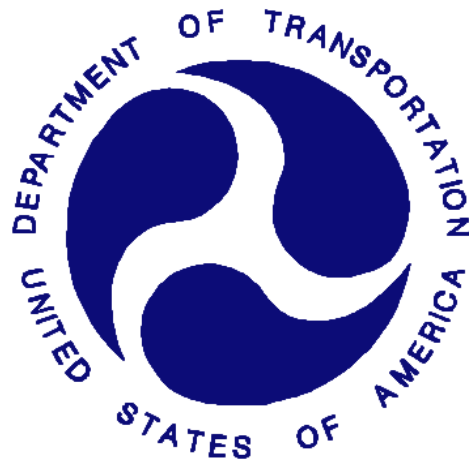


REPORT NUMBER: NCAP-MGA-2014-039

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

**NISSAN MOTOR CO., LTD.
2014 Nissan Pathfinder S 4X4 SUV
NHTSA No.: O20145200**

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




Test Date: December 13, 2013

Final Report Date: January 17, 2014

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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Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: January 17, 2014

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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15. Supplementary Notes																																																							
16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2014 Nissan Pathfinder S 4X4 SUV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), and 301 performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on December 13, 2013. The impact velocity of the vehicle was 56.6 km/h and the ambient temperature at the barrier face at the time of impact was 21.8°C. The target vehicle post-test maximum crush was 527 located to the left of the vehicle's centerline. The test vehicle's performance was as follows:																																																							
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3

<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of FMVSS 212, FMVSS 219 (Partial) Data, and 301 Data	25
16	FMVSS 301 Static Rollover Results	27
17	Dummy/Vehicle Temperature Stabilization Data	28

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

SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-12-D-00258. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2014 Nissan Pathfinder S 4X4 SUV at a velocity of 56.6 km/h. The test was performed at MGA Research Corporation on December 13, 2013. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and fourteen (14) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

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

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

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

The 628 channels of data were recorded on a data acquisition system. Appendix B contains the dummy response data traces.

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

The maximum static crush of the vehicle was 527 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee bolster. 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)	337	0.42	2064	110	44	17	2295	2112
Passenger (5 th)	248	0.33	608	196	37	14	2131	2118

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

TEST NOTES

Driver Neck Moment Z is not valid after 142ms
 Driver Right Upper Tibia FZ has spike @ 93ms that affects minimum
 Load Cell F-01 MZ has questionable data
 Load Cell I-05 MY has questionable data per zero data
 Load Cell K-15 MY has 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: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20145200	Traction Control System (TCS)	Yes
Model Year	2014	Power Steering	Yes
Make	Nissan	Power Window Auto-Reverse	Yes
Model	Pathfinder	Driver Frontal Airbag	Yes
Body Style	SUV	Driver Curtain Airbag	Yes
VIN	5N1AR2MM3EC636111	Driver Head/Torso Airbag	No
Body Color	Dark Slate	Driver Torso Airbag	No
Odometer (km/mi)	80 / 50	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	3.5	Driver Pelvis Airbag	No
Type/No. Cylinders	6	Driver Knee Airbag	No
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	CVT	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	AWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Co., Ltd.	GVWR (kg)	2715
Date of Manufacture	10/13	GAWR Front (kg)	1325
		GAWR Rear (kg)	1415

VEHICLE SEATING AND WEIGHT CAPACITY DATA

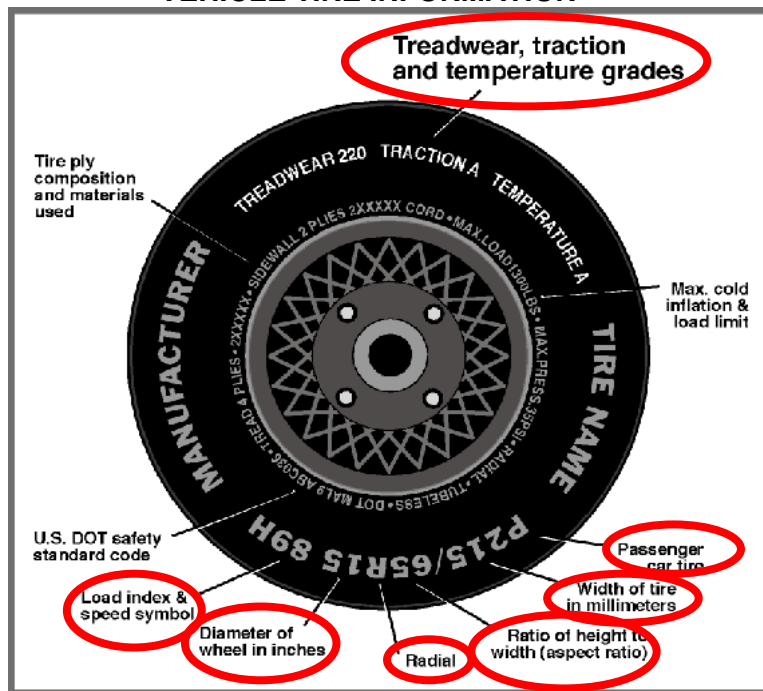
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	Split Bench	
Designated Seating Capacity (DSC)	2	3	2	7
Capacity Weight (VCW) (kg)				521
Cargo Weight (RCLW) (kg)				45

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	235/65R18	235/65R18
Tire Size on Vehicle	235/65R18	235/65R18
Tire Manufacturer	Continental	Continental
Tire Model	Cross Contact LX	Cross Contact LX
Treadwear	680	680
Traction	A	A
Temperature Grade	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	106T	106T
Tire Material	Rubber	Rubber
DOT Safety Code Left	A36U 3WH 3513	A36U 3WH 3513
DOT Safety Code Right	A36U 3WH 3513	A36U 3WH 3513

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	565.6	427.7		589.2	511.7	
Right	kg	544.3	428.2		558.4	485.4	
Ratio	%	56.5	43.5		53.5	46.5	
Totals	kg	1109.9	855.9	1965.8	1147.6	997.1	2144.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1965/8
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Test Vehicle Target Weight (TVTW)	kg	2151.4

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	832	829	837	840	1263
As Tested	mm	824	828	815	820	1348
Post Test	mm	861	852	812	800	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2900
Total Vehicle Length at Left Side	mm	4846
Total Vehicle Length at Centerline	mm	5015
Total Vehicle Length at Right Side	mm	4846
Weight of Ballast in Cargo Area	kg	26.8
Weight of Vehicle Components Removed	kg	19.1
Amount of Stoddard Solvent in Fuel Tank	L	67.9

List of components removed to meet test weight: None

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	5015
2	Total Width	1958
3	Bumper Top Height	658
4	Bumper Bottom Height	518
5	Longitudinal Member Top Height	630
6	Distance between Longitudinal Members	955
7	Longitudinal Member Width	47
8	Engine Top Height	985
9	Engine Bottom Height	195
10	Engine and Gearbox Width	866
11	Front Bumper-Engine Distance	356
12	Front Shock Absorber Fixing Height	1006
13	Bonnet Leading Edge Height	958
14	Front Shock Absorber Fixing Width	1296
15	Front Bumper – Front Axle Distance	990
16	Front Axle – A-Pillar Distance	492
17	A-Pillar – B-Pillar Distance	1172
18	B-Pillar – Rear Axle Distance	1440
19	B-Pillar – C-Pillar Distance	970
20	Roof Sill Bottom Height	1590
21	Roof Sill Top Height	1718
22	Floor Sill Bottom Height	308
23	Floor Sill Top Height	488

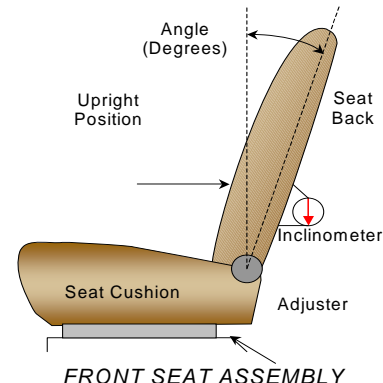
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer's design angle. For the passenger seat back, seat back is adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated August 2013.



	Degrees
Driver Seat Back Angle	0.0° on headrest post
Passenger Seat Back Angle	-5.6° on headrest post

SEAT FORE/AFT POSITIONS

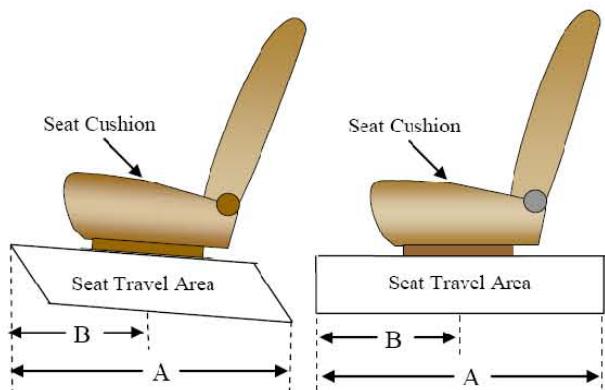
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated August 2013.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	25 detents (1 st as 1)	11 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	5 (1 st as 1)	0 (uppermost as 0)
Passenger Seat	5 (1 st as 1)	0 (uppermost as 0)



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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

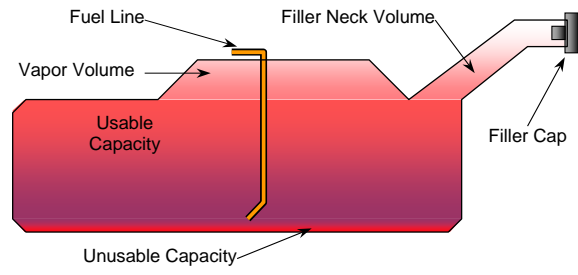
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	73.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	66.2 to 68.6
Actual Amount of Solvent used	67.9
1/3 of Usable Capacity	24.3

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. The fuel pump will pump fuel 1) for 1.0 seconds after the ignition is switched to "ON", 2) while the engine is running, 3) for 1.5 seconds after the engine stops running. 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

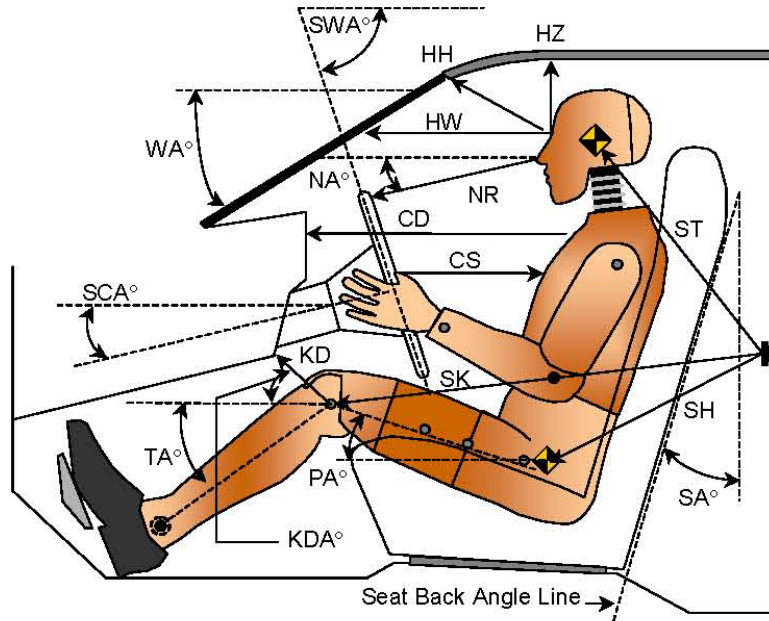
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	65.4	202
Geometric Center Position 2	62.6	182
Uppermost Position 3	59.8	162
Telescoping Steering Wheel Travel		40
Test Position	62.6	182

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013



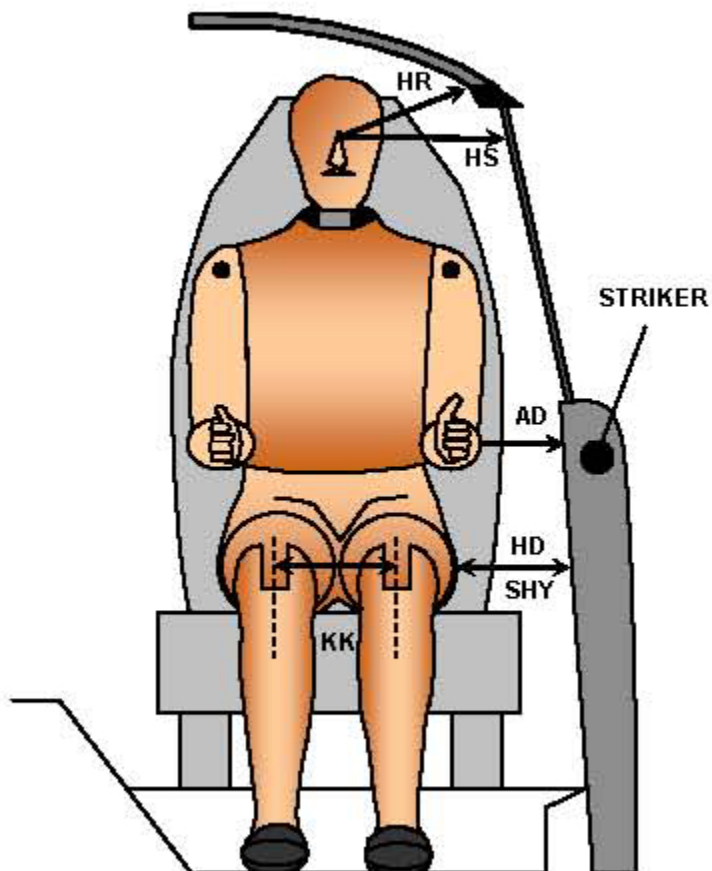
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		27.4		
SWA°	Steering Wheel Angle		62.6		
SCA°	Steering Column Angle		27.4		
SA°	Seat Back Angle (on headrest post)		0.0		-5.6
HZ	Head to Roof (Z)	234	90.0	232	90.0
HH	Head to Header	292	24.1	285	43.2
HW	Head to Windshield	730	0.0	694	0.0
NR	Nose to Rim	426	13.7		
CD	Chest to Dash	561		365	
CS	Chest to Steering Hub	326	3.6		
RA	Rim to Abdomen	192	0.0		
KDL	Left Knee to Dash	156	31.4	76	34.8
KDR	Right Knee to Dash	141	33.1	90	40.3
PA°	Pelvic Angle		24.4		20.9
TA°	Tibia Angle		50.1		53.1
SK	Striker to Knee	634	94.6	774	99.9
ST	Striker to Head	531	11.3	537	30.2
SH	Striker to H-Point	304	33.8	466	107.2

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013



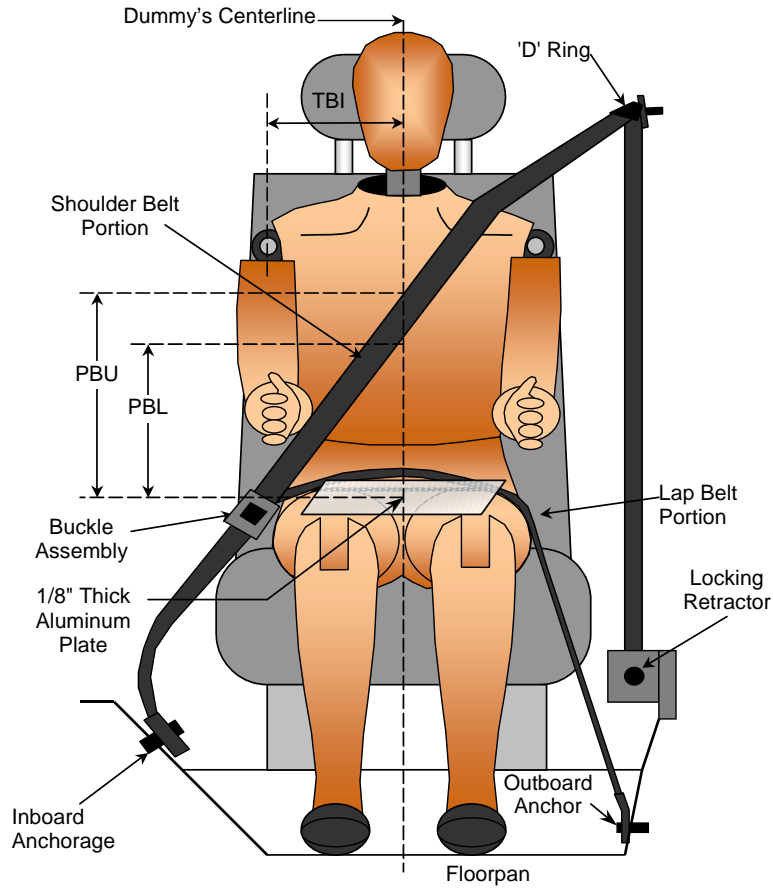
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	156	98
HD	H-Point to Door	147	191
HR	Head to Side Header	259	296
HS	Head to Side Window	349	481
KK	Knee to Knee	376	234
SHY	Striker to H-Point (Y Direction)	302	327
AA	Ankle to Ankle	353	182

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	380	330
PBL - Top surface of reference to belt lower edge	mm	300	230

BELT LENGTH DATA

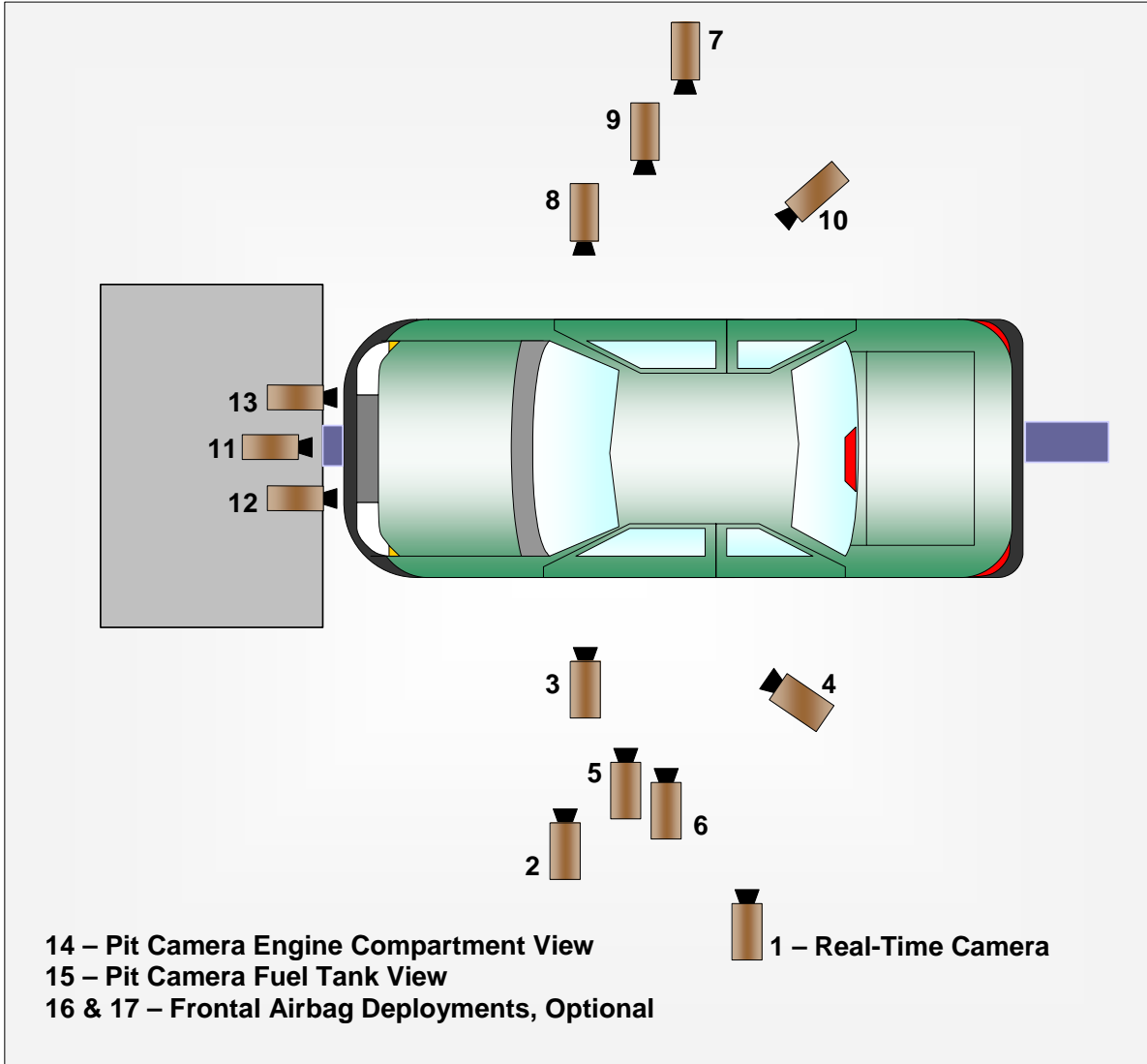
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	880	1000
Lap Belt Length as measured on ATD	mm	640	730
Remainder of belt on reel	mm	1730	1620
Total Belt Length for Continuous Webbing Systems	mm	3250	3350

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1400	-6680	-1900	35	1000
3	Left Front Half	1200	-5200	-1370	24	1000
4	Left Angle	5100	-5160	-1950	50	1000
5	Steering Column - Top	590	-5180	-1210	24	1000
6	Steering Column - Bottom	570	-5200	-810	24	1000
7	Right Overall	2300	7000	-1430	20	1000
8	Passenger Close-Up	1480	6640	-1900	35	1000
9	Right Front Half	1240	5220	-1360	24	1000
10	Right Angle	5310	4780	-1870	50	1000
11	Windshield	-260	0	-2860	20	1000
12	Driver Windshield	-30	-360	-2270	8.5	1000
13	Passenger Windshield	-30	360	-2270	8.5	1000
14	Pit Front	940	0	3150	24	1000
15	Pit Rear	2990	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

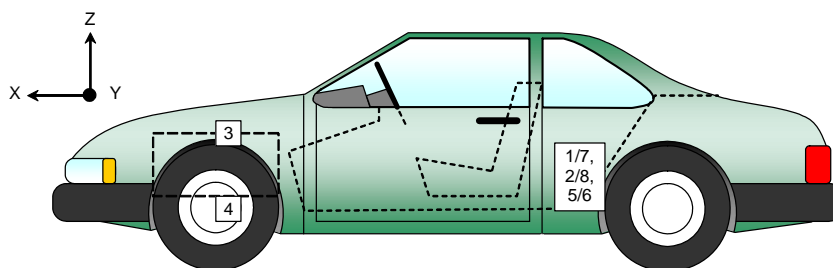
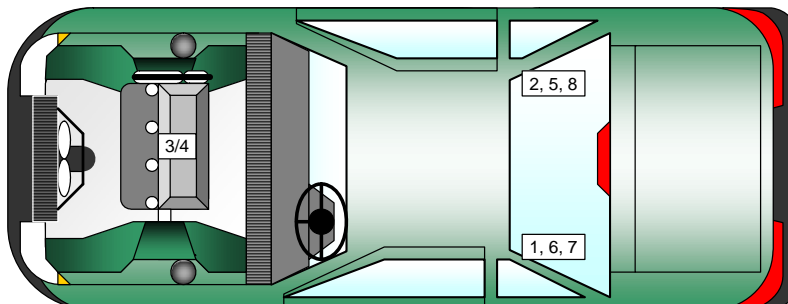
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	2026	-342	-520
2	Right Rear Crossmember Accelerometer – X Direction	2015	375	-526
3	Engine Top X	4097	0	-957
4	Engine Bottom X	4342	-27	-352
5	Left Rear Crossmember Accelerometer – Z Direction	2026	-342	-520
6	Right Rear Crossmember Accelerometer – Z Direction	2015	375	-526
7	Left Rear Crossmember Accelerometer Redundant – X Direction	2026	-342	-520
8	Right Rear Crossmember Accelerometer Redundant – X Direction	2015	375	-526

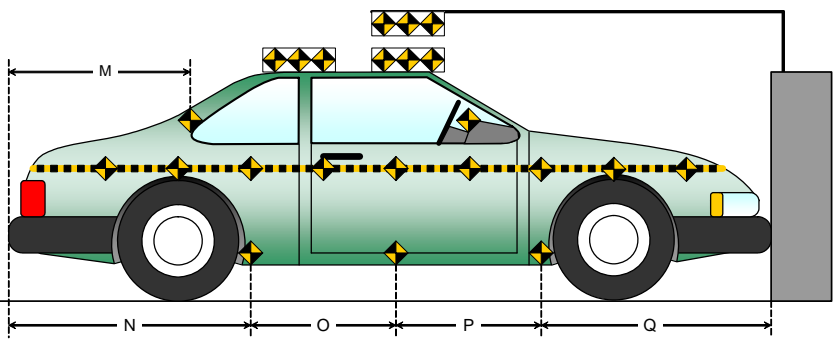
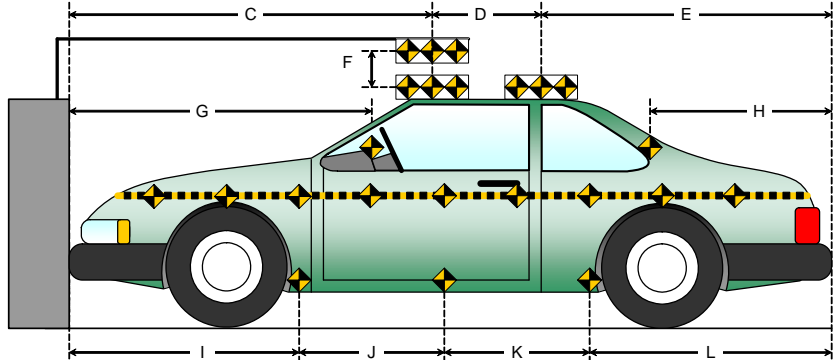
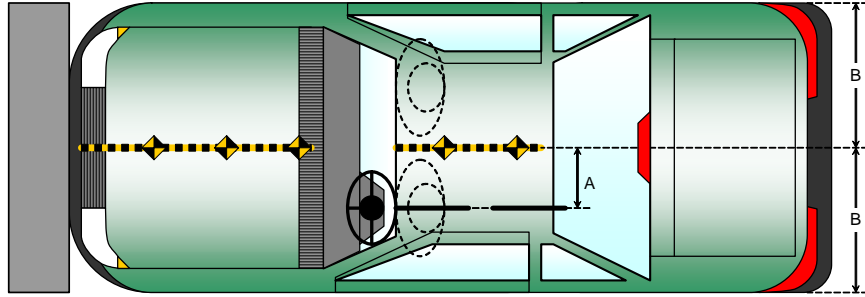
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: Q20145200
 Test Date: 12/13/2013

Item	Value (mm)
A	403
B	979
C	2410
D	668
E	1937
F	105
G	
H	1434
I	1497
J	968
K	968
L	1582
M	1434
N	1582
O	968
P	968
Q	1497



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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

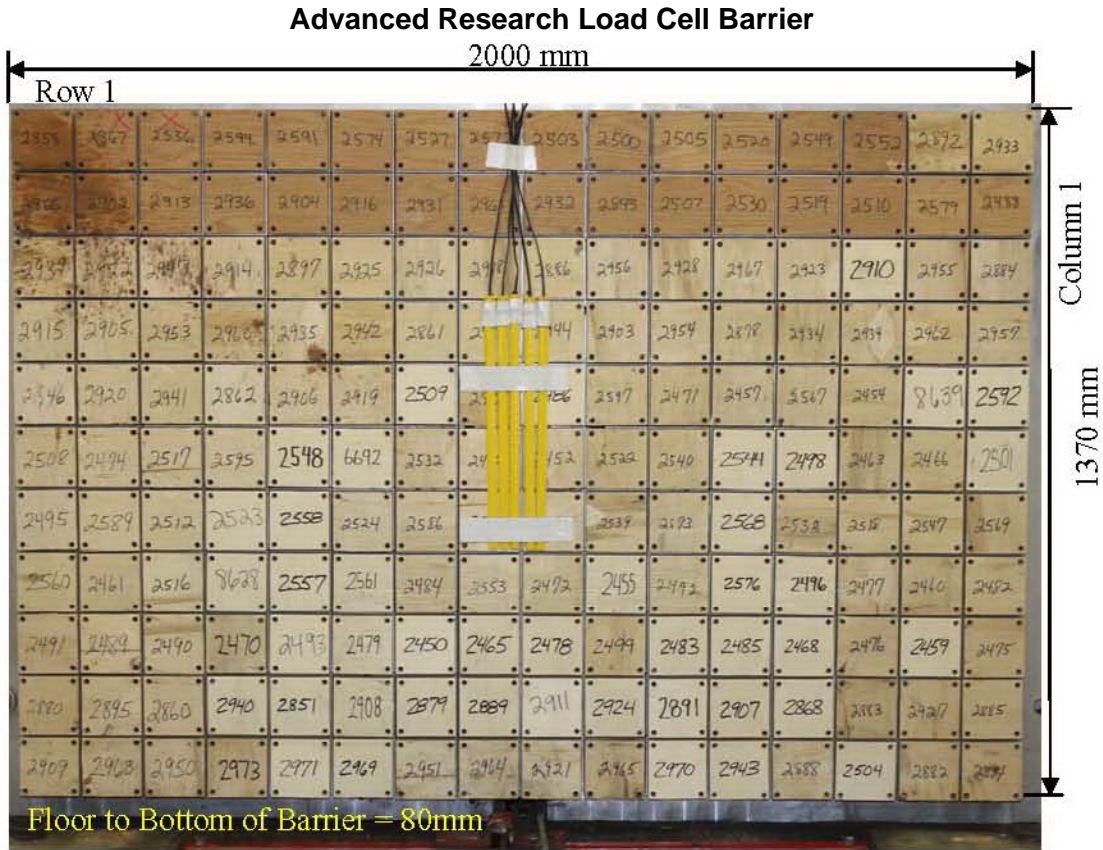


Photo for Reference Only

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

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

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

INSTRUMENTATION

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	46
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	628

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: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

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

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	None
Other Notable Effects	Hood became unlatched during impact.

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	3780
Center	mm	3740
Right Side	mm	3770
Average	mm	3763

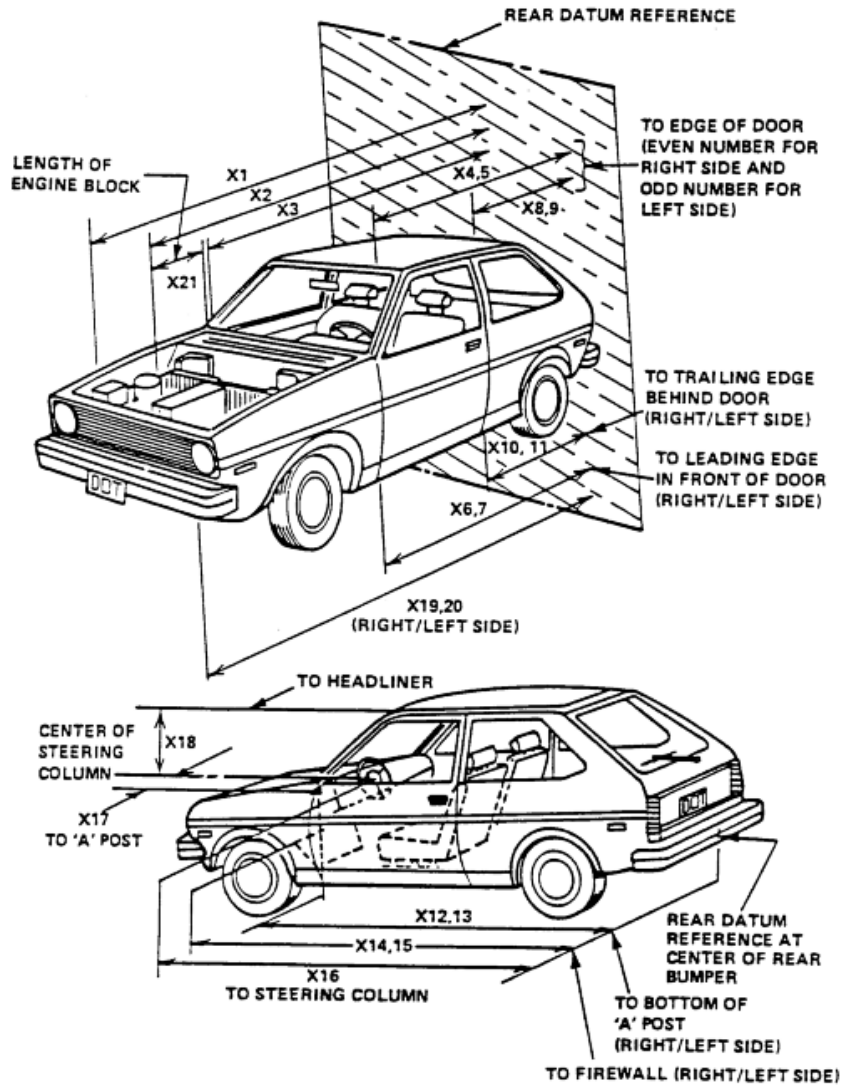
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	Disabled	Yes	Disabled
Torso/Pelvis Side Airbag	Yes	Disabled	Yes	Disabled
Knee Airbag	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013



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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	5015	4506	509
2	RSOV to Front of Engine	mm	4486	4215	271
3	RSOV to Firewall	mm	4040	3987	53
4	RSOV to Upper Leading Edge of Right Door	mm	3406	3406	0
5	RSOV to Upper Leading Edge of Left Door	mm	3406	3404	2
6	RSOV to Lower Leading Edge of Right Door	mm	3444	3444	0
7	RSOV to Lower Leading Edge of Left Door	mm	3444	3442	2
8	RSOV to Upper Trailing Edge of Right Door	mm	2305	2304	1
9	RSOV to Upper Trailing Edge of Left Door	mm	2305	2302	3
10	RSOV to Lower Trailing Edge of Right Door	mm	2318	2317	1
11	RSOV to Lower Trailing Edge of Left Door	mm	2318	2315	3
12	RSOV to Bottom of "A" Post of Right Side	mm	3437	3436	1
13	RSOV to Bottom of "A" Post of Left Side	mm	3436	3434	2
14	RSOV to Firewall, Right Side	mm	3800	3764	36
15	RSOV to Firewall, Left Side	mm	3799	3784	15
16	RSOV to Steering Column	mm	2965	2960	5
17	Center of Steering Column to "A" Post	mm	415	405	10
18	Center of Steering Column to Headliner	mm	458	456	2
19	RSOV to Right Side of Front Bumper	mm	4846	4465	381
20	RSOV to Left Side of Front Bumper	mm	4846	4462	384
21	Length of Engine Block	mm	464	464	0
RD	RSOV to Right Side of Dash Panel	mm	3266	3246	20
CD	RSOV to Center of Dash Panel	mm	3224	3176	48
LD	RSOV to Left Side of Dash Panel	mm	3266	3264	2

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

VEHICLE INFORMATION

VIN: 5N1AR2MM3EC636111 Wheelbase (mm): 2900
 Vehicle Size Category: MPV Test Weight (kg): 2144.7

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

Cal. Procedure/Interval: MGA procedure / 6 month

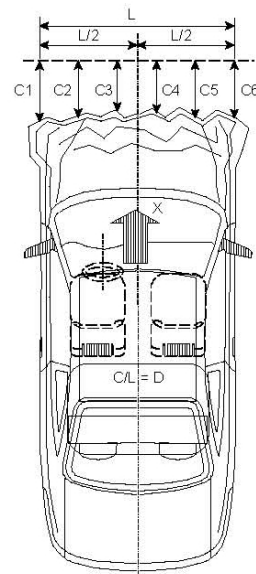
Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.6

Velocity Change (km/h): 66.7

Time of Separation (msec): 98.8



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1284

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4846	4462	384
C2	Crush zone 2 at left side	mm	4950	4423	527
C3	Crush zone 3 at left side	mm	4967	4446	521
C4	Crush zone 4 at right side	mm	4967	4497	470
C5	Crush zone 5 at right side	mm	4950	4494	456
C6	Crush zone 6 at right side	mm	4846	4465	381
L	C1 TO C6	mm	1284	1258	26

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

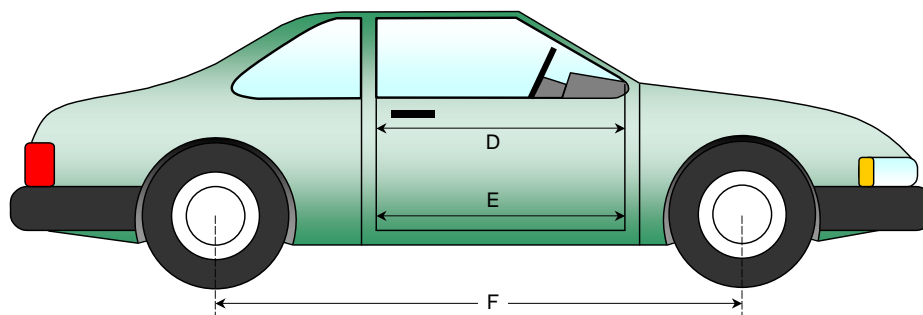
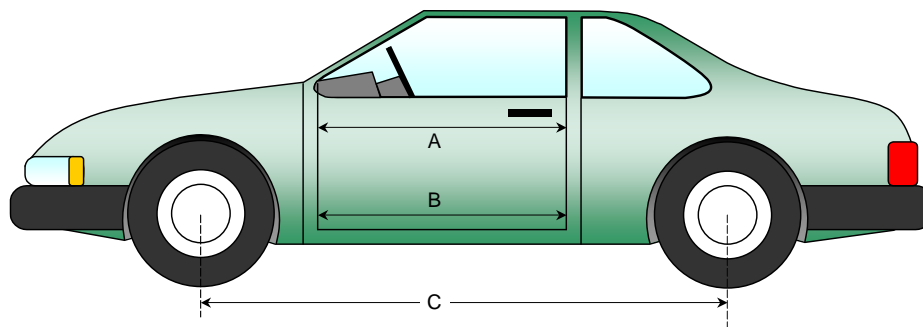
NHTSA No.: O20145200
 Test Date: 12/13/2013

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1058	1058	0
B	Left Side Lower	mm	986	986	0
D	Right Side Upper	mm	1058	1058	0
E	Right Side Lower	mm	986	986	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2900	2855	45
F	Right Side Wheelbase	mm	2900	2890	10



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

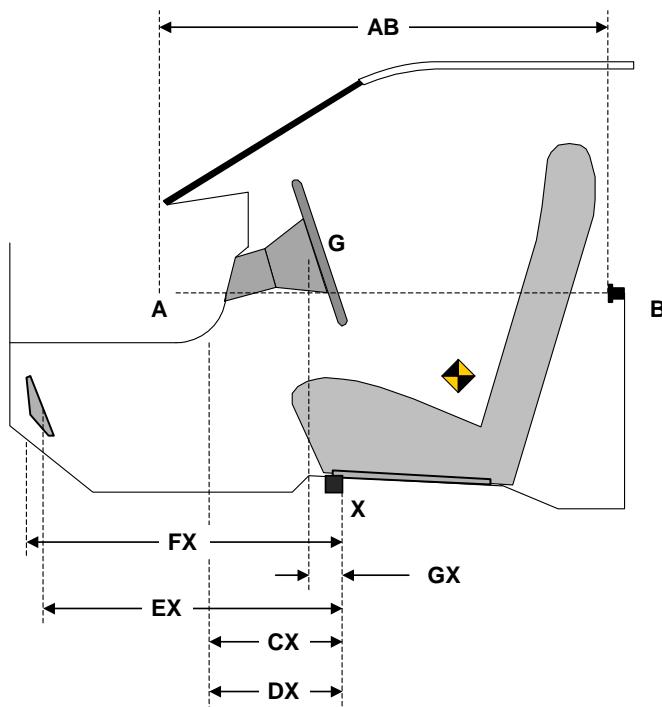
Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	781	781	0
CX	Left Knee Bolster to X	mm	163	160	3
DX	Right Knee Bolster to X	mm	161	154	7
EX	Brake Pedal to X	mm	488	510	-22
FX	Foot Rest to X	mm	469	464	5
GX	Center of Steering Column Wheel Hub to X	mm	-19	14	33

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013

Windshield Mounting Details:

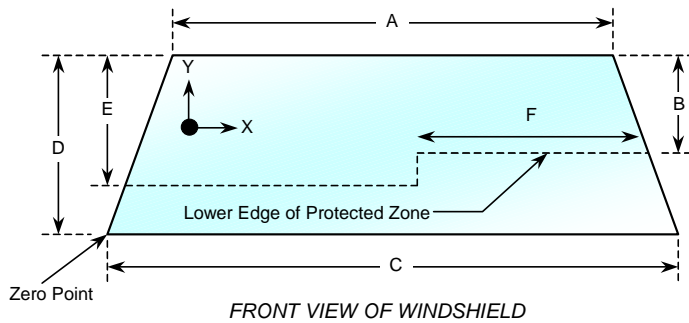
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.8°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2420	2420	100
Right Side	2420	2420	100
Total	4840	4840	100



Item	Units	Value
A	mm	1348
B	mm	564
C	mm	1460
D	mm	1016
E	mm	561
F	mm	555

AREA OF PROTECTED ZONE FAILURES - NONE

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

X	Y

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

X	Y

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

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.8°C Test Time: 3:05 p.m.

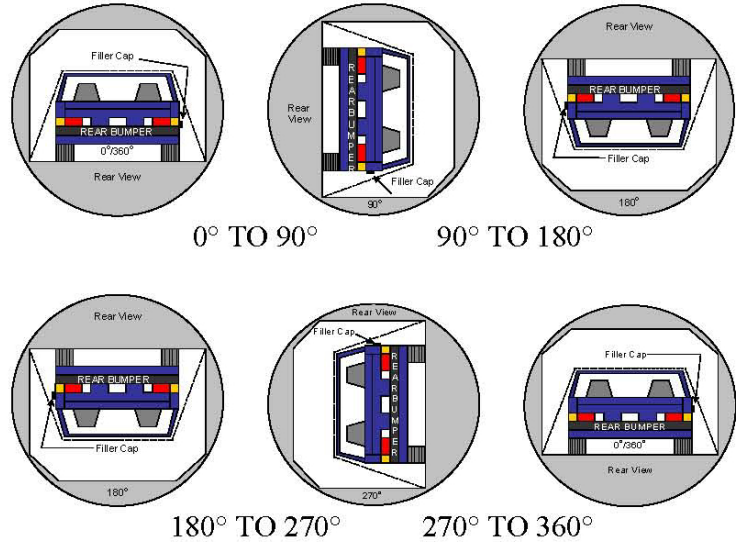
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: None

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
Test Date: 12/13/2013

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°	113	300	413
90° to 180°	110	300	410
180° to 270°	110	300	410
270° to 360°	109	300	409

FMVSS 301 SPILLAGE TABLE (units in ounces)

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

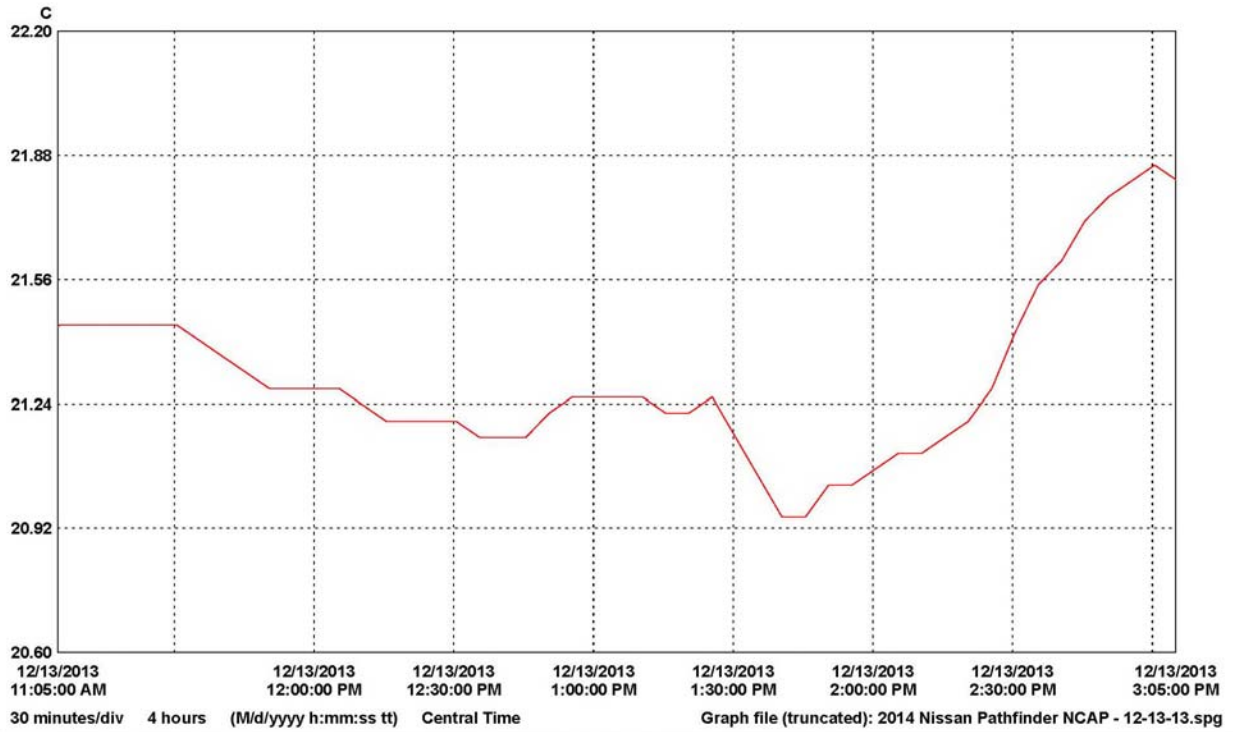
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

**DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA**

Test Vehicle: 2014 Nissan Pathfinder S 4X4 SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20145200
 Test Date: 12/13/2013



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	12032257	Crash1	1		21.86	21.29	20.95	C	Temperature	12032257_Crash1.spl

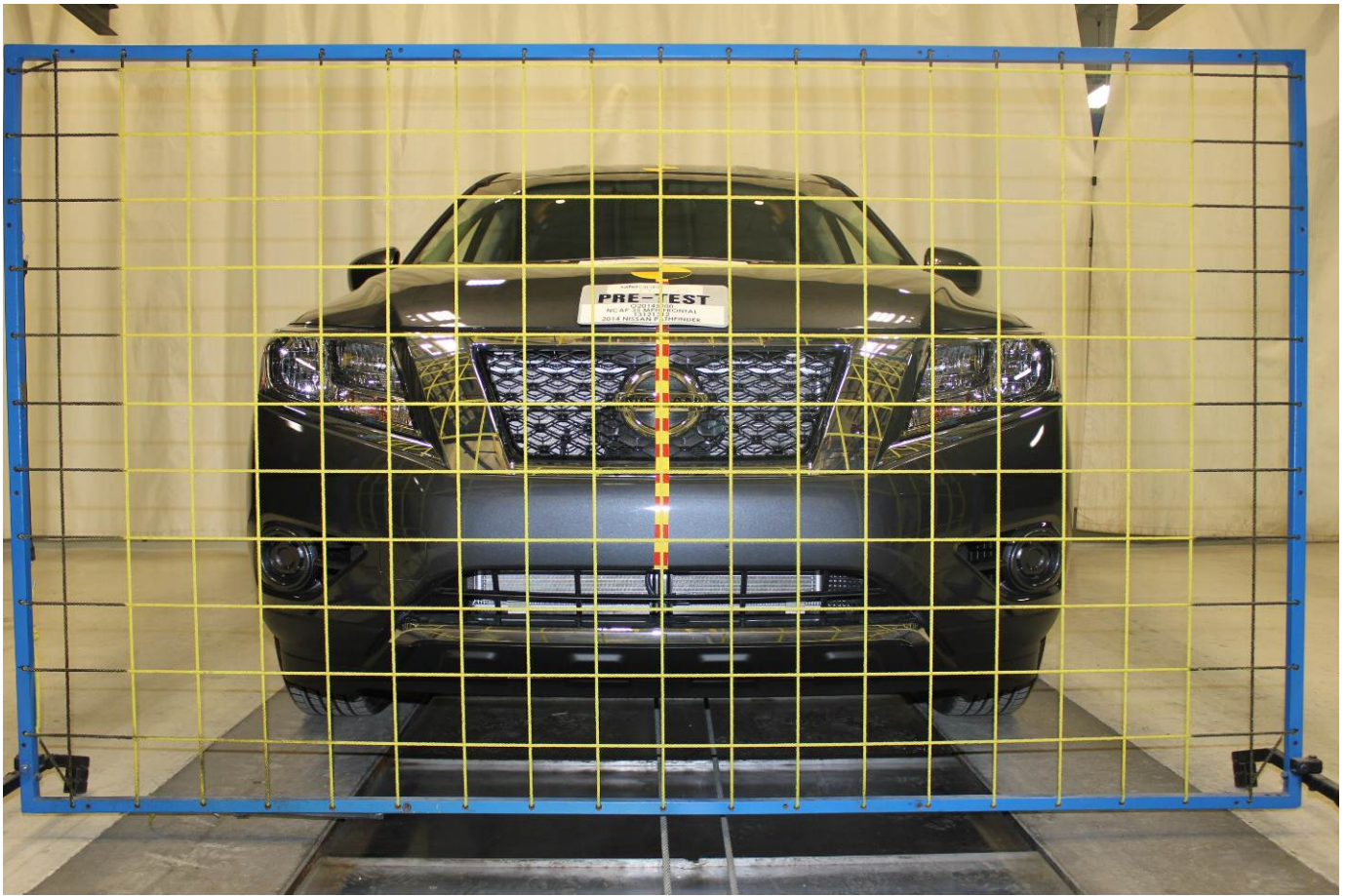
**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 1.	Load Cell Location	A-1
Photo No. 2.	Load Cell Wall	A-1
Photo No. 3.	Manufacturer's Label	A-2
Photo No. 4.	Tire Placard	A-2
Photo No. 5.	2014 Nissan Pathfinder Frontal As Delivered	A-3
Photo No. 6.	Left Rear 3-4 View, As Received	A-3
Photo No. 7.	Pre-Test Front View of Test Vehicle	A-4
Photo No. 8.	Post-Test Front View of Test Vehicle	A-4
Photo No. 9.	Pre-Test Left View of Test Vehicle	A-5
Photo No. 10.	Post-Test Left View of Test Vehicle	A-5
Photo No. 11.	Pre-Test Right View of Test Vehicle	A-6
Photo No. 12.	Post-Test Right View of Test Vehicle	A-6
Photo No. 13.	Pre-Test Right Front 3-4 View	A-7
Photo No. 14.	Post-Test Right Front 3-4 View	A-7
Photo No. 15.	Pre-Test Left Rear 3-4 View	A-8
Photo No. 16.	Post-Test Left Rear 3-4 View	A-8
Photo No. 17.	Pre-Test Windshield View	A-9
Photo No. 18.	Post-Test Windshield View	A-9
Photo No. 19.	Pre-Test Engine Compartment View	A-10
Photo No. 20.	Post-Test Engine Compartment View	A-10
Photo No. 21.	Pre-Test Fuel Filler Cap View	A-11
Photo No. 22.	Post-Test Fuel Filler Cap View	A-11
Photo No. 23.	Pre-Test Front Underbody View	A-12
Photo No. 24.	Post-Test Front Underbody View	A-12
Photo No. 25.	Pre-Test Mid Front Underbody View	A-13
Photo No. 26.	Post-Test Mid Front Underbody View	A-13
Photo No. 27.	Pre-Test Mid Rear Underbody View	A-14
Photo No. 28.	Post-Test Mid Rear Underbody View	A-14
Photo No. 29.	Pre-Test Rear Underbody View	A-15
Photo No. 30.	Post-Test Rear Underbody View	A-15

		<u>Page No.</u>
Photo No. 31.	Pre-Test Dummy Cable Routing	A-16
Photo No. 32.	Post-Test Dummy Cable Routing	A-16
Photo No. 33.	Pre-Test Driver Dummy Front View	A-17
Photo No. 34.	Post-Test Driver Dummy Front View	A-17
Photo No. 35.	Pre-Test Driver Dummy Window View	A-18
Photo No. 36.	Post-Test Driver Dummy Window View	A-18
Photo No. 37.	Pre-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 38.	Post-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 39.	Pre-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 40.	Post-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 41.	Pre-Test View of Belt Anchorage for Driver Dummy	A-21
Photo No. 42.	Post-Test View of Belt Anchorage for Driver Dummy	A-21
Photo No. 43.	Pre-Test Driver Dummy Feet	A-22
Photo No. 44.	Post-Test Driver Dummy Feet	A-22
Photo No. 45.	Pre-Test Driver's Side Knee Bolster (without dummy)	A-23
Photo No. 46.	Post-Test Driver's Side Knee Bolster (without dummy)	A-23
Photo No. 47.	Pre-Test Driver's Side Floorpan	A-24
Photo No. 48.	Post-Test Driver's Side Floorpan	A-24
Photo No. 49.	Post-Test Driver Dummy Face	A-25
Photo No. 50.	Post-Test Driver Dummy Contact with Airbag	A-25
Photo No. 51.	Post-Test Driver Dummy Contact with Headrest	A-26
Photo No. 52.	Post-Test Driver Dummy Contact with Knee Bolster	A-26
Photo No. 53.	Pre-Test View of the Steering Wheel	A-27
Photo No. 54.	Post-Test View of the Steering Wheel	A-27
Photo No. 55.	Pre-Test Passenger Dummy Front View	A-28
Photo No. 56.	Post-Test Passenger Dummy Front View	A-28
Photo No. 57.	Pre-Test Passenger Dummy Window View	A-29
Photo No. 58.	Post-Test Passenger Dummy Window View	A-29
Photo No. 59.	Pre-Test Passenger Dummy and Vehicle Interior (Door Open)	A-30
Photo No. 60.	Post-Test Passenger Dummy and Vehicle Interior (Door Open)	A-30

		<u>Page No.</u>
Photo No. 61.	Pre-Test Passenger's Seat Fore-Aft Markings	A-31
Photo No. 62.	Post-Test Passenger's Seat Fore-Aft Markings	A-31
Photo No. 63.	Pre-Test View of Belt Anchorage for Passenger Dummy	A-32
Photo No. 64.	Post-Test View of Belt Anchorage for Passenger Dummy	A-32
Photo No. 65.	Pre-Test Passenger Dummy Feet	A-33
Photo No. 66.	Post-Test Passenger Dummy Feet	A-33
Photo No. 67.	Pre-Test Passenger's Side Knee Bolster (without dummy)	A-34
Photo No. 68.	Post-Test Passenger's Side Knee Bolster (without dummy)	A-34
Photo No. 69.	Pre-Test Passenger's Side Floorpan	A-35
Photo No. 70.	Post-Test Passenger's Side Floorpan	A-35
Photo No. 71.	Post-Test Passenger Dummy Face	A-36
Photo No. 72.	Post-Test Passenger Dummy Contact with Airbag	A-36
Photo No. 73.	Post-Test Passenger Dummy Contact with Headrest	A-37
Photo No. 74.	Post-Test Passenger Dummy Contact with Glovebox	A-37
Photo No. 75.	Ballast Installed in Vehicle	A-38
Photo No. 76.	Post-Test Stoddard Solvent Spillage Location View	A-38
Photo No. 77.	Post-Test Speed Trap Read-Out	A-39
Photo No. 78.	Vehicle at 0 Degree on Static Rollover Device	A-39
Photo No. 79.	Vehicle at 90 Degrees on Static Rollover Device	A-40
Photo No. 80.	Vehicle at 180 Degrees on Static Rollover Device	A-40
Photo No. 81.	Vehicle at 270 Degrees on Static Rollover Device	A-41
Photo No. 82.	Vehicle at 360 Degrees on Static Rollover Device	A-41
Photo No. 83.	2014 Nissan Pathfinder Frontal Impact Event	A-42
Photo No. 84.	Monroney Label	A-42



Load Cell Location

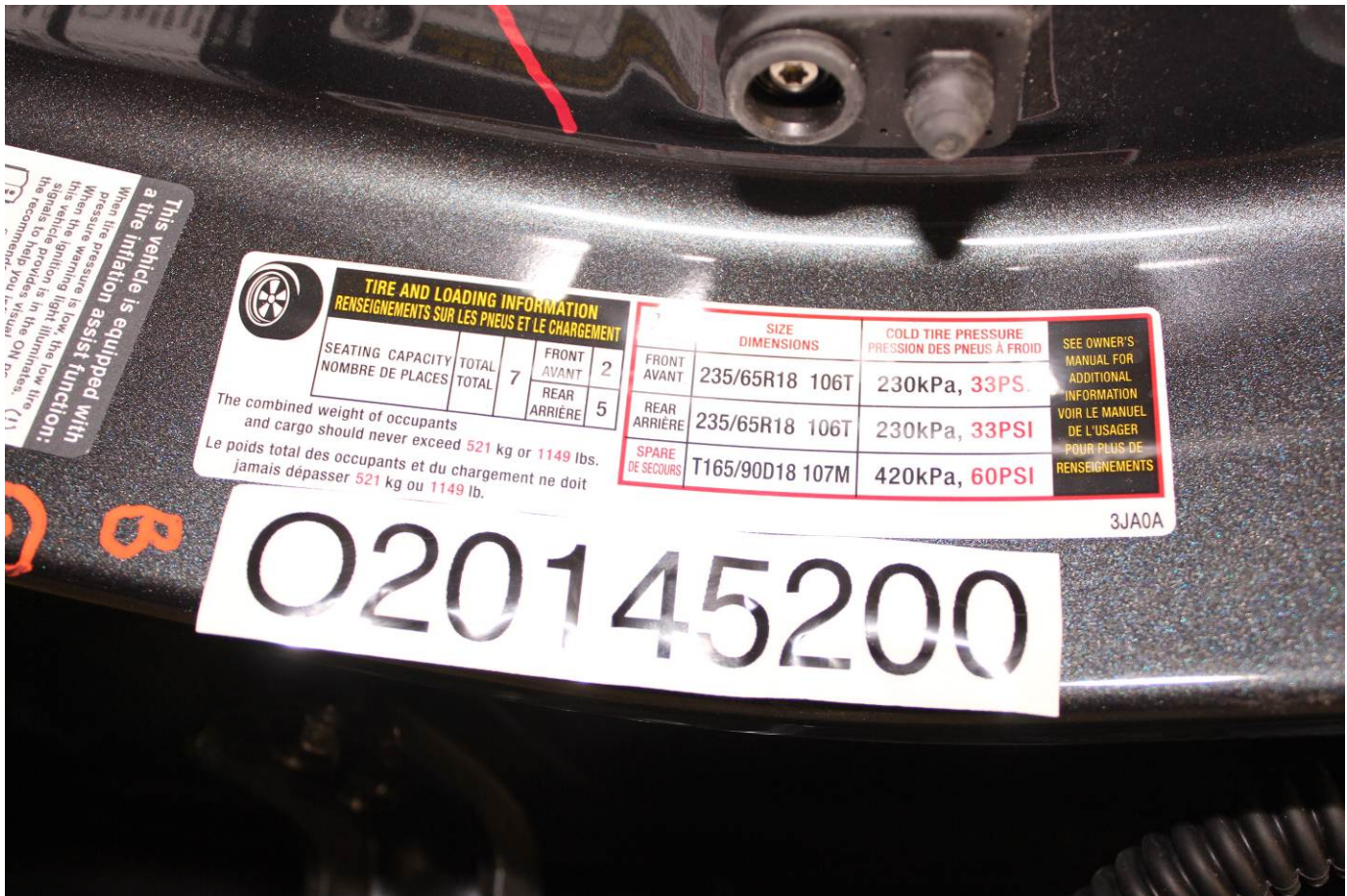


Load Cell Wall



O20145200

Manufacturer's Label



O20145200

Tire Placard



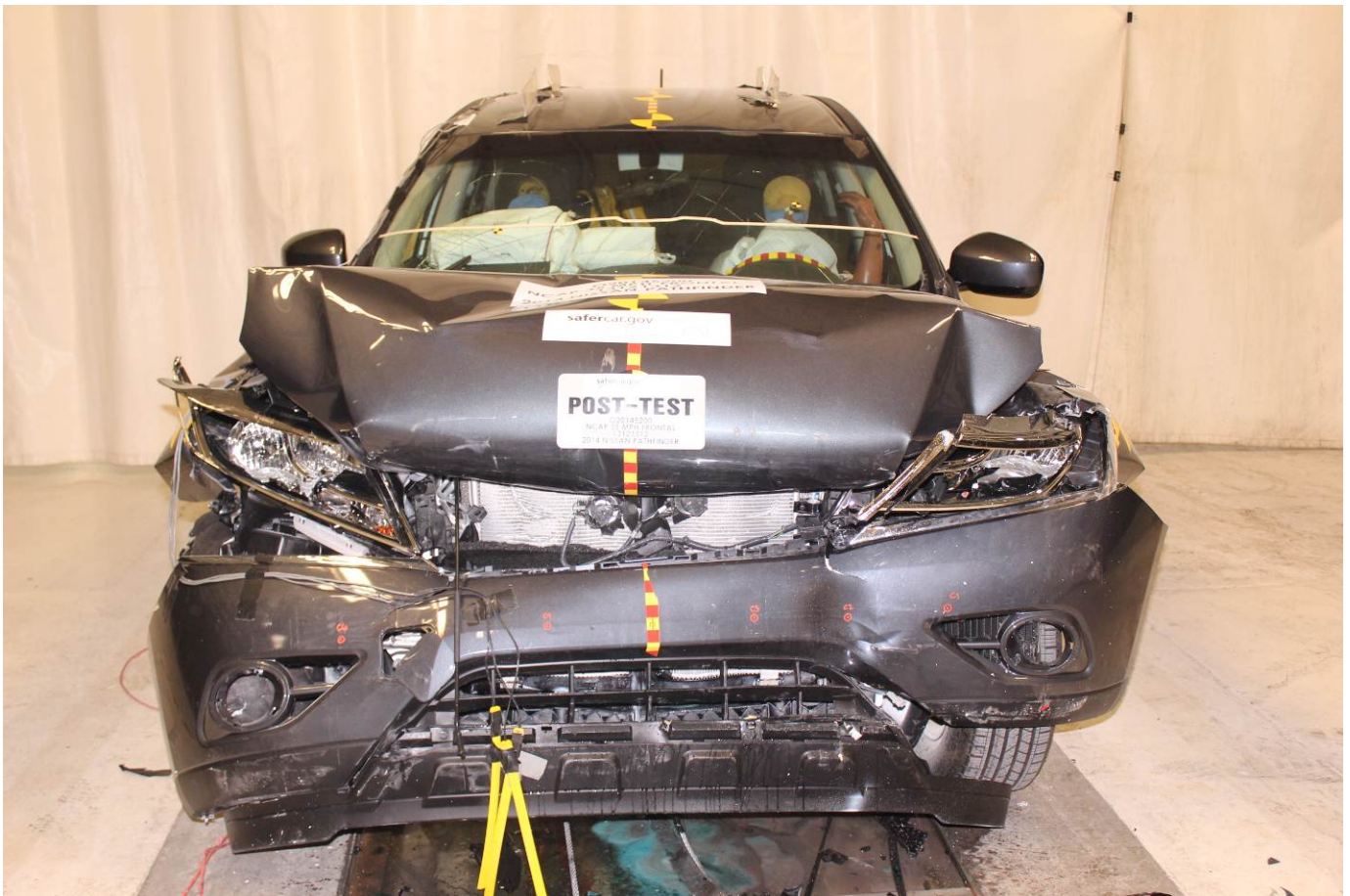
2014 Nissan Pathfinder Frontal As Delivered



Left Rear 3-4 View, As Received



Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Left View of Test Vehicle



Post-Test Left View of Test Vehicle



Pre-Test Right View of Test Vehicle



Post-Test Right View of Test Vehicle



Pre-Test Right Front 3-4 View



Post-Test Right Front 3-4 View



Pre-Test Left Rear 3-4 View



Post-Test Left Rear 3-4 View



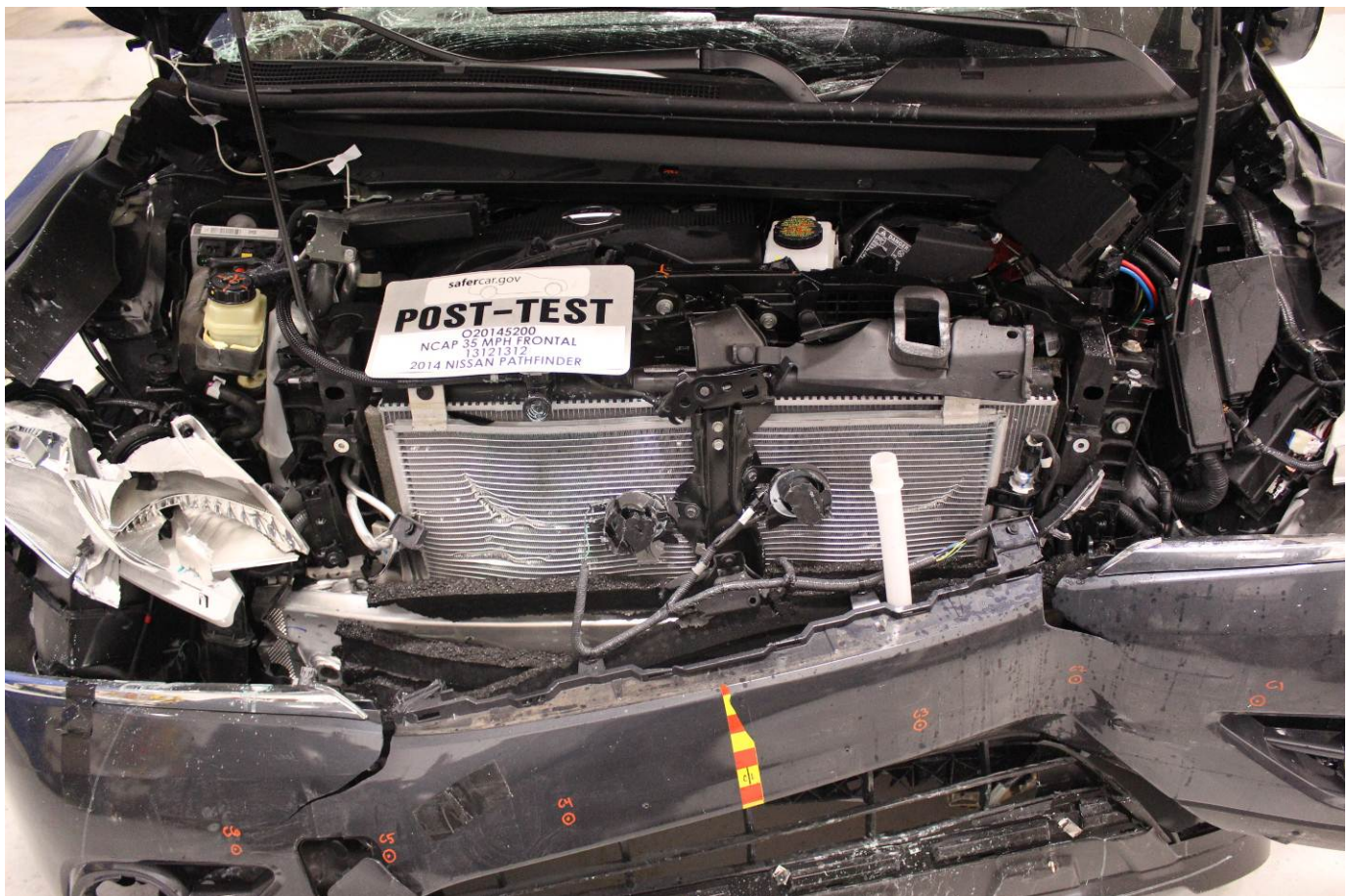
Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



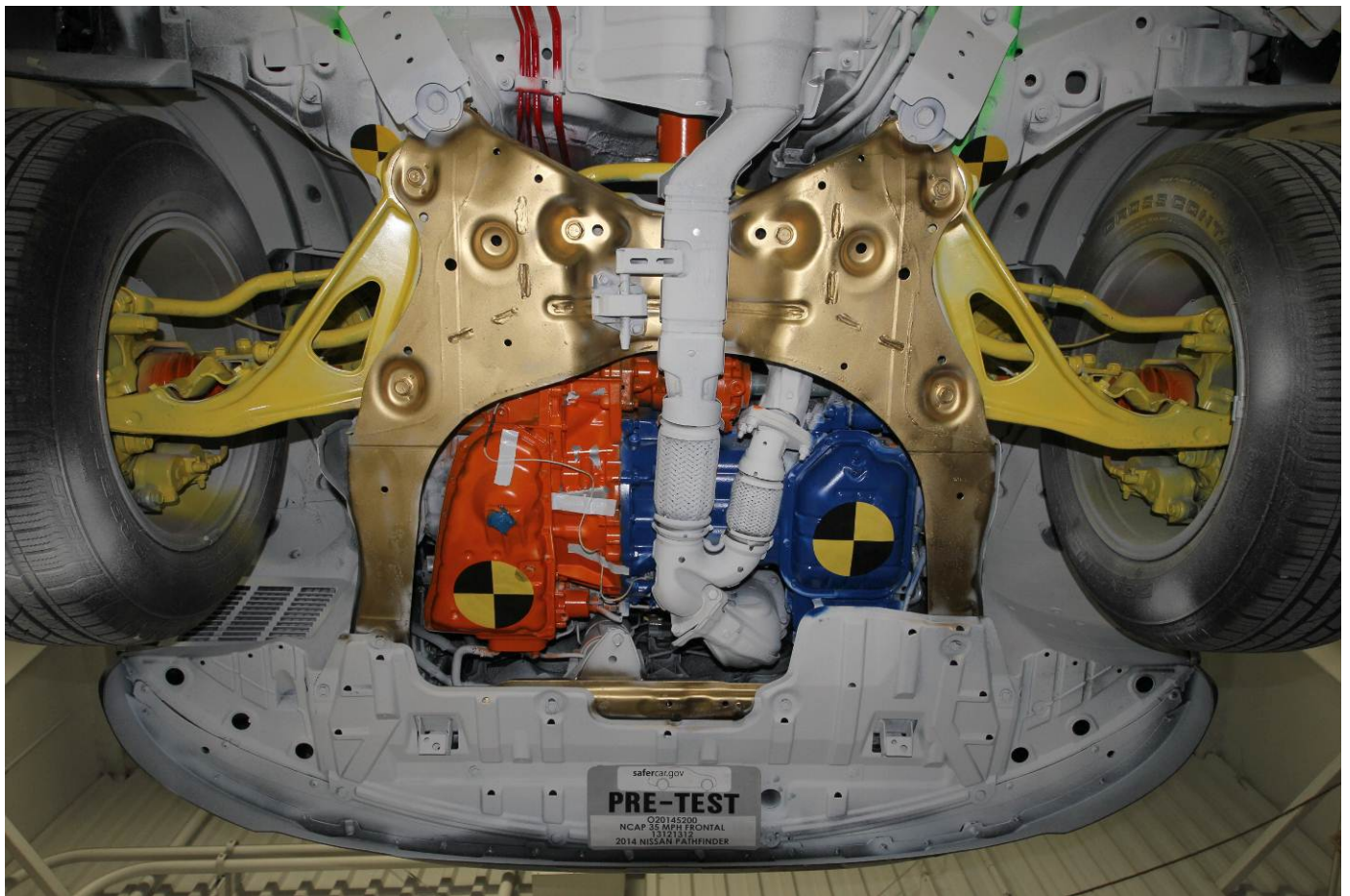
Post-Test Engine Compartment View



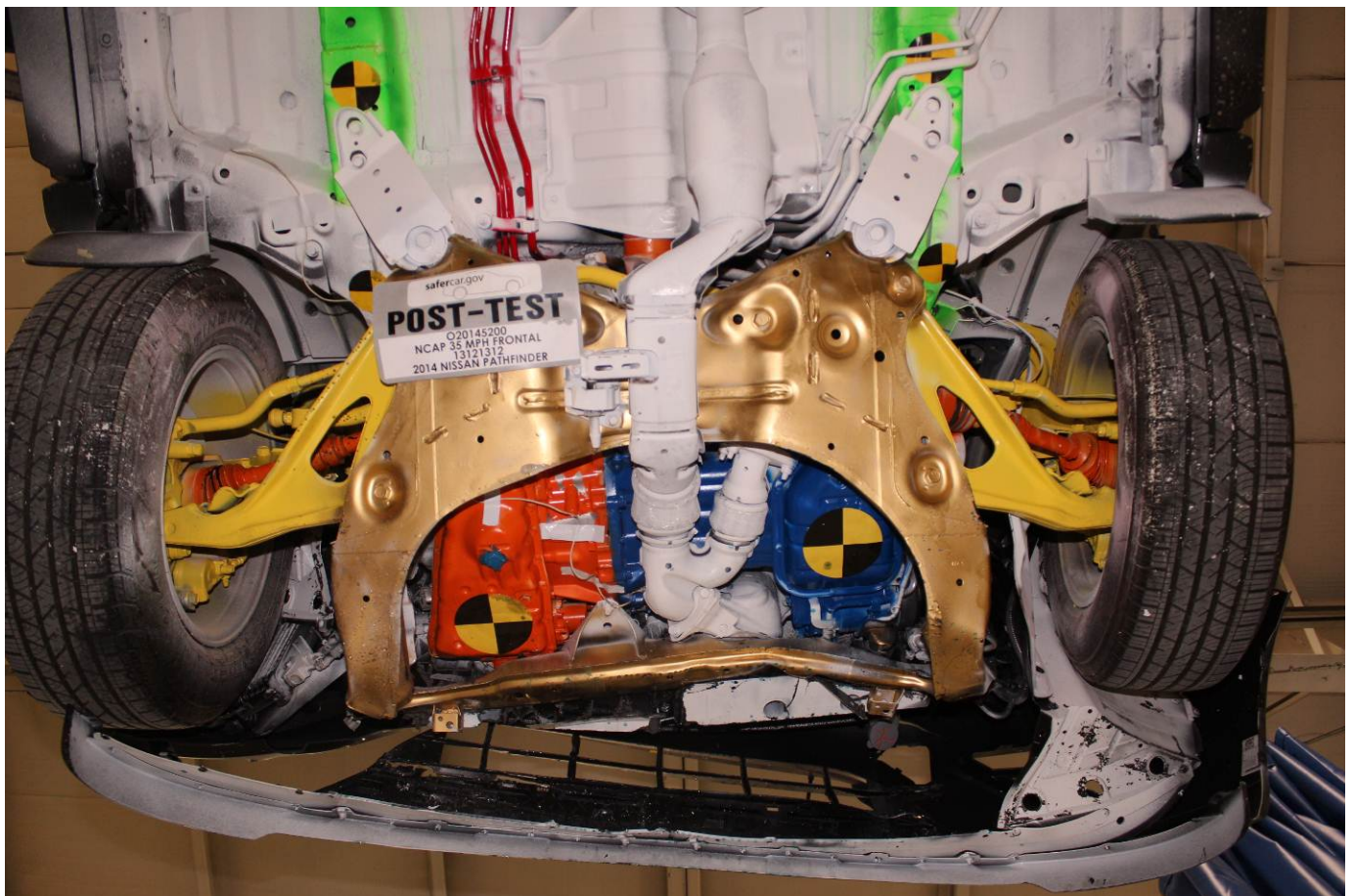
Pre-Test Fuel Filler Cap View



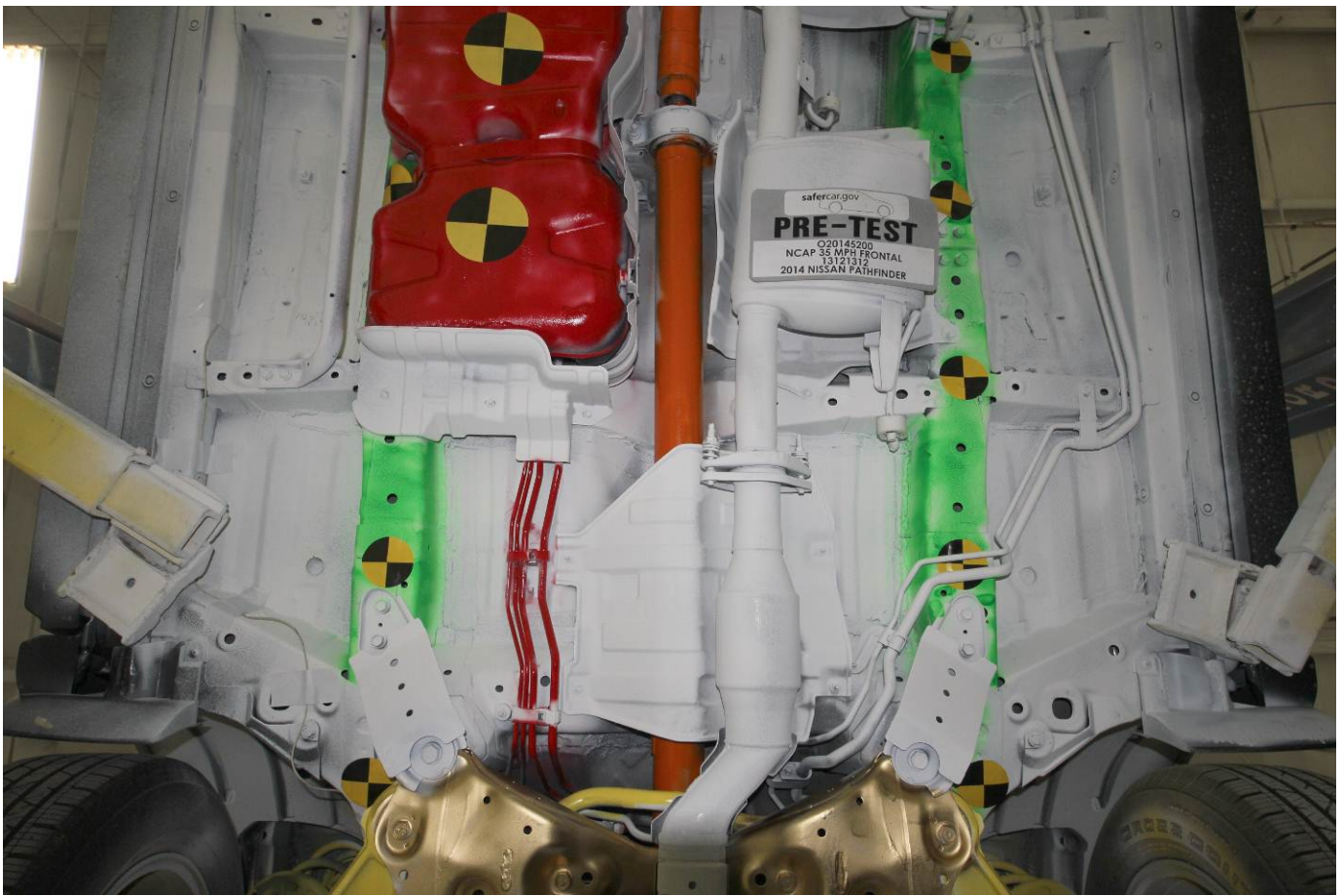
Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



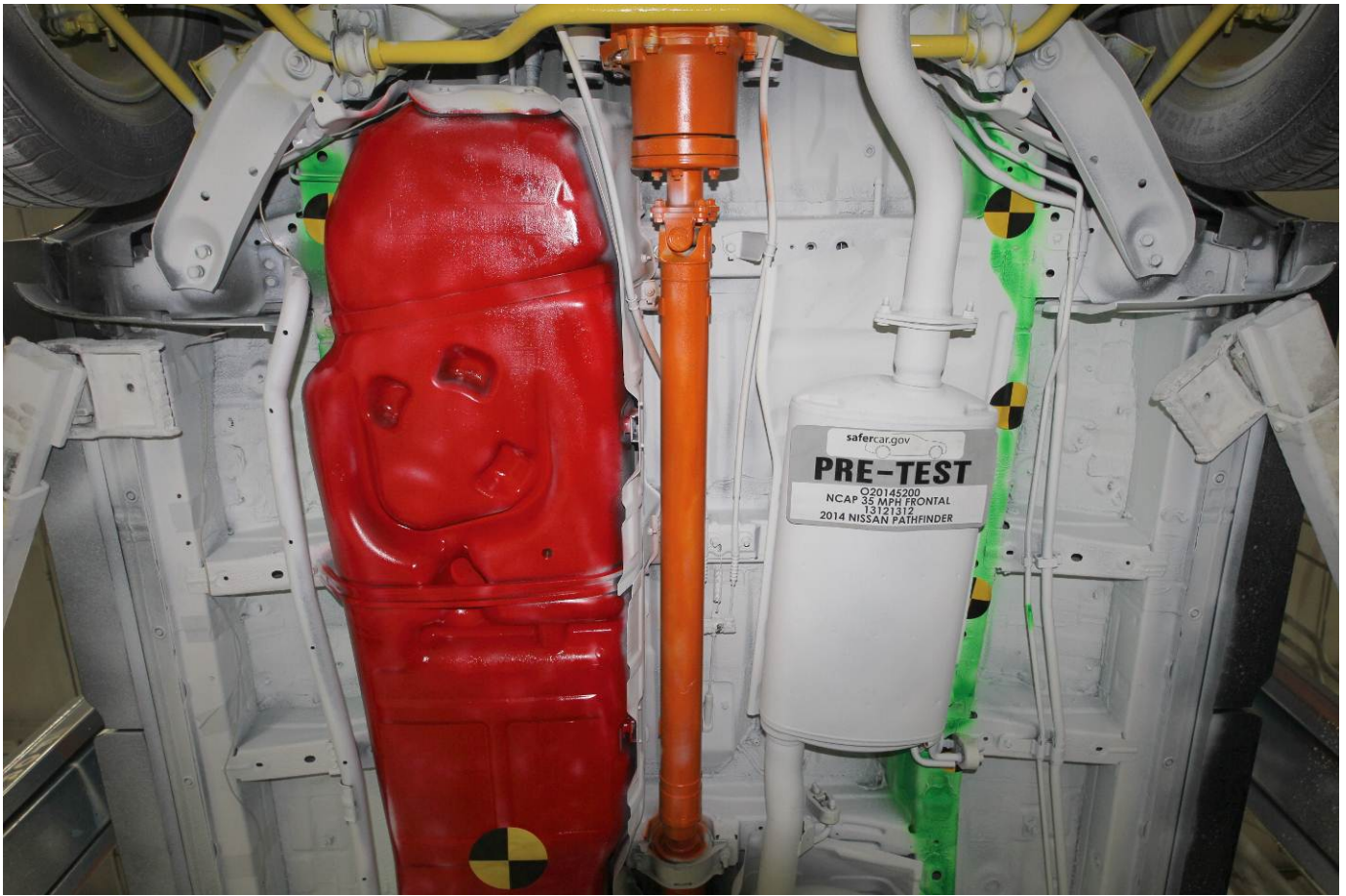
Post-Test Front Underbody View



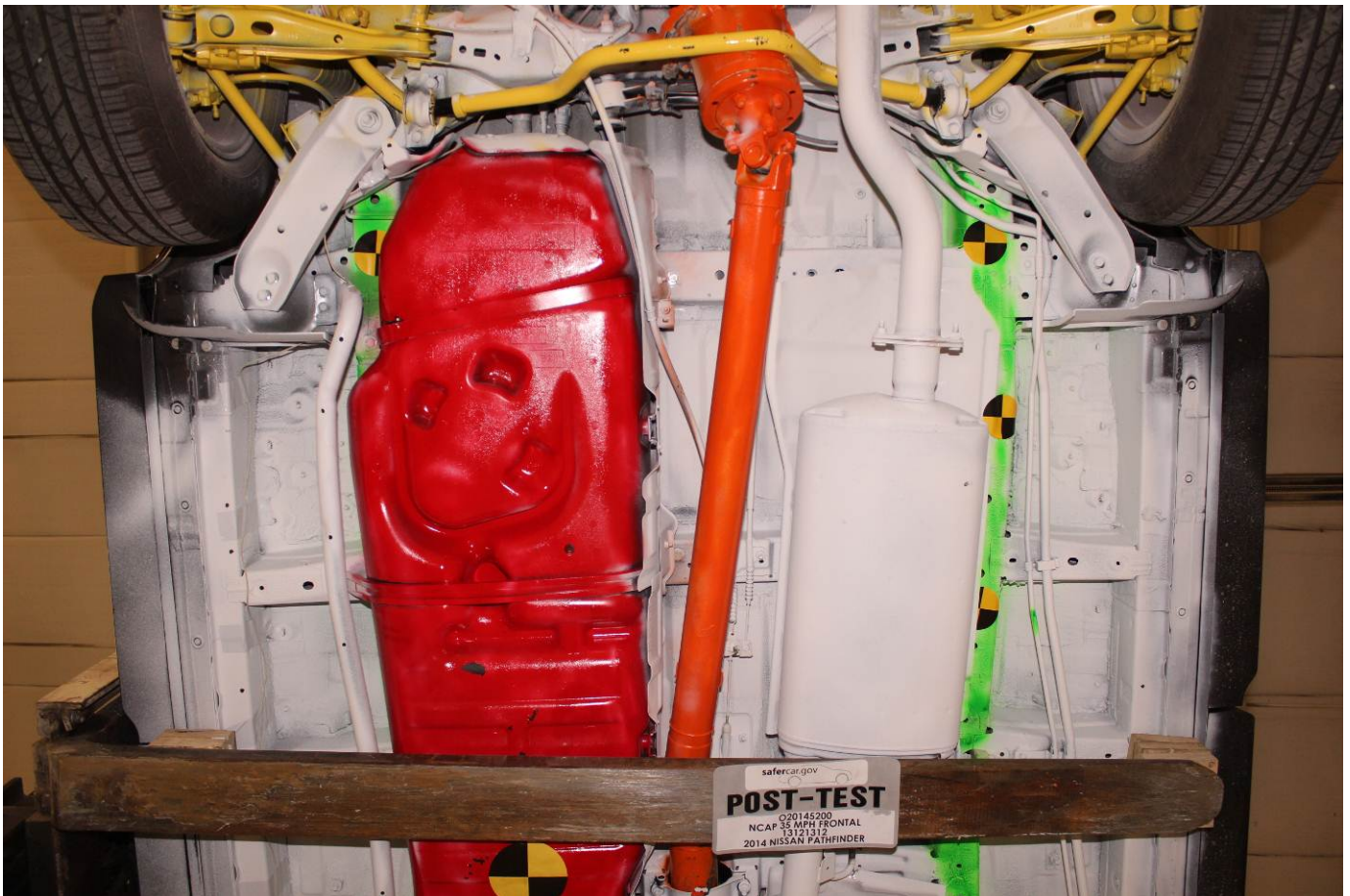
Pre-Test Mid Front Underbody View



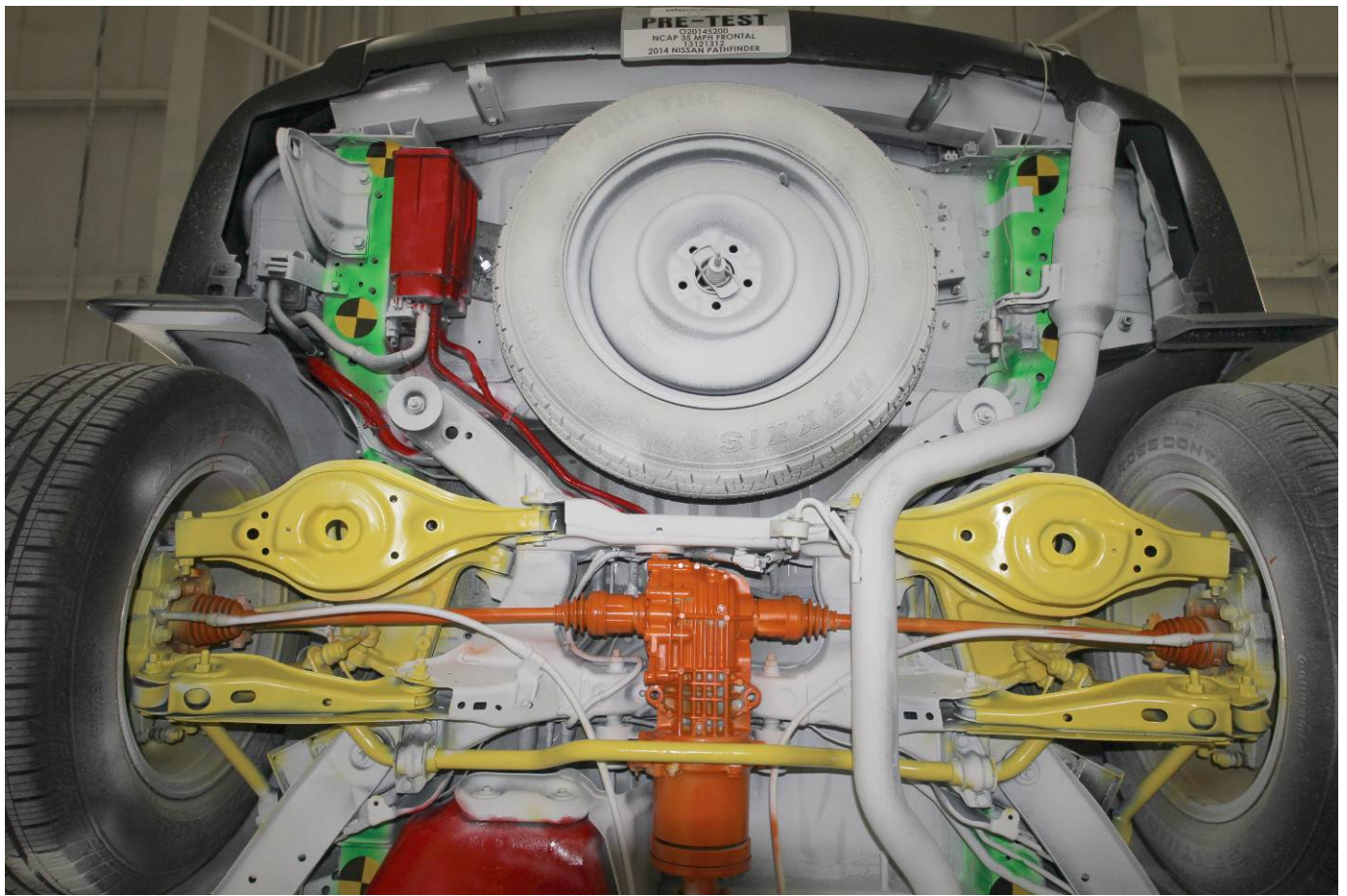
Post-Test Mid Front Underbody View



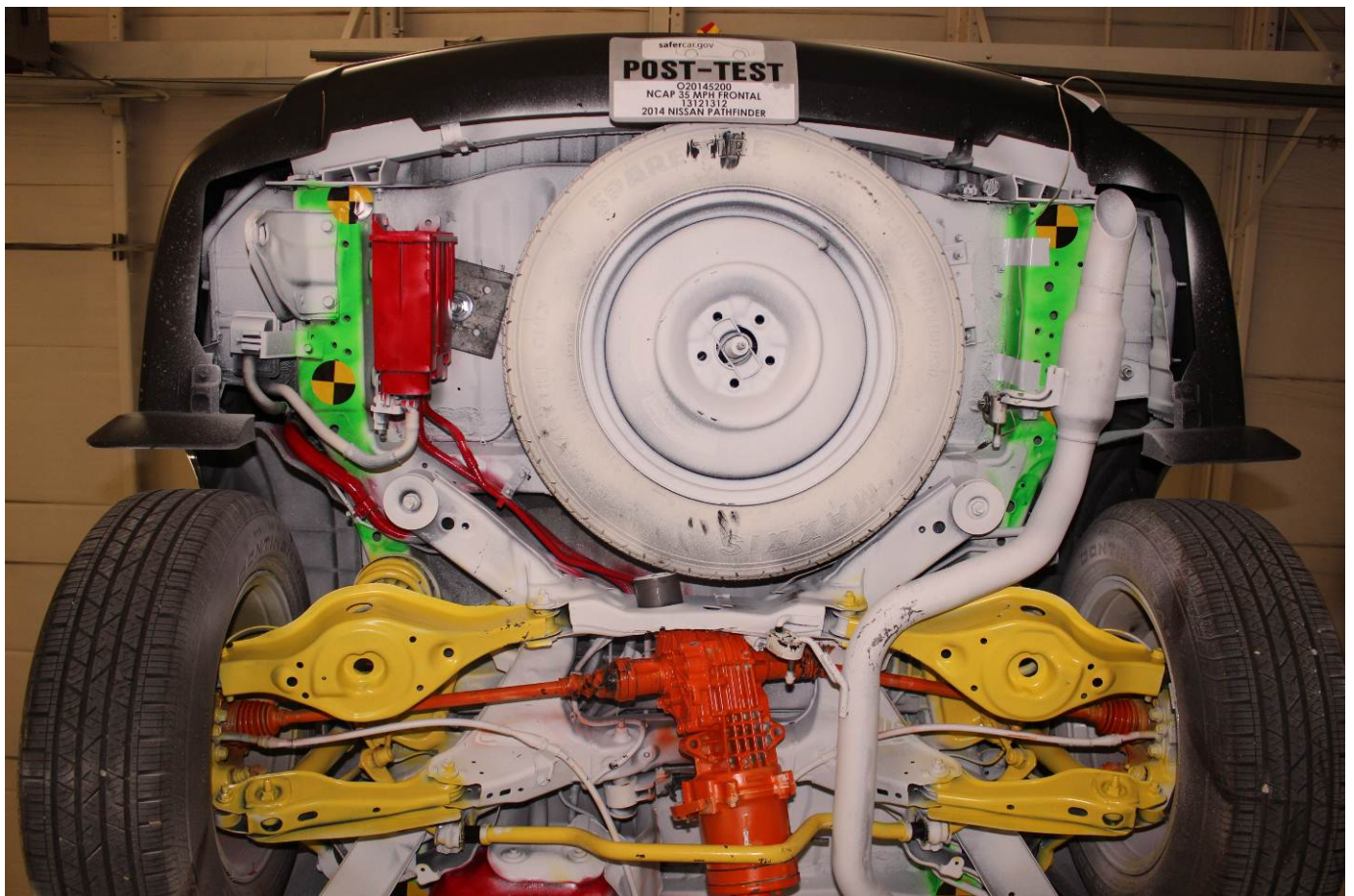
Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



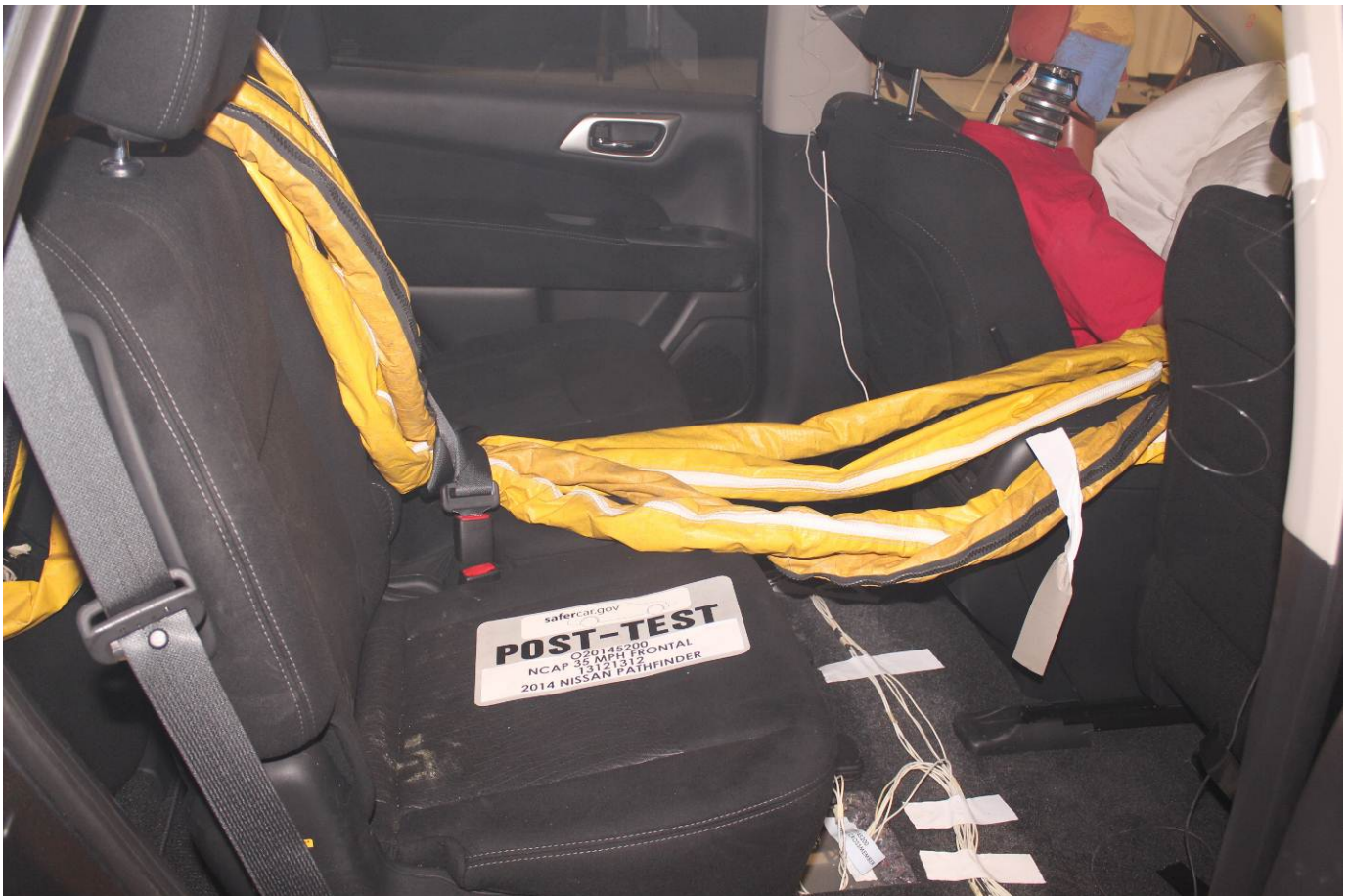
Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Dummy Cable Routing



Post-Test Dummy Cable Routing



Pre-Test Driver Dummy Front View



Post-Test Driver Dummy Front View



Pre-Test Driver Dummy Window View



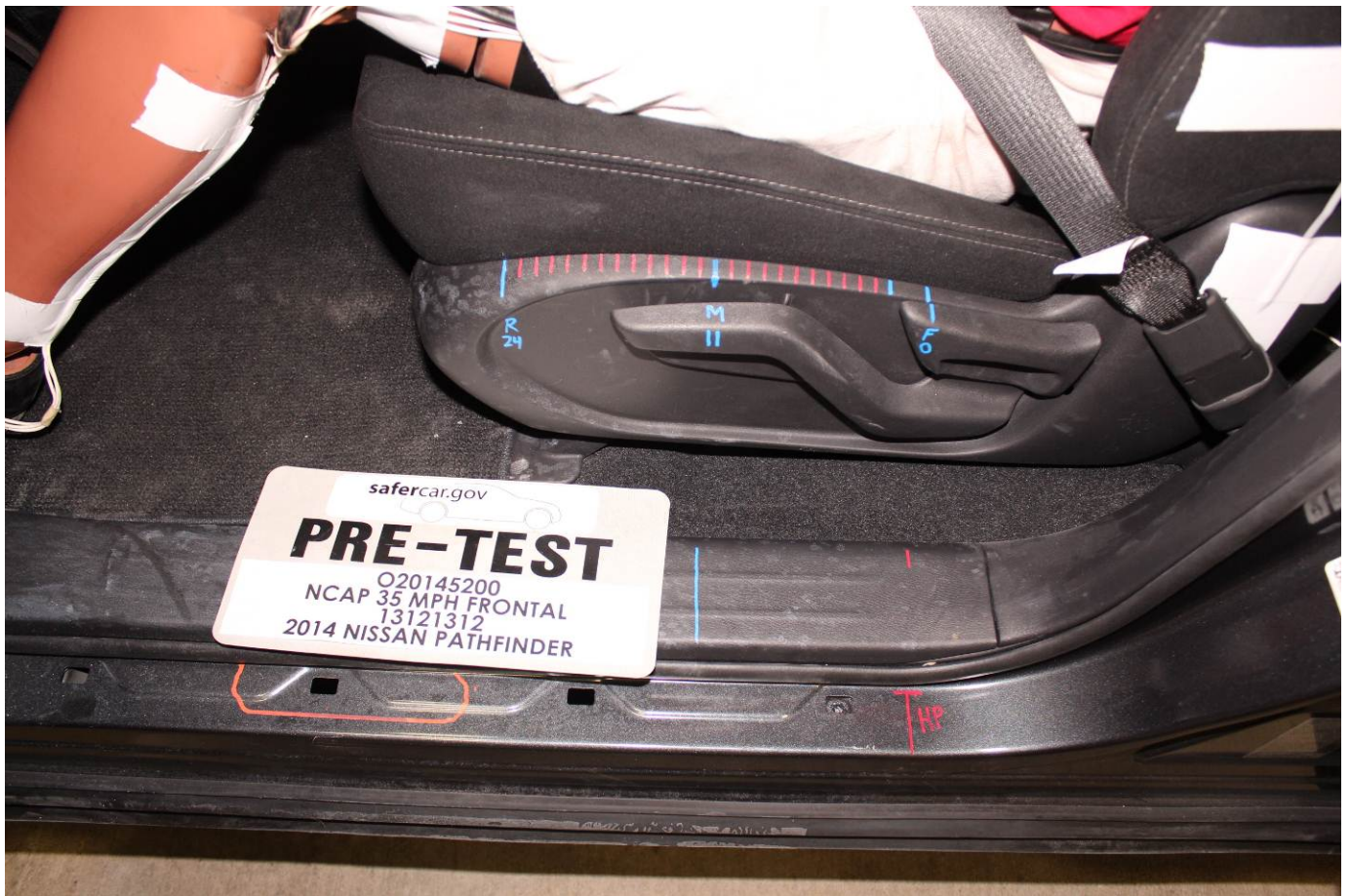
Post-Test Driver Dummy Window View



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



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



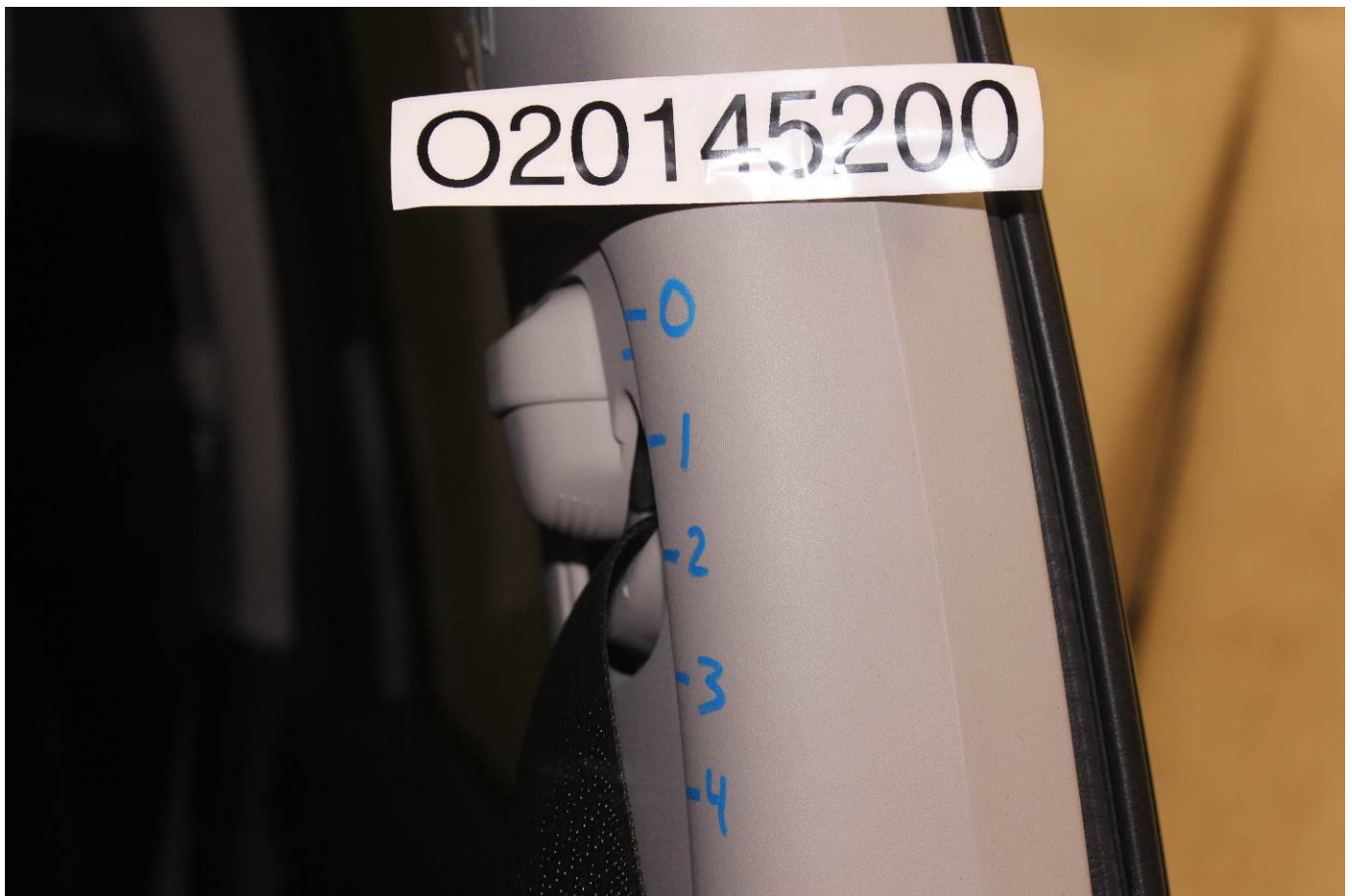
Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings



Pre-Test View of Belt Anchorage for Driver Dummy



Post-Test View of Belt Anchorage for Driver Dummy



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet

PHOTOGRAPH NOT AVAILABLE

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



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

PHOTOGRAPH NOT AVAILABLE

Pre-Test Driver's Side Floorpan



Post-Test Driver's Side Floorpan



Post-Test Driver Dummy Face



Post-Test Driver Dummy Contact with Airbag



Post-Test Driver Dummy Contact with Headrest



Post-Test Driver Dummy Contact with Knee Bolster



Pre-Test View of the Steering Wheel



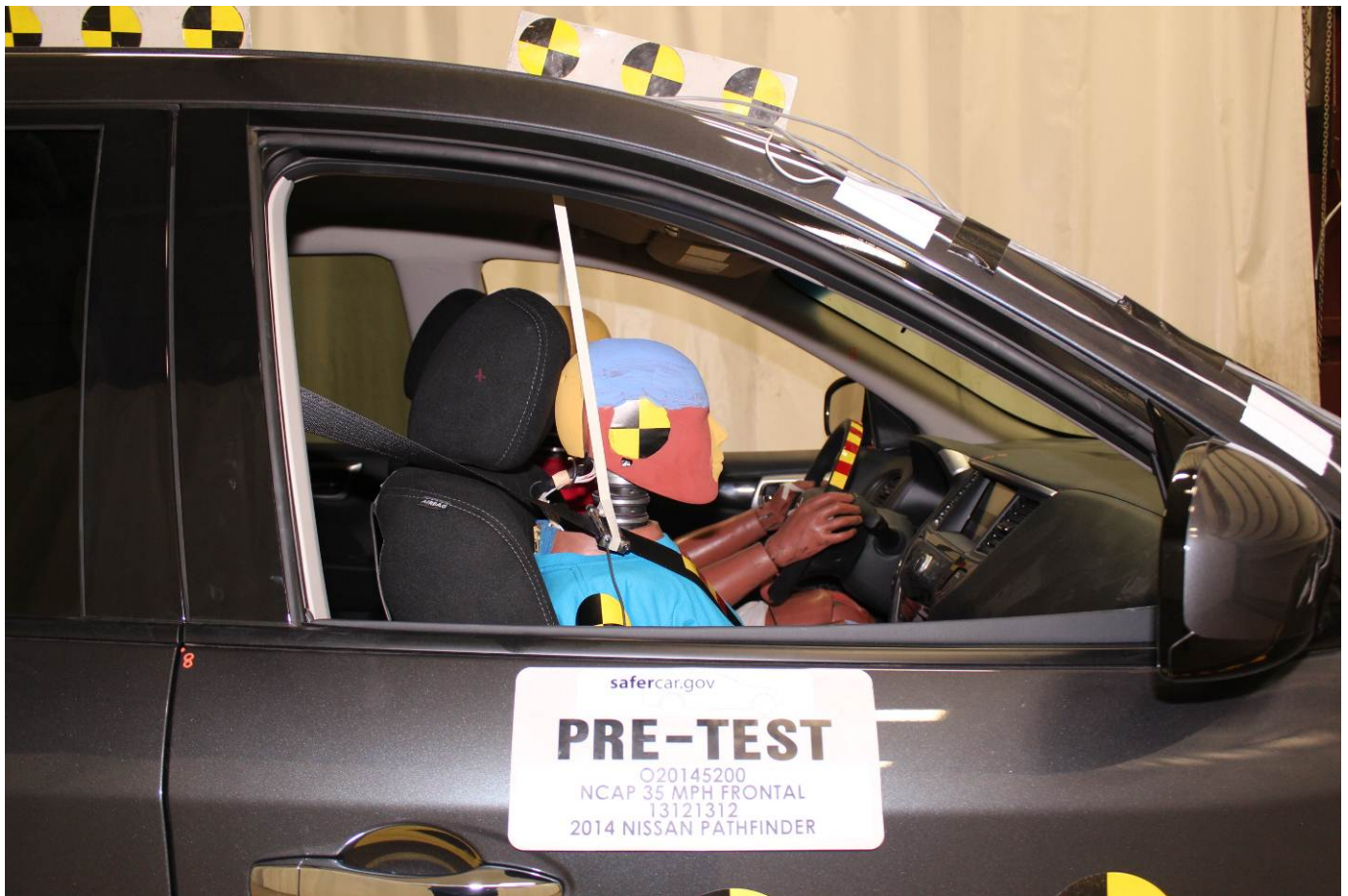
Post-Test View of the Steering Wheel



Pre-Test Passenger Dummy Front View



Post-Test Passenger Dummy Front View



Pre-Test Passenger Dummy Window View



Post-Test Passenger Dummy Window View



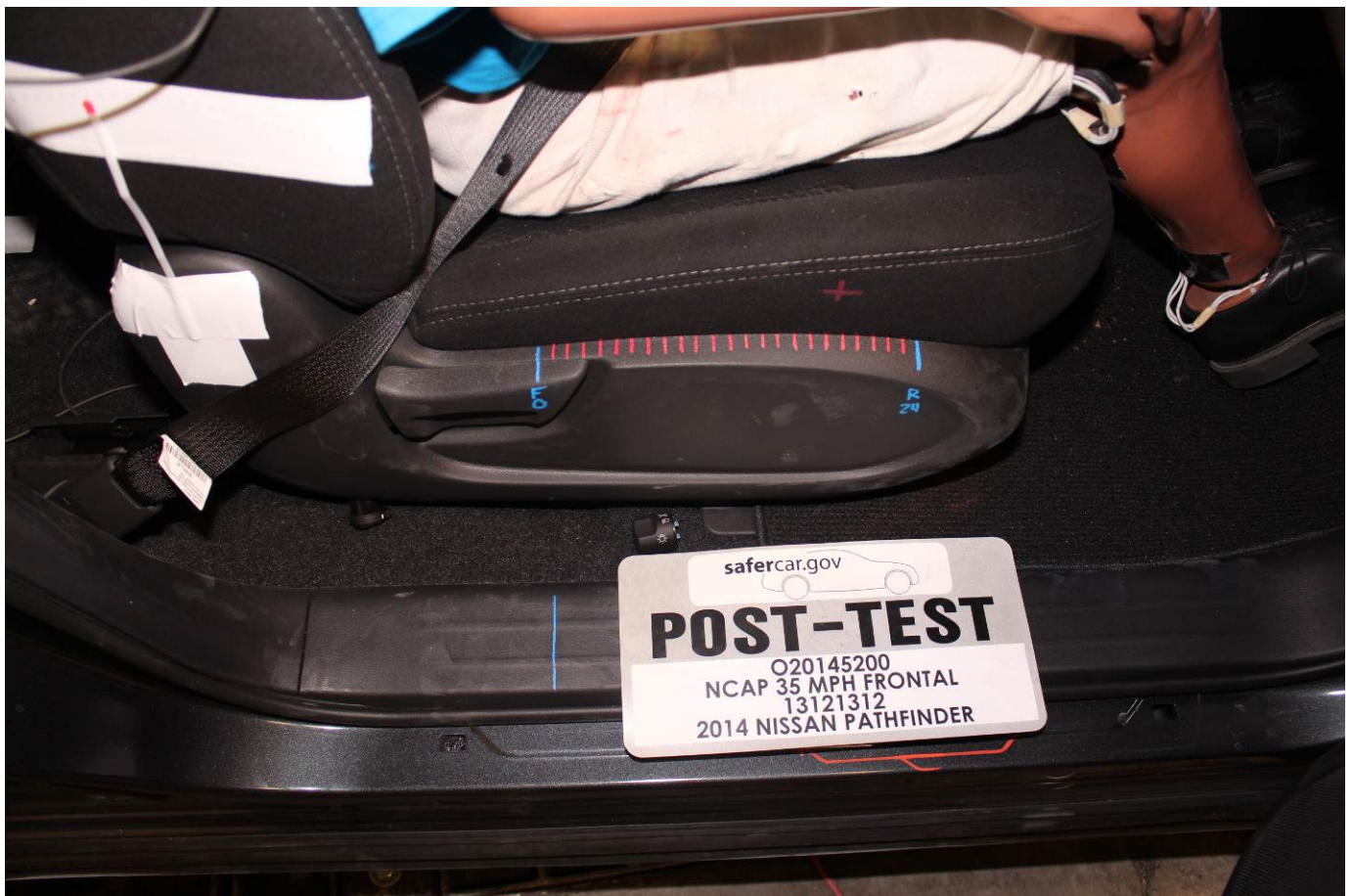
Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



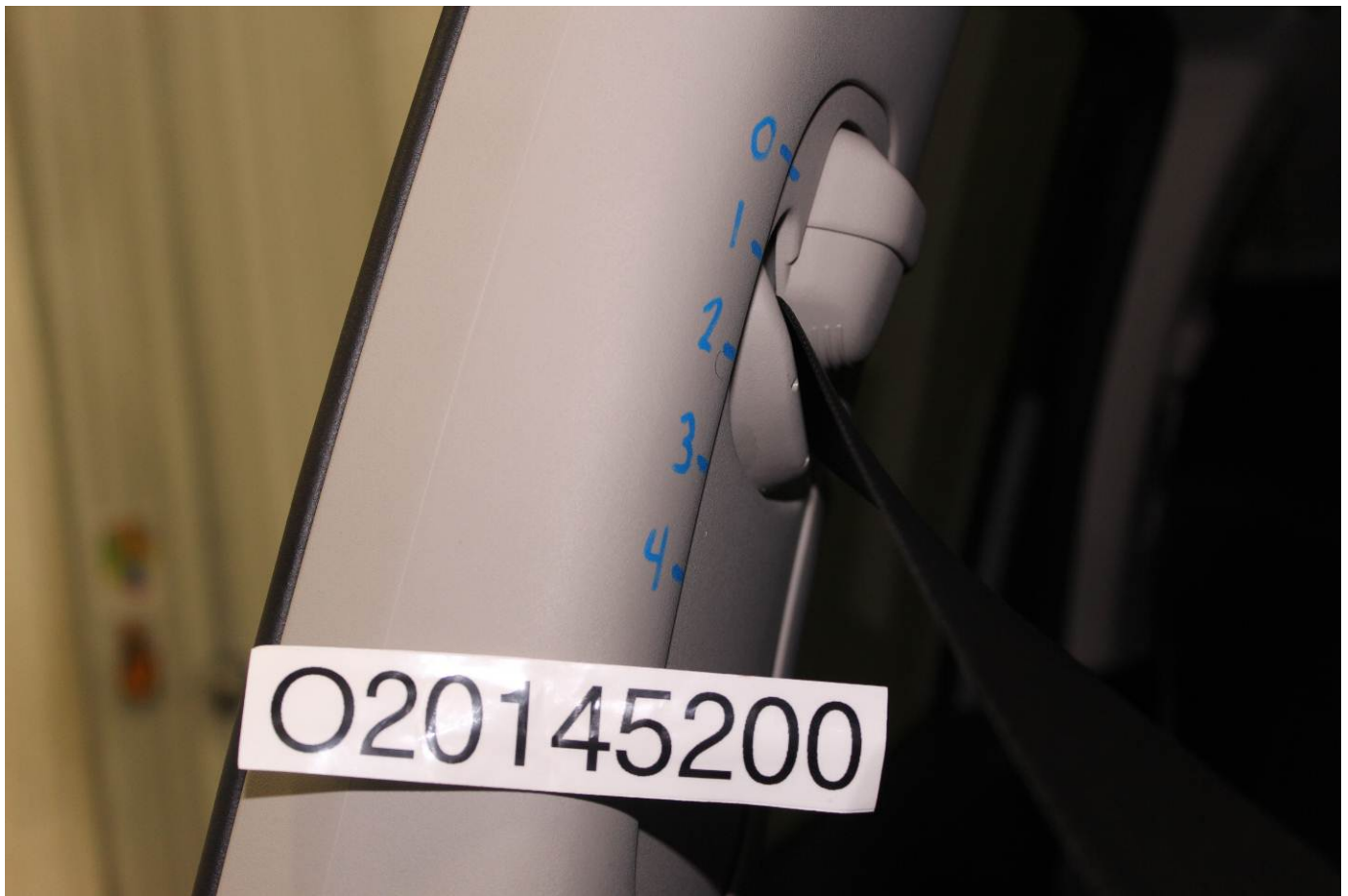
Post-Test Passenger Dummy and Vehicle Interior (Door Open)



Pre-Test Passenger's Seat Fore-Aft Markings



Post-Test Passenger's Seat Fore-Aft Markings



Pre-Test View of Belt Anchorage for Passenger Dummy



Post-Test View of Belt Anchorage for Passenger Dummy



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet

PHOTOGRAPH NOT AVAILABLE

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



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

PHOTOGRAPH NOT AVAILABLE

Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



Post-Test Passenger Dummy Face



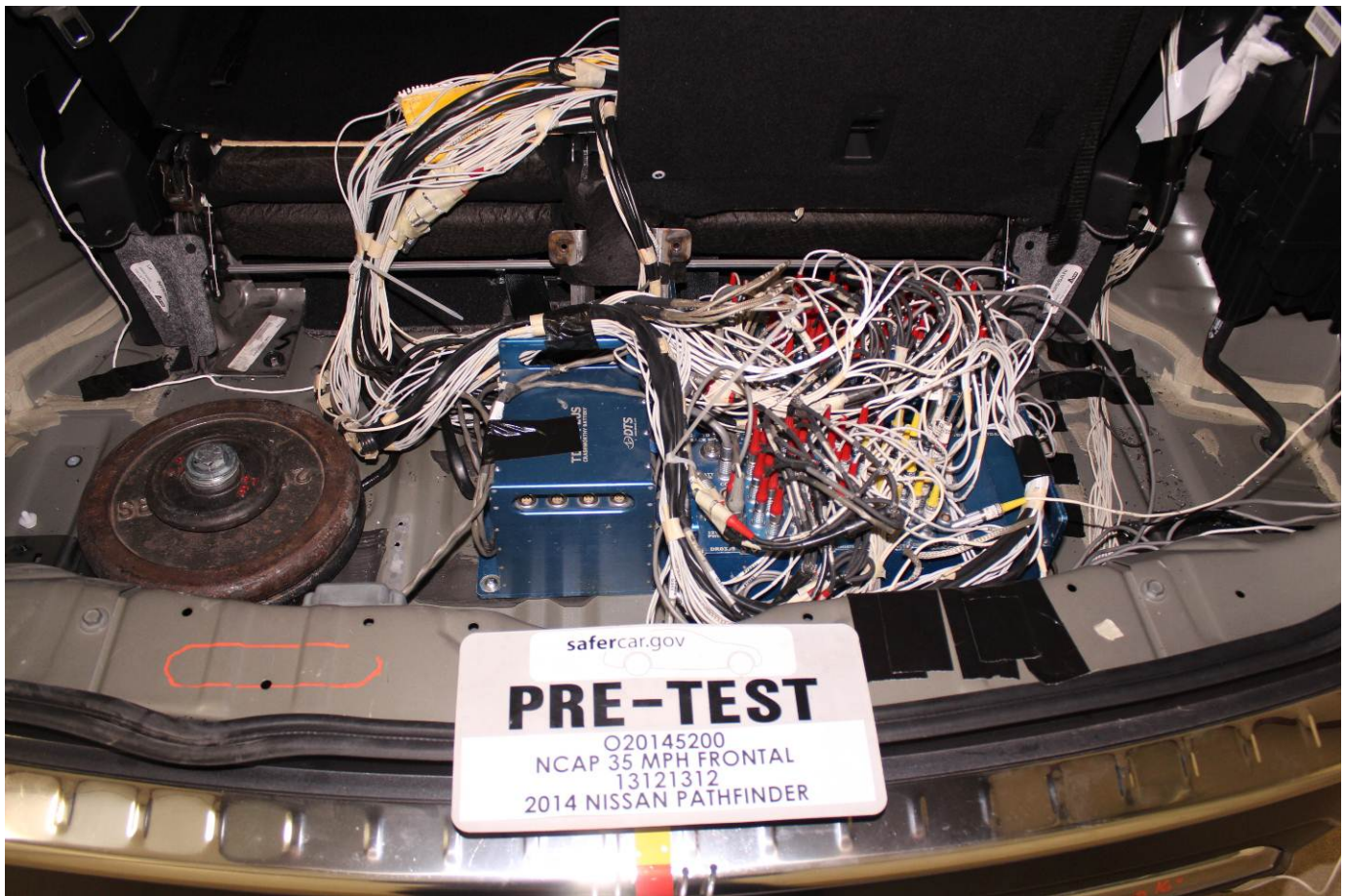
Post-Test Passenger Dummy Contact with Airbag



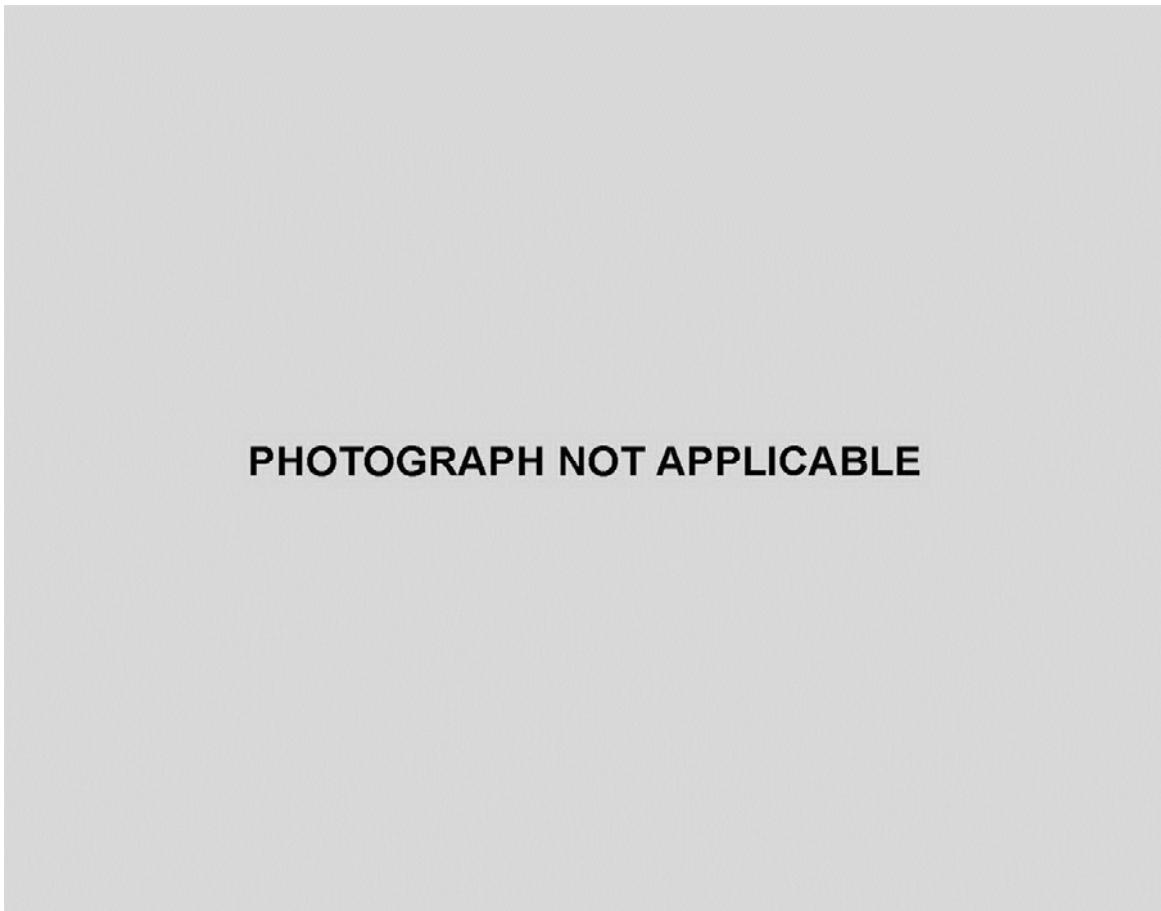
Post-Test Passenger Dummy Contact with Headrest



Post-Test Passenger Dummy Contact with Glovebox



Ballast Installed in Vehicle



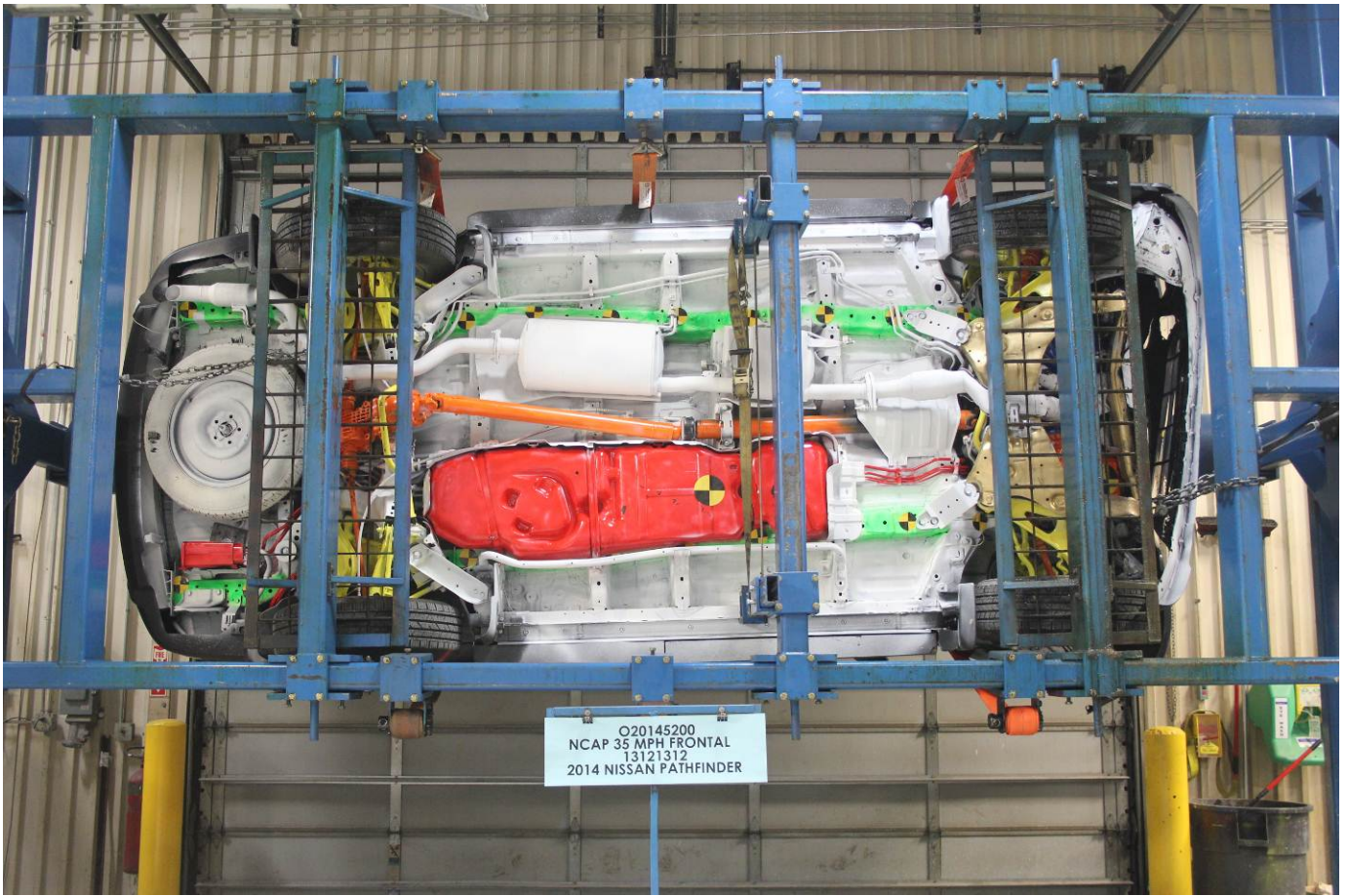
Post-Test Stoddard Solvent Spillage Location View



Post-Test Speed Trap Read-Out

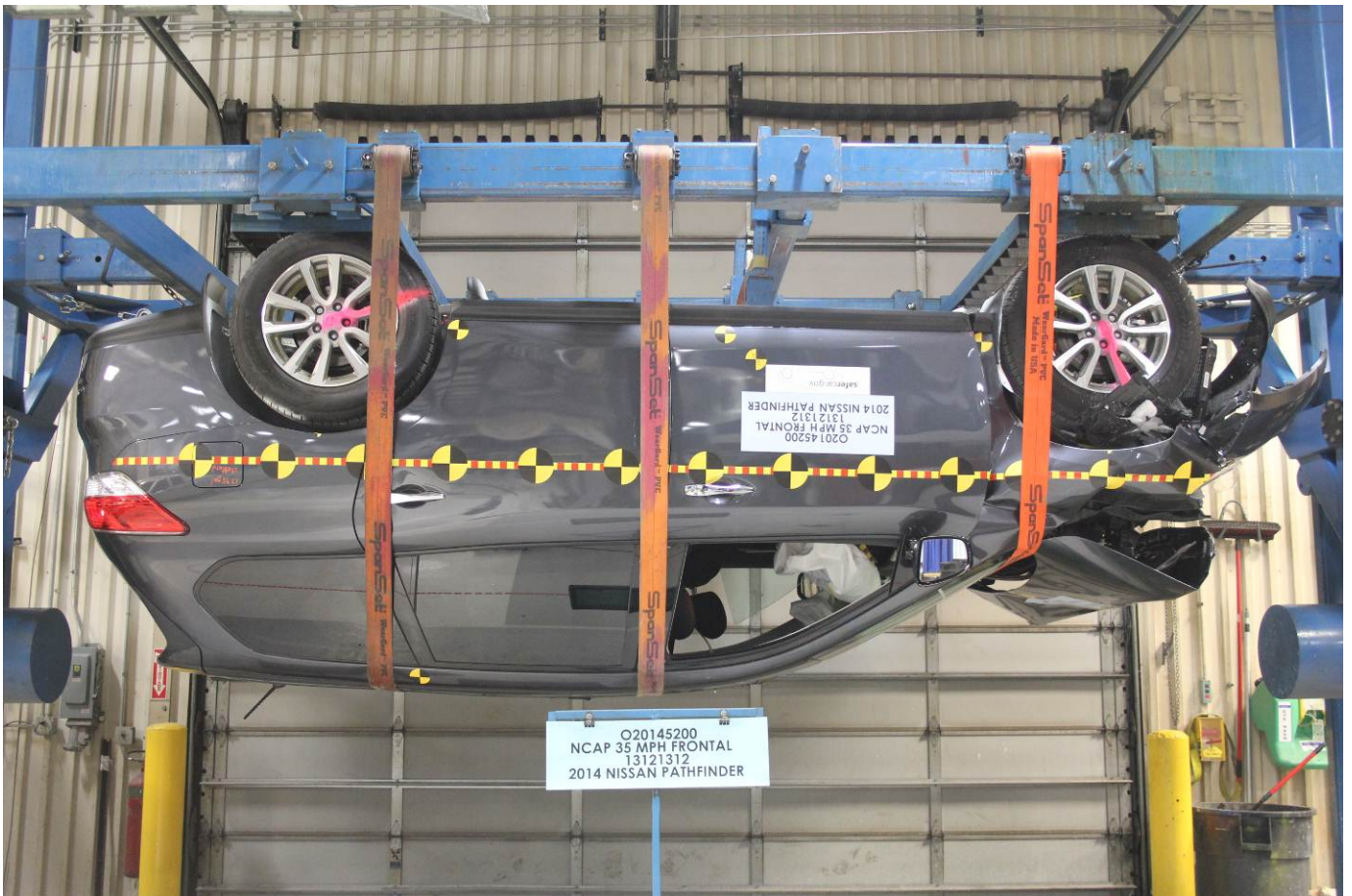


Vehicle at 0 Degree on Static Rollover Device



Q20145200
NCAP 35 MPH FRONTAL
13121312
2014 NISSAN PATHFINDER

Vehicle at 90 Degrees on Static Rollover Device



Q20145200
NCAP 35 MPH FRONTAL
13121312
2014 NISSAN PATHFINDER

Q20145200
NCAP 35 MPH FRONTAL
13121312
2014 NISSAN PATHFINDER

Vehicle at 180 Degrees on Static Rollover Device



Q20145200
NCAP 35 MPH FRONTAL
13121312
2014 NISSAN PATHFINDER

Vehicle at 270 Degrees on Static Rollover Device



Q20145200
NCAP 35 MPH FRONTAL
13121312
2014 NISSAN PATHFINDER

Vehicle at 360 Degrees on Static Rollover Device



2014 Nissan Pathfinder Frontal Impact Event



2014 PATHFINDER S 4X4



Scan QR code for general model information & options

THE NEXT GEN SUV

Standard Equipment Included at No Extra Charge

MECHANICAL & PERFORMANCE
 3.5-liter V6 w/260HP/240lb-ft Torque
 XTRONIC CVT®(Continuously Variable Transmission)
 Continuous Valve Timing Control System (CVTCS)
 Intuitive 4WD w/ 4x4 and Selectable 2WD, Auto and 4WD Lock Modes
 5,000 lb. Towing Capacity
 Electronic Brake Force Distribution (EBD)
 4-Wheel Ventilated Disc Brakes w/Auto-Lock Braking System (ABS)
 18" Alloy Wheels
 235/65R18 All Season Tires
 Temporary Spare Tire

SAFETY & SECURITY
 Driver & Front Passenger, Side-Impact, & Curtain Air Bags
 Lower Anchors & Tethers for Children (LATCH)
 Child Safety Rear Door Locks
 Vehicle Dynamic Control (VDC)
 Traction Control System (TCS)
 Nissan Vehicle Immobilizer System
 Vehicle Security System
 Tire Pressure Monitoring System (TPMS) with Easy Fill Tire Alert

COMFORT & CONVENIENCE
 7 Passenger Seating Capacity
 EZ Flex™ Seating System
 LATCH AND GLIDE™ Technology
 2nd-Row 60/40 Split Fold-Flat Bench Seat w/Recline
 5.5 Inches Sliding 2nd-Row 3rd-Row 50/50 Split Fold-Flat Bench Seat w/Recline
 6-Way Manual Driver's Seat w/Manual Lumbar Support
 4-Way Manual Front Passenger Seat
 Power Door Locks w/Auto Locking Feature
 Remote Keyless Entry
 Push Button Ignition
 AM/FM/MP3/USB/CD 6-Speaker Audio System w/Aux-input
 Advanced Drive Assist™ Display
 Tri-Zone Automatic Temperature Control w/ 2nd-Row Center Console Controls and 2nd and 3rd-Row Vents
 Dual Power Remote-Controlled Outside Mirrors
 Cargo Floor Storage Compartment
 (2) 12-Volts DC Power Outlets
 Rear Manual 1,1gate

EXTERIOR
 Chrome Grille w/Front and Rear Chrome Accent Fascia
 Chrome Front and Rear Door Handles

Manufacturer's Suggested Retail Base Price:	\$30,450.00
Options Included by Manufacturer	
SPLASH GUARDS	150.00
REAR BUMPER PROTECTOR	200.00
CARPETED FLOOR MATS	200.00
DESTINATION CHARGES	860.00
Total*	\$31,860.00

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy Small SUVs range from 16 to 30 MPG. The best vehicle rates 121 MPG.

21 MPG combined city/hwy
 19 city 25 highway

4.8 gallons per 100 miles

You spend \$1,000 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,500

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

1 5 10 Best

This vehicle emits 617 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fuel-economy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and costs \$11,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.59 per gallon. MPG is miles per gallon (city/combined/hwy). Vehicle emissions are a significant cause of climate change and smog.

fuel-economy.gov
 Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS DELIVERY

Overall Vehicle Score Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.	Not Rated	VEHICLE COLORS: EXT: DARK SLATE INT: CHARCOAL
Frontal Crash Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.	Driver Not Rated Passenger Not Rated	FINAL ASSEMBLY POINT: SMYRNA TRANSPORT METHOD: TRUCK
Side Crash Based on the risk of injury in a side impact.	Front seat Not Rated Rear seat Not Rated	DEALER: BOUCHER NISSAN WAUKESHA 1451 E MORELAND BLVD WAUKESHA WI 53186
Rollover Based on the risk of rollover in a single-vehicle crash.	Not Rated	

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

This Vehicle qualifies for Nissan's
Security+Plus Vehicle Protection Plan
 The only service agreement backed by Nissan!
 Ask your dealer for details, or call 1-800-NISSAN-1 for more information

VIN: 5N1AR2MM3EC036111
 EMS:30 STATE EMISSIONS
 MDL:25014-636111 K50-G
 OPT: E-892B94C03L92

20131003234330P25057

*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

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

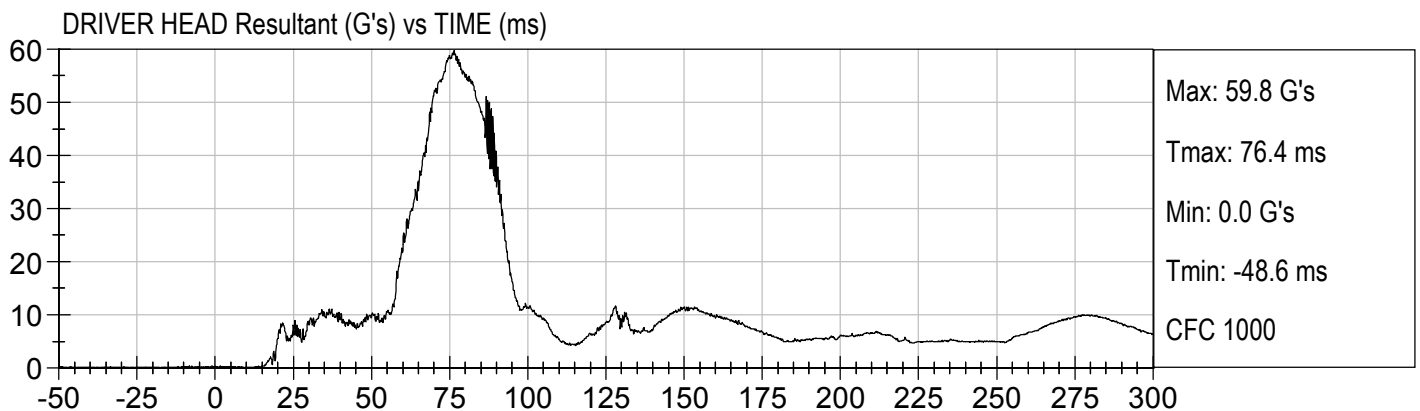
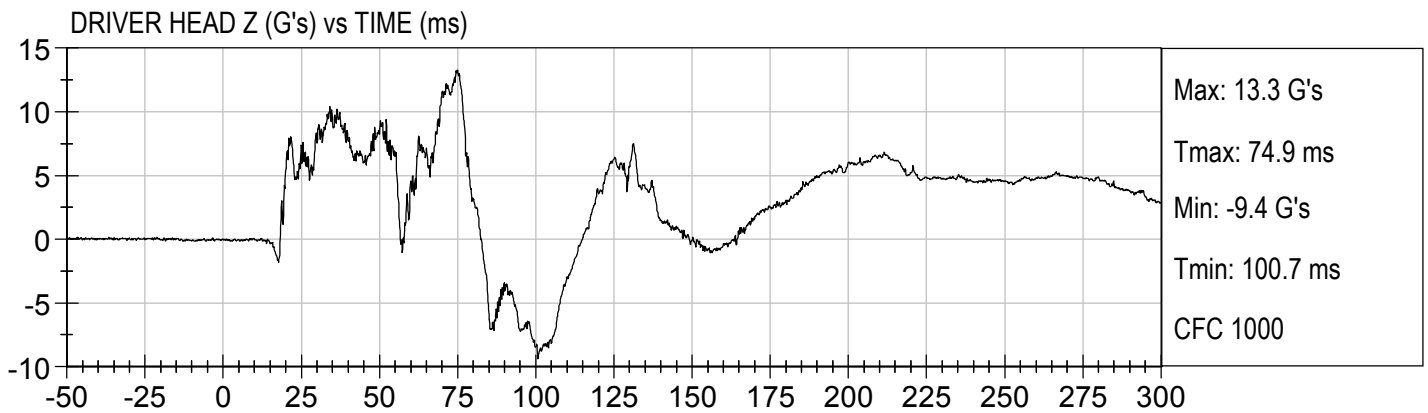
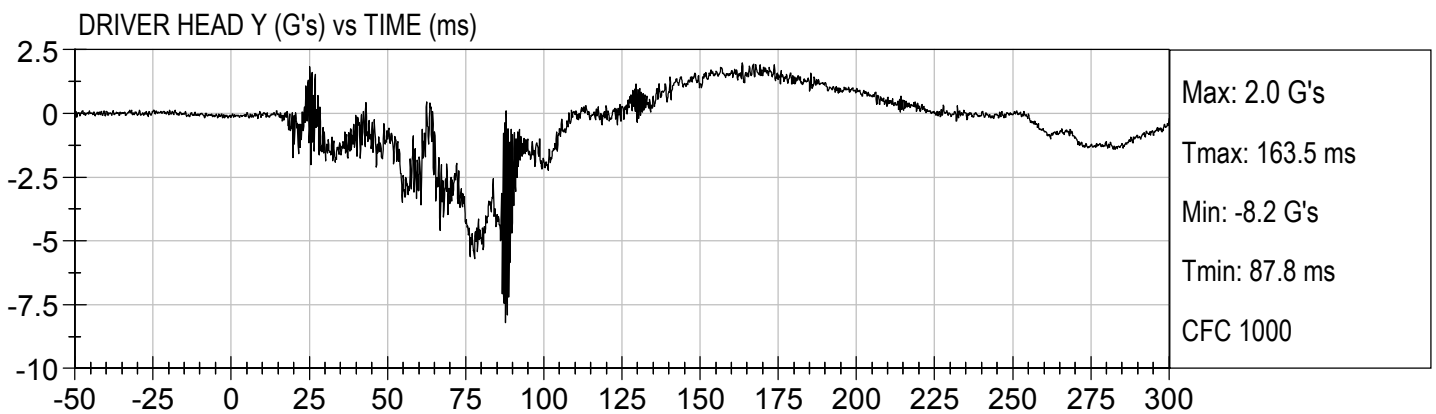
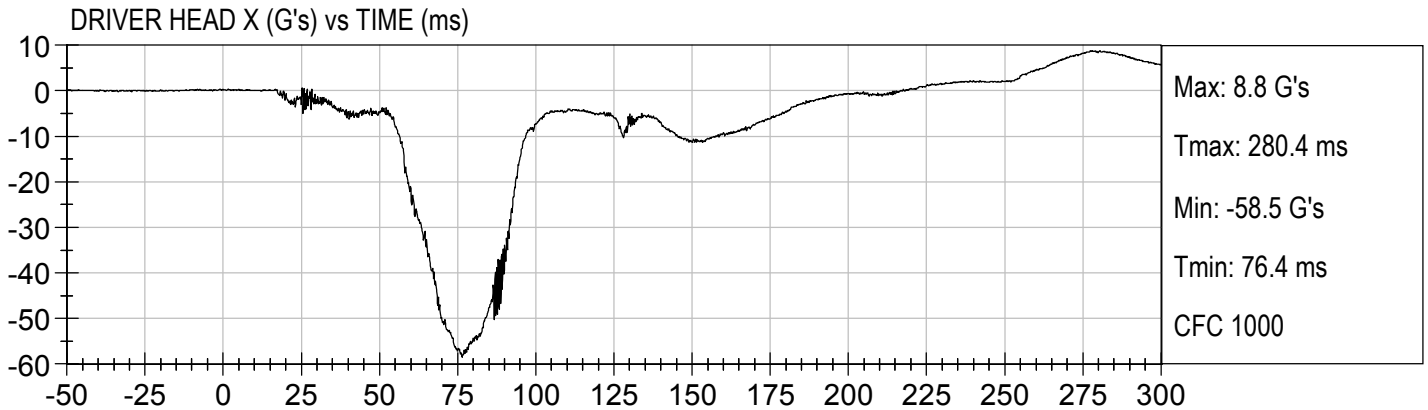
	<u>Page No.</u>
Figure No. 28. Passenger Neck Force X vs. Time	B-10
Figure No. 29. Passenger Neck Force Z vs. Time	B-10
Figure No. 30. Passenger Neck Moment Y vs. Time	B-10
Figure No. 31. Passenger Nij (NTF) vs. Time	B-11
Figure No. 32. Passenger Nij (NTE) vs. Time	B-11
Figure No. 33. Passenger Nij (NCF)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

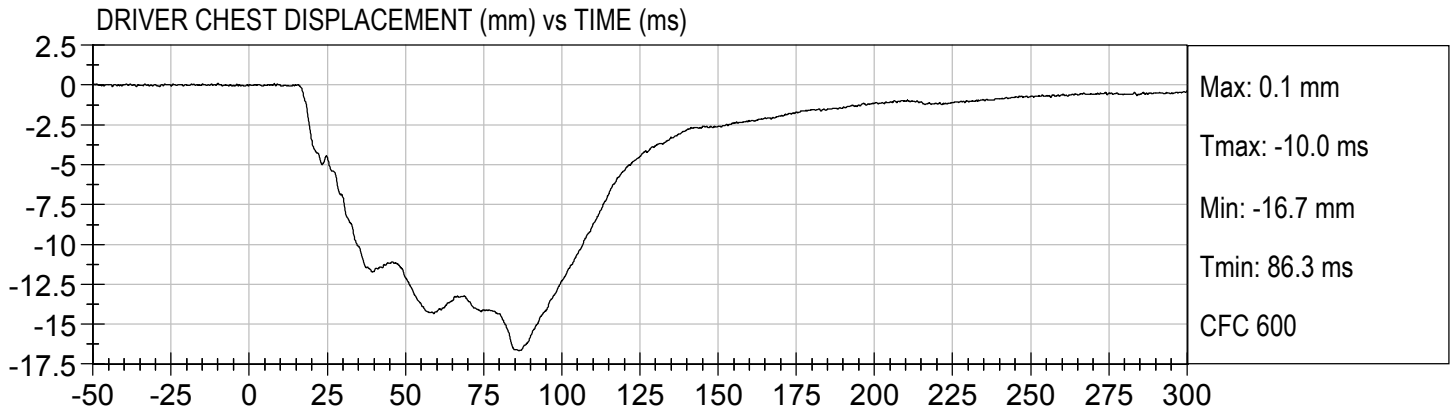
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

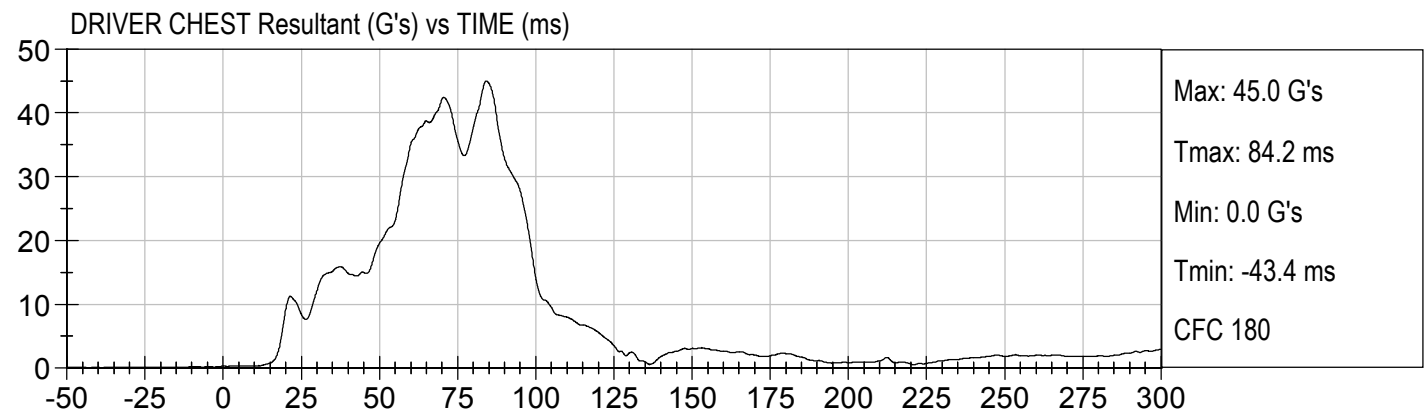
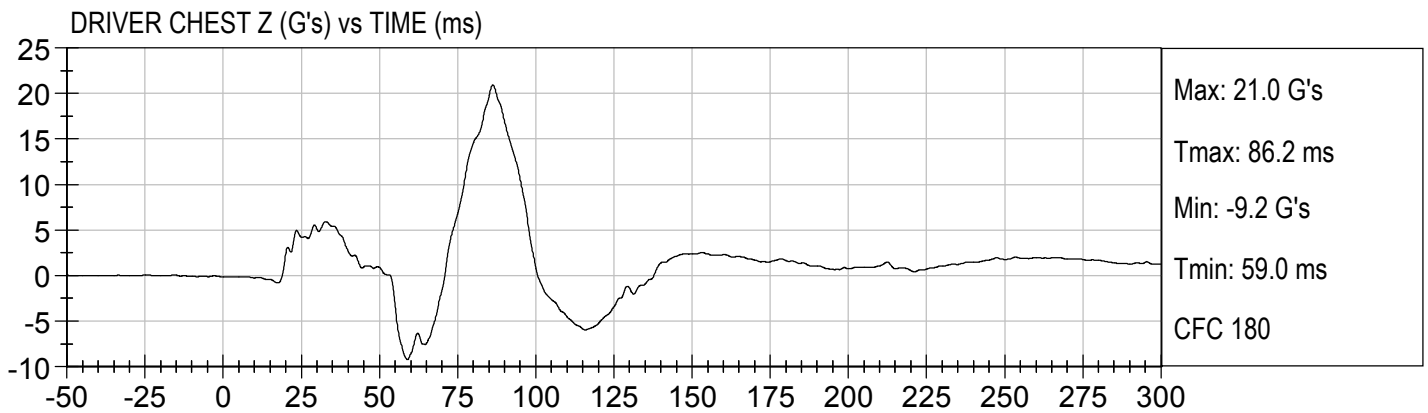
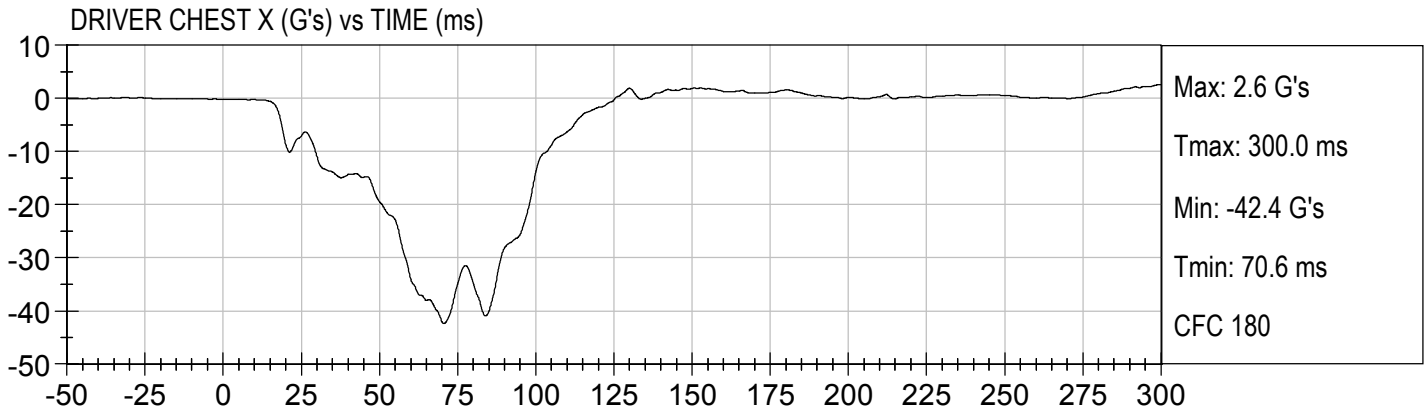
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 Driver Head Z Redundant
 Driver Upper Neck Force Y
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 Driver Chest X Redundant
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 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
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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

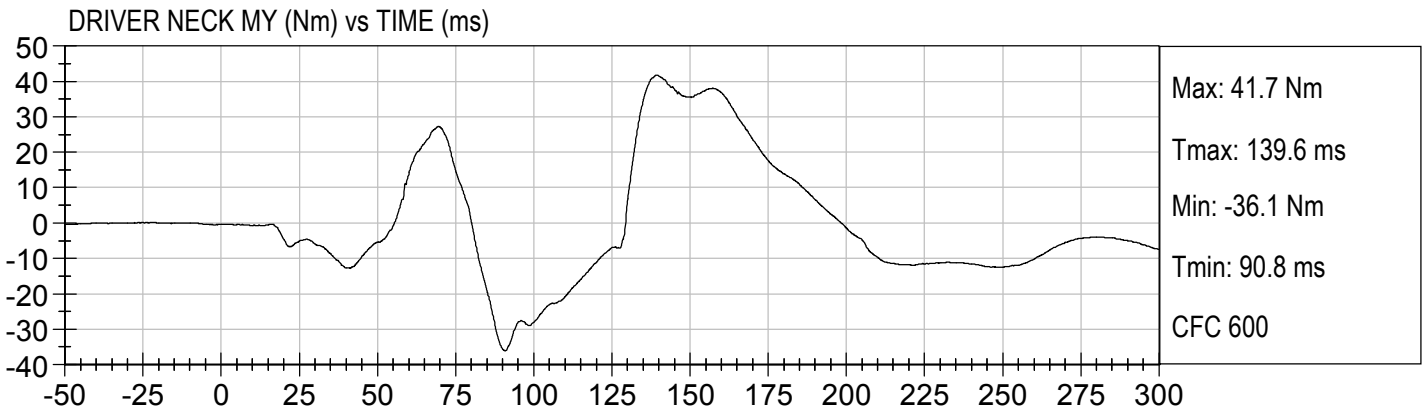
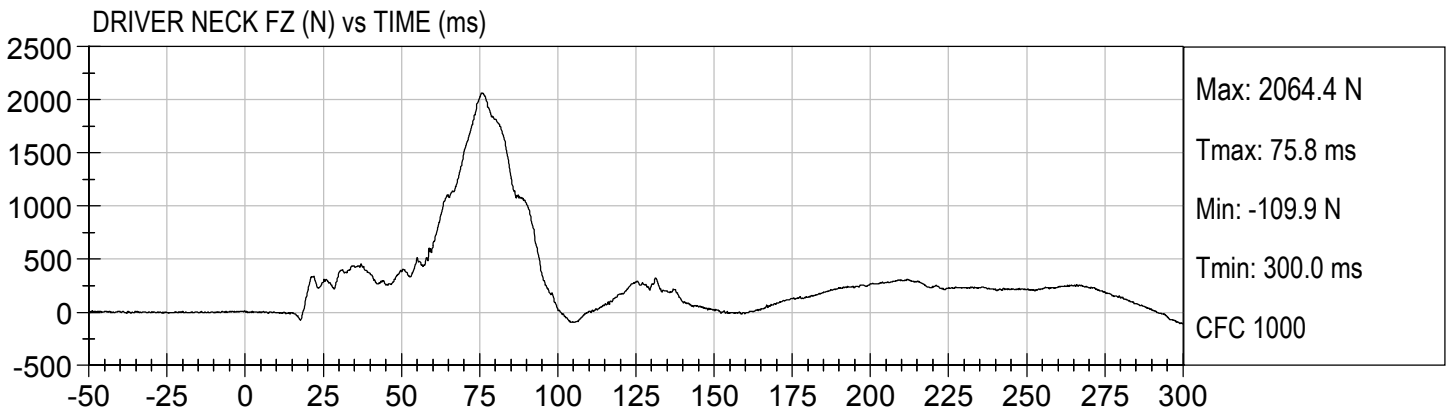
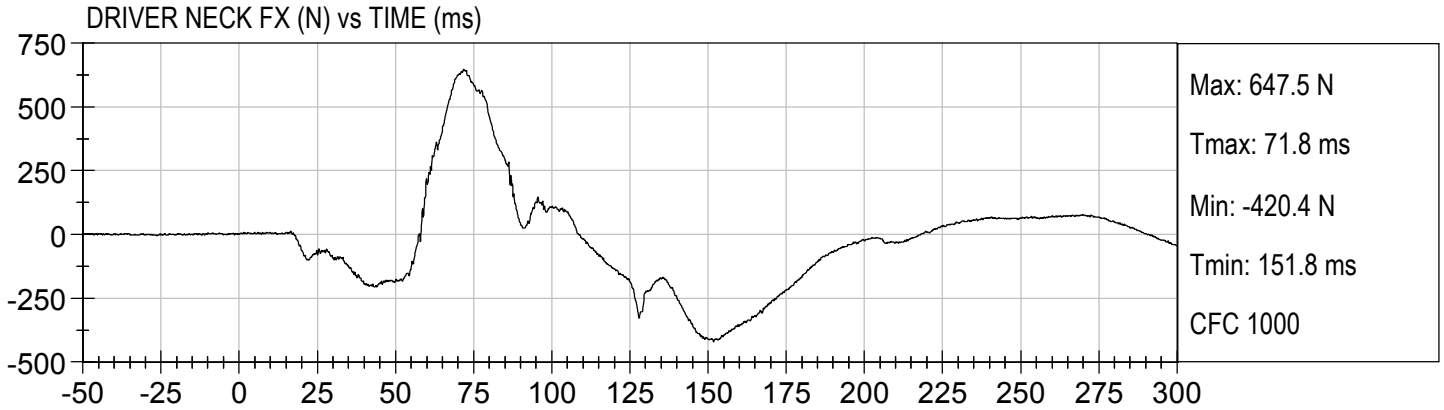
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Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
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Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver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

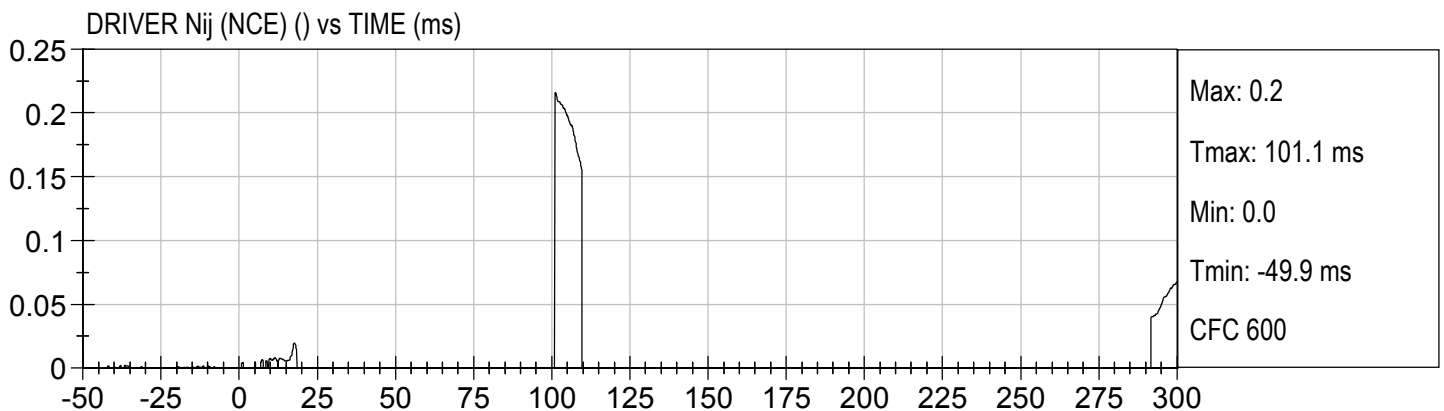
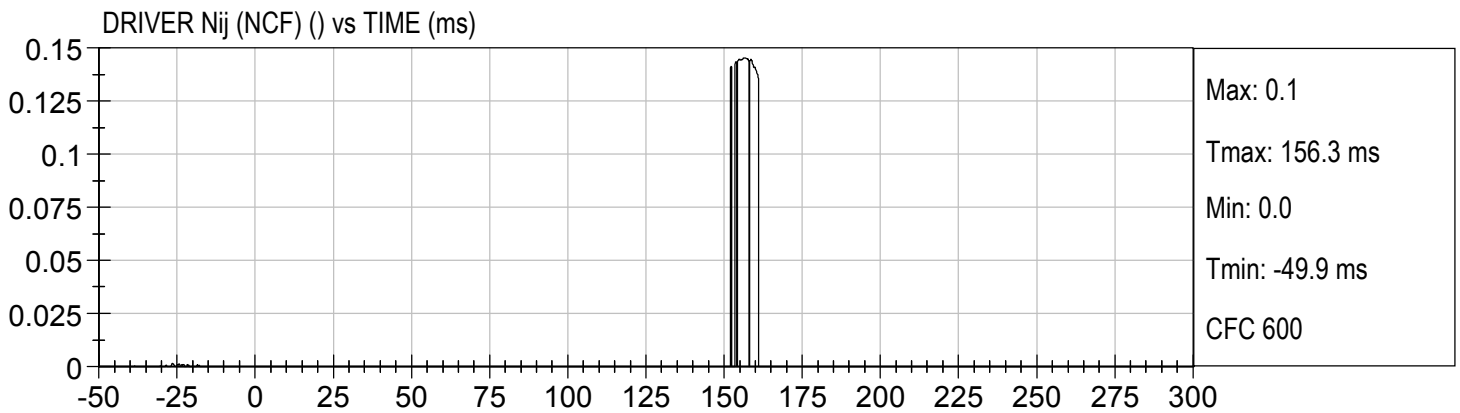
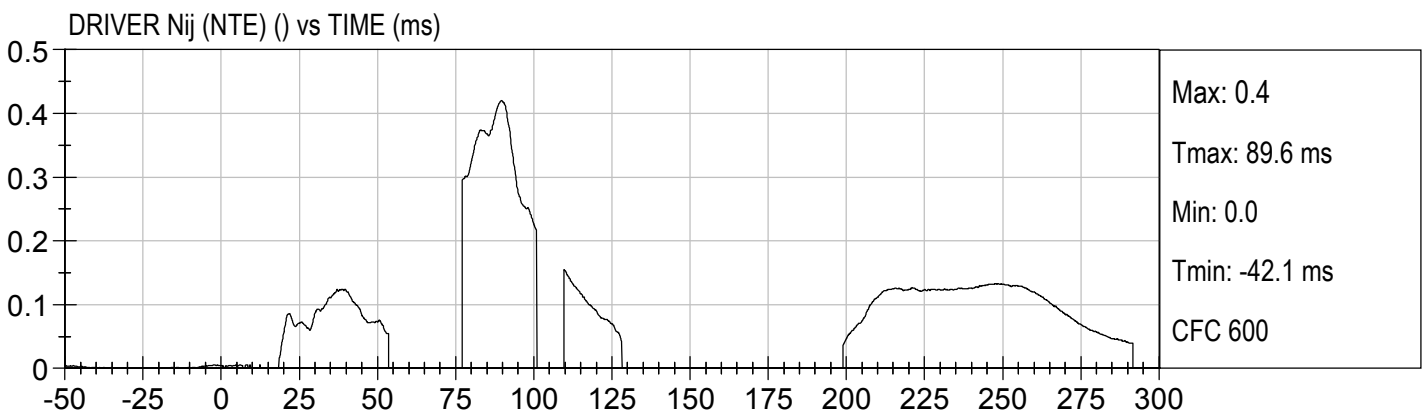
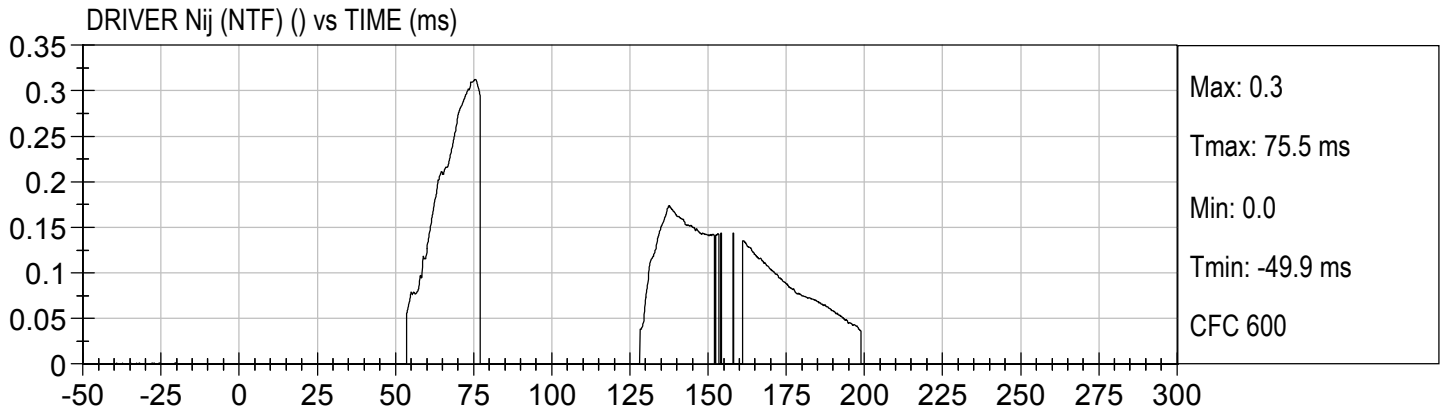
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Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force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

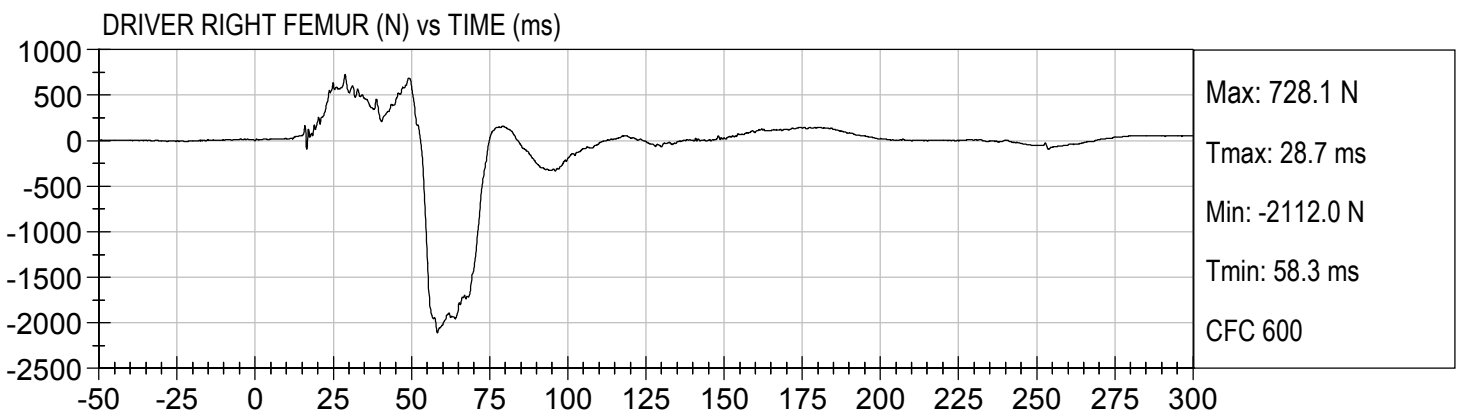
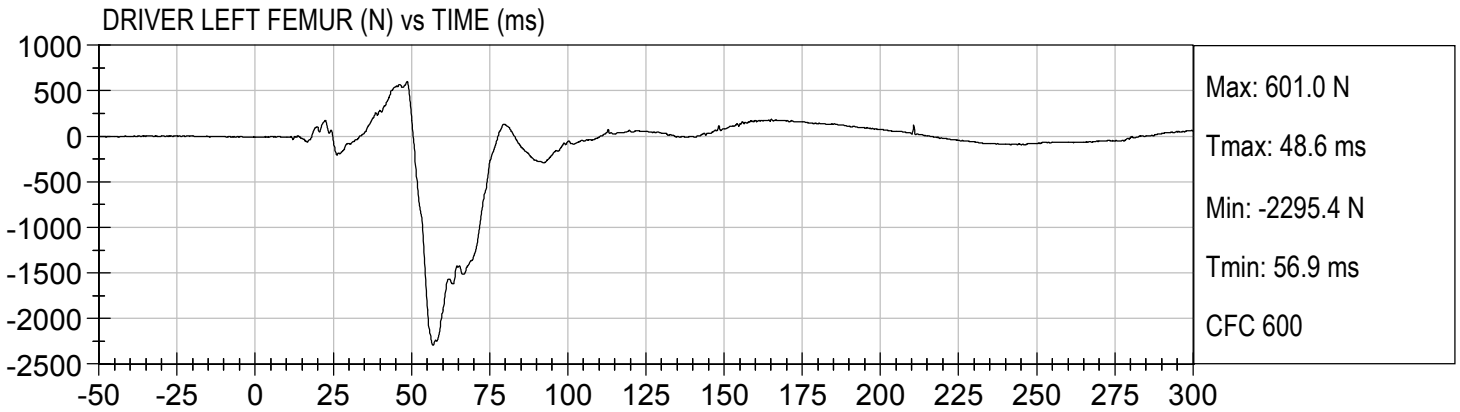


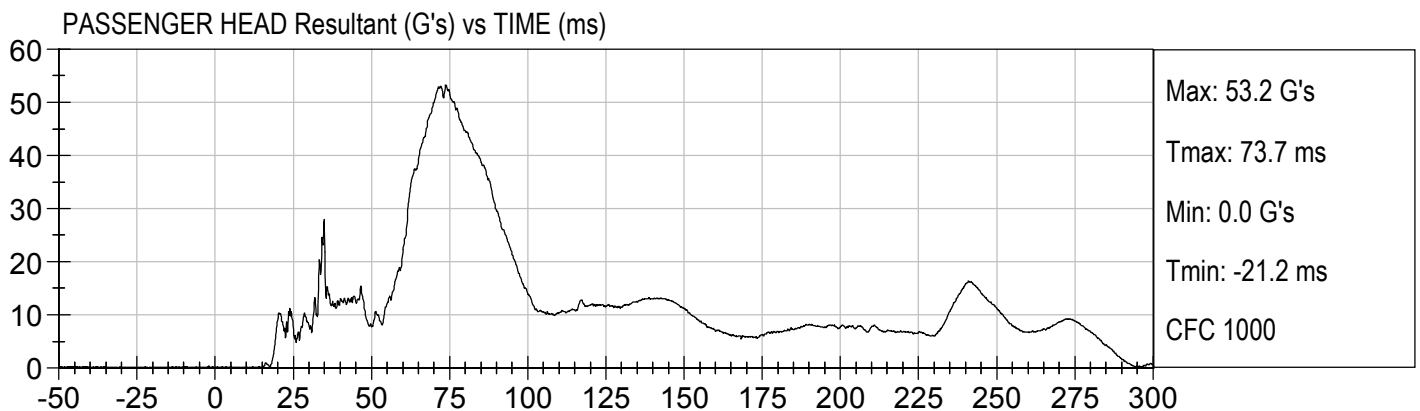
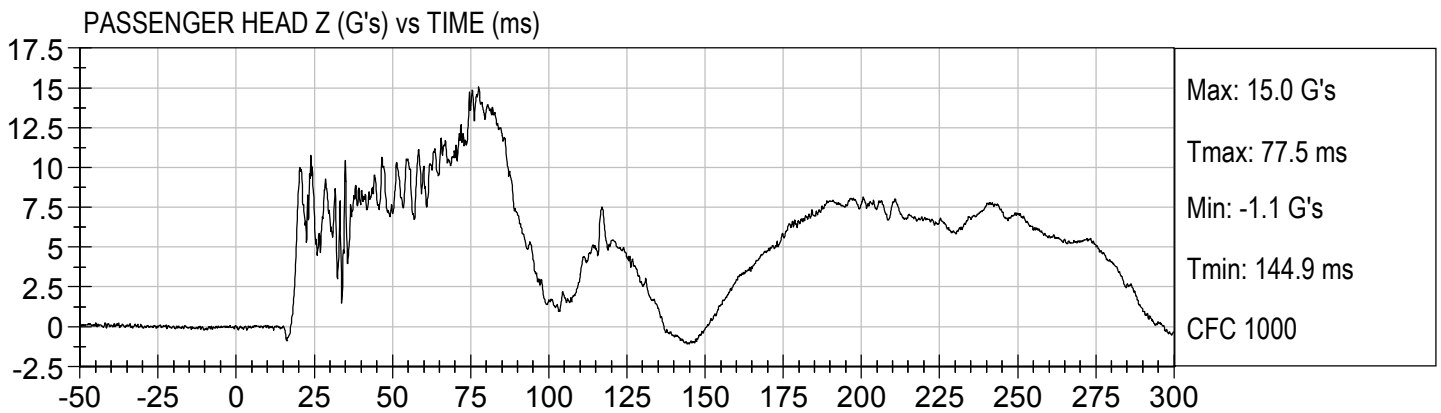
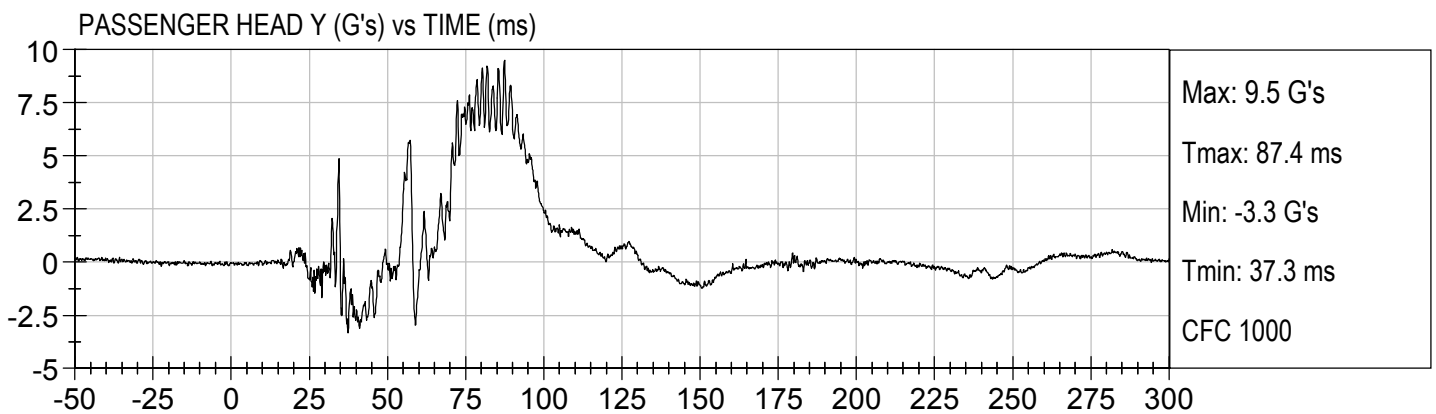
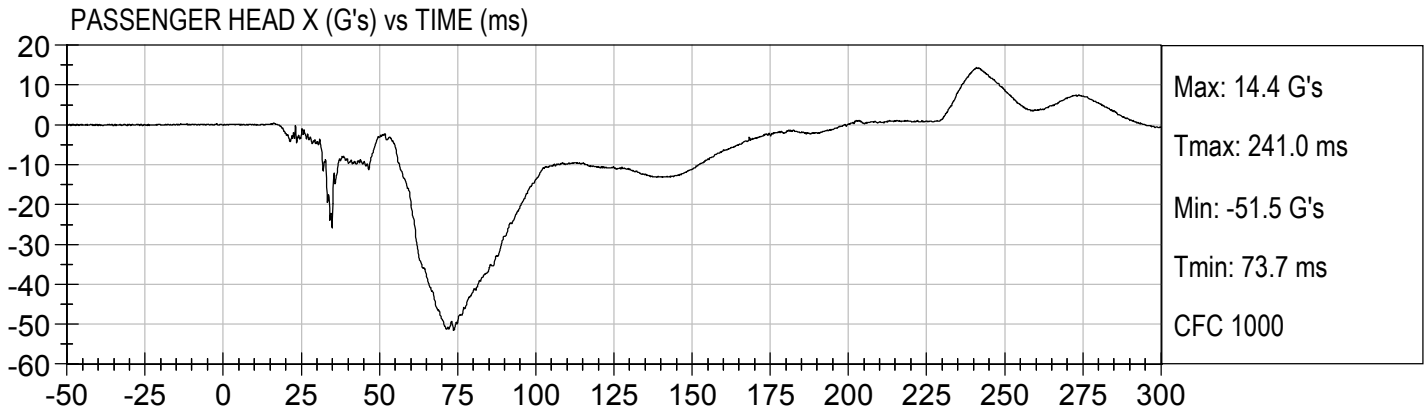


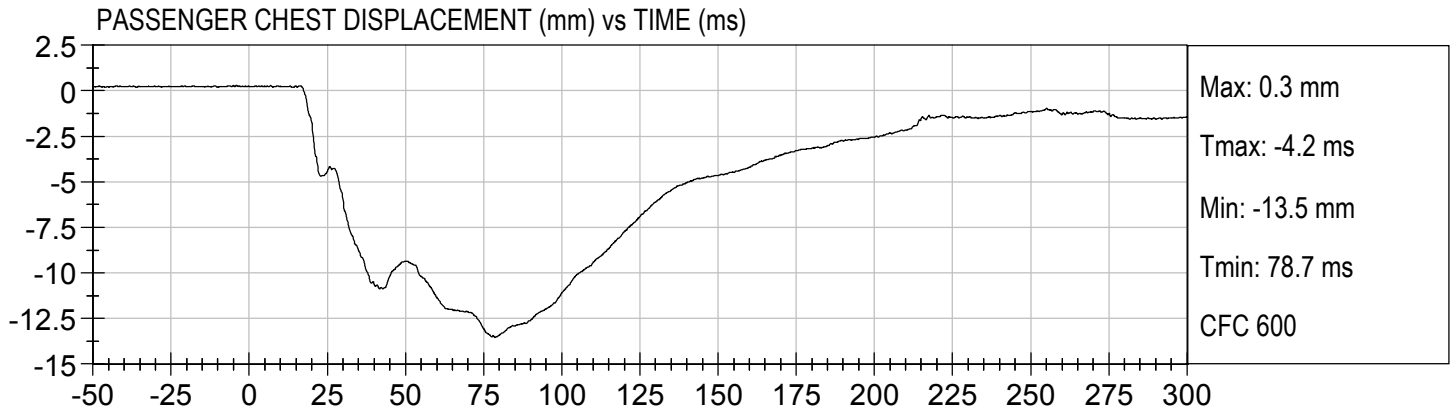


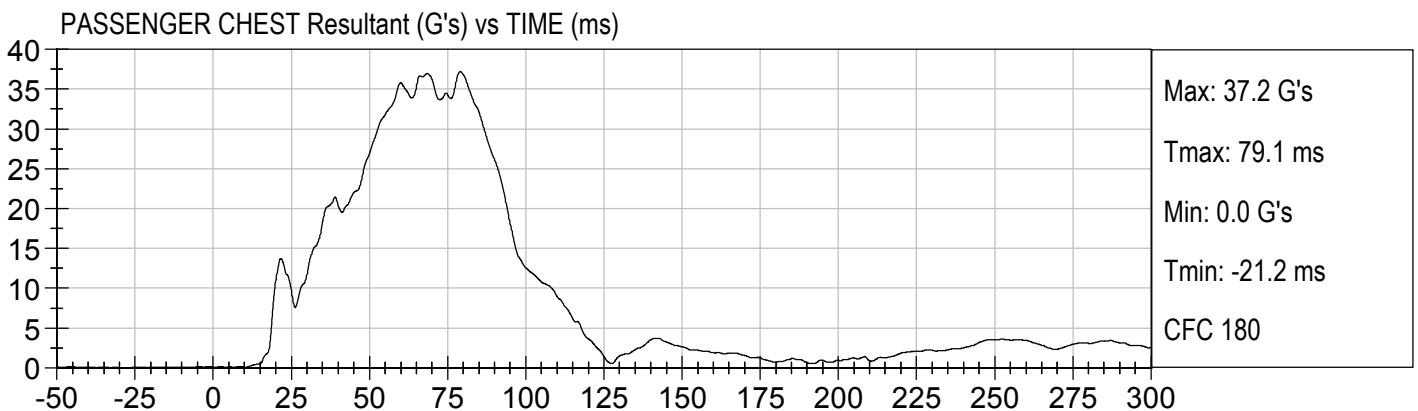
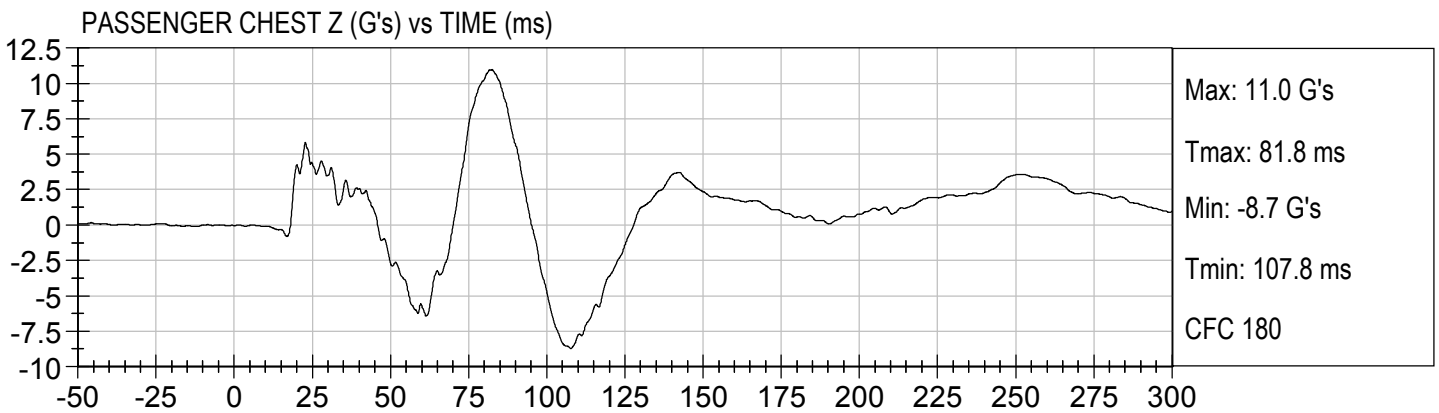
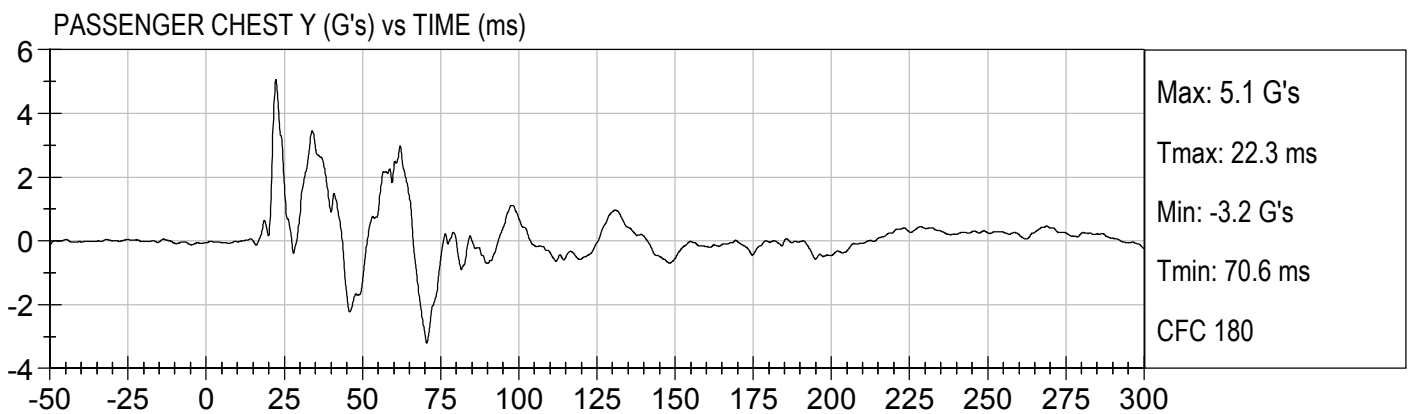
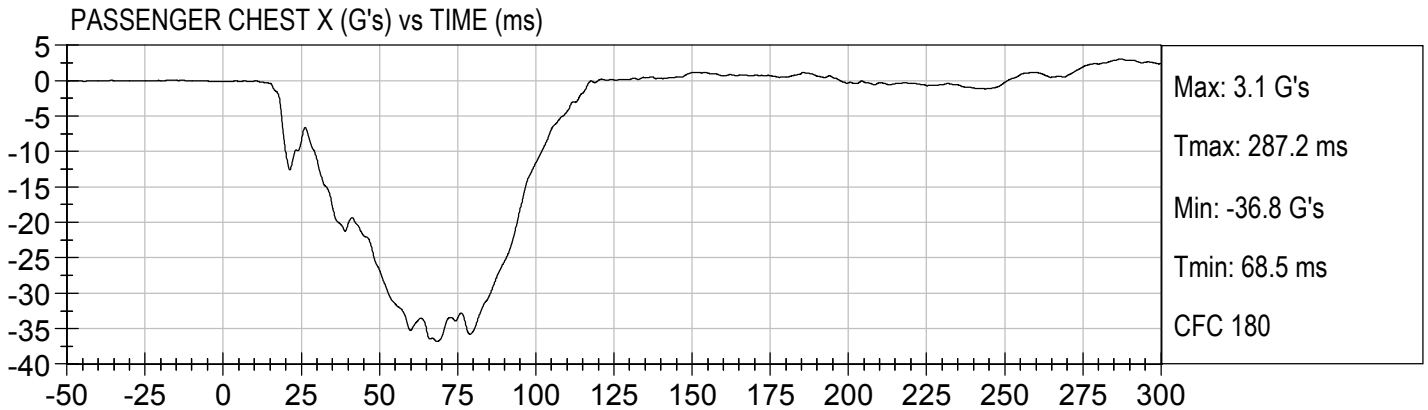


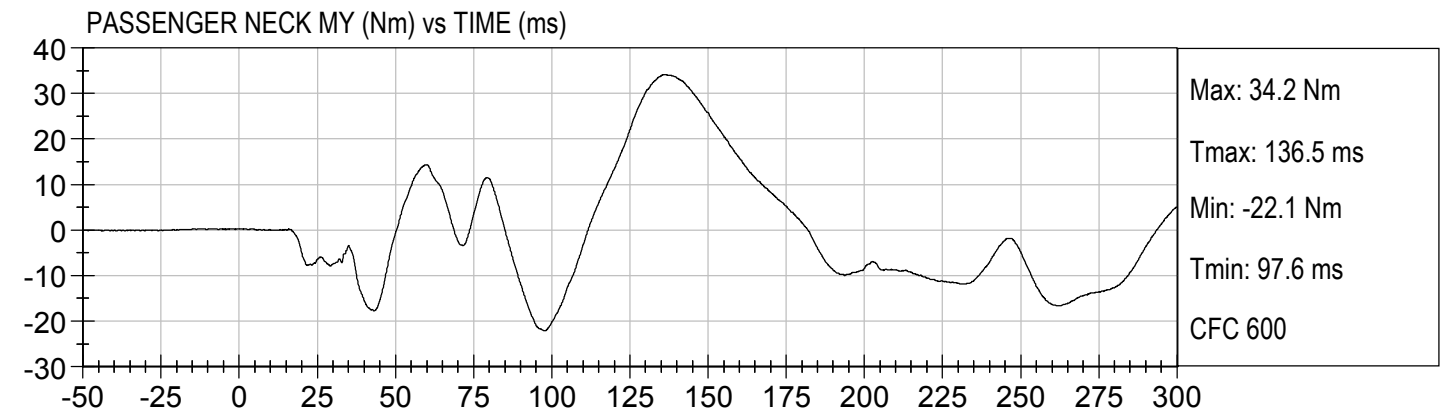
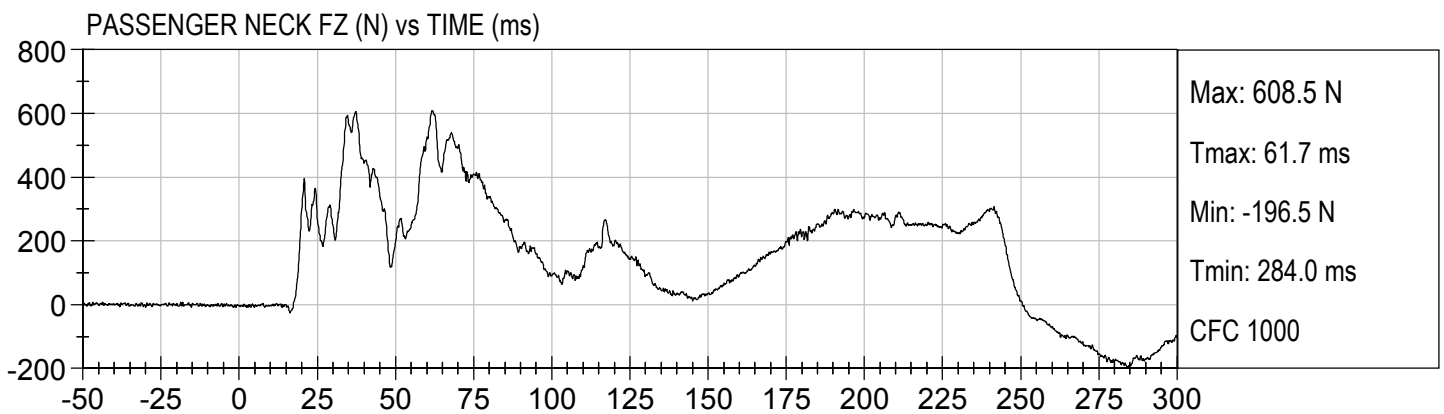
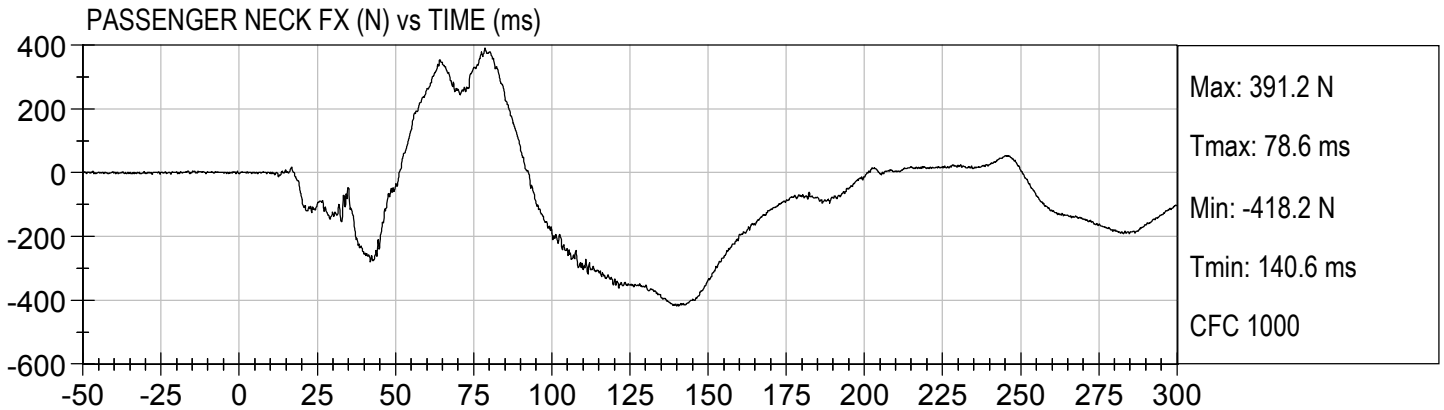


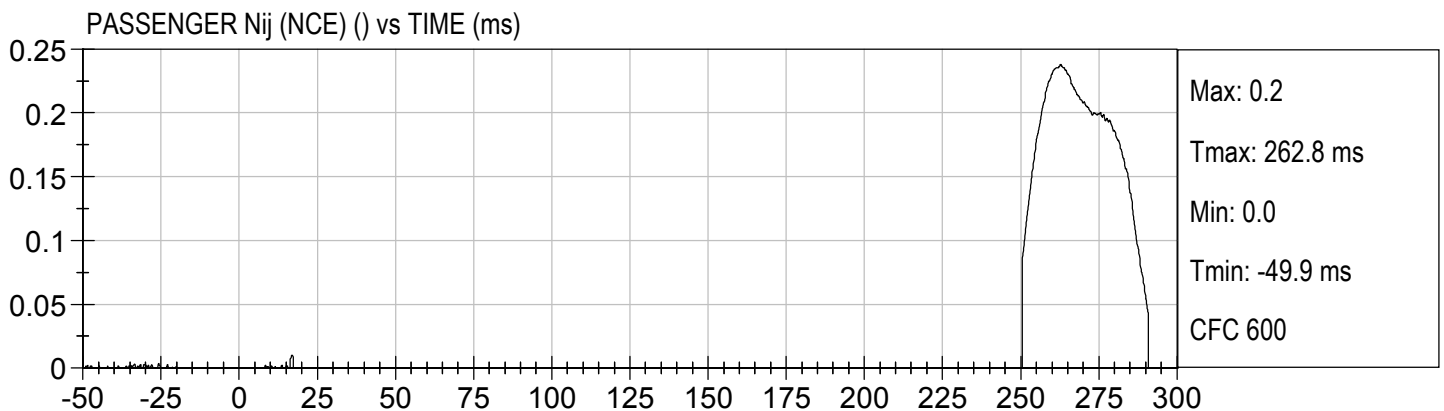
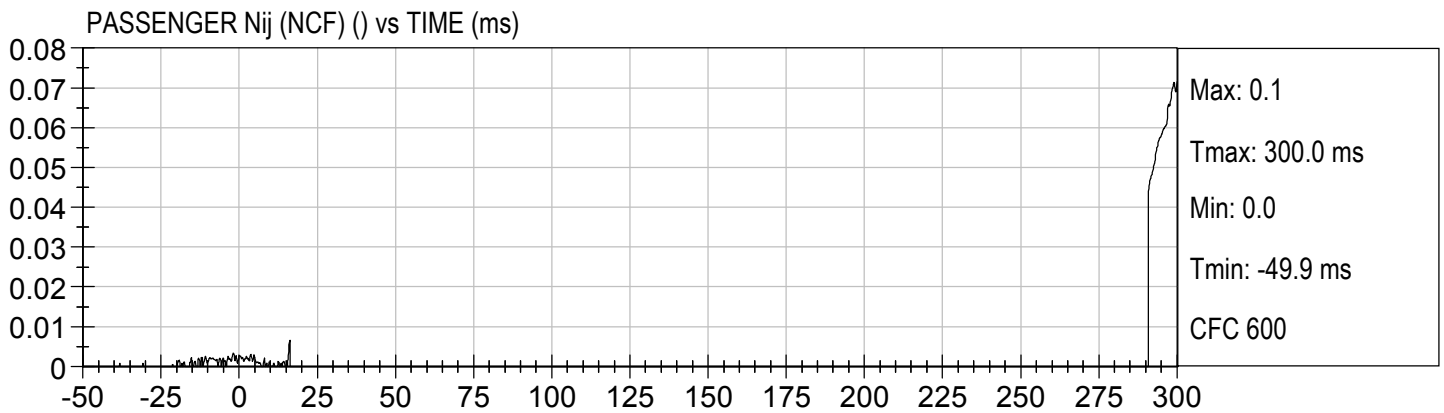
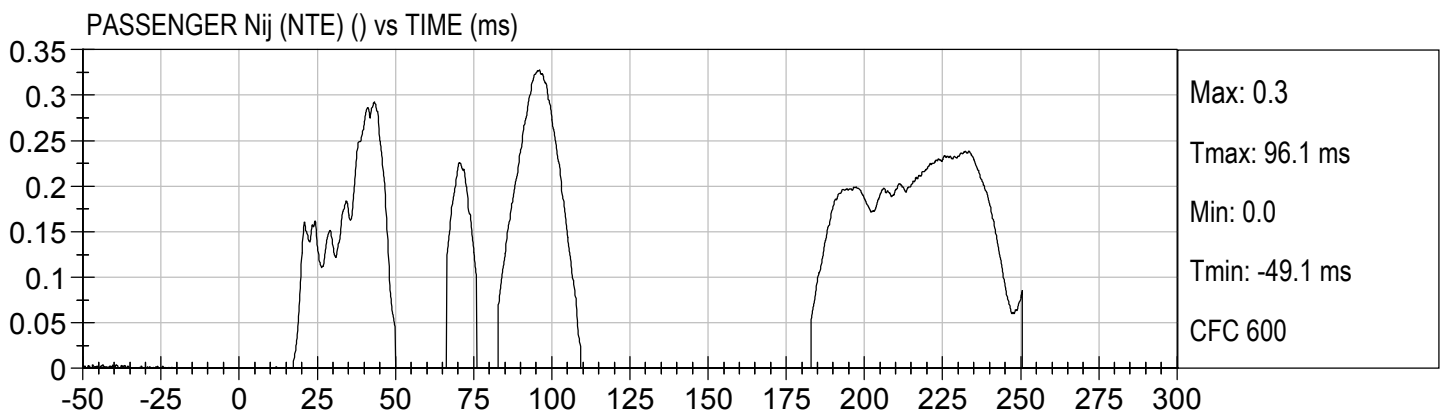
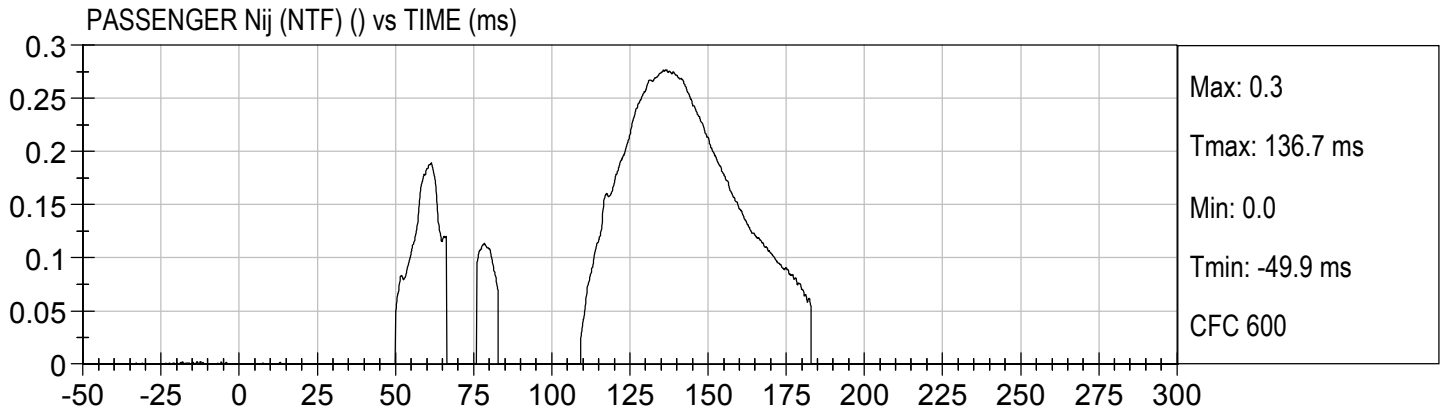


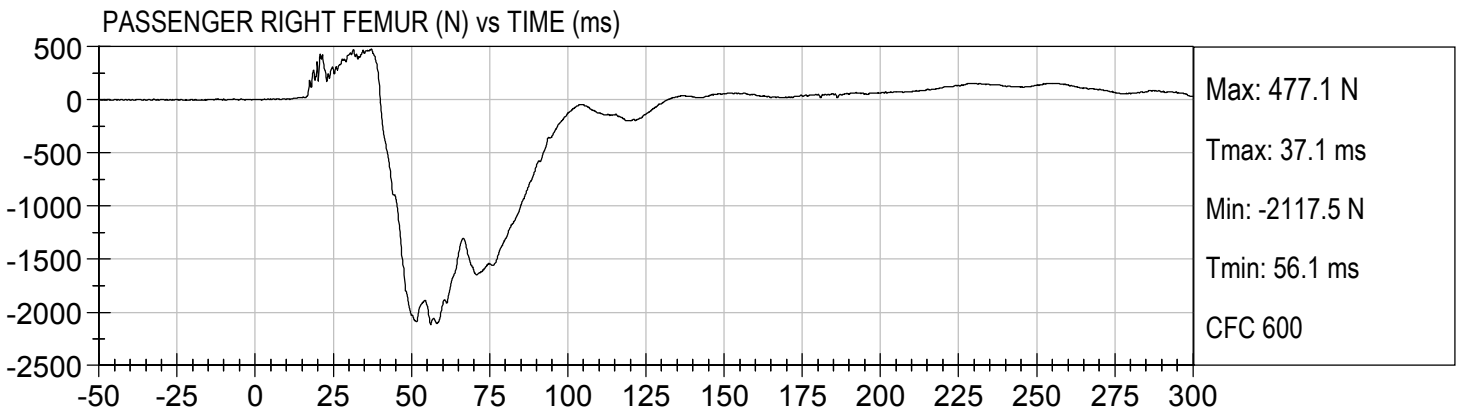
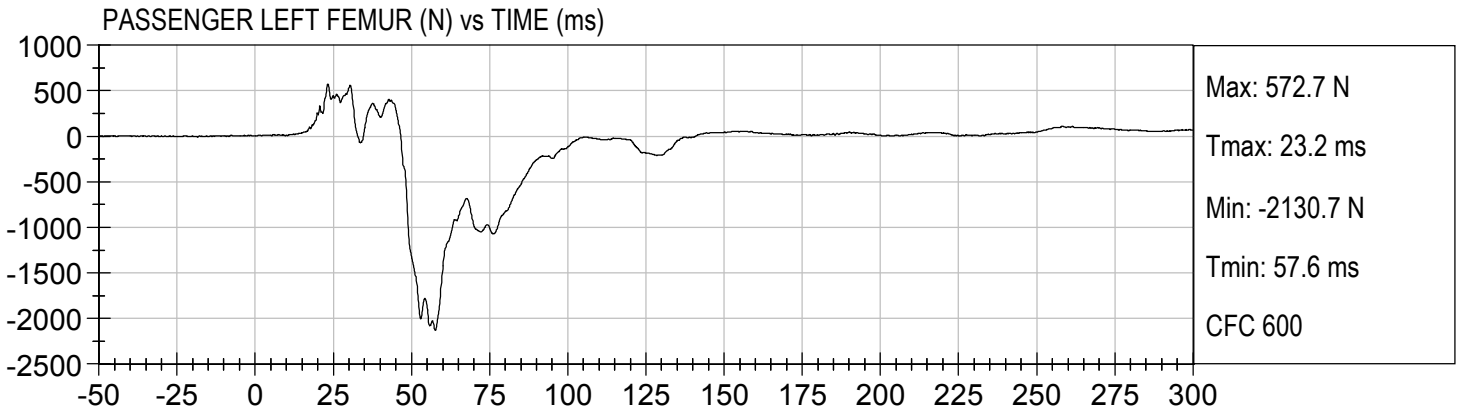












APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

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

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

HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued

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

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

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

ATD Serial No: 351

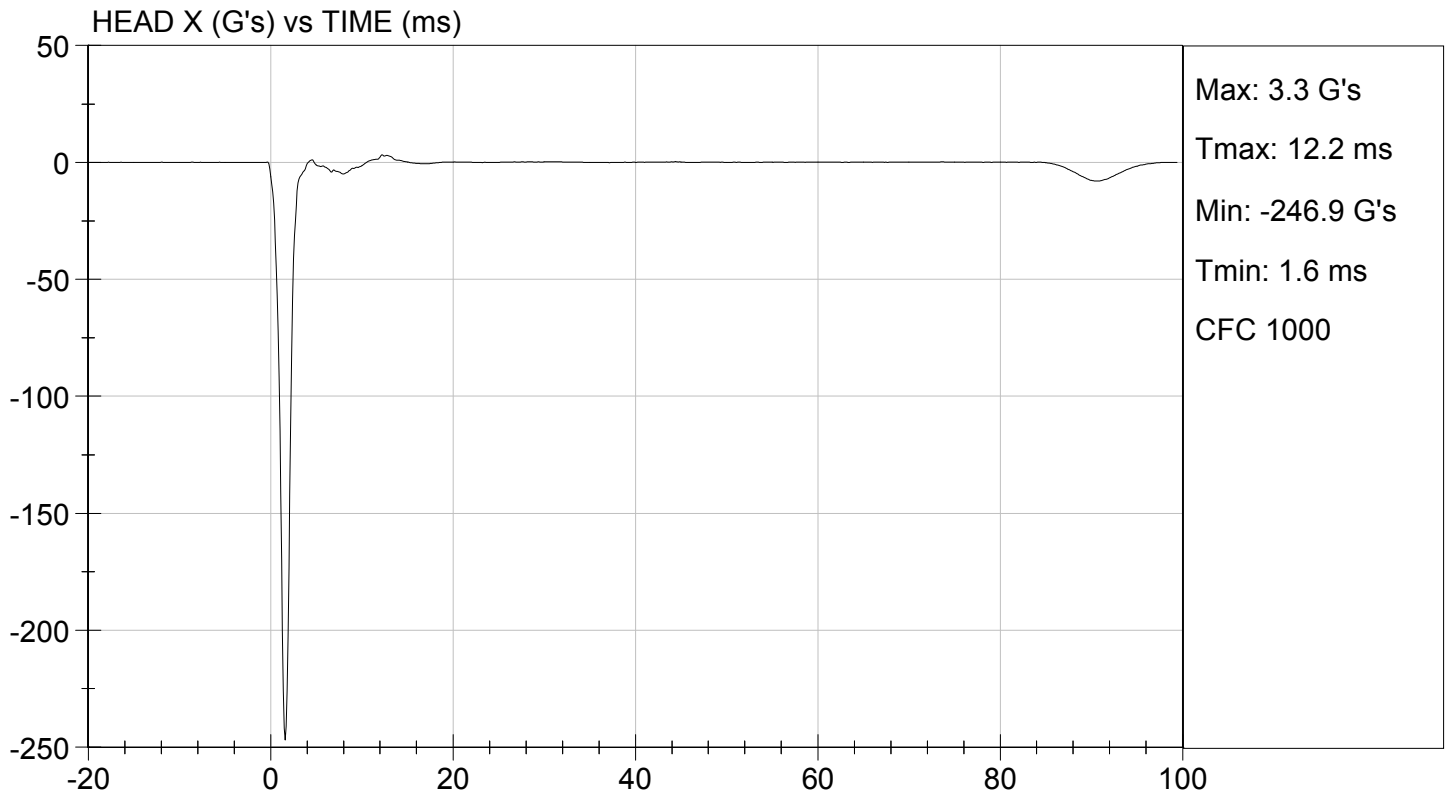
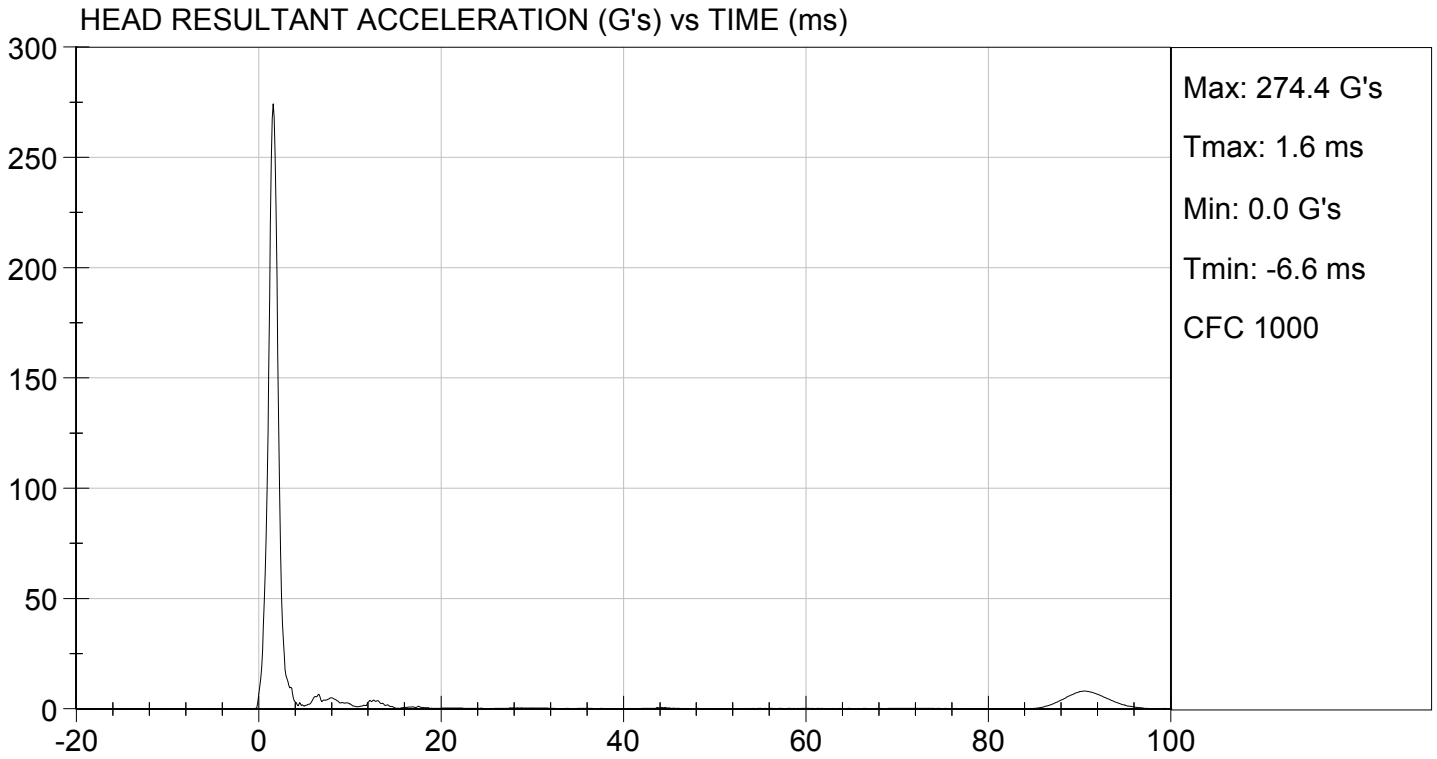
Test ID: D134171

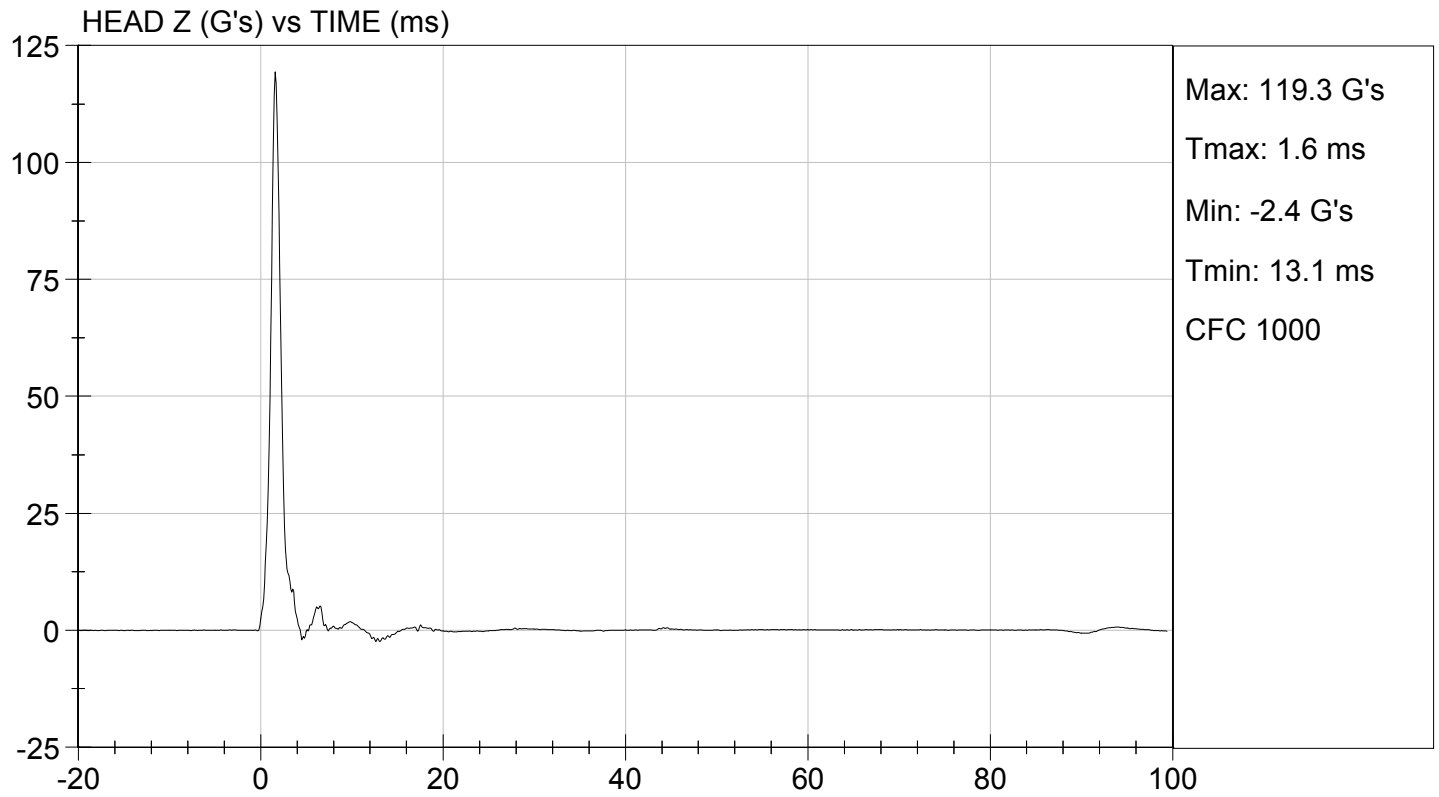
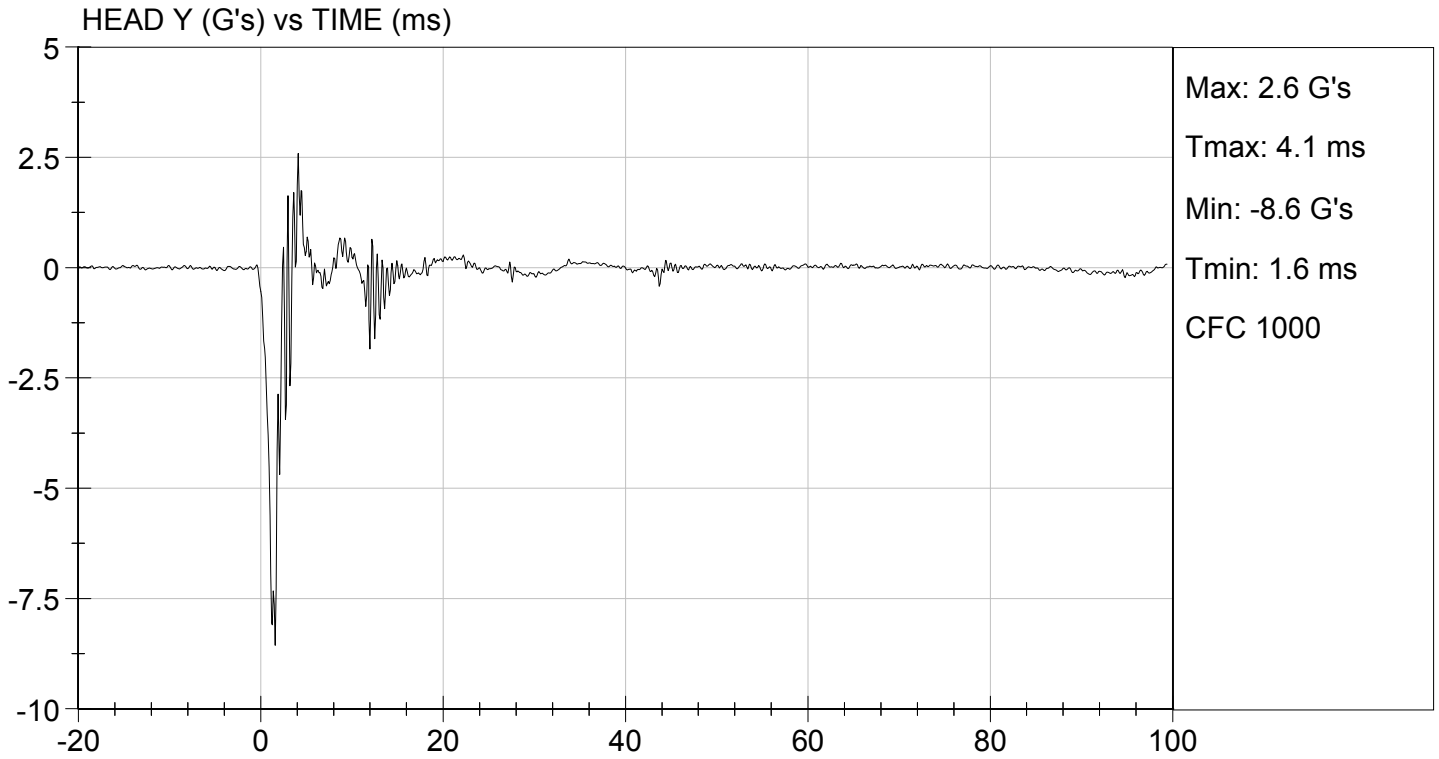
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	12	Pass
Peak Resultant Acceleration	G's	225 to 275	274	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-8.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

12/06/2013
Test Date

David Winkelbauer
Approved By





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

ATD Serial No: 351

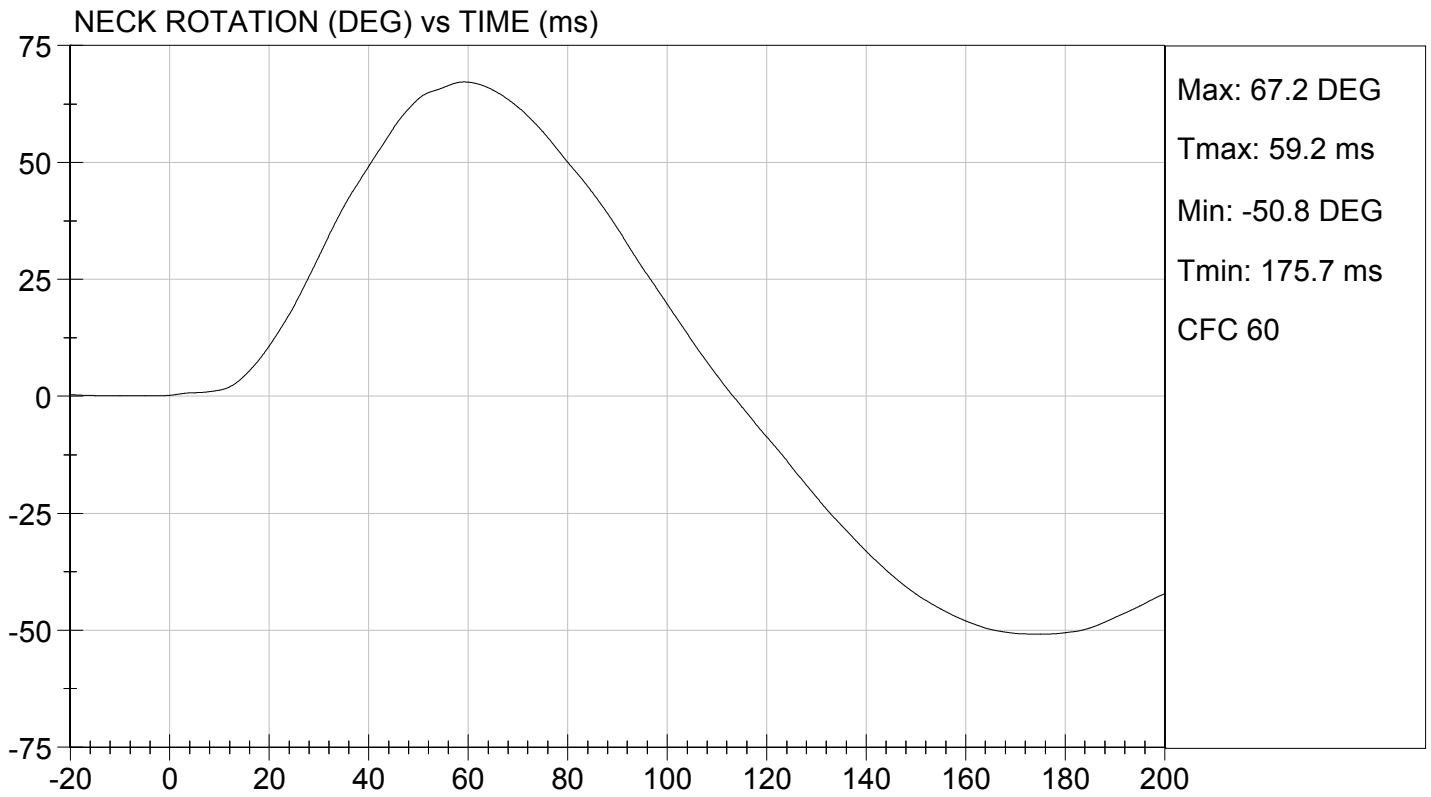
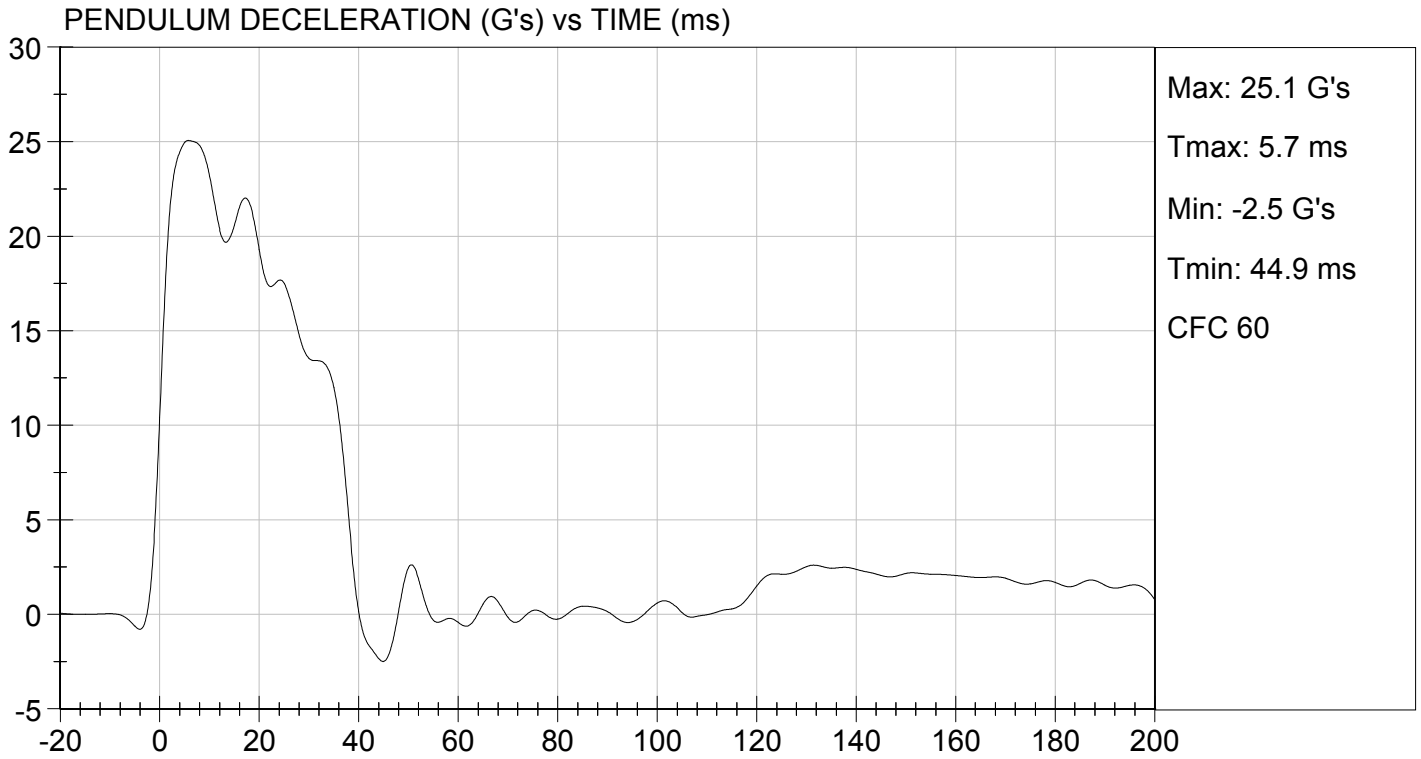
Test I.D.: D134172

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	24	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.13	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.17	Pass
	20 ms	G's	17.60 to 22.60	19.30	Pass
	30 ms	G's	12.50 to 18.50	13.52	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	38.1	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	67.2	Pass
	Time	ms	57.0 to 64.0	59.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.4	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	94.3	Pass
	Time	ms	47.0 to 58.0	51.0	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	101.3	Pass
Overall Test Results					Pass

Jessica Hall
 Laboratory Technician

12/09/2013
 Test Date

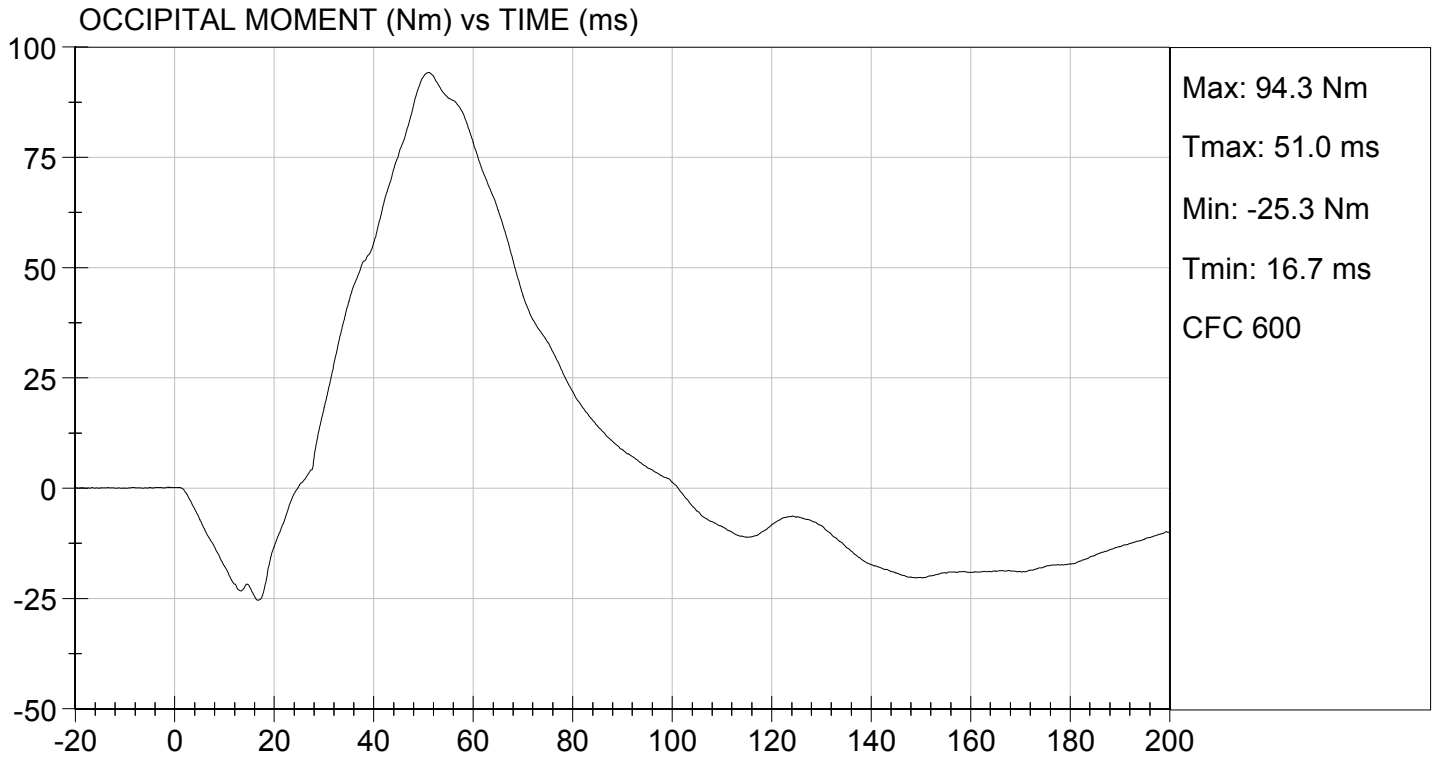
David Winkelbauer
 Approved By





TEST DESC: NECK FLEXION
VELOCITY: 23.40 ft/s, 7.13 m/s

TEST DATE: 12/09/2013
TEST #: D134172



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

ATD Serial No: 351

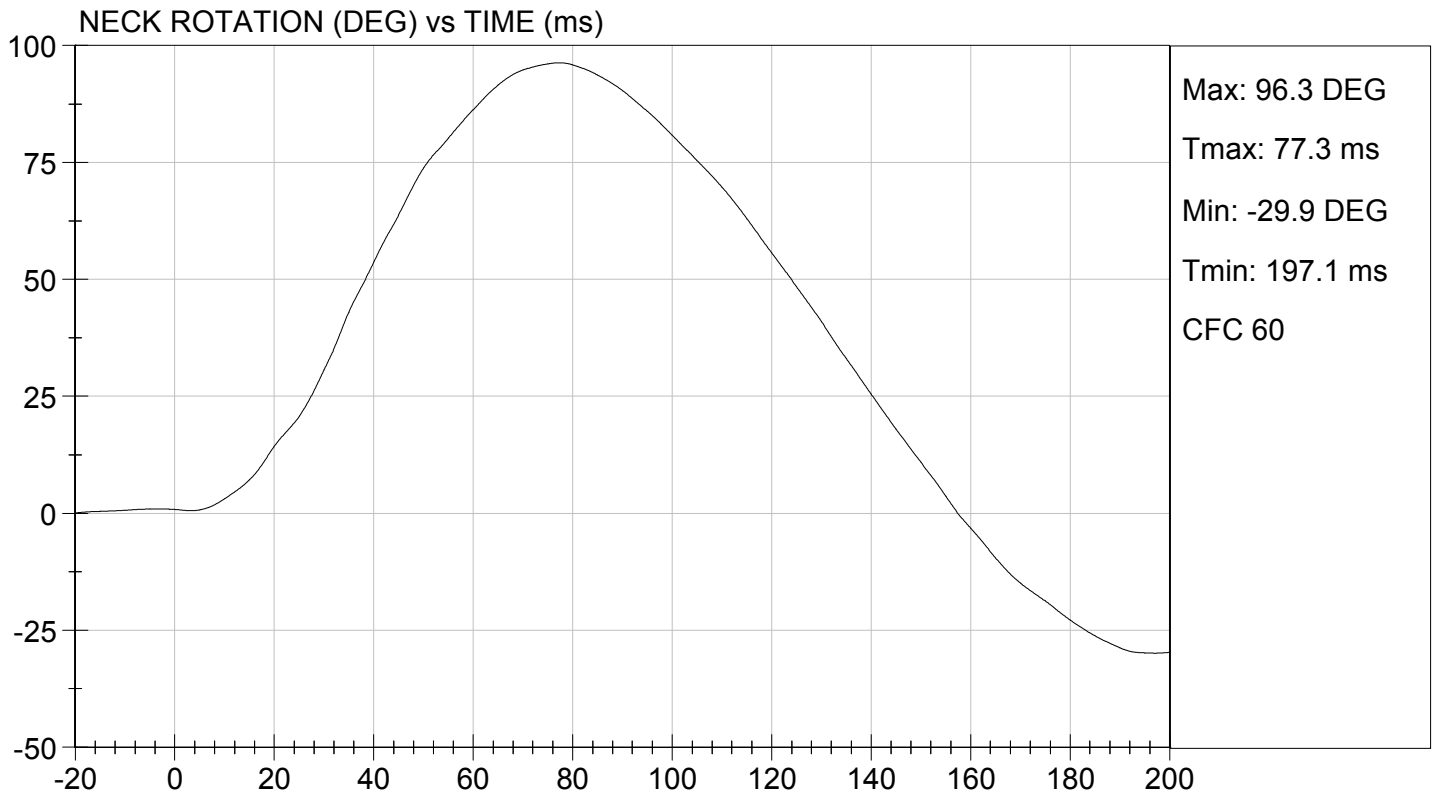
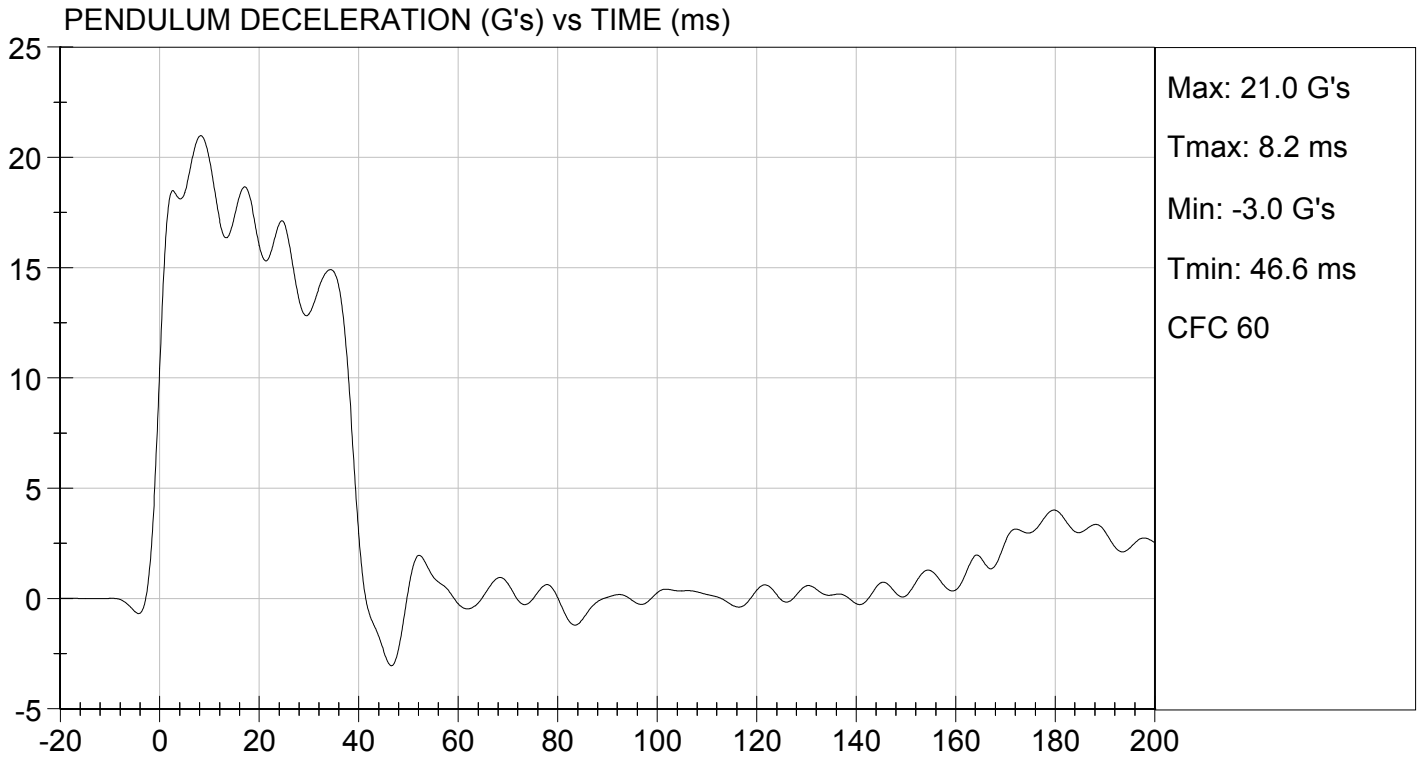
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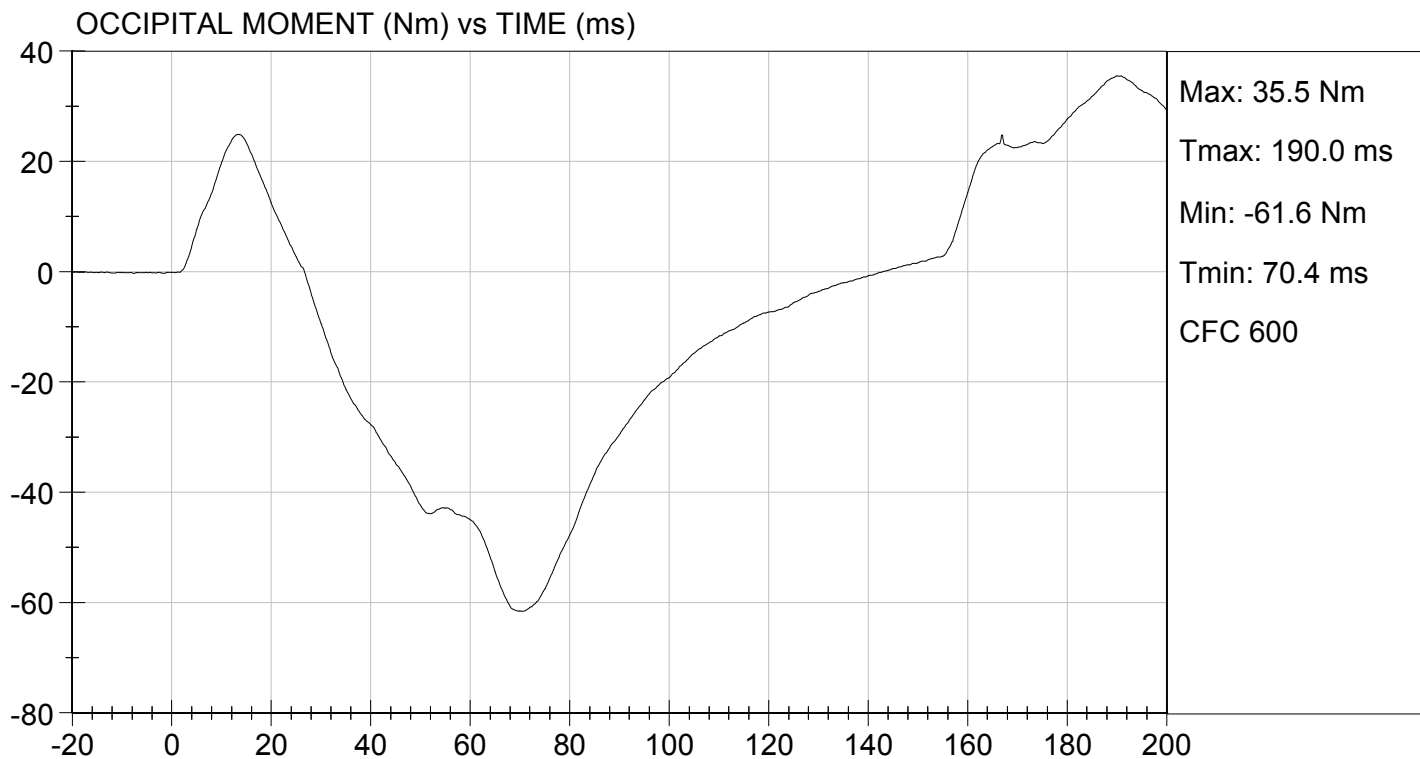
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	24	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.19	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.85	Pass
	20 ms	G's	14.00 to 19.00	16.01	Pass
	30 ms	G's	11.00 to 16.00	12.92	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.3	Pass
	Time	ms	72.0 to 82.0	77.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	157.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.6	Pass
	Time	ms	65.0 to 79.0	70.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.1	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

12/09/2013
Test Date

David Winkelbauer
Approved By





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

ATD Serial No: 351

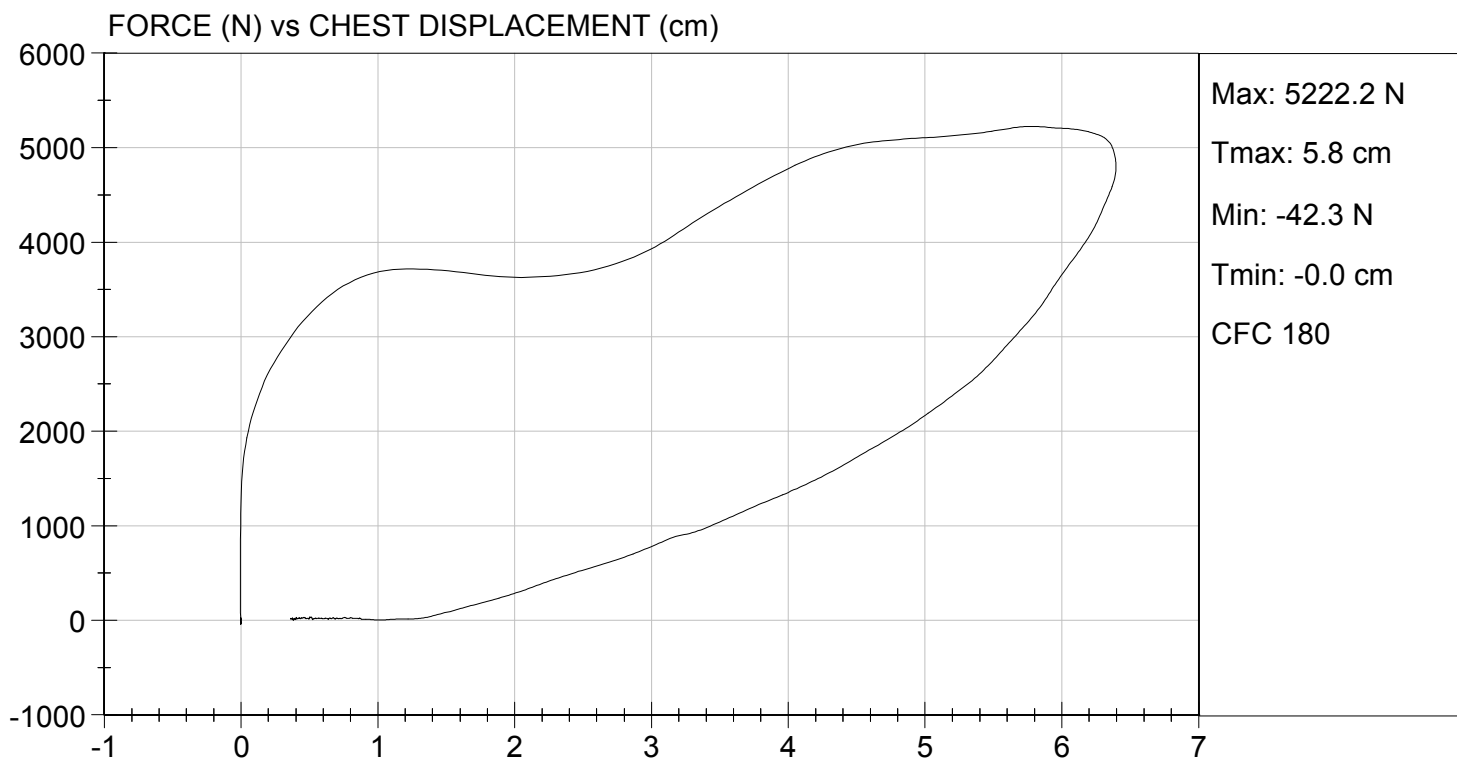
Test I.D: D134174

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	24	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,222	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.40	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results				Pass


 Laboratory Technician

12/09/2013
 Test Date


 Approved By



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

ATD Serial No: 351

Test I.D: D134175

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	N	4715 to 5782	5,166	Pass
Overall Test Results				Pass



Laboratory Technician

12/06/2013

Test Date

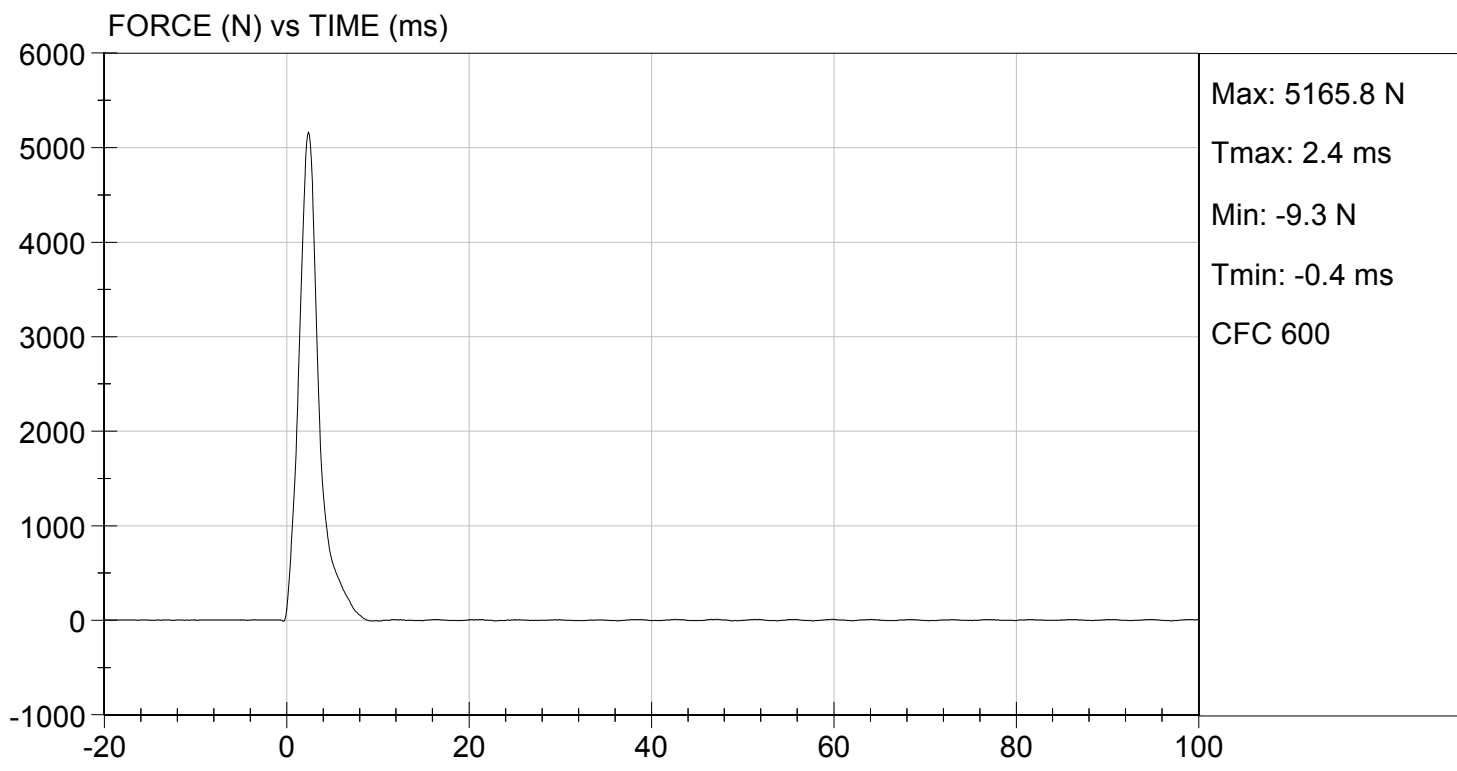


Approved By



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

TEST DATE: 12/06/2013
TEST #: D134175



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

ATD Serial No: 351

Test I.D: D134176

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5,115	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

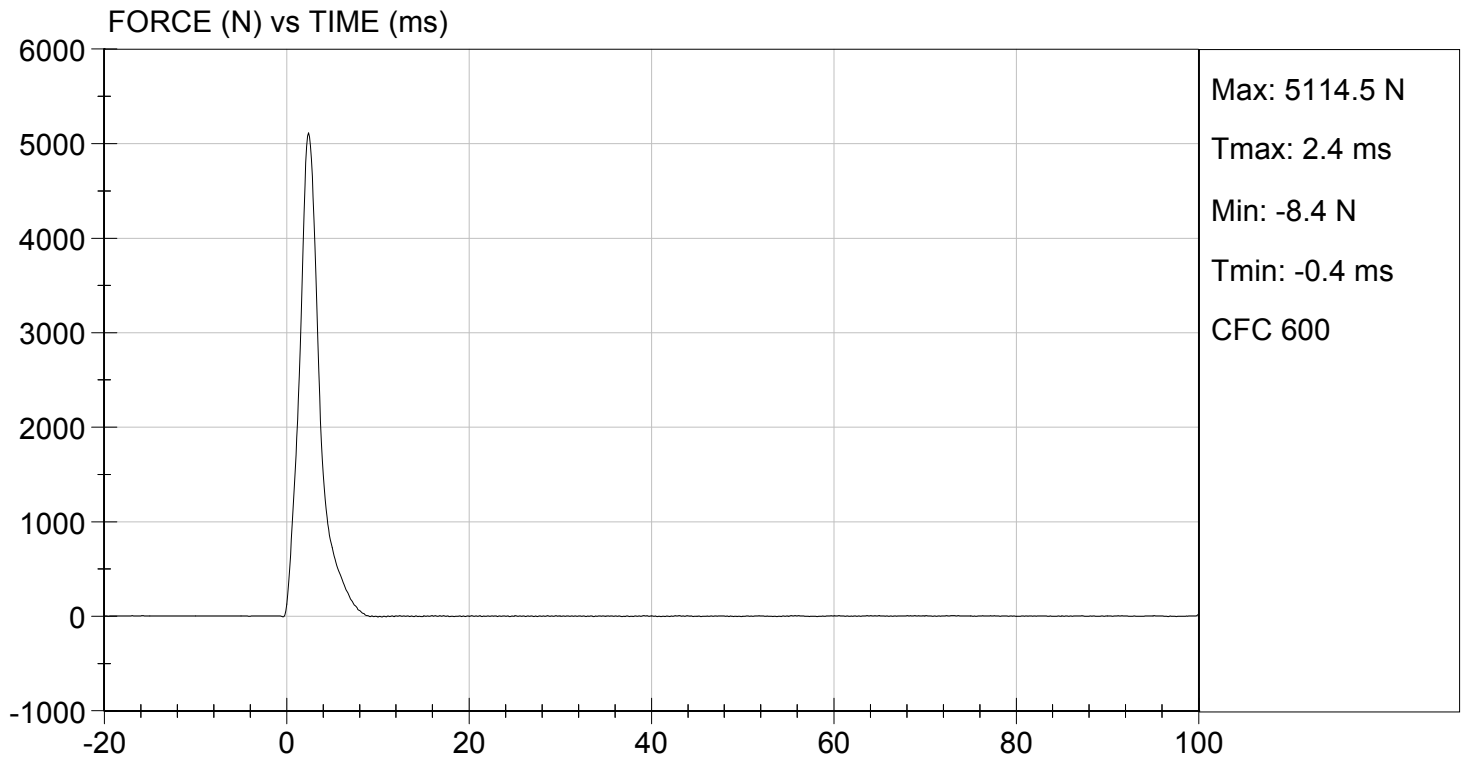
12/06/2013
 Test Date

David Winkelbauer
 Approved By



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

TEST DATE: 12/06/2013
TEST #: D134176



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

ATD Serial No: 351

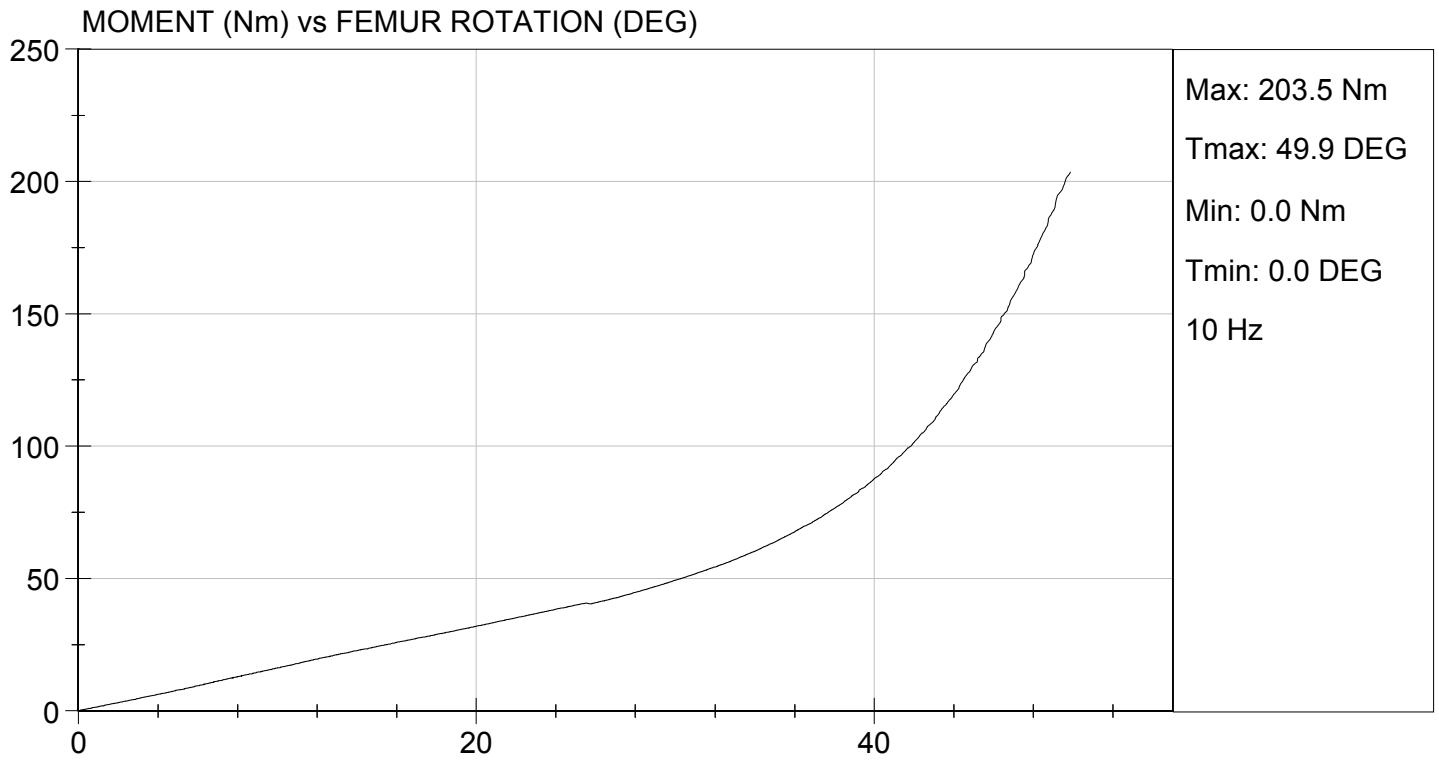
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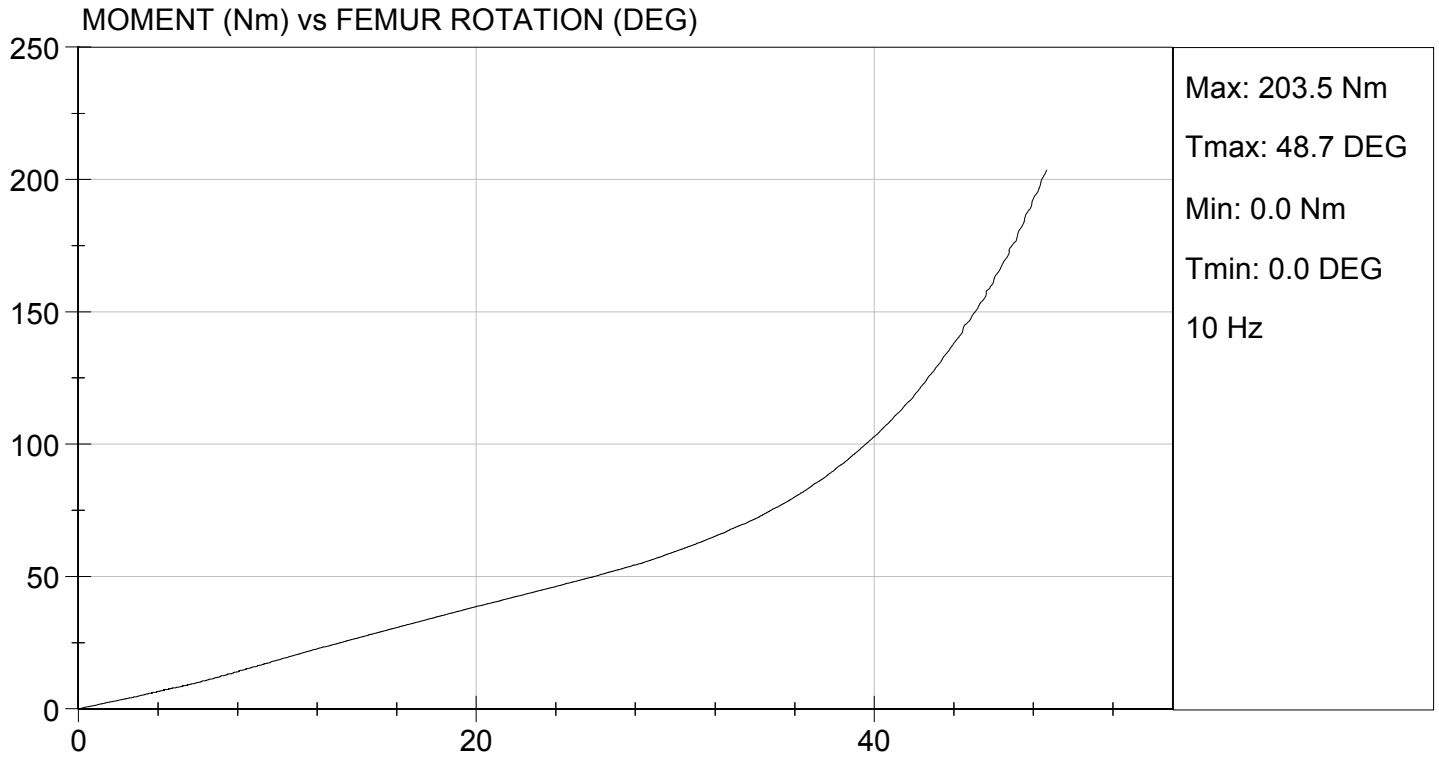
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	12	12	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	49.3	59.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	49.9	48.7	Pass
Overall Test Results					Pass

Jessica Hall
 Laboratory Technician

12/06/2013
 Test Date

David Winkelbauer
 Approved By





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

ATD Serial No: 351

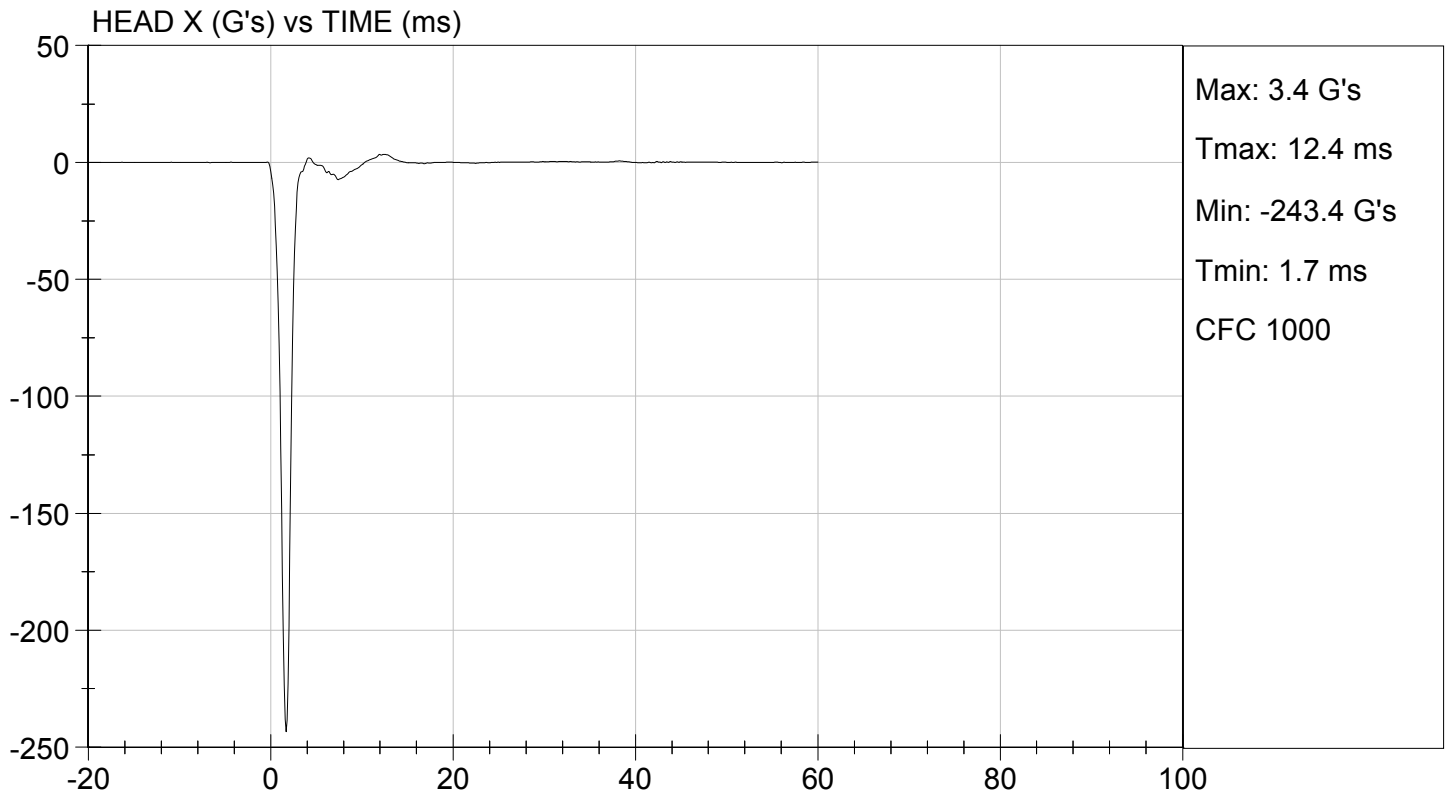
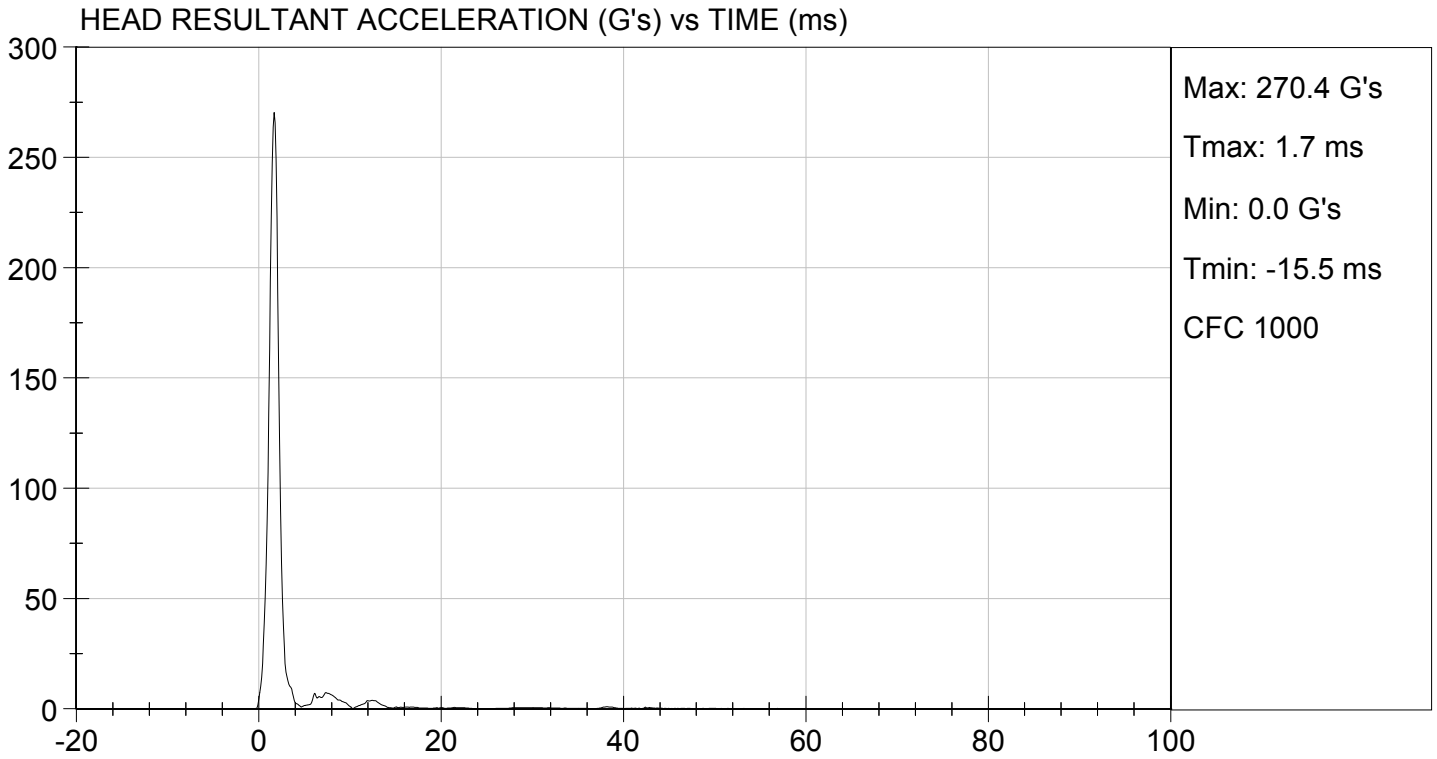
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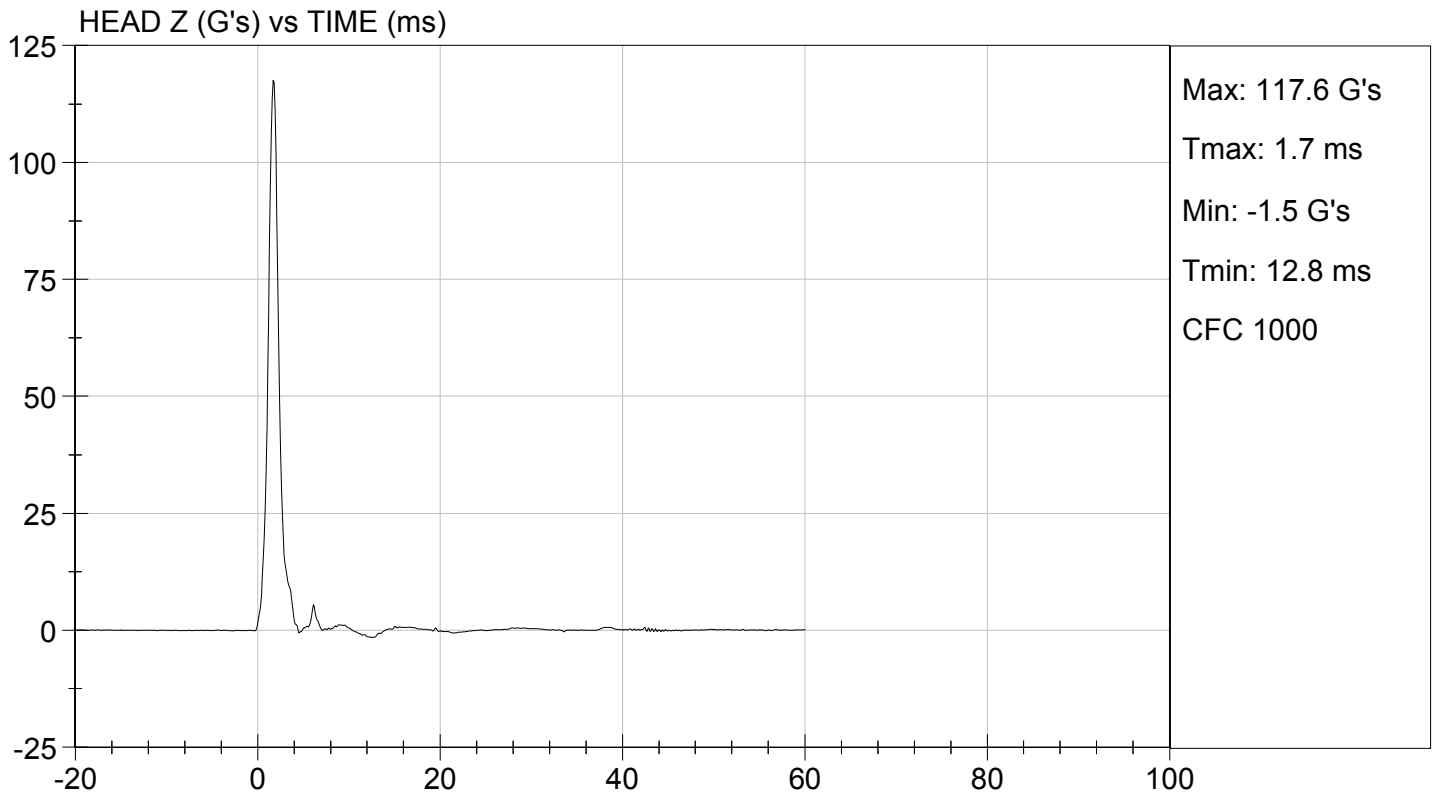
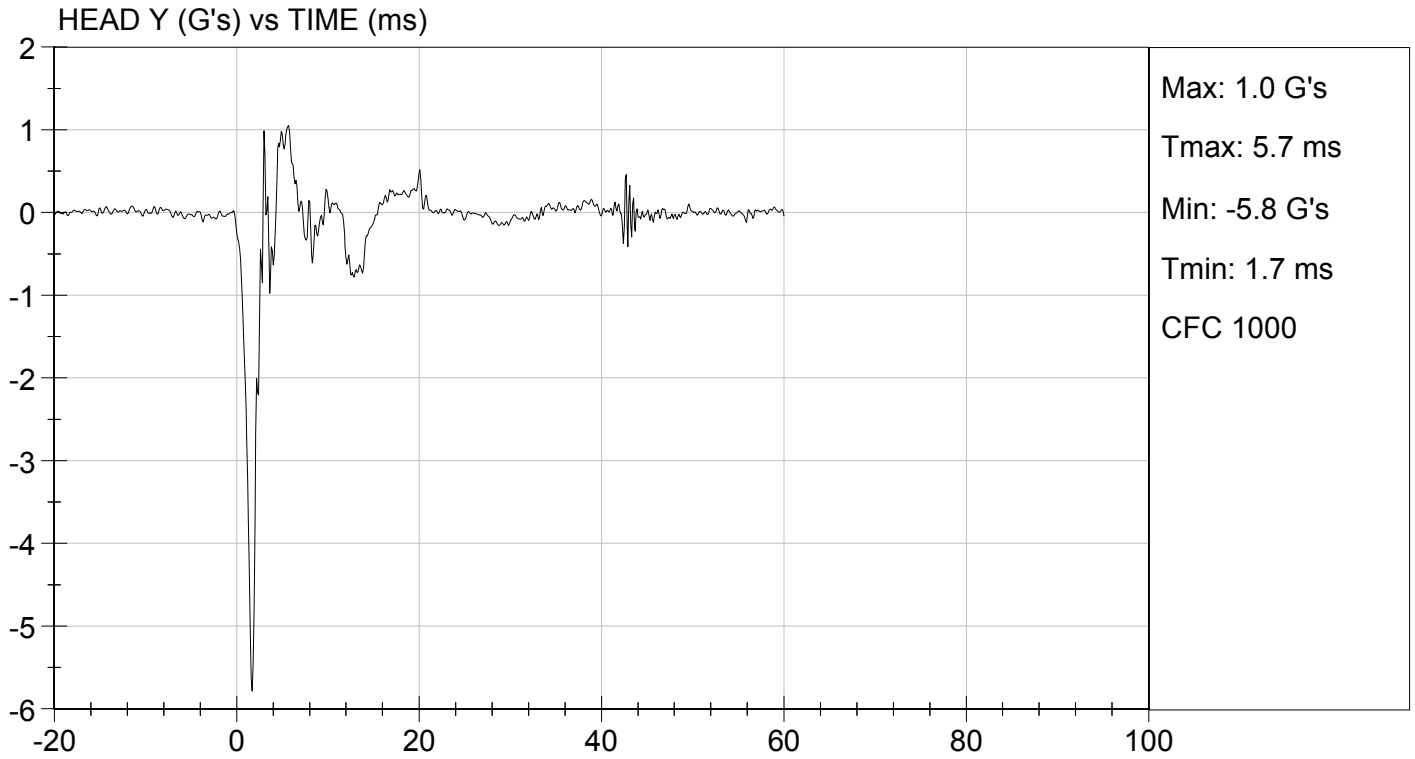
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 to 275	270	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-5.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

12/13/2013
Test Date

David Winkelbauer
Approved By





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

ATD Serial No: 351

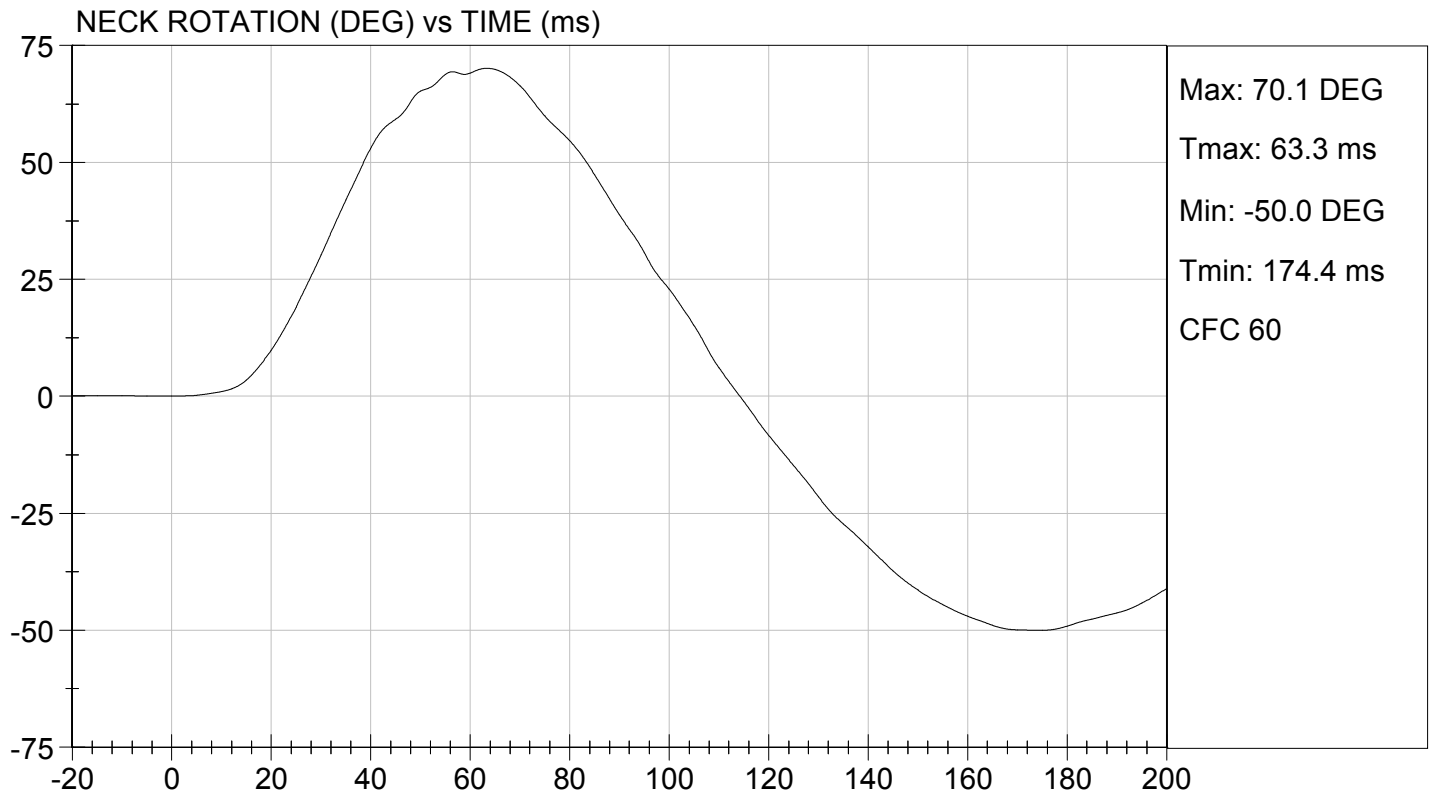
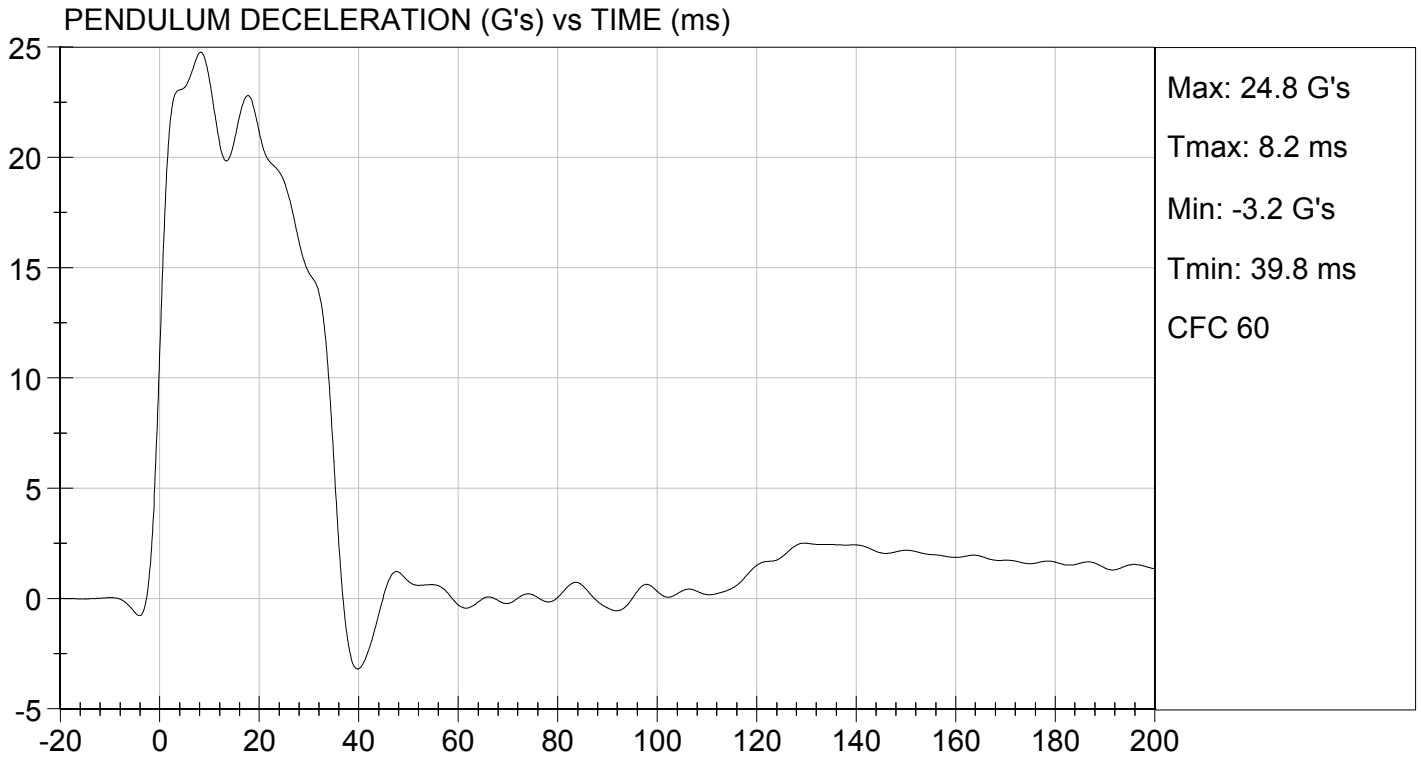
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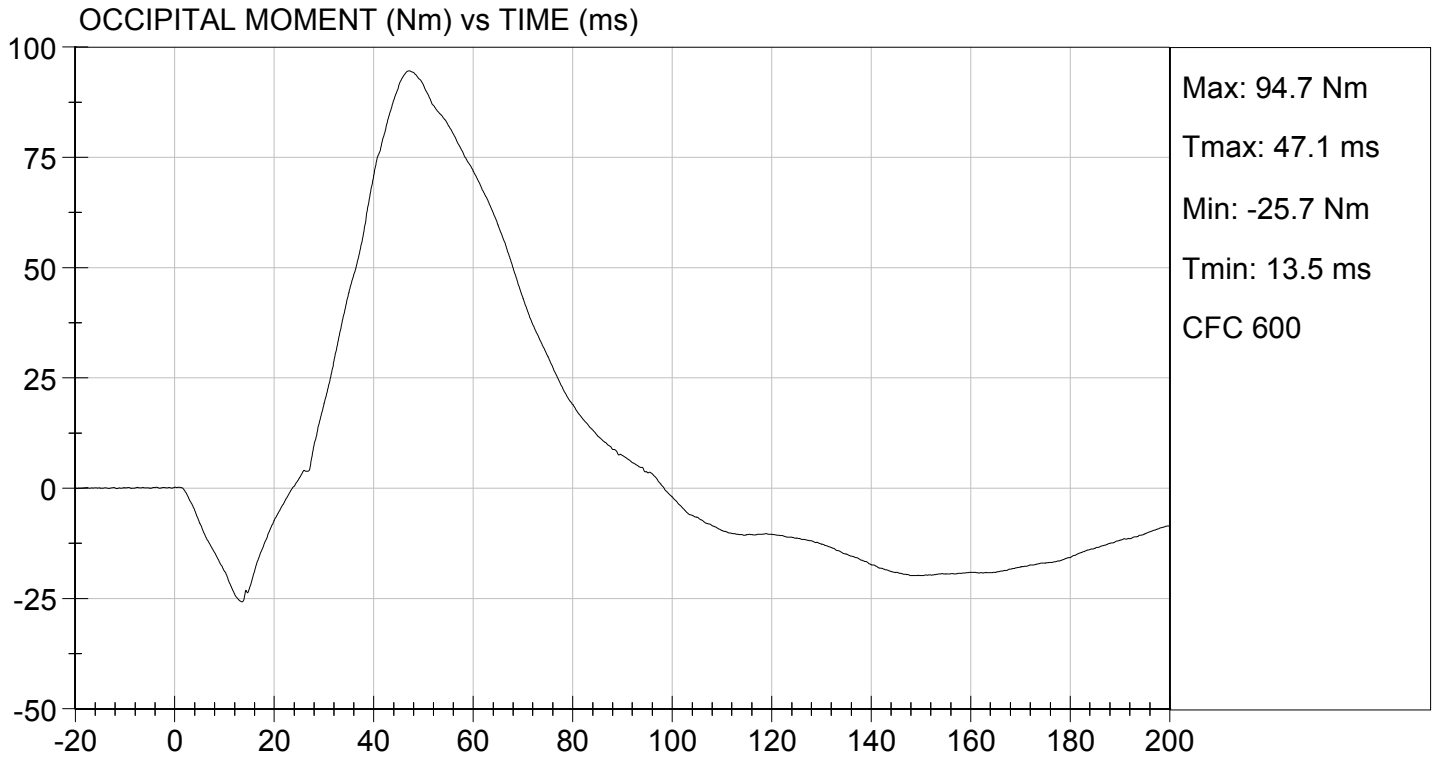
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	11	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.46	Pass
	20 ms	G's	17.60 to 22.60	21.16	Pass
	30 ms	G's	12.50 to 18.50	14.82	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.4	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.1	Pass
	Time	ms	57.0 to 64.0	63.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.4	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	94.7	Pass
	Time	ms	47.0 to 58.0	47.1	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.5	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

12/16/2013
Test Date

David Winkelbauer
Approved By





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

ATD Serial No: 351

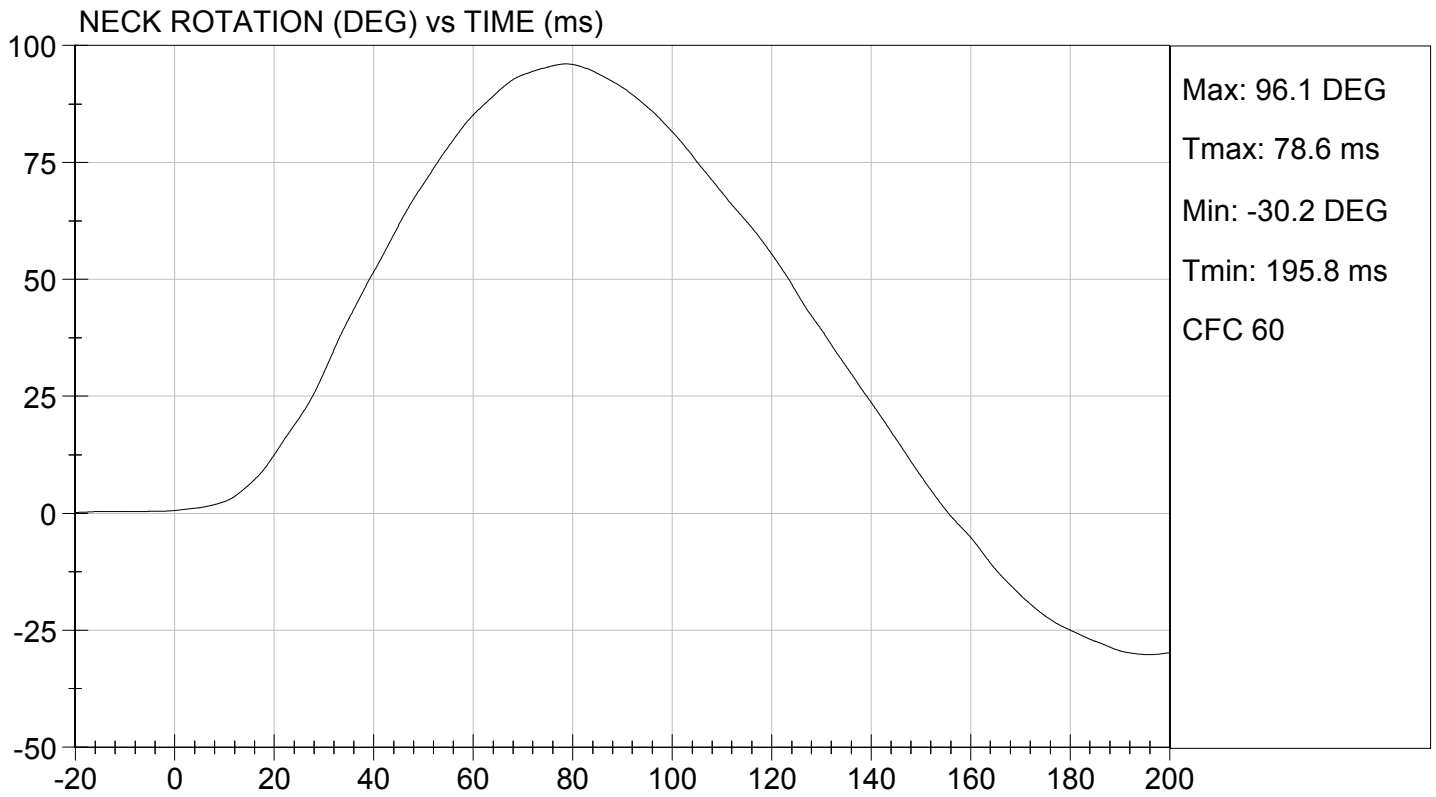
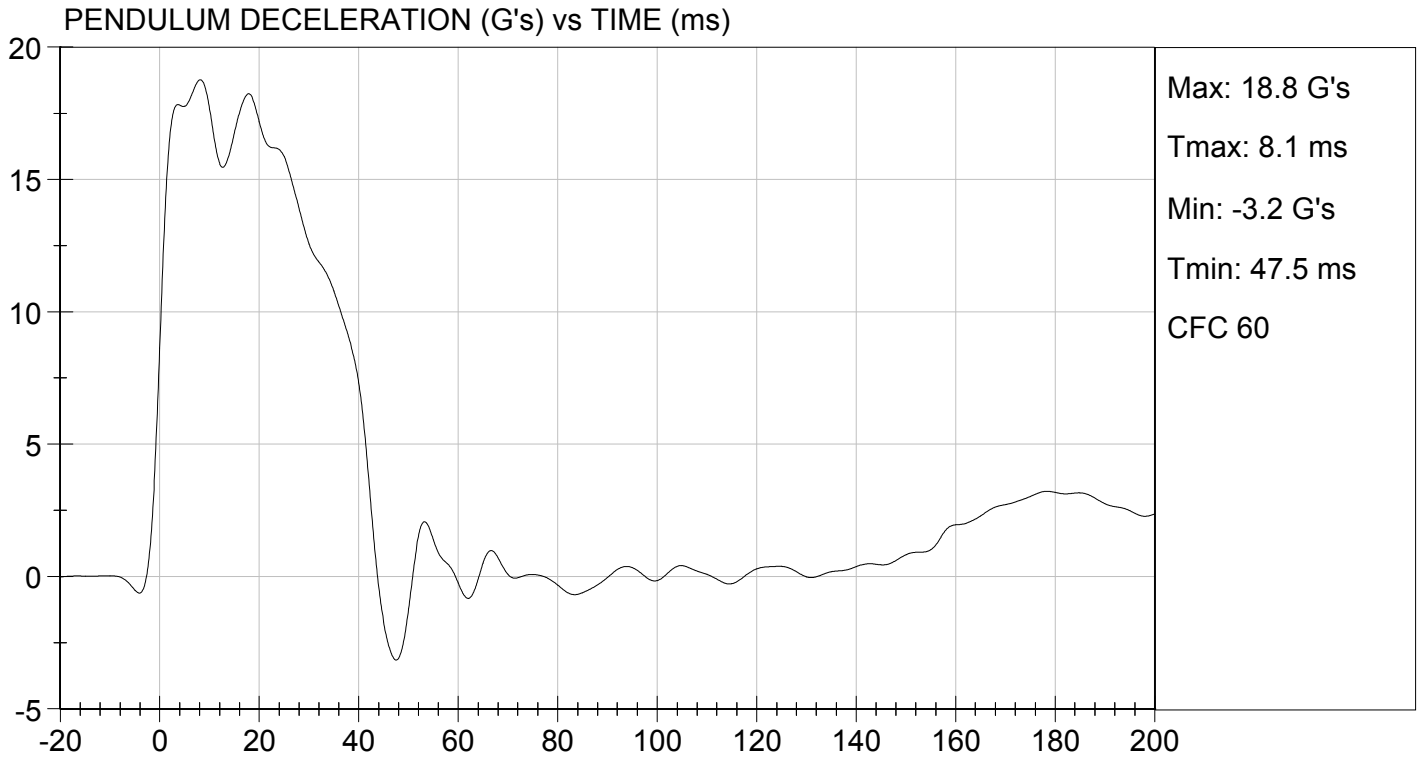
Test I.D.: D134263

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	11	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.66	Pass
	20 ms	G's	14.00 to 19.00	17.18	Pass
	30 ms	G's	11.00 to 16.00	12.56	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.1	Pass
	Time	ms	72.0 to 82.0	78.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	155.7	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.2	Pass
	Time	ms	65.0 to 79.0	70.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.9	Pass
Overall Test Results					Pass

Jessica Gall
Laboratory Technician

12/16/2013
Test Date

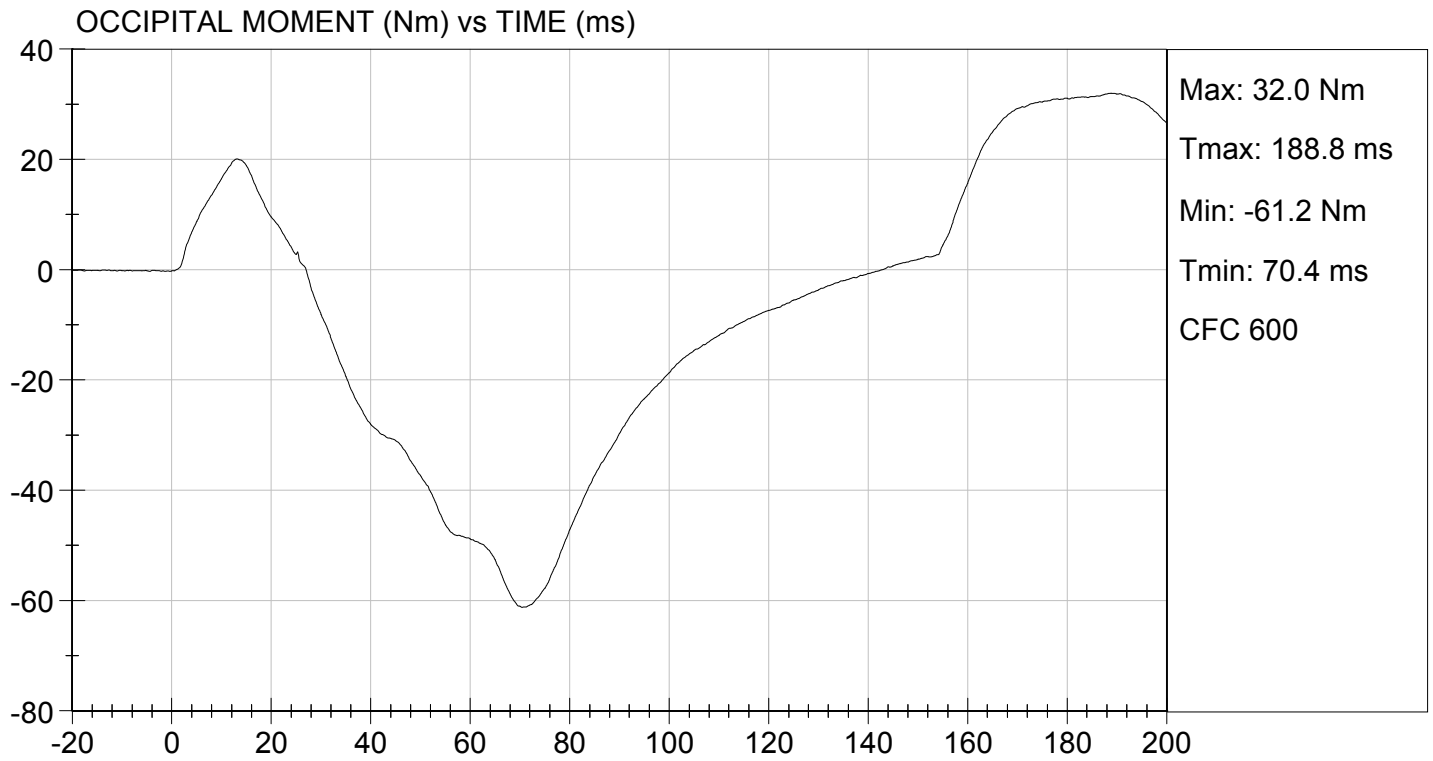
David Winkelbauer
Approved By





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

TEST DATE: 12/16/2013
TEST #: D134263



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

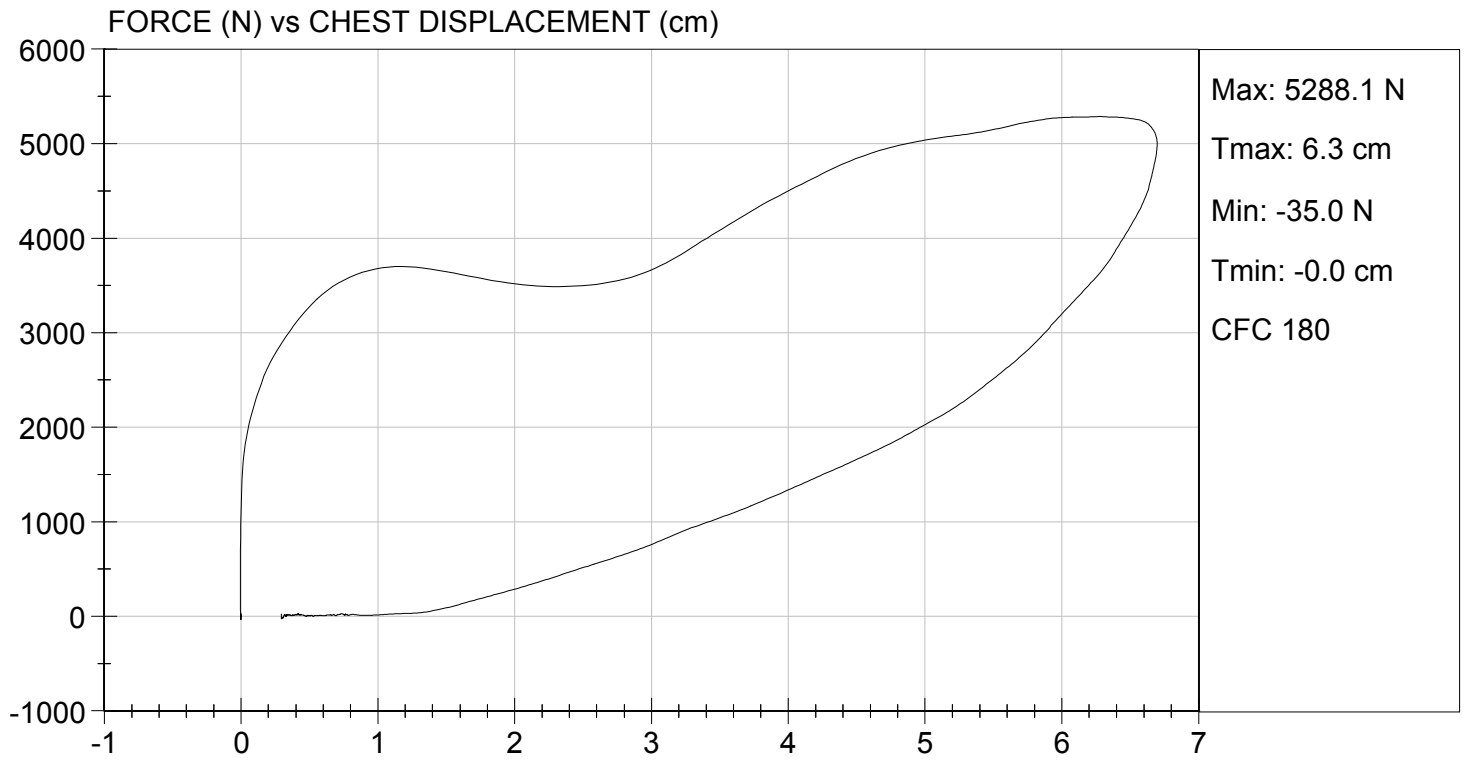
Test I.D: D134264

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	12	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,288	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.70	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

12/16/2013
 Test Date

David Winkelbauer
 Approved By




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

ATD Serial No: 351

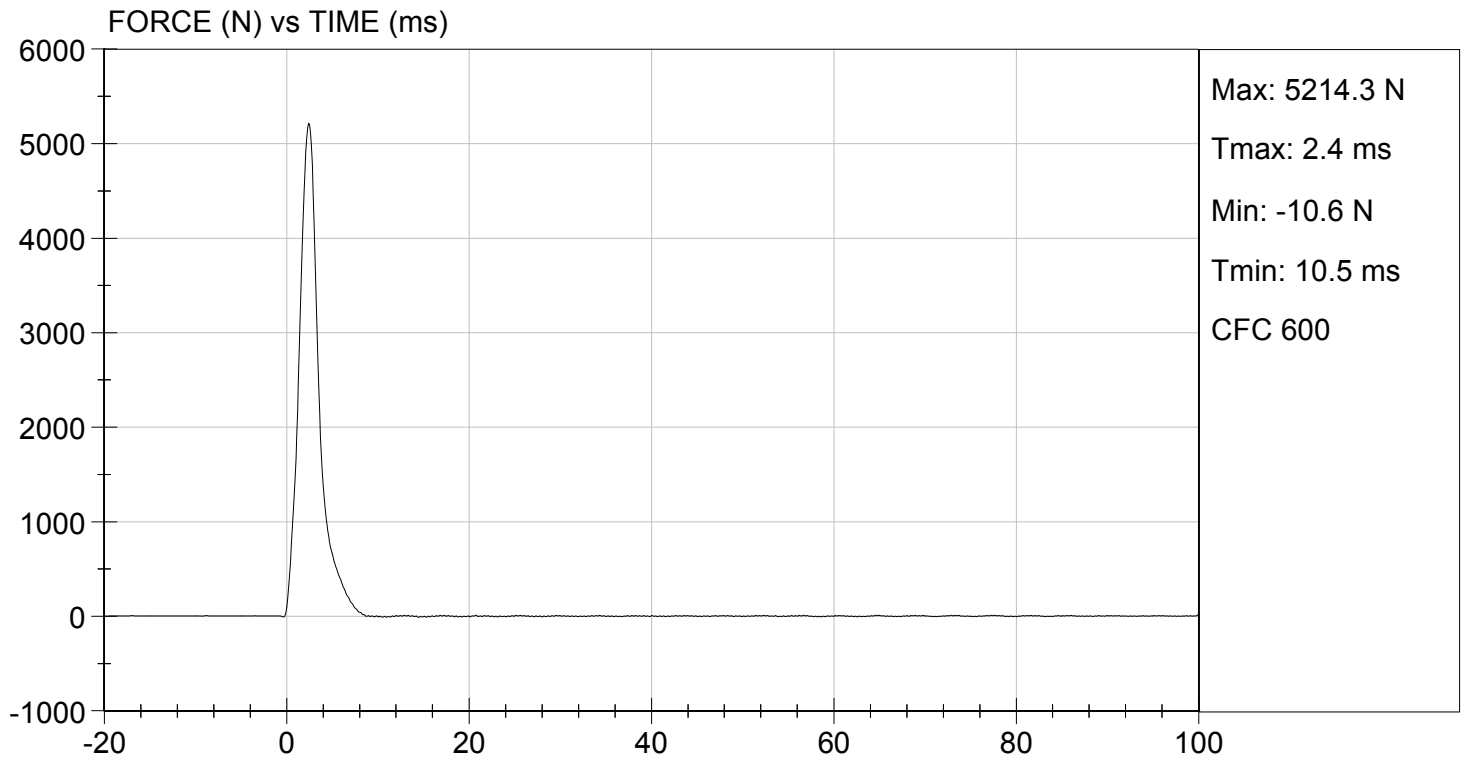
Test I.D: D134265

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5,214	Pass
Overall Test Results				Pass


 Laboratory Technician

12/13/2013
 Test Date


 Approved By



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

ATD Serial No: 351

Test I.D: D134266

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,261	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

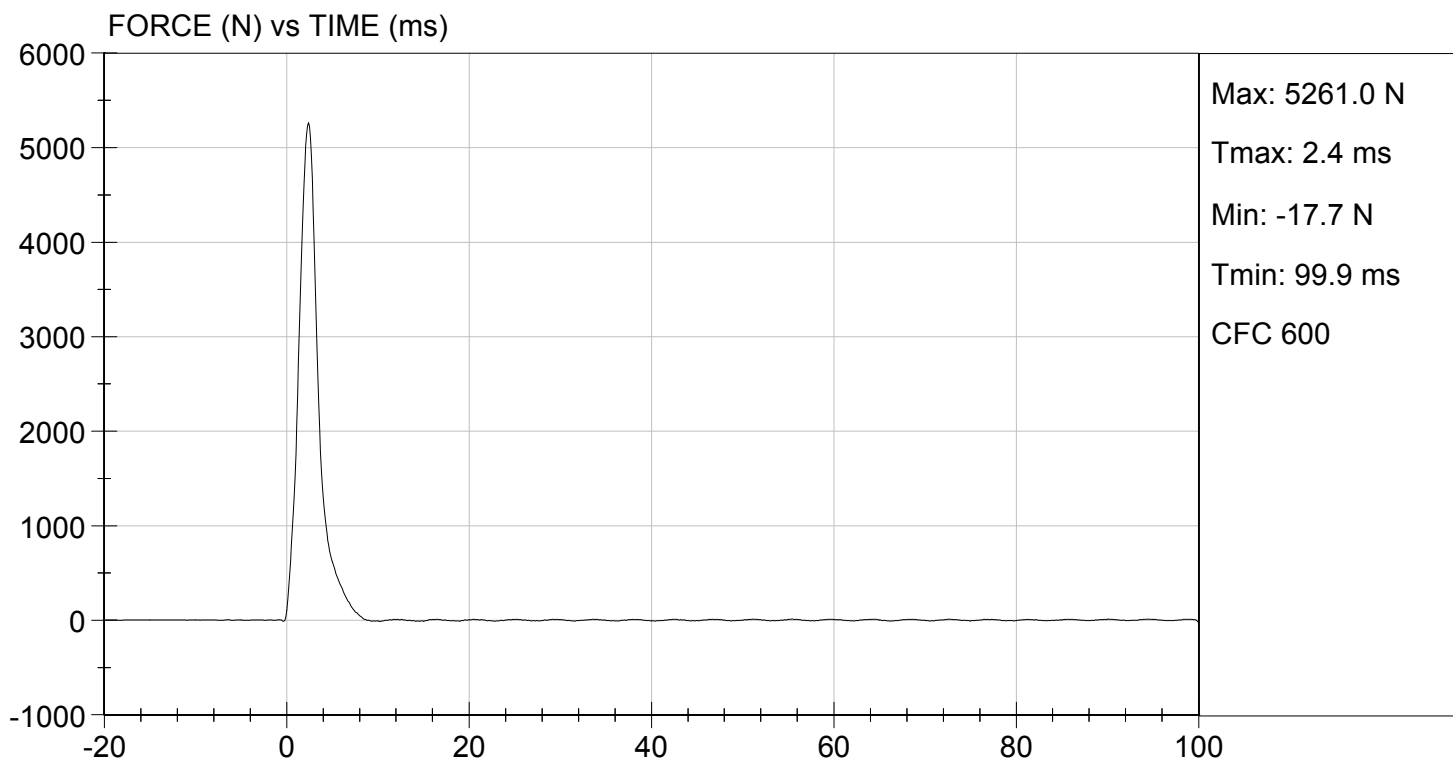
12/13/2013
 Test Date

David Winkelbauer
 Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.88 ft/s, 2.10 m/s

TEST DATE: 12/13/2013
TEST #: D134266



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

ATD Serial No: 351

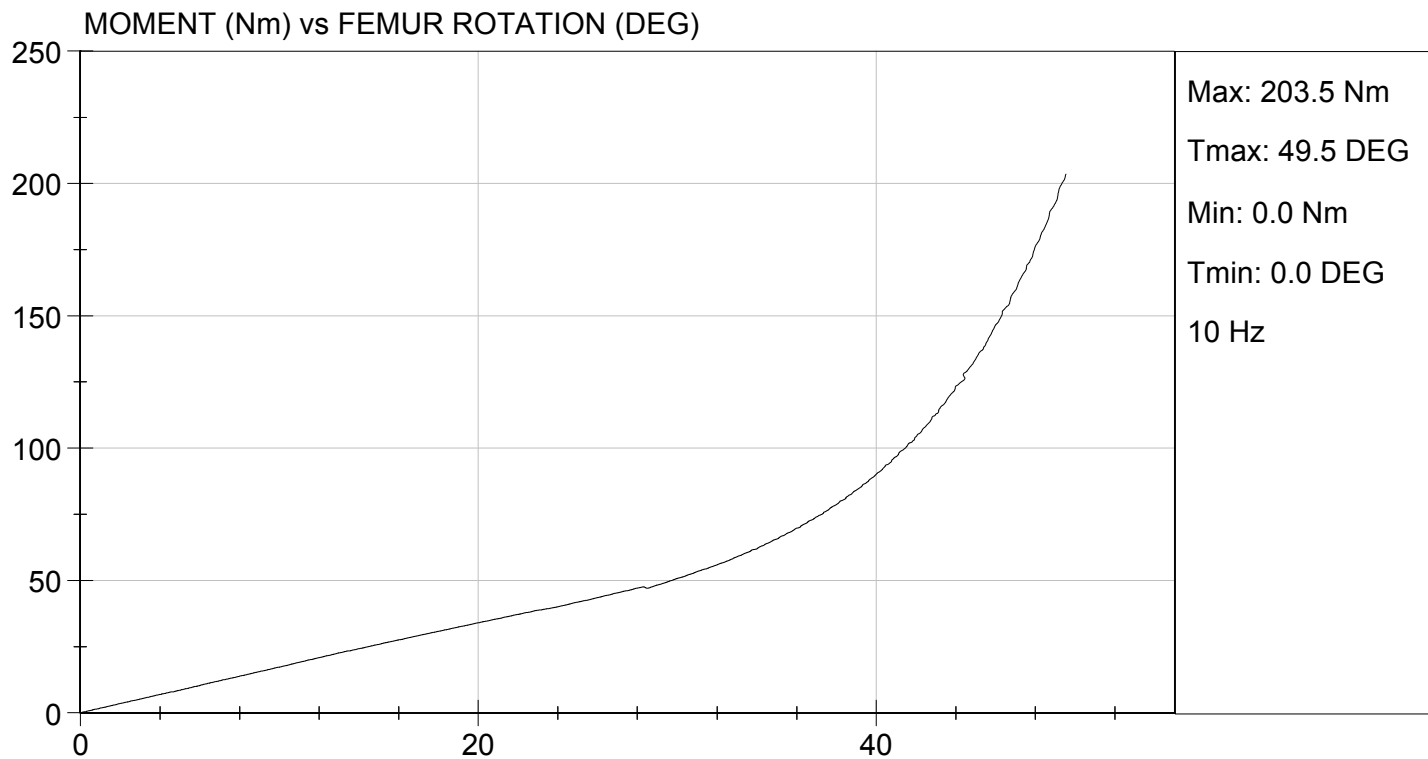
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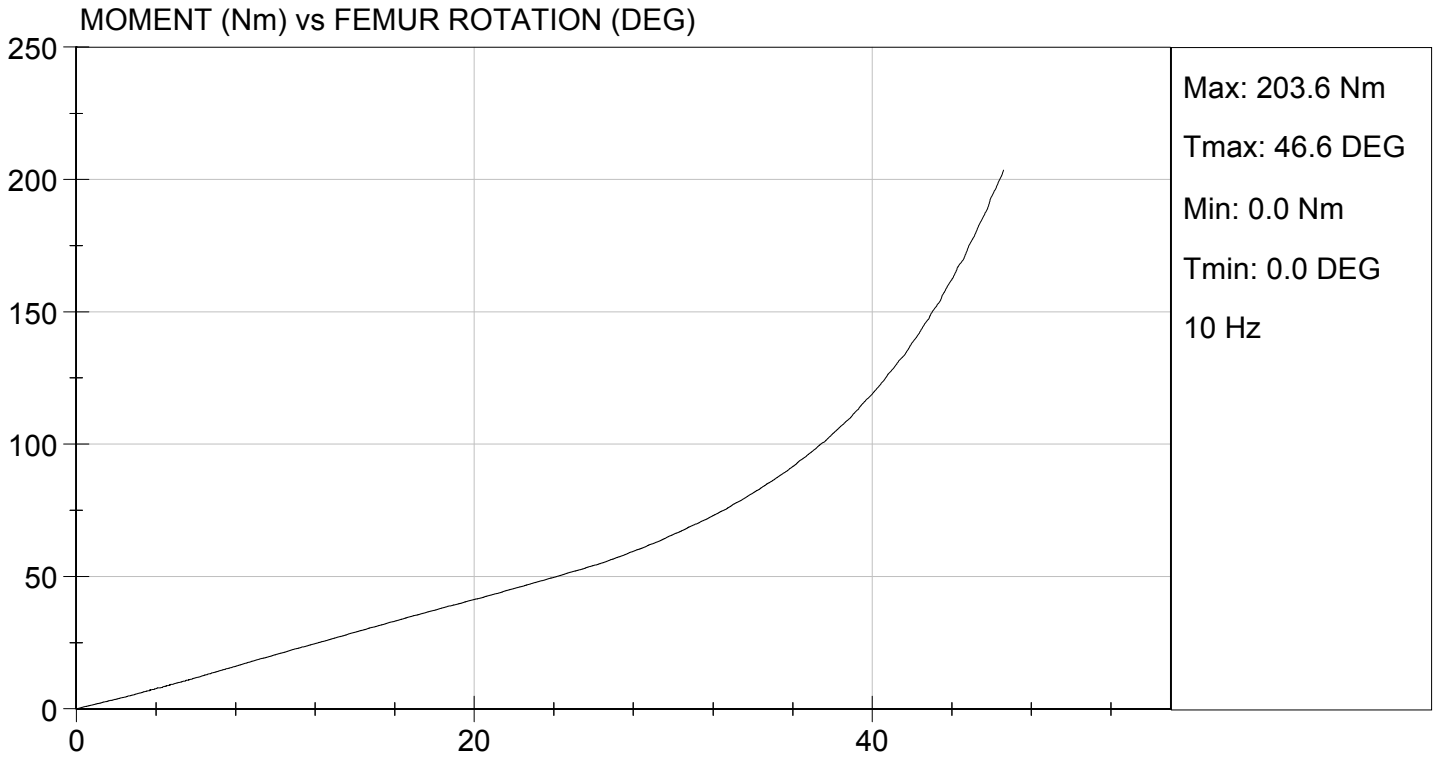
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.8	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	19	19	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	50.8	65.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	49.5	46.6	Pass
Overall Test Results					Pass

Jessica Gall
 Laboratory Technician

12/13/2013
 Test Date

David Winkelbauer
 Approved By





**Hybrid III, 5th External Measurements
SN: 138**

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	785.1
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	456.8
C	H-POINT HEIGHT	Reference	81.3-86.3	84.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	146.2
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	78.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	127.5
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	249.6
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	201.9
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	526.7
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.3
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	398.0
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	414-439.4	430.5

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	184.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	221.0
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	472.6
S	HEAD BREADTH	The widest part of the head	137.1-147.3	141.9
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	184.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	307.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	360.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	546.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	875.1
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	785.4
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.4
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.1

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

ATD Serial No: 138

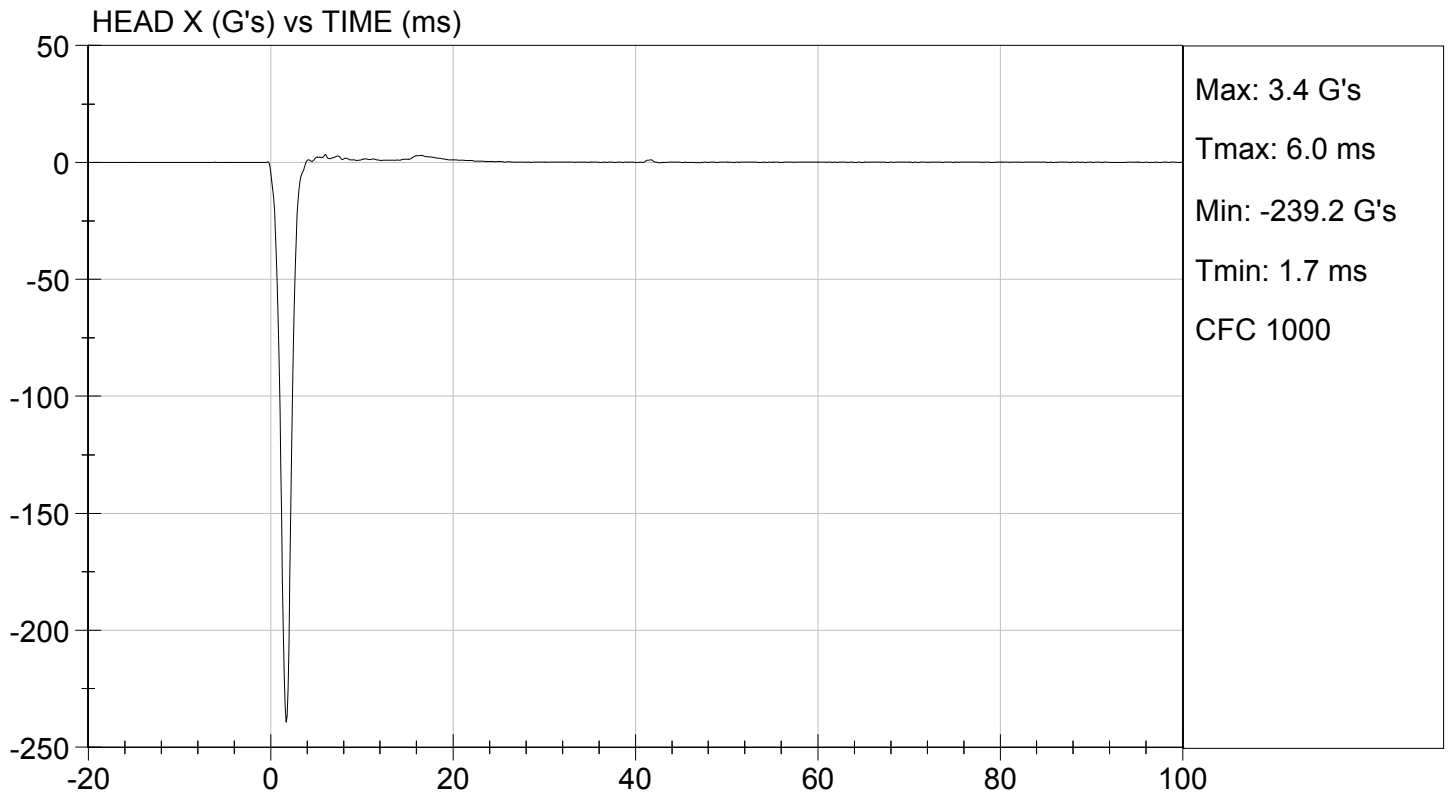
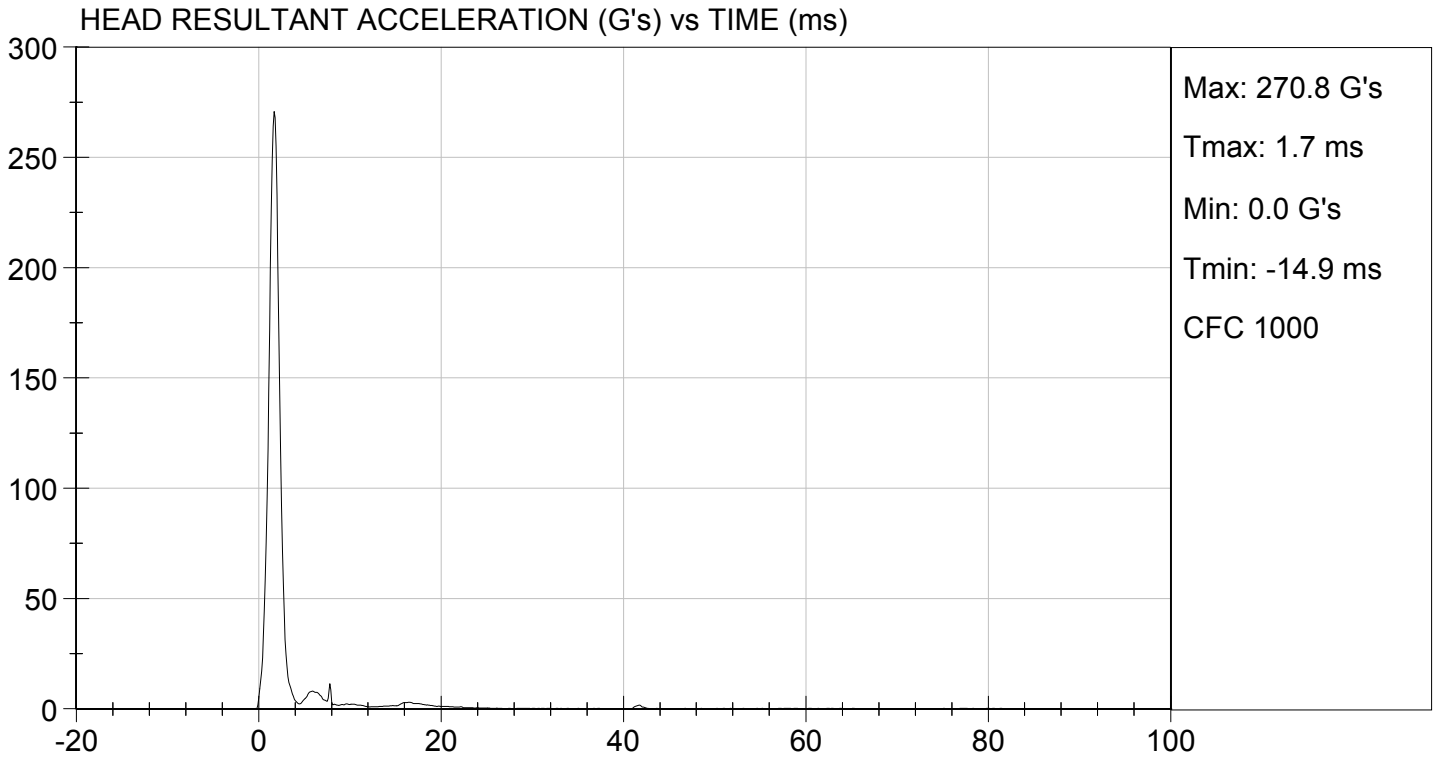
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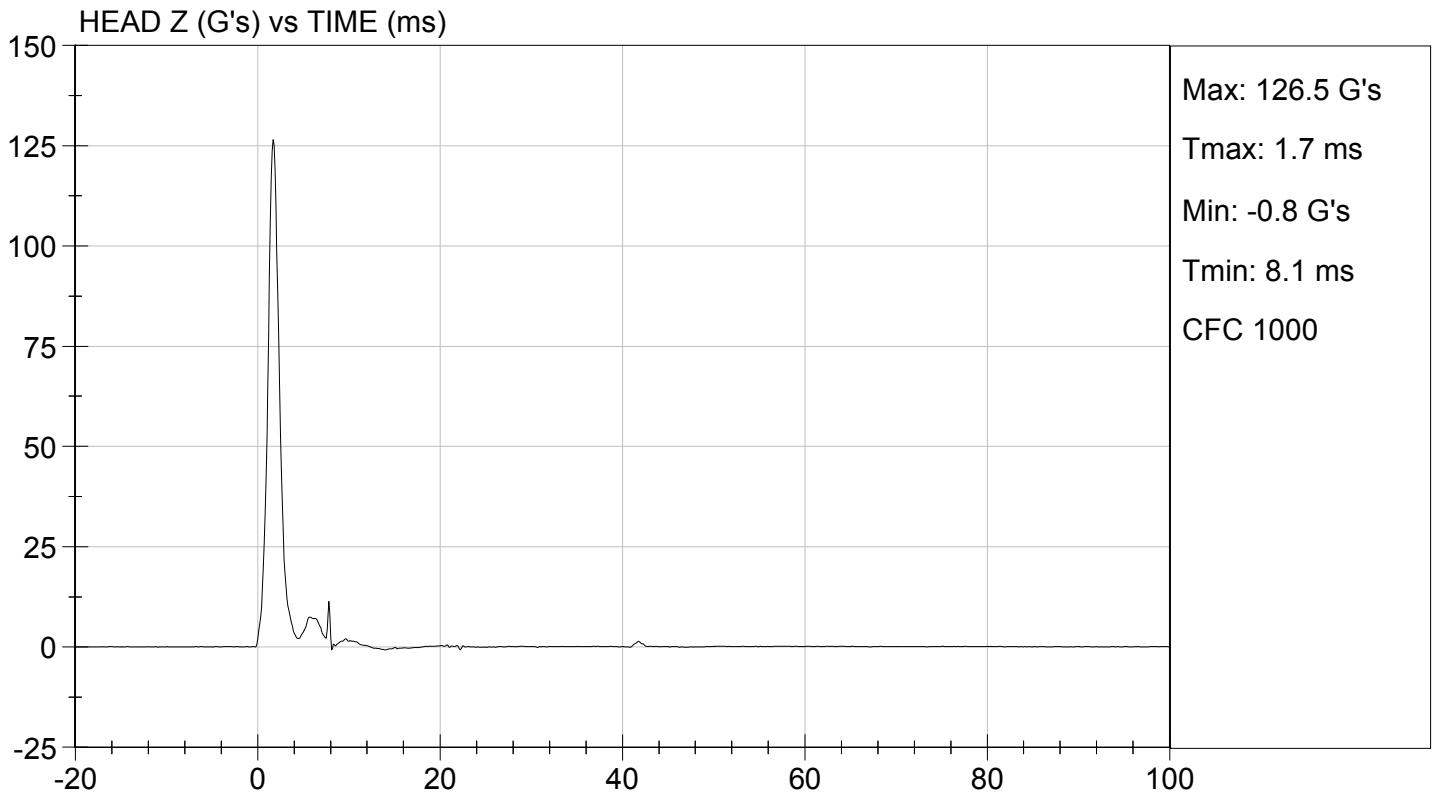
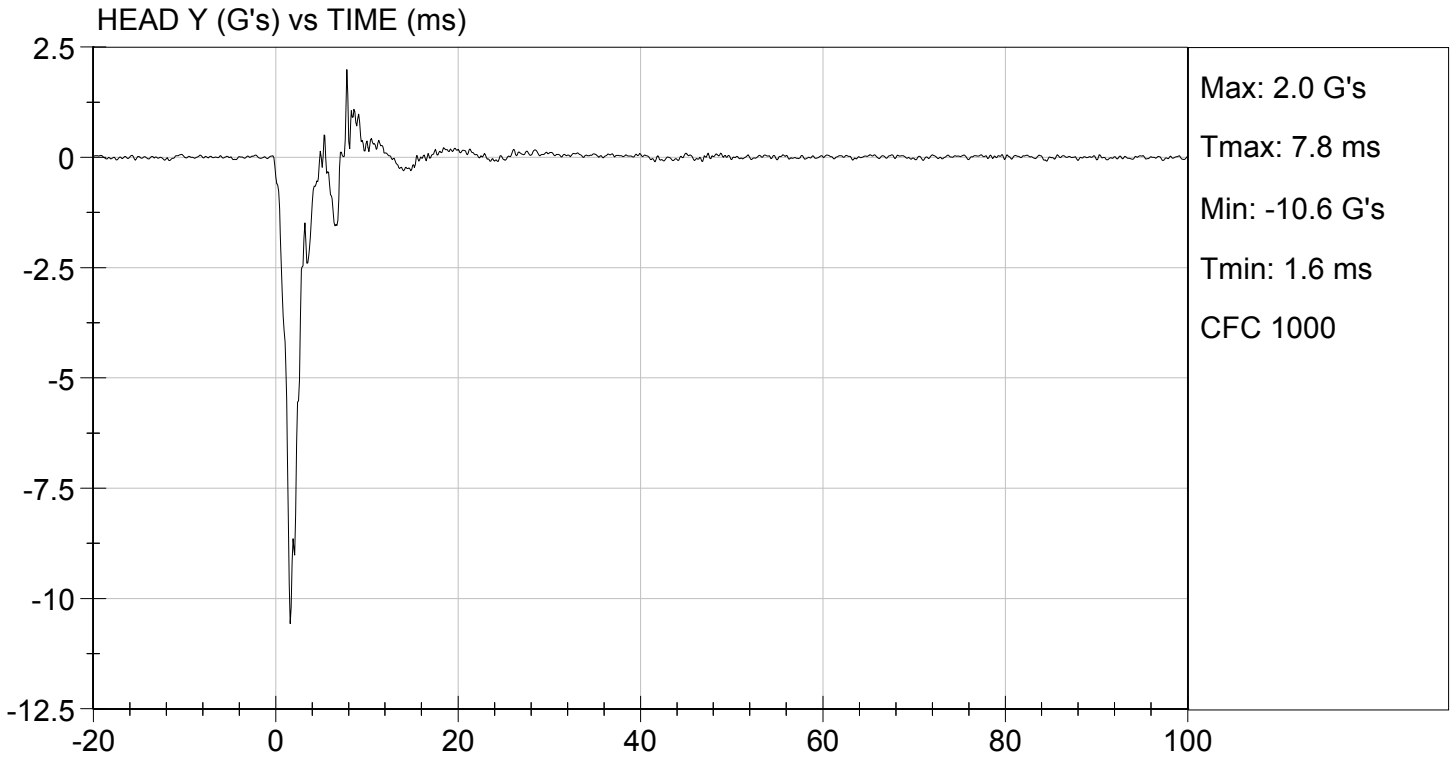
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	12	Pass
Peak Resultant Acceleration	G's	250 to 300	271	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-10.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

12/06/2013
Test Date

David Winkelbauer
Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

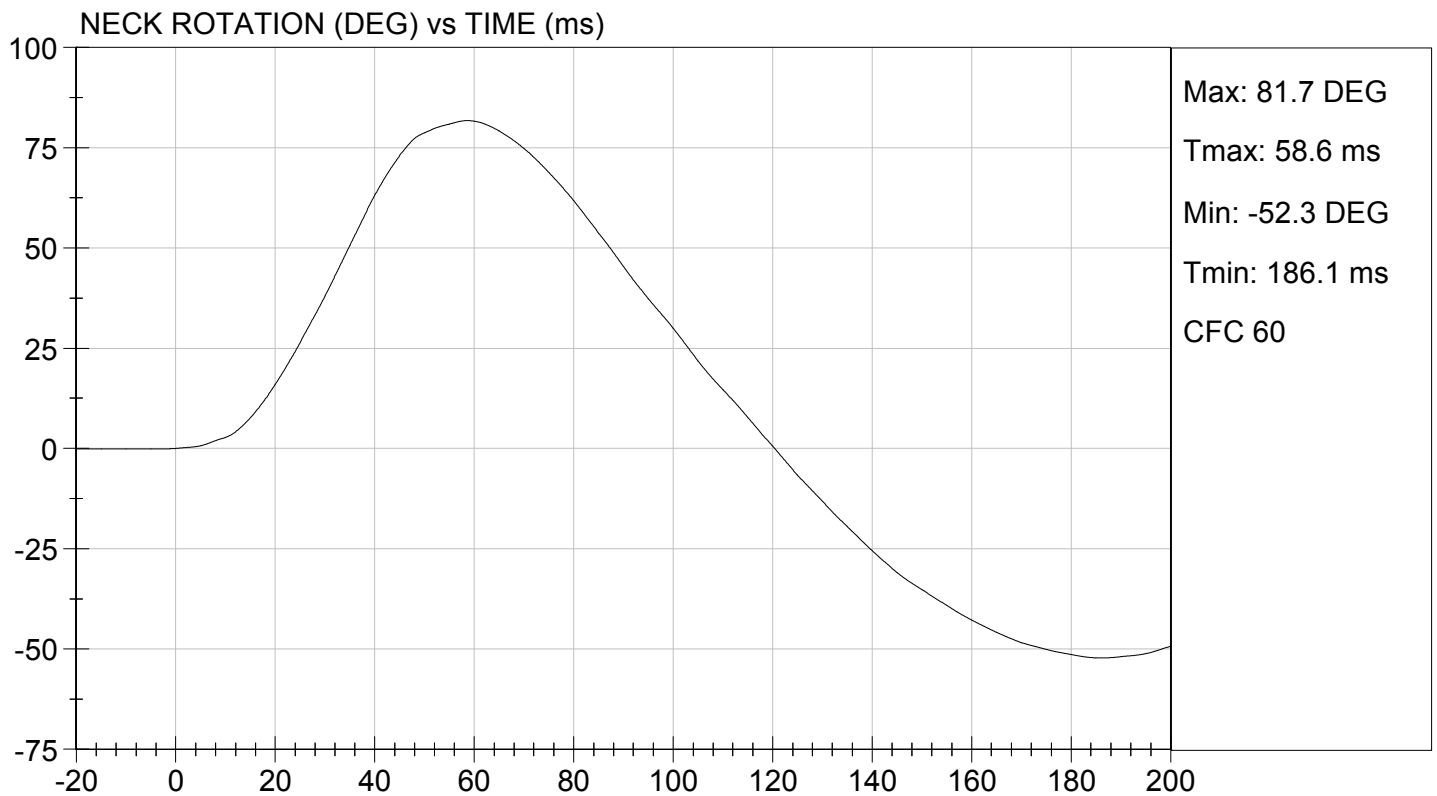
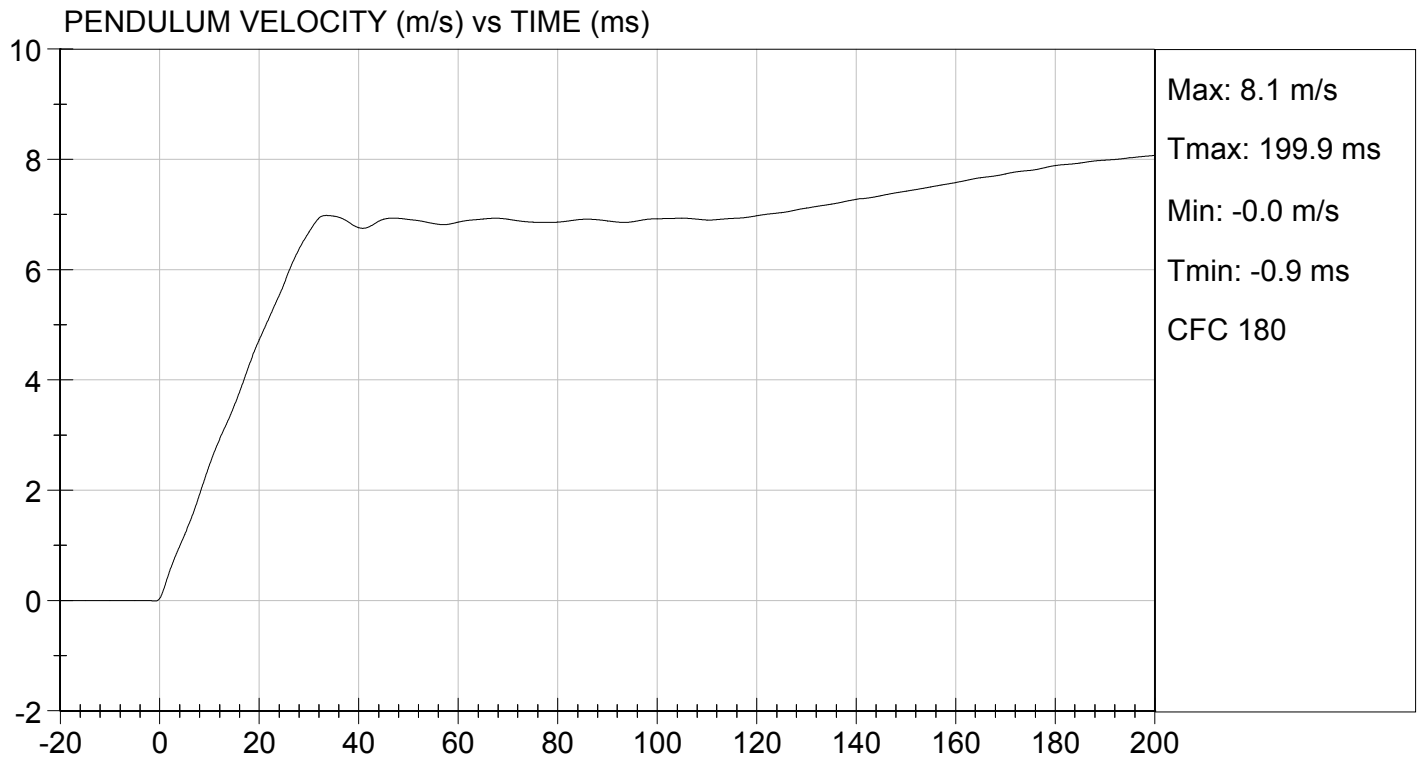
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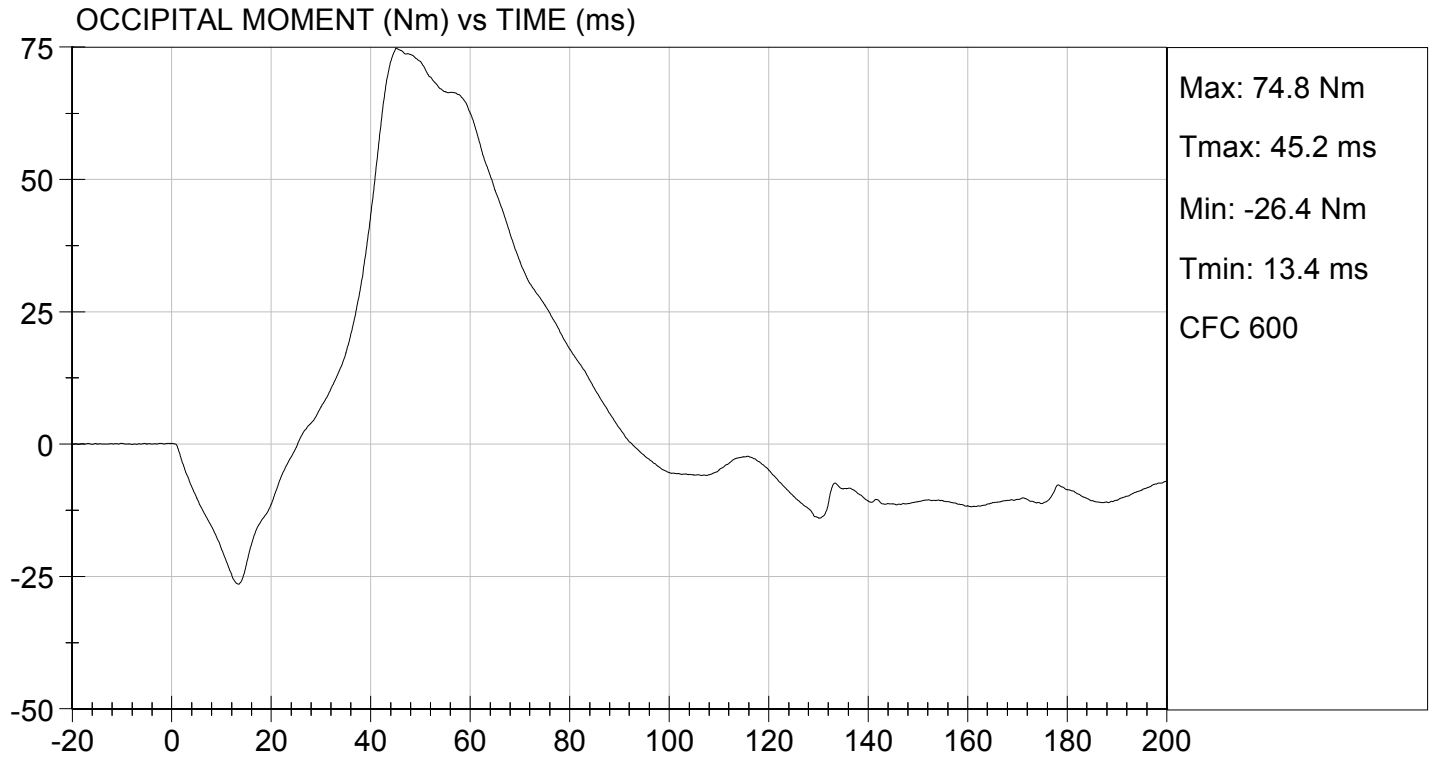
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	24	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.13	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.7	Pass
	30 ms	m/s	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	74	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
Overall Results					Pass

Jessica Gall
Laboratory Technician

12/09/2013
Test Date

David Winkelbauer
Approved By





MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

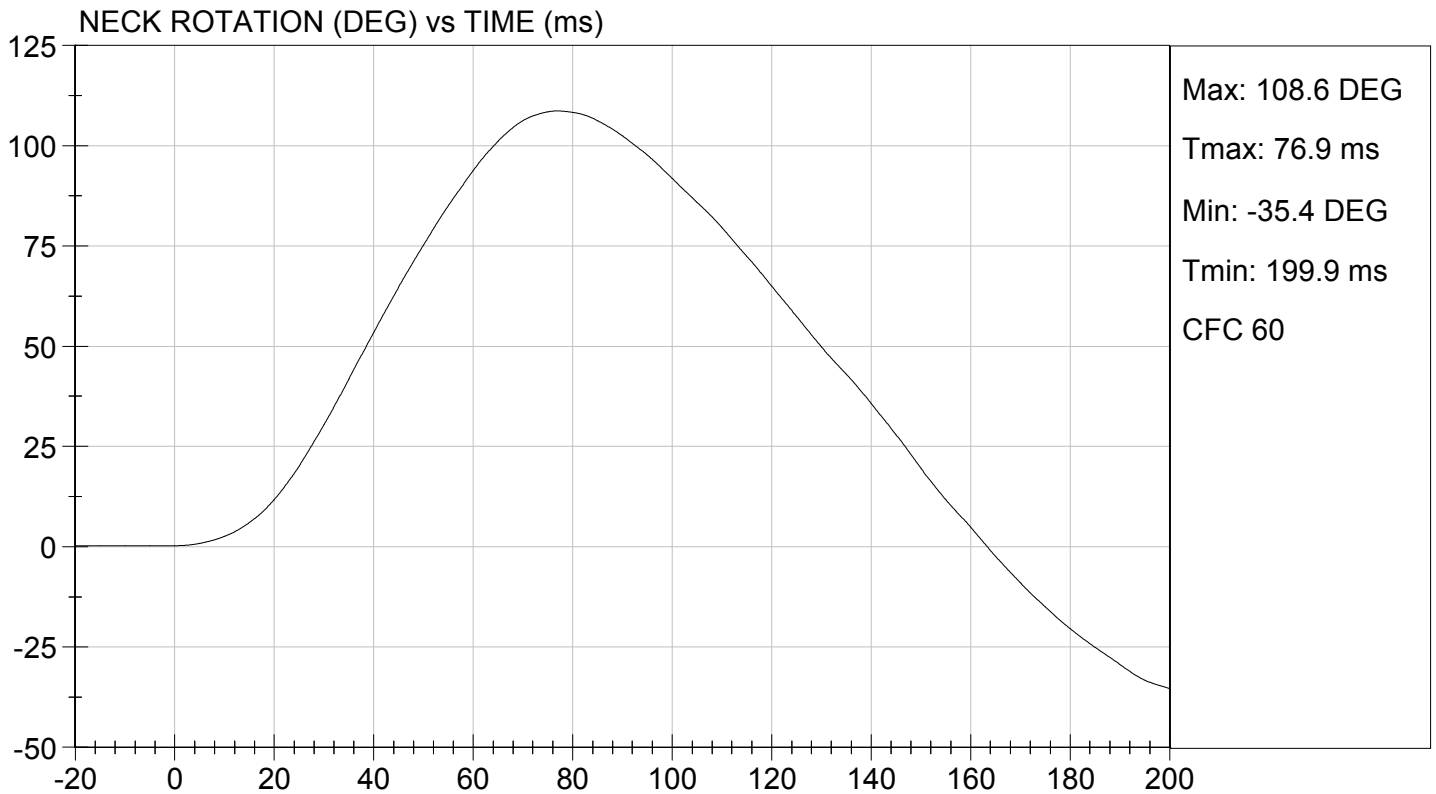
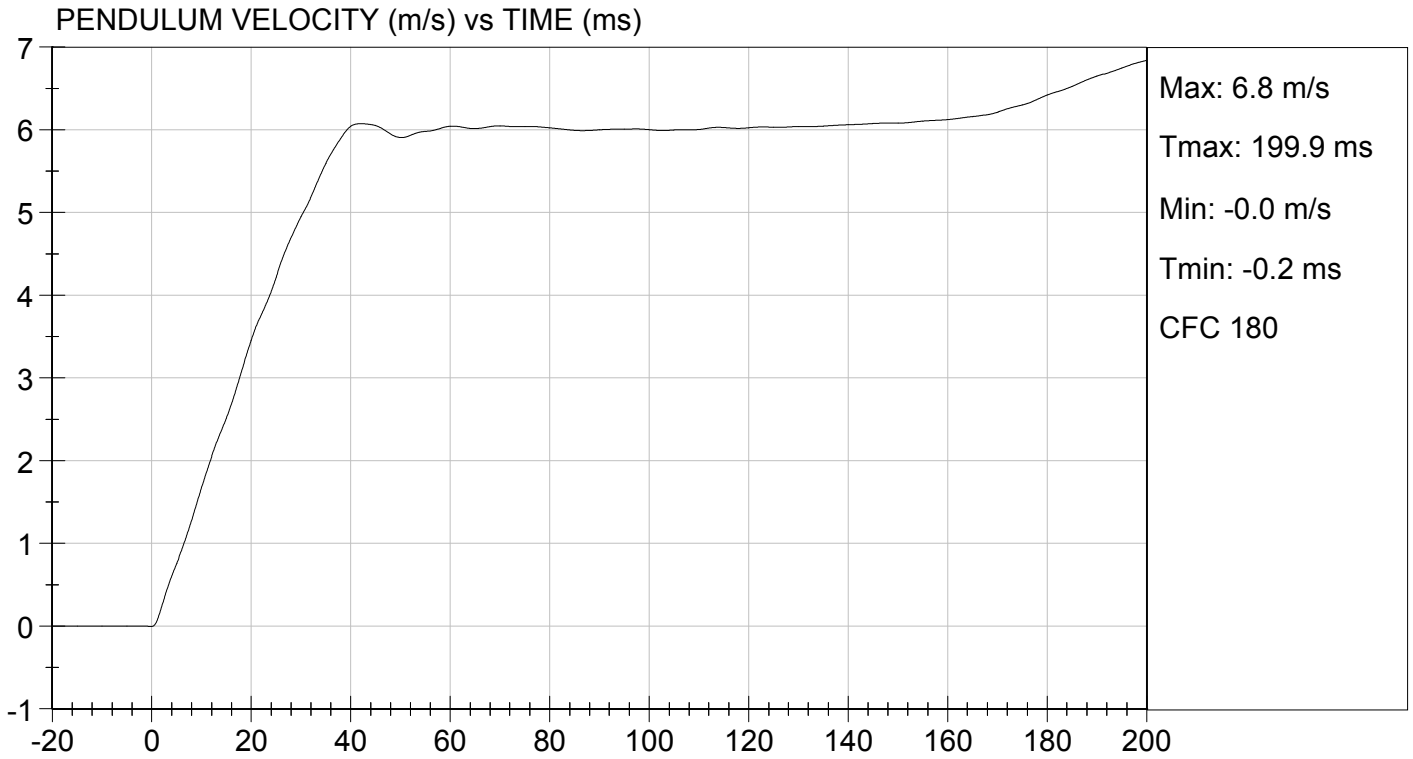
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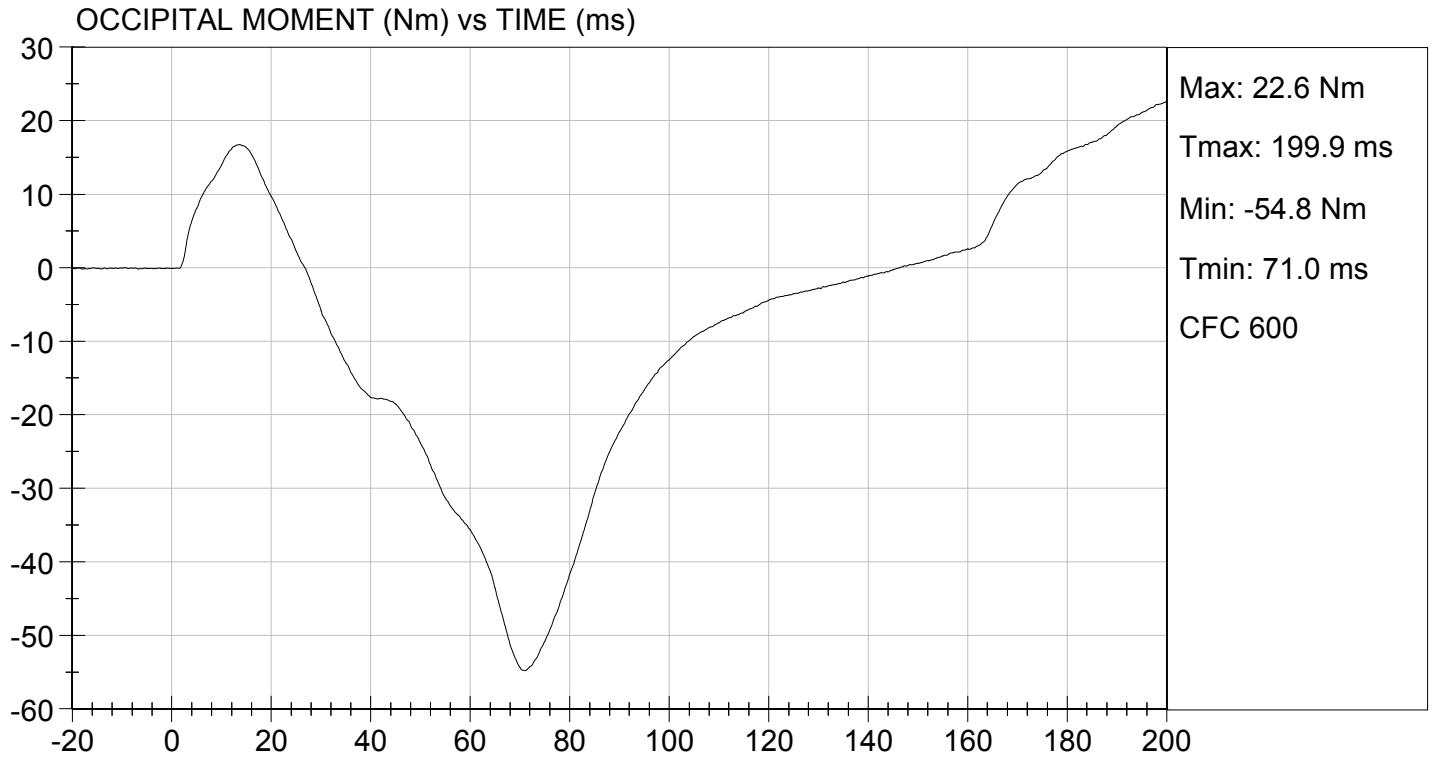
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	24	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.19	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	109	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

12/09/2013
Test Date

David Winkelbauer
Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

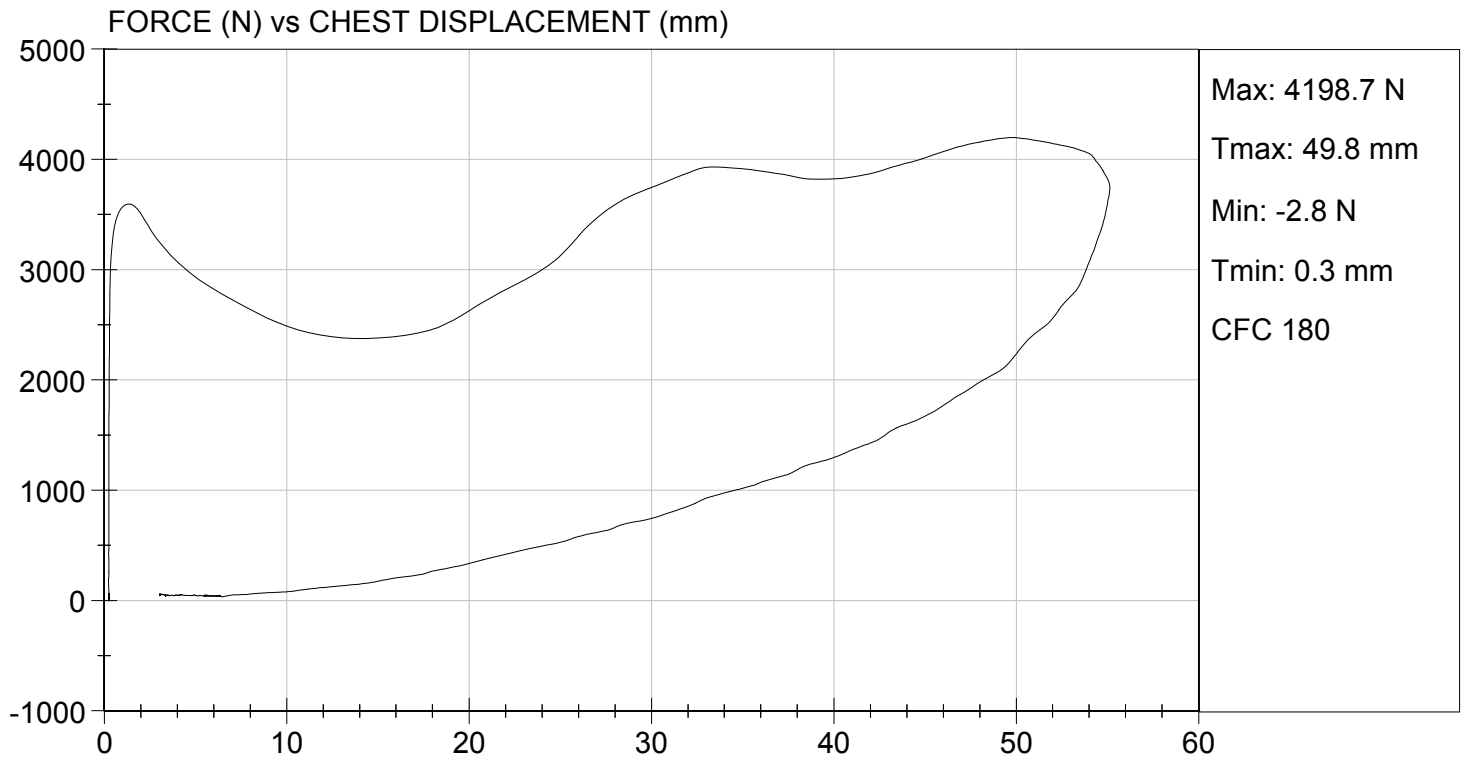
Test I.D: D134184

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Relative Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	55	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4197	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4199	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

12/09/2013
 Test Date

David Winkelbauer
 Approved By



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

ATD Serial No: 138

Test I.D: D134185

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Speed	m/s	2.07 to 2.13	2.07	Pass
Maximum Force	N	3450 to 4060	3531	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

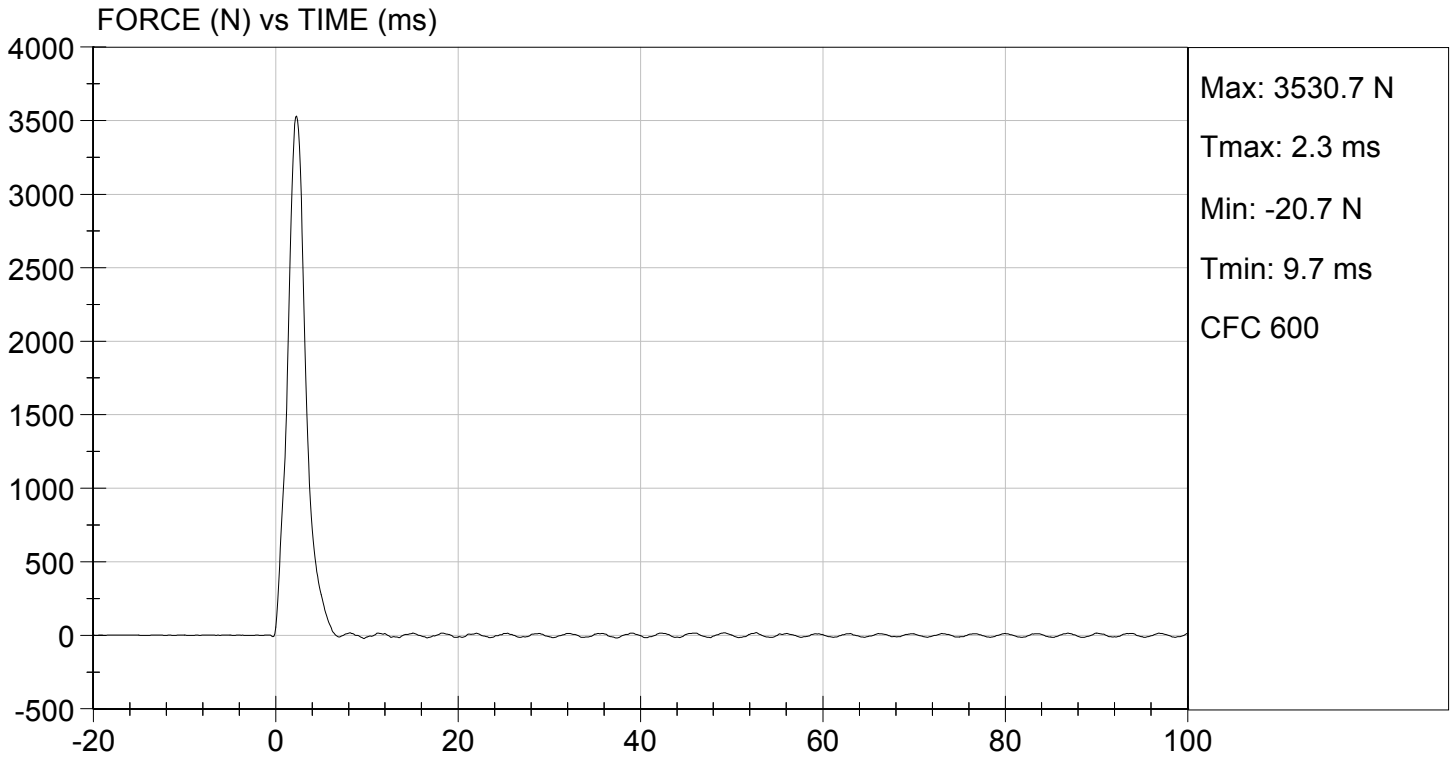
12/06/2013
 Test Date

David Winkelbauer
 Approved By



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

TEST DATE: 12/06/2013
TEST #: D134185



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D134186

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3681	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

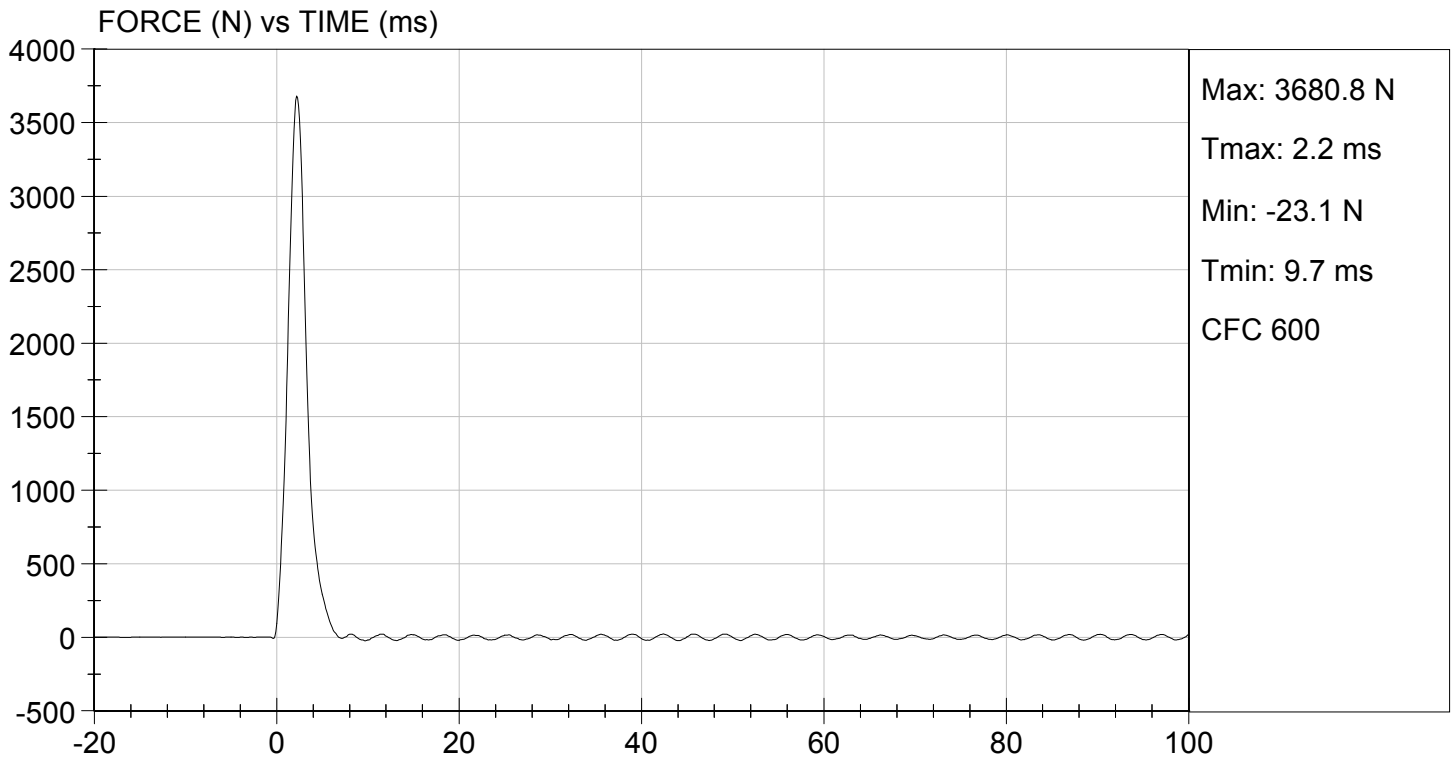
12/06/2013
Test Date

David Winkelbauer
Approved By



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

TEST DATE: 12/06/2013
TEST #: D134186



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D.: D134187

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	376	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass

Jessica Gall
 Laboratory Technician

12/09/2013
 Test Date

David Winkelbauer
 Approved By

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

ATD Serial No: 138

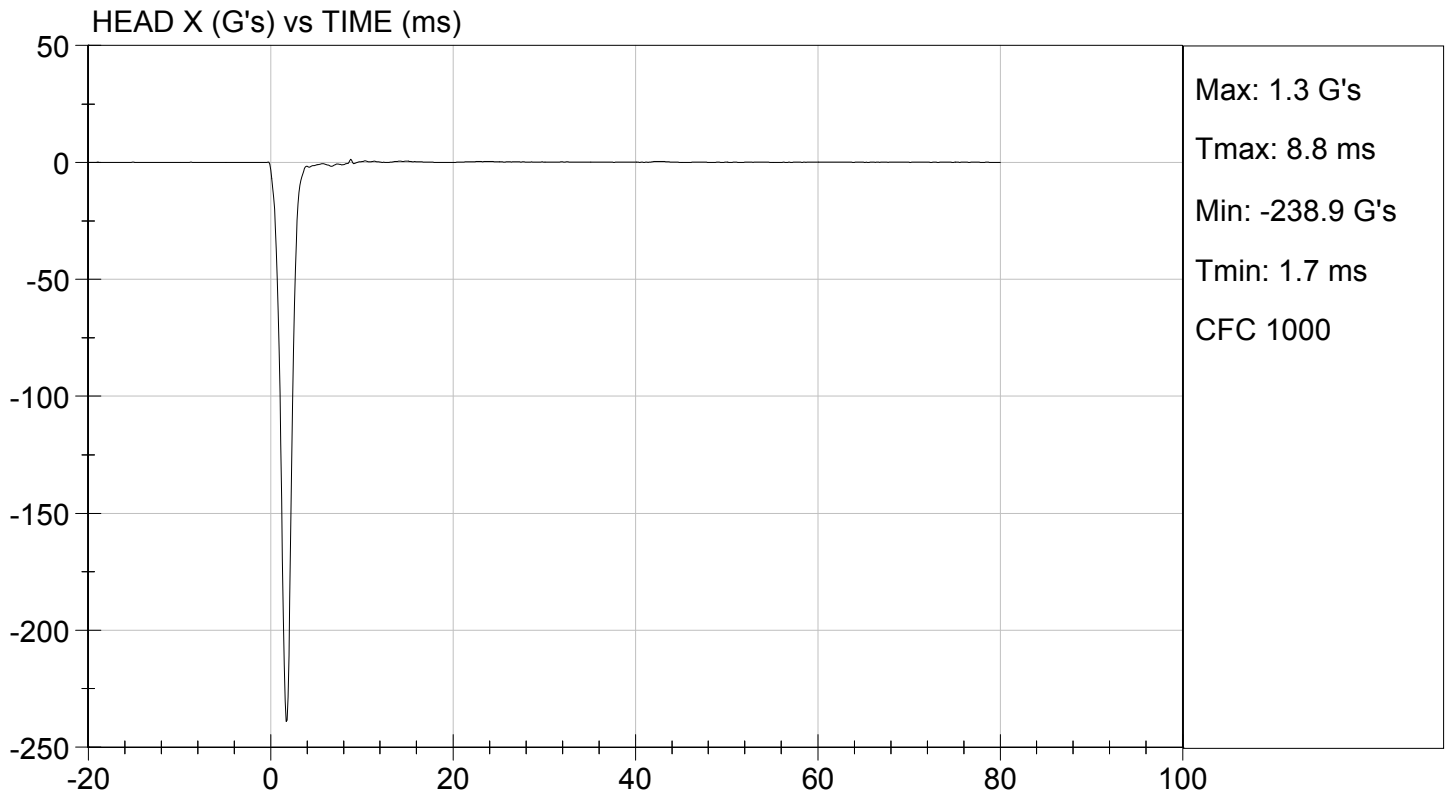
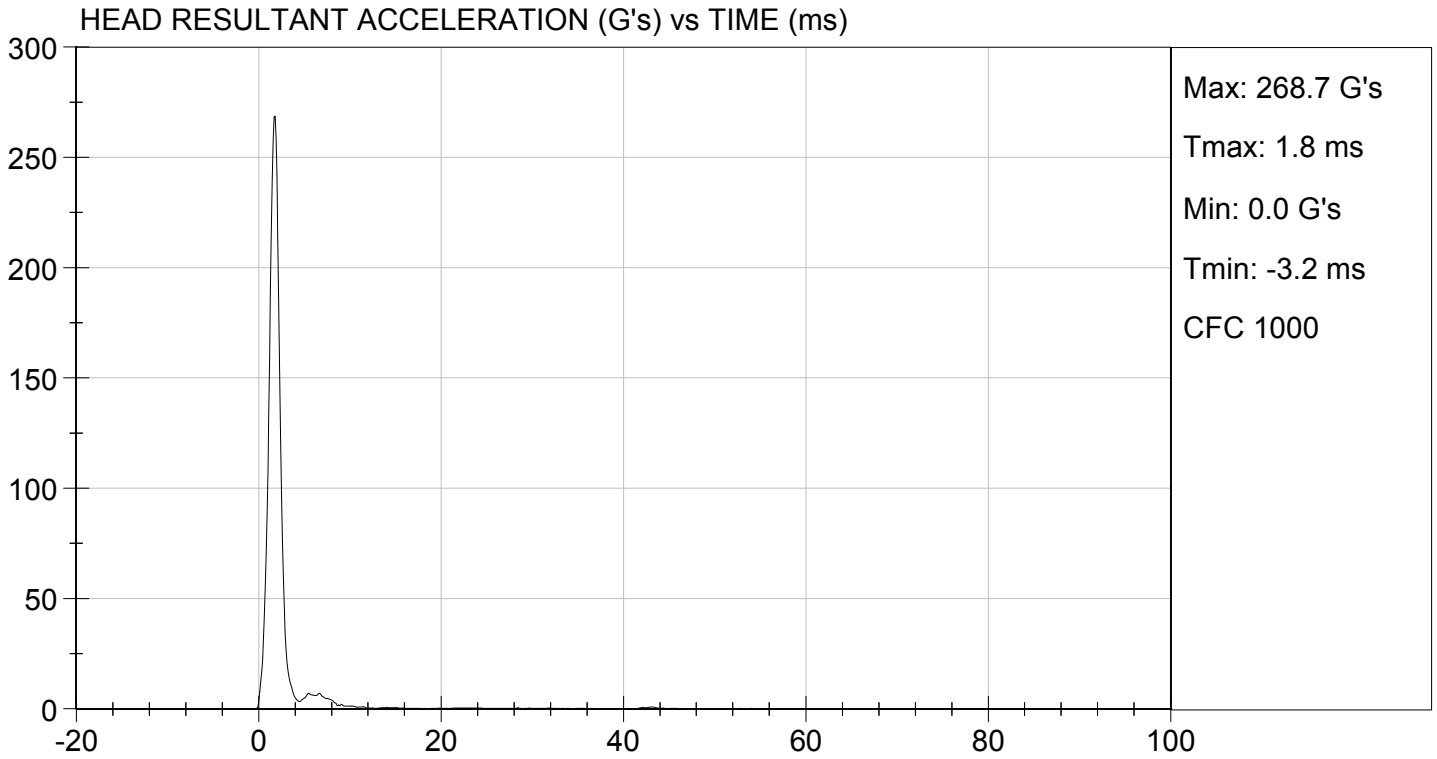
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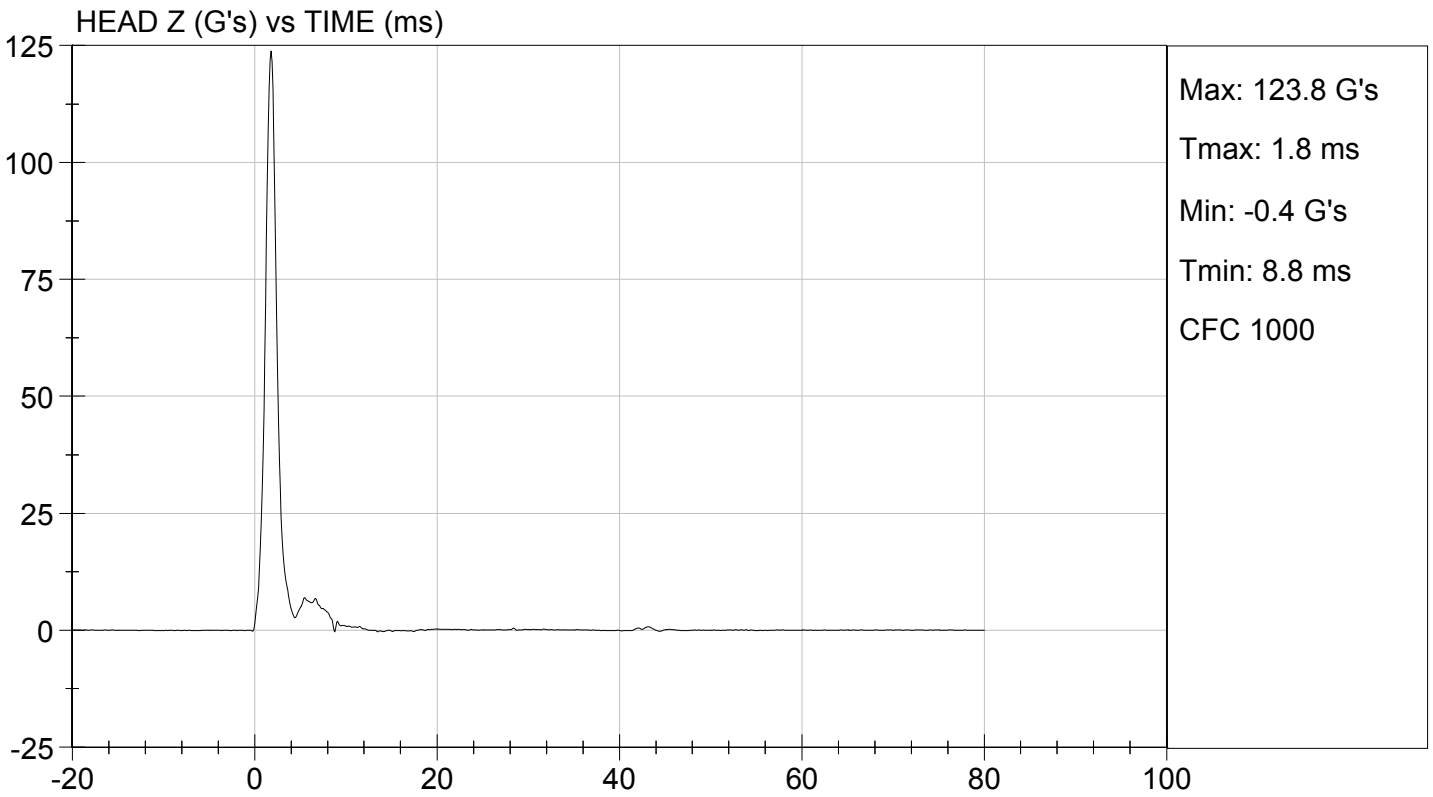
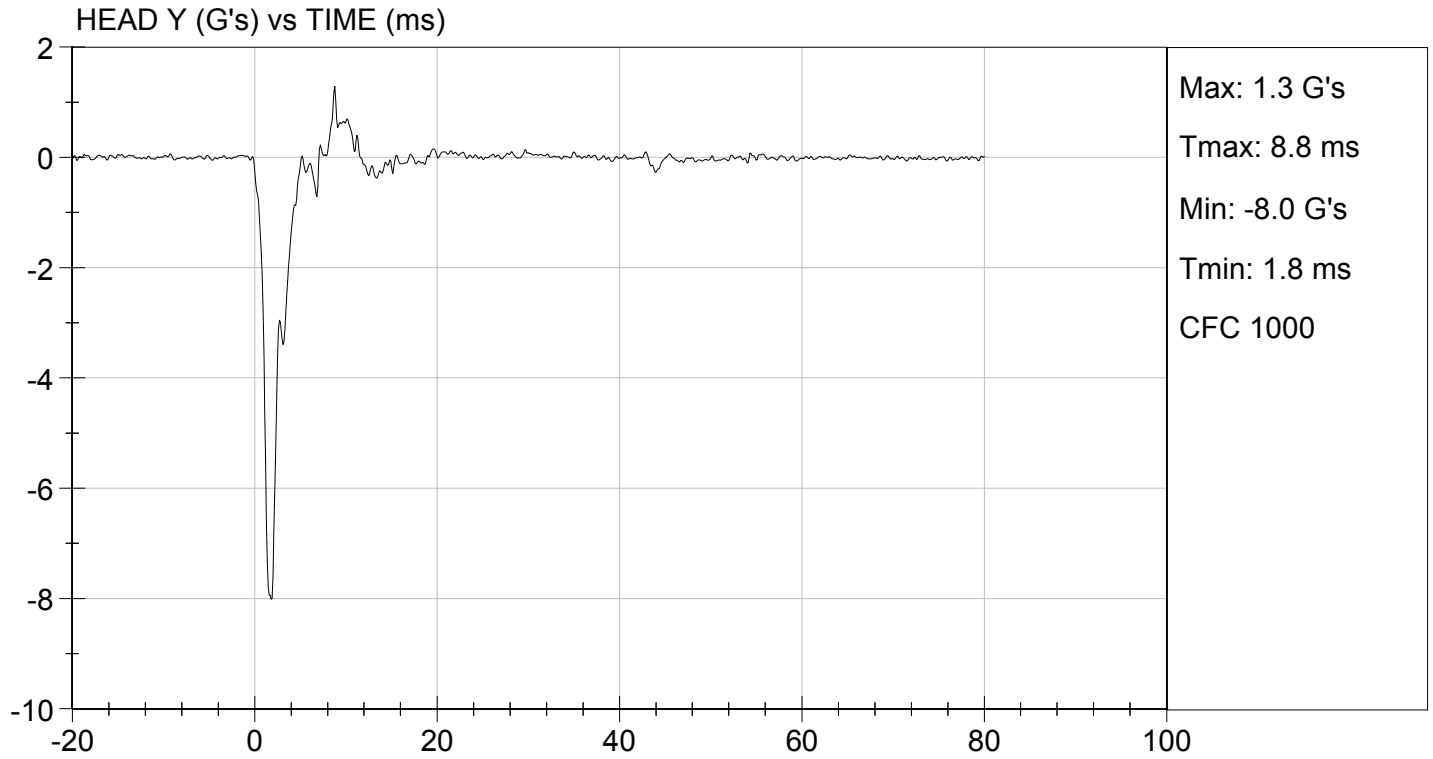
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	12	Pass
Peak Resultant Acceleration	G's	250 to 300	269	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-8.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

12/16/2013
Test Date

David Winkelbauer
Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

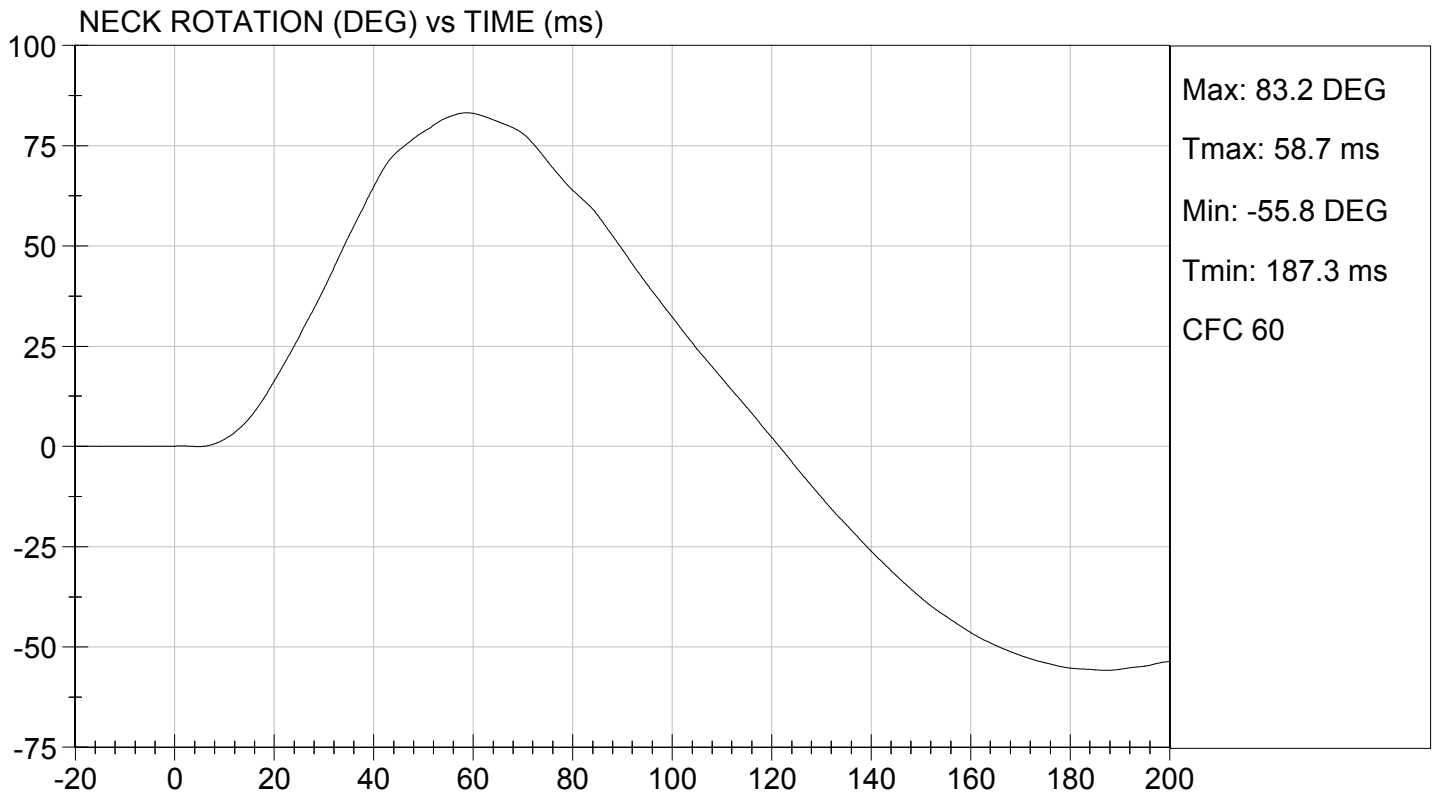
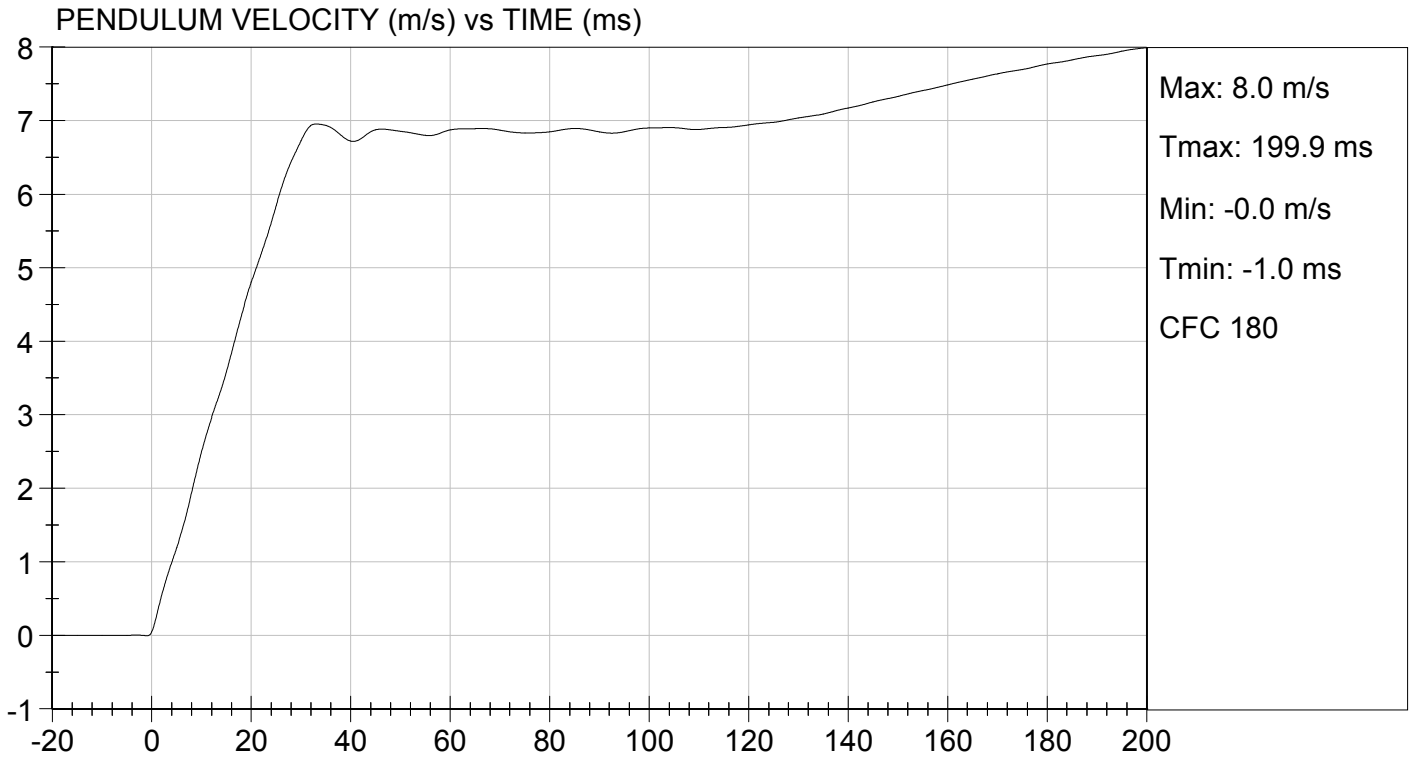
Test I.D.: D134272

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	11	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.05	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.8	Pass
	30 ms	m/s	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	83	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

12/16/2013
Test Date

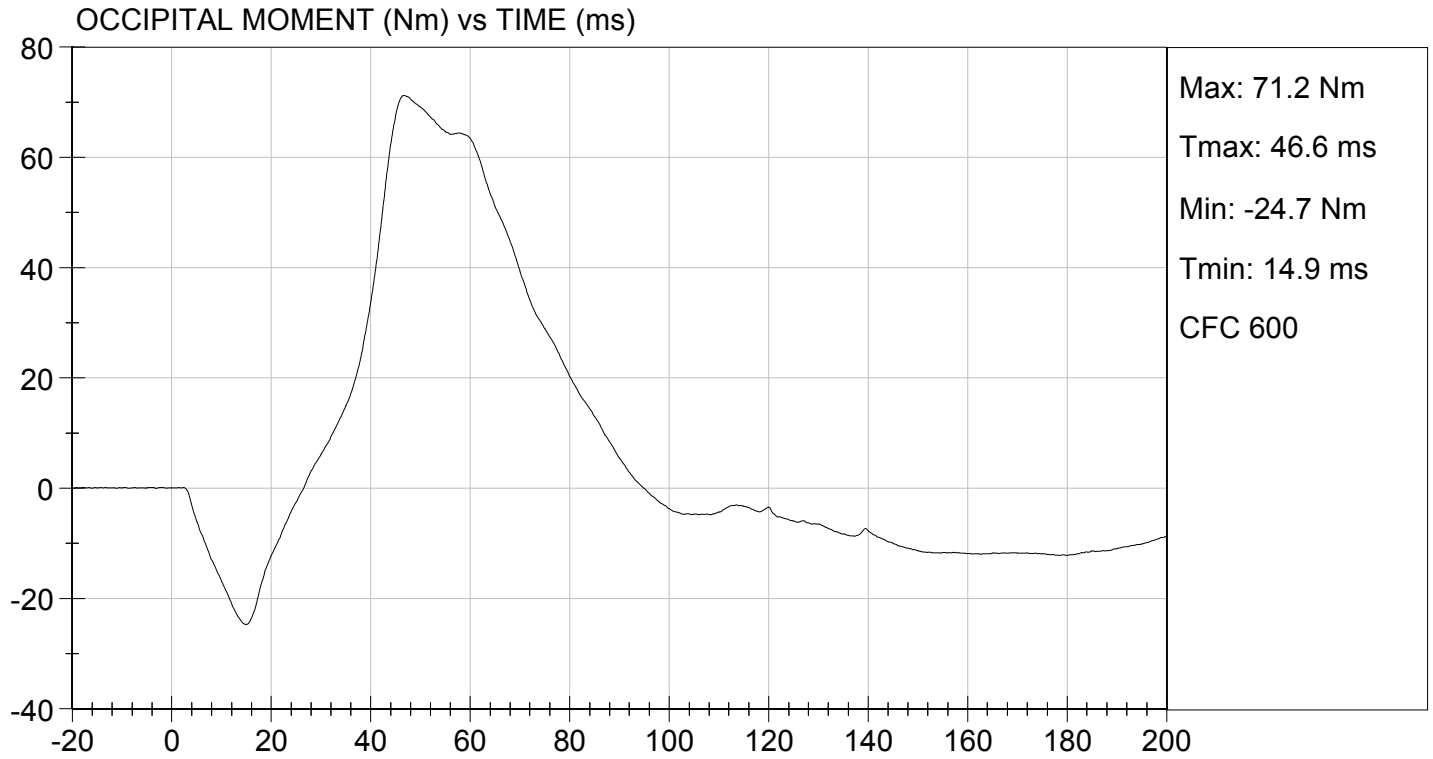
David Winkelbauer
Approved By





TEST DESC: NECK FLEXION
VELOCITY: 23.14 ft/s, 7.05 m/s

TEST DATE: 12/16/2013
TEST #: D134272



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

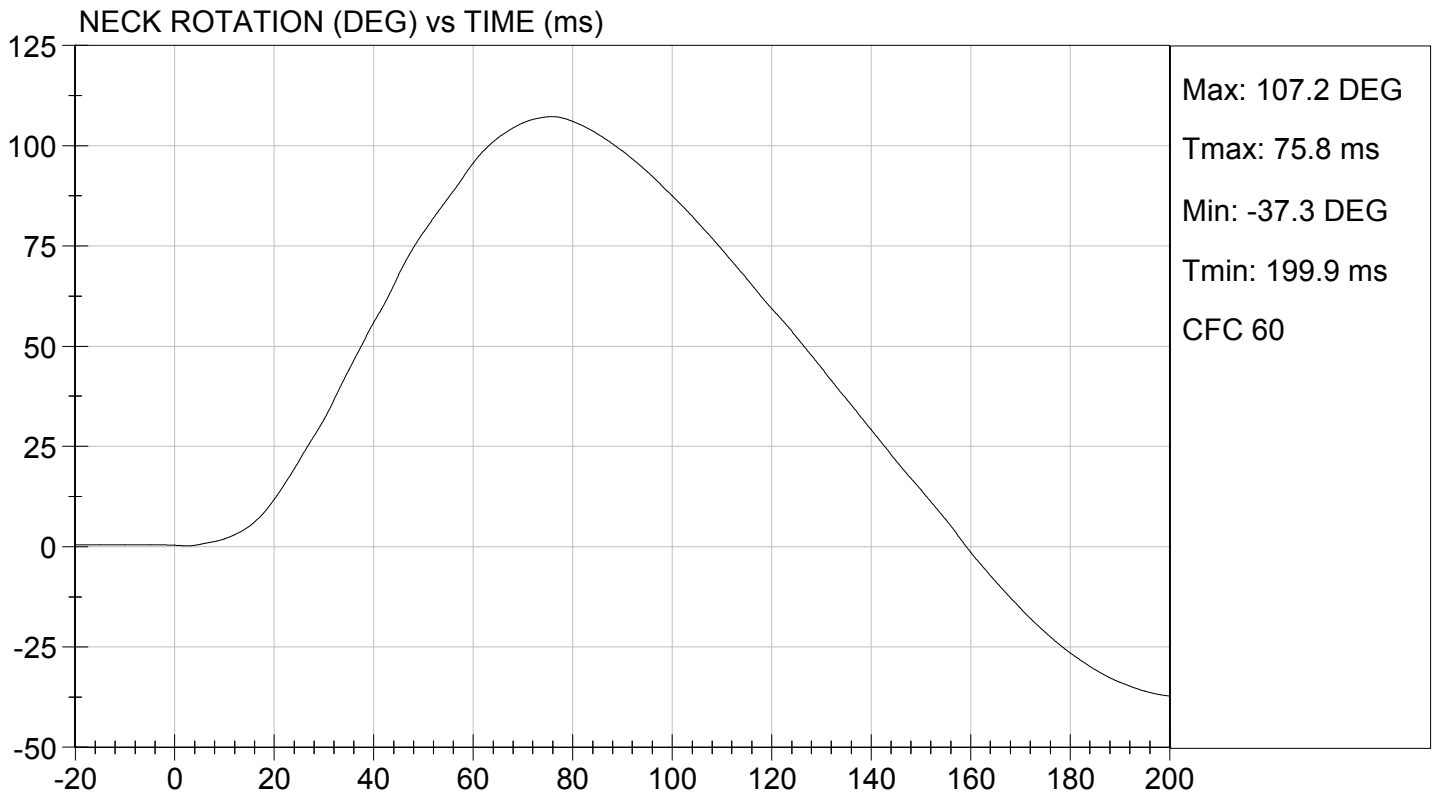
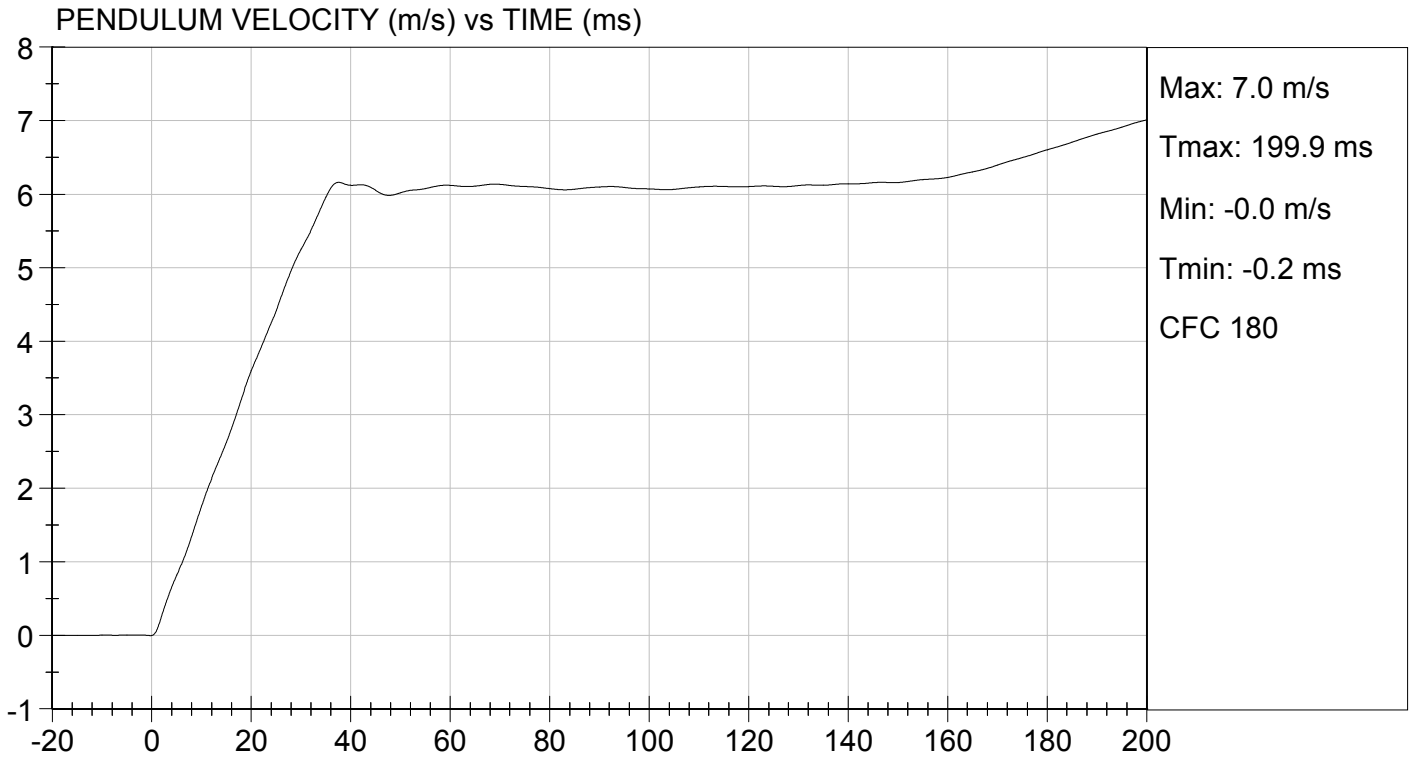
Test I.D: D134273

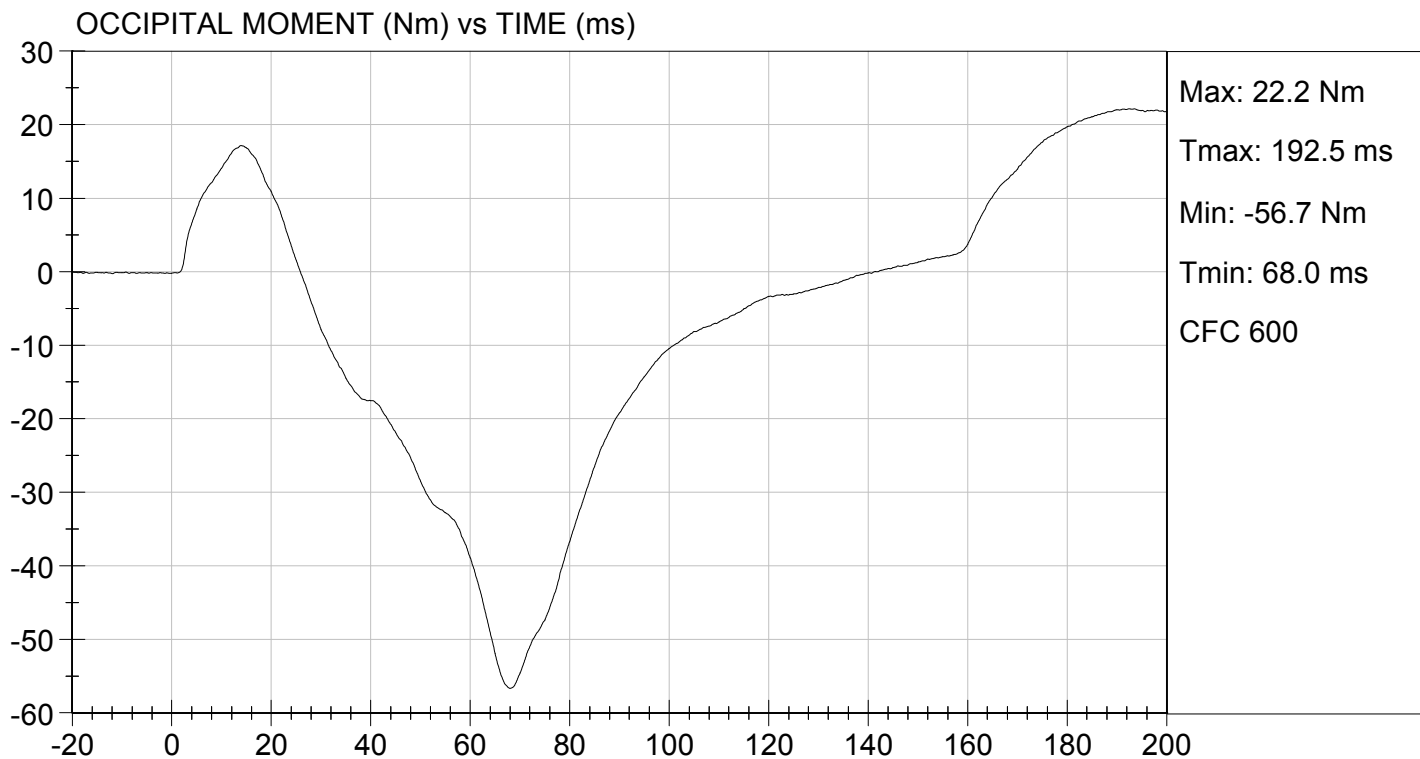
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	11	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	99	Pass
Overall Results					Pass

Jessica Gall
Laboratory Technician

12/16/2013
Test Date

David Winkelbauer
Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D134274

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	12	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	56	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4269	Pass
Internal Hysteresis	%	69 to 85	74	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4248	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

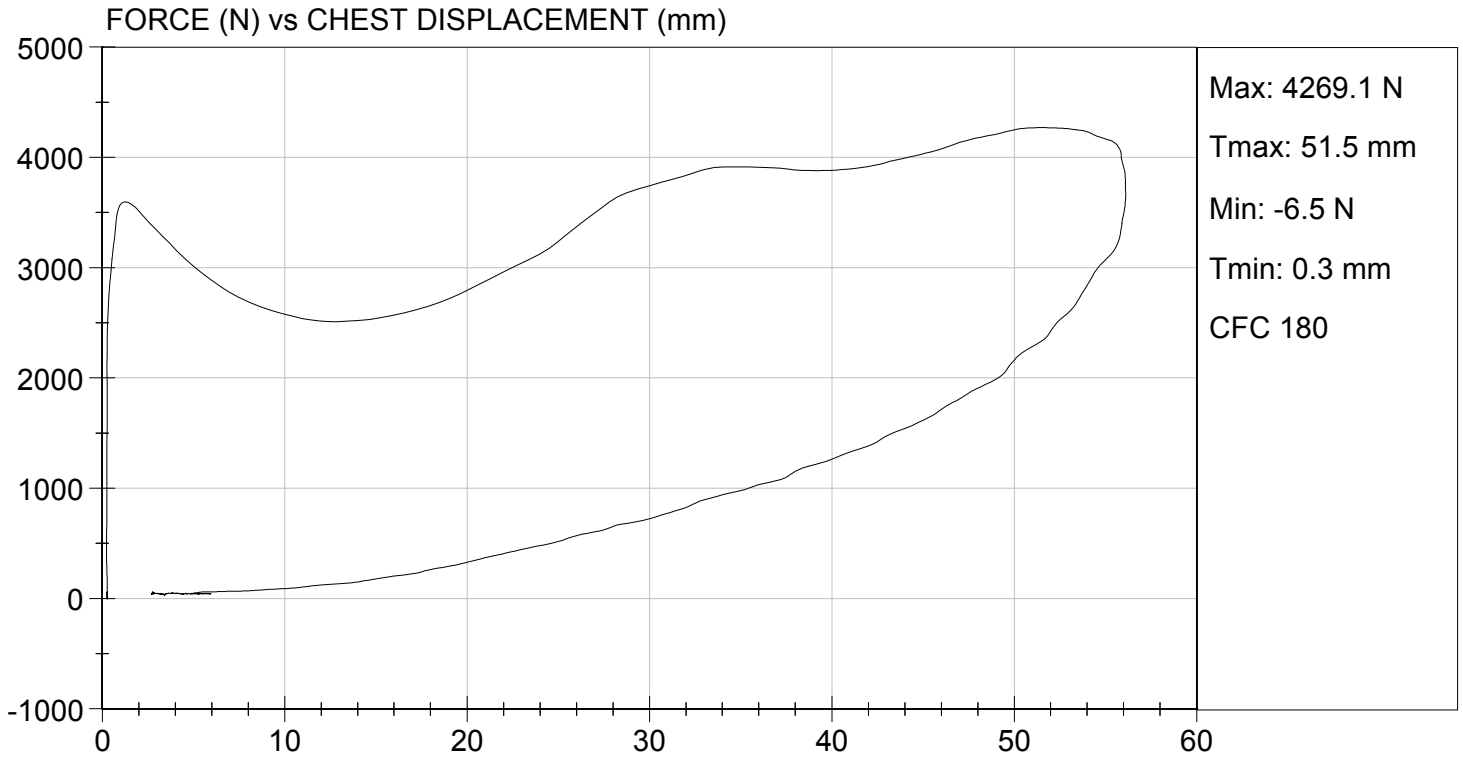
12/16/2013
Test Date

David Winkelbauer
Approved By



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

TEST DATE: 12/16/2013
TEST #: D134274



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

ATD Serial No: 138

Test I.D.: D134275

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	11	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3511	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

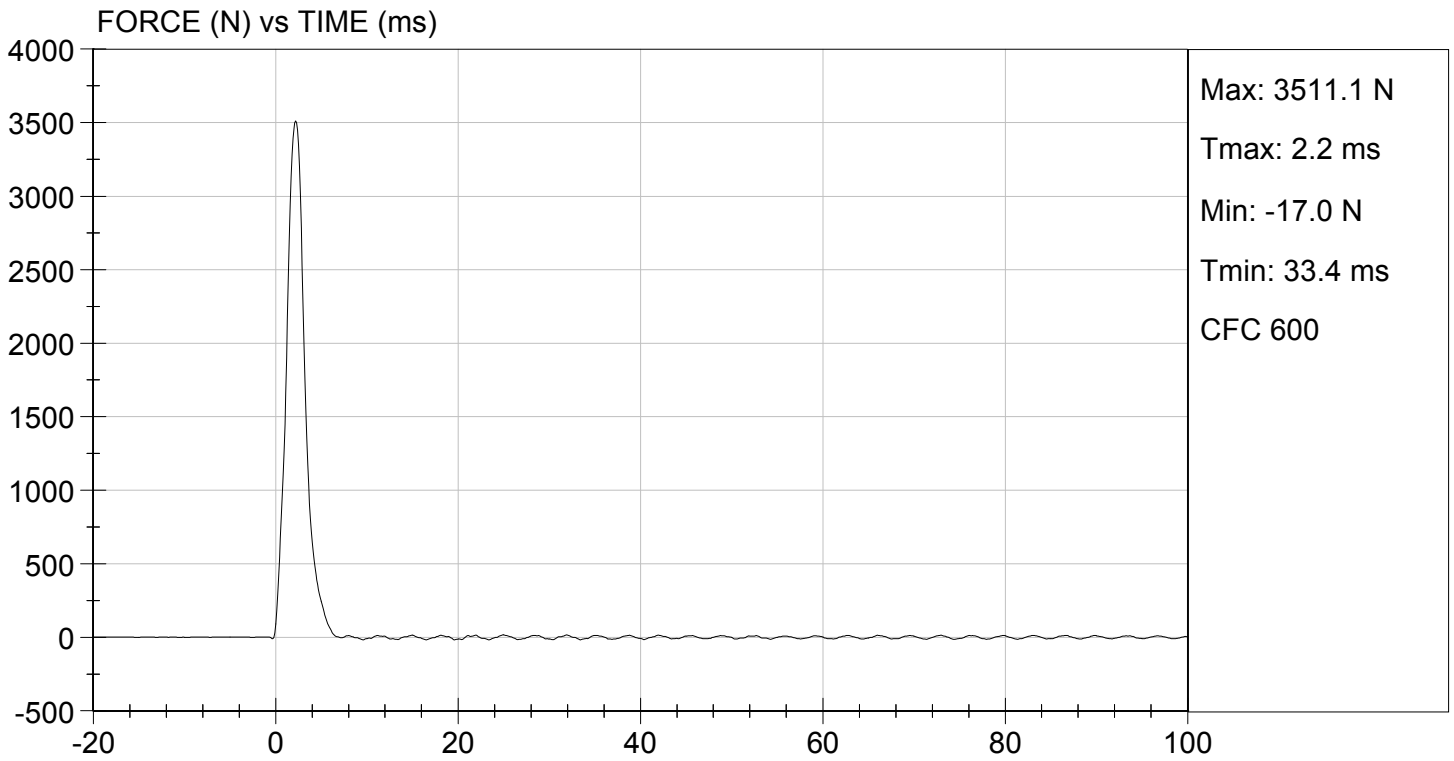
12/16/2013
 Test Date

David Winkelbauer
 Approved By



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

TEST DATE: 12/16/2013
TEST #: D134275



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D134276

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	11	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3630	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

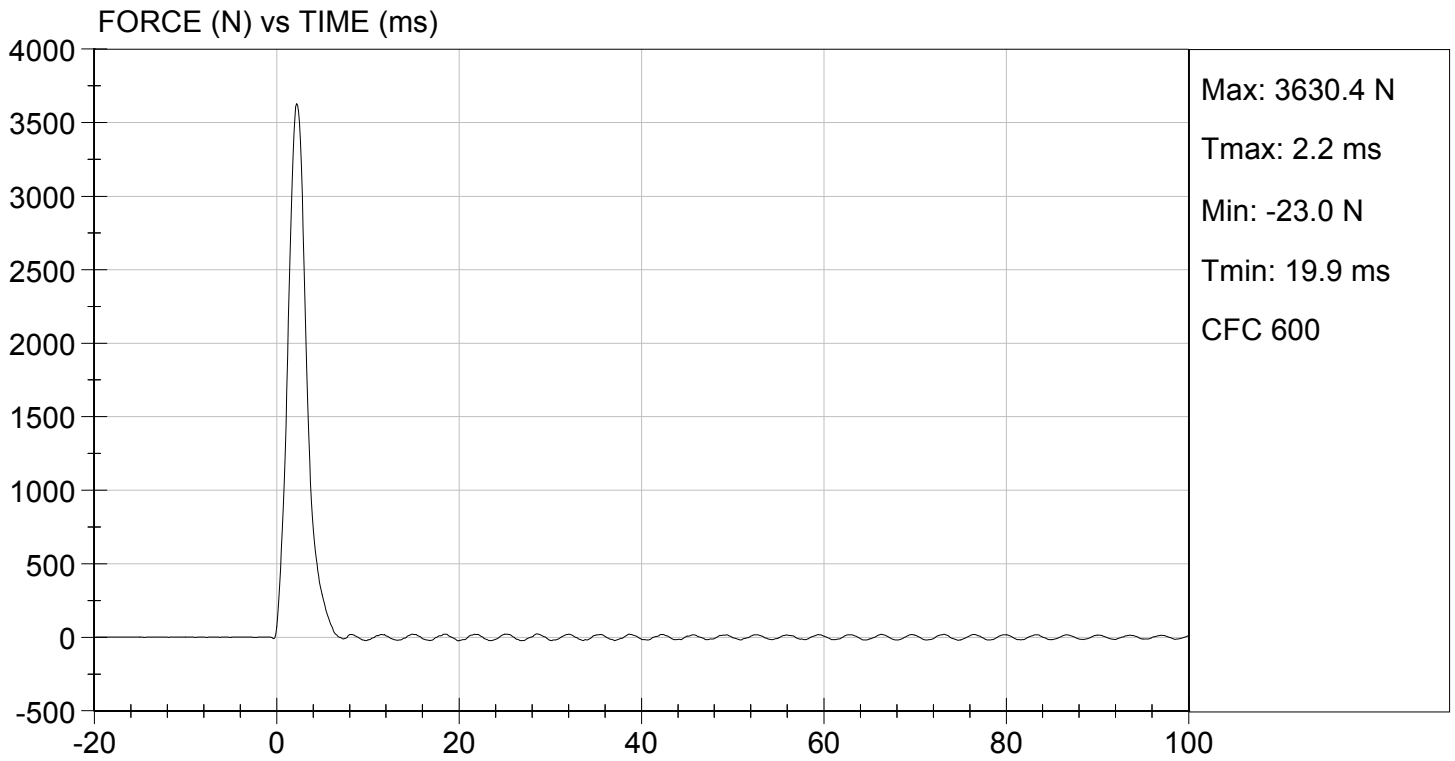
12/16/2013
Test Date

David Winkelbauer
Approved By



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

TEST DATE: 12/16/2013
TEST #: D134276



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D134277

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	12	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	373	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass

Jessica Gall
 Laboratory Technician

12/16/2013
 Test Date

David Winkelbauer
 Approved By