

REPORT NUMBER: NCAP-MGA-22-018

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

**HYUNDAI MOTOR MANUFACTURING ALABAMA, LLC
2022 Hyundai Tucson SEL AWD 5-Door SUV
NHTSA No.: O20224200**

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



Test Date: February 25, 2022

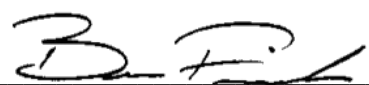
Final Report Date: April 3, 2023

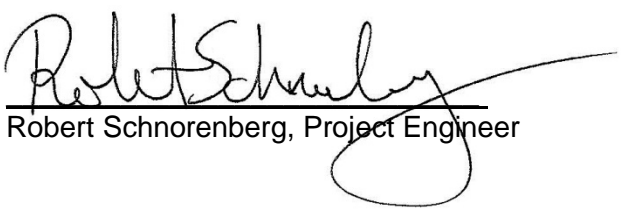
FINAL REPORT

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

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Prepared by: 
Ben Fischer, Program Manager

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: April 3, 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: _____

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16. Abstract A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2022 Hyundai Tucson SEL AWD 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on February 25, 2022. The impact velocity of the vehicle was 56.05 km/h and the ambient temperature at the barrier face at the time of impact was 21.5°C. The target vehicle post-test maximum crush was 574 mm located to the right of the vehicle centerline. The test vehicle's performance was as follows:																																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>364</td> <td>700</td> <td>325</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>24</td> <td>52</td> <td>11</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.24</td> <td>1</td> <td>0.35</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>728</td> <td>2620</td> <td>555</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>61</td> <td>2520</td> <td>262</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>122</td> <td>6805</td> <td>226</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>269</td> <td>6805</td> <td>56</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	364	700	325	Maximum Chest Compression	mm	63	24	52	11	Nij		1	0.24	1	0.35	Neck Tension	N	4170	728	2620	555	Neck Compression	N	4000	61	2520	262	Left Femur Force	N	10008	122	6805	226	Right Femur Force	N	10008	269	6805	56
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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 2022 Hyundai Tucson SEL AWD 5-Door SUV at a velocity of 56.05 km/h. The test was performed at MGA Research Corporation on February 25, 2022. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. A seat belt load cell was installed on the driver's shoulder belt to measure dummy torso 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 631 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 574 mm located to the right of the vehicle centerline and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

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

The occupant data is summarized below:

ATD position	HIC₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	364	0.24	728	61	43.6	24	122	269
Passenger (5 th)	325	0.35	555	262	51.2	11	226	56

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

TEST NOTES

Driver Lap Belt load cell was not installed.

Passenger Shoulder and Lap Belt load cells were not installed.

Top of Engine X recorded no valid data after 30 ms.

Barrier C-01 Fx recorded no valid data.

Barrier C-02 Fx, My recorded no valid data.

Barrier C-08 Fx recorded questionable data.

Barrier C-15 Fx recorded questionable data.

Barrier D-05 Fx recorded questionable data.

Barrier D-14 Fx recorded questionable data.

Barrier I-05 My recorded no valid data.

Barrier K-03 Fx recorded questionable 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: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20224200	Traction Control System (TCS)	Yes
Model Year	2022	Power Steering	Yes
Make	Hyundai	Power Window Auto-Reverse	Yes
Model	Tucson SEL AWD	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	5NMJBCAE7NH055921	Driver Head/Torso Airbag	No
Body Color	Phantom Black	Driver Torso Airbag	No
Odometer (km/mi)	394 km / 245 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.5 L	Driver Pelvis Airbag	No
Type/No. Cylinders	Inline 4	Driver Knee Airbag	No
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	8	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	AWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Front Pass. Knee Airbag	No
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	HYUNDAI MOTOR MANUFACTURING ALABAMA, LLC	GVWR (kg)	2160
		GAWR Front (kg)	1260
Date of Manufacture	Oct/11/21	GAWR Rear (kg)	1200

VEHICLE SEATING AND WEIGHT CAPACITY DATA

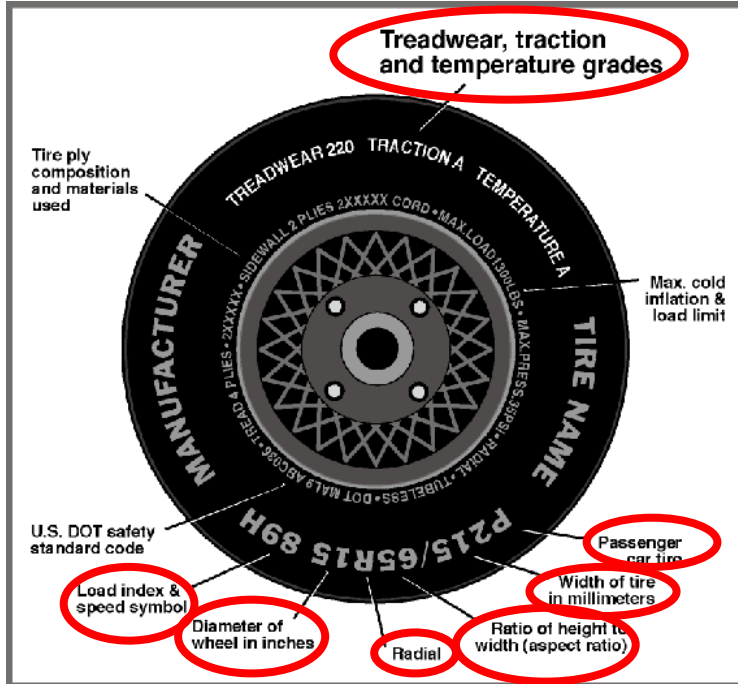
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contoured		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				420
Cargo Weight (RCLW) (kg)				80

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/65R17	235/65R17
Tire Size on Vehicle	235/65R17	235/65R17
Tire Manufacturer	Nexen	Nexen
Tire Model	Roadian	Roadian
Treadwear	600	600
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	104H	104H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1UA9Y BMBL 1721	1UA9Y BAML 1721
DOT Safety Code Right	1UA9Y CAEL 1721	1UA9Y AAML 1721

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	486.5	329.5		512.5	419.5	
Right	kg	453.5	341.5		468.5	424.5	
Ratio	%	58.3%	41.7%		53.8%	46.2%	
Totals	kg	940.0	671.0	1611.0	981.0	844.0	1825.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1611.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	80
Calculated Test Vehicle Target Weight (TVTW)	kg	1832.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	805	806	830	827	1147
As Tested	mm	792	791	781	787	1274
Post Test	mm	860	930	754	802	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2755
Total Vehicle Length at Left Side	mm	4527
Total Vehicle Length at Centerline	mm	4632
Total Vehicle Length at Right Side	mm	4527
Weight of Ballast in Cargo Area	kg	84
Weight of Vehicle Components Removed	kg	30
Amount of Stoddard Solvent in Fuel Tank	L	50.3

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, RR taillight, underbody plastic.

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4632
2	Total Width	1865
3	Bumper Top Height	616
4	Bumper Bottom Height	516
5	Longitudinal Member Top Height	621
6	Distance between Longitudinal Members	930
7	Longitudinal Member Width	72
8	Engine Top Height	909
9	Engine Bottom Height	390
10	Engine and Gearbox Width	789
11	Front Bumper-Engine Distance	430
12	Front Shock Absorber Fixing Height	980
13	Bonnet Leading Edge Height	900
14	Front Shock Absorber Fixing Width	1175
15	Front Bumper – Front Axle Distance	750
16	Front Axle – A-Pillar Distance	522
17	A-Pillar – B-Pillar Distance	1040
18	B-Pillar – Rear Axle Distance	1181
19	B-Pillar – C-Pillar Distance	1085
20	Roof Sill Bottom Height	1595
21	Roof Sill Top Height	1645
22	Floor Sill Bottom Height	369
23	Floor Sill Top Height	438

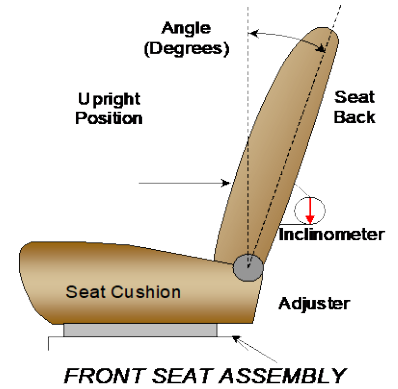
**DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

NOMINAL DESIGN RIDING POSITION

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



	Degrees
Driver Seat Back Angle	1.0° on outboard headrest post
Passenger Seat Back Angle	-1.4° on outboard headrest post

SEAT FORE/AFT POSITIONS

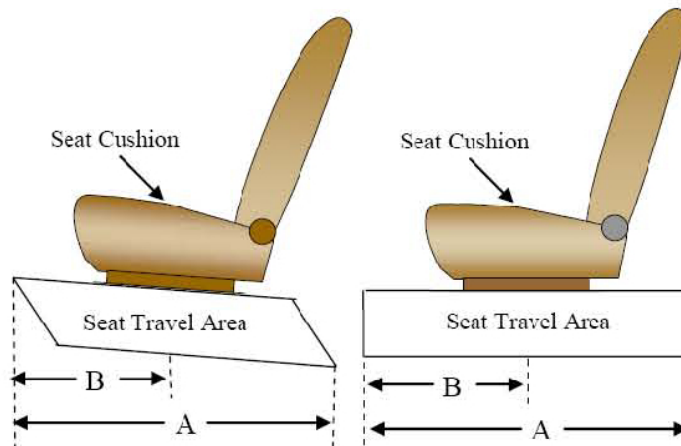
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	304 mm	152 mm
Passenger Seat	240 mm / 38 detents (1 st as 1)	0 mm / 0 th detent (1 st as 0)

SEAT BELT UPPER ANCHORAGES

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

	Total # of Positions	Placed in Position #
Driver Seat	4 (1 st as 1)	0 (1 st as 0)
Passenger Seat	4 (1 st as 1)	0 (1 st as 0)



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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

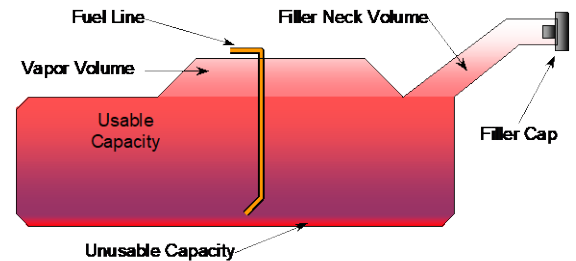
NHTSA No.: O20224200
 Test Date: 2/25/2022

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	54.1
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	49.8 to 50.9
Actual Amount of Solvent used	50.3
1/3 of Usable Capacity	18.0

FUEL PUMP

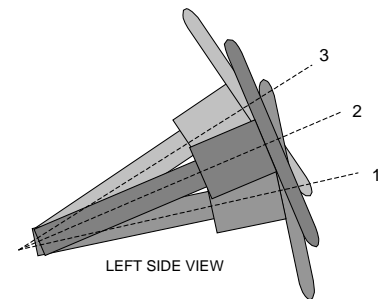
The vehicle is equipped with an electronic fuel pump. The fuel pump will run when the engine is running. The pump will also briefly run when the ignition key is turned to the "on" position. The filler neck is located on the driver's side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

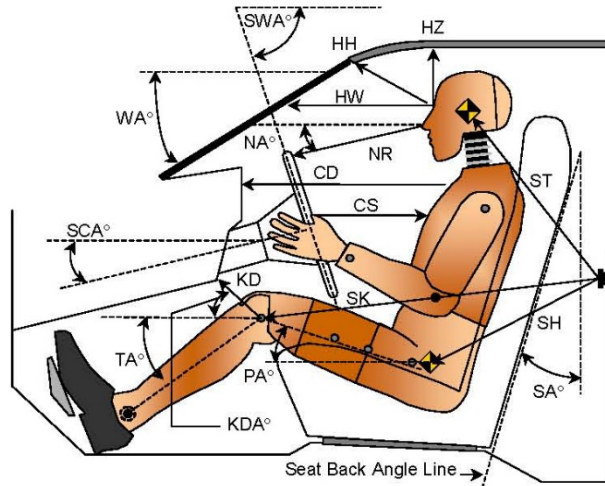
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	66.9	
Geometric Center Position 2	64.4	
Uppermost Position 3	61.9	
Telescoping Steering Wheel Travel		52
Test Position	64.4	26

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022



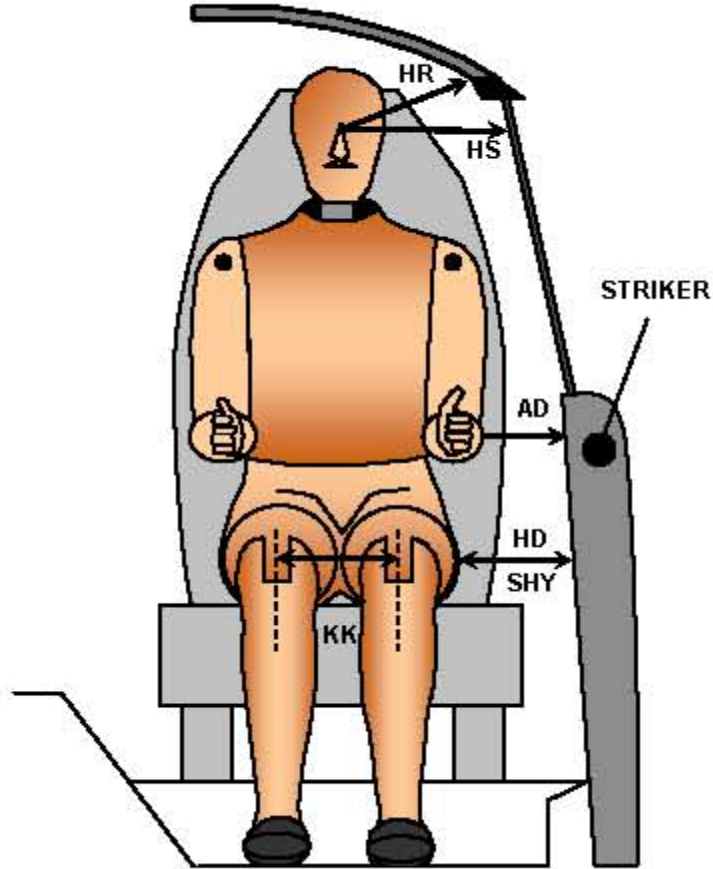
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		24.8		
SWA°	Steering Wheel Angle		64.4		
SCA°	Steering Column Angle		25.6		
SA°	Seat Back Angle		1.0		-1.4
HZ	Head to Roof (Z)	196	90	238	90
HH	Head to Header	343	22.1	316	43.9
HW	Head to Windshield	647	0	676	0
NR	Nose to Rim	389	14.7		
CD	Chest to Dash	526		427	
CS	Chest to Steering Hub	303	6.0		
RA	Rim to Abdomen	189	0		
KDL	Left Knee to Dash	179	26.5	138	29.0
KDR	Right Knee to Dash	190	27.9	133	28.6
PA°	Pelvic Angle		22.9		21.9
TA°	Tibia Angle		45.0		53.7
SK	Striker to Knee	594	98.6	680	101.7
ST	Striker to Head	447	12.0	445	30.0
SH	Striker to H-Point	270	120.4	414	117.7

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022



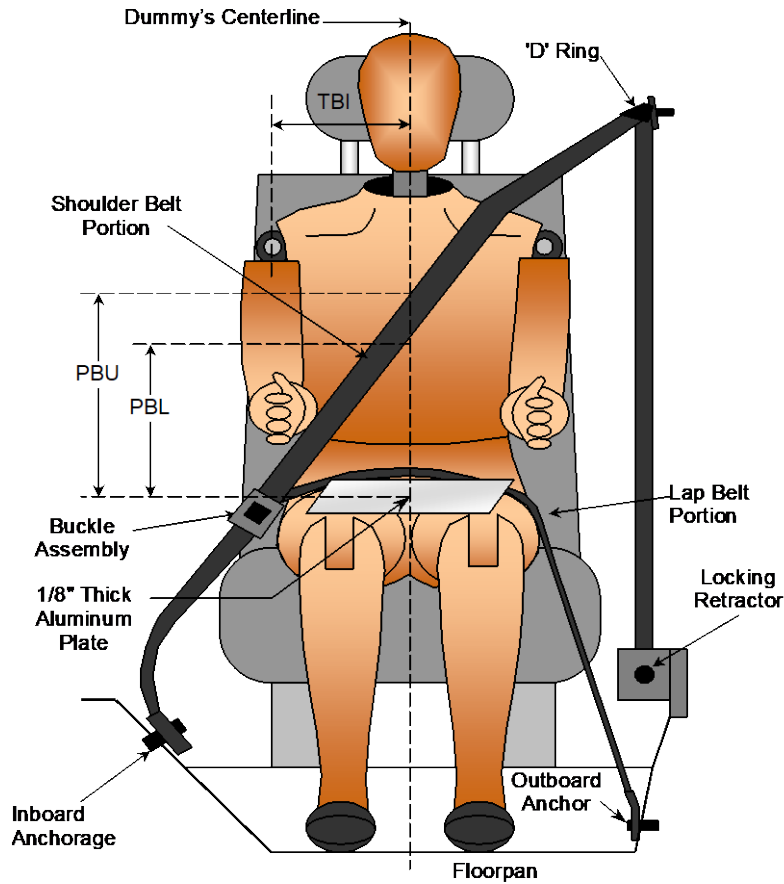
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	133	77
HD	H-Point to Door	143	209
HR	Head to Side Header	213	268
HS	Head to Side Window	338	370
KK	Knee to Knee	352	227
SHY	Striker to H-Point (Y Direction)	290	271
AA	Ankle to Ankle	338	169

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	370	360
PBL - Top surface of reference to belt lower edge	mm	295	270

BELT LENGTH DATA

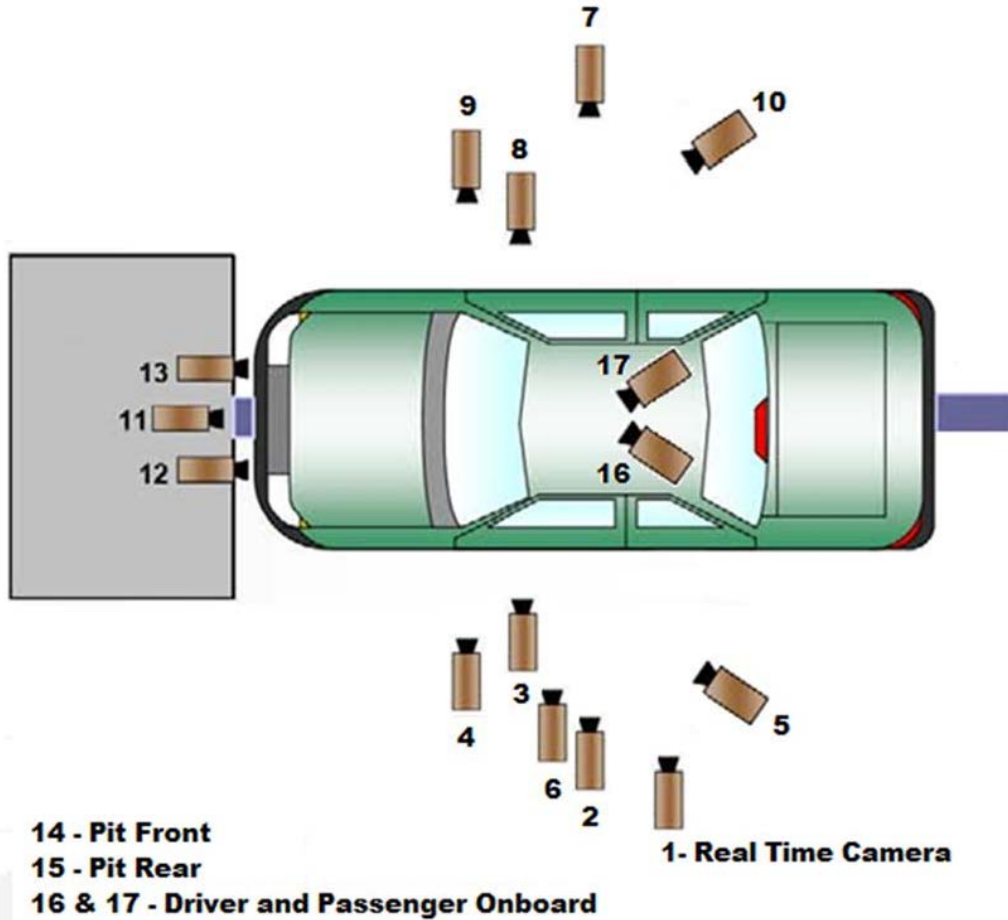
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	890	915
Lap Belt Length as measured on ATD	mm	575	885
Remainder of belt on reel	mm	735	600
Total Belt Length for Continuous Webbing Systems	mm	3000	3200

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
Test Date: 2/25/2022

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: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

CAMERA LOCATIONS

No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2195	-5885	-1405	12	1000
3	Driver Close-Up	-1625	-6695	-1800	50	1000
4	Left Front Half	-1340	-5555	-1360	24	1000
5	Left Angle	-7195	-5820	-1995	75	1000
6	Steering Column	-920	-5510	-1275	50	1000
7	Right Overall	-2260	5970	-1390	12	1000
8	Passenger Close-Up	-1650	7120	-1850	50	1000
9	Right Front Half	-1280	5470	-1360	24	1000
10	Right Angle	-7480	5390	-1990	75	1000
11	Windshield	130	0	-2310	12	1000
12	Driver Windshield	180	-370	-2230	25	1000
13	Passenger Windshield	180	370	-2230	25	1000
14	Pit Front	-945	0	3340	24	1000
15	Pit Rear	-2800	0	3340	24	1000
16	Driver Onboard				12	1000
17	Passenger Onboard				12	1000
18	Real-Time Pan View					30

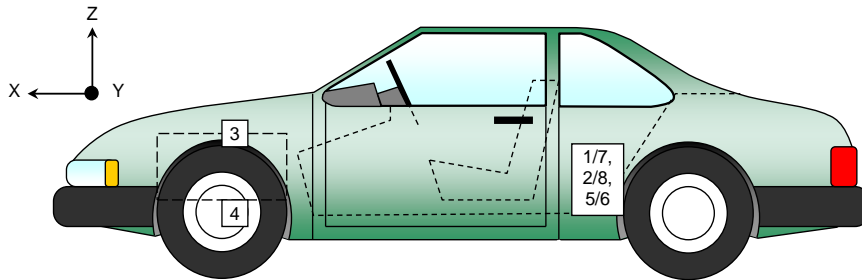
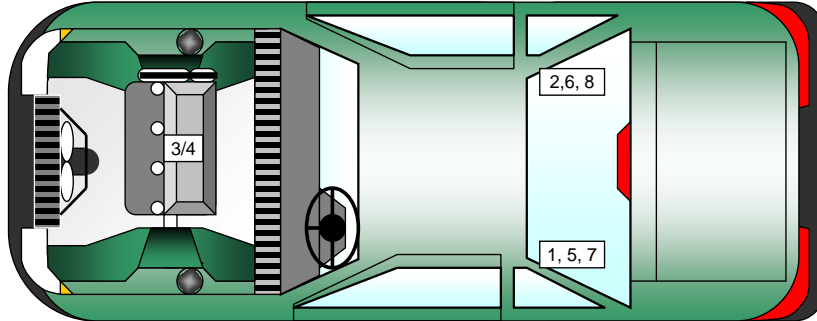
*COORDINATES:

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

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1769	-340	-379
2	Right Rear Crossmember Accelerometer – X Direction	1769	340	-379
3	Engine Top X	3928	180	-935
4	Engine Bottom X	3912	0	-356
5	Left Rear Crossmember Accelerometer – Z Direction	1769	-340	-379
6	Right Rear Crossmember Accelerometer – Z Direction	1769	340	-379
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1769	-385	-422
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1769	385	-422

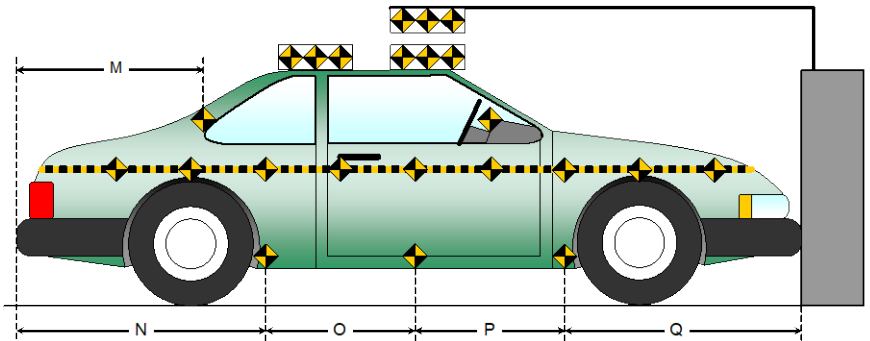
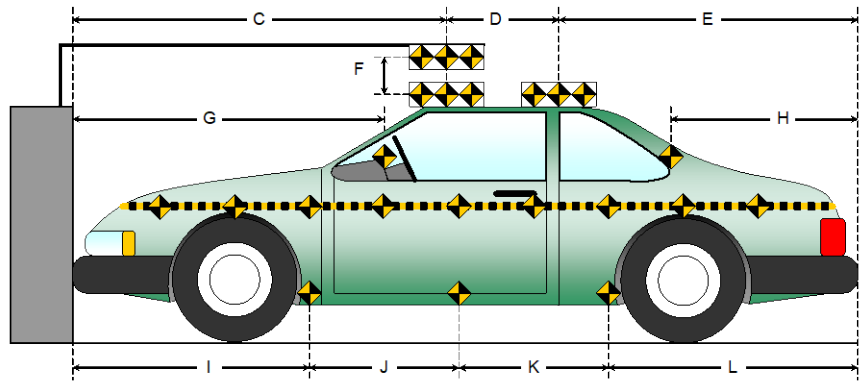
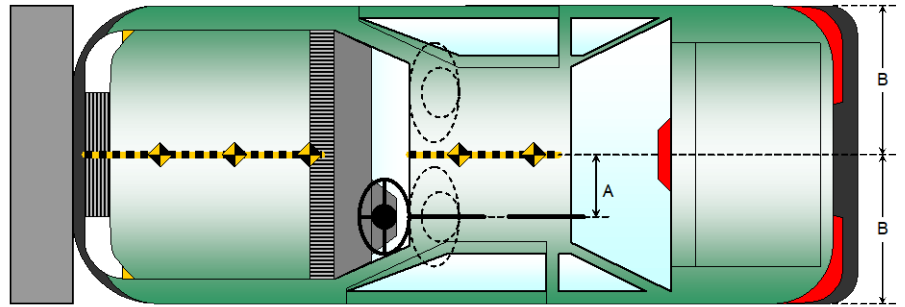
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
Test Date: 2/25/2022

Item	Value (mm)
A	390
B	933
C	2285
D	610
E	1737
F	110
G	
H	653
I	1410
J	855
K	855
L	1512
M	653
N	1512
O	855
P	855
Q	1410



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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

ADVANCED RESEARCH LOAD CELL BARRIER

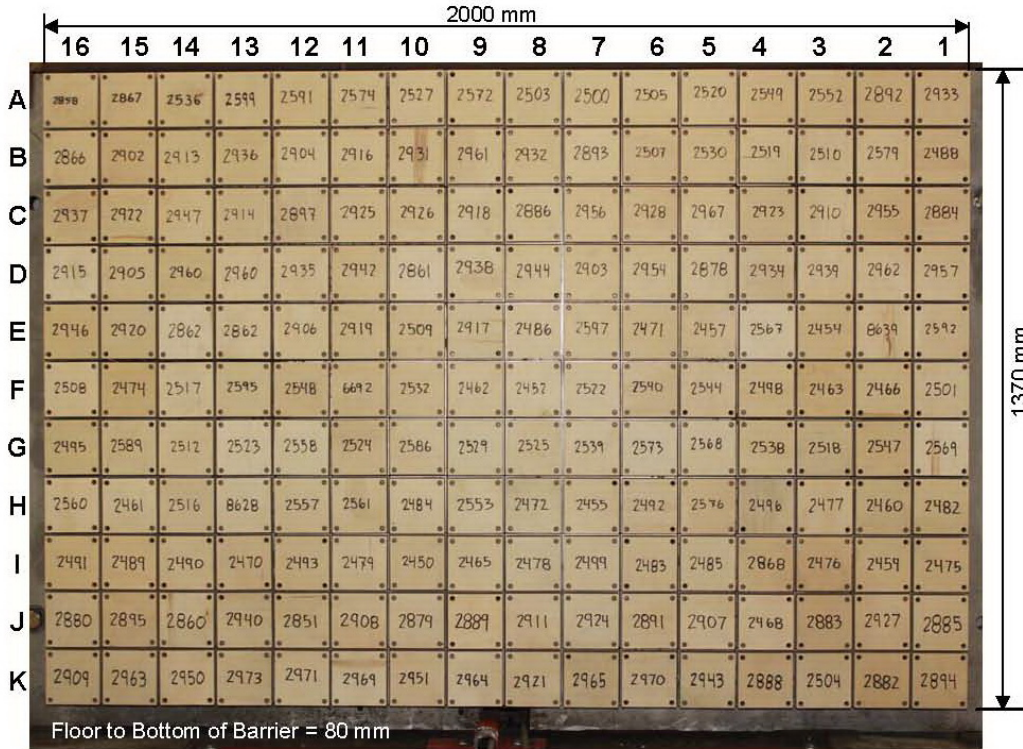


Photo for Reference Only

Centerline

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

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

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Data Channels	48
Passenger Dummy Data Channels	47
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	631

CAMERA COVERAGE

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

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

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

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

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

OTHER VEHICLE POST-TEST OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Cracked by passenger airbag
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	2942
Center	mm	2952
Right Side	mm	2847
Average	mm	2914

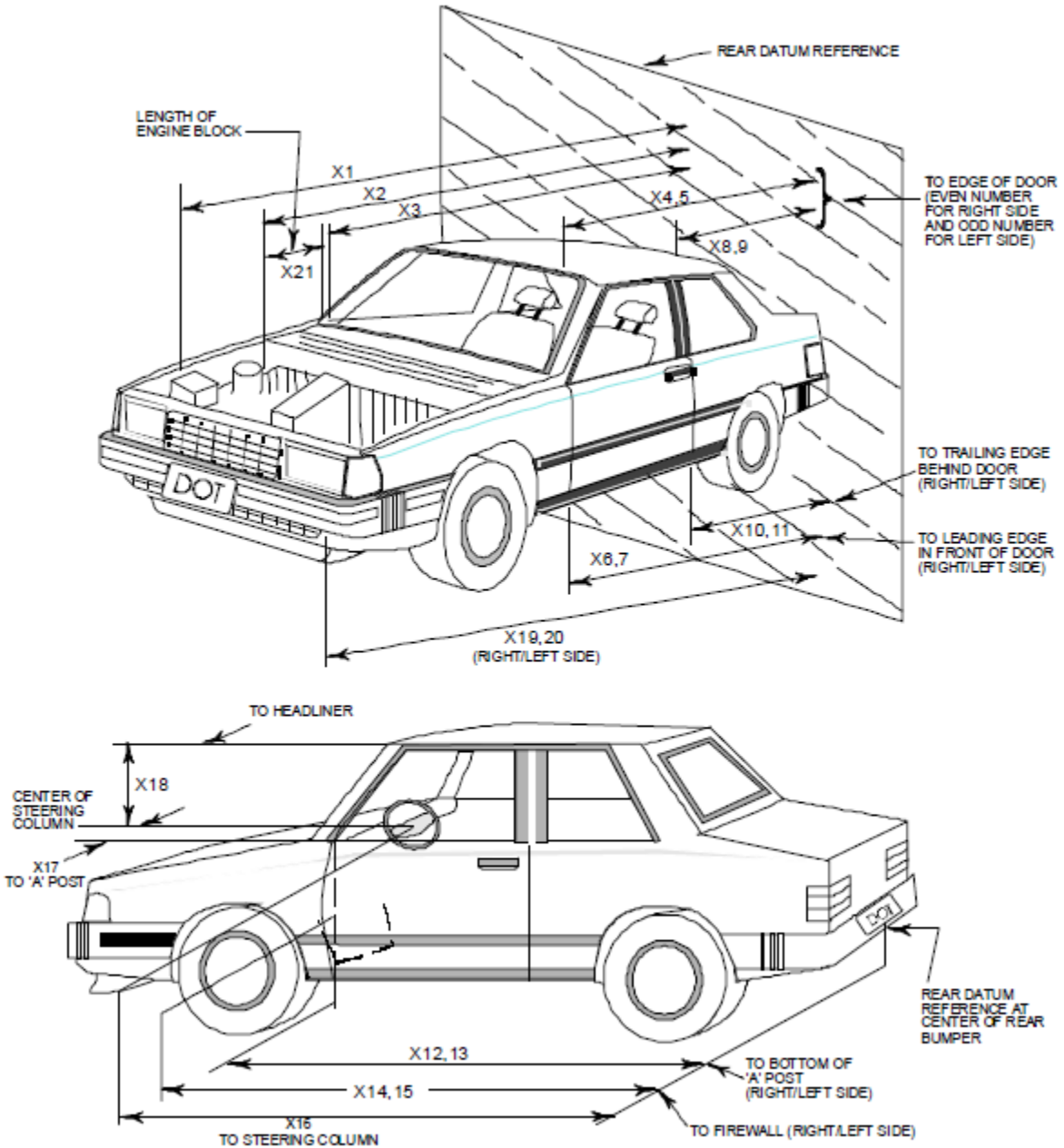
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	
Other				

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022



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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
Test Date: 2/25/2022

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	4632	4218	-414
2	RSOV to Front of Engine	4077	4030	-47
3	RSOV to Firewall	3646	3625	-21
4	RSOV to Upper Leading Edge of Right Door	3206	3241	35
5	RSOV to Upper Leading Edge of Left Door	3206	3196	-10
6	RSOV to Lower Leading Edge of Right Door	3196	3220	24
7	RSOV to Lower Leading Edge of Left Door	3196	3171	-25
8	RSOV to Upper Trailing Edge of Right Door	2143	2190	47
9	RSOV to Upper Trailing Edge of Left Door	2143	2133	-10
10	RSOV to Lower Trailing Edge of Right Door	2158	2195	37
11	RSOV to Lower Trailing Edge of Left Door	2158	2149	-9
12	RSOV to Bottom of "A" Post of Right Side	3191	3181	-10
13	RSOV to Bottom of "A" Post of Left Side	3189	3112	-77
14	RSOV to Firewall, Right Side	3670	3662	-8
15	RSOV to Firewall, Left Side	3670	3618	-52
16	RSOV to Steering Column	2734	2808	74
17	Center of Steering Column to "A" Post	384	400	16
18	Center of Steering Column to Headliner	440	510	70
19	RSOV to Right Side of Front Bumper	4527	4213	-314
20	RSOV to Left Side of Front Bumper	4527	4150	-377
21	Length of Engine Block	471	511	40
RD	RSOV to Right Side of Dash Panel	3011	3032	21
CD	RSOV to Center of Dash Panel	3016	3000	-16
LD	RSOV to Left Side of Dash Panel	3011	3008	-3

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: 2022 Hyundai Tucson SEL AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

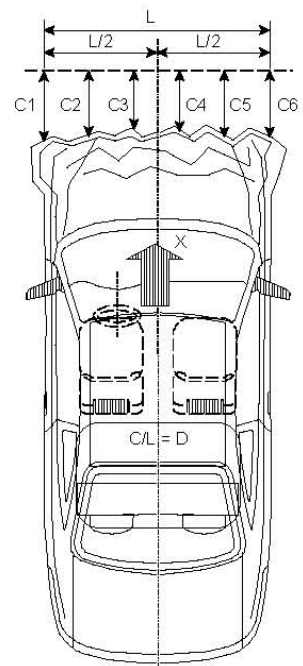
NHTSA No.: O20224200
Test Date: 2/25/2022

VEHICLE INFORMATION

VIN:	<u>5NMJBCAE7NH055921</u>	Wheelbase (mm):	<u>2755</u>
Vehicle Size Category:	<u>MPV</u>	Test Weight (kg):	<u>1825.0</u>

ACCELEROMETER DATA

Accelerometer Locations:	<u>As per Data Sheet No. 7</u>
Cal. Procedure/Interval:	<u>MGA Procedure / 6 month</u>
Integration Algorithm:	<u>Trapezoidal</u>
Linearity:	<u>> 99%</u>
Impact Velocity (km/h):	<u>56.05</u>
Velocity Change (km/h):	<u>66.5</u>
Time of Separation (msec)	<u>96</u>



CRUSH PROFILE

Collision Deformation Classification:	<u>12FDEW3</u>
Midpoint of Damage:	<u>Centerline</u>
Damage Region Length (mm):	<u>1215</u>
Impact Mode:	<u>Frontal</u>

No.	Measurement Description	Units	Pre-Test	Post-Test	Exterior Crush
C1	Crush zone 1 at left side	mm	4527	4150	377
C2	Crush zone 2 at left side	mm	4614	4194	420
C3	Crush zone 3 at left side	mm	4630	4206	424
C4	Crush zone 4 at right side	mm	4630	4158	472
C5	Crush zone 5 at right side	mm	4614	4235	379
C6	Crush zone 6 at right side	mm	4527	4213	314
L	C1 TO C6	mm	1215	1204	11

* 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: 2022 Hyundai Tucson SEL AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

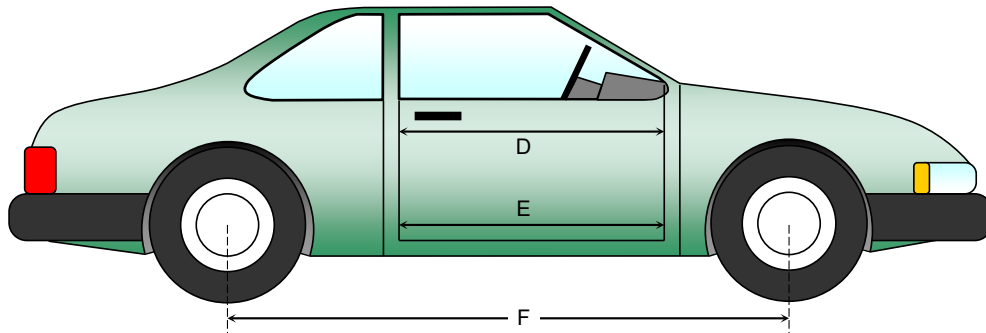
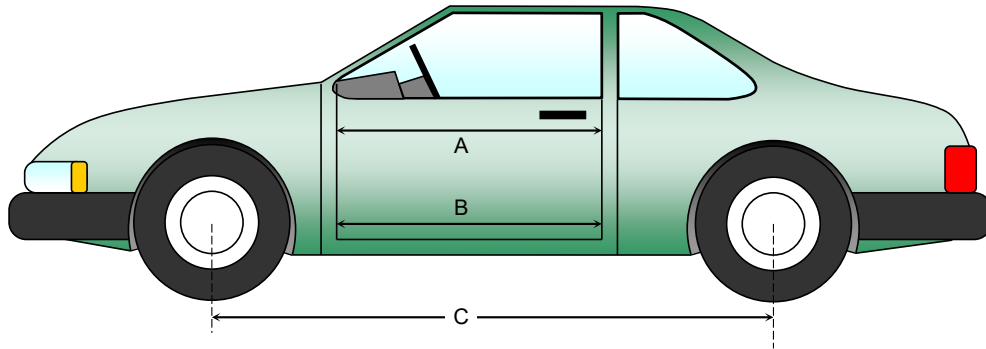
NHTSA No.: O20224200
Test Date: 2/25/2022

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	962	963	1
B	Left Side Lower	mm	874	873	-1
D	Right Side Upper	mm	964	963	-1
E	Right Side Lower	mm	860	858	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	2755	2678	-77
F	Right Side Wheelbase	mm	2755	2692	-63



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

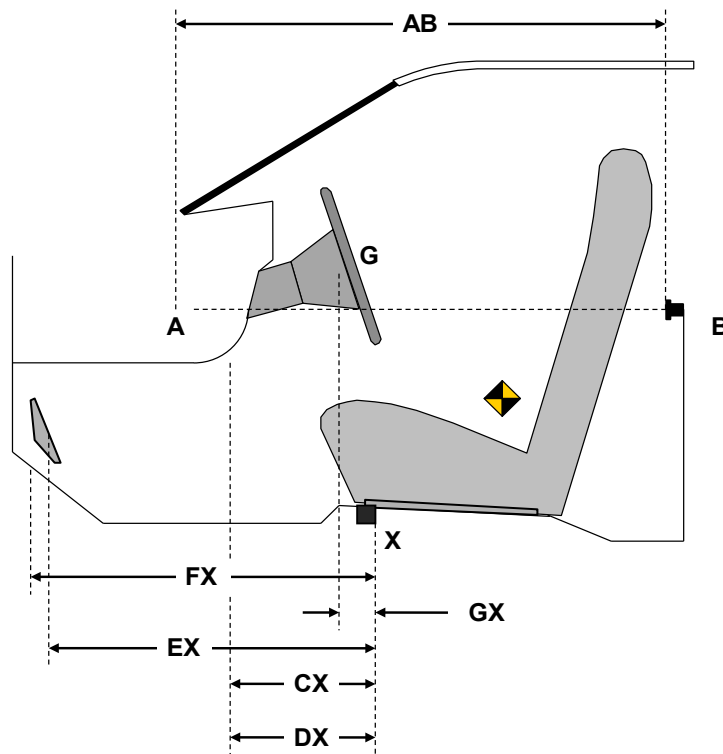
Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	787	785	-2
CX	Left Knee Bolster to X	mm	251	259	8
DX	Right Knee Bolster to X	mm	264	266	2
EX	Brake Pedal to X	mm	526	505	-21
FX	Foot Rest to X	mm	539	525	-14
GX	Center of Steering Column Wheel Hub to X	mm	25	67	42

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

WINDSHIELD MOUNTING DETAILS

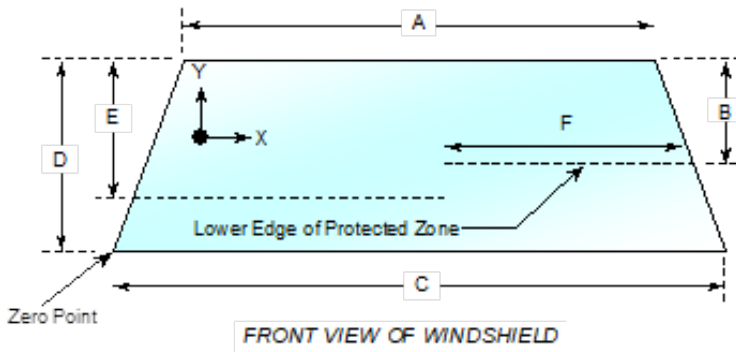
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.5°C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2217	2217	100
Right Side	2217	2217	100
Total	4434	4434	100



Item	Units	Value
A	mm	1256
B	mm	512
C	mm	1538
D	mm	820
E	mm	514
F	mm	515

AREA OF PROTECTED ZONE FAILURES

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

X	Y

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

X	Y

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

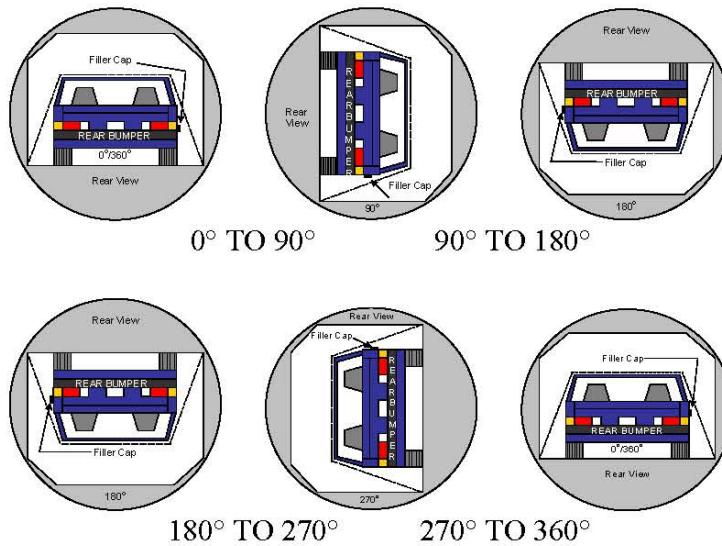
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.5°C

Test Time: 12:07 p.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°	110	300	410
180° to 270°	108	300	408
270° to 360°	110	300	410

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

Test Vehicle: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022

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	

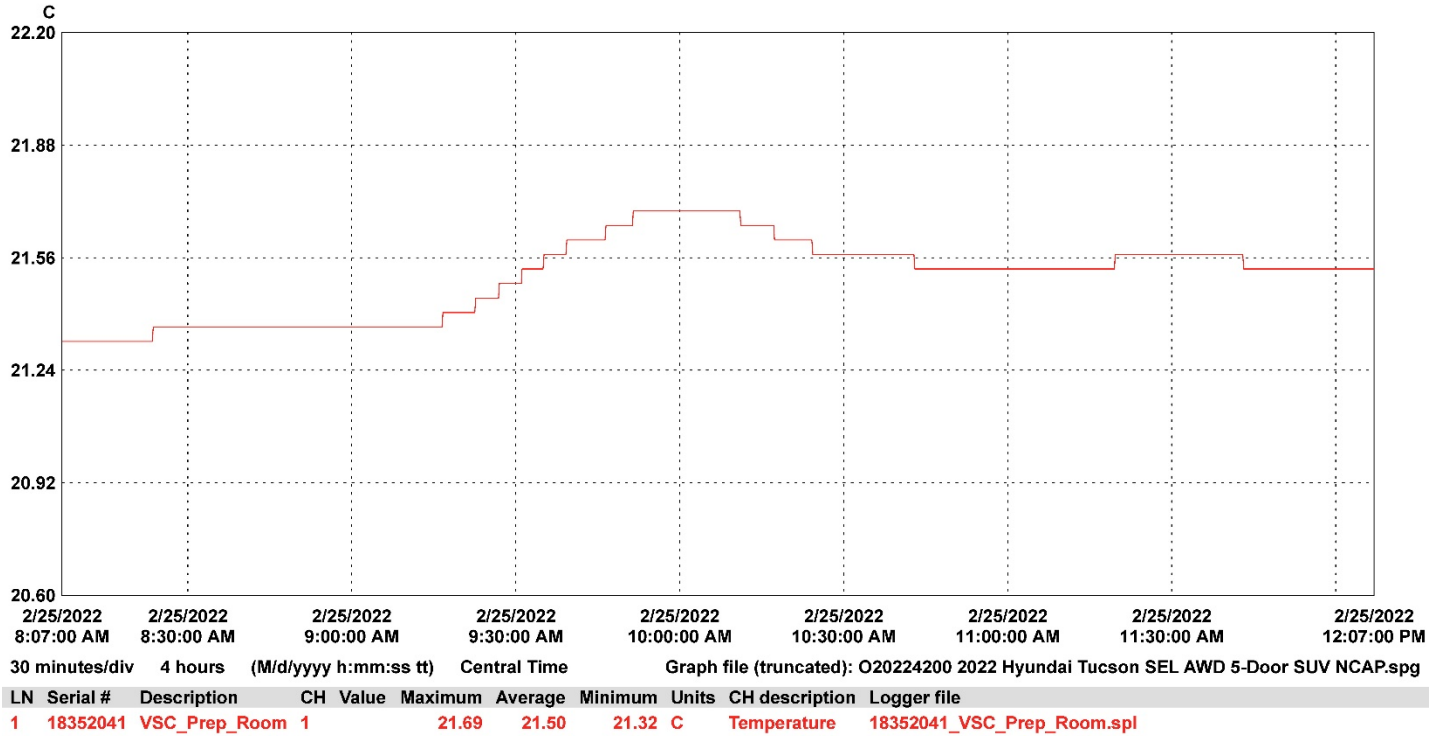
SOLVENT SPILLAGE LOCATION TABLE

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: 2022 Hyundai Tucson SEL AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20224200
 Test Date: 2/25/2022



**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. 005a	Vehicle Load Carrying Capacity Reduction Label	A-3
Photo No. 006	2022 Hyundai Tucson SEL AWD 5-Door SUV Frontal As Delivered	A-4
Photo No. 007	Left Rear 3-4 View, As Received	A-4
Photo No. 008	Pre-Test Front View of Test Vehicle	A-5
Photo No. 009	Post-Test Front View of Test Vehicle	A-5
Photo No. 010	Pre-Test Left View of Test Vehicle	A-6
Photo No. 011	Post-Test Left View of Test Vehicle	A-6
Photo No. 012	Pre-Test Right View of Test Vehicle	A-7
Photo No. 013	Post-Test Right View of Test Vehicle	A-7
Photo No. 014	Pre-Test Right Front 3-4 View	A-8
Photo No. 015	Post-Test Right Front 3-4 View	A-8
Photo No. 016	Pre-Test Left Rear 3-4 View	A-9
Photo No. 017	Post-Test Left Rear 3-4 View	A-9
Photo No. 018	Pre-Test Windshield View	A-10
Photo No. 019	Post-Test Windshield View	A-10
Photo No. 020	Pre-Test Engine Compartment View	A-11
Photo No. 021	Post-Test Engine Compartment View	A-11
Photo No. 022	Pre-Test Fuel Filler Cap View	A-12
Photo No. 023	Post-Test Fuel Filler Cap View	A-12
Photo No. 024	Pre-Test Front Underbody View	A-13
Photo No. 025	Post-Test Front Underbody View	A-13
Photo No. 026	Pre-Test Rear Underbody View	A-14
Photo No. 027	Post-Test Rear Underbody View	A-14
Photo No. 028	Pre-Test Dummy Cable Routing	A-15

		<u>Page No.</u>
Photo No. 029	Post-Test Dummy Cable Routing	A-15
Photo No. 030	Pre-Test Driver Dummy Front View	A-16
Photo No. 031	Post-Test Driver Dummy Front View	A-16
Photo No. 032	Pre-Test Driver Dummy Window View	A-17
Photo No. 033	Post-Test Driver Dummy Window View	A-17
Photo No. 034	Pre-Test Driver Dummy and Vehicle Interior View	A-18
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-19
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-20
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-21
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-22
Photo No. 043	Post-Test Driver Dummy Feet	A-22
Photo No. 044	Pre-Test Driver's Side Knee Bolster	A-23
Photo No. 045	Post-Test Driver's Side Knee Bolster	A-23
Photo No. 046	Pre-Test Driver's Side Floorpan	A-24
Photo No. 047	Post-Test Driver's Side Floorpan	A-24
Photo No. 048	Post-Test Driver Dummy Face	A-25
Photo No. 049	Post-Test Driver Dummy Contact with Airbag	A-25
Photo No. 050	Post-Test Driver Dummy Contact with Headrest	A-26
Photo No. 051	Pre-Test View of the Steering Wheel	A-26
Photo No. 052	Post-Test View of the Steering Wheel	A-27
Photo No. 053	Pre-Test Passenger Dummy Front View	A-27
Photo No. 054	Post-Test Passenger Dummy Front View	A-28
Photo No. 055	Pre-Test Passenger Dummy Window View	A-28
Photo No. 056	Post-Test Passenger Dummy Window View	A-29
Photo No. 057	Pre-Test Passenger Dummy and Vehicle Interior	A-29
Photo No. 058	Post-Test Passenger Dummy and Vehicle Interior	A-30

		<u>Page No.</u>
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-31
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-32
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-33
Photo No. 065	Pre-Test Passenger Dummy Feet	A-33
Photo No. 066	Post-Test Passenger Dummy Feet	A-34
Photo No. 067	Pre-Test Passenger's Side Knee Bolster	A-34
Photo No. 068	Post-Test Passenger's Side Knee Bolster	A-35
Photo No. 069	Pre-Test Passenger's Side Floorpan	A-35
Photo No. 070	Post-Test Passenger's Side Floorpan	A-36
Photo No. 071	Post-Test Passenger Dummy Face	A-36
Photo No. 072	Post-Test Passenger Dummy Contact with Airbag	A-37
Photo No. 073	Post-Test Passenger Dummy Contact with Headrest	A-37
Photo No. 074	Photograph of Ballast Installed in Vehicle	A-38
Photo No. 075	Post-Test Stoddard Solvent Spillage Location View	A-38
Photo No. 076	Post-Test Speed Trap Read-Out	A-39
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-40
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-41
Photo No. 081	Vehicle at 360 Degrees on Static Rollover Device	A-41
Photo No. 082	2022 Hyundai Tucson SEL AWD 5-Door SUV Frontal Impact Event	A-42
Photo No. 083	Monroney Label Photograph	A-42

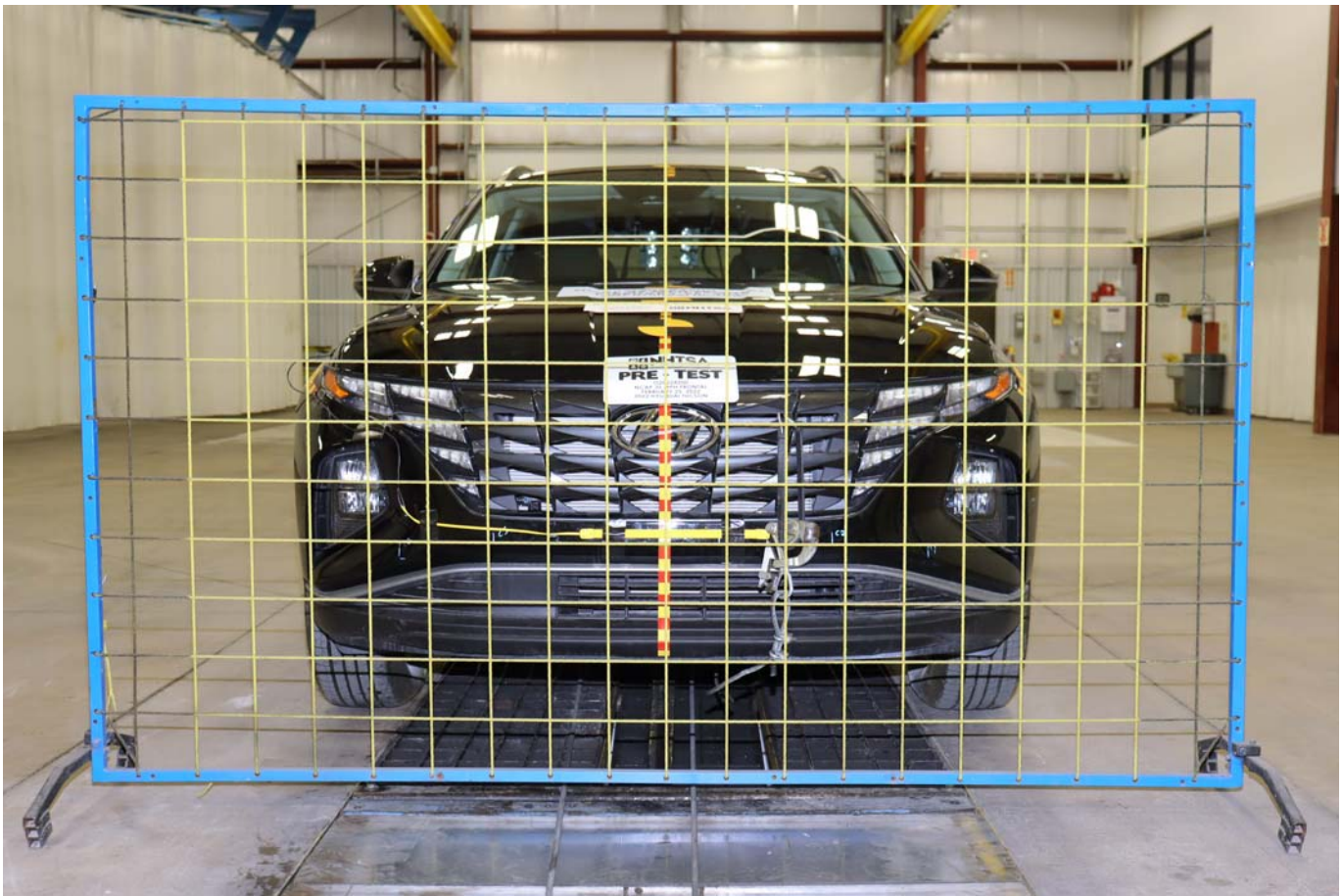


Photo No. 001 - Load Cell Location

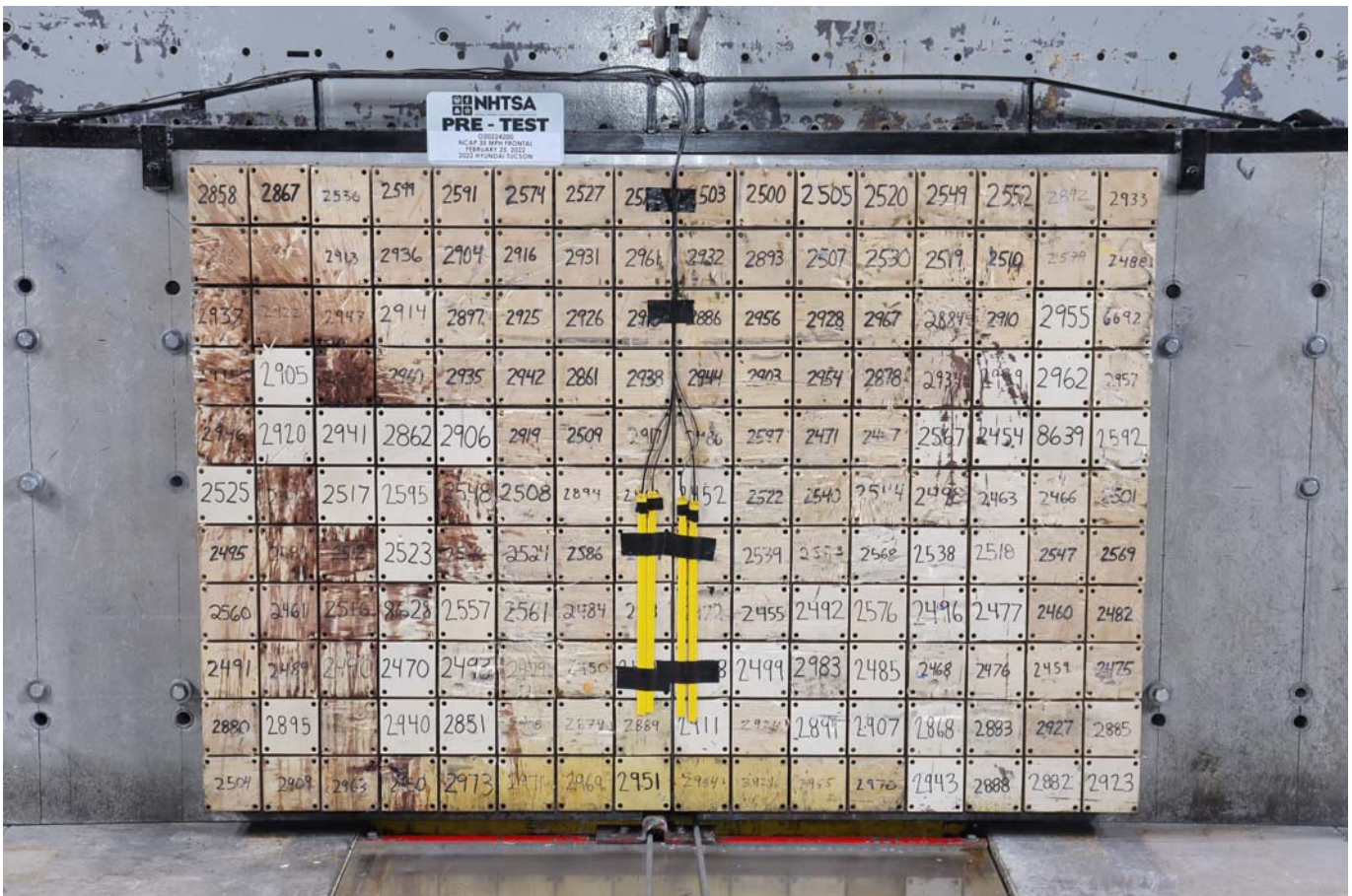


Photo No. 002 - Pre-Test Load Cell Wall



Photo No. 003 - Post-Test Load Cell Wall

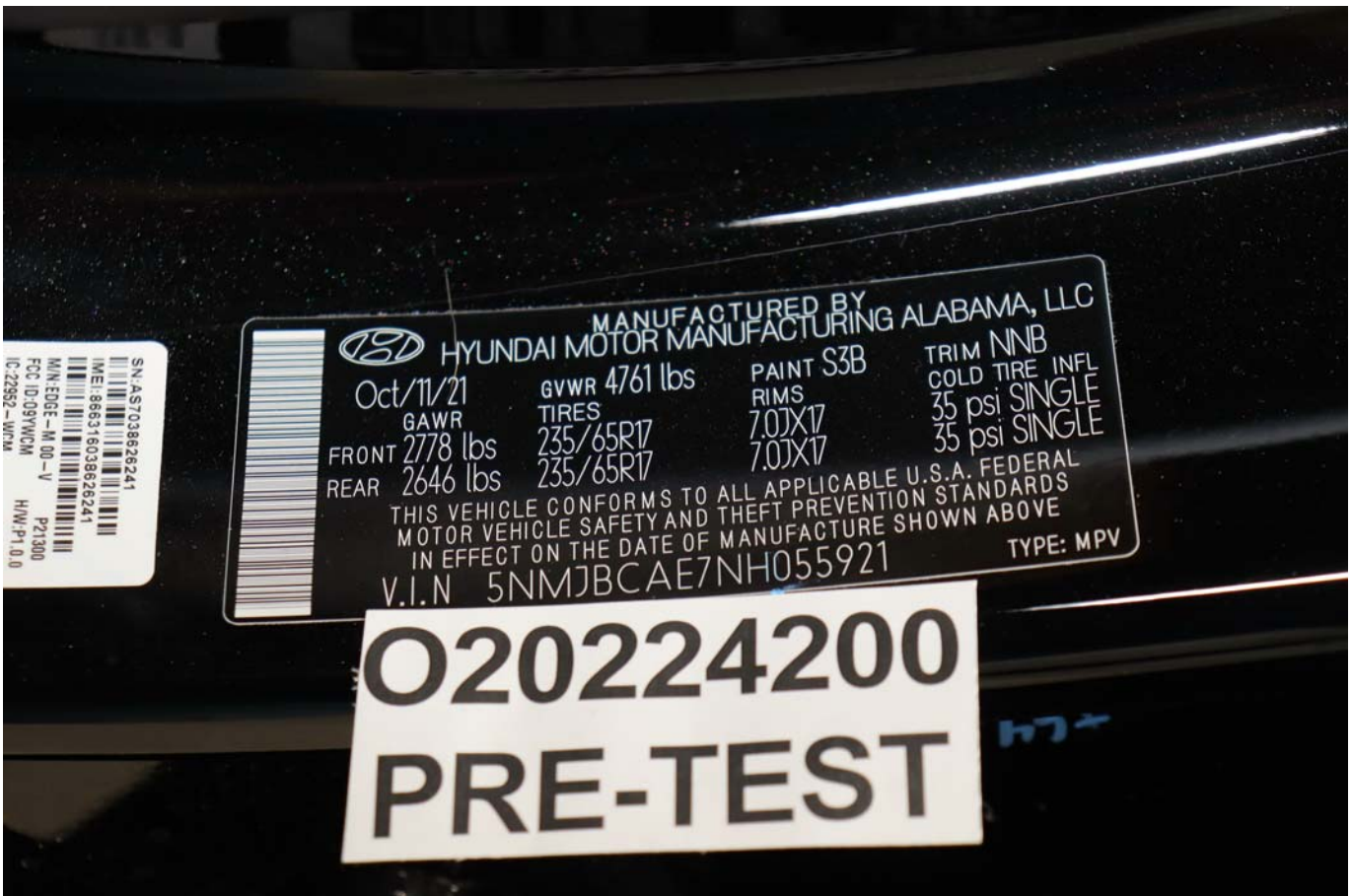


Photo No. 004 - Manufacturer's Label



Photo No. 005 - Tire Placard

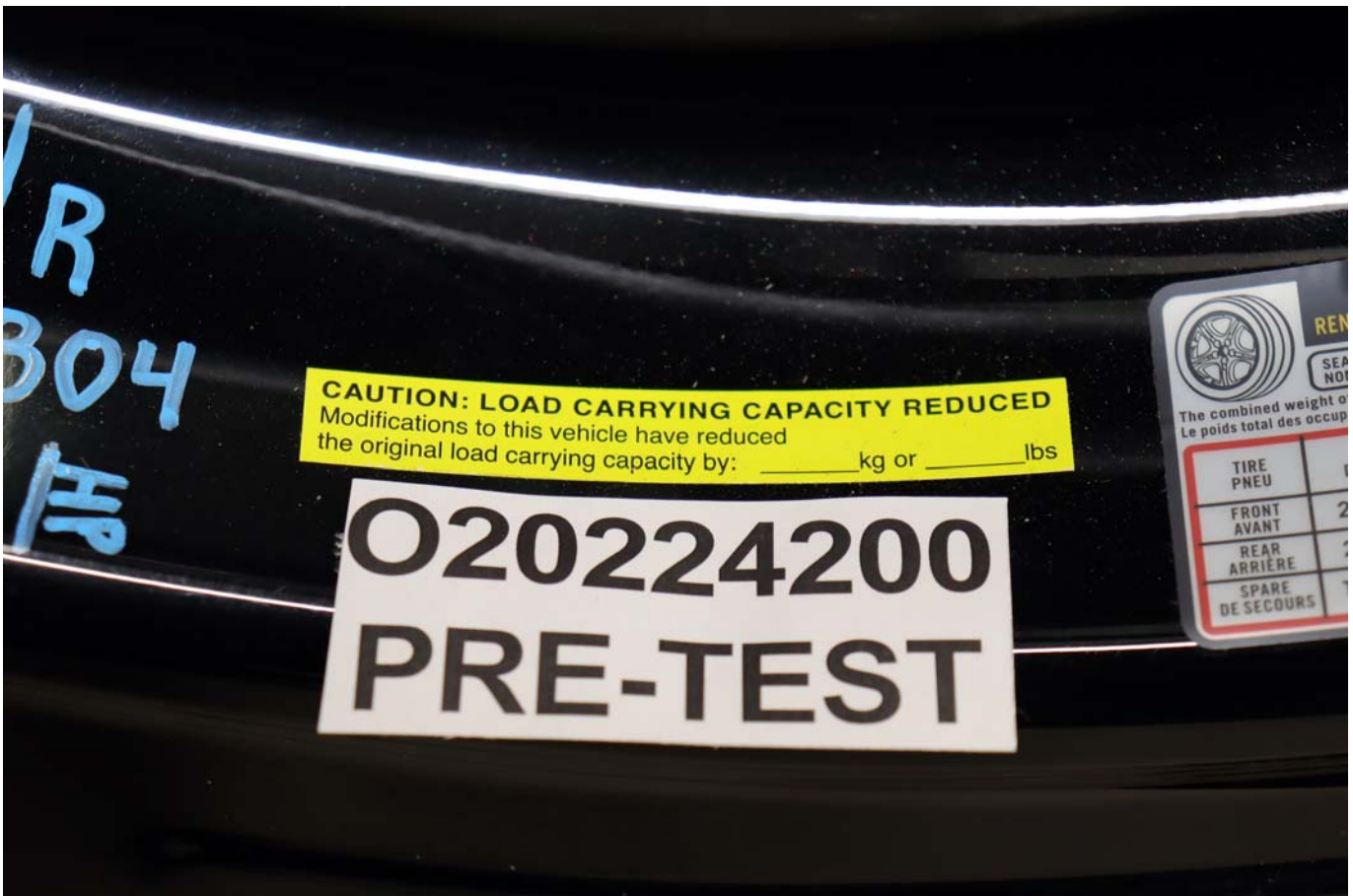


Photo No. 005a - Vehicle Load Carrying Capacity Reduction Label



Photo No. 006 - 2022 Hyundai Tucson SEL AWD 5-Door SUV Frontal As Delivered



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



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

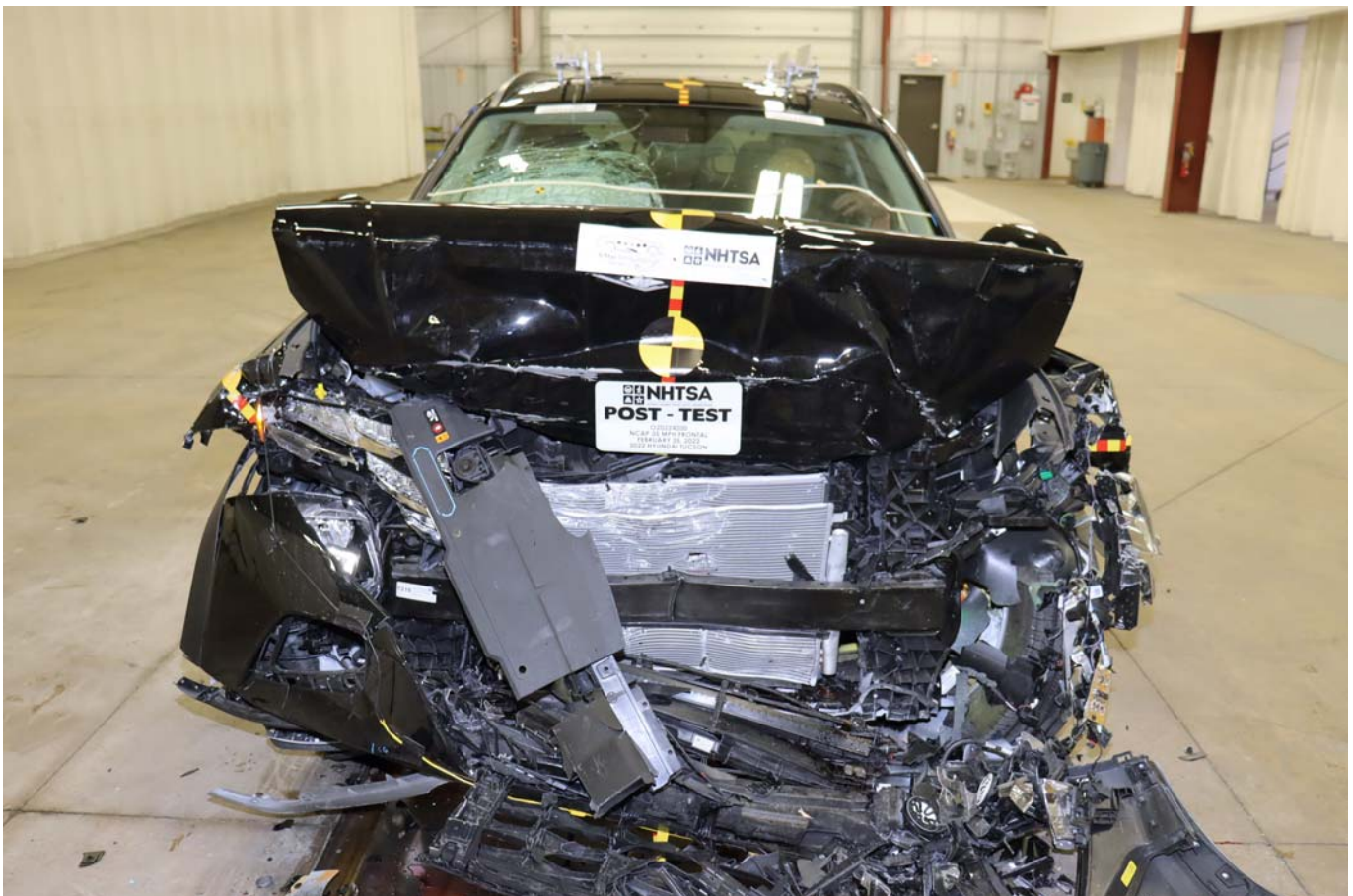


Photo No. 009 - Post-Test Front View of Test Vehicle



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



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



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



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



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

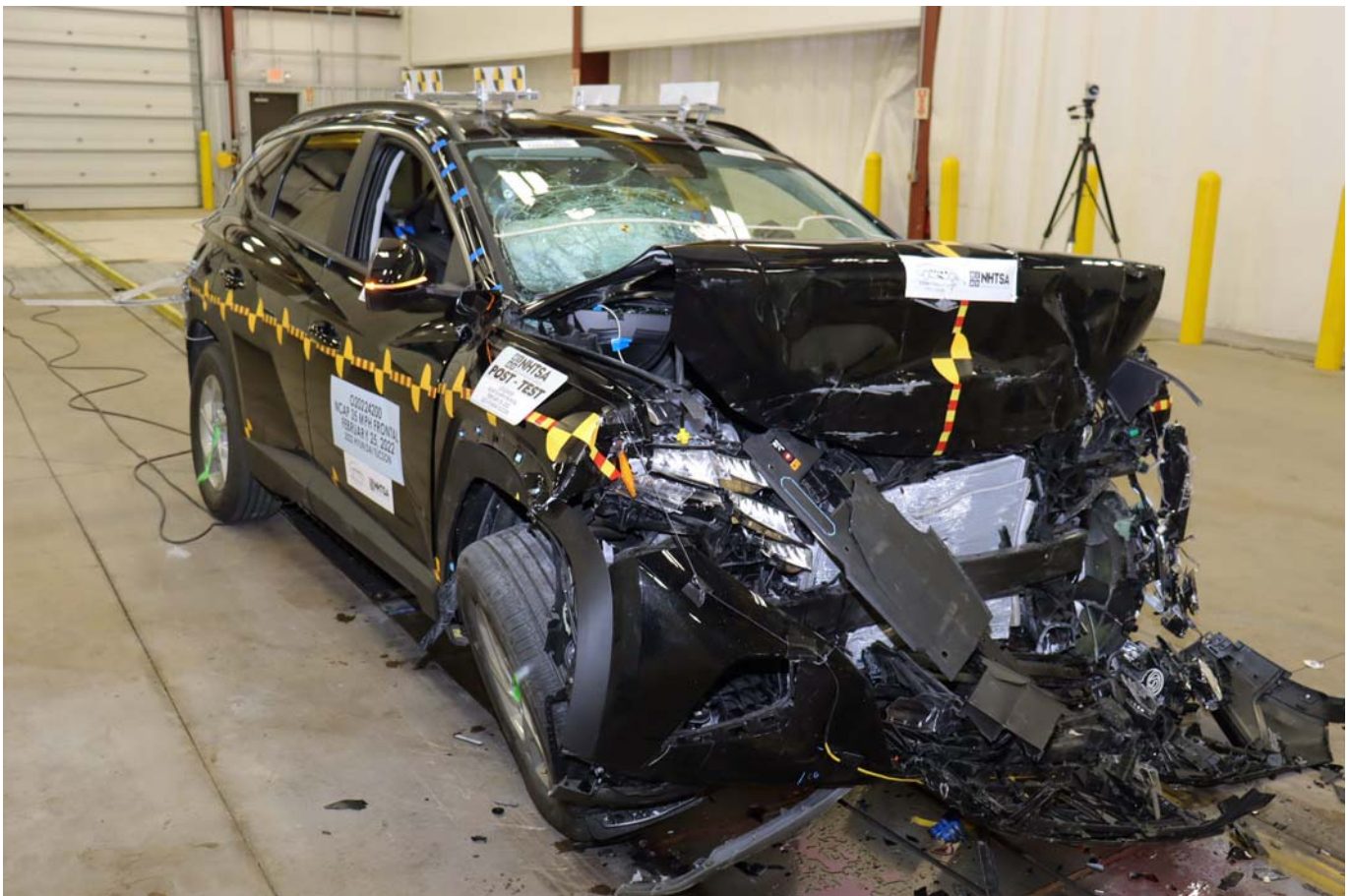


Photo No. 015 - Post-Test Right Front 3-4 View



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



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



Photo No. 018 - Pre-Test Windshield View



Photo No. 019 - Post-Test Windshield View

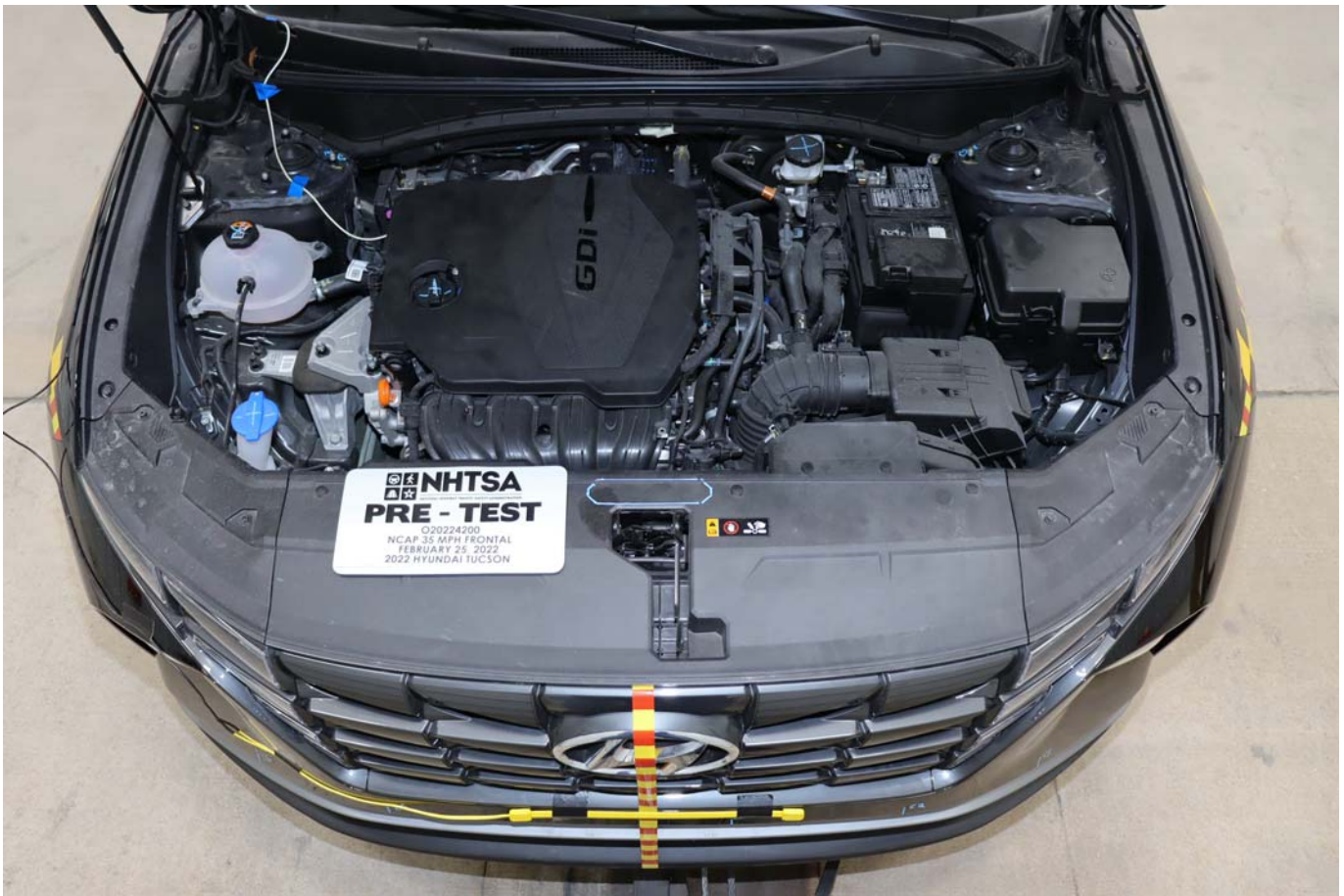


Photo No. 020 - Pre-Test Engine Compartment View

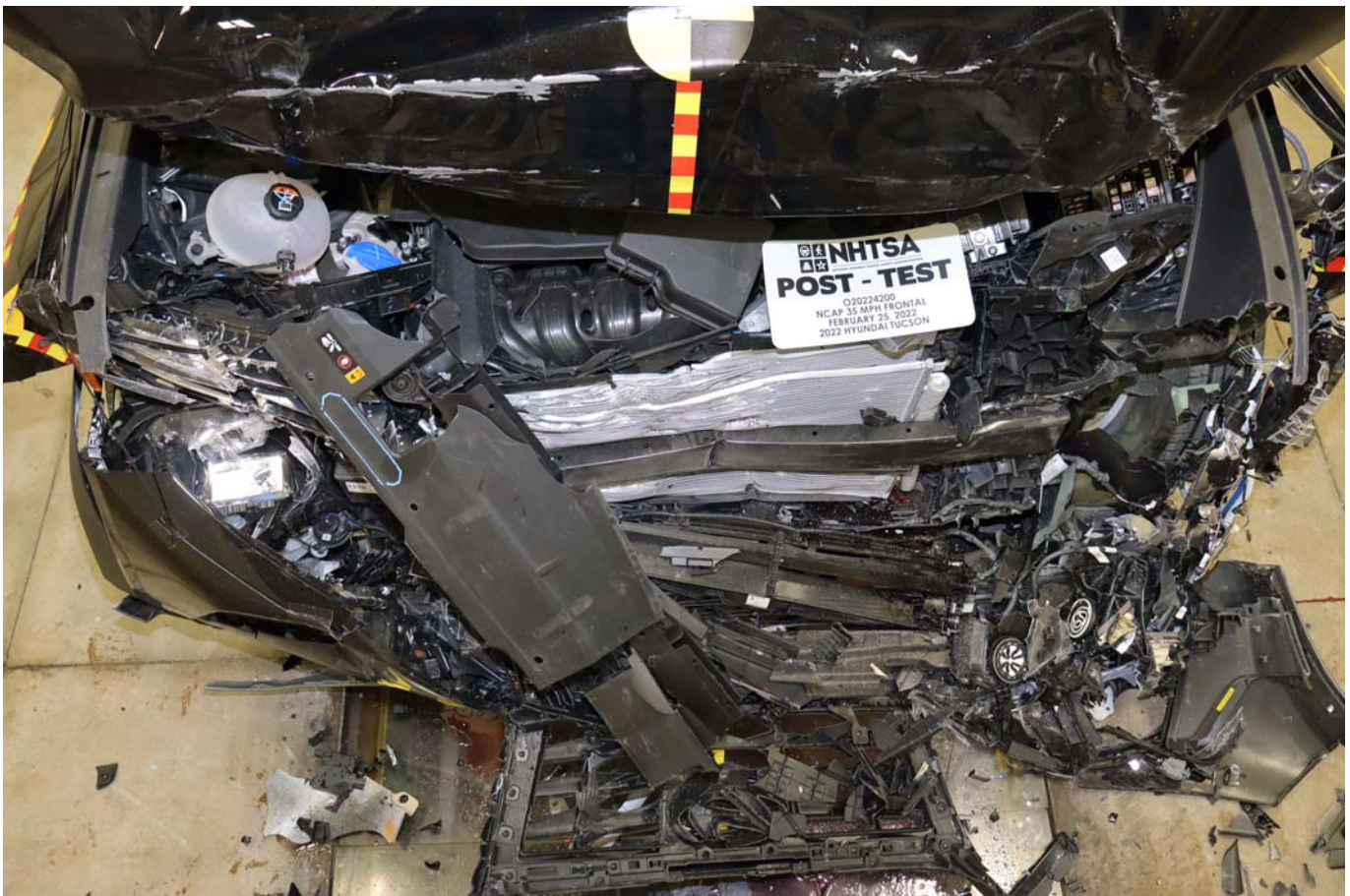


Photo No. 021 - Post-Test Engine Compartment View



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



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

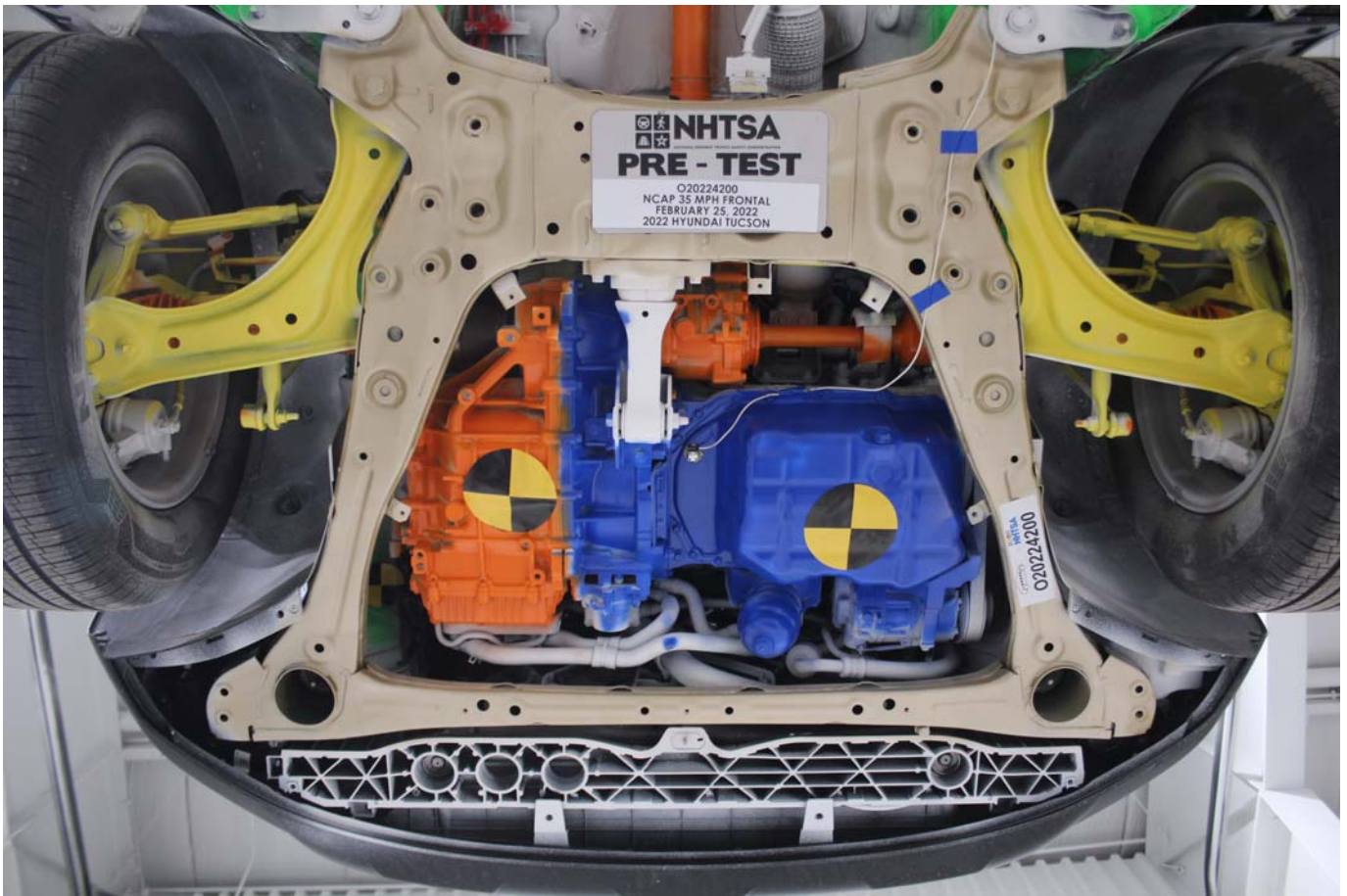


Photo No. 024 - Pre-Test Front Underbody View

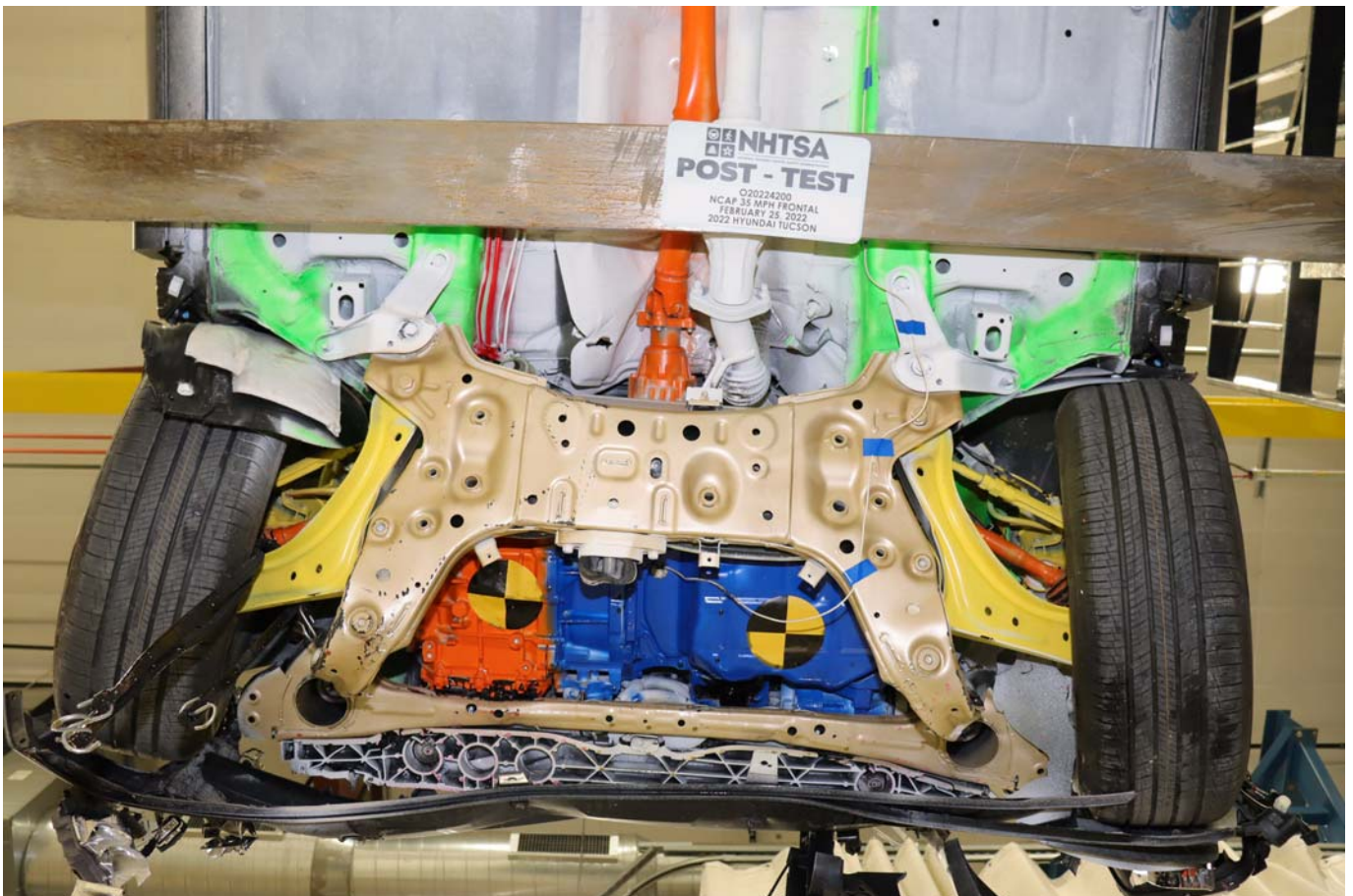


Photo No. 025 - Post-Test Front Underbody View

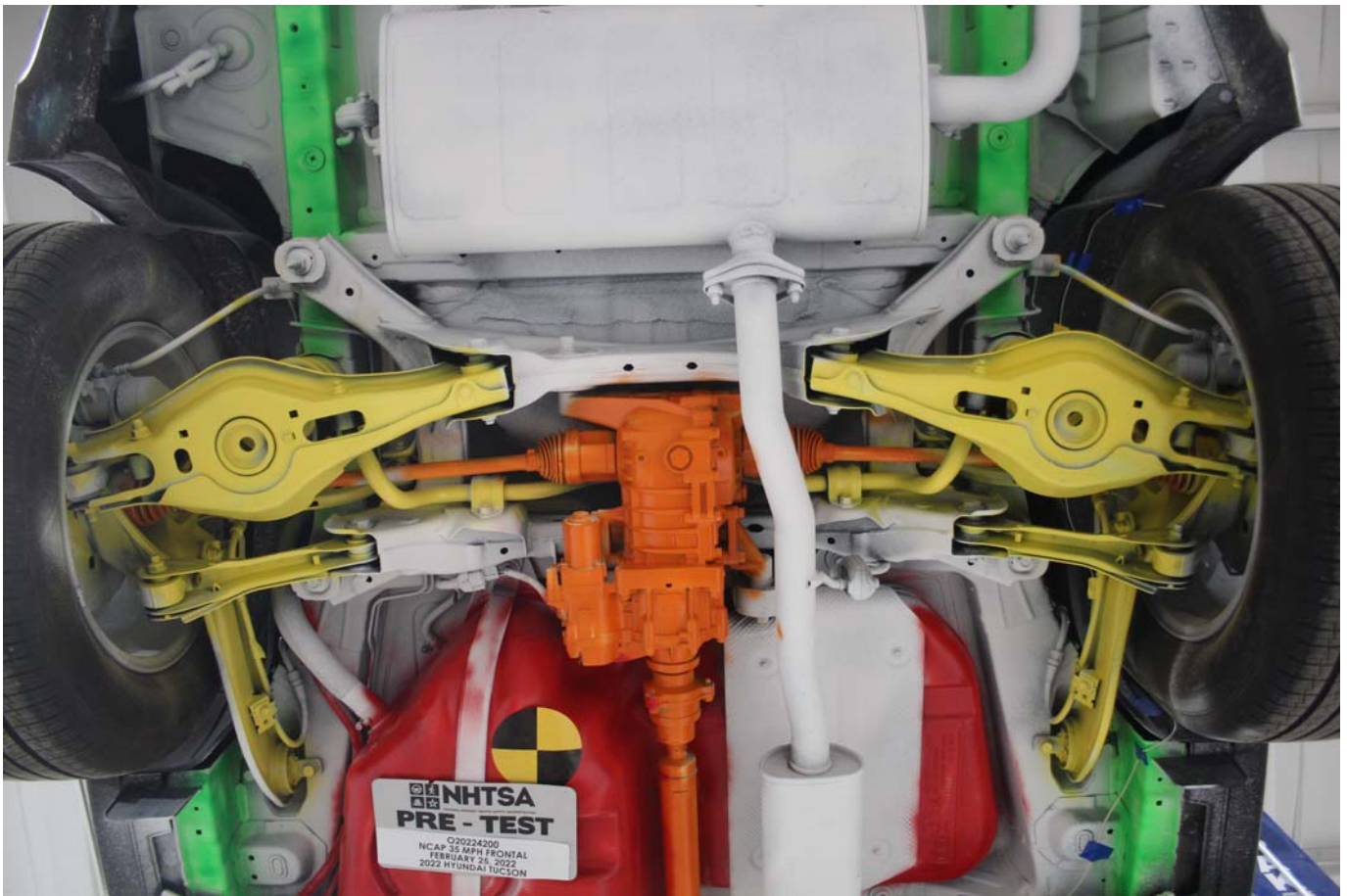


Photo No. 026 - Pre-Test Rear Underbody View

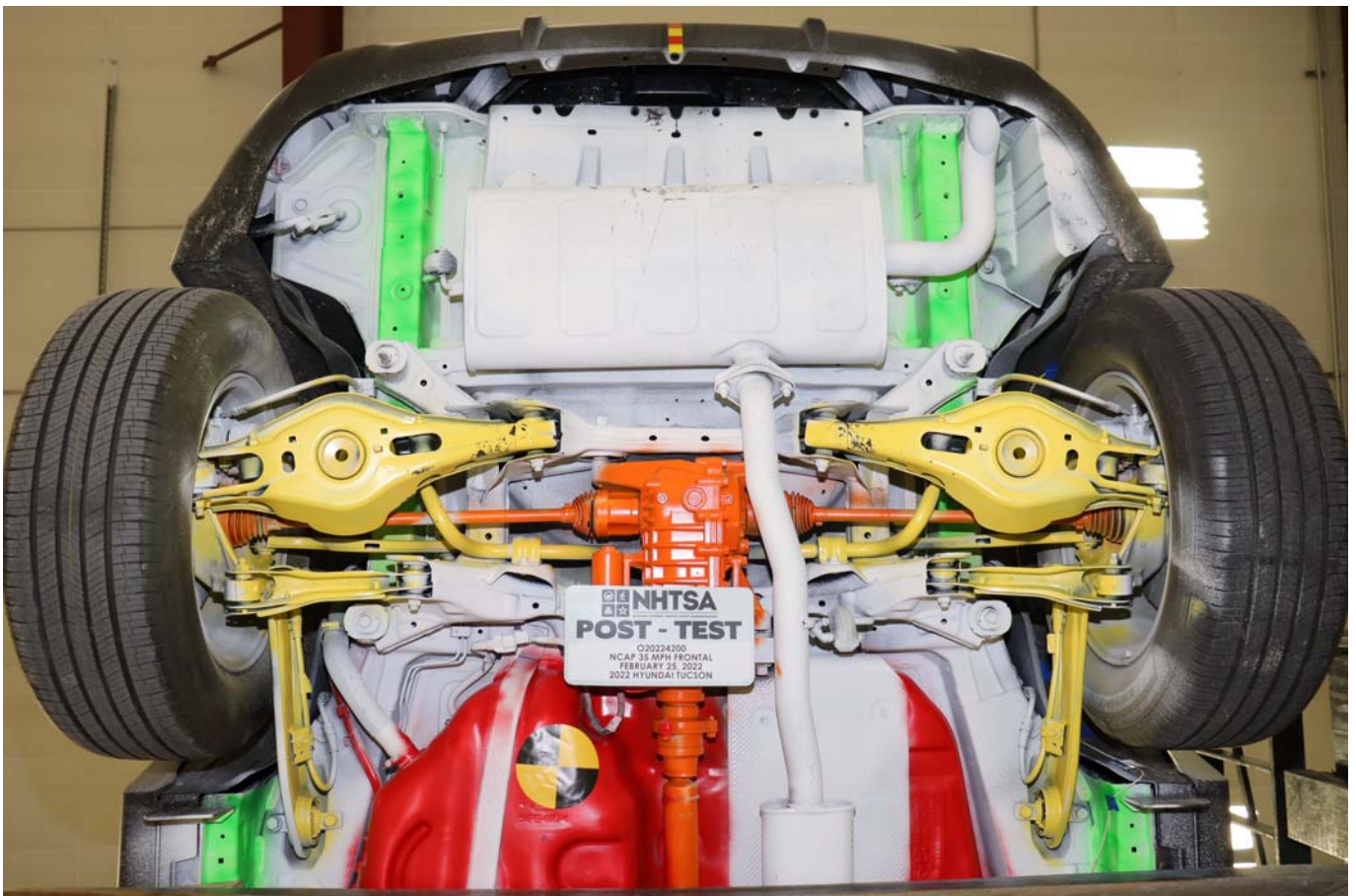


Photo No. 027 - Post-Test Rear Underbody View



Photo No. 028 - Pre-Test Dummy Cable Routing

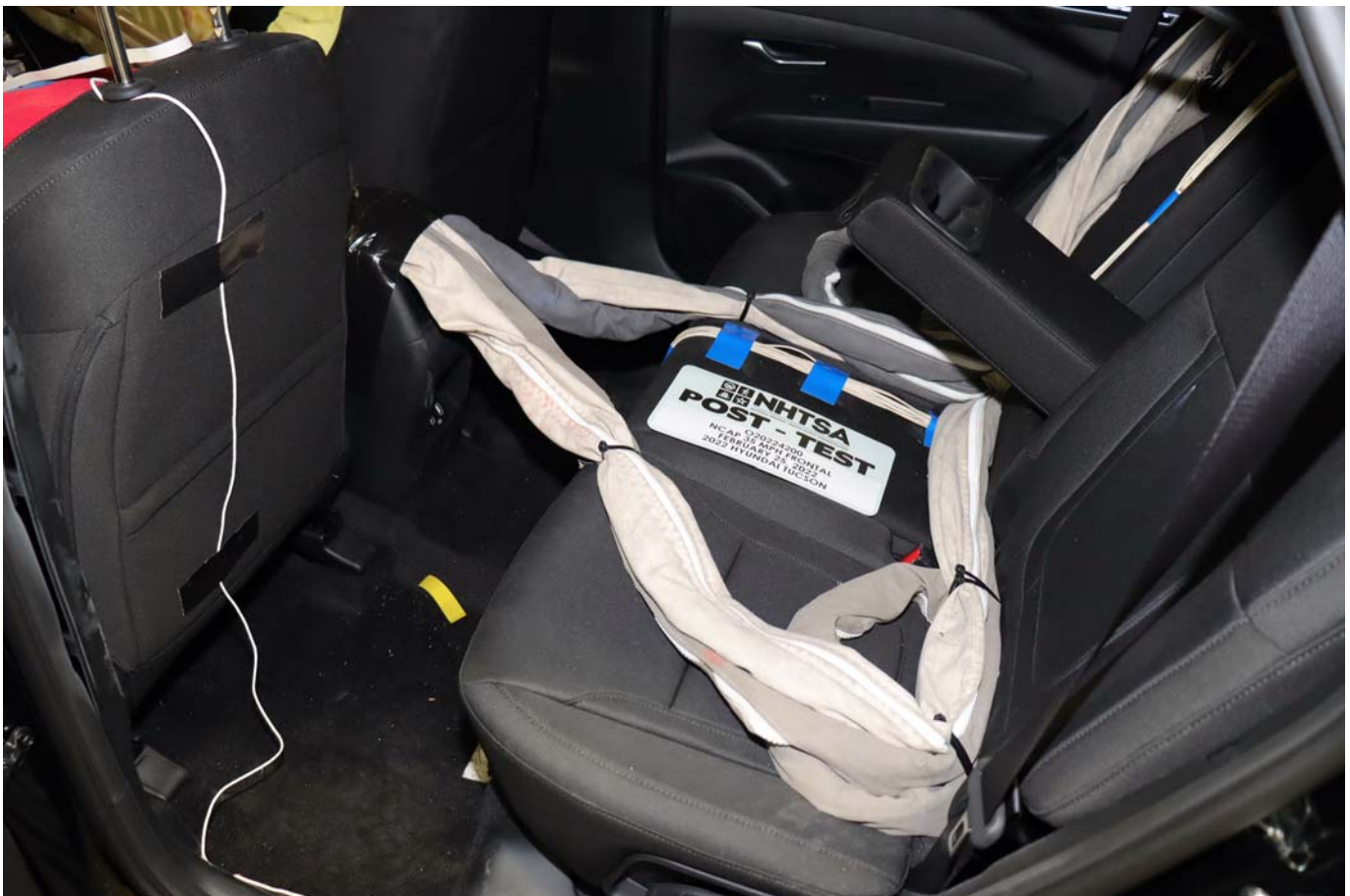


Photo No. 029 - Post-Test Dummy Cable Routing

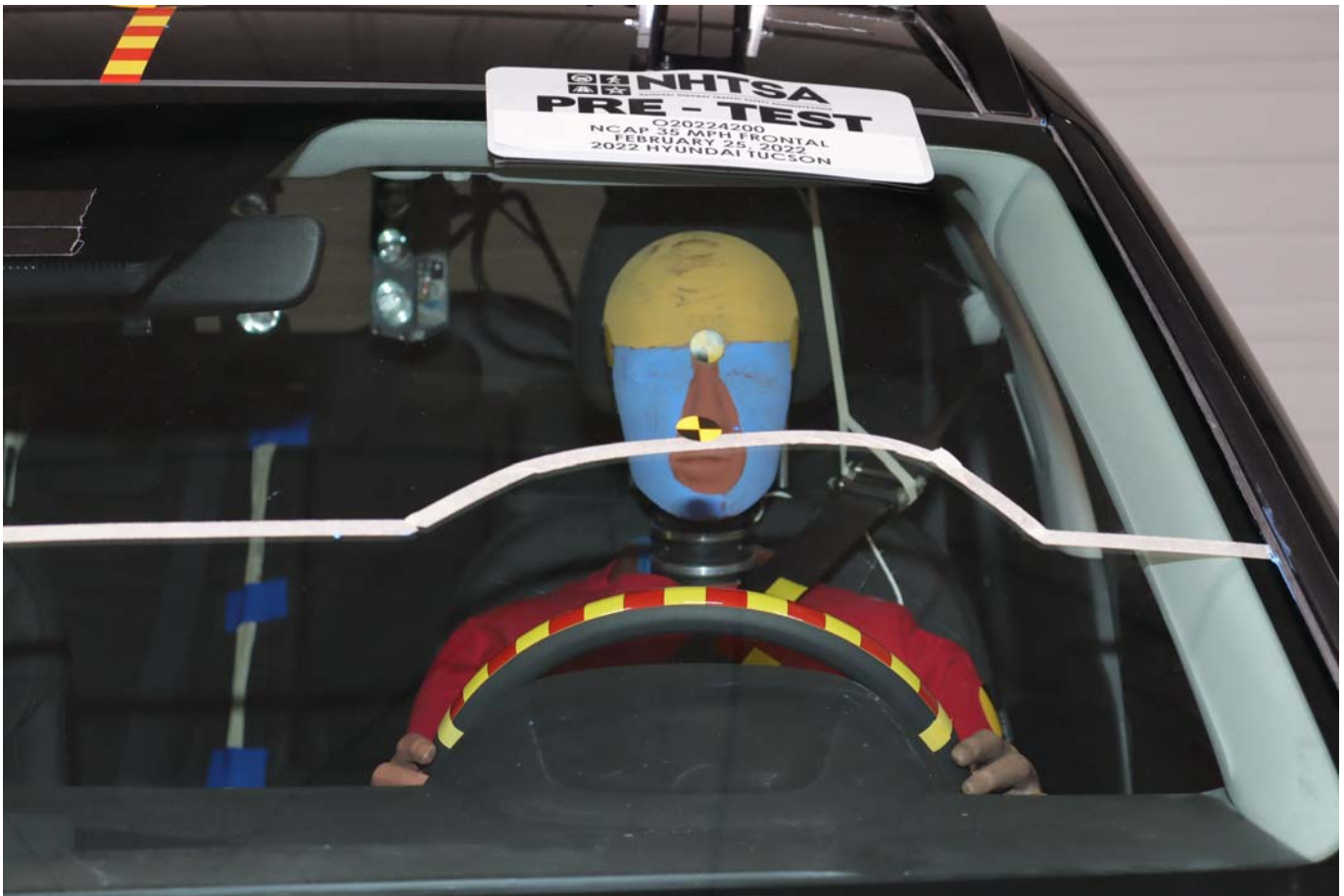


Photo No. 030 - Pre-Test Driver Dummy Front View



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



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



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



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



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



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



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



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



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



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



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



Photo No. 042 - Pre-Test Driver Dummy Feet



Photo No. 043 - Post-Test Driver Dummy Feet



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



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



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



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



Photo No. 048 - Post-Test Driver Dummy Face



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



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



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



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



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



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



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



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



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



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



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

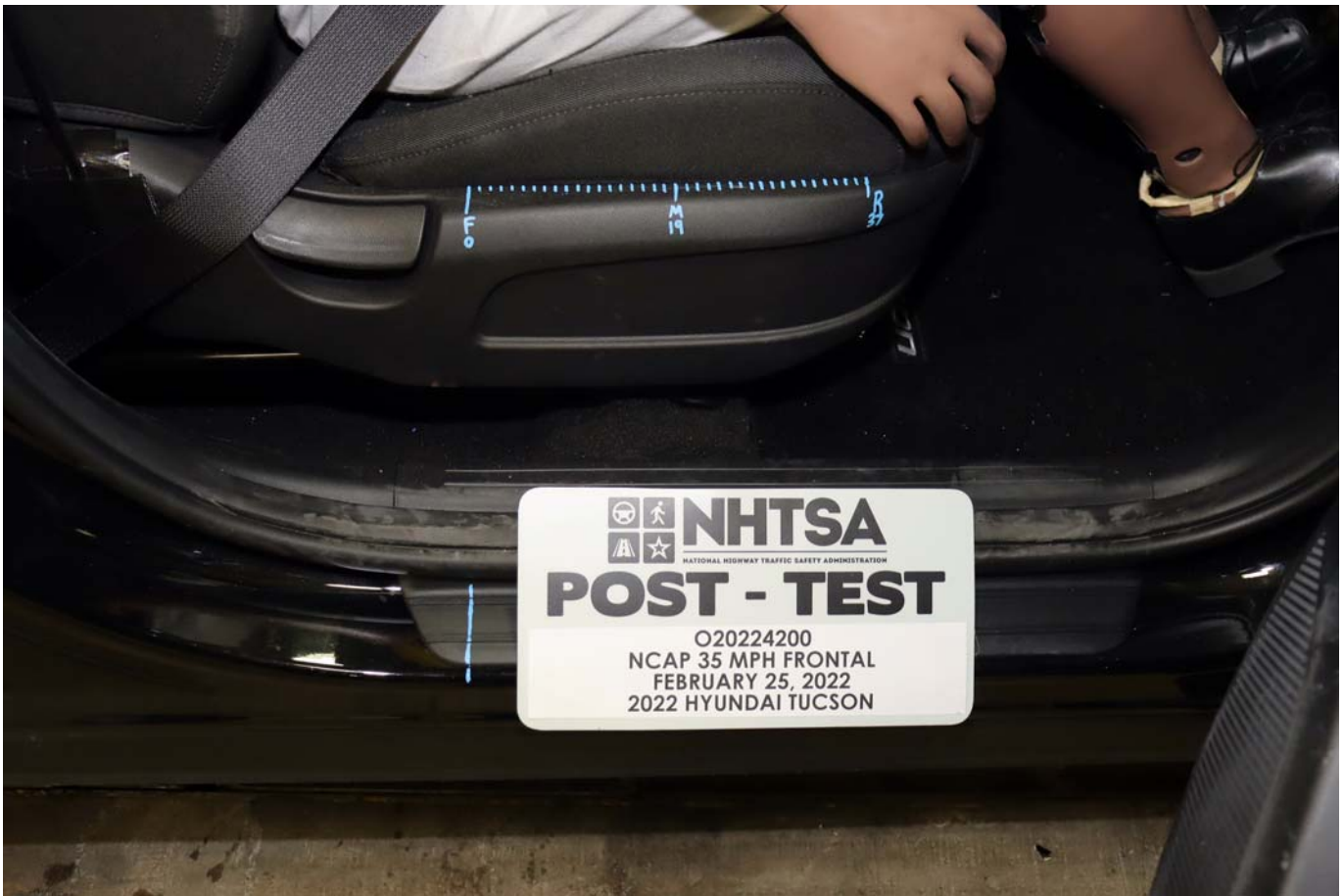


Photo No. 060 - Post-Test Passenger's Seat Fore-Aft Markings



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



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



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



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



Photo No. 065 - Pre-Test Passenger Dummy Feet



Photo No. 066 - Post-Test Passenger Dummy Feet



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



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



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



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

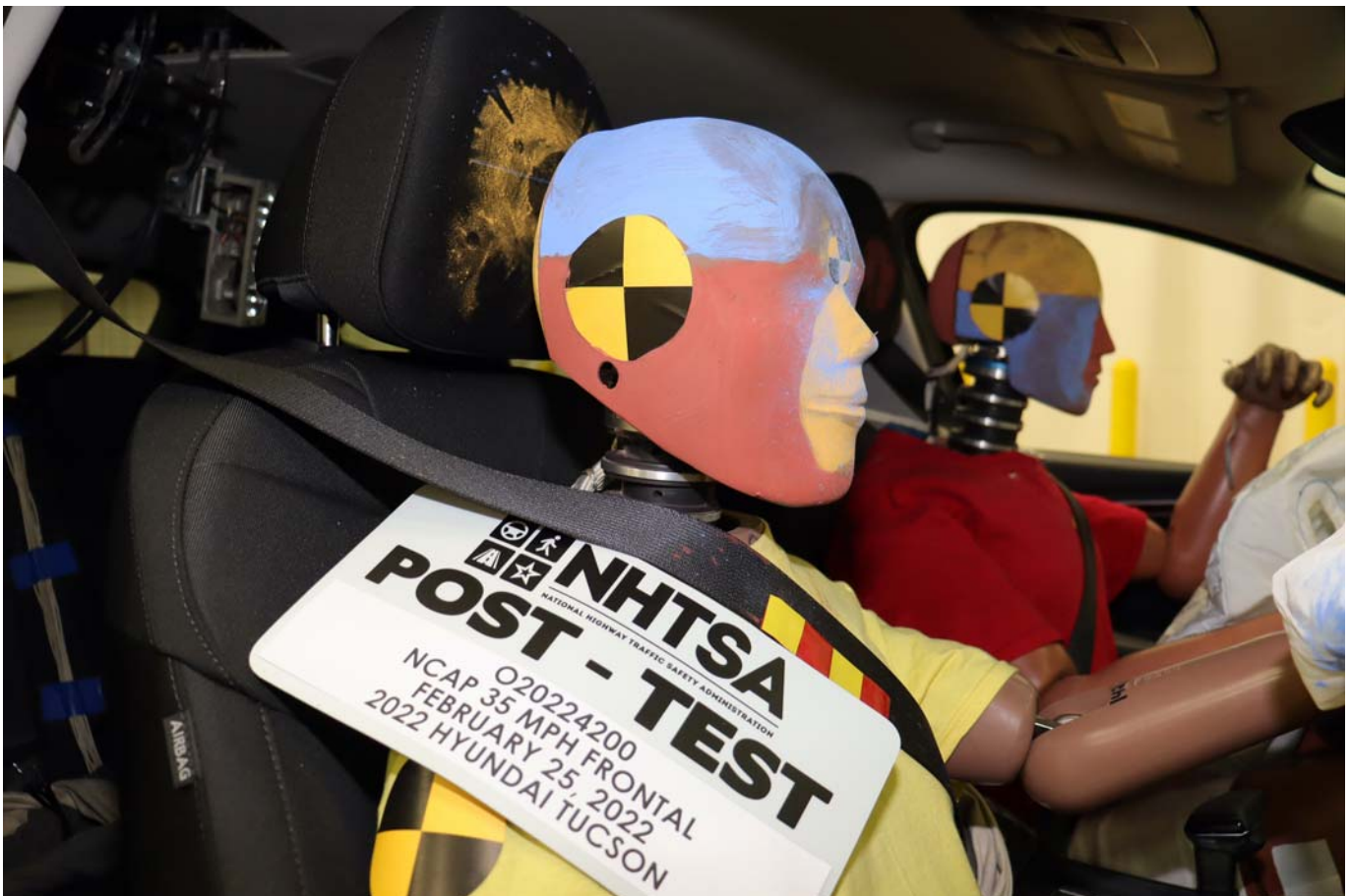


Photo No. 071 - Post-Test Passenger Dummy Face



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



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



Photo No. 074 - Photograph of Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

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



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



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



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



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



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



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



Photo No. 082 - 2022 Hyundai Tucson SEL AWD 5-Door SUV Frontal Impact Event



2022 TUCSON SEL AWD

SOLD TO: TX191
SHIPPED TO: TX191
 SHOTTENKIRK HYUNDAI GRANBURY
 4960 EAST HIGHWAY 377
 GRANBURY TX 76049

VIN: SNMJBCAE7NH055921
MODEL: R5432A45
ENGINE: G4KNMK246082
PORT OF ENTRY: MA
EXTERIOR COLOR: PHANTOM BLACK
INTERIOR/SEAT COLOR: BLACK/BLACK
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 29 lbs. / 13 kgs.
EMISSIONS: This vehicle is certified to meet emission requirements in all 50 states

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA).
www.safercar.gov or 1-888-327-4236

STANDARD FEATURES:
AMERICA'S BEST WARRANTY
 5-year/60,000-mile New Vehicle Warranty*
 10-year/100,000-mile Powertrain Warranty*
 7-year/Unlimited-mile Anti-perforation Warranty*
 3-year/36,000-mile Complimentary Maintenance*
 5-year/Unlimited-mile Roadside Assistance
 *Limited warranties, see dealer for details

ADVANCED SAFETY TECHNOLOGY
 Forward Collision-Avoidance Assist
 Lane Keeping Assist, Lane Following Assist
 Driver Attention Warning, Rear Occupant Alert
 Blind Spot Collision-Avoidance Assist
 Rear Cross-Traffic Collision-Avoidance Assist
 Safe Exit Warning
 Electronic Stability Control (ESC) w/ Traction Control
 ABS w/ Electronic Brake-Force Distribution & Brake Assist
 Downhill Brake Control, Hillstart Assist Control
 Front, Front Side & Side-Curtain Airbags w/ Rollover Sensors
 Tire Pressure Monitoring System w/ Individual Tire Indicator

POWERTRAIN TECHNOLOGY
 Smartstream 2.5L 4-Cylinder Engine w/ GDI & MPI
 8-Speed Automatic Transmission w/ SHIFTRONIC®
 Idle, Stop & Go; Electric Parking Brake
 HTRAC All-Wheel Drive; Drive Mode Select

EXTERIOR
 17-inch Alloy Wheels; Temporary Compact Spare Tire
 LED Daytime Running Lights
 Automatic LED Headlights; High Beam Assist
 LED Tail Lamps, Roof Side Rails
 Rear Privacy Glass
 Bodycolor Rear Spoiler w/ LED Brake Light

COMFORT & CONVENIENCE
 Air Conditioning w/ Cabin Air Filter
 Proximity Key w/ Push Button Start
 Power Driver's Seat w/ Lumbar Support
 Heated Front Seats
 Heated Side Mirrors w/ Turn Signals
 Illuminated Survivors w/ Sliding Arm Extender
 Tilt-and-Telescopic Steering Wheel w/Audio, Cruise & Phone Ctrls
 Smart Cruise Control w/ Stop & Go
 60/40 Split Folding Rear Seat w/ Recline & Center Armrest
 Cargo Area Remote Folding Release Seatback
 Rear Air Vents; Dual Rear USB Outlets
 4.2-inch LCD Multi-Information Display

INCLUDED	COMFORT & CONVENIENCE(cont.)	INCLUDED
INCLUDED	8-inch Display Audio w/ Android Auto (TM) & Apple CarPlay (TM)	INCLUDED
INCLUDED	Rearview Monitor w/ Parking Guidance	INCLUDED
INCLUDED	AM/FM/HD Radio® Audio System	INCLUDED
INCLUDED	Dual Front USB Outlets; 2 12V DC Power Outlets	INCLUDED
INCLUDED	SiriusXM® Radio w/90 Day Platinum trial subscription;	INCLUDED
	Not Available in AK & HI	
	Blue Link® Connected Services 3-years Standard (enrollment req)	INCLUDED
	Blue Link Remote Start (3-year Complimentary Service)	INCLUDED
	Full Tank of Fuel	INCLUDED
	Manufacturer's Suggested Retail Price:	\$28,150.00
	ADDED FEATURES:	
INCLUDED	*Carpeted Floor Mats	\$195.00
INCLUDED	*Cargo Net	\$55.00
INCLUDED	*Reversible Cargo Tray	\$115.00
INCLUDED	*Cargo Cover	\$190.00
INCLUDED	*Cross Rails	\$315.00
INCLUDED	*Wheel Locks	\$65.00
	Inland Freight & Handling:	\$1,225.00
	Total Price:	\$30,310.00

**2021 Insurance Institute for Highway Safety
 TOP SAFETY PICK+**



EPA DOT Fuel Economy and Environment

Fuel Economy
26 MPG
 combined city/hwy
 24 city
 29 highway
 3.8 gallons per 100 miles

You spend \$250 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,350

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

Smog Rating (tailpipe only)
1 5 **10**

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$6,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at 5.25¢ per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
 Calculate personalized estimates and compare vehicles

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline license and title fees state and local taxes and dealer installed options and accessories are not included in the manufacturer's suggested retail price. This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements of 15 U.S.C. 1231 et seq, which prohibits its removal or alteration prior to delivery to the ultimate purchaser.

**PARTS CONTENT INFORMATION
 FOR VEHICLE IN THIS CARLINE:
 U.S./CANADIAN PARTS CONTENT: 49 %
 MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 34 %**

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

**FOR THIS VEHICLE:
 FINAL ASSEMBLY POINT: MONTGOMERY, ALABAMA U.S.A.
 COUNTRY OF ORIGIN:
 ENGINE: U.S.A.
 TRANSMISSION: U.S.A.**

285 A 1

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

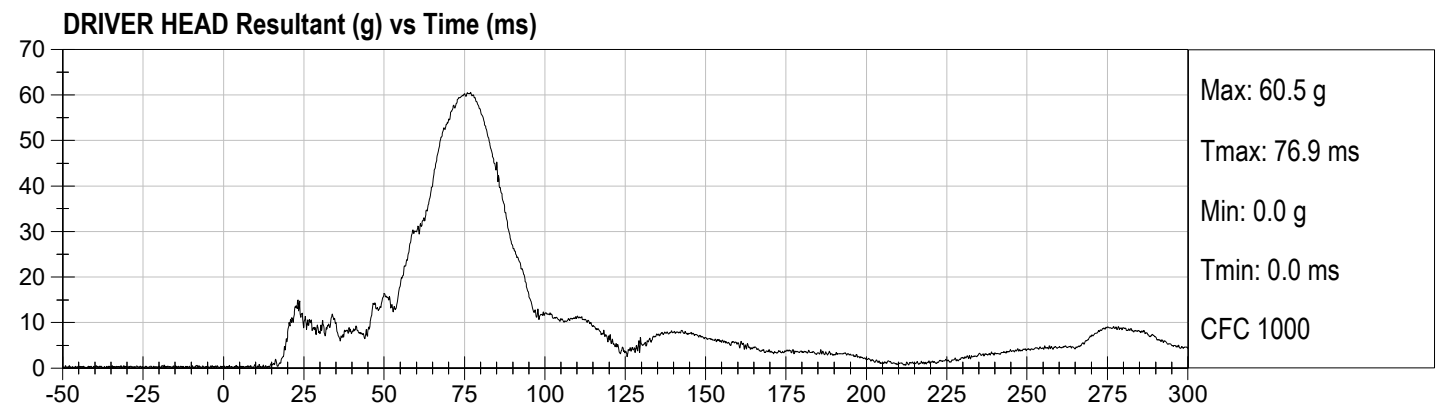
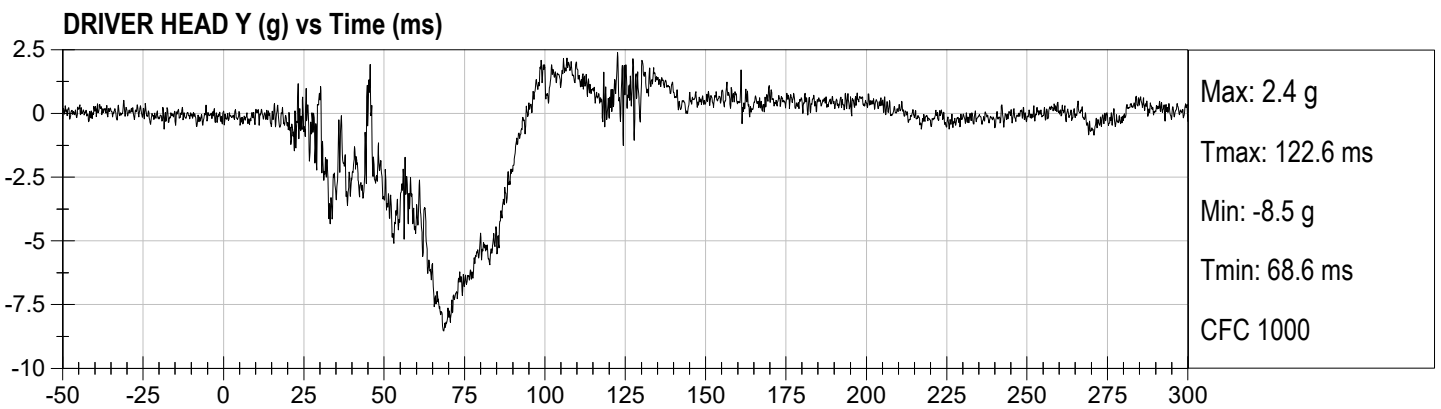
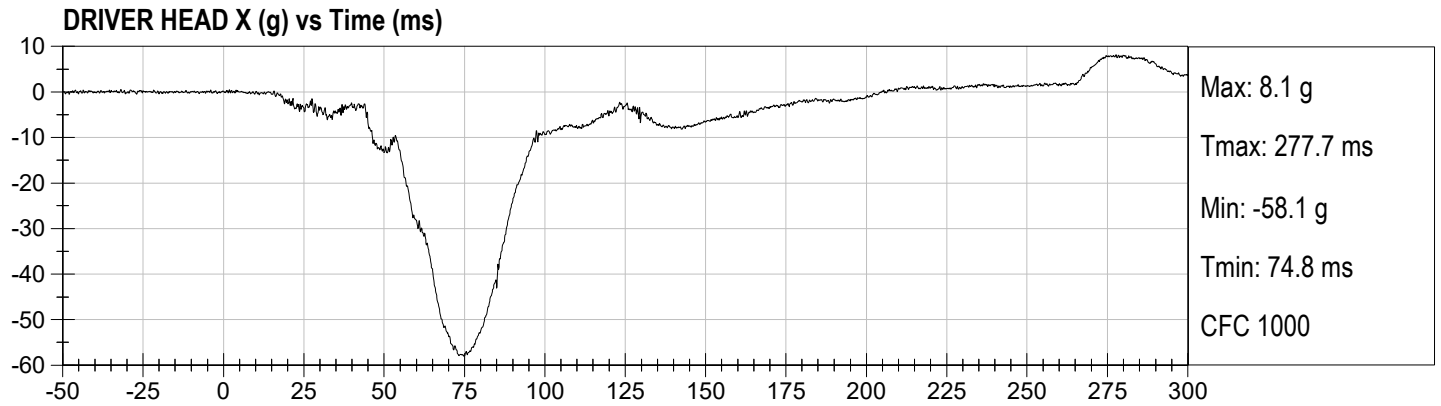
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Figure No. 28. Passenger Neck Force X vs. Time	B-10
Figure No. 29. Passenger Neck Force Z vs. Time	B-10
Figure No. 30. Passenger Neck Moment Y vs. Time	B-10
Figure No. 31. Passenger Nij (NTF) vs. Time	B-11
Figure No. 32. Passenger Nij (NTE) vs. Time	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

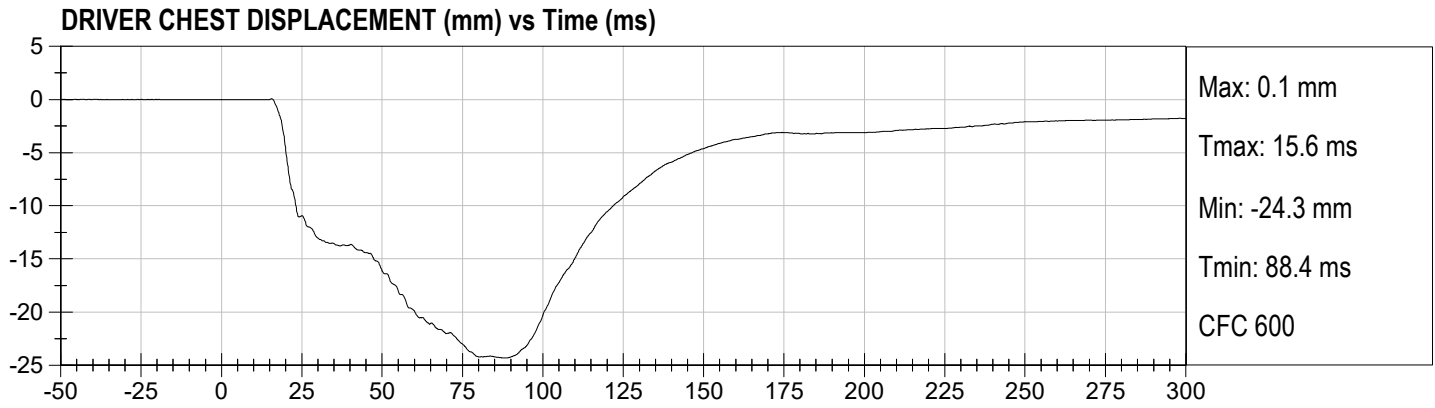
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

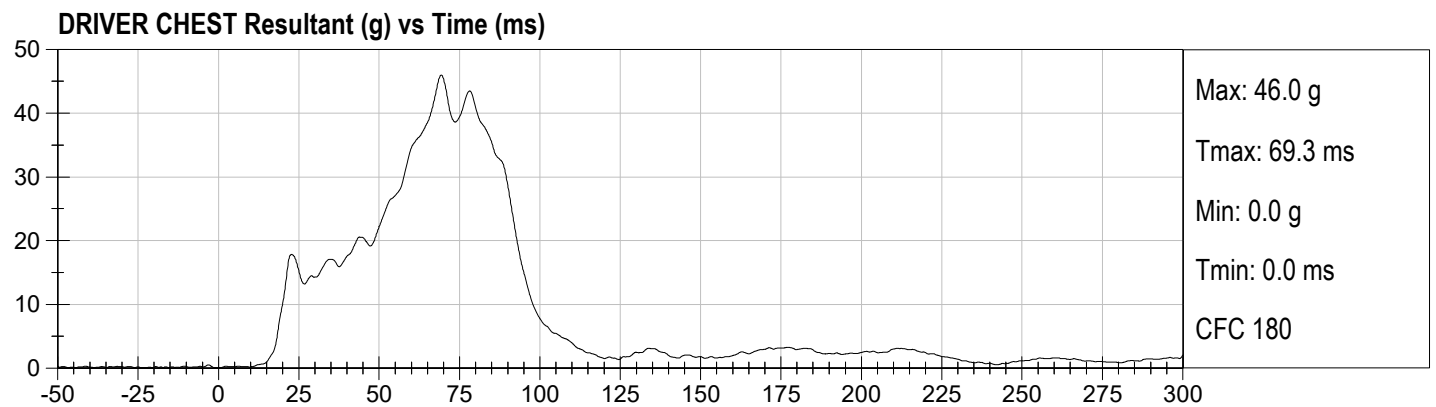
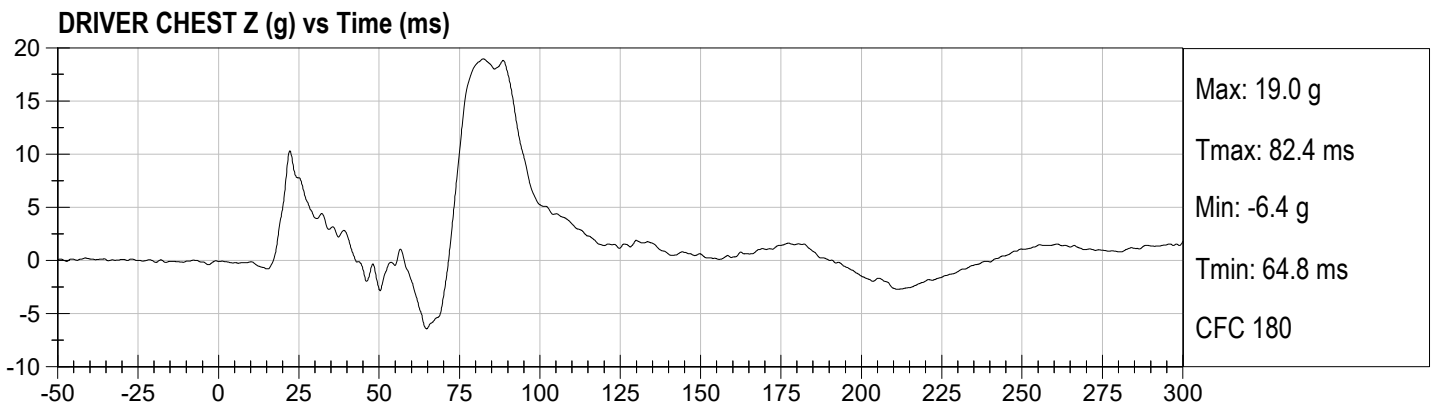
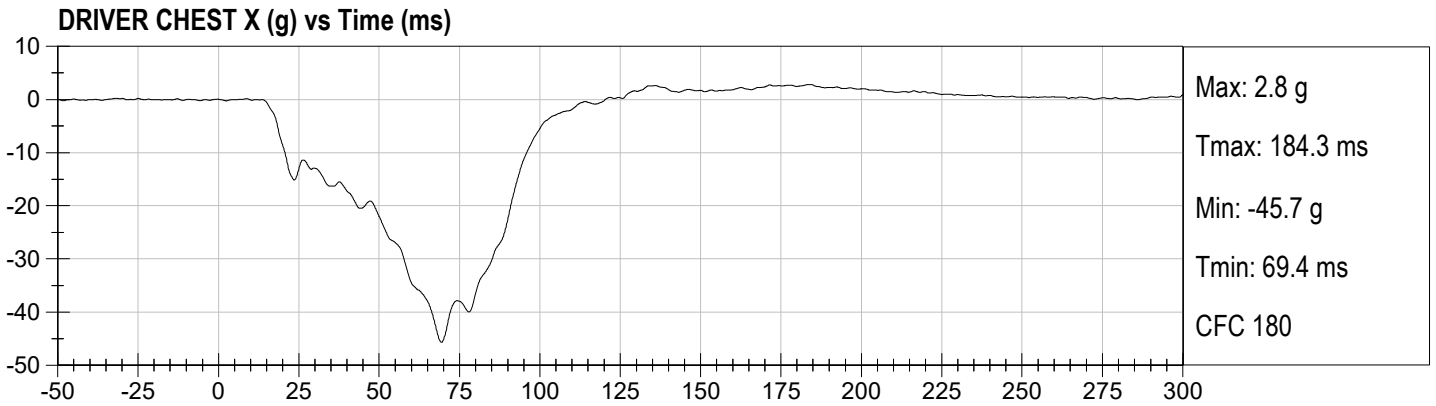
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Driver Head Y Redundant
Driver Head Z Redundant
Driver Head Angular Velocity X
Driver Head Angular Velocity Y
Driver Head Angular Velocity Z
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Redundant
Driver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

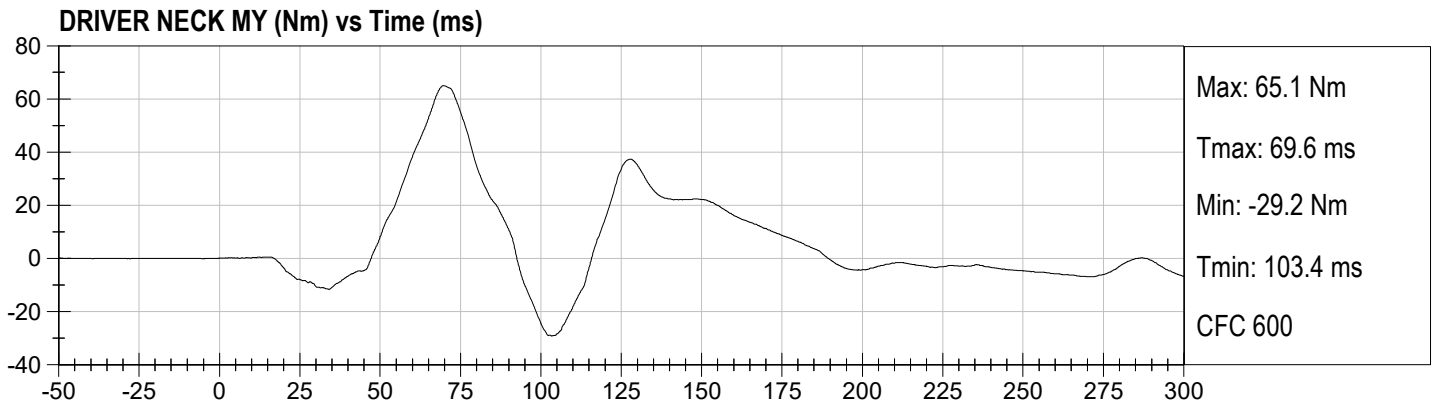
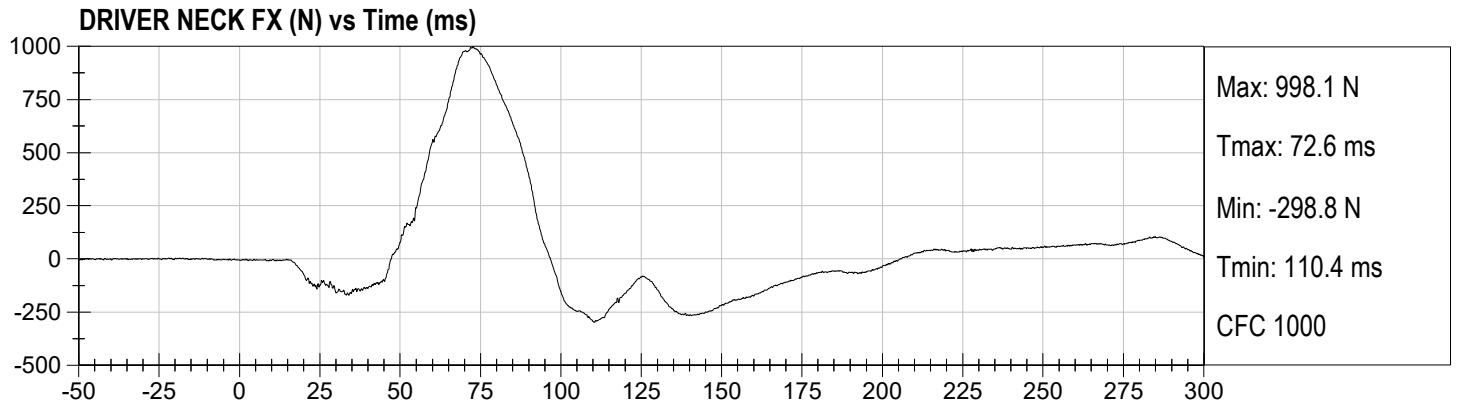
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Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower 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

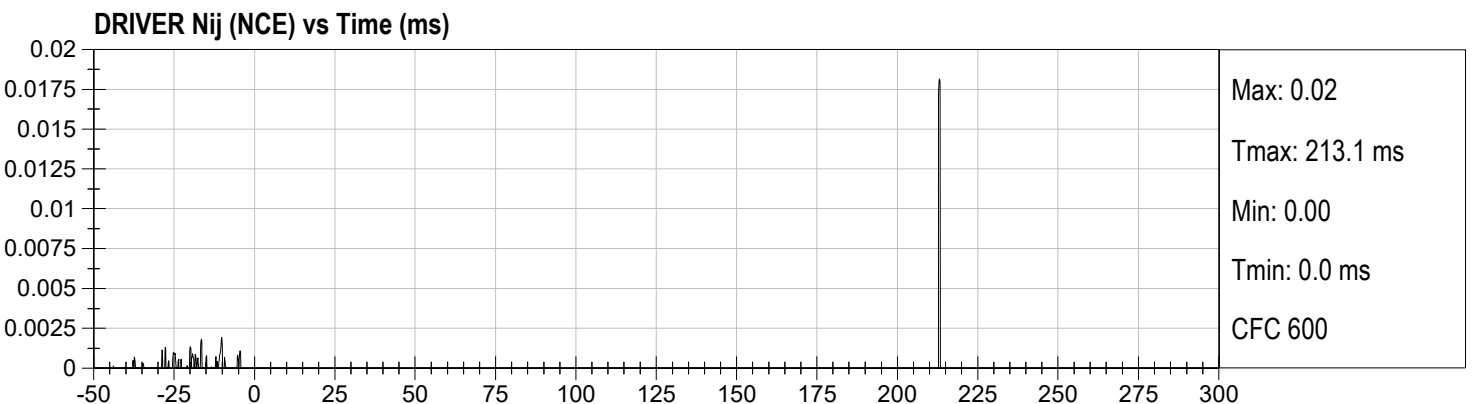
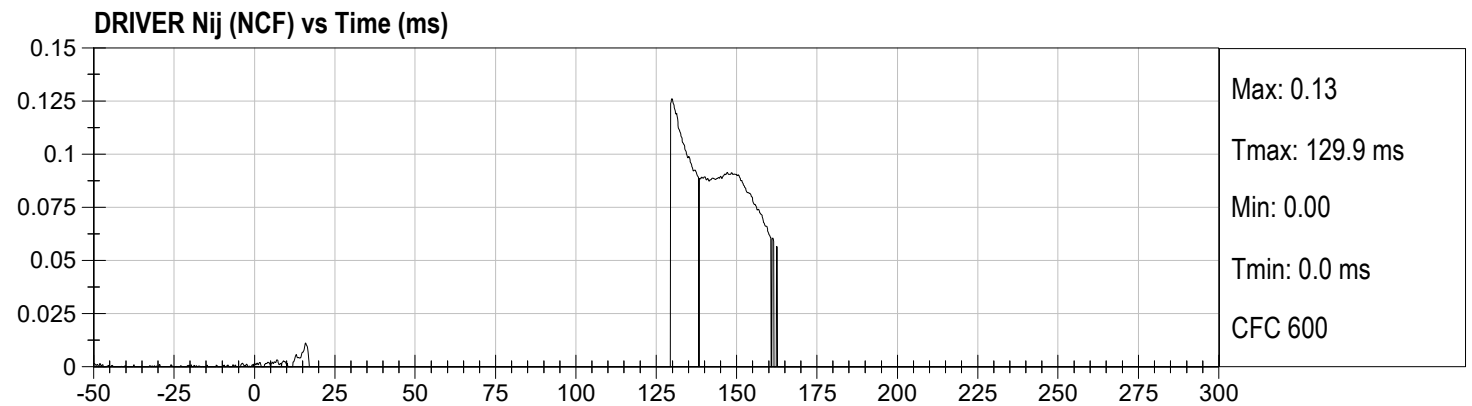
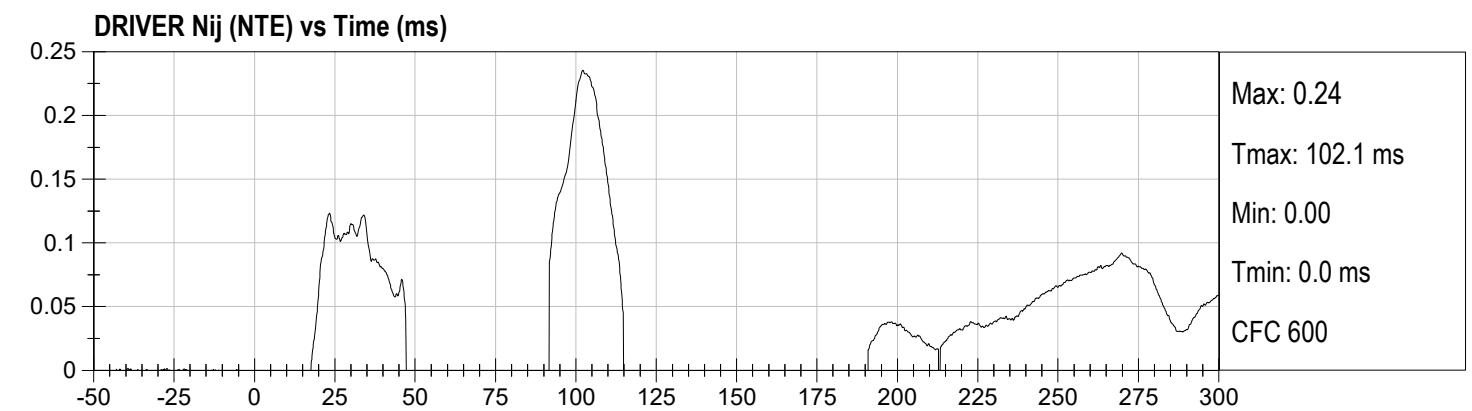
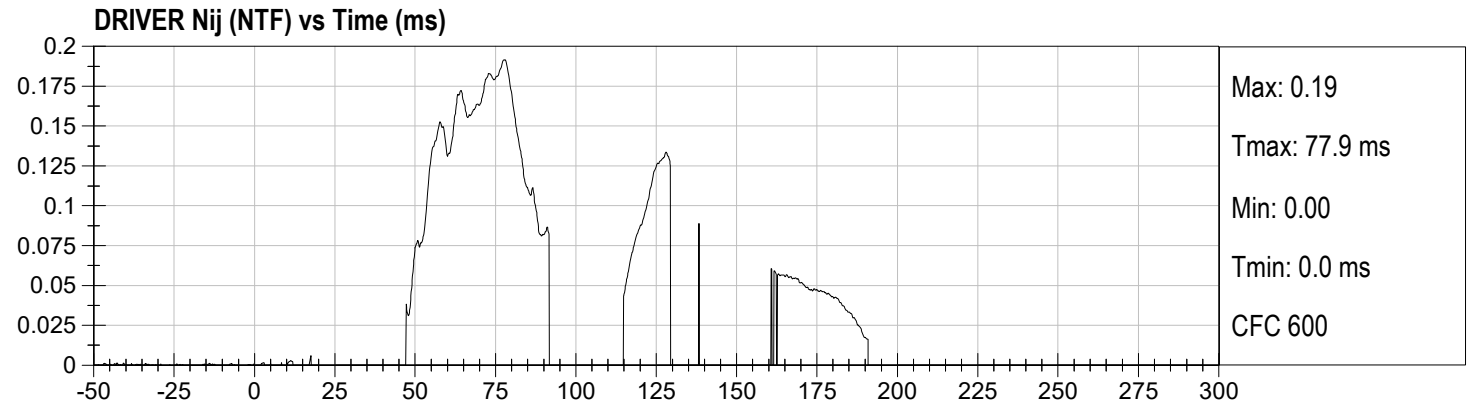
Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger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



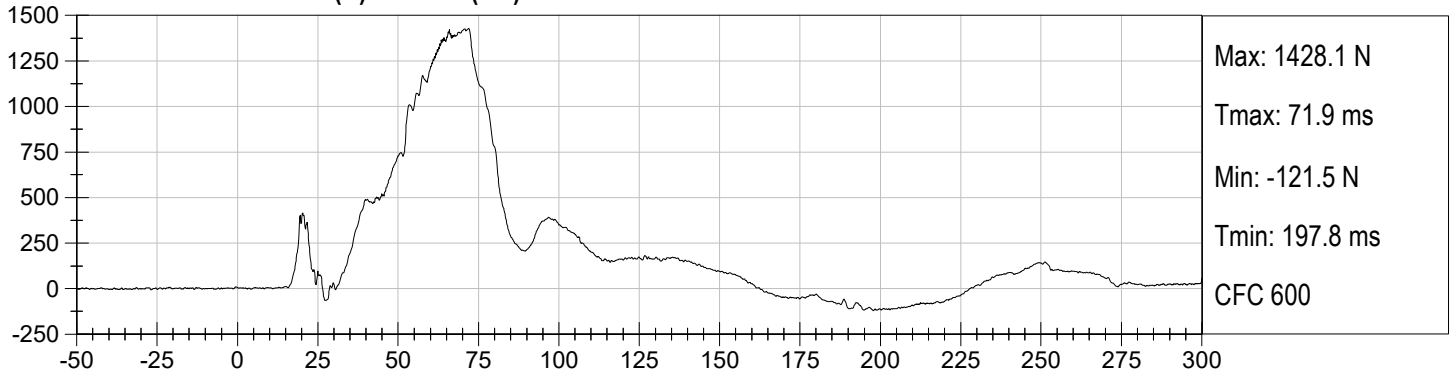




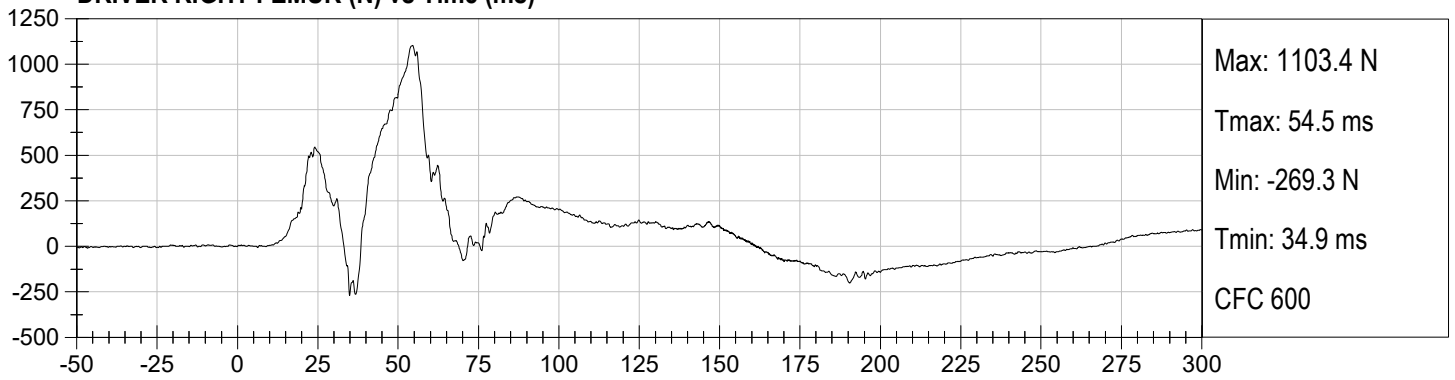


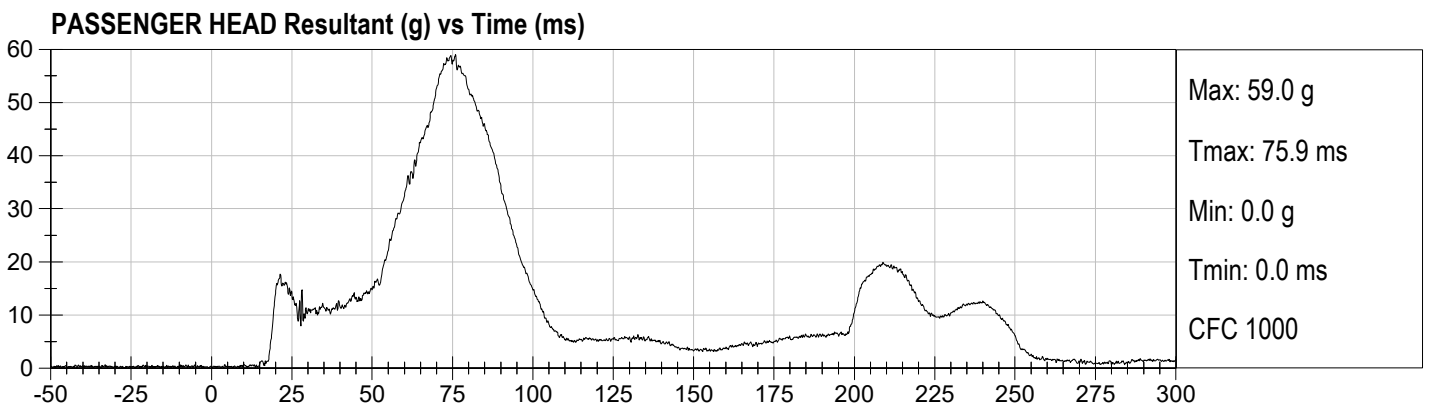
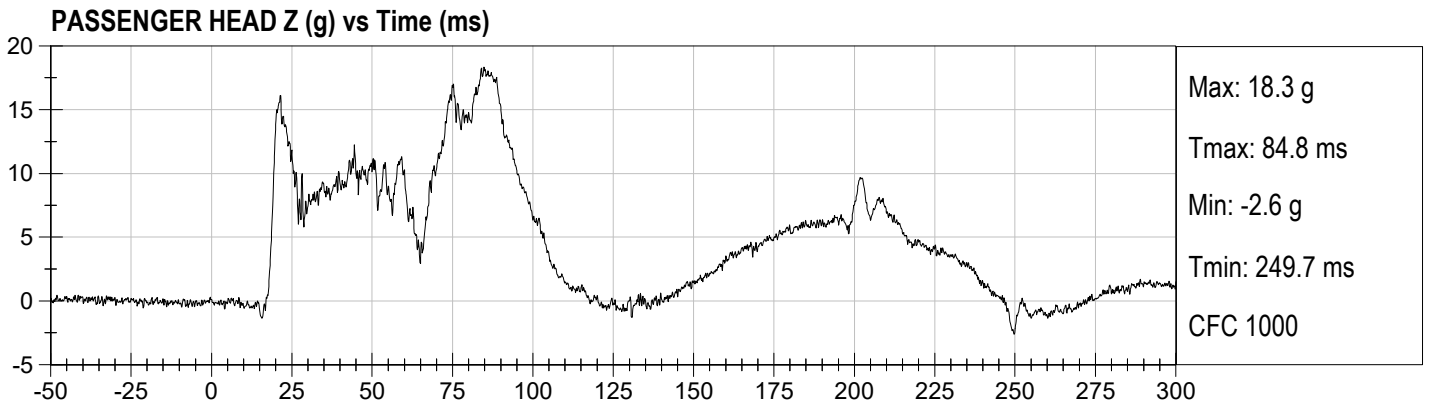
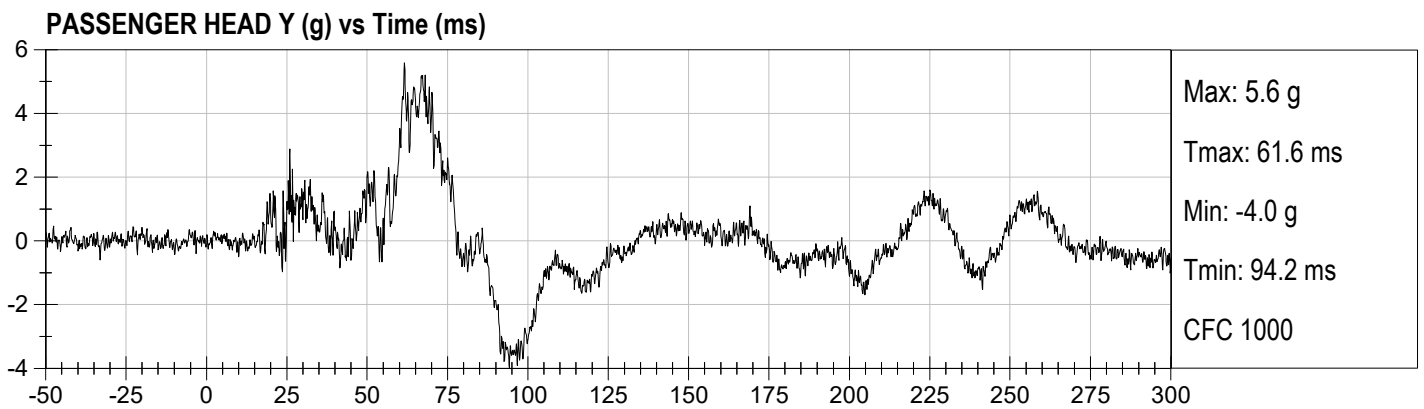
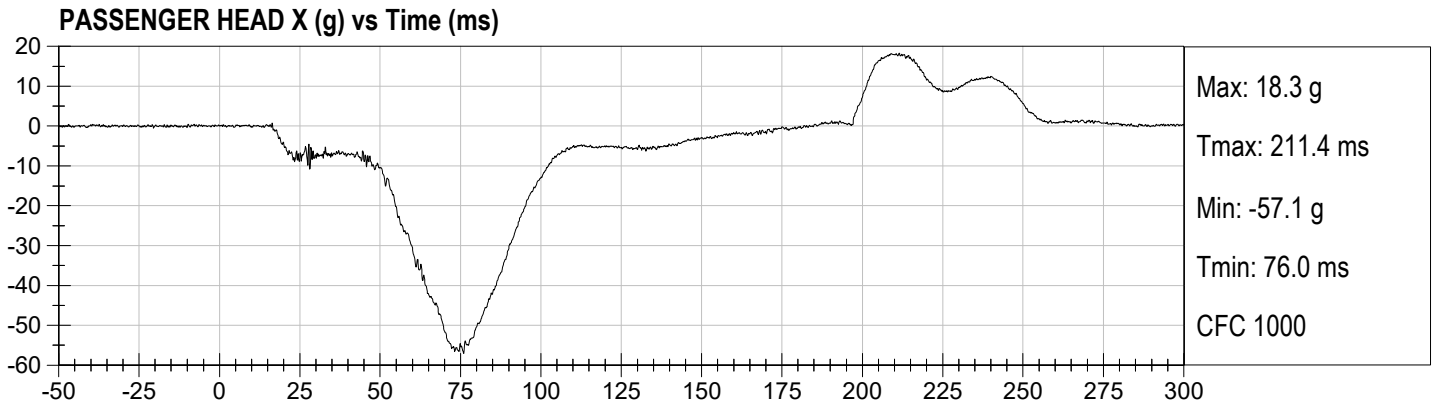


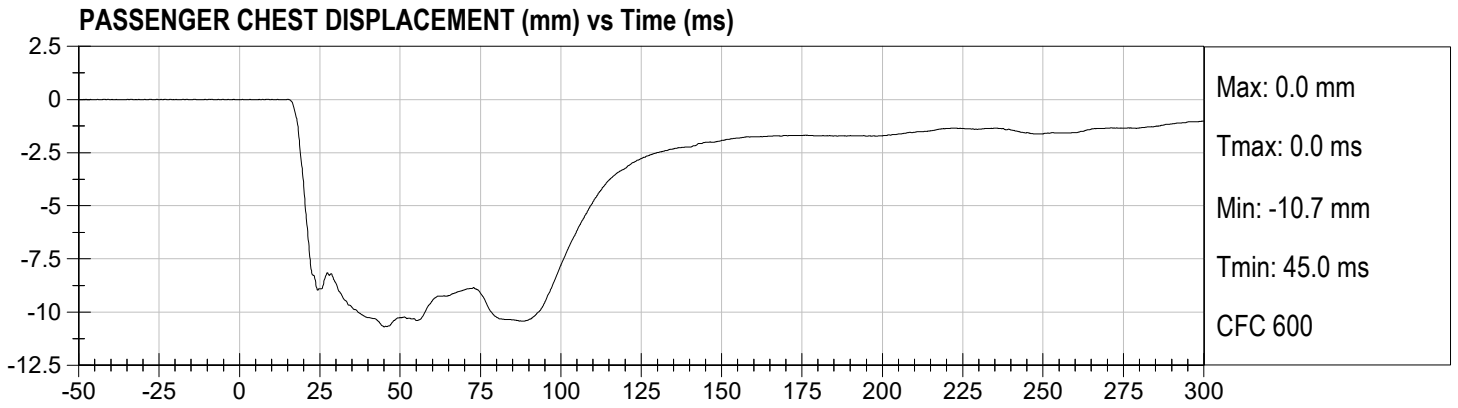
DRIVER LEFT FEMUR (N) vs Time (ms)

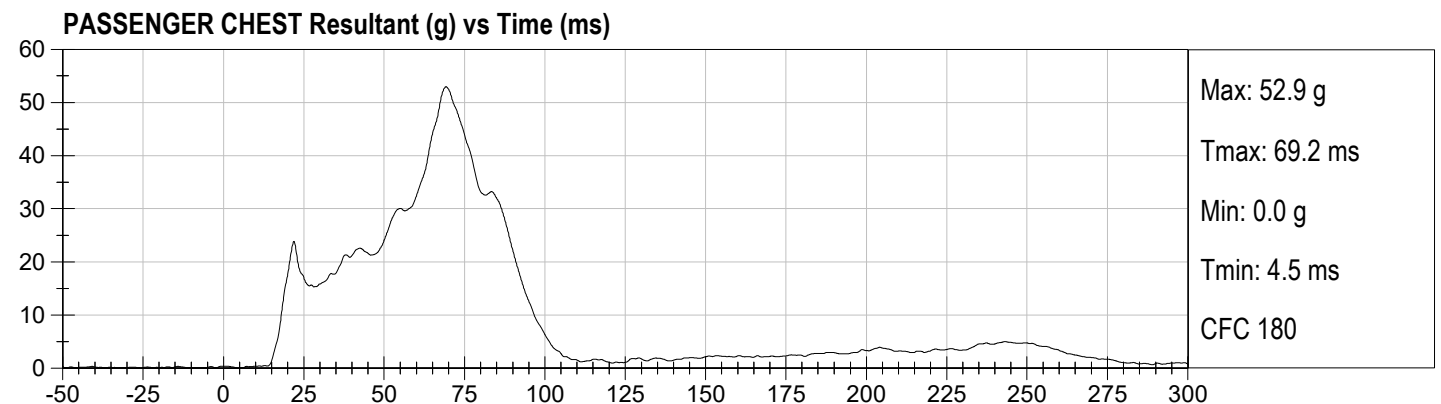
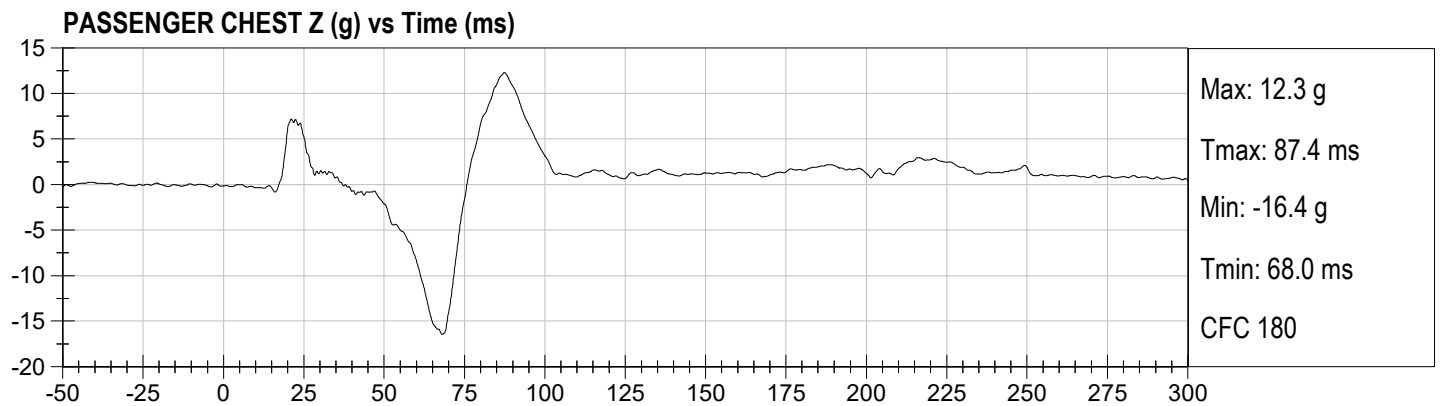
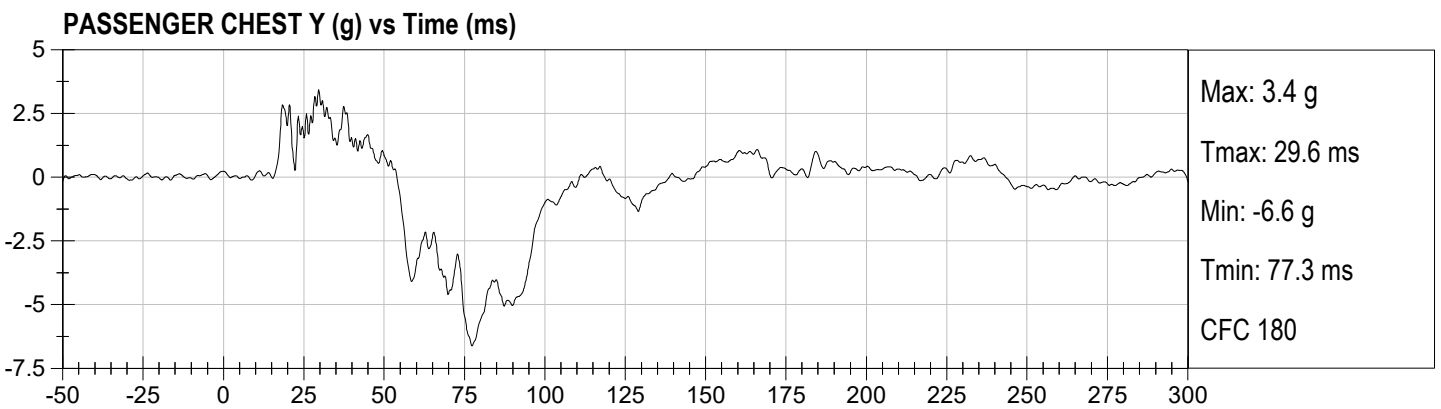
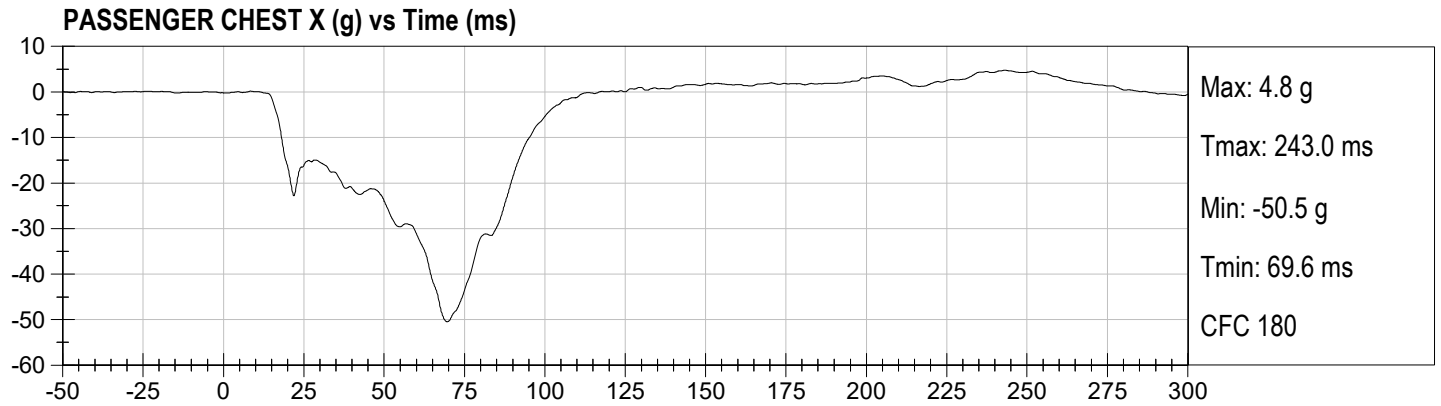


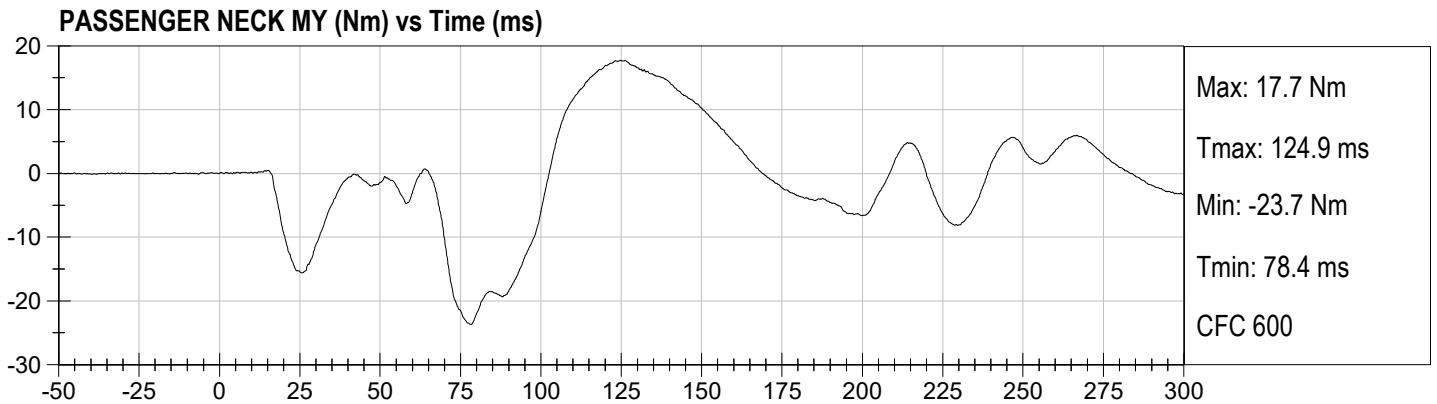
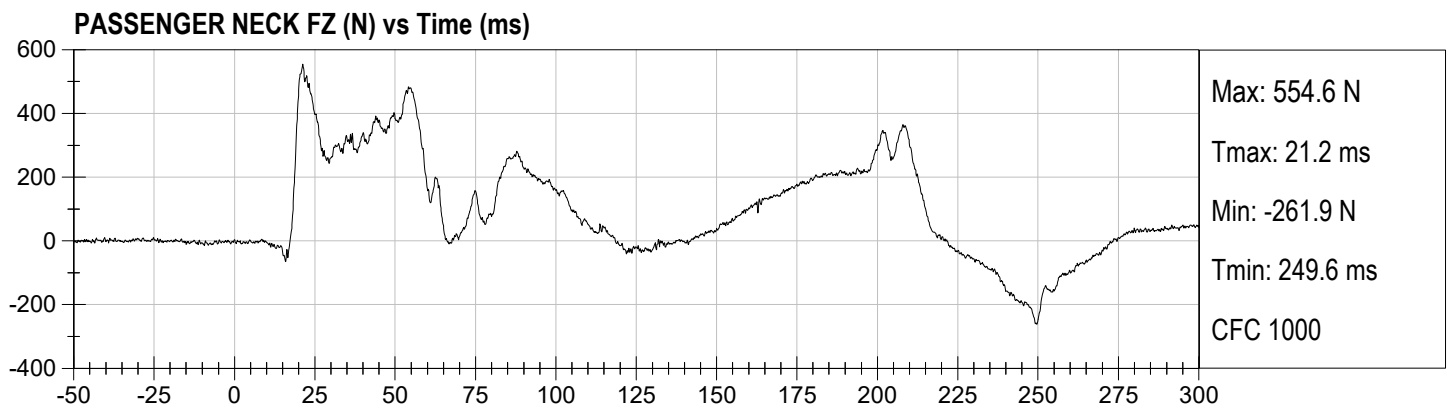
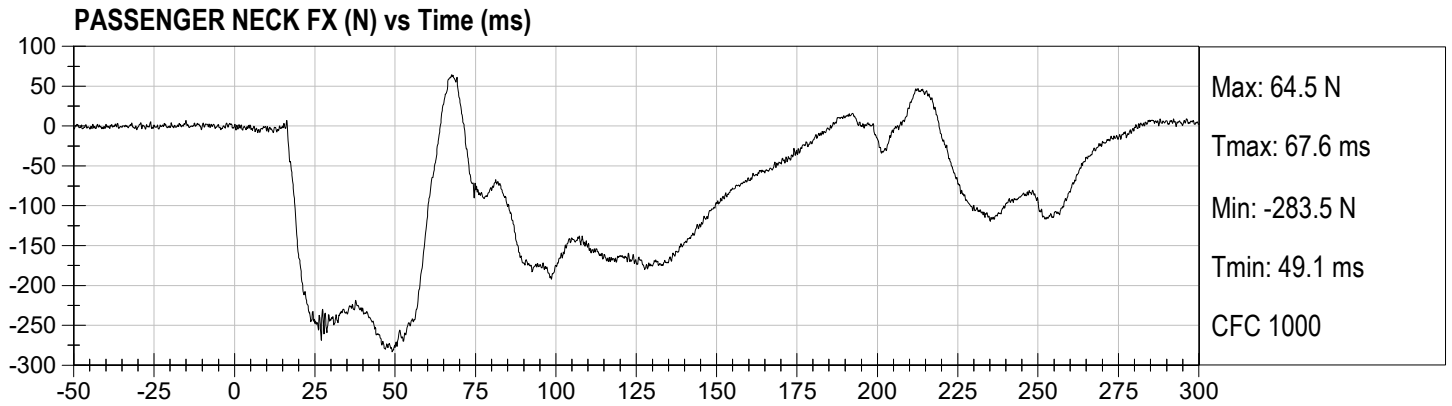
DRIVER RIGHT FEMUR (N) vs Time (ms)



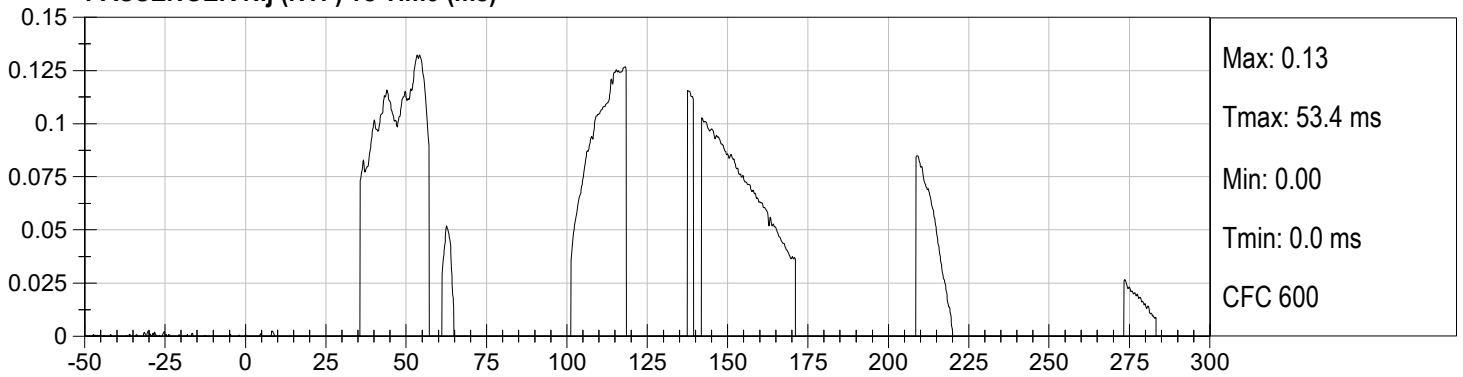




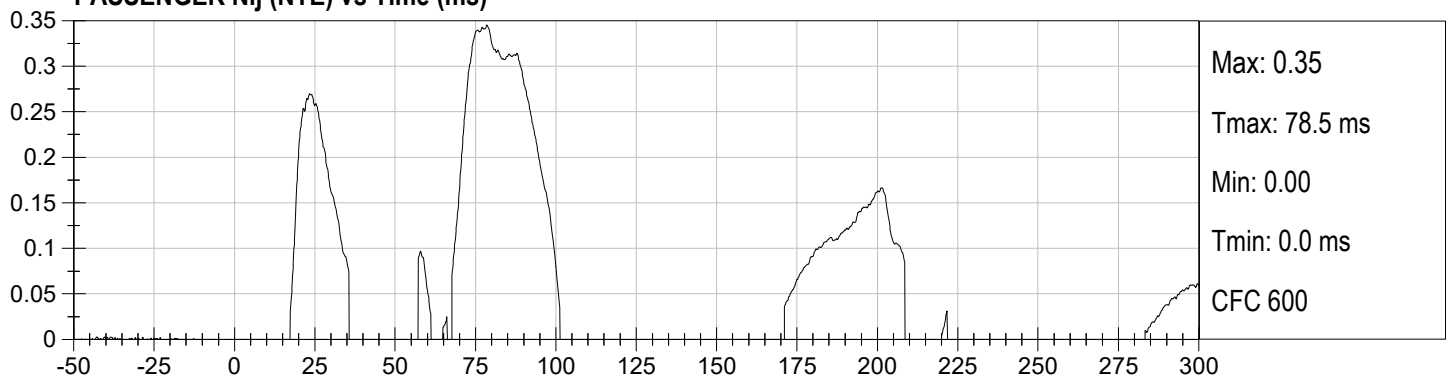




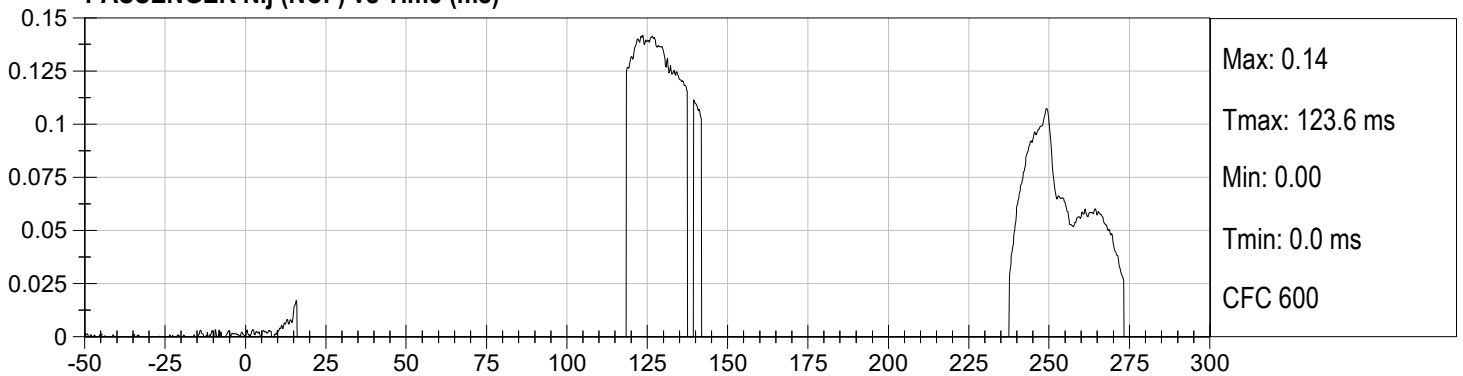
PASSENGER Nij (NTF) vs Time (ms)



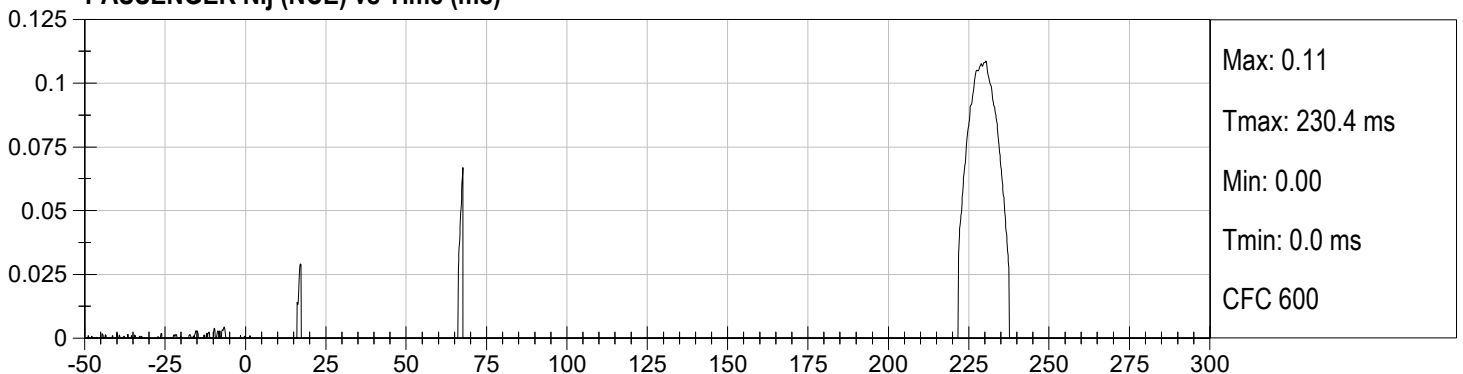
PASSENGER Nij (NTE) vs Time (ms)



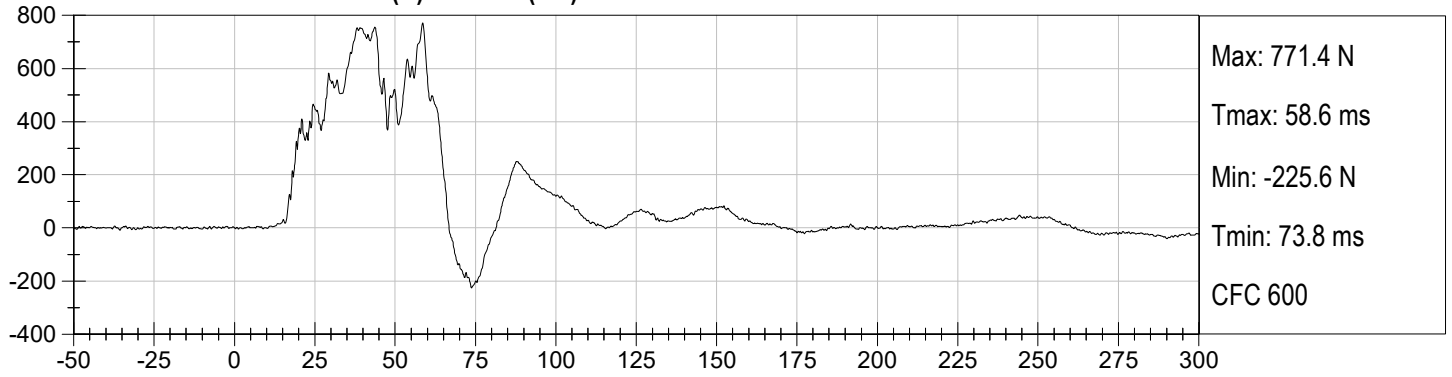
PASSENGER Nij (NCF) vs Time (ms)



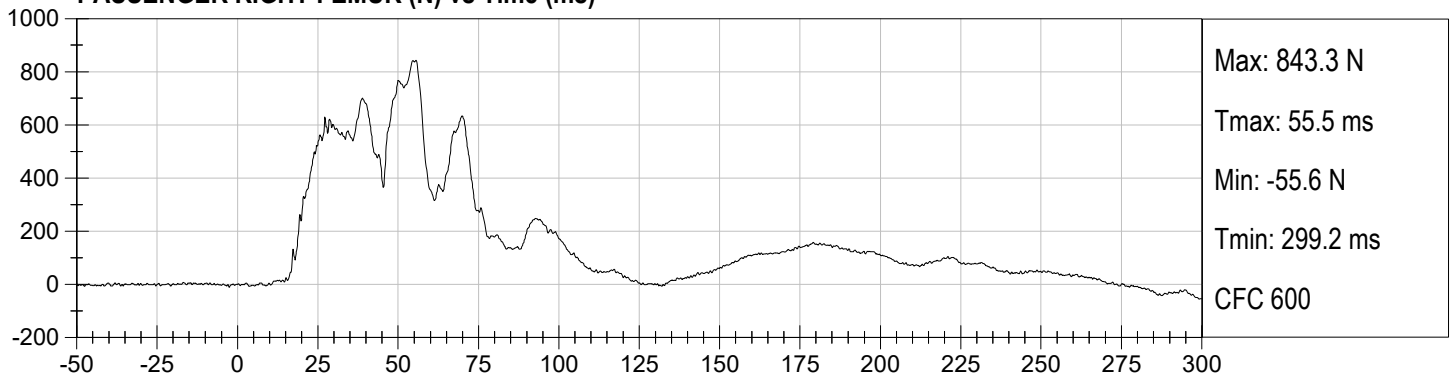
PASSENGER Nij (NCE) vs Time (ms)



PASSENGER LEFT FEMUR (N) vs Time (ms)



PASSENGER RIGHT FEMUR (N) vs Time (ms)



APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

**Hybrid III, 50th External Measurements
SN: 351**

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

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

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

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

ATD Serial No: 351

Test ID: D220391

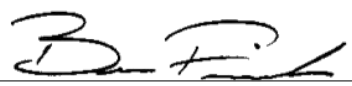
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Peak Resultant Acceleration	G's	225 to 275	255	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



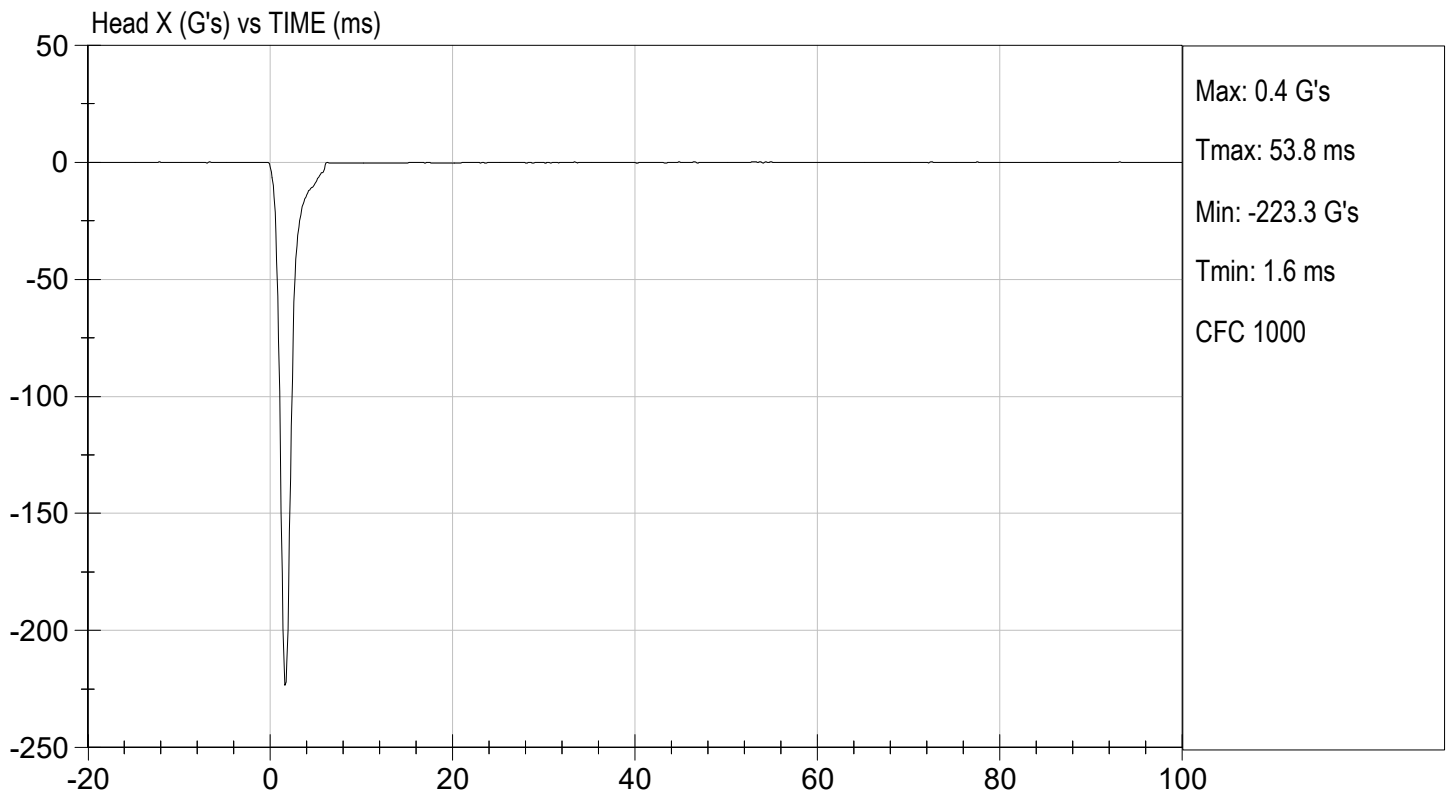
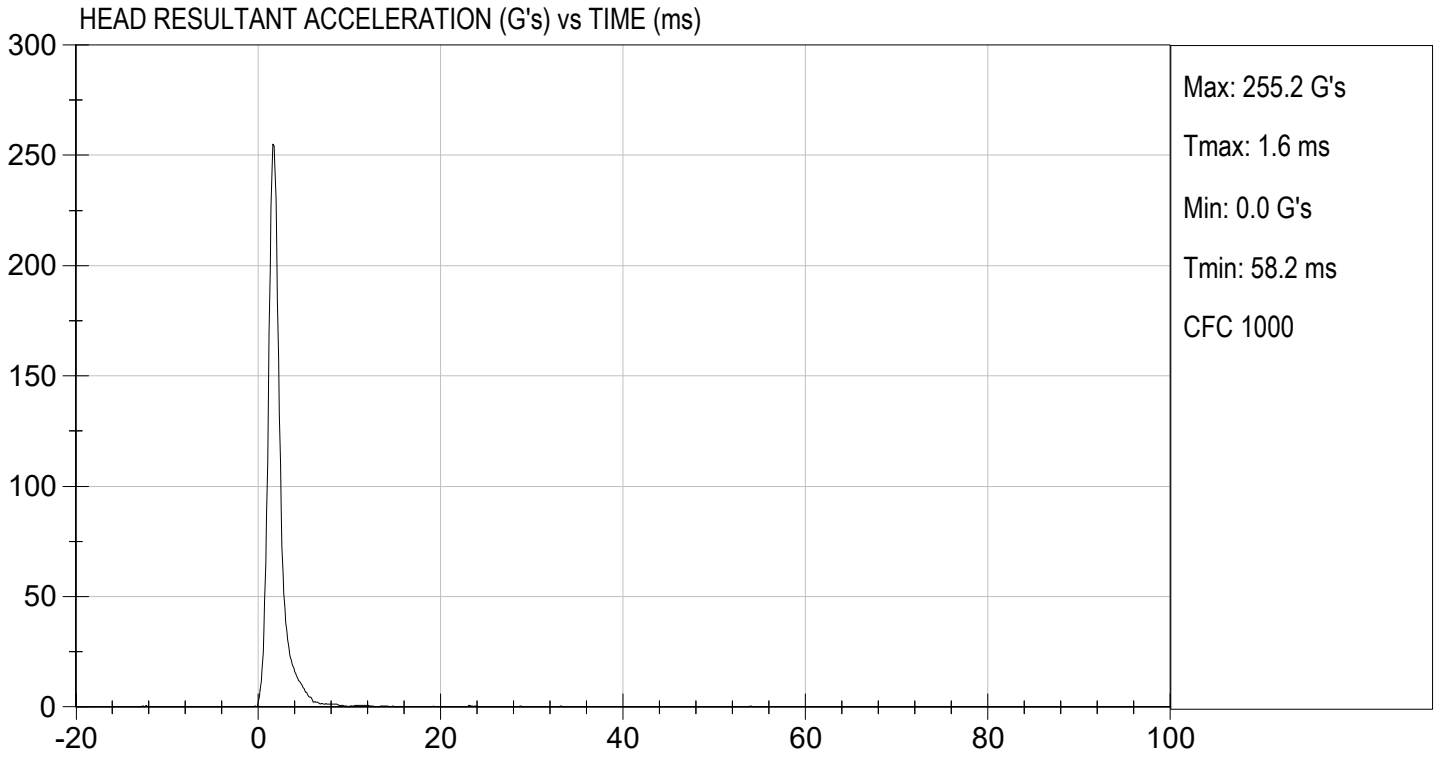
 Laboratory Technician

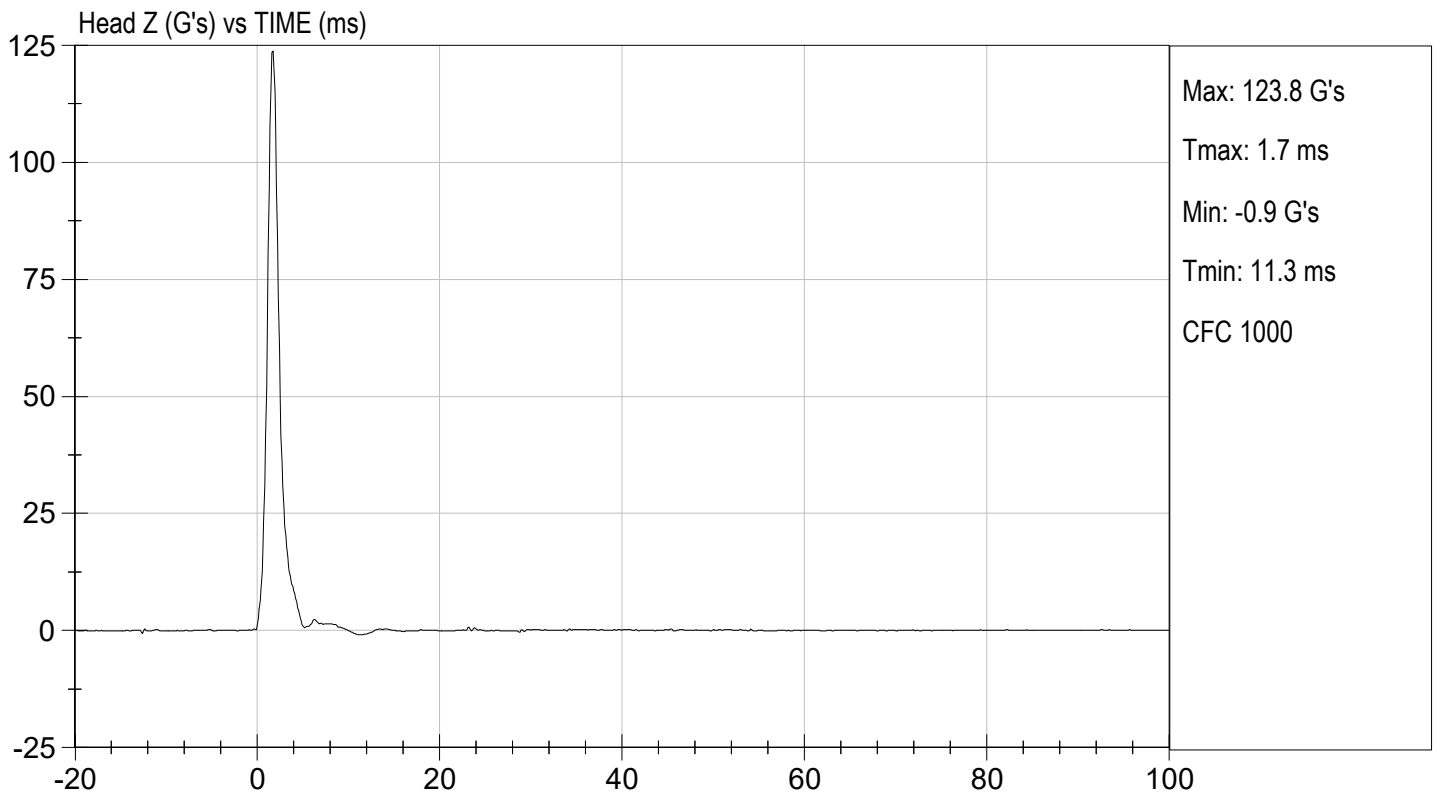
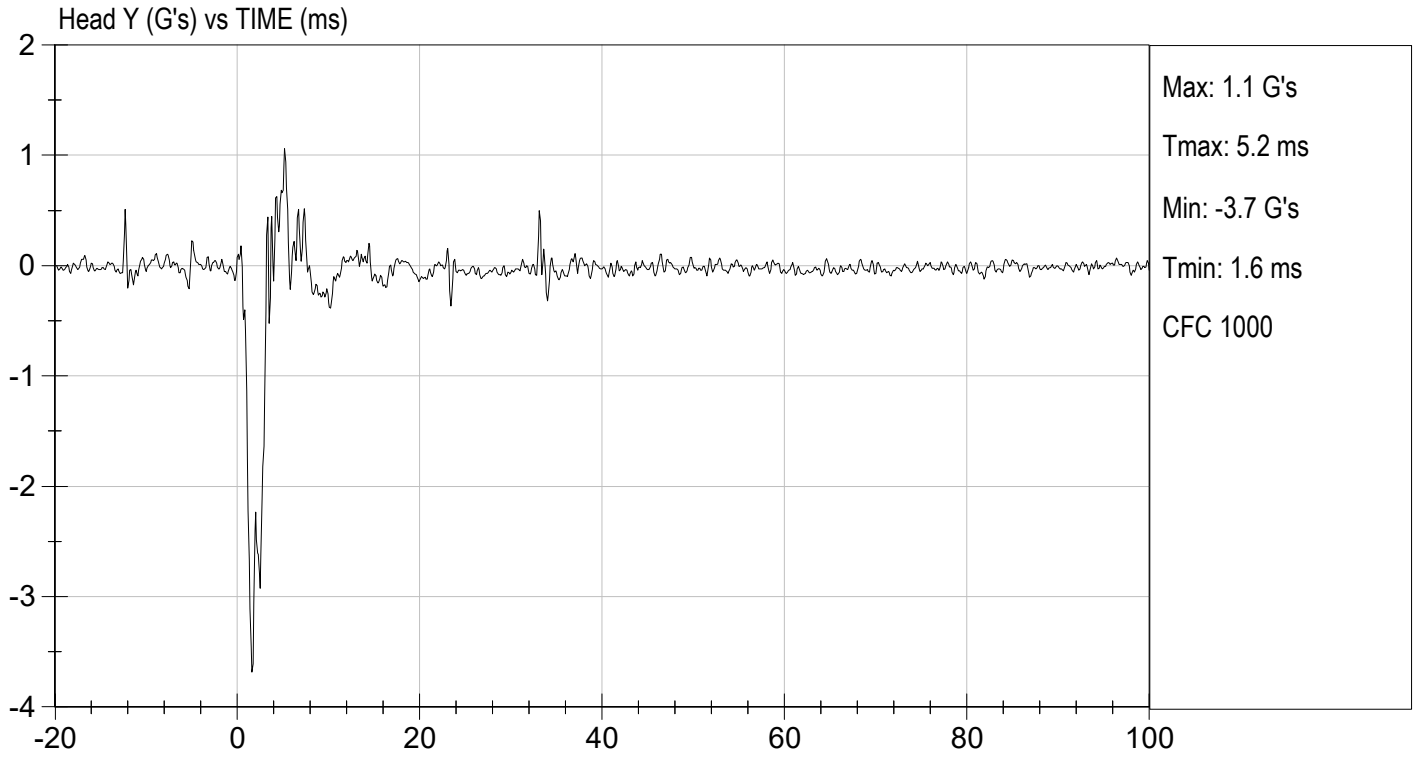
02/10/2022

 Test Date



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

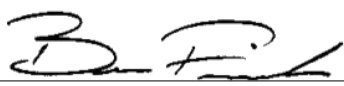
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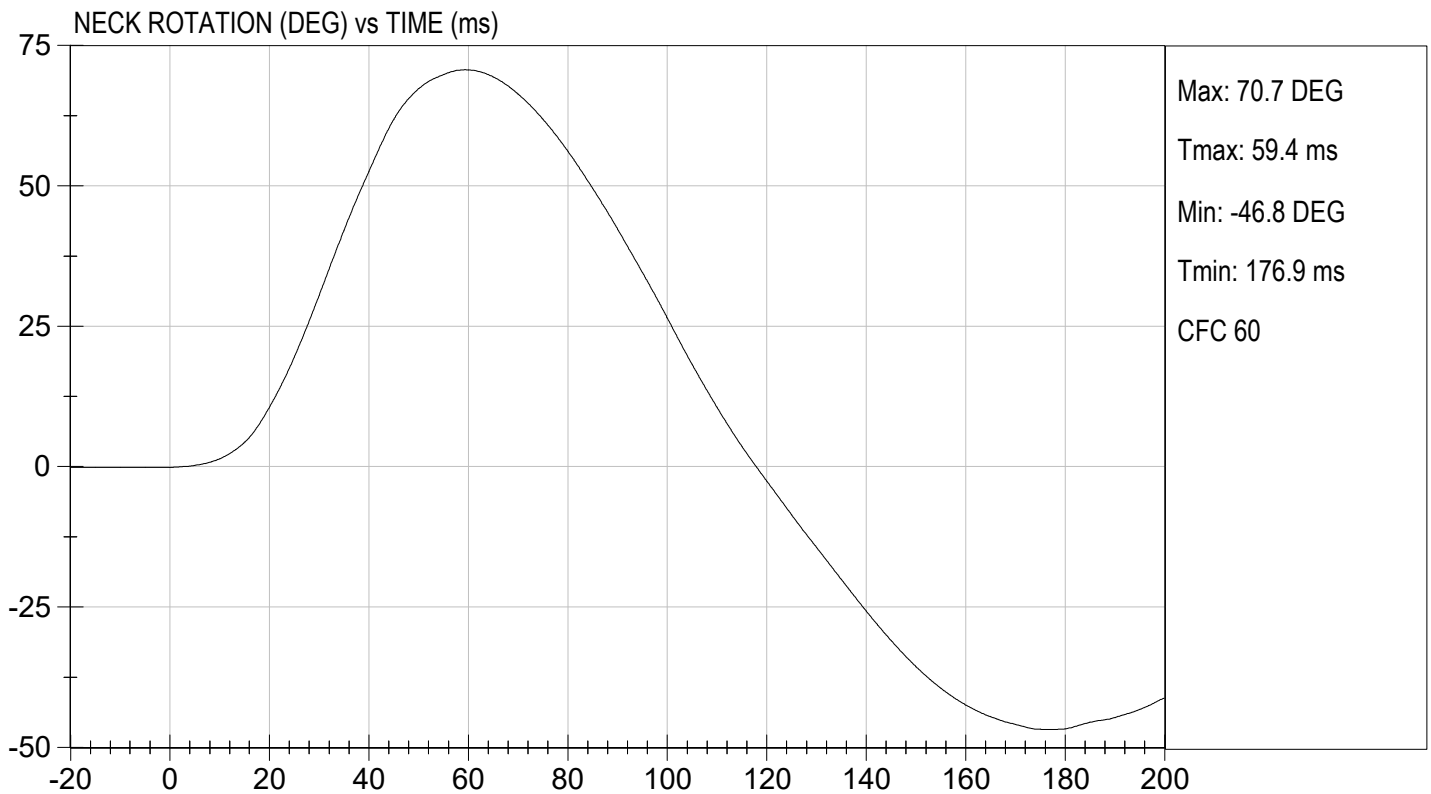
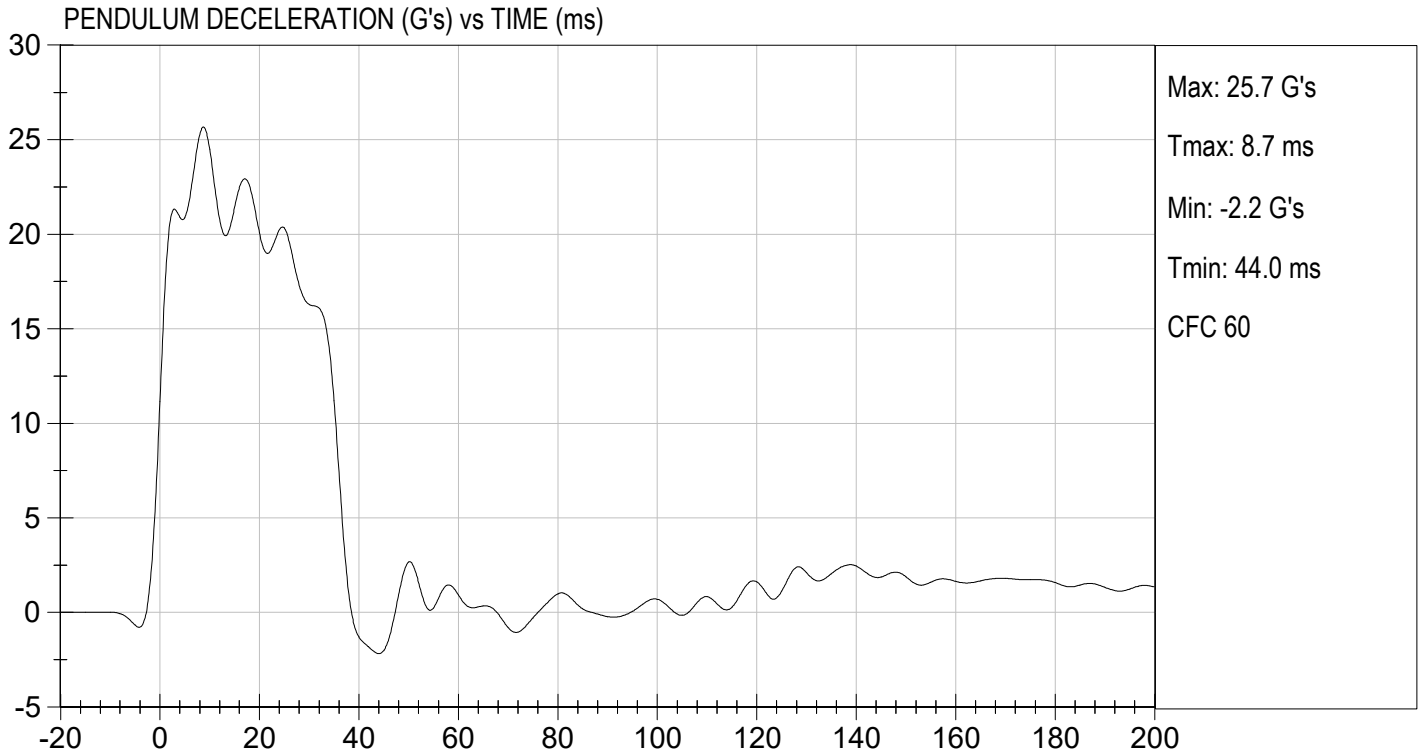
Test I.D.: D220392

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.89	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.49	Pass
	20 ms	G's	17.60 to 22.60	20.08	Pass
	30 ms	G's	12.50 to 18.50	16.29	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	16.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.7	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.7	Pass
	Time	ms	57.0 to 64.0	59.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.0	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	94.3	Pass
	Time	ms	47.0 to 58.0	48.8	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.0	Pass
Overall Test Results					Pass


 Laboratory Technician

02/09/2022
 Test Date

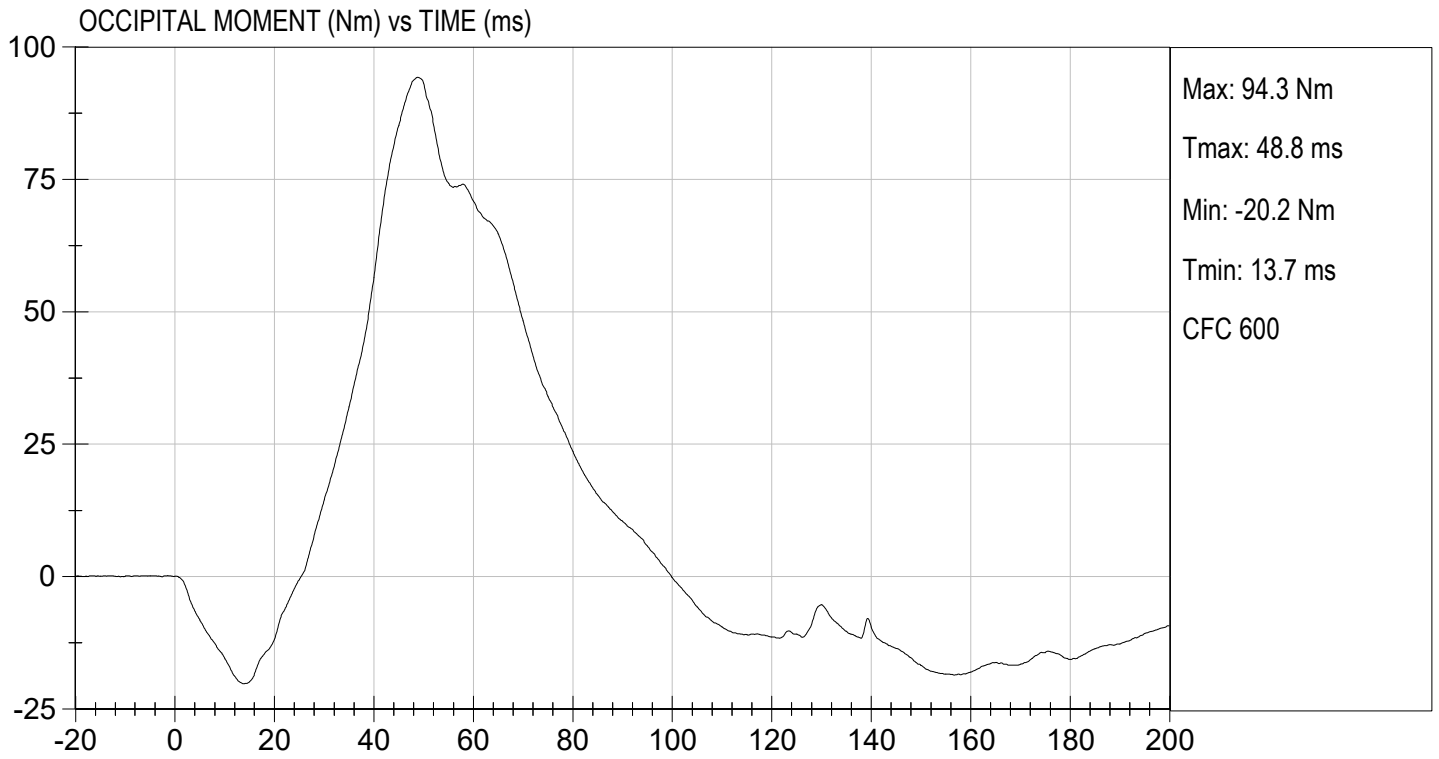

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TEST DESC: NECK FLEXION
VELOCITY: 22.62 ft/s, 6.89 m/s

TEST DATE: 02/09/2022
TEST #: D220392

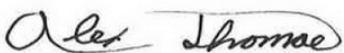


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

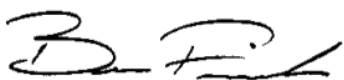
ATD Serial No: 351

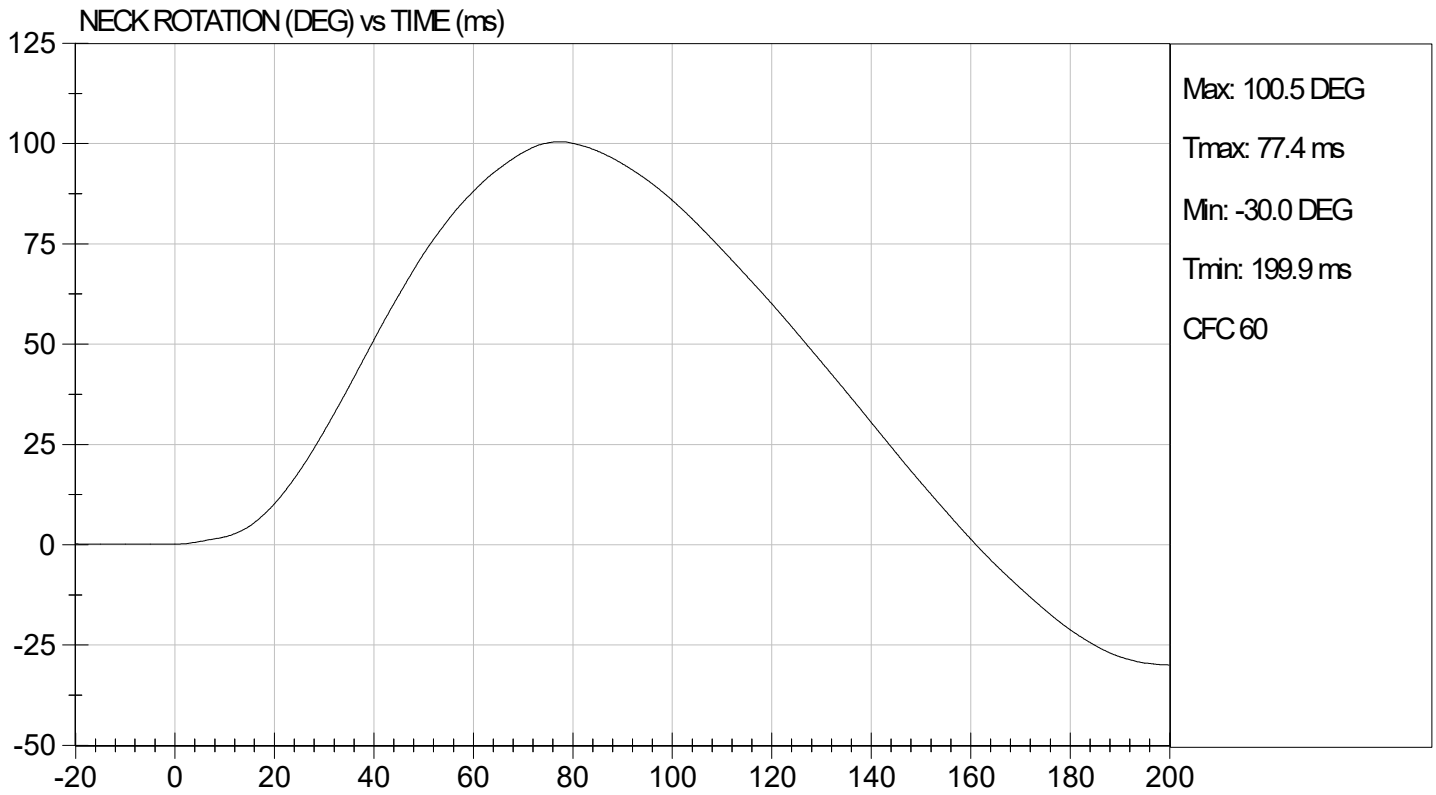
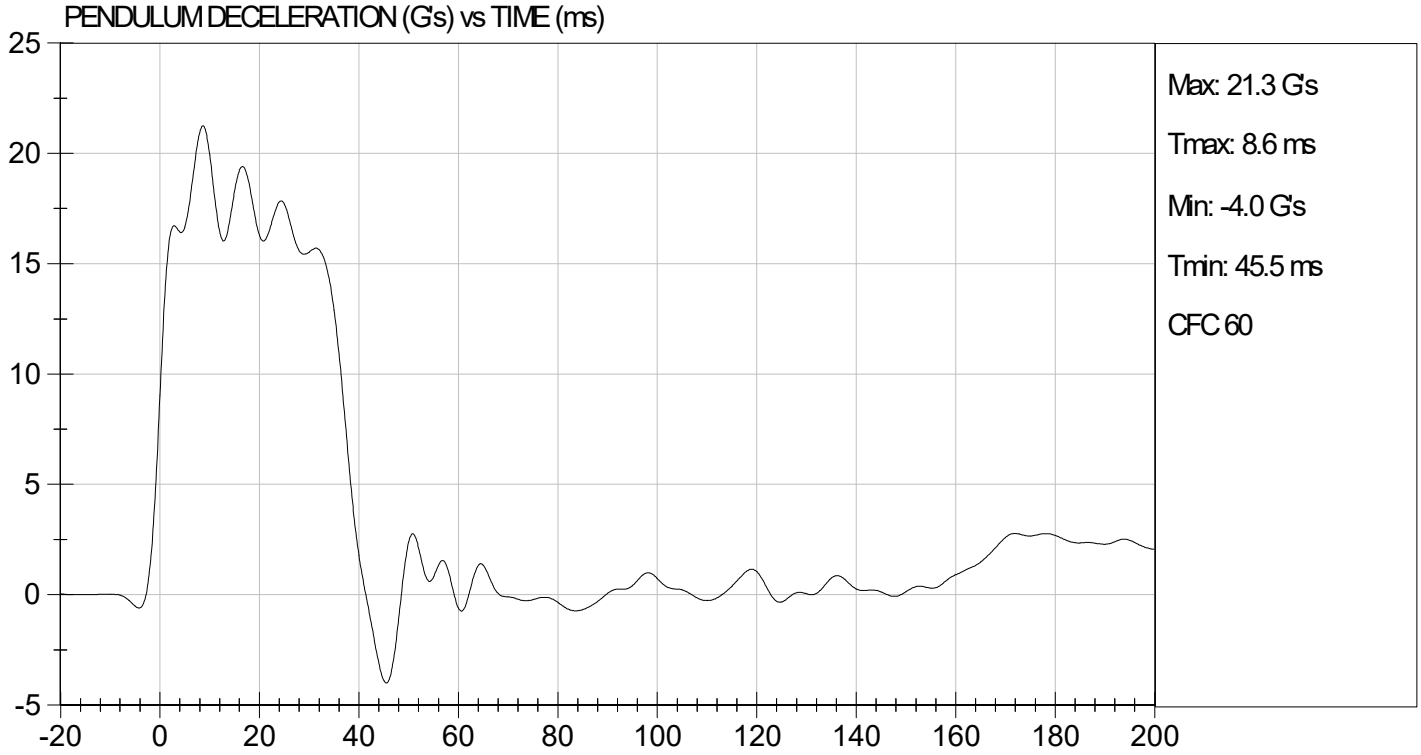
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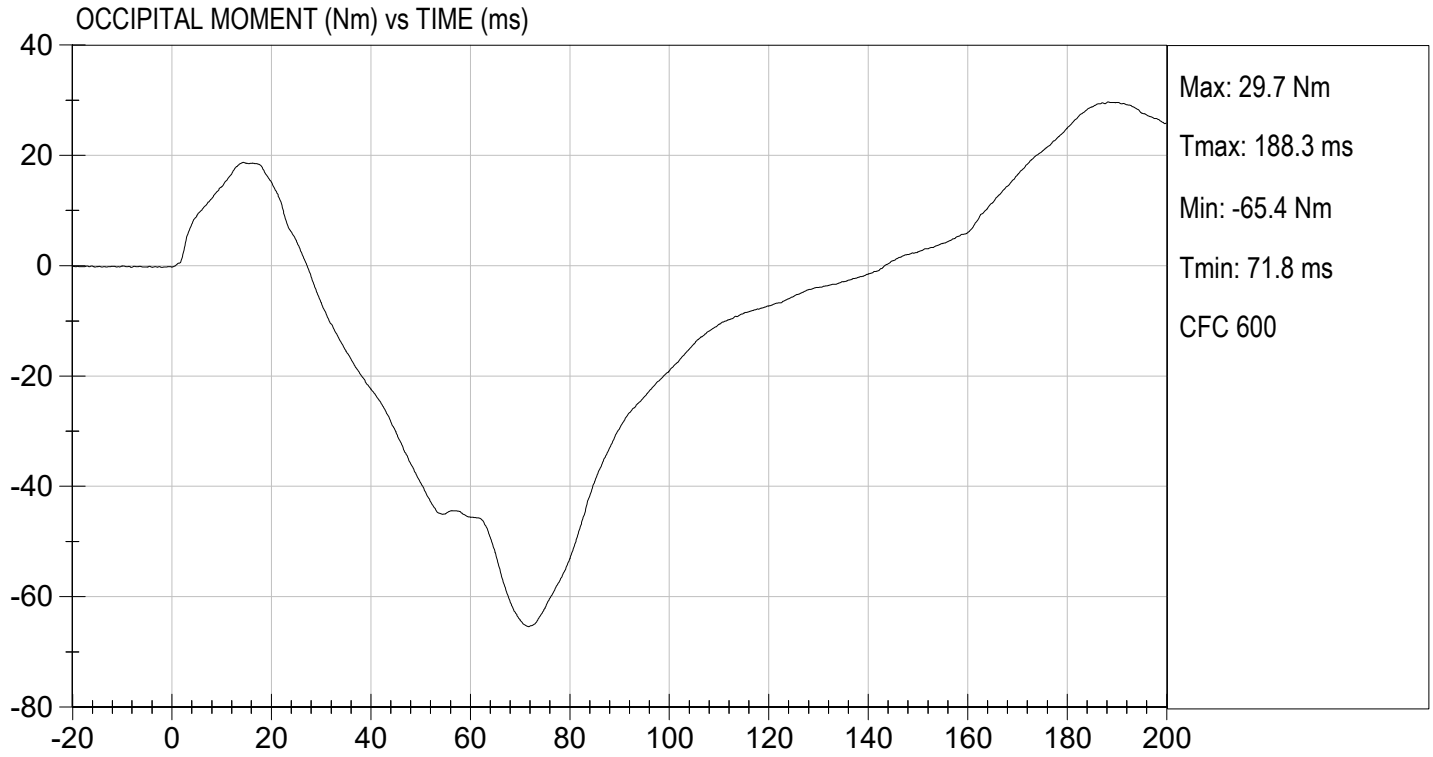
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.93	Pass
	20 ms	G's	14.00 to 19.00	16.29	Pass
	30 ms	G's	11.00 to 16.00	15.53	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	15.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.5	Pass
	Time	ms	72.0 to 82.0	77.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	161.2	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-65.4	Pass
	Time	ms	65.0 to 79.0	71.8	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.4	Pass
Overall Test Results					Pass


 Laboratory Technician

02/09/2022
 Test Date


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MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

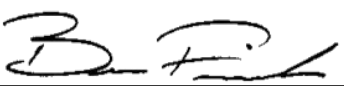
ATD Serial No: 351

Test I.D: D220394

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	26	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,376	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.24	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results				Pass


 Laboratory Technician

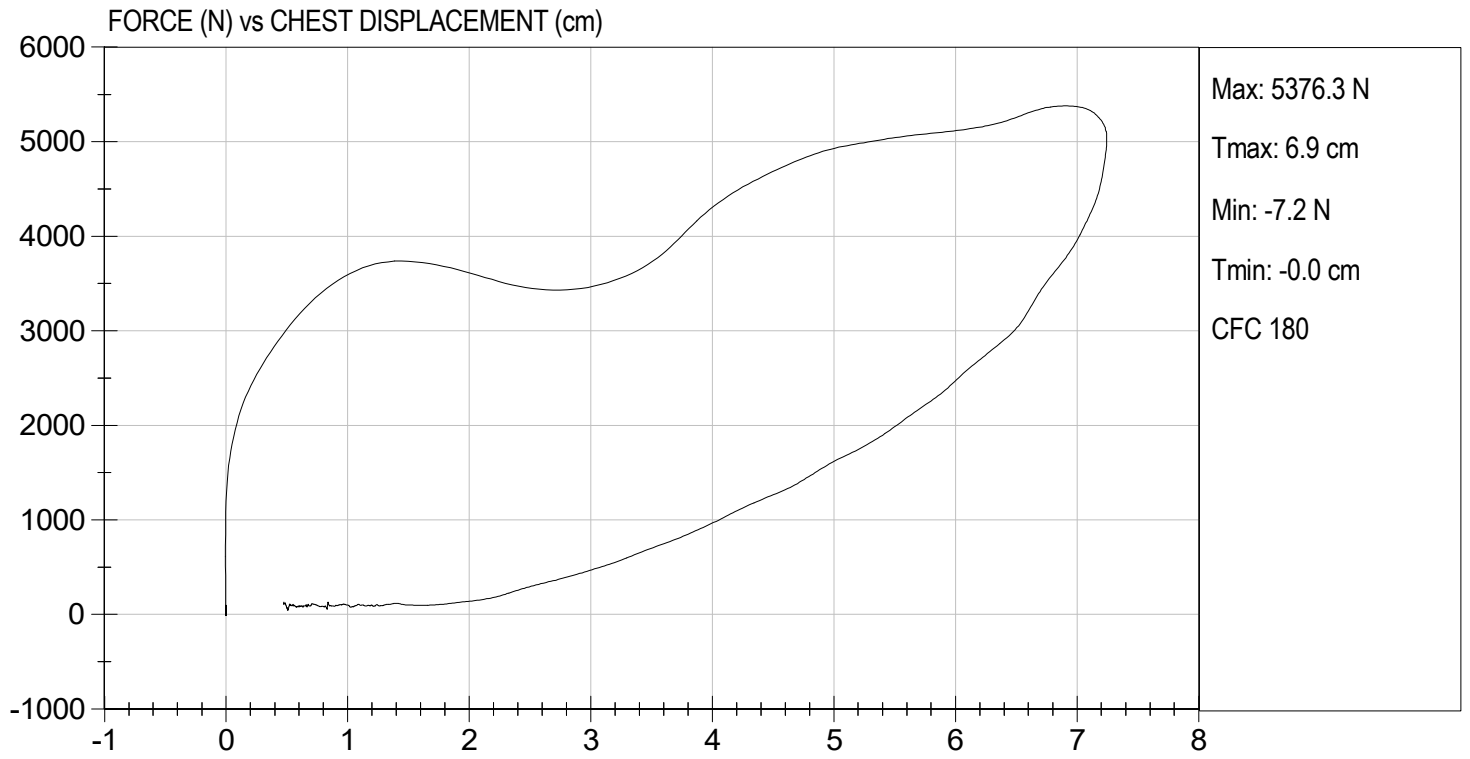
02/09/2022
 Test Date


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

TEST DATE: 02/09/2022
TEST #: D220394



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

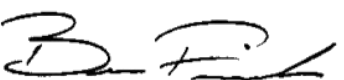
ATD Serial No: 351

Test I.D: D220395

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	2.11	Pass
Peak Probe Force	N	4715 to 5782	5,102	Pass
Overall Test Results				Pass


 Laboratory Technician

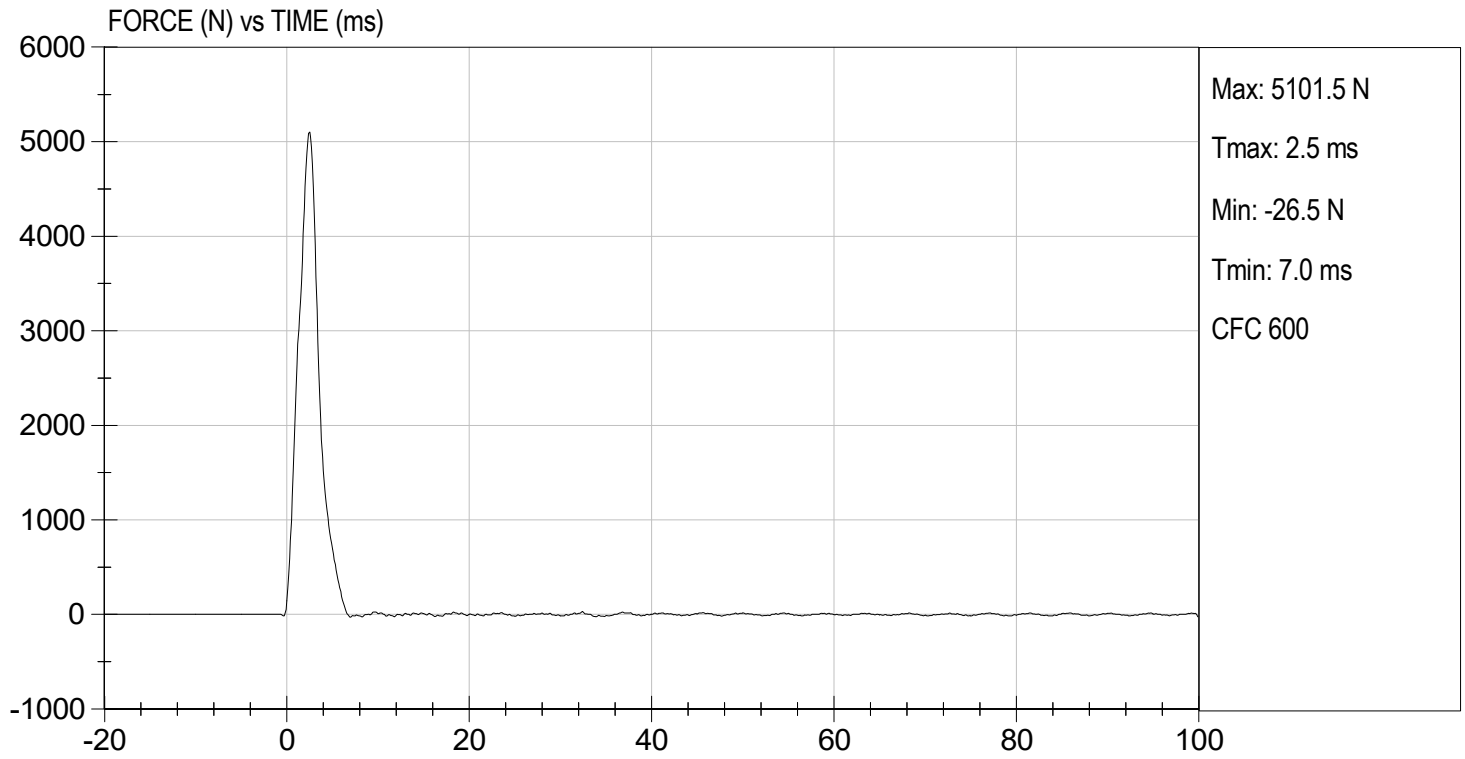
02/10/2022
 Test Date


 Approved By



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

TEST DATE: 02/10/2022
TEST #: D220395



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

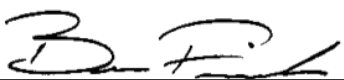
ATD Serial No: 351

Test I.D: D220396

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	5,070	Pass
Overall Test Results				Pass


 Laboratory Technician

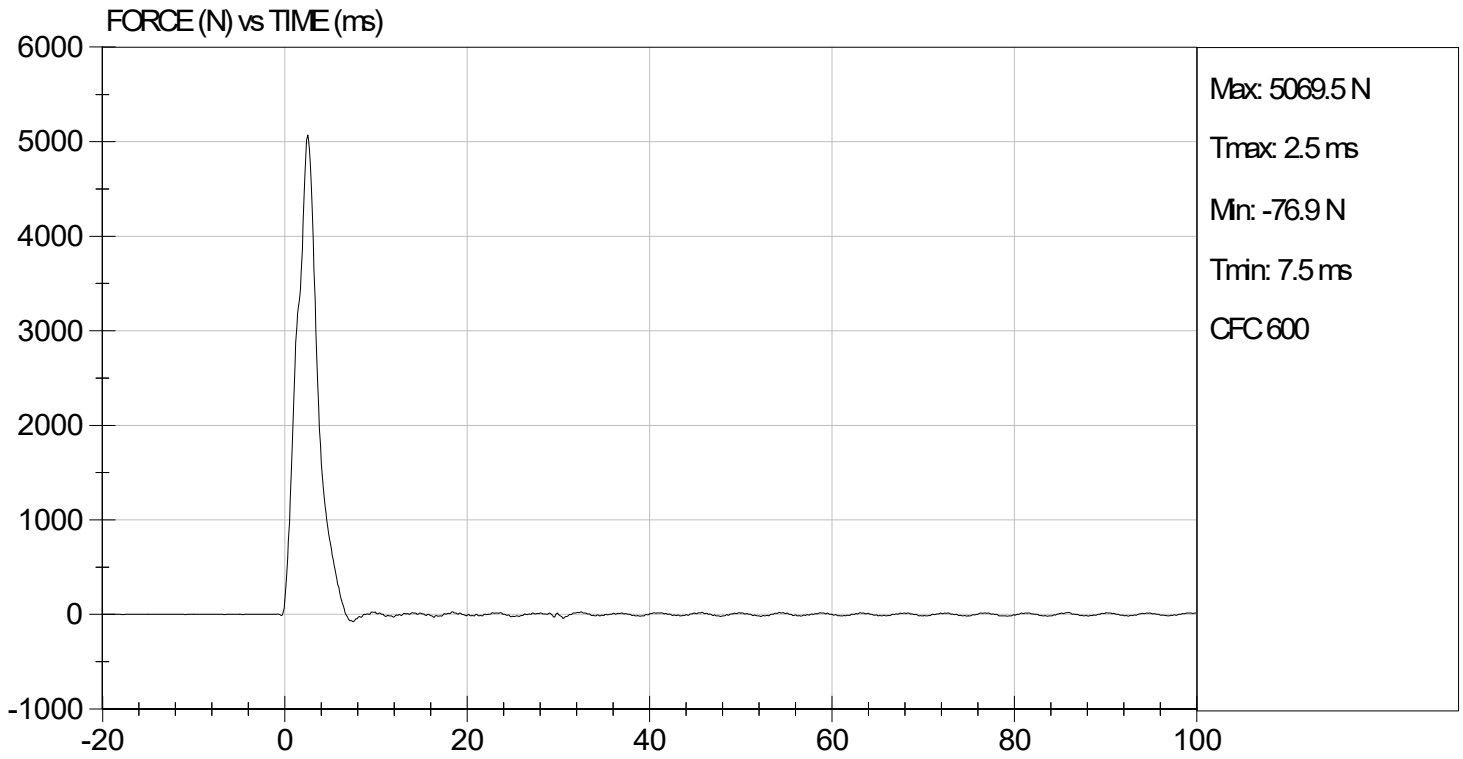
02/10/2022
 Test Date


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

TEST DATE: 02/10/2022
TEST #: D220396



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

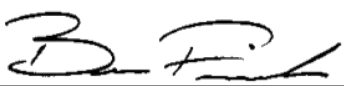
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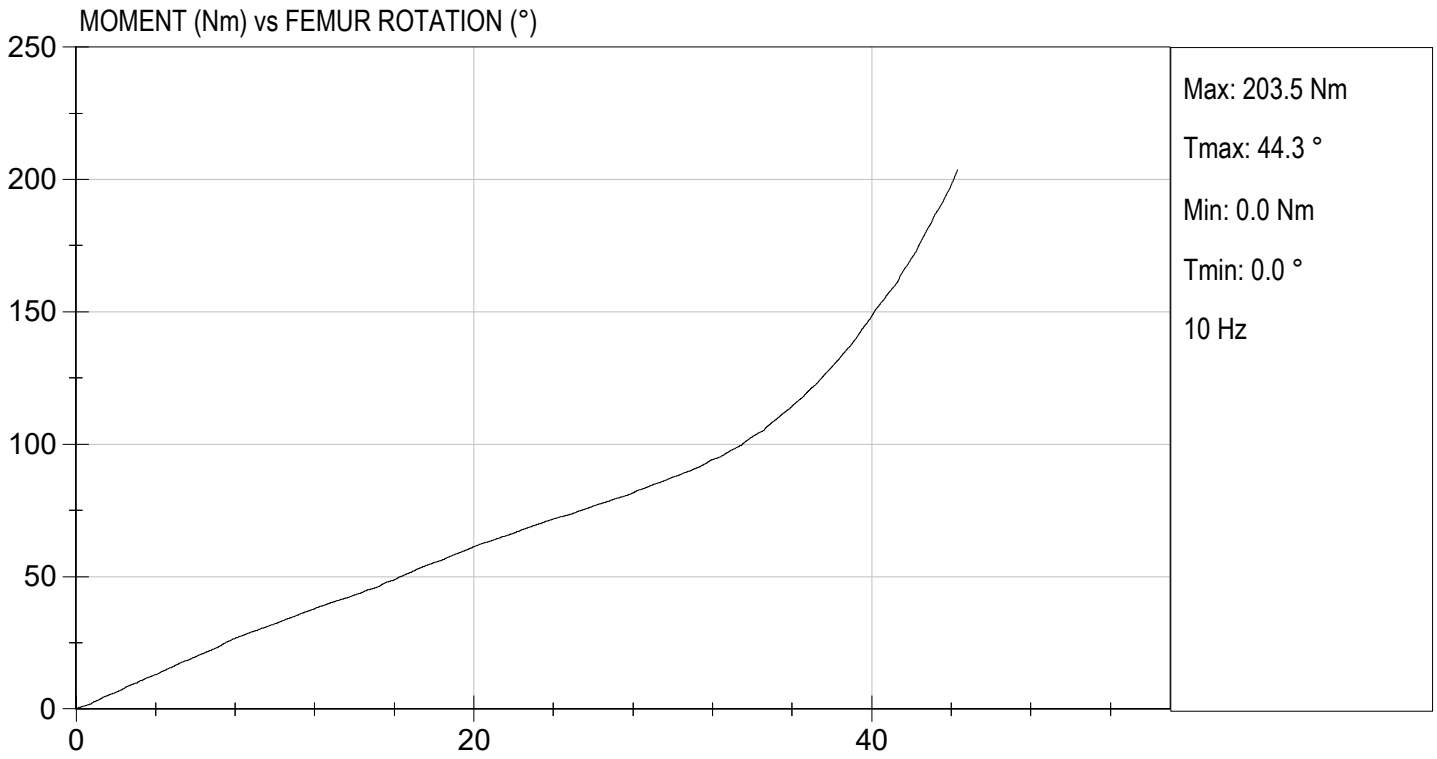
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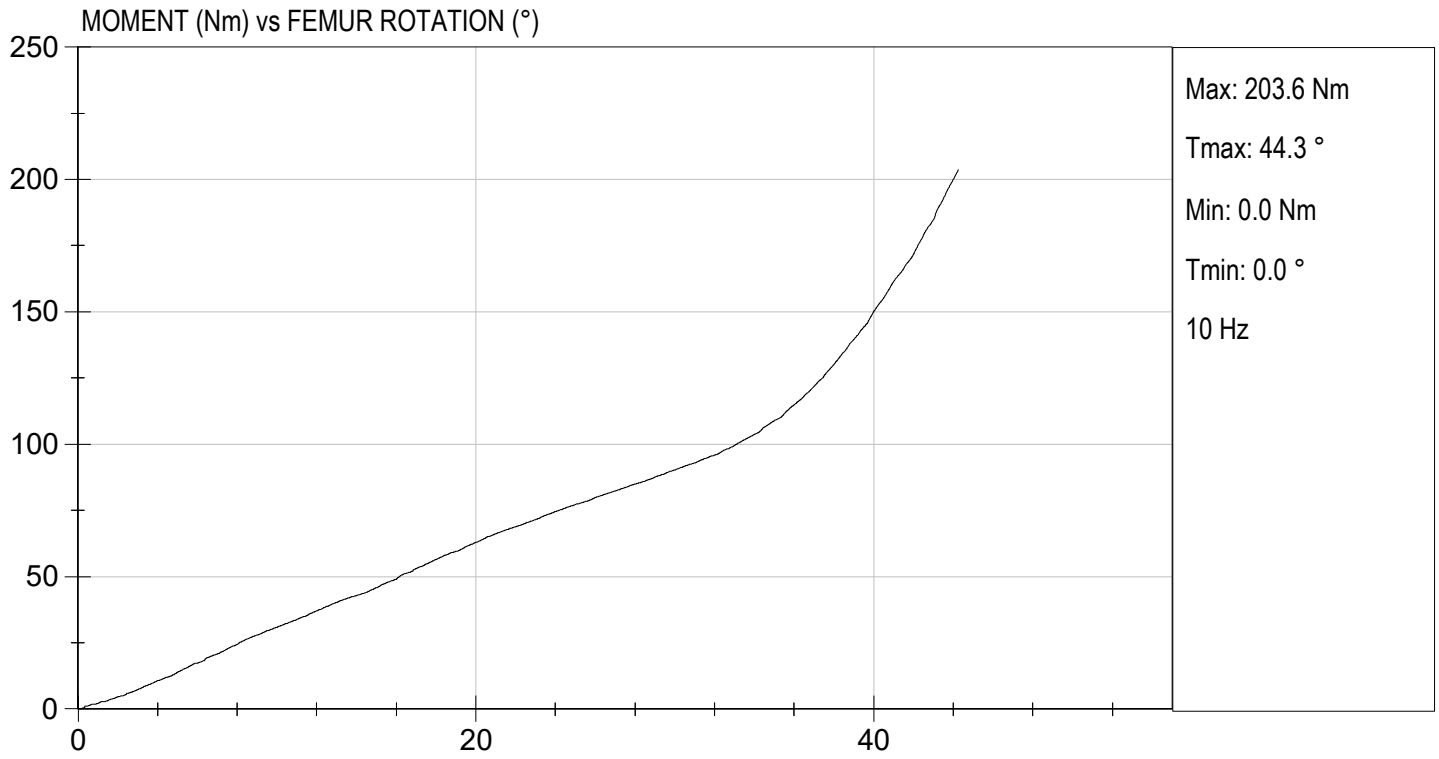
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	28	28	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	87.6	90.3	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.3	44.3	Pass
Overall Test Results					Pass


 Laboratory Technician

02/10/2022
 Test Date


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CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

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

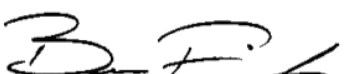
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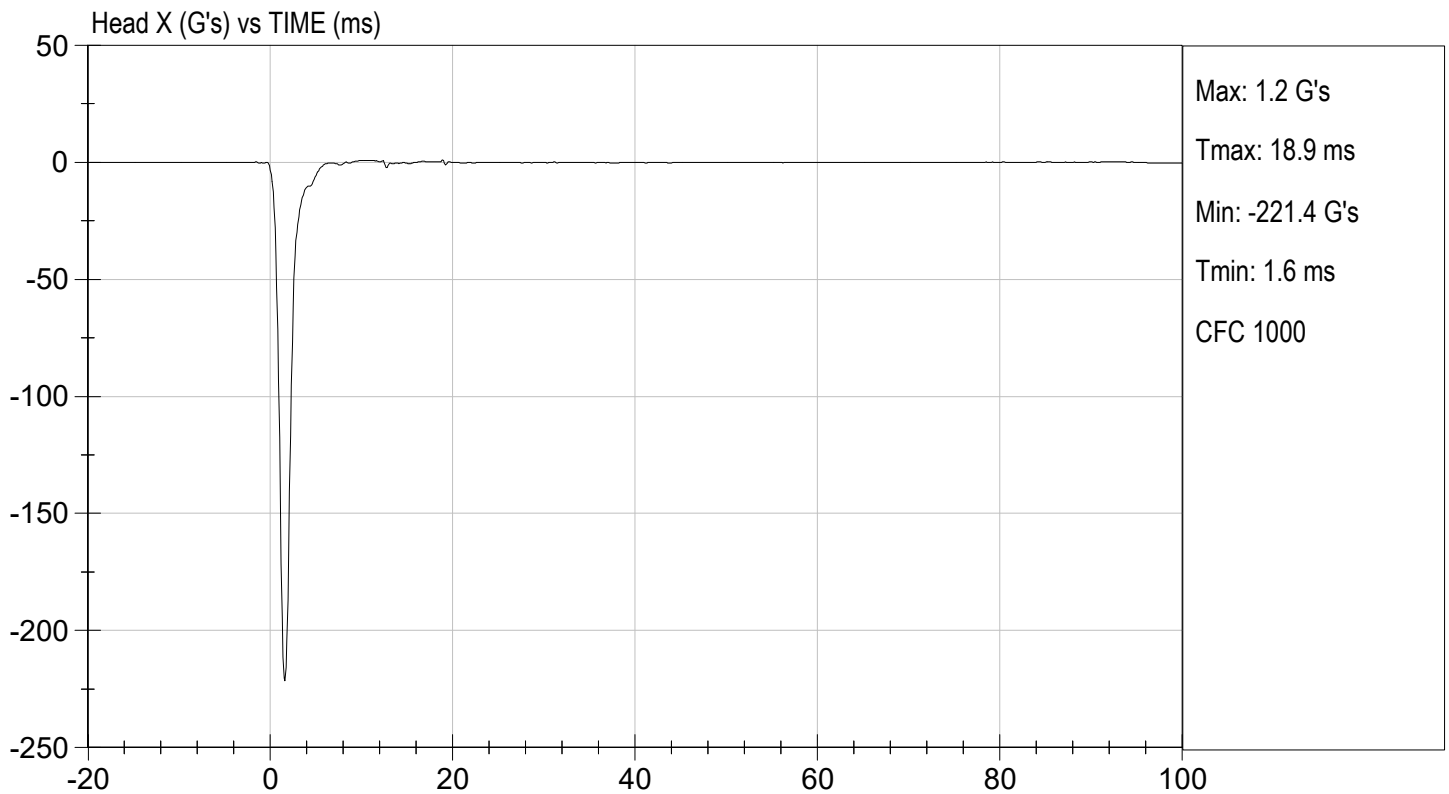
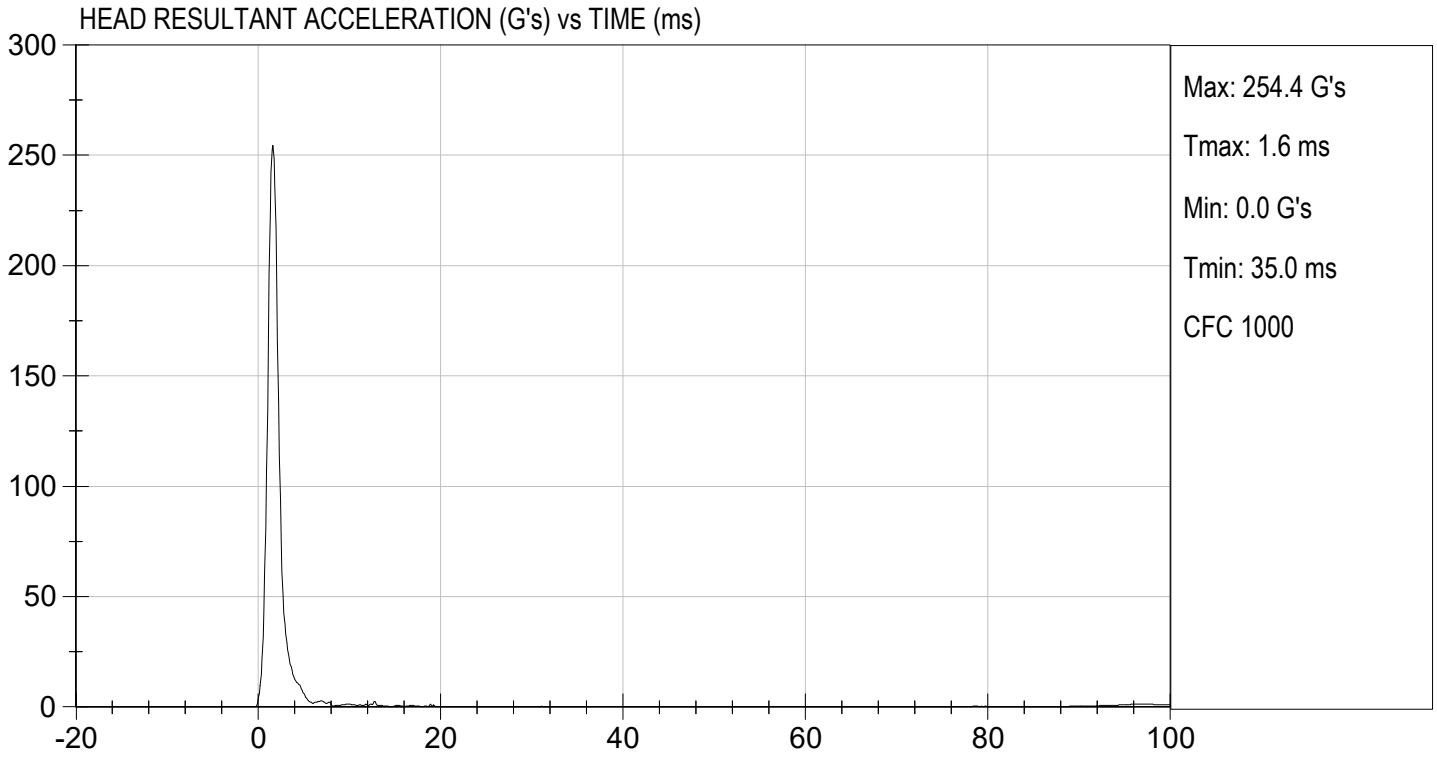
Test ID: D220571

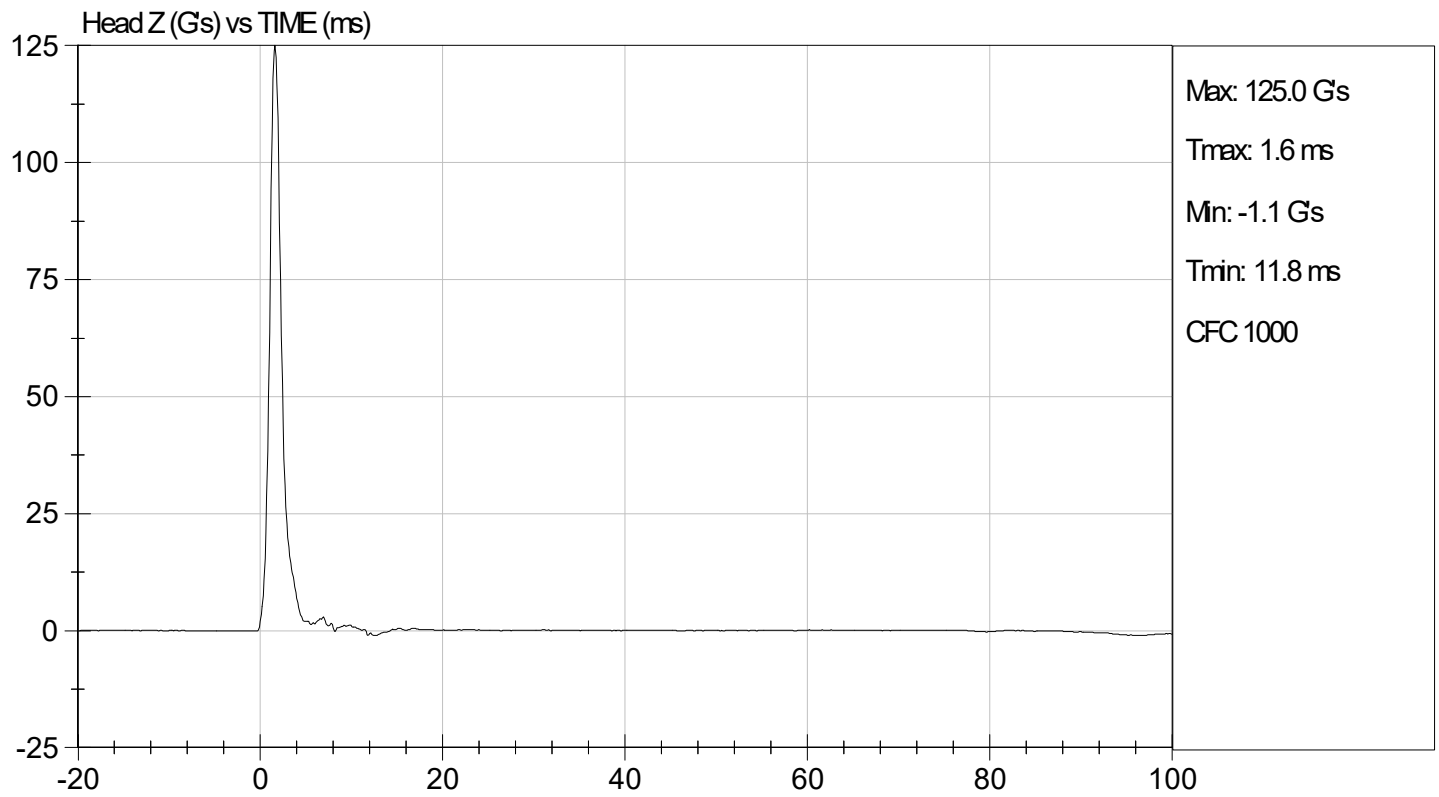
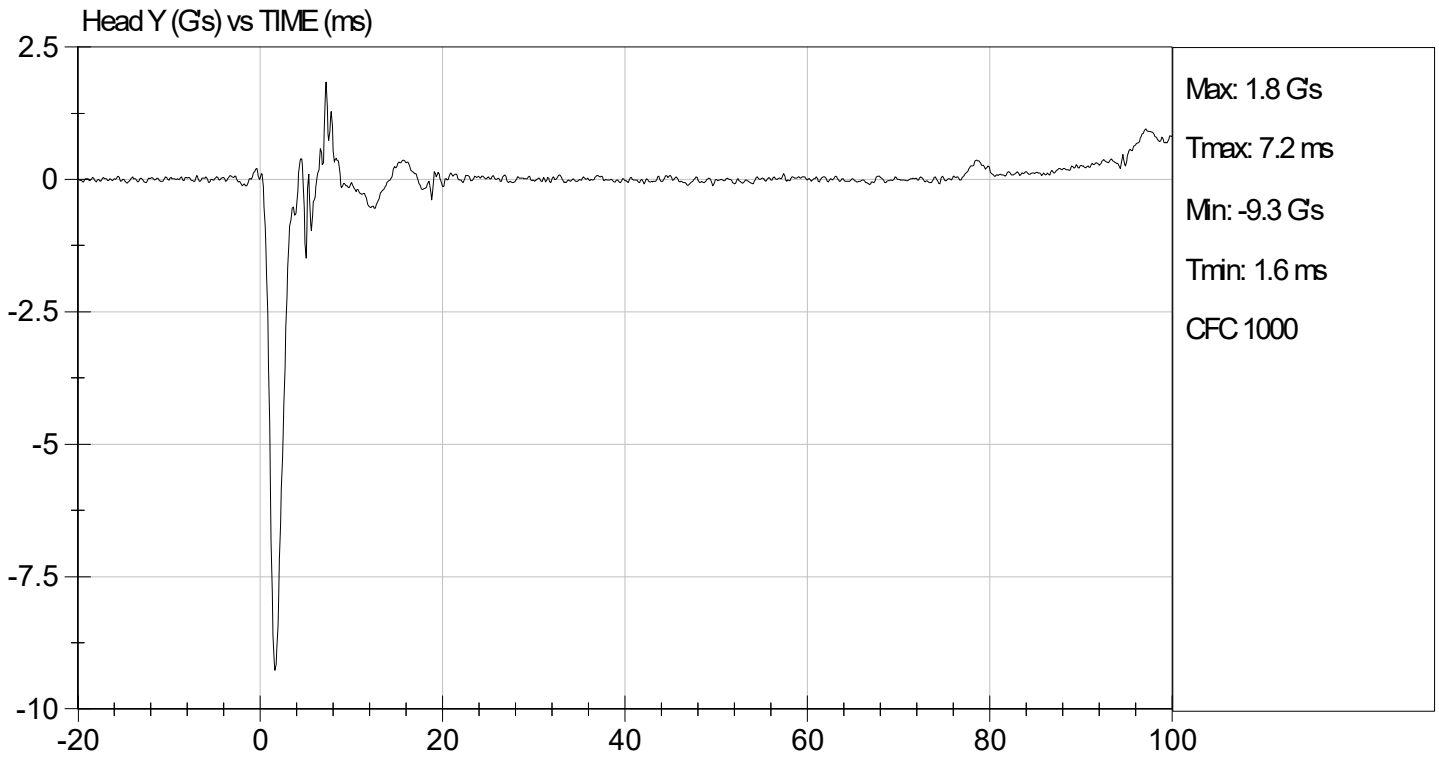
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	225 to 275	254	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-9.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





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

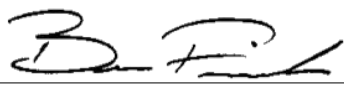
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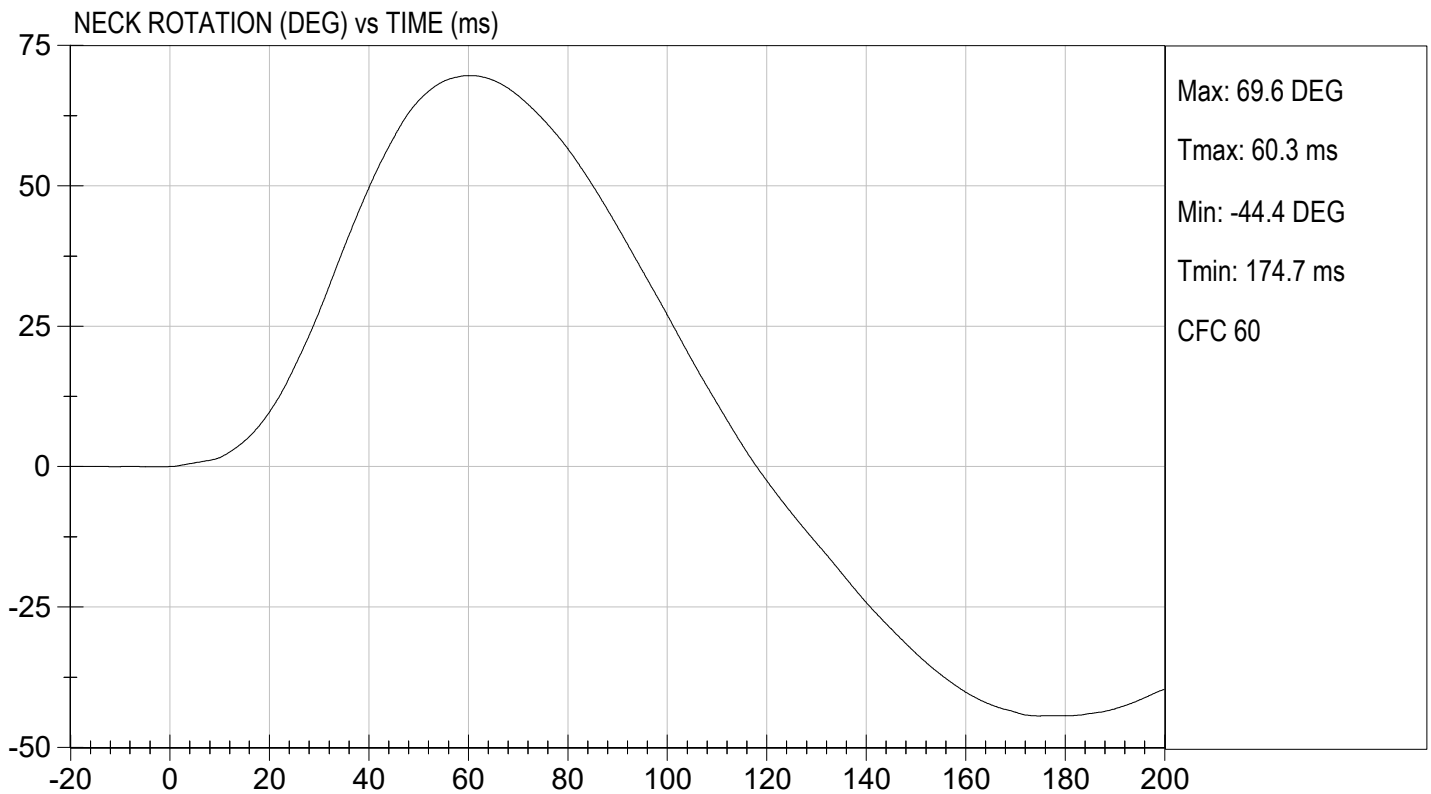
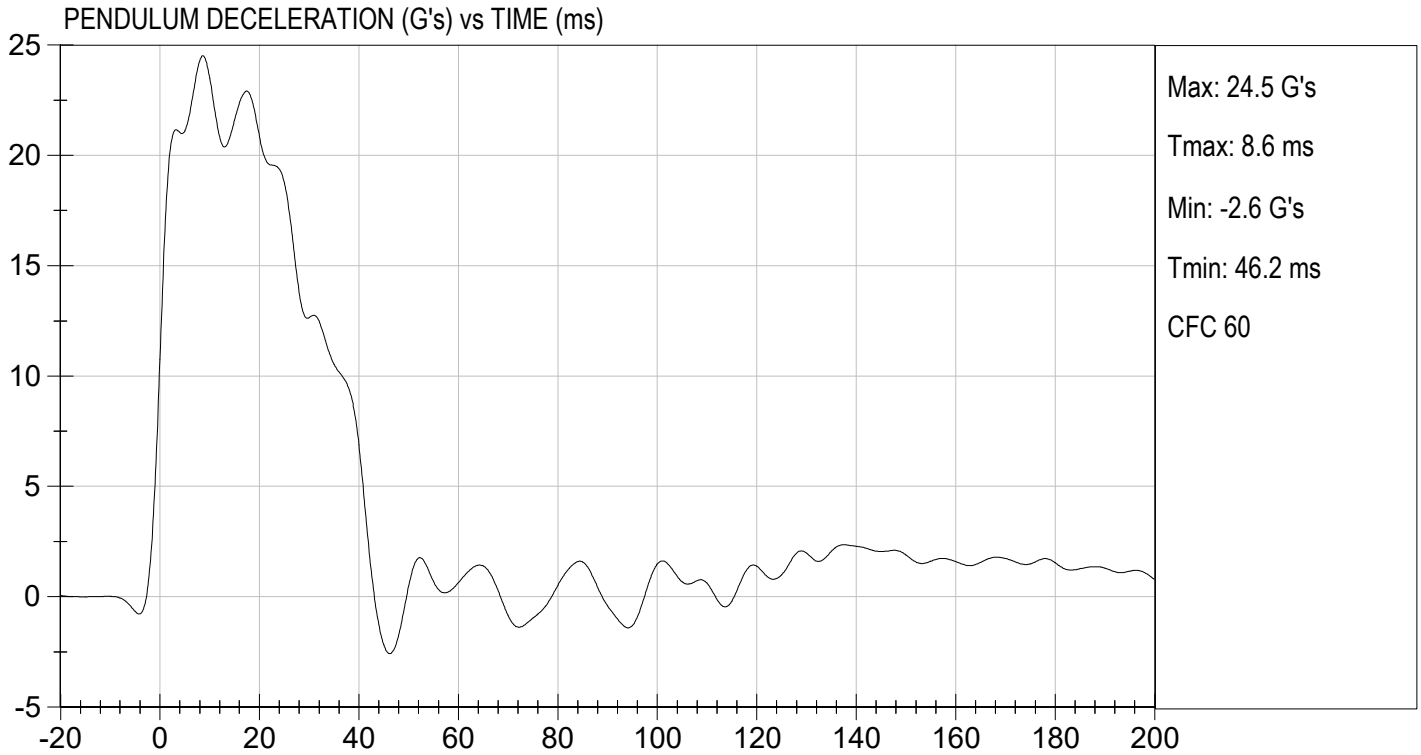
Test I.D.: D220572

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	22	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.50	Pass
	20 ms	G's	17.60 to 22.60	20.86	Pass
	30 ms	G's	12.50 to 18.50	12.65	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	40.9	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	69.6	Pass
	Time	ms	57.0 to 64.0	60.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.1	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	88.1	Pass
	Time	ms	47.0 to 58.0	50.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	99.8	Pass
Overall Test Results					Pass


 Laboratory Technician

02/28/2022
 Test Date

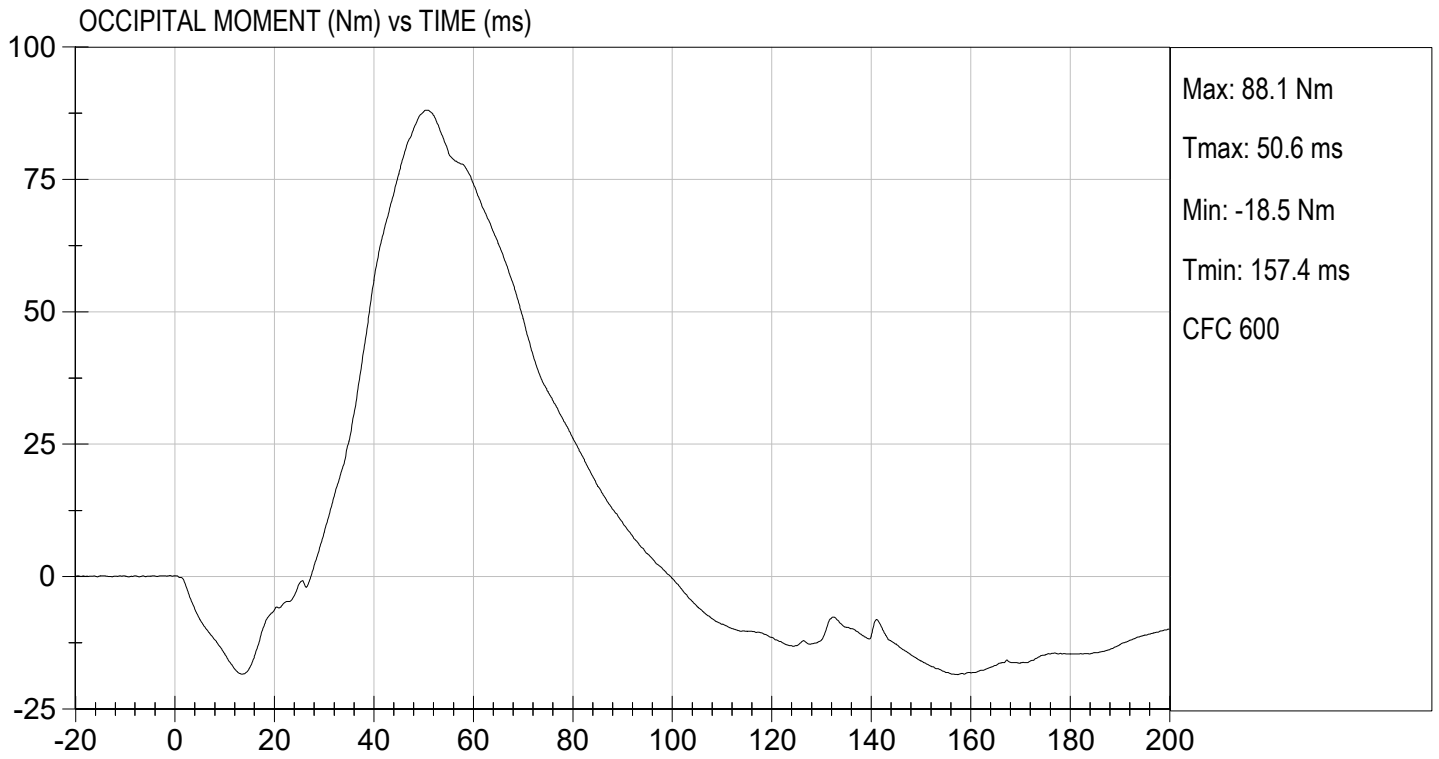

 Approved By





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

TEST DATE: 02/28/2022
TEST #: D220572



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

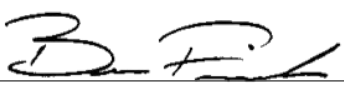
ATD Serial No: 351

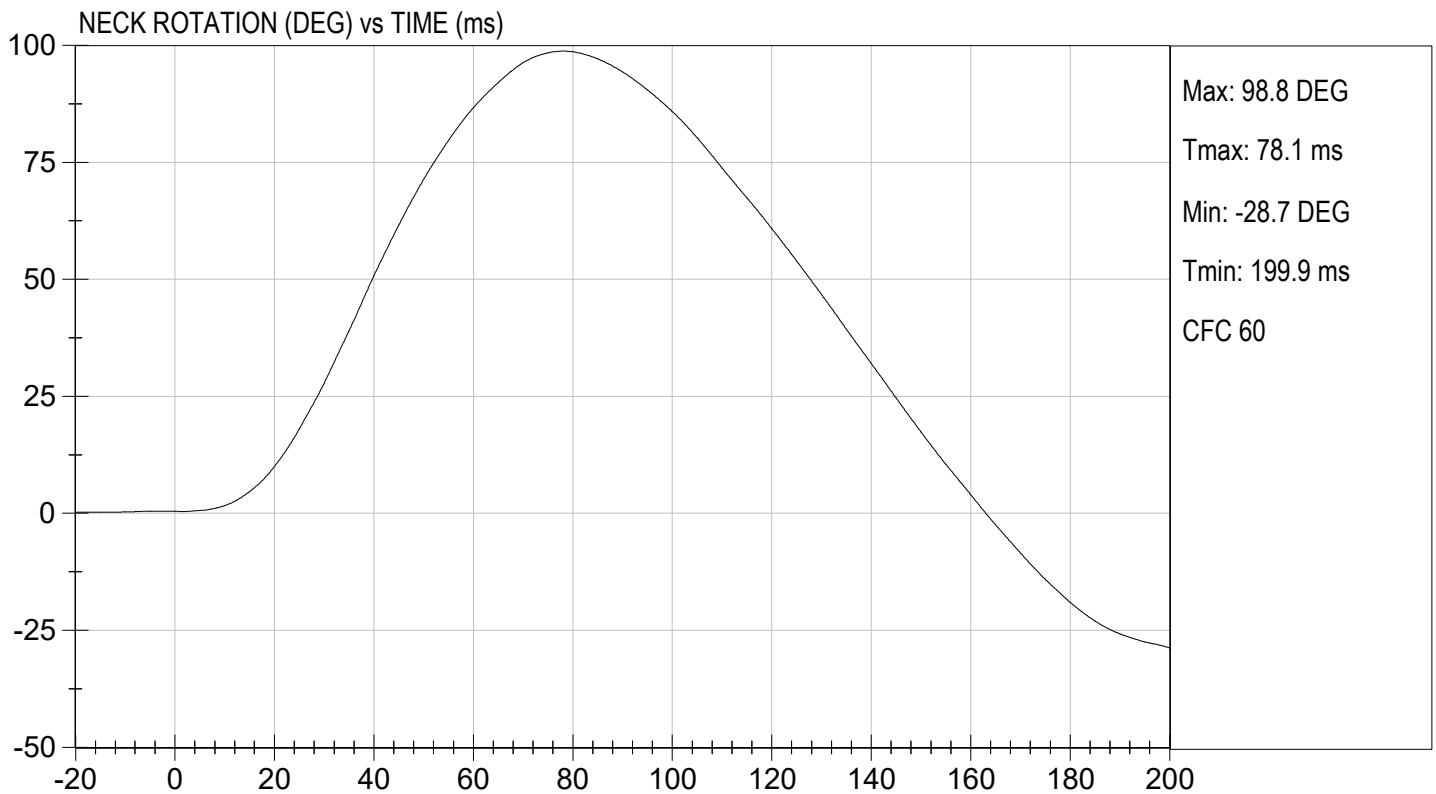
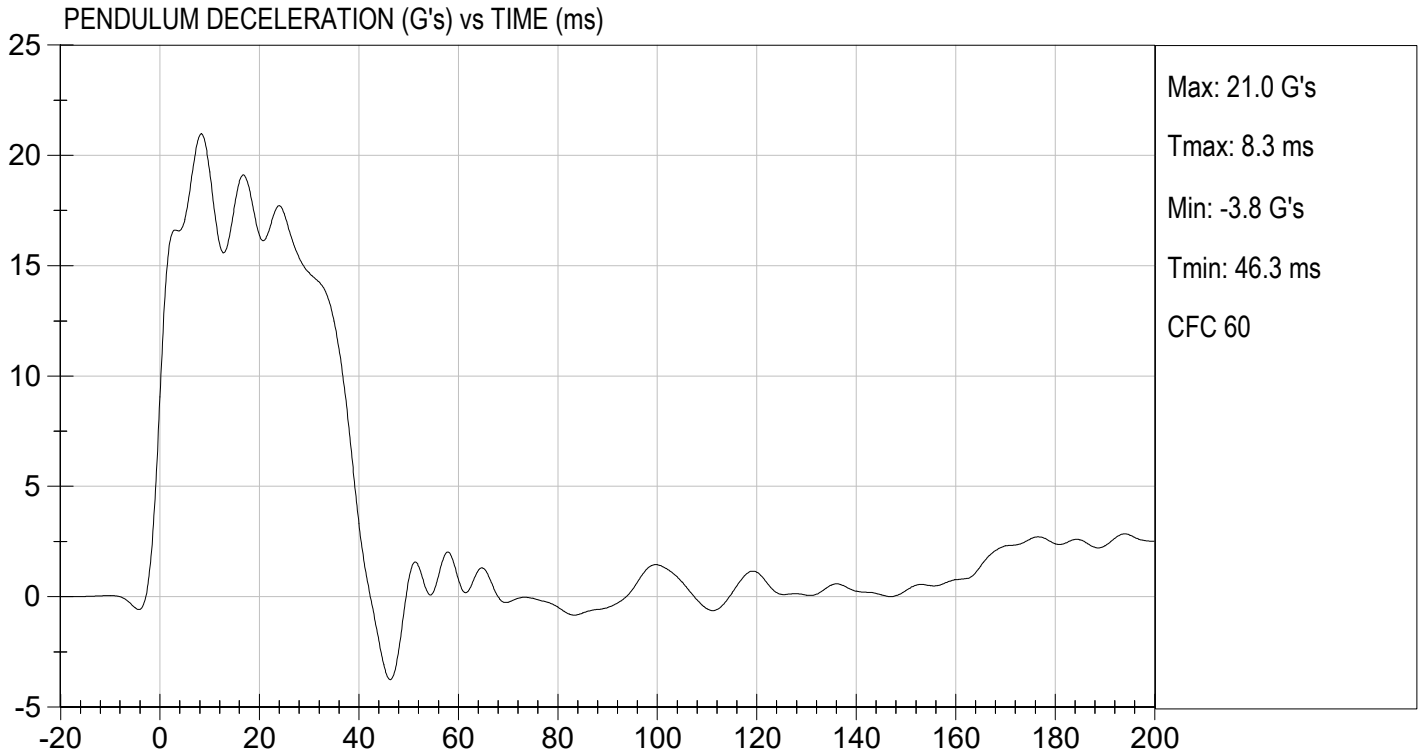
Test I.D.: D220573

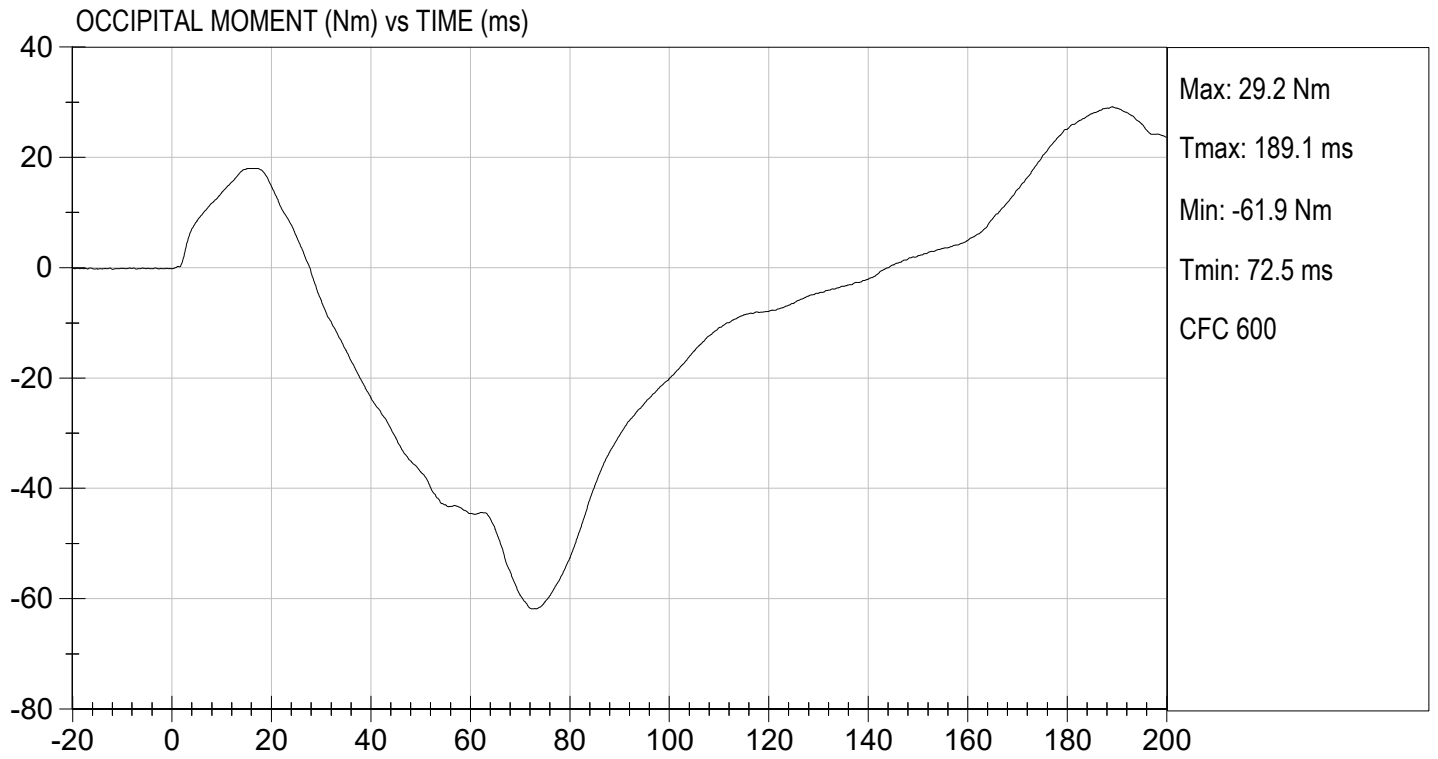
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	22	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.25	Pass
	20 ms	G's	14.00 to 19.00	16.38	Pass
	30 ms	G's	11.00 to 16.00	14.67	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.8	Pass
	Time	ms	72.0 to 82.0	78.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	163.2	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.9	Pass
	Time	ms	65.0 to 79.0	72.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	144.2	Pass
Overall Test Results					Pass


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D220574

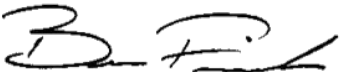
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,309	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.93	Pass
Internal Hysteresis	%	69 to 85	74	Pass
Overall Test Results				Pass



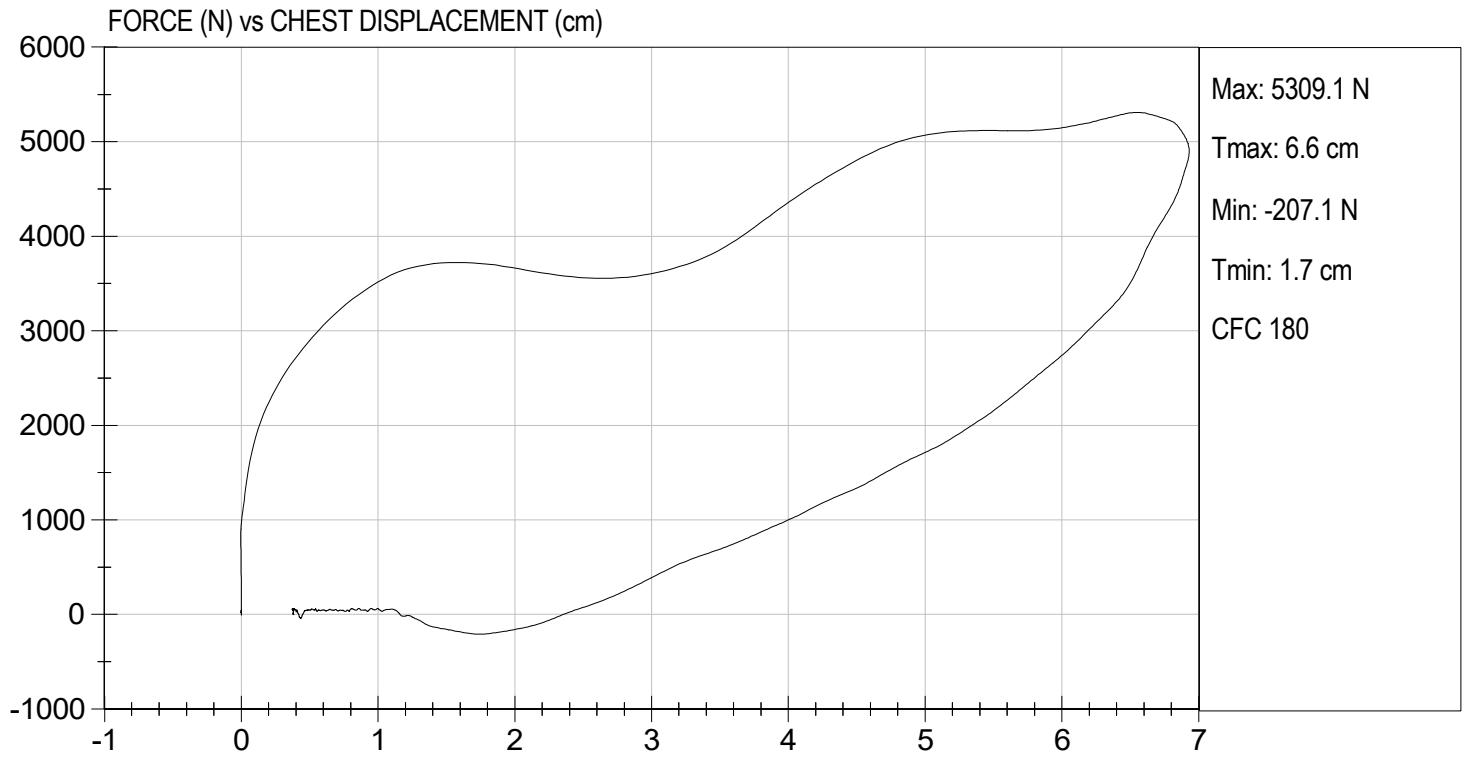
 Laboratory Technician

02/28/2022

 Test Date



 Approved By



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

ATD Serial No: 351

Test I.D: D220575

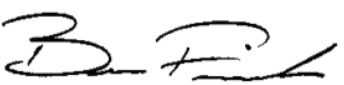
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	N	4715 to 5782	4,732	Pass
Overall Test Results				Pass



 Laboratory Technician

02/28/2022

 Test Date

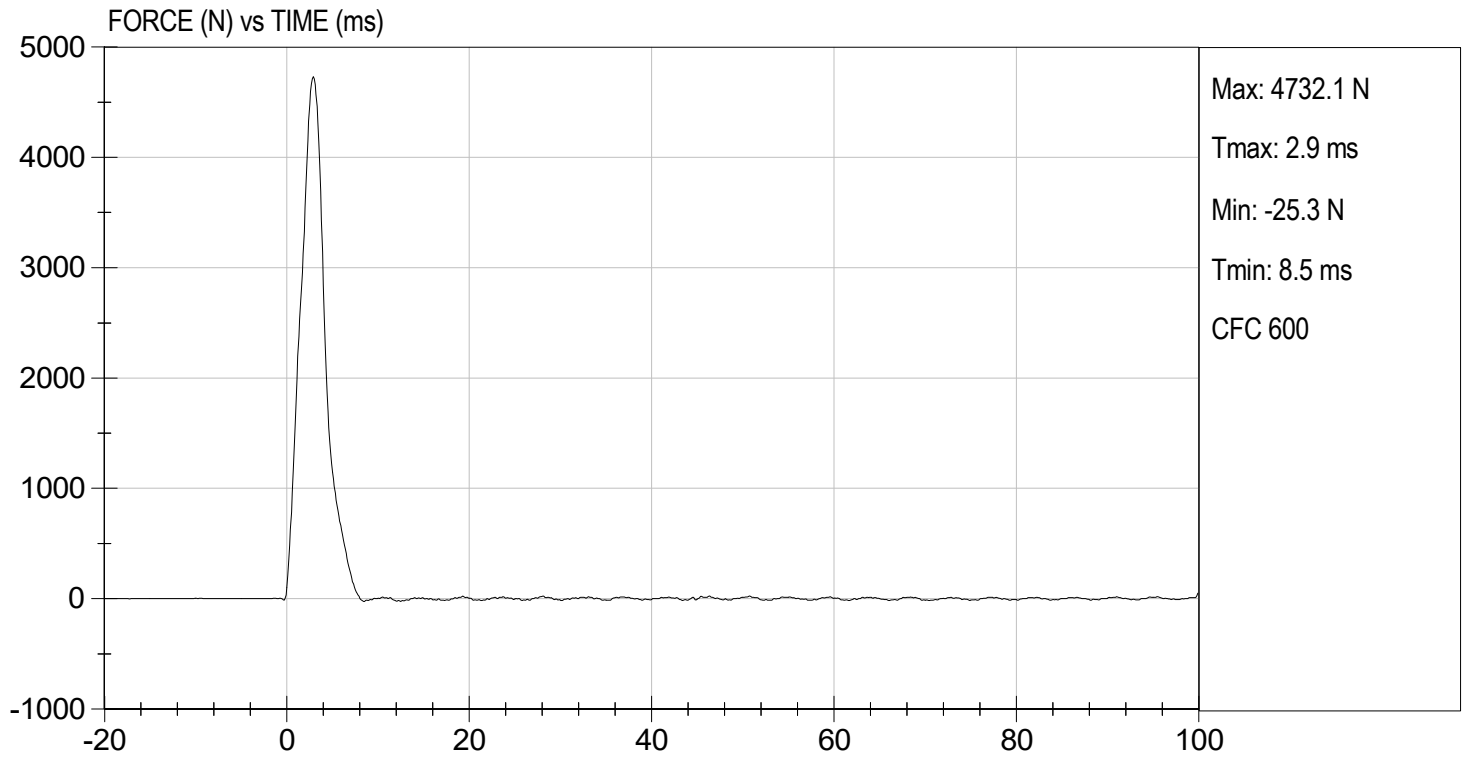


 Approved By



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

TEST DATE: 02/28/2022
TEST #: D220575



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

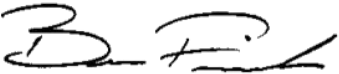
ATD Serial No: 351

Test I.D: D220576

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	N	4715 to 5782	5,710	Pass
Overall Test Results				Pass


 Laboratory Technician

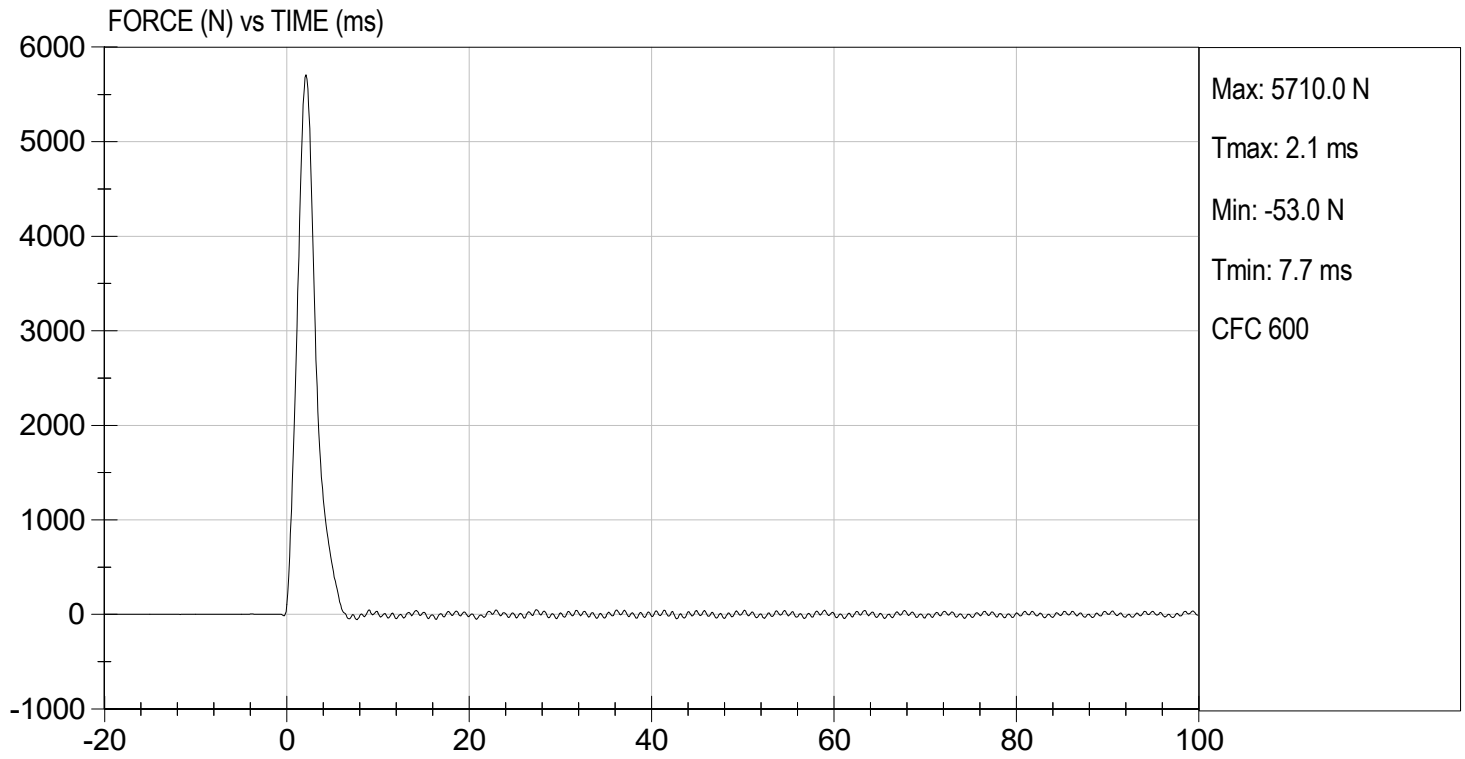
02/28/2022
 Test Date


 Approved By



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

TEST DATE: 02/28/2022
TEST #: D220576



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

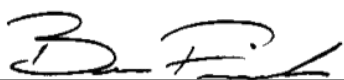
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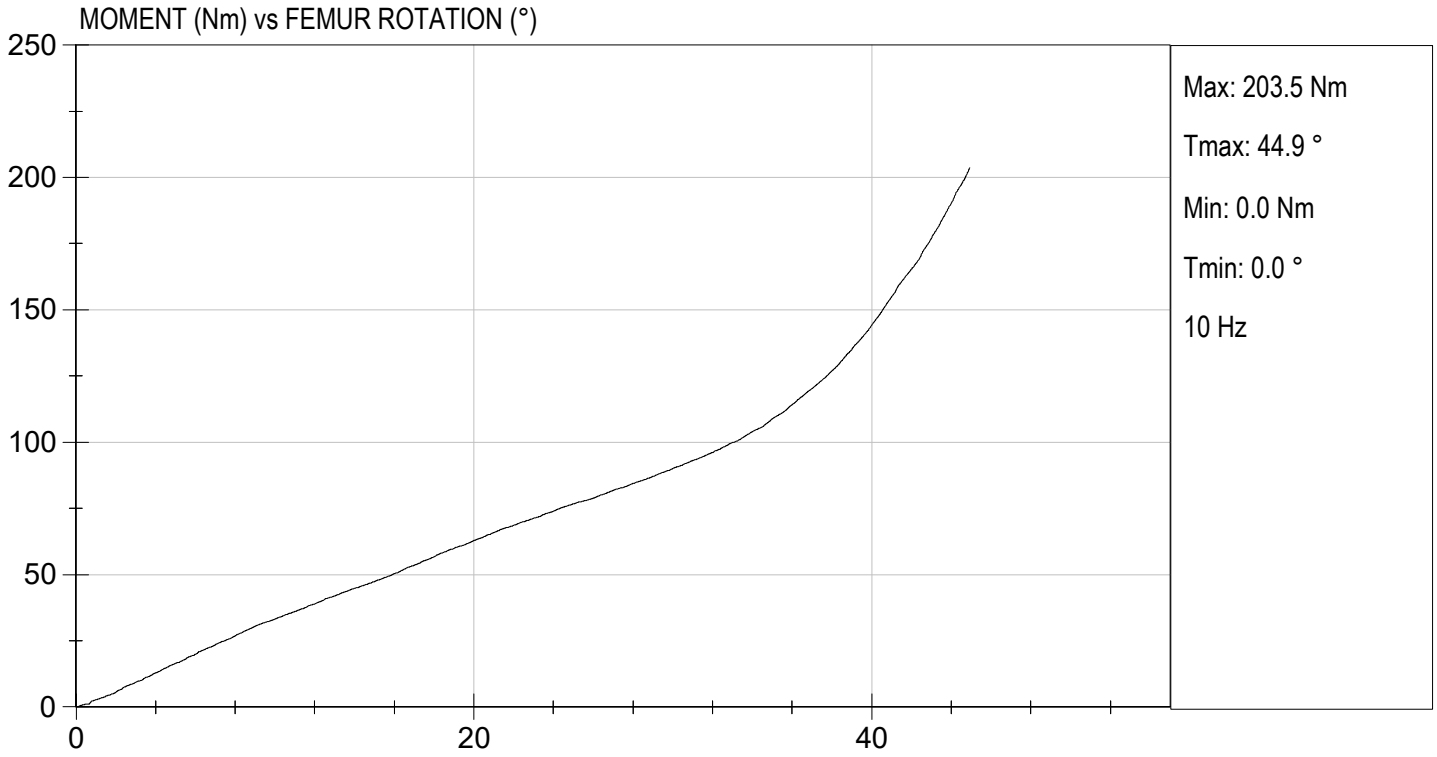
Test I.D: D220570

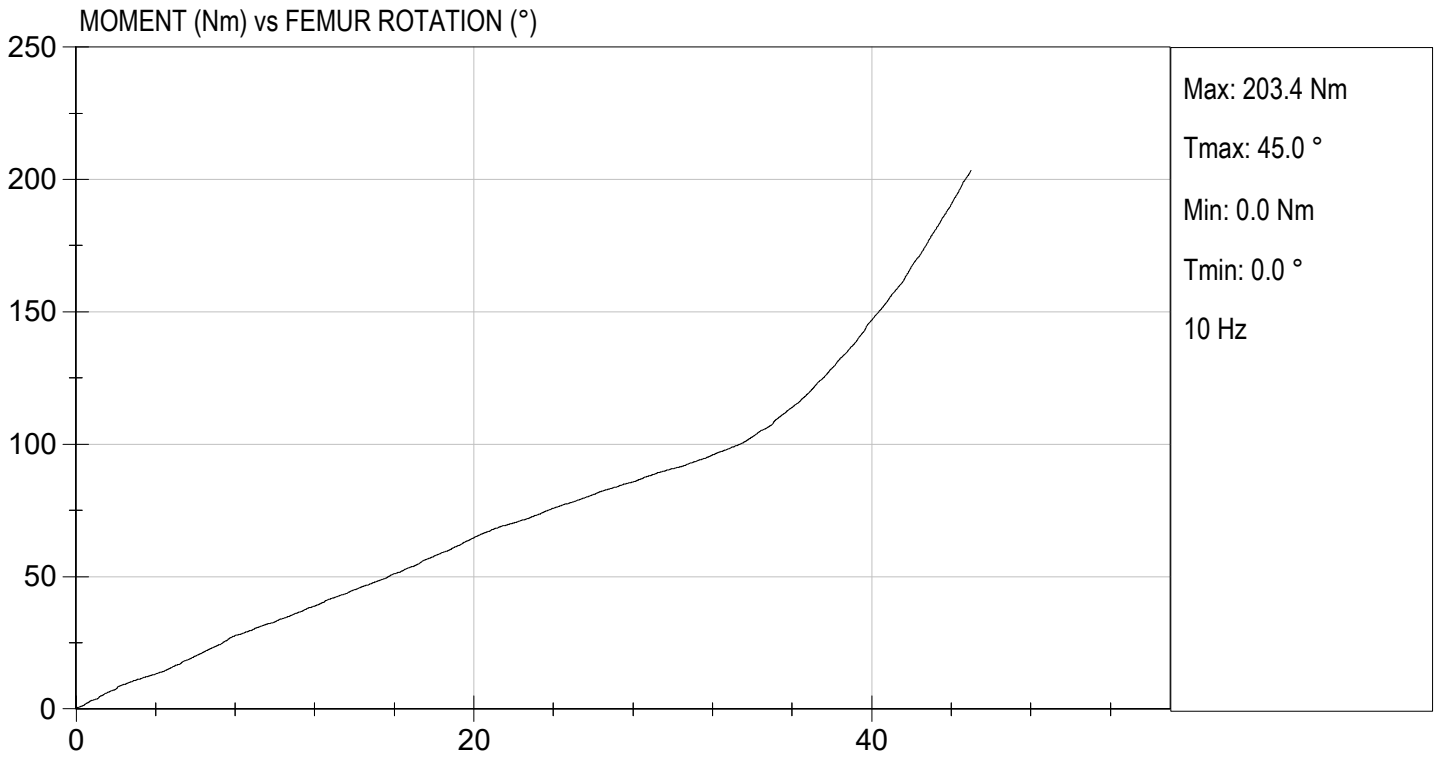
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	22	22	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	90.1	90.8	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.9	45.0	Pass
Overall Test Results					Pass


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

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

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


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

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

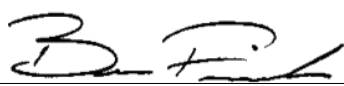
ATD Serial No: 142

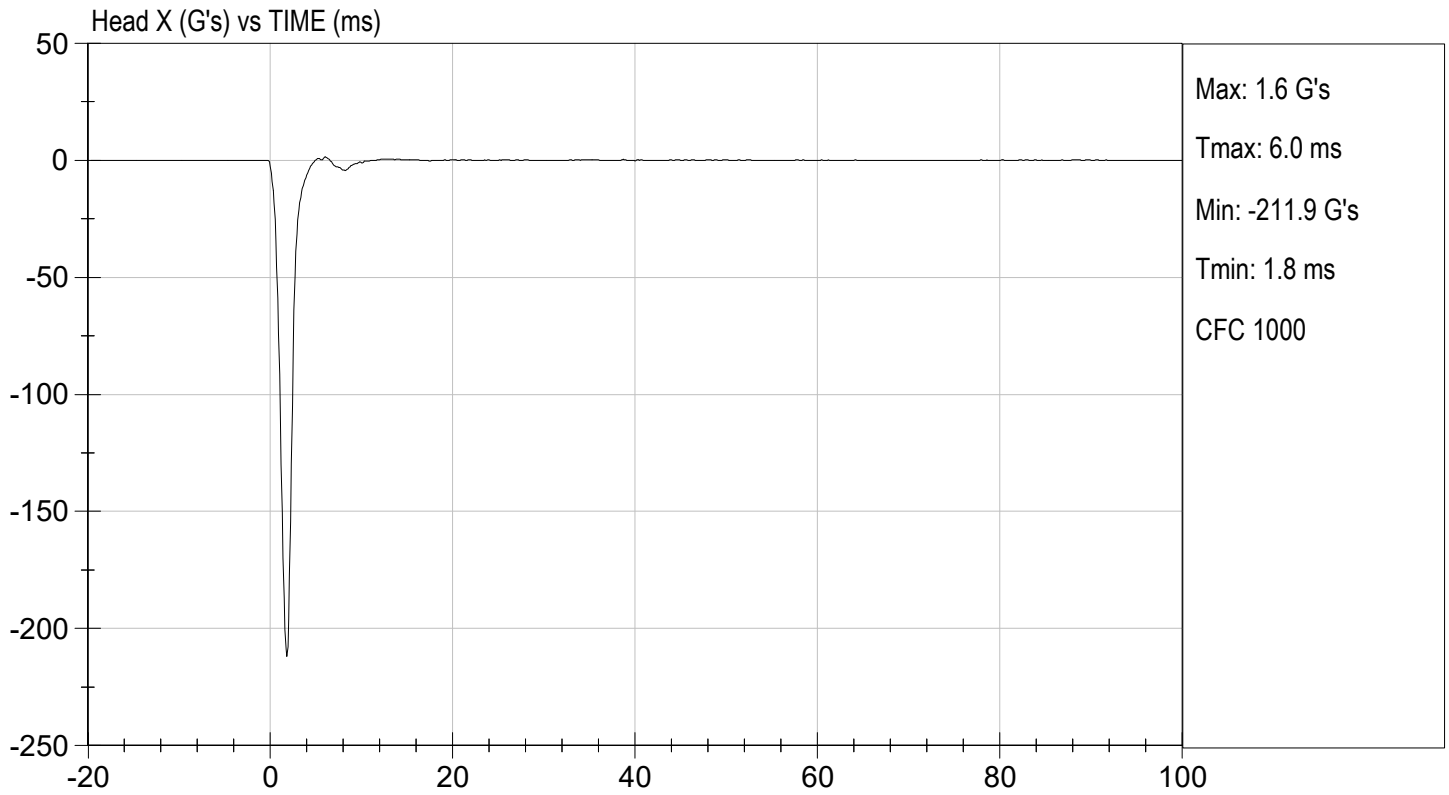
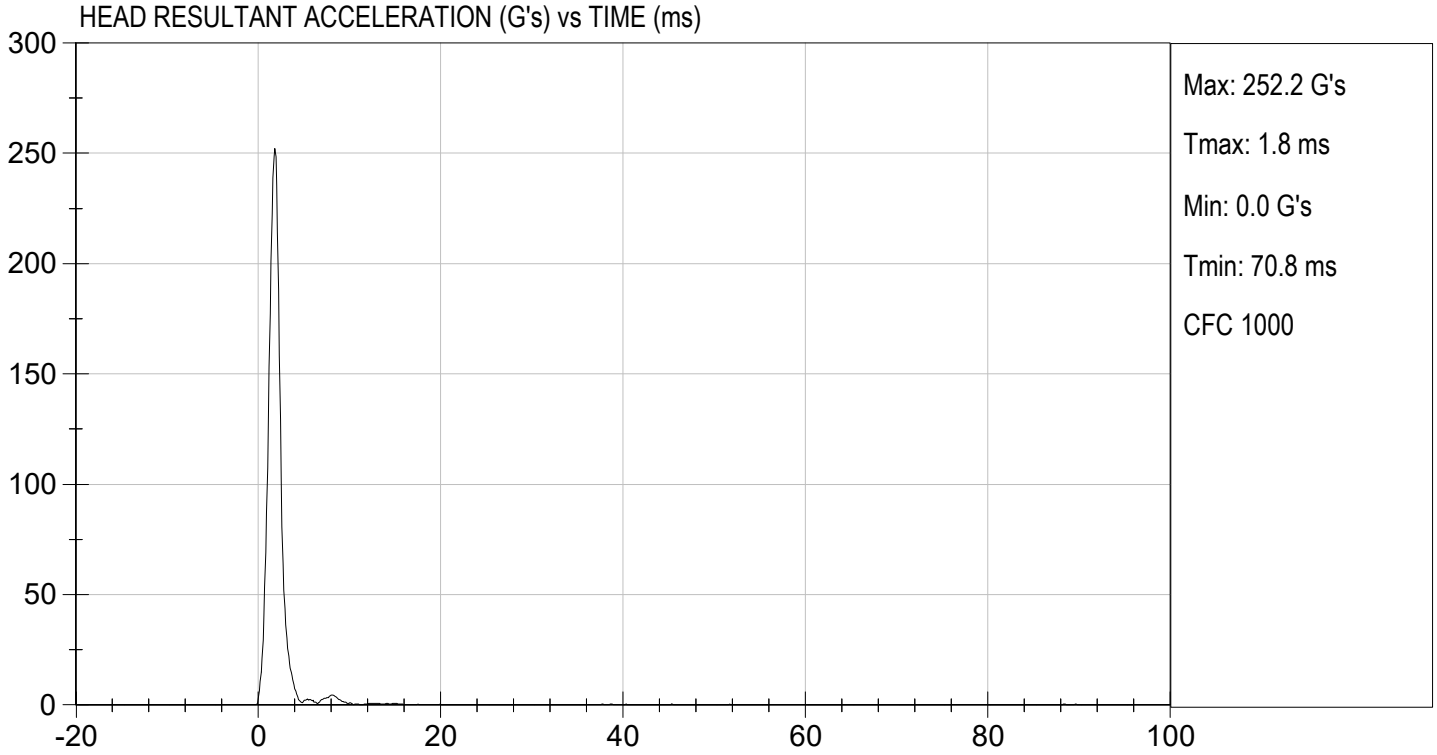
Test ID: D220401

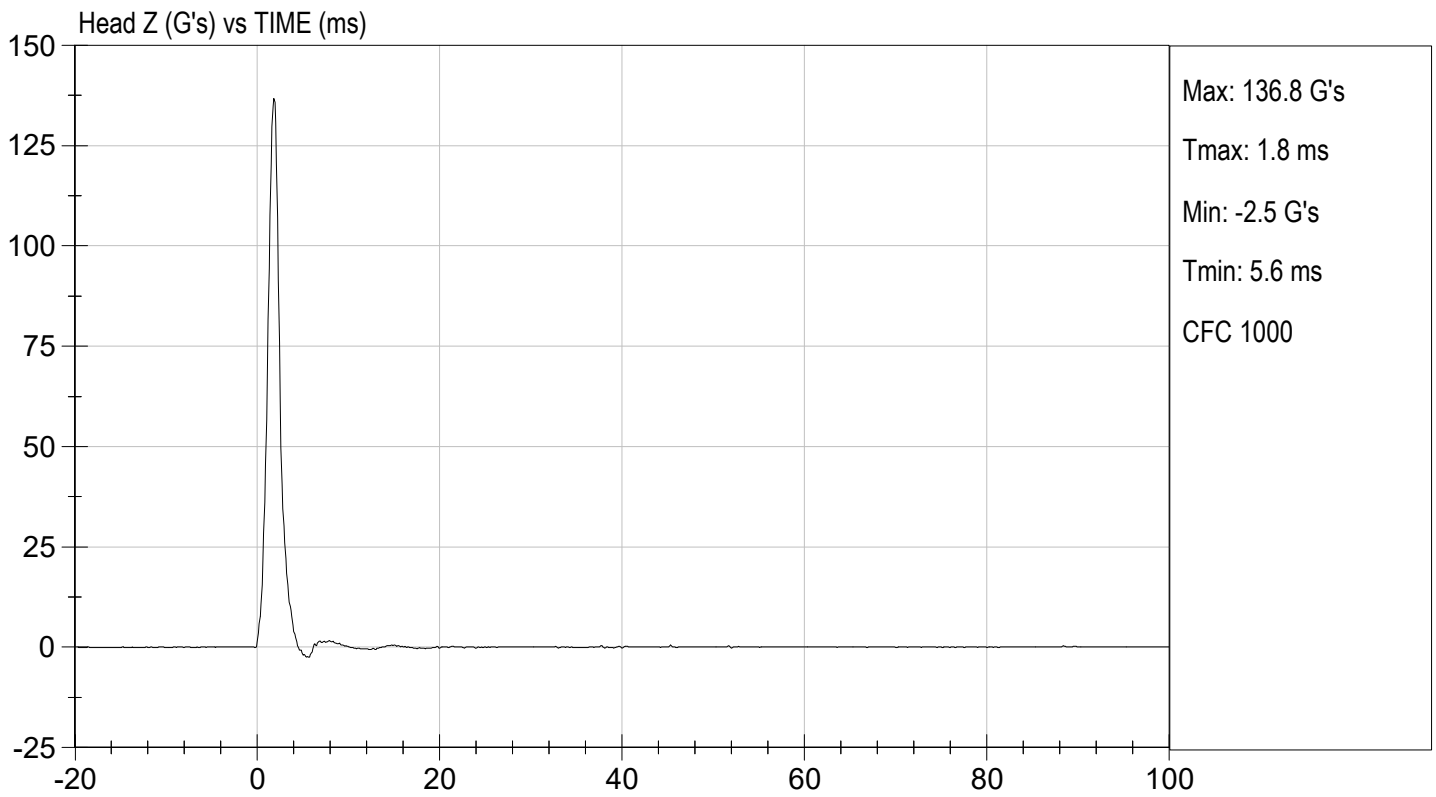
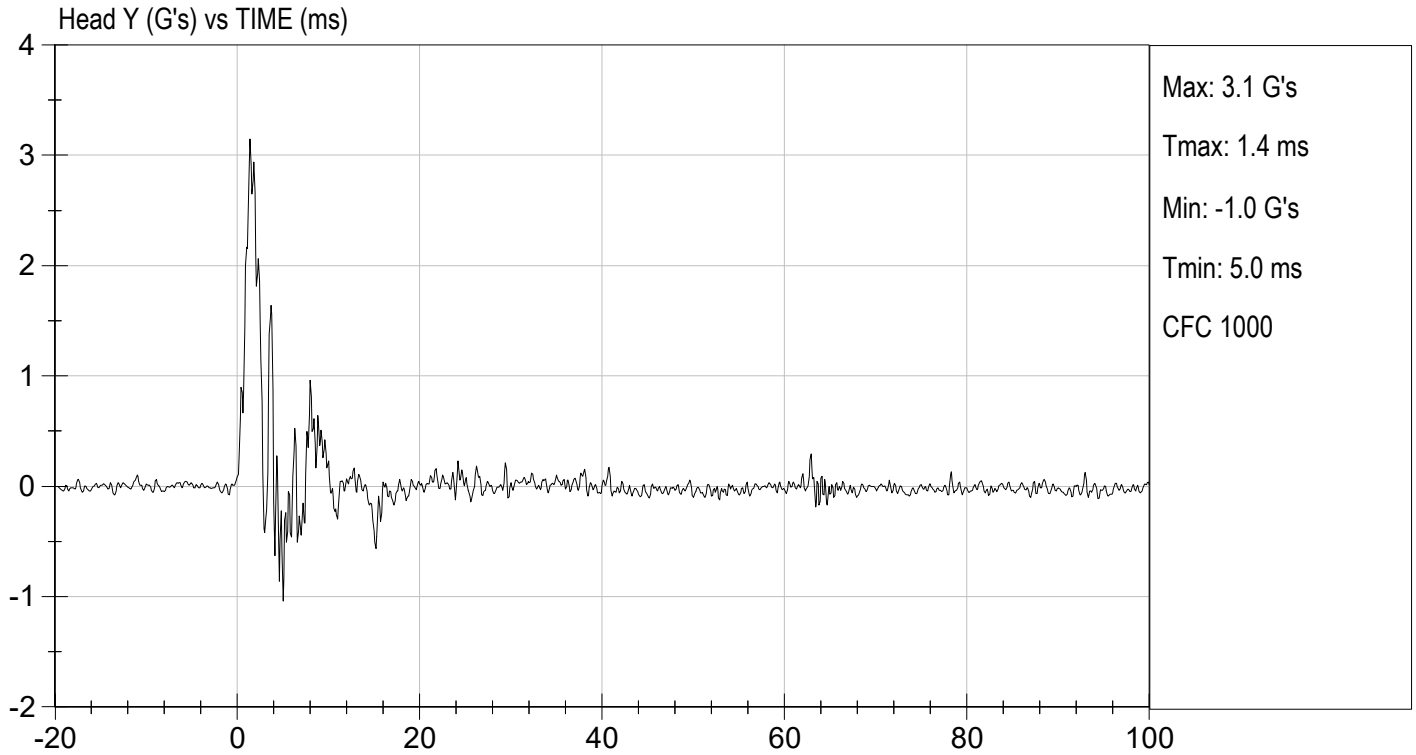
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	250 to 300	252	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	3.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

02/10/2022
 Test Date


 Approved By






MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

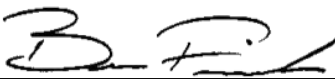
ATD Serial No: 142

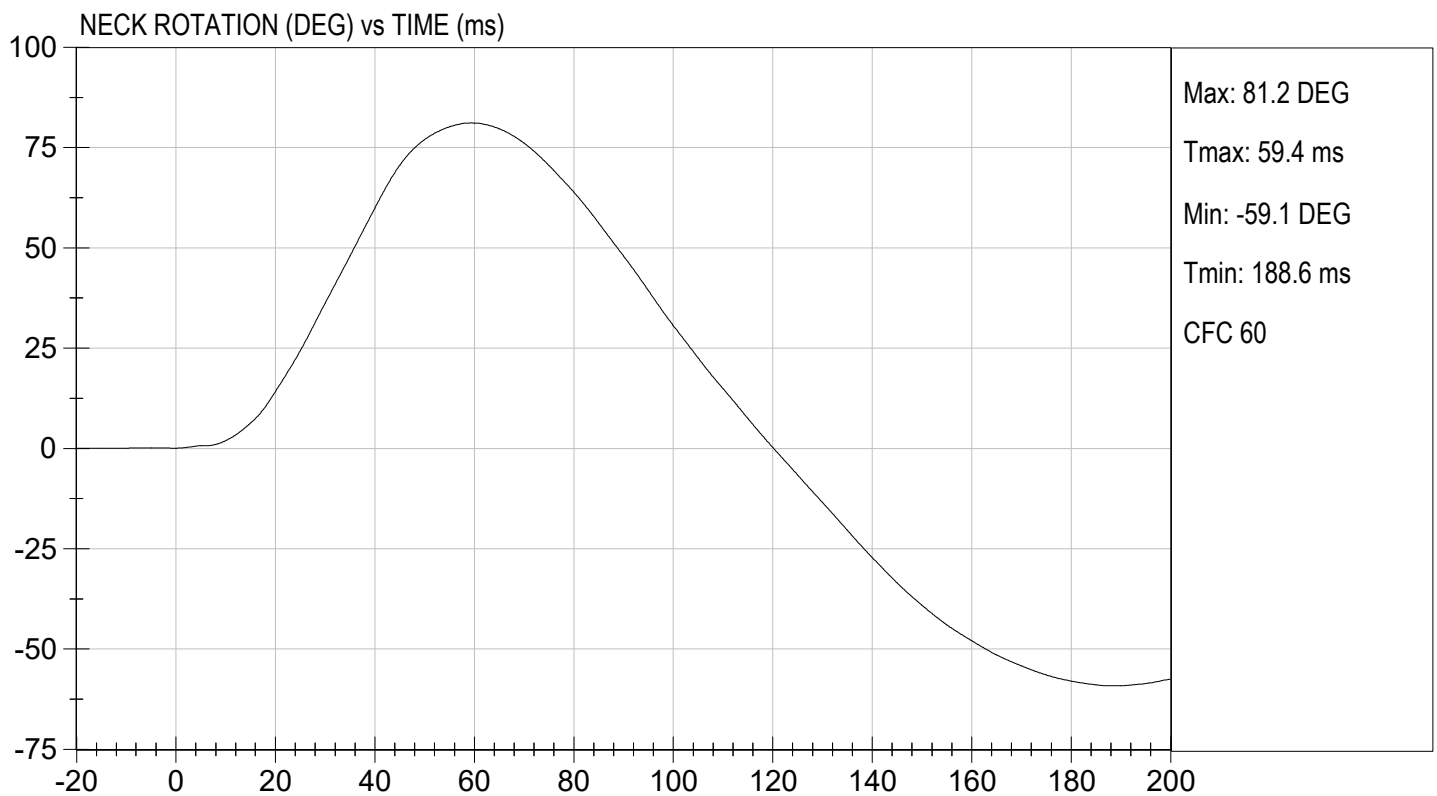
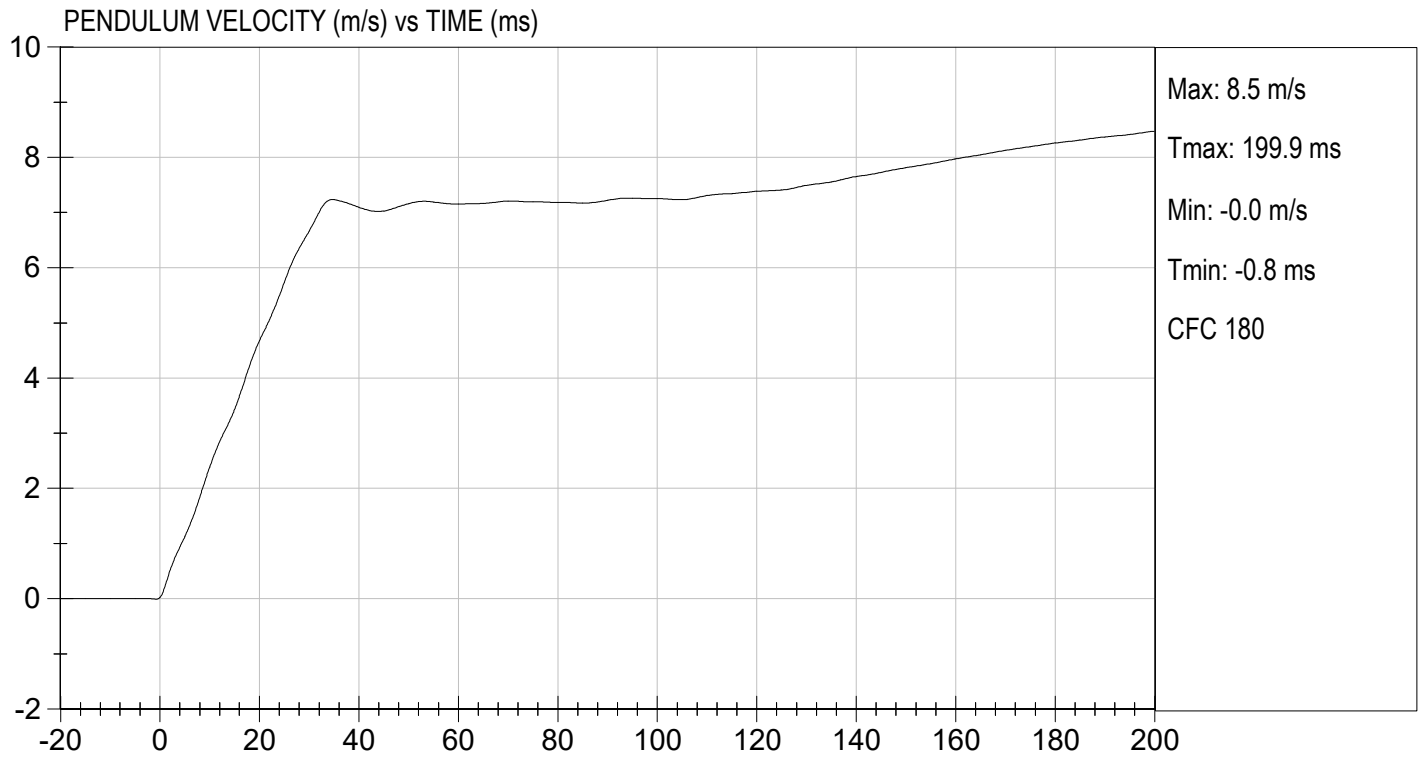
Test I.D: D220402

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	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	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.7	Pass
	30 ms	m/s	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
Overall Results					Pass


 Laboratory Technician

02/10/2022
 Test Date

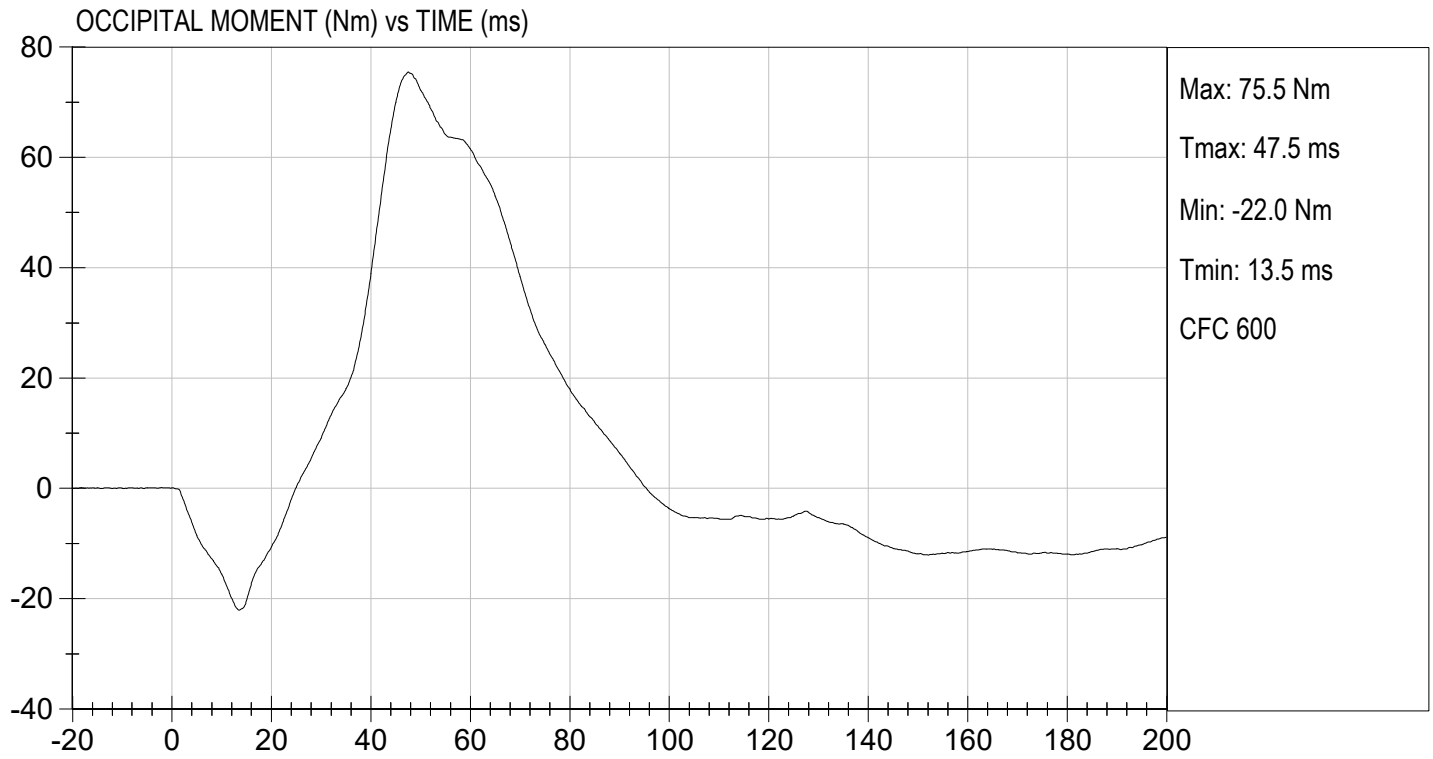

 Approved By





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

TEST DATE: 02/10/2022
TEST #: D220402




MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

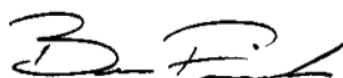
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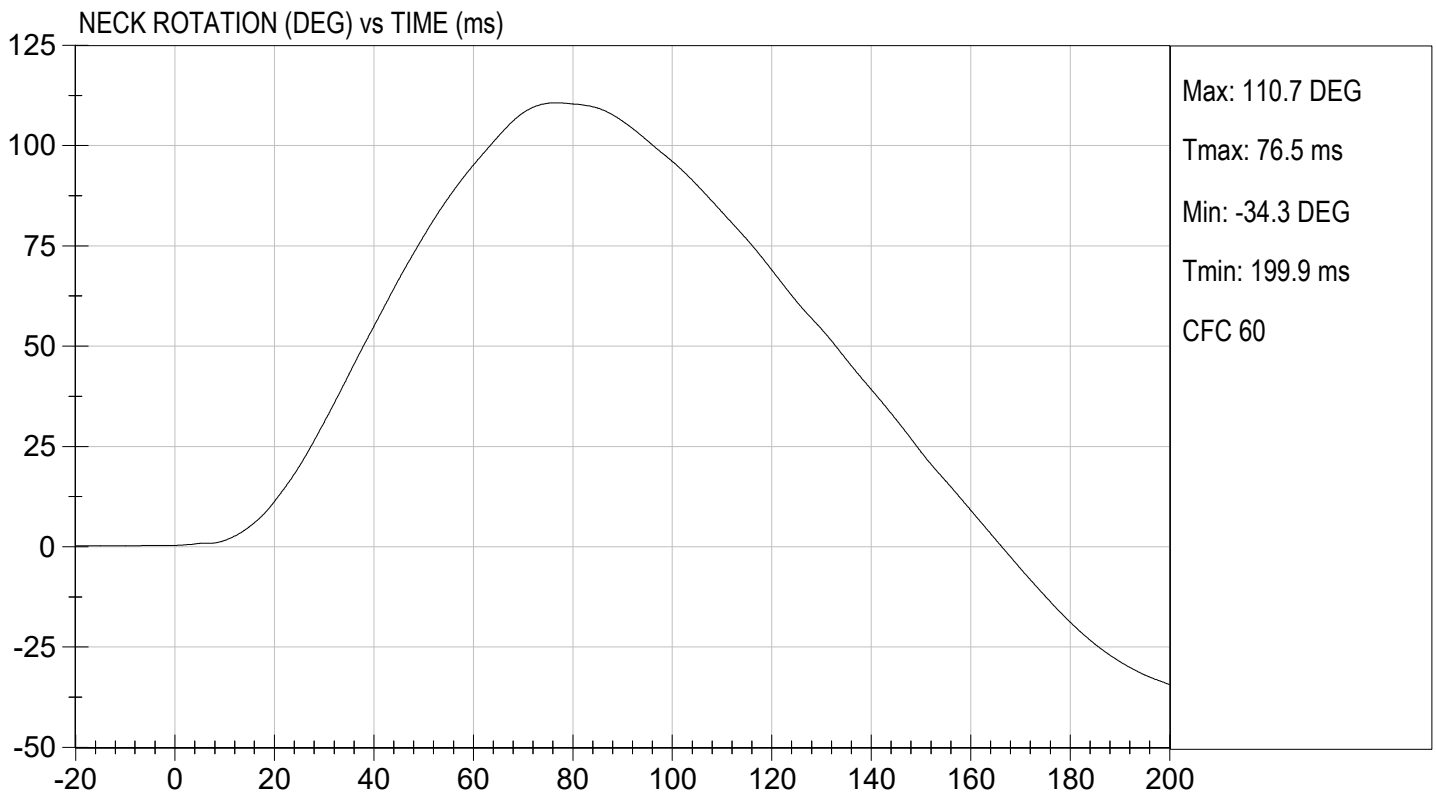
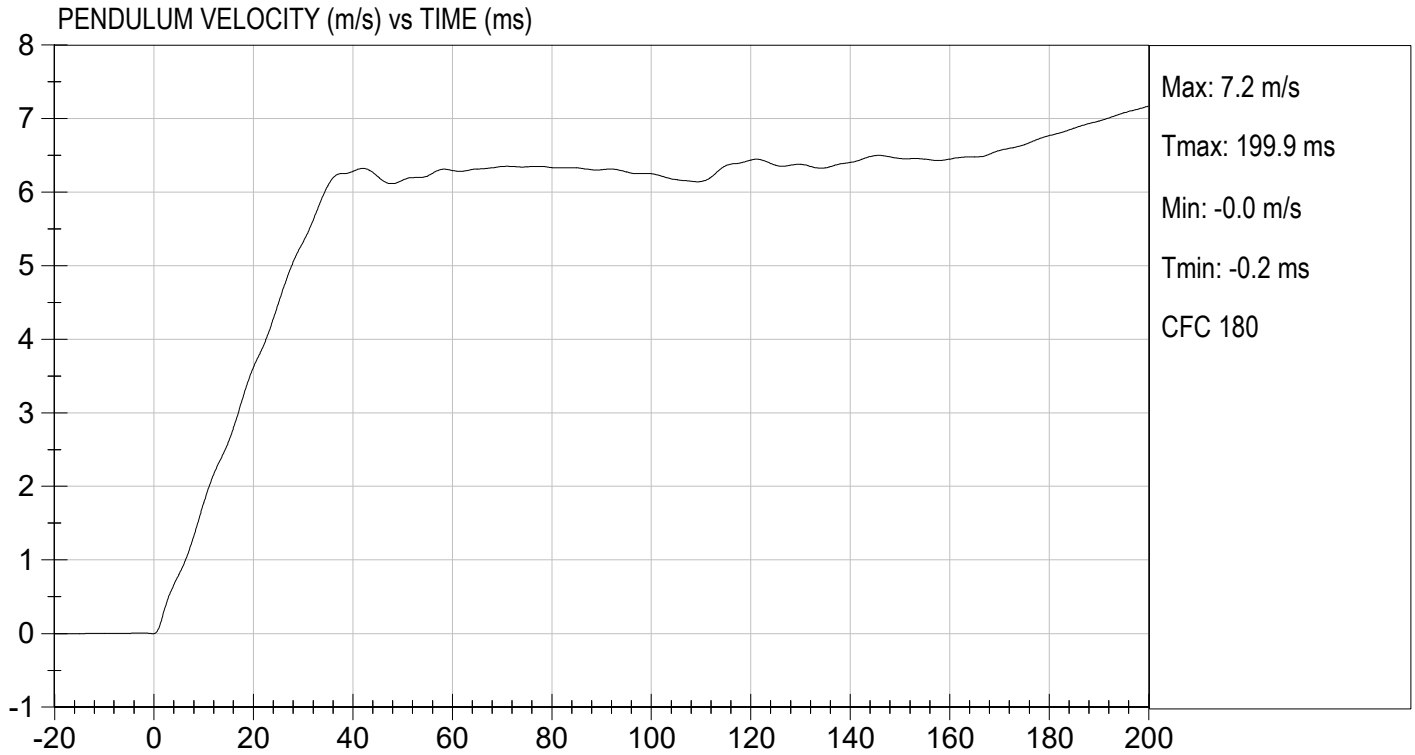
Test I.D.: D220403

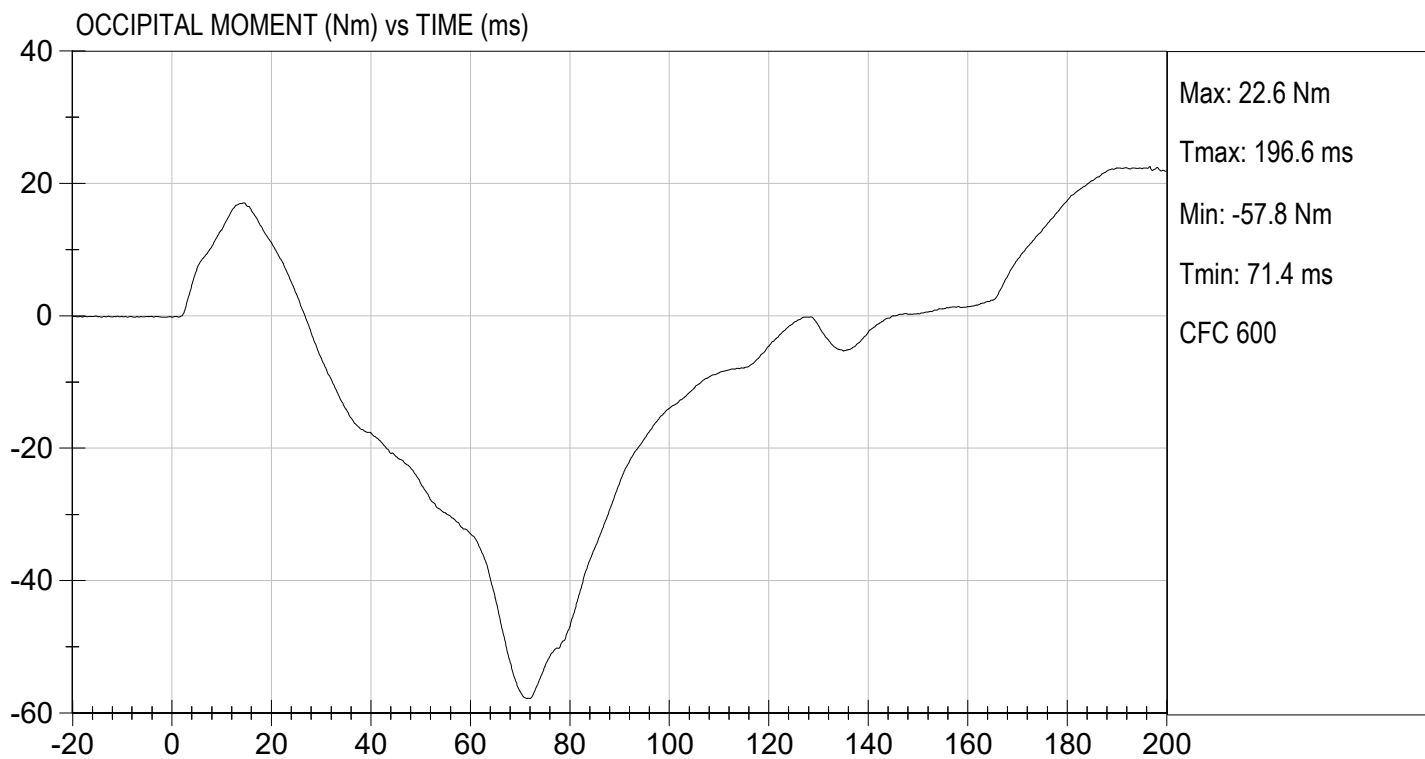
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	111	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-58	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
Overall Results					Pass


 Laboratory Technician

02/10/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

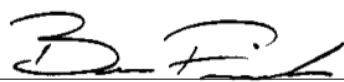
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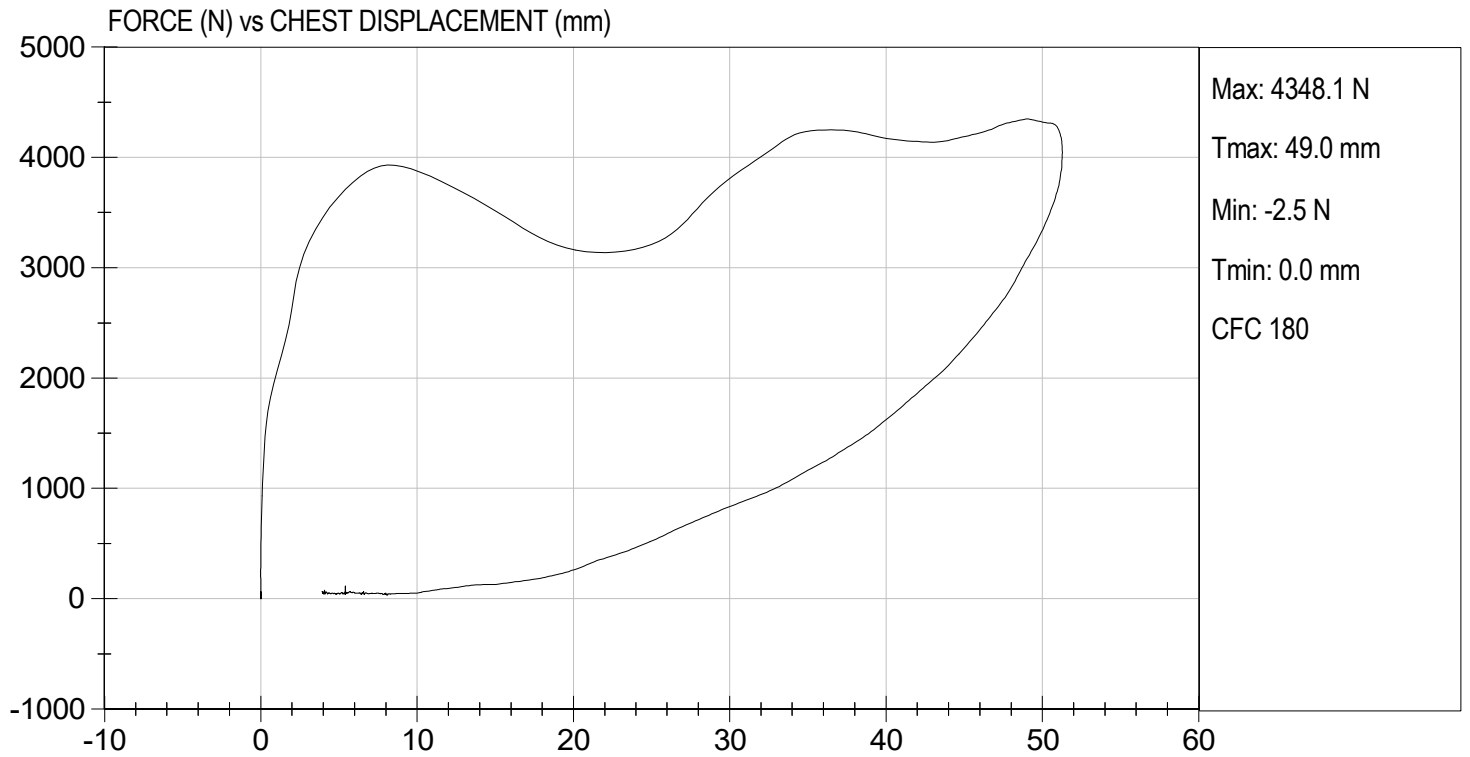
Test I.D: D220404

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4320	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4348	Pass
Overall Test Results				Pass


 Laboratory Technician

02/11/2022
 Test Date


 Approved By



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

ATD Serial No: 142

Test I.D: D220405

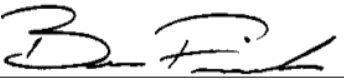
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	N	3450 to 4060	3845	Pass
Overall Test Results				Pass



 Laboratory Technician

02/09/2022

 Test Date

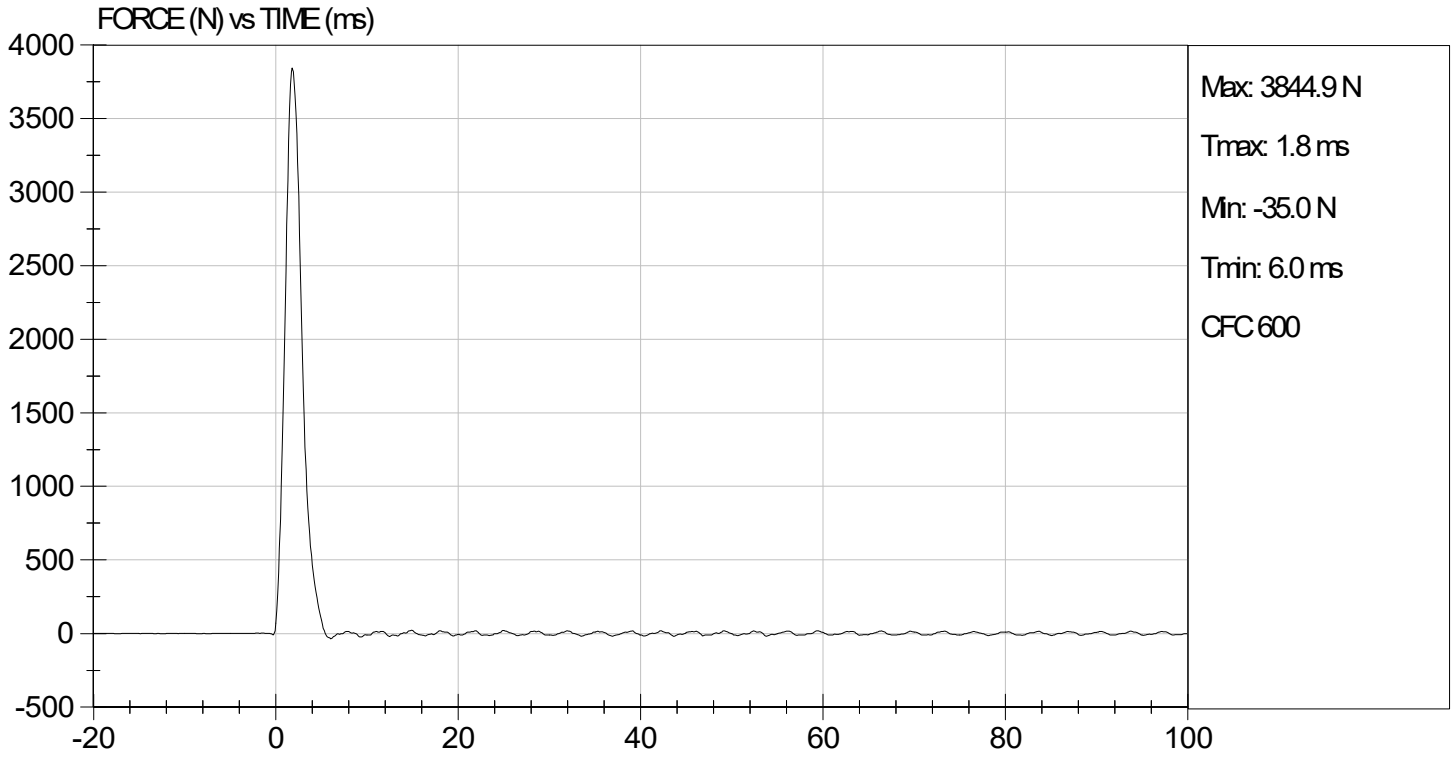


 Approved By



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

TEST DATE: 02/09/2022
TEST #: D220405



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

ATD Serial No: 142

Test I.D: D220406

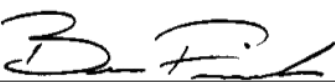
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	N	3450 to 4060	3915	Pass
Overall Test Results				Pass



 Laboratory Technician

02/09/2022

 Test Date

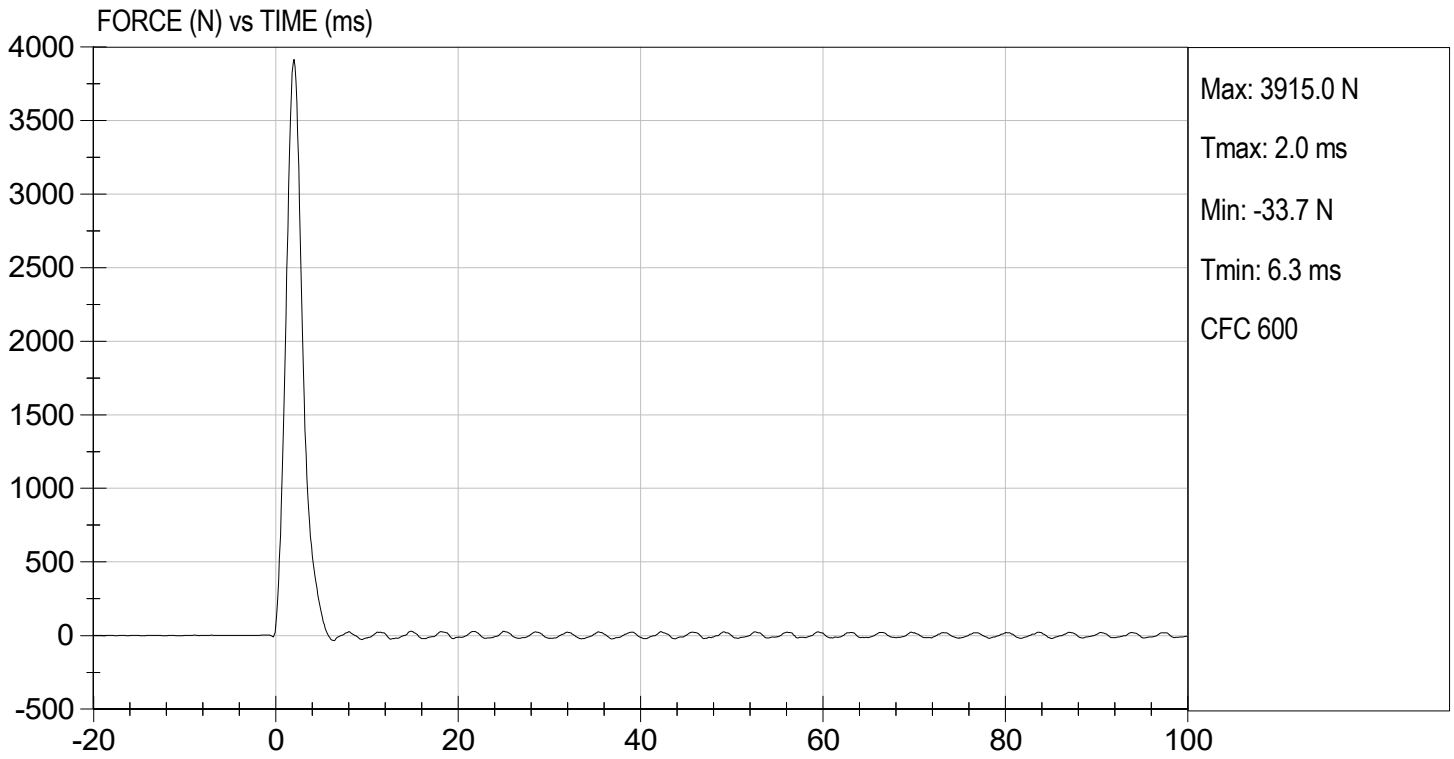


 Approved By



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

TEST DATE: 02/09/2022
TEST #: D220406

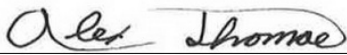


MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220407

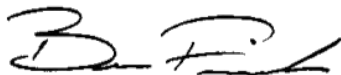
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Initial Angle	deg	0 to 20	14	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	381	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.7	Pass
Overall Result				Pass



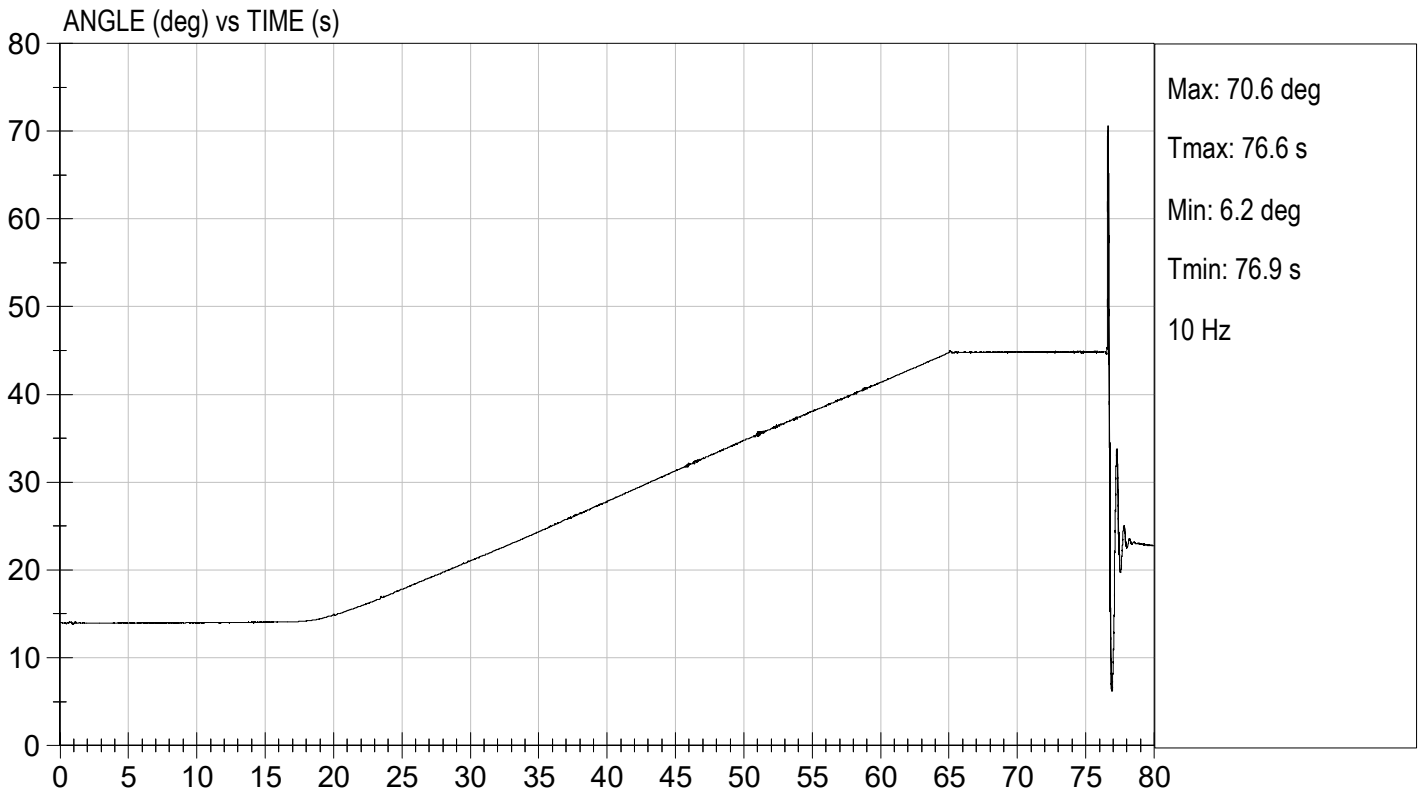
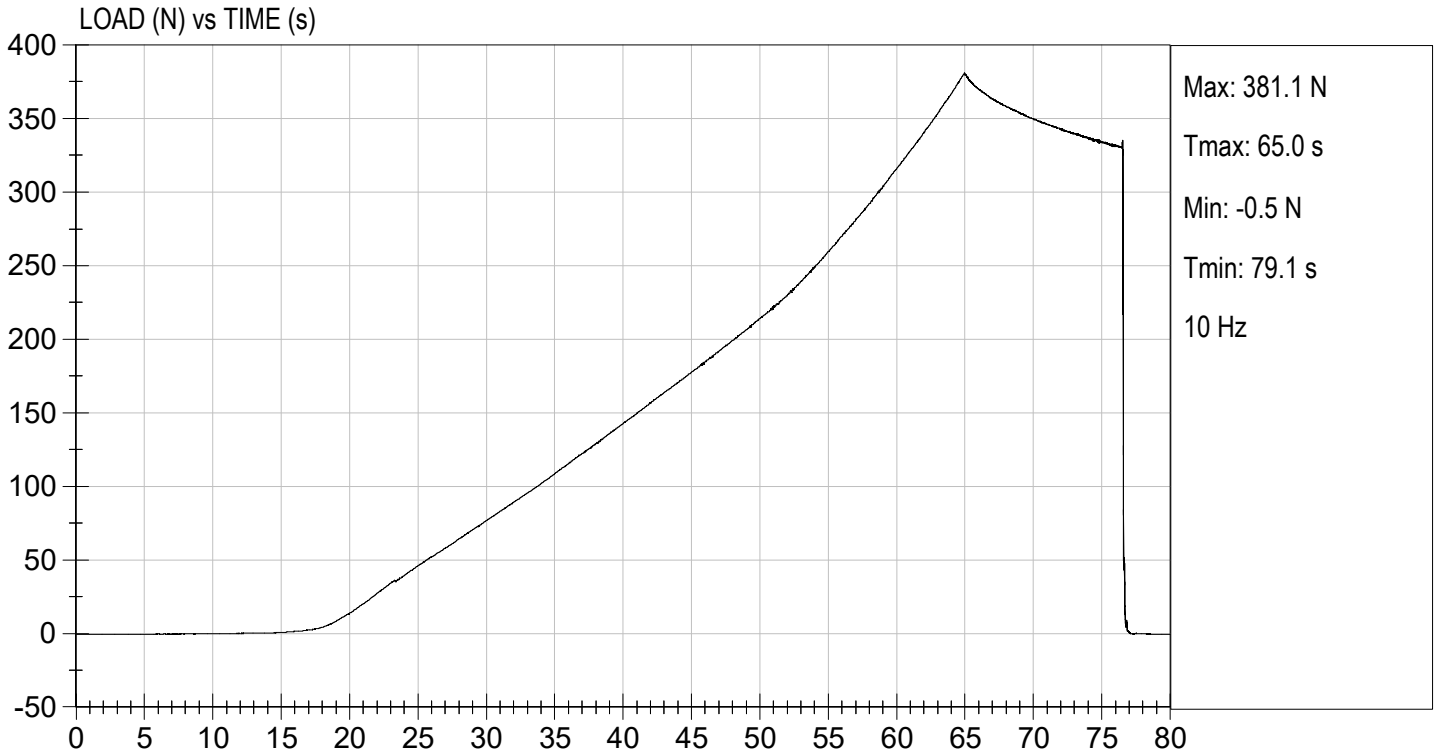
Laboratory Technician

02/09/2022

Test Date



Approved By



CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

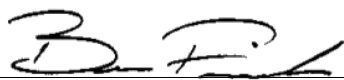
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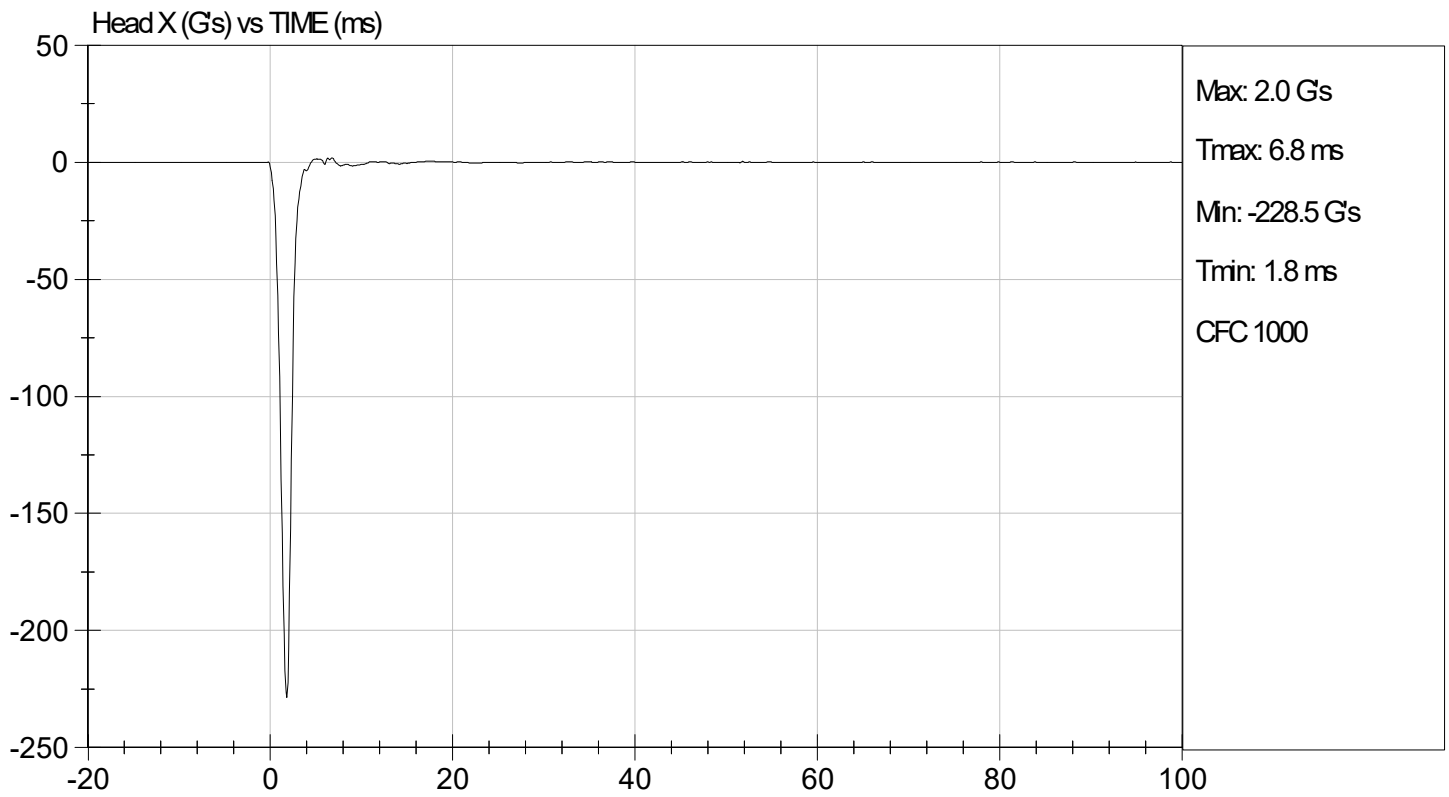
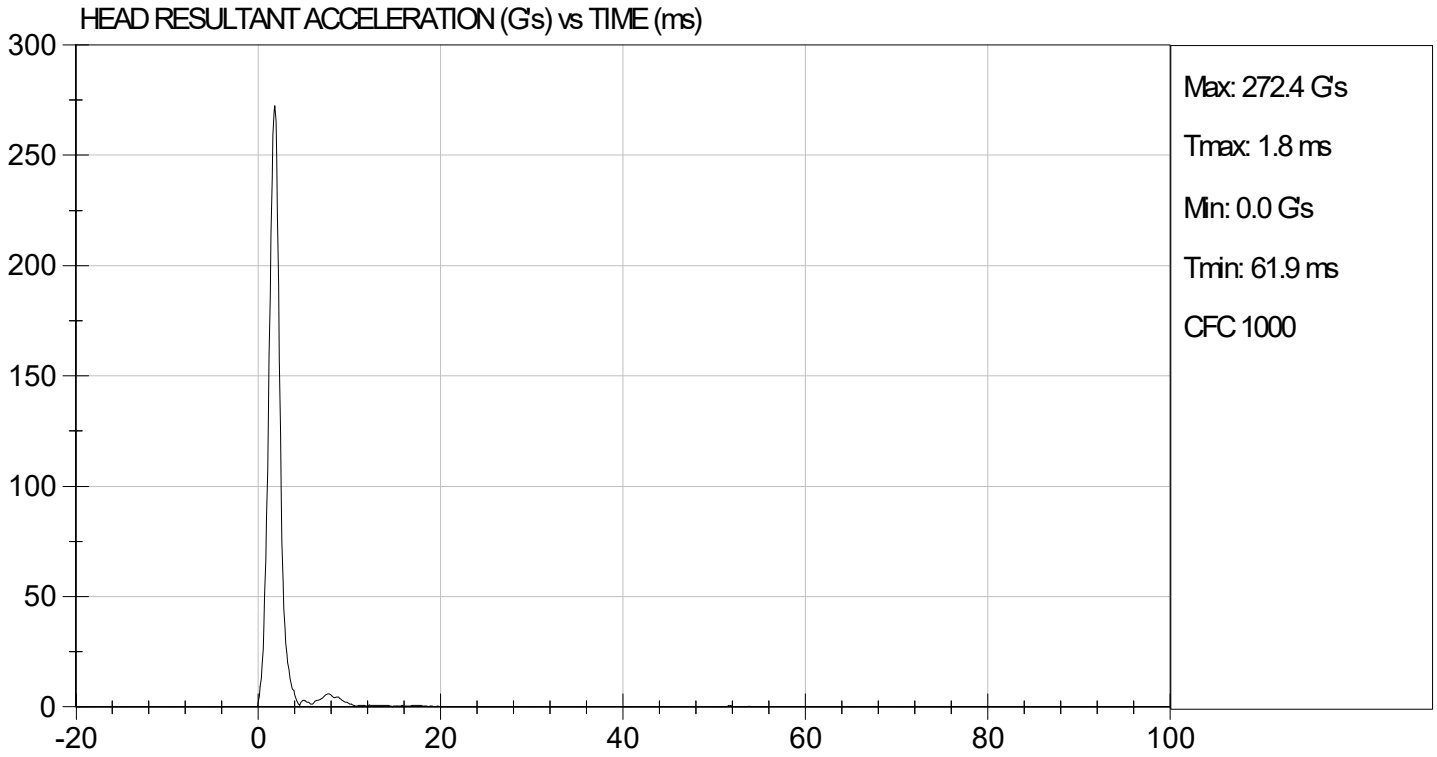
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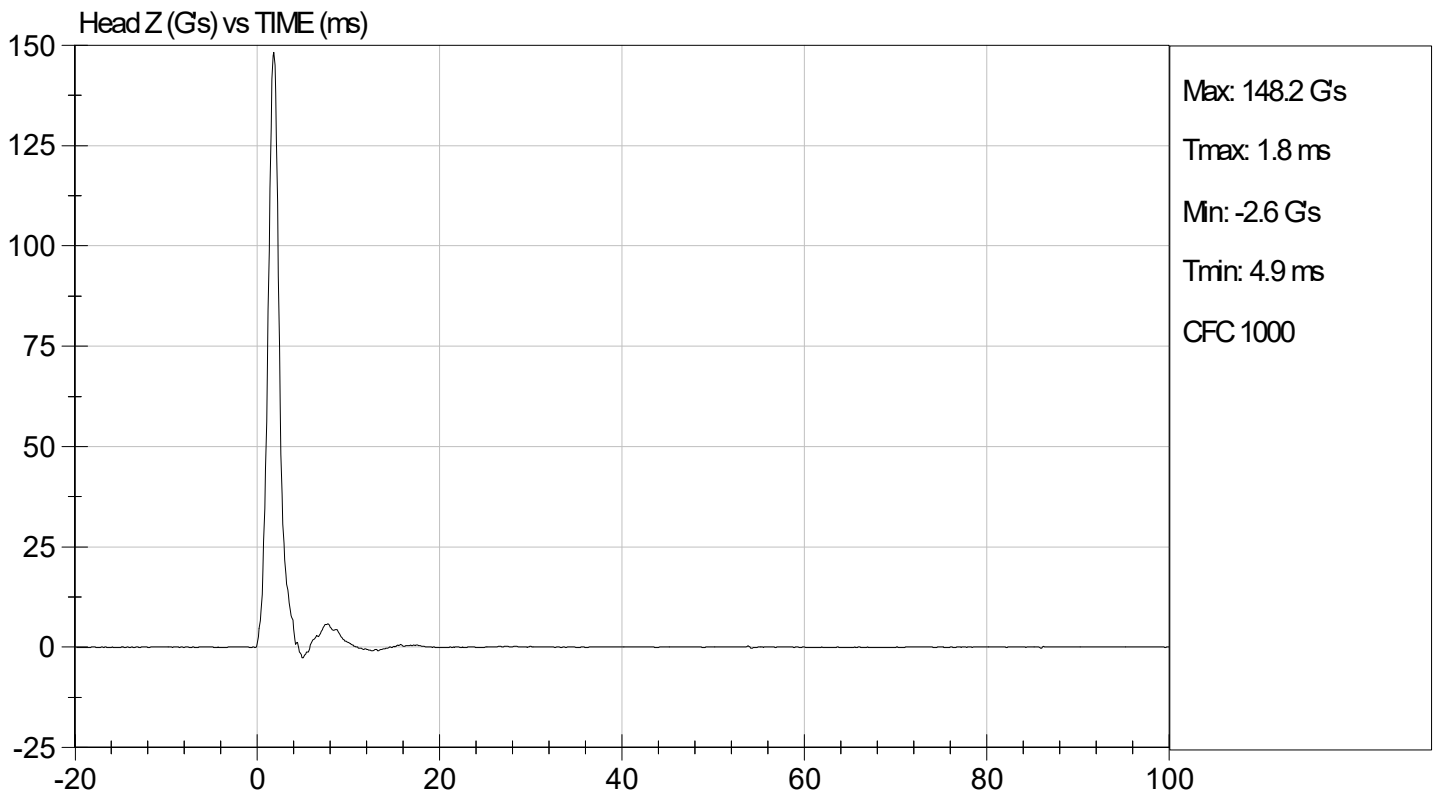
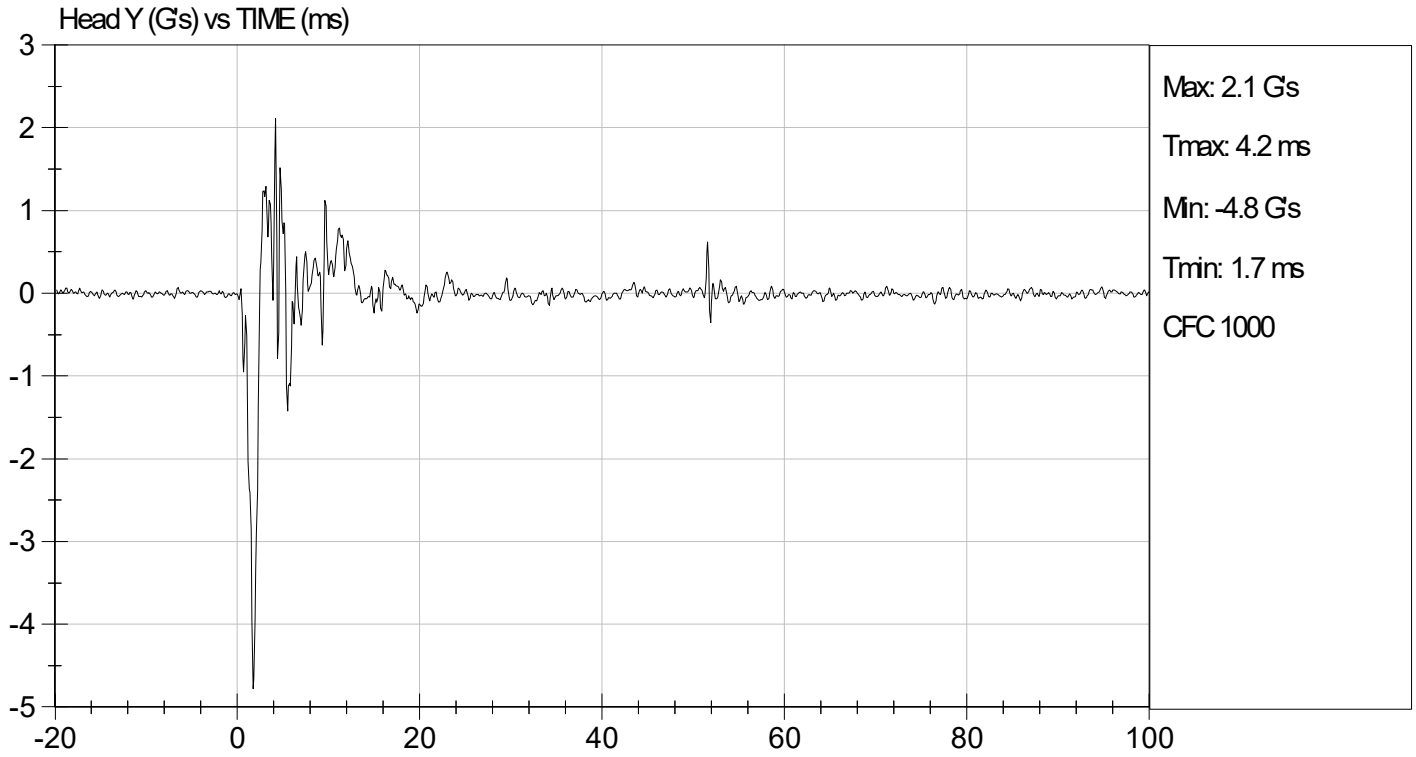
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	250 to 300	272	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-4.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220582

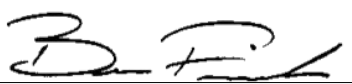
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	80	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
Overall Results					Pass



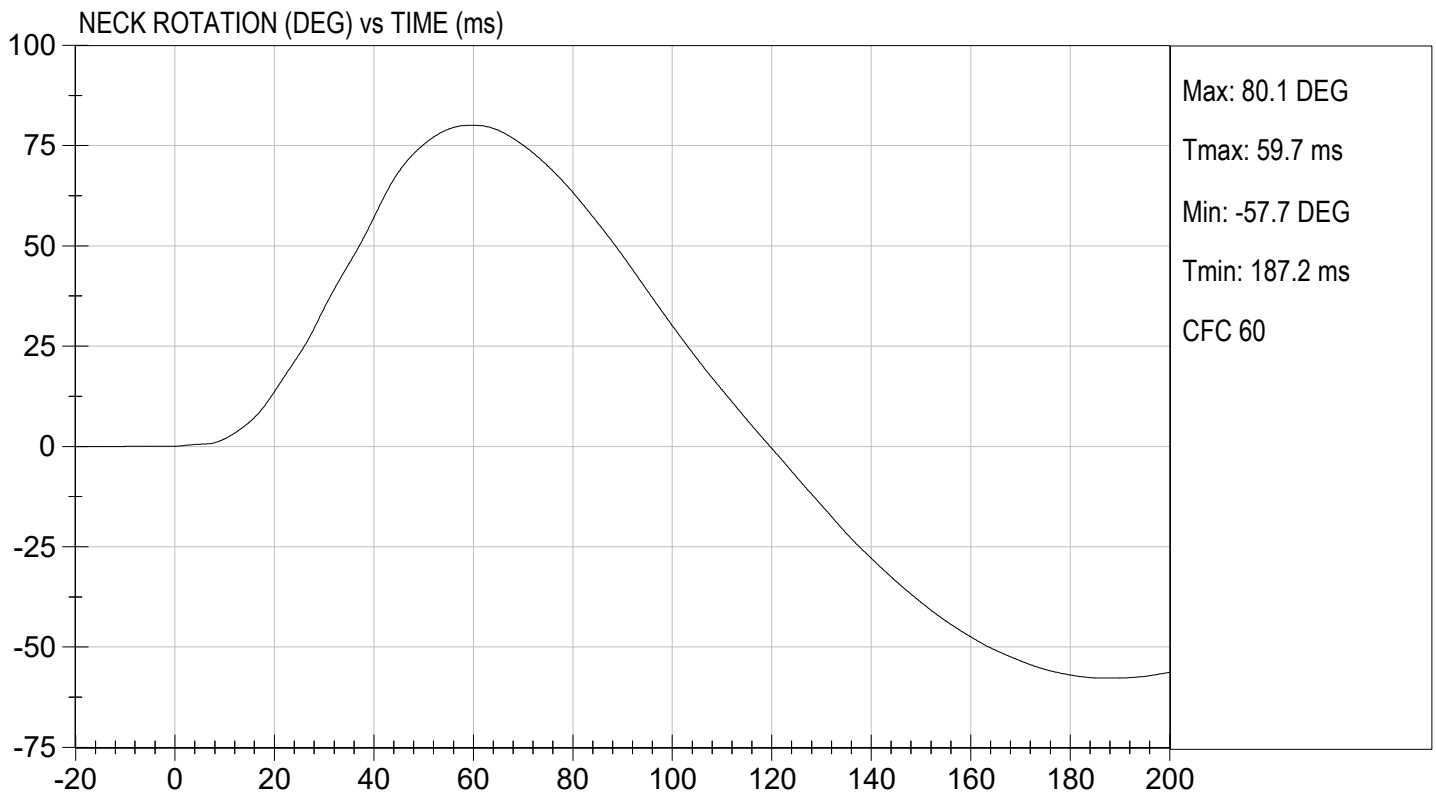
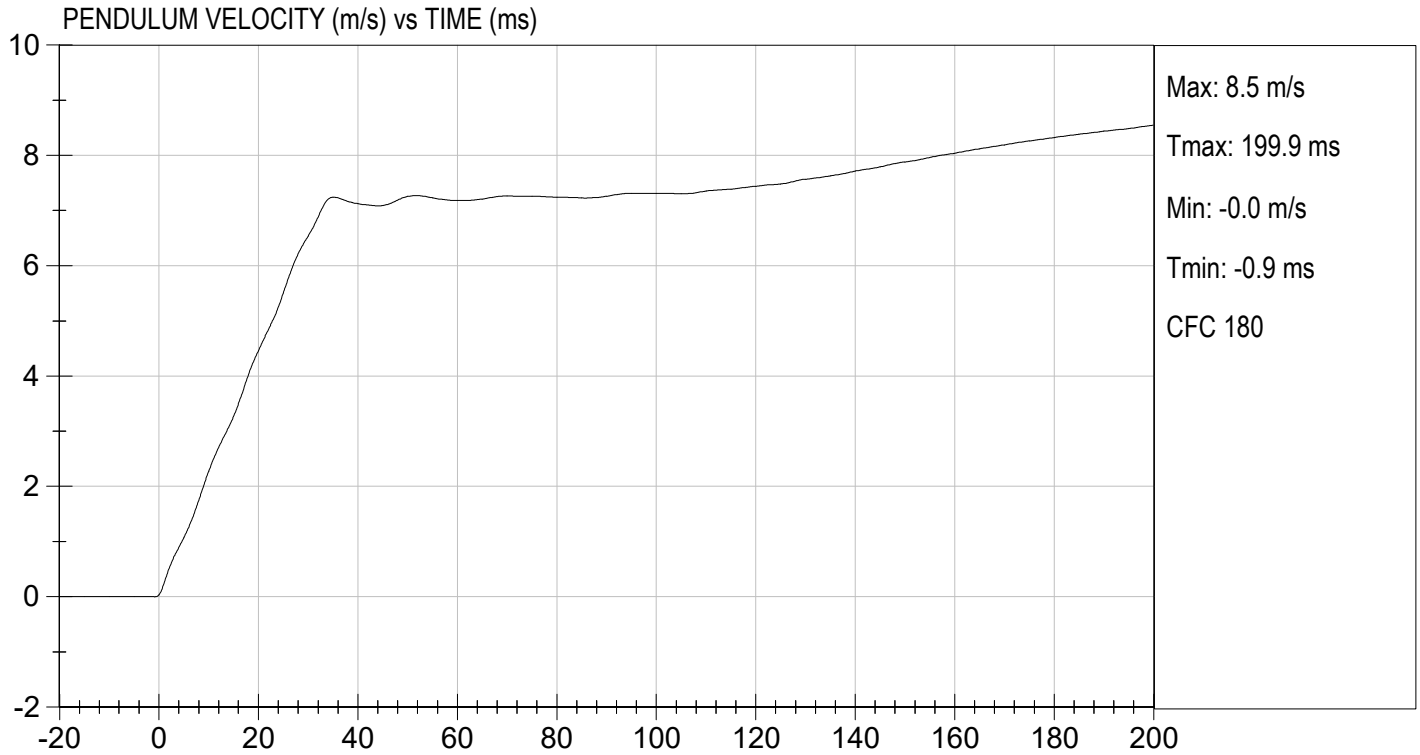
 Laboratory Technician

02/28/2022

 Test Date



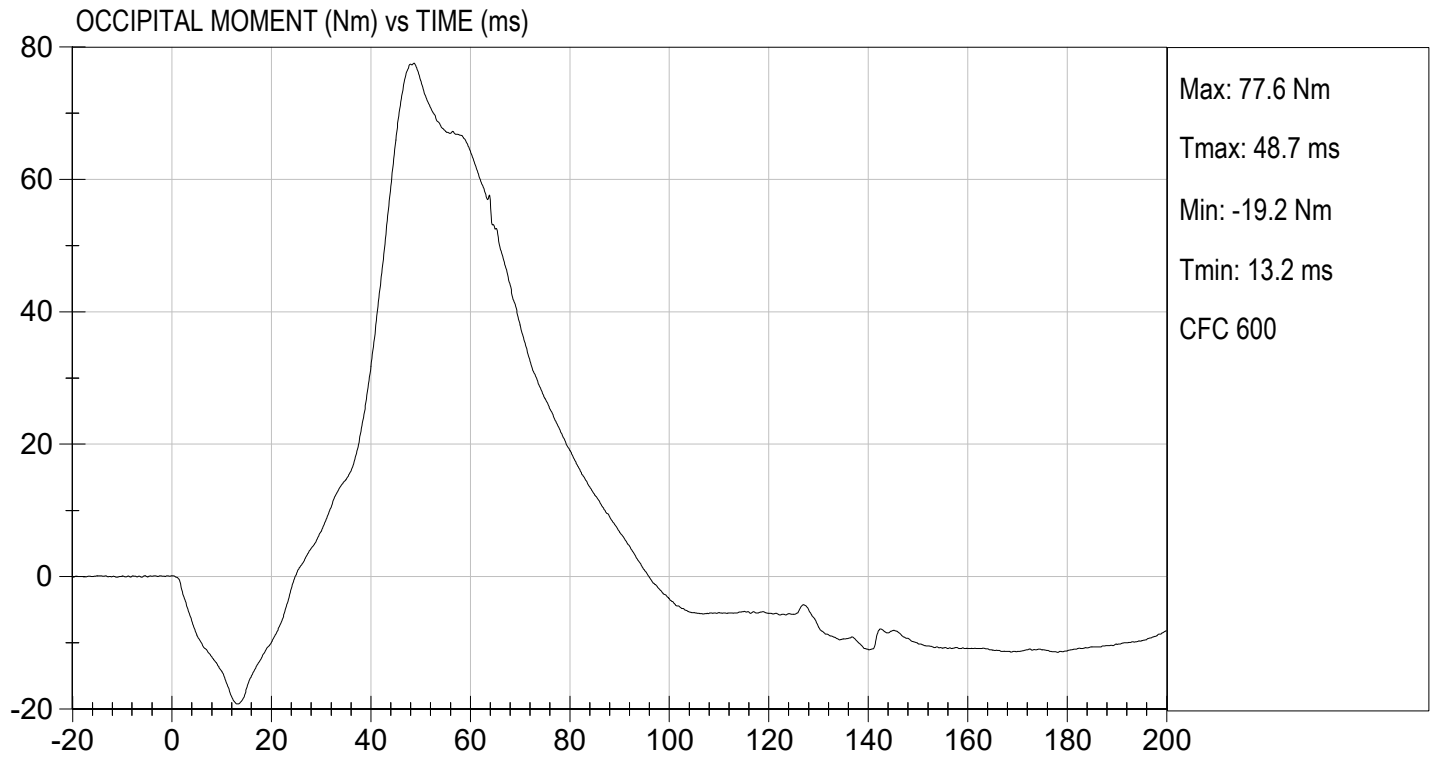
 Approved By





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

TEST DATE: 02/28/2022
TEST #: D220582



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

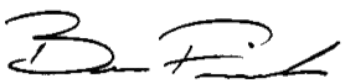
ATD Serial No: 142

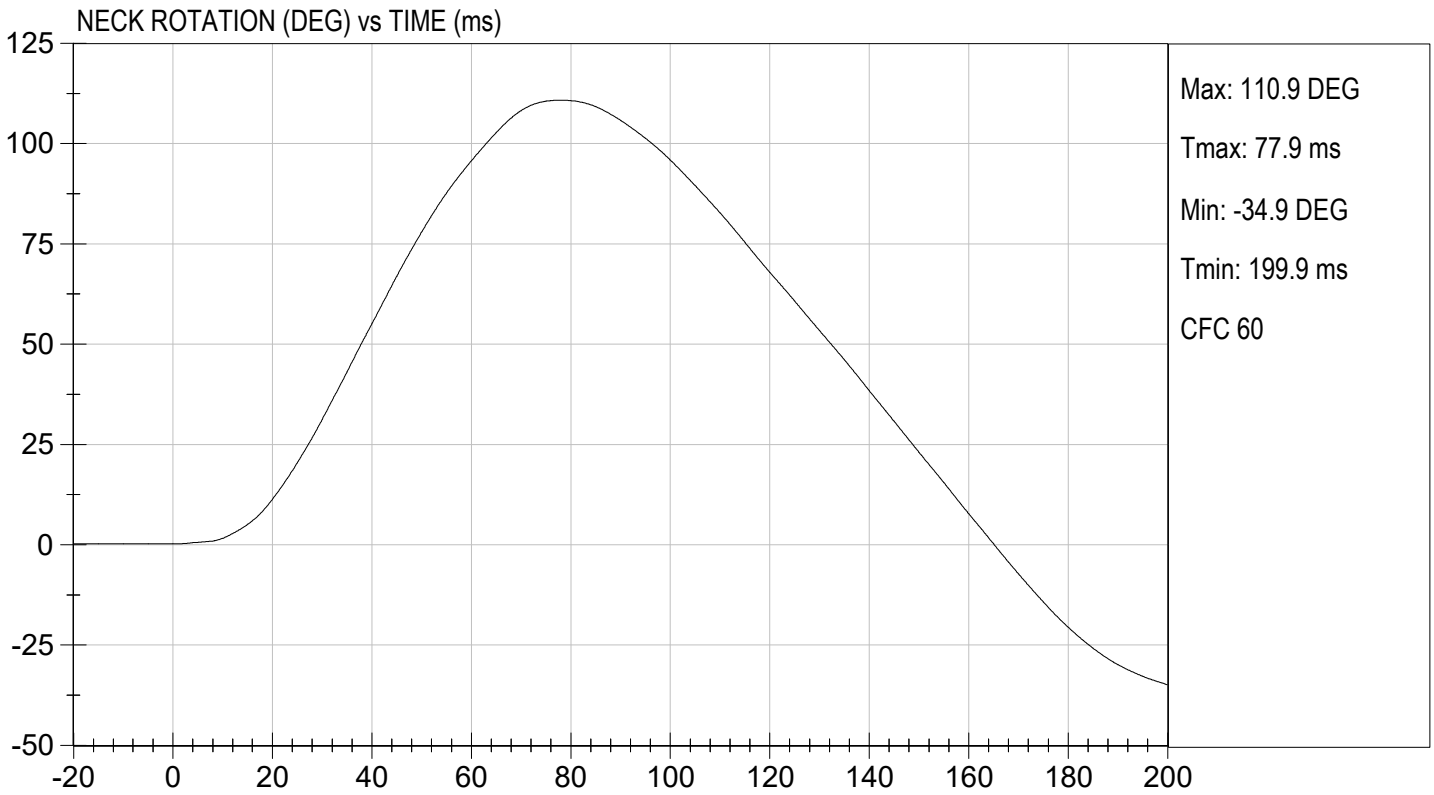
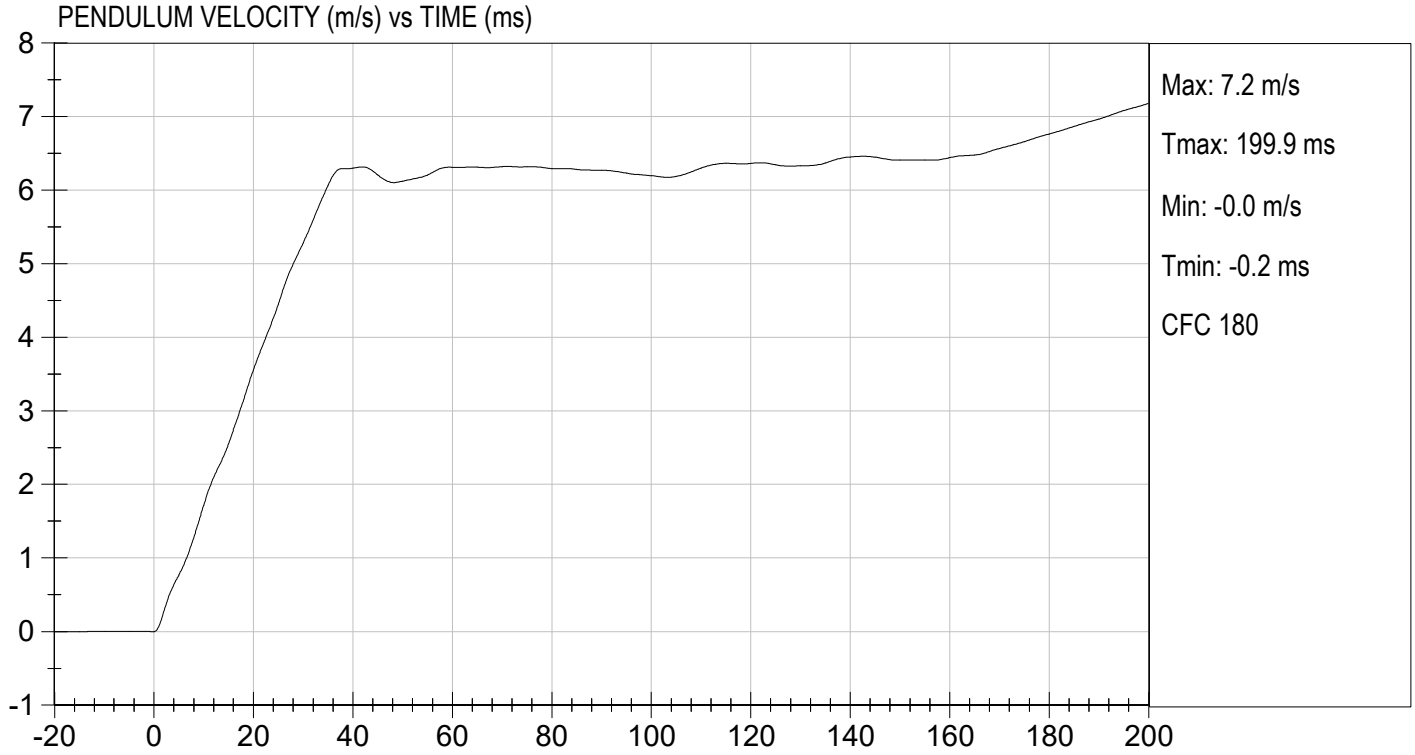
Test I.D.: D220583

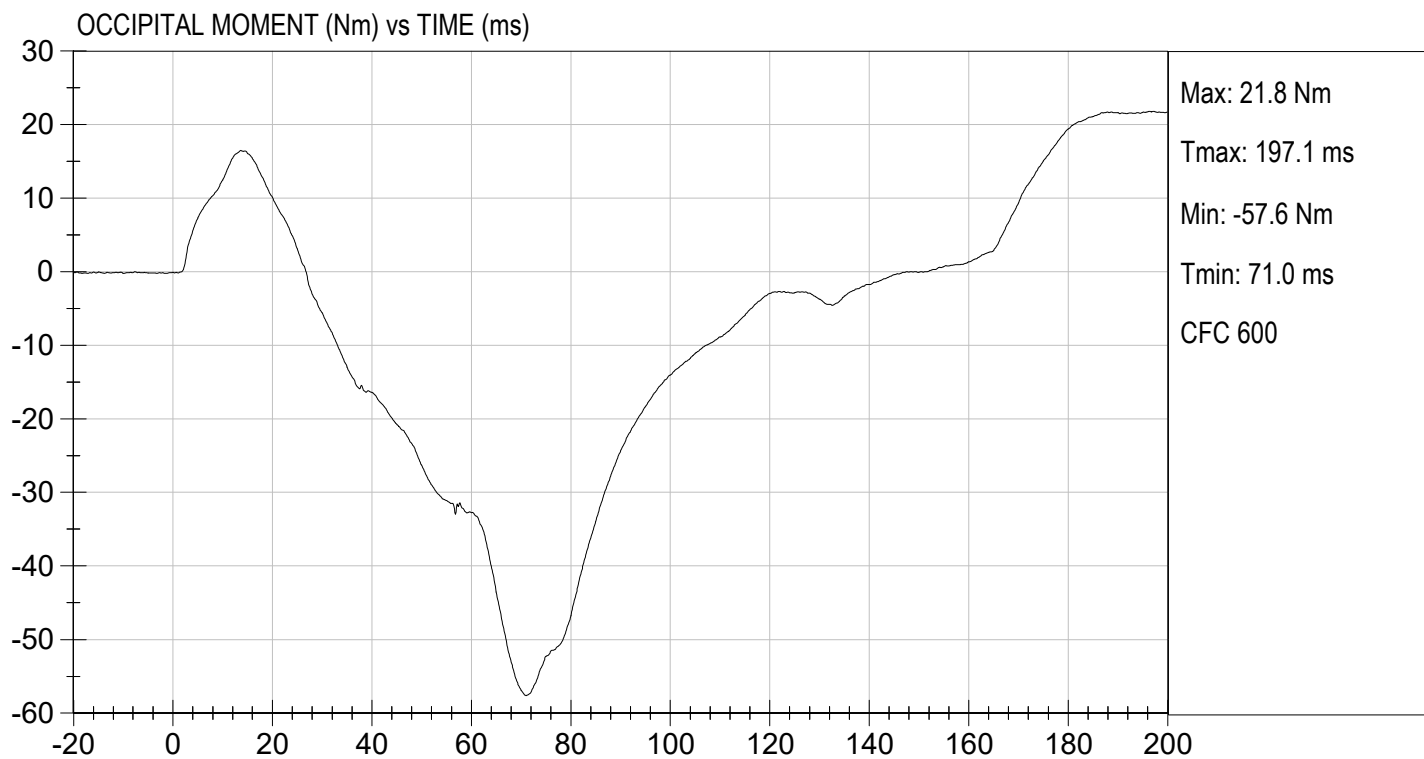
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	111	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-58	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	106	Pass
Overall Results					Pass


Laboratory Technician

02/28/2022
Test Date


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MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

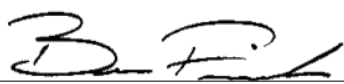
ATD Serial No: 142

Test I.D: D220584

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	6.59 to 6.83	6.60	Pass
Peak Deflection	mm	50 to 58	53	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4381	Pass
Internal Hysteresis	%	69 to 85	76	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4381	Pass
Overall Test Results				Pass


 Laboratory Technician

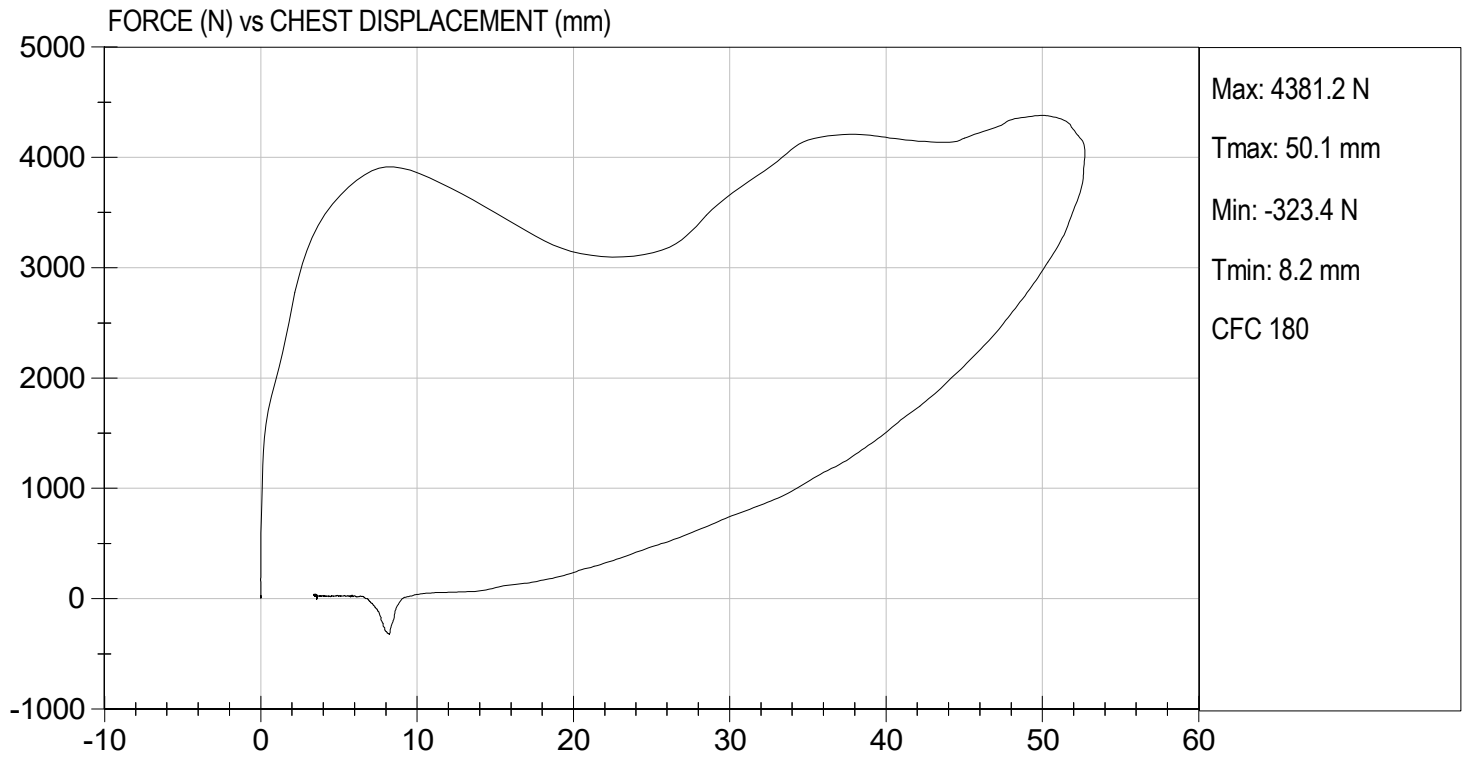
02/28/2022
 Test Date


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TEST DESC: THORAX IMPACT
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 02/28/2022
TEST #: D220584



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

ATD Serial No: 142

Test I.D: D220585

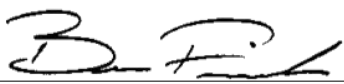
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3763	Pass
Overall Test Results				Pass



 Laboratory Technician

02/25/2022

 Test Date

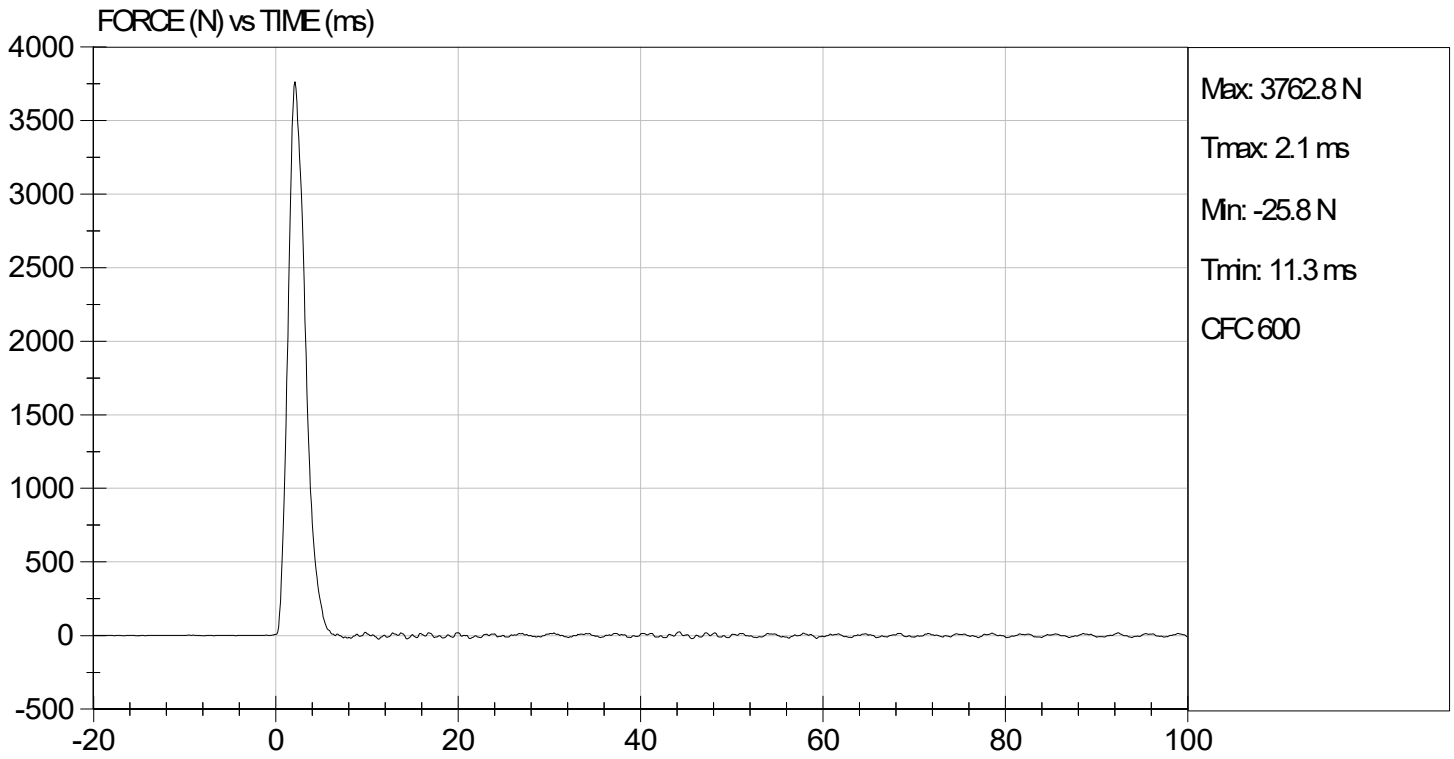


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TEST DESC: RIGHT KNEE
VELOCITY: 6.94 ft/s, 2.12 m/s

TEST DATE: 02/25/2022
TEST #: D220585



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

ATD Serial No: 142

Test I.D: D220586

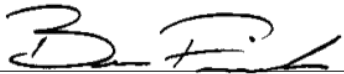
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3788	Pass
Overall Test Results				Pass



Laboratory Technician

02/25/2022

Test Date

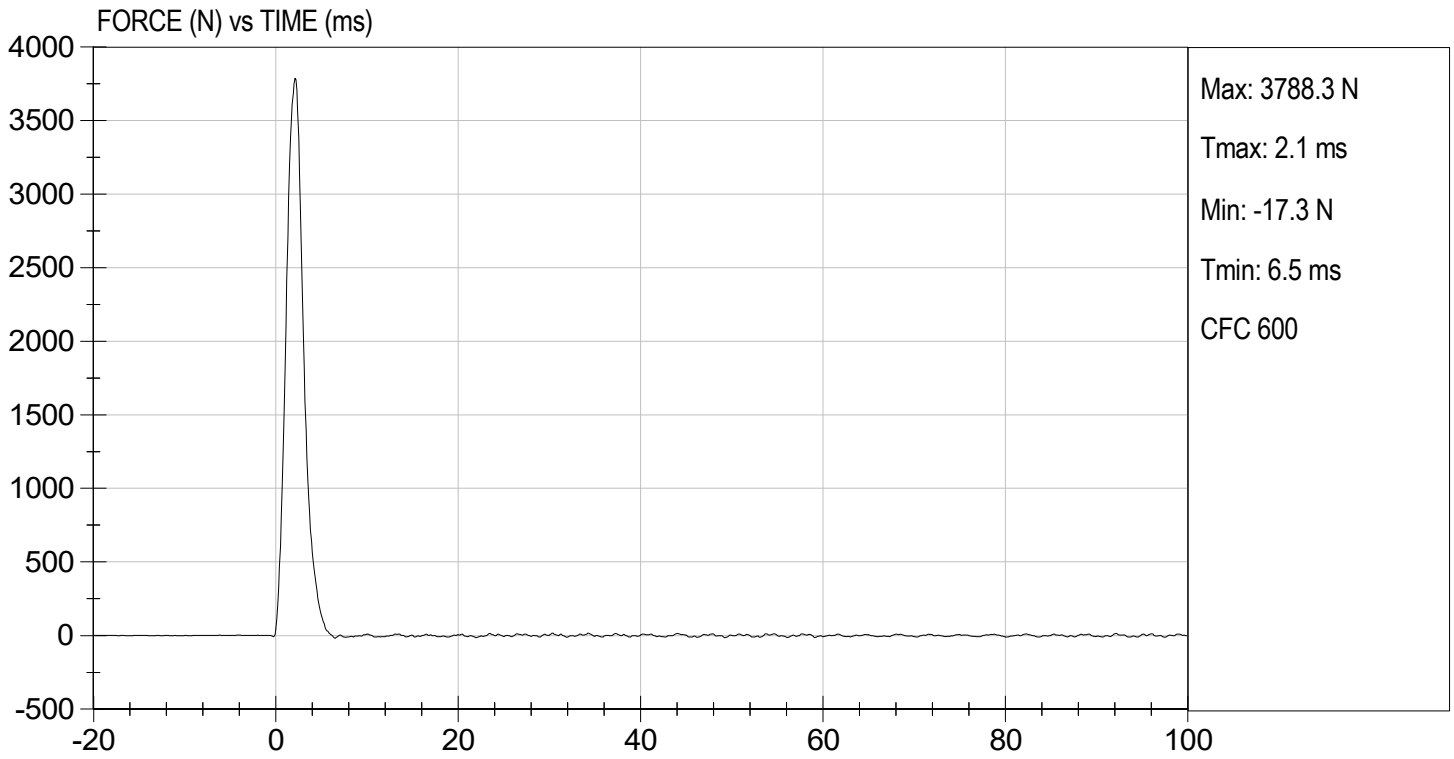


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TEST DESC: LEFT KNEE
VELOCITY: 6.97 ft/s, 2.12 m/s

TEST DATE: 02/25/2022
TEST #: D220586



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

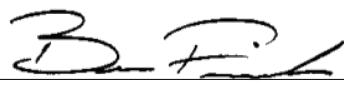
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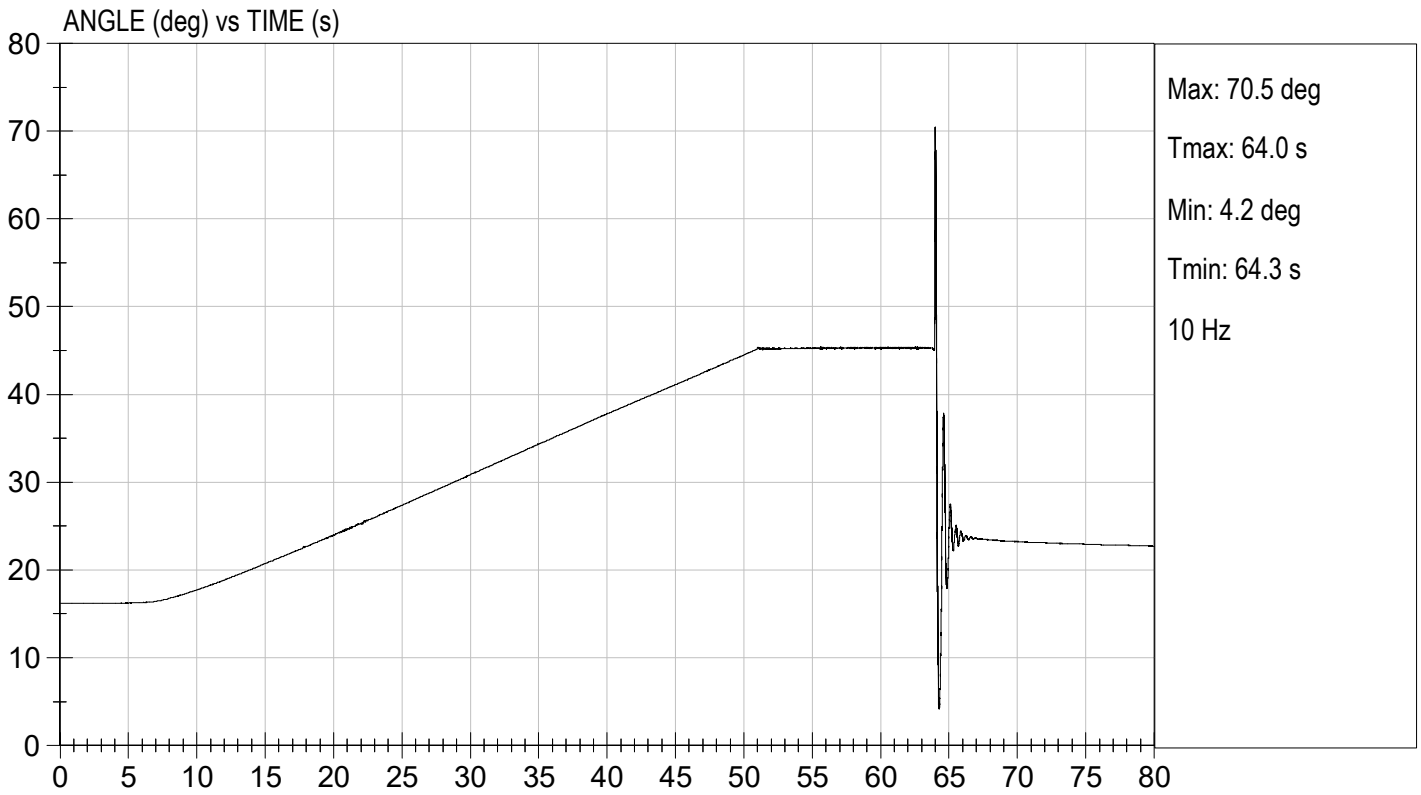
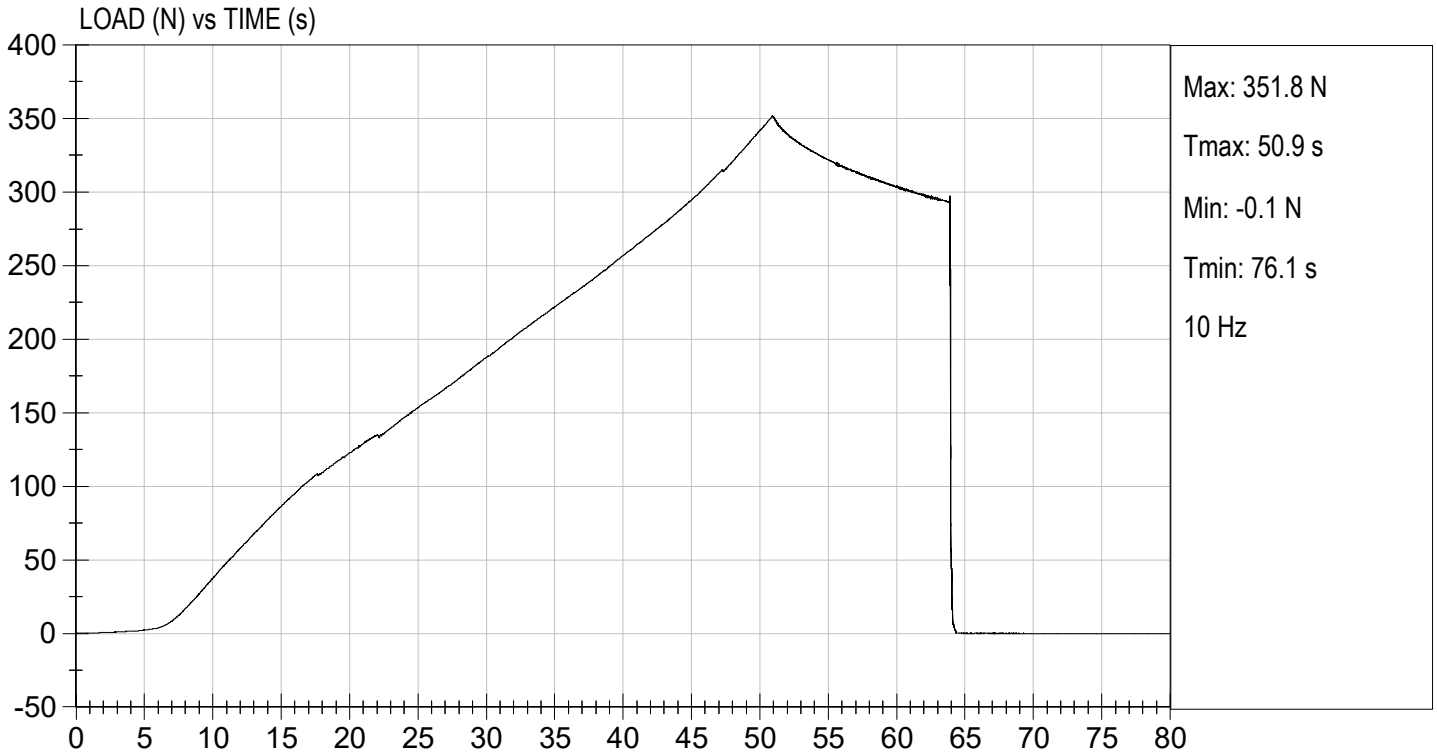
Test I.D: D220587

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	24	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	352	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.7	Pass
Overall Result				Pass


 Laboratory Technician

02/25/2022
 Test Date


 Approved By



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 50 th S/N 351		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	P79741	Endevco	01/25/2022	
		Y	P79743	Endevco	01/25/2022	
		Z	P79744	Endevco	01/25/2022	
	Redundant	X	P94834	Endevco	01/25/2022	
		Y	P94856	Endevco	01/25/2022	
		Z	P97412	Endevco	01/25/2022	
Head Angular Rate Sensors			X	ARS7325	DTS	08/09/2021
			Y	ARS7340	DTS	08/09/2021
			Z	ARS7354	DTS	08/09/2021
Upper Neck Load Cell			Fx, Fy, Fz Mx, My, Mz	NG1915	Denton	01/18/2022
Chest Accelerometers	Primary	X	P86792	Endevco	01/25/2022	
		Y	P86793	Endevco	01/25/2022	
		Z	P88348	Endevco	01/25/2022	
	Redundant	X	P88666	Endevco	01/25/2022	
		Y	P88667	Endevco	01/25/2022	
		Z	P94109	Endevco	01/25/2022	
Chest Potentiometer			X	351	Humanetics	01/25/2022
Pelvis Accelerometers			X	P95526	Endevco	01/25/2022
			Y	P96038	Endevco	01/25/2022
			Z	P97742	Endevco	01/25/2022
Femur Load Cells	Right	Primary	Z	FG121P	Denton	01/28/2022
		Redundant	Z	FG121R	Denton	01/28/2022
	Left	Primary	Z	FG122P	Denton	01/28/2022
		Redundant	Z	FG122R	Denton	01/28/2022
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG405	Denton	01/18/2022
		Lower	Mx, My, Fz	AG368	Denton	01/18/2022
	Left	Upper	Mx, My, Fz	TG475	Denton	01/18/2022
		Lower	Mx, My, Fz	AG504	Denton	01/18/2022
Foot Accelerometers	Right	Rear	X	T22486	Endevco	01/25/2022
			Z	P97382	Endevco	01/25/2022
		Front	Z	P82120	Endevco	01/25/2022
	Left	Rear	X	T16468	Endevco	01/25/2022
			Z	T16496	Endevco	01/25/2022
		Front	Z	T16501	Endevco	01/25/2022
Seat Belt Load Cells			Lap			
			Shoulder	SBG157	FTSS	11/13/2019

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

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

TABLE 3 – VEHICLE INSTRUMENTATION

Instrument Location			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember / Rear Seat Accelerometers	Left	Primary	X	A305729	MSI	11/22/2021
			Z	A377310	MSI	11/05/2021
		Redundant	X	A377301	MSI	11/05/2021
	Right	Primary	X	A390903	MSI	10/22/2021
			Z	A390965	MSI	10/22/2021
		Redundant	X	A390955	MSI	10/20/2021
Engine Accelerometers		Top	X	A340624	MSI	01/10/2022
		Bottom	X	A383489	MSI	01/05/2022