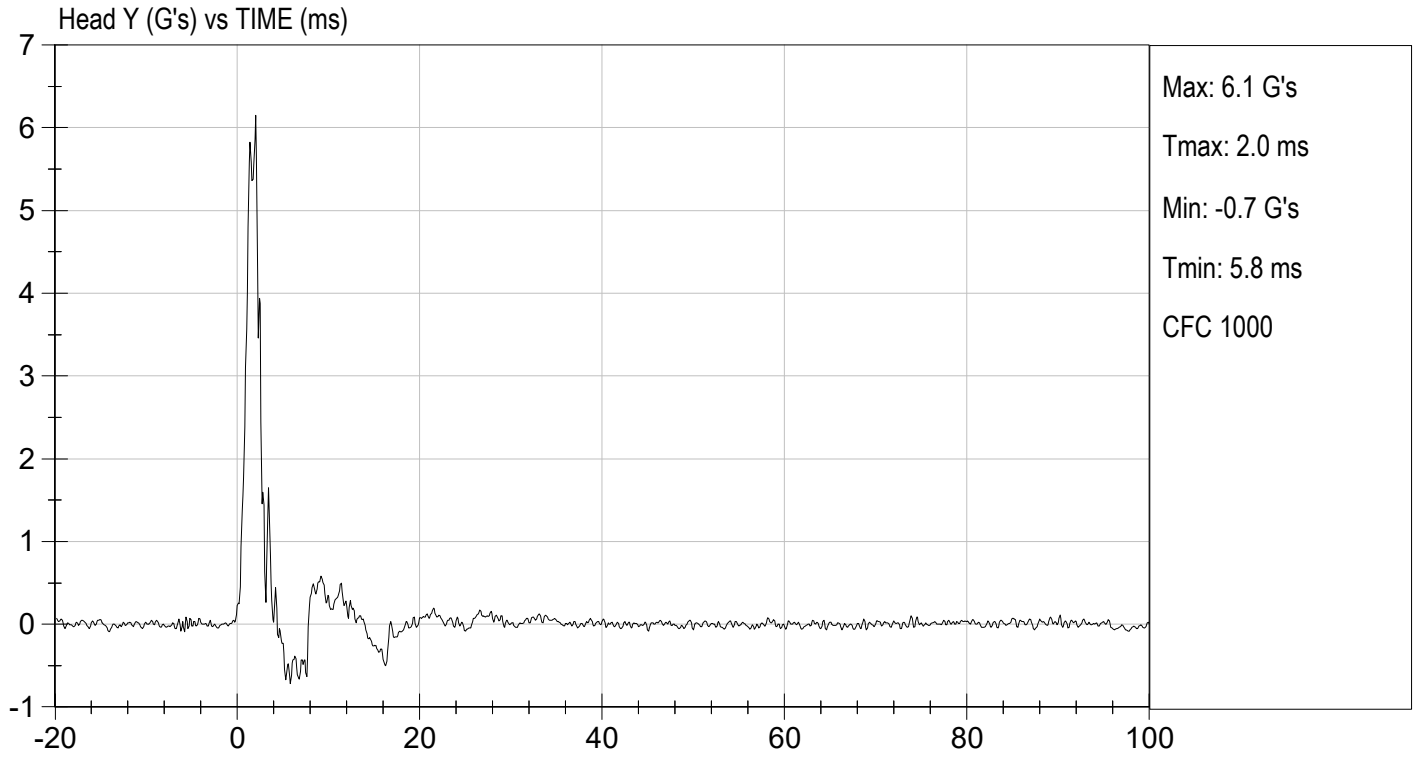


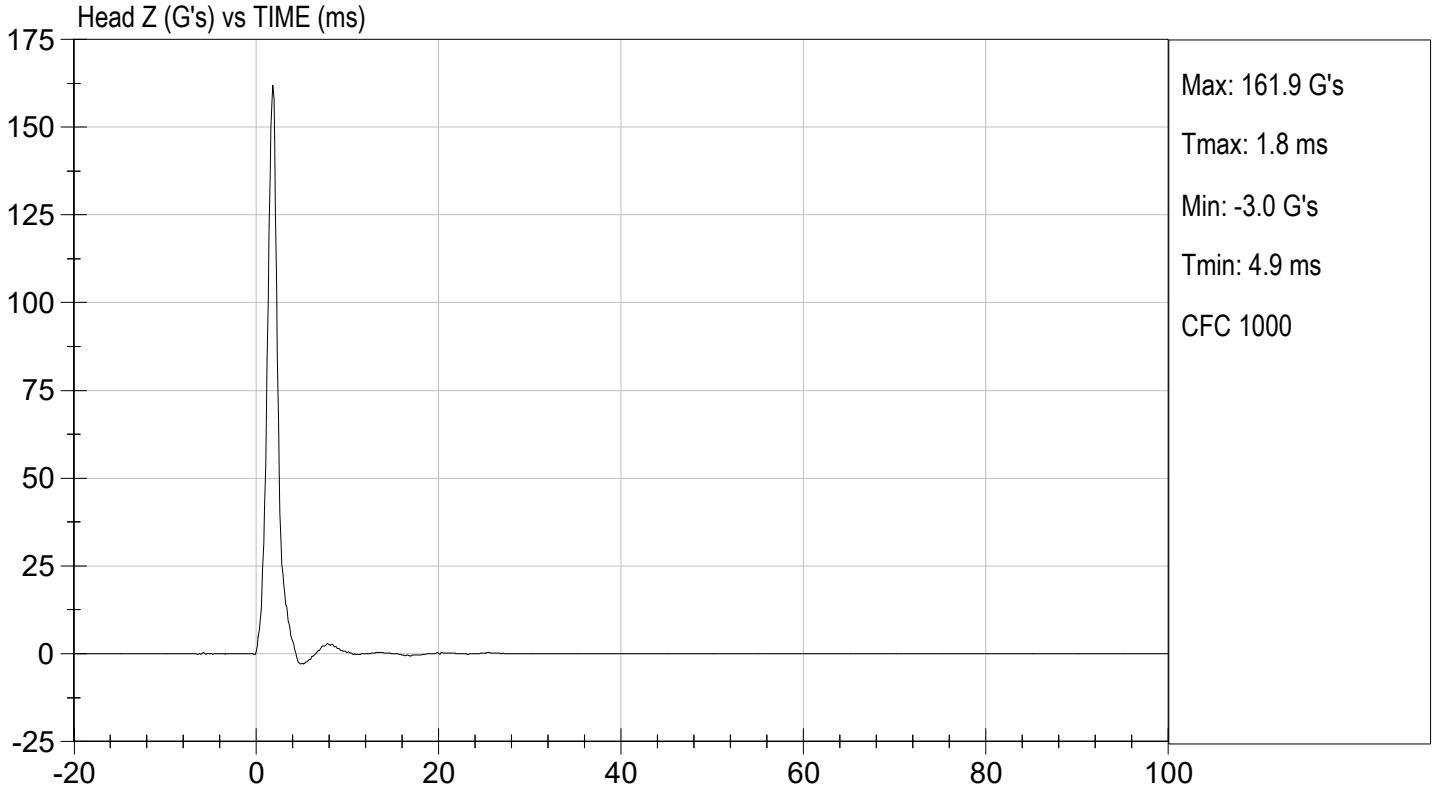
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/24/2022
TEST #: D220191





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220192

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.8	Pass
	30 ms	m/s	5.8 to 7.0	6.9	Pass
D Plane Rotation	Max	deg	77 to 91	85	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
			Overall Results		Pass

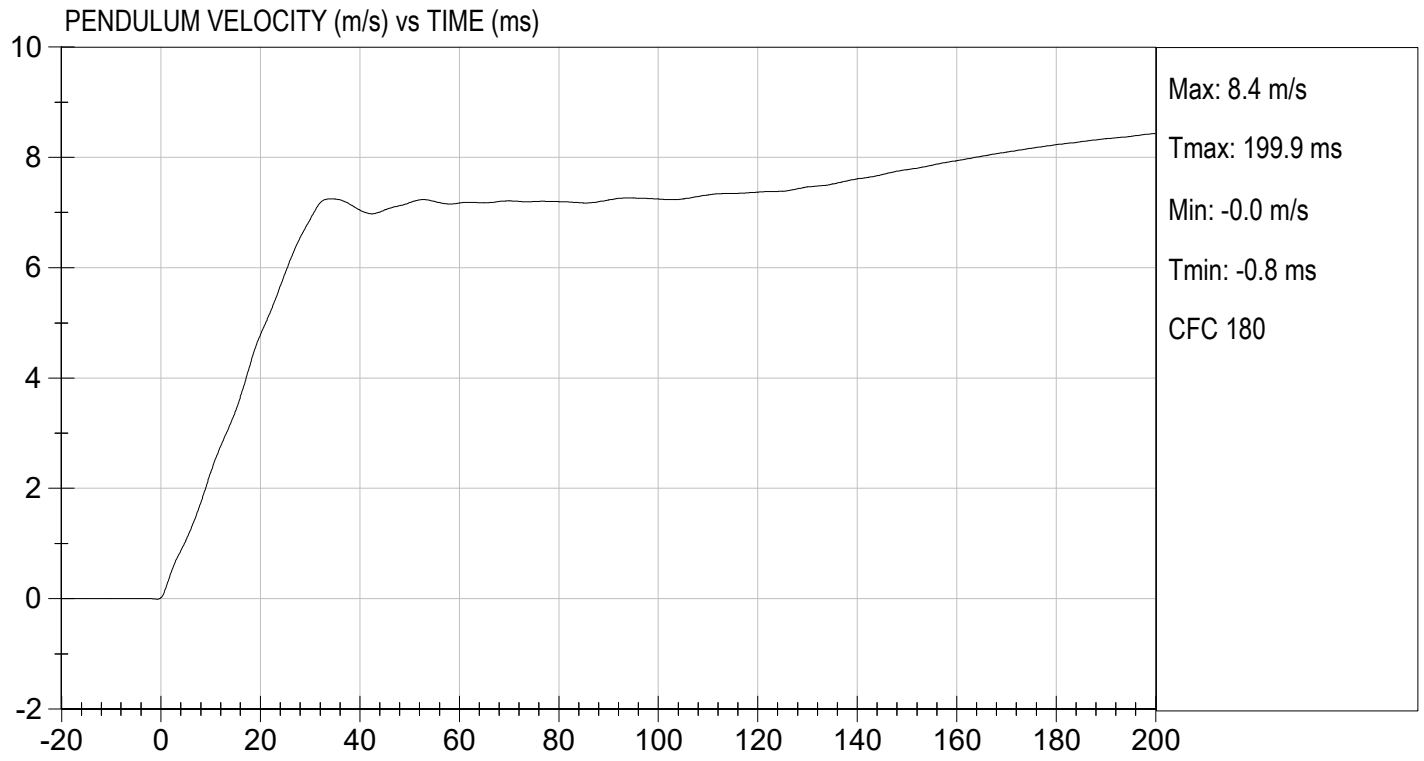
Laboratory Technician

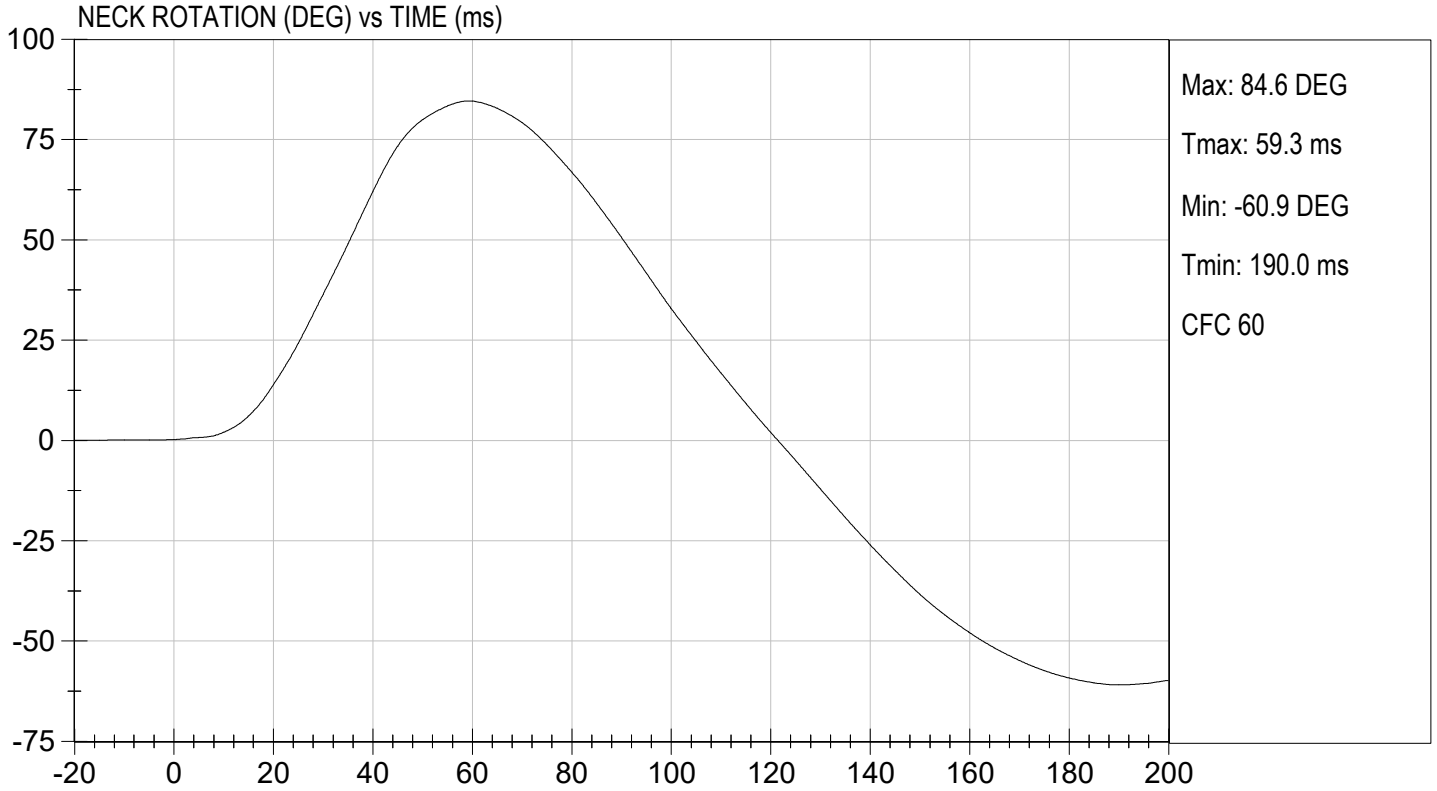
01/25/2022
Test Date

Approved By

TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

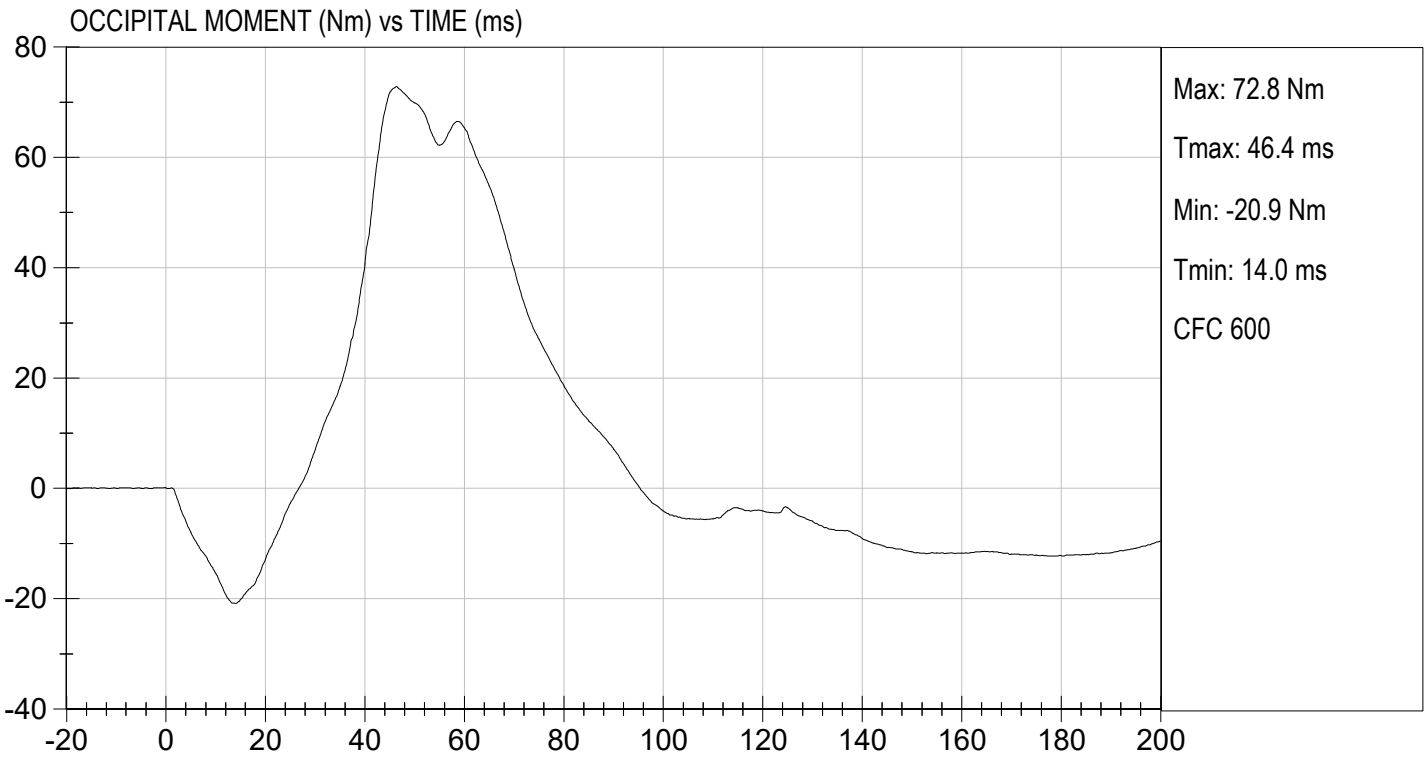
TEST DATE: 01/25/2022
TEST #: D220192





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 01/25/2022
TEST #: D220192



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220193

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.05	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	113	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	106	Pass
			Overall Results		Pass

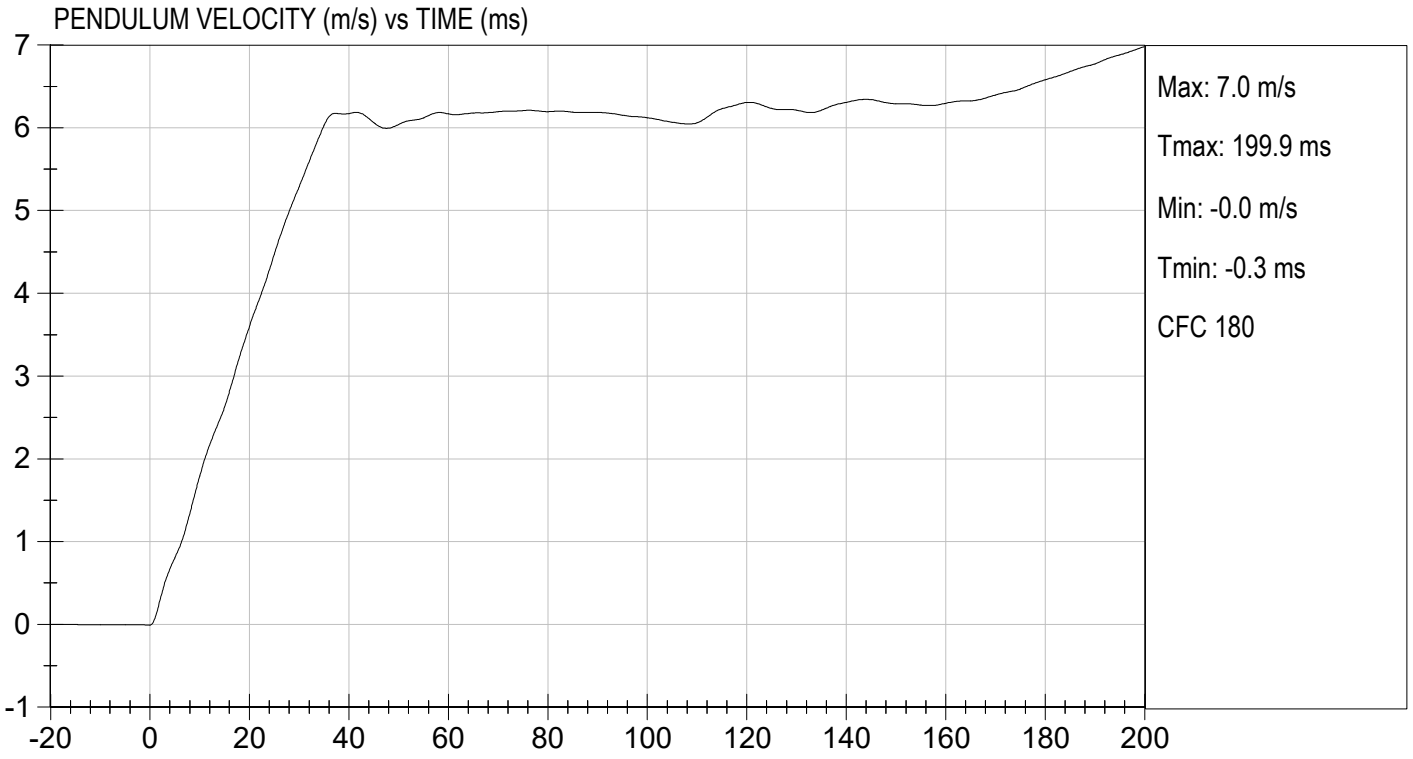
Laboratory Technician

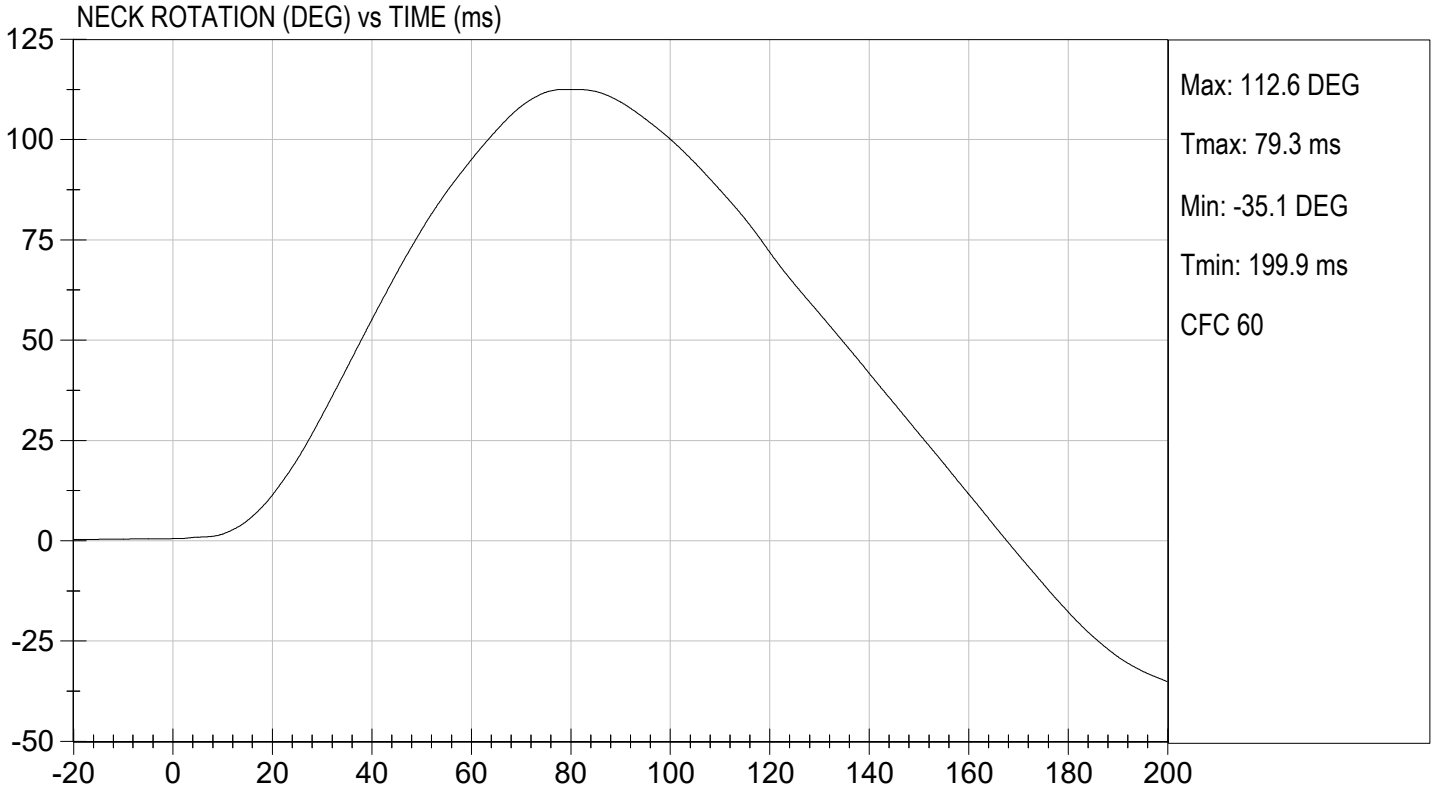
01/25/2022
Test Date

Approved By

TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

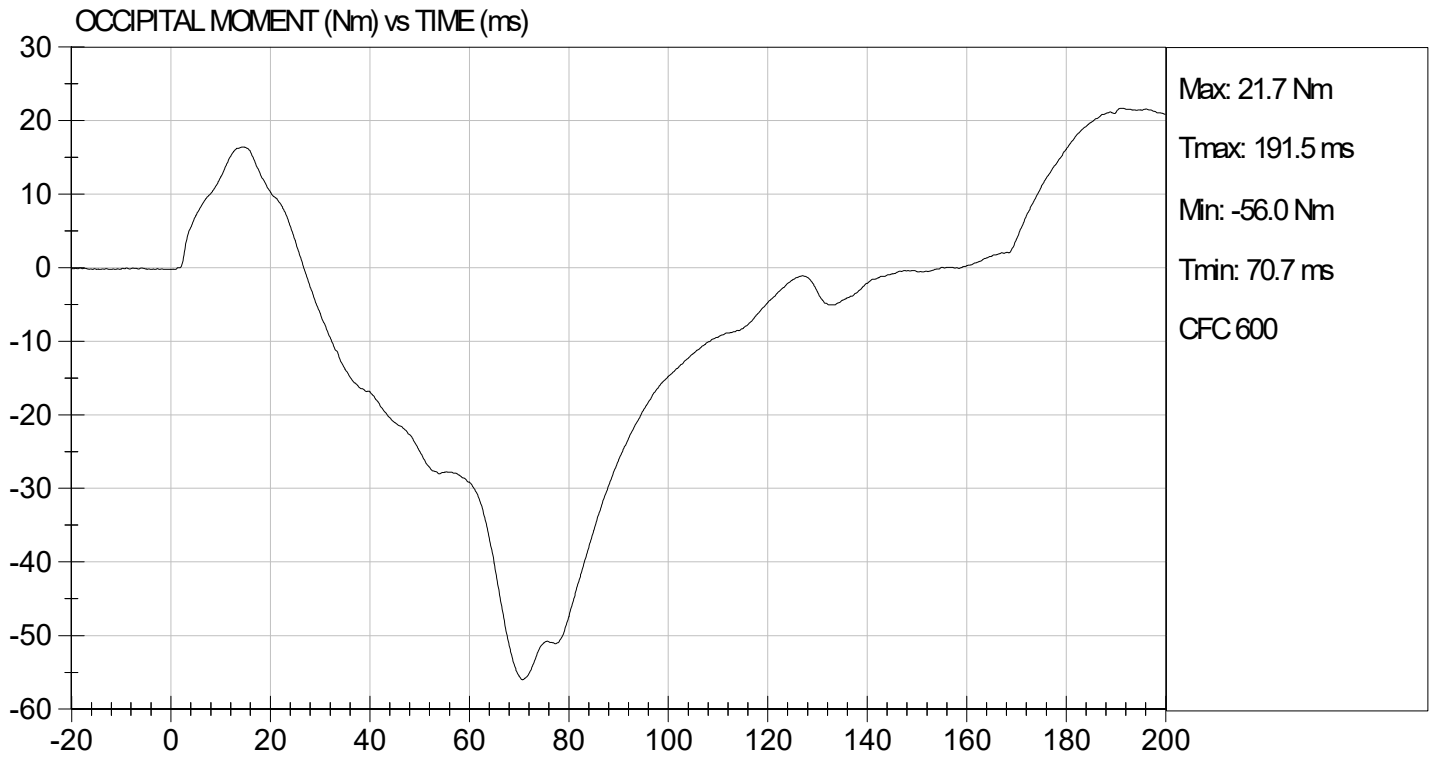
TEST DATE: 01/25/2022
TEST #: D220193





TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/25/2022
TEST #: D220193



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220194

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	50	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4141	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4397	Pass
		Overall Test Results		Pass

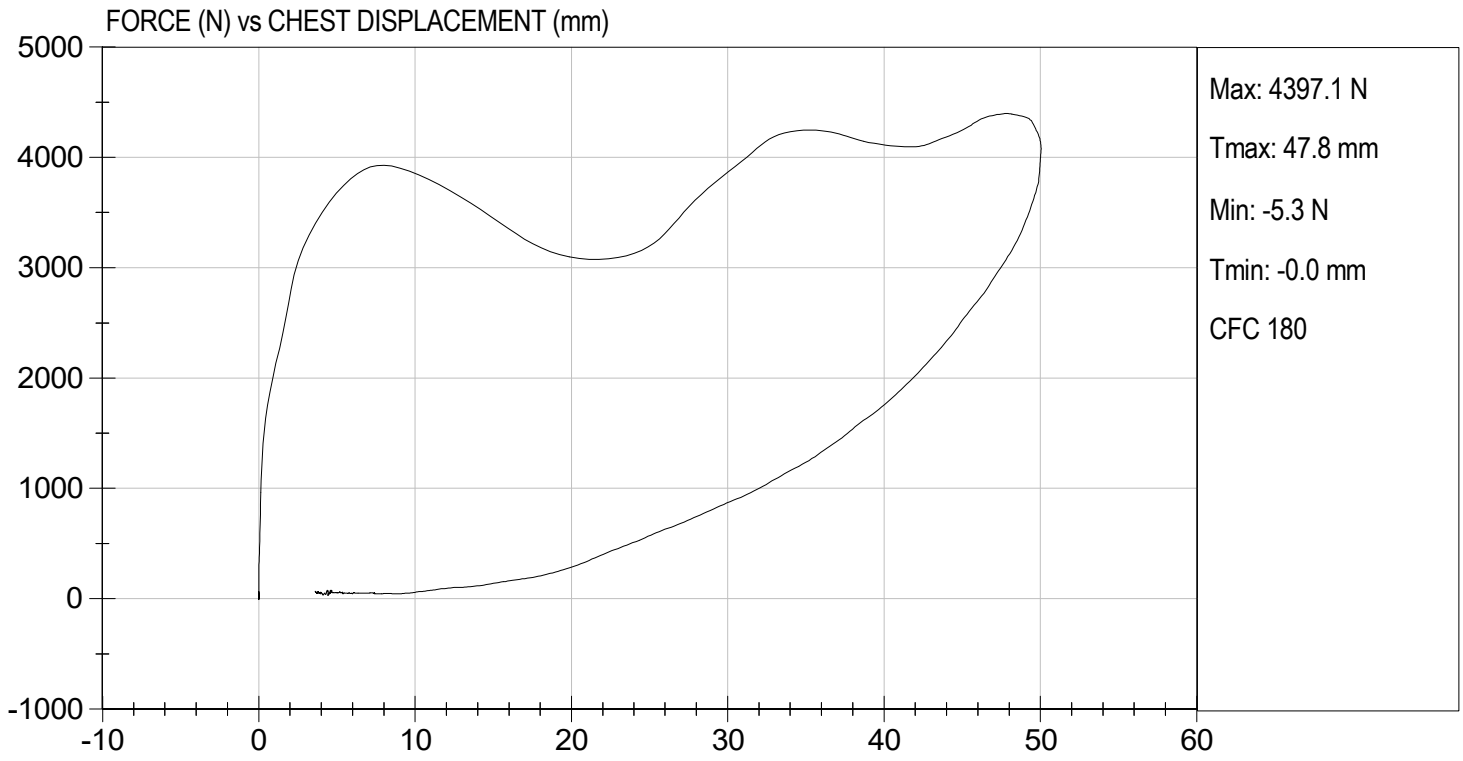
Laboratory Technician

01/24/2022
Test Date

Approved By

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

TEST DATE: 01/24/2022
TEST #: D220194



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220195

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	4018	Pass
		Overall Test Results		Pass

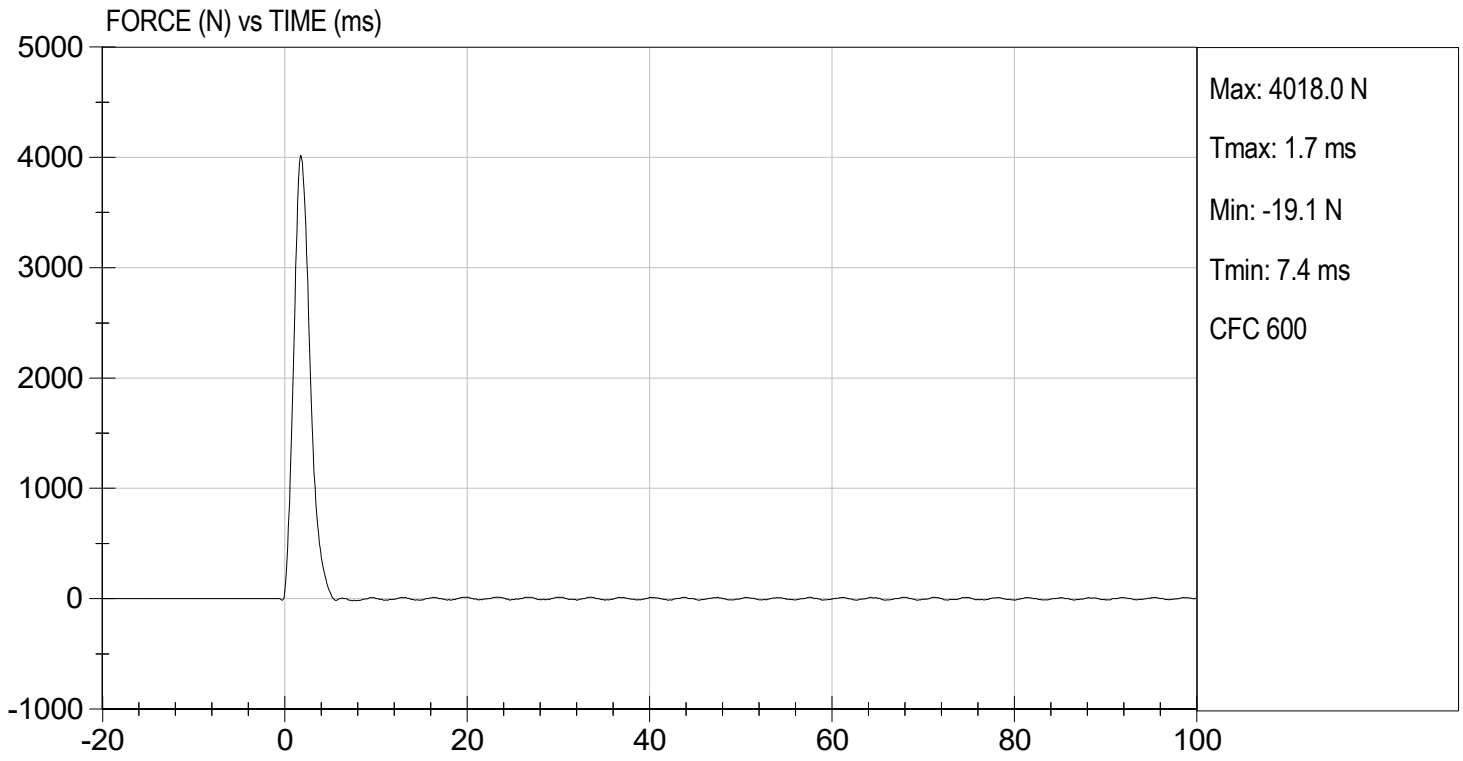
Laboratory Technician

01/24/2022
Test Date

Approved By

TEST DESC: RIGHT KNEE
VELOCITY: 6.92 ft/s, 2.11 m/s

TEST DATE: 01/24/2022
TEST #: D220195



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142 **Test I.D:** D220196

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3972	Pass
		Overall Test Results		Pass

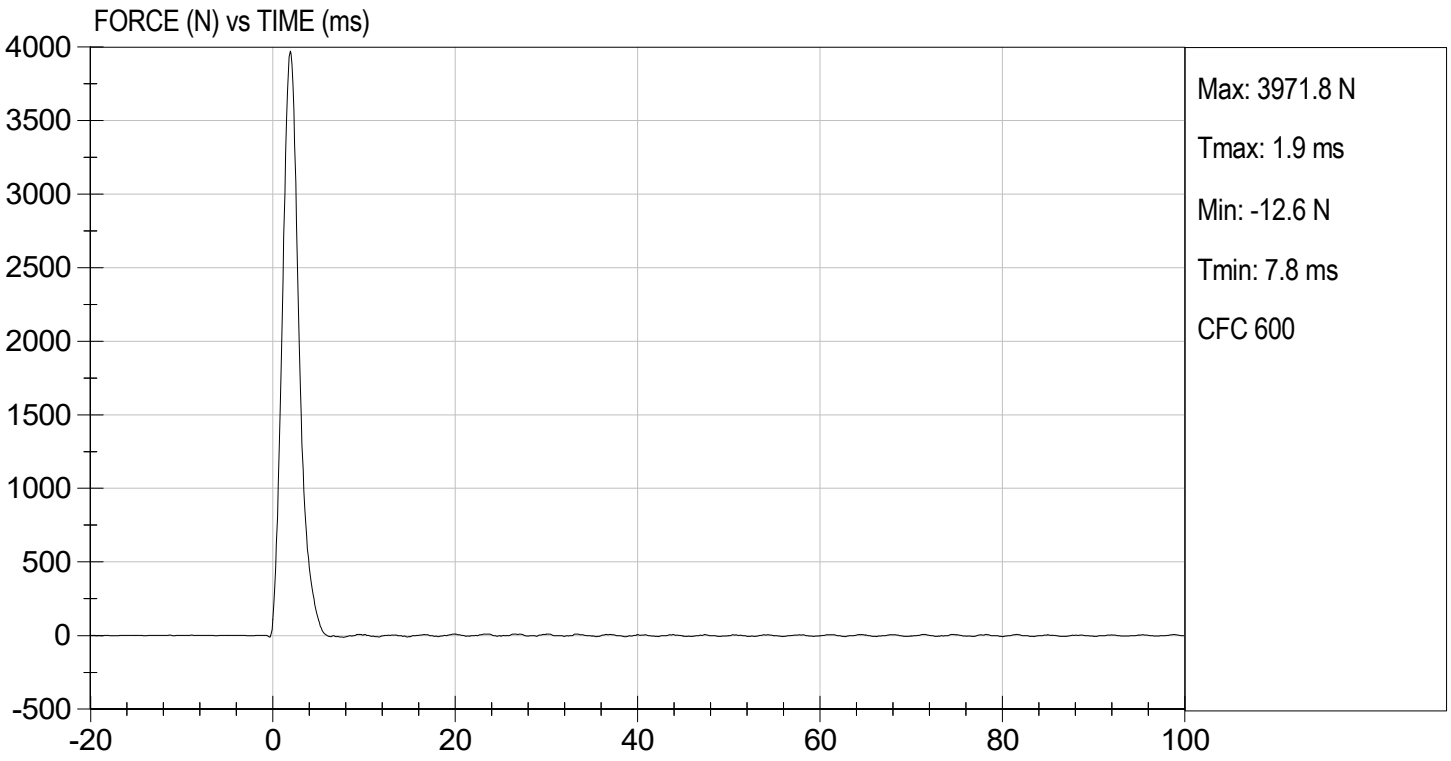
Laboratory Technician

01/24/2022
Test Date

Approved By

TEST DESC: LEFT KNEE
VELOCITY: 6.92 ft/s, 2.11 m/s

TEST DATE: 01/24/2022
TEST #: D220196



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

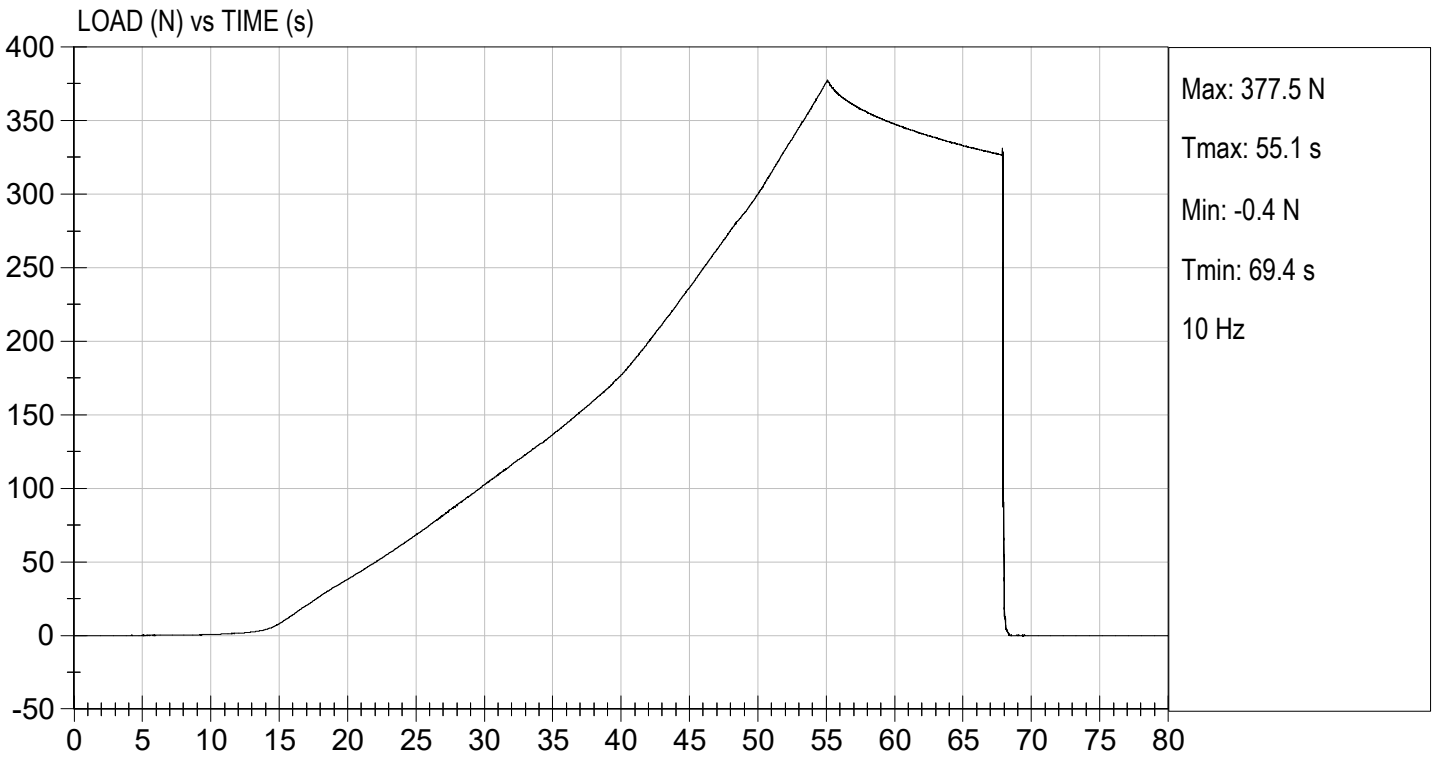
ATD Serial No: 142 **Test I.D:** D220197

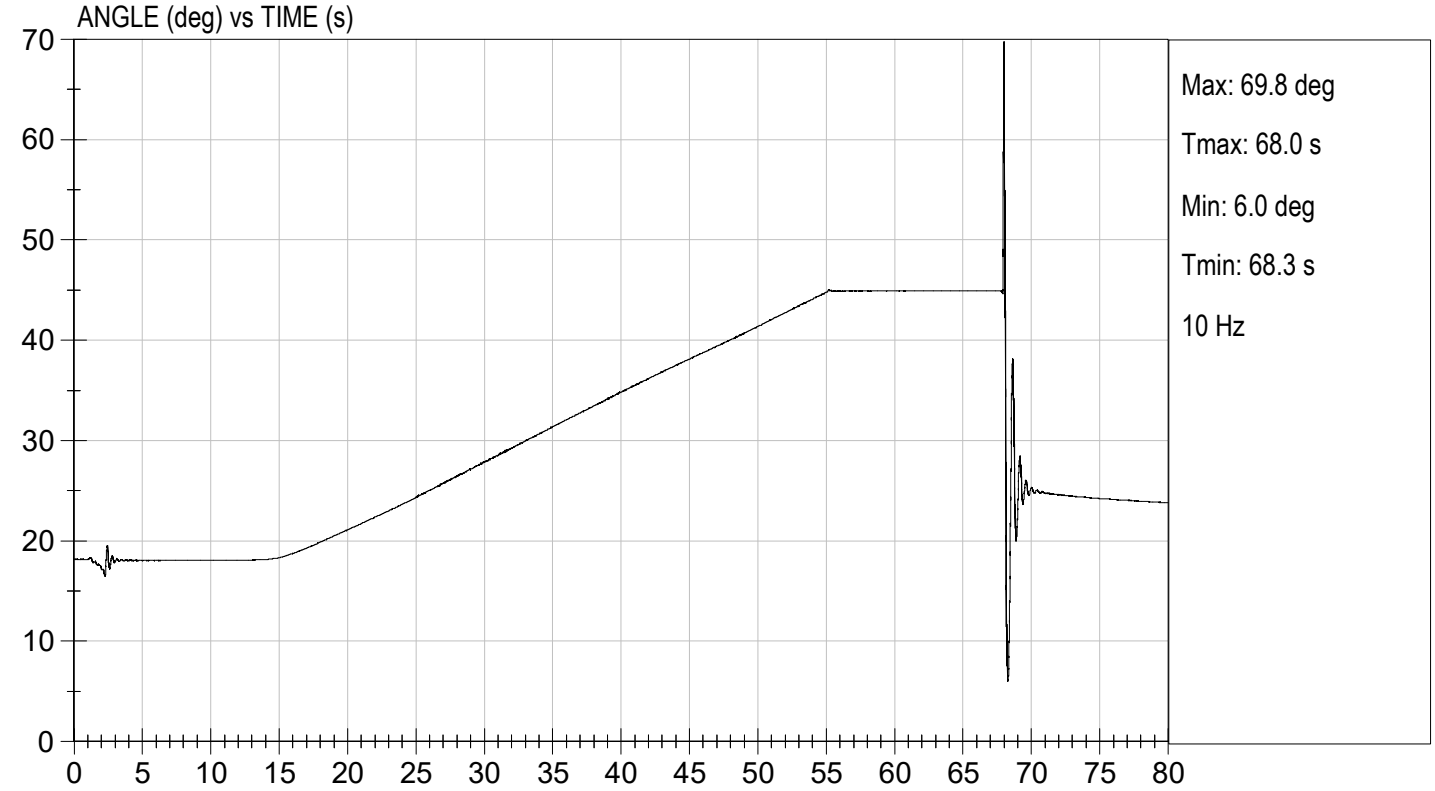
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	377	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.7	Pass
		Overall Result		Pass

Laboratory Technician

01/24/2022
Test Date

Approved By


LOAD (N) vs TIME (s)
400
350
300
250
200
150
100
50
0
-50
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
Max: 377.5 N
Tmax: 55.1 s
Min: -0.4 N
Tmin: 69.4 s
10 Hz


ANGLE (deg) vs TIME (s)
70
60
50
40
30
20
10
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
Max: 69.8 deg
Tmax: 68.0 s
Min: 6.0 deg
Tmin: 68.3 s
10 Hz

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 50th S/N 351		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	P79741	Endevco	08/23/2021
			Y	P79743	Endevco	08/23/2021
			Z	P79744	Endevco	08/23/2021
		Redundant	X	P94834	Endevco	08/23/2021
			Y	P94856	Endevco	08/23/2021
			Z	P97412	Endevco	08/23/2021
Head Angular Rate Sensors			X	ARS15213	DTS	03/02/2021
			Y	ARS15231	DTS	03/02/2021
			Z	ARS15229	DTS	03/02/2021
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG2203	Denton	02/10/2021
Chest Accelerometers		Primary	X	P86792	Endevco	08/23/2021
			Y	P86793	Endevco	08/23/2021
			Z	P88348	Endevco	08/23/2021
		Redundant	X	P88666	Endevco	08/23/2021
			Y	P88667	Endevco	08/23/2021
			Z	P94109	Endevco	08/23/2021
Chest Potentiometer			X	351	Humanetics	08/23/2021
Pelvis Accelerometers			X	P95526	Endevco	08/23/2021
			Y	P96038	Endevco	08/23/2021
			Z	P97742	Endevco	08/23/2021
Femur Load Cells	Right	Primary	Z	FG121P	Denton	08/23/2021
		Redundant	Z	FG121R	Denton	08/23/2021
	Left	Primary	Z	FG122P	Denton	08/23/2021
		Redundant	Z	FG122R	Denton	08/23/2021
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG408	Denton	02/09/2021
		Lower	Mx, My, Fz	AG116	Denton	02/09/2021
	Left	Upper	Mx, My, Fz	TG480	Denton	02/09/2021
		Lower	Mx, My, Fz	AG502	Denton	02/09/2021
Foot Accelerometers	Right	Rear	X	T22486	Endevco	08/23/2021
			Z	P97382	Endevco	08/23/2021
		Front	Z	P82120	Endevco	08/23/2021
	Left	Rear	X	T16468	Endevco	08/23/2021
			Z	T16496	Endevco	08/23/2021
		Front	Z	T16501	Endevco	08/23/2021
Seat Belt Load Cells		Lap		SBG161	FTSS	11/13/2019
		Shoulder		SBG157	FTSS	11/13/2019

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 5th S/N 142		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	P97377	Endevco	10/04/2021
			Y	P94800	Endevco	10/04/2021
			Z	P94802	Endevco	10/04/2021
		Redundant	X	P94799	Endevco	10/04/2021
			Y	P94801	Endevco	10/04/2021
			Z	P94803	Endevco	10/04/2021
Head Angular Rate Sensors			X	ARS7516	DTS	08/09/2021
			Y	ARS7357	DTS	08/09/2021
			Z	ARS7391	DTS	08/09/2021
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG2256	Denton	04/27/2021
Chest Accelerometers		Primary	X	P94793	Endevco	10/04/2021
			Y	P95322	Endevco	10/04/2021
			Z	P88719	Endevco	10/04/2021
		Redundant	X	P94794	Endevco	10/04/2021
			Y	P95370	Endevco	10/04/2021
			Z	P94785	Endevco	10/04/2021
Chest Potentiometer			X	142	Humanetics	10/18/2021
Pelvis Accelerometers			X	P94798	Endevco	10/04/2021
			Y	P97705	Endevco	10/04/2021
			Z	P82646	Endevco	10/04/2021
Femur Load Cells	Right	Primary	Z	FG126P	Denton	10/04/2021
		Redundant	Z	FG126R	Denton	10/04/2021
	Left	Primary	Z	FG127P	Denton	10/04/2021
		Redundant	Z	FG127R	Denton	10/04/2021
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG467	Denton	04/28/2021
		Lower	Mx, My, Fz	AG491	Denton	04/28/2021
	Left	Upper	Mx, My, Fz	TG478	Denton	04/28/2021
		Lower	Mx, My, Fz	AG500	Denton	04/28/2021
Foot Accelerometers	Right	Rear	X	P94795	Endevco	10/04/2021
			Z	P94796	Endevco	10/04/2021
		Front	Z	P94797	Endevco	10/04/2021
	Left	Rear	X	P83167	Endevco	10/04/2021
			Z	P83168	Endevco	10/04/2021
		Front	Z	P83169	Endevco	10/04/2021
Seat Belt Load Cells		Lap		SBG273	FTSS	11/13/2019
		Shoulder		SBG272	FTSS	11/13/2019

TABLE 3 – VEHICLE INSTRUMENTATION

Instrument Location			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember / Rear Seat Accelerometers	Left	Primary	X	A391142	MSI	12/08/2021
			Z	A390916	MSI	12/08/2021
		Redundant	X	A390915	MSI	12/08/2021
	Right	Primary	X	A337171	MSI	08/24/2021
			Z	A340734	MSI	09/27/2021
		Redundant	X	A340766	MSI	09/29/2021
Engine Accelerometers		Top	X	A390970	MSI	10/20/2021
		Bottom	X	A390888	MSI	12/09/2021