

**REPORT NUMBER: NCAP-MGA-23-007**

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

**FORD MOTOR CO.  
2023 Ford Explorer XLT 4WD 5-Door SUV  
NHTSA No.: M20230200**

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



**Test Date: January 24, 2023**

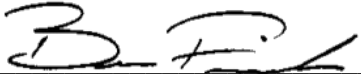
**Final Report Date: December 19, 2023**

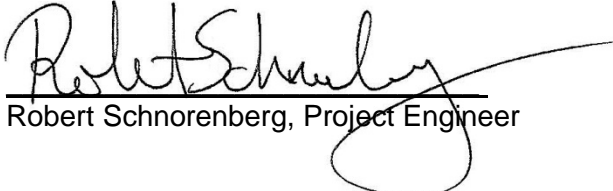
**FINAL REPORT**

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

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by:   
Ben Fischer, Program Manager

Approved by:   
Robert Schnorenberg, Project Engineer

Approval Date: December 19, 2023

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: \_\_\_\_\_

## TECHNICAL REPORT DOCUMENTATION PAGE

<b>1. Report No.</b> NCAP-MGA-23-007	<b>2. Government Accession No.</b>	<b>3. Recipient's Catalog No.</b>																																																							
<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Frontal Impact Testing of a 2023 Ford Explorer XLT 4WD 5-Door SUV, NHTSA No.: M20230200		<b>5. Report Date</b> December 19, 2023																																																							
		<b>6. Performing Organization Code</b> MGA																																																							
<b>7. Author(s)</b> Ben Fischer, Program Manager		<b>8. Performing Organization Report No.</b> NCAP-MGA-23-007																																																							
<b>9. Performing Organization Name and Address</b> MGA Research Corporation 5000 Warren Road Burlington, WI 53105		<b>10. Work Unit No.</b>																																																							
		<b>11. Contract or Grant No.</b> 693JJ919D000006																																																							
<b>12. Sponsoring Agency Name and Address</b> U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE Washington, D.C. 20590		<b>13. Type of Report and Period Covered</b> Final Test Report January 24, 2023 to December 19, 2023																																																							
		<b>14. Sponsoring Agency Code</b> NRM-110																																																							
<b>15. Supplementary Notes</b>																																																									
<b>16. Abstract</b> A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2023 Ford Explorer XLT 4WD 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 January 24, 2023.  The impact velocity of the vehicle was 56.24 km/h and the ambient temperature at the barrier face at the time of impact was 21.6°C. The target vehicle post-test maximum crush was 568 mm located to the right of the vehicle centerline. The test vehicle's performance was as follows:																																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td></td> <td>700</td> <td>117.891</td> <td>700</td> <td>209.599</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>23.014</td> <td>52</td> <td>9.642</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.284</td> <td>1</td> <td>0.315</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1040.809</td> <td>2620</td> <td>722.399</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>163.960</td> <td>2520</td> <td>238.047</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>1253.643</td> <td>6805</td> <td>1496.350</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>1191.138</td> <td>6805</td> <td>1553.315</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC <sub>15</sub> )		700	117.891	700	209.599	Maximum Chest Compression	mm	63	23.014	52	9.642	Nij		1	0.284	1	0.315	Neck Tension	N	4170	1040.809	2620	722.399	Neck Compression	N	4000	163.960	2520	238.047	Left Femur Force	N	10008	1253.643	6805	1496.350	Right Femur Force	N	10008	1191.138	6805	1553.315
Measurement Description	Units	Driver ATD		Passenger ATD																																																					
		Threshold	Result	Threshold	Result																																																				
Head Injury Criteria (HIC <sub>15</sub> )		700	117.891	700	209.599																																																				
Maximum Chest Compression	mm	63	23.014	52	9.642																																																				
Nij		1	0.284	1	0.315																																																				
Neck Tension	N	4170	1040.809	2620	722.399																																																				
Neck Compression	N	4000	163.960	2520	238.047																																																				
Left Femur Force	N	10008	1253.643	6805	1496.350																																																				
Right Femur Force	N	10008	1191.138	6805	1553.315																																																				
<b>17. Key Words</b>  35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)			<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590																																																						
<b>19. Security Classification of Report</b> Unclassified	<b>20. Security Classification of Page</b> Unclassified	<b>21. No. of Pages</b> 178	<b>22. Price</b>																																																						

## TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of Indicant FMVSS No. 212 and FMVSS No. 219 (Partial) Data	25
16	FMVSS No. 301 Barrier Impact and Static Rollover Results	26
17	Dummy/Vehicle Temperature Stabilization Data	28
<u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Qualification and Performance Verification Data	C
D	Test Equipment and Instrumentation Qualification Data	D

## **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 Ford Explorer XLT 4WD 5-Door SUV at a velocity of 56.24 km/h. The test was performed at MGA Research Corporation on January 24, 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 50<sup>th</sup> percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5<sup>th</sup> percentile female test device (ATD) was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

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

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

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

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 639 mm located at 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:

<b>ATD position</b>	<b>HIC<sub>15</sub></b>	<b>Nij</b>	<b>Neck Tension (N)</b>	<b>Neck Comp. (N)</b>	<b>3ms Chest Clip (g)</b>	<b>Chest Disp. (mm)</b>	<b>Left Femur (N)</b>	<b>Right Femur (N)</b>
Driver (50 <sup>th</sup> )	117.891	0.284	1040.809	163.960	37.486	23.014	1253.643	1191.138
Passenger (5 <sup>th</sup> )	209.599	0.315	722.399	238.047	40.355	9.642	1496.350	1553.315

The test data can be found on the NHTSA website at [www.nhtsa.gov](http://www.nhtsa.gov)

### **TEST NOTES**

Top of Engine X recorded no valid data after 10 ms.  
 Barrier C-01 Fx recorded no valid data.  
 Barrier C-02 Fx, My recorded no valid data.  
 Barrier K-15 My recorded no valid data.

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 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA No.	M20230200	Traction Control System (TCS)	Yes
Model Year	2023	Power Steering	Yes
Make	Ford	Power Window Auto-Reverse	Yes
Model	Explorer XLT 4WD	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	1FMSK8DH1PGA00491	Driver Head/Torso Airbag	No
Body Color	Atlas Blue Metallic	Driver Torso Airbag	No
Odometer (km/mi)	146 km / 91 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.3 L	Driver Pelvis Airbag	No
Type/No. Cylinders	Inline 4	Driver Knee Airbag	Yes
Engine Placement	Longitudinal	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	10	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	4WD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	Yes	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?	No
--	----

**DATA FROM CERTIFICATION LABEL**

Manufactured By	FORD MOTOR CO.	GVWR (kg)	2964
Date of Manufacture	12/22	GAWR Front (kg)	1191
		GAWR Rear (kg)	1554

**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	Split Bench	
Designated Seating Capacity (DSC)	2	2	2	6
Capacity Weight (VCW) (kg)				698
Cargo Weight (RCLW) (kg)				136

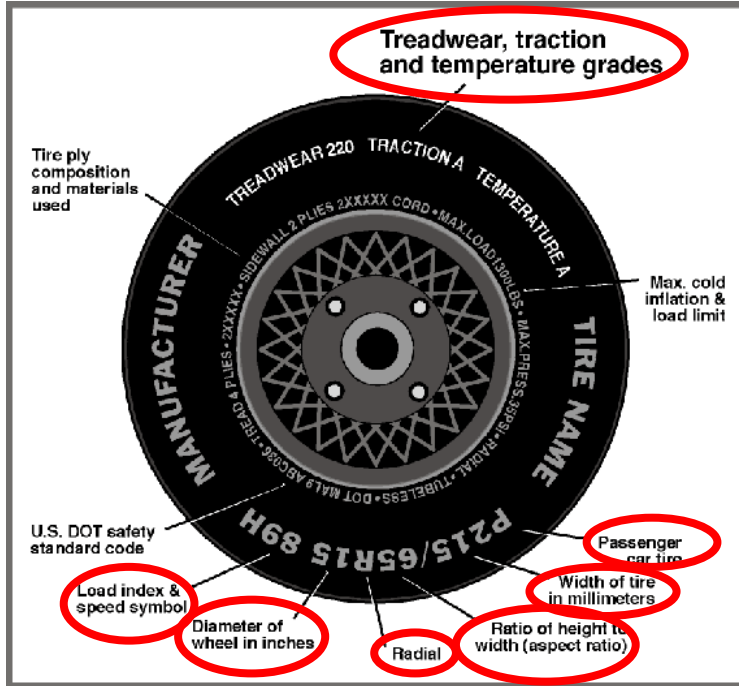
\* Rated Cargo and Luggage Weight (RCLW) limited to maximum of 300 lbs (136 kg).

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**VEHICLE TIRE INFORMATION**



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	255/65R18	255/65R18
Tire Size on Vehicle	255/65R18	255/65R18
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	111H	111H
Tire Material	Rubber	Rubber
DOT Safety Code Left	OOT68 2VHA 4422	OOT68 2VHA 4322
DOT Safety Code Right	OOT68 2VHA 4322	OOT68 2VHA 4322

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	501.5	487.5		520.0	609.5	
Right	kg	518.5	468.0		530.5	585.5	
Ratio	%	51.6%	48.4%		46.8%	53.2%	
Totals	kg	1020.0	955.5	1975.5	1050.5	1195.0	2245.5

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1975.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	136
Calculated Test Vehicle Target Weight (TVTW)	kg	2252.5

**TEST VEHICLE ATTITUDES AND CG**

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	887	879	889	892	1465
As Tested	mm	859	854	848	852	1611
Post Test	mm	940	945	844	863	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	3028
Total Vehicle Length at Left Side	mm	4890
Total Vehicle Length at Centerline	mm	5069
Total Vehicle Length at Right Side	mm	4890
Weight of Ballast in Cargo Area	kg	111
Weight of Vehicle Components Removed	kg	27
Amount of Stoddard Solvent in Fuel Tank	L	67.9

List of components removed to meet test weight: None.

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

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**TARGET VEHICLE STRUCTURAL MEASUREMENT**

	Elements	Pre-Test (mm)
1	Total Length	5069
2	Total Width	2018
3	Bumper Top Height	583
4	Bumper Bottom Height	494
5	Longitudinal Member Top Height	607
6	Distance between Longitudinal Members	963
7	Longitudinal Member Width	68
8	Engine Top Height	909
9	Engine Bottom Height	283
10	Engine and Gearbox Width	1076
11	Front Bumper-Engine Distance	675
12	Front Shock Absorber Fixing Height	1143
13	Bonnet Leading Edge Height	1055
14	Front Shock Absorber Fixing Width	230
15	Front Bumper – Front Axle Distance	783
16	Front Axle – A-Pillar Distance	595
17	A-Pillar – B-Pillar Distance	1161
18	B-Pillar – Rear Axle Distance	1272
19	B-Pillar – C-Pillar Distance	1198
20	Roof Sill Bottom Height	1614
21	Roof Sill Top Height	1672
22	Floor Sill Bottom Height	291
23	Floor Sill Top Height	483

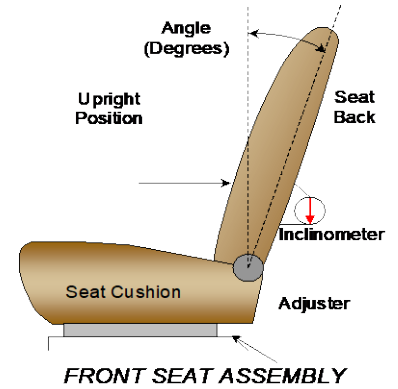
**DATA SHEET NO. 2  
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**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	-0.5° on outboard headrest post

**SEAT FORE/AFT POSITIONS**

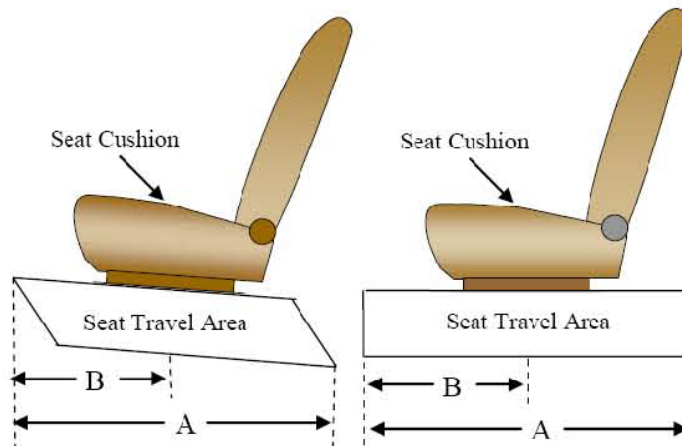
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	310 mm	155 mm
Passenger Seat	250 mm	0 mm

**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 <sup>st</sup> as 1)	0 (1 <sup>st</sup> as 0)
Passenger Seat	4 (1 <sup>st</sup> as 1)	0 (1 <sup>st</sup> as 0)



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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

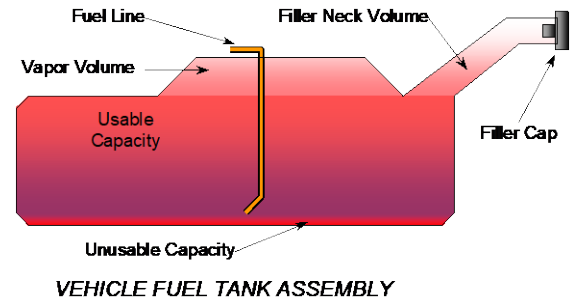
NHTSA No.: M20230200  
 Test Date: 1/24/2023

**FUEL TANK CAPACITY DATA**

	<b>Liters</b>
Usable Capacity of "Standard Tank"	73.1
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	67.3 to 68.7
Actual Amount of Solvent used	67.9
1/3 of Usable Capacity	24.4

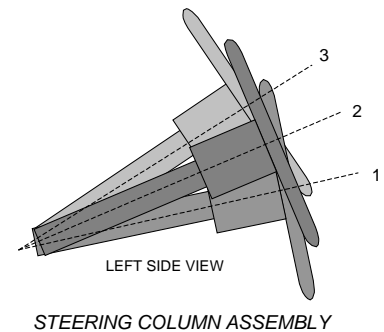
**FUEL PUMP**

The vehicle is equipped with an electronic fuel pump. The electric fuel pump operates for two seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within two seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running; if the engine stalls, the fuel pump is deactivated. Also, a fuel pump shut-off system is provided and designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude. The filler neck is located on the driver's side.



**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.



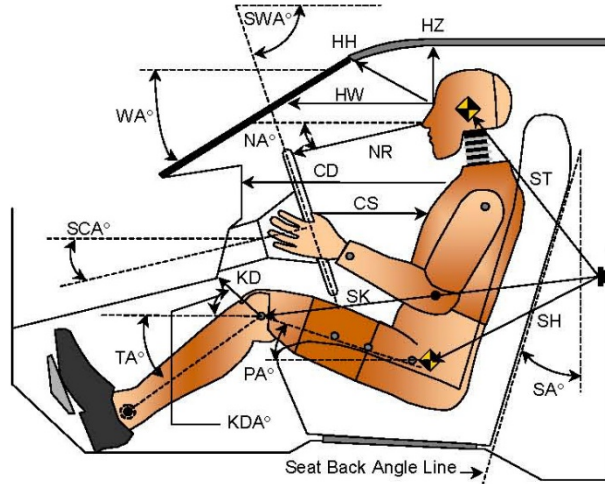
**STEERING COLUMN POSITION**

	<b>Degrees</b>	<b>Fore/Aft Position (mm)</b>
Lowermost Position 1	67.8	
Geometric Center Position 2	65.0	
Uppermost Position 3	62.2	
Telescoping Steering Wheel Travel		52
Test Position	65.0	26

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
Test Date: 1/24/2023



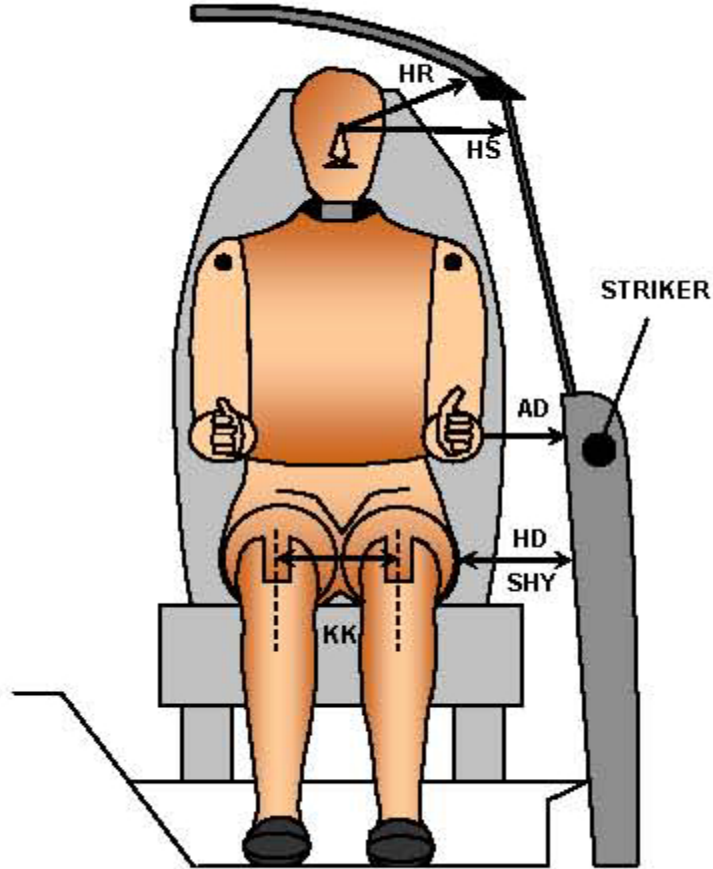
**LEFT SIDE VIEW**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		0.0		
SWA°	Steering Wheel Angle		65.0		
SCA°	Steering Column Angle		25.0		
SA°	Seat Back Angle		3.1		-0.5
HZ	Head to Roof (Z)	243	90	229	90
HH	Head to Header	358	27.2	306	47.3
HW	Head to Windshield	683	0	673	0
NR	Nose to Rim	405	7.7		
CD	Chest to Dash	568		426	
CS	Chest to Steering Hub	322	0.4		
RA	Rim to Abdomen	203	0		
KDL	Left Knee to Dash	211	29.0	125	30.1
KDR	Right Knee to Dash	188	30.1	128	28.0
PA°	Pelvic Angle		24.6		20.3
TA°	Tibia Angle		48.7		70.4
SK	Striker to Knee	598	95.2	706	92.8
ST	Striker to Head	551	11.3	532	25.2
SH	Striker to H-Point	263	122.4	364	107.3

**DATA SHEET NO. 4  
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023



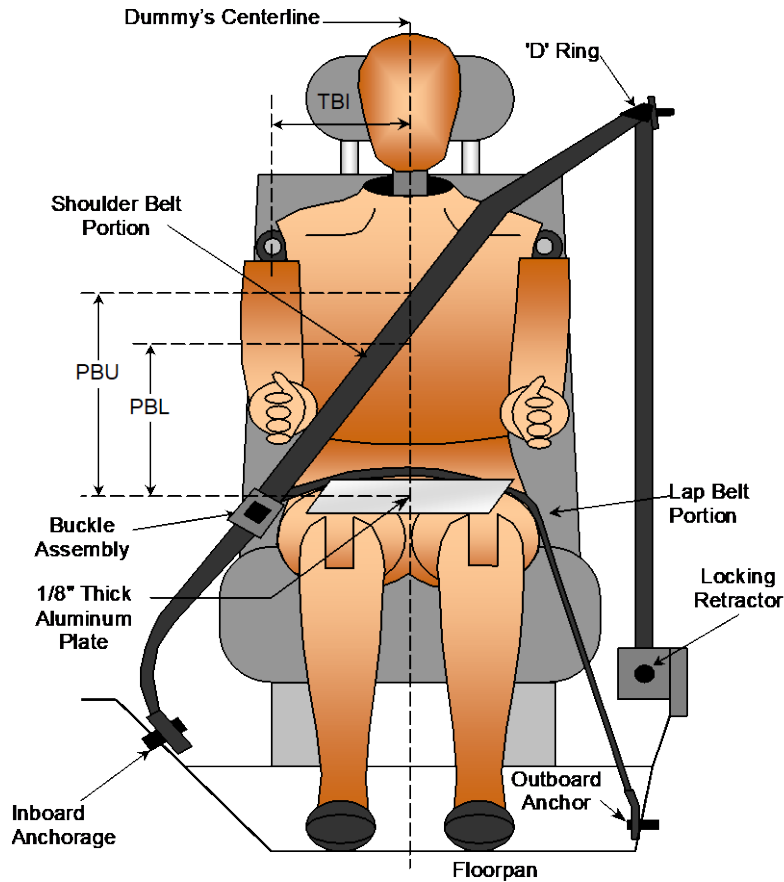
**FRONT VIEW OF DUMMY**

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	142	95
HD	H-Point to Door	147	192
HR	Head to Side Header	252	274
HS	Head to Side Window	386	402
KK	Knee to Knee	356	232
SHY	Striker to H-Point (Y Direction)	296	330
AA	Ankle to Ankle	351	174

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023



**FRONT VIEW OF DUMMY**

**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	345	330
PBL - Top surface of reference to belt lower edge	mm	260	240

**BELT LENGTH DATA**

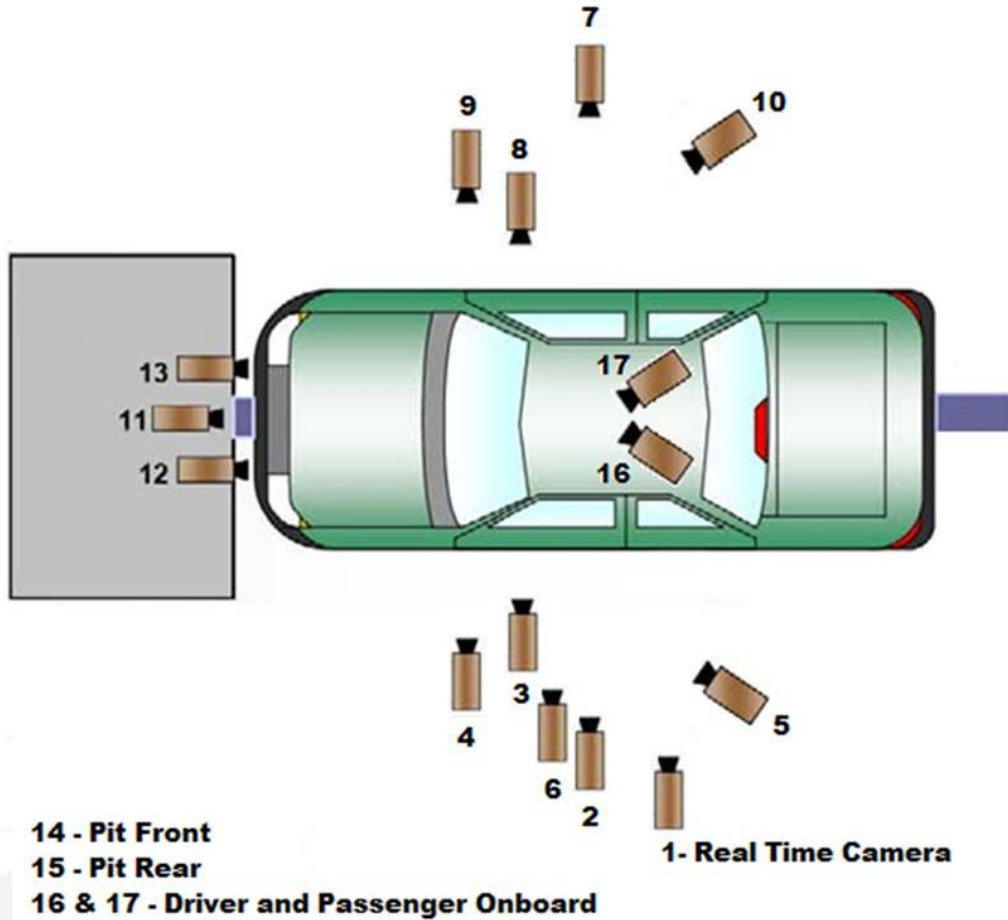
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	900	930
Lap Belt Length as measured on ATD	mm	690	745
Remainder of belt on reel	mm	860	775
Total Belt Length for Continuous Webbing Systems	mm	3000	3000

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
Test Date: 1/24/2023

**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 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**CAMERA LOCATIONS**

No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2580	-6105	-1495	12	1000
3	Driver Close-Up	-1895	-7320	-1830	50	1000
4	Left Front Half	-1590	-5870	-1345	24	1000
5	Left Angle	-7275	-5745	-1695	75	1000
6	Steering Column	-1045	-5990	-1265	50	1000
7	Right Overall	-2410	6180	-1505	12	1000
8	Passenger Close-Up	-1750	6910	-1820	50	1000
9	Right Front Half	-1350	5710	-1510	24	1000
10	Right Angle	-7310	5430	-1705	75	1000
11	Windshield	45	0	-2310	12	1000
12	Driver Windshield	165	-370	-2230	25	1000
13	Passenger Windshield	165	370	-2230	25	1000
14	Pit Front	-945	0	3340	24	1000
15	Pit Rear	-3000	0	3340	24	1000
16	Driver Onboard				12	1000
17	Passenger Onboard				12	1000
18	Real-Time Pan View					30

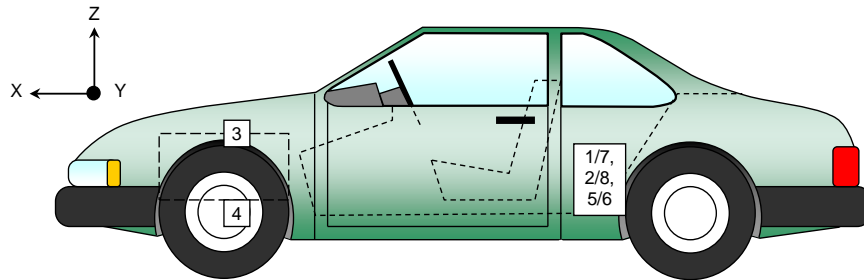
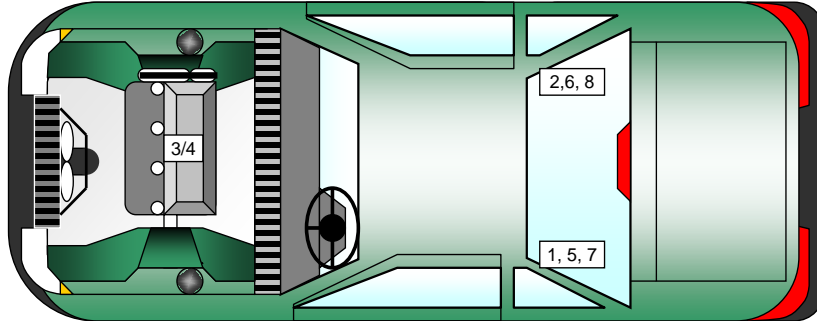
\*COORDINATES:

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

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
Test Date: 1/24/2023



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	2109	-445	-429
2	Right Rear Crossmember Accelerometer – X Direction	2109	445	-429
3	Engine Top X	4092	-67	-909
4	Engine Bottom X	4356	0	-283
5	Left Rear Crossmember Accelerometer – Z Direction	2109	-445	-429
6	Right Rear Crossmember Accelerometer – Z Direction	2109	445	-429
7	Left Rear Crossmember Accelerometer Redundant – X Direction	2109	-425	-429
8	Right Rear Crossmember Accelerometer Redundant – X Direction	2109	425	-429

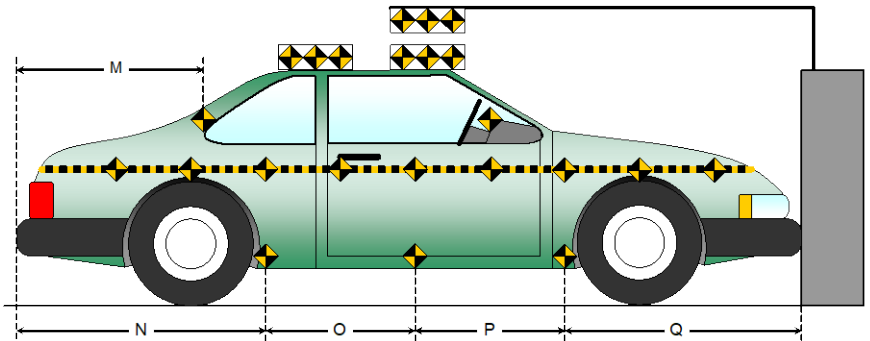
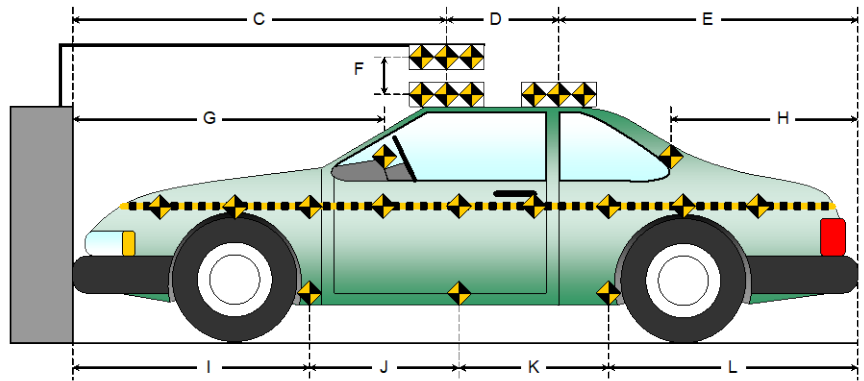
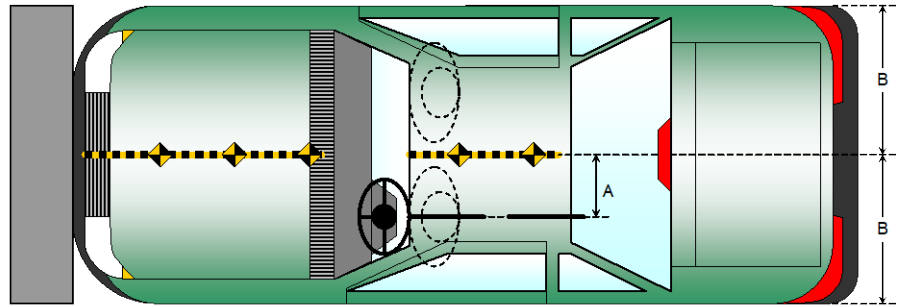
Reference Points: X - Rear Surface of Vehicle (+ forward)  
Y - Vehicle Centerline (+ to right)  
Z - Ground Plane (+ down)

**DATA SHEET NO. 8**  
**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
Test Date: 1/24/2023

Item	Value (mm)
A	435
B	1009
C	2440
D	610
E	2019
F	10
G	
H	1218
I	1466
J	914
K	914
L	1775
M	1218
N	1775
O	914
P	914
Q	1466



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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**ADVANCED RESEARCH LOAD CELL BARRIER**

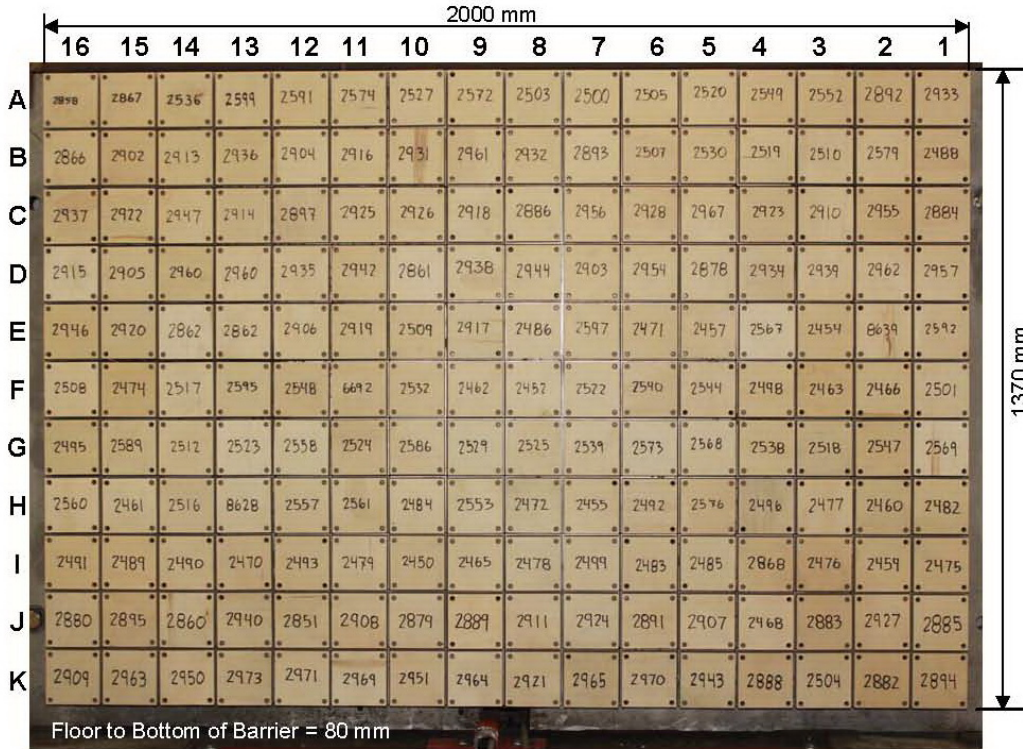


Photo for Reference Only

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 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**INSTRUMENTATION**

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

**CAMERA COVERAGE**

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

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

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

**OTHER VEHICLE POST-TEST OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Small crack on driver side from hood contact
Window Damage	None
Other Notable Effects	None

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	590
Center	mm	360
Right Side	mm	510
Average	mm	487

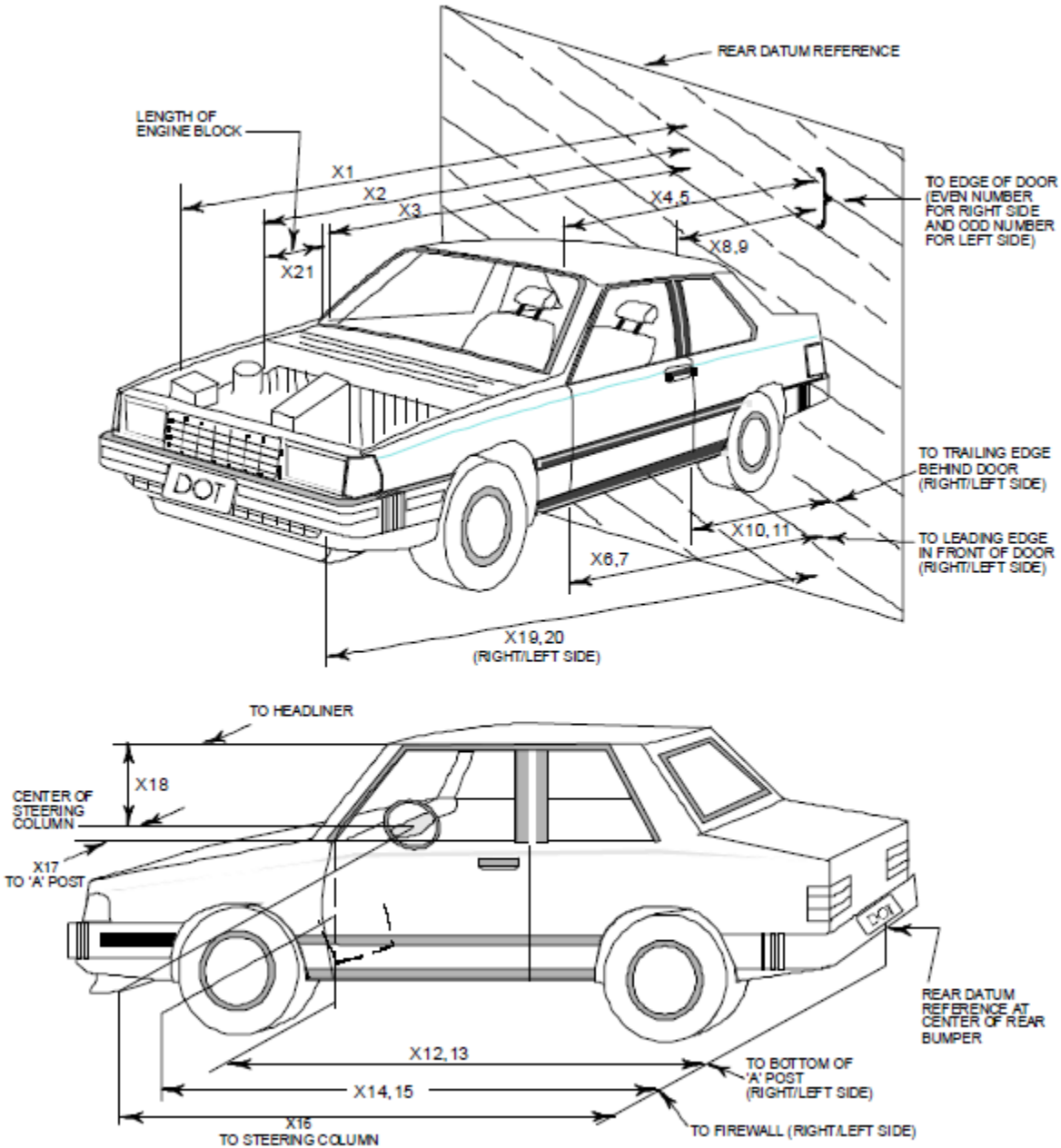
**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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

## DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023



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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
Test Date: 1/24/2023

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	5069	4430	-639
2	RSOV to Front of Engine	4221	4170	-51
3	RSOV to Firewall	3986	3930	-56
4	RSOV to Upper Leading Edge of Right Door	3551	3528	-23
5	RSOV to Upper Leading Edge of Left Door	3547	3540	-7
6	RSOV to Lower Leading Edge of Right Door	3522	3510	-12
7	RSOV to Lower Leading Edge of Left Door	3522	3513	-9
8	RSOV to Upper Trailing Edge of Right Door	2394	2379	-15
9	RSOV to Upper Trailing Edge of Left Door	2389	2386	-3
10	RSOV to Lower Trailing Edge of Right Door	2420	2421	1
11	RSOV to Lower Trailing Edge of Left Door	2428	2427	-1
12	RSOV to Bottom of "A" Post of Right Side	3529	3530	1
13	RSOV to Bottom of "A" Post of Left Side	3526	3520	-6
14	RSOV to Firewall, Right Side	3978	3940	-38
15	RSOV to Firewall, Left Side	3983	3960	-23
16	RSOV to Steering Column	3028	3160	132
17	Center of Steering Column to "A" Post	370	375	5
18	Center of Steering Column to Headliner	439	480	41
19	RSOV to Right Side of Front Bumper	4890	4450	-440
20	RSOV to Left Side of Front Bumper	4890	4410	-480
21	Length of Engine Block	449	449	0
RD	RSOV to Right Side of Dash Panel	3269	3280	11
CD	RSOV to Center of Dash Panel	3313	3290	-23
LD	RSOV to Left Side of Dash Panel	3268	3285	17

All dimensions in mm

\* The post-test measurements presented in this table were revised on 12/27/2023 due to the original values being affected by a measurement setup error.

**DATA SHEET NO. 13  
ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

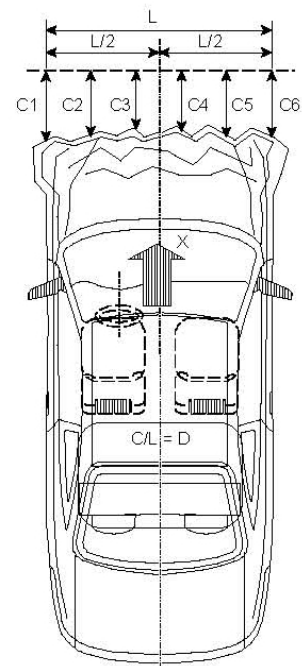
NHTSA No.: M20230200  
 Test Date: 1/24/2023

**VEHICLE INFORMATION**

VIN: 1FMSK8DH1PGA00491 Wheelbase (mm): 3028  
 Vehicle Size Category: MPV Test Weight (kg): 2245.5

**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): 56.24  
 Velocity Change (km/h): 67.1  
 Time of Separation (msec) 110



**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW3  
 Midpoint of Damage: Centerline  
 Damage Region Length (mm): 1724  
 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Exterior Crush
C1	Crush zone 1 at left side	mm	4890	4410	480
C2	Crush zone 2 at left side	mm	5008	4426	582
C3	Crush zone 3 at left side	mm	5052	4430	622
C4	Crush zone 4 at right side	mm	5052	4418	634
C5	Crush zone 5 at right side	mm	5008	4420	588
C6	Crush zone 6 at right side	mm	4890	4450	440
L	C1 TO C6	mm	1724	1706	18

\* The post-test measurements presented in this table were revised on 12/27/2023 due to the original values being affected by a measurement setup error.

**DATA SHEET NO. 14**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
Test Program: NCAP Frontal Barrier Impact Test

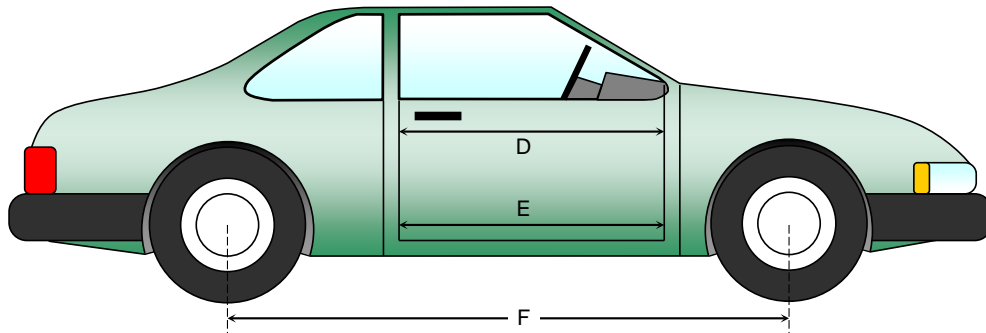
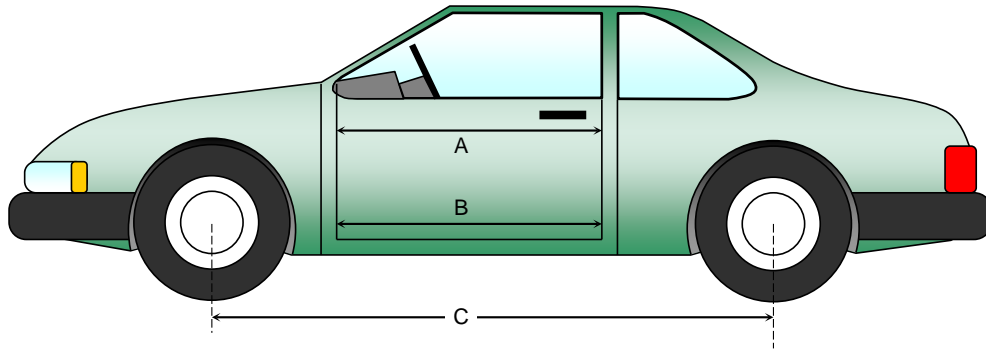
NHTSA No.: M20230200  
Test Date: 1/24/2023

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	1043	1042	-1
B	Left Side Lower	mm	971	962	-9
D	Right Side Upper	mm	1044	1042	-2
E	Right Side Lower	mm	968	967	-1

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	3028	2944	-84
F	Right Side Wheelbase	mm	3028	2932	-96



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

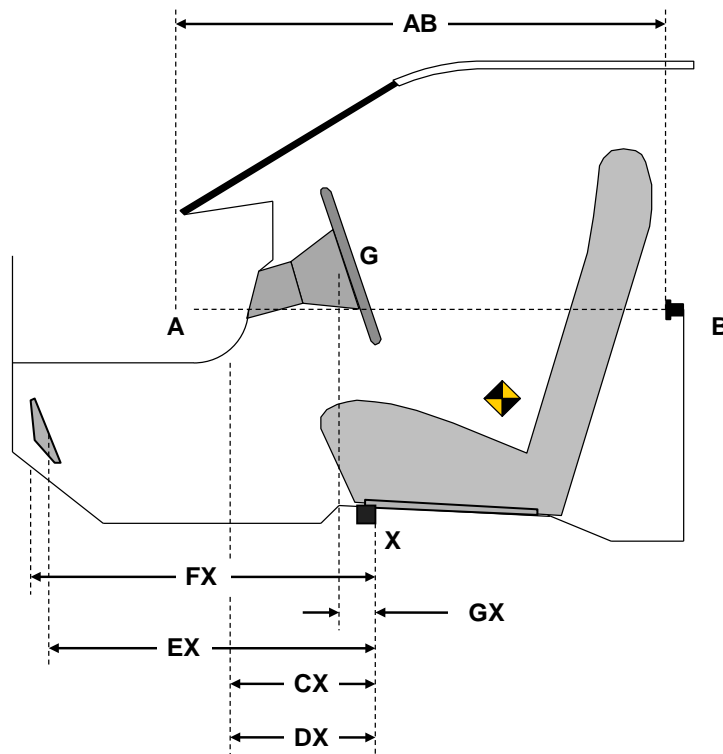
Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	775	775	0
CX	Left Knee Bolster to X	mm	367	323	-44
DX	Right Knee Bolster to X	mm	365	337	-28
EX	Brake Pedal to X	mm	581	473	-108
FX	Foot Rest to X	mm	619	607	-12
GX	Center of Steering Column Wheel Hub to X	mm	118	139	21

X = Front of Seat Track (stationary)



**DRIVER COMPARTMENT**

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**WINDSHIELD MOUNTING DETAILS**

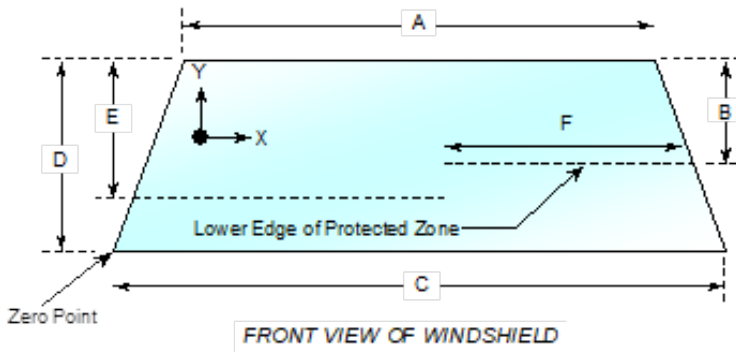
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.6°C.

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2387	2387	100
Right Side	2387	2387	100
Total	4774	4774	100



Item	Units	Value
A	mm	1372
B	mm	462
C	mm	1706
D	mm	848
E	mm	527
F	mm	548

**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 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

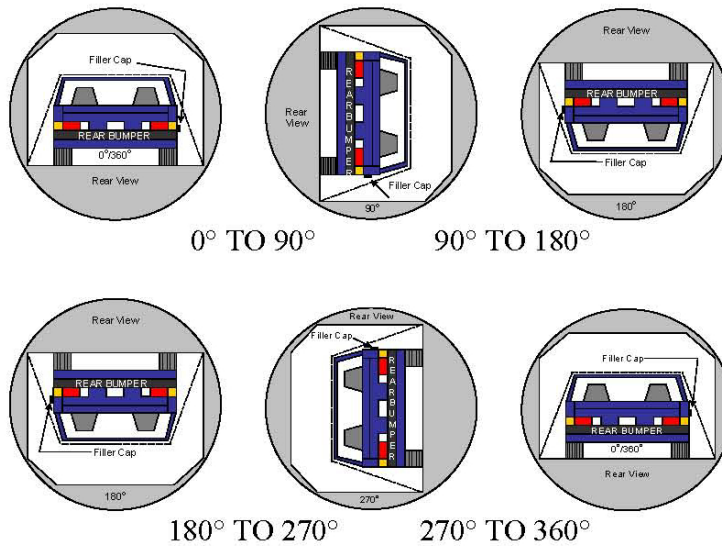
**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 21.6°C

Test Time: 11:29 a.m.

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.  
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.  
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None  
 D. Spillage Details: None

**FMVSS 301 STATIC ROLLOVER 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°	111	300	411
90° to 180°	111	300	411
180° to 270°	108	300	408
270° to 360°	109	300	409

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

Test Vehicle: 2023 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023

**FMVSS 301 SPILLAGE TABLE (UNITS IN OUNCES)**

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

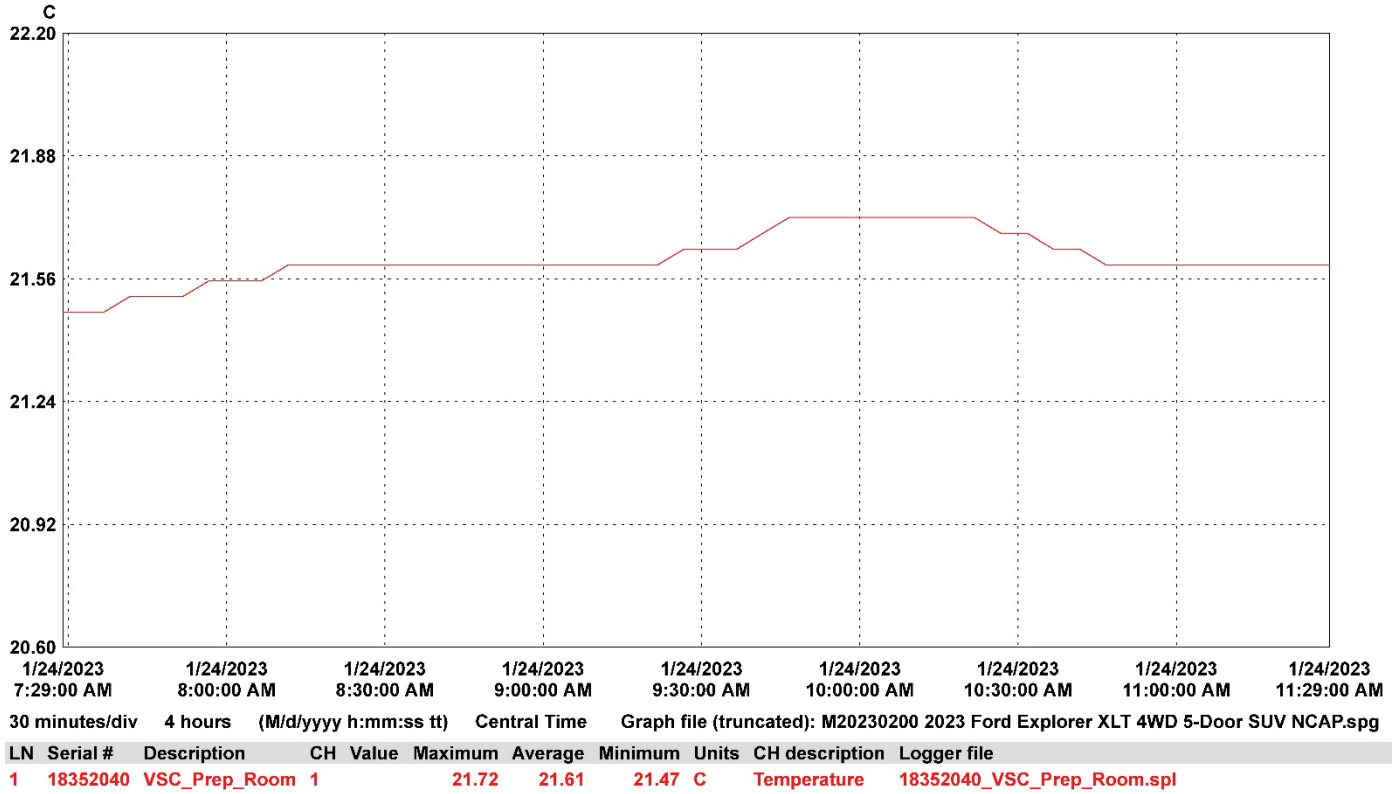
**SOLVENT SPILLAGE LOCATION TABLE**

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 Ford Explorer XLT 4WD 5-Door SUV  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20230200  
 Test Date: 1/24/2023



**APPENDIX A  
PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	Load Cell Location	A-1
Photo No. 002	Pre-Test Load Cell Wall	A-1
Photo No. 003	Post-Test Load Cell Wall	A-2
Photo No. 004	Manufacturer's Label	A-2
Photo No. 005	Tire Placard	A-3
Photo No. 006	2023 Ford Explorer XLT 4WD 5-Door SUV Frontal As Delivered	A-3
Photo No. 007	Left Rear 3-4 View, As Received	A-4
Photo No. 008	Pre-Test Front View of Test Vehicle	A-4
Photo No. 009	Post-Test Front View of Test Vehicle	A-5
Photo No. 010	Pre-Test Left View of Test Vehicle	A-5
Photo No. 011	Post-Test Left View of Test Vehicle	A-6
Photo No. 012	Pre-Test Right View of Test Vehicle	A-6
Photo No. 013	Post-Test Right View of Test Vehicle	A-7
Photo No. 014	Pre-Test Right Front 3-4 View	A-7
Photo No. 015	Post-Test Right Front 3-4 View	A-8
Photo No. 016	Pre-Test Left Rear 3-4 View	A-8
Photo No. 017	Post-Test Left Rear 3-4 View	A-9
Photo No. 018	Pre-Test Windshield View	A-9
Photo No. 019	Post-Test Windshield View	A-10
Photo No. 020	Pre-Test Engine Compartment View	A-10
Photo No. 021	Post-Test Engine Compartment View	A-11
Photo No. 022	Pre-Test Fuel Filler Cap View	A-11
Photo No. 023	Post-Test Fuel Filler Cap View	A-12
Photo No. 024	Pre-Test Front Underbody View	A-12
Photo No. 025	Post-Test Front Underbody View	A-13
Photo No. 026	Pre-Test Rear Underbody View	A-13
Photo No. 027	Post-Test Rear Underbody View	A-14
Photo No. 028	Pre-Test Dummy Cable Routing	A-14
Photo No. 029	Post-Test Dummy Cable Routing	A-15
Photo No. 030	Pre-Test Driver Dummy Front View	A-15

		<u>Page No.</u>
Photo No. 031	Post-Test Driver Dummy Front View	A-16
Photo No. 032	Pre-Test Driver Dummy Window View	A-16
Photo No. 033	Post-Test Driver Dummy Window View	A-17
Photo No. 034	Pre-Test Driver Dummy and Vehicle Interior View	A-17
Photo No. 035	Post-Test Driver Dummy and Vehicle Interior View	A-18
Photo No. 036	Pre-Test Driver's Seat Fore-Aft Markings	A-18
Photo No. 037	Post-Test Driver's Seat Fore-Aft Markings	A-19
Photo No. 038	Pre-Test View of Belt Anchorage for Driver Dummy	A-19
Photo No. 039	Post-Test View of Belt Anchorage for Driver Dummy	A-20
Photo No. 040	Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy	A-20
Photo No. 041	Post-Test View of Belt Buckle and Latch Plate for Driver Dummy	A-21
Photo No. 042	Pre-Test Driver Dummy Feet	A-21
Photo No. 043	Post-Test Driver Dummy Feet	A-22
Photo No. 044	Pre-Test Driver's Side Knee Bolster	A-22
Photo No. 045	Post-Test Driver's Side Knee Bolster	A-23
Photo No. 046	Pre-Test Driver's Side Floorpan	A-23
Photo No. 047	Post-Test Driver's Side Floorpan	A-24
Photo No. 048	Post-Test Driver Dummy Face	A-24
Photo No. 049	Post-Test Driver Dummy Contact with Airbag	A-25
Photo No. 050	Post-Test Driver Dummy Contact with Headrest	A-25
Photo No. 051	Pre-Test View of the Steering Wheel	A-26
Photo No. 052	Post-Test View of the Steering Wheel	A-26
Photo No. 053	Pre-Test Passenger Dummy Front View	A-27
Photo No. 054	Post-Test Passenger Dummy Front View	A-27
Photo No. 055	Pre-Test Passenger Dummy Window View	A-28
Photo No. 056	Post-Test Passenger Dummy Window View	A-28
Photo No. 057	Pre-Test Passenger Dummy and Vehicle Interior	A-29
Photo No. 058	Post-Test Passenger Dummy and Vehicle Interior	A-29
Photo No. 059	Pre-Test Passenger's Seat Fore-Aft Markings	A-30
Photo No. 060	Post-Test Passenger's Seat Fore-Aft Markings	A-30

		<u>Page No.</u>
Photo No. 061	Pre-Test View of Belt Anchorage for Passenger Dummy	A-31
Photo No. 062	Post-Test View of Belt Anchorage for Passenger Dummy	A-31
Photo No. 063	Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy	A-32
Photo No. 064	Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy	A-32
Photo No. 065	Pre-Test Passenger Dummy Feet	A-33
Photo No. 066	Post-Test Passenger Dummy Feet	A-33
Photo No. 067	Pre-Test Passenger's Side Knee Bolster	A-34
Photo No. 068	Post-Test Passenger's Side Knee Bolster	A-34
Photo No. 069	Pre-Test Passenger's Side Floorpan	A-35
Photo No. 070	Post-Test Passenger's Side Floorpan	A-35
Photo No. 071	Post-Test Passenger Dummy Face	A-36
Photo No. 072	Post-Test Passenger Dummy Contact with Airbag	A-36
Photo No. 073	Post-Test Passenger Dummy Contact with Headrest	A-37
Photo No. 074	Photograph of Ballast Installed in Vehicle	A-37
Photo No. 075	Post-Test Stoddard Solvent Spillage Location View	A-38
Photo No. 076	Post-Test Speed Trap Read-Out	A-38
Photo No. 077	Vehicle at 0 Degree on Static Rollover Device	A-39
Photo No. 078	Vehicle at 90 Degrees on Static Rollover Device	A-39
Photo No. 079	Vehicle at 180 Degrees on Static Rollover Device	A-40
Photo No. 080	Vehicle at 270 Degrees on Static Rollover Device	A-40
Photo No. 081	Vehicle at 360 Degrees on Static Rollover Device	A-41
Photo No. 082	2023 Ford Explorer XLT 4WD 5-Door SUV Frontal Impact Event	A-41
Photo No. 083	Monroney Label Photograph	A-42



Photo No. 001 - Load Cell Location

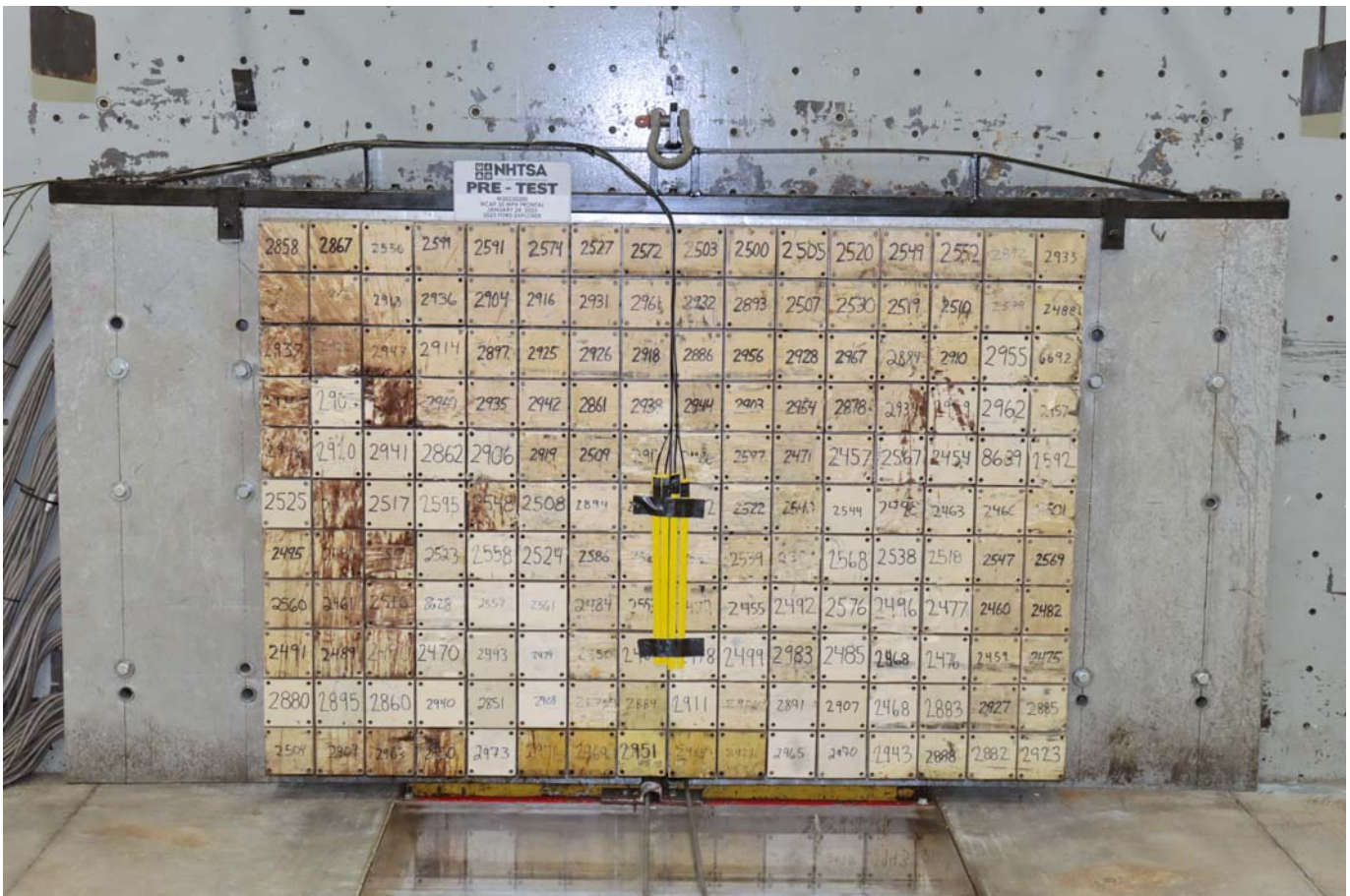


Photo No. 002 - Pre-Test Load Cell Wall

# PHOTOGRAPH NOT AVAILABLE

Photo No. 003 - Post-Test Load Cell Wall



Photo No. 004 - Manufacturer's Label



Photo No. 005 - Tire Placard



Photo No. 006 - 2023 Ford Explorer XLT 4WD 5-Door SUV Frontal As Delivered



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

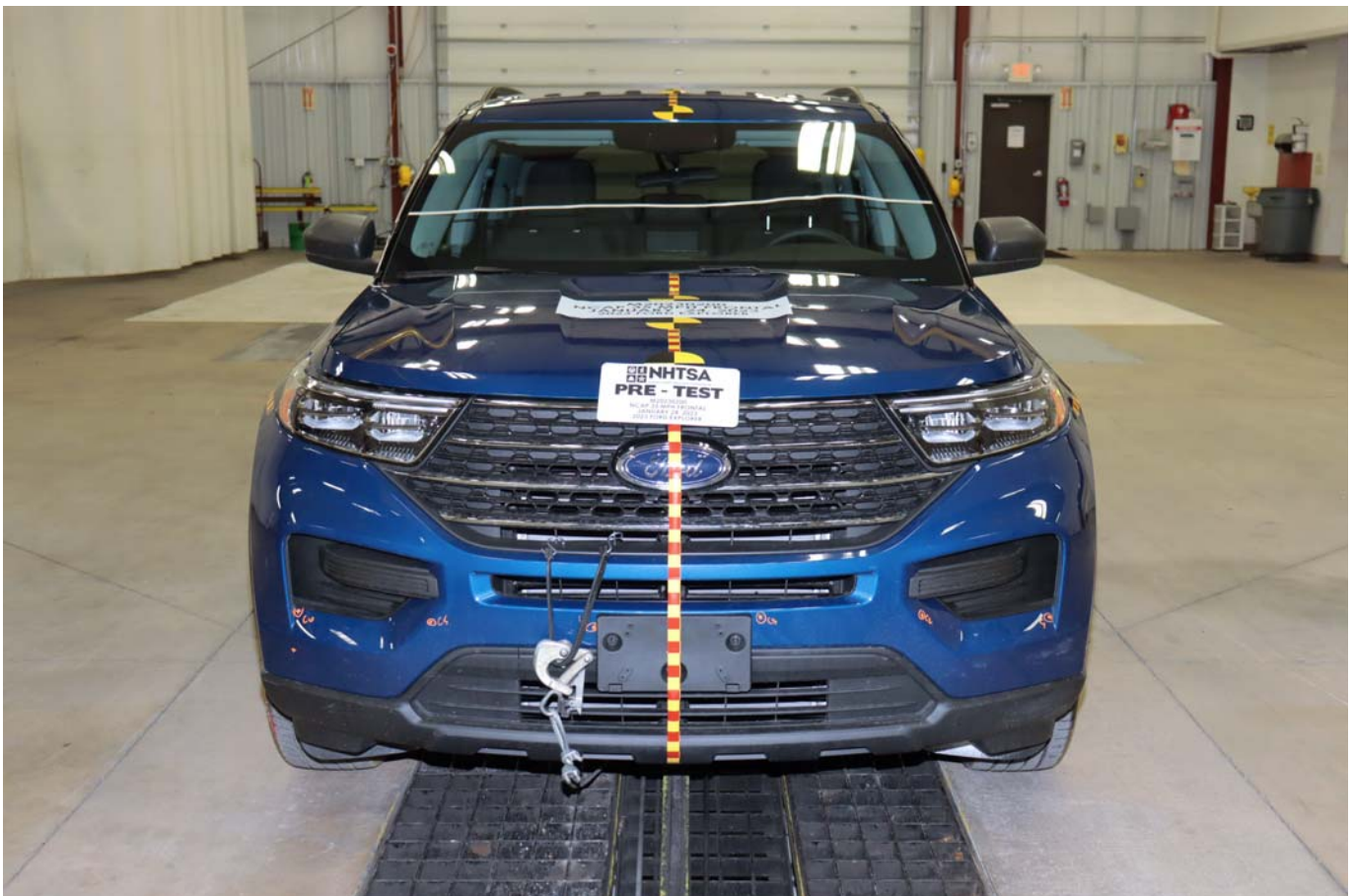


Photo No. 008 - Pre-Test Front View of Test Vehicle

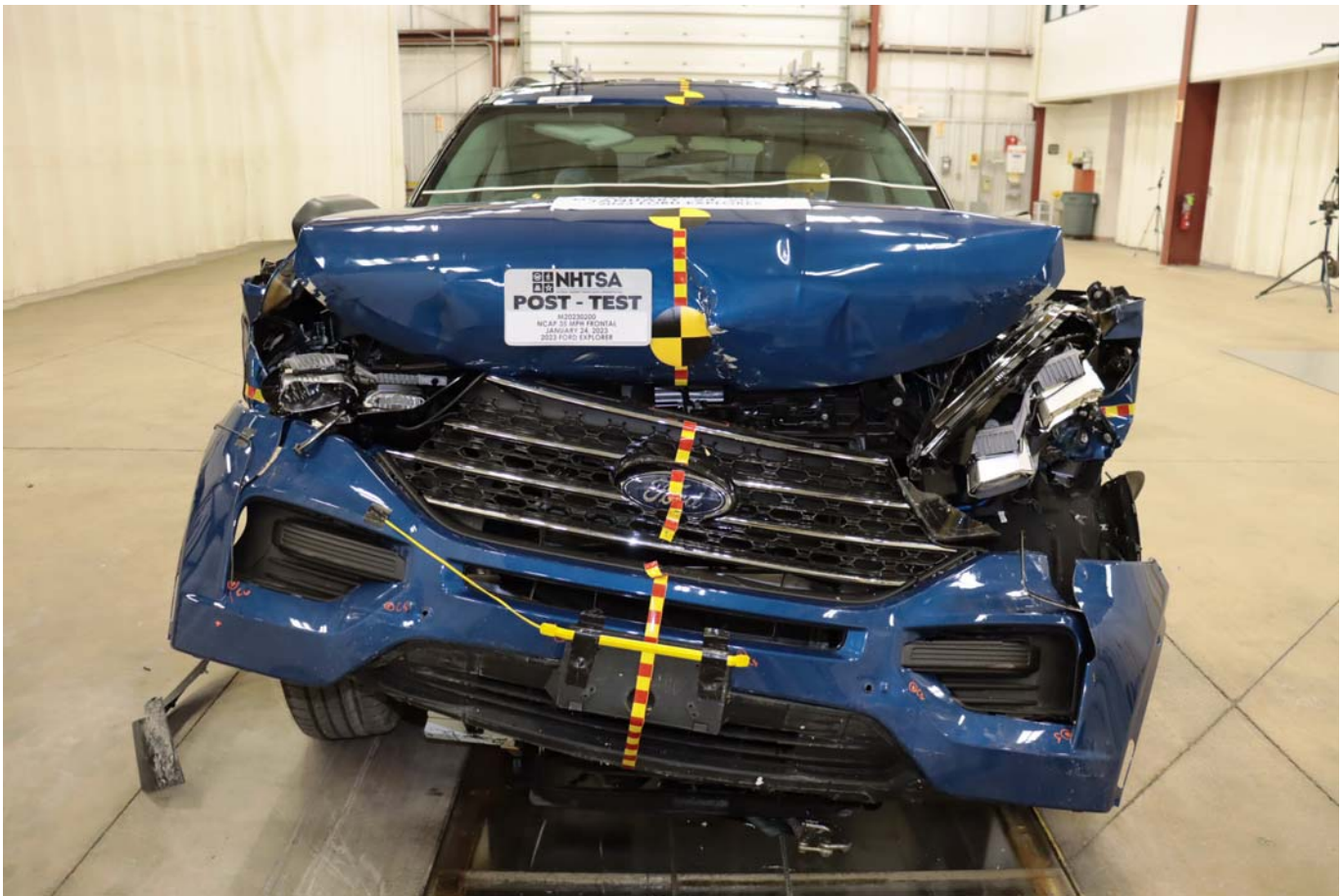


Photo No. 009 - Post-Test Front View of Test Vehicle



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

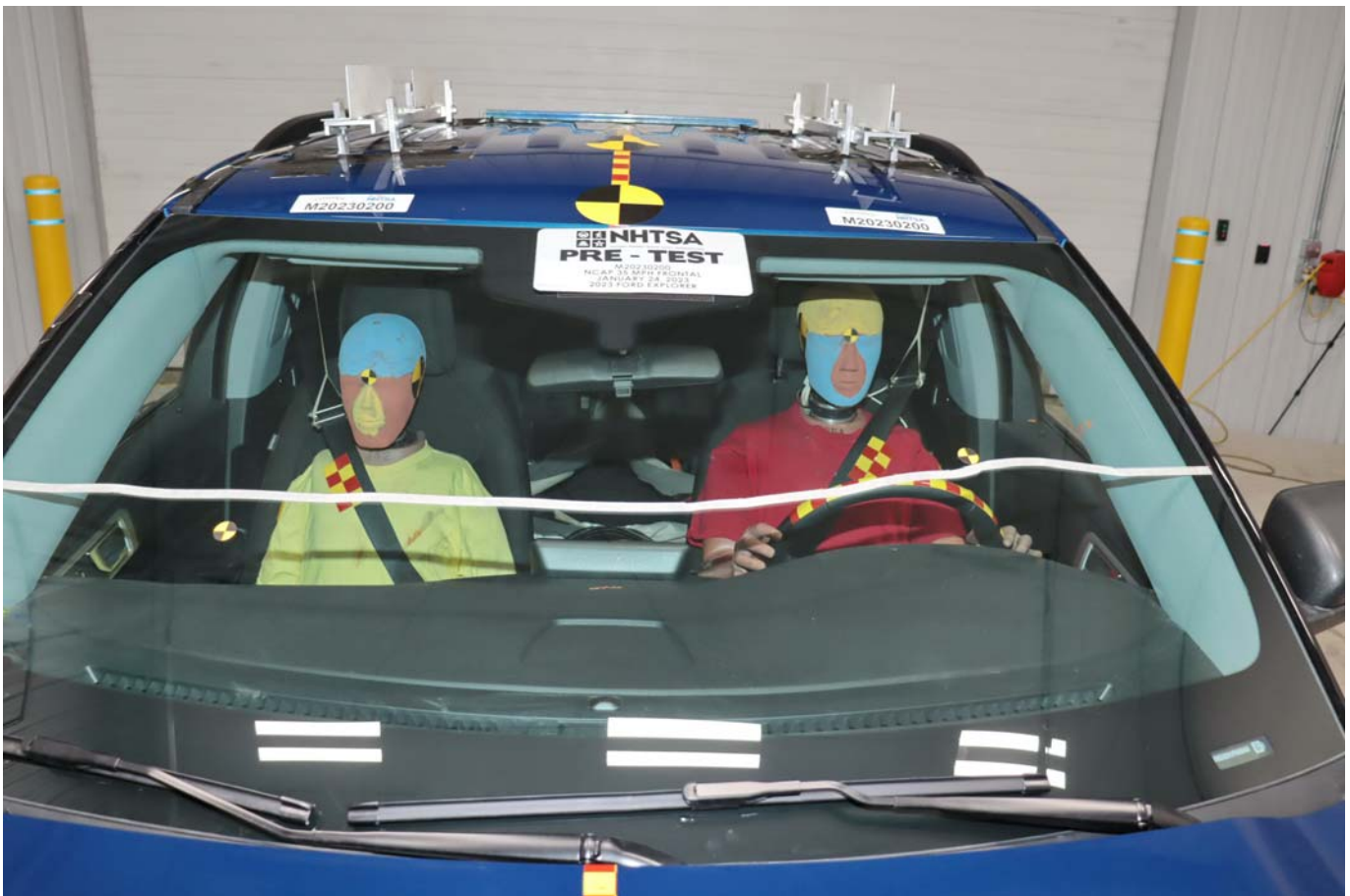


Photo No. 018 - Pre-Test Windshield View



Photo No. 019 - Post-Test Windshield View

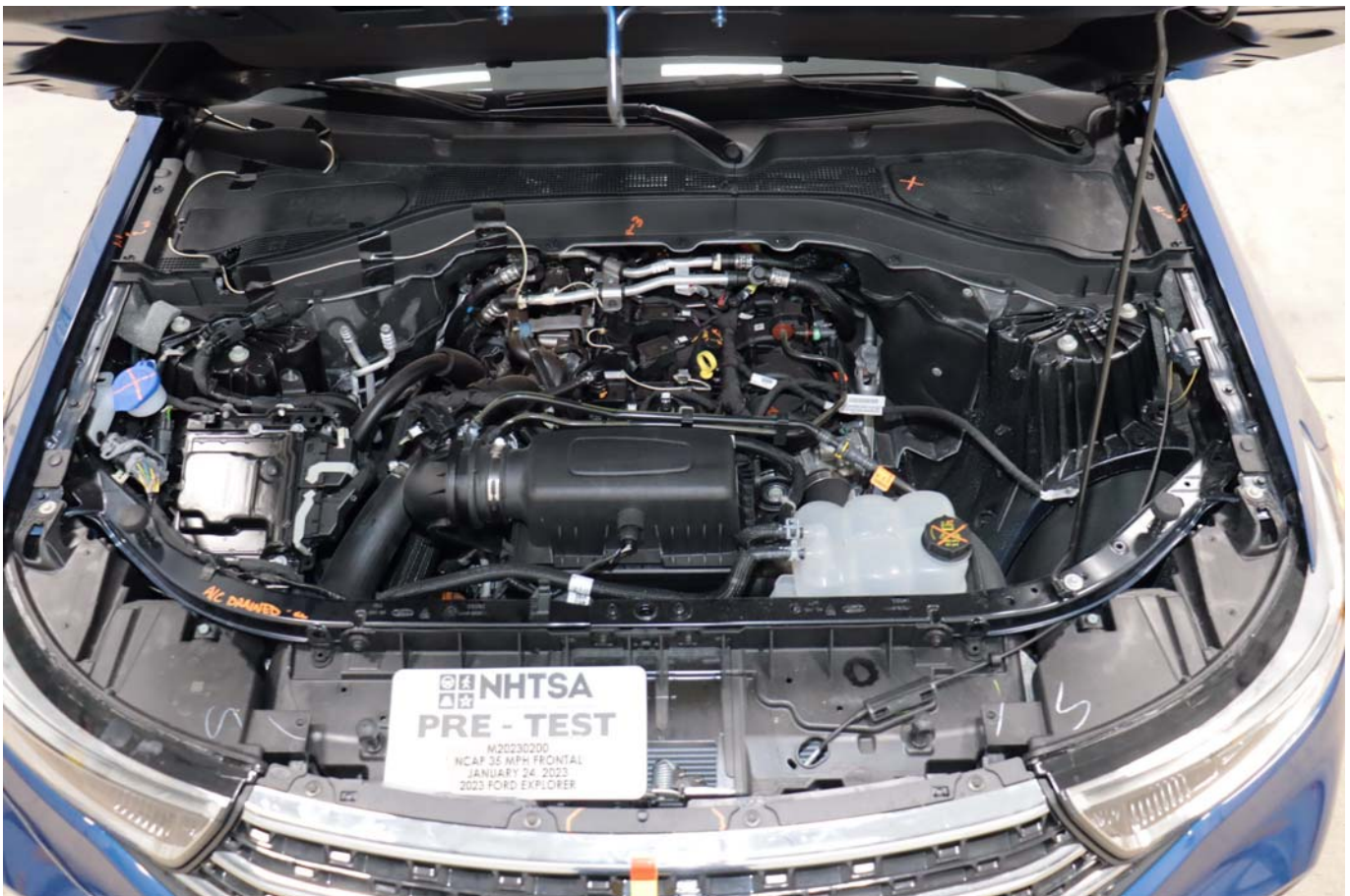


Photo No. 020 - Pre-Test Engine Compartment View

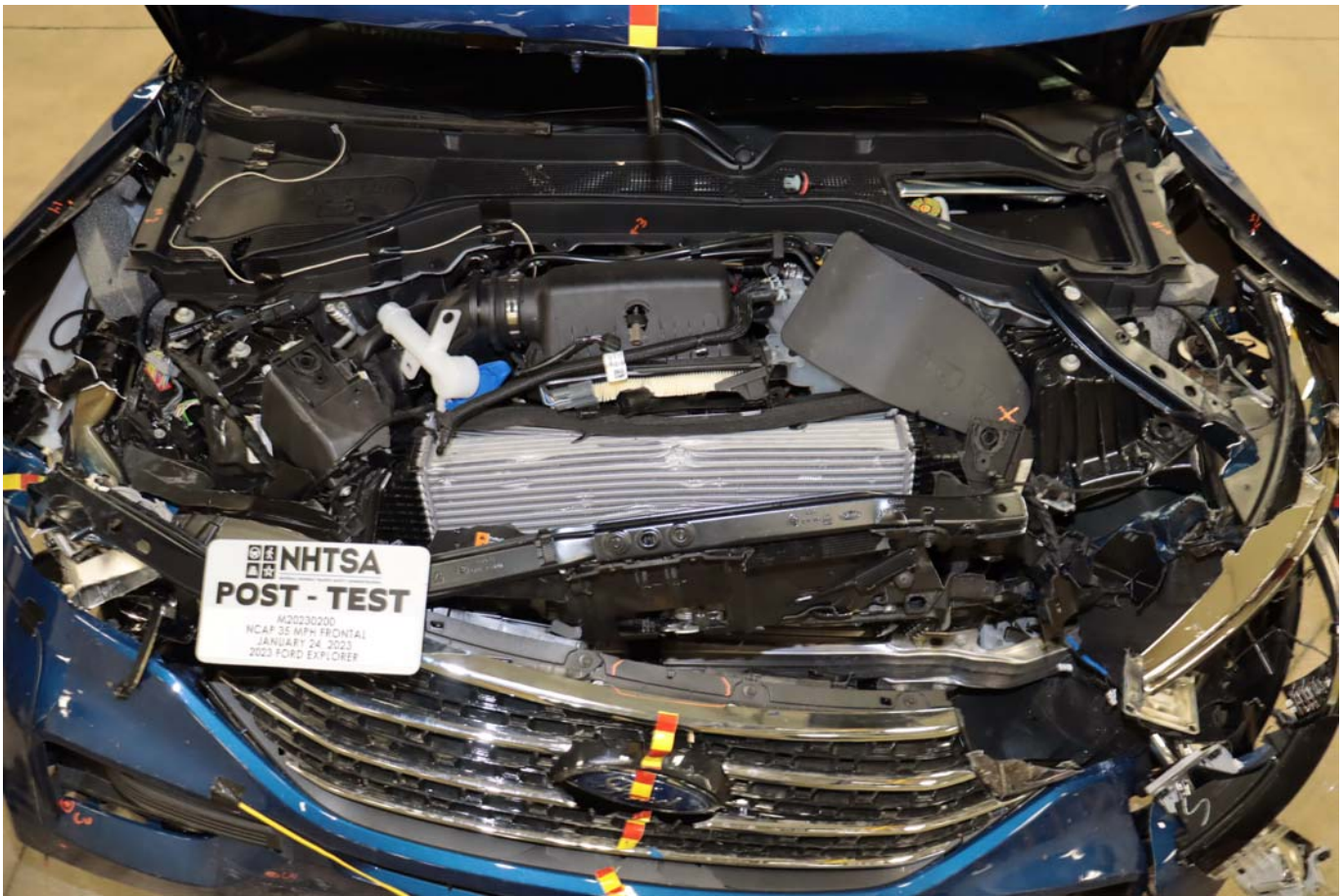


Photo No. 021 - Post-Test Engine Compartment View



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



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

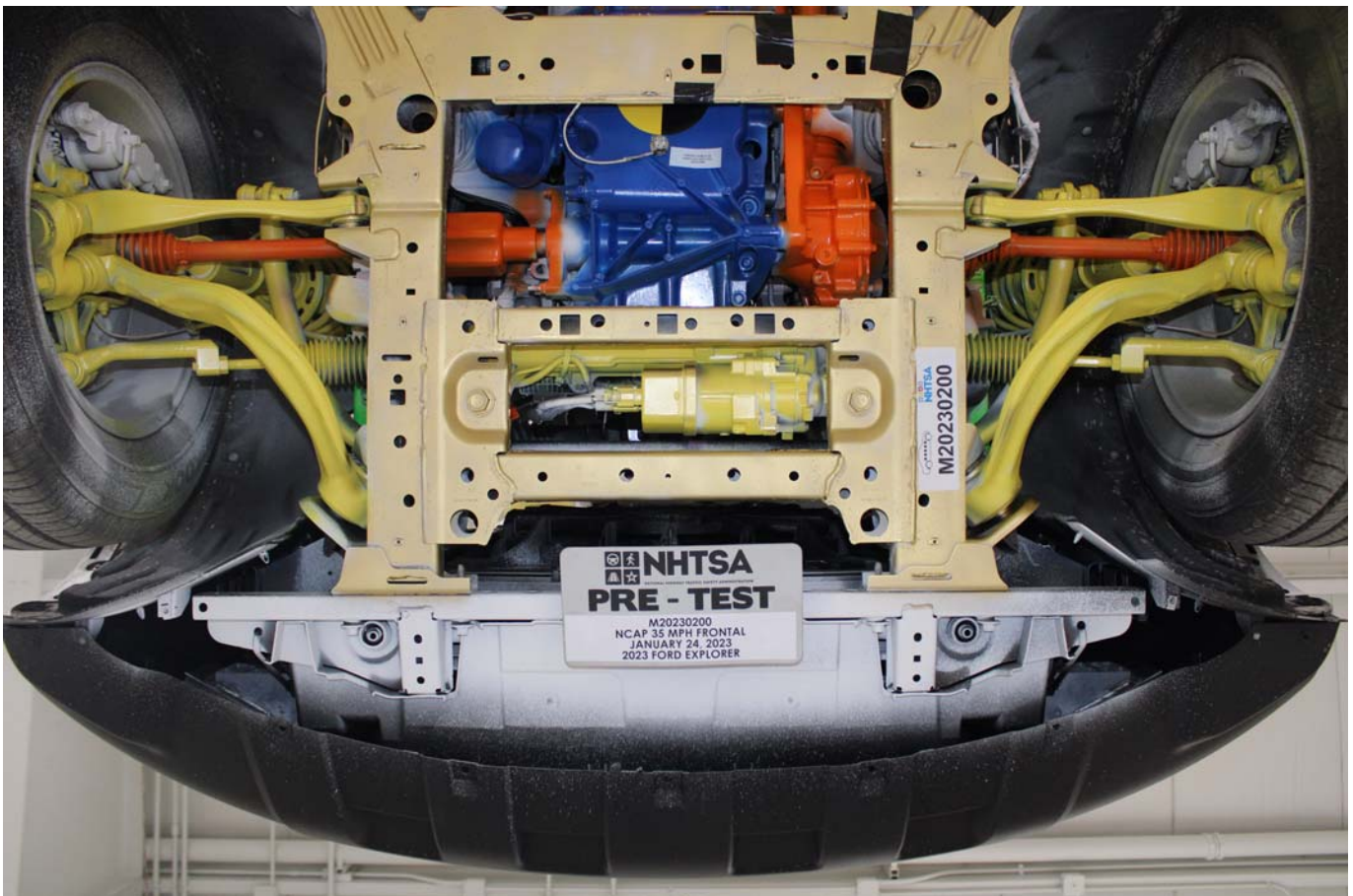


Photo No. 024 - Pre-Test Front Underbody View

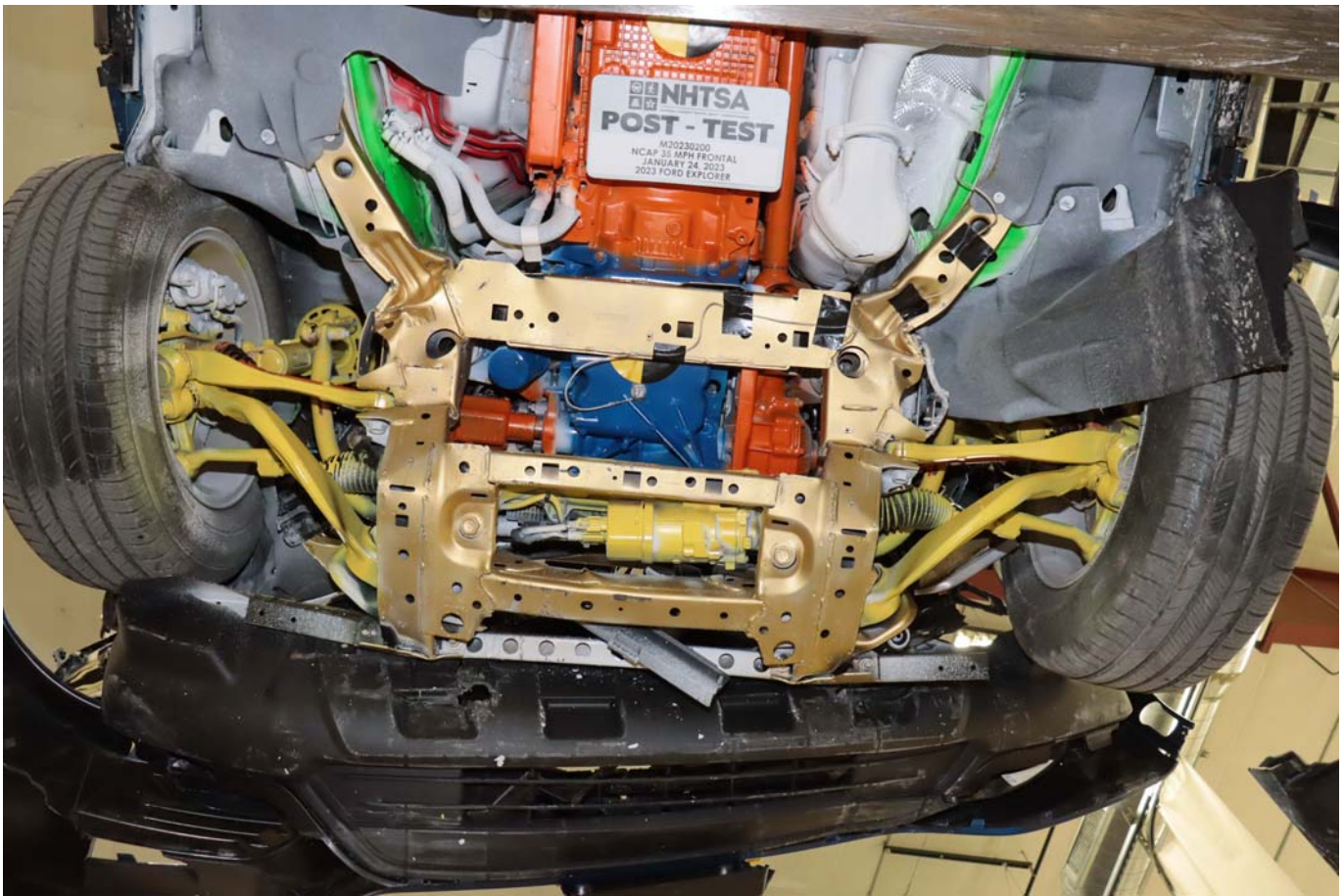


Photo No. 025 - Post-Test Front Underbody View

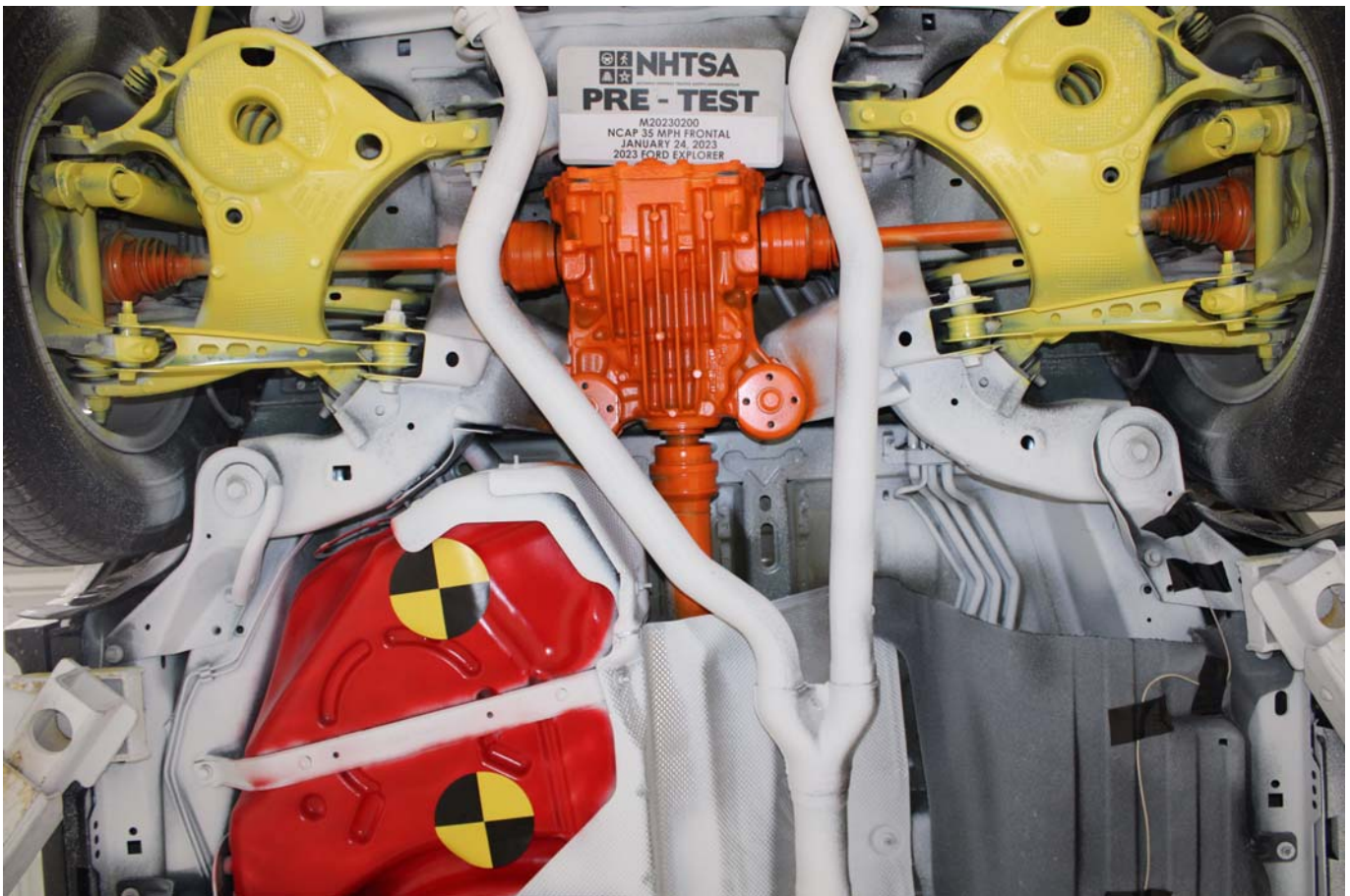


Photo No. 026 - Pre-Test Rear Underbody View

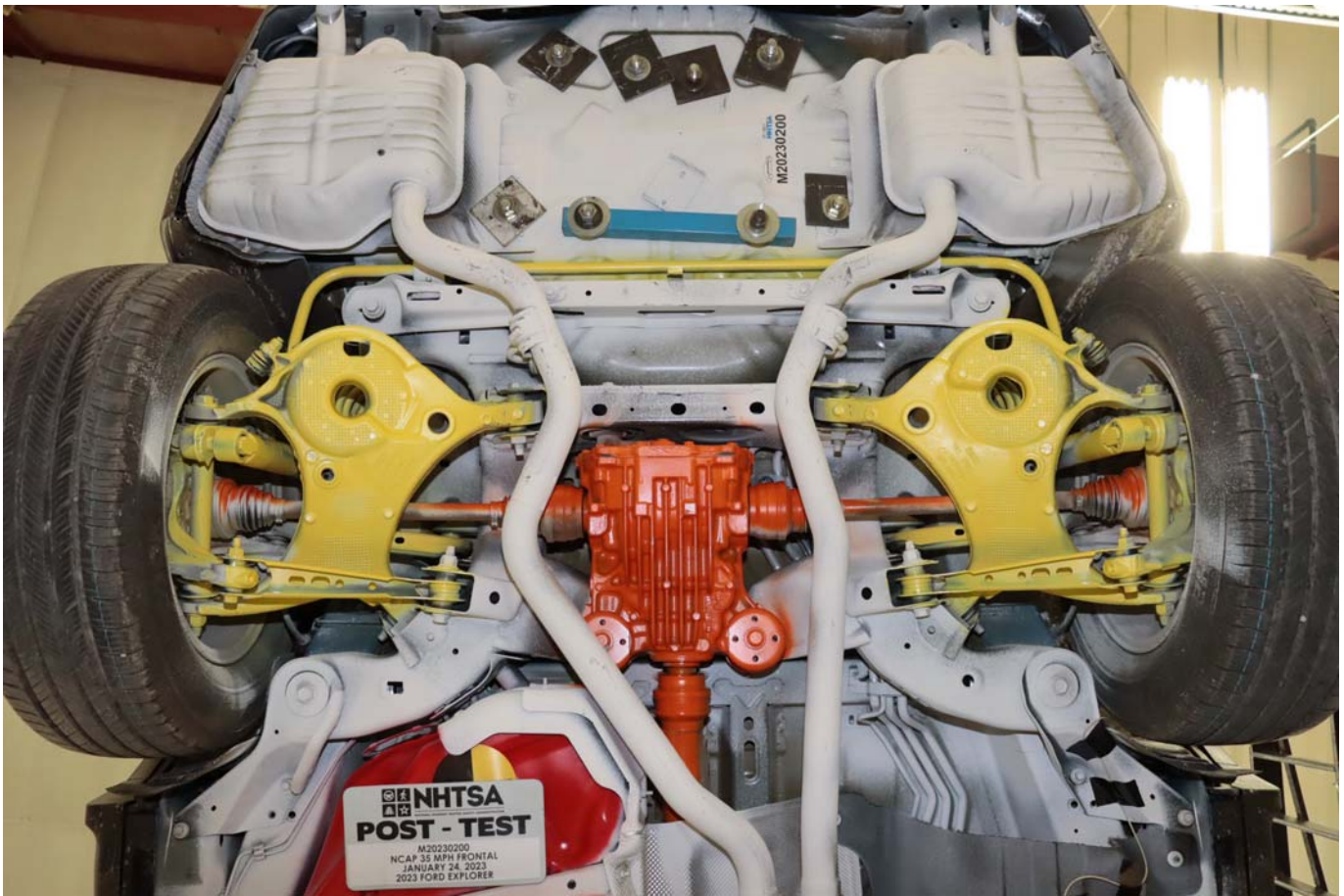


Photo No. 027 - Post-Test Rear Underbody View



Photo No. 028 - Pre-Test Dummy Cable Routing





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



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



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



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



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



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



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



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



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



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

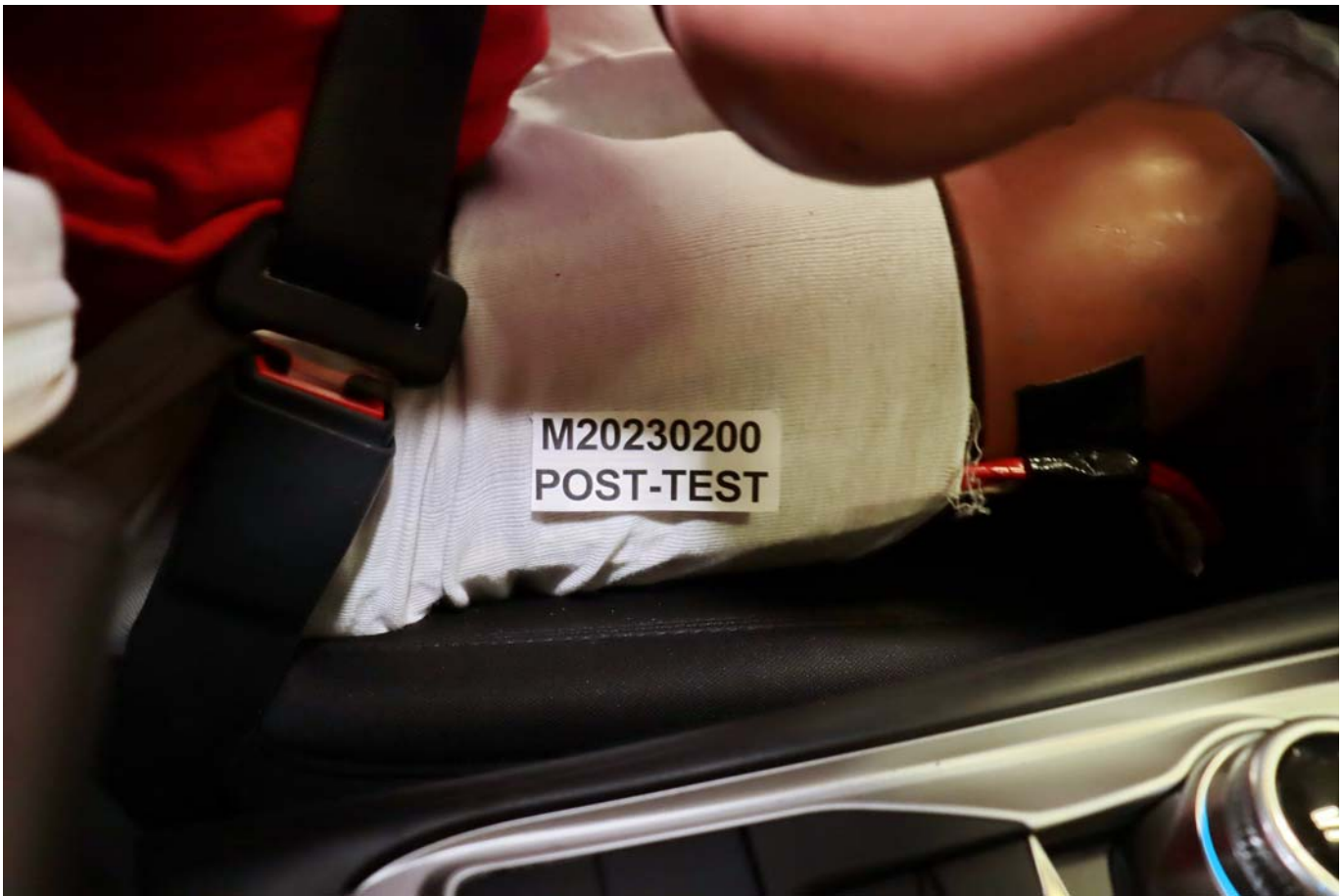


Photo No. 041 - Post-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 042 - Pre-Test Driver Dummy Feet



Photo No. 043 - Post-Test Driver Dummy Feet



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

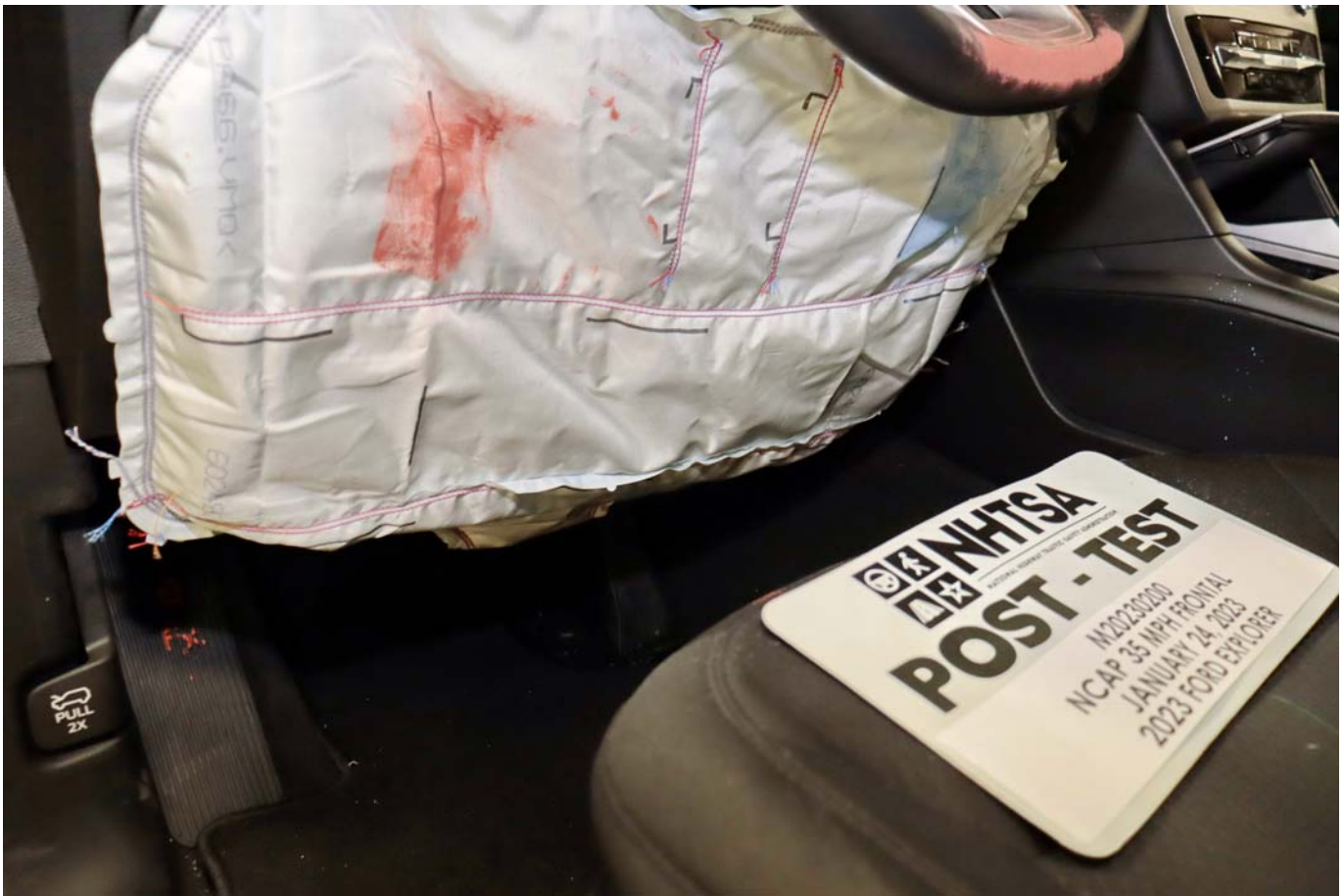


Photo No. 045 - Post-Test Driver's Side Knee Bolster

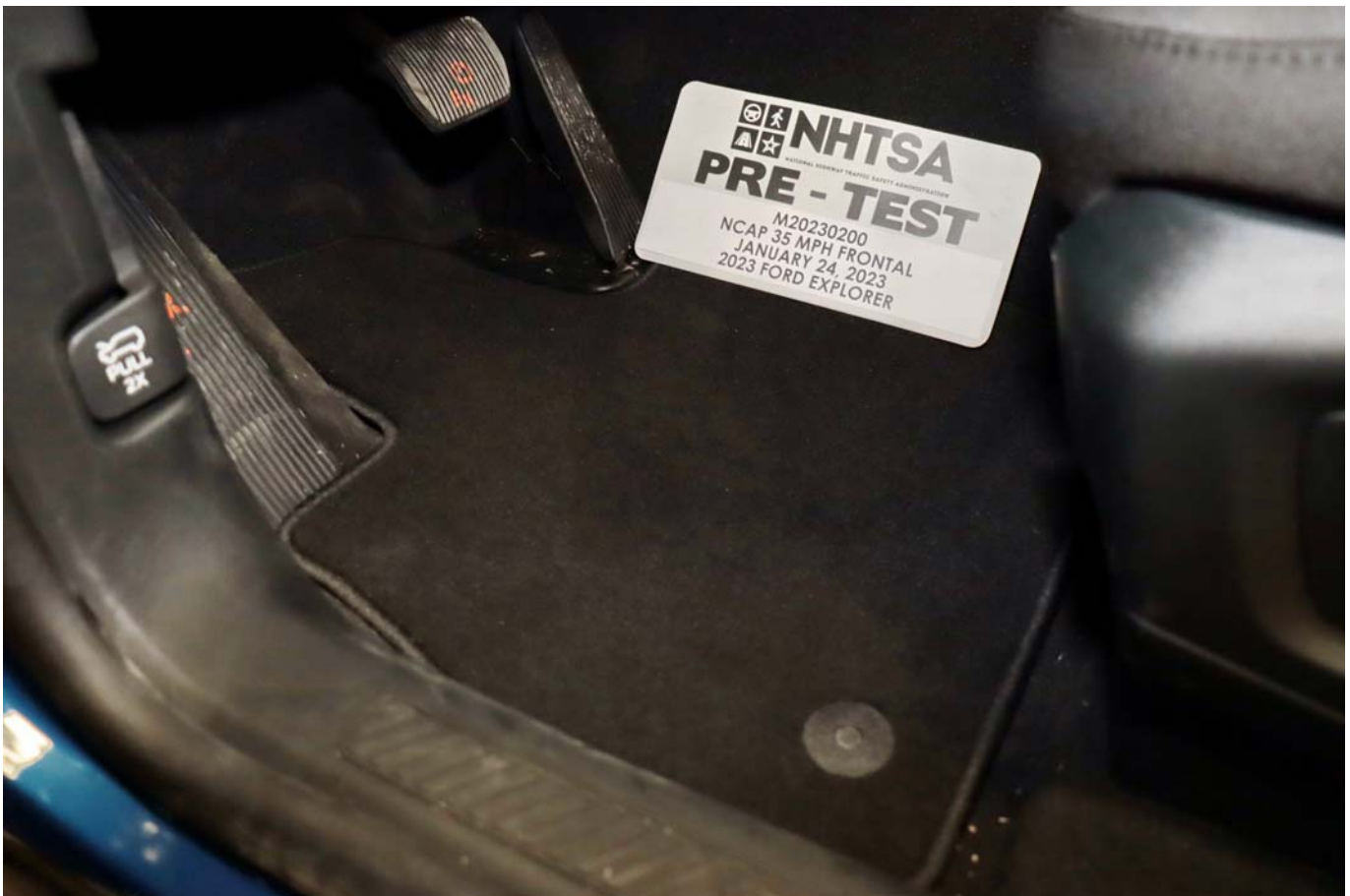


Photo No. 046 - Pre-Test Driver's Side Floorpan



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



Photo No. 048 - Post-Test Driver Dummy Face

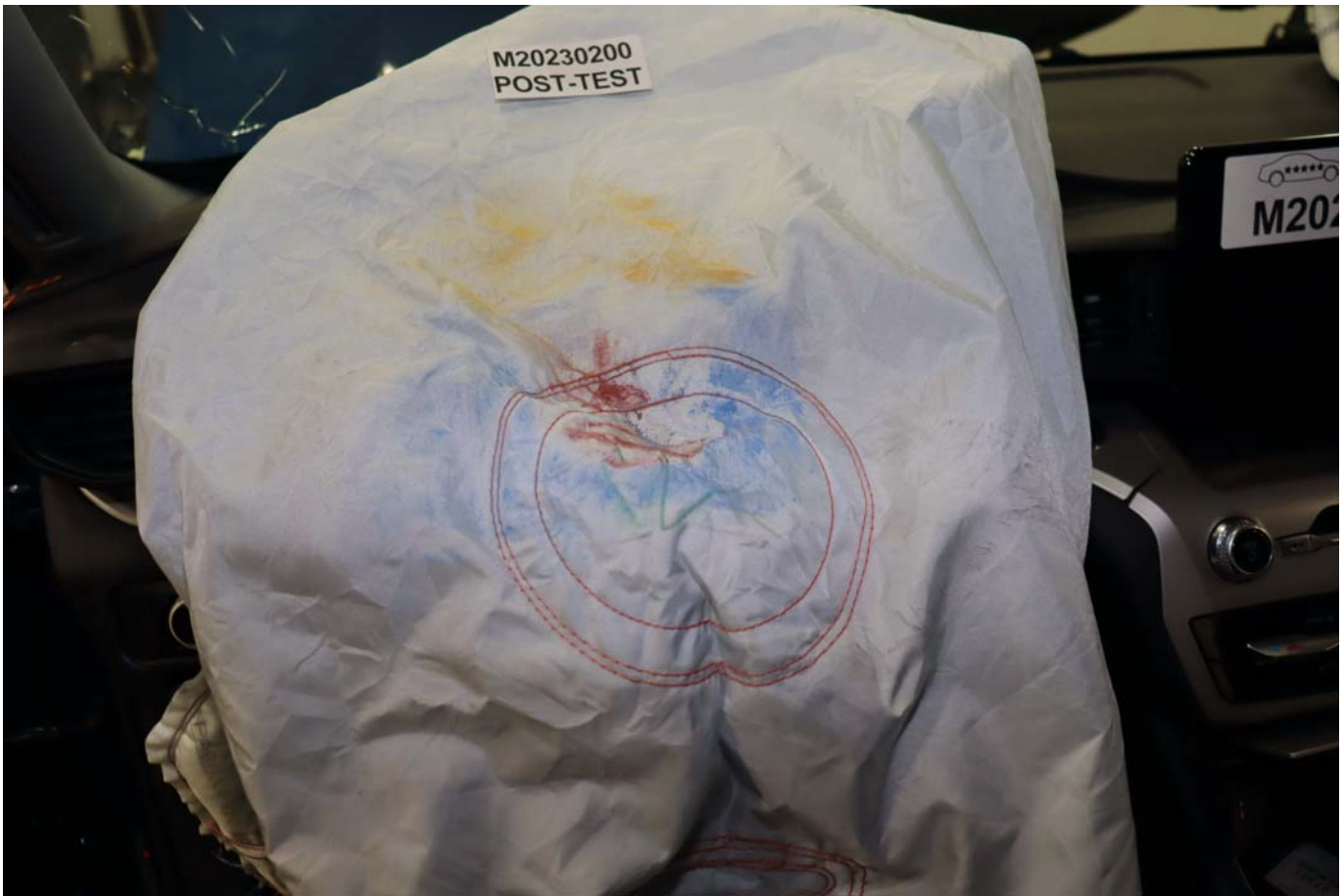


Photo No. 049 - Post-Test Driver Dummy Contact with Airbag



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



Photo No. 065 - Pre-Test Passenger Dummy Feet



Photo No. 066 - Post-Test Passenger Dummy Feet



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



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

**PHOTOGRAPH NOT AVAILABLE**

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



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



Photo No. 071 - Post-Test Passenger Dummy Face

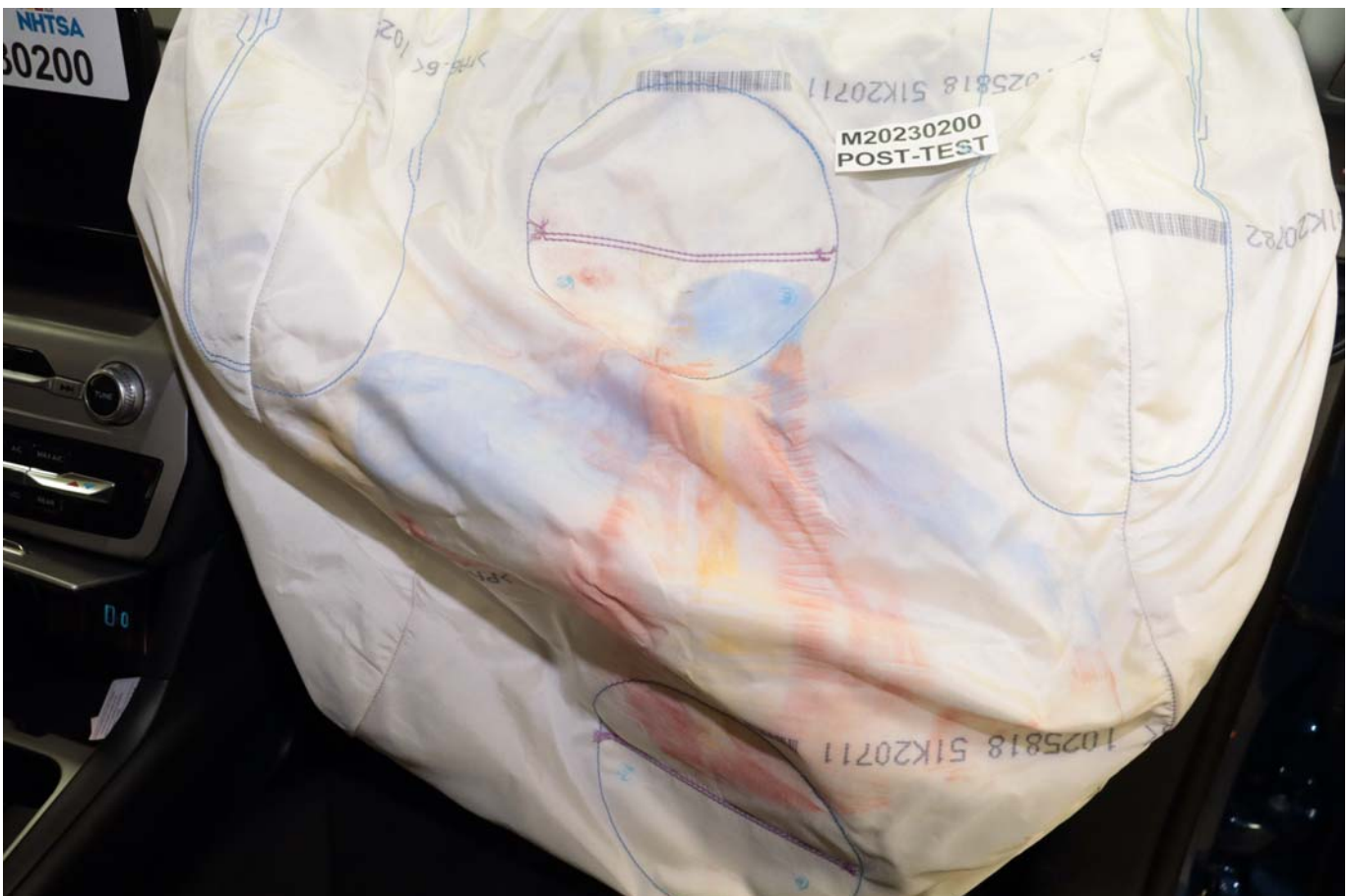


Photo No. 072 - Post-Test Passenger Dummy Contact with Airbag



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



Photo No. 074 - Photograph of Ballast Installed in Vehicle

**PHOTOGRAPH NOT APPLICABLE**

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



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



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



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



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



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



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



Photo No. 082 - 2023 Ford Explorer XLT 4WD 5-Door SUV Frontal Impact Event

**Ford**  
Go Further  
ford.com

**VEHICLE DESCRIPTION**  
**EXPLORER**  
2023 EXPLORER XLT 4WD  
119" WHEELBASE  
2.3L ECOBOOST I-4 ENGINE  
10-SPEED AUTO TRANSMISSION

**EXTERIOR**  
ATLAS BLUE METALLIC  
**INTERIOR**  
EBONY UNIQUE CLOTH SEATS

**PG A00491**

**STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE**

**EXTERIOR**

- DOOR HANDLES - BODY COLOR
- EASY FUEL CAPLESS FILLER
- HEADLAMPS - AUTO LED
- LED SIGNATURE LIGHTING
- MIRRORS-MAN-FOLD DUAL PWIR
- HEATED WITH APPROACH LAMPS
- POWER LIFTGATE
- PRIVACY GLASS - REAR DOORS
- REAR INT WIPER/WASH/WFRST
- REAR SPOILER, BODY COLOR
- ROOF-RACK SIDE RAILS-BLACK
- TAILLAMPS-LED
- TRAILER SWAY CONTROL
- VARIABLE INTERVAL WIPERS

**INTERIOR**

- TOUCH UP/DOWN DR/PASS WIN
- 3RD ROW - 50/50 FOLD FLAT
- DUAL ILLUM VIS VANITY MIRR
- HEATED CLOTH FRONT SEATS
- IP CLUSTER 6.5" LCD SCREEN
- LEATHER WRAPPED STR WHEEL
- POWER DRIVER SEAT - 10 WAY
- POWER PASS SEAT - 4-WAY
- POWERPOINTS - 12V
- ROTARY GEAR SHIFT DIAL
- TILT/TELESCOPING STEERING
- WHEEL MOUNTED CONTROLS
- TRI-ZONE ELECTRIC TMP CTRL
- USB A(1) AND C(1)-1ST ROW

**FUNCTIONAL**

- 4-DR INTELL ACCESS LOCK/ UNLOCK W/PUSH-BUTTON START
- AM/FM/MP3, 6 SPEAKERS
- BRAKES, 4-WHEEL DISC/ABS
- FORD CO-PILOT360™
- FORDPASS™ CONNECT
- HILL START ASSIST
- REAR PARKING SENSORS
- REAR VIEW CAMERA
- REFRESH96
- SIDE-WIND STABILIZATION
- SYNC®3 8" SCR N W/APPLINK®

**SAFETY/SECURITY**

- ADVANCETRAC™ WITH RSC®
- AIRBAG-DRIVER/PASS KNEE
- AIRBAGS - DUAL STAGE FRONT
- AIRBAGS - FRONT SEAT MOUNTED SIDE IMPACT™
- AIRBAGS - SAFETY CANOPY®
- INDIV TIRE PRESS MONIT SYS
- LATCH CHILD SAFETY SYSTEM
- PERIMETER ALARM
- PERSONAL SAFETY SYSTEM™
- SOS POST-CRASH ALERT SYS™

**WARRANTY**

- 3YR/36,000 BUMPER / BUMPER
- 5YR/60,000 POWERTRAIN
- 5YR/60,000 ROADSIDE ASSIST

**INCLUDED ON THIS VEHICLE EQUIPMENT GROUP 209A**

**OPTIONAL EQUIPMENT/OTHER**

- 18" 5-SPOKE PAINTED ALUM WHLS
- P255/65R18 A/S BSW TIRES
- 4WD REGIONAL DISCOUNT
- 60 STATE EMISSIONS
- AUTO START-STOP REMOVAL
- 4G LTE WI-FI HOTSPOT CREDIT
- FRONT LICENSE PLATE BRACKET

**PRICE INFORMATION**

BASE PRICE \$40,570.00  
TOTAL OPTIONS/OTHER - 70.00  
TOTAL VEHICLE & OPTIONS/OTHER DESTINATION & DELIVERY 40,500.00  
TOTAL BEFORE DISCOUNTS 41,995.00  
4WD REGIONAL DISCOUNT 300.00  
TOTAL SAVINGS 300.00

**RESIDENCY RESTRICTIONS APPLY TO DISCOUNTSAVINGS - BASED ON CUSTOMER ZIP CODE. SEE DEALER FOR DETAILS.**

**89.8 miles**

**Ford**

**SOLD TO**  
Gordie Boucher Ford of Kenosha  
8301 75th St.  
Kenosha WI 53142

**RAMP ONE**  
41A 305

**FINAL ASSEMBLY PLANT**  
CHICAGO

**METHOD OF TRANSF**  
CONVOY

**ITEM #**  
41-1007 OT 1

**TOTAL MSRP \$41,695.00**

Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit [www.ford.com/finance](http://www.ford.com/finance).

**SPECIAL ORDER**  
NL301 R RB X 325 003679 11 30 22

**SOLD TO (IF OTHER THAN SOLD TO)**

**SHP THROUGH**

This label is affixed pursuant to the Federal Automobile Information Disclosure Act. Gasoline, License, and Title Fees, State and Local taxes are not included. Dealer installed options or accessories are not included unless listed above.

**EPA DOT Fuel Economy and Environment** Gasoline Vehicle

**Fuel Economy**  
22 MPG combined city/hwy  
20 city  
26 highway  
4.5 gallons per 100 miles

Standard SUV's range from 14 to 102 MPG. The best vehicle rates 132 MPG.

**You spend \$2,000 more in fuel costs over 5 years compared to the average new vehicle.**

**Annual fuel cost \$2,000**

**Fuel Economy & Greenhouse Gas Rating** (tailpipe only) 1 5 10 Best

**Smog Rating** (tailpipe only) 1 6 10 Best

This vehicle emits 404 grams CO<sub>2</sub> per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions. Learn more at [fuelconomy.gov](http://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 \$2.95 per gallon. MSRP is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

**fuelconomy.gov**  
Calculate personalized estimates and compare vehicles

**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 ★★★★★ ★★★★★

Based on the risk of injury in a side impact.

**Rollover** ★★★★★

Based on the risk of rollover in a single-vehicle crash.

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

**AMERICA'S ALL TIME BEST-SELLING SUV**

The FordPass Connect™ modern is active and sending vehicle data (e.g., diagnostics) to Ford. See in-vehicle Settings for connectivity options. FordPass Connect™ service and FordPass™ App required for certain remote features (see App Terms for more information). Connected service and related feature functionality is subject to compatible AT&T-networks availability. Evolving technology/cellular networks may affect functionality and availability, or continued provision of some features, prohibiting them from functioning. Message and data rates may apply. See your local Ford website for our privacy policy.

**Ford FORD PROTECT™**

Insist on Ford Protect! The only extended service plan fully backed by Ford and honored at every Ford dealership in the U.S., Canada and Mexico. See your Ford dealer or visit [www.FordOwner.com](http://www.FordOwner.com).

1FMSK8DH1PGA00491

**WARNING:** Operating, servicing and maintaining a passenger vehicle, pickup truck, van, or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to [www.P65Warnings.ca.gov/passenger-vehicle](http://www.P65Warnings.ca.gov/passenger-vehicle).

SCAN OR TEXT 13P6A00491 TO 48088

Mag 8 Data rates may apply. Text HELP for help.

[www.ford.com/help/privacy-terms/](http://www.ford.com/help/privacy-terms/)

Photo No. 083 - Monroney Label Photograph

**APPENDIX B**  
**DUMMY RESPONSE DATA TRACES**

## TABLE OF DATA PLOTS

Page No.

### List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Chest Displacement vs. Time	B-2
Figure No. 6.	Driver Chest X Acceleration vs. Time	B-3
Figure No. 7.	Driver Chest Y Acceleration vs. Time	B-3
Figure No. 8.	Driver Chest Z Acceleration vs. Time	B-3
Figure No. 9.	Driver Chest Resultant Acceleration vs. Time	B-3
Figure No. 10.	Driver Neck Force X vs. Time	B-4
Figure No. 11.	Driver Neck Force Z vs. Time	B-4
Figure No. 12.	Driver Neck Moment Y vs. Time	B-4
Figure No. 13.	Driver Nij (NTF) vs. Time	B-5
Figure No. 14.	Driver Nij (NTE) vs. Time	B-5
Figure No. 15.	Driver Nij (NCF) vs. Time	B-5
Figure No. 16.	Driver Nij (NCE) vs. Time	B-5
Figure No. 17.	Driver Left Femur Force vs. Time	B-6
Figure No. 18.	Driver Right Femur Force vs. Time	B-6
Figure No. 19.	Passenger Head X Acceleration vs. Time	B-7
Figure No. 20.	Passenger Head Y Acceleration vs. Time	B-7
Figure No. 21.	Passenger Head Z Acceleration vs. Time	B-7
Figure No. 22.	Passenger Head Resultant Acceleration vs. Time	B-7
Figure No. 23.	Passenger Chest Displacement vs. Time	B-8
Figure No. 24.	Passenger Chest X Acceleration vs. Time	B-9
Figure No. 25.	Passenger Chest Y Acceleration vs. Time	B-9
Figure No. 26.	Passenger Chest Z Acceleration vs. Time	B-9
Figure No. 27.	Passenger Chest Resultant Z Acceleration vs. Time	B-9

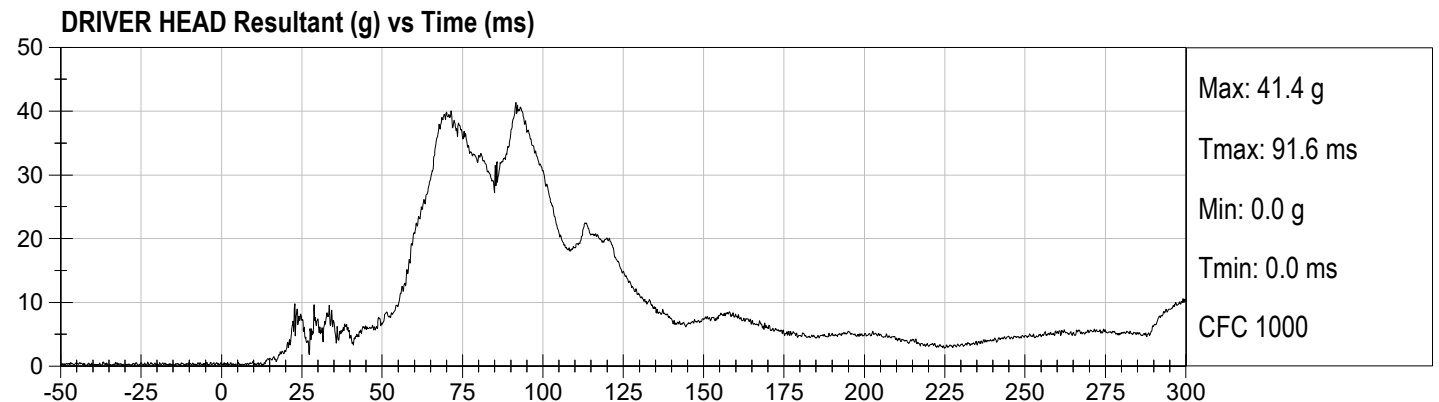
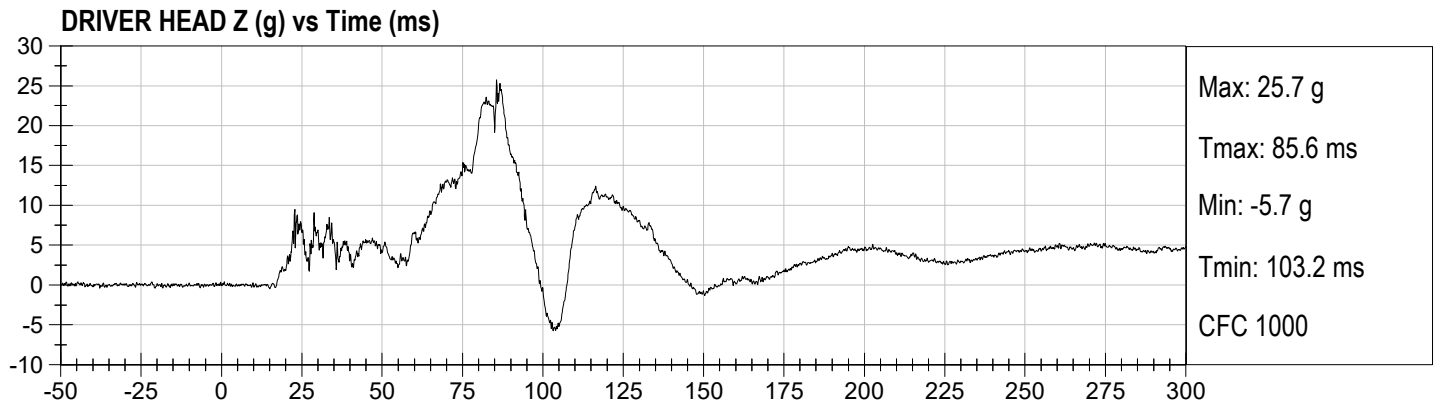
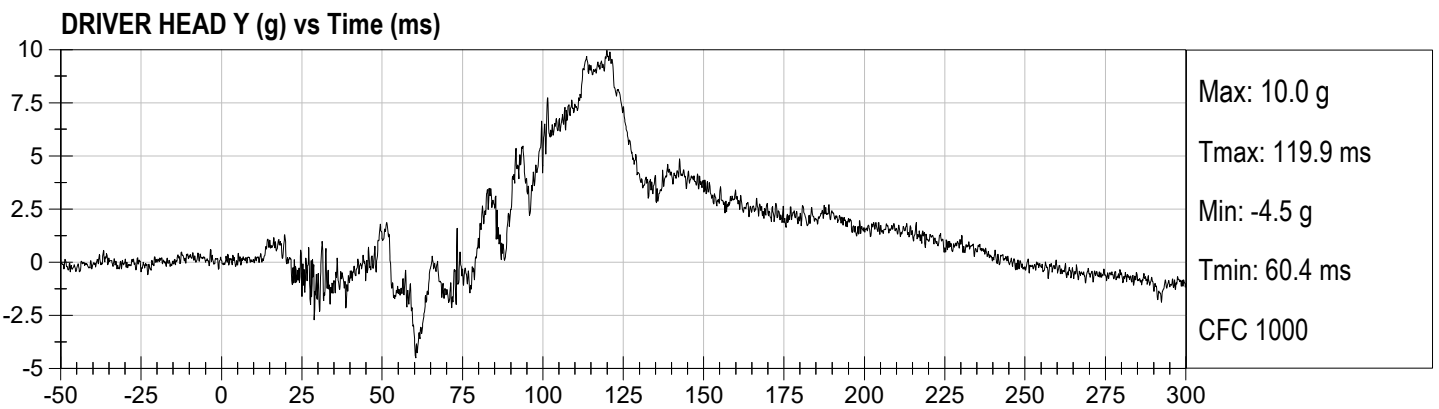
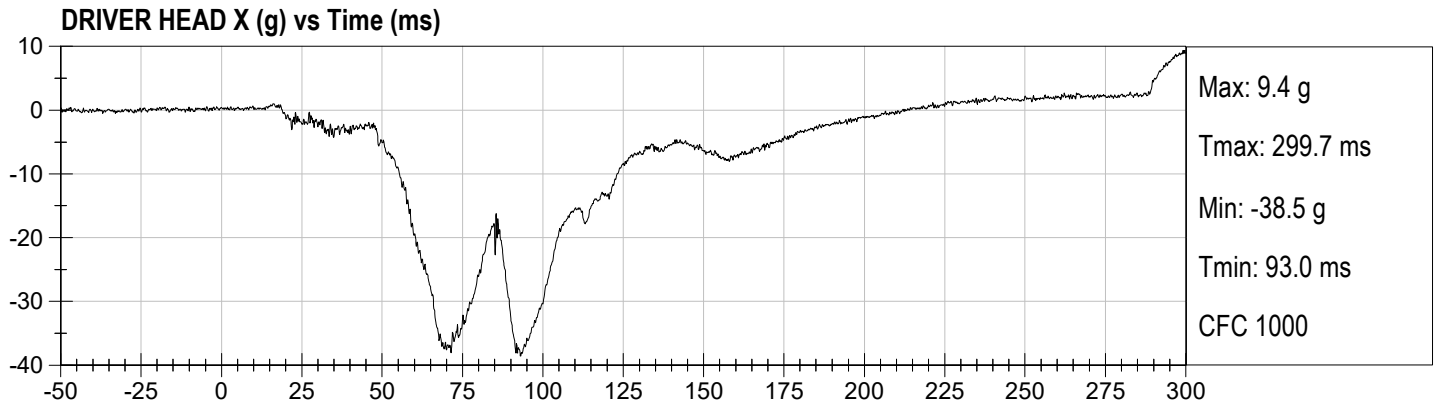
	<u>Page No.</u>
Figure No. 28. Passenger Neck Force X vs. Time	B-10
Figure No. 29. Passenger Neck Force Z vs. Time	B-10
Figure No. 30. Passenger Neck Moment Y vs. Time	B-10
Figure No. 31. Passenger Nij (NTF) vs. Time	B-11
Figure No. 32. Passenger Nij (NTE) vs. Time	B-11
Figure No. 33. Passenger Nij (NCF) vs. Time	B-11
Figure No. 34. Passenger Nij (NCE) vs. Time	B-11
Figure No. 35. Passenger Left Femur Force vs. Time	B-12
Figure No. 36. Passenger Right Femur Force vs. Time	B-12

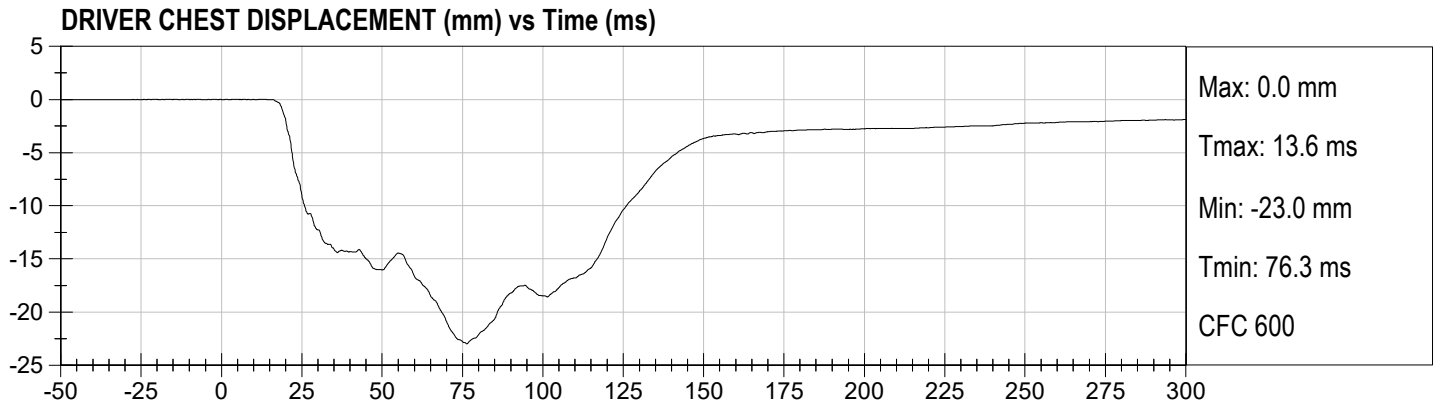
**The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at [www.nhtsa.gov](http://www.nhtsa.gov)**

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

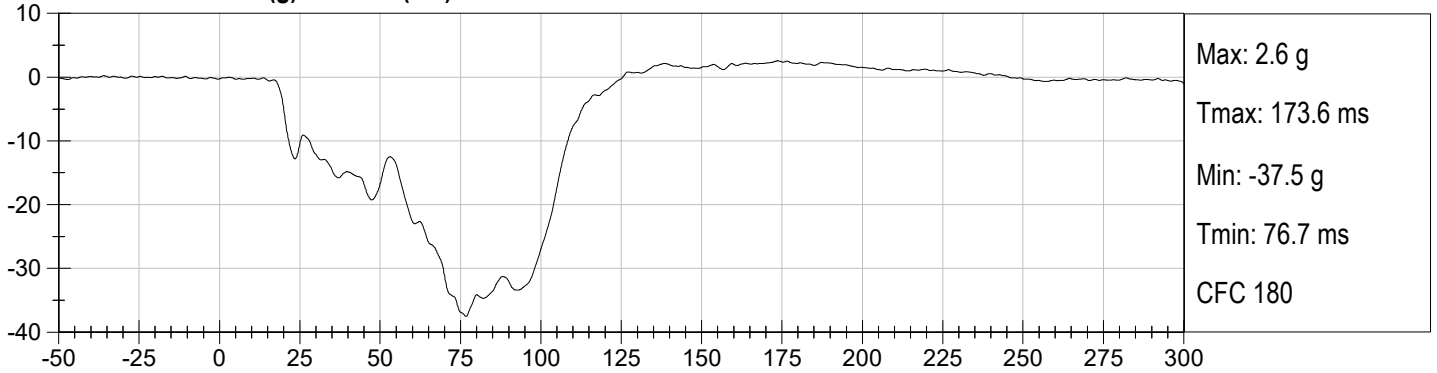
Driver Left Upper Tibia Force Z  
Driver Left Lower Tibia Moment X  
Driver Left Lower Tibia Moment Y  
Driver Left Lower Tibia Force Z  
Driver Right Upper Tibia Moment X  
Driver Right Upper Tibia Moment Y  
Driver Right Upper Tibia Force Z  
Driver Right Lower Tibia Moment X  
Driver Right Lower Tibia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

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

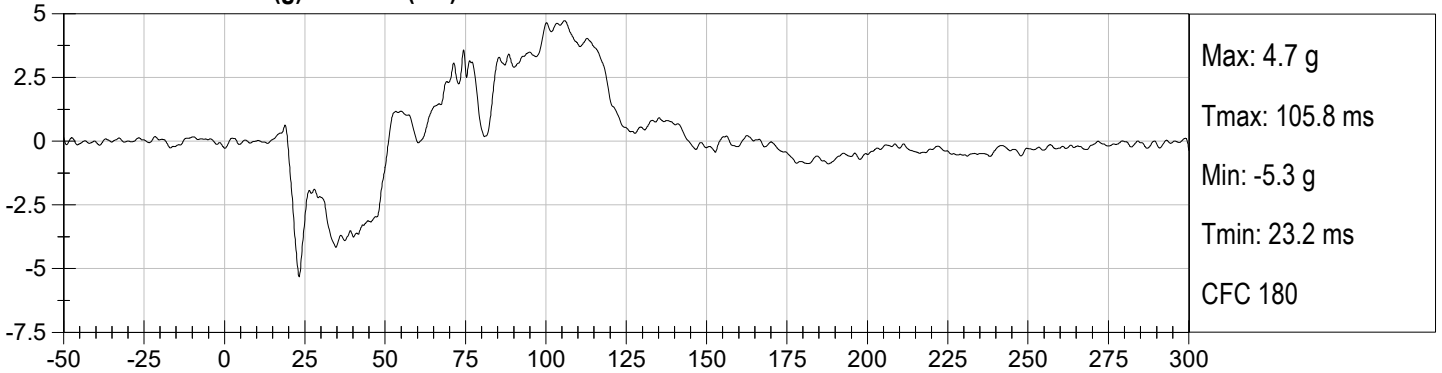




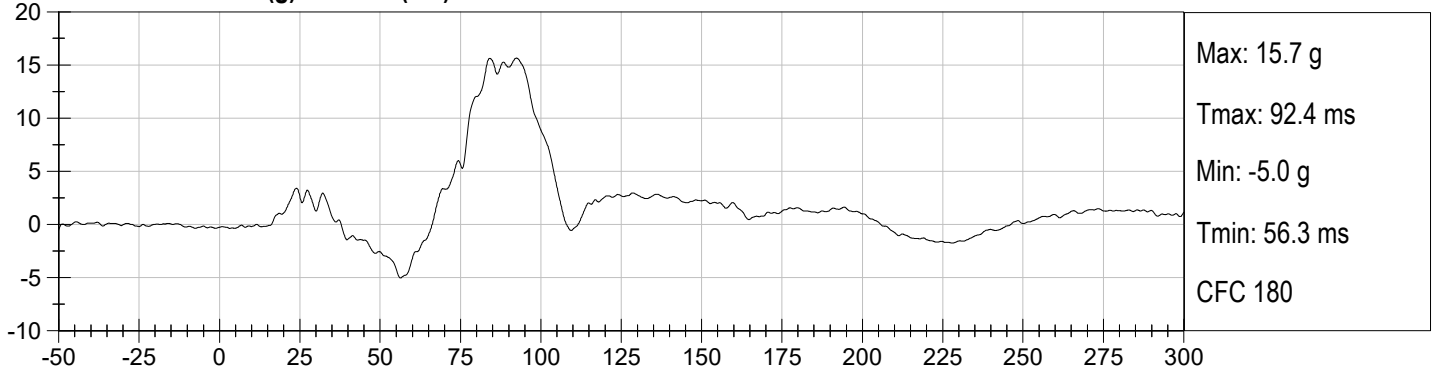
**DRIVER CHEST X (g) vs Time (ms)**



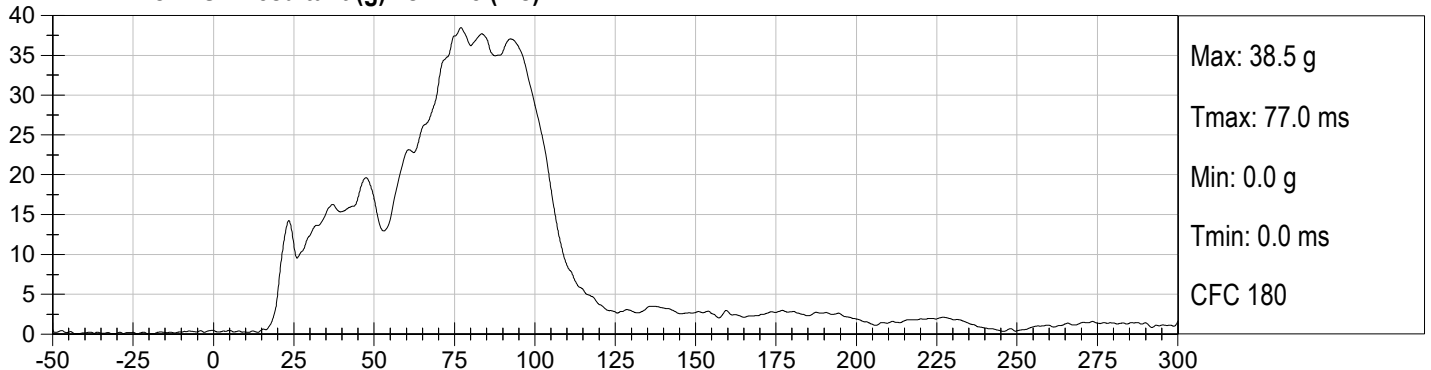
**DRIVER CHEST Y (g) vs Time (ms)**

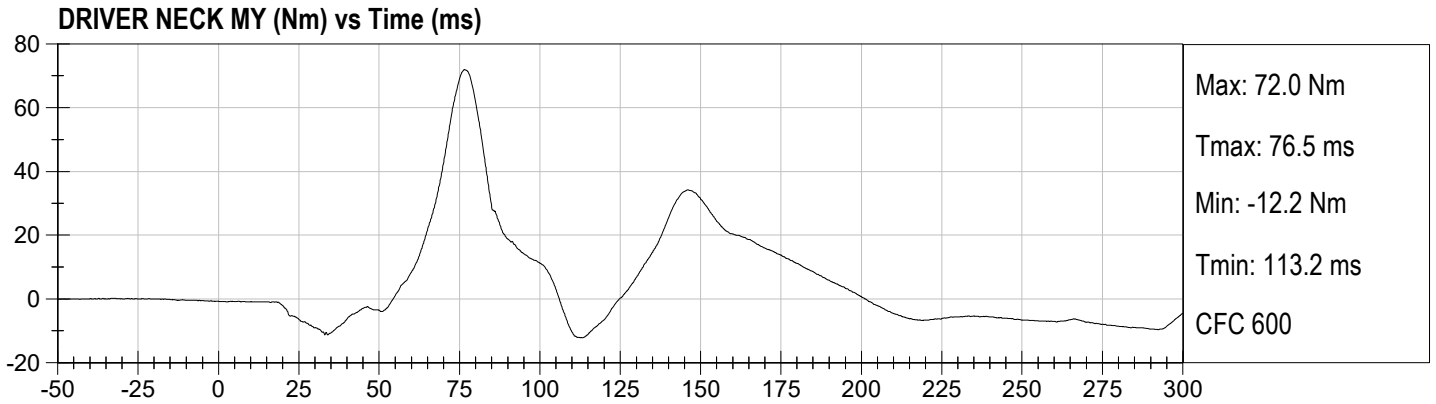
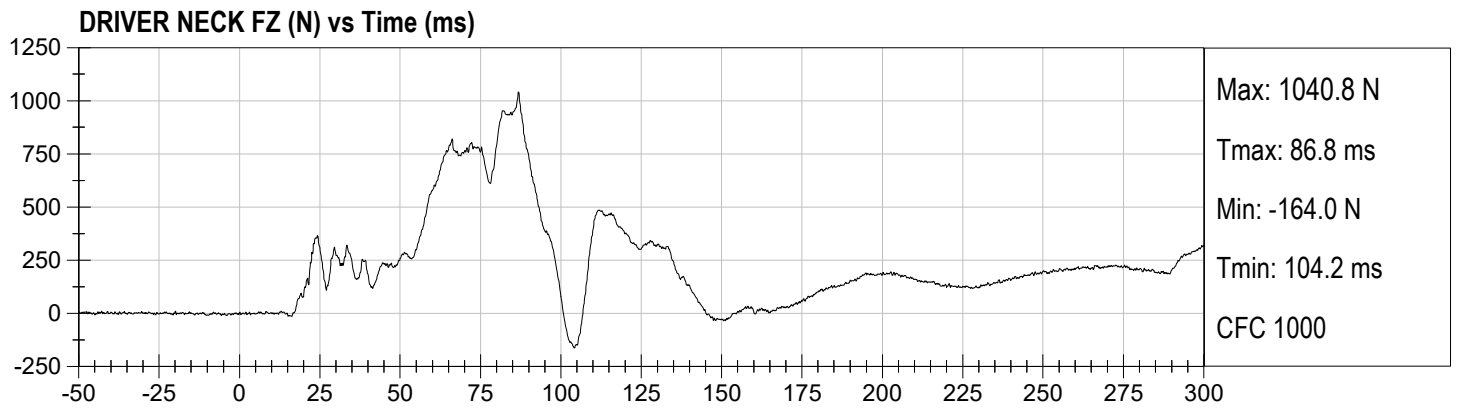
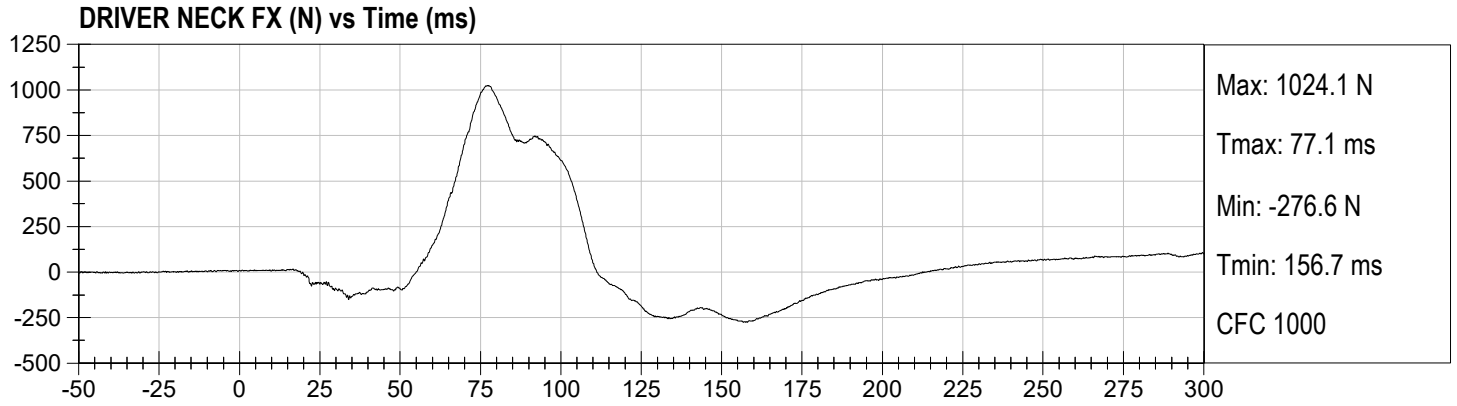


**DRIVER CHEST Z (g) vs Time (ms)**

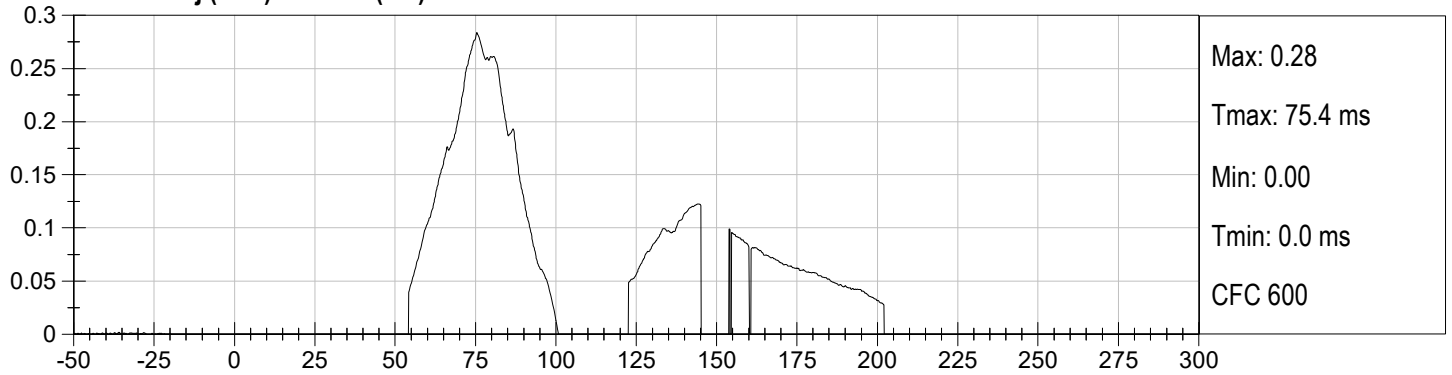


**DRIVER CHEST Resultant (g) vs Time (ms)**

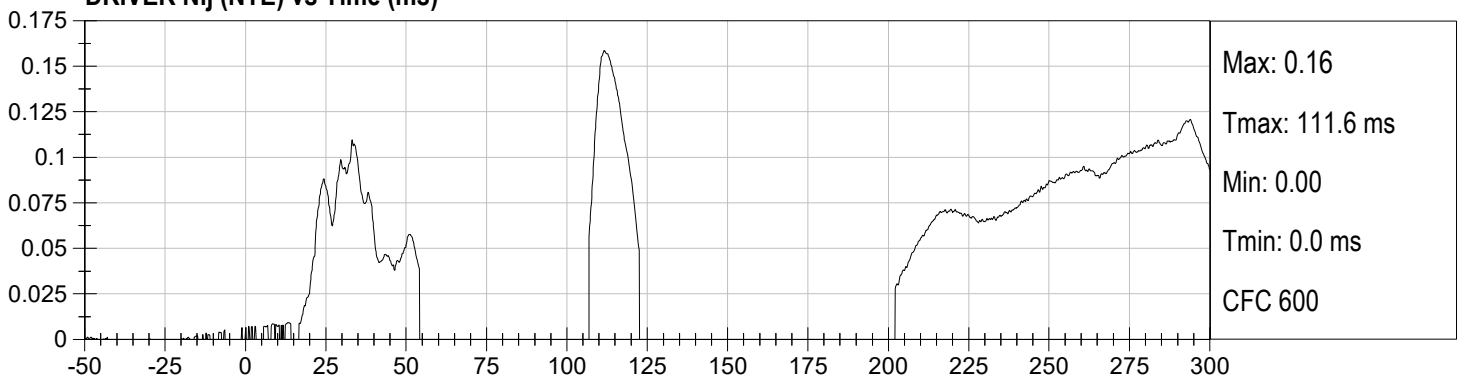




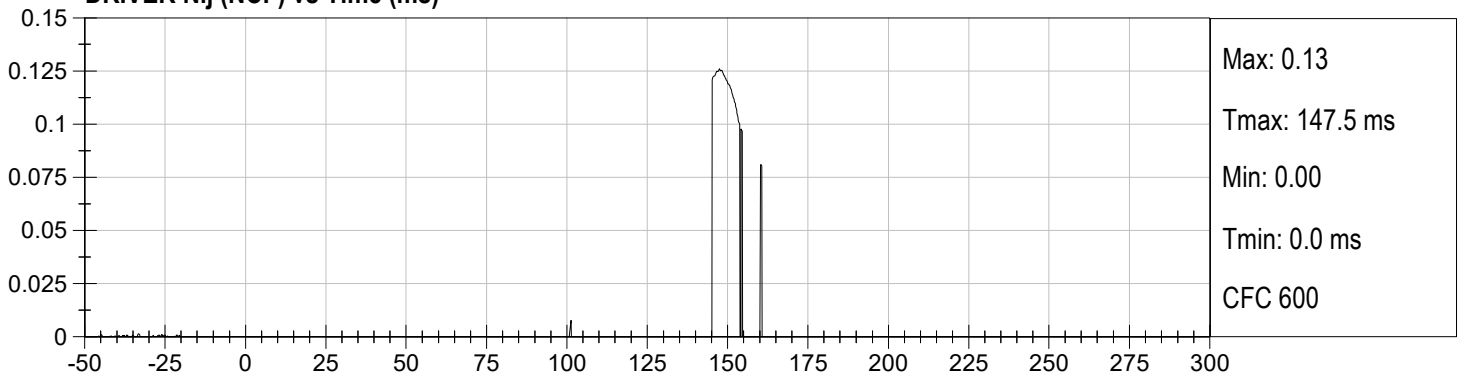
DRIVER Nij (NTF) vs Time (ms)



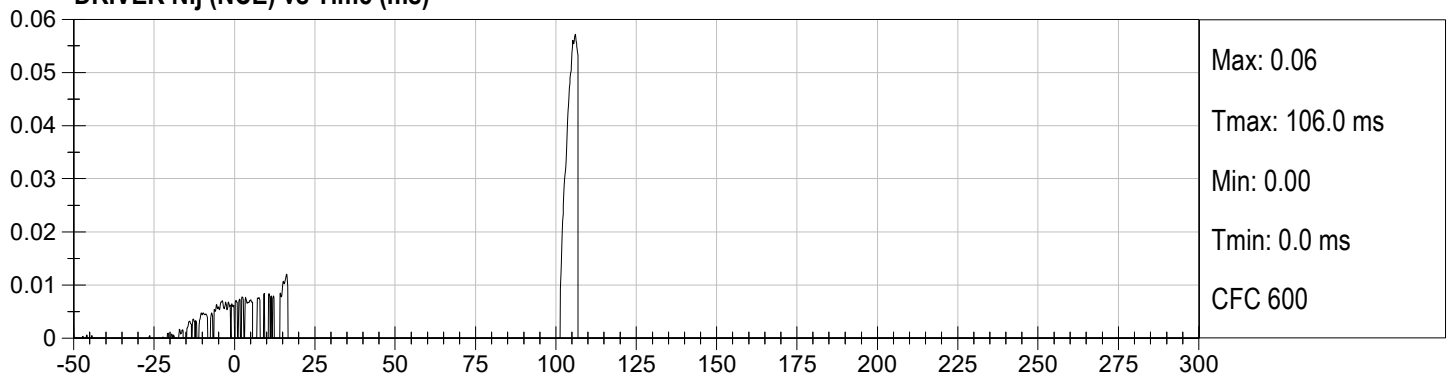
DRIVER Nij (NTE) vs Time (ms)



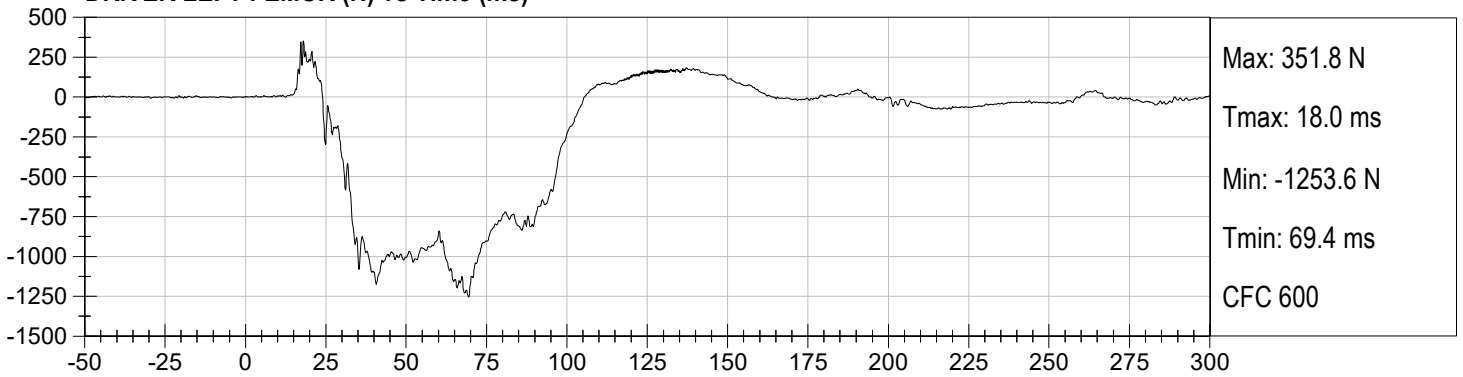
DRIVER Nij (NCF) vs Time (ms)



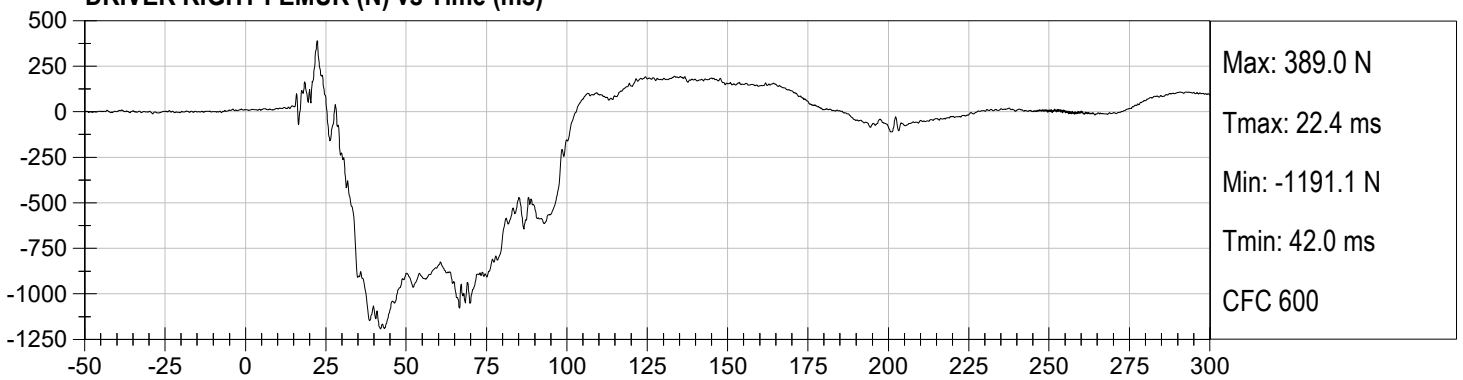
DRIVER Nij (NCE) vs Time (ms)

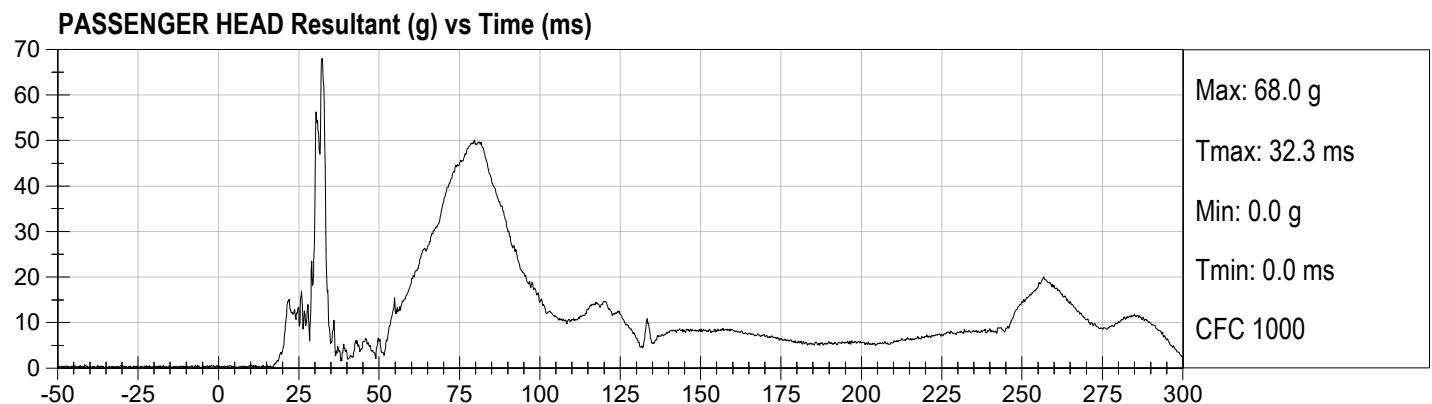
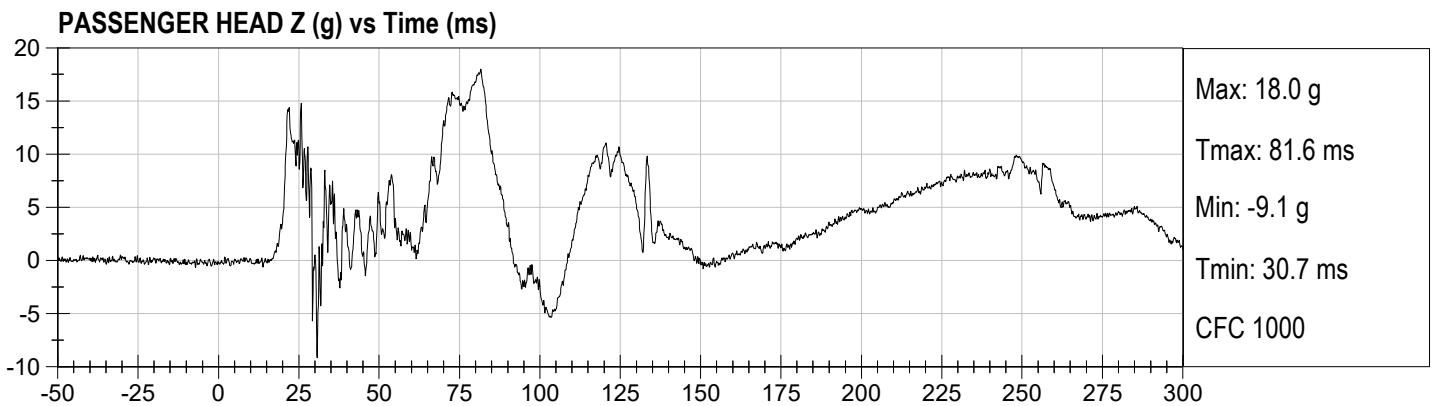
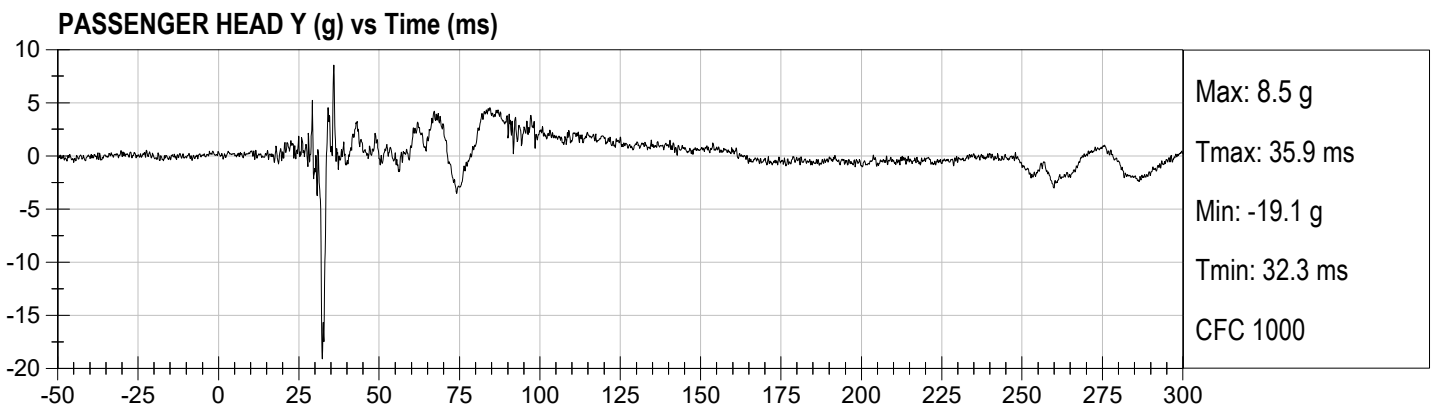
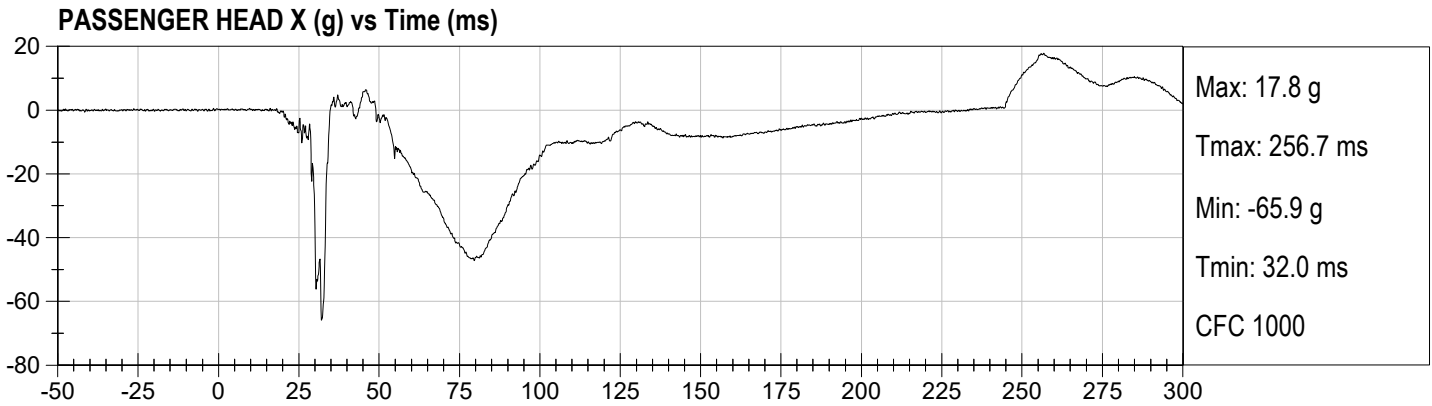


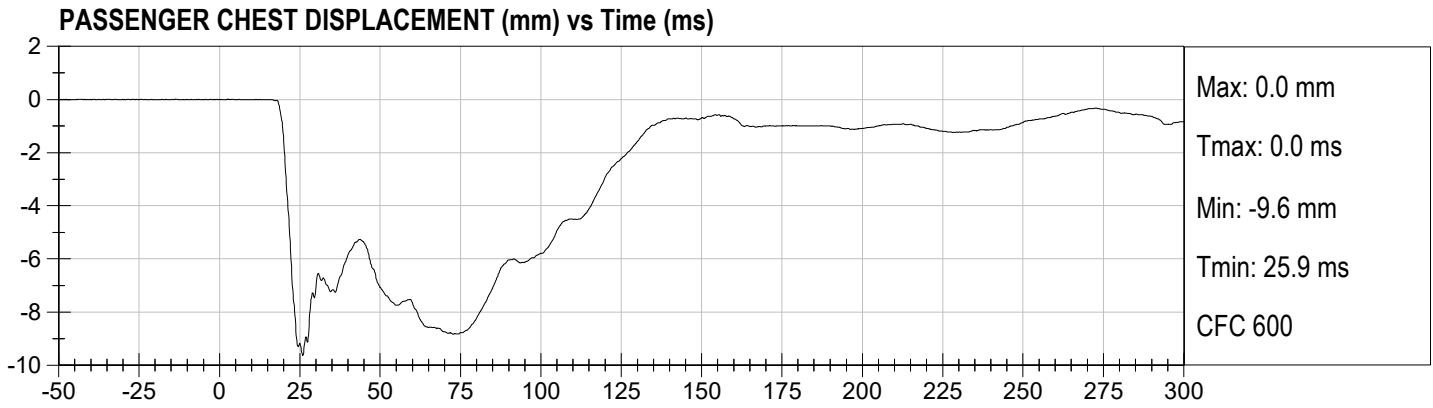
**DRIVER LEFT FEMUR (N) vs Time (ms)**

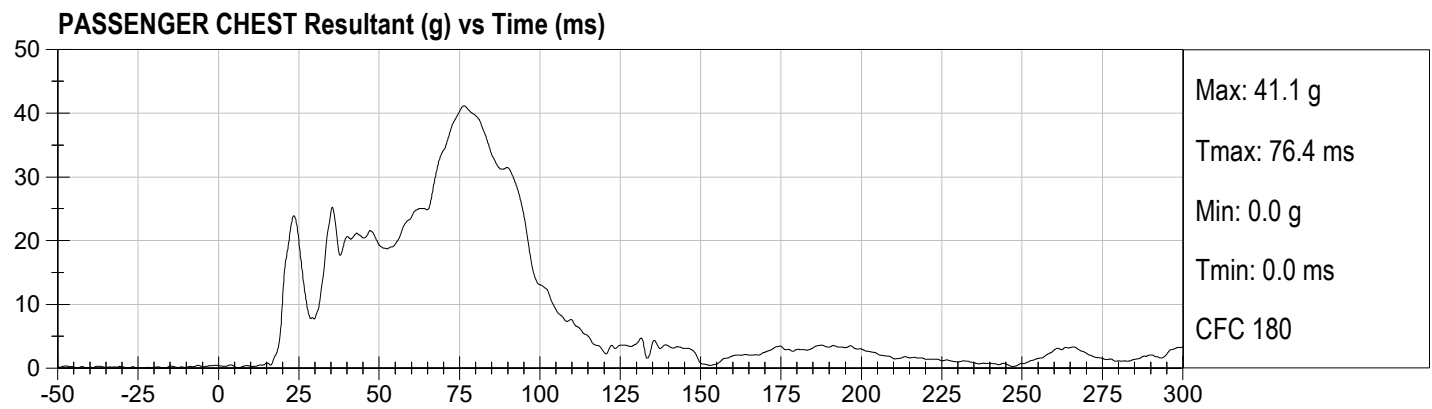
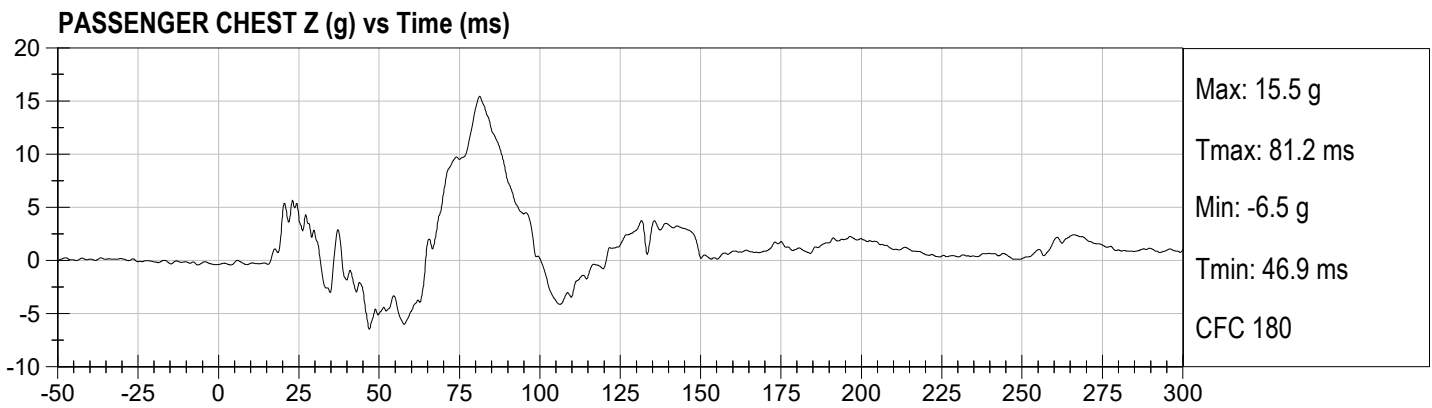
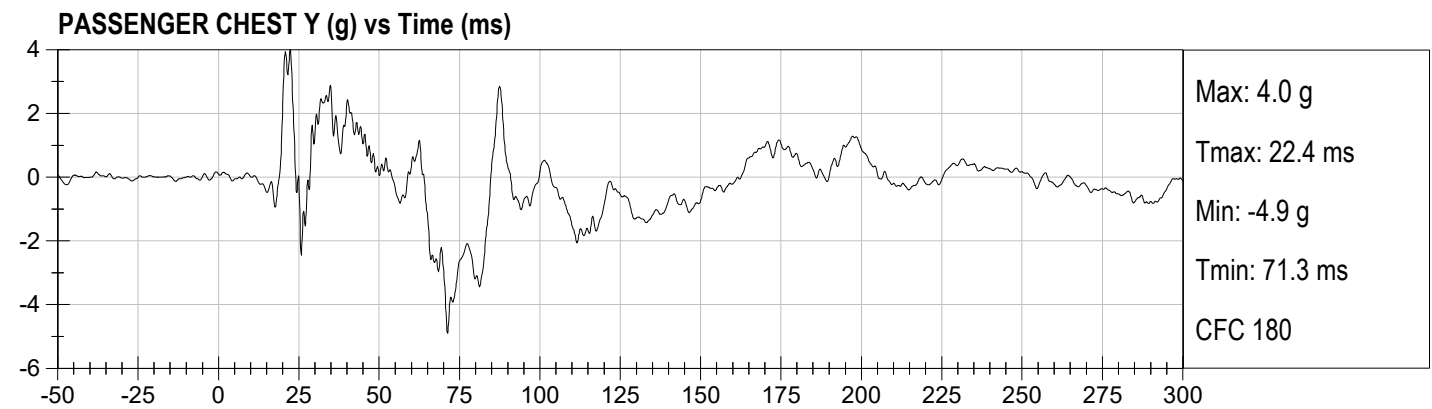
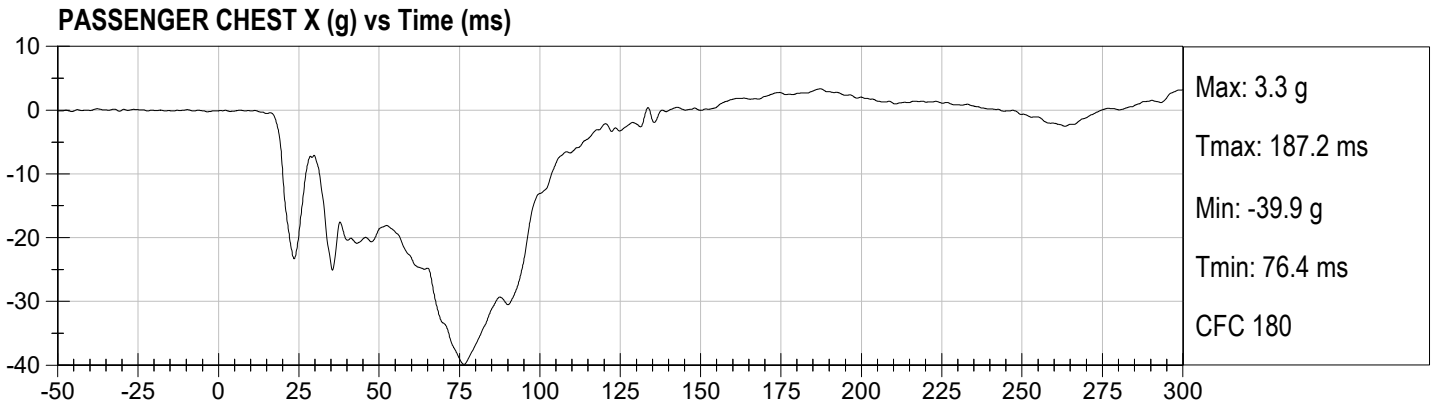


**DRIVER RIGHT FEMUR (N) vs Time (ms)**

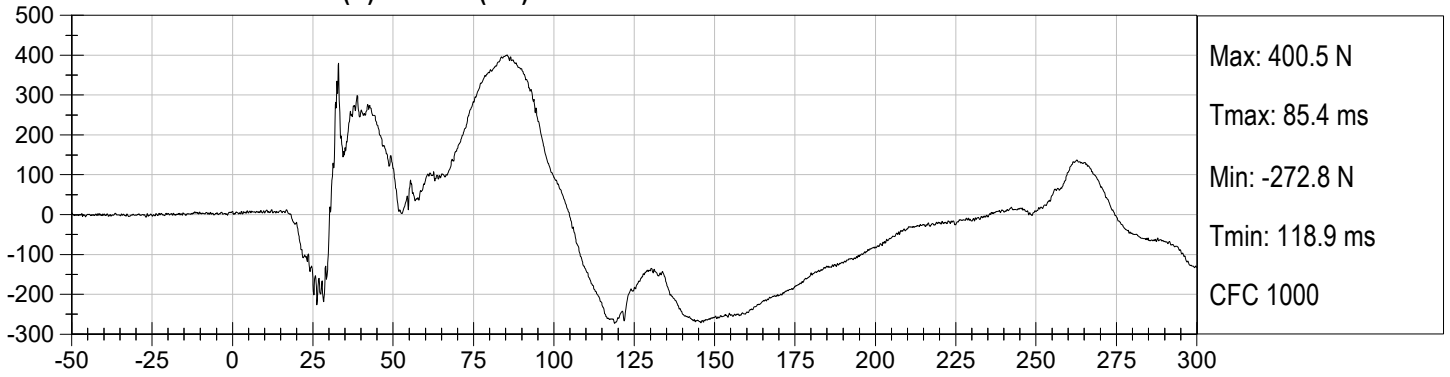




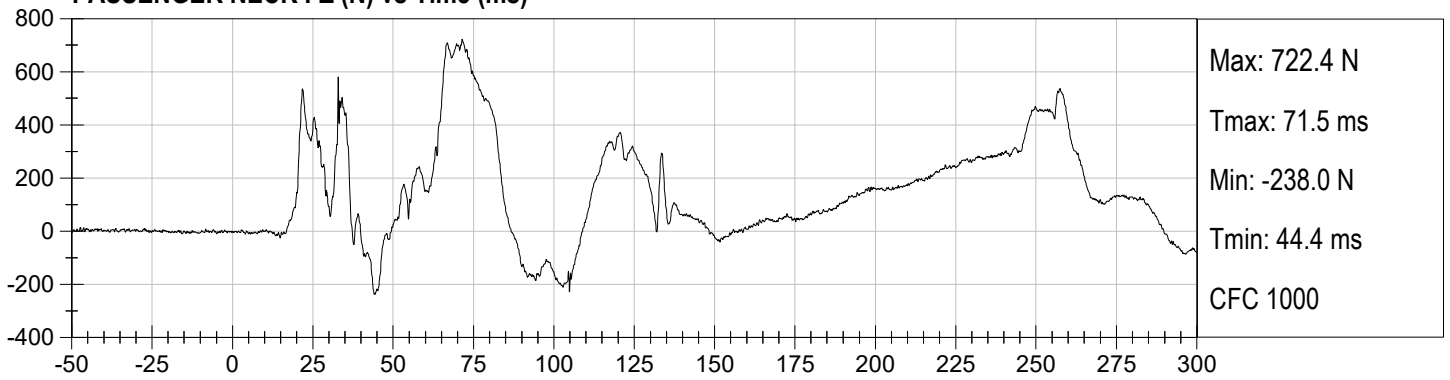




**PASSENGER NECK FX (N) vs Time (ms)**



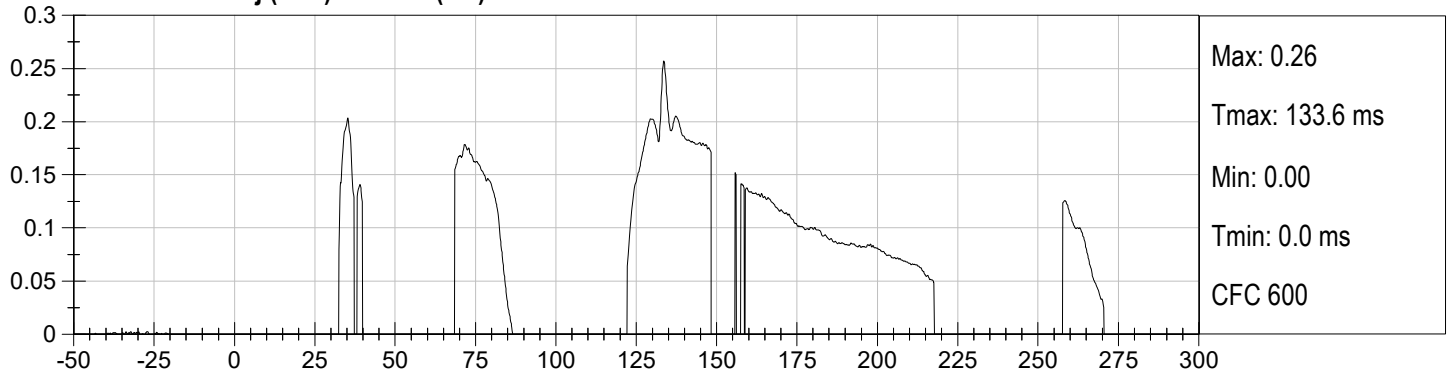
**PASSENGER NECK FZ (N) vs Time (ms)**



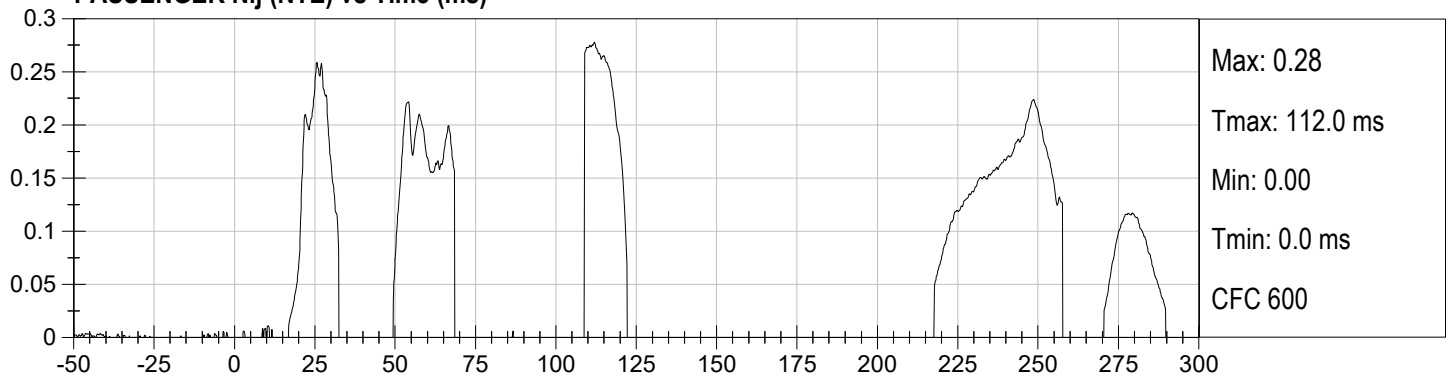
**PASSENGER NECK MY (Nm) vs Time (ms)**



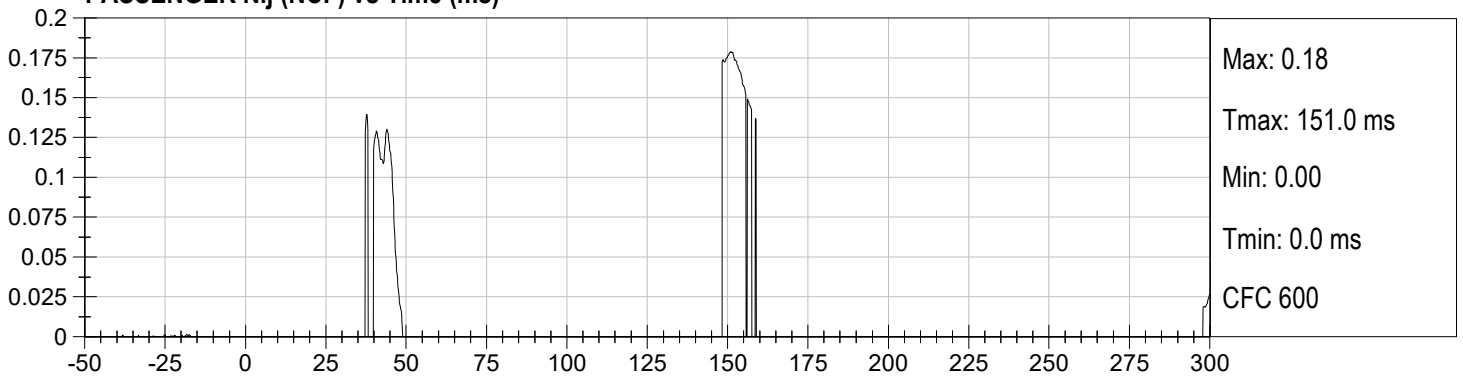
PASSENGER Nij (NTF) vs Time (ms)



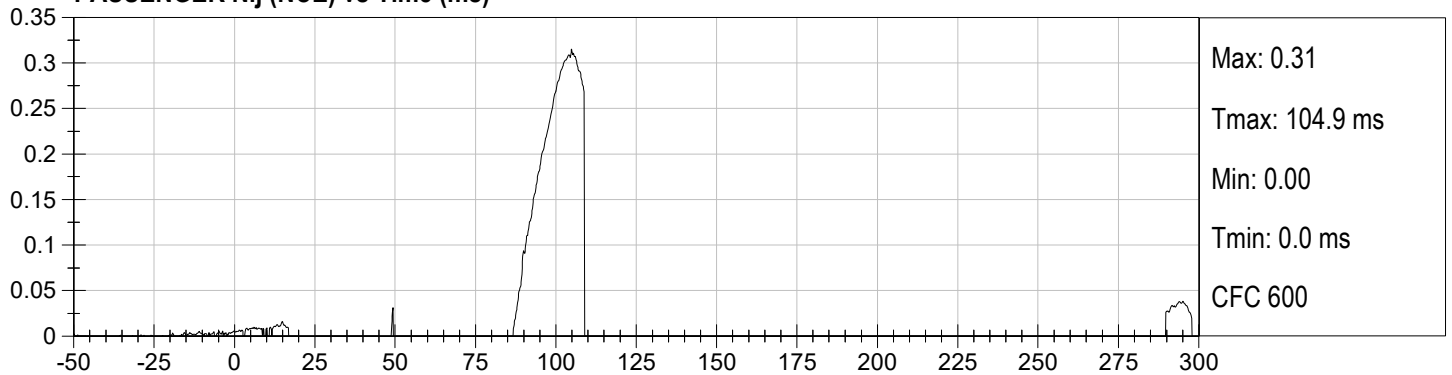
PASSENGER Nij (NTE) vs Time (ms)

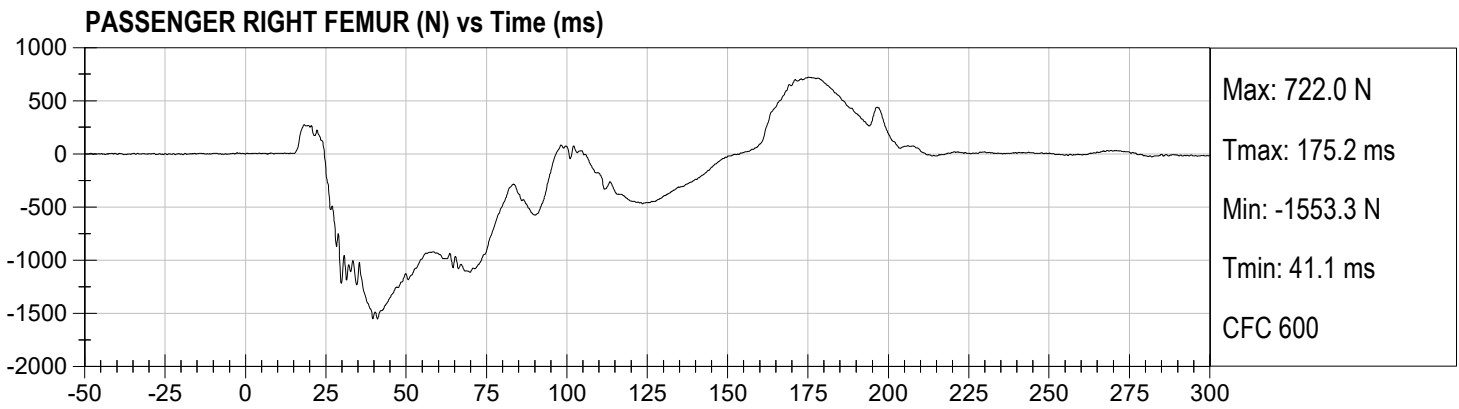
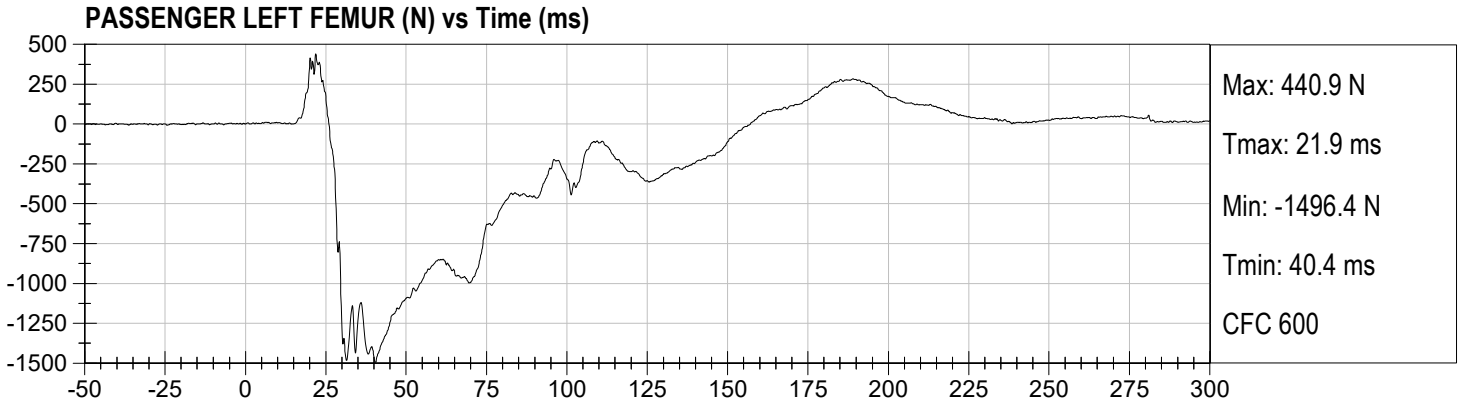


PASSENGER Nij (NCF) vs Time (ms)



PASSENGER Nij (NCE) vs Time (ms)





**APPENDIX C**  
**DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA**

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**HYBRID III 50<sup>TH</sup> 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

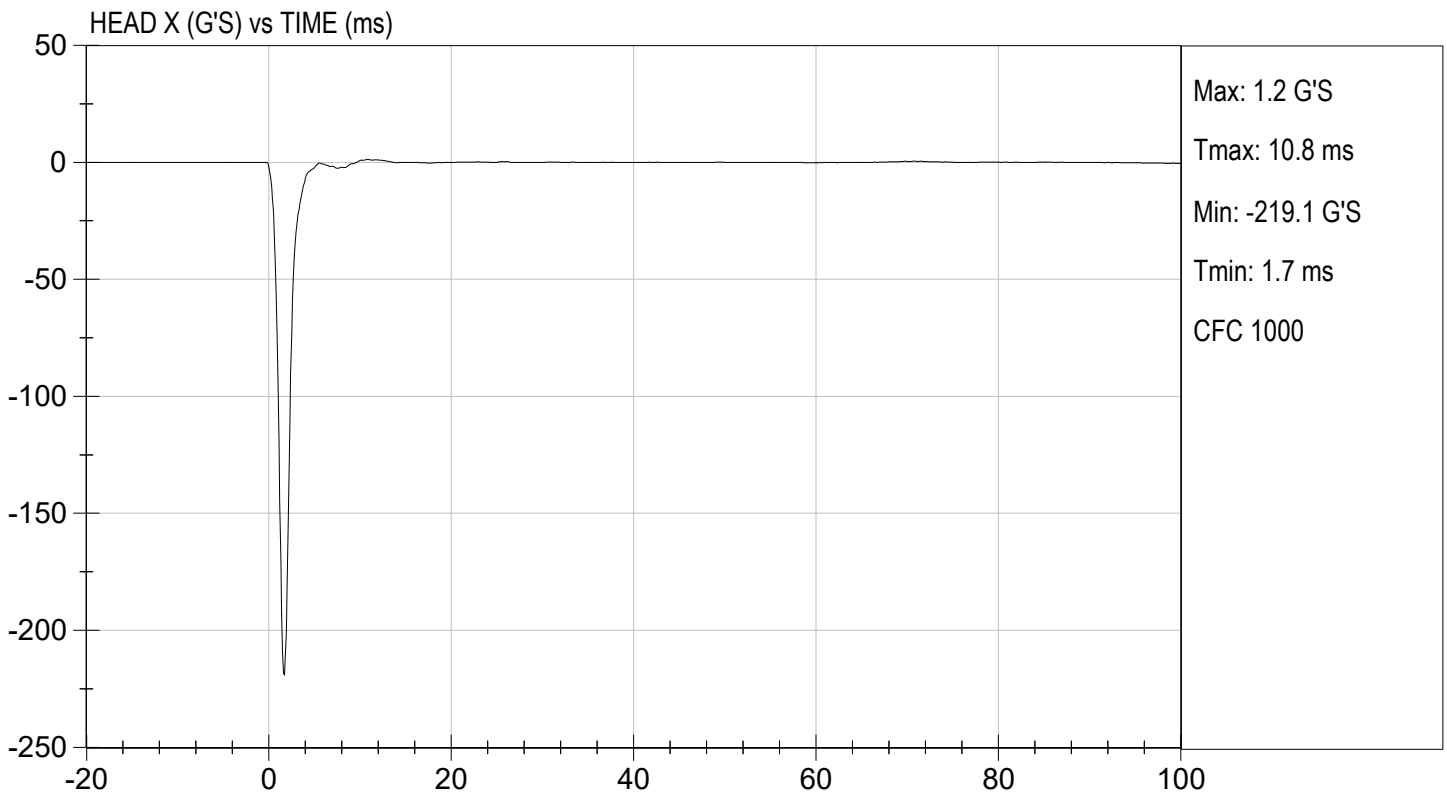
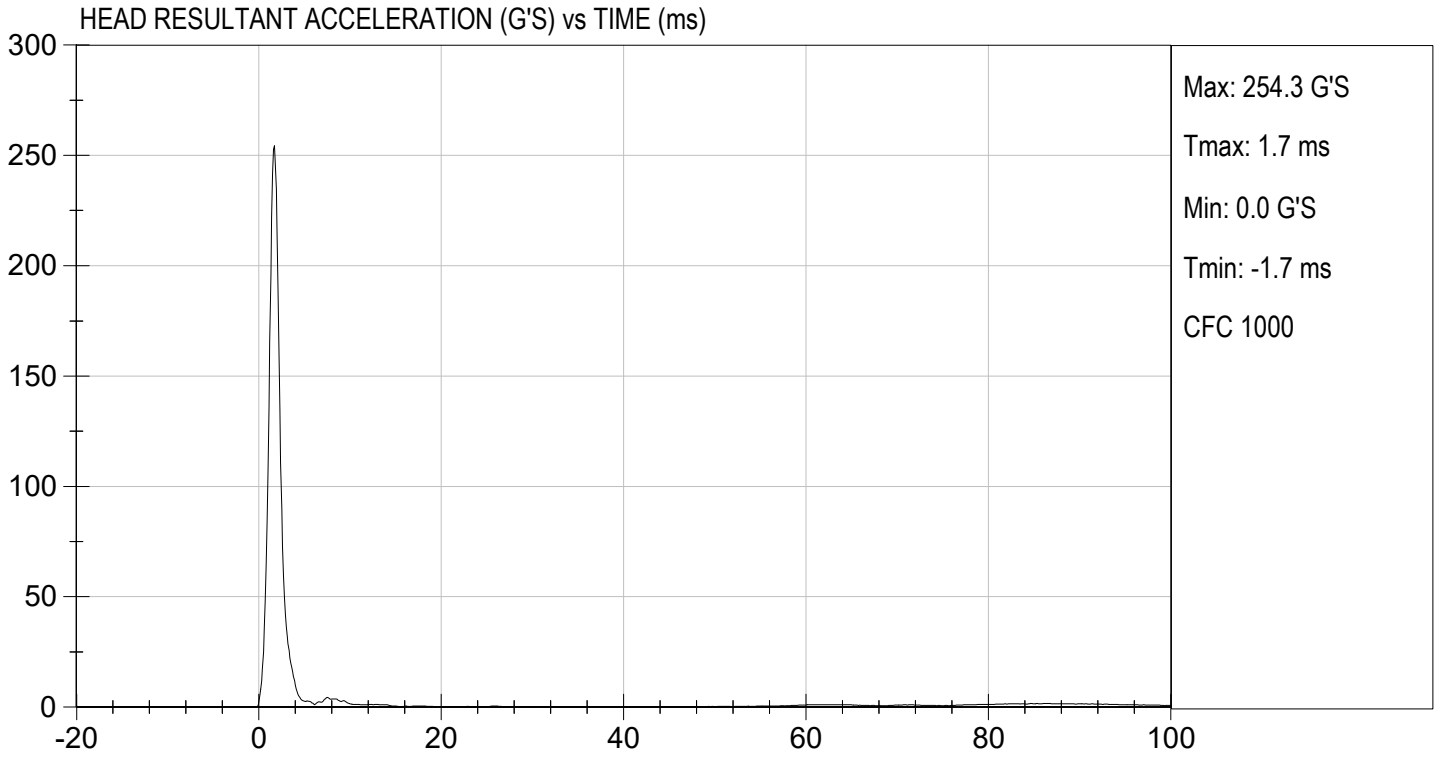
Test ID: D230141

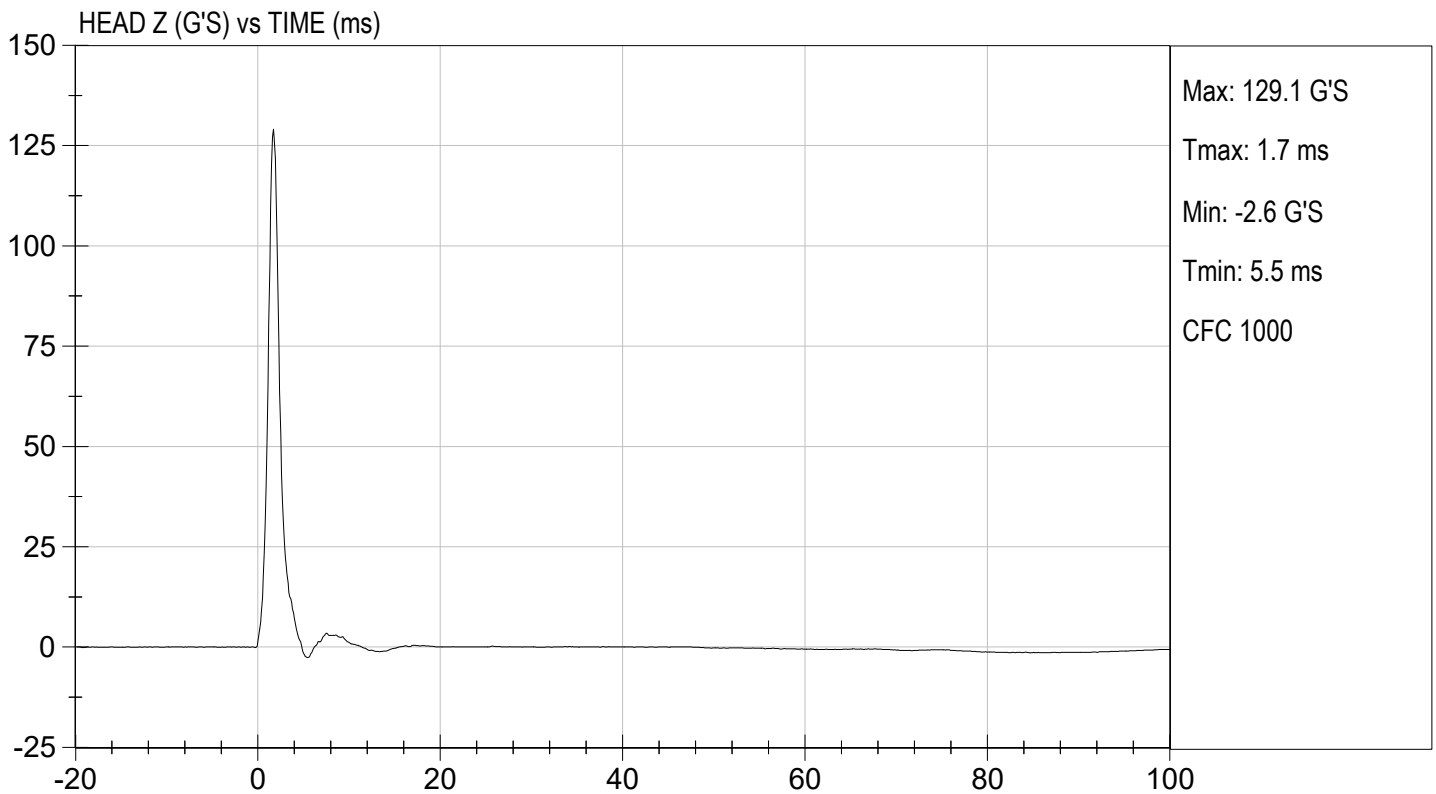
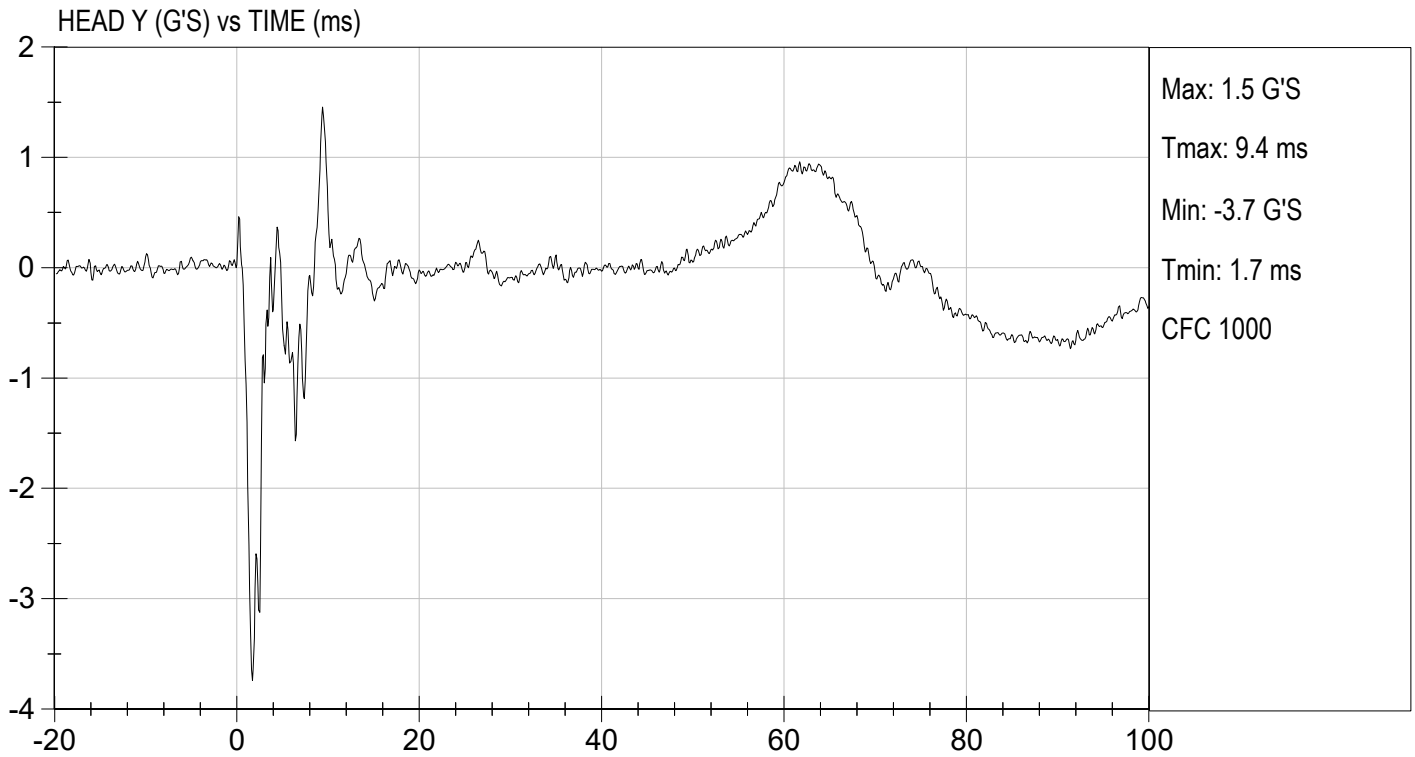
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Peak Resultant Acceleration	G's	225 to 275	254	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Nathaniel Benjamin  
Laboratory Technician

01/19/2023  
Test Date

B. F. K.  
Approved By





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

ATD Serial No: 351

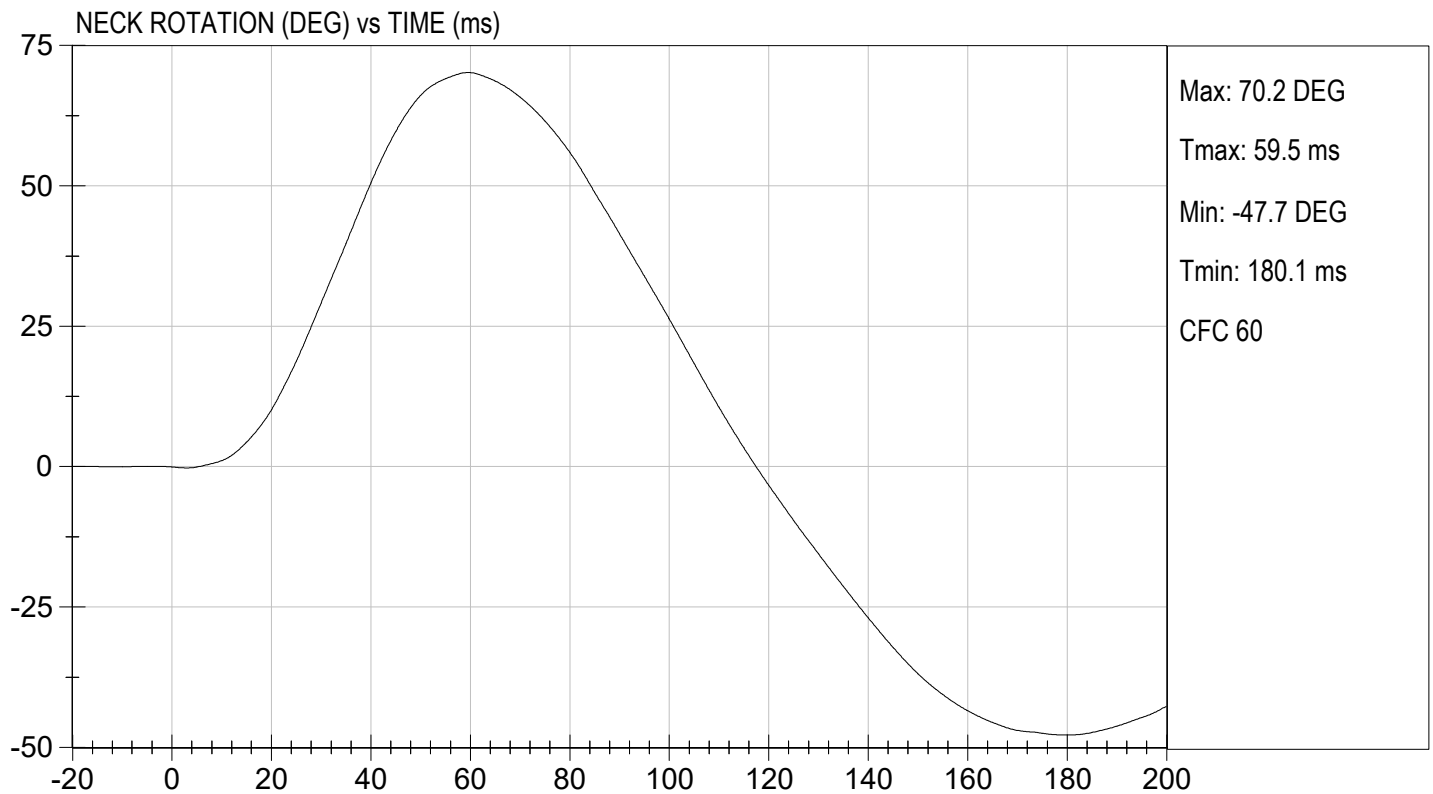
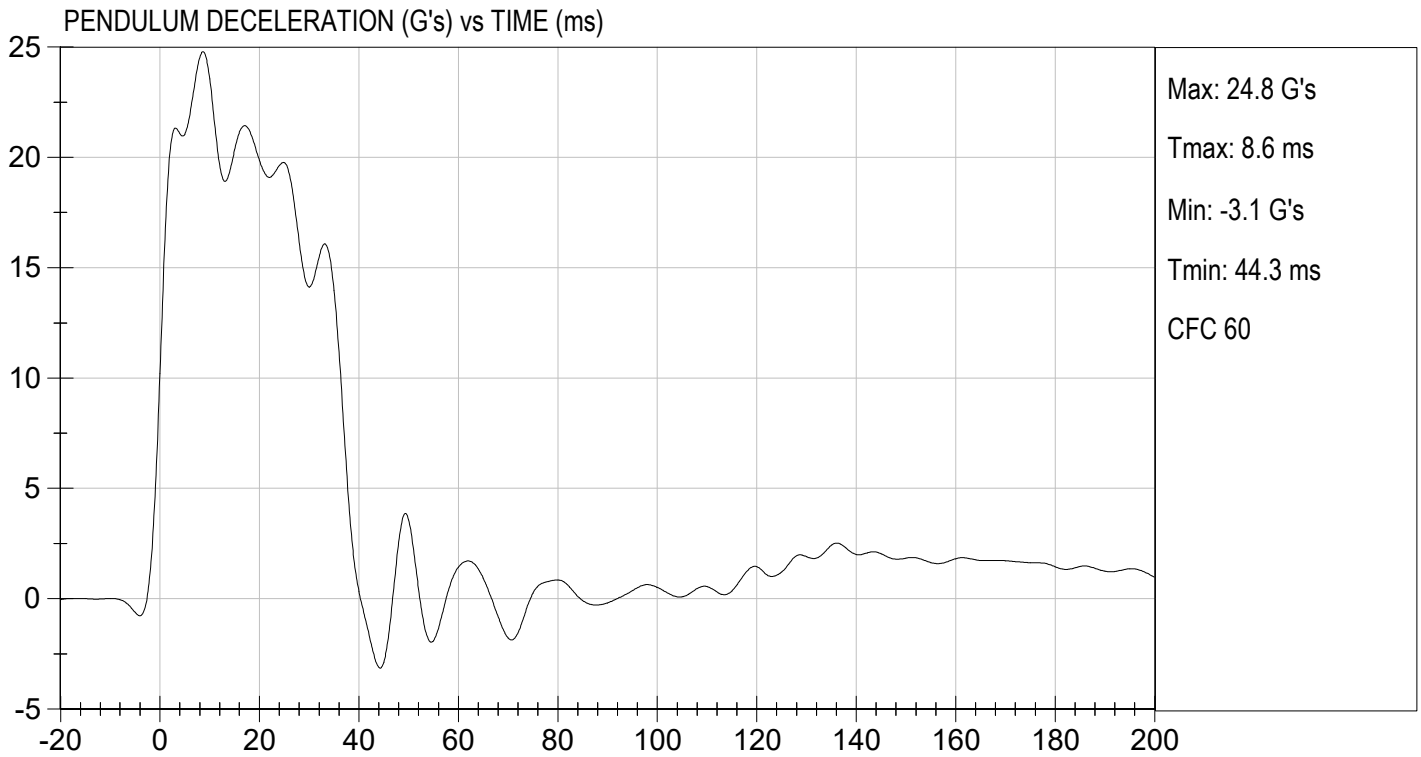
Test I.D.: D230142

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	31	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.57	Pass
	20 ms	G's	17.60 to 22.60	19.86	Pass
	30 ms	G's	12.50 to 18.50	14.12	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	37.8	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.2	Pass
	Time	ms	57.0 to 64.0	59.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	94.3	Pass
	Time	ms	47.0 to 58.0	49.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.5	Pass
Overall Test Results					Pass

Nathaniel Benjamin  
 Laboratory Technician

01/19/2023  
 Test Date

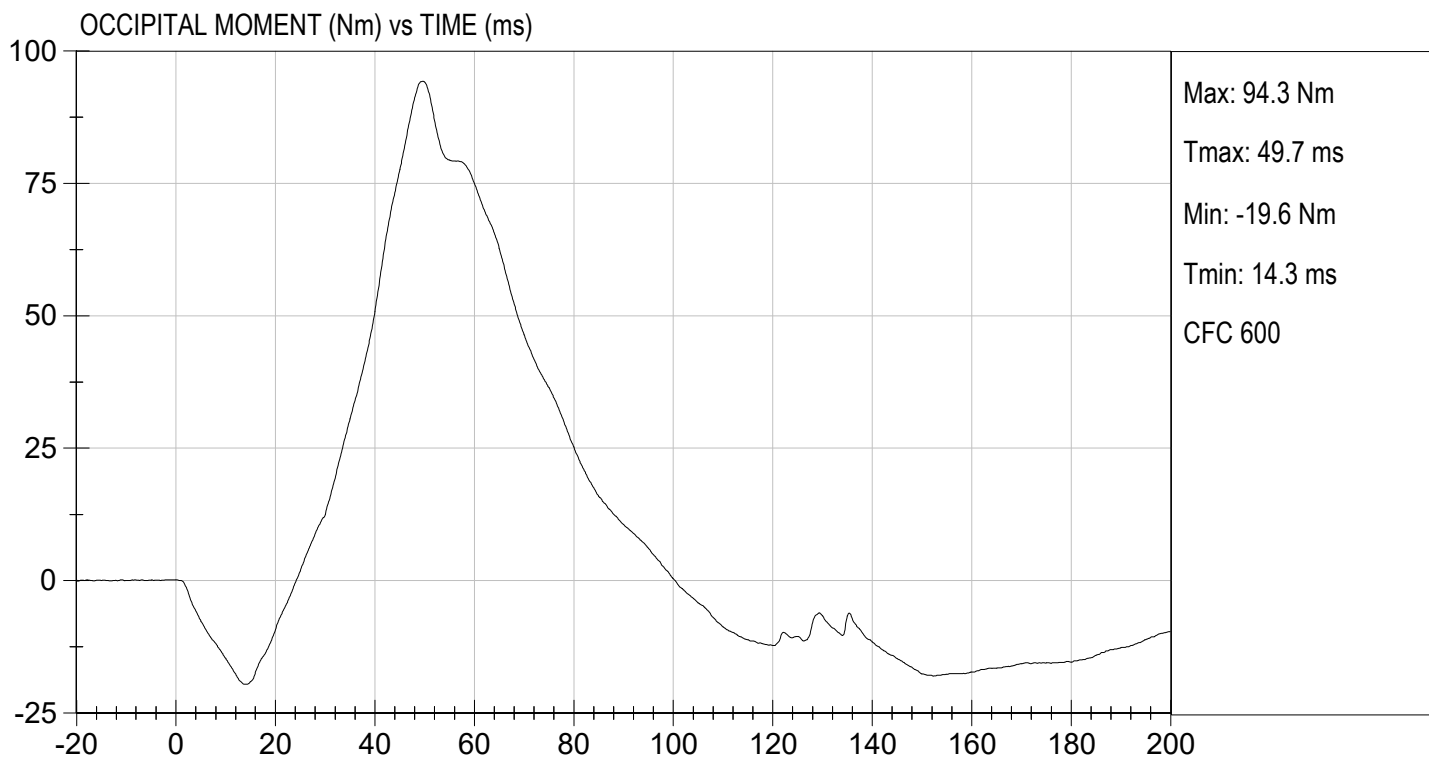
B. F. K.  
 Approved By





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

TEST DATE: 01/19/2023  
TEST #: D230142



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

ATD Serial No: 351

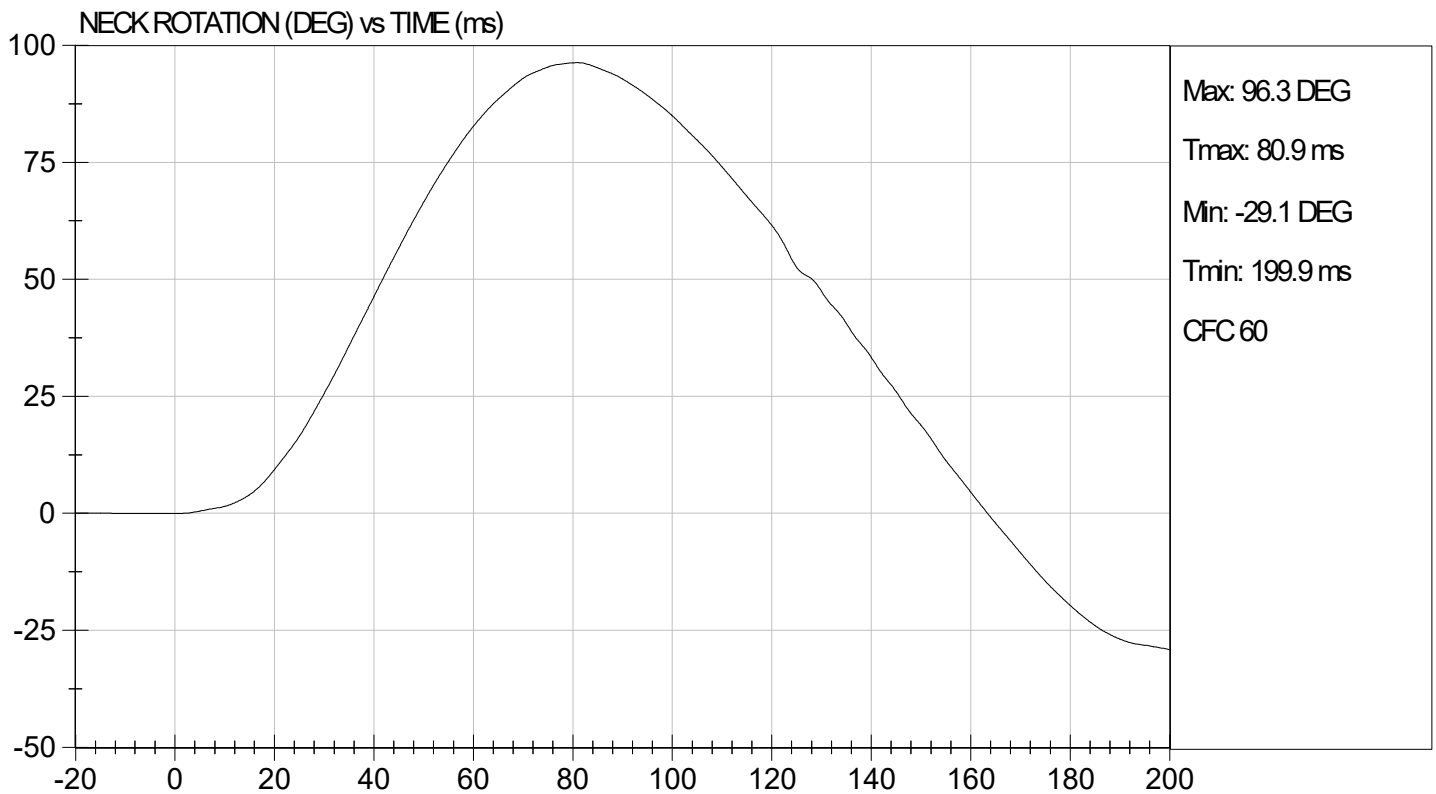
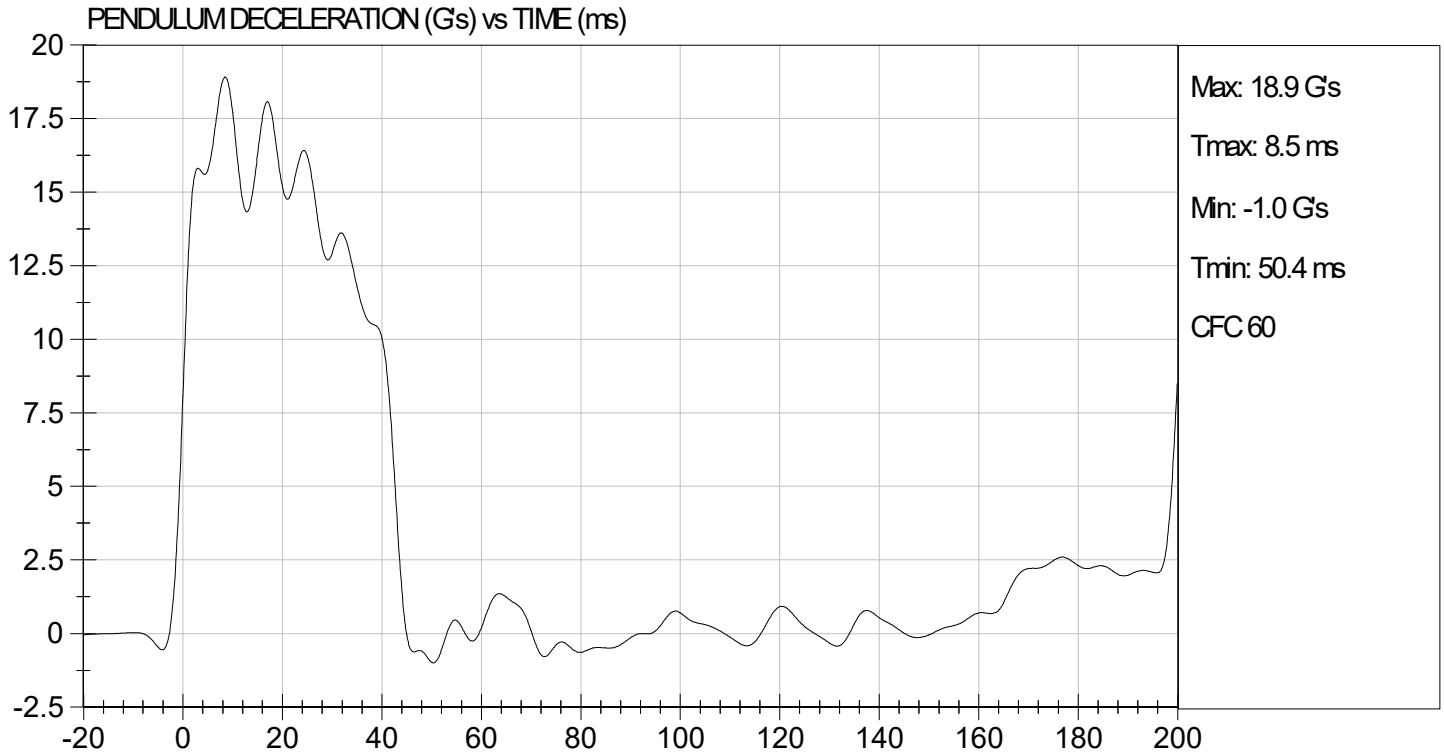
Test I.D.: D230143

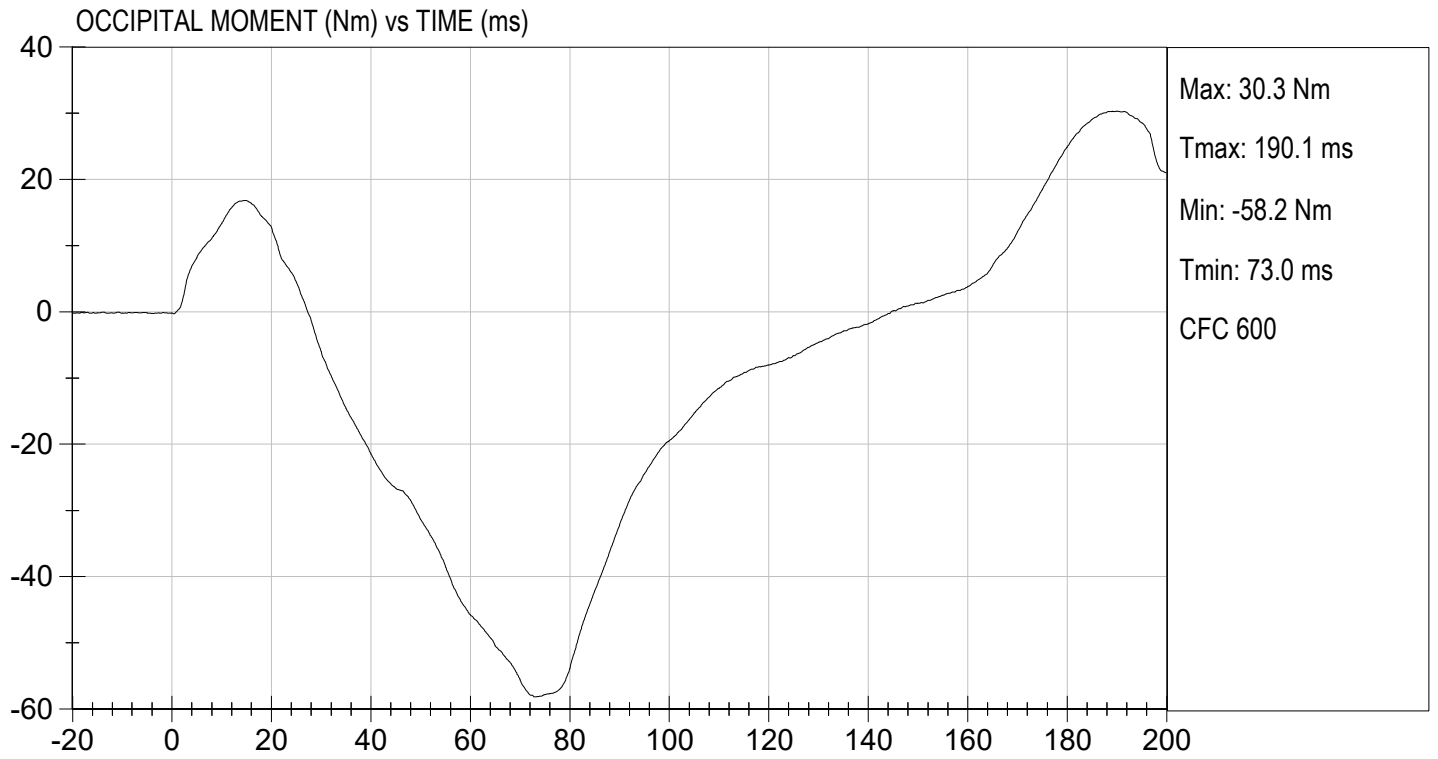
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	31	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.70	Pass
	20 ms	G's	14.00 to 19.00	15.18	Pass
	30 ms	G's	11.00 to 16.00	12.93	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	42.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.3	Pass
	Time	ms	72.0 to 82.0	80.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	163.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-58.2	Pass
	Time	ms	65.0 to 79.0	73.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	144.8	Pass
Overall Test Results					Pass

Nathaniel Benjamin  
 Laboratory Technician

01/19/2023  
 Test Date

BFL  
 Approved By





**MGA RESEARCH CORPORATION**  
**THORAX IMPACT**  
**HYBRID III 50TH PERCENTILE MALE**

**ATD Serial No:** 351

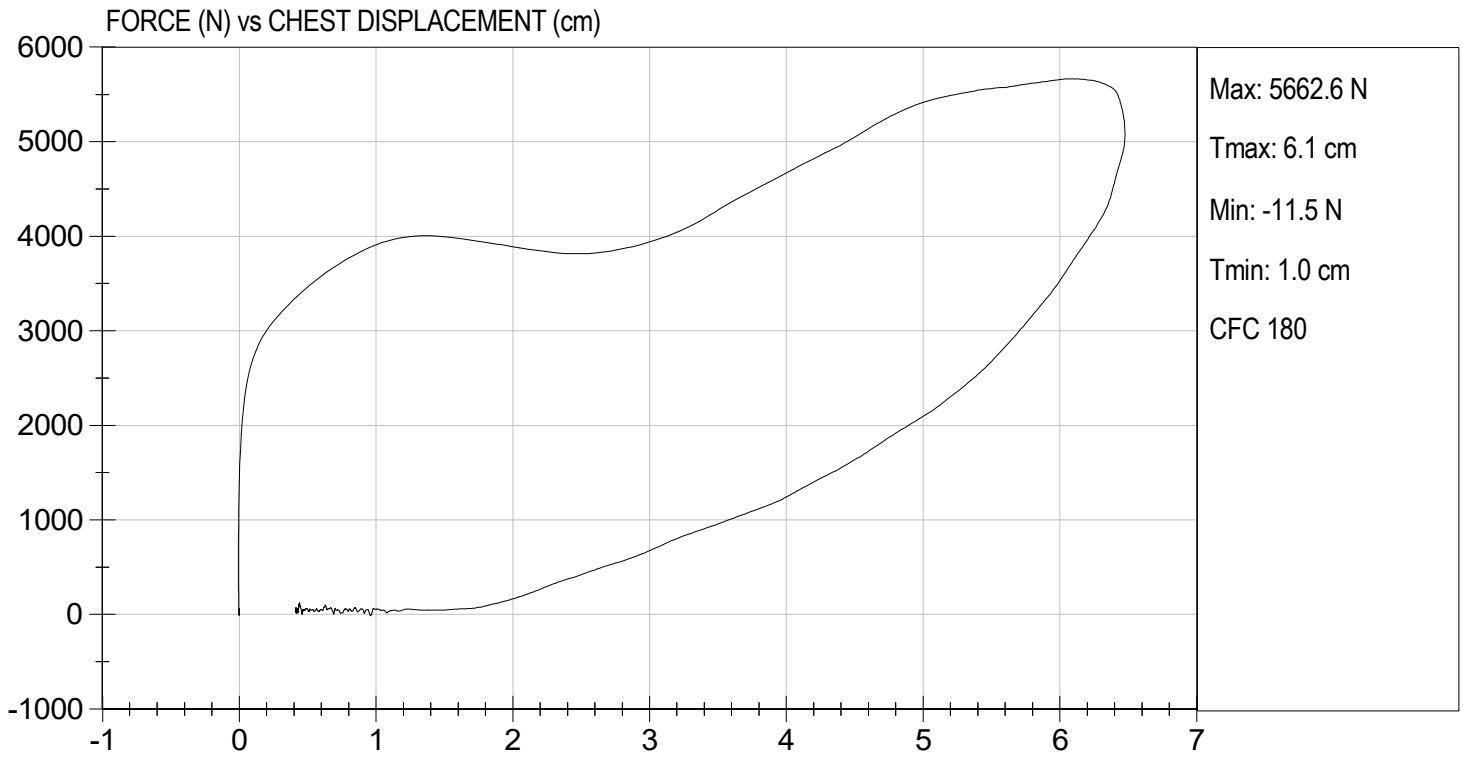
**Test I.D.:** D230144

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	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5,663	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.48	Pass
Internal Hysteresis	%	69 to 85	73	Pass
<b>Overall Test Results</b>				<b>Pass</b>

*Nathaniel Benjamin*  
 Laboratory Technician

01/19/2023  
 Test Date

*B.F.*  
 Approved By



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

ATD Serial No: 351

Test I.D: D230145

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	34	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	4,893	Pass
Overall Test Results				Pass

*Nathaniel Benjamin*  
 Laboratory Technician

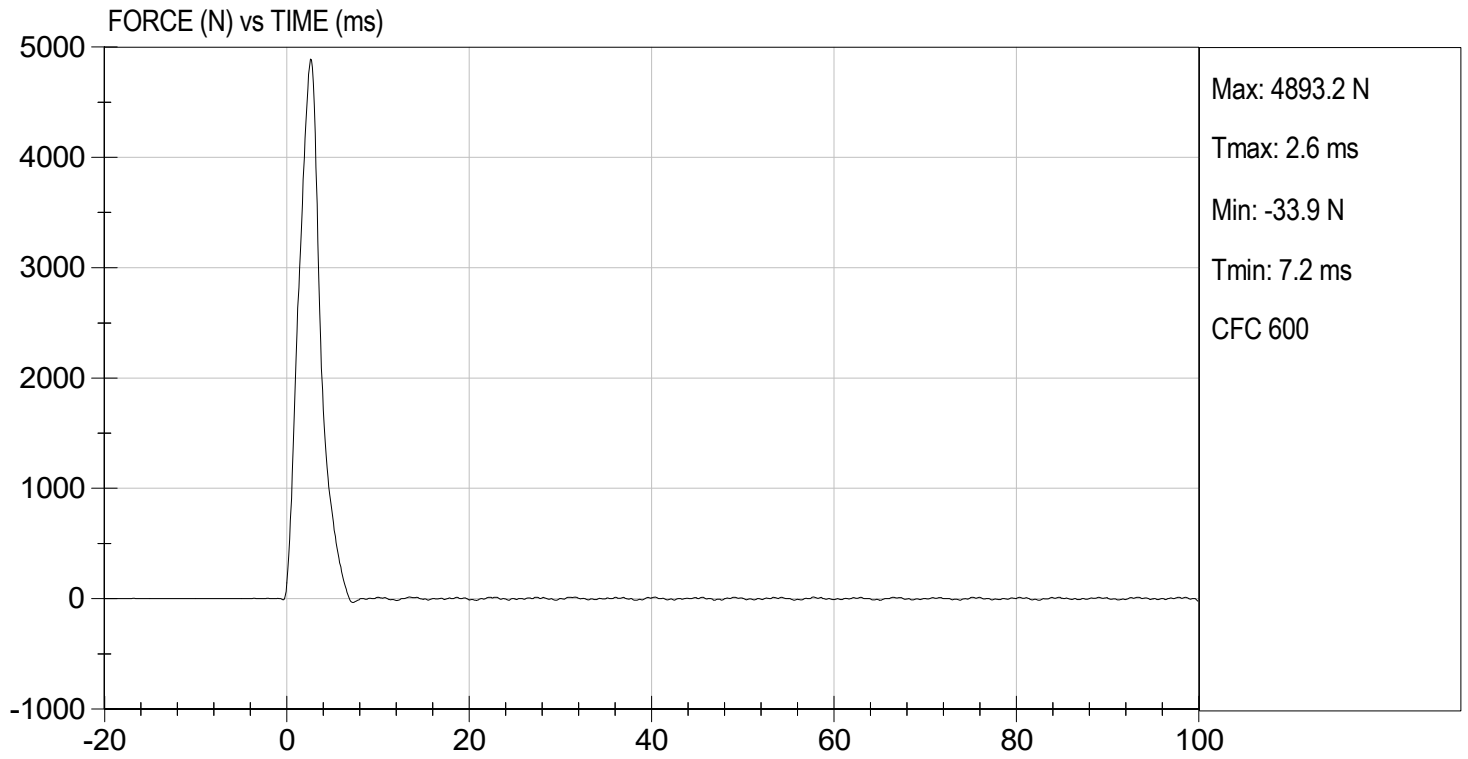
01/19/2023  
 Test Date

*BFL*  
 Approved By



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

TEST DATE: 01/19/2023  
TEST #: D230145



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

ATD Serial No: 351

Test I.D: D230146

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	34	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	N	4715 to 5782	5,450	Pass
Overall Test Results				Pass

*Nathaniel Benjamin*  
 Laboratory Technician

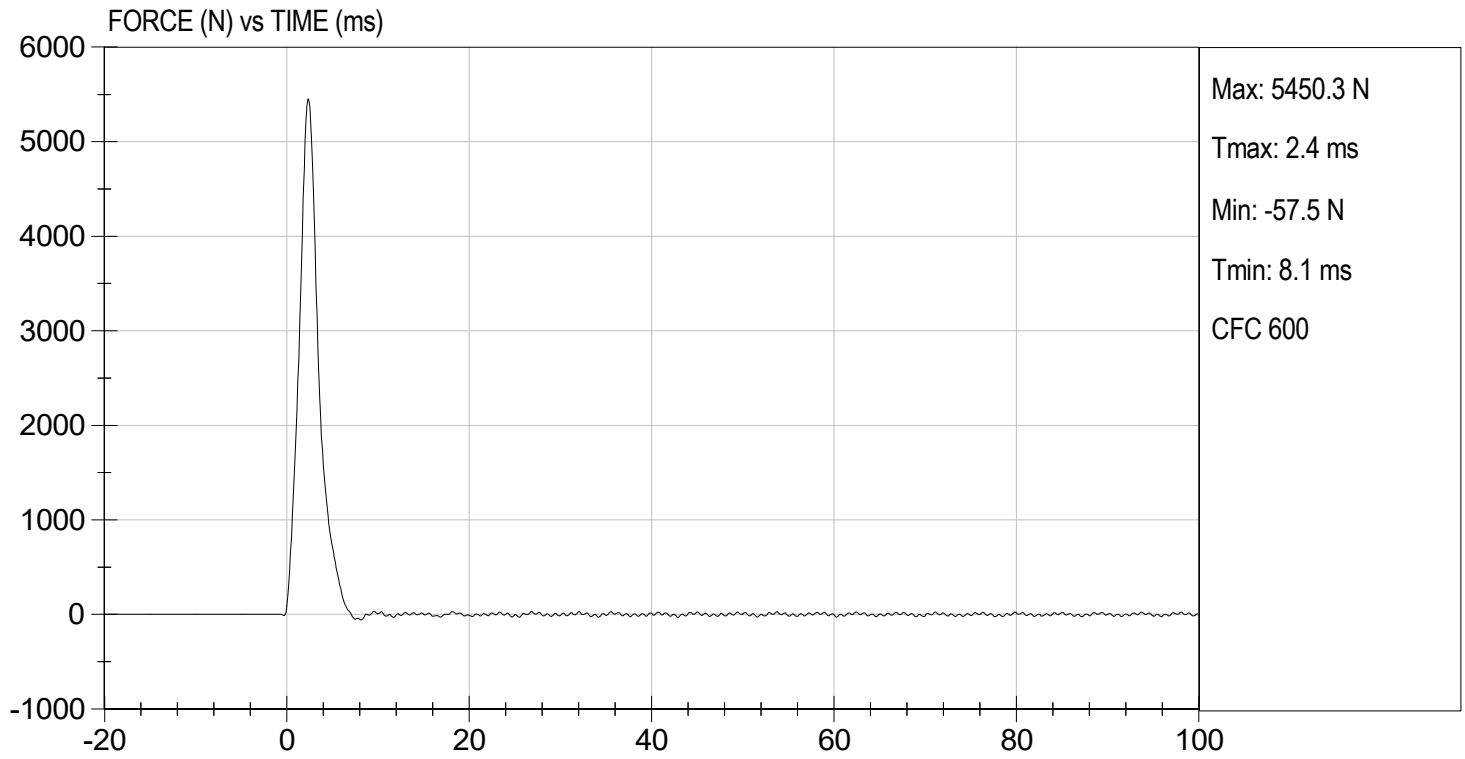
01/19/2023  
 Test Date

*B.F.K.*  
 Approved By



TEST DESC: LEFT KNEE  
VELOCITY: 6.80 ft/s, 2.07 m/s

TEST DATE: 01/19/2023  
TEST #: D230146



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

**ATD Serial No:** 351

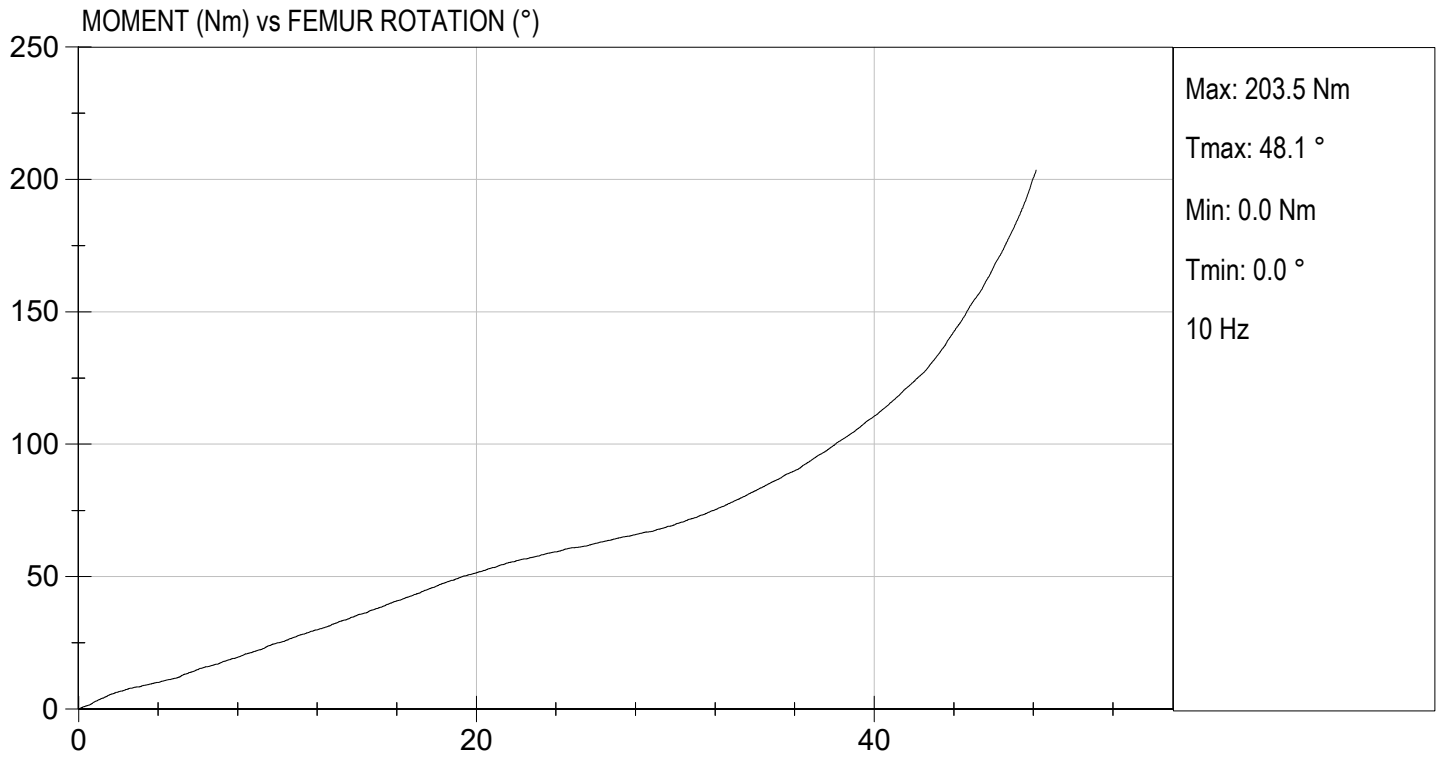
**Test I.D.:** D230140

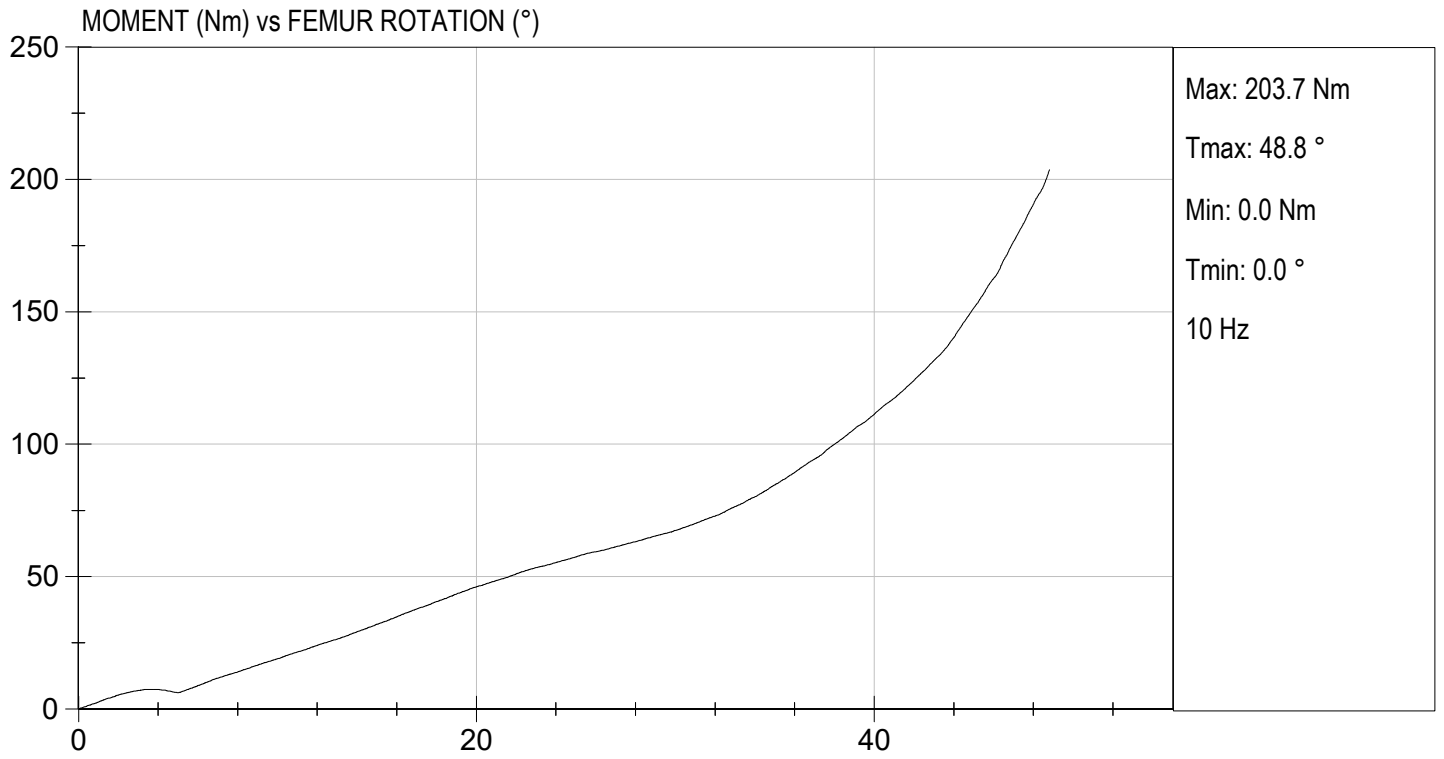
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	31	31	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.5	Pass
30 Degrees	Nm	94.9 Nm Max	69.7	67.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	48.1	48.8	Pass
Overall Test Results					Pass

  
 Laboratory Technician

01/19/2023  
 Test Date

  
 Approved By





**CALIBRATION TEST RESULTS**

**POST-TEST**

**HYBRID III 50<sup>TH</sup> PERCENTILE MALE - DRIVER ATD**

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

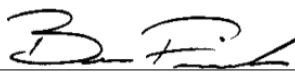
ATD Serial No: 351

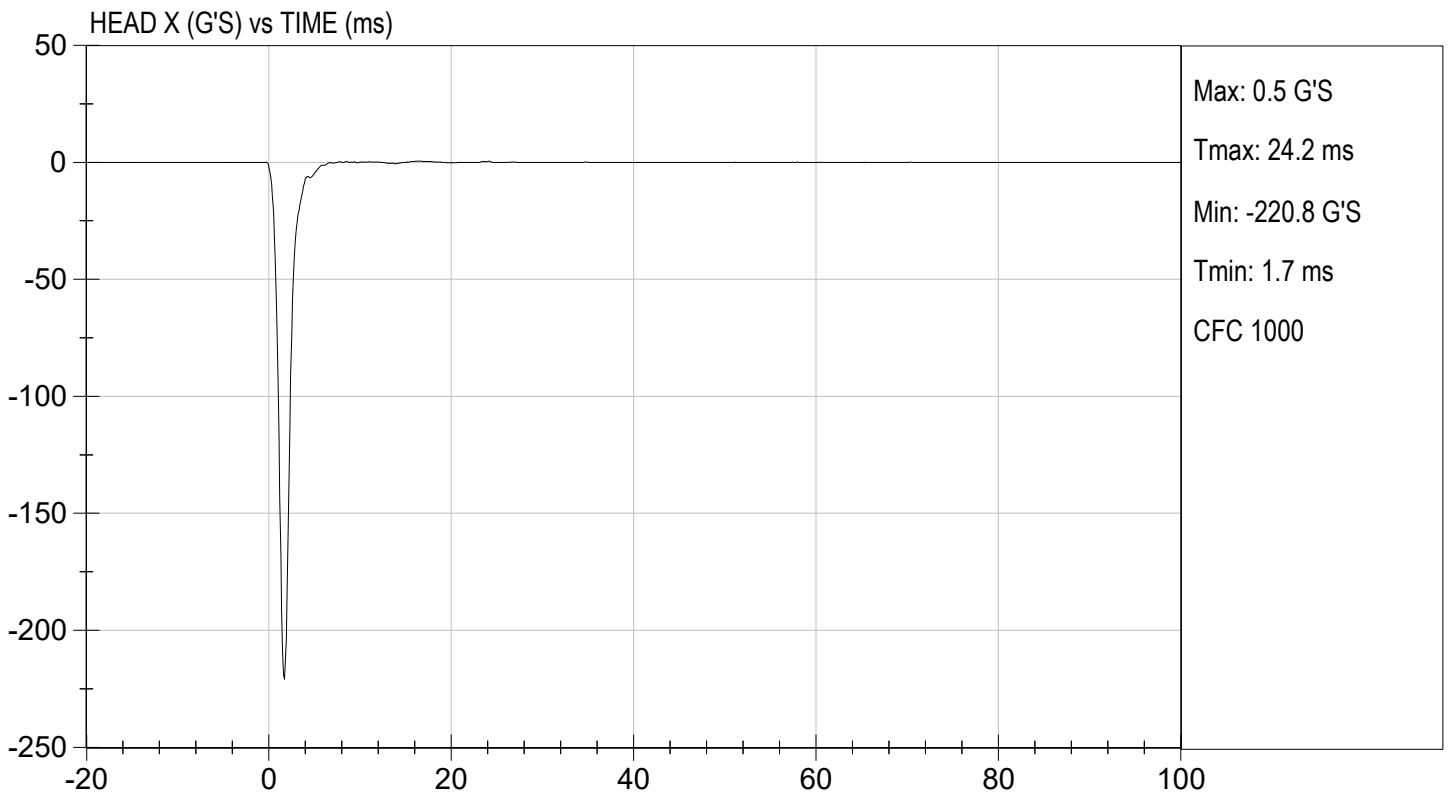
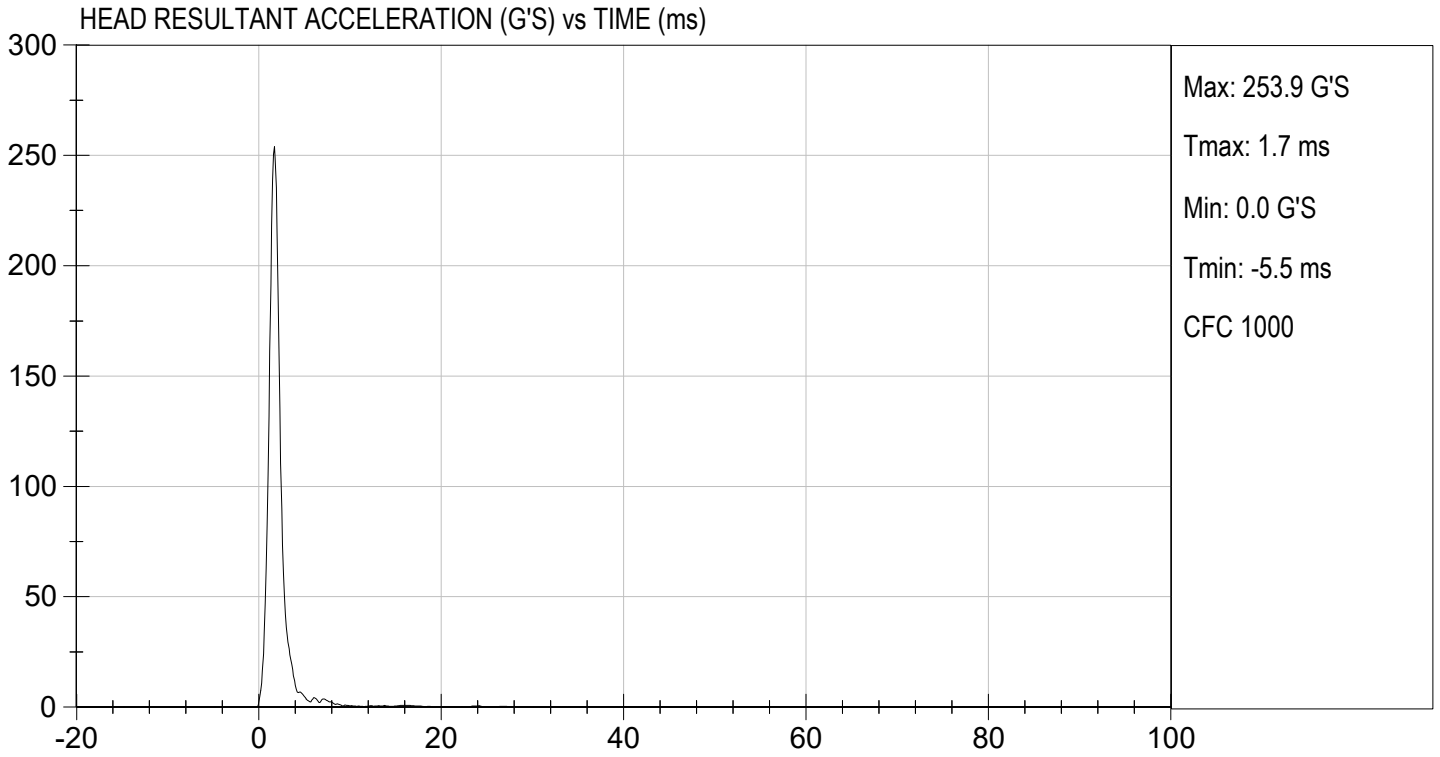
Test ID: D230241

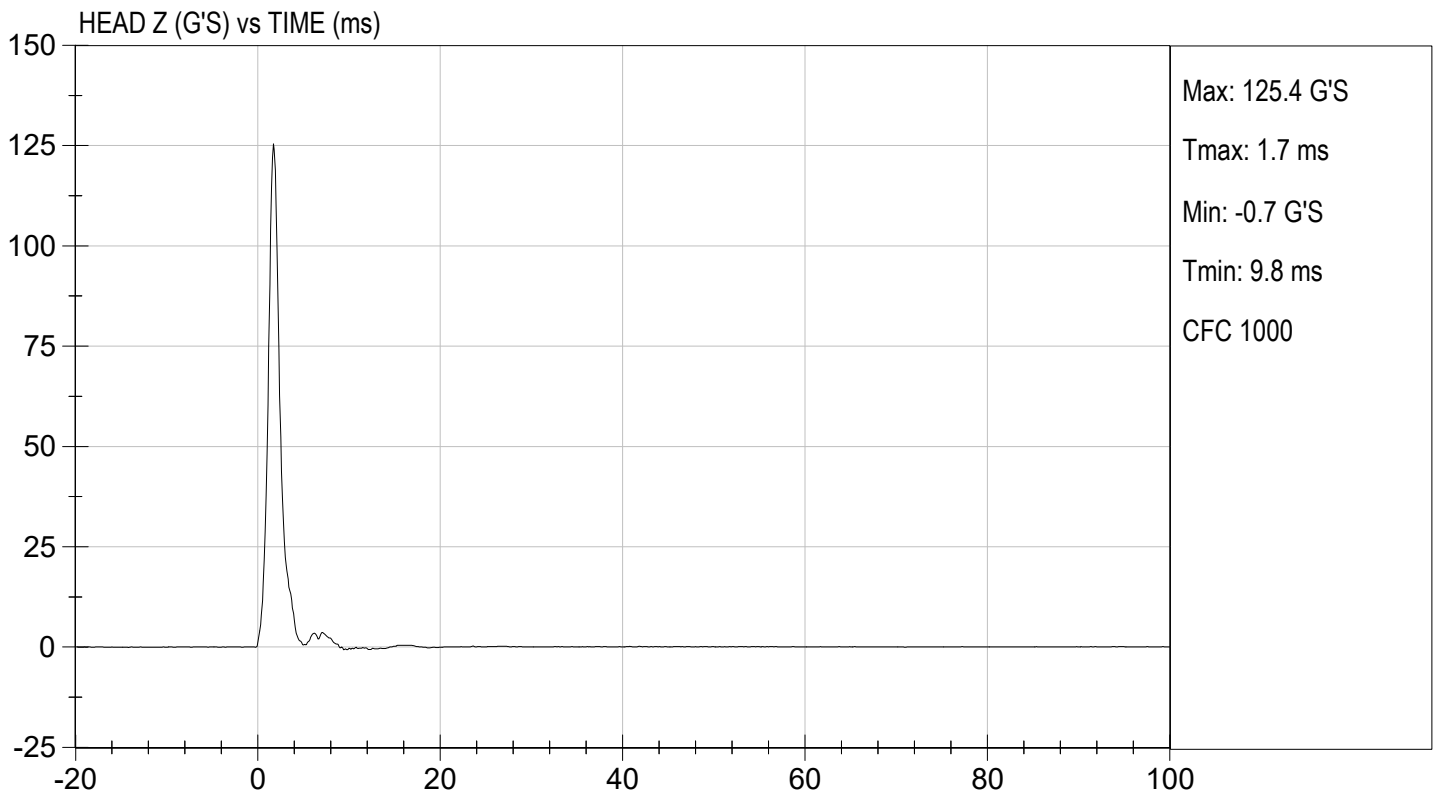
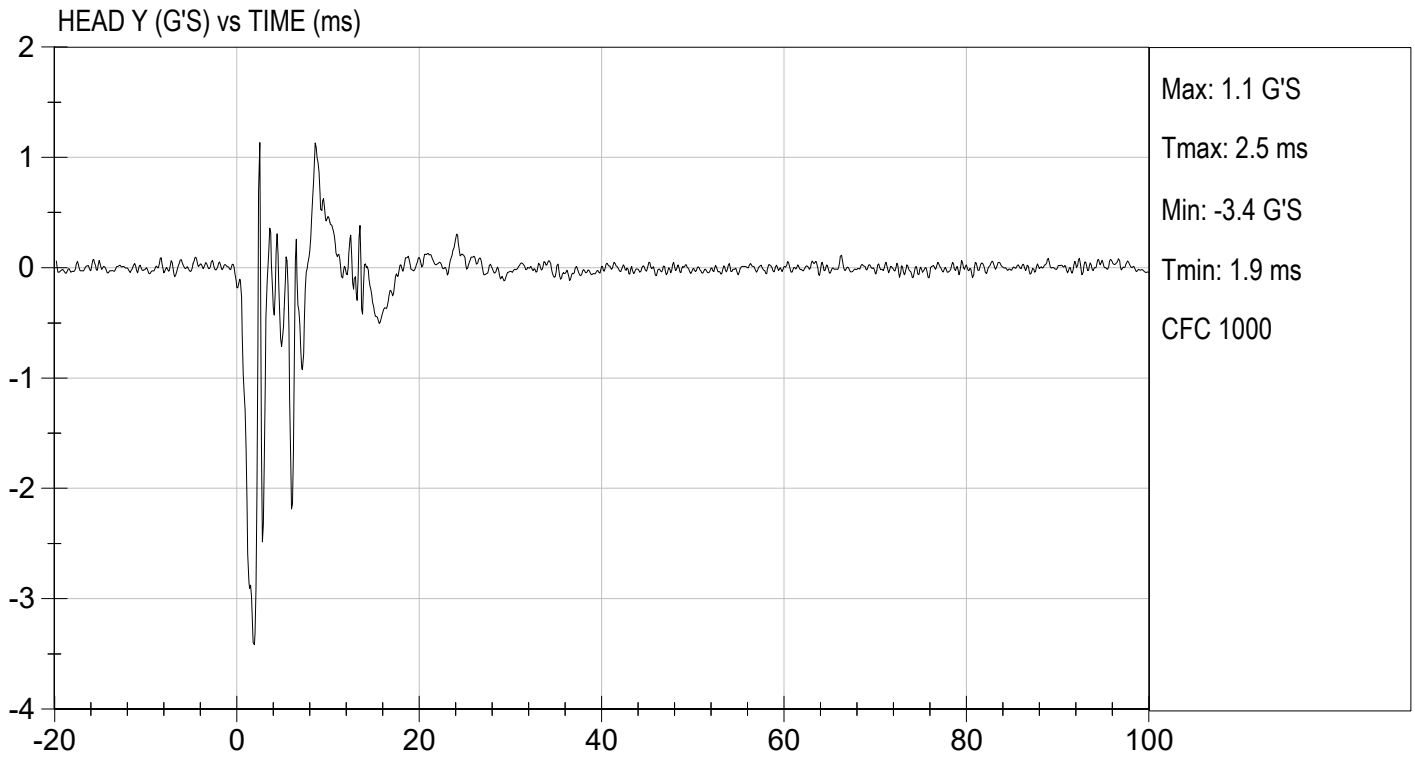
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Peak Resultant Acceleration	G's	225 to 275	254	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

01/25/2023  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By





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

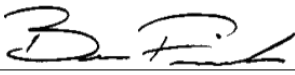
ATD Serial No: 351

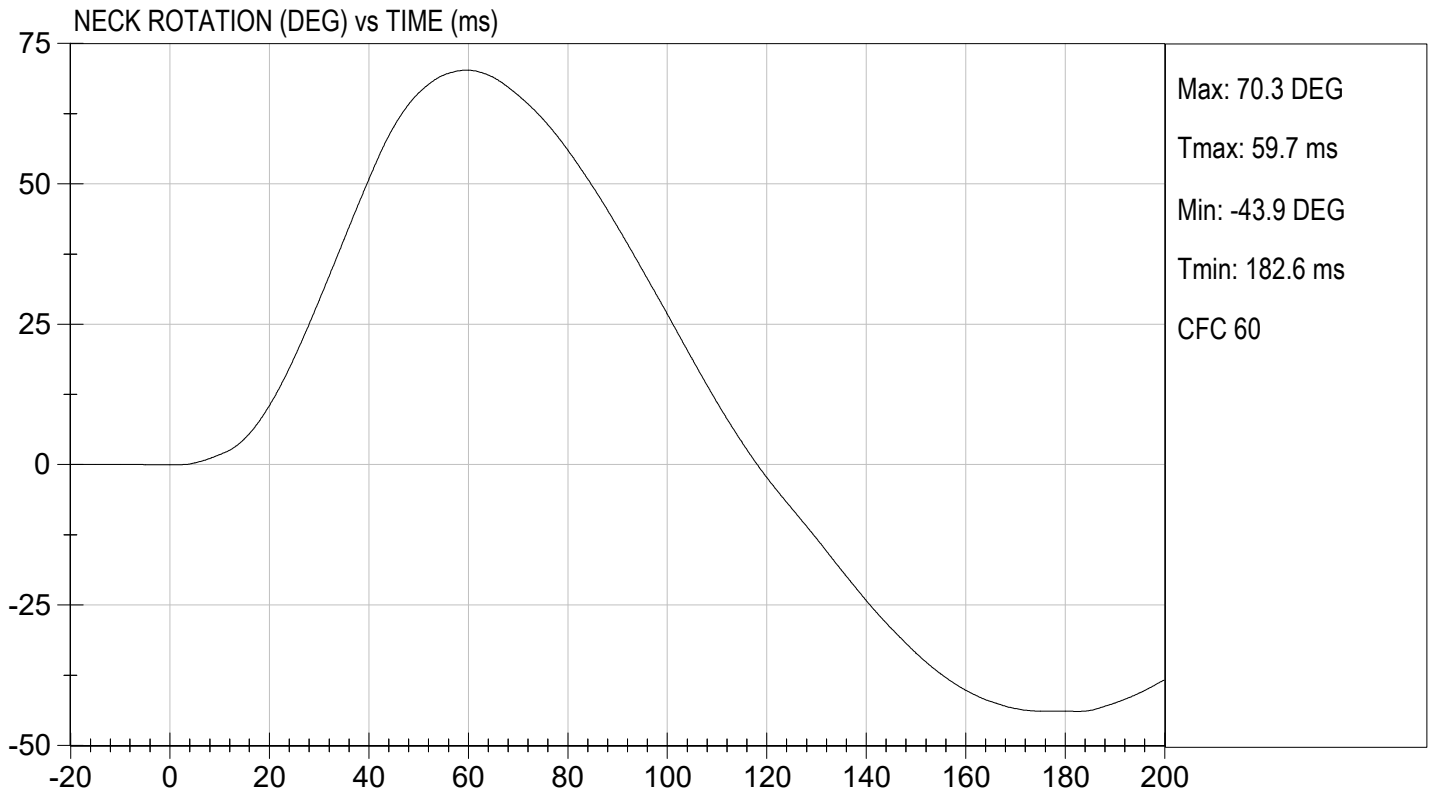
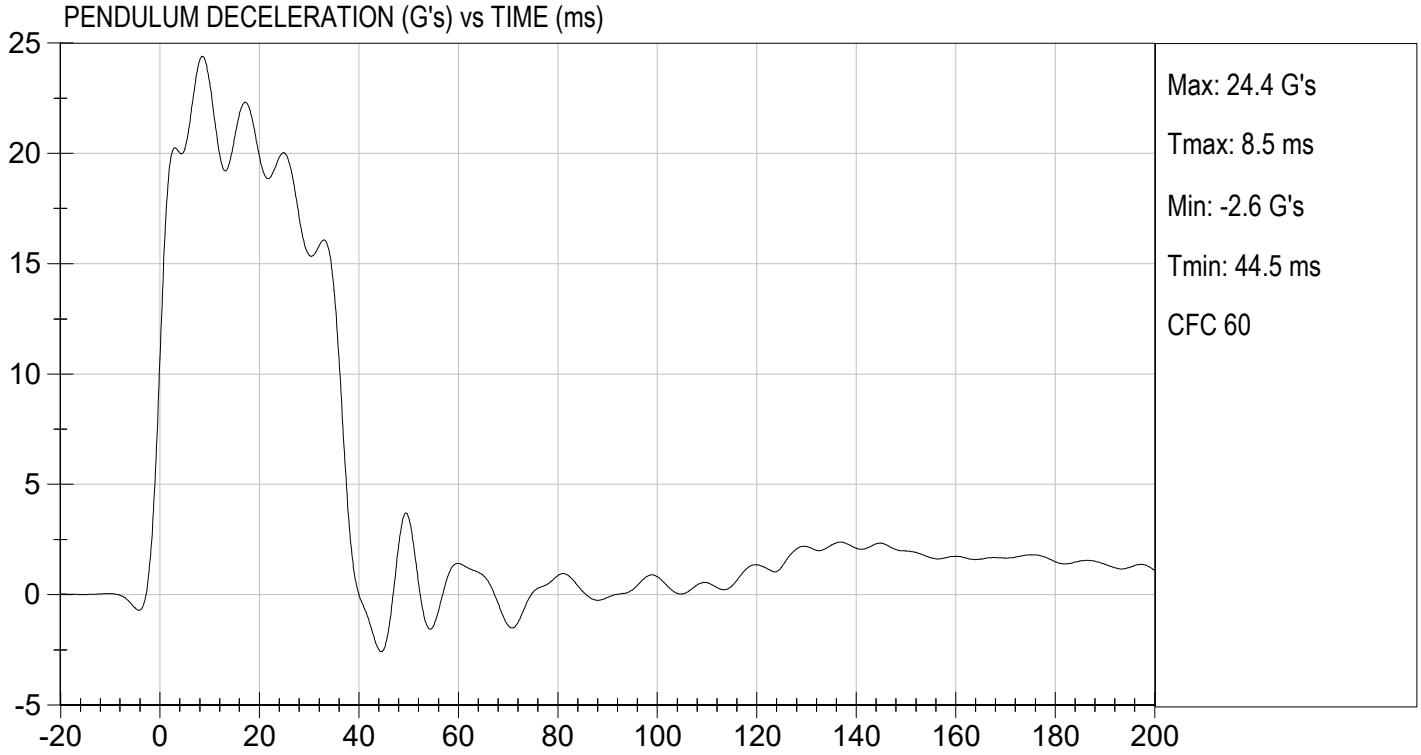
Test I.D.: D230242

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.18	Pass
	20 ms	G's	17.60 to 22.60	19.86	Pass
	30 ms	G's	12.50 to 18.50	15.39	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	37.6	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.3	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	118.2	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	94.3	Pass
	Time	ms	47.0 to 58.0	49.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.6	Pass
Overall Test Results					Pass

  
 \_\_\_\_\_  
 Laboratory Technician

01/26/2023  
 \_\_\_\_\_  
 Test Date

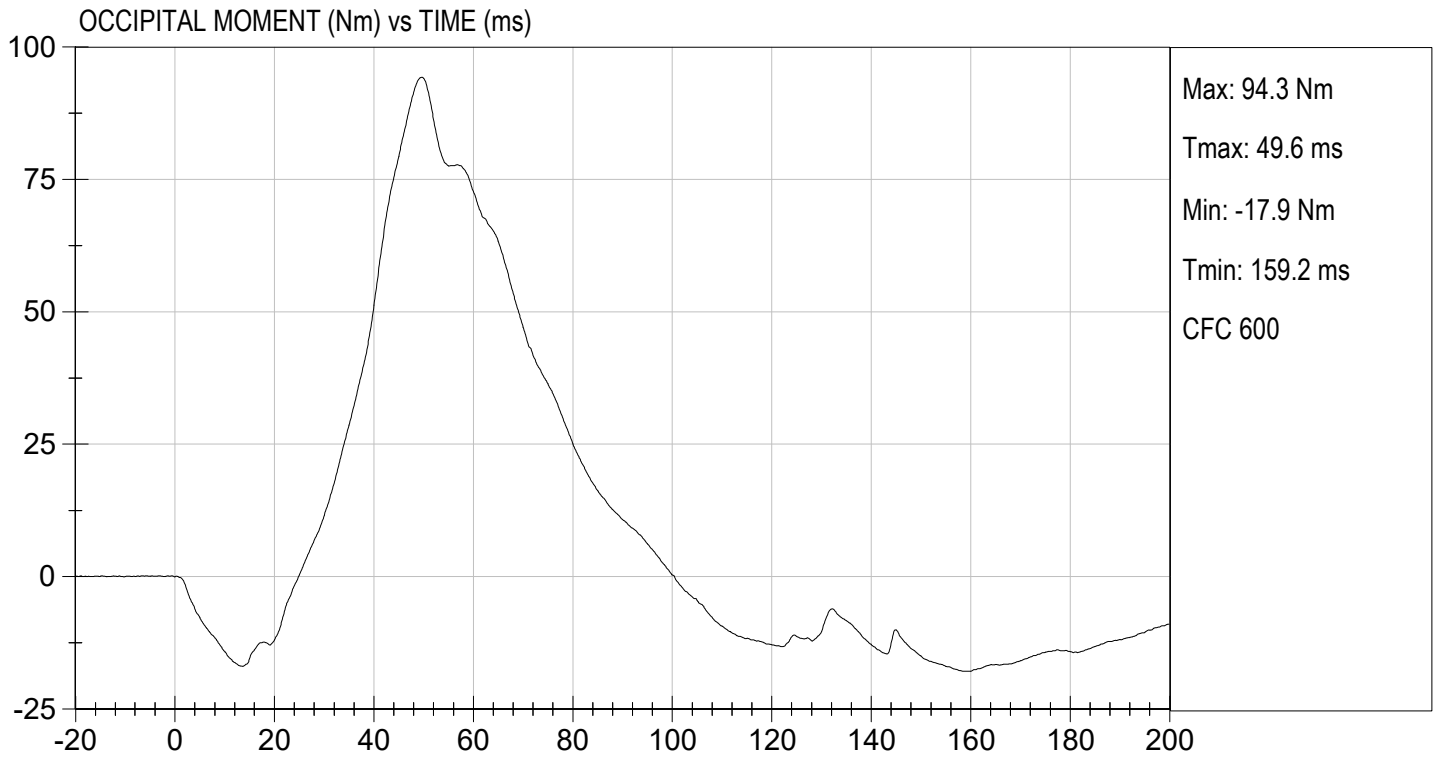
  
 \_\_\_\_\_  
 Approved By





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

TEST DATE: 01/26/2023  
TEST #: D230242



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

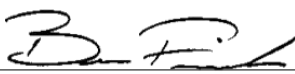
ATD Serial No: 351

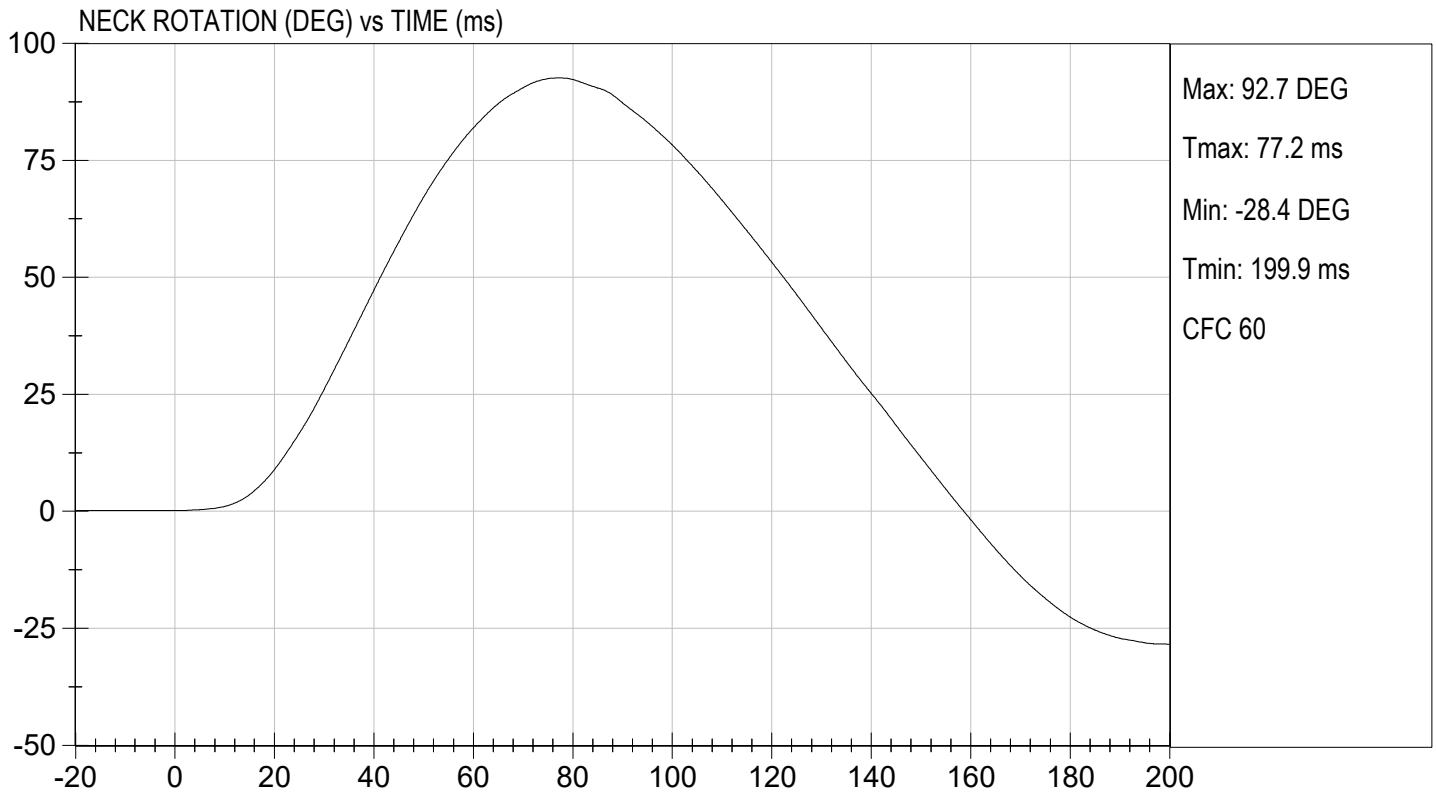
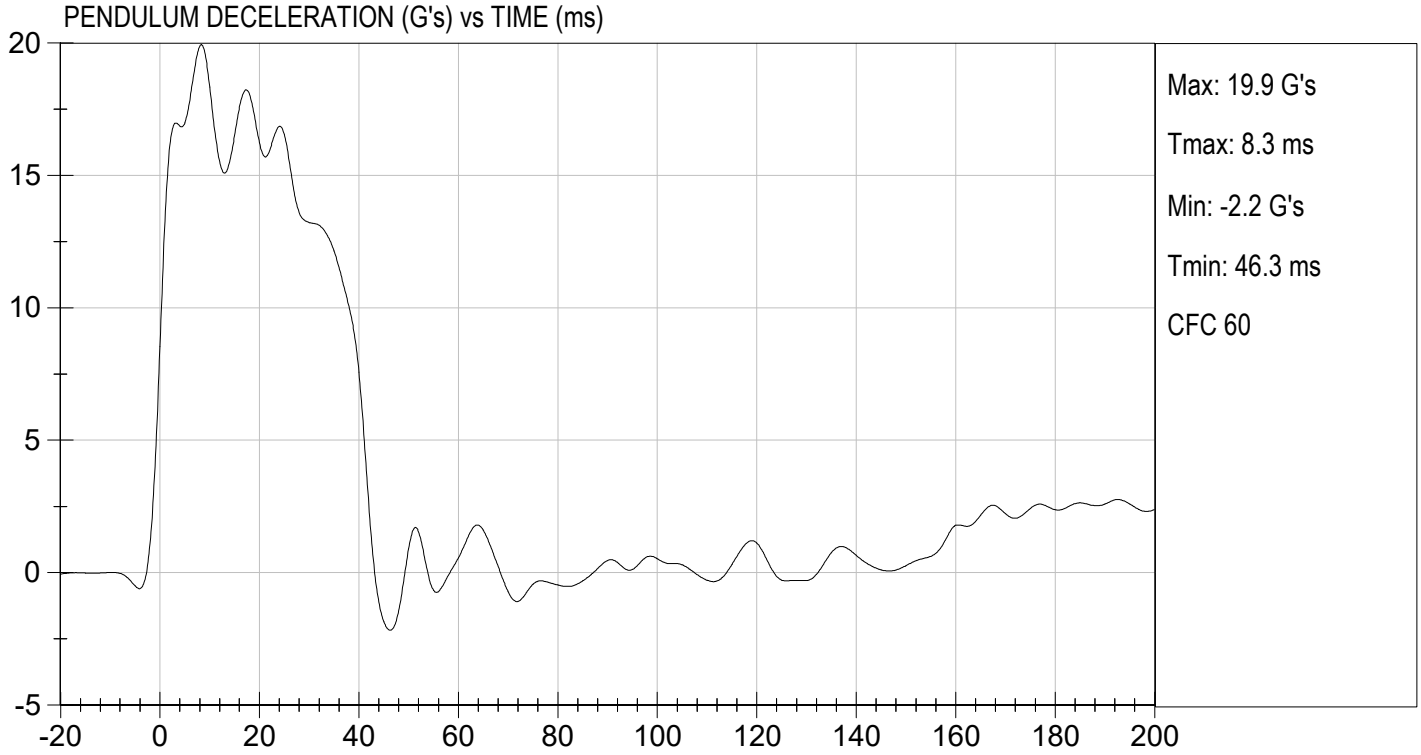
Test I.D.: D230243

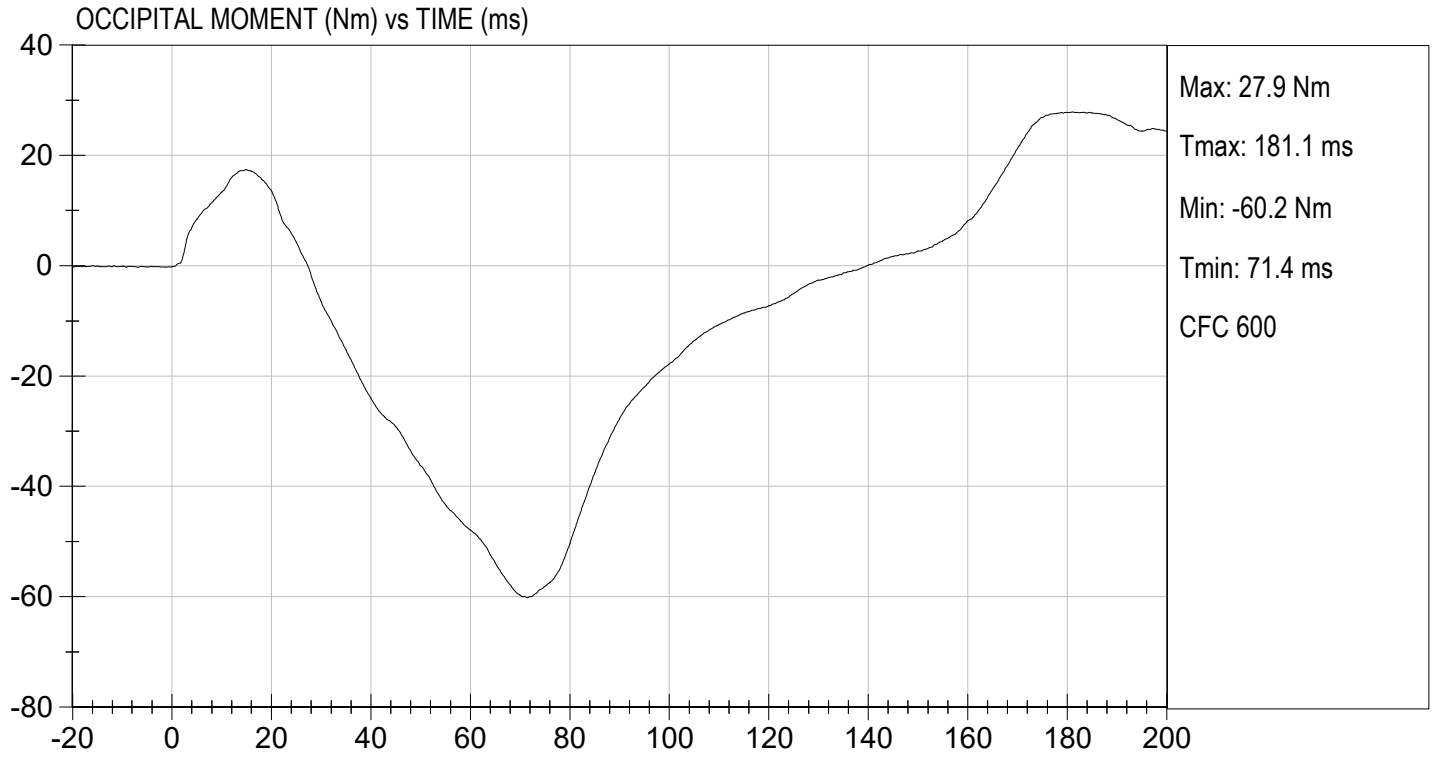
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.34	Pass
	20 ms	G's	14.00 to 19.00	16.24	Pass
	30 ms	G's	11.00 to 16.00	13.22	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.7	Pass
	Time	ms	72.0 to 82.0	77.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.8	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.2	Pass
	Time	ms	65.0 to 79.0	71.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	139.9	Pass
Overall Test Results					Pass

  
 Laboratory Technician

01/26/2023  
 Test Date

  
 Approved By





**MGA RESEARCH CORPORATION**  
**THORAX IMPACT**  
**HYBRID III 50TH PERCENTILE MALE**

**ATD Serial No:** 351

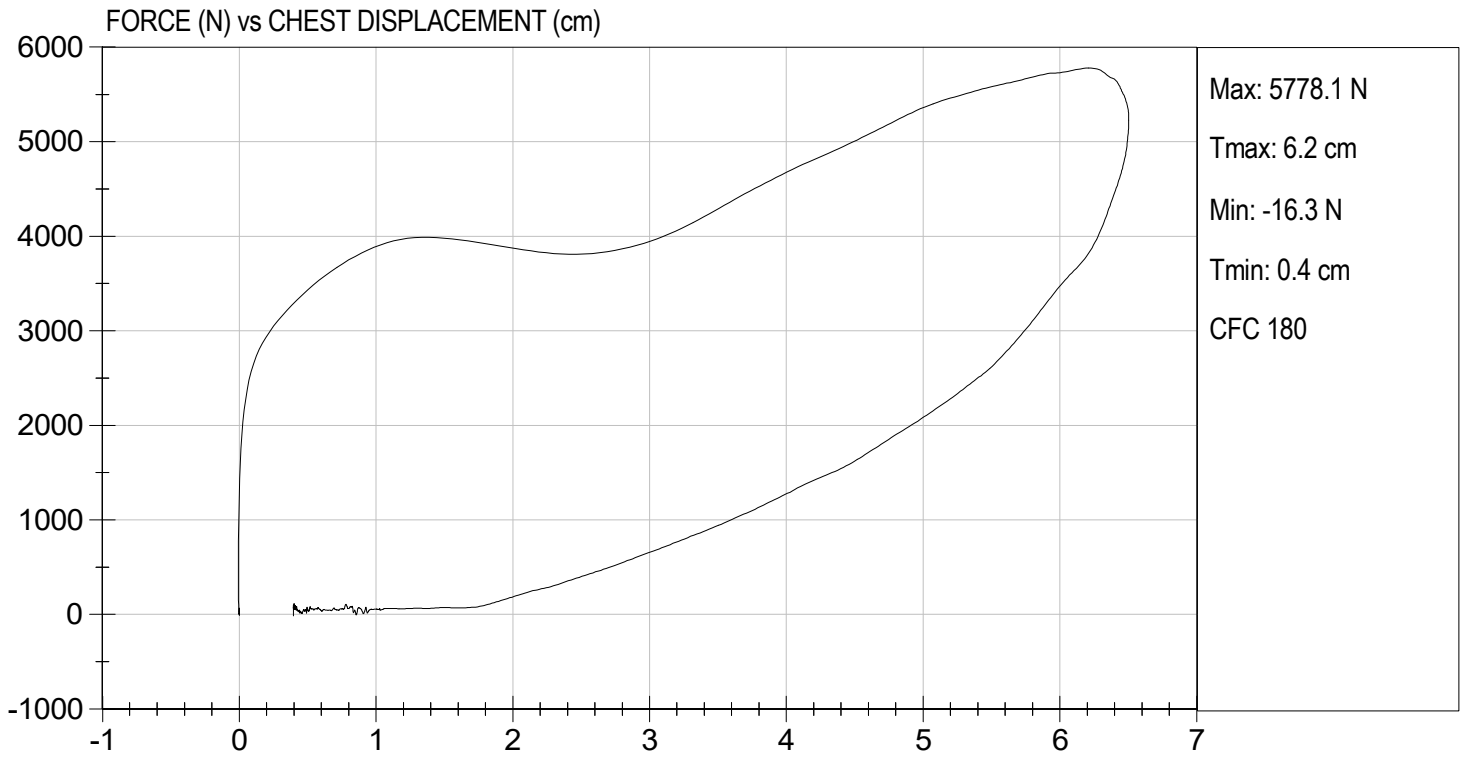
**Test I.D:** D230244

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	25	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5,778	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.50	Pass
Internal Hysteresis	%	69 to 85	73	Pass
<b>Overall Test Results</b>				<b>Pass</b>

*Nathaniel Benjamin*  
 Laboratory Technician

01/25/2023  
 Test Date

*BFL*  
 Approved By



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

ATD Serial No: 351

Test I.D: D230245

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	26	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	4715 to 5782	5,121	Pass
Overall Test Results				Pass

*Nathaniel Benjamin*  
 Laboratory Technician

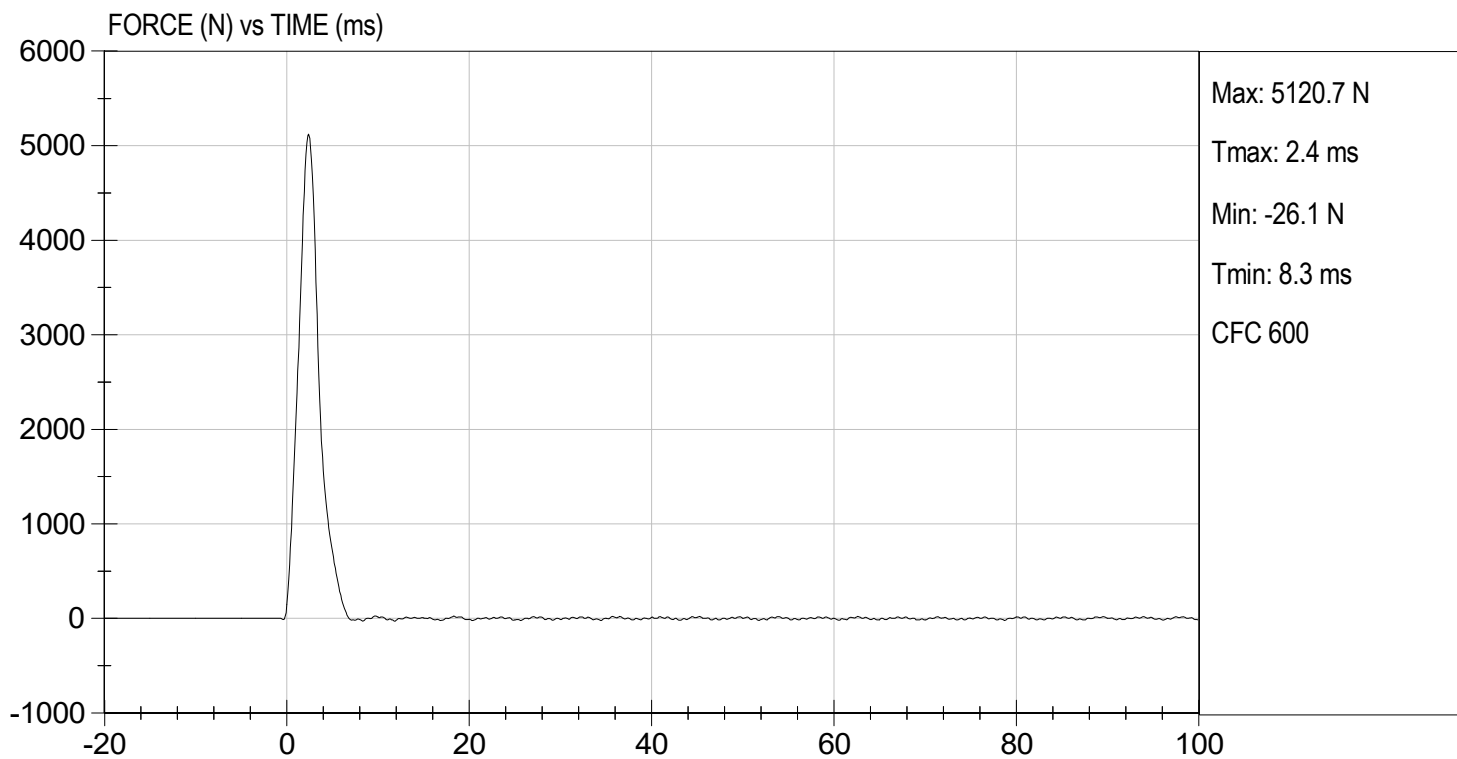
01/25/2023  
 Test Date

*B. F. L.*  
 Approved By



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

TEST DATE: 01/25/2023  
TEST #: D230245



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

ATD Serial No: 351

Test I.D: D230246

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	26	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,557	Pass
Overall Test Results				Pass

*Nathaniel Benjamin*  
 Laboratory Technician

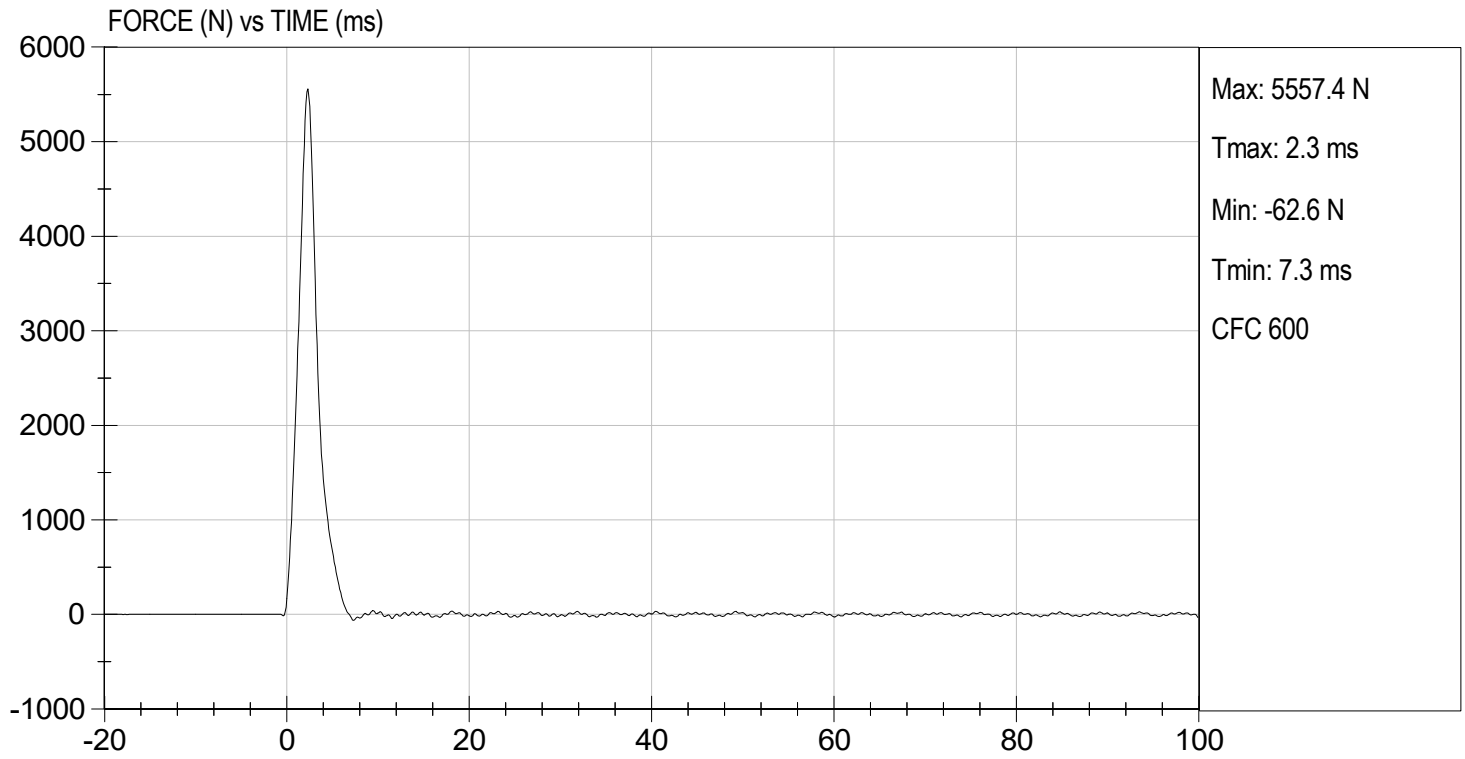
01/25/2023  
 Test Date

*B. F. K.*  
 Approved By



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

TEST DATE: 01/25/2023  
TEST #: D230246



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

**ATD Serial No:** 351

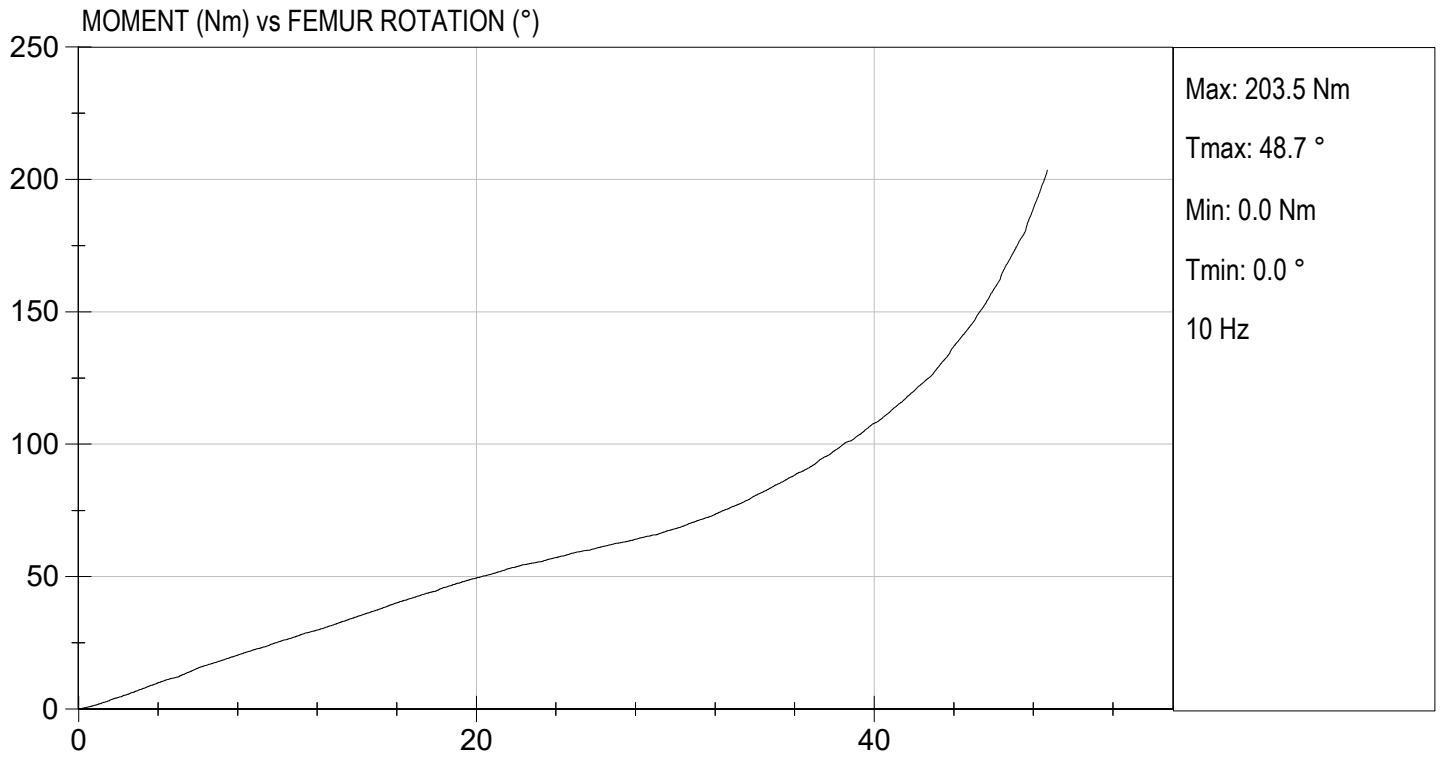
**Test I.D:** D230240

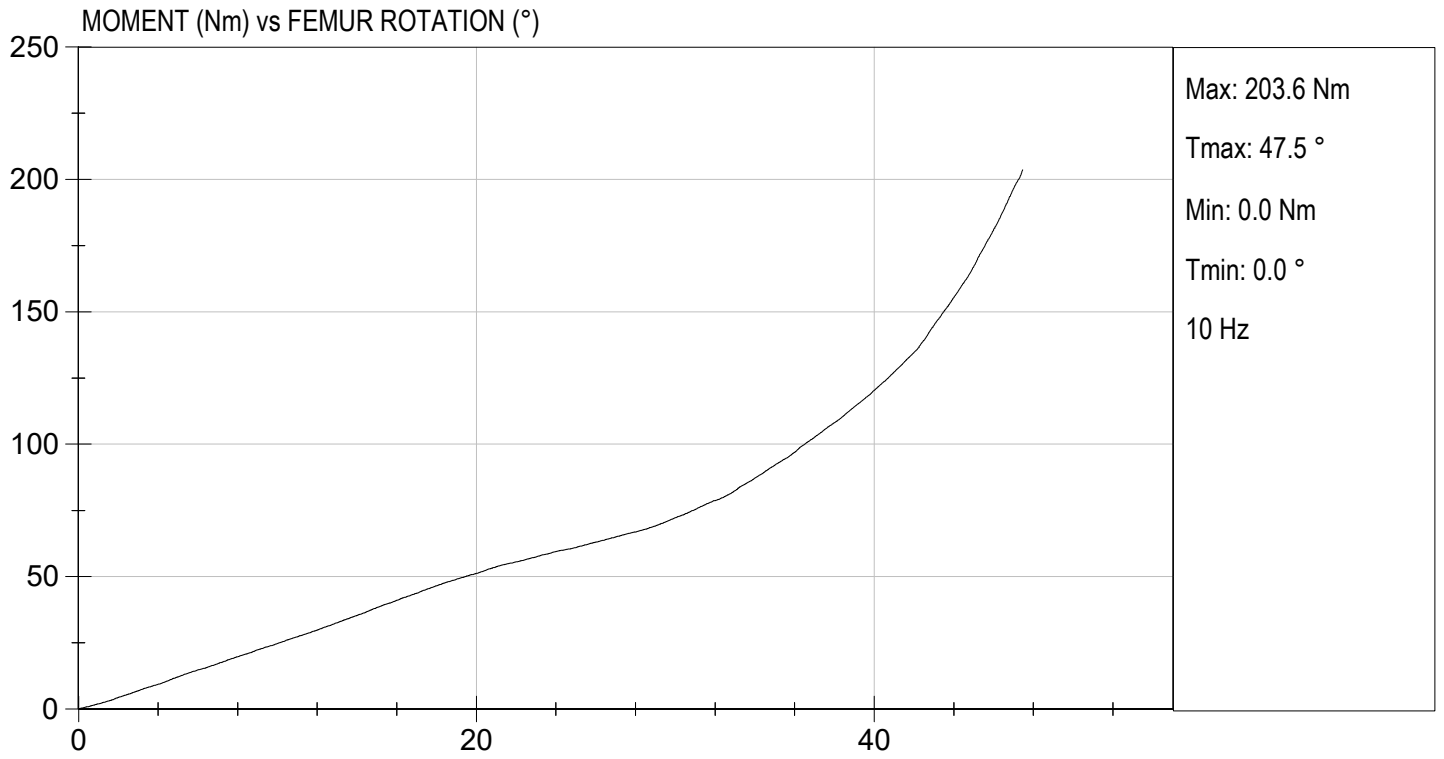
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	27	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	6.5	Pass
30 Degrees	Nm	94.9 Nm Max	68.1	72.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	48.7	47.5	Pass
Overall Test Results					Pass

*Nathaniel Benjamin*  
 Laboratory Technician

01/25/2023  
 Test Date

*B. F. L.*  
 Approved By





**CALIBRATION TEST RESULTS**

**PRE-TEST**

**HYBRID III 5<sup>TH</sup> PERCENTILE FEMALE - PASSENGER ATD**

**Hybrid III, 5th External Measurements  
SN: 142**

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

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

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

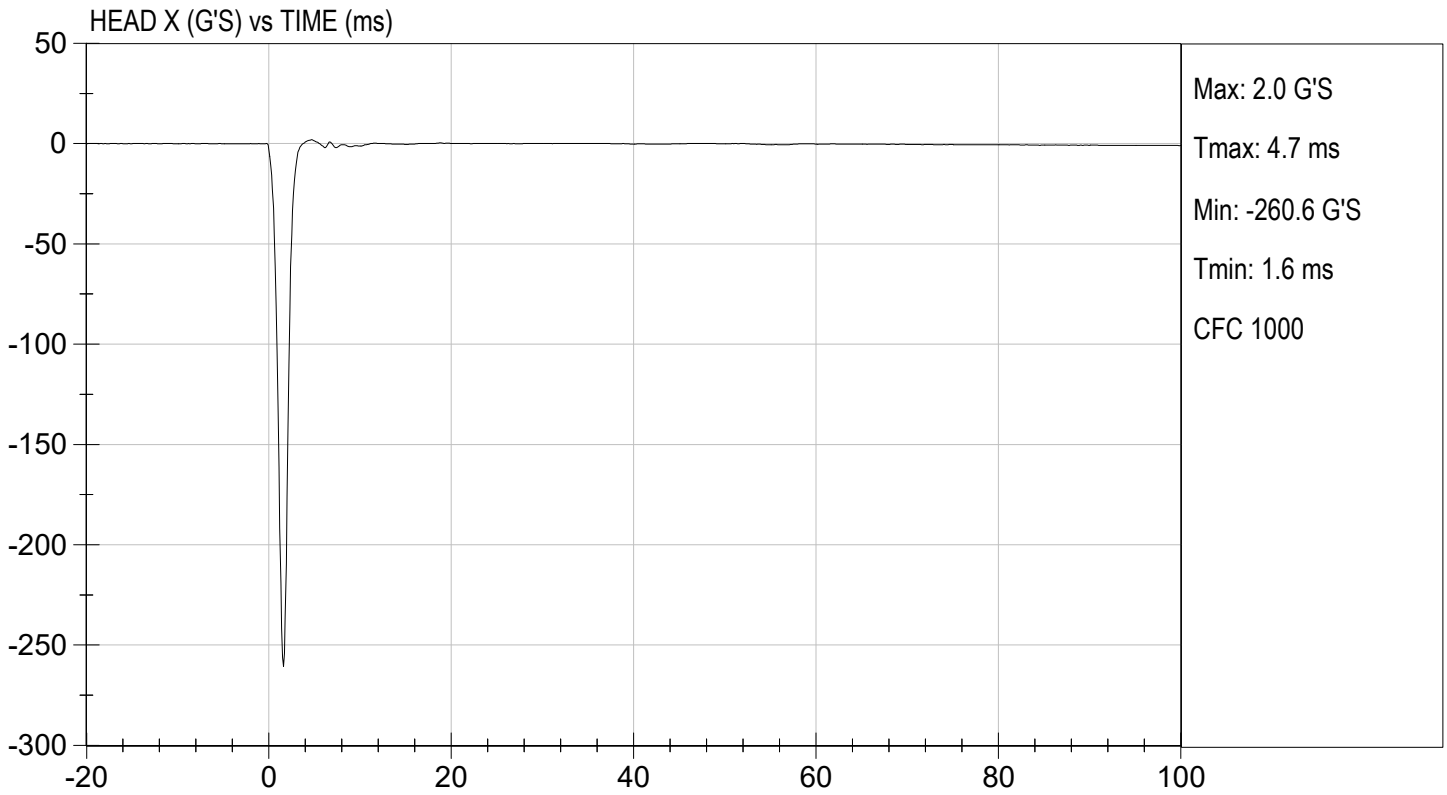
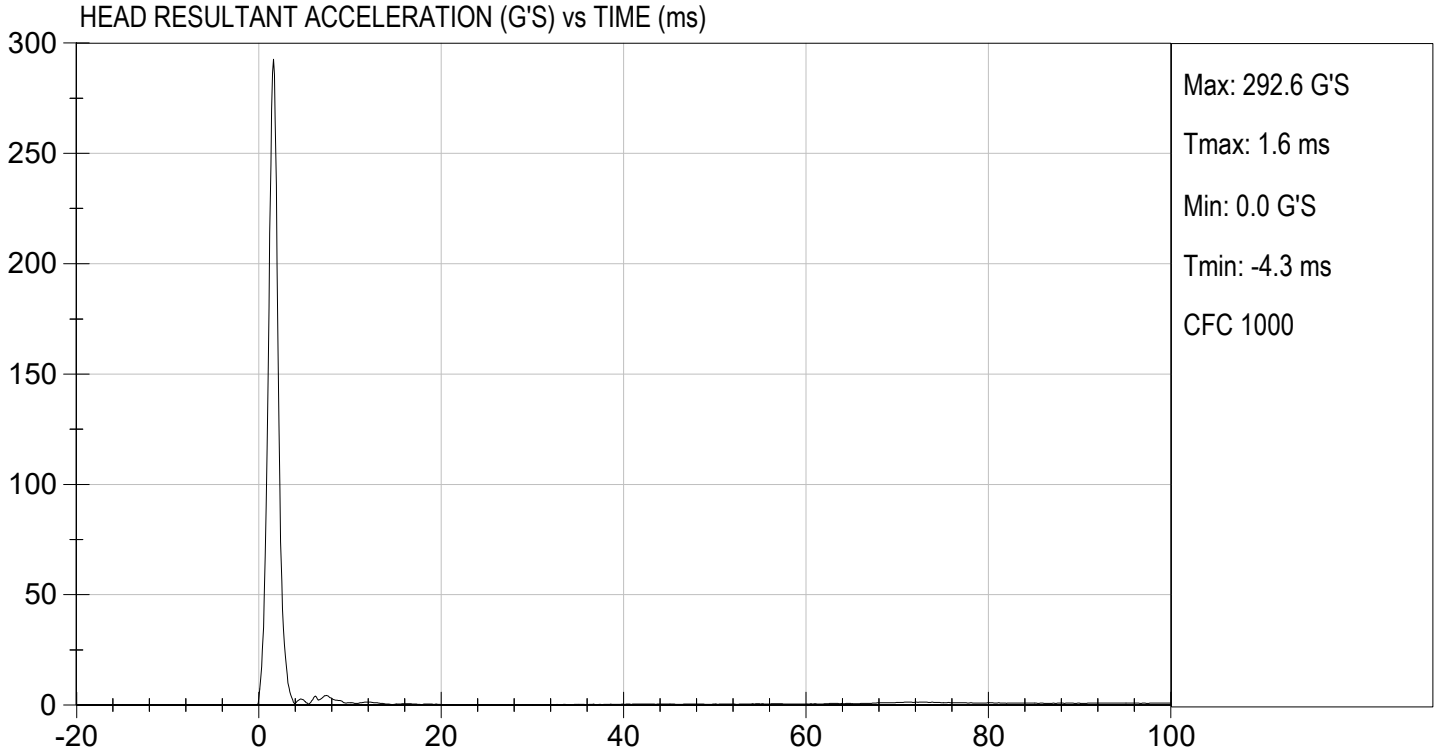
Test ID: D230151

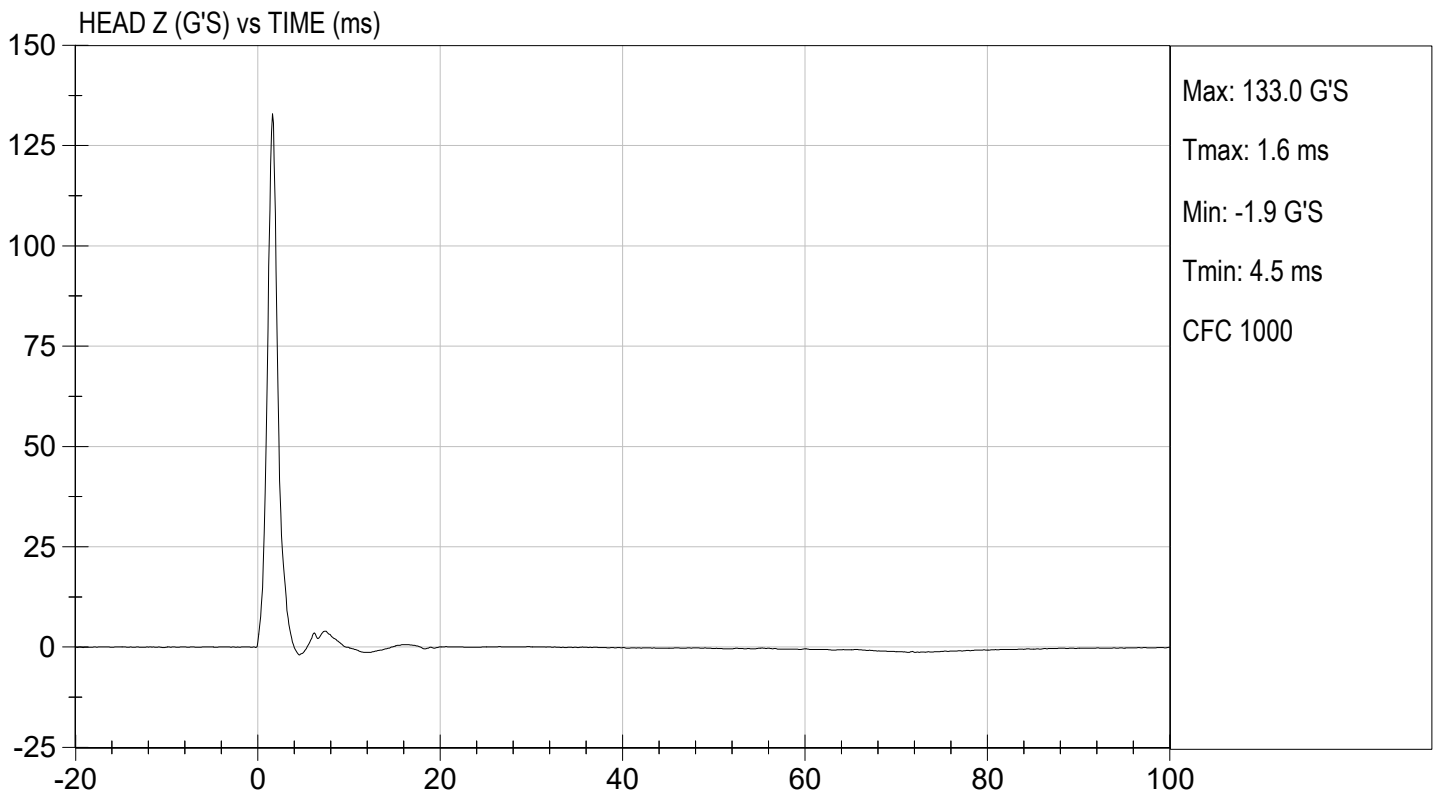
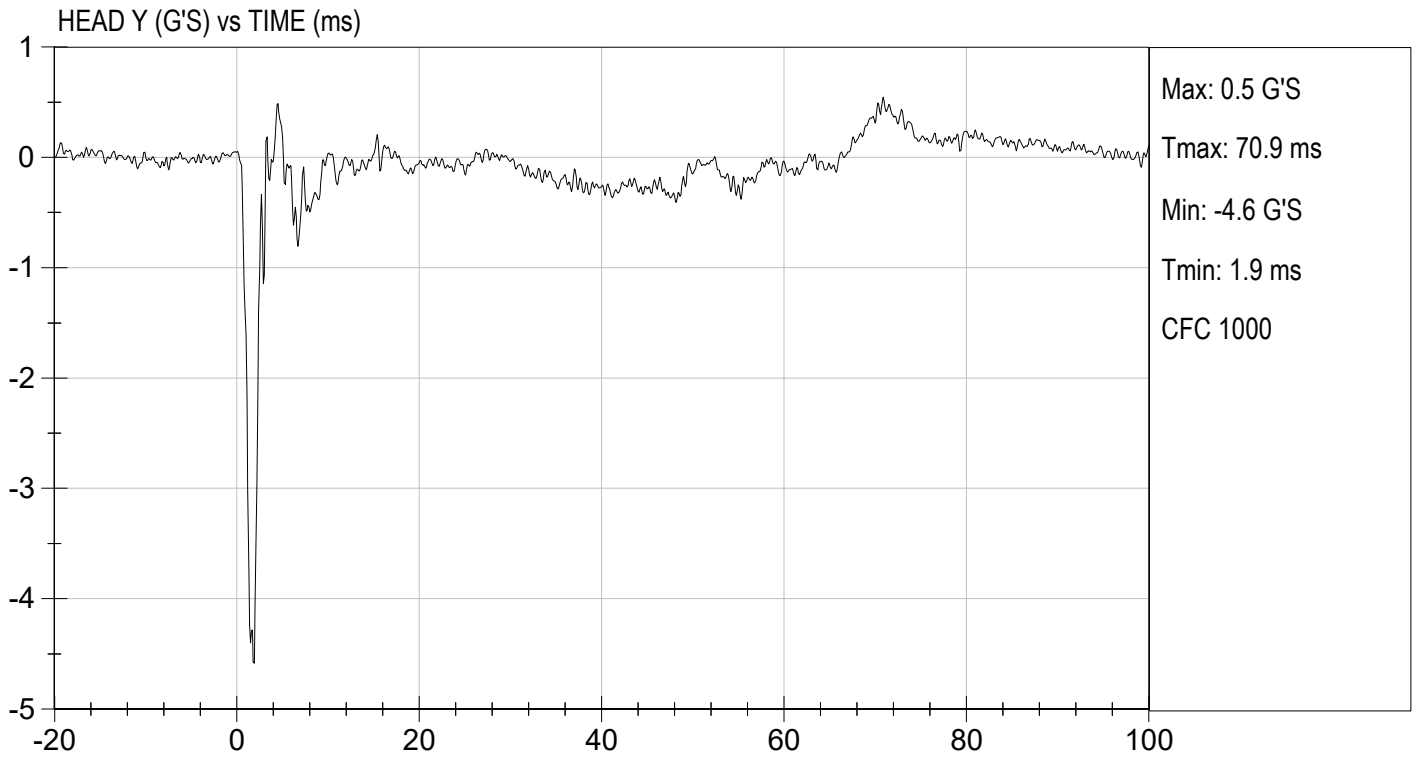
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Peak Resultant Acceleration	G's	250 to 300	293	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-4.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

*Nathaniel Benjamin*  
 Laboratory Technician

01/19/2023  
 Test Date

*B. F. K.*  
 Approved By






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

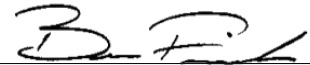
ATD Serial No: 142

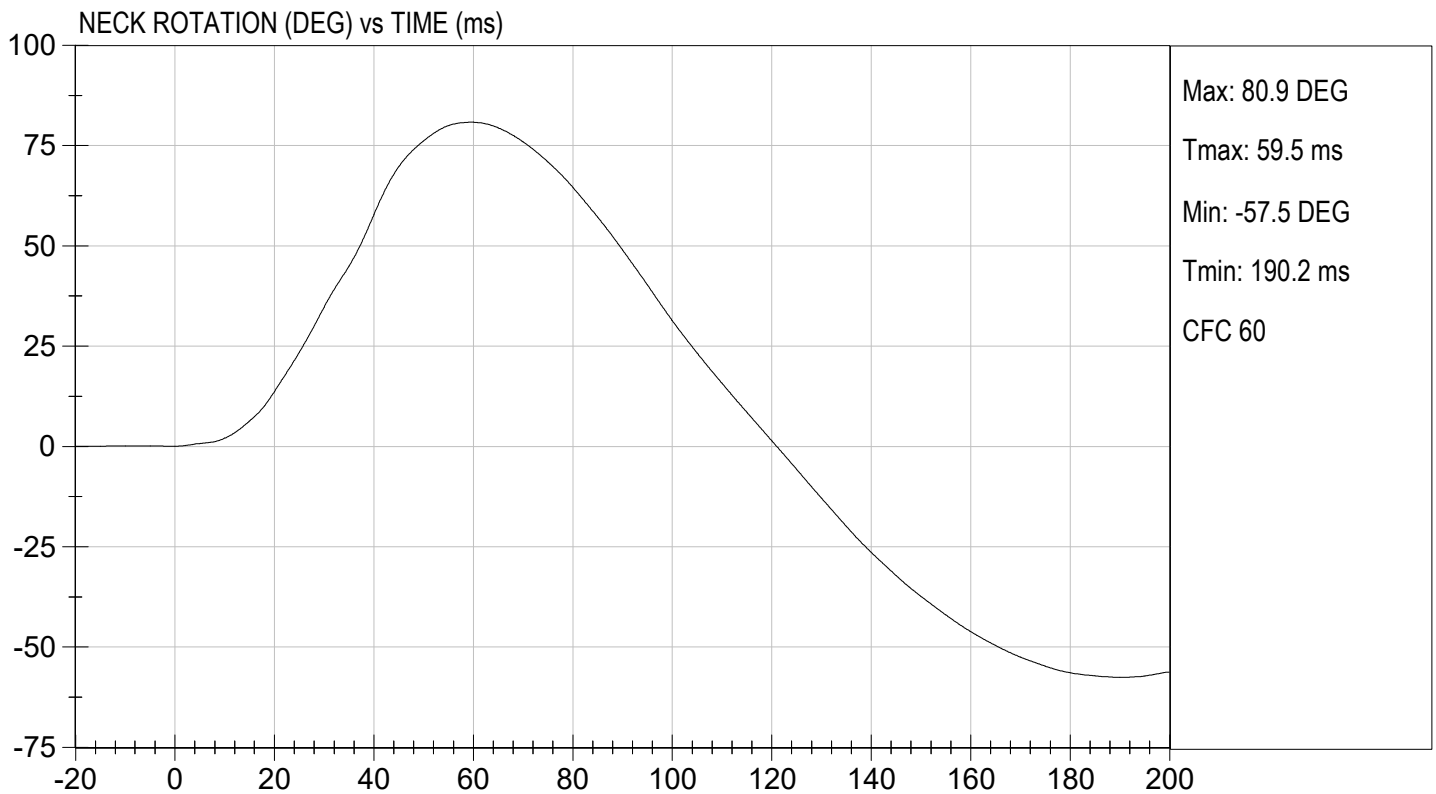
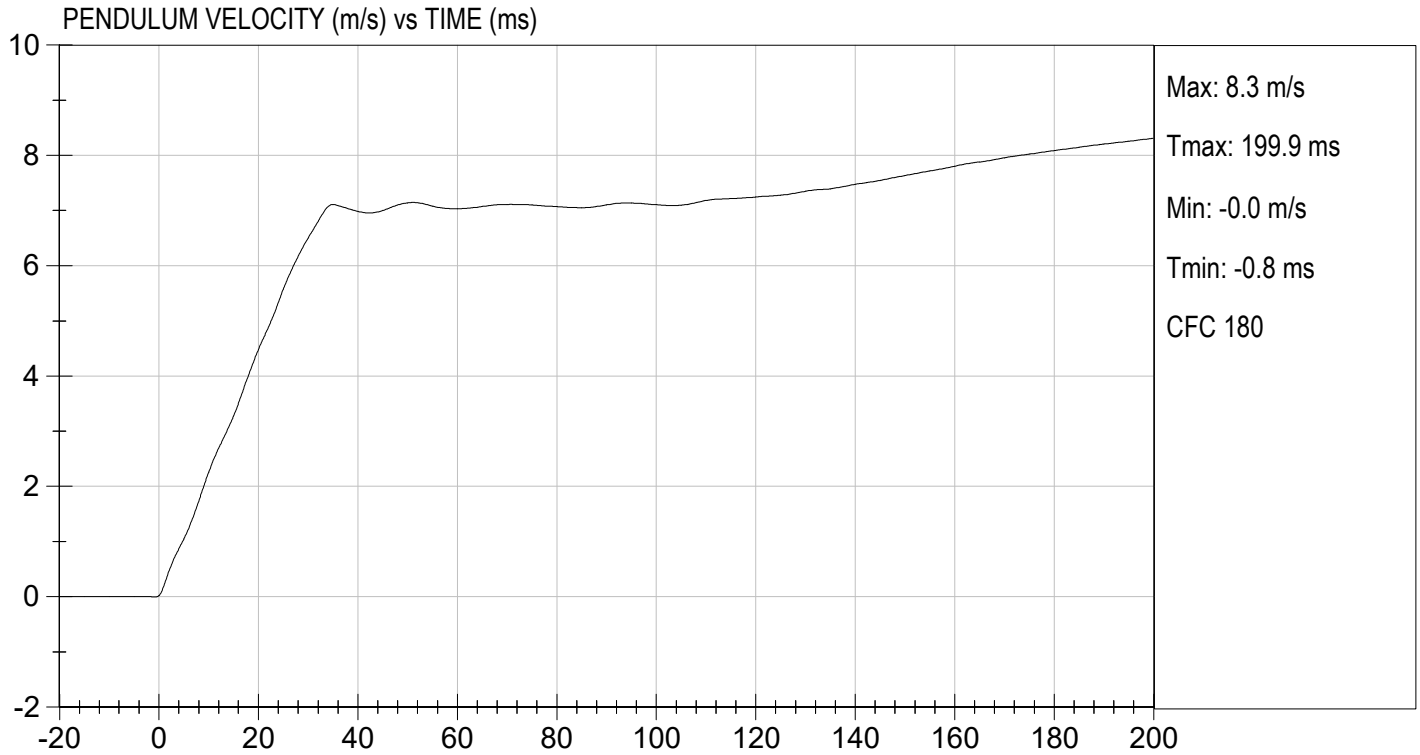
Test I.D: D230152

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	34	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	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
Overall Results					Pass

  
 Laboratory Technician

01/19/2023  
 Test Date

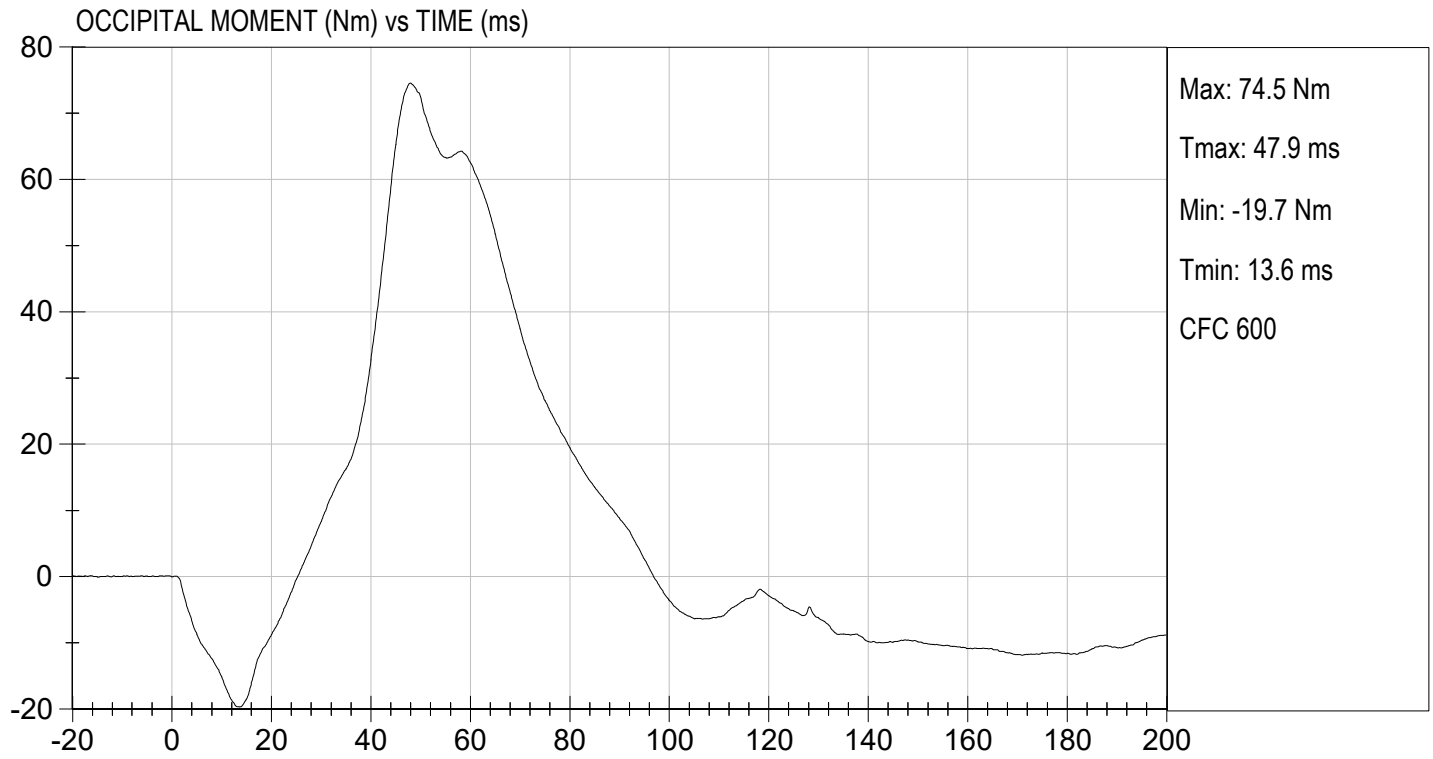
  
 Approved By





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

TEST DATE: 01/19/2023  
TEST #: D230152



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

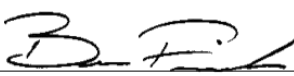
ATD Serial No: 142

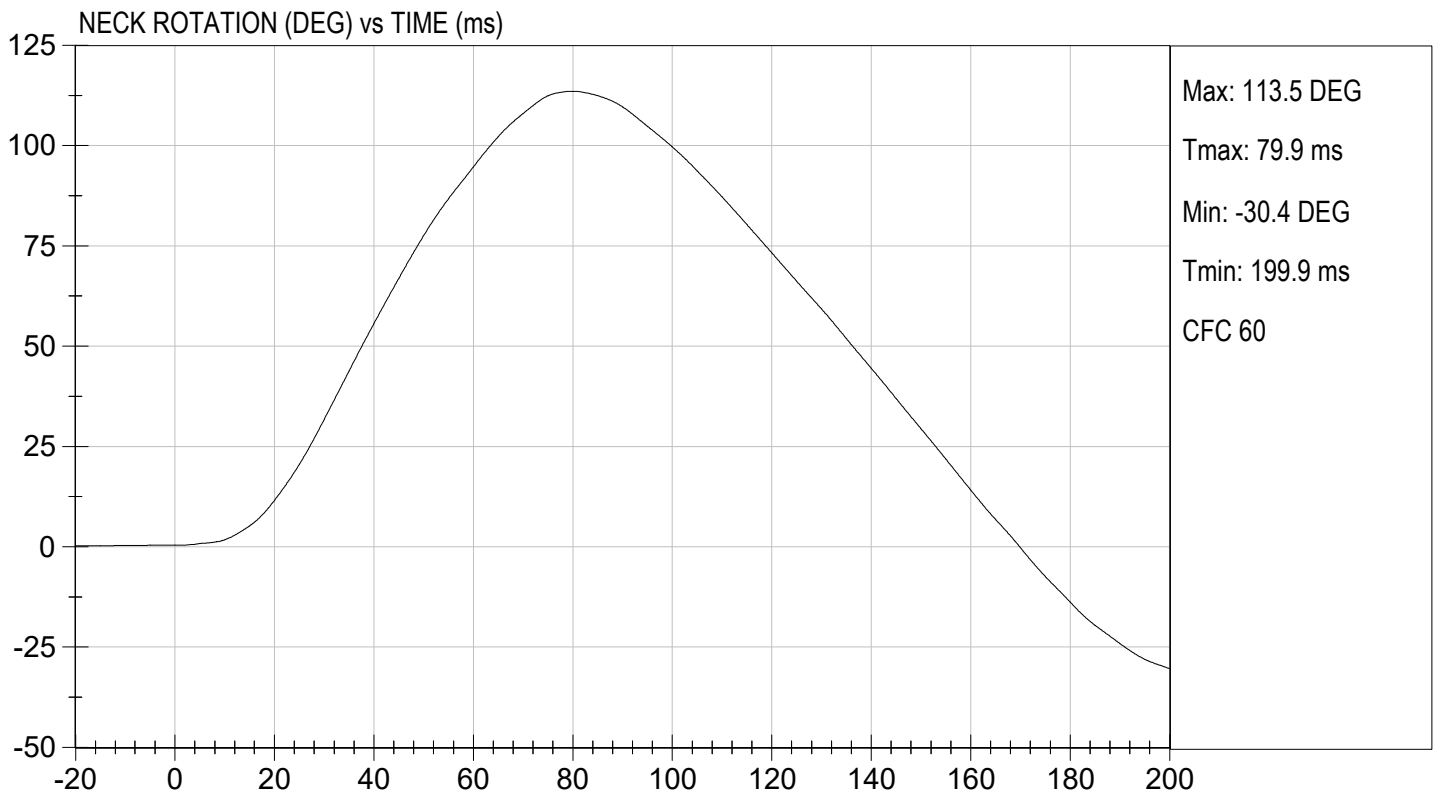
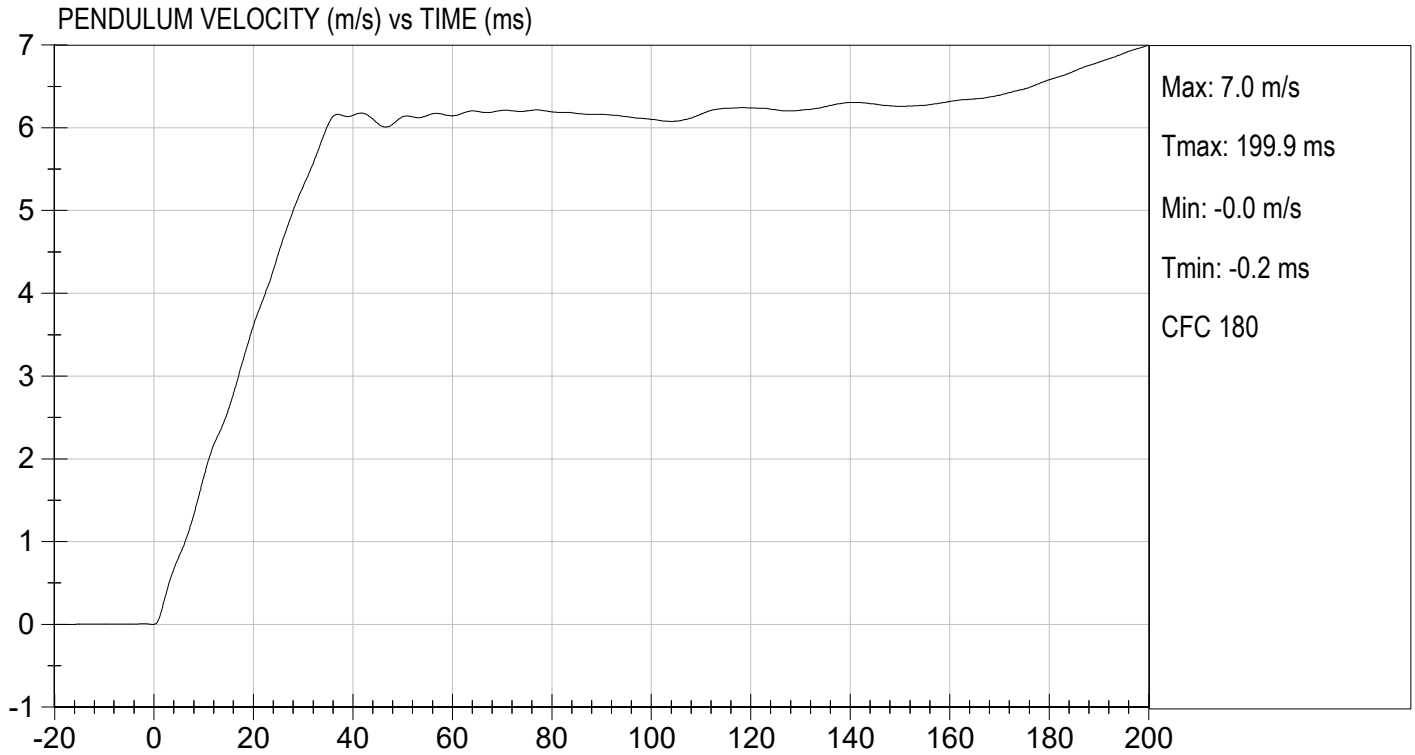
Test I.D.: D230153

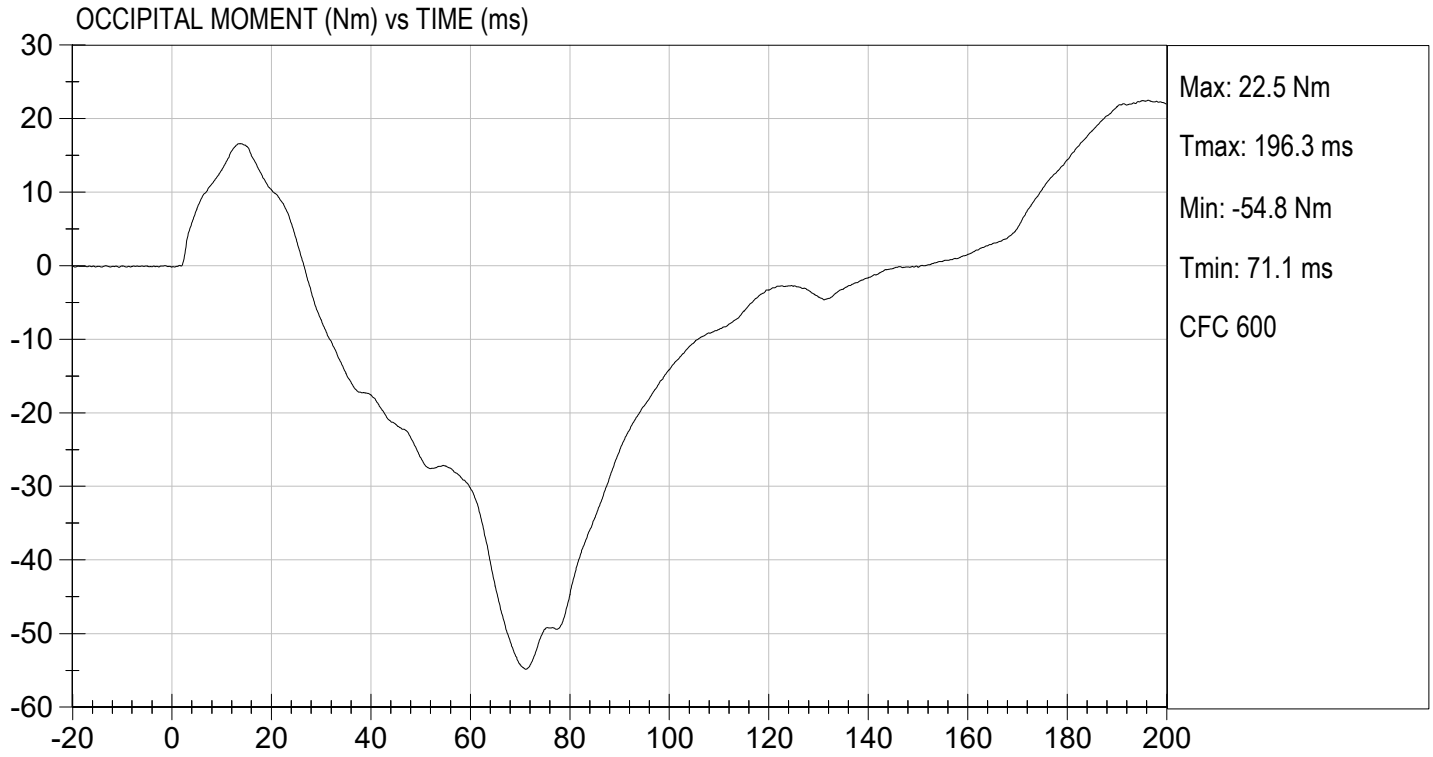
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.18	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	114	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	104	Pass
Overall Results					Pass

  
 Laboratory Technician

01/20/2023  
 Test Date

  
 Approved By





**MGA RESEARCH CORPORATION**  
**THORAX IMPACT**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

Test I.D: D230154

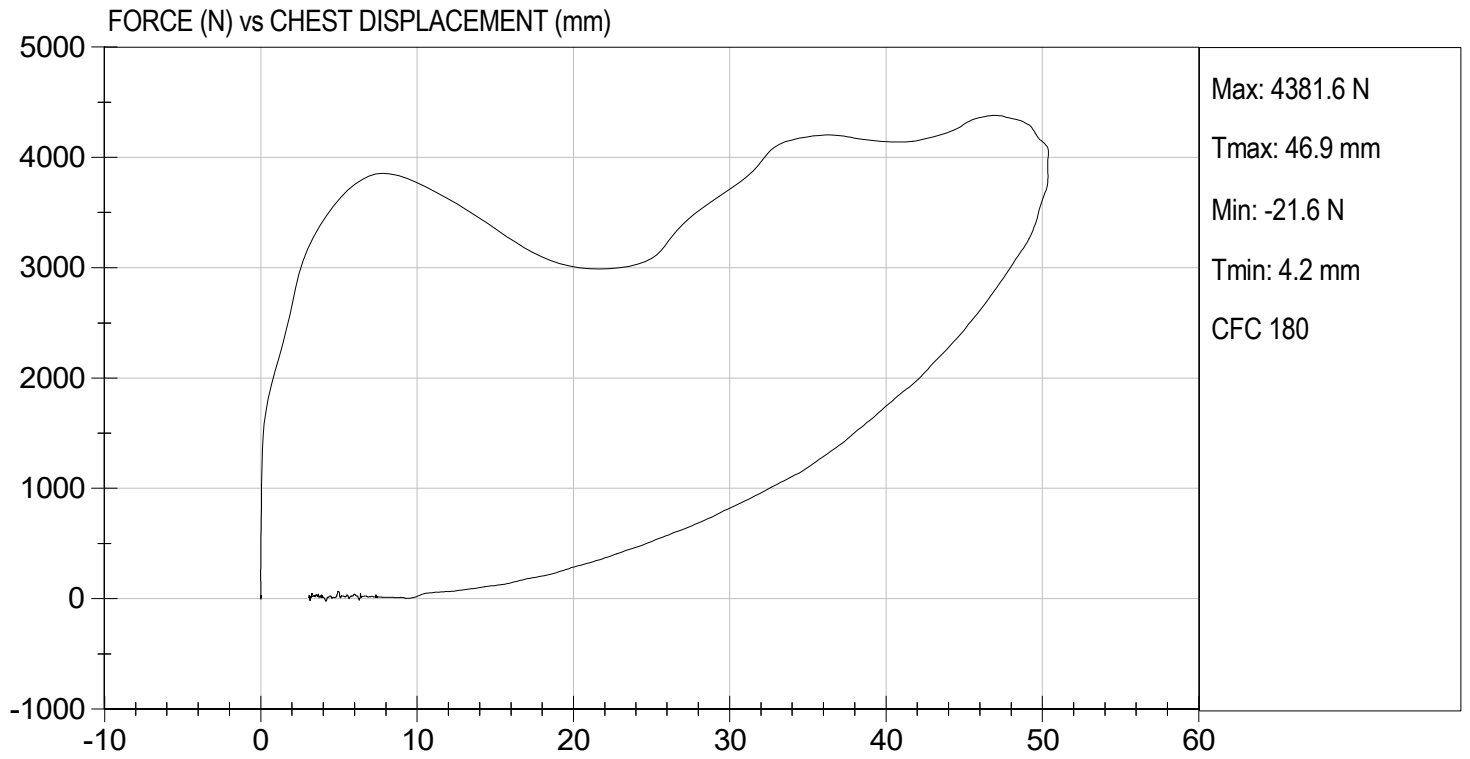
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Relative Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	50	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4136	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4382	Pass
Overall Test Results				Pass

*Nathaniel Benjamin*  
 Laboratory Technician

01/19/2023

Test Date

*BFL*  
 Approved By



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

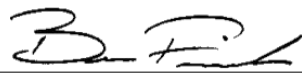
**ATD Serial No:** 142

**Test I.D.:** D230155

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	31	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3821	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

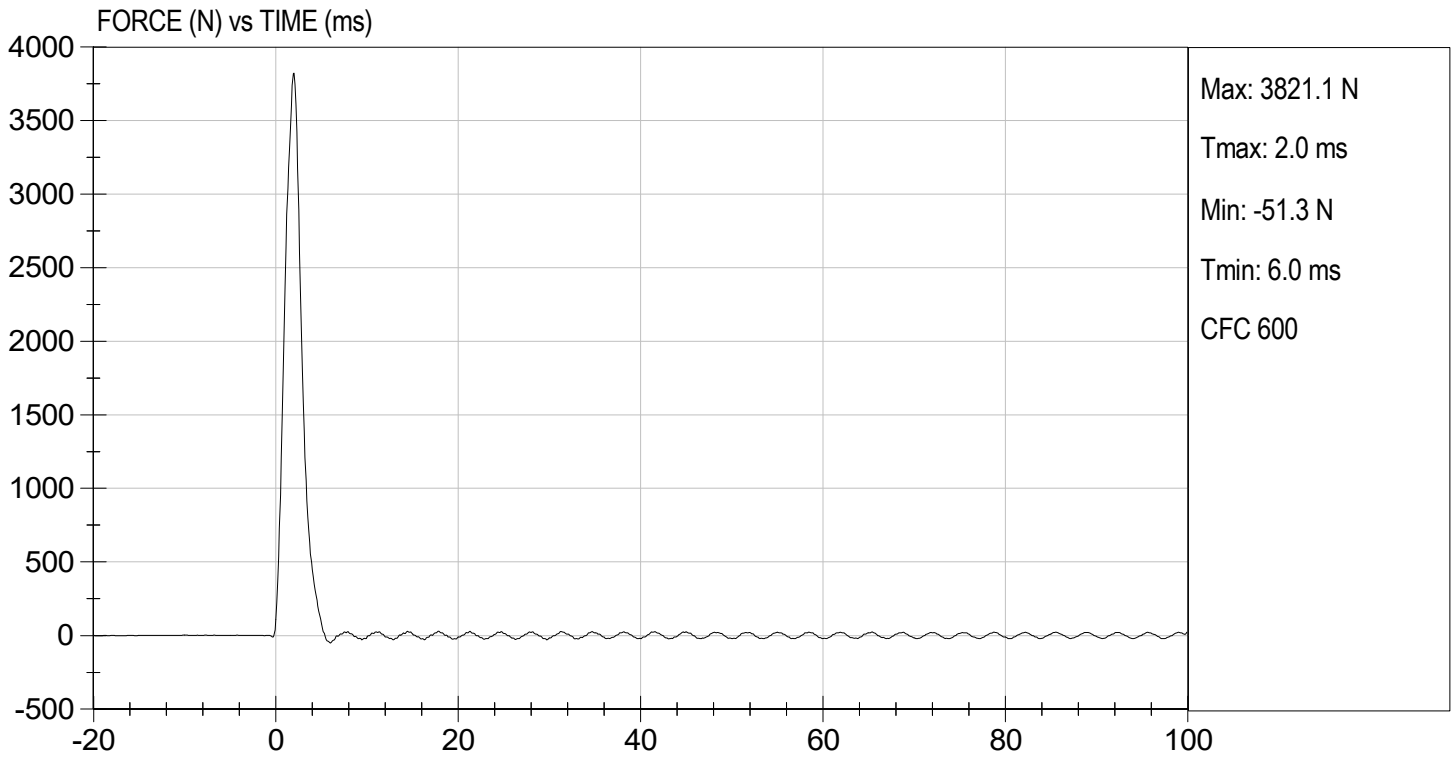
01/19/2023  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



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

TEST DATE: 01/19/2023  
TEST #: D230155



**MGA RESEARCH CORPORATION**  
**LEFT KNEE IMPACT TEST**  
**HYBRID III 5TH PERCENTILE**

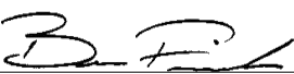
**ATD Serial No:** 142

**Test I.D.:** D230156

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	31	Pass
Probe Speed	m/s	2.07 to 2.13	2.07	Pass
Maximum Force	N	3450 to 4060	3834	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 \_\_\_\_\_  
 Laboratory Technician

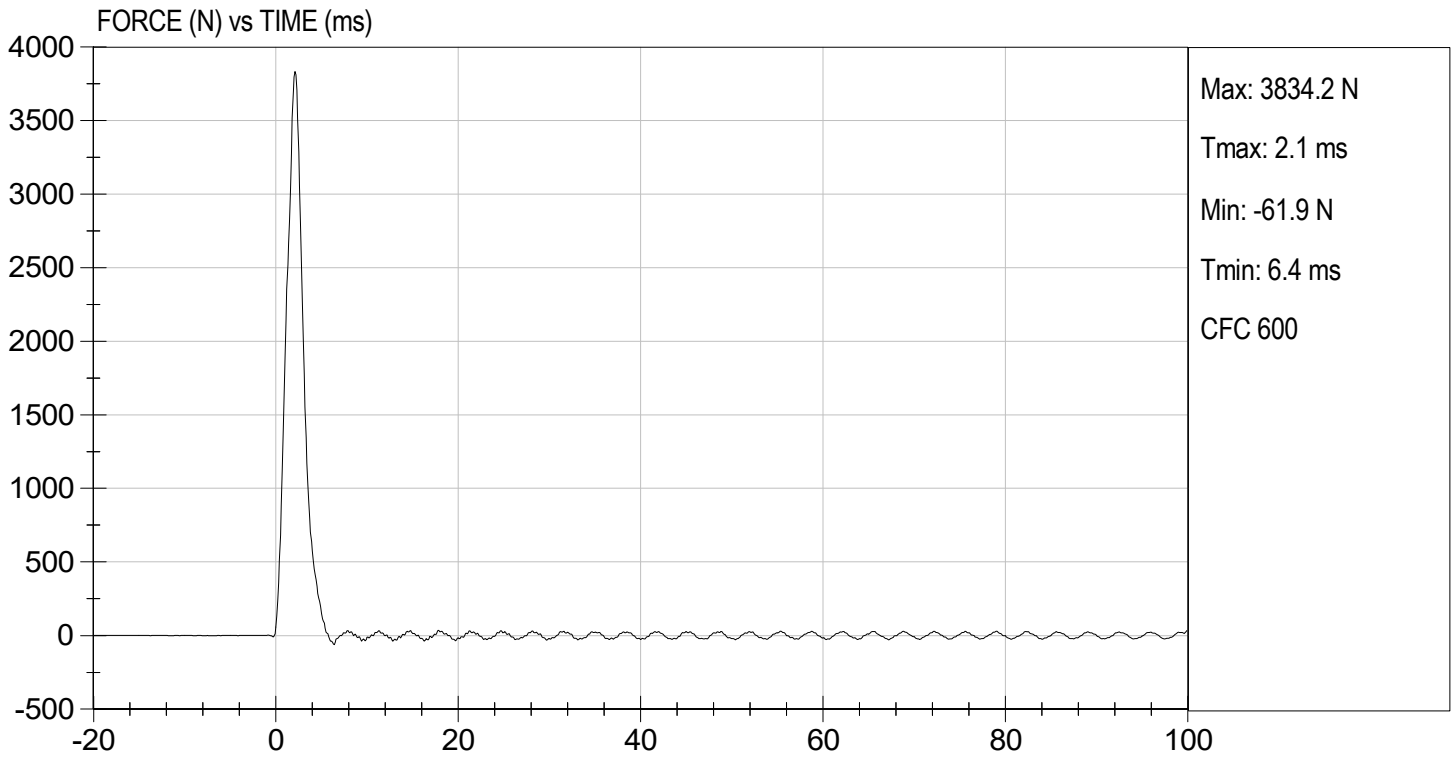
01/19/2023  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



TEST DESC: LEFT KNEE  
VELOCITY: 6.80 ft/s, 2.07 m/s

TEST DATE: 01/19/2023  
TEST #: D230156



**MGA RESEARCH CORPORATION**  
**TORSO FLEXION TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

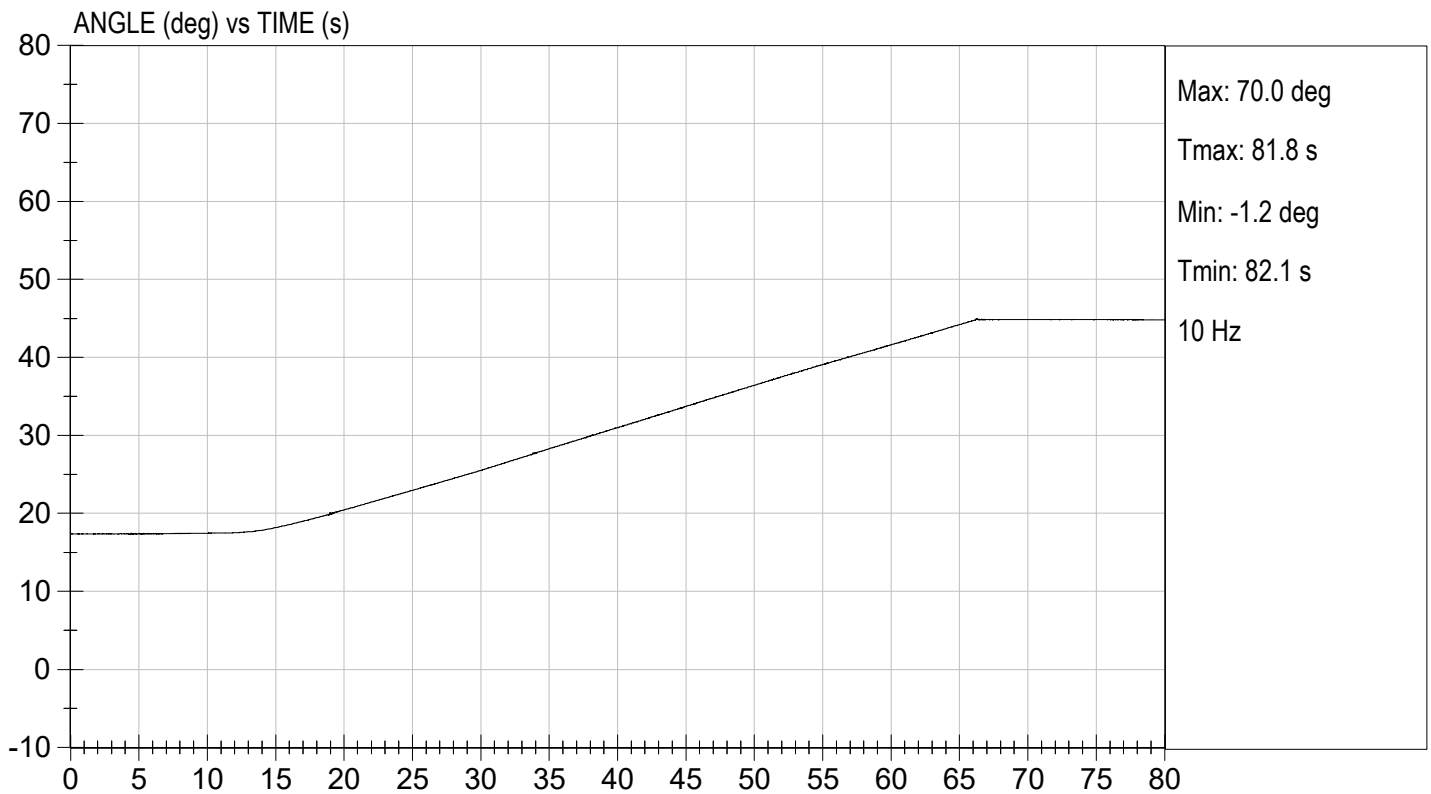
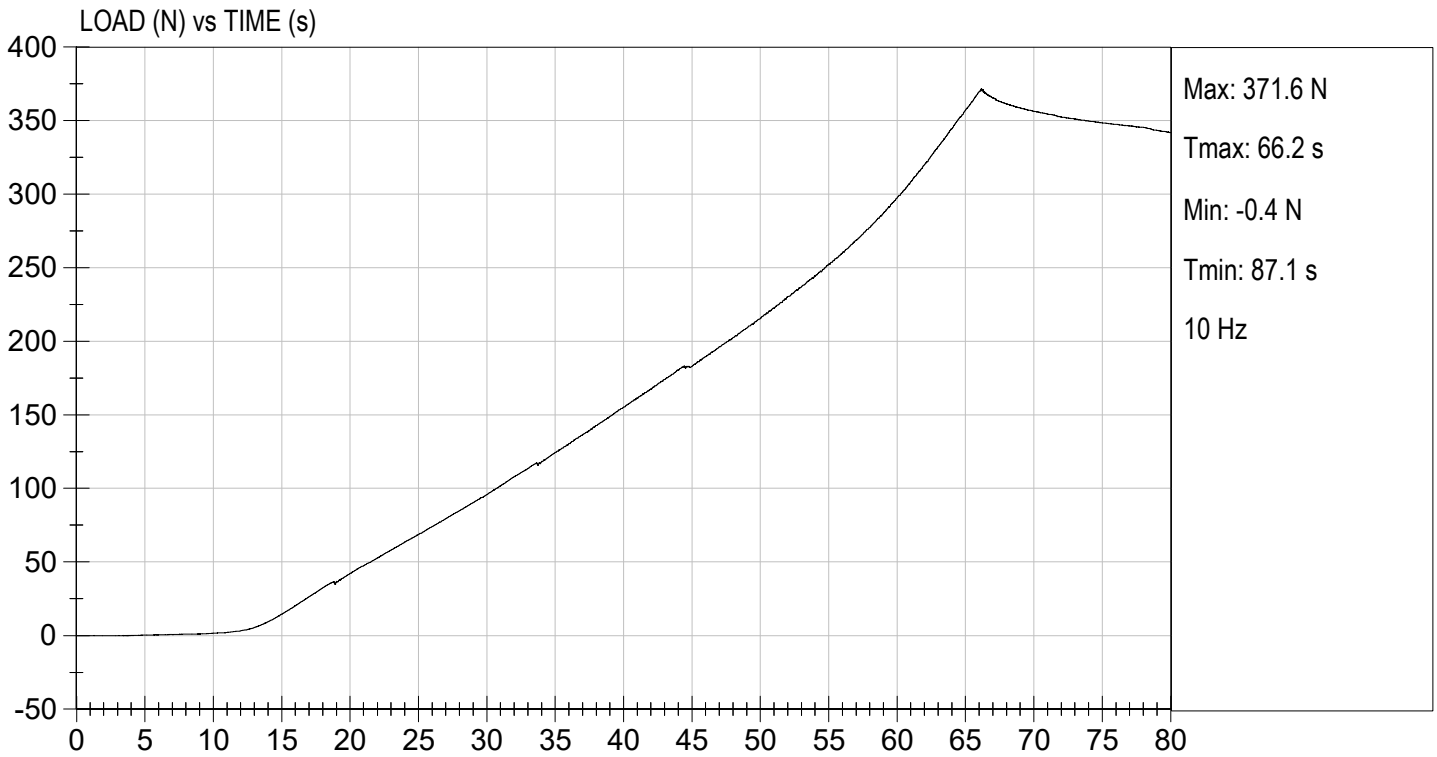
Test I.D: D230157

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	31	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	3	Pass
Force at 45 deg	N	320 to 390	372	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
<b>Overall Result</b>				<b>Pass</b>

Nathaniel Benjamin  
 Laboratory Technician

01/19/2023  
 Test Date

BFL  
 Approved By



**CALIBRATION TEST RESULTS**

**POST-TEST**

**HYBRID III 5<sup>TH</sup> PERCENTILE FEMALE - PASSENGER ATD**

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**HYBRID III 5TH PERCENTILE**

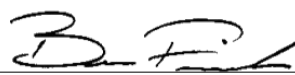
ATD Serial No: 142

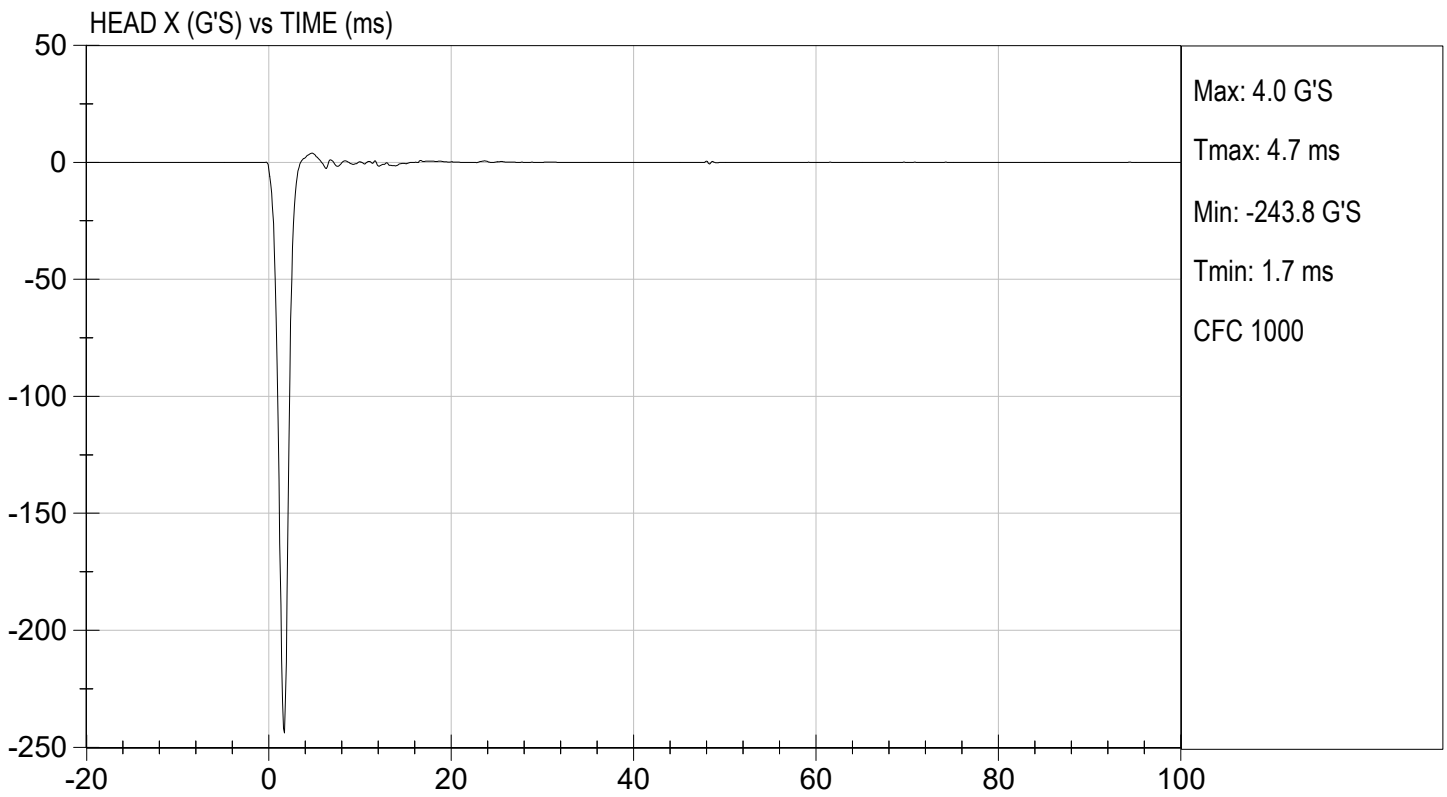
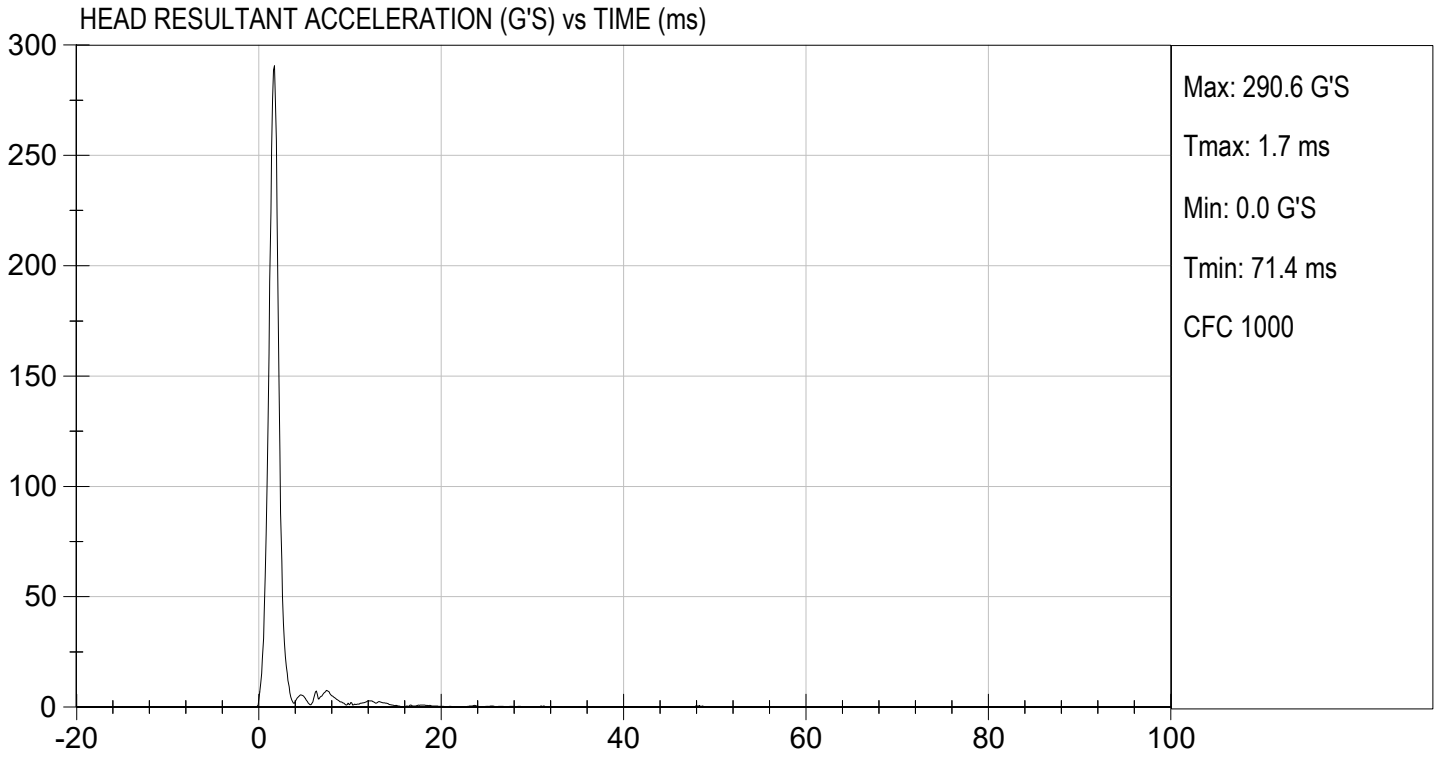
Test ID: D230231

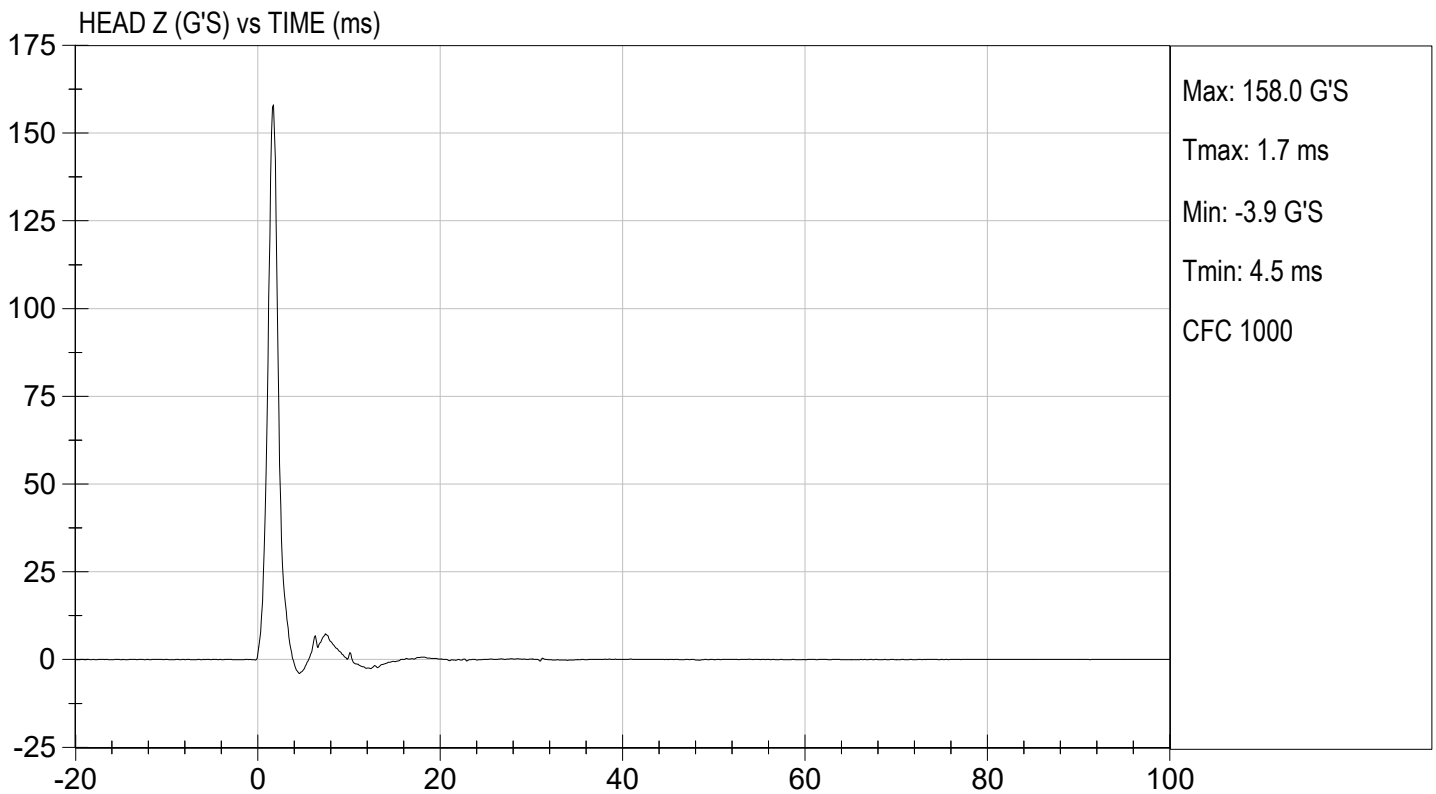
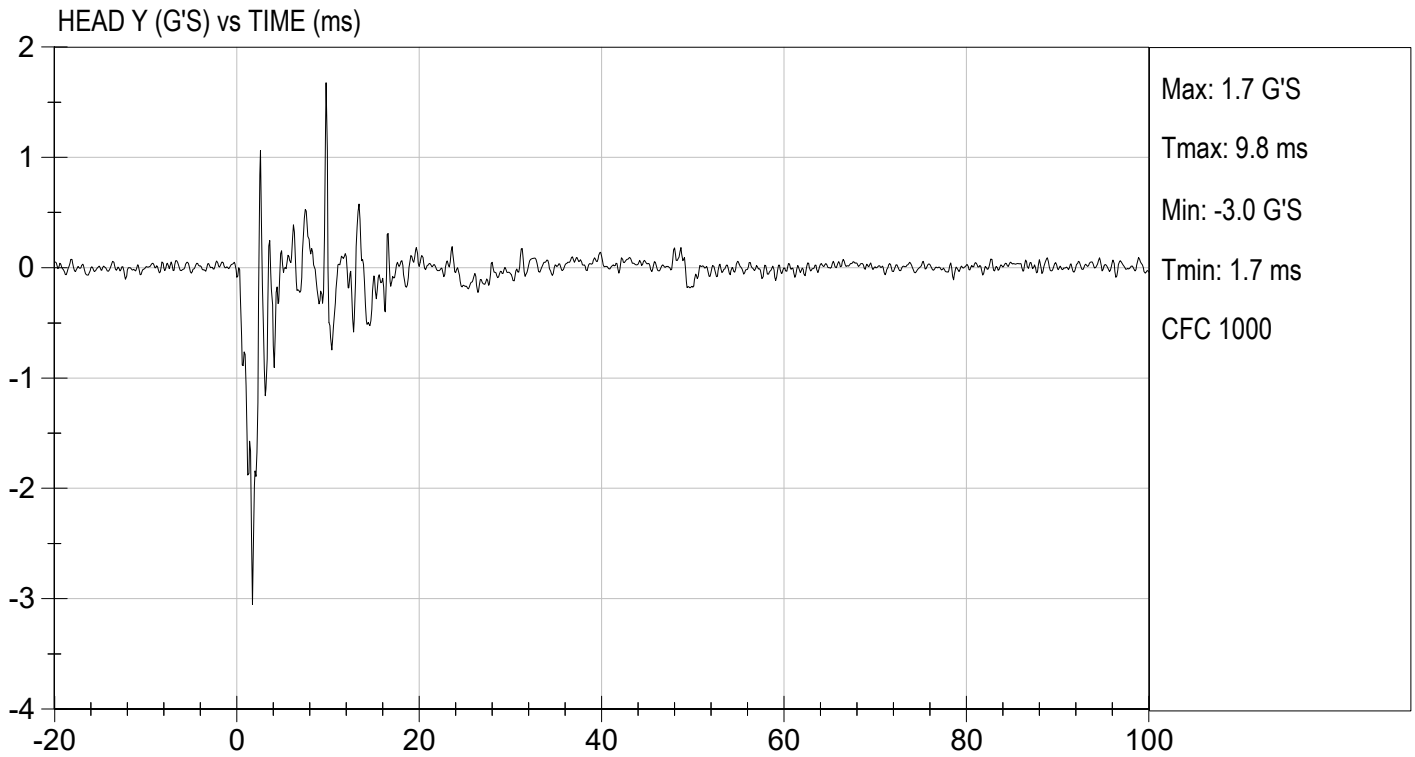
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Peak Resultant Acceleration	G's	250 to 300	291	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

01/25/2023  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By





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

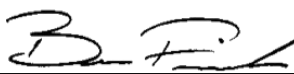
ATD Serial No: 142

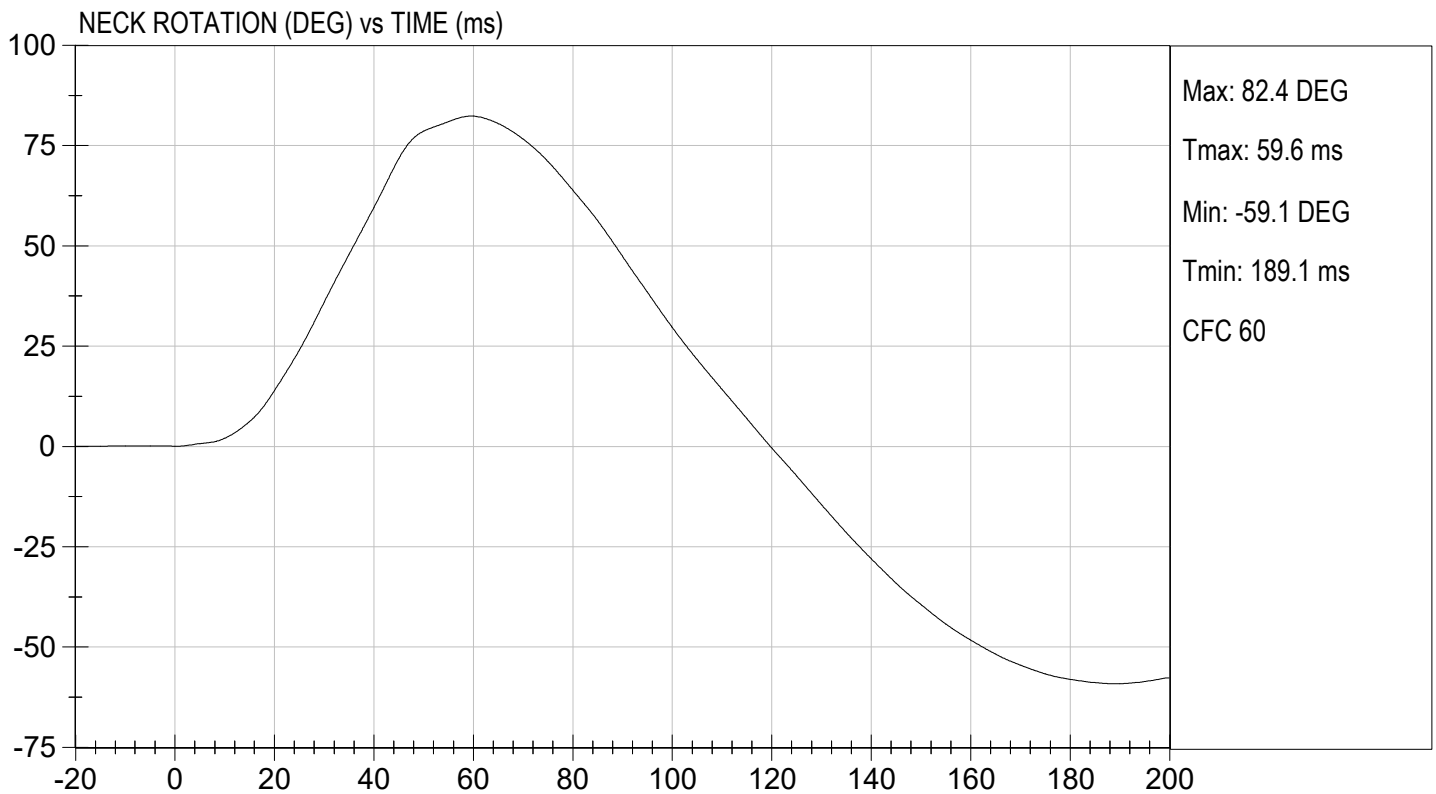
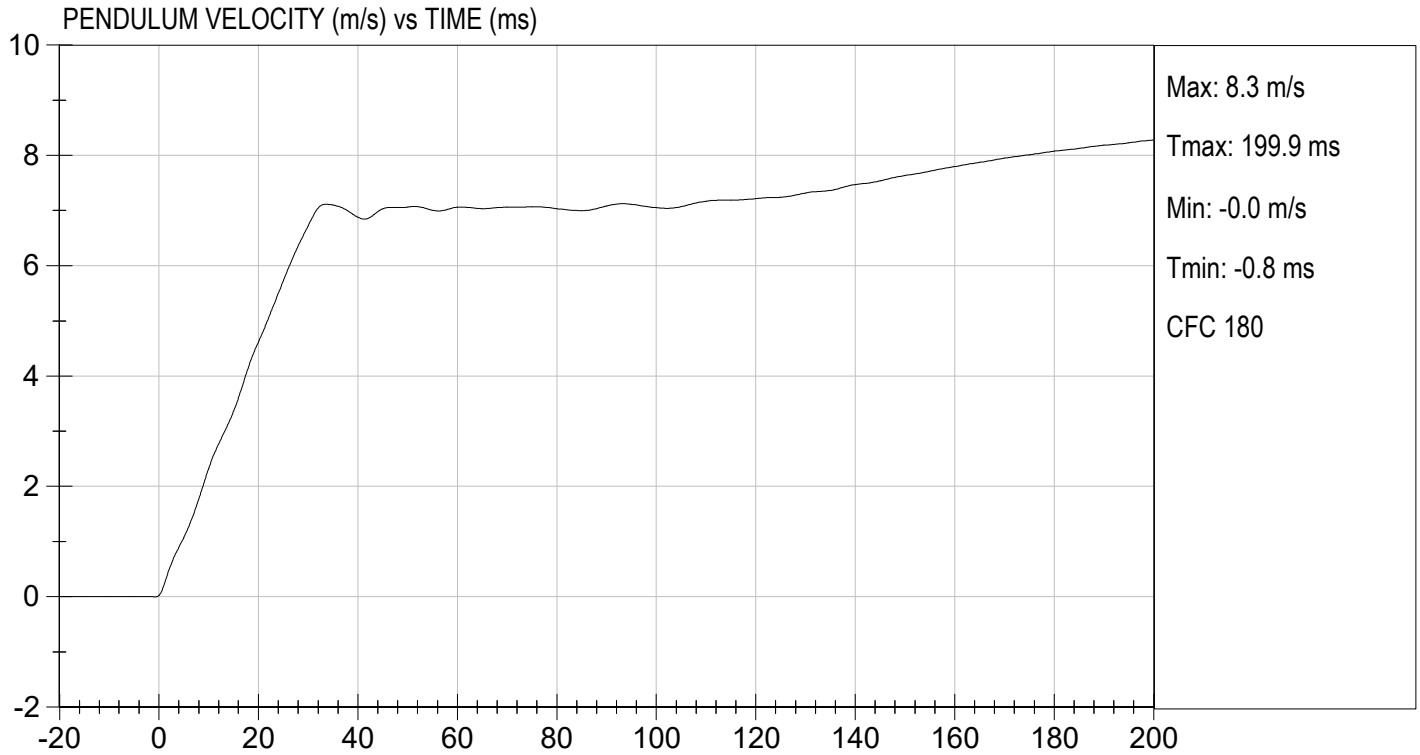
Test I.D: D230232

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	28	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
Overall Results					Pass

  
 \_\_\_\_\_  
 Laboratory Technician

01/26/2023  
 \_\_\_\_\_  
 Test Date

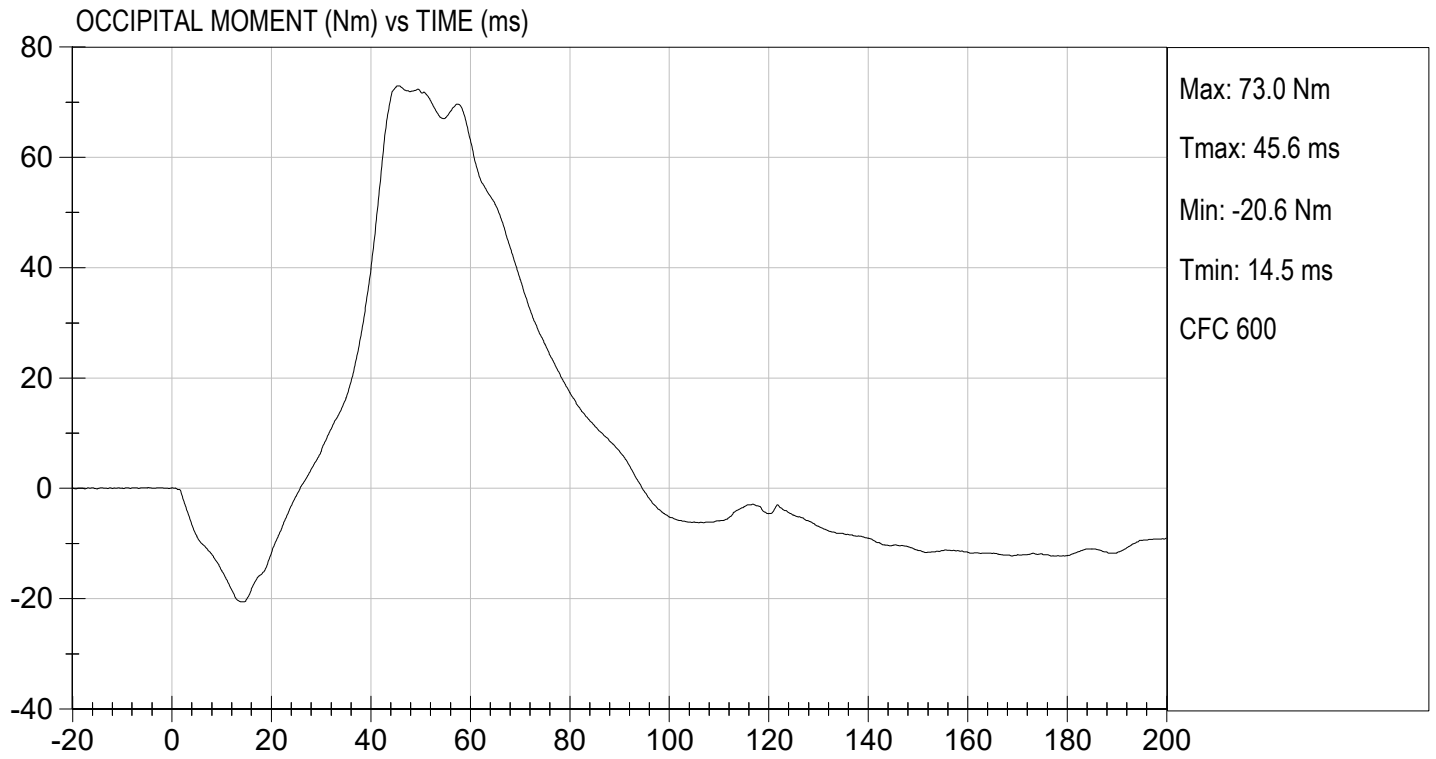
  
 \_\_\_\_\_  
 Approved By





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

TEST DATE: 01/26/2023  
TEST #: D230232



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

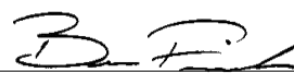
ATD Serial No: 142

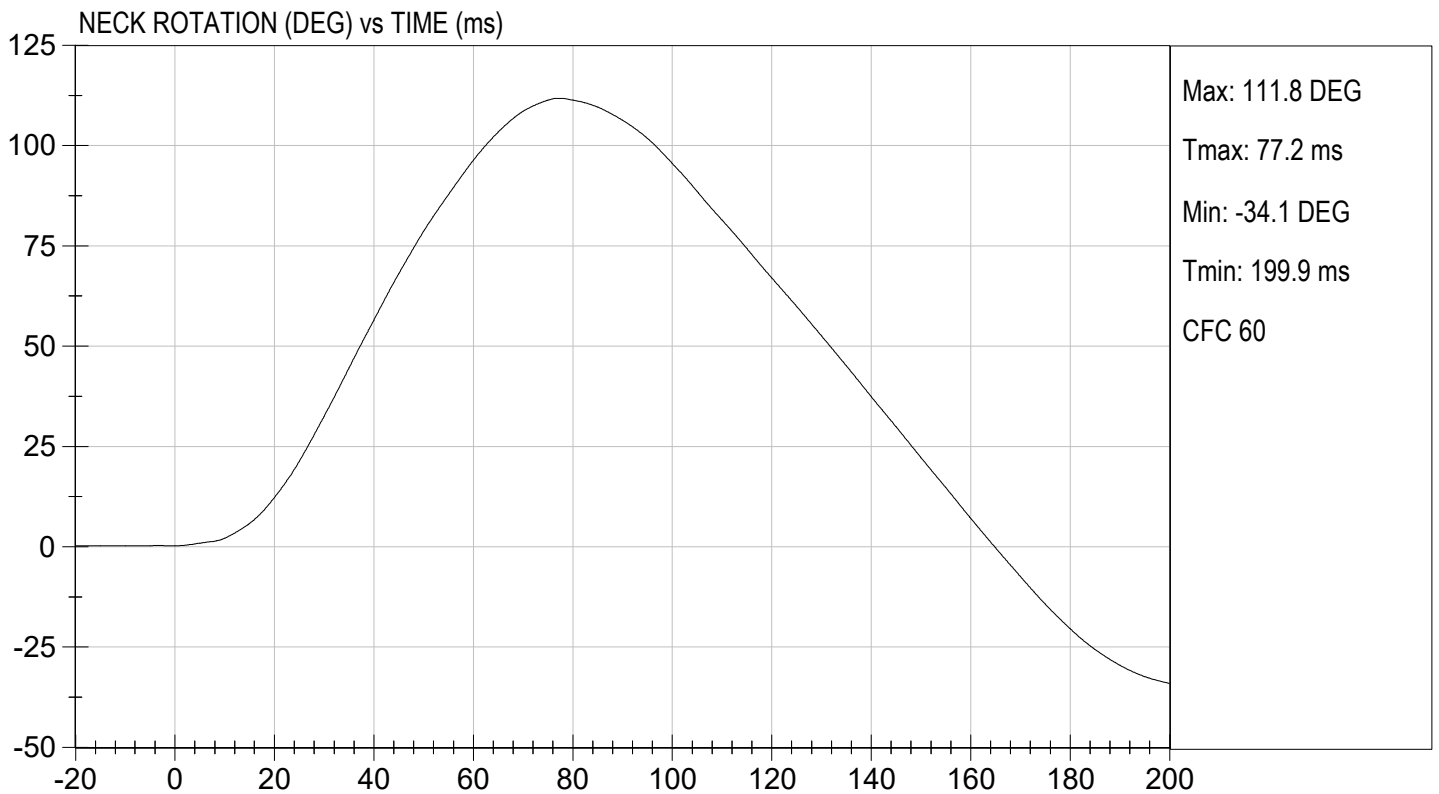
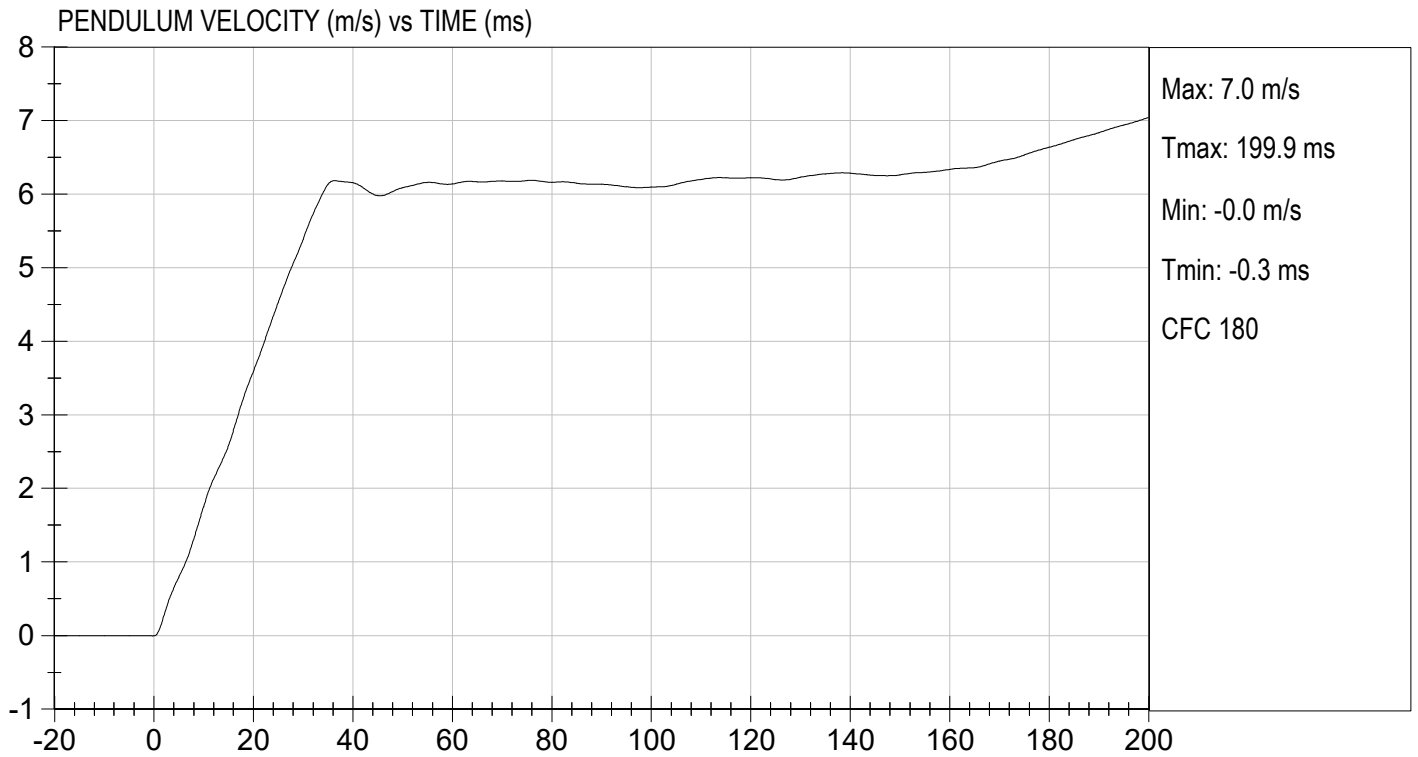
Test I.D.: D230233

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	28	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	112	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	104	Pass
Overall Results					Pass

  
 Laboratory Technician

01/26/2023  
 Test Date

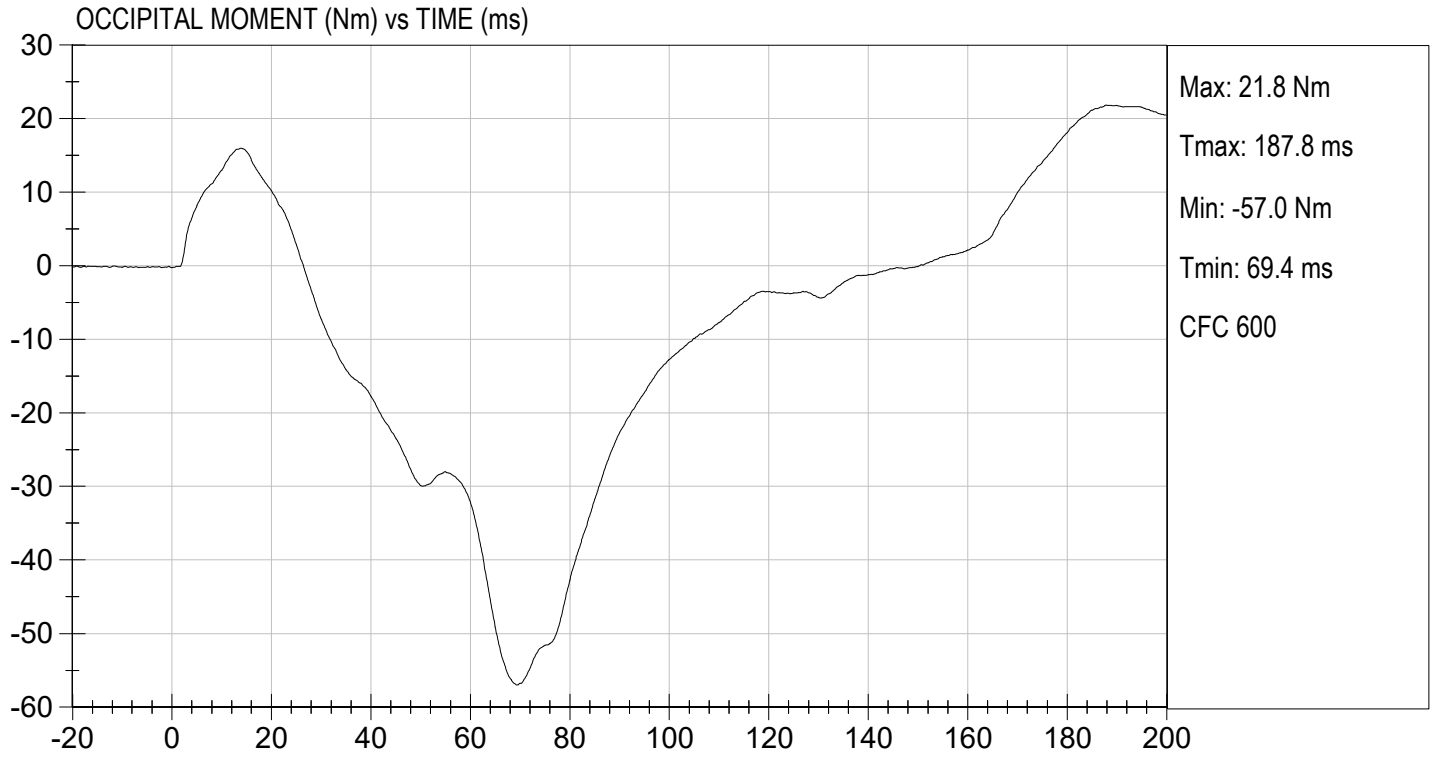
  
 Approved By





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

TEST DATE: 01/26/2023  
TEST #: D230233



**MGA RESEARCH CORPORATION**  
**THORAX IMPACT**  
**HYBRID III 5TH PERCENTILE**

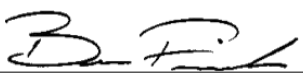
ATD Serial No: 142

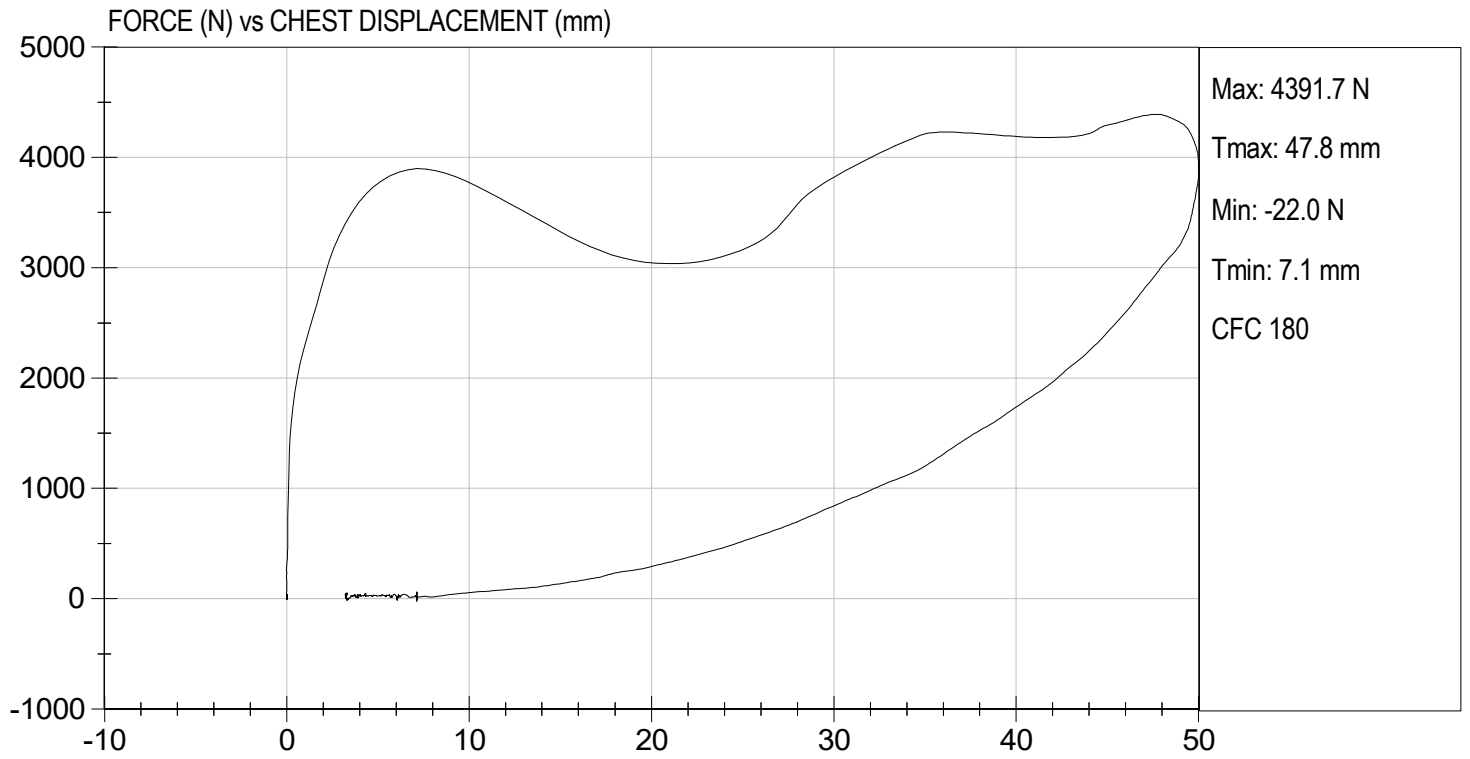
Test I.D: D230234

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Relative Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	50	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	3924	Pass
Internal Hysteresis	%	69 to 85	76	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4392	Pass
Overall Test Results				Pass

  
 Laboratory Technician

01/25/2023  
 Test Date

  
 Approved By



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

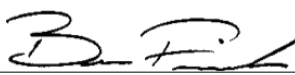
ATD Serial No: 142

Test I.D: D230235

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	26	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3530	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

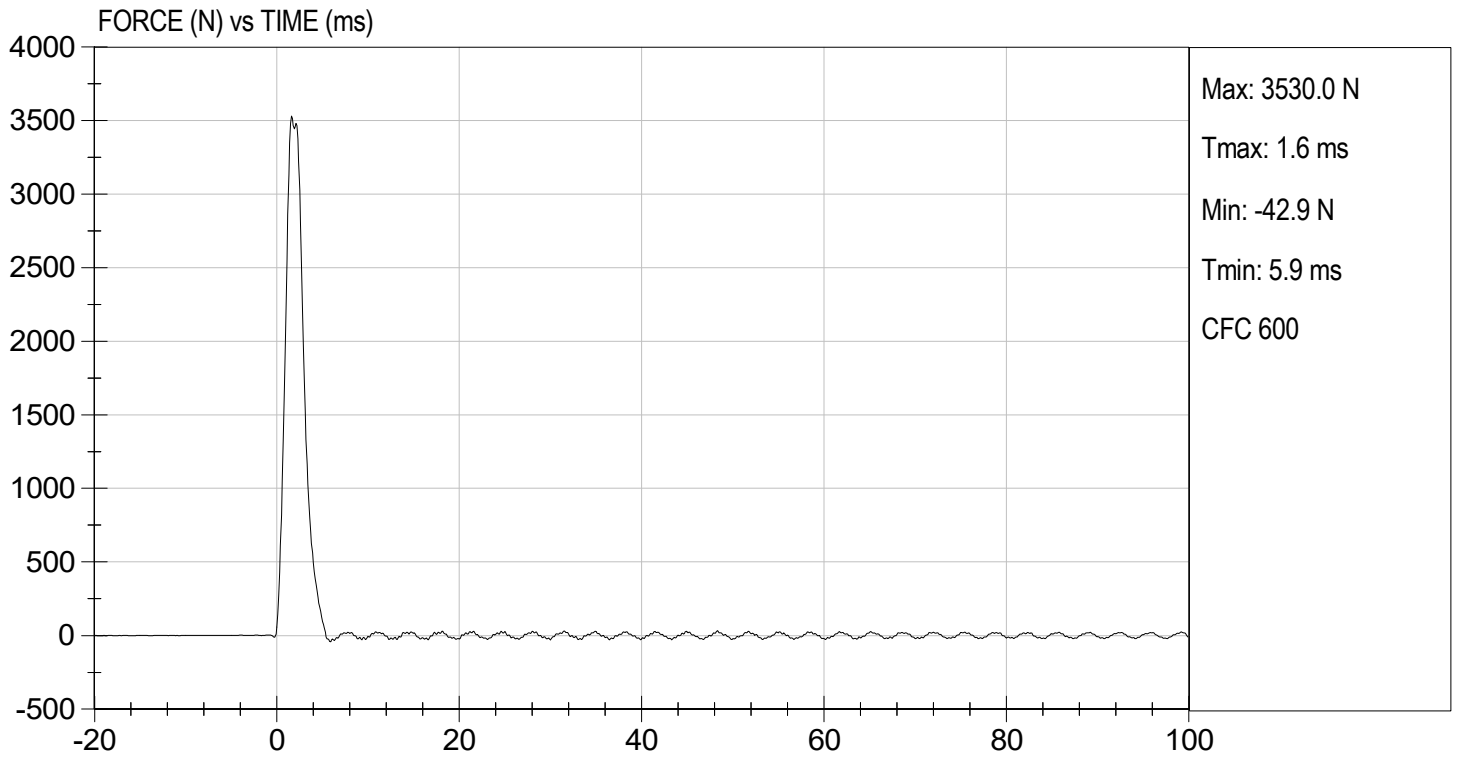
01/25/2023  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



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

TEST DATE: 01/25/2023  
TEST #: D230235



**MGA RESEARCH CORPORATION**

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

**ATD Serial No:** 142

**Test I.D.:** D230236

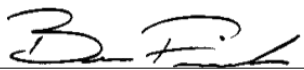
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3895	Pass
Overall Test Results				Pass



Laboratory Technician

01/25/2023

Test Date

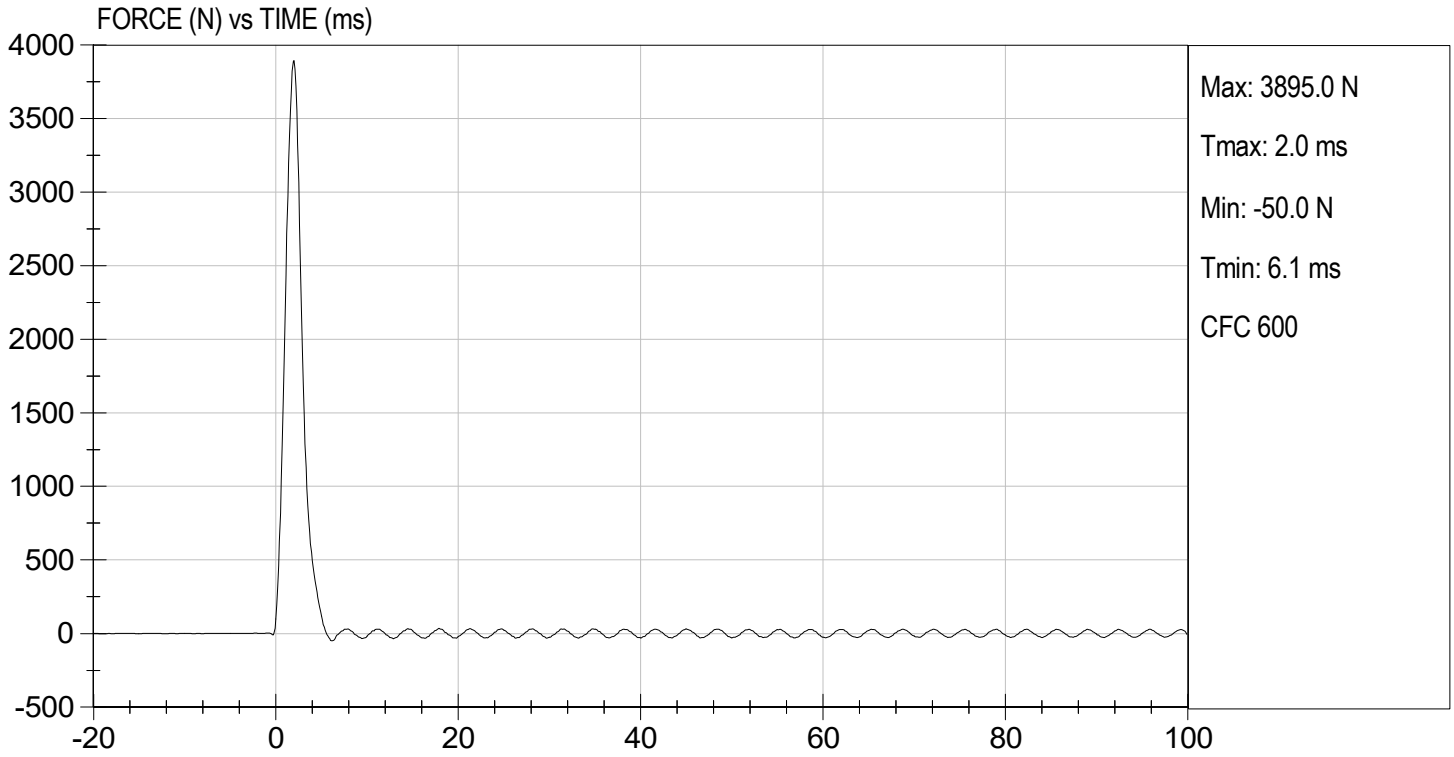


Approved By



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

TEST DATE: 01/25/2023  
TEST #: D230236



**MGA RESEARCH CORPORATION**  
**TORSO FLEXION TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 142

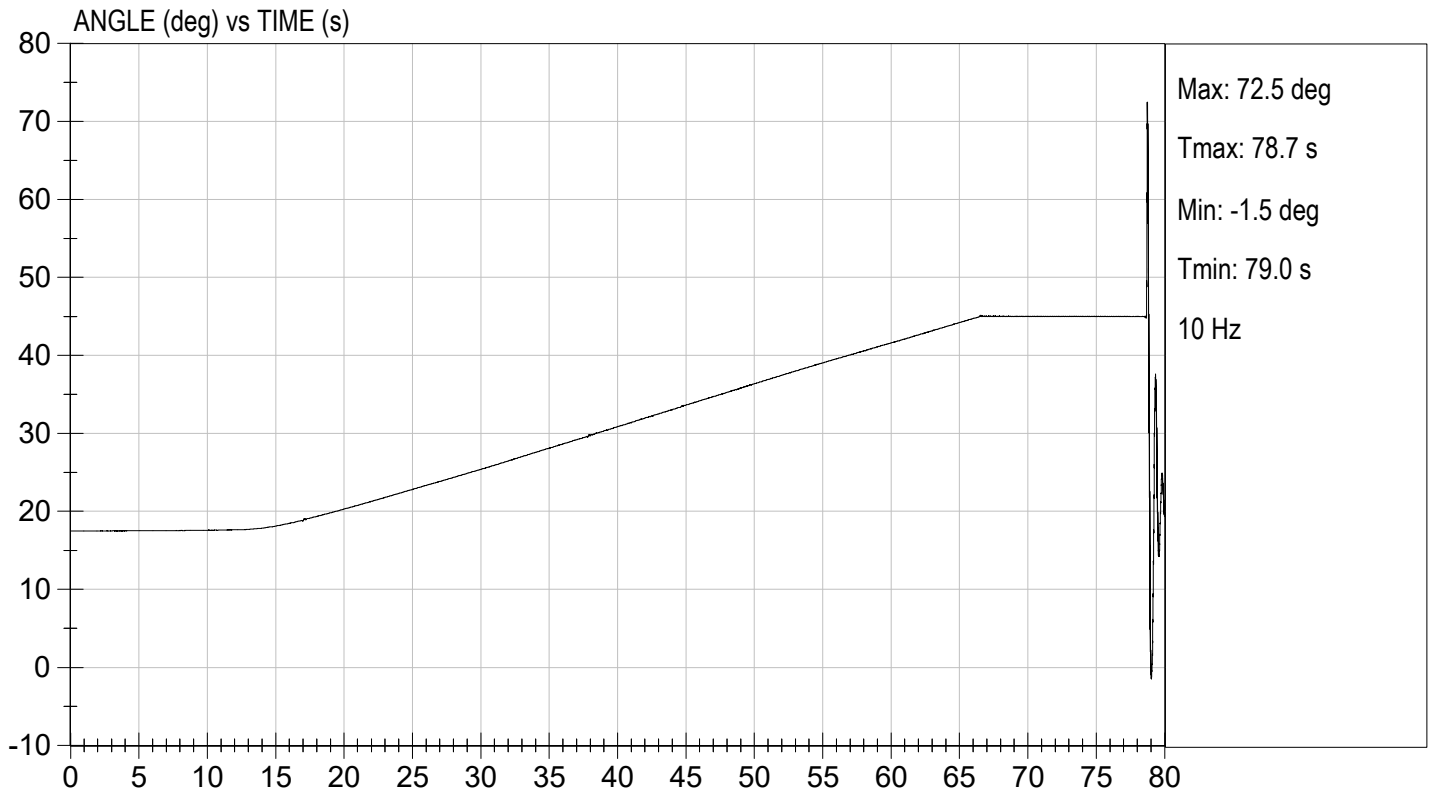
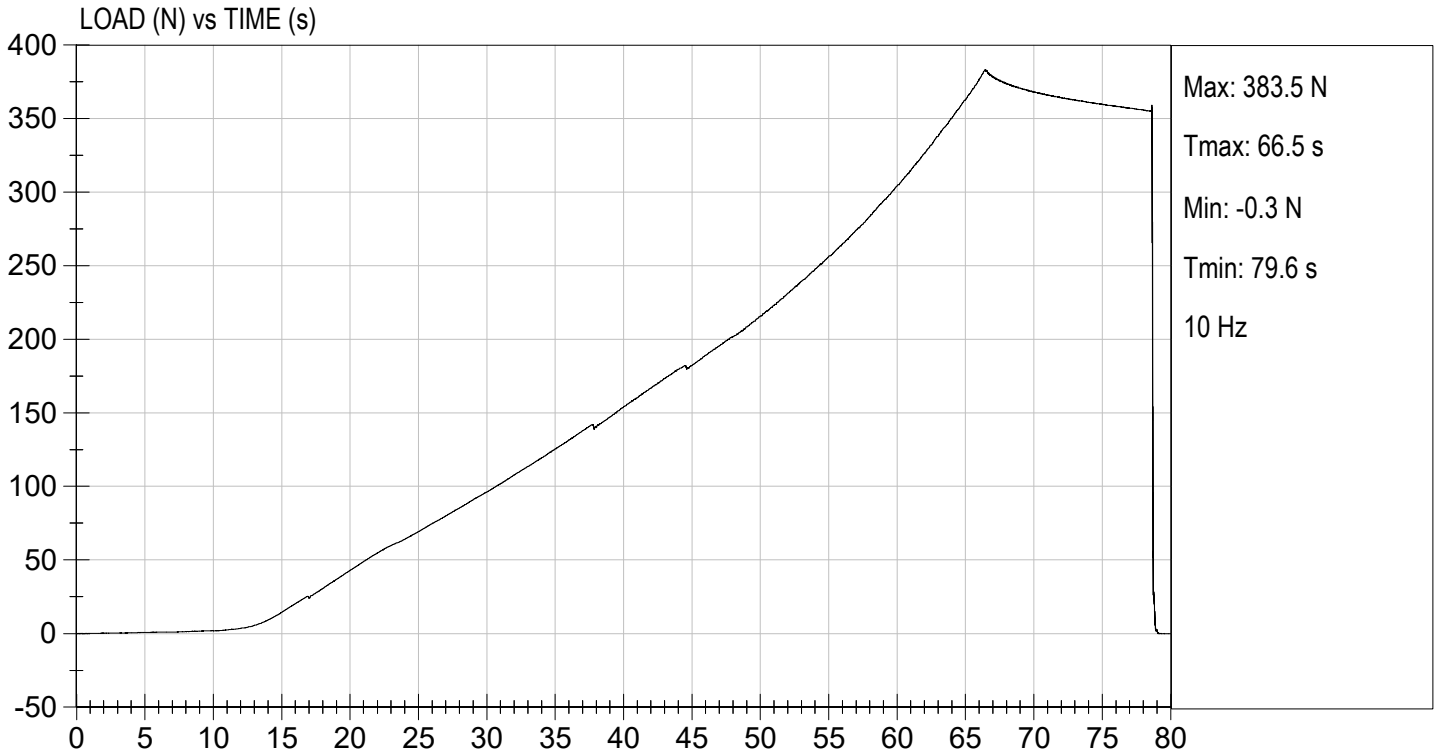
Test I.D: D230237

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	26	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	2	Pass
Force at 45 deg	N	320 to 390	383	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.5	Pass
<b>Overall Result</b>				<b>Pass</b>

  
 \_\_\_\_\_  
 Laboratory Technician

01/25/2023  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



**APPENDIX D**  
**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA**

**TABLE 1 – DRIVER DUMMY INSTRUMENTATION**

Instrument Location			Axis	Hybrid III 50 <sup>th</sup> 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	SBG157	FTSS	11/13/2019
			Shoulder	SBG161	FTSS	11/13/2019

**TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION**

Instrument Location			Axis	Hybrid III 5 <sup>th</sup> S/N 142		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary		X	P94799	Endevco	10/10/2022
			Y	P94800	Endevco	10/10/2022
			Z	P94801	Endevco	10/10/2022
	Redundant		X	P94802	Endevco	10/10/2022
			Y	P94803	Endevco	10/10/2022
			Z	P97377	Endevco	10/10/2022
Head Angular Rate Sensors			X	ARS7413	DTS	03/14/2022
			Y	ARS7602	DTS	03/14/2022
			Z	ARS15229	DTS	03/15/2022
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG2203	Denton	03/23/2022
Chest Accelerometers	Primary		X	P88719	Endevco	10/10/2022
			Y	P94785	Endevco	10/10/2022
			Z	P94793	Endevco	10/10/2022
	Redundant		X	P95322	Endevco	10/10/2022
			Y	P95370	Endevco	10/10/2022
			Z	T30901	Endevco	10/10/2022
Chest Potentiometer			X	142	Humanetics	10/11/2022
Pelvis Accelerometers			X	P82646	Endevco	10/10/2022
			Y	P94798	Endevco	10/10/2022
			Z	P97705	Endevco	10/10/2022
Femur Load Cells	Right	Primary	Z	FG126P	Denton	10/11/2022
		Redundant	Z	FG126R	Denton	10/11/2022
	Left	Primary	Z	FG127P	Denton	10/11/2022
		Redundant	Z	FG127R	Denton	10/11/2022
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG408	Denton	03/23/2022
		Lower	Mx, My, Fz	AG116	Denton	03/23/2022
	Left	Upper	Mx, My, Fz	TG480	Denton	03/23/2022
		Lower	Mx, My, Fz	AG502	Denton	03/23/2022
Foot Accelerometers	Right	Rear	X	P94795	Endevco	10/10/2022
			Z	P94796	Endevco	10/10/2022
		Front	Z	P94797	Endevco	10/10/2022
	Left	Rear	X	P83167	Endevco	10/10/2022
			Z	P83168	Endevco	10/10/2022
		Front	Z	P83169	Endevco	10/10/2022
Seat Belt Load Cells			Lap	SBG272	FTSS	11/13/2019
			Shoulder	SBG273	FTSS	11/13/2019

**TABLE 3 – VEHICLE INSTRUMENTATION**

Instrument Location			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember / Rear Seat Accelerometers	Left	Primary	X	A405502	MSI	12/15/2022
			Z	A416903	MSI	12/15/2022
		Redundant	X	A370260	MSI	12/15/2022
	Right	Primary	X	A377301	MSI	12/21/2022
			Z	A390880	MSI	12/21/2022
		Redundant	X	A361022	MSI	12/21/2022
Engine Accelerometers		Top	X	A340210	MSI	12/15/2022
		Bottom	X	A377307	MSI	08/10/2022