

REPORT NUMBER: NCAP-MGA-2012-022

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

**HYUNDAI MOTOR COMPANY
2012 Hyundai Accent GLS 4-Dr Sedan
NHTSA No.: MC0503**

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



Test Date: November 3, 2011


Final Report Date: December 2, 2011

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: December 2, 2011

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2012 Hyundai Accent GLS 4-Dr Sedan 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), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on November 3, 2011. The impact velocity was 56.2 km/h and the ambient temperature at the barrier face at the time of impact was 21.5°C. The target vehicle post-test maximum crush was 470 mm located at the vehicle's centerline. The test vehicle's performance was as follows:																																																							
<table border="1" style="width: 100%; border-collapse: collapse; background-color: #ffff00;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Threshold</th> <th rowspan="2">Driver ATD</th> <th rowspan="2">Passenger ATD</th> </tr> <tr> <th>50th</th> <th>5th</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>700</td> <td>210</td> <td>340</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>19</td> <td>10</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.35</td> <td>0.56</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>2164</td> <td>1334</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>393</td> <td>375</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1521</td> <td>992</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>773</td> <td>707</td> </tr> </tbody> </table>						Measurement Description	Units	Threshold		Driver ATD	Passenger ATD	50 th	5 th	Head Injury Criteria (HIC ₁₅)	N/A	700	700	210	340	Maximum Chest Compression	mm	63	52	19	10	Nij	N/A	1	1	0.35	0.56	Neck Tension	N	4170	2620	2164	1334	Neck Compression	N	4000	2520	393	375	Left Femur Force	N	10008	6805	1521	992	Right Femur Force	N	10008	6805	773	707
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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 DTNH22-06-D-00028. 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 was impacted by a 2012 Hyundai Accent GLS 4-Dr Sedan at a velocity of 56.2 kph. The test was performed at MGA Research Corporation on November 3, 2011. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two 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 on the driver's and passenger's shoulder belts to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 036) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 228 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest displacement, neck, and femur 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 470 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 and visor. The driver's knees contacted the knee bolster. 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)	210	0.35	2164	393	40	19	1521	773
Passenger (5 th)	340	0.56	1334	375	47	10	992	707

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

TEST NOTES

There was no valid data collected for:

- Bottom of Engine X after 18 msec.
- Passenger Lap Belt after 14 msec.

- Load Cell 6-13 is questionable after 240 msec.
- Load Cell 8-2 is questionable data.
- Load Cell 8-15 is questionable data.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0503	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Hyundai	Automatic Door Locks (ADLs)	No
Model	Accent	Power Window Auto-Reverse	No
Body Style	Sedan	Other Optional Feature	N/A
VIN	KMHCT4AE7CU102023	Driver Front Airbag	Yes
Body Color	Marathon Blue	Driver Curtain Airbag	Yes
Odometer (km/mi)	174 / 280	Driver Head/Torso Airbag	No
Engine Displacement (L)	1.6	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	No
Transmission Speeds	6	Pass. Curtain Airbag	Yes
Overdrive	No	Pass. Head/Torso Airbag	No
Final Drive	Front	Pass. Torso Airbag	No
Roof Rack	No	Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Pass. Seat Belt Pretensioner	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	N/A
All-Wheel Drive (AWD)	No	Other Safety Restraint	N/A
Does owner's manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company	GVWR (kg)	1600
Date of Manufacture	JUL/27/11	GAWR Front (kg)	850
Vehicle Type	Passenger Car	GAWR Rear (kg)	840

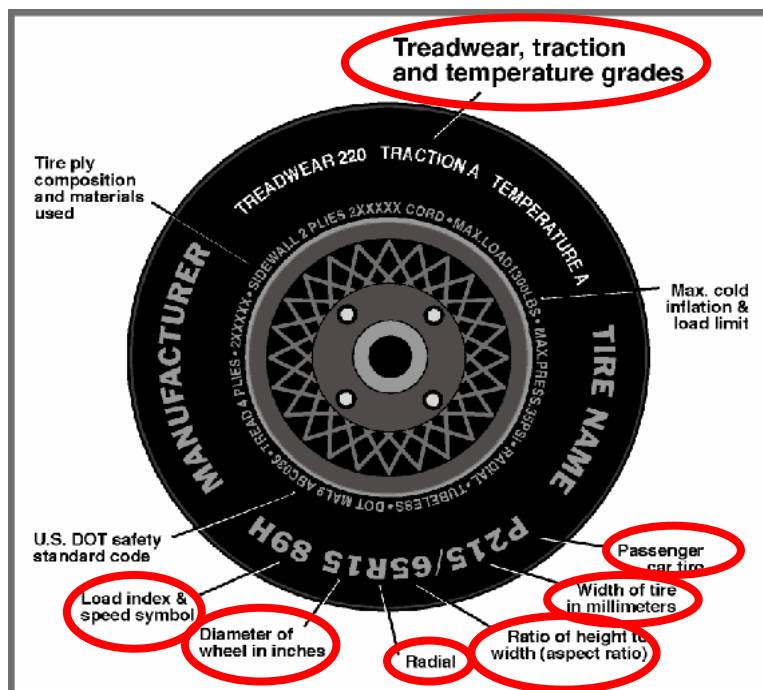
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				45

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	220	220
Recommended Tire Size	P175/70R14	P175/70R14

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Tire Size on Vehicle	P175/70R14	P175/70R14
Tire Manufacturer	Hankook	Hankook
Tire Name	Optimo	Optimo
Tire Type	Passenger	Passenger
Tire Width	175	175
Aspect Ratio	70	70
Radial	Yes	Yes
Wheel Diameter	14	14
Load Index/Speed Symbol	84T	84T
Treadwear	400	400
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Rubber	Rubber

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	356.0	229.5		390.6	292.6	
Right	kg	353.4	212.3		378.3	268.0	
Ratio	%	61.6	38.4		57.8	42.2	
Totals	kg	709.4	441.8	1151.2	768.9	560.6	1329.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1151.2
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Vehicle Target Weight (TVTWS)	kg	1336.8

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	636	641	650	649	986
As Tested	mm	627	633	612	620	1083
Post Test	mm	574	588	618	615	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2568
Total Vehicle Length at Left Side	mm	4175
Total Vehicle Length at Centerline	mm	4364
Total Vehicle Length at Right Side	mm	4175
Weight of Ballast in Cargo Area	kg	7.7
Weight of Vehicle Components Removed	kg	7.3
Amount of Stoddard Solvent in Fuel Tank	L	40.0

List of components removed: Right taillight, tire repair kit, rear floor mats, trunk carpet.

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4364
2	Total Width	1688
3	Bumper Top Height	532
4	Bumper Bottom Height	420
5	Longitudinal Member Top Height	498
6	Distance between Longitudinal Members	725
7	Longitudinal Member Width	60
8	Engine Top Height	766
9	Engine Bottom Height	170
10	Engine and Gearbox Width	770
11	Front Bumper-Engine Distance	215
12	Front Shock Absorber Fixing Height	832
13	Bonnet Leading Edge Height	746
14	Front Shock Absorber Fixing Width	1120
15	Front Bumper – Front Axle Distance	819
16	Front Axle – A-Pillar Distance	394
17	A-Pillar – B-Pillar Distance	1115
18	B-Pillar – Rear Axle Distance	1095
19	B-Pillar – C-Pillar Distance	670
20	Roof Sill Bottom Height	1320
21	Roof Sill Top Height	1429
22	Floor Sill Bottom Height	175
23	Floor Sill Top Height	325

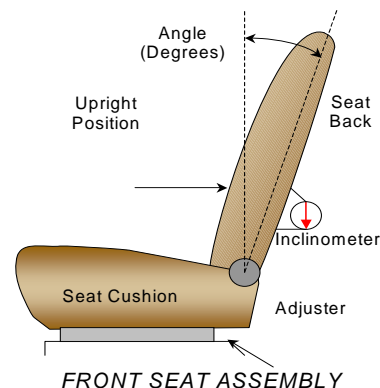
**DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

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 January 2010.



SEAT BACK ANGLE	Degrees
Driver Seat Back Angle	8.2° on head rest post
Passenger Seat Back Angle	8.8° on head rest post

SEAT FORE/AFT POSITIONS

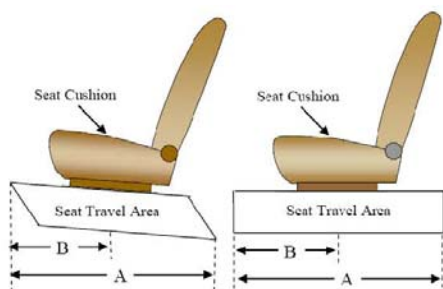
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	25 detents (1 st as 1)	10 th detent (foremost as 0)
Passenger Seat	25 detents (1 st as 1)	0 detent (foremost 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	3 (1 st as 0)	0 (uppermost as 0)
Passenger Seat	3 (1 st as 0)	0 (uppermost as 0)



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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

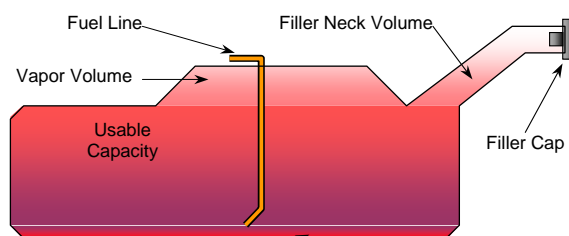
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	43.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	39.6 to 40.5
Actual Amount of Solvent used	40.0
1/3 of Usable Capacity	14.3

FUEL PUMP

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

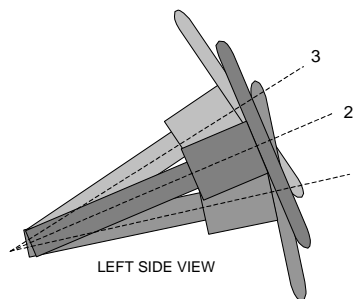
The vehicle is equipped with an electric fuel pump. No operating instructions. The fuel pipe is on the left side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

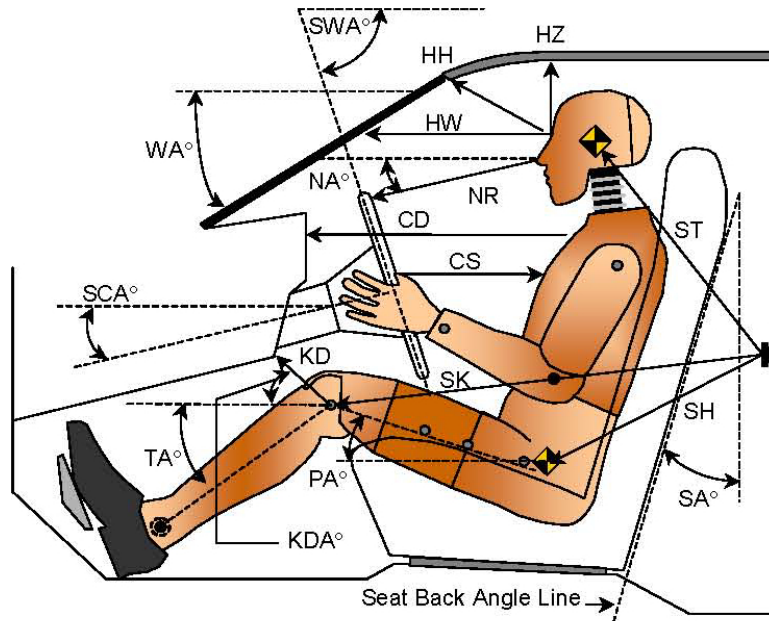
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	65.9	
Geometric Center – Position 2	63.8	
Uppermost – Position 3	61.6	
Telescoping Steering Wheel Travel		
Test Position	63.8	

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

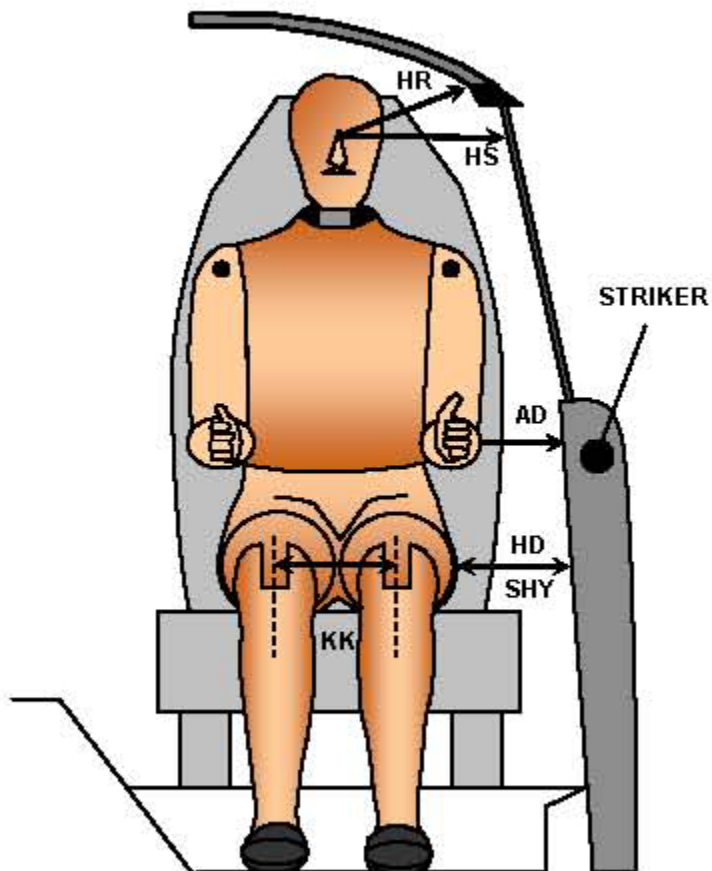


Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		22.0		
SWA°	Steering Wheel Angle		63.8		
SCA°	Steering Column Angle		26.2		
SA°	Seat Back Angle (on headrest post)		8.2		8.8
HZ	Head to Roof (Z)	193	90	243	90
HH	Head to Header	359	24.9	315	41.1
HW	Head to Windshield	686	0	732	0
NR	Nose to Rim	440	7.9		
CD	Chest to Dash	550		483	
CS	Chest to Steering Hub	352	1.1		
RA	Rim to Abdomen	220	0		
KDL	Left Knee to Dash	176	21.5	139	34.7
KDR	Right Knee to Dash	164	20.7	146	38.8
PA°	Pelvic Angle		23.7		20.7
TA°	Tibia Angle		42.4		46.7
SK	Striker to Knee	545	91.6	614	97.8
ST	Striker to Head	490	6.7	443	20.6
SH	Striker to H-Point	220	128.3	302	115.8

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011



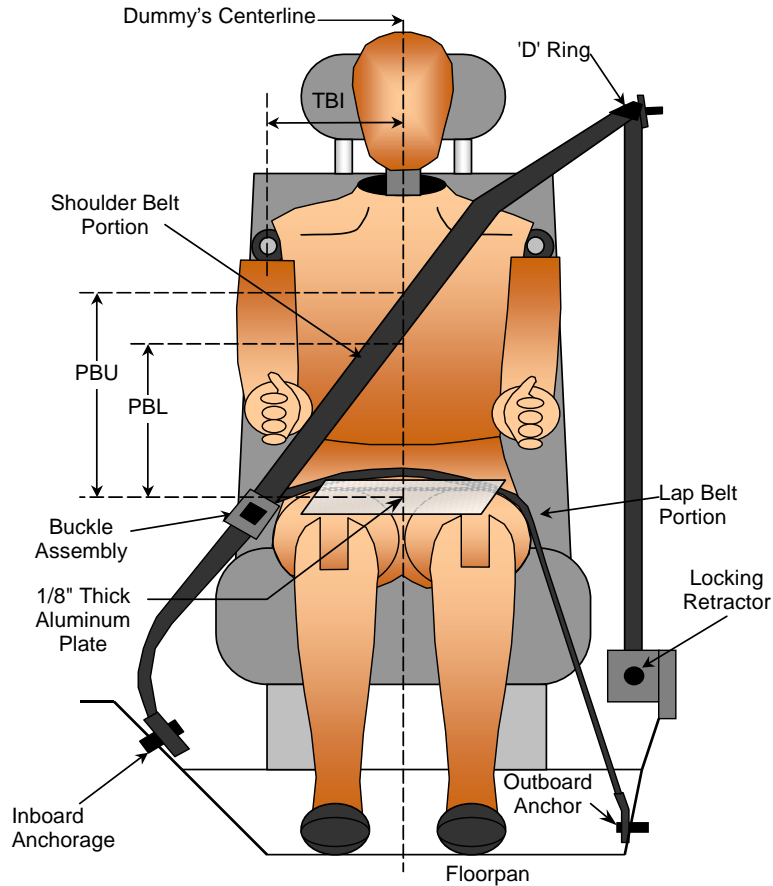
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	103	93
HD	H-Point to Door	139	172
HR	Head to Side Header	201	257
HS	Head to Side Window	304	348
KK	Knee to Knee	341	225
SHY	Striker to H-Point (Y Direction)	264	300
AA	Ankle to Ankle	313	160

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	360	340
PBL - Top surface of reference to belt lower edge	mm	290	260

BELT LENGTH DATA

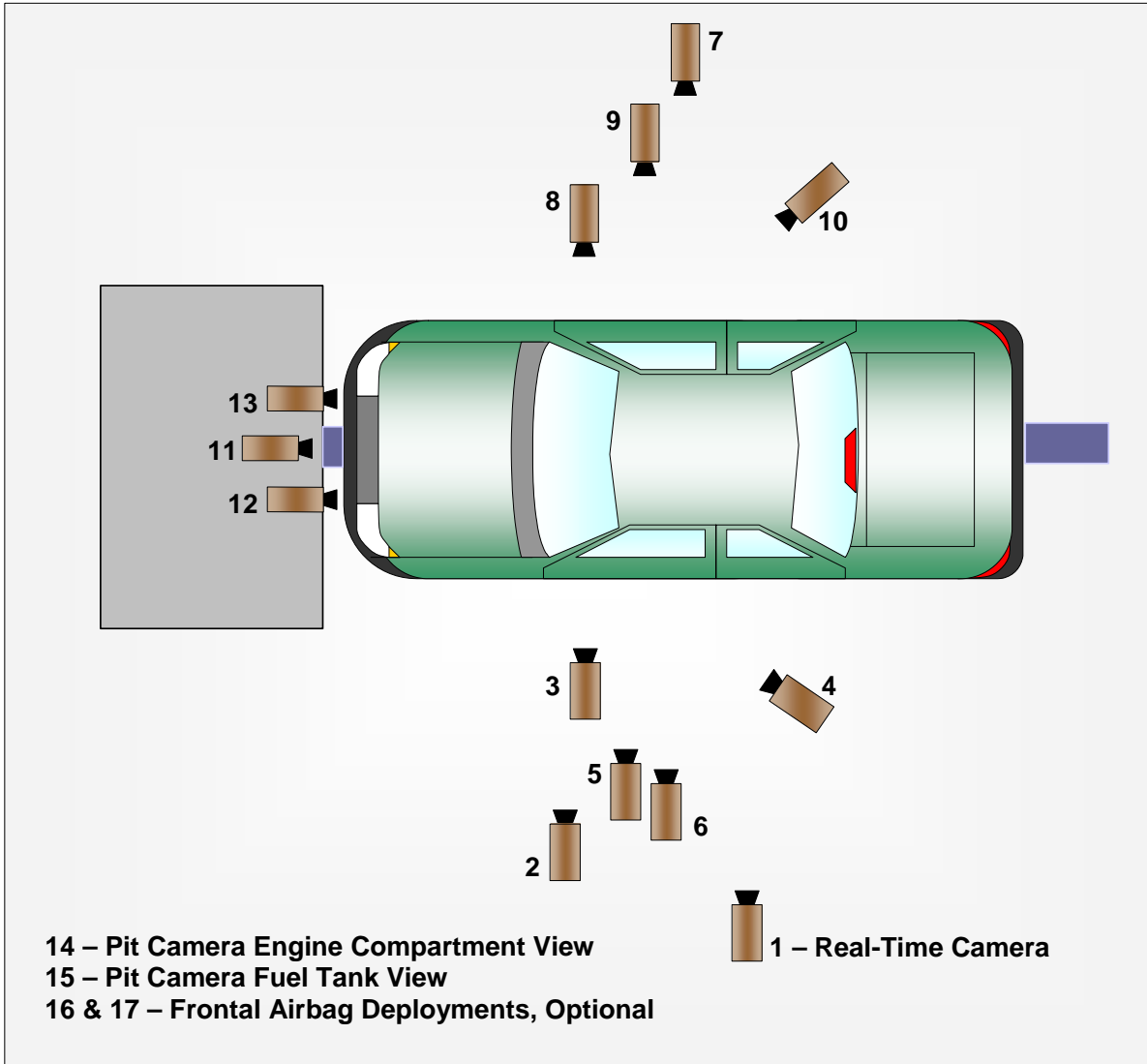
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	805	875
Lap Belt Length as measured on ATD	mm	630	670
Remainder of belt on reel	mm	1665	1605
Total Belt Length for Continuous Webbing Systems	mm	3100	3150

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1390	-6280	-1780	35	1000
3	Left Front Half	1180	-4910	-1080	24	1000
4	Left Angle	5390	-4900	-1880	50	1000
5	Steering Column - Top	490	-5160	-1240	24	1000
6	Steering Column - Bottom	460	-5120	-830	24	1000
7	Right Overall	1830	6210	-1110	20	1000
8	Passenger Close-Up	1460	6420	-1800	35	1000
9	Right Front Half	1120	5000	-1070	24	1000
10	Right Angle	5450	4820	-1900	50	1000
11	Windshield	-180	0	-2810	24	1000
12	Driver Windshield	250	-450	-2030	12.5	1000
13	Passenger Windshield	250	450	-2030	12.5	1000
14	Pit Front	1210	0	3150	24	1000
15	Pit Rear	3190	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

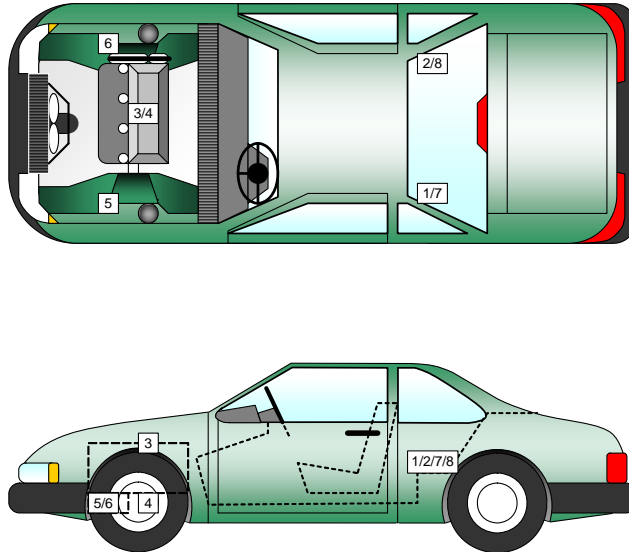
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1738	-375	-216
2	Right Rear Accelerometer – X Direction	1738	362	-216
3	Engine Top X	3685	54	-365
4	Engine Bottom X	3795	80	-250
5	Left Brake Caliper X	3609	-687	-207
6	Right Brake Caliper X	3609	687	-207
7	Left Rear Accelerometer Redundant – X Direction	1738	-375	-216
8	Right Rear Accelerometer Redundant – X Direction	1738	362	-216

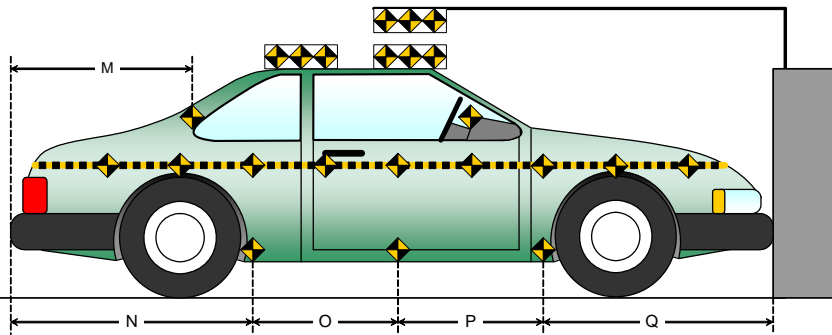
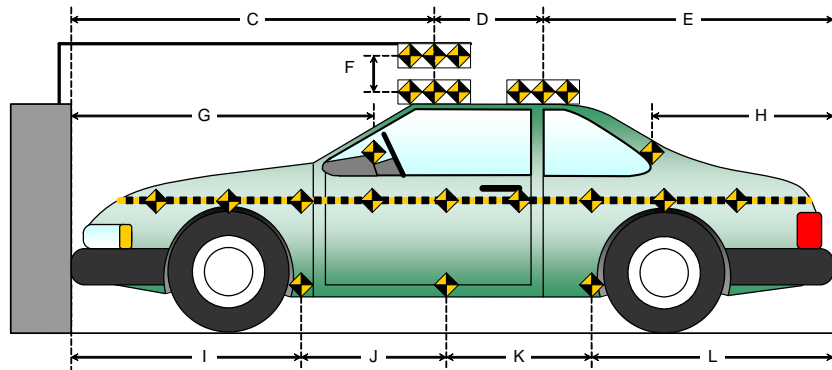
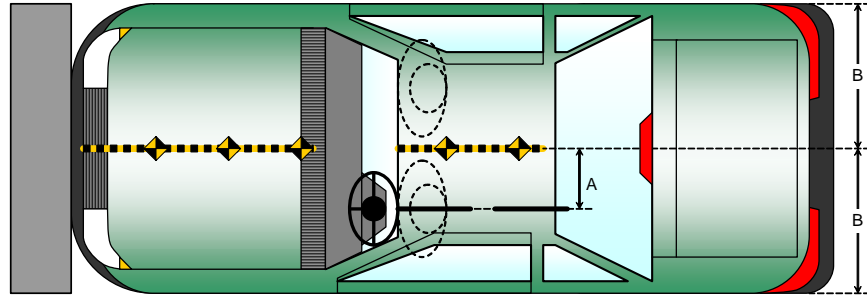
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

Item	Value (mm)
A	350
B	845
C	2240
D	670
E	1454
F	495
G	
H	894
I	1254
J	890
K	890
L	1330
M	894
N	1330
O	890
P	890
Q	1254



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

Advanced Research Load Cell Barrier



1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	1-11	1-12	1-13	1-14	1-15	1-16
2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10	2-11	2-12	2-13	2-14	2-15	2-16
3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16
4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8	4-9	4-10	4-11	4-12	4-13	4-14	4-15	4-16
5-1	5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9	5-10	5-11	5-12	5-13	5-14	5-15	5-16
6-1	6-2	6-3	6-4	6-5	6-6	6-7	6-8	6-9	6-10	6-11	6-12	6-13	6-14	6-15	6-16
7-1	7-2	7-3	7-4	7-5	7-6	7-7	7-8	7-9	7-10	7-11	7-12	7-13	7-14	7-15	7-16
8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8	8-9	8-10	8-11	8-12	8-13	8-14	8-15	8-16
9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	9-10	9-11	9-12	9-13	9-14	9-15	9-16
10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10	10-11	10-12	10-13	10-14	10-15	10-16
11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10	11-11	11-12	11-13	11-14	11-15	11-16

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: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

INSTRUMENTATION

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	46
Vehicle Structure Accelerometers	8
Barrier Channels	128
Total	228

CAMERA COVERAGE

High-Speed Vehicle Onboard	0
High-Speed Offboard	14
Real-Time	2
Total	16

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 036	HIII 5% / 634
Head Contact	Airbag, Headrest, Visor	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	None
Right Knee Contact	Knee Bolster	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	Cracked
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1537
Center	mm	1565
Right Side	mm	1550
Average	mm	1551

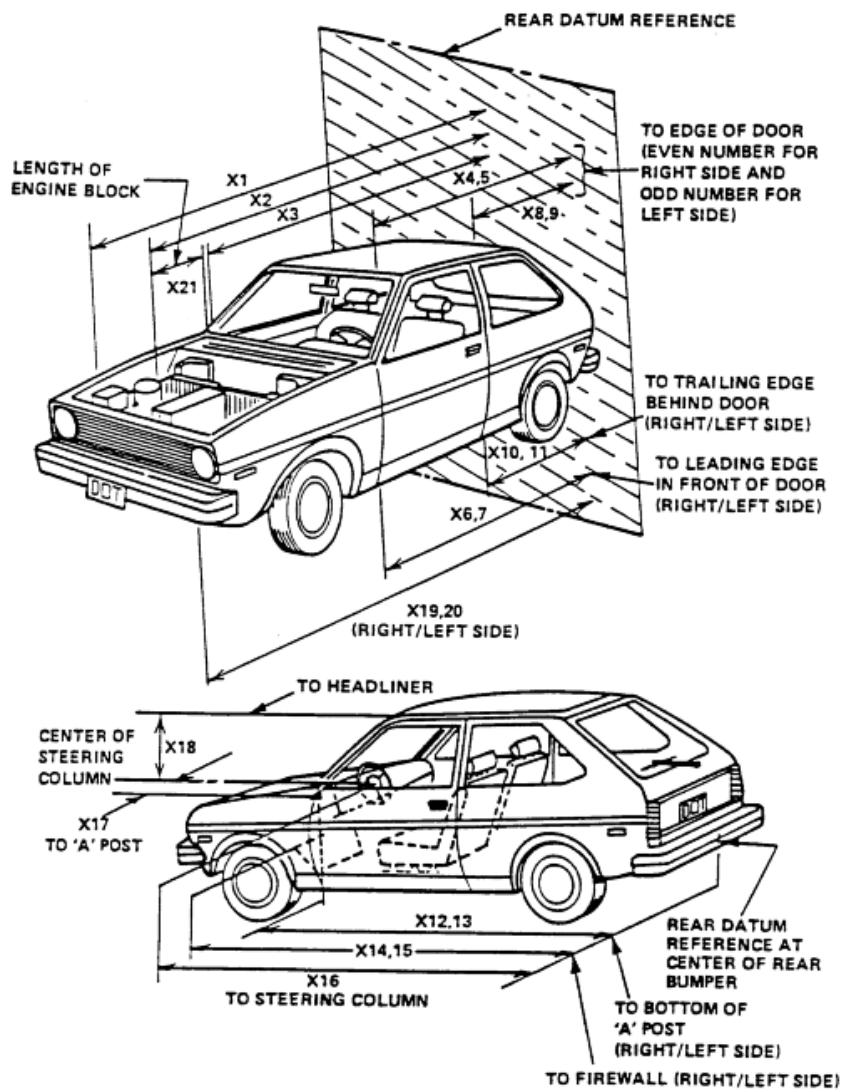
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Right Front (Passenger)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	No		No	
Curtain Side Airbag	Yes	No	Yes	No
Torso/Abdomen/Pelvis Side Airbag	Yes	No	Yes	No
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4364	3894	470
2	RSOV to Front of Engine	mm	3919	3749	170
3	RSOV to Firewall	mm	3475	3469	6
4	RSOV to Upper Leading Edge of Right Door	mm	3055	3056	-1
5	RSOV to Upper Leading Edge of Left Door	mm	3055	3057	-2
6	RSOV to Lower Leading Edge of Right Door	mm	3036	3036	0
7	RSOV to Lower Leading Edge of Left Door	mm	3036	3033	3
8	RSOV to Upper Trailing Edge of Right Door	mm	1982	1982	0
9	RSOV to Upper Trailing Edge of Left Door	mm	1922	1982	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2000	2000	0
11	RSOV to Lower Trailing Edge of Left Door	mm	2000	1997	3
12	RSOV to Bottom of "A" Post of Right Side	mm	3002	3003	-1
13	RSOV to Bottom of "A" Post of Left Side	mm	3002	2999	3
14	RSOV to Firewall, Right Side	mm	3430	3423	7
15	RSOV to Firewall, Left Side	mm	3450	3440	10
16	RSOV to Steering Column	mm	2588	2612	-24
17	Center of Steering Column to "A" Post	mm	355	380	-25
18	Center of Steering Column to Headliner	mm	392	460	-68
19	RSOV to Right Side of Front Bumper	mm	4175	3870	305
20	RSOV to Left Side of Front Bumper	mm	4175	3922	253
21	Length of Engine Block	mm	500	500	0
RD	RSOV to Right Side of Dash Panel	mm	2785	2788	-3
CD	RSOV to Center of Dash Panel	mm	2822	2820	2
LD	RSOV to Left Side of Dash Panel	mm	2805	2805	0

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

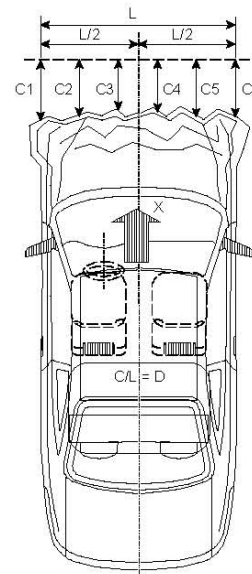
Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan NHTSA No.: MC0503
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/03/2011

VEHICLE INFORMATION

VIN: KMHCT4AE7CU102023 Wheelbase (mm): 2568
 Vehicle Size Category: Sedan Test Weight (kg): 1329.5

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): 56.2
 Velocity Change (km/h): 60.3
 Time of Separation (msec): 81.2



CRUSH PROFILE

Collision Deformation Classification: Frontal
 Midpoint of Damage: Centerline
 Damage Region Length (mm): 1366
 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4175	3922	253
C2	Crush zone 2 at left side	mm	4270	3919	351
C3	Crush zone 3 at left side	mm	4312	3910	402
C4	Crush zone 4 at right side	mm	4312	3909	403
C5	Crush zone 5 at right side	mm	4270	3879	391
C6	Crush zone 6 at right side	mm	4175	3870	305
L	C1 TO C6	mm	1366	1360	6

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

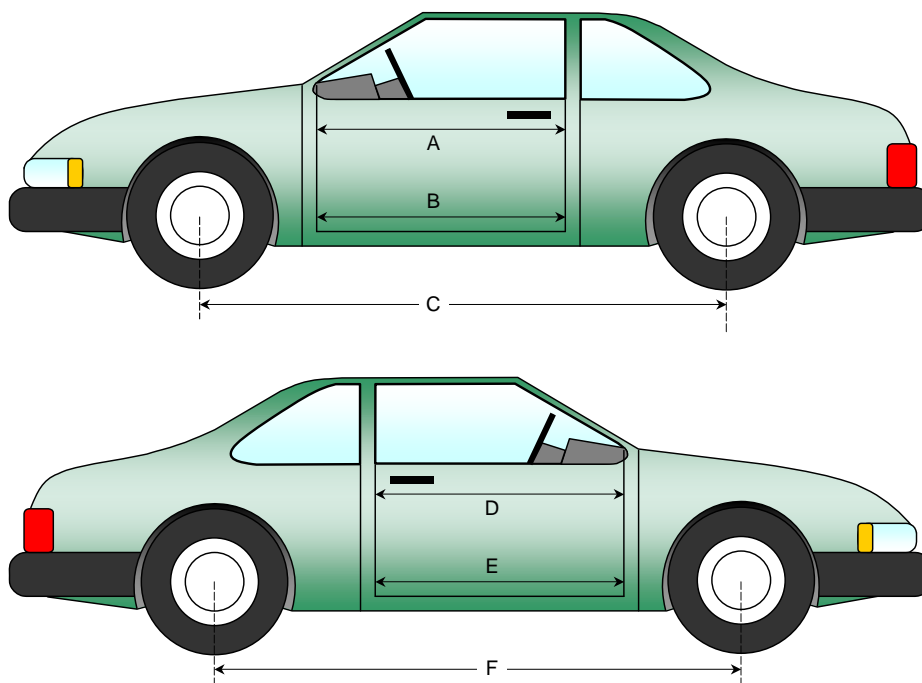
NHTSA No.: MC0503
 Test Date: 11/03/2011

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	984	984	0
B	Left Side Lower	mm	913	914	-1
D	Right Side Upper	mm	984	983	1
E	Right Side Lower	mm	913	913	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2568	2537	31
F	Right Side Wheelbase	mm	2568	2536	32



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

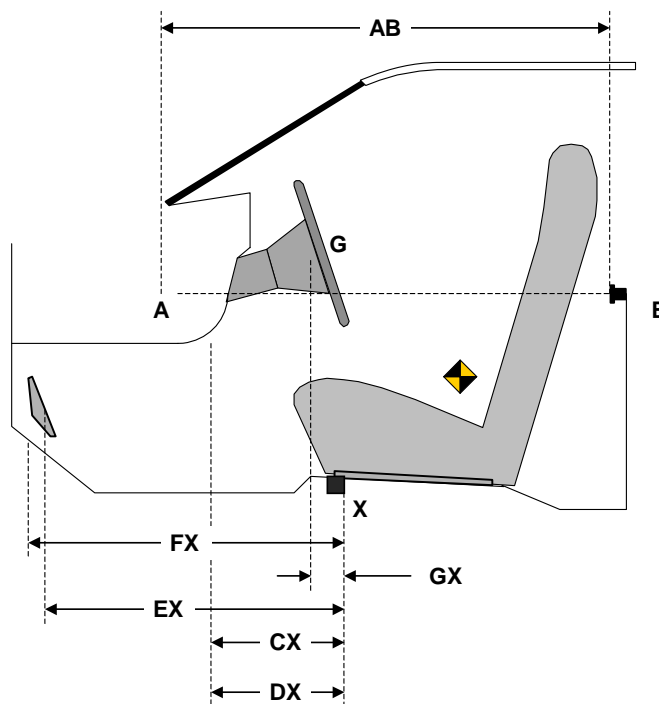
Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	860	860	0
CX	Left Knee Bolster to X	mm	274	290	-16
DX	Right Knee Bolster to X	mm	270	283	-13
EX	Brake Pedal to X	mm	541	464	77
FX	Foot Rest to X	mm	560	545	15
GX	Center of Steering Column Wheel Hub to X	mm	70	141	-71

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011

Windshield Mounting Details:

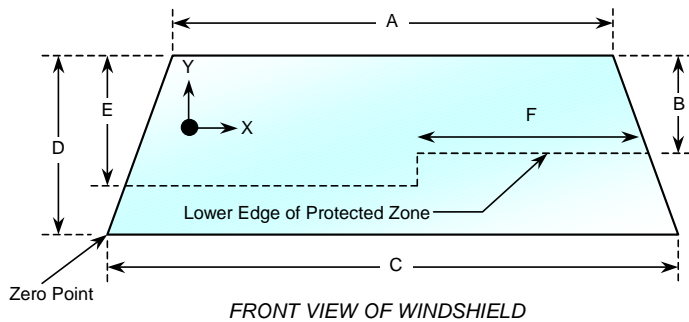
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.5°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2129	2129	100
Right Side	2129	2129	100
Total	4258	4258	100



Item	Units	Value
A	mm	1130
B	mm	557
C	mm	1420
D	mm	854
E	mm	566
F	mm	450

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, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan NHTSA No.: MC0503
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/03/2011

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 10:05 pm Temperature: 21.5° C

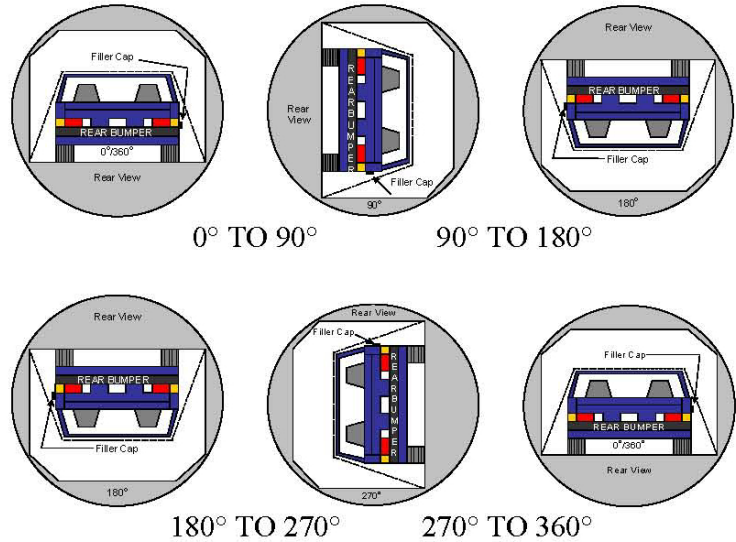
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
Test Date: 11/03/2011

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°	119	300	419
90° to 180°	115	300	415
180° to 270°	106	300	406
270° to 360°	113	300	413

FMVSS 301 ROLLOVER 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

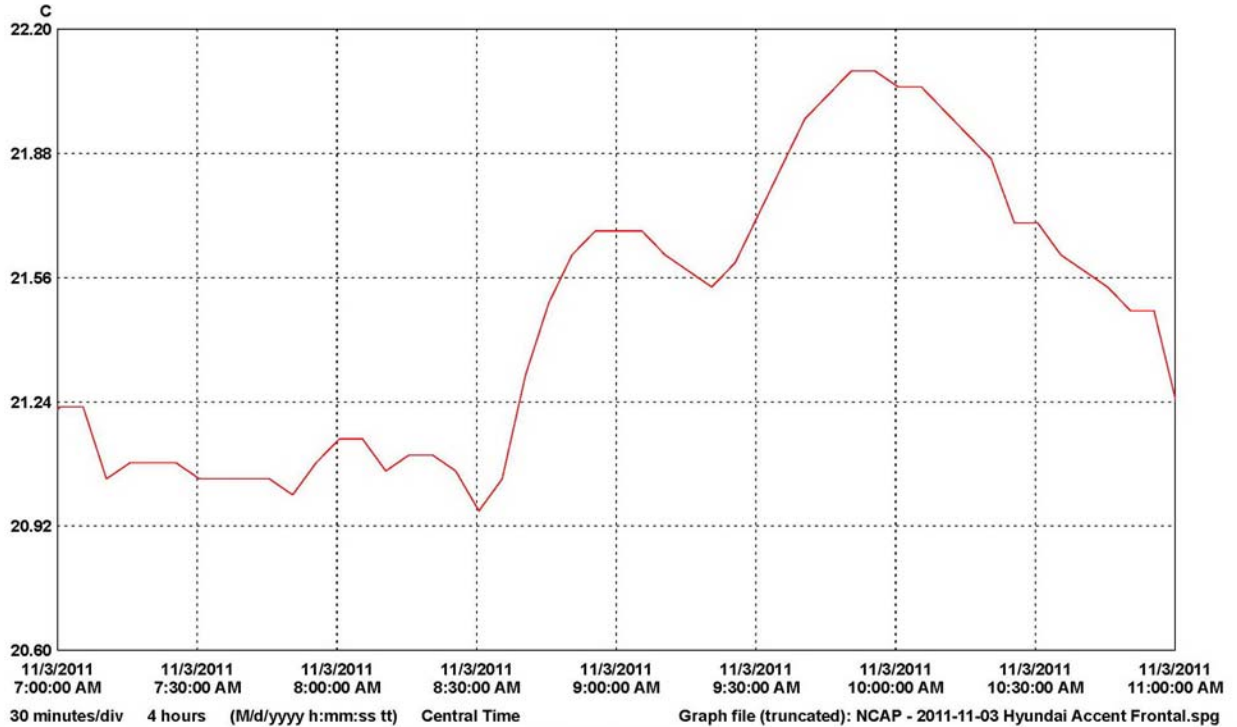
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0503
 Test Date: 11/03/2011



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	04042132	MGA logger	1	22.09	21.46	20.96	C	Temperature	04042132_MGA_logger.spl	

APPENDIX A
PHOTOGRAPHS

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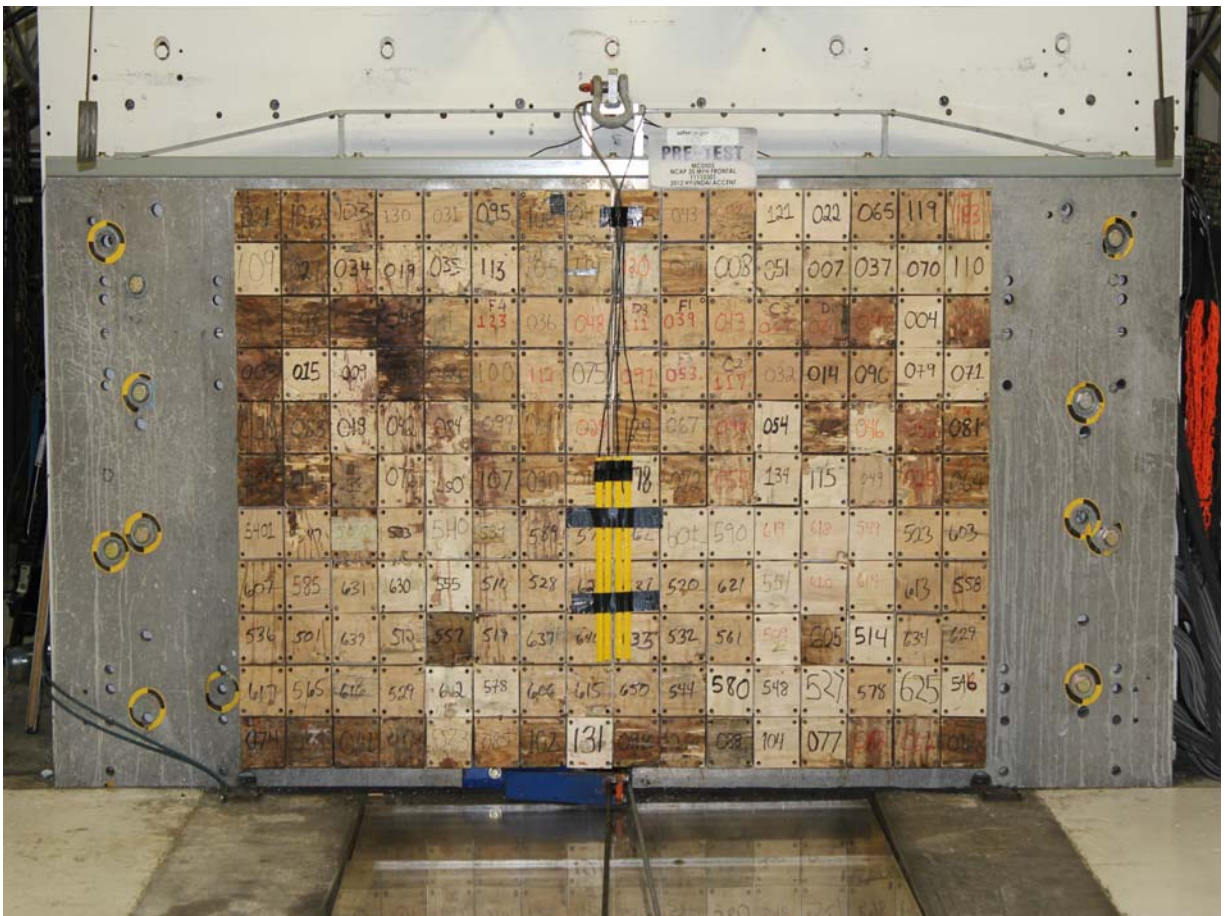
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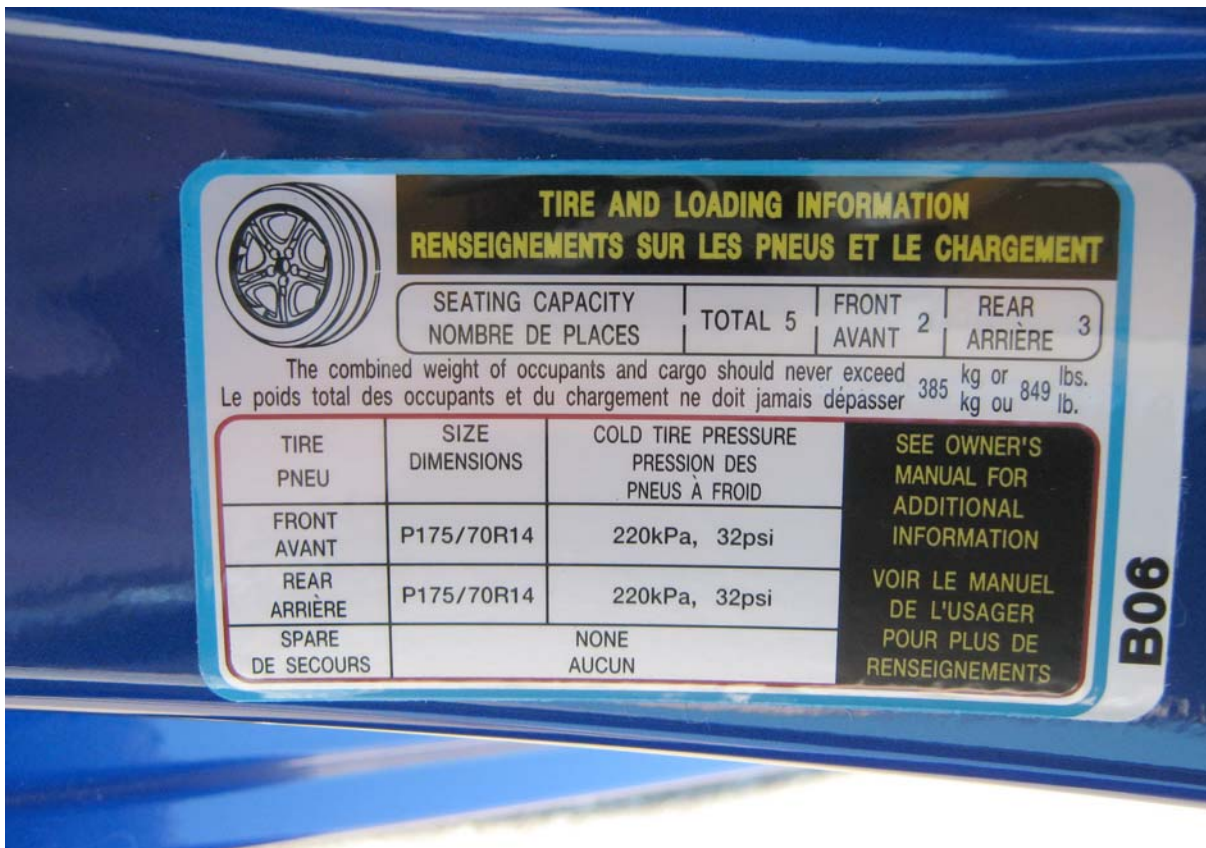
Load Cell Location



Load Cell Wall



Manufacturer's Label



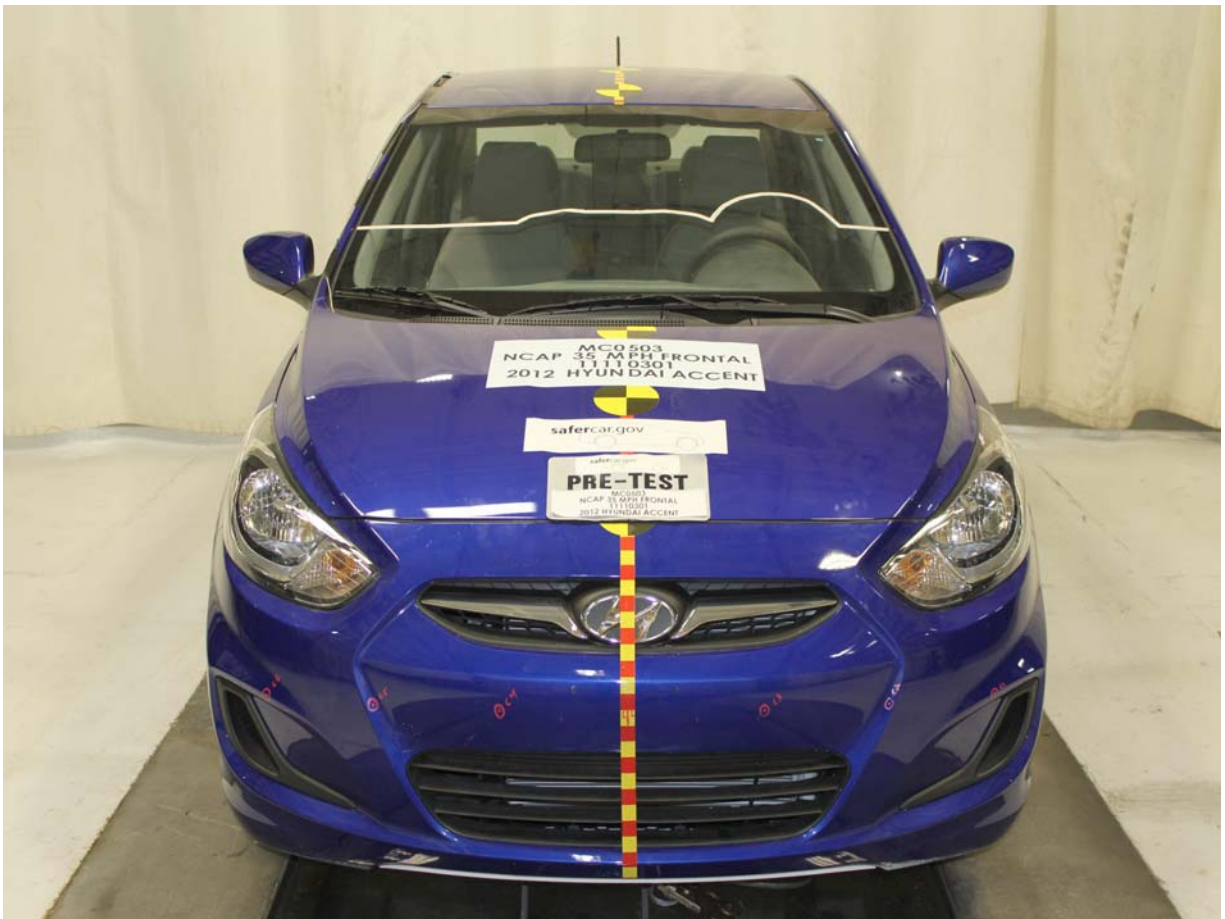
Tire Placard



2012 Hyundai Accent Frontal As Delivered



Left Rear Three-Quarter 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



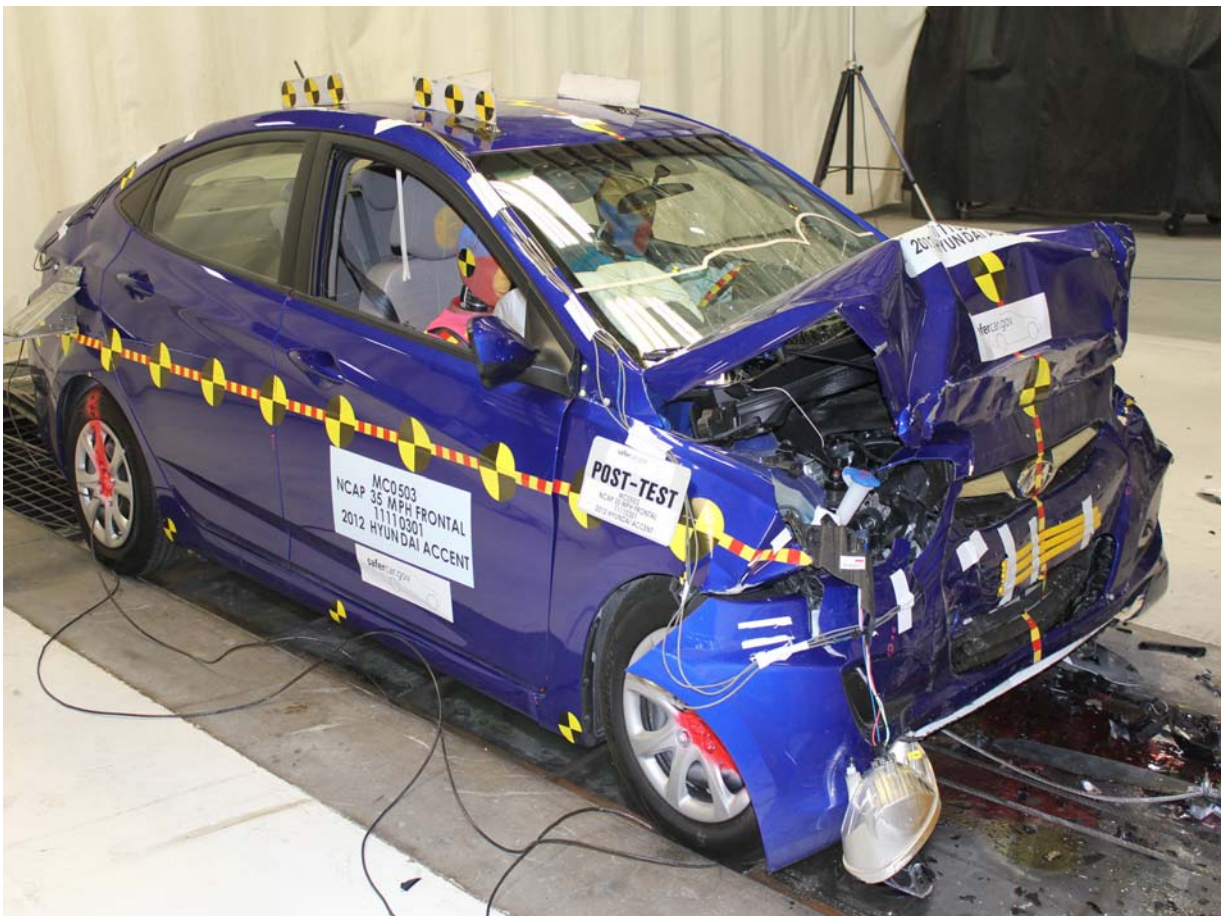
Pre-Test Right View of Test Vehicle



Post-Test Right View of Test Vehicle



Pre-Test Right Front Three-Quarter View



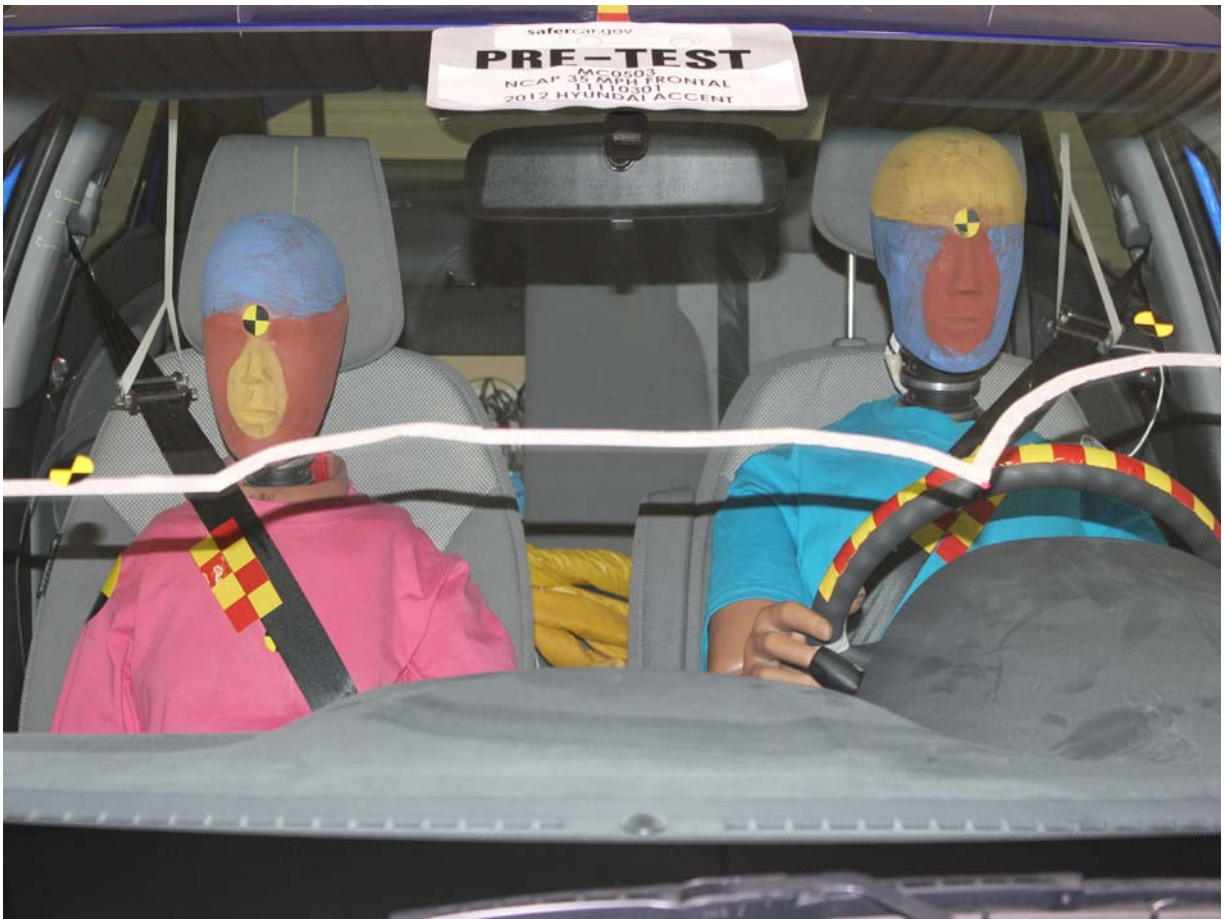
Post-Test Right Front Three-Quarter View



Pre-Test Left Rear Three-Quarter View



Post-Test Left Rear Three-Quarter View



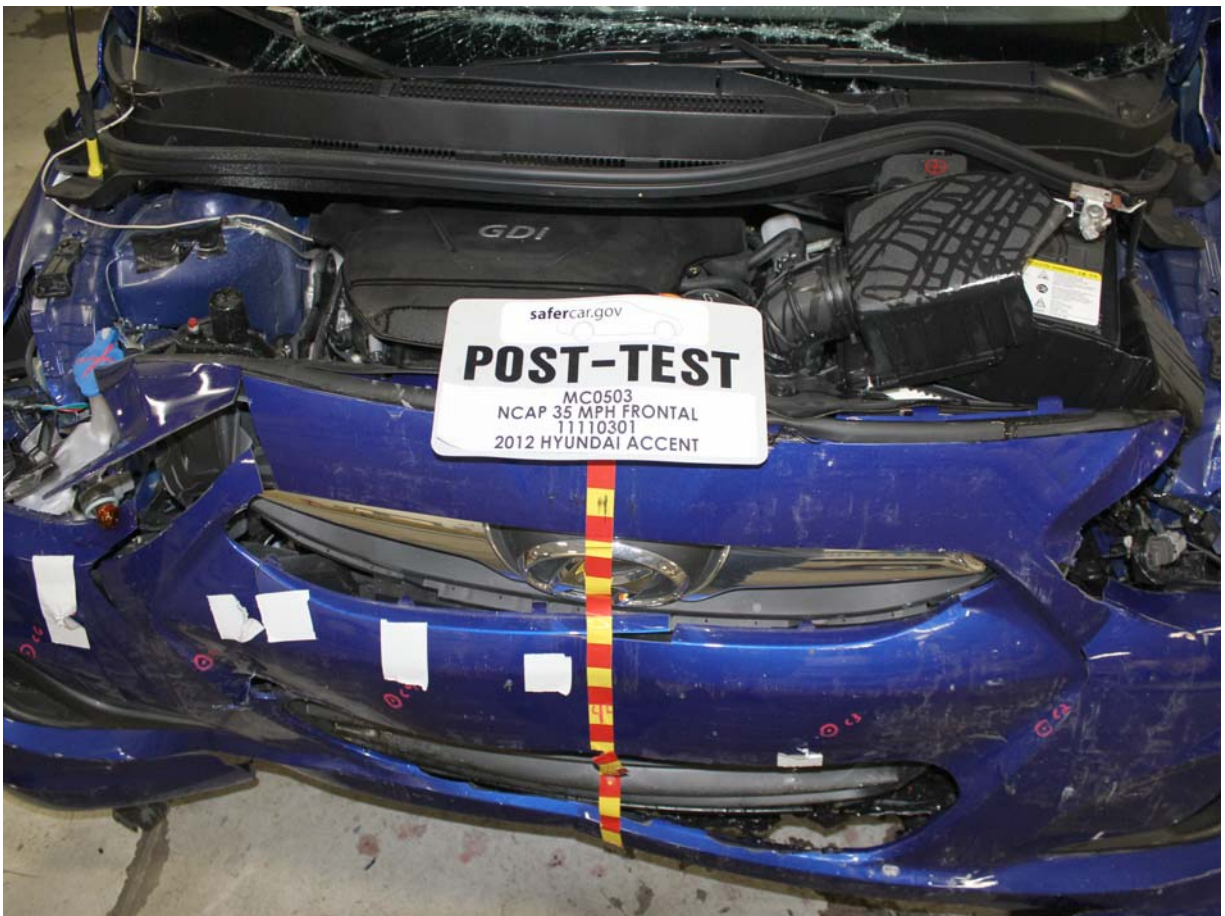
Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



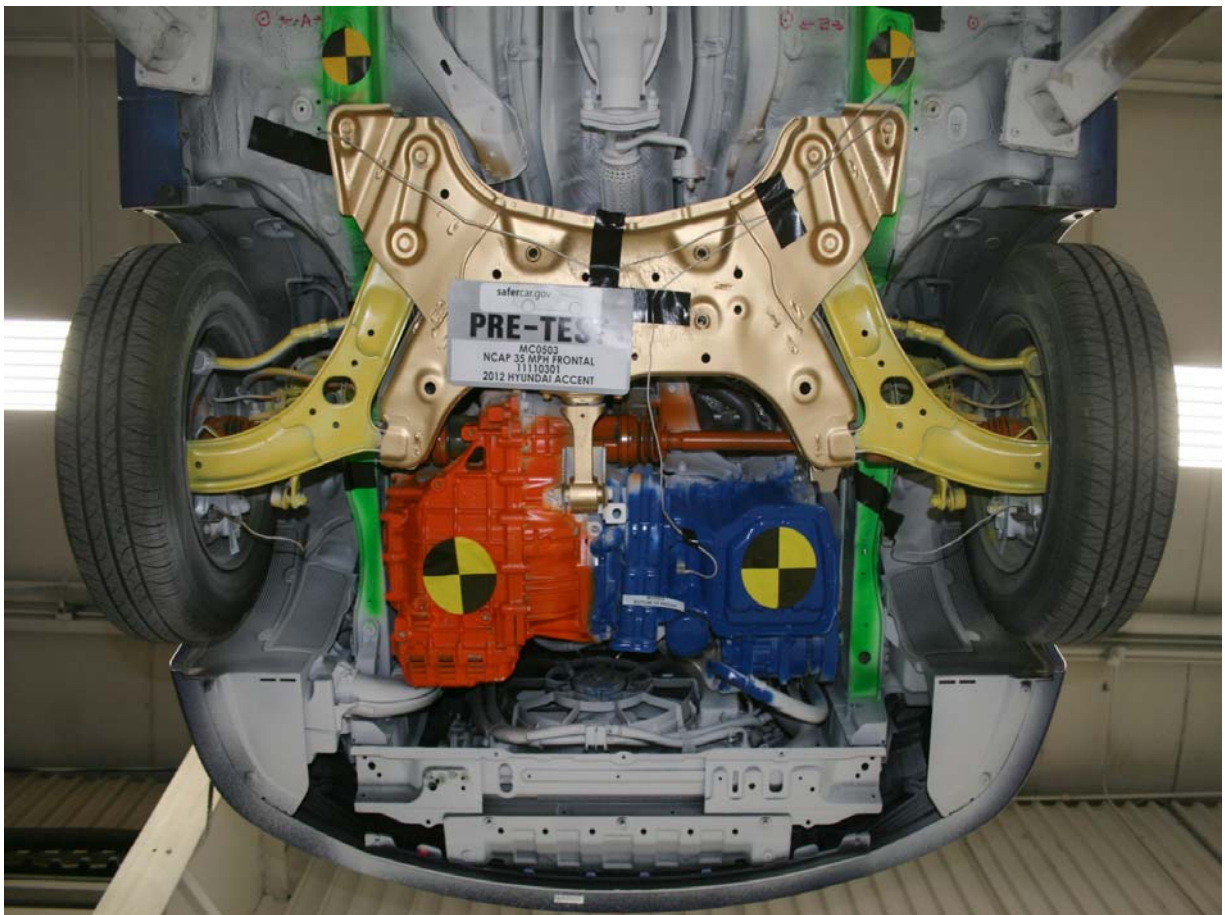
Post-Test Engine Compartment View



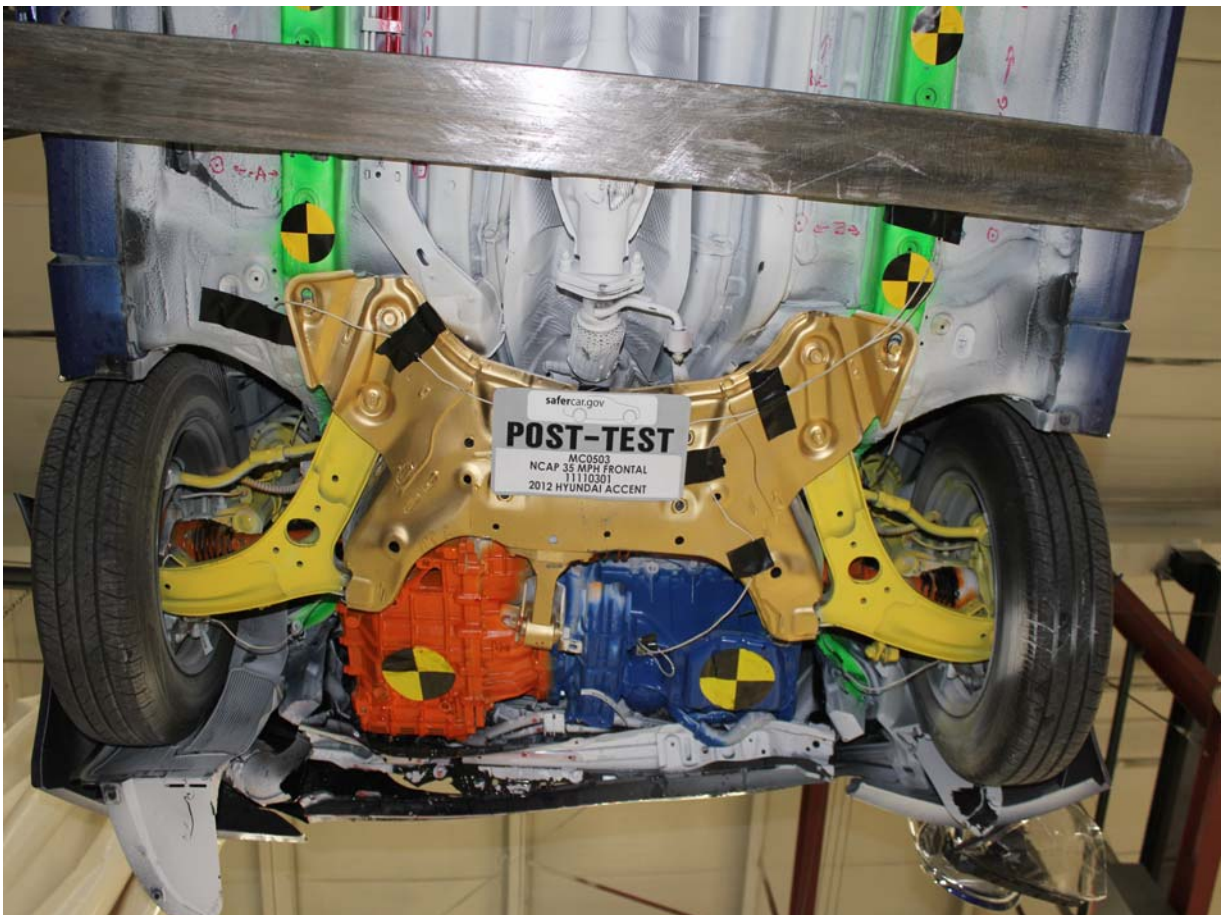
Pre-Test Fuel Filler Cap View



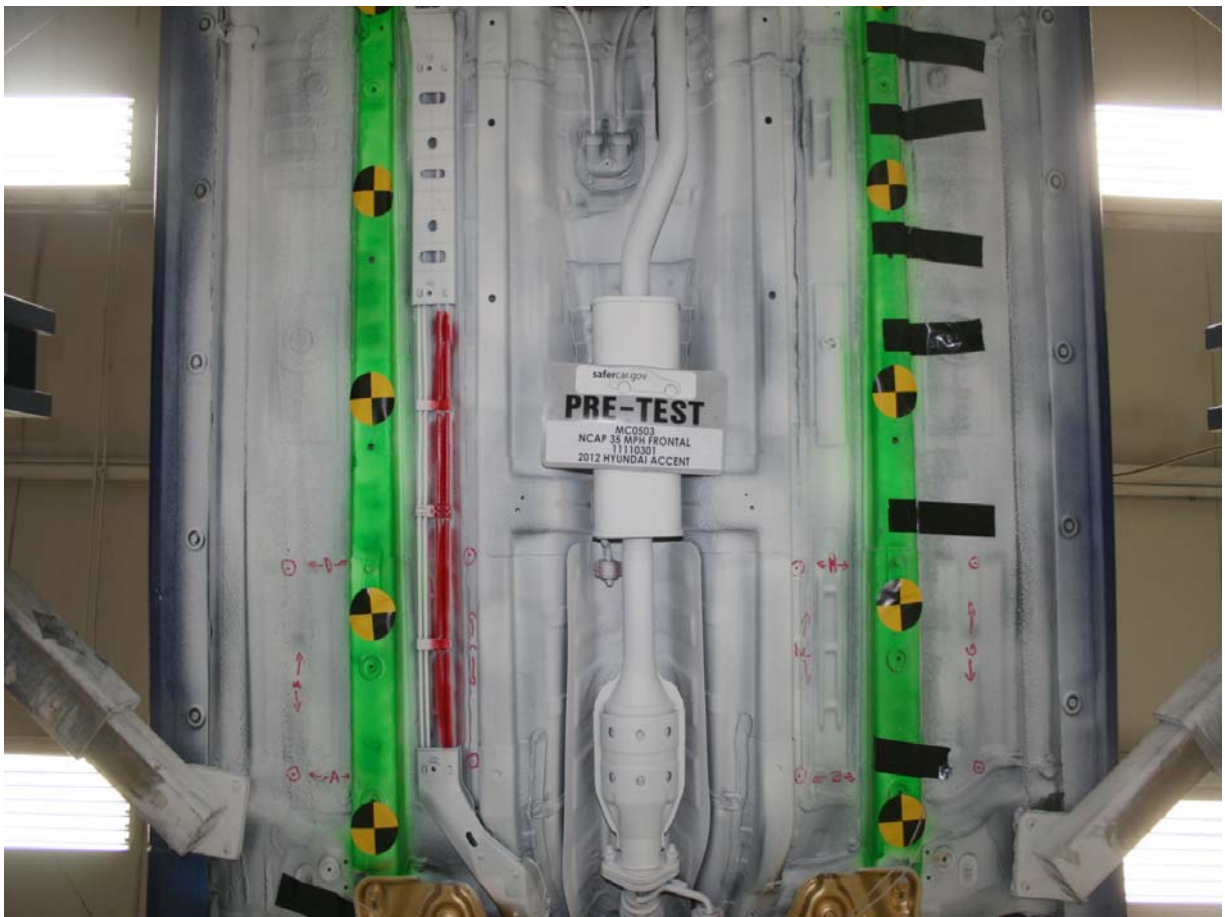
Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



Post-Test Front Underbody View



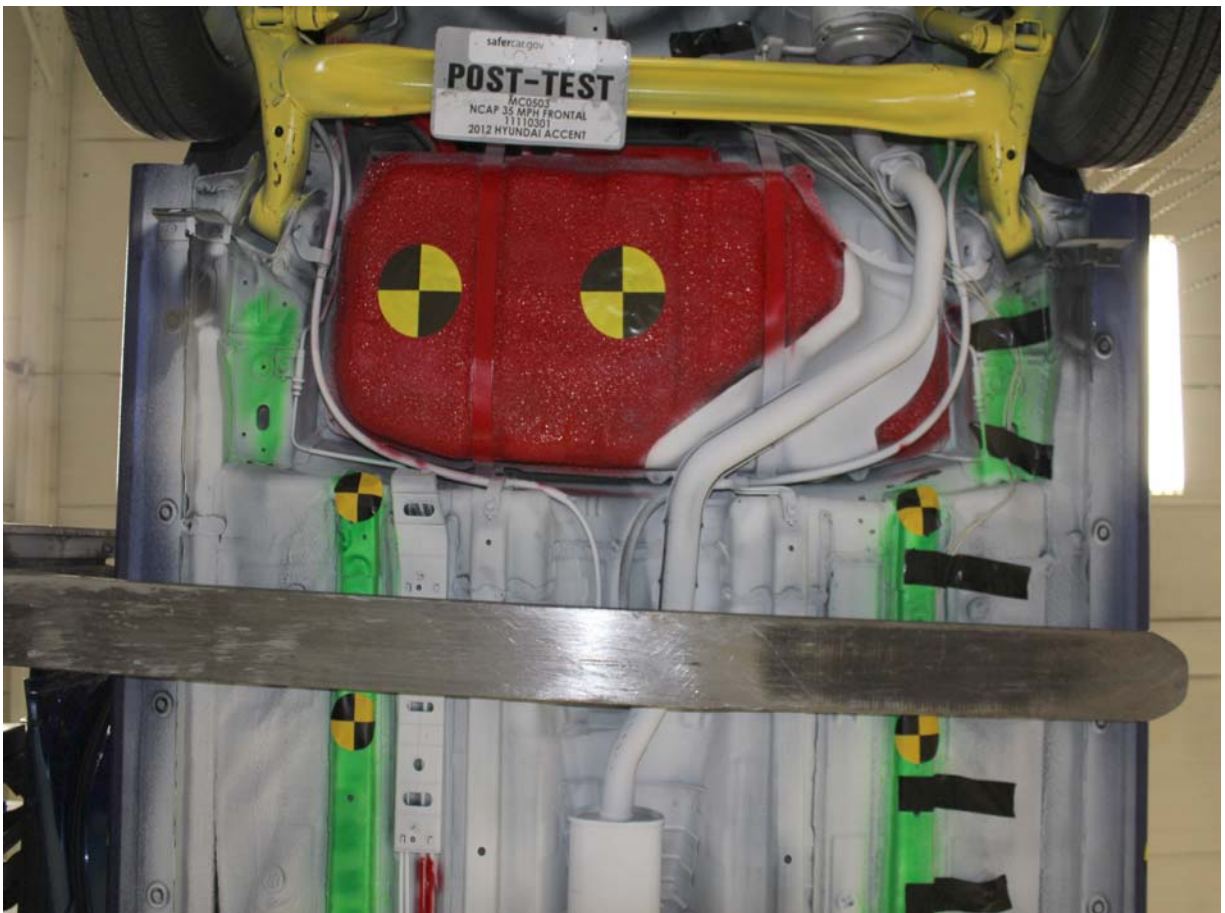
Pre-Test Mid Front Underbody View



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



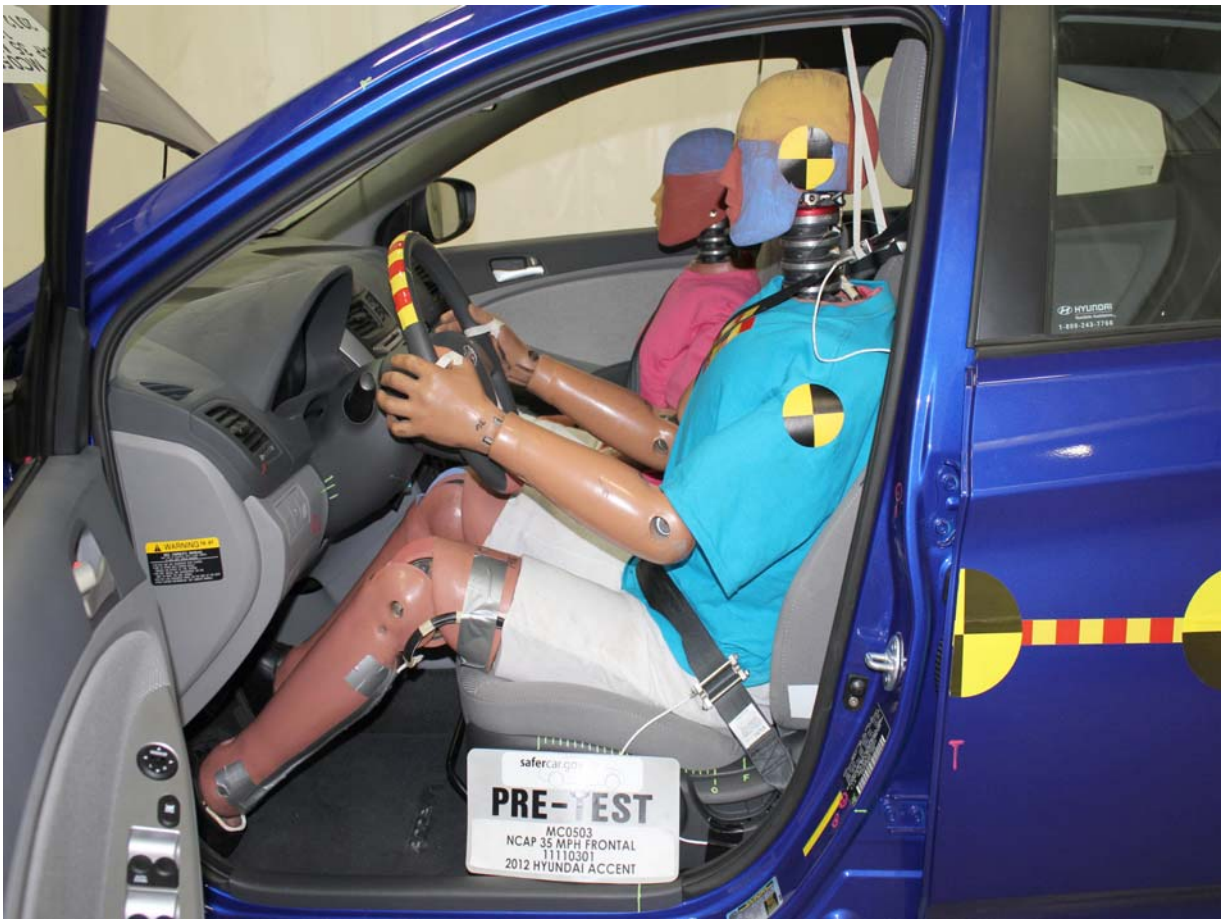
Post-Test Driver Dummy Front View



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 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)



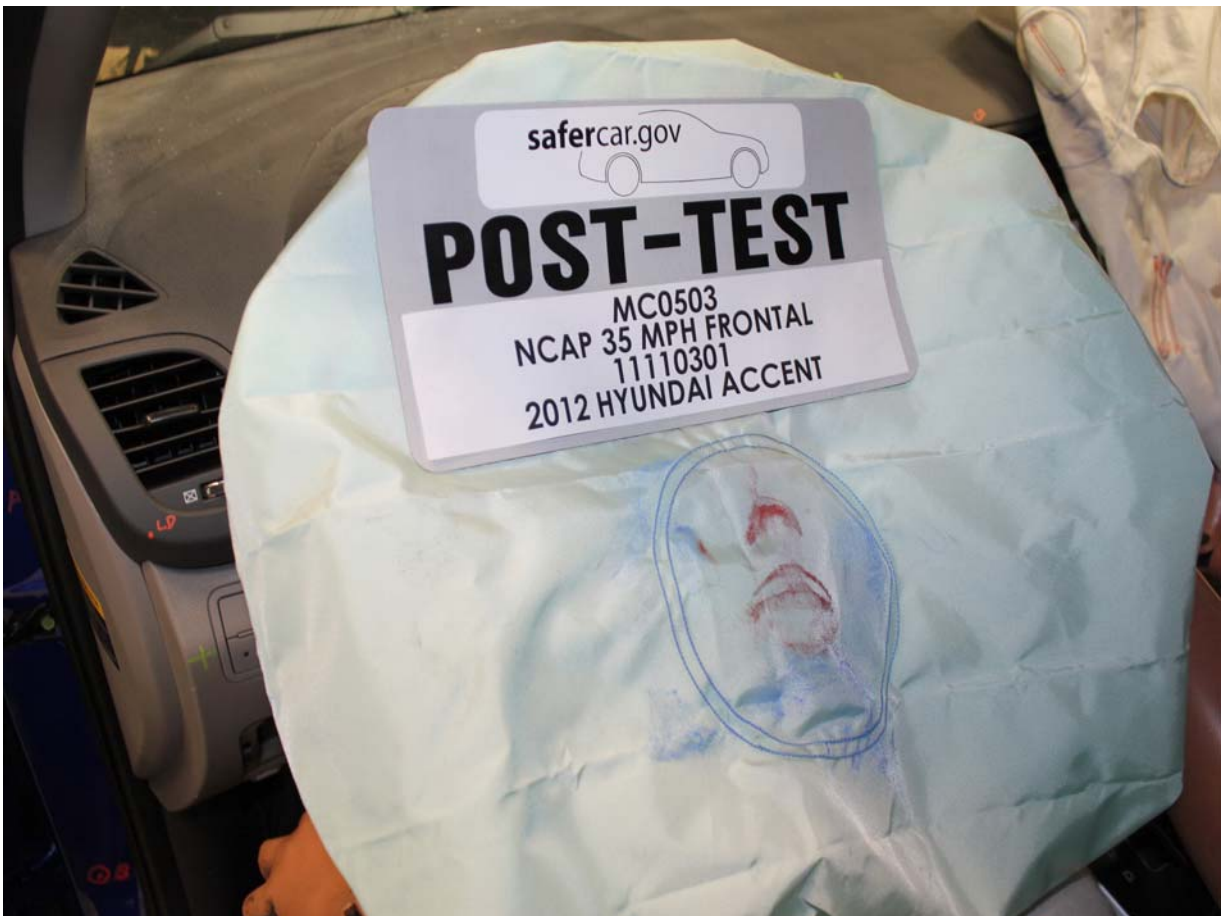
Pre-Test Driver's Side Floorpan



Post-Test Driver's Side Floorpan



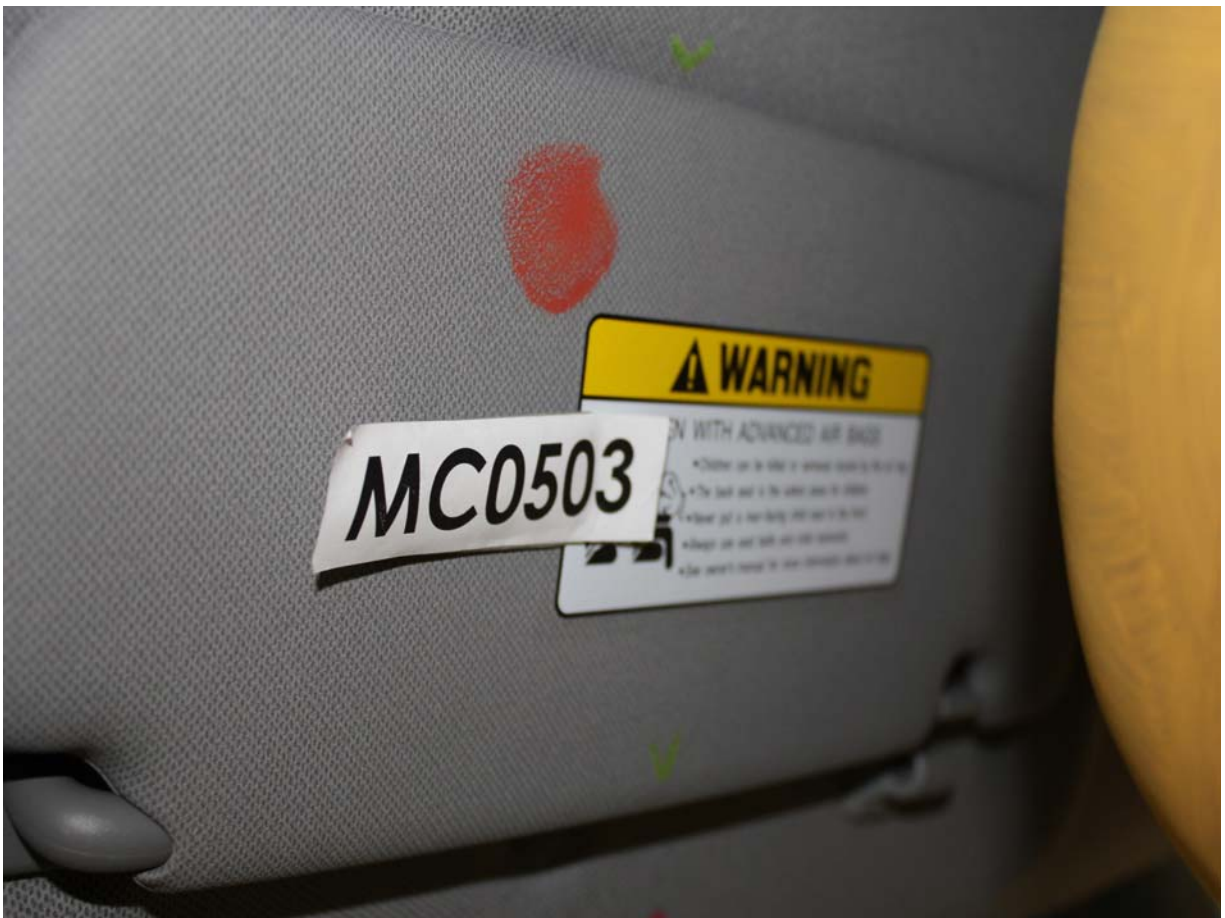
Post-Test Driver Dummy Face



Post-Test Driver Dummy Contact with Airbag



Post-Test Driver Dummy Contact with Headrest



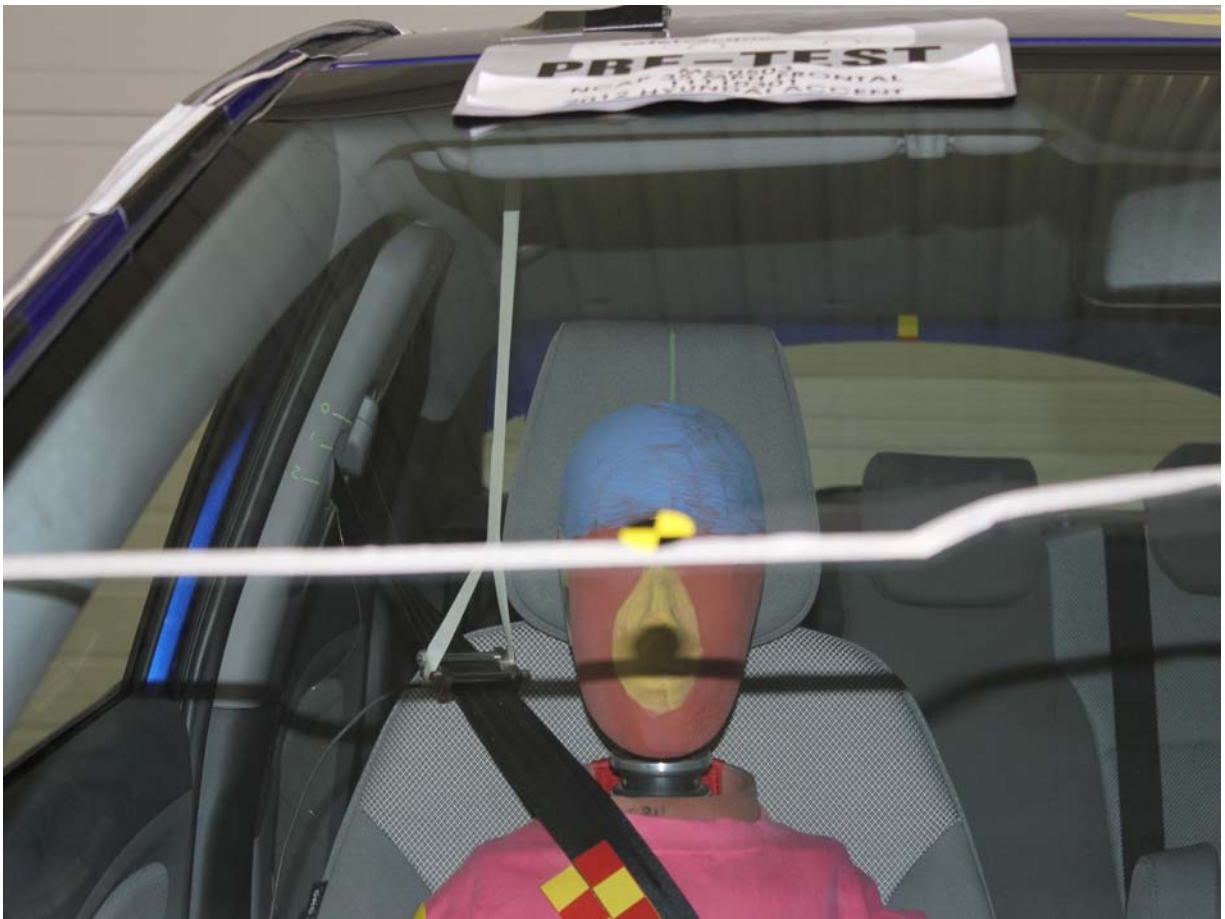
Post-Test Driver Dummy Contact with Visor



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



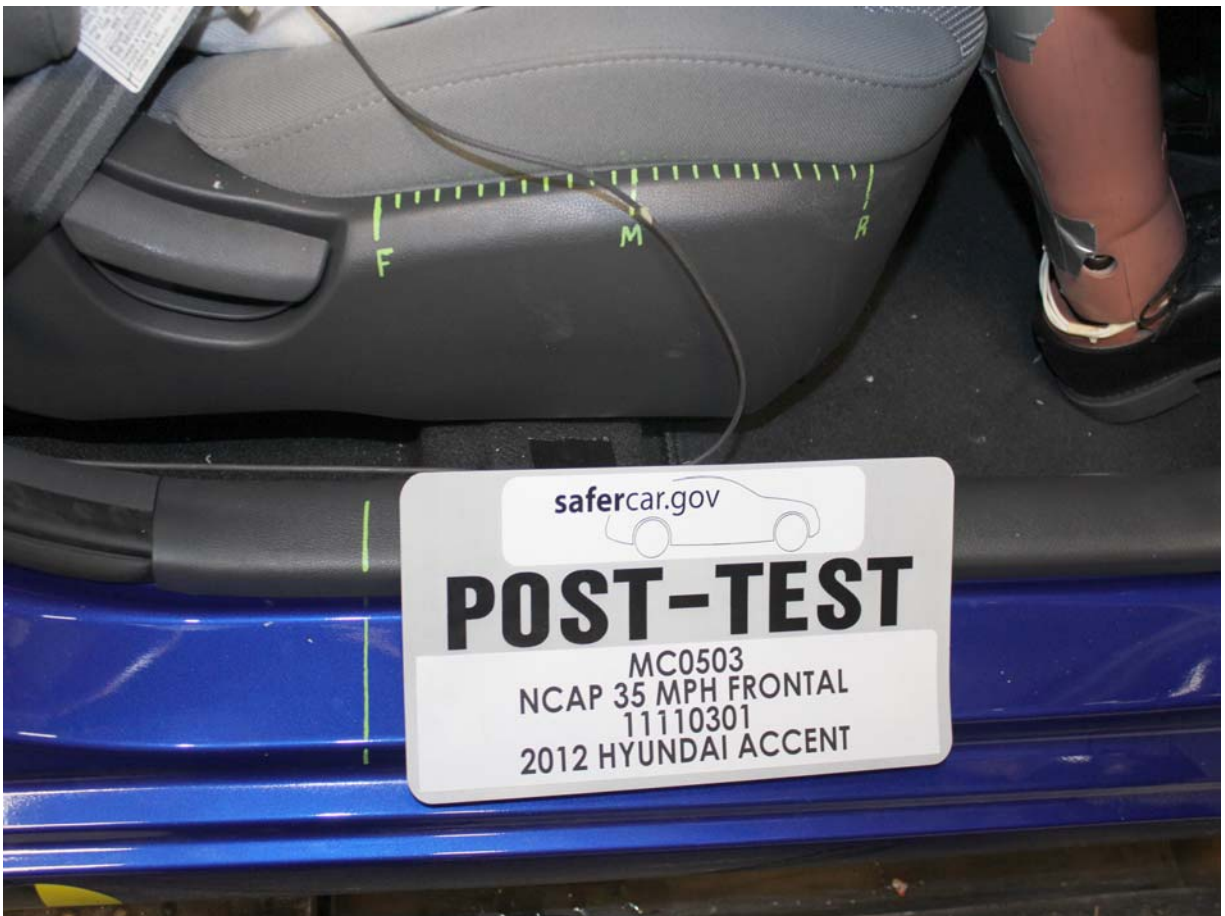
Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



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 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



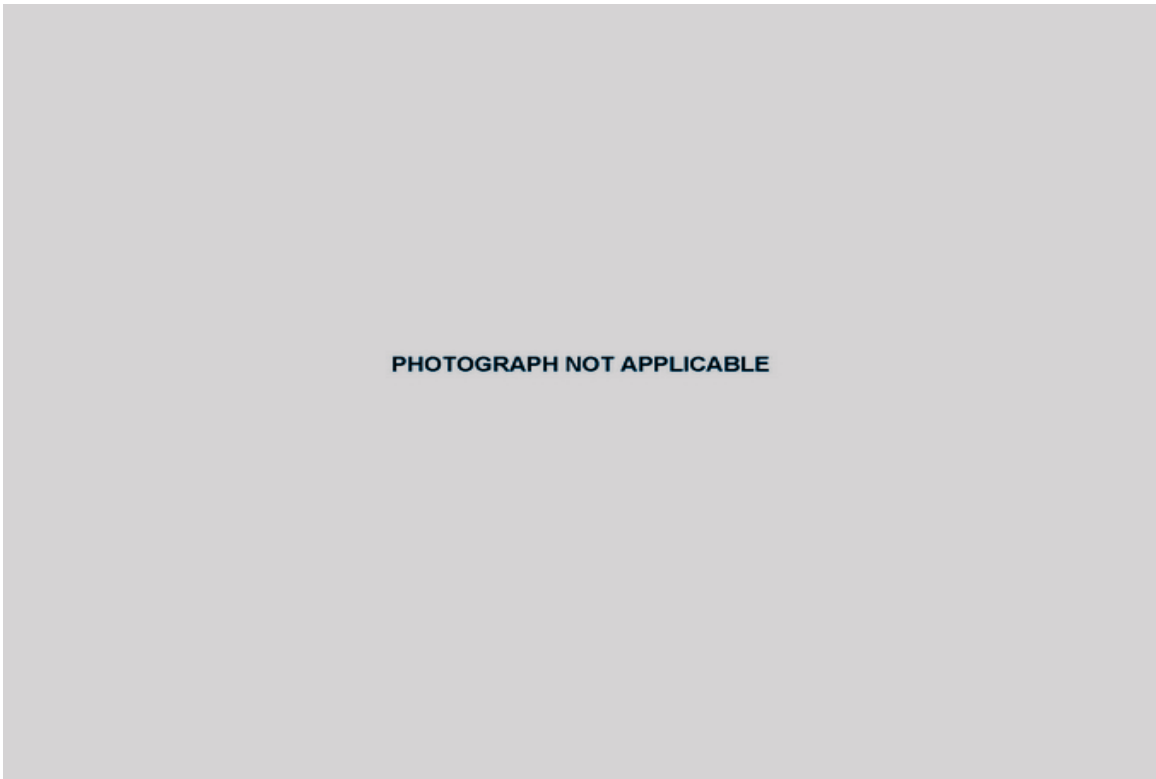
Post-Test Passenger Dummy Contact with Airbag



Post-Test Passenger Dummy Contact with Headrest



Ballast Installed in Vehicle



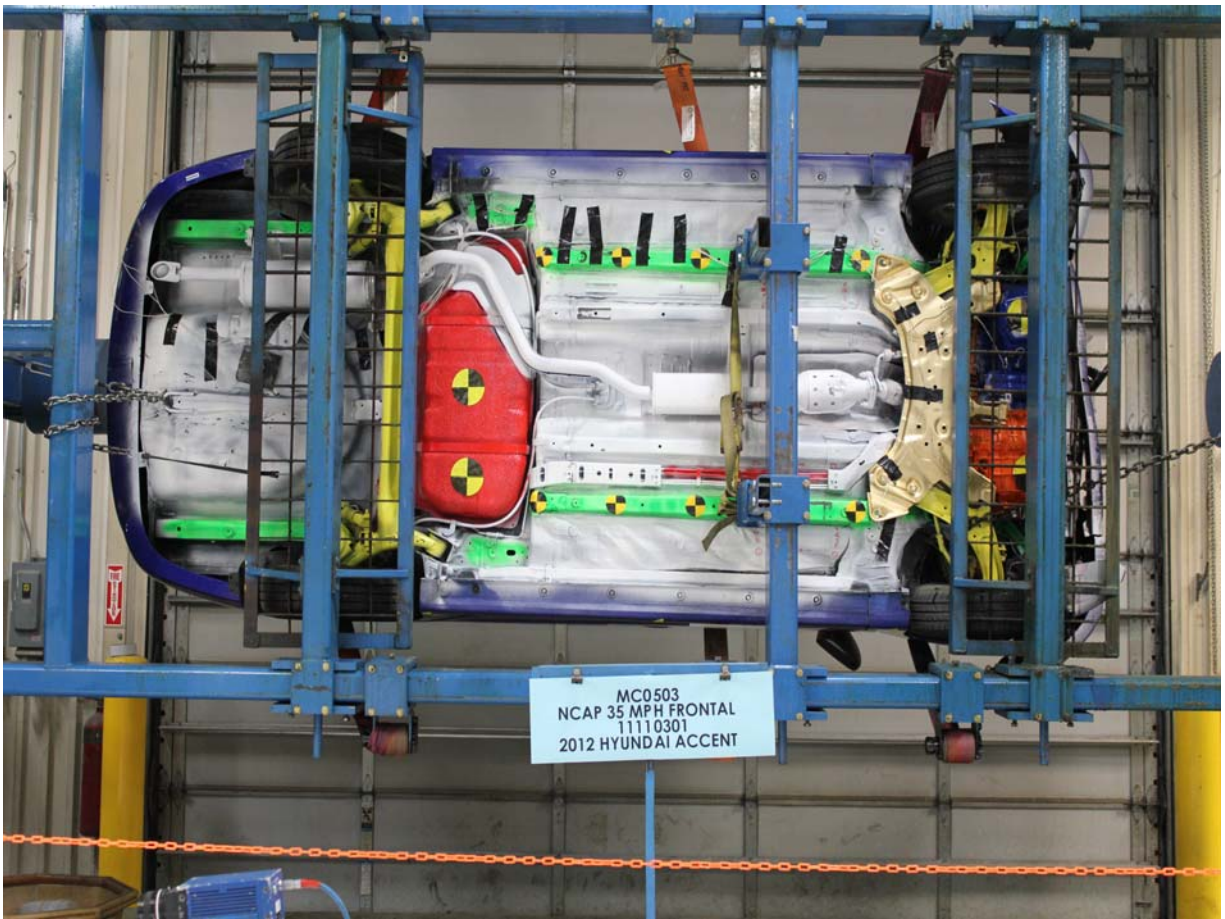
Post-Test Stoddard Solvent Spillage Location View



Post-Test Speed Trap Read-Out



Vehicle at 0 Degrees 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



2012 Hyundai Accent Frontal Impact Event

HYUNDAI 2012 ACCENT GLS		2012 All-New Accent Fuel Economy, Design, Roominess and Warranty		G132899																					
SOLD TO: W1026 ZIMBRICK EASTSIDE HYUNDAI 5453 WAYNE TERRACE MADISON WI 53718 SHIPPED TO: W1026	VIN: KMHC74AE7CU102023 MODEL: 1640DF45 ENGINE: G4FDBUR40241 PORT OF ENTRY: PT EXTERIOR COLOR: MARATHON BLUE INTERIOR COLOR: GRAY MODE OF TRANSPORT: TRUCK ACCESSORY WEIGHT: 9 lbs. EMISSIONS: This vehicle is certified to meet emission requirements in all 50 states.	STANDARD FEATURES: AMERICA'S BEST WARRANTY *3-year/60,000-mile New Vehicle Warranty* *10-year/100,000-mile Powertrain Warranty* *7-year/Unlimited-mile Anti-perforation Warranty* *3-year/Unlimited-mile Roadside Assistance* *Unlimited warranties, see dealer for details. ADVANCED SAFE™ TECHNOLOGY *Electronic Stability Control (ESC) w/ Traction Control* *ABS w/ Electronic Brake Force Distribution & Brake Assist* *4-Wheel Disc Brakes* *Front, Front Side Impact & Side Curtain Airbags* *Front Seatbelt Pre Tensioners* *Tire Pressure Monitoring System* *Active Front Head Restraints* POWERTRAIN TECHNOLOGY *1.8L GDI, 138 HP, 123 lb-ft Torque, DOHC 4-Cylinder* *Dual Continuous Variable Valve Timing* *6-Speed Automatic Transmission w/ SHIFTRONIC®* *Active Eco System* COMFORT & CONVENIENCE *Air Conditioning w/ Cabin Air Filter* *AM/FM/MP3/CMP3® Audio System w/ 6 Speakers* *XM® Satellite Radio w/90 Day Trial; Not Available in AK & HI* *iPod®/USB & Auxiliary Input Jacks* *Power Windows, Door Locks, & Bodycolor Mirrors* *TR Steering Column* *TR Computer* *Driver Seat Height Adjustment* *Driver Seat Armrest* *Dual Vanity Mirrors* *Map, Dome & Cargo Lights* *Cloth Door Insert* *Front Passenger Grabback Pocket* *60/40 Split-Folding Rear Seat* *Adjustable Head Restraints for All Seating Positions* *Front 2-Speed Intermittent Wiper* *16-inch Wheels w/ Full Covers and 175/70R14 Tires* *Windshield Sunshade & Band* *Tinted Window Glass* *Rear Window Defogger* *Full Tank of Gas*	Manufacturer's Suggested Retail Price: \$15,195.00 INCLUDED: *Carpeted Floor Mats \$95.00 *Cargo Net \$45.00 *Cargo Tray \$80.00 *PoDS® Cable \$35.00 INCLUDED: *ESC w/ Traction Control *ABS w/ Electronic Brake Force Distribution & Brake Assist *4-Wheel Disc Brakes *Front, Front Side Impact & Side Curtain Airbags *Front Seatbelt Pre Tensioners *Tire Pressure Monitoring System *Active Front Head Restraints *1.8L GDI, 138 HP, 123 lb-ft Torque, DOHC 4-Cylinder *Dual Continuous Variable Valve Timing *6-Speed Automatic Transmission w/ SHIFTRONIC® *Active Eco System *Air Conditioning w/ Cabin Air Filter *AM/FM/MP3/CMP3® Audio System w/ 6 Speakers *XM® Satellite Radio w/90 Day Trial; 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Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline license and title fees, state and local taxes and dealer installed options and accessories are not included in the manufacturer's suggested retail price.		This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements of 15 U.S.C. 1201 et seq, which prohibits its removal or alteration prior to delivery to the ultimate purchaser.																							
PART CONTENT INFORMATION FOR VEHICLES IN THIS COUNTRY: U.S./CANADIAN PARTS CONTENT: 1 % MAJOR SOURCES OF FOREIGN PARTS CONTENT: Korea 91 % Note: Parts content does not include final assembly, distribution, or other non-parts costs. FOR THIS VEHICLE: FINAL ASSEMBLY POINT: Ulsan, Korea COUNTRY OF ORIGIN: ENGINE: Korea TRANSMISSION: Korea																									
EPA Fuel Economy Estimates <table border="1"> <tr> <td>CITY MPG</td> <td>30</td> <td>HIGHWAY MPG</td> <td>40</td> </tr> <tr> <td colspan="4"> Estimated Annual Fuel Cost \$ 1682.00 based on 15,000 miles at \$3.70 per gallon </td> </tr> <tr> <td colspan="4"> Combined Fuel Economy This Vehicle 33 All Compact Cars 14 - 41 </td> </tr> <tr> <td colspan="2"> Expected range for most drivers 24 to 36 MPG </td> <td colspan="2"> Expected range for most drivers 33 to 47 MPG </td> </tr> <tr> <td colspan="4"> Year actual mileage will vary depending on how you drive and maintain your vehicle </td> </tr> </table>						CITY MPG	30	HIGHWAY MPG	40	Estimated Annual Fuel Cost \$ 1682.00 based on 15,000 miles at \$3.70 per gallon				Combined Fuel Economy This Vehicle 33 All Compact Cars 14 - 41				Expected range for most drivers 24 to 36 MPG		Expected range for most drivers 33 to 47 MPG		Year actual mileage will vary depending on how you drive and maintain your vehicle			
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Environmental Performance Protect the Environment, choose vehicles with higher scores: <table border="1"> <tr> <td>Global Warming Score</td> <td>9</td> <td>Smog Score</td> <td>5</td> </tr> <tr> <td colspan="2"> 1 (Cleanest) 9 (Average) 10 (Dirtiest) </td> <td colspan="2"> 1 (Average) 5 (Cleanest) 10 (Dirtiest) </td> </tr> </table> <p>Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on this vehicle's measured emissions. Please visit www.DriveCleaner.com for more information. AIR RESOURCES BOARD</p>						Global Warming Score	9	Smog Score	5	1 (Cleanest) 9 (Average) 10 (Dirtiest)		1 (Average) 5 (Cleanest) 10 (Dirtiest)													
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1 (Cleanest) 9 (Average) 10 (Dirtiest)		1 (Average) 5 (Cleanest) 10 (Dirtiest)																							
GOVERNMENT SAFETY RATINGS <table border="1"> <tr> <td>Frontal Crash</td> <td>Driver Passenger</td> <td>Not Rated</td> </tr> <tr> <td>Side Crash</td> <td>Front seat Rear seat</td> <td>Not Rated</td> </tr> <tr> <td>Rollover</td> <td></td> <td>Not Rated</td> </tr> </table> <p>Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight. Star ratings 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).</p>						Frontal Crash	Driver Passenger	Not Rated	Side Crash	Front seat Rear seat	Not Rated	Rollover		Not Rated											
Frontal Crash	Driver Passenger	Not Rated																							
Side Crash	Front seat Rear seat	Not Rated																							
Rollover		Not Rated																							
242 A 2303GSKALB 212 <p>See the Free Fuel Economy Guide at dealers or www.fueleconomy.gov</p> <p>www.safercar.gov or 1-888-327-4236</p>																									

Monroney Label

APPENDIX B
DUMMY RESPONSE DATA TRACES

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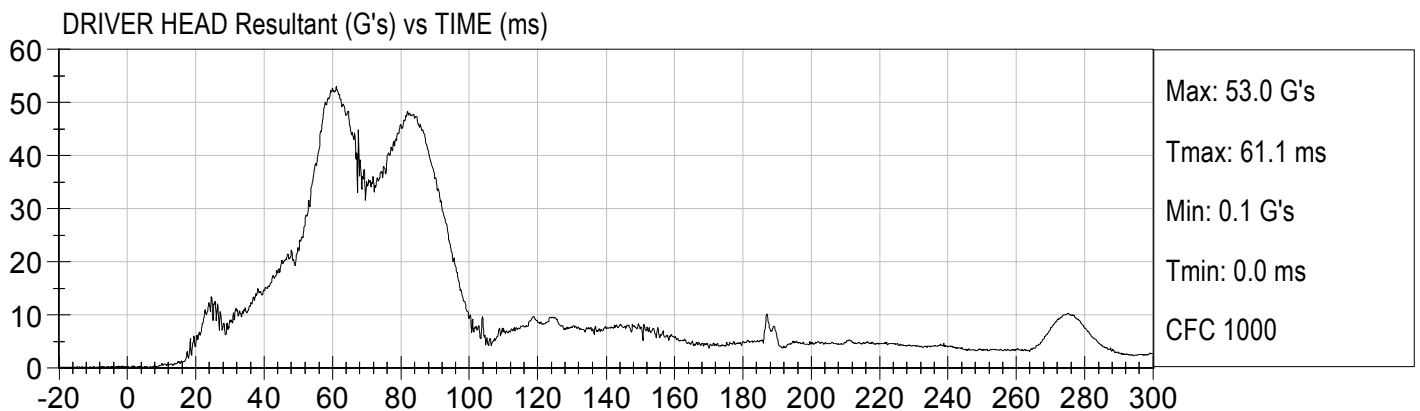
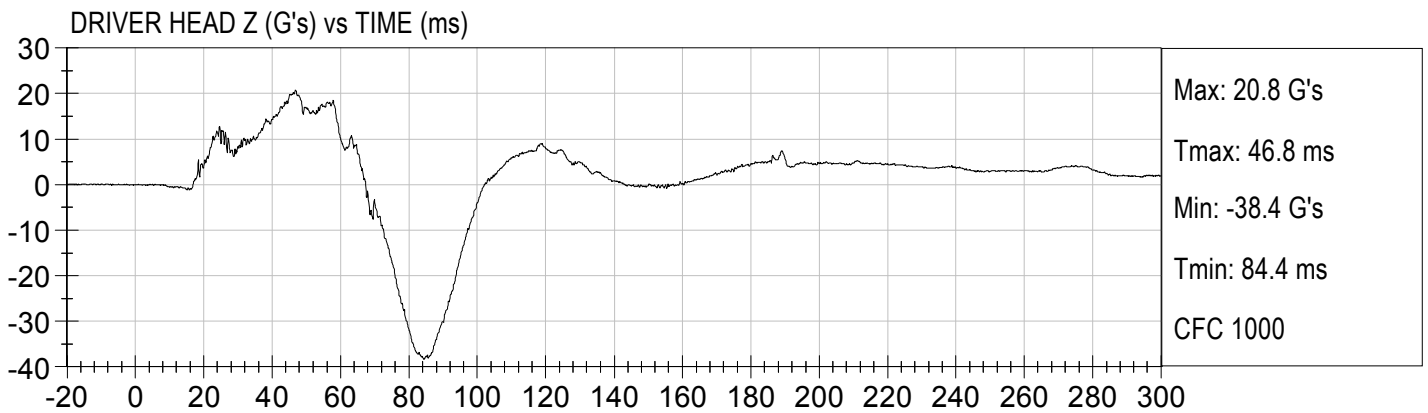
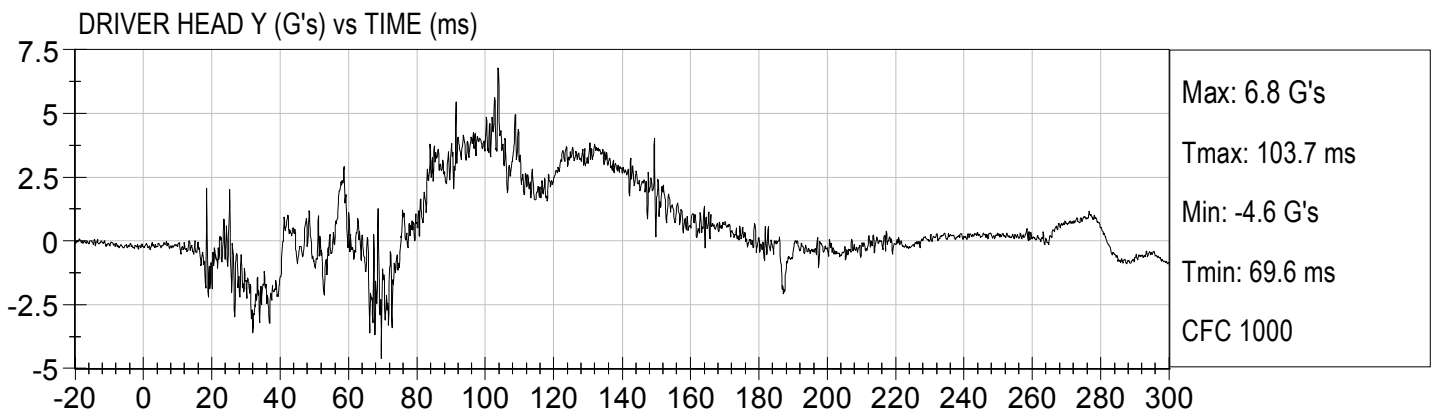
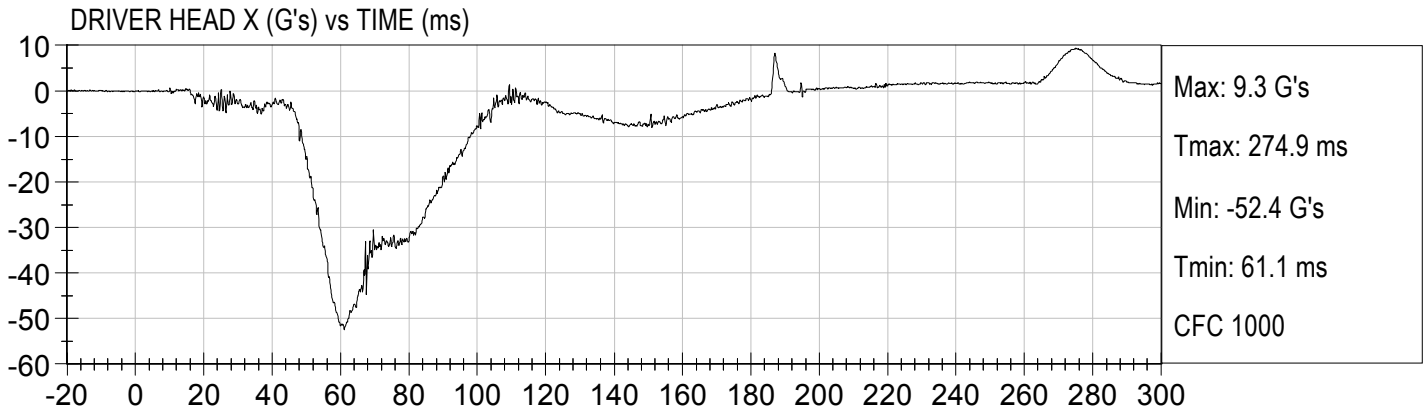
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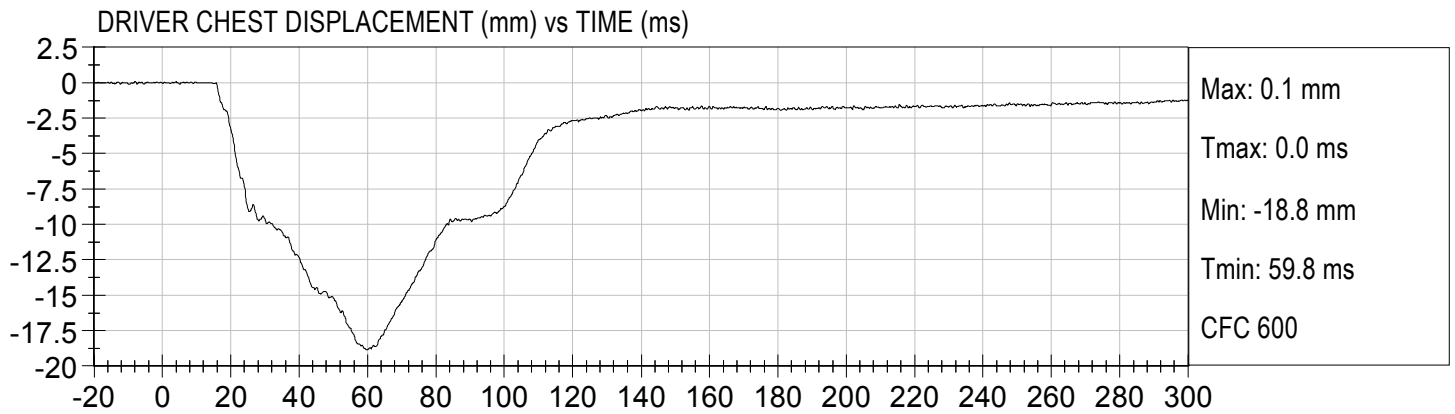
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

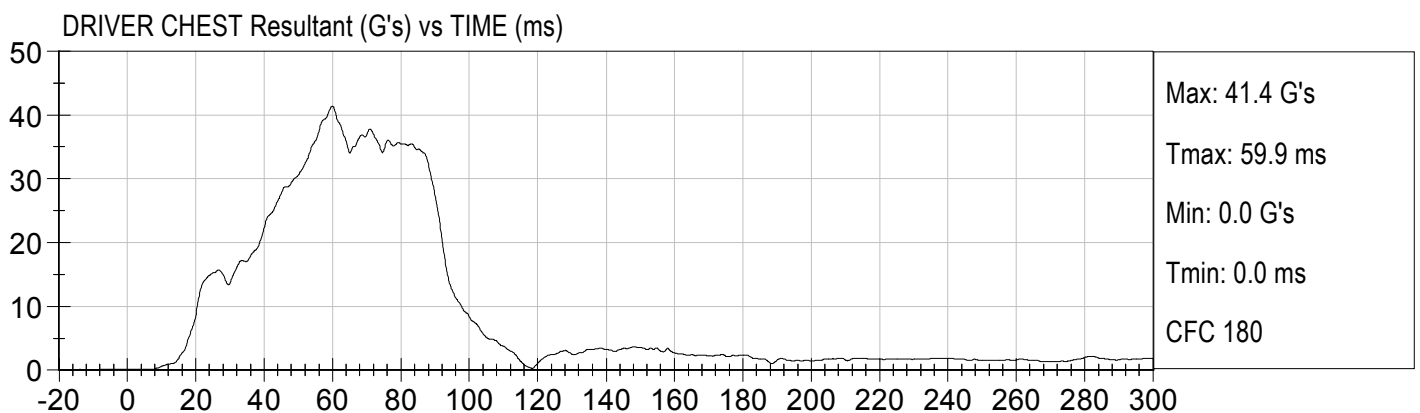
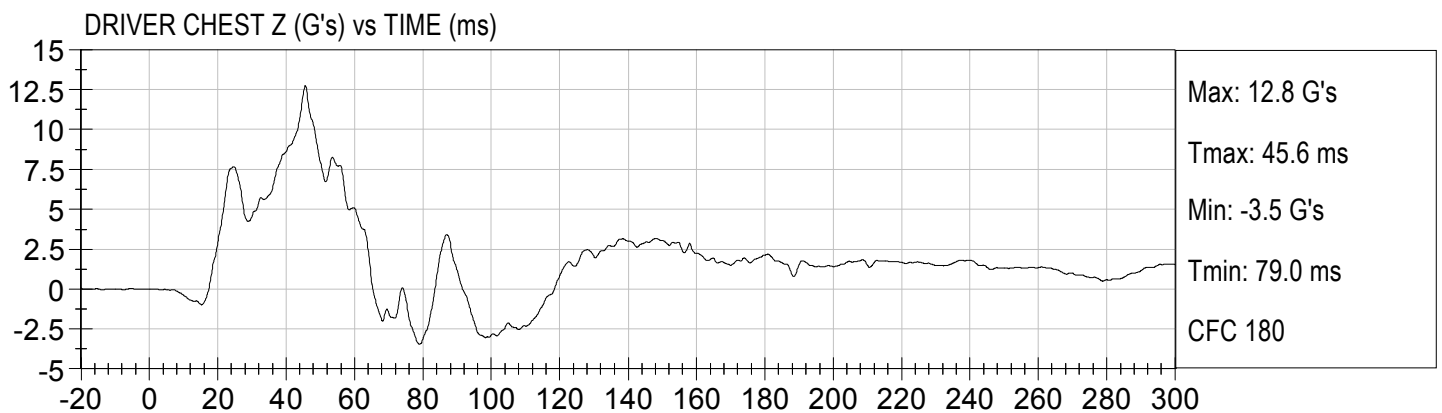
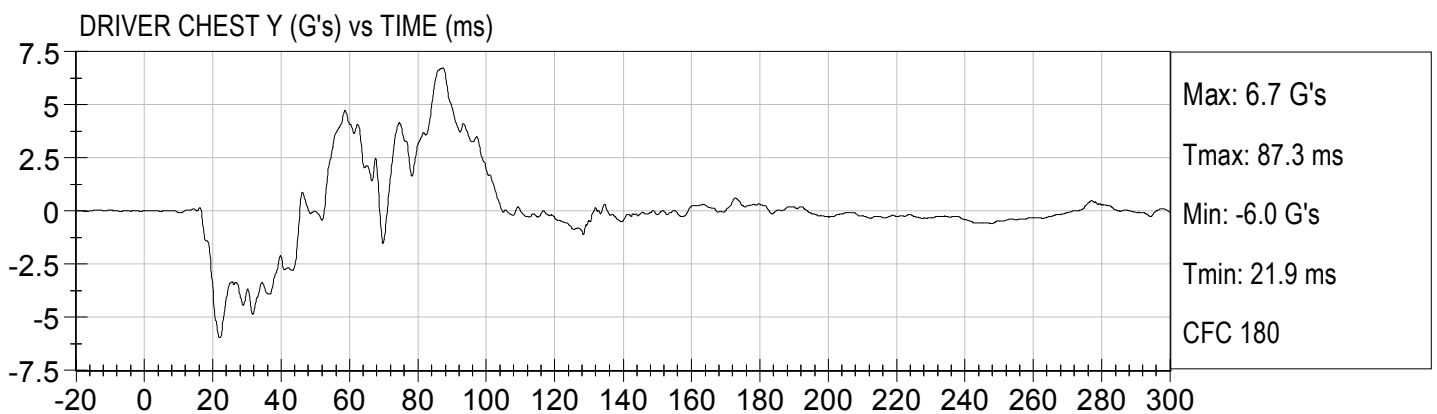
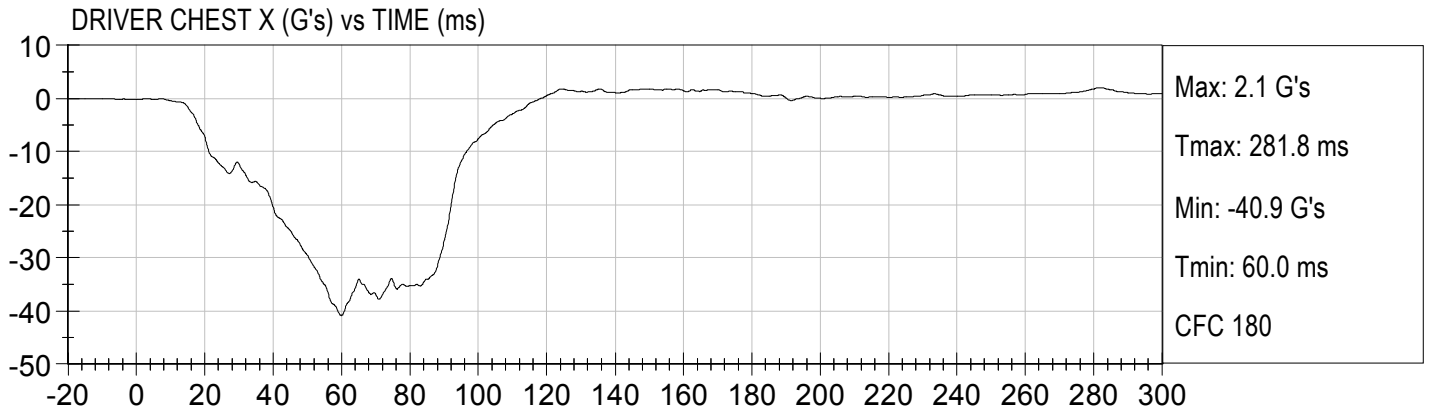
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 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
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 Driver Chest Z Redundant
 Driver Pelvis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

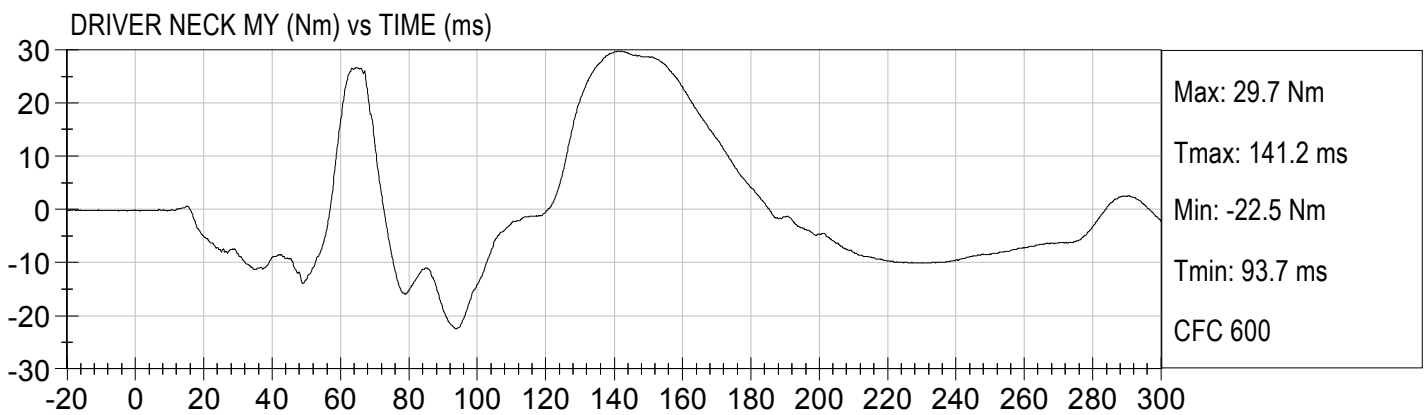
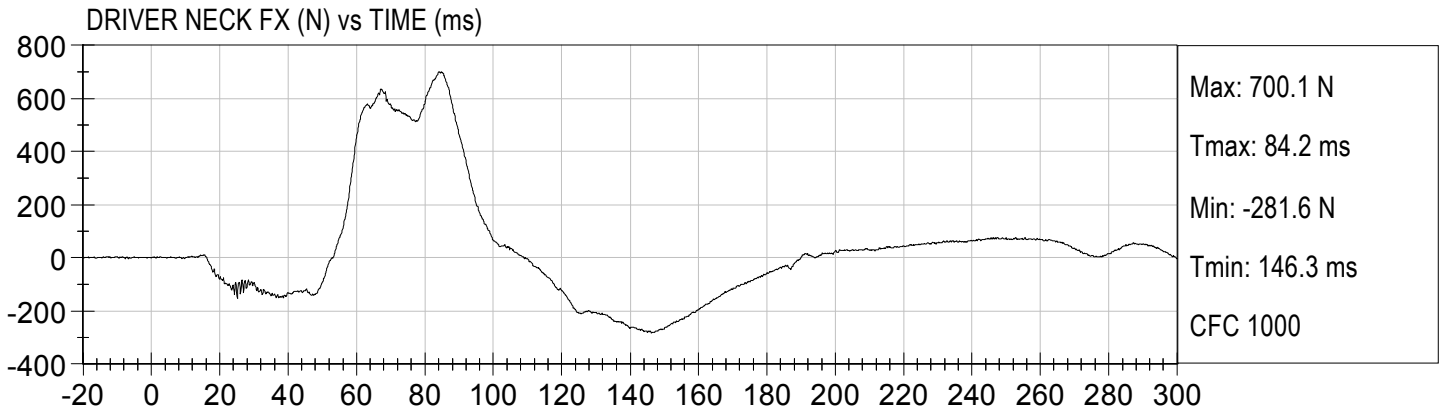
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Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot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

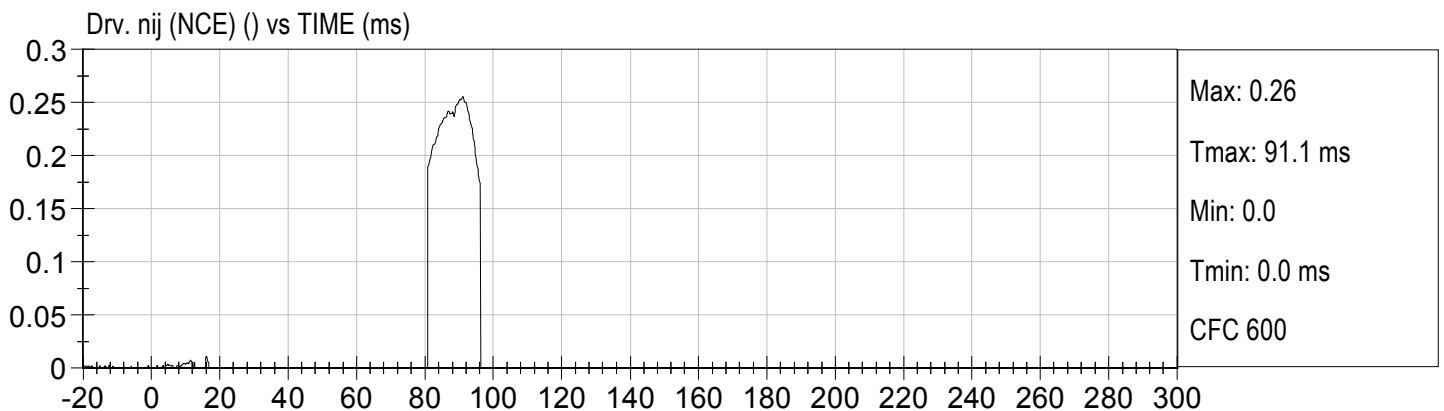
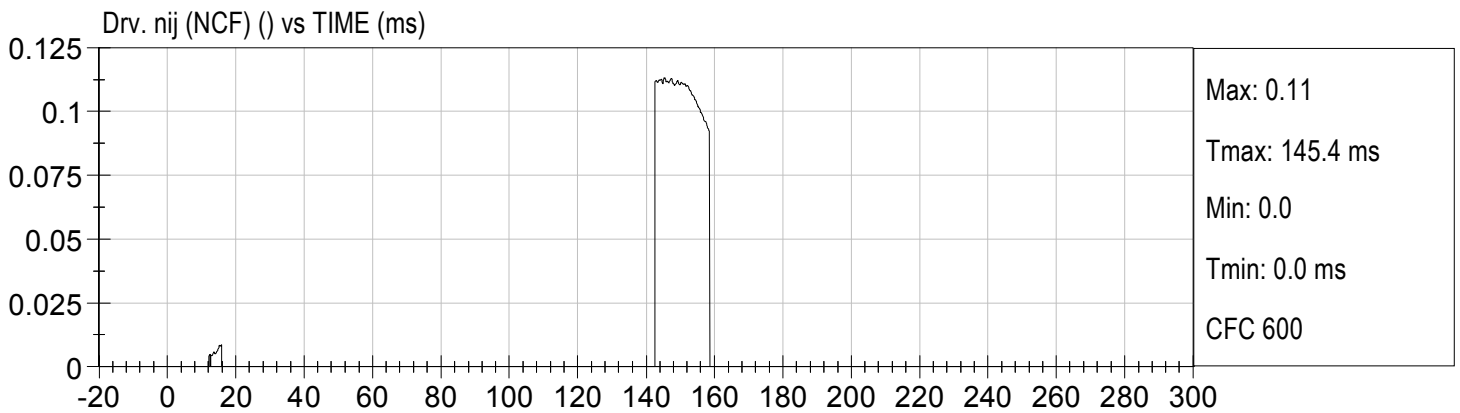
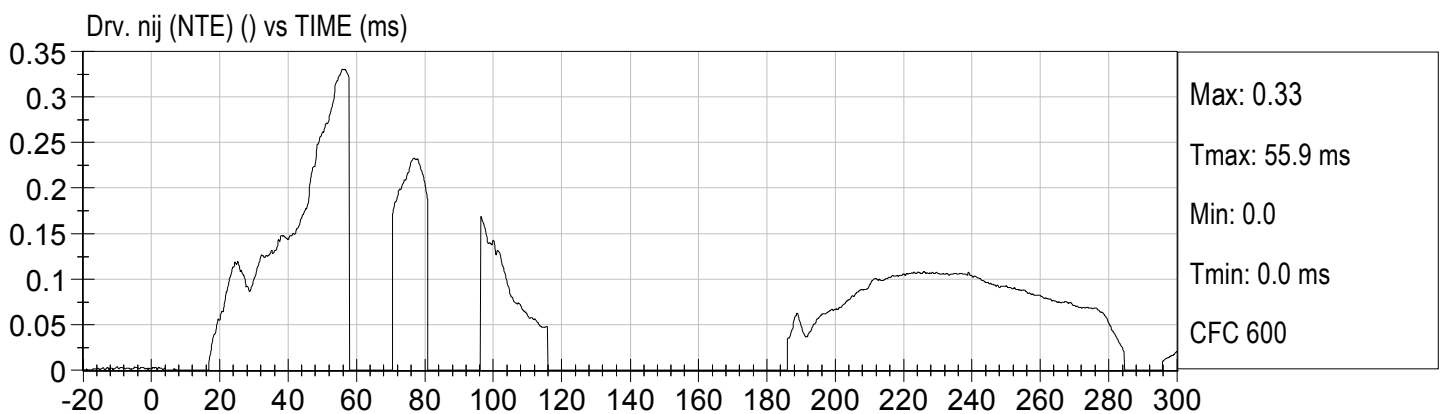
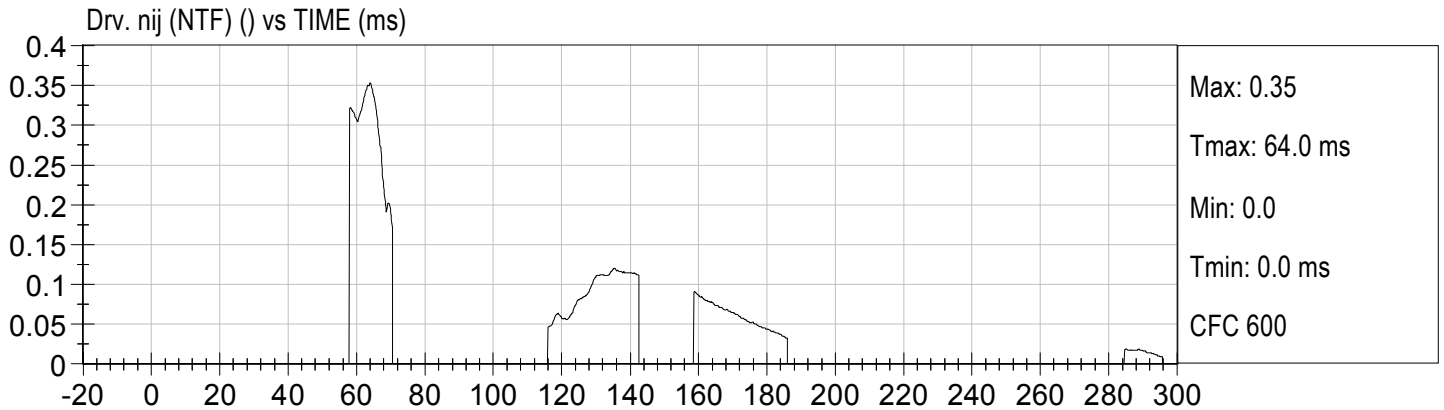
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right 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
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Left Rear Seat Crossmember Xr
Right Rear Seat Crossmember Xr
Advanced Research Load Cell Barrier – 128 channels

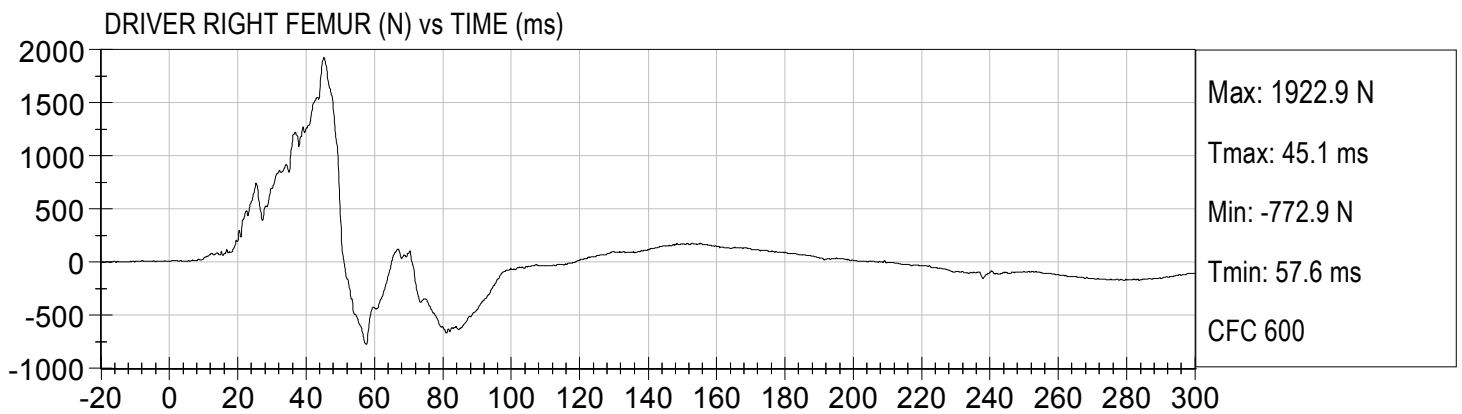
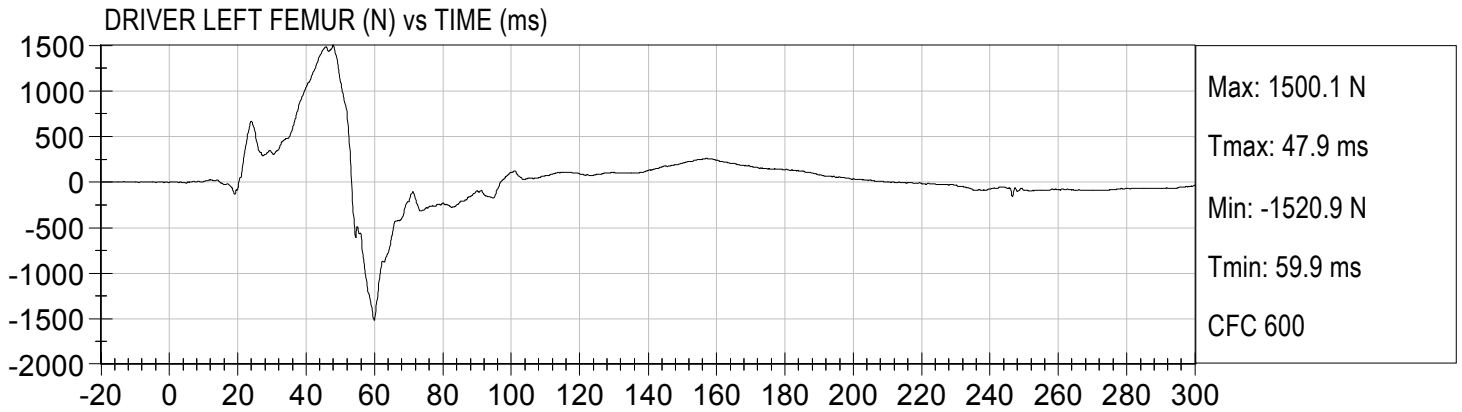


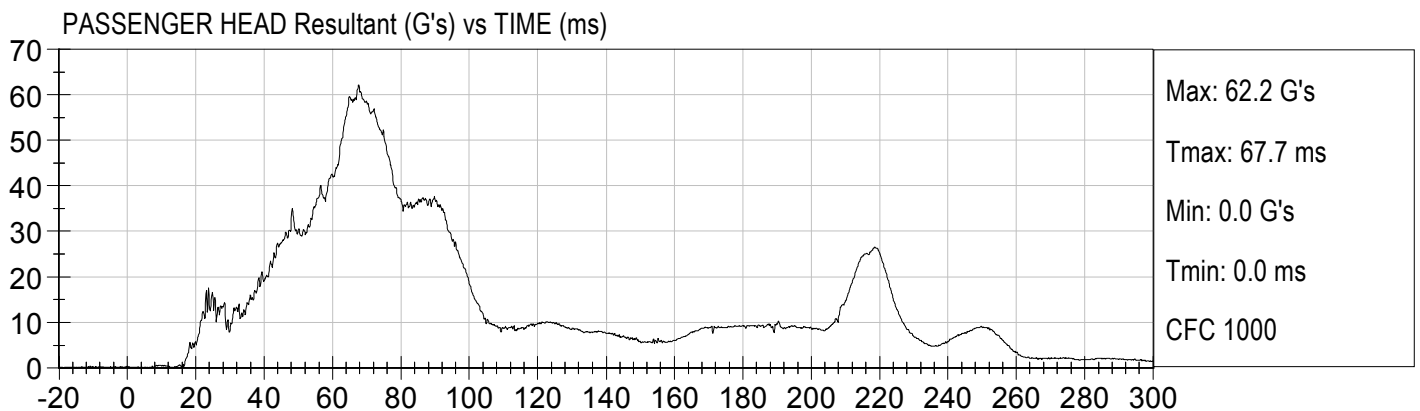
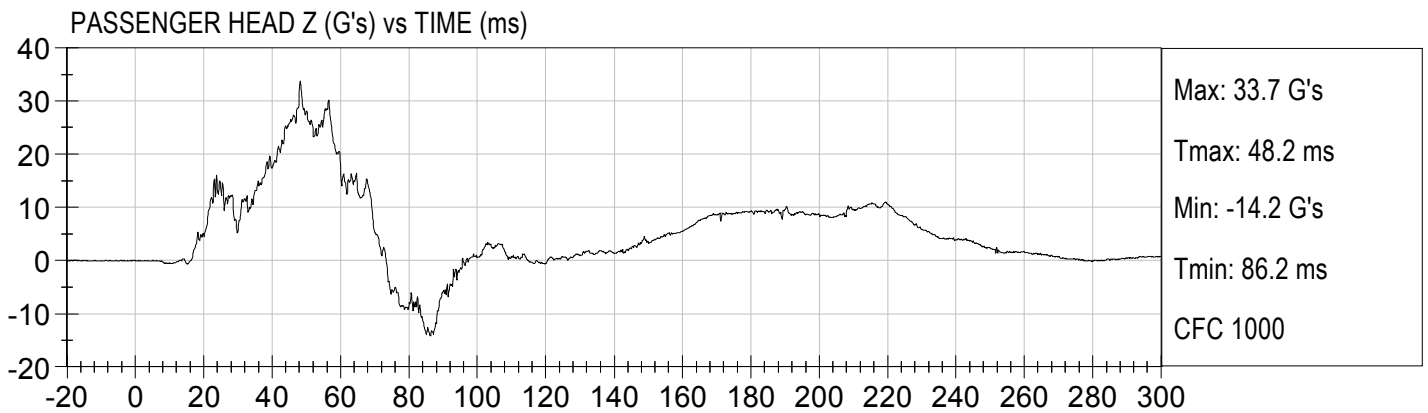
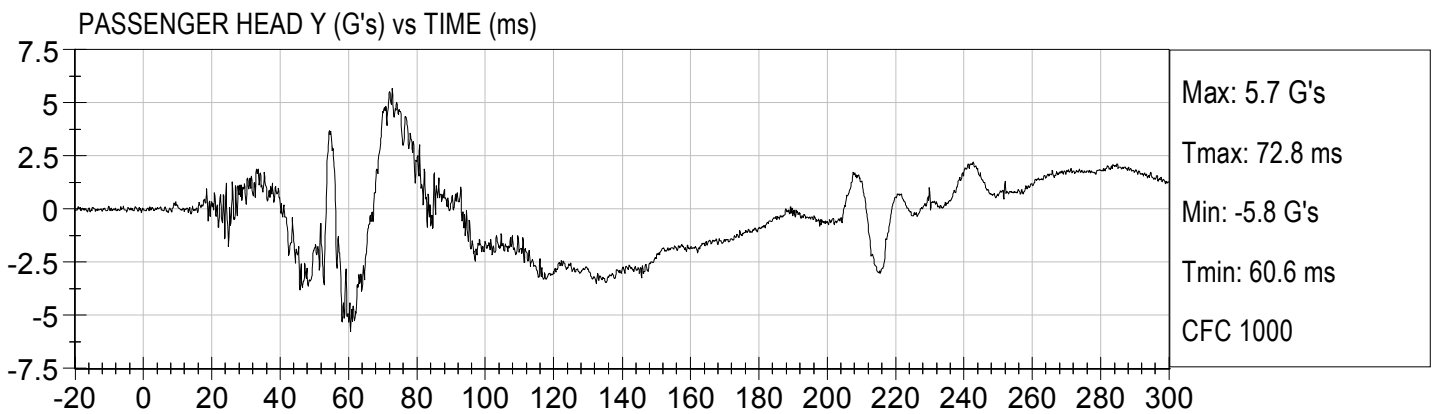
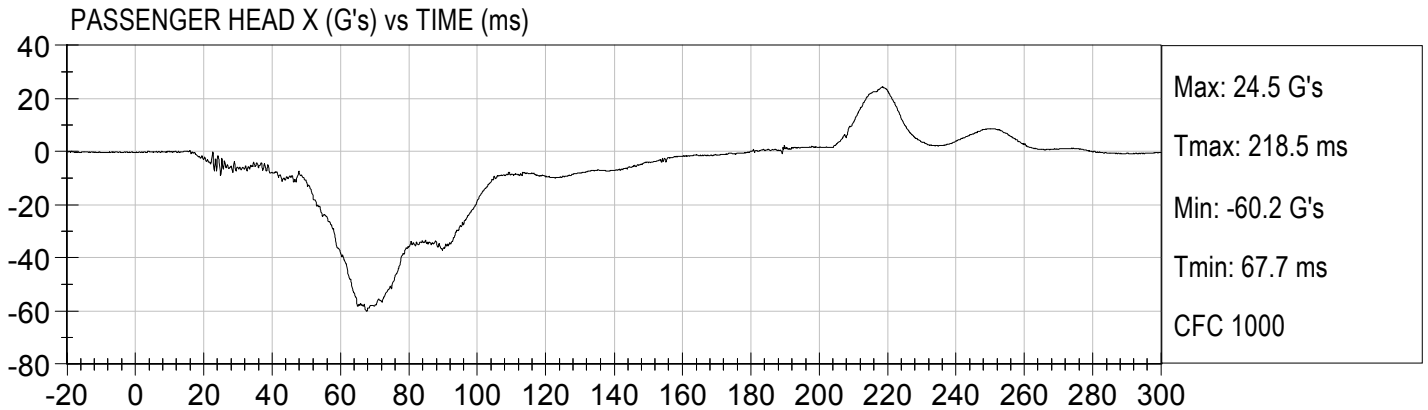


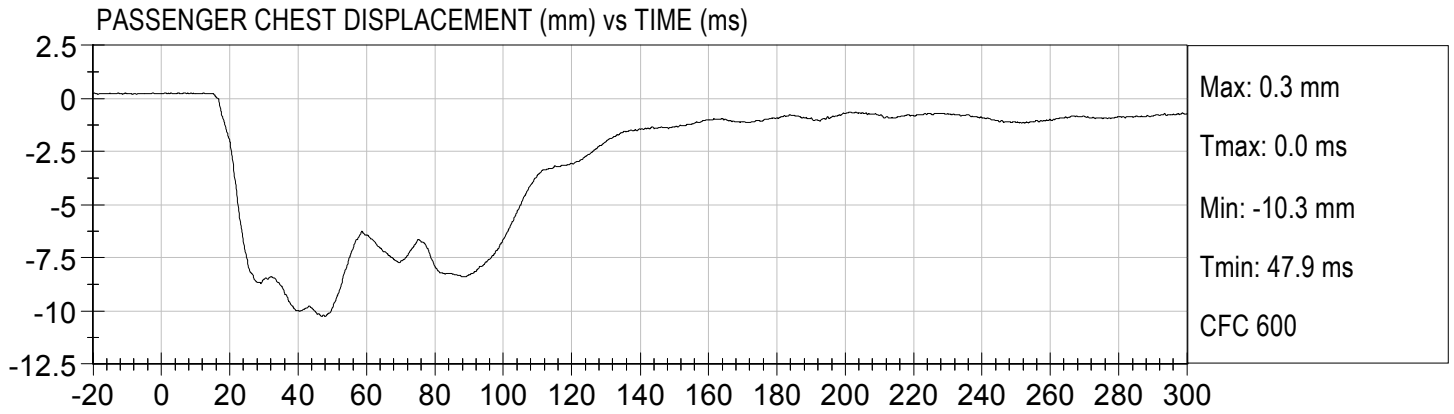


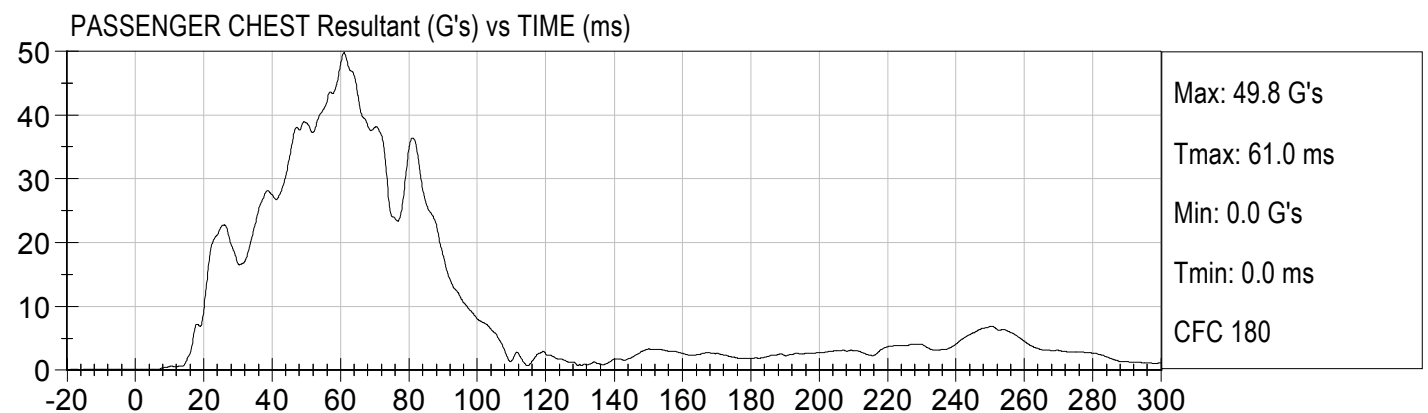
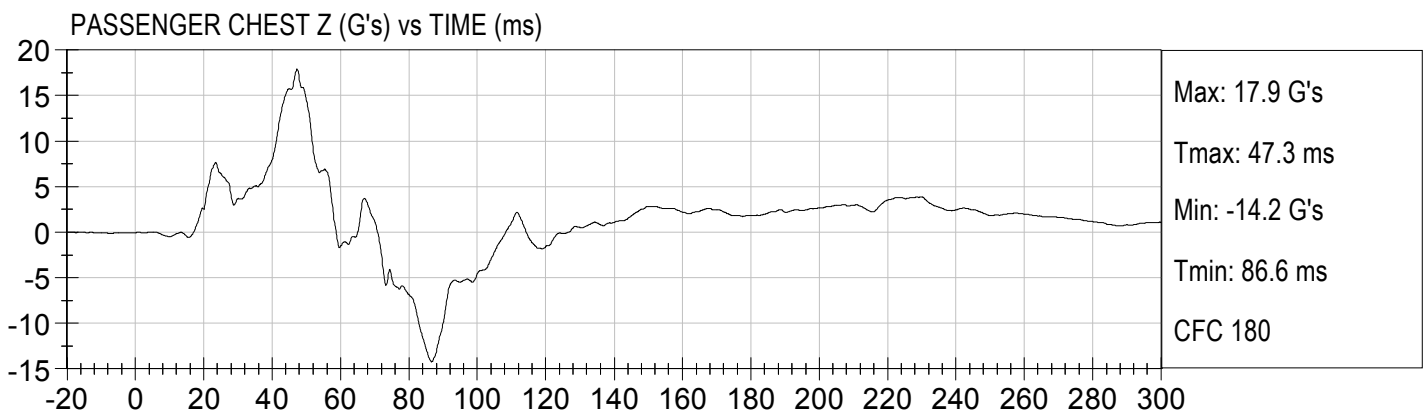
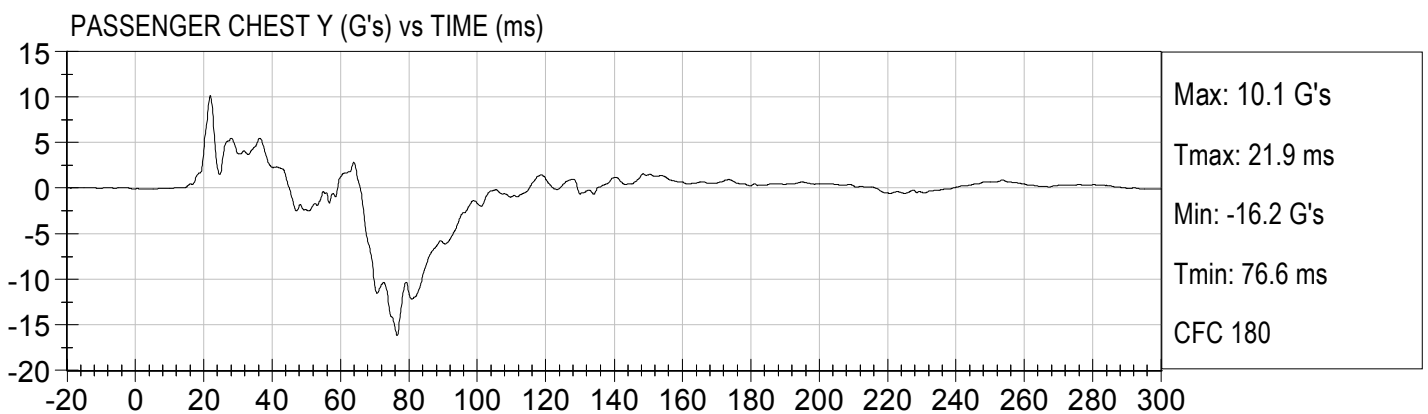
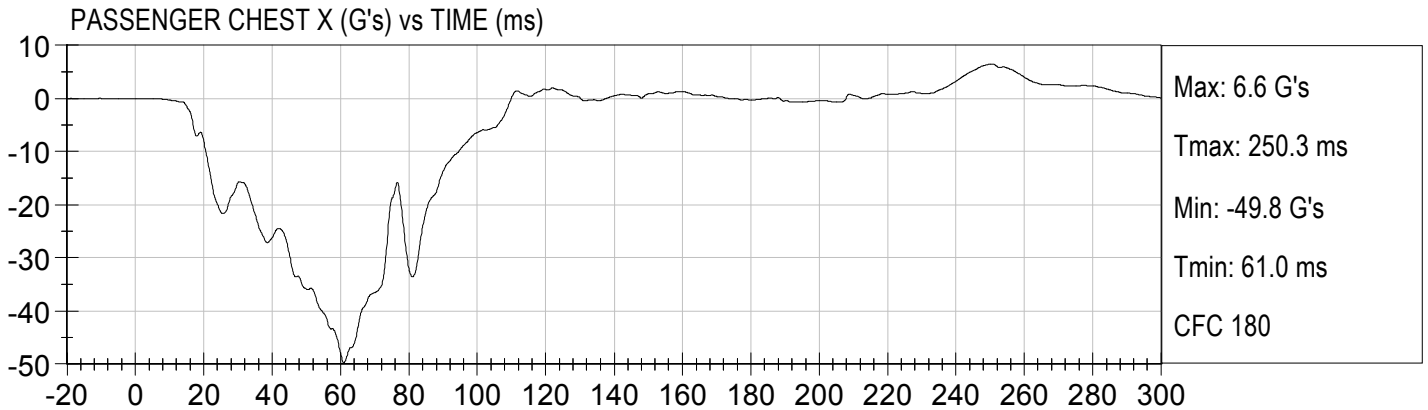


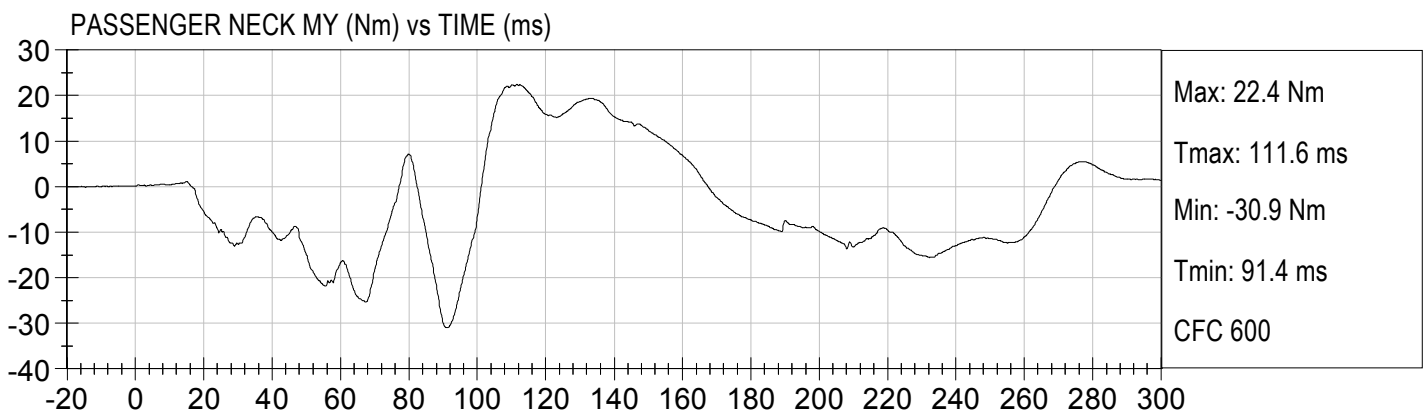
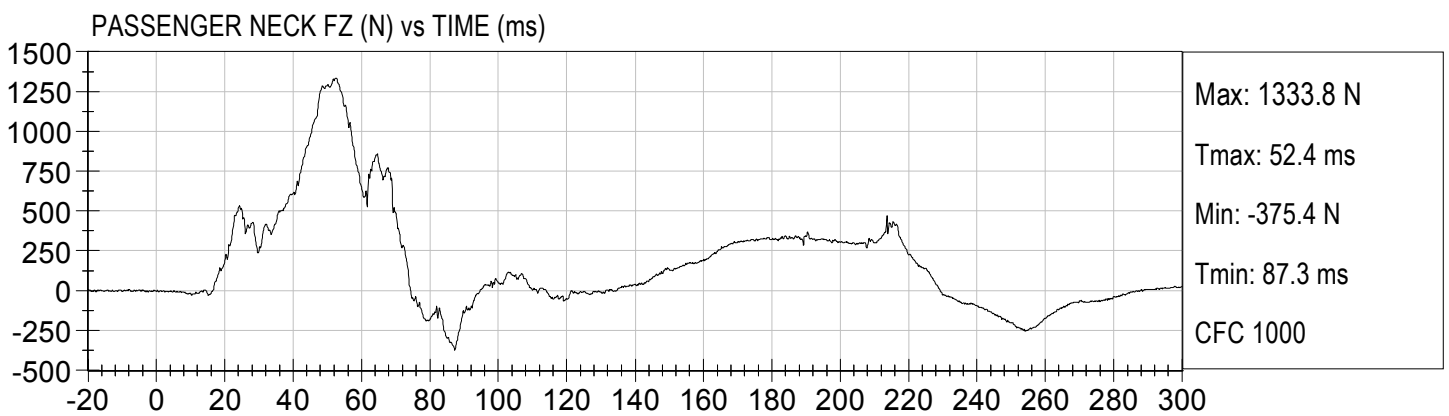
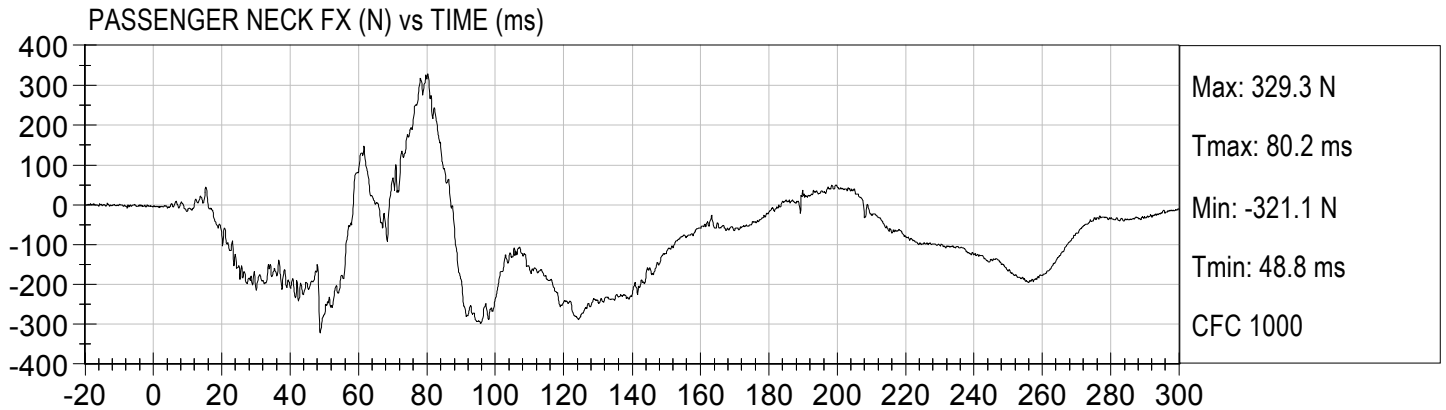


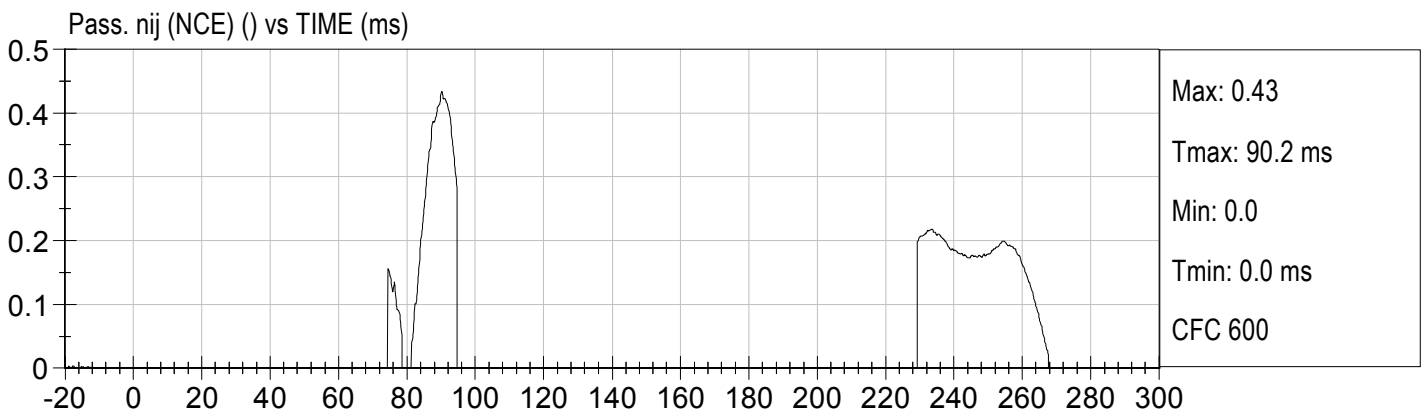
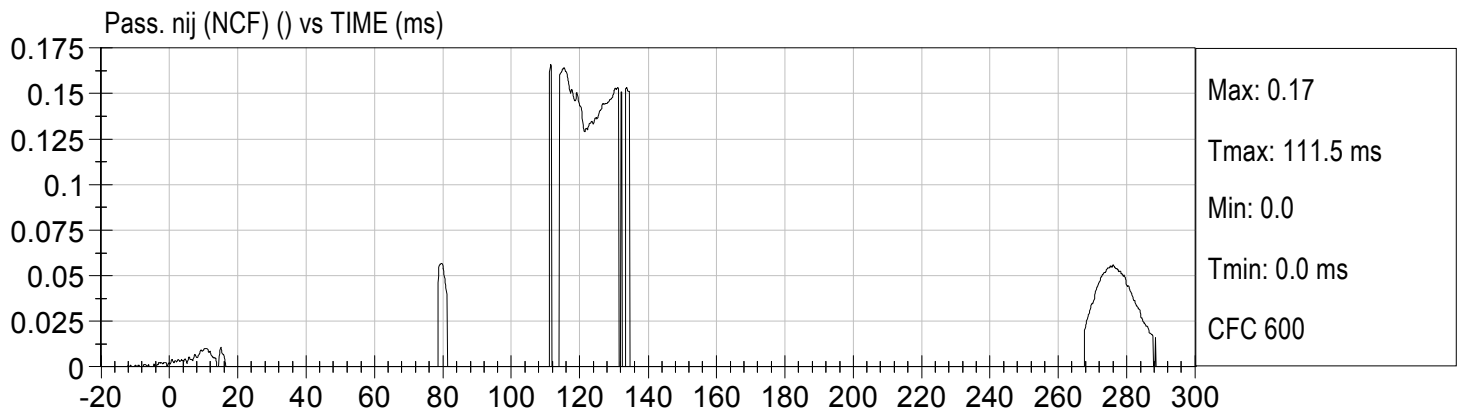
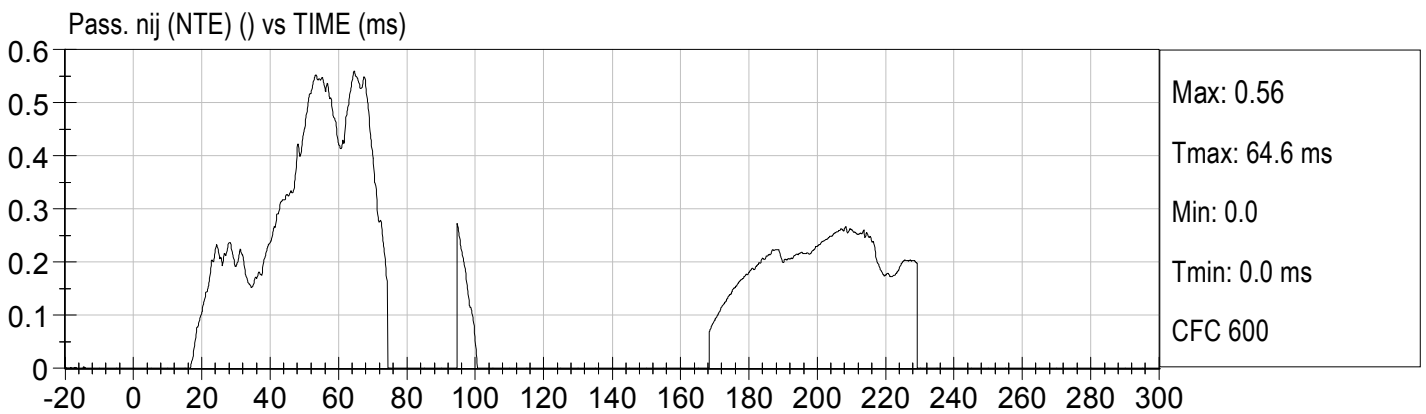
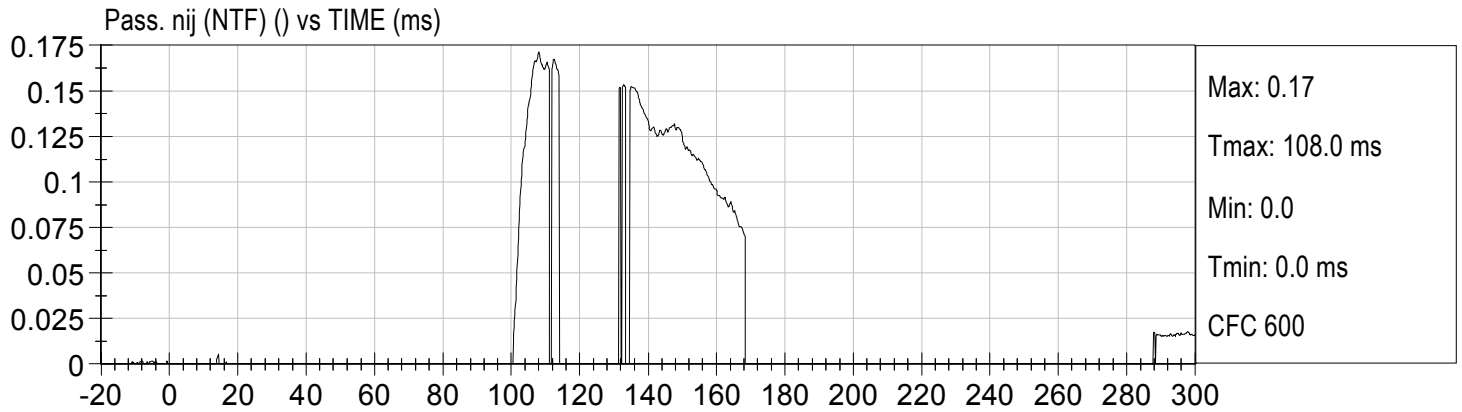


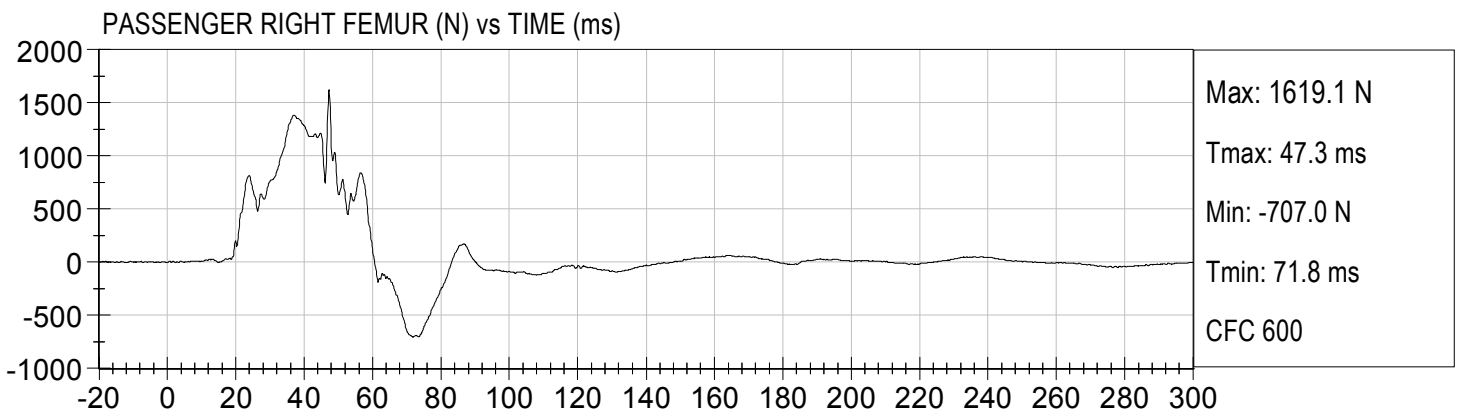
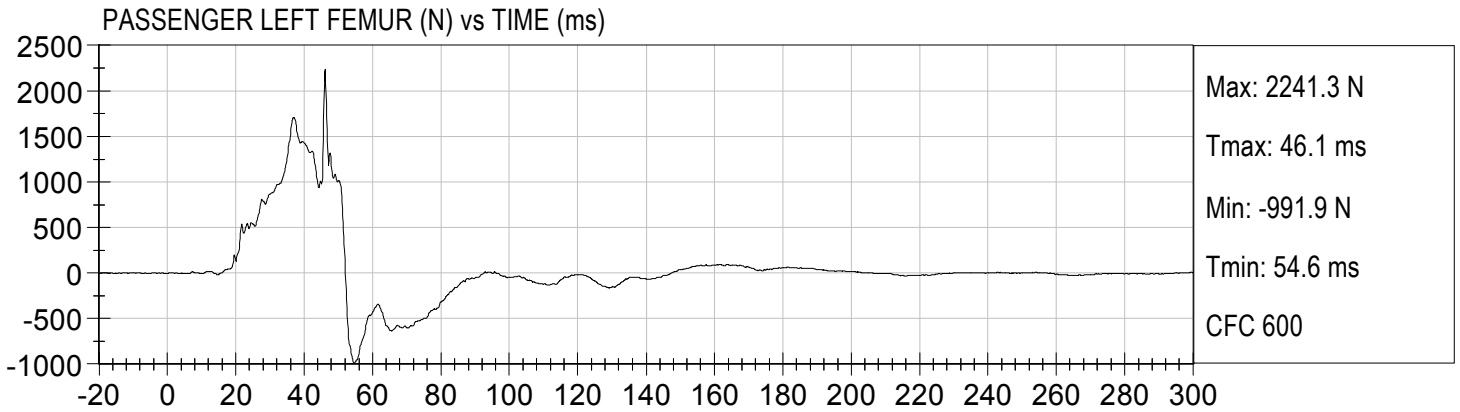












APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

**Hybrid III, 50th External Measurements
SN: 036**

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	34.7
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	5.4
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.6
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	5.8
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	11.5
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	13.0
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.9
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	17.3
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	17.9

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	8.8
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.0
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.4
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.1
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	38.4
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	34.0
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: 036

Test ID: D113611

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	G's	225 - 275	244	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-5.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

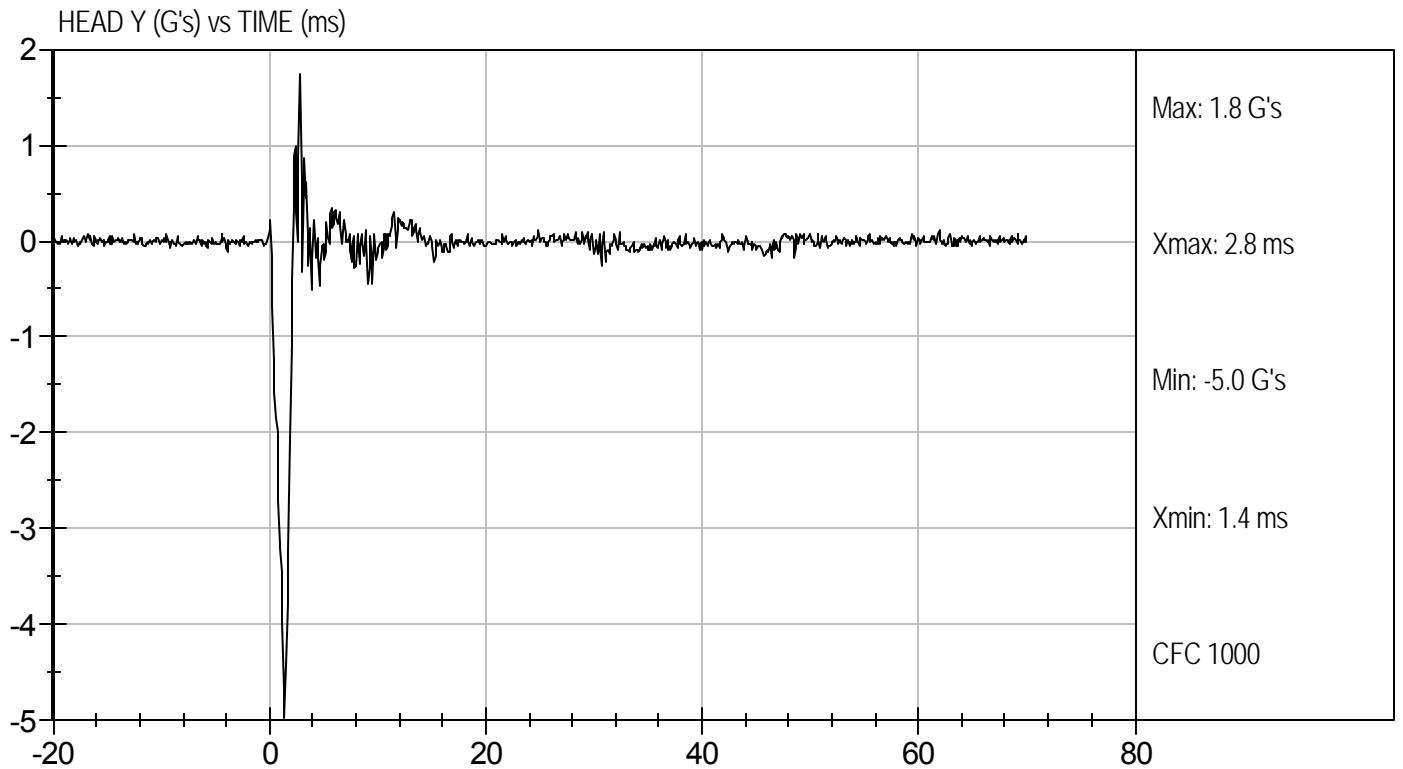
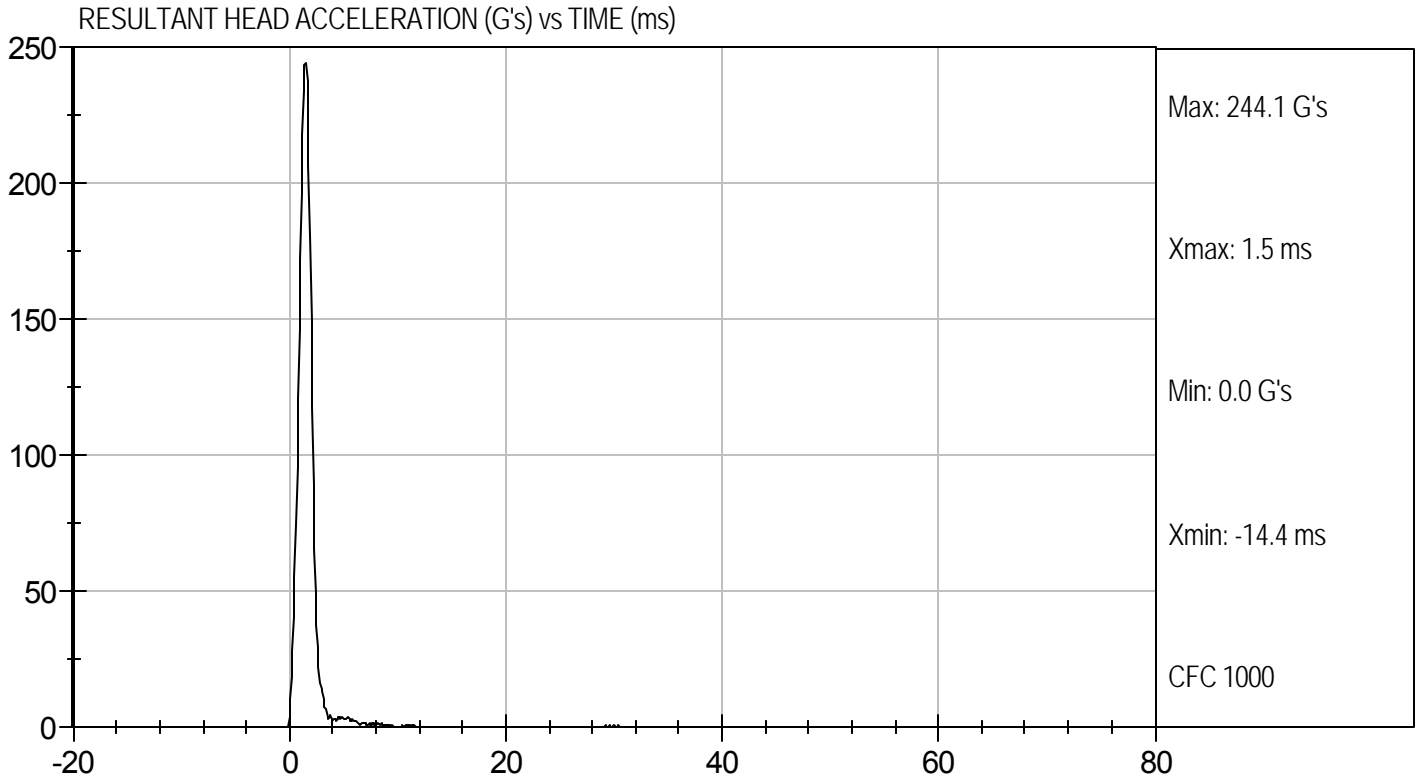
10/28/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D113611

Test Date: 10/28/11
Velocity: 0 ft/s, 0.00 m/s



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


ATD Serial No: 036

Test I.D.: D113612

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.61	Pass
	20 ms	G's	17.60 to 22.60	18.50	Pass
	30 ms	G's	12.50 to 18.50	13.24	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.5	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	117.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	95.1	Pass
	Time	ms	47.0 to 58.0	47.8	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.1	Pass
Overall Test Results					Pass


 Laboratory Technician

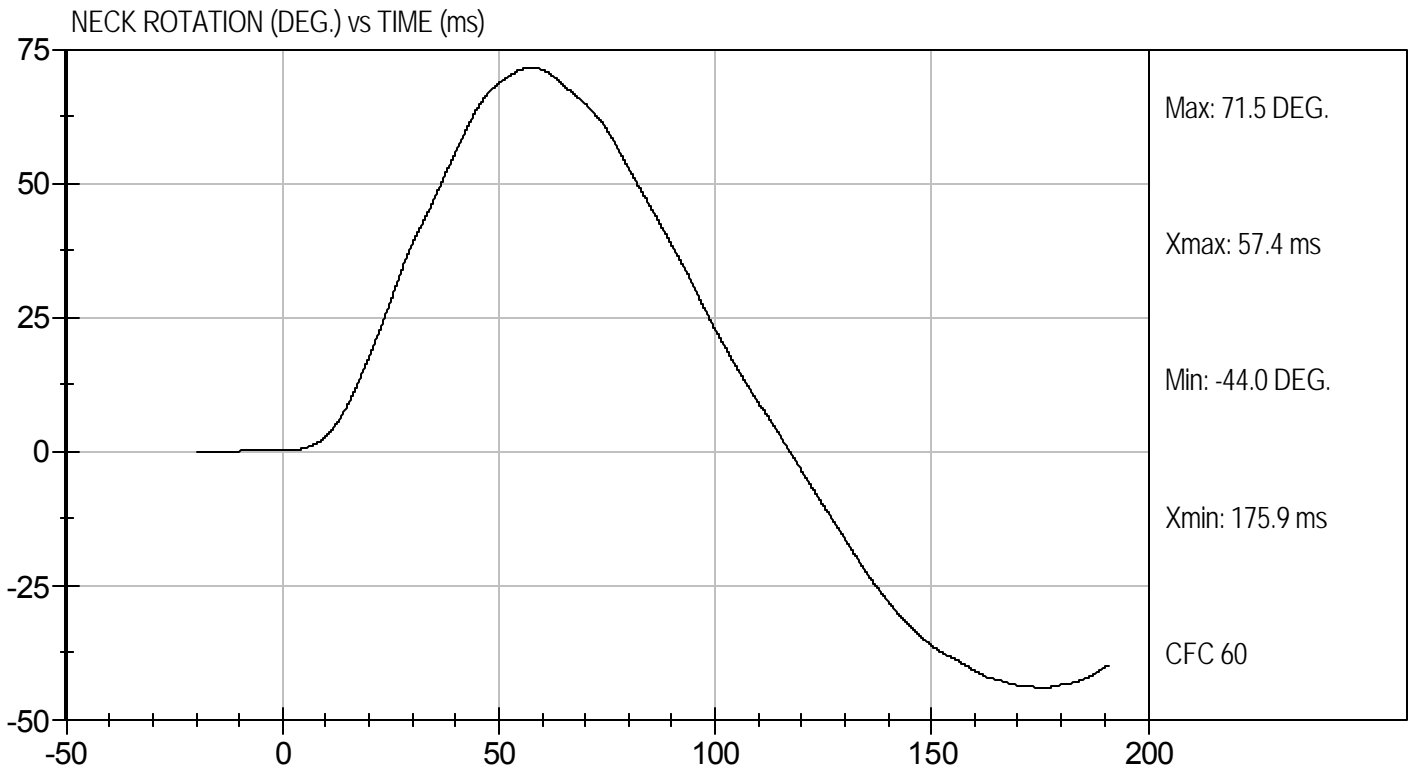
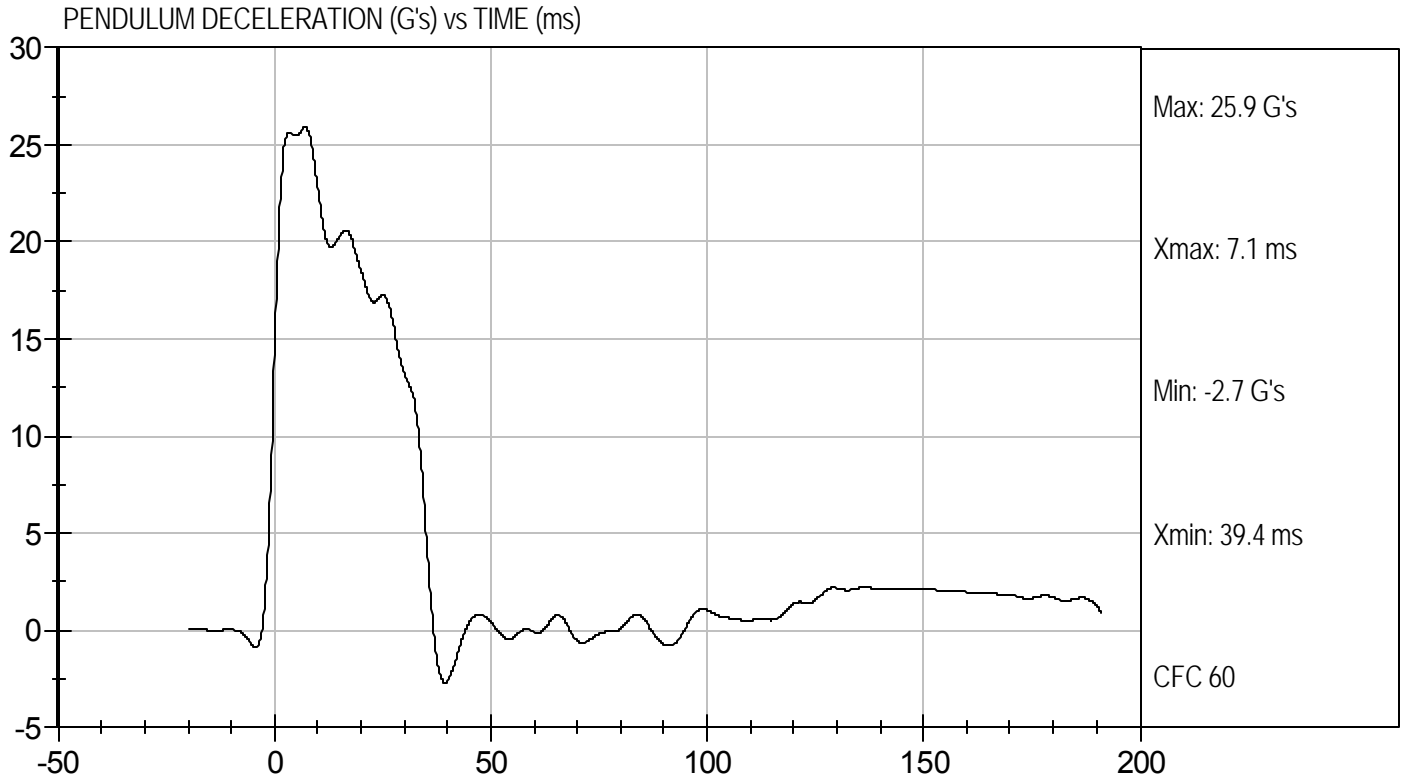
10/28/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D113612

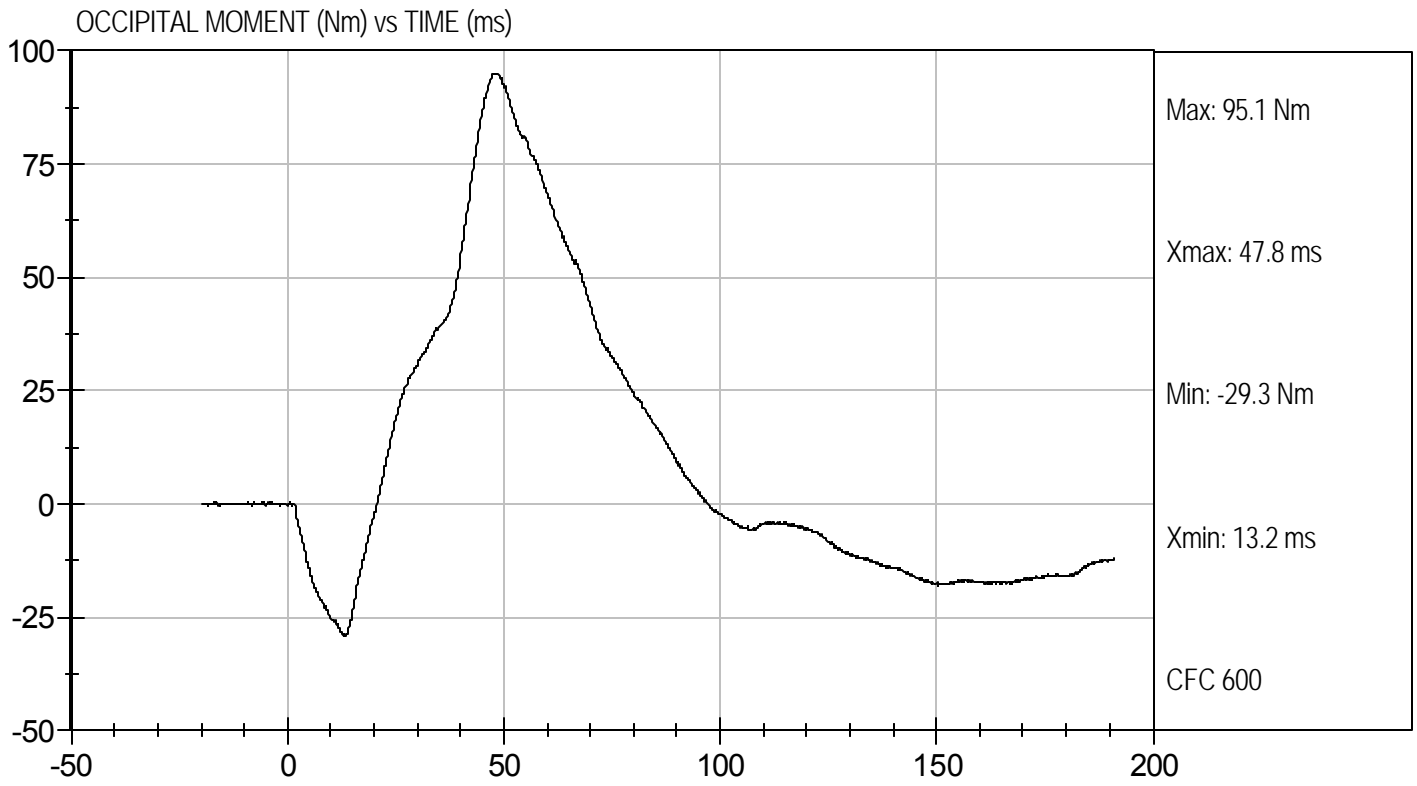
Test Date: 10/28/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D113612

Test Date: 10/28/11
Velocity: 23.15 ft/s, 7.06 m/s



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

ATD Serial No: 036

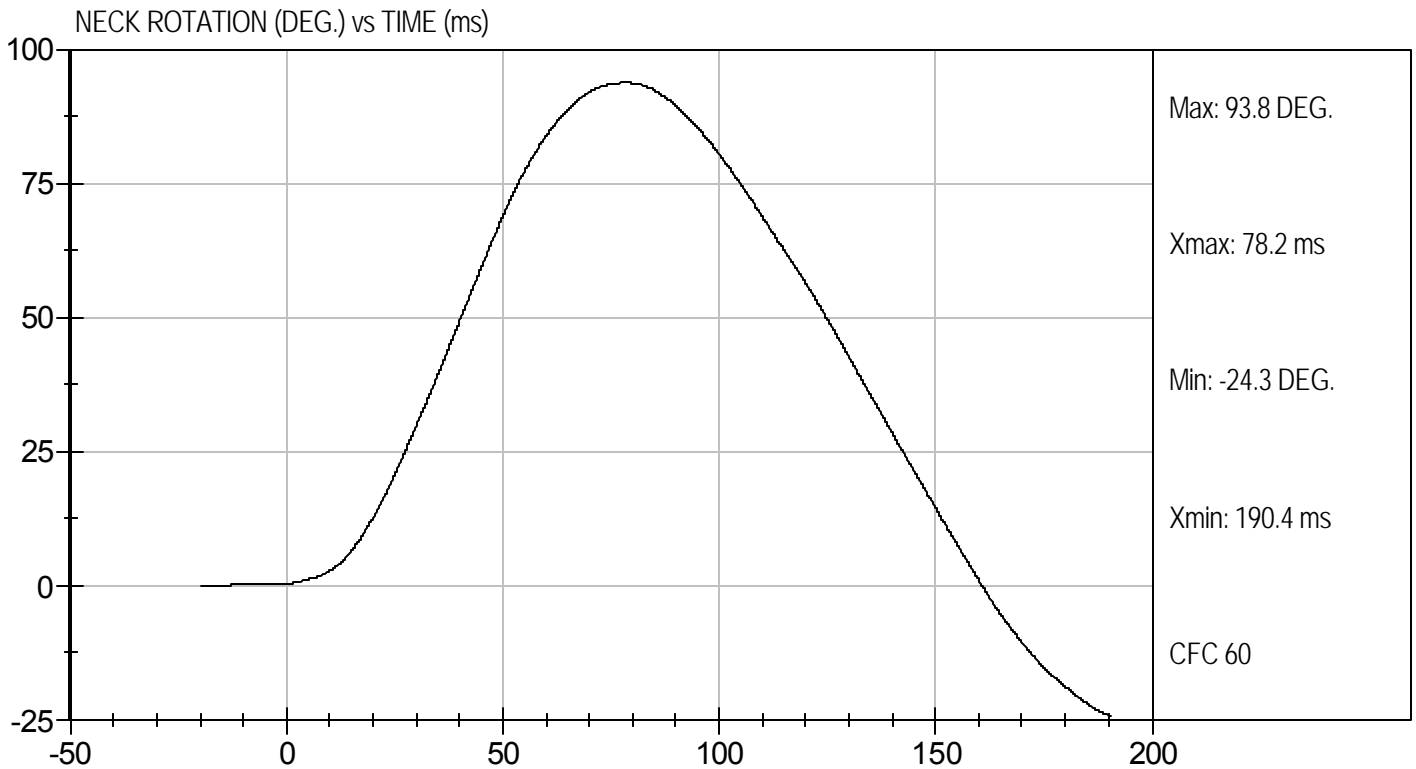
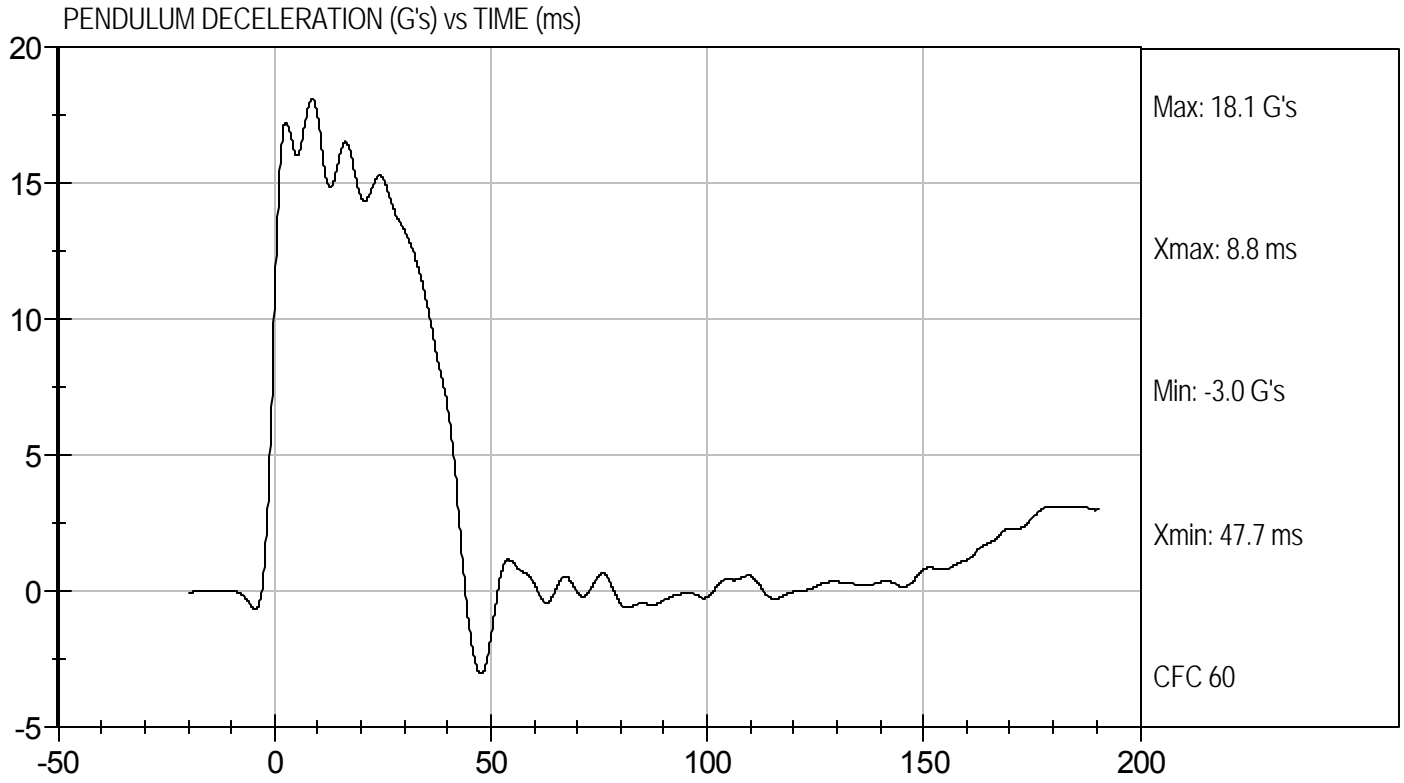
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Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	34	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.46	Pass
	20 ms	G's	14.00 to 19.00	14.47	Pass
	30 ms	G's	11.00 to 16.00	13.28	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.26	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	93.8	Pass
	Time	ms	72.0 to 82.0	78.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	160.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-59.0	Pass
	Time	ms	65.0 to 79.0	70.3	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.1	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

10/31/11
Test Date

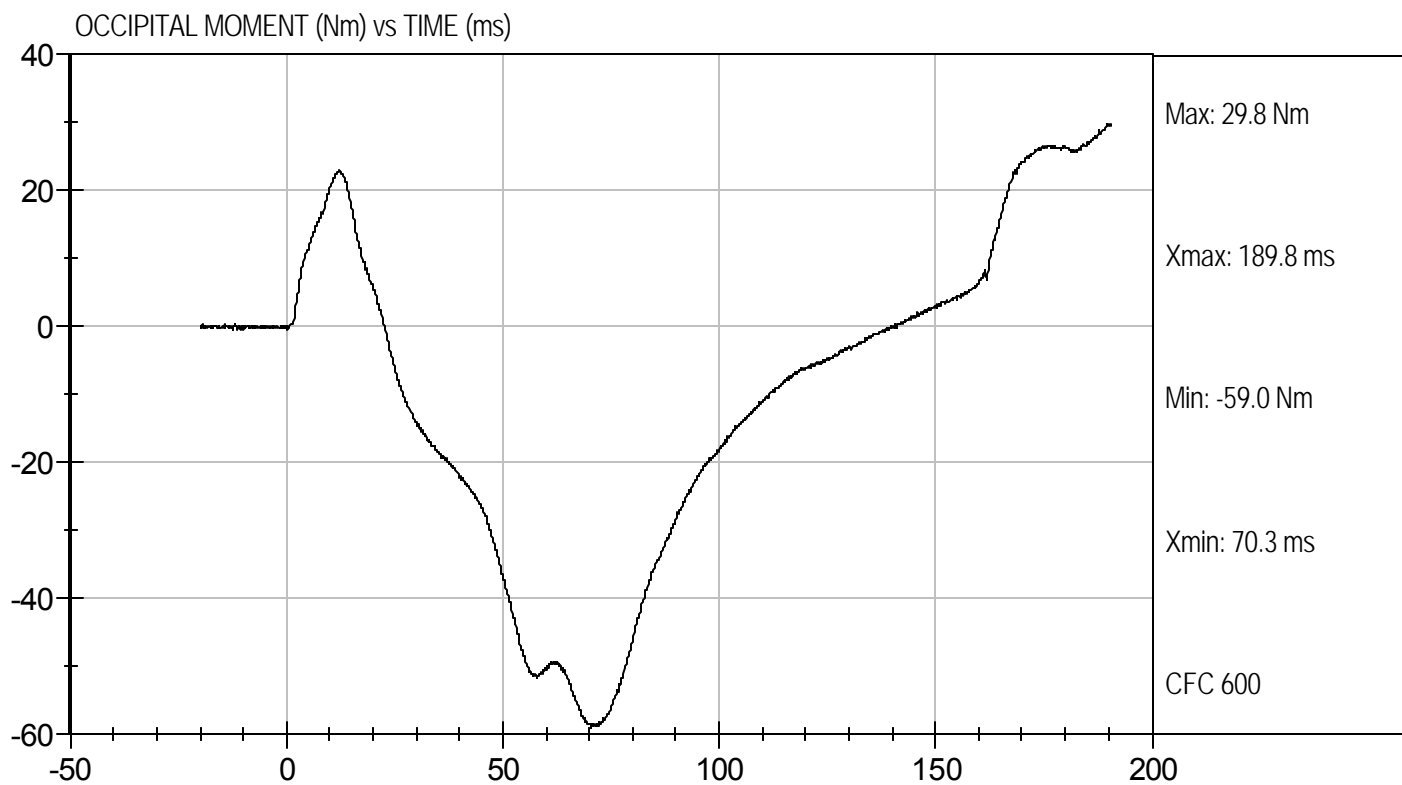
David Winkelbauer
Approved By





Test Desc: Neck Extension
Component ID: D113613

Test Date: 10/31/11
Velocity: 20.10 ft/s, 6.13 m/s



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


ATD Serial No: 036

Test I.D: D113614

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	34	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,424	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.78	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results				Pass


Laboratory Technician

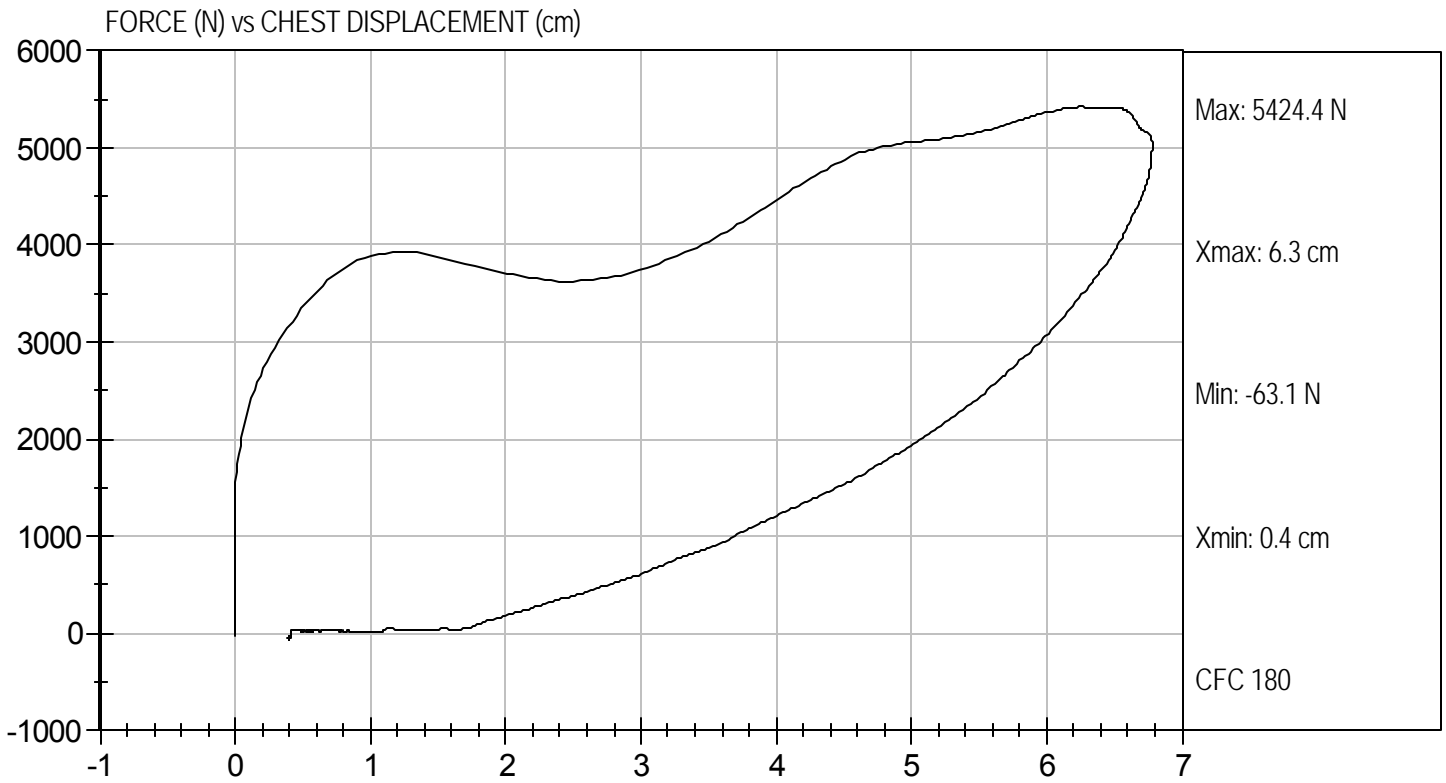
10/31/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113614

Test Date: 10/31/11
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 036

Test I.D: D113615


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	4,789	Pass
Overall Test Results				Pass



 Laboratory Technician

10/28/11

 Test Date

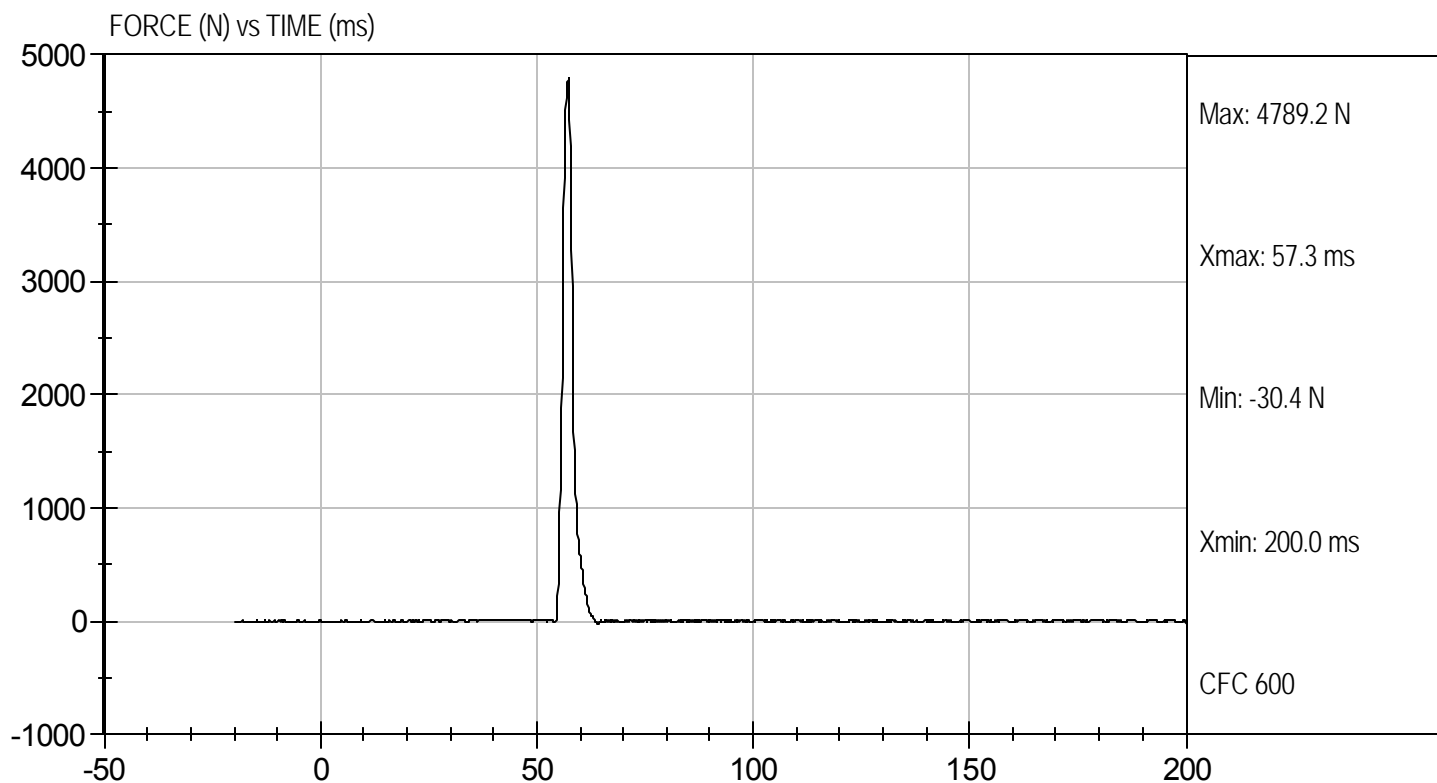


 Approved By



Test Desc: Right Knee
Component ID: D113615

Test Date: 10/28/11
Velocity: 6.92 ft/s, 2.11 m/s



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

ATD Serial No: 036

Test I.D: D113616

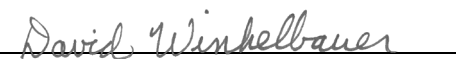
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,372	Pass
Overall Test Results				Pass



 Laboratory Technician

10/28/11

 Test Date

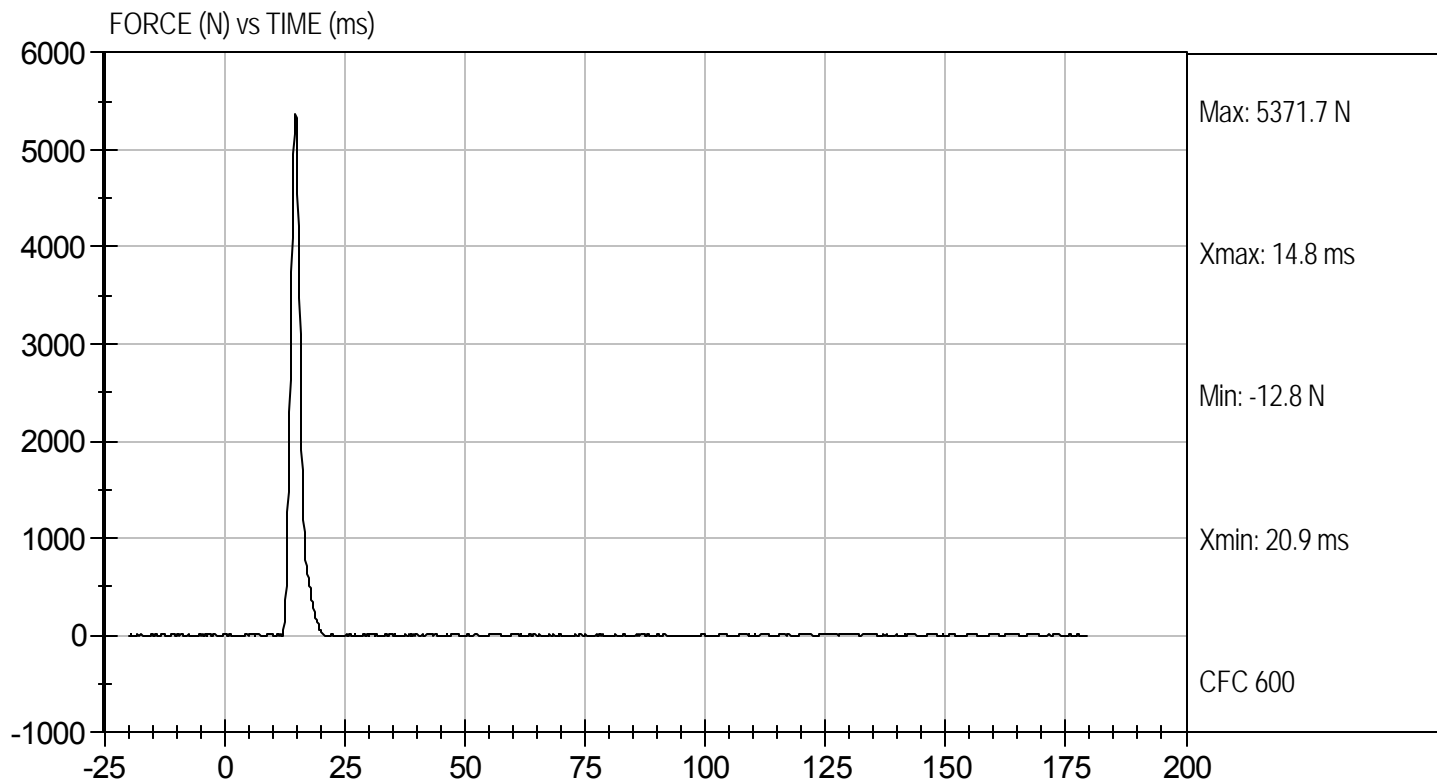


 Approved By



Test Desc: Left Knee
Component ID: D113616

Test Date: 10/28/11
Velocity: 6.94 ft/s, 2.12 m/s



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

ATD Serial No: 036

Test I.D: D113610

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.0	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	28	28	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	89.9	78.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	40.7	41.1	Pass
Overall Test Results					Pass

Jessica Hall
 Laboratory Technician

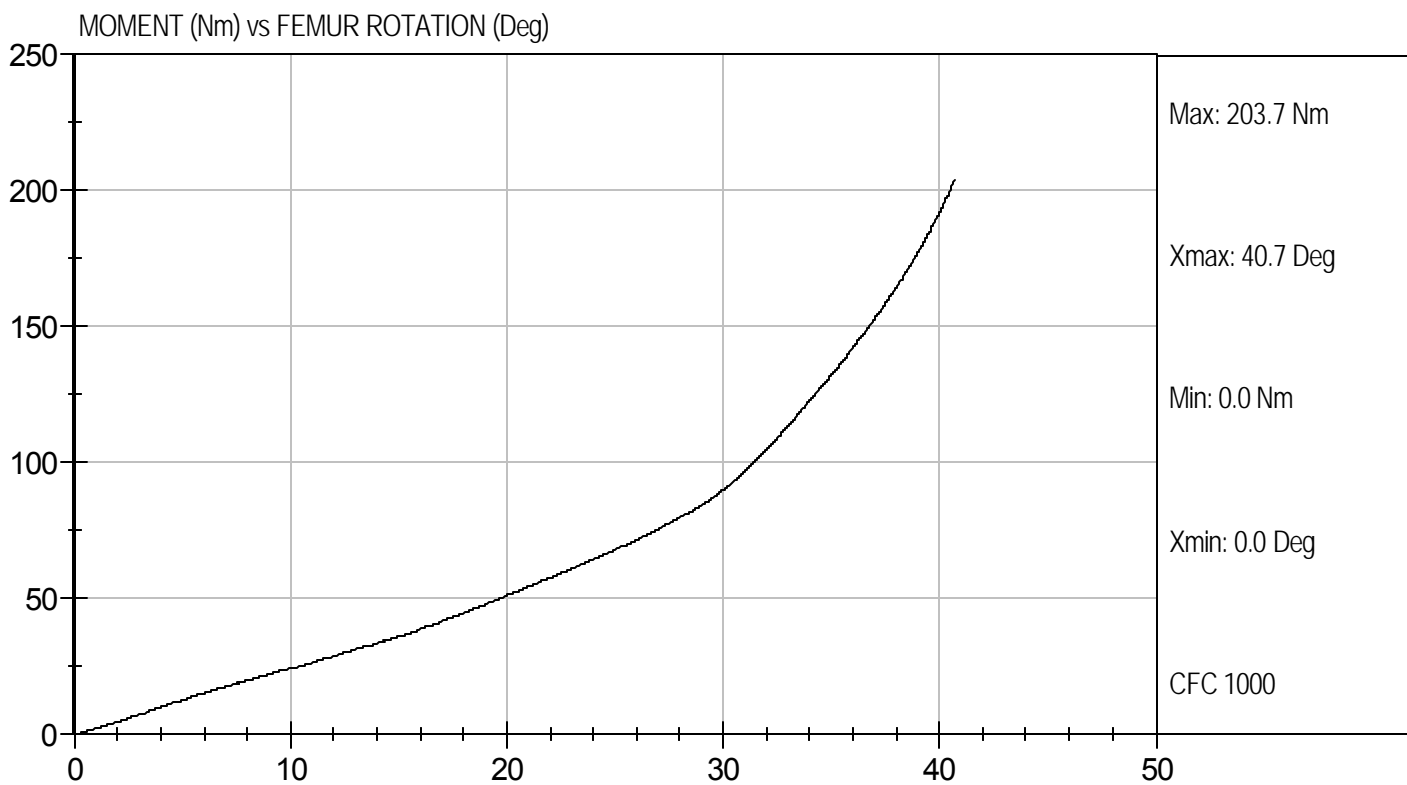
10/28/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Hip Femur Flexion
Component ID: D113619

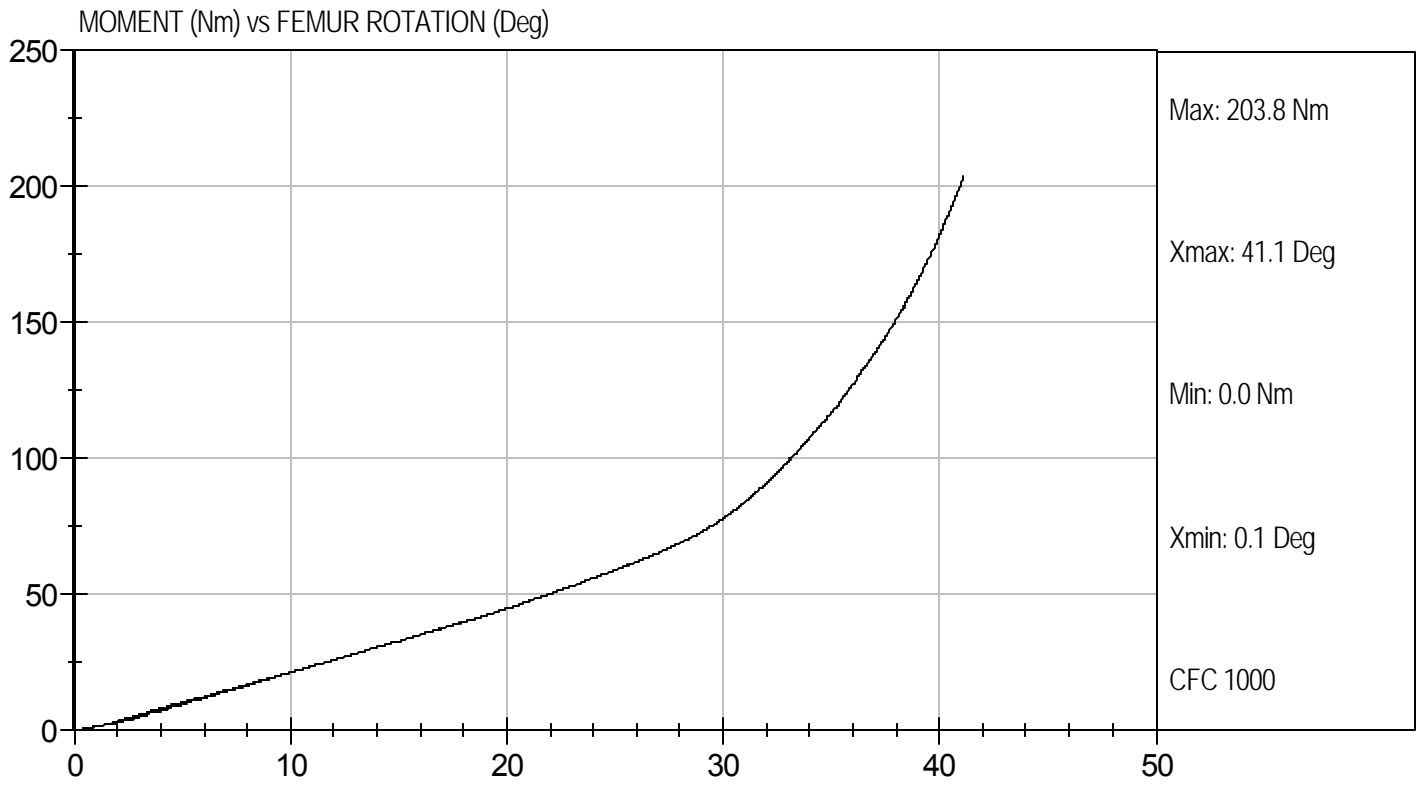
Test Date: 10/28/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D113610

Test Date: 10/28/11
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 036

Test ID: D113681

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Peak Resultant Acceleration	G's	225 - 275	242	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

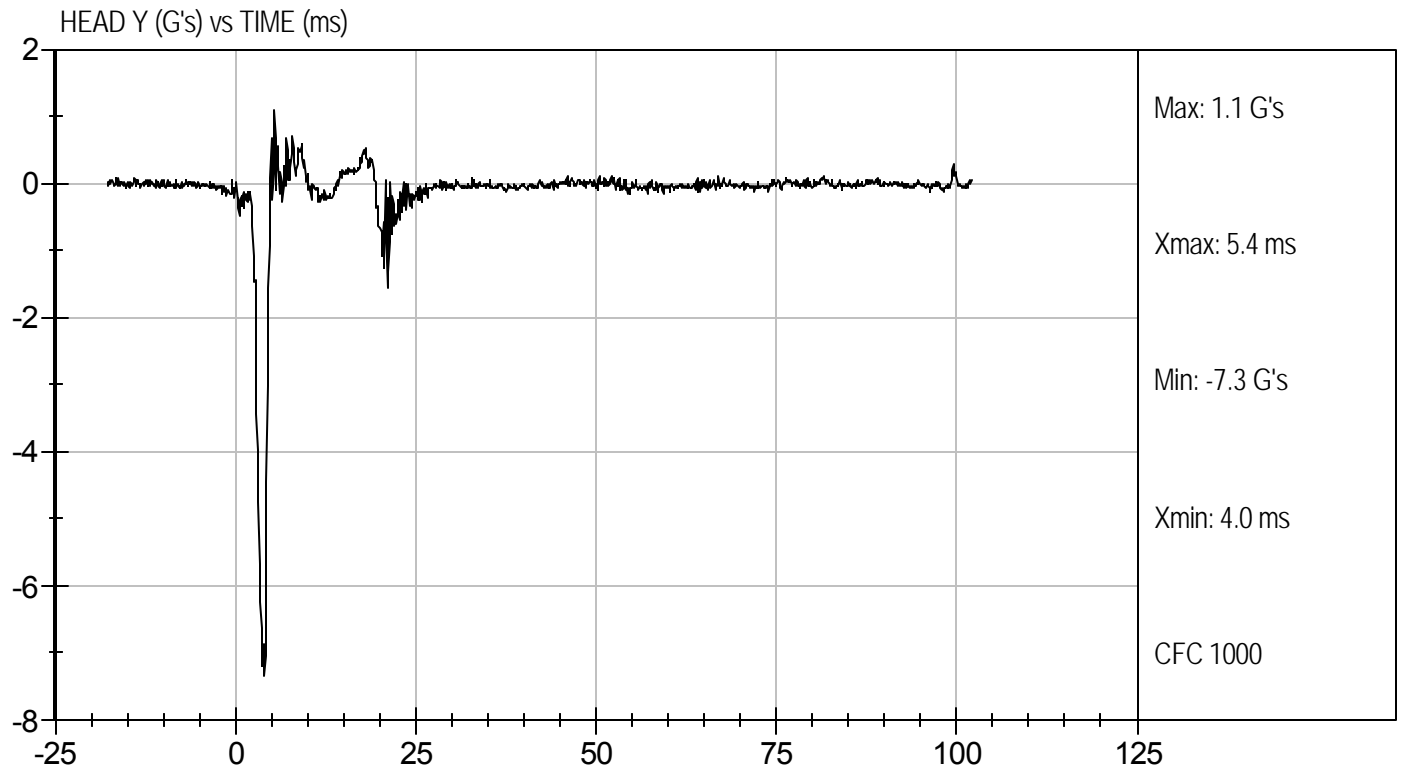
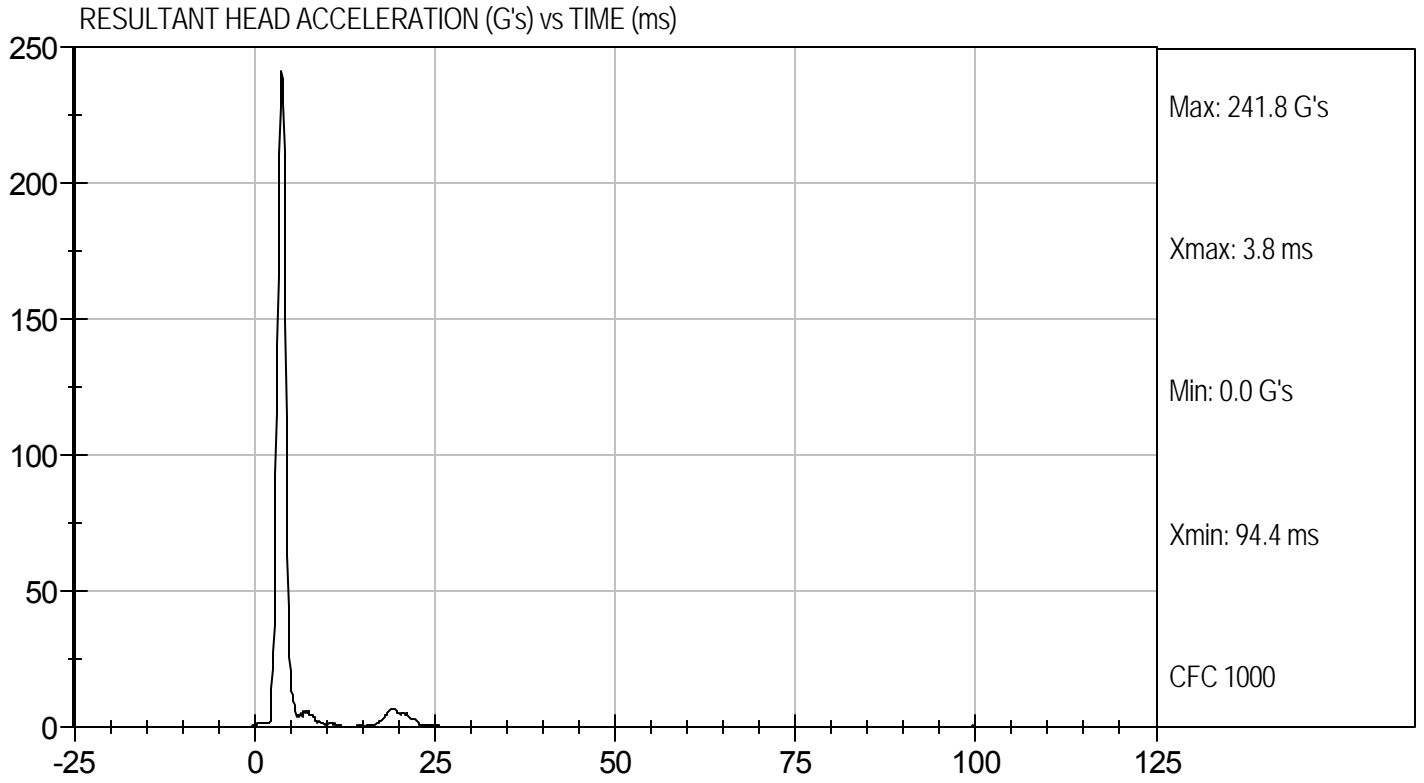
11/3/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Head Drop
Component ID: D113681

Test Date: 11/3/11
Velocity: 0 ft/s, 0.00 m/s



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

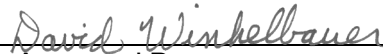
ATD Serial No: 036

Test I.D.: D113682

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	33	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.40	Pass
	20 ms	G's	17.60 to 22.60	18.36	Pass
	30 ms	G's	12.50 to 18.50	13.61	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	73.7	Pass
	Time	ms	57.0 to 64.0	59.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.1	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	98.0	Pass
	Time	ms	47.0 to 58.0	49.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.2	Pass
Overall Test Results					Pass


 Laboratory Technician

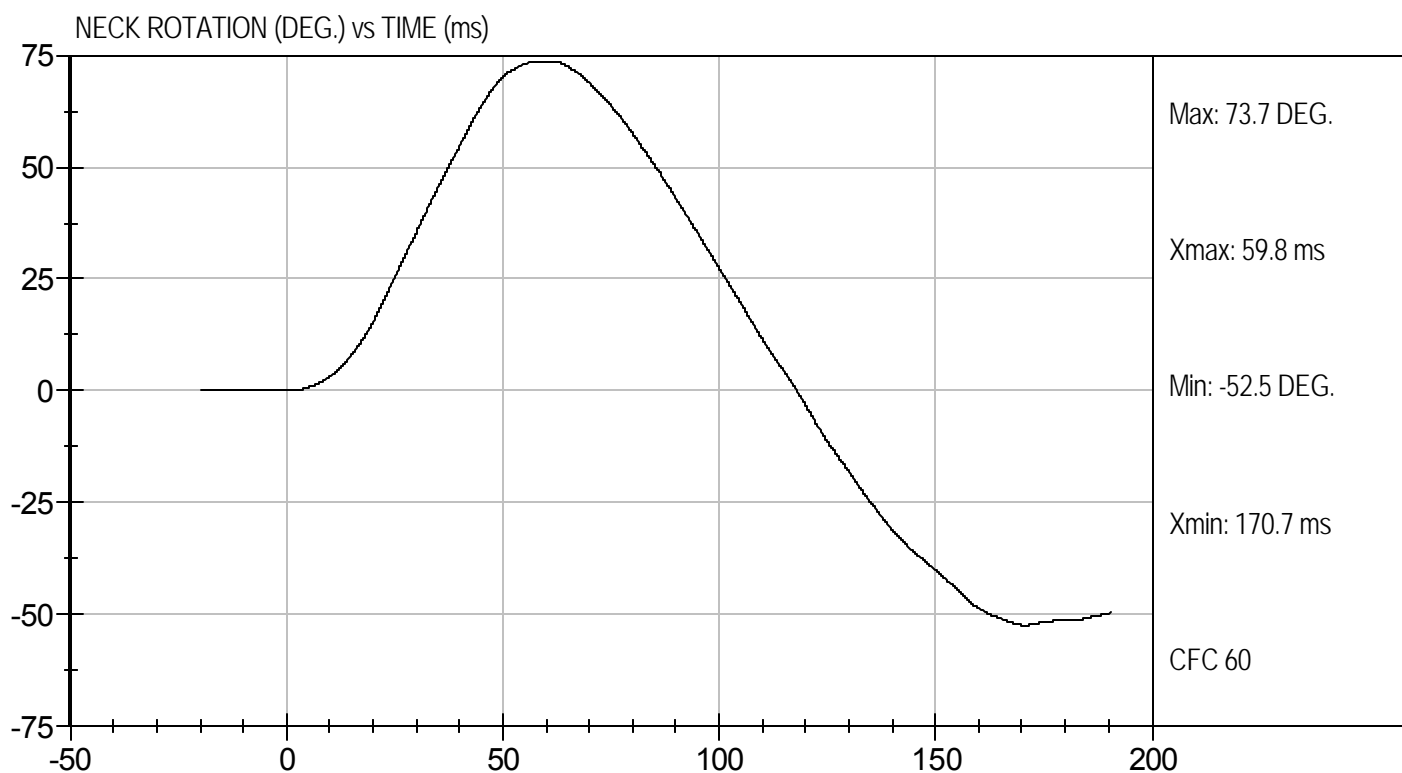
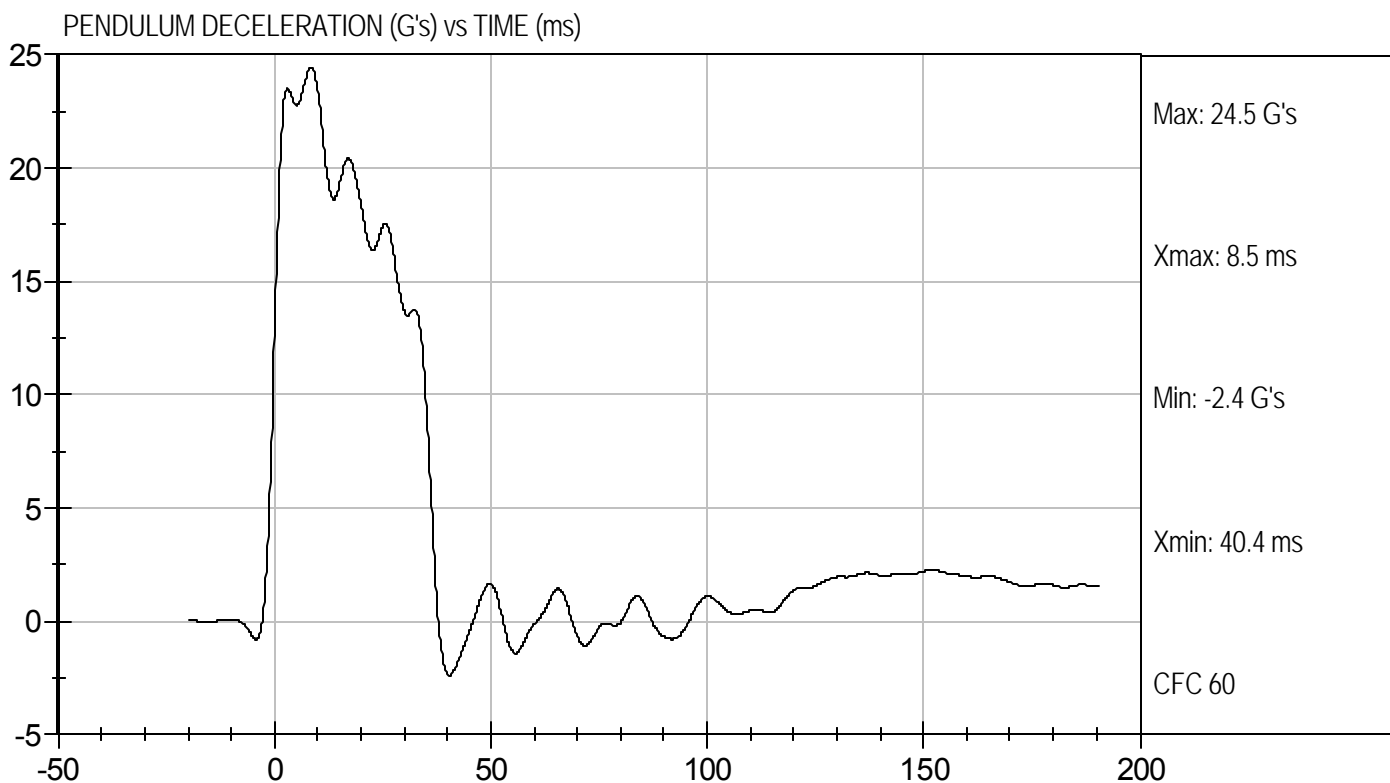
11/3/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D113682

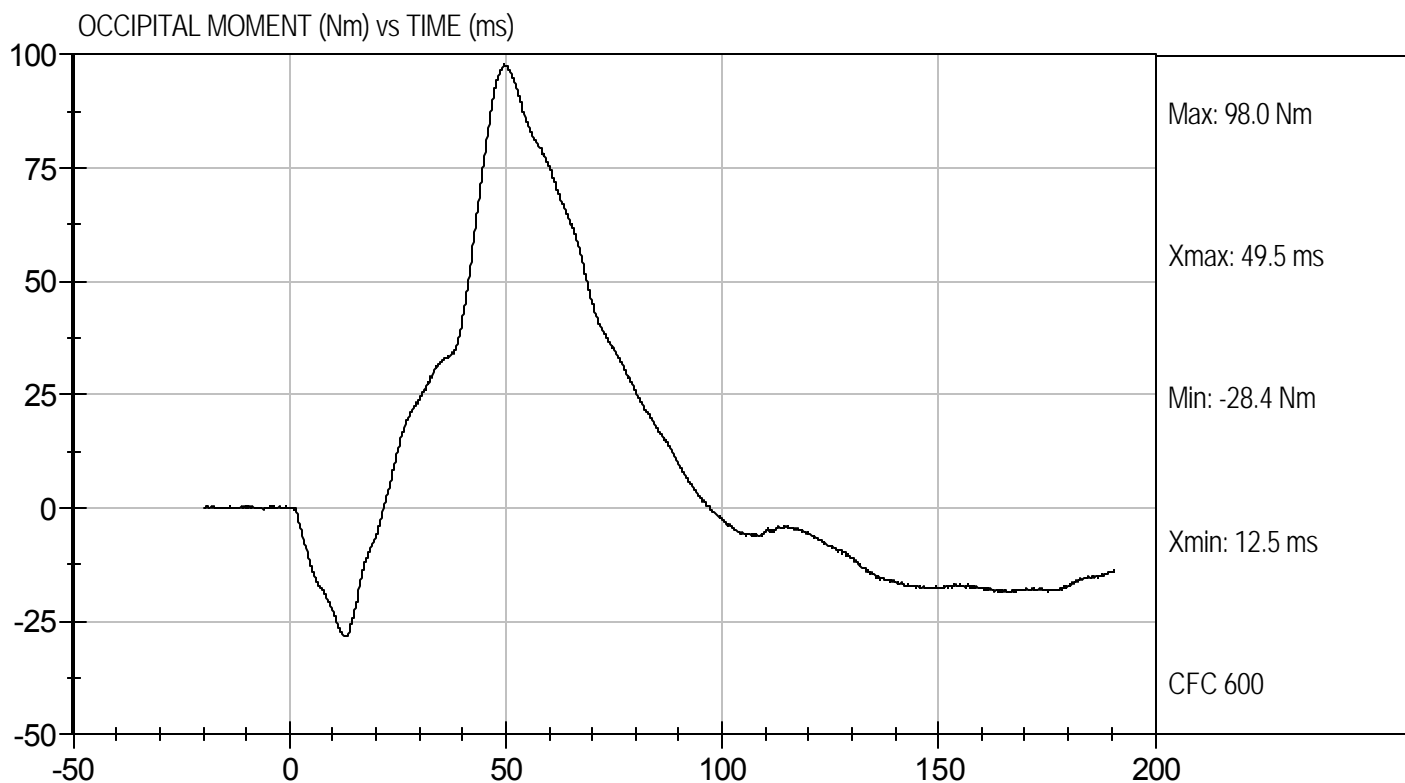
Test Date: 11/3/11
Velocity: 22.83 ft/s, 6.96 m/s





Test Desc: Neck Flexion
Component ID: D113682

Test Date: 11/3/11
Velocity: 22.83 ft/s, 6.96 m/s



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

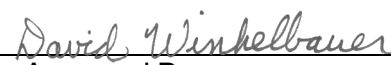
ATD Serial No: 036

Test I.D.: D113683

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	33	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.82	Pass
	20 ms	G's	14.00 to 19.00	15.19	Pass
	30 ms	G's	11.00 to 16.00	11.34	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.5	Pass
	Time	ms	72.0 to 82.0	77.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.7	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-69.3	Pass
	Time	ms	65.0 to 79.0	71.6	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.5	Pass
Overall Test Results					Pass


Laboratory Technician

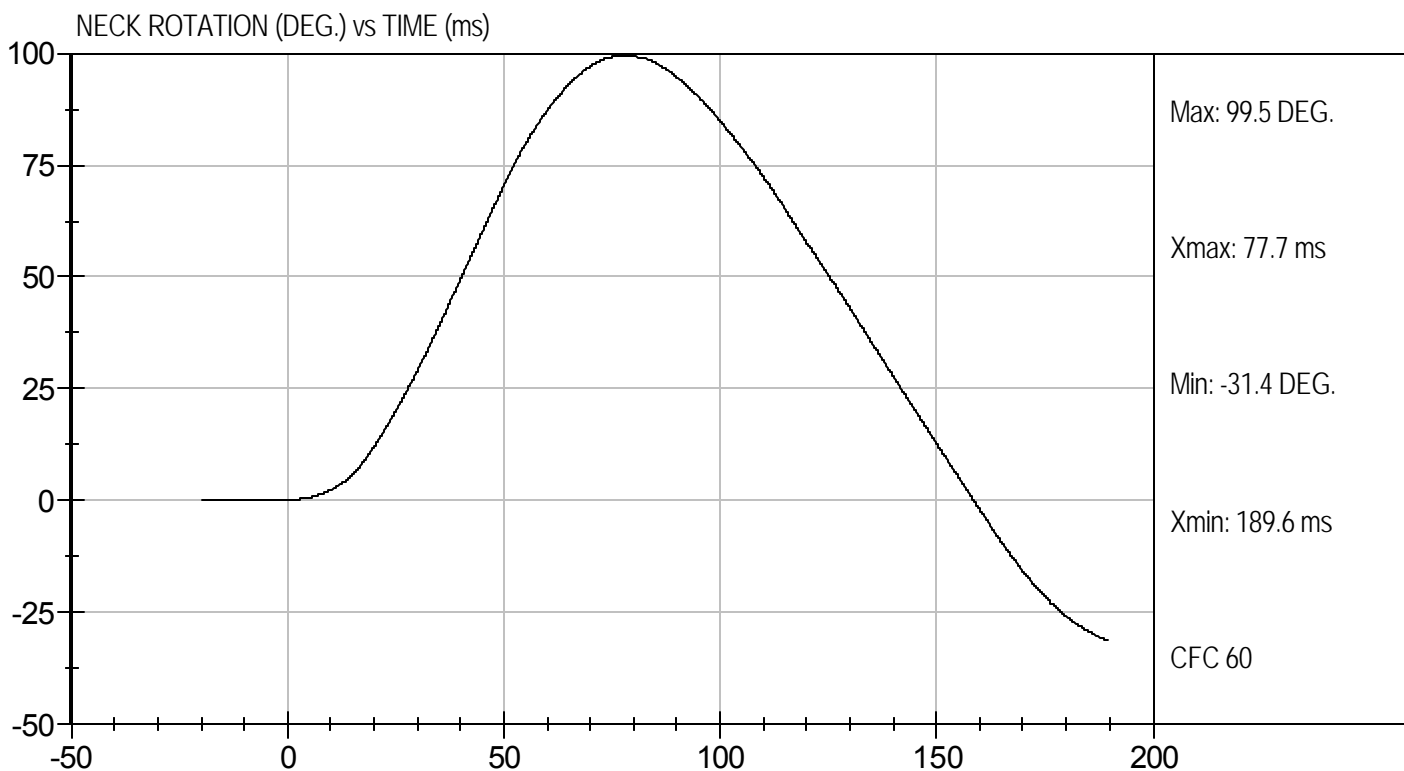
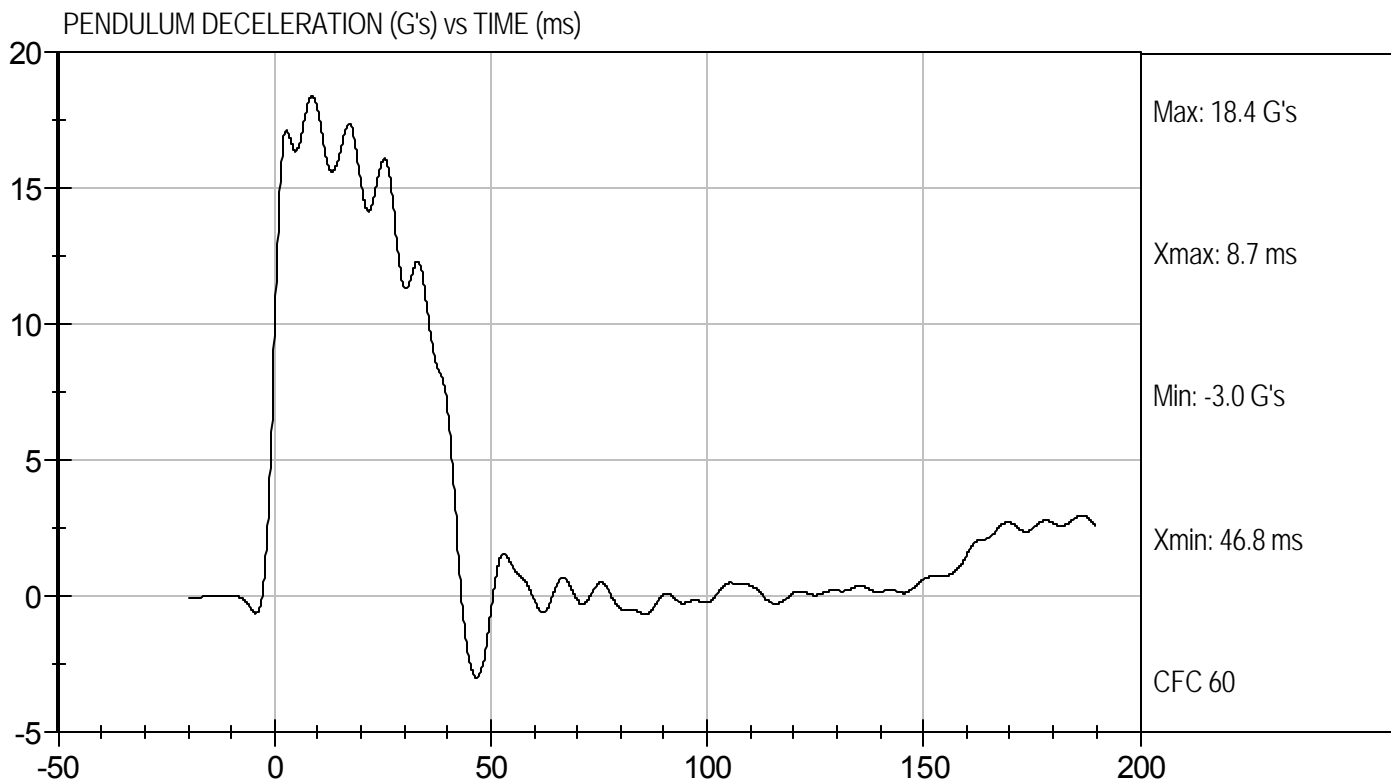
11/3/11
Test Date


Approved By



Test Desc: Neck Extension
Component ID: D113683

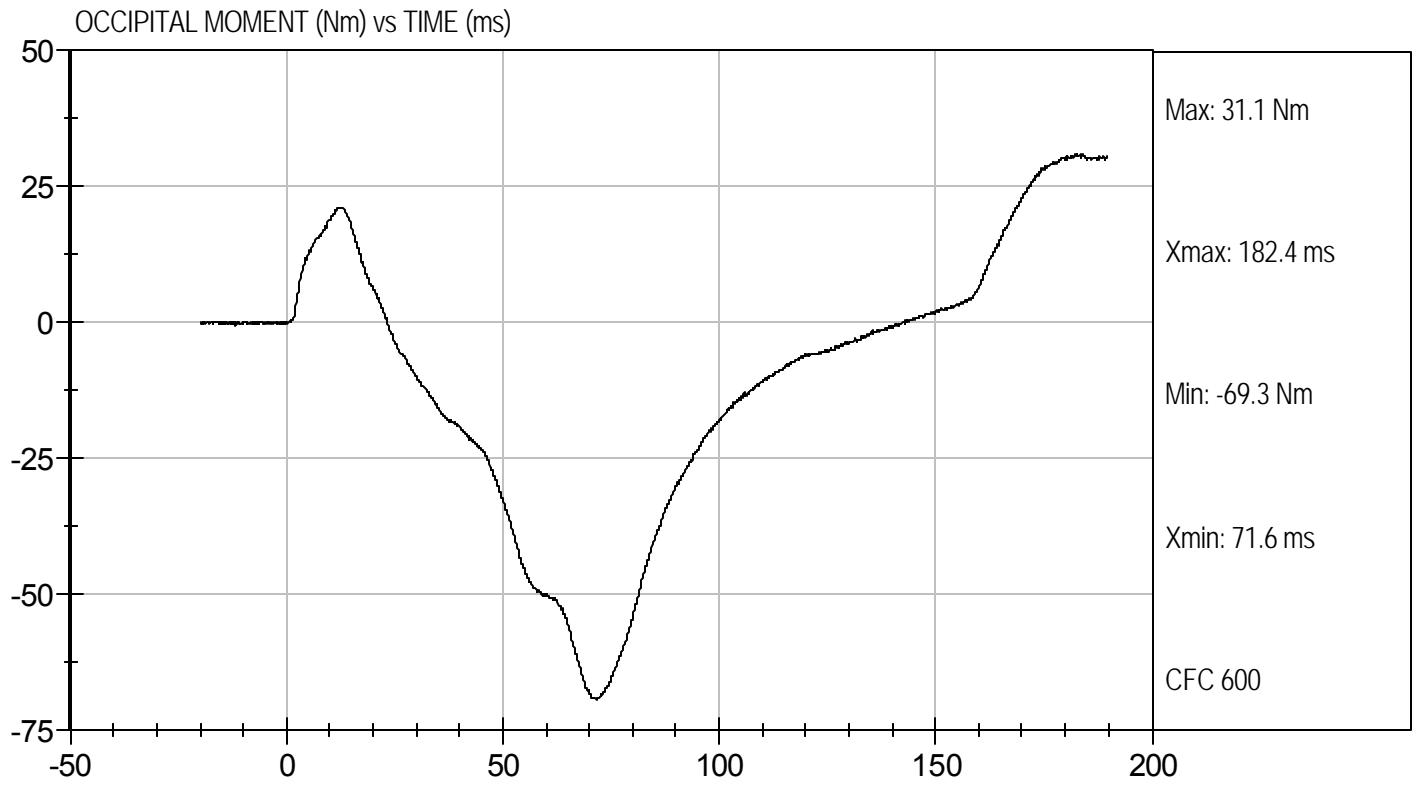
Test Date: 11/3/11
Velocity: 19.84 ft/s, 6.05 m/s





Test Desc: Neck Extension
Component ID: D113683

Test Date: 11/3/11
Velocity: 19.84 ft/s, 6.05 m/s



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

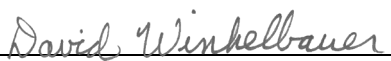
ATD Serial No: 036

Test I.D: D113684

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,628	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.83	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results				Pass


Laboratory Technician

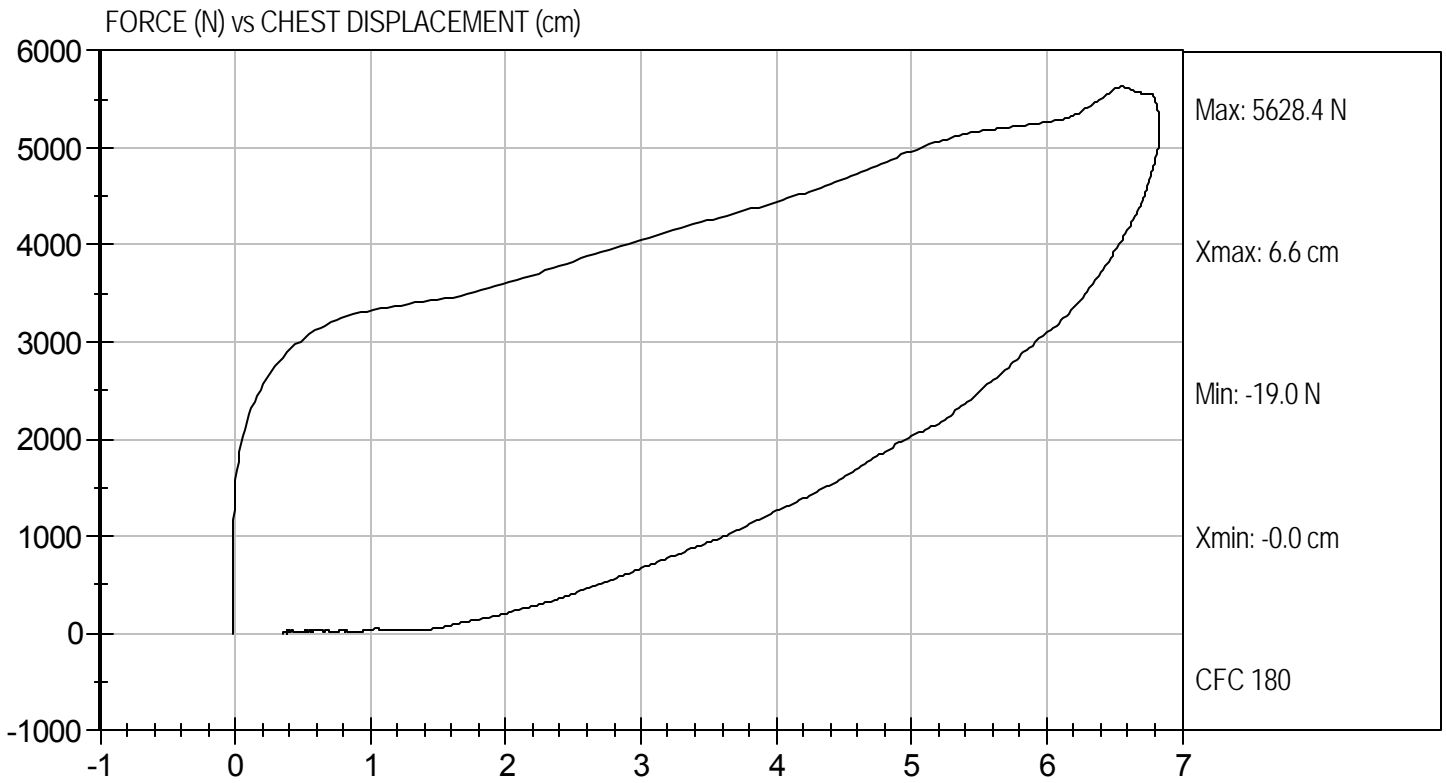
11/3/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113684

Test Date: 11/3/11
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 036

Test I.D: D113685

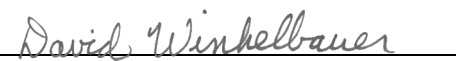
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,162	Pass
Overall Test Results				Pass



 Laboratory Technician

11/3/11

 Test Date

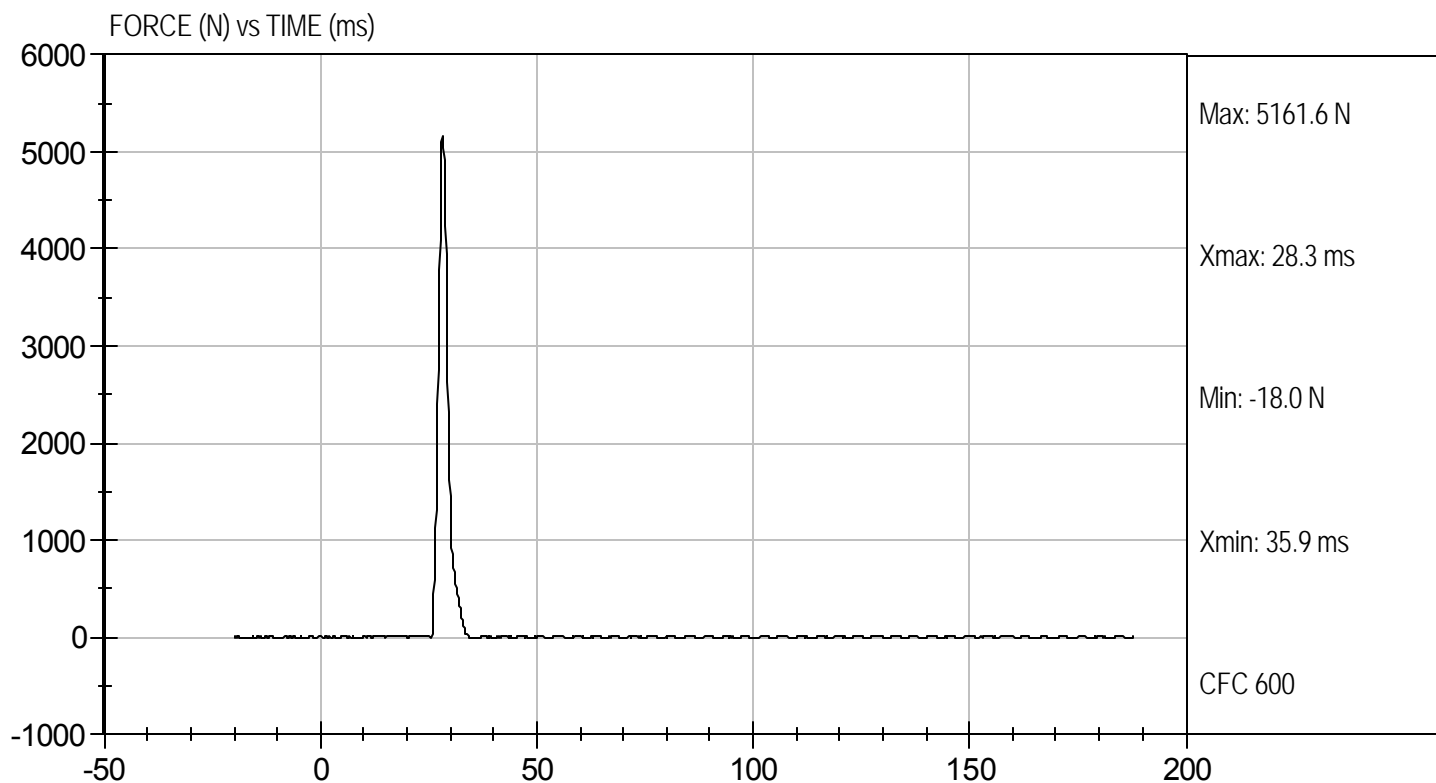


 Approved By



Test Desc: Right Knee
Component ID: D113685

Test Date: 11/3/11
Velocity: 6.97 ft/s, 2.12 m/s




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

ATD Serial No: 036

Test I.D: D113686

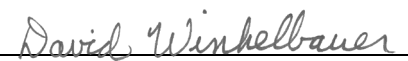
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,278	Pass
Overall Test Results				Pass



 Laboratory Technician

11/3/11

 Test Date

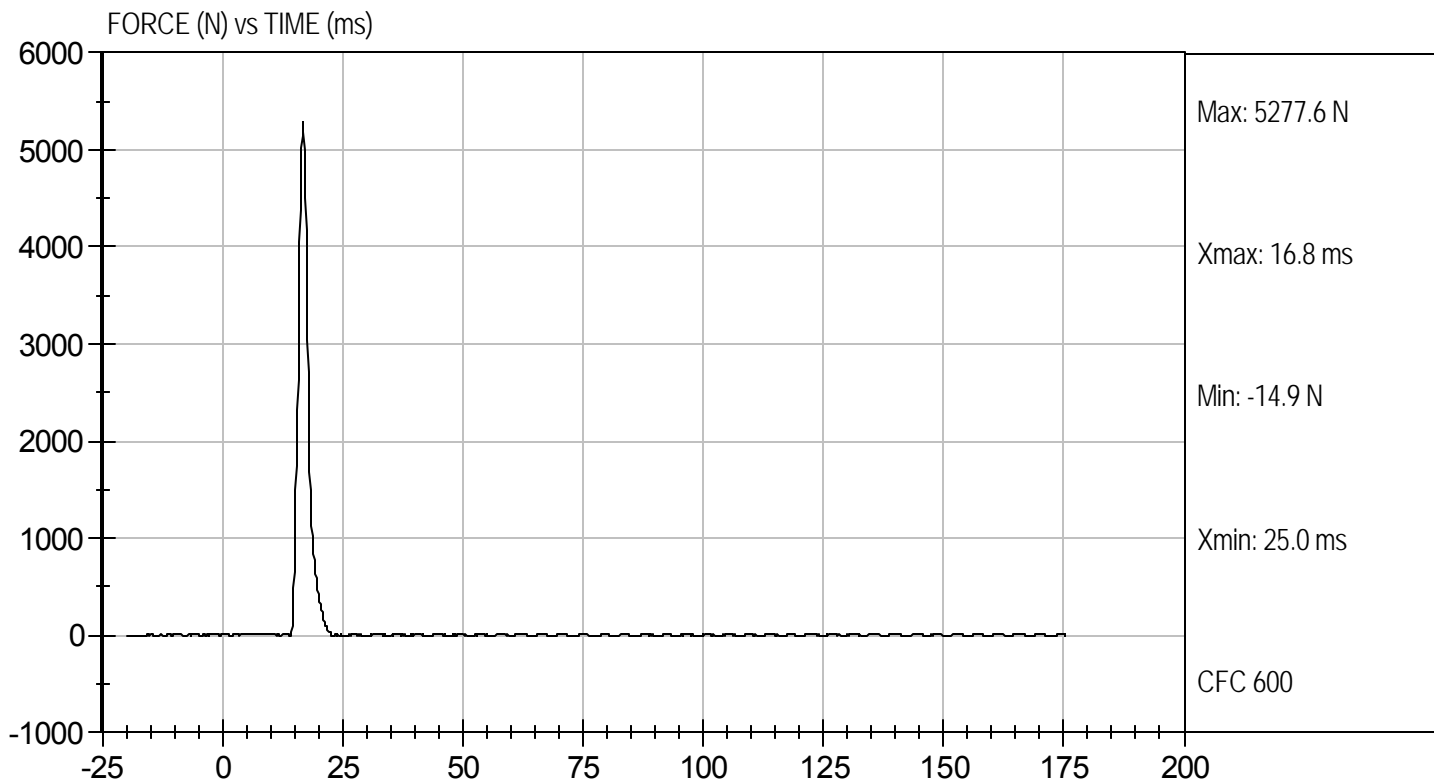


 Approved By



Test Desc: Left Knee
Component ID: D113686

Test Date: 11/3/11
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 036

Test I.D: D113680

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.3	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	35	35	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	94.1	78.3	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	40.1	41.0	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

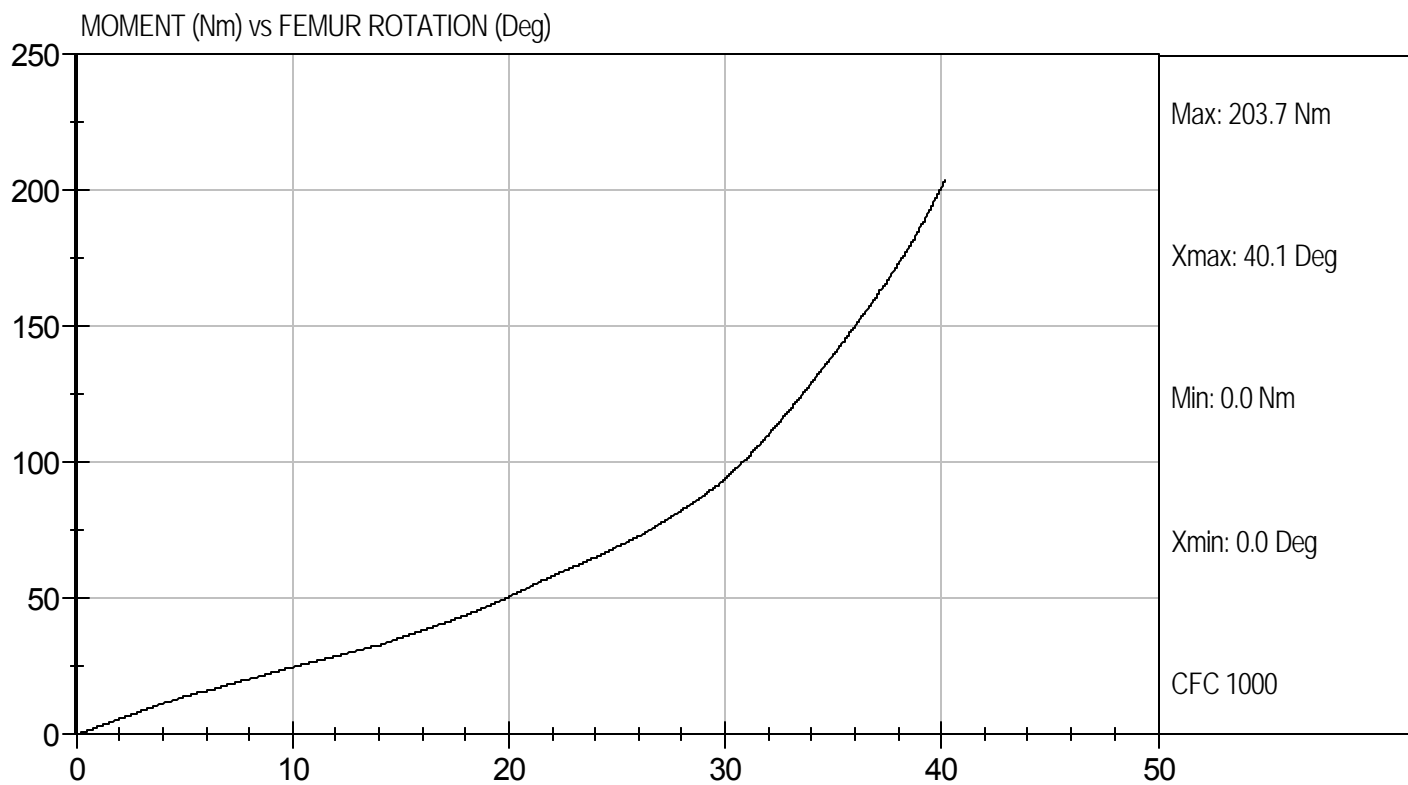
11/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D113689

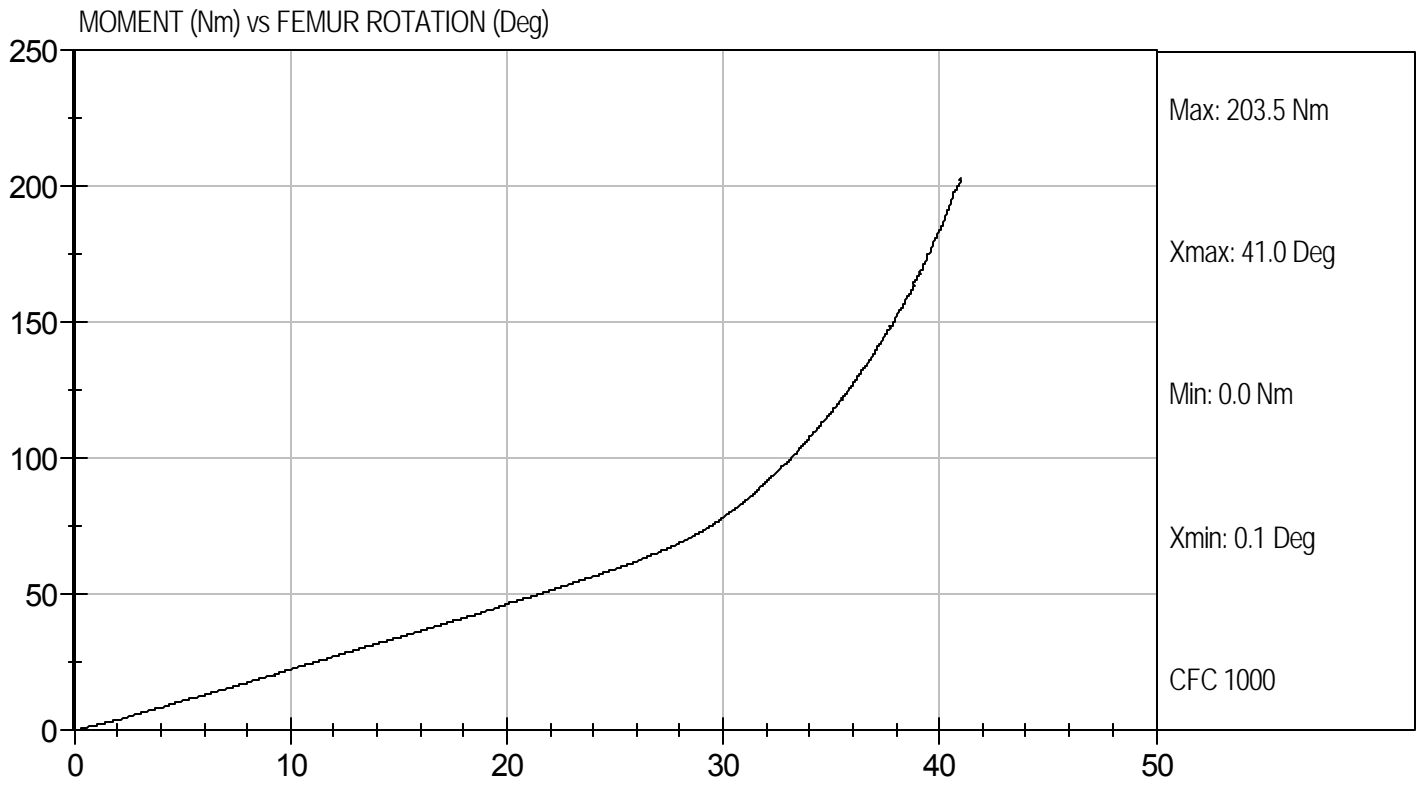
Test Date: 11/3/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D113680

Test Date: 11/3/11
Velocity: 0 ft/s, 0.00 m/s



**Hybrid III, 5th External Measurements
SN: 634**

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	784.6
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	449.0
C	H-POINT HEIGHT	Reference	81.3-86.3	85.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	145.0
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	79.2
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	125.6
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	253.4
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	277.8
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	197.5
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	541.4
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.1
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	400.4
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	428.6

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	181.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	224.7
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	482.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	139.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	179.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	306.1
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	355.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	90.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	540.6
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	868.7
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	786.8
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: 634

Test ID: D113581

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	35	Pass
Peak Resultant Acceleration	G's	250 to 300	286	Pass
Peak Lateral Acceleration	G's	+/- 15	-5.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

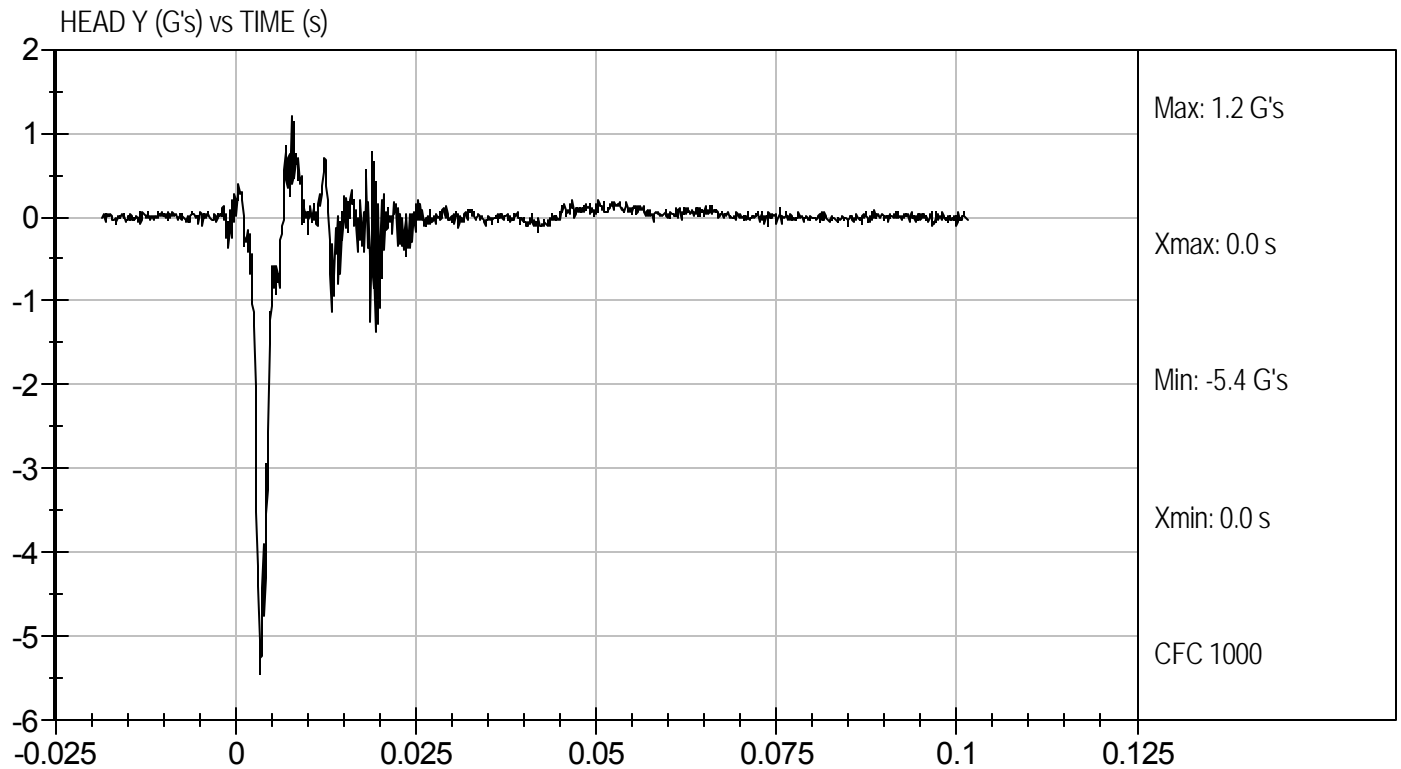
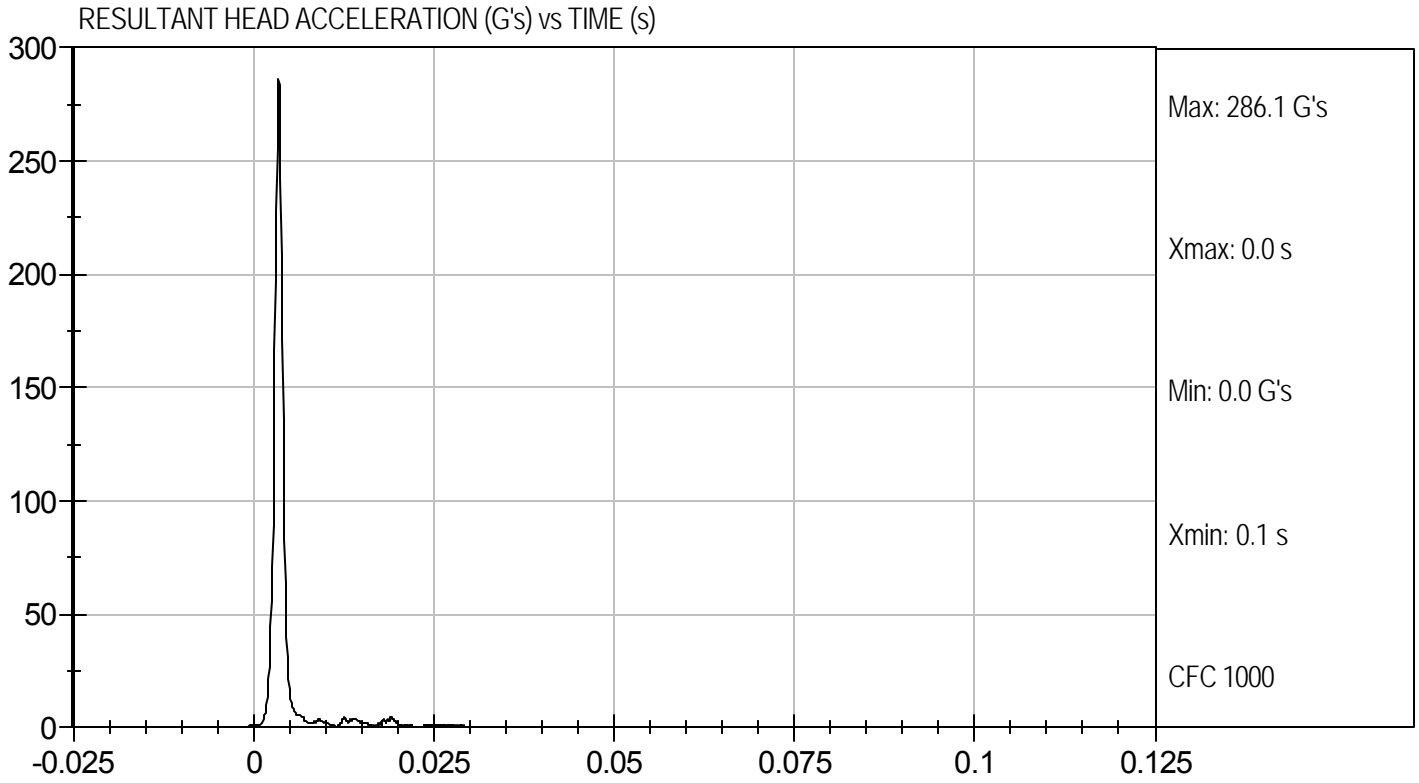
10/26/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Head Drop
Component ID: D113581

Test Date: 10/26/11
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE


ATD Serial No: 634

Test I.D.: D113582

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	35	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.3	Pass
D Plane Rotation	Max	deg	77 to 91	77	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
				Overall Results	Pass


 Laboratory Technician

10/27/11
 Test Date

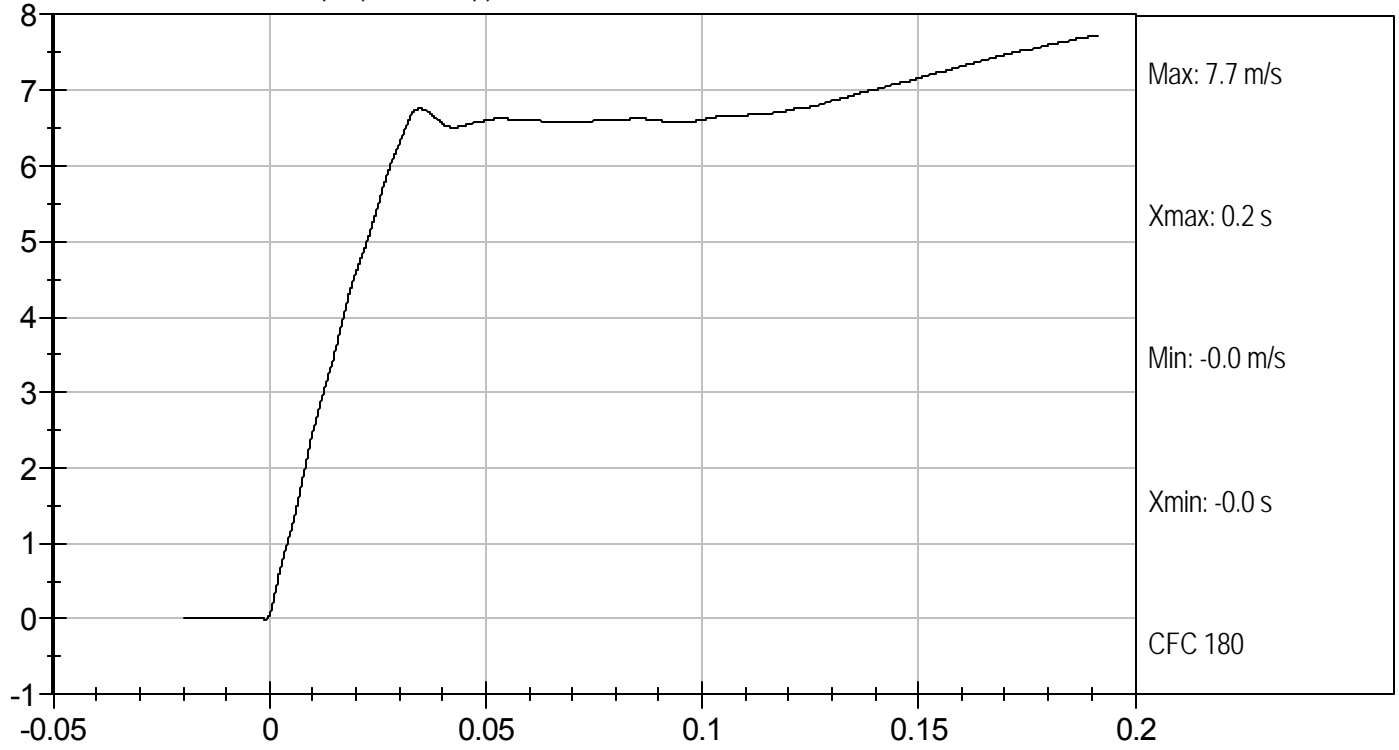

 Approved By



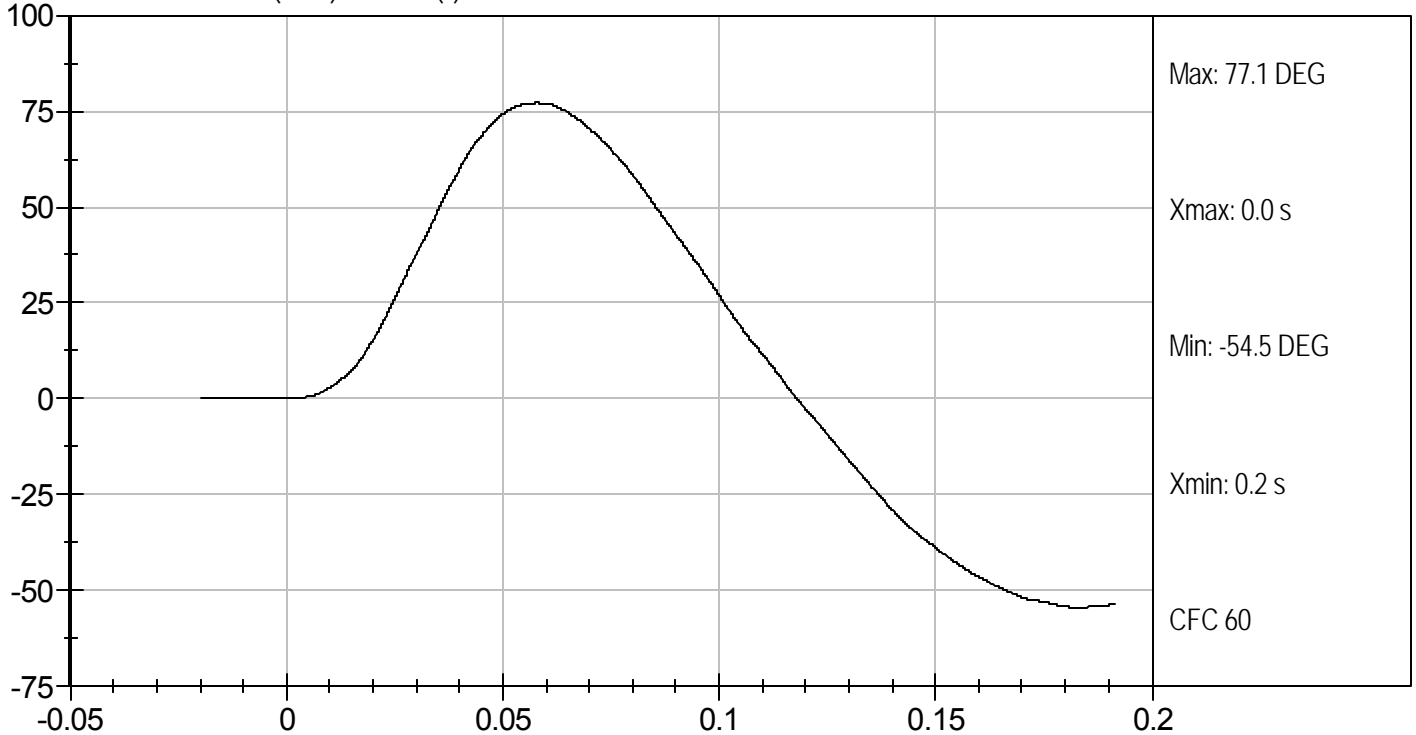
Test Desc: Neck Flexion
Component ID: D113582

Test Date: 10/27/11
Velocity: 23.15 ft/s, 7.06 m/s

PENDULUM VELOCITY (m/s) vs TIME (s)



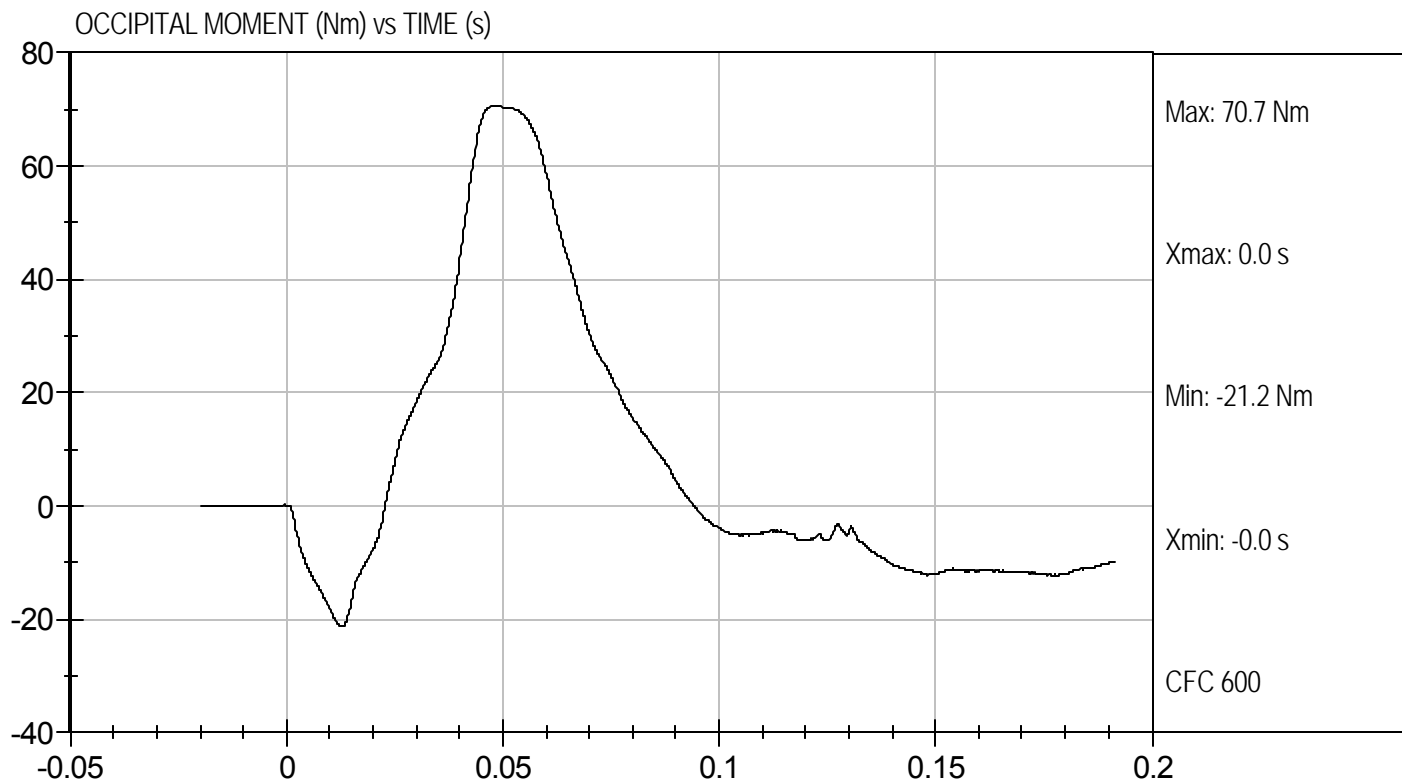
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D113582

Test Date: 10/27/11
Velocity: 23.15 ft/s, 7.06 m/s

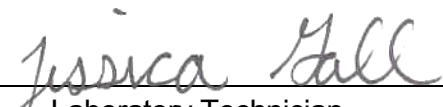


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE


ATD Serial No: 634

Test I.D.: D113583

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	34	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	102	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass


 Laboratory Technician

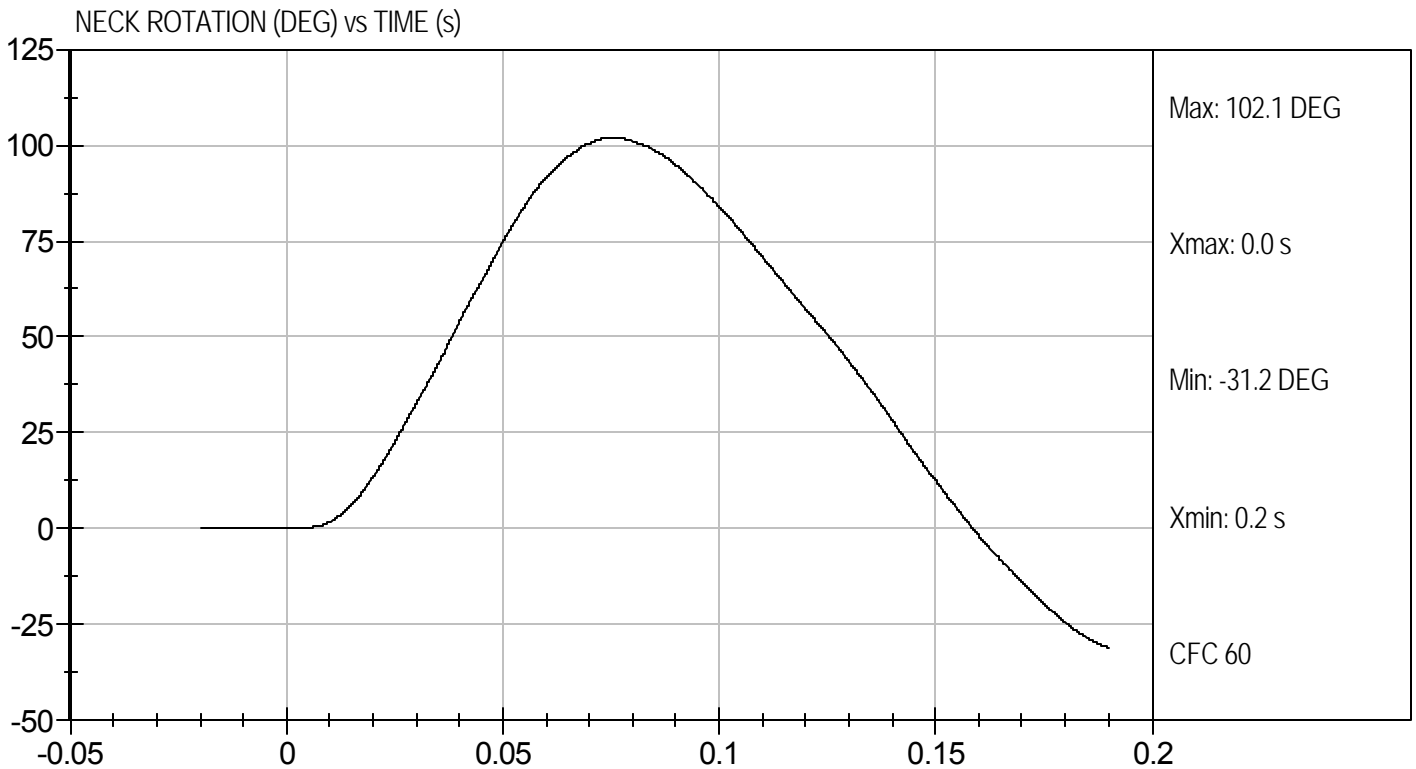
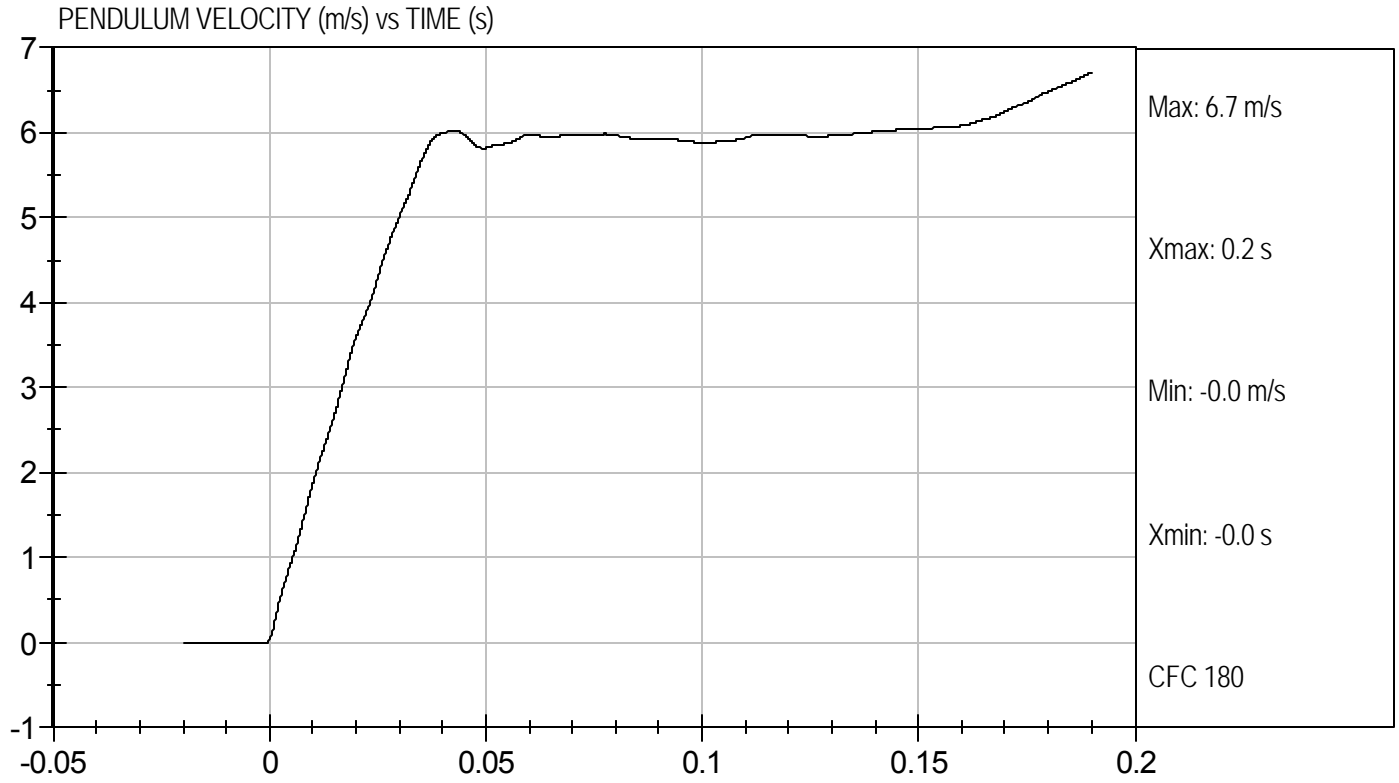
10/27/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D113583

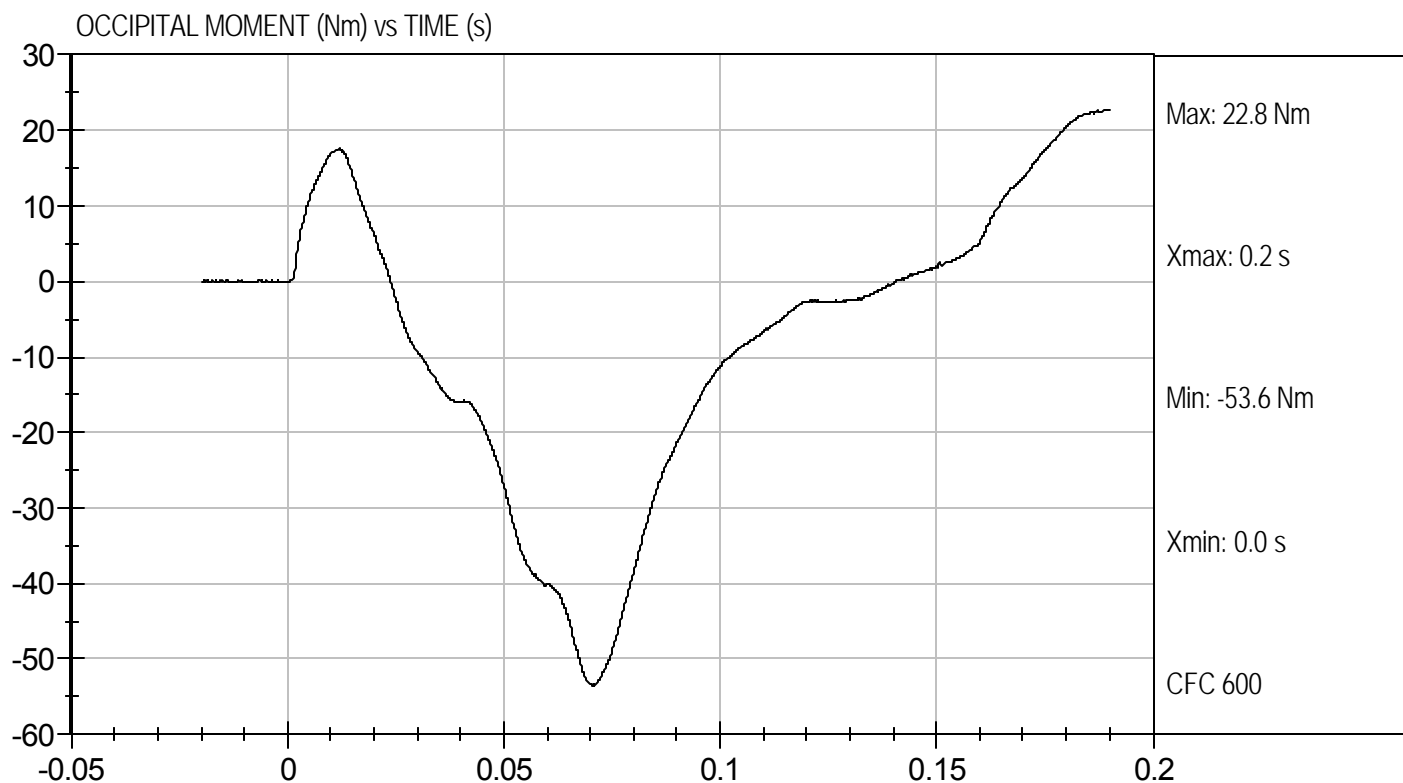
Test Date: 10/27/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D113583

Test Date: 10/27/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113584

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Relative Humidity	%	10 to 70	34	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	50	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.0	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4221	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

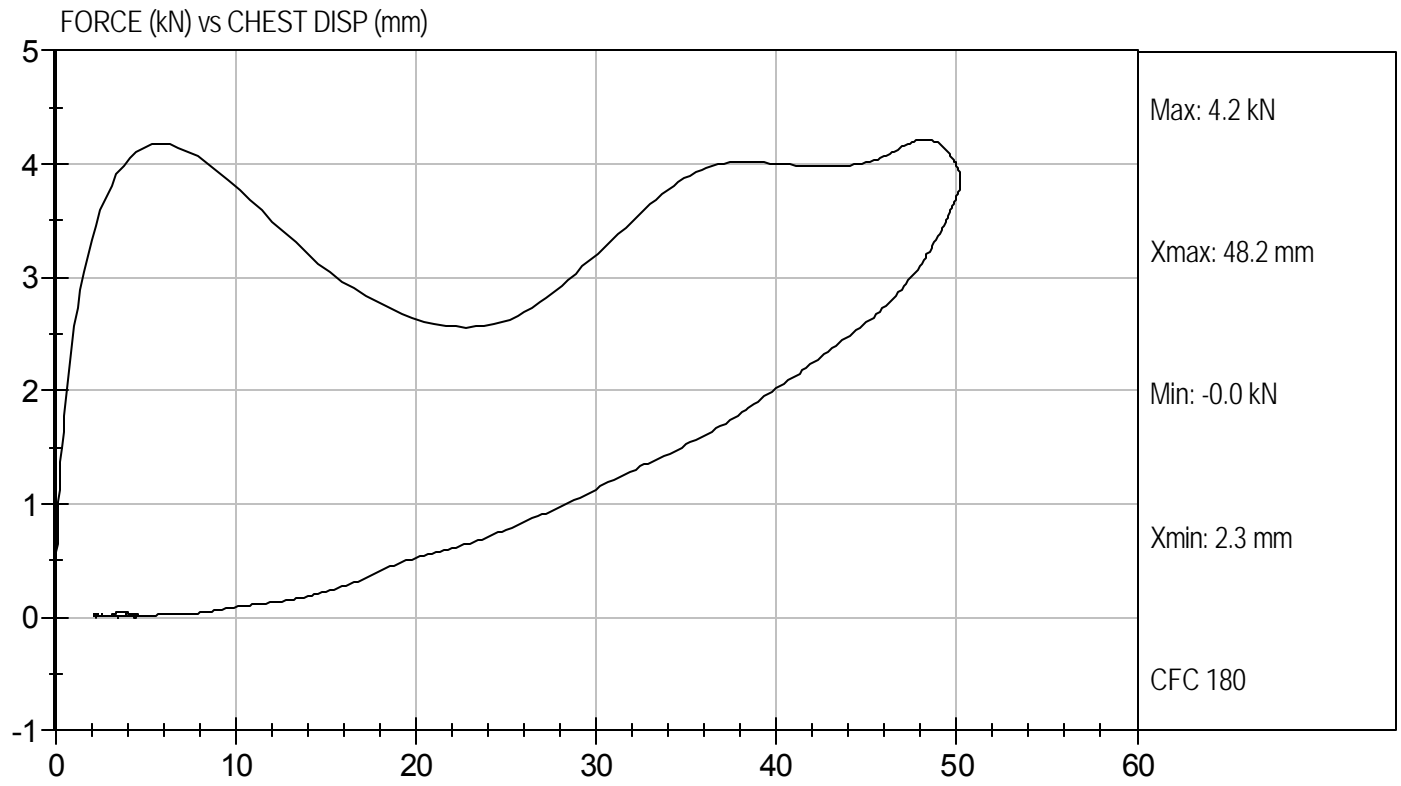
 10/26/11
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax Impact
Component ID: D113584

Test Date: 10/26/11
Velocity: 21.92 ft/s, 6.68 m/s



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

ATD Serial No: 634

Test I.D: D113585


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.80	Pass
Overall Test Results				Pass



 Laboratory Technician

10/27/11

 Test Date

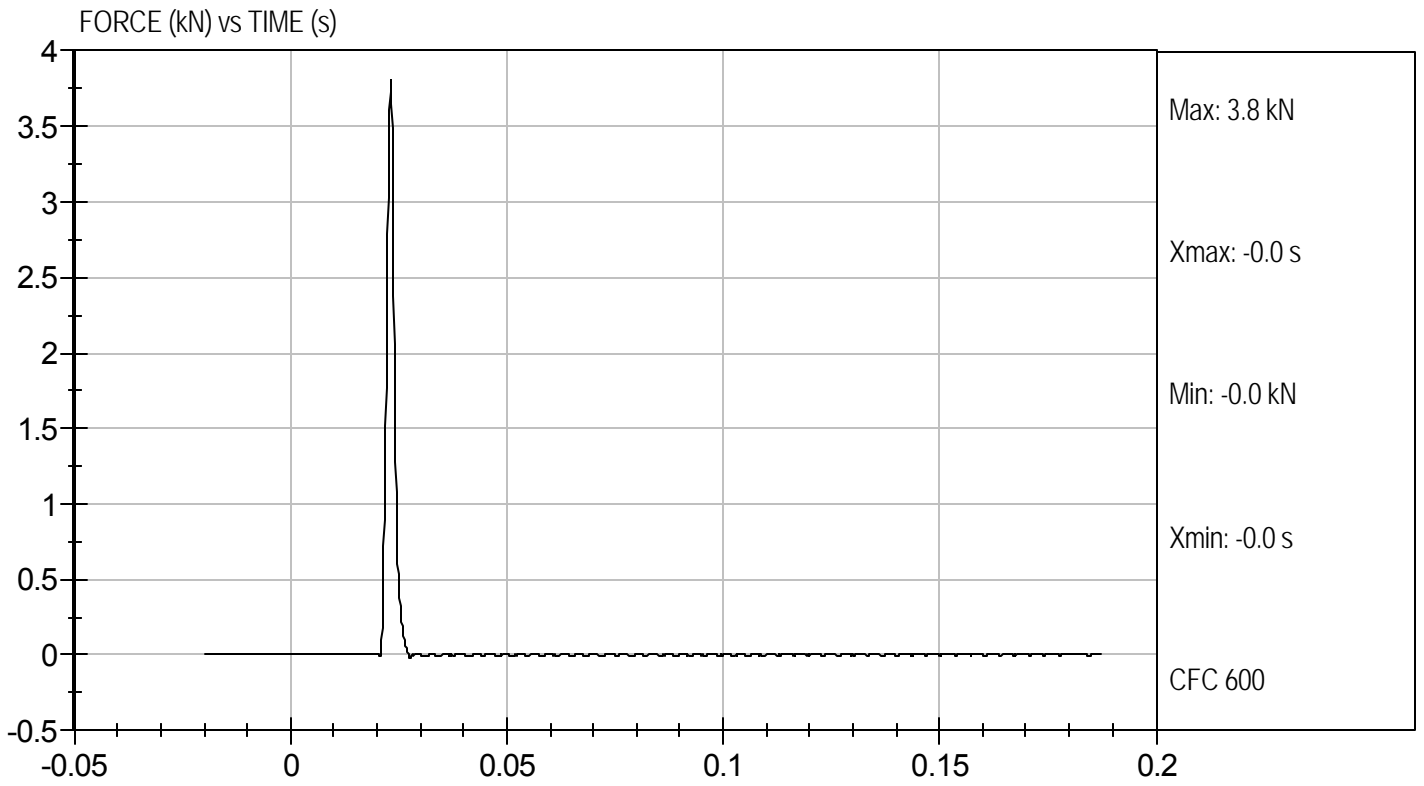


 Approved By



Test Desc: Right Knee
Component ID: D113585

Test Date: 10/27/11
Velocity: 6.94 ft/s, 2.12 m/s



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

ATD Serial No: 634

Test I.D: D113586


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.79	Pass
Overall Test Results				Pass



 Laboratory Technician

10/27/11

 Test Date

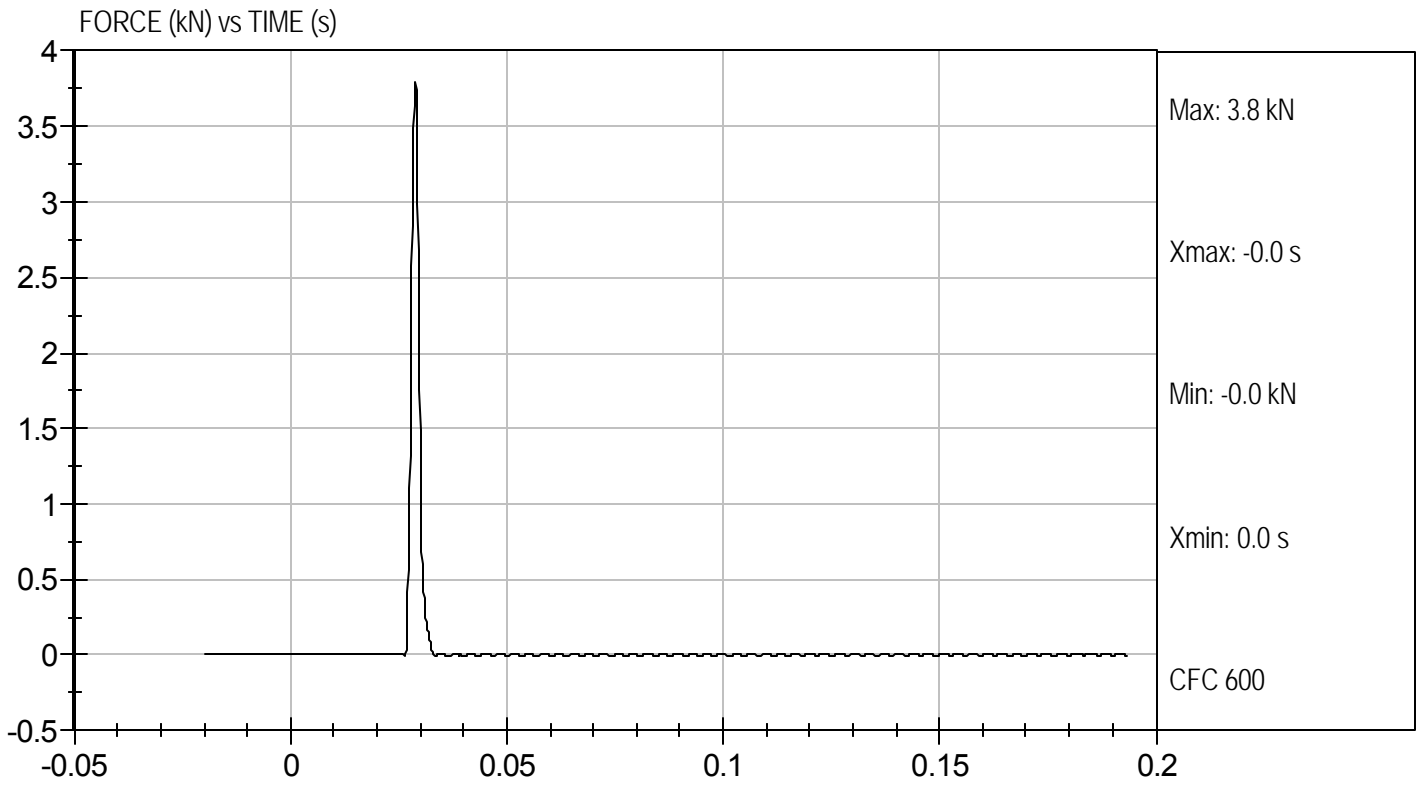


 Approved By



Test Desc: Left Knee
Component ID: D113586

Test Date: 10/27/11
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

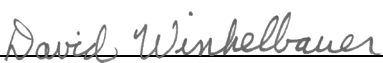
ATD Serial No: 634

Test I.D: D113587

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	34	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	389	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


 Laboratory Technician

10/27/11
 Test Date


 Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D113691

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	36	Pass
Peak Resultant Acceleration	G's	250 to 300	274	Pass
Peak Lateral Acceleration	G's	+/- 15	-9.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

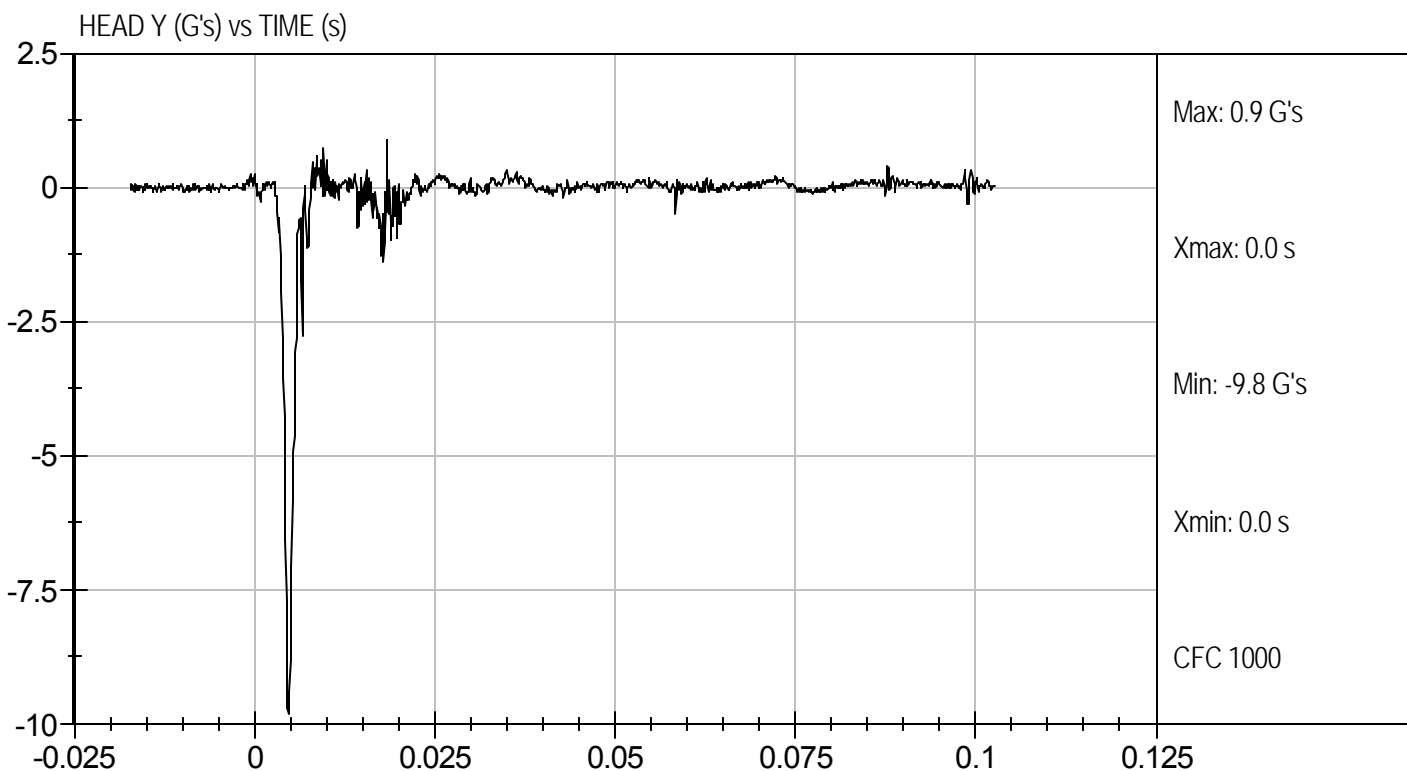
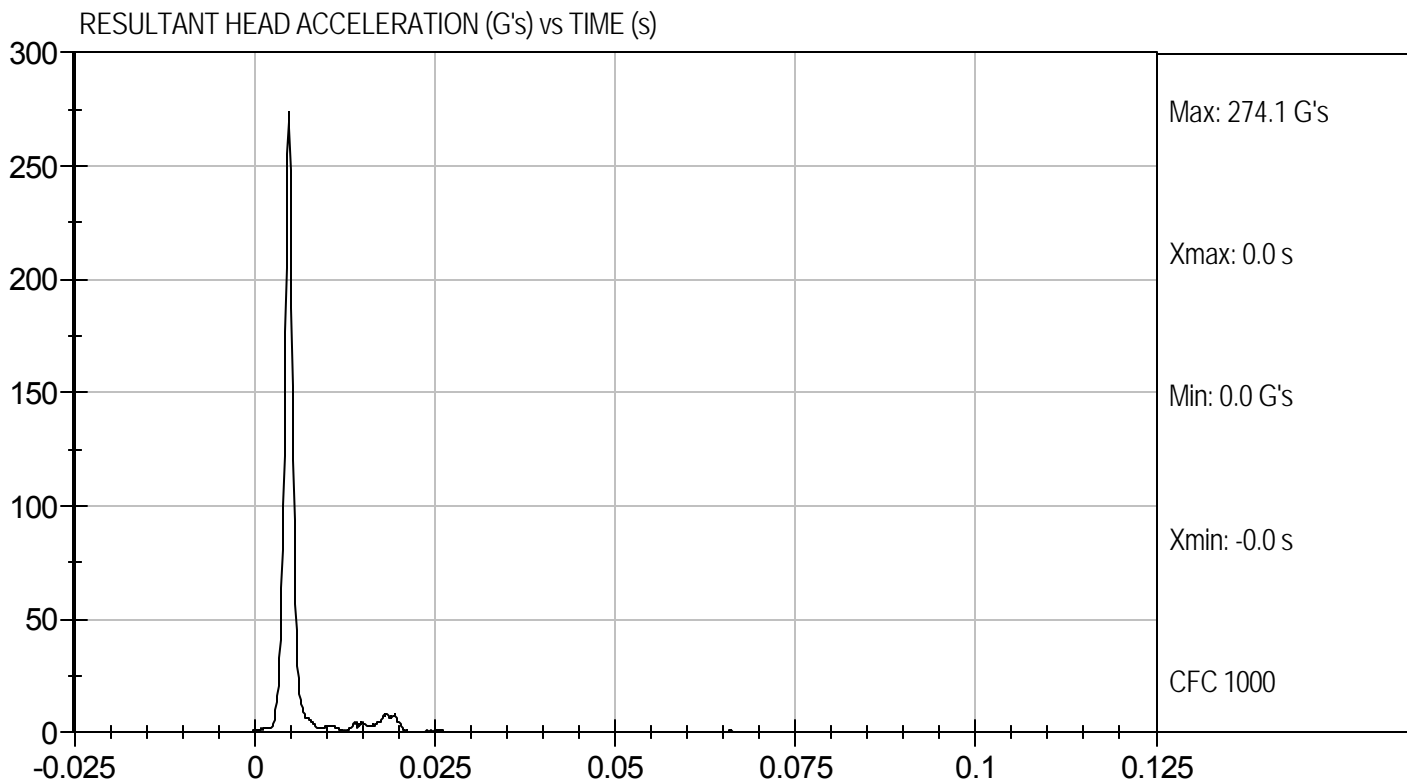
11/3/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Head Drop
Component ID: D113691

Test Date: 11/3/11
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D.: D113692

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Speed		m/s	6.89 to 7.13	6.95	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.4	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	81	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

11/3/11
Test Date

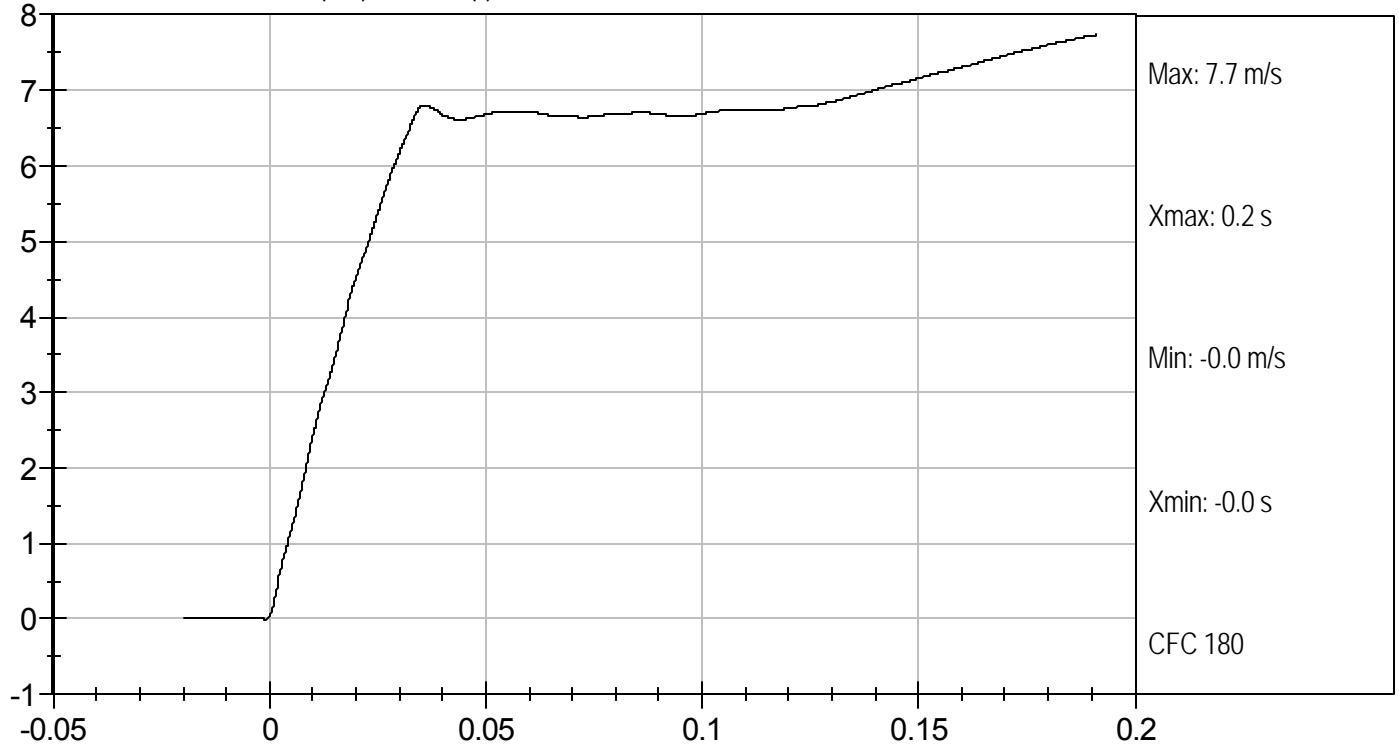
David Winkelbauer
Approved By



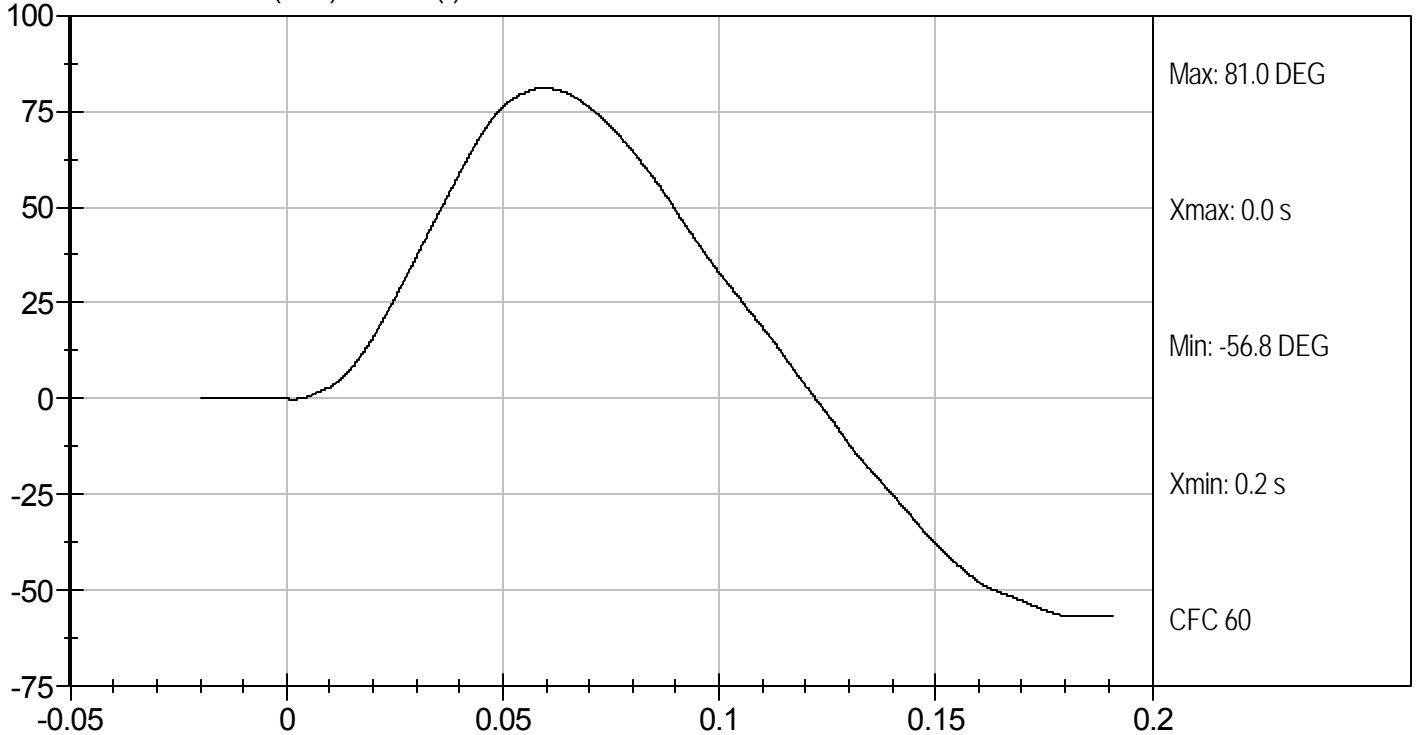
Test Desc: Neck Flexion
Component ID: D113692

Test Date: 11/3/11
Velocity: 22.8 ft/s, 6.95 m/s

PENDULUM VELOCITY (m/s) vs TIME (s)



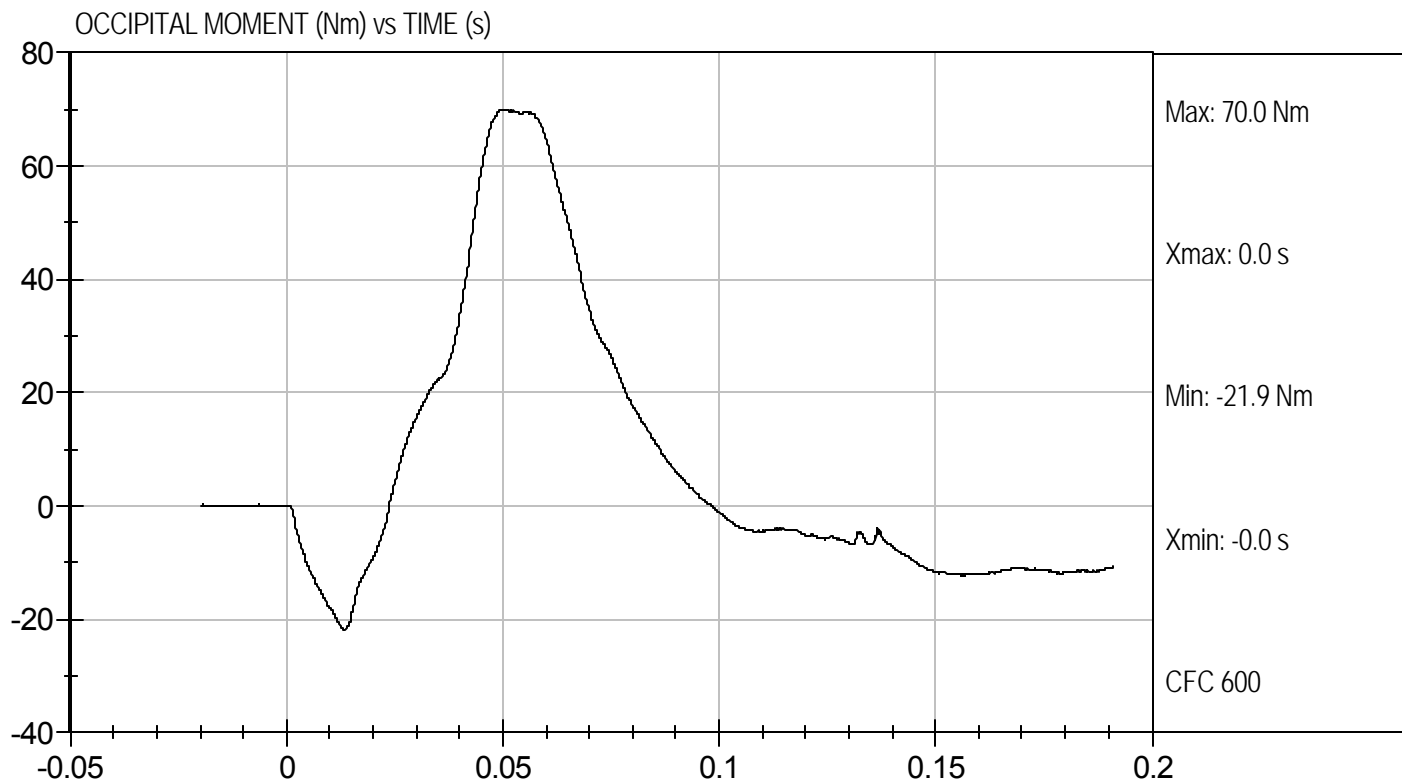
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D113692

Test Date: 11/3/11
Velocity: 22.8 ft/s, 6.95 m/s

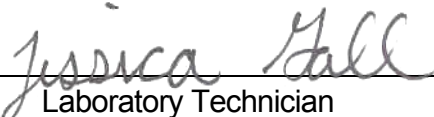


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

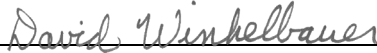
ATD Serial No: 634

Test I.D.: D113693

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	33	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	109	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass


 Laboratory Technician

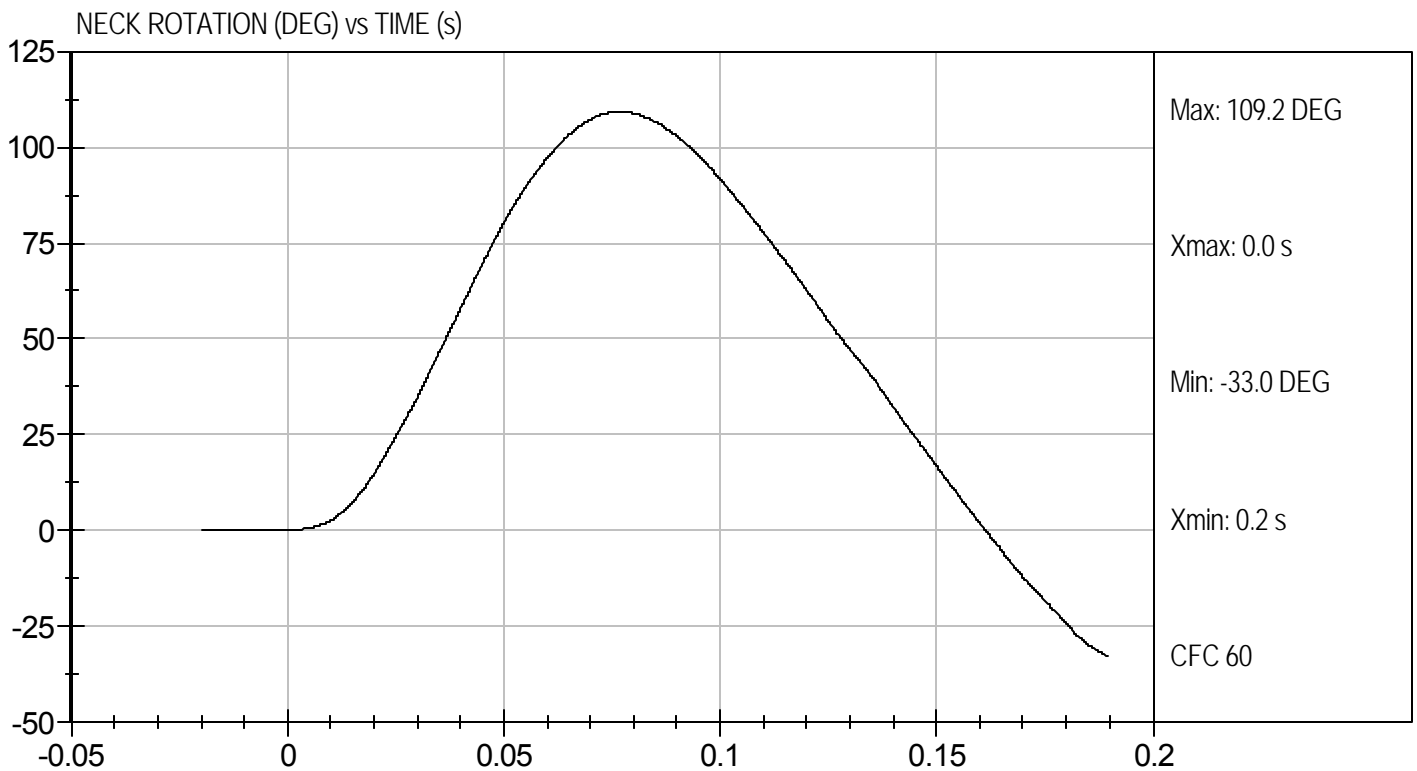
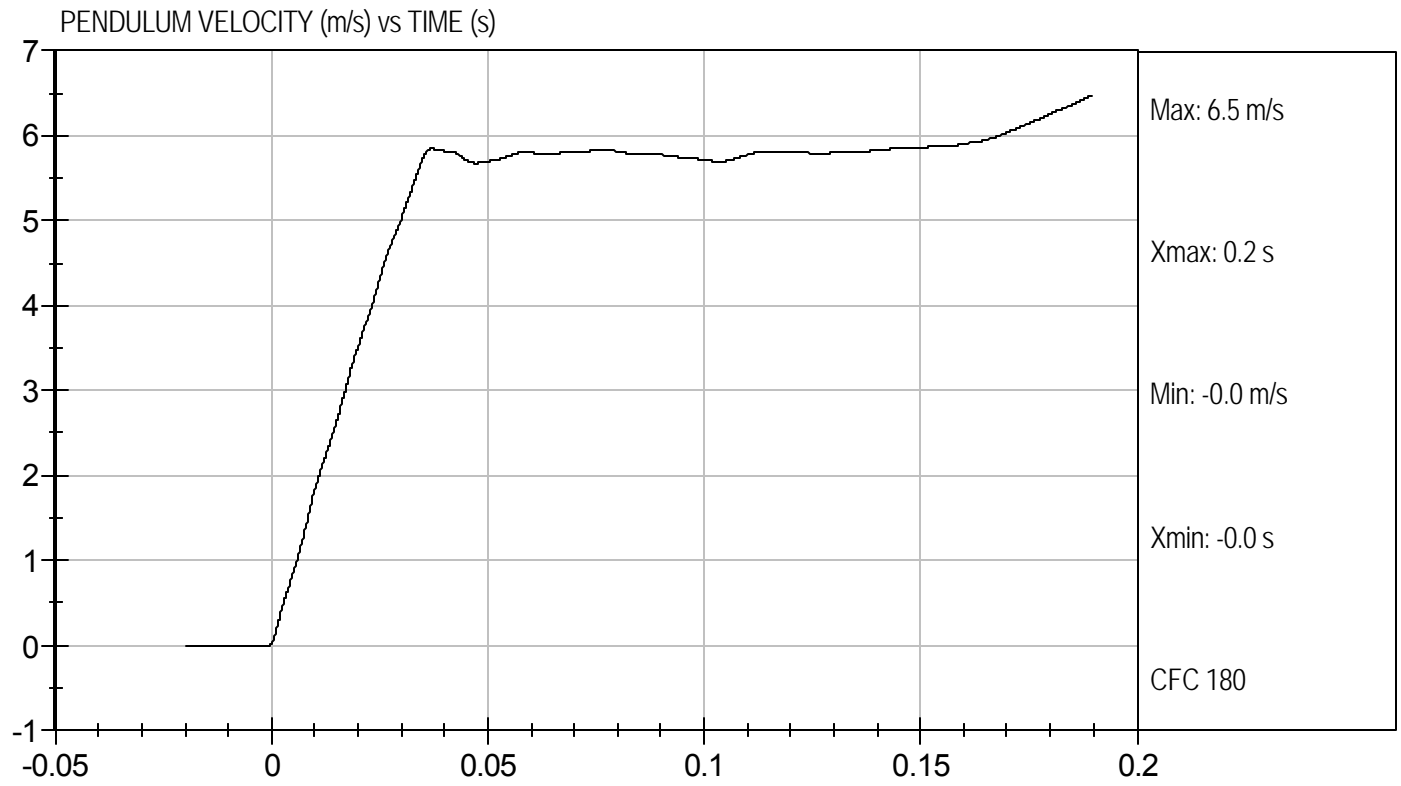
11/3/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D113693

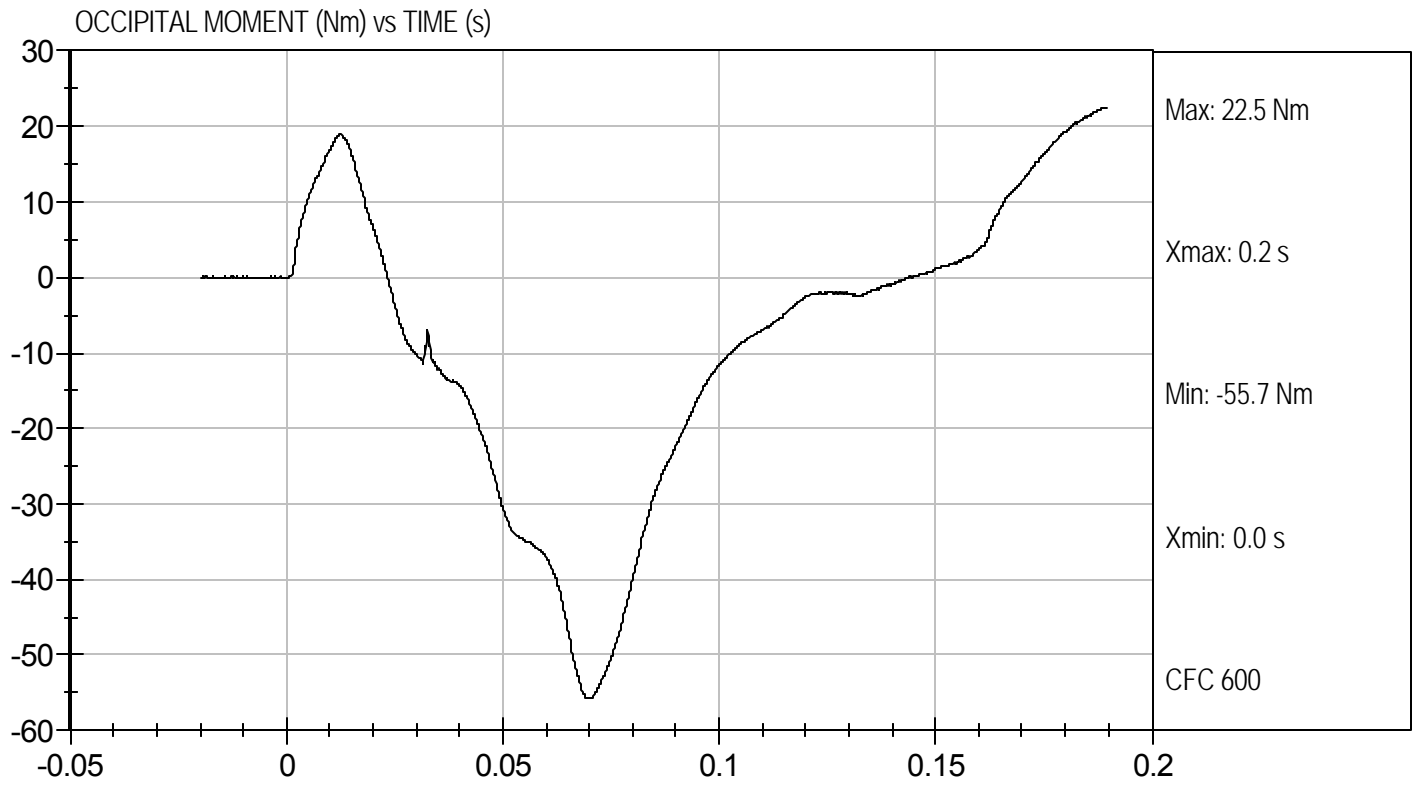
Test Date: 11/3/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D113693

Test Date: 11/3/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

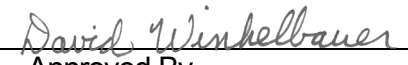
ATD Serial No: 634

Test I.D: D113694

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	55	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.13	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4051	Pass
Overall Test Results				Pass


 Laboratory Technician

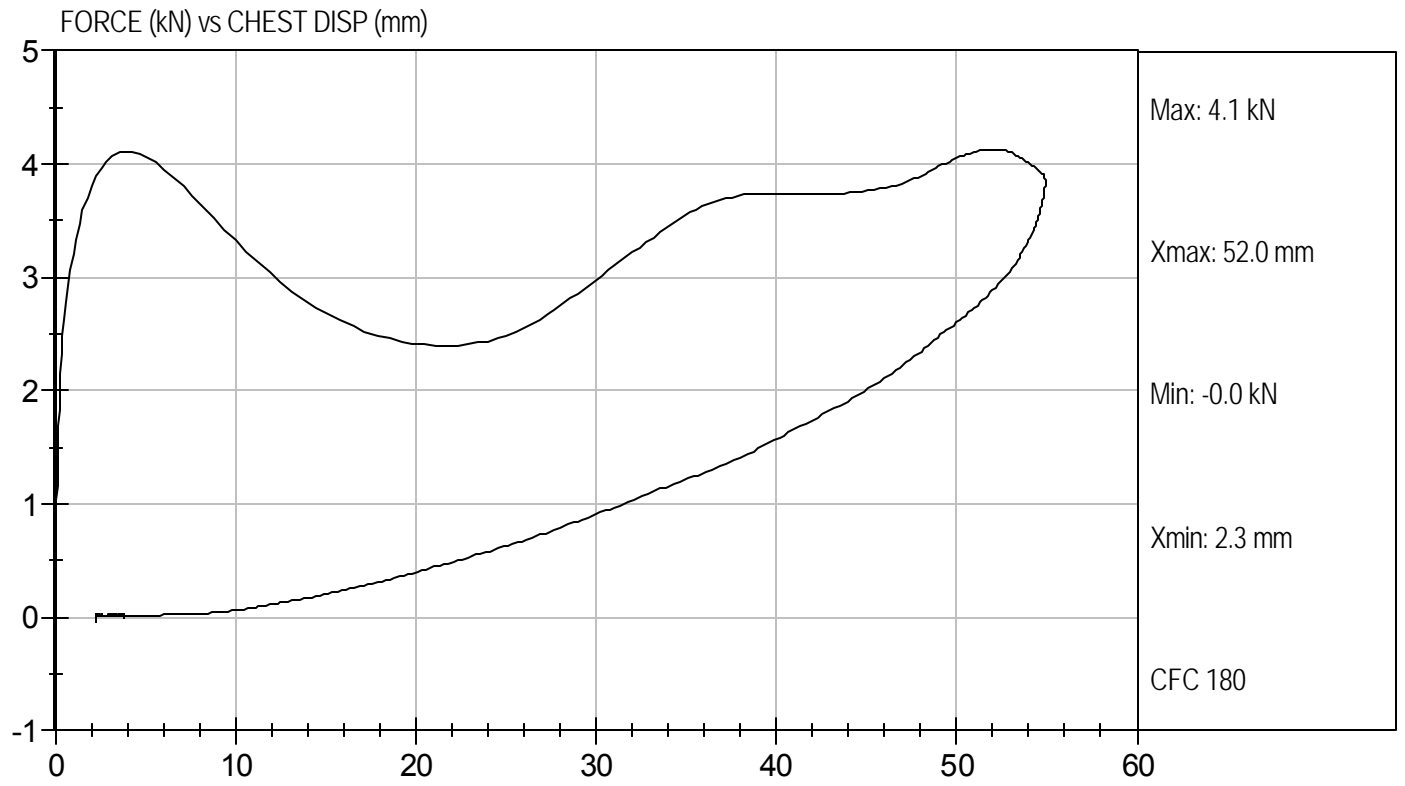
11/4/11
 Test Date


 Approved By



Test Desc: Thorax Impact
Component ID: D113694

Test Date: 11/4/11
Velocity: 21.9 ft/s, 6.68 m/s



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

ATD Serial No: 634

Test I.D: D113695


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.88	Pass
Overall Test Results				Pass



 Laboratory Technician

11/3/11

 Test Date

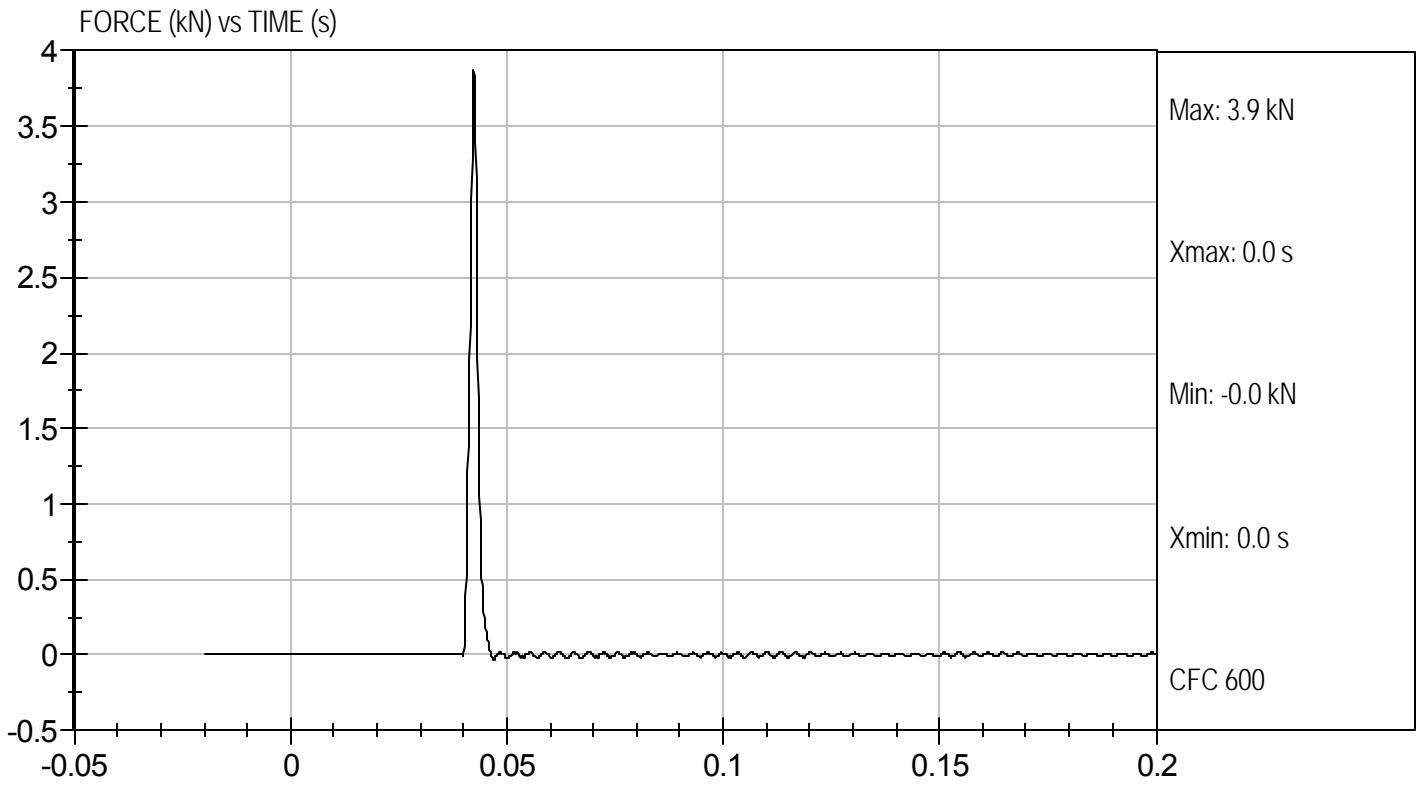


 Approved By



Test Desc: Right Knee
Component ID: D113695

Test Date: 11/3/11
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 634

Test I.D: D113696

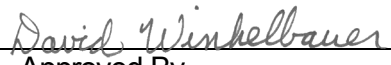
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.87	Pass
Overall Test Results				Pass



 Laboratory Technician

11/3/11

 Test Date

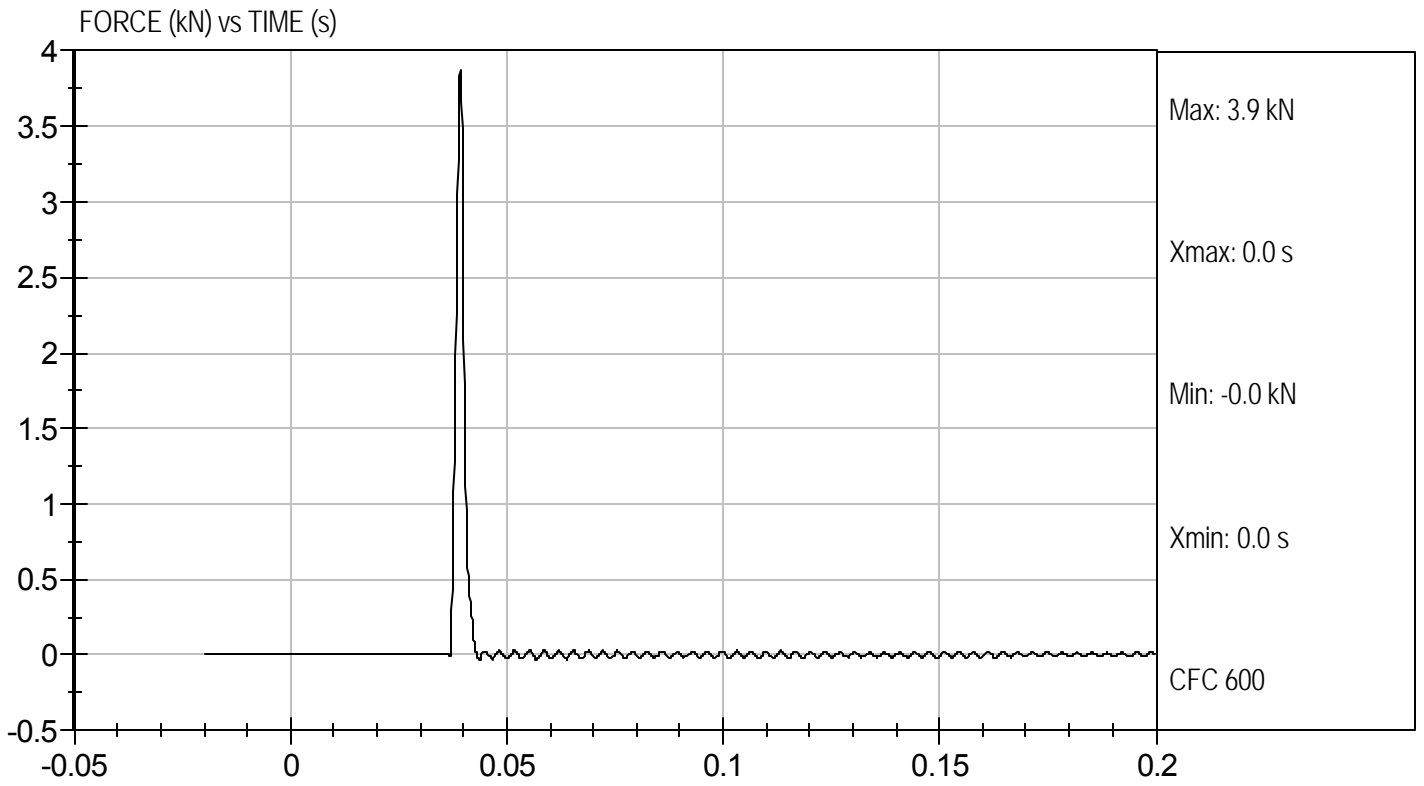


 Approved By



Test Desc: Left Knee
Component ID: D113696

Test Date: 11/3/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE


ATD Serial No: 634

Test I.D: D113697

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	364	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


 Laboratory Technician

11/4/11
 Test Date


 Approved By