

REPORT NUMBER: NCAP-MGA-23-018

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

**TOYOTA MOTOR CORPORATION
2023 Subaru Solterra 5-Door SUV
NHTSA No.: O20235500**

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



Test Date: May 4, 2023

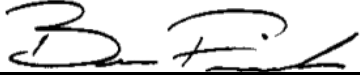
Final Report Date: January 31, 2024

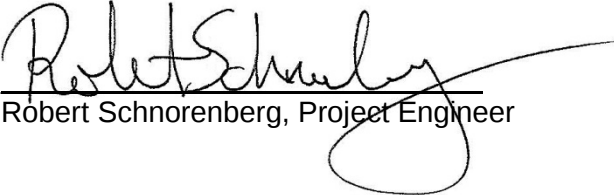
FINAL REPORT

**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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Approval Date: January 31, 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 Subaru Solterra 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 May 4, 2023. The impact velocity of the vehicle was 56.42 km/h and the ambient temperature at the barrier face at the time of impact was 21.2°C. The target vehicle post-test maximum crush was 522 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; margin-top: 10px;"> <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>151.567</td> <td>700</td> <td>227.281</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>24.203</td> <td>52</td> <td>12.901</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.353</td> <td>1</td> <td>0.370</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1069.223</td> <td>2620</td> <td>580.288</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>46.277</td> <td>2520</td> <td>110.785</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>2084.940</td> <td>6805</td> <td>991.164</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>2744.462</td> <td>6805</td> <td>868.613</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	151.567	700	227.281	Maximum Chest Compression	mm	63	24.203	52	12.901	Nij		1	0.353	1	0.370	Neck Tension	N	4170	1069.223	2620	580.288	Neck Compression	N	4000	46.277	2520	110.785	Left Femur Force	N	10008	2084.940	6805	991.164	Right Femur Force	N	10008	2744.462	6805	868.613
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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 Subaru Solterra 5-Door SUV at a velocity of 56.42 km/h. The test was performed at MGA Research Corporation on May 4, 2023. 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. 351) and the right-front passenger (position 2) ATD (Serial No. 142) were qualified previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 630 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 Stoddard Solvent or 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 522 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 airbag.

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

The occupant data is summarized below:

ATD position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	151.567	0.353	1069.223	46.277	37.434	24.203	2084.940	2744.462
Passenger (5 th)	227.281	0.370	580.288	110.785	40.222	12.901	991.164	868.613

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

TEST NOTES

Driver Shoulder Belt load cell was not installed.

Driver Lap Belt load cell was not installed.

Passenger Shoulder Belt load cell was not installed.

Passenger Lap Belt load cell was not installed.

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 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20235500	Traction Control System (TCS)	Yes
Model Year	2023	Power Steering	Yes
Make	Subaru	Power Window Auto-Reverse	Yes
Model	Solterra	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	JTMABABA4PA007001	Driver Head/Torso Airbag	No
Body Color	Cosmic White Pearl	Driver Torso Airbag	No
Odometer (km/mi)	45 km / 28 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	Yes	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	TOYOTA MOTOR CORPORATION	GVWR (kg)	2550
Date of Manufacture	05/22	GAWR Front (kg)	1355
		GAWR Rear (kg)	1400

VEHICLE SEATING AND WEIGHT CAPACITY DATA

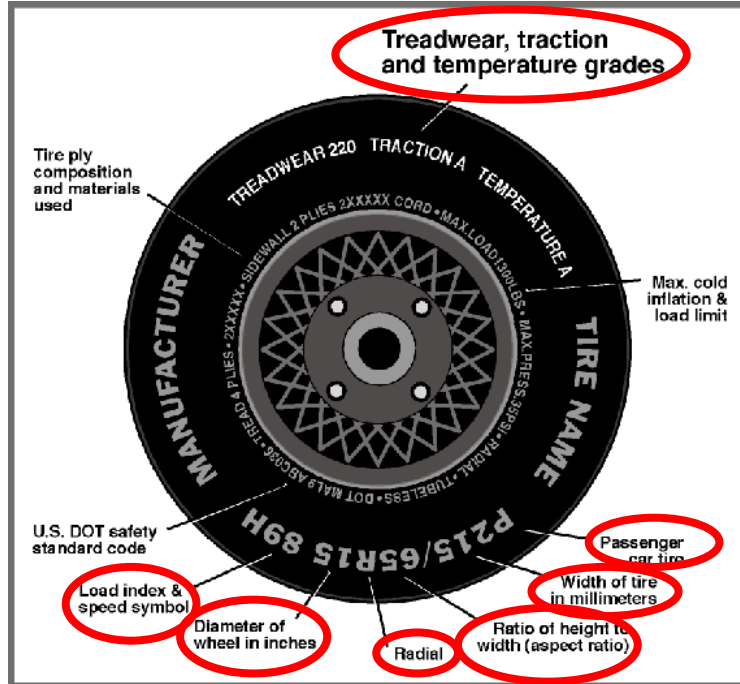
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contoured		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				475
Cargo Weight (RCLW) (kg)				135

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	260	260
Recommended Tire Size	235/50R20	235/50R20
Tire Size on Vehicle	235/50R20	235/50R20
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Turanza	Turanza
Treadwear	400	400
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index/Speed Symbol	100V	100V
Tire Material	Rubber	Rubber
DOT Safety Code Left	EJYB CBL 1422	EJYB CBL 1422
DOT Safety Code Right	EJYB CBL 1522	EJYB CBL 1522

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	522.5	476.5		551.5	585.5	
Right	kg	553.0	443.5		576.5	551.0	
Ratio	%	53.9%	46.1%		49.8%	50.2%	
Totals	kg	1075.5	920.0	1995.5	1128.0	1136.5	2264.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1995.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	135
Calculated Test Vehicle Target Weight (TVTW)	kg	2271.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	819	830	832	825	1316
As Tested	mm	812	818	800	806	1433
Post Test	mm	853	872	792	812	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2855
Total Vehicle Length at Left Side	mm	4531
Total Vehicle Length at Centerline	mm	4691
Total Vehicle Length at Right Side	mm	4531
Weight of Ballast in Cargo Area	kg	68
Weight of Vehicle Components Removed	kg	13
Amount of Stoddard Solvent in Fuel Tank	L	

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

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4691
2	Total Width	1893
3	Bumper Top Height	594
4	Bumper Bottom Height	480
5	Longitudinal Member Top Height	526
6	Distance between Longitudinal Members	724
7	Longitudinal Member Width	86
8	Engine Top Height	965
9	Engine Bottom Height	257
10	Engine and Gearbox Width	483
11	Front Bumper-Engine Distance	436
12	Front Shock Absorber Fixing Height	1022
13	Bonnet Leading Edge Height	927
14	Front Shock Absorber Fixing Width	247
15	Front Bumper – Front Axle Distance	622
16	Front Axle – A-Pillar Distance	539
17	A-Pillar – B-Pillar Distance	1091
18	B-Pillar – Rear Axle Distance	1228
19	B-Pillar – C-Pillar Distance	1129
20	Roof Sill Bottom Height	1515
21	Roof Sill Top Height	1560
22	Floor Sill Bottom Height	235
23	Floor Sill Top Height	417

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

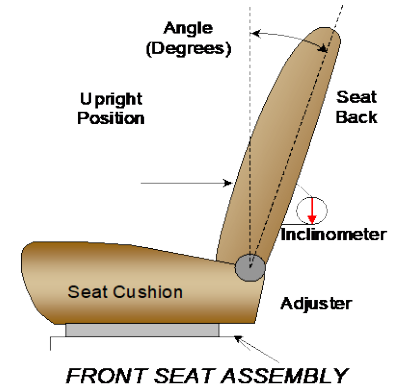
Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

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	3.1° on outboard headrest post
Passenger Seat Back Angle	0.9° on outboard headrest post



SEAT FORE/AFT POSITIONS

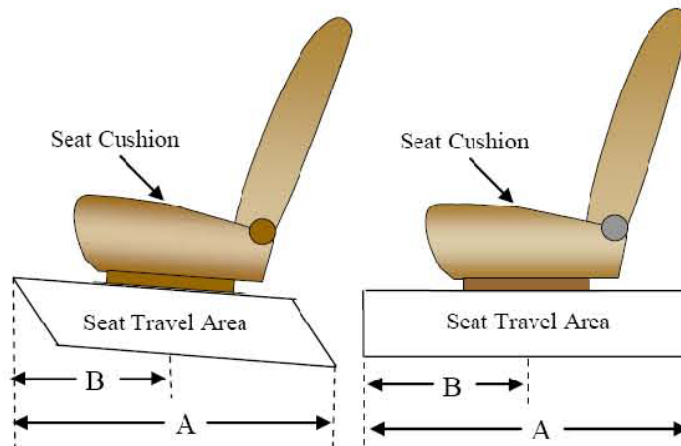
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	302 mm	151 mm
Passenger Seat	260 mm / 27 detents (1 st as 1)	0 mm / 0 th detent (1 st 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 (1 st as 1)	0 (1 st as 0)
Passenger Seat	4 (1 st as 1)	0 (1 st as 0)



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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

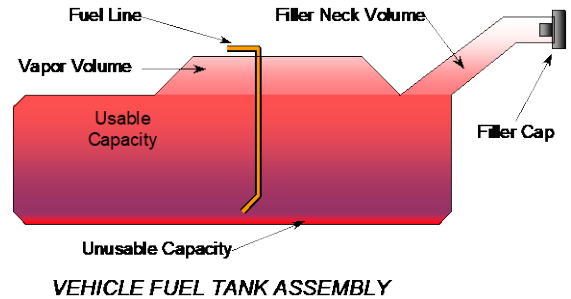
NHTSA No.: O20235500
 Test Date: 5/4/2023

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	

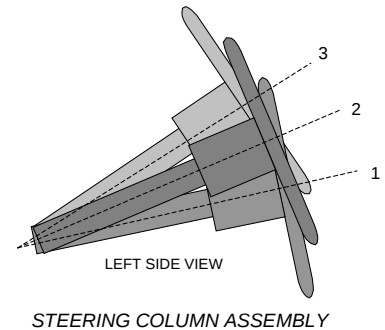
FUEL PUMP

Electric vehicle.



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.



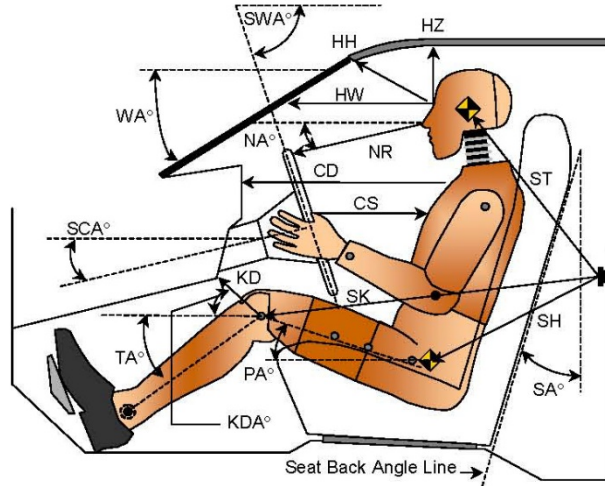
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	71.5	
Geometric Center Position 2	69.4	
Uppermost Position 3	67.3	
Telescoping Steering Wheel Travel		56
Test Position	69.4	28

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023



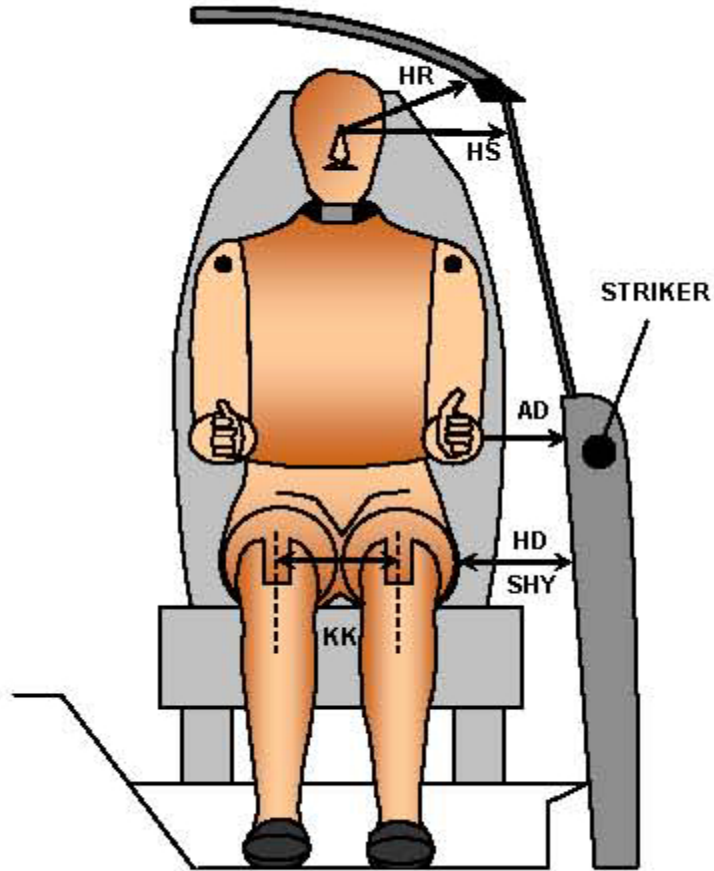
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		22.8		
SWA°	Steering Wheel Angle		69.4		
SCA°	Steering Column Angle		20.6		
SA°	Seat Back Angle		3.1		0.9
HZ	Head to Roof (Z)	184	90	180	90
HH	Head to Header	327	28.3	260	42.3
HW	Head to Windshield	649	0	607	0
NR	Nose to Rim	374	15.1		
CD	Chest to Dash	767		390	
CS	Chest to Steering Hub	299	1.5		
RA	Rim to Abdomen	205	0		
KDL	Left Knee to Dash	165	33.2	150	37.6
KDR	Right Knee to Dash	164	33.2	155	38.0
PA°	Pelvic Angle		23.8		19.4
TA°	Tibia Angle		41.8		50.3
SK	Striker to Knee	558	94.4	670	95.3
ST	Striker to Head	505	12.3	484	32.8
SH	Striker to H-Point	279	128.3	369	112.1

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023



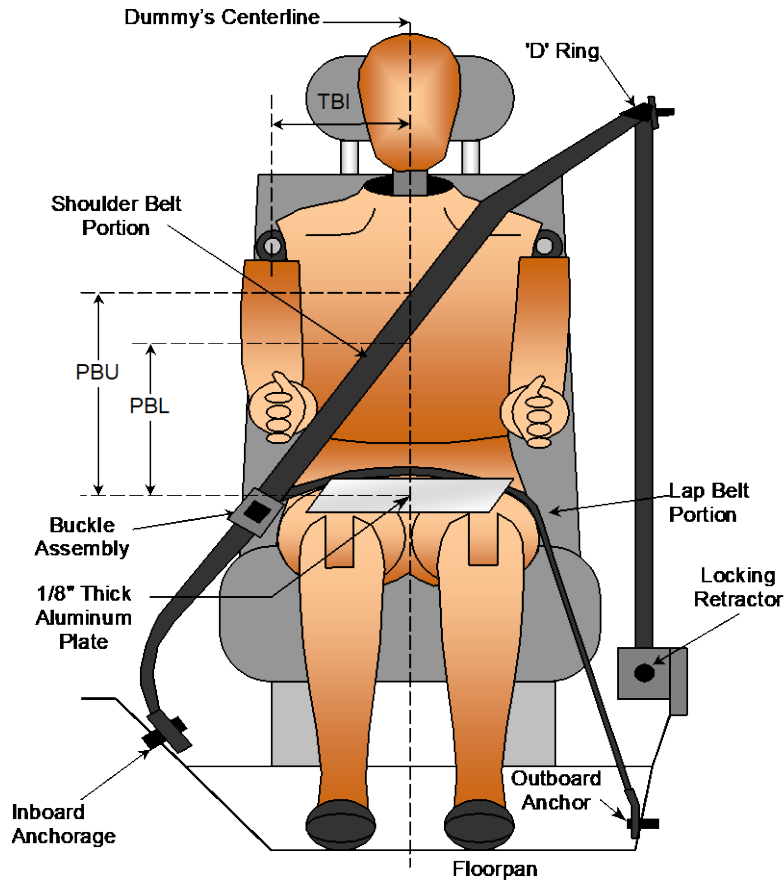
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	123	71
HD	H-Point to Door	153	179
HR	Head to Side Header	232	245
HS	Head to Side Window	348	375
KK	Knee to Knee	334	230
SHY	Striker to H-Point (Y Direction)	249	331
AA	Ankle to Ankle	324	160

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	350	320
PBL - Top surface of reference to belt lower edge	mm	280	230

BELT LENGTH DATA

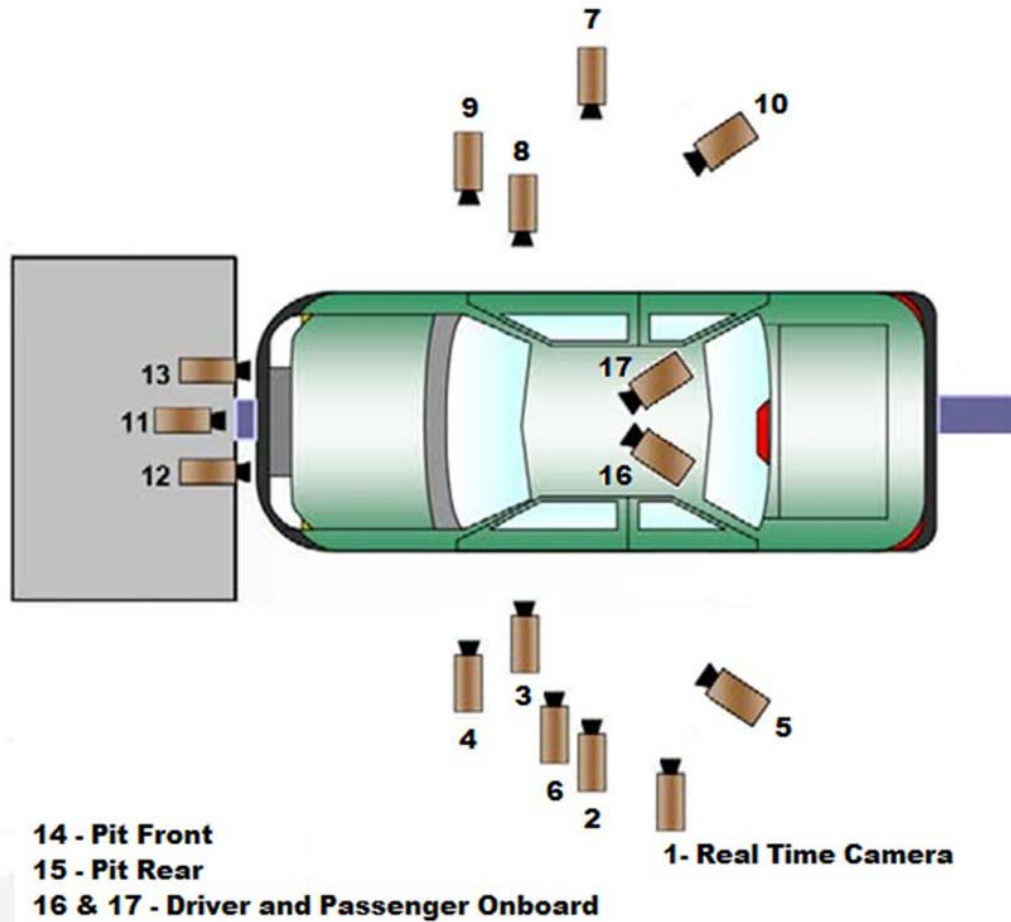
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	855	910
Lap Belt Length as measured on ATD	mm	610	675
Remainder of belt on reel	mm	545	425
Total Belt Length for Continuous Webbing Systems	mm	2560	2560

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

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 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

CAMERA LOCATIONS

No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2390	-6125	-1340	12	1000
3	Driver Close-Up	-1865	-7405	-1920	50	1000
4	Left Front Half	-1635	-5790	-1400	24	1000
5	Left Angle	-7235	-5835	-2005	75	1000
6	Steering Column	-1000	-5920	-1245	50	1000
7	Right Overall	-2170	6075	-1515	12	1000
8	Passenger Close-Up	-1695	6935	-1870	50	1000
9	Right Front Half	-1170	5110	-1450	24	1000
10	Right Angle	-7225	5615	-2030	75	1000
11	Windshield	165	0	-2310	12	1000
12	Driver Windshield	165	-370	-2230	25	1000
13	Passenger Windshield	45	370	-2230	25	1000
14	Pit Front	-1090	0	3340	24	1000
15	Pit Rear	-3240	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

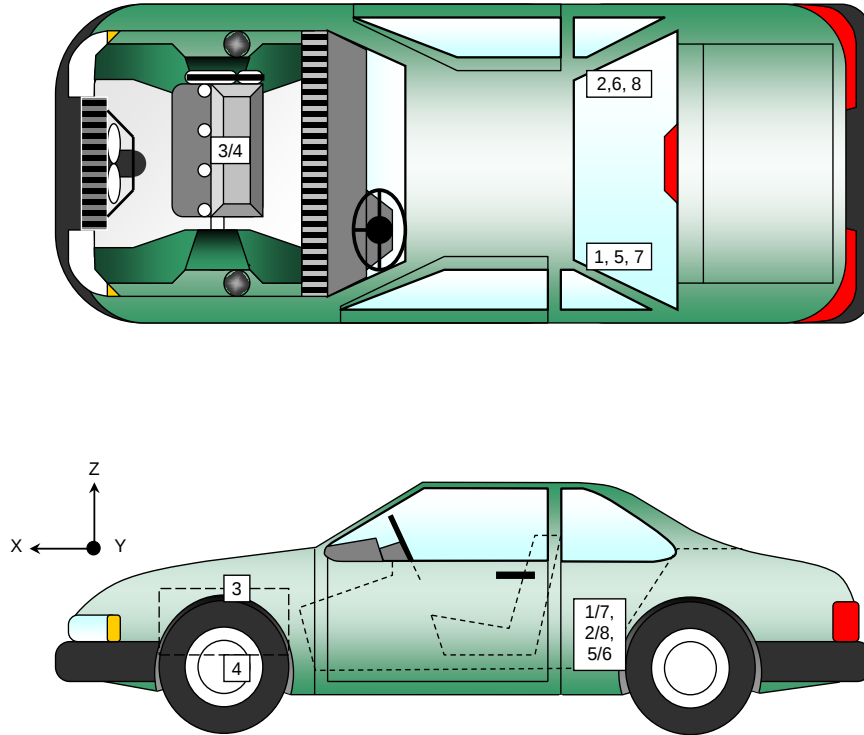
+Y = right of monorail centerline

+Z = below ground level

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1738	-390	-395
2	Right Rear Crossmember Accelerometer – X Direction	1738	390	-395
3	Engine Top X	3805	0	-965
4	Engine Bottom X	3864	-15	-257
5	Left Rear Crossmember Accelerometer – Z Direction	1738	-390	-395
6	Right Rear Crossmember Accelerometer – Z Direction	1738	390	-395
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1738	-340	-395
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1738	340	-395

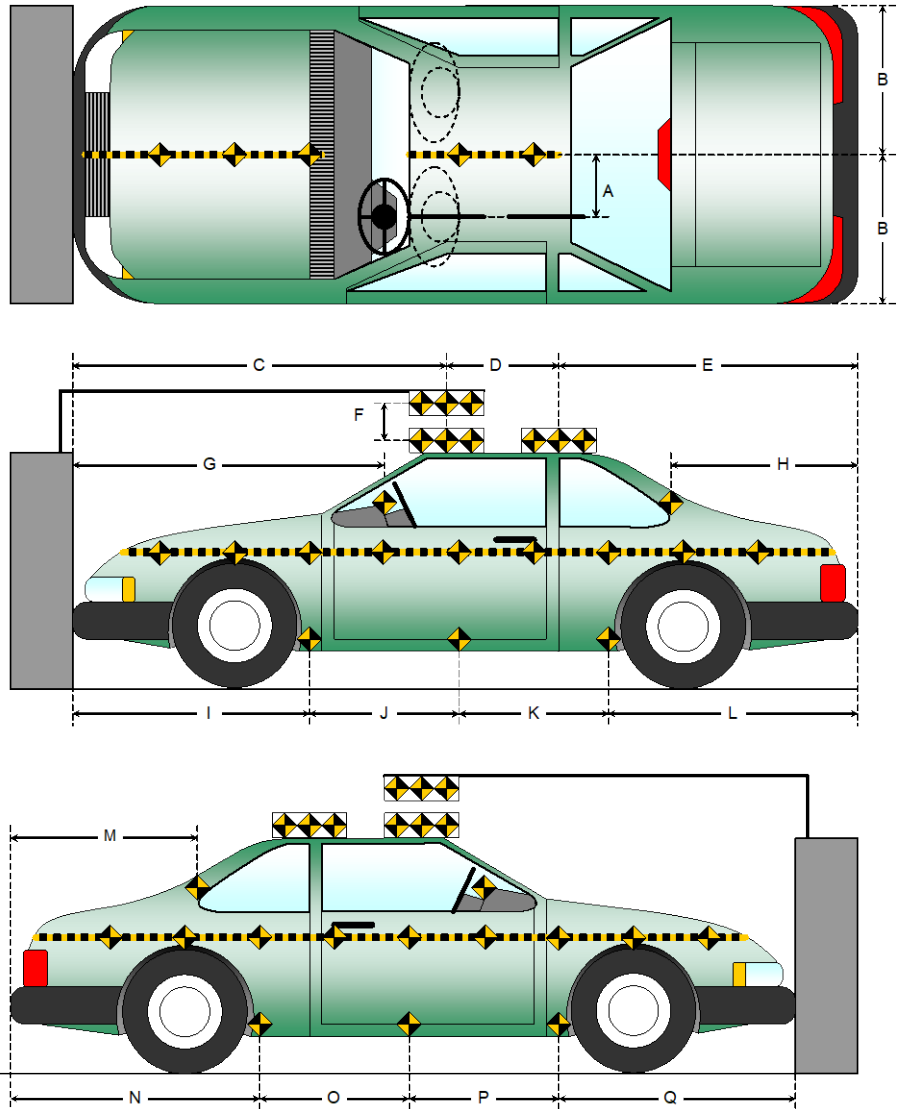
Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

Item	Value (mm)
A	375
B	947
C	2340
D	610
E	1741
F	140
G	
H	923
I	1461
J	896
K	896
L	1438
M	923
N	1438
O	896
P	896
Q	1461



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

ADVANCED RESEARCH LOAD CELL BARRIER

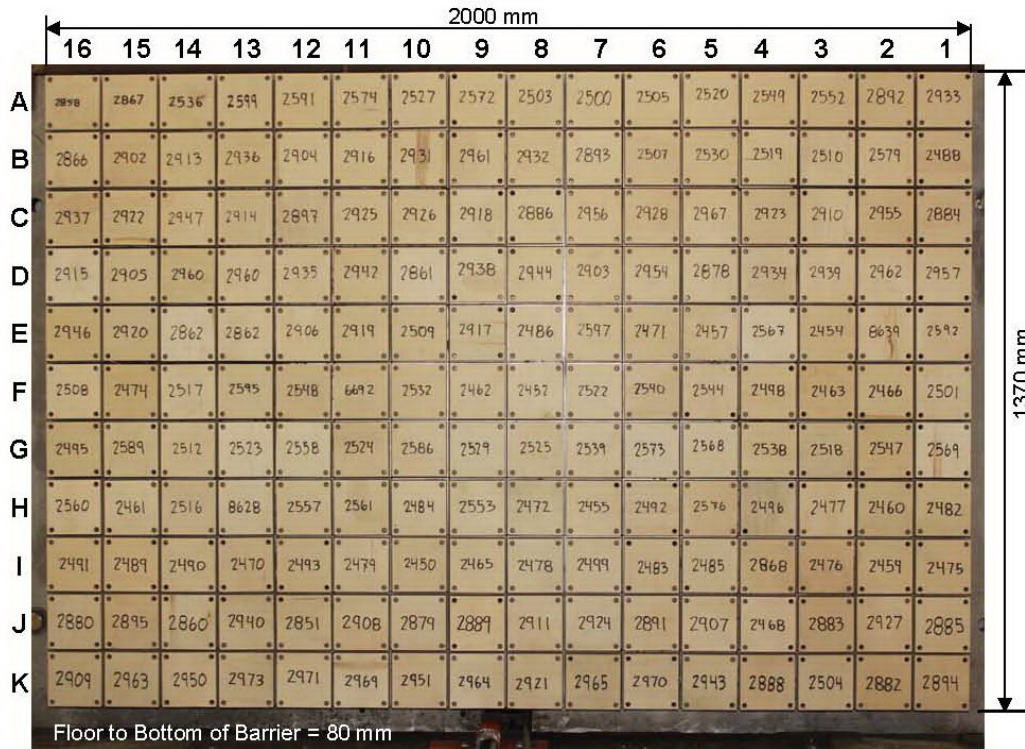


Photo for Reference Only

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 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Data Channels	47
Passenger Dummy Data Channels	47
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	630

CAMERA COVERAGE

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

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

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

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

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

OTHER VEHICLE POST-TEST OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	685
Center	mm	670
Right Side	mm	670
Average	mm	675

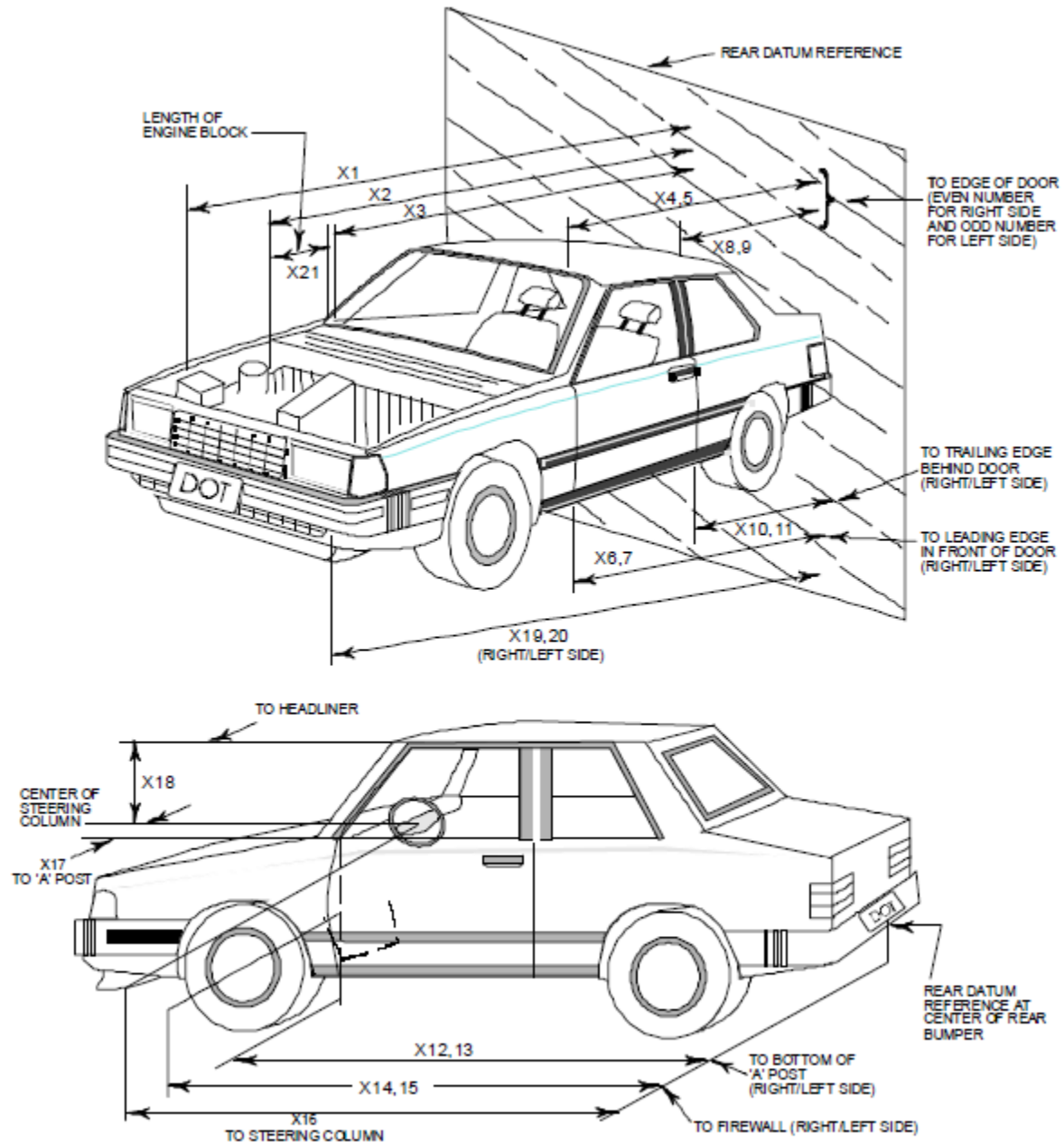
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	4691	4218	-473
2	RSOV to Front of Engine	3996	3880	-116
3	RSOV to Firewall	3669	3613	-56
4	RSOV to Upper Leading Edge of Right Door	3153	3157	4
5	RSOV to Upper Leading Edge of Left Door	3148	3157	9
6	RSOV to Lower Leading Edge of Right Door	3123	3139	16
7	RSOV to Lower Leading Edge of Left Door	3123	3143	20
8	RSOV to Upper Trailing Edge of Right Door	2102	2094	-8
9	RSOV to Upper Trailing Edge of Left Door	2107	2100	-7
10	RSOV to Lower Trailing Edge of Right Door	2152	2148	-4
11	RSOV to Lower Trailing Edge of Left Door	2143	2152	9
12	RSOV to Bottom of "A" Post of Right Side	3159	3179	20
13	RSOV to Bottom of "A" Post of Left Side	3158	3179	21
14	RSOV to Firewall, Right Side	3651	3646	-5
15	RSOV to Firewall, Left Side	3653	3649	-4
16	RSOV to Steering Column	2649	2774	125
17	Center of Steering Column to "A" Post	377	365	-12
18	Center of Steering Column to Headliner	406	452	46
19	RSOV to Right Side of Front Bumper	4531	4109	-422
20	RSOV to Left Side of Front Bumper	4531	4085	-446
21	Length of Engine Block	263	263	0
RD	RSOV to Right Side of Dash Panel	2988	3004	16
CD	RSOV to Center of Dash Panel	3008	3039	31
LD	RSOV to Left Side of Dash Panel	2990	3003	13

All dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

VEHICLE INFORMATION

VIN: JTMABABA4PA007001
Vehicle Size Category: MPV

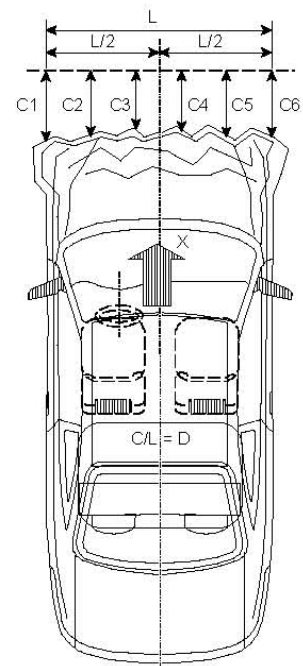
Wheelbase (mm): 2855
Test Weight (kg): 2264.5

ACCELEROMETER DATA

Accelerometer Locations: As per Data Sheet No. 7
Cal. Procedure/Interval: MGA Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.42
Velocity Change (km/h): 63.9
Time of Separation (msec) 96

CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: Centerline
Damage Region Length (mm): 1504
Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Exterior Crush
C1	Crush zone 1 at left side	mm	4531	4085	446
C2	Crush zone 2 at left side	mm	4665	4173	492
C3	Crush zone 3 at left side	mm	4691	4184	507
C4	Crush zone 4 at right side	mm	4691	4186	505
C5	Crush zone 5 at right side	mm	4665	4143	522
C6	Crush zone 6 at right side	mm	4531	4109	422
L	C1 TO C6	mm	1504	1496	-8

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

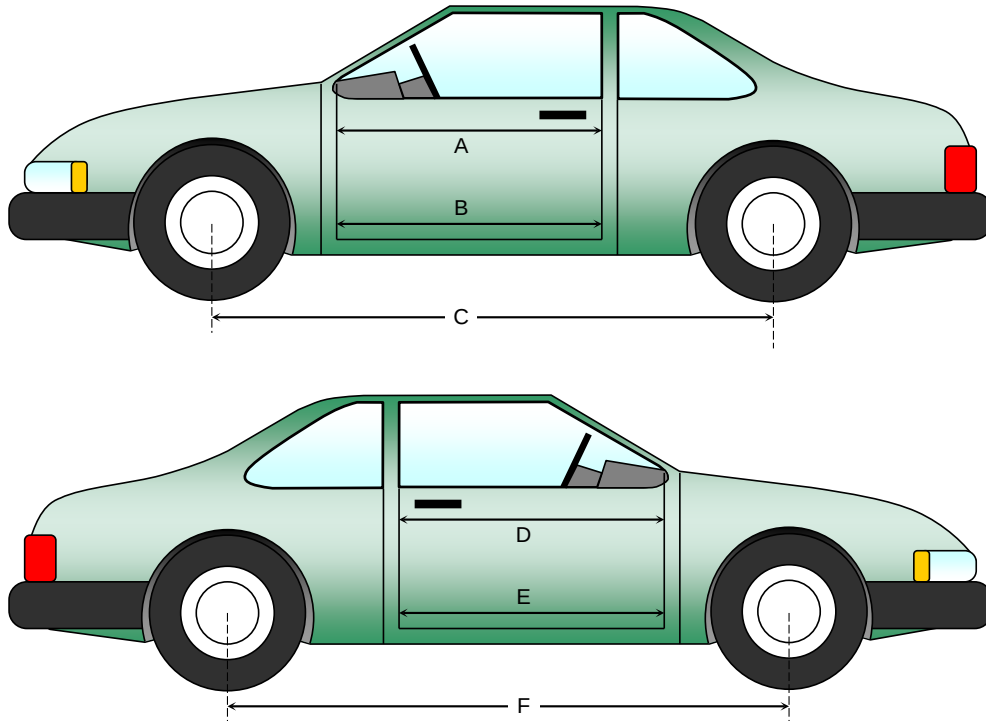
NHTSA No.: O20235500
Test Date: 5/4/2023

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	971	974	3
B	Left Side Lower	mm	881	892	11
D	Right Side Upper	mm	972	972	0
E	Right Side Lower	mm	886	888	2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	2855	2768	-87
F	Right Side Wheelbase	mm	2855	2768	-87



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

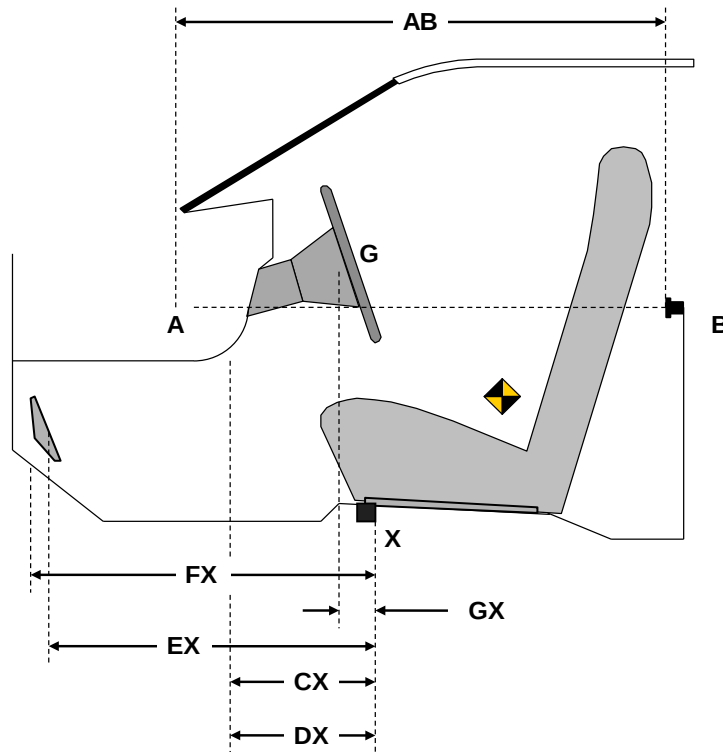
Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	697	696	-1
CX	Left Knee Bolster to X	mm	306	304	-2
DX	Right Knee Bolster to X	mm	309	312	3
EX	Brake Pedal to X	mm	565	549	-16
FX	Foot Rest to X	mm	575	565	-10
GX	Center of Steering Column Wheel Hub to X	mm	38	92	54

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

WINDSHIELD MOUNTING DETAILS

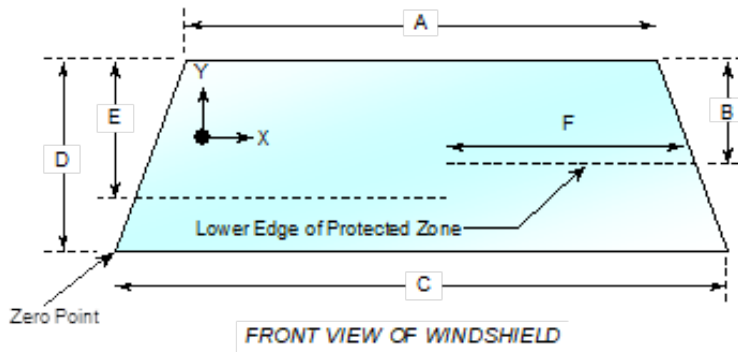
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.2°C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2174	2174	100
Right Side	2174	2174	100
Total	4348	4348	100



Item	Units	Value
A	mm	1220
B	mm	499
C	mm	1484
D	mm	822
E	mm	574
F	mm	607

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 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

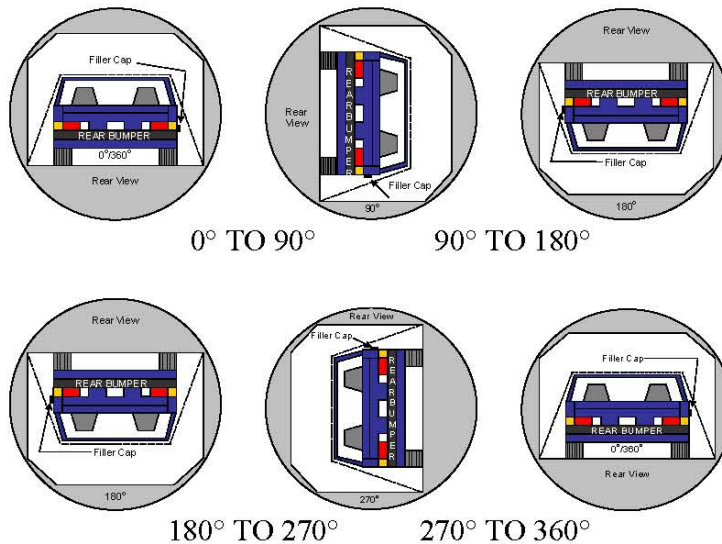
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.2°C

Test Time: 11:58 a.m.

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) N/A oz.
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) N/A oz.
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) N/A
 D. Spillage Details: N/A

FMVSS 301 STATIC ROLLOVER RESULTS



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

SOLVENT COLLECTION TIME TABLE IN SECONDS

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

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°				

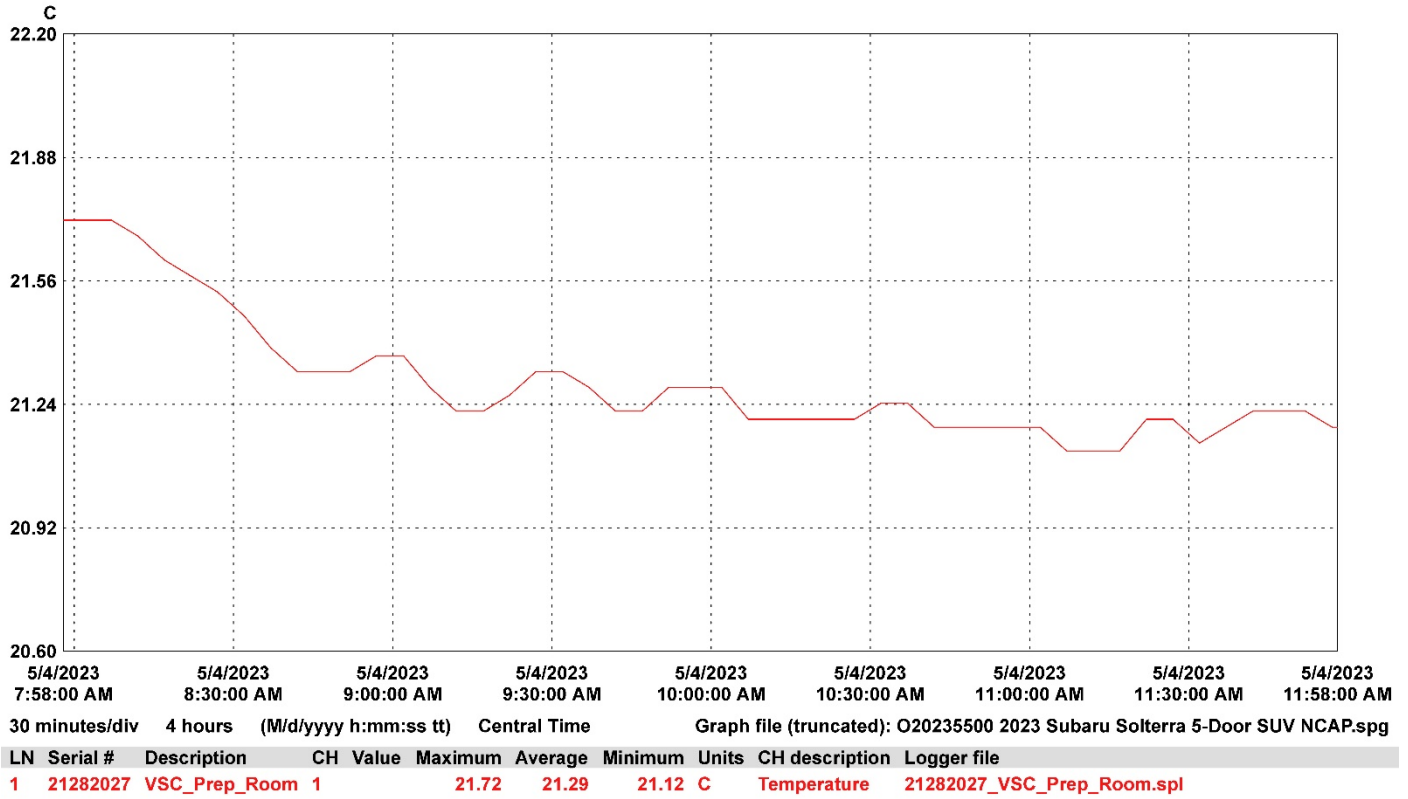
SOLVENT SPILLAGE LOCATION TABLE

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 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023



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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

ELECTRIC VEHICLE PROPULSION SYSTEM

	Units	Observations and Conclusions
Type of Electric Vehicle		Electric
Propulsion Battery Type		Lithium-Ion
Nominal Voltage	V	355.2
Physical Location of Automatic Propulsion Battery Disconnect		Inside propulsion battery case
Auxiliary Battery Type		Lead-Acid

PROPULSION BATTERY SYSTEM DATA

	Units	Observations and Conclusions
Electrolyte Fluid Type		LiPF6
Electrolyte Fluid Specific Gravity	g/L	1.2
Electrolyte Fluid Kinematic Viscosity	cSt	3.5
Electrolyte Fluid Color		Clear (light yellow)
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable)		High-Resistance Coolant, Orange
Location of Battery Modules		X Inside Passenger Compartment
		Outside Passenger Compartment
		The high-voltage battery is located below the 2 nd row seat cushion.

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	408
95% of Maximum State of Charge	387.6
Test Voltage - No less than 95% of maximum State of Charge	397.1
<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 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Location(s)	Body structure in engine bay
---	------------------------------

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 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		57580164
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		6/21/2022

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	397.1
----	---	-------

ELECTRIC ISOLATION MEASUREMENTS
PROPULSION BATTERY TO VEHICLE CHASSIS

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

V1	V	
V2	V	

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

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

Ro	Ω	
----	---	--

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

ELECTRICAL ISOLATION CALCULATIONS

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

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

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

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
Test Date: 5/4/2023

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		57580164
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		6/21/2022

ELECTRICAL ISOLATION MEASUREMENTS

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

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

ELECTRICAL ISOLATION CALCULATIONS

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

$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$							
Ri1 Post-Impact	Ω		Impact Time		Minutes		Seconds
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$							
Ri2 Post-Impact	Ω		Impact Time		Minutes		Seconds
$R_i = \text{The lesser of } R_{i1} \text{ and } R_{i2}$							
Ri Post-Impact	Ω		Impact Time		Minutes		Seconds
$R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$							
Ri / Vb Post-Impact	Ω		Impact Time		Minutes		Seconds

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

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

PROPULSION BATTERY SYSTEM COMPONENTS

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

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

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

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

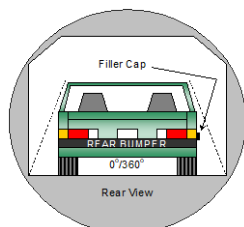
	Yes (Fail)	No
Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?		X

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

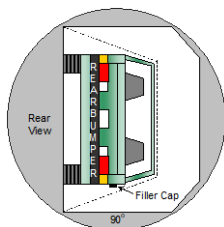
Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

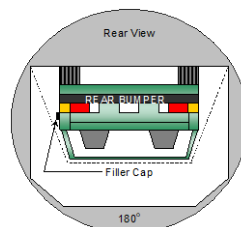
PROPULSION BATTERY SYSTEM COMPONENTS



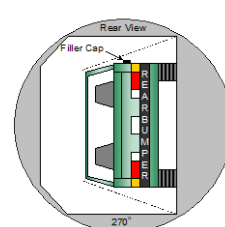
0°/360°



90°



180°



270°

PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time (spec. 1-3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0° - 90°	1	min	49	sec	5	min	6	min	49	sec	7	min
90° - 180°	1	min	51	sec	5	min	6	min	51	sec	7	min
180° - 270°	1	min	47	sec	5	min	6	min	47	sec	7	min
270° - 360°	1	min	52	sec	5	min	6	min	52	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 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		57580164
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		6/21/2022

ELECTRICAL ISOLATION MEASUREMENTS

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

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

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

ELECTRICAL ISOLATION CALCULATIONS

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

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

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

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

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

POST-CRASH / PRE-ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
Front Drive Unit / Inverter Assembly to Electrical Ground		X		X
High-Voltage Battery Case to Electrical Ground		X		X
Rear Drive Unit to Electrical Ground		X		X
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case		X		X
Rear Drive Unit to High-Voltage Battery Case		X		X

STATIC ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
Front Drive Unit / Inverter Assembly to Electrical Ground		X		X
High-Voltage Battery Case to Electrical Ground		X		X
Rear Drive Unit to Electrical Ground		X		X
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case		X		X
Rear Drive Unit to High-Voltage Battery Case		X		X

POST-ROLLOVER

Description of Evaluated Location	Probe Contact with High Voltage Source		Probe Lamp Illuminated	
	Yes, Fail	No, Pass	Yes, Fail	No, Pass
Front Drive Unit / Inverter Assembly to Electrical Ground		X		X
High-Voltage Battery Case to Electrical Ground		X		X
Rear Drive Unit to Electrical Ground		X		X
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case		X		X
Rear Drive Unit to High-Voltage Battery Case		X		X

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

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

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

POST-CRASH / PRE-ROLLOVER

Description of Evaluated Location	Measuring Path	Method 2 ONLY		Methods 1 & 2	Pass or Fail
	BC or BB	Voltage (V) Volts	Current (I) Amps	Resistance (R=V/I) Ω	
Front Drive Unit / Inverter Assembly to Electrical Ground	BC			0.002	Pass
High-Voltage Battery Case to Electrical Ground	BC			0.001	Pass
Rear Drive Unit to Electrical Ground	BC			0.006	Pass
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case	BB			0.007	Pass
Rear Drive Unit to High-Voltage Battery Case	BB			0.003	Pass

STATIC ROLLOVER

Description of Evaluated Location	Measuring Path	Method 2 ONLY		Methods 1 & 2	Pass or Fail
	BC or BB	Voltage (V) Volts	Current (I) Amps	Resistance (R=V/I) Ω	
Front Drive Unit / Inverter Assembly to Electrical Ground	BC			0.002	Pass
High-Voltage Battery Case to Electrical Ground	BC			0.001	Pass
Rear Drive Unit to Electrical Ground	BC			0.006	Pass
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case	BB			0.007	Pass
Rear Drive Unit to High-Voltage Battery Case	BB			0.003	Pass

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

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

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

POST-ROLLOVER

Description of Evaluated Location	Measuring Path	Method 2 ONLY		Methods 1 & 2	Pass or Fail
	BC or BB	Voltage (V) Volts	Current (I) Amps	Resistance (R=V/I) Ω	
Front Drive Unit / Inverter Assembly to Electrical Ground	BC			0.002	Pass
High-Voltage Battery Case to Electrical Ground	BC			0.001	Pass
Rear Drive Unit to Electrical Ground	BC			0.006	Pass
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case	BB			0.003	Pass
Rear Drive Unit to High-Voltage Battery Case	BB			0.007	Pass

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

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

Test Vehicle: 2023 Subaru Solterra 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20235500
 Test Date: 5/4/2023

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

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

POST-CRASH / PRE-ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass or Fail
	BC or BB	VAC (V) Volts	VDC (V) Volts	
Front Drive Unit / Inverter Assembly to Electrical Ground	BC	0.0	0.0	Pass
High-Voltage Battery Case to Electrical Ground	BC	0.0	0.0	Pass
Rear Drive Unit to Electrical Ground	BC	0.0	0.0	Pass
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case	BB	0.0	0.0	Pass
Rear Drive Unit to High-Voltage Battery Case	BB	0.0	0.0	Pass

STATIC ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass or Fail
	BC or BB	VAC (V) Volts	VDC (V) Volts	
Front Drive Unit / Inverter Assembly to Electrical Ground	BC	0.0	0.0	Pass
High-Voltage Battery Case to Electrical Ground	BC	0.0	0.0	Pass
Rear Drive Unit to Electrical Ground	BC	0.0	0.0	Pass
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case	BB	0.0	0.0	Pass
Rear Drive Unit to High-Voltage Battery Case	BB	0.0	0.0	Pass

POST-ROLLOVER

Description of Evaluated Location	Measuring Path	Measured Voltage		Pass or Fail
	BC or BB	VAC (V) Volts	VDC (V) Volts	
Front Drive Unit / Inverter Assembly to Electrical Ground	BC	0.0	0.0	Pass
High-Voltage Battery Case to Electrical Ground	BC	0.0	0.0	Pass
Rear Drive Unit to Electrical Ground	BC	0.0	0.0	Pass
Front Drive Unit / Inverter Assembly to High-Voltage Battery Case	BB	0.0	0.0	Pass
Rear Drive Unit to High-Voltage Battery Case	BB	0.0	0.0	Pass

**APPENDIX A
PHOTOGRAPHS**

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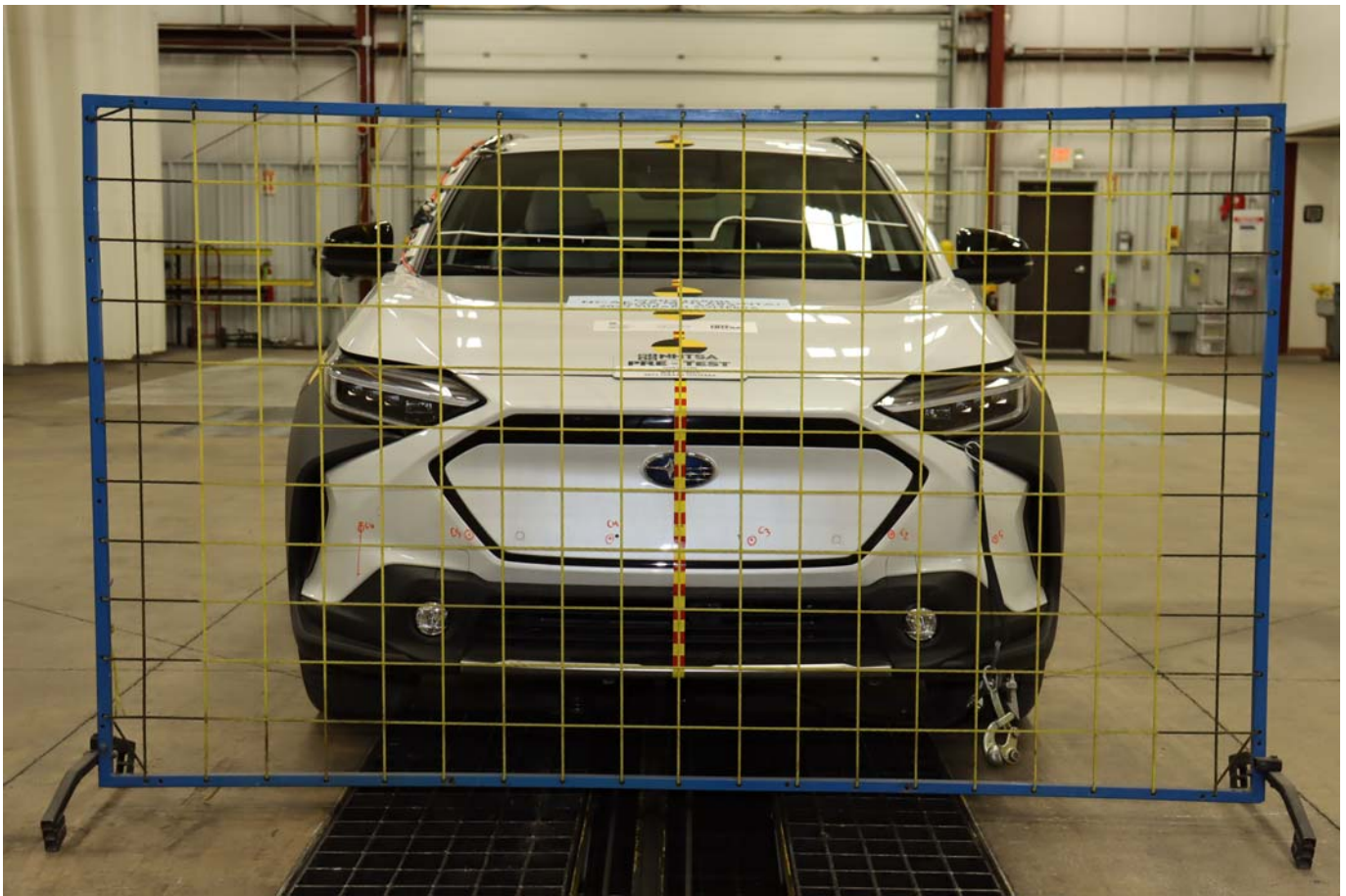
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PHOTOGRAPH NOT AVAILABLE

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Photo No. 004 - Manufacturer's Label



Photo No. 005 - Tire Placard



Photo No. 006 - 2023 Subaru Solterra 5-Door SUV Frontal As Delivered



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

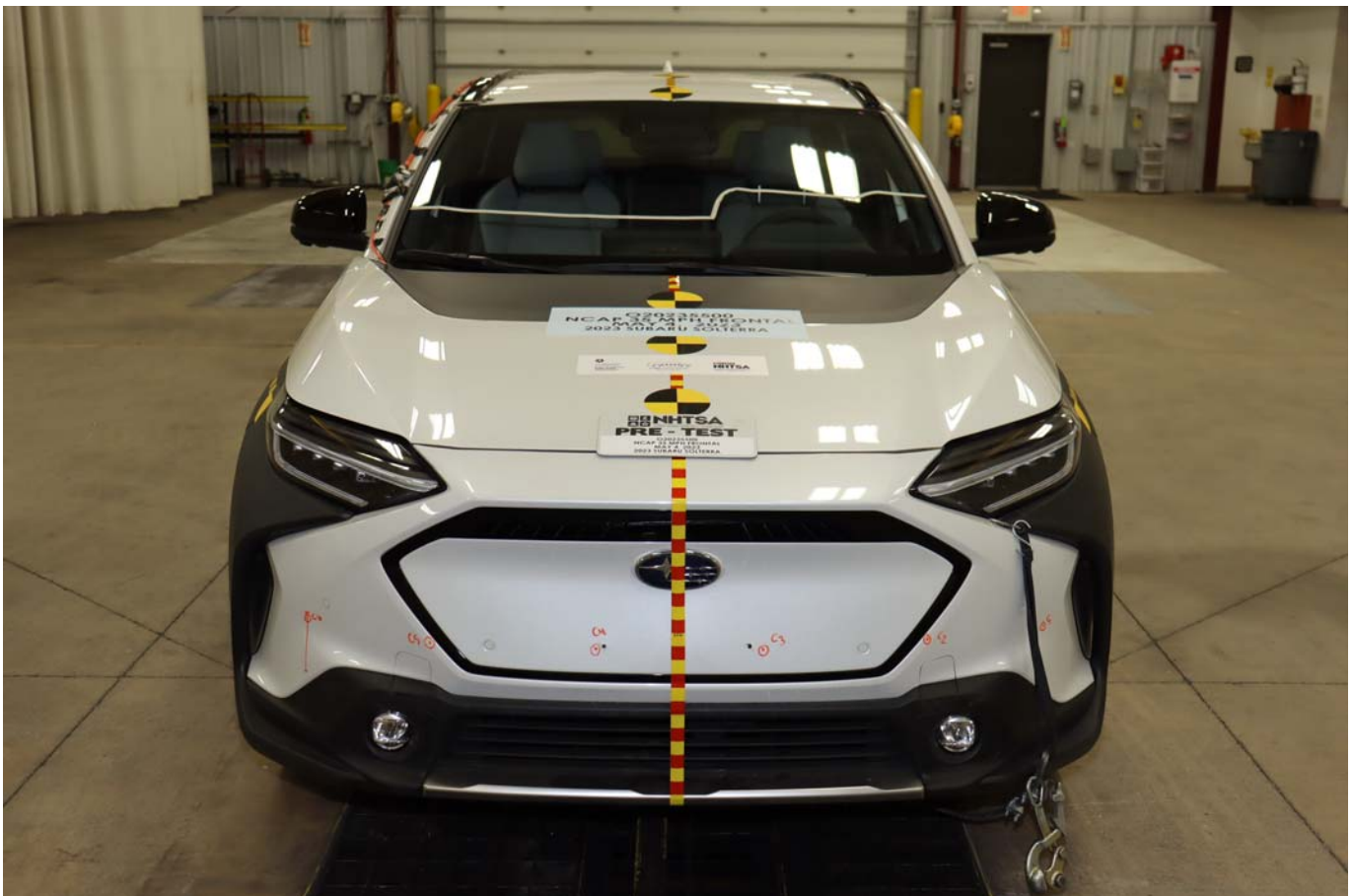


Photo No. 008 - Pre-Test Front View of Test Vehicle

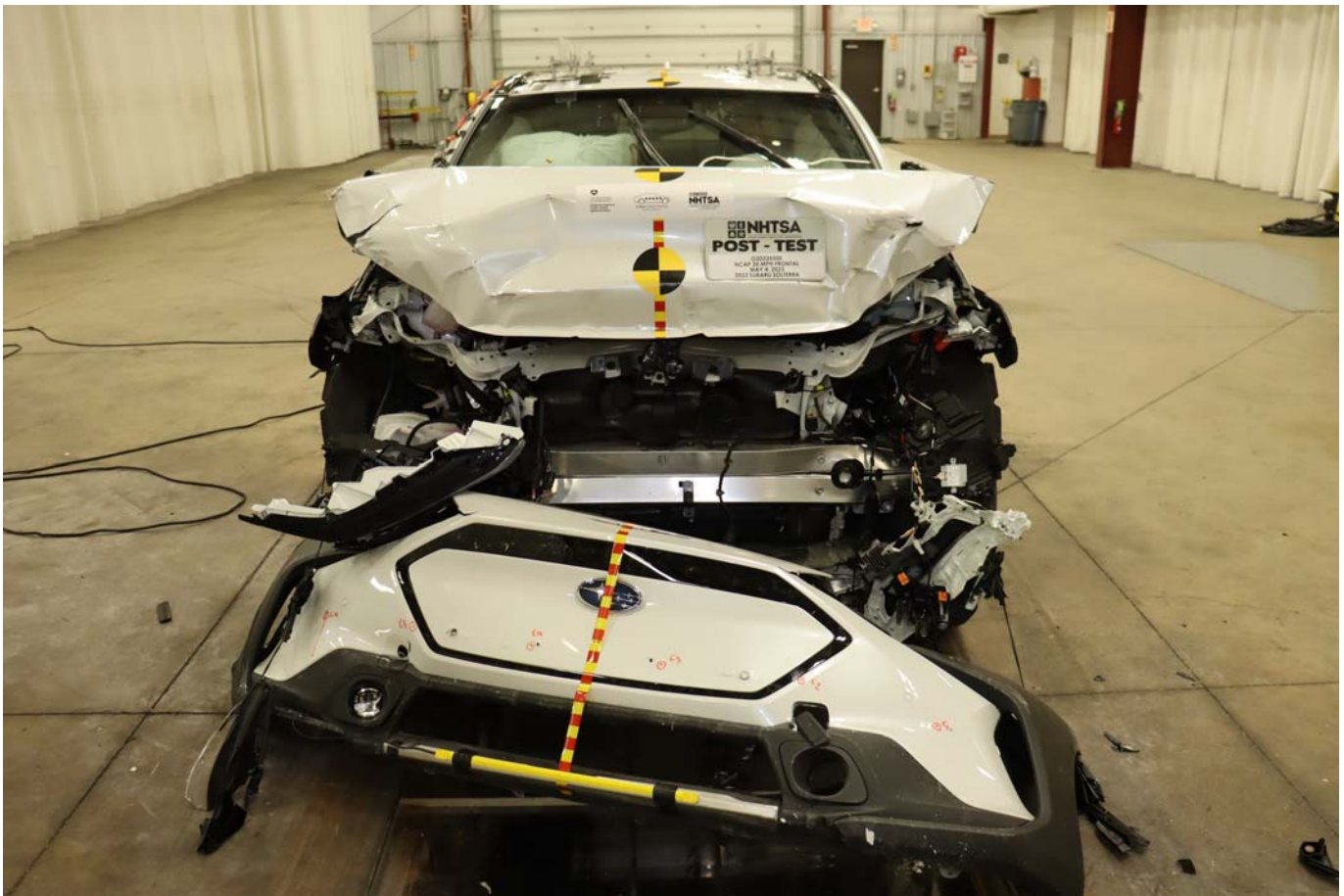


Photo No. 009 - Post-Test Front View of Test Vehicle



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

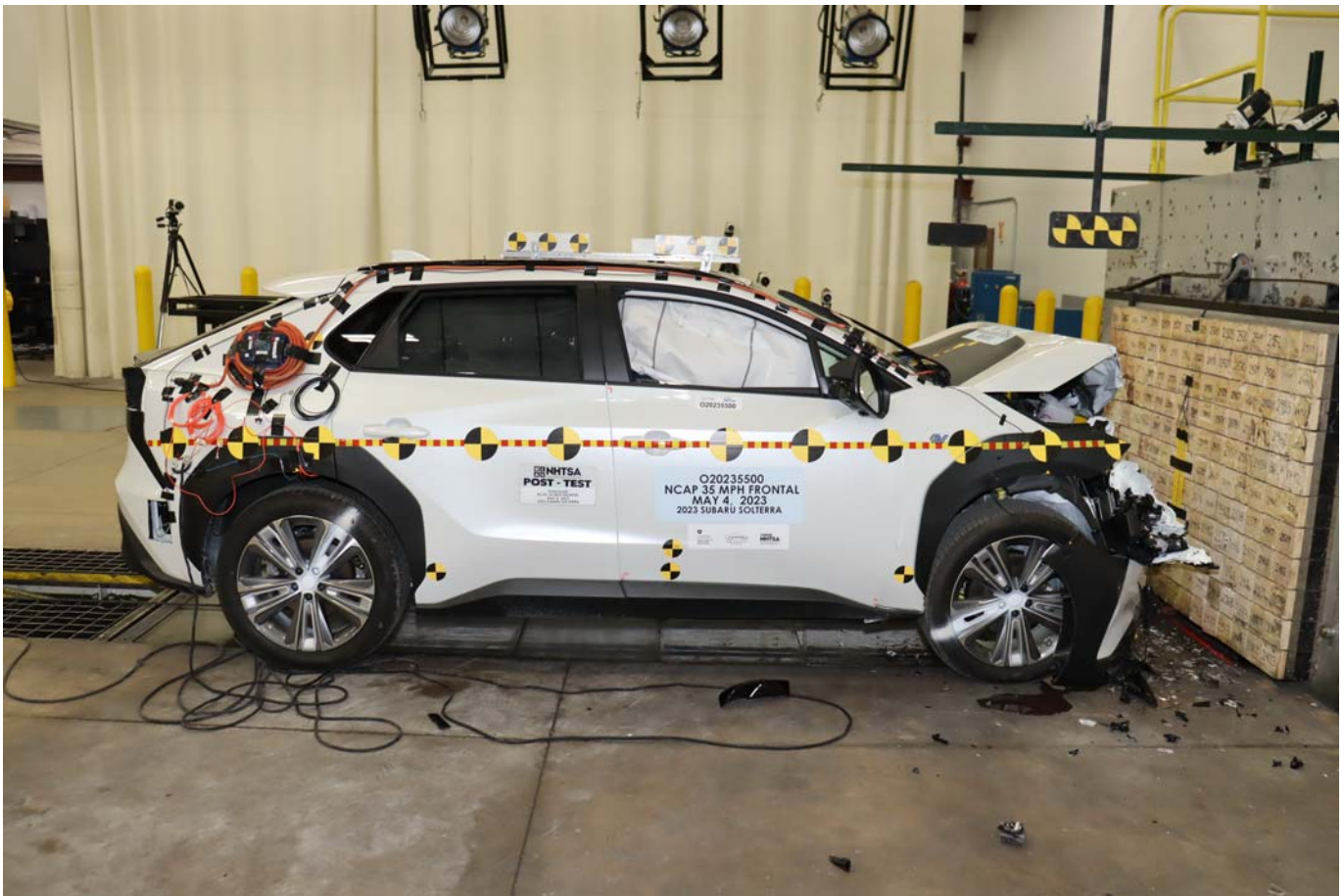


Photo No. 013 - Post-Test Right View of Test Vehicle

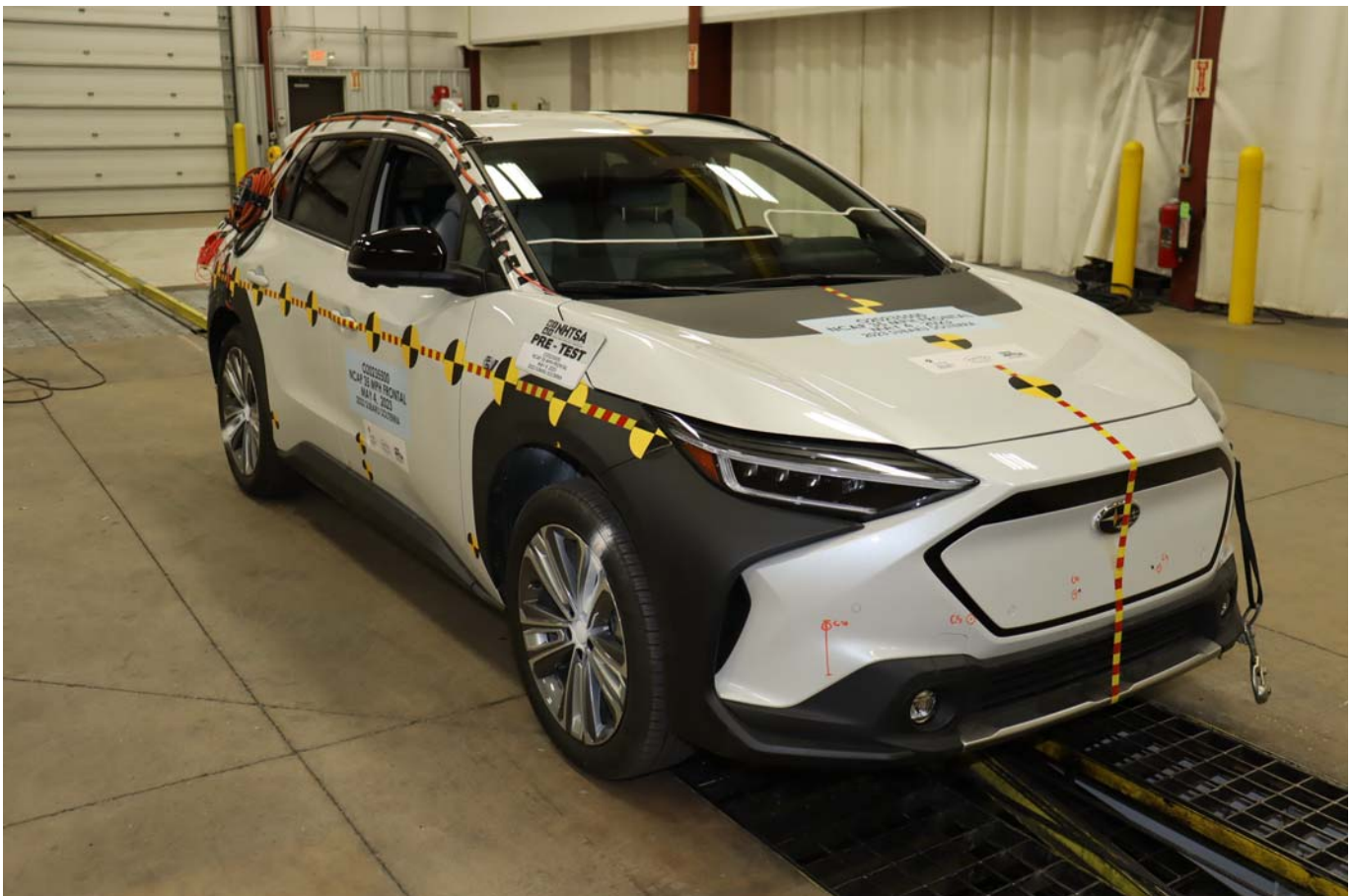


Photo No. 014 - Pre-Test Right Front 3-4 View

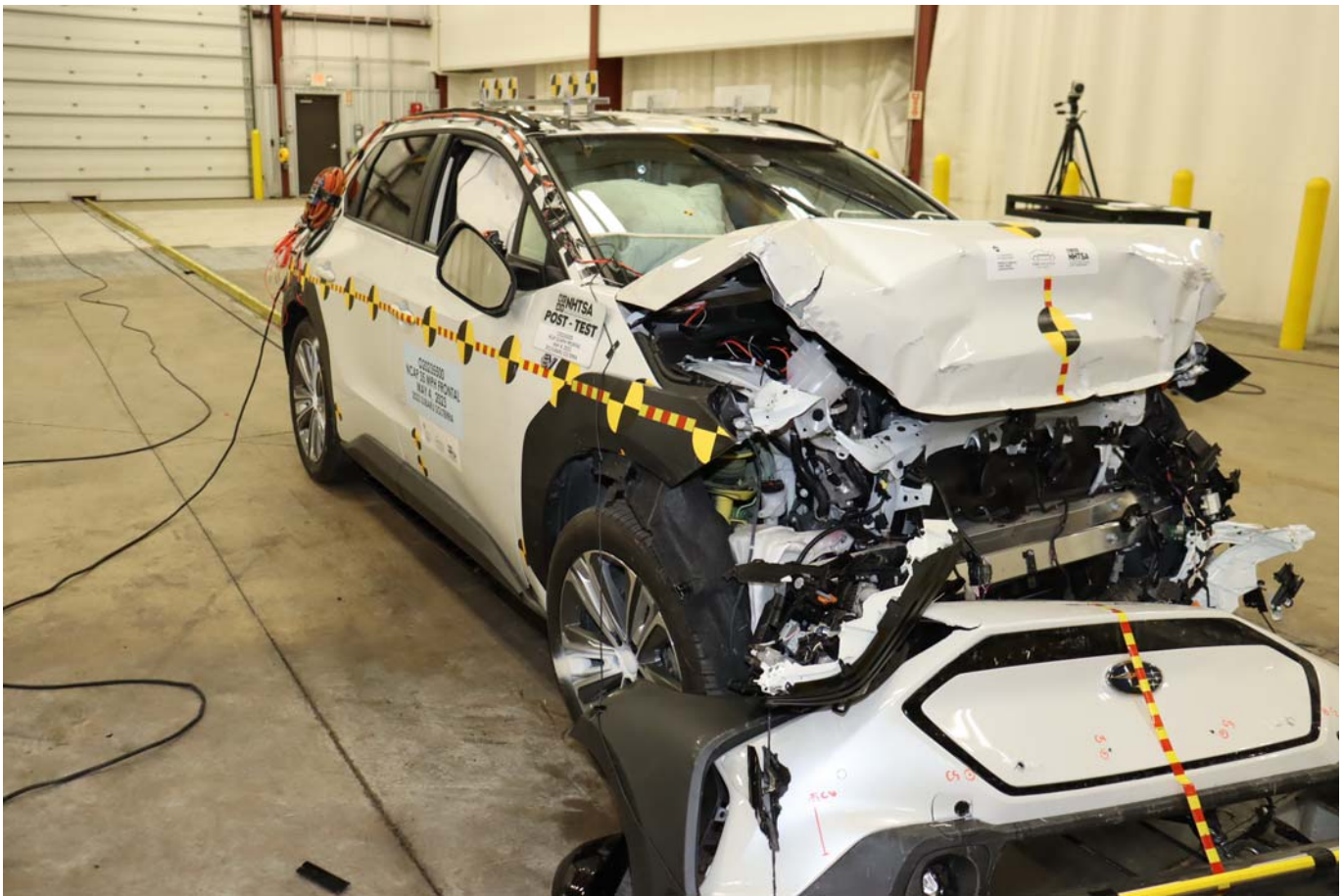


Photo No. 015 - Post-Test Right Front 3-4 View



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

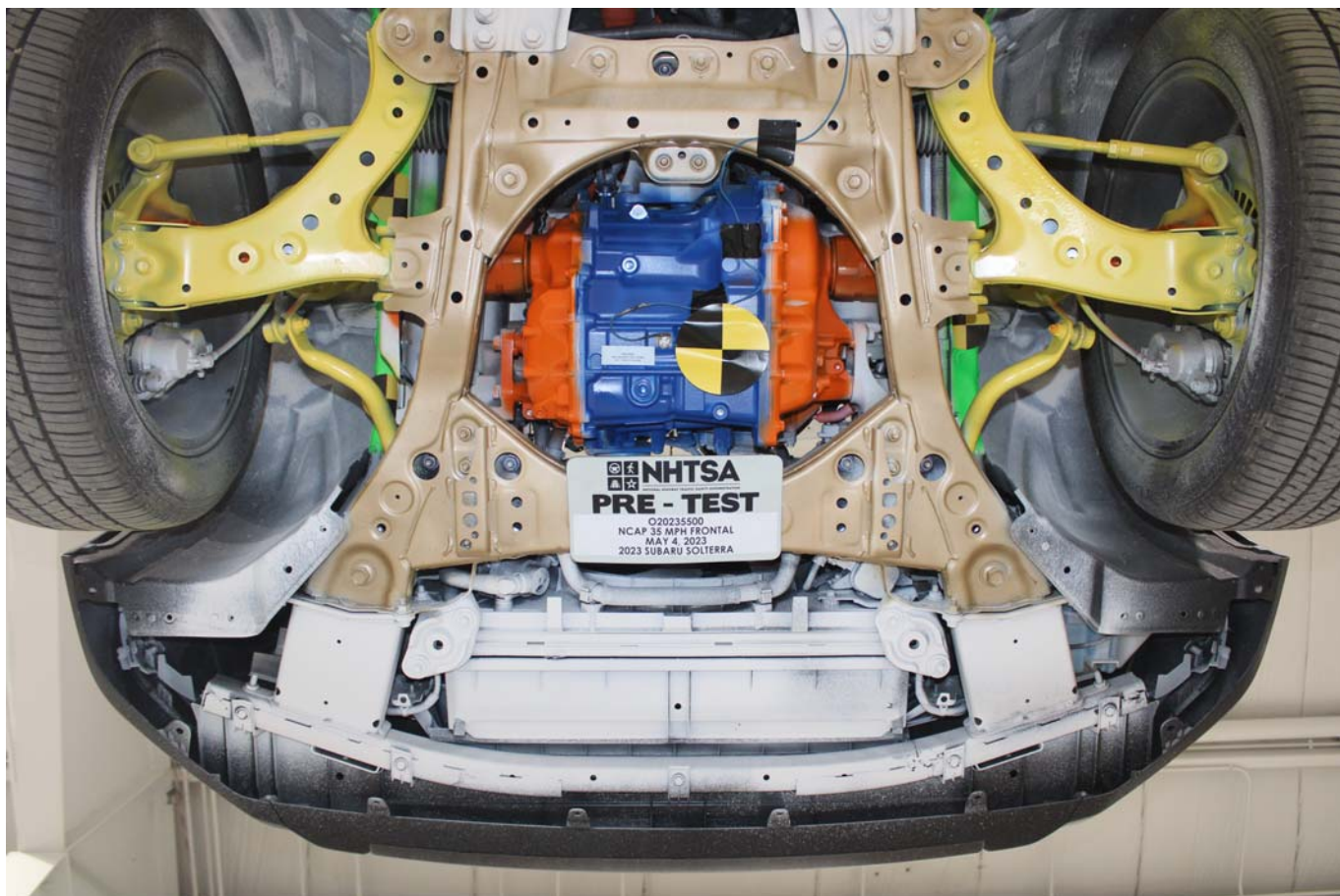


Photo No. 024 - Pre-Test Front Underbody View

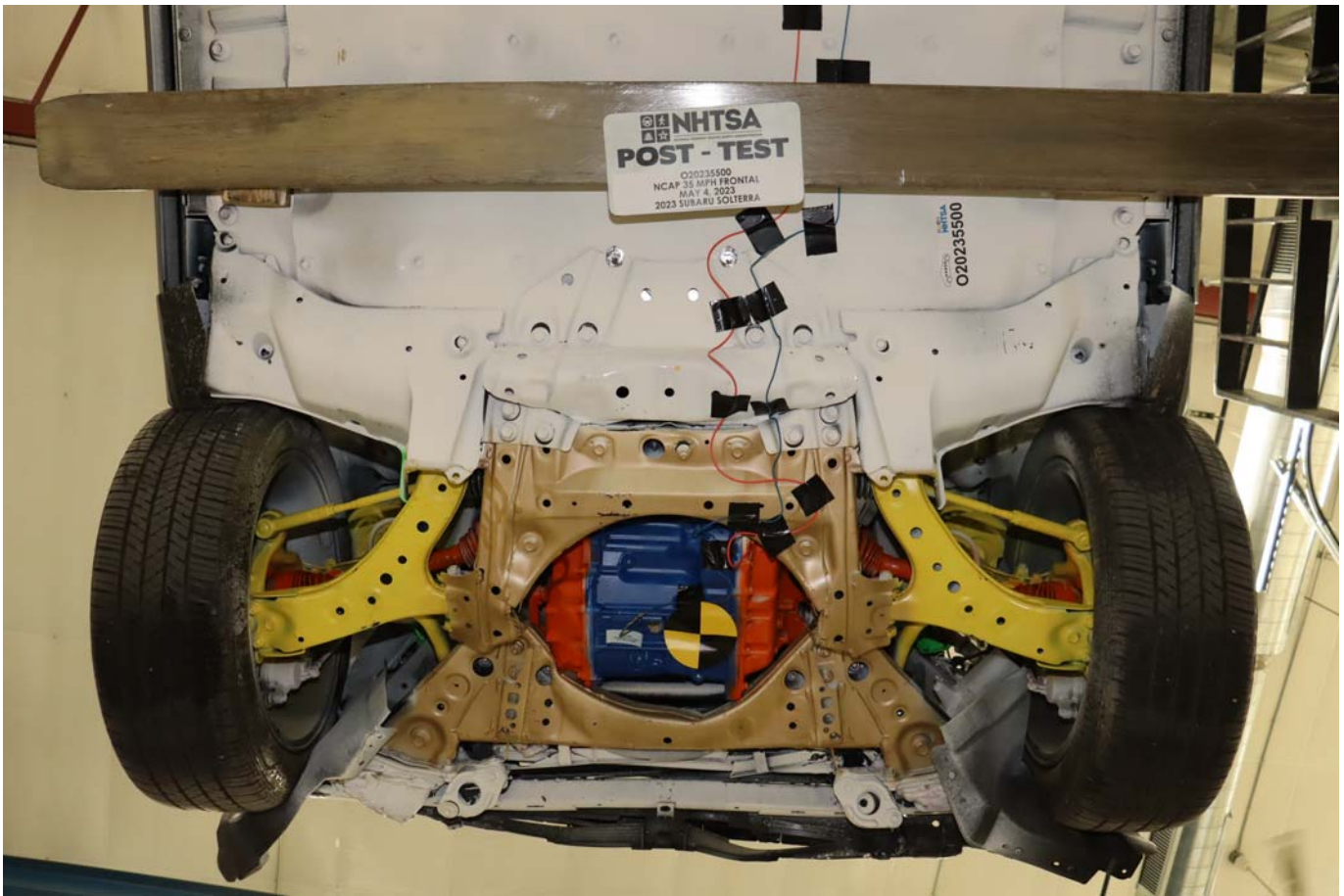


Photo No. 025 - Post-Test Front Underbody View

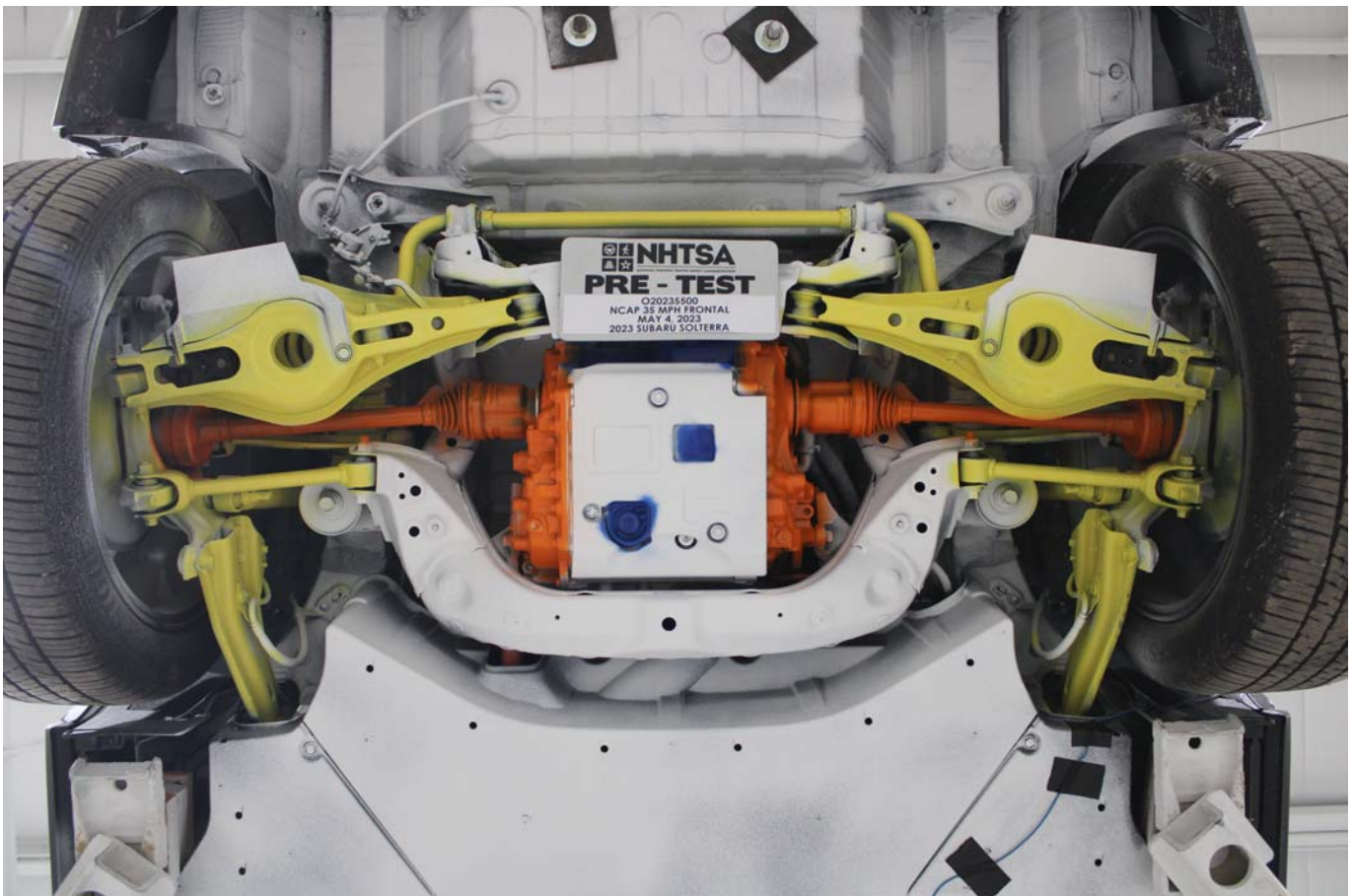


Photo No. 026 - Pre-Test Rear Underbody View

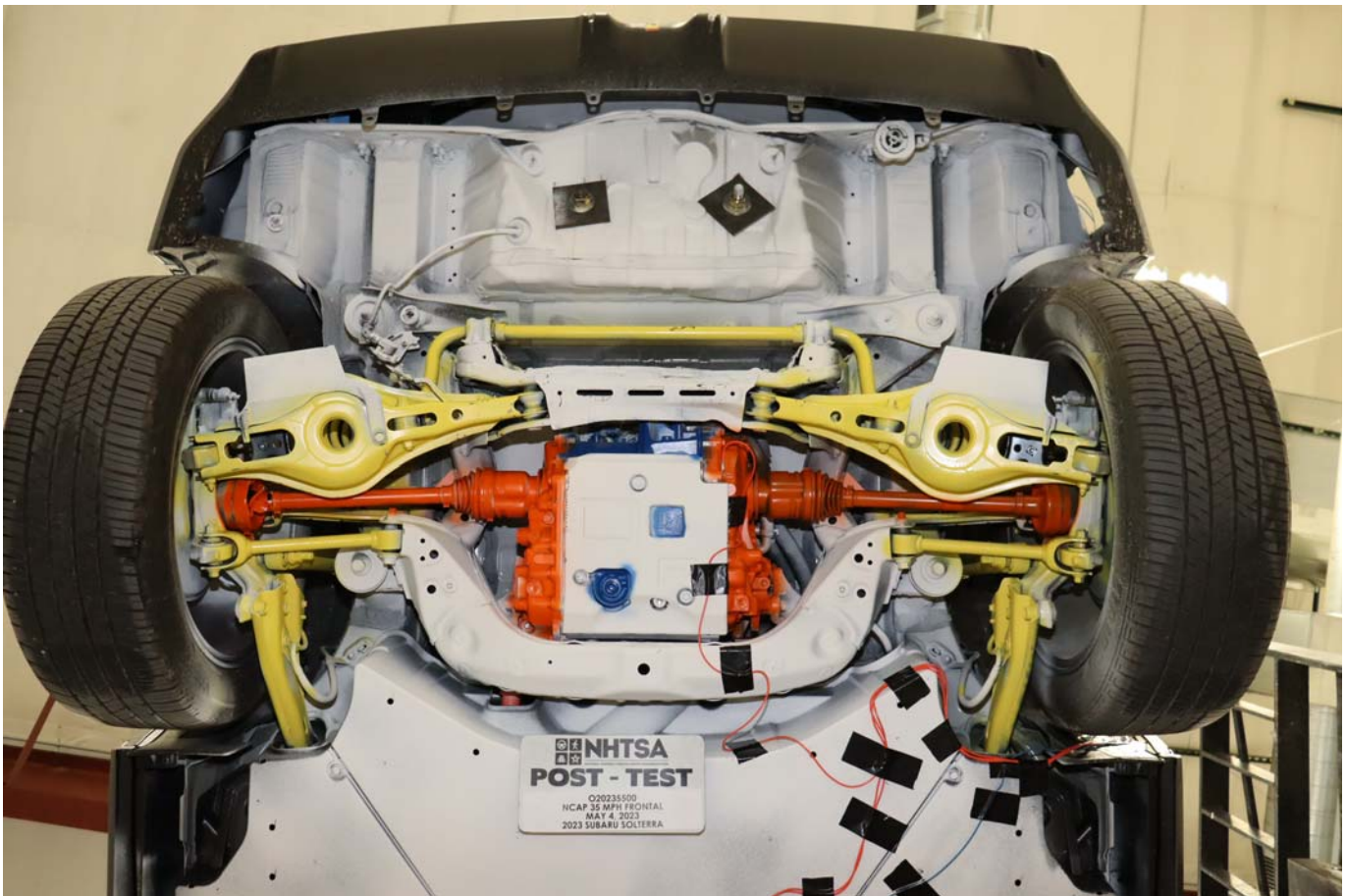


Photo No. 027 - Post-Test Rear Underbody View



Photo No. 028 - Pre-Test Dummy Cable Routing



Photo No. 029 - Post-Test Dummy Cable Routing



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



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



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





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



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



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



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



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



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



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



Photo No. 042 - Pre-Test Driver Dummy Feet



Photo No. 043 - Post-Test Driver Dummy Feet



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



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



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



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



Photo No. 048 - Post-Test Driver Dummy Face



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



Photo No. 065 - Pre-Test Passenger Dummy Feet



Photo No. 066 - Post-Test Passenger Dummy Feet



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



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



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



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



Photo No. 071 - Post-Test Passenger Dummy Face

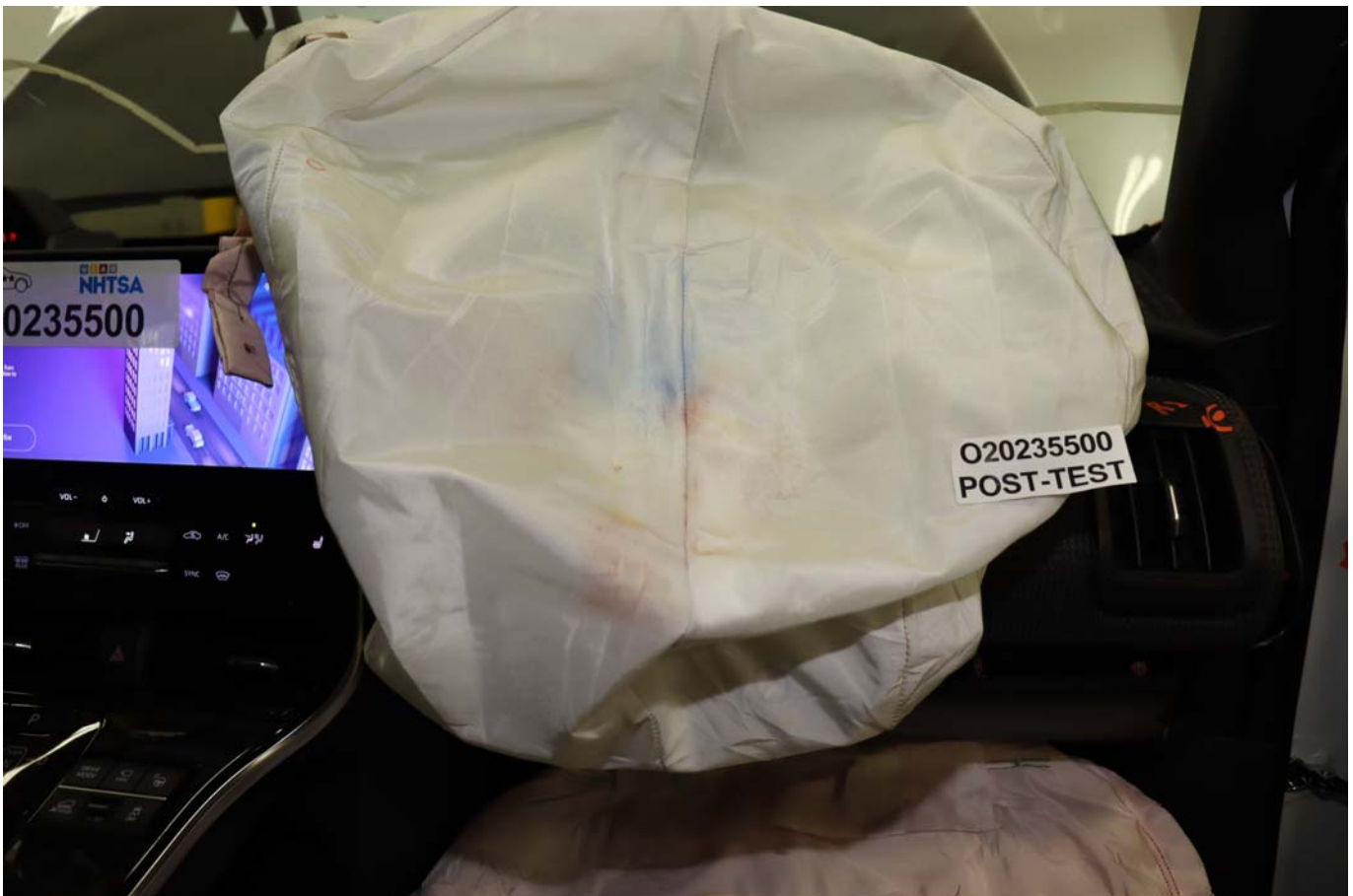


Photo No. 072 - Post-Test Passenger Dummy Contact with Airbag



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

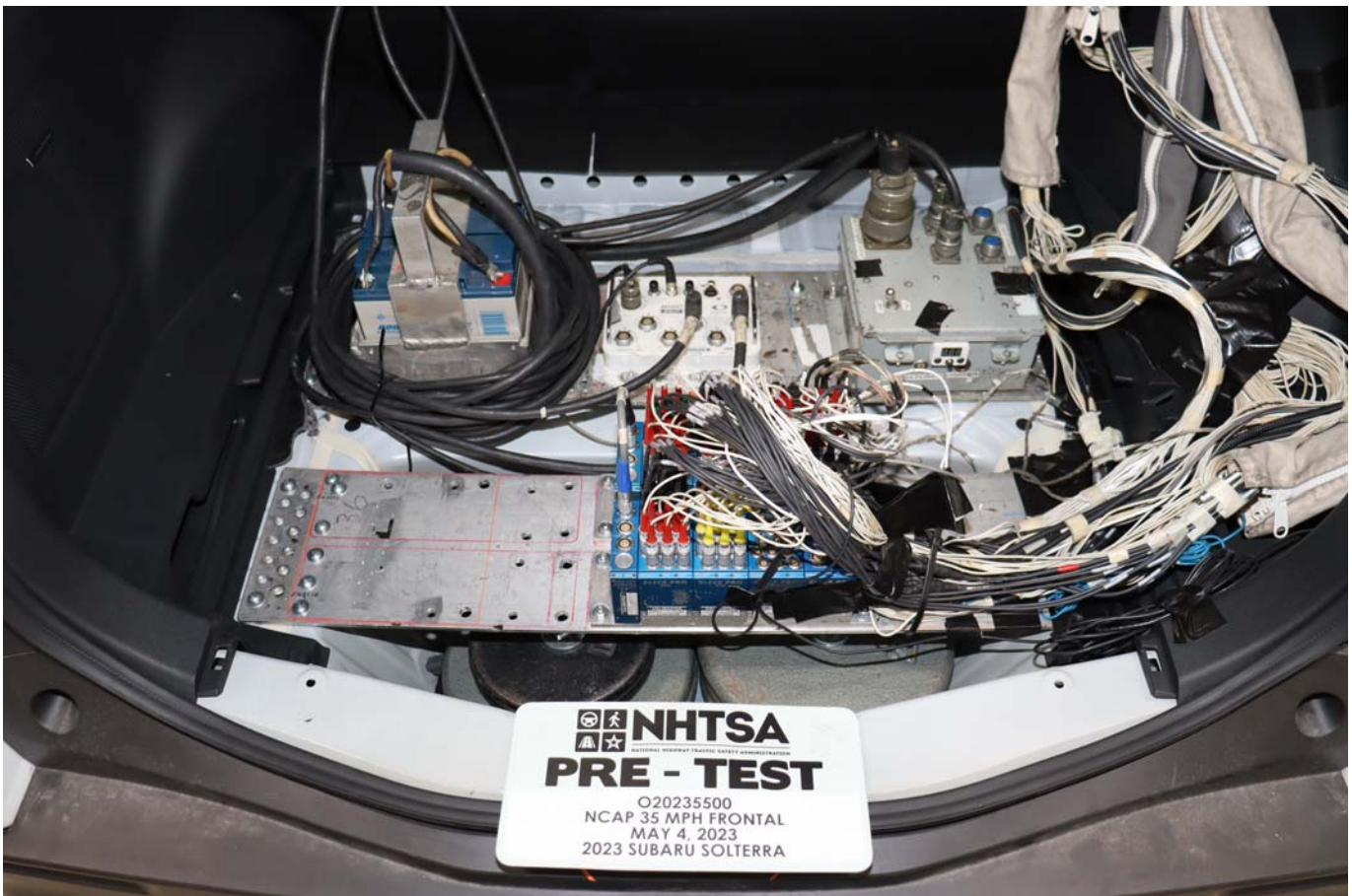


Photo No. 074 - Photograph of Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

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



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

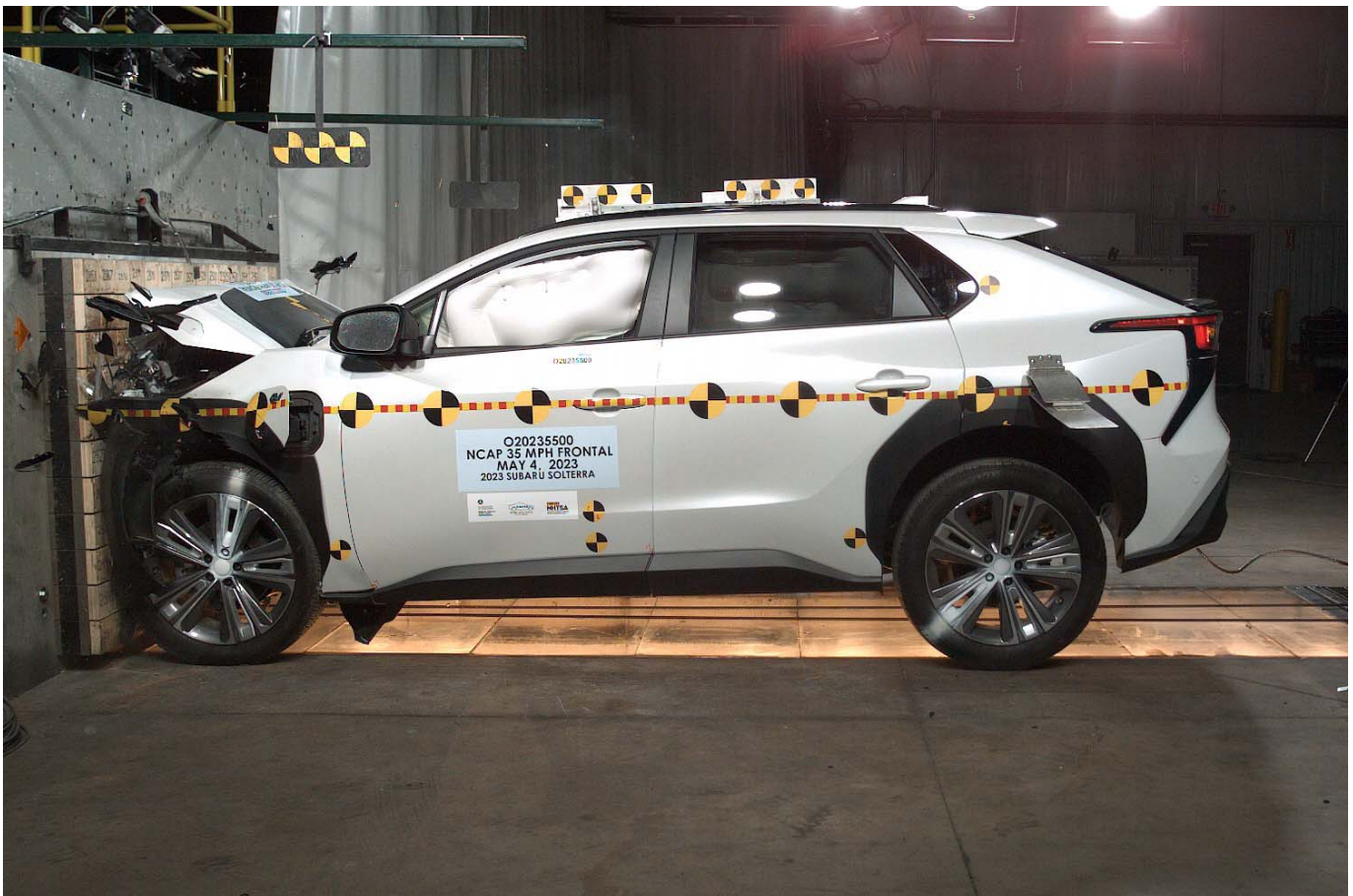


Photo No. 082 - 2023 Subaru Solterra 5-Door SUV Frontal Impact Event

SOLTERRA

VIN
Model/Code
Port/Assembly
Deliver by/Carrier

JTMABABA4PA007001
2023 SUBARU SOLTERRA LIMITED/PEG
BALTIMORE
TRUCK / 457

SHIP TO: 402269
OURISMAN SUBARU WALDORF
2286 CRAIN HIGHWAY
WALDORF MD 20601

SOLD TO: 402269
OURISMAN SUBARU WALDORF
2286 CRAIN HIGHWAY
WALDORF MD 20601



GOVERNMENT 5-STAR SAFETY RATINGS

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

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

Subaru Added Security®
Agreement Backed By Subaru
The Only Extended Service™

- Protection designed to fit your driving needs, up to 10 years/100,000 miles of coverage
- We only use Genuine Subaru replacement parts
- We use Subaru-trained technicians - those who know your vehicle best
- Towing and rental car reimbursements during covered repairs
- Transferable coverage to the next owner

Scan the QR code or ask your sales representative for more details

STANDARD EQUIPMENT

SAFETY
Symmetrical All-Wheel Drive (AWD)
Blind Spot Monitor (BSM) with Rear Cross Traffic Alert
Vehicle Stability Control (VSC)
Dynamic Radar Cruise Control (DRCC) w/Lane Tracing Assist
Parking Support Brake (PKSB) System w/Pedestrian Detection
Safe Exit Assist (SEA)
Emergency Driving Stop Assist (EDSS)
Advanced Frontal Airbag System
Driver & Front Passenger Knee Airbag
Curtain Shield Airbags w/Rollover Sensor
Front Seat Side (Pelvis/Torso) Airbags
4-Wheel Anti-Lock (ABS) Disc Brakes w/ Brake Assist
Flat Tire Repair Kit
Acoustic Vehicle Alerting System

PERFORMANCE AND EXTERIOR

Dual Electric Motors
Dual Function X-MODE with Grip Control
72.8 kWh (total) High Voltage Battery
120V Battery Charging Cable
Multi-Beam LED Headlights
20" Alloy Wheels
Split Roof Spoiler and Rear Ducktail Spoiler
Roof Rails with Fixed Roof Rack Mounting Points
Galactic Black Power Folding Ext Mirrors w/LED turn signals
LED Fog Lights

COMFORT, CONVENIENCE & INTERIOR

Subaru Solterra Connect Trial. See retailer for details.
12.3" Subaru Multimedia Audio System w/available navigation
Wireless Apple CarPlay & Android Auto
Wireless Smartphone Charger
2 USB C & 1 USB A input/charging ports, 2 USB C charging ports
SiriusXM Satellite Radio with 4 month trial
Voice Activated Virtual Assistant ("Hey, Subaru")
Dual Zone Climate Control w/avail Remote Climate Control
Advanced Park Automatic Parking Assistant
Panoramic View Monitor 360 camera w/Parking Assist
3 Door Keyless Entry with Push Button Start
Anti-Glare Rear View Mirror w/HomeLink
Rain Sensing Windshield Wipers
StarTex Trimmed Upholstery
10-Way Power Driver's Seat
Power Back Door
Heated Front/Rear Seats, Steering Wheel, Mirrors & Wiper-De-Icer

LIMITED WARRANTY/ROADSIDE ASSISTANCE

3 Years / 36,000 Miles Basic
5 Years / 60,000 Miles Powertrain
5 Years / Unlimited Mileage Rust Perforation
8 Yr / 100k mi High Voltage Battery & Electric Motor Assy
3 Years / 36,000 24/7 Roadside Assistance
See Owner Info Kit & Warranty for Detail

OPTIONAL EQUIPMENT AND OTHER ITEMS

Manufacturer's Suggested Retail Price	\$48,495.00
Cosmic White Pearl	\$395.00
Standard Option: 31	
All-Weather Floor Liners	\$176.00

EPA DOT Fuel Economy and Environment

Electric Vehicle

Fuel Economy

102 MPGe combined city/hwy

111 city 93 highway 33 kwh-hrs per 100 miles

You save \$4,500 in fuel costs over 5 years compared to the average new vehicle.

Driving Range: When fully charged, vehicle can travel about... **222 miles**

Charge Time: 11.0 hours (240V)

Annual fuel cost \$700

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

Smog Rating (tailpipe only)

1 10 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.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at 50.14 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 0%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN: 70%
CHINA: 30%

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

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

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*Ford is a registered trademark of Ford Motor Company. A registered trademark of Ford Motor Company. BlueMotion is a registered trademark of BlueMotion. 45D, Inc. is a registered trademark of 45D, Inc. Toyota is a registered trademark of Toyota Motor Sales, U.S.A., Inc. TOYOTA is a registered trademark of TOYOTA Motor Sales, U.S.A., Inc.

Destination and Delivery	\$1,225.00
Total Suggested Retail Price	\$50,291.00

THIS LABEL HAS BEEN APPLIED PURSUANT TO FEDERAL LAW. DO NOT REMOVE OR ALTER PRIOR TO THE 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



Photo No. 305-03 - First Responder Warning Label

PHOTOGRAPH NOT AVAILABLE

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

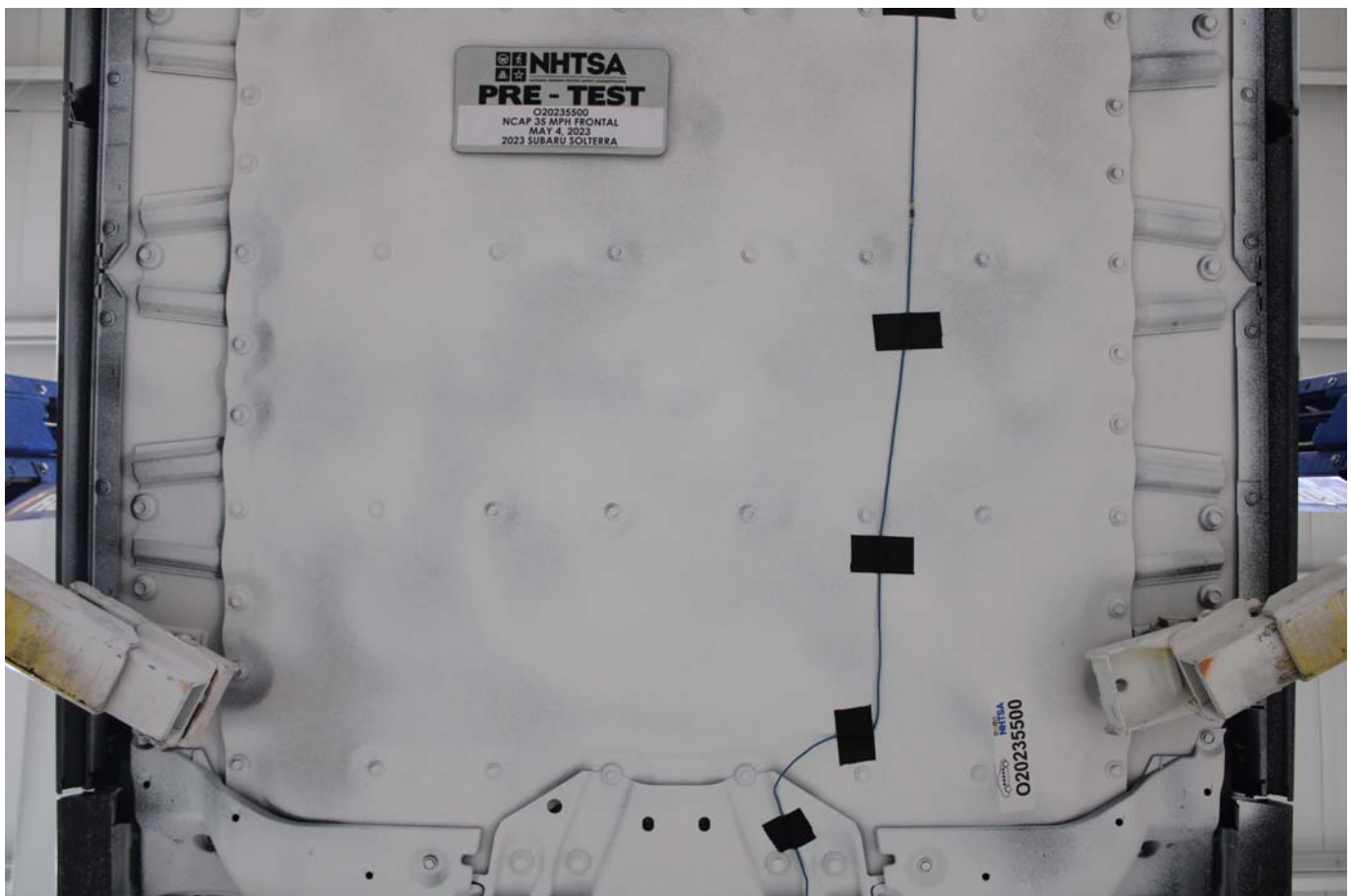


Photo No. 305-09 - Pre-Impact View of Propulsion Battery



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

PHOTOGRAPH NOT AVAILABLE

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)

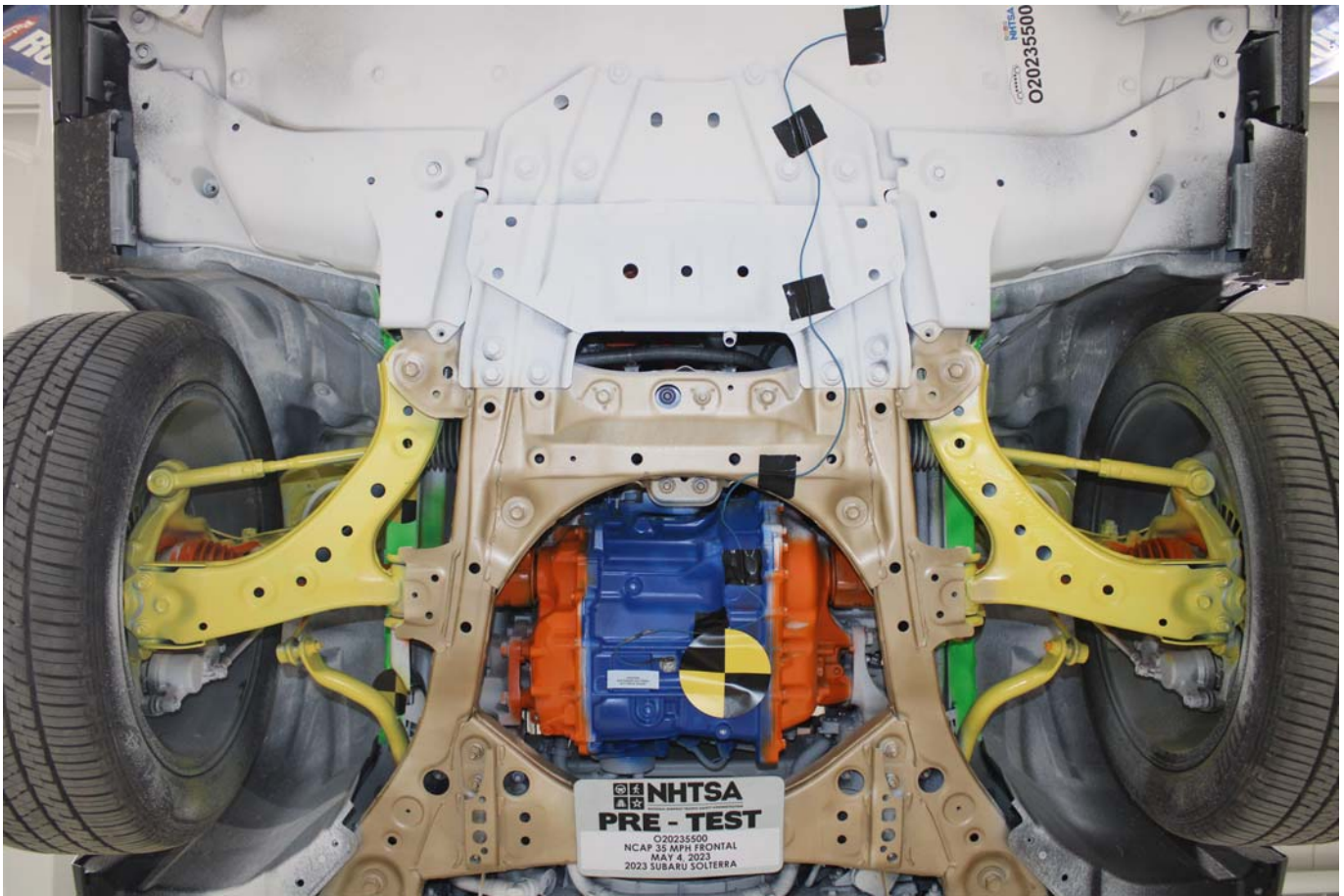


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

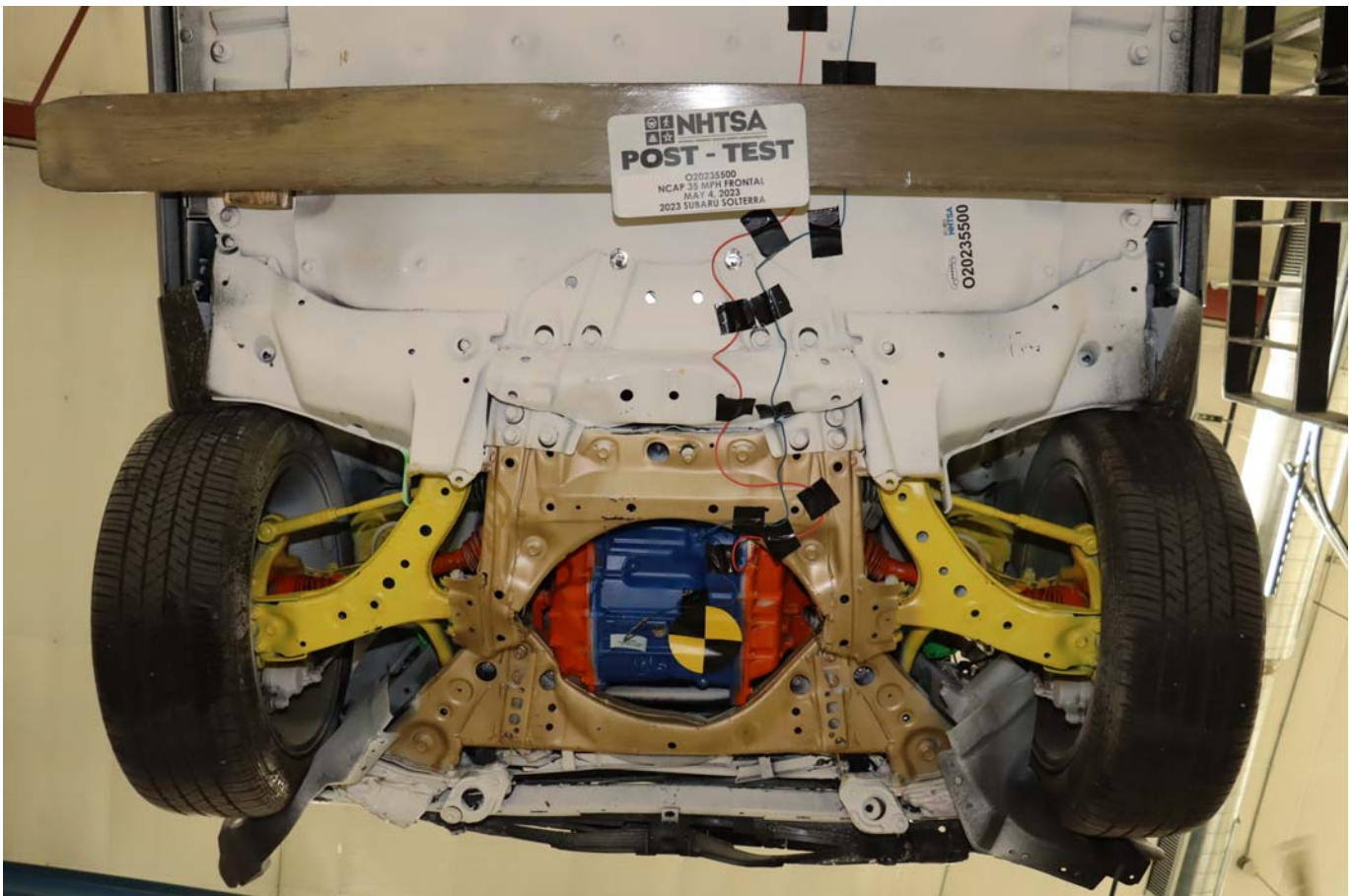


Photo No. 305-17 - Post-Impact View of Electric Propulsion Drive



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)

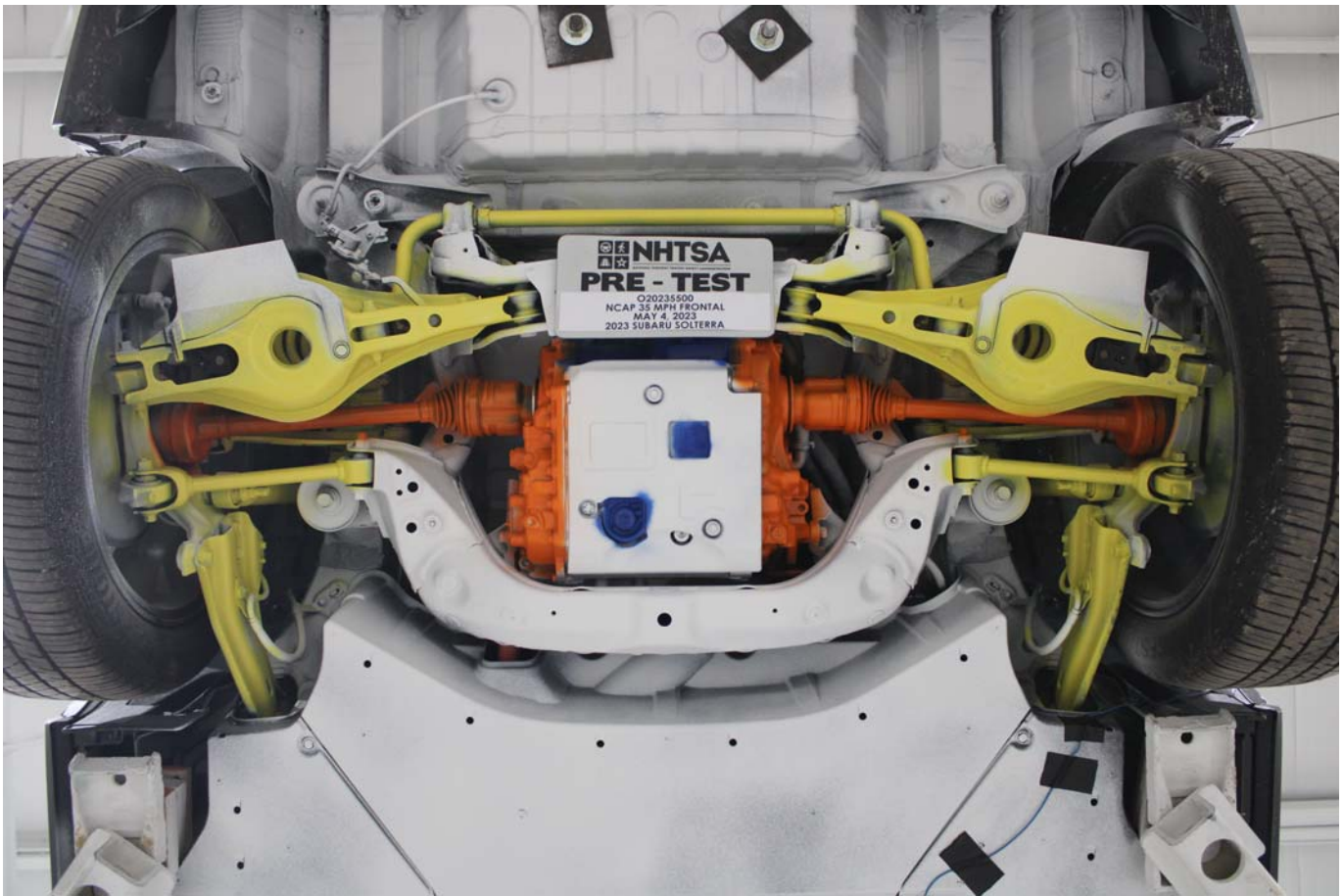


Photo No. 305-20 - Pre-Impact View of Other Visible Electric Propulsion Components



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



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

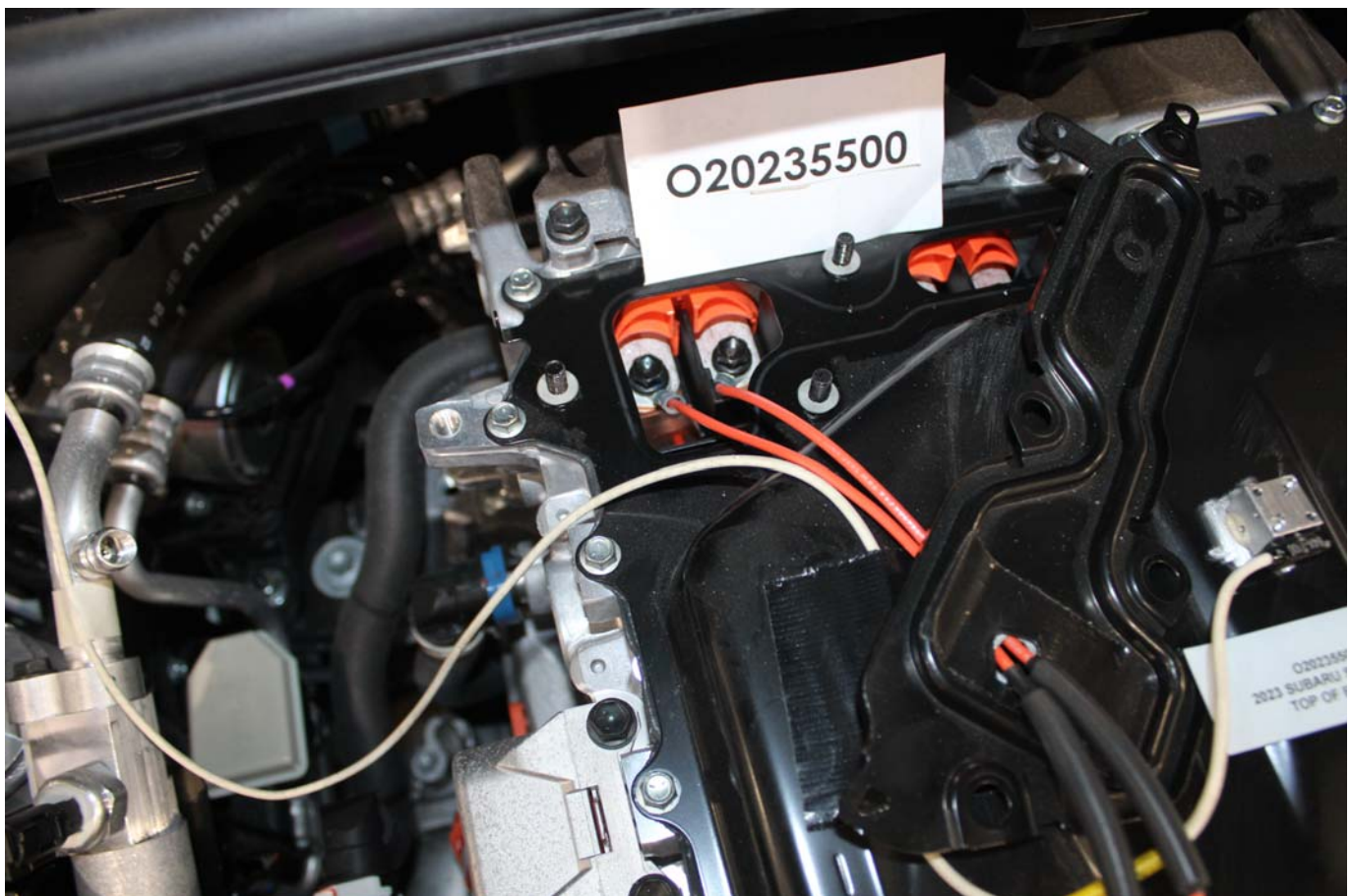


Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached



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



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

PHOTOGRAPH NOT AVAILABLE

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

PHOTOGRAPH NOT AVAILABLE

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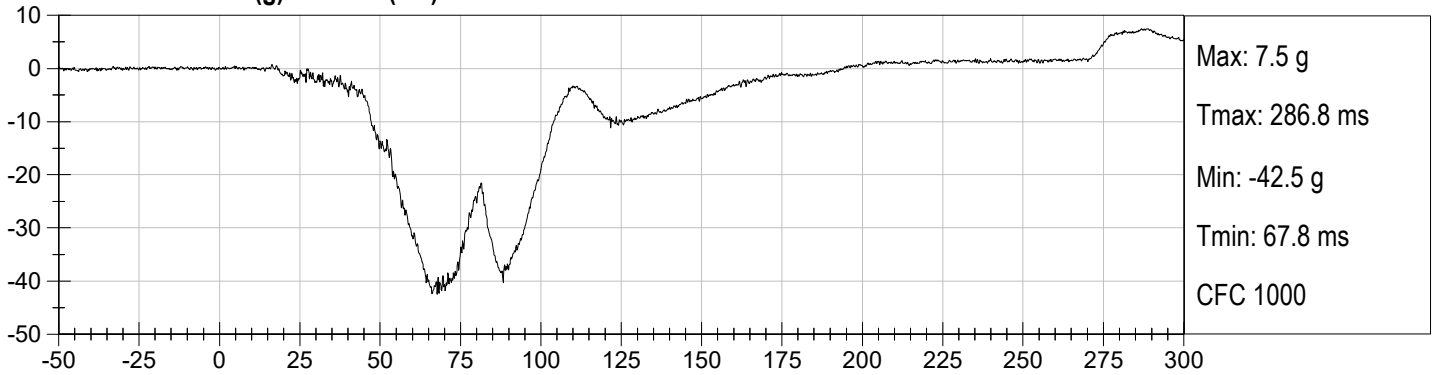
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Head Angular Velocity X
 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
 Driver Pelvis Z
 Driver Left Femur Redundant
 Driver Right Femur Redundant
 Driver Left Upper Tibia Moment X
 Driver Left Upper Tibia Moment Y

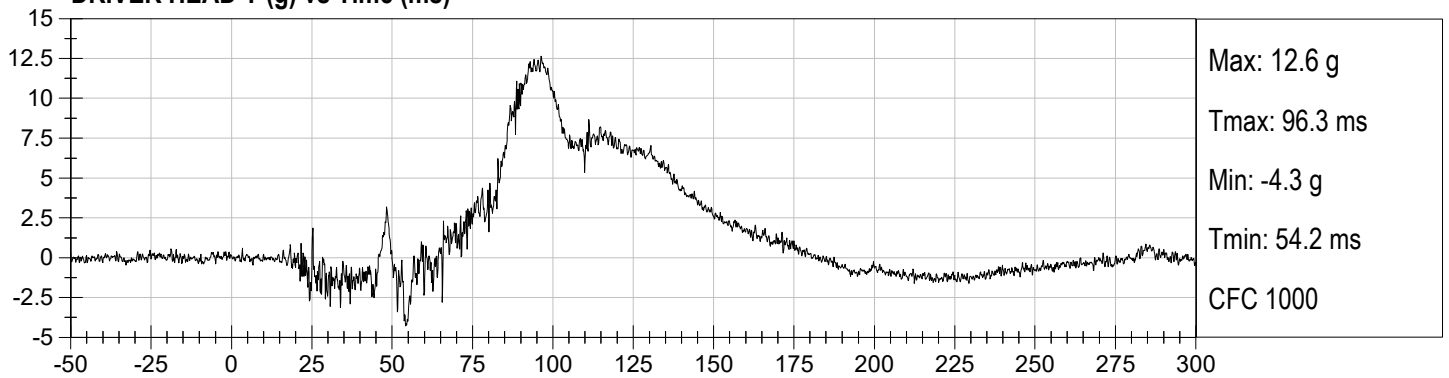
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Lap Belt Force
Driver Shoulder Belt Force
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
Passenger Upper Neck Force Y
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
Passenger Chest X Redundant
Passenger Chest Y Redundant
Passenger Chest Z Redundant
Passenger Pelvis X
Passenger Pelvis Y

Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Lap Belt Force
Passenger Shoulder Belt Force
Left Rear Seat Crossmember X
Right Rear Seat Crossmember X
Vehicle Engine Top X
Vehicle Engine Bottom X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember Xr
Right Rear Seat Crossmember Xr
Advanced Research Load Cell Barrier – 528 channels

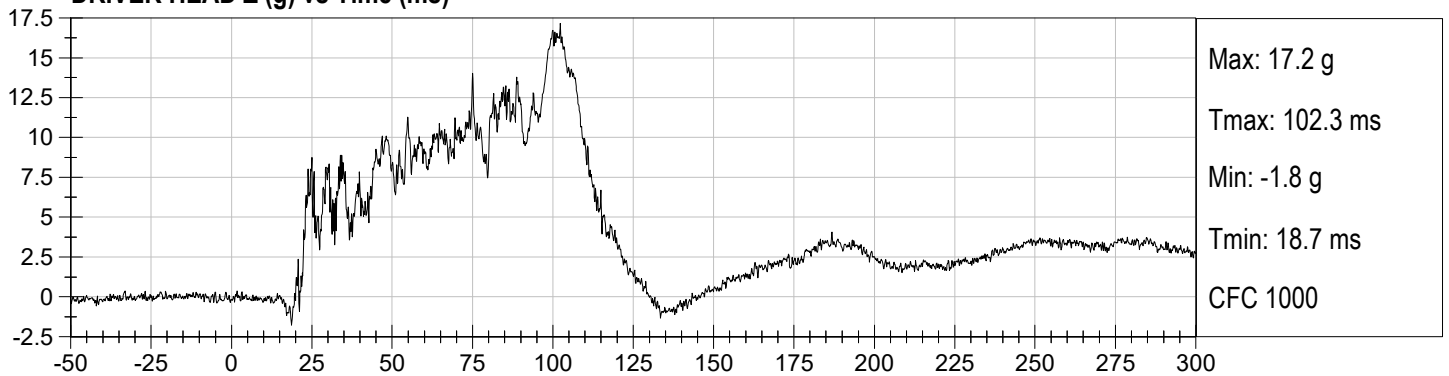
DRIVER HEAD X (g) vs Time (ms)



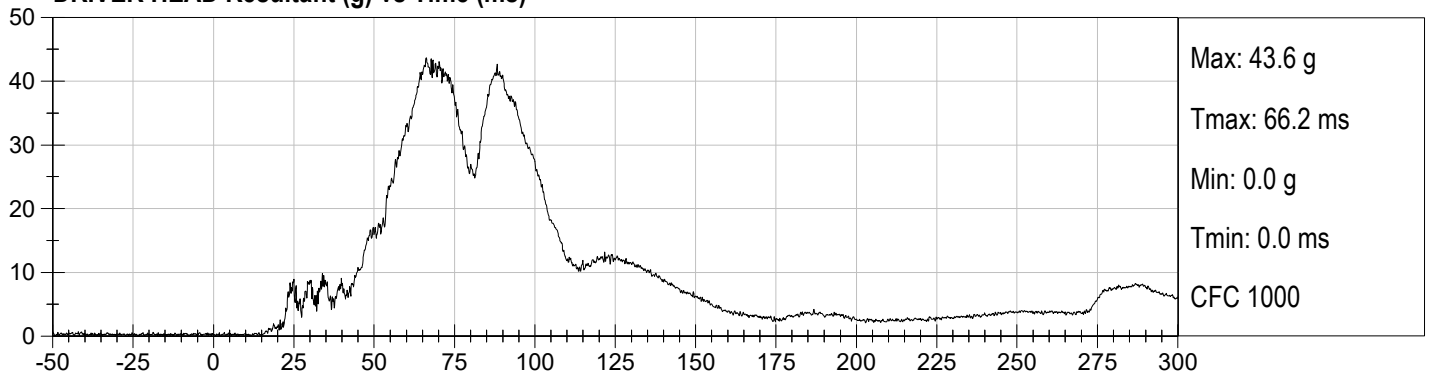
DRIVER HEAD Y (g) vs Time (ms)

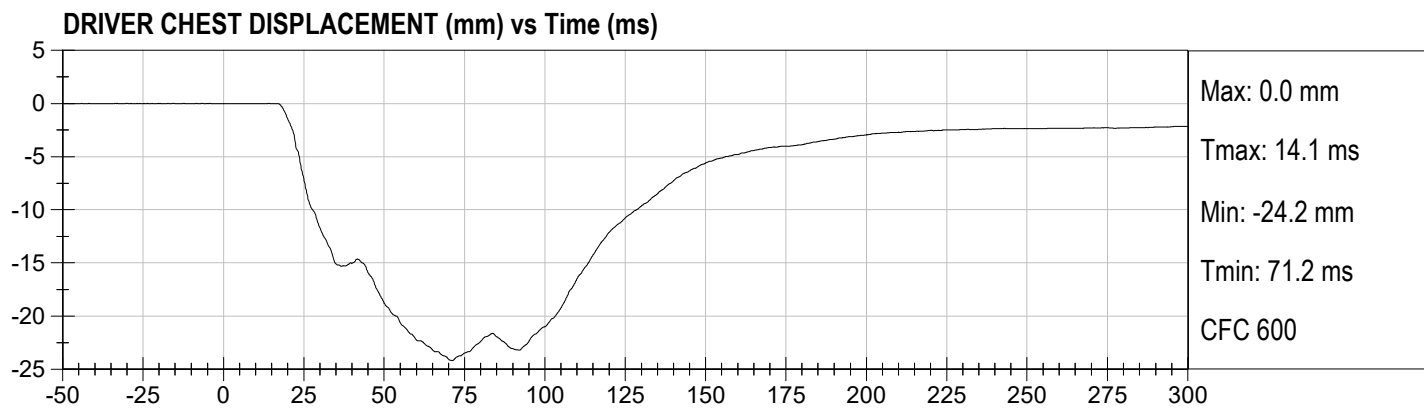


DRIVER HEAD Z (g) vs Time (ms)

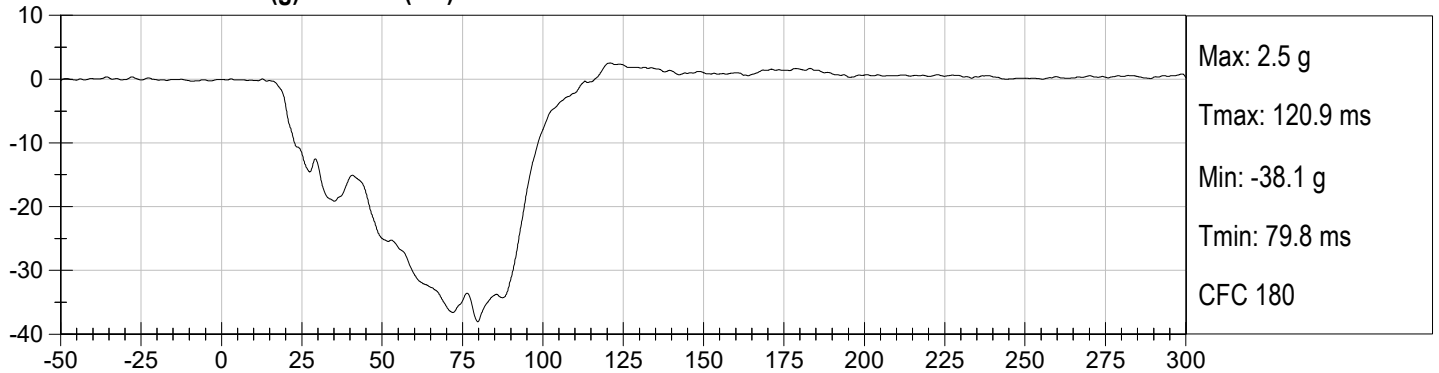


DRIVER HEAD Resultant (g) vs Time (ms)

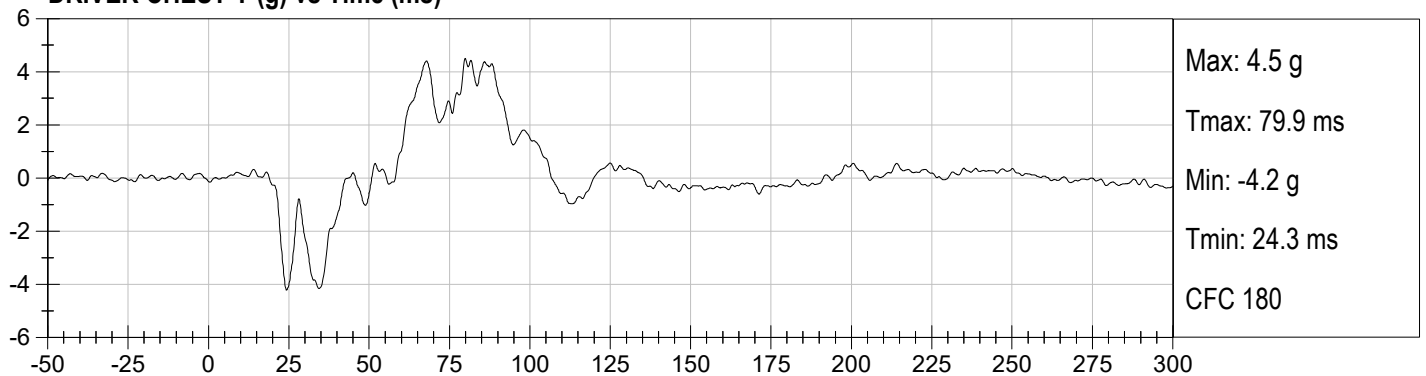




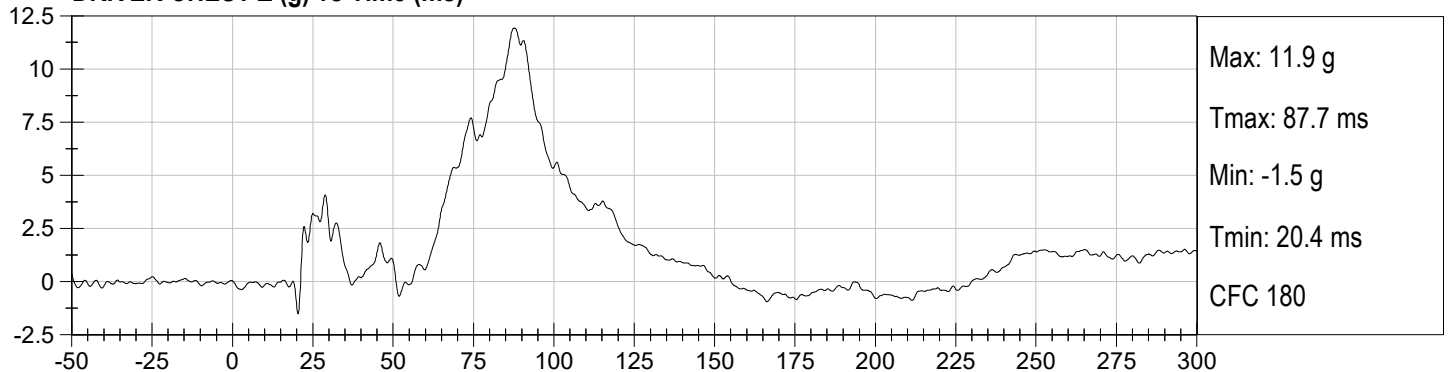
DRIVER CHEST X (g) vs Time (ms)



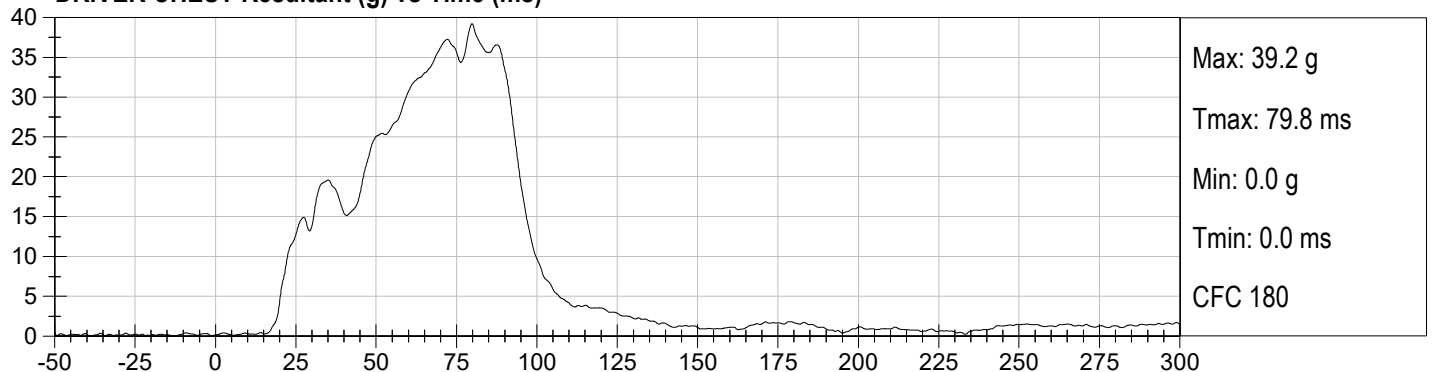
DRIVER CHEST Y (g) vs Time (ms)



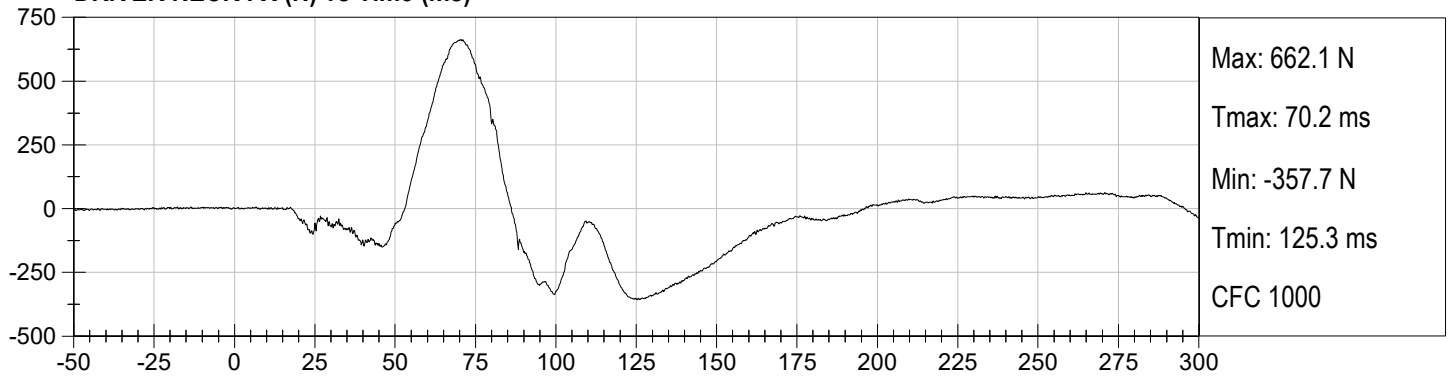
DRIVER CHEST Z (g) vs Time (ms)



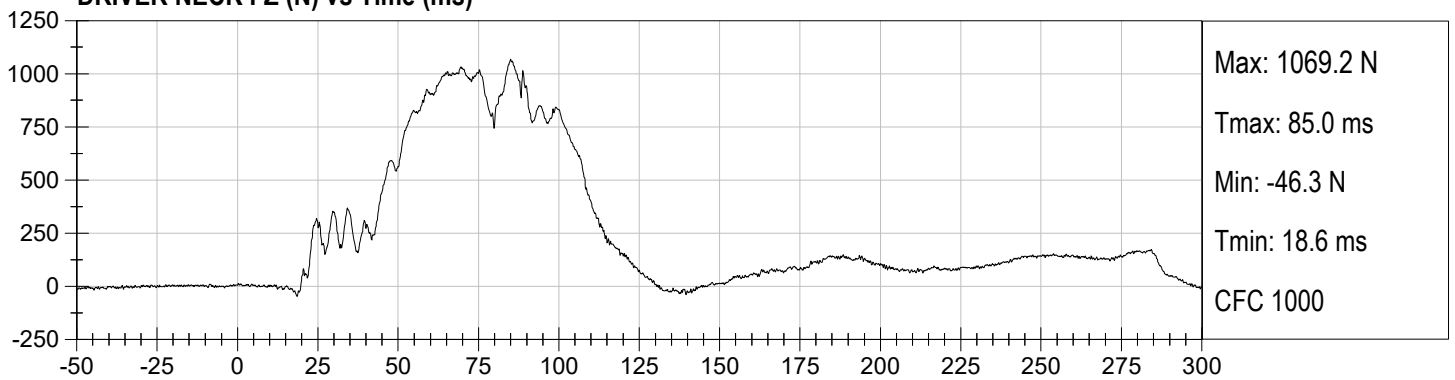
DRIVER CHEST Resultant (g) vs Time (ms)



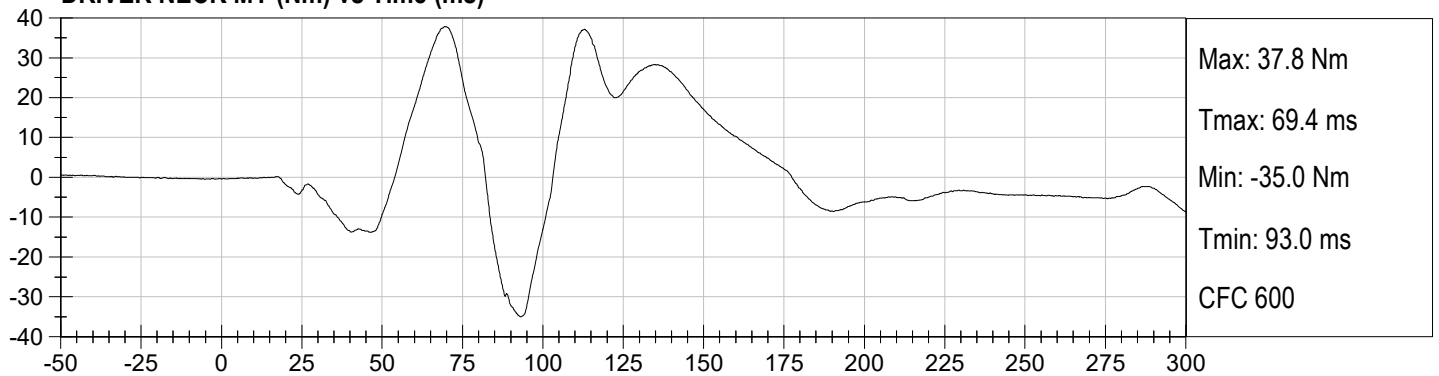
DRIVER NECK FX (N) vs Time (ms)



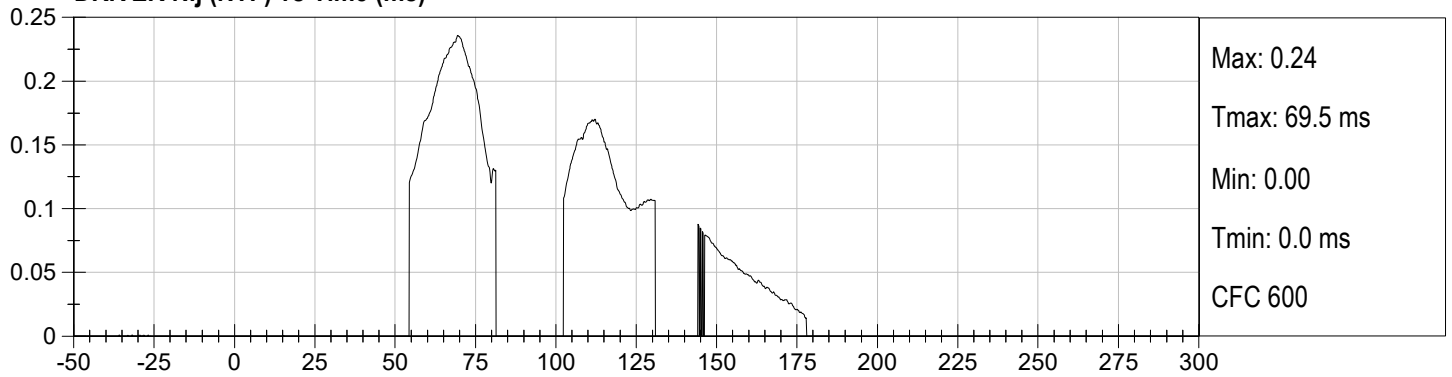
DRIVER NECK FZ (N) vs Time (ms)



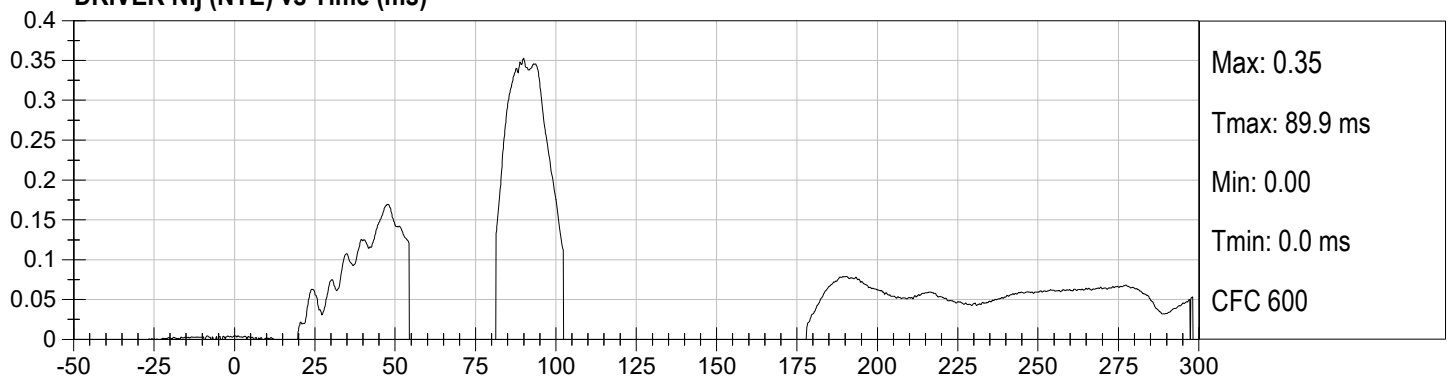
DRIVER NECK MY (Nm) vs Time (ms)



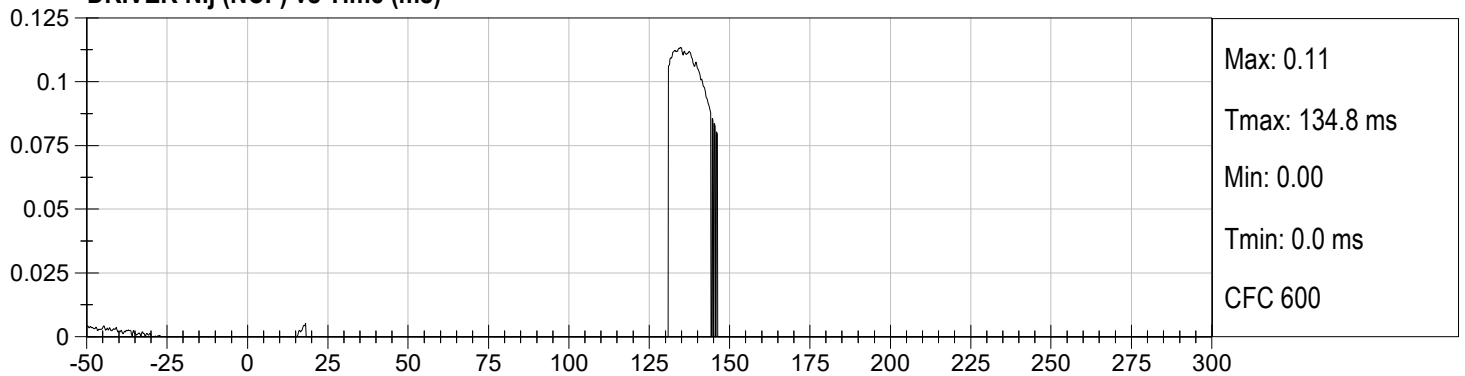
DRIVER Nij (NTF) vs Time (ms)



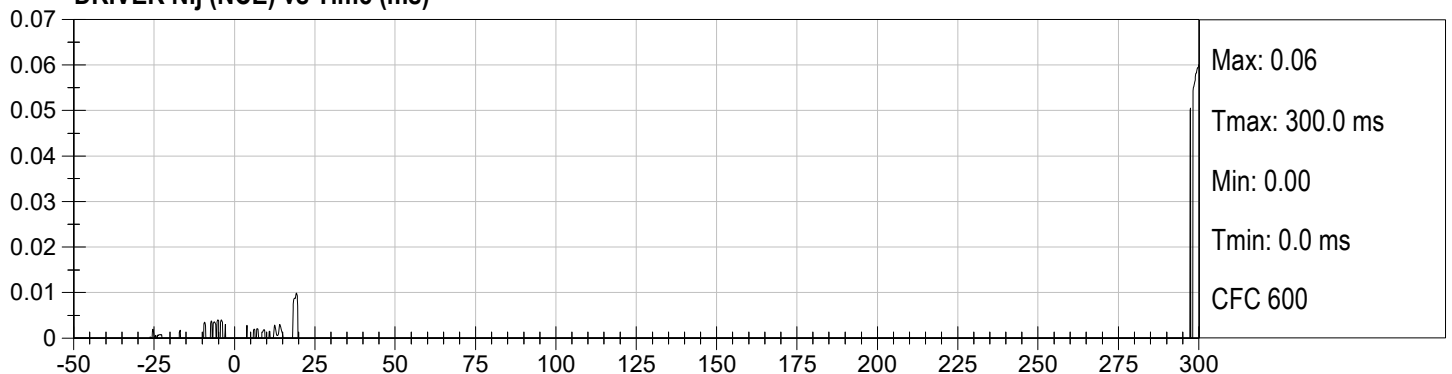
DRIVER Nij (NTE) vs Time (ms)



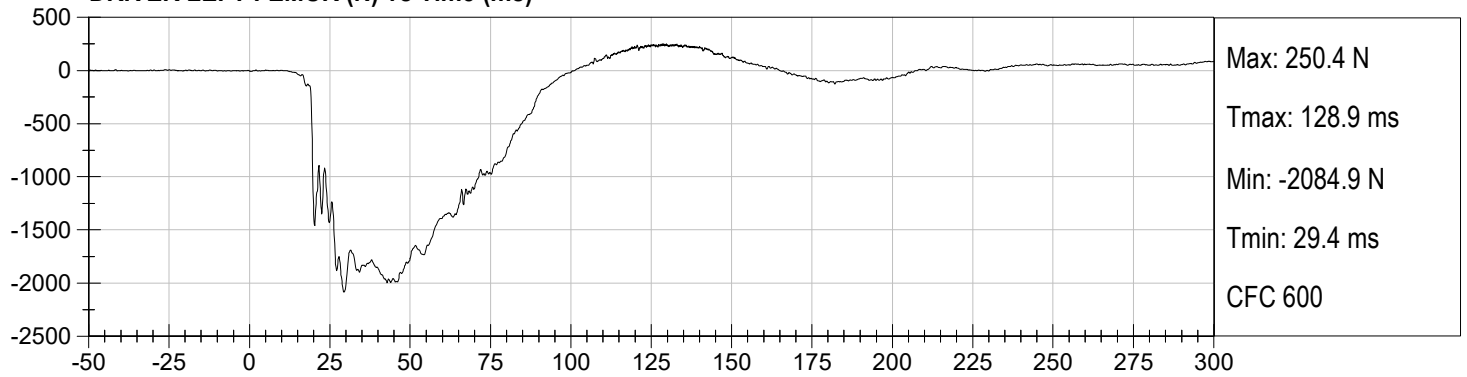
DRIVER Nij (NCF) vs Time (ms)



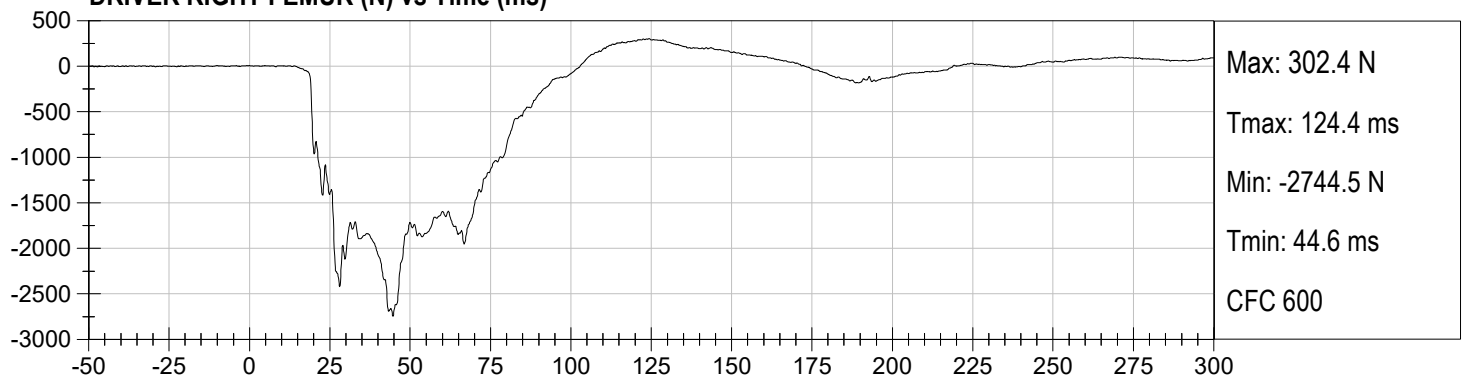
DRIVER Nij (NCE) vs Time (ms)



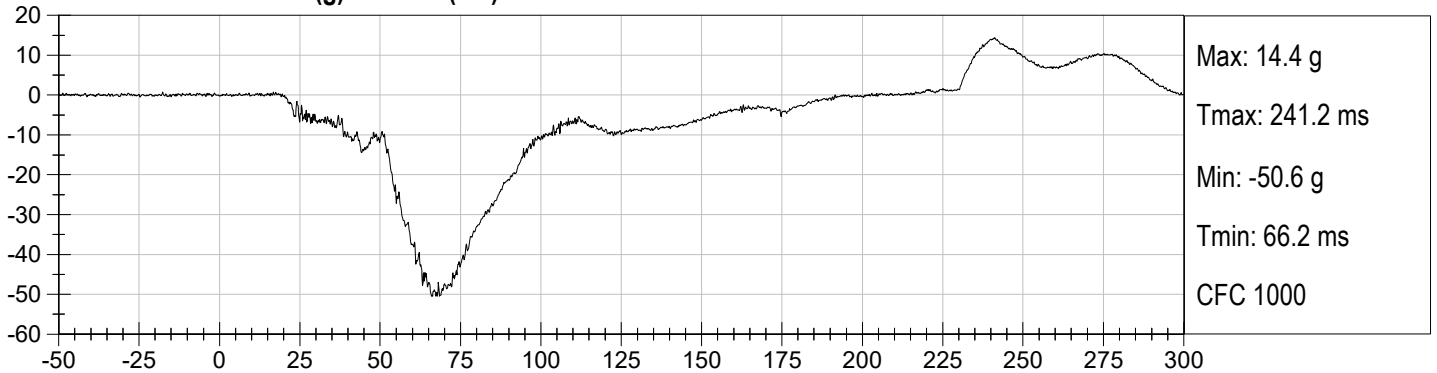
DRIVER LEFT FEMUR (N) vs Time (ms)



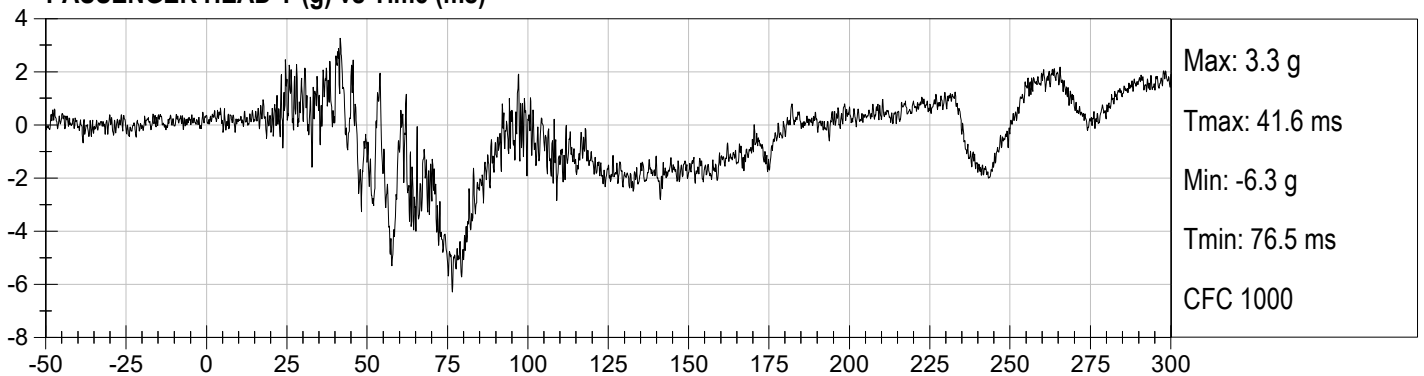
DRIVER RIGHT FEMUR (N) vs Time (ms)



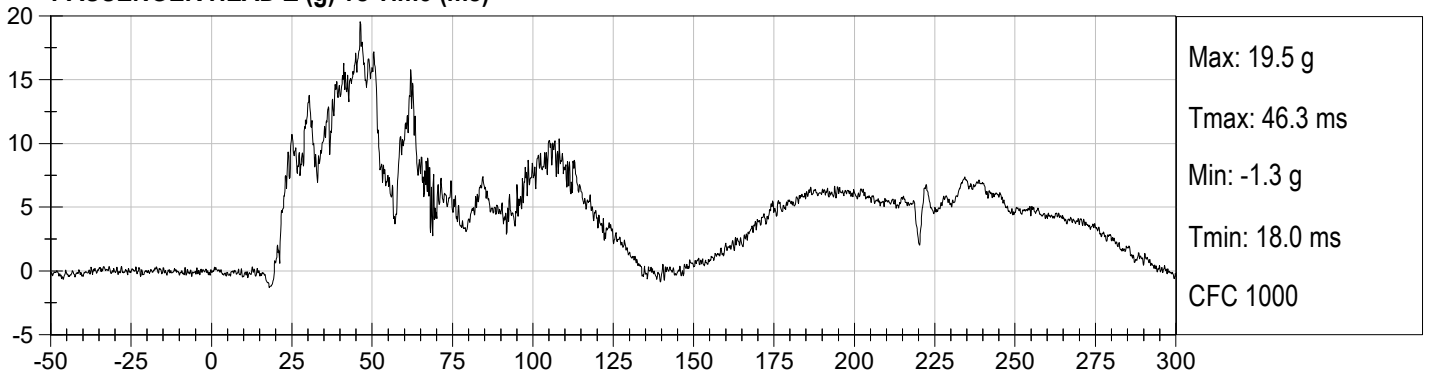
PASSENGER HEAD X (g) vs Time (ms)



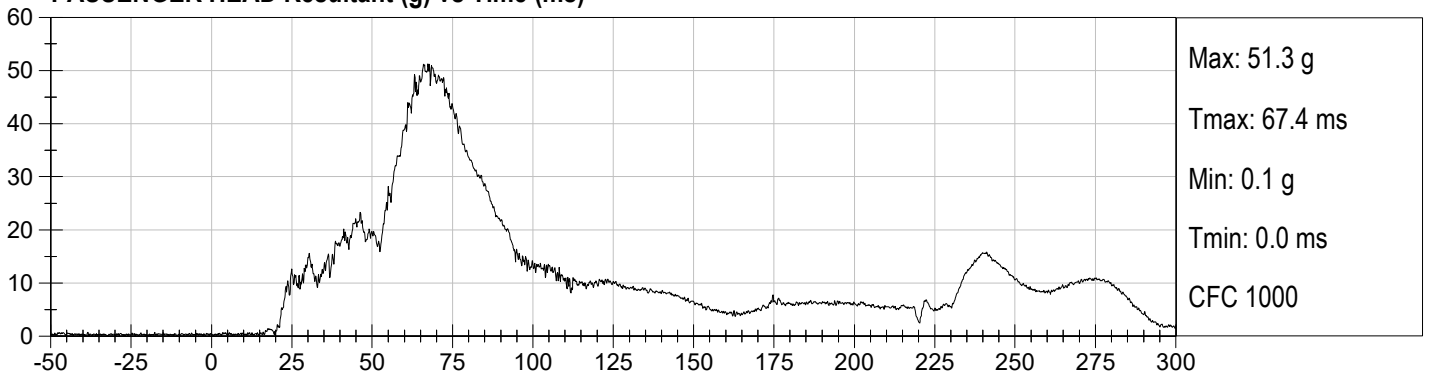
PASSENGER HEAD Y (g) vs Time (ms)

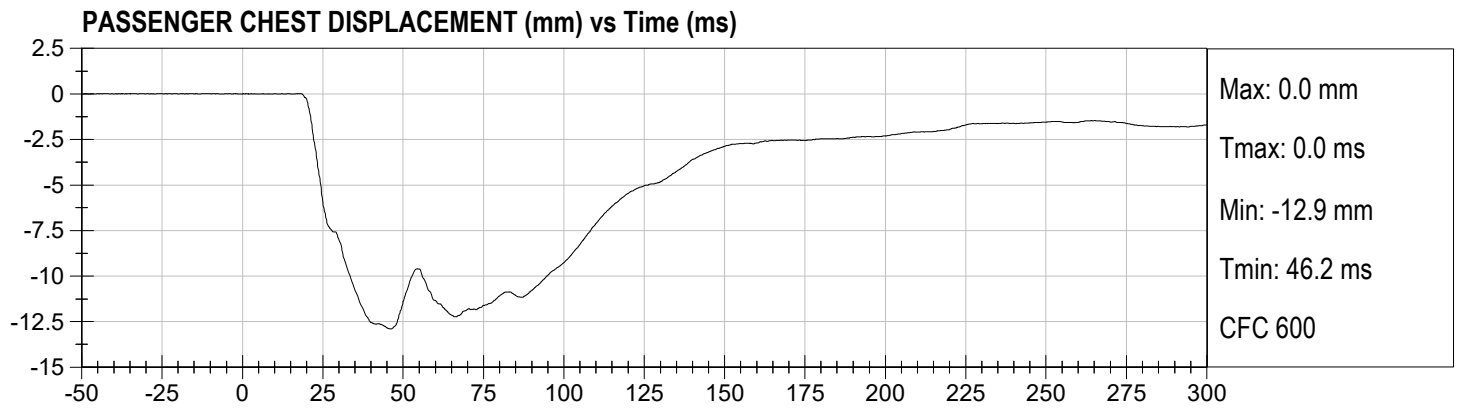


PASSENGER HEAD Z (g) vs Time (ms)

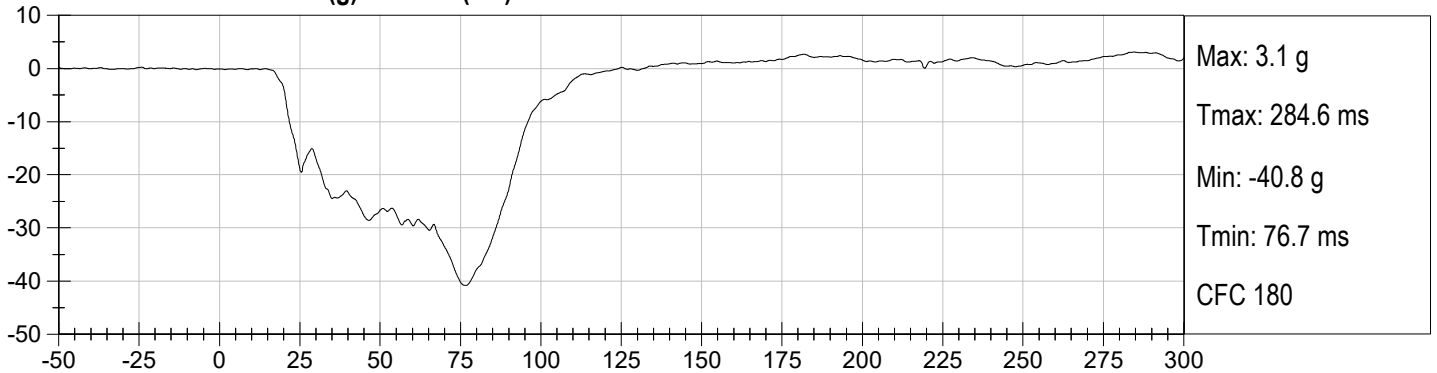


PASSENGER HEAD Resultant (g) vs Time (ms)

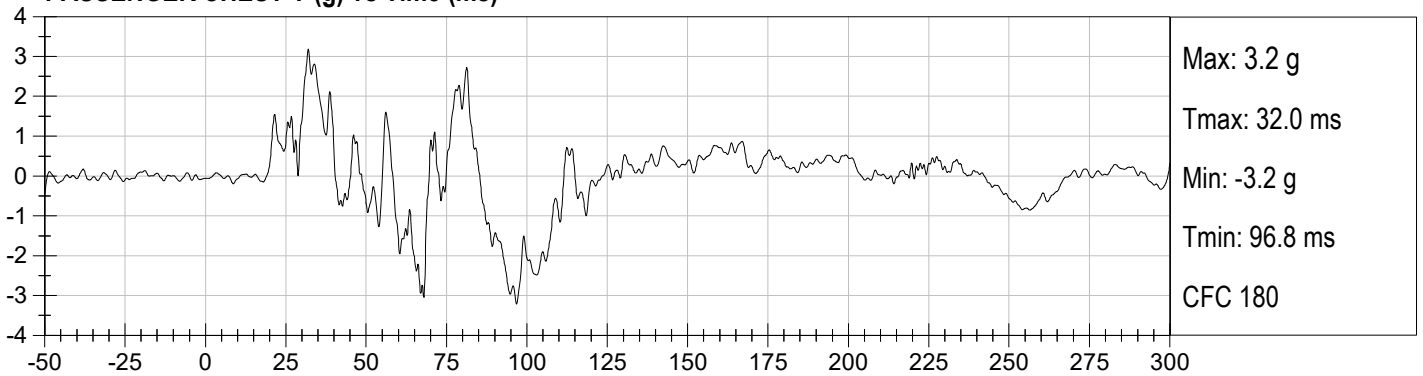




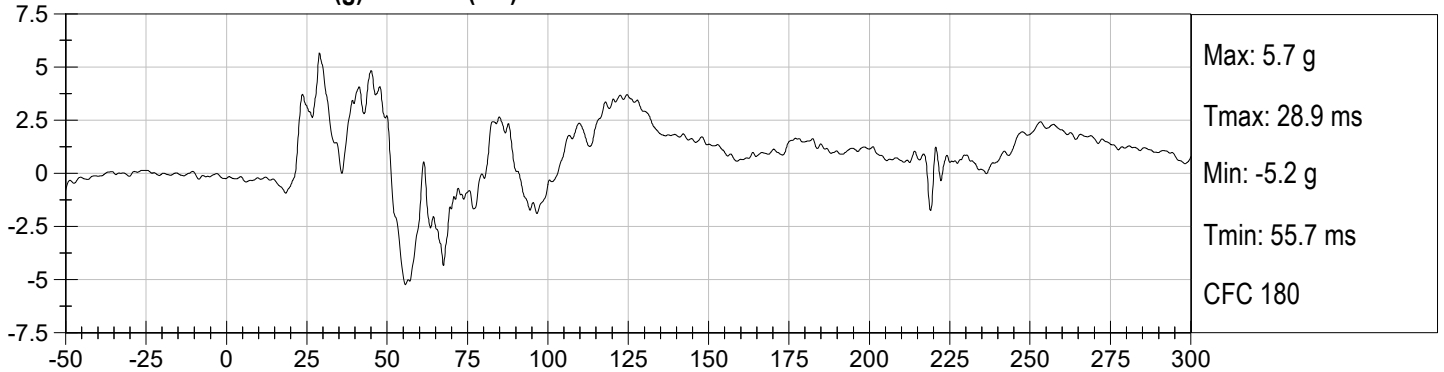
PASSENGER CHEST X (g) vs Time (ms)



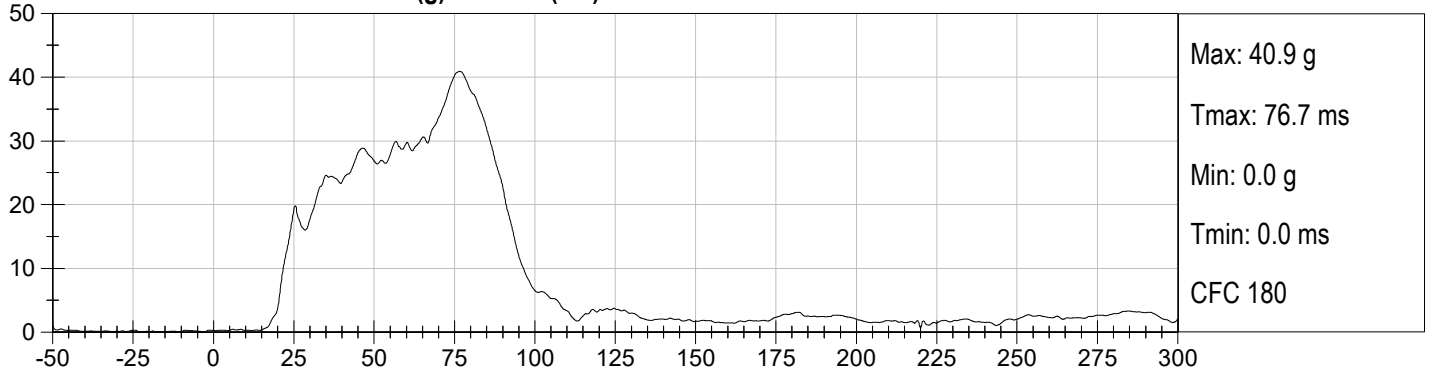
PASSENGER CHEST Y (g) vs Time (ms)



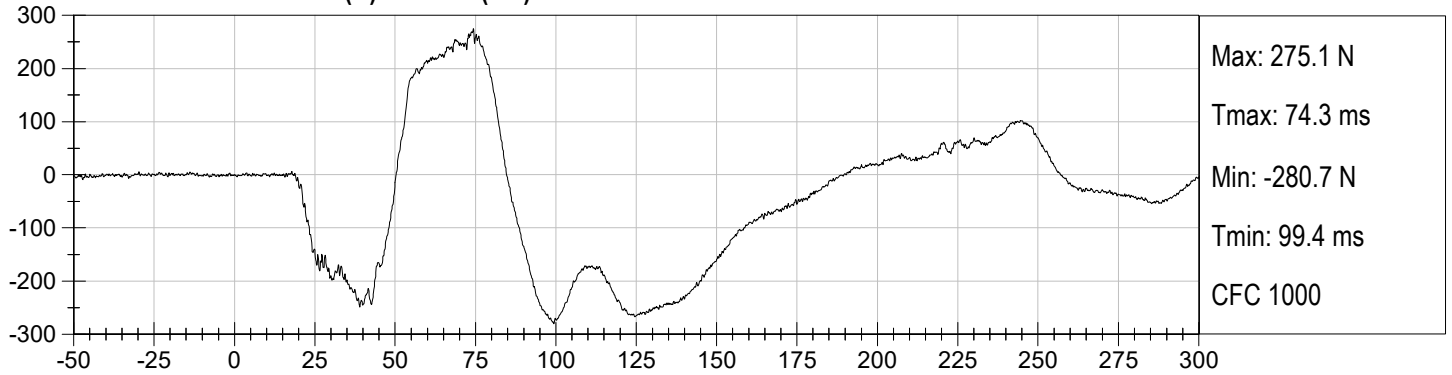
PASSENGER CHEST Z (g) vs Time (ms)



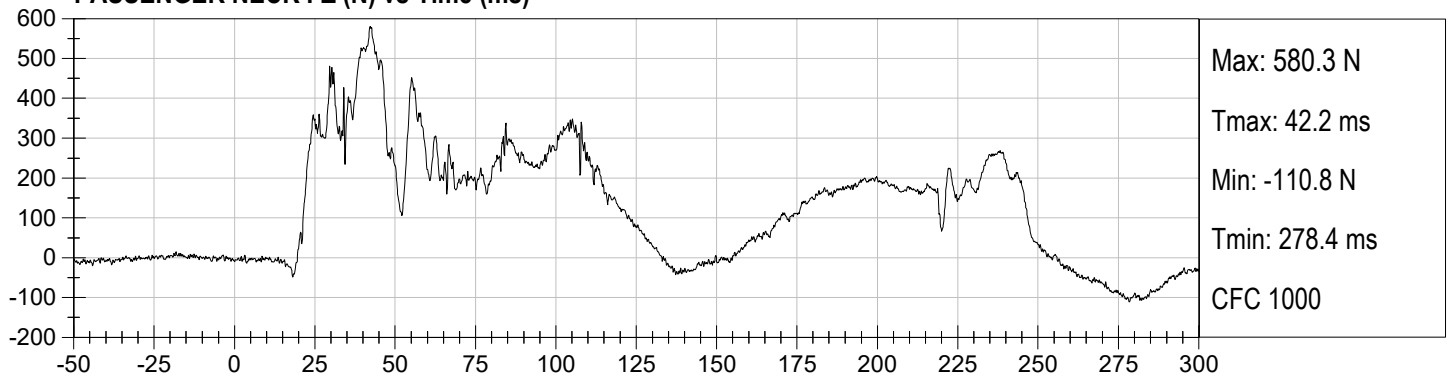
PASSENGER CHEST Resultant (g) vs Time (ms)



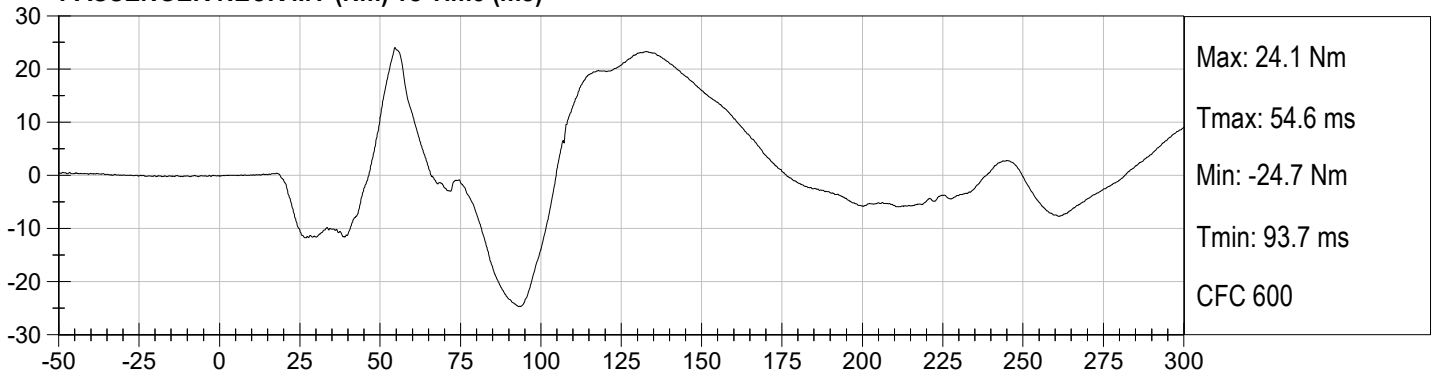
PASSENGER NECK FX (N) vs Time (ms)



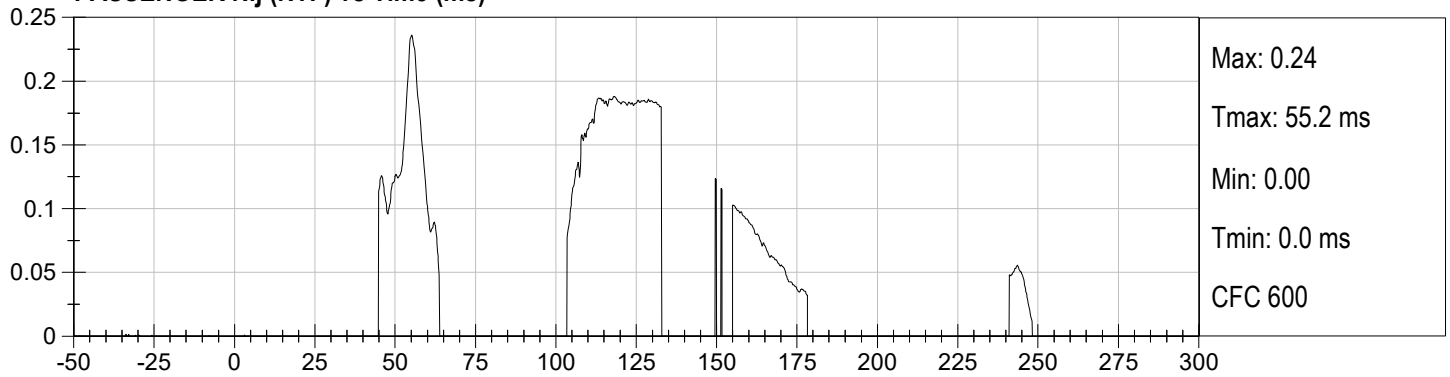
PASSENGER NECK FZ (N) vs Time (ms)



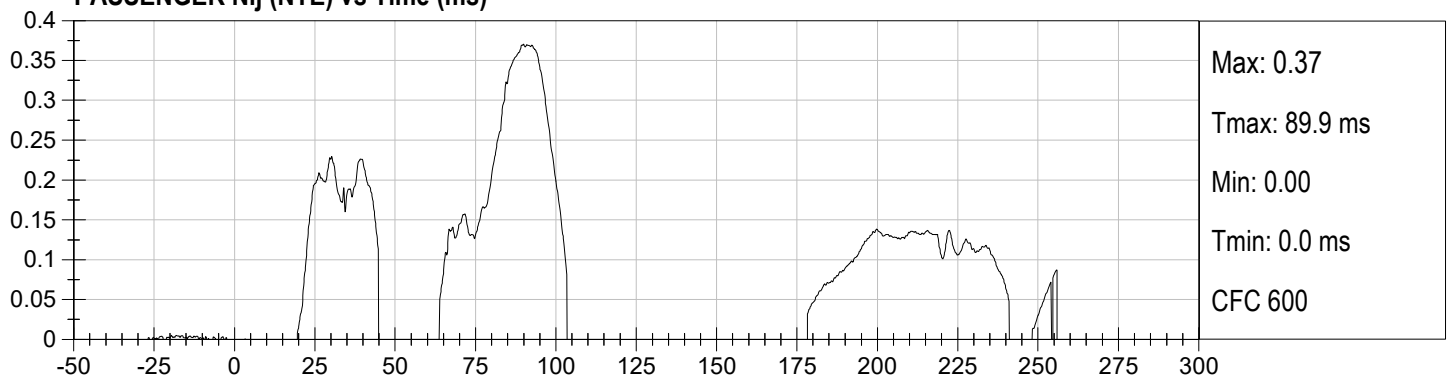
PASSENGER NECK MY (Nm) vs Time (ms)



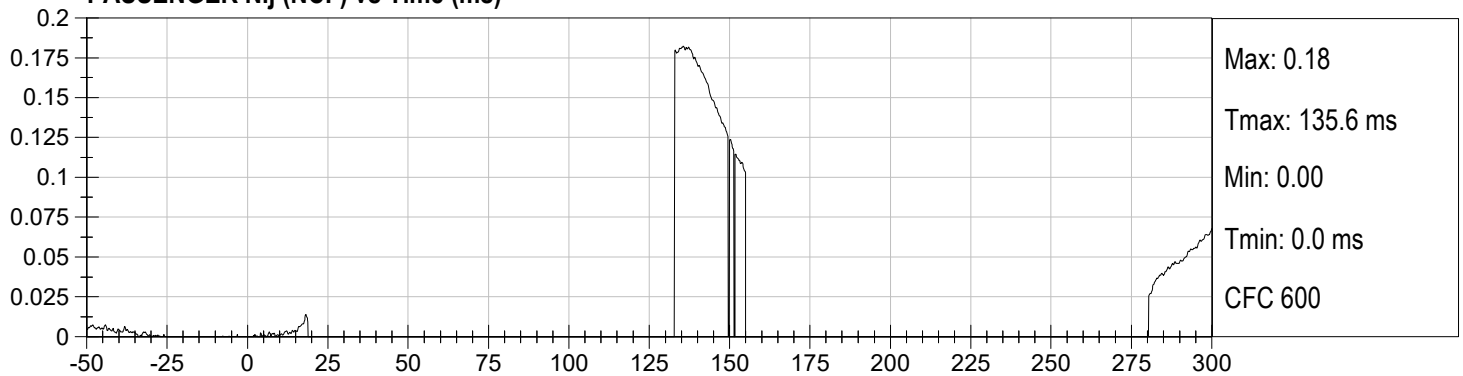
PASSENGER Nij (NTF) vs Time (ms)



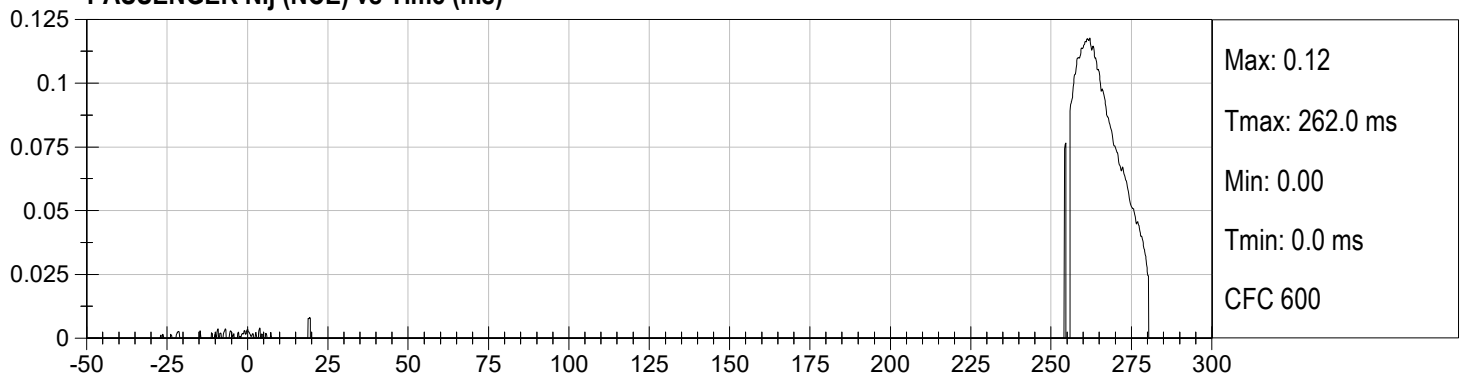
PASSENGER Nij (NTE) vs Time (ms)



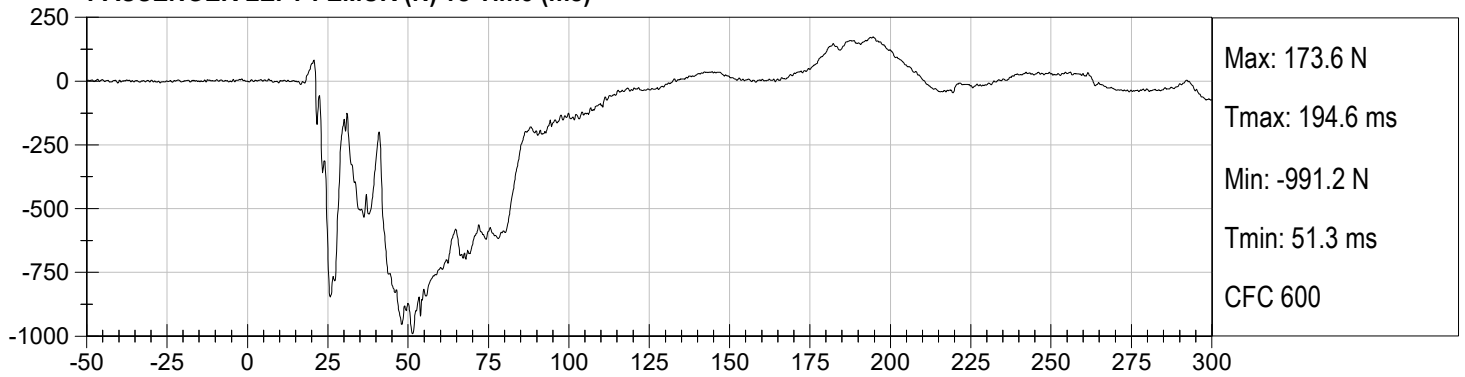
PASSENGER Nij (NCF) vs Time (ms)



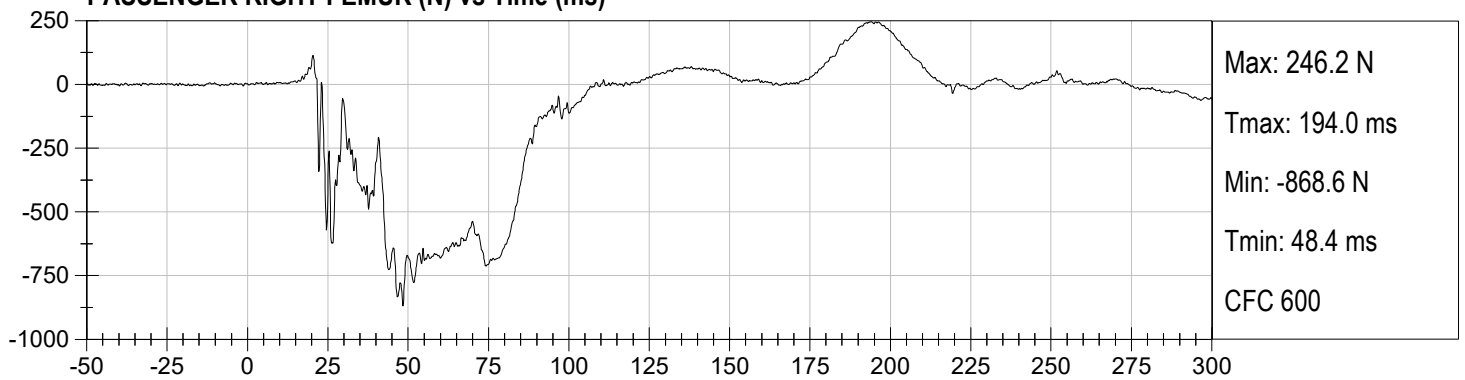
PASSENGER Nij (NCE) vs Time (ms)



PASSENGER LEFT FEMUR (N) vs Time (ms)



PASSENGER RIGHT FEMUR (N) vs Time (ms)



APPENDIX C
DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION

QUALIFICATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

Hybrid III, 50th External Measurements
SN: 351

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

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

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

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

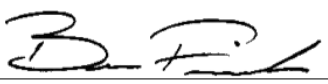
ATD Serial No: 351

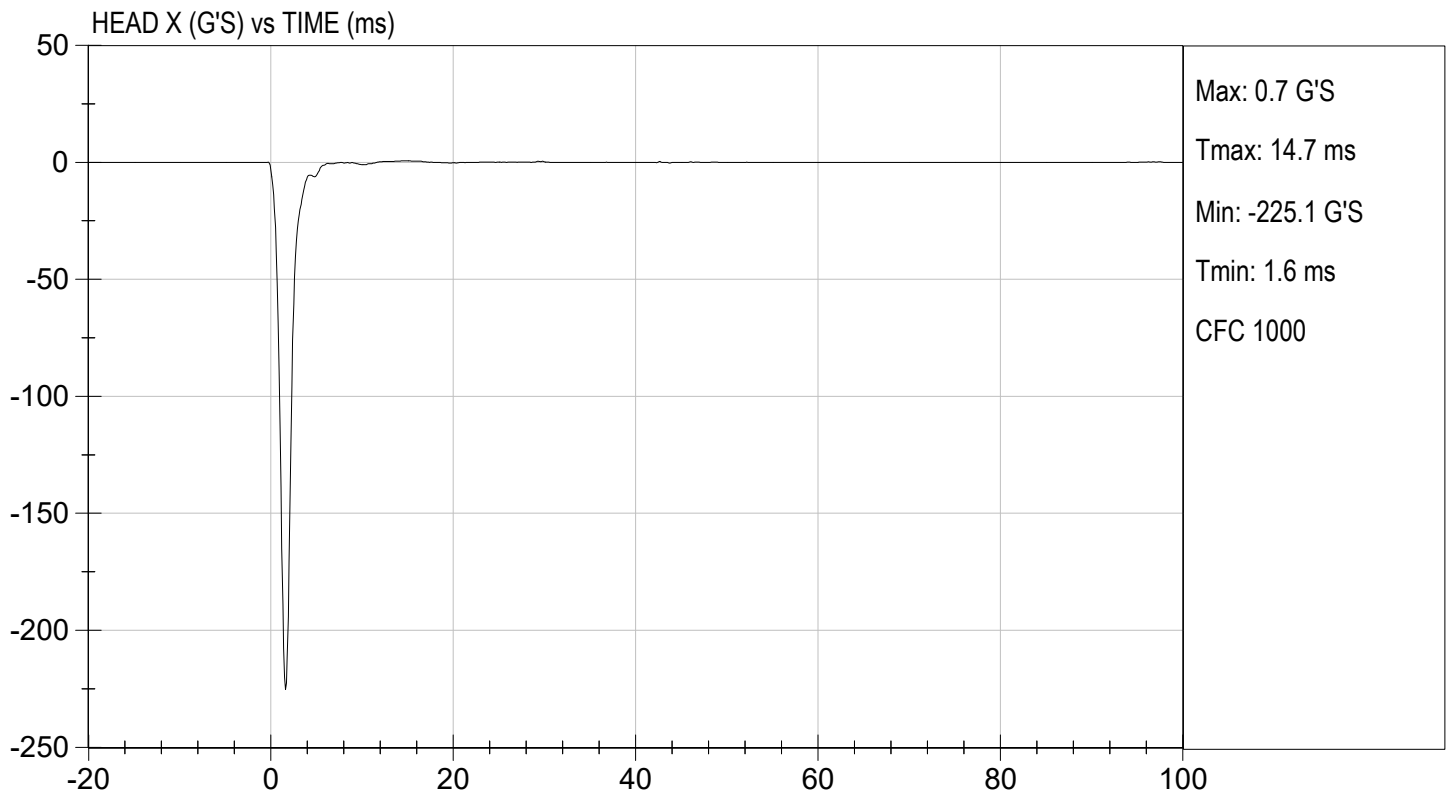
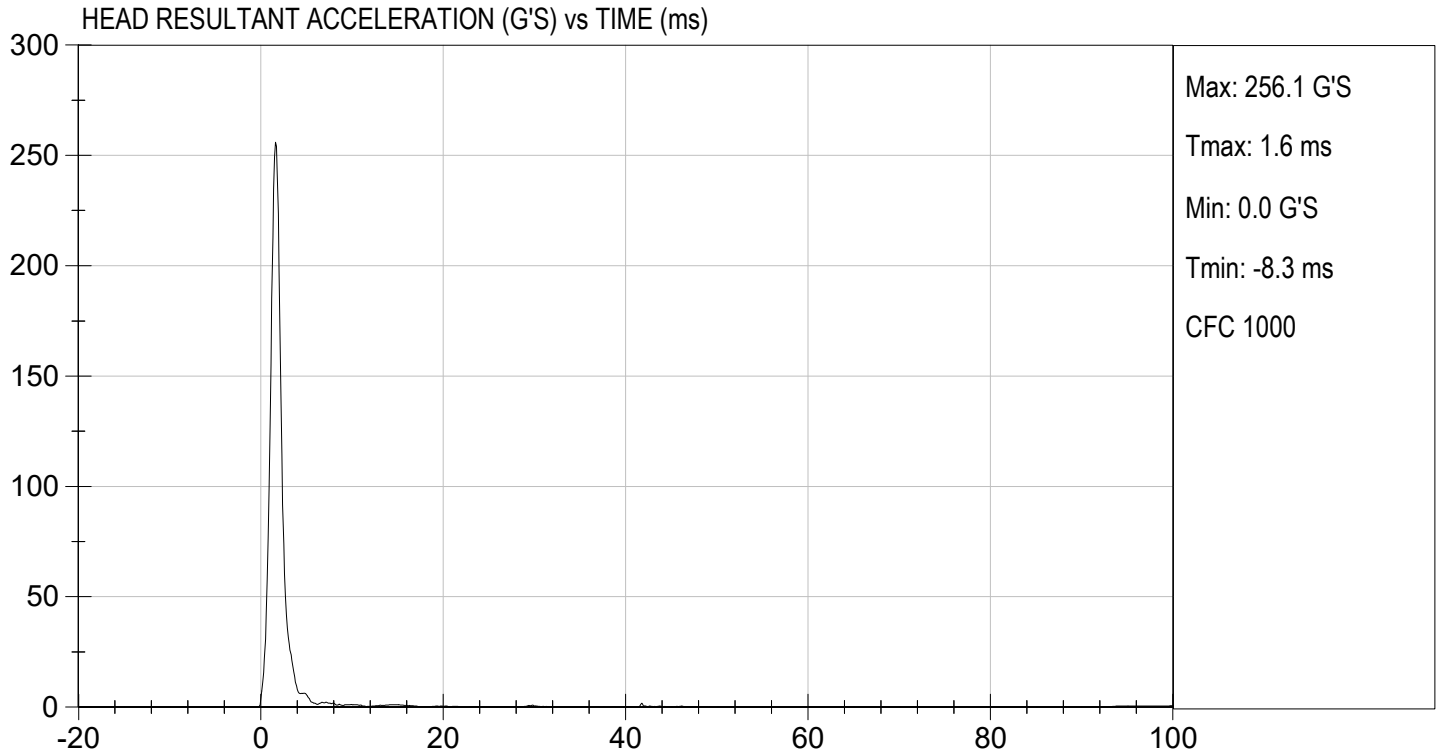
Test ID: D230941

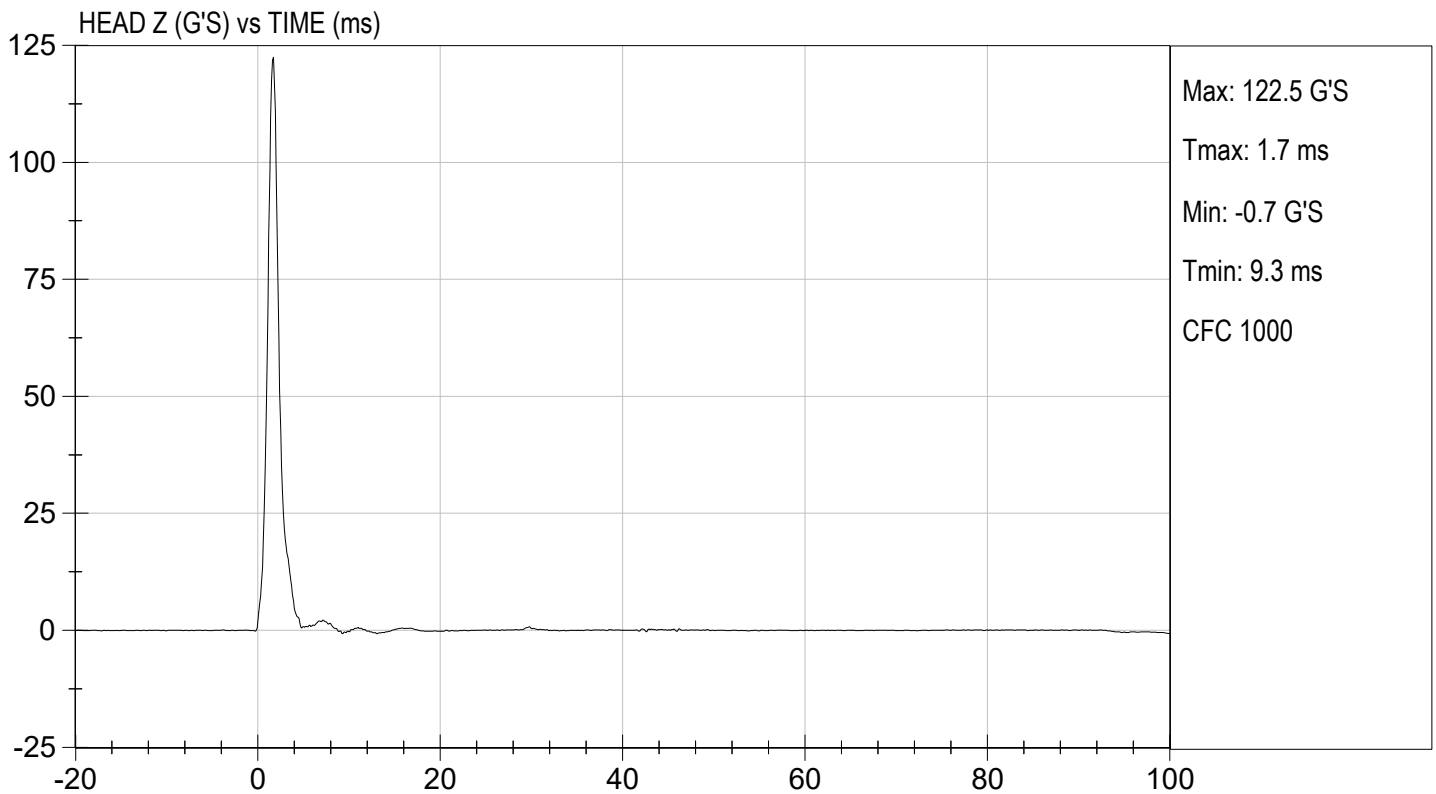
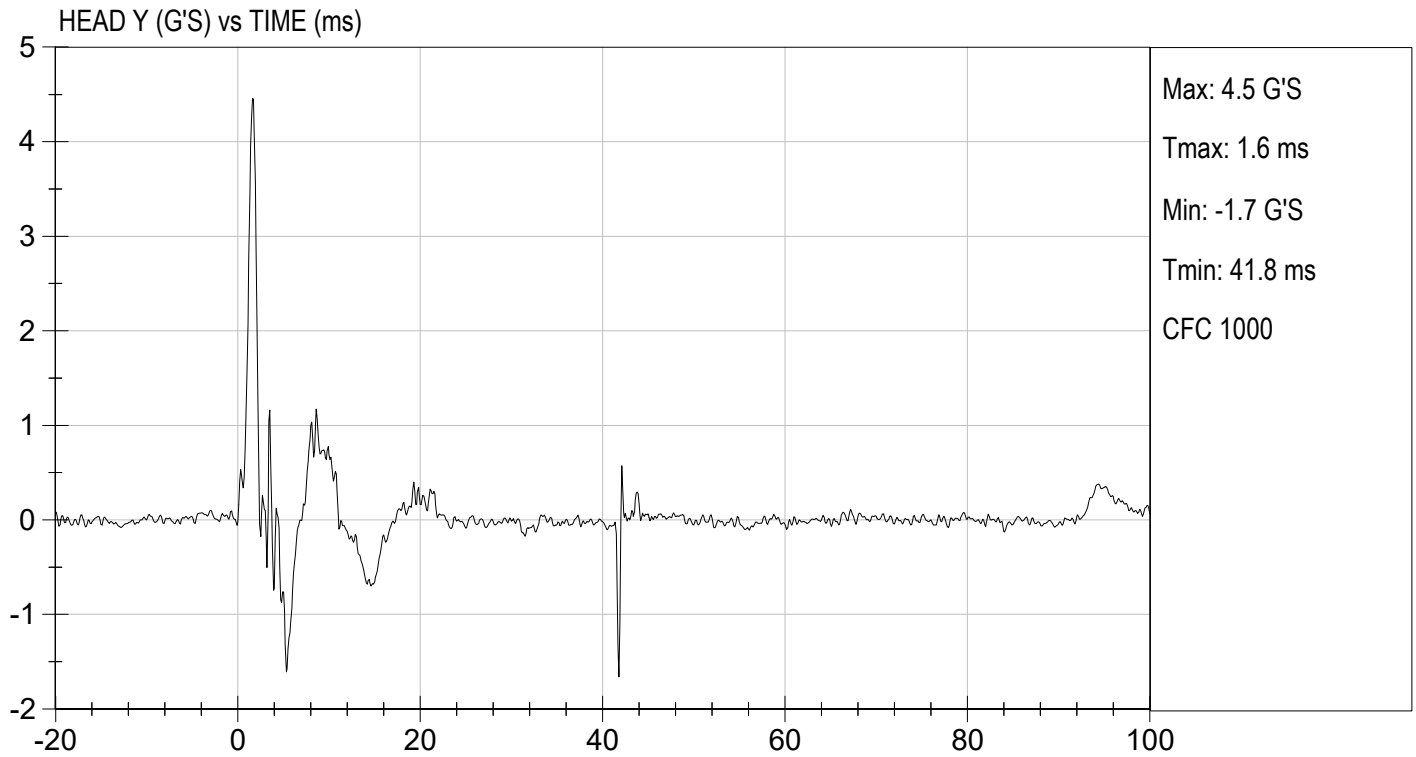
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Peak Resultant Acceleration	G's	225 to 275	256	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	4.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

04/12/2023
Test Date


Approved By



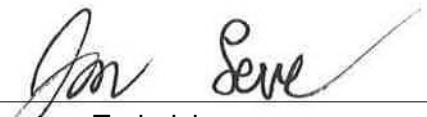


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

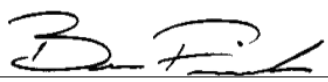
Test I.D: D230942

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
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	25.57	Pass
	20 ms	G's	17.60 to 22.60	19.28	Pass
	30 ms	G's	12.50 to 18.50	14.87	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.6	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	72.2	Pass
	Time	ms	57.0 to 64.0	59.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.1	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	91.6	Pass
	Time	ms	47.0 to 58.0	48.2	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.5	Pass
Overall Test Results					Pass


 Laboratory Technician

04/13/2023

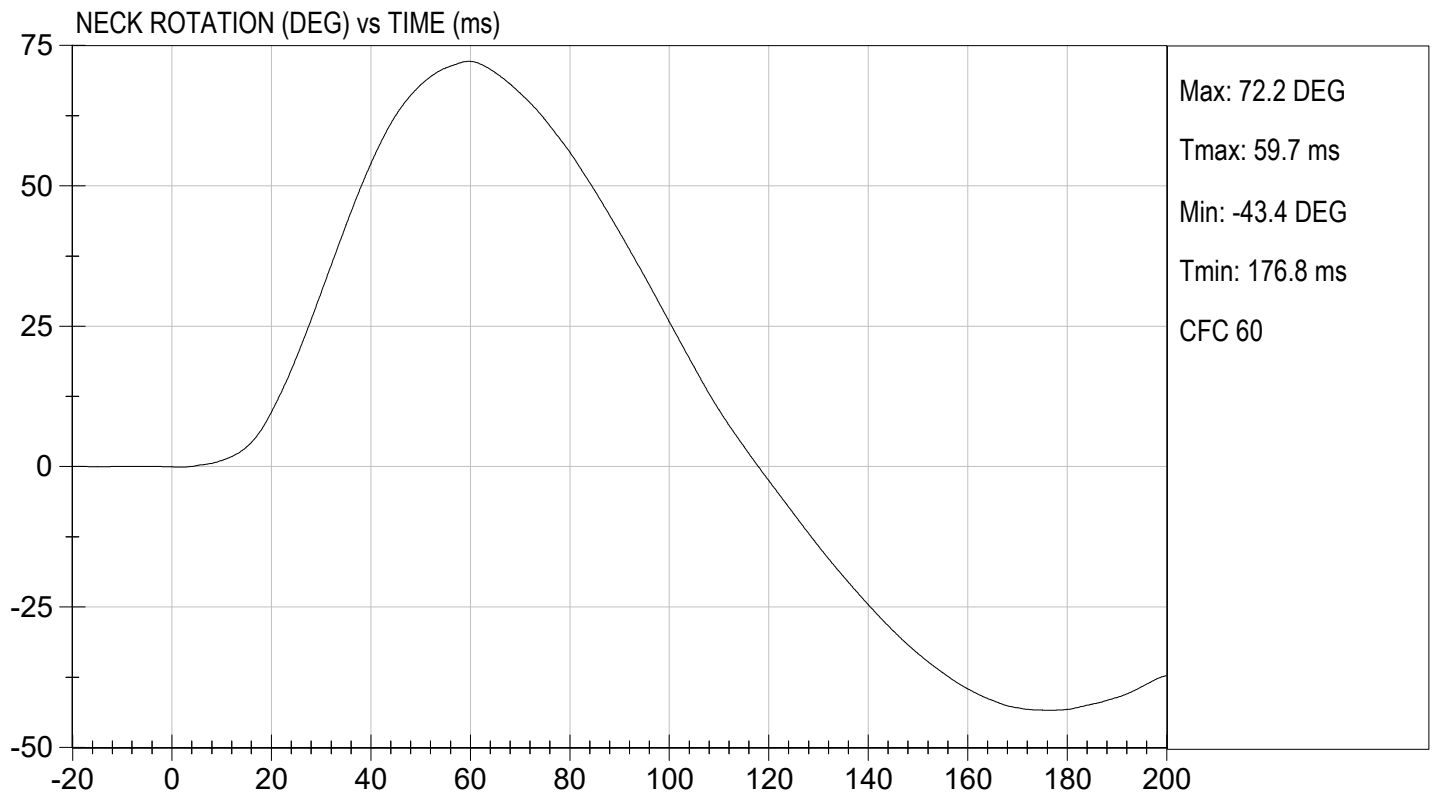
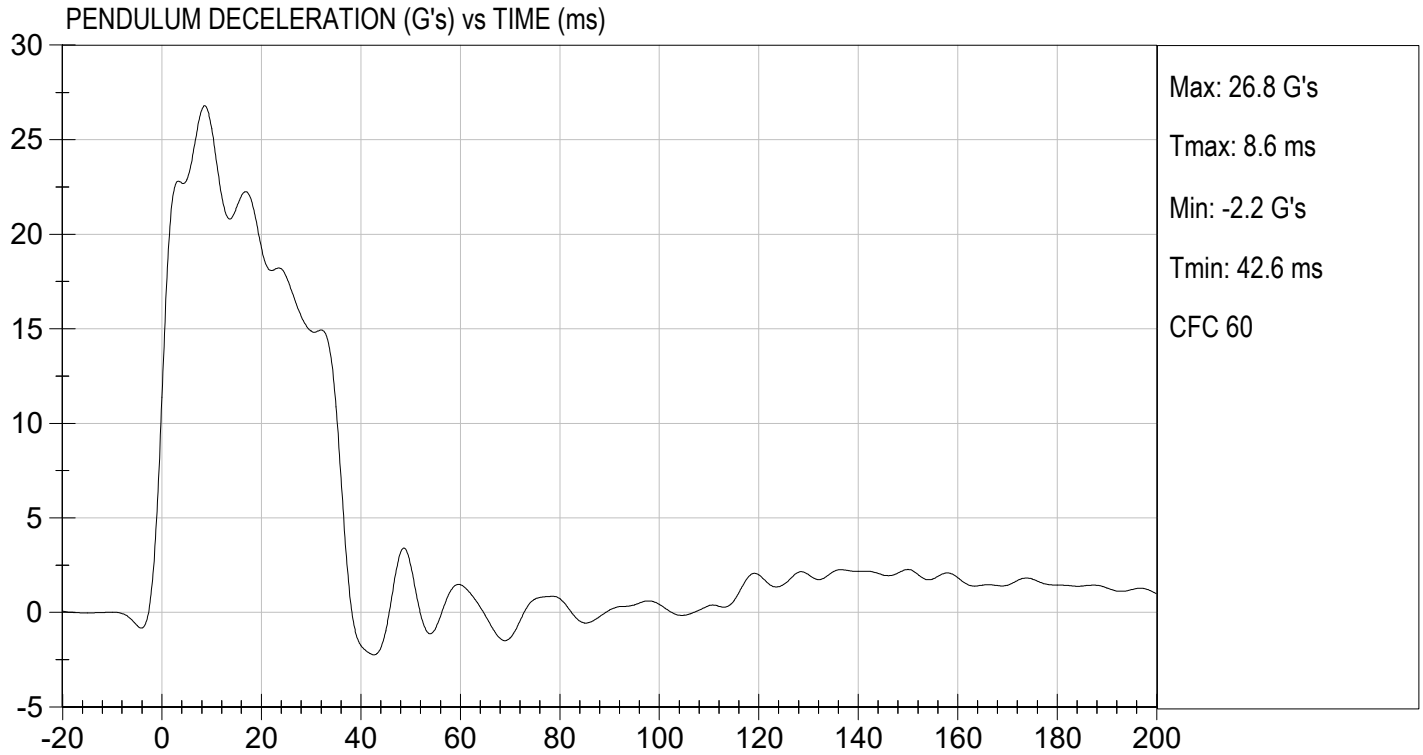
Test Date


 Approved By



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

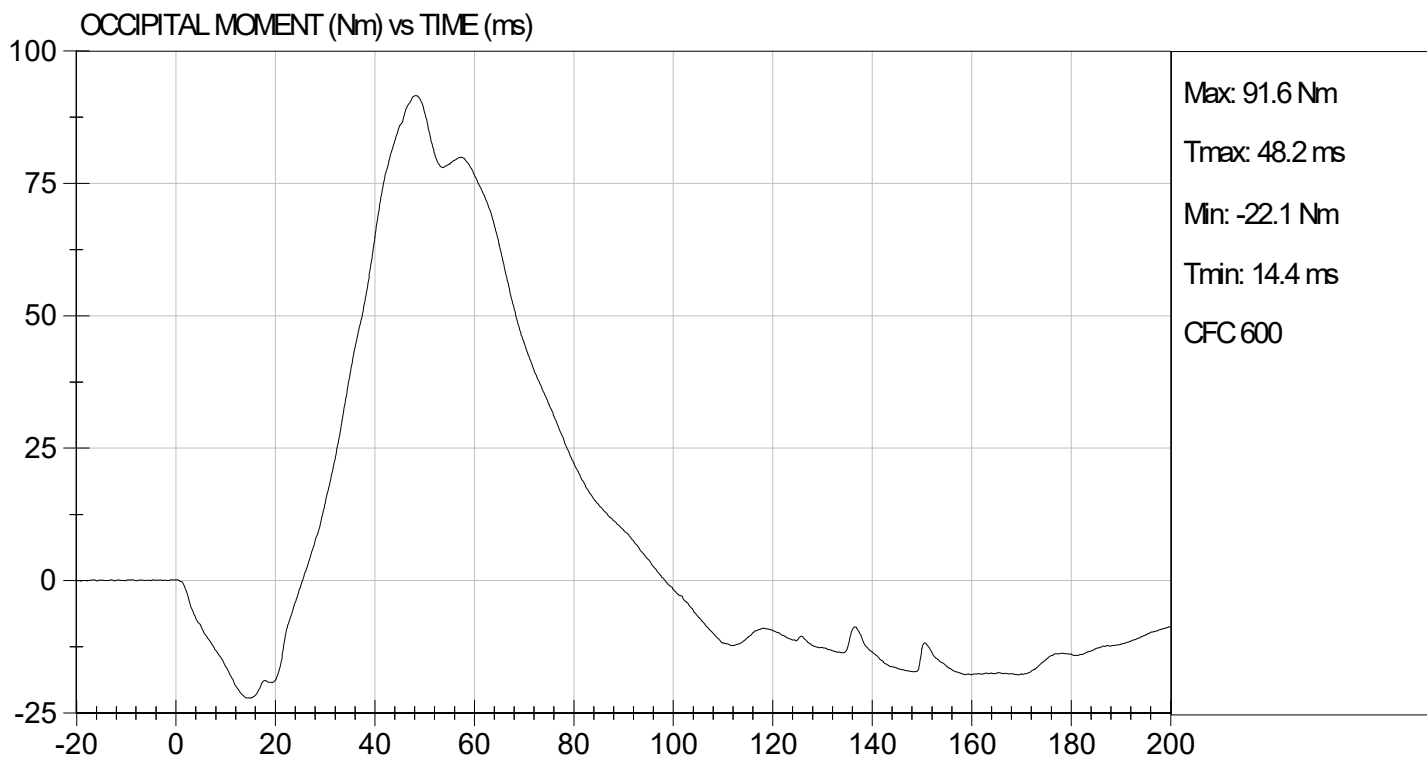
TEST DATE: 04/13/2023
TEST #: D230942





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

TEST DATE: 04/13/2023
TEST #: D230942

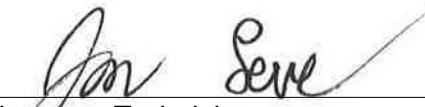


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D230943

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	38	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	21.08	Pass
	20 ms	G's	14.00 to 19.00	15.14	Pass
	30 ms	G's	11.00 to 16.00	11.47	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.0	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	40.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.5	Pass
	Time	ms	72.0 to 82.0	73.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-63.9	Pass
	Time	ms	65.0 to 79.0	71.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	139.8	Pass
Overall Test Results					Pass


 Laboratory Technician

04/13/2023

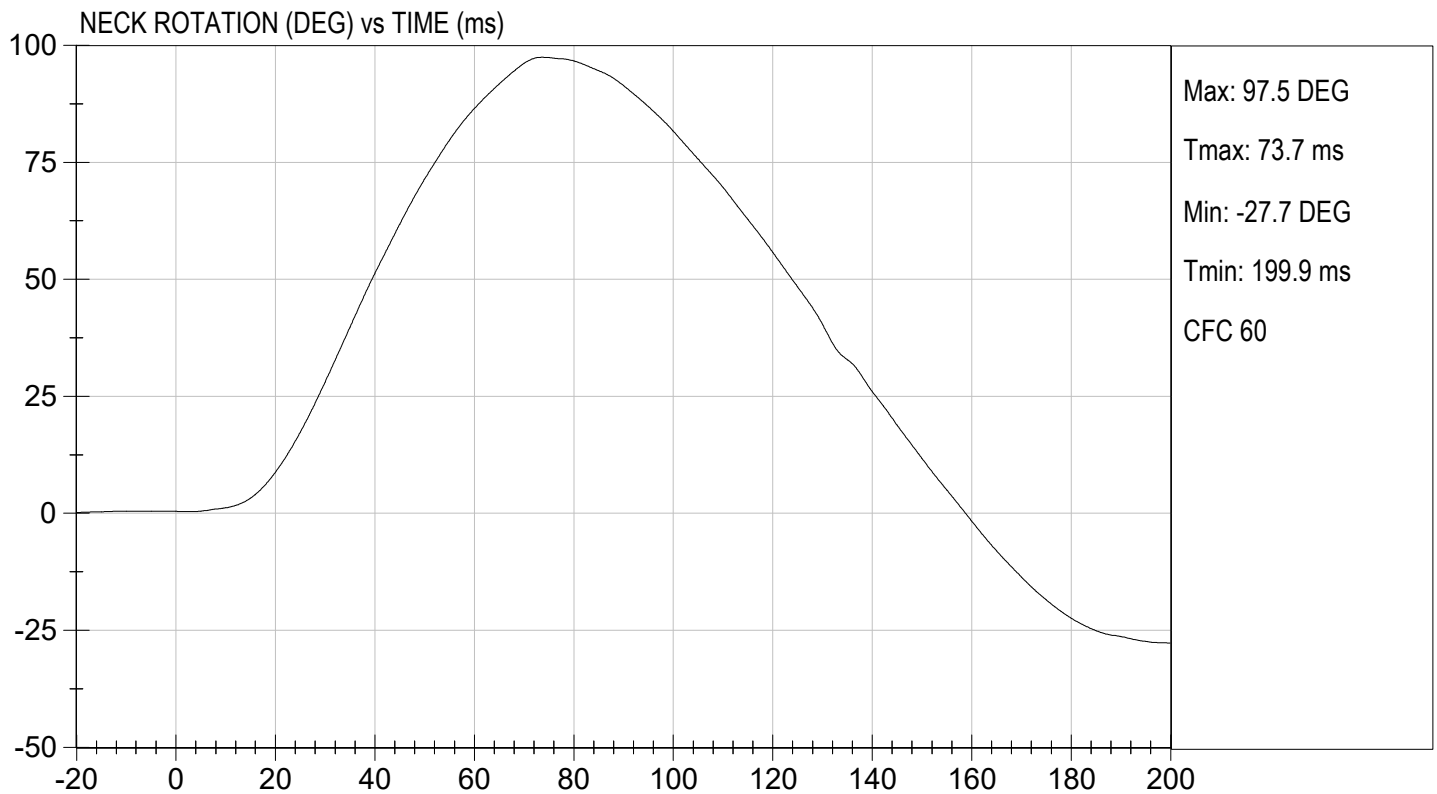
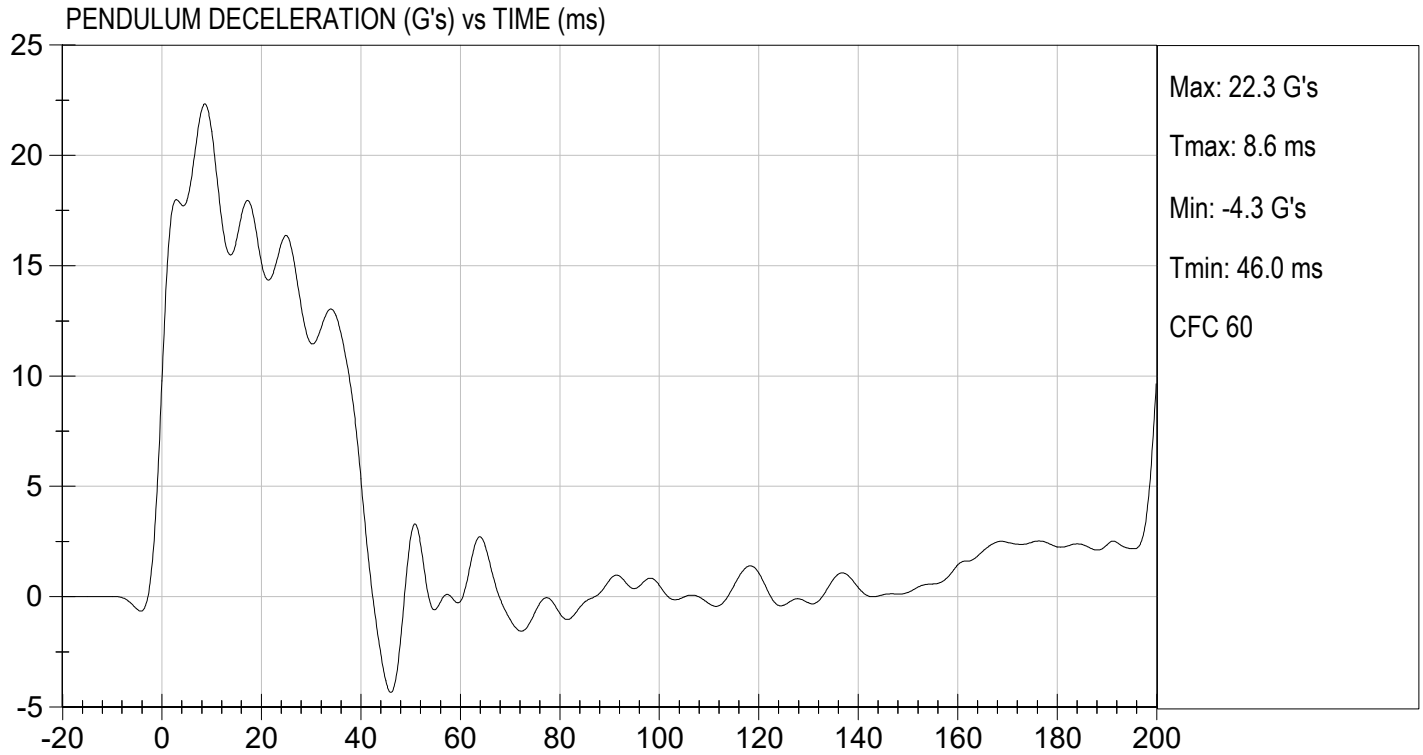
Test Date


 Approved By



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

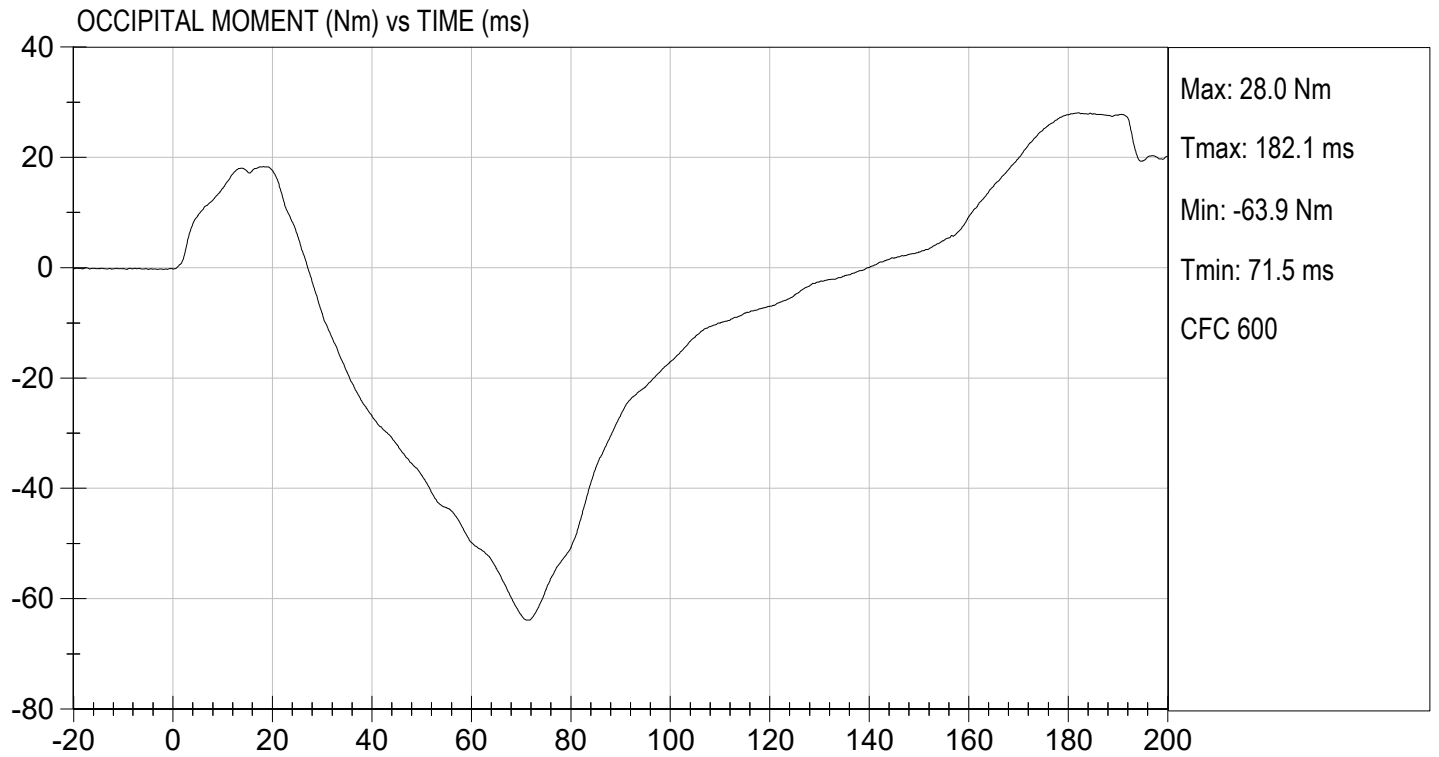
TEST DATE: 04/13/2023
TEST #: D230943





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

TEST DATE: 04/13/2023
TEST #: D230943



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

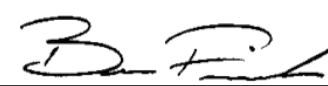
ATD Serial No: 351

Test I.D: D230944

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,764	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.83	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

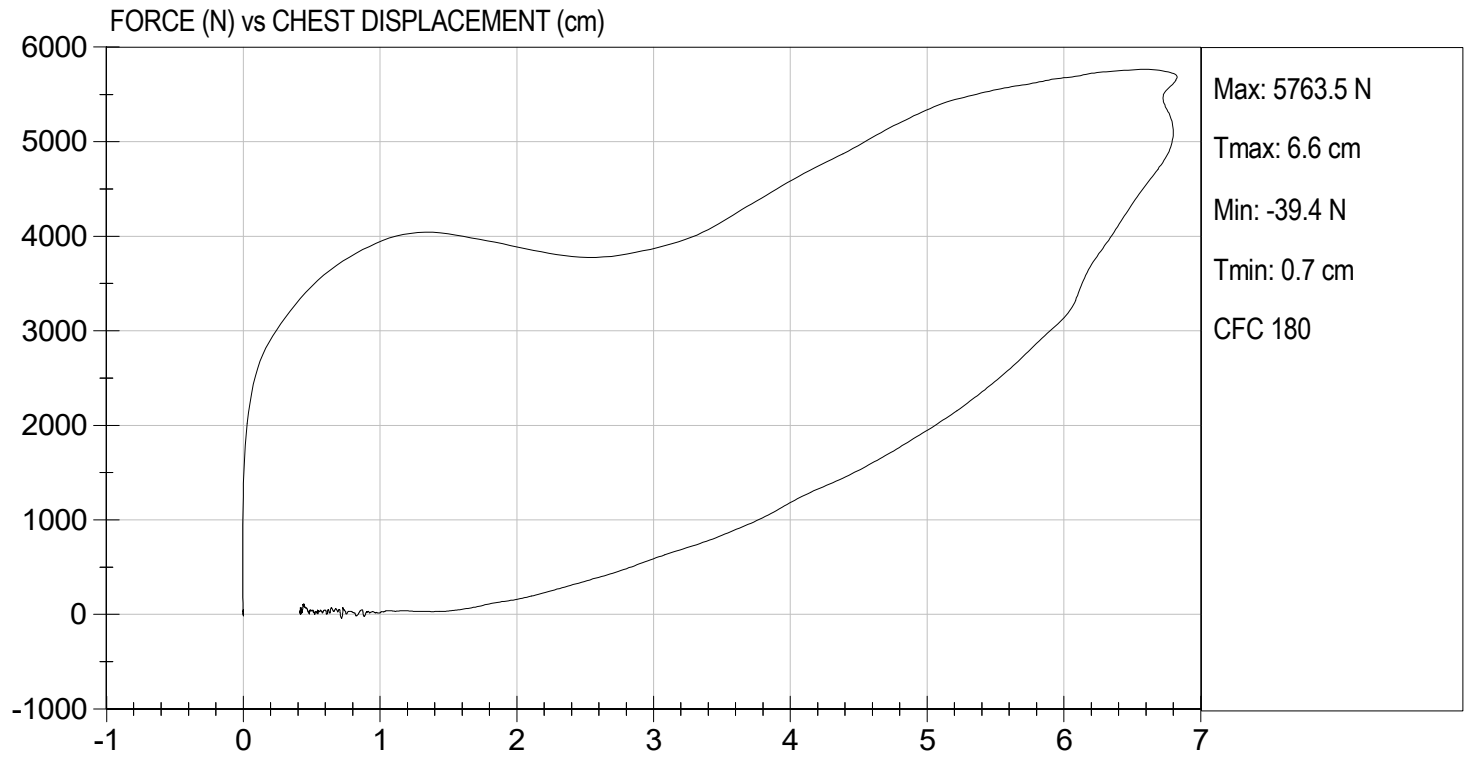
04/11/2023
Test Date


Approved By



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

TEST DATE: 04/11/2023
TEST #: D230944



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

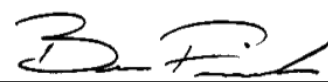
ATD Serial No: 351

Test I.D: D230945

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	4,955	Pass
Overall Test Results				Pass


Laboratory Technician

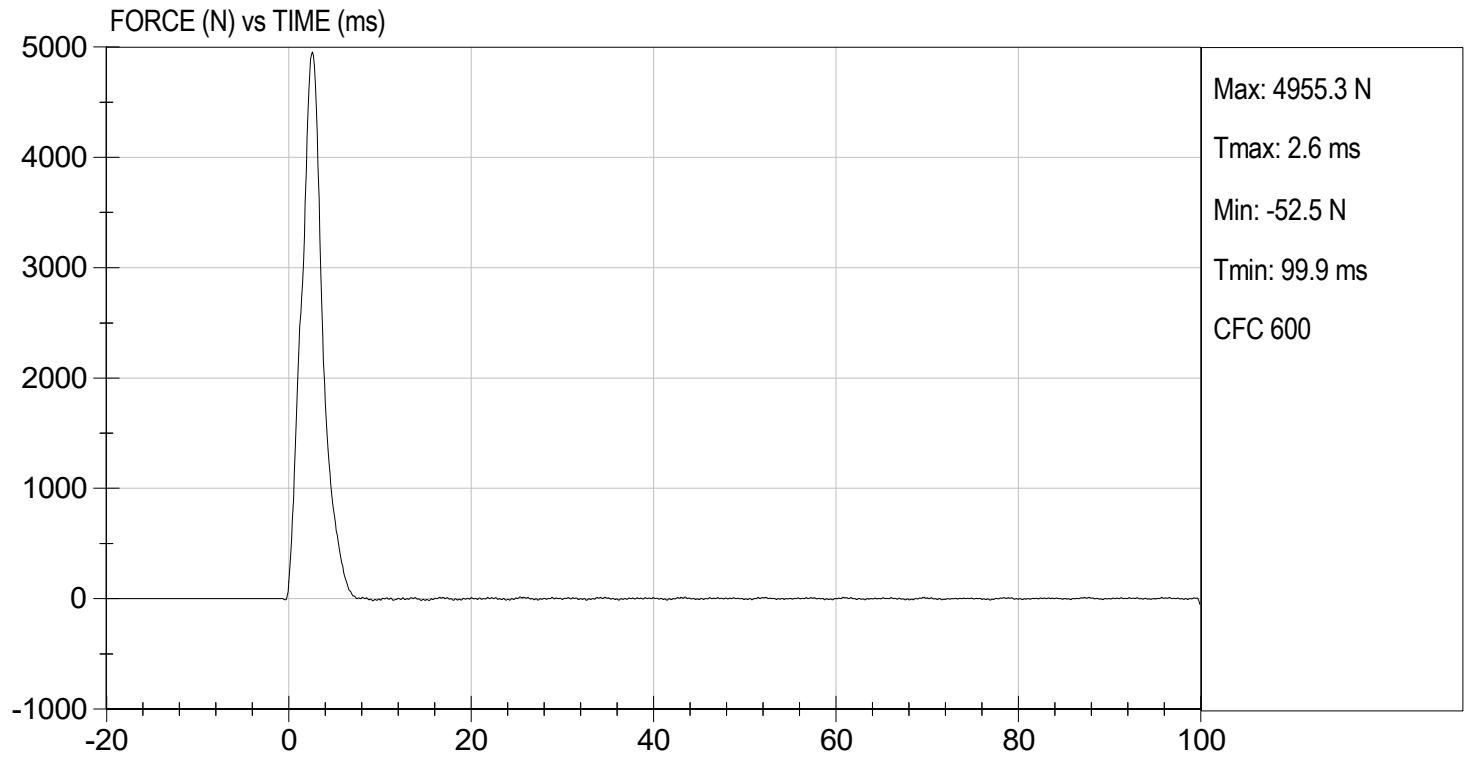
04/12/2023
Test Date


Approved By



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

TEST DATE: 04/12/2023
TEST #: D230945



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

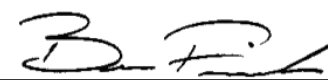
ATD Serial No: 351

Test I.D: D230946

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	4,969	Pass
Overall Test Results				Pass


Laboratory Technician

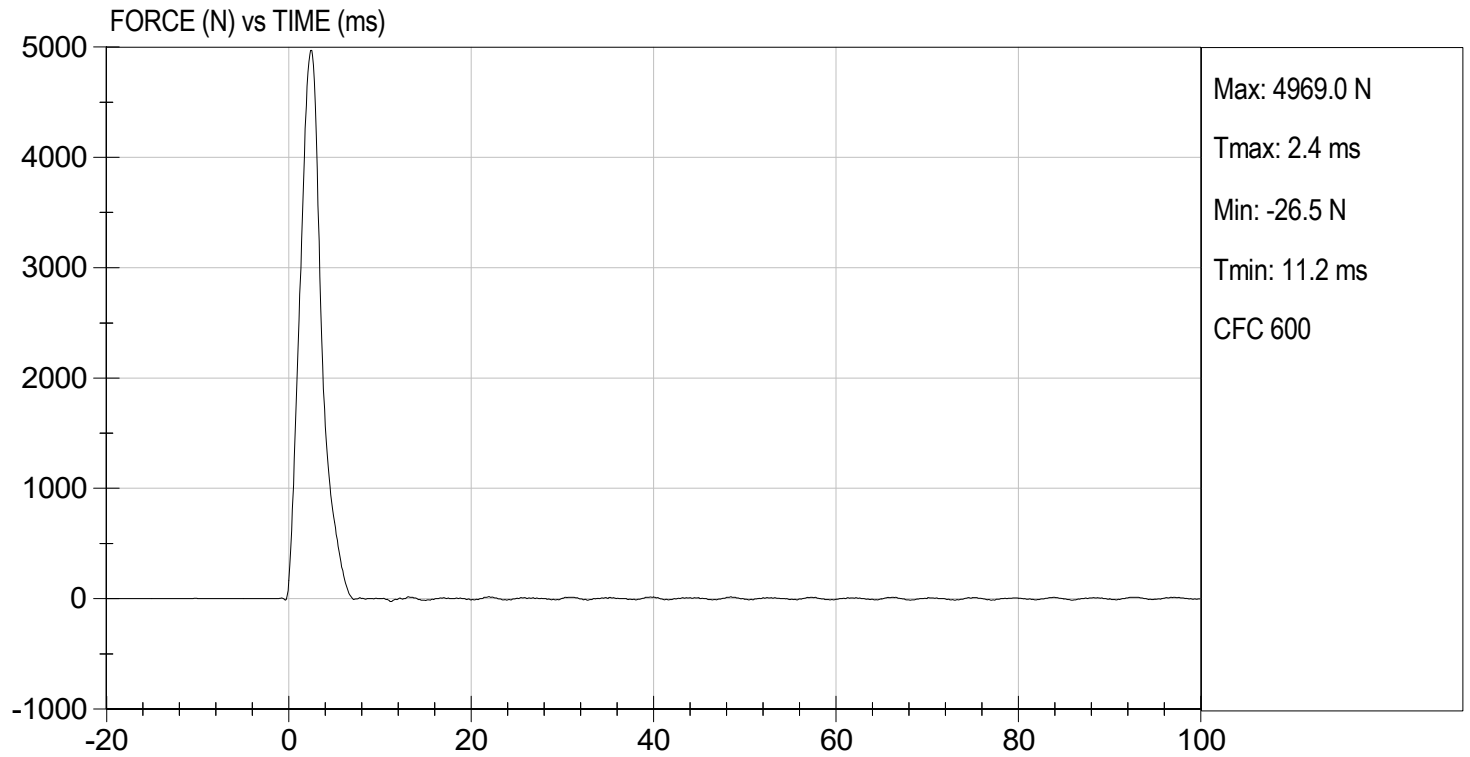
04/12/2023
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 7.00 ft/s, 2.13 m/s

TEST DATE: 04/12/2023
TEST #: D230946



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

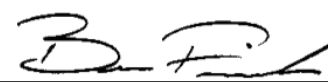
ATD Serial No: 351

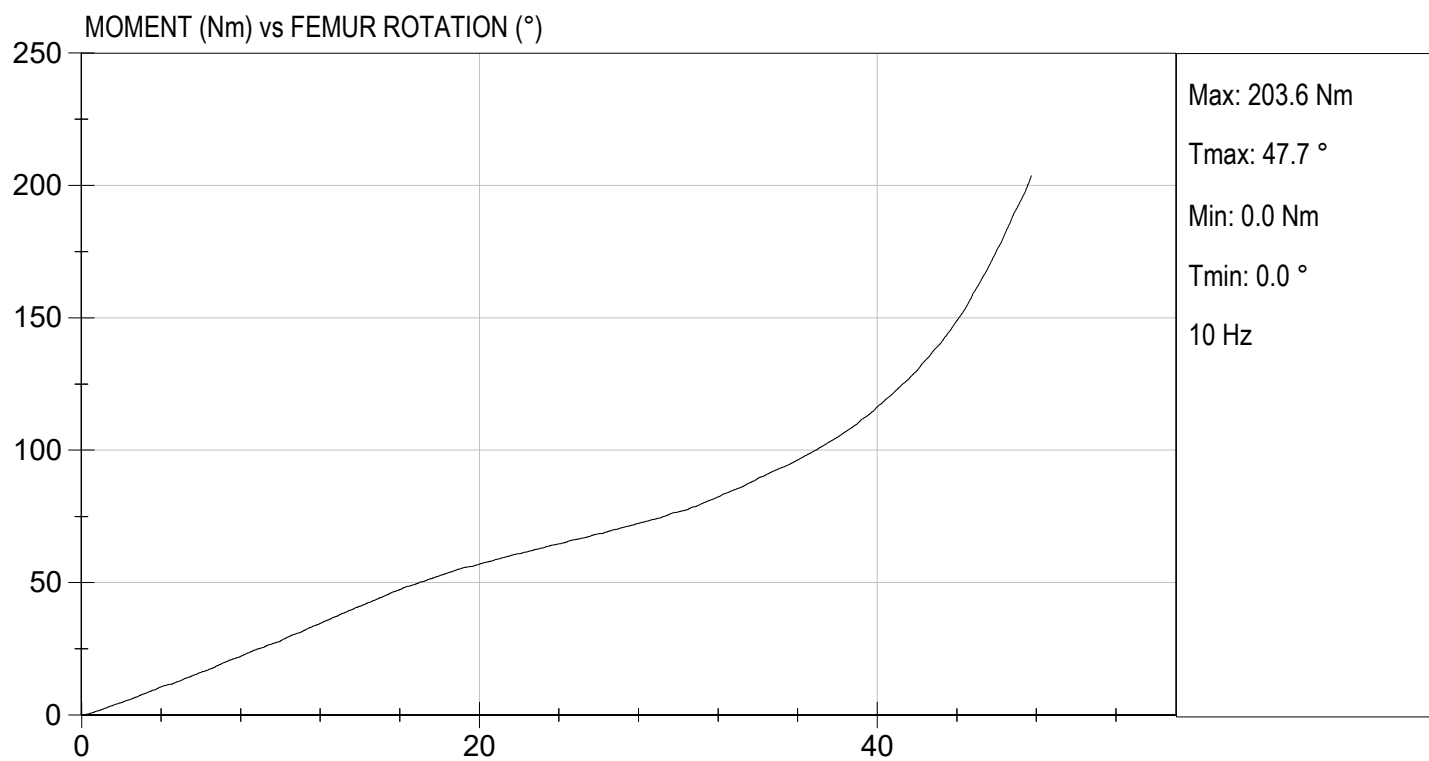
Test I.D: D230940

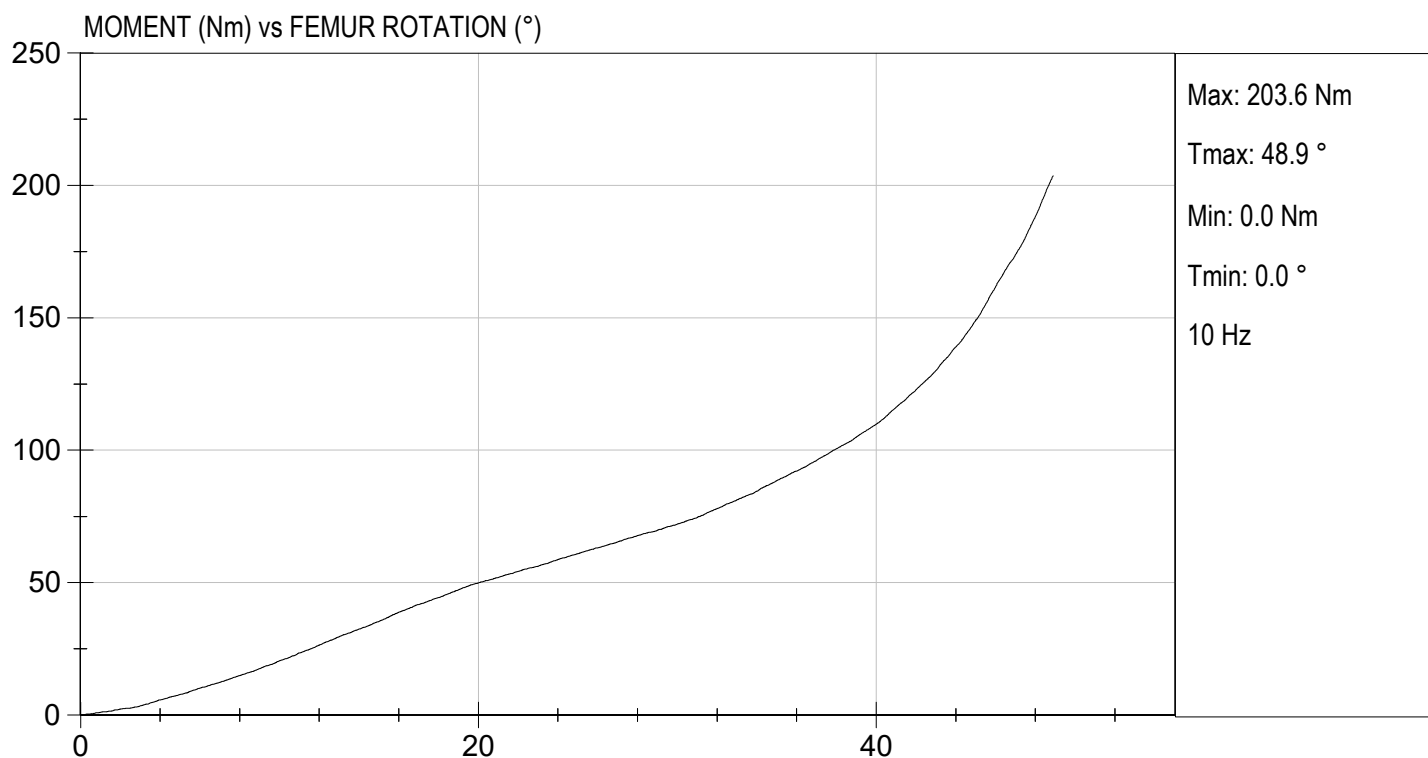
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.3	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	39	39	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.5	Pass
30 Degrees	Nm	94.9 Nm Max	76.7	72.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	47.7	48.9	Pass
Overall Test Results					Pass


 Laboratory Technician

04/13/2023
 Test Date


 Approved By





QUALIFICATION TEST RESULTS

POST-TEST

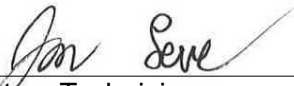
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

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

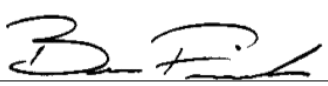
ATD Serial No: 351

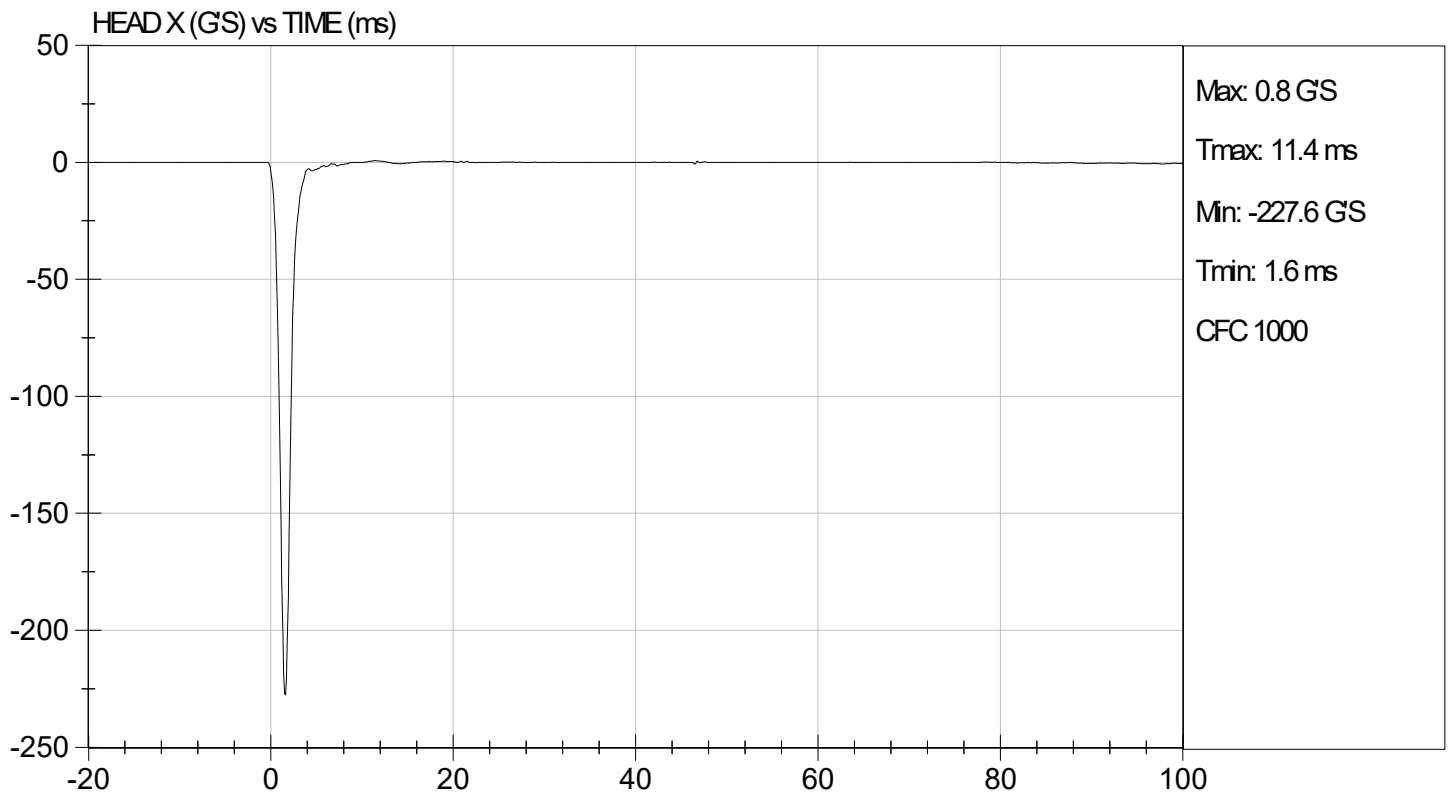
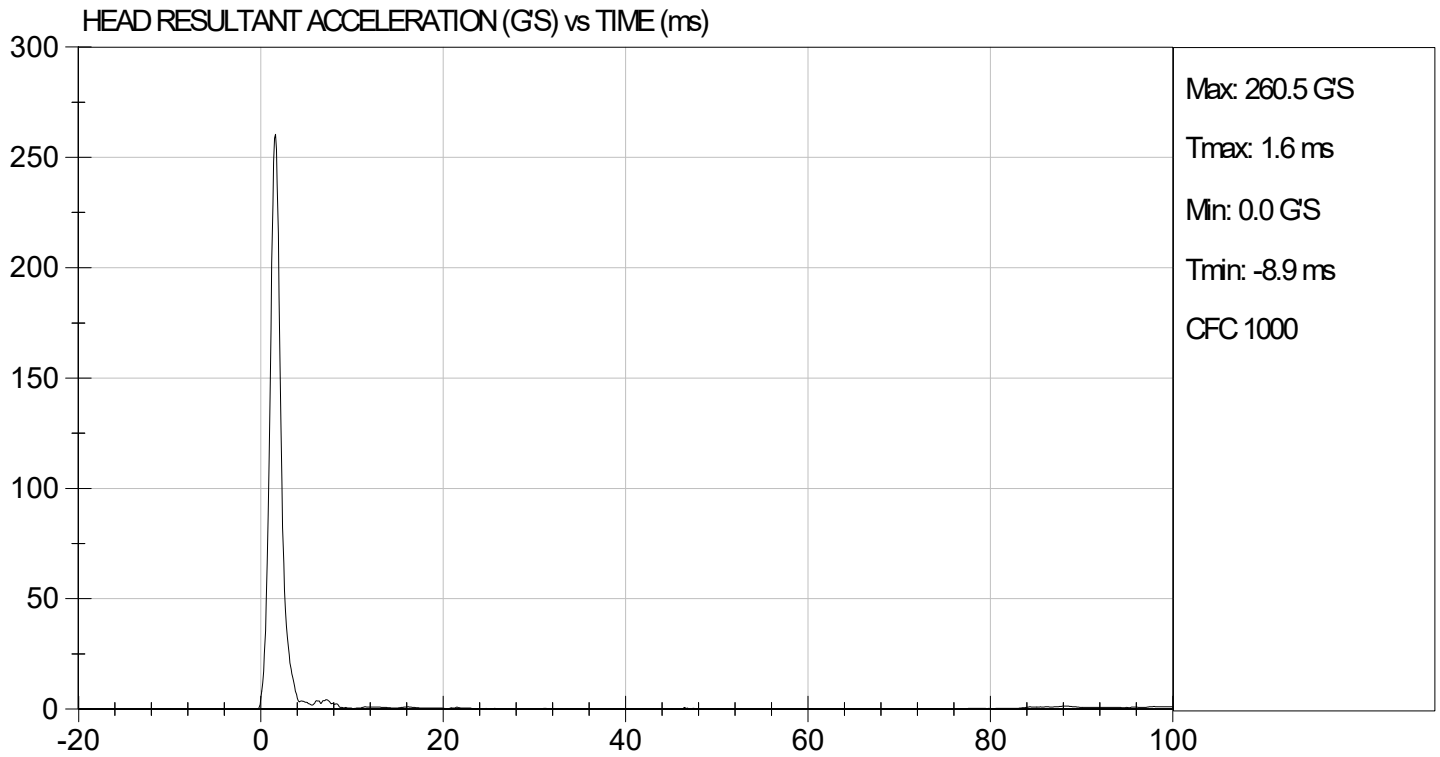
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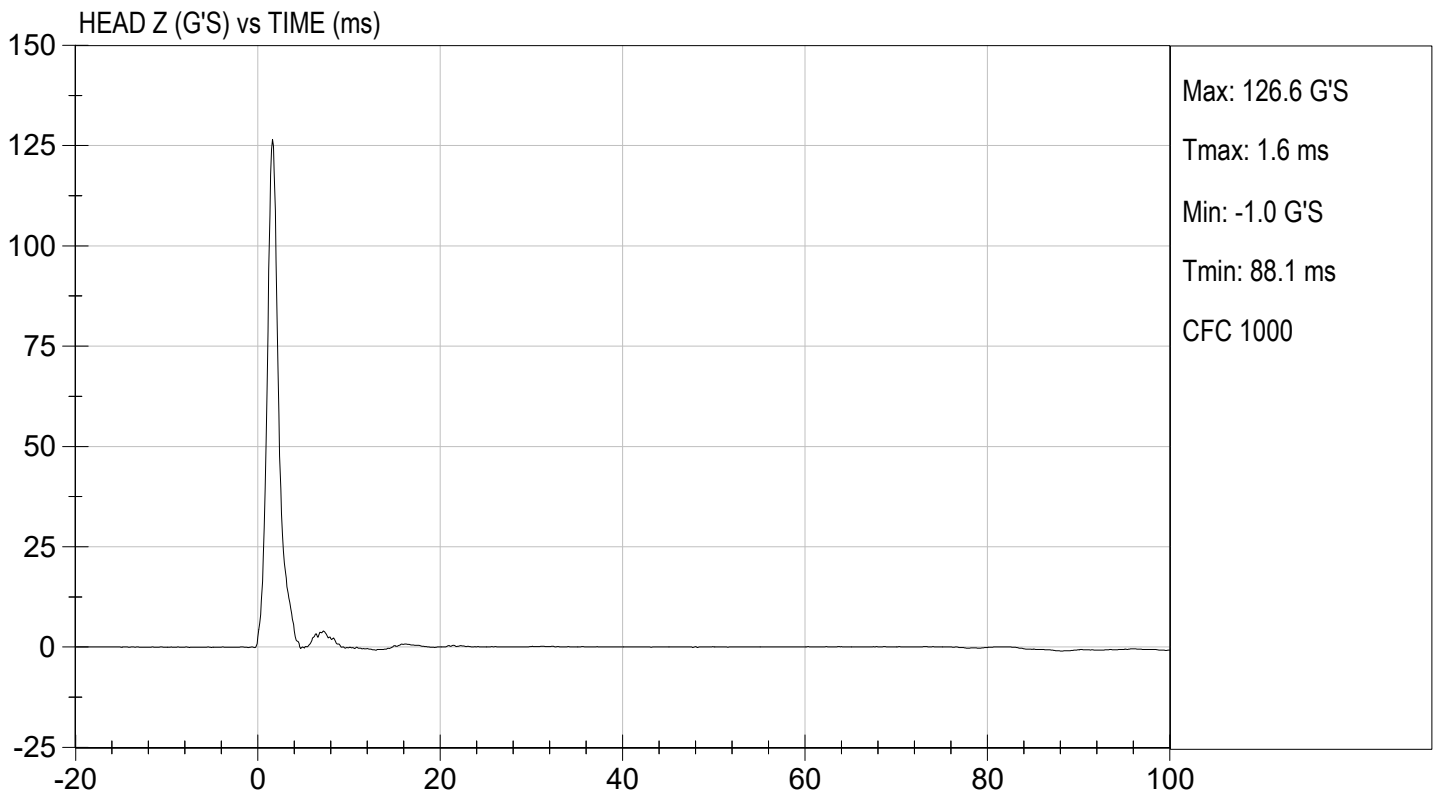
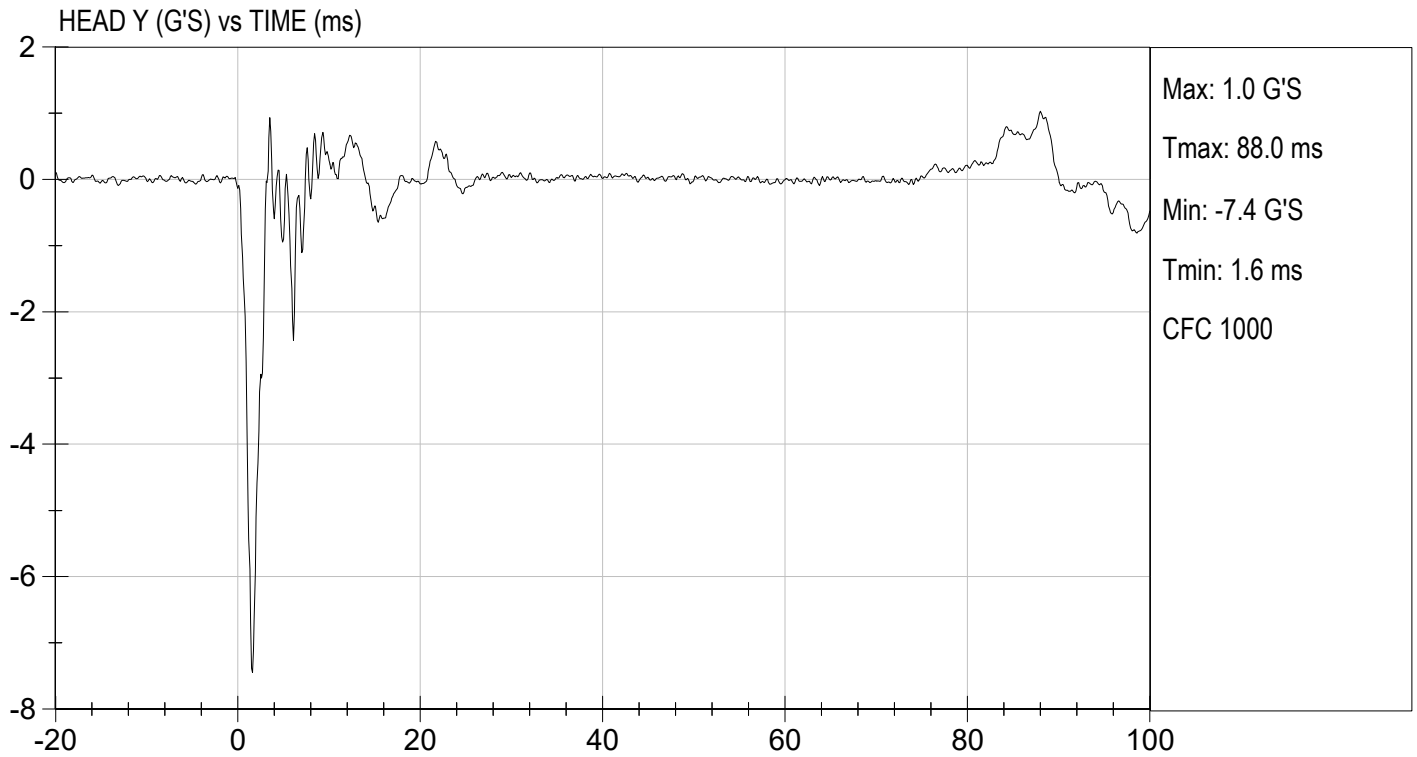
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	225 to 275	261	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

05/08/2023
Test Date


Approved By



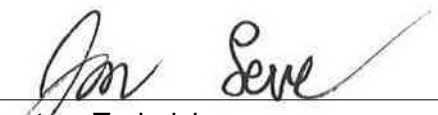


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D231142

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	47	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.23	Pass
	20 ms	G's	17.60 to 22.60	20.53	Pass
	30 ms	G's	12.50 to 18.50	16.08	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	16.1	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.4	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.1	Pass
	Time	ms	57.0 to 64.0	58.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	115.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	92.7	Pass
	Time	ms	47.0 to 58.0	48.2	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.9	Pass
Overall Test Results					Pass


 Laboratory Technician

05/10/2023

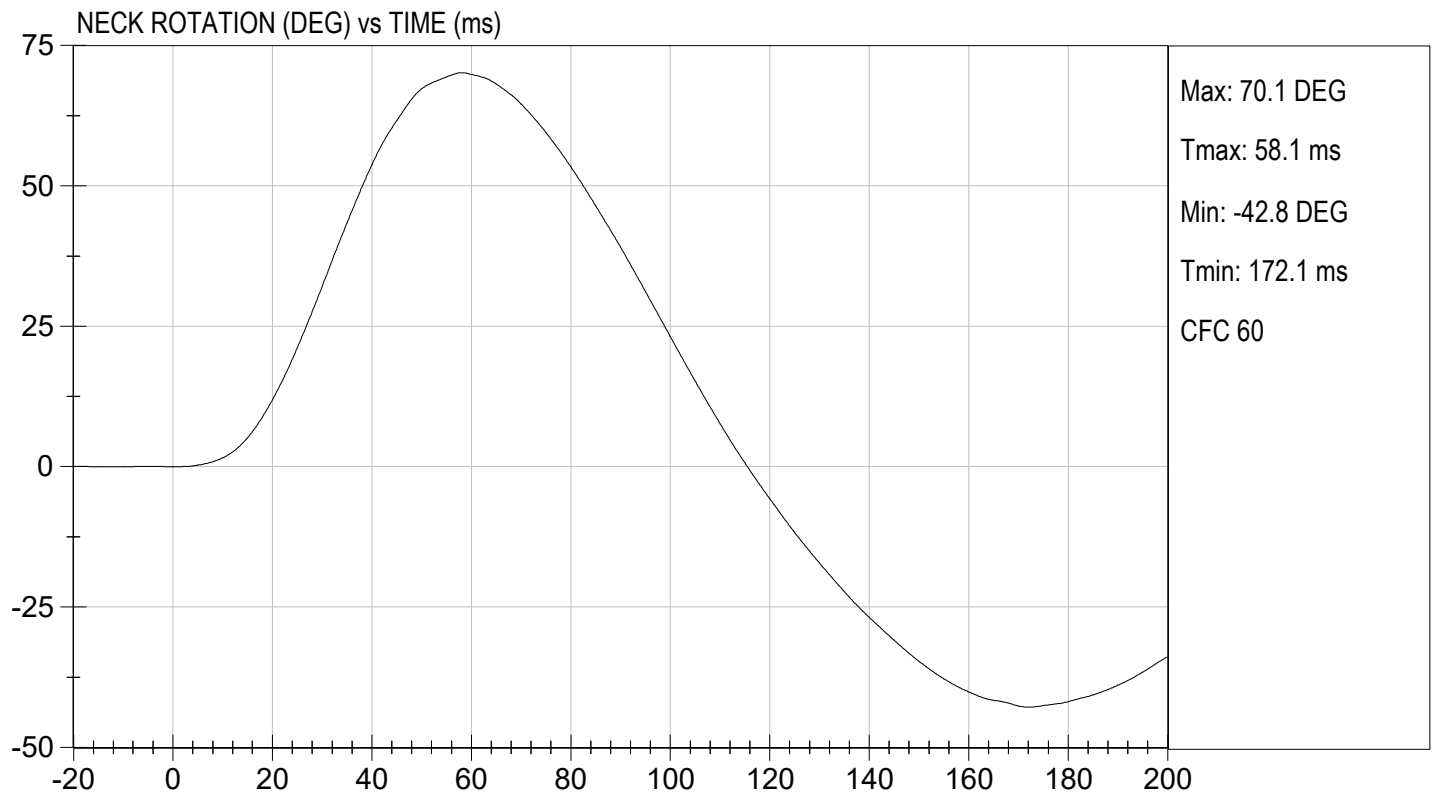
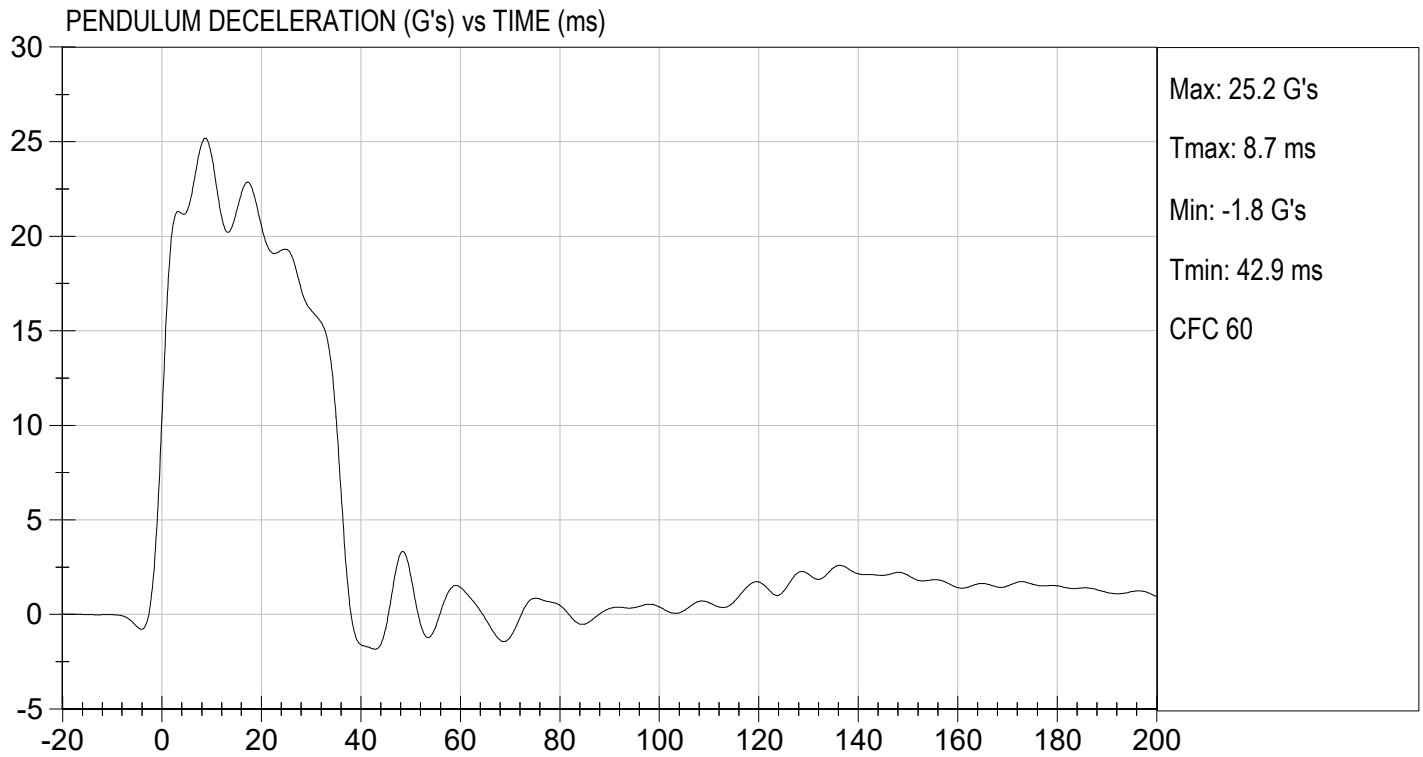
Test Date


 Approved By



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

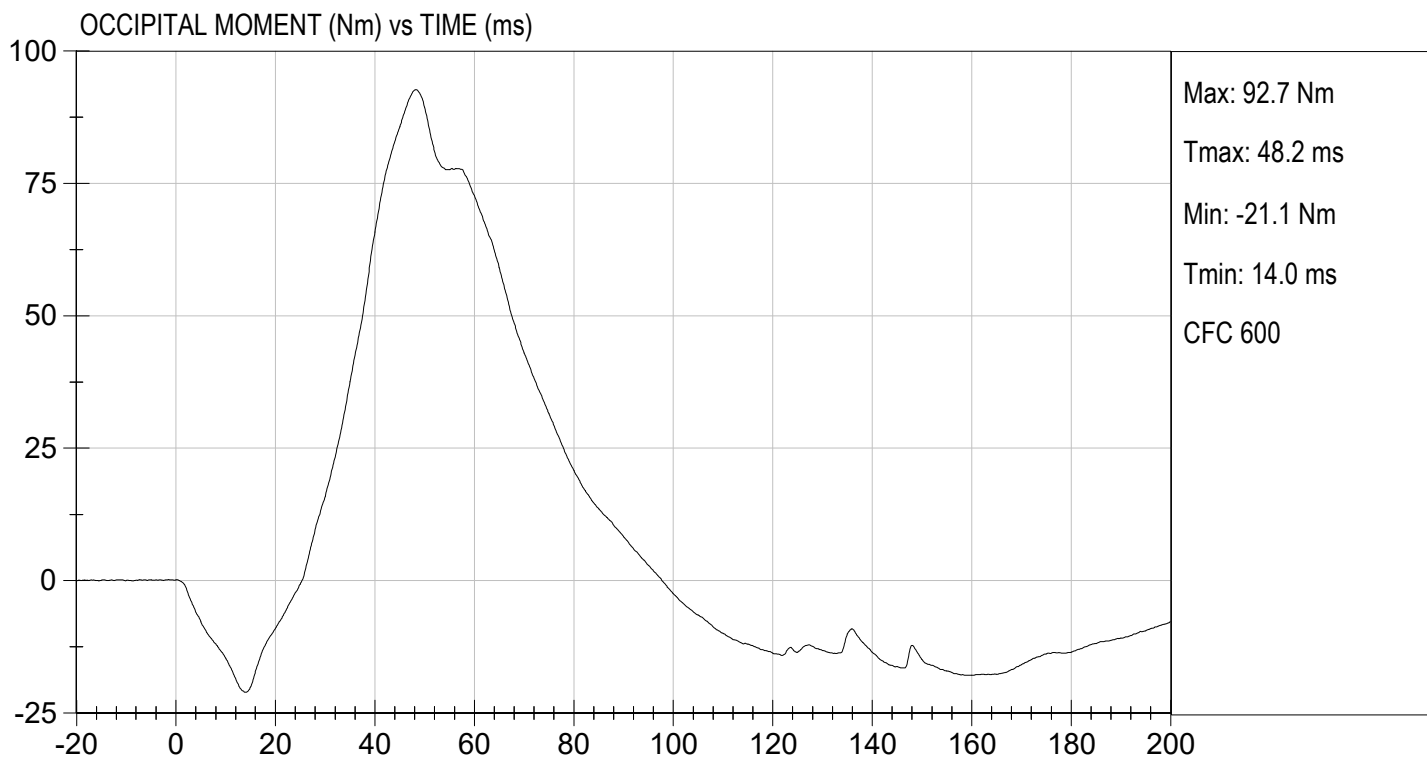
TEST DATE: 05/10/2023
TEST #: D231142





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

TEST DATE: 05/10/2023
TEST #: D231142

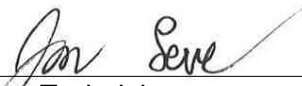


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

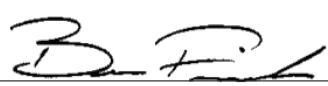
ATD Serial No: 351

Test I.D: D231143

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	47	Pass
Pendulum Velocity		m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.50	Pass
	20 ms	G's	14.00 to 19.00	14.81	Pass
	30 ms	G's	11.00 to 16.00	13.09	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.8	Pass
	Time	ms	72.0 to 82.0	75.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	155.0	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.0	Pass
	Time	ms	65.0 to 79.0	69.8	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	138.5	Pass
Overall Test Results					Pass


 Laboratory Technician

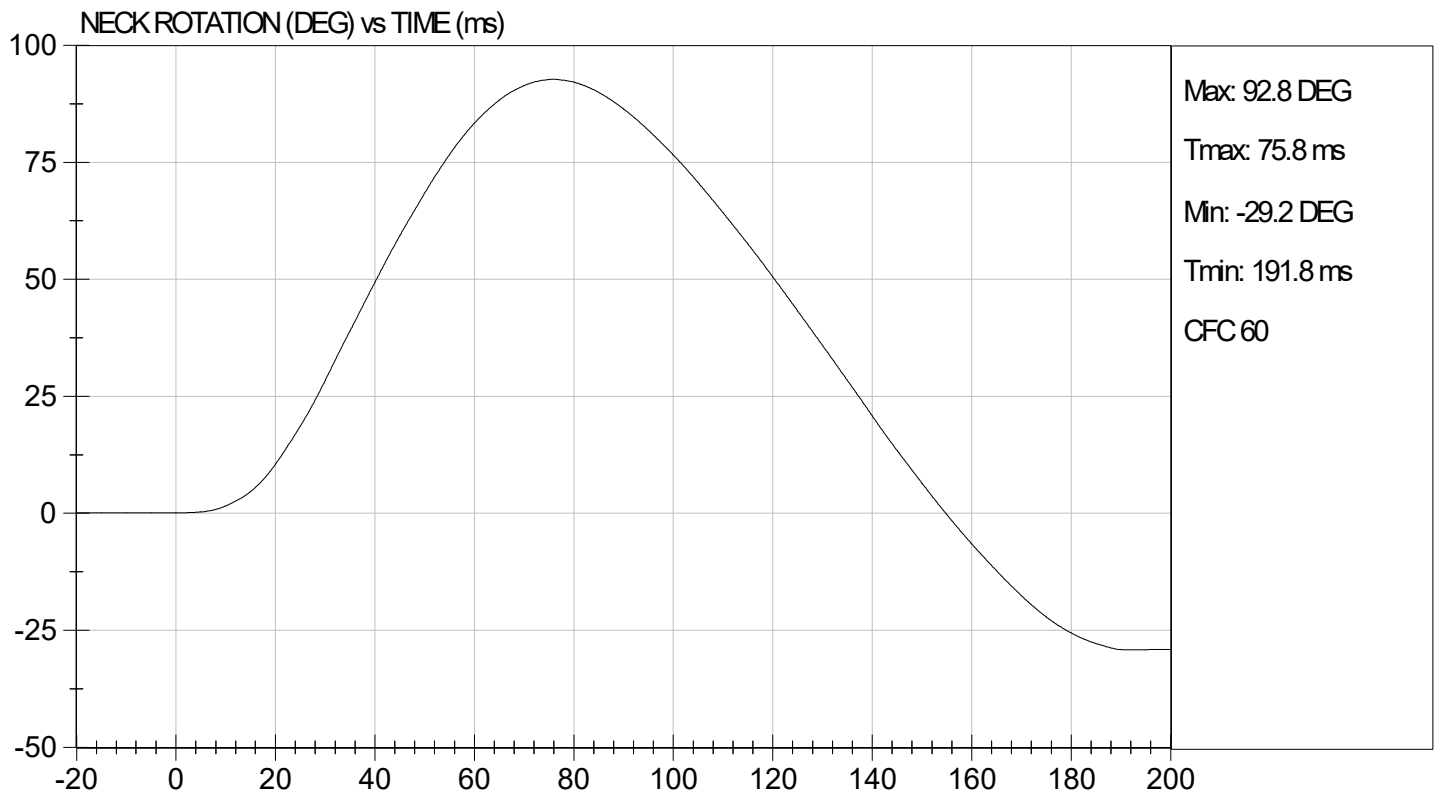
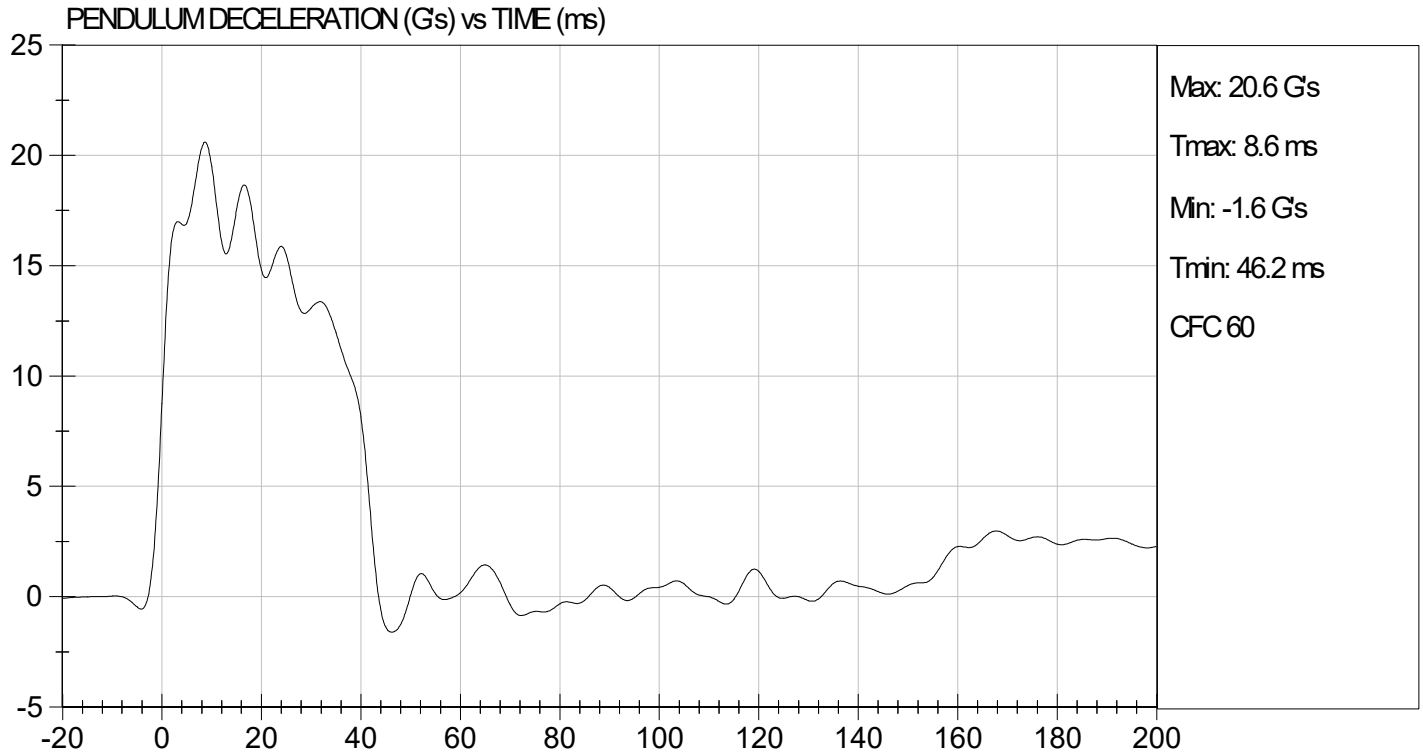
05/09/2023
 Test Date


 Approved By



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

TEST DATE: 05/09/2023
TEST #: D231143





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

TEST DATE: 05/09/2023
TEST #: D231143

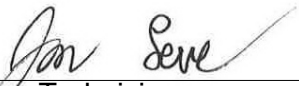


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

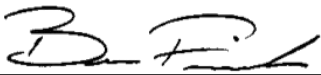
Test I.D: D231144

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	46	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,632	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.62	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Overall Test Results			Pass	



Laboratory Technician

05/08/2023
Test Date

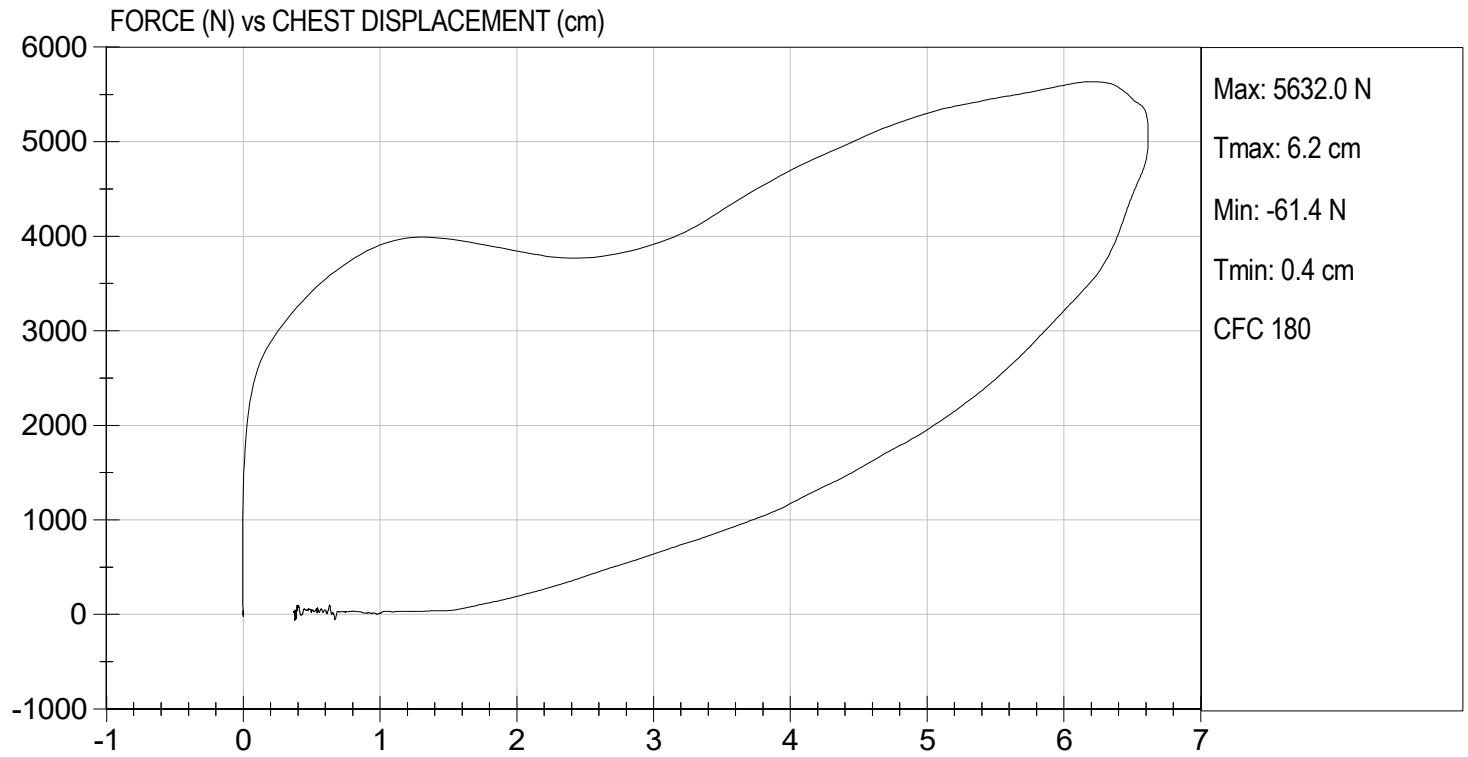


Approved By



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

TEST DATE: 05/08/2023
TEST #: D231144



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

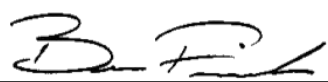
ATD Serial No: 351

Test I.D: D231145

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	50	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5,114	Pass
Overall Test Results				Pass


Laboratory Technician

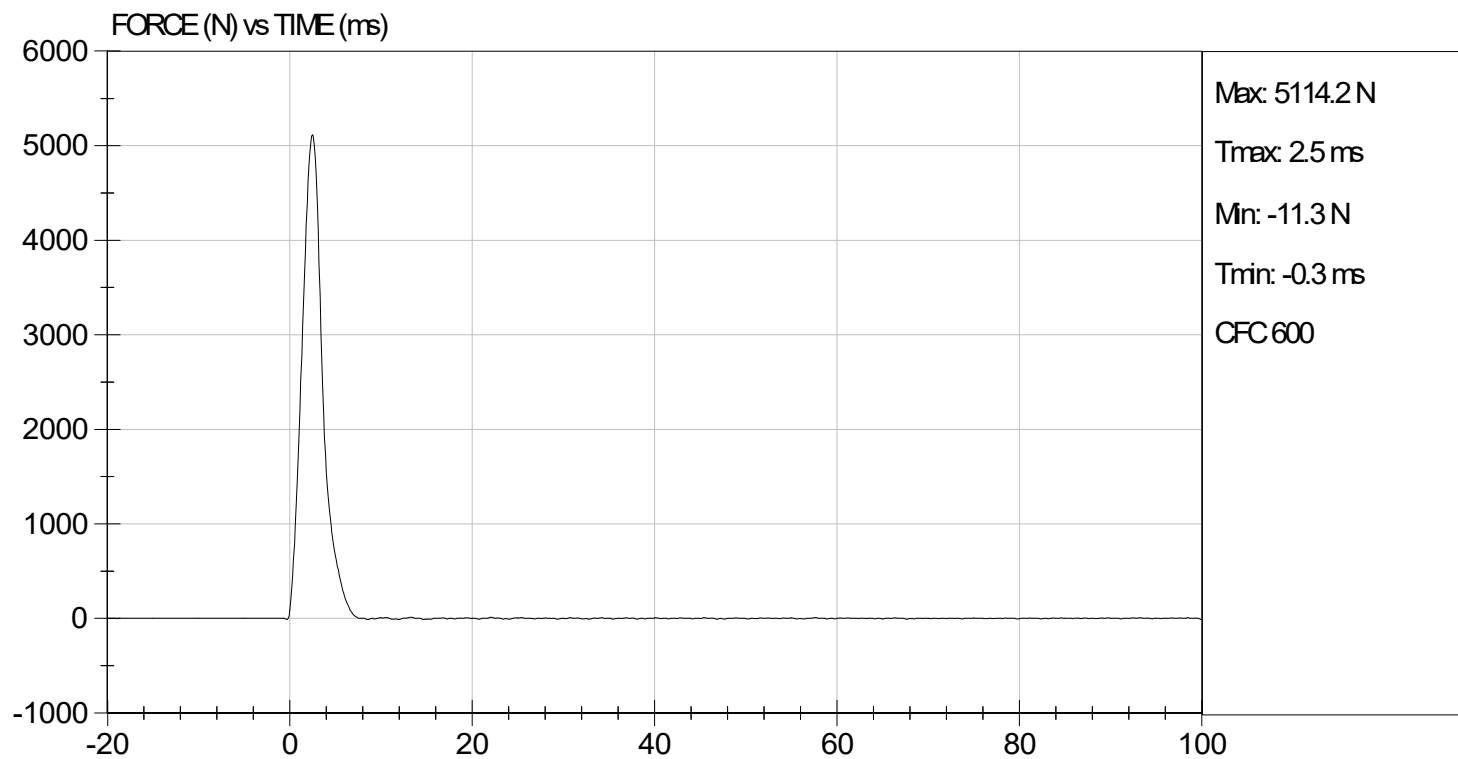
05/09/2023
Test Date


Approved By



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

TEST DATE: 05/09/2023
TEST #: D231145



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

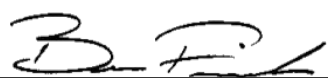
ATD Serial No: 351

Test I.D: D231146

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	50	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,302	Pass
Overall Test Results				Pass


Laboratory Technician

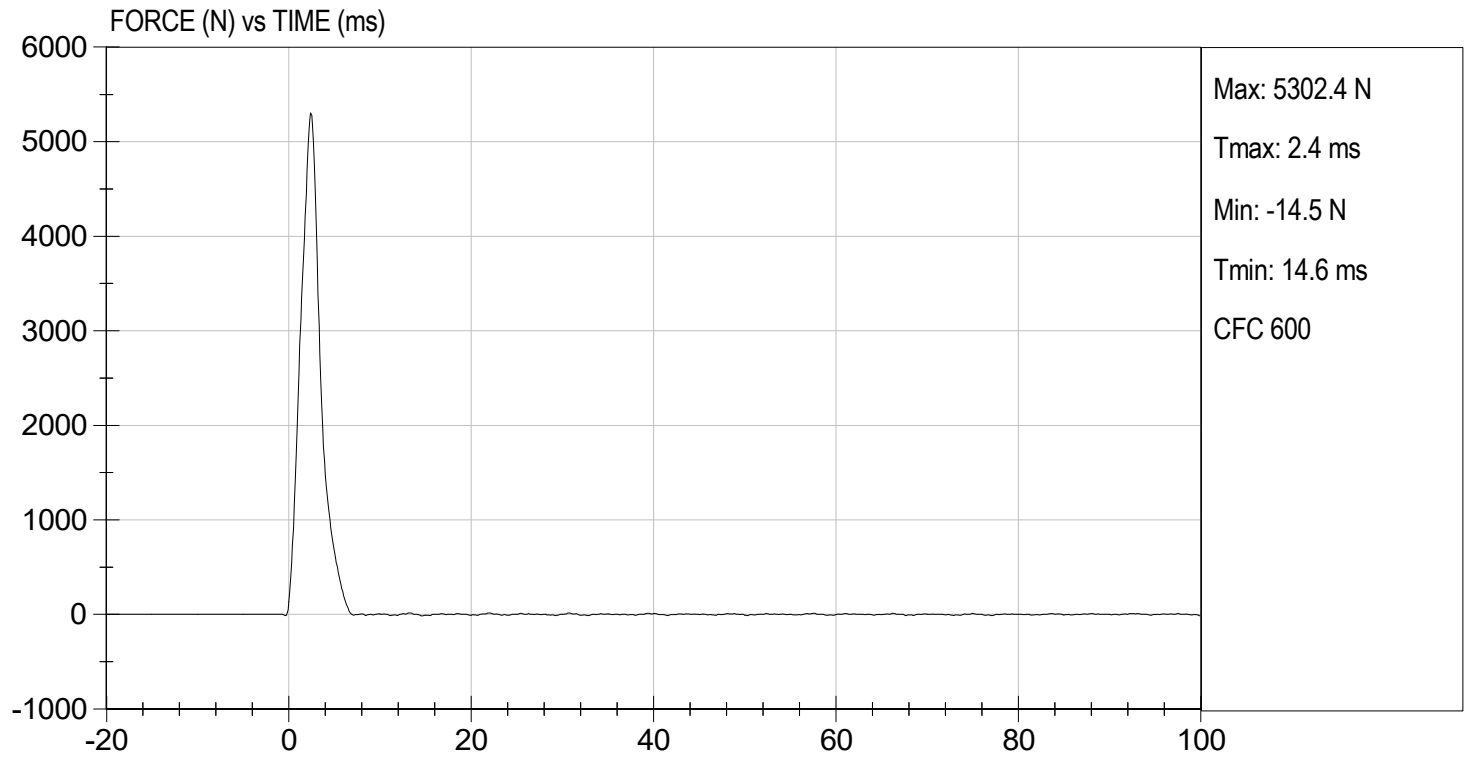
05/09/2023
Test Date


Approved By



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

TEST DATE: 05/09/2023
TEST #: D231146



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

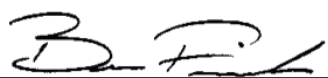
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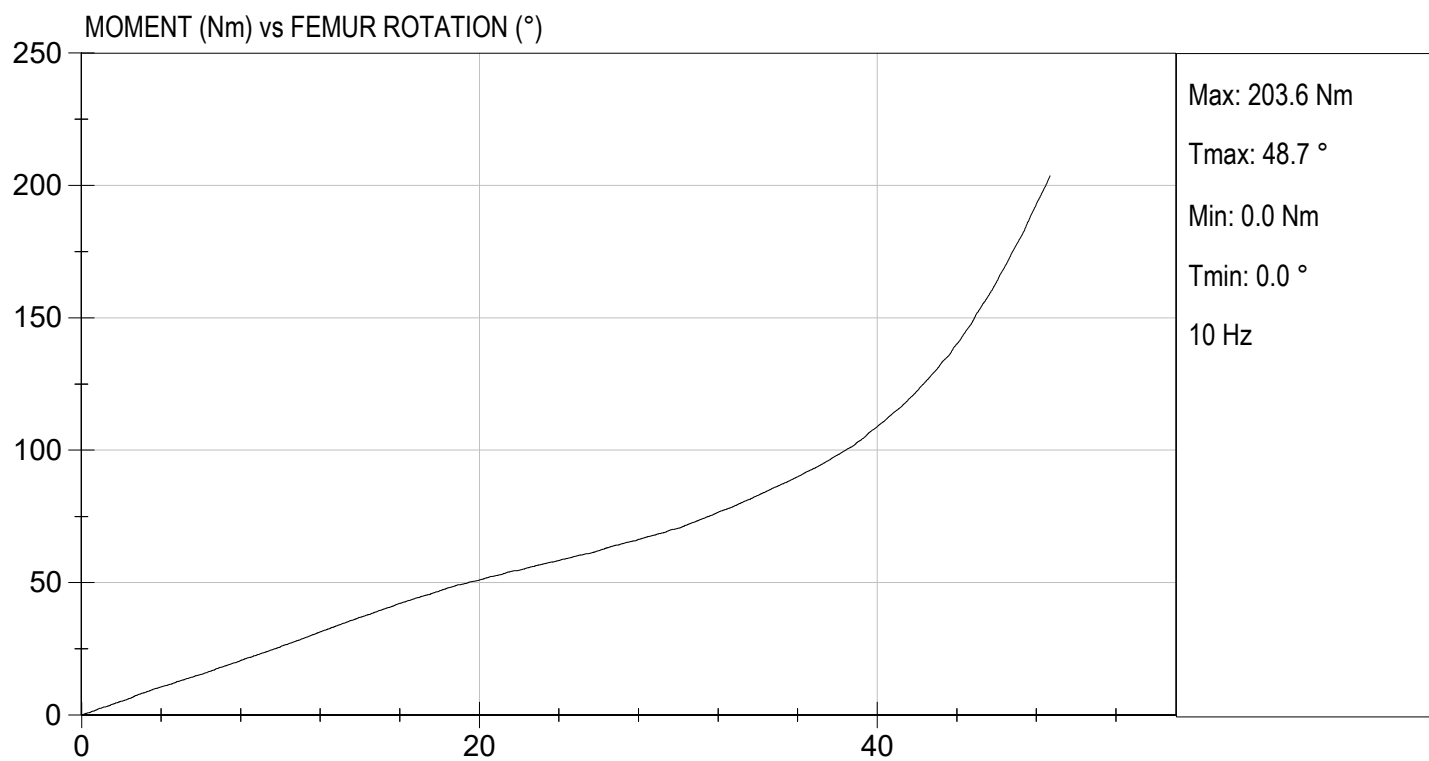
Test I.D: D231140

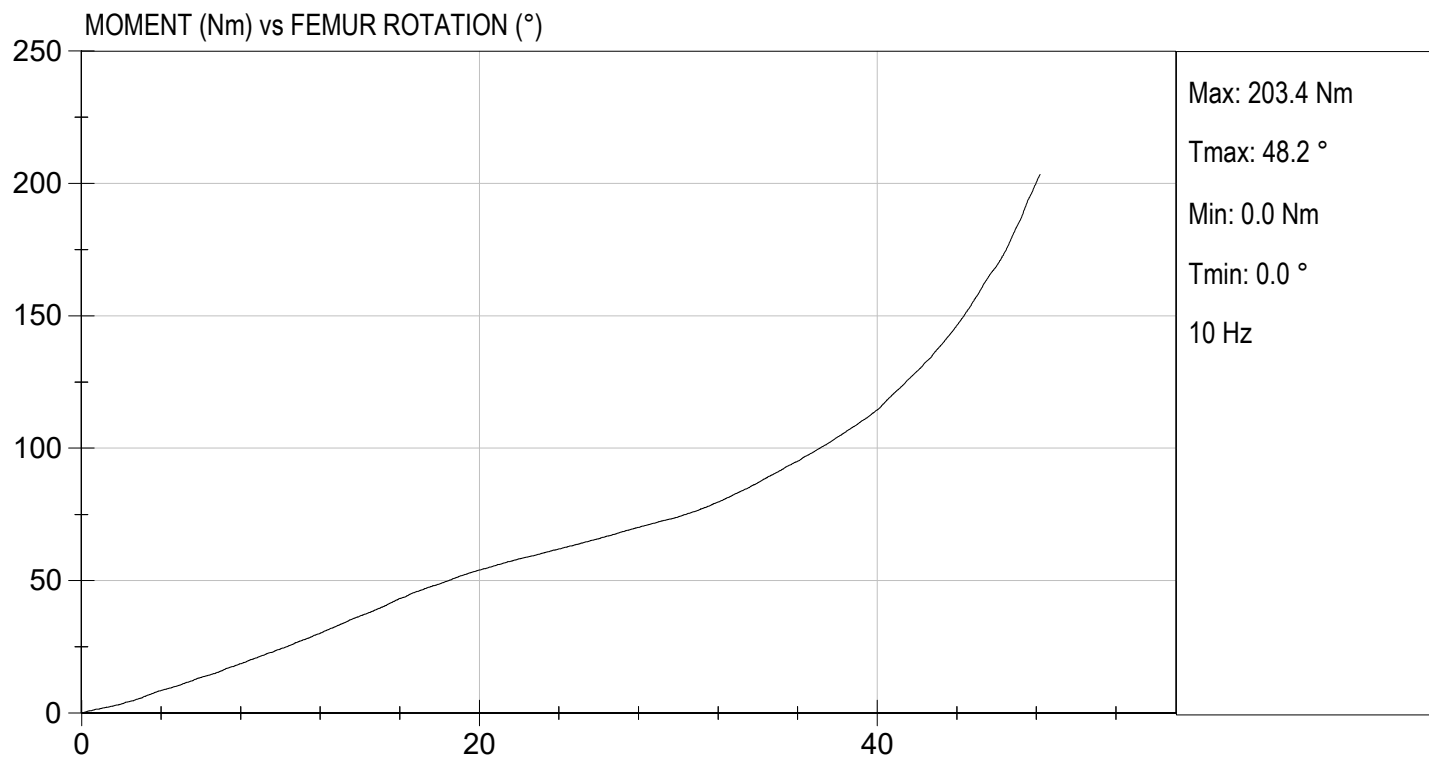
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.4	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	46	46	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.4	Pass
30 Degrees	Nm	94.9 Nm Max	70.5	74.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	48.7	48.2	Pass
Overall Test Results					Pass


 Laboratory Technician

05/09/2023
 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 heal	218.5-233.7	227.3
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	475.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	138.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188	181.0
U	HIP BREADTH	The widest part of the hip	299.7-314.9	308.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	362.1
W	FOOT BREADTH	The widest part of the foot	78.8-94	82.8
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	545.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	870.7
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	779.9
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	350.1
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	170.0

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

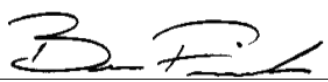
ATD Serial No: 142

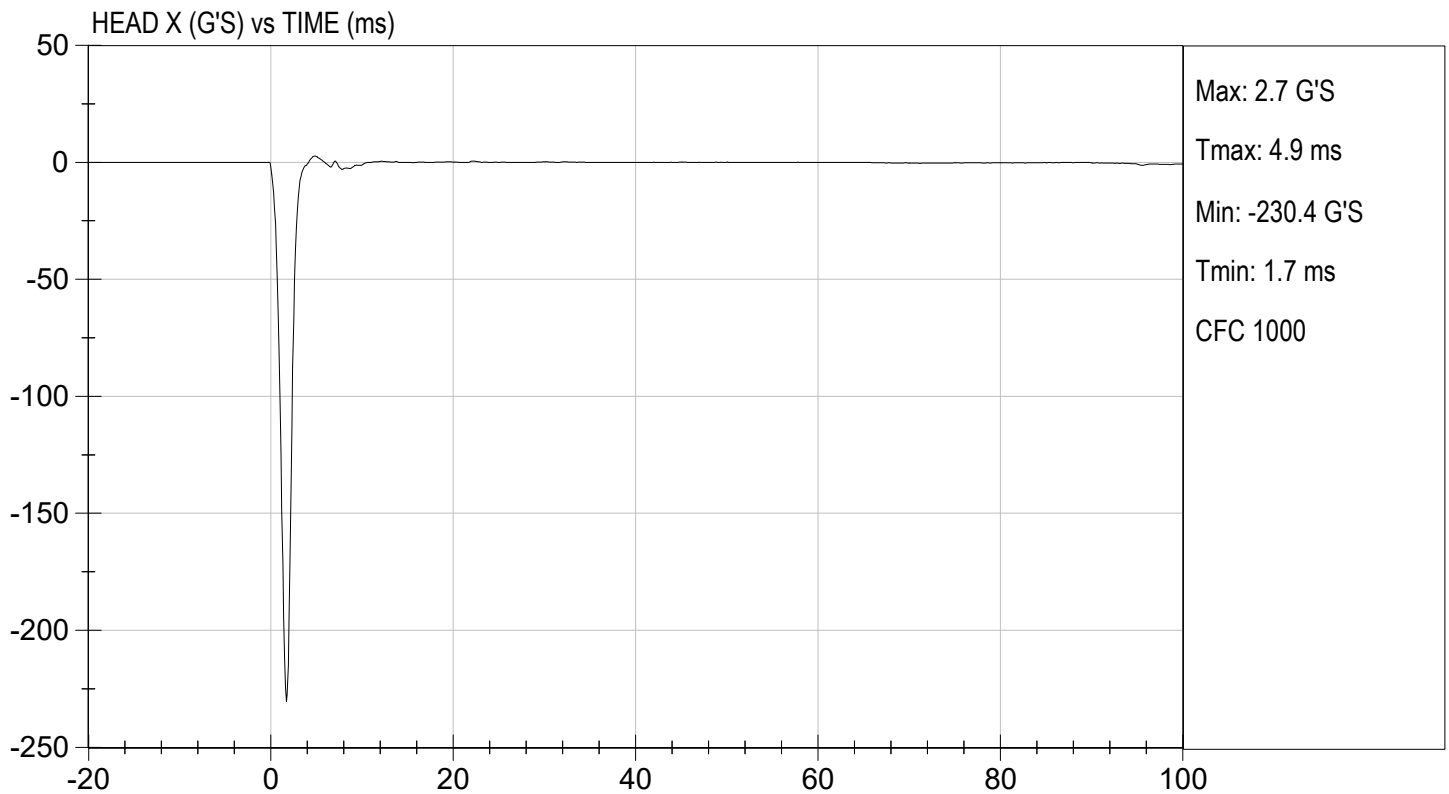
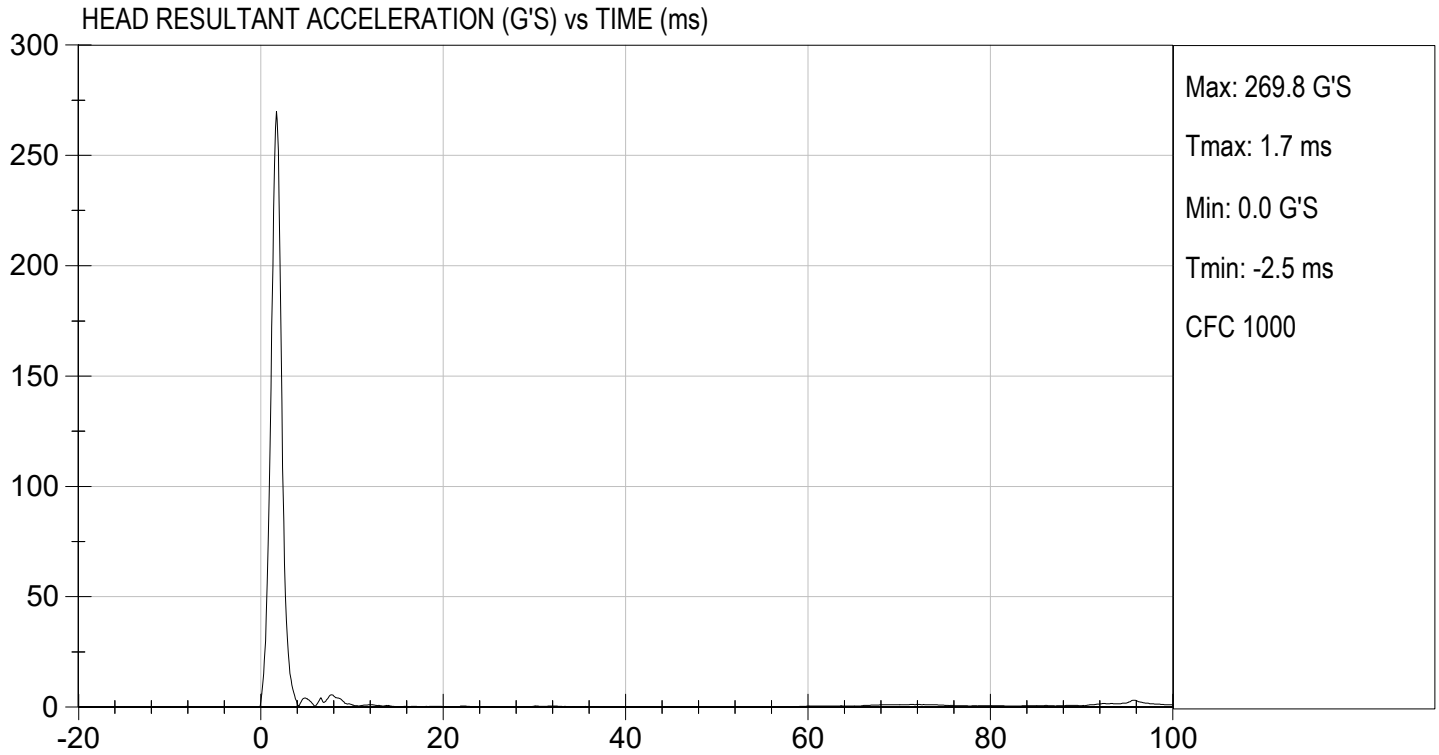
Test ID: D230931

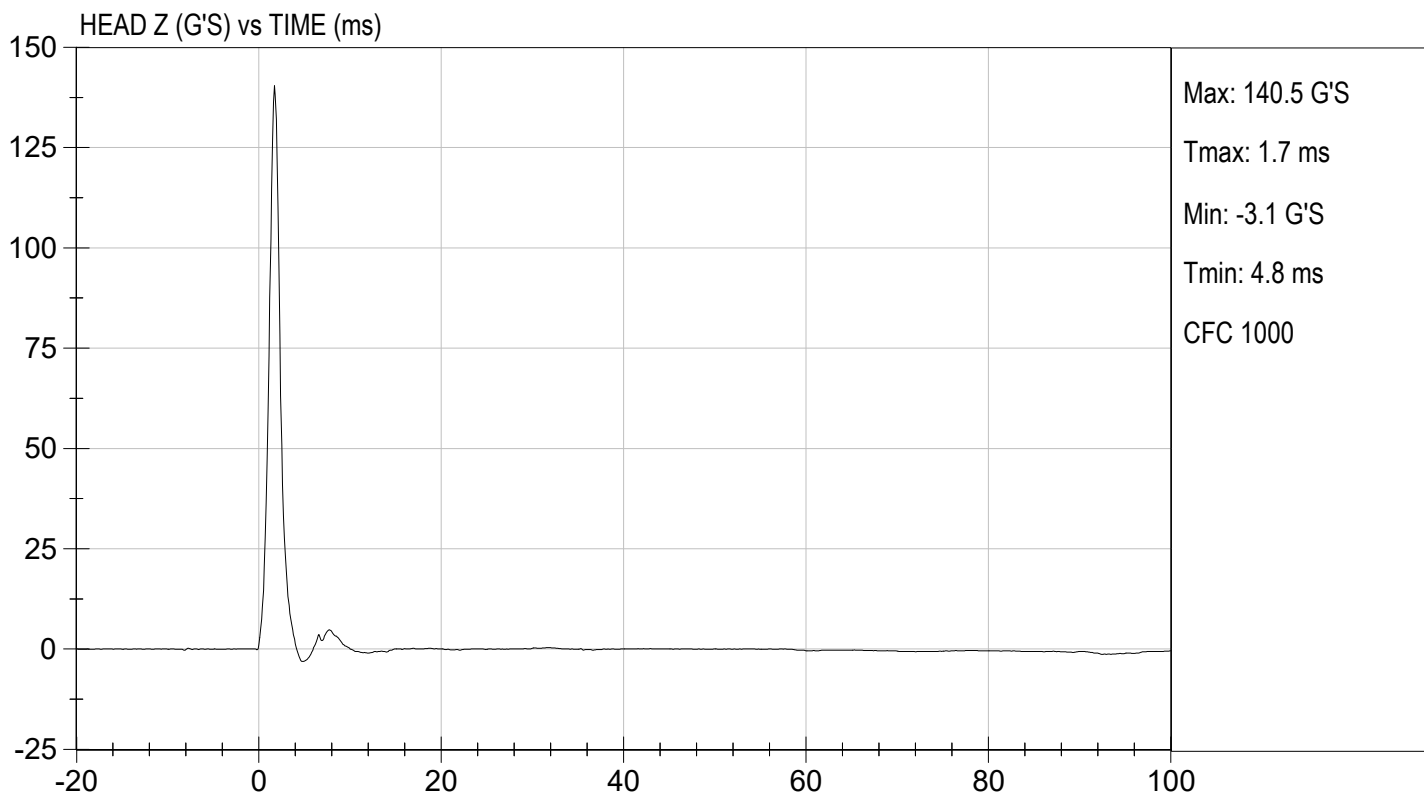
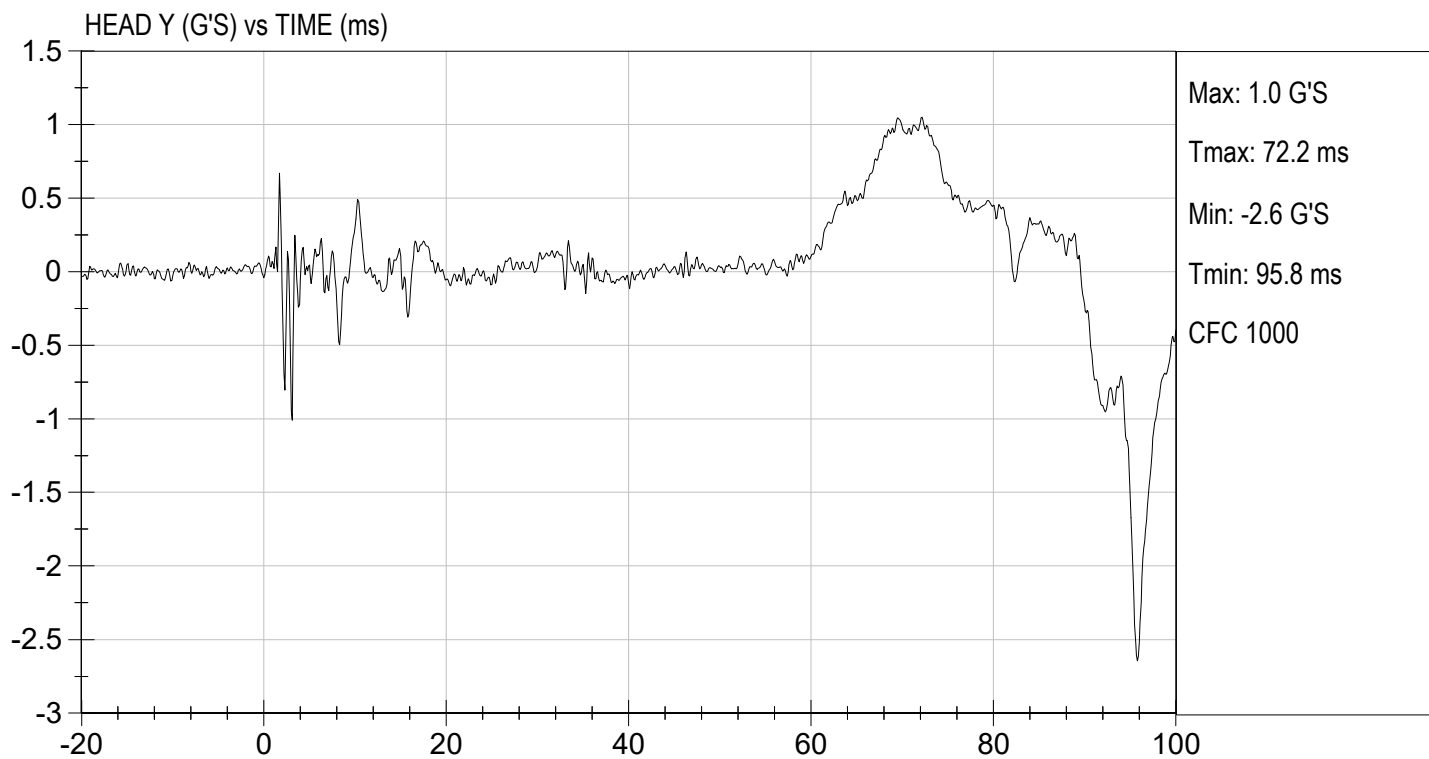
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	250 to 300	270	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

04/12/2023
Test Date


Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

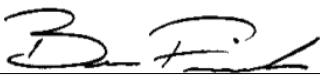
ATD Serial No: 142

Test I.D: D230932

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	38	Pass
Pendulum Speed		m/s	6.89 to 7.13	6.96	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	75	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
Overall Results					Pass


 Laboratory Technician

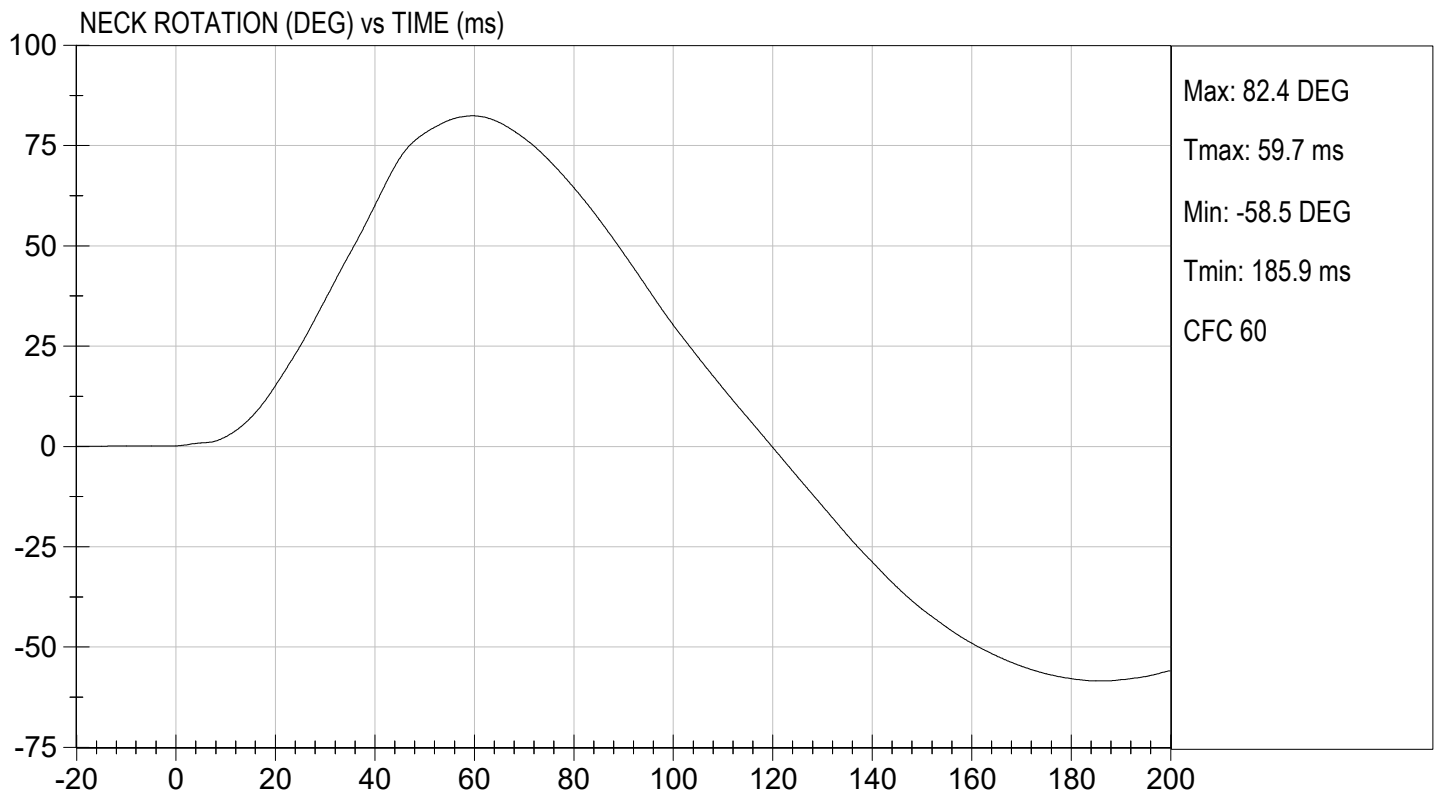
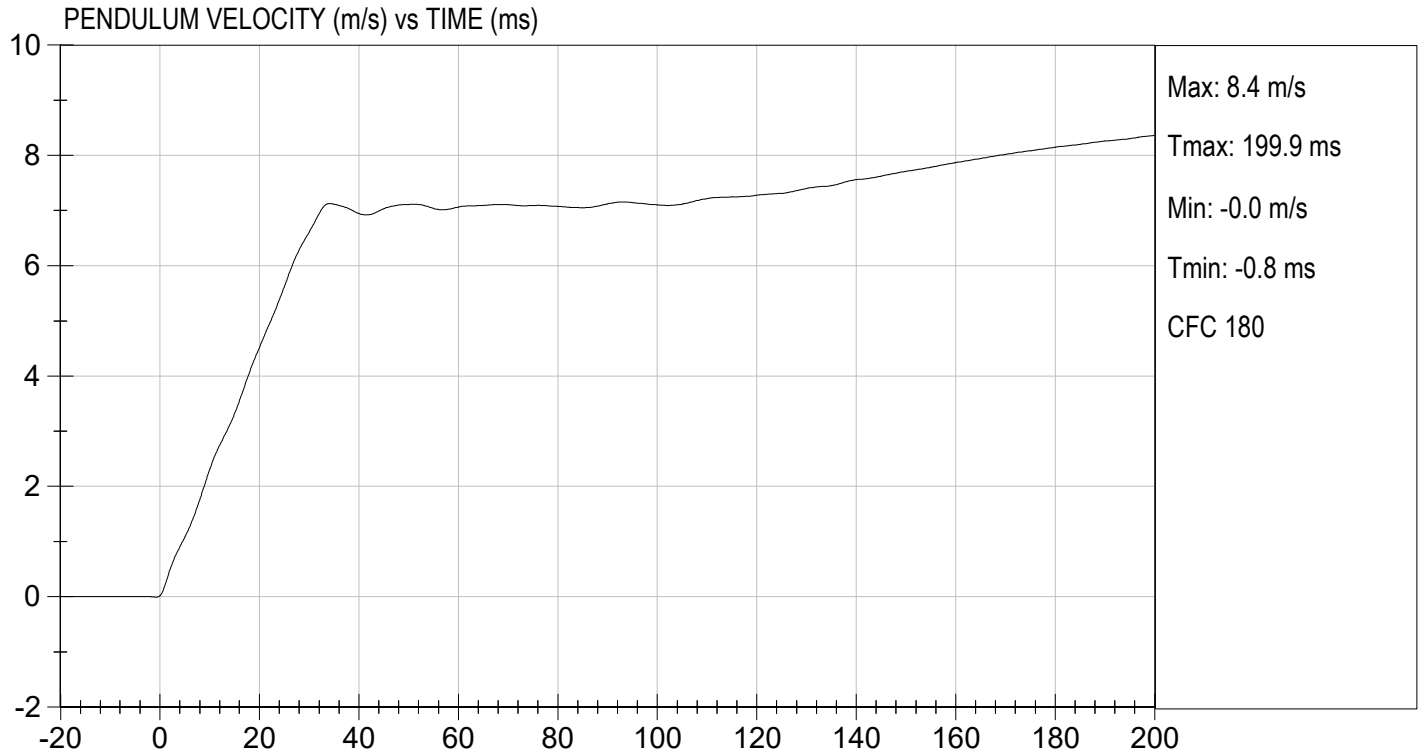
04/13/2023
 Test Date


 Approved By



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

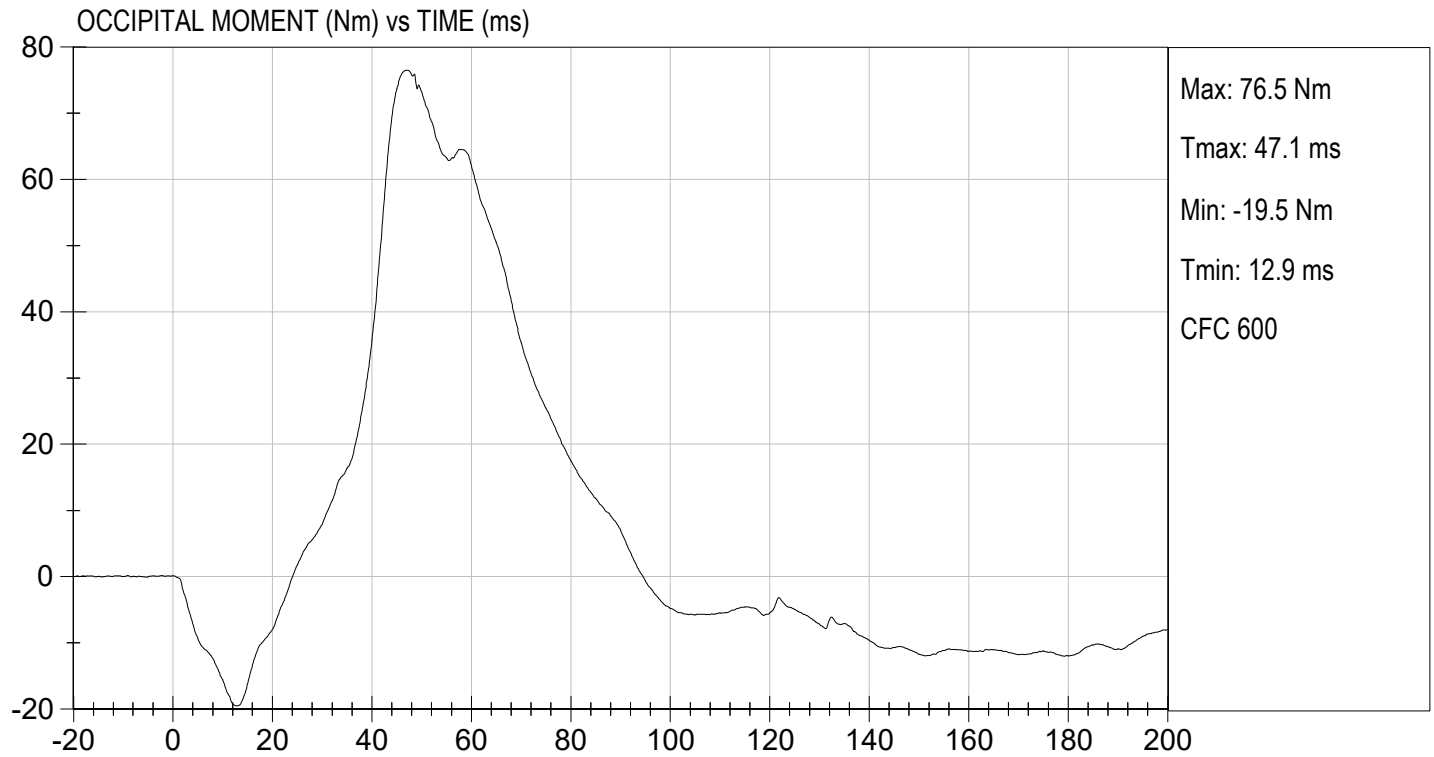
TEST DATE: 04/13/2023
TEST #: D230932





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

TEST DATE: 04/13/2023
TEST #: D230932



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

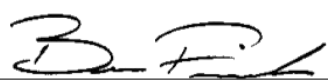
ATD Serial No: 142

Test I.D: D230933

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	38	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.05	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.6	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
Overall Results					Pass


Laboratory Technician

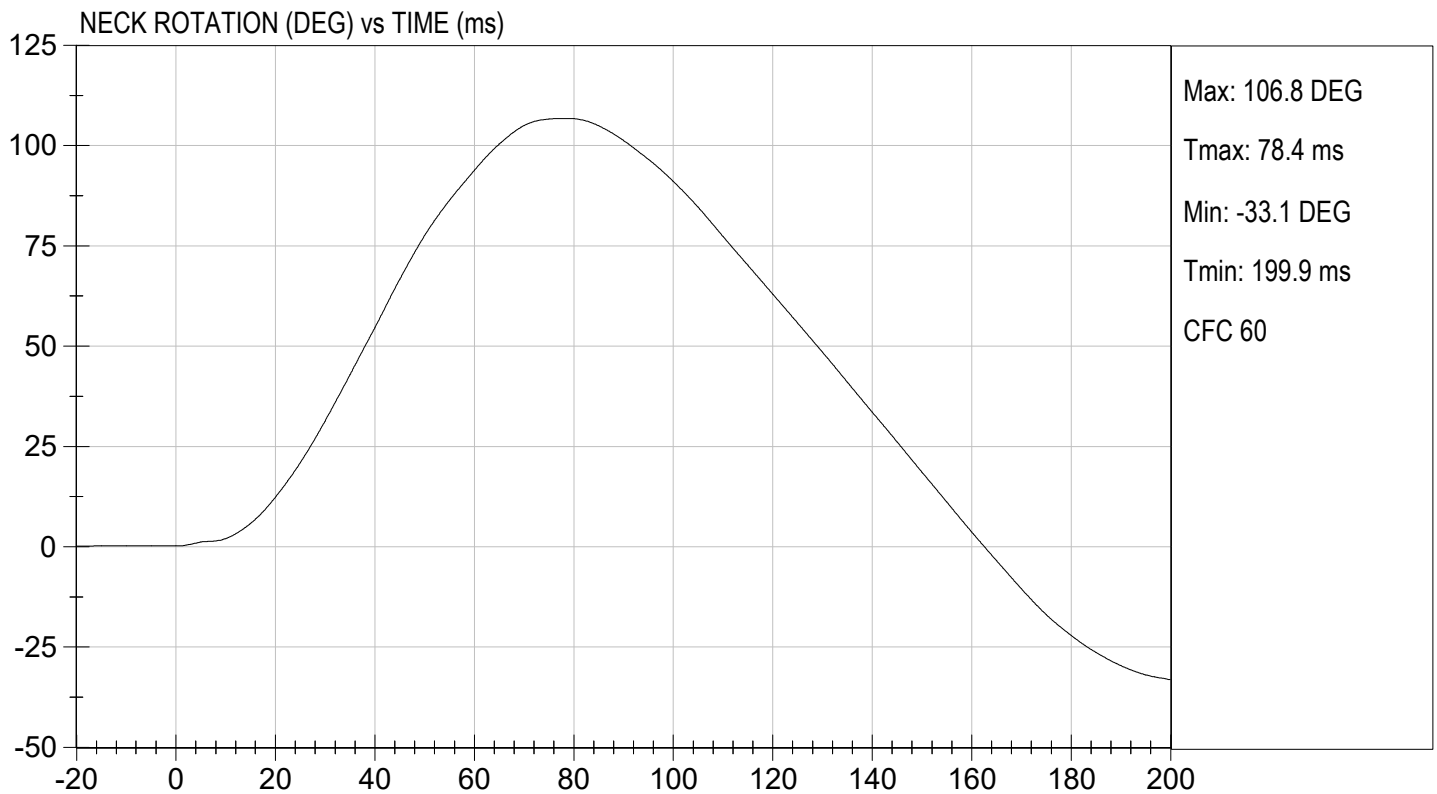
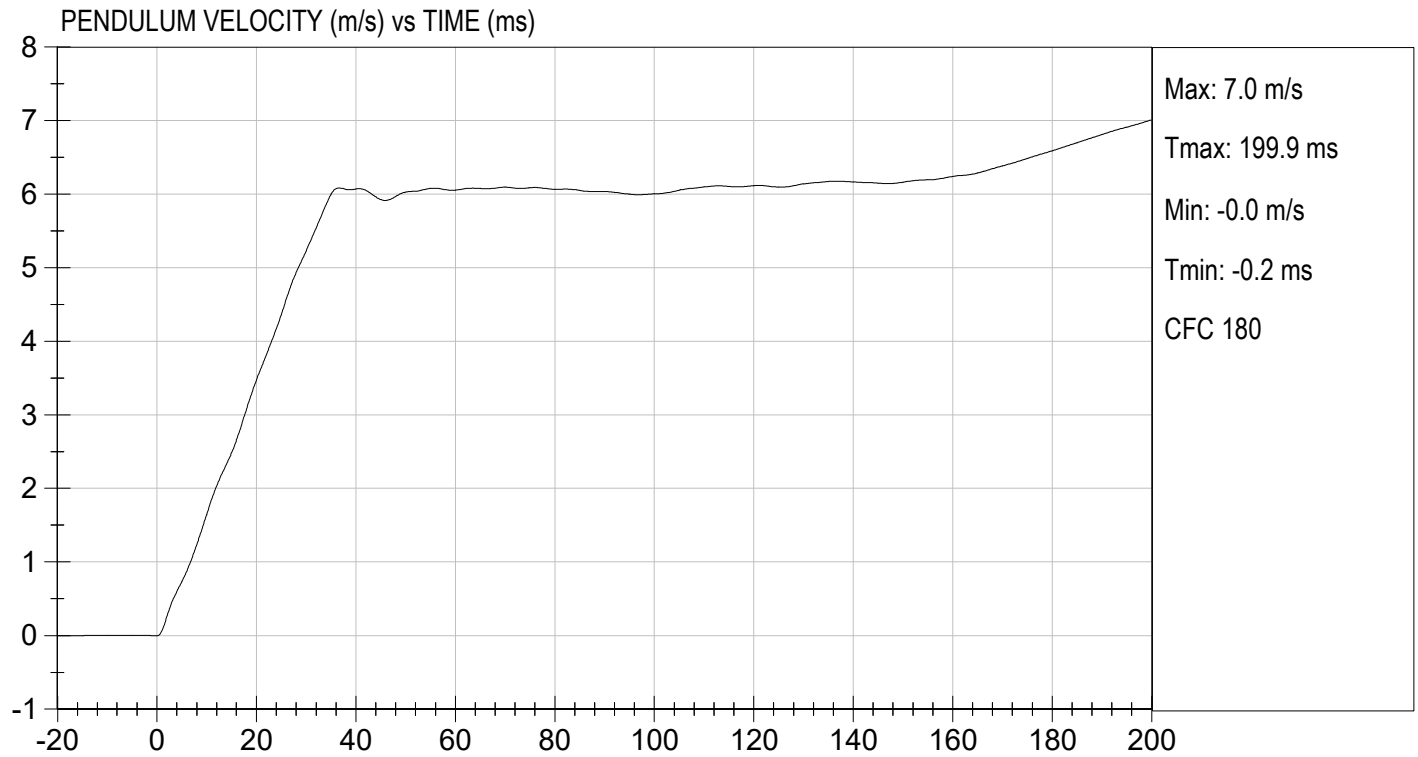
04/13/2023
Test Date


Approved By



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

TEST DATE: 04/13/2023
TEST #: D230933





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

TEST DATE: 04/13/2023
TEST #: D230933



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

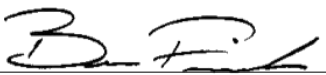
Test I.D: D230934

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Relative Humidity	%	10 to 70	34	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	4222	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4414	Pass
Overall Test Results				Pass


Laboratory Technician

04/11/2023

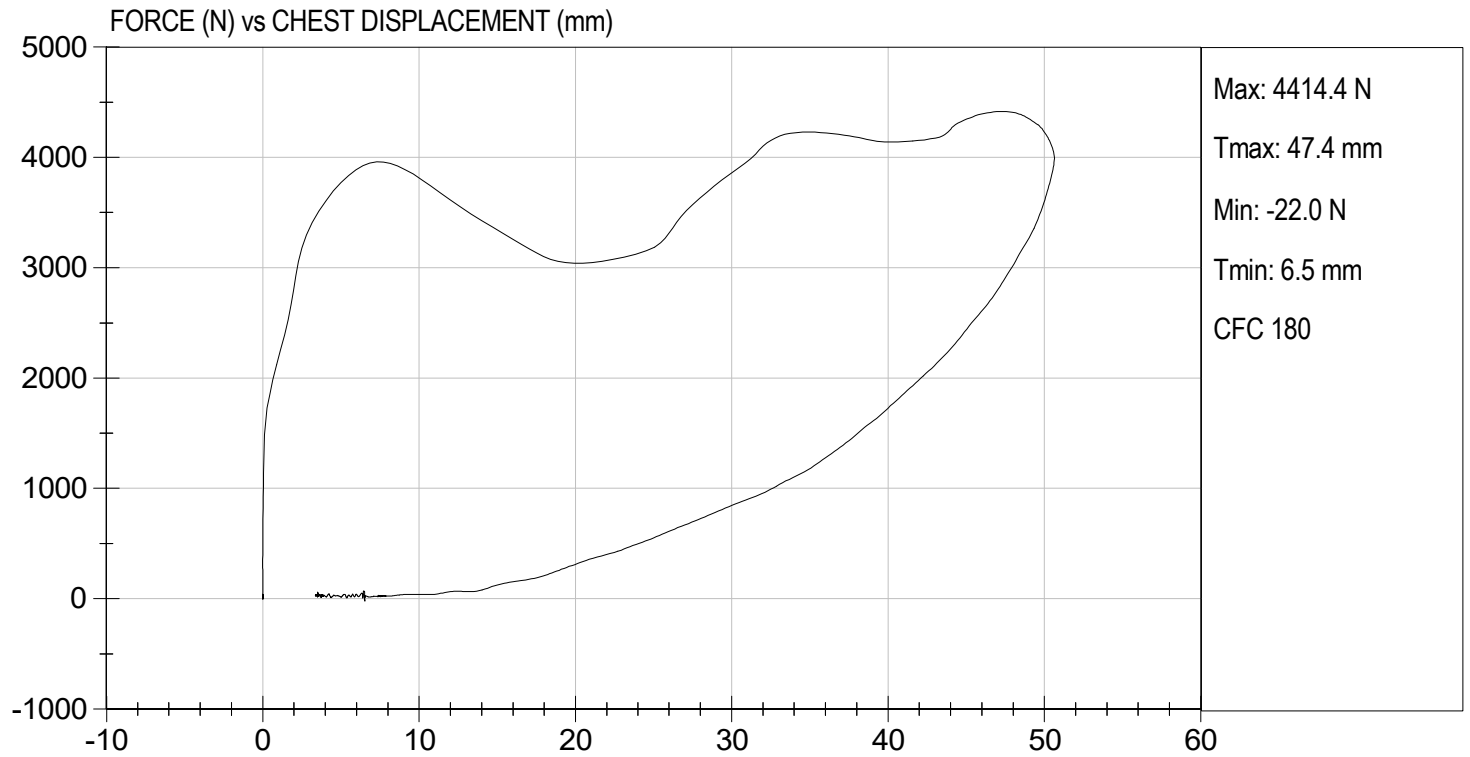
Test Date


Approved By



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

TEST DATE: 04/11/2023
TEST #: D230934



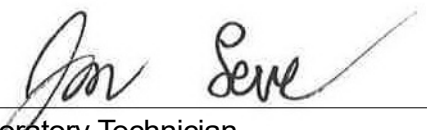
MGA RESEARCH CORPORATION

**RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

Test I.D: D230935

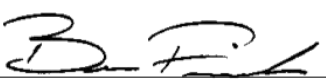
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	N	3450 to 4060	3552	Pass
Overall Test Results				Pass



Laboratory Technician

04/12/2023

Test Date

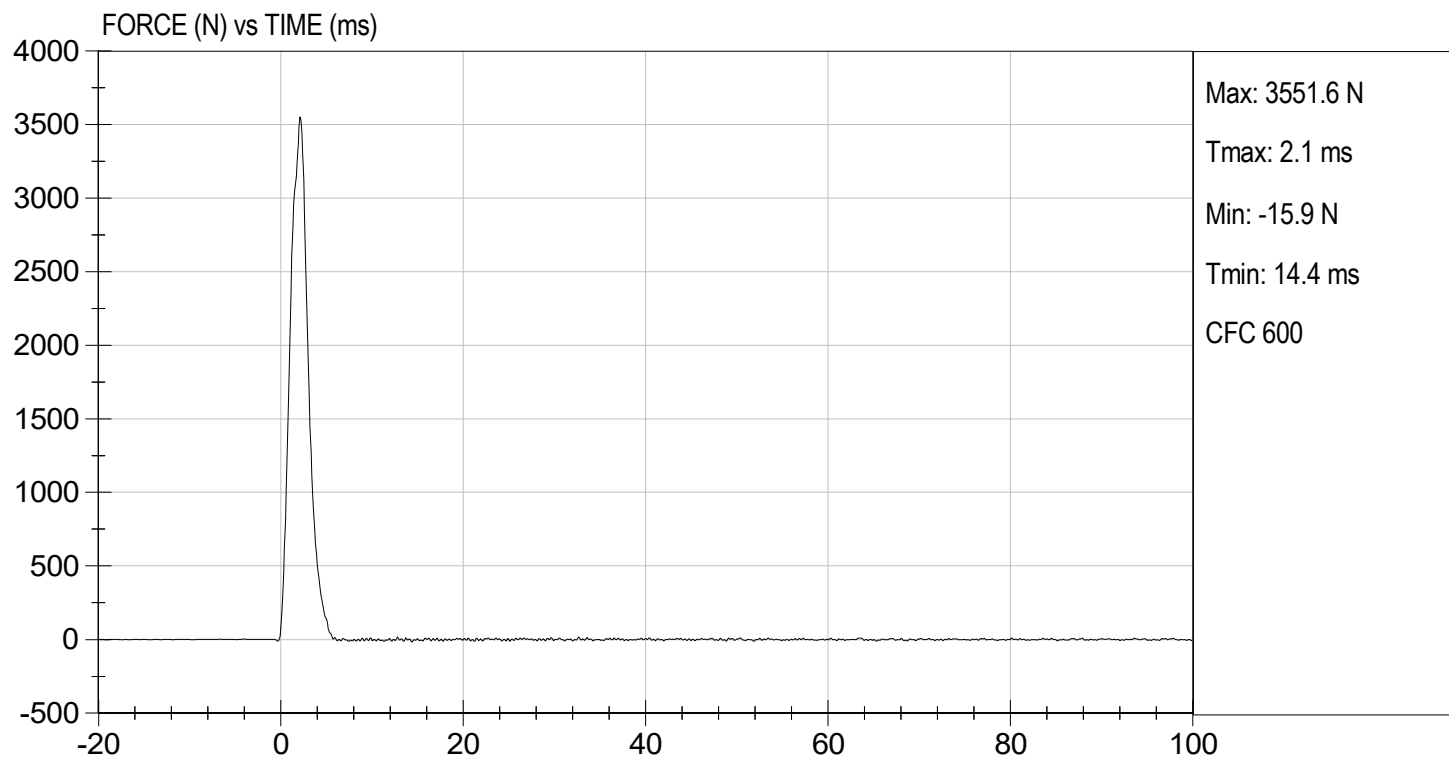


Approved By



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

TEST DATE: 04/12/2023
TEST #: D230935



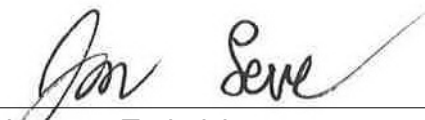
MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

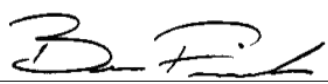
ATD Serial No: 142

Test I.D: D230936

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	N	3450 to 4060	3687	Pass
Overall Test Results				Pass


Laboratory Technician

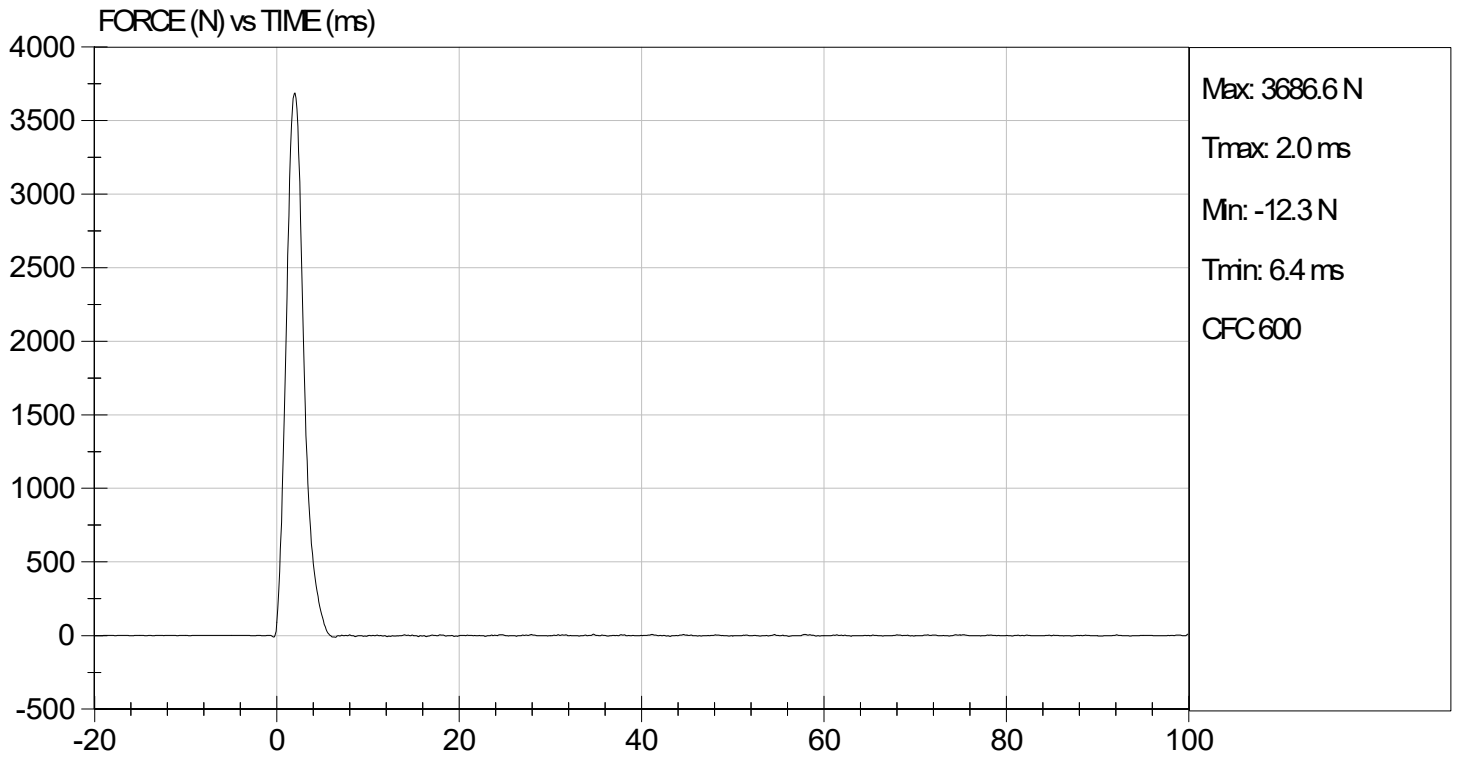
04/12/2023
Test Date


Approved By



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

TEST DATE: 04/12/2023
TEST #: D230936



MGA RESEARCH CORPORATION

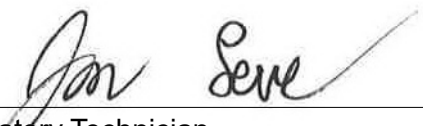
TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

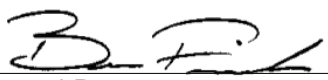
Test I.D: D230937

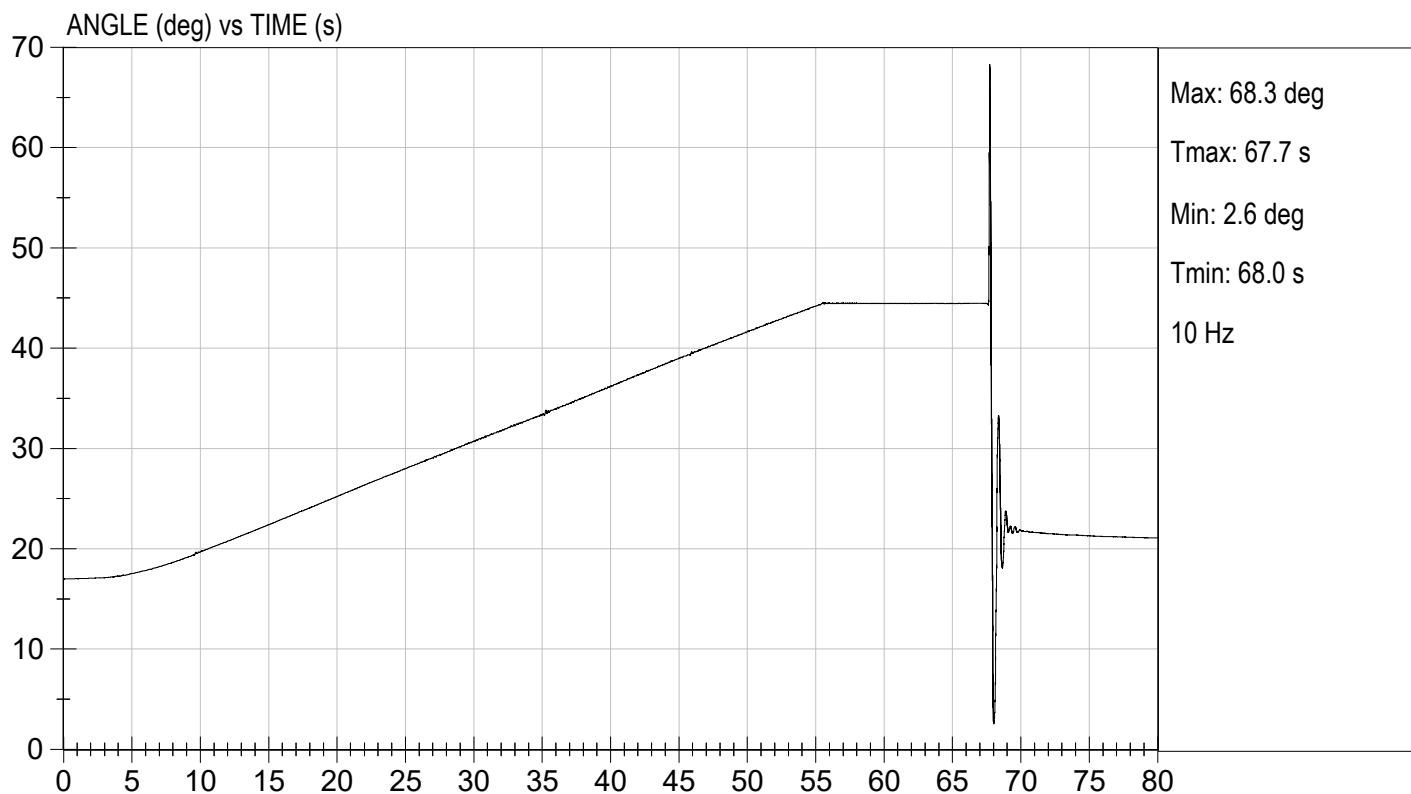
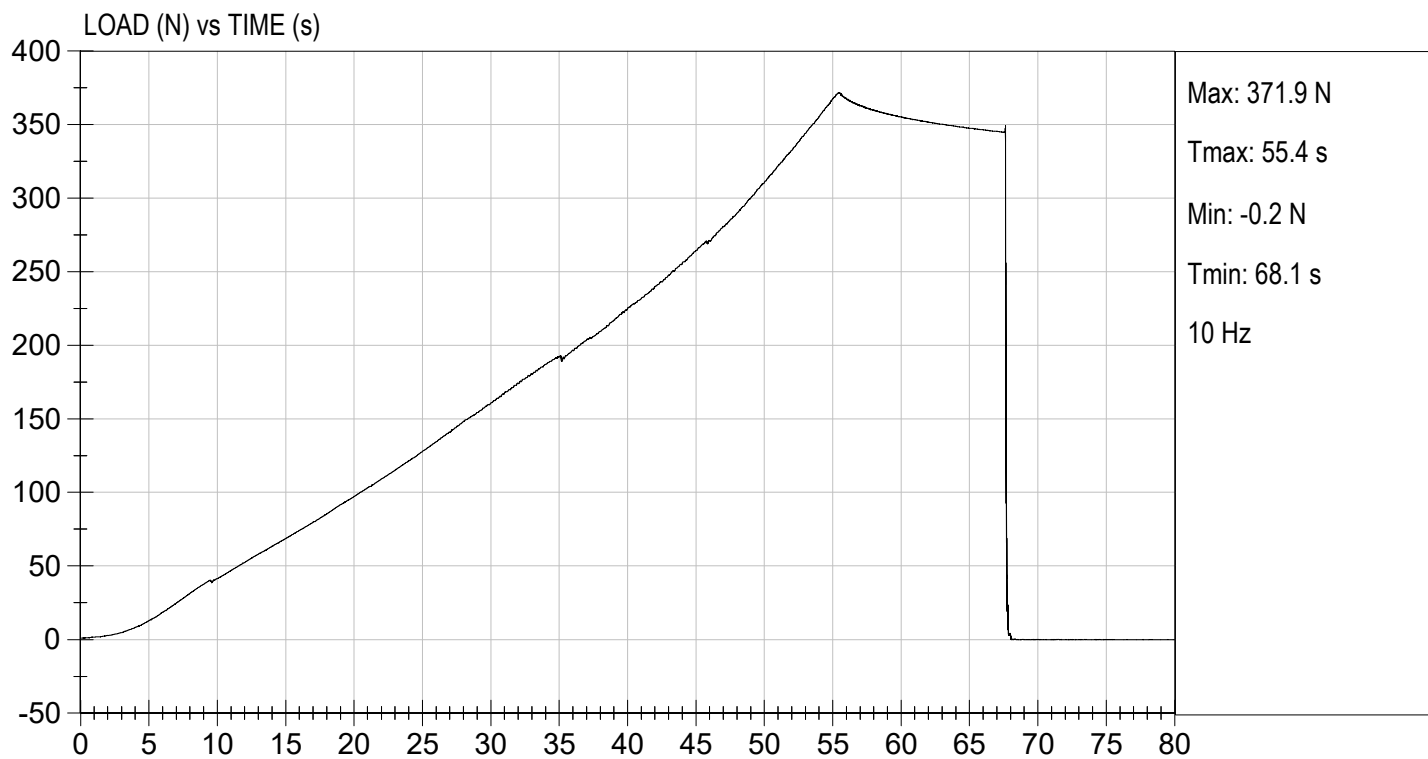
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	371	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
Overall Result			Pass	


Laboratory Technician

04/12/2023

Test Date


Approved By



QUALIFICATION TEST RESULTS

POST-TEST

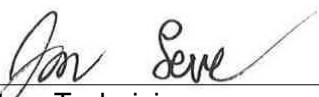
HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

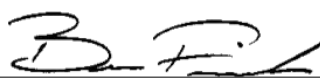
ATD Serial No: 142

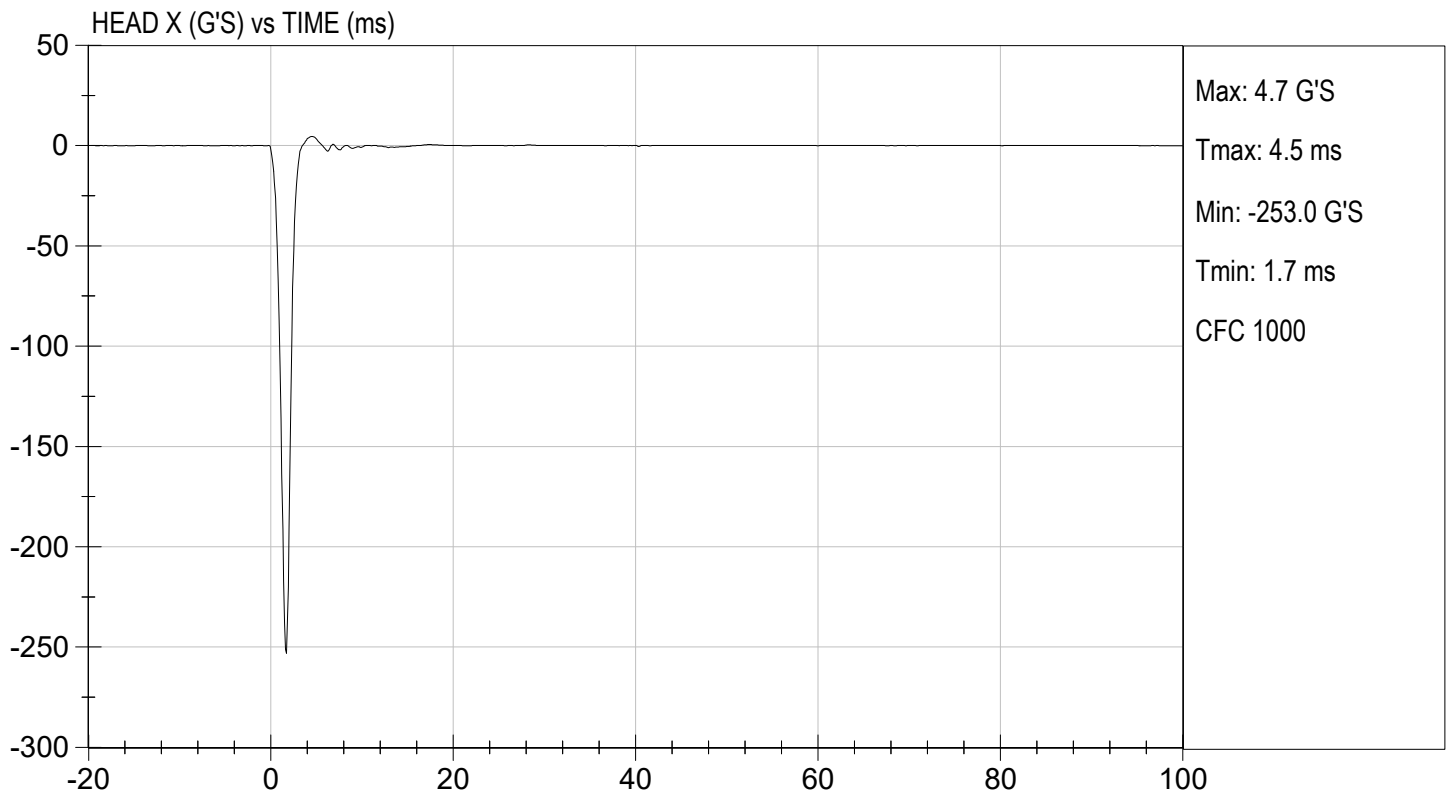
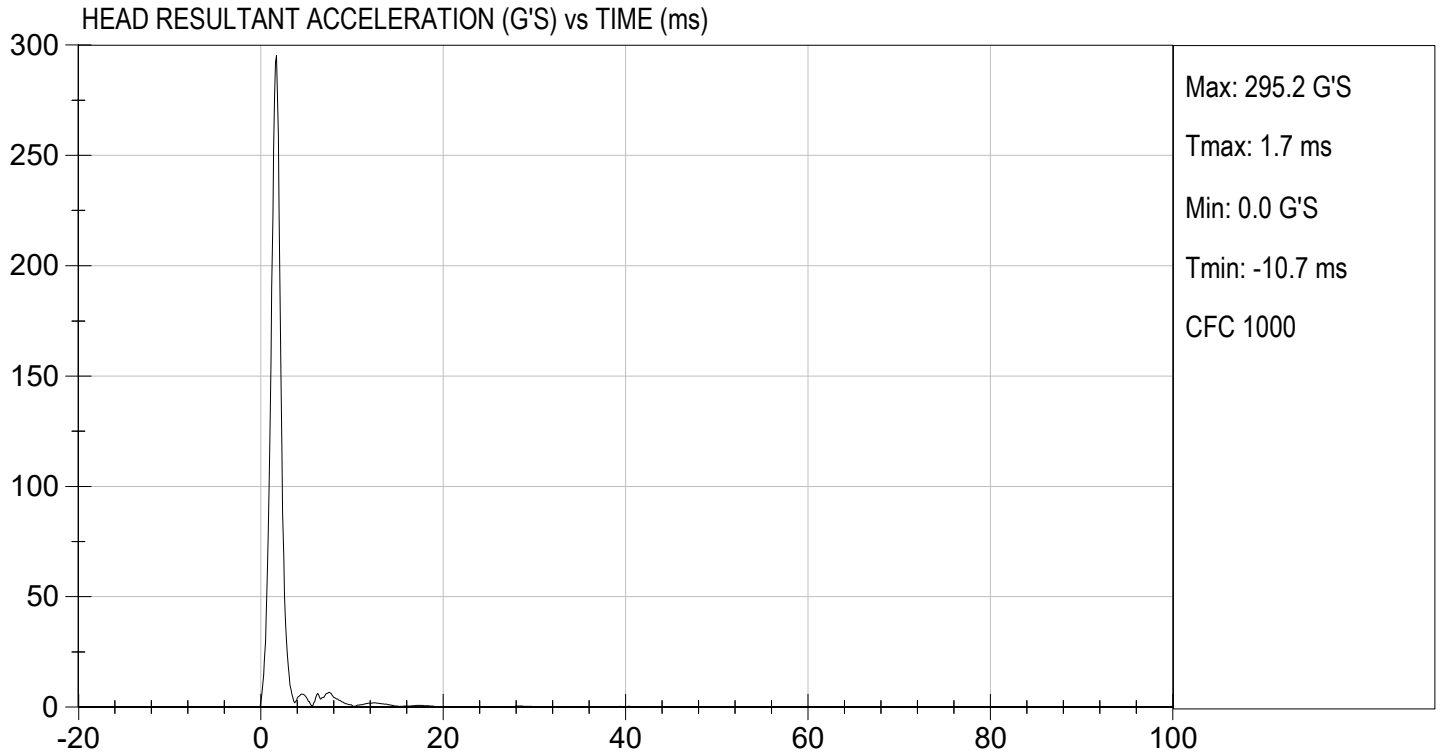
Test ID: D231131

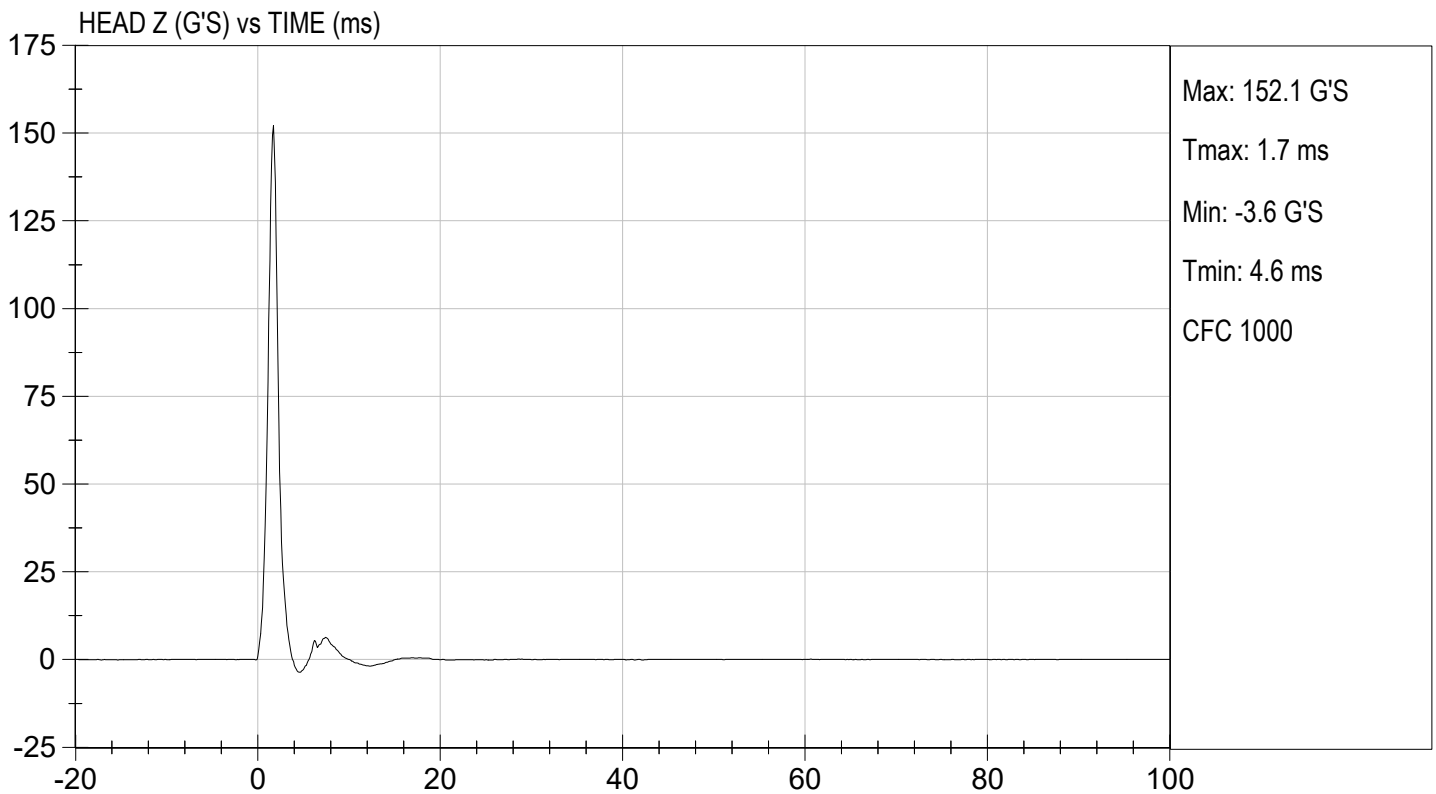
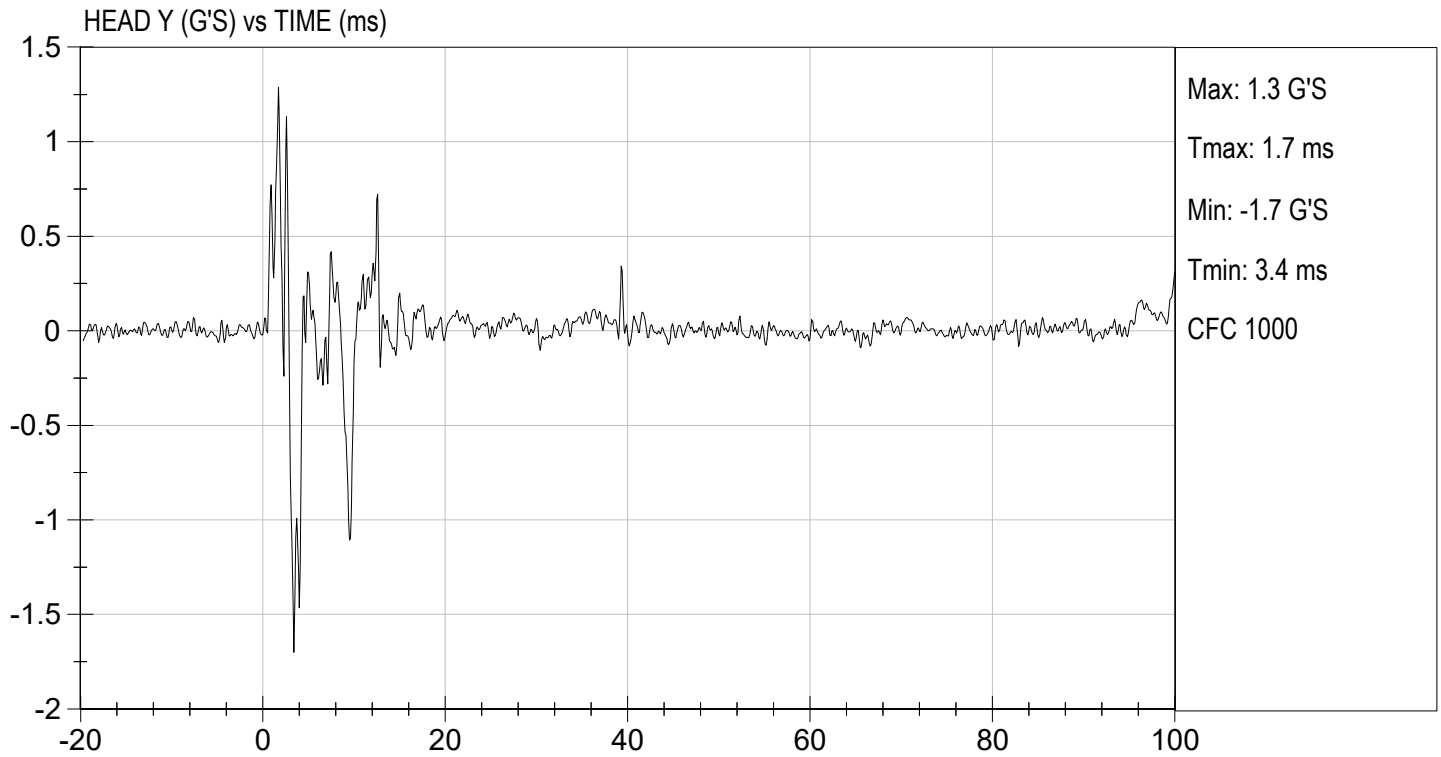
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	250 to 300	295	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-1.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

05/08/2023
Test Date

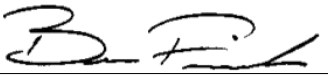

Approved By





MGA RESEARCH CORPORATION**NECK FLEXION TEST
HYBRID III 5TH PERCENTILE**ATD Serial No: 142Test I.D: D231132

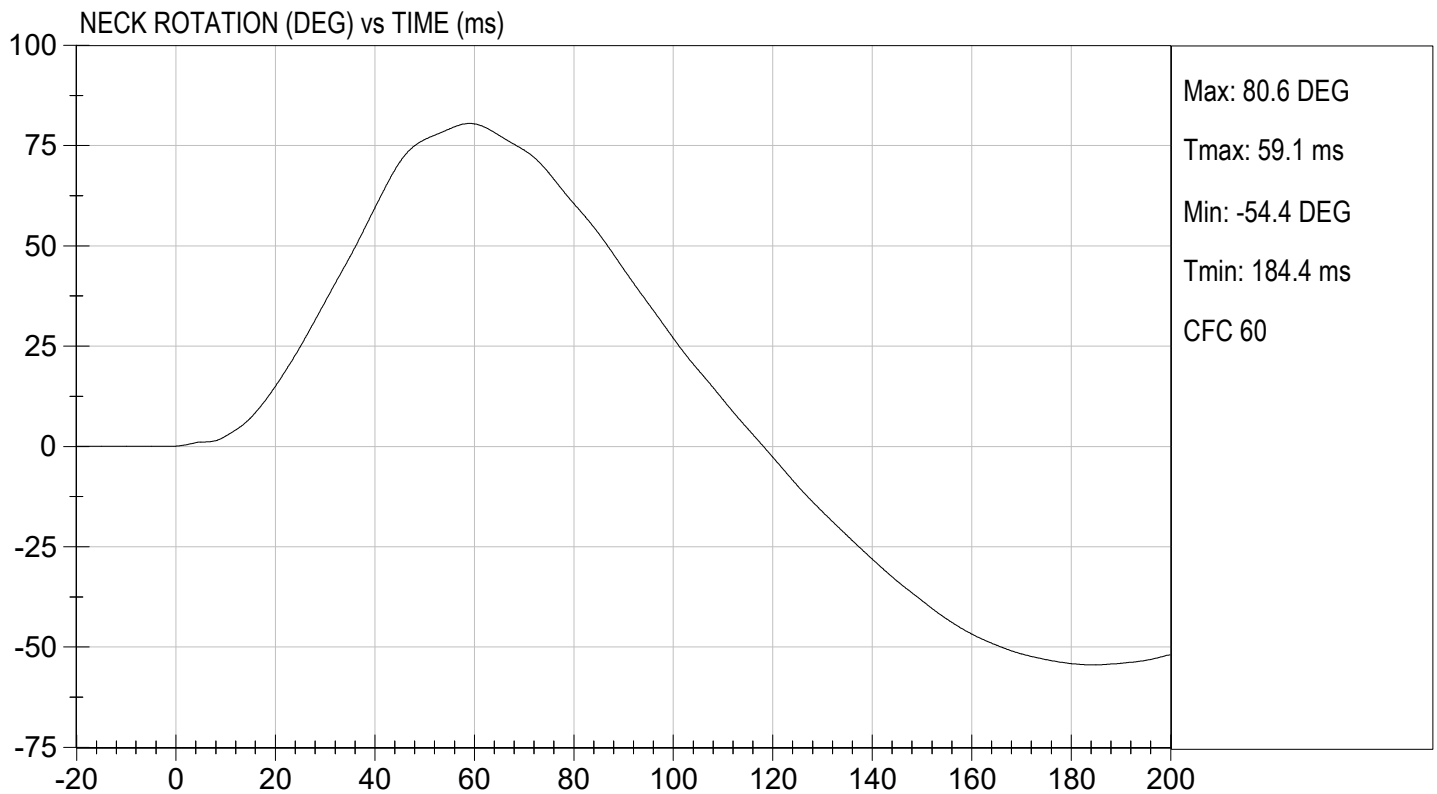
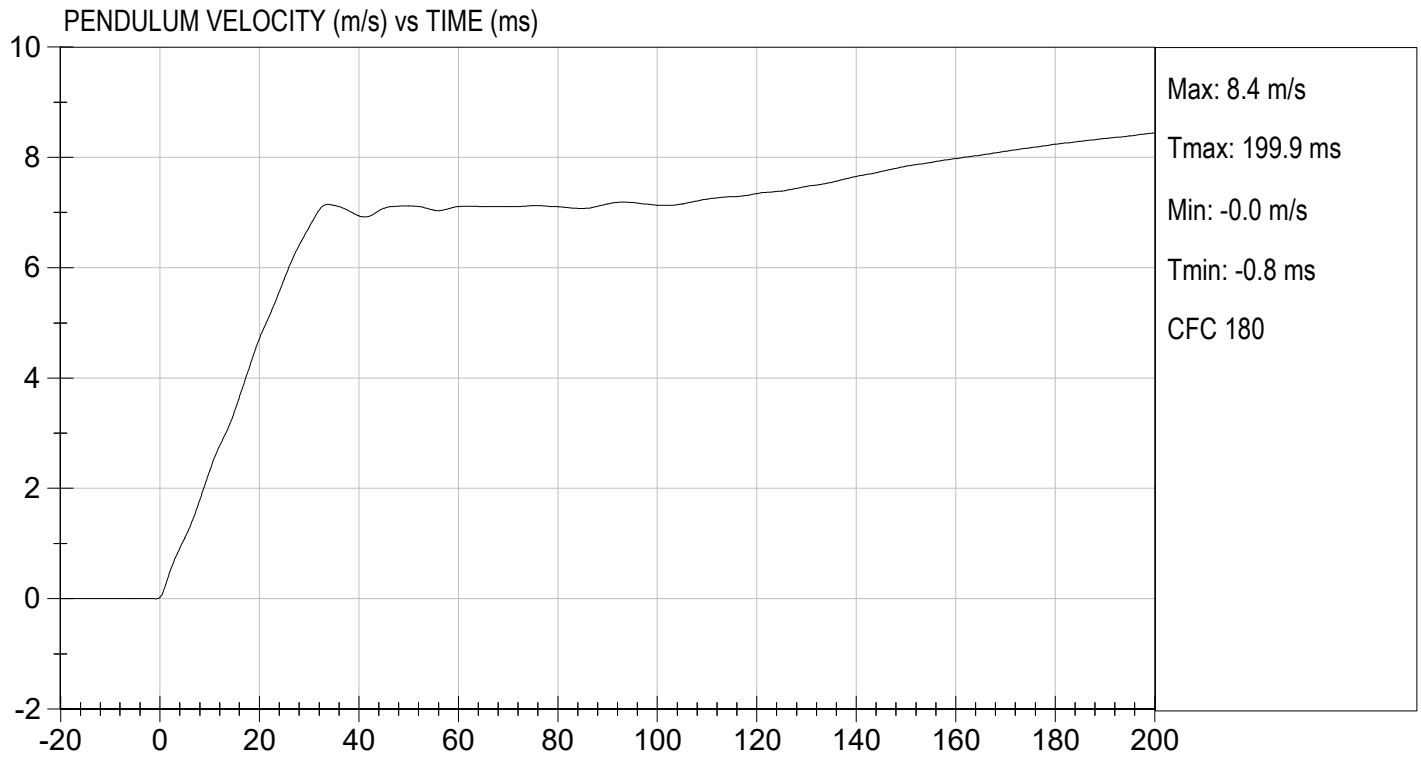
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	49	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.7	Pass
	30 ms	m/s	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	81	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	83	Pass
Overall Results				Pass	


Laboratory Technician05/08/2023
Test Date
Approved By



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

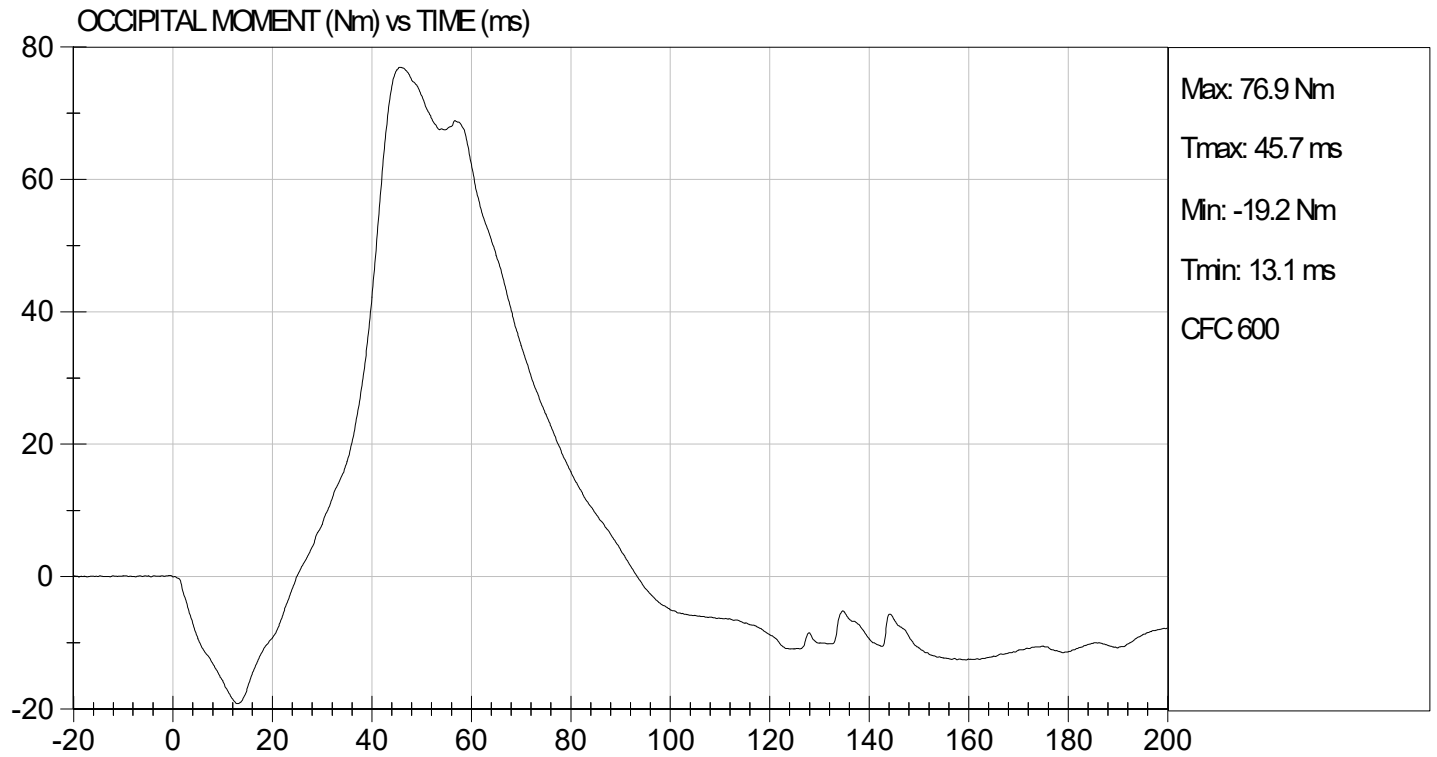
TEST DATE: 05/08/2023
TEST #: D231132





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

TEST DATE: 05/08/2023
TEST #: D231132

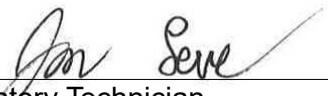


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

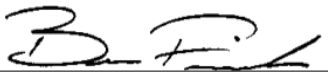
ATD Serial No: 142

Test I.D: D231133

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	49	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	3.5	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
Overall Results					Pass


 Laboratory Technician

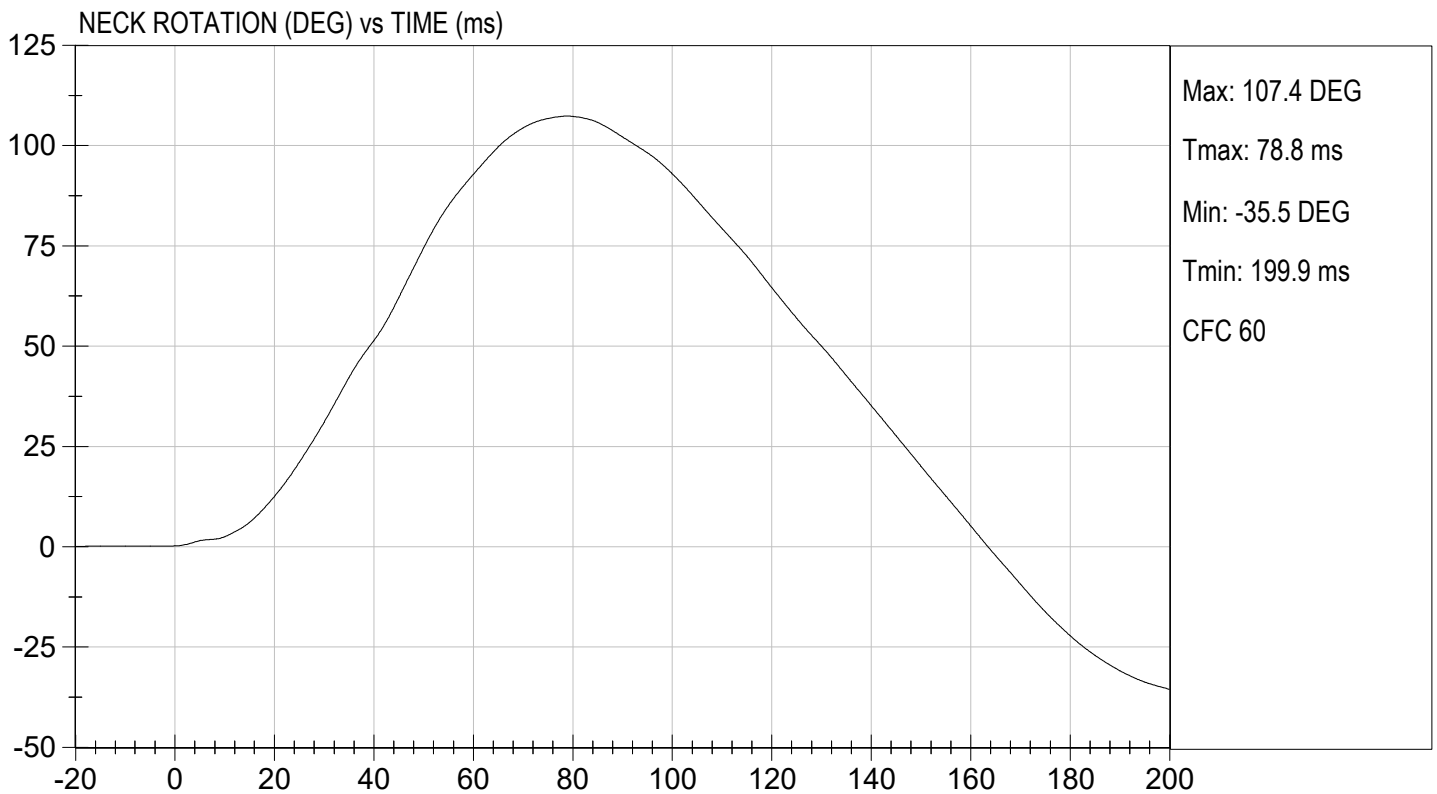
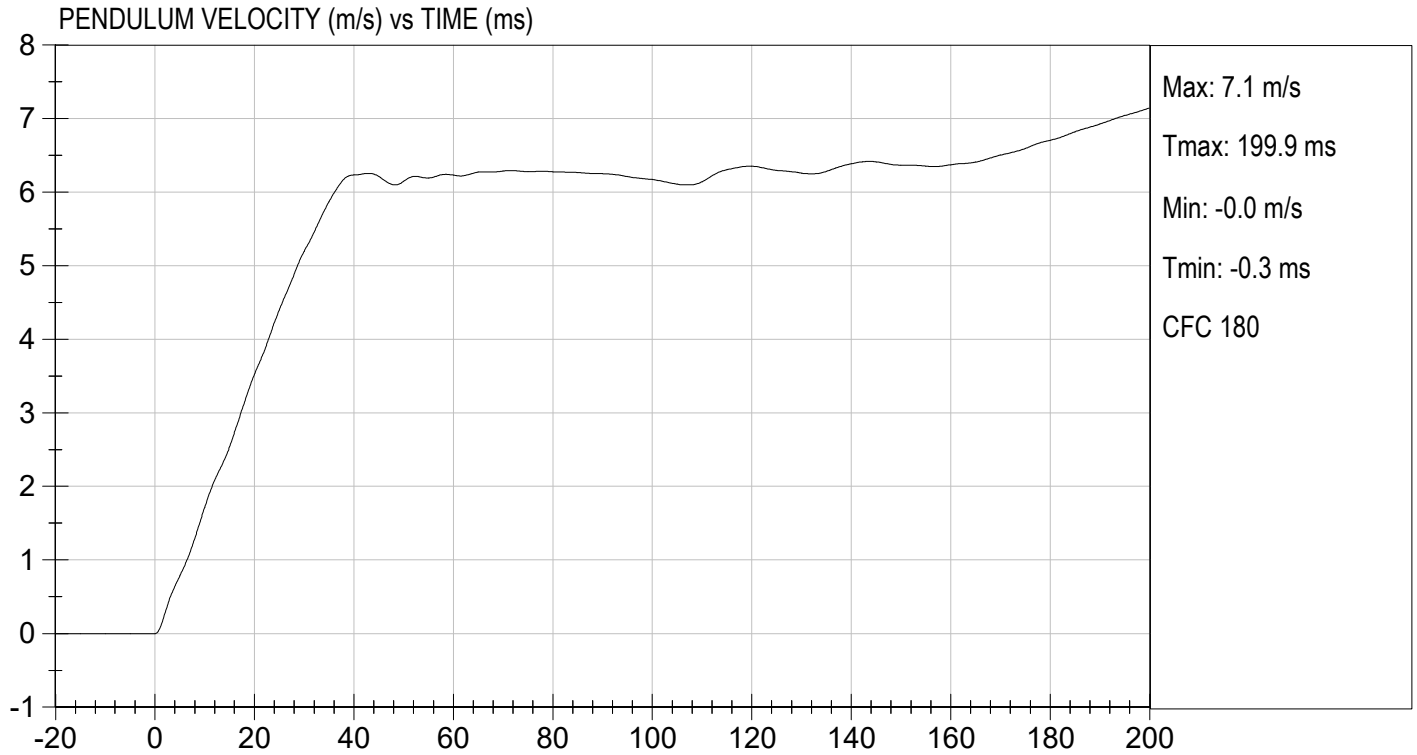
05/08/2023
 Test Date


 Approved By



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

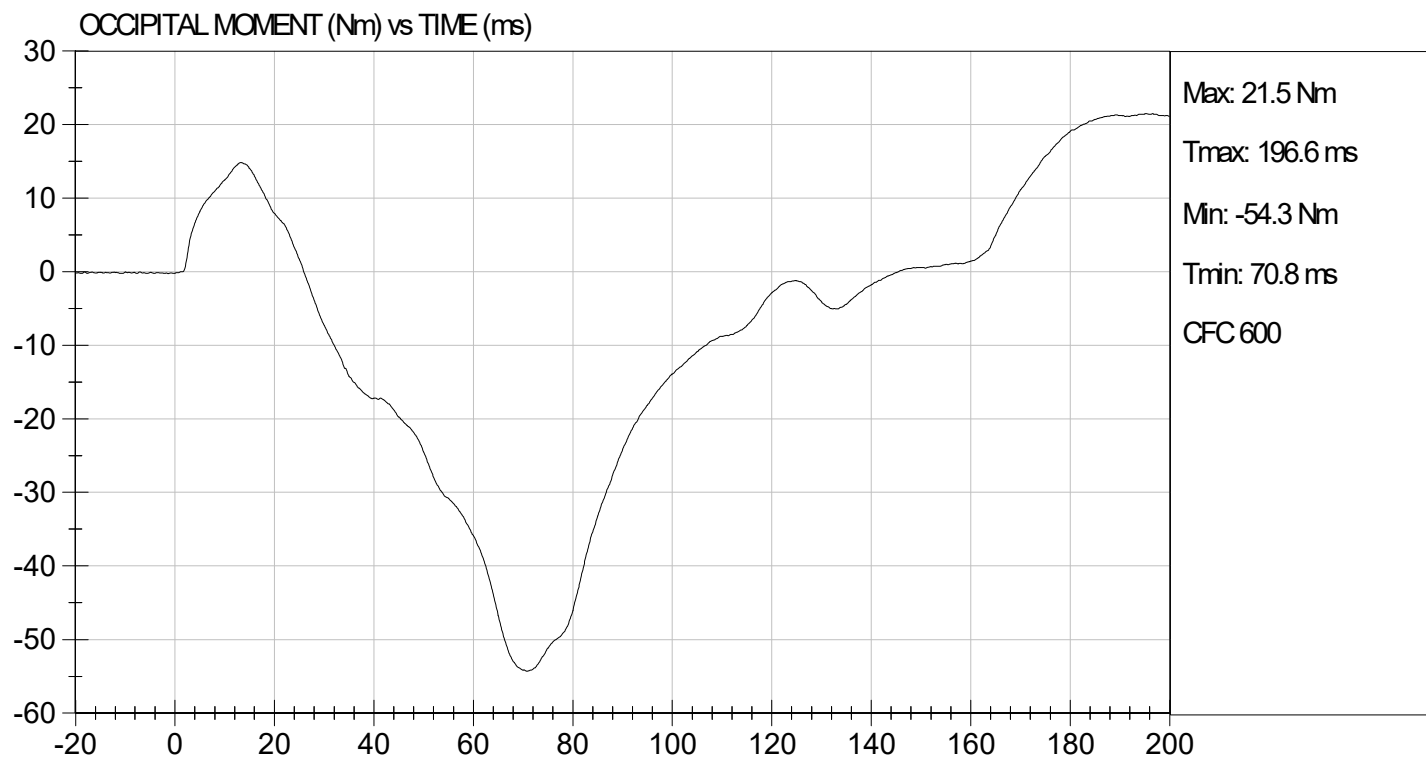
TEST DATE: 05/08/2023
TEST #: D231133





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

TEST DATE: 05/08/2023
TEST #: D231133

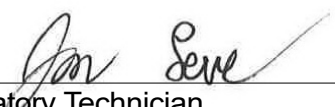


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

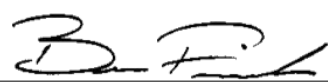
Test I.D: D231134

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	46	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4322	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4384	Pass
Overall Test Results				Pass


Laboratory Technician

05/08/2023

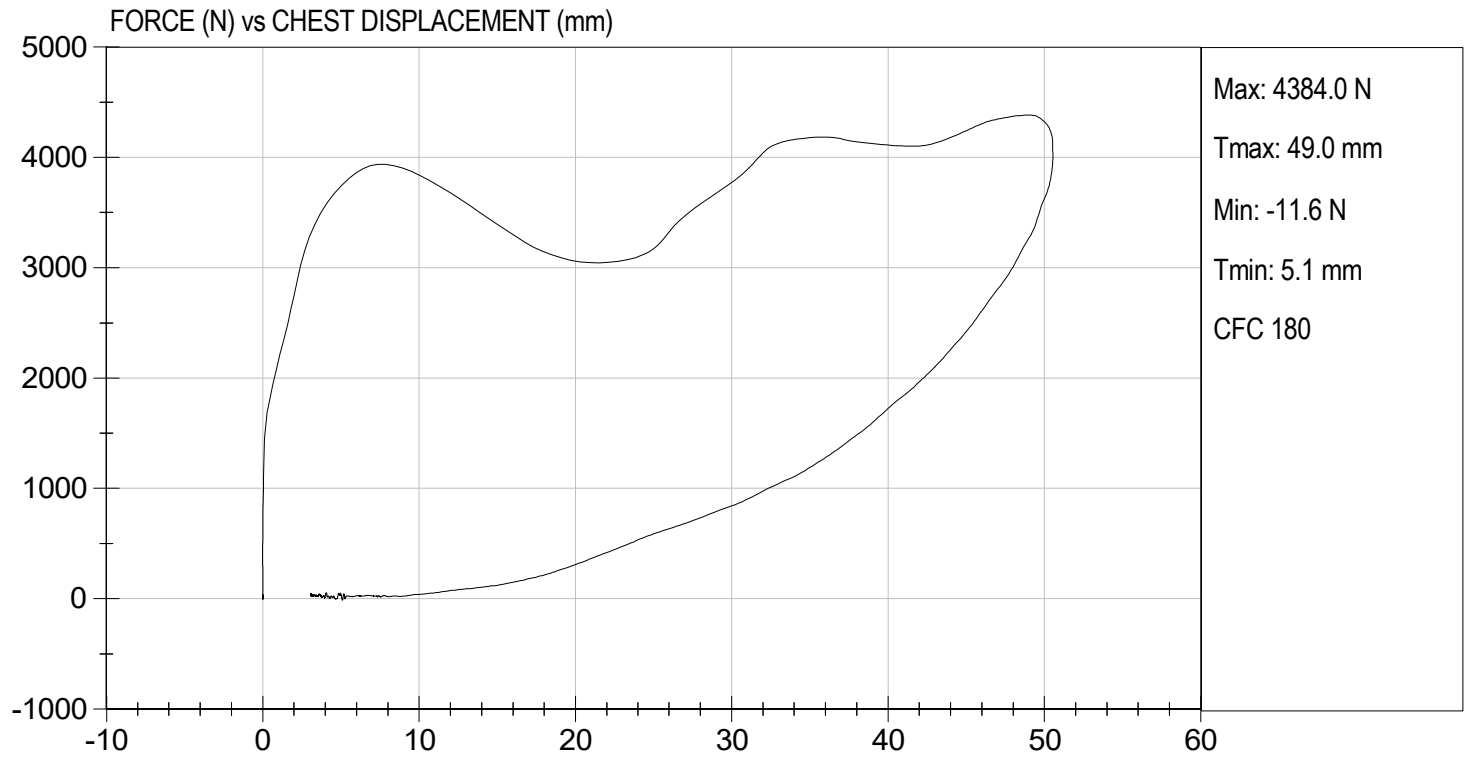
Test Date


Approved By



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

TEST DATE: 05/08/2023
TEST #: D231134



MGA RESEARCH CORPORATION

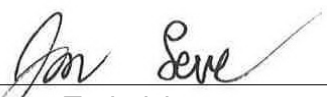
RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

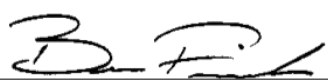
Test I.D: D231135

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	2.07 to 2.13	2.08	Pass
Maximum Force	N	3450 to 4060	3682	Pass
Overall Test Results				Pass


Laboratory Technician

05/08/2023

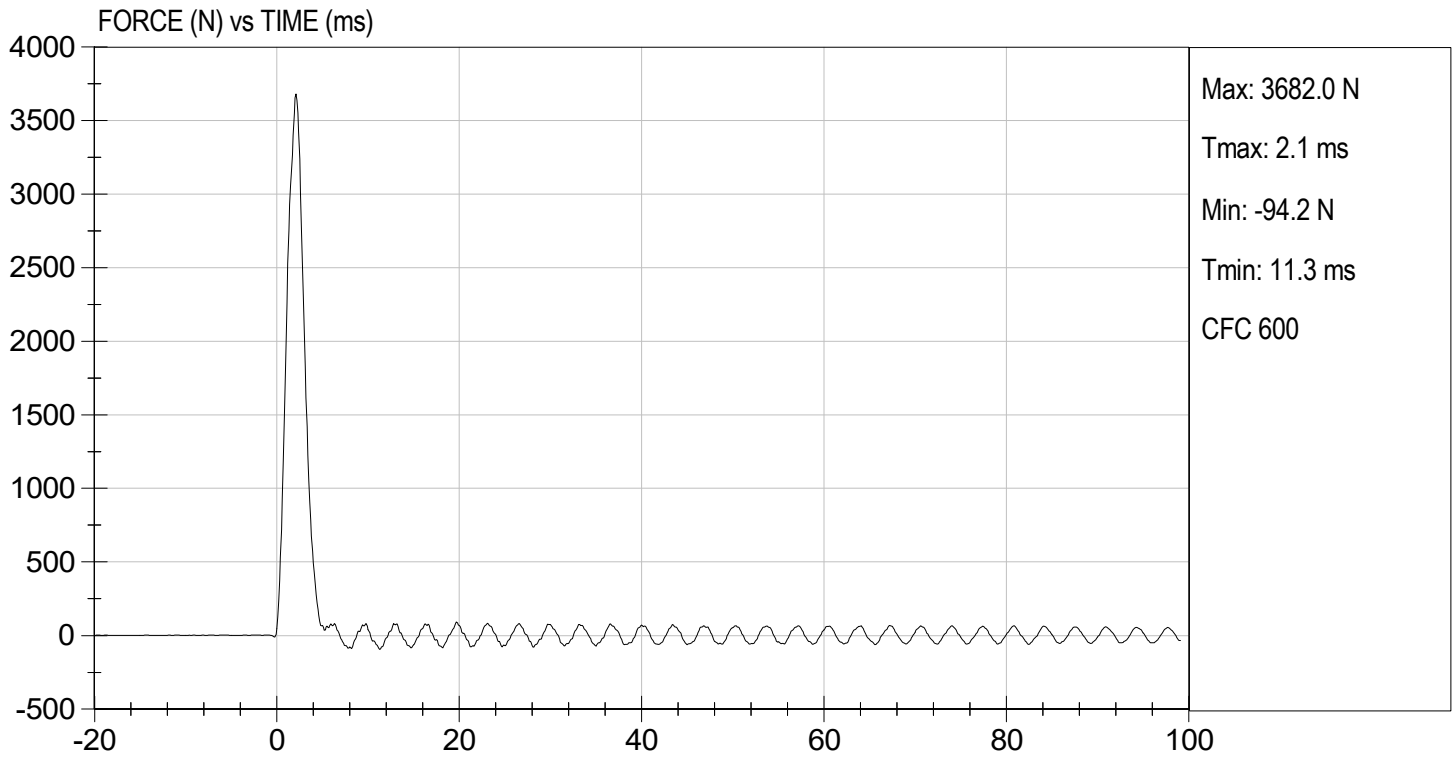
Test Date


Approved By



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

TEST DATE: 05/08/2023
TEST #: D231135



MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

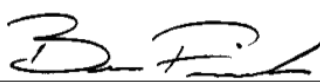
ATD Serial No: 142

Test I.D: D231136

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	2.07 to 2.13	2.08	Pass
Maximum Force	N	3450 to 4060	3774	Pass
Overall Test Results				Pass


Laboratory Technician

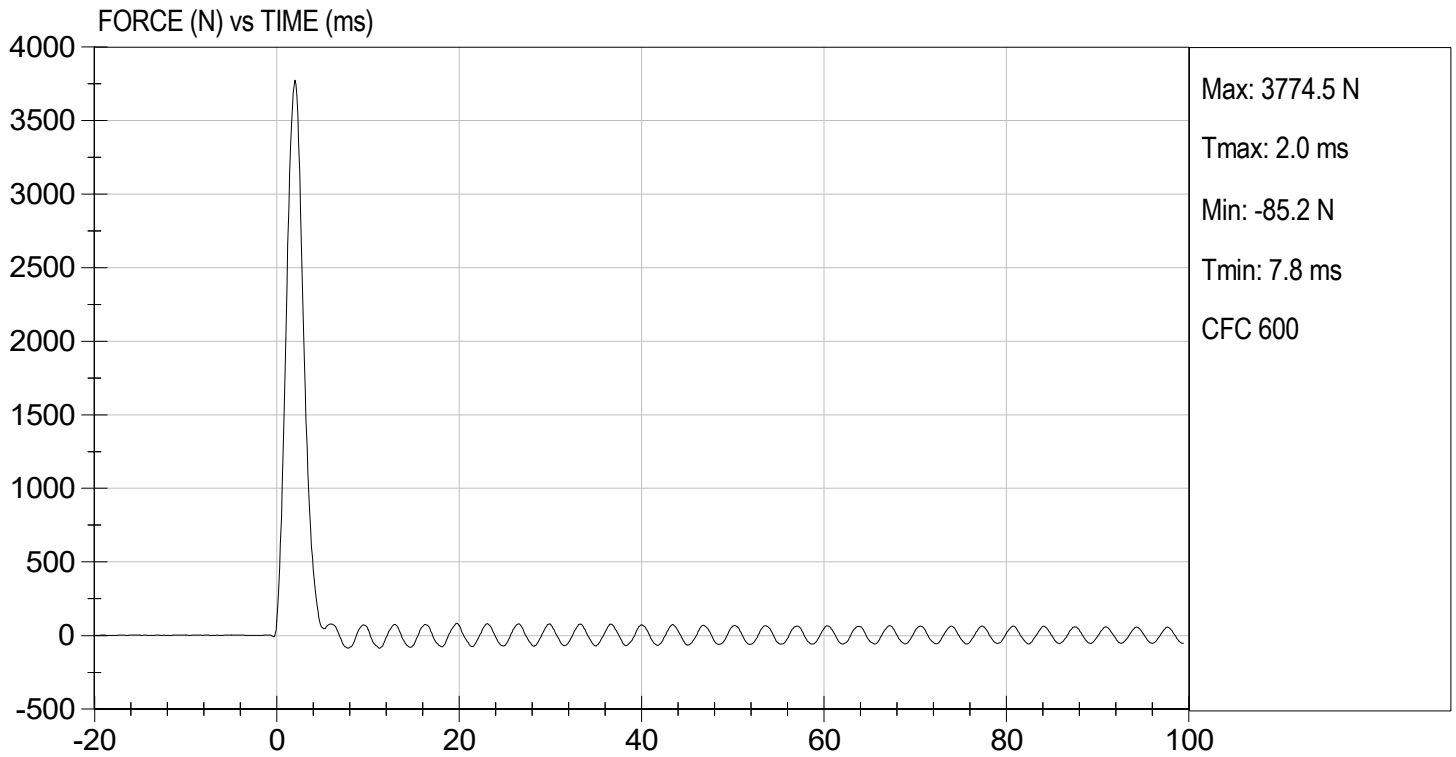
05/08/2023
Test Date


Approved By



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

TEST DATE: 05/08/2023
TEST #: D231136



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 142

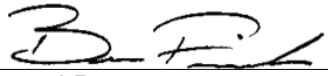
Test I.D: D231137

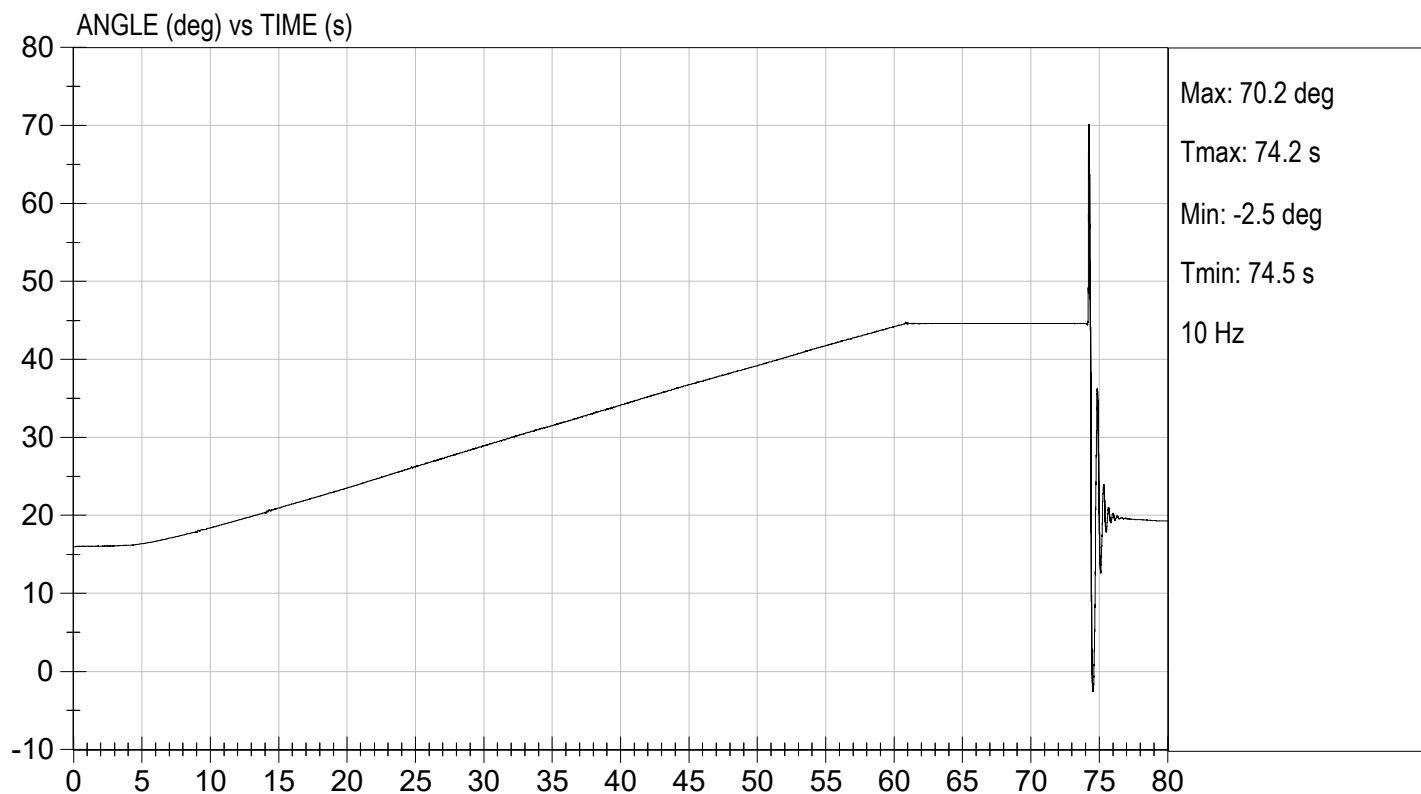
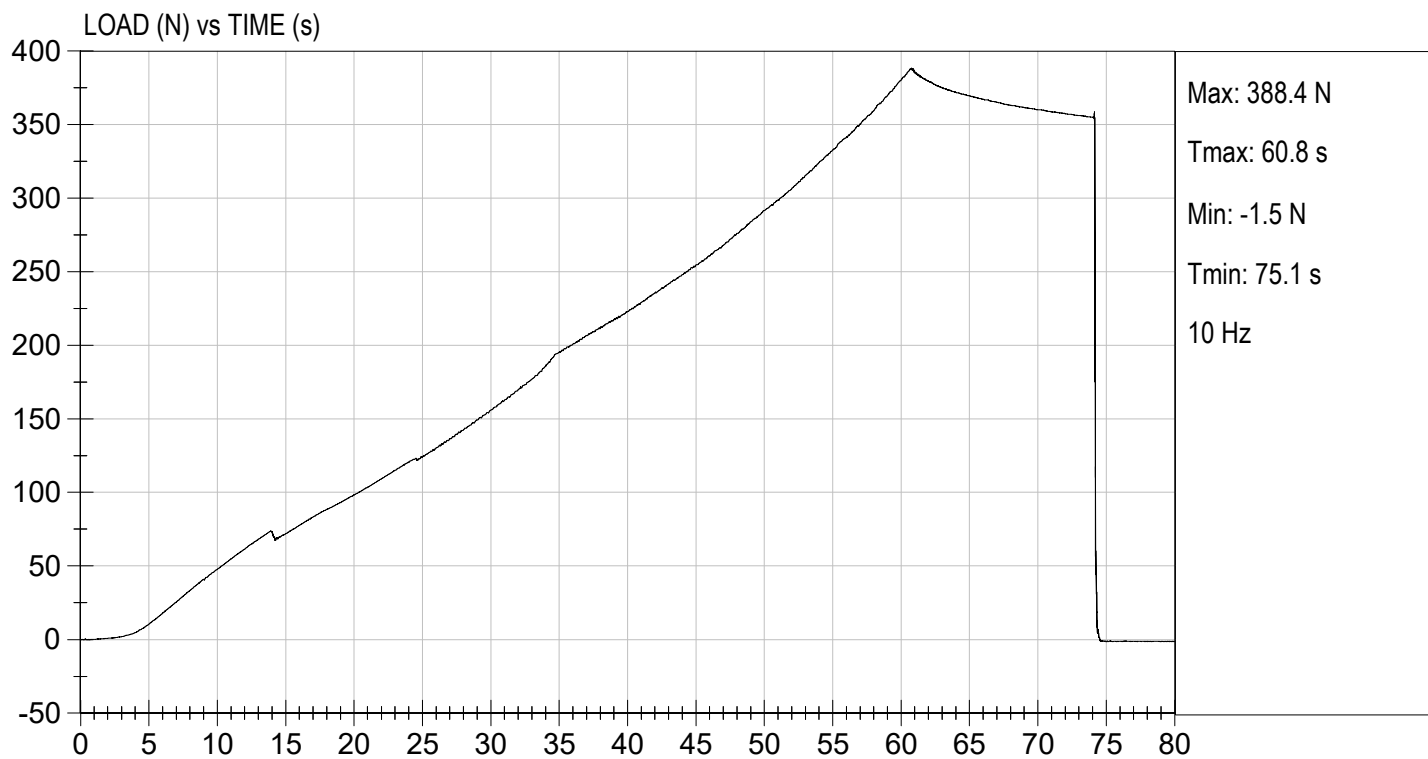
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	3	Pass
Force at 45 deg	N	320 to 390	388	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
Overall Result			Pass	


Laboratory Technician

05/09/2023

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 351		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary		X	P79741	Endevco	12/29/2022
			Y	P79743	Endevco	12/29/2022
			Z	P79744	Endevco	12/29/2022
	Redundant		X	P94834	Endevco	12/29/2022
			Y	P94856	Endevco	12/29/2022
			Z	P97412	Endevco	12/29/2022
Head Angular Rate Sensors			X	ARS7442	DTS	09/06/2022
			Y	ARS7475	DTS	09/06/2022
			Z	ARS7516	DTS	09/06/2022
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG2022	Denton	09/21/2022
Chest Accelerometers	Primary		X	P86792	Endevco	12/29/2022
			Y	P88348	Endevco	12/29/2022
			Z	P86793	Endevco	12/29/2022
	Redundant		X	P88666	Endevco	12/29/2022
			Y	P94109	Endevco	12/29/2022
			Z	P88667	Endevco	12/29/2022
Chest Potentiometer			X	351	Humanetics	12/29/2022
Pelvis Accelerometers			X	P95526	Endevco	12/29/2022
			Y	P96038	Endevco	12/29/2022
			Z	P97742	Endevco	12/29/2022
Femur Load Cells	Right	Primary	Z	FG121P	Denton	12/29/2022
		Redundant	Z	FG121R	Denton	12/29/2022
	Left	Primary	Z	FG122P	Denton	12/29/2022
		Redundant	Z	FG122R	Denton	12/29/2022
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG467	Denton	12/21/2022
		Lower	Mx, My, Fz	AG491	Denton	12/21/2022
	Left	Upper	Mx, My, Fz	TG478	Denton	12/21/2022
		Lower	Mx, My, Fz	AG500	Denton	12/21/2022
Foot Accelerometers	Right	Rear	X	T22486	Endevco	12/29/2022
			Z	P97382	Endevco	12/29/2022
		Front	Z	P82120	Endevco	12/29/2022
	Left	Rear	X	T16468	Endevco	12/29/2022
			Z	T16496	Endevco	12/29/2022
		Front	Z	T16501	Endevco	12/29/2022
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	04/26/2023
			Y	P94800	Endevco	04/26/2023
			Z	P94801	Endevco	04/26/2023
	Redundant		X	P94802	Endevco	04/26/2023
			Y	P94803	Endevco	04/26/2023
			Z	P97377	Endevco	04/26/2023
Head Angular Rate Sensors			X	ARS7325	DTS	09/06/2022
			Y	ARS7340	DTS	09/06/2022
			Z	ARS7354	DTS	09/06/2022
Upper Neck Load Cell		Fx, Fy, Fz Mx, My, Mz	NG1915	Denton	02/22/2023	
Chest Accelerometers	Primary		X	P88719	Endevco	04/26/2023
			Y	P94785	Endevco	04/26/2023
			Z	P94793	Endevco	04/26/2023
	Redundant		X	P95322	Endevco	04/26/2023
			Y	P95370	Endevco	04/26/2023
			Z	T30901	Endevco	04/26/2023
Chest Potentiometer		X	142	Humanetics	04/25/2023	
Pelvis Accelerometers			X	P82646	Endevco	04/25/2023
			Y	P94798	Endevco	04/25/2023
			Z	P97705	Endevco	04/25/2023
Femur Load Cells	Right	Primary	Z	FG126P	Denton	04/25/2023
		Redundant	Z	FG126R	Denton	04/25/2023
	Left	Primary	Z	FG127P	Denton	04/25/2023
		Redundant	Z	FG127R	Denton	04/25/2023
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG405	Denton	02/22/2023
		Lower	Mx, My, Fz	AG368	Denton	02/22/2023
	Left	Upper	Mx, My, Fz	TG475	Denton	02/22/2023
		Lower	Mx, My, Fz	AG504	Denton	02/22/2023
Foot Accelerometers	Right	Rear	X	P94795	Endevco	04/25/2023
			Z	P94796	Endevco	04/25/2023
		Front	Z	P94797	Endevco	04/25/2023
	Left	Rear	X	P83167	Endevco	04/26/2023
			Z	P83168	Endevco	04/26/2023
		Front	Z	P83169	Endevco	04/26/2023
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	A403812	MSI	02/15/2023
			Z	A370353	MSI	02/08/2023
		Redundant	X	A393867	MSI	02/08/2023
	Right	Primary	X	T29887	Endevco	02/08/2023
			Z	T32744	Endevco	02/10/2023
		Redundant	X	T32196	Endevco	02/08/2023
Engine Accelerometers		Top	X	A416952	MSI	02/22/2023
		Bottom	X	PCB1285	PCB	03/30/2023