

REPORT NUMBER: NCAP-MGA-2015-055

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

**VOLKSWAGEN DE MEXICO S.A. DE C.V. MEXICO
2015 Volkswagen Golf 3-Dr Hatchback
NHTSA No.: O20155803**

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




Test Date: January 30, 2015

Final Report Date: May 28, 2015

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NVS-111
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

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Approval Date: May 28, 2015

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2015 Volkswagen Golf 3-Dr Hatchback 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 January 30, 2015. The impact velocity of the vehicle was 56.1 km/h and the ambient temperature at the barrier face at the time of impact was 21.0°C. The target vehicle post-test maximum crush was 356 located to the left of the vehicle's centerline. The test vehicle's performance was as follows:																																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td style="background-color: yellow;">454</td> <td>700</td> <td style="background-color: yellow;">220</td> </tr> <tr> <td>Maximum Chest</td> <td>mm</td> <td>63</td> <td style="background-color: yellow;">22</td> <td>52</td> <td style="background-color: yellow;">10</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td style="background-color: yellow;">0.33</td> <td>1</td> <td style="background-color: yellow;">0.37</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td style="background-color: yellow;">1566</td> <td>2620</td> <td style="background-color: yellow;">774</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td style="background-color: yellow;">237</td> <td>2520</td> <td style="background-color: yellow;">277</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td style="background-color: yellow;">479</td> <td>6805</td> <td style="background-color: yellow;">1355</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td style="background-color: yellow;">453</td> <td>6805</td> <td style="background-color: yellow;">667</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	454	700	220	Maximum Chest	mm	63	22	52	10	Nij	N/A	1	0.33	1	0.37	Neck Tension	N	4170	1566	2620	774	Neck Compression	N	4000	237	2520	277	Left Femur Force	N	10008	479	6805	1355	Right Femur Force	N	10008	453	6805	667
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number 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 2015 Volkswagen Golf 3-Dr Hatchback at a velocity of 56.1 km/h. The test was performed at MGA Research Corporation on January 30, 2015. 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 and the passenger's shoulder belt to measure dummy torso section loading.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 138) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 631 channels of data were recorded on a data acquisition system. Appendix B contains the dummy response data traces.

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

The maximum static crush of the vehicle was 356 mm 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 and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee bolster and steering wheel. The passenger's visible contact points were as follows: The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glovebox.

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)	454	0.33	1566	237	53	22	479	453
Passenger (5 th)	220	0.37	774	277	50	10	1355	667

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

TEST NOTES

Driver Right Lower Tibia MX has no valid data after 18 ms.
 Barrier D-06 MY has no valid data collected.
 Barrier K-16 MY has no valid data collected.

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: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20155803	Traction Control System (TCS)	Yes
Model Year	2015	Power Steering	Yes
Make	Volkswagen	Power Window Auto-Reverse	Yes
Model	Golf	Driver Frontal Airbag	Yes
Body Style	3-Dr Hatchback	Driver Curtain Airbag	Yes
VIN	3VW817AU4FM023228	Driver Head/Torso Airbag	No
Body Color	Platinum Gray Metallic	Driver Torso Airbag	No
Odometer (km/mi)	190 /118	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	1.8	Driver Pelvis Airbag	No
Type/No. Cylinders	4	Driver Knee Airbag	No
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Manual	Front Pass. Curtain Airbag	Yes
Transmission Speeds	5	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	Front	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?	No
--	----

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen de Mexico S.A. de C.V. Mexico	GVWR (kg)	1870
		GAWR Front (kg)	980
Date of Manufacture	08/14	GAWR Rear (kg)	940

VEHICLE SEATING AND WEIGHT CAPACITY DATA

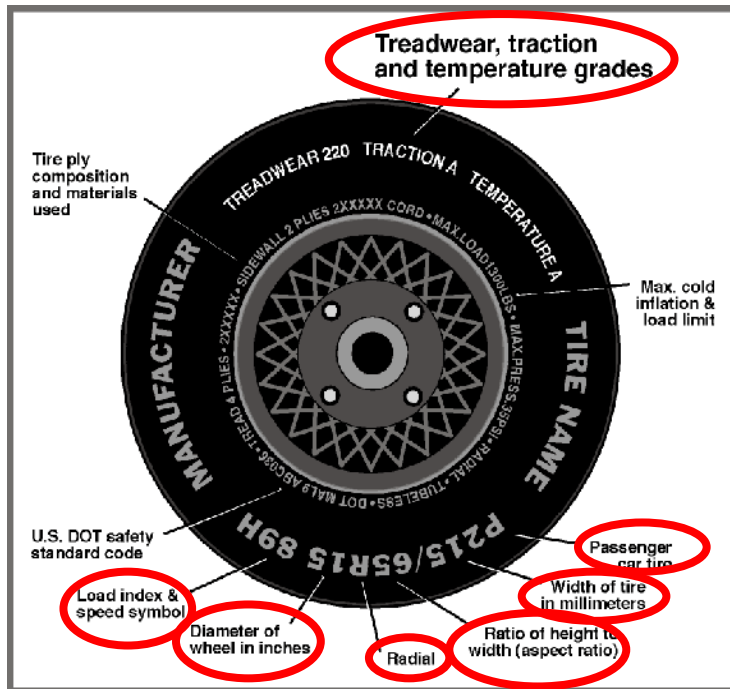
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				456
Cargo Weight (RCLW) (kg)				116

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	195/65R15	195/65R15
Tire Size on Vehicle	195/65R15	195/65R15
Tire Manufacturer	Continental	Continental
Tire Model	ProContact	ProContact
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Left	P5AE WC1A 3014	P5AE WC1A 3014
DOT Safety Code Right	P5AE WC1A 3014	P5AE WC1A 3014

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	384.5	264.5		420.0	358.0	
Right	kg	400.0	258.0		416.5	362.5	
Ratio	%	60.0	40.0		53.7	46.3	
Totals	kg	784.5	522.5	1307.0	836.5	720.5	1557.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1307.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	116
Calculated Test Vehicle Target Weight (TVTW)	kg	1563.6

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	693	690	698	698	1051
As Tested	mm	673	673	642	642	1216
Post Test	mm	690	719	631	648	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2628
Total Vehicle Length at Left Side	mm	4163
Total Vehicle Length at Centerline	mm	4281
Total Vehicle Length at Right Side	mm	4163
Weight of Ballast in Cargo Area	kg	37.2
Weight of Vehicle Components Removed	kg	24.5
Amount of Stoddard Solvent in Fuel Tank	L	46.5

List of components removed to meet test weight: None

List of components removed for instrumentation, data box, and equipment installation:
Cargo cover/divider, jack & tools, spare tire/cover, all wheel covers, rear license plate holder.

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4281
2	Total Width	1767
3	Bumper Top Height	437
4	Bumper Bottom Height	530
5	Longitudinal Member Top Height	530
6	Distance between Longitudinal Members	890
7	Longitudinal Member Width	90
8	Engine Top Height	786
9	Engine Bottom Height	165
10	Engine and Gearbox Width	800
11	Front Bumper-Engine Distance	370
12	Front Shock Absorber Fixing Height	856
13	Bonnet Leading Edge Height	686
14	Front Shock Absorber Fixing Width	1135
15	Front Bumper – Front Axle Distance	863
16	Front Axle – A-Pillar Distance	457
17	A-Pillar – B-Pillar Distance	1326
18	B-Pillar – Rear Axle Distance	845
19	B-Pillar – C-Pillar Distance	724
20	Roof Sill Bottom Height	1385
21	Roof Sill Top Height	1428
22	Floor Sill Bottom Height	216
23	Floor Sill Top Height	354

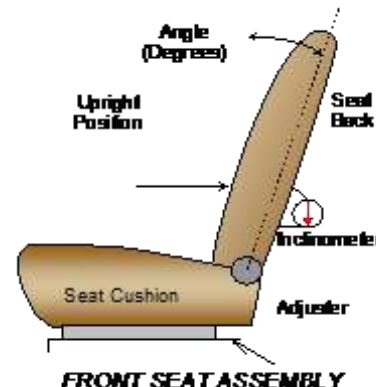
**DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

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 August 2013.



	Degrees
Driver Seat Back Angle	20.7° with level on seatback
Passenger Seat Back Angle	15.2° with level on seatback

SEAT FORE/AFT POSITIONS

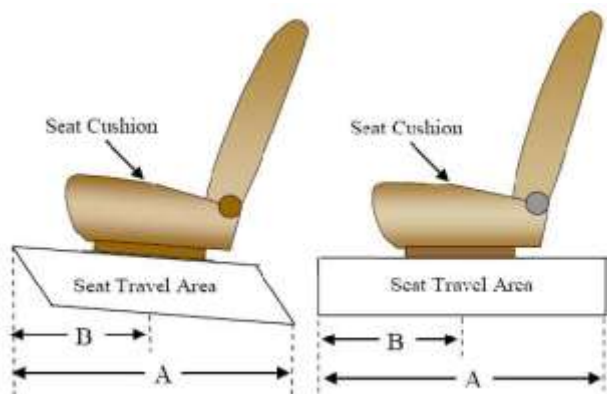
The driver and passenger seat fore/aft positions are adjusted following Appendix F, “Driver & Passenger Dummy Seating & Positioning Procedures” in the NCAP Test Procedure dated August 2013.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	310 mm / 38 detents	160 mm / 15 th detent (1 st as 0)
Passenger Seat	254 mm / 38 detents	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: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

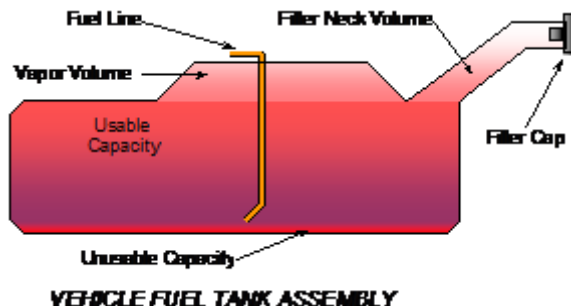
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	50.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	46.0 to 47.0
Actual Amount of Solvent used	46.5
1/3 of Usable Capacity	16.7

FUEL PUMP

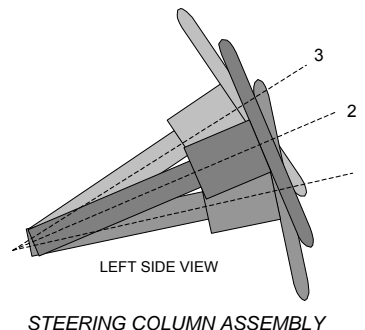
Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

The vehicle is equipped with an electric fuel pump. The fuel pump runs for 2 seconds after ignition is switched on. If the engine doesn't run, the fuel pump stops running. If there is a crash signal, it will also stop running. The fuel pipe is on the right side.



STEERING COLUMN ADJUSTMENT

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



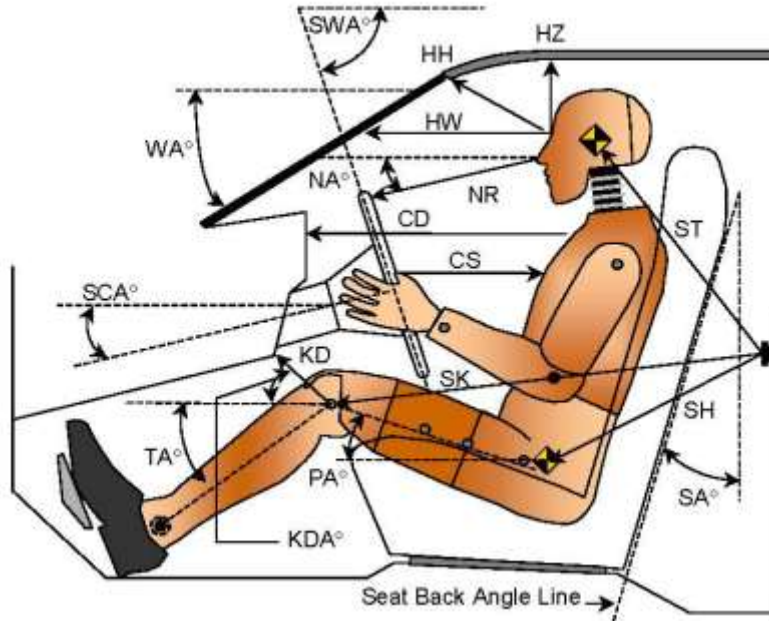
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	68.6	206
Geometric Center Position 2	66.4	179
Uppermost Position 3	64.2	152
Telescoping Steering Wheel Travel		54
Test Position	66.4	179

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015



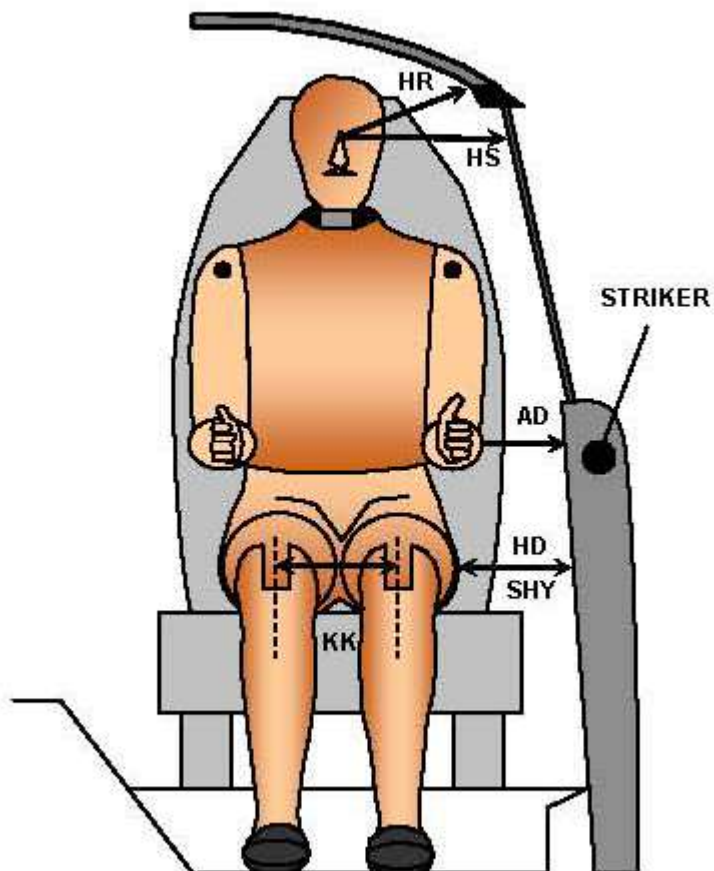
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		24.3		
SWA°	Steering Wheel Angle		66.4		
SCA°	Steering Column Angle		23.6		
SA°	Seat Back Angle (on headrest post)		20.7		15.2
HZ	Head to Roof (Z)	199	90.0	223	90.0
HH	Head to Header	366	19.3	302	39.8
HW	Head to Windshield	685	0.0	685	0.0
NR	Nose to Rim	410	7.9		
CD	Chest to Dash	539		395	
CS	Chest to Steering Hub	335	4.7		
RA	Rim to Abdomen	225	0.0		
KDL	Left Knee to Dash	238	24.0	142	33.9
KDR	Right Knee to Dash	235	27.1	142	31.3
PA°	Pelvic Angle		23.8		21.3
TA°	Tibia Angle		37.3		46.3
SK	Striker to Knee	799	100.5	887	98.0
ST	Striker to Head	483	35.1	541	51.3
SH	Striker to H-Point	475	147.9	579	110.5

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015



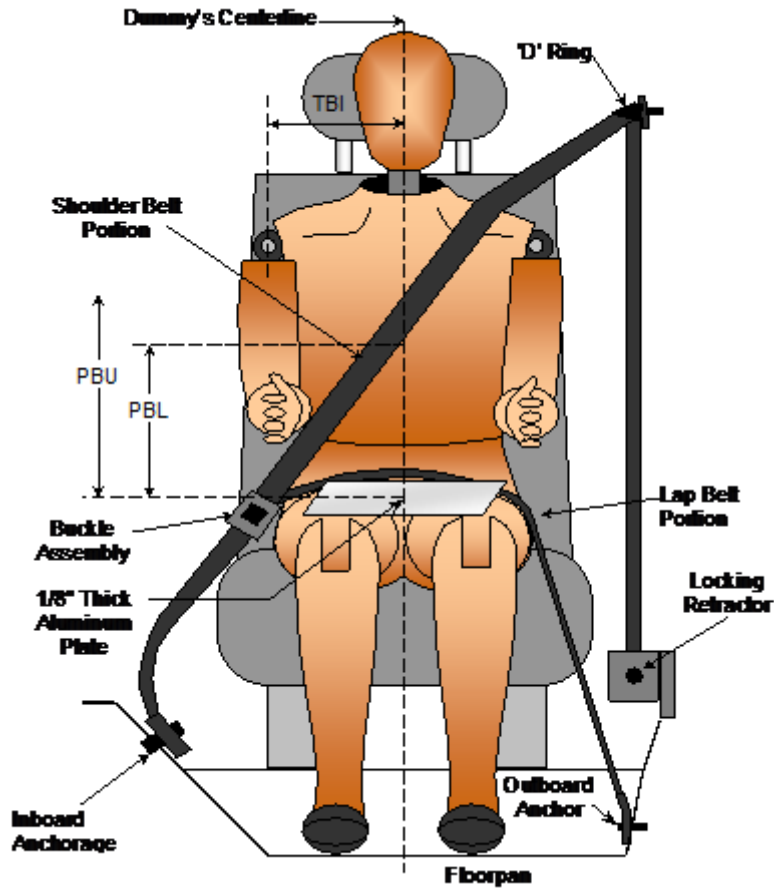
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	143	97
HD	H-Point to Door	131	180
HR	Head to Side Header	209	258
HS	Head to Side Window	322	364
KK	Knee to Knee	349	226
SHY	Striker to H-Point (Y Direction)	280	319
AA	Ankle to Ankle	350	180

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	360	350
PBL - Top surface of reference to belt lower edge	mm	285	265

BELT LENGTH DATA

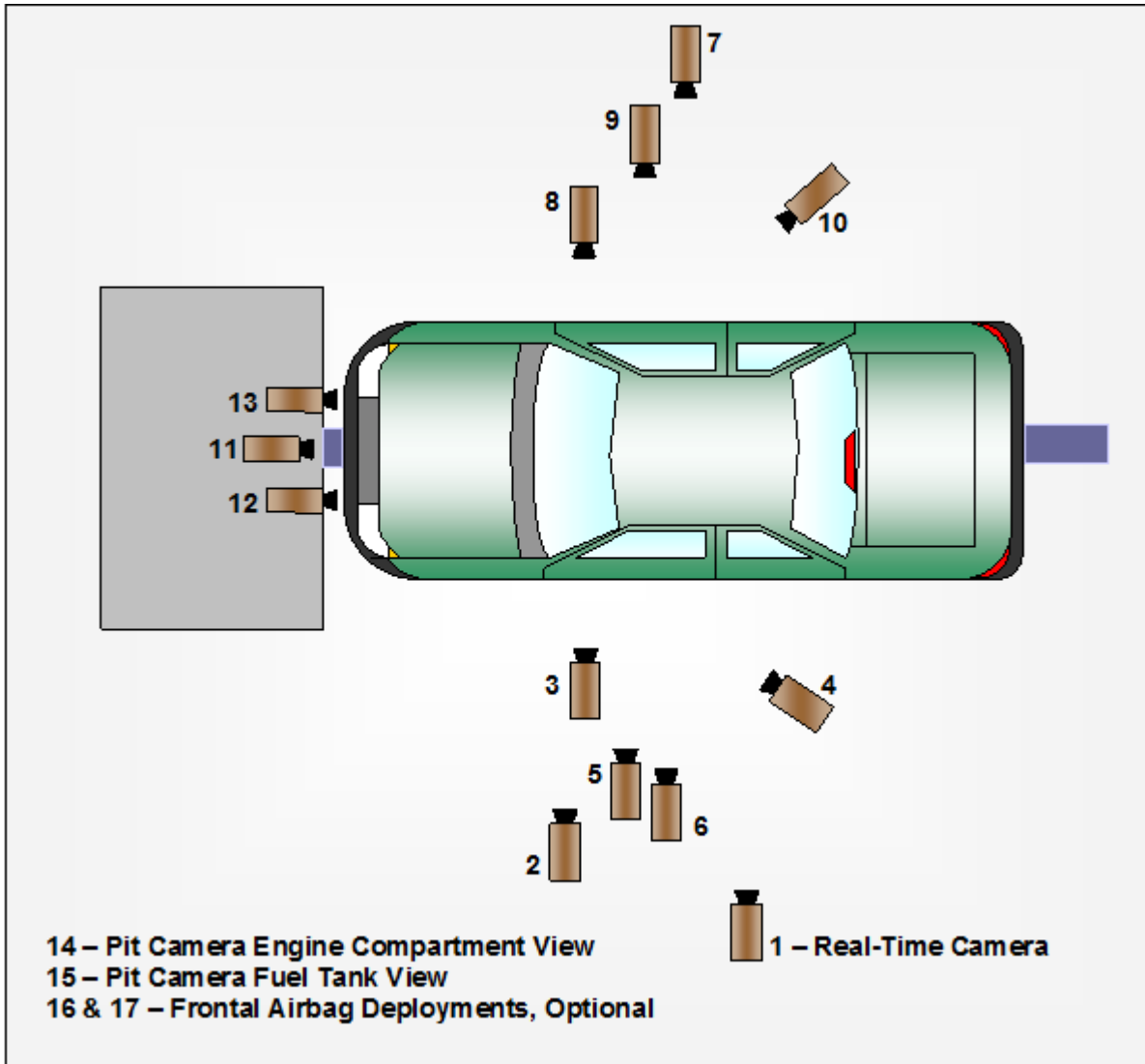
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	980	1045
Lap Belt Length as measured on ATD	mm	780	865
Remainder of belt on reel	mm	1430	1280
Total Belt Length for Continuous Webbing Systems	mm	3190	3190

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1310	-6320	-1800	35	1000
3	Left Front Half	1080	-5110	-1140	24	1000
4	Left Angle	5470	-5030	-1850	50	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	2030	6140	-1250	20	1000
8	Passenger Close-Up	1470	6290	-1810	35	1000
9	Right Front Half	1120	5180	-1270	24	1000
10	Right Angle	5500	4910	-1900	50	1000
11	Windshield	-430	0	-2810	20	1000
12	Driver Windshield	40	-450	-2030	8.5	1000
13	Passenger Windshield	40	450	-2810	8.5	1000
14	Pit Front	1010	0	3150	24	1000
15	Pit Rear	2960	0	3150	24	1000
16	Onboard Driver Side				12	1000
17	Onboard Passenger Side				12	1000
18	Real-Time Pan View					30

*COORDINATES:

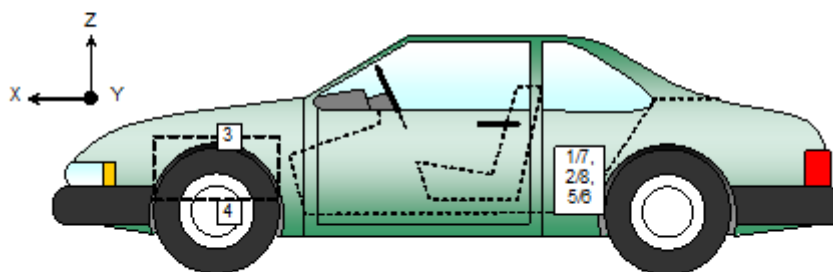
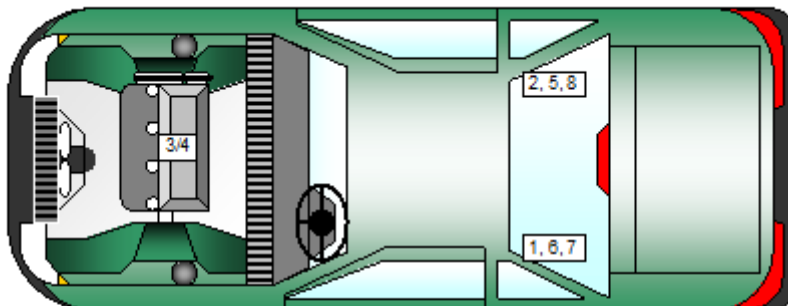
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 5 & 6 were not used for this test.

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1735	-345	-221
2	Right Rear Crossmember Accelerometer – X Direction	1738	355	-216
3	Engine Top X	3577	230	-759
4	Engine Bottom X	3560	210	-155
5	Left Rear Crossmember Accelerometer – Z Direction	1735	-345	-221
6	Right Rear Crossmember Accelerometer – Z Direction	1738	355	-216
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1735	-345	-221
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1738	355	-216

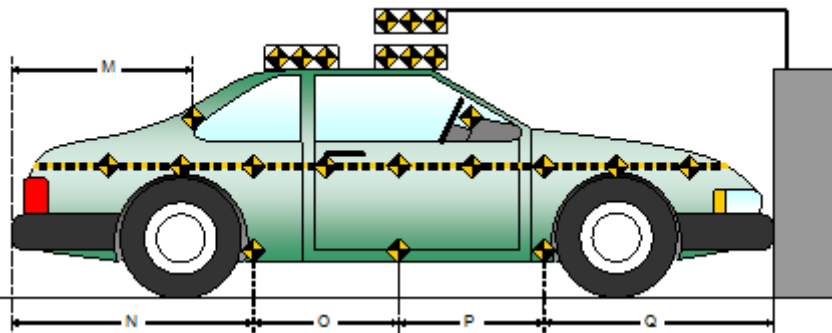
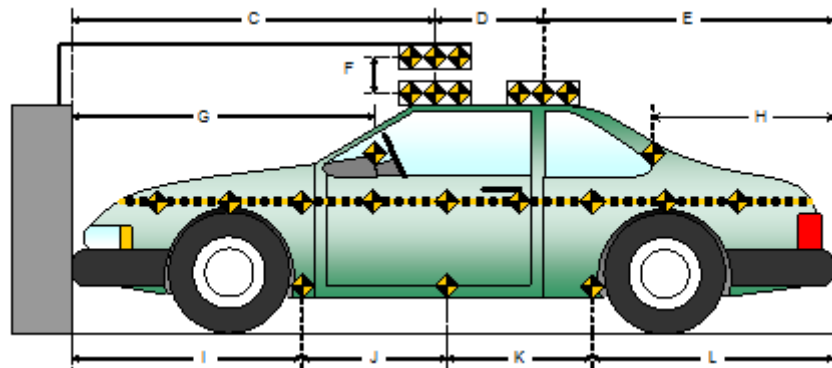
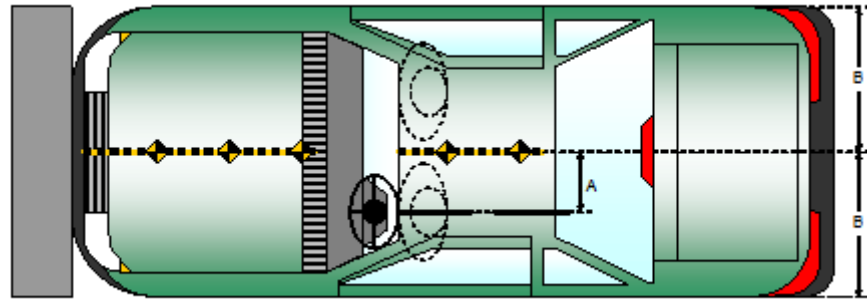
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

Item	Value (mm)
A	345
B	884
C	2265
D	610
E	1406
F	15
G	
H	888
I	1266
J	908
K	908
L	1199
M	888
N	1199
O	908
P	908
Q	1266



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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

Advanced Research Load Cell Barrier

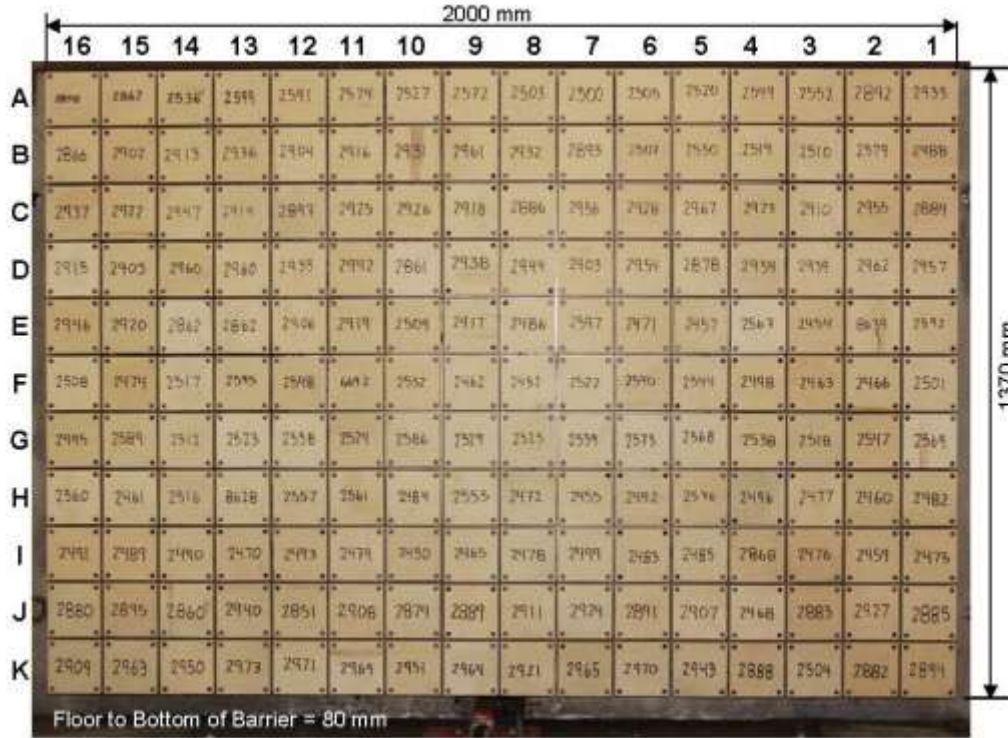


Photo for Reference Only

								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: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

INSTRUMENTATION

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	48
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	631

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: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

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	Glovebox
Right Knee Contact	None	Glovebox

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	None
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	4010
Center	mm	4005
Right Side	mm	4030
Average	mm	4015

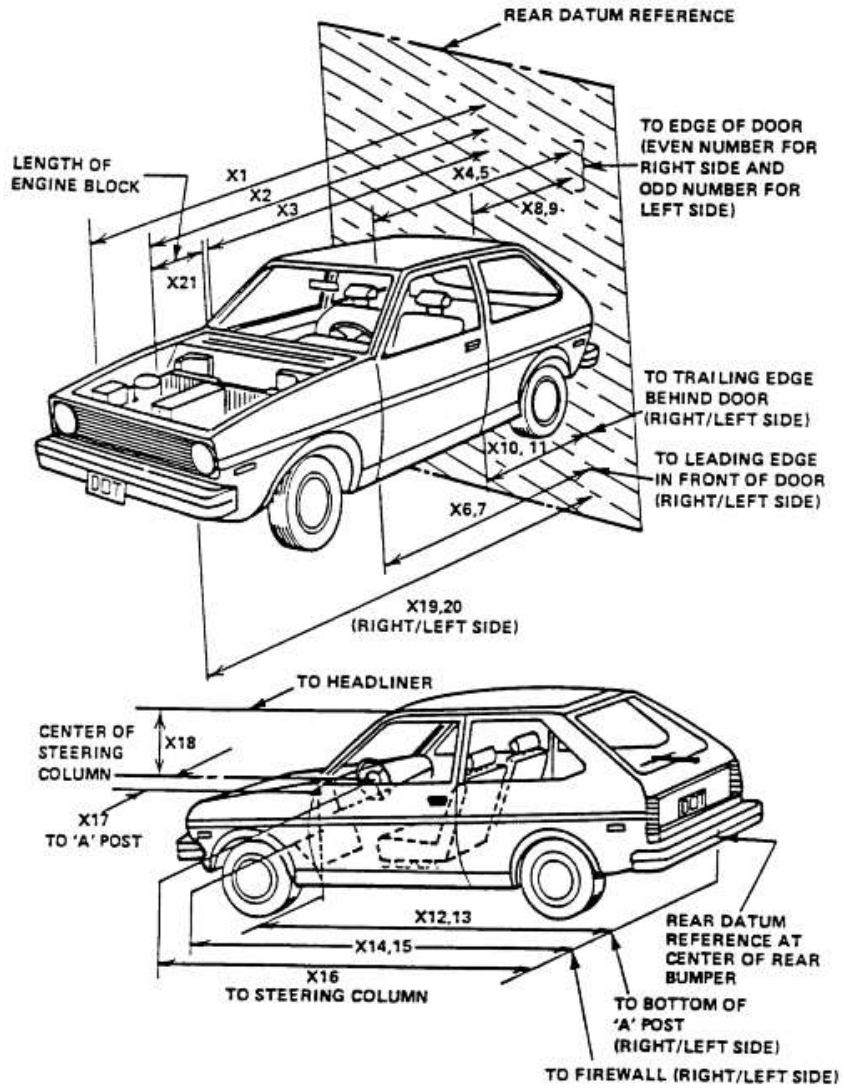
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015



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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4281	3928	353
2	RSOV to Front of Engine	mm	3647	3432	215
3	RSOV to Firewall	mm	3284	3282	2
4	RSOV to Upper Leading Edge of Right Door	mm	2876	2878	-2
5	RSOV to Upper Leading Edge of Left Door	mm	2876	2878	-2
6	RSOV to Lower Leading Edge of Right Door	mm	2881	2886	-5
7	RSOV to Lower Leading Edge of Left Door	mm	2881	2885	-4
8	RSOV to Upper Trailing Edge of Right Door	mm	1589	1588	1
9	RSOV to Upper Trailing Edge of Left Door	mm	1589	1590	-1
10	RSOV to Lower Trailing Edge of Right Door	mm	1672	1676	-4
11	RSOV to Lower Trailing Edge of Left Door	mm	1672	1674	-2
12	RSOV to Bottom of "A" Post of Right Side	mm	2915	2914	1
13	RSOV to Bottom of "A" Post of Left Side	mm	2915	2911	4
14	RSOV to Firewall, Right Side	mm	2990	2986	4
15	RSOV to Firewall, Left Side	mm	2990	2989	1
16	RSOV to Steering Column	mm	2385	2420	-35
17	Center of Steering Column to "A" Post	mm	370	358	12
18	Center of Steering Column to Headliner	mm	413	417	-4
19	RSOV to Right Side of Front Bumper	mm	4163	3905	258
20	RSOV to Left Side of Front Bumper	mm	4163	3926	237
21	Length of Engine Block	mm	345	345	0
RD	RSOV to Right Side of Dash Panel	mm	2559	2559	0
CD	RSOV to Center of Dash Panel	mm	2637	2636	1
LD	RSOV to Left Side of Dash Panel	mm	2560	2558	2

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

VEHICLE INFORMATION

VIN: 3VW817AU4FM023228 Wheelbase (mm): 2628
Vehicle Size Category: Passenger Car Test Weight (kg): 1557.0

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

Cal. Procedure/Interval: MGA procedure / 6 month

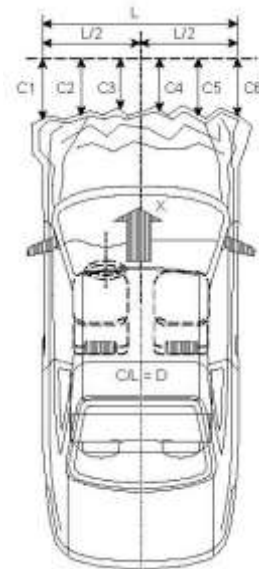
Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.1

Velocity Change (km/h): 65.1

Time of Separation (msec): 87.1



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1104

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4163	3926	237
C2	Crush zone 2 at left side	mm	4215	3883	332
C3	Crush zone 3 at left side	mm	4231	3875	356
C4	Crush zone 4 at right side	mm	4231	3907	324
C5	Crush zone 5 at right side	mm	4215	3916	299
C6	Crush zone 6 at right side	mm	4163	3905	258
L	C1 TO C6	mm	1104	1100	4

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

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

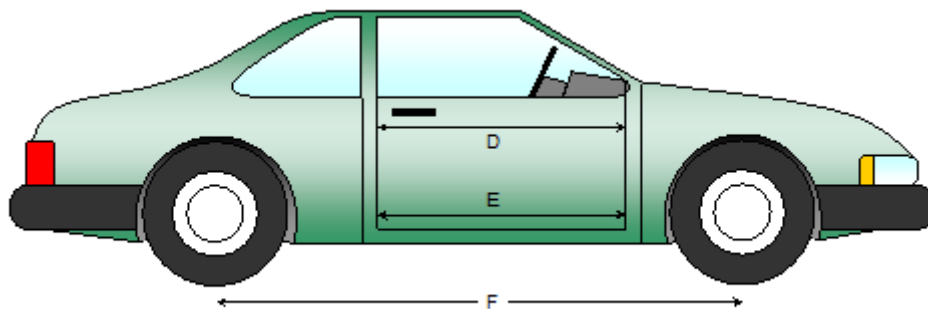
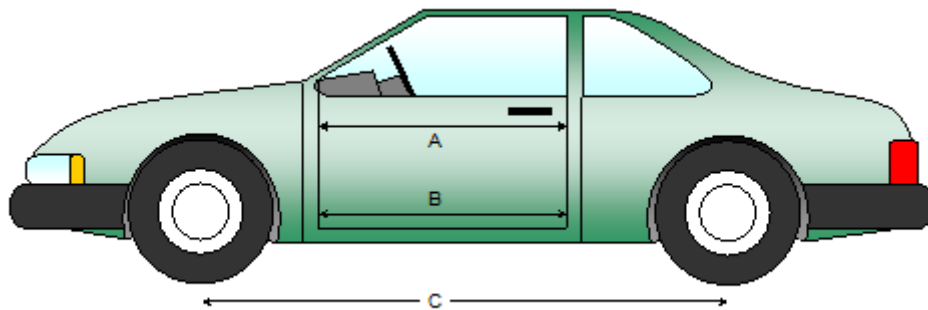
NHTSA No.: O20155803
 Test Date: 1/30/2015

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1190	1190	0
B	Left Side Lower	mm	1110	1110	0
D	Right Side Upper	mm	1190	1190	0
E	Right Side Lower	mm	1110	1110	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2628	2615	13
F	Right Side Wheelbase	mm	2628	2617	11



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

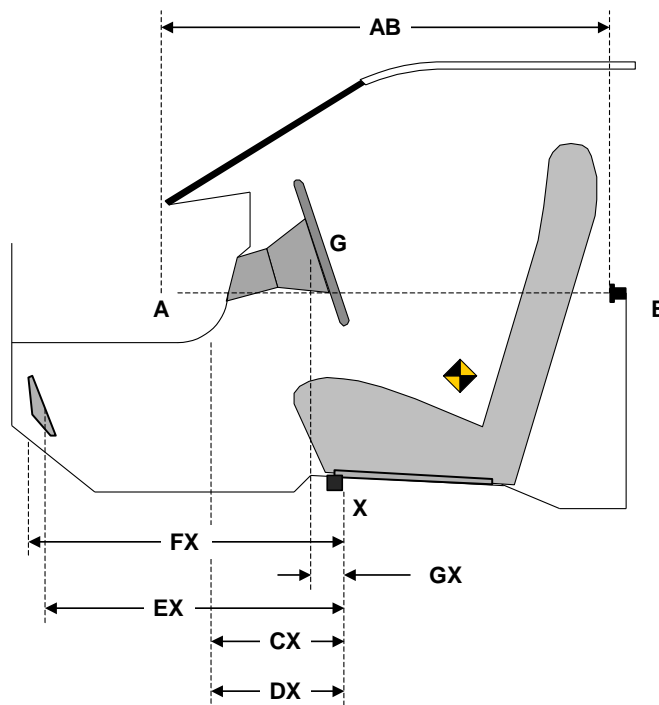
Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	985	985	0
CX	Left Knee Bolster to X	mm	252	255	-3
DX	Right Knee Bolster to X	mm	269	273	-4
EX	Brake Pedal to X	mm	571	562	9
FX	Foot Rest to X	mm	614	609	5
GX	Center of Steering Column Wheel Hub to X	mm	60	115	-55

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: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

Windshield Mounting Details:

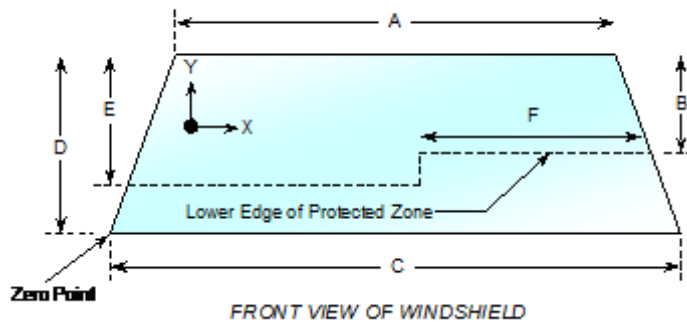
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.0° C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2138	2138	100
Right Side	2138	2138	100
Total	4276	4276	100



Item	Units	Value
A	mm	1146
B	mm	416
C	mm	1482
D	mm	824
E	mm	484
F	mm	486

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: 2015 Volkswagen Golf 3-Dr Hatchback
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
Test Date: 1/30/2015

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.0°C

Test Time: 11:26 a.m.

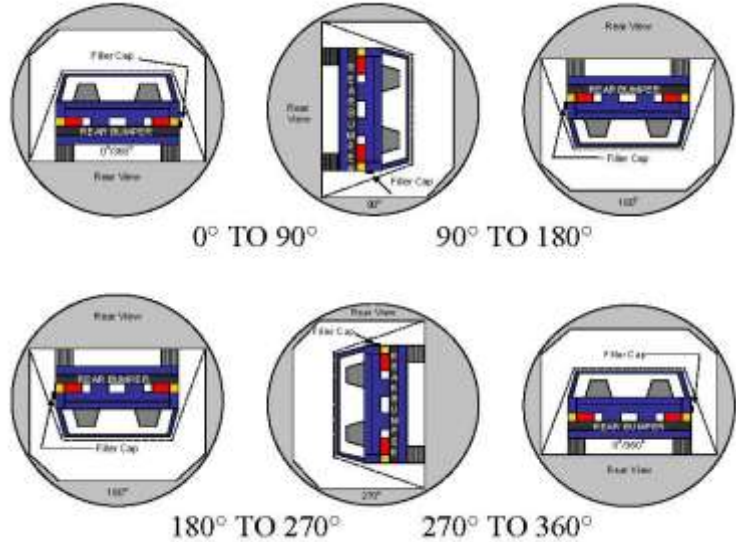
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: None

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015

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°	112	300	412
90° to 180°	109	300	409
180° to 270°	107	300	407
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

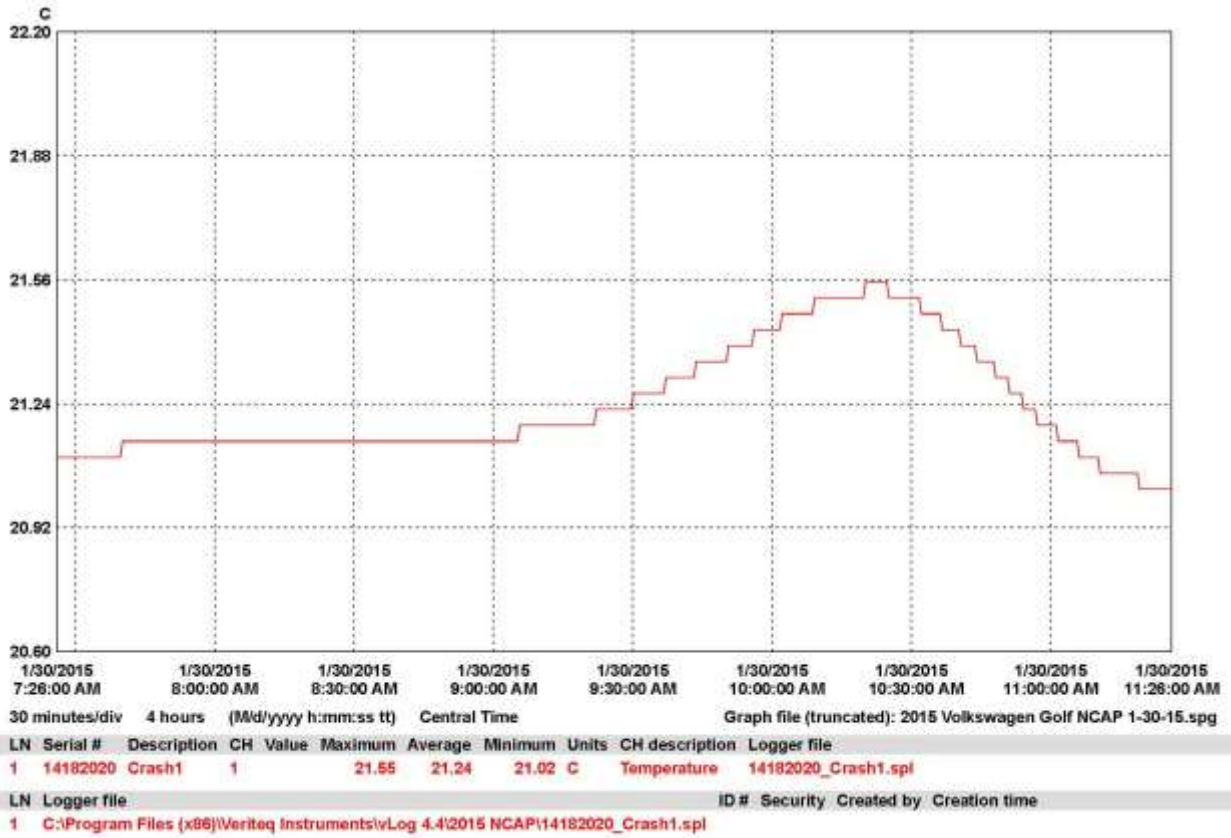
SOLVENT SPILLAGE LOCATION TABLE

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: 2015 Volkswagen Golf 3-Dr Hatchback
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155803
 Test Date: 1/30/2015



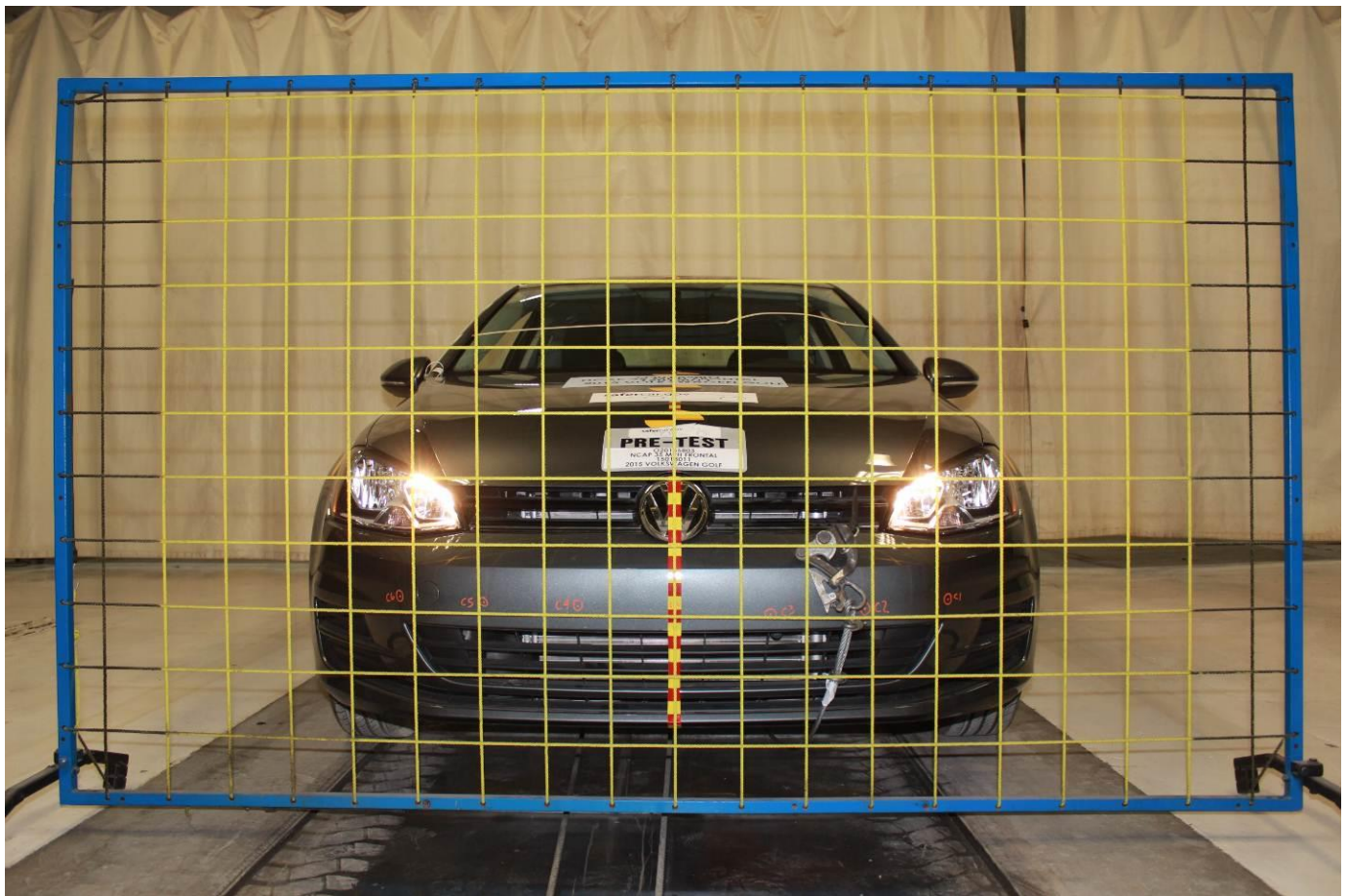
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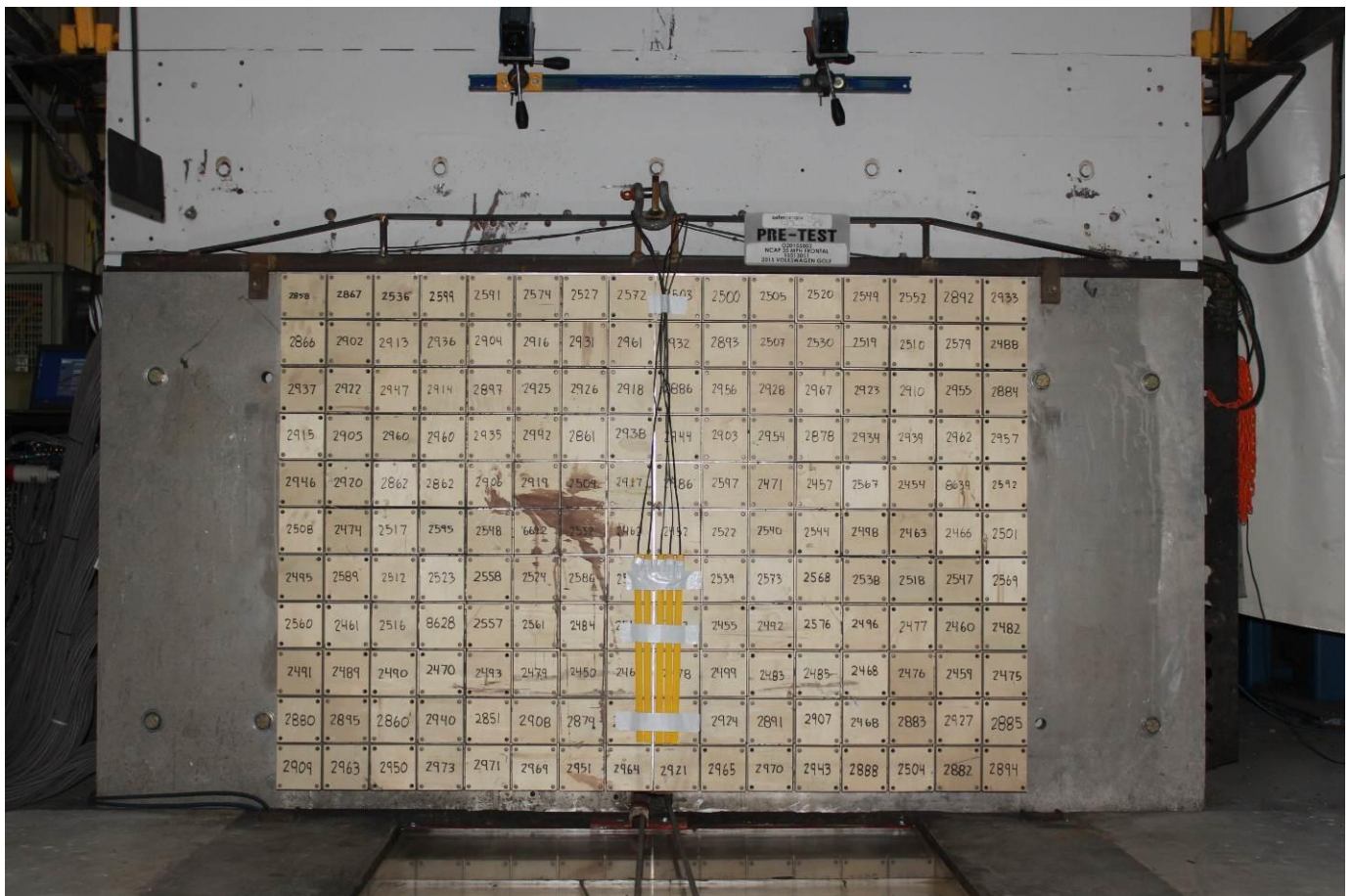
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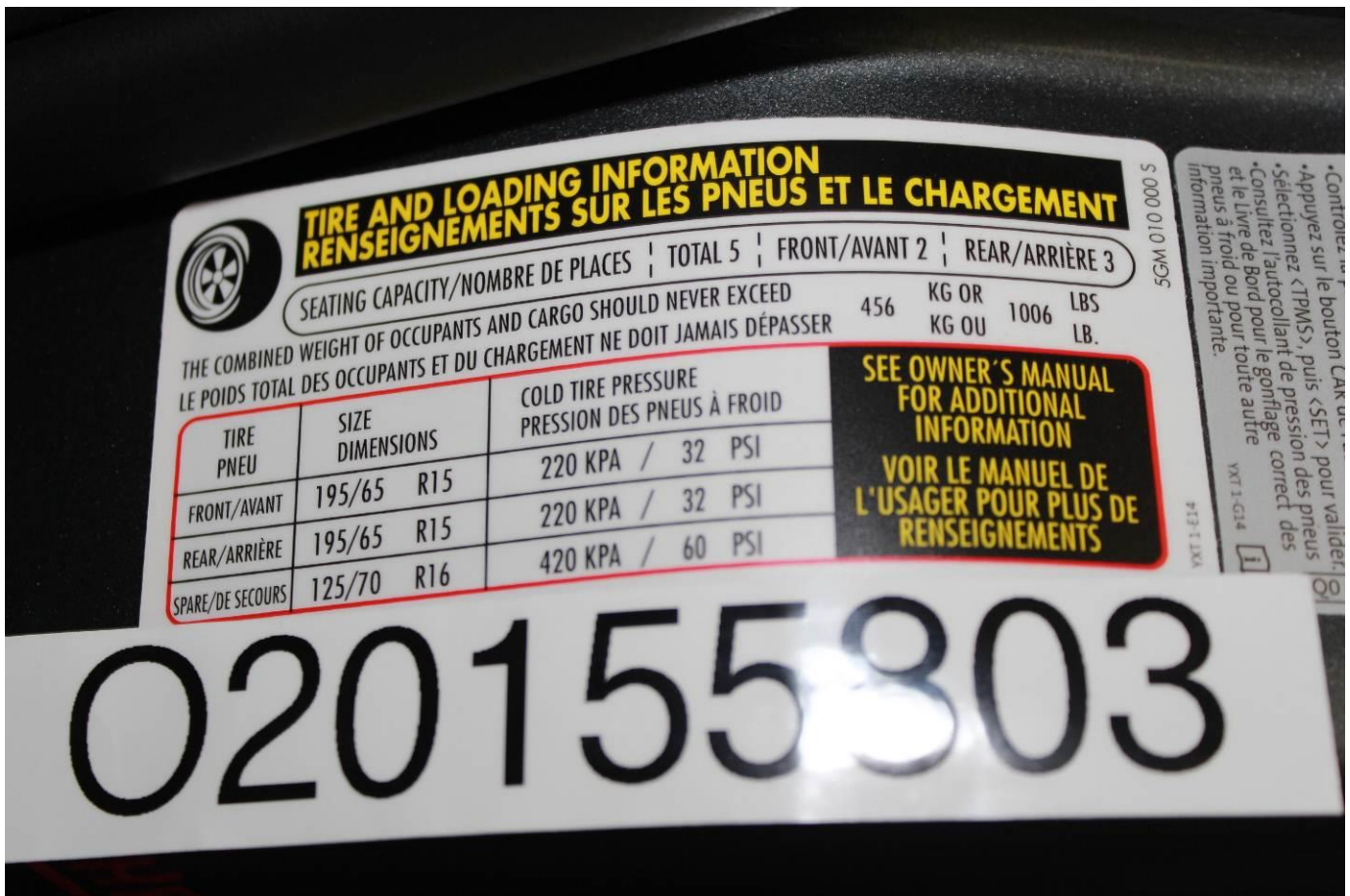
Load Cell Location



Load Cell Wall



Manufacturer's Label



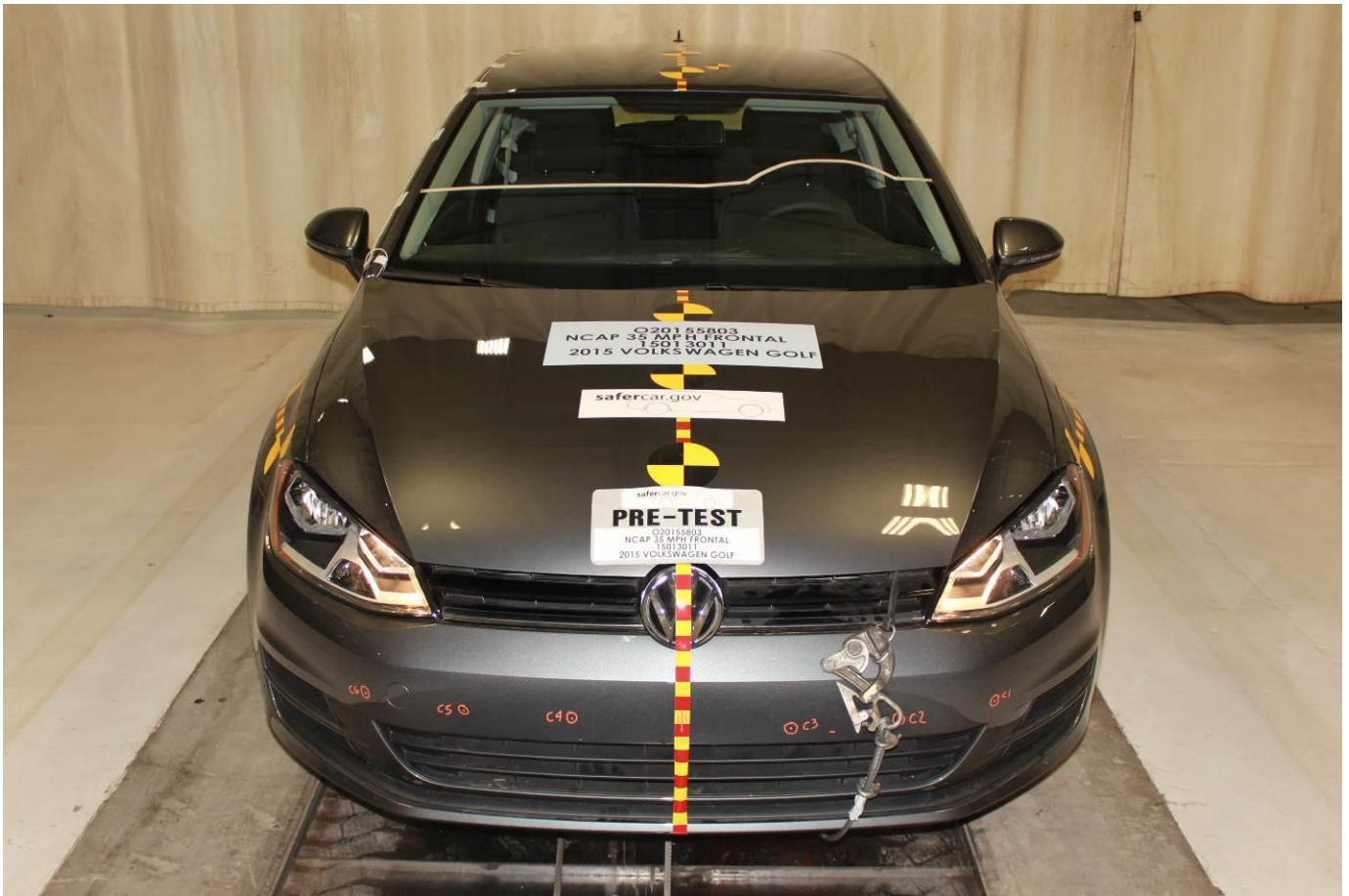
Tire Placard



2015 Volkswagen Golf Frontal As Delivered



Left Rear 3-4 View, As Received



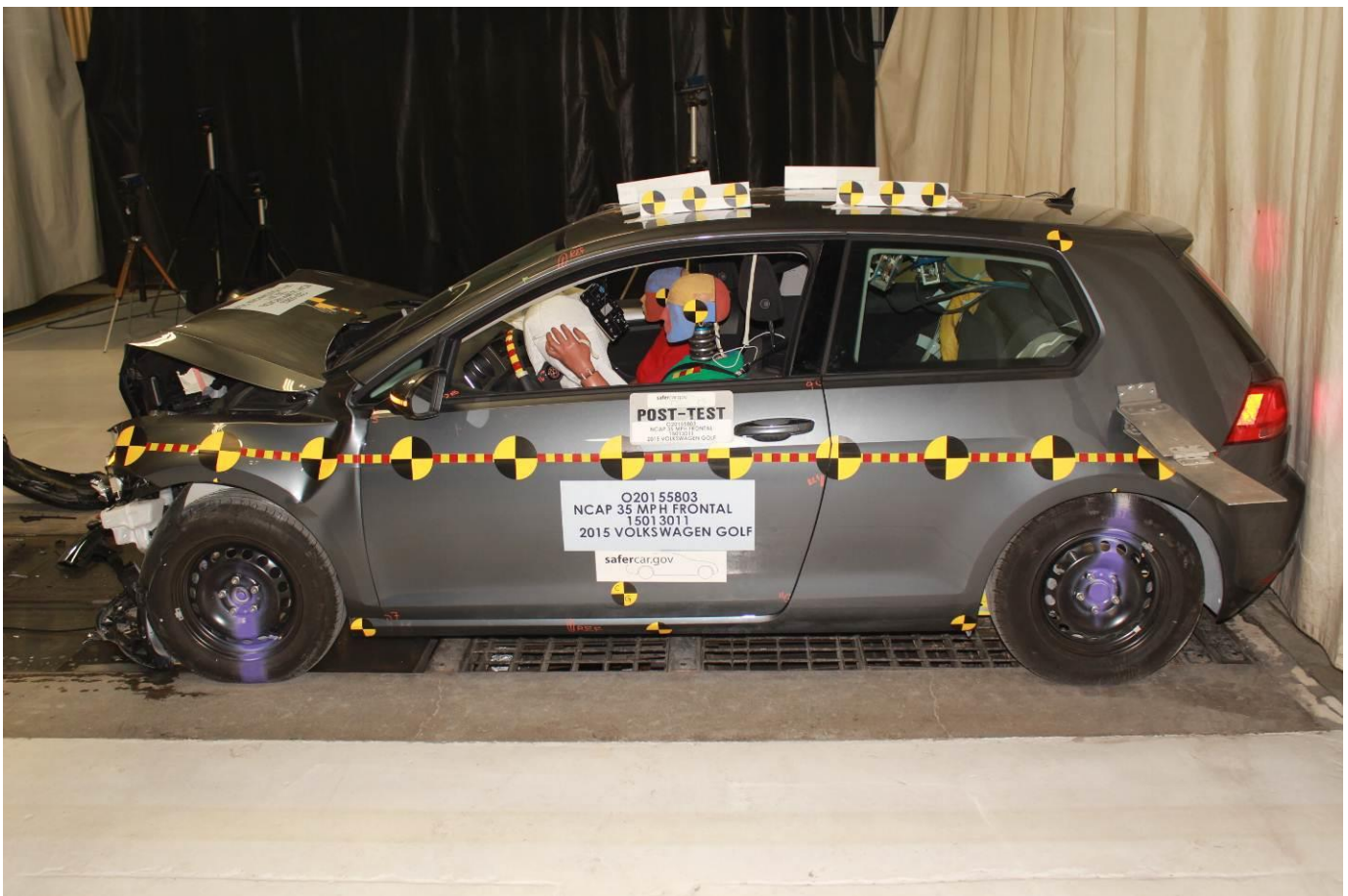
Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



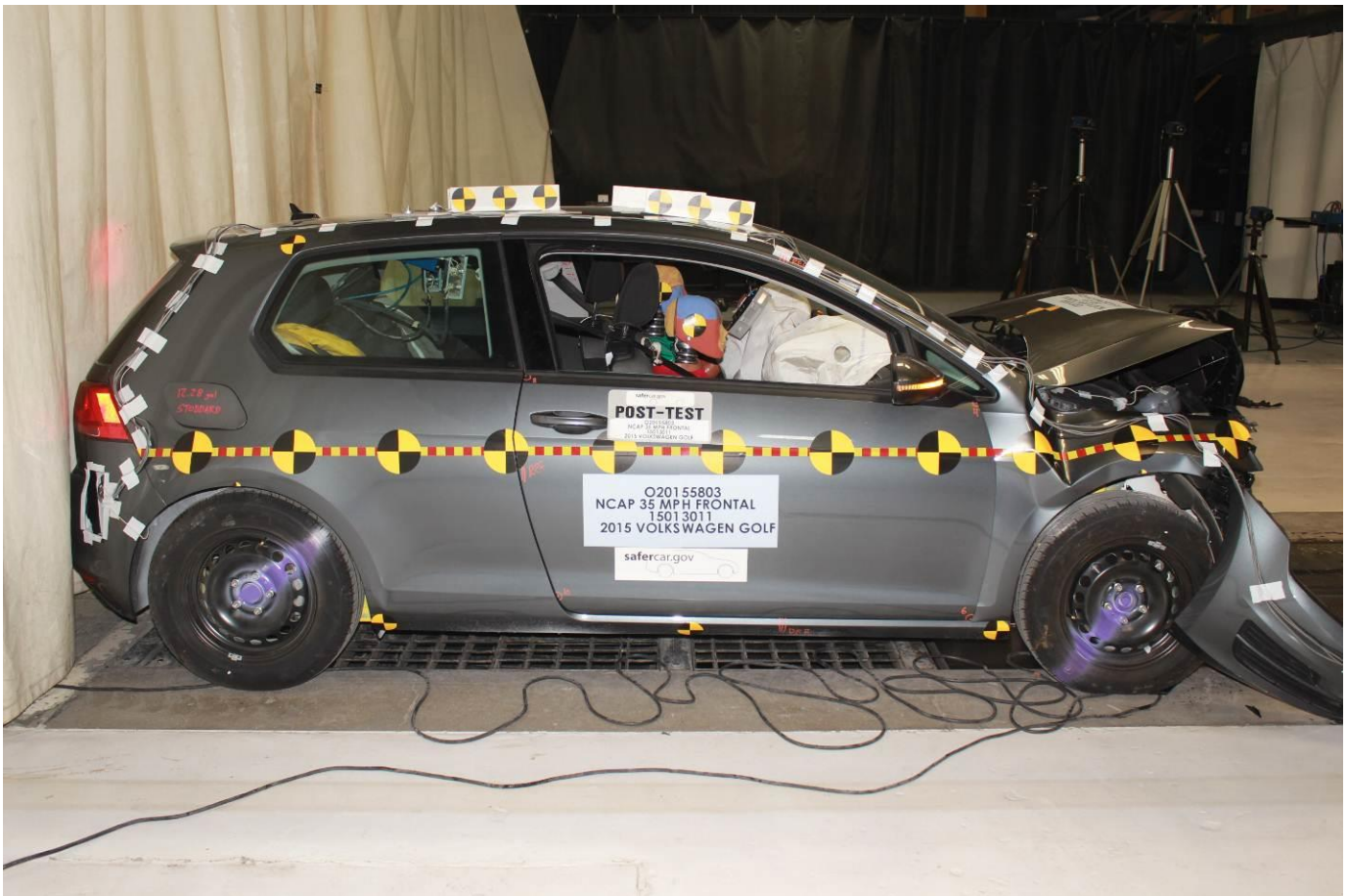
Pre-Test Left View of Test Vehicle



Post-Test Left View of Test Vehicle



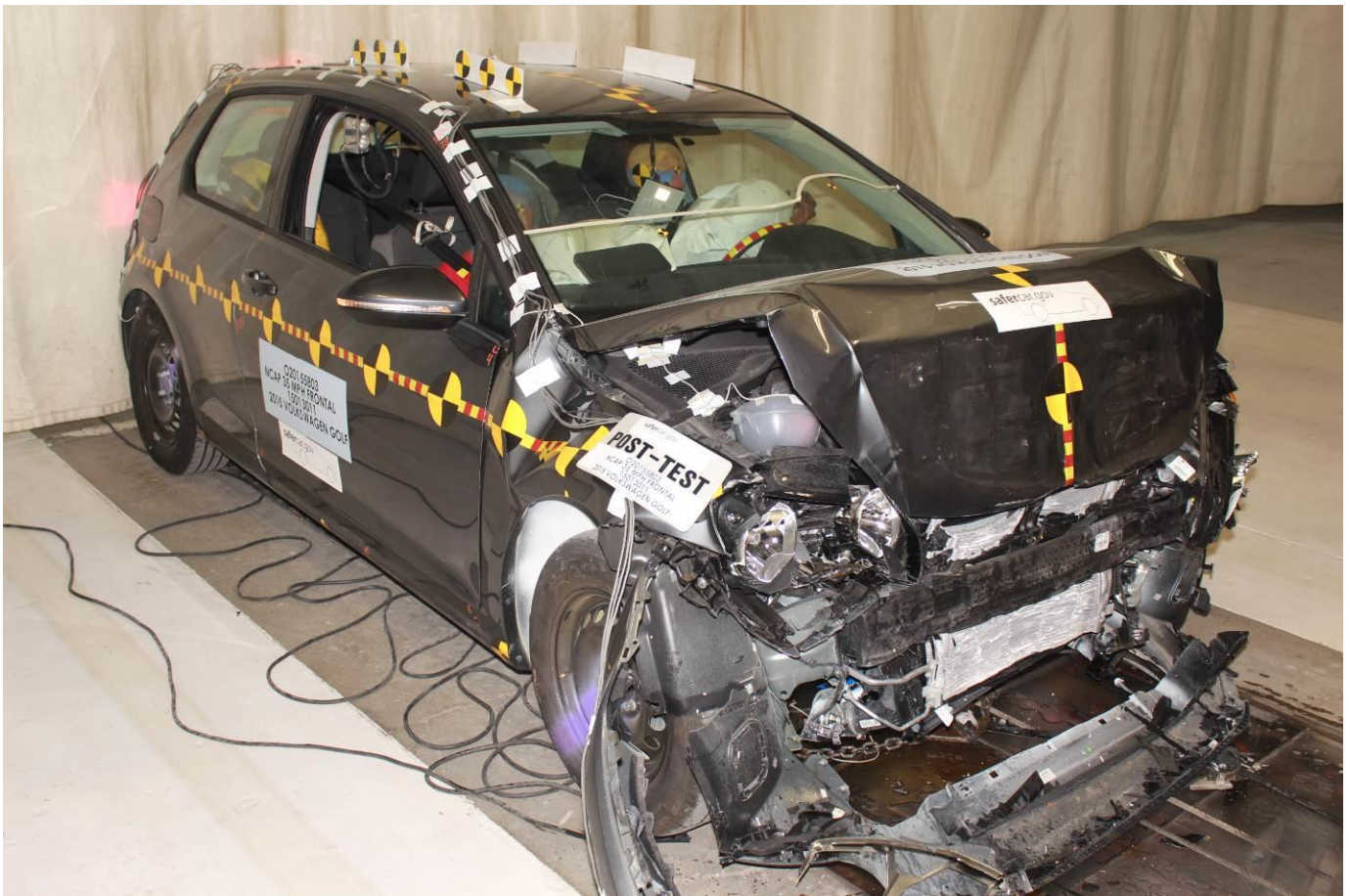
Pre-Test Right View of Test Vehicle



Post-Test Right View of Test Vehicle



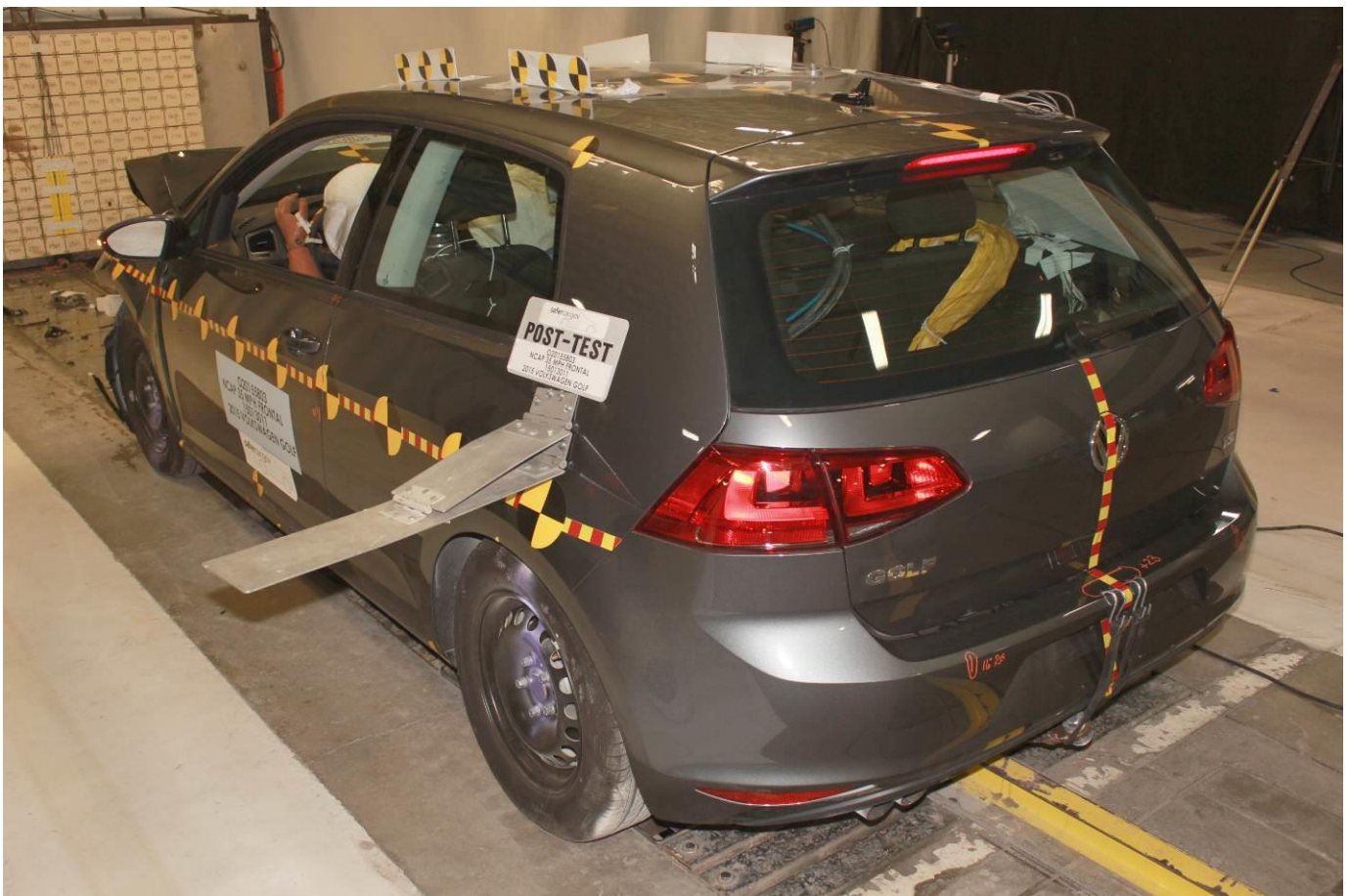
Pre-Test Right Front 3-4 View



Post-Test Right Front 3-4 View



Pre-Test Left Rear 3-4 View



Post-Test Left Rear 3-4 View



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



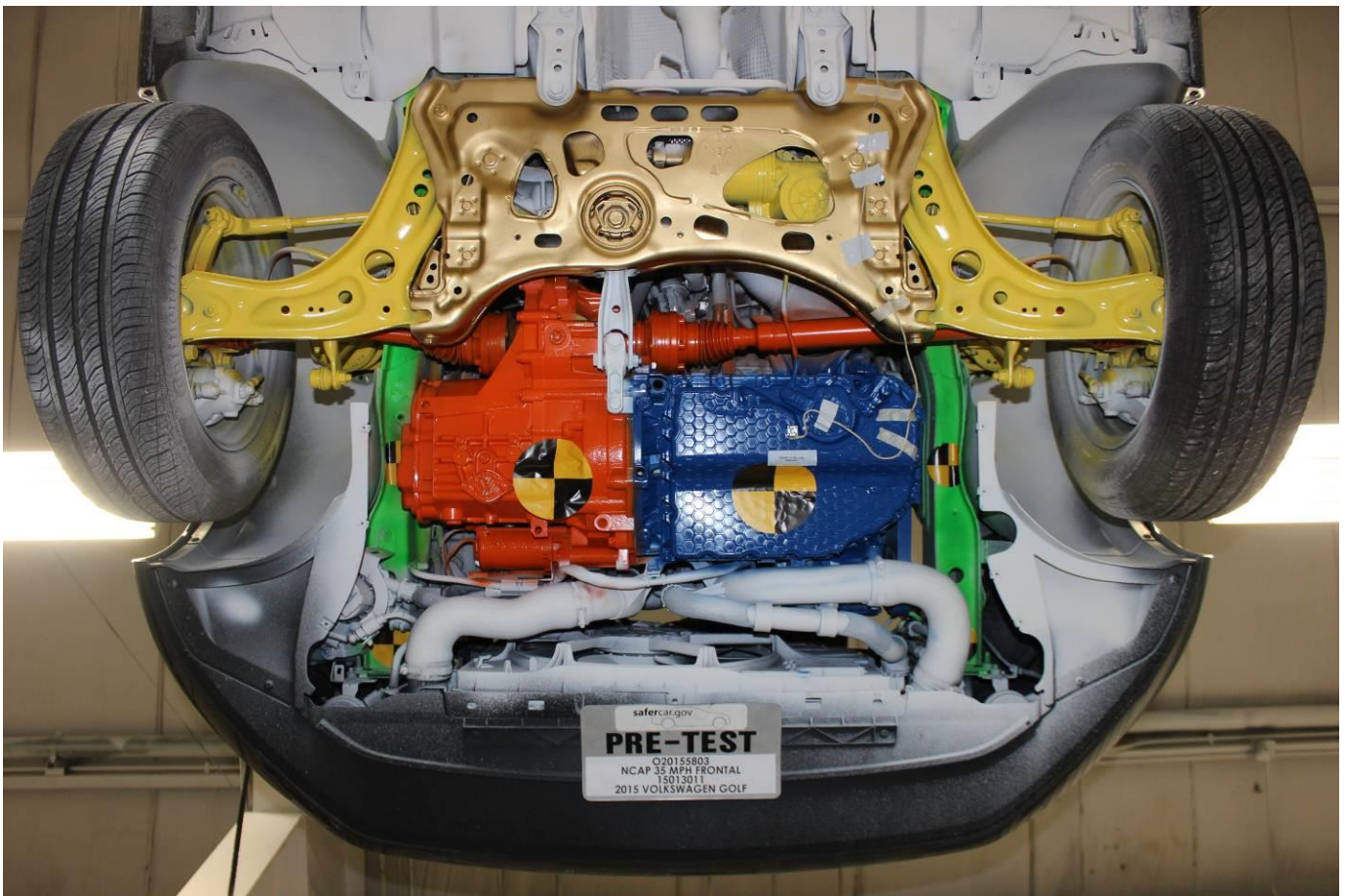
Post-Test Engine Compartment View



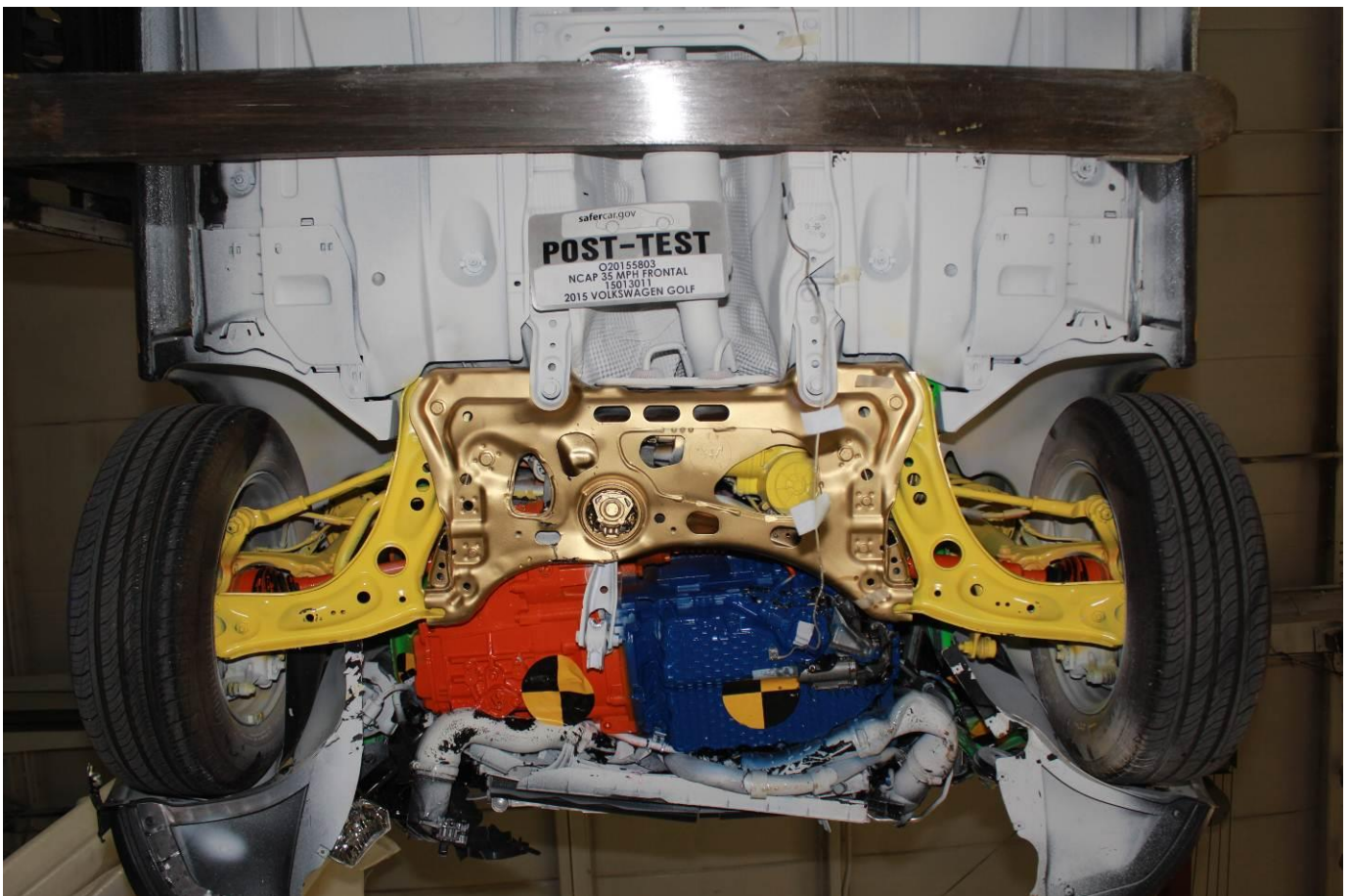
Pre-Test Fuel Filler Cap View



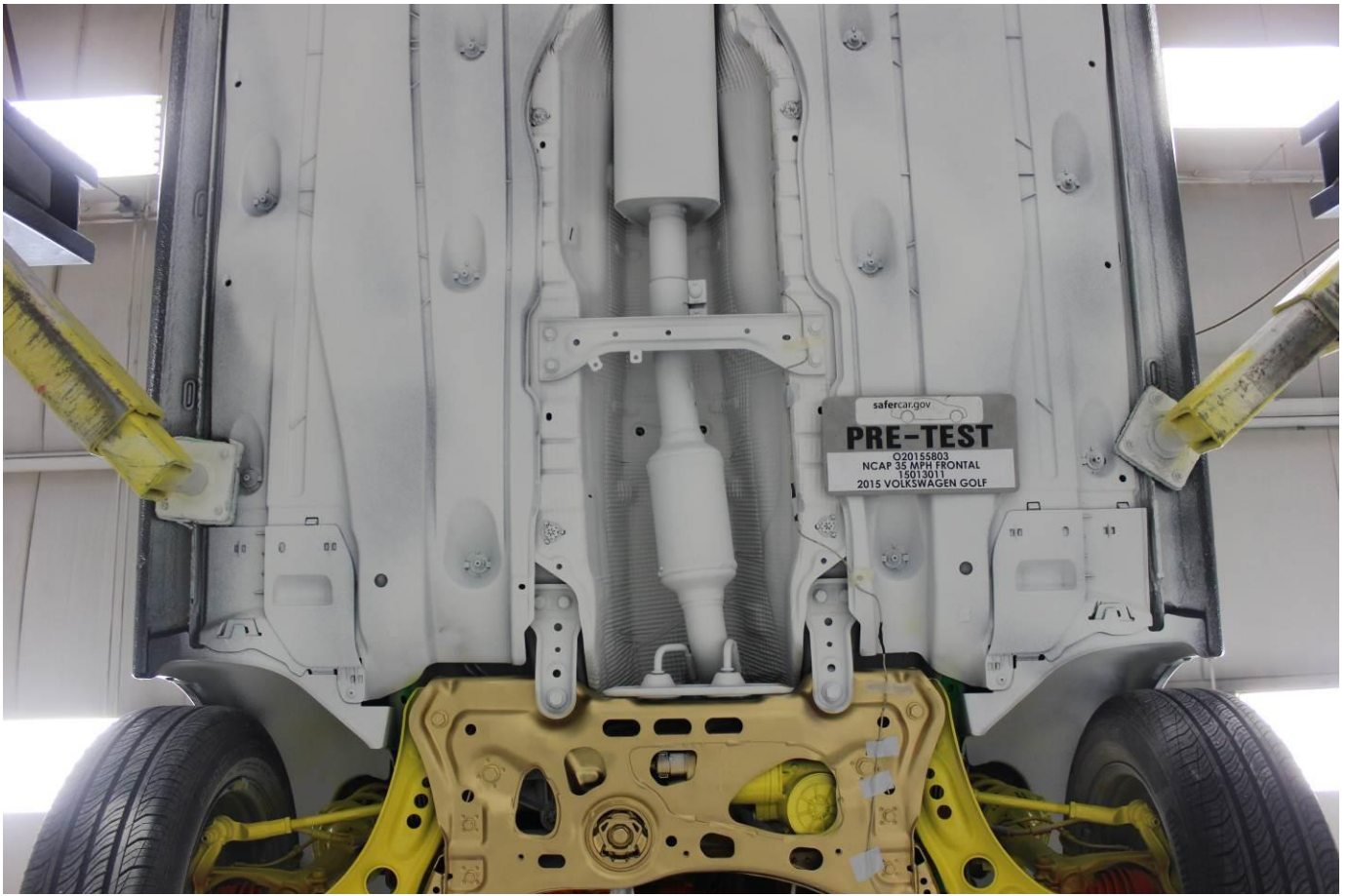
Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



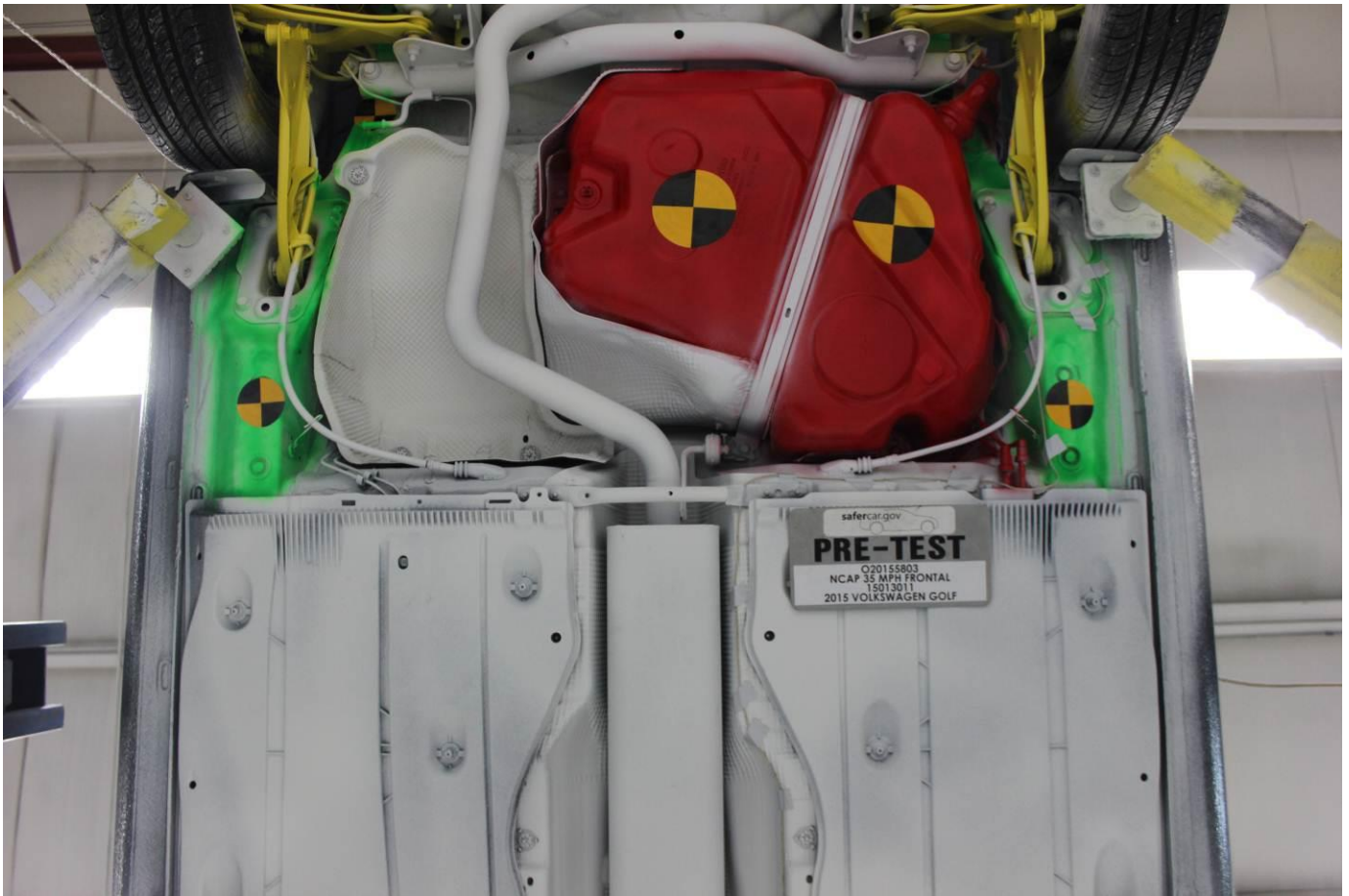
Post-Test Front Underbody View



Pre-Test Mid Front Underbody View



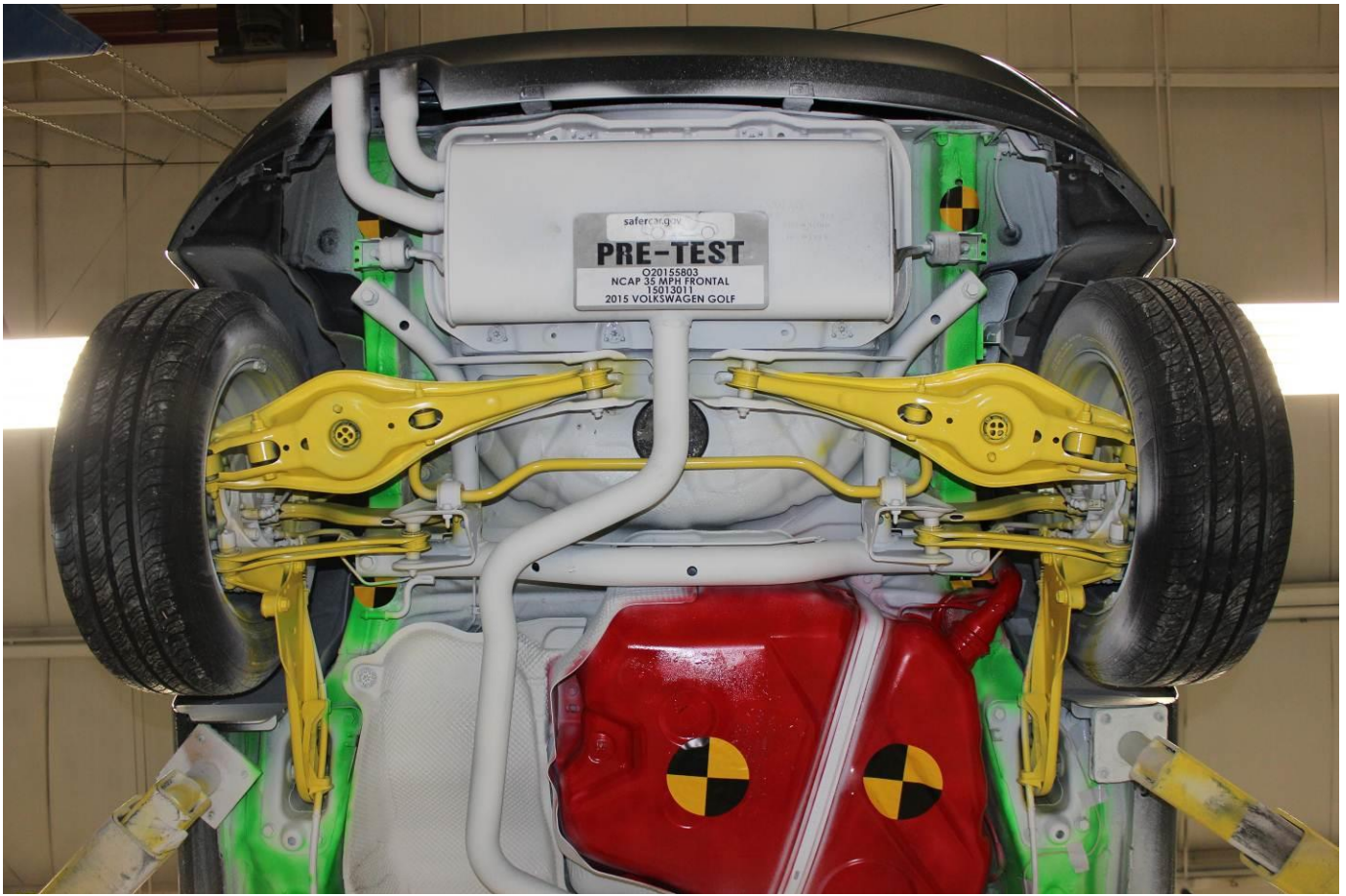
Post-Test Mid Front Underbody View



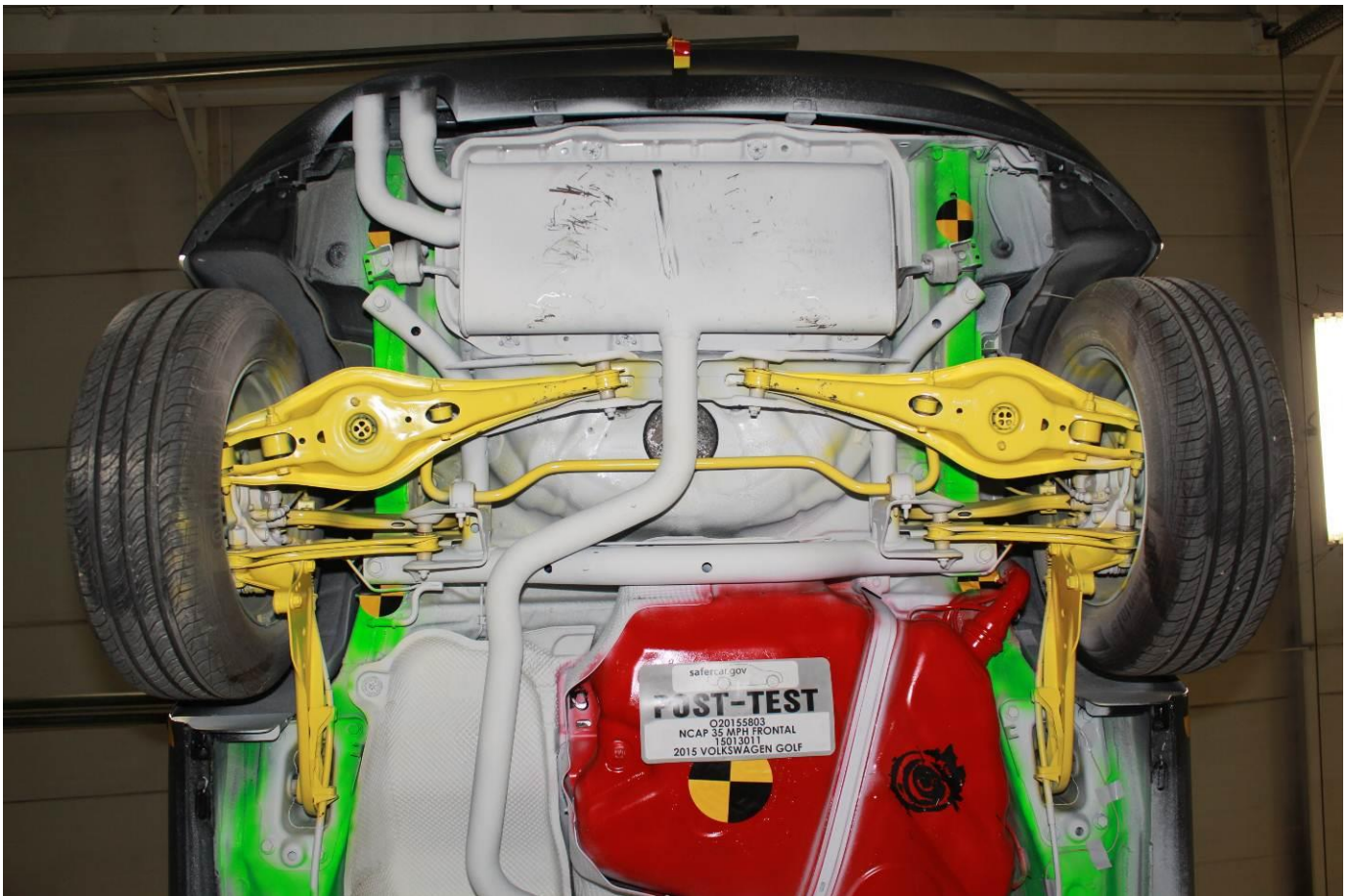
Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Dummy Cable Routing



Post-Test Dummy Cable Routing



Pre-Test Driver Dummy Front View



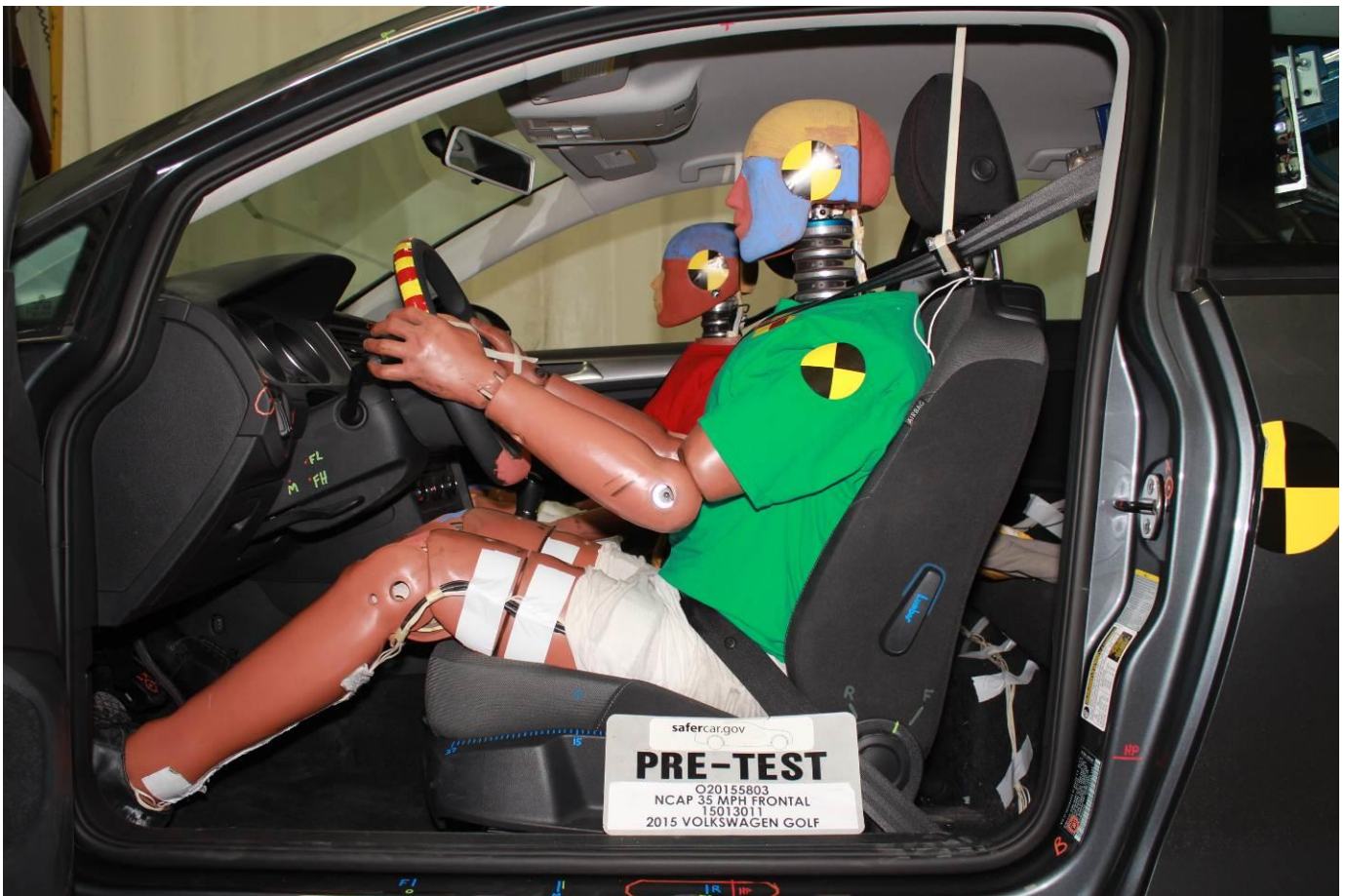
Post-Test Driver Dummy Front View



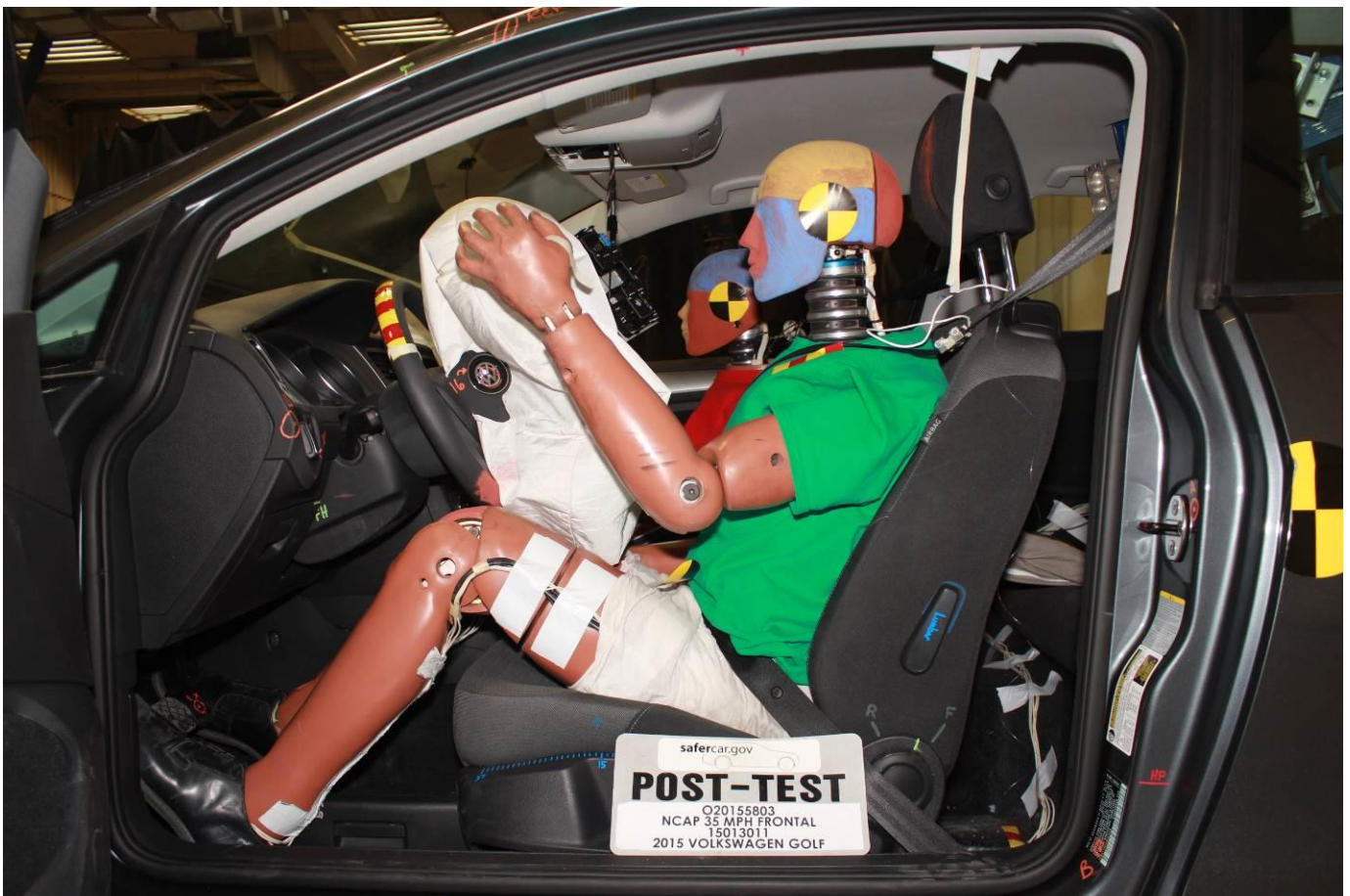
Pre-Test Driver Dummy Window View



Post-Test Driver Dummy Window View



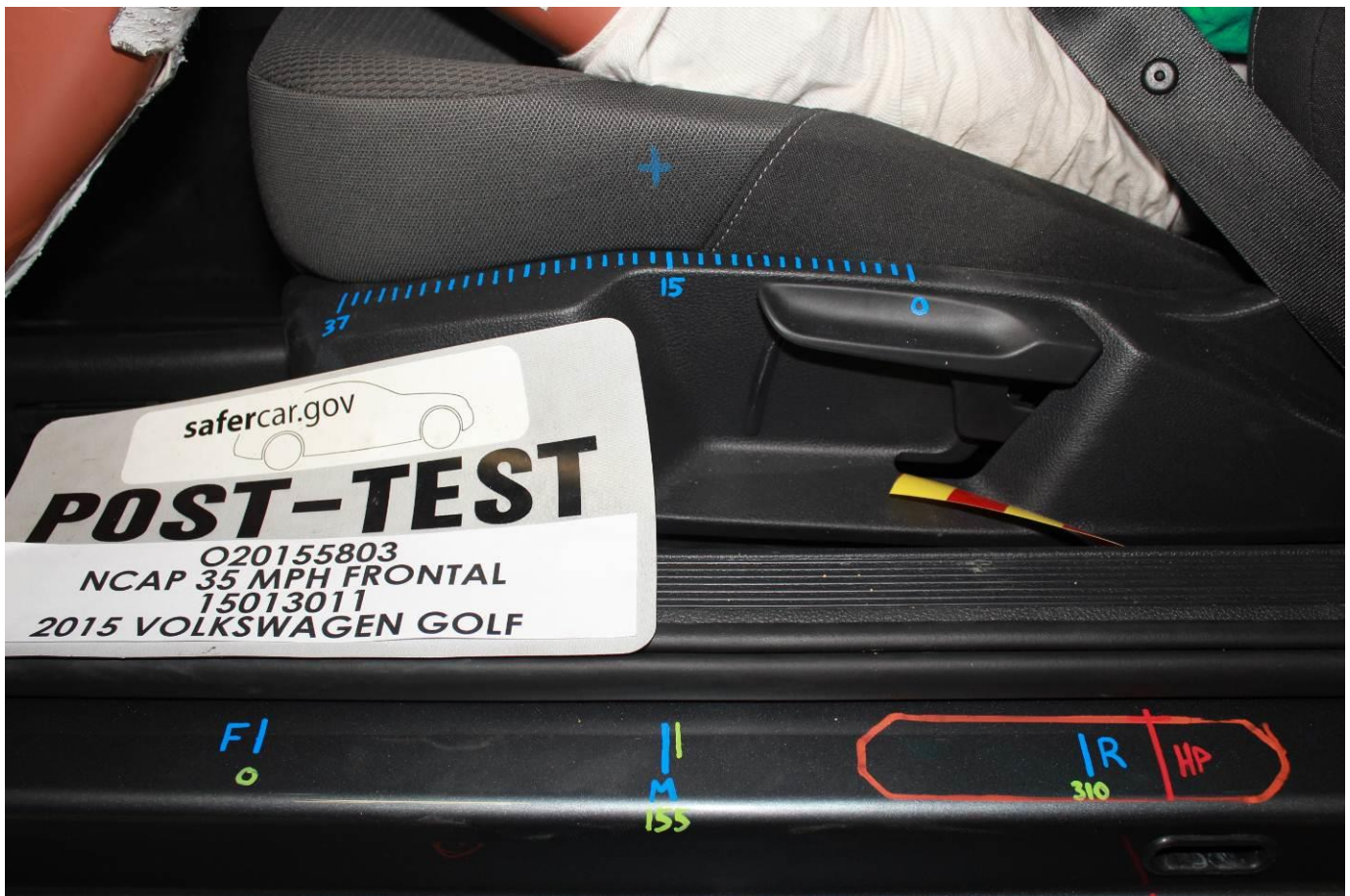
Pre-Test Driver Dummy and Vehicle Interior (Door Open)



Post-Test Driver Dummy and Vehicle Interior (Door Open)



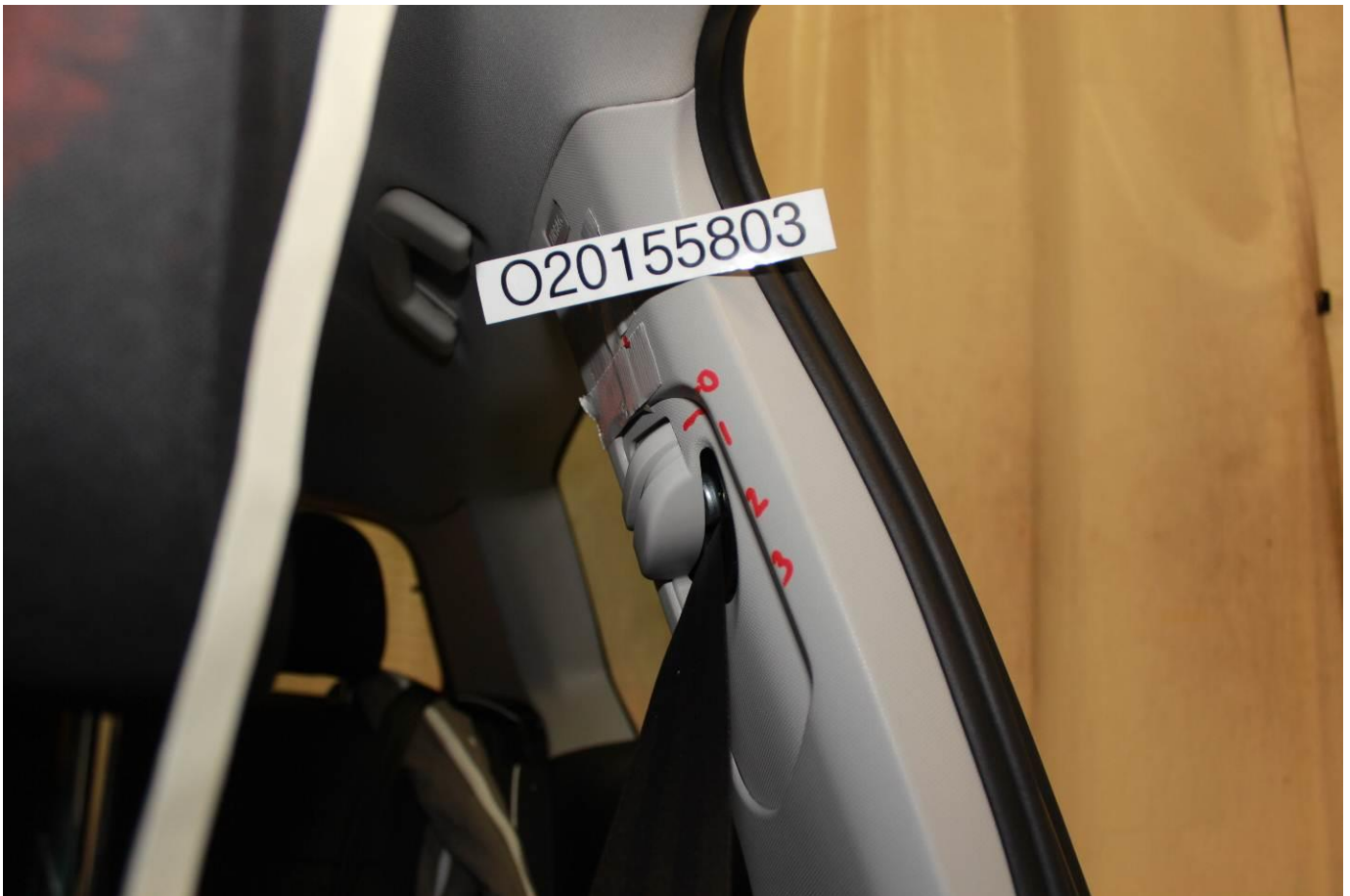
Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings



Pre-Test View of Belt Anchorage for Driver Dummy



Post-Test View of Belt Anchorage for Driver Dummy



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



Pre-Test Driver's Side Knee Bolster (without dummy)



Post-Test Driver's Side Knee Bolster (without dummy)



Pre-Test Driver's Side Floorpan



Post-Test Driver's Side Floorpan



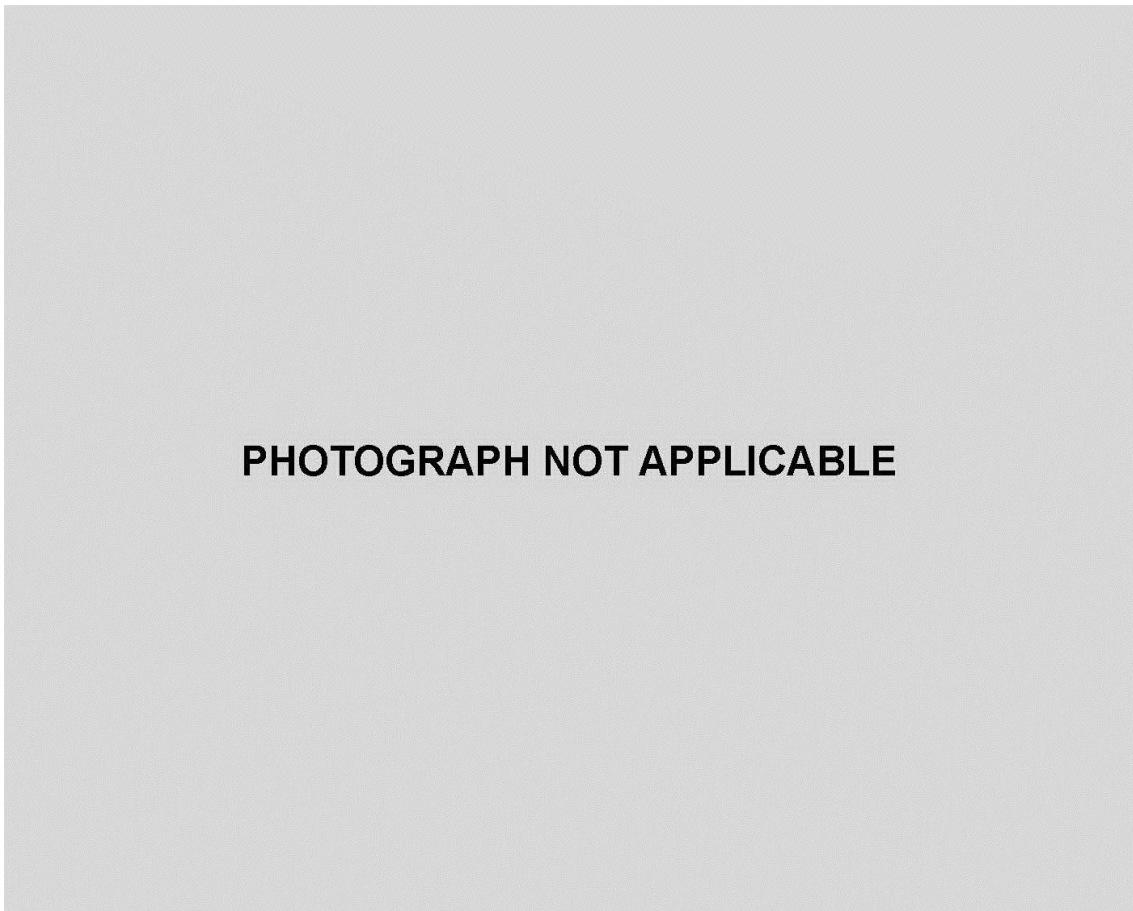
Post-Test Driver Dummy Face



Post-Test Driver Dummy Contact with Airbag



Post-Test Driver Dummy Contact with Headrest



Post-Test Driver Dummy Contact with Knee Bolster



Pre-Test View of the Steering Wheel



Post-Test View of the Steering Wheel



Pre-Test Passenger Dummy Front View



Post-Test Passenger Dummy Front View



Pre-Test Passenger Dummy Window View



Post-Test Passenger Dummy Window View



Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



Post-Test Passenger Dummy and Vehicle Interior (Door Open)



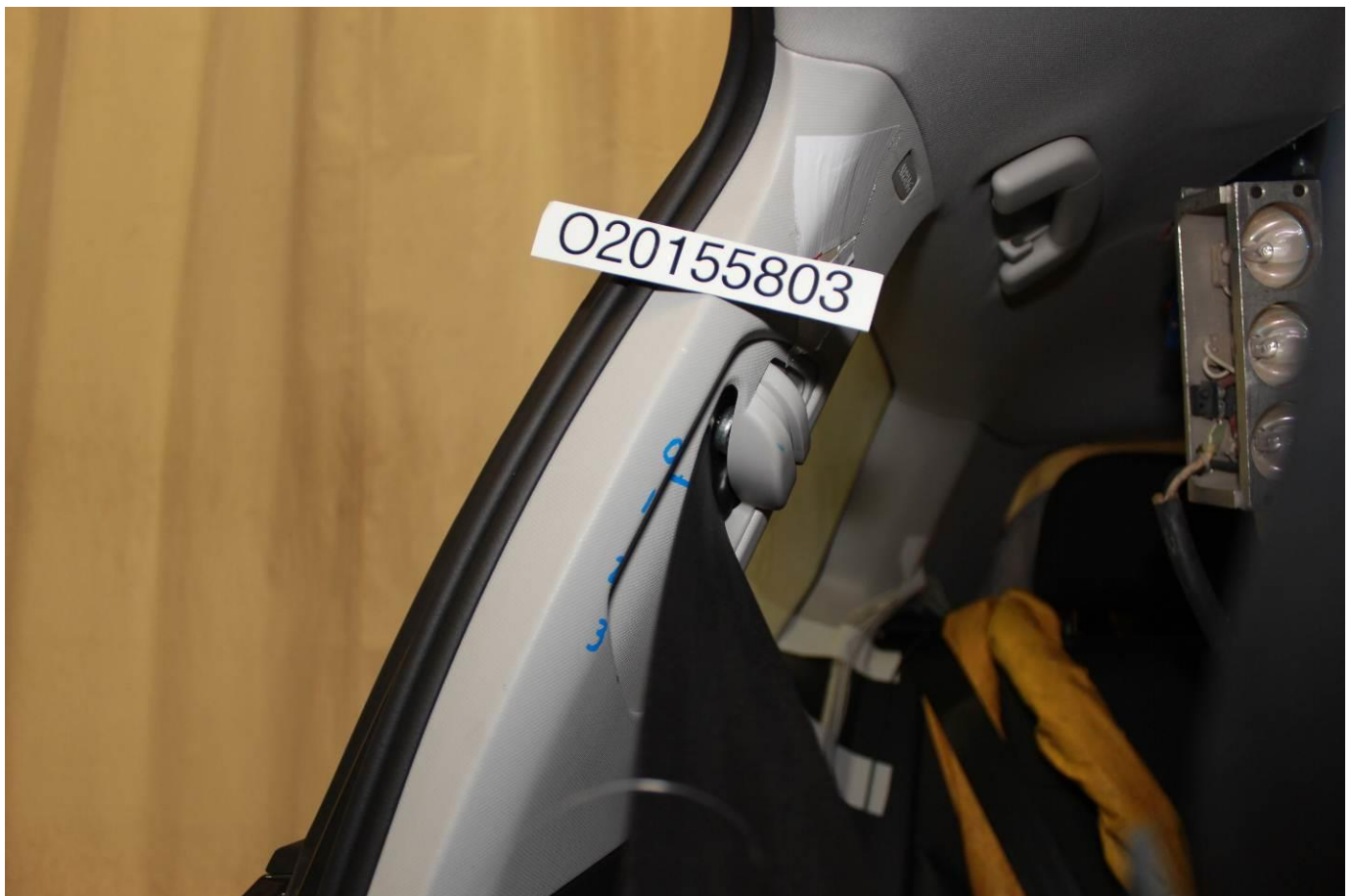
Pre-Test Passenger's Seat Fore-Aft Markings



Post-Test Passenger's Seat Fore-Aft Markings



Pre-Test View of Belt Anchorage for Passenger Dummy



Post-Test View of Belt Anchorage for Passenger Dummy



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



Pre-Test Passenger's Side Knee Bolster (without dummy)



Post-Test Passenger's Side Knee Bolster (without dummy)



Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



Post-Test Passenger Dummy Face



Post-Test Passenger Dummy Contact with Airbag



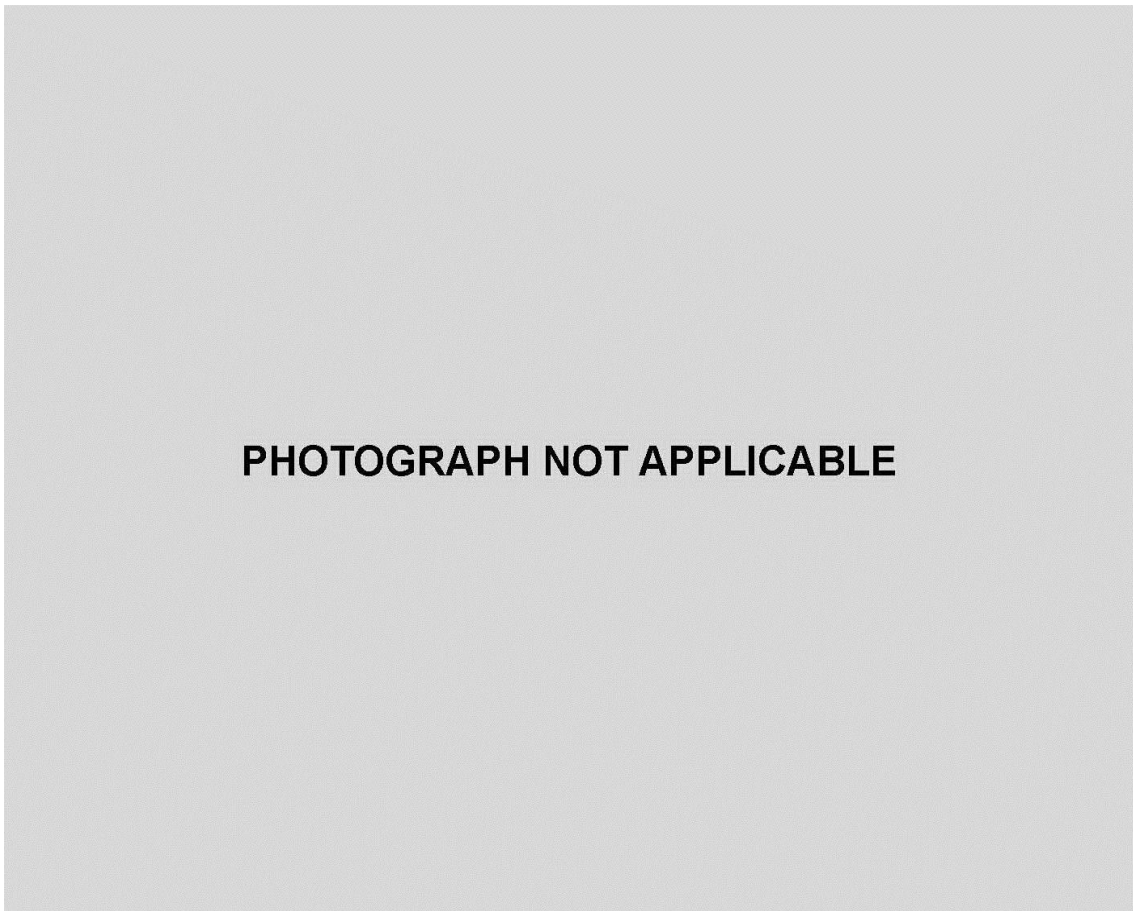
Post-Test Passenger Dummy Contact with Headrest



Post-Test Passenger Dummy Contact with Glovebox



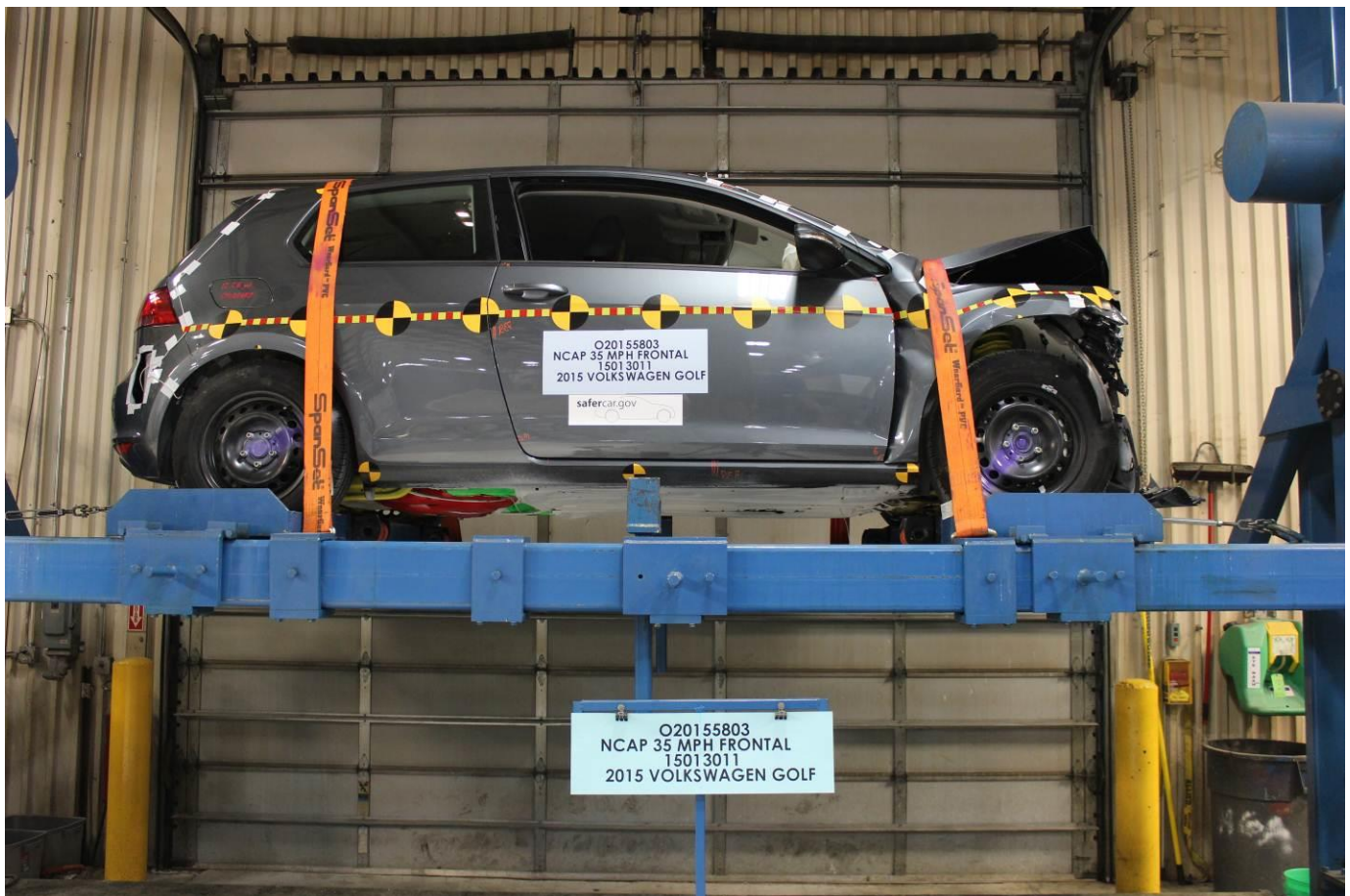
Ballast Installed in Vehicle



Post-Test Stoddard Solvent Spillage Location View



Post-Test Speed Trap Read-Out



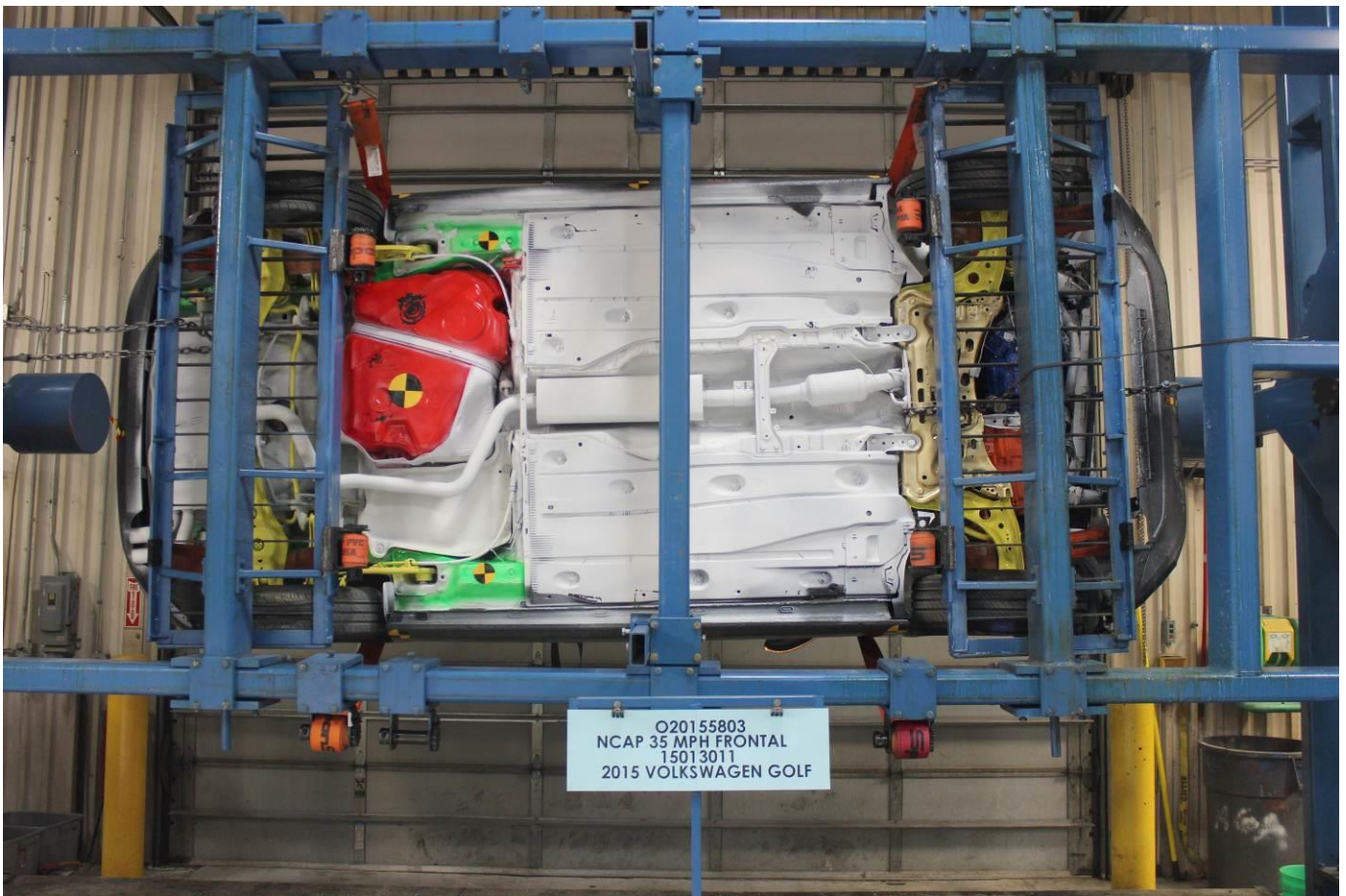
Vehicle at 0 Degree on Static Rollover Device



Vehicle at 90 Degrees on Static Rollover Device



Vehicle at 180 Degrees on Static Rollover Device



Vehicle at 270 Degrees on Static Rollover Device



Vehicle at 360 Degrees on Static Rollover Device



2015 Volkswagen Golf Frontal Impact Event

2015 Golf TSI® Launch Edition

Exterior: Platinum Gray Metallic Exterior Interior: Titan Black Cloth Interior

Ready. Set. Golf.

Das Auto.

STANDARD FEATURES (unless replaced by options)

PERFORMANCE / TECHNICAL

- 1.8L TSI® DOHC 16-valve turbocharged 4-cylinder engine w/ direct injection
- Partial Zero Emission Vehicle (PZEV)
- Servotronic® speed-variable electro-mechanical power steering
- Electronic Stability Control (ESC)
- XDS® Cross Differential System
- Multi-link independent rear suspension
- 15" steel wheels w/ full wheel covers & all-season tires

SAFETY / DURABILITY

- Driver & front passenger front & side airbag supplemental restraint systems
- Side Curtain Protection® head impact airbags, front & rear
- Side impact protection door beams
- 3-point safety belts, all seating positions
- Intelligent Cruise Response System (ICRS)
- Anti-lock Braking System (ABS) w/ front & rear disc brakes
- Tire Pressure Monitoring System (TPMS)
- Lower Anchors & Tethers for Children (LATCH)

COMFORT / CONVENIENCE / ADDITIONAL FEATURES

- 5.8" Touchscreen AM/FM/CD player w/ MP3 playback & 8 speakers
- Bluetooth® mobile telephone connectivity
- SiriusXM® Satellite Radio (limited time subscription included)
- Media Interface (MI2)
- Climate single-zone manual climate control
- Glove compartment w/ adjustable cooling
- Cloth comfort seats
- Manually adjustable front seats w/ manual lumbar support
- 60/40 split-folding rear seats w/ center armrest, storage & pass-through
- Height adjustable, telescoping steering column
- Center console w/ cupholders & adjustable front armrest w/ storage
- Front & rear reading lights, illuminated vanity mirrors
- Multifunction display w/ trip computer
- Power central locking system w/ remote
- Power windows w/ pinch protection
- Power adjustable, manually folding, heated exterior mirrors
- Variable intermittent front windshield wipers
- Rear window washer & wiper
- Daytime Running Lights (DRL)
- Front & rear carpeted floor mats

Manufacturer's Suggested Retail Price: **\$17,995.00**

DRIVER CARE PACKAGE

WARRANTY INFORMATION

- Volkswagen New Vehicle Limited Warranty
- 3 years/36,000 miles (whichever occurs first)
- Powertrain Limited Warranty
- 5 years/80,000 miles (whichever occurs first)
- Limited Warranty against Corrosion Perforation
- 12 years/unlimited mileage

24-HOUR ROADSIDE ASSISTANCE

Please ask your dealer for a copy of the Volkswagen warranty booklet for details.

VOLKSWAGEN CAREFREE MAINTENANCE

Scheduled maintenance services described in the Volkswagen Maintenance booklet are covered at no charge for 12 months/10,000 miles (whichever occurs first).

PACKAGES/OPTIONS

Platinum Gray Metallic Exterior
Titan Black Cloth Interior
5-Speed Manual Transmission

No Charge
No Charge
No Charge

Destination Charge **\$820.00**

Total Price: \$18,815.00

Fuel, license, title fees, taxes and dealer-installed accessories are not included.

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:	FOR THIS VEHICLE:
U.S./CANADIAN	FINAL ASSEMBLY POINT:
PARTS CONTENT: 7%	PUEBLA, MEXICO
MAJOR SOURCES OF FOREIGN	COUNTRY OF ORIGIN:
PARTS CONTENT:	ENGINE: MEXICO
GERMANY: 25%	TRANSMISSION:
MEXICO: 21%	GERMANY

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION OR OTHER NON-PARTS COSTS.

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy **30** MPG
combined city/hwy 25 city 37 highway
3.3 gallons per 100 miles

Compact Cars range from 14 to 105 MPG. The best vehicle rates 118 MPG.

You save \$2,250 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,750

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **7** Smog Rating (tailpipe only) **9**

This vehicle emits 300 grams of CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$11,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.50 per gallon. MPG is miles per gallon (gallon equivalent). Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score **Not Rated**
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

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

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

Who better to get you into a Volkswagen than us? Volkswagen Credit. Das Auto.

Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

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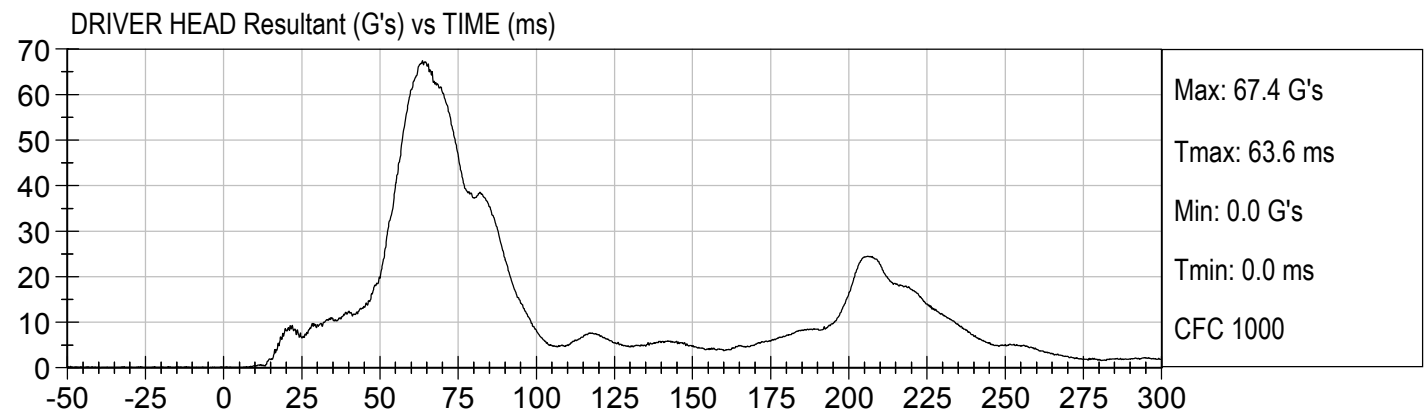
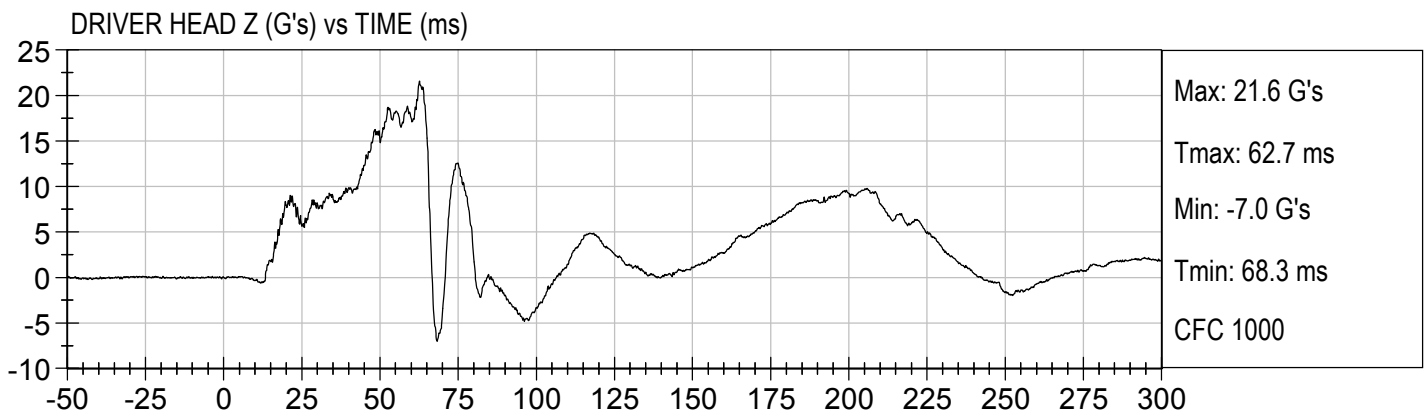
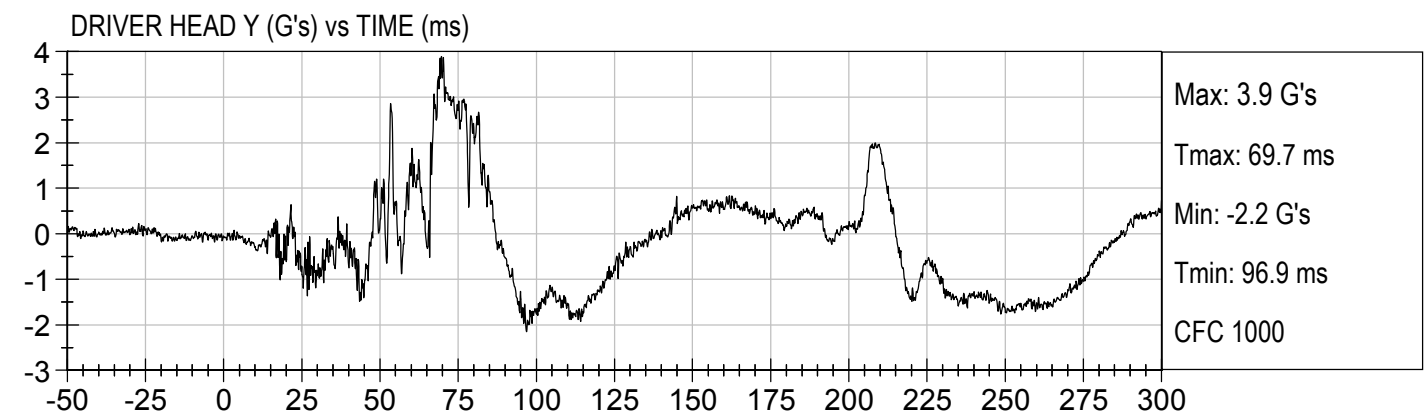
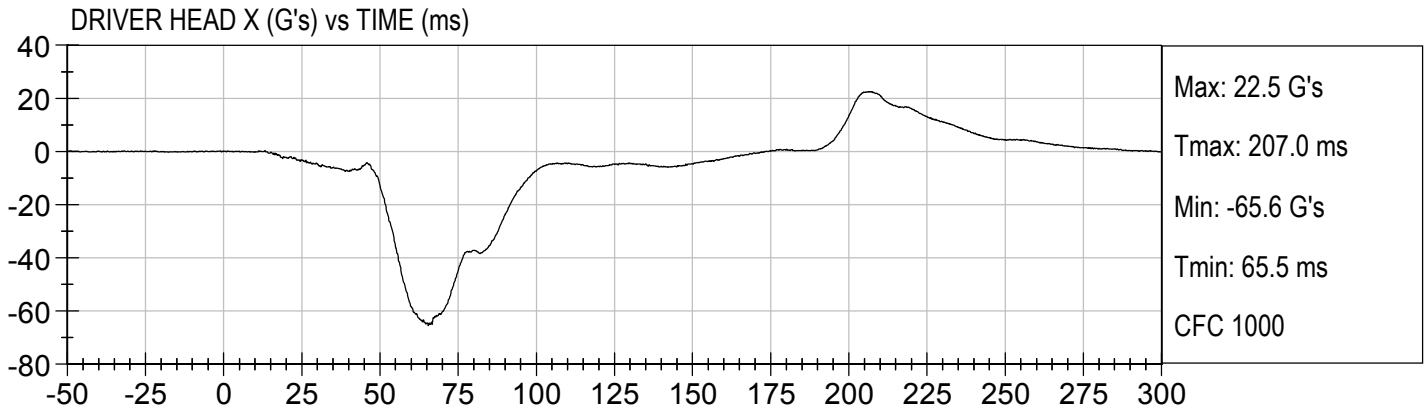
	<u>Page No.</u>
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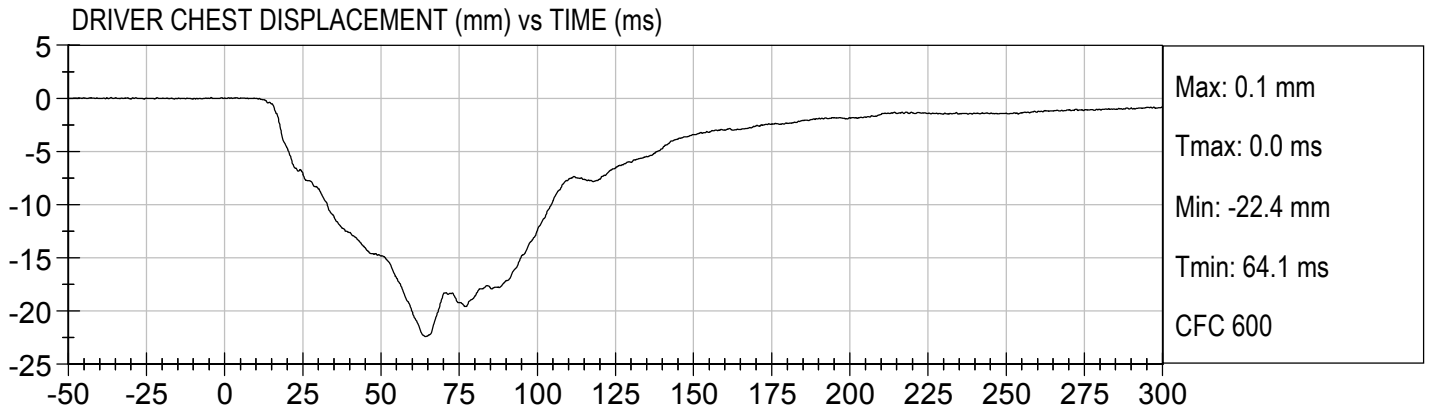
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

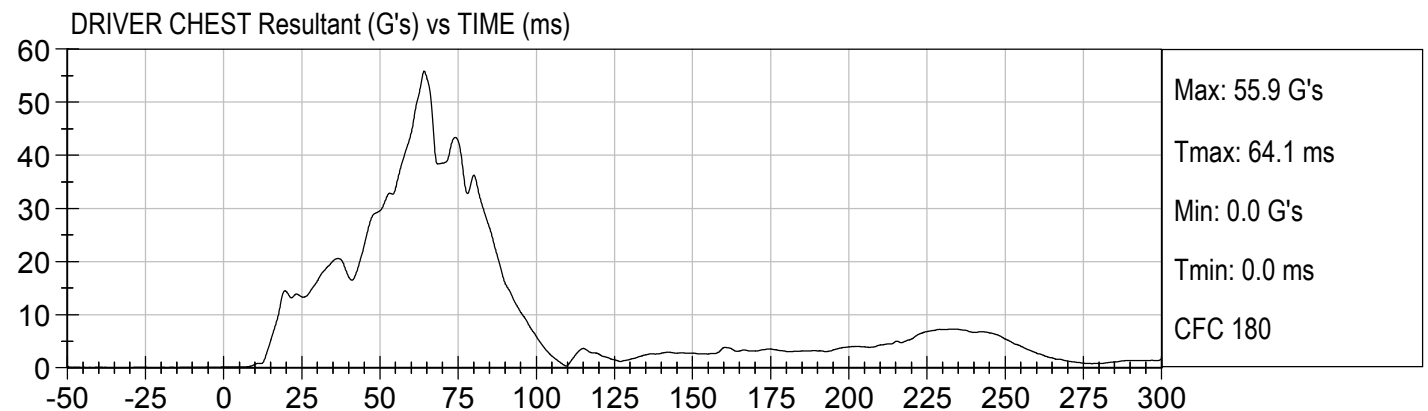
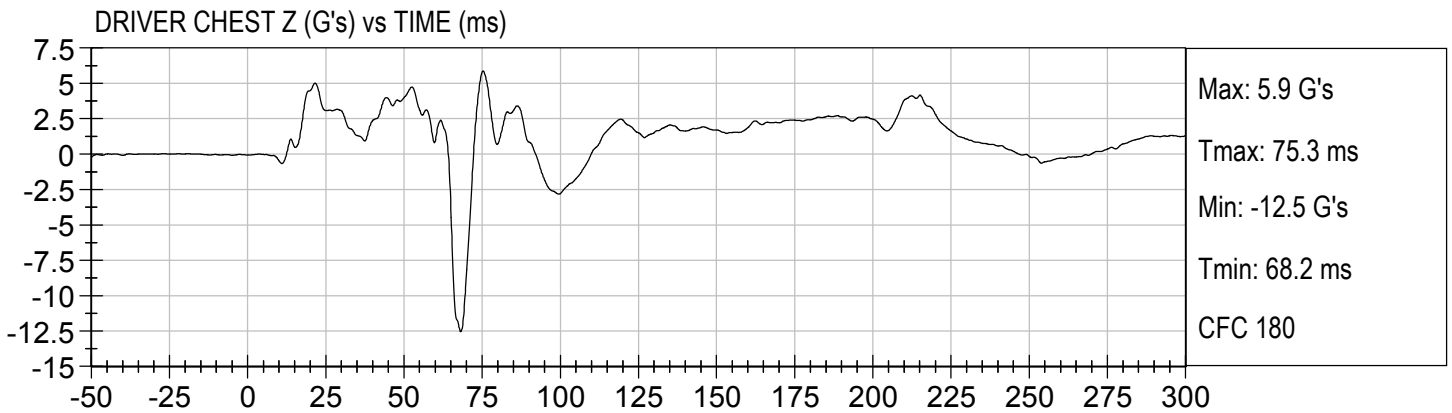
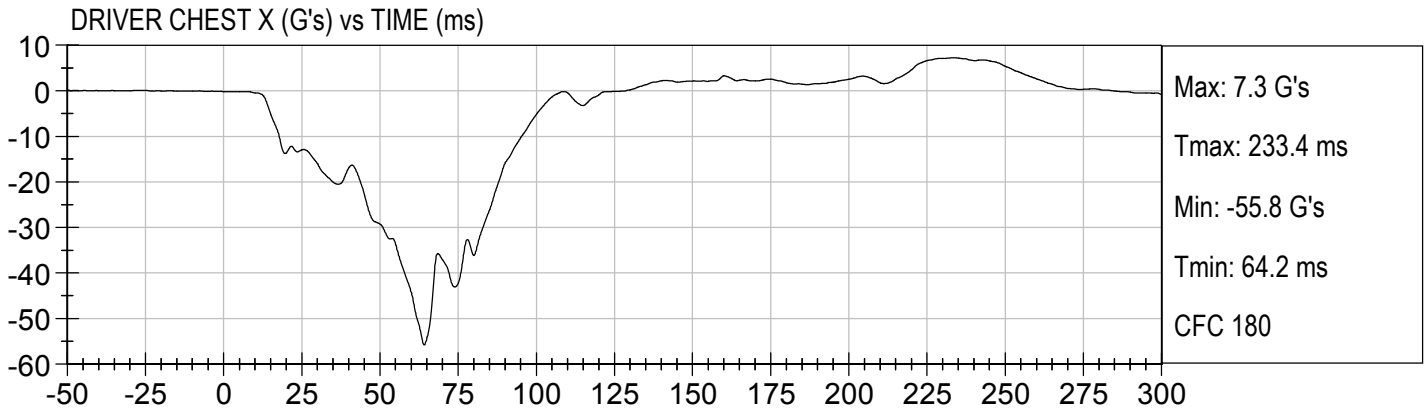
Driver Head X Redundant
Driver Head Y Redundant
Driver Head Z Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Redundant
Driver Chest Y Redundant
Driver Chest Z Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Redundant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

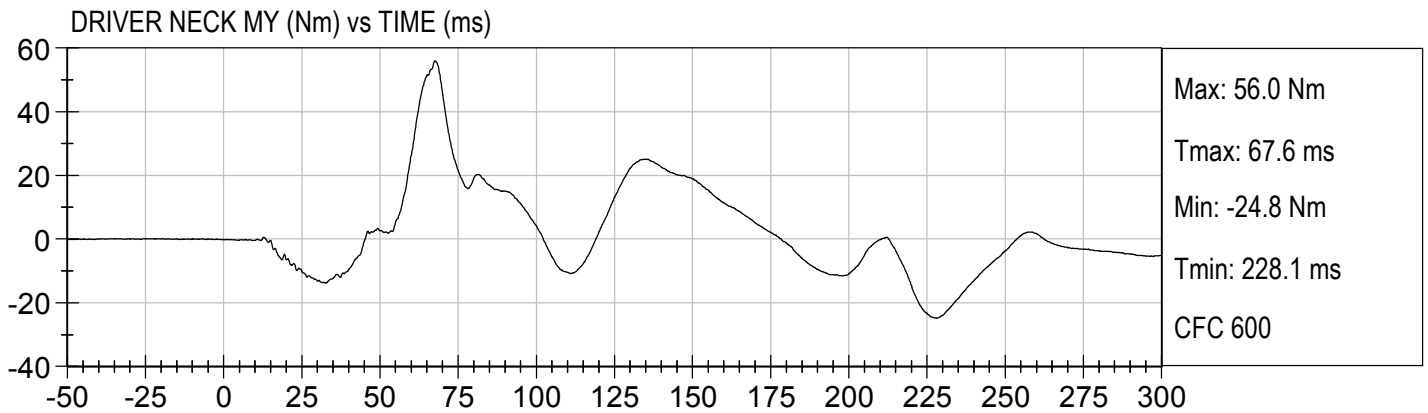
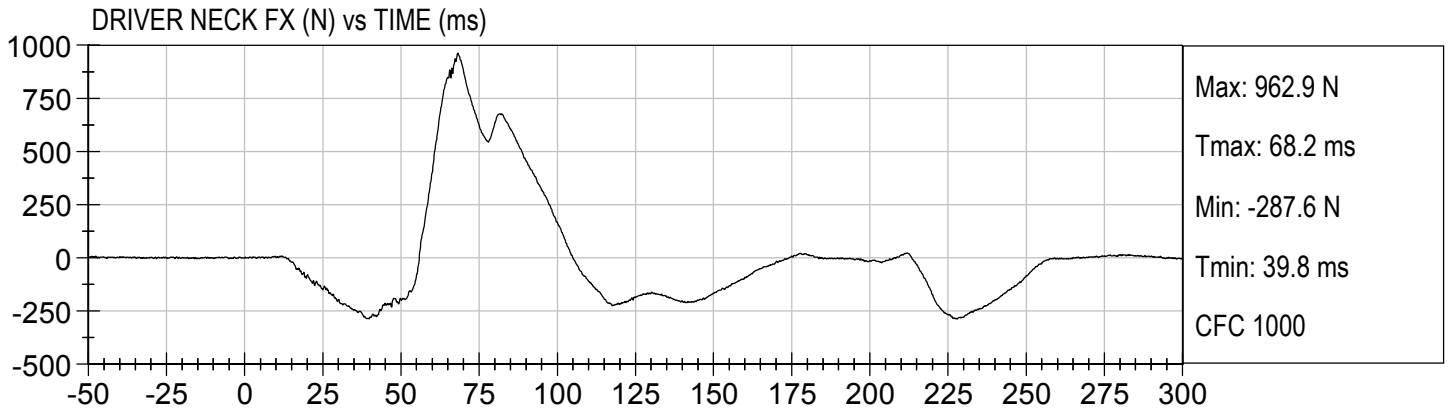
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver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

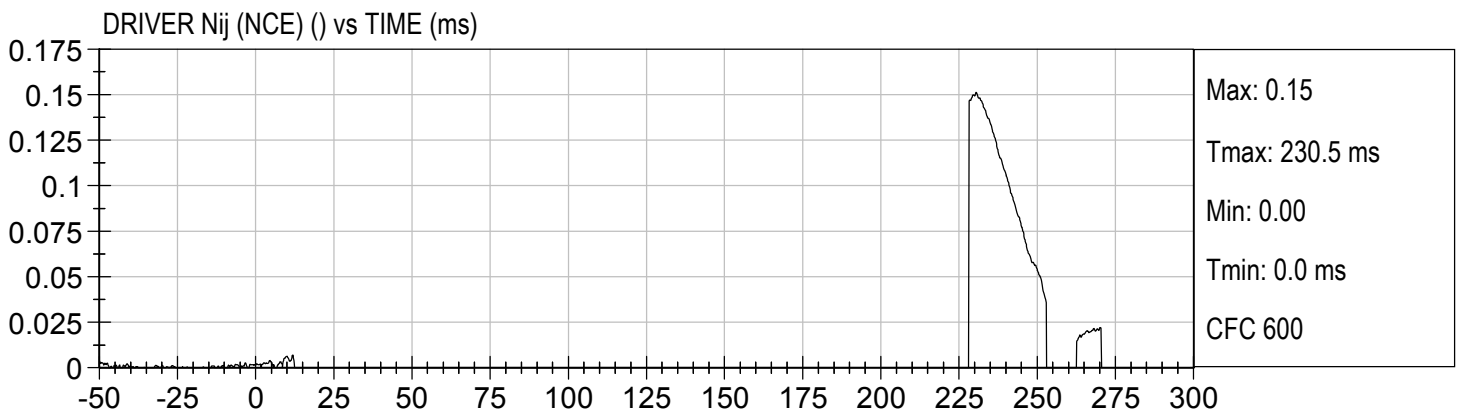
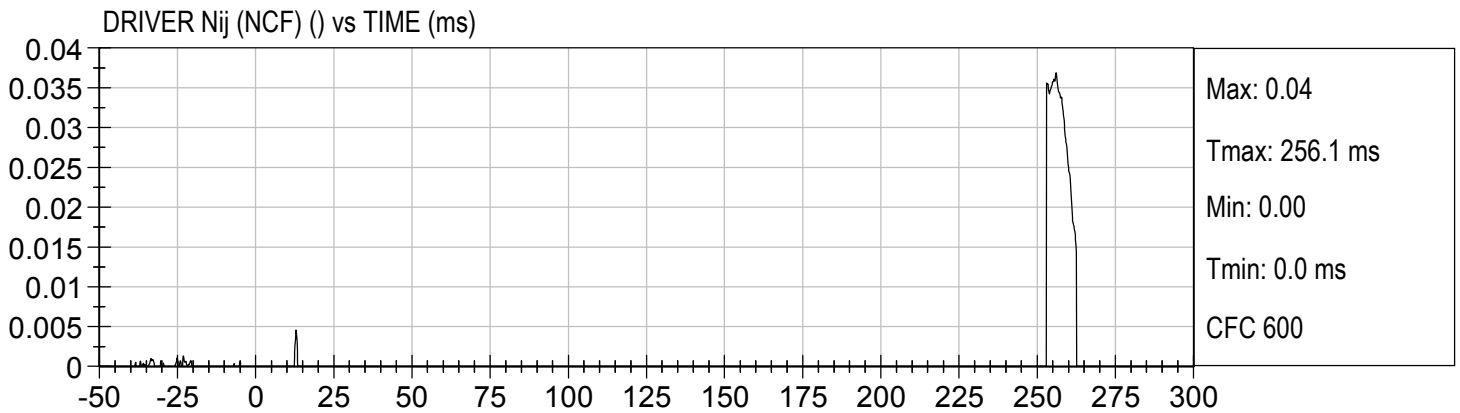
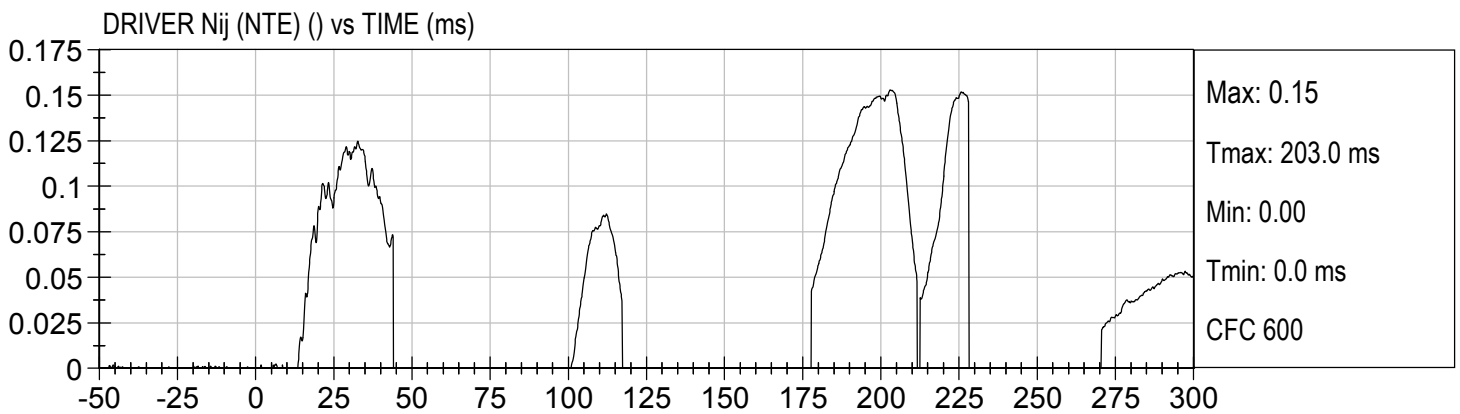
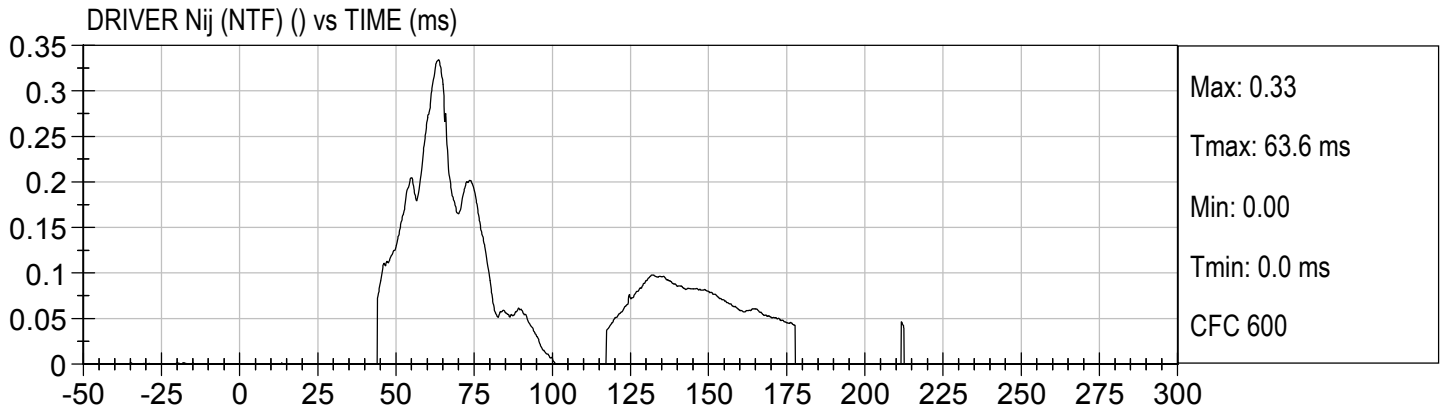
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia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

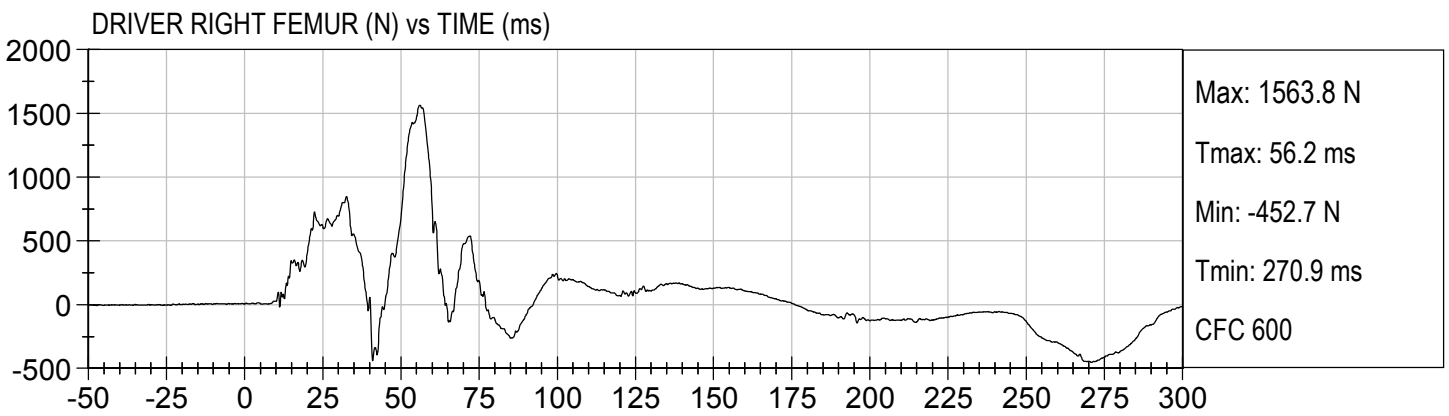
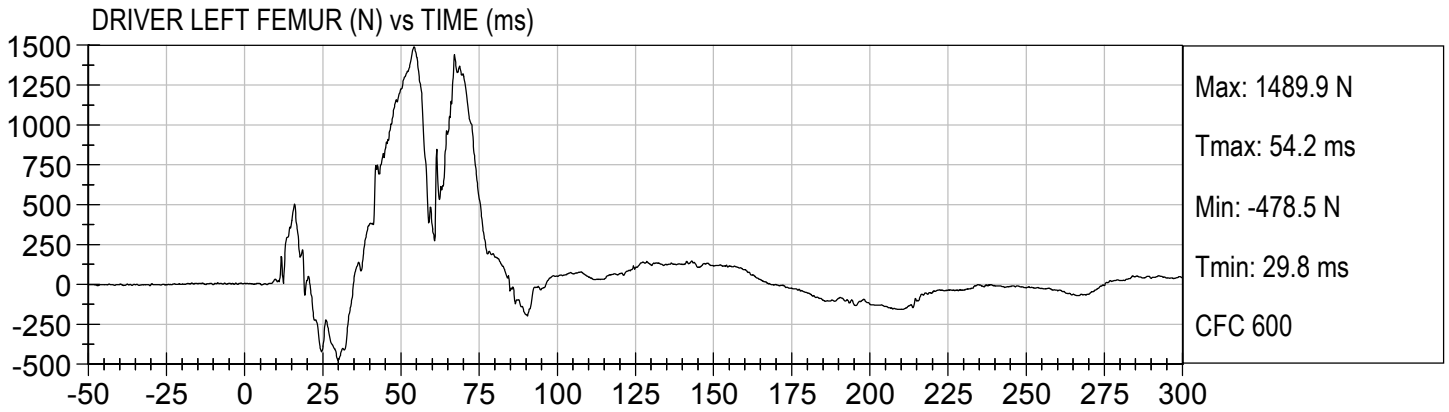


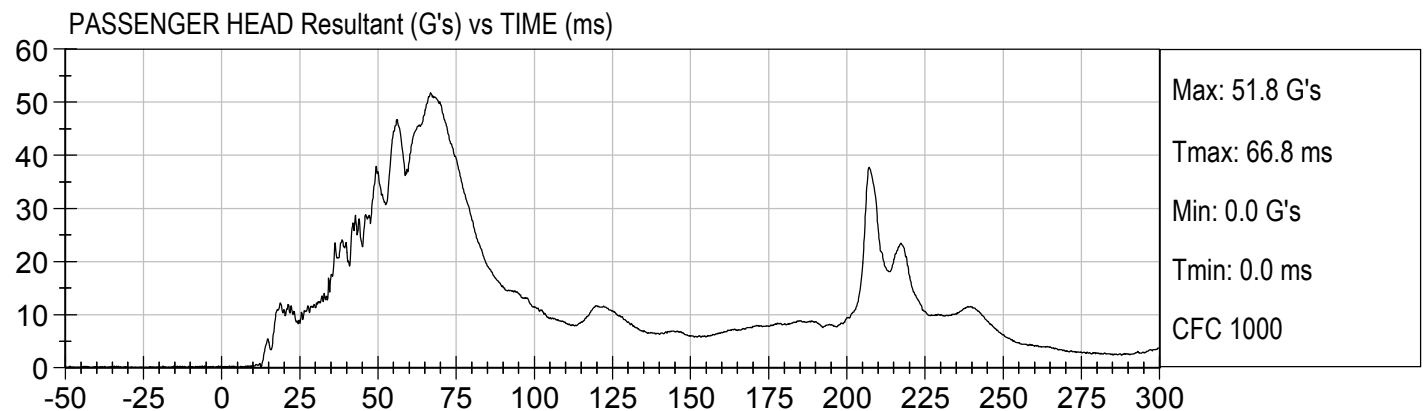
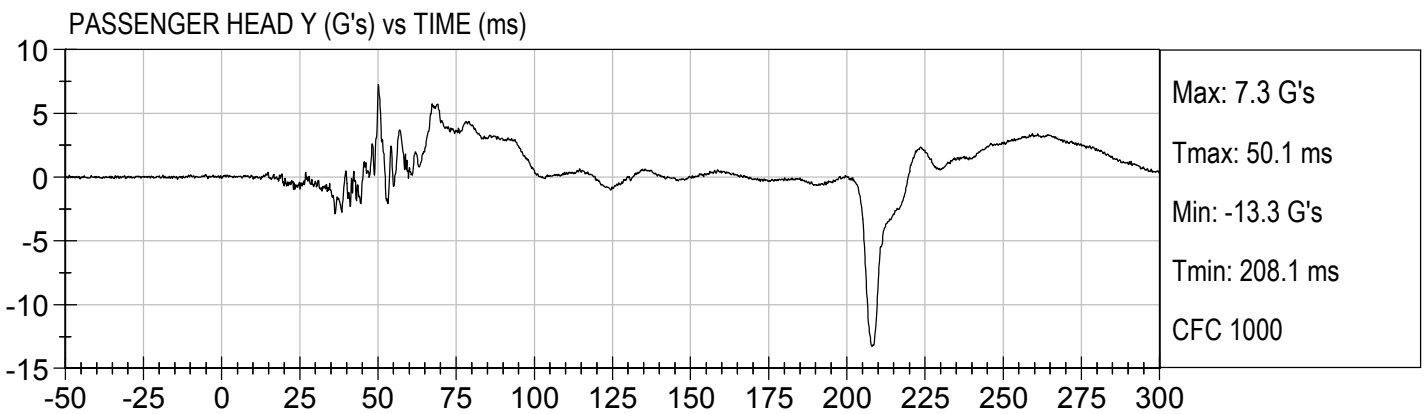
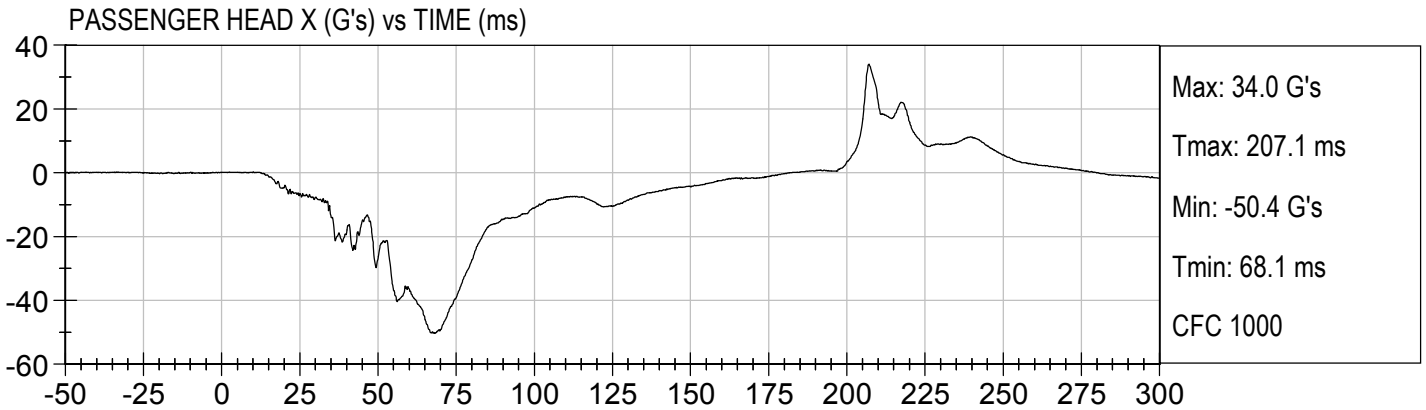


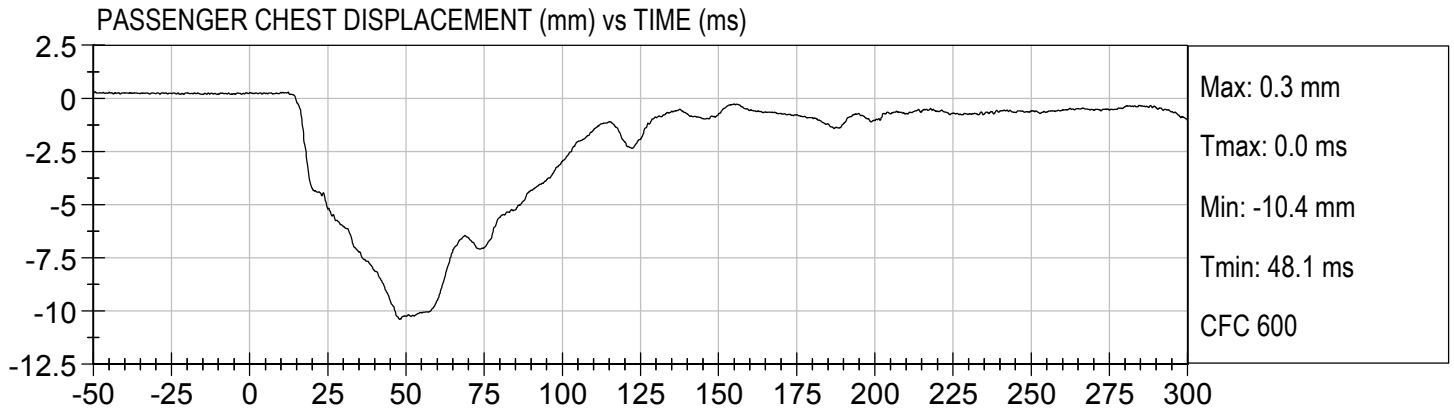


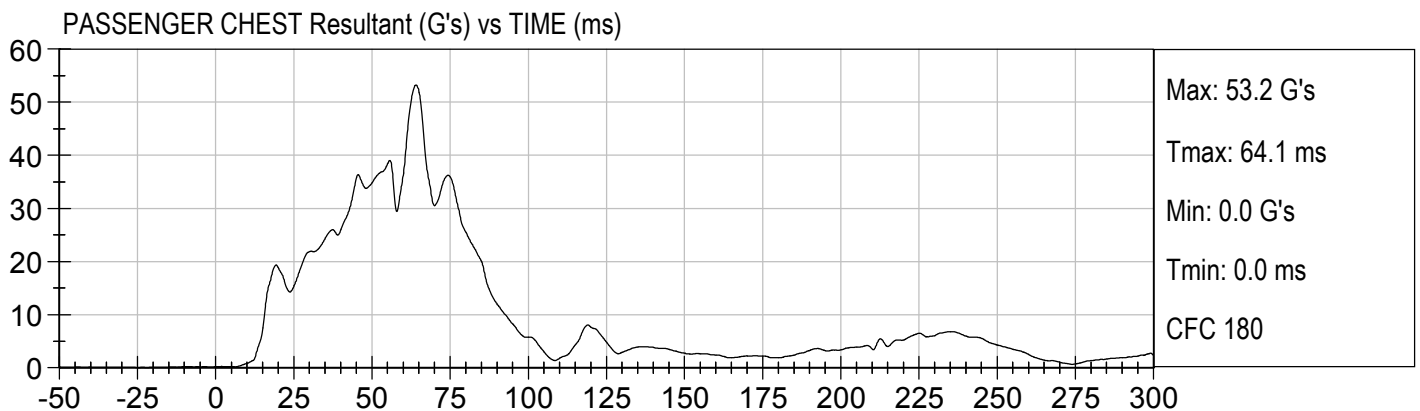
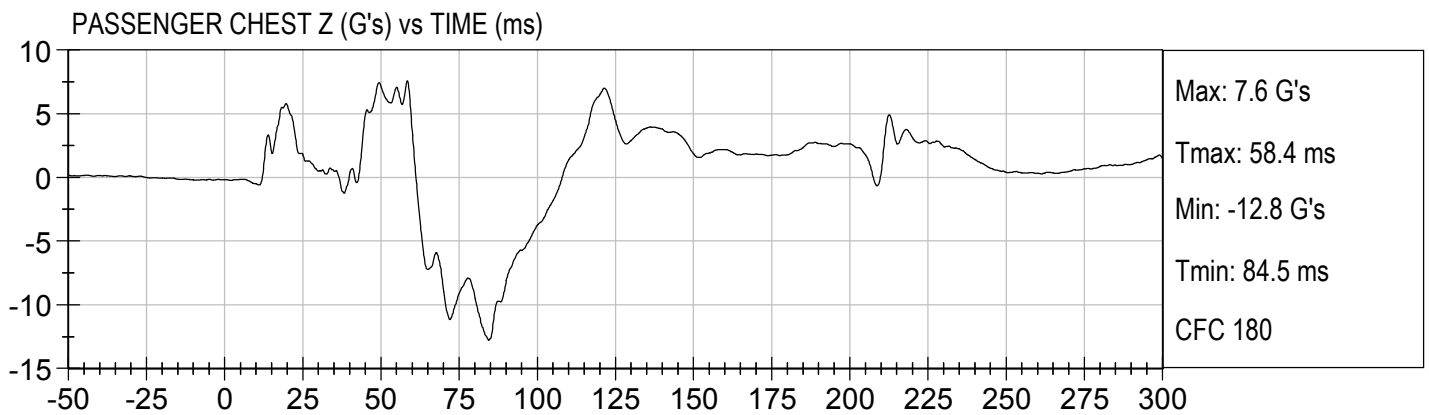
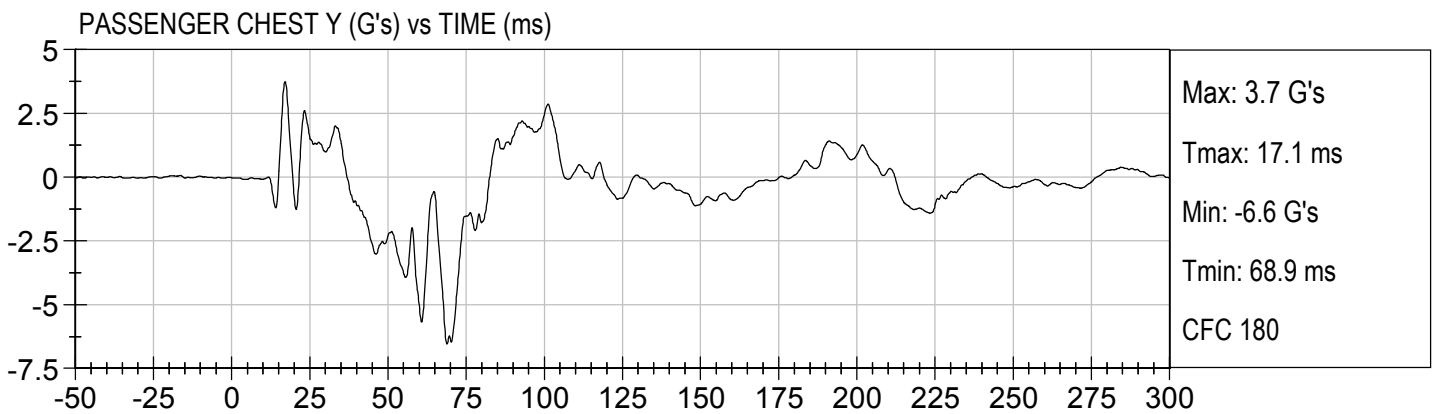
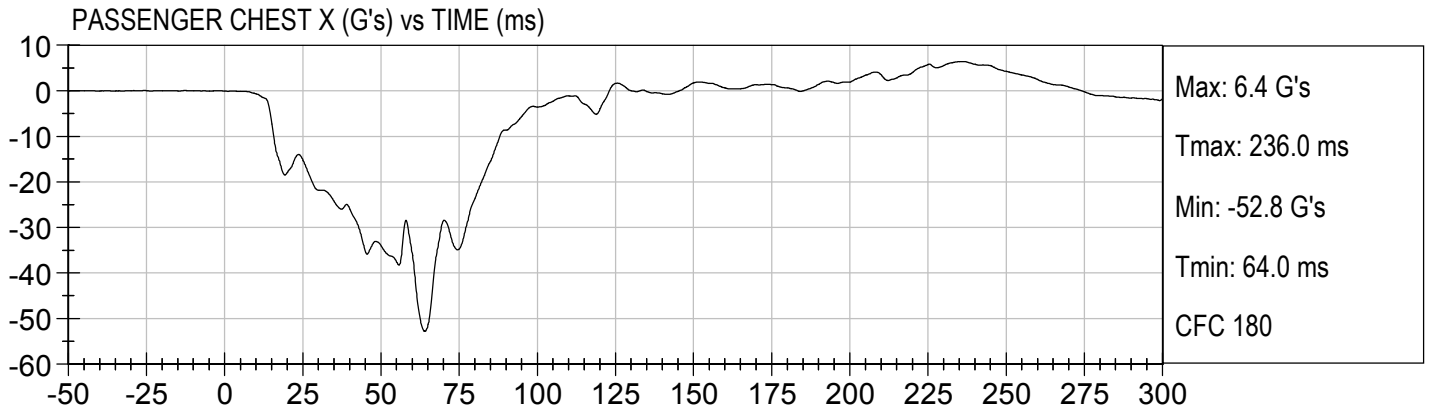


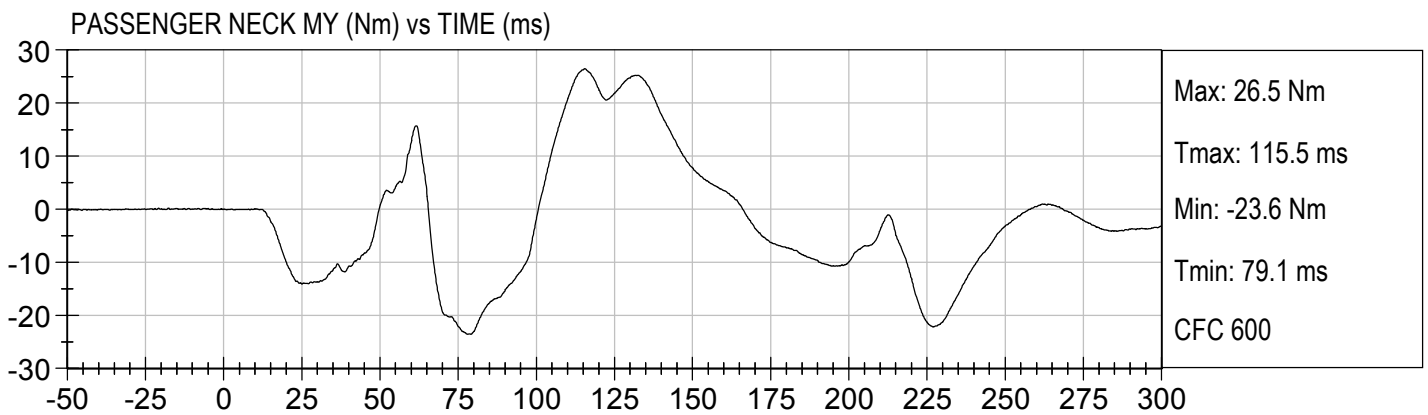
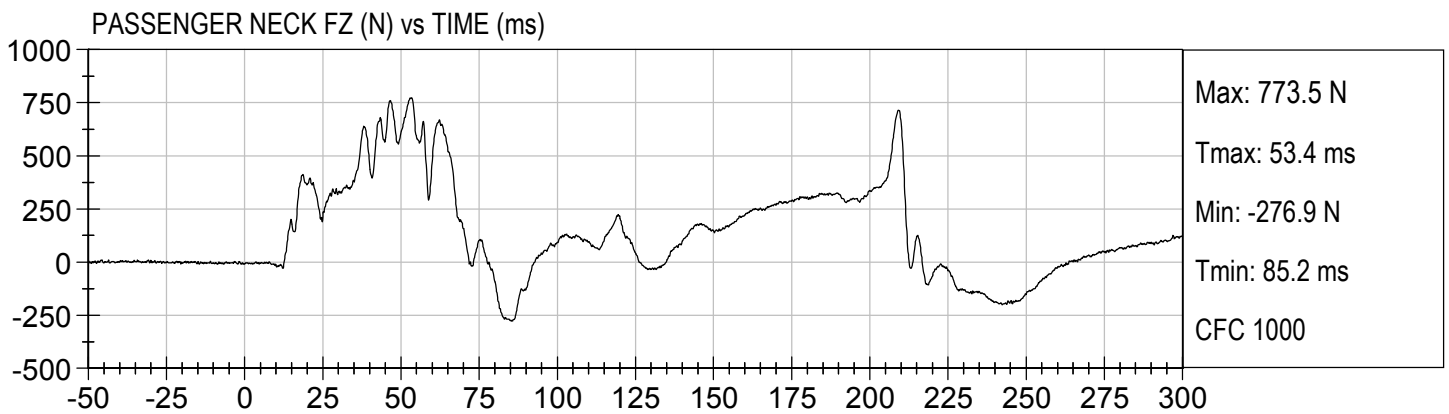
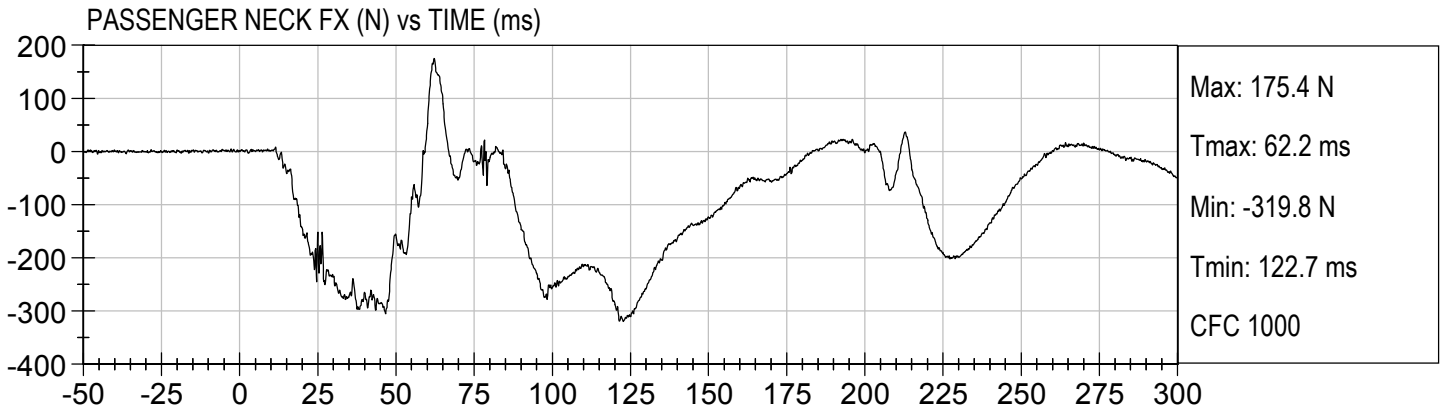


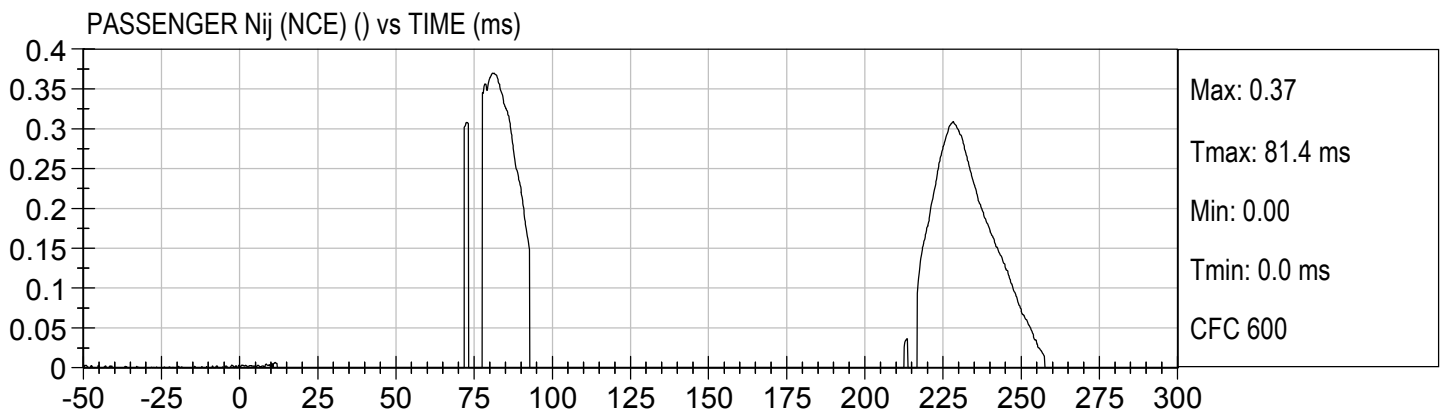
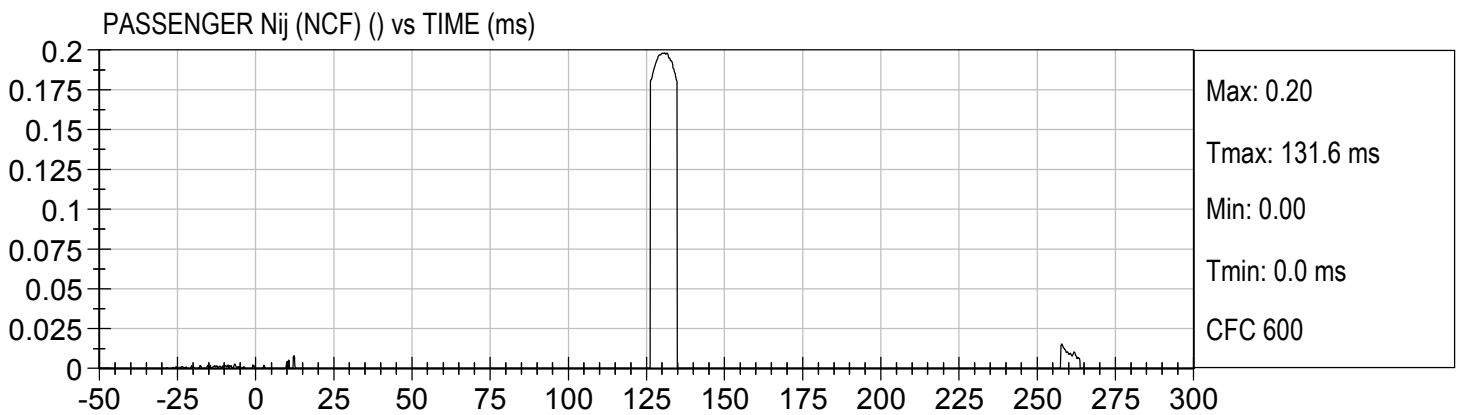
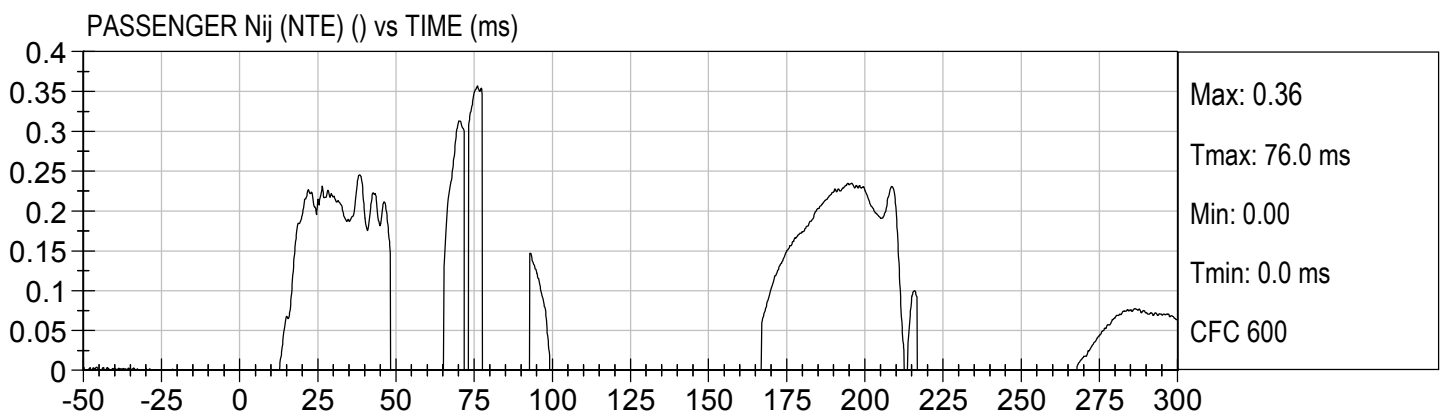
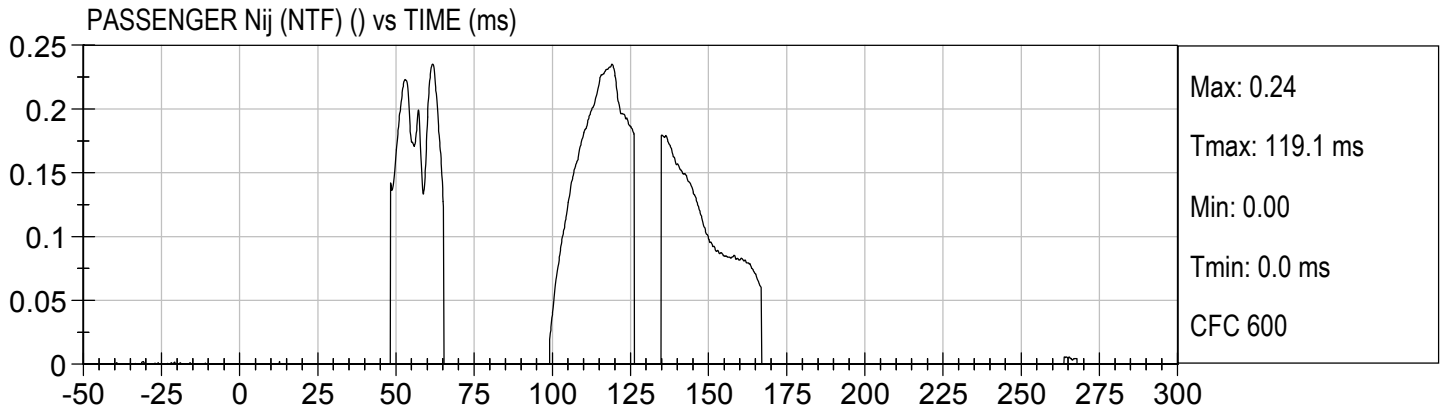


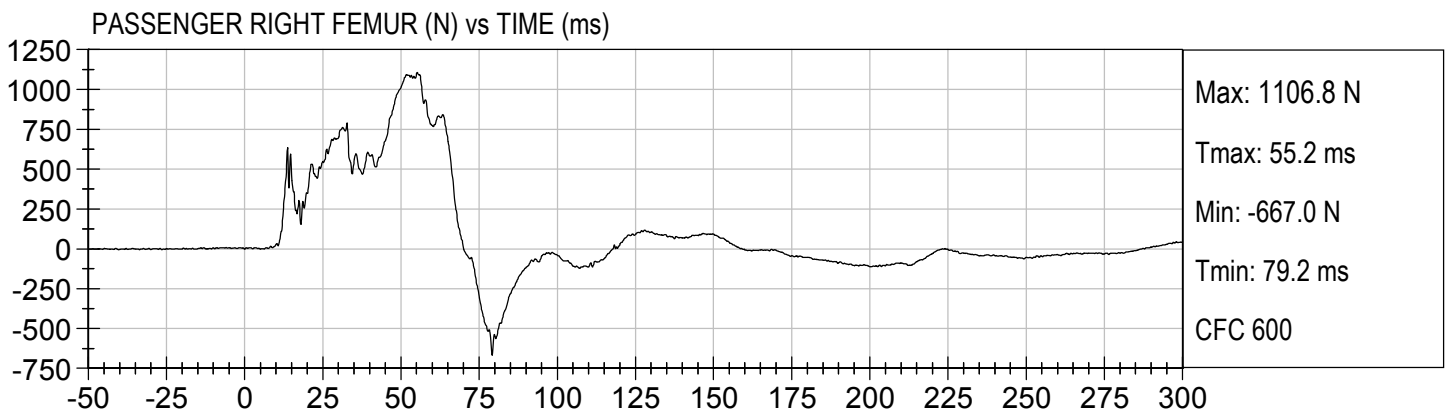
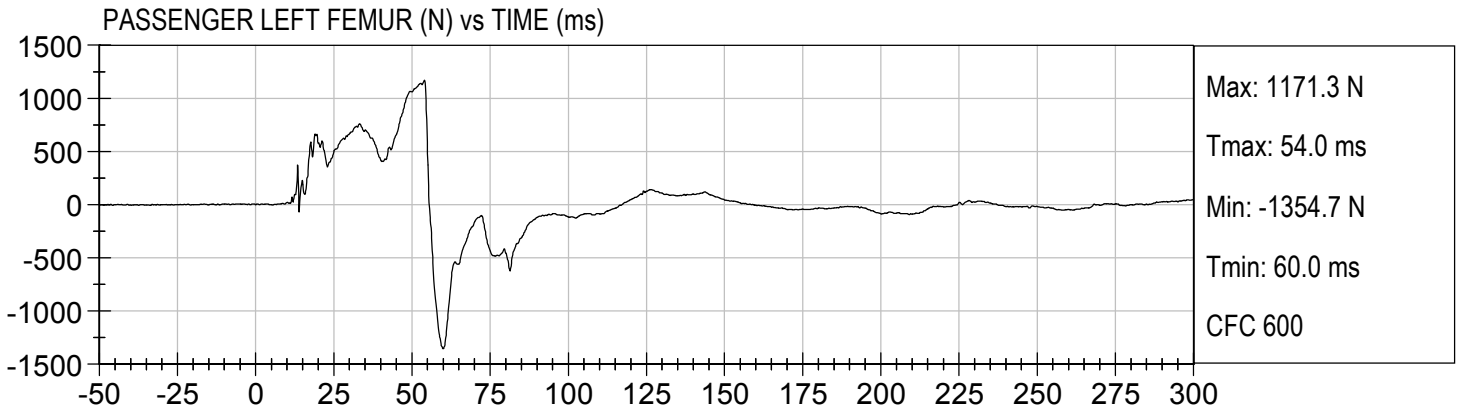












APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

**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

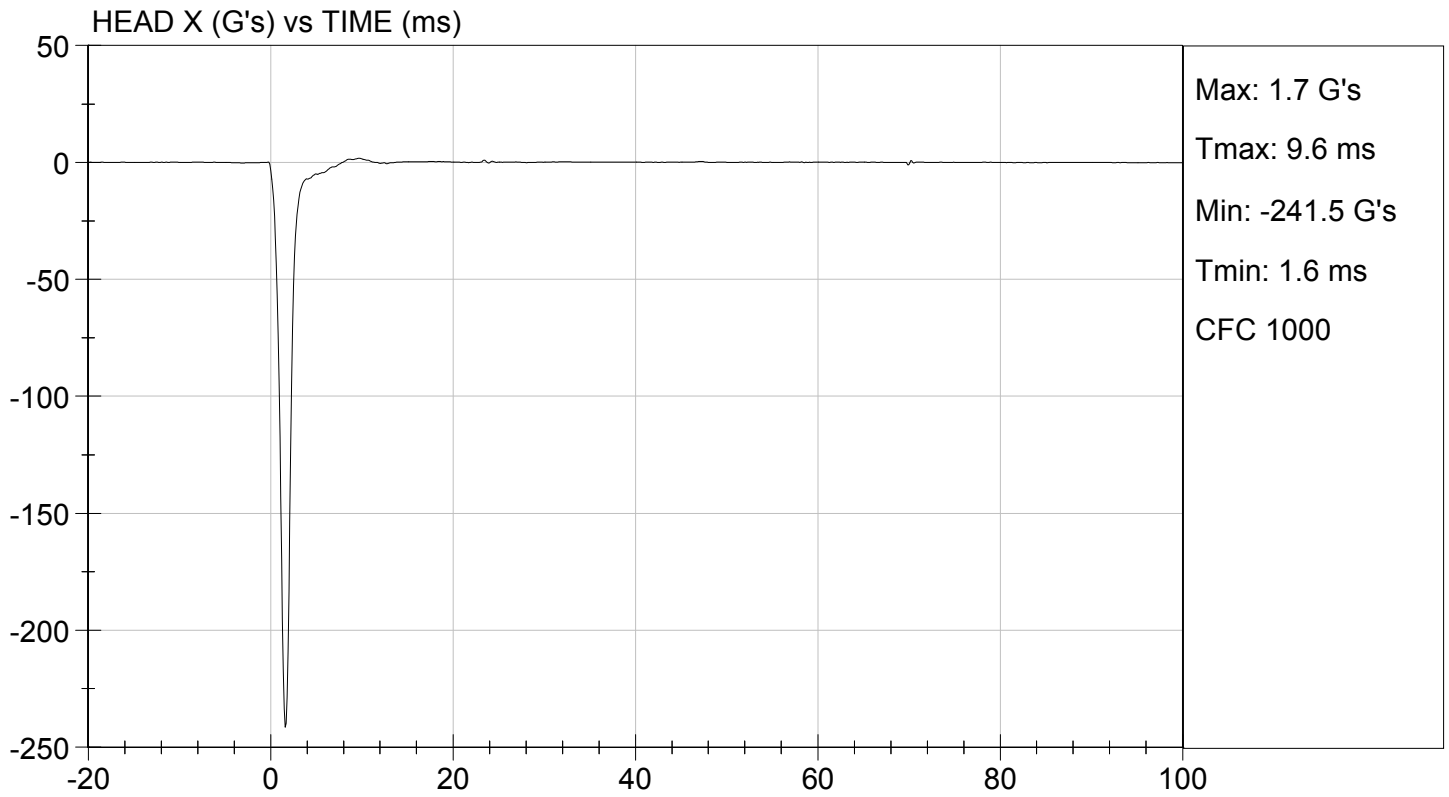
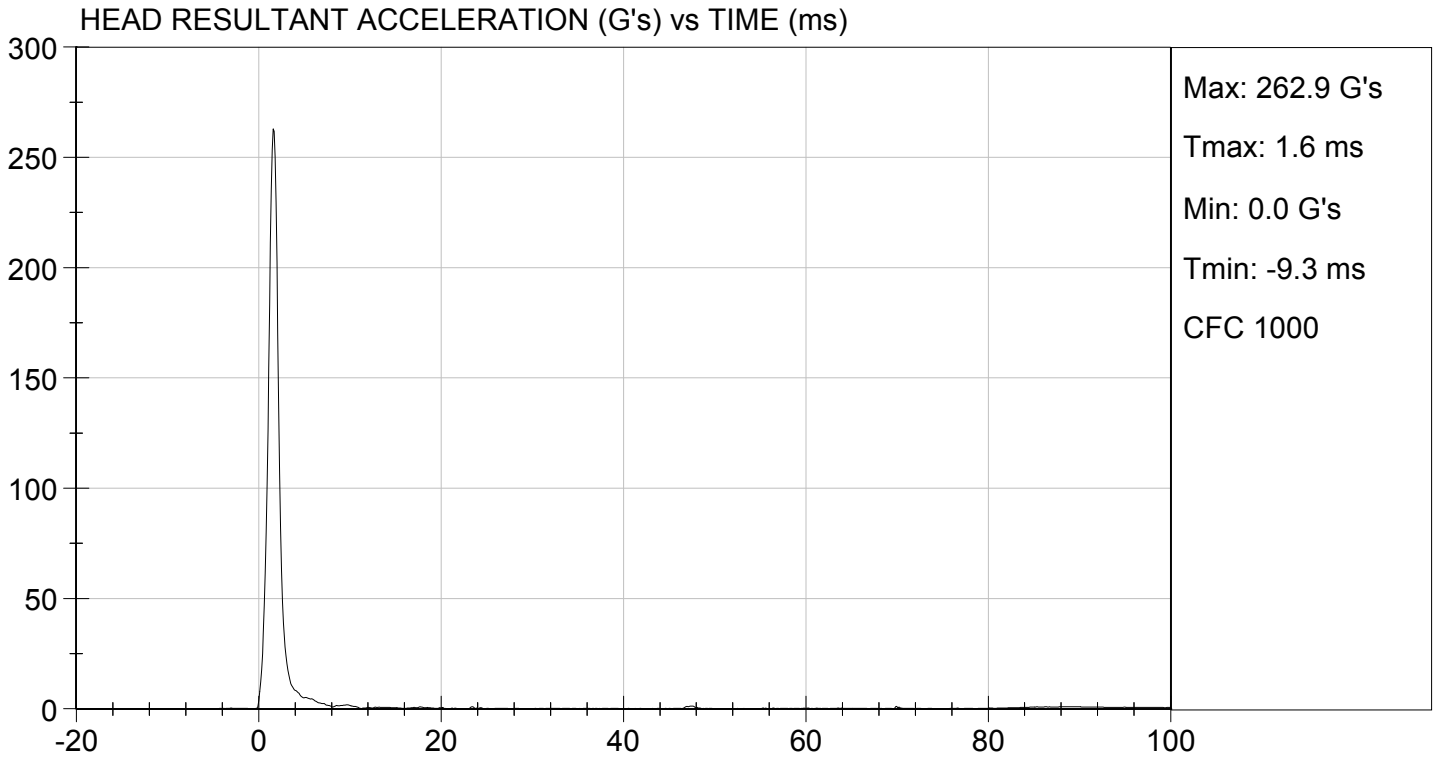
Test ID: D15241

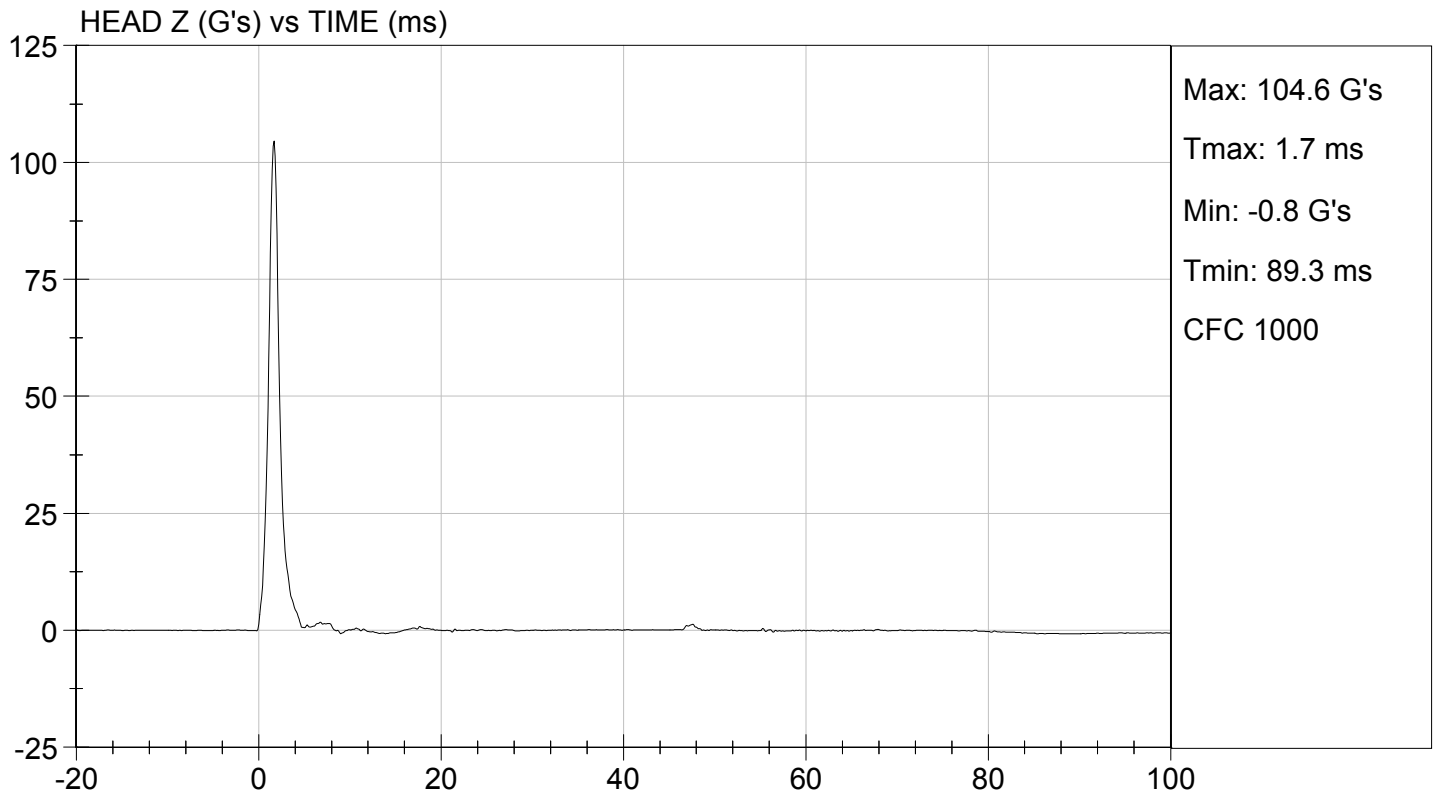
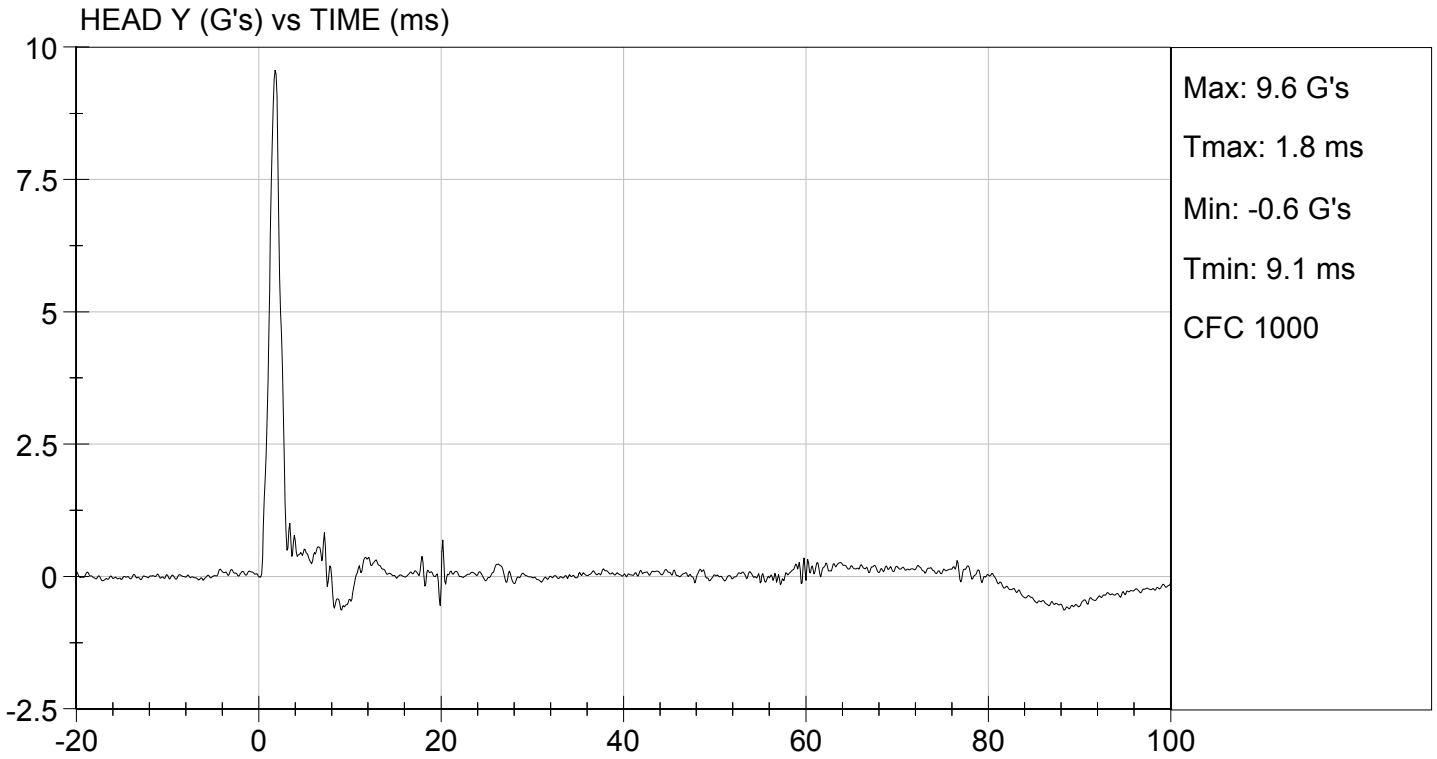
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 to 275	263	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	9.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

David Schoedel
 Laboratory Technician

01/26/2015
 Test Date

Jessica Hall
 Approved By



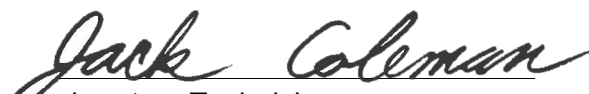


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

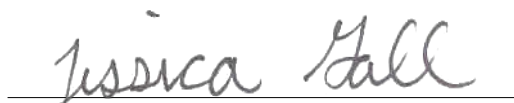
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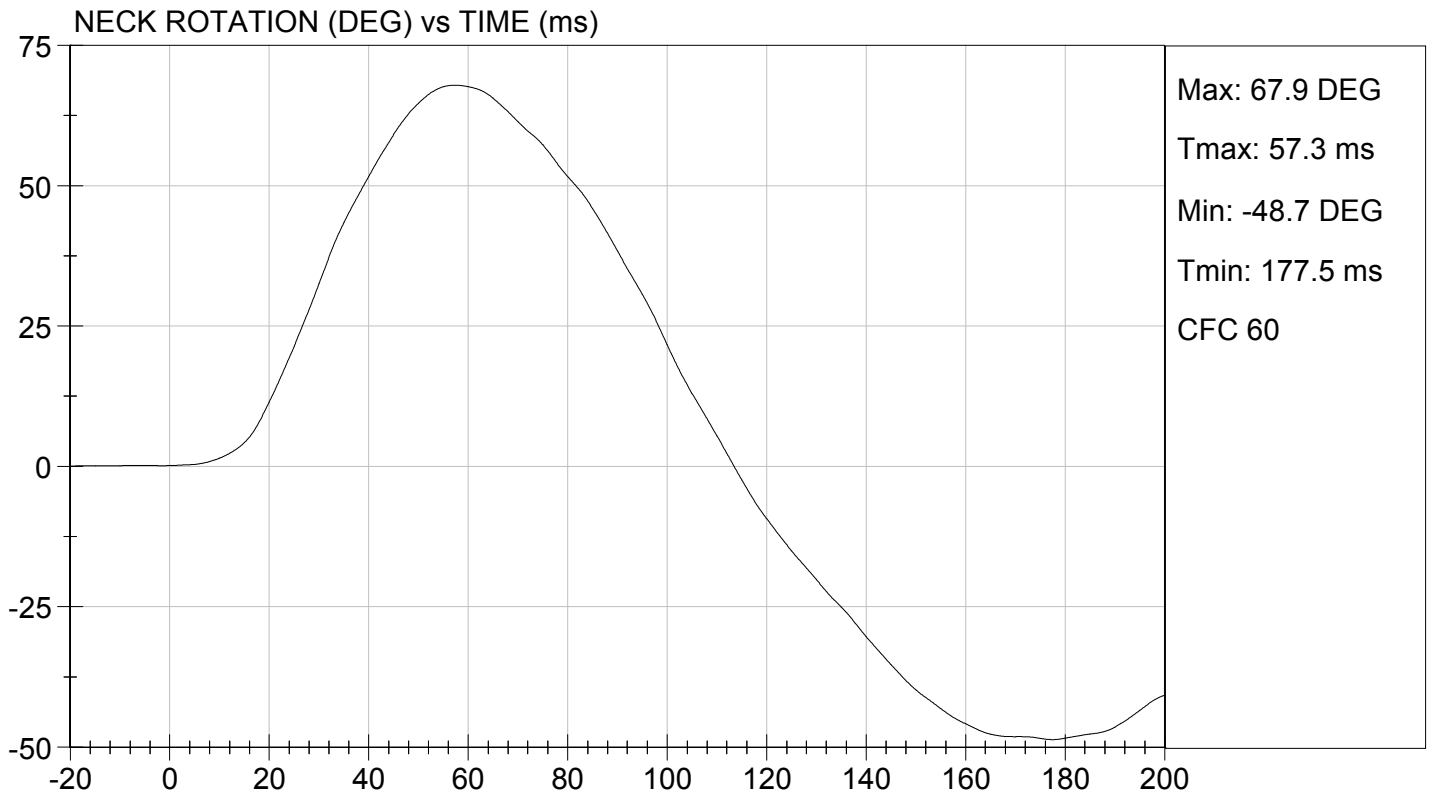
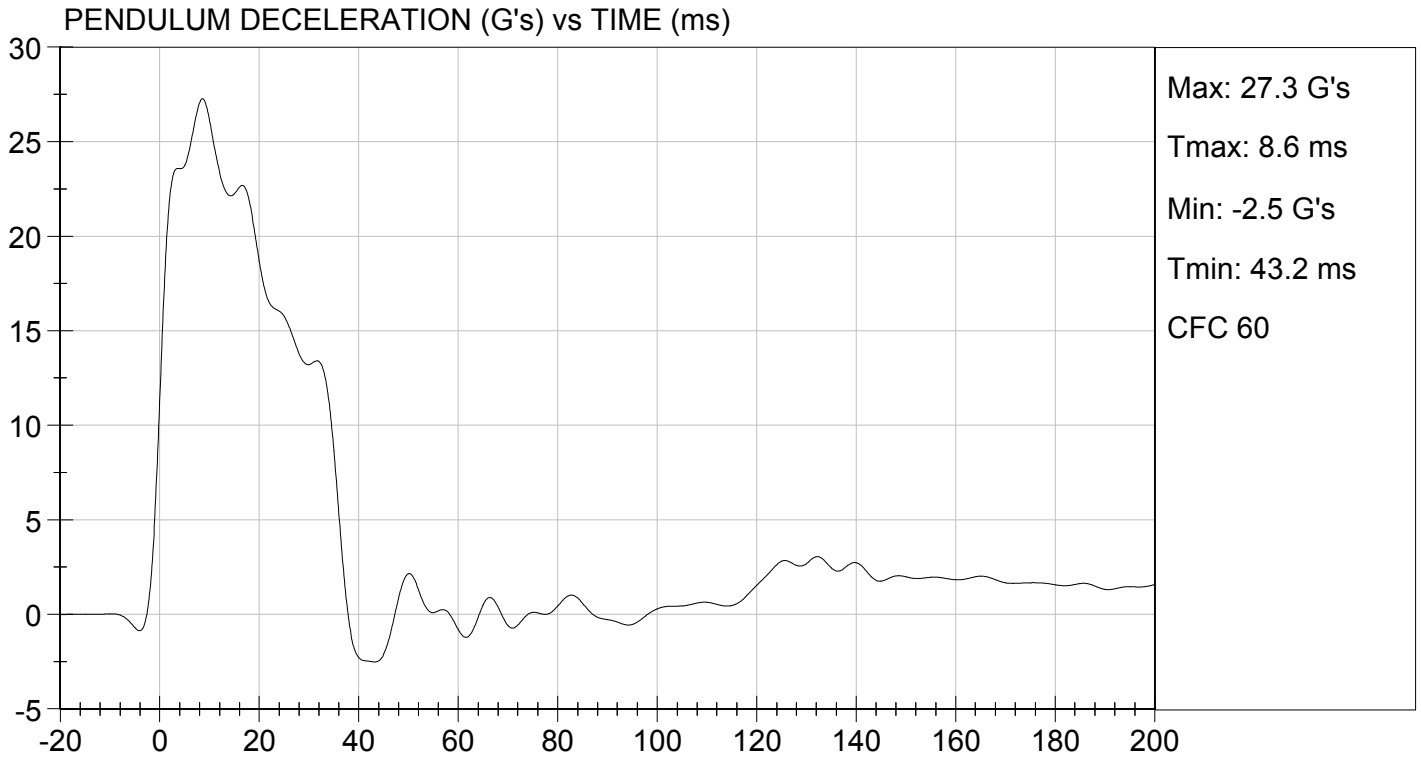
Test I.D: D15242

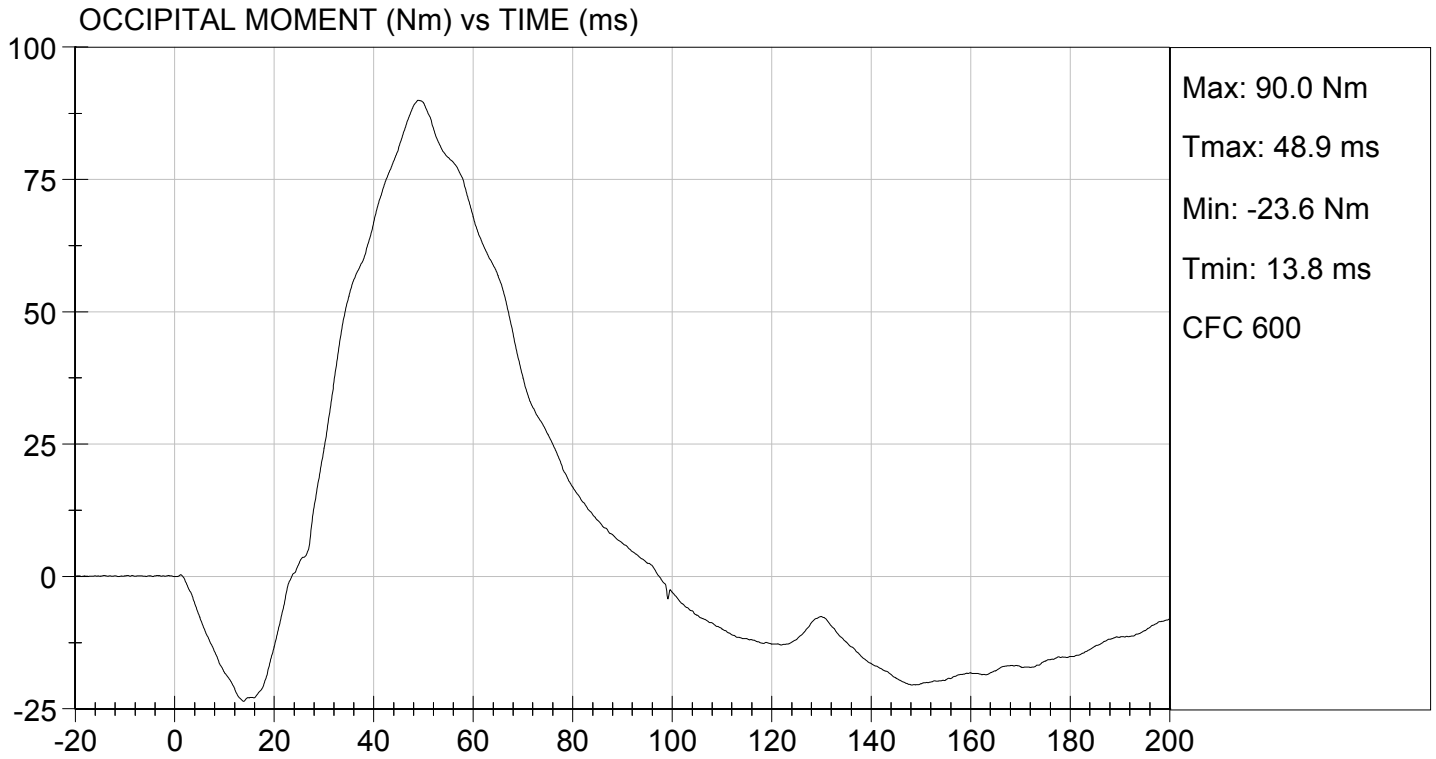
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	26.10	Pass
	20 ms	G's	17.60 to 22.60	18.70	Pass
	30 ms	G's	12.50 to 18.50	13.20	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.2	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	67.9	Pass
	Time	ms	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	90.0	Pass
	Time	ms	47.0 to 58.0	48.9	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.5	Pass
Overall Test Results					Pass


 Laboratory Technician

01/26/2015
 Test Date


 Approved By





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

ATD Serial No: 351

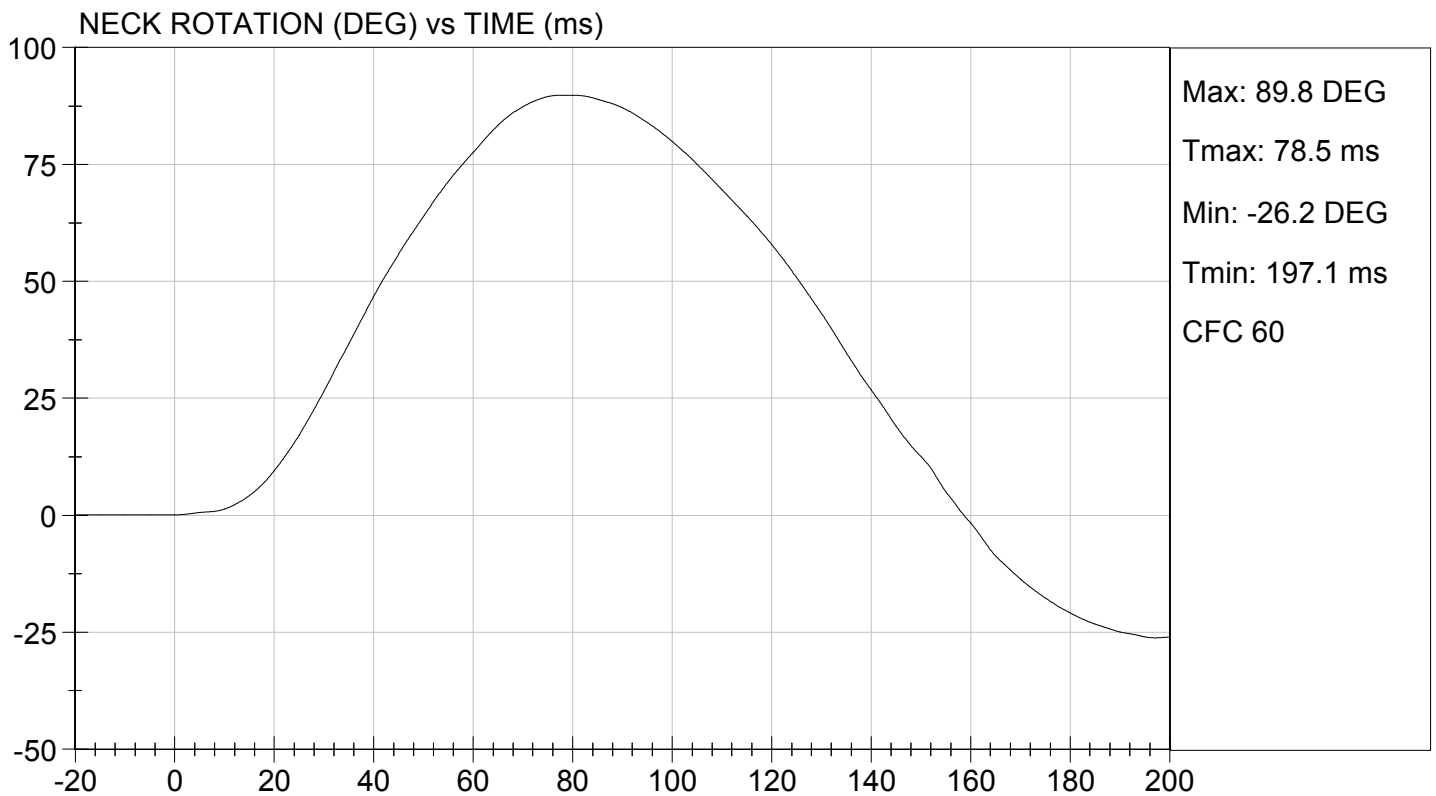
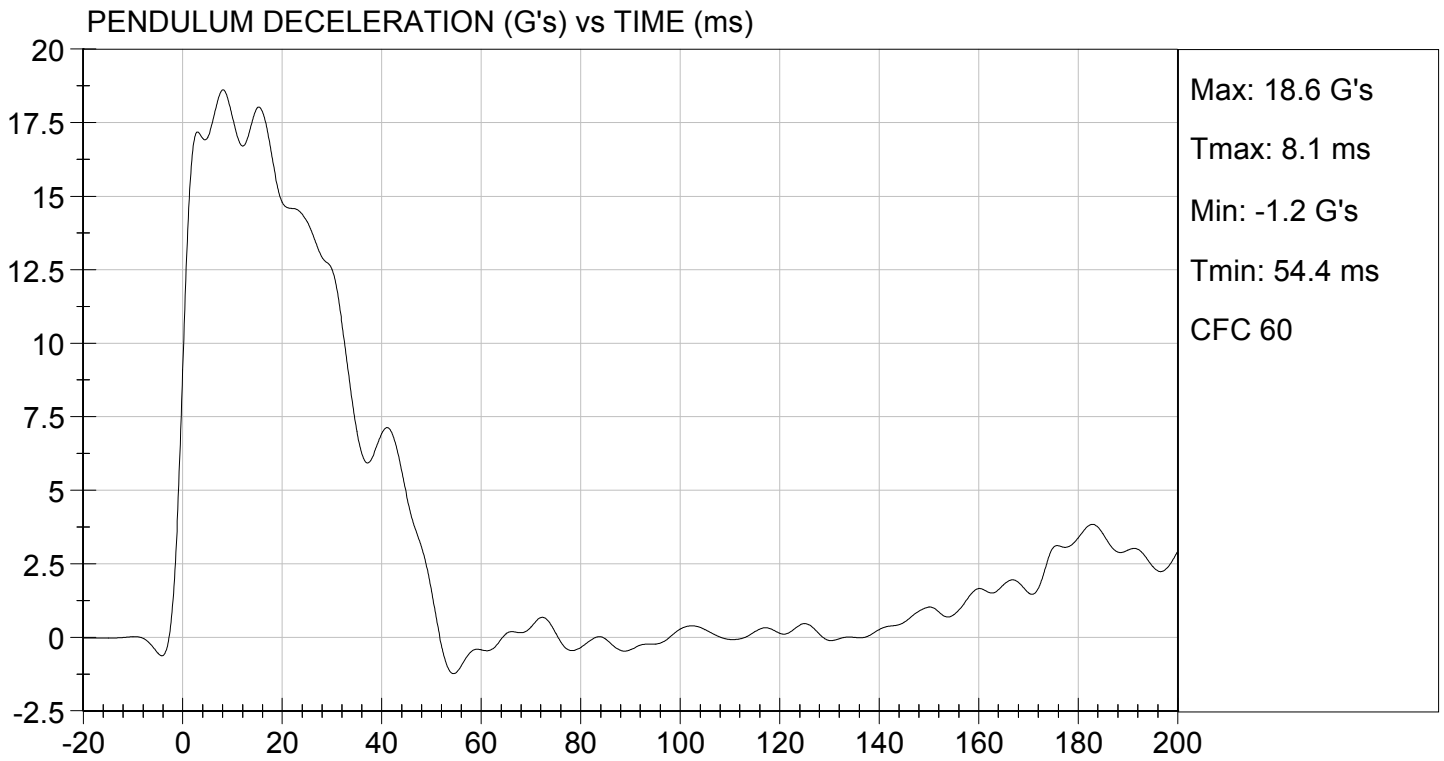
Test I.D.: D15243

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.66	Pass
	20 ms	G's	14.00 to 19.00	14.79	Pass
	30 ms	G's	11.00 to 16.00	12.51	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	44.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	89.8	Pass
	Time	ms	72.0 to 82.0	78.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.8	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-53.2	Pass
	Time	ms	65.0 to 79.0	69.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	147.3	Pass
Overall Test Results					Pass

Jack Coleman
 Laboratory Technician

01/26/2015
 Test Date

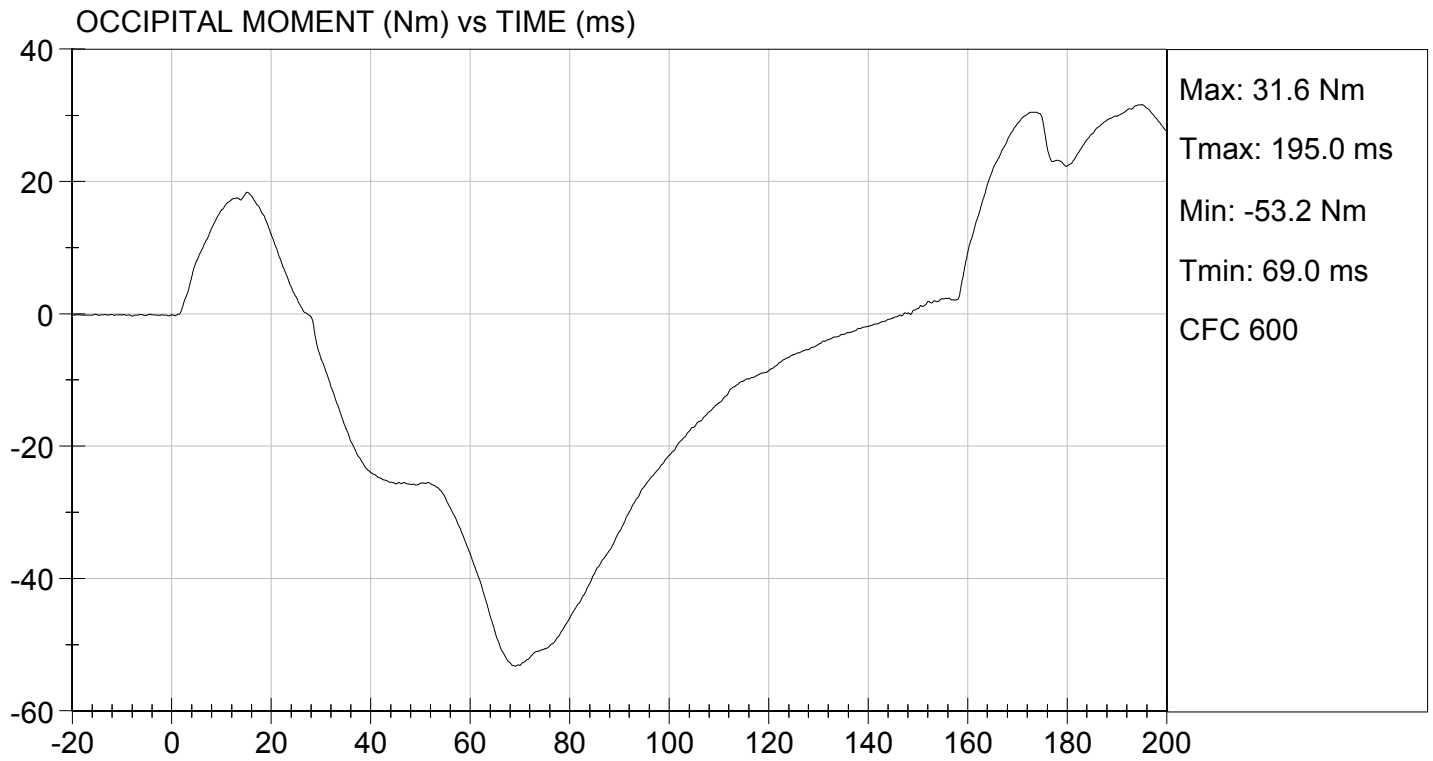
Jessica Hall
 Approved By





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

TEST DATE: 01/26/2015
TEST #: D15243



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

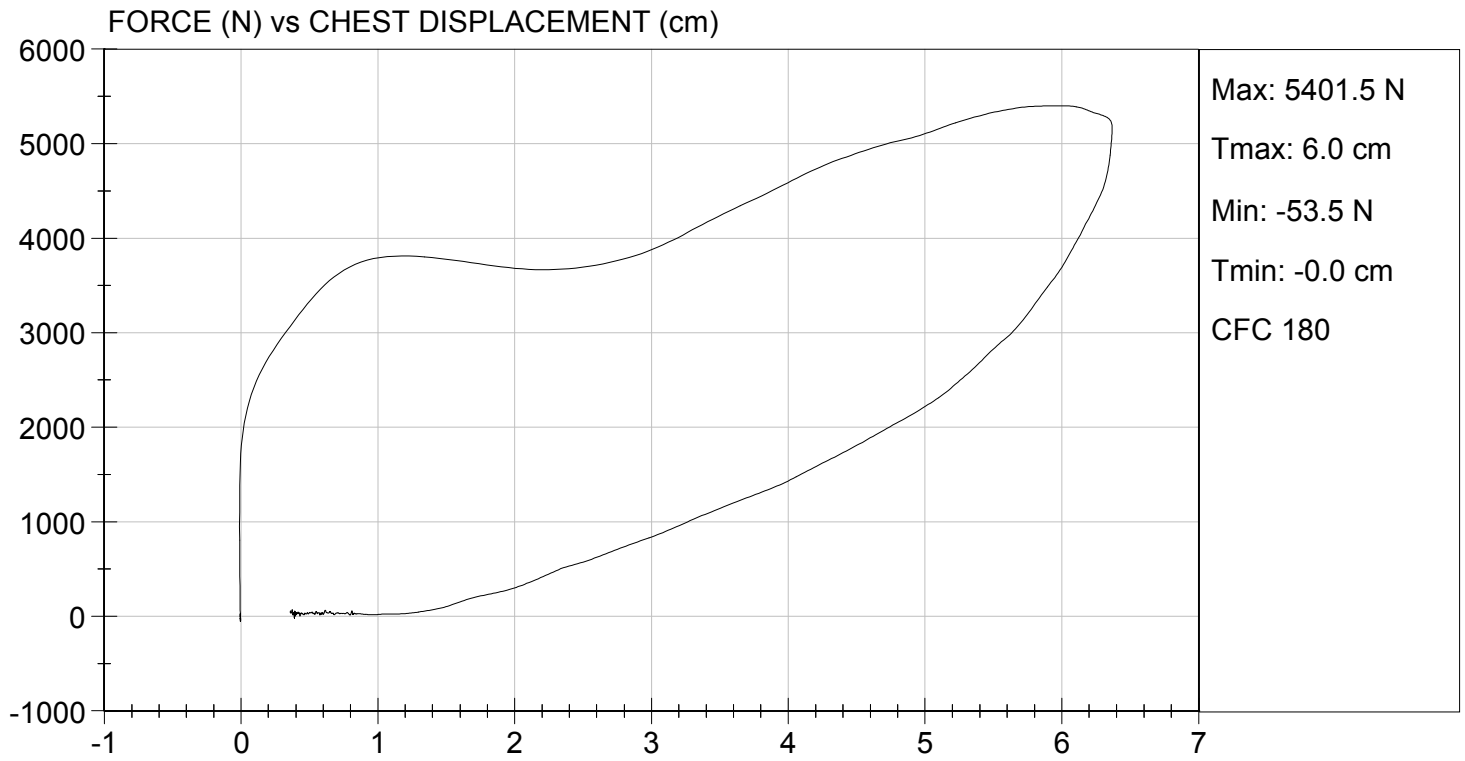
Test I.D: D15244

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,402	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.37	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results				Pass

Jack Coleman
 Laboratory Technician

01/27/2015
 Test Date

Jessica Hall
 Approved By



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

ATD Serial No: 351

Test I.D: D15245

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,341	Pass
Overall Test Results				Pass

Maxime Chamberland
 Laboratory Technician

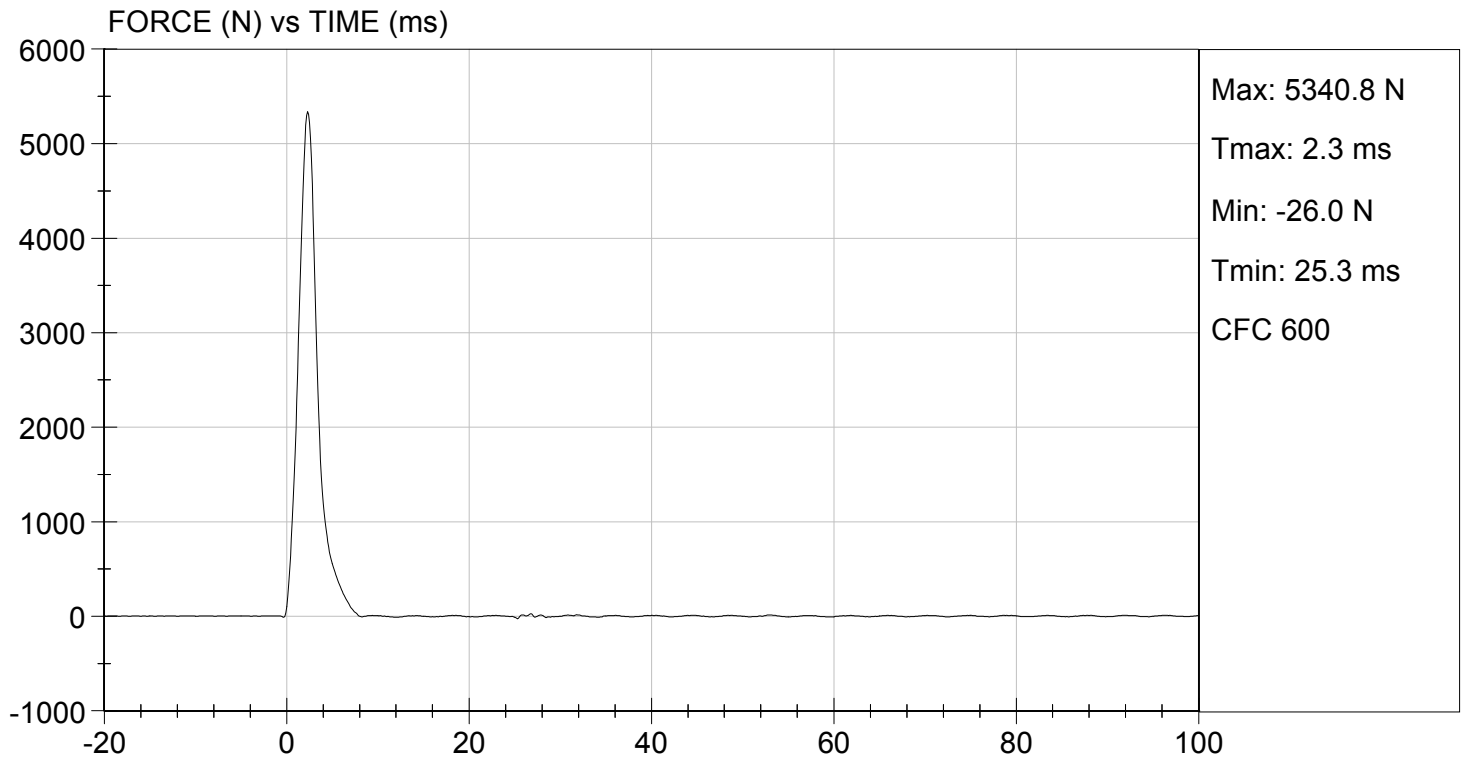
01/26/2015
 Test Date

Jessica Hall
 Approved By



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

TEST DATE: 01/26/2015
TEST #: D15245



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

ATD Serial No: 351

Test I.D: D15246

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	4,884	Pass
Overall Test Results				Pass

Maxime Chamberland
 Laboratory Technician

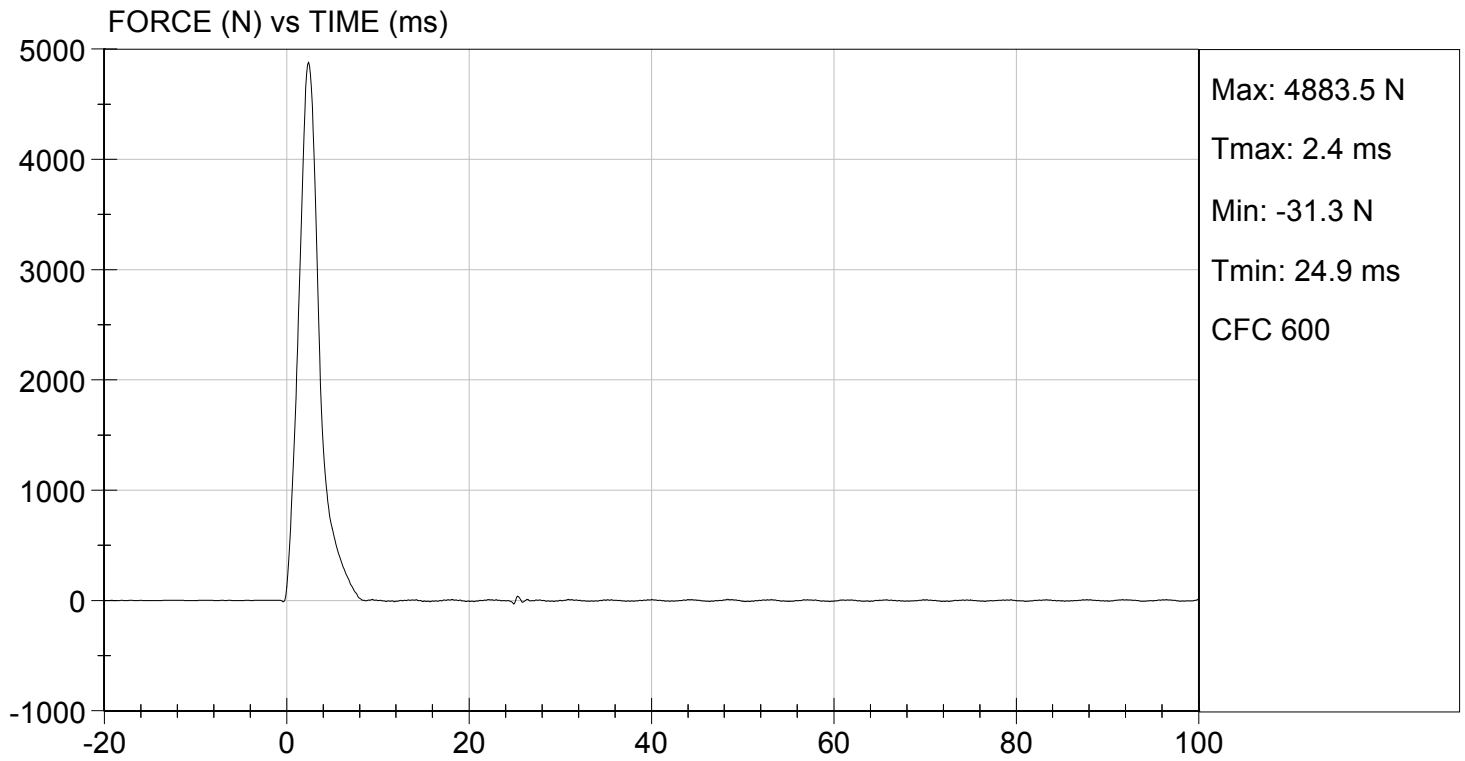
01/26/2015
 Test Date

Jessica Hall
 Approved By



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

TEST DATE: 01/26/2015
TEST #: D15246



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

ATD Serial No: 351

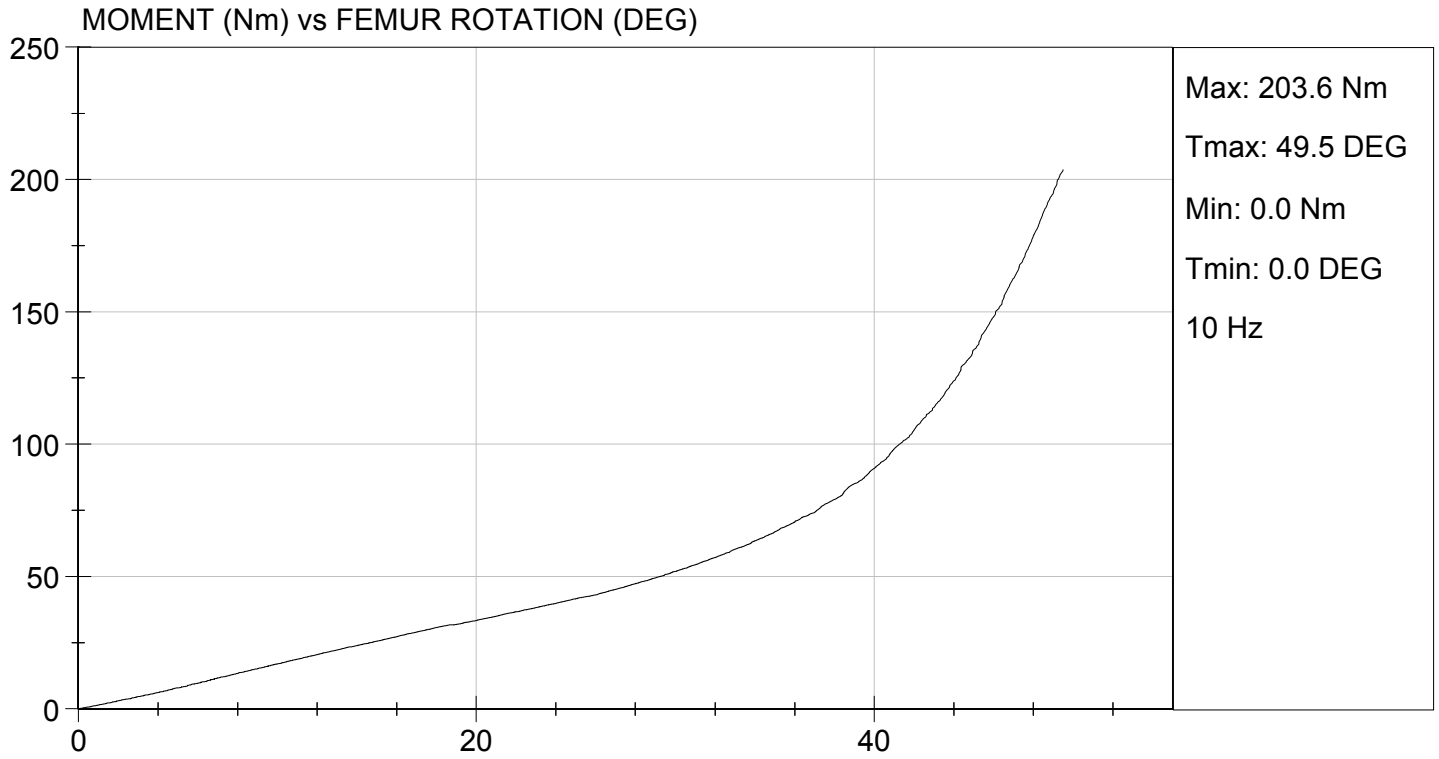
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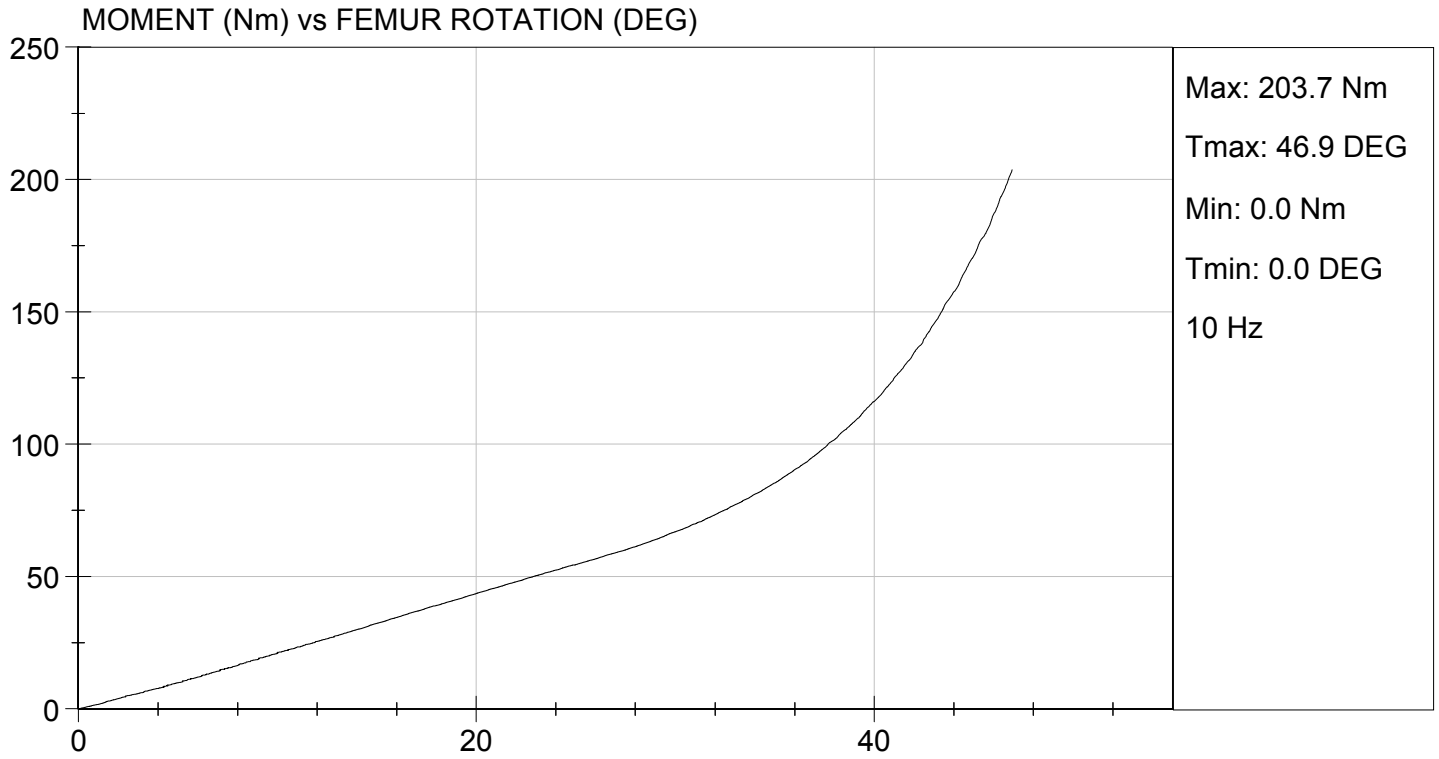
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	19	19	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	51.9	66.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	49.5	46.9	Pass
Overall Test Results					Pass

Jack Coleman
 Laboratory Technician

01/26/2015
 Test Date

Jessica Hall
 Approved By





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

ATD Serial No: 351

Test ID: D15321

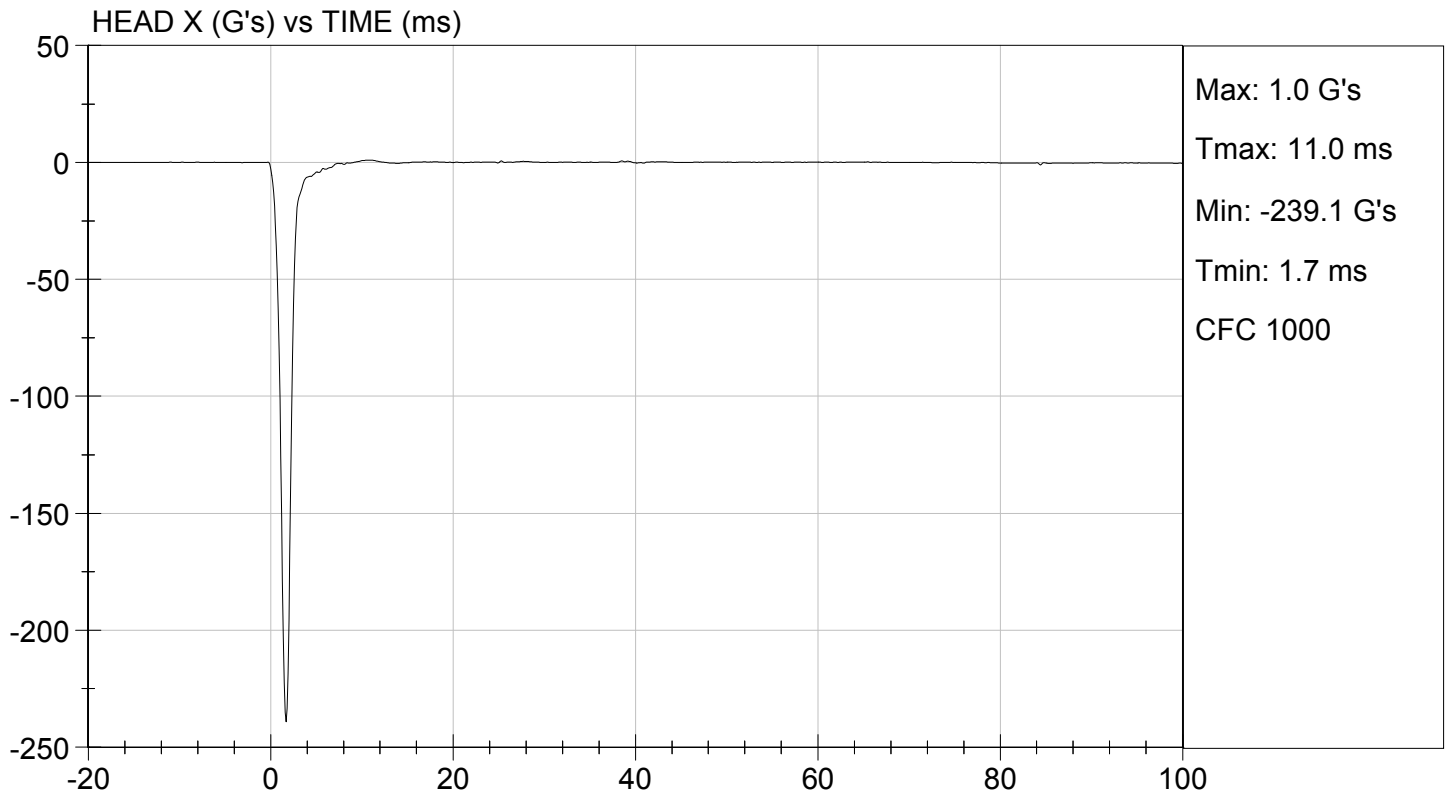
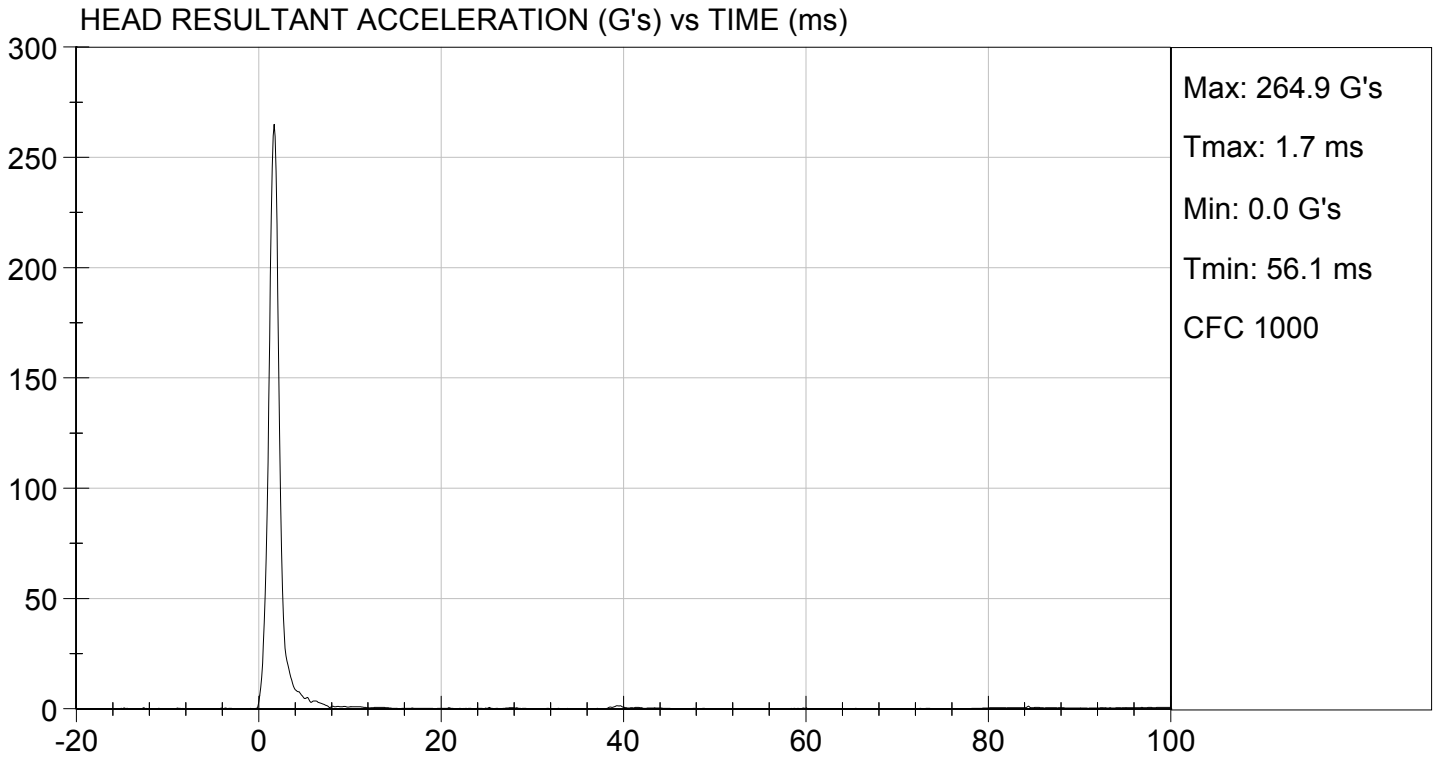
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Peak Resultant Acceleration	G's	225 to 275	265	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	14.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

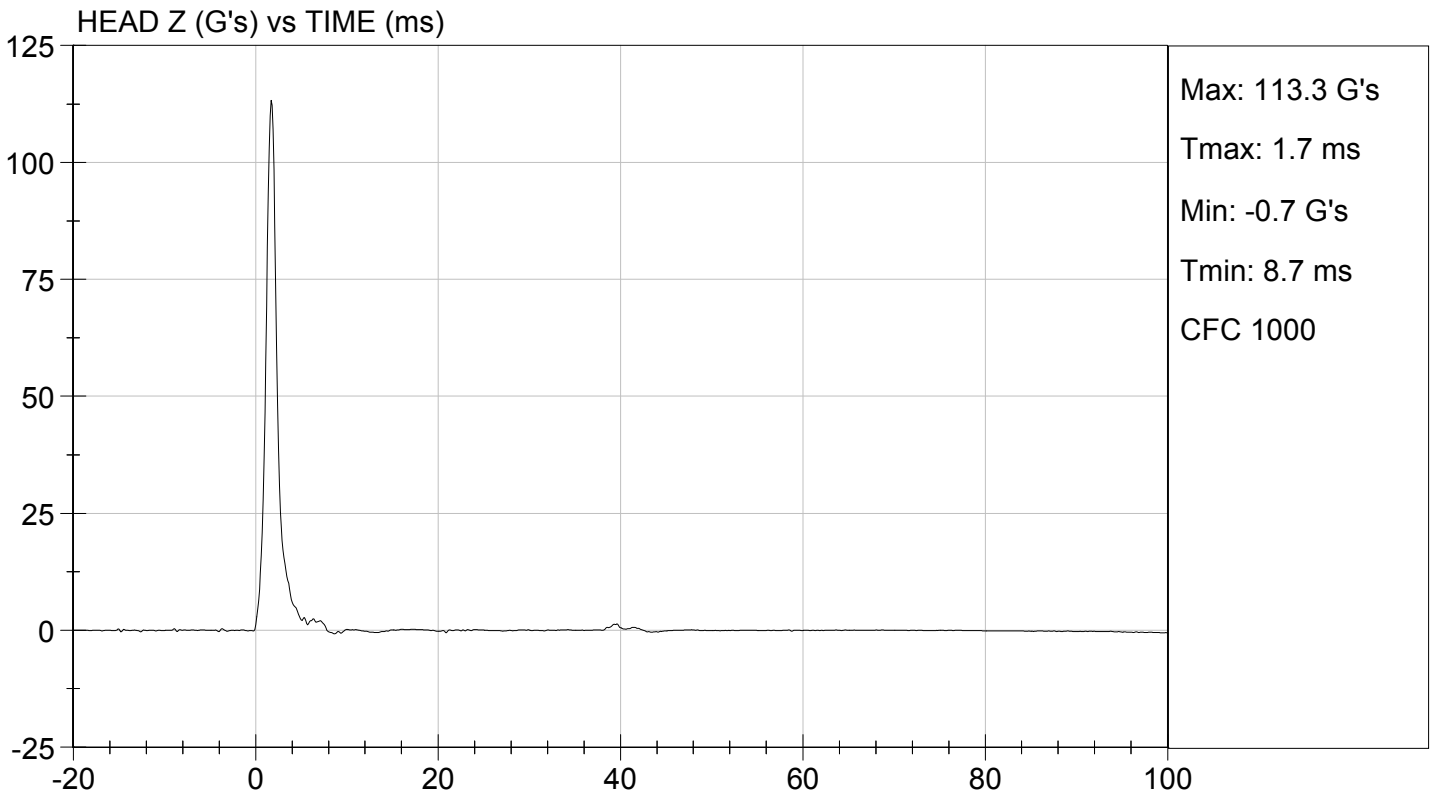
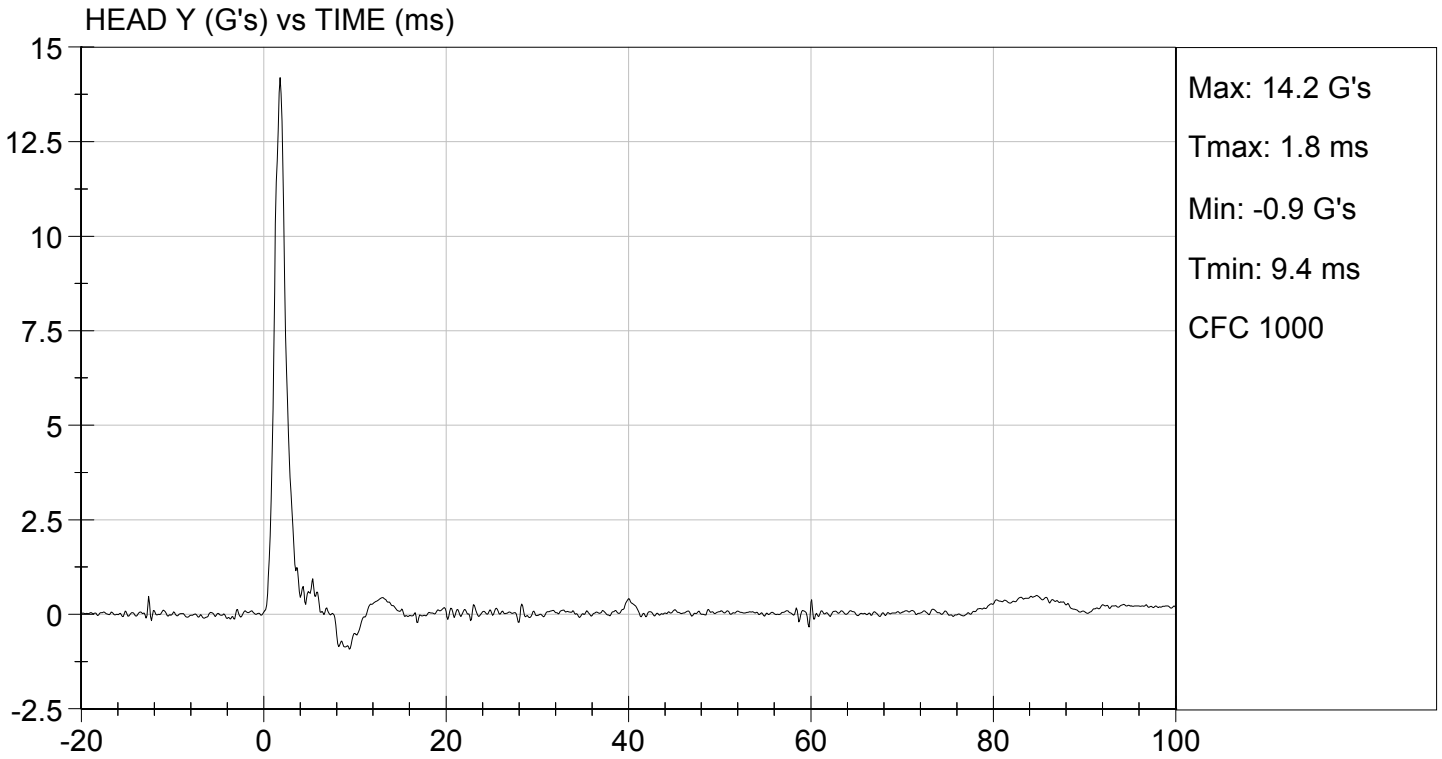
David Schoedel
Laboratory Technician

01/30/2015

Test Date

Jessica Hall
Approved By





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

ATD Serial No: 351

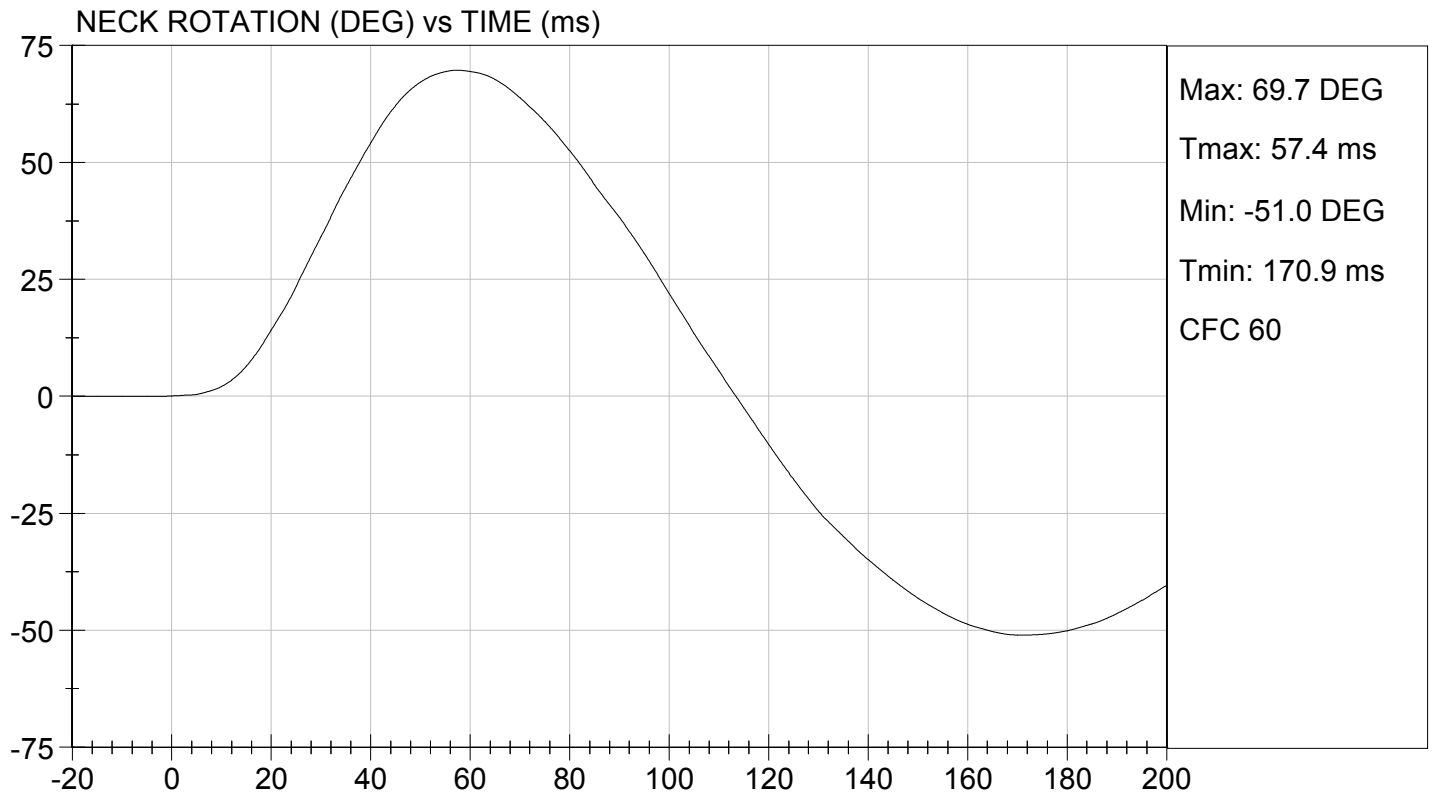
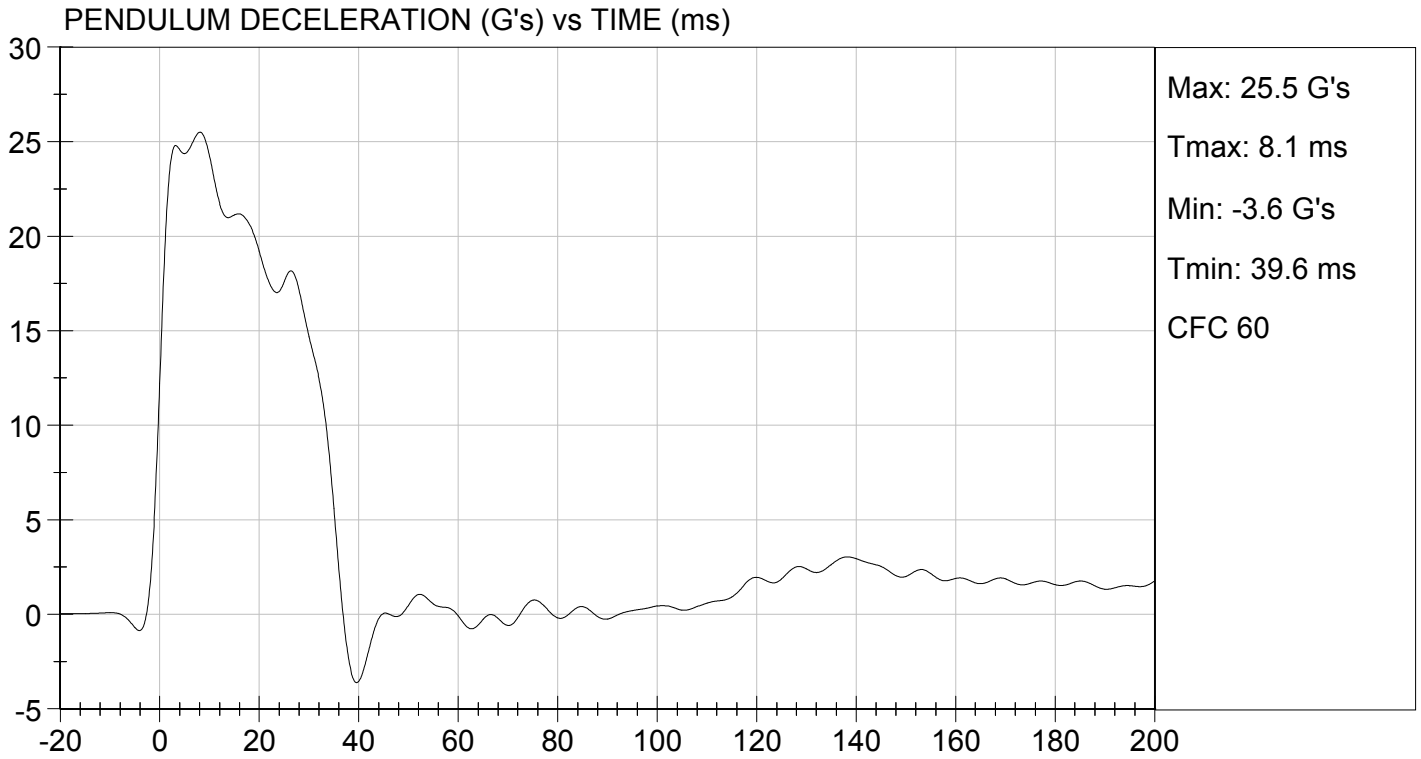
Test I.D: D15322

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.97	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.21	Pass
	20 ms	G's	17.60 to 22.60	19.20	Pass
	30 ms	G's	12.50 to 18.50	14.67	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.3	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	69.7	Pass
	Time	ms	57.0 to 64.0	57.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	96.2	Pass
	Time	ms	47.0 to 58.0	50.8	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	101.8	Pass
Overall Test Results					Pass

David Schoedel
 Laboratory Technician

01/30/2015
 Test Date

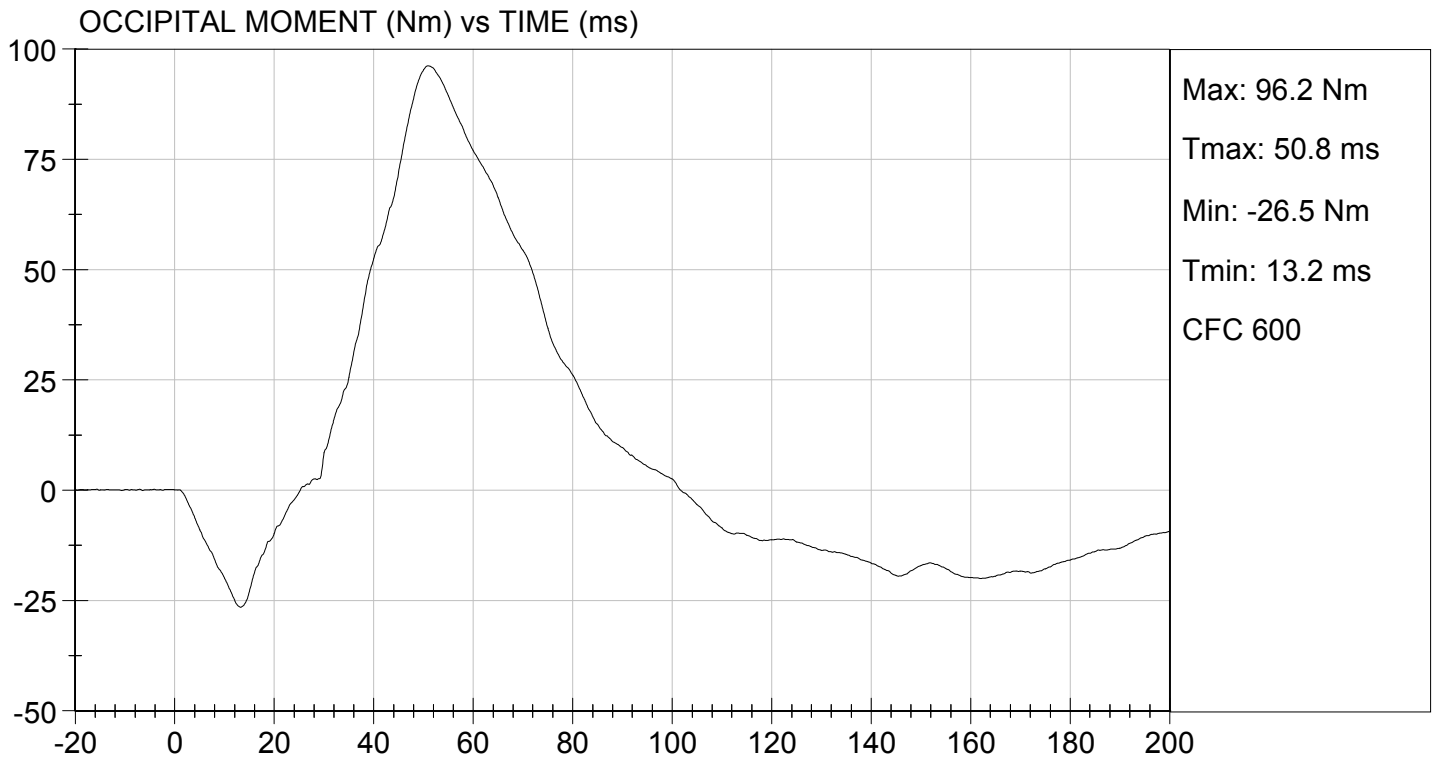
Jessica Hall
 Approved By





TEST DESC: NECK FLEXION
VELOCITY: 22.86 ft/s, 6.97 m/s

TEST DATE: 01/30/2015
TEST #: D15322



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

ATD Serial No: 351

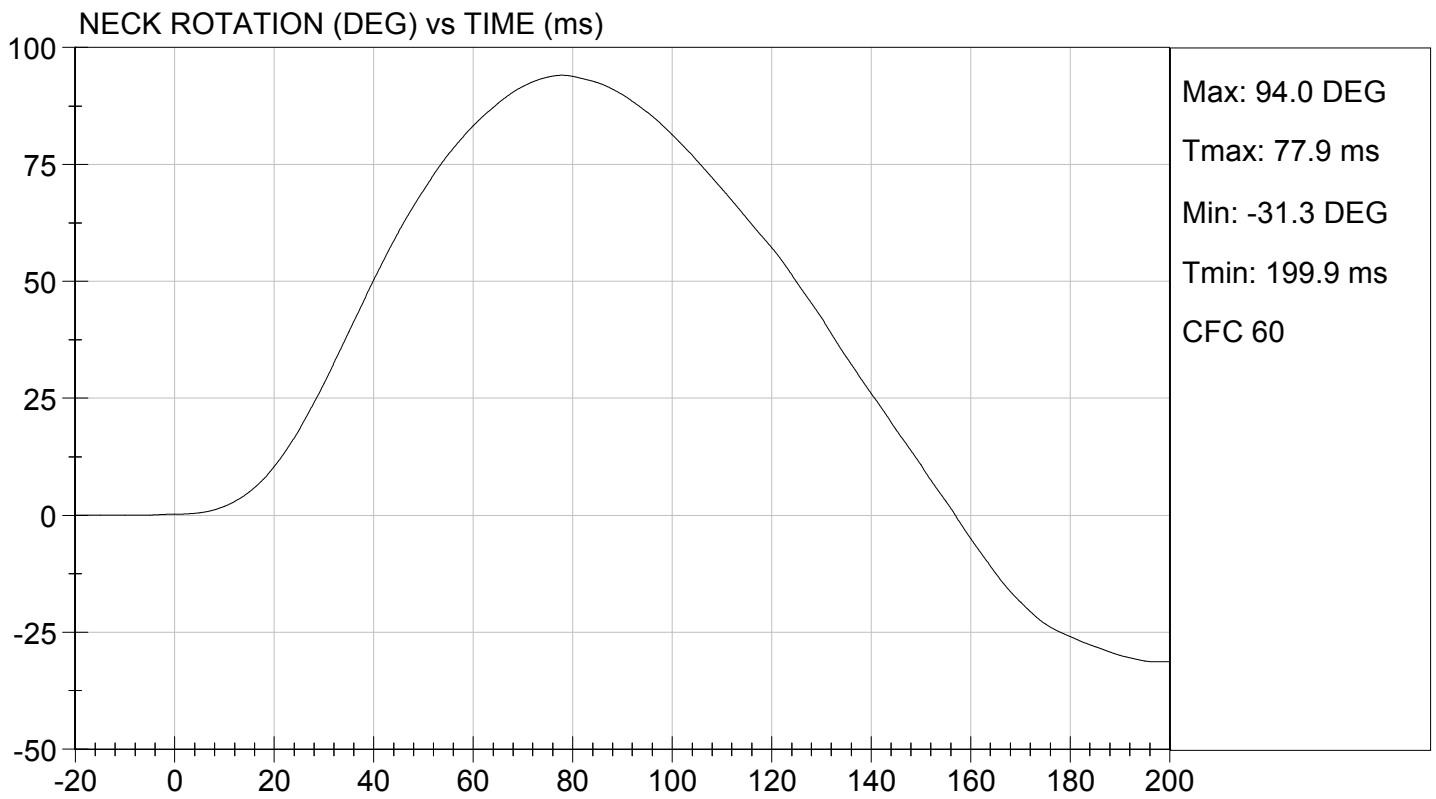
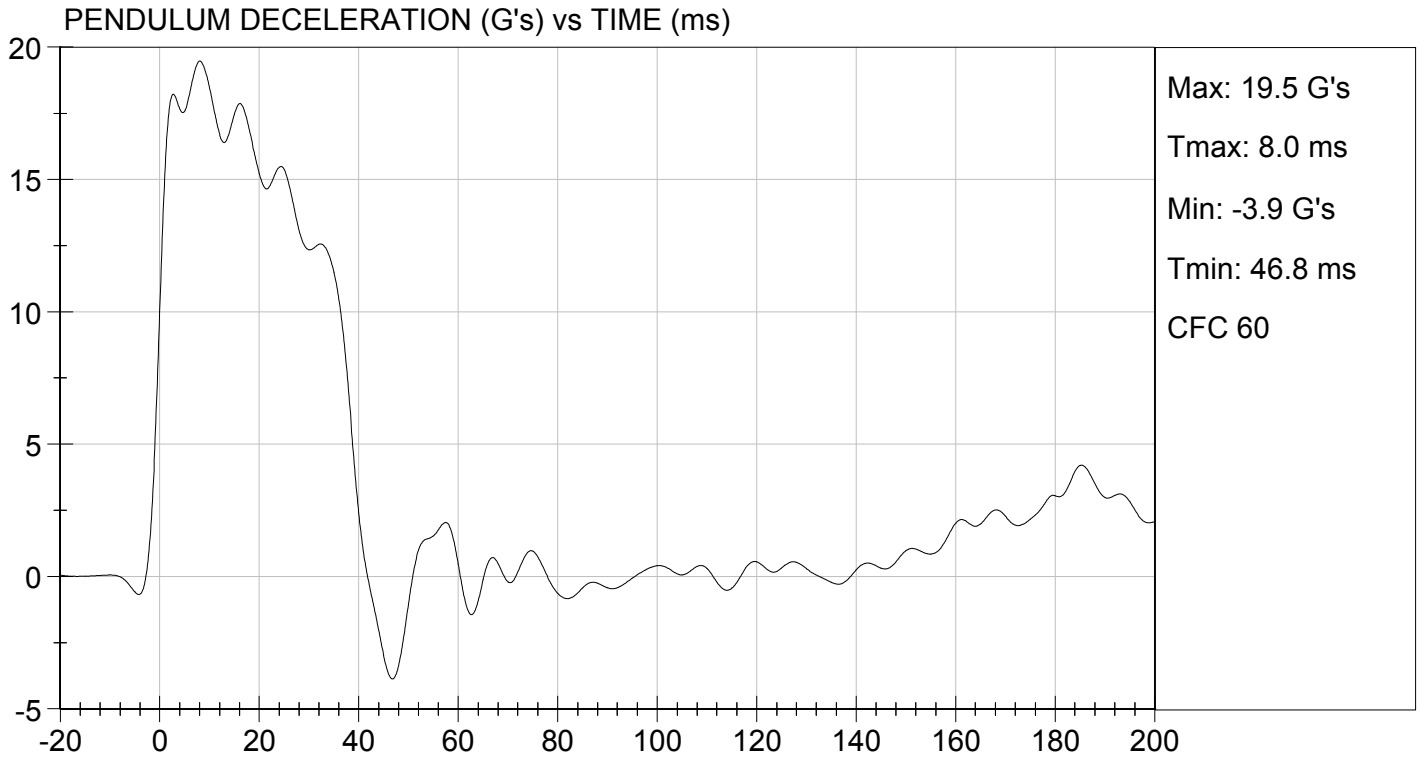
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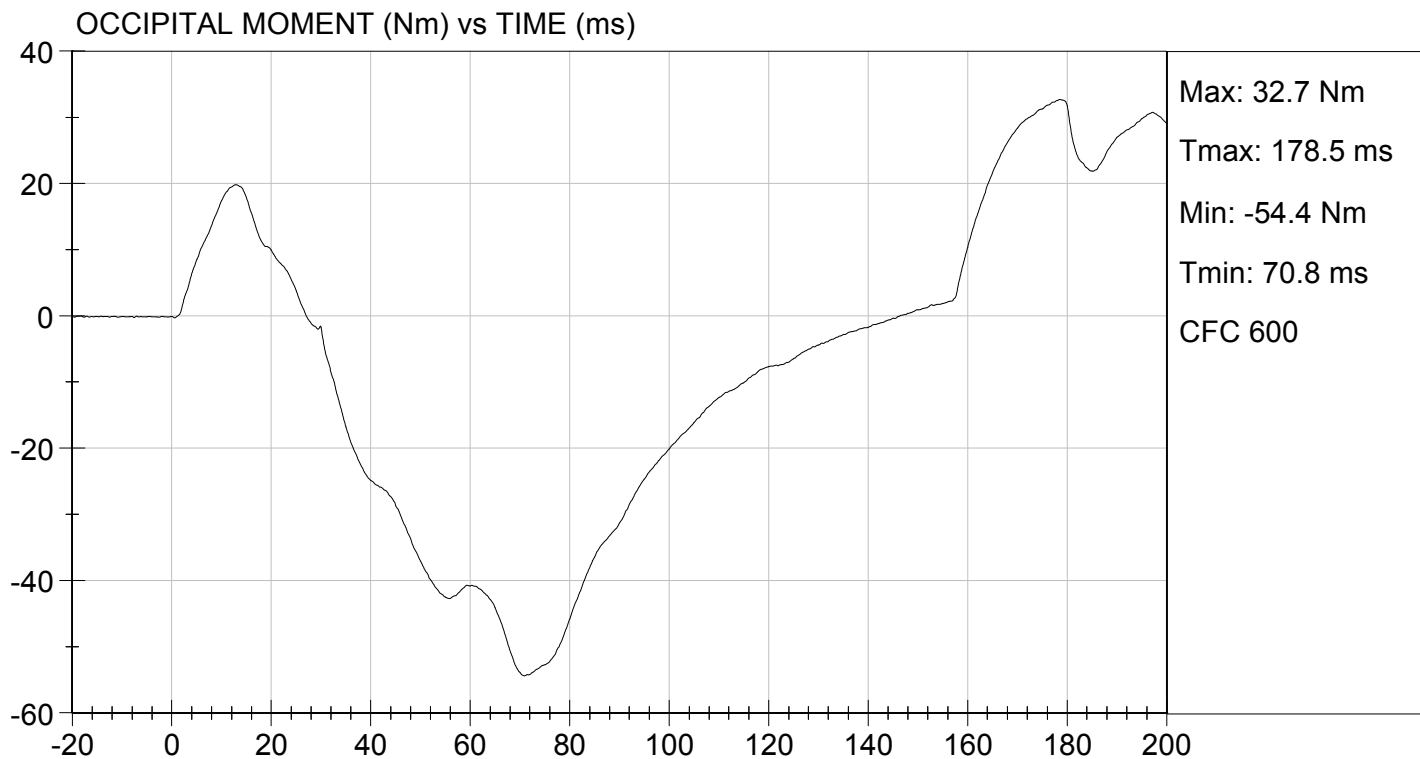
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.45	Pass
	20 ms	G's	14.00 to 19.00	15.23	Pass
	30 ms	G's	11.00 to 16.00	12.34	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.0	Pass
	Time	ms	72.0 to 82.0	77.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	157.1	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-54.4	Pass
	Time	ms	65.0 to 79.0	70.8	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	146.5	Pass
Overall Test Results					Pass

David Schoedel
Laboratory Technician

01/30/2015
Test Date

Jessica Hall
Approved By





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

ATD Serial No: 351

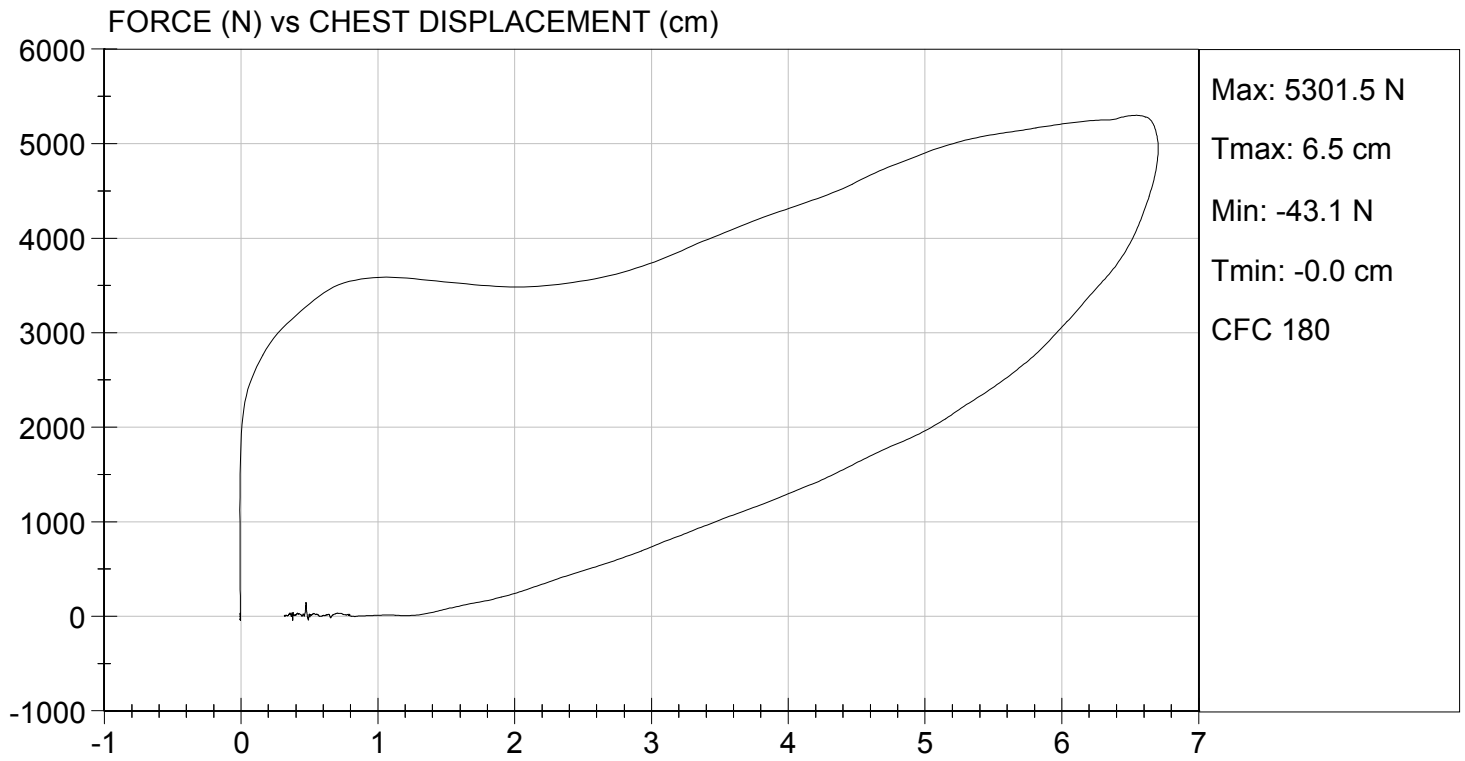
Test I.D: D15324

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	15	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,301	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.71	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

01/30/2015
Test Date

Jessica Hall
Approved By



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

ATD Serial No: 351

Test I.D: D15325

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	4,770	Pass
Overall Test Results				Pass

David Schoedel
 Laboratory Technician

01/30/2015

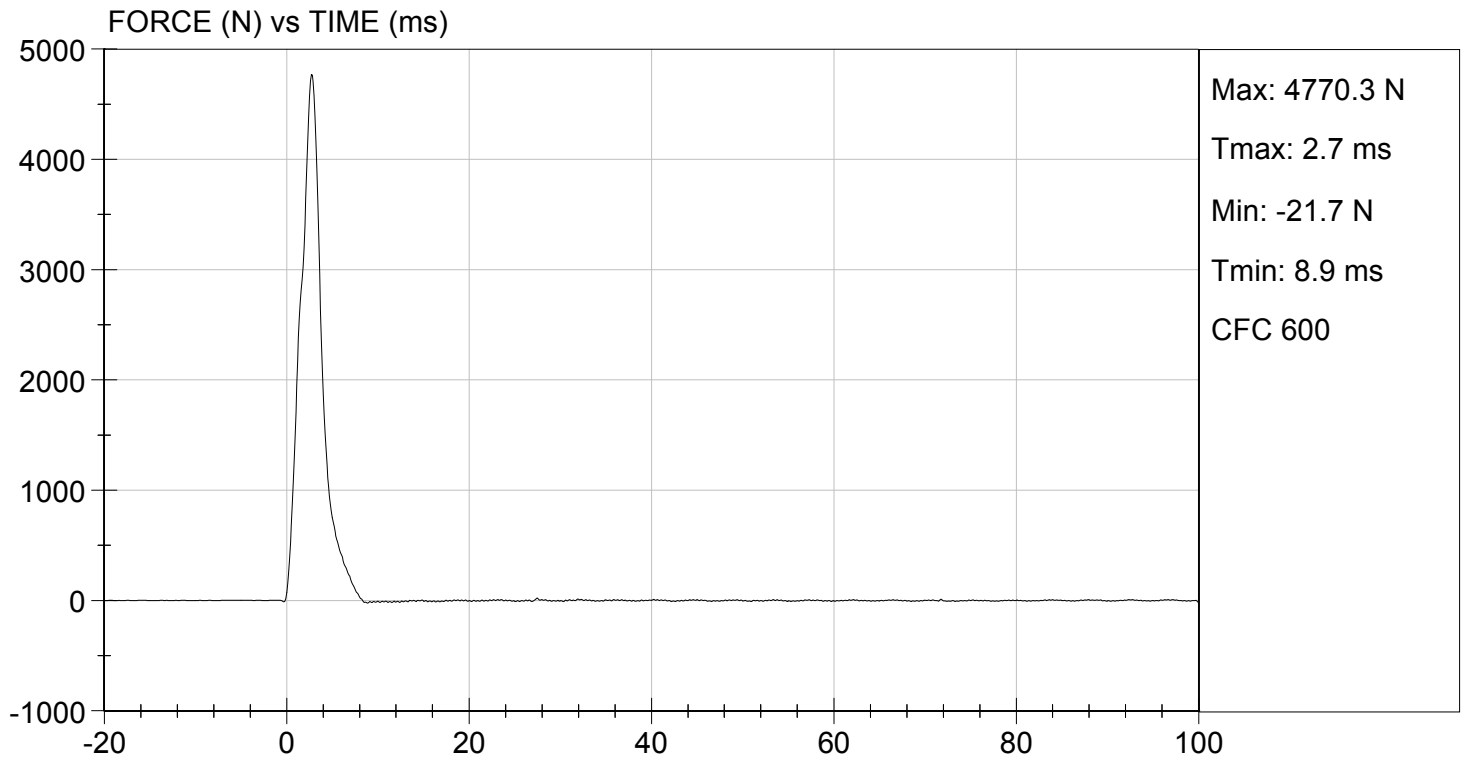
Test Date

Jessica Hall
 Approved By



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

TEST DATE: 01/30/2015
TEST #: D15325



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

ATD Serial No: 351

Test I.D: D15326

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	4,959	Pass
Overall Test Results				Pass

David Schoedel
 Laboratory Technician

01/30/2015

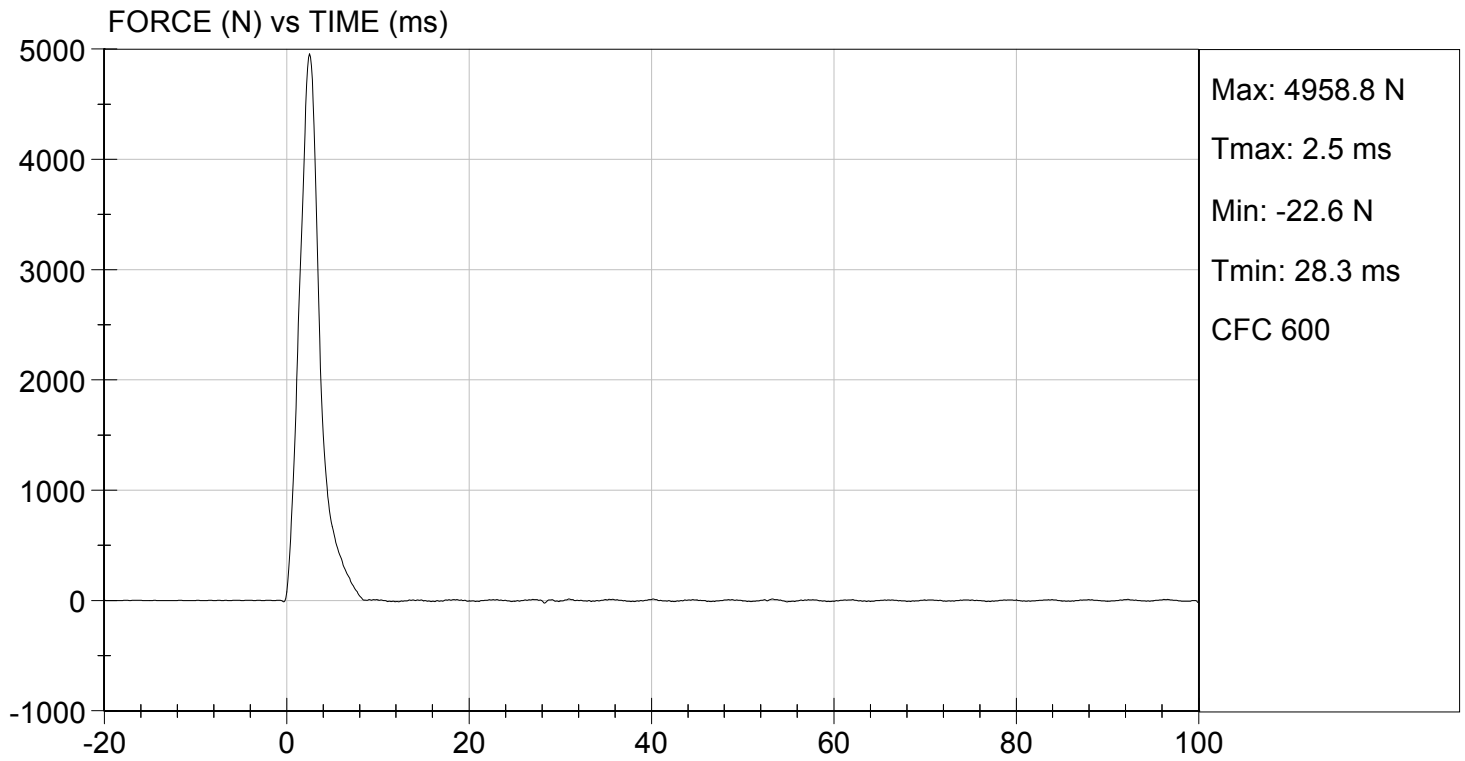
Test Date

Jessica Hall
 Approved By



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

TEST DATE: 01/30/2015
TEST #: D15326



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

ATD Serial No: 351

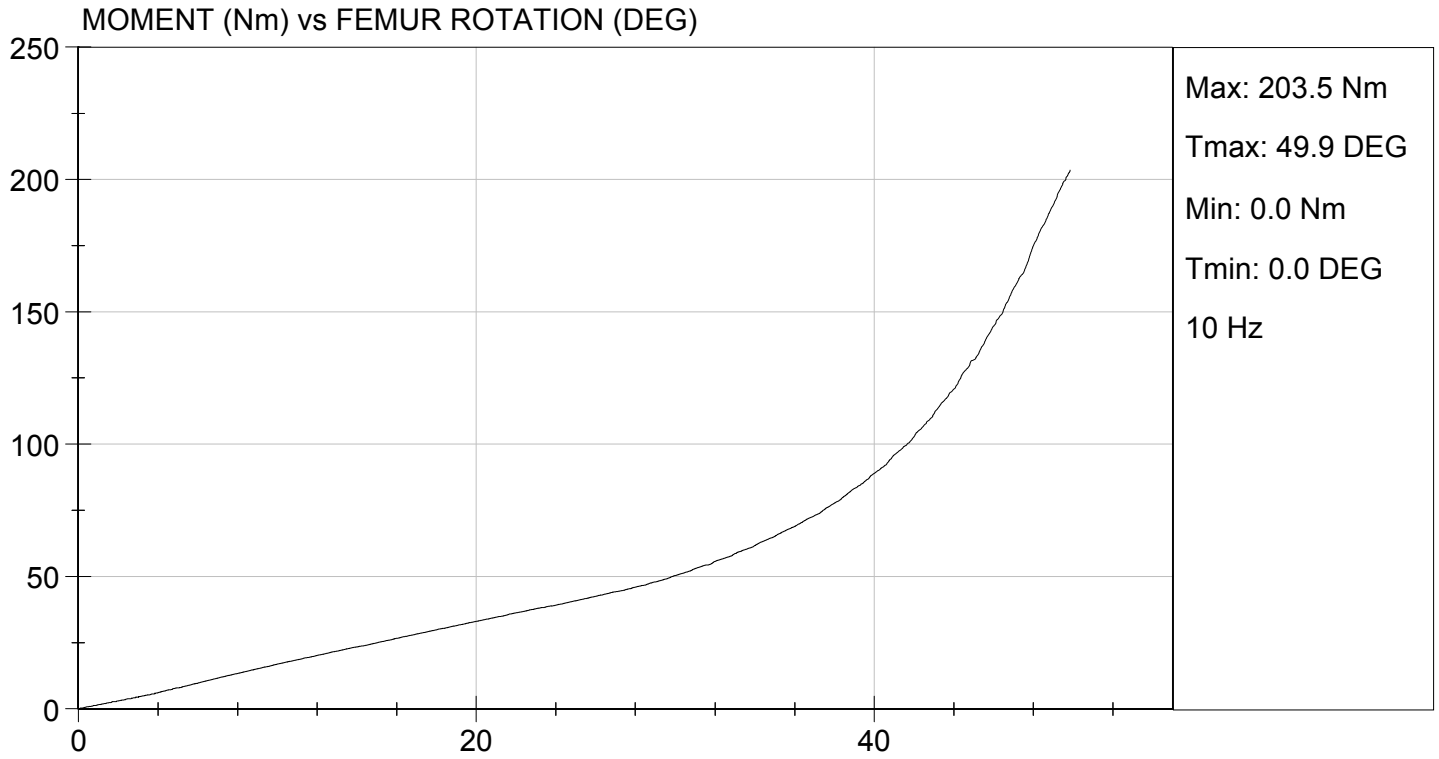
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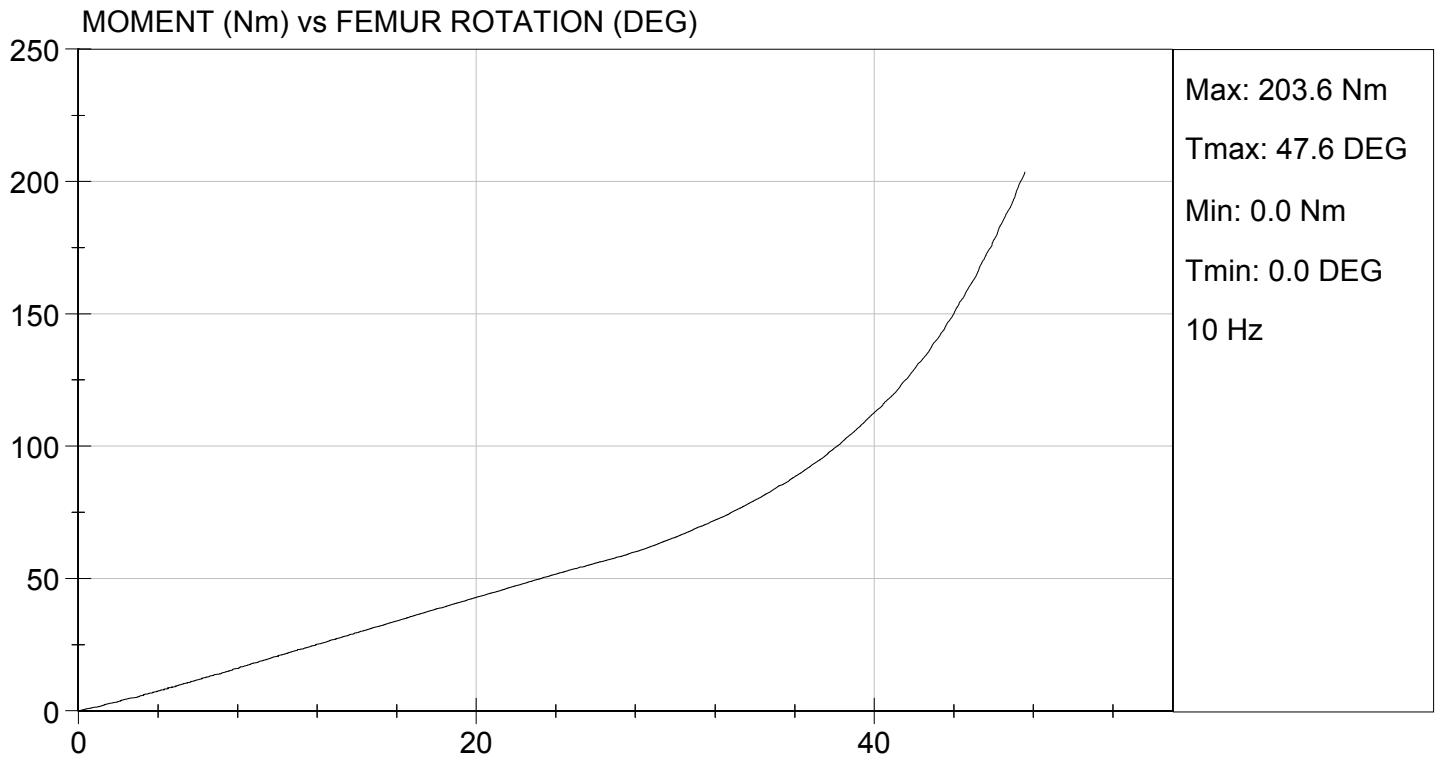
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	14	14	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	50.4	65.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	49.9	47.6	Pass
Overall Test Results					Pass

Maxime Chamberland
 Laboratory Technician

01/30/2015
 Test Date

Jessica Hall
 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: D15251

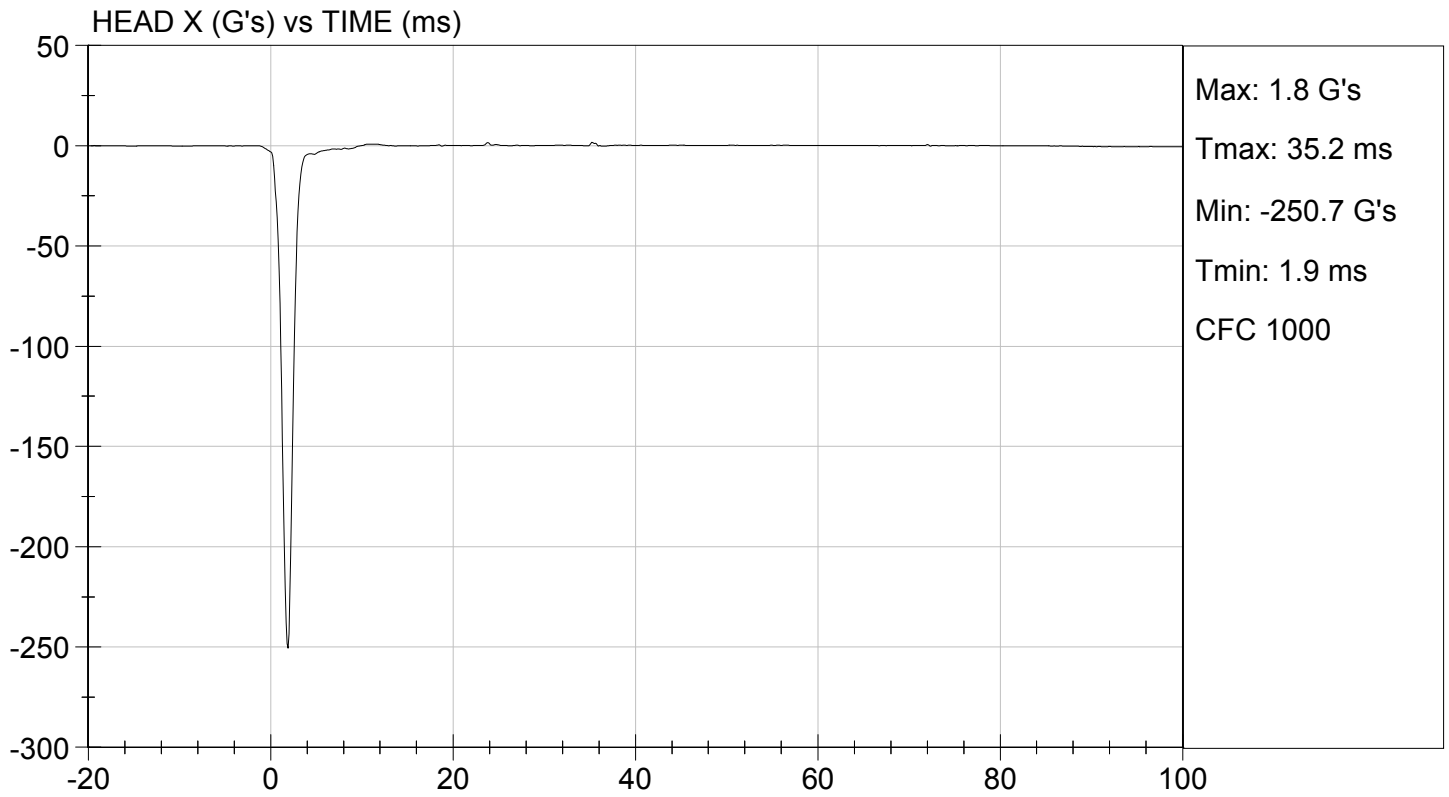
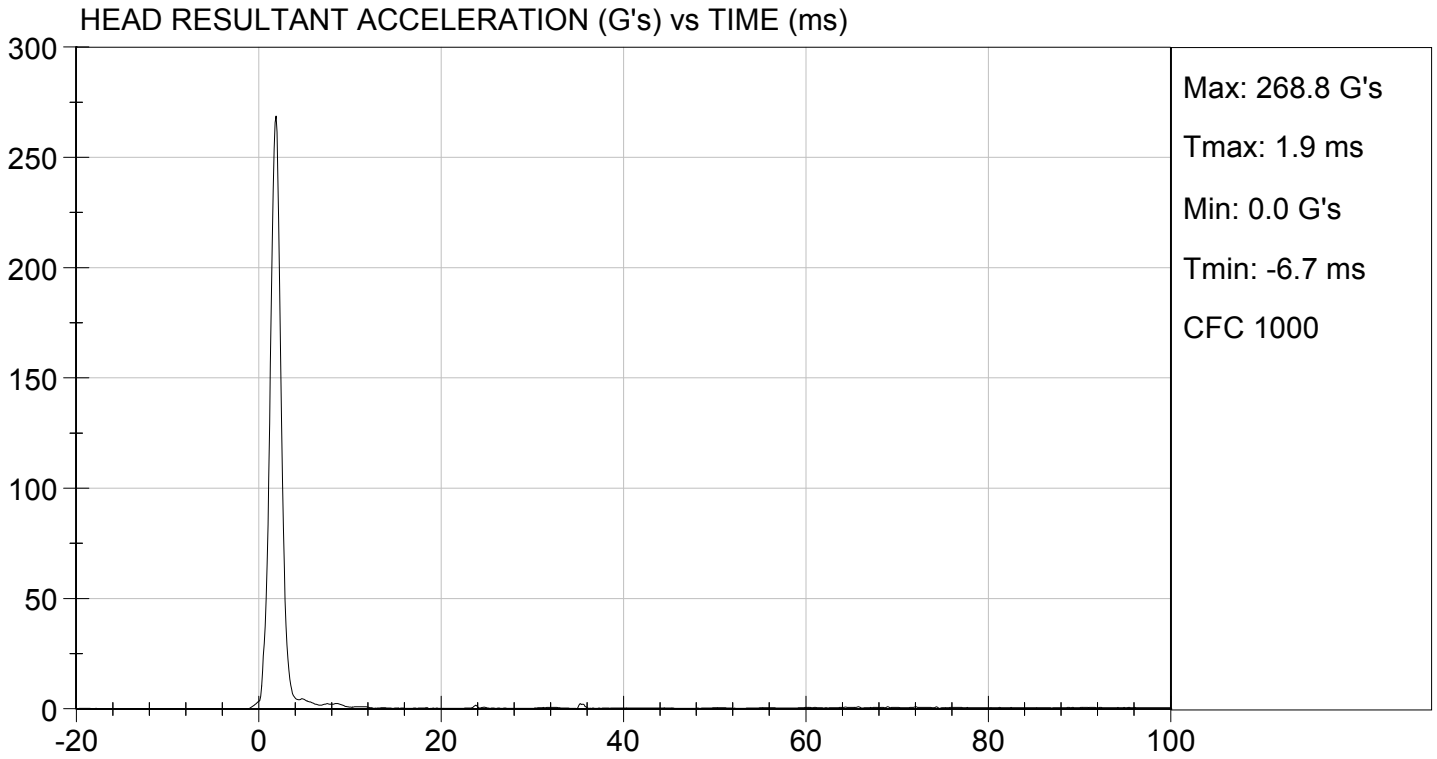
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	250 to 300	269	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

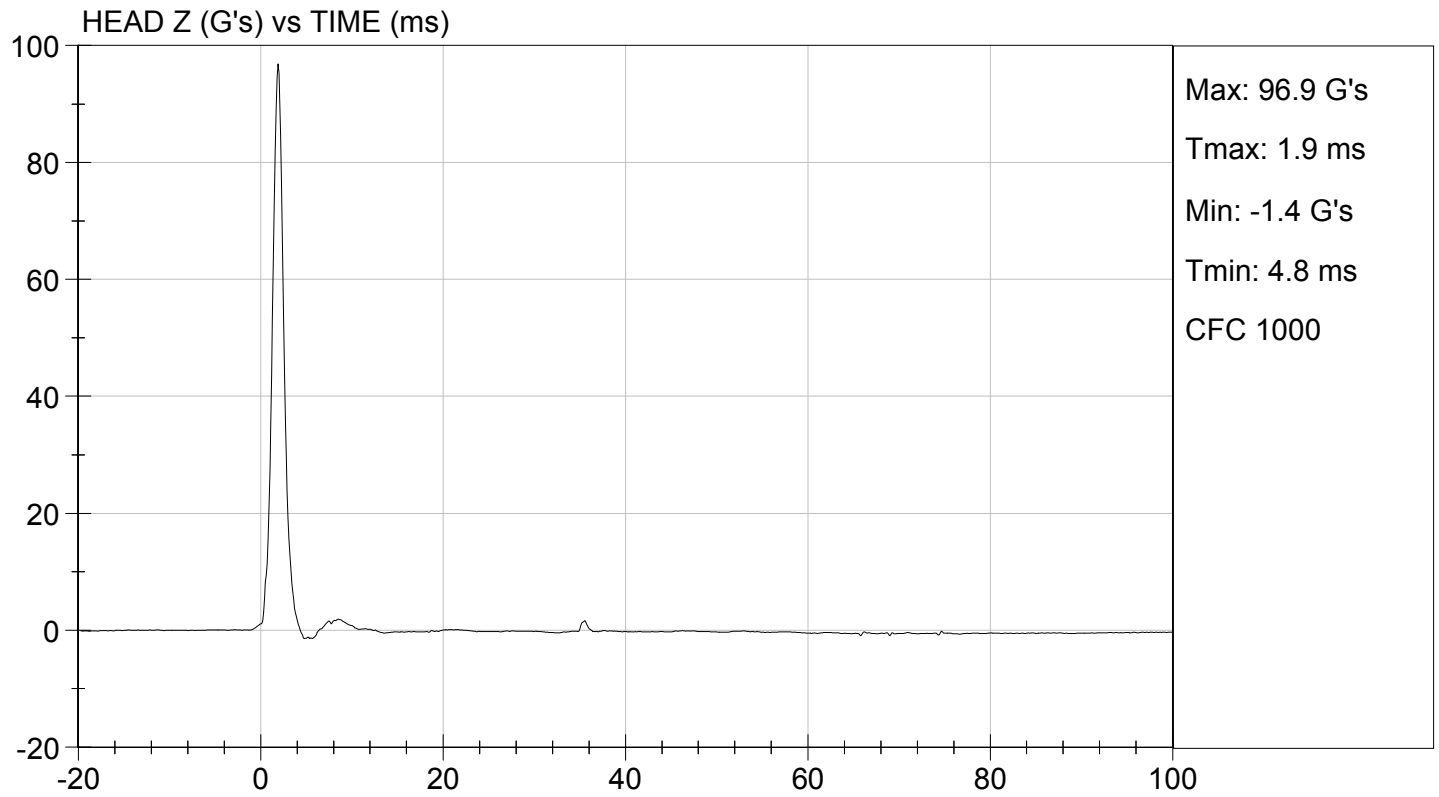
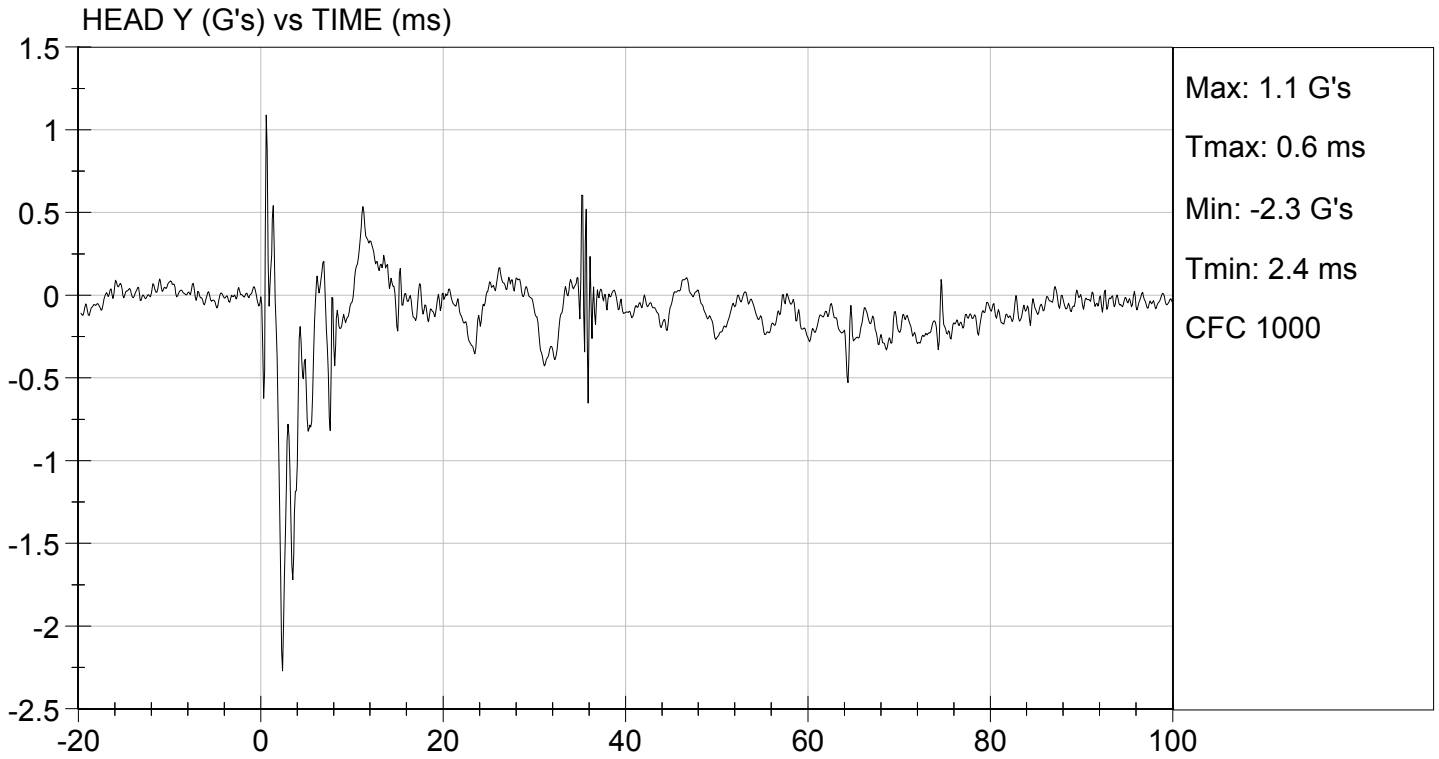
David Schoedel
Laboratory Technician

01/26/2015

Test Date

Jessica Hall
Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

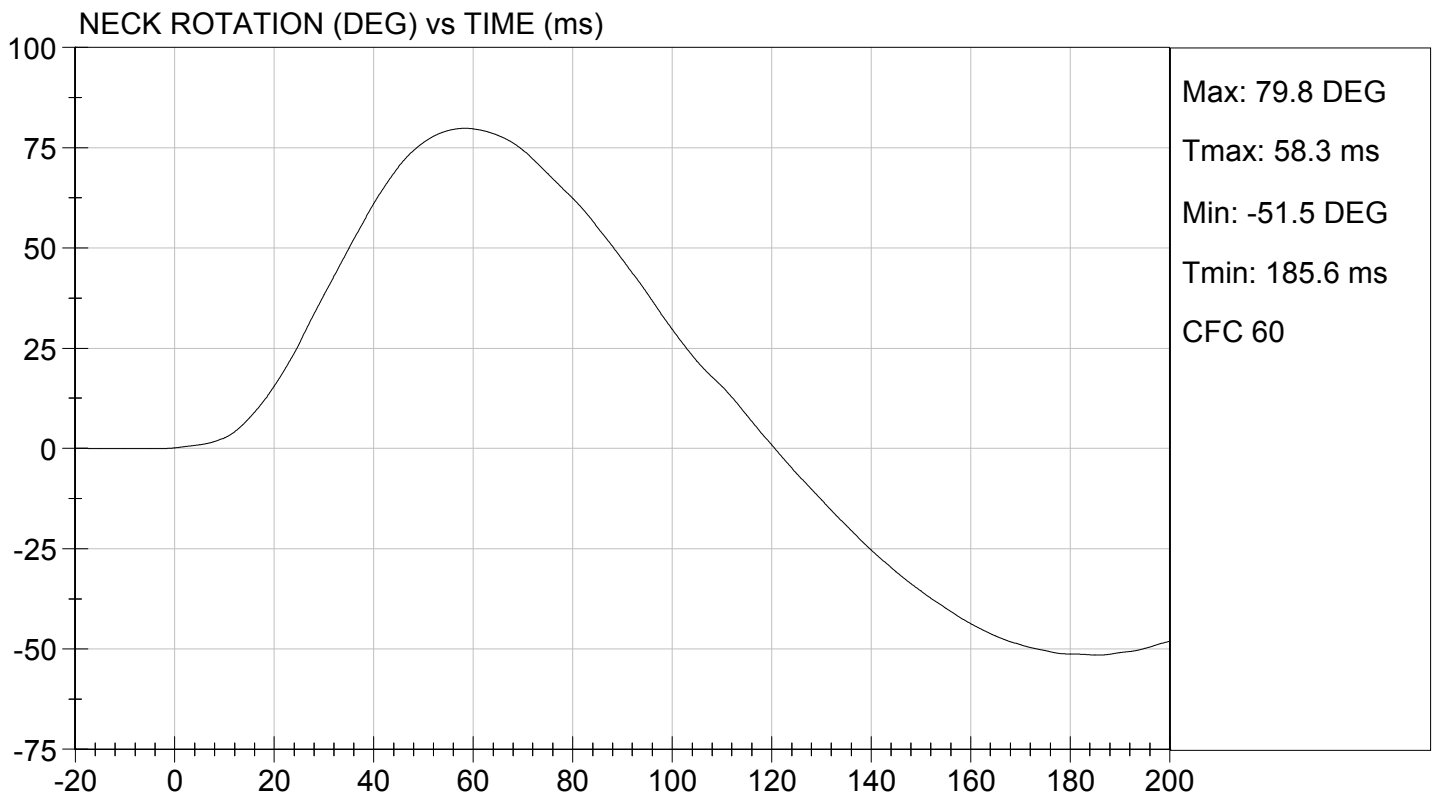
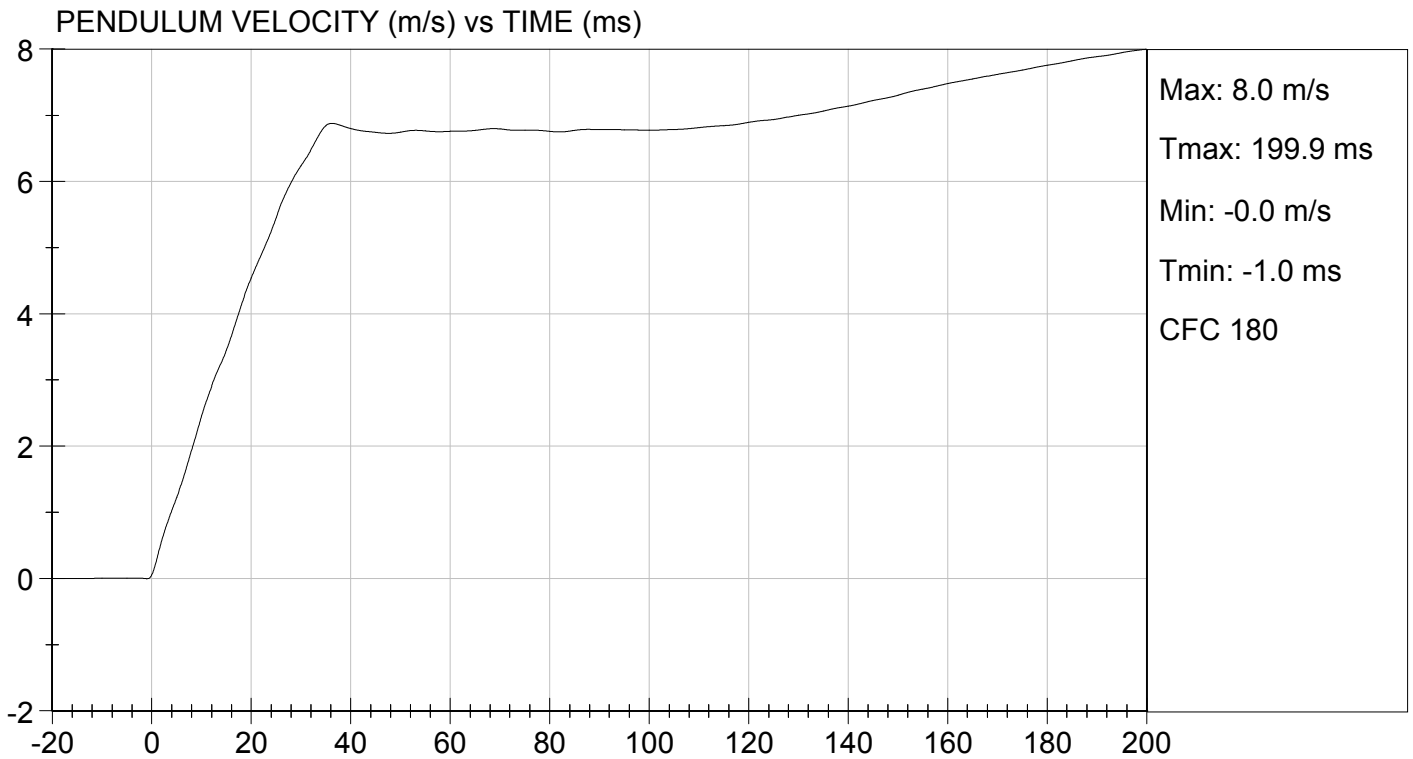
Test I.D.: D15252

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	23	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	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	80	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
Overall Results					Pass

David Schoedel
 Laboratory Technician

01/27/2015
 Test Date

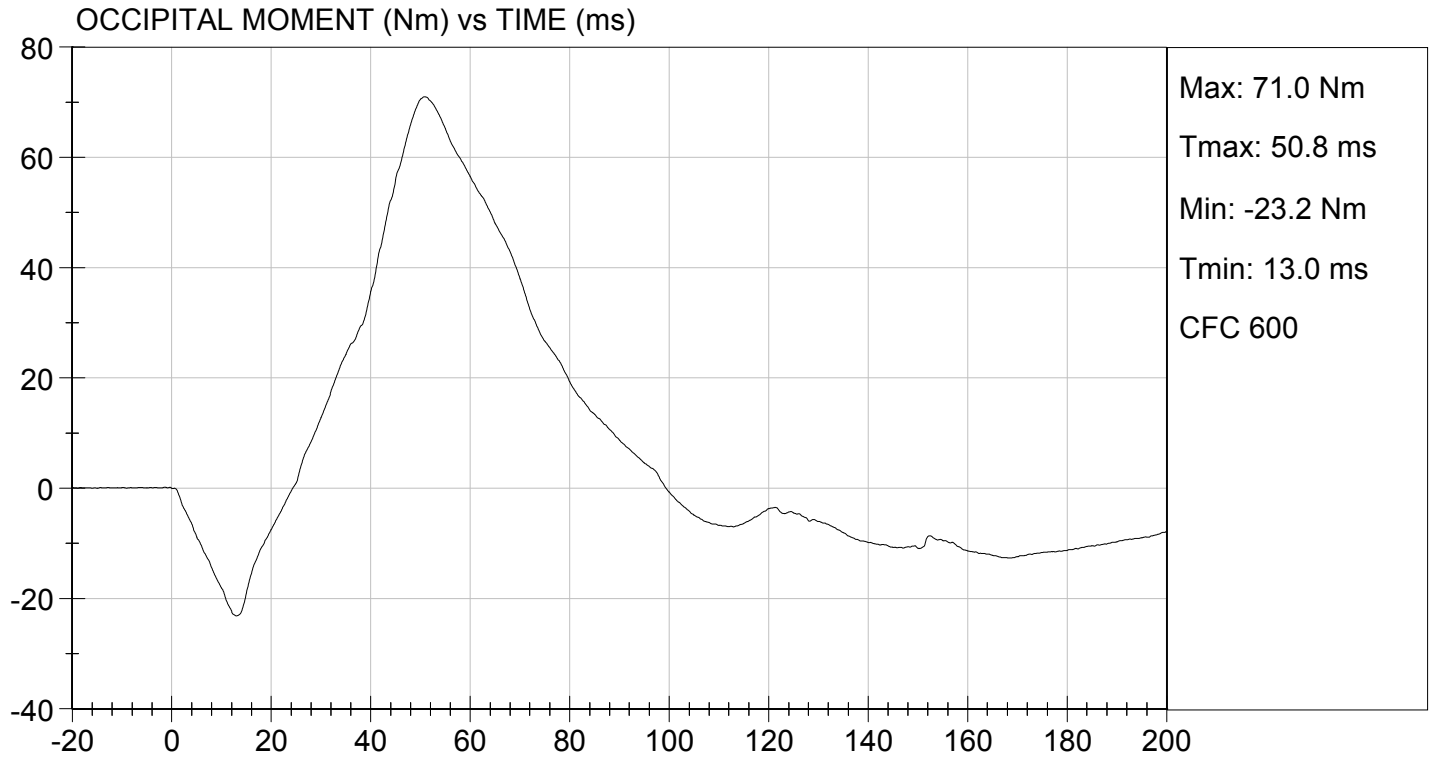
Jessica Hall
 Approved By





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

TEST DATE: 01/27/2015
TEST #: D15252



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

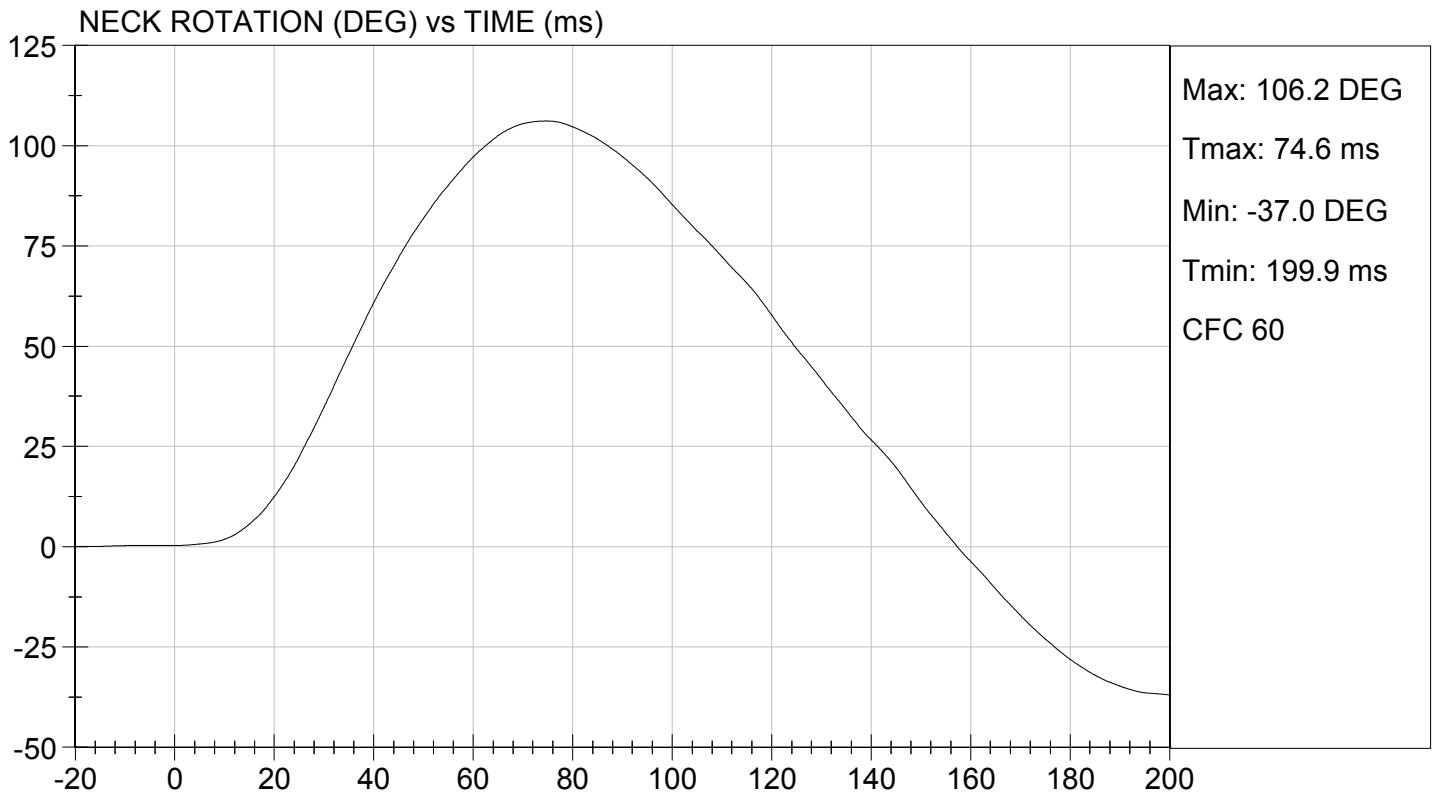
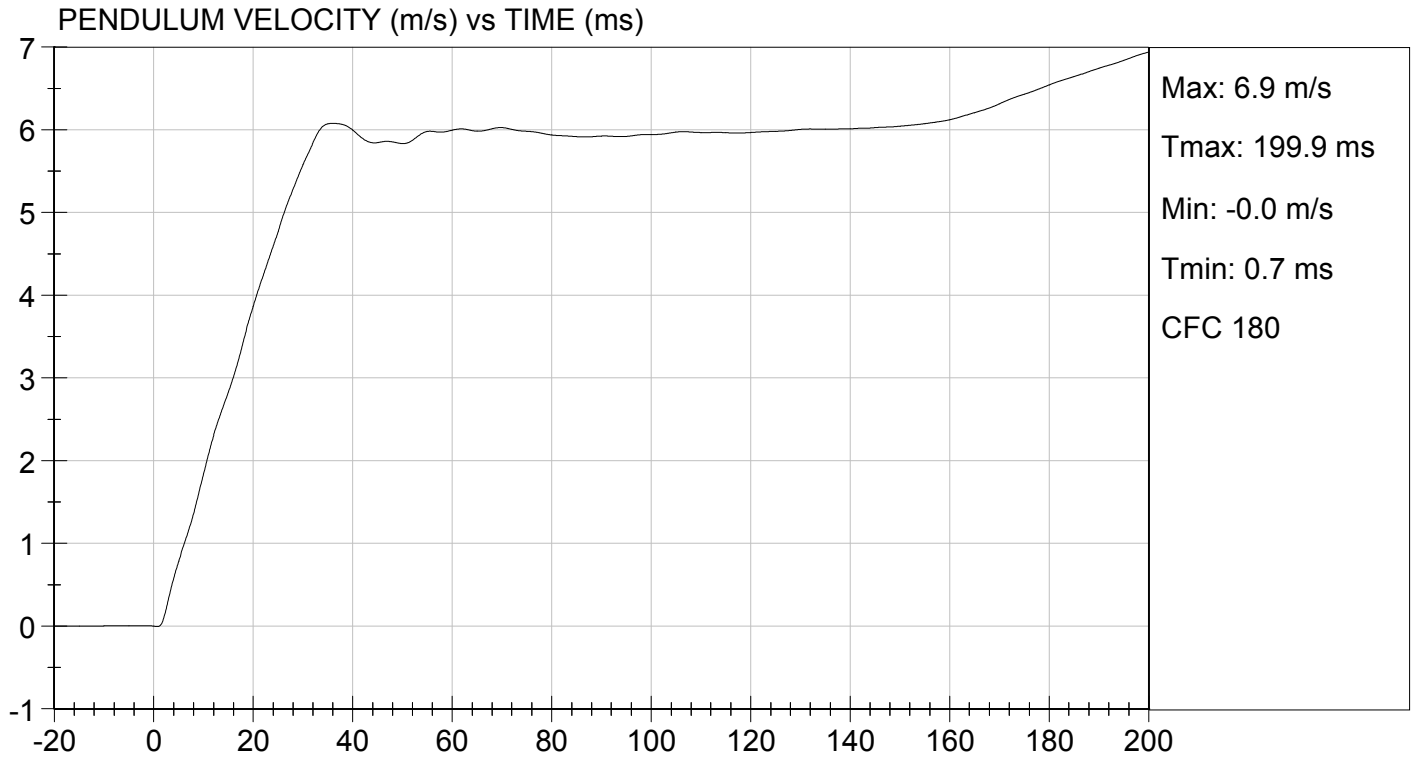
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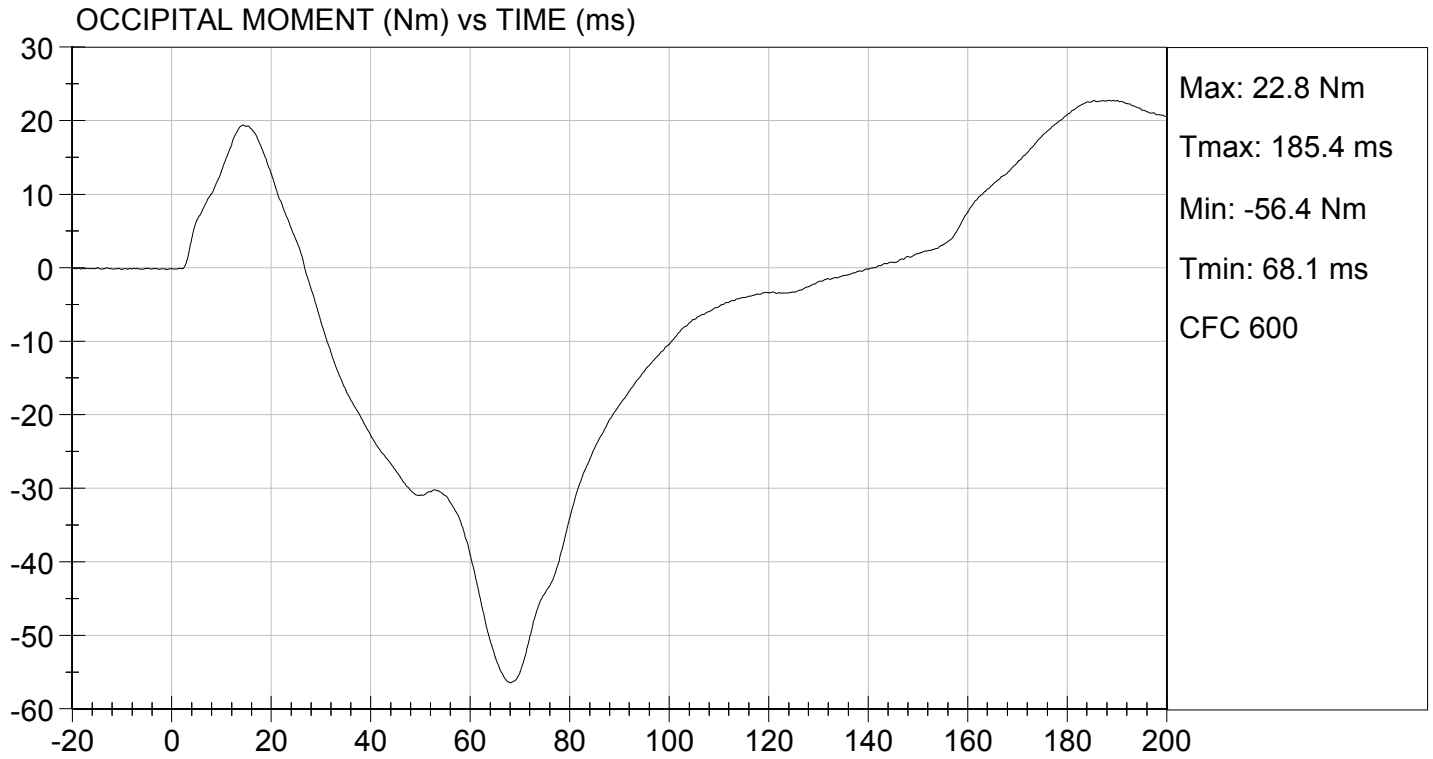
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.19	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.9	Pass
	30 ms	m/s	4.6 to 5.6	5.6	Pass
D Plane Rotation	Max	deg	99 to 114	106	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	100	Pass
Overall Results					Pass

David Schoedel
 Laboratory Technician

01/27/2015
 Test Date

Jessica Hall
 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138


Test I.D: D15254

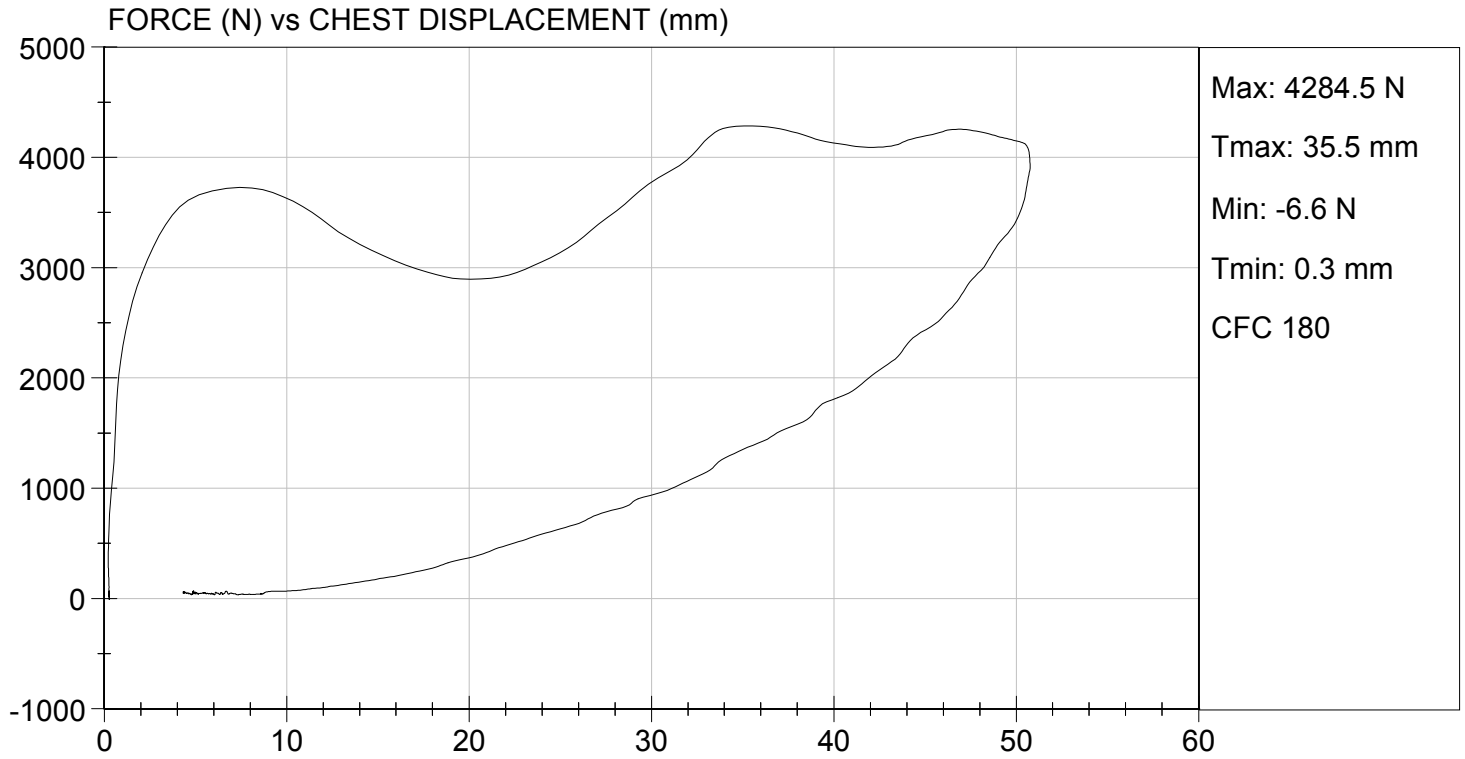
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4150	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4284	Pass
Overall Test Results				Pass


 Laboratory Technician

01/27/2015

Test Date


 Approved By



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

ATD Serial No: 138

Test I.D: D15255

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	18	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3537	Pass
Overall Test Results				Pass

David Schoedel
 Laboratory Technician

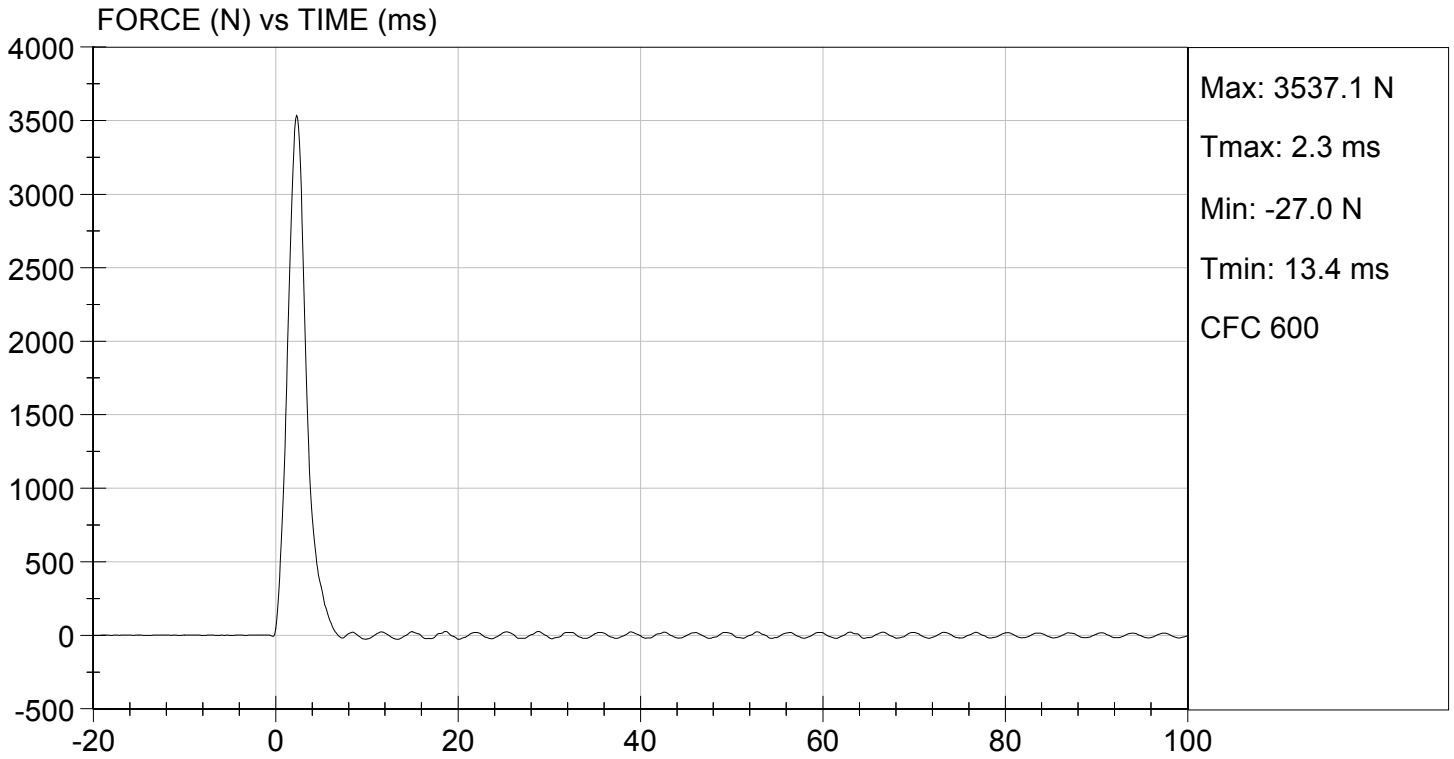
01/26/2015
 Test Date

Jessica Hall
 Approved By



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

TEST DATE: 01/26/2015
TEST #: D15255



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D15256

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	18	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3637	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

01/26/2015

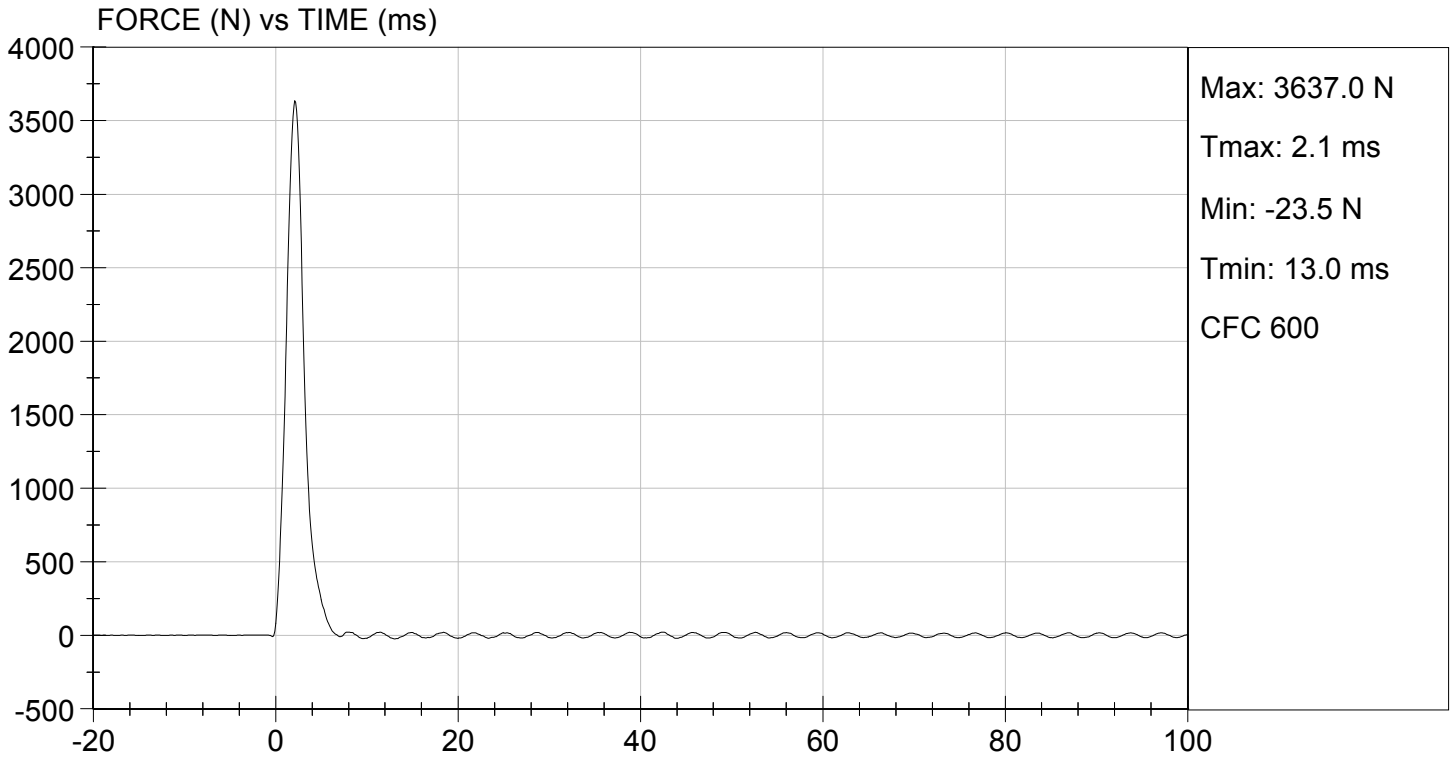
Test Date

Jessica Hall
Approved By



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

TEST DATE: 01/26/2015
TEST #: D15256



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D15257

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	18	Pass
Initial Angle	deg	0 to 20	20	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	364	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass

David Schoedel
 Laboratory Technician

01/26/2015
 Test Date

Jessica Hall
 Approved By

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

ATD Serial No: 138

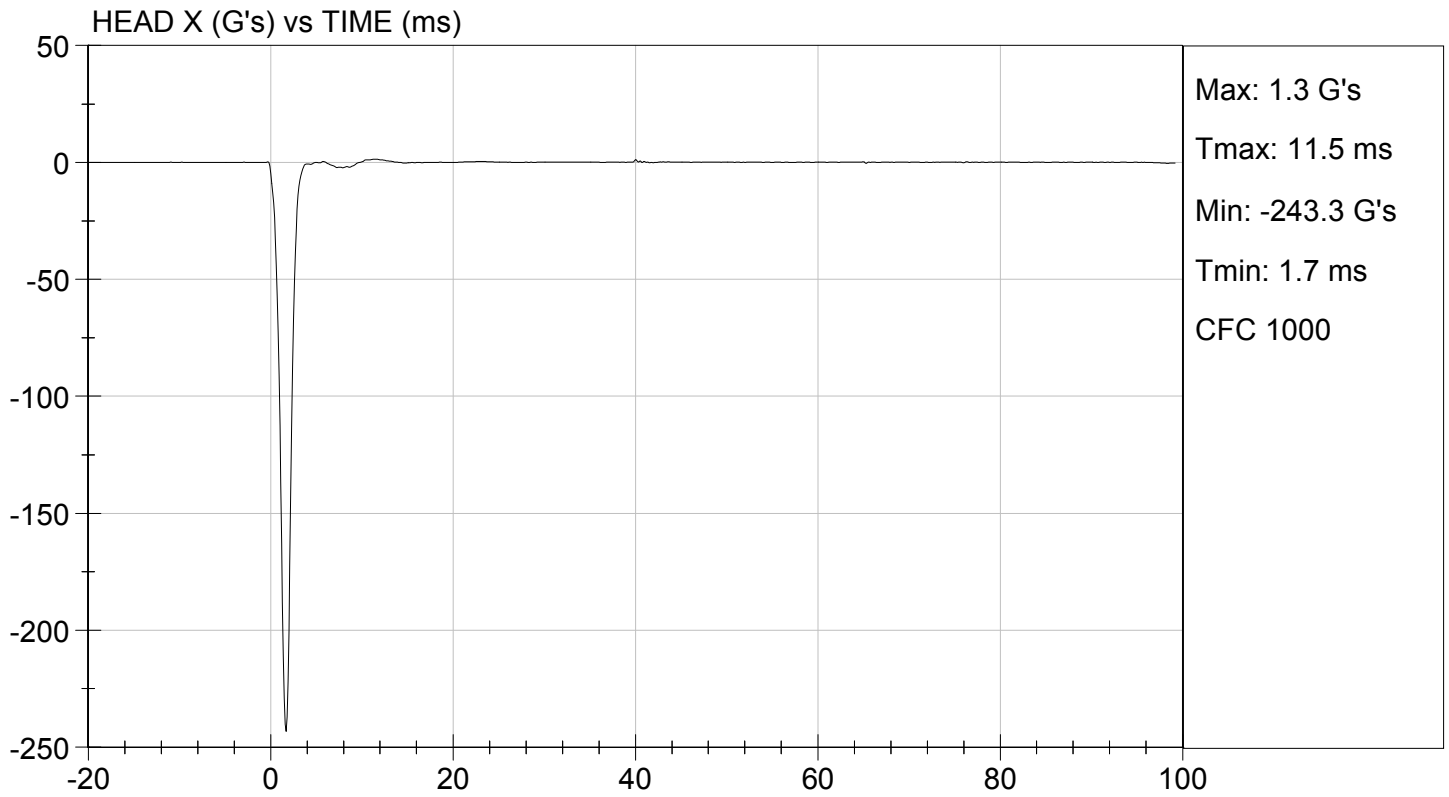
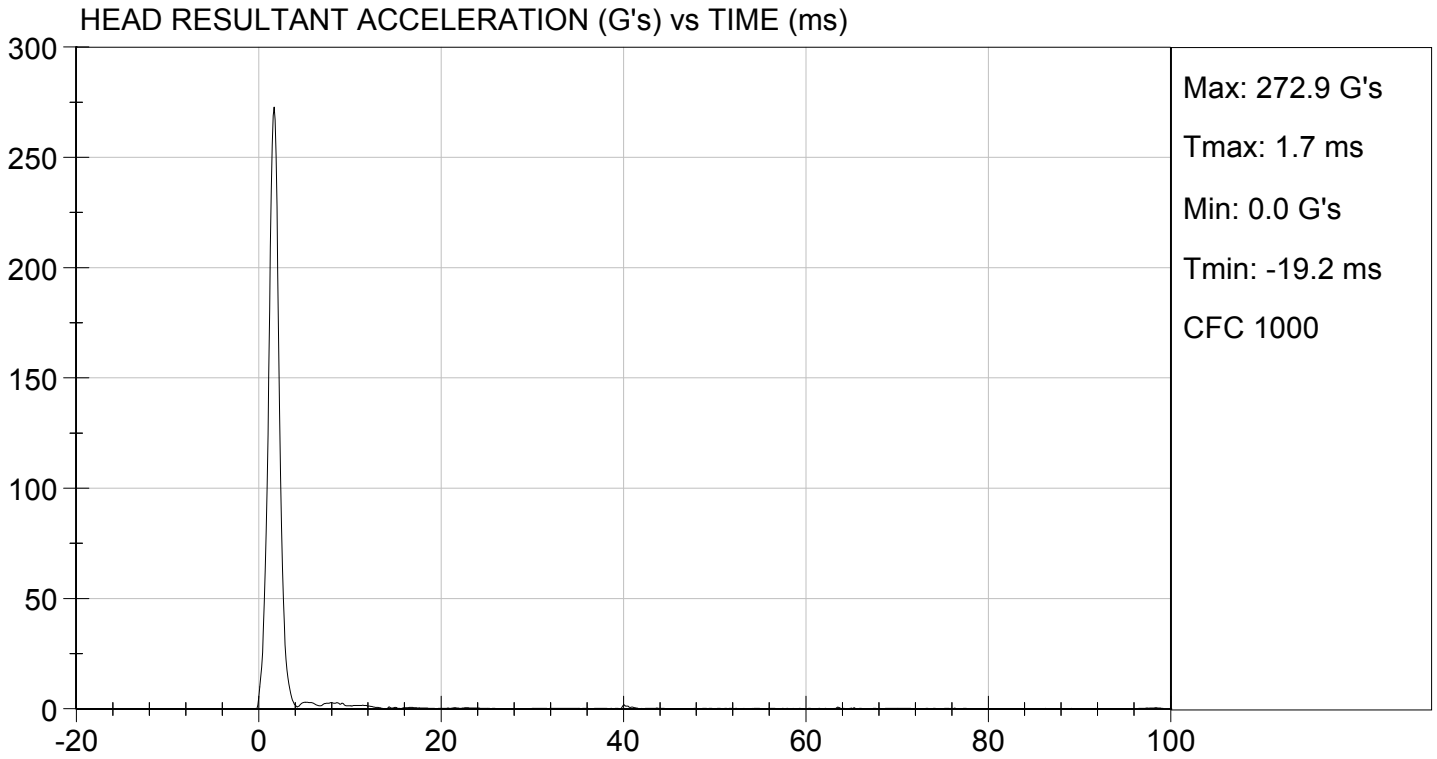
Test ID: D15331

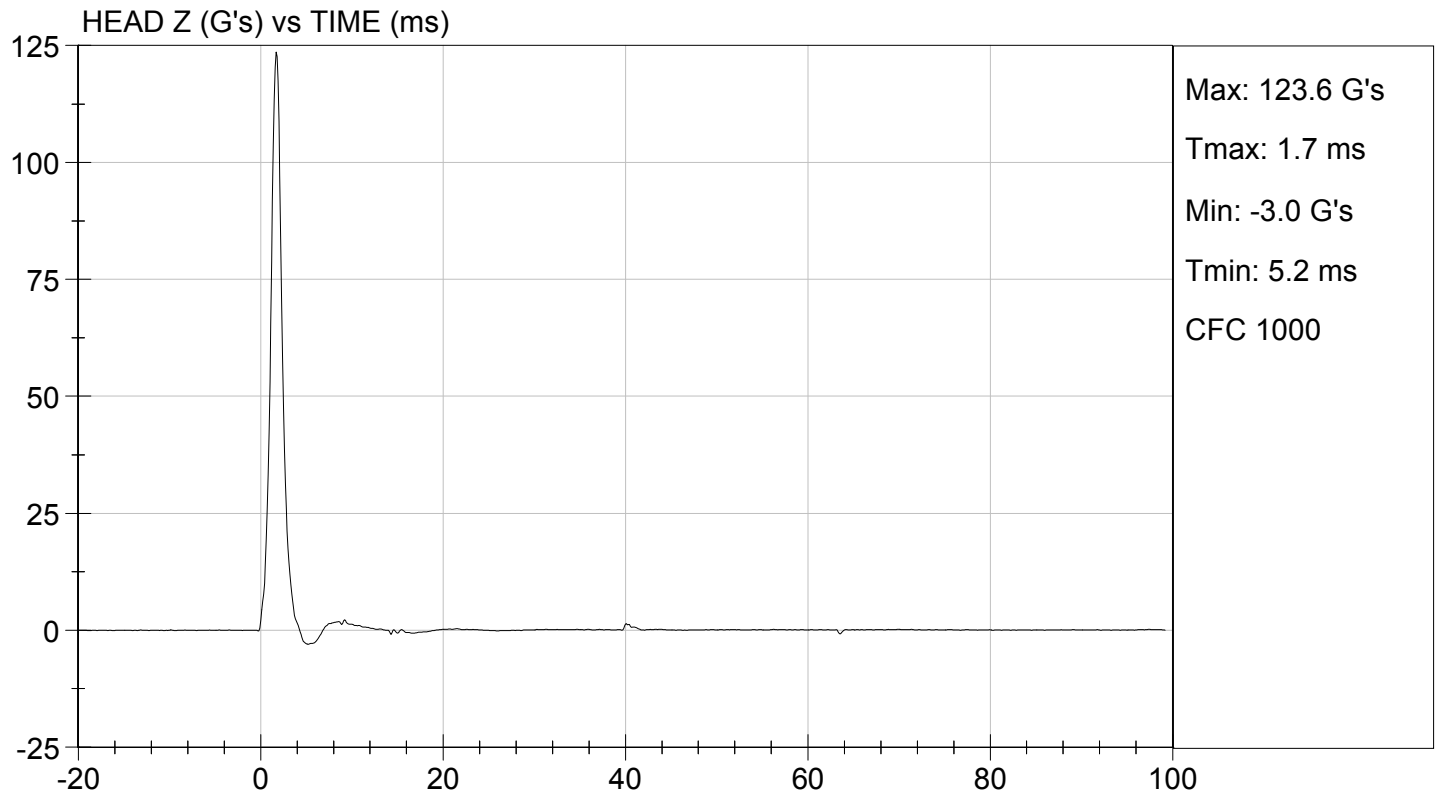
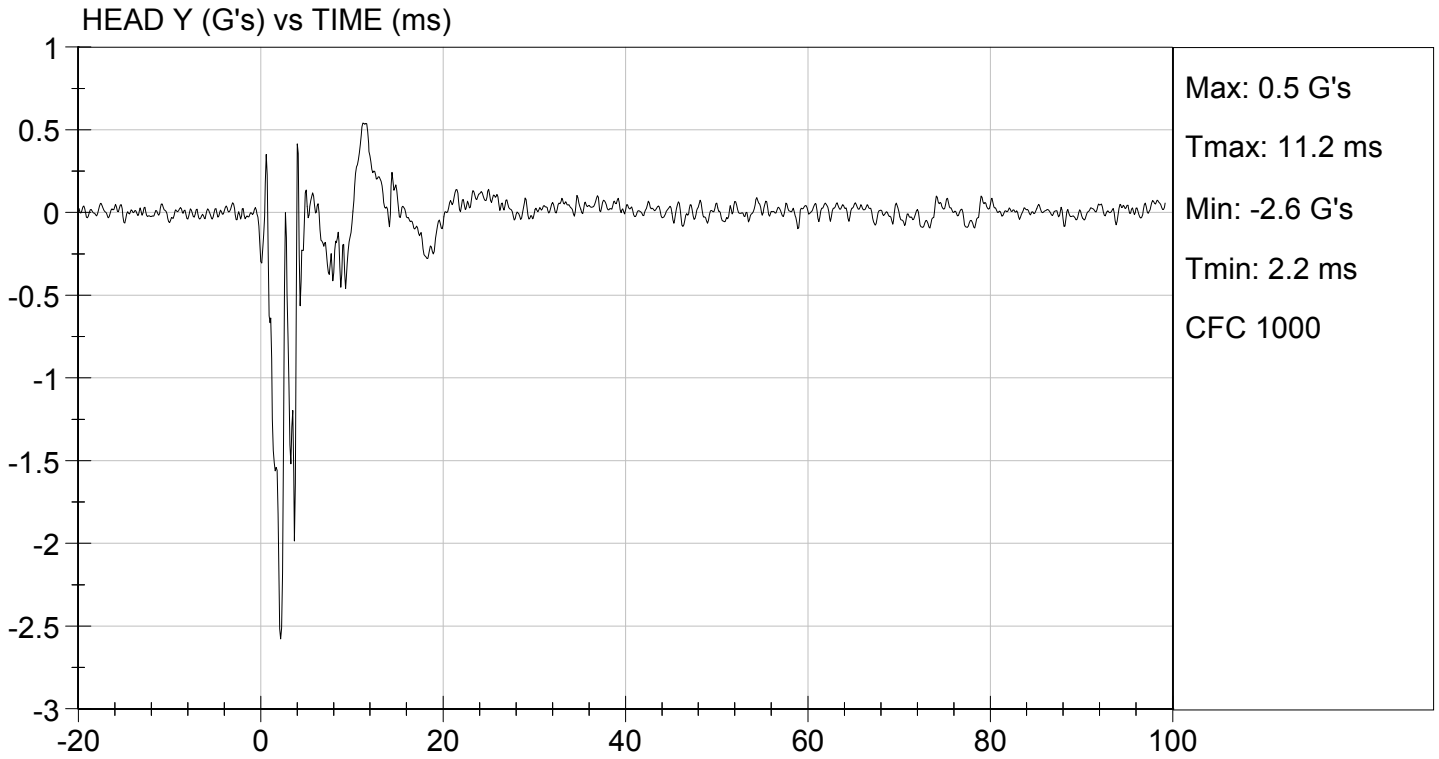
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Peak Resultant Acceleration	G's	250 to 300	273	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

01/30/2015
Test Date

Jessica Hall
Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

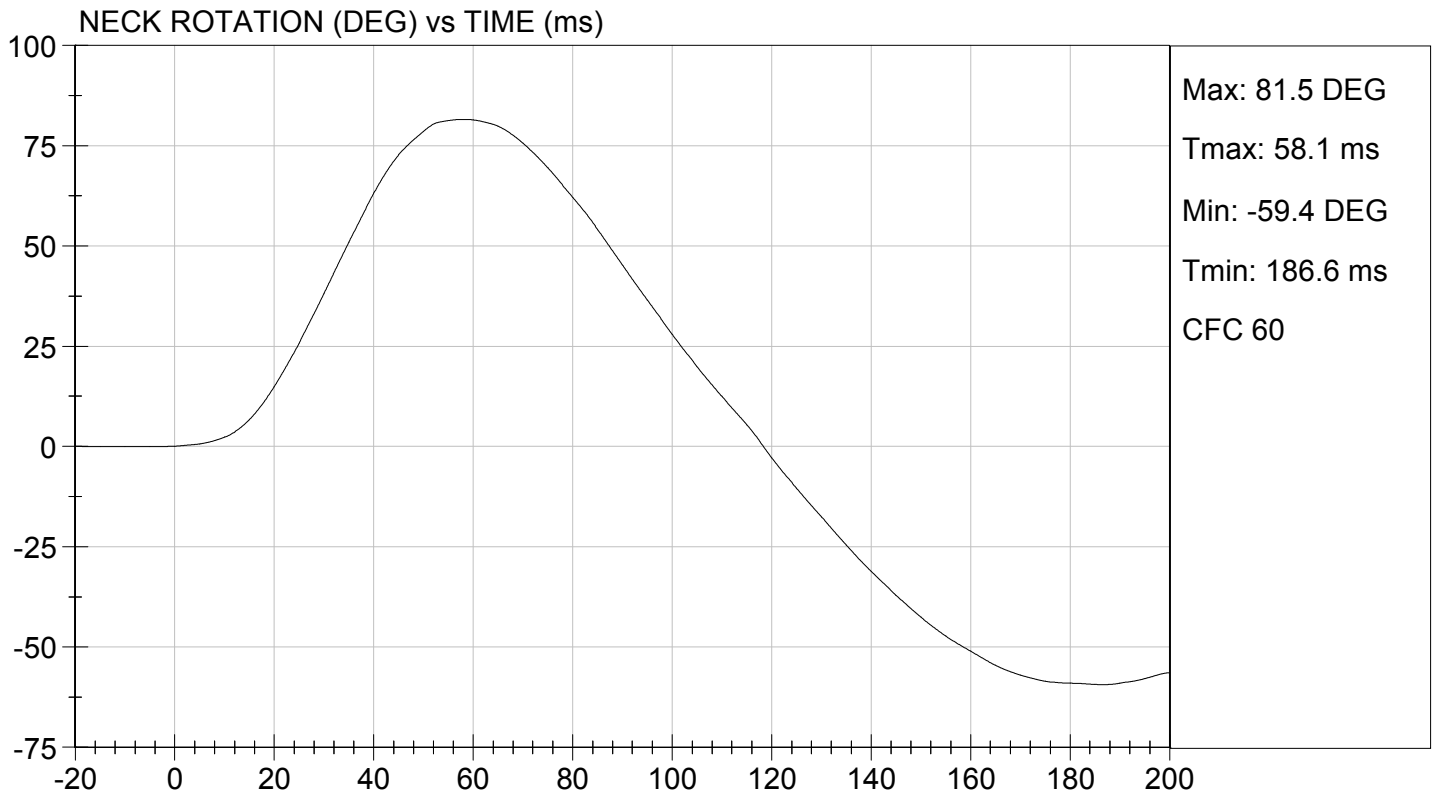
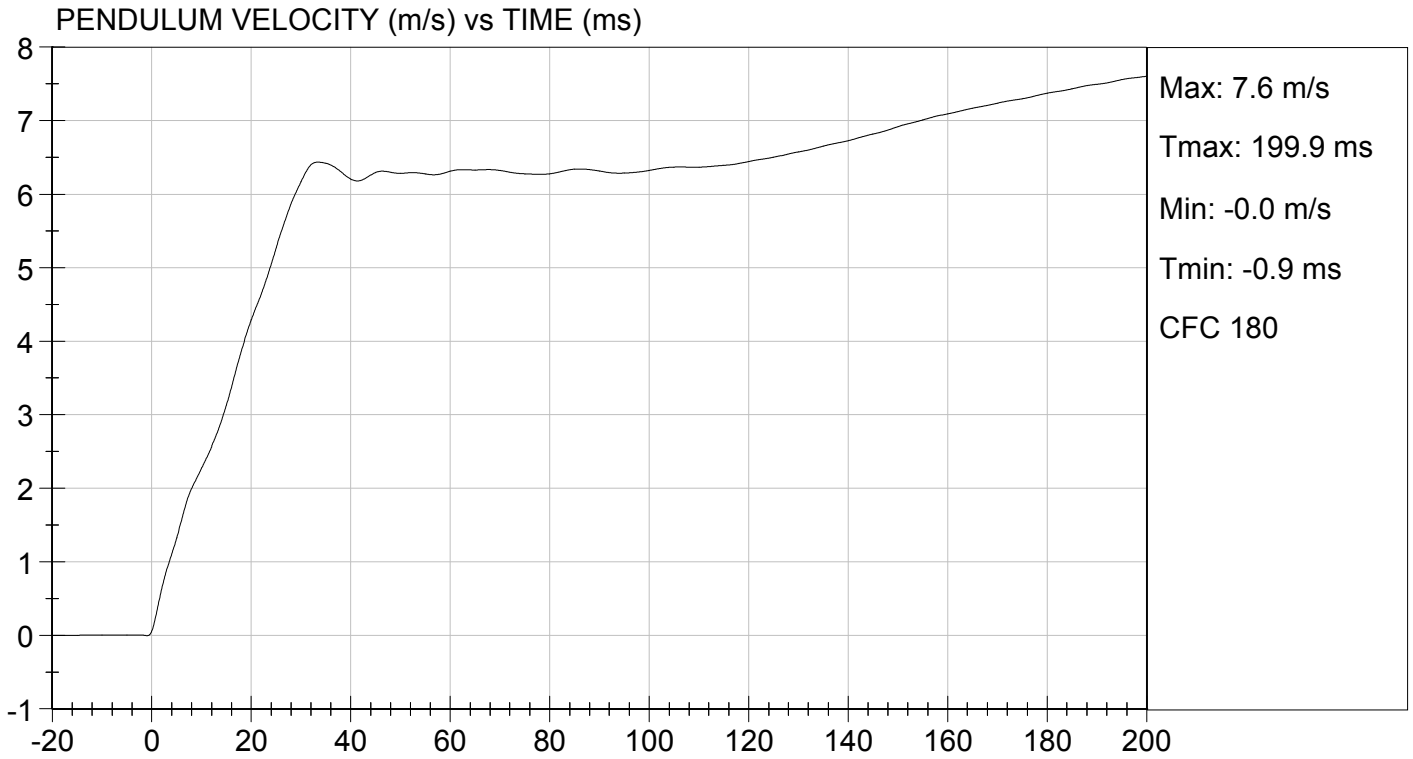
Test I.D.: D15332

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	16	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	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	82	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	83	Pass
Overall Results					Pass

David Schoedel
Laboratory Technician

01/30/2015
Test Date

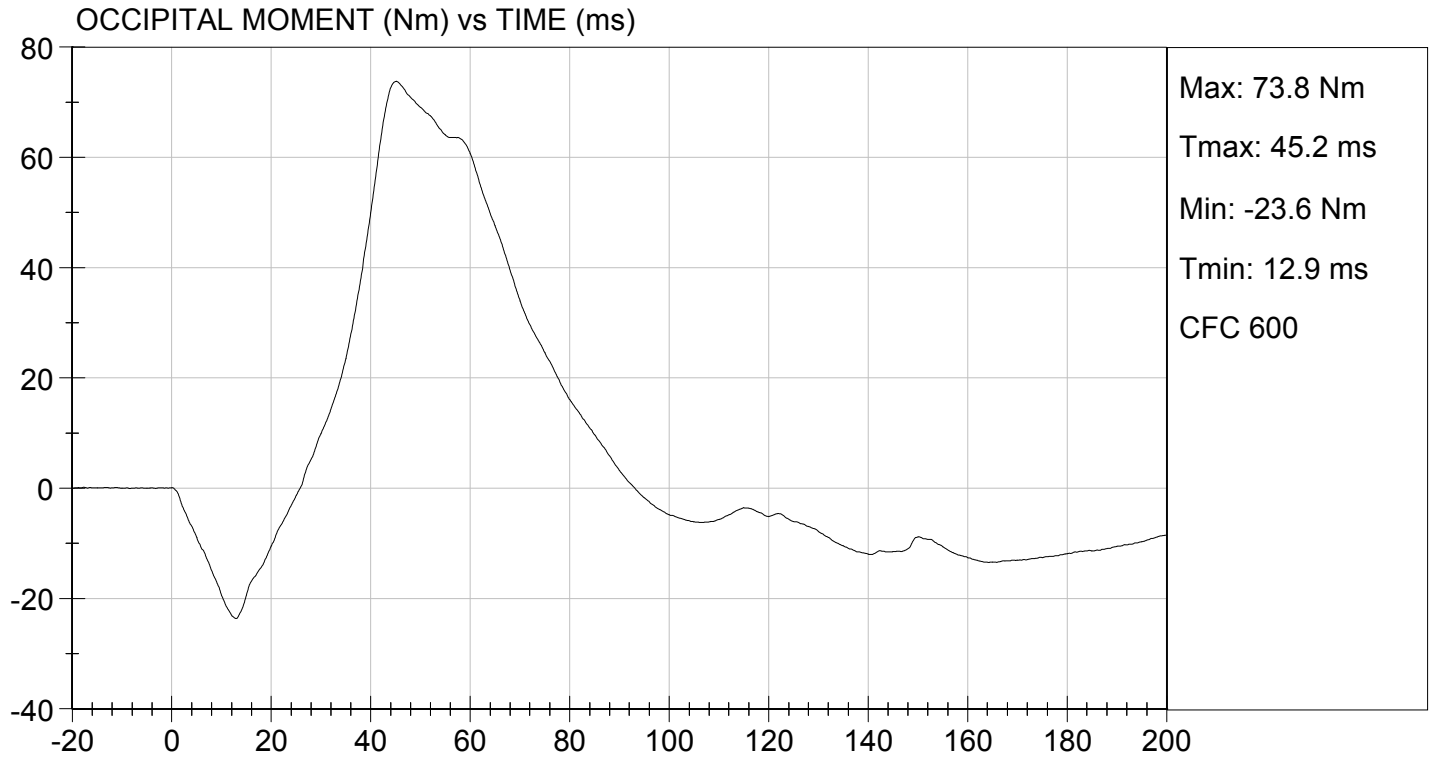
Jessica Hall
Approved By





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

TEST DATE: 01/30/2015
TEST #: D15332



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

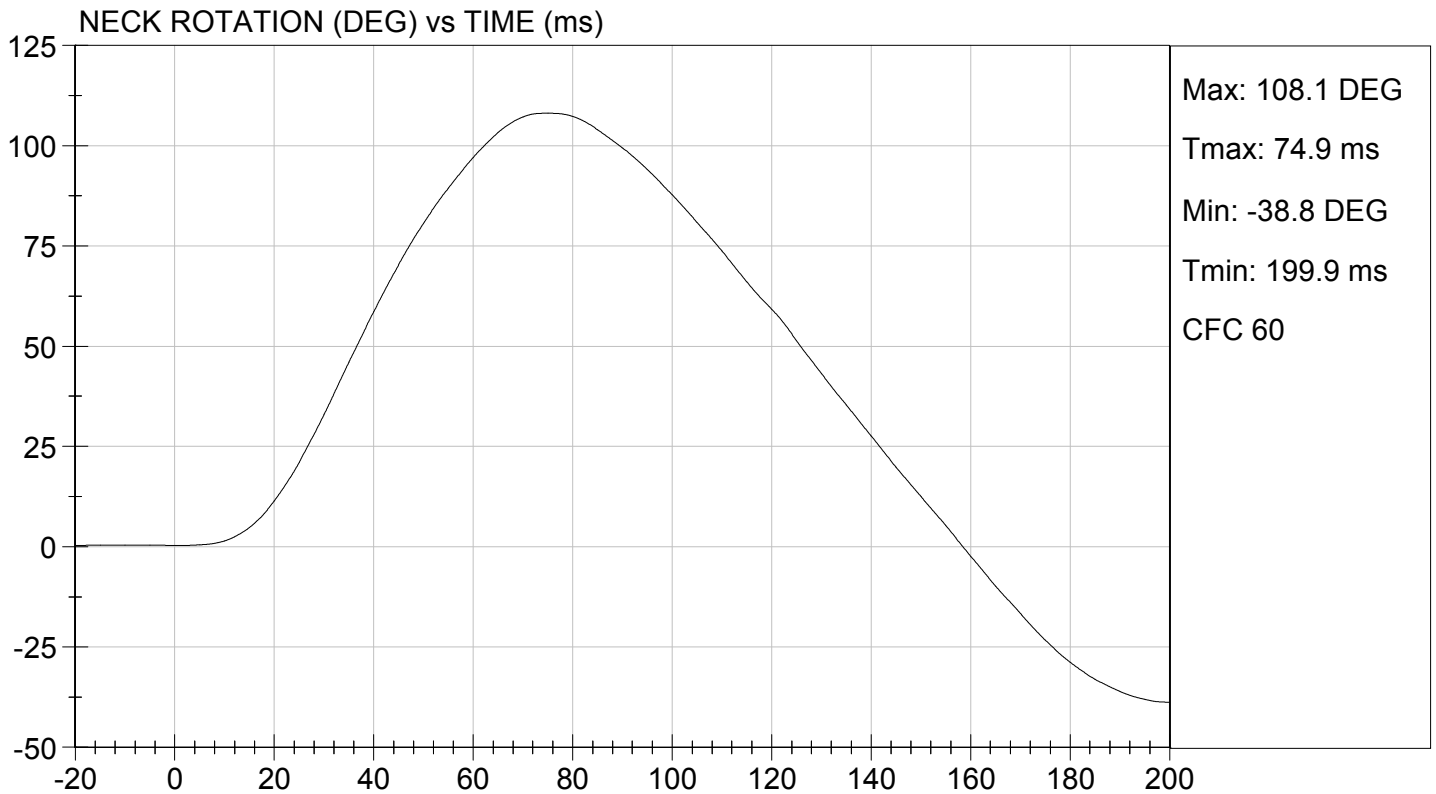
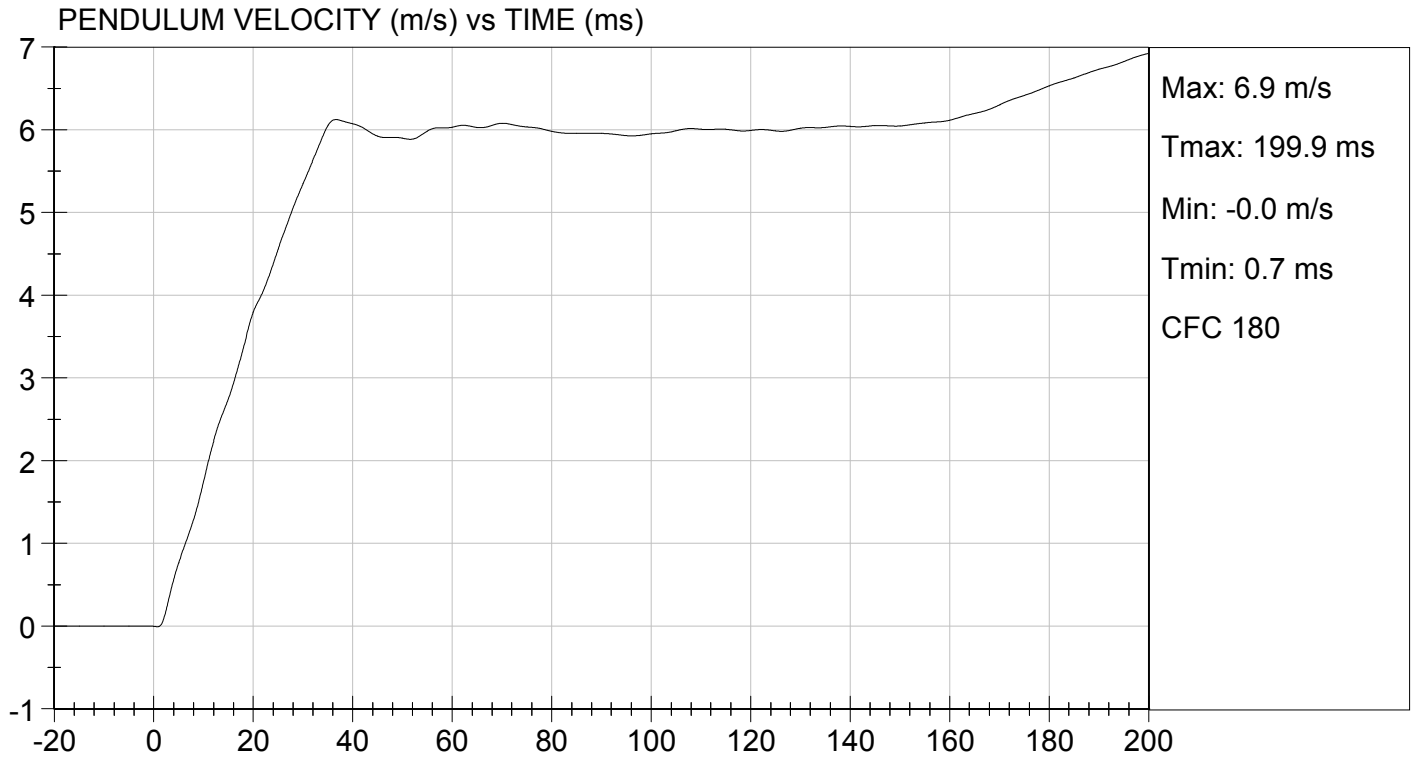
Test I.D: D15333

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.05	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.8	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	100	Pass
Overall Results					Pass

David Schoedel
 Laboratory Technician

01/30/2015
 Test Date

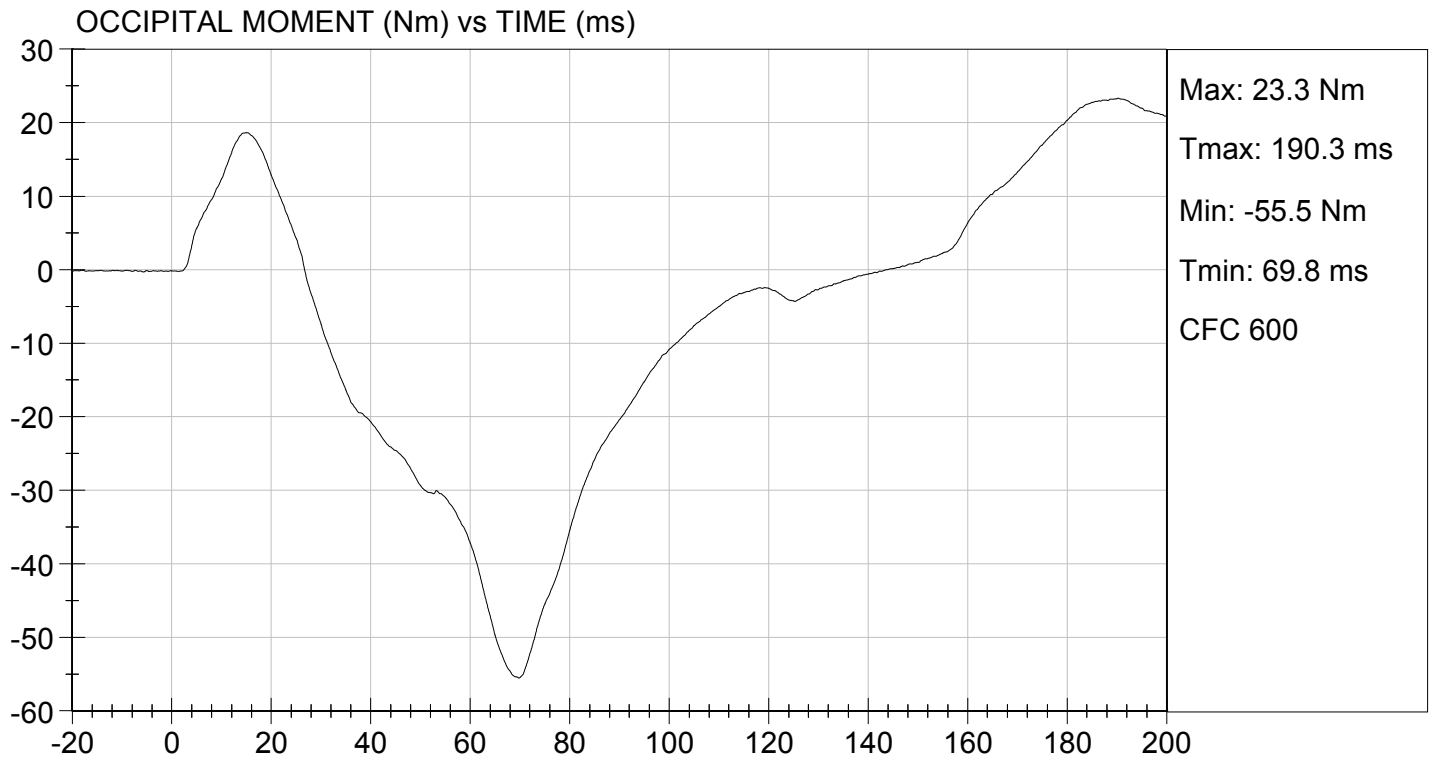
Jessica Hall
 Approved By





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

TEST DATE: 01/30/2015
TEST #: D15333



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D15334

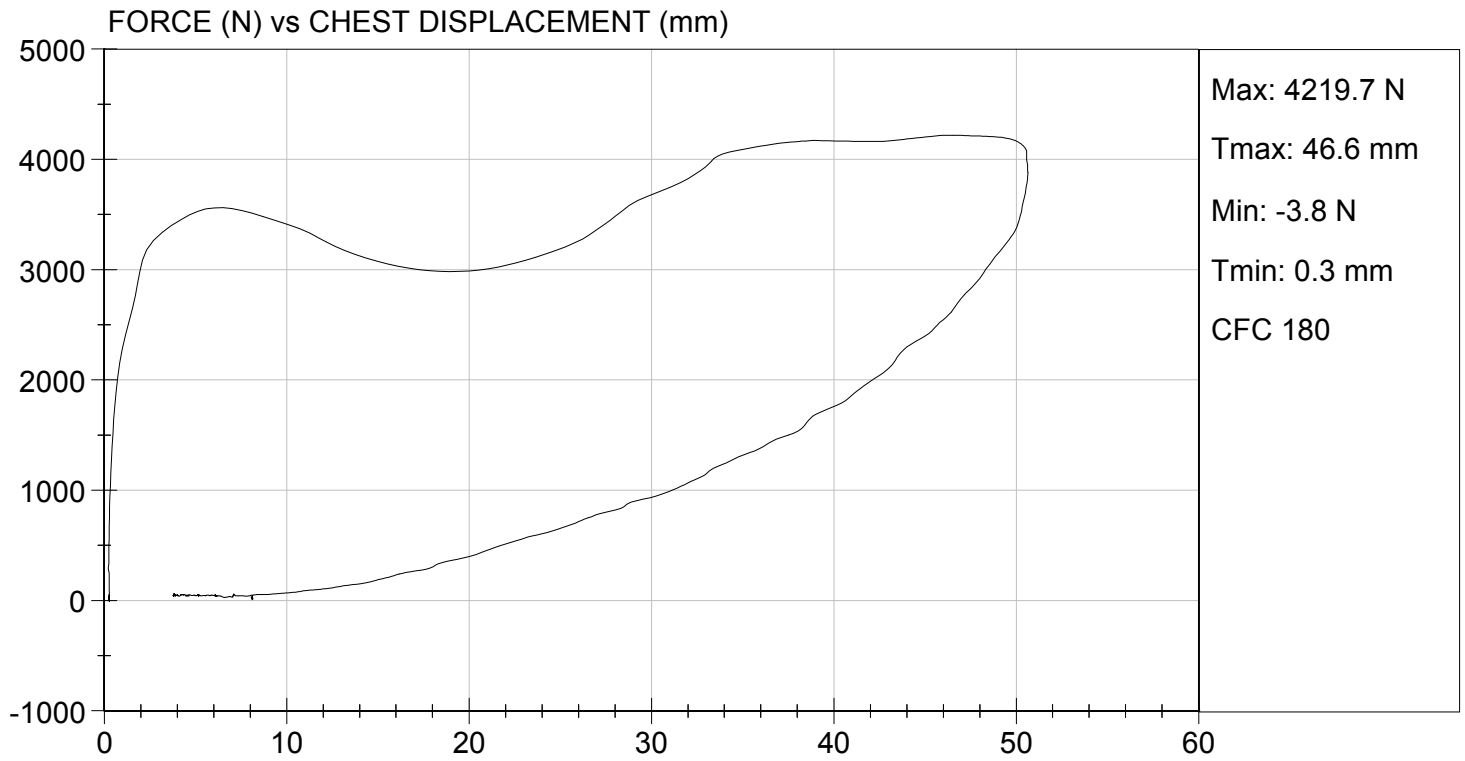
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	15	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4167	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4220	Pass
Overall Test Results				Pass

David Schoedel
 Laboratory Technician

01/30/2015

Test Date

Jessica Hall
 Approved By



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

ATD Serial No: 138

Test I.D.: D15335

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3565	Pass
Overall Test Results				Pass

David Schoedel
 Laboratory Technician

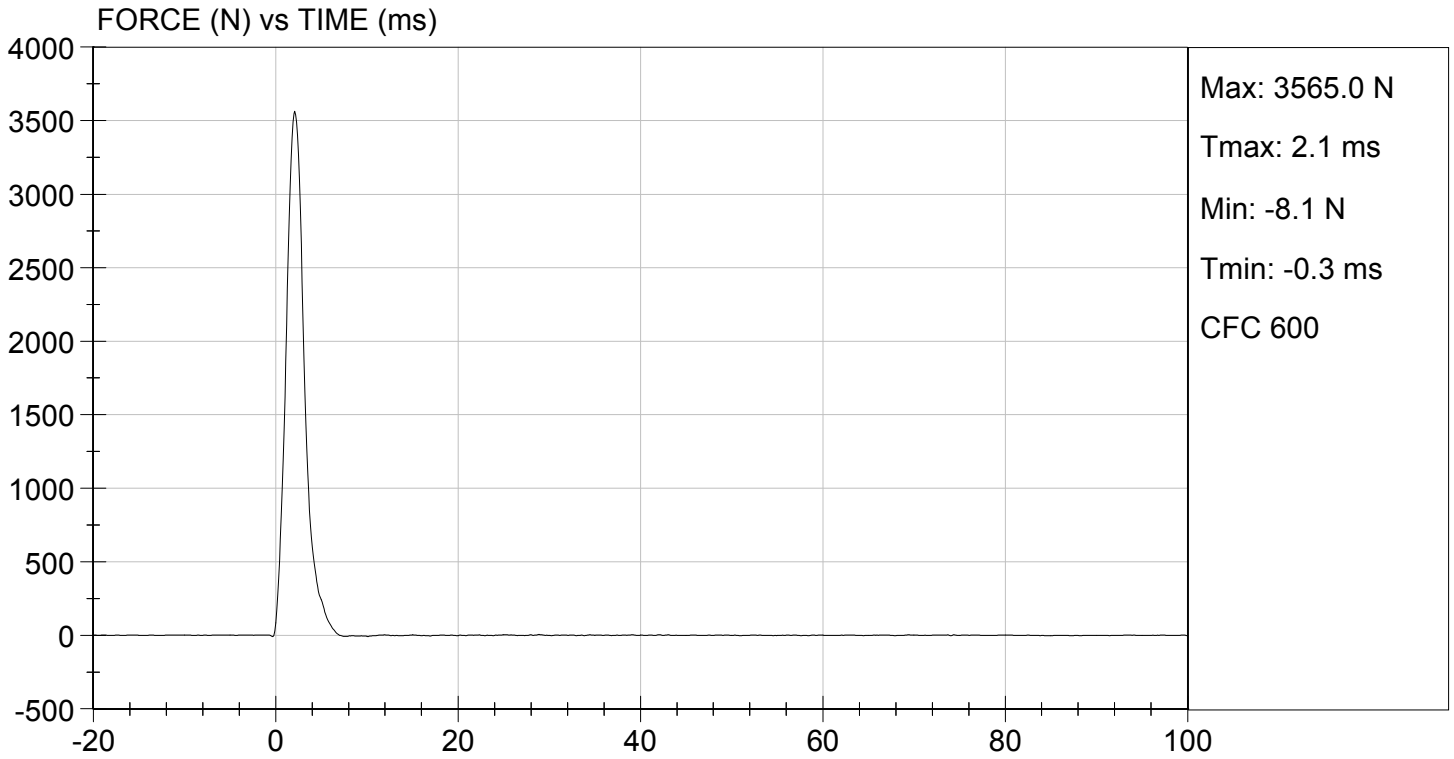
01/30/2015
 Test Date

Jessica Hall
 Approved By



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

TEST DATE: 01/30/2015
TEST #: D15335



MGA RESEARCH CORPORATION

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

ATD Serial No: 138

Test I.D.: D15336

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3550	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

01/30/2015

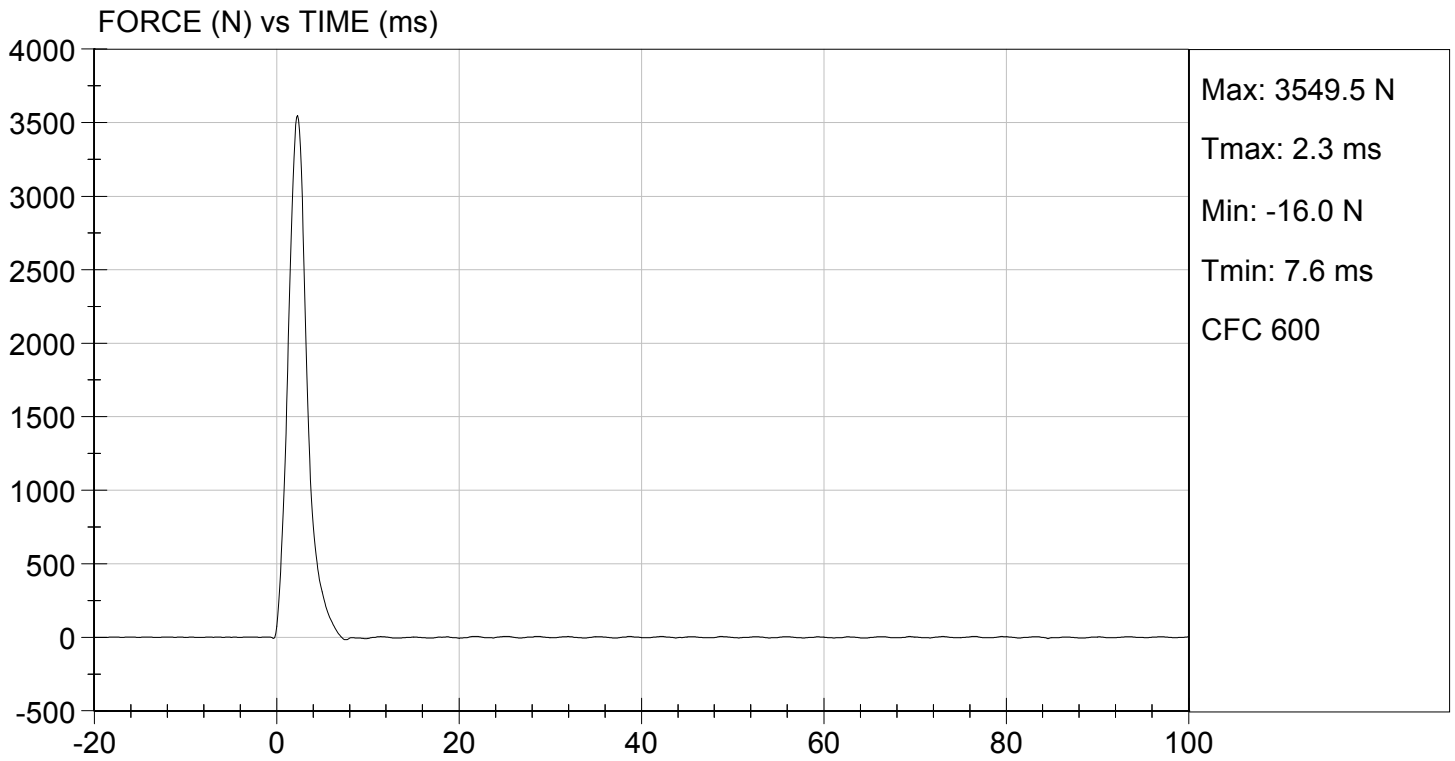
Test Date

Jessica Hall
Approved By



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

TEST DATE: 01/30/2015
TEST #: D15336



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D15337

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	2	Pass
Force at 45 deg	N	320 to 390	374	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass

David Schoedel

Laboratory Technician

01/30/2015

Test Date

Jessica Hall
 Approved By