

REPORT NUMBER: NCAP-MGA-2017-001

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

**KIA MOTORS CORPORATION
2017 Kia Sportage LX AWD 5-Door SUV
NHTSA No.: O20174200**

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



Test Date: May 26, 2016

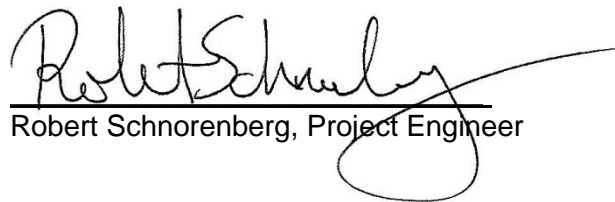
Final Report Date: August 22, 2016

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

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Approval Date: August 22, 2016

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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<p>16. Abstract</p> <p>A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2017 Kia Sportage LX AWD 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), and 301 performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on May 26, 2016.</p> <p>The impact velocity of the vehicle was 56.30 km/h and the ambient temperature at the barrier face at the time of impact was 21.6°C. The target vehicle post-test maximum crush was 452mm located at the vehicle's centerline. The test vehicle's performance was as follows:</p>																																																							
<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>N/A</td> <td>700</td> <td style="background-color: yellow;">207</td> <td>700</td> <td style="background-color: yellow;">222</td> </tr> <tr> <td>Maximum Chest</td> <td>mm</td> <td>63</td> <td style="background-color: yellow;">30</td> <td>52</td> <td style="background-color: yellow;">14</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td style="background-color: yellow;">0.22</td> <td>1</td> <td style="background-color: yellow;">0.42</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td style="background-color: yellow;">901</td> <td>2620</td> <td style="background-color: yellow;">673</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td style="background-color: yellow;">321</td> <td>2520</td> <td style="background-color: yellow;">310</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td style="background-color: yellow;">48</td> <td>6805</td> <td style="background-color: yellow;">146</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td style="background-color: yellow;">1029</td> <td>6805</td> <td style="background-color: yellow;">70</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	207	700	222	Maximum Chest	mm	63	30	52	14	Nij	N/A	1	0.22	1	0.42	Neck Tension	N	4170	901	2620	673	Neck Compression	N	4000	321	2520	310	Left Femur Force	N	10008	48	6805	146	Right Femur Force	N	10008	1029	6805	70
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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 FMVSS 212, FMVSS 219 (Partial) Data, and 301 Data	25
16	FMVSS 301 Static Rollover Results	27
17	Dummy/Vehicle Temperature Stabilization Data	28

<u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration and Performance Verification Data	C

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 DTNH22-12-D-00258. 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 Frontal NCAP Laboratory Test Procedure.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2017 Kia Sportage LX AWD 5-Door SUV at a velocity of 56.30 km/h. The test was performed at MGA Research Corporation on May 26, 2016. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and fourteen (14) 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 Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also installed on the driver's shoulder belt, driver's lap belt, passenger's shoulder belt, and passenger's lap 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. 138) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

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

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

The maximum static crush of the vehicle was 452mm at the vehicle centerline and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

The occupant data is summarized below:

ATD position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	207	0.22	901	321	46	30	48	1029
Passenger (5 th)	222	0.42	673	310	45	14	146	70

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

TEST NOTES

Barrier K-16 My recorded no valid data.
 Barrier C-04 Fx recorded no valid data.
 Barrier C-04 My recorded no valid data.
 Barrier C-04 Mz recorded no valid data.

Camera No. 11 – Windshield did not record.

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: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20174200	Traction Control System (TCS)	Yes
Model Year	2017	Power Steering	Yes
Make	Kia	Power Window Auto-Reverse	Yes
Model	Sportage LX	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	KNDPMCAC5H7041644	Driver Head/Torso Airbag	No
Body Color	Pacific Blue	Driver Torso Airbag	No
Odometer (km/mi)	23km / 14mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.0 L	Driver Pelvis Airbag	No
Type/No. Cylinders	4	Driver Knee Airbag	No
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	6	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	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA MOTORS CORPORATION	GVWR (kg)	2150
Date of Manufacture	01/16	GAWR Front (kg)	1200
		GAWR Rear (kg)	1150

VEHICLE SEATING AND WEIGHT CAPACITY DATA

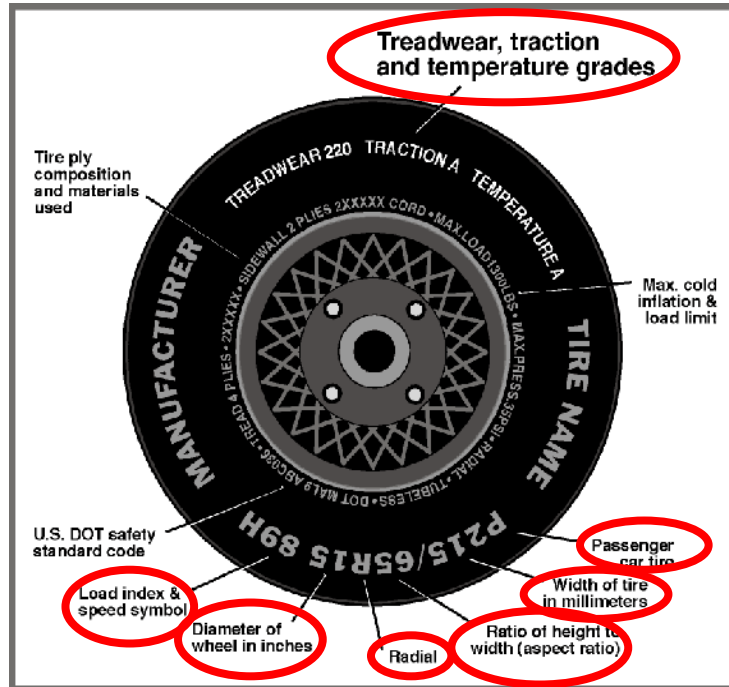
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				440
Cargo Weight (RCLW) (kg)				100

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	225/60R17	225/60R17
Tire Size on Vehicle	225/60R17	225/60R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadwear	540	540
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	99H	99H
Tire Material	Rubber	Rubber
DOT Safety Code Left	5MJF 1BH 5115	5MJF 1BH 5115
DOT Safety Code Right	5MJF 1BH 5115	5MJF 1BH 5115

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
Test Date: 5/26/2016

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	472.0	332.5		507.5	418.0	
Right	kg	459.5	323.0		487.5	408.0	
Ratio	%	58.7%	41.3%		54.6%	45.4%	
Totals	kg	931.5	655.5	1587.0	995.0	826.0	1821.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1587.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	100
Calculated Test Vehicle Target Weight (TVTW)	kg	1828.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	762	766	775	774	1102
As Tested	mm	749	753	736	744	1209
Post Test	mm	723	744	731	746	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2668
Total Vehicle Length at Left Side	mm	4288
Total Vehicle Length at Centerline	mm	4484
Total Vehicle Length at Right Side	mm	4288
Weight of Ballast in Cargo Area	kg	38
Weight of Vehicle Components Removed	kg	25
Amount of Stoddard Solvent in Fuel Tank	L	57.5

List of components removed to meet test weight: None.

List of components removed for instrumentation, data box, and equipment installation: Cargo area carpet and trim, LR/RR floor mat, jack and tool kit, spare tire, RR tail light.

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4484
2	Total Width	1810
3	Bumper Top Height	605
4	Bumper Bottom Height	478
5	Longitudinal Member Top Height	571
6	Distance between Longitudinal Members	970
7	Longitudinal Member Width	59
8	Engine Top Height	904
9	Engine Bottom Height	230
10	Engine and Gearbox Width	906
11	Front Bumper-Engine Distance	352
12	Front Shock Absorber Fixing Height	966
13	Bonnet Leading Edge Height	935
14	Front Shock Absorber Fixing Width	1193
15	Front Bumper – Front Axle Distance	914
16	Front Axle – A-Pillar Distance	470
17	A-Pillar – B-Pillar Distance	1086
18	B-Pillar – Rear Axle Distance	1128
19	B-Pillar – C-Pillar Distance	664
20	Roof Sill Bottom Height	1422
21	Roof Sill Top Height	1595
22	Floor Sill Bottom Height	472
23	Floor Sill Top Height	260

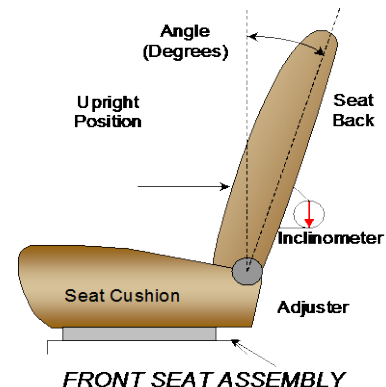
**DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

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 October 2015.



	Degrees
Driver Seat Back Angle	0.4° on headrest post
Passenger Seat Back Angle	2.1° on headrest post

SEAT FORE/AFT POSITIONS

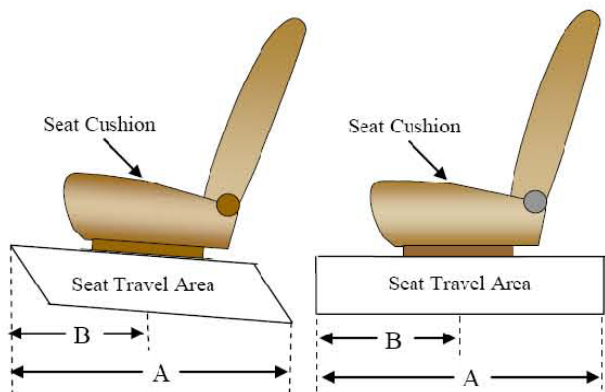
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated October 2015.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	299 mm / 38 detents (1 st as 1)	150 mm / 14 th detent (1 st as 0)
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 positioning 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: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

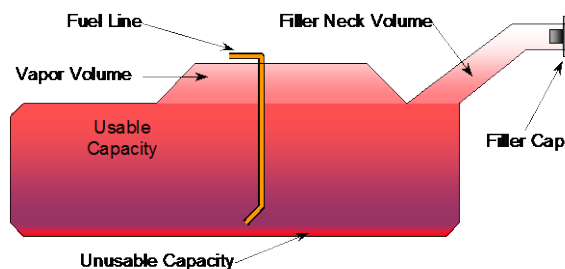
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	62.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	57.0 to 58.3
Actual Amount of Solvent used	57.5
1/3 of Usable Capacity	20.7

FUEL PUMP

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

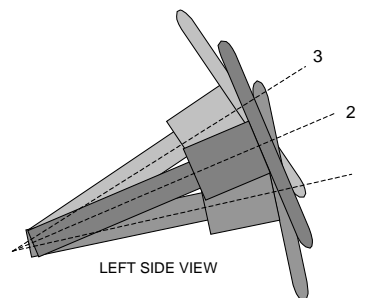
Fuel pump operates with ignition "ON". The filler neck is located on the driver's side.



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

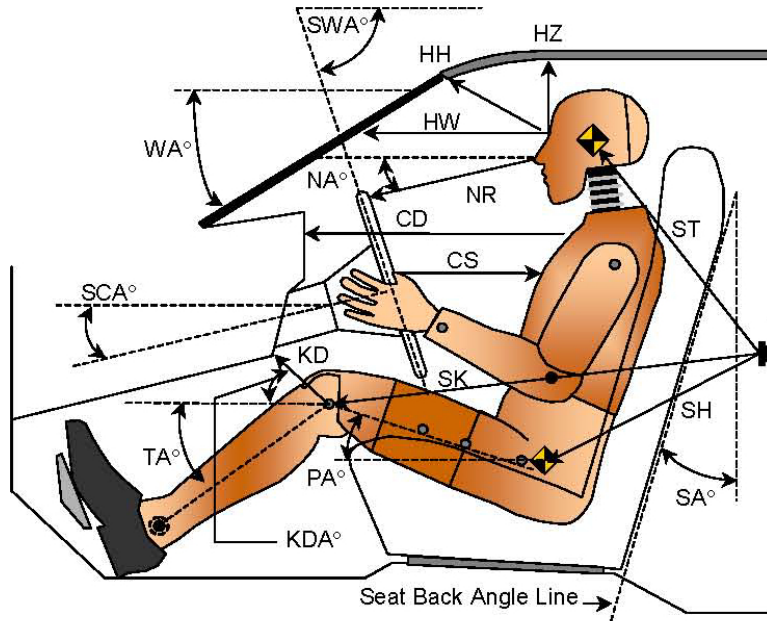
STEERING COLUMN POSITION

	Degrees	Fore/Aft
Lowermost Position 1	66.5	240
Geometric Center	64.0	265
Uppermost Position 3	61.5	290
Telescoping Steering		50
Test Position	64.0	265

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016



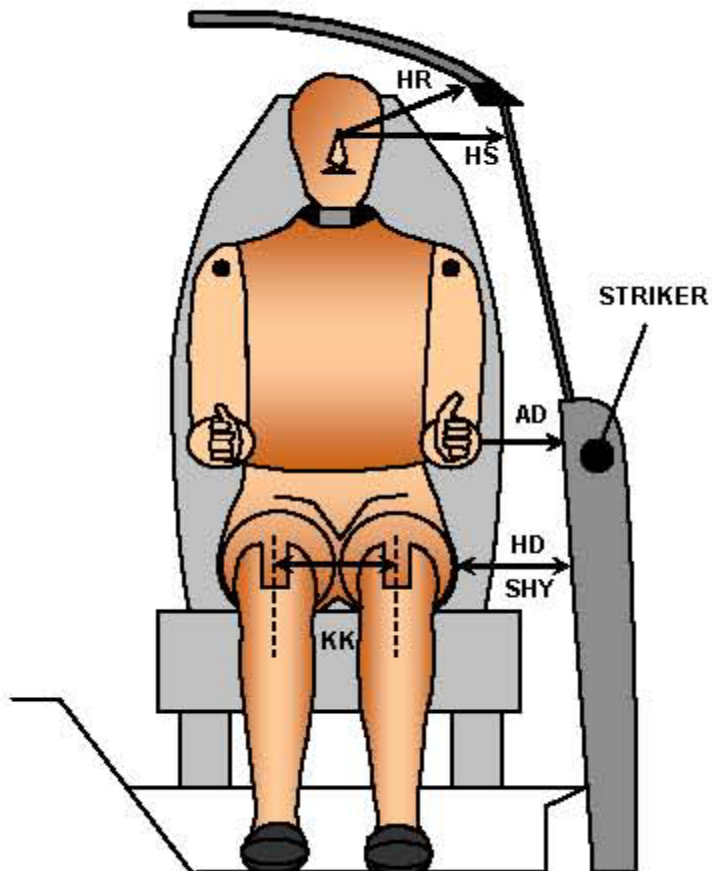
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		24.6		
SWA°	Steering Wheel Angle		64.0		
SCA°	Steering Column Angle		26.0		
SA°	Seat Back Angle		0.4		2.1
HZ	Head to Roof (Z)	188	90	249	90
HH	Head to Header	334	22.8	322	42.8
HW	Head to Windshield	632	0	742	0
NR	Nose to Rim	376	4.7		
CD	Chest to Dash	512		420	
CS	Chest to Steering Hub	292	4.3		
RA	Rim to Abdomen	168	0		
KDL	Left Knee to Dash	189	39.2	138	30.9
KDR	Right Knee to Dash	143	31.9	145	30.0
PA°	Pelvic Angle		24.4		21.7
TA°	Tibia Angle		49.6		48.2
SK	Striker to Knee	595	100.7	678	106.1
ST	Striker to Head	425	16.6	356	32.2
SH	Striker to H-Point	333	138.6	402	126.6

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016



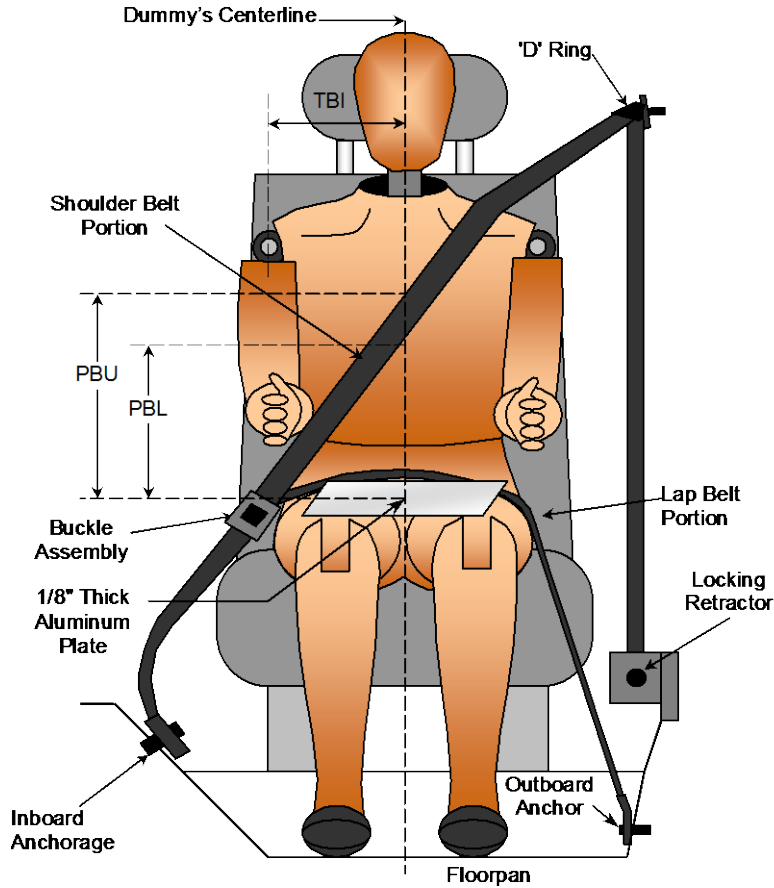
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	136	88
HD	H-Point to Door	165	206
HR	Head to Side Header	221	279
HS	Head to Side Window	335	369
KK	Knee to Knee	358	227
SHY	Striker to H-Point (Y Direction)	290	310
AA	Ankle to Ankle	355	162

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	380	370
PBL - Top surface of reference to belt lower edge	mm	310	275

BELT LENGTH DATA

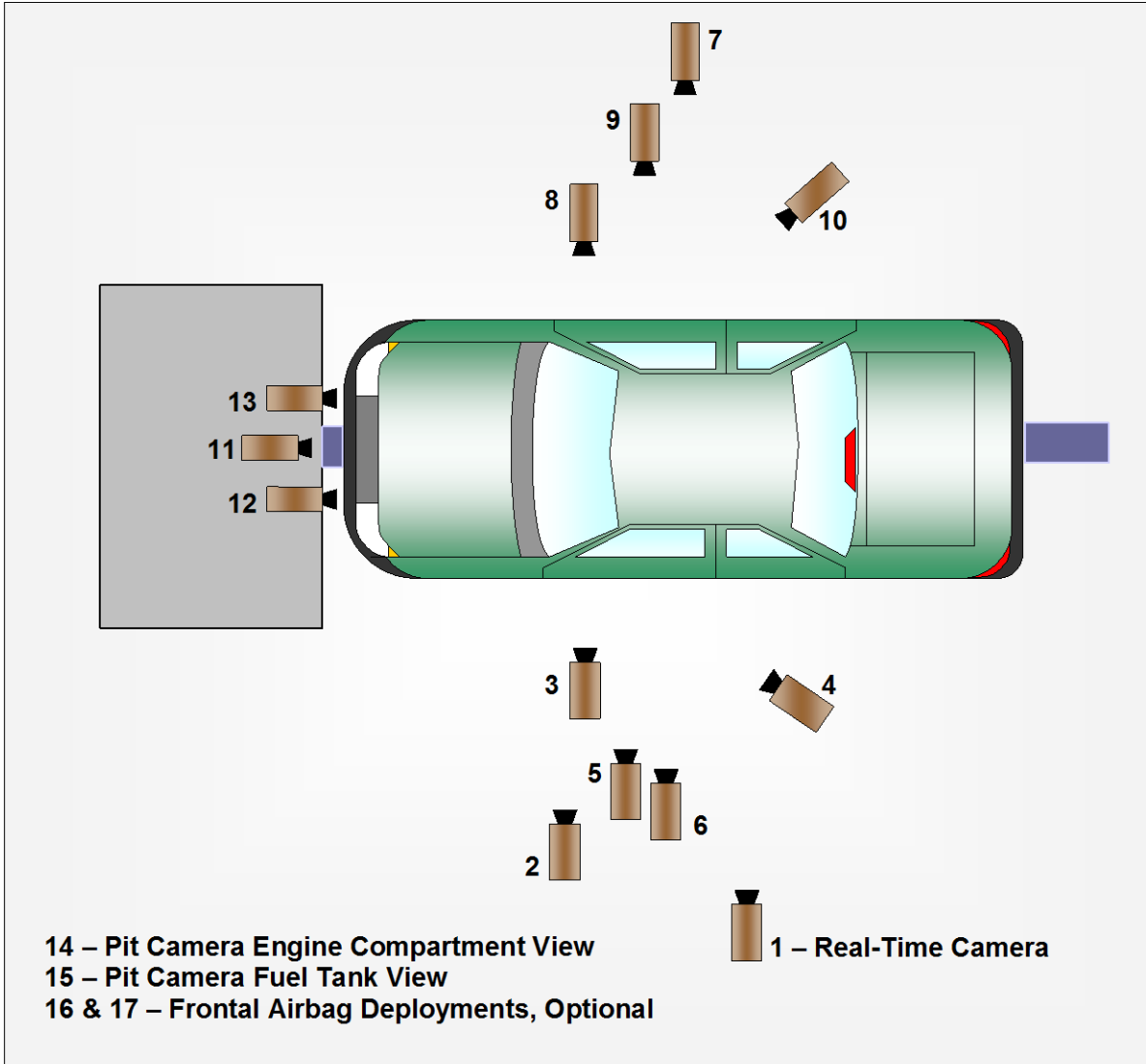
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	830	855
Lap Belt Length as measured on ATD	mm	590	650
Remainder of belt on reel	mm	830	745
Total Belt Length for Continuous Webbing Systems	mm	3050	3050

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
Test Date: 5/26/2016

CAMERA POSITIONS FOR FRONTAL IMPACTS



**DATA SHEET NO. 6 (CONTINUED)
CAMERA LOCATIONS AND DATA**

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	-1680	-6440	-2000	35	1000
3	Left Front Half	-1060	-5000	-1290	24	1000
4	Left Angle	-6260	-5000	-2000	50	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	-1880	5300	-1340	16	1000
8	Passenger Close-Up	-1320	6380	-2010	35	1000
9	Right Front Half	-1130	4900	-1290	24	1000
10	Right Angle	-6300	5000	-2030	50	1000
11	Windshield	430	0	-2810	20	1000
12	Driver Windshield	-30	-450	-2030	8.5	1000
13	Passenger Windshield	-30	450	-2030	8.5	1000
14	Pit Front	-1180	0	3150	24	1000
15	Pit Rear	-2990	0	3150	24	1000
16	Onboard Driver Side				12	1000
17	Onboard Passenger Side				12	1000
18	Real-Time Pan View					30

***COORDINATES:**

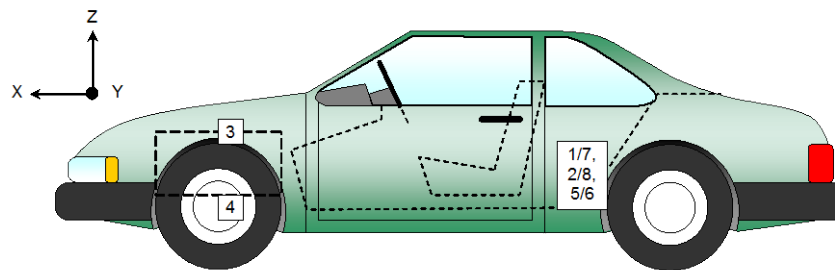
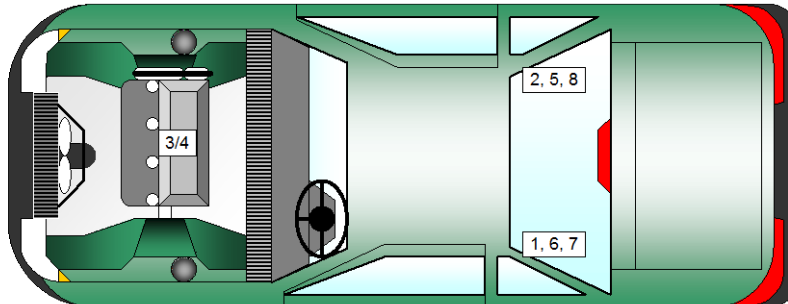
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 5 & 6 were not used for this test.

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1730	-441	-339
2	Right Rear Crossmember Accelerometer – X Direction	1731	440	-340
3	Engine Top X	3760	37	-885
4	Engine Bottom X	3779	0	-326
5	Left Rear Crossmember Accelerometer – Z Direction	1730	-441	-339
6	Right Rear Crossmember Accelerometer – Z Direction	1731	440	-340
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1760	-441	-336
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1759	440	-337

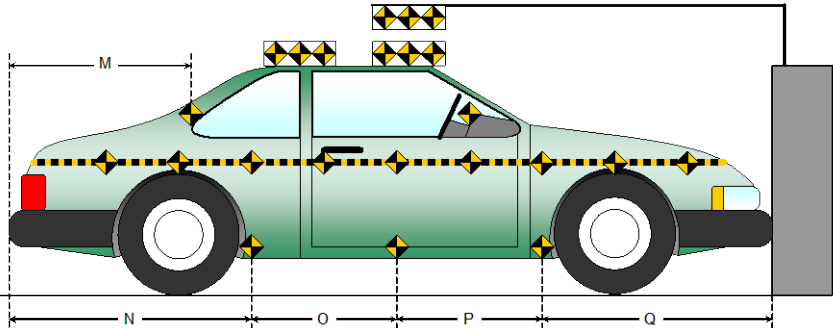
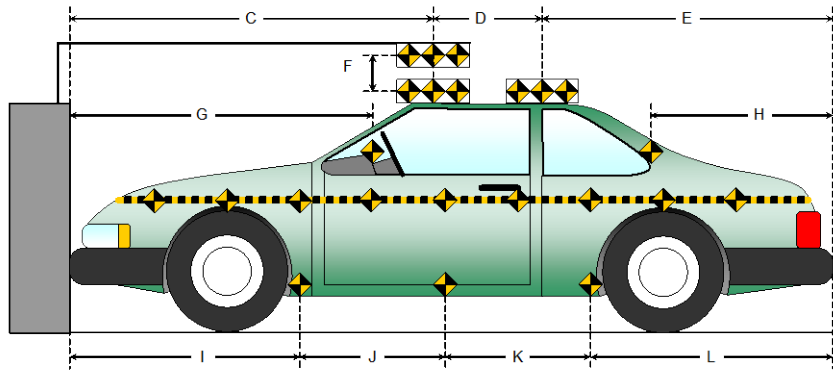
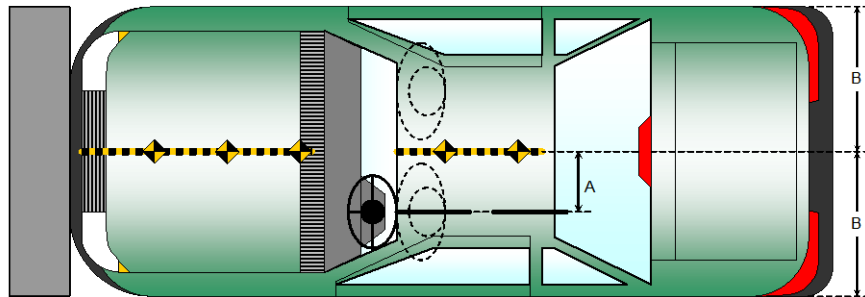
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

Item	Value (mm)
A	370
B	905
C	2180
D	613
E	1691
F	155
G	
H	842
I	1379
J	872
K	872
L	1361
M	842
N	1361
O	872
P	872
Q	1379



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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

Advanced Research Load Cell Barrier

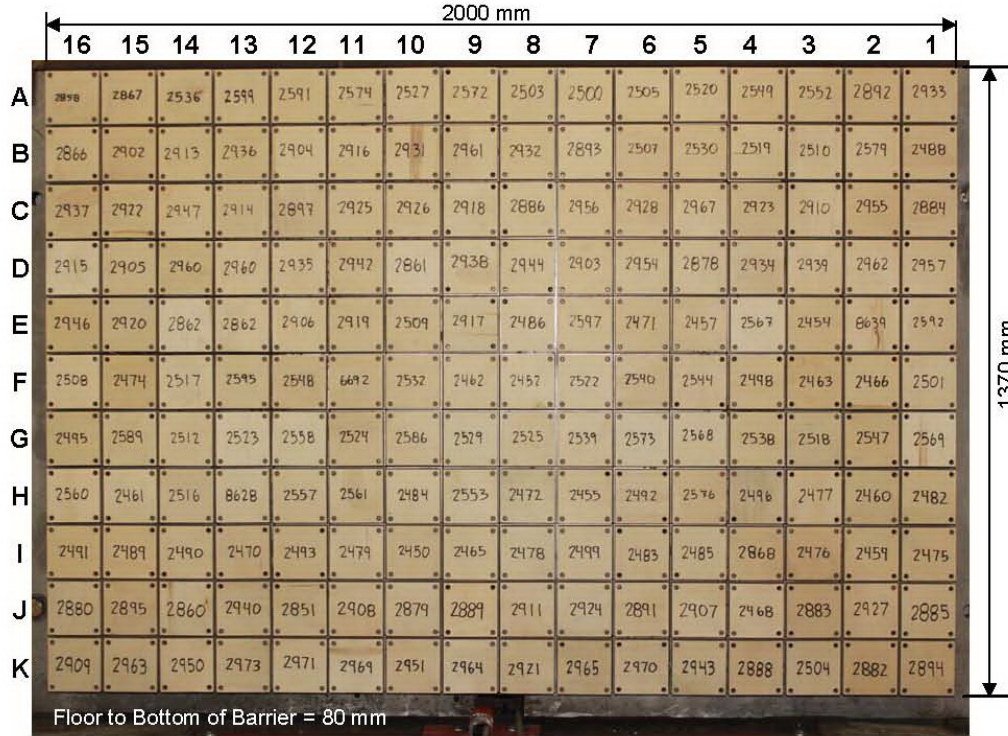


Photo for Reference Only

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: 2017 Kia Sportage LX AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
Test Date: 5/26/2016

INSTRUMENTATION

Driver Dummy Data Channels	49
Passenger Dummy Data Channels	49
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	634

CAMERA COVERAGE

High-Speed Vehicle Onboard	2
High-Speed Offboard	12
Real-Time	2
Total	16

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 138
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	None	None
Right Knee Contact	None	None

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were locked	Doors were locked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	3170
Center	mm	3100
Right Side	mm	3090
Average	mm	3120

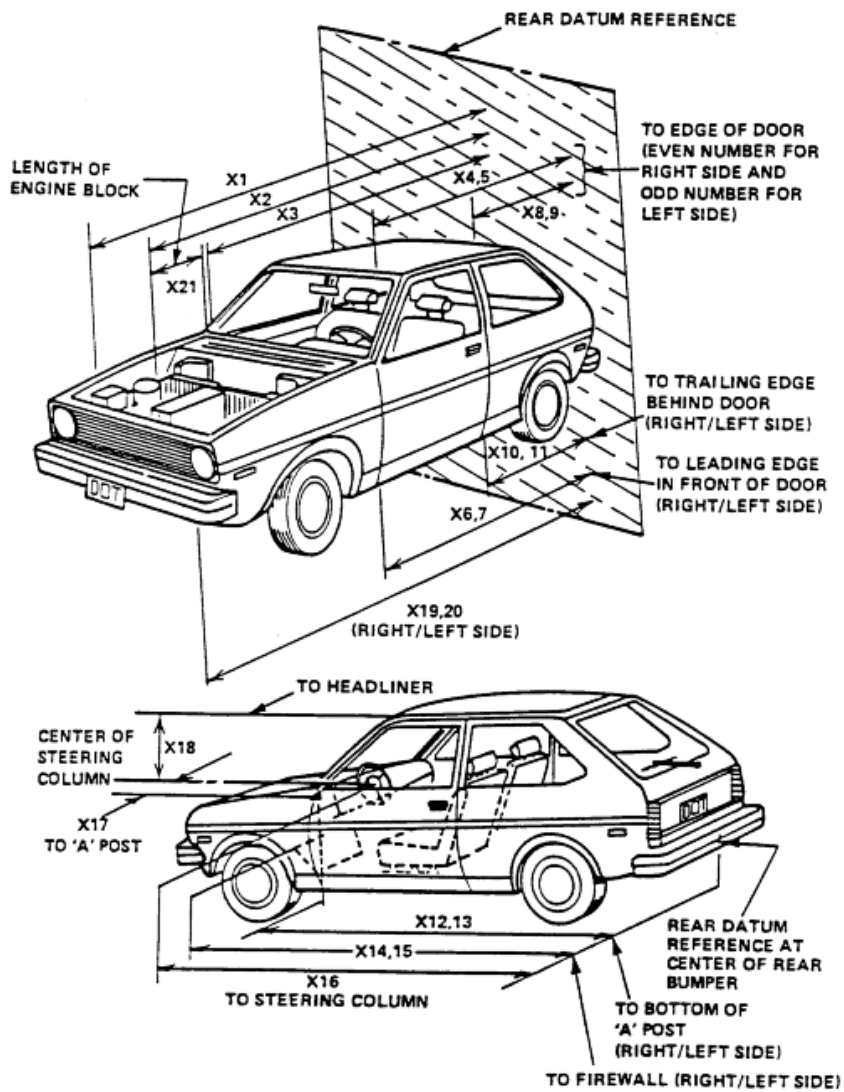
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	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	

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016



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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
Test Date: 5/26/2016

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4484	4032	452
2	RSOV to Front of Engine	mm	3839	3618	221
3	RSOV to Firewall	mm	3518	3481	37
4	RSOV to Upper Leading Edge of Right Door	mm	3020	3043	-23
5	RSOV to Upper Leading Edge of Left Door	mm	3020	3042	-22
6	RSOV to Lower Leading Edge of Right Door	mm	3015	3017	-2
7	RSOV to Lower Leading Edge of Left Door	mm	3015	3007	8
8	RSOV to Upper Trailing Edge of Right Door	mm	1988	1997	-9
9	RSOV to Upper Trailing Edge of Left Door	mm	1988	1996	-8
10	RSOV to Lower Trailing Edge of Right Door	mm	1990	2016	-26
11	RSOV to Lower Trailing Edge of Left Door	mm	1990	1982	8
12	RSOV to Bottom of "A" Post of Right Side	mm	3022	2989	33
13	RSOV to Bottom of "A" Post of Left Side	mm	3020	2994	26
14	RSOV to Firewall, Right Side	mm	3230	3236	-6
15	RSOV to Firewall, Left Side	mm	3229	3243	-14
16	RSOV to Steering Column	mm	2560	2640	-80
17	Center of Steering Column to "A" Post	mm	411	416	-5
18	Center of Steering Column to Headliner	mm	440	475	-35
19	RSOV to Right Side of Front Bumper	mm	4288	3999	289
20	RSOV to Left Side of Front Bumper	mm	4288	4015	273
21	Length of Engine Block	mm	502	502	0
RD	RSOV to Right Side of Dash Panel	mm	2831	2892	-61
CD	RSOV to Center of Dash Panel	mm	2835	2902	-67
LD	RSOV to Left Side of Dash Panel	mm	2875	2873	2

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

VEHICLE INFORMATION

VIN: KNDPMCAC5H7041644 Wheelbase (mm): 2668
 Vehicle Size Category: MPV Test Weight (kg): 1821.0

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

Cal. Procedure/Interval: MGA procedure / 6 month

Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.30

Velocity Change (km/h): 64.9

Time of Separation (msec): 96

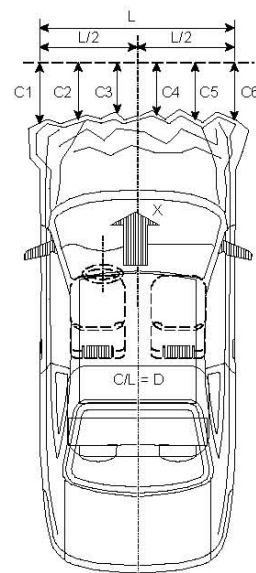
CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1584

Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4288	4015	273
C2	Crush zone 2 at left side	mm	4415	4014	401
C3	Crush zone 3 at left side	mm	4452	4032	420
C4	Crush zone 4 at right side	mm	4452	4025	427
C5	Crush zone 5 at right side	mm	4415	3987	428
C6	Crush zone 6 at right side	mm	4288	3999	289
L	C1 TO C6	mm	1412	1381	31

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

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

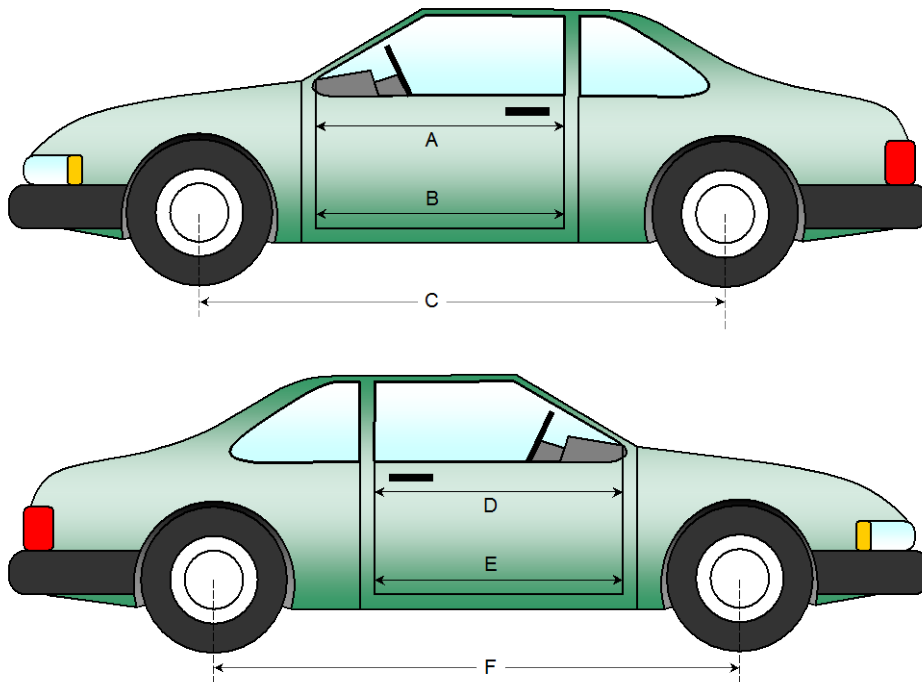
NHTSA No.: O20174200
 Test Date: 5/26/2016

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	968	968	0
B	Left Side Lower	mm	888	888	0
D	Right Side Upper	mm	968	968	0
E	Right Side Lower	mm	888	888	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2668	2638	30
F	Right Side Wheelbase	mm	2668	2612	56



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

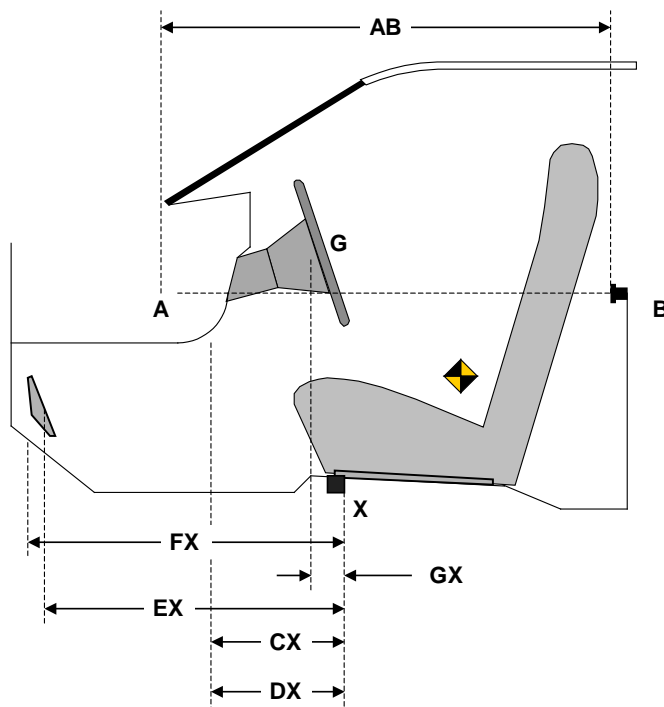
Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	770	770	0
CX	Left Knee Bolster to X	mm	279	289	-10
DX	Right Knee Bolster to X	mm	228	240	-12
EX	Brake Pedal to X	mm	524	498	26
FX	Foot Rest to X	mm	535	521	14
GX	Center of Steering Column Wheel Hub to X	mm	39	91	-52

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

DATA SHEET NO. 15
SUMMARY OF FMVSS 212, FMVSS 219 (PARTIAL) DATA, AND 301 DATA

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

Windshield Mounting Details:

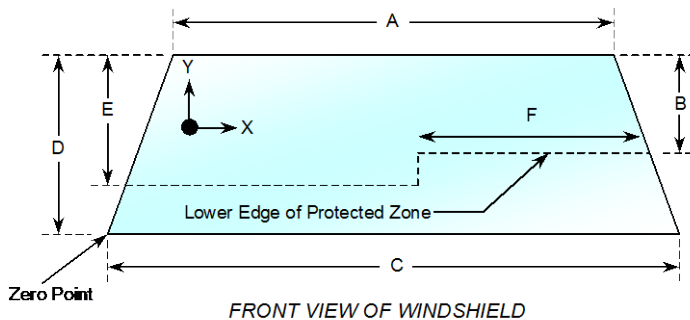
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.6° C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2230	2230	100.0
Right Side	2230	2230	100.0
Total	4460	4460	100.0



Item	Units	Value
A	mm	1212
B	mm	572
C	mm	1500
D	mm	874
E	mm	586
F	mm	590

AREA OF PROTECTED ZONE FAILURES - NONE

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. 15 (CONTINUED)
SUMMARY OF FMVSS 212, FMVSS 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
Test Date: 5/26/2016

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.6°C Test Time: 9:27 a.m.

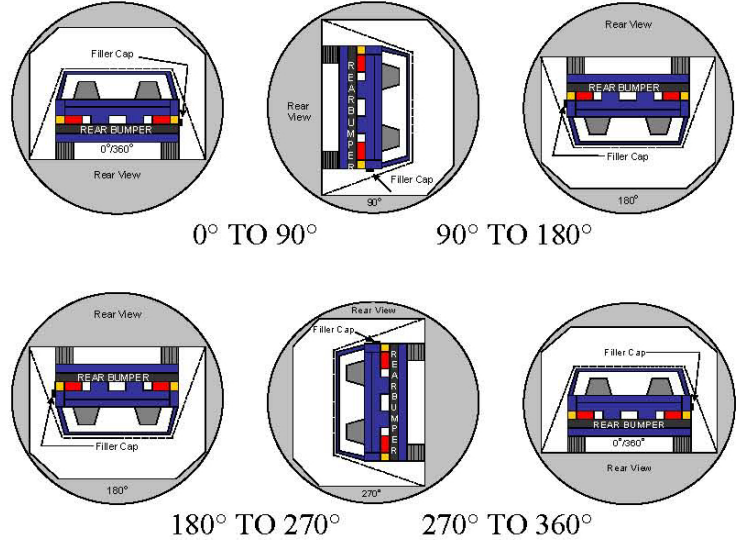
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: None

**DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016

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°	115	300	415
90° to 180°	115	300	415
180° to 270°	112	300	412
270° to 360°	113	300	413

FMVSS 301 SPILLAGE TABLE (units in ounces)

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

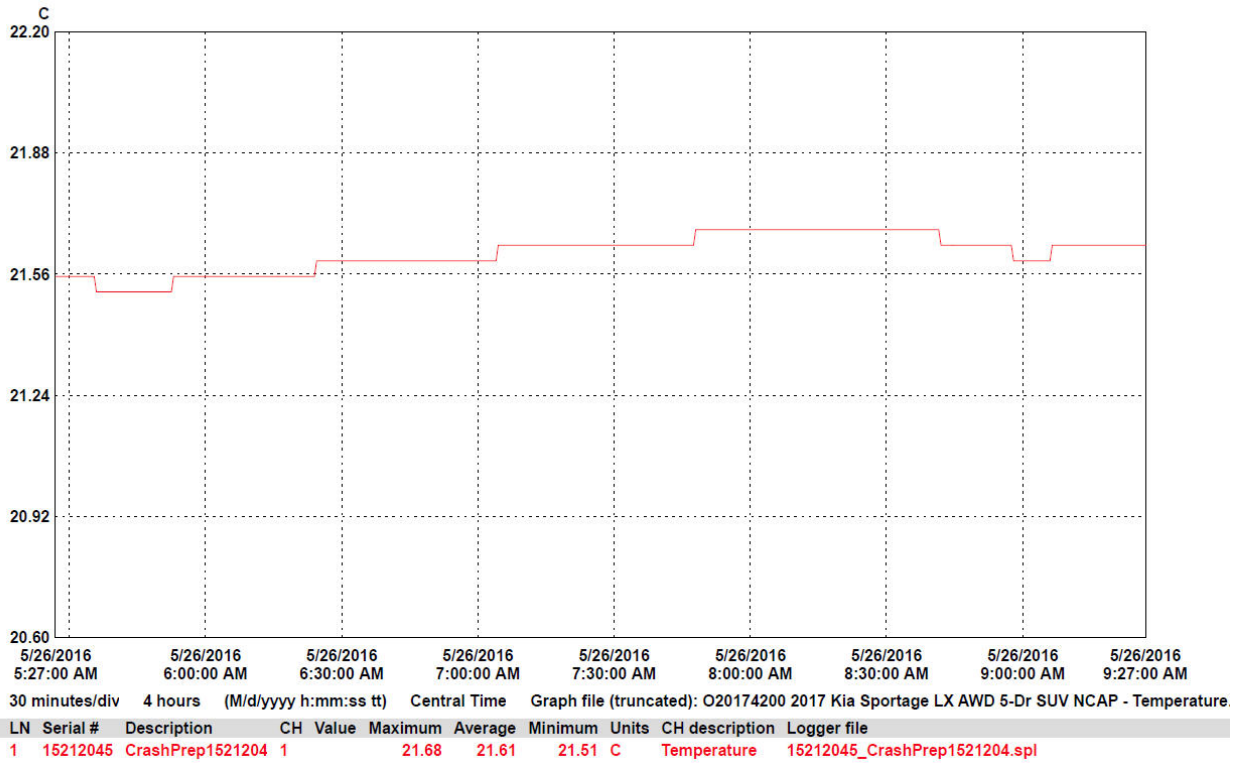
SOLVENT SPILLAGE LOCATION TABLE

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: 2017 Kia Sportage LX AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20174200
 Test Date: 5/26/2016



**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	Load Cell Location	A-1
Photo No. 002	Pre-Test Load Cell Wall	A-1
Photo No. 003	Post-Test Load Cell Wall	A-2
Photo No. 004	Manufacturer's Label	A-2
Photo No. 005	Tire Placard	A-3
Photo No. 006	2017 Kia Sportage LX AWD Frontal As Delivered	A-3
Photo No. 007	Left Rear 3-4 View, As Received	A-4
Photo No. 008	Pre-Test Front View of Test Vehicle	A-4
Photo No. 009	Post-Test Front View of Test Vehicle	A-5
Photo No. 010	Pre-Test Left View of Test Vehicle	A-5
Photo No. 011	Post-Test Left View of Test Vehicle	A-6
Photo No. 012	Pre-Test Right View of Test Vehicle	A-6
Photo No. 013	Post-Test Right View of Test Vehicle	A-7
Photo No. 014	Pre-Test Right Front 3-4 View	A-7
Photo No. 015	Post-Test Right Front 3-4 View	A-8
Photo No. 016	Pre-Test Left Rear 3-4 View	A-8
Photo No. 017	Post-Test Left Rear 3-4 View	A-9
Photo No. 018	Pre-Test Windshield View	A-9
Photo No. 019	Post-Test Windshield View	A-10
Photo No. 020	Pre-Test Engine Compartment View	A-10
Photo No. 021	Post-Test Engine Compartment View	A-11
Photo No. 022	Pre-Test Fuel Filler Cap View	A-11
Photo No. 023	Post-Test Fuel Filler Cap View	A-12
Photo No. 024	Pre-Test Front Underbody View	A-12
Photo No. 025	Post-Test Front Underbody View	A-13
Photo No. 026	Pre-Test Rear Underbody View	A-13
Photo No. 027	Post-Test Rear Underbody View	A-14
Photo No. 028	Pre-Test Dummy Cable Routing	A-14
Photo No. 029	Post-Test Dummy Cable Routing	A-15
Photo No. 030	Pre-Test Driver Dummy Front View	A-15

		<u>Page No.</u>
Photo No. 031	Post-Test Driver Dummy Front View	A-16
Photo No. 032	Pre-Test Driver Dummy Window View	A-16
Photo No. 033	Post-Test Driver Dummy Window View	A-17
Photo No. 034	Pre-Test Driver Dummy and Vehicle Interior (Door Open)	A-17
Photo No. 035	Post-Test Driver Dummy and Vehicle Interior (Door Open)	A-18
Photo No. 036	Pre-Test Driver's Seat Fore-Aft Markings	A-18
Photo No. 037	Post-Test Driver's Seat Fore-Aft Markings	A-19
Photo No. 038	Pre-Test View of Belt Anchorage for Driver Dummy	A-19
Photo No. 039	Post-Test View of Belt Anchorage for Driver Dummy	A-20
Photo No. 040	Pre-Test Driver Dummy Feet	A-20
Photo No. 041	Post-Test Driver Dummy Feet	A-21
Photo No. 042	Pre-Test Driver's Side Knee Bolster (without dummy)	A-21
Photo No. 043	Post-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 044	Pre-Test Driver's Side Floorpan	A-22
Photo No. 045	Post-Test Driver's Side Floorpan	A-23
Photo No. 046	Post-Test Driver Dummy Face	A-23
Photo No. 047	Post-Test Driver Dummy Contact with Airbag	A-24
Photo No. 048	Post-Test Driver Dummy Contact with Headrest	A-24
Photo No. 049	Pre-Test View of the Steering Wheel	A-25
Photo No. 050	Post-Test View of the Steering Wheel	A-25
Photo No. 051	Pre-Test Passenger Dummy Front View	A-26
Photo No. 052	Post-Test Passenger Dummy Front View	A-26
Photo No. 053	Pre-Test Passenger Dummy Window View	A-27
Photo No. 054	Post-Test Passenger Dummy Window View	A-27
Photo No. 055	Pre-Test Passenger Dummy and Vehicle Interior (Door Open)	A-28
Photo No. 056	Post-Test Passenger Dummy and Vehicle Interior (Door Open)	A-28
Photo No. 057	Pre-Test Passenger's Seat Fore-Aft Markings	A-29
Photo No. 058	Post-Test Passenger's Seat Fore-Aft Markings	A-29
Photo No. 059	Pre-Test View of Belt Anchorage for Passenger Dummy	A-30
Photo No. 060	Post-Test View of Belt Anchorage for Passenger Dummy	A-30

		<u>Page No.</u>
Photo No. 061	Pre-Test Passenger Dummy Feet	A-31
Photo No. 062	Post-Test Passenger Dummy Feet	A-31
Photo No. 063	Pre-Test Passenger's Side Knee Bolster (without dummy)	A-32
Photo No. 064	Post-Test Passenger's Side Knee Bolster (without dummy)	A-32
Photo No. 065	Pre-Test Passenger's Side Floorpan	A-33
Photo No. 066	Post-Test Passenger's Side Floorpan	A-33
Photo No. 067	Post-Test Passenger Dummy Face	A-34
Photo No. 068	Post-Test Passenger Dummy Contact with Airbag	A-34
Photo No. 069	Post-Test Passenger Dummy Contact with Headrest	A-35
Photo No. 070	Ballast Installed in Vehicle	A-35
Photo No. 071	Post-Test Stoddard Solvent Spillage Location View	A-36
Photo No. 072	Post-Test Speed Trap Read-Out	A-36
Photo No. 073	Vehicle at 0 Degree on Static Rollover Device	A-37
Photo No. 074	Vehicle at 90 Degrees on Static Rollover Device	A-37
Photo No. 075	Vehicle at 180 Degrees on Static Rollover Device	A-38
Photo No. 076	Vehicle at 270 Degrees on Static Rollover Device	A-38
Photo No. 077	Vehicle at 360 Degrees on Static Rollover Device	A-39
Photo No. 078	2017 Kia Sportage LX AWD Frontal Impact Event	A-39
Photo No. 079	Monroney Label Photograph	A-40

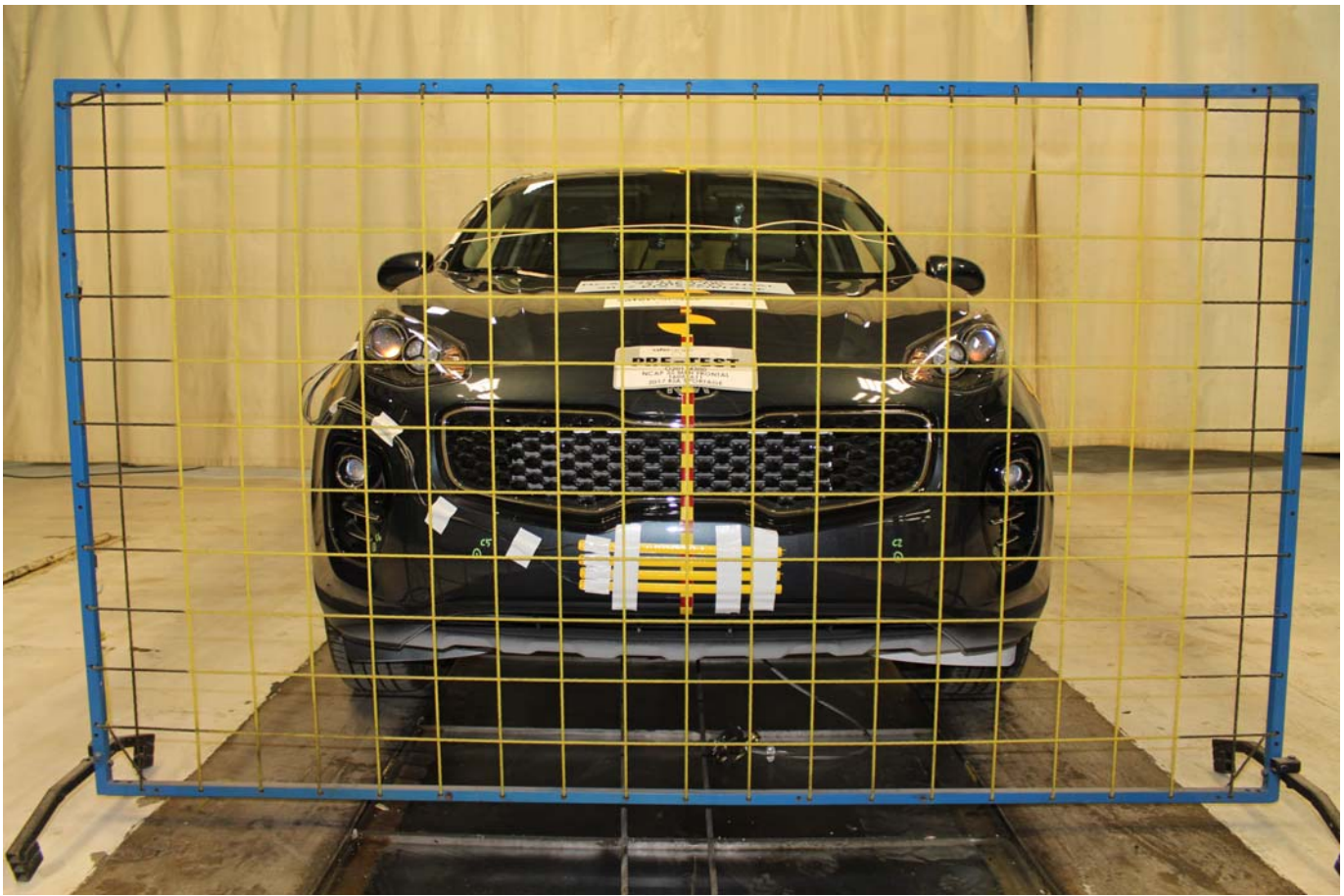


Photo No. 001 - Load Cell Location



Photo No. 002 - Pre-Test Load Cell Wall



Photo No. 003 - Post-Test Load Cell Wall



Photo No. 004 - Manufacturer's Label



Photo No. 005 - Tire Placard



Photo No. 006 - 2017 Kia Sportage LX AWD Frontal As Delivered



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



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

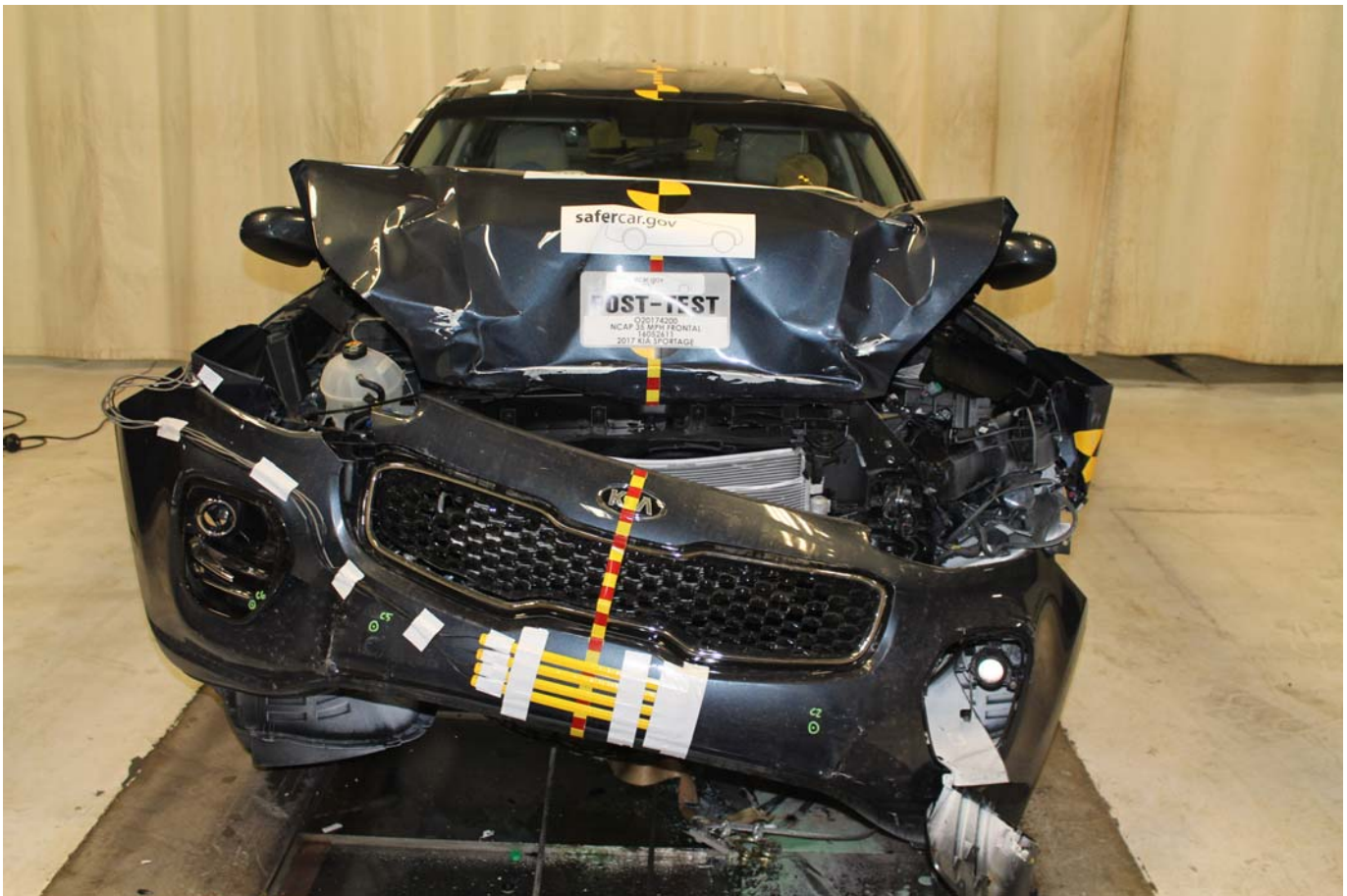


Photo No. 009 - Post-Test Front View of Test Vehicle



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

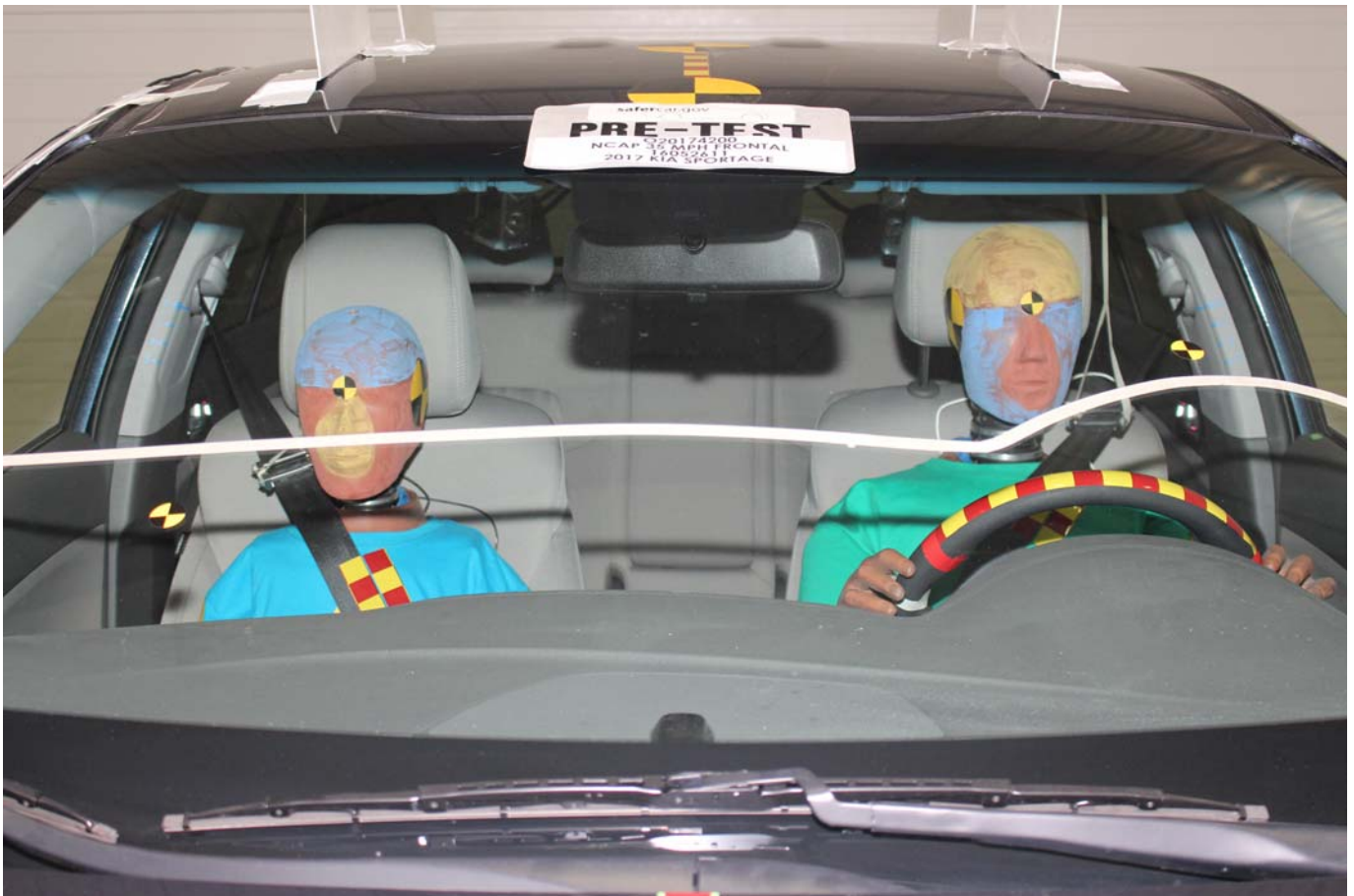


Photo No. 018 - Pre-Test Windshield View



Photo No. 019 - Post-Test Windshield View

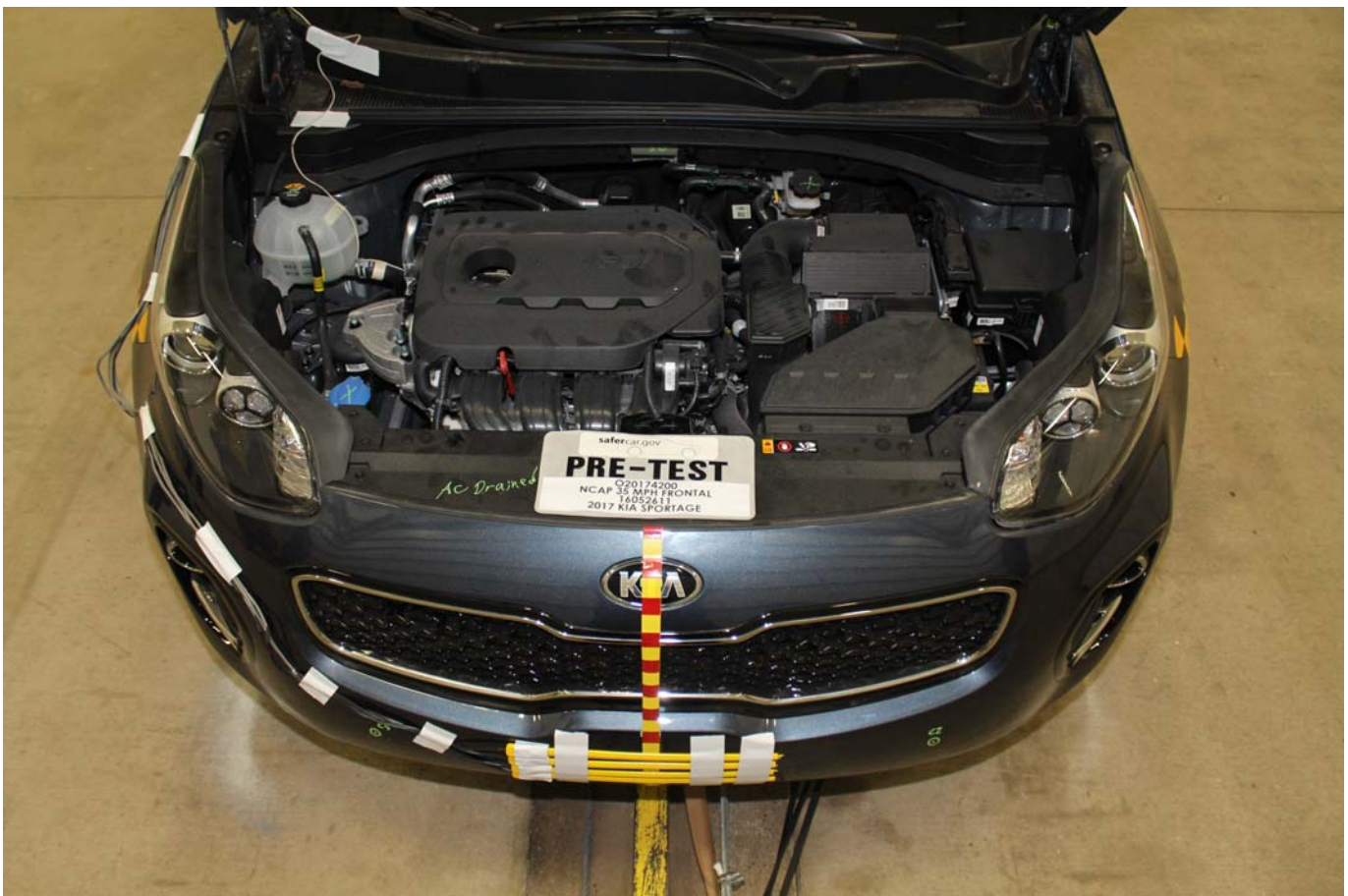


Photo No. 020 - Pre-Test Engine Compartment View

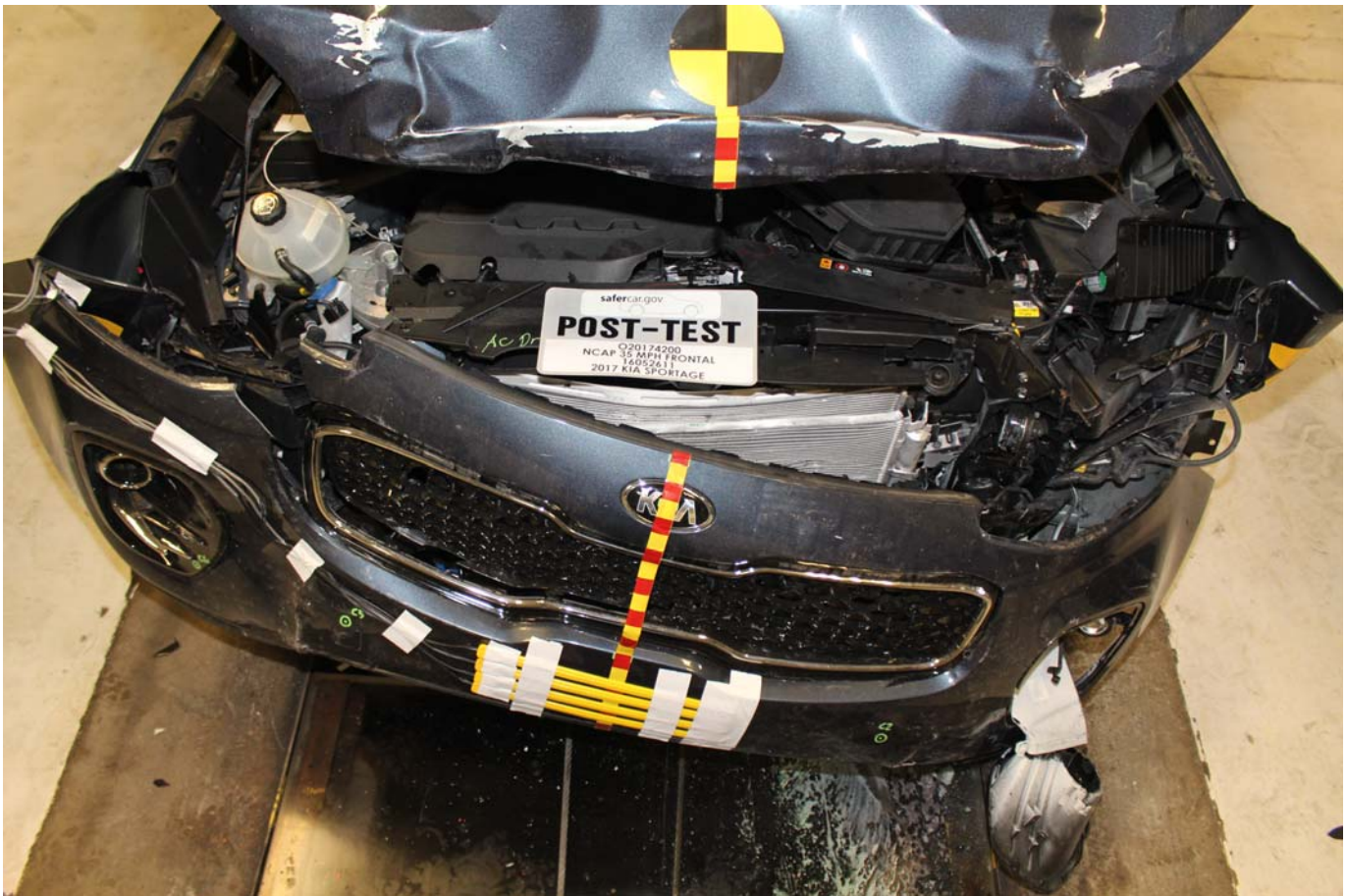


Photo No. 021 - Post-Test Engine Compartment View



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



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

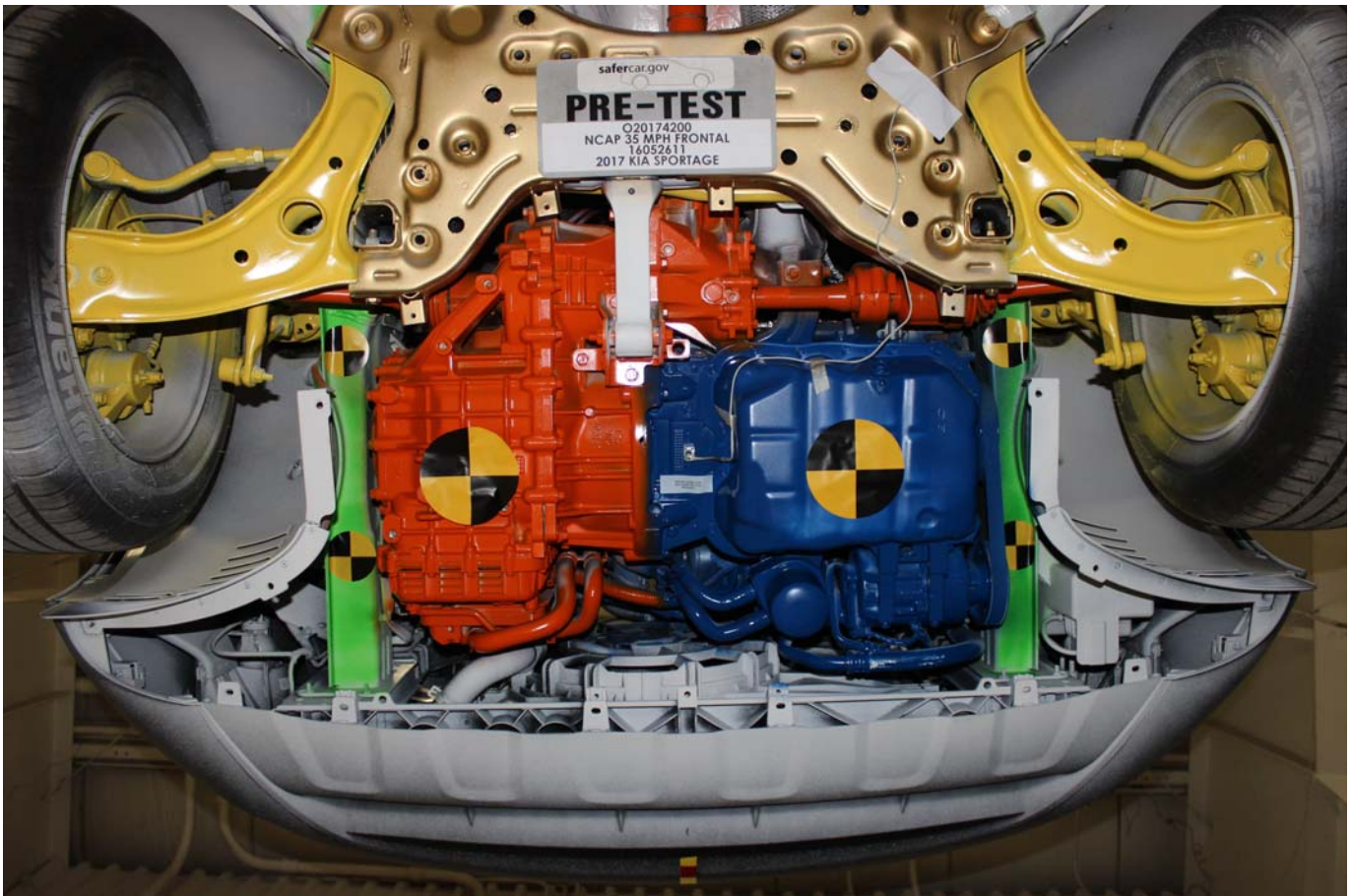


Photo No. 024 - Pre-Test Front Underbody View

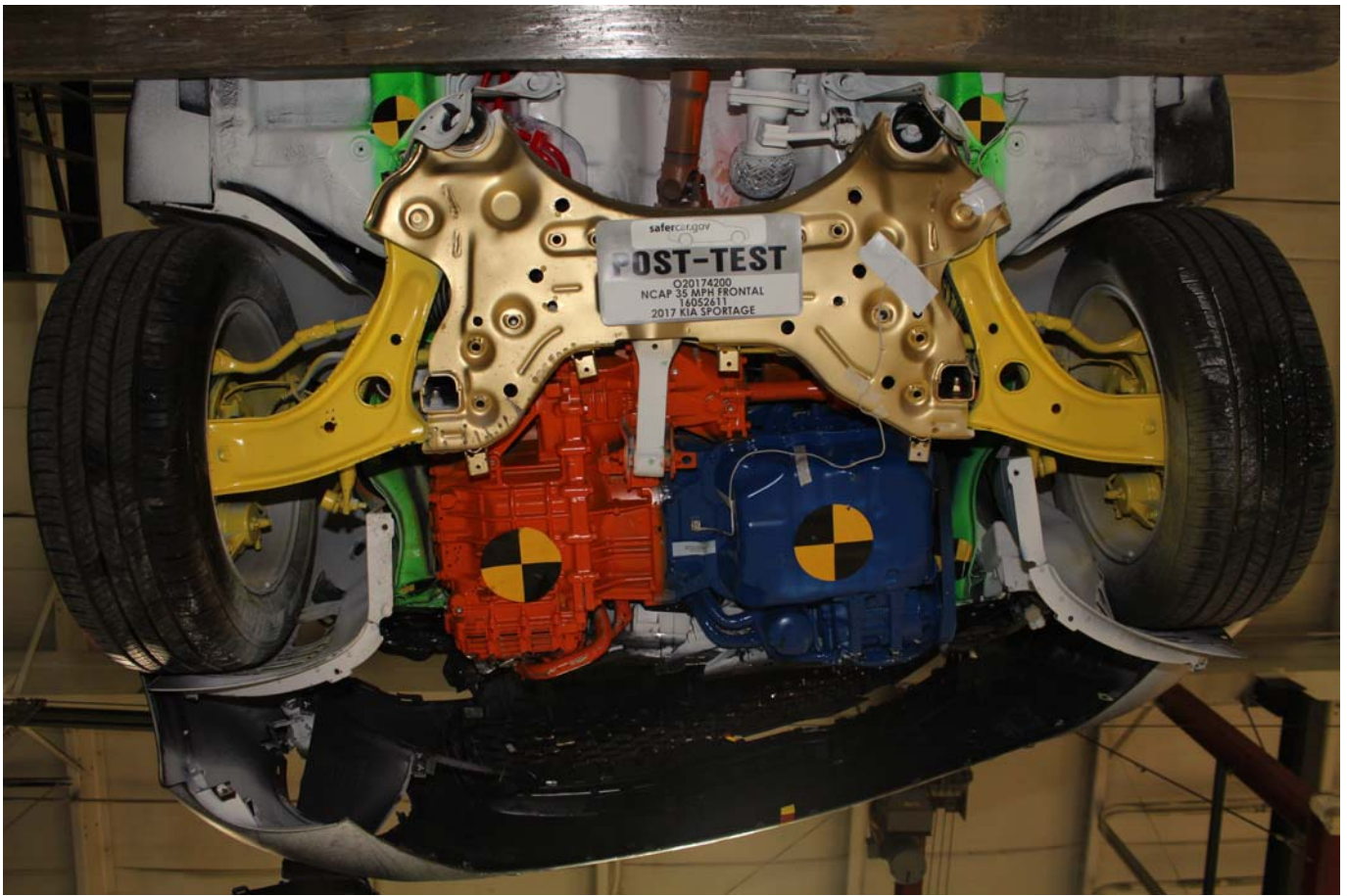


Photo No. 025 - Post-Test Front Underbody View

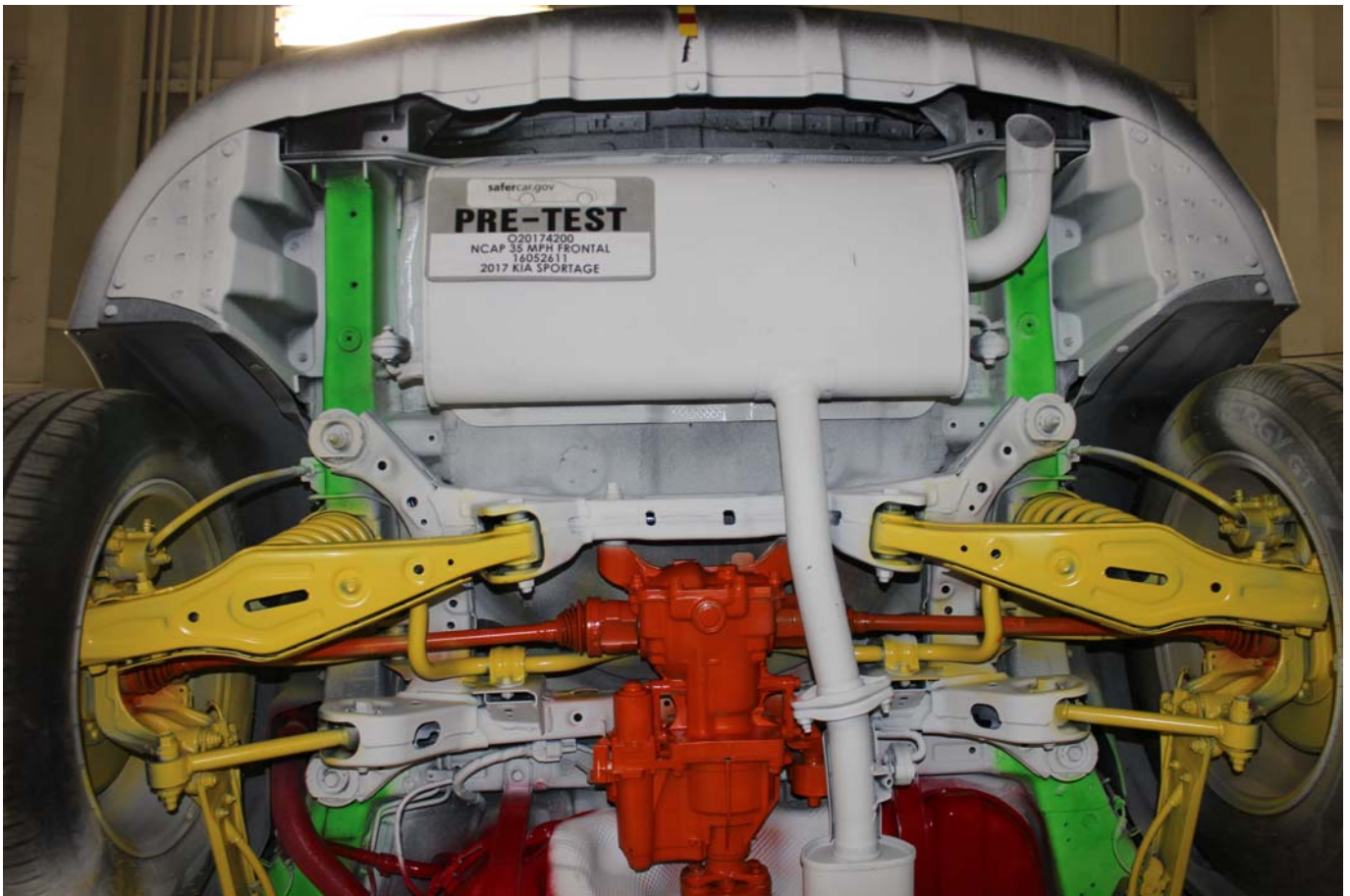


Photo No. 026 - Pre-Test Rear Underbody View

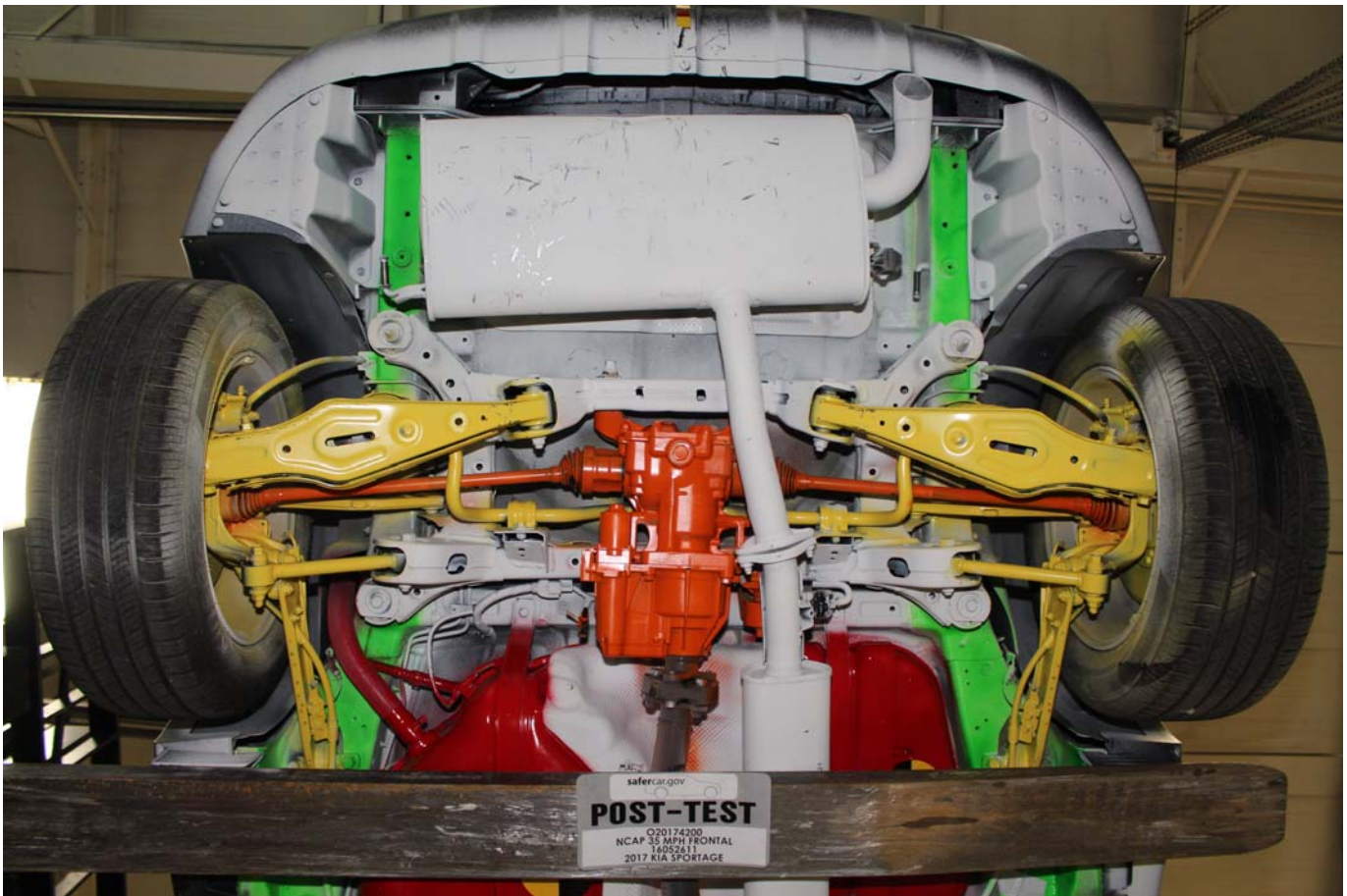


Photo No. 027 - Post-Test Rear Underbody View



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

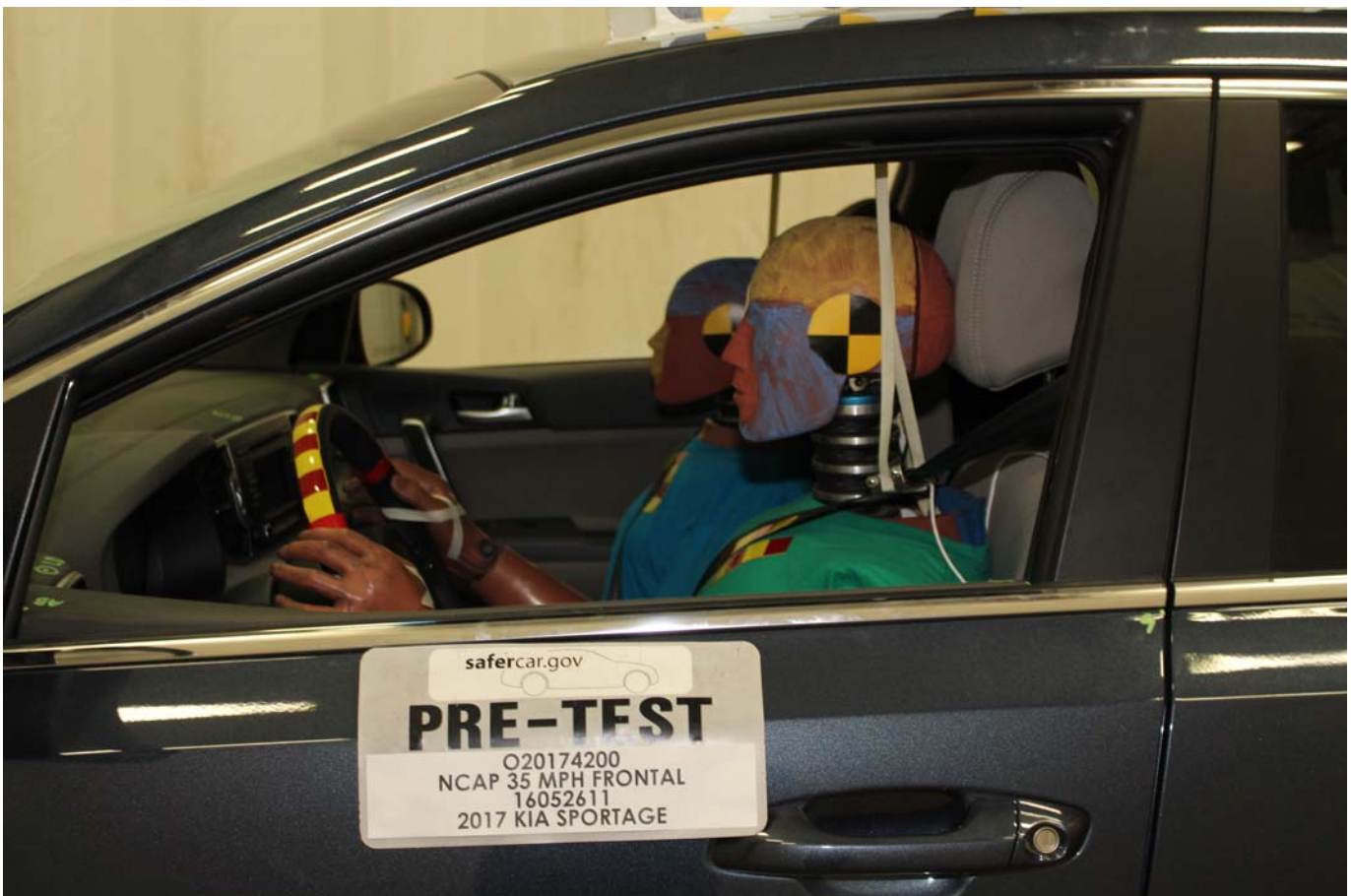


Photo No. 032 - Pre-Test Driver Dummy Window View



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



Photo No. 034 - Pre-Test Driver Dummy and Vehicle Interior (Door Open)



Photo No. 035 - Post-Test Driver Dummy and Vehicle Interior (Door Open)



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 Driver Dummy Feet



Photo No. 041 - Post-Test Driver Dummy Feet



Photo No. 042 - Pre-Test Driver's Side Knee Bolster (without dummy)



Photo No. 043 - Post-Test Driver's Side Knee Bolster (without dummy)



Photo No. 044 - Pre-Test Driver's Side Floorpan



Photo No. 045 - Post-Test Driver's Side Floorpan



Photo No. 046 - Post-Test Driver Dummy Face



Photo No. 047 - Post-Test Driver Dummy Contact with Airbag



Photo No. 048 - Post-Test Driver Dummy Contact with Headrest



Photo No. 049 - Pre-Test View of the Steering Wheel



Photo No. 050 - Post-Test View of the Steering Wheel



Photo No. 051 - Pre-Test Passenger Dummy Front View



Photo No. 052 - Post-Test Passenger Dummy Front View



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

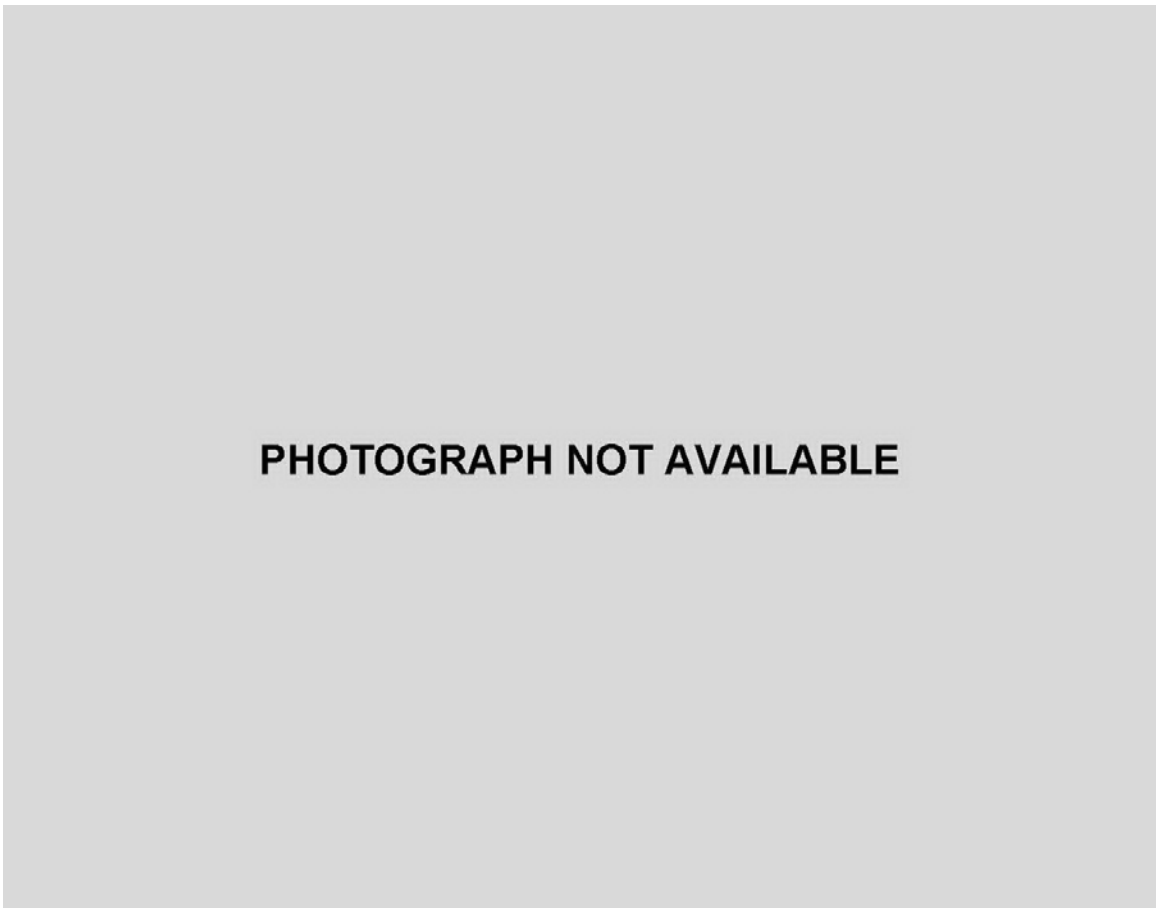


Photo No. 054 - Post-Test Passenger Dummy Window View



Photo No. 055 - Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



Photo No. 056 - Post-Test Passenger Dummy and Vehicle Interior (Door Open)



Photo No. 057 - Pre-Test Passenger's Seat Fore-Aft Markings



Photo No. 058 - Post-Test Passenger's Seat Fore-Aft Markings



Photo No. 059 - Pre-Test View of Belt Anchorage for Passenger Dummy



Photo No. 060 - Post-Test View of Belt Anchorage for Passenger Dummy

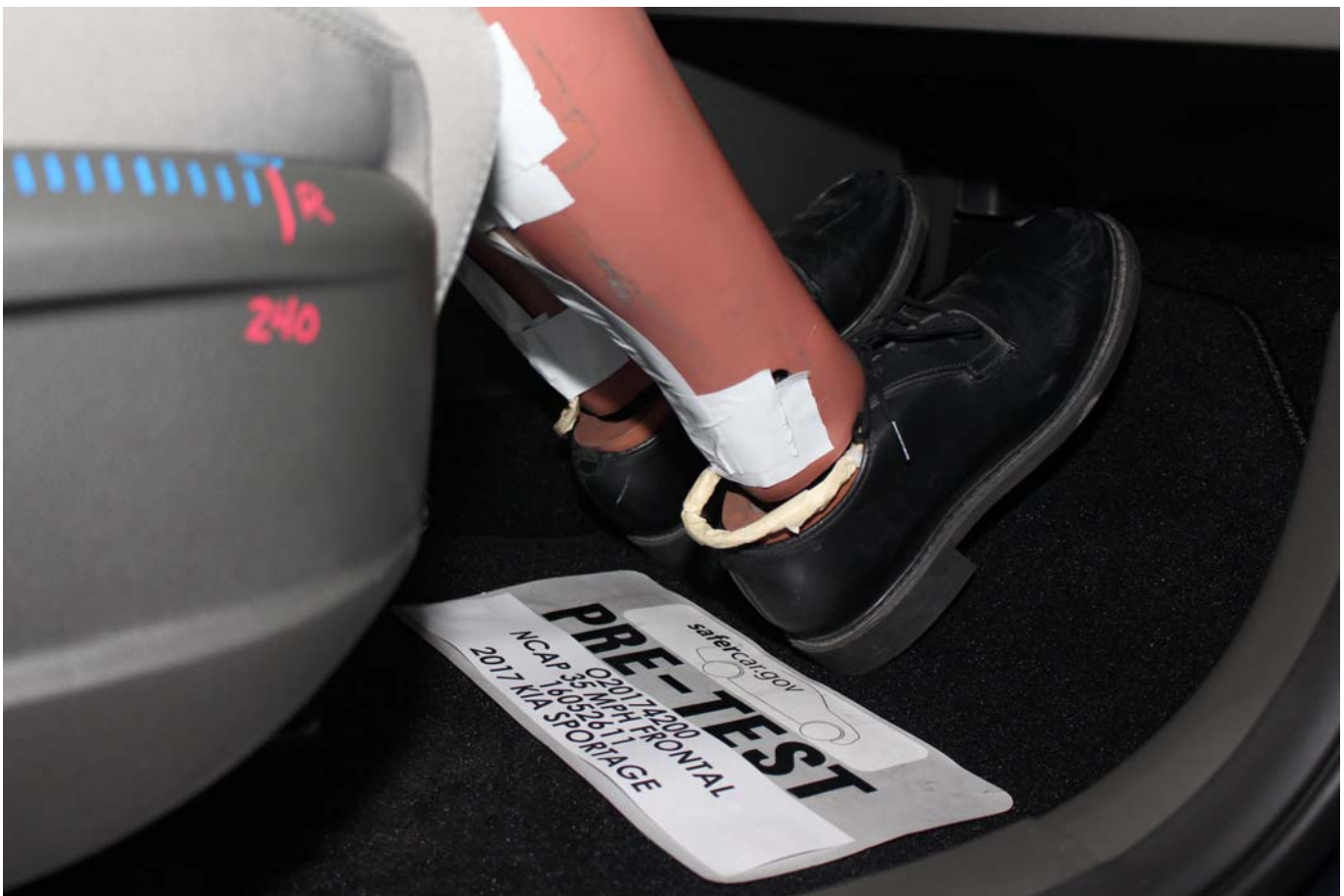


Photo No. 061 - Pre-Test Passenger Dummy Feet



Photo No. 062 - Post-Test Passenger Dummy Feet



Photo No. 063 - Pre-Test Passenger's Side Knee Bolster (without dummy)



Photo No. 064 - Post-Test Passenger's Side Knee Bolster (without dummy)



Photo No. 065 - Pre-Test Passenger's Side Floorpan



Photo No. 066 - Post-Test Passenger's Side Floorpan



Photo No. 067 - Post-Test Passenger Dummy Face



Photo No. 068 - Post-Test Passenger Dummy Contact with Airbag



Photo No. 069 - Post-Test Passenger Dummy Contact with Headrest

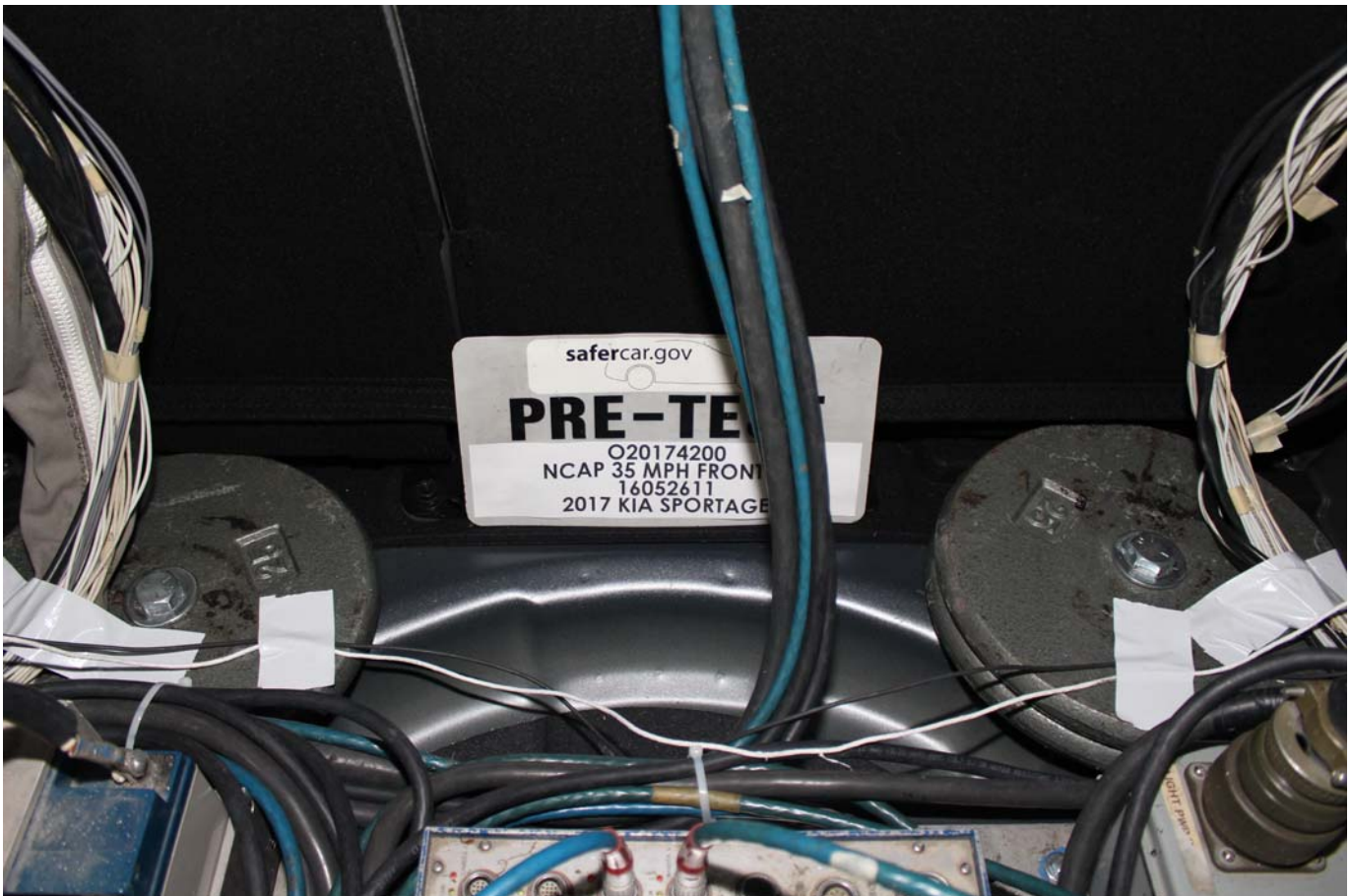


Photo No. 070 - Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Photo No. 071 - Post-Test Stoddard Solvent Spillage Location View



Photo No. 072 - Post-Test Speed Trap Read-Out



Photo No. 073 - Vehicle at 0 Degree on Static Rollover Device



Photo No. 074 - Vehicle at 90 Degrees on Static Rollover Device



Photo No. 075 - Vehicle at 180 Degrees on Static Rollover Device



Photo No. 076 - Vehicle at 270 Degrees on Static Rollover Device



Photo No. 077 - Vehicle at 360 Degrees on Static Rollover Device

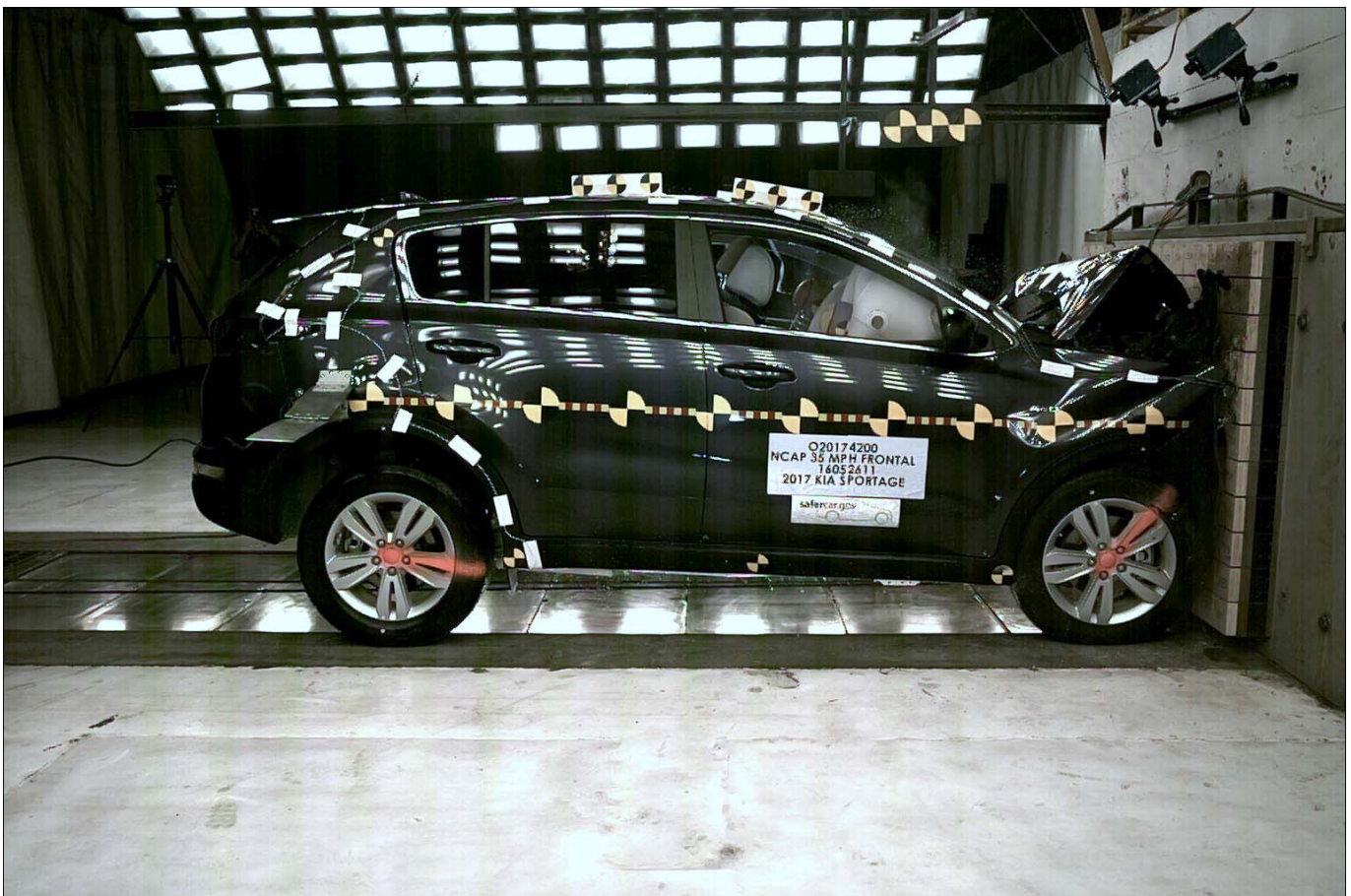


Photo No. 078 - 2017 Kia Sportage LX AWD Frontal Impact Event



2017 SPORTAGE LX AWD MODEL / OPT. CODE: 42422 / 010 EXTERIOR COLOR: PACIFIC BLUE INTERIOR COLOR: GRAY VEHICLE ID NUMBER: KNDPMCA5H7041644 PORT OF ENTRY: PHILADELPHIA		MAQURE KIA 370 ELMIRA ROAD ITHACA NY 14850		
STANDARD FEATURES MECHANICAL 2.4L Gas Direct Injection (GDI) 4-Cyl Engine 6-Speed Automatic Transmission All Wheel Drive w/ Locking Center Differential Drive Mode Select (DMS) 17" Alloy Wheels SAFETY Dual Front Advanced Airbags Front Seat Mounted Side Airbags Full-Length Side Curtain Airbags Anti-Lock Braking System (ABS) Traction Control System (TCS) Electronic Stability Control (ESC) Downhill Brake/Hill-start Assist Control (DBC/HAC) Tire Pressure Monitoring System (TPMS) INTERIOR, COMFORT & CONVENIENCE Air Conditioning w/ Rear Vents Power Windows, Door Locks & Outside Mirrors AM/FM/MP3 with 5" Touchscreen Display SIRIUSXM® Satellite Radio w/free 3-mo. subscription* Bluetooth (Phone and Streaming Audio) USB/Auxiliary Input Jacks 60/40 Split Folding and Reclining Rear Seats Remote Keyless Entry System Tilt & Telescopic Steering Column Steering Wheel Controls (Bluetooth/Audio/Cruise) 3.5" Mono TFT LCD Meter Cluster Rear Camera Display Rear Center Armrest with Cupholders Dual-Level Cargo Floor EXTERIOR Fog Lights Auto-On/Off Projection Headlights LED Daytime Running Lights Privacy Glass Rear Spoiler Compact Spare Tire WARRANTY 10 Year/100,000 Mile Limited Powertrain Warranty 5 Year/60,000 Mile Limited Basic Warranty 5 Year/60,000 Mile Roadside Assistance *Ask dealer for details		MANUFACTURER'S SUGGESTED RETAIL PRICE ▶ \$24,490.00 ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features) Cargo Mat \$95.00 Carpeted Floor Mats \$130.00		EPA DOT Fuel Economy and Environment Gasoline Vehicle Fuel Economy 22 MPG combined city/hwy 21 city 25 highway 4.5 gallons per 100 miles SMALL SUVs range from 18 to 33 MPG. The best vehicle rates 119 MPG. You spend \$1250 more in fuel costs over 5 years compared to the average new vehicle.
		Annual fuel Cost \$1650 Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only) 1 5 10 Best East (This vehicle emits 403 grams CO ₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.)		fuueleconomy.gov Calculate personalized estimates and compare vehicles.
		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.		PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 1% MAJOR SOURCES OF FOREIGN PARTS: KOREA: 96% NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY DISTRIBUTION, OR OTHER NON-PARTS COSTS. FOR THIS VEHICLE FINAL ASSEMBLY POINT: KORE COUNTRY OF ORIGIN ENGINE: KORE TRANSMISSION: KORE
TOTAL ADDITIONAL WEIGHT: 18.2		MSRP INCLUDING OPTIONS \$24,715.00 ISLAND FREIGHT AND HANDLING \$895.00 TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ▶ \$25,610.00		

Photo No. 079 - Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

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

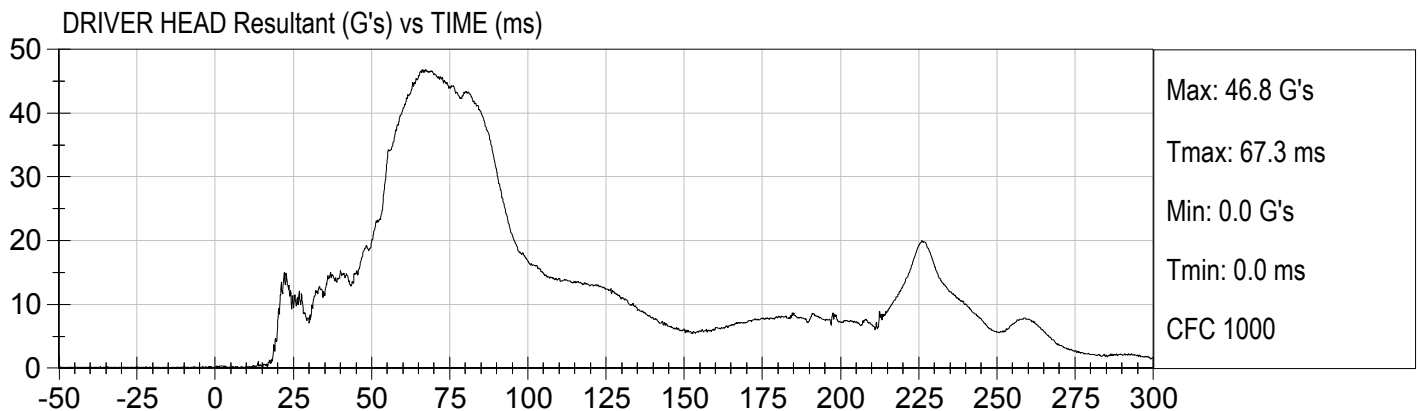
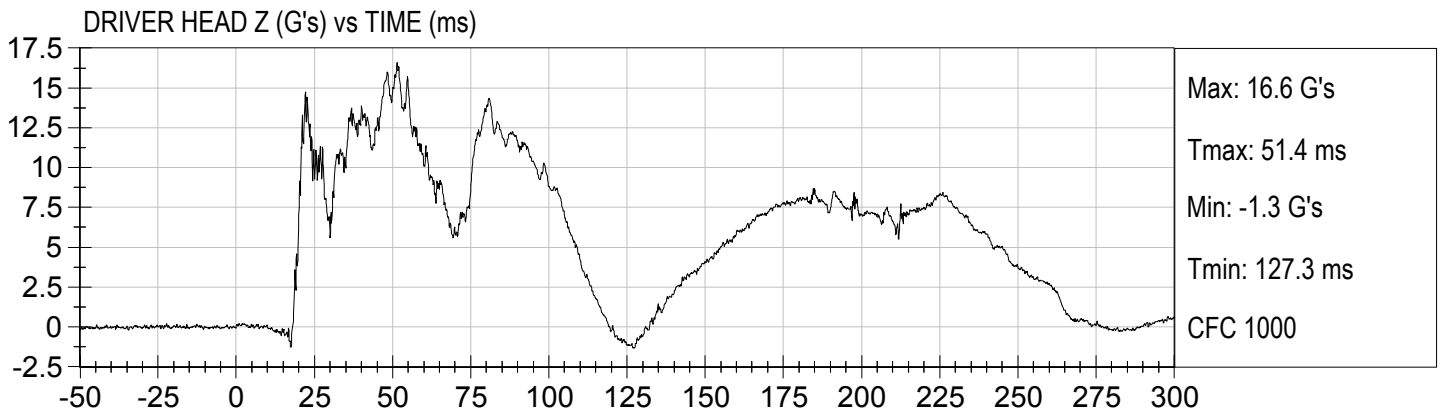
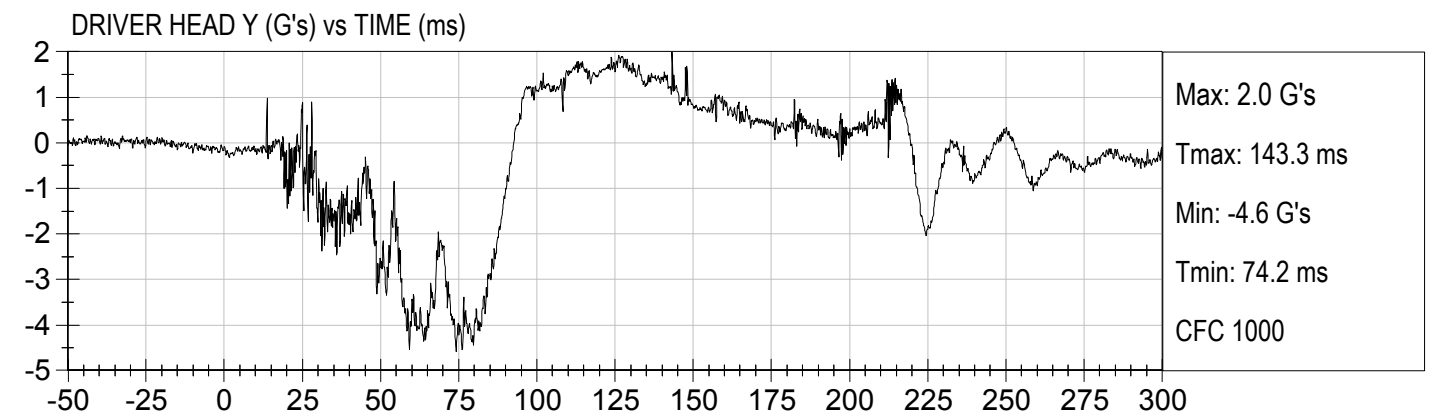
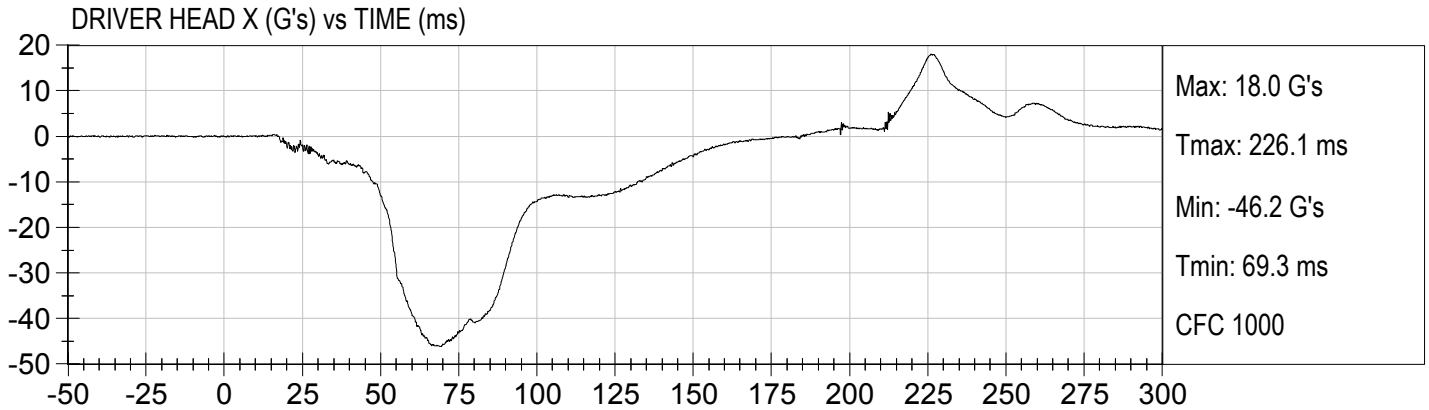
	<u>Page No.</u>
Figure No. 28. Passenger Neck Force X vs. Time	B-10
Figure No. 29. Passenger Neck Force Z vs. Time	B-10
Figure No. 30. Passenger Neck Moment Y vs. Time	B-10
Figure No. 31. Passenger Nij (NTF) vs. Time	B-11
Figure No. 32. Passenger Nij (NTE) vs. Time	B-11
Figure No. 33. Passenger Nij (NCF)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

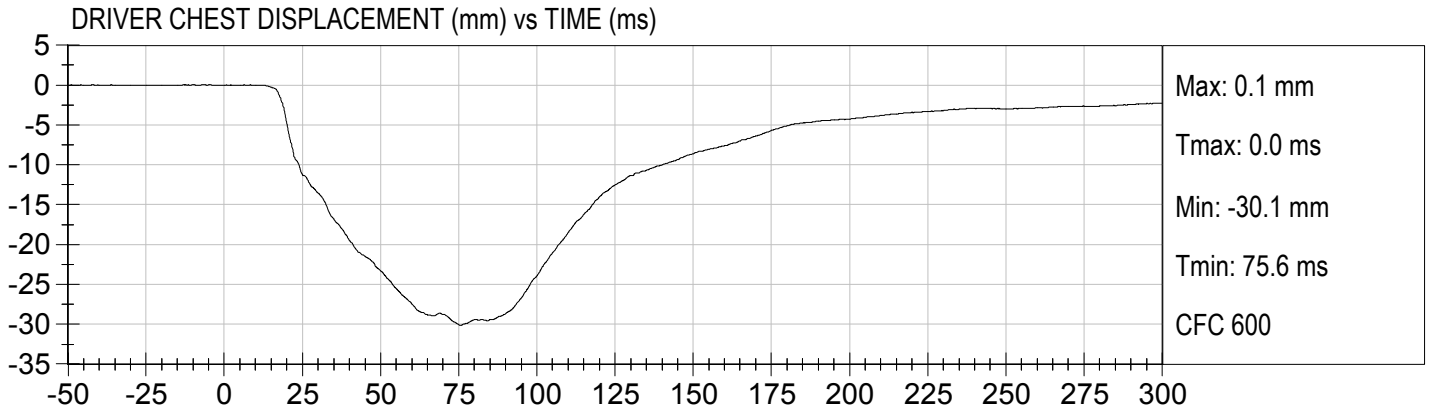
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

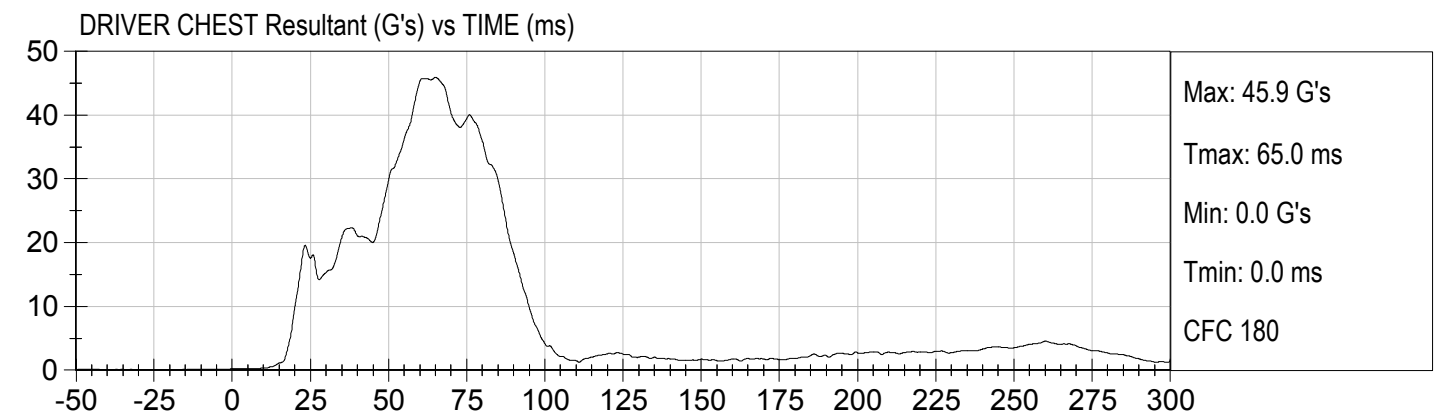
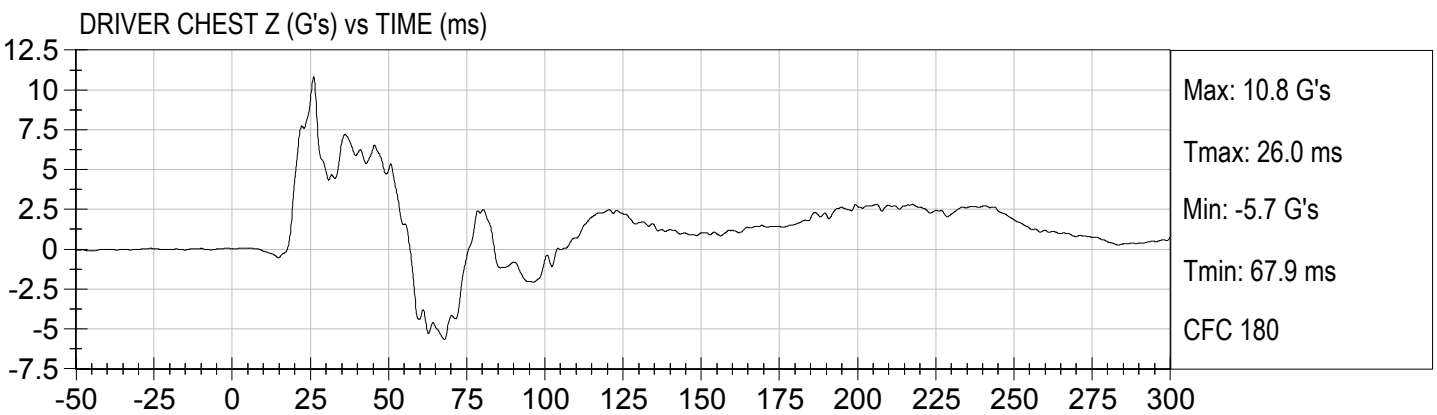
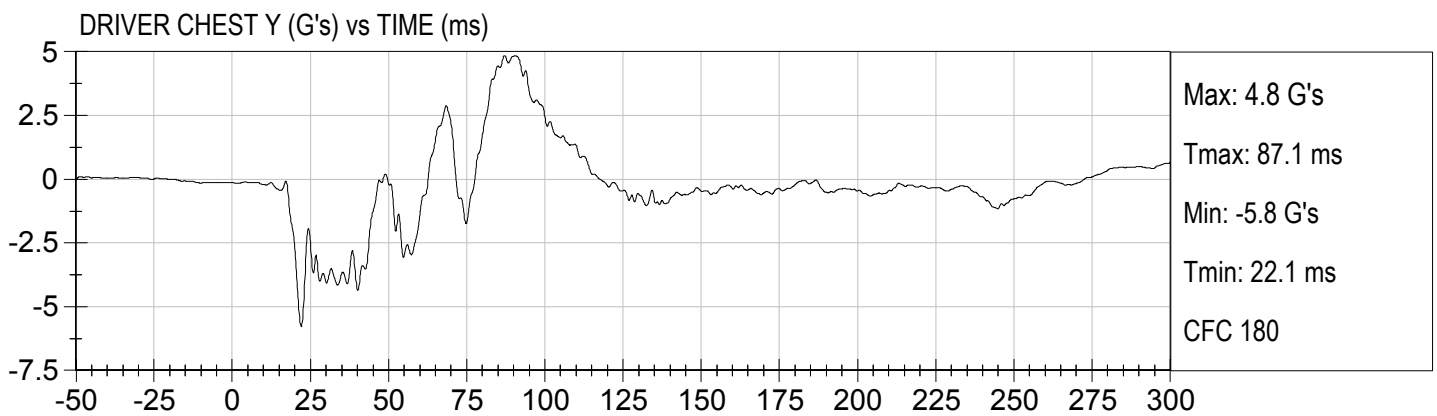
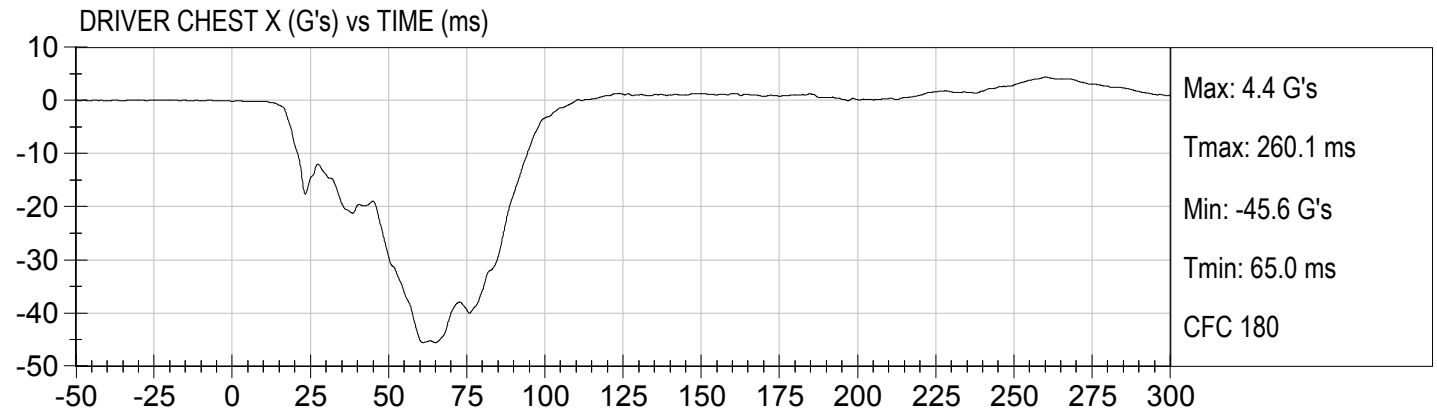
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 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver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

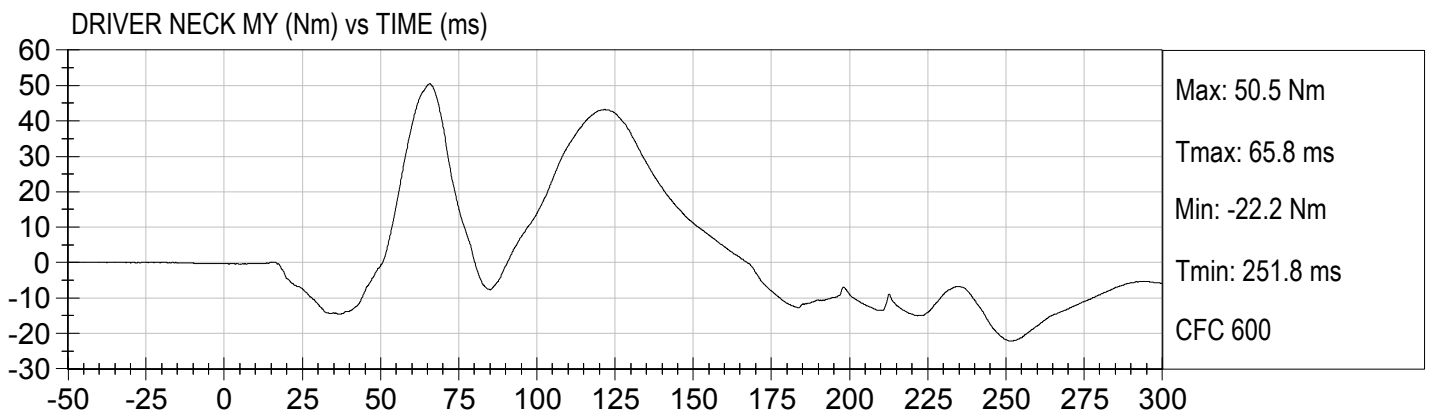
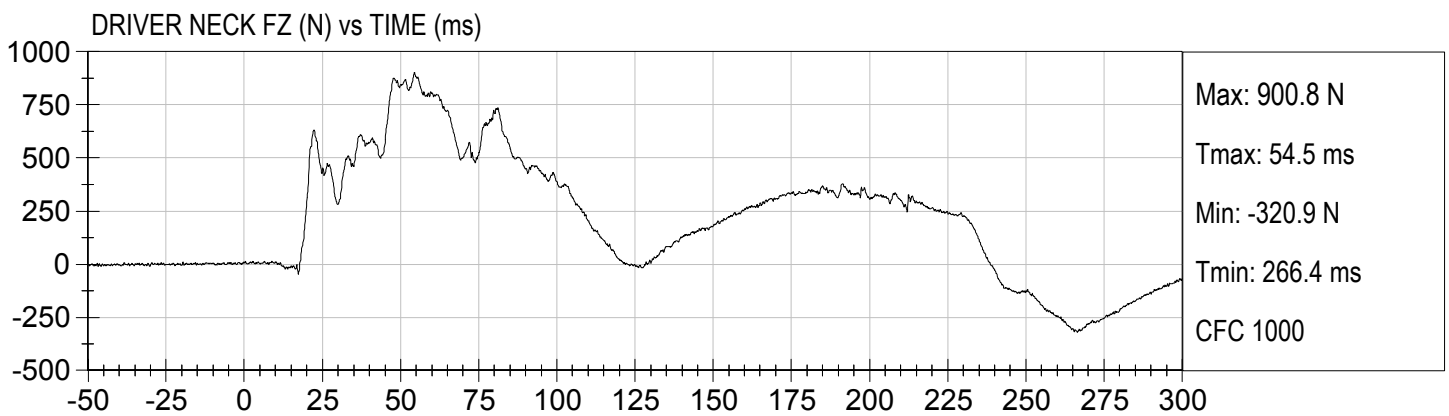
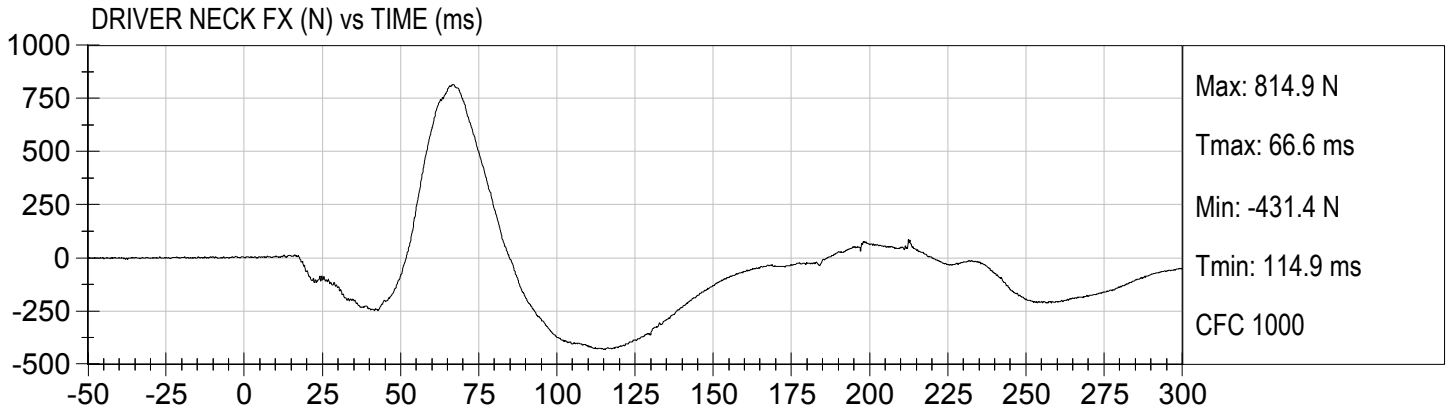
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Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver 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

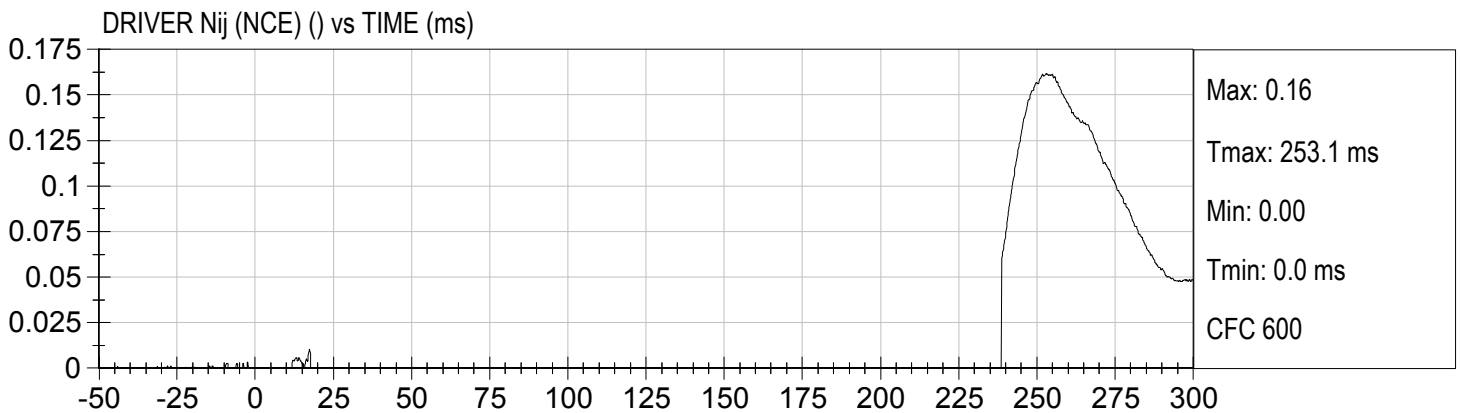
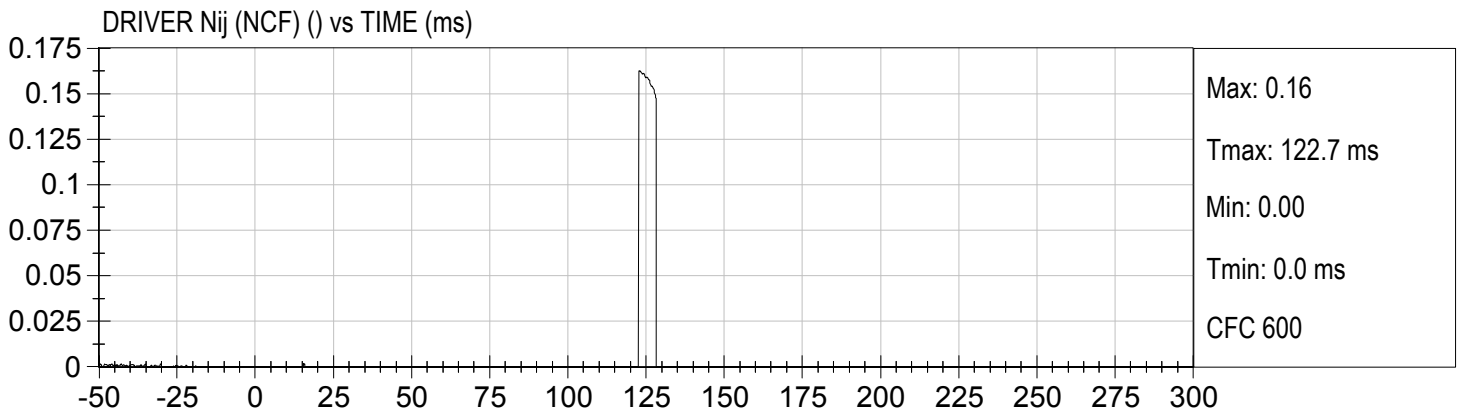
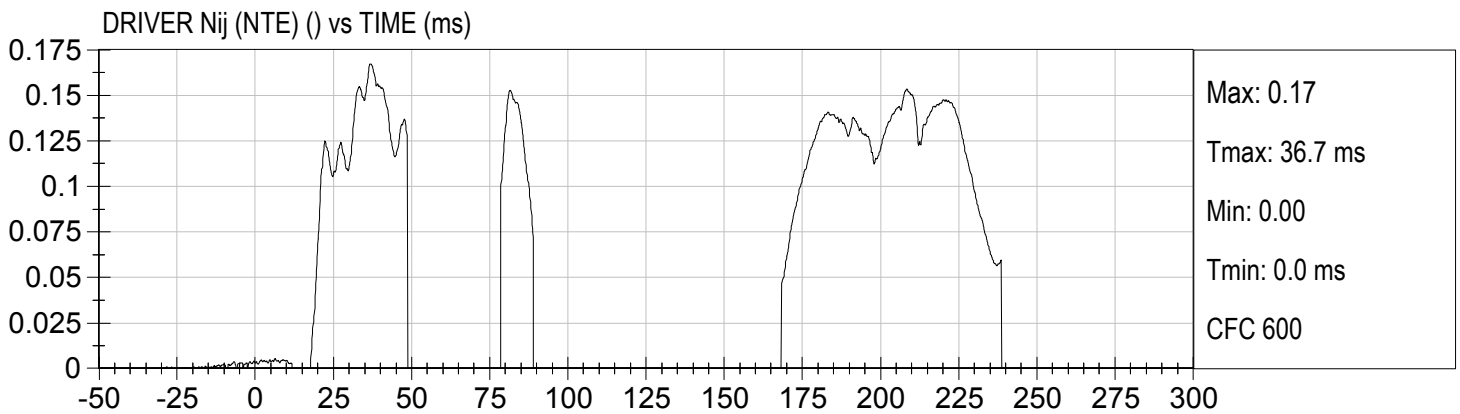
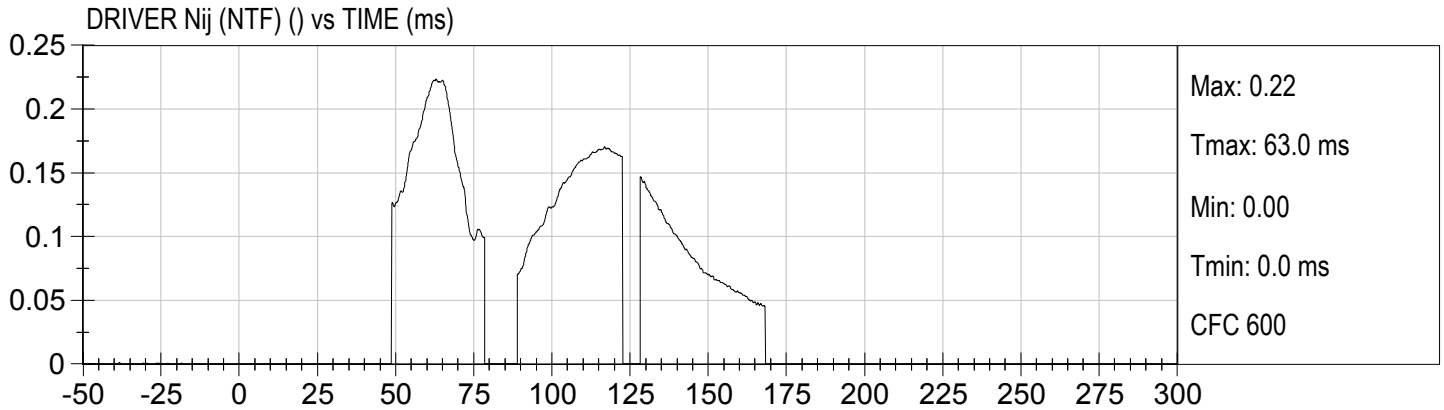
Passenger Pelvis Z
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Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
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Passenger Left Lower Tibia Moment Y
Passenger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

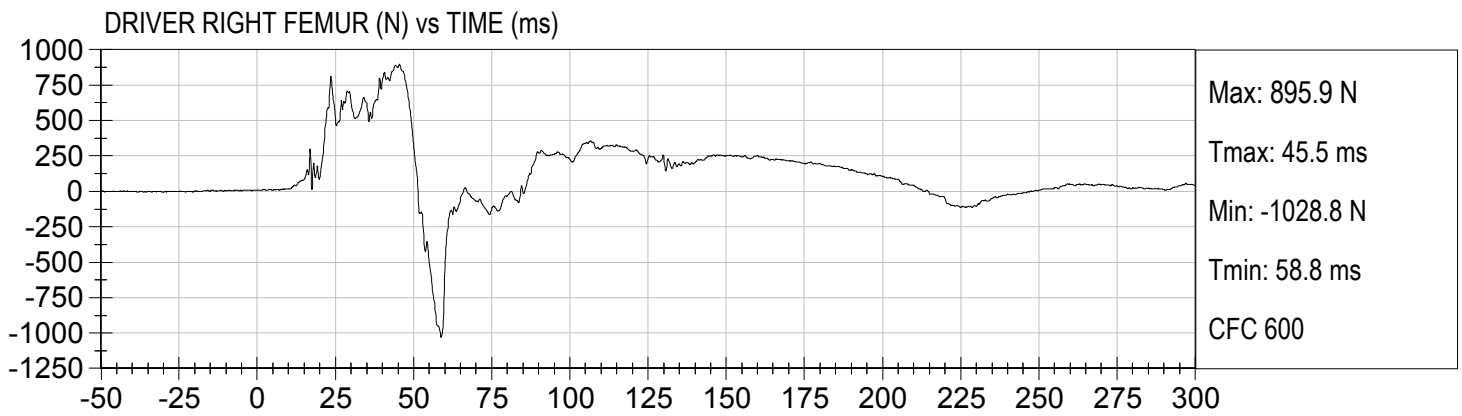
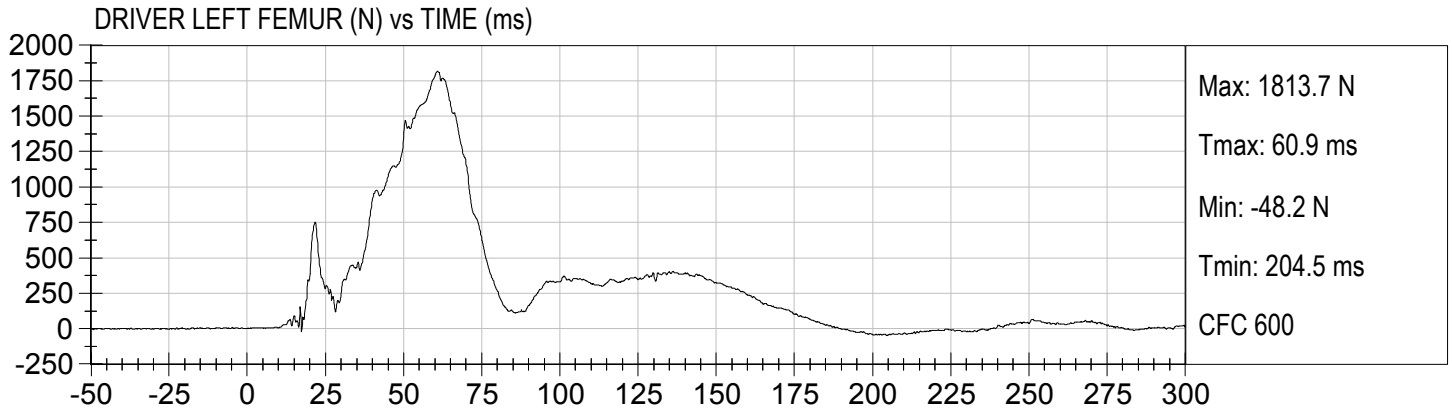


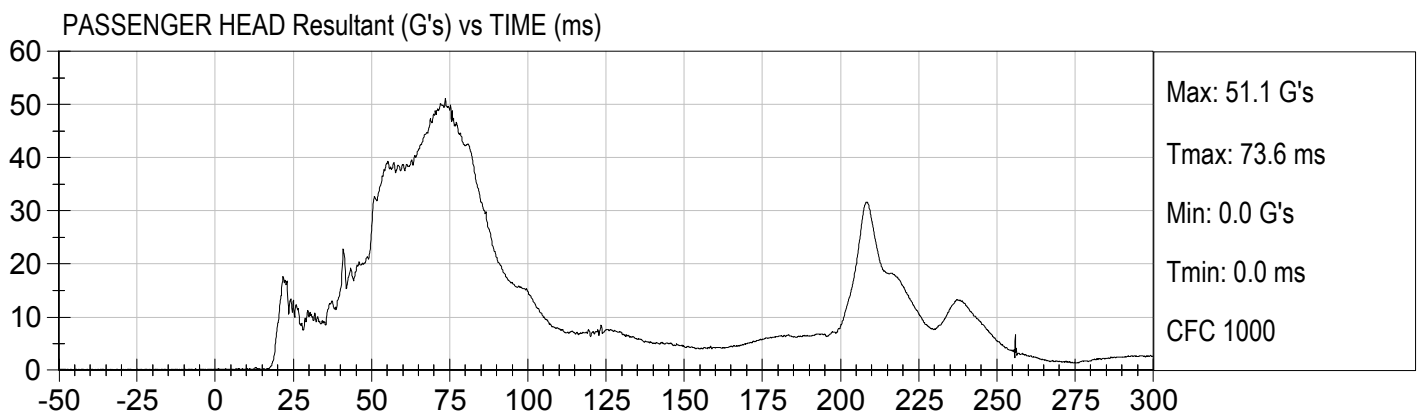
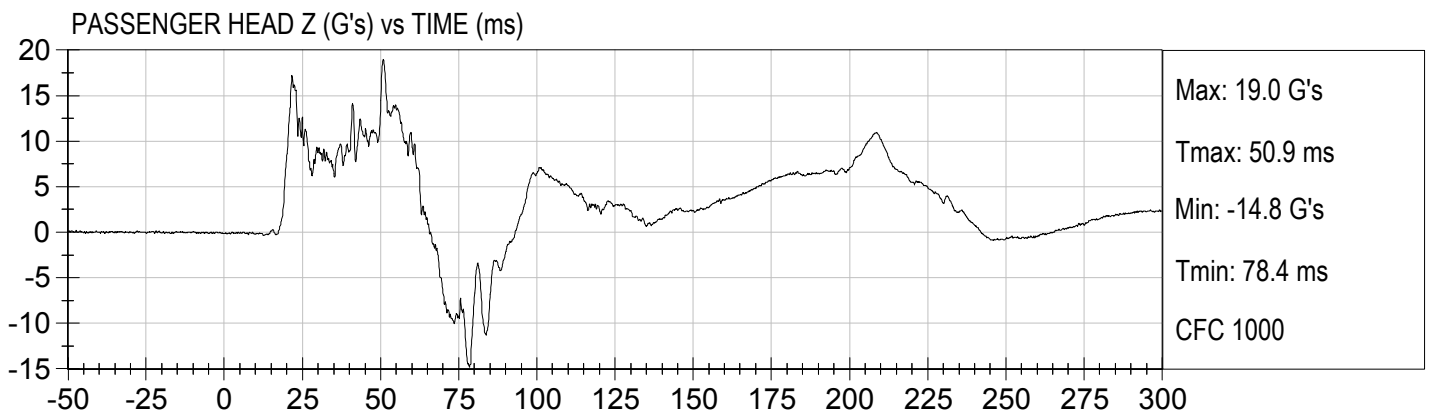
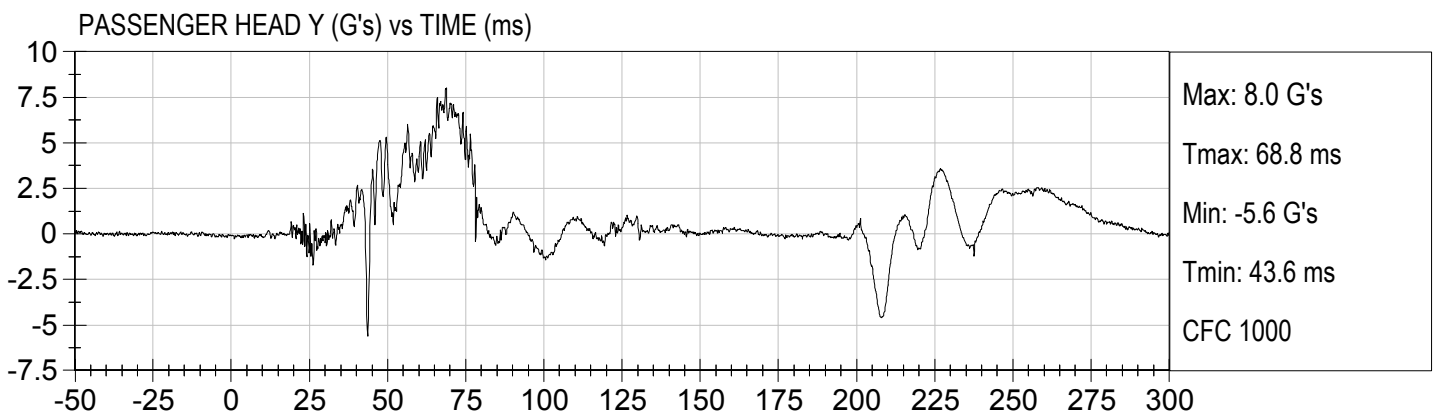
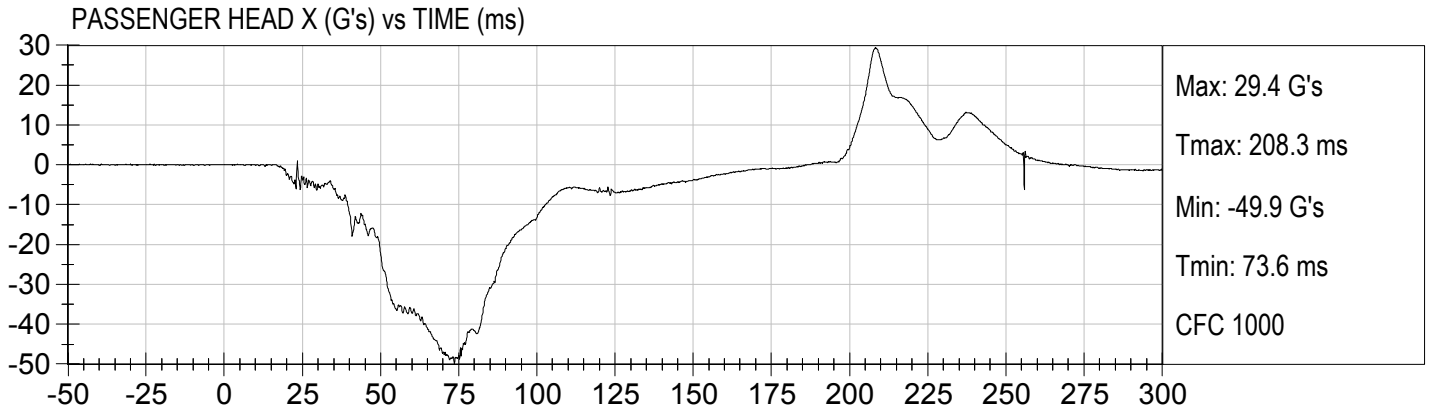


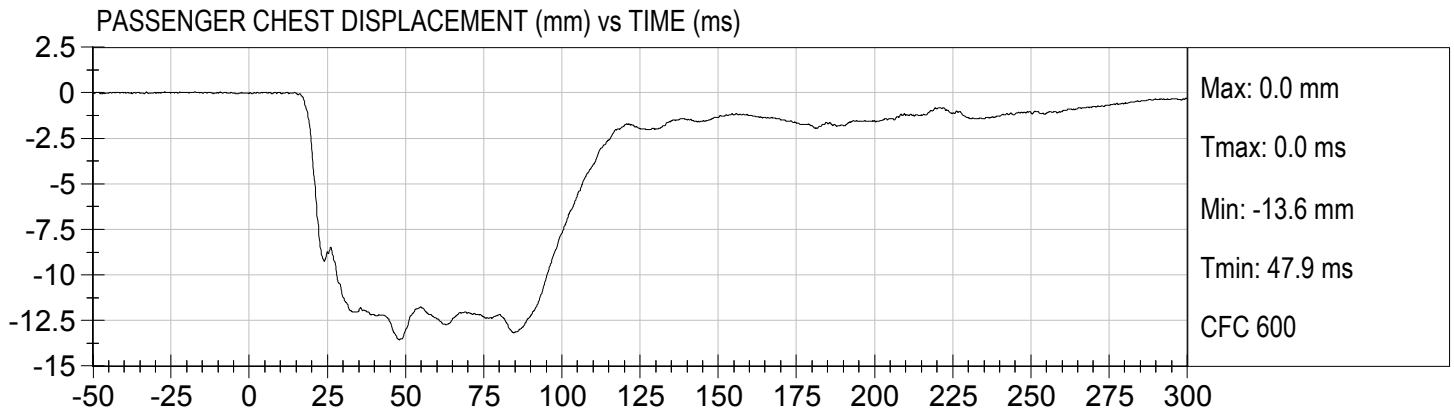


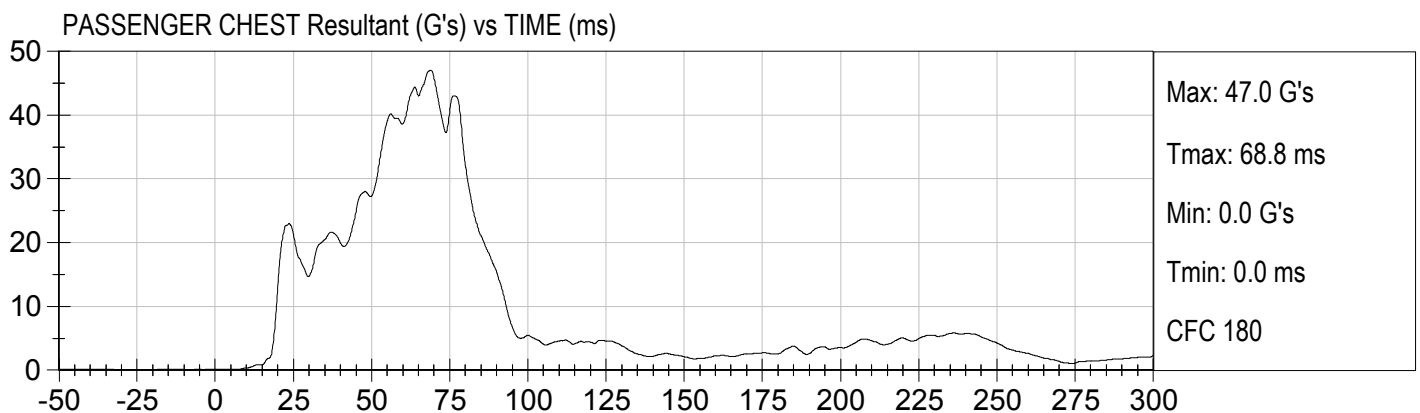
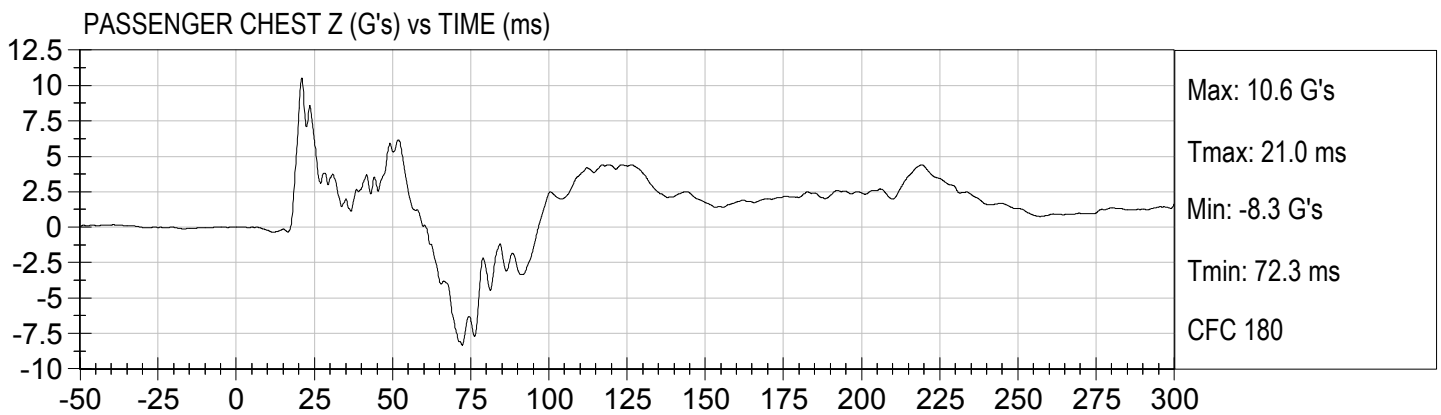
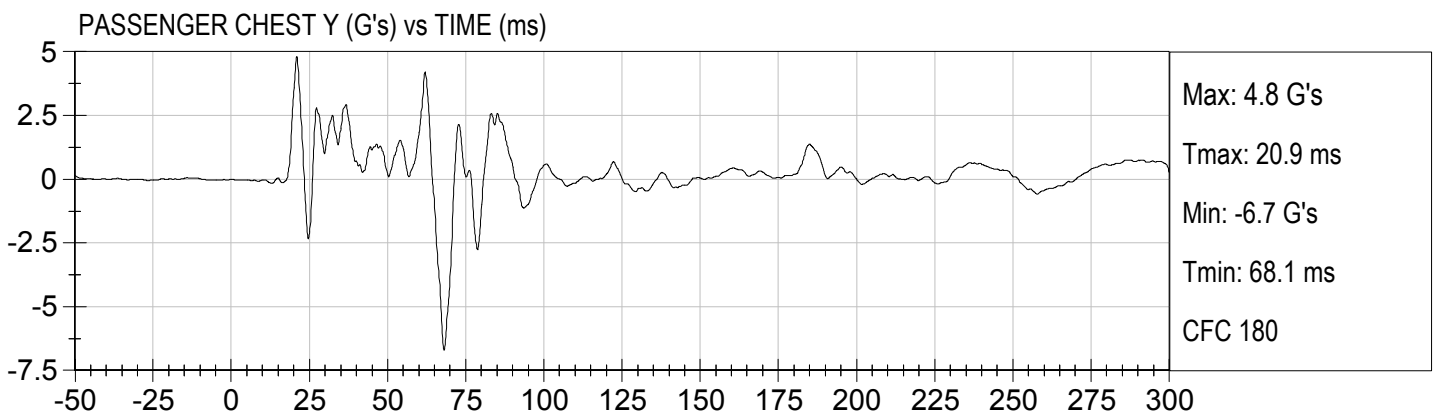
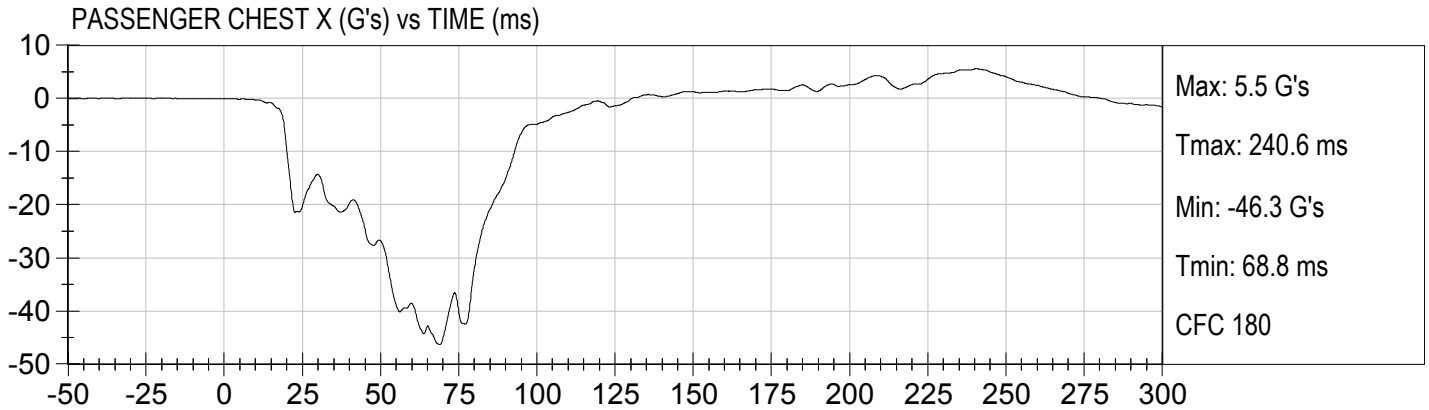


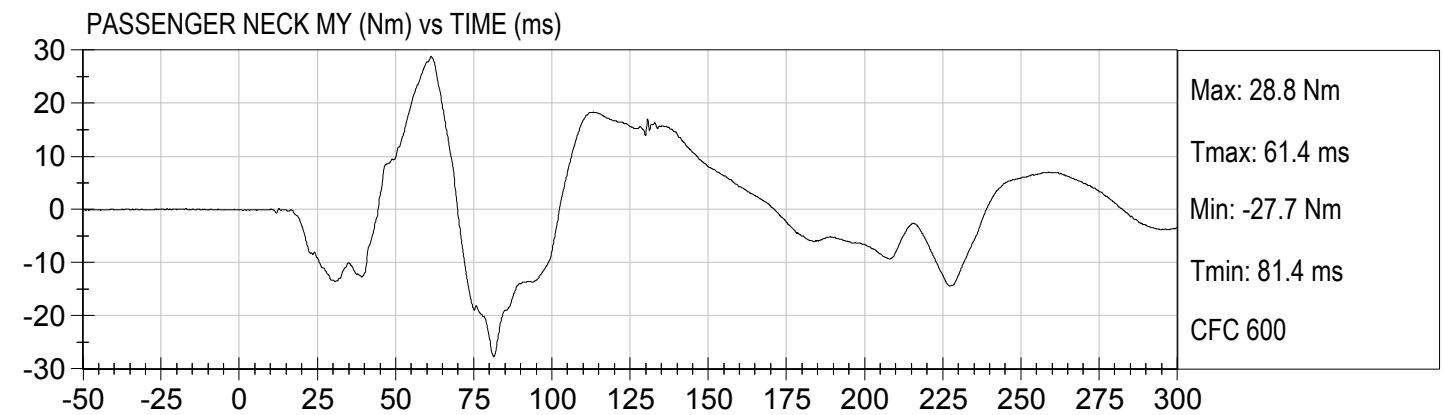
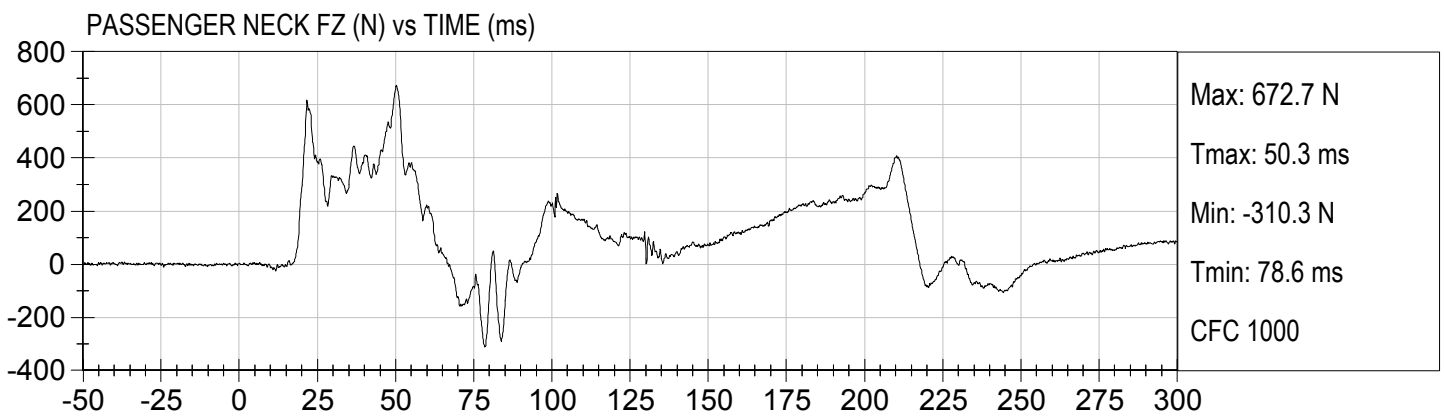
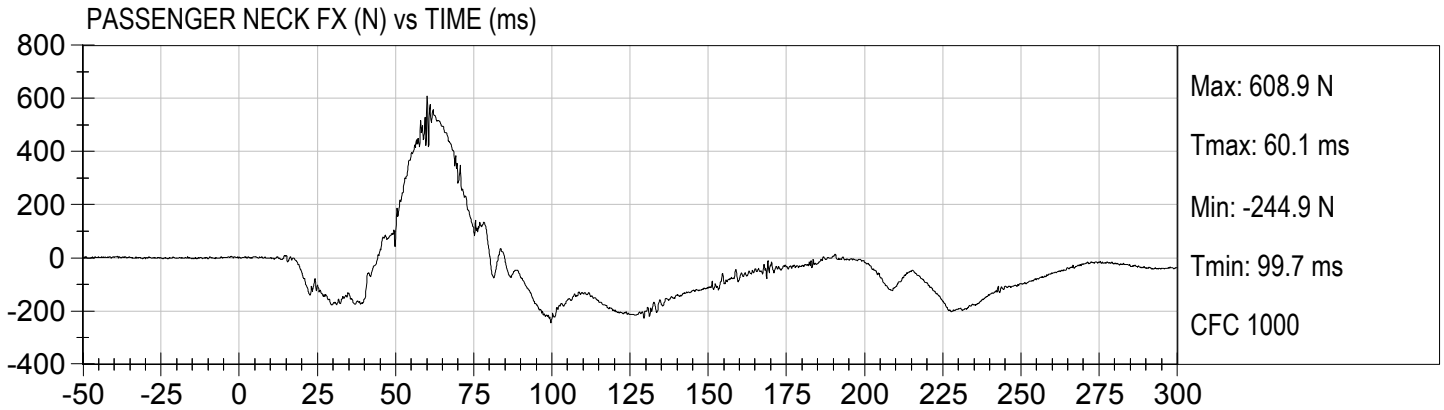


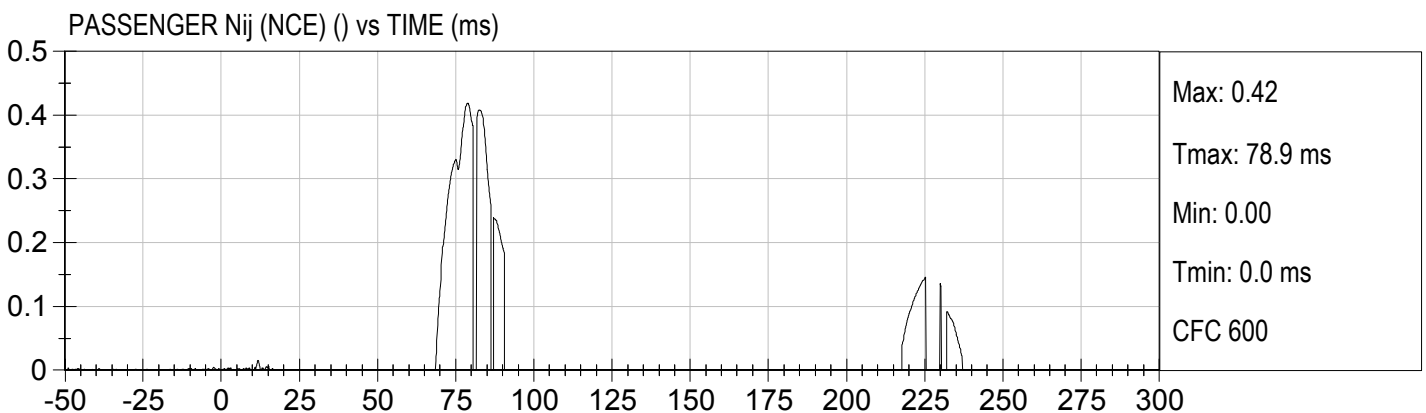
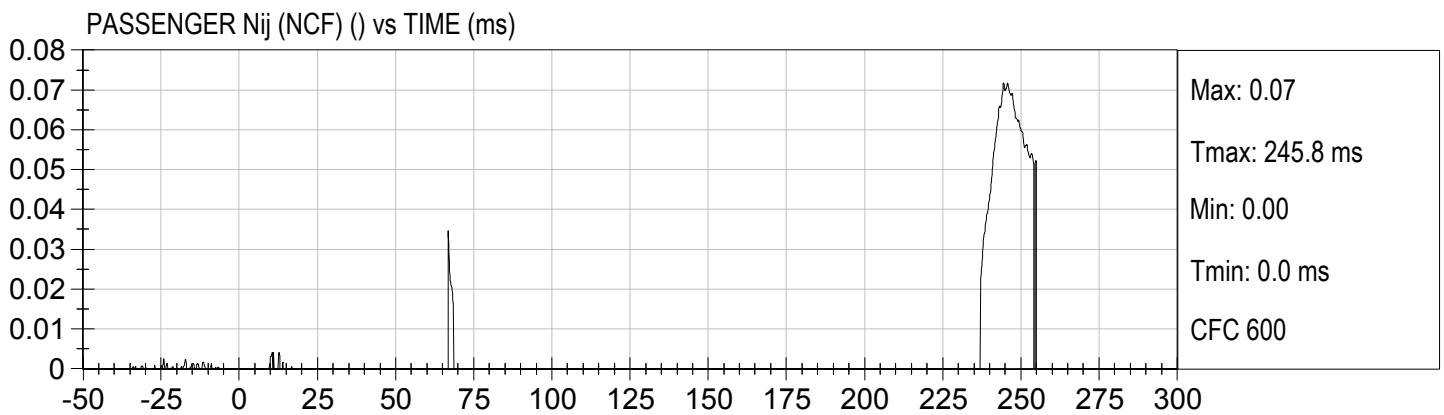
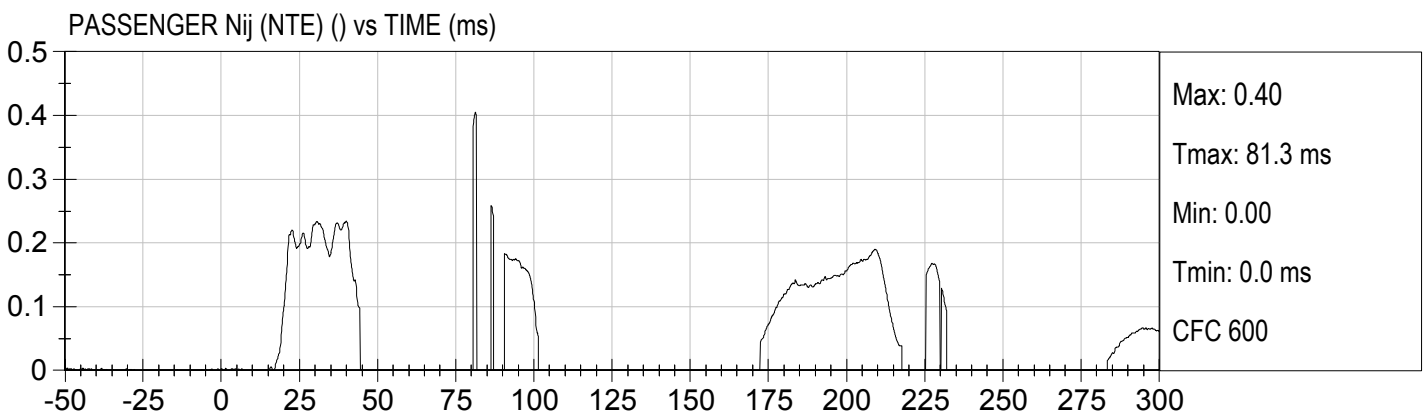
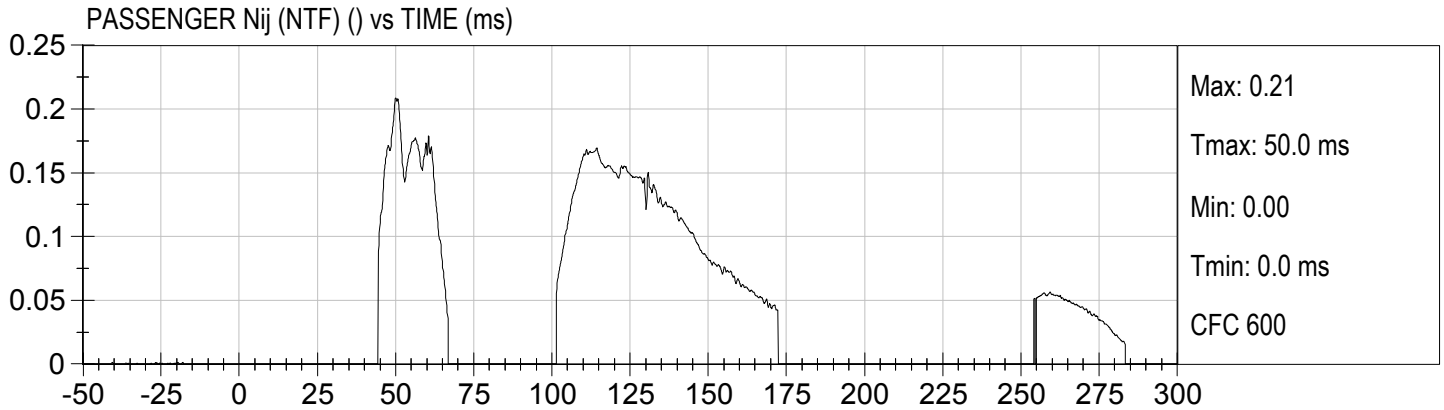


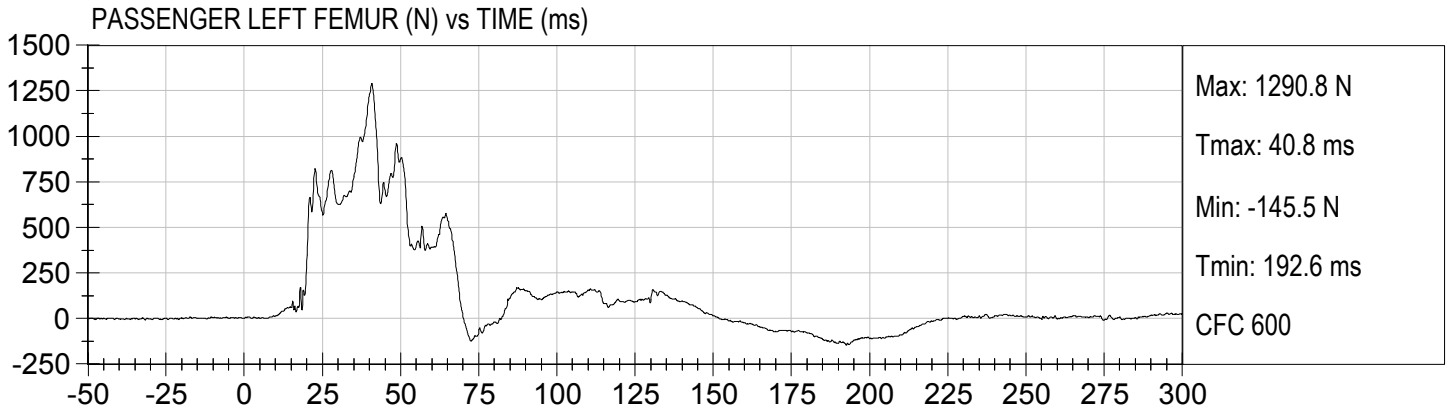












APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

**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

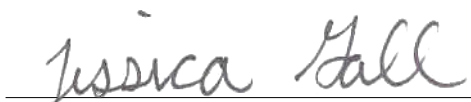
ATD Serial No: 351

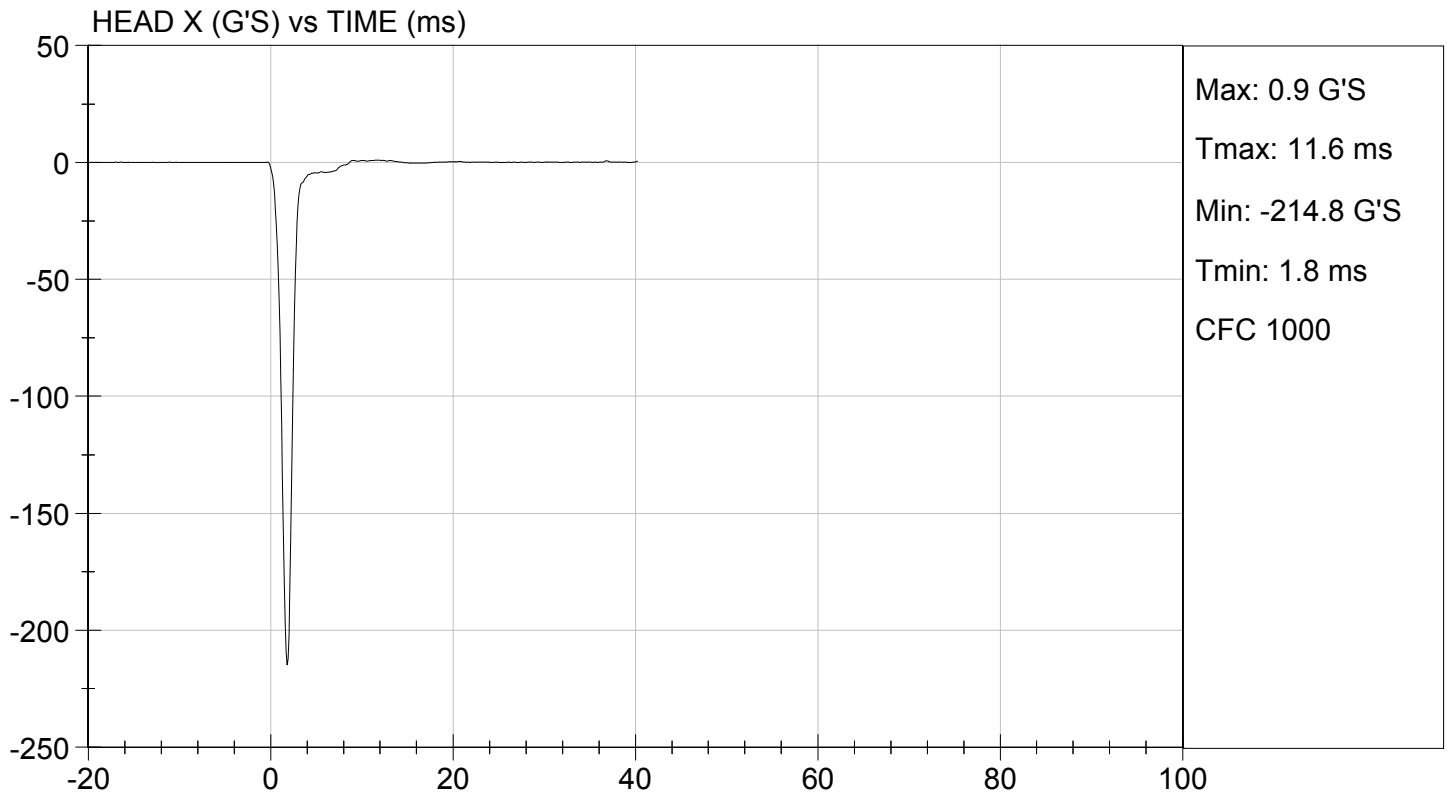
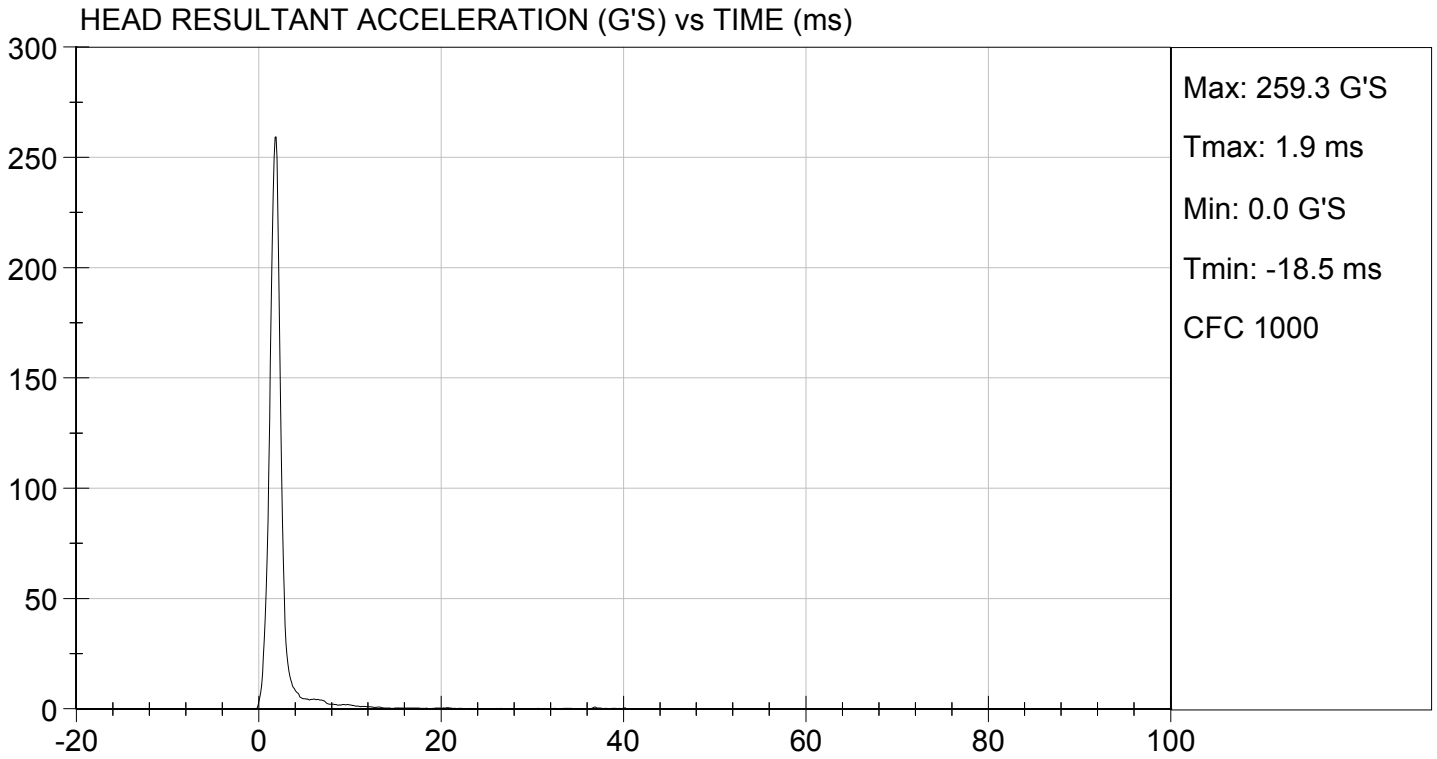
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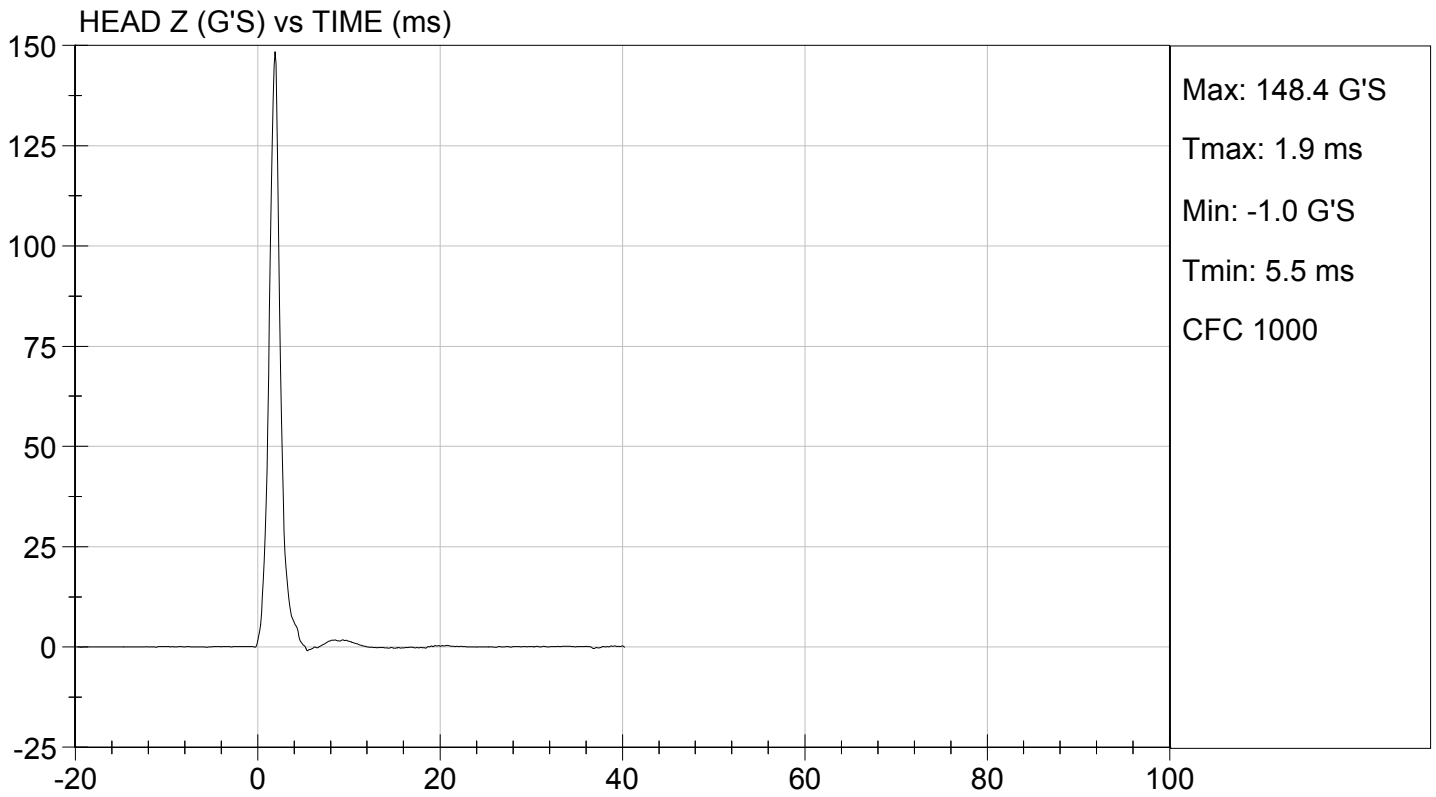
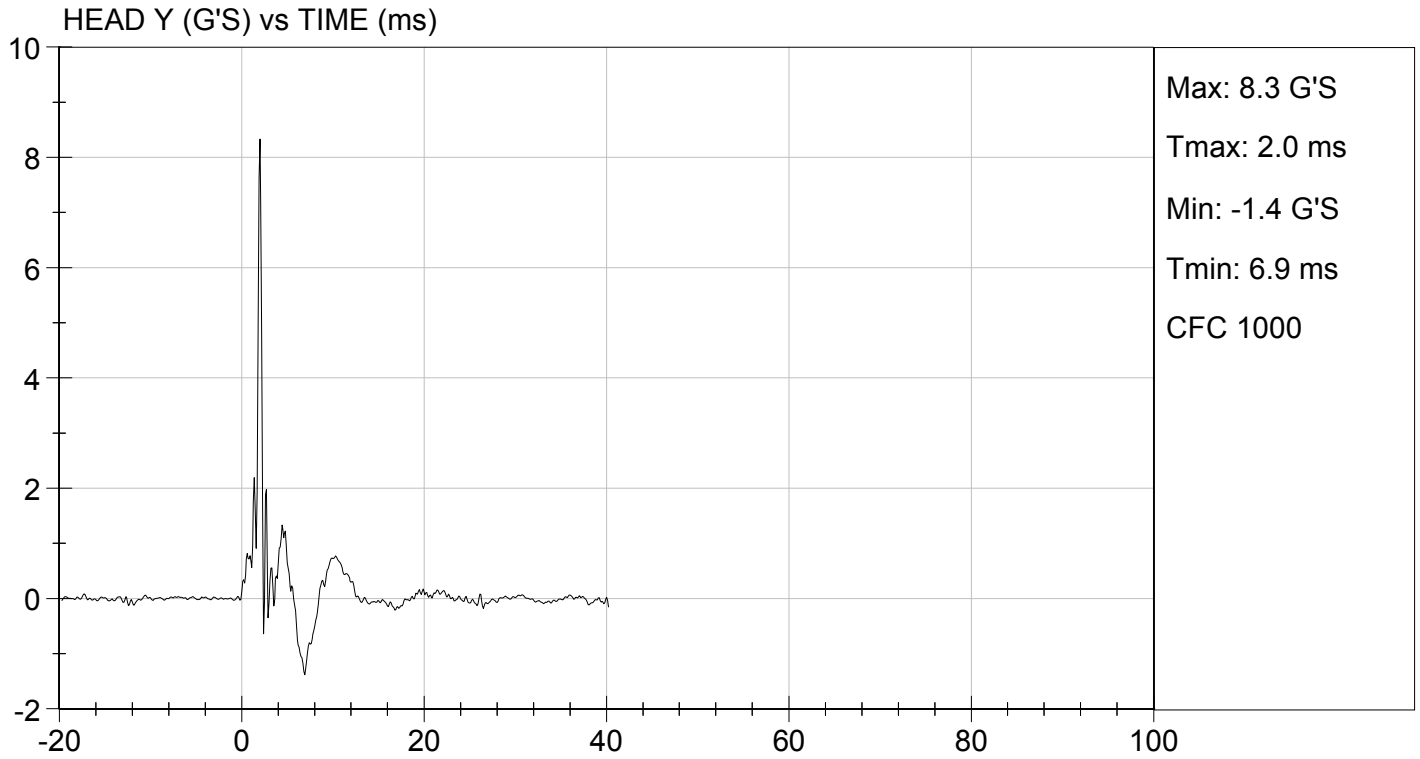
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	225 to 275	259	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	8.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

04/25/2016
 Test Date


 Approved By





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

ATD Serial No: 351

Test I.D: D161452

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.81	Pass
	20 ms	G's	17.60 to 22.60	20.84	Pass
	30 ms	G's	12.50 to 18.50	14.94	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.0	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	72.0	Pass
	Time	ms	57.0 to 64.0	59.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.7	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	89.9	Pass
	Time	ms	47.0 to 58.0	48.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	101.0	Pass
Overall Test Results					Pass



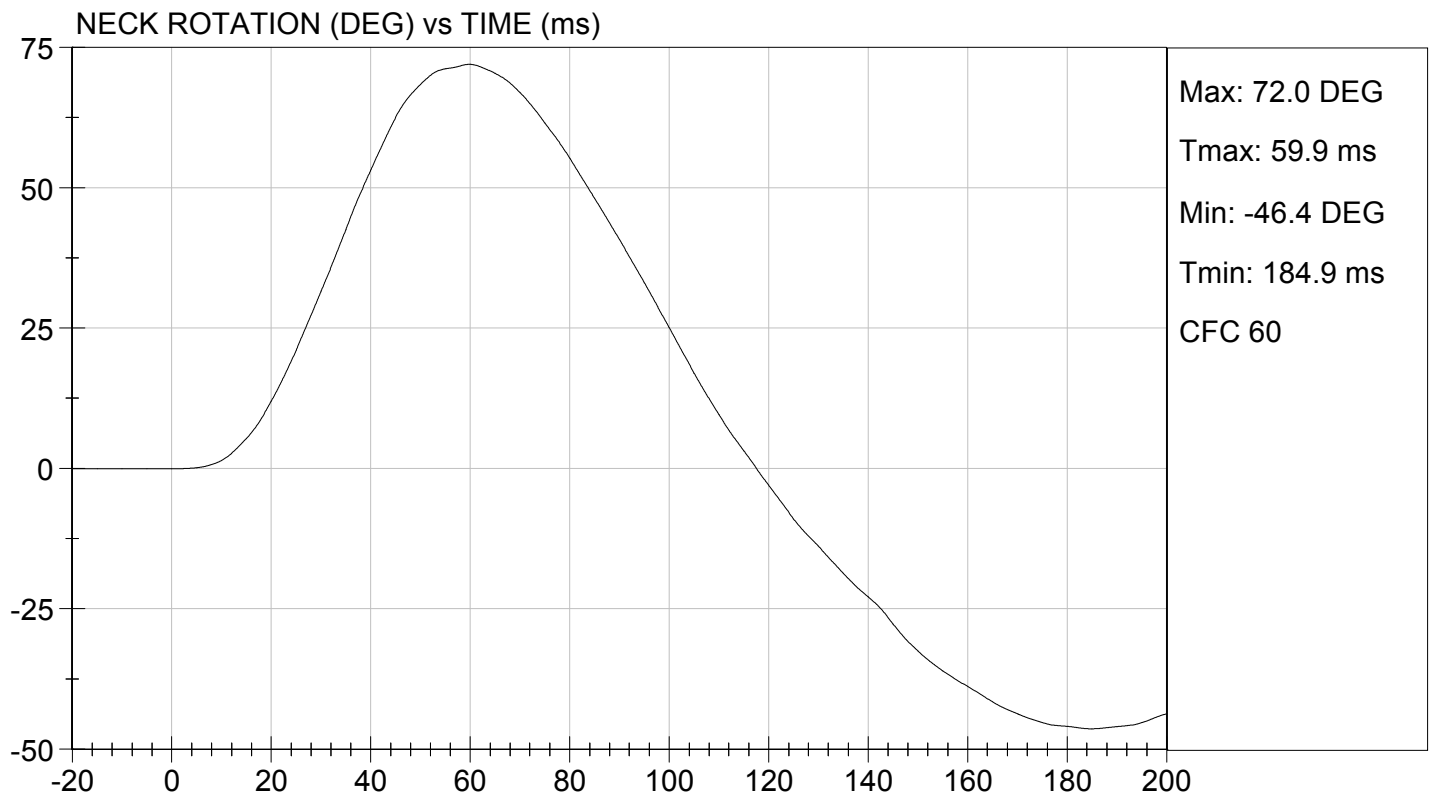
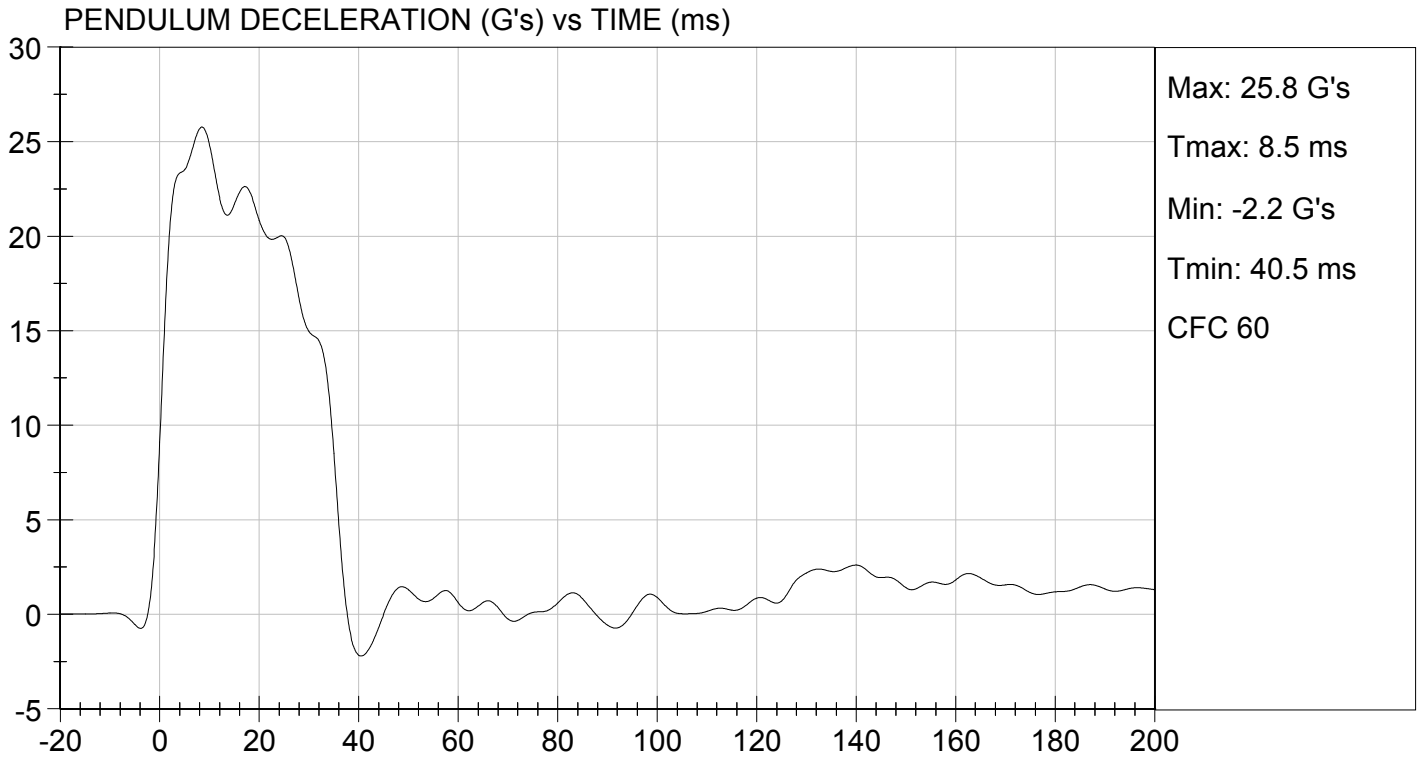
 Laboratory Technician

04/25/2016

 Test Date



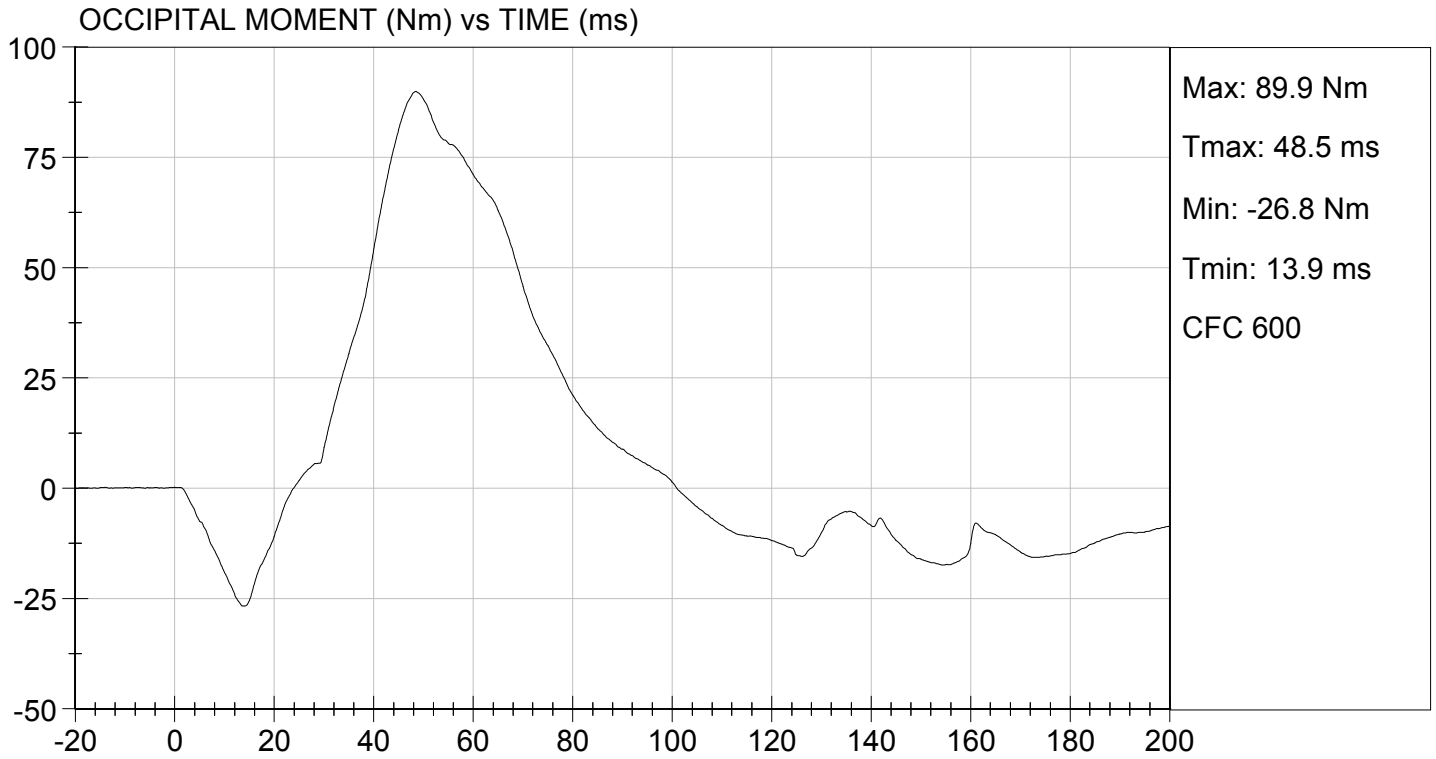
 Approved By





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

TEST DATE: 04/25/2016
TEST #: D161452



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

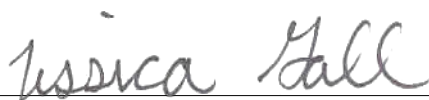
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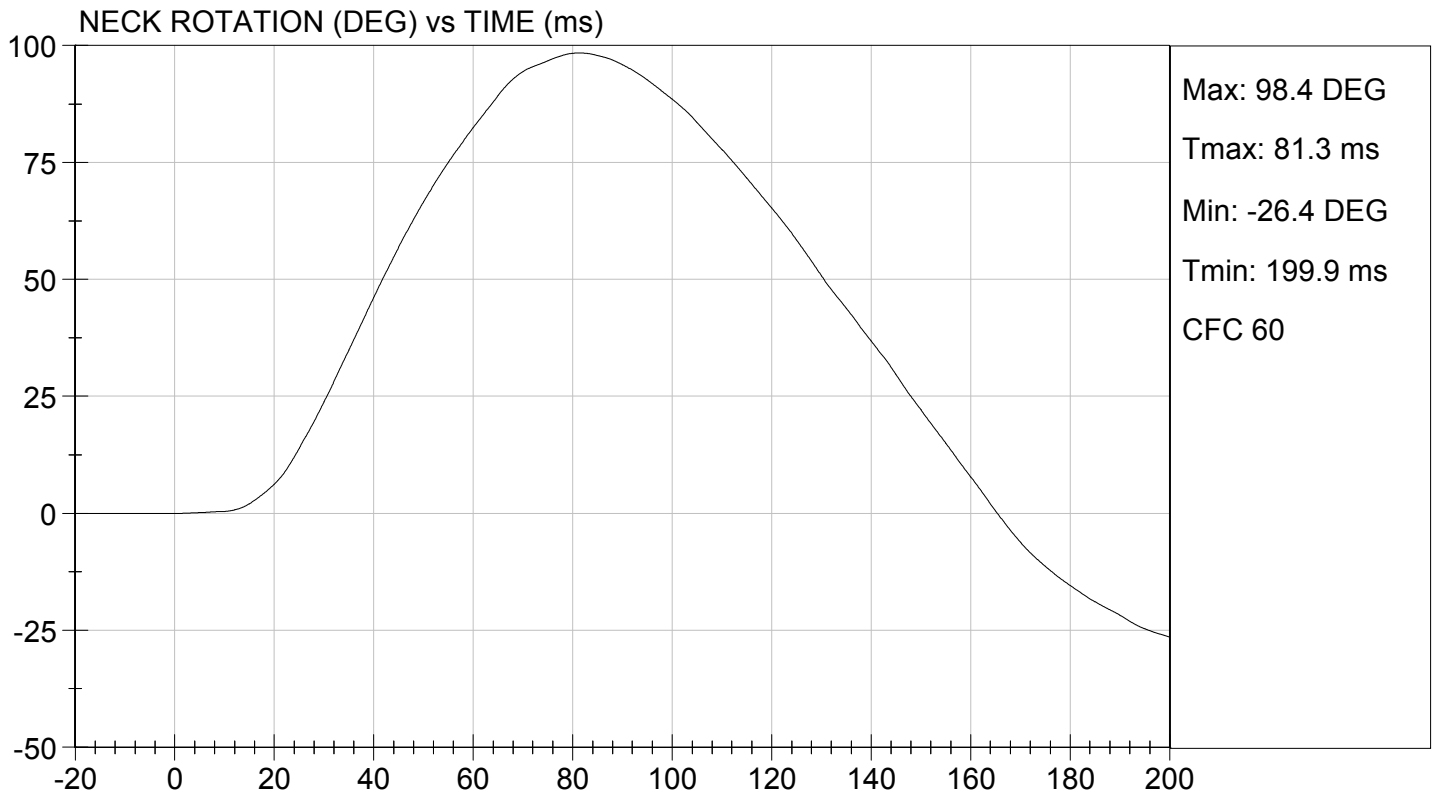
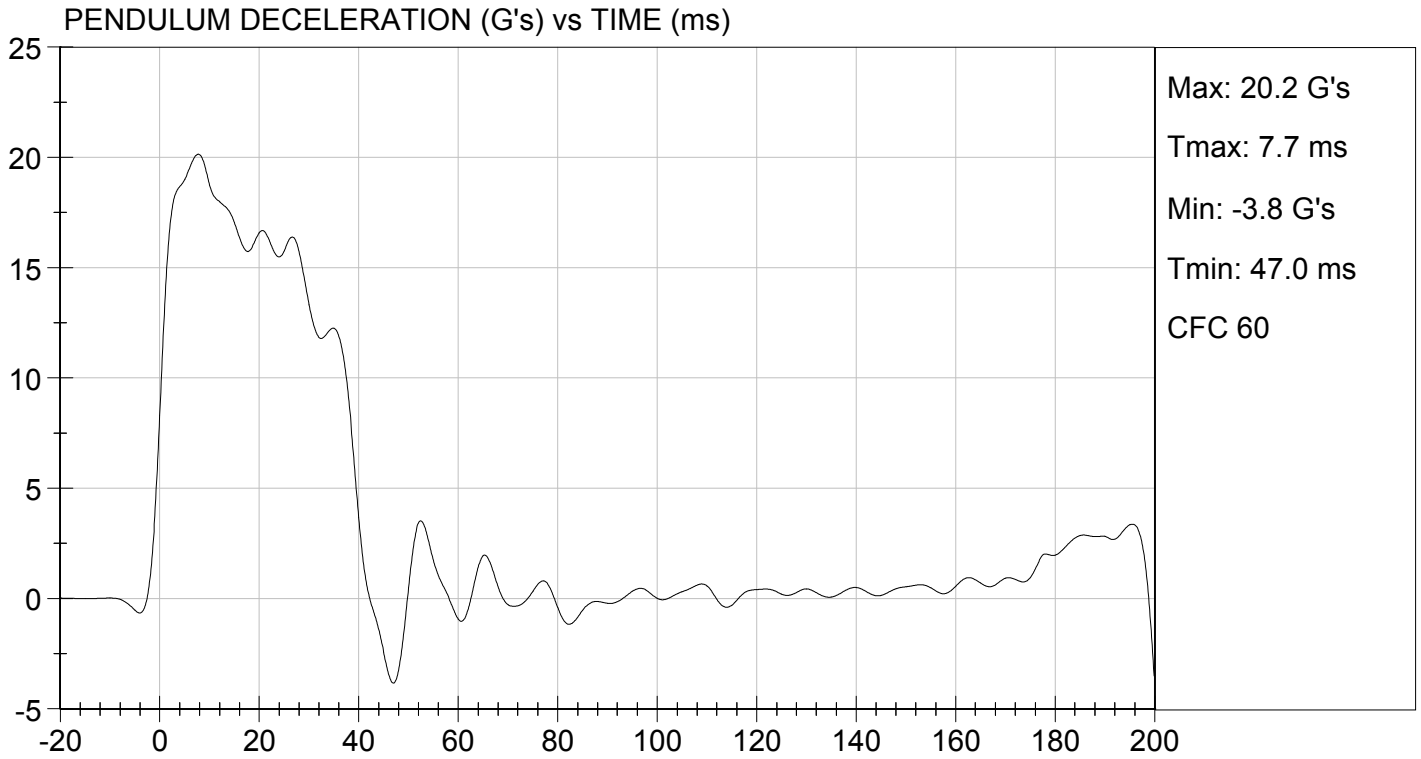
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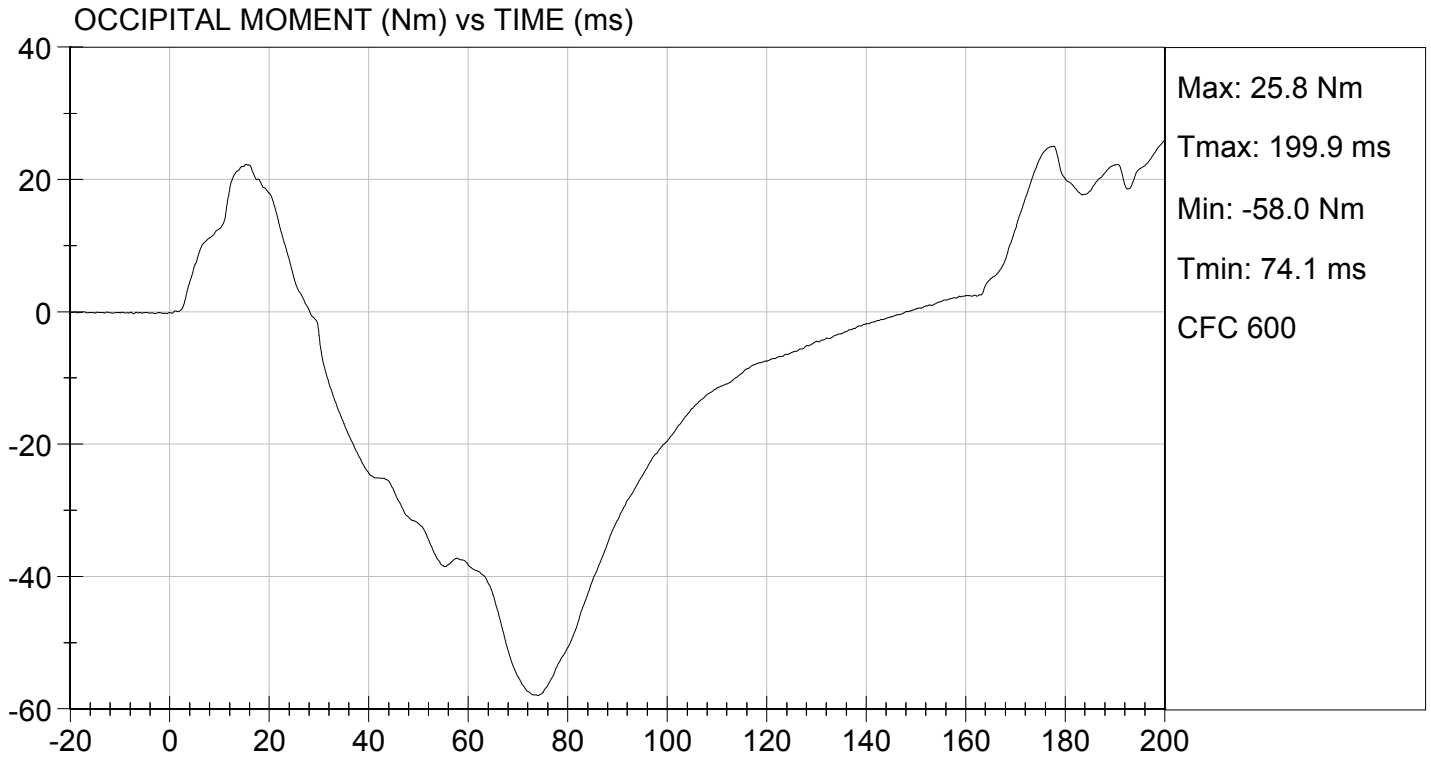
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.75	Pass
	20 ms	G's	14.00 to 19.00	16.59	Pass
	30 ms	G's	11.00 to 16.00	13.32	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.4	Pass
	Time	ms	72.0 to 82.0	81.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	165.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-58.0	Pass
	Time	ms	65.0 to 79.0	74.1	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	148.0	Pass
Overall Test Results					Pass


 Laboratory Technician

04/26/2016
 Test Date


 Approved By





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

ATD Serial No: 351

Test I.D: D161454

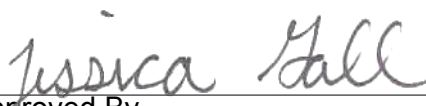
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,600	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.94	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Overall Test Results				Pass



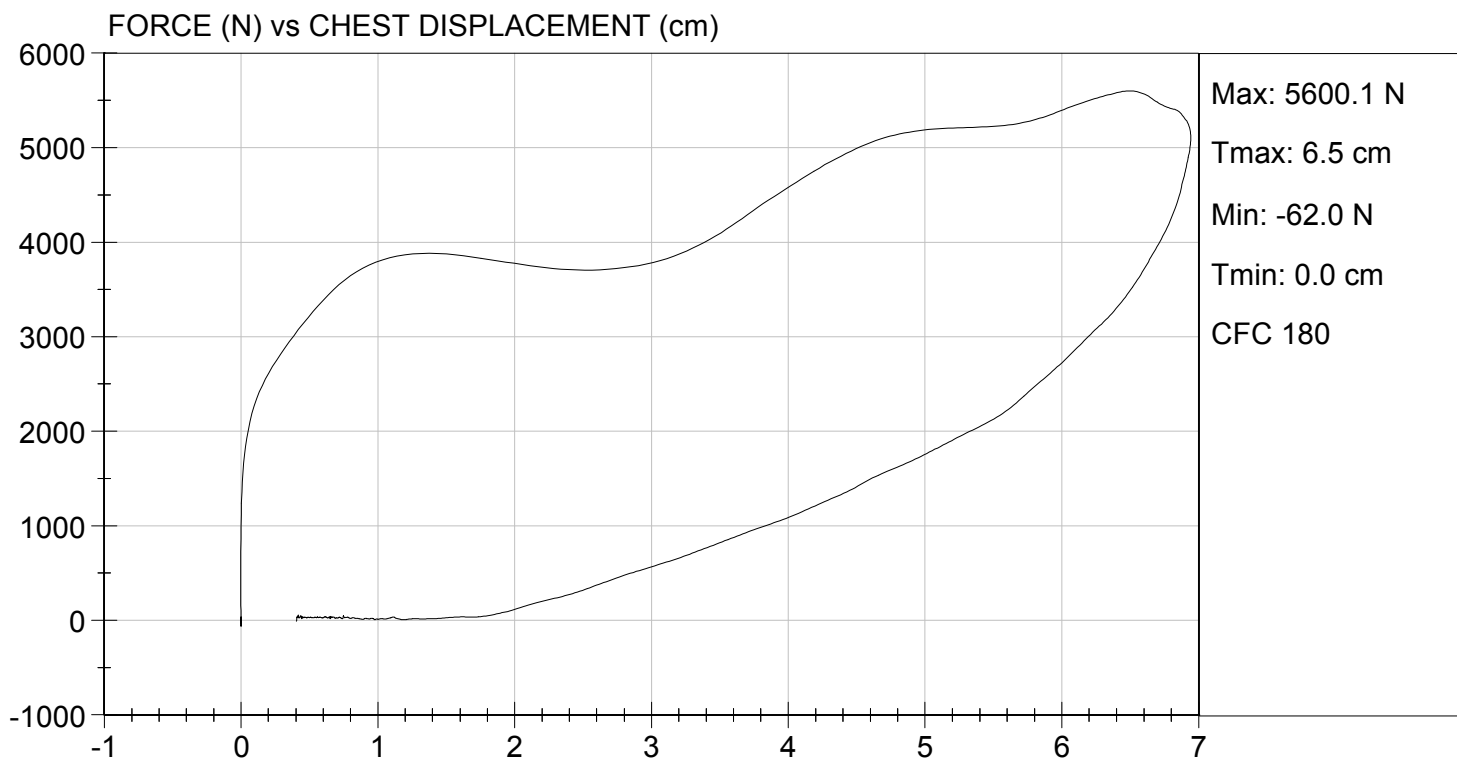
 Laboratory Technician

04/26/2016

 Test Date



 Approved By



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

ATD Serial No: 351

Test I.D.: D161455


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	4,940	Pass
Overall Test Results				Pass



 Laboratory Technician

04/25/2016

 Test Date

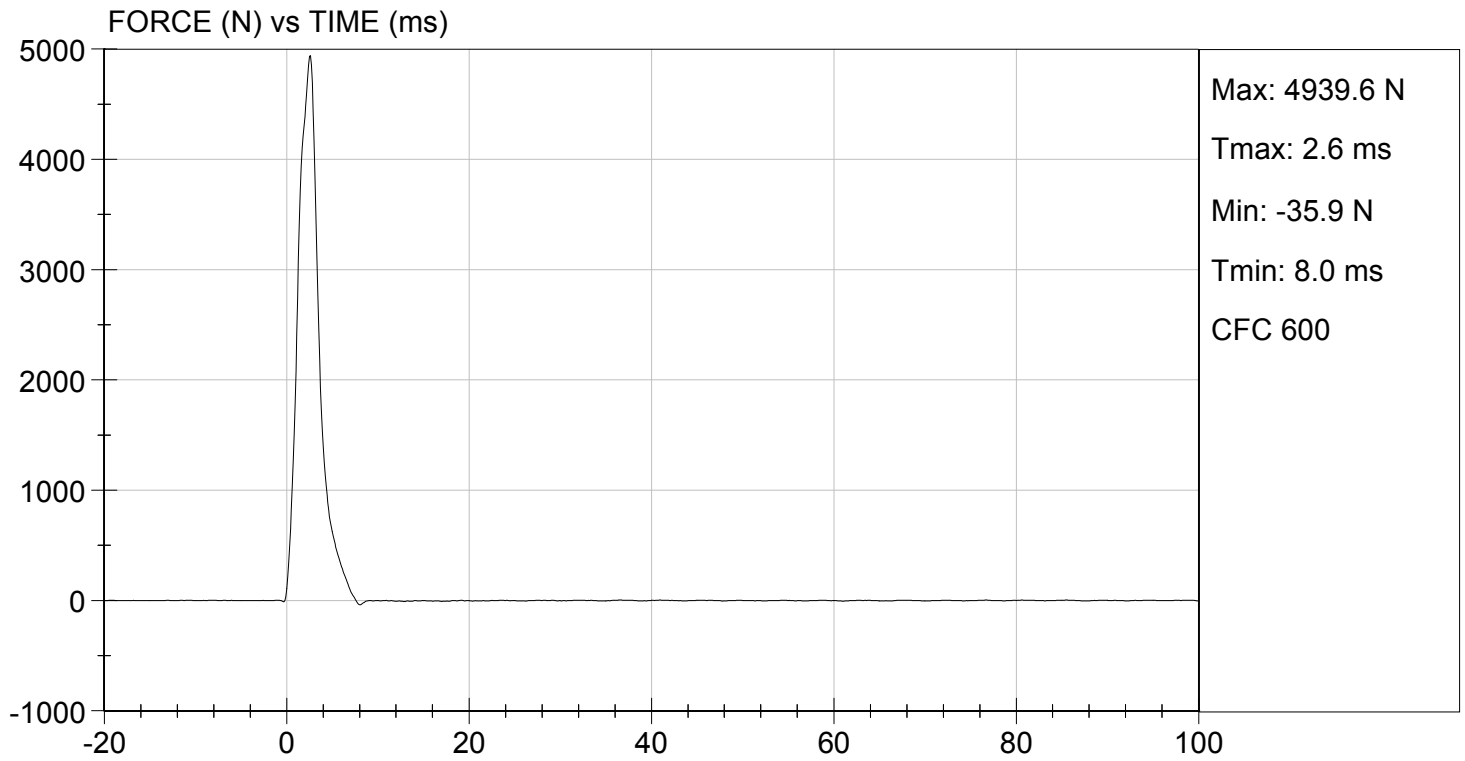


 Approved By



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

TEST DATE: 04/25/2016
TEST #: D161455



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

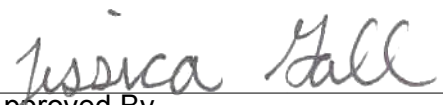
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Test I.D: D161456

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,015	Pass
Overall Test Results				Pass


 Laboratory Technician

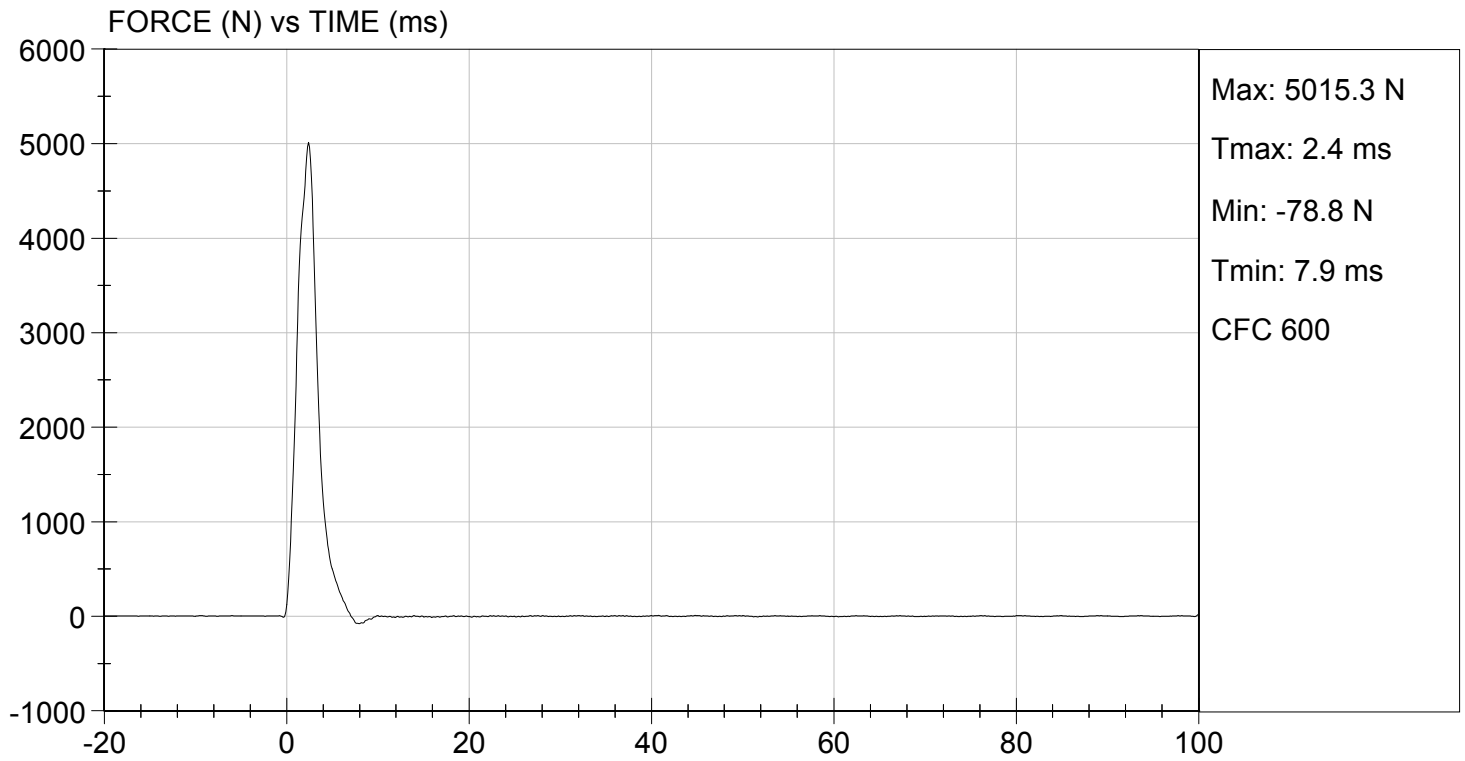
04/25/2016
 Test Date


 Approved By



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

TEST DATE: 04/25/2016
TEST #: D161456



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


ATD Serial No: 351

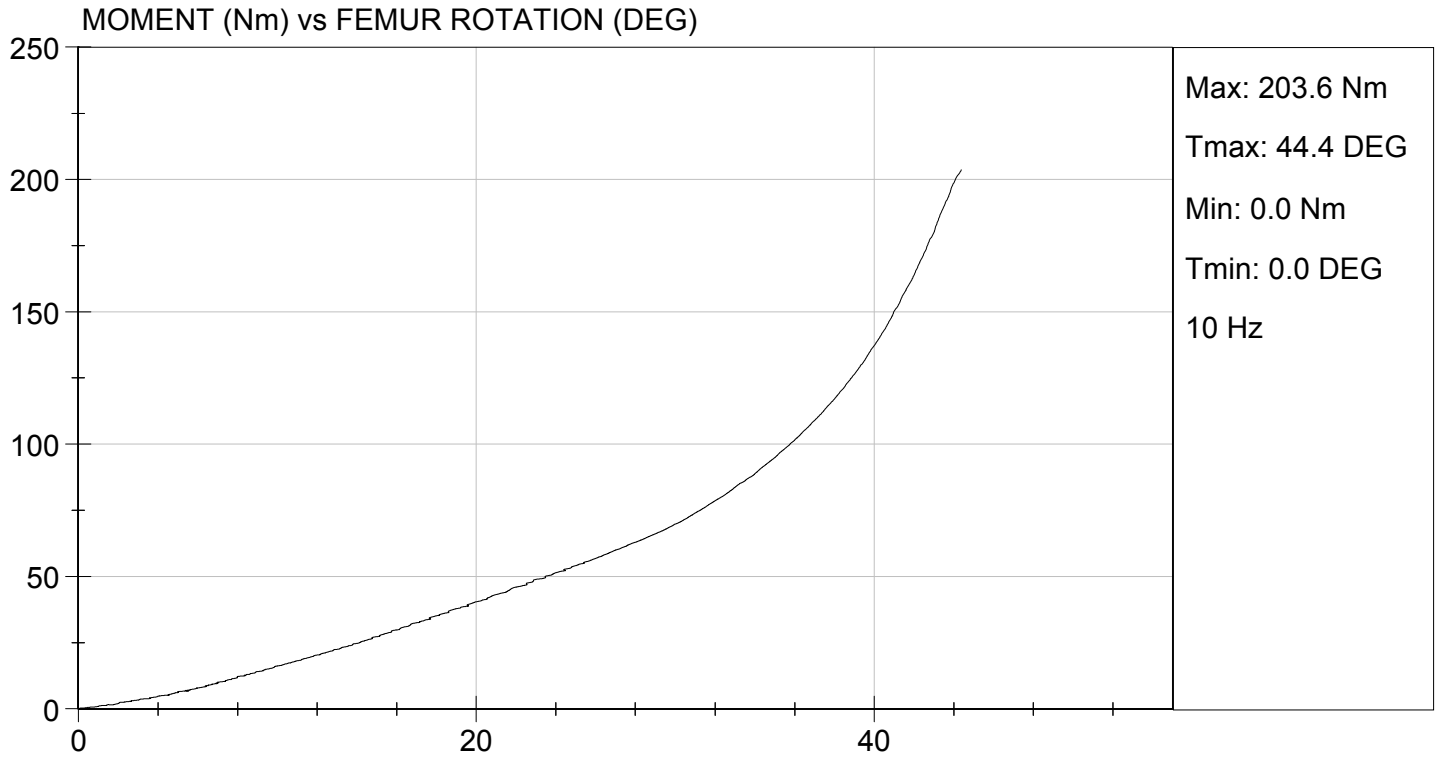
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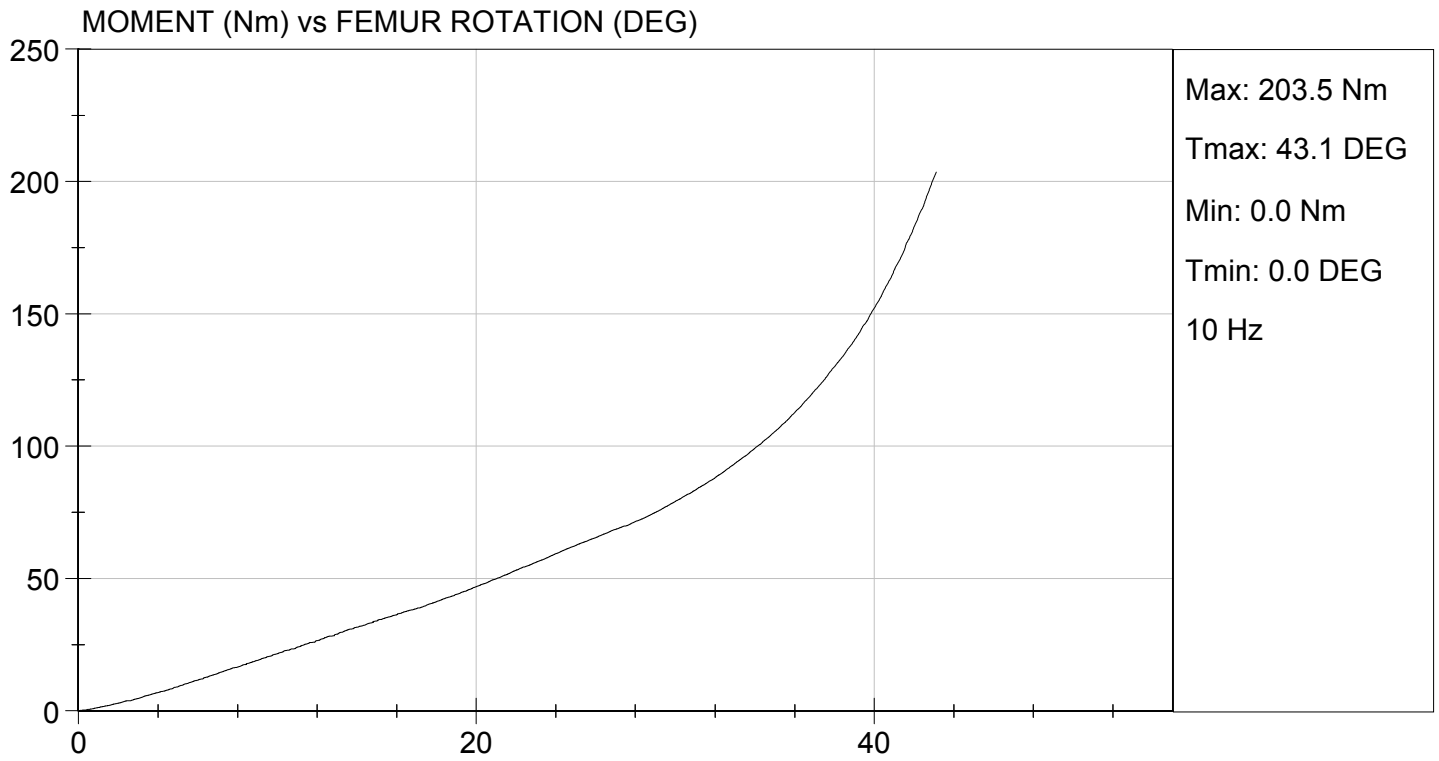
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	46	46	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	69.8	79.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.4	43.1	Pass
Overall Test Results					Pass


Laboratory Technician

04/25/2016
Test Date


Approved By





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

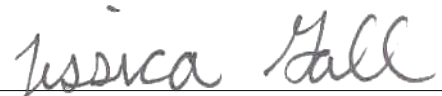
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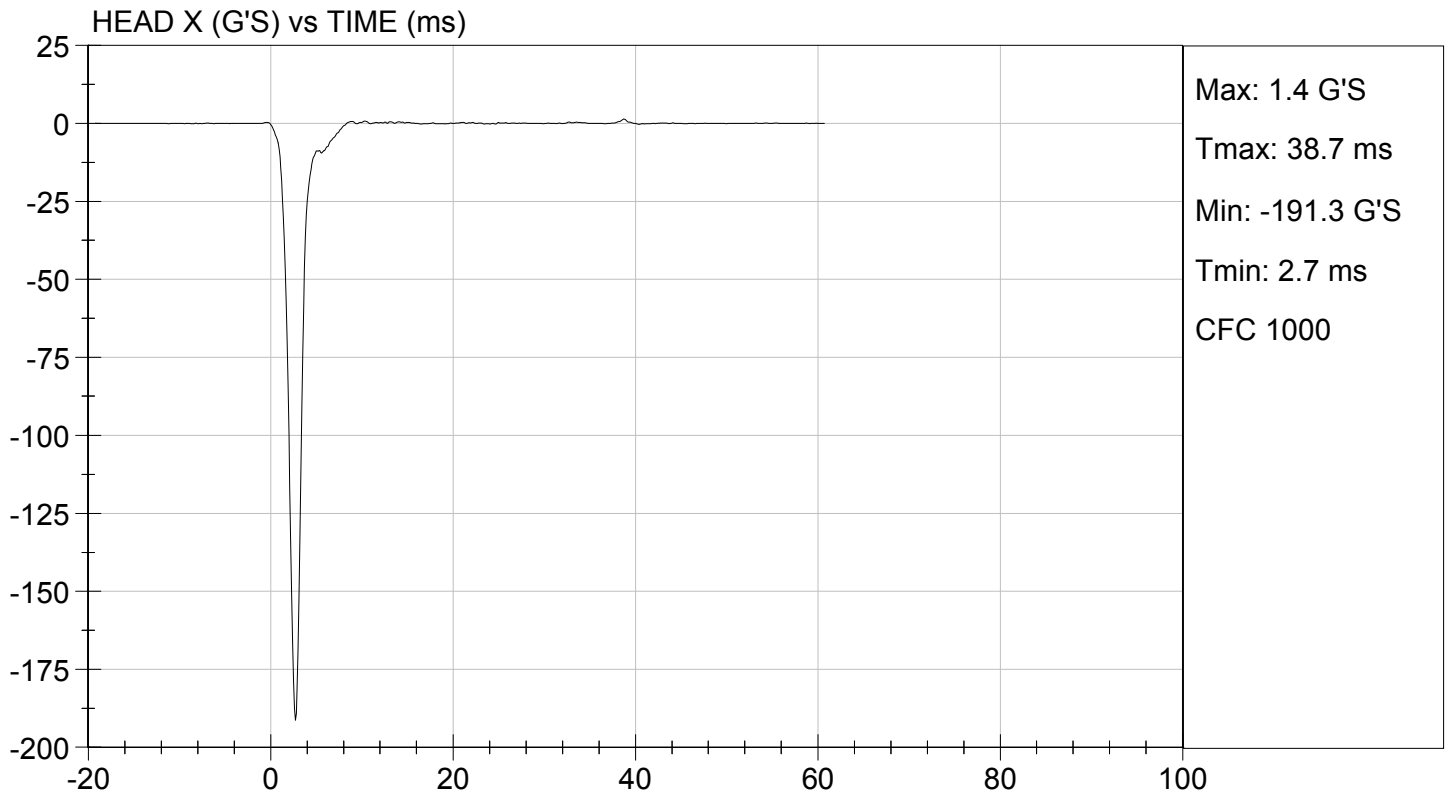
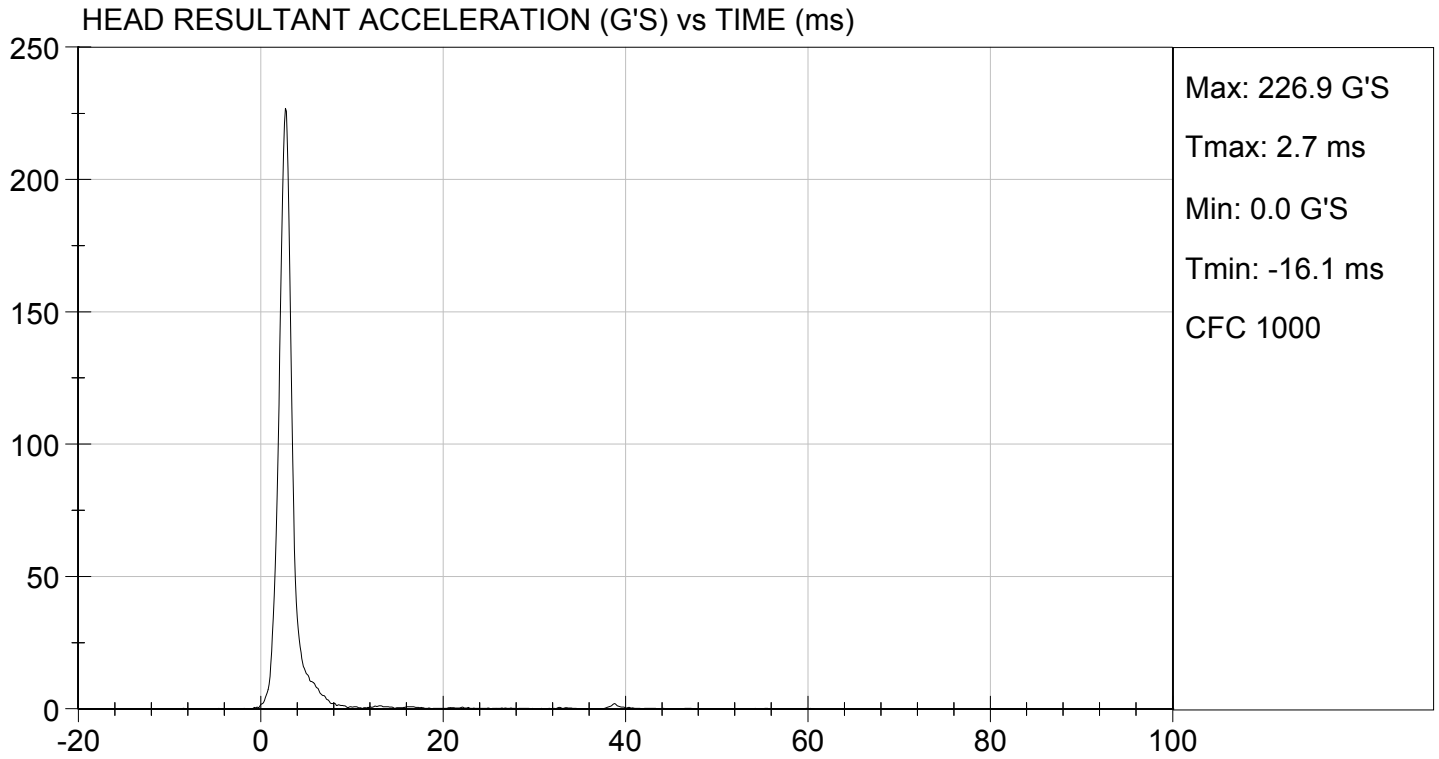
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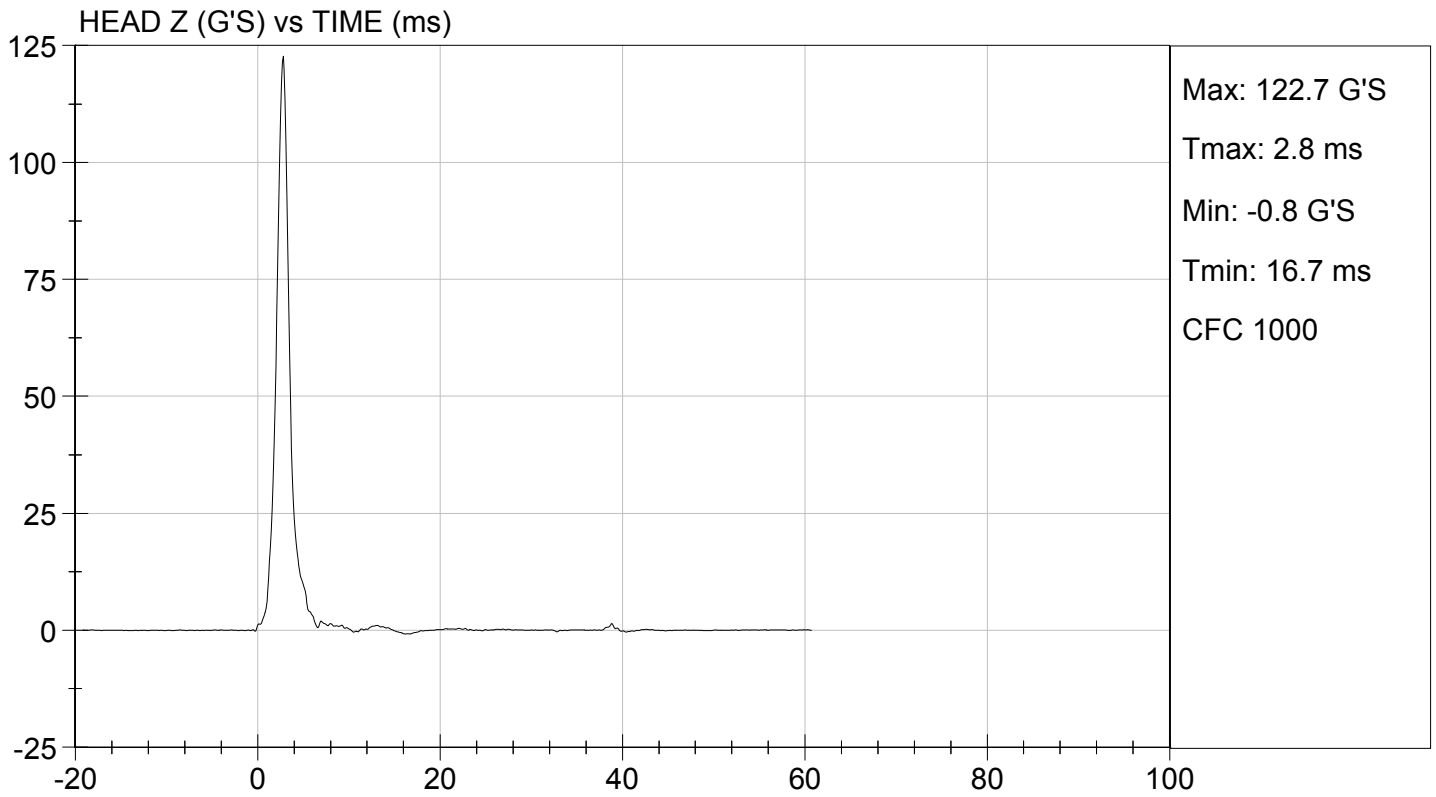
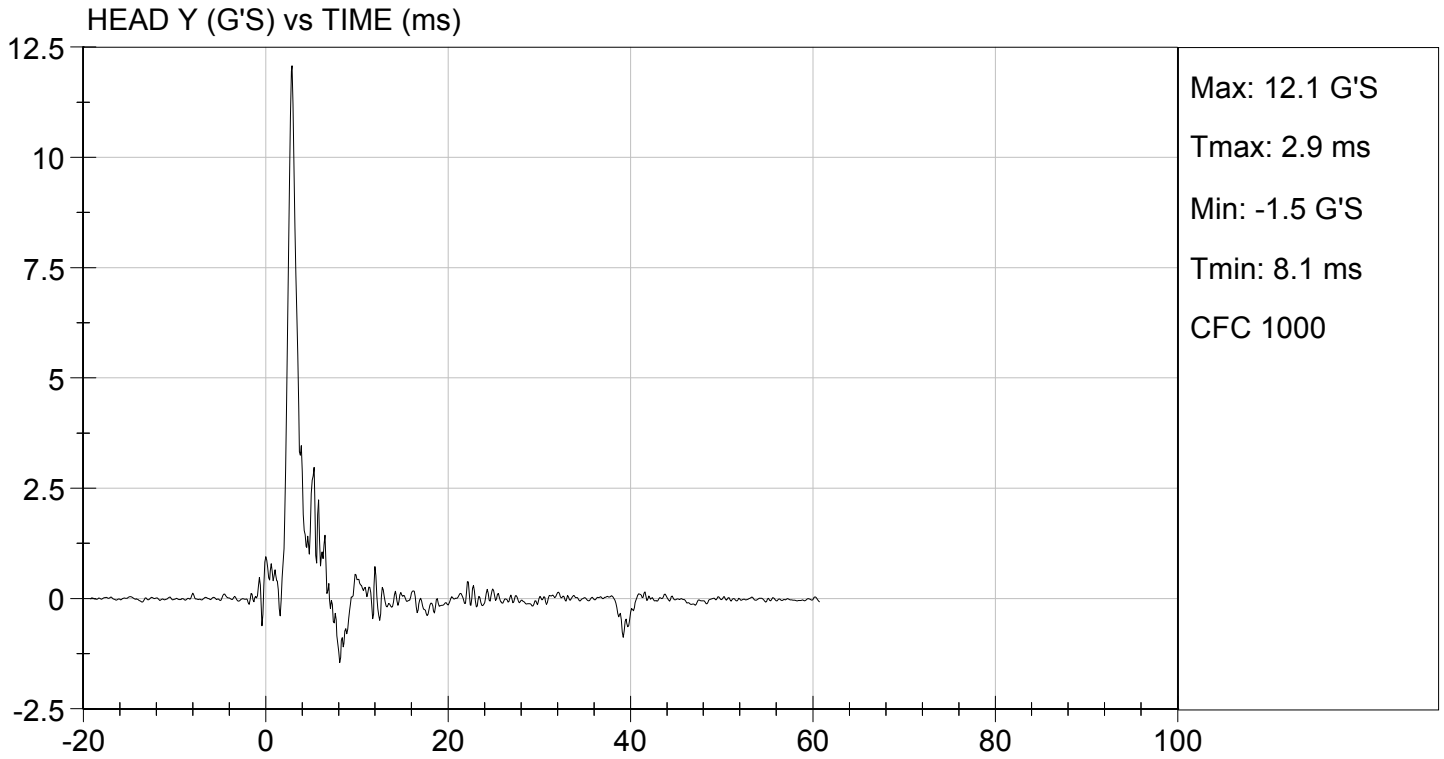
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	225 to 275	227	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	12.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

05/26/2016
 Test Date


 Approved By





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

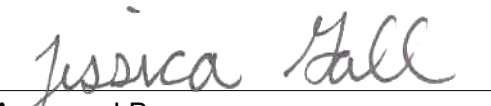
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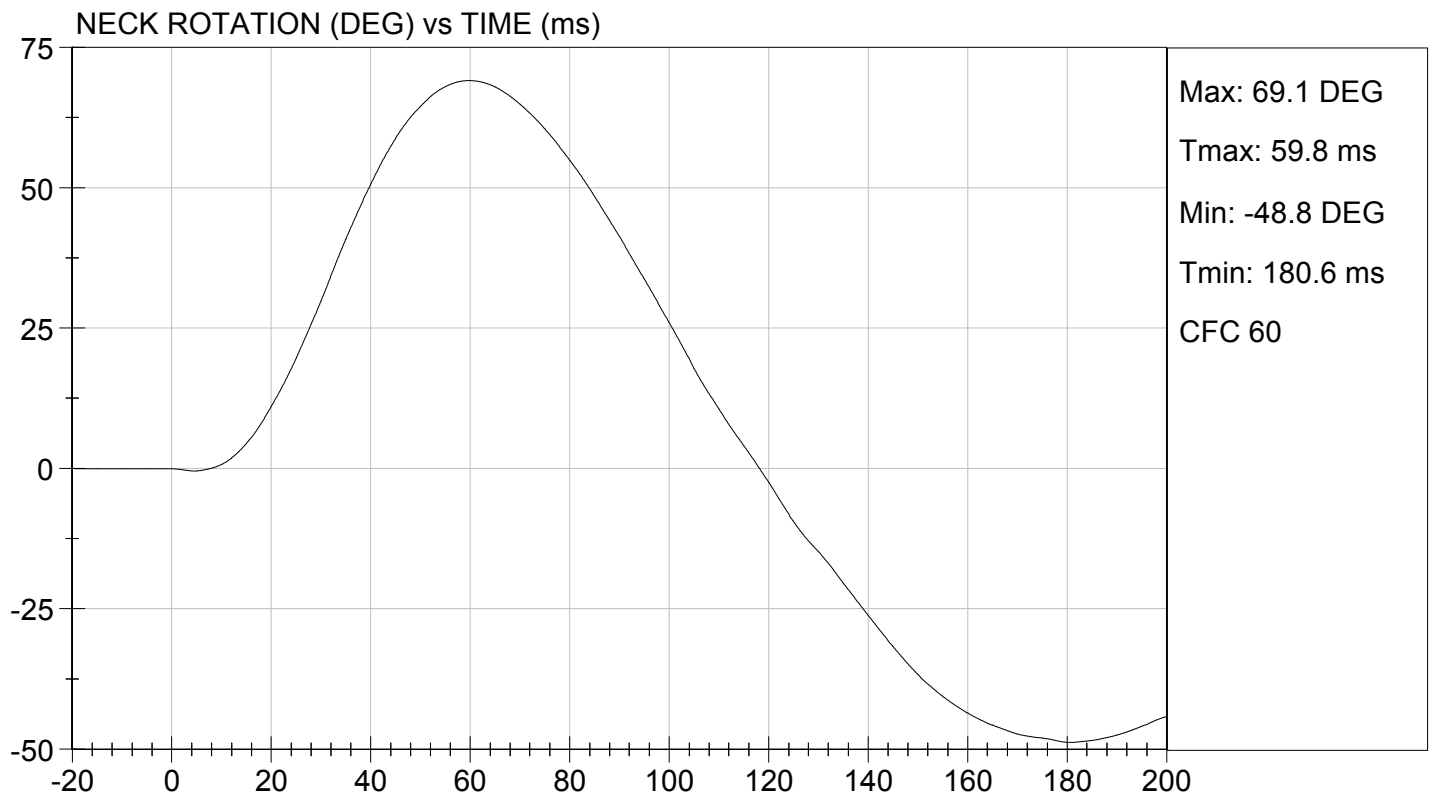
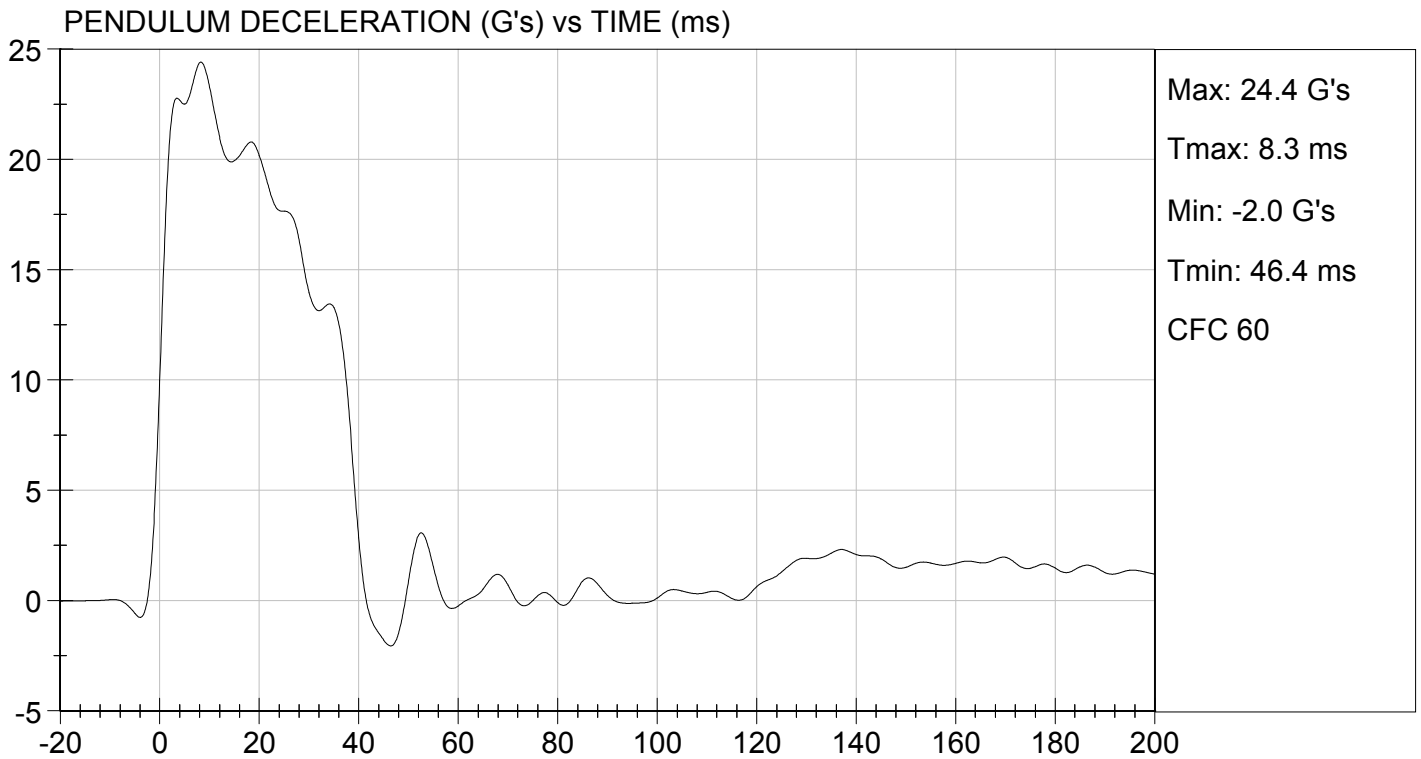
Test I.D: D161822

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	48	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.27	Pass
	20 ms	G's	17.60 to 22.60	20.19	Pass
	30 ms	G's	12.50 to 18.50	13.95	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	39.3	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	69.1	Pass
	Time	ms	57.0 to 64.0	59.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.3	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	89.2	Pass
	Time	ms	47.0 to 58.0	52.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	102.3	Pass
Overall Test Results					Pass


 Laboratory Technician

05/26/2016
 Test Date

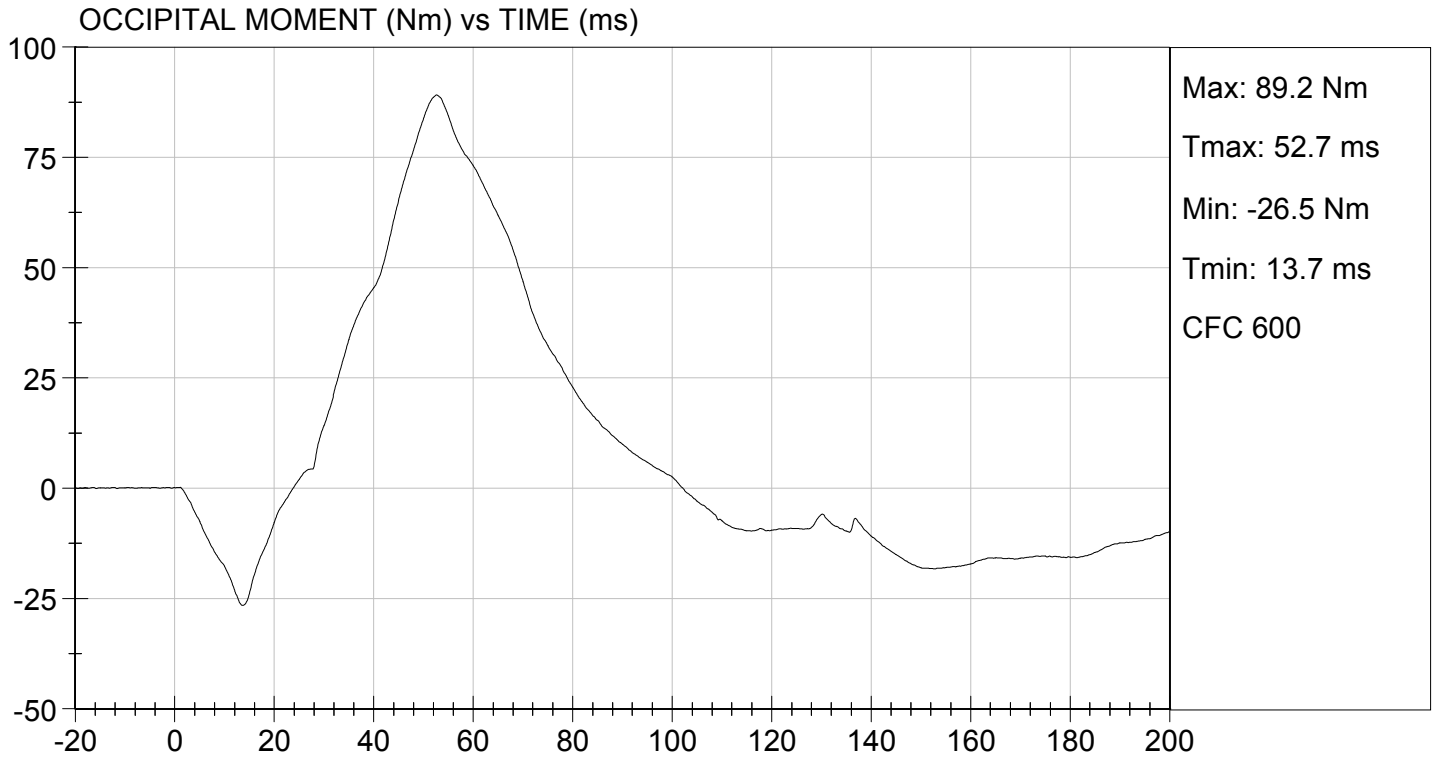

 Approved By





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

TEST DATE: 05/26/2016
TEST #: D161822



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

ATD Serial No: 351

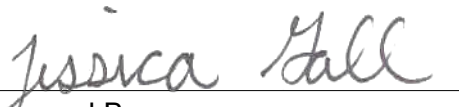
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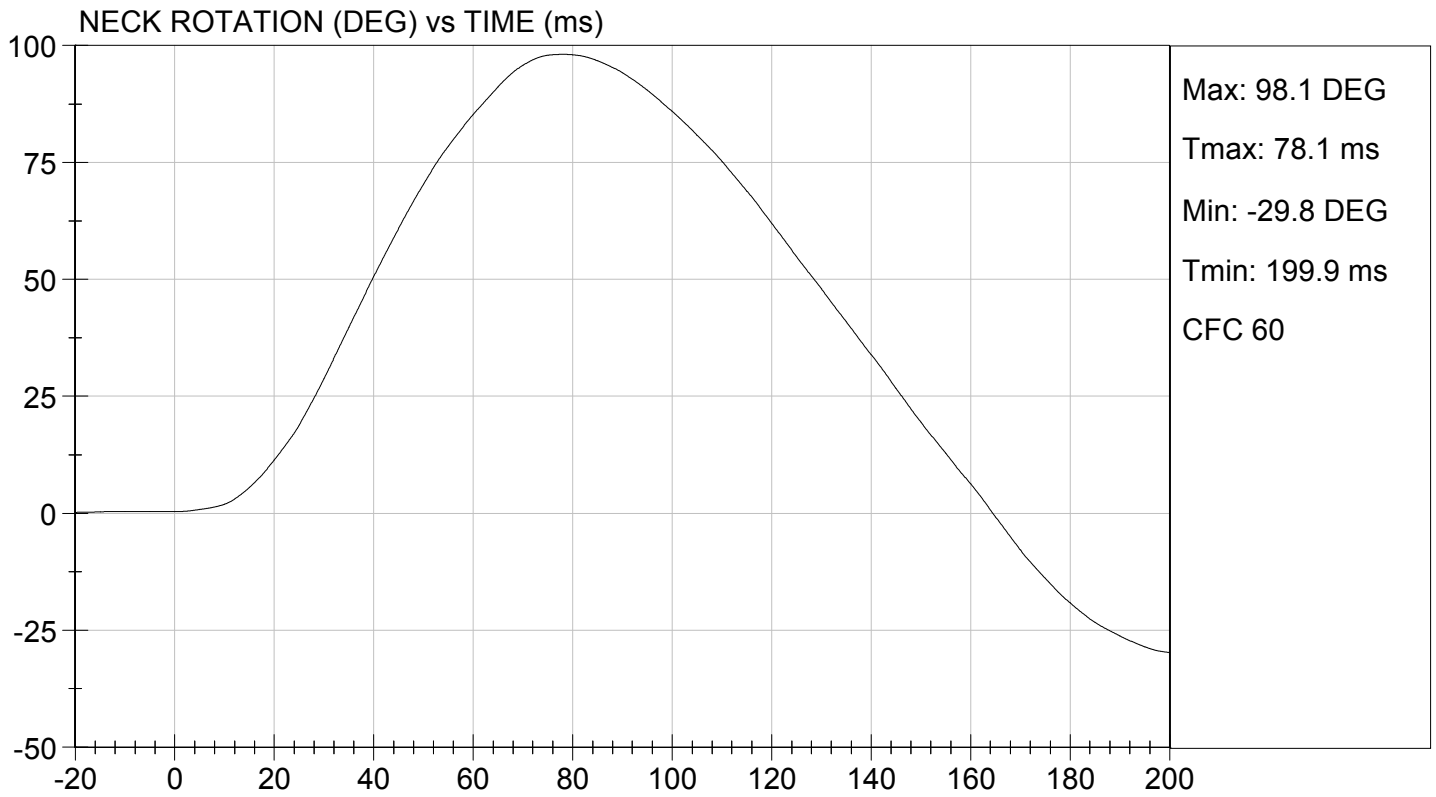
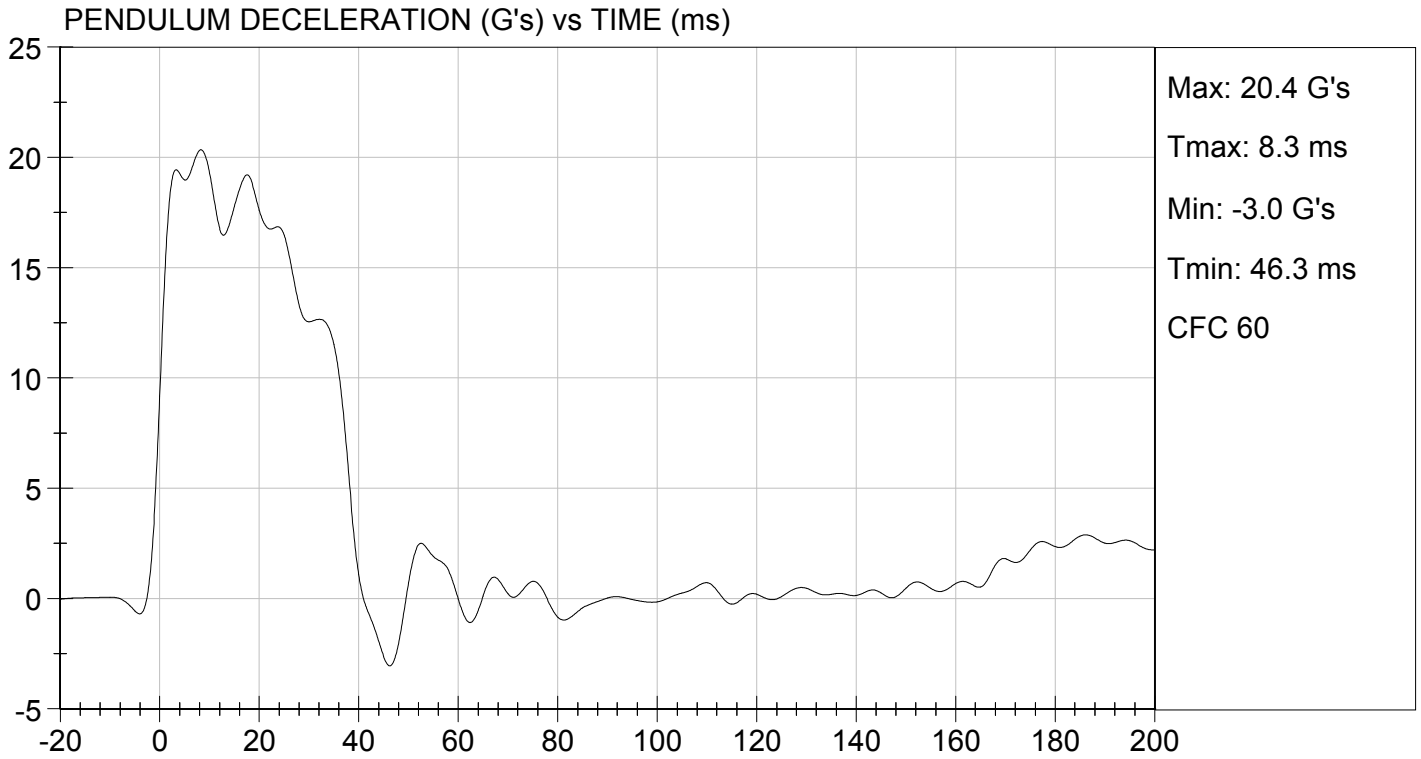
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	48	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.28	Pass
	20 ms	G's	14.00 to 19.00	17.61	Pass
	30 ms	G's	11.00 to 16.00	12.54	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.1	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	164.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.0	Pass
	Time	ms	65.0 to 79.0	71.7	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	148.0	Pass
Overall Test Results					Pass

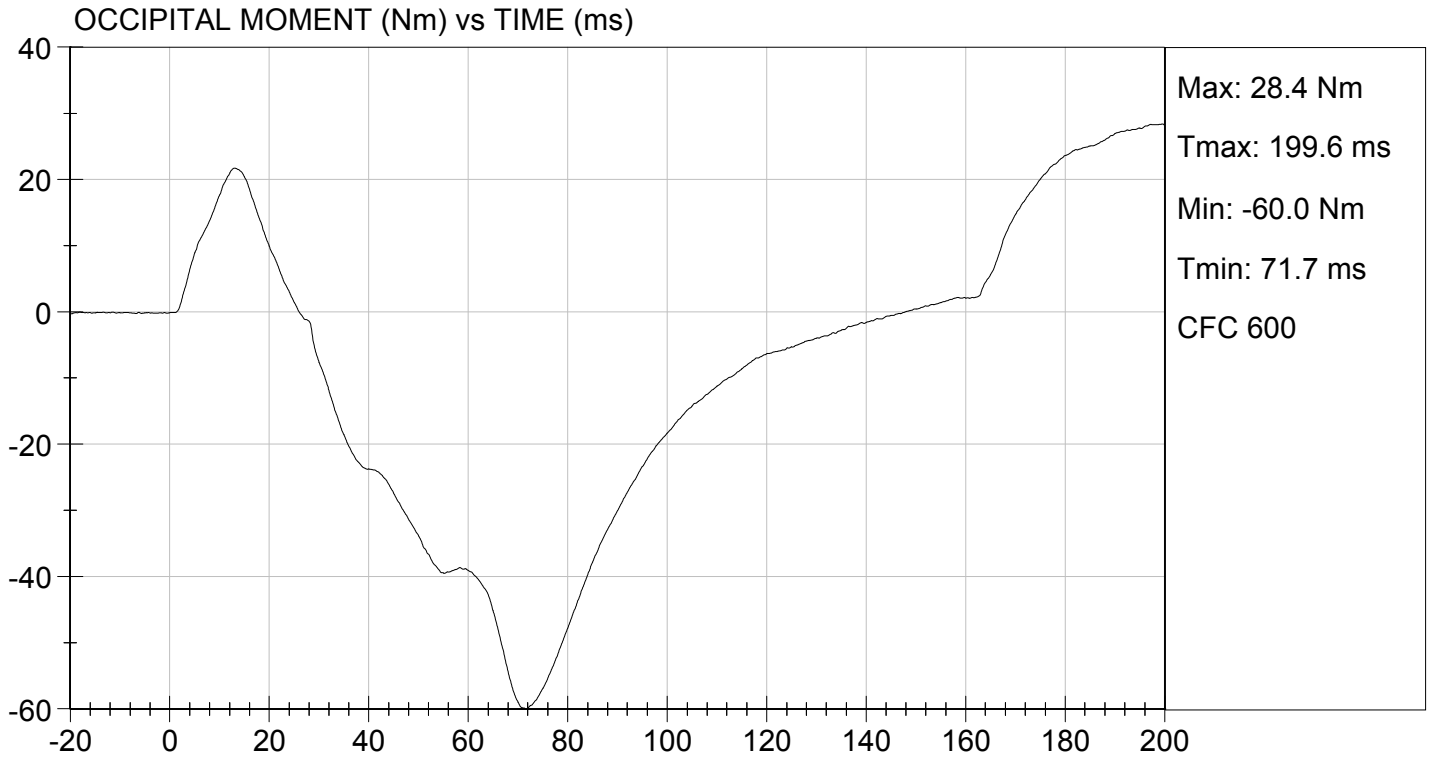

 Laboratory Technician

05/26/2016

Test Date


 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

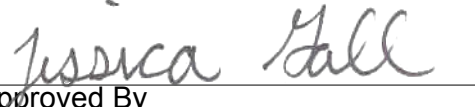
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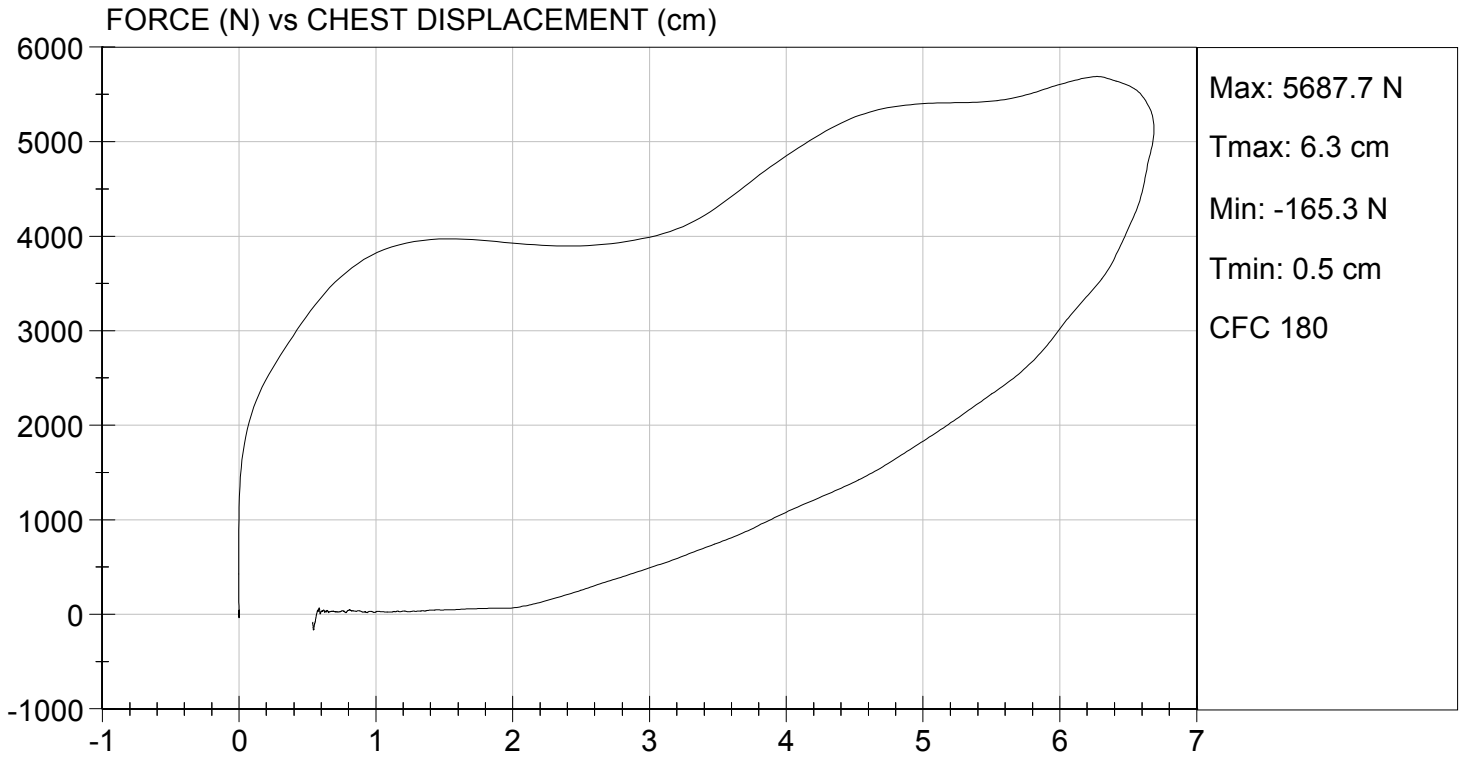
Test I.D: D161824

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	56	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,688	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.69	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Overall Test Results				Pass


 Laboratory Technician

05/27/2016
 Test Date


 Approved By



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


ATD Serial No: 351

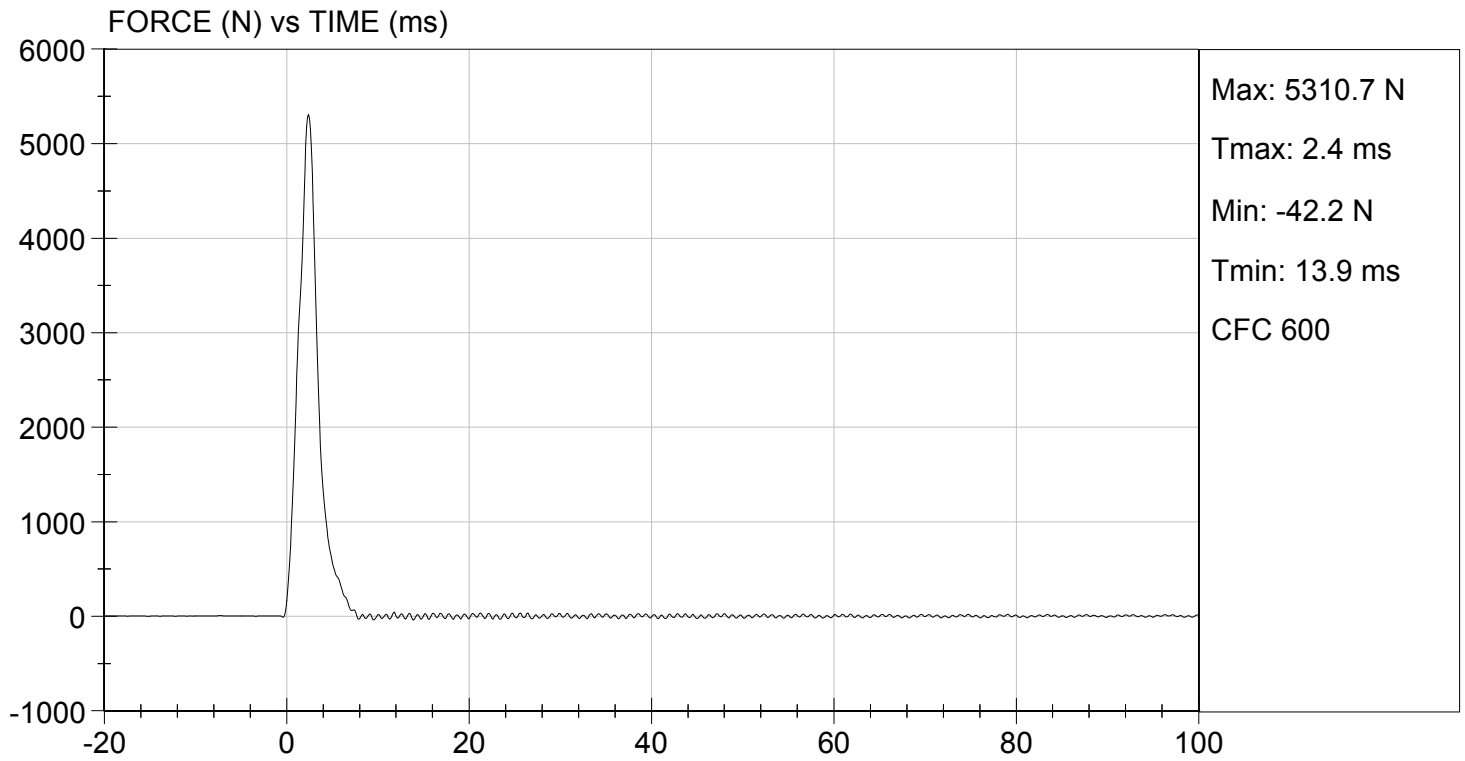
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Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,311	Pass
Overall Test Results				Pass


 Laboratory Technician

05/26/2016
 Test Date


 Approved By



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


ATD Serial No: 351

Test I.D: D161826

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,221	Pass
Overall Test Results				Pass


 Laboratory Technician

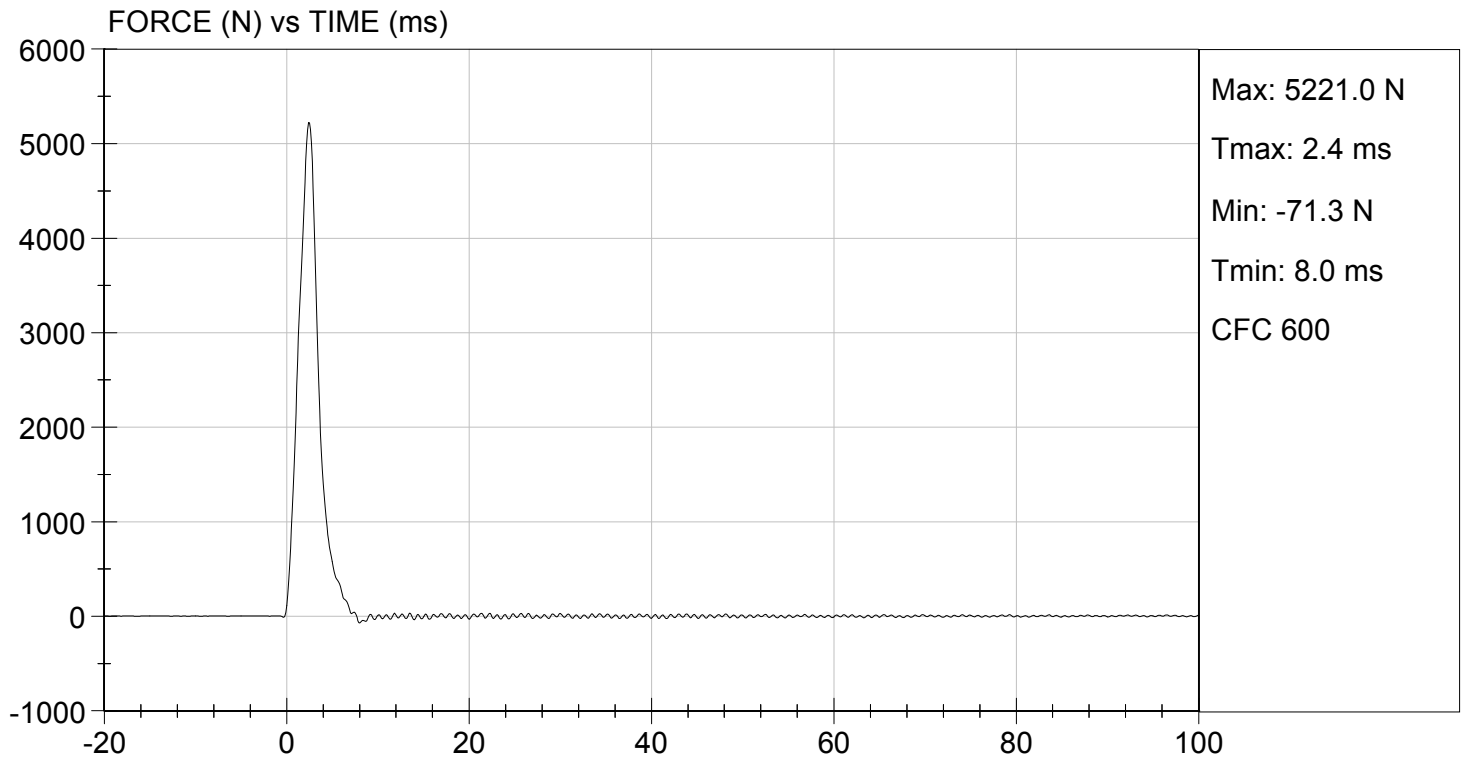
05/26/2016
 Test Date


 Approved By



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

TEST DATE: 05/26/2016
TEST #: D161826



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

ATD Serial No: 351

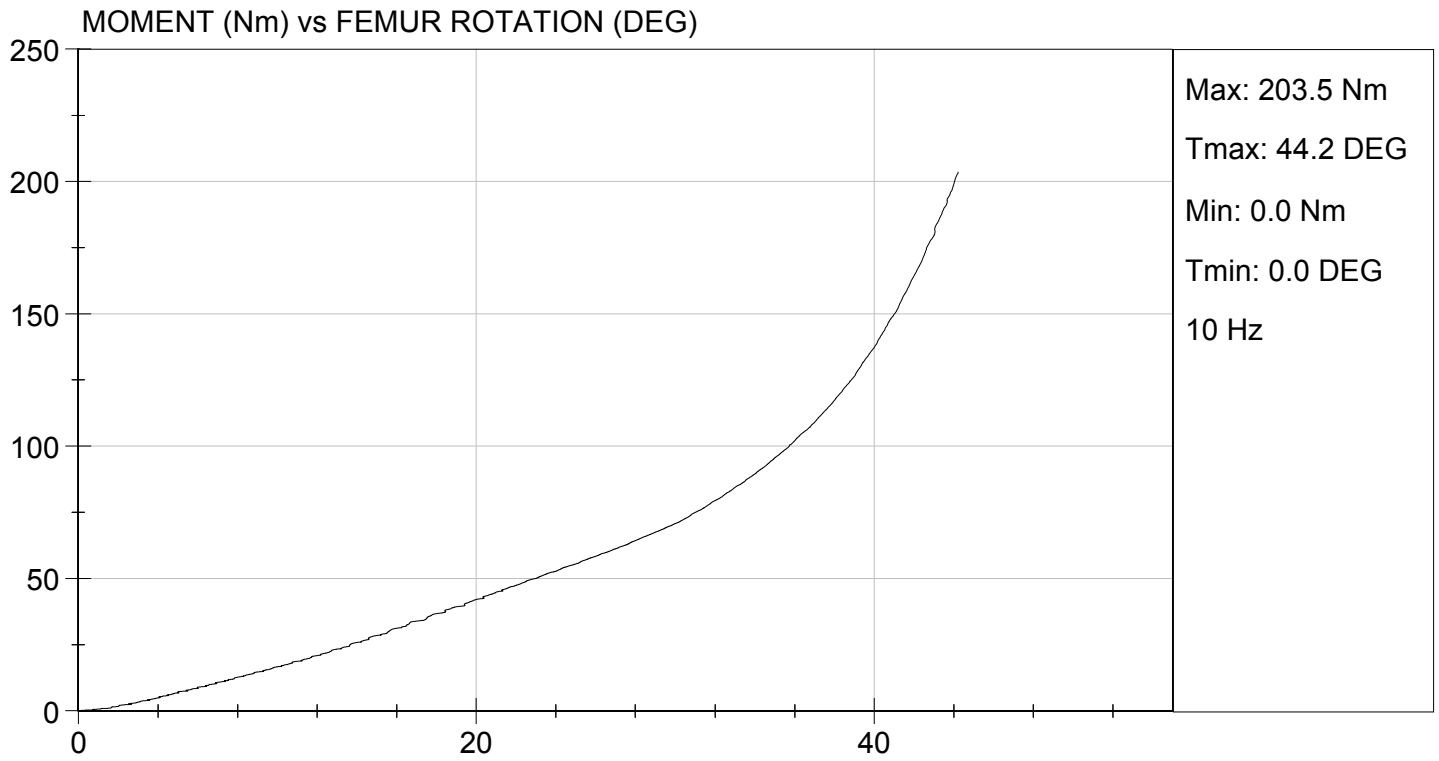
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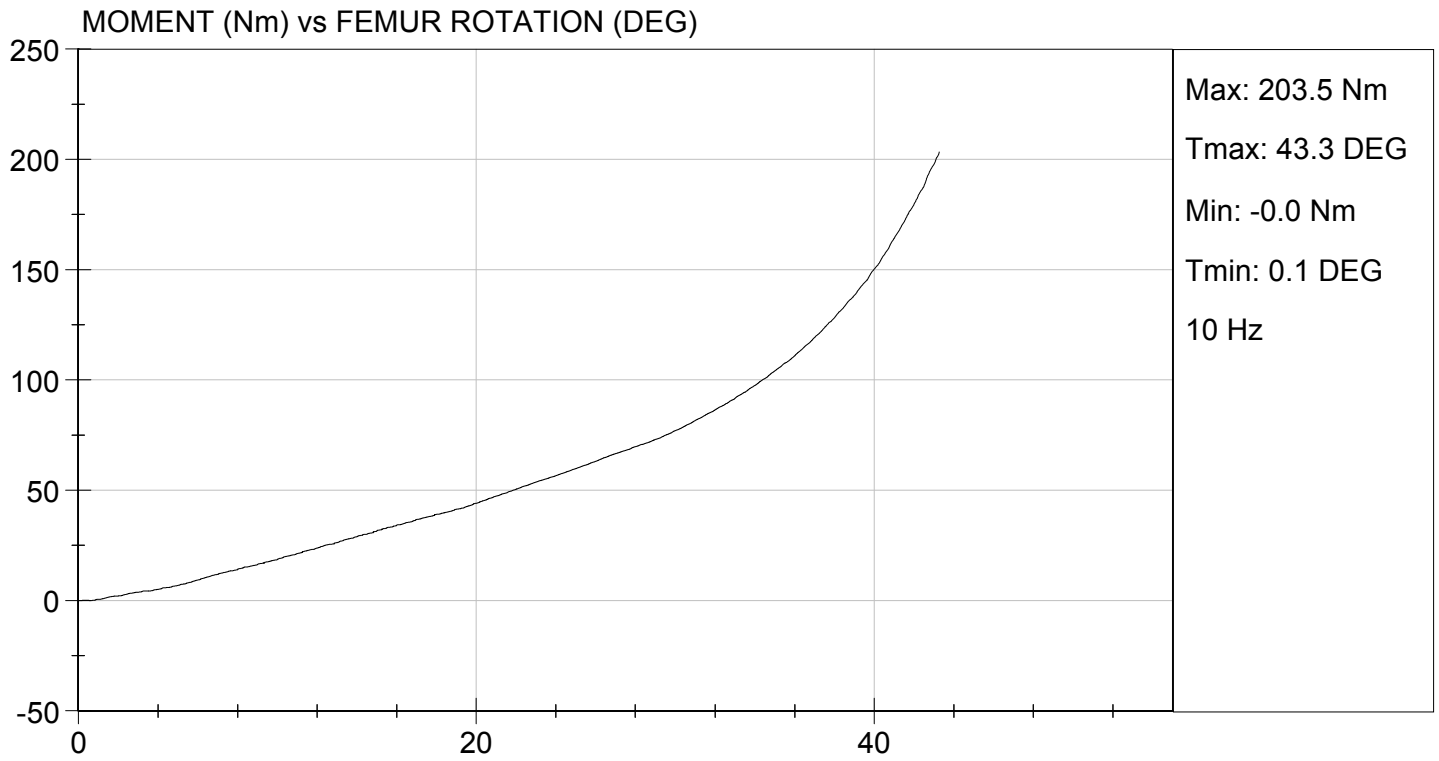
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	50	50	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.2	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	70.8	77.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.2	43.3	Pass
Overall Test Results					Pass


 Laboratory Technician

05/26/2016
 Test Date


 Approved By





Hybrid III, 5th External Measurements
SN: 138

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	785.1
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	456.8
C	H-POINT HEIGHT	Reference	81.3-86.3	84.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	146.2
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	78.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	127.5
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	249.6
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
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	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	201.9
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	526.7
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.3
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	398.0

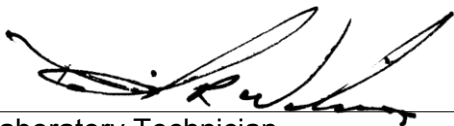
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	414-439.4	430.5
HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	184.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	221.0
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	472.6
S	HEAD BREADTH	The widest part of the head	137.1-147.3	141.9
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	184.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	307.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	360.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	546.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	875.1
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	785.4
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.4
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.1

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

ATD Serial No: 138

Test ID: D161231

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	37	Pass
Peak Resultant Acceleration	G's	250 to 300	263	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	10.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



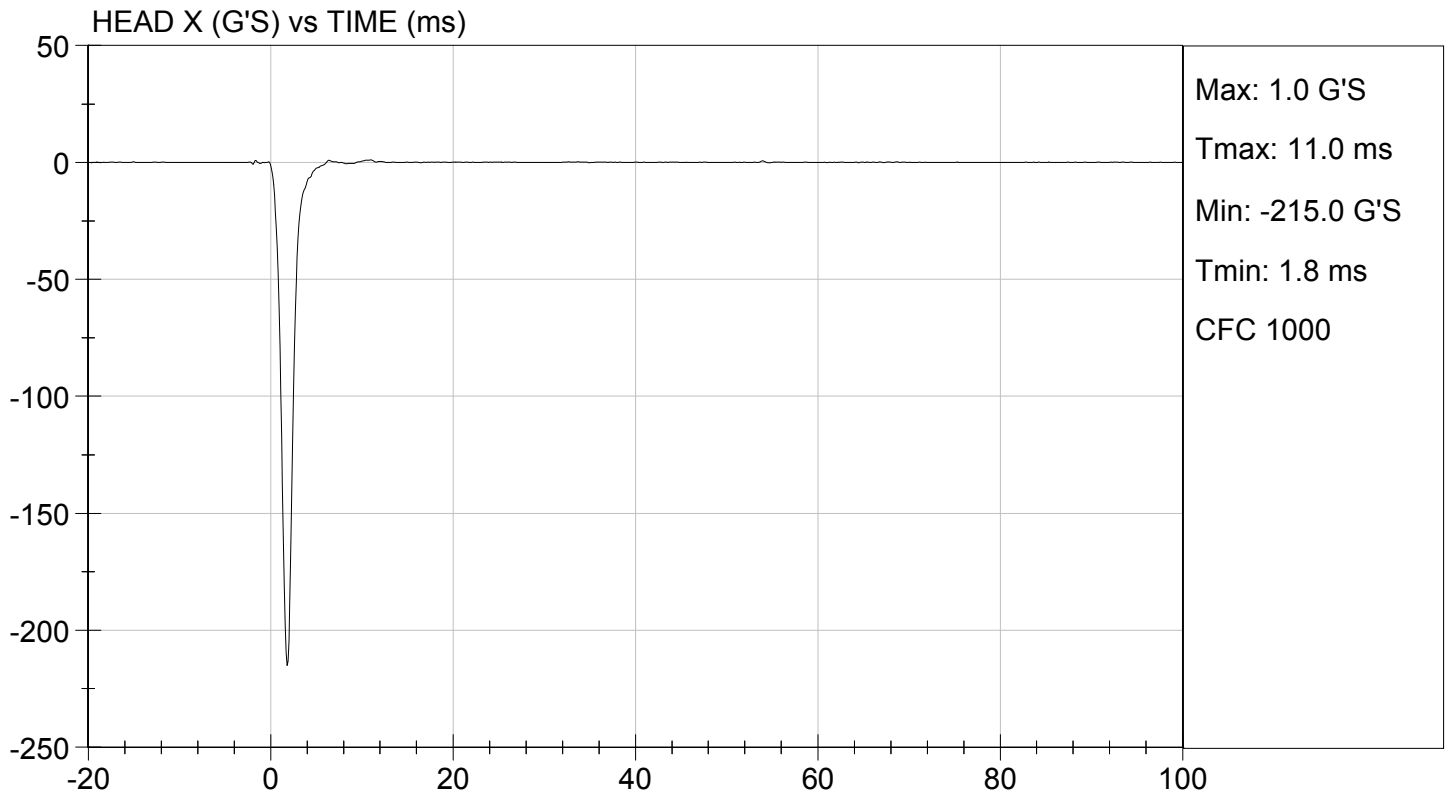
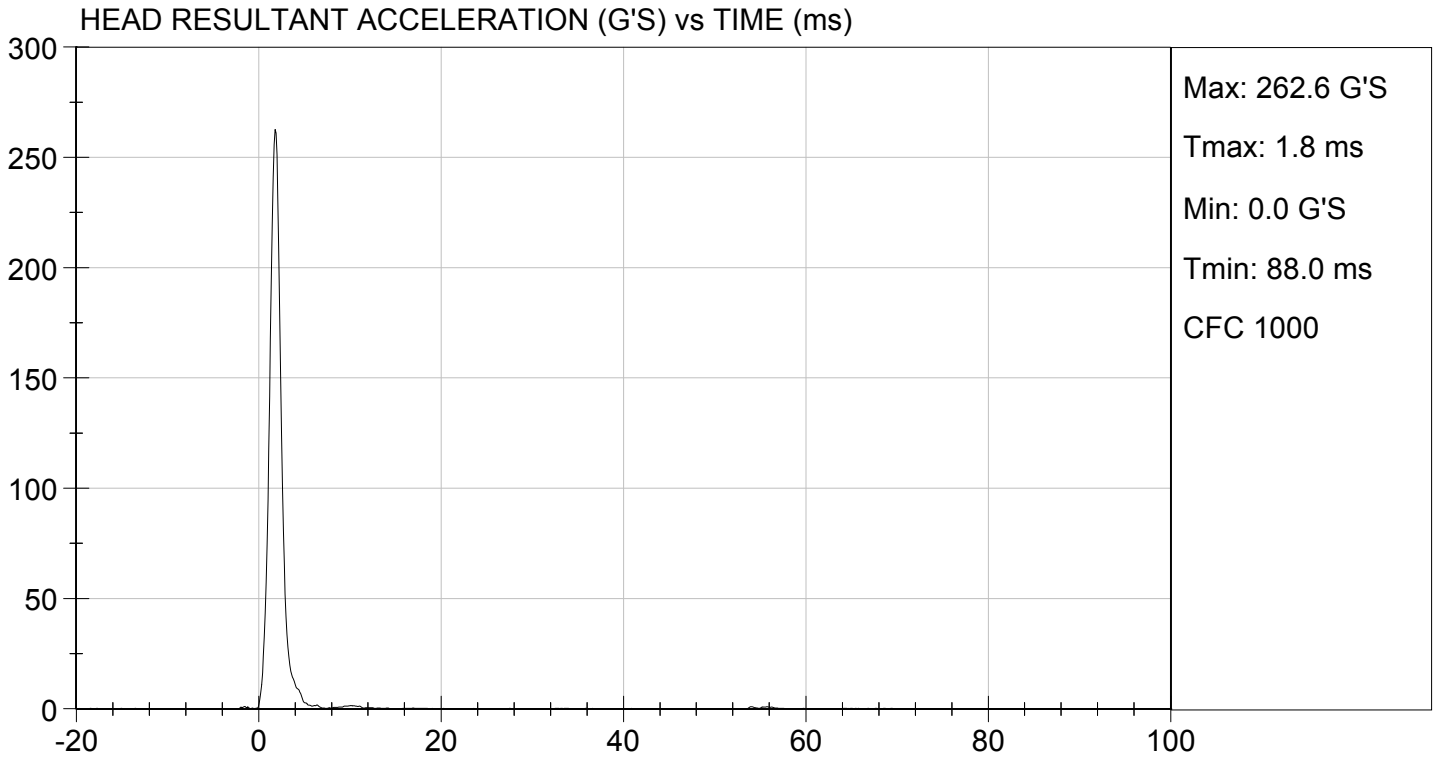
Laboratory Technician

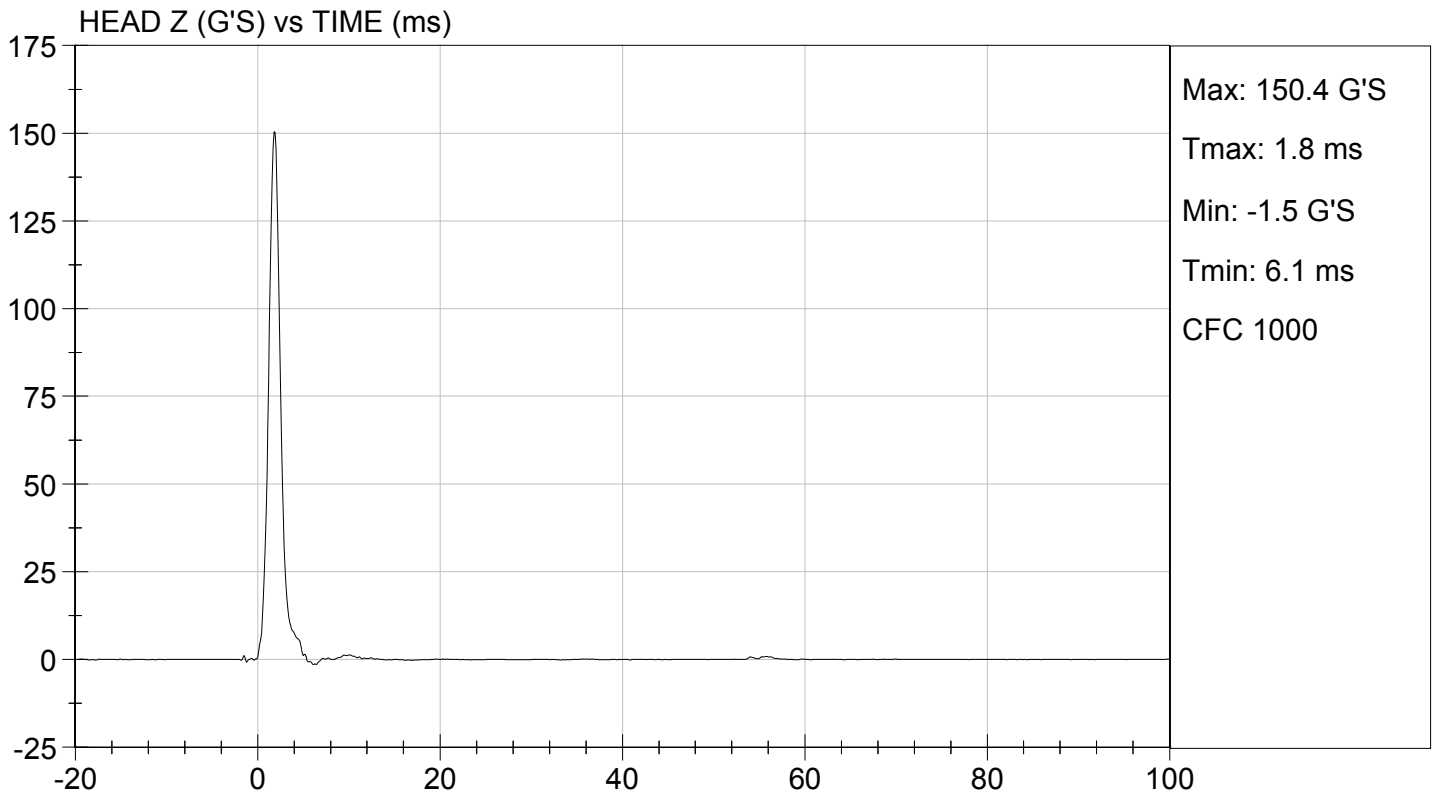
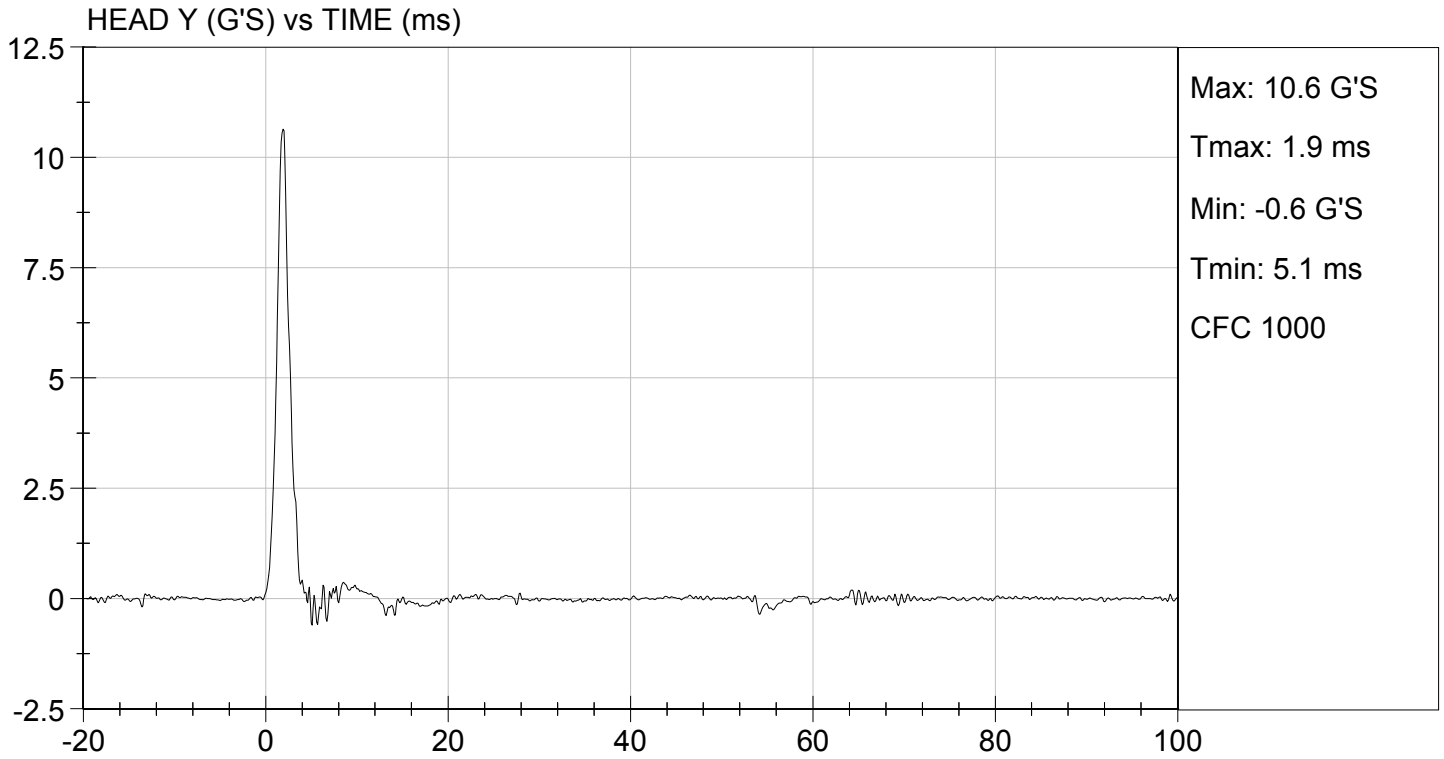
04/06/2016

Test Date



Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161232


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	36	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	4.3	Pass
	30 ms	m/s	5.8 to 7.0	6.0	Pass
D Plane Rotation	Max	deg	77 to 91	79	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	89	Pass
Overall Results					Pass



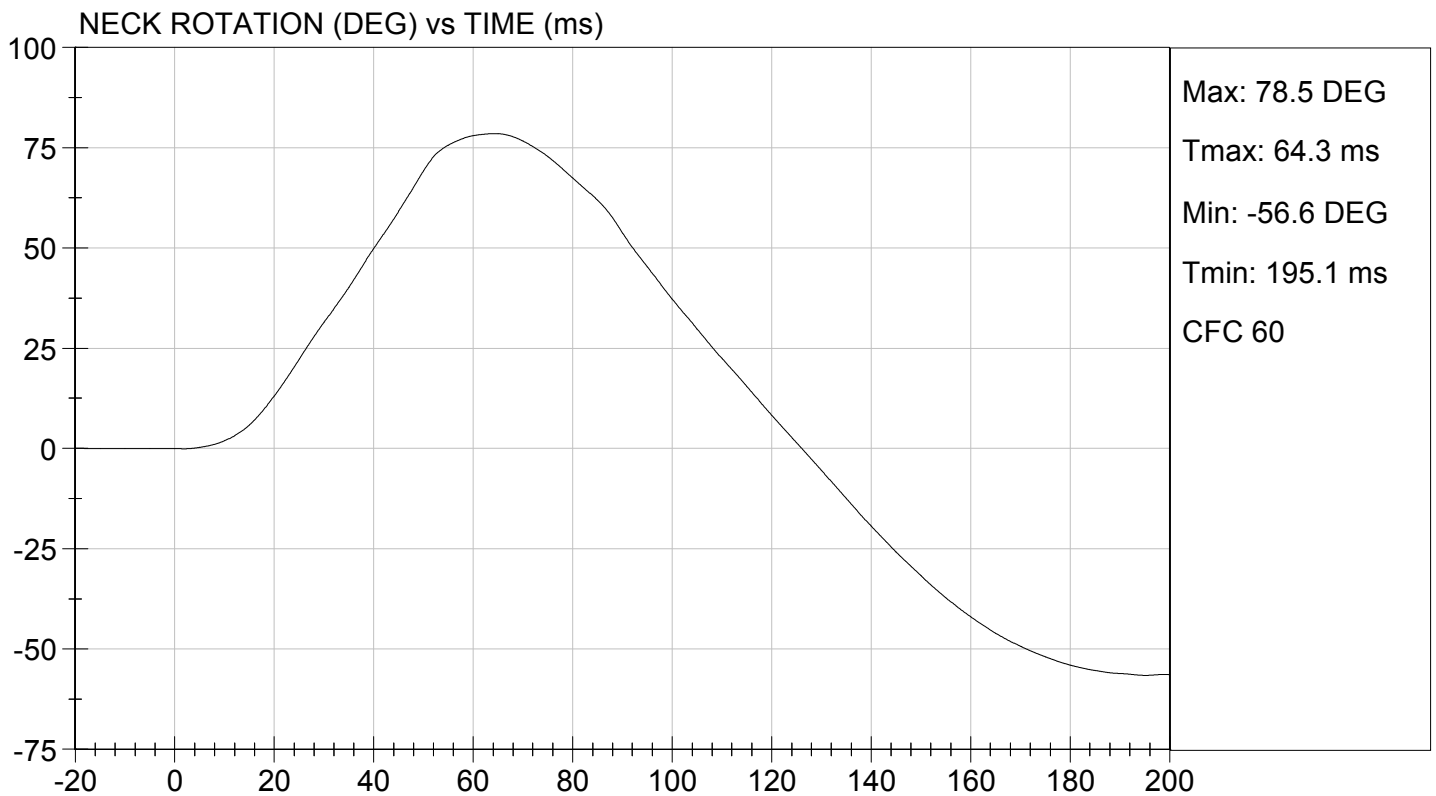
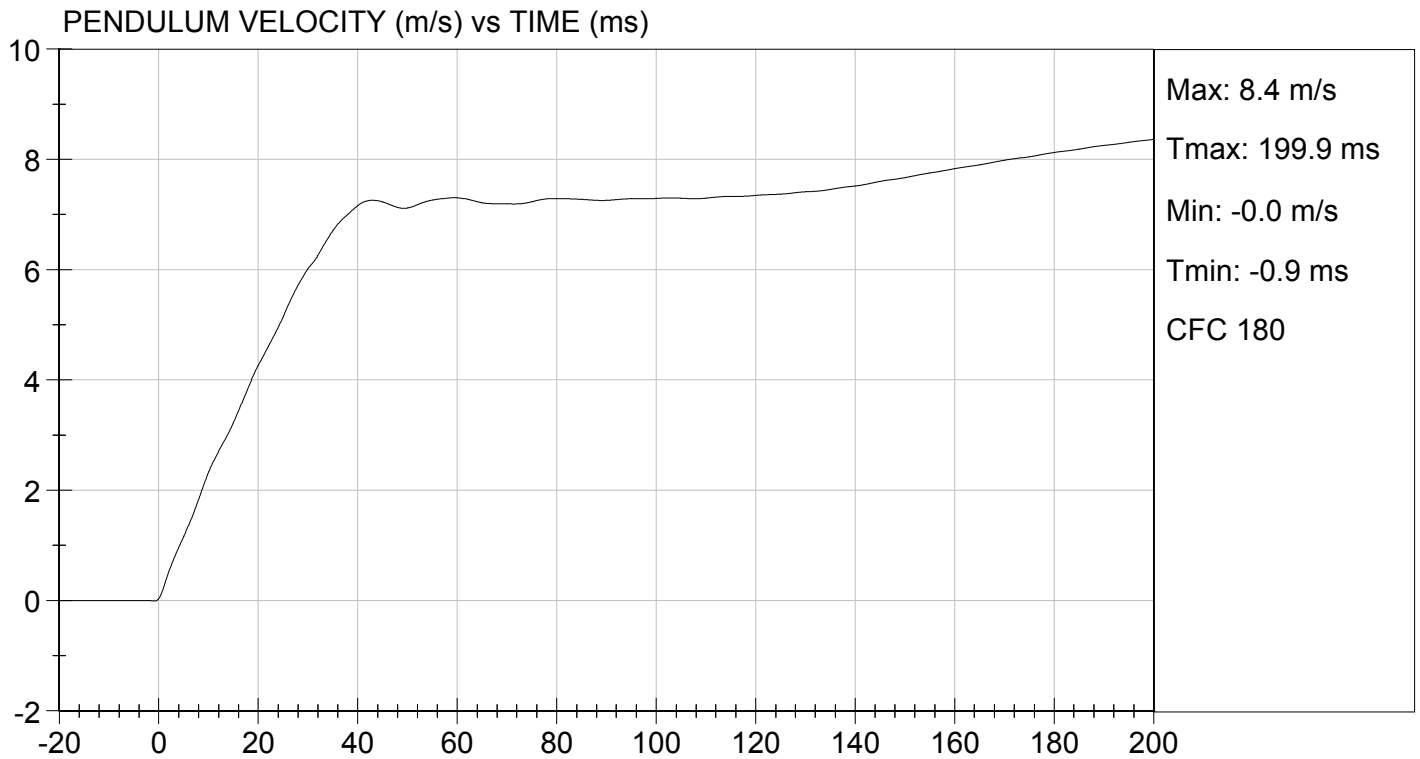
 Laboratory Technician

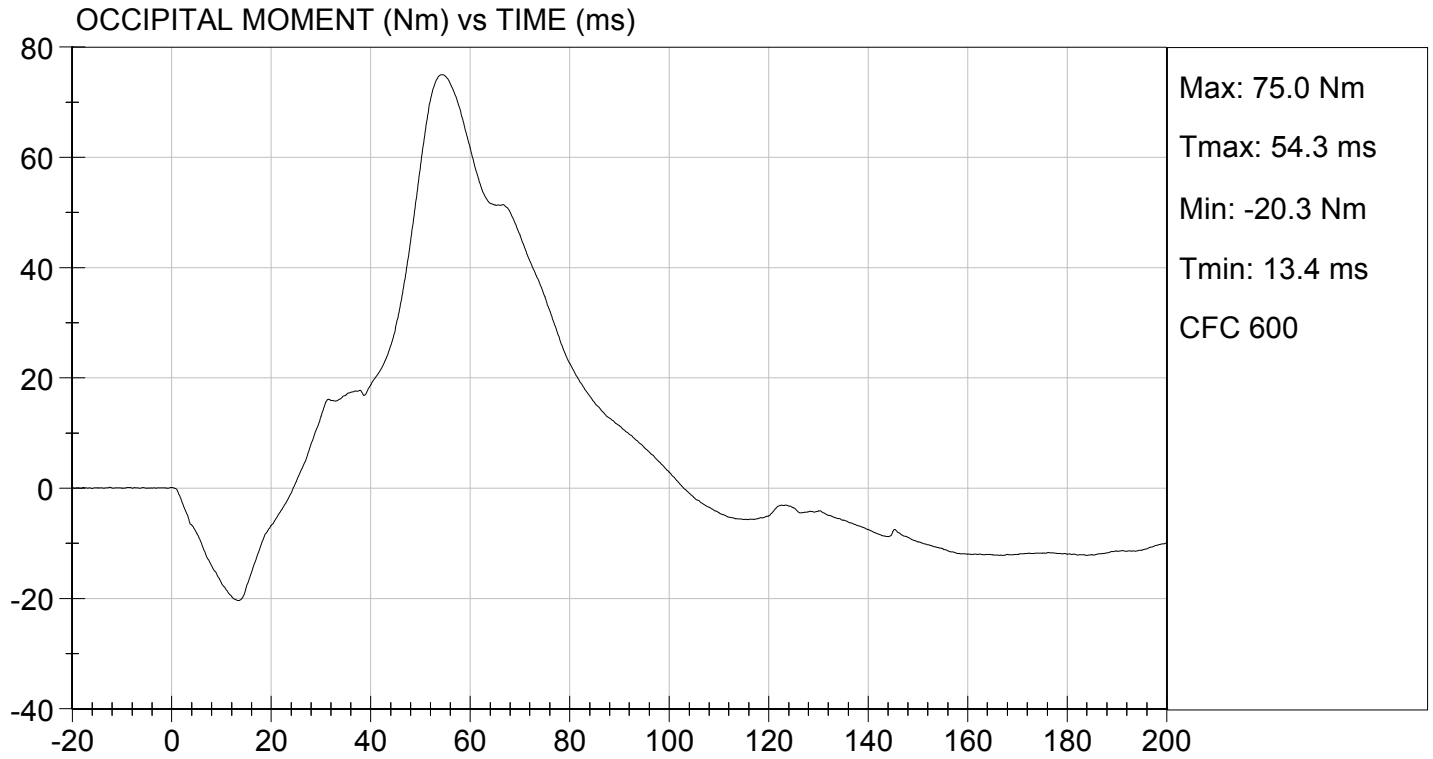
04/06/2016

 Test Date



 Approved By





MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

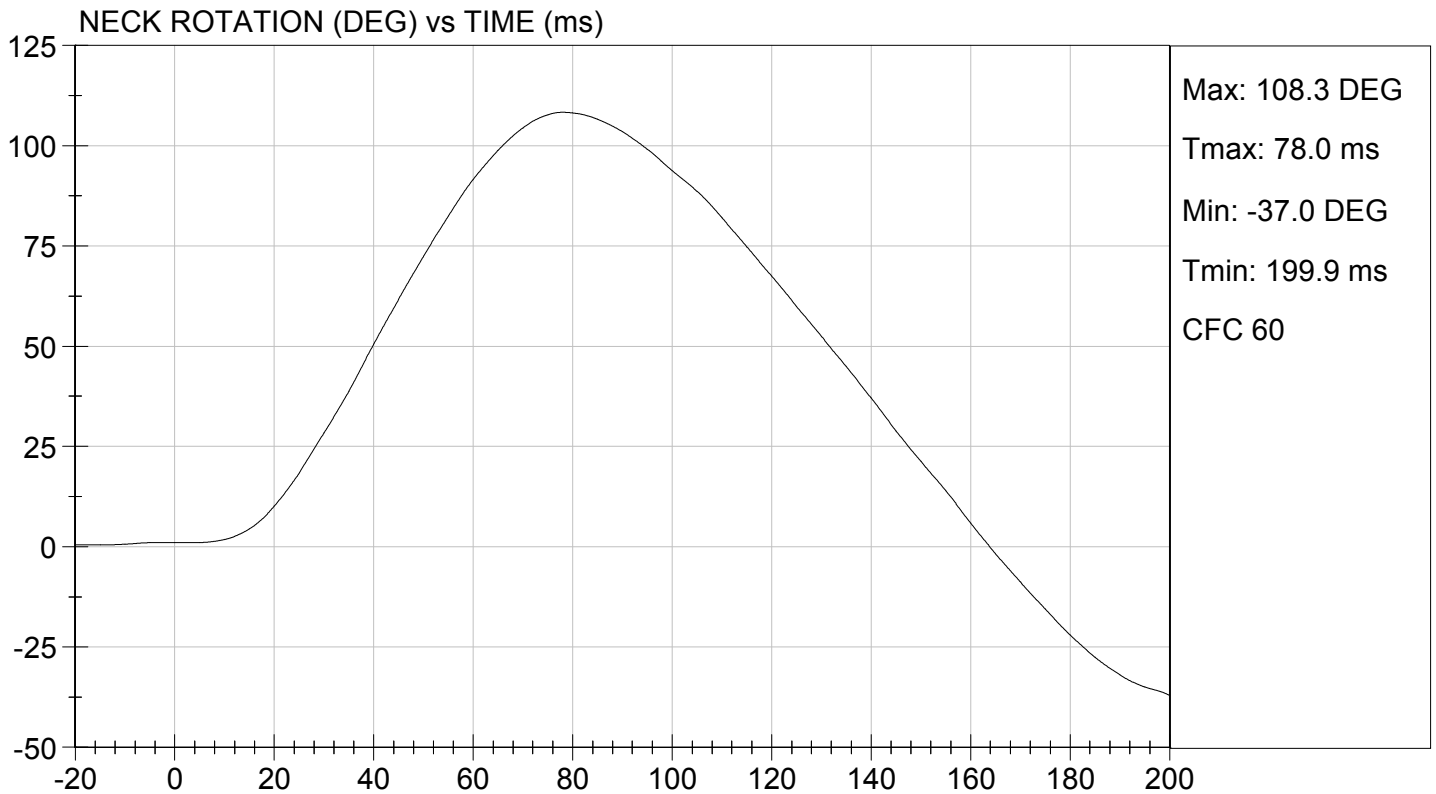
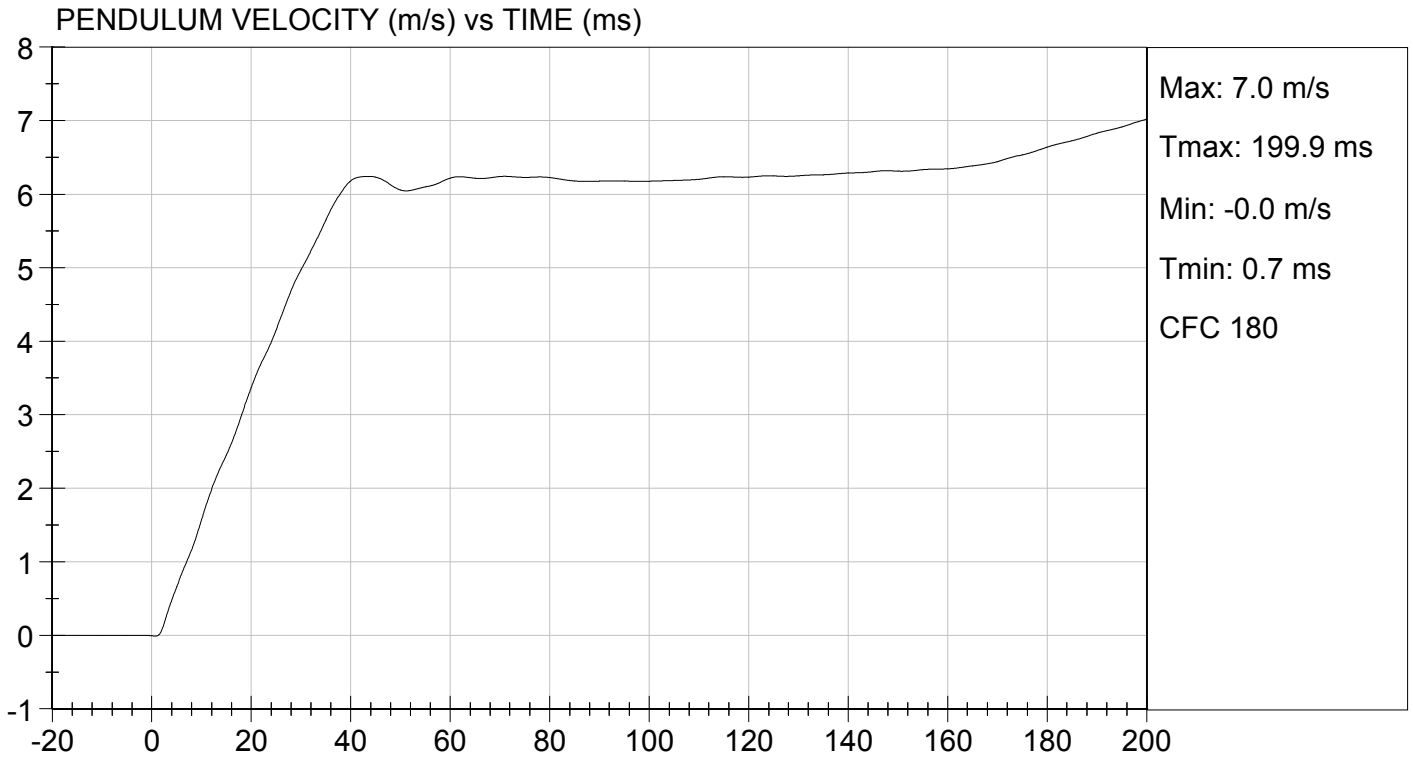
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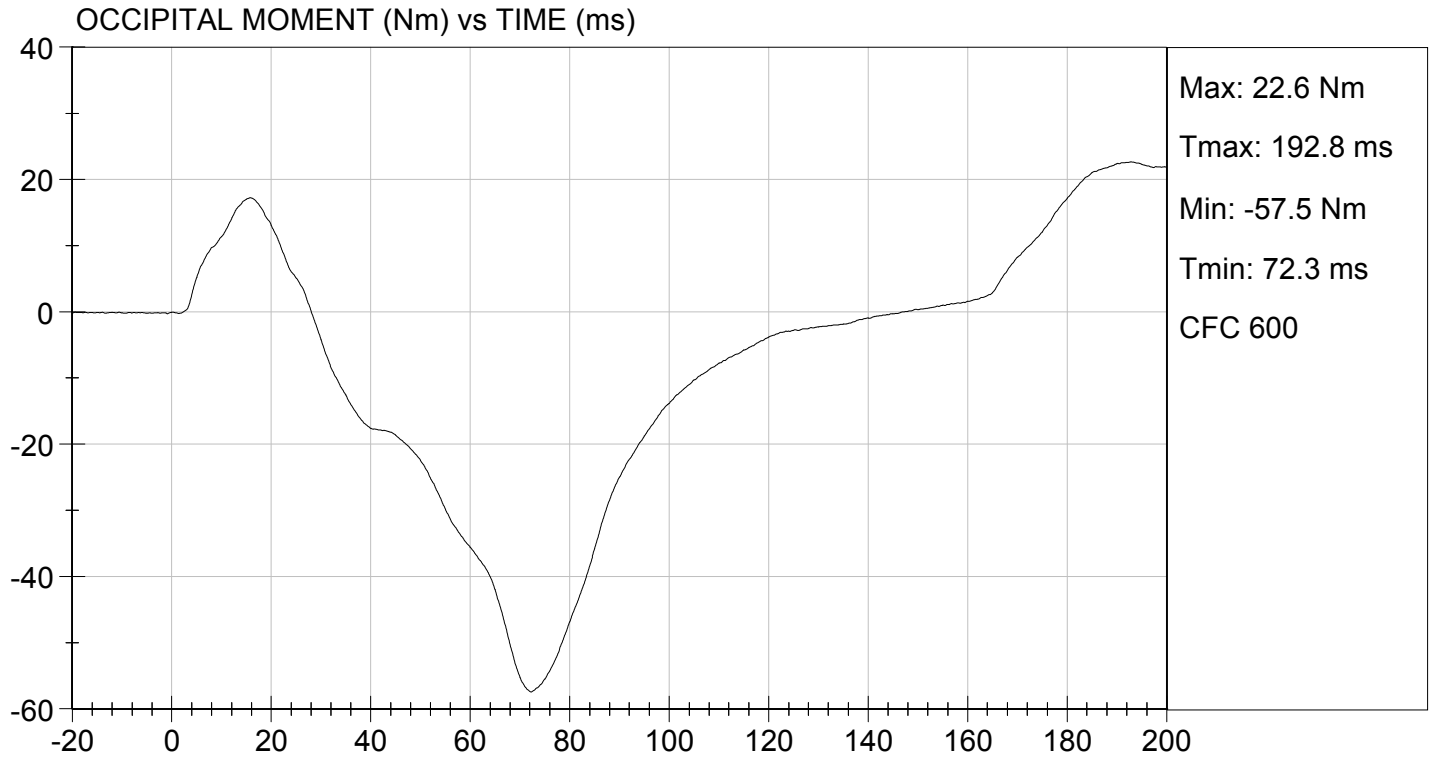
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.6	Pass
	20 ms	m/s	3.1 to 3.9	3.4	Pass
	30 ms	m/s	4.6 to 5.6	5	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
Overall Results					Pass


 Laboratory Technician

04/06/2016
 Test Date


 Approved By



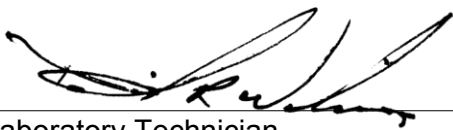


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161234

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.9	Pass
Relative Humidity	%	10 to 70	35	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4381	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4368	Pass
Overall Test Results				Pass



Laboratory Technician

04/07/2016

Test Date

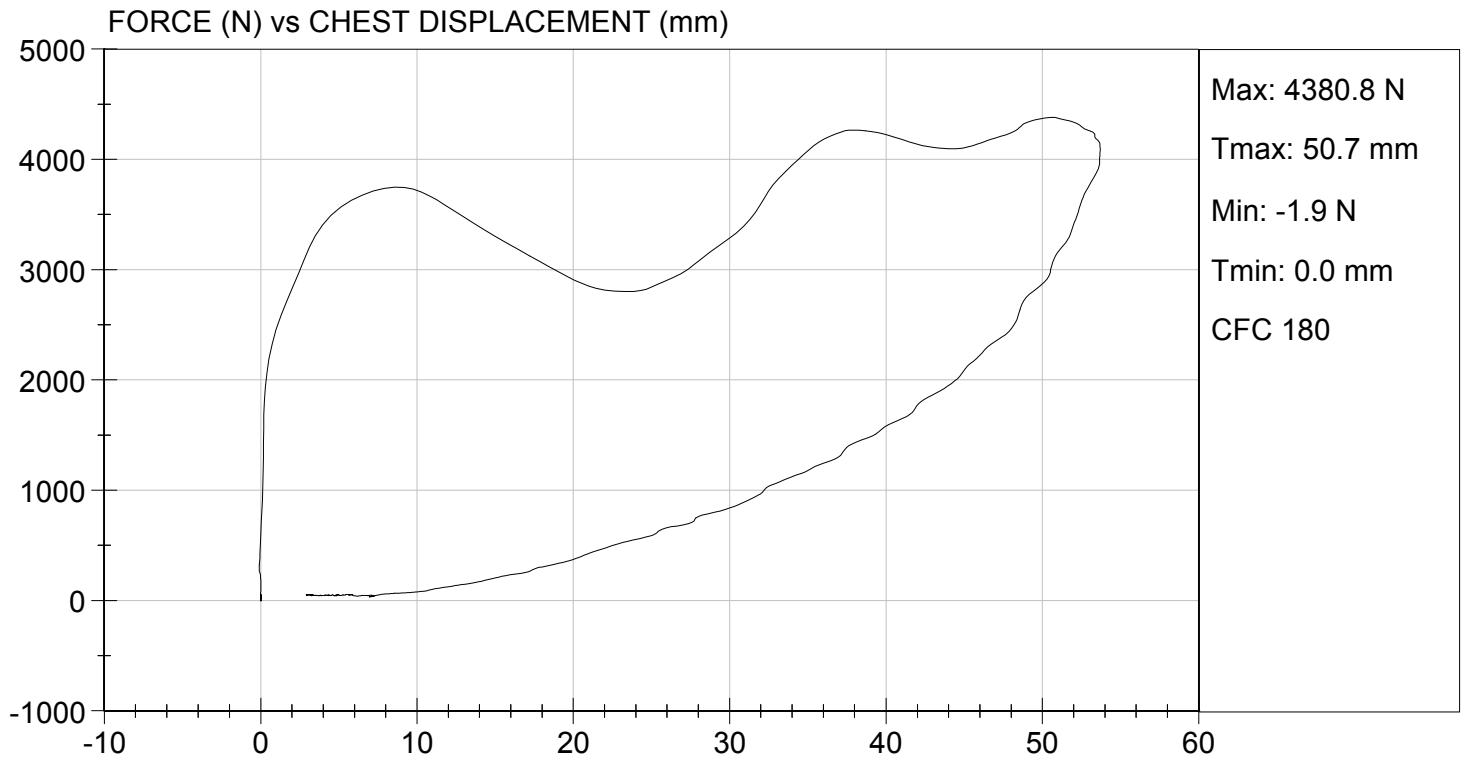


Approved By



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

TEST DATE: 04/07/2016
TEST #: D161234

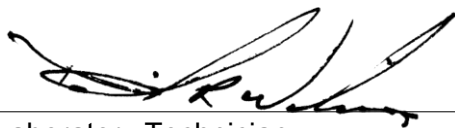


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161235

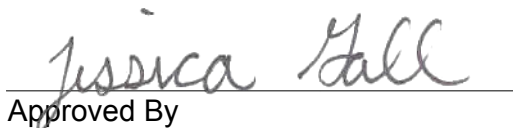
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3501	Pass
Overall Test Results				Pass



Laboratory Technician

04/06/2016

Test Date

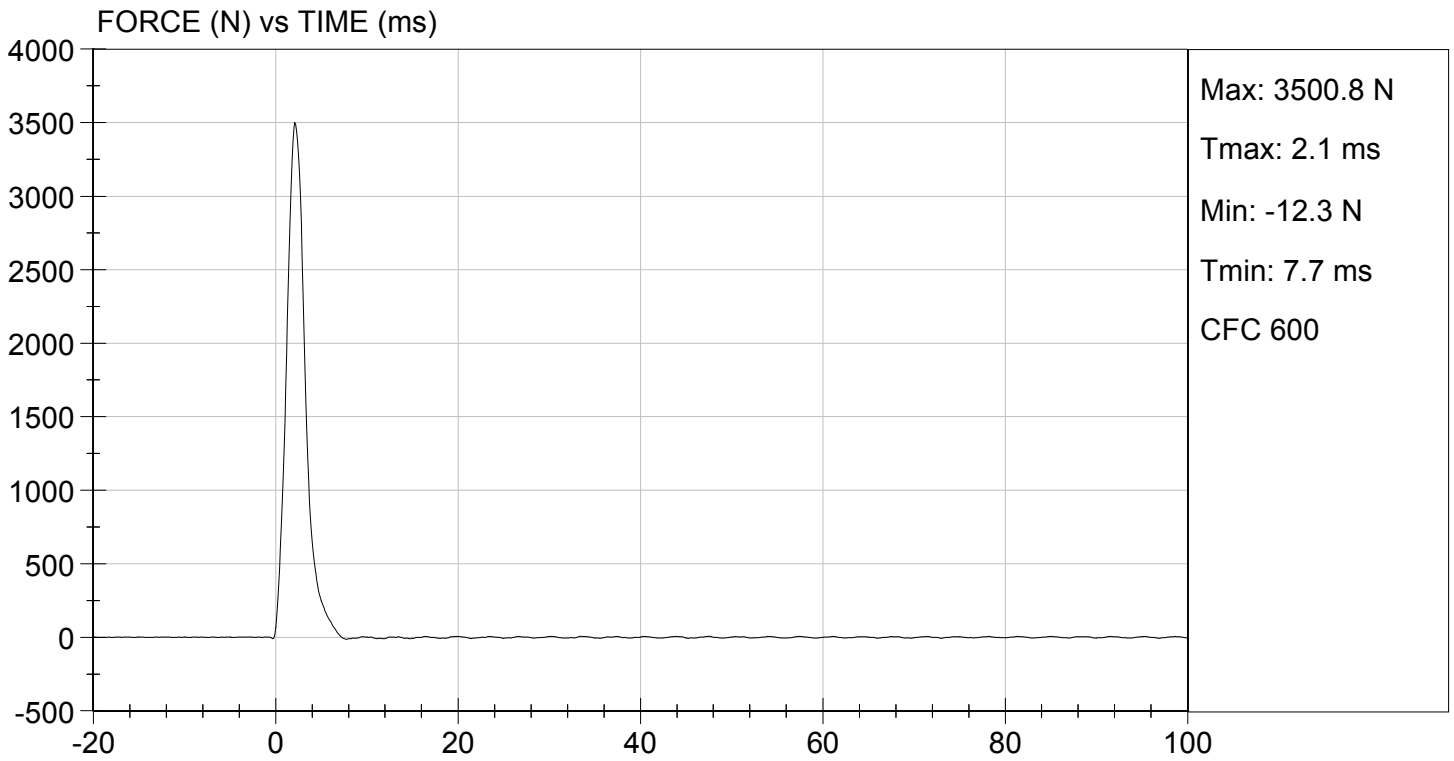


Approved By



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

TEST DATE: 04/06/2016
TEST #: D161235

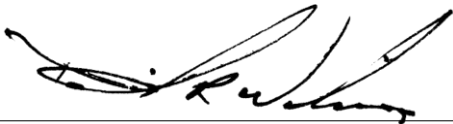


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161236


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	36	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3486	Pass
Overall Test Results				Pass



 Laboratory Technician

 04/06/2016

Test Date

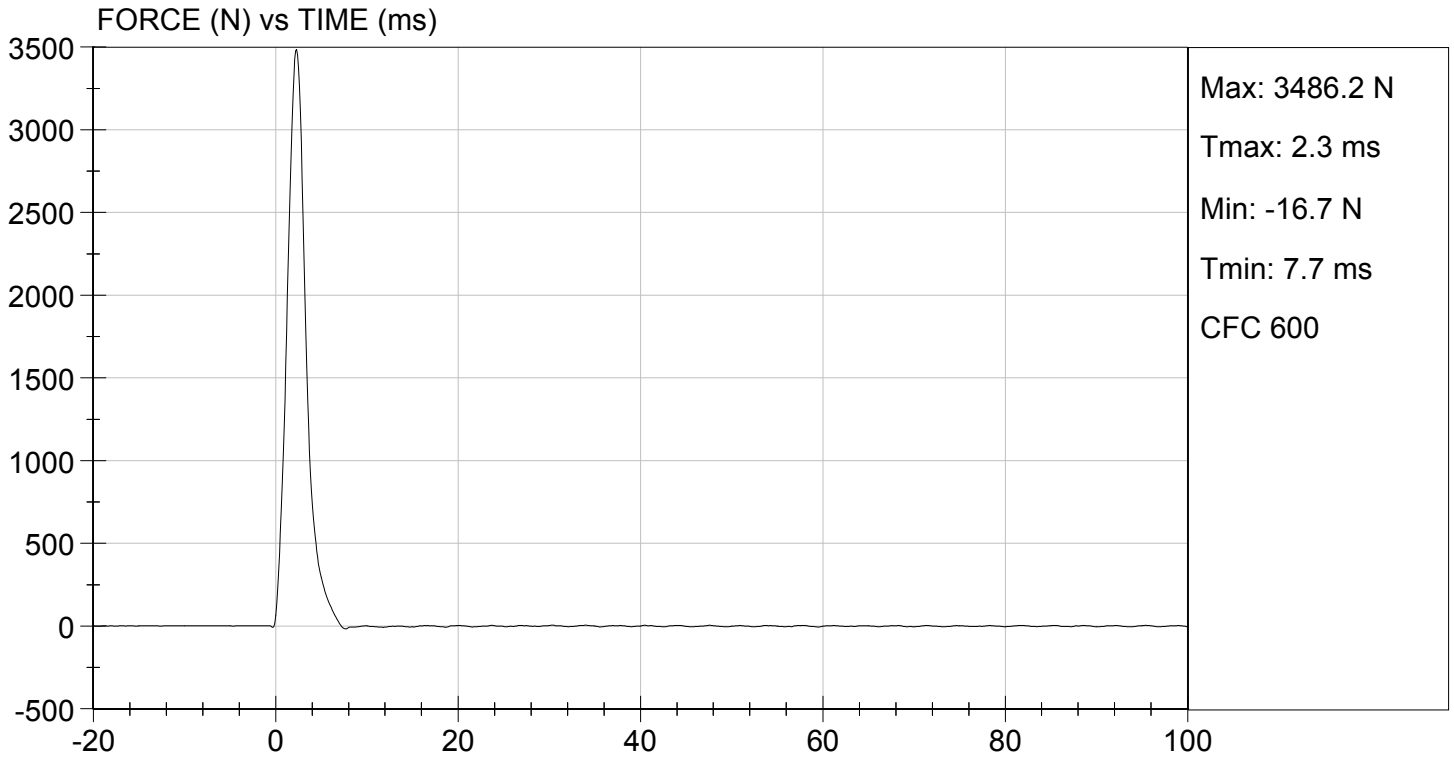


 Approved By



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

TEST DATE: 04/06/2016
TEST #: D161236



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161237

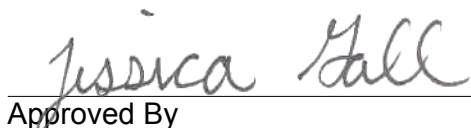
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	364	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.8	Pass
Overall Result				Pass



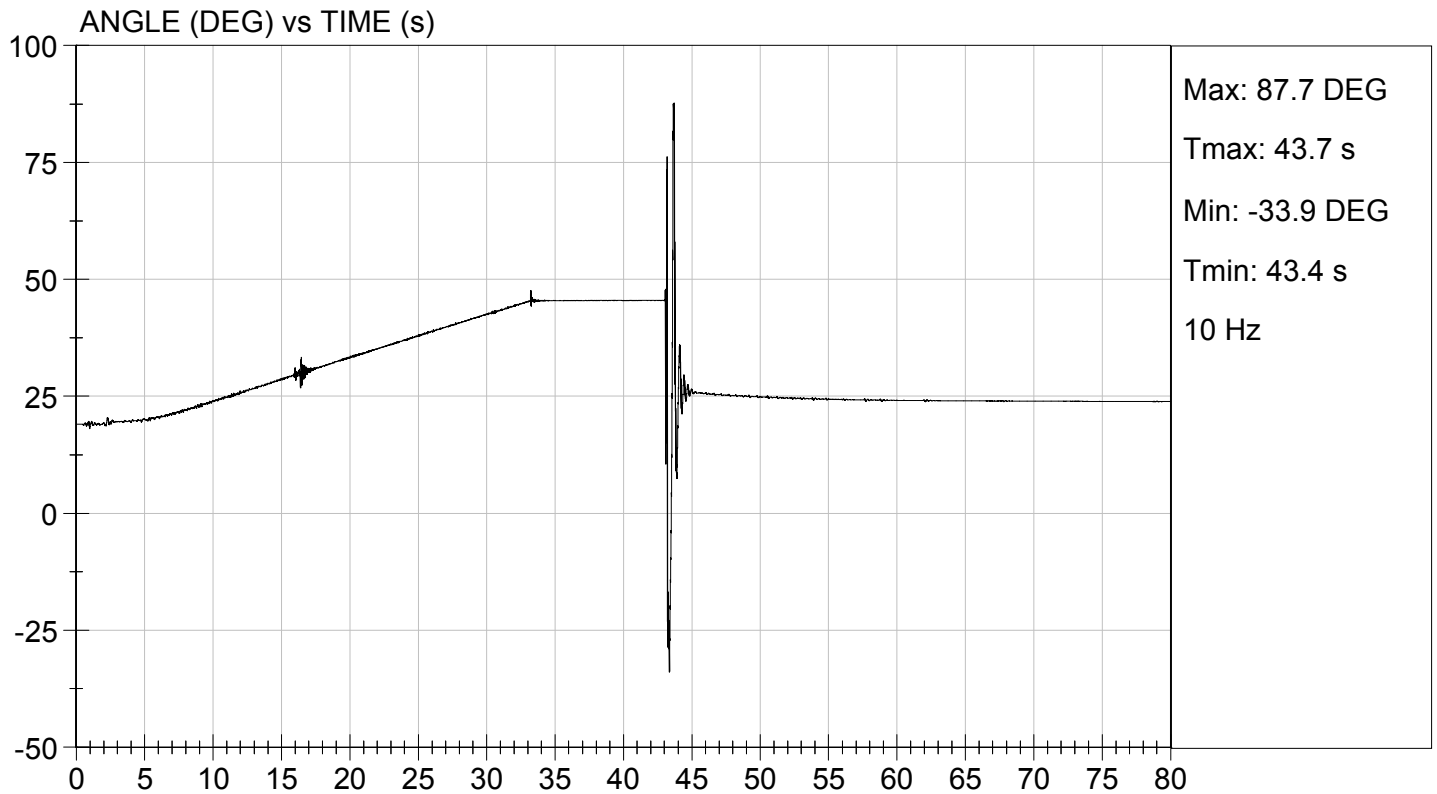
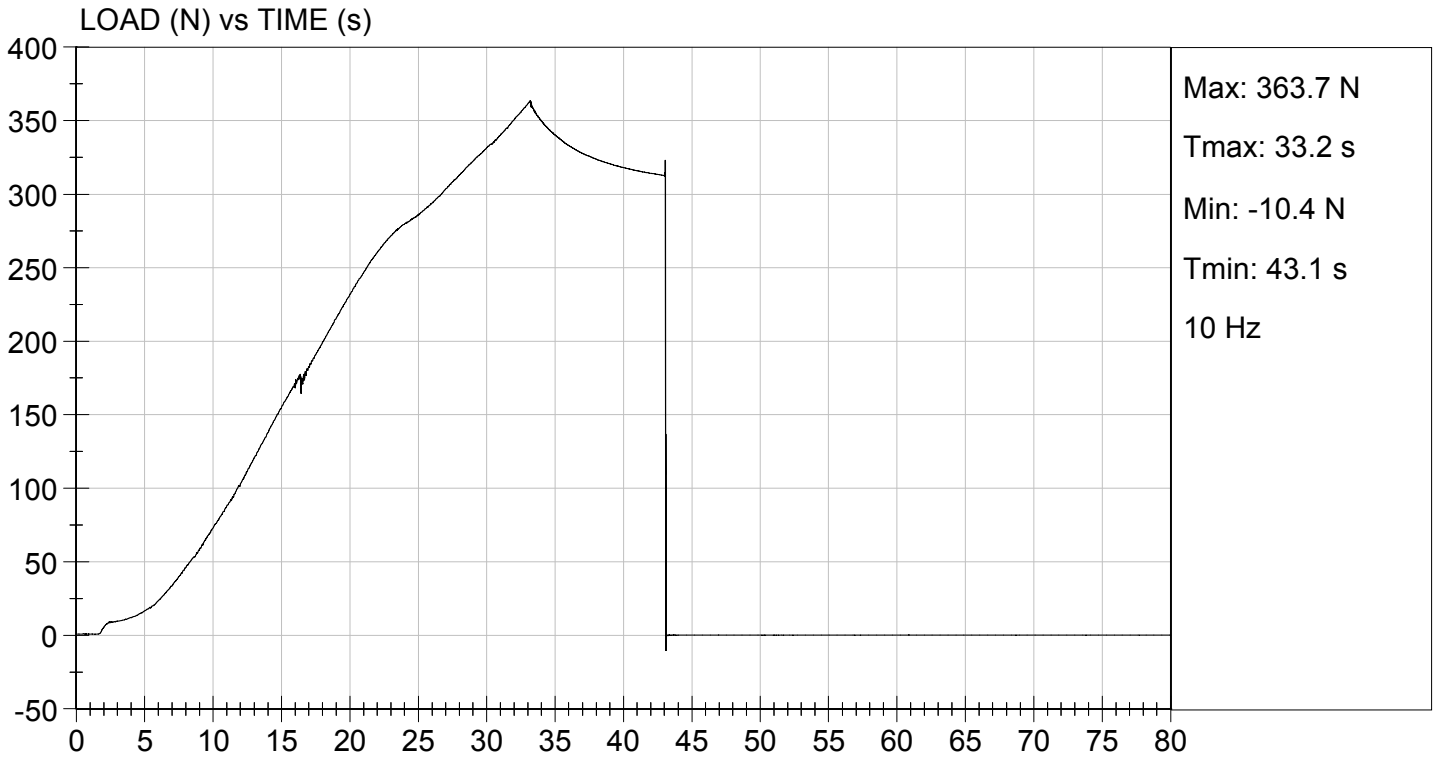
Laboratory Technician

04/06/2016

Test Date



Approved By

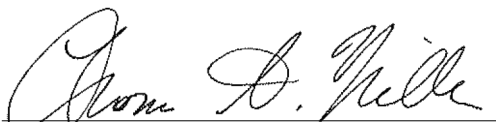


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE


ATD Serial No: 138

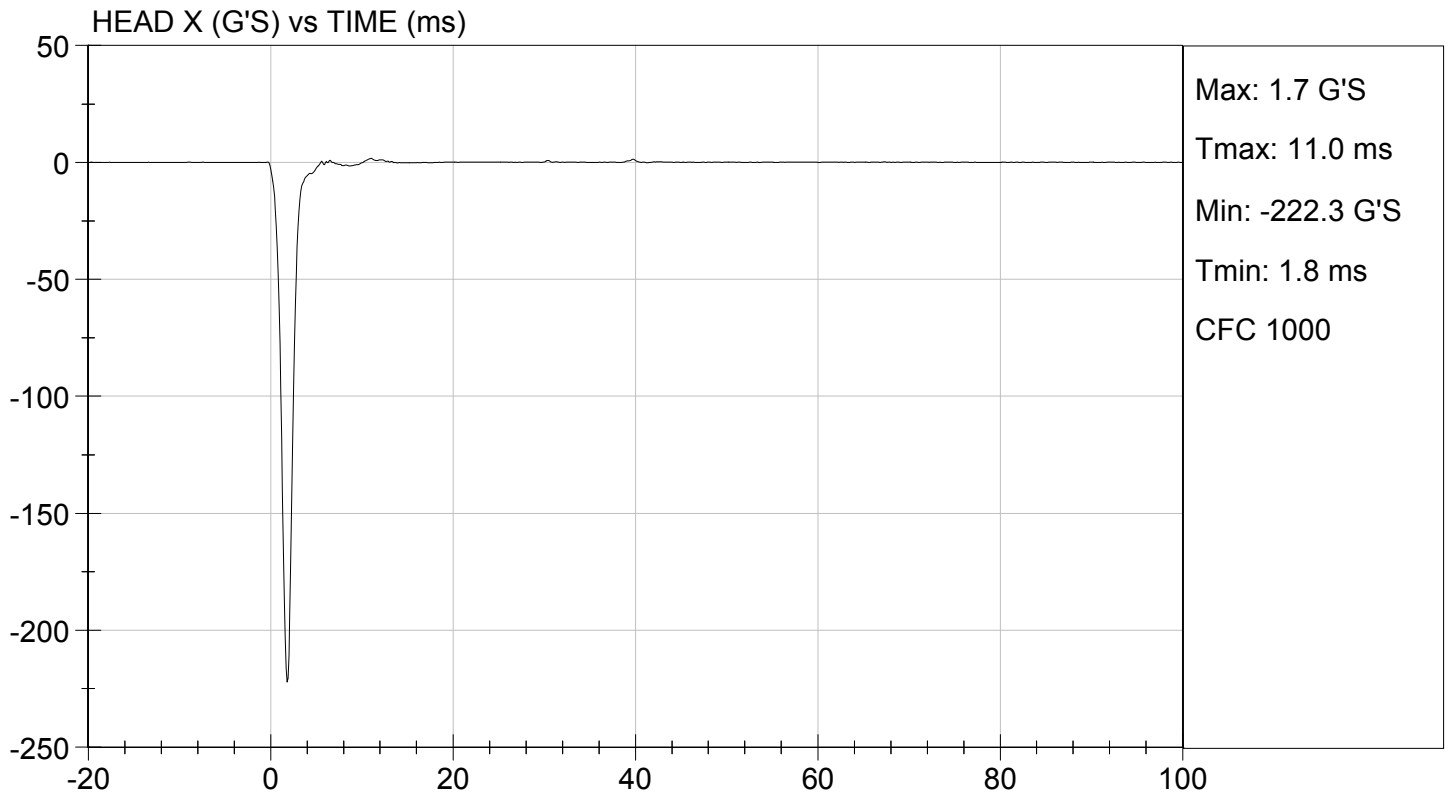
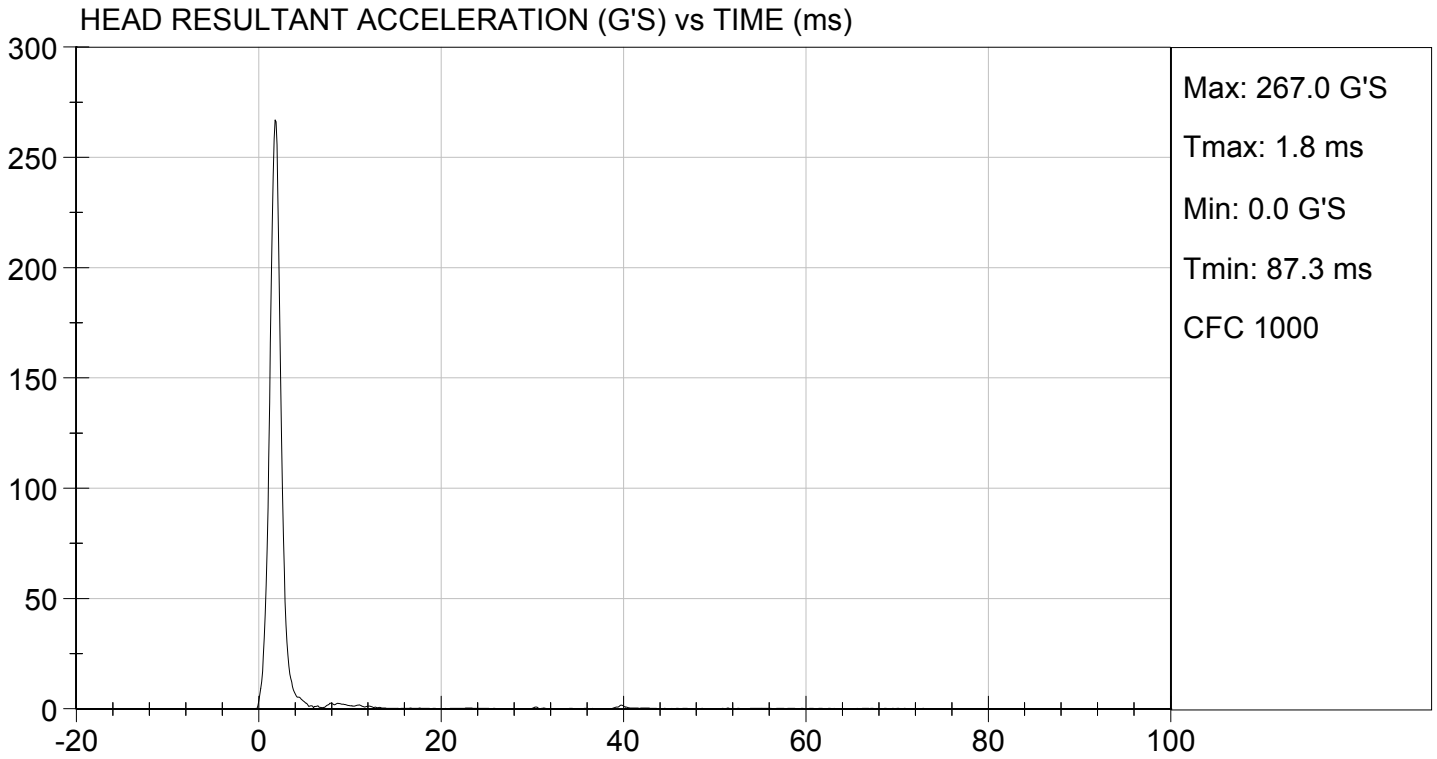
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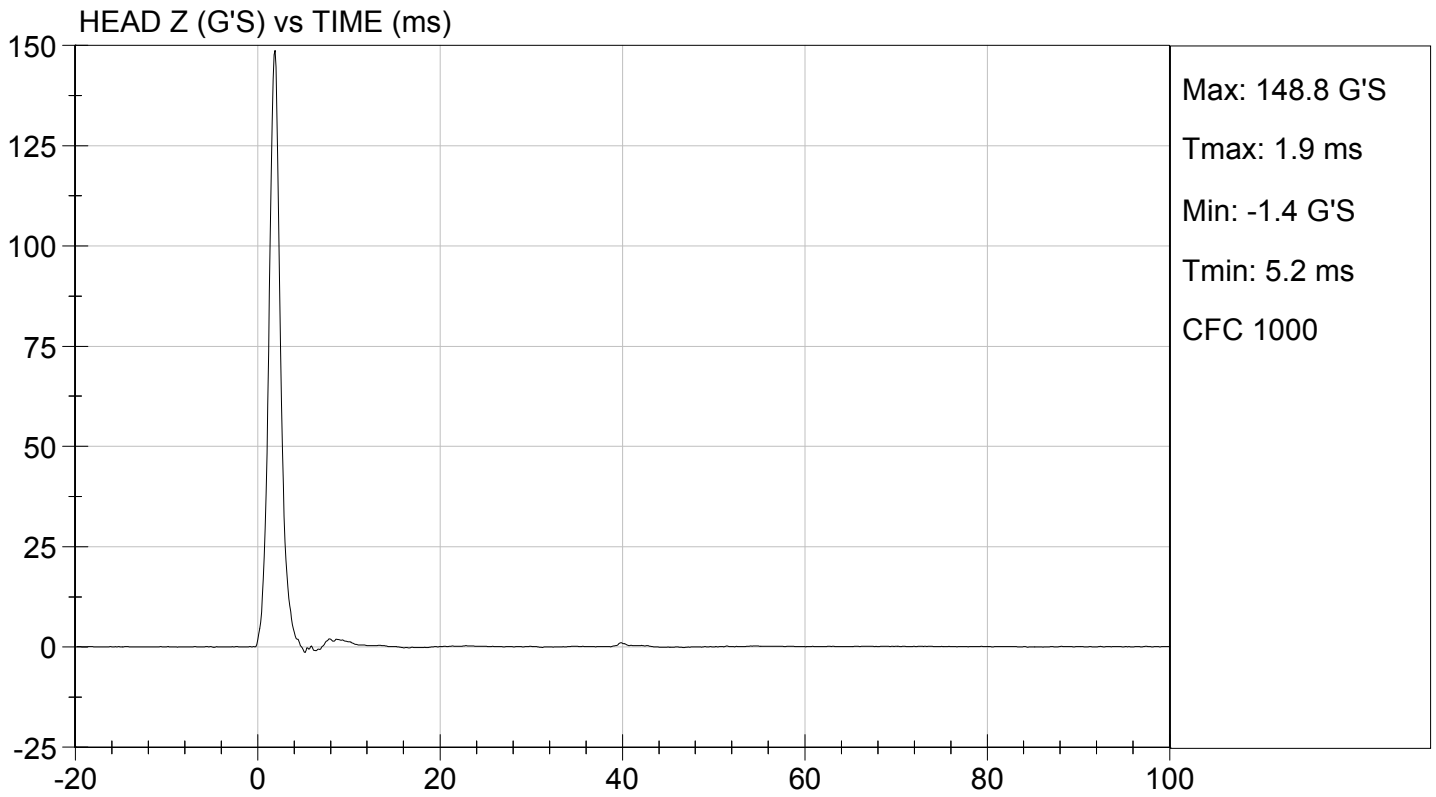
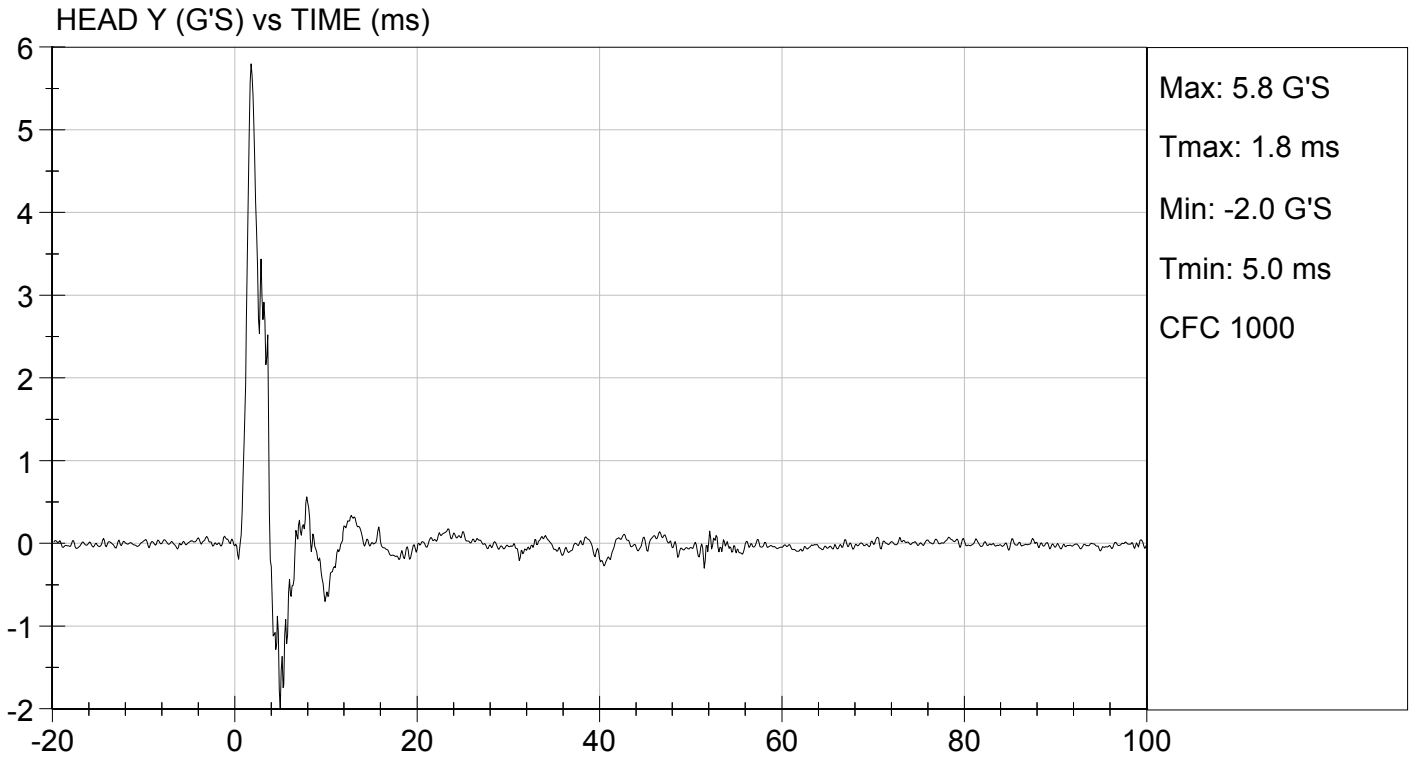
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	250 to 300	267	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	5.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

05/26/2016
 Test Date


 Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161832


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	56	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.4	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass



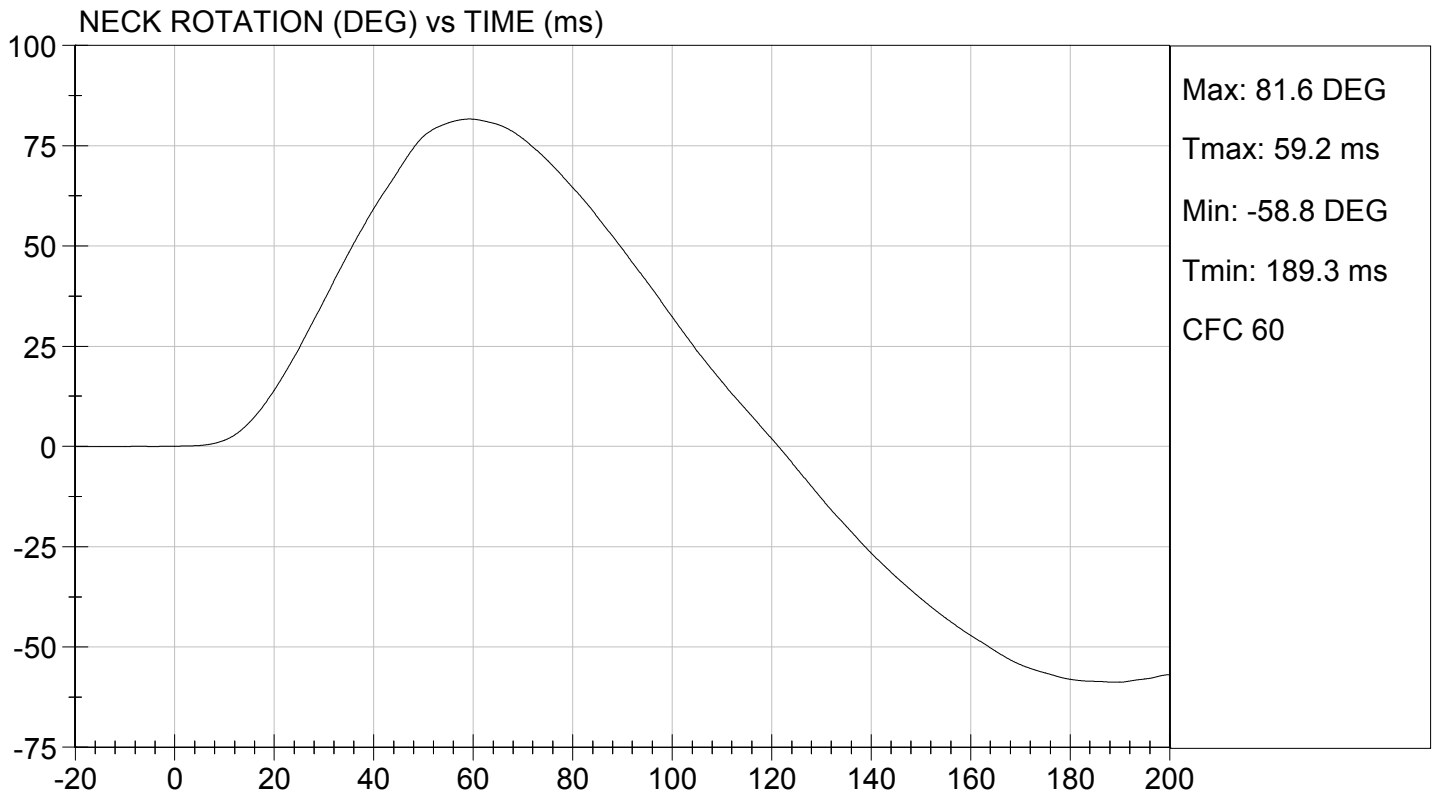
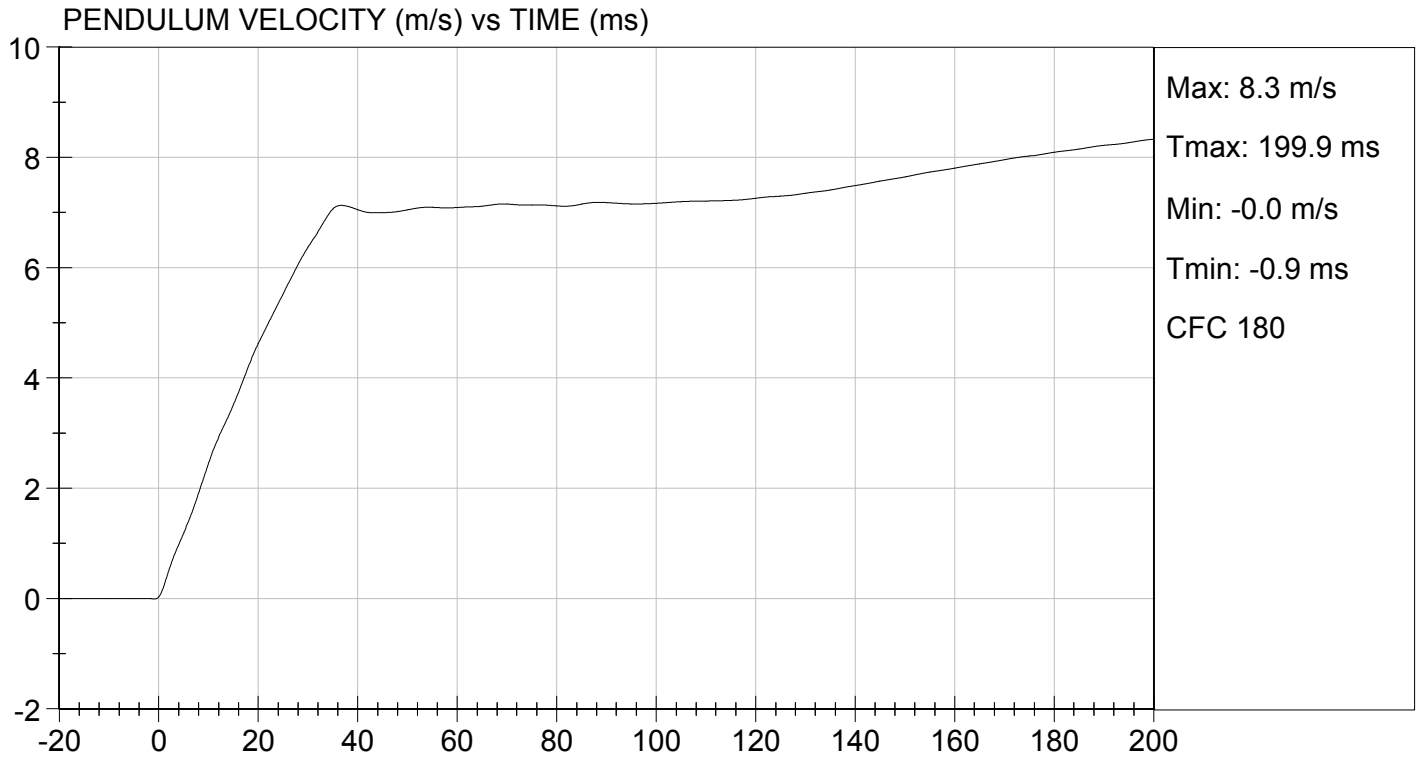
 Laboratory Technician

05/27/2016

 Test Date



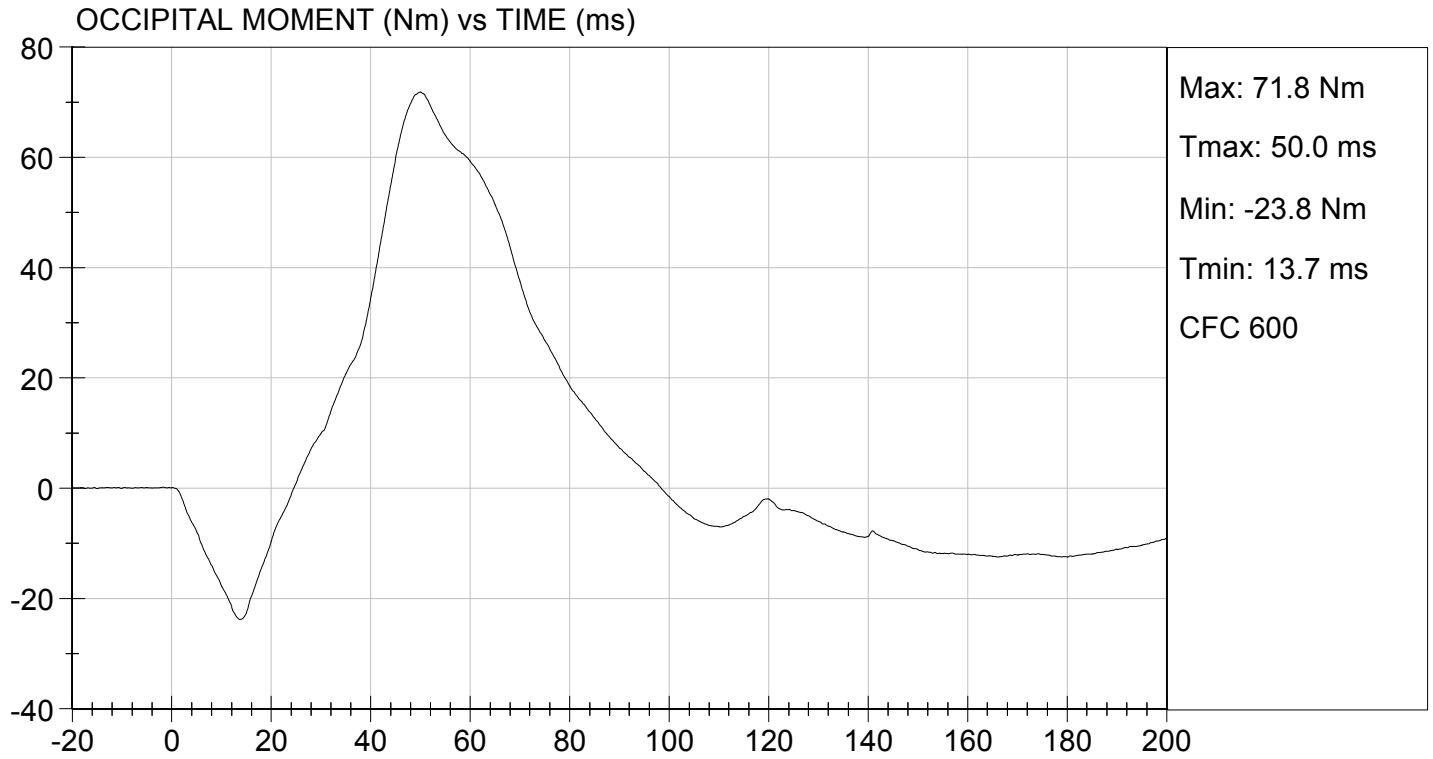
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TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 05/27/2016
TEST #: D161832

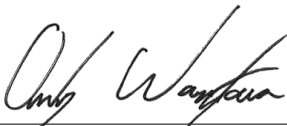


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161833

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	56	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	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	109	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass



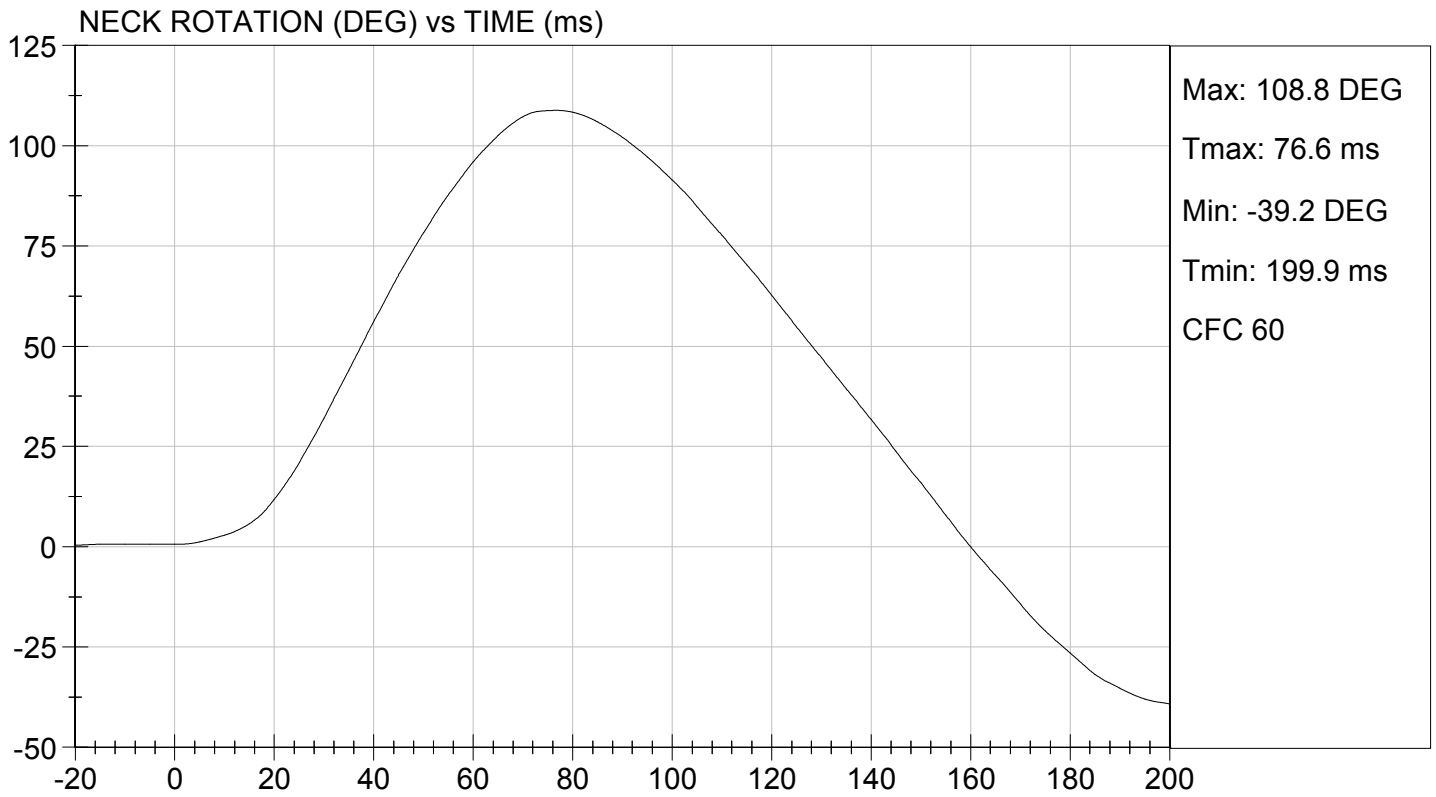
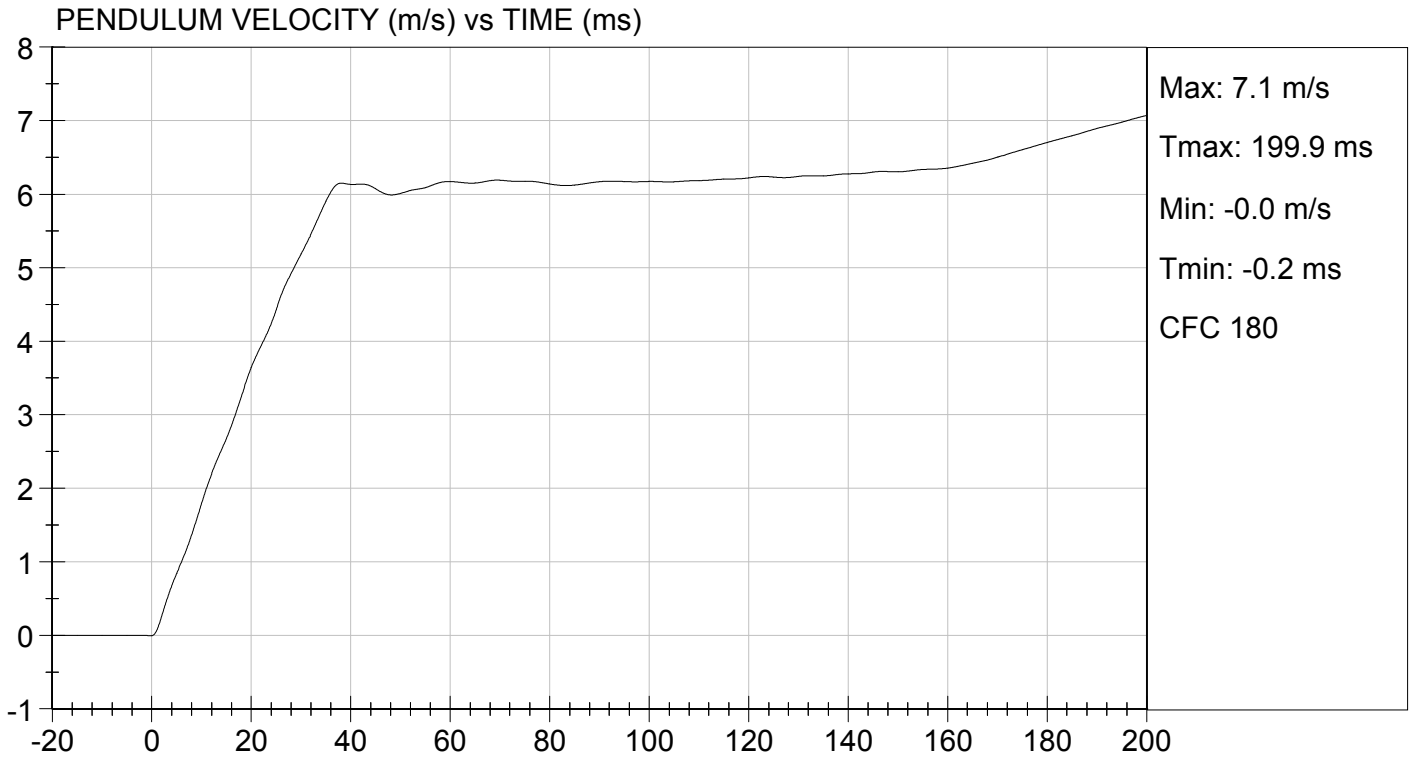
Laboratory Technician

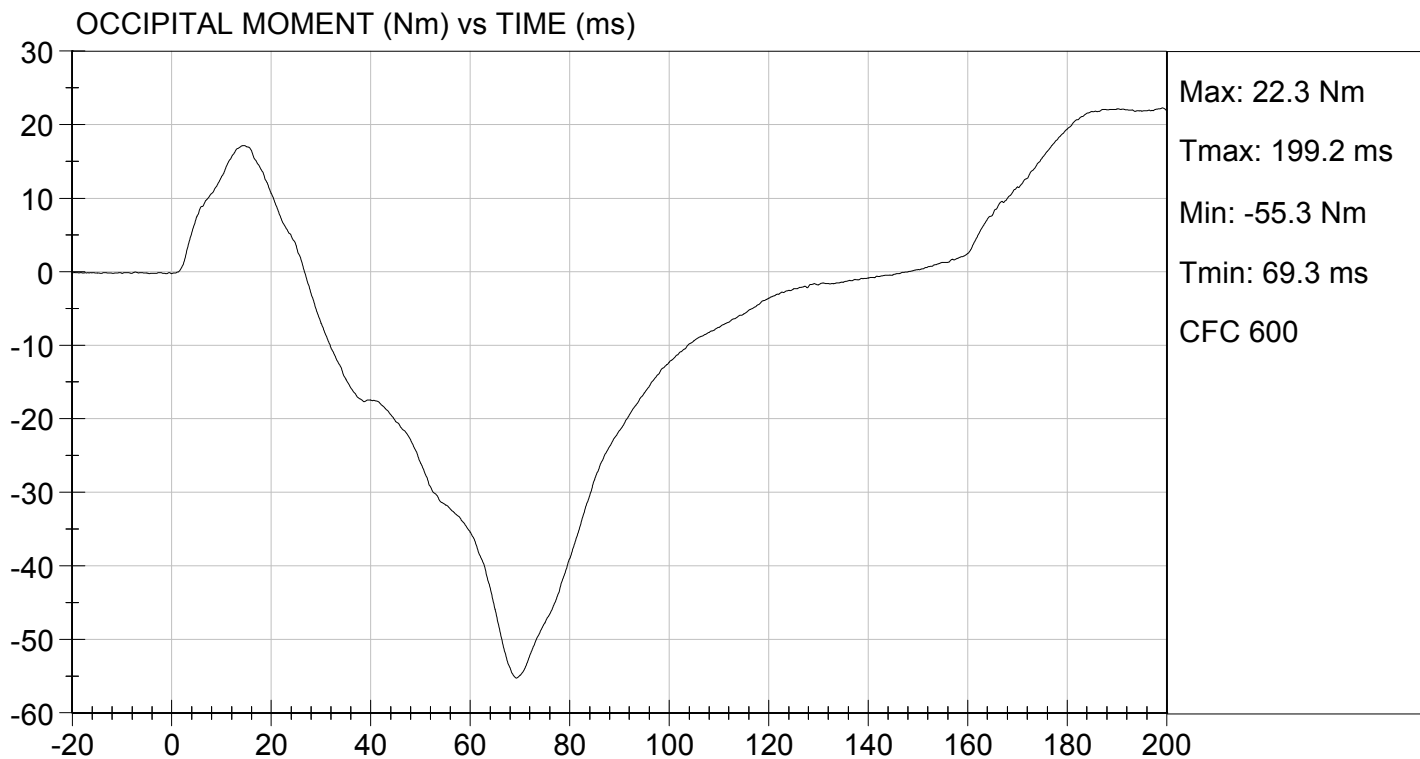
05/27/2016

Test Date



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MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161834

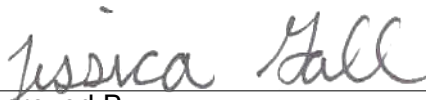
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	54	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4312	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4302	Pass
Overall Test Results				Pass



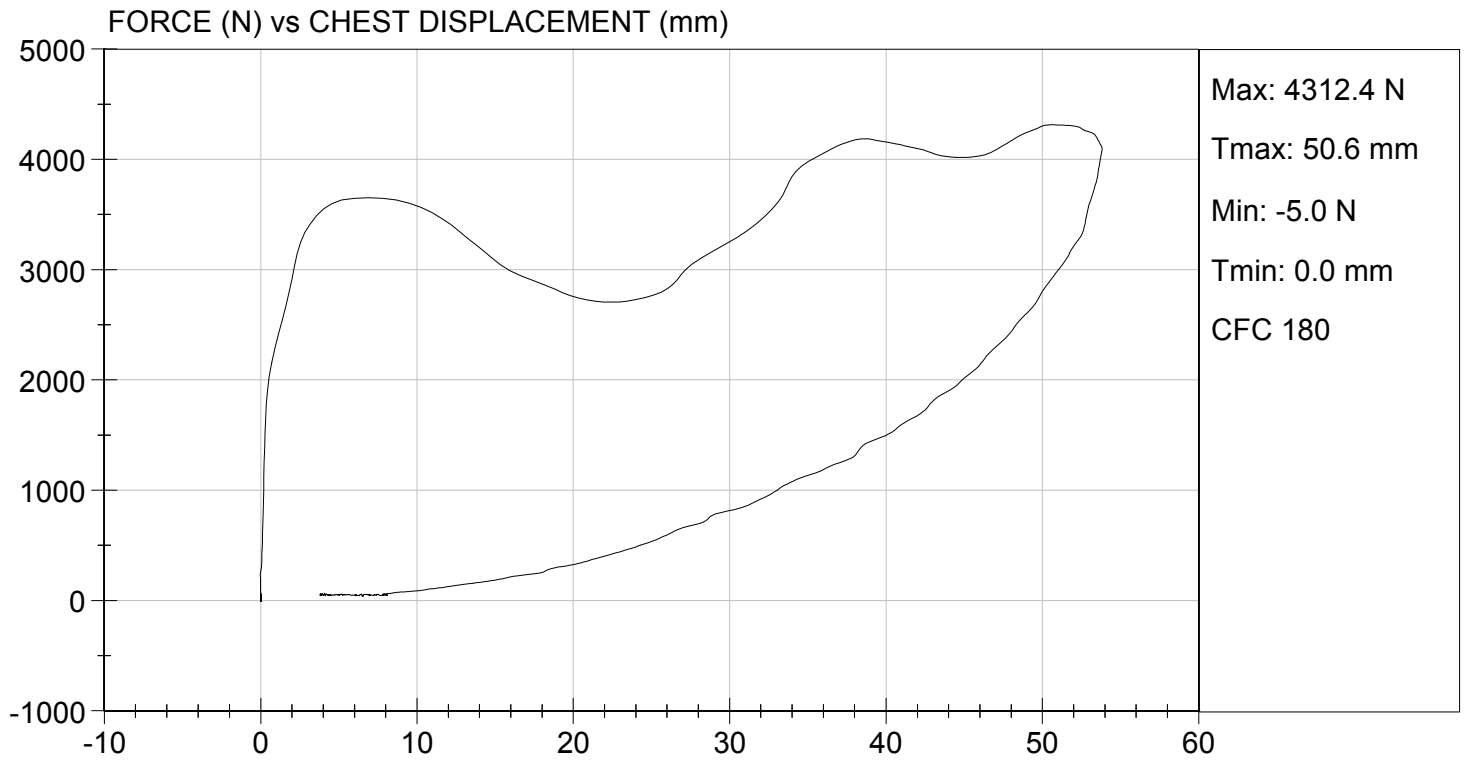
Laboratory Technician

05/27/2016

Test Date



Approved By

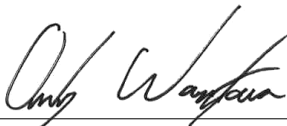


**MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 138

Test I.D: D161835

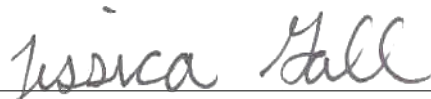
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3623	Pass
Overall Test Results				Pass



Laboratory Technician

05/26/2016

Test Date

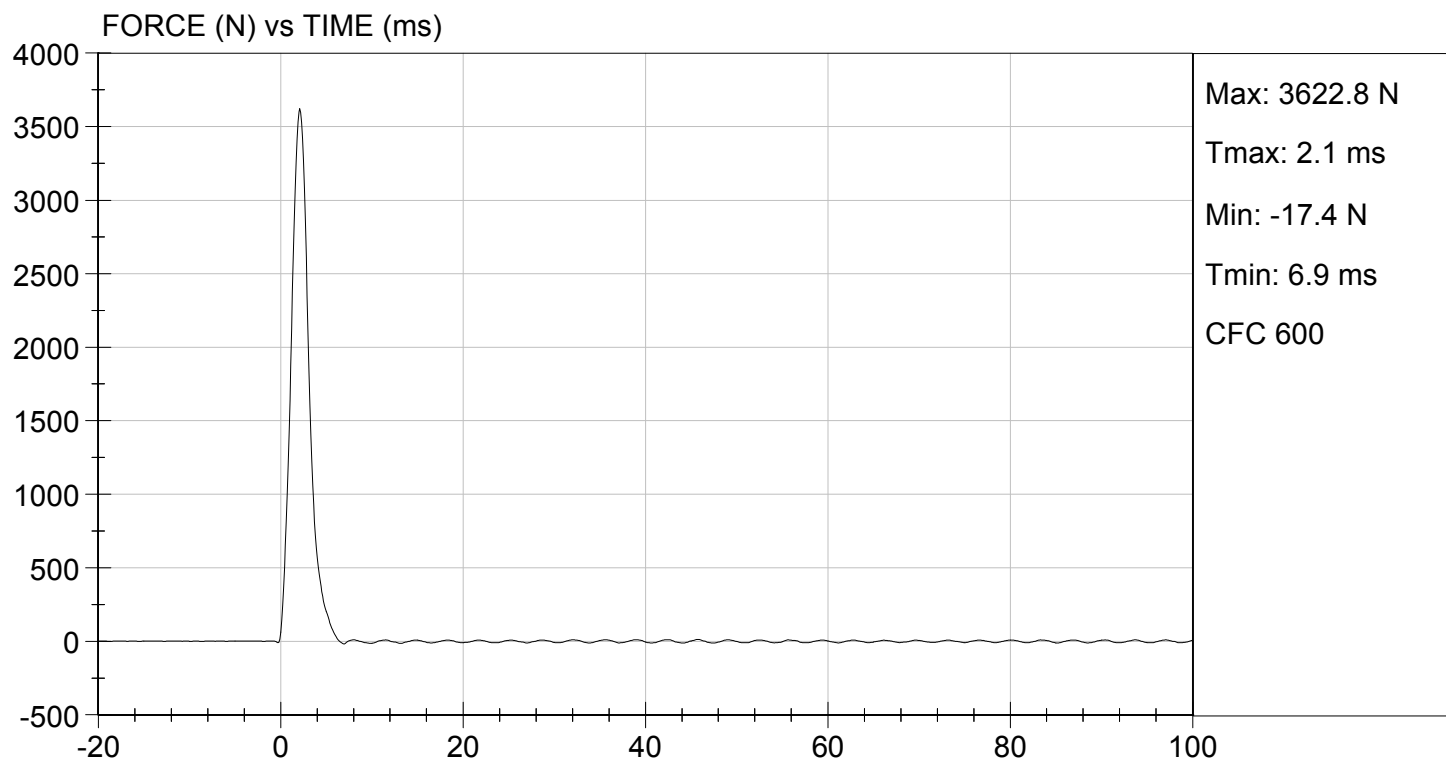


Approved By



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

TEST DATE: 05/26/2016
TEST #: D161835

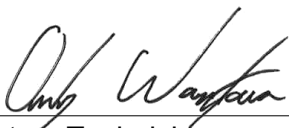


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161836

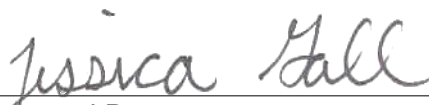
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3547	Pass
Overall Test Results				Pass



Laboratory Technician

05/26/2016

Test Date

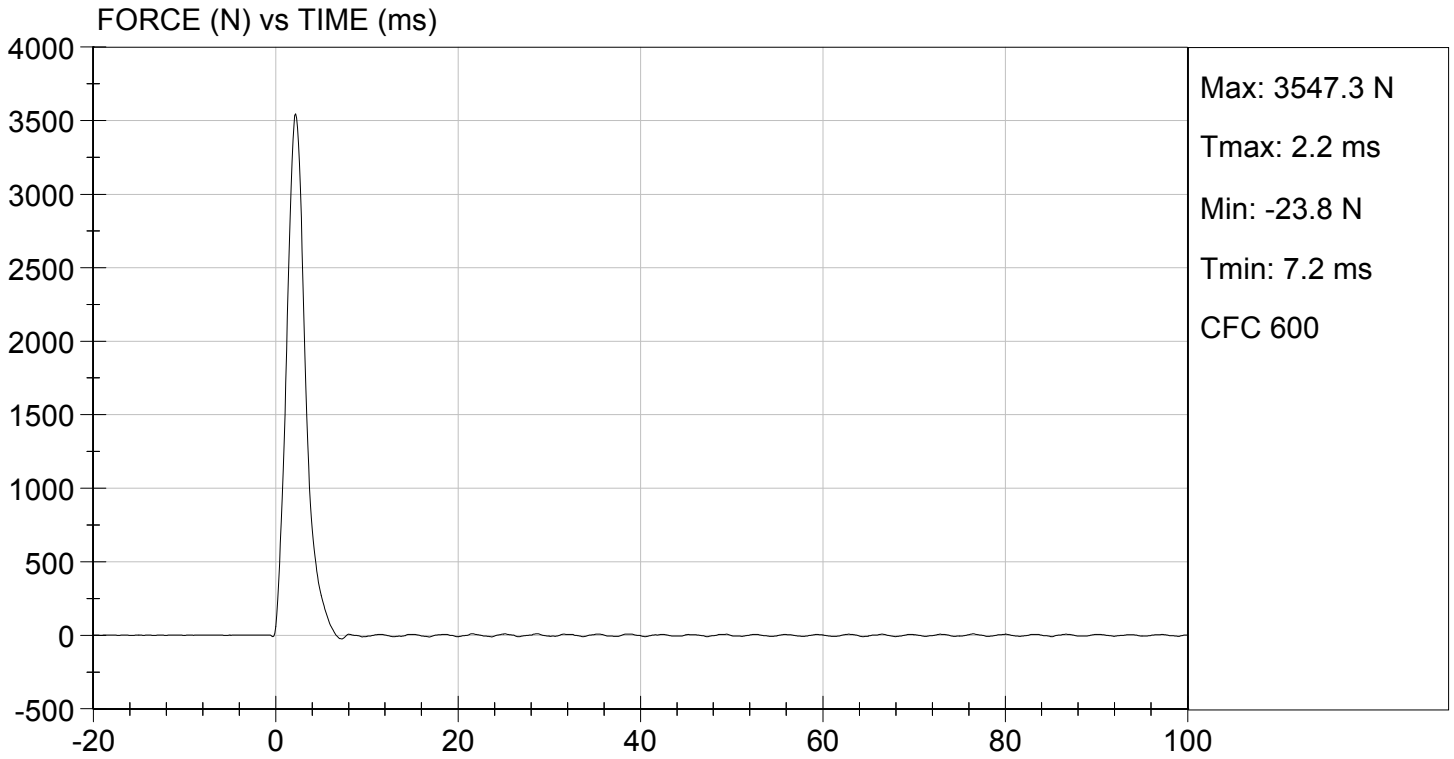


Approved By



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

TEST DATE: 05/26/2016
TEST #: D161836

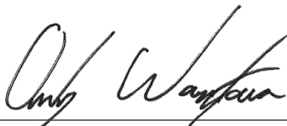


MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D161837

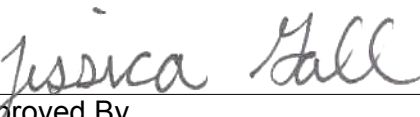
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	363	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass



Laboratory Technician

05/26/2016

Test Date



Approved By

