

REPORT NUMBER: NCAP-MGA-23-061

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test**

**NISSAN MOTOR CO., LTD
2023 Nissan Ariya Engage AWD 5-Door SUV
NHTSA No.: O20235201**

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



Test Date: March 20, 2024

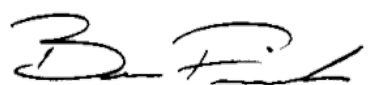
Final Report Date: October 17, 2024

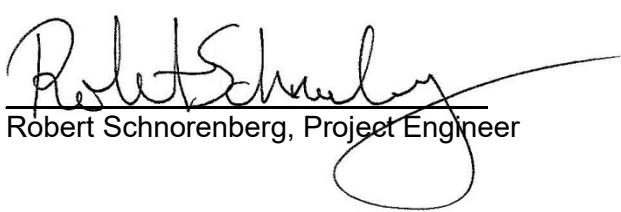
FINAL REPORT

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

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Robert Schnorenberg, Project Engineer

Approval Date: October 17, 2024

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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16. Abstract A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2023 Nissan Ariya Engage AWD 5-Door SUV 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 March 20, 2024. The impact velocity of the vehicle was 56.18 km/h and the ambient temperature at the barrier face at the time of impact was 21.8°C. The target vehicle post-test maximum crush was 322 mm located to the right of the vehicle centerline. The test vehicle's performance was as follows:																																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>154.443</td> <td>700</td> <td>343.785</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>28.000</td> <td>52</td> <td>19.091</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.396</td> <td>1</td> <td>0.402</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1700.675</td> <td>2620</td> <td>979.394</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>258.384</td> <td>2520</td> <td>184.416</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>1067.089</td> <td>6805</td> <td>1256.178</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>1533.566</td> <td>6805</td> <td>1093.948</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	154.443	700	343.785	Maximum Chest Compression	mm	63	28.000	52	19.091	Nij		1	0.396	1	0.402	Neck Tension	N	4170	1700.675	2620	979.394	Neck Compression	N	4000	258.384	2520	184.416	Left Femur Force	N	10008	1067.089	6805	1256.178	Right Femur Force	N	10008	1533.566	6805	1093.948
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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 2023 Nissan Ariya Engage AWD 5-Door SUV at a velocity of 56.18 km/h. The test was performed at MGA Research Corporation on March 20, 2024. 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.

The driver (position 1) ATD (Serial No. 064) 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 278 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 high-voltage battery isolation after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 322 mm located to the right 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 bolster and 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 glove box and knee airbag.

The occupant data is summarized below:

ATD position	HIC₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	154.443	0.396	1700.675	258.384	37.183	28.000	1067.089	1533.566
Passenger (5 th)	343.785	0.402	979.394	184.416	36.419	19.091	1256.178	1093.948

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

TEST NOTES

None.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20235201	Traction Control System (TCS)	Yes
Model Year	2023	Power Steering	Yes
Make	Nissan	Power Window Auto-Reverse	Yes
Model	Ariya Engage AWD	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	JN1CF0BB2PM702644	Driver Head/Torso Airbag	No
Body Color	Gun Metallic	Driver Torso Airbag	No
Odometer (km/mi)	121 km / 75 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		Front Pass. Head/Torso Airbag	No
Overdrive	No	Front Pass. Torso Airbag	No
Final Drive	AWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Front Pass. Knee Airbag	Yes
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	Driver	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?	No
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DATA FROM CERTIFICATION LABEL

Manufactured By	NISSAN MOTOR CO., LTD	GVWR (kg)	2535
		GAWR Front (kg)	1230
Date of Manufacture	04/23	GAWR Rear (kg)	1315

VEHICLE SEATING AND WEIGHT CAPACITY DATA

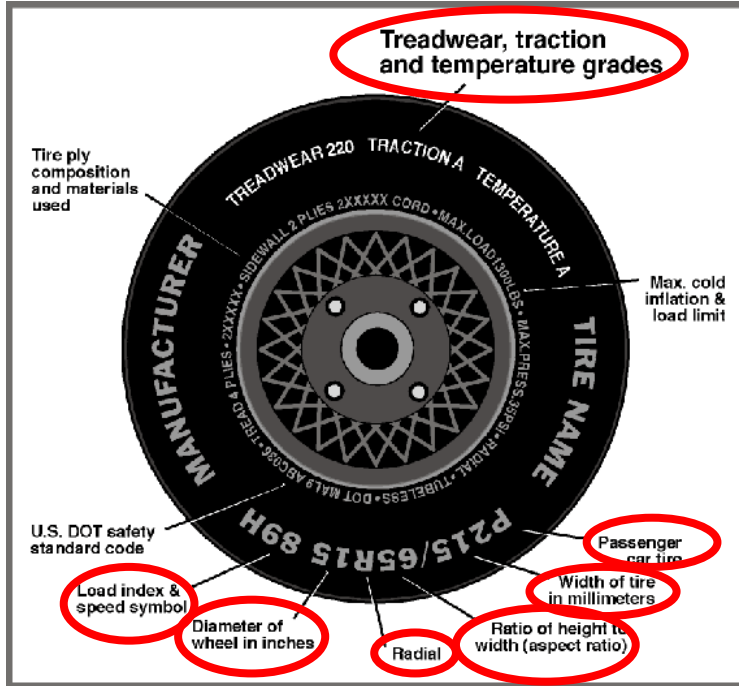
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contoured		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				400
Cargo Weight (RCLW) (kg)				60

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	280	280
Recommended Tire Size	235/55R19	235/55R19
Tire Size on Vehicle	235/55R19	235/55R19
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Alenza Sport A/S	Alenza Sport A/S
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	101V	101V
Tire Material	Rubber	Rubber
DOT Safety Code Left	EJFO JMM 0423	EJFO JMM 0423
DOT Safety Code Right	EJFO JMM 0423	EJFO JMM 0423

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	552.5	493.5		588.0	557.0	
Right	kg	536.0	516.5		569.0	579.0	
Ratio	%	51.9%	48.1%		50.5%	49.5%	
Totals	kg	1088.5	1010.0	2098.5	1157.0	1136.0	2293.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2098.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	60
Calculated Test Vehicle Target Weight (TVTW)	kg	2299.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	805	806	806	804	1336
As Tested	mm	786	784	783	791	1375
Post Test	mm	855	790	802	767	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2775
Total Vehicle Length at Left Side	mm	4470
Total Vehicle Length at Centerline	mm	4645
Total Vehicle Length at Right Side	mm	4470
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	18
Amount of Stoddard Solvent in Fuel Tank	L	

List of components removed to meet test weight: RR taillight, wheel covers.

List of components removed for instrumentation, data box, and equipment installation: Cargo area carpet/trim/divider, jack and tools, EV charging cable.

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4645
2	Total Width	1762
3	Bumper Top Height	570
4	Bumper Bottom Height	447
5	Longitudinal Member Top Height	627
6	Distance between Longitudinal Members	68
7	Longitudinal Member Width	773
8	Engine Top Height	846
9	Engine Bottom Height	216
10	Engine and Gearbox Width	291
11	Front Bumper-Engine Distance	326
12	Front Shock Absorber Fixing Height	958
13	Bonnet Leading Edge Height	924
14	Front Shock Absorber Fixing Width	1197
15	Front Bumper – Front Axle Distance	704
16	Front Axle – A-Pillar Distance	548
17	A-Pillar – B-Pillar Distance	1067
18	B-Pillar – Rear Axle Distance	1160
19	B-Pillar – C-Pillar Distance	1219
20	Roof Sill Bottom Height	1406
21	Roof Sill Top Height	1491
22	Floor Sill Bottom Height	272
23	Floor Sill Top Height	412

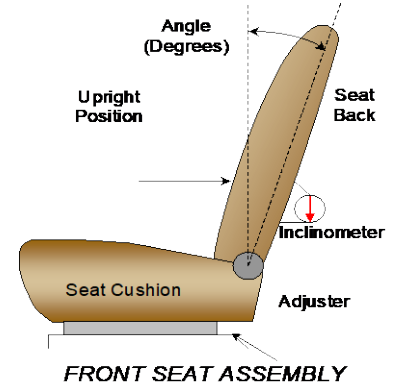
**DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

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	3.8° on outboard headrest post
Passenger Seat Back Angle	1.5° on outboard headrest post

SEAT FORE/AFT POSITIONS

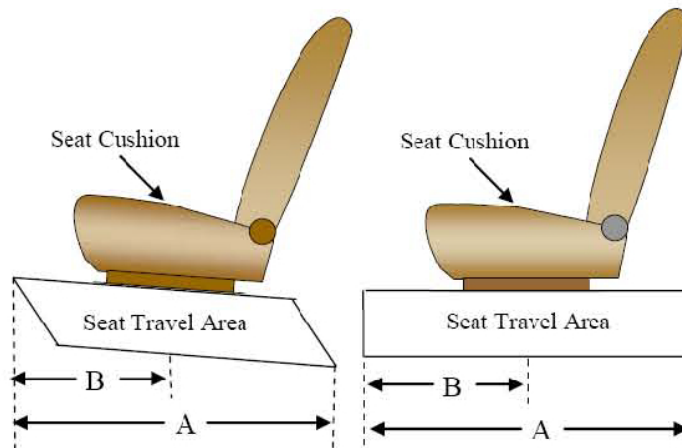
The driver and passenger seat fore/aft positions are adjusted following Appendix F, “Driver & Passenger Dummy Seating & Positioning Procedures” in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	322 mm	161 mm
Passenger Seat	260 mm / 27 detents (1st as 1)	10 mm / 1st 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	4 (1st as 1)	0 (1st as 0)
Passenger Seat	4 (1st as 1)	0 (1st as 0)



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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

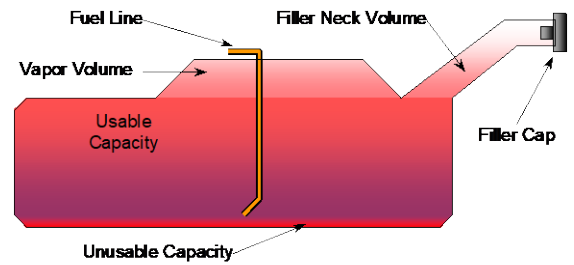
NHTSA No.: O20235201
 Test Date: 3/20/2024

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

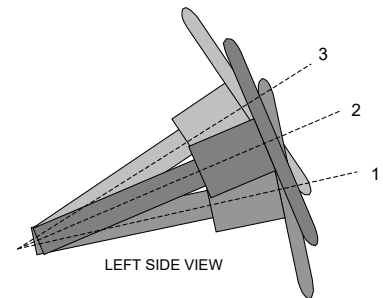
Electric vehicle.



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

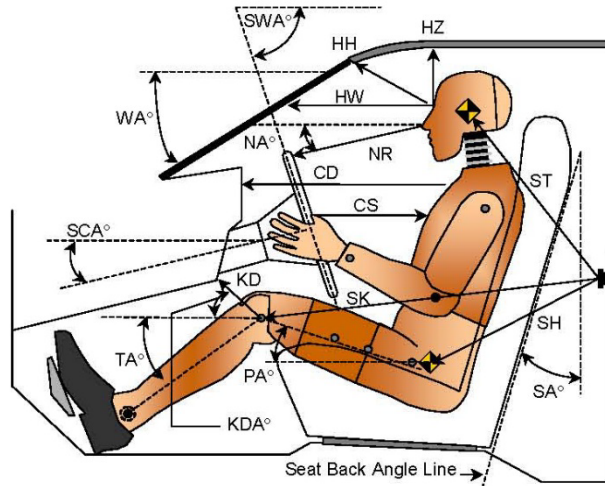
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	65.4	
Geometric Center Position 2	62.8	
Uppermost Position 3	60.1	
Telescoping Steering Wheel Travel		58
Test Position	62.8	29

**DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024



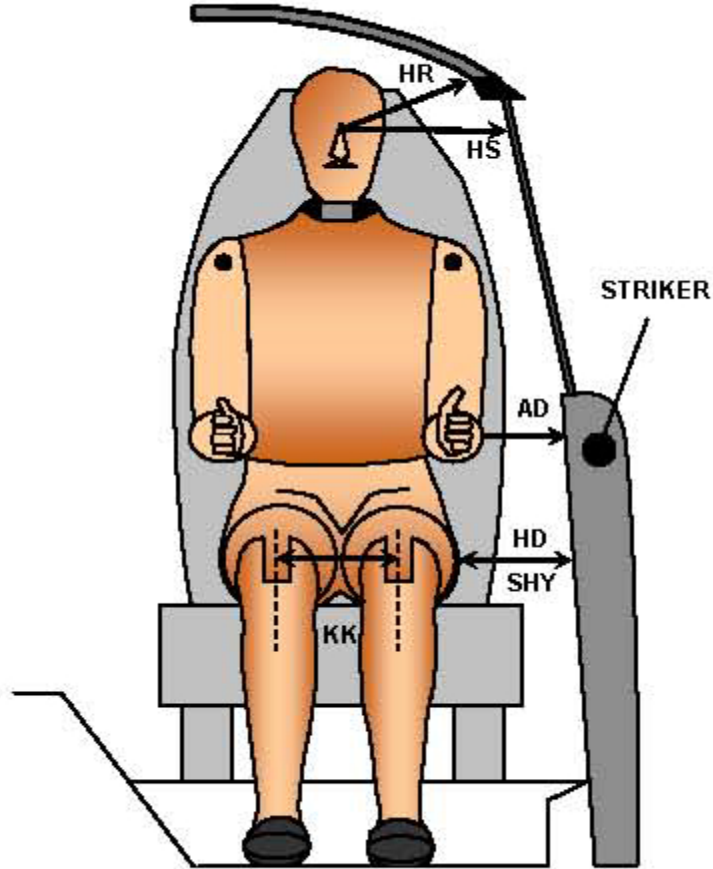
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		23.5		
SWA°	Steering Wheel Angle		62.8		
SCA°	Steering Column Angle		27.2		
SA°	Seat Back Angle		3.8		1.5
HZ	Head to Roof (Z)	172	90	175	90
HH	Head to Header	325	26.9	252	51.4
HW	Head to Windshield	658	0	625	0
NR	Nose to Rim	396	9.7		
CD	Chest to Dash	592		402	
CS	Chest to Steering Hub	294	4.6		
RA	Rim to Abdomen	185	0		
KDL	Left Knee to Dash	133	21.2	64	48.0
KDR	Right Knee to Dash	116	40.9	87	37.8
PA°	Pelvic Angle		24.2		19.3
TA°	Tibia Angle		40.1		51.1
SK	Striker to Knee	622	91.6	707	91.0
ST	Striker to Head	542	12.5	531	27.5
SH	Striker to H-Point	287	116.8	388	103.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
Test Date: 3/20/2024



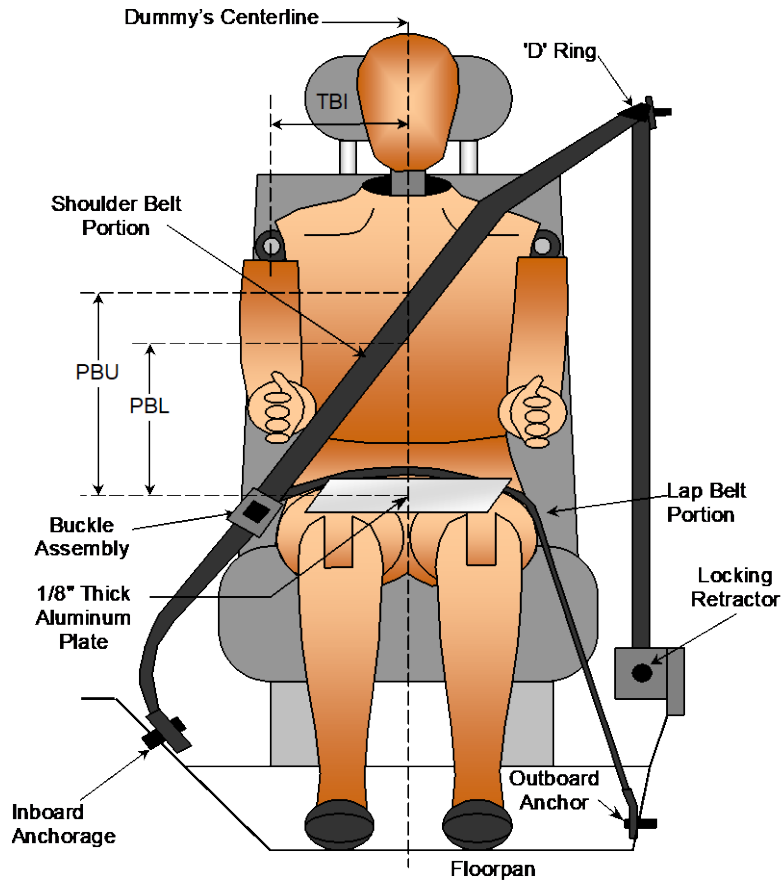
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	93	137
HD	H-Point to Door	141	173
HR	Head to Side Header	221	267
HS	Head to Side Window	342	346
KK	Knee to Knee	343	227
SHY	Striker to H-Point (Y Direction)	231	263
AA	Ankle to Ankle	340	162

**DATA SHEET NO. 5
SEAT BELT POSITIONING DATA**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	335	320
PBL - Top surface of reference to belt lower edge	mm	255	230

BELT LENGTH DATA

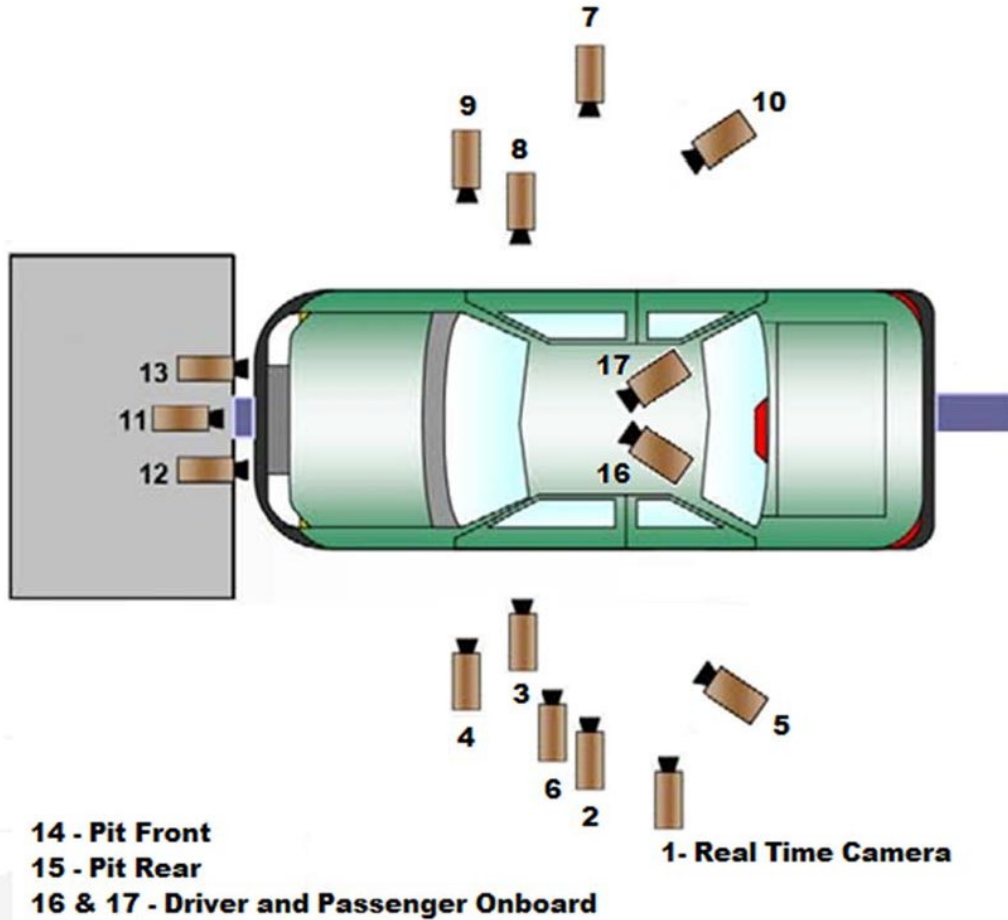
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	910	960
Lap Belt Length as measured on ATD	mm	500	524
Remainder of belt on reel	mm	1290	1216
Total Belt Length for Continuous Webbing Systems	mm	3400	3400

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
Test Date: 3/20/2024

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

CAMERA LOCATIONS

No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2200	-5710	-1420	12	1000
3	Driver Close-Up	-1630	-6710	-2220	50	1000
4	Left Front Half	-1220	-5460	-1430	24	1000
5	Left Angle	-7280	-5730	-2260	75	1000
6	Steering Column	-900	-5720	-1260	50	1000
7	Right Overall	-2100	5740	-1440	12	1000
8	Passenger Close-Up	-1570	6500	-2260	50	1000
9	Right Front Half	-1080	5290	-1470	24	1000
10	Right Angle	-7440	5430	-2220	75	1000
11	Windshield	150	0	-2310	12	1000
12	Driver Windshield	200	-370	-2230	25	1000
13	Passenger Windshield	200	370	-2230	25	1000
14	Pit Front	-840	0	3340	24	1000
15	Pit Rear	-2830	0	3340	24	1000
16	Driver Onboard				12	1000
17	Passenger Onboard				12	1000
18	Real-Time Pan View					30

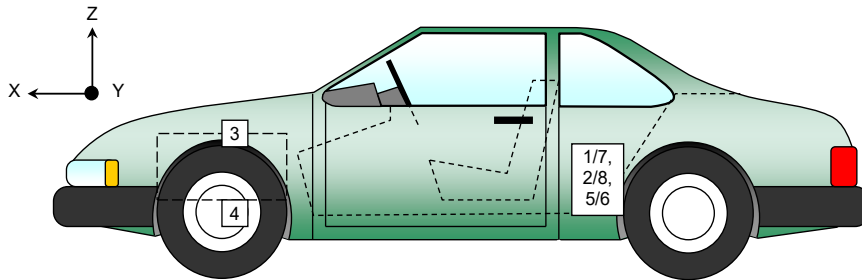
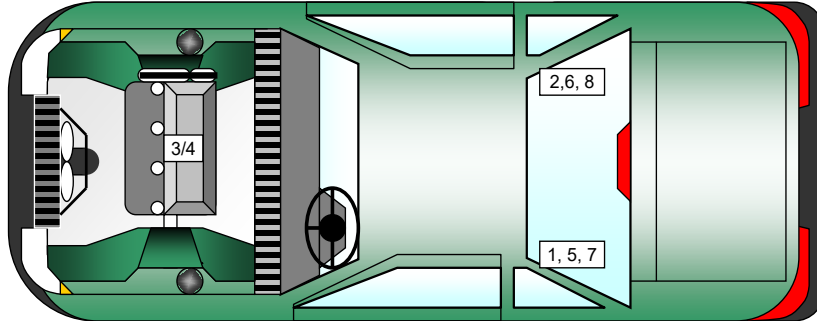
*COORDINATES:

- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1918	-356	-390
2	Right Rear Crossmember Accelerometer – X Direction	1922	355	-389
3	Engine Top X	4114	-11	-858
4	Engine Bottom X	3874	79	-204
5	Left Rear Crossmember Accelerometer – Z Direction	1918	-356	-390
6	Right Rear Crossmember Accelerometer – Z Direction	1922	355	-389
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1918	-356	-390
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1922	355	-389

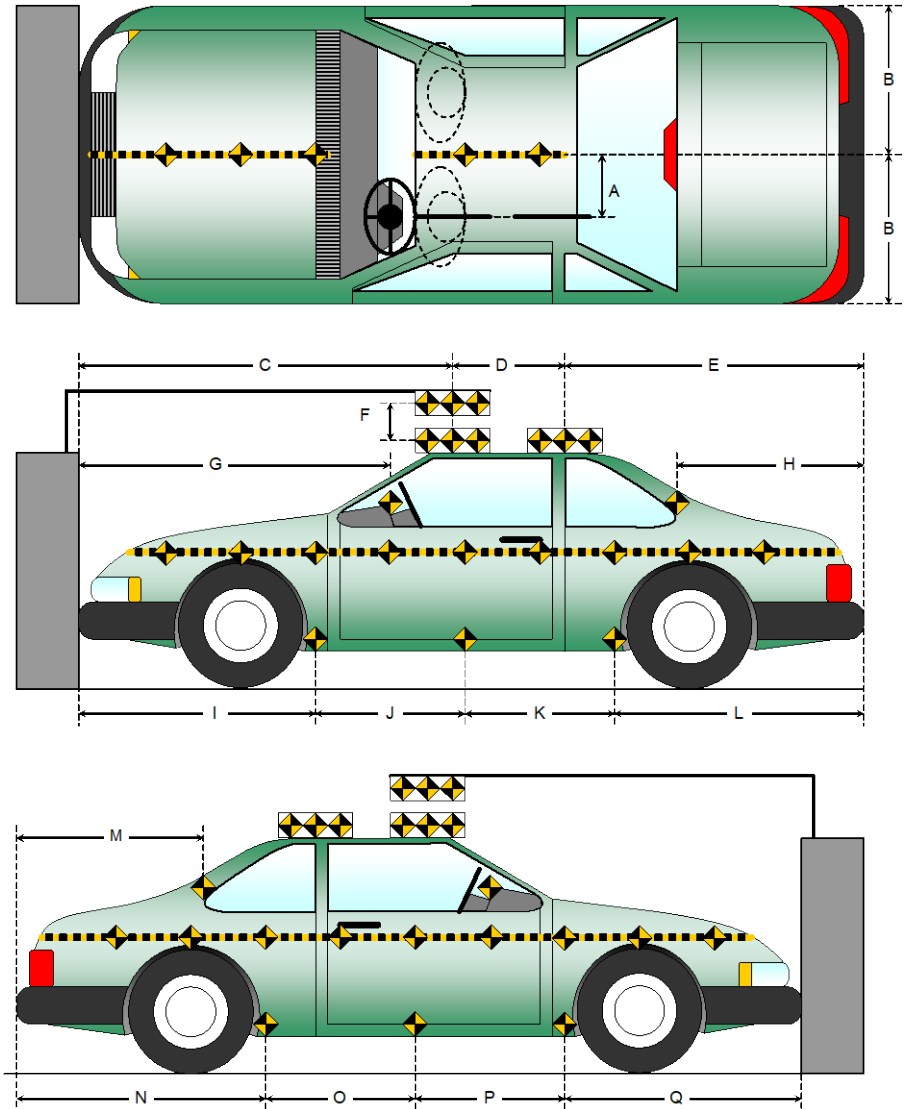
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

Item	Value (mm)
A	390
B	881
C	2254
D	606
E	1785
F	305
G	
H	973
I	1415
J	851
K	847
L	1532
M	973
N	1534
O	850
P	849
Q	1412



**DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

ADVANCED RESEARCH LOAD CELL BARRIER

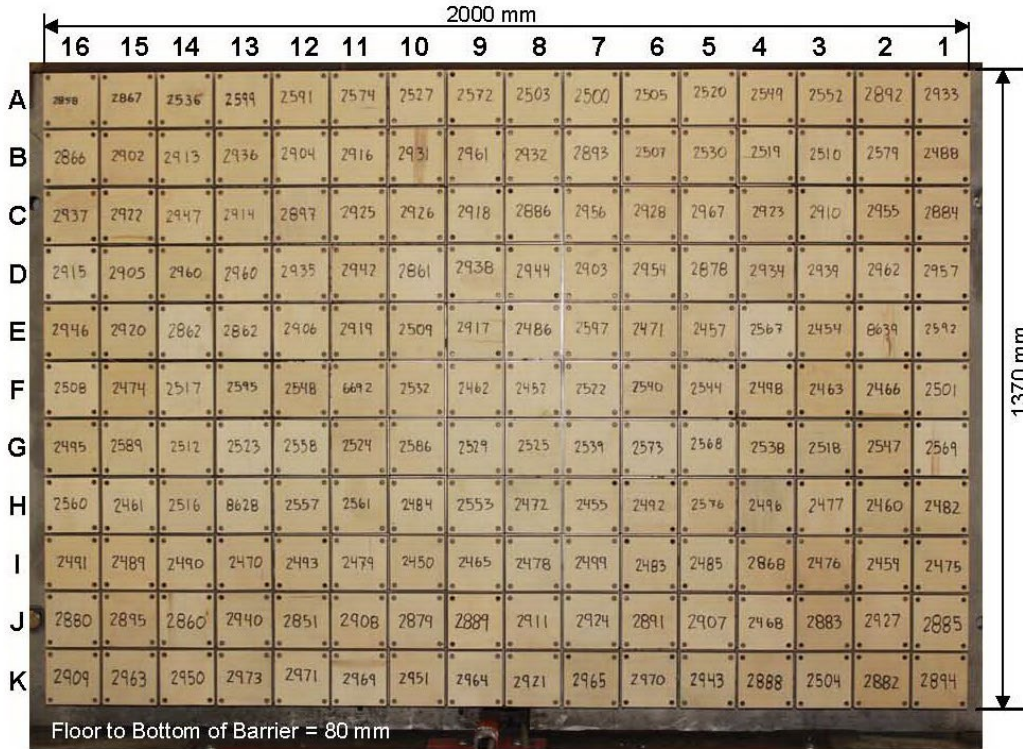


Photo for Reference Only

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: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Data Channels	47
Passenger Dummy Data Channels	47
Vehicle Structure Accelerometers	8
Barrier Channels	176
Total	278

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	15
Real-Time	2
Total	19

**DATA SHEET NO. 11
POST-TEST OBSERVATIONS**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 064	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 Bolster	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 locked	Doors were locked
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	Cracked
Window Damage	None
Other Notable Effects	RF tire deflated after event

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	4557
Center	mm	4491
Right Side	mm	4434
Average	mm	4494

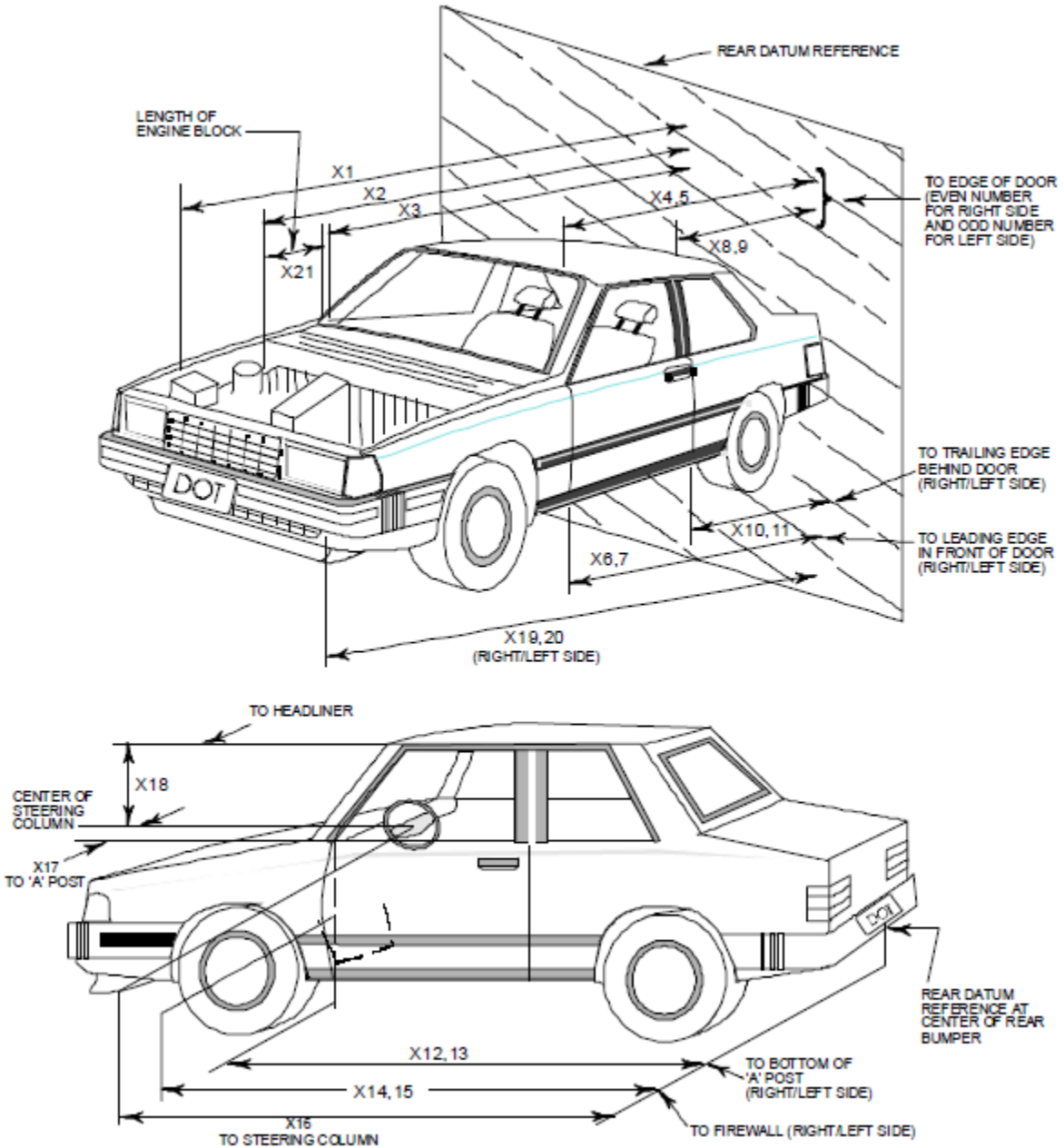
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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	Yes	Yes
Other				

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024



**DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
Test Date: 3/20/2024

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	4645	4255	-390
2	RSOV to Front of Engine	4148	3890	-258
3	RSOV to Firewall	3791	3752	-39
4	RSOV to Upper Leading Edge of Right Door	3239	3236	-3
5	RSOV to Upper Leading Edge of Left Door	3238	3235	-3
6	RSOV to Lower Leading Edge of Right Door	3258	3256	-2
7	RSOV to Lower Leading Edge of Left Door	3256	3252	-4
8	RSOV to Upper Trailing Edge of Right Door	2151	2148	-3
9	RSOV to Upper Trailing Edge of Left Door	2151	2146	-5
10	RSOV to Lower Trailing Edge of Right Door	2231	2228	-3
11	RSOV to Lower Trailing Edge of Left Door	2230	2225	-5
12	RSOV to Bottom of "A" Post of Right Side	3233	3232	-1
13	RSOV to Bottom of "A" Post of Left Side	3231	3229	-2
14	RSOV to Firewall, Right Side	3715	3685	-30
15	RSOV to Firewall, Left Side	3718	3685	-33
16	RSOV to Steering Column	2792	2880	88
17	Center of Steering Column to "A" Post	275	262	-13
18	Center of Steering Column to Headliner	431	416	-15
19	RSOV to Right Side of Front Bumper	4470	4221	-249
20	RSOV to Left Side of Front Bumper	4470	4250	-220
21	Length of Engine Block	389	389	0
RD	RSOV to Right Side of Dash Panel	3126	3125	-1
CD	RSOV to Center of Dash Panel	3225	3222	-3
LD	RSOV to Left Side of Dash Panel	3129	3130	1

All dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

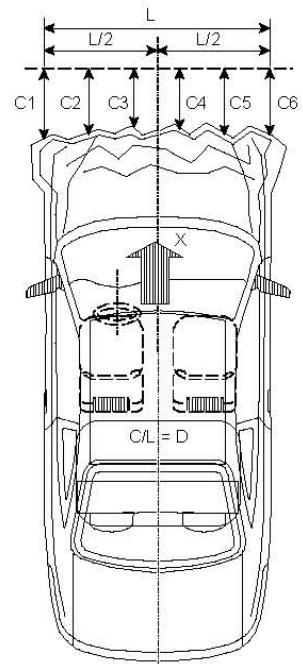
NHTSA No.: O20235201
Test Date: 3/20/2024

VEHICLE INFORMATION

VIN:	<u>JN1CF0BB2PM702644</u>	Wheelbase (mm):	<u>2775</u>
Vehicle Size Category:	<u>Passenger Car</u>	Test Weight (kg):	<u>2293.0</u>

ACCELEROMETER DATA

Accelerometer Locations:	<u>As per Data Sheet No. 7</u>
Cal. Procedure/Interval:	<u>MGA Procedure / 6 month</u>
Integration Algorithm:	<u>Trapezoidal</u>
Linearity:	<u>> 99%</u>
Impact Velocity (km/h):	<u>56.18</u>
Velocity Change (km/h):	<u>64.6</u>
Time of Separation (msec)	<u>93</u>



CRUSH PROFILE

Collision Deformation Classification:	<u>12FDEW2</u>
Midpoint of Damage:	<u>Centerline</u>
Damage Region Length (mm):	<u>1396</u>
Impact Mode:	<u>Frontal</u>

No.	Measurement Description	Units	Pre-Test	Post-Test	Exterior Crush
C1	Crush zone 1 at left side	mm	2530	2748	218
C2	Crush zone 2 at left side	mm	2405	2708	303
C3	Crush zone 3 at left side	mm	2361	2682	321
C4	Crush zone 4 at right side	mm	2361	2683	322
C5	Crush zone 5 at right side	mm	2399	2704	305
C6	Crush zone 6 at right side	mm	2530	2777	247
L	C1 TO C6	mm	1396	1443	-47

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

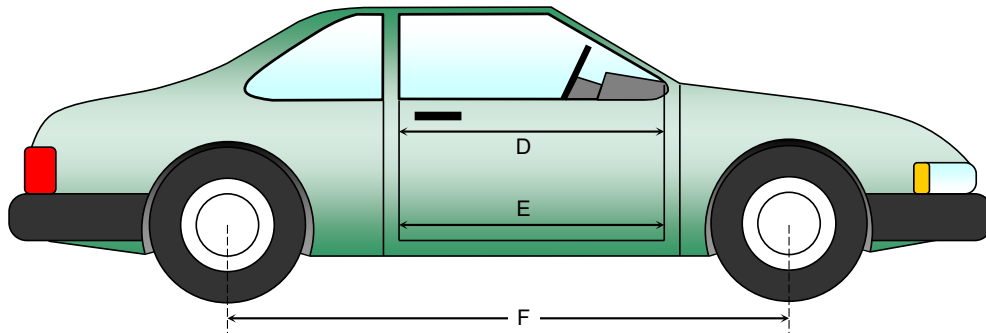
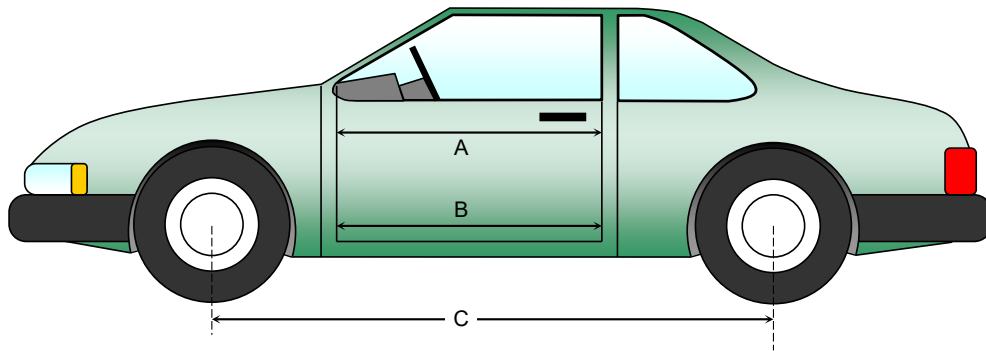
NHTSA No.: O20235201
Test Date: 3/20/2024

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	1003	1000	-3
B	Left Side Lower	mm	920	917	-3
D	Right Side Upper	mm	1002	1000	-2
E	Right Side Lower	mm	901	900	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	2775	2715	-60
F	Right Side Wheelbase	mm	2779	2717	-62



**DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

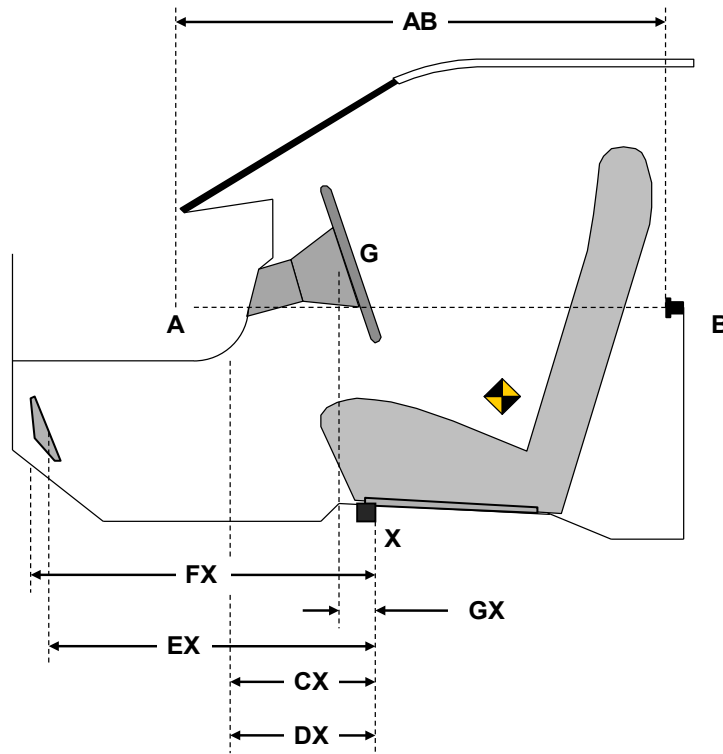
Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	814	815	1
CX	Left Knee Bolster to X	mm	302	264	-38
DX	Right Knee Bolster to X	mm	239	183	-56
EX	Brake Pedal to X	mm	557	497	-60
FX	Foot Rest to X	mm	544	506	-38
GX	Center of Steering Column Wheel Hub to X	mm	52	110	58

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

WINDSHIELD MOUNTING DETAILS

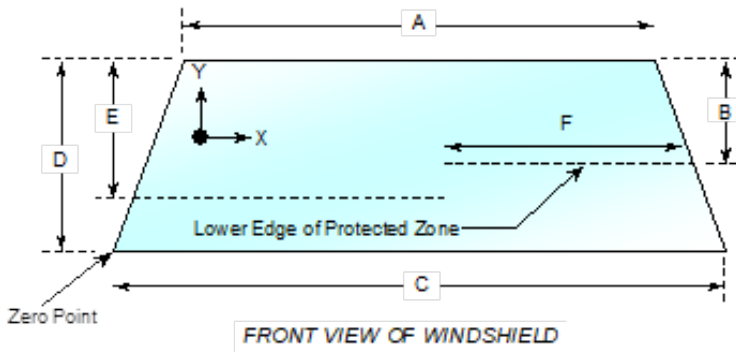
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.8°C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2324	2324	100
Right Side	2324	2324	100
Total	4648	4648	100



Item	Units	Value
A	mm	1268
B	mm	598
C	mm	1676
D	mm	852
E	mm	611
F	mm	528

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: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

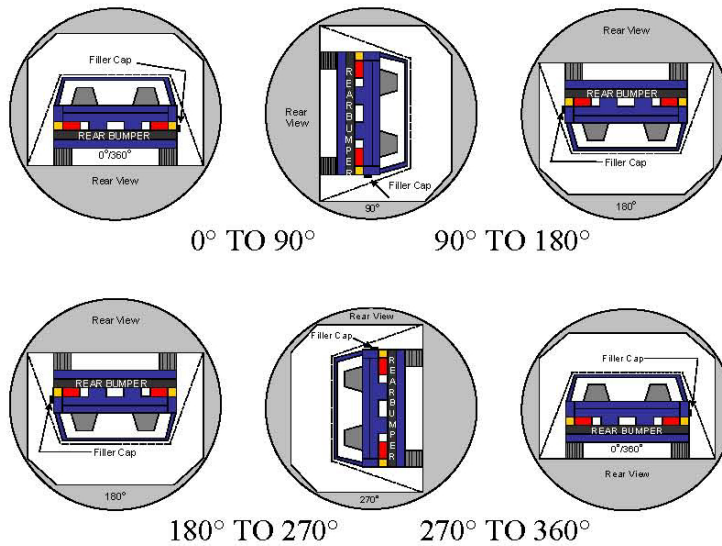
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: N/A

Test Time: N/A

- 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: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

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°				

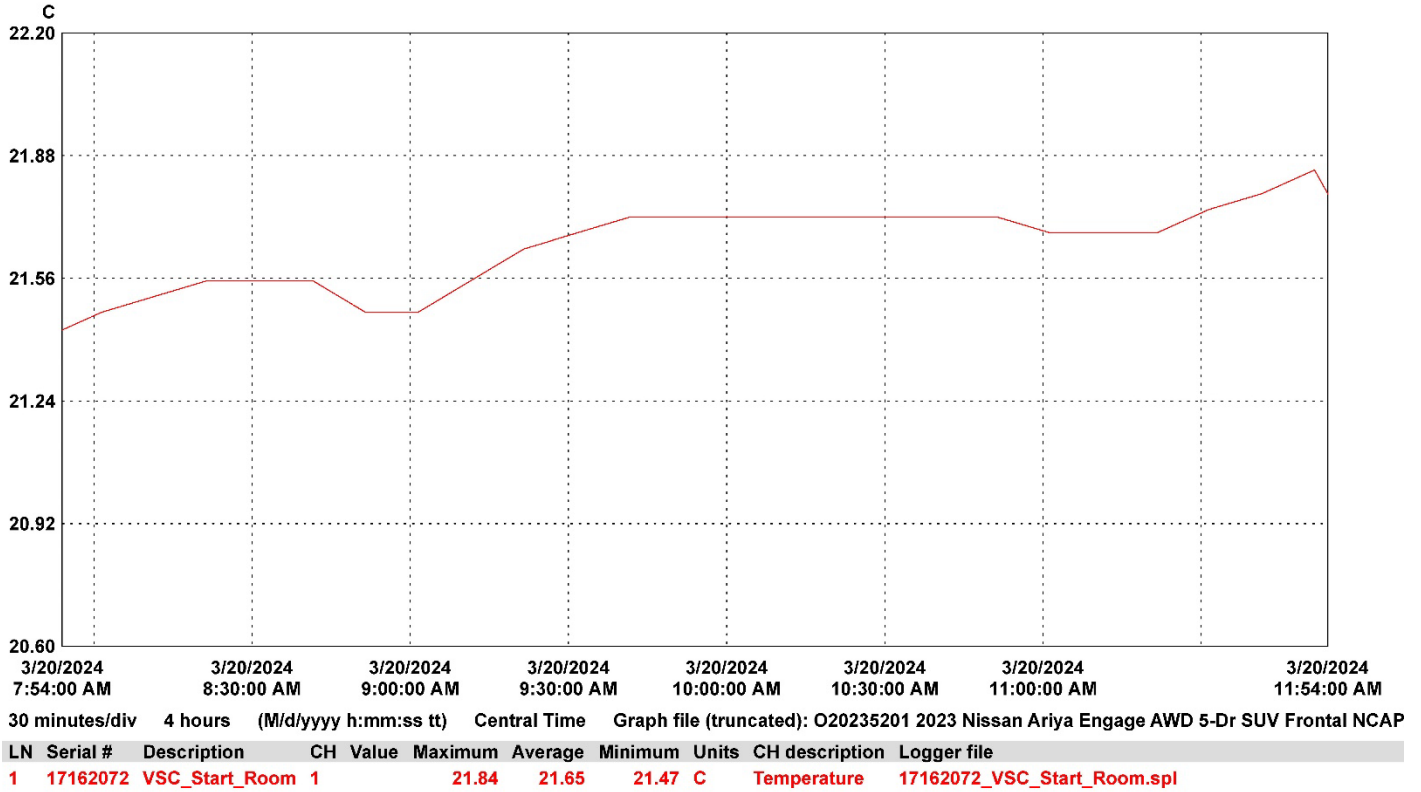
SOLVENT SPILLAGE LOCATION TABLE

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: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024



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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

ELECTRIC VEHICLE PROPULSION SYSTEM

	Units	Observations and Conclusions
Type of Electric Vehicle		Electric
Propulsion Battery Type		Lithium-ion Battery
Nominal Voltage	V	402
Physical Location of Automatic Propulsion Battery Disconnect		Inside the Battery Pack System
Auxiliary Battery Type		Lead acid battery

PROPULSION BATTERY SYSTEM DATA

	Units	Observations and Conclusions
Electrolyte Fluid Type		Organic Electrolyte
Electrolyte Fluid Specific Gravity	g/ml	1.2
Electrolyte Fluid Kinematic Viscosity	mPa*s	3.7
Electrolyte Fluid Color		Clear
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable)		Water cooling, Green
Location of Battery Modules		Inside Passenger Compartment
		X Outside Passenger Compartment
		The high-voltage battery is located on the underside of the vehicle.

PROPULSION BATTERY STATE OF CHARGE

<i>For all battery types:</i>	
Voltage range corresponding to useable energy of the battery:	
Minimum State of Charge	
Maximum State of Charge	402 V
95% of Maximum State of Charge	381.9 V
Test Voltage - No less than 95% of maximum State of Charge	397.5 V
<i>For batteries that are rechargeable ONLY by an energy source on the vehicle:</i>	
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: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Location(s)	Bolt attaching bracket to front of battery
--	--

PROPULSION BATTERY SYSTEM

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

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		62100018
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		7/14/2023

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	397.5
----	---	-------

ELECTRIC ISOLATION MEASUREMENTS
PROPULSION BATTERY TO VEHICLE CHASSIS

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

V1	V	335.6
V2	V	48.7

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

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

R_o	Ω	542,700
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V1' Pre-Impact	V	91.1
V2' Pre-Impact	V	12.2

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

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.

$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$		
Ri1 Pre-Impact	Ω	1,667,895
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$		
Ri2 Pre-Impact	Ω	12,812,512
Ri = The lesser of Ri1 and Ri2		
Ri Pre-Impact	Ω	1,667,895
$R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$		
Ri / Vb Pre-Impact	Ω	4,196

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

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?	X	
Additional Comments	None	

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		62100018
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		7/14/2023

ELECTRICAL ISOLATION MEASUREMENTS

Vb Post-Impact	V	8.94
----------------	---	------

Post-Impact	V	Value	Impact Time	Minutes	Seconds
V1 Post-Impact	V	96.2	Impact Time	1	8
V2 Post-Impact	V	21.33		1	17
V1' Post-Impact	V	0.10		1	31
V2' Post-Impact	V	0.12		1	25

Ro	Ω	542,700
----	---	---------

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

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.

$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$							
Ri1 Post-Impact	Ω	637,172,280	Impact Time	1	Minutes	31	Seconds
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$							
Ri2 Post-Impact	Ω	528,539,105	Impact Time	1	Minutes	25	Seconds
Ri = The lesser of Ri1 and Ri2							
Ri Post-Impact	Ω	528,539,105	Impact Time	1	Minutes	25	Seconds
$R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$							
Ri / Vb Post-Impact	Ω	59,120,705	Impact Time	1	Minutes	25	Seconds

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

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?	X	
Additional Comments	None	

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

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

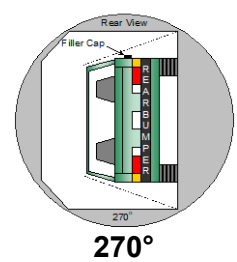
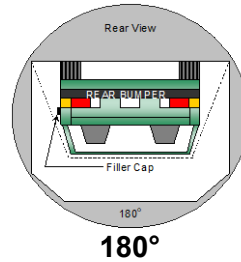
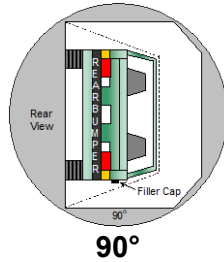
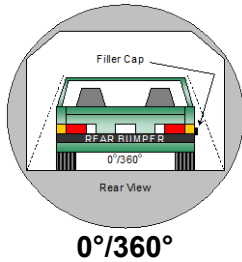
	Yes (Fail)	No
Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?		X

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

PROPULSION BATTERY SYSTEM COMPONENTS



PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time (spec. 1-3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
	1	min	52	sec	5	min	6	min	52	sec	7	min
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	48	sec	5	min	6	min	48	sec	7	min
270° - 360°	1	min	51	sec	5	min	6	min	51	sec	7	min

TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

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

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

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

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		62100018
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		7/14/2023

ELECTRICAL ISOLATION MEASUREMENTS

Vb Post-Impact	V	0.0
Ro	Ω	542,700

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	2.2	V	0°	min	19	sec	
	2.5		90°				2
	2.5		180°				2
	2.5		270°				2
	0.6		360°				2
V2	1.5	V	0°	min	28	sec	
	1.1		90°				2
	0.4		180°				3
	1.5		270°				3
	0.2		360°				2
V1'	0.0	V	0°	min	42	sec	
	0.0		90°				2
	0.0		180°				3
	0.0		270°				3
	0.0		360°				3
V2'	0.0	V	0°	min	34	sec	
	0.0		90°				2
	0.0		180°				3
	0.0		270°				3
	0.0		360°				2

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

Test Vehicle: 2023 Nissan Ariya Engage AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235201
 Test Date: 3/20/2024

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	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	2		42	
	Zero Volts		180°	3		21	
	Zero Volts		270°	3		19	
	Zero Volts		360°	3		0	
$Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']$							
Ri2	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	2		34	
	Zero Volts		180°	3		13	
	Zero Volts		270°	3		10	
	Zero Volts		360°	2		53	
Ri = The lesser of Ri1 and Ri2							
Ri	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	2		34	
	Zero Volts		180°	3		13	
	Zero Volts		270°	3		10	
	Zero Volts		360°	2		53	
$Ri / Vb = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$							
Ri / Vb	Zero Volts	Ω/V	0°		min		sec
	Zero Volts		90°	2		34	
	Zero Volts		180°	3		13	
	Zero Volts		270°	3		10	
	Zero Volts		360°	2		53	

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

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?	X	
Additional Comments	None	

**APPENDIX A
PHOTOGRAPHS**

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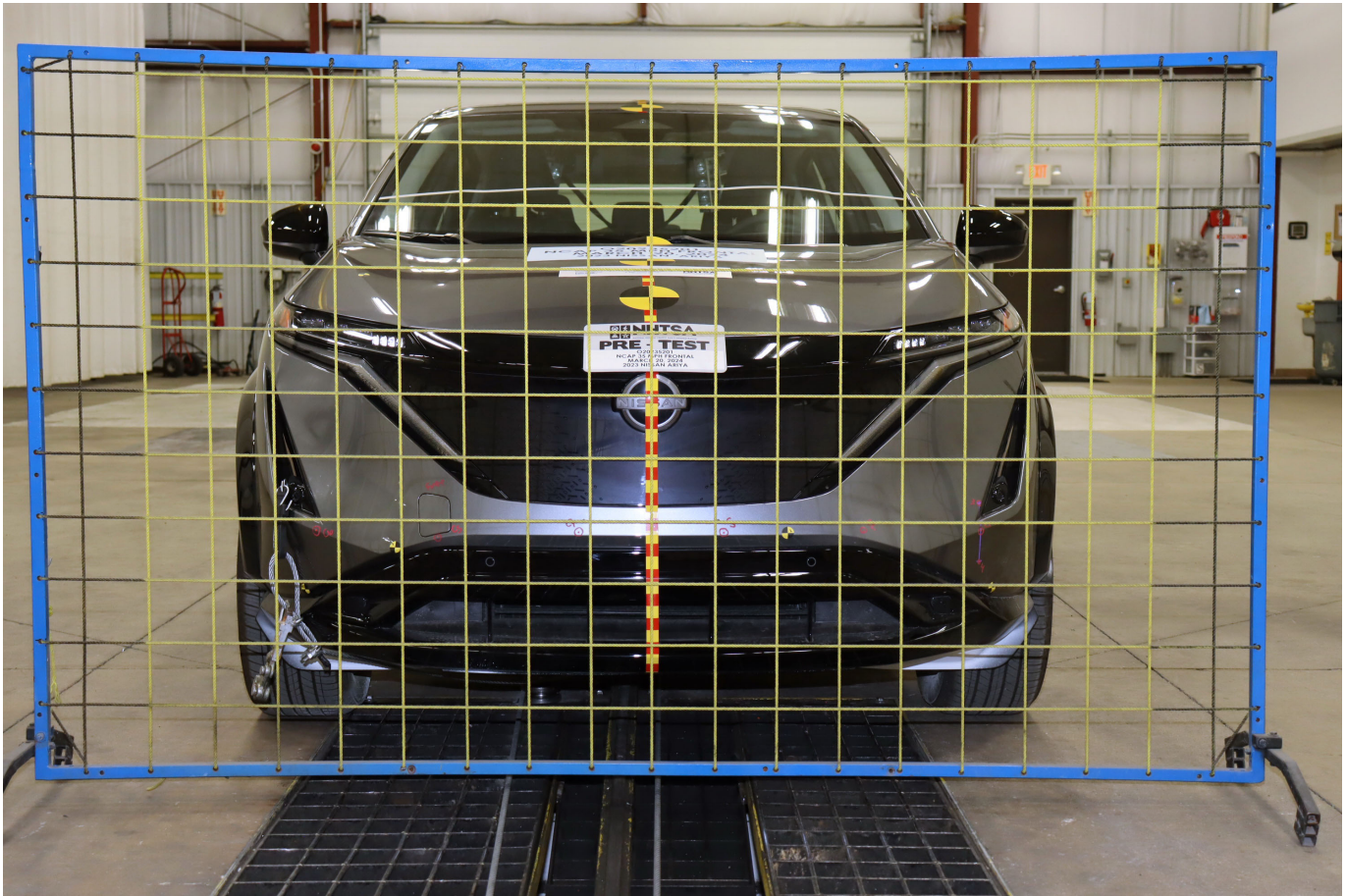


Photo No. 001 - Load Cell Location



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 - 2023 Nissan Ariya Engage AWD 5-Door SUV 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

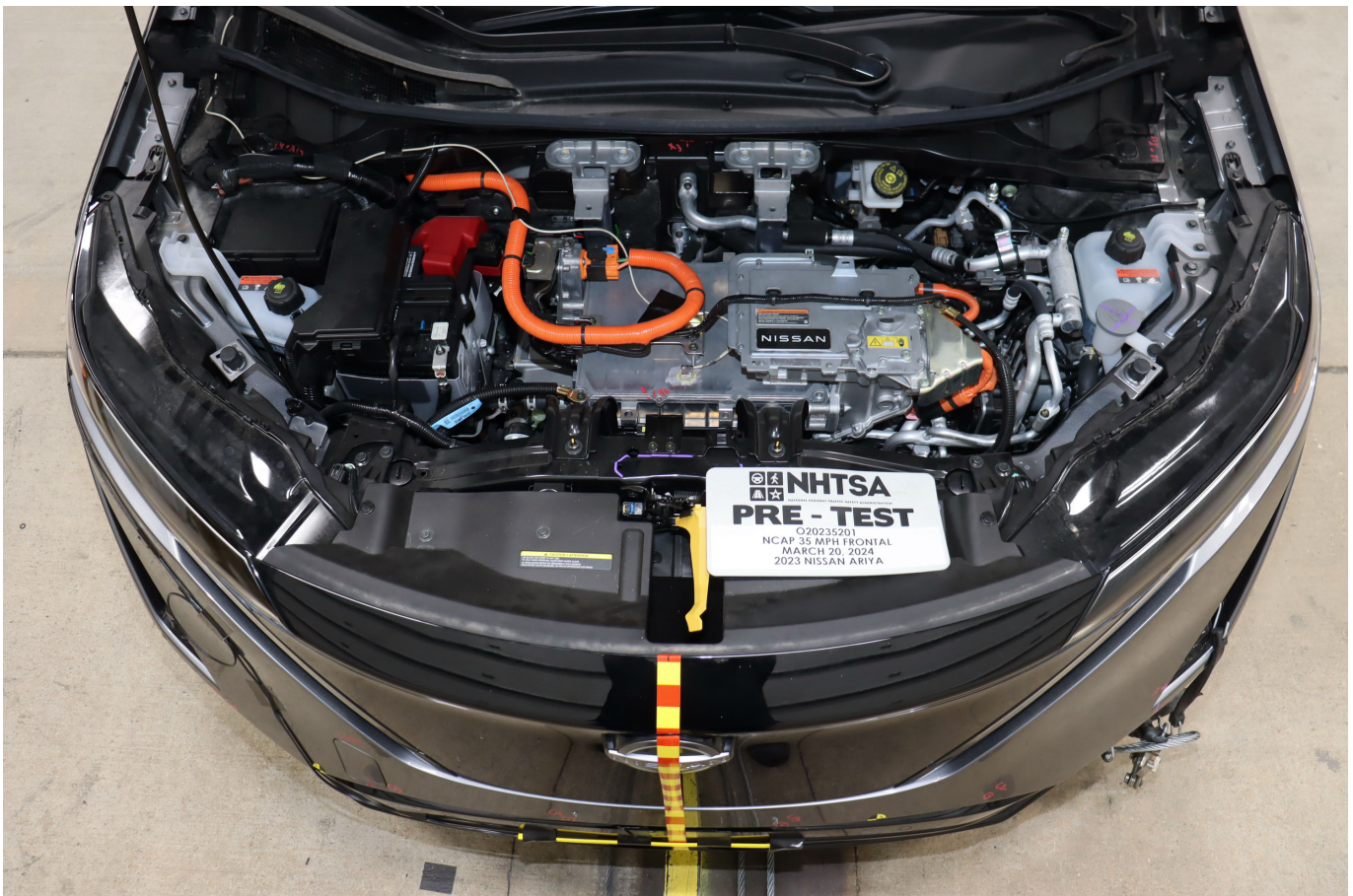
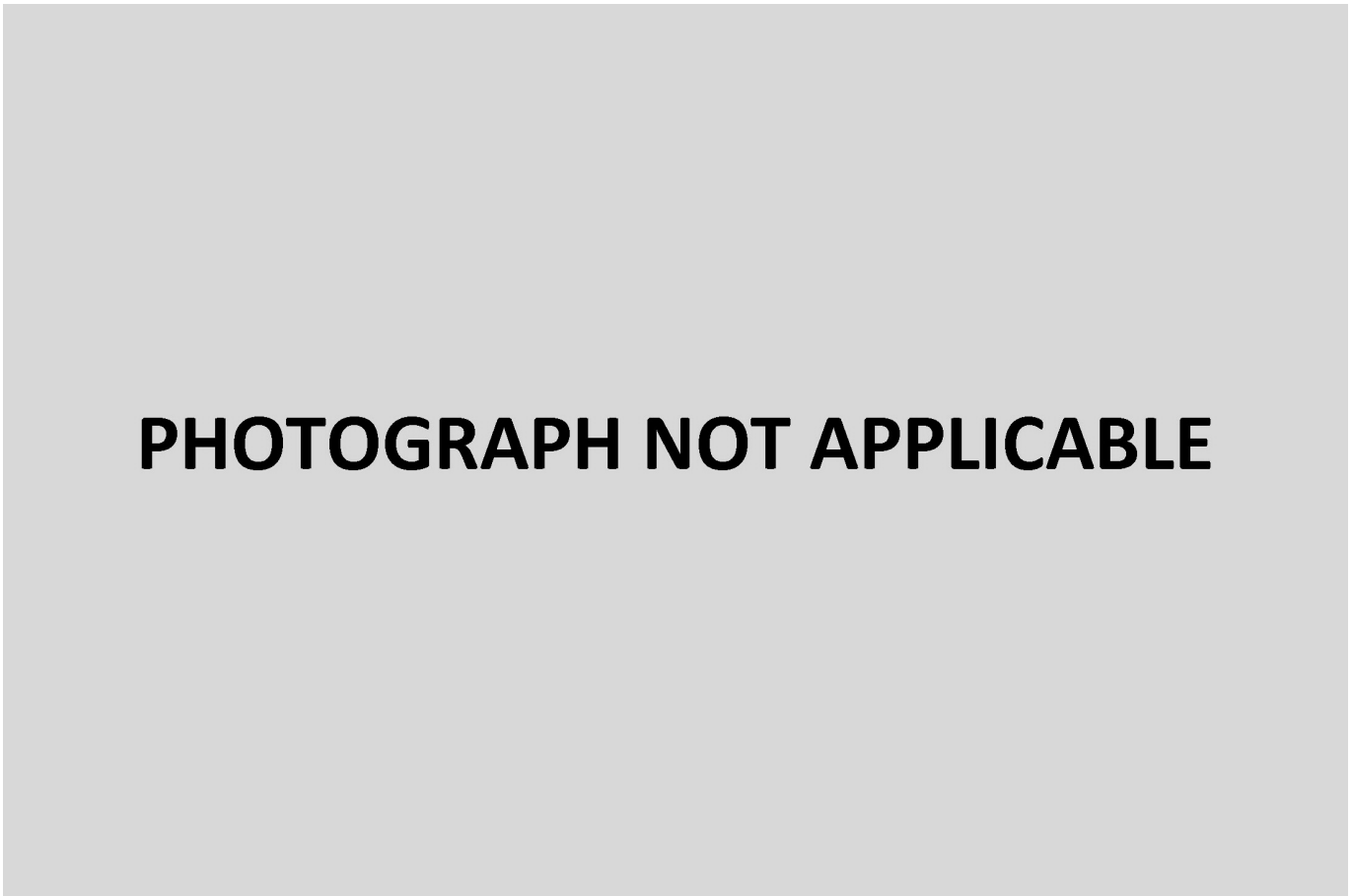


Photo No. 020 - Pre-Test Engine Compartment View



Photo No. 021 - Post-Test Engine Compartment View



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

PHOTOGRAPH NOT APPLICABLE

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

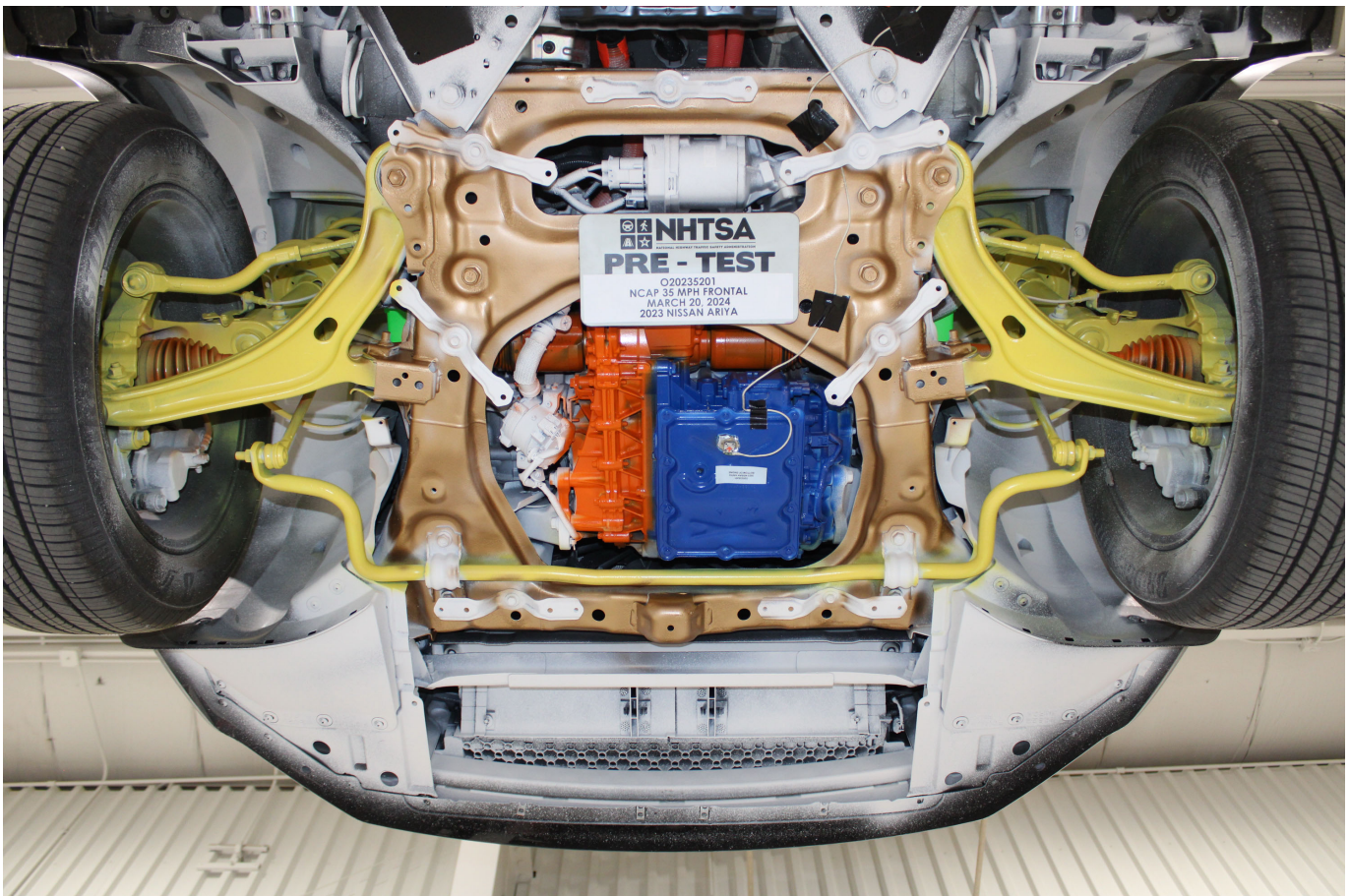


Photo No. 024 - Pre-Test Front Underbody View

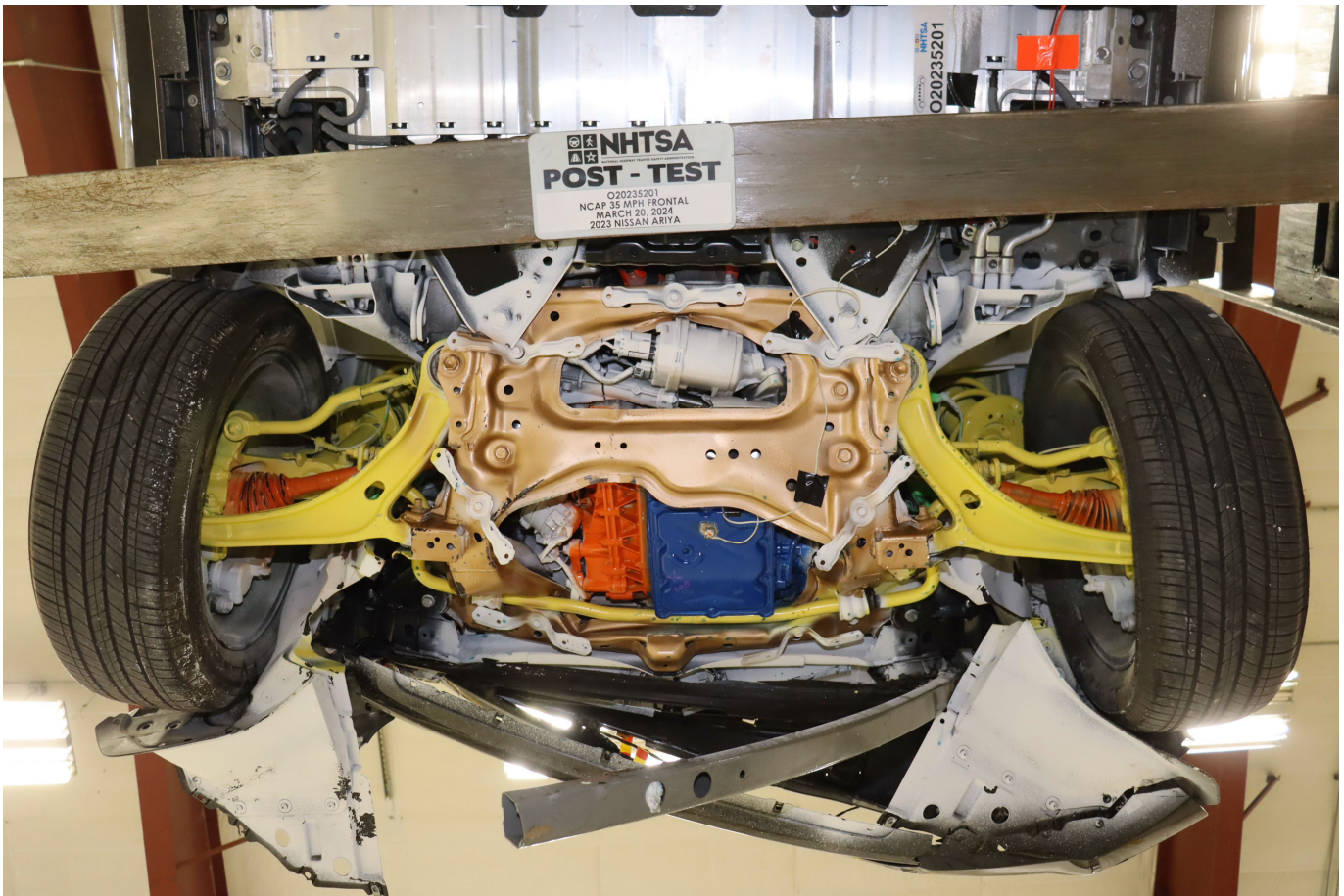


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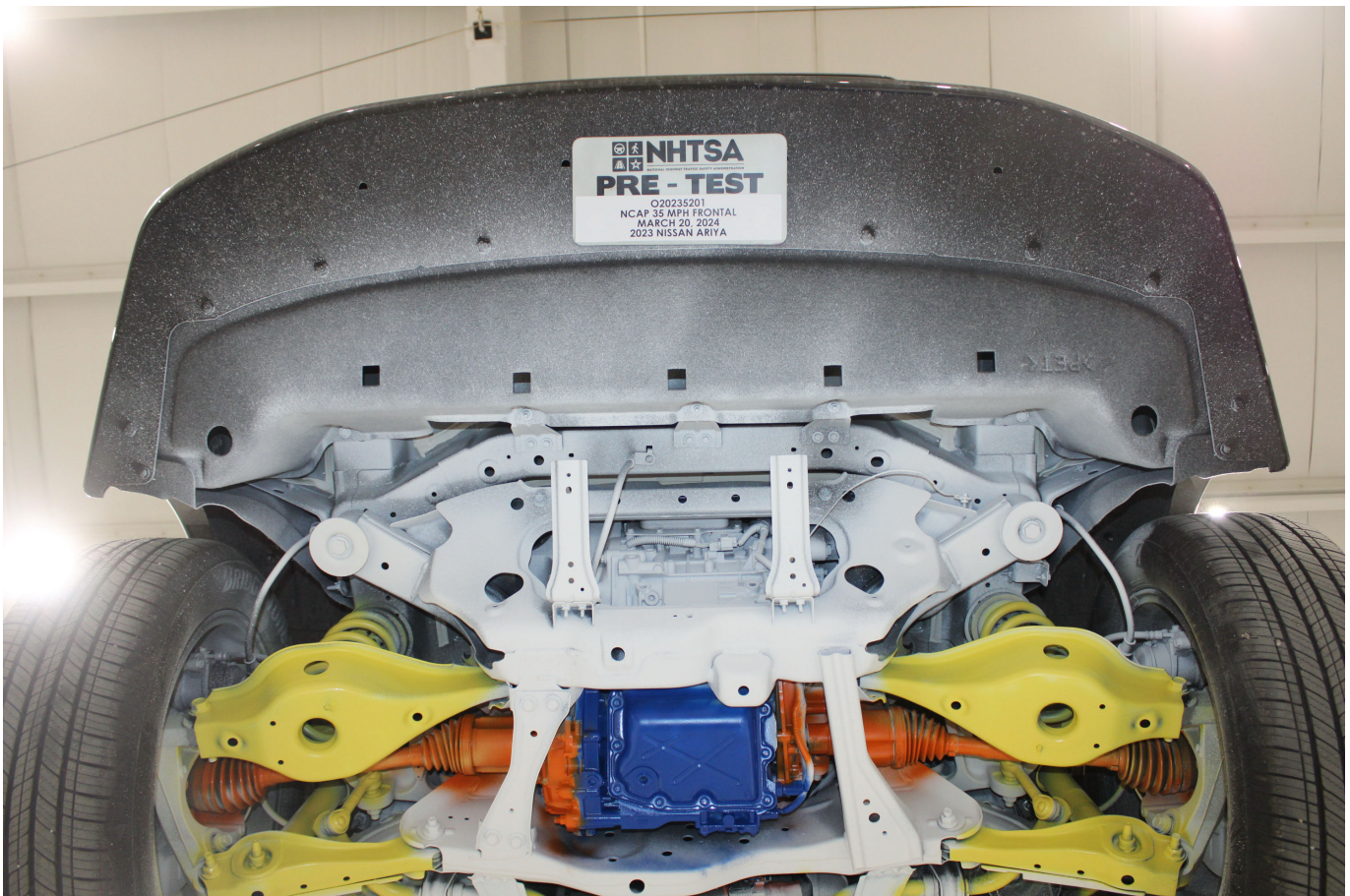


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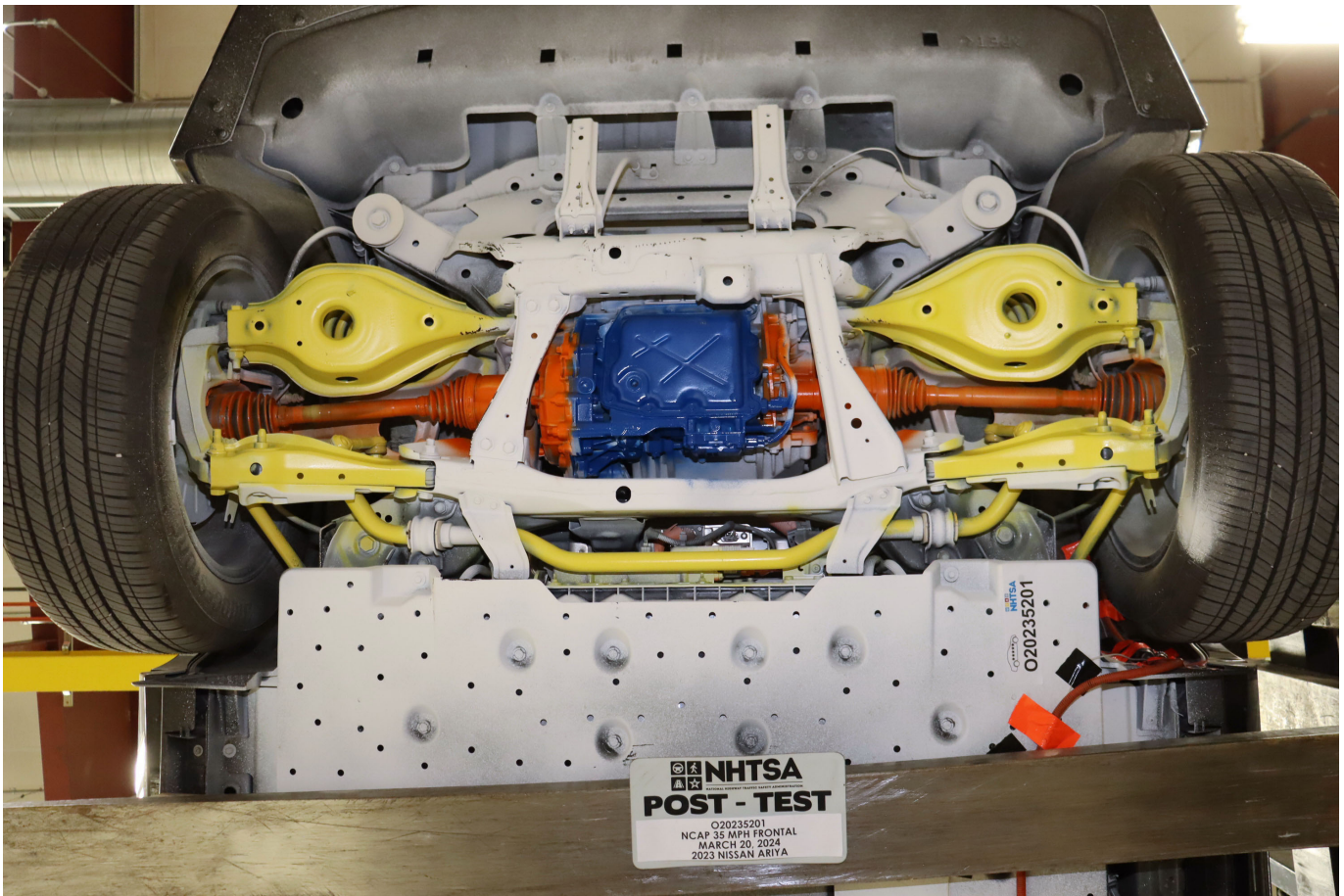


Photo No. 027 - Post-Test Rear Underbody View



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. 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

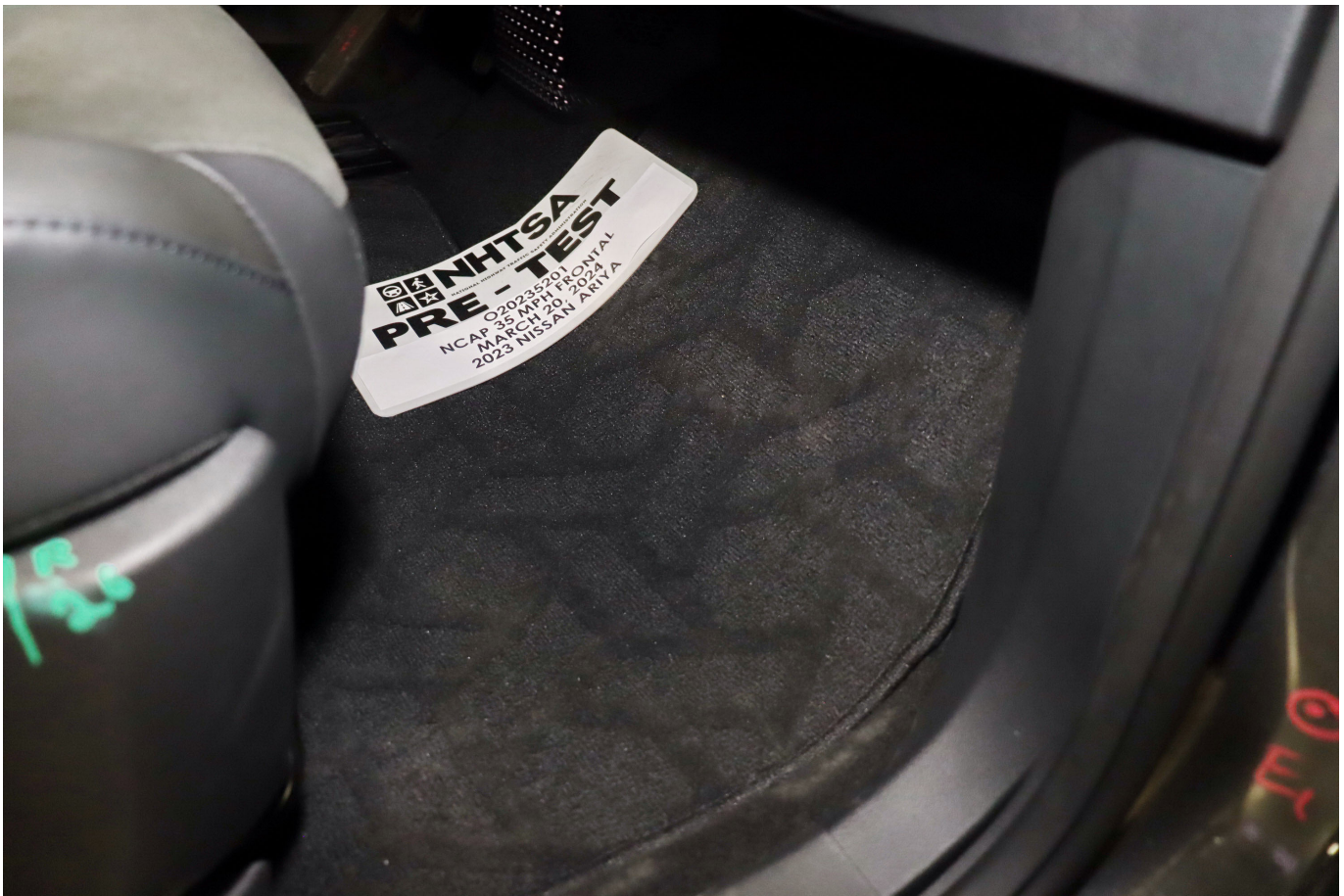


Photo No. 069 - Pre-Test Passenger's Side Floorpan



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

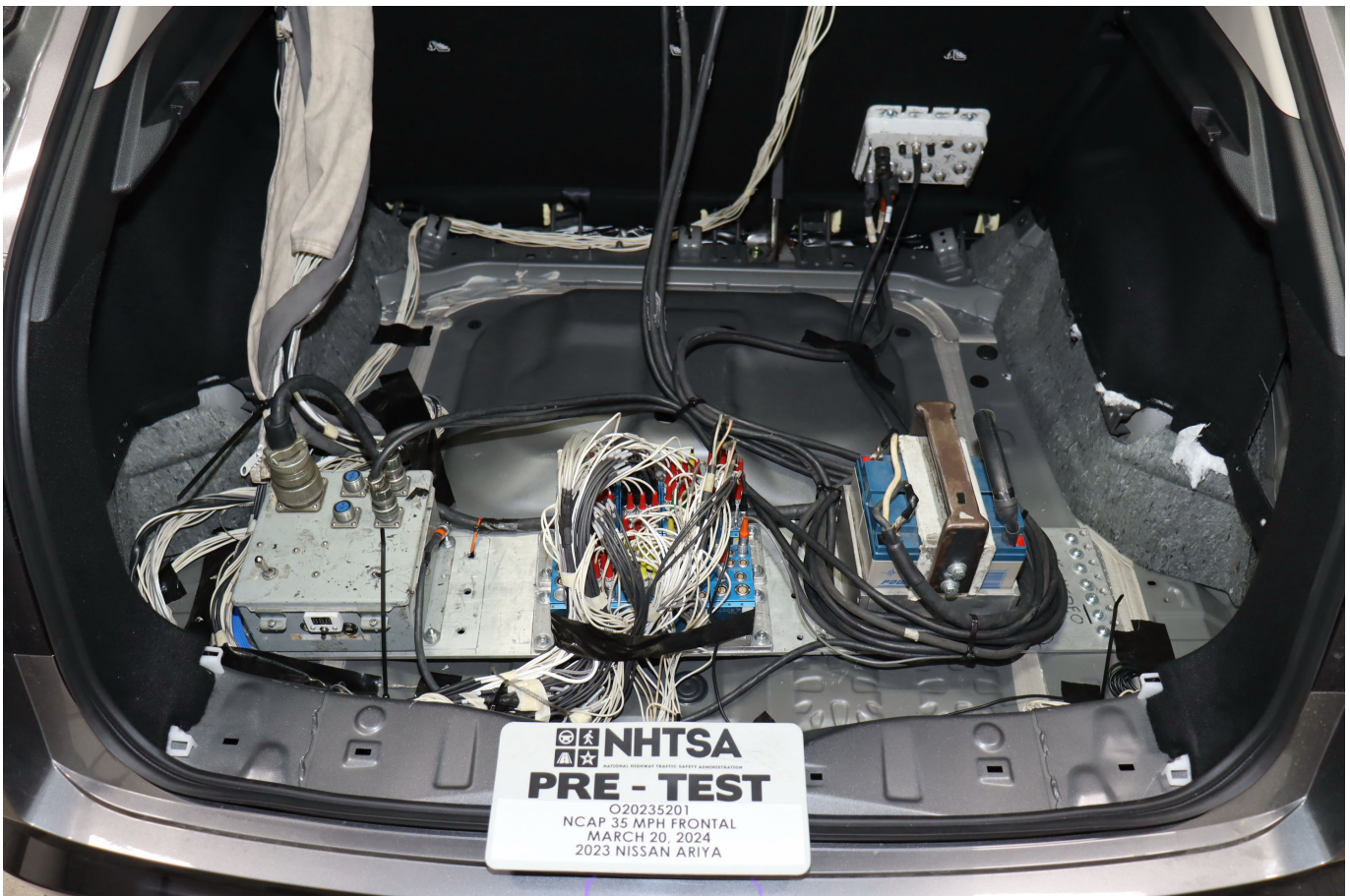


Photo No. 074 - Photograph of Ballast Installed in Vehicle

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

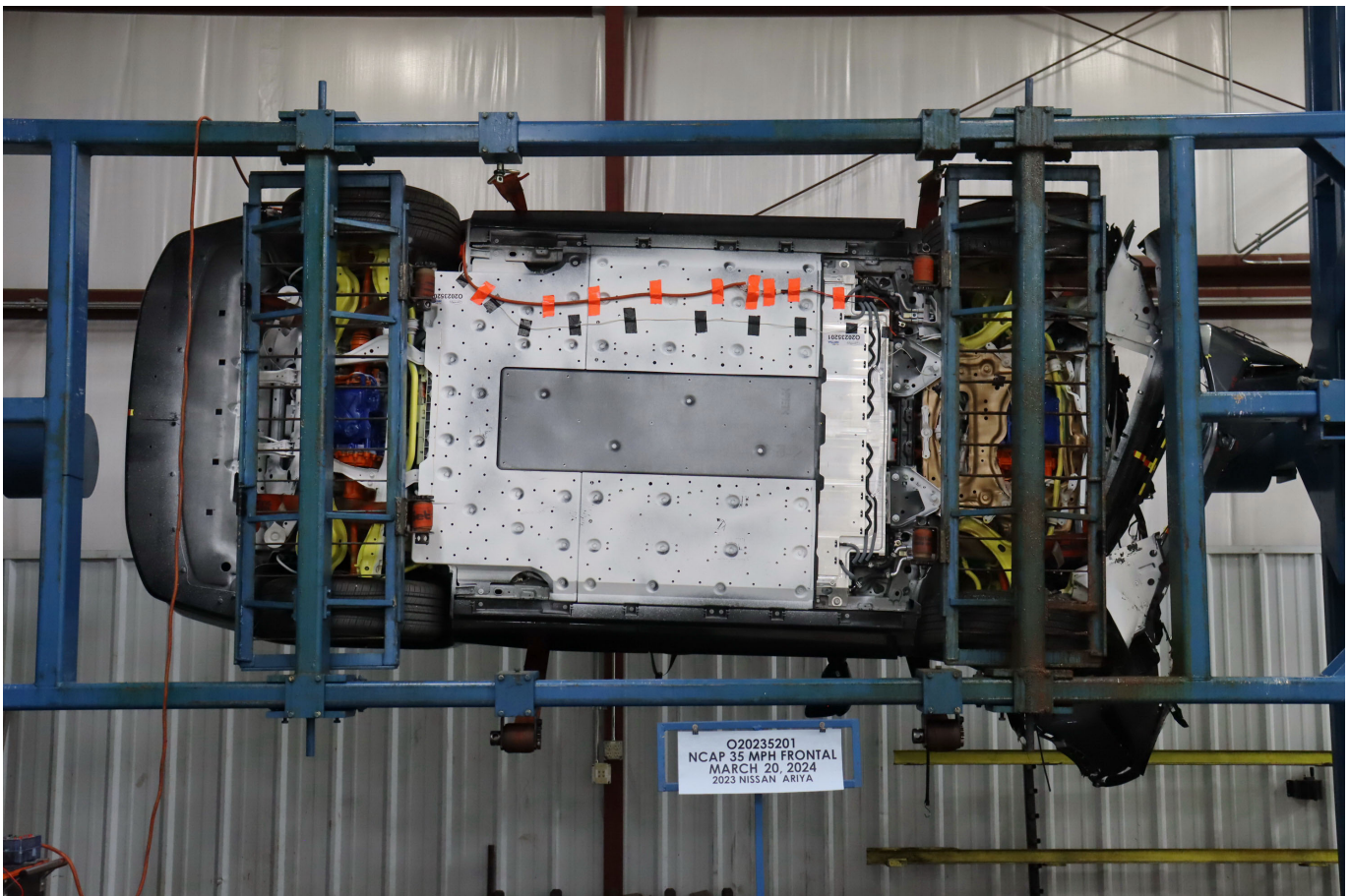


Photo No. 080 - Vehicle at 270 Degrees on Static Rollover Device



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



Photo No. 082 - 2023 Nissan Ariya Engage AWD 5-Door SUV Frontal Impact Event



**2023 NISSAN ARIYA
ENGAGE AWD e-4ORCE
UP TO 205 MILES+++**



EPA DOT Fuel Economy and Environment Electric Vehicle

Fuel Economy

95 MPGe
combined city/hwy

SMALL STATION WAGONS range from 16 to 120 MPGe. The best vehicle rates 132 MPGe.

You save \$4,250
in fuel costs over 5 years compared to the average new vehicle.

101 89 35
city highway kW-hrs per 100 miles

Driving Range
When fully charged, vehicle can travel about...
Charge Time: 10 hours:40V

205 miles

Annual fuel cost \$750

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

1 10 10 1 10 10

This vehicle emits 0 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Does not include emissions from generating electricity; learn more at fuelconomy.gov.

fuelconomy.gov
Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS DELIVERY

Overall Vehicle Score Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.	Not Rated	VEHICLE COLORS: EXT: GUN METALLIC INT: CHARCOAL
Frontal Crash Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.	Driver Not Rated Passenger Not Rated	FINAL ASSEMBLY POINT: LOS ANGELES
Side Crash Based on the risk of injury in a side impact.	Front seat Not Rated Rear seat Not Rated	TRANSPORT METHOD: TRUCK
Rollover Based on the risk of rollover in a single-vehicle crash.	Not Rated	DEALER: BOUCHER NISSAN/WAUKESHA 1451 E MORELAND BLVD WAUKESHA WI 53186

Star ratings range from 1 to 5 stars (*****) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

This Vehicle qualifies for Nissan's
Security+Plus Extended Protection Plan
The only service agreement backed by Nissan Extended Services North America!
Ask your dealer for details, or call 1-800-NISSAN-1 for more information

VIN: JN1CF0B62PM702644
EMS: 50 STATE EMISSIONS
MDL: 24213-702644 KAD-G
OPT: G-L92N92C03

20230623231548AS0507

100% ELECTRIC

Standard Equipment Included at No Extra Charge

MECHANICAL & PERFORMANCE:
335 hp (250kW) AC Synchronous Motor
63 kWh useable Lithium-Ion Battery with Liquid Cooling
Battery Heater
7.2kW Onboard Charger
Quick Charge Port
Power Assisted Vented Front & Rear Braking System
Regenerative Braking System with e-Step Mode
Portable Charge Cable (120V/240V EVSE)

SAFETY & SECURITY:
Nissan Safety Shield 360
Automatic Emergency Braking with Pedestrian Detection
Blind Spot Warning
Lane Departure Warning
Rear Automatic Braking
Rear Cross Traffic Alert
High Beam Assist
Intelligent Blind Spot Intervention

COMFORT & CONVENIENCE:
ProPILOT Assist with Navi-link
Intelligent Cruise Control
Windshield-Type Colored Head-Up Display
12.3" Advanced Drive-Assist™ Display
Front & Rear Capacitive Door Handle with Approach Unlock & Walk Away Lock
Rear Door Alert
RearView Monitor
Intelligent Auto Headlights
Intelligent Driver Alertness
Traffic Sign Recognition
Nissan Intelligent Key® with Push Button Ignition+ Hybrid Heater
Power Sliding Center Console
Heated Steering Wheel
Front & Rear Heated Seats

AUDIO & INFOTAINMENT:
NissanConnect®
Wireless Apple CarPlay®+ Android Auto™ ++
Nissan Door to Door Connected Navigation
SiriusXM® with 360L
Advanced Audio Features
SiriusXM® Satellite Traffic
SiriusXM® Satellite Travel Link
Bluetooth® Hands-free Phone System
NissanConnect® Services with Trial Access Included++

EXTERIOR:
19" Alloy Wheels with Aero Wheel Covers
Full LED Headlights (Low/High Beam) with LED Signature DTRL
Dual Power Folding & Heated Outside Mirrors
LED Tail Lights with Full-width Illumination

++Federal/State/Local Laws May Apply Review Before Using

+++For More Information See Dealer Owner's Manual or www.NissanUSA.com/connect/legat

+++Actual Range Will Vary With Trim Levels, Options, & Driving Conditions See Customer Disclosure For Details

++++Optional Equipment Replaces Standard Where Applicable

Manufacturer's Suggested Retail Base Price:	\$47,190.00
Options Included by Manufacturer Carpeted Floor Mats & First Aid Kit Illuminated Kick Plates	260.00 485.00
DESTINATION CHARGES	1,335.00
Total*	\$49,270.00

*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

Photo No. 083 - Monroney Label Photograph

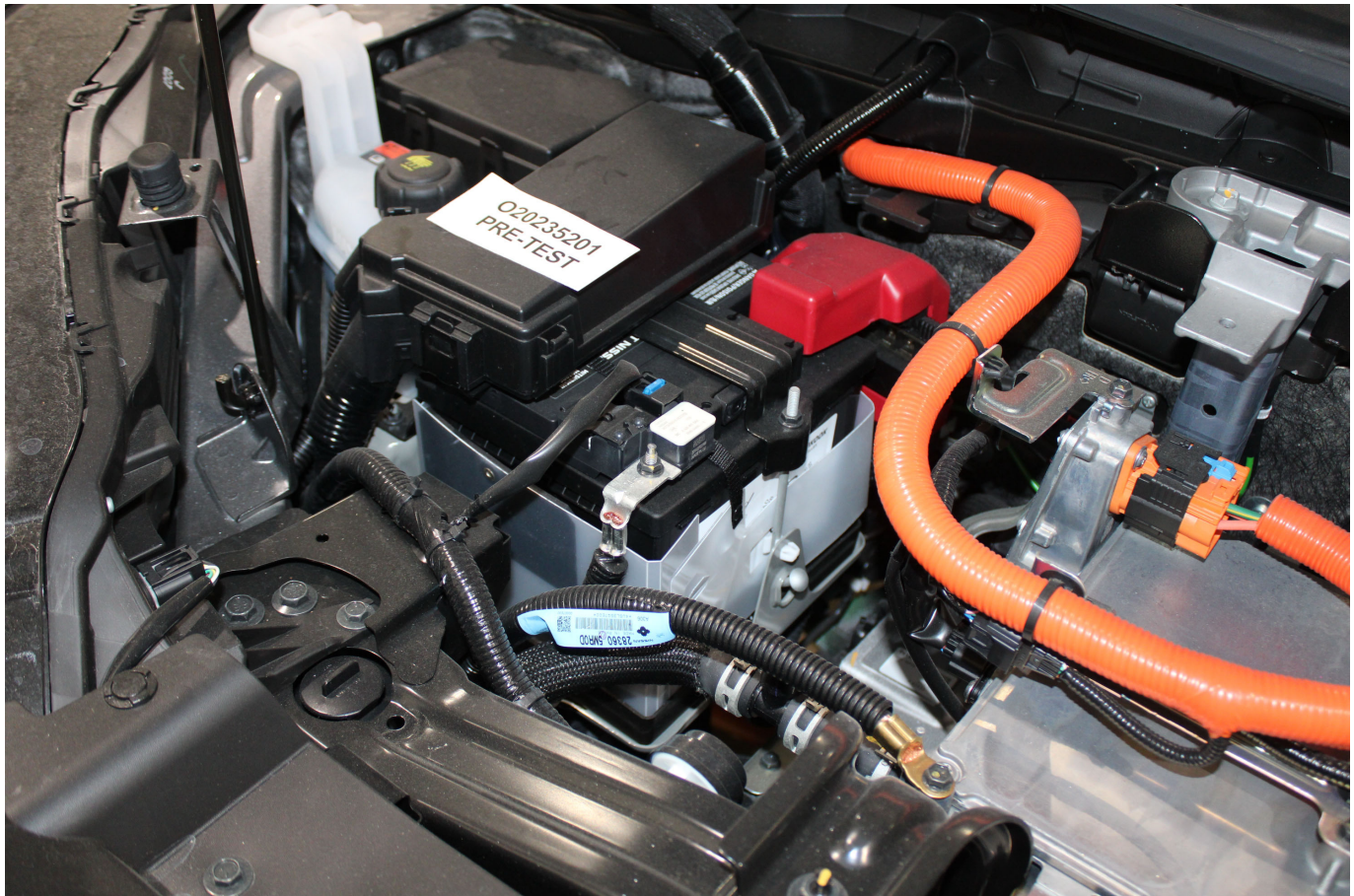


Photo No. 305-01 - Auxiliary Power Module Warning Label



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

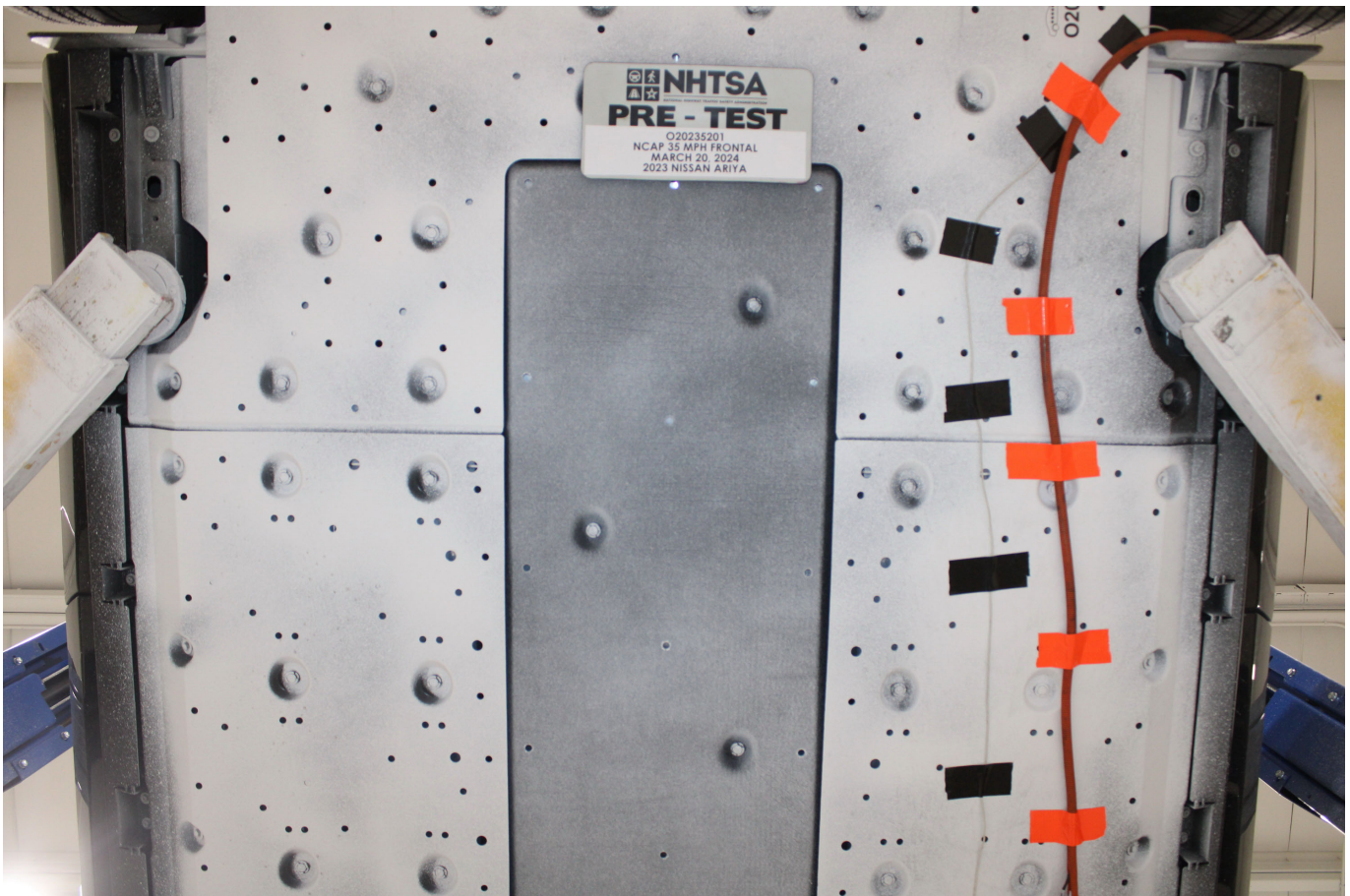


Photo No. 305-09 - Pre-Impact View of Propulsion Battery



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

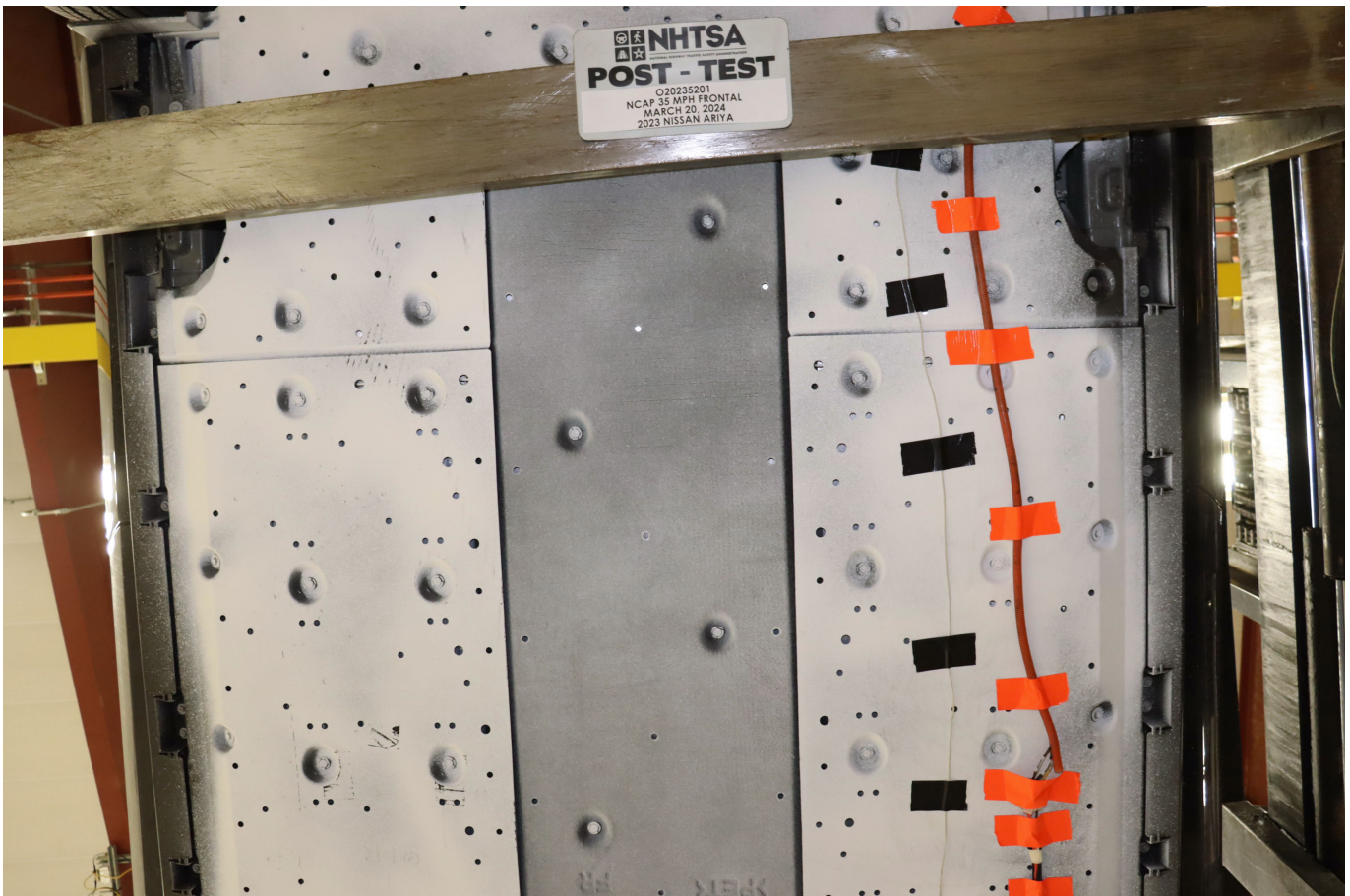


Photo No. 305-11 - Post-Impact Rear View of Propulsion Battery

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

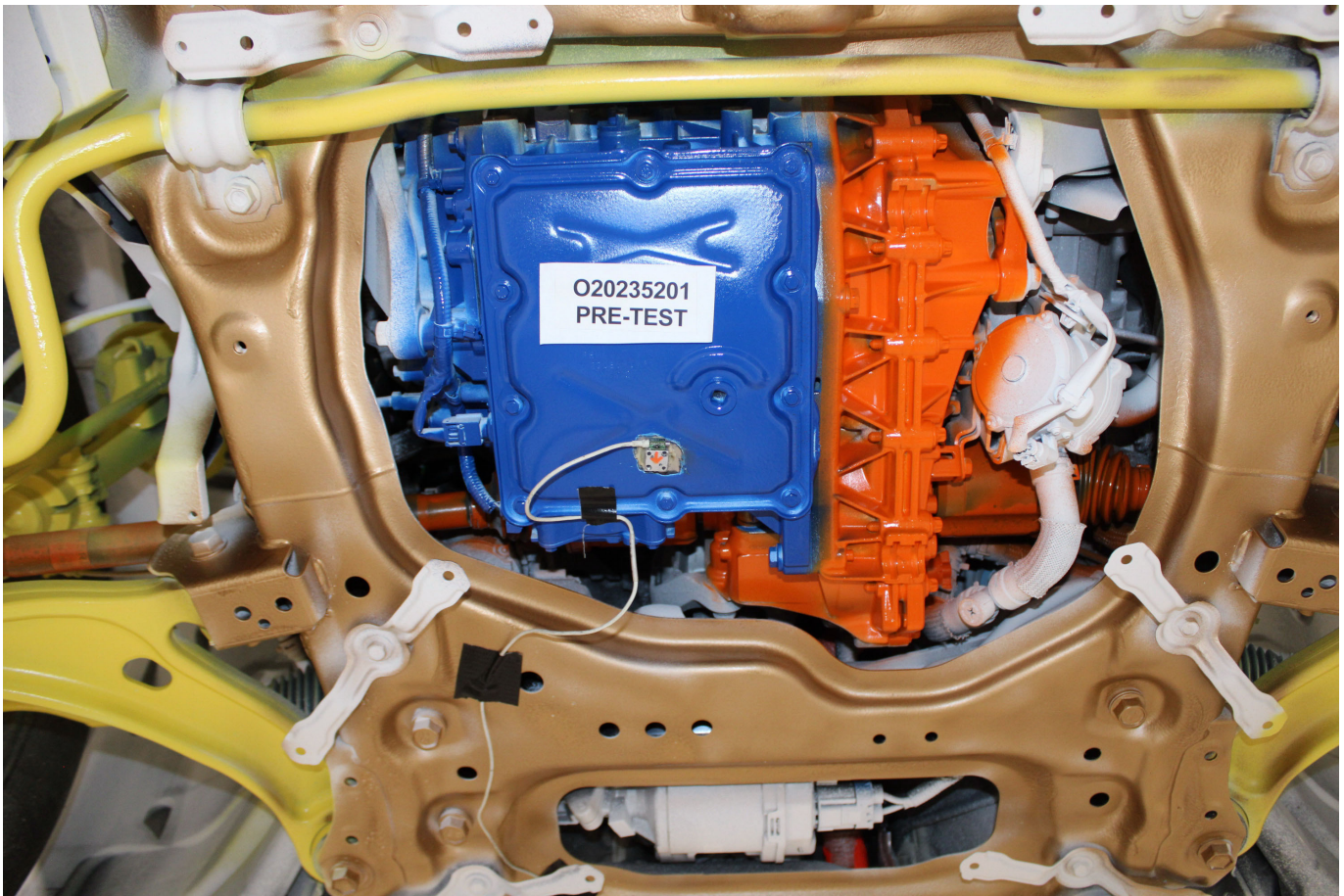


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

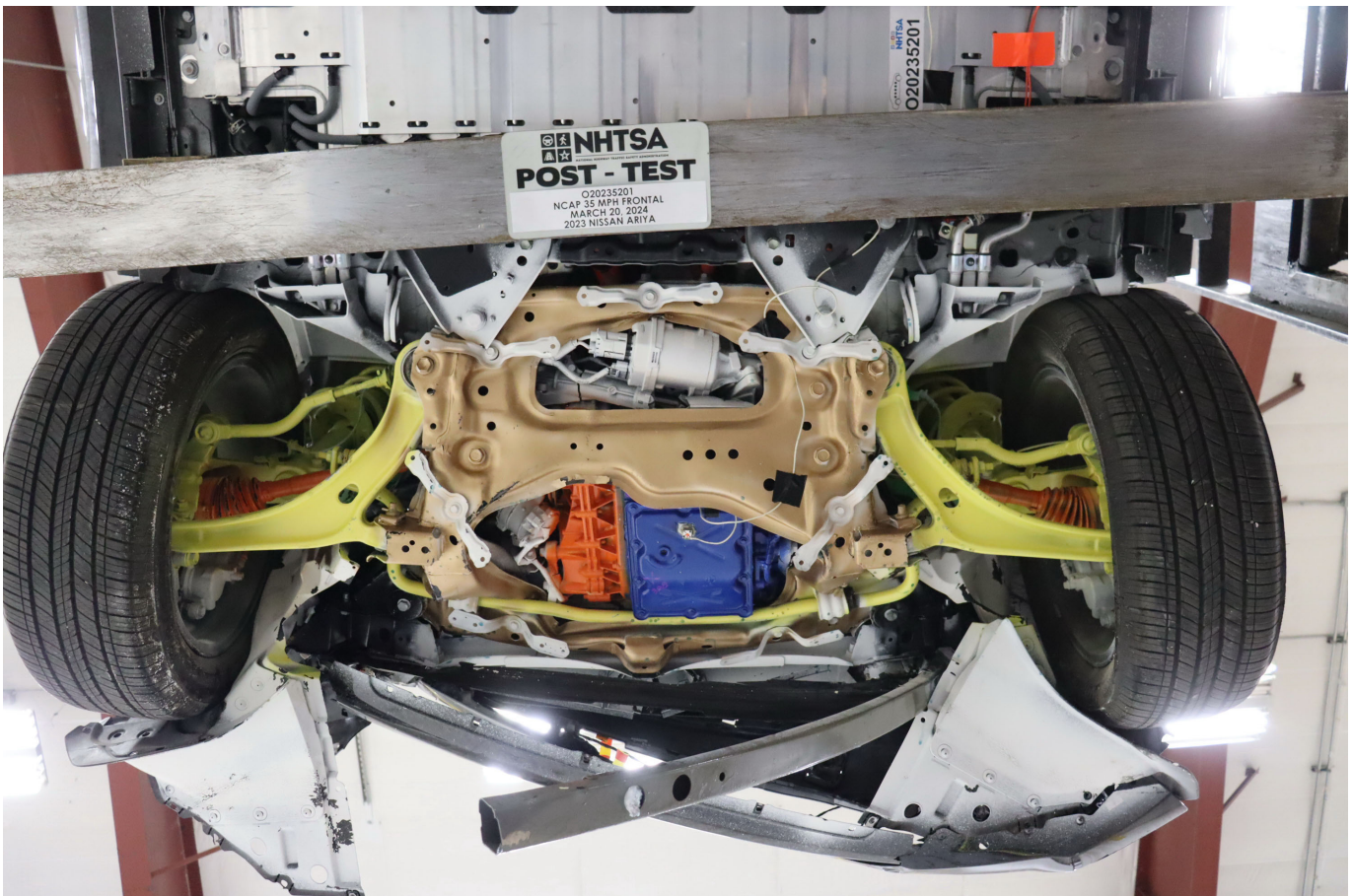


Photo No. 305-17 - Post-Impact View of Electric Propulsion Drive

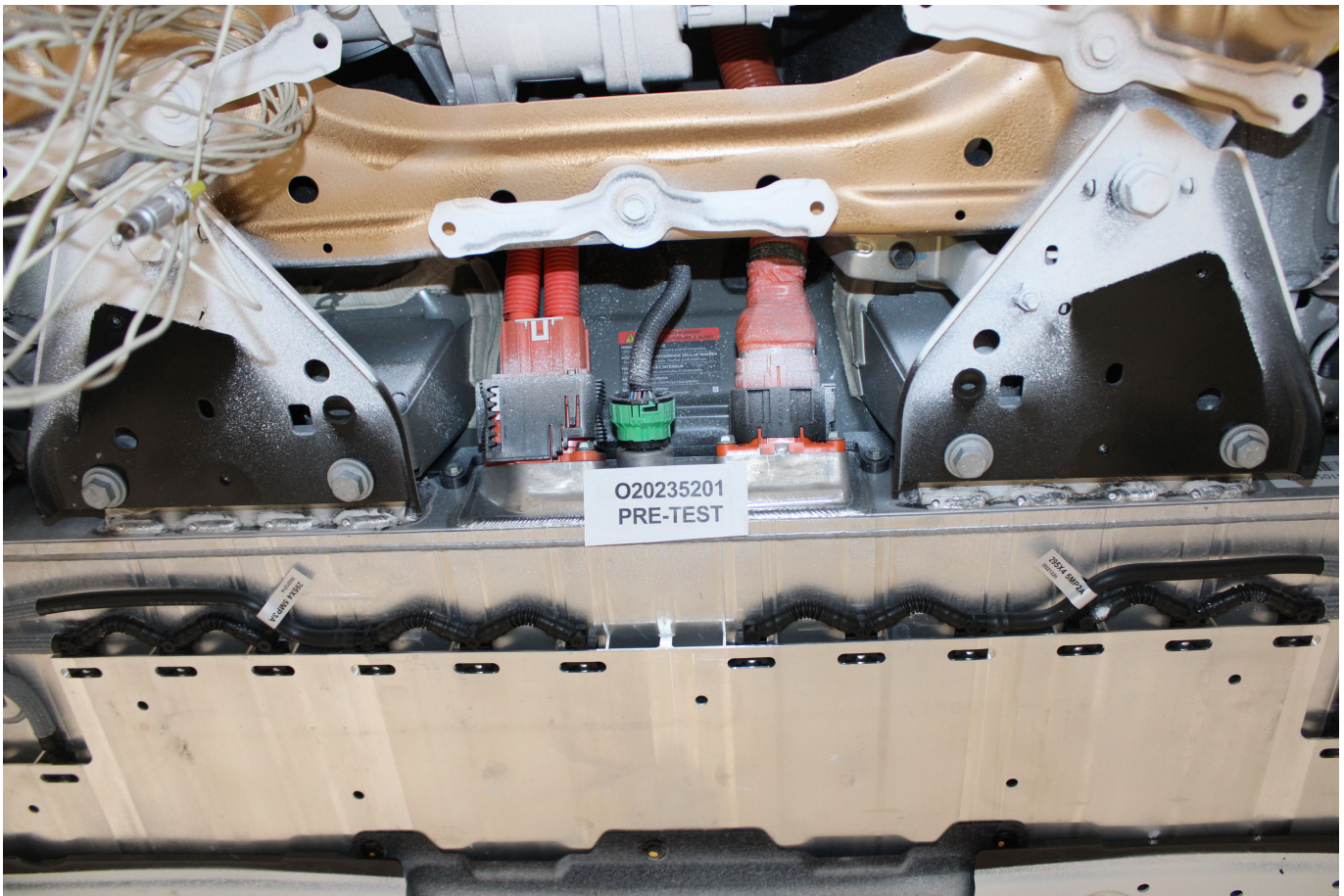


Photo No. 305-18 - Pre-Impact View of High Voltage Interconnect(s)

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

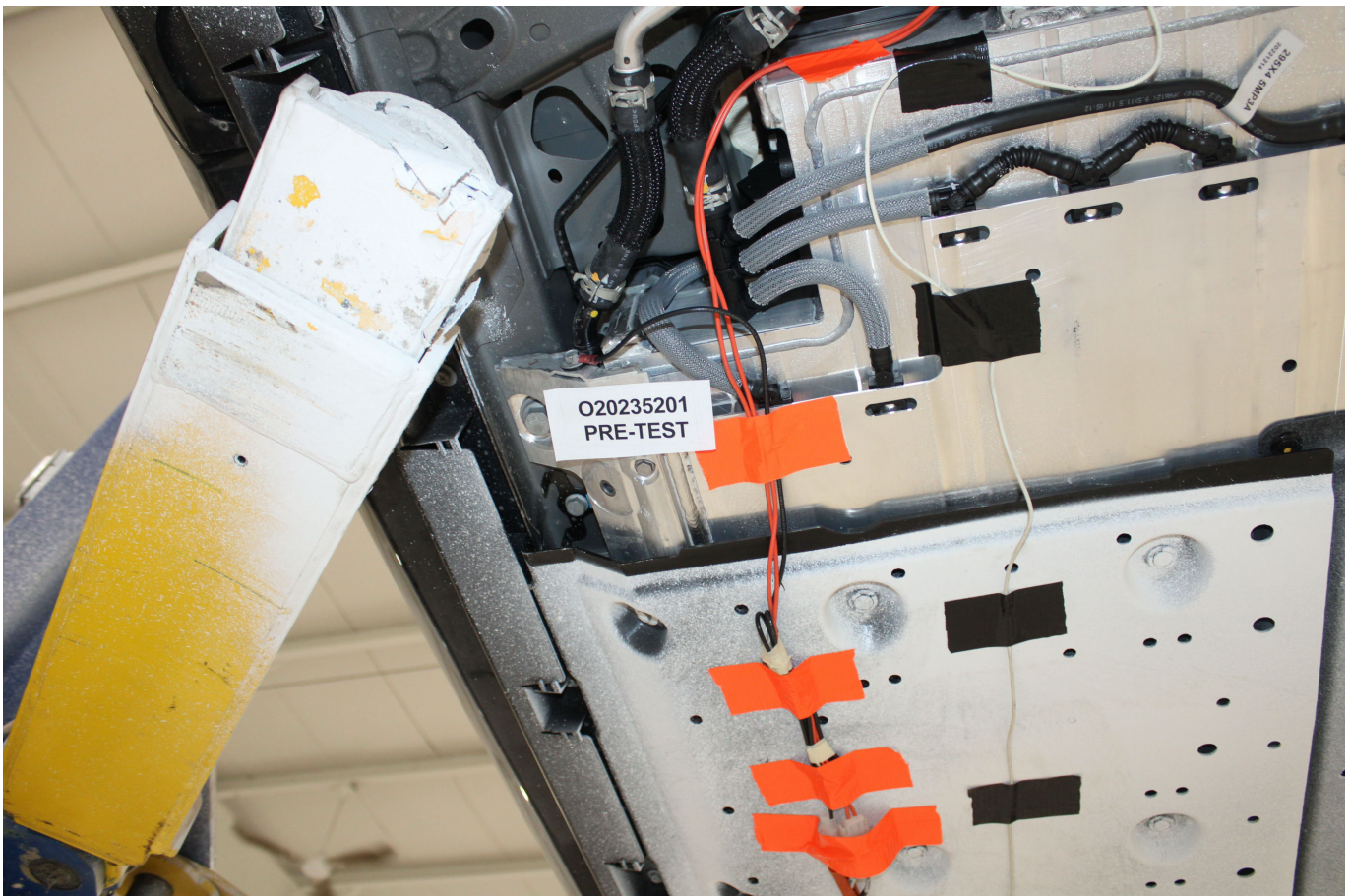


Photo No. 305-21 - Pre-Impact View of Ground Lead Attached



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

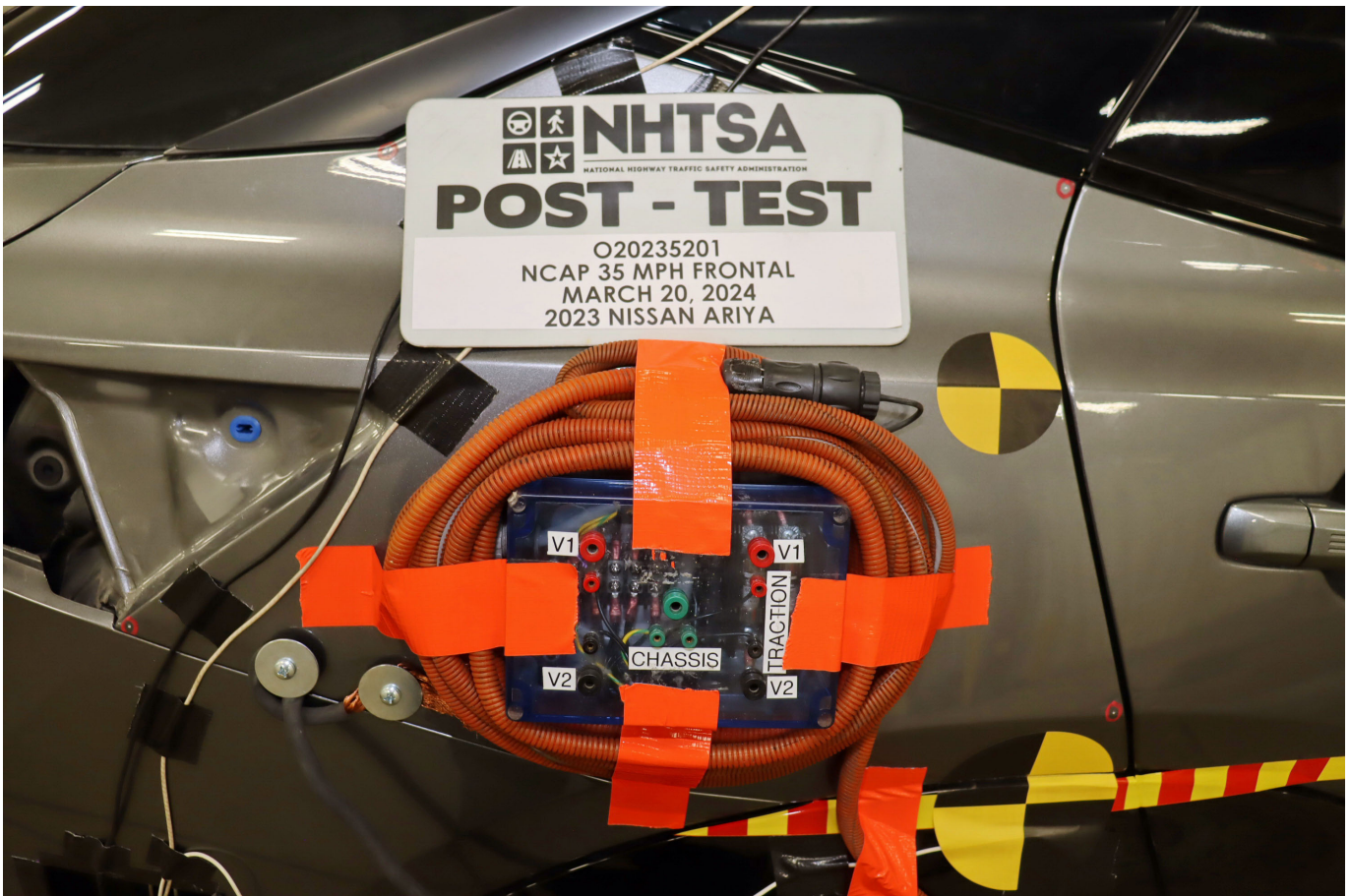


Photo No. 305-25 - Post-Impact View of Installed Test Interface Port



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

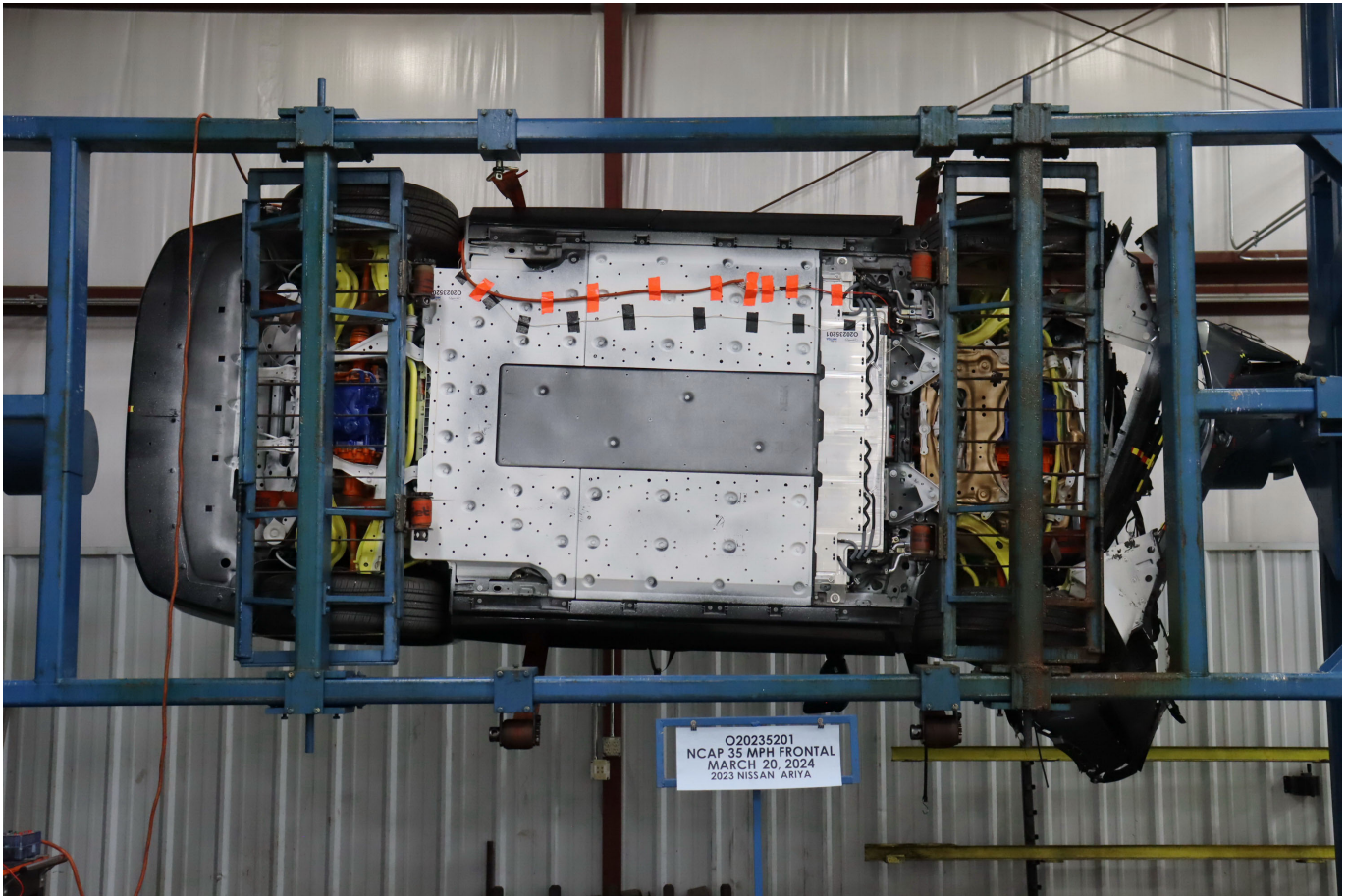


Photo No. 305-30 - FMVSS No. 305 Static Rollover at 270 Degrees



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

APPENDIX B
DUMMY RESPONSE DATA TRACES

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Figure No. 27.	Passenger Chest Resultant Z Acceleration vs. Time	B-9

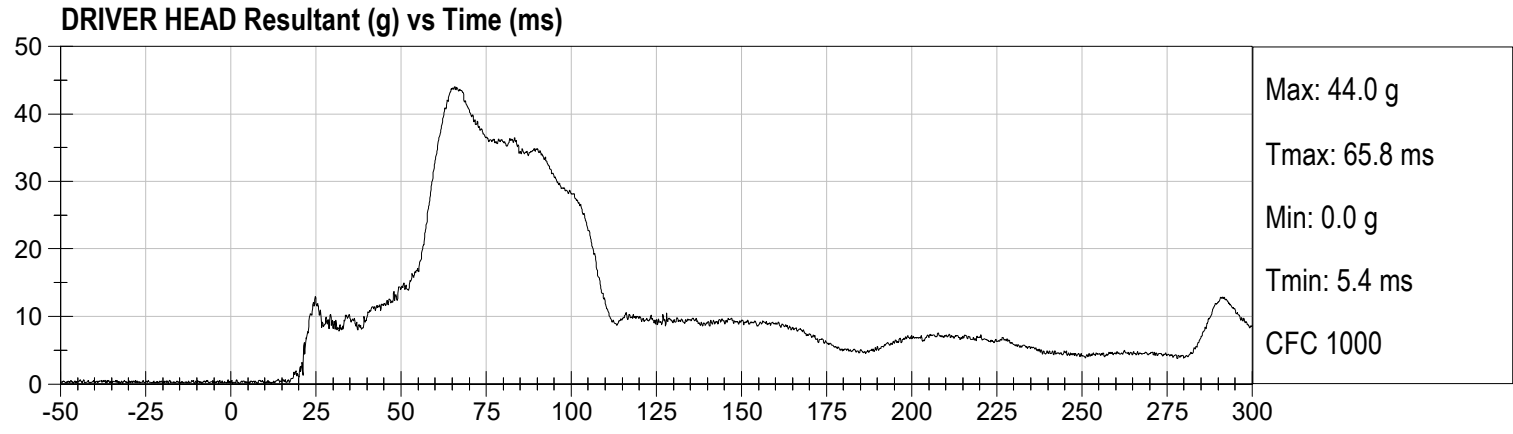
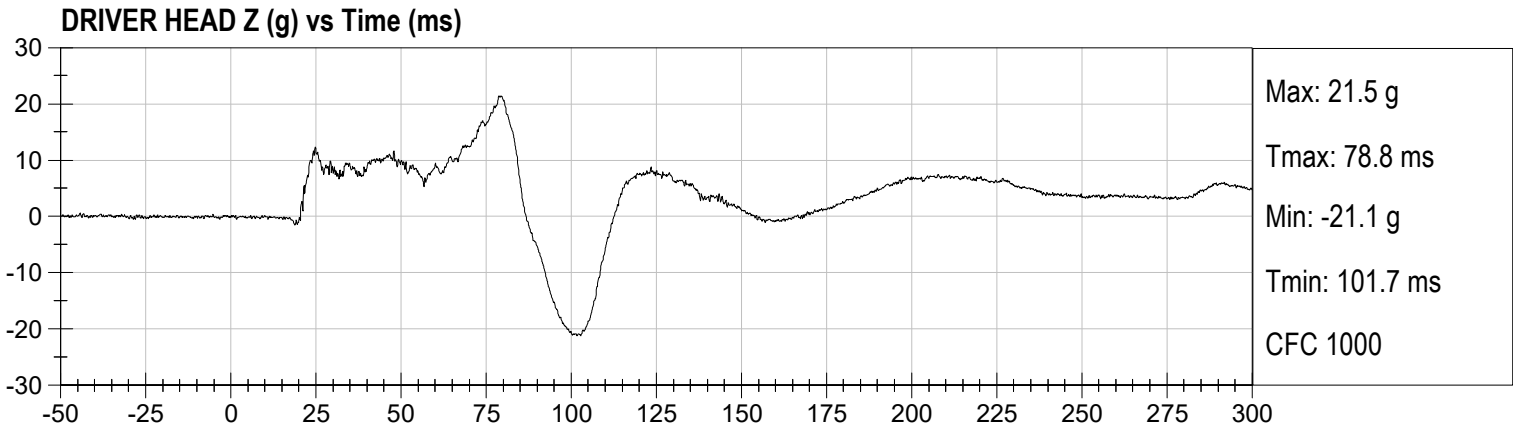
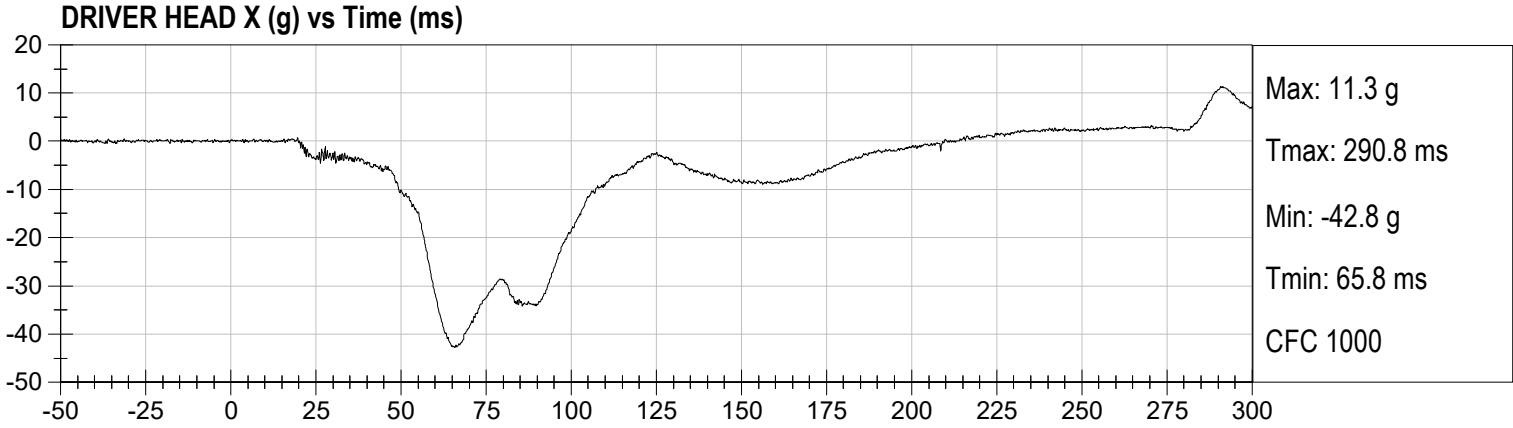
	<u>Page No.</u>
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The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

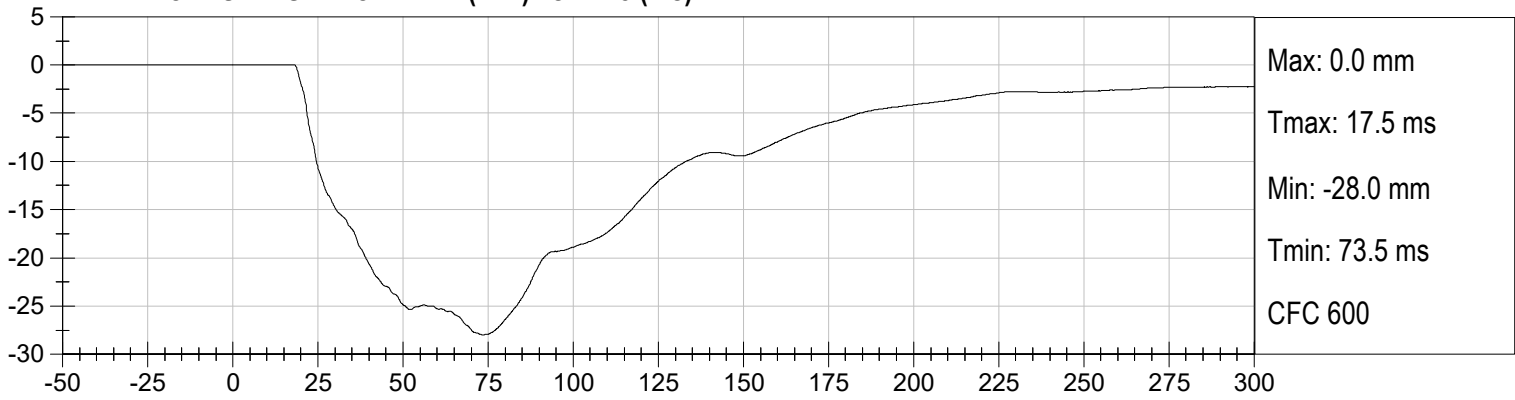
Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Head Angular Velocity X
 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 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

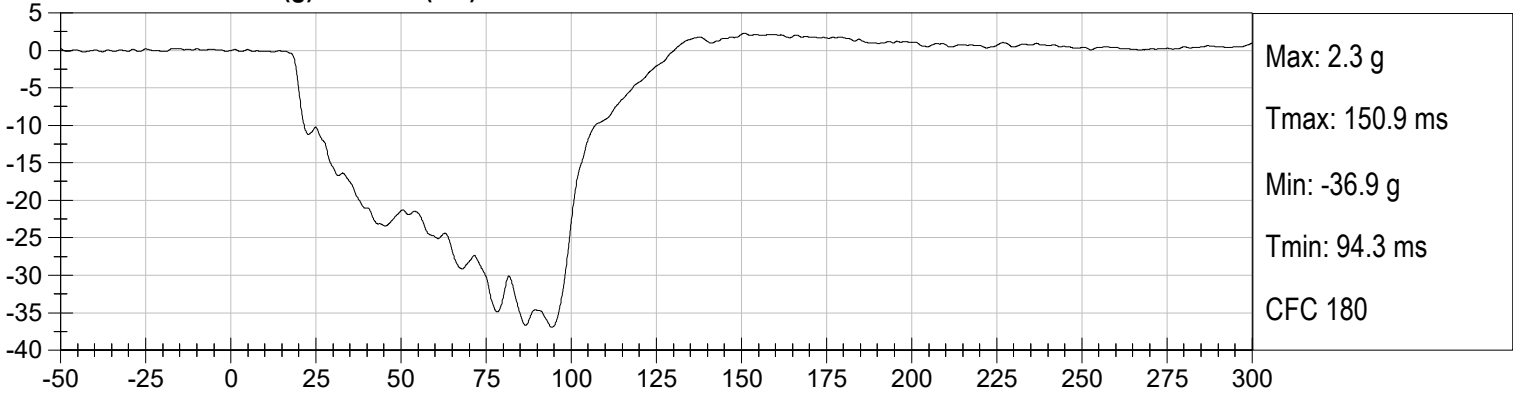
Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger 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



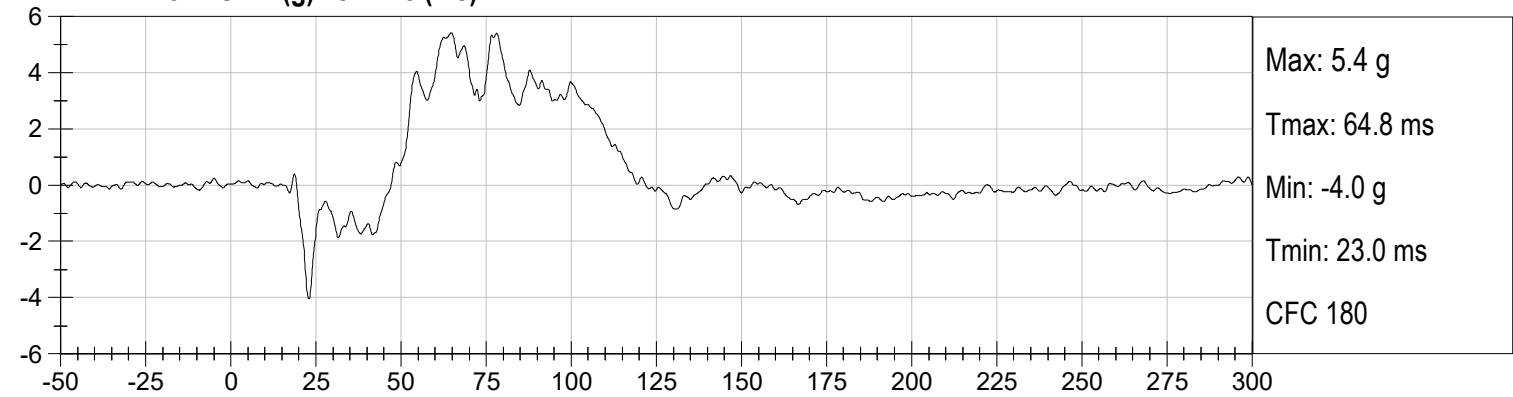
DRIVER CHEST DISPLACEMENT (mm) vs Time (ms)



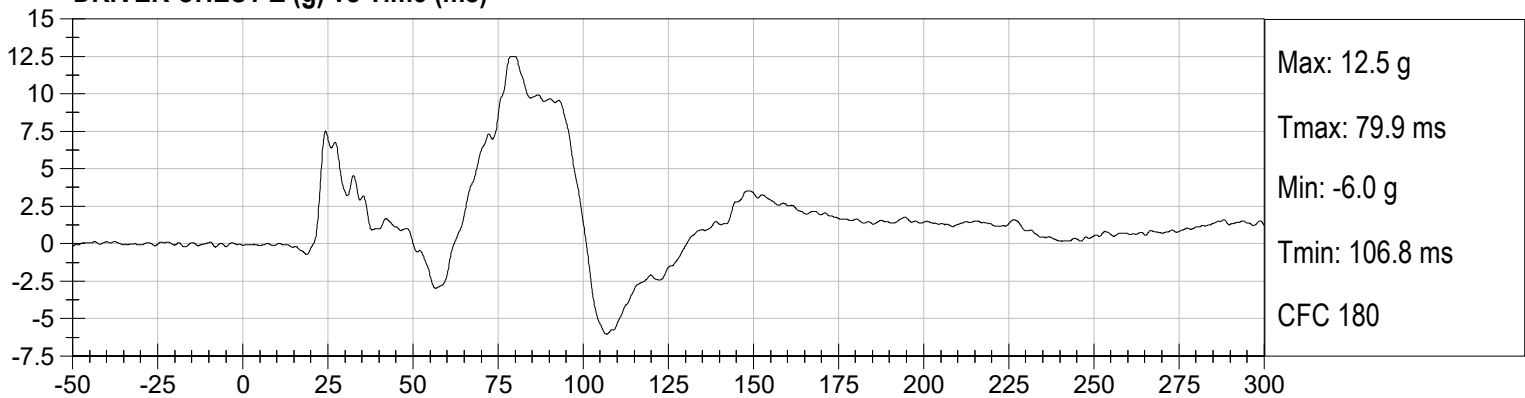
DRIVER CHEST X (g) vs Time (ms)



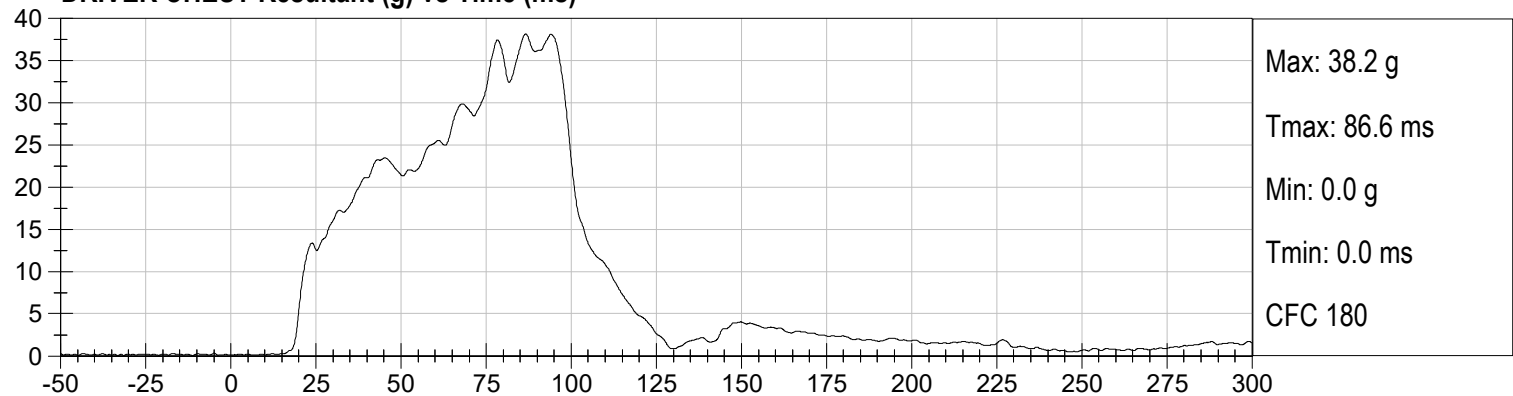
DRIVER CHEST Y (g) vs Time (ms)



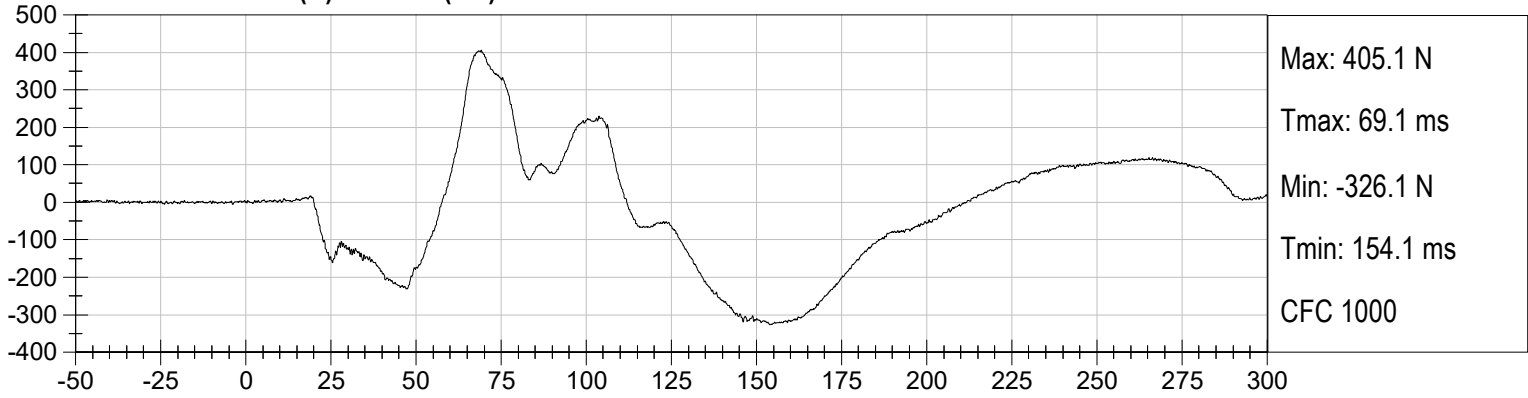
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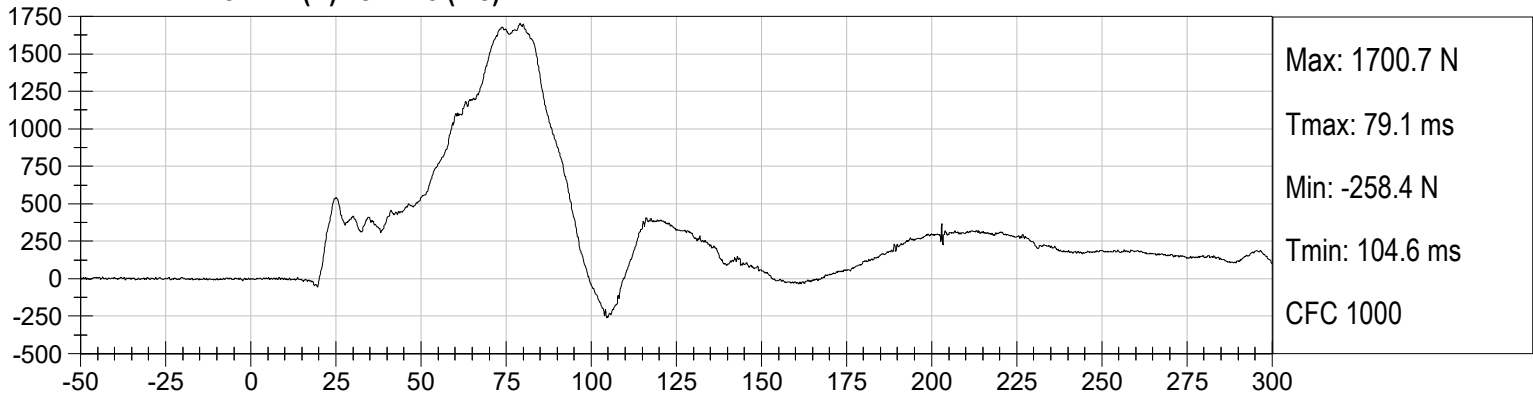
DRIVER CHEST Resultant (g) vs Time (ms)



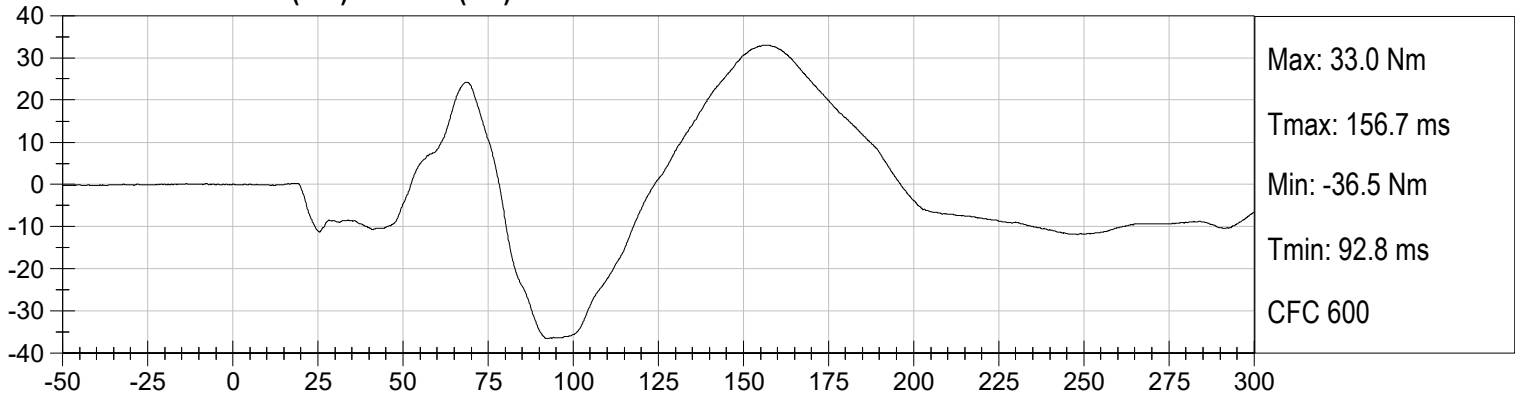
DRIVER NECK FX (N) vs Time (ms)



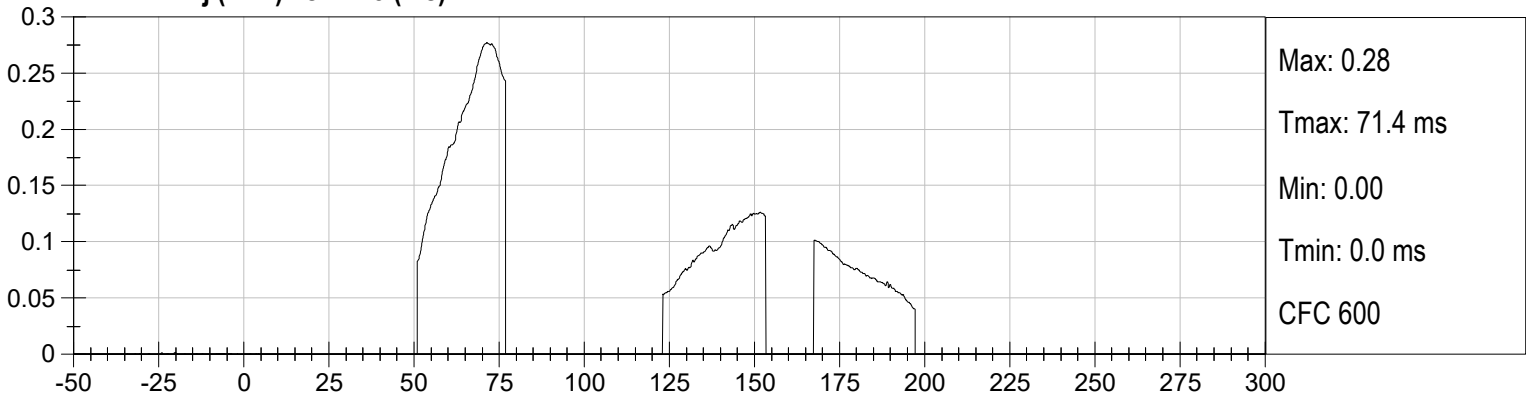
DRIVER NECK FZ (N) vs Time (ms)



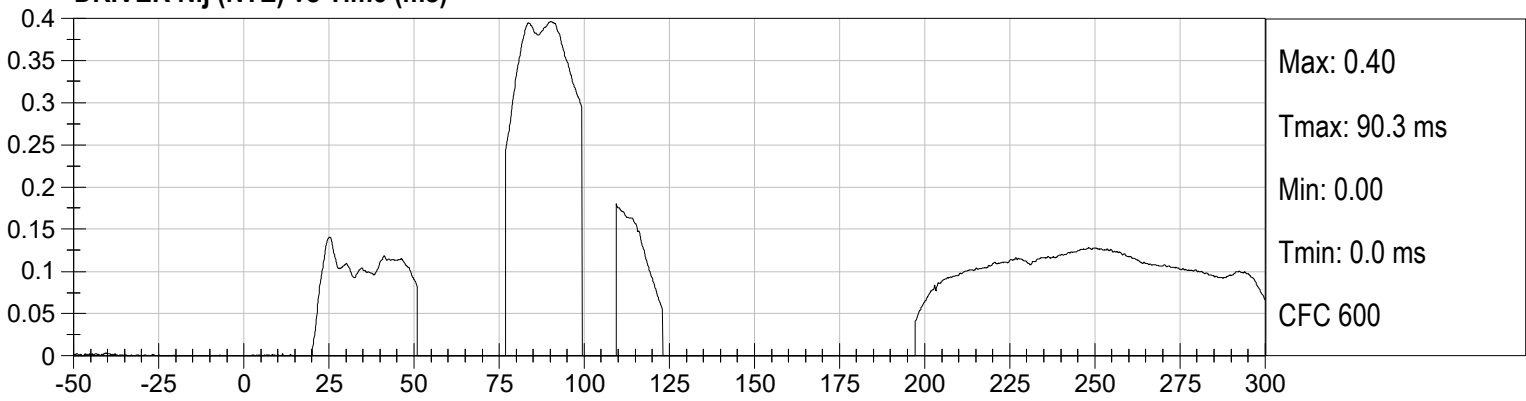
DRIVER NECK MY (Nm) vs Time (ms)



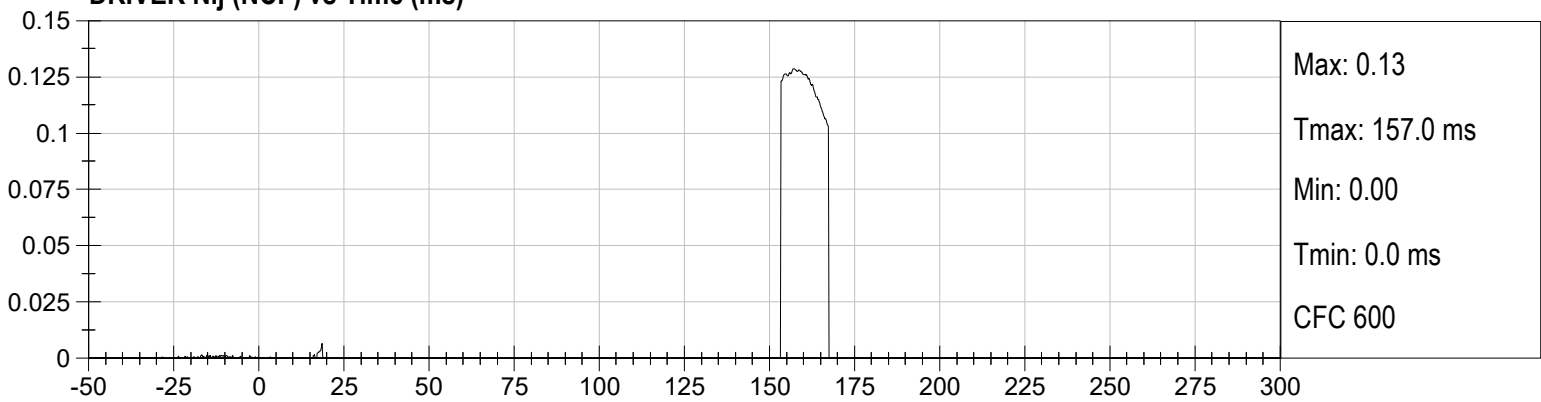
DRIVER Nij (NTF) vs Time (ms)



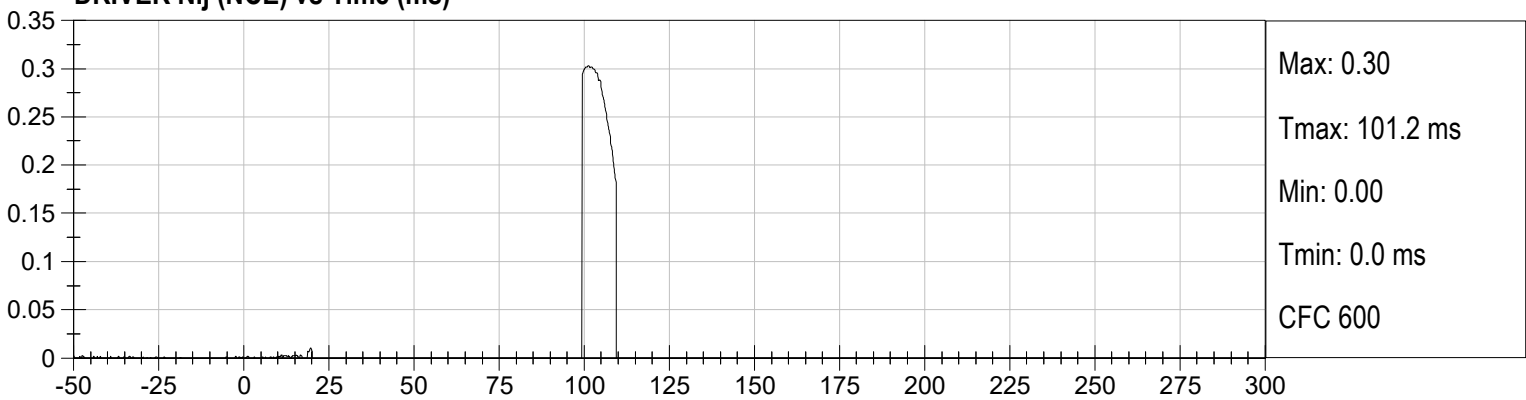
DRIVER Nij (NTE) vs Time (ms)



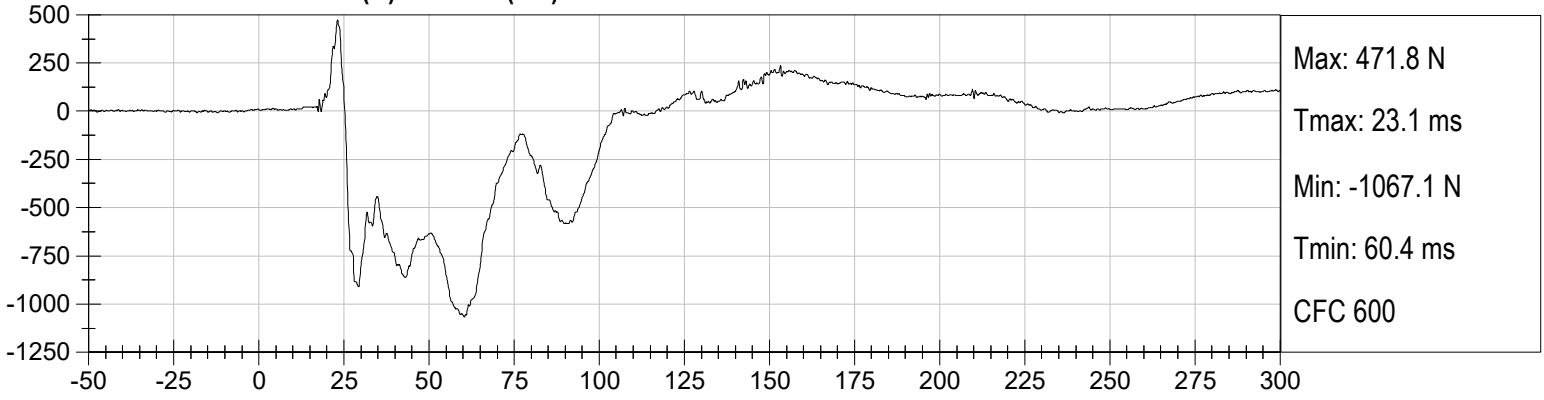
DRIVER Nij (NCF) vs Time (ms)



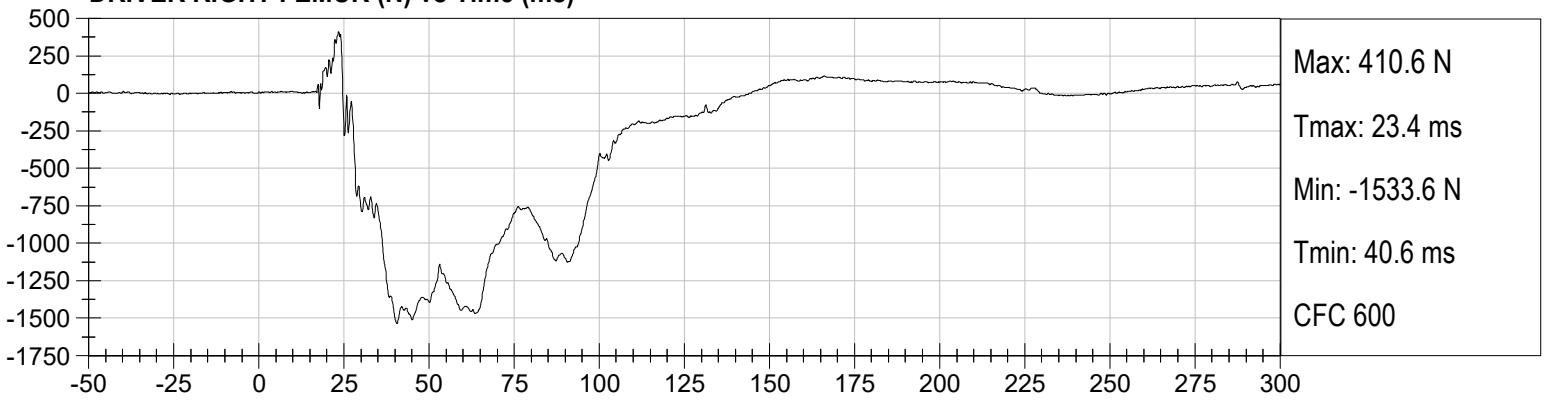
DRIVER Nij (NCE) vs Time (ms)



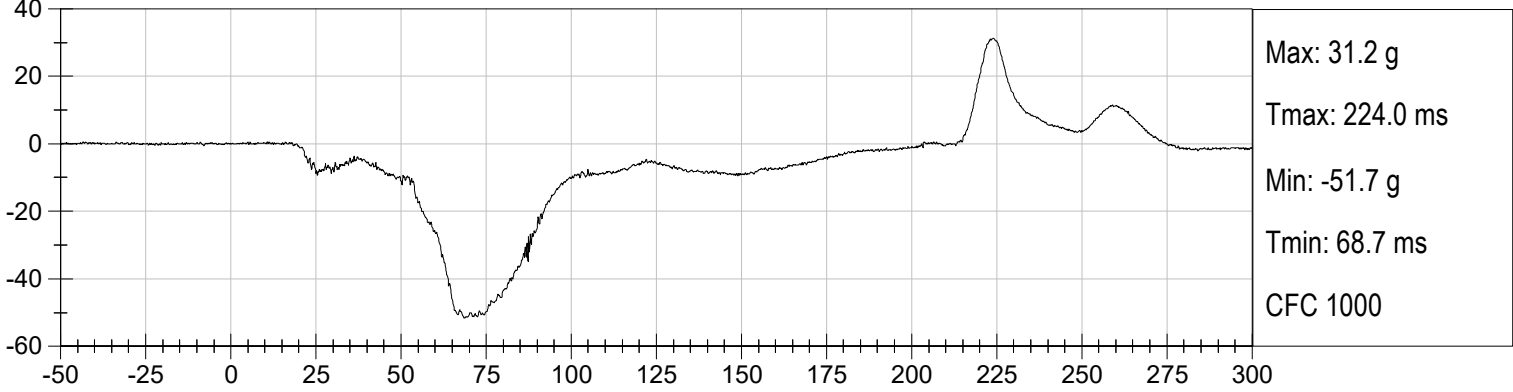
DRIVER LEFT FEMUR (N) vs Time (ms)



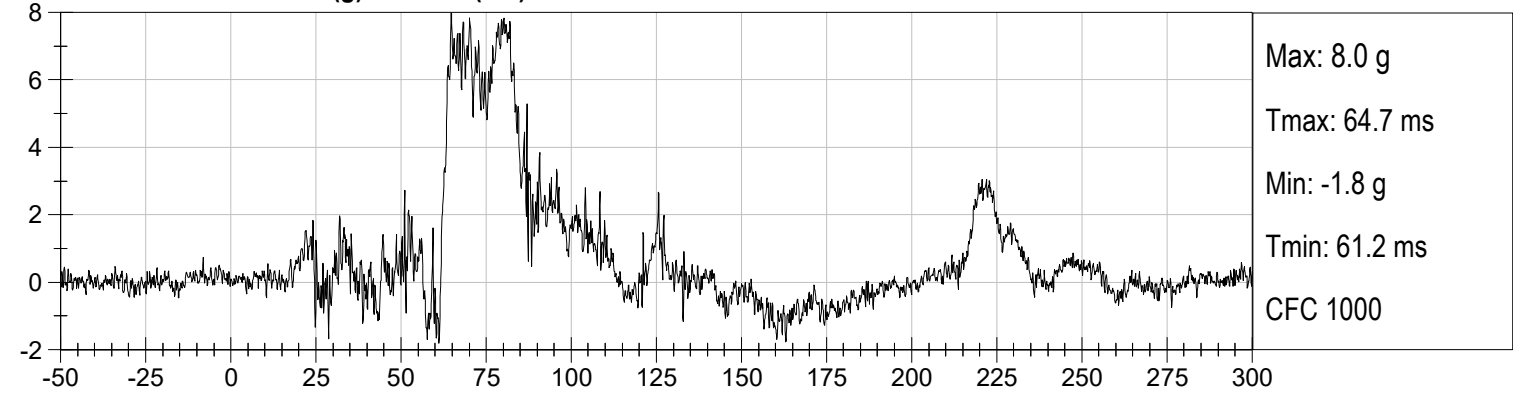
DRIVER RIGHT FEMUR (N) vs Time (ms)



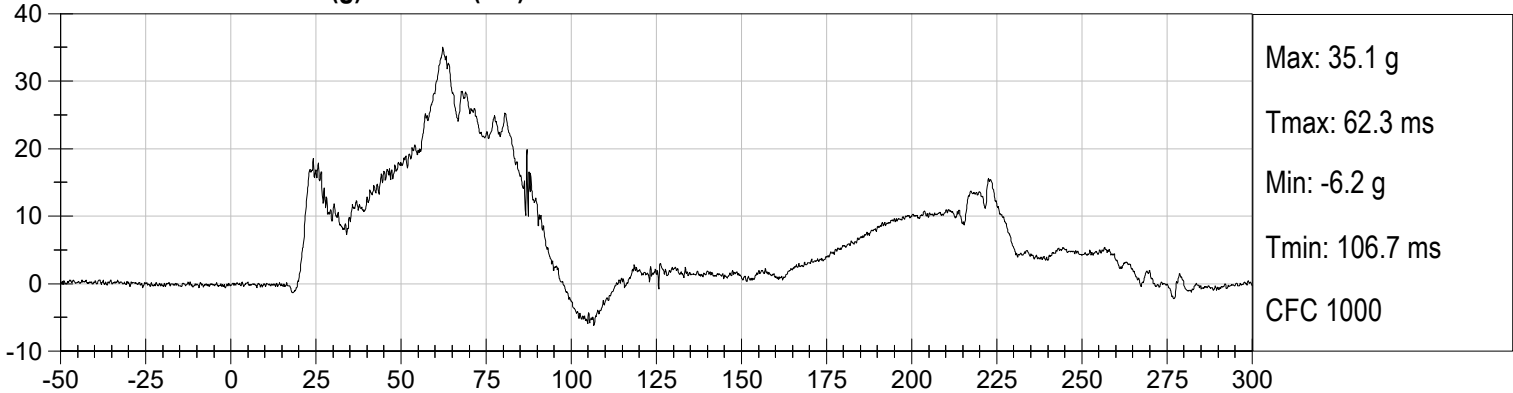
PASSENGER HEAD X (g) vs Time (ms)



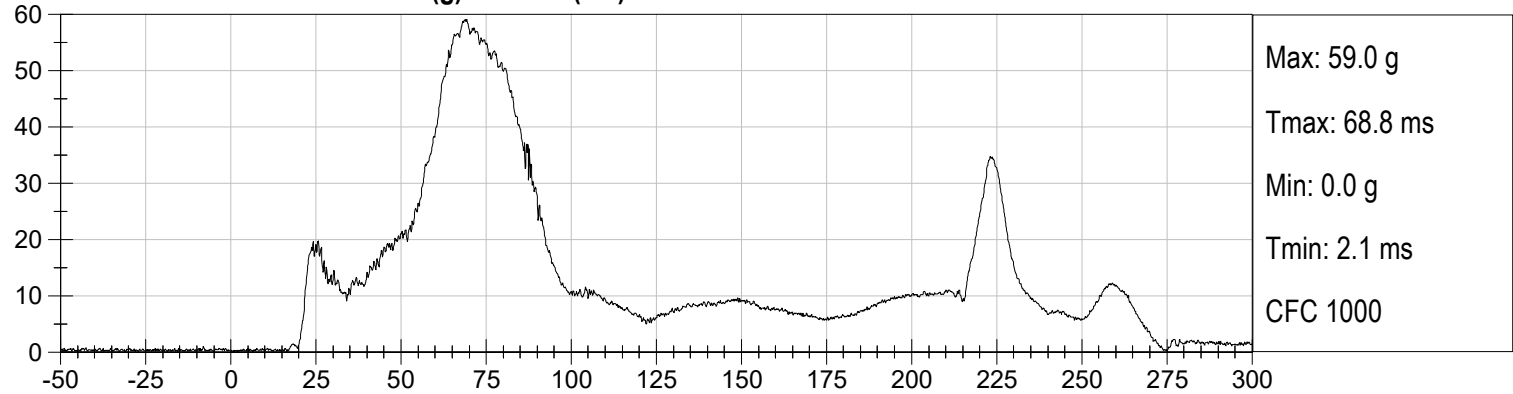
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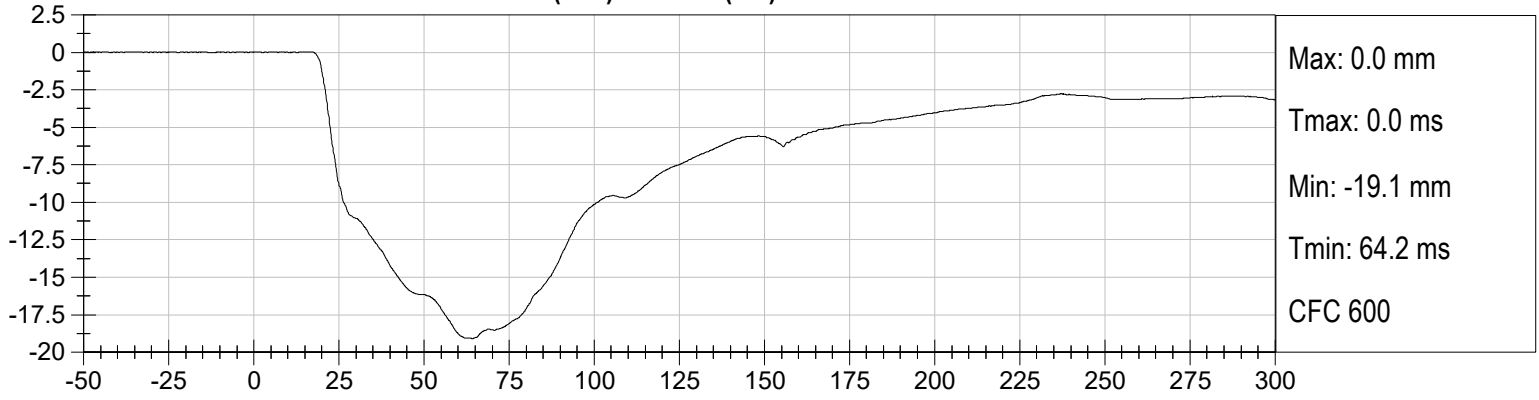
PASSENGER HEAD Z (g) vs Time (ms)



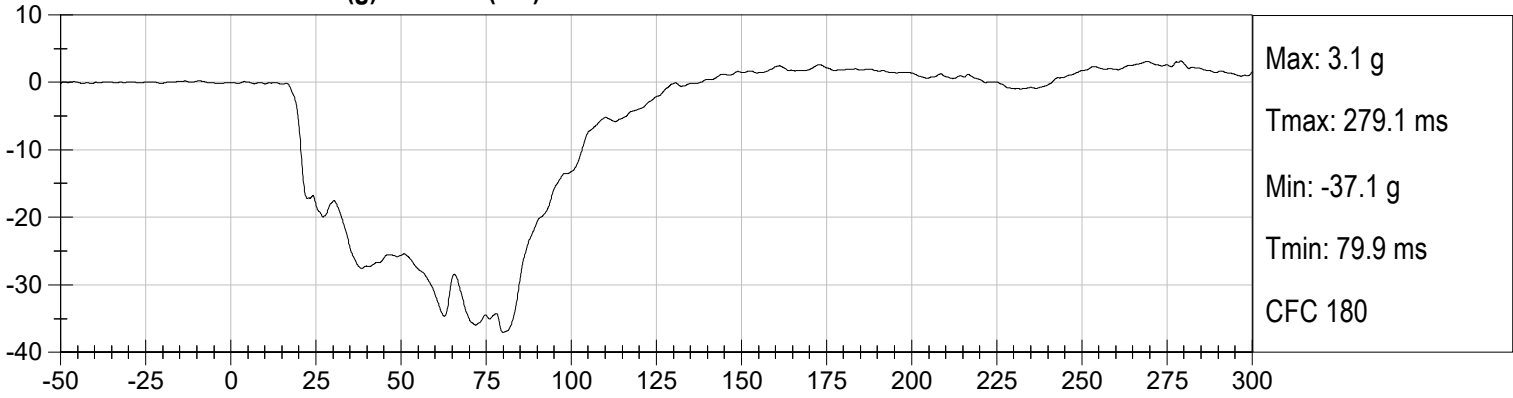
PASSENGER HEAD Resultant (g) vs Time (ms)



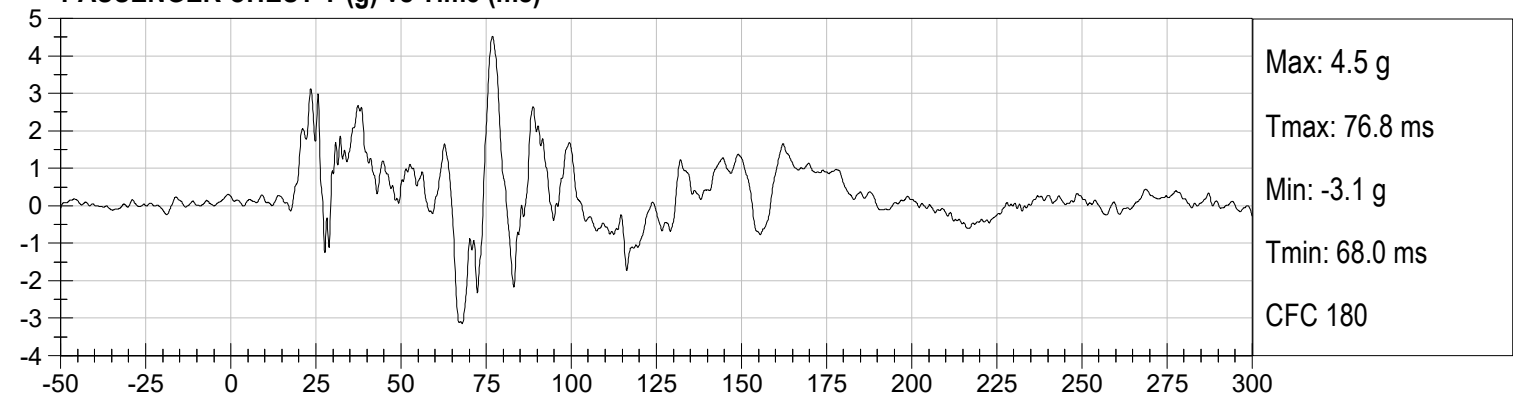
PASSENGER CHEST DISPLACEMENT (mm) vs Time (ms)



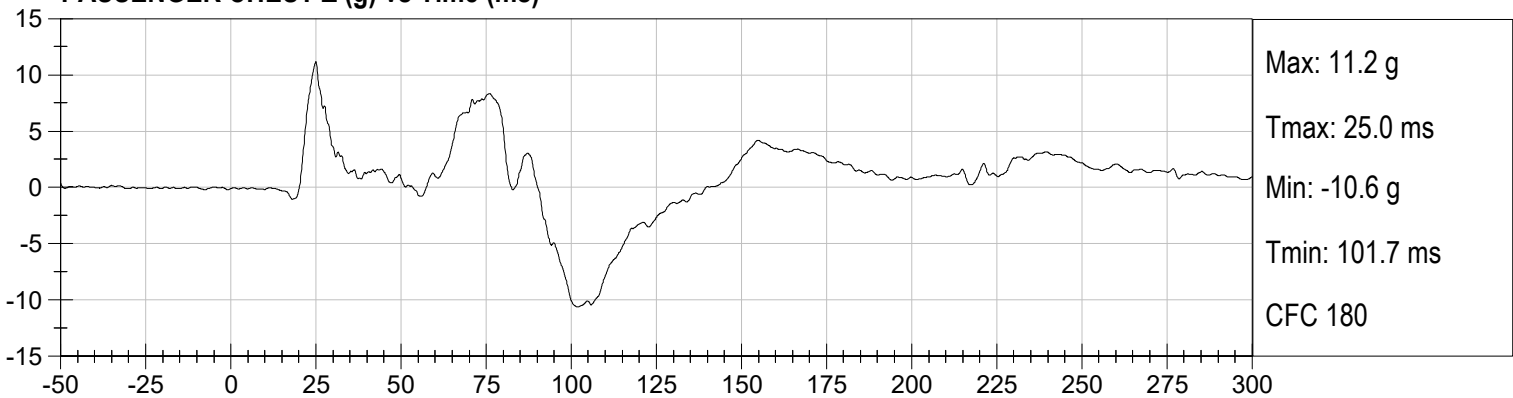
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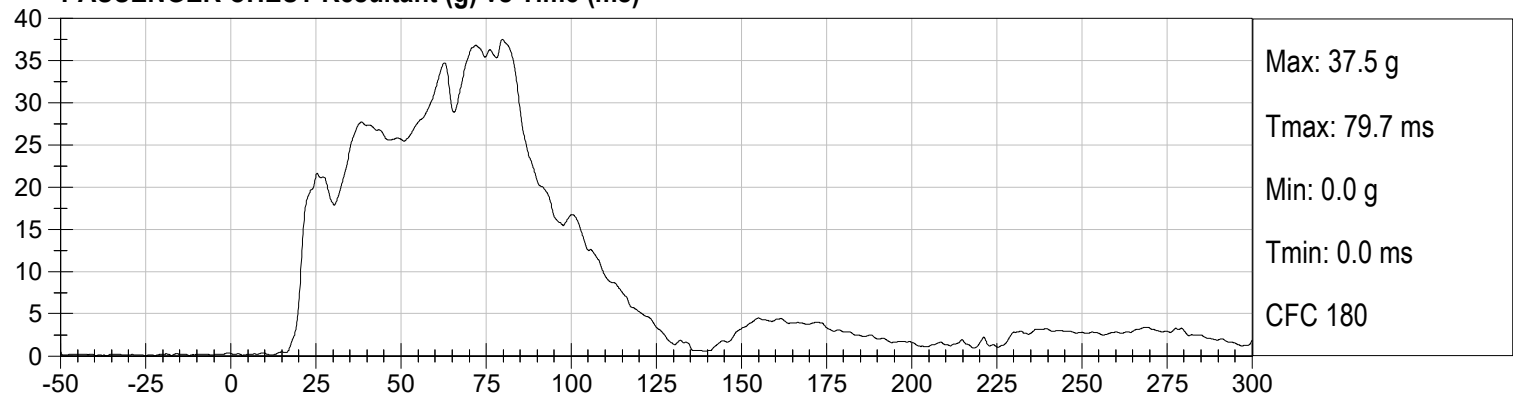
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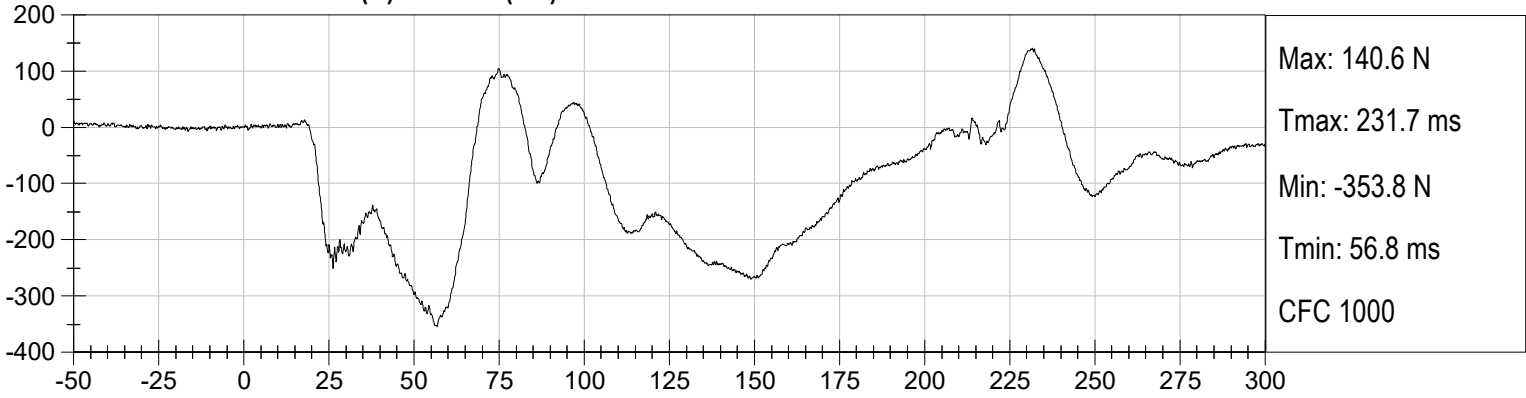
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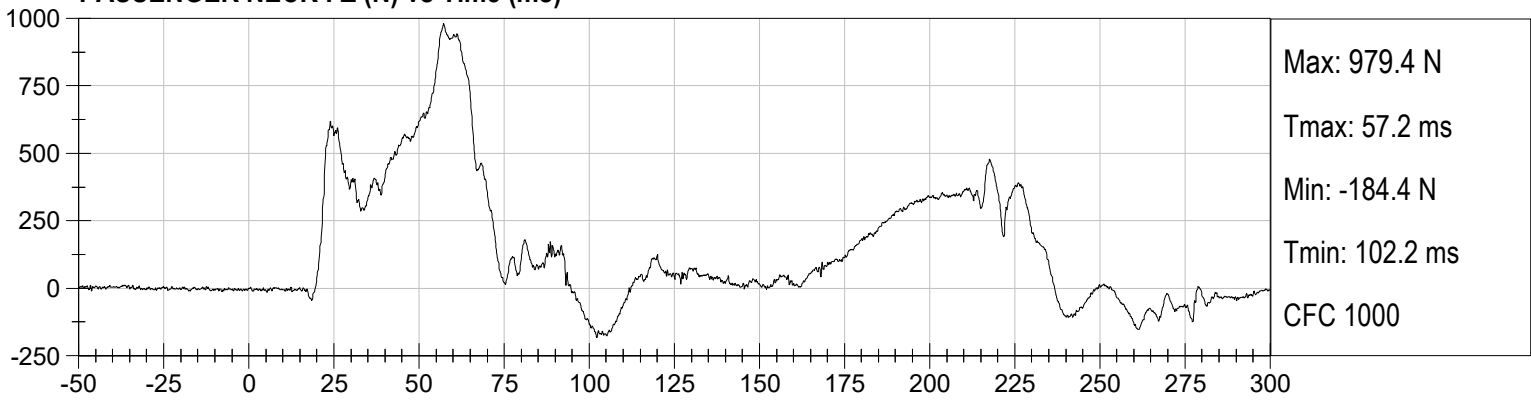
PASSENGER CHEST Resultant (g) vs Time (ms)



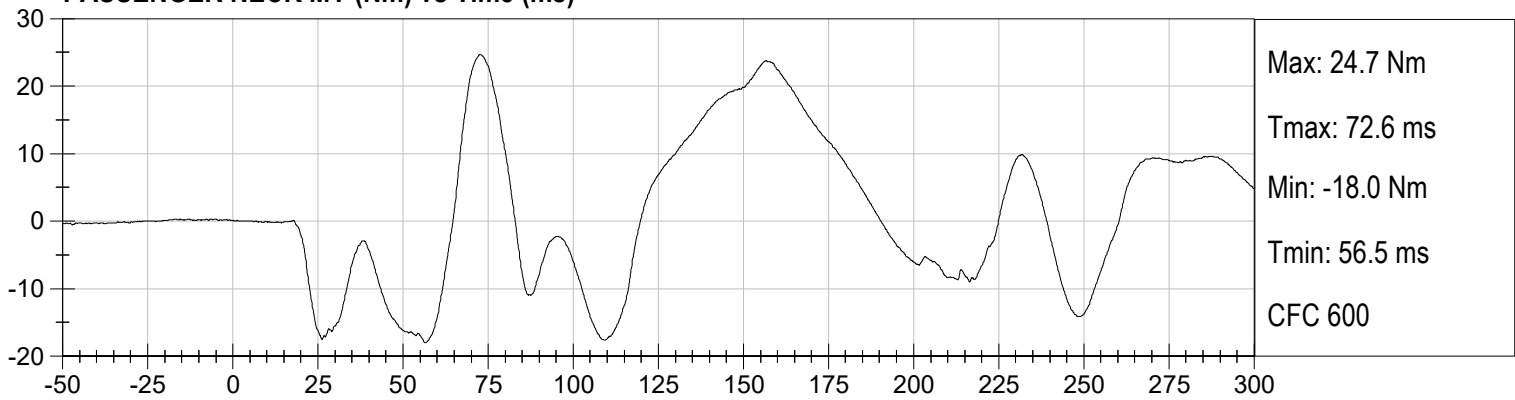
PASSENGER NECK FX (N) vs Time (ms)



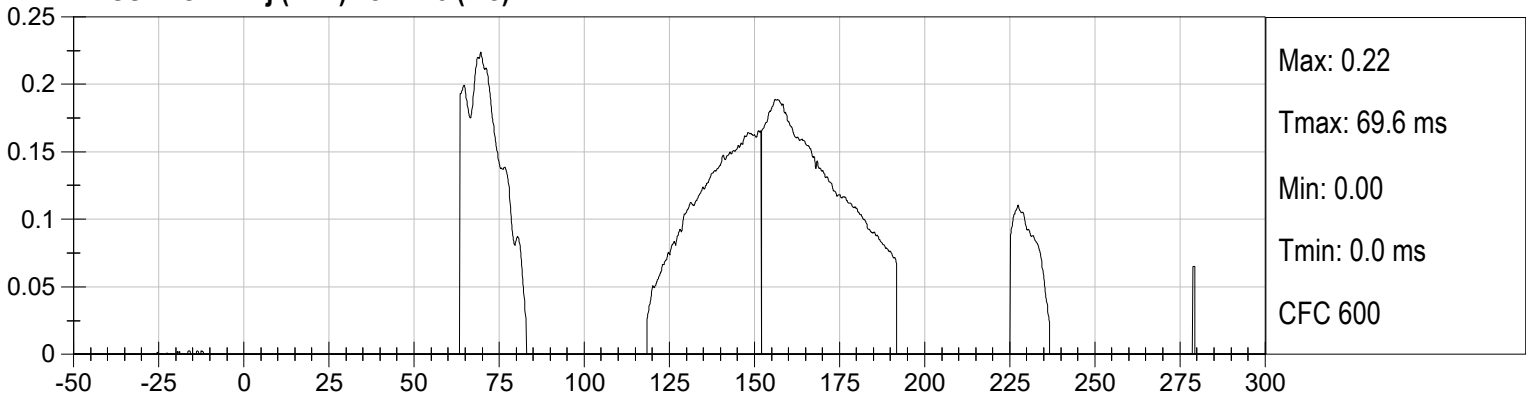
PASSENGER NECK FZ (N) vs Time (ms)



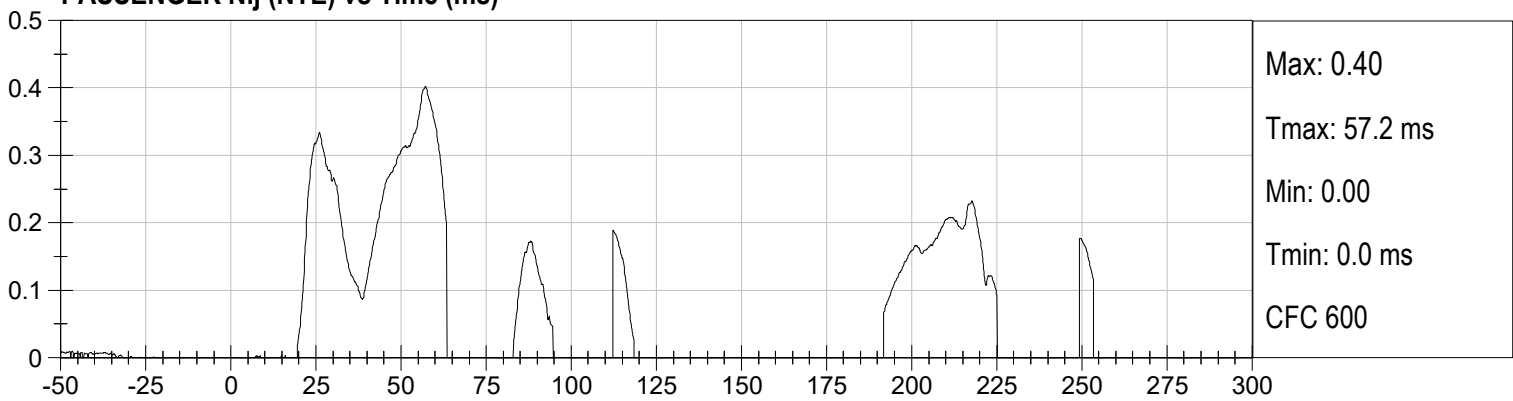
PASSENGER NECK MY (Nm) vs Time (ms)



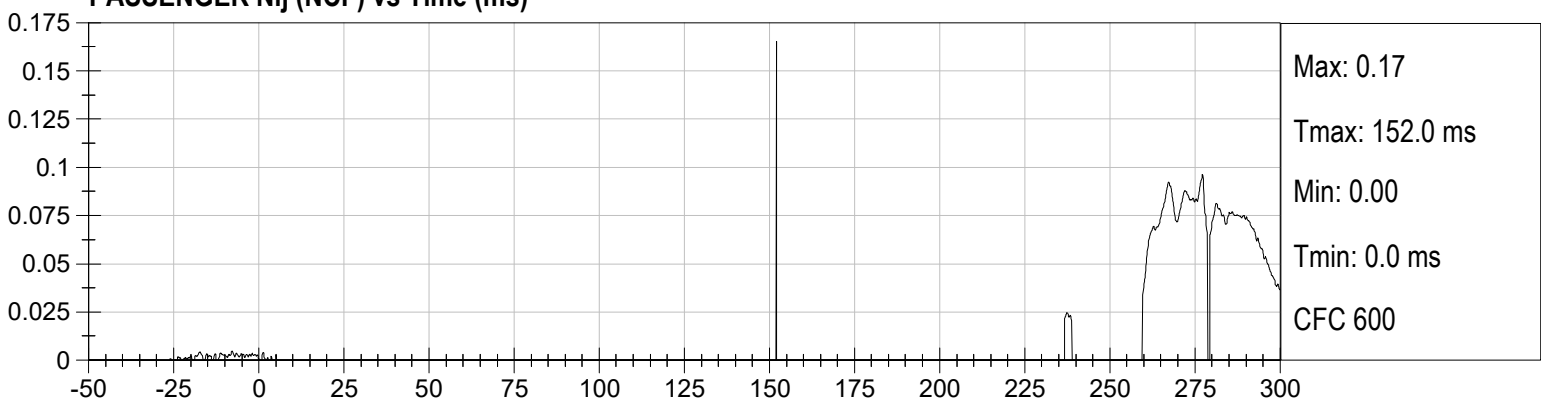
PASSENGER Nij (NTF) vs Time (ms)



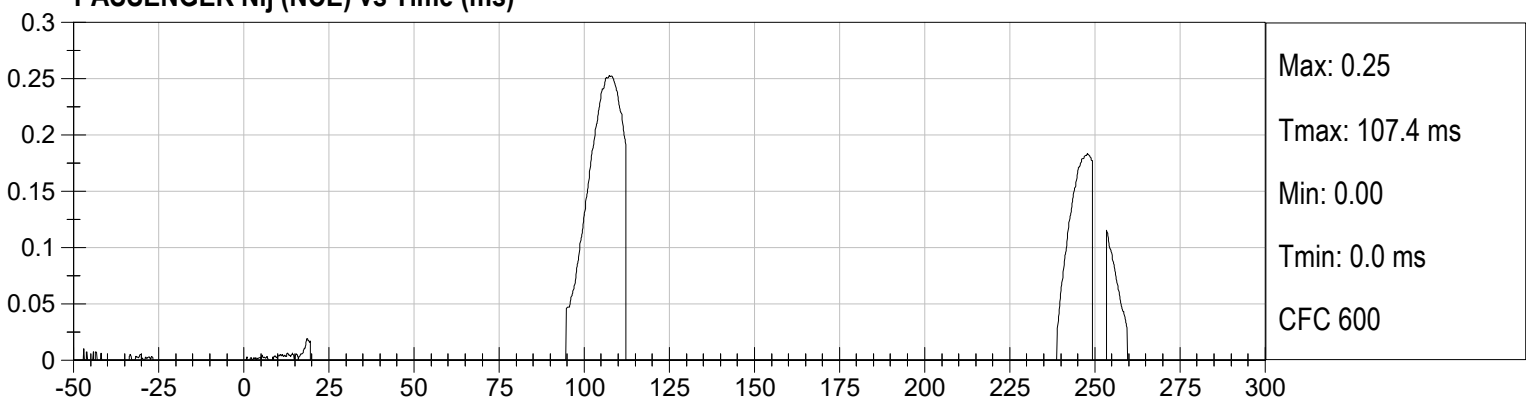
PASSENGER Nij (NTE) vs Time (ms)



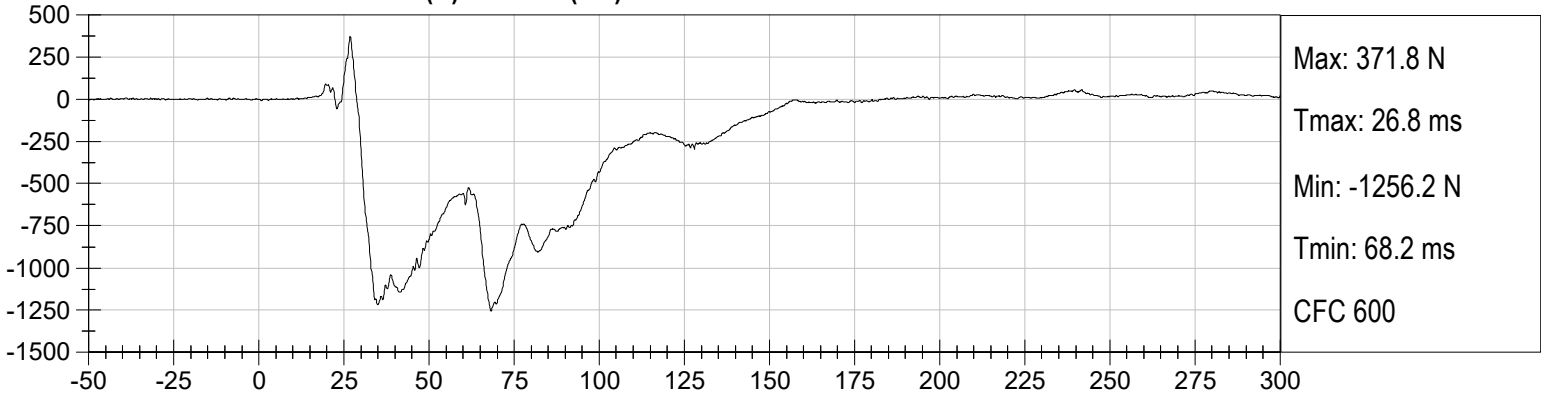
PASSENGER Nij (NCF) vs Time (ms)



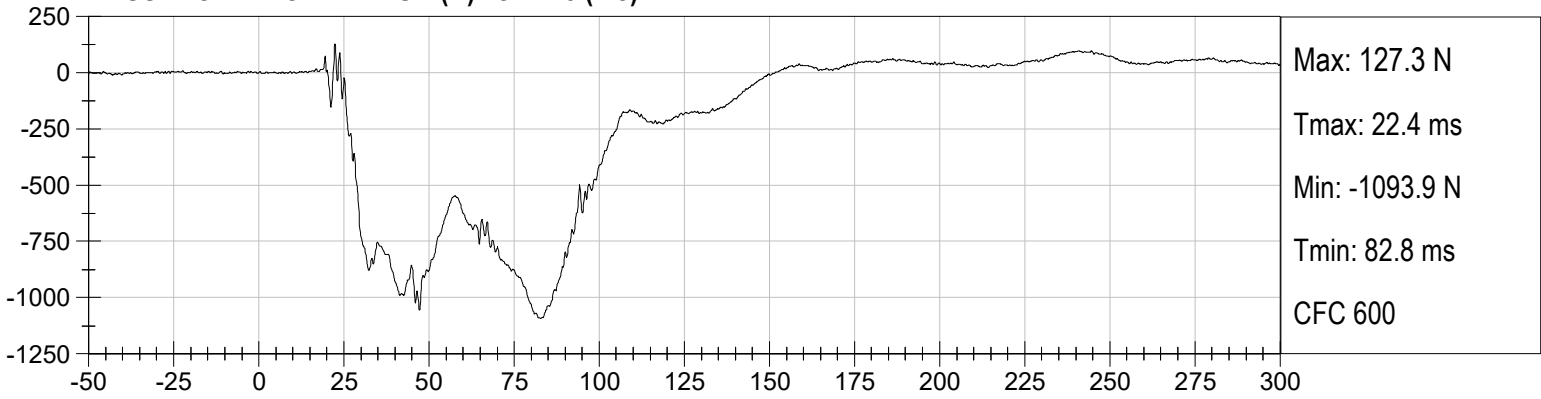
PASSENGER Nij (NCE) vs Time (ms)



PASSENGER LEFT FEMUR (N) vs Time (ms)



PASSENGER RIGHT FEMUR (N) vs Time (ms)



APPENDIX C
DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION

QUALIFICATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

**Hybrid III 50th, External Measurements
SN: 064**

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	34.71
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.31
C	H-POINT HEIGHT	Reference	3.3-3.5	3.38
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.40
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.46
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.09
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	11.48
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.75
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	13.08
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	8.13
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	23.49
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.01
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.22
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	18.20

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	8.43
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.33
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.65
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	3.94
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	39.25
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.89
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.00
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.00

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

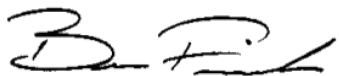
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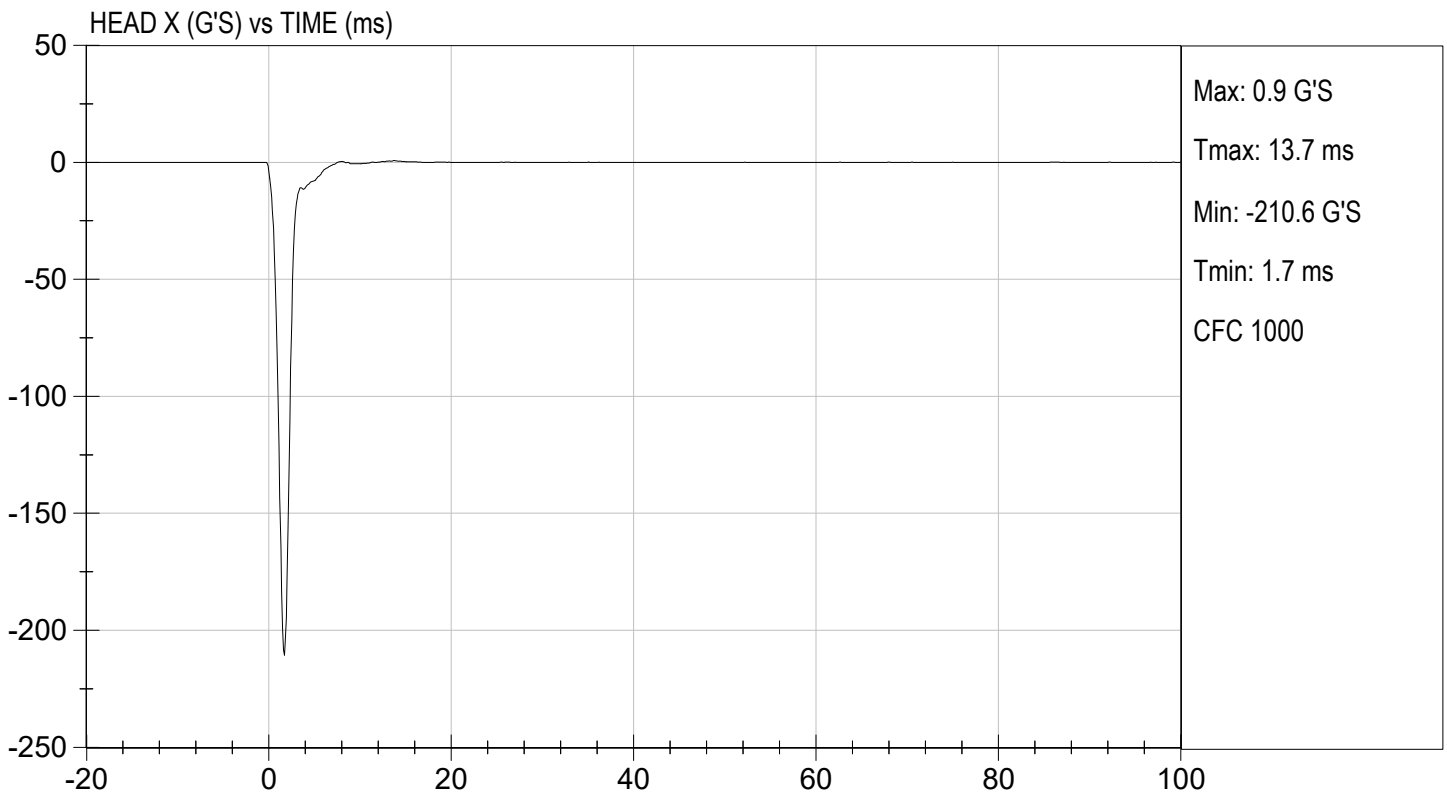
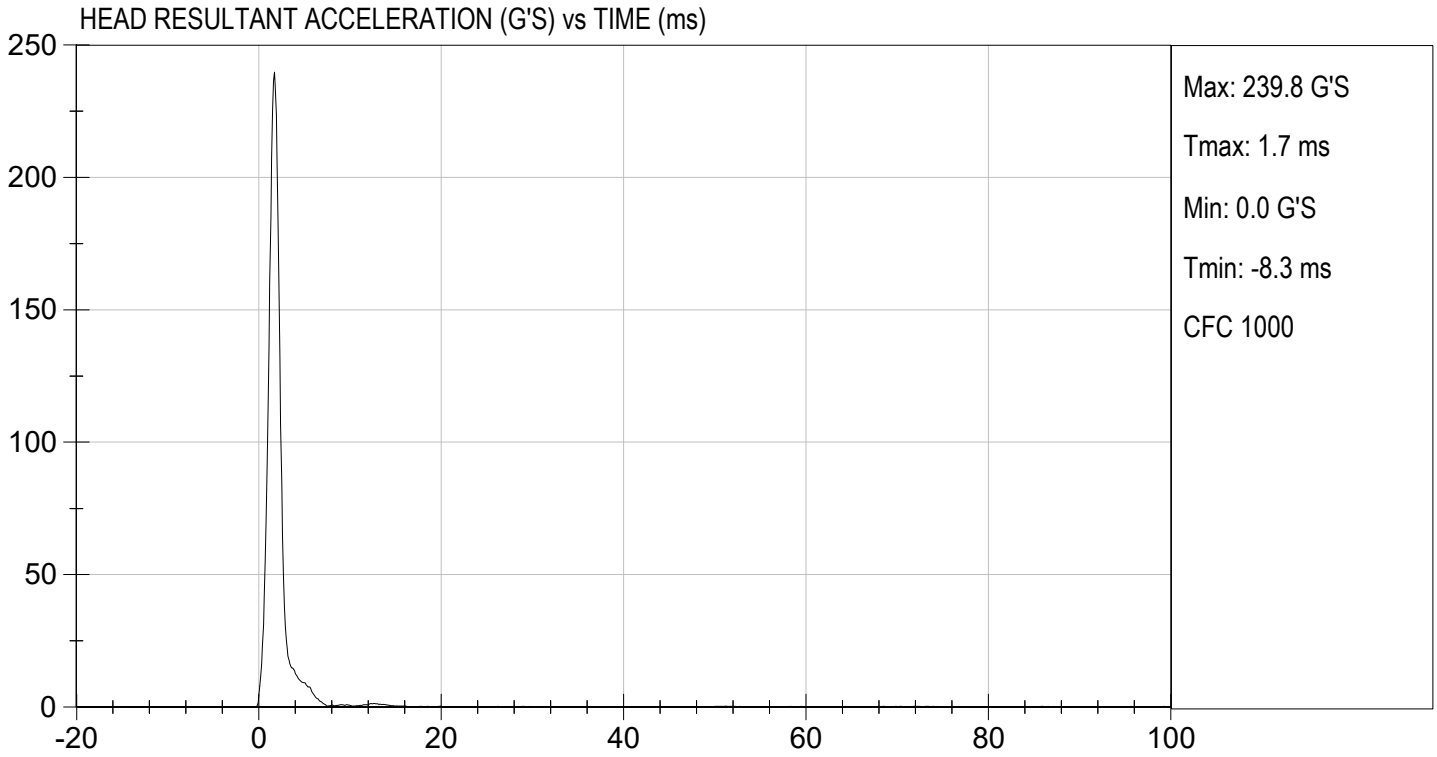
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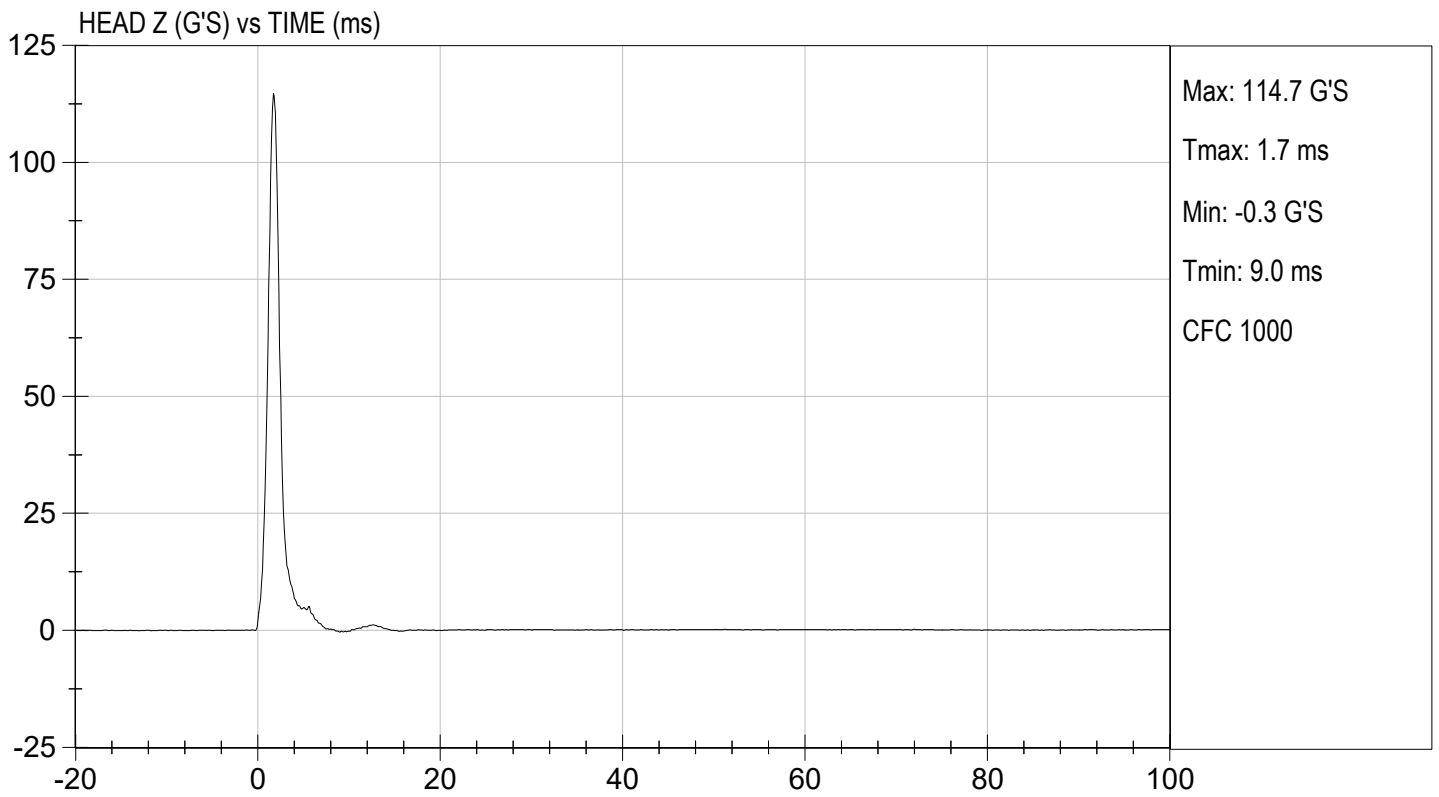
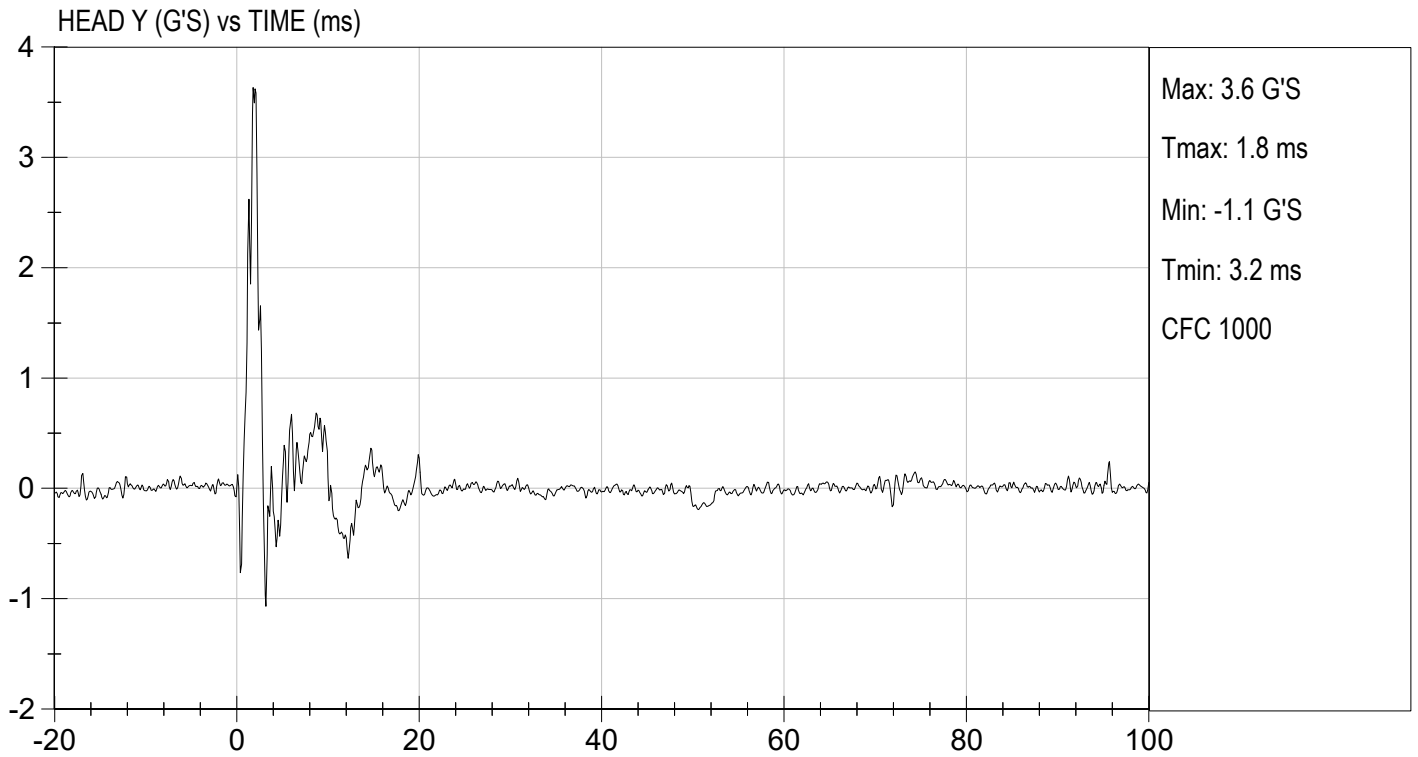
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Peak Resultant Acceleration	G's	225 to 275	240	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	3.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

03/05/2024
 Test Date


 Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 064

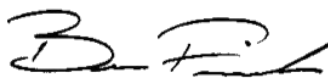
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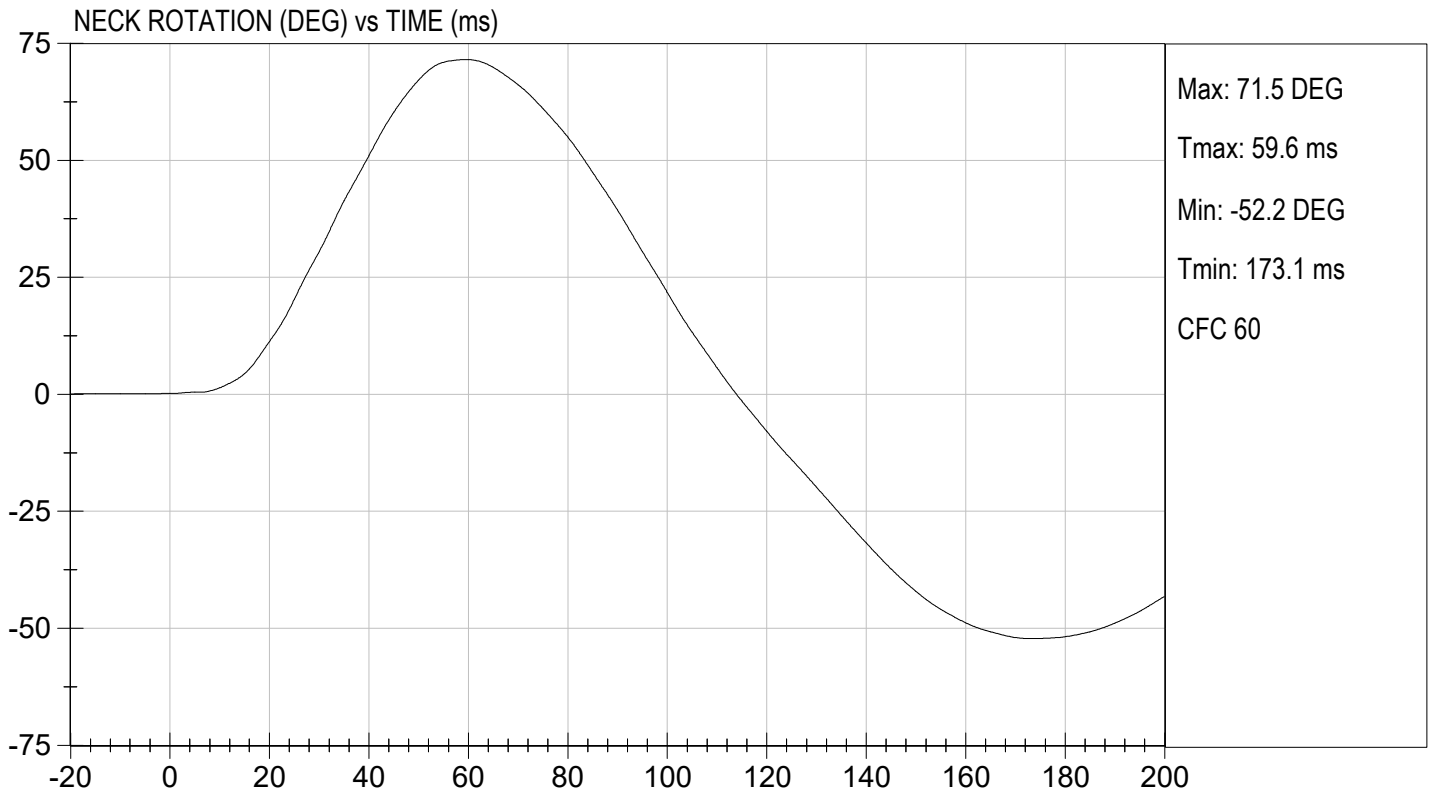
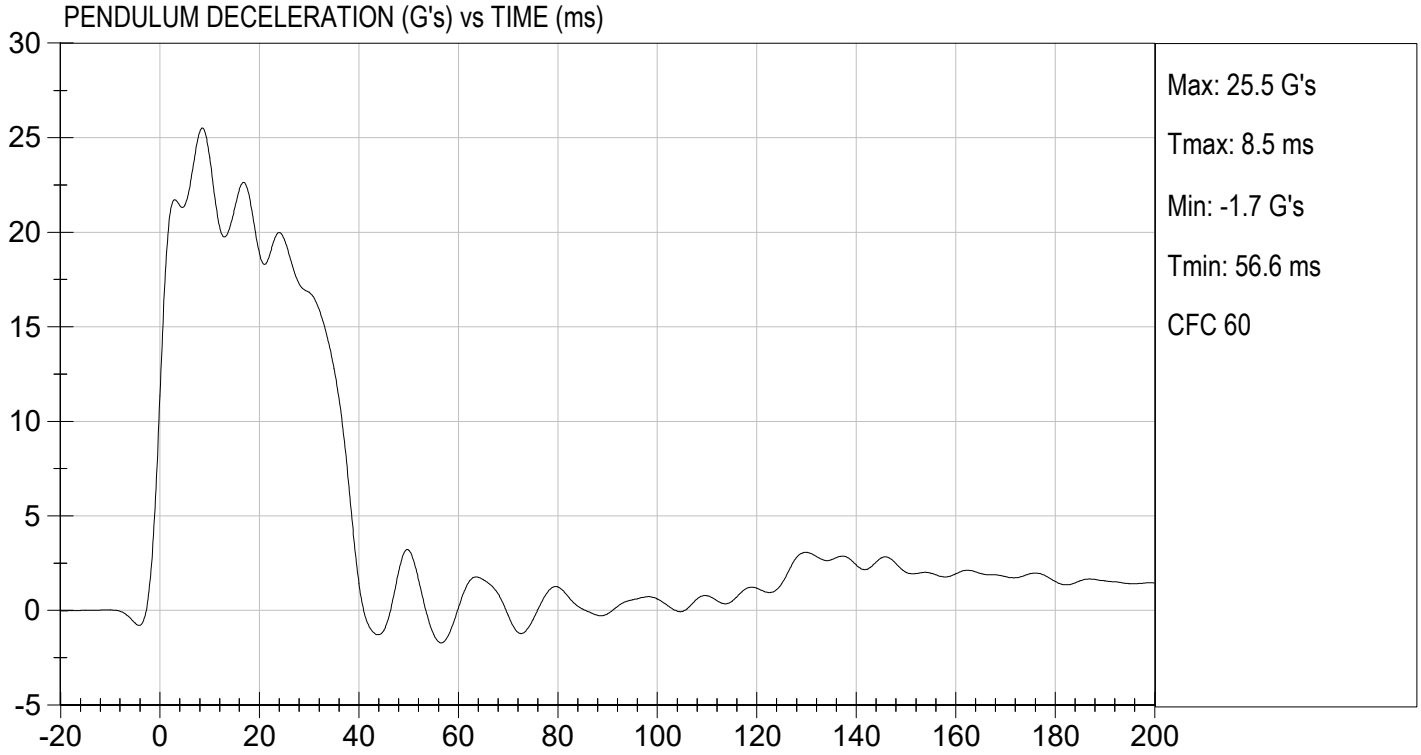
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.93	Pass
	20 ms	G's	17.60 to 22.60	18.88	Pass
	30 ms	G's	12.50 to 18.50	16.82	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	16.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	38.6	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	71.5	Pass
	Time	ms	57.0 to 64.0	59.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.1	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	97.9	Pass
	Time	ms	47.0 to 58.0	51.0	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.8	Pass
Overall Test Results					Pass


 Laboratory Technician

03/05/2024

Test Date

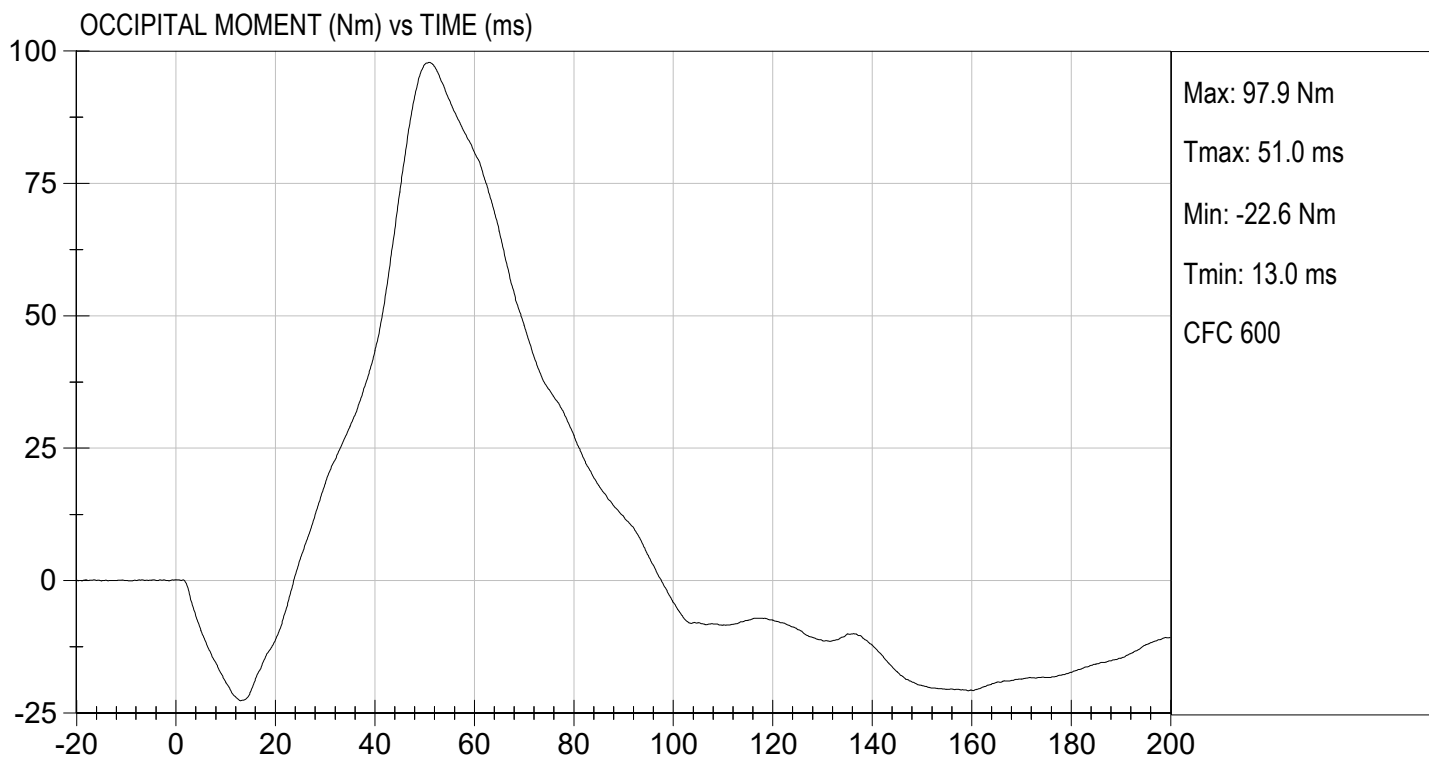

 Approved By





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

TEST DATE: 03/05/2024
TEST #: D240602



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 064

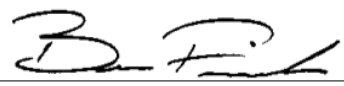
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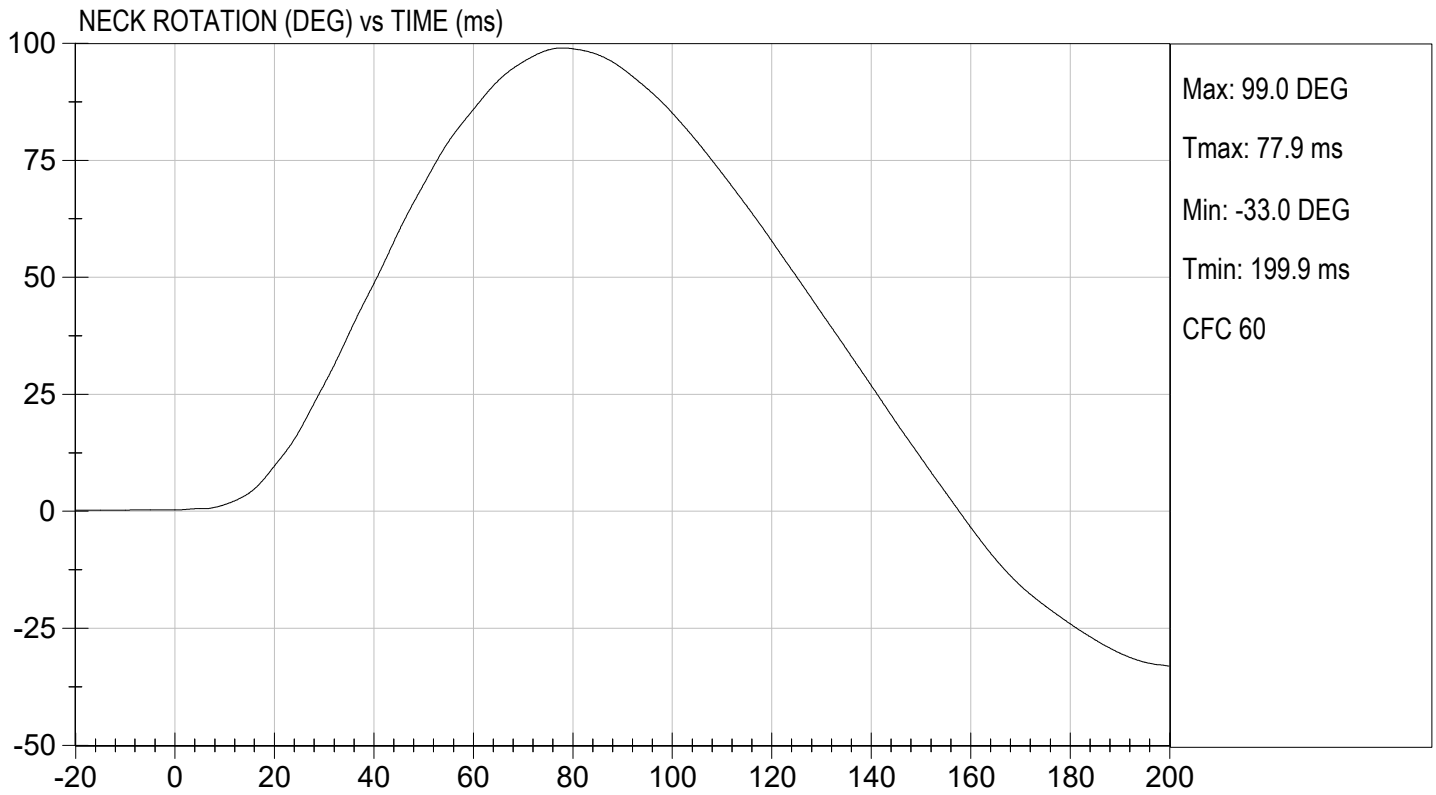
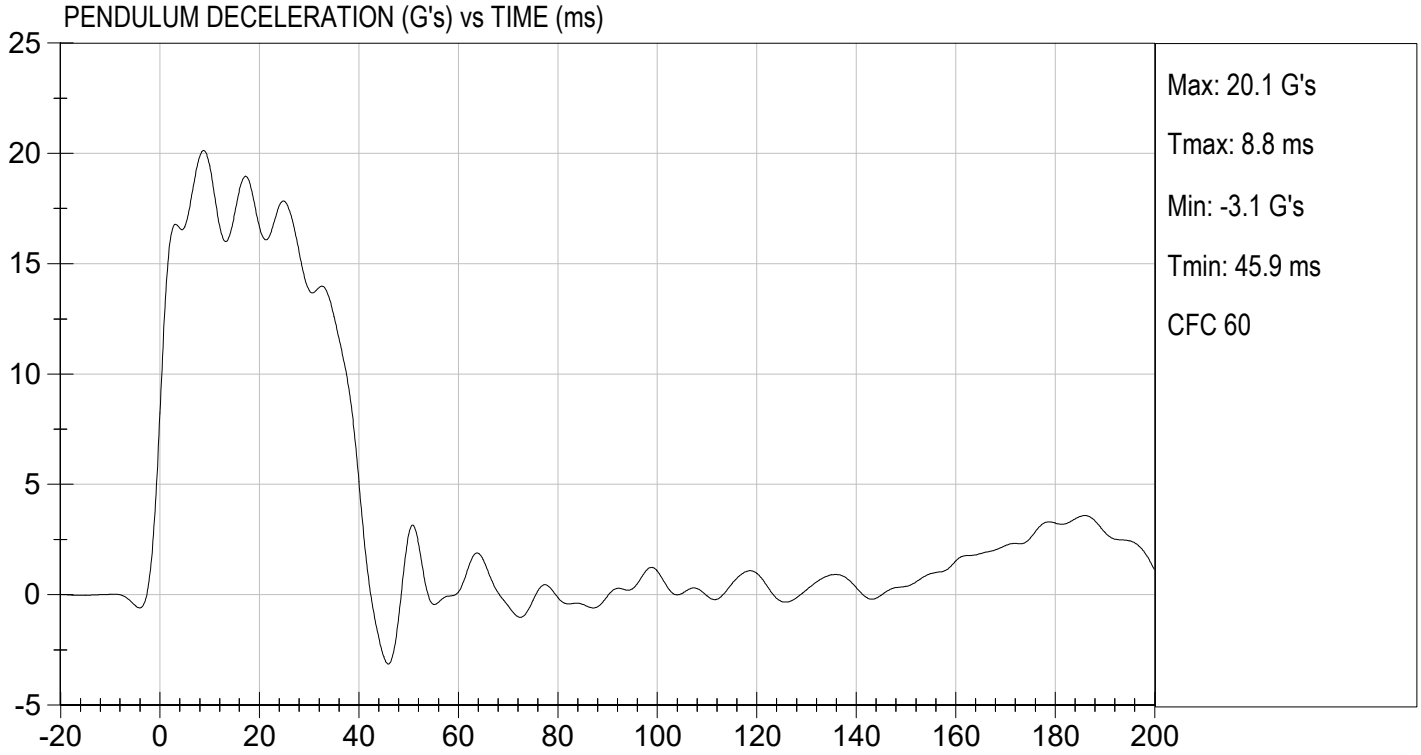
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Velocity		m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.43	Pass
	20 ms	G's	14.00 to 19.00	16.67	Pass
	30 ms	G's	11.00 to 16.00	13.79	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.0	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	40.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.0	Pass
	Time	ms	72.0 to 82.0	77.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	157.8	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.4	Pass
	Time	ms	65.0 to 79.0	73.7	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.0	Pass
Overall Test Results					Pass


 Laboratory Technician

03/05/2024

Test Date


 Approved By





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

TEST DATE: 03/05/2024
TEST #: D240603



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

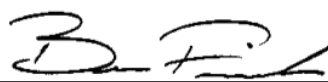
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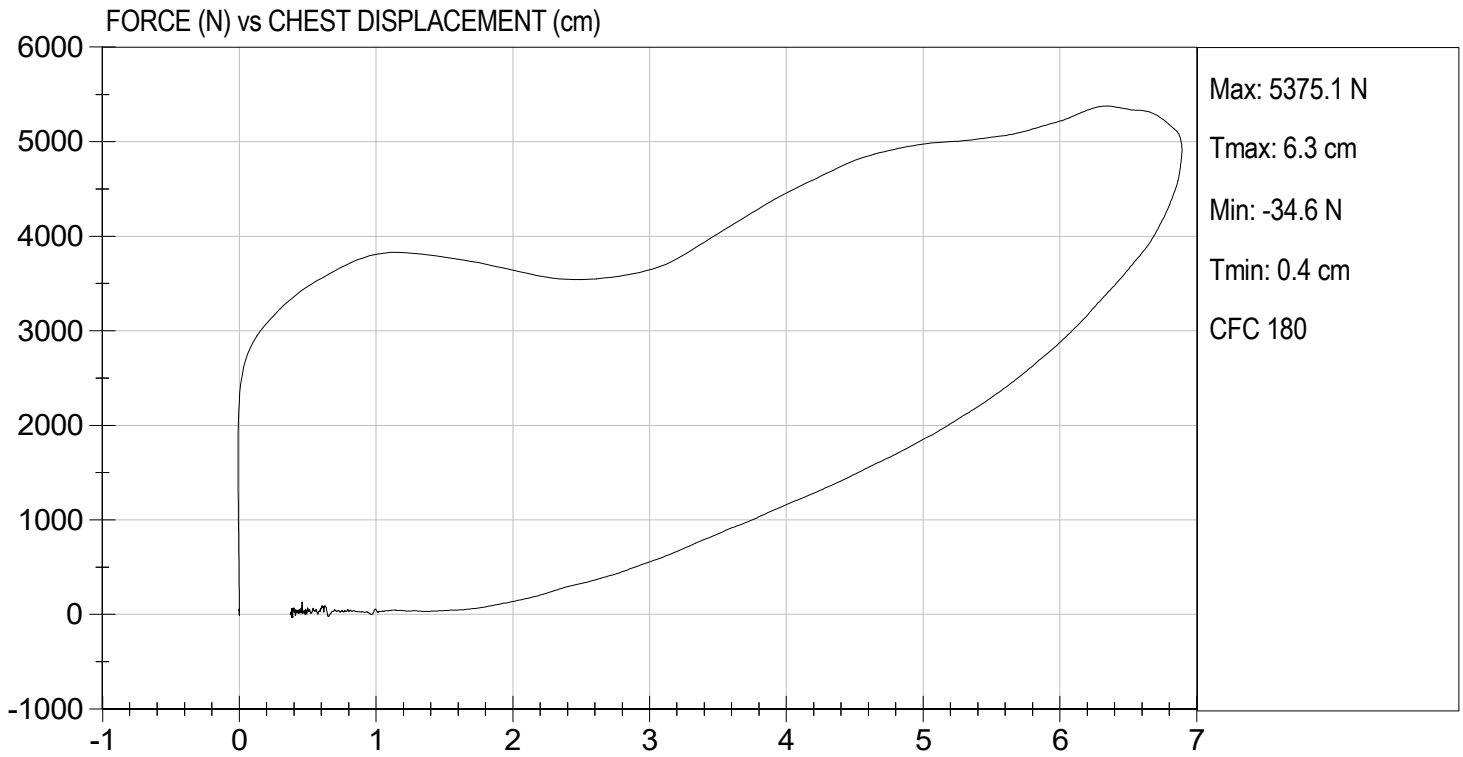
Test I.D: D240604

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,375	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.89	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Overall Test Results				Pass


 Laboratory Technician

03/05/2024
 Test Date


 Approved By



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

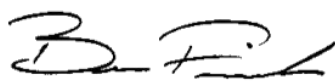
ATD Serial No: 064

Test I.D: D240605

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,056	Pass
Overall Test Results				Pass


 Laboratory Technician

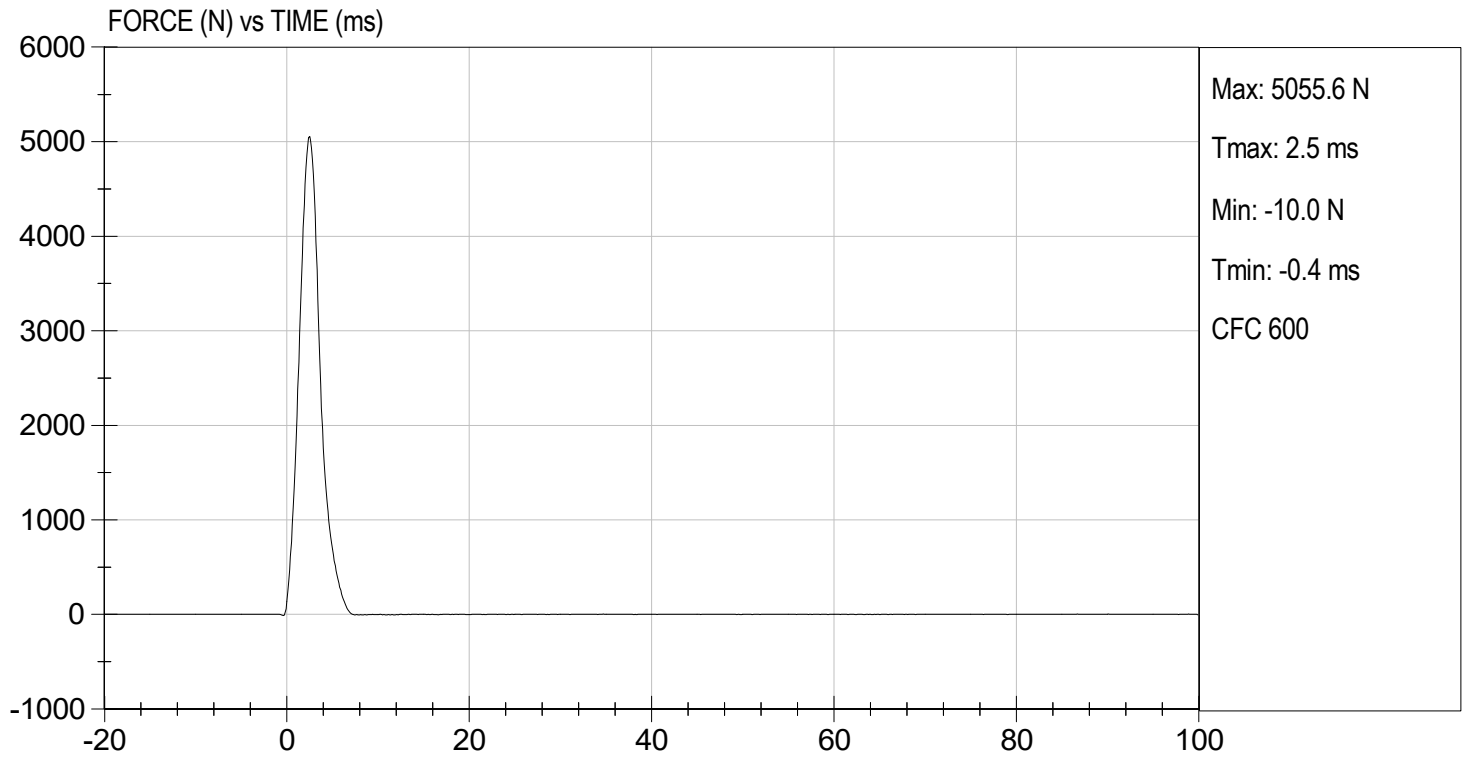
03/05/2024
 Test Date


 Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 03/05/2024
TEST #: D240605



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

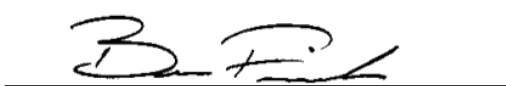
ATD Serial No: 064

Test I.D: D240606

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	4,891	Pass
Overall Test Results				Pass


 Laboratory Technician

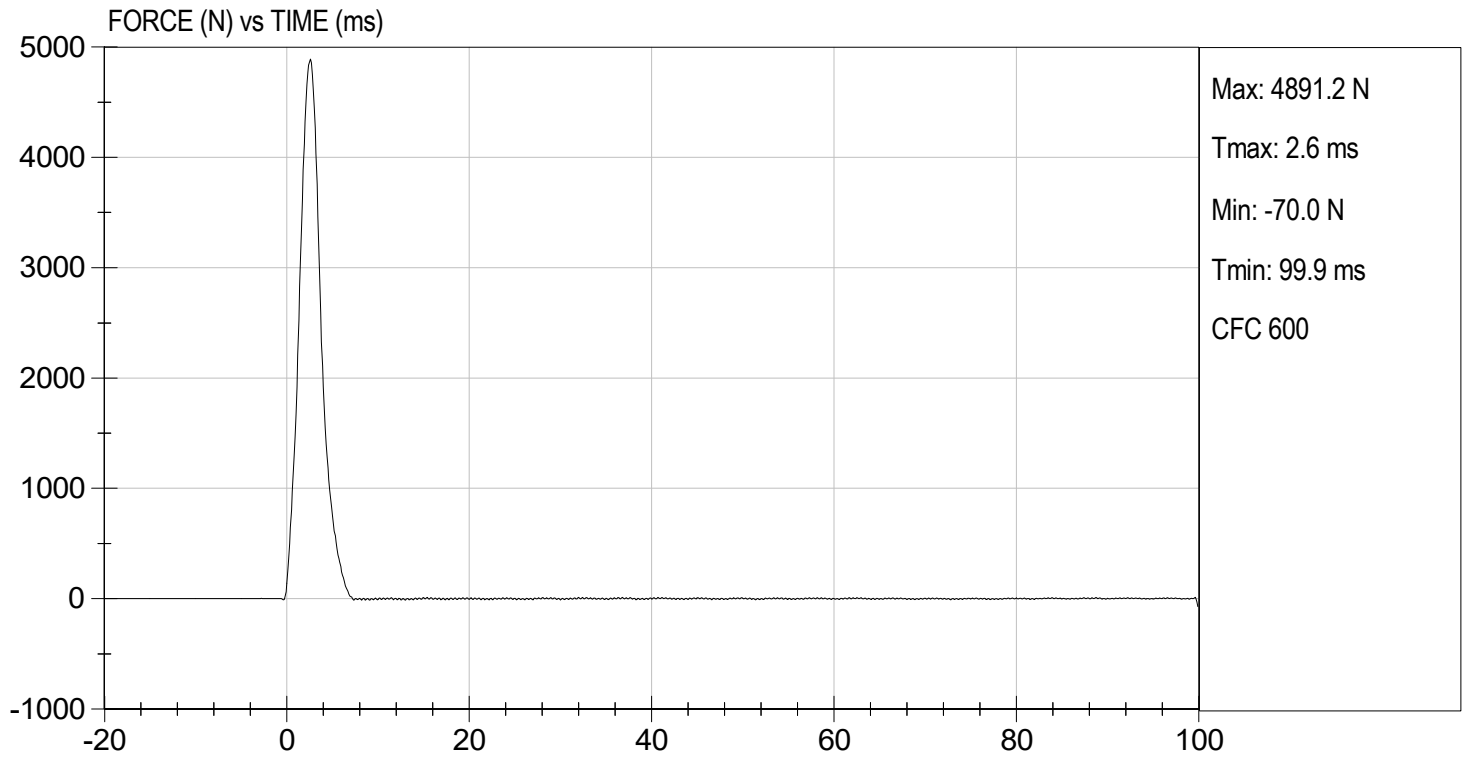
03/05/2024
 Test Date


 Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 03/05/2024
TEST #: D240606



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

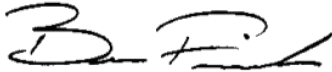
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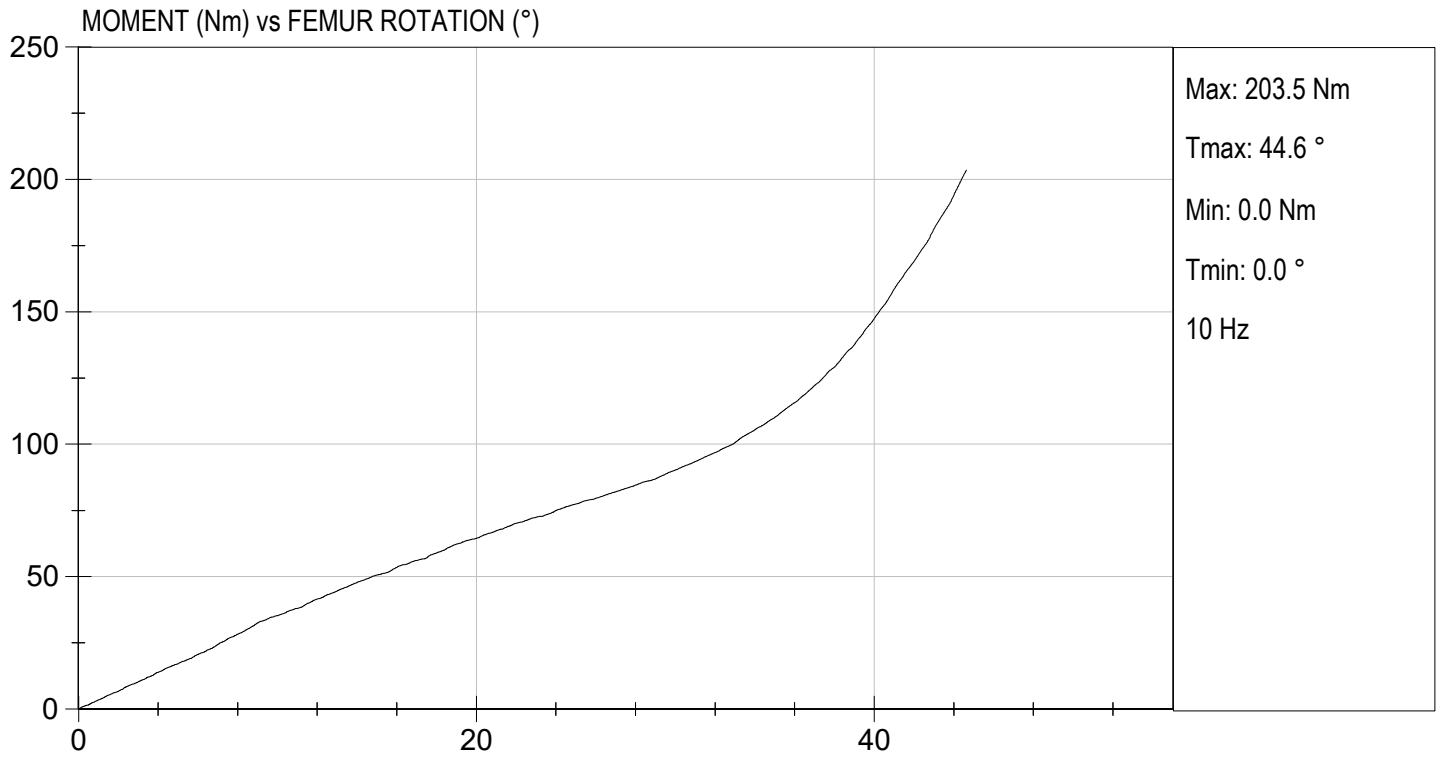
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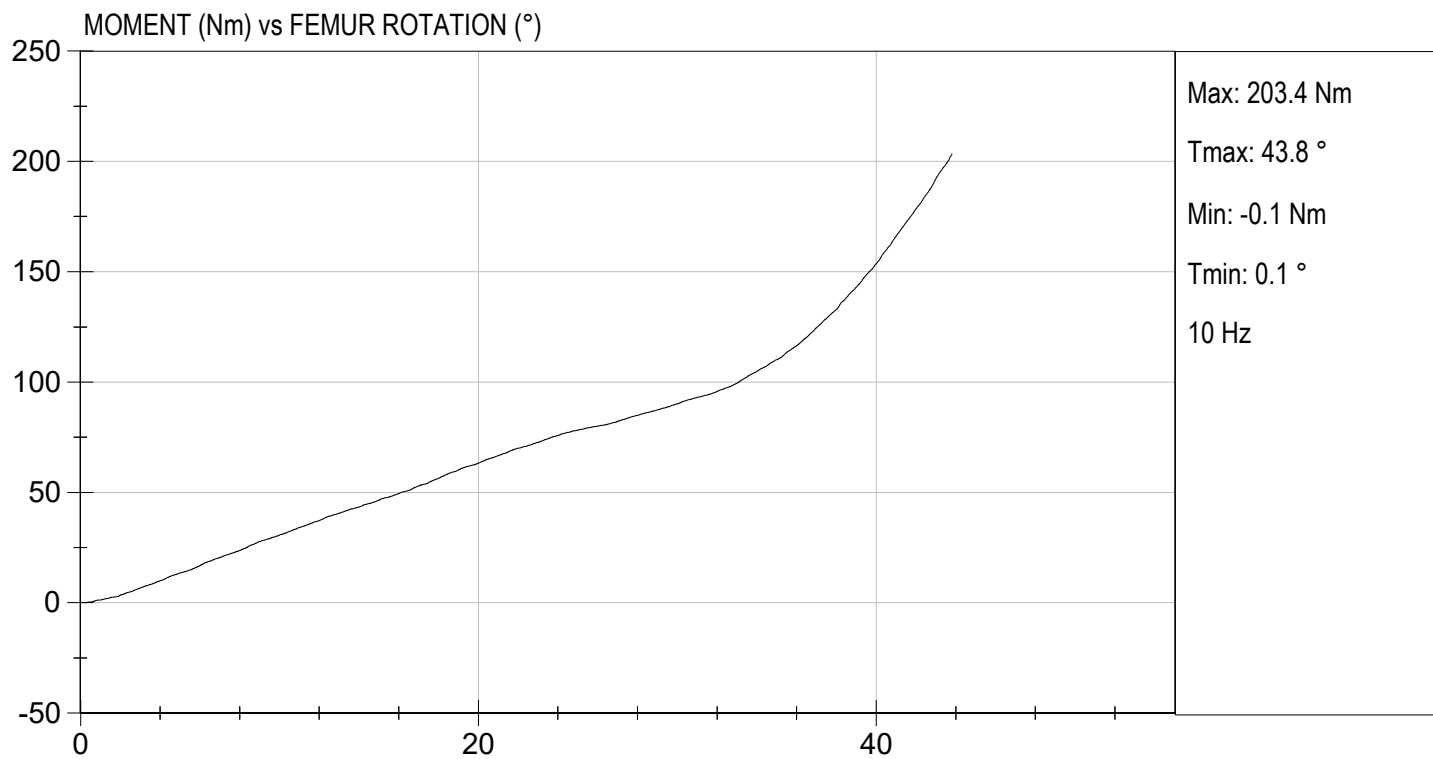
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.4	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	36	36	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	90.3	90.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.6	43.8	Pass
Overall Test Results					Pass


 Laboratory Technician

03/05/2024
 Test Date


 Approved By





QUALIFICATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

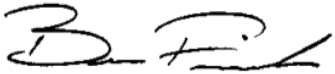
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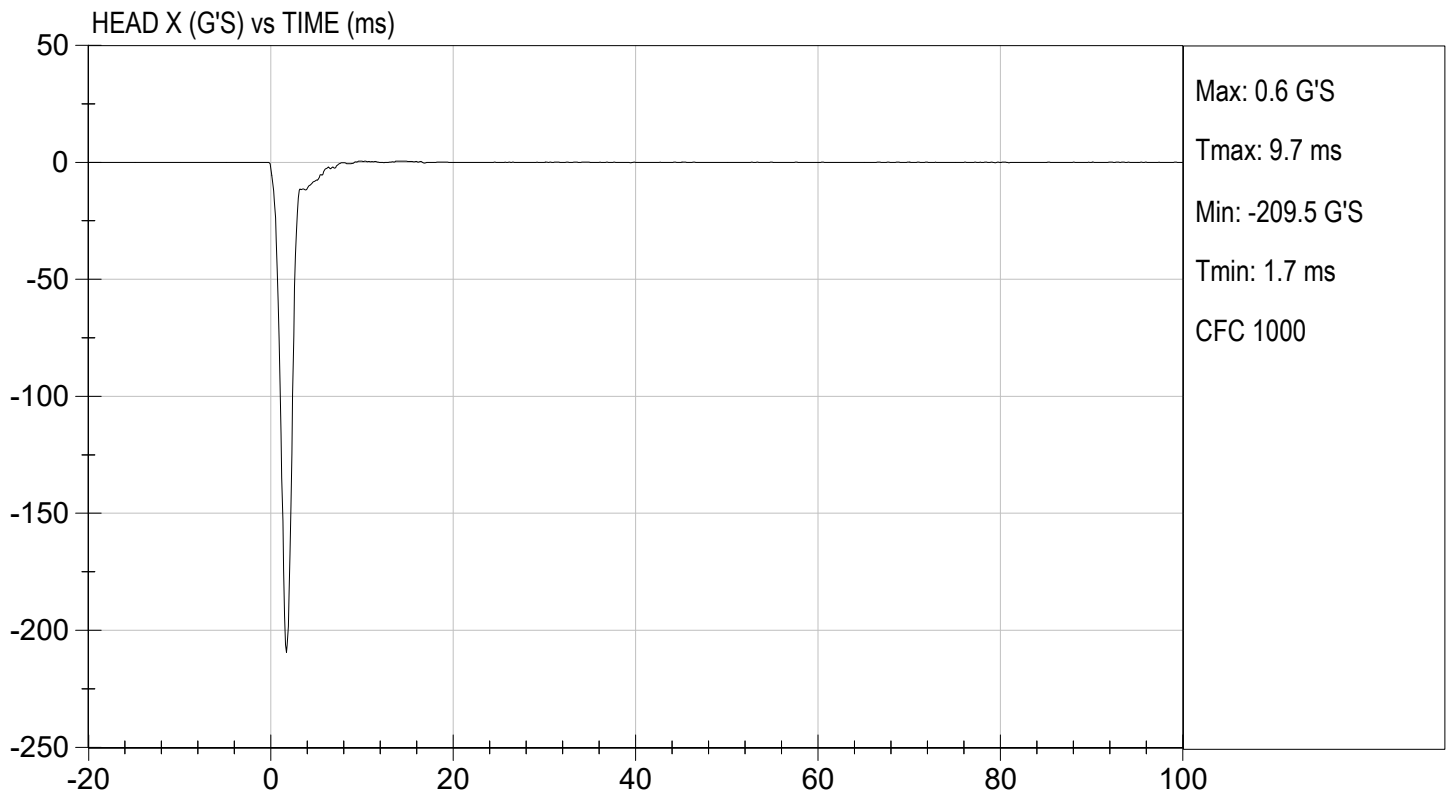
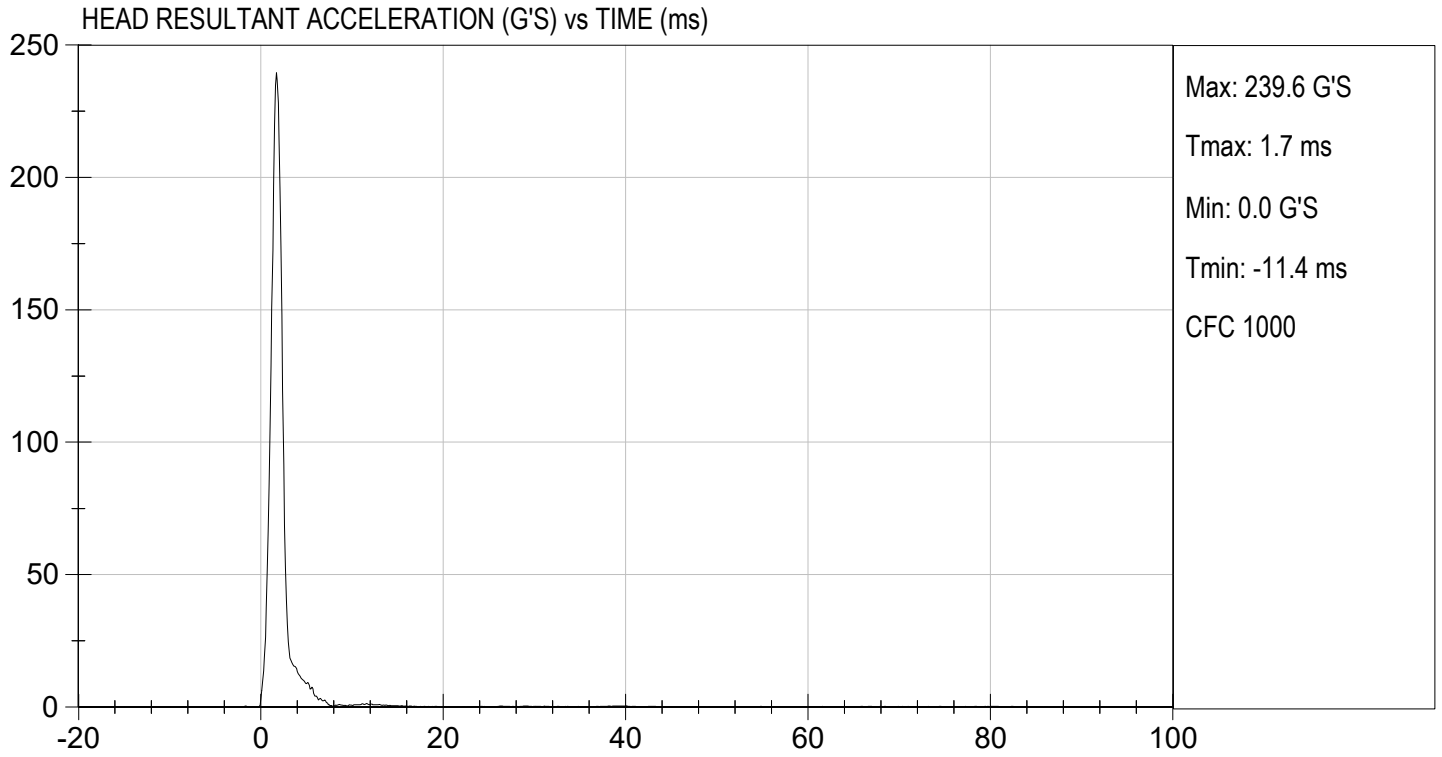
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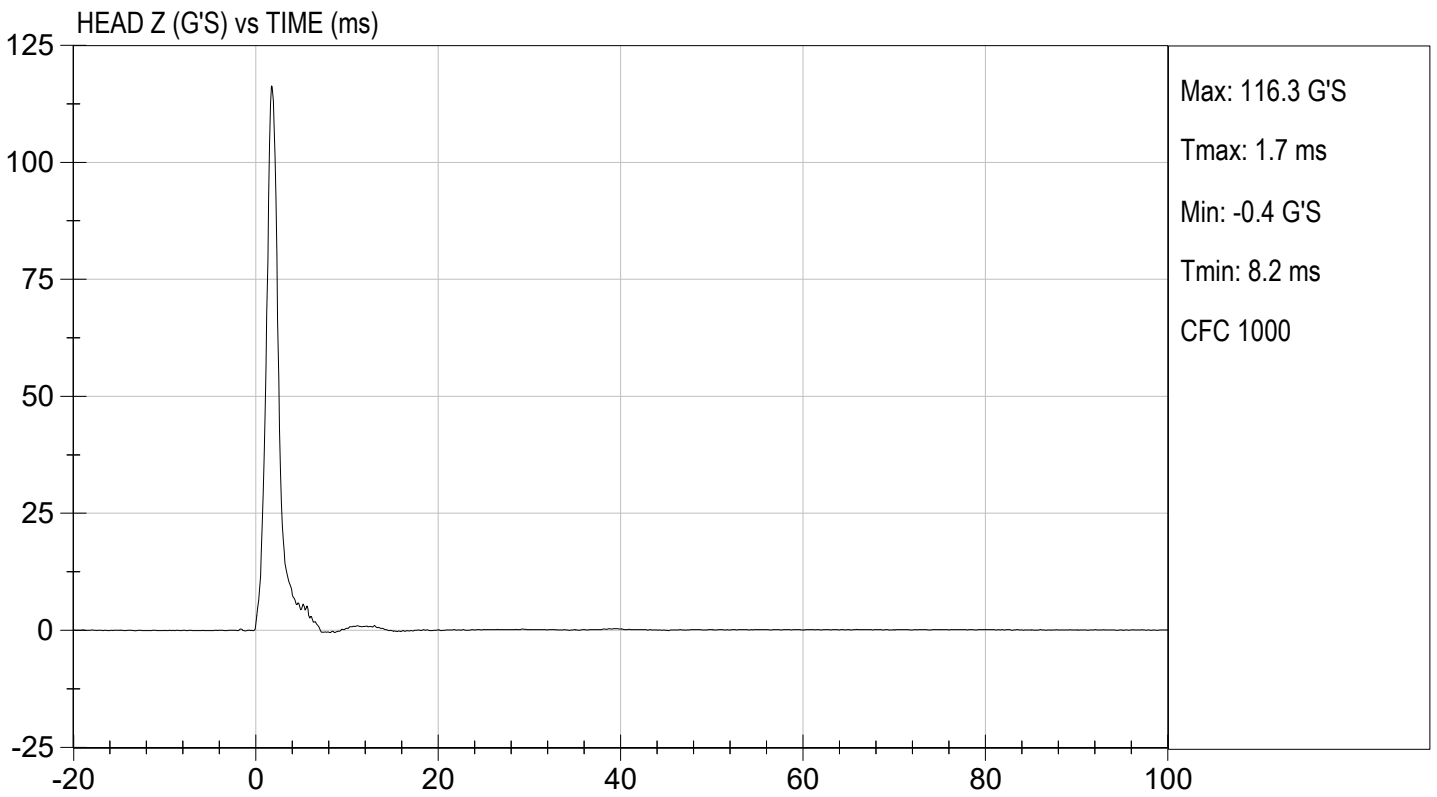
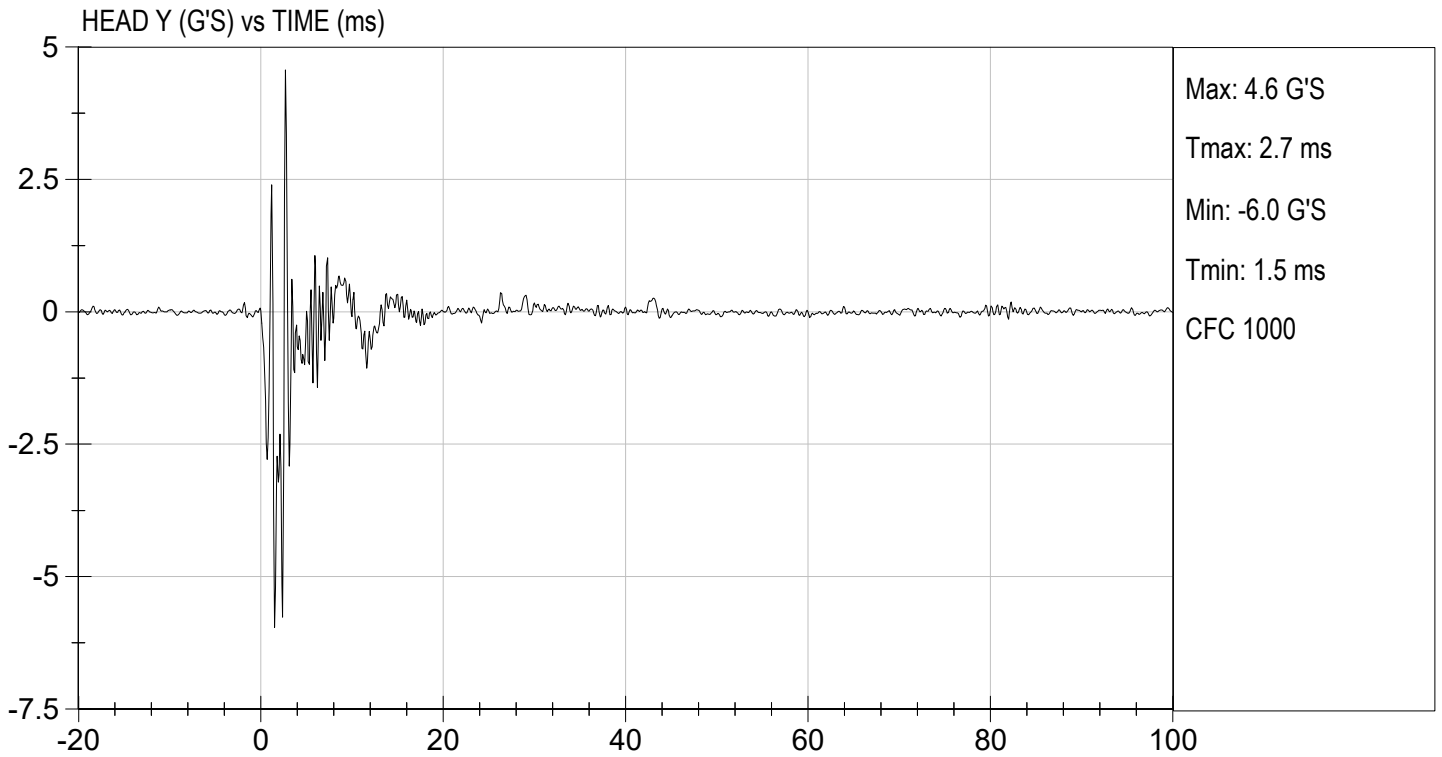
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Peak Resultant Acceleration	G's	225 to 275	240	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-6.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

03/22/2024
 Test Date


 Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

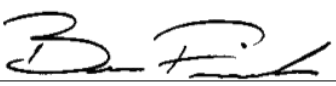
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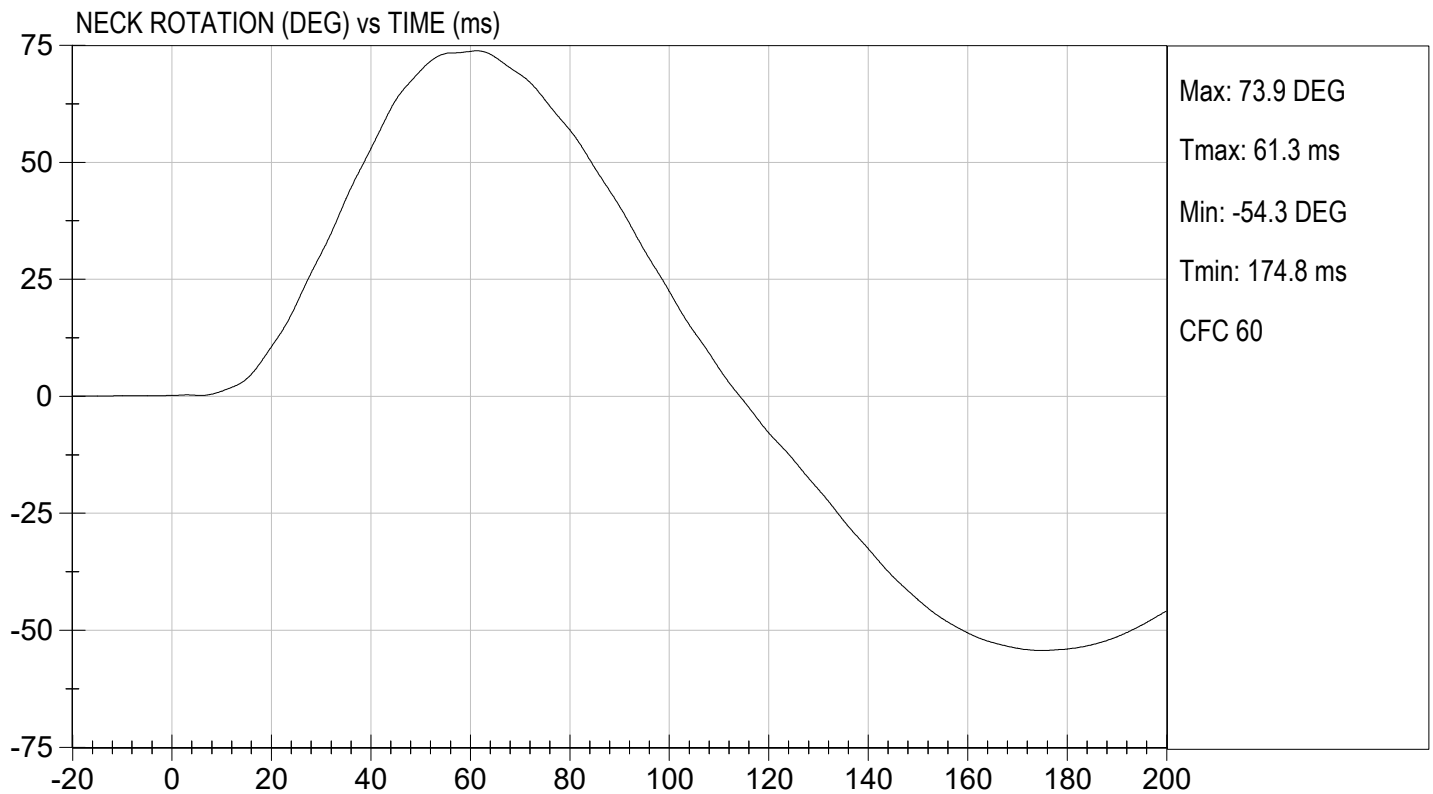
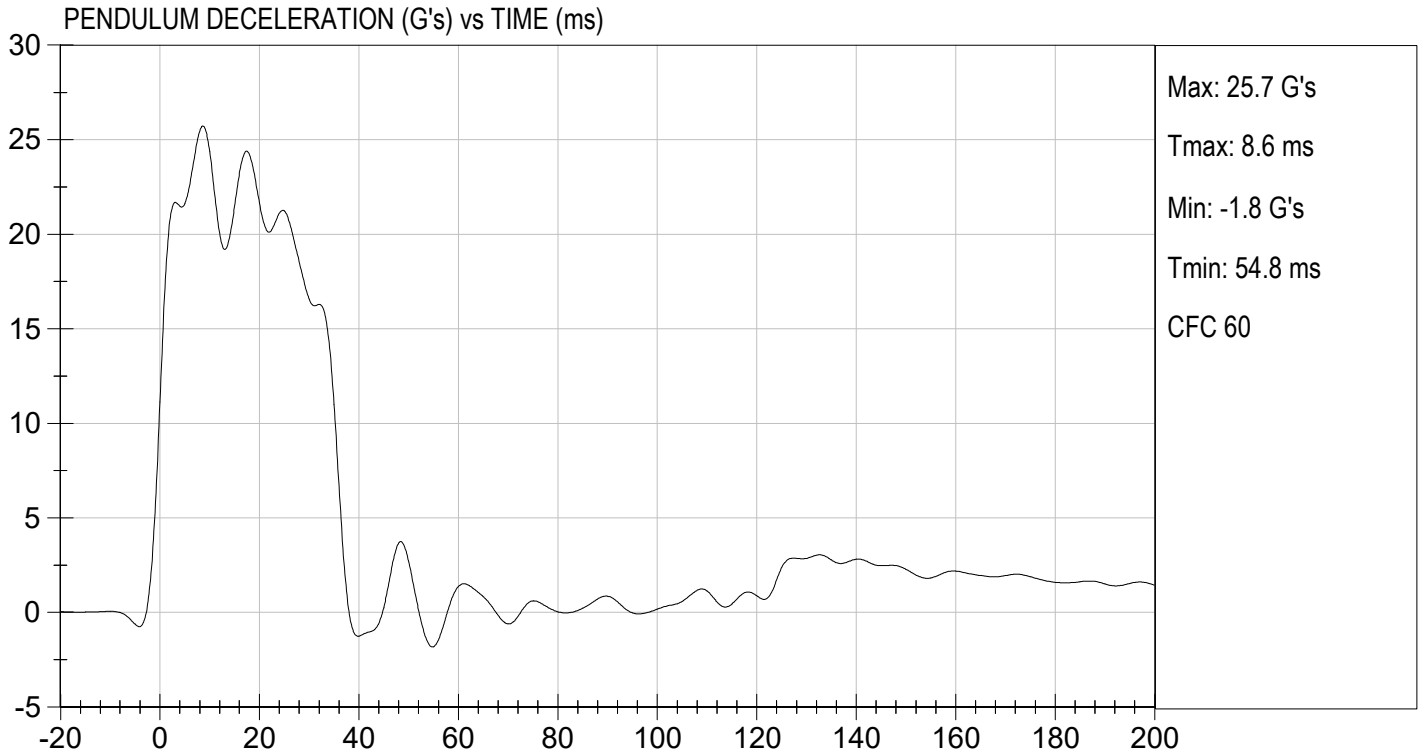
Test I.D.: D240782

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.36	Pass
	20 ms	G's	17.60 to 22.60	21.66	Pass
	30 ms	G's	12.50 to 18.50	16.56	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	16.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	73.9	Pass
	Time	ms	57.0 to 64.0	61.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.4	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	99.4	Pass
	Time	ms	47.0 to 58.0	49.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.1	Pass
Overall Test Results					Pass


 Laboratory Technician

03/22/2024
 Test Date

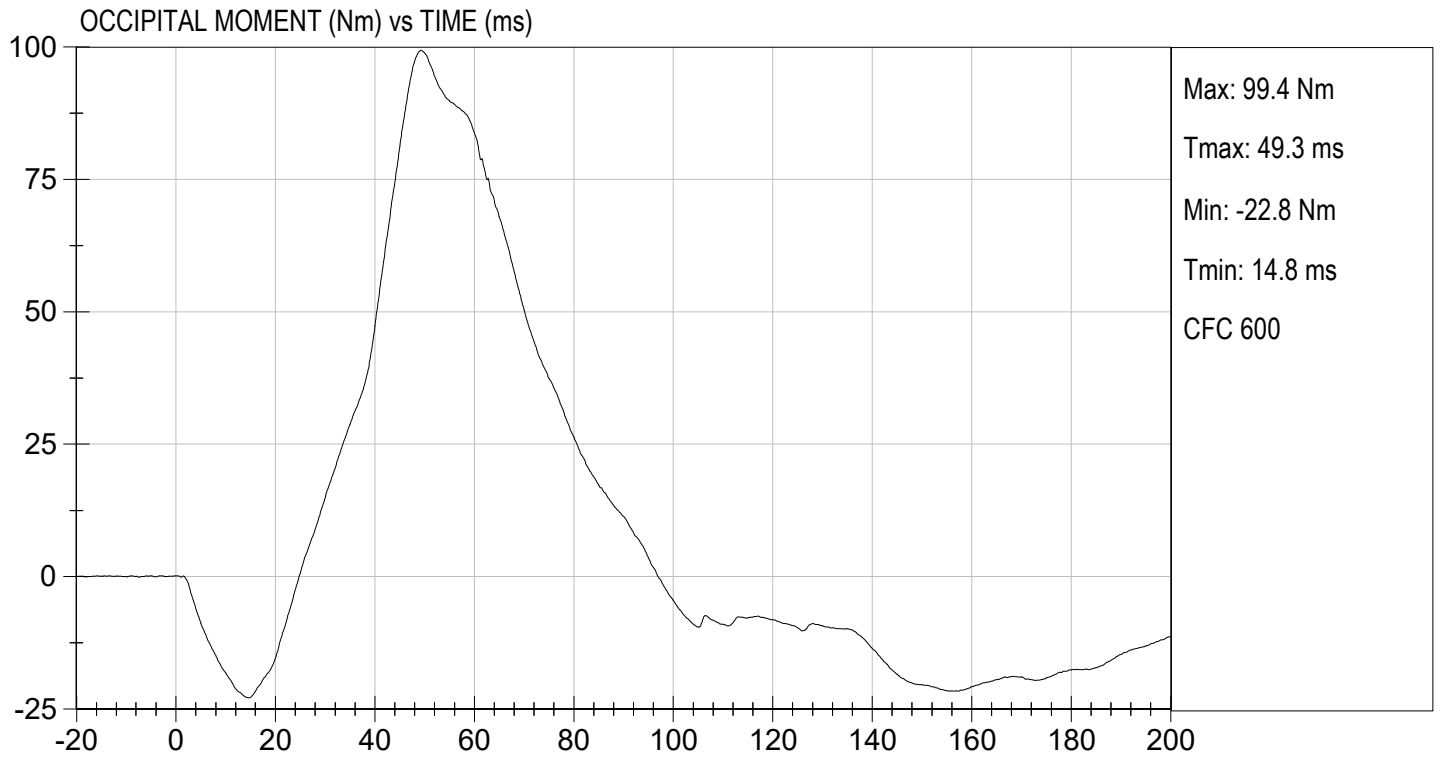

 Approved By





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

TEST DATE: 03/22/2024
TEST #: D240782



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

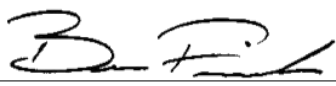
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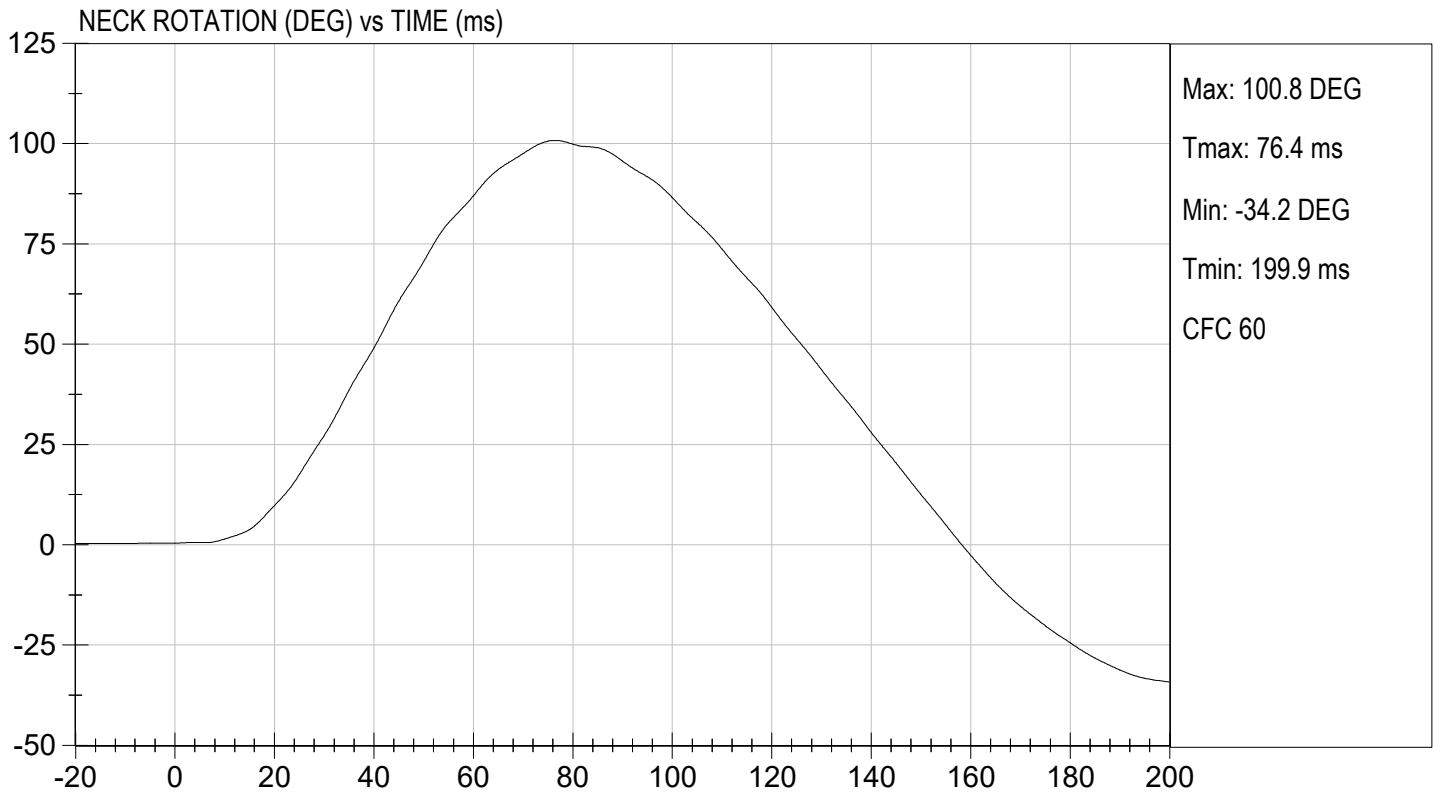
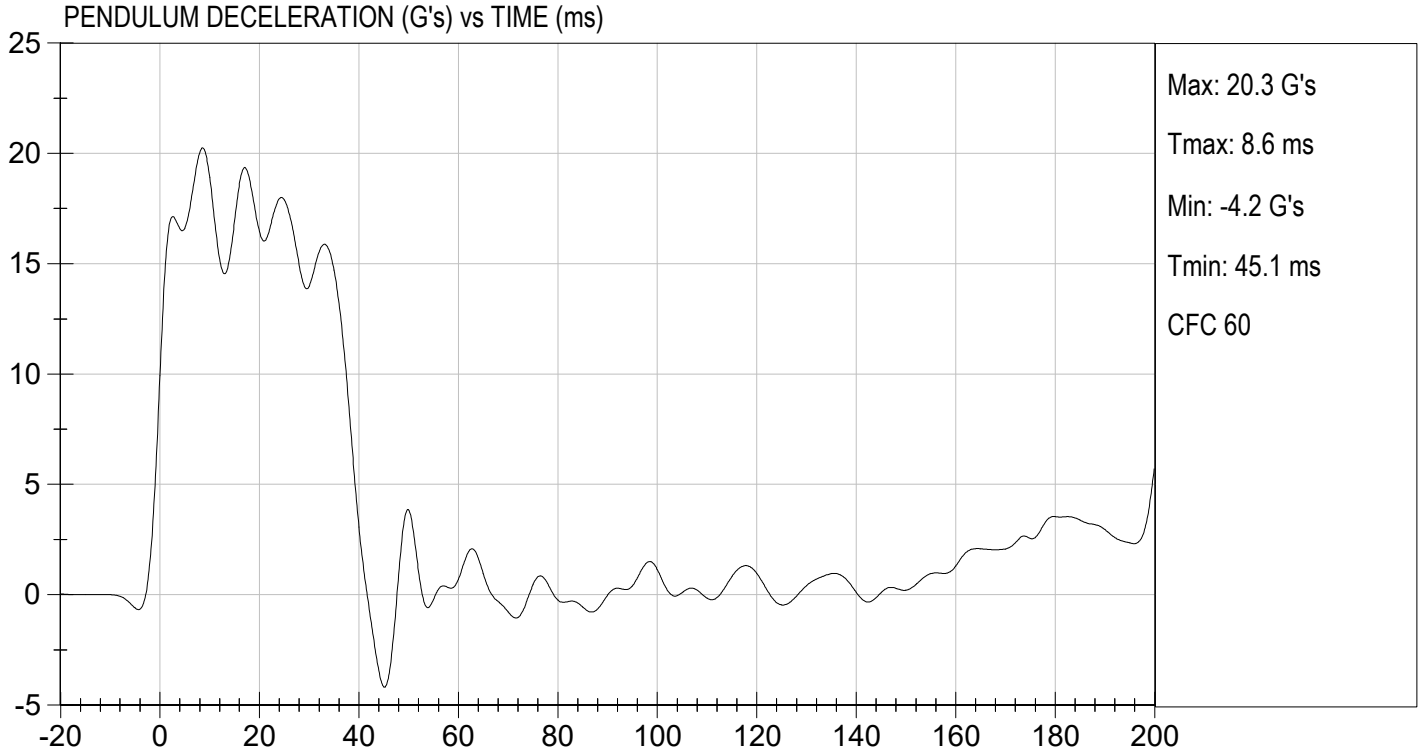
Test I.D.: D240783

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.91	Pass
	20 ms	G's	14.00 to 19.00	16.46	Pass
	30 ms	G's	11.00 to 16.00	13.98	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	15.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.8	Pass
	Time	ms	72.0 to 82.0	76.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.4	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.9	Pass
	Time	ms	65.0 to 79.0	74.1	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.8	Pass
Overall Test Results					Pass


 Laboratory Technician

03/22/2024
 Test Date

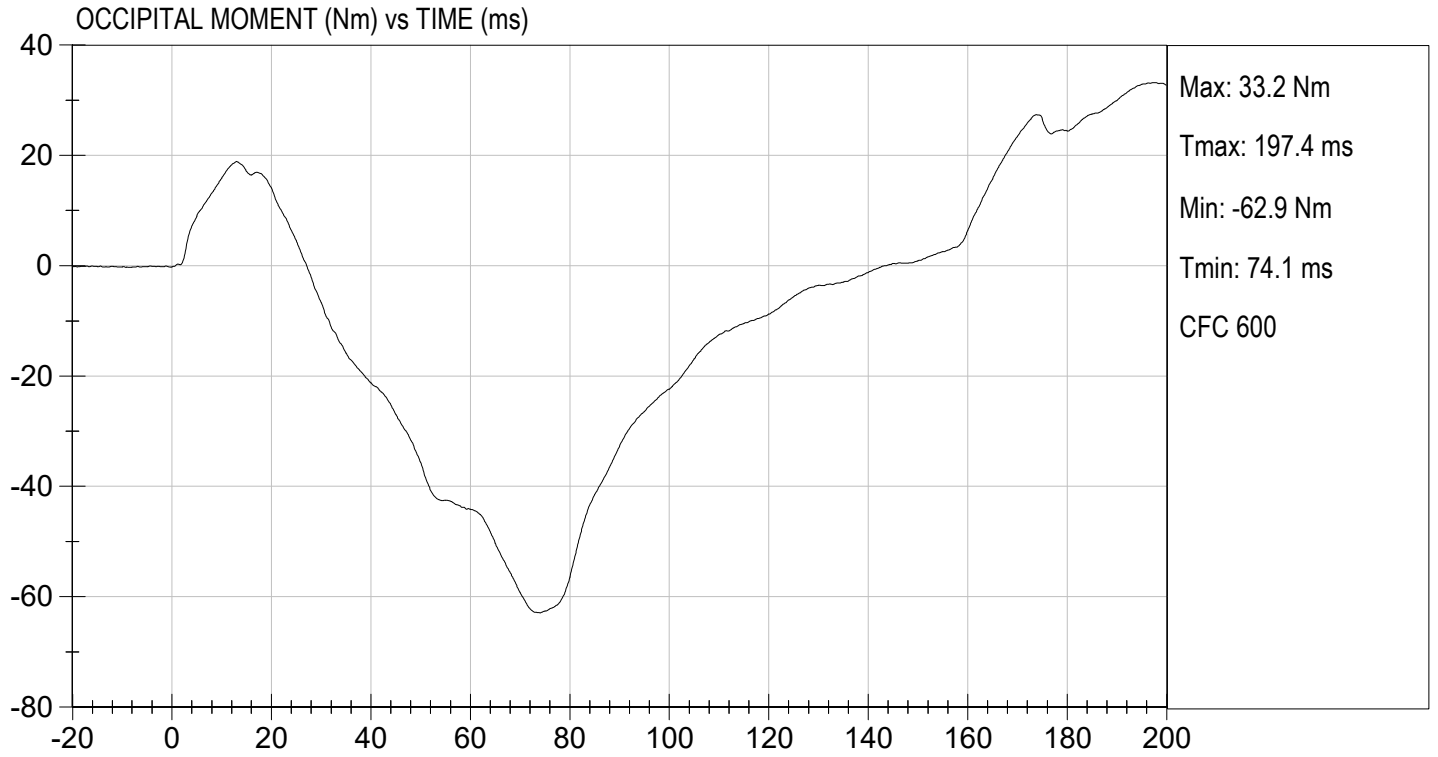

 Approved By





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

TEST DATE: 03/22/2024
TEST #: D240783



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

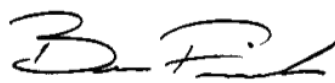
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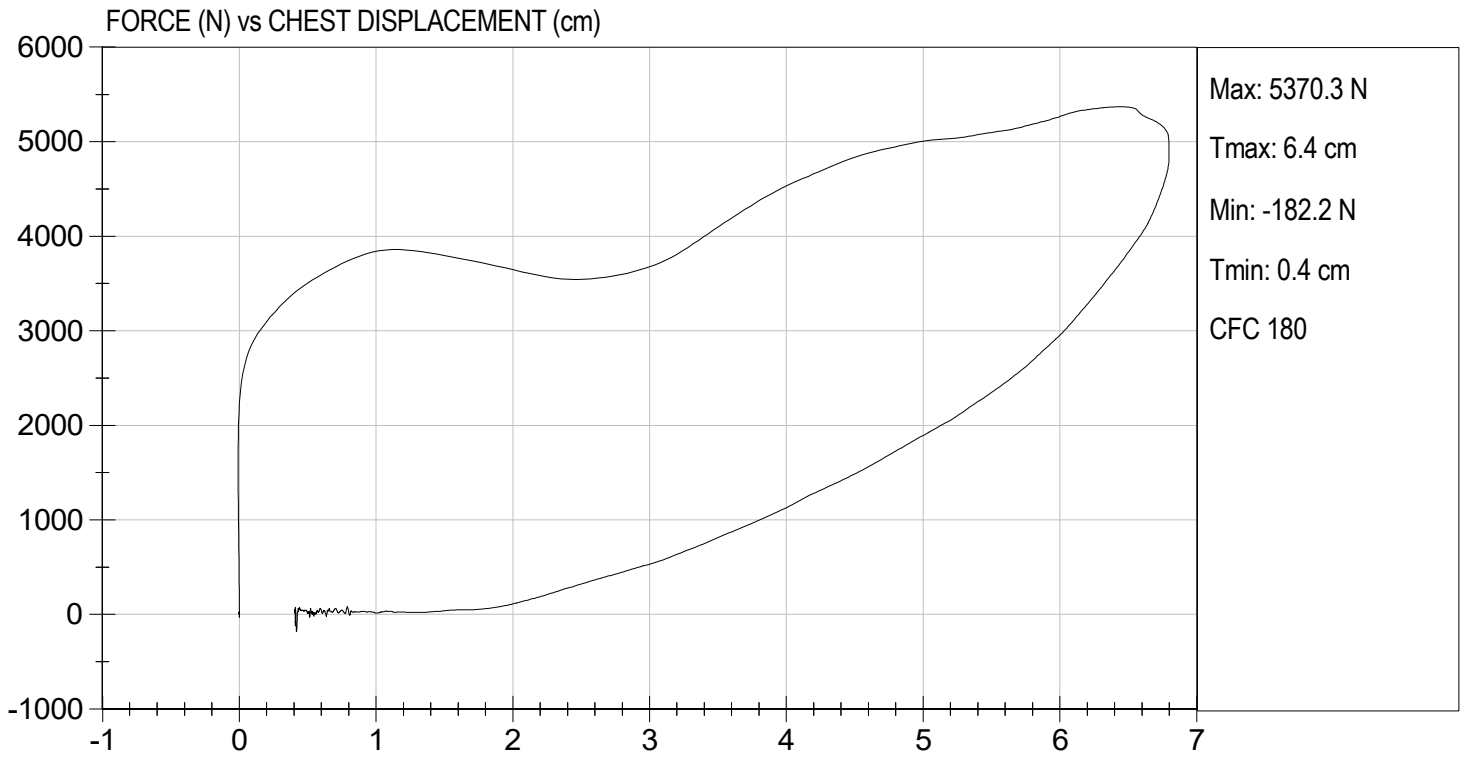
Test I.D: D240784

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,370	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.80	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Overall Test Results				Pass


 Laboratory Technician

03/21/2024
 Test Date


 Approved By



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

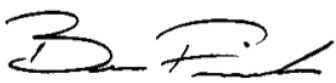
ATD Serial No: 064

Test I.D: D240785

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,047	Pass
Overall Test Results				Pass


 Laboratory Technician

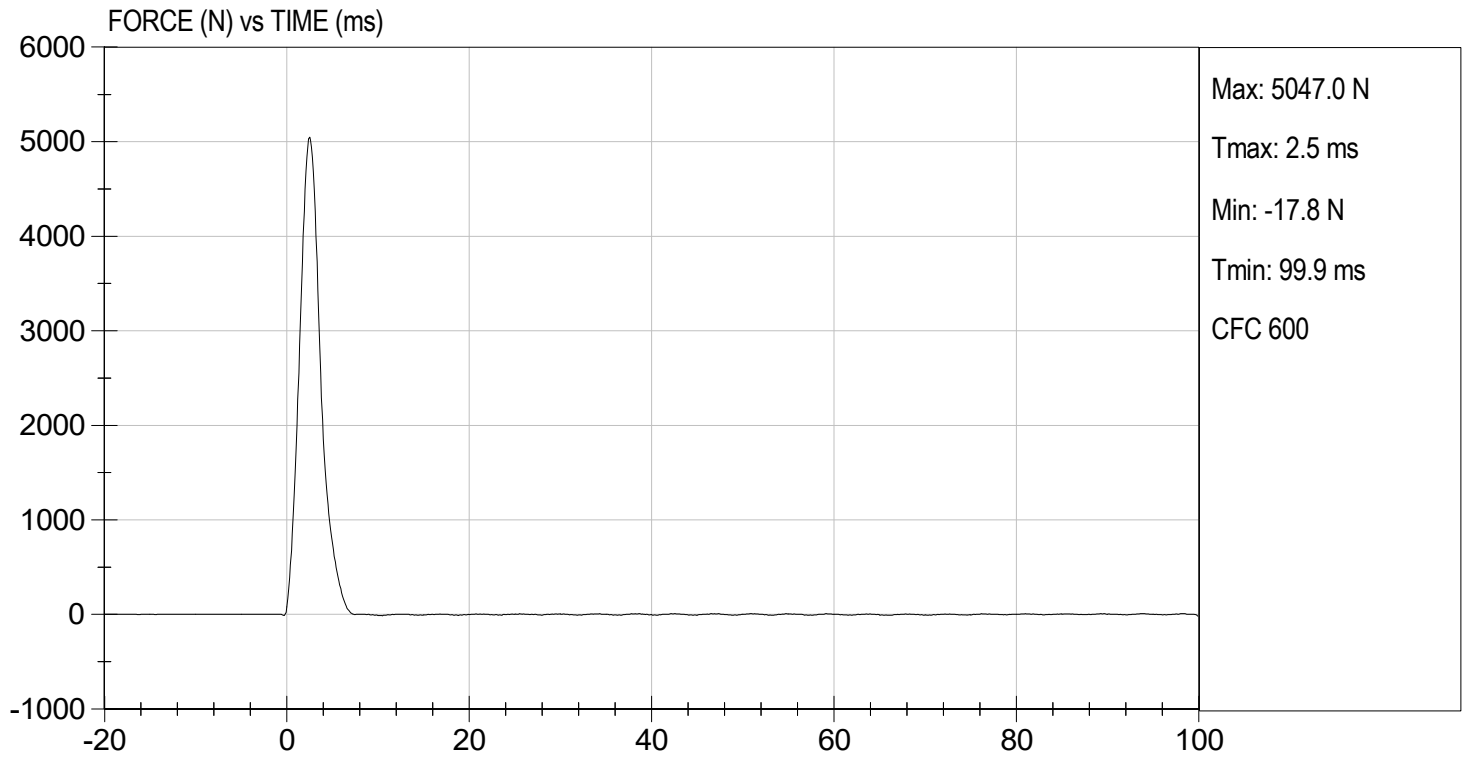
03/21/2024
 Test Date


 Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 03/21/2024
TEST #: D240785



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

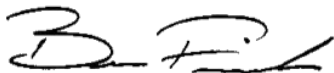
ATD Serial No: 064

Test I.D: D240786

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	4,956	Pass
Overall Test Results				Pass


 Laboratory Technician

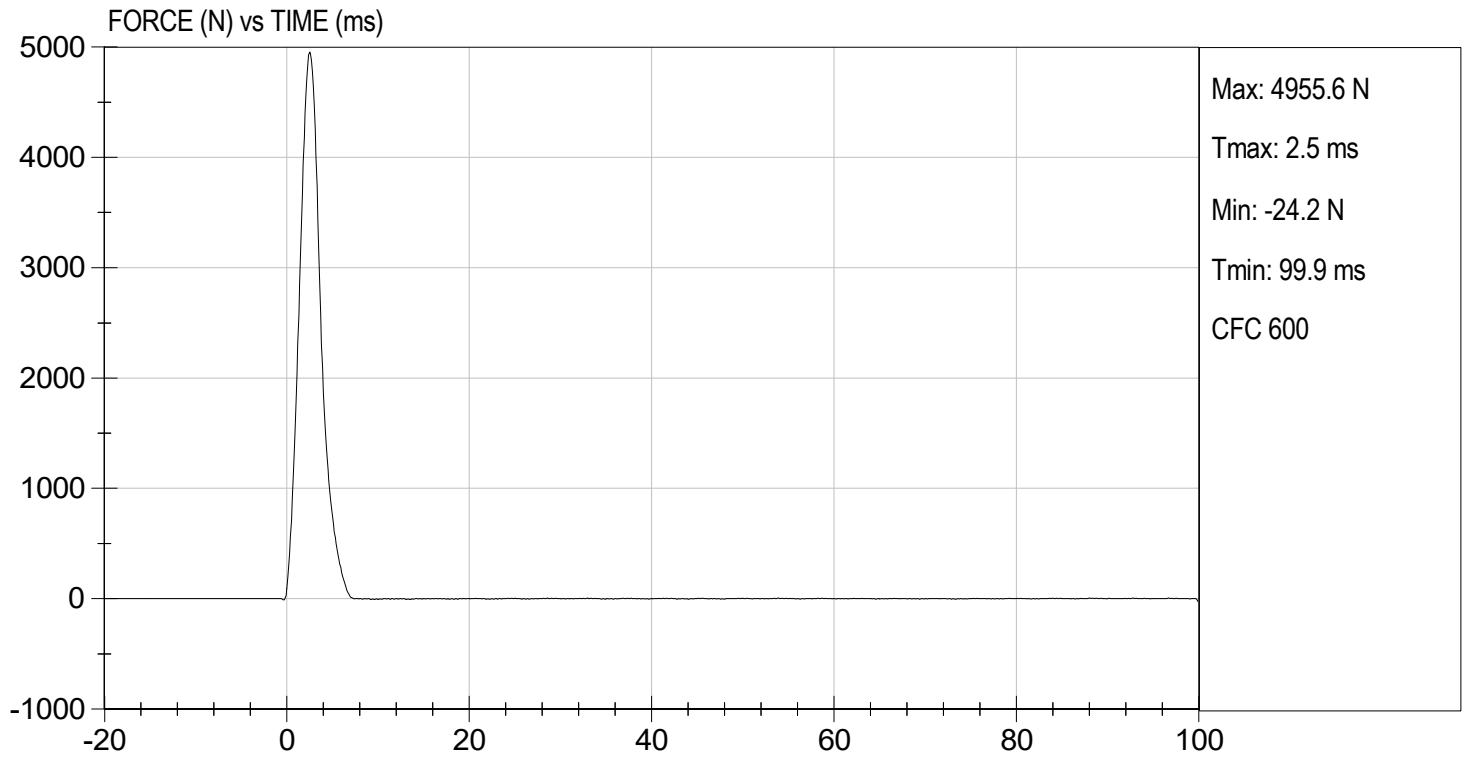
03/21/2024
 Test Date


 Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 03/21/2024
TEST #: D240786



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

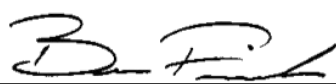
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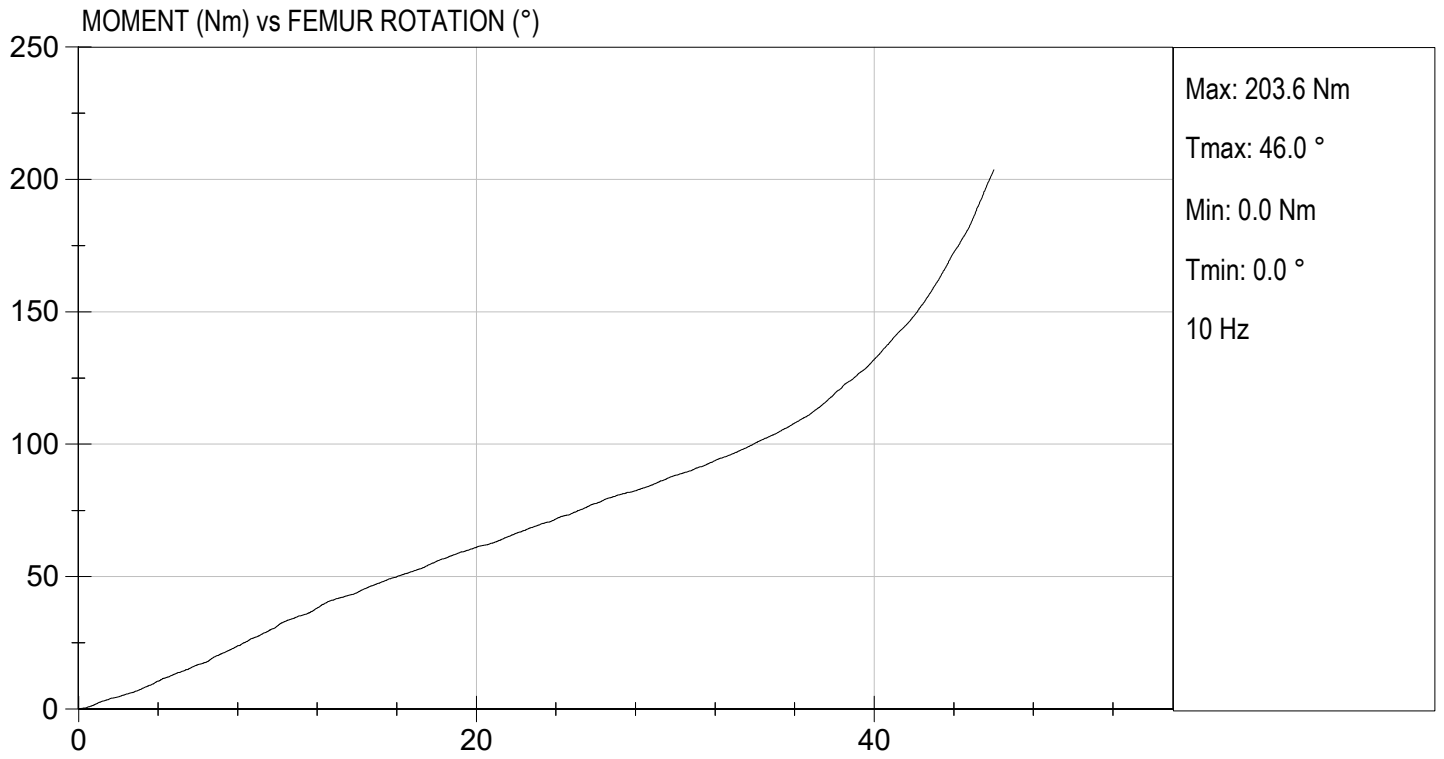
Test I.D: D240780

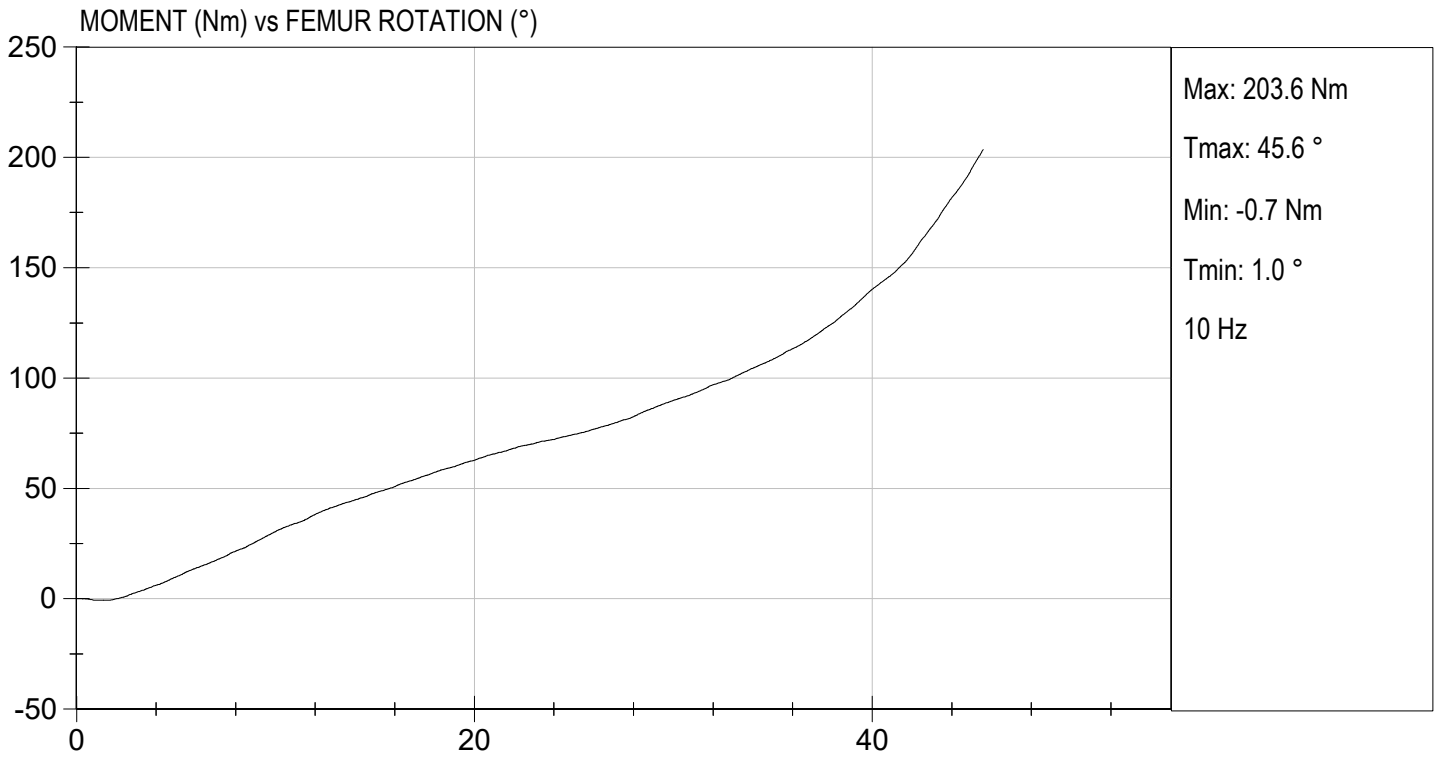
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.4	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	28	28	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.5	Pass
30 Degrees	Nm	94.9 Nm Max	88.3	89.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	46.0	45.6	Pass
Overall Test Results					Pass


 Laboratory Technician

03/22/2024
 Test Date


 Approved By





QUALIFICATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

Hybrid III, 5th External Measurements
SN: 142

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 heel	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

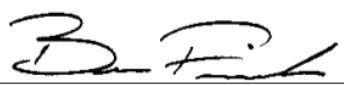
ATD Serial No: 142

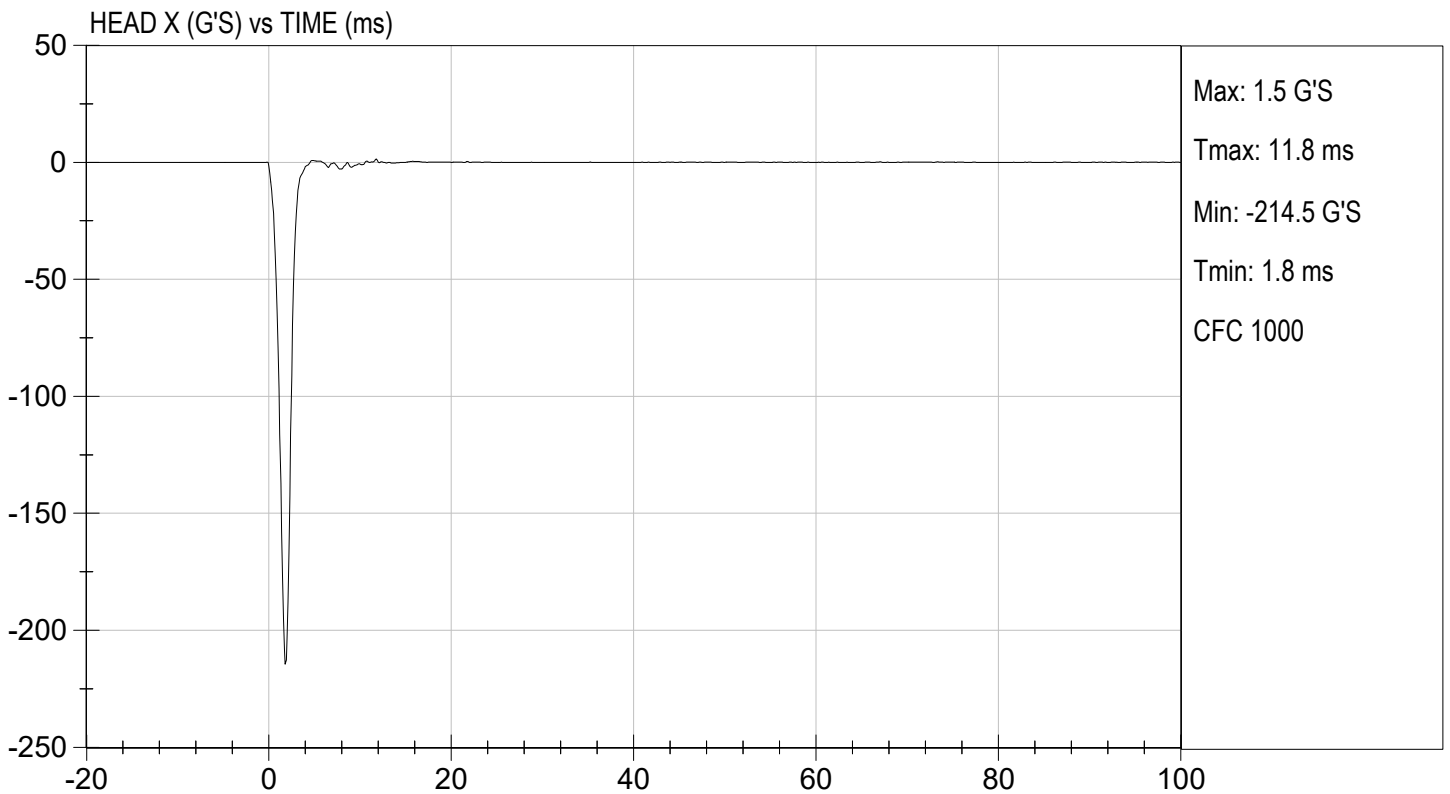
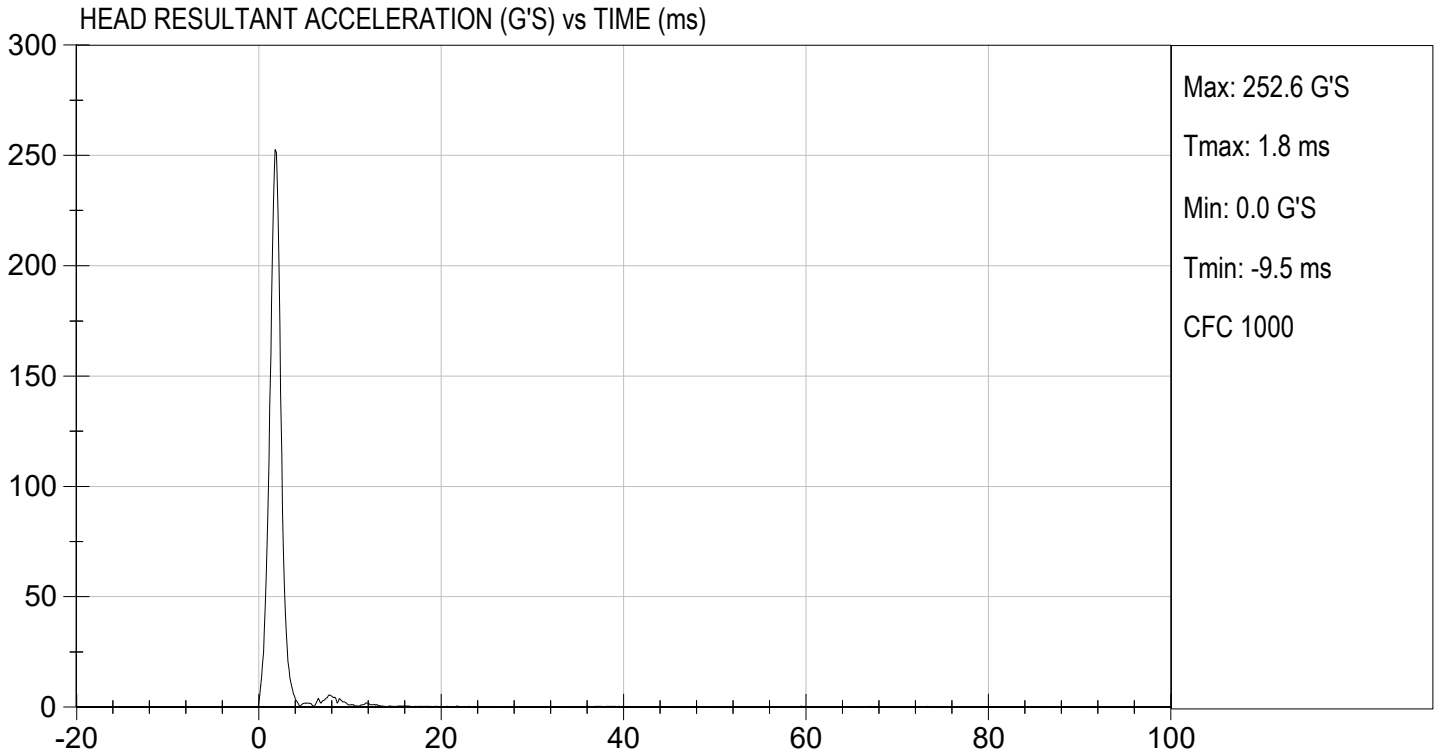
Test ID: D240591

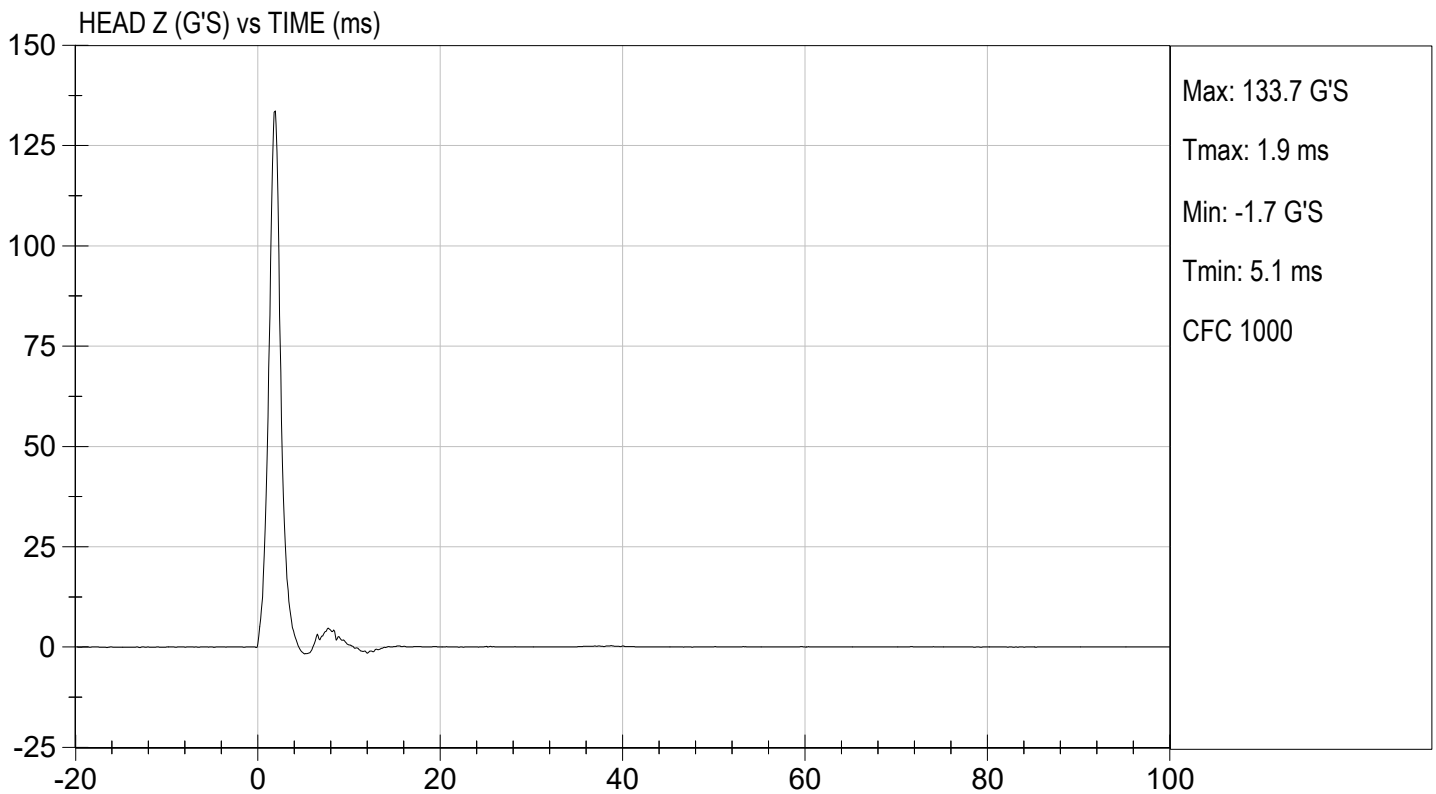
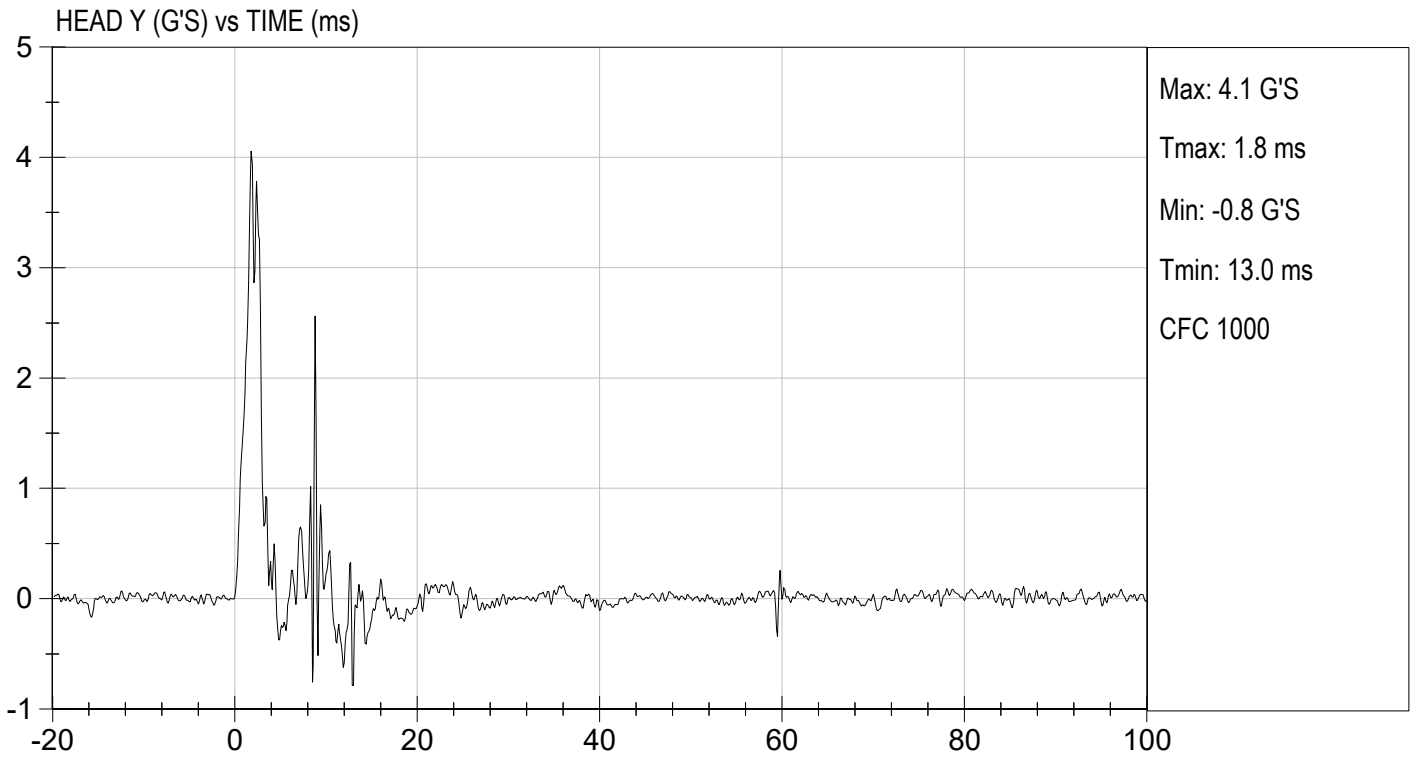
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Peak Resultant Acceleration	G's	250 to 300	253	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	4.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

03/05/2024
 Test Date


 Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D240592

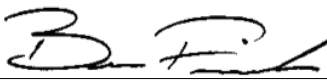
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	37	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.8	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
Overall Results					Pass



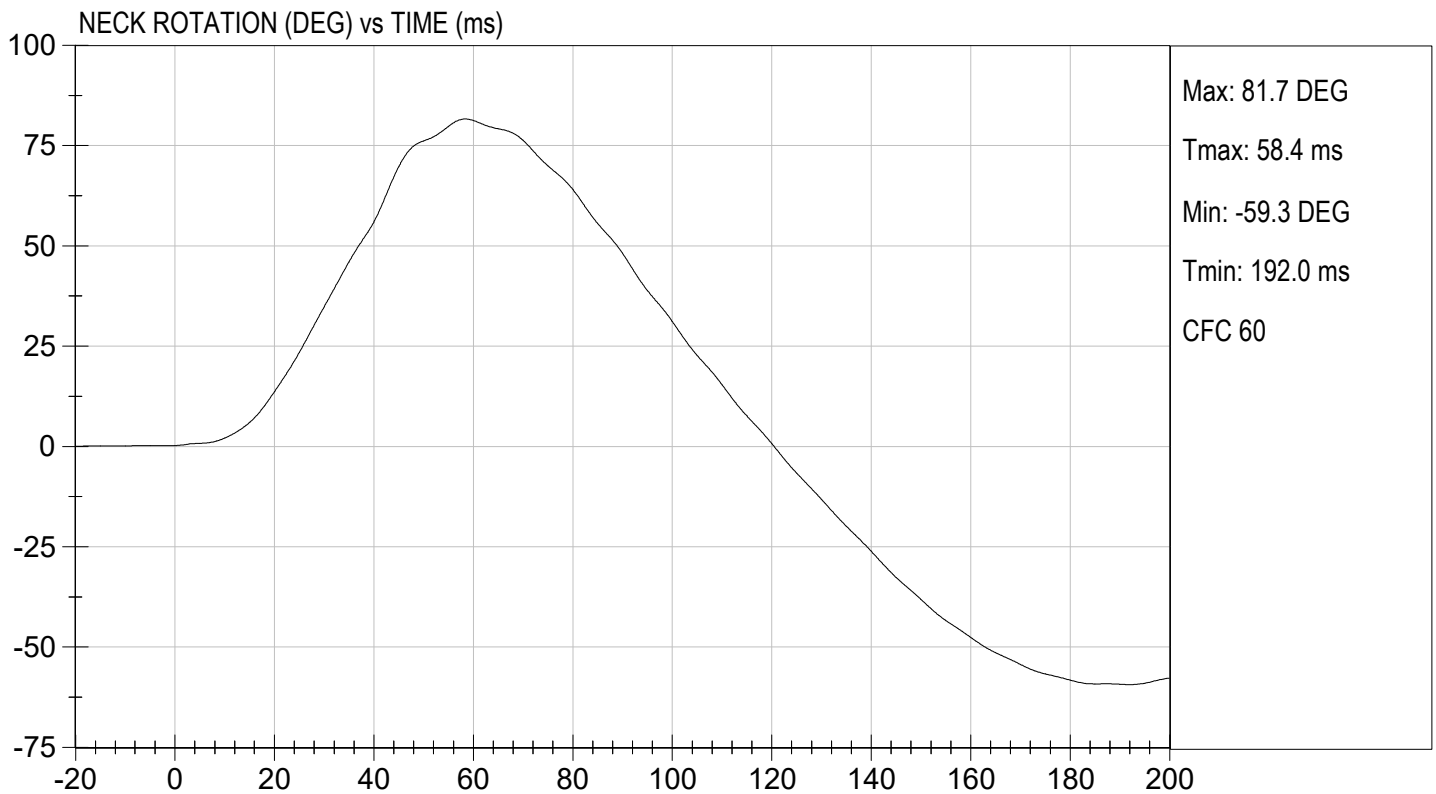
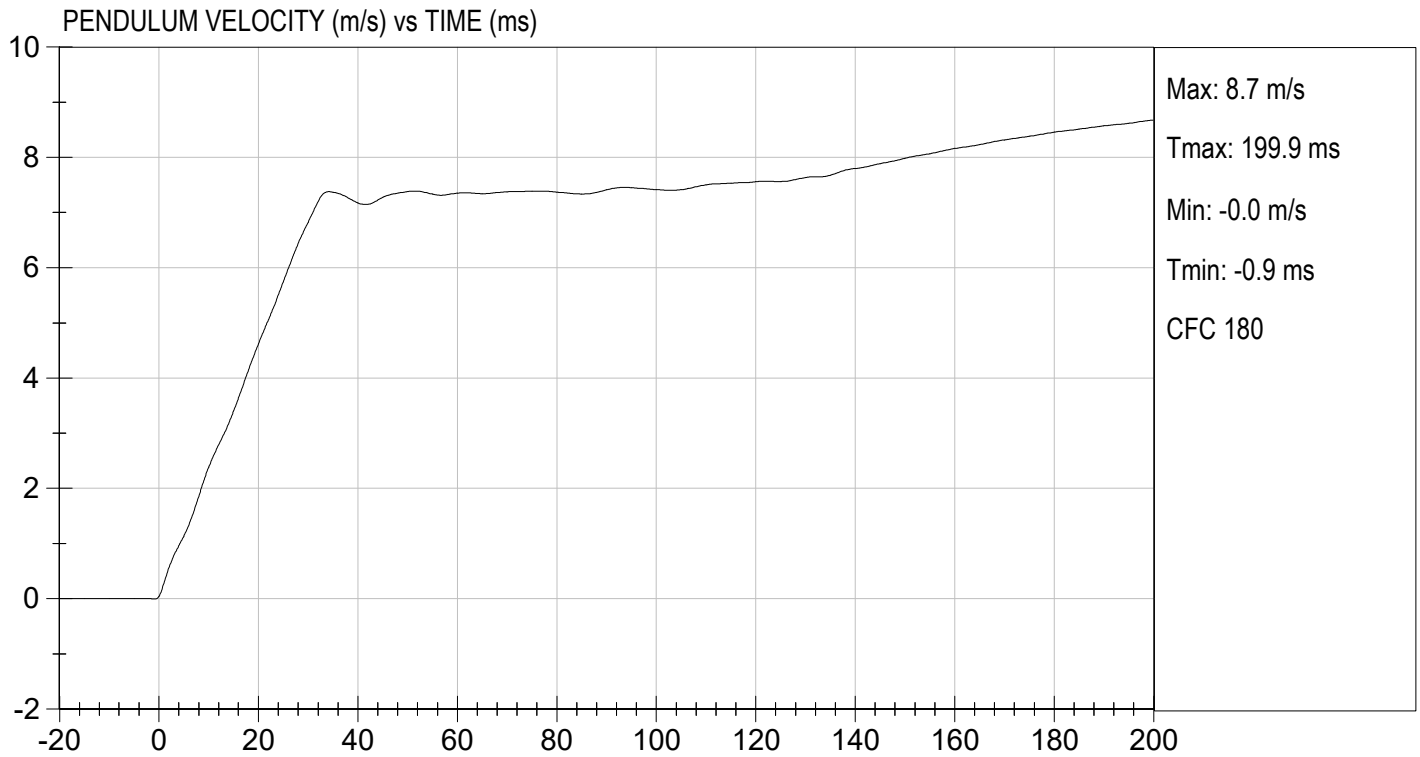
 Laboratory Technician

03/05/2024

 Test Date



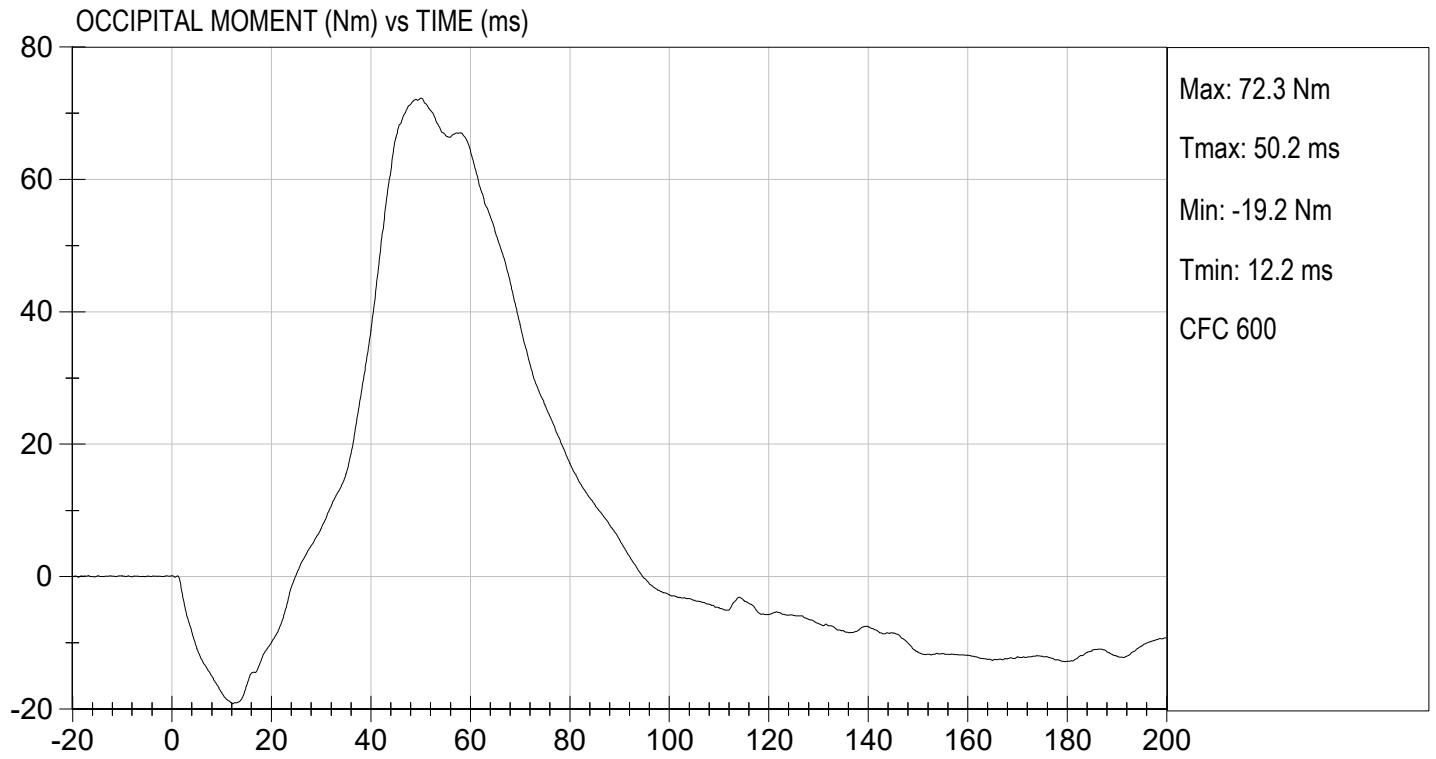
 Approved By





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

TEST DATE: 03/05/2024
TEST #: D240592



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

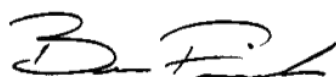
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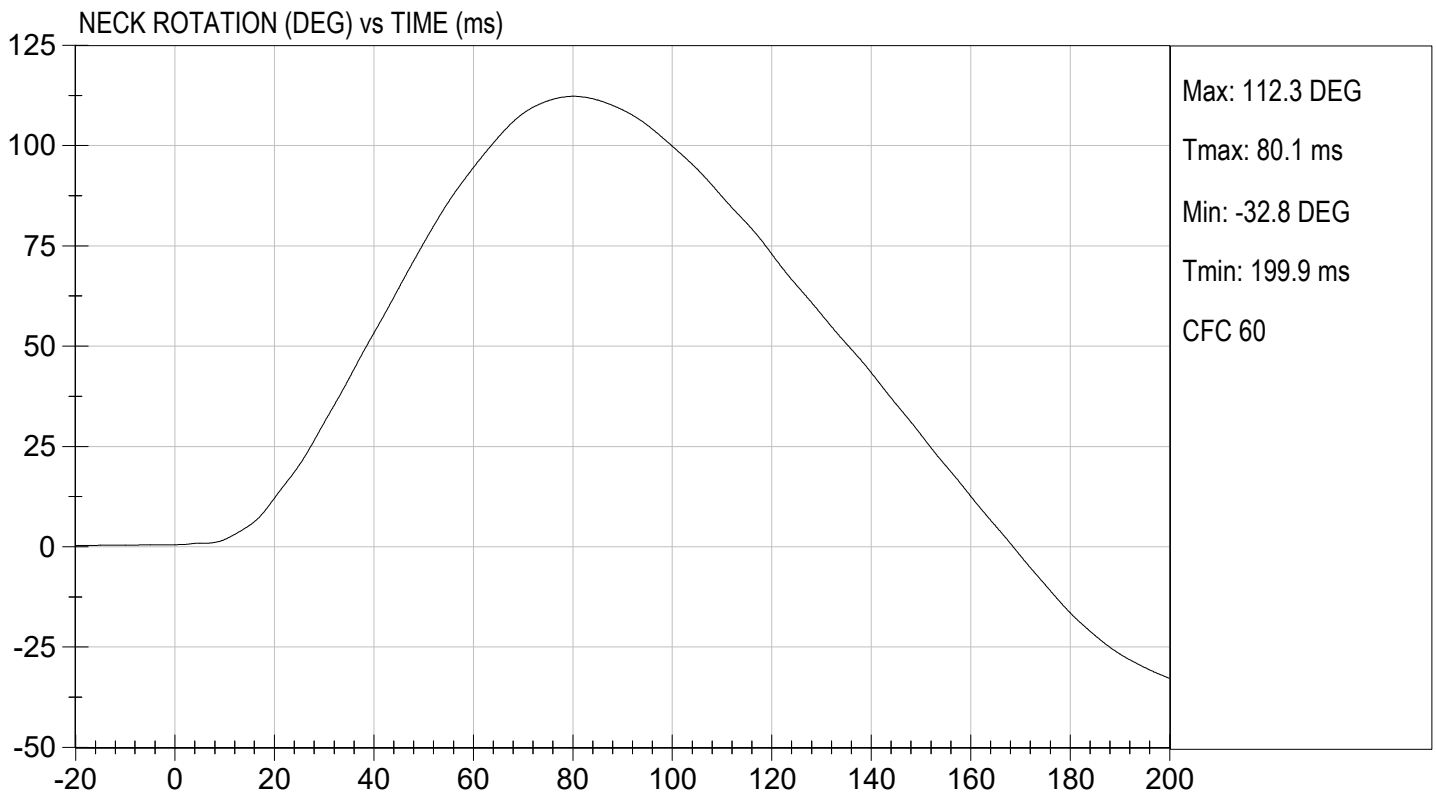
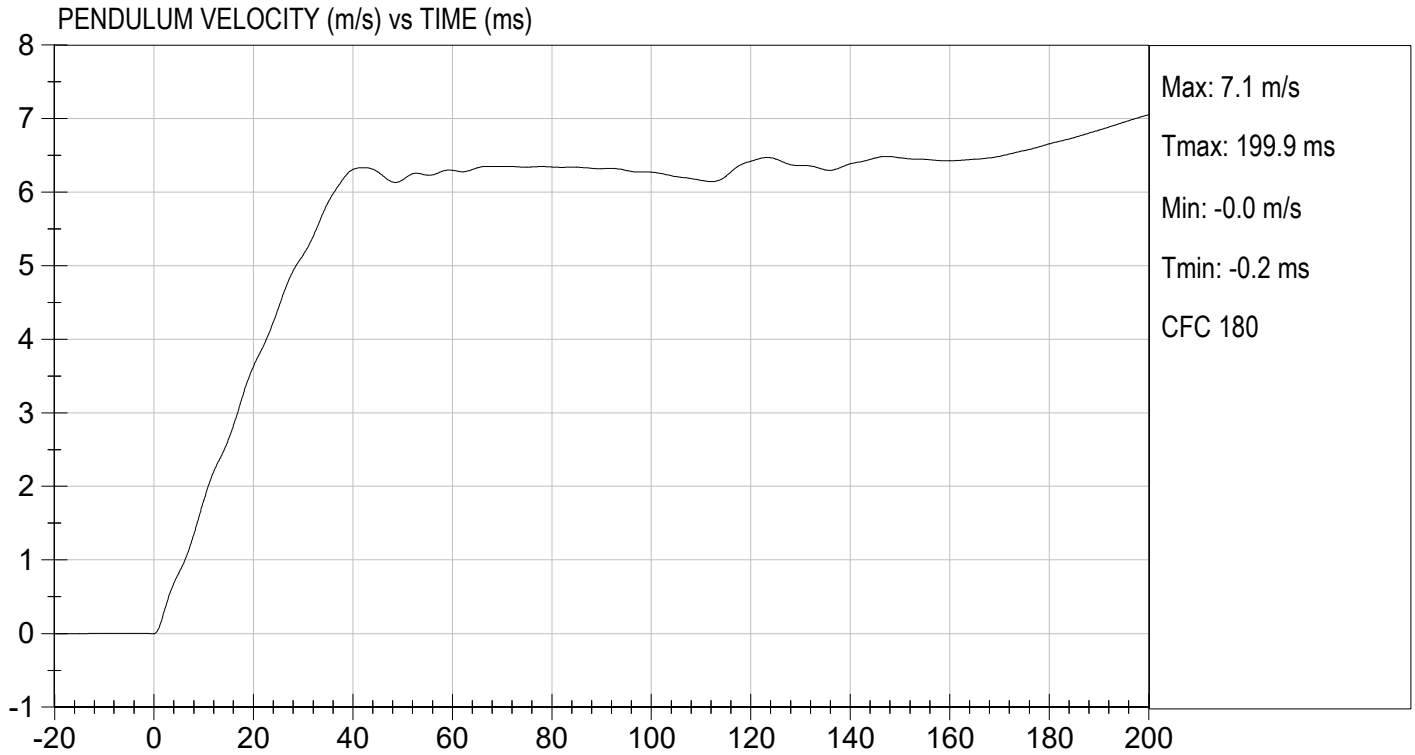
Test I.D.: D240593

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	37	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	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	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	112	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-53	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
Overall Results					Pass


 Laboratory Technician

03/05/2024
 Test Date

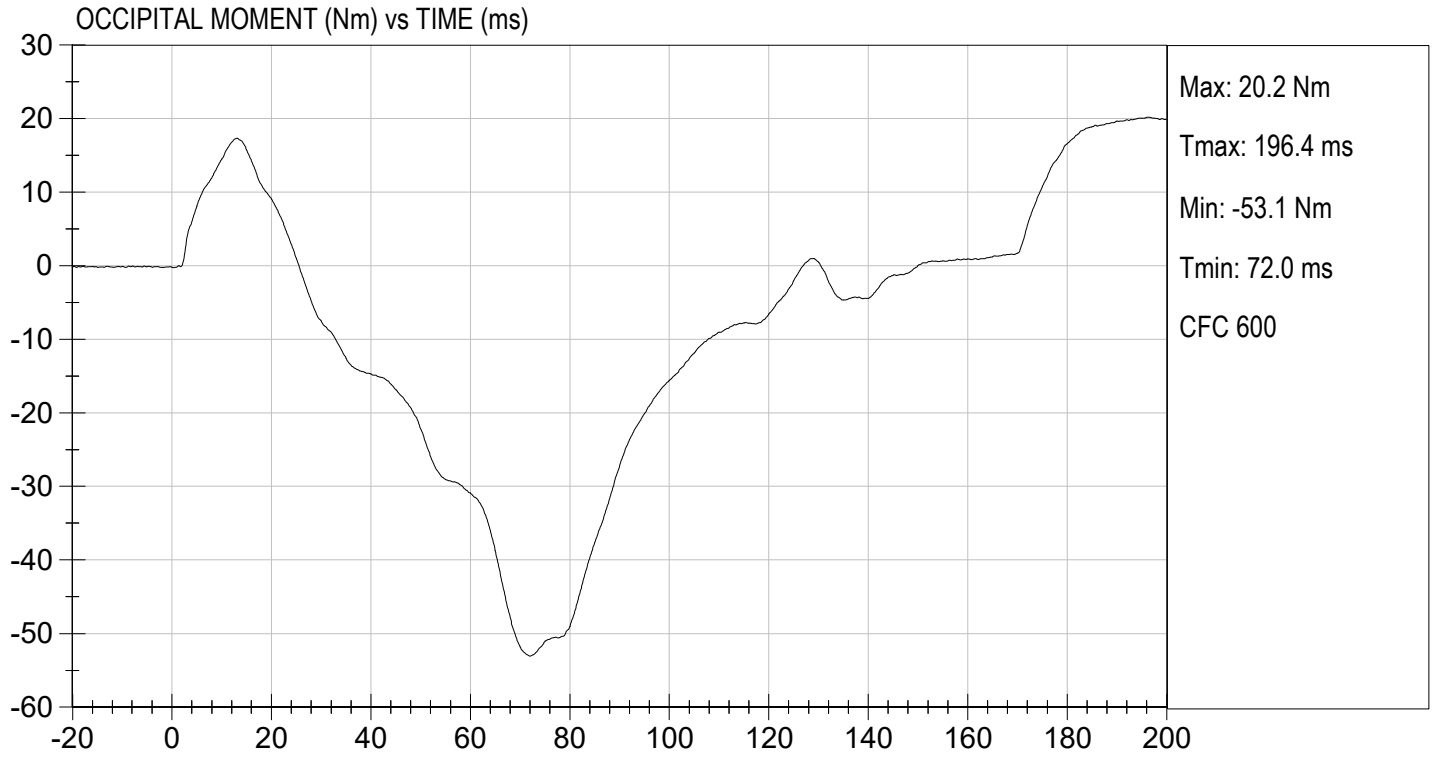

 Approved By





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 03/05/2024
TEST #: D240593



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

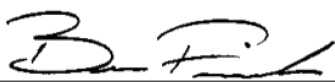
Test I.D: D240594

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	37	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4169	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4369	Pass
Overall Test Results				Pass


 Laboratory Technician

03/05/2024

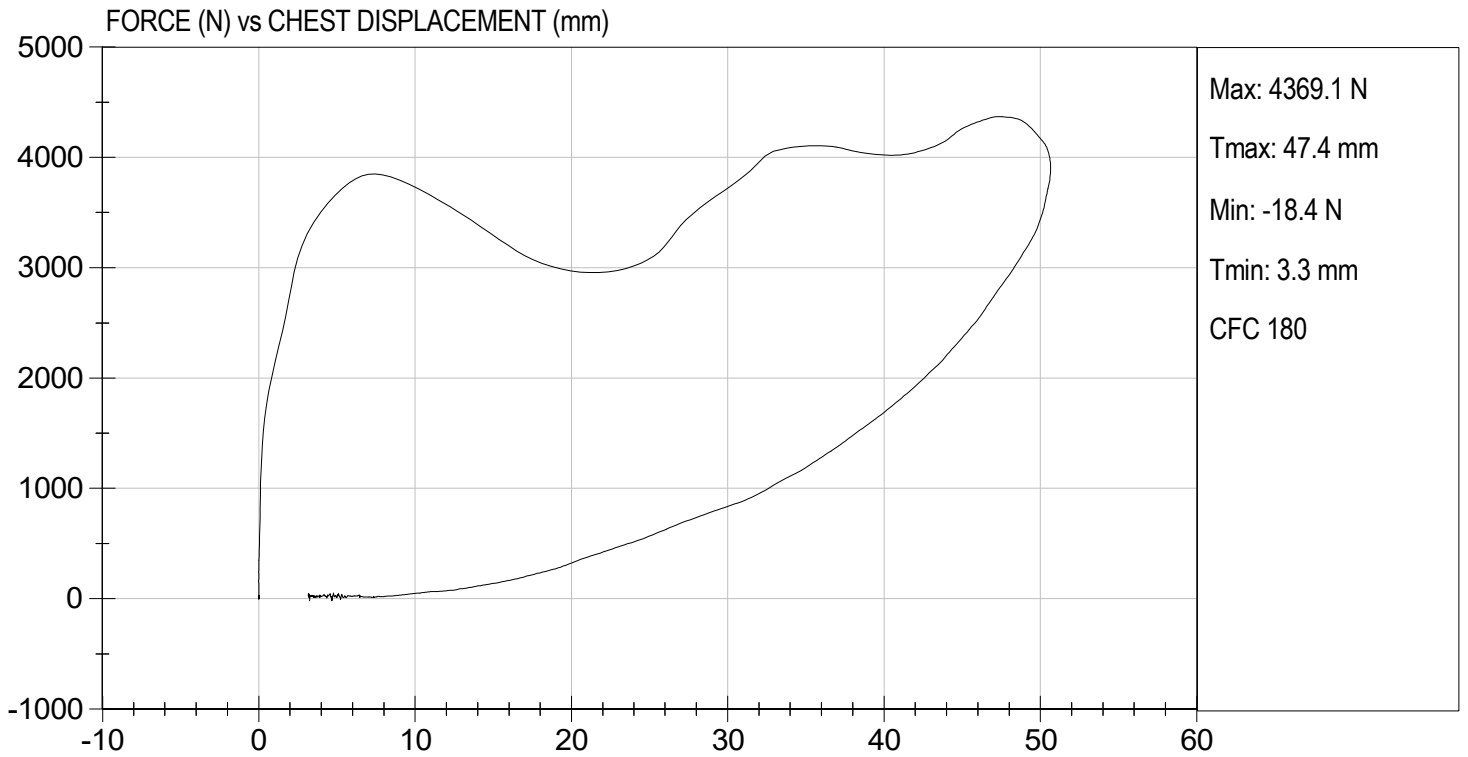
Test Date


 Approved By



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

TEST DATE: 03/05/2024
TEST #: D240594



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

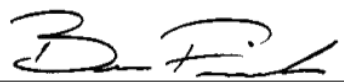
ATD Serial No: 142

Test I.D: D240595

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3892	Pass
Overall Test Results				Pass


Laboratory Technician

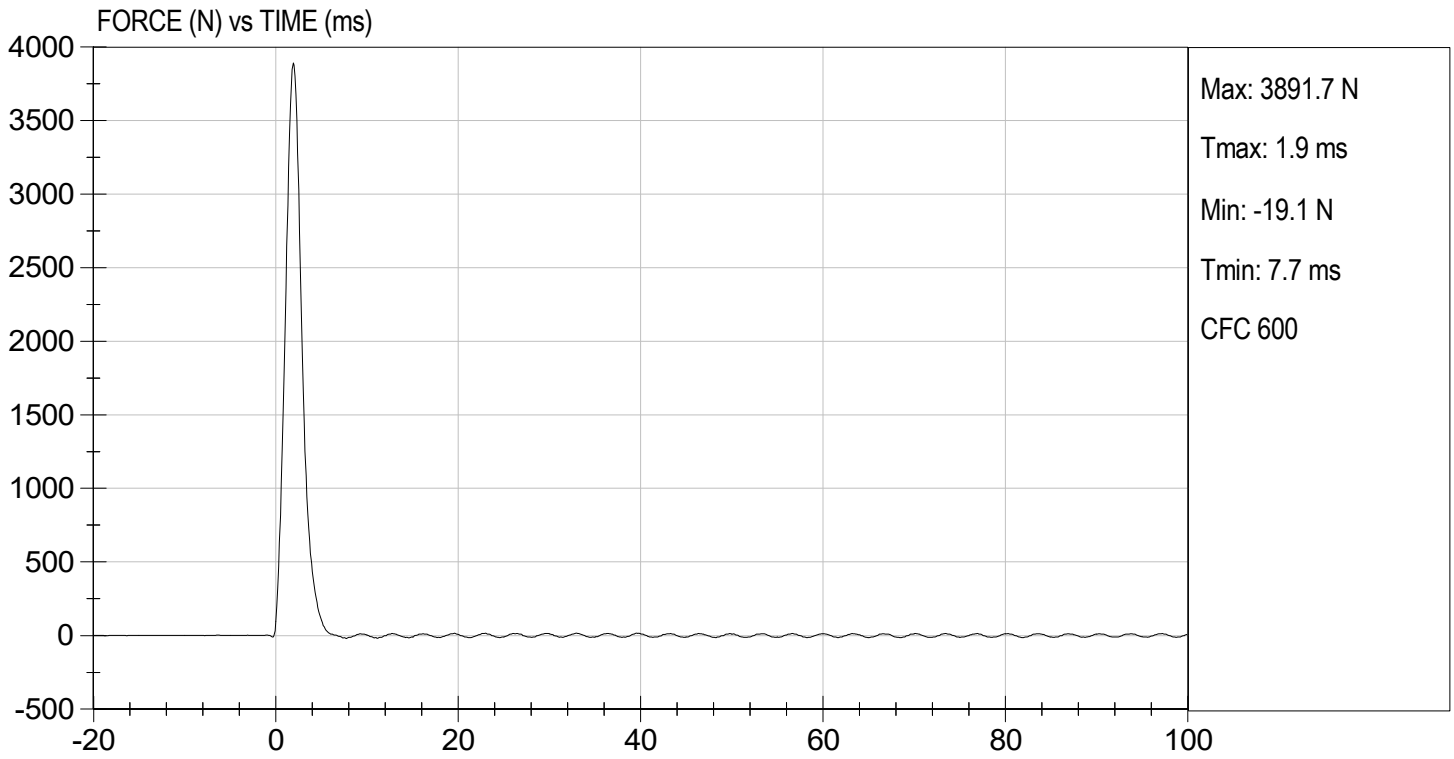
03/05/2024
Test Date


Approved By



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

TEST DATE: 03/05/2024
TEST #: D240595



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

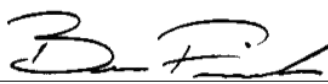
ATD Serial No: 142

Test I.D: D240596

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3829	Pass
Overall Test Results				Pass


Laboratory Technician

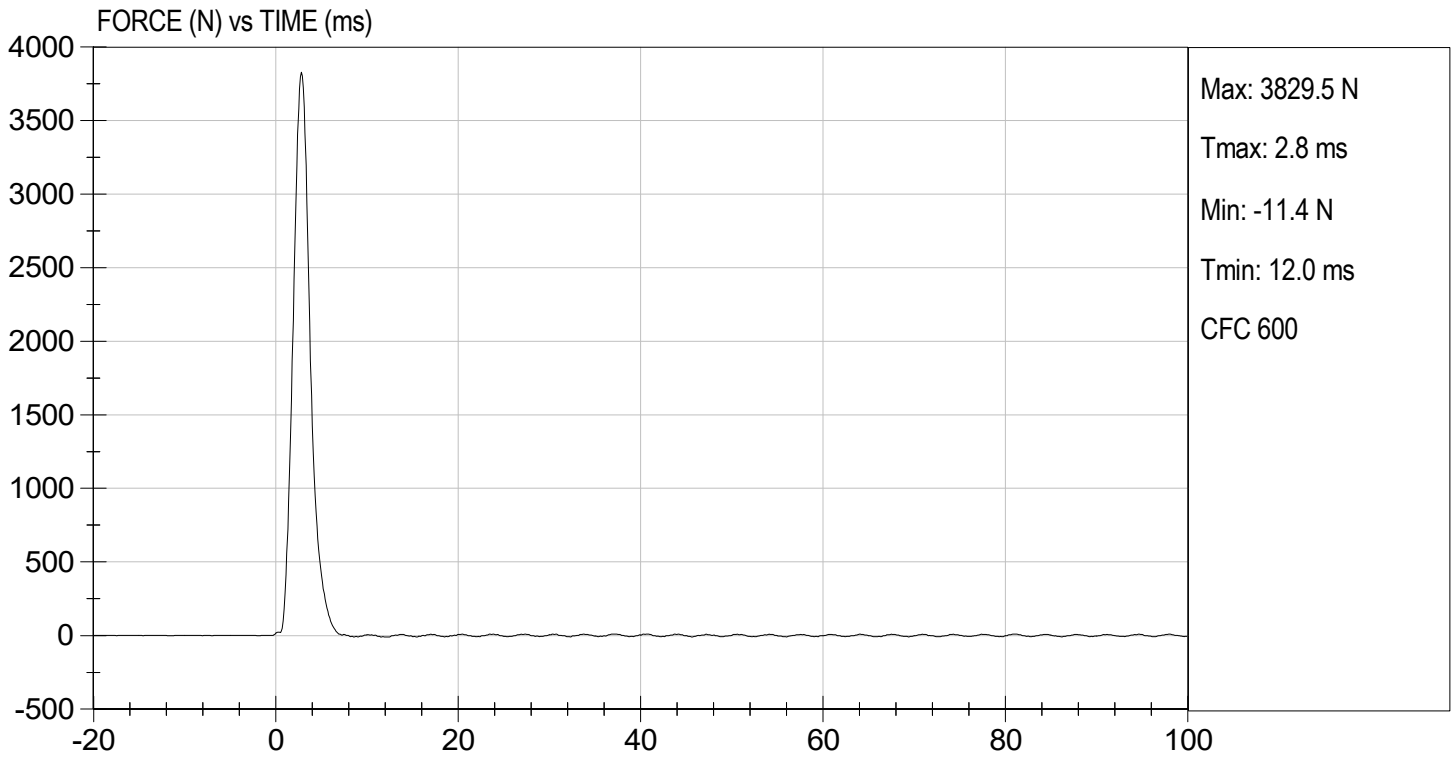
03/05/2024
Test Date


Approved By



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

TEST DATE: 03/05/2024
TEST #: D240596



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

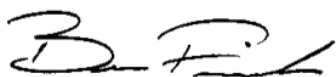
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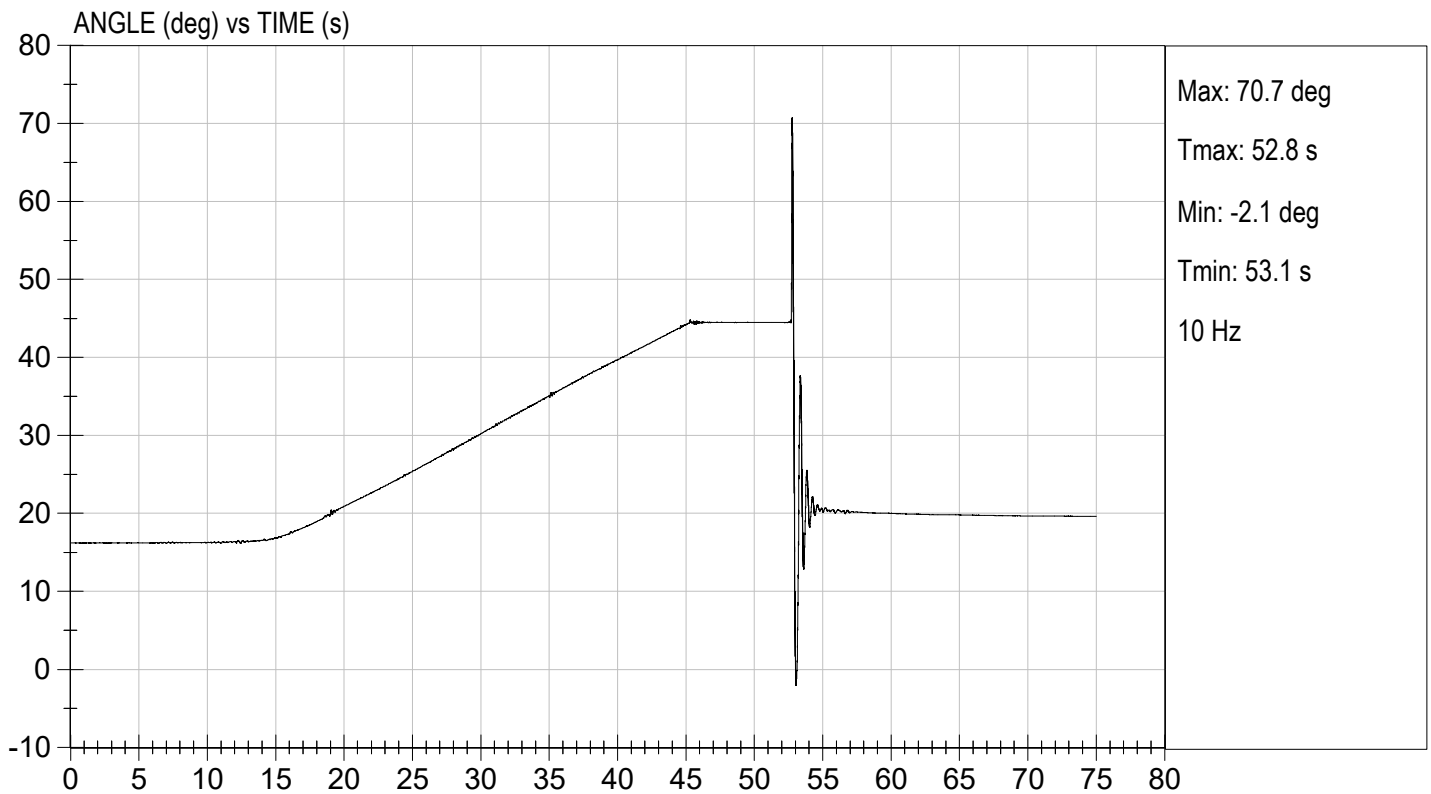
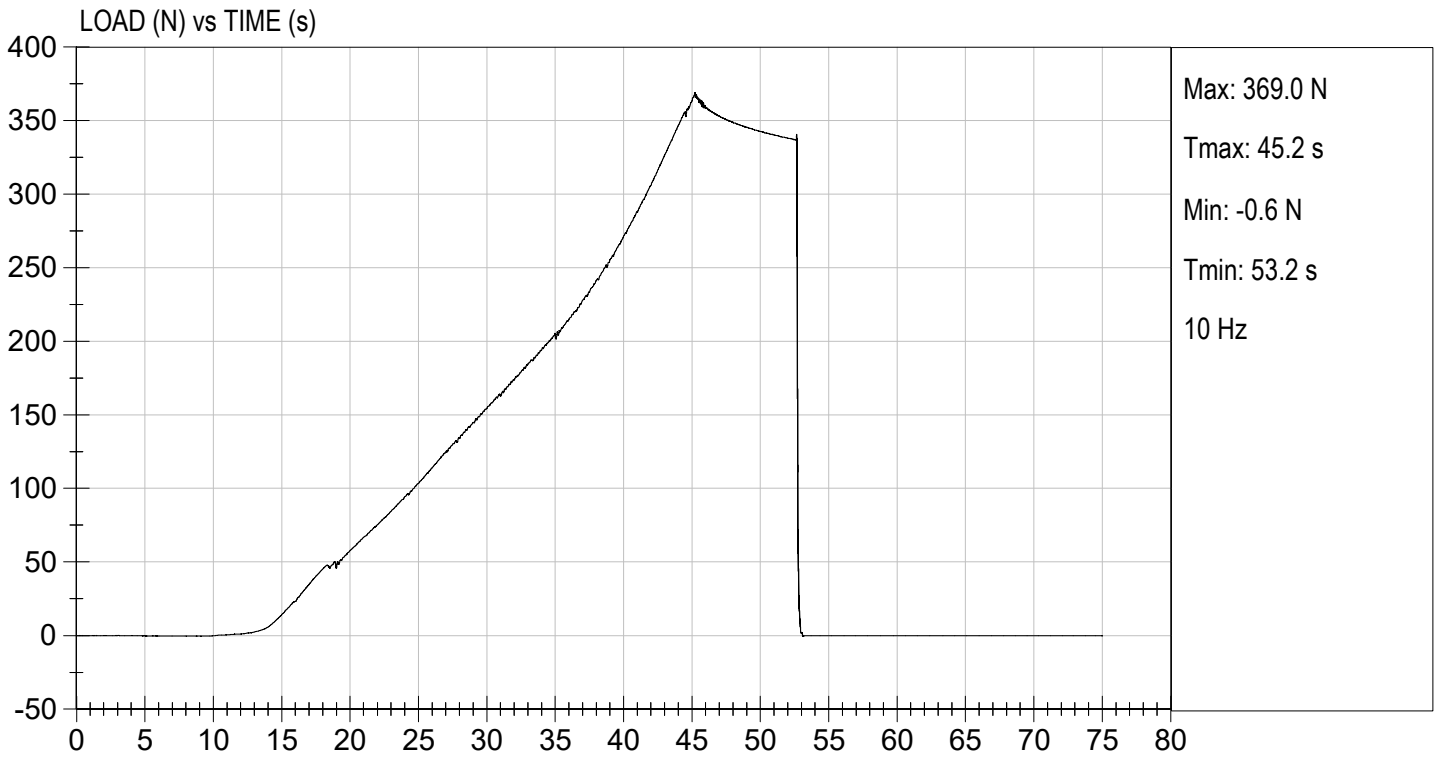
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	3	Pass
Force at 45 deg	N	320 to 390	368	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass


Laboratory Technician

03/05/2024

Test Date


Approved By



QUALIFICATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

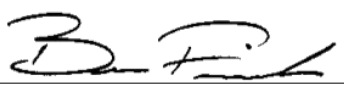
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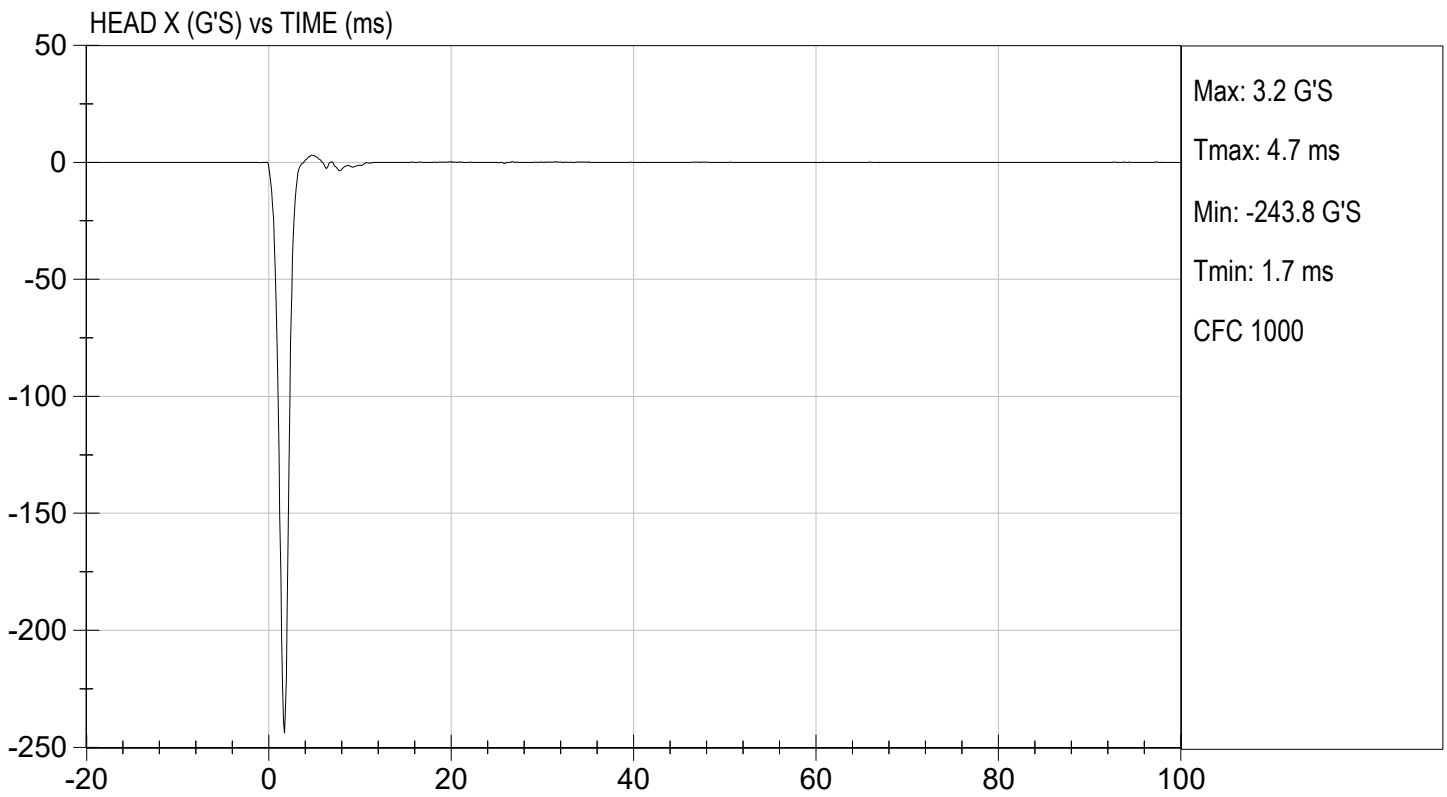
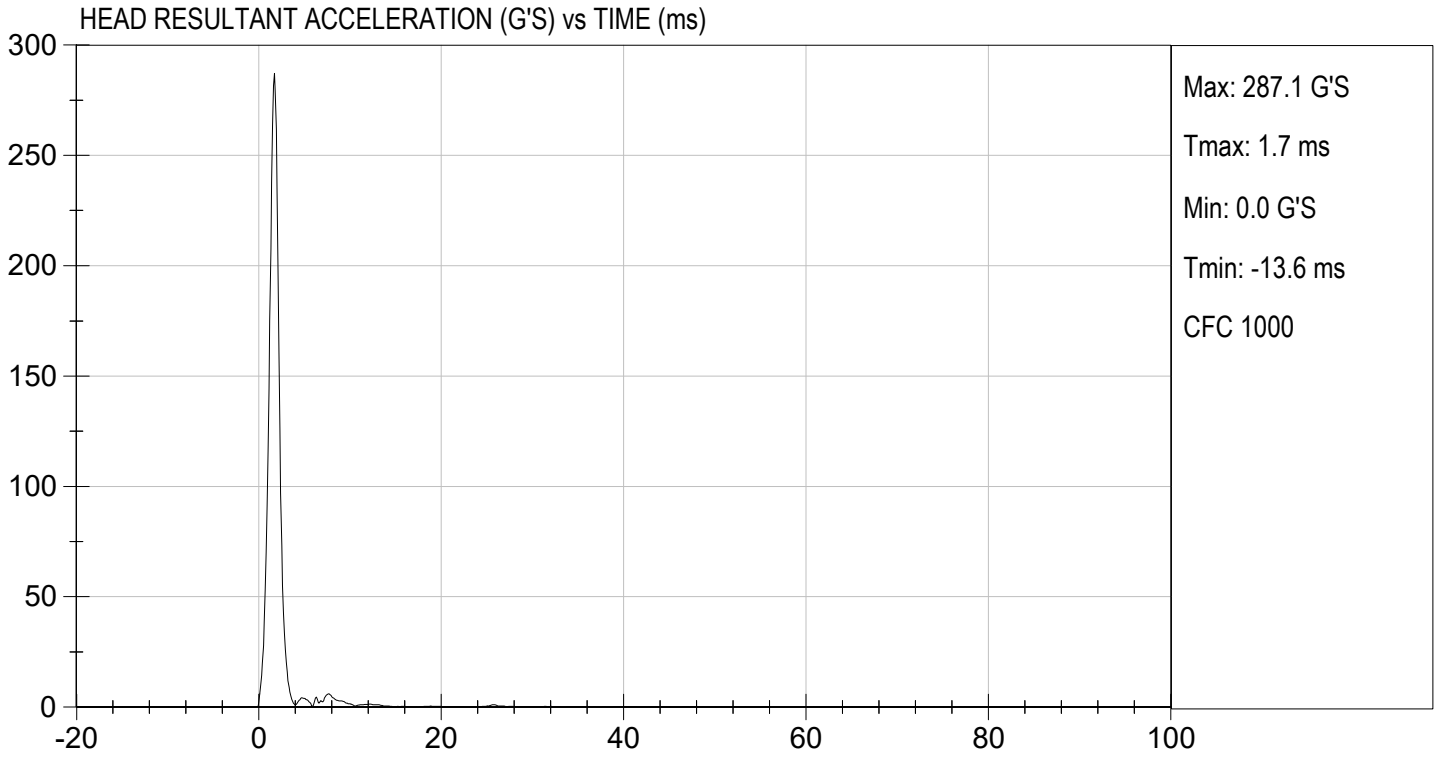
Test ID: D240771

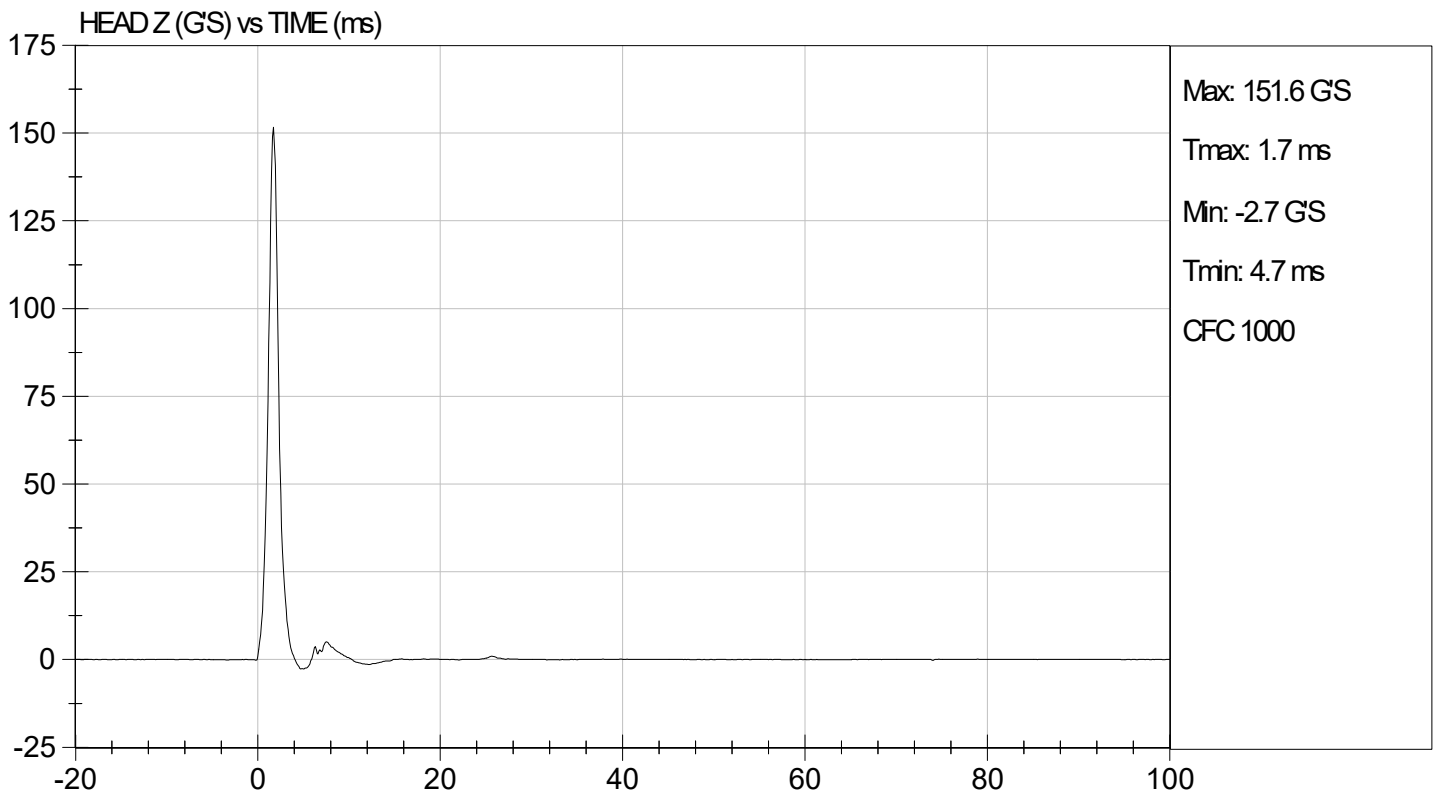
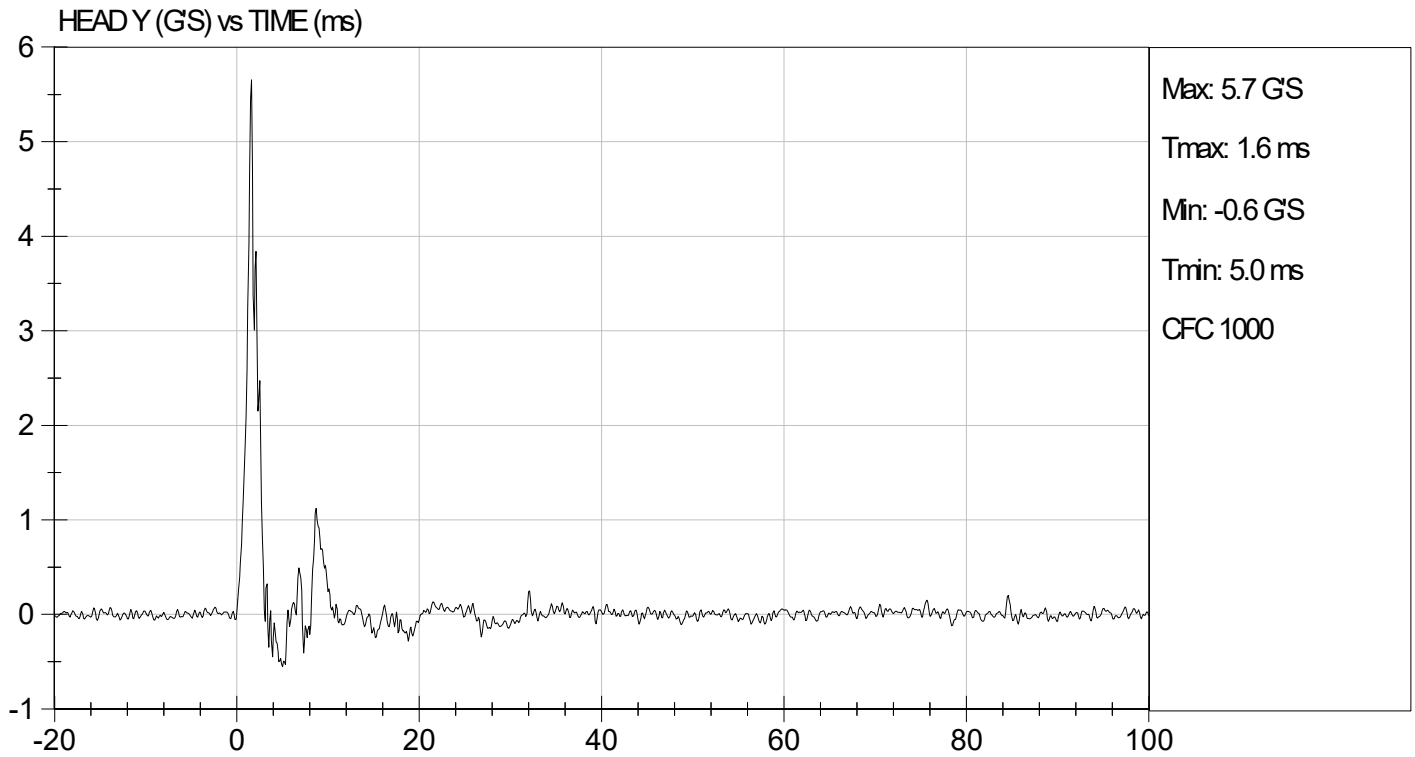
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	250 to 300	287	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	5.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

03/22/2024
 Test Date


 Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

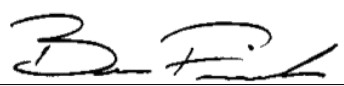
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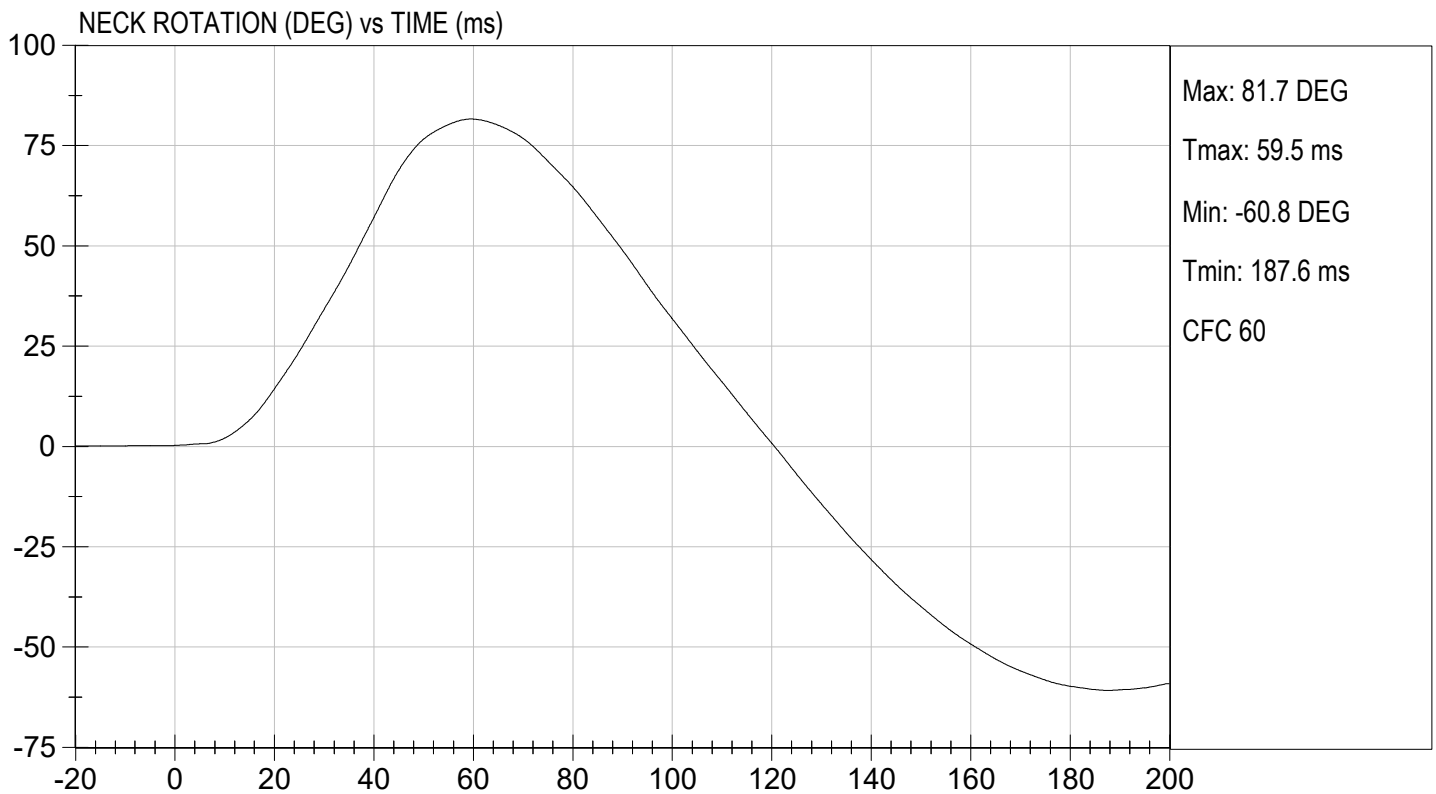
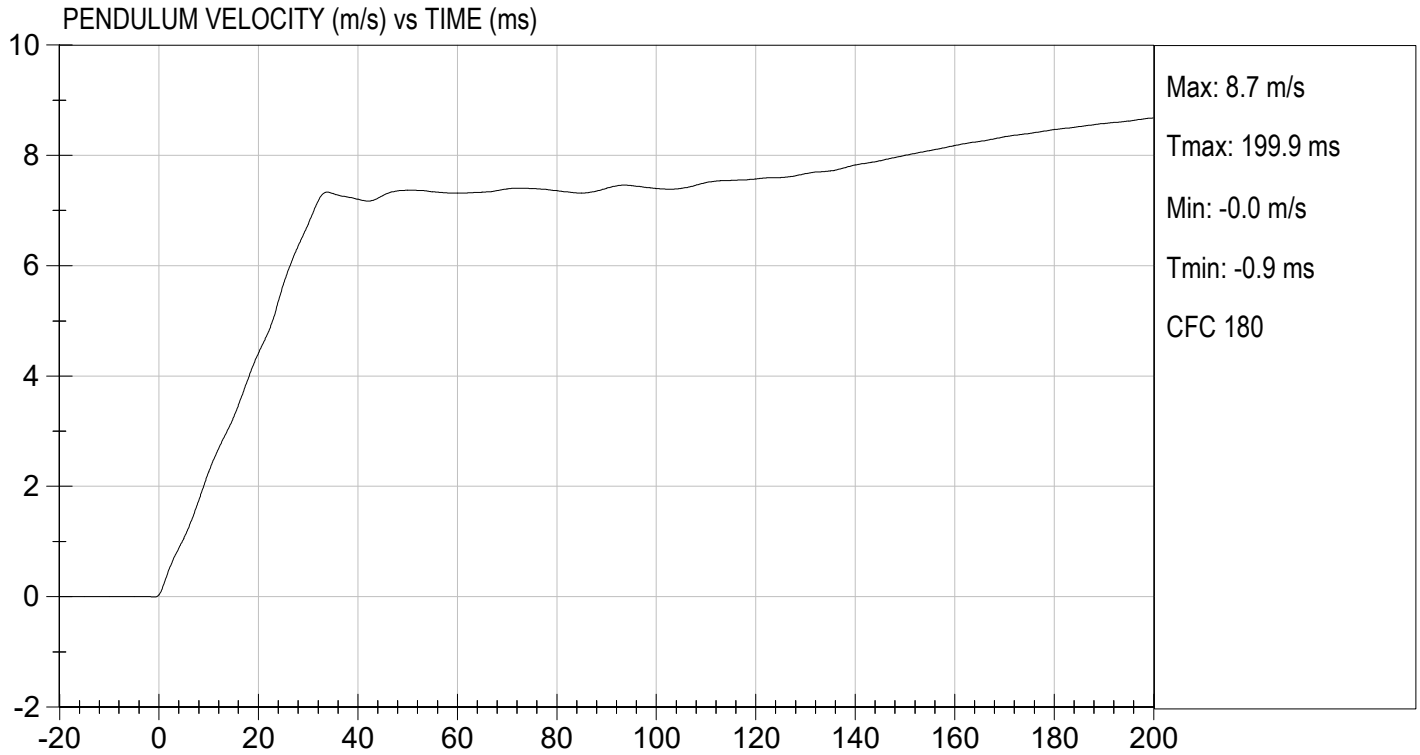
Test I.D: D240772

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Speed		m/s	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	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.8	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	74	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
Overall Results					Pass


 Laboratory Technician

03/22/2024
 Test Date

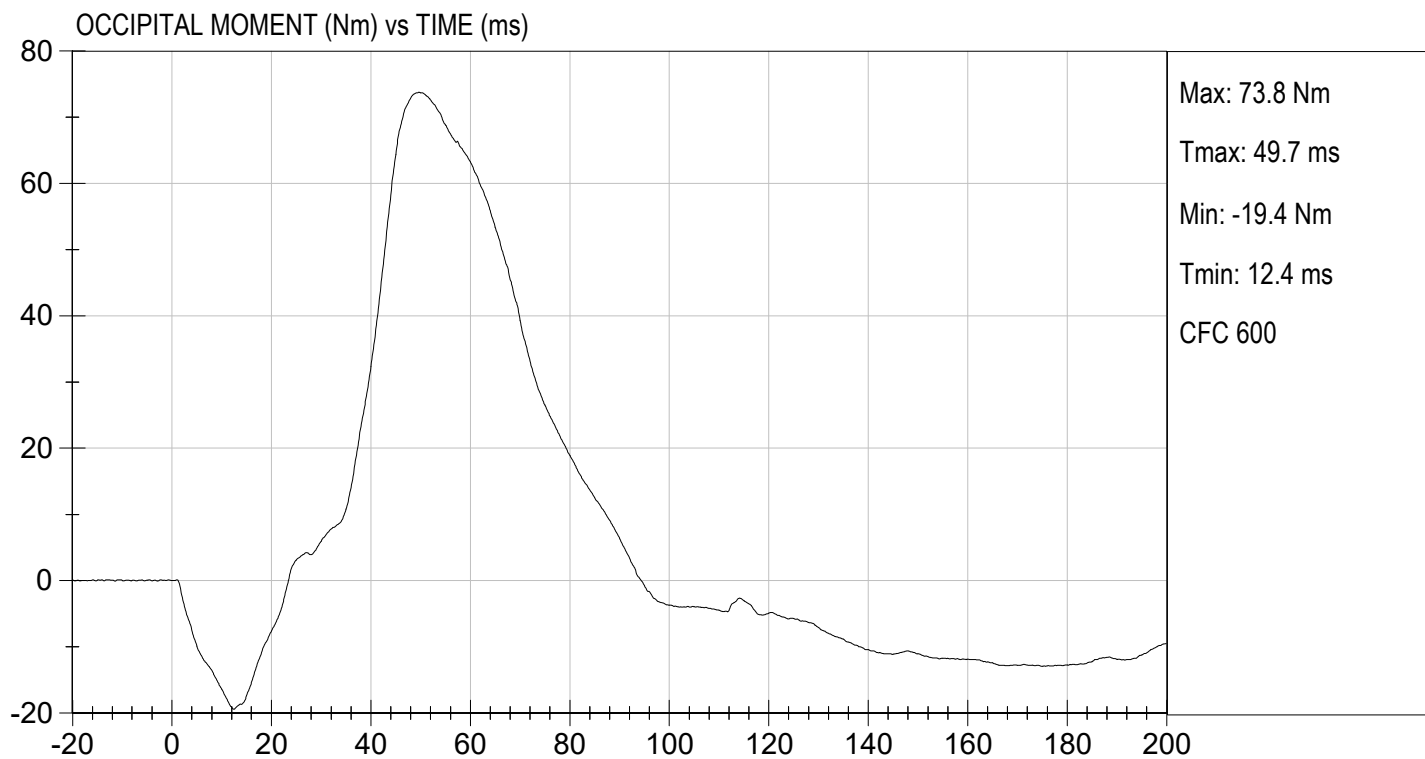

 Approved By





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

TEST DATE: 03/22/2024
TEST #: D240772



**MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

Test I.D: D240773

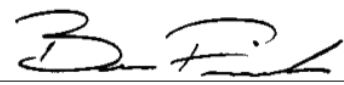
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	Pass
	20 ms	m/s	3.1 to 3.9	3.4	Pass
	30 ms	m/s	4.6 to 5.6	5	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	110	Pass
Overall Results					Pass



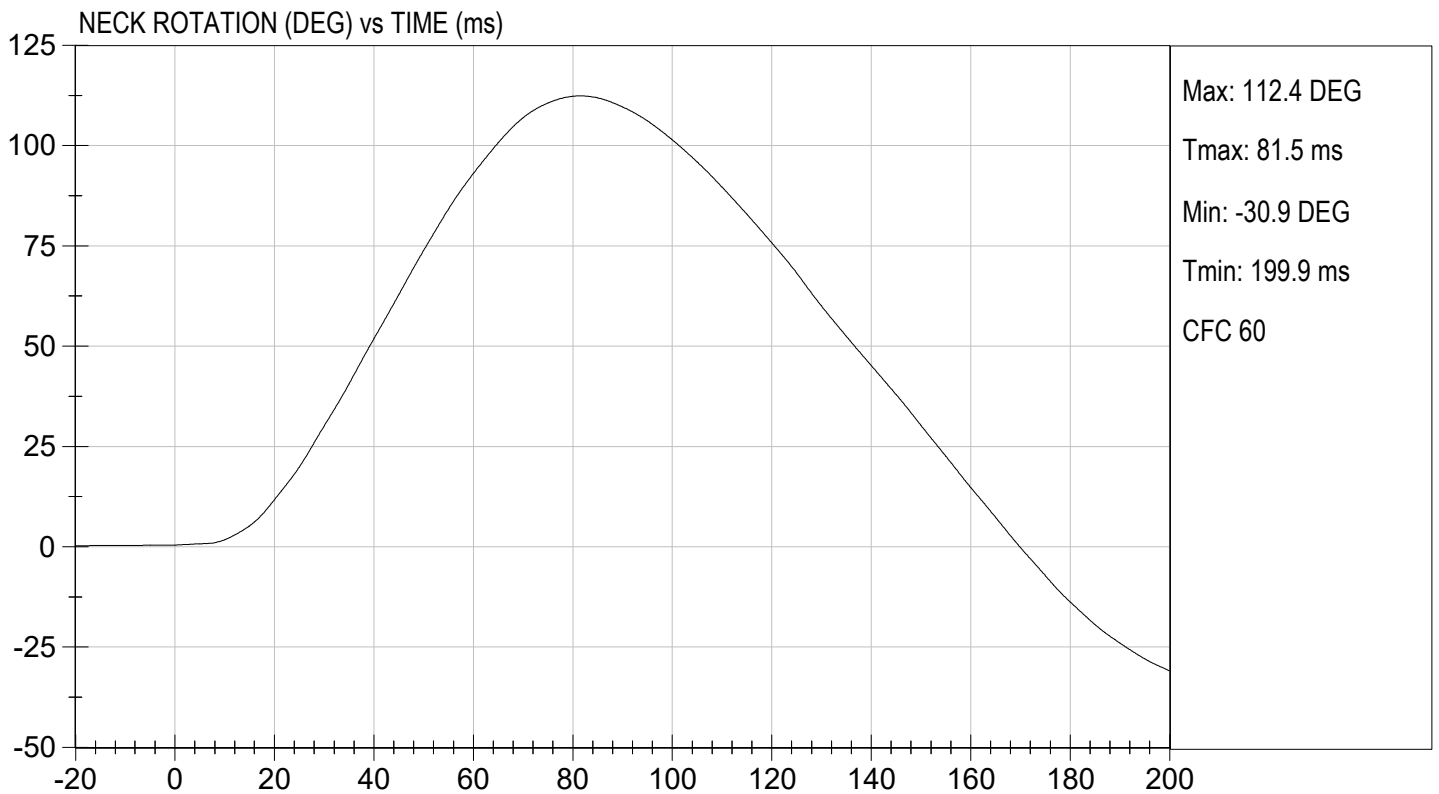
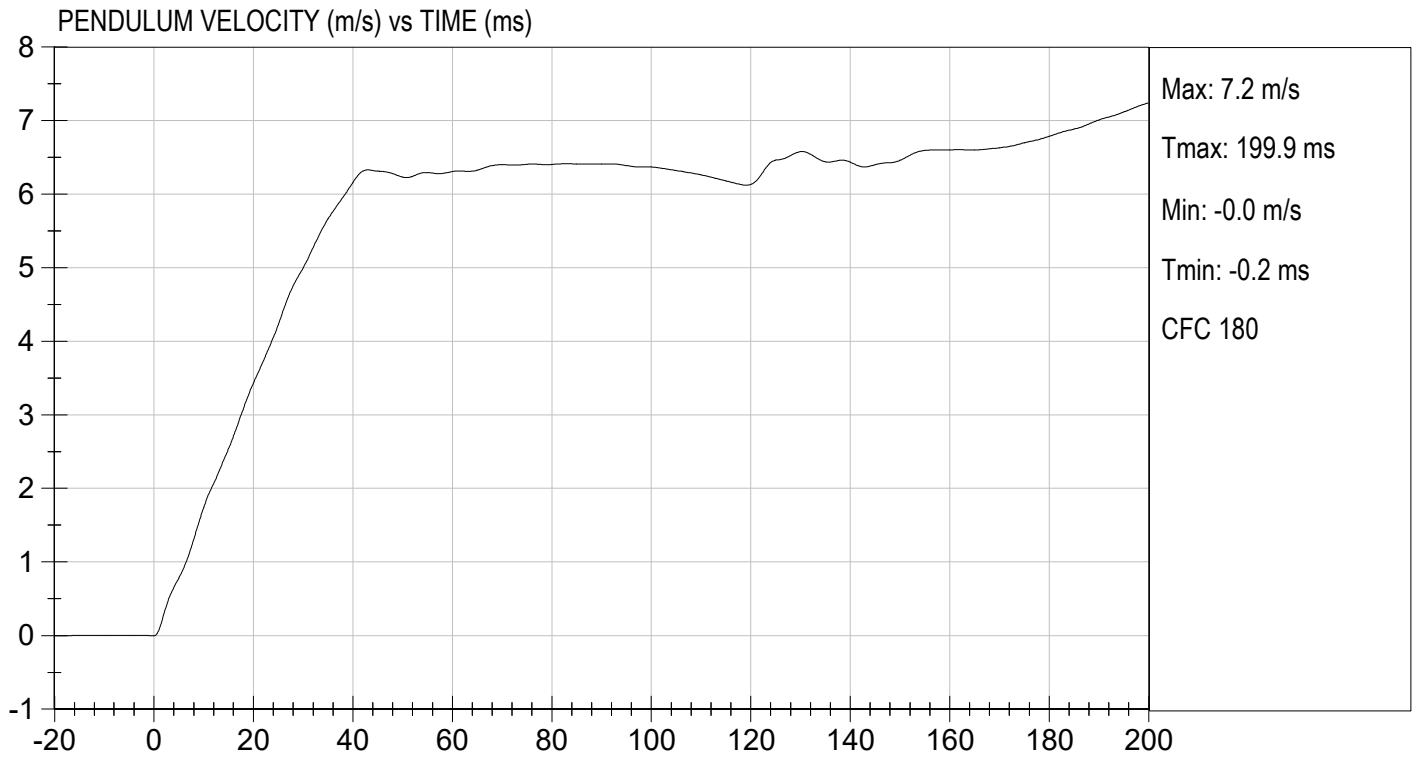
 Laboratory Technician

03/22/2024

 Test Date



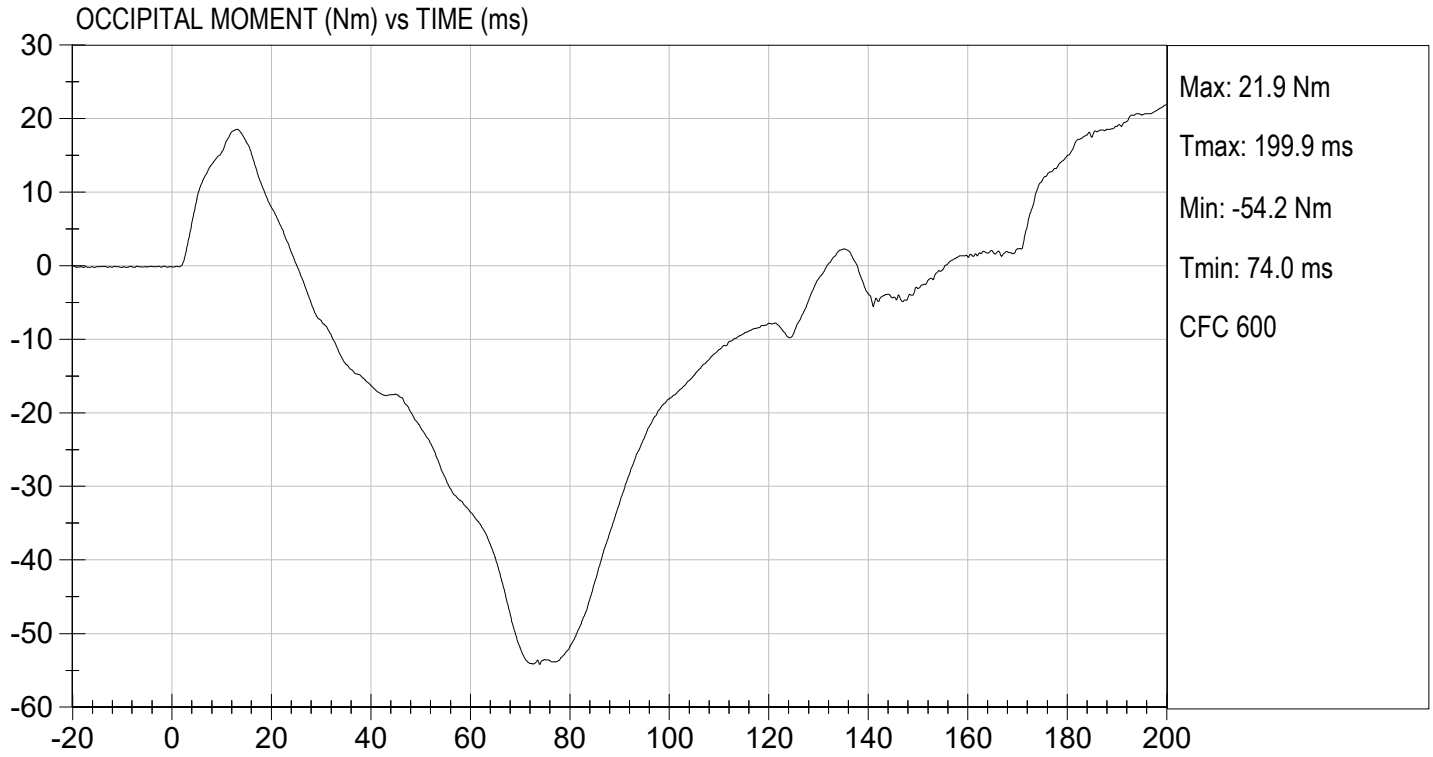
 Approved By





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 03/22/2024
TEST #: D240773



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D240774

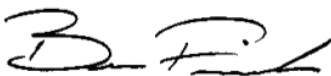
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	53	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4373	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4380	Pass
Overall Test Results				Pass



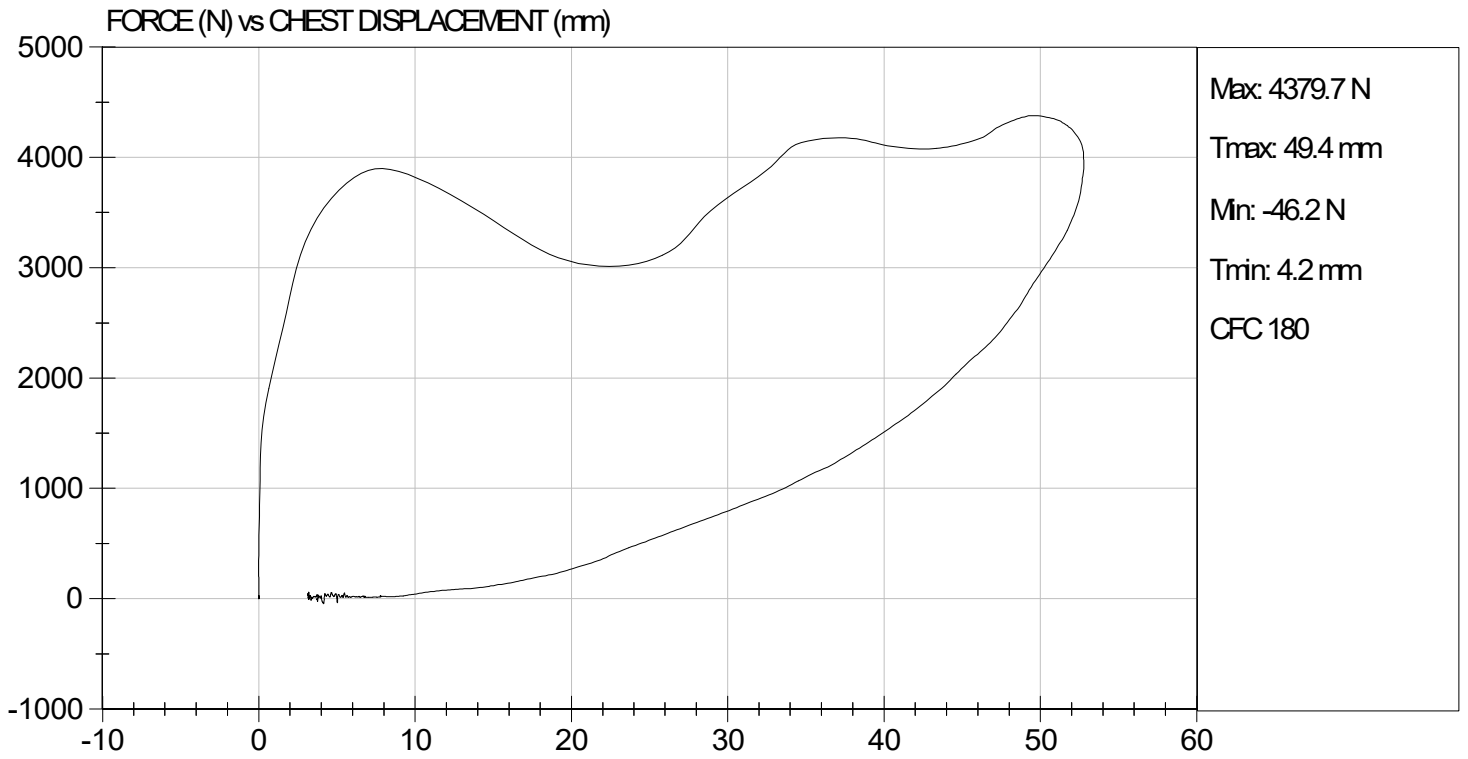
Laboratory Technician

03/21/2024

Test Date



Approved By



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

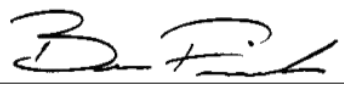
ATD Serial No: 142

Test I.D: D240775

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	N	3450 to 4060	3728	Pass
Overall Test Results				Pass


Laboratory Technician

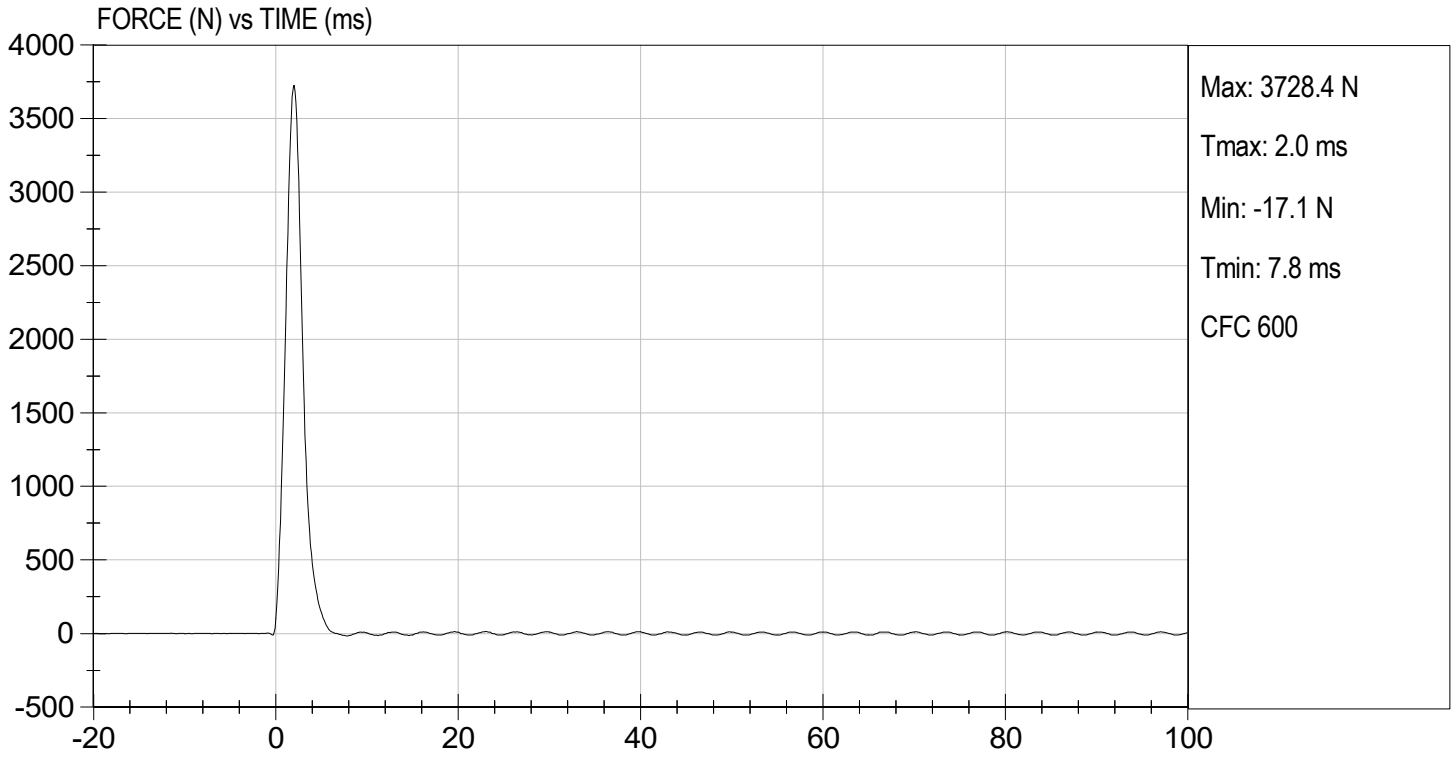
03/21/2024
Test Date


Approved By



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

TEST DATE: 03/21/2024
TEST #: D240775



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D240776

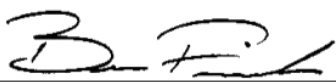
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3909	Pass
Overall Test Results				Pass



Laboratory Technician

03/21/2024

Test Date

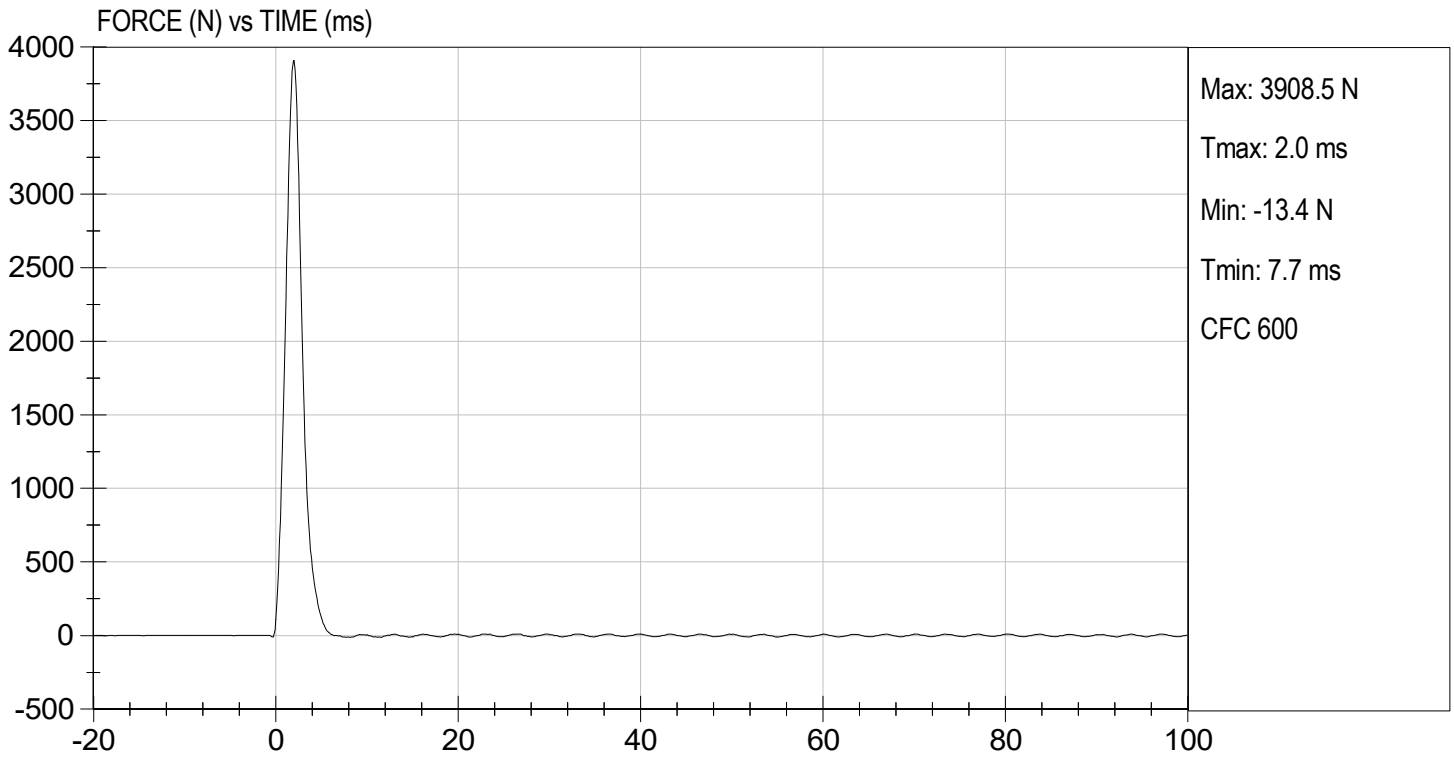


Approved By



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

TEST DATE: 03/21/2024
TEST #: D240776



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

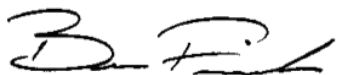
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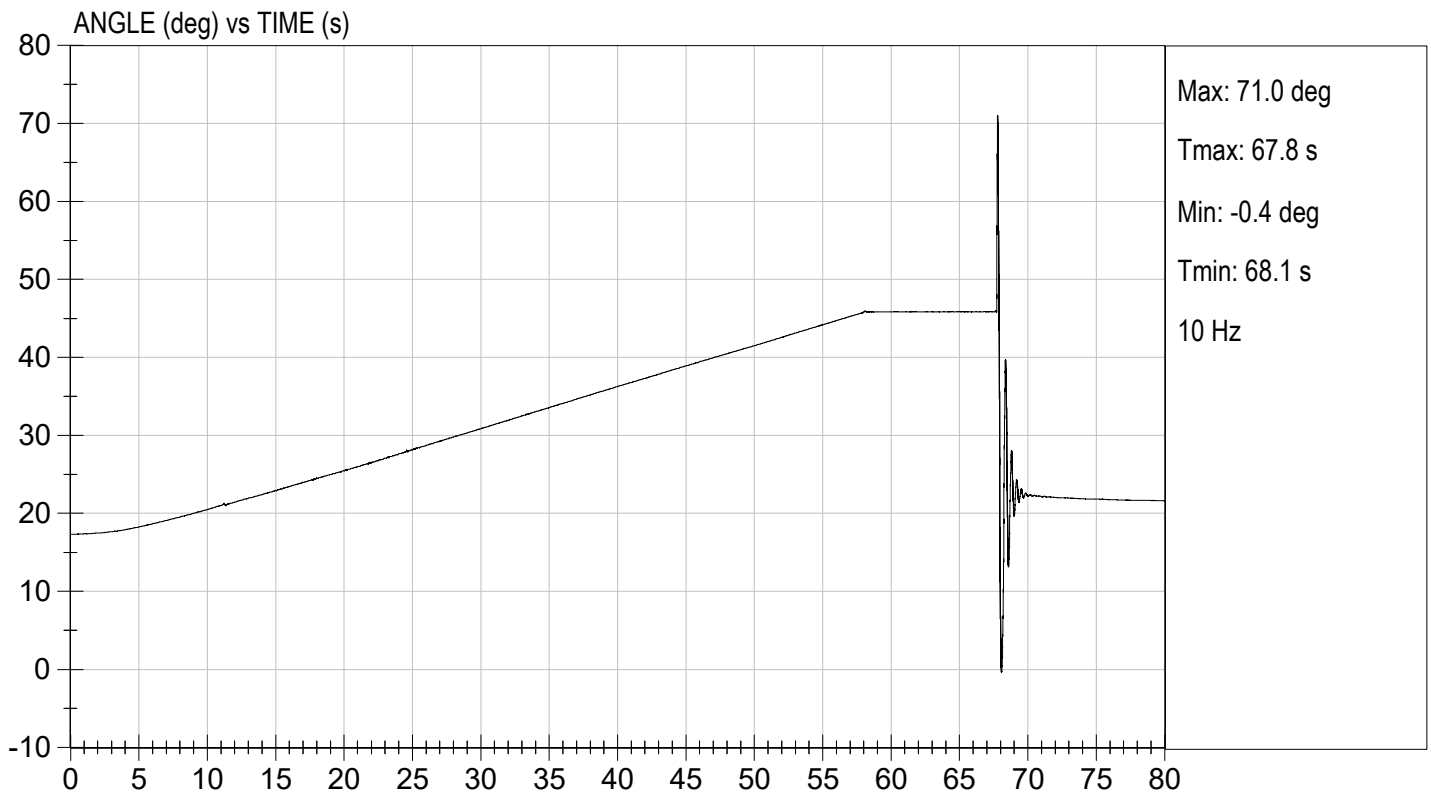
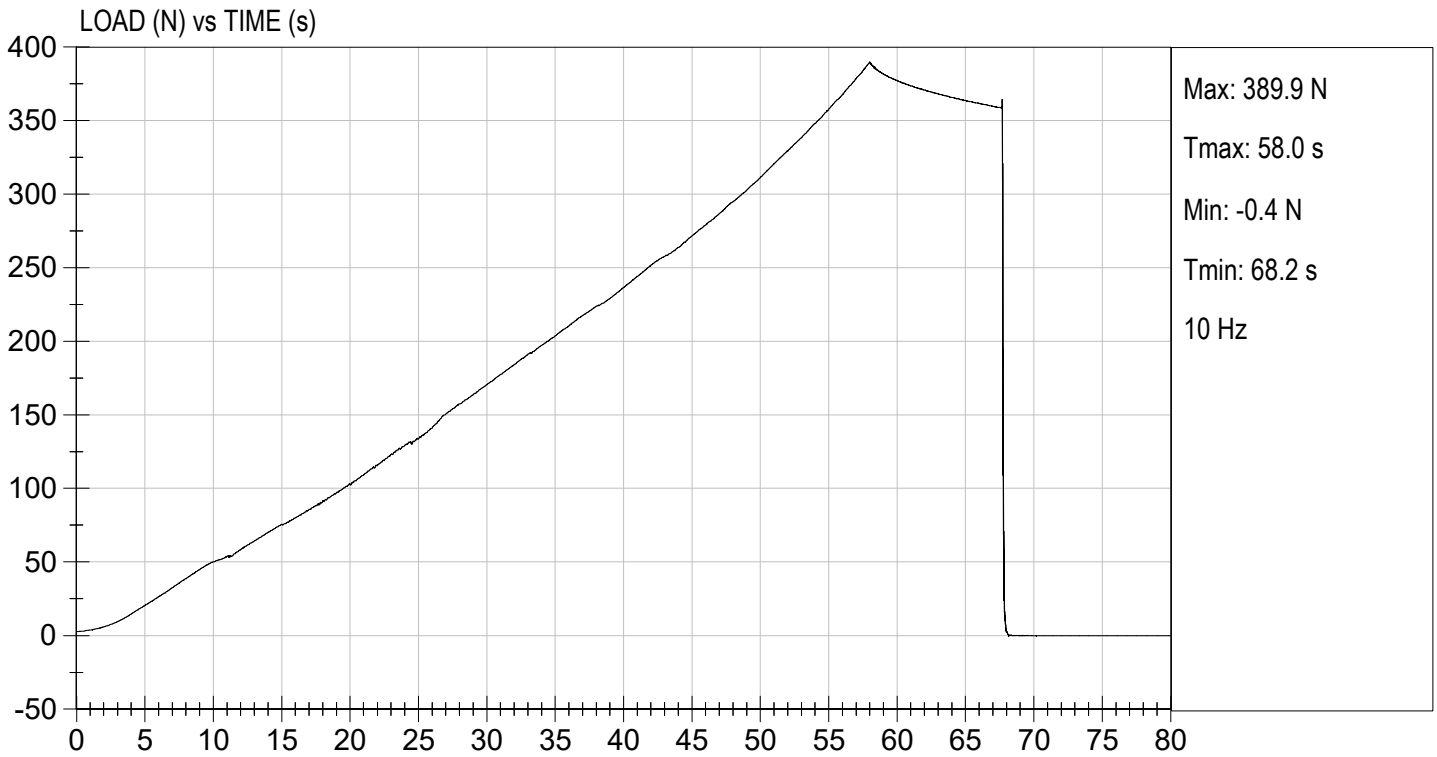
Test I.D: D240777

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	390	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
Overall Result				Pass


 Laboratory Technician

03/22/2024
 Test Date


 Approved By



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 50 th S/N 064		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	T30960	Endevco	11/27/2023	
		Y	P79743	Endevco	11/22/2023	
		Z	P79741	Endevco	11/22/2023	
	Redundant	X	P79744	Endevco	11/22/2023	
		Y	P94834	Endevco	11/22/2023	
		Z	P94856	Endevco	11/22/2023	
Head Angular Rate Sensors			X	ARS7502	DTS	04/07/2023
			Y	ARS7524	DTS	04/07/2023
			Z	ARS7547	DTS	04/07/2023
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG1911	Denton	06/23/2023
Chest Accelerometers	Primary	X	P86793	Endevco	11/27/2023	
		Y	P88348	Endevco	11/27/2023	
		Z	P86792	Endevco	11/27/2023	
	Redundant	X	P88667	Endevco	11/27/2023	
		Y	P94109	Endevco	11/27/2023	
		Z	P88666	Endevco	11/27/2023	
Chest Potentiometer			X	064	Humanetics	02/16/2024
Pelvis Accelerometers			X	P97742	Endevco	11/22/2023
			Y	P96038	Endevco	11/22/2023
			Z	P95526	Endevco	11/22/2023
Femur Load Cells	Right	Primary	Z	FG121P	Denton	11/22/2023
		Redundant	Z	FG121R	Denton	11/22/2023
	Left	Primary	Z	FG122P	Denton	11/22/2023
		Redundant	Z	FG122R	Denton	11/22/2023
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG408	Denton	11/28/2023
		Lower	Mx, My, Fz	AG116	Denton	11/28/2023
	Left	Upper	Mx, My, Fz	TG480	Denton	11/28/2023
		Lower	Mx, My, Fz	AG502	Denton	11/28/2023
Foot Accelerometers	Right	Rear	X	T22486	Endevco	11/22/2023
			Z	P97382	Endevco	11/22/2023
		Front	Z	P82120	Endevco	11/22/2023
	Left	Rear	X	T16468	Endevco	11/22/2023
			Z	T32154	Endevco	11/22/2023
		Front	Z	T32190	Endevco	11/22/2023
Seat Belt Load Cells			Lap			
			Shoulder			

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 5 th S/N 142		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X		P94799	Endevco	10/27/2023
		Y		P94800	Endevco	10/27/2023
		Z		P94801	Endevco	10/27/2023
	Redundant	X		P94802	Endevco	10/27/2023
		Y		P94803	Endevco	10/27/2023
		Z		P97377	Endevco	10/27/2023
Head Angular Rate Sensors			X	ARS7413	DTS	04/07/2023
			Y	ARS7421	DTS	04/07/2023
			Z	ARS7423	DTS	04/07/2023
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG2203	Denton	01/22/2024
Chest Accelerometers	Primary	X		P88719	Endevco	10/27/2023
		Y		P94785	Endevco	10/27/2023
		Z		P94793	Endevco	10/27/2023
	Redundant	X		P95322	Endevco	10/27/2023
		Y		P95370	Endevco	10/27/2023
		Z		T30901	Endevco	10/27/2023
Chest Potentiometer			X	142	Humanetics	10/27/2023
Pelvis Accelerometers			X	P94798	Endevco	10/30/2023
			Y	P82646	Endevco	10/27/2023
			Z	P97705	Endevco	10/27/2023
Femur Load Cells	Right	Primary	Z	FG126P	Denton	10/27/2023
		Redundant	Z	FG126R	Denton	10/27/2023
	Left	Primary	Z	FG127P	Denton	10/27/2023
		Redundant	Z	FG127R	Denton	10/27/2023
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG467	Denton	01/22/2024
		Lower	Mx, My, Fz	AG500	Denton	01/22/2024
	Left	Upper	Mx, My, Fz	TG478	Denton	01/22/2024
		Lower	Mx, My, Fz	AG491	Denton	01/22/2024
Foot Accelerometers	Right	Rear	X	P94795	Endevco	10/27/2023
			Z	P94796	Endevco	10/27/2023
		Front	Z	P94797	Endevco	10/30/2023
	Left	Rear	X	P83167	Endevco	10/30/2023
			Z	P83168	Endevco	10/27/2023
		Front	Z	P83169	Endevco	10/30/2023
Seat Belt Load Cells		Lap				
		Shoulder				

TABLE 3 – VEHICLE INSTRUMENTATION

Instrument Location			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember / Rear Seat Accelerometers	Left	Primary	X	A340265	MSI	11/22/2023
			Z	P68311	Endevco	11/22/2023
		Redundant	X	T39126	Endevco	10/28/2023
	Right	Primary	X	A383118	MSI	12/15/2023
			Z	T38330	Endevco	10/25/2023
		Redundant	X	T29887	Endevco	11/16/2023
Engine Accelerometers		Top	X	A305729	MSI	01/18/2024
		Bottom	X	T33419	Endevco	02/14/2024