REPORT NUMBER: NCAP-KAR-13-018

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

VOLKSWAGEN DE MEXICO S.A. DE C.V.
2013 VOLKSWAGEN BEETLE 2-DOOR COUPE

NHTSA NUMBER: QD5800

PREPARED BY:
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DECEMBER 10, 2012

FINAL REPORT

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY PERFORMANCE STANDARDS
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE, SE
ROOM W43/410
WASHINGTON, DC 20590

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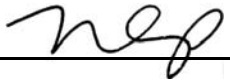
Reviewed By: 

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Approval Date: December 10, 2012

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 DOCUMENTATON PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NCAP-KAR-13-018		

4. Title and Subtitle
Final Report of New Car Assessment Program Testing of a
2013 Volkswagen Beetle 2-Door Coupe
NHTSA No. QD5800

5. Report Date
December 10, 2012

6. Performing Organization Code
KAR

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TR-P33001-03-NC

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10. Work Unit No.

11. Contract or Grant No.
DTNH22-12-D-00259

12. Sponsoring Agency Name and Address
U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
1200 New Jersey Ave., SE, Room W43-410
Washington, D.C. 20590

13. Type of Report and Period Covered
Final Test Report, Nov. 27 - Dec.10, 2012

14. Sponsoring Agency Code
NVS-111

15. Supplementary Notes

16. Abstract

A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2013 Volkswagen Beetle 2-door coupe in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on November 27, 2012.

The impact velocity of the vehicle was 56.82 km/h and the ambient temperature at the barrier face at the time of impact was 19.1 deg. C. The target vehicle's post-test maximum crush was 262 mm at the vehicle's centerline. The test vehicle's performance is as follows:

Measurement Description	Units	Driver ATD		Passenger ATD	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC_{15})	N/A	700.0	256.3	700.0	404.2
Maximum Chest Compression	mm	63	-24	52	-19
Nij	N/A	1	0.22	1	0.39
Neck Tension	N	4170	1009.2	2620	898.1
Neck Compression	N	4000	-475.4	2520	-522.8
Left Femur Force	N	10008	-1870.5	6805	-1758.8
Right Femur Force	N	10008	-2855.6	6805	-1309.9

17. Key Words
35 mph Frontal Barrier Impact Test
New Car Assessment Program (NCAP)

18. Distribution Statement
Copies of this report are available from:
National Highway Traffic Safety Administration
Technical Information Services Division, NPO-411
1200 New Jersey Ave., SE
Washington, DC 20590
e-mail: tis@nhtsa.dot.gov
FAX: 202-493-2833

19. Security Classification of this report	20. Security Classification of this page	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	134	

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program, sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-12-D-00259. 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 test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure, dated September, 2012.

SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2013 Volkswagen Beetle 2-door coupe at a velocity of 56.82 km/h. The test was performed at KARCO Engineering, LLC. on November 27, 2012. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

Three (3) real-time cameras and sixteen (16) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of 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 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 force transducers, right / left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 034) and the right-front passenger (position 2) ATD (Serial No. 141) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 134 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100% 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 test vehicle was 262 mm located at the vehicle's centerline. 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 ATD's head contacted the airbag and the headrest. The upper torso contacted the airbag. Both the left and right knees contacted the knee bolster and steering column.

The passenger's visible contact points were as follows: The passenger ATD's head contacted the airbag and the headrest. The upper torso contacted the airbag. Both the left and right knees contacted the glove box.

The occupant data is summarized below:

ATD Position	HIC_{15}	T^1	T^2	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	256.3	68.1	83.1	-24	0.22	1009.2	-475.4	-1870.5	-2855.6
Passenger (5th)	404.2	56.7	71.7	-19	0.39	898.1	-522.8	-1758.8	-1309.9

SECTION 2

DATA SHEETS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in^2	kPa	6.895
Temperature	General Use	^oF	^oC	=(Tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	QD5800
Model Year	2013
Make	Volkswagen
Model	Beetle
Body Style	2-Door Coupe
VIN	3VWJP7ATXDM601806
Body Color	Yellow Rush
Odometer Reading (km / mi)	74 / 46
Engine Displacement (L)	2.5
Type / No. of Cylinders	Inline 5
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Front
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System	Yes
Power Steering	Yes
Power Window Auto-Reverse	No
Driver Frontal Airbag	Yes
Driver Curtain Airbag	No
Driver Head/Torso Airbag	Yes
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	No
Front Pass. Head/Torso Airbag	Yes
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	No
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Seat Belt Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	None

Does Owner's Manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen De Mexico S.A. De C.V.
Date of Manufacture	Jul-12

GVWR (kg)	1780
GAWR Front (kg)	1010
GAWR Rear (kg)	820

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

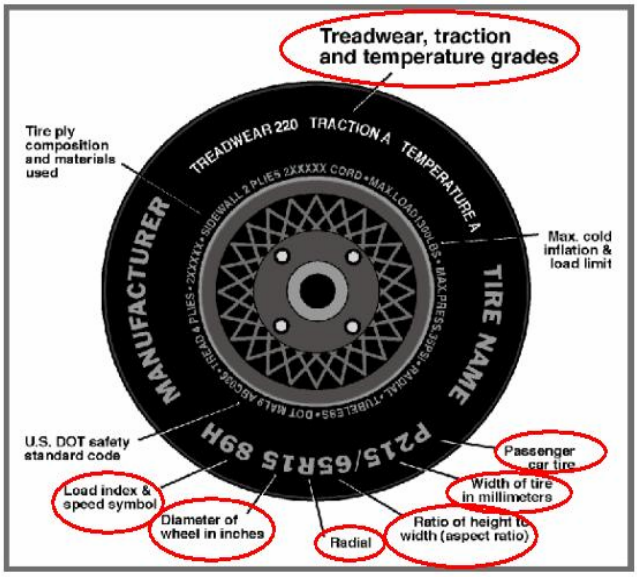
Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Contour			
Designated Seating Capacity	2	2		4	
Capacity Weight (VCW) (kg)				370.0	*A*
DSC x 68.04 (kg)				272.2	*B*
Cargo Weight (RCLW) (kg)				97.8	*A-B*

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	200	200
Recommended Tire Size	215/55R17	215/55R17
Tire Size on Vehicle	215/55R17	215/55R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Optimo H426	Optimo H426
Treadwear	440	440
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 1 Nylon, 2 Steel	1 Polyester, 1 Nylon, 2 Steel
Load Index / Speed Symbol	94H	94H
Tire Material	Polyester, Nylon, Steel	Polyester, Nylon, Steel
DOT Safety Code Left	5MT1 DLH 2012	5MT1 DLH 2012
DOT Safety Code Right	5MT1 DLH 1112	5MT1 DLH 2012

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	437.5	255.0		476.0	348.0	
Right	kg	431.5	257.5		442.0	349.0	
Ratio	%	62.9%	37.1%	100.0%	56.8%	43.2%	100.0%
Total	kg	869.0	512.5	1381.5	918.0	697.0	1615.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1381.5	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	97.8	C
Calculated Vehicle Target Weight (TVTW)	kg	1620.3	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	700	701	729	718	1246
As Tested	mm	693	691	687	688	1317
Post-Test	mm	695	660	691	684	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2525
Total Vehicle Length at Left Side	mm	3636
Total Vehicle Length at Centerline	mm	4277
Total Vehicle Length at Right Side	mm	3637
Weight of Ballast in Cargo Area	kg	95.6
Weight of Vehicle Components Removed	kg	21.0
Amount of Stoddard Solvent in Fuel Tank	L	51.15

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Spare Tire and Tools (16 kg), Trunk Trim (5 kg)

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test
1	Total Length	4277
2	Total Width	1820
3	Bumper Top Height	541
4	Bumper Bottom Height	420
5	Longitudinal Member Top Height	520
6	Distance Between Longitudinal Members	860
7	Longitudinal Member Width	90
8	Engine Top Height	820
9	Engine Bottom Height	191
10	Engine and Gearbox Width	560
11	Front Bumper to Engine Distance	370
12	Front Shock Absorber Fixing Height	865
13	Bonnet Leading Edge Height	575
14	Front Shock Absorber Fixing Width	1150
15	Front Bumper to Front Axle Distance	880
16	Front Axle to A-Pillar Distance	535
17	A-Pillar to B-Pillar Distance	1171
18	B-Pillar to Rear Axle Distance	825
19	B-Pillar to C-Pillar Distance	750
20	Roof Sill Bottom Height	1295
21	Roof Sill Top Height	1414
22	Floor Sill Bottom Height	180
23	Floor Sill Top Height	355

All measurements in millimeters.

DATA SHEET NO. 2

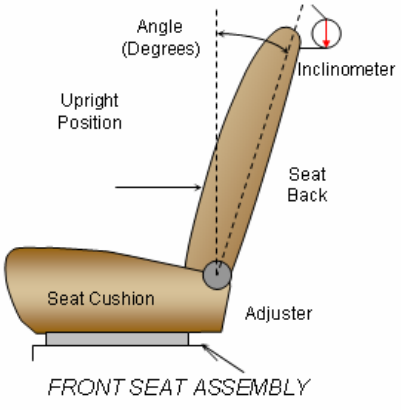
SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at 0° ± 0.5°. Seat back angle is measured at the headrest post using a digital inclinometer.

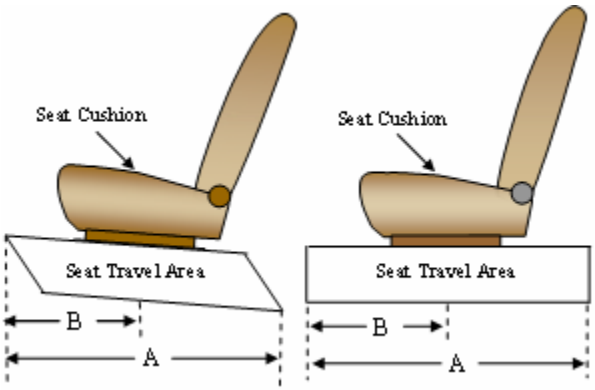


SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	19.0
Passenger Seat Back Angle	15.9

SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is set to the forward most position where the ATD will not contact any interior panels.



SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position
Driver Seat	313 mm	161 mm
Passenger Seat	257 mm	0 mm

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50th percentile adult male ATD for the driver, and a 5th percentile adult female ATD for the passenger. Position "H" is the uppermost position, followed by position "M1". Position "L" is the lowermost position.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	Fixed	Fixed
Passenger Seat	Fixed	Fixed

DATA SHEET NO. 2 … (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

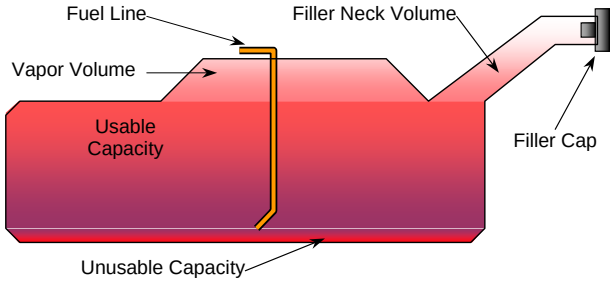
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	55.00
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	50.6 to 51.7
Actual Amount of Stoddard Solvent Used	51.15
1/3 of Usable Capacity	18.33

FUEL PUMP

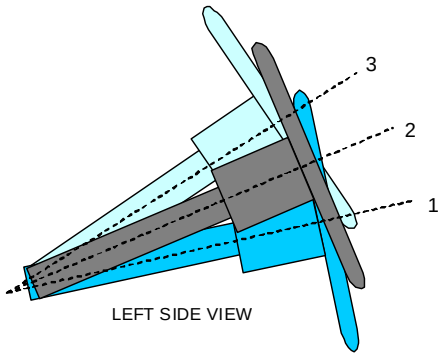
The vehicle is equipped with an electric fuel pump. The fuel pump runs for 2 seconds after the ignition is switched on. If the engine does not run, the fuel pump stops running.



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. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used to measure telescoping steering wheel travel.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

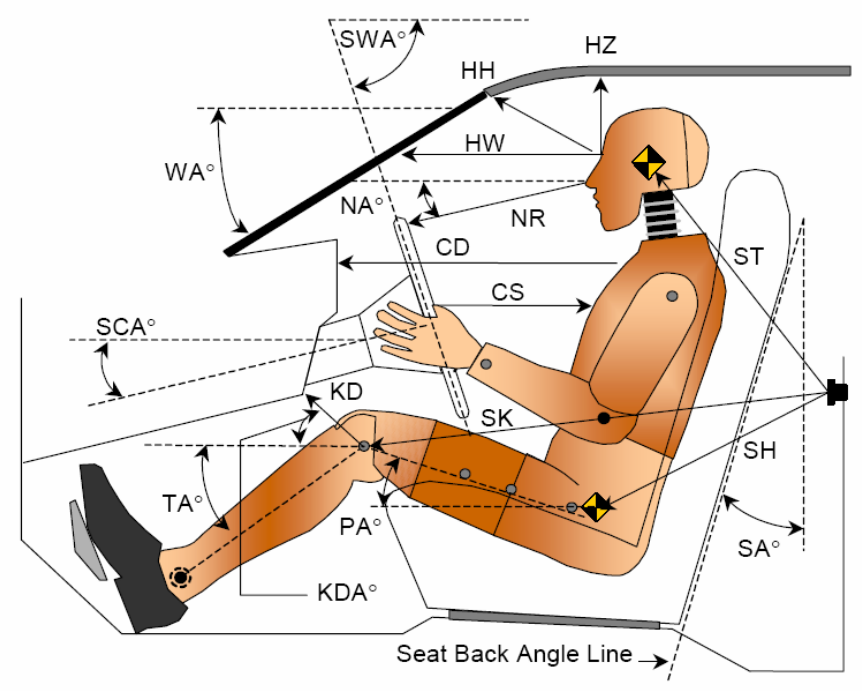
	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.2	95
Geometric Center Position, No. 2	22.6	123
Uppermost Position, No. 3	25.1	150
Telescoping Steering Wheel Travel		55
Test Position	22.6	123

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



LEFT SIDE VIEW

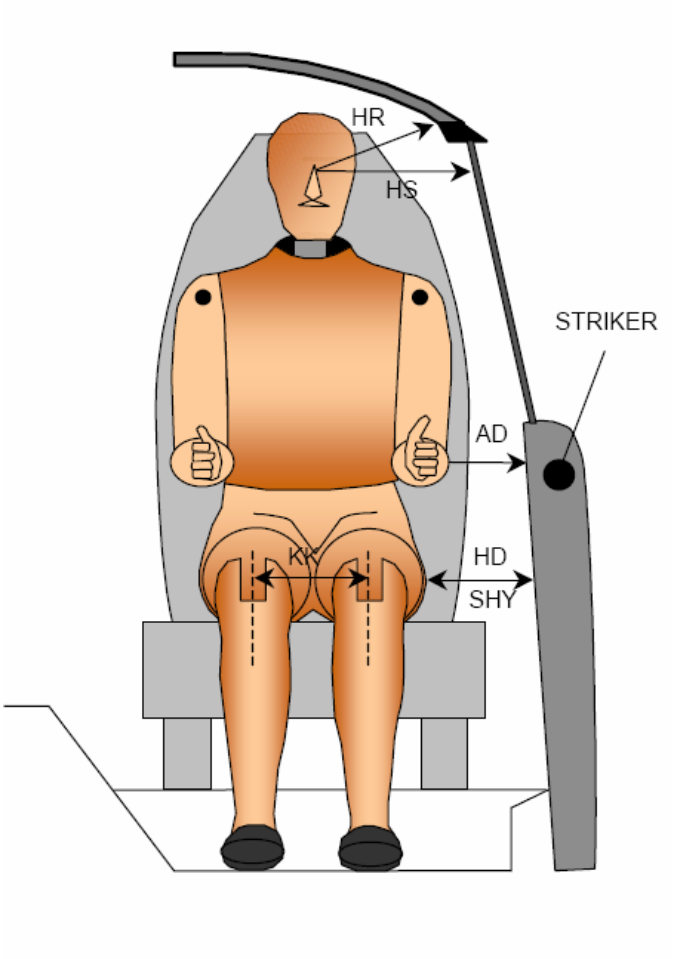
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		30.9		
SWA°	Steering Wheel Angle		67.4		
SCA°	Steering Column Angle		22.6		
SA°	Seat Back Angle (On Headrest Post)		19.0		15.9
HZ	Head to Roof	254	90.0	300	90.0
HH	Head to Header	472	21.9	389	31.3
HW	Head to Windshield	721	0.0	698	0.0
NR	Nose to Rim	415	8.7	427	27.4
CD	Chest to Dash	563	11.6	381	9.1
CS	Chest to Steering Hub	319	0.0		
RA	Rim to Abdomen	228	0.0		
KDL	Left Knee to Dash	220	31.8	127	30.3
KDR	Right Knee to Dash	188	41.0	126	40.9
PA°	Pelvic Angle		21.9		21.5
TA°	Tibia Angle		40.6		52.5
SK	Striker to Knee	810	9.6	912	2.7
ST	Striker to Head	502	53.5	562	37.1
SH	Striker to H-Point	490	28.7	658	18.8

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



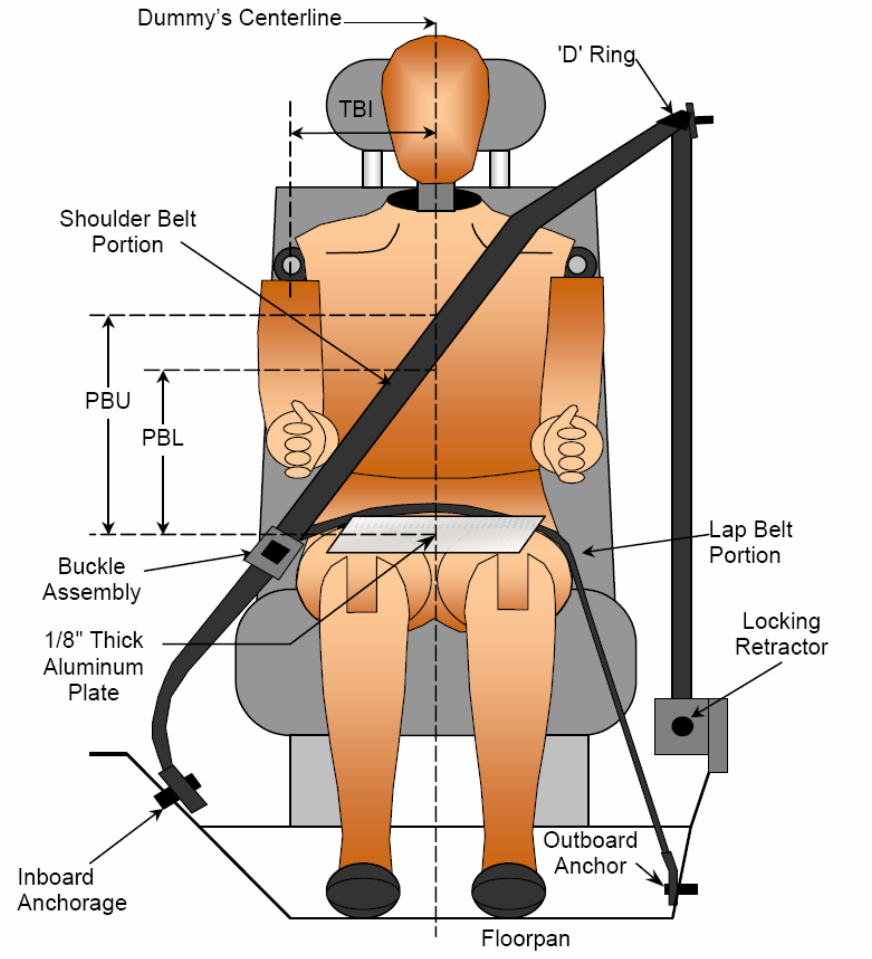
Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	128	114
HD	H-Point to Door	139	187
HR	Head to Side Header	250	287
HS	Head to Side Window	347	360
KK	Knee to Knee	345	224
SHY	Striker to H-Point (Y-Direction)	222	248
AA	Ankle to Ankle	339	167

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Code	Measurement Description	Units	Driver	Passenger
PBU	Top Surface of Aluminum Plate to Belt Upper Edge	mm	390	352
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	300	253

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	1010	1085
Lap Belt Length as Measured on ATD	mm	720	800
Remainder of Belt on Reel	mm	1005	834
Total Belt Length for Continuous Webbing Systems	mm	2735	2719

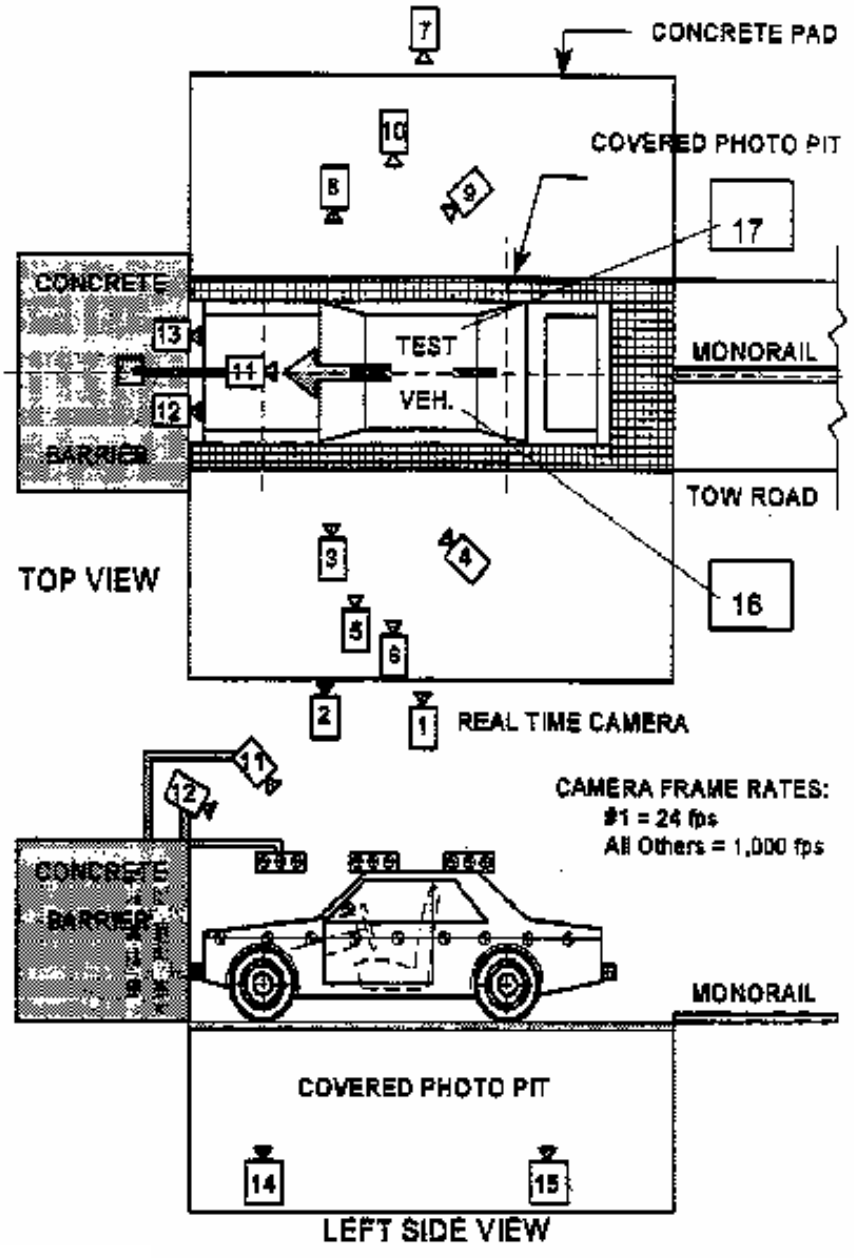
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 … (CONTINUED)

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

CAMERA LOCATIONS

No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Driver Close-Up	-2590	-7950	-1371	24	1000
3	Left Front Half	-1701	-6197	-1701	50	1000
4	Left Angle	-6696	-10308	-3211	ZOOM	1000
5	Steering Column - Top	-1966	-10412	-3688	50	1000
6	Steering Column - Bottom	-1972	-10412	-3379	50	1000
7	Right Overall	-2336	7569	-1012	24	1000
8	Passenger Close-Up	-1733	7581	-1408	50	1000
9	Right Front Half	-1600	8214	-1811	ZOOM	1000
10	Right Angle	-6217	9516	-4830	ZOOM	1000
11	Windshield	-354	0	-5749	12	1000
12	Driver Windshield	297	-366	-2460	12	1000
13	Passenger Windshield	297	366	-2460	24	1000
14	Pit Front	-756	0	1495	12	1000
15	Pit Rear	-3398	0	1495	8	1000
16	Onboard Driver Airbag (Optional)	-1420	300	-1320	12	1000
17	Onboard Passenger Airbag (Optional)	-1420	-300	-1320	12	1000
18	Real-Time Left View of Impact					
19	Real-Time Right View of Impact					

Coordinates: +X = forward impact plane

+Y = right of monorail center

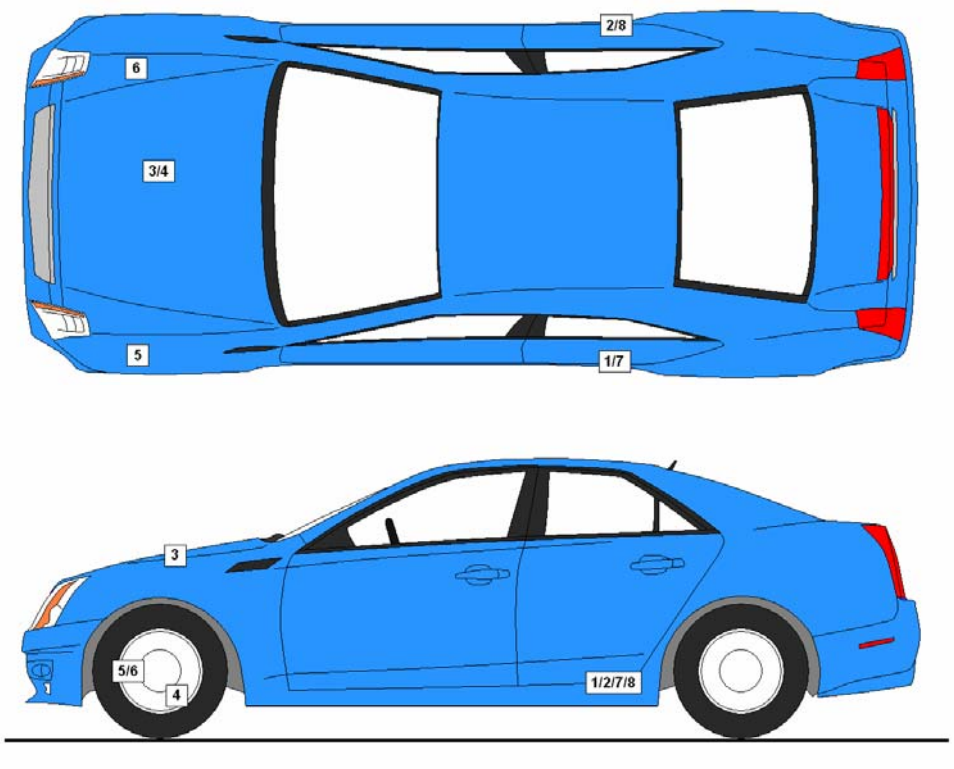
+Z = into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	2000	-720	-385
2	Right Rear Accelerometer X-Direction	2000	720	-385
3	Engine Top X	3620	20	-760
4	Engine Bottom X	3640	100	-200
5	Left Brake Caliper X			
6	Right Brake Caliper X			
7	Left Rear Accelerometer Z-Direction	2000	-720	-385
8	Right Rear Accelerometer Z-Direction	2000	720	-385

Reference Points: X – Rear Surface of Vehicle (+ forward)

Y – Vehicle Centerline (+ to right)

Z – Ground Plane (+ down)

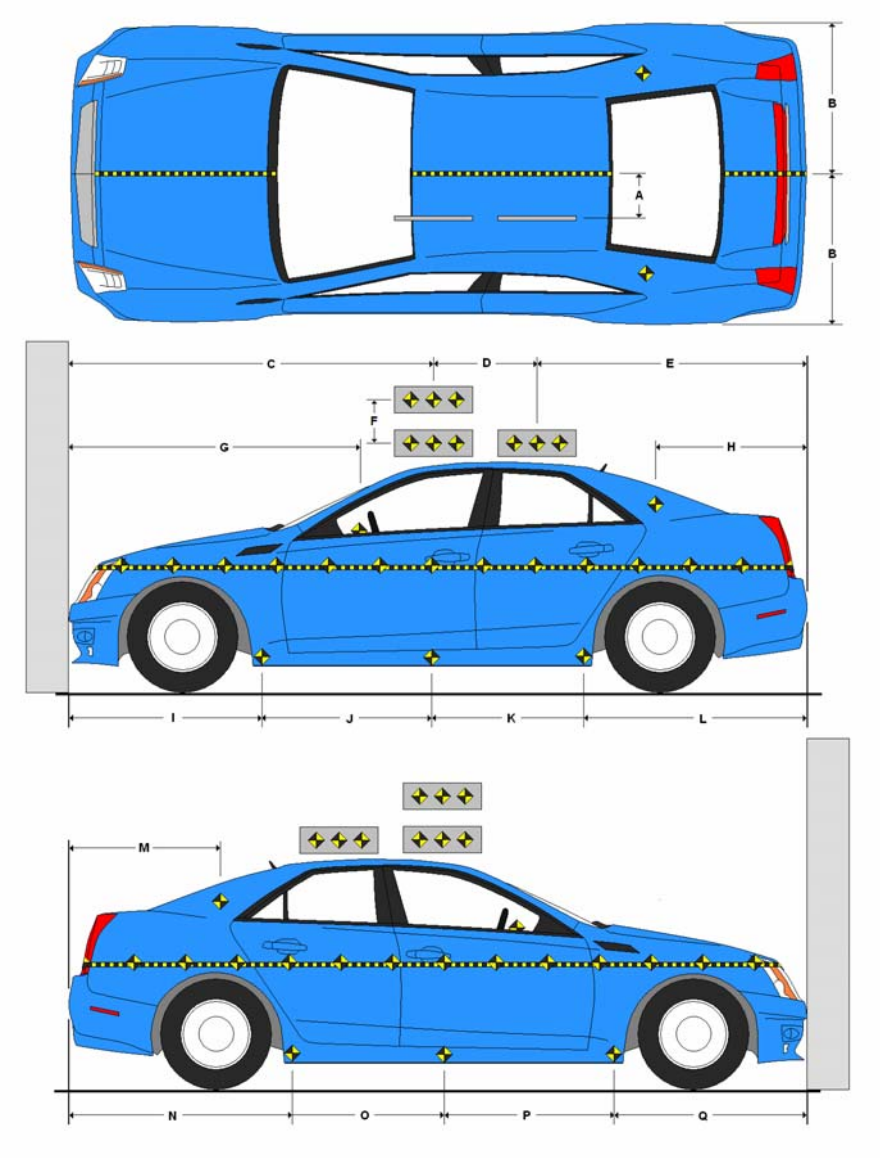
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

Item	Value
A	375
B	910
C	2080
D	610
E	1581
F	305
G	1690
H	804
I	1328
J	828
K	828
L	1297
M	800
N	1297
O	825
P	825
Q	1350



All measurements in millimeters.

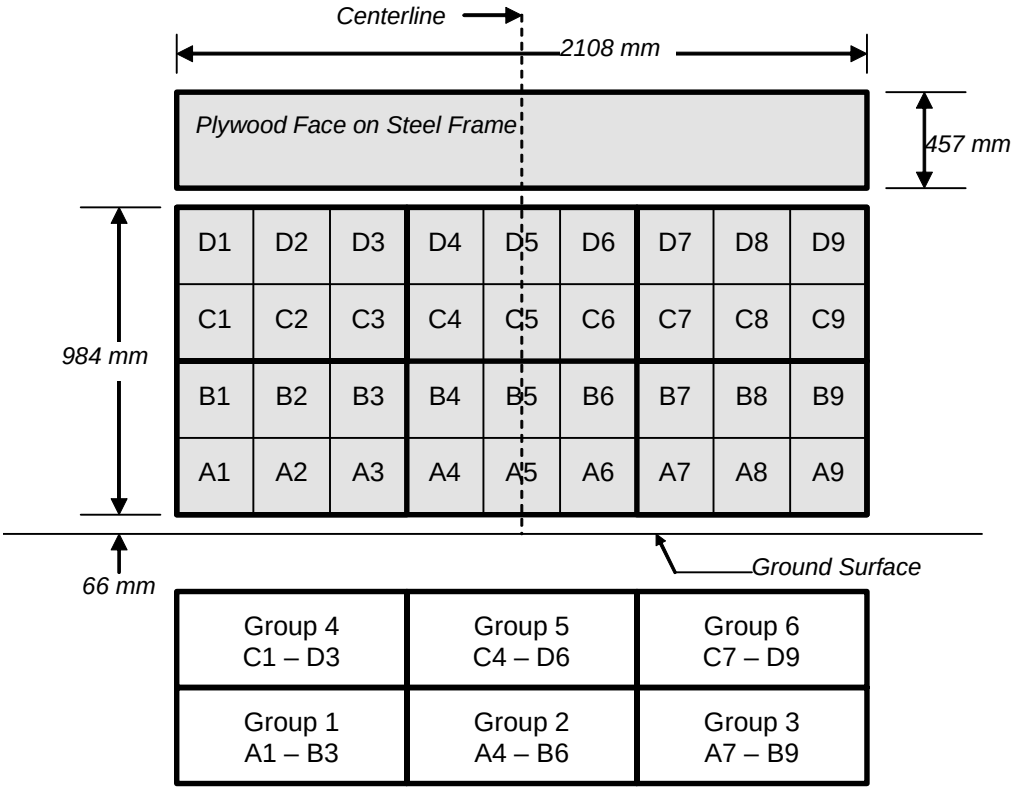
DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

36 Load Cell Rigid Barrier (NHTSA Standard)
Load Cell Locations on Fixed Barrier



6 Groups of 6 Load Cells Each

DATA SHEET NO. 10

TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

INSTRUMENTATION

Driver Dummy Accelerometers	44
Passenger Dummy Accelerometers	44
Vehicle Structure Accelerometers	8
Seat Belt Load Cells	2
Load Cell Barrier	36
Total	134

CAMERA COVERAGE

High-Speed Vehicle On Board	2
High-Speed Off board	14
Real Time	3
Total	19

DATA SHEET NO. 11

POST-TEST OBSERVATIONS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type/Serial No.	P572E 50th Percentile Male ATD / 034	P572O 5th Percentile Female ATD / 141
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster, Steering Column	Glove Box
Right Knee Contact	Knee Bolster, Steering Column	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Track Shift (mm)	16	12
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1740
Center	mm	1765
Right Side	mm	1765
Average	mm	1757

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

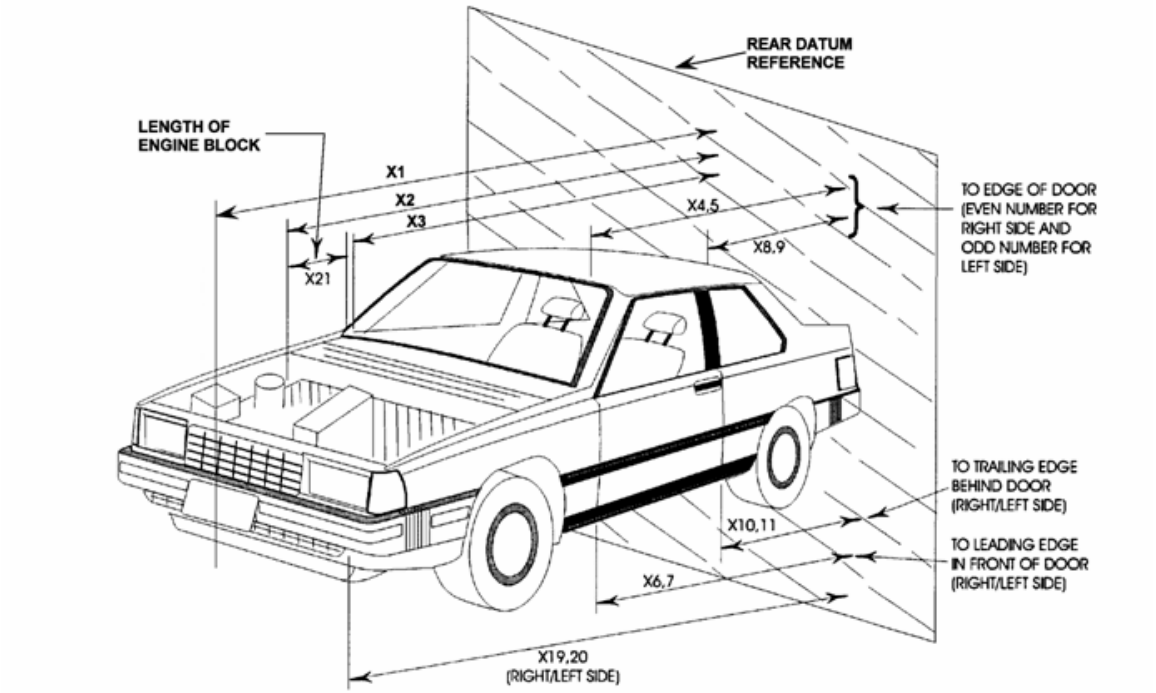
Restraint Type	Driver		Passenger	
	Installed	Operated	Installed	Operated
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 (Head/Torso)	Yes	No	Yes	No
Knee Airbag	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

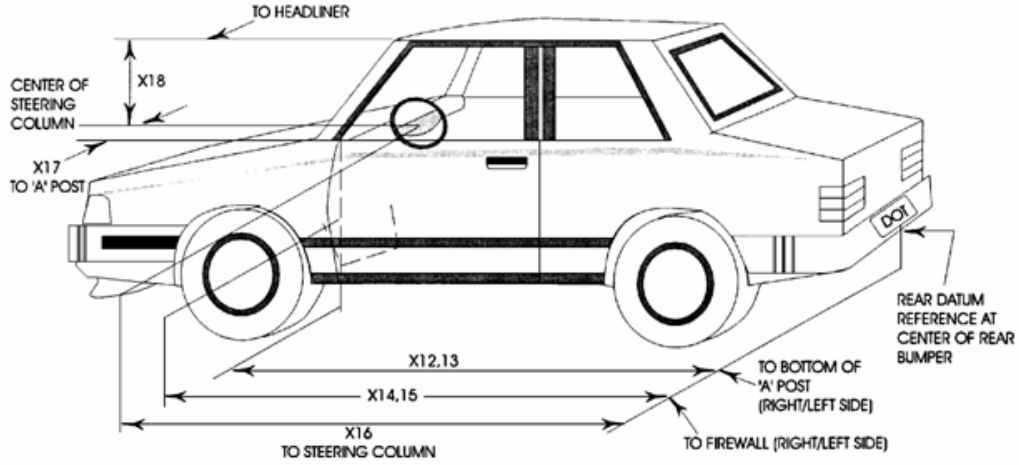
DATA SHEET NO. 12

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12





DATA SHEET NO. 12 … (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4277	4015	-262
2	Rear Surface of Vehicle to Front of Engine	3907	3669	-238
3	RSOV to Firewall	3287	3243	-44
4	RSOV to Upper Leading Edge of Right Door	2865	2878	13
5	RSOV to Upper Leading Edge of Left Door	2860	2867	7
6	RSOV to Lower Leading Edge of Right Door	2885	2885	0
7	RSOV to Lower Leading Edge of Left Door	2882	2884	2
8	RSOV to Upper Trailing Edge of Right Door	1611	1626	15
9	RSOV to Upper Trailing Edge of Left Door	1607	1616	9
10	RSOV to Lower Trailing Edge of Right Door	1703	1702	-1
11	RSOV to Lower Trailing Edge of Left Door	1697	1697	0
12	RSOV to Bottom of A-Pillar, Right Side	2821	2833	12
13	RSOV to Bottom of A-Pillar, Left Side	2821	2820	-1
14	RSOV to Firewall, Right Side	3307	1016	-2291
15	RSOV to Firewall, Left Side	3297	3292	-5
16	RSOV to Steering Column	2410	2514	104
17	Center of Steering Column to A-Pillar	415	404	-11
18	Center of Steering Column to Headliner	405	433	28
19	RSOV to Right Side of Front Bumper	3637	3507	-130
20	RSOV to Left Side of Front Bumper	3636	3572	-64
21	Length of Engine Block	675	675	0
RD	RSOV to Right Side of Dash Panel	2620	2630	10
CD	RSOV to Center of Dash Panel	2590	2593	3
LD	RSOV to Left Side of Dash Panel	2605	2627	22

All measurements in millimeters.

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

VEHICLE INFORMATION

VIN: 3VWJP7ATXDM601806 Wheelbase (mm): 2525

Vehicle Size Category: 2-Door Coupe Test Weight (kg): 1615.0

ACCELEROMETER DATA

Accelerometer Locations: Left Rear Crossmember

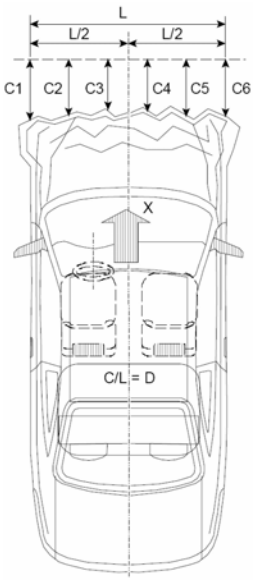
Cal. Procedure/Interval: Drop Test / 6 months

Integration Algorithm: NHTSA Standard Linearity: Good

Impact Velocity (km/h): 56.82

Velocity Change (km/h): 64.8

Time of Separation (msec): 58.3



CRUSH PROFILE

Collision Deformation Classification: 12FDEW1

Midpoint of Damage: Vehicle Centerline

Damage Region Length (mm): 1395

Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	225	409	184
C2	Crush Zone 2 at Left Side	mm	60	276	216
C3	Crush Zone 3 at Left Side	mm	23	263	240
C4	Crush Zone 4 at Right Side	mm	23	266	243
C5	Crush Zone 5 at Right Side	mm	55	294	239
C6	Crush Zone 6 at Right Side	mm	220	430	210
L	C1 to C6	mm	1395		

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

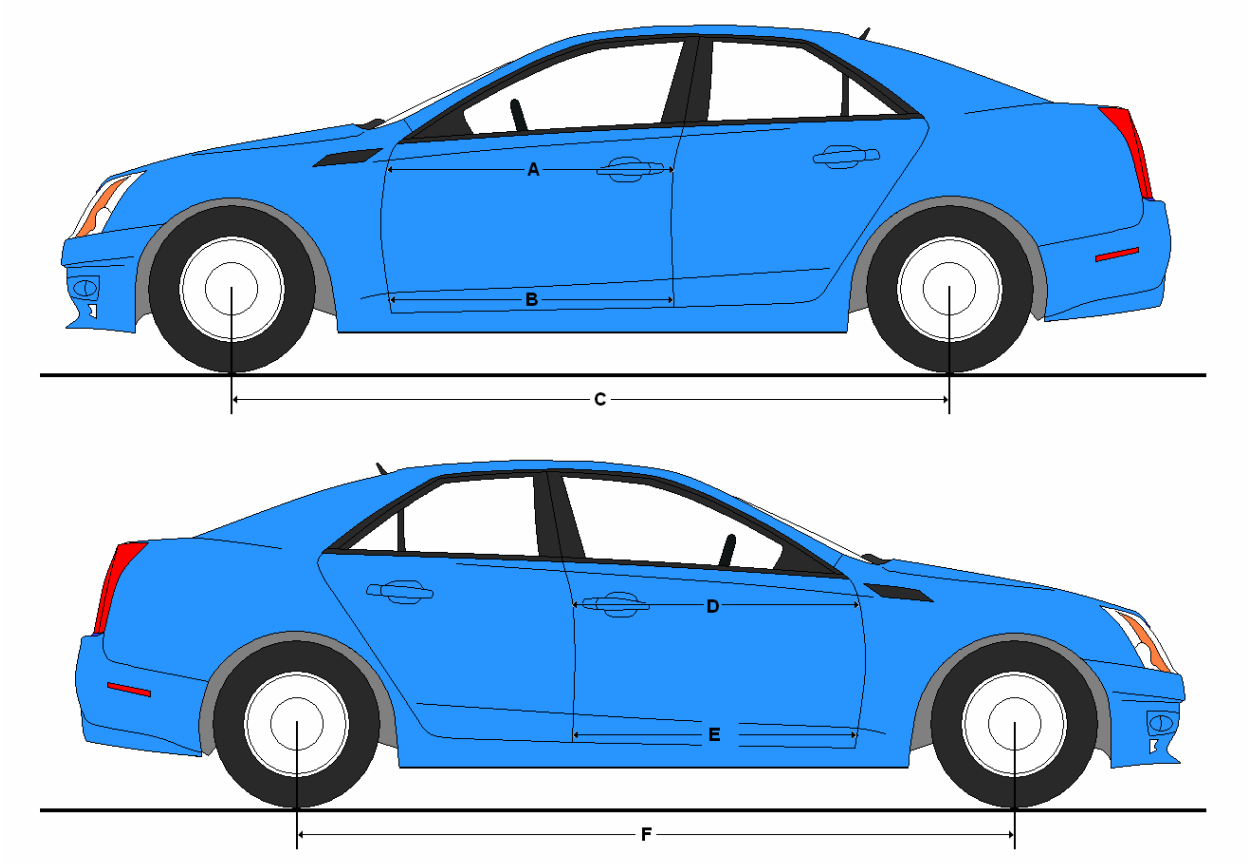
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1171	1167	4
B	Left Side Lower	mm	1073	1074	-1
D	Right Side Upper	mm	1168	1166	2
E	Right Side Lower	mm	1080	1076	4

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2525	2506	19
F	Right Side Wheelbase	mm	2525	2472	53



DATA SHEET NO. 14 … (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

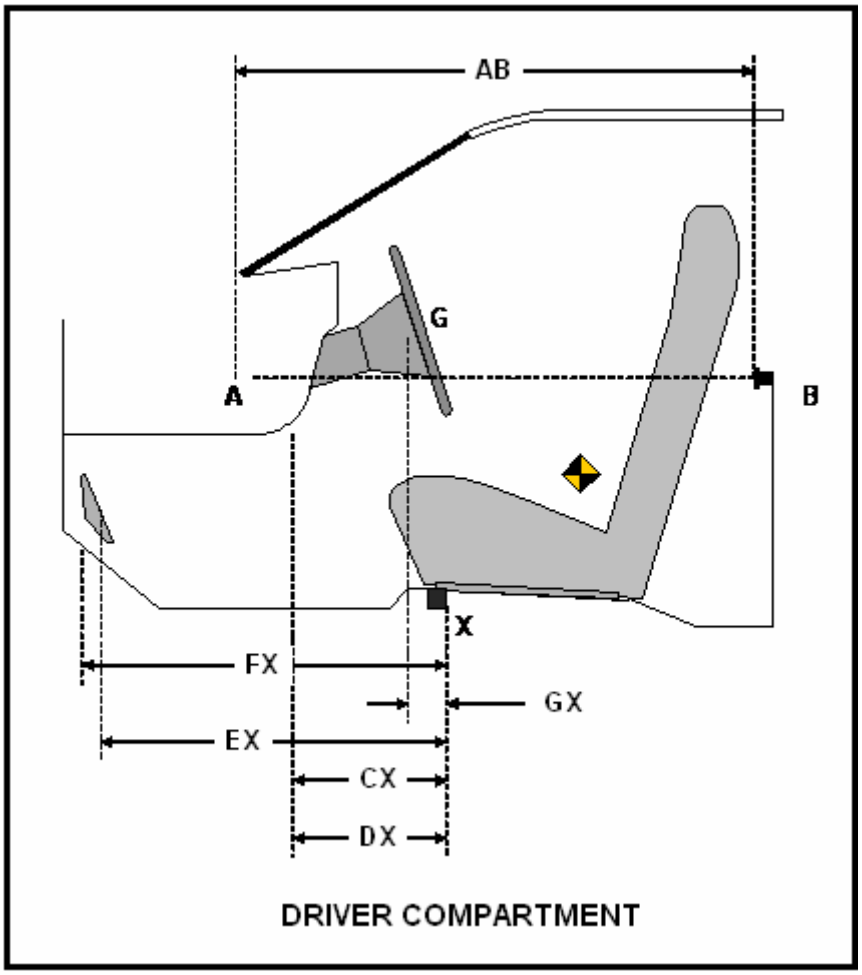
Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	1053	1047	6
CX	Left Knee Bolster to X	mm	260	280	-20
DX	Right Knee Bolster to X	mm	285	265	20
EX	Brake Pedal to X	mm	545	498	47
FX	Foot Rest to X	mm	575	550	25
GX	Center of Steering Wheel Hub to X	mm	30	95	-20

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

SUMMARY OF FMVSS 212 AND 219 (PARTIAL) DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

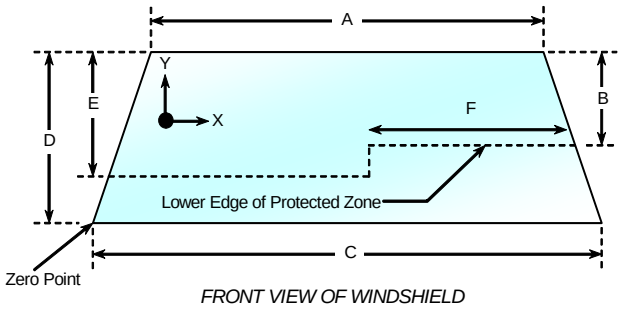
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber cement.

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

Temperature of windshield molding during test: 21.1 ° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2091	2091	100.0%
Right Side	2091	2091	100.0%
Total	4182	4182	100.0%



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1195
B	mm	291
C	mm	1457
D	mm	765
E	mm	362
F	mm	307

AREAS OF PROTECTED ZONE FAILURES

A. Provide Coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield.

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.

X	Y

DATA SHEET NO. 15 … (CONTINUED)

SUMMARY OF FMVSS 212 AND 219 (PARTIAL) DATA

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 19.1° C Test Time: 2:45 PM

Stoddard Solvent Spillage Measurements

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)

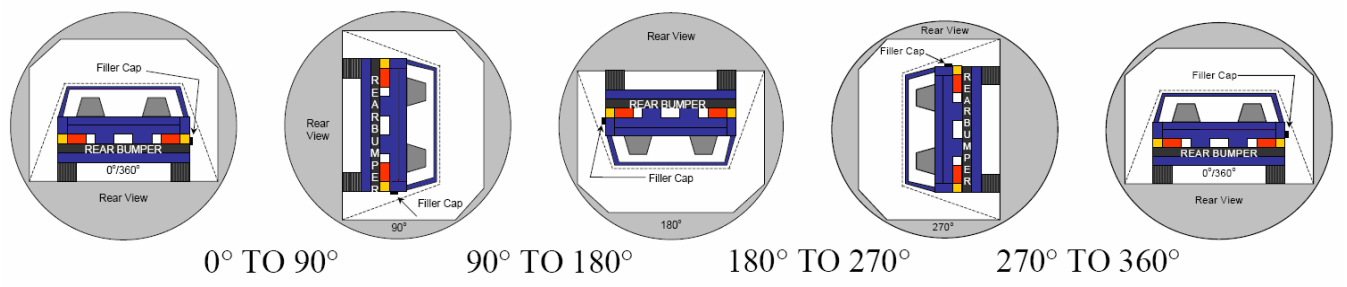
D. Spillage: There was no Stoddard solvent spillage.

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



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: There was no Stoddard solvent spillage.

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	80	300	380
90° To 180°	81	300	381
180° To 270°	78	300	378
270° To 360°	78	300	378

FMVSS 301 SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° To 90°	0			
90° To 180°	0			
180° To 270°	0			
270° To 360°	0			

SOLVENT SPILLAGE LOCATION TABLE

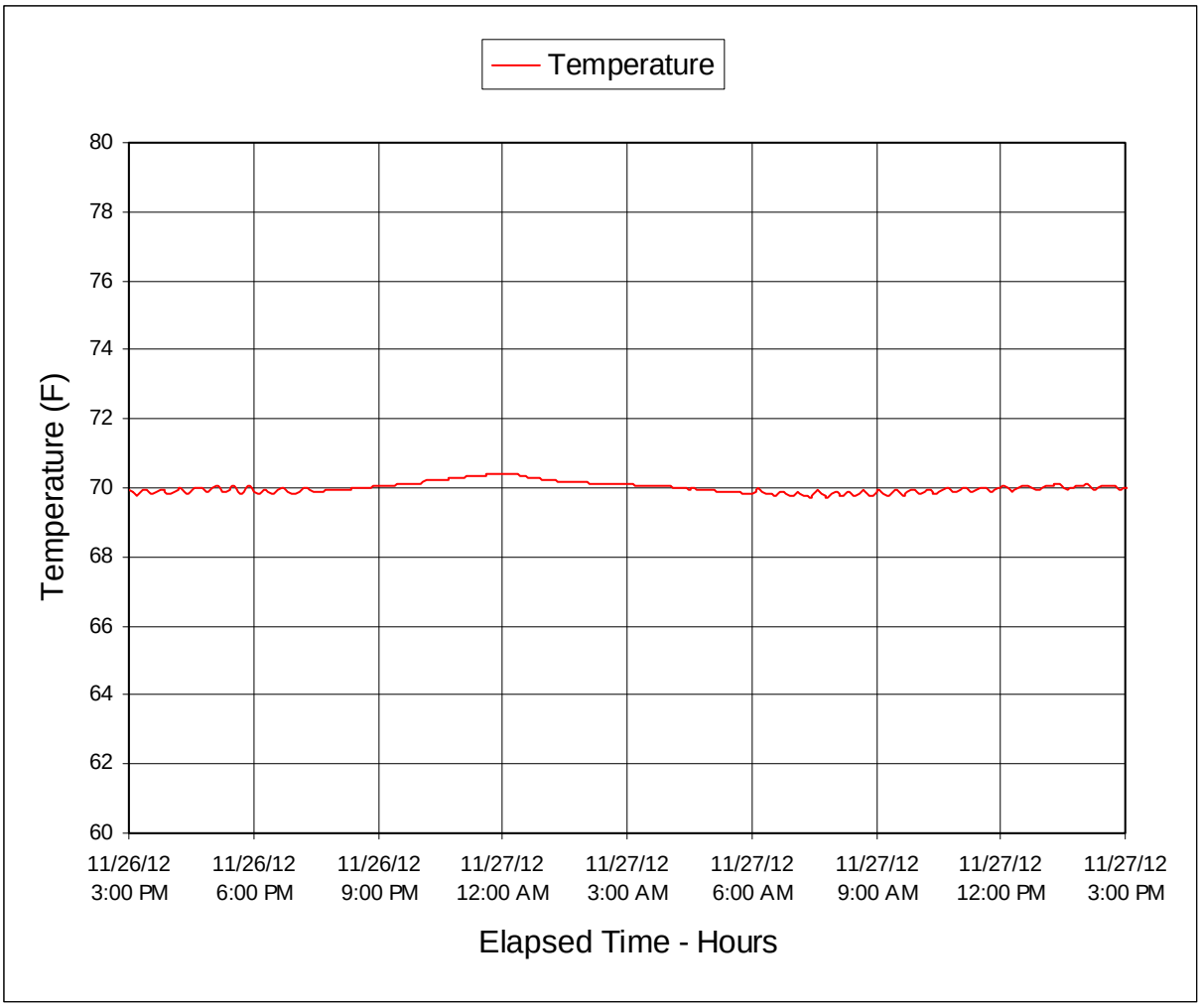
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 17

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2013 Volkswagen Beetle 2-Door Coupe NHTSA No.: QD5800

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 11/27/12



APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS … (CONTINUED)

TABLE OF PHOTOGRAPHS … (CONTINUED)

FIGURE 1. Load Cell Location

FIGURE 2. Load Cell Wall

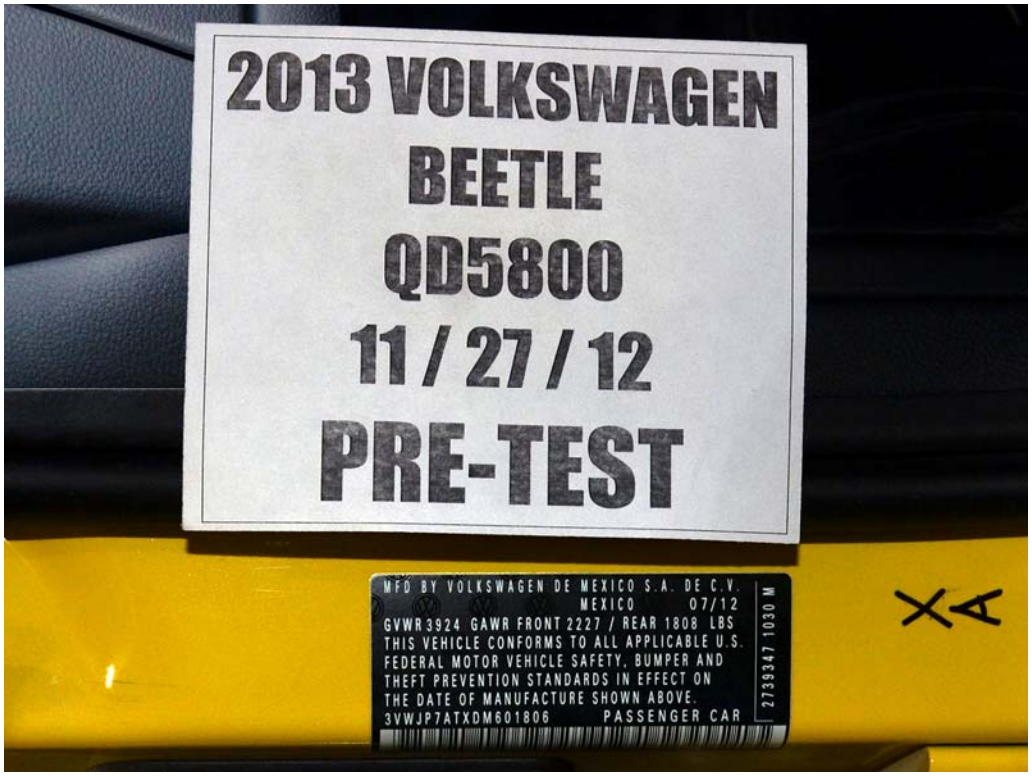


FIGURE 3. Manufacturer's Label

FIGURE 4. Tire Placard

FIGURE 5. 2013 Volkswagen Beetle Frontal As Delivered

FIGURE 6. Left Rear ¾ View, As Received

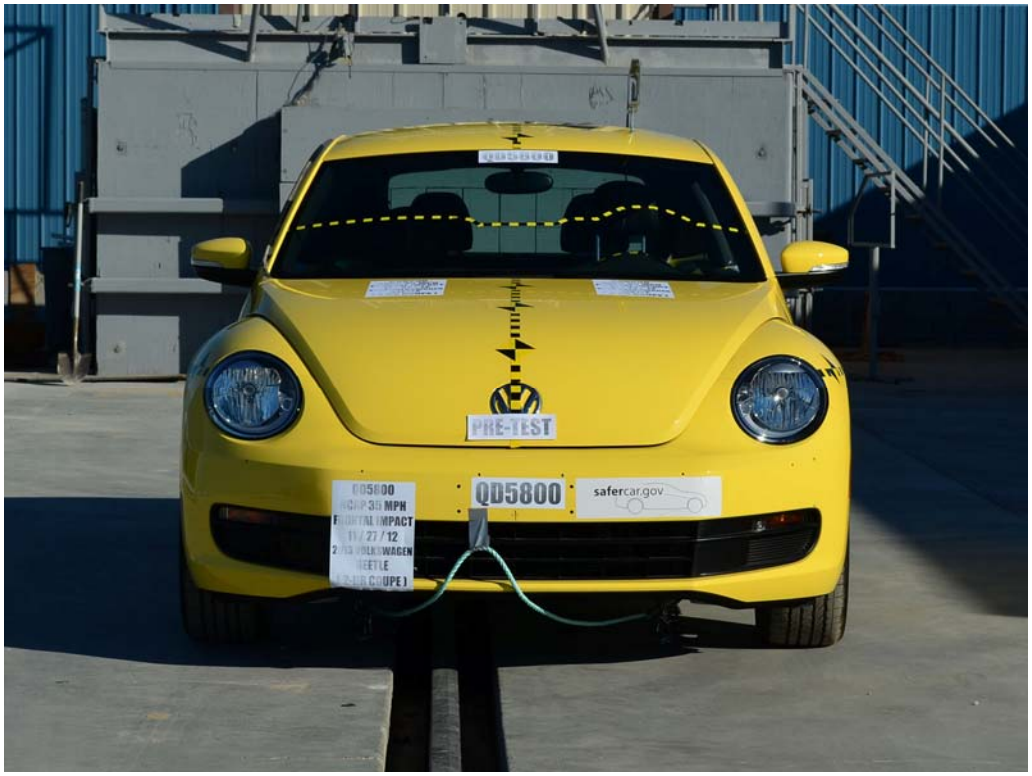


FIGURE 7. Pre-Test Front View of Test Vehicle

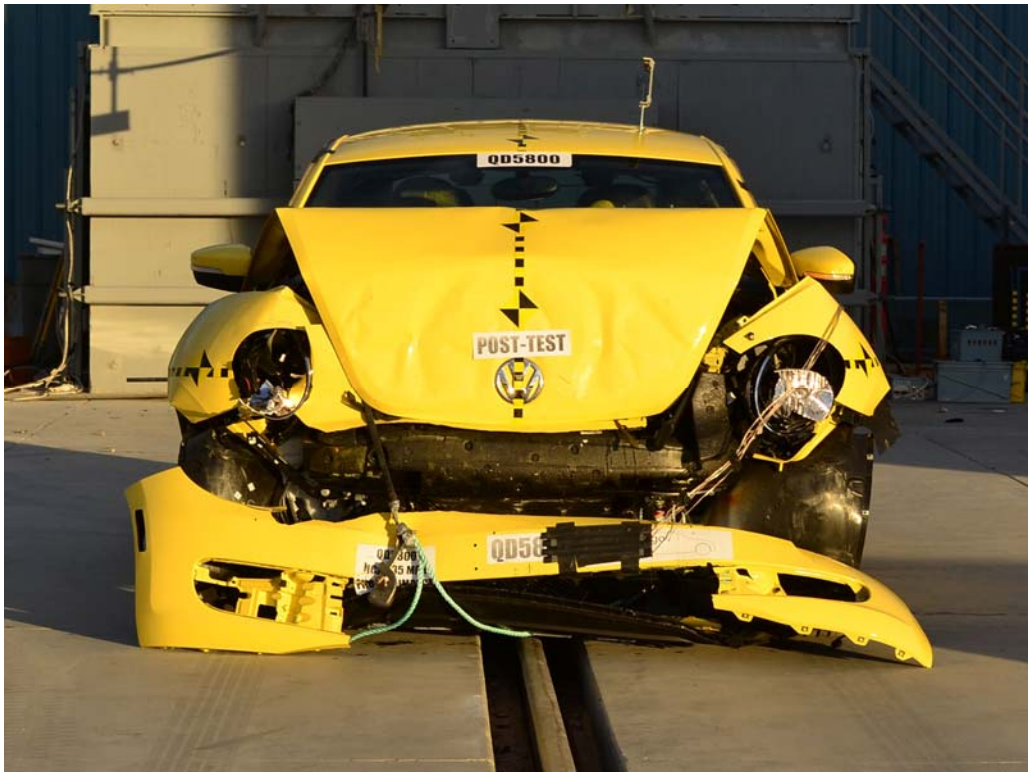


FIGURE 8. Post-Test Front View of Test Vehicle

FIGURE 9. Pre-Test Left View of Test Vehicle

FIGURE 10. Post-Test Left View of Test Vehicle

FIGURE 11. Pre-Test Right View of Test Vehicle

FIGURE 12. Post-Test Right View of Test Vehicle

FIGURE 13. Pre-Test Right Front ¾ View

FIGURE 14. Post-Test Right Front ¾ View

FIGURE 15. Pre-Test Left Rear ¾ View

FIGURE 16. Post-Test Left Rear ¾ View

FIGURE 17. Pre-Test Windshield View

FIGURE 18. Post-Test Windshield View

FIGURE 19. Pre-Test Engine Compartment View

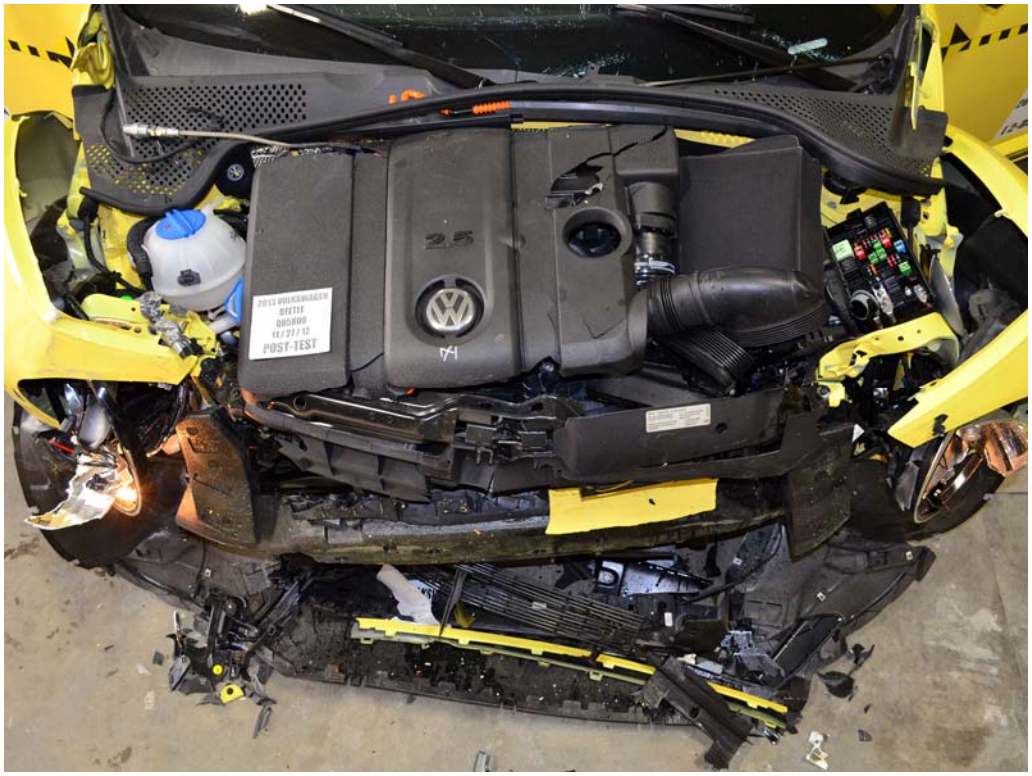


FIGURE 20. Post-Test Engine Compartment View

FIGURE 21. Pre-Test Fuel Filler Cap View

FIGURE 22. Post-Test Fuel Filler Cap View

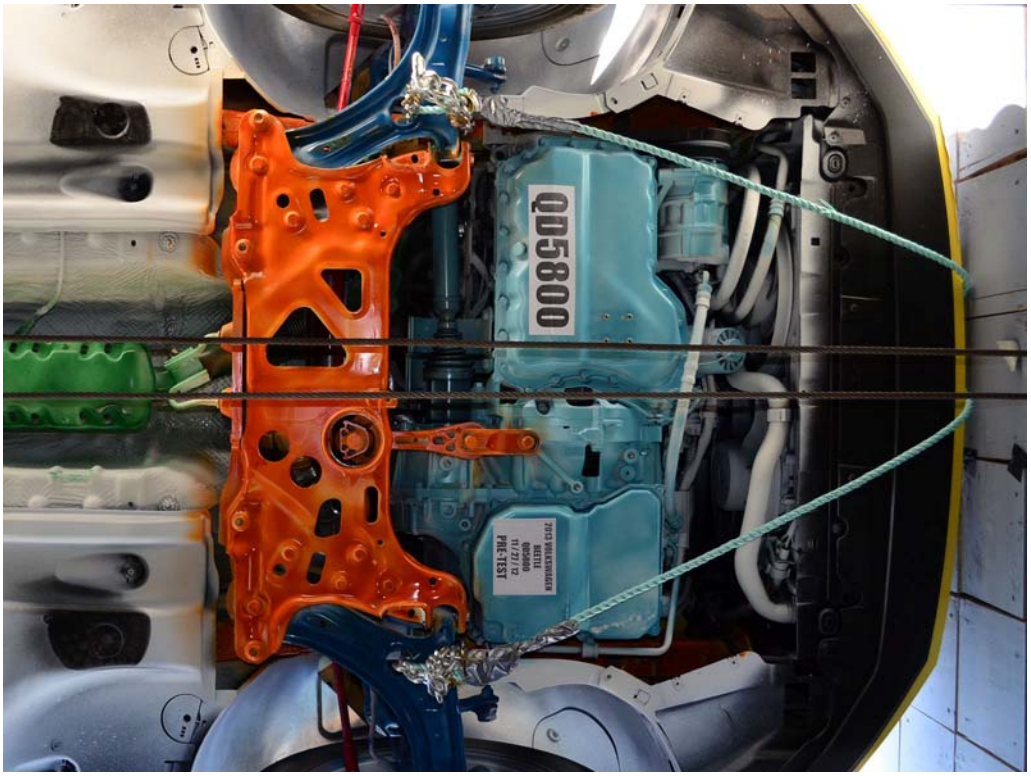


FIGURE 23. Pre-Test Front Underbody View

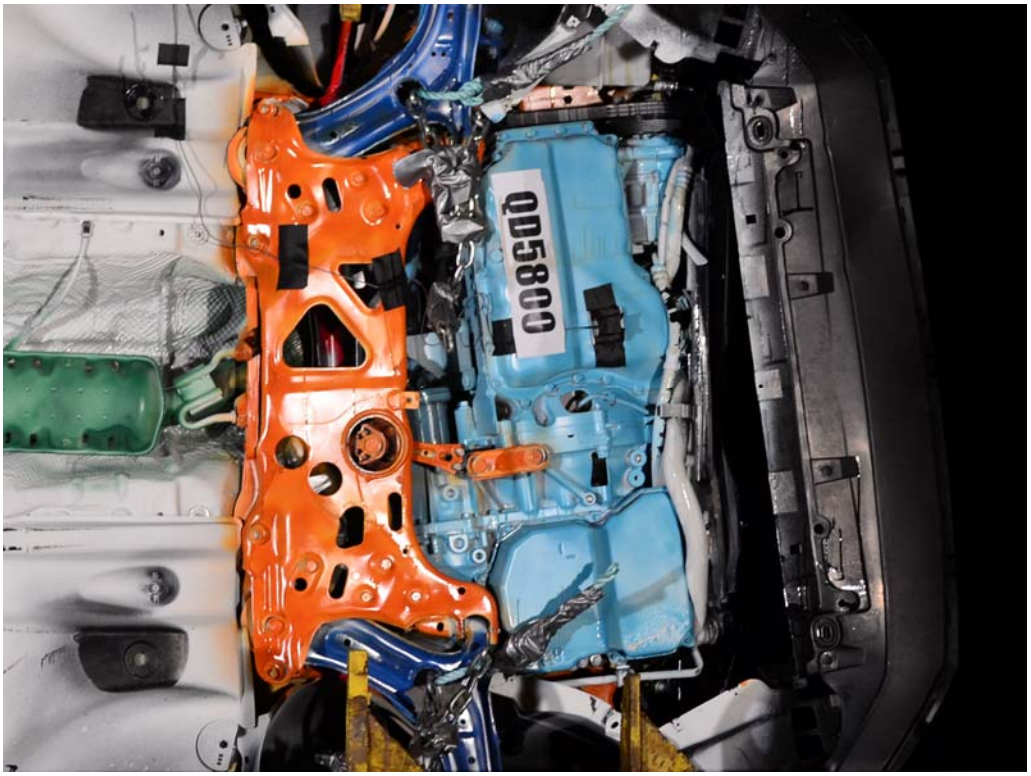


FIGURE 24. Post-Test Front Underbody View

FIGURE 25. Pre-Test Rear Underbody View

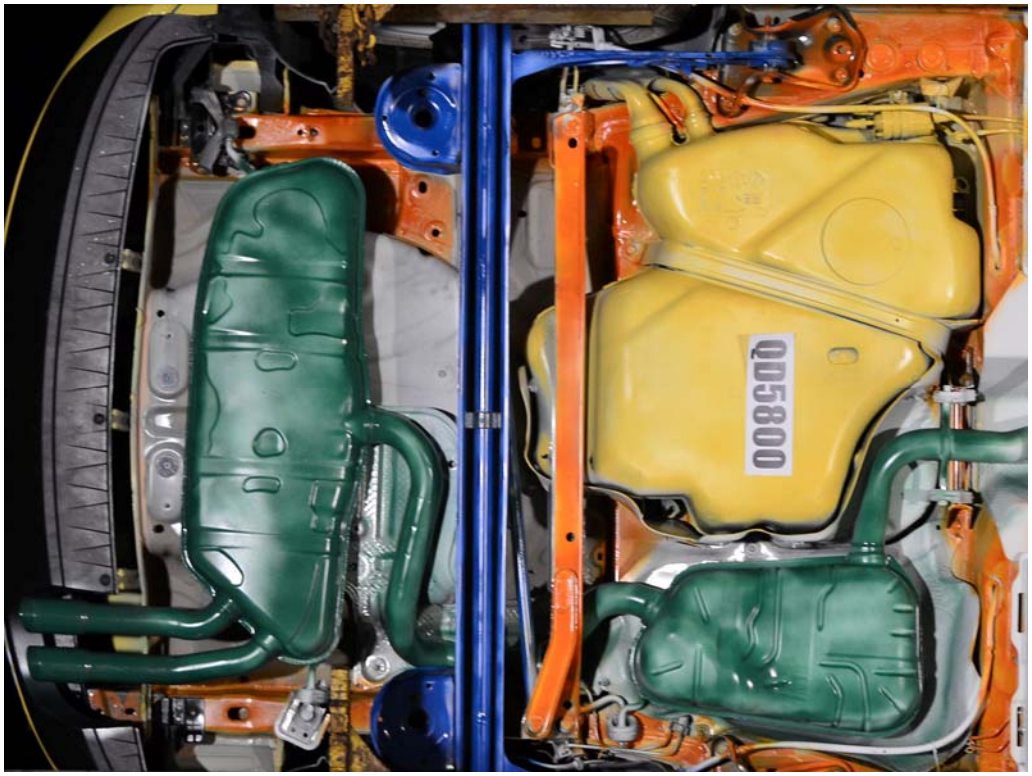


FIGURE 26. Post-Test Rear Underbody View

FIGURE 27. Pre-Test Dummy Cable Routing

FIGURE 28. Post-Test Dummy Cable Routing

FIGURE 29. Pre-Test Driver Dummy Front View

FIGURE 30. Post-Test Driver Dummy Front View

FIGURE 31. Pre-Test Driver Dummy Window View

FIGURE 32. Post-Test Driver Dummy Window View

FIGURE 33. Pre-Test Driver Dummy and Vehicle Interior View

FIGURE 34. Post-Test Driver Dummy and Vehicle Interior View

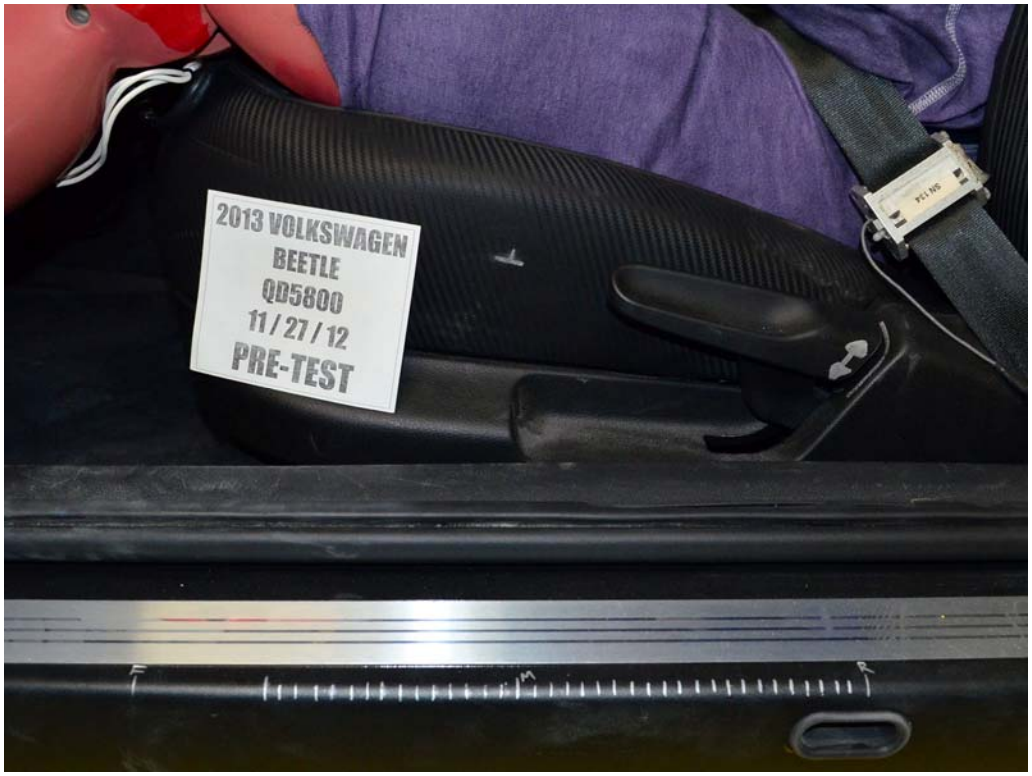


FIGURE 35. Pre-Test Driver's Seat Fore-Aft Markings

FIGURE 36. Post-Test Driver's Seat Fore-Aft Markings

FIGURE 37. Pre-Test View of Belt Anchorage for Driver Dummy

FIGURE 38. Post-Test View of Belt Anchorage for Driver Dummy

FIGURE 39. Pre-Test Driver Dummy Feet

FIGURE 40. Post-Test Driver Dummy Feet

FIGURE 41. Pre-Test Driver's Side Knee Bolster

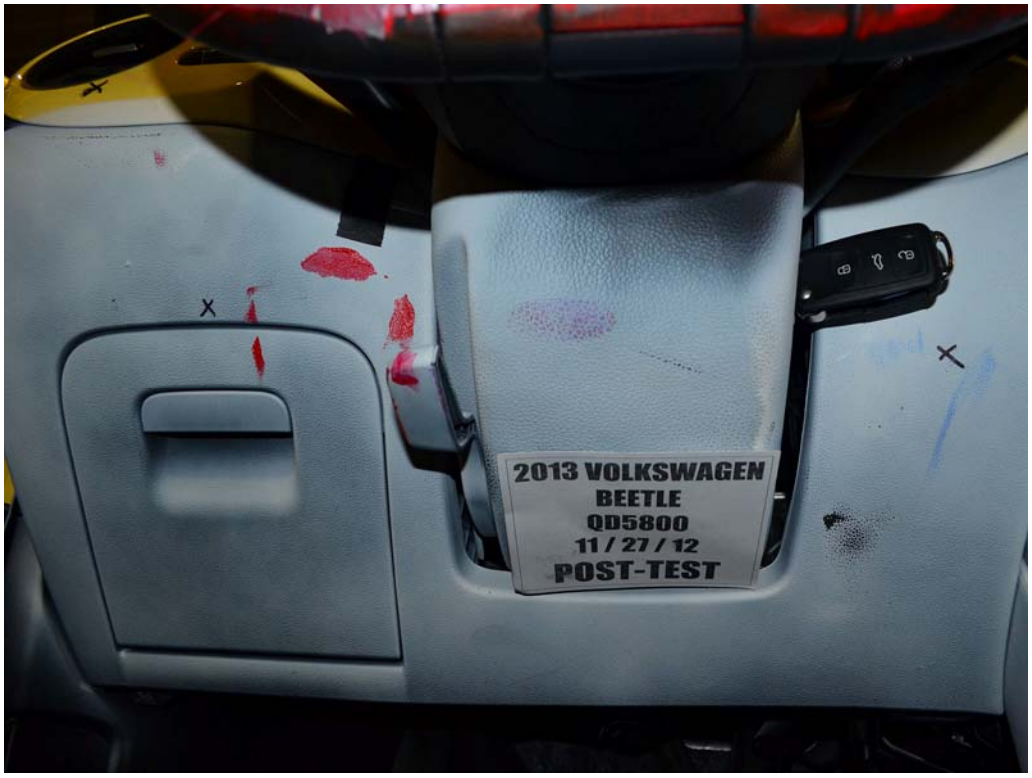


FIGURE 42. Post-Test Driver's Side Knee Bolster

FIGURE 43. Pre-Test Driver's Side Floorpan

FIGURE 44. Post-Test Driver's Side Floorpan

FIGURE 45. Post-Test Driver Dummy Face

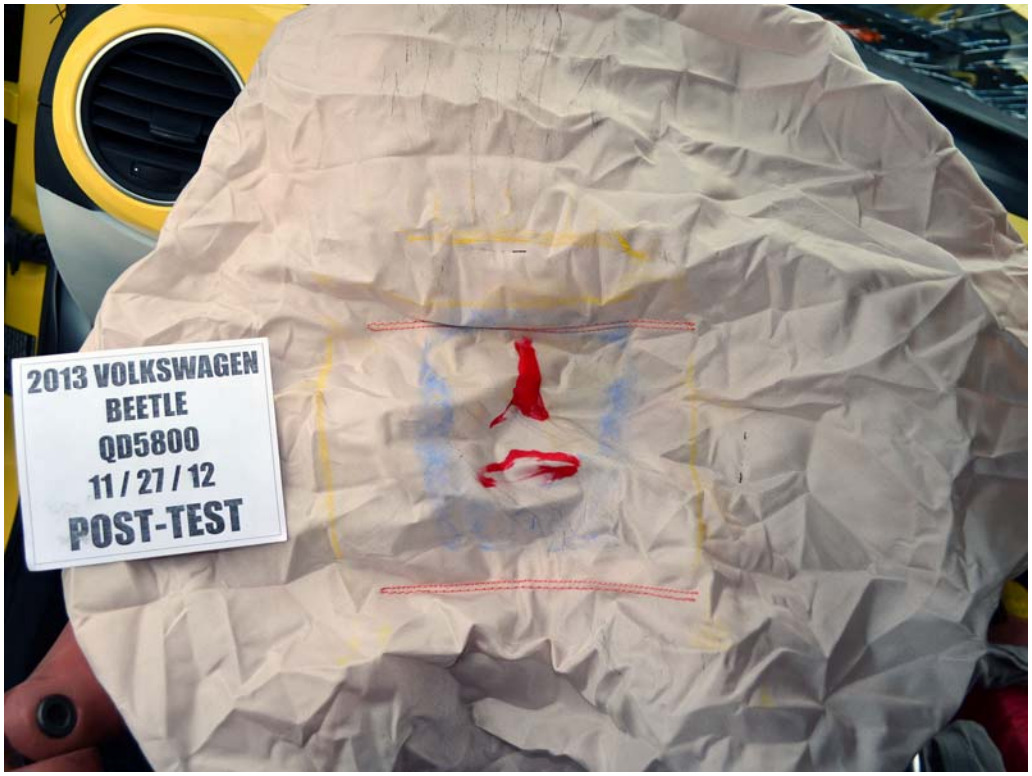


FIGURE 46. Post-Test Driver Dummy Contact With Airbag

FIGURE 47. Post-Test Driver Dummy Contact With Headrest

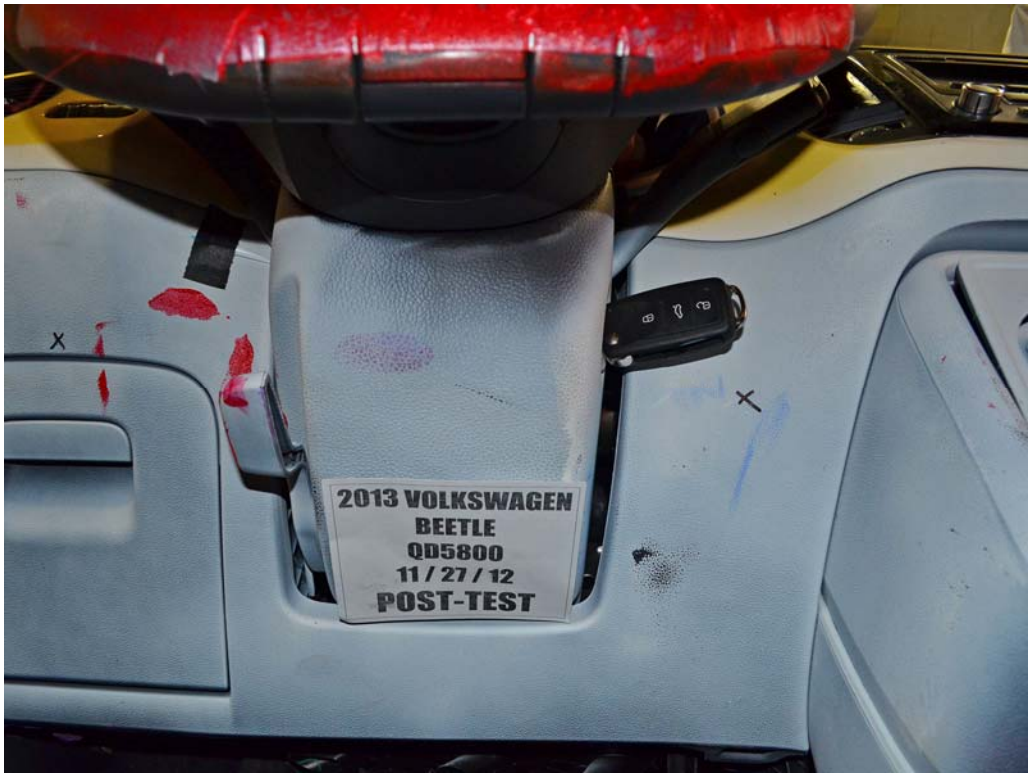


FIGURE 47a. Post-Test Driver Dummy Contact With Knee Bolster

FIGURE 47b. Post-Test Driver Dummy Contact With Steering Column

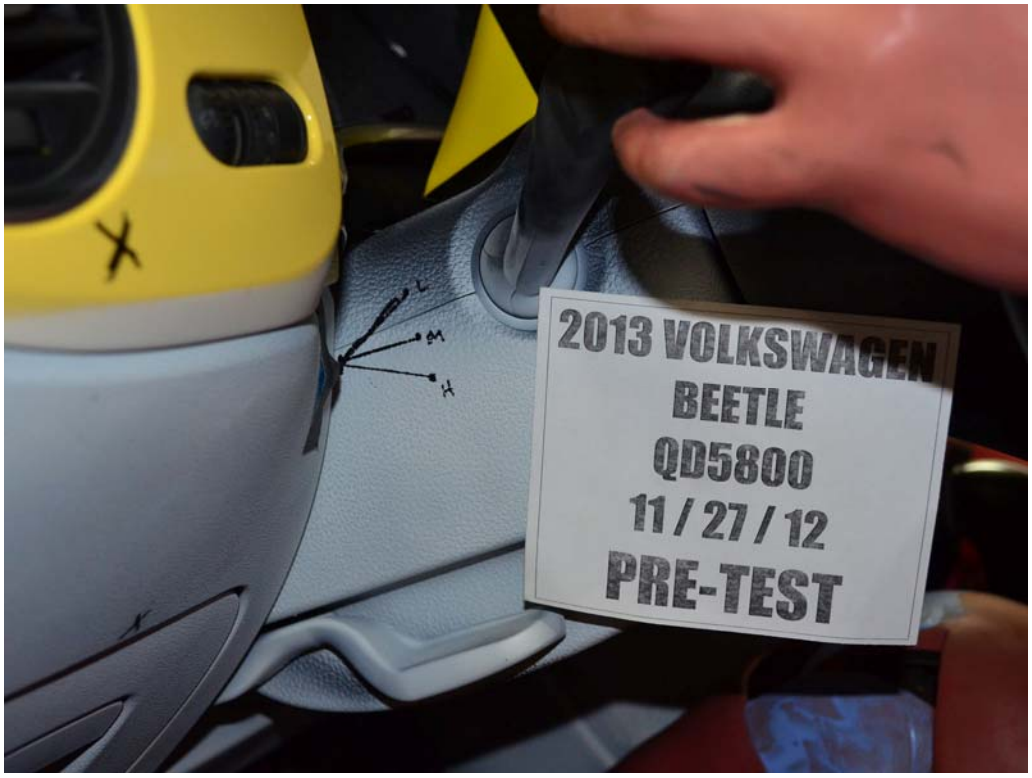


FIGURE 48. Pre-Test View of the Steering Wheel

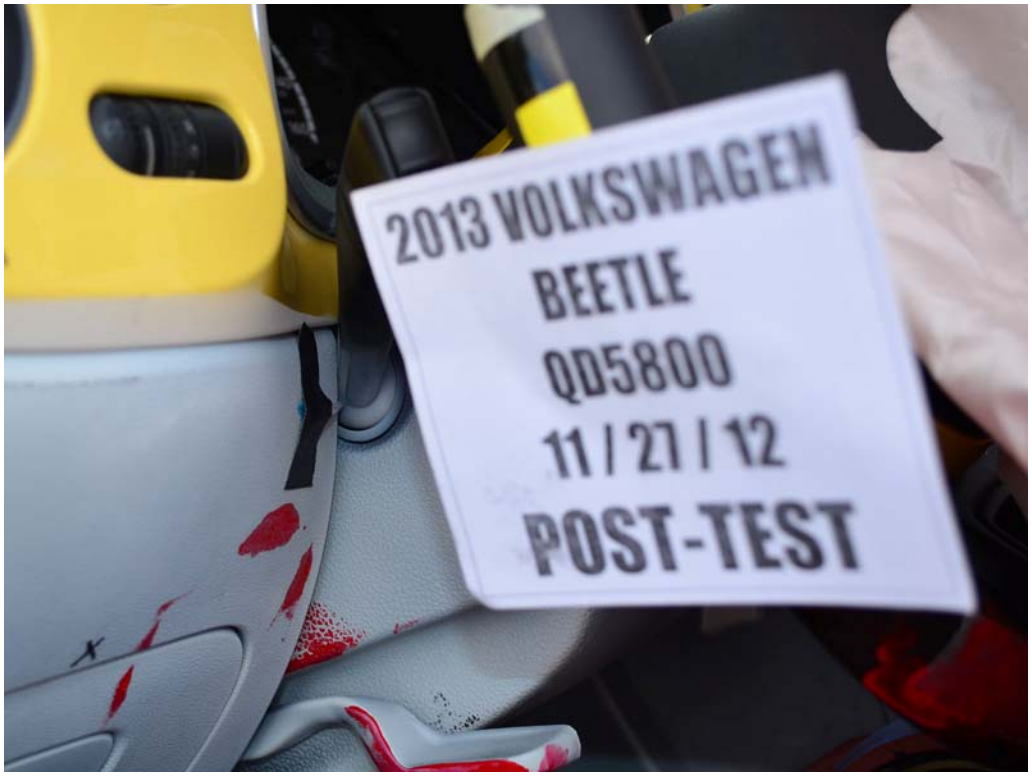


FIGURE 49. Post-Test View of the Steering Wheel

FIGURE 50. Pre-Test Passenger Dummy Front View

FIGURE 51. Post-Test Passenger Dummy Front View

FIGURE 52. Pre-Test Passenger Dummy Window View

FIGURE 53. Post-Test Passenger Dummy Window View

FIGURE 54. Pre-Test Passenger Dummy and Vehicle Interior View

FIGURE 55. Post-Test Passenger Dummy and Vehicle Interior View

FIGURE 56. Pre-Test Passenger's Seat Fore-Aft Markings

FIGURE 57. Post-Test Passenger's Seat Fore-Aft Markings

FIGURE 58. Pre-Test View of Belt Anchorage for Passenger Dummy

FIGURE 59. Post-Test View of Belt Anchorage for Passenger Dummy

FIGURE 60. Pre-Test Passenger Dummy Feet

FIGURE 61. Post-Test Passenger Dummy Feet

FIGURE 62. Pre-Test Passenger's Side Knee Bolster

FIGURE 63. Post-Test Passenger's Side Knee Bolster

FIGURE 64. Pre-Test Passenger's Side Floorpan

FIGURE 65. Post-Test Passenger's Side Floorpan

FIGURE 66. Post-Test Passenger Dummy Contact With Airbag

FIGURE 66a. Post-Test Passenger Dummy Contact With Headrest

FIGURE 66b. Post-Test Passenger Dummy Contact With Glovebox

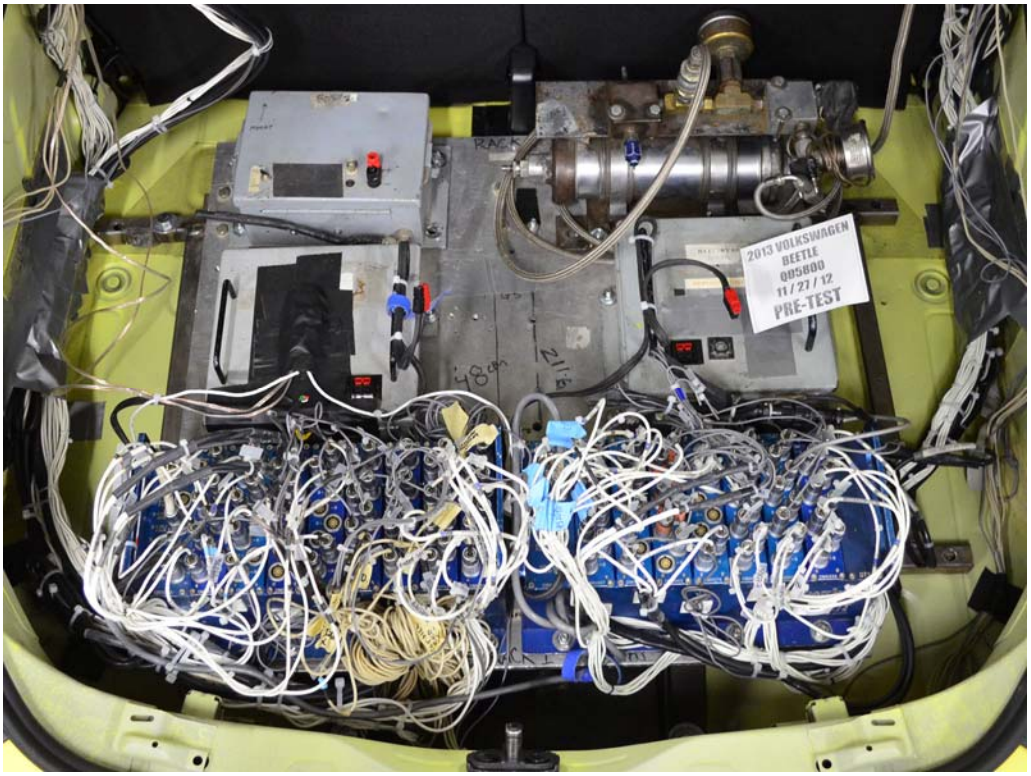


FIGURE 67. Photograph of Ballast Installed In vehicle

Photograph Not Applicable

No Stoddard
Solvent Leakage

FIGURE 68. Post-Test Stoddard Solvent Spillage Location View

FIGURE 69. Post-Test Speed Trap Read-Out

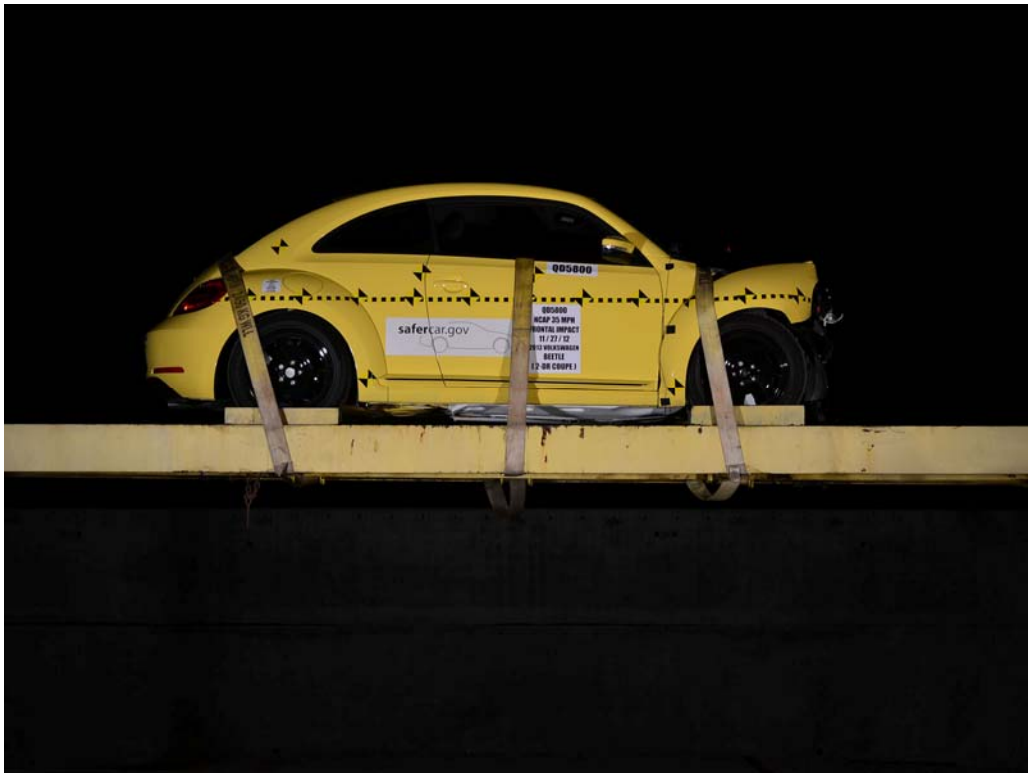


FIGURE 70. Vehicle at 0° on Static Rollover Device

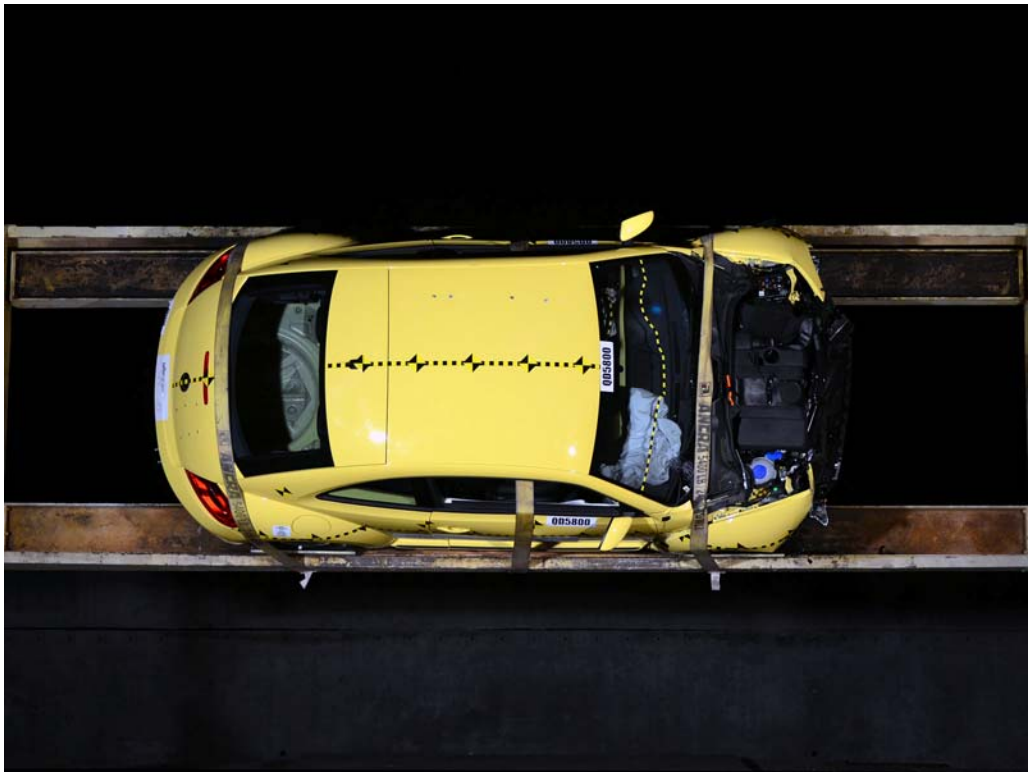


FIGURE 71. Vehicle at 90° on Static Rollover Device

FIGURE 72. Vehicle at 180° on Static Rollover Device

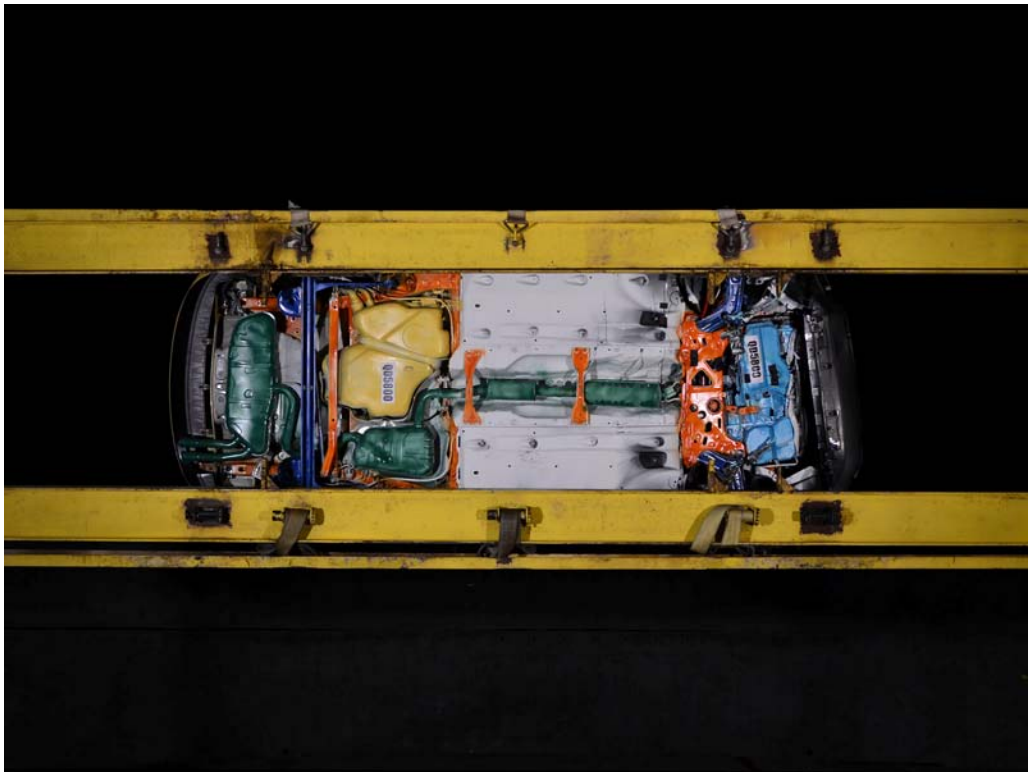


FIGURE 73. 2013 Vehicle at 270°on Static Rollover Device

FIGURE 74. Vehicle at 360° on Static Rollover Device

FIGURE 75. 2013 Volkswagen Beetle Frontal Impact Event

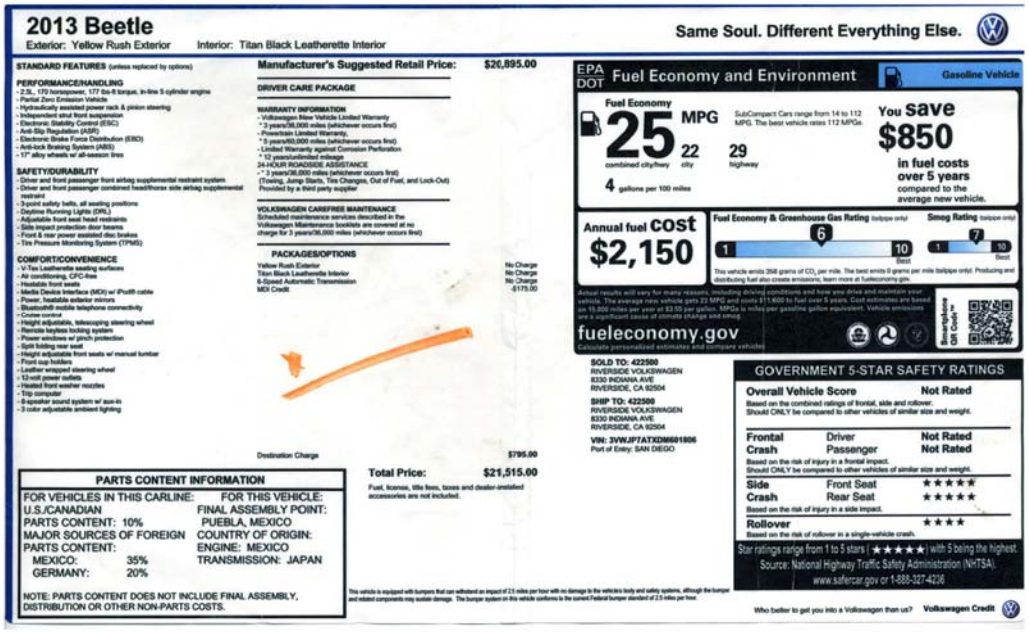


FIGURE 76. Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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

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

Driver Right Foot Aft Z
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Z
Passenger Upper Neck Moment Y
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Force Z Redundant
Passenger Right Femur Force Z Redundant
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Left Rear Seat Crossmember X

Left Rear Seat Crossmember Z

Right Rear Seat Crossmember X

Right Rear Seat Crossmember Z

Vehicle Engine Top X

Vehicle Engine Bottom X

Vehicle Left Brake Caliper X

Vehicle Right Brake Caliper X

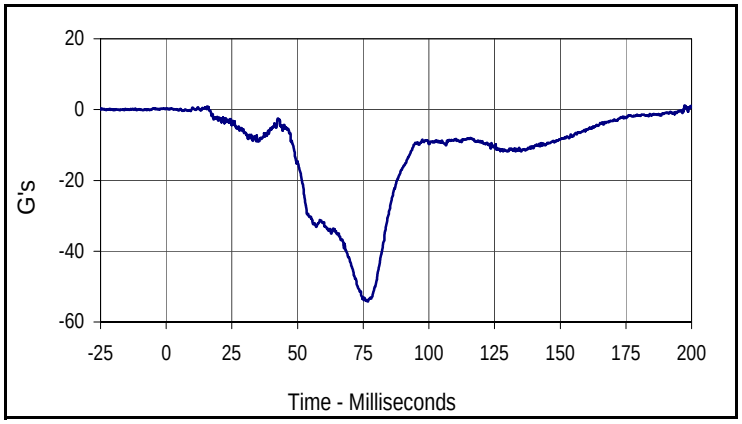
Load Cell Barrier A1-A9

Load Cell Barrier B1-B9

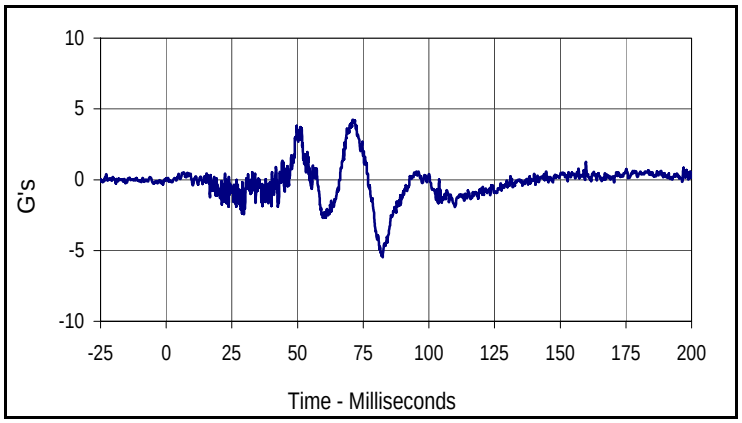
Load Cell Barrier C1-C9

Load Cell Barrier D1-D9

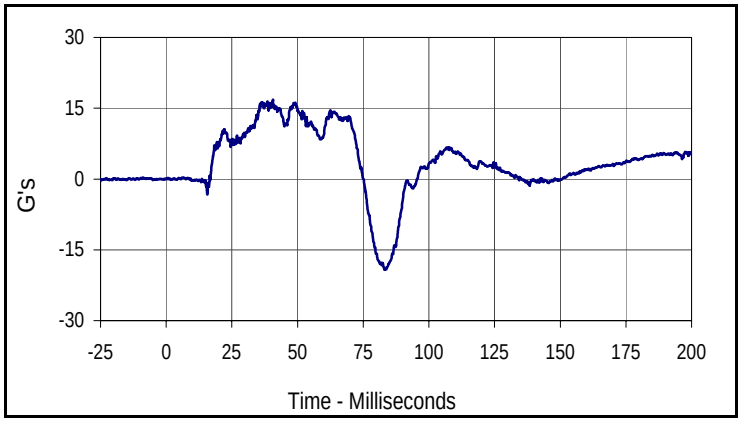
Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12



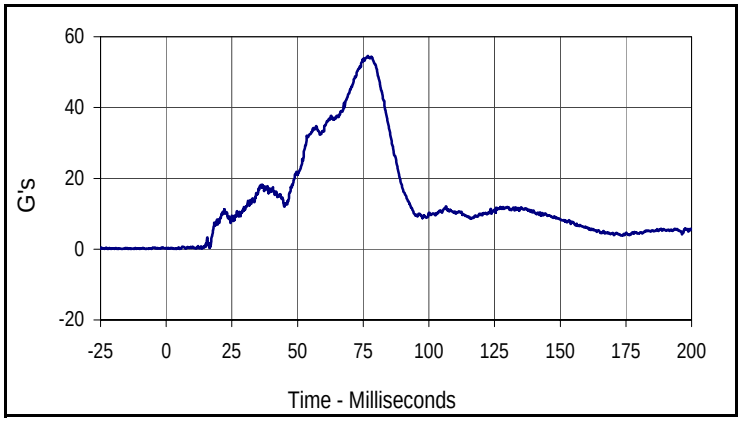
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
1.2	197.3	-54.2	76.7



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.2	71.0	-5.5	82.4

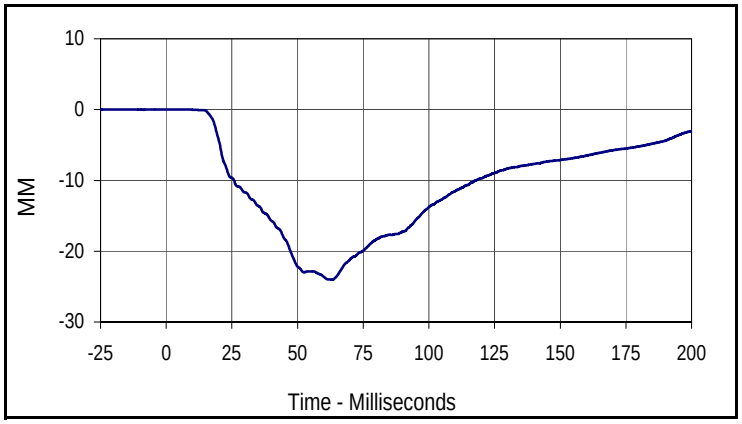


Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
16.8	40.6	-19.2	83.2



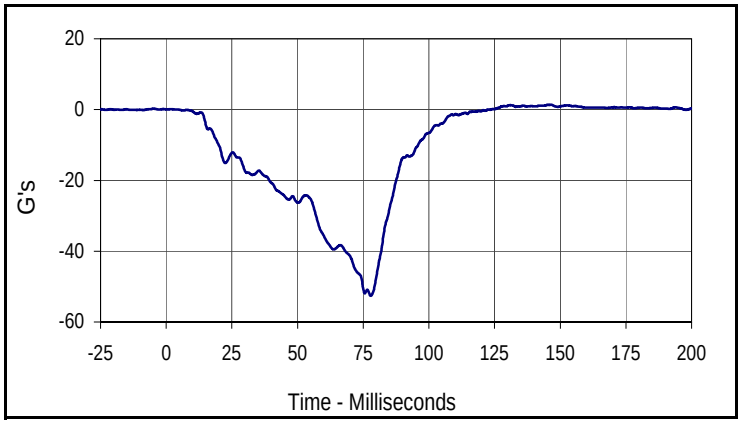
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
54.6	76.8	0.1	2.6

Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12

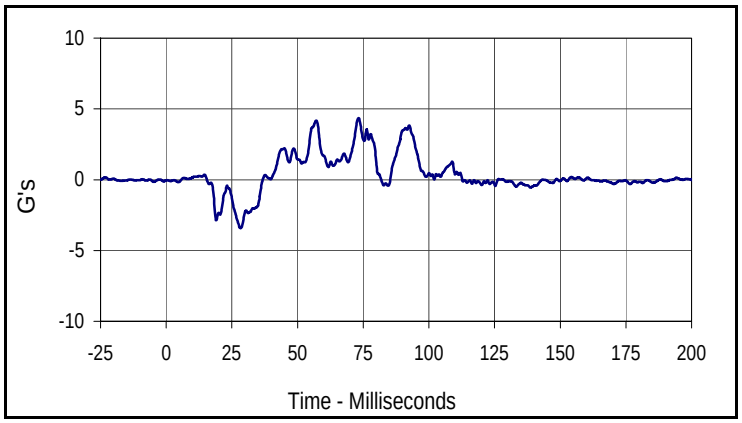


Curve Description			
Driver Chest Deflection			
Plot No.	Type	SAE Class	Units
005	FIL	600	MM
Max	Time	Min	Time
0.0	1.4	-24.0	63.3

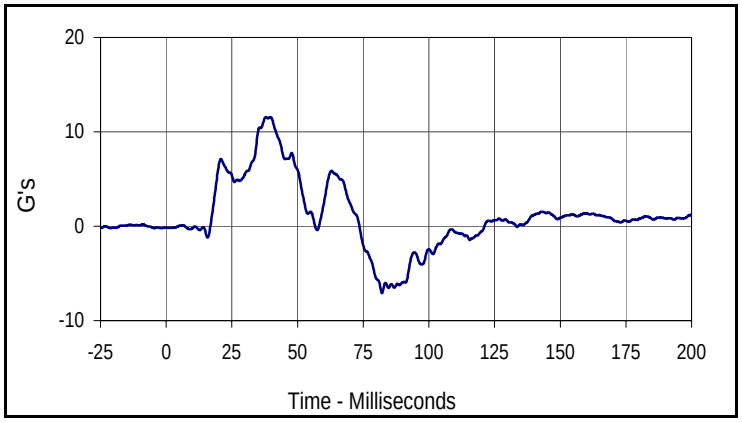
Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12



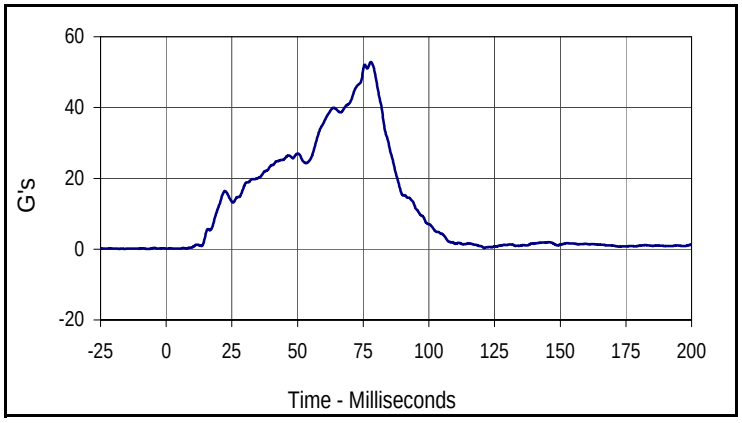
Curve Description			
Driver Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
1.4	146.5	-52.6	77.9



Curve Description			
Driver Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
4.3	73.2	-3.4	28.2

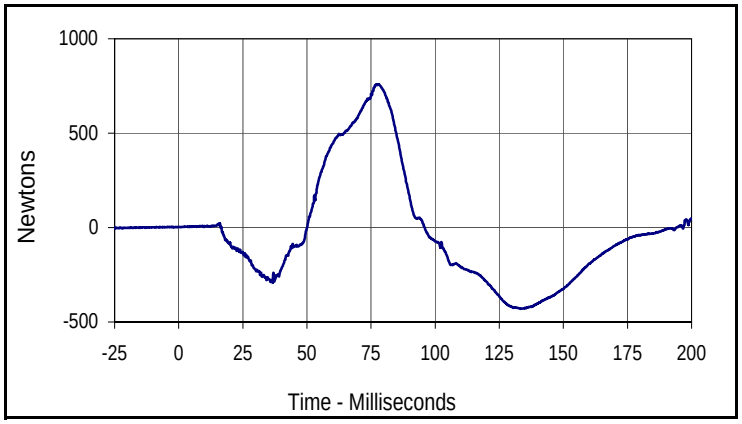


Curve Description			
Driver Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
008	FIL	180	G's
Max	Time	Min	Time
11.6	37.9	-7.1	82.1



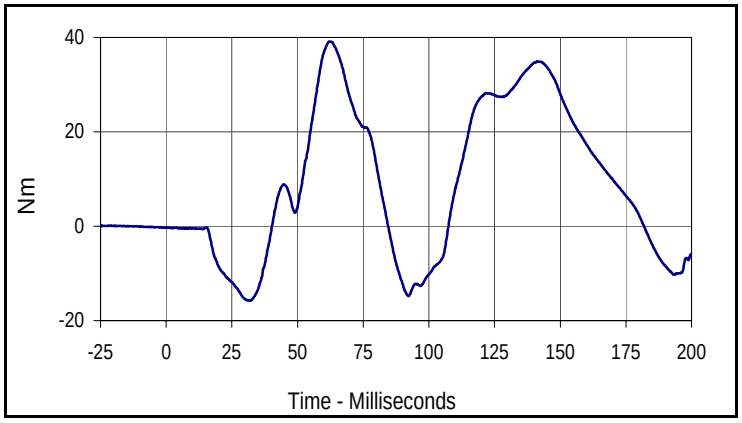
Curve Description			
Driver Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
009	RES	180	G's
Max	Time	Min	Time
52.9	77.9	0.1	5.4

Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12

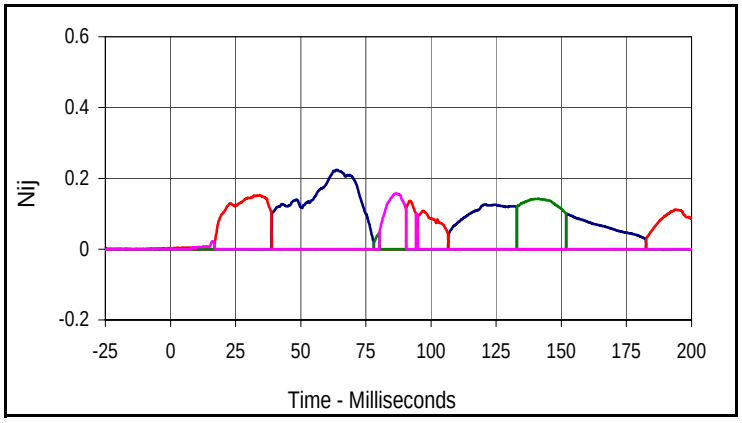


Curve Description			
Driver Upper Neck Force X			
Plot No.	Type	SAE Class	Units
010	FIL	1000	Newtons
Max	Time	Min	Time
760.2	77.7	-430.2	133.3

Curve Description			
Driver Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
011	FIL	1000	Newtons
Max	Time	Min	Time
1009.2	69.4	-475.4	83.1

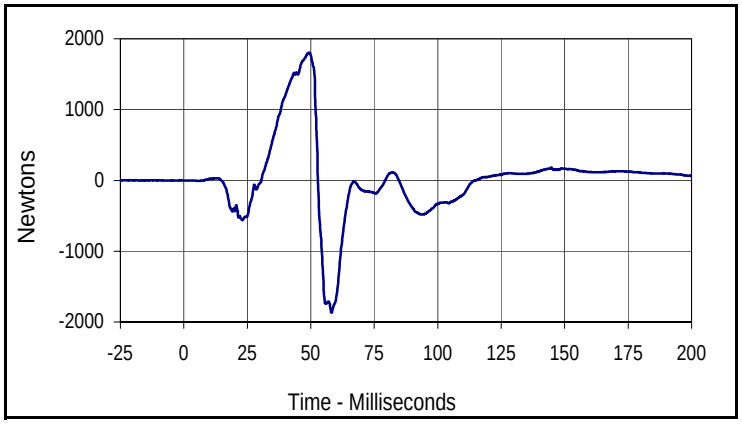


Curve Description			
Driver Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
012	FIL	600	Nm
Max	Time	Min	Time
39.1	62.5	-15.8	31.7

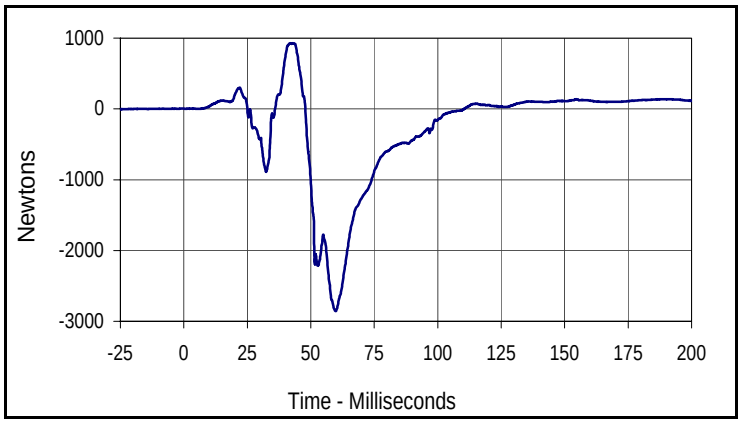


Curve Description			
Driver Nij			
Units	Type	Max	Time
Ntf	FIL	0.22	63.7
Units	Type	Max	Time
Nte	FIL	0.15	33.8
Units	Type	Max	Time
Ncf	FIL	0.14	141.3
Units	Type	Max	Time
Nce	FIL	0.16	86.5

Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12

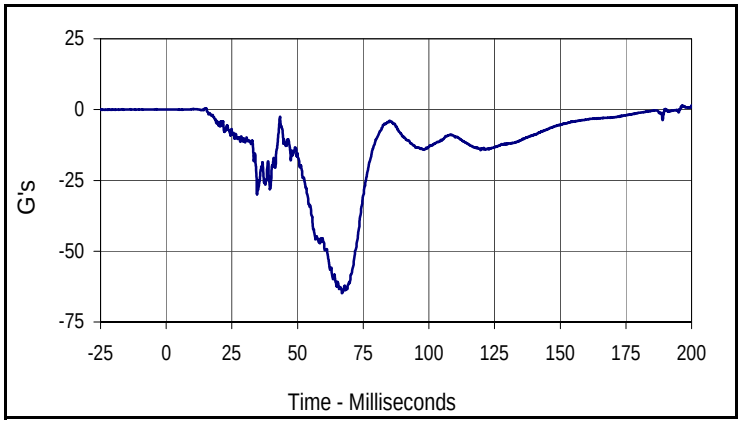


Curve Description			
Driver Left Femur Force Z			
Plot No.	Type	SAE Class	Units
013	FIL	600	Newtons
Max	Time	Min	Time
1803.7	49.4	-1870.5	58.2

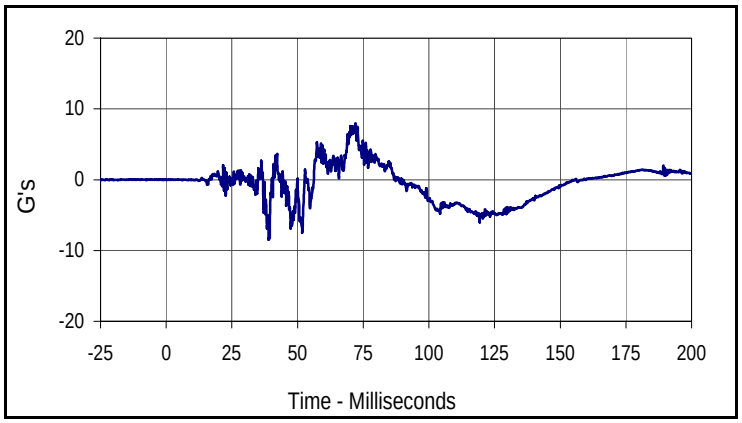


Curve Description			
Driver Right Femur Force Z			
Plot No.	Type	SAE Class	Units
014	FIL	600	Newtons
Max	Time	Min	Time
928.3	43.0	-2855.6	59.8

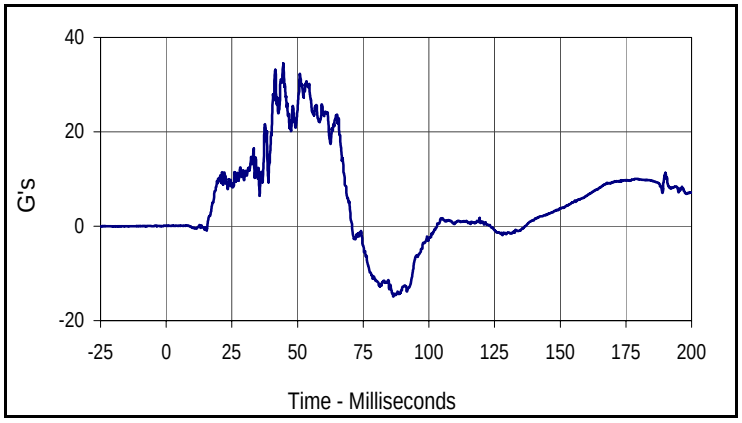
Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12



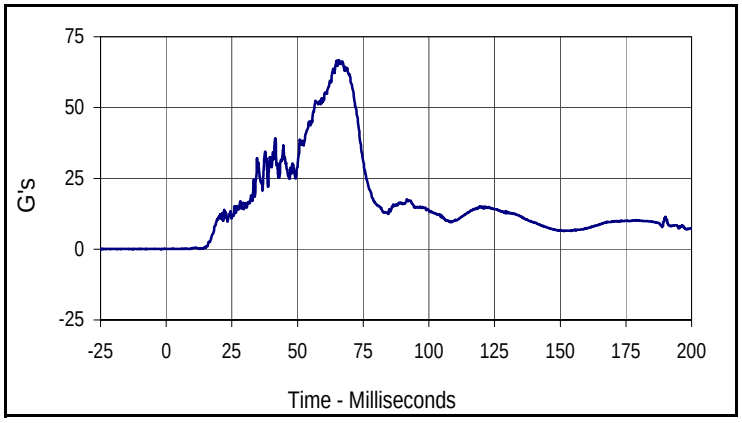
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
1.5	200.0	-64.8	67.0



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
8.0	72.1	-8.5	39.0

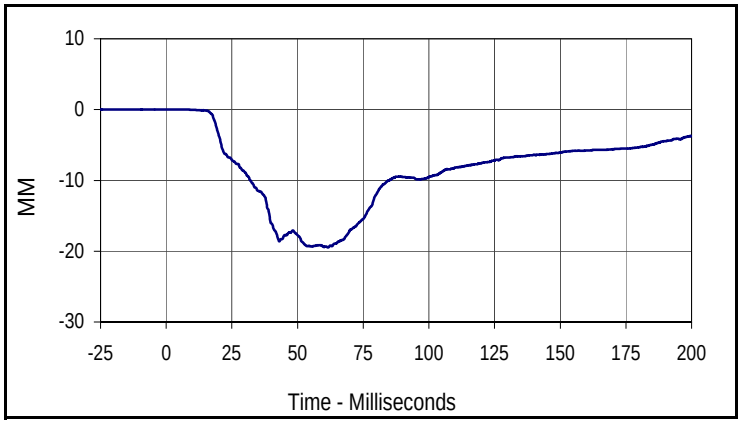


Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
017	FIL	1000	G's
Max	Time	Min	Time
34.5	44.6	-14.9	86.5



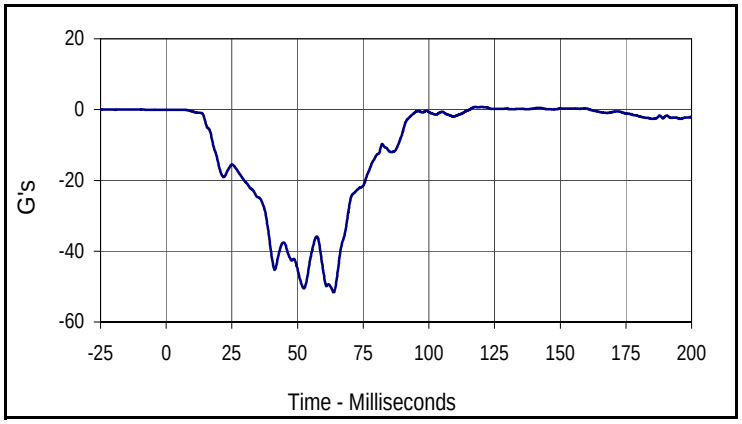
Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
018	RES	1000	G's
Max	Time	Min	Time
66.8	65.7	0.0	5.5

Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12

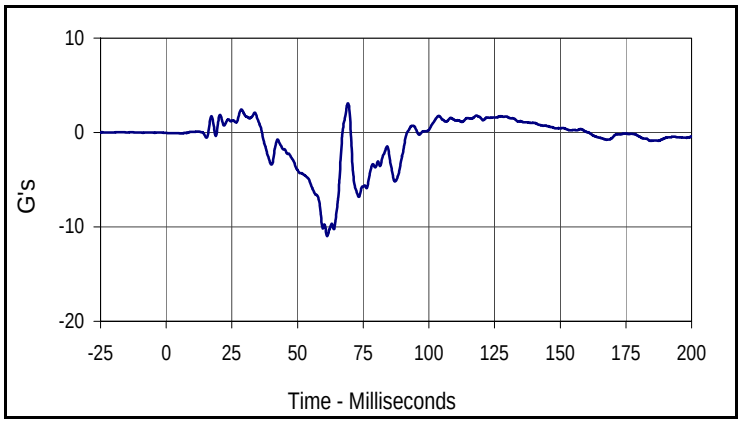


Curve Description			
Passenger Chest Deflection			
Plot No.	Type	SAE Class	Units
019	FIL	600	MM
Max	Time	Min	Time
0.0	6.2	-19.5	61.6

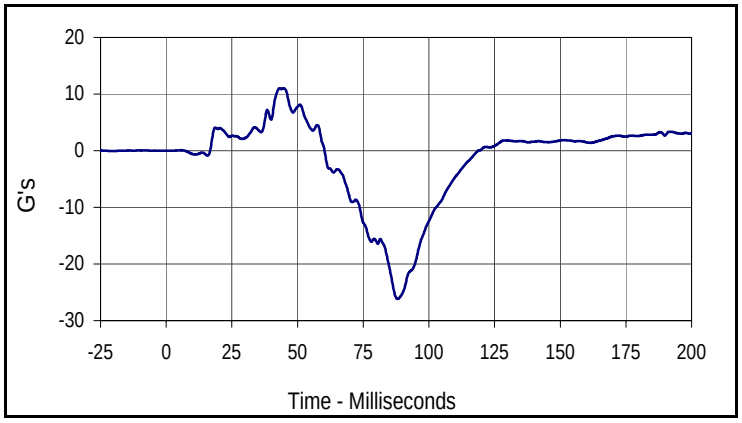
Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12



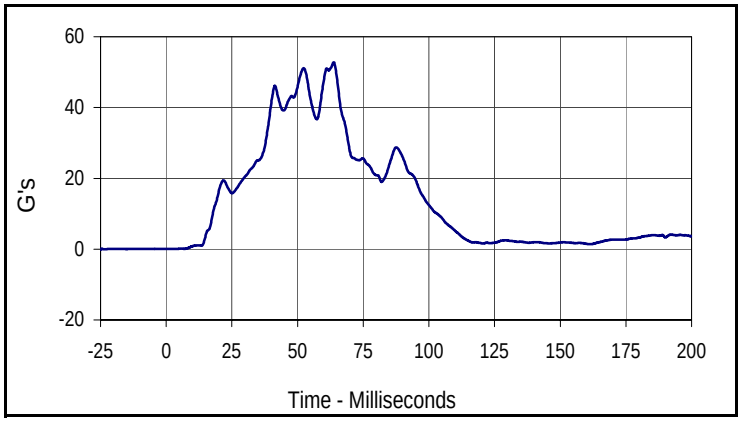
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
020	FIL	180	G's
Max	Time	Min	Time
0.8	117.7	-51.6	63.8



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
021	FIL	180	G's
Max	Time	Min	Time
3.1	69.2	-11.0	61.3

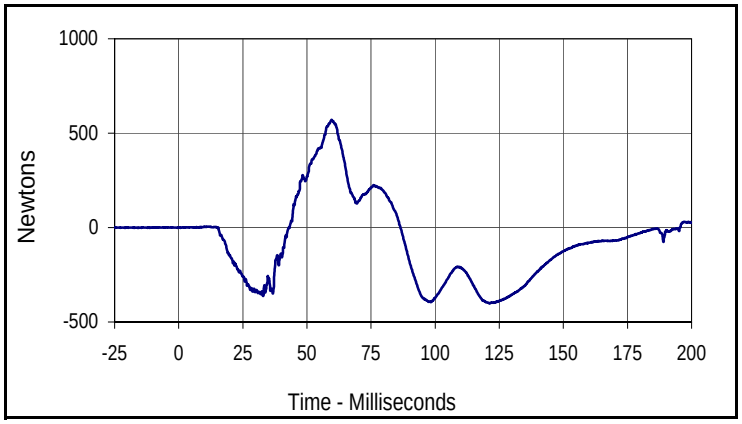


Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
022	FIL	180	G's
Max	Time	Min	Time
11.0	43.1	-26.2	88.0

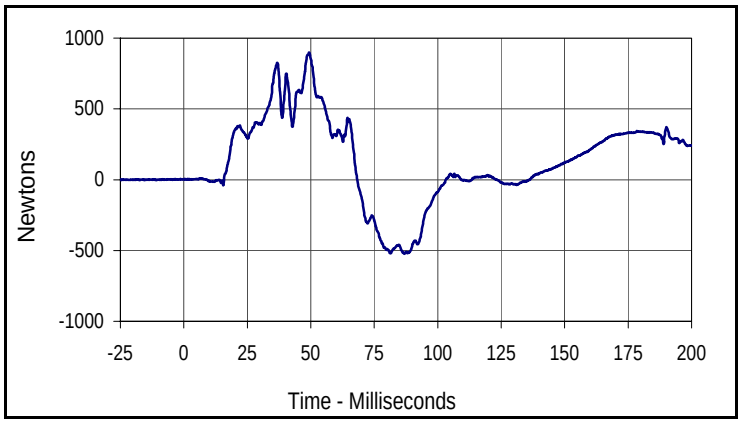


Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
023	RES	180	G's
Max	Time	Min	Time
52.8	63.8	0.1	0.0

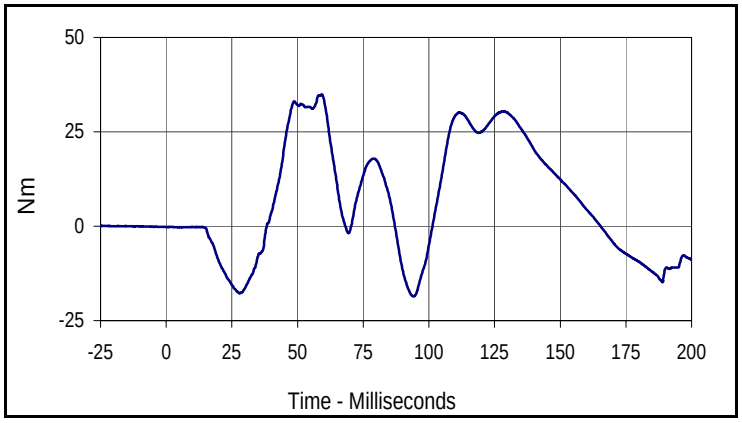
Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12



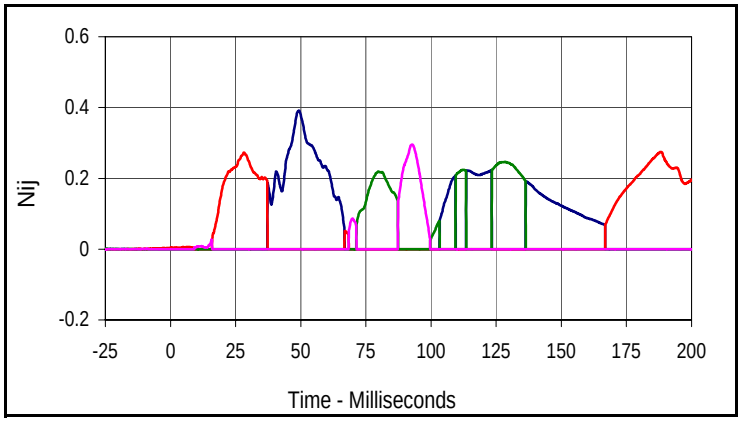
Curve Description			
Passenger Upper Neck Force X			
Plot No.	Type	SAE Class	Units
024	FIL	1000	Newtons
Max	Time	Min	Time
570.7	59.6	-400.9	121.4



Curve Description			
Passenger Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
025	FIL	1000	Newtons
Max	Time	Min	Time
898.1	49.4	-522.8	86.8

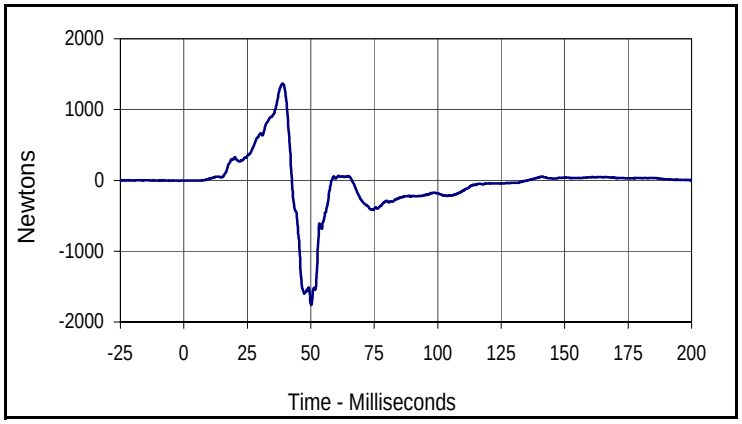


Curve Description			
Passenger Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
026	FIL	600	Nm
Max	Time	Min	Time
34.9	59.3	-18.6	94.1

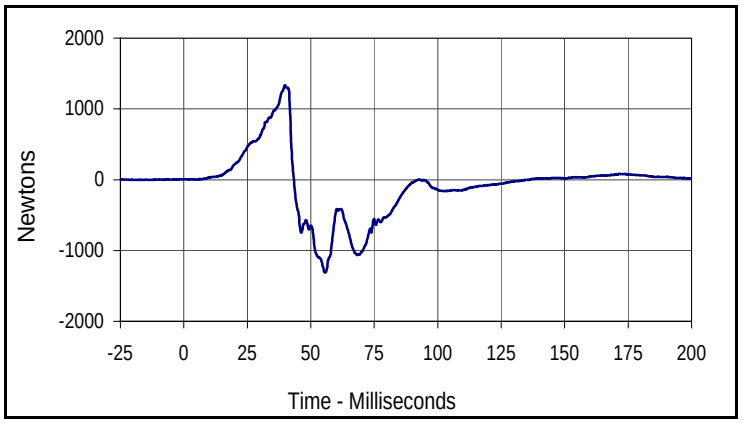


Curve Description			
Passenger Nij			
Units	Type	Max	Time
Ntf	FIL	0.39	49.4
Units	Type	Max	Time
Nte	FIL	0.27	188.0
Units	Type	Max	Time
Ncf	FIL	0.25	128.4
Units	Type	Max	Time
Nce	FIL	0.30	92.7

Test Vehicle:	2013 Volkswagen Beetle 2-Door Coupe	NHTSA No.:	QD5800
Test Program:	56 km/h Frontal Impact NCAP Test	Test Date:	11/27/12



Curve Description			
Passenger Left Femur Force Z			
Plot No.	Type	SAE Class	Units
027	FIL	600	Newtons
Max	Time	Min	Time
1366.8	38.9	-1758.8	50.2



Curve Description			
Passenger Right Femur Force Z			
Plot No.	Type	SAE Class	Units
028	FIL	600	Newtons
Max	Time	Min	Time
1336.3	39.8	-1309.9	55.6

APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: Hybrid III 50th Percentile Male Dummy Damage Checklist Test Date: 11/19/12

ATD Serial No.: 034 Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

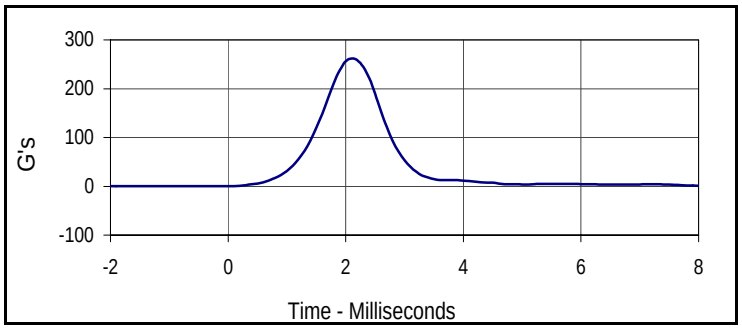
Test Program: Hybrid III 50th Percentile Male External Measurements Test Date: 11/19/12

ATD Serial No.: 034 Test I.D.: N/A

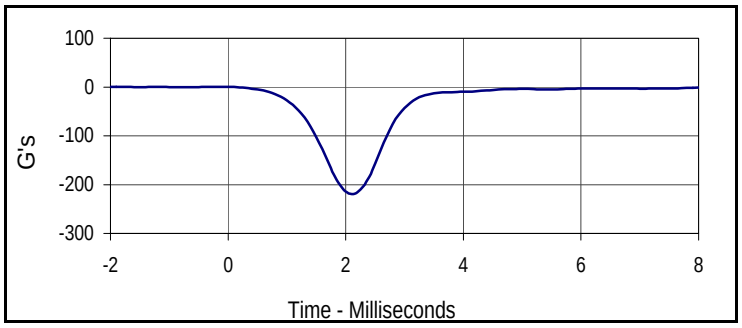
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.16	Pass
Laboratory Relative Humidity	%	10 to 70	29.9	Pass
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	514	Pass
C - H point height	mm	84 to 89	85	Pass
D - H point location from backline	mm	135 to 140	137	Pass
E - Shoulder pivot from backline	mm	84 to 94	89	Pass
F - Thigh clearance	mm	140 to 155	146	Pass
G - Back of elbow to wrist pivot	mm	290 to 305	297	Pass
H - Head back to backline	mm	41 to 46	43	Pass
I - Shoulder to elbow length	mm	330 to 345	336	Pass
J - Elbow rest height	mm	190 to 211	201	Pass
K - Buttock to knee length	mm	579 to 604	586	Pass
L - Popliteal length	mm	429 to 455	438	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock popliteal length	mm	452 to 477	472	Pass
O - Chest depth without jacket	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	260	Pass
V - Shoulder breadth	mm	422 to 437	433	Pass
W - Foot breadth	mm	91 to 107	99	Pass
Y - Chest circumference (with chest jacket)	mm	970 to 1001	981	Pass
Z - Waist circumference	mm	836 to 866	864	Pass
AA - Location for chest circumference	mm	429 to 434	429	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
		Overall Test Results		Pass

Test Program:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034HD035

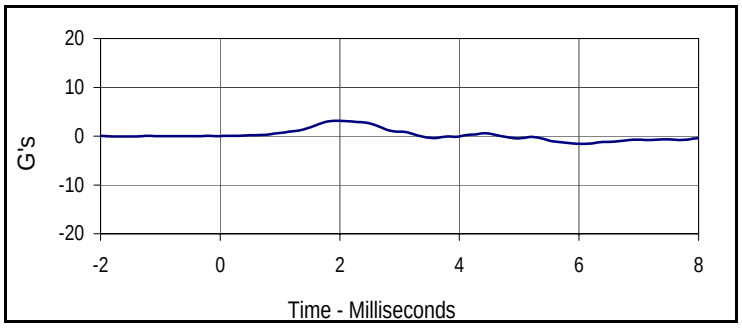
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	240	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Peak Resultant Acceleration		G's	225.0 to 275.0	262.0	Pass
Peak Lateral Acceleration		G's	≤15.0	3.1	Pass
Oscillations After Main Pulse		%	<10% of peak Res. Acceleration	4.4	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
			Overall Test Results		Pass



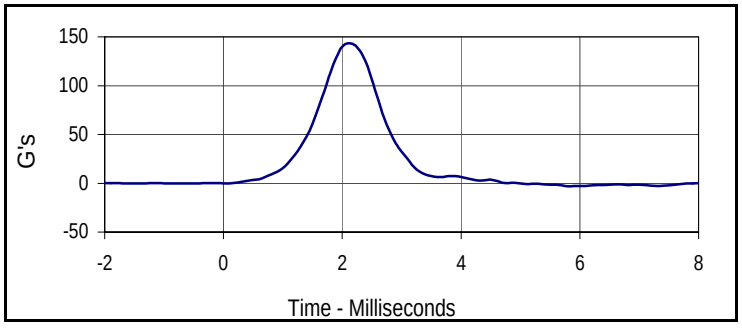
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
262.0	2.1	0.0	-0.8



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	-1.9	-219.2	2.1



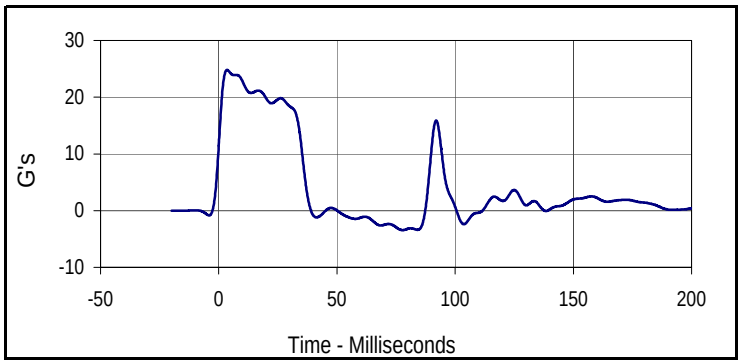
Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
3.1	1.9	-1.6	6.0



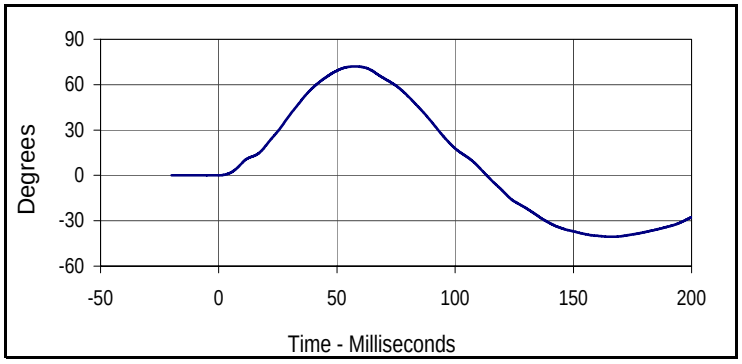
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
143.5	2.1	-3.0	5.8

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034NF035

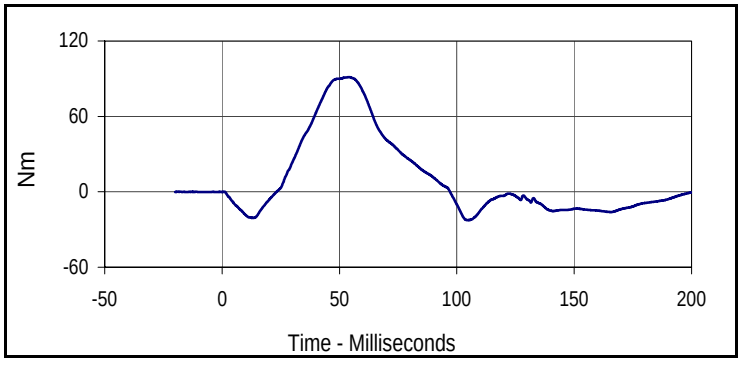
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	285	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.02	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.8	Pass
	20 Msec.	G's	17.6 to 22.6	19.8	Pass
	30 Msec.	G's	12.5 to 18.5	18.4	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.4	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.7	Pass
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	72.0	Pass
	Time	Msec.	57.0 to 64.0	57.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	113.4	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	91.3	Pass
	Time	Msec.	47.0 to 58.0	53.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	97.1	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
24.8	3.5	-3.4	77.8

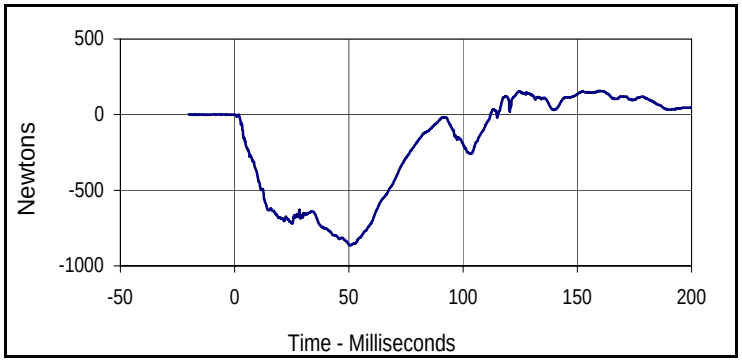


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
72.0	57.5	-40.6	166.0

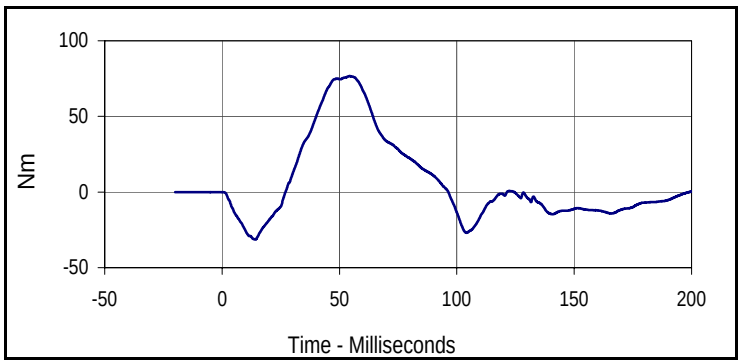


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
91.3	53.8	-22.6	104.4

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034NF035



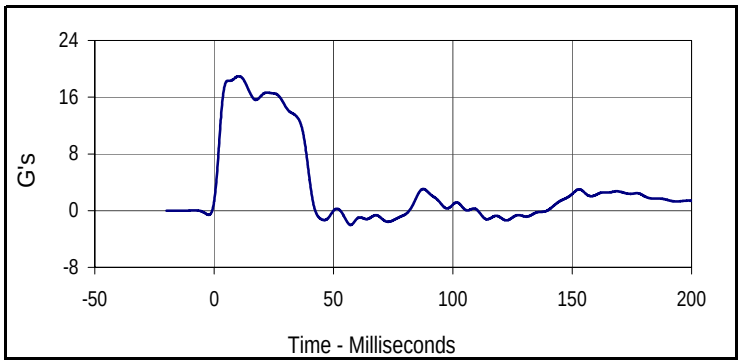
Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
157.0	159.2	-865.1	50.3



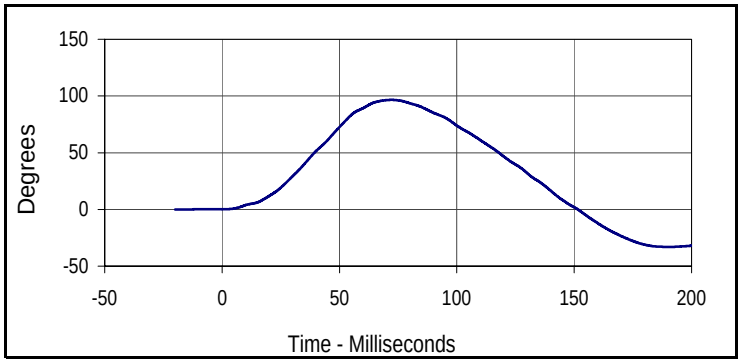
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
76.7	54.3	-31.4	14.1

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034NE035

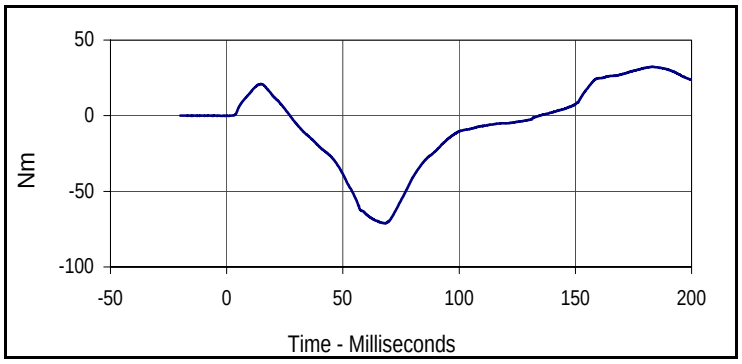
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	320	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.09	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.9	Pass
	20 Msec.	G's	14.0 to 19.0	16.3	Pass
	30 Msec.	G's	11.0 to 16.0	14.6	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	14.6	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	39.8	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	96.6	Pass
	Time	Msec.	72.0 to 82.0	72.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	151.6	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-71.2	Pass
	Time	Msec.	65.0 to 79.0	68.1	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	134.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
19.0	10.3	-2.0	57.2

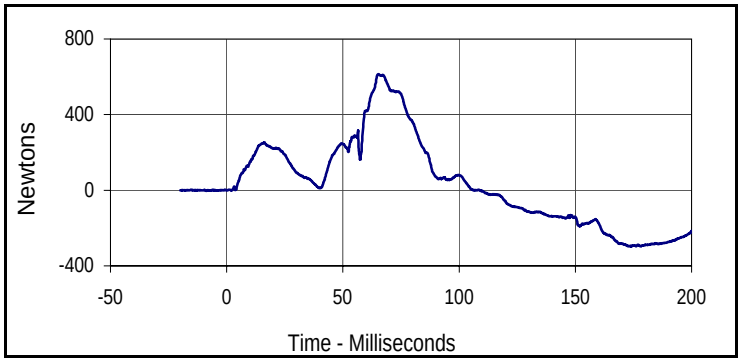


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
96.6	72.1	-33.1	190.4

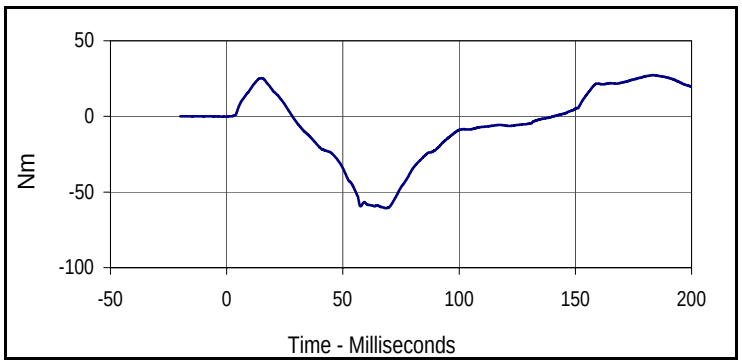


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
32.3	183.3	-71.2	68.1

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034NE035



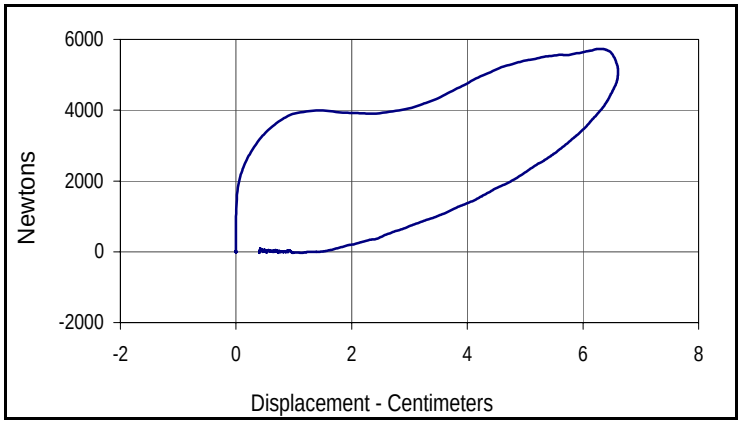
Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
614.4	65.2	-297.1	174.0



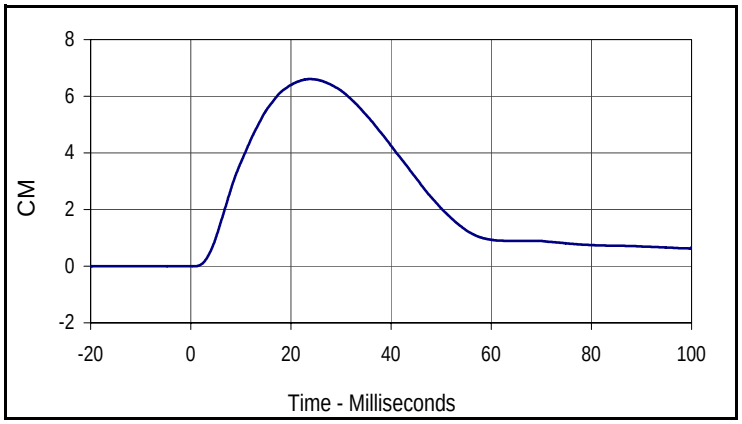
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
27.3	183.3	-60.7	68.5

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034CH035

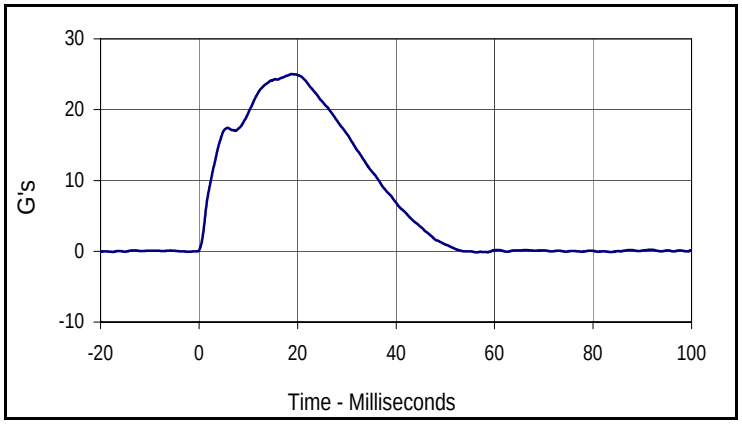
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	370	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Probe Velocity		m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force		Newtons	5159 to 5893	5732	Pass
Peak Sternum Deflection		CM	6.35 to 7.26	6.61	Pass
Internal Hysterysis		%	69 to 85	70.9	Pass
			Overall Test Results		Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysterysis
001	FIL	180	70.9
Peak Probe Force		Peak Chest Deflection	
5732		6.61	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.6	23.8	0.0	0.7



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
25.0	18.8	-0.1	56.4

Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034LK035 , M034RK035

Left Knee

Tested Parameter		Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time		Minutes	≥240	405	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity at T=0		m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force		Newtons	4715 to 5782	5041	Pass
			Overall Test Results		Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4981	Pass
		Overall Test Results		Pass

Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5041.4	2.8	-44.5	10.0

Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
103.0	2.8	-0.9	10.0

Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
4981.1	2.8	-44.5	10.0

Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
101.8	2.8	-0.9	10.0

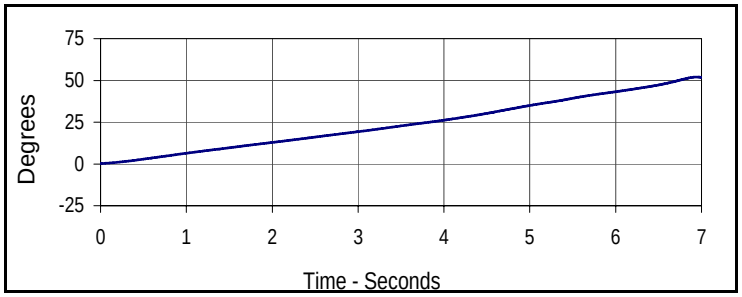
Test Program:	Hybrid III 50th Percentile Male Hip Joint-Femur Flexion Test	Test Date:	11/19/12
ATD Serial No.:	034	Test I.D.:	M034LF035 , M034RF035

Left Hip Joint-Femur Results

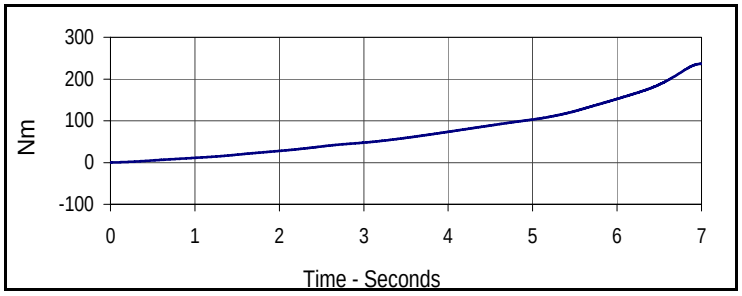
Tested Parameter		Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time		Minutes	≥240	455	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Rotation Rate		deg/sec	5 to 10	7.5	Pass
Femur Torque at 30°		Nm	≤ 95	87.9	Pass
Rotation at 203 Nm		Degrees	40.0 to 50.0	49.0	Pass
			Overall Test Results		Pass

Right Hip Joint-Femur Results

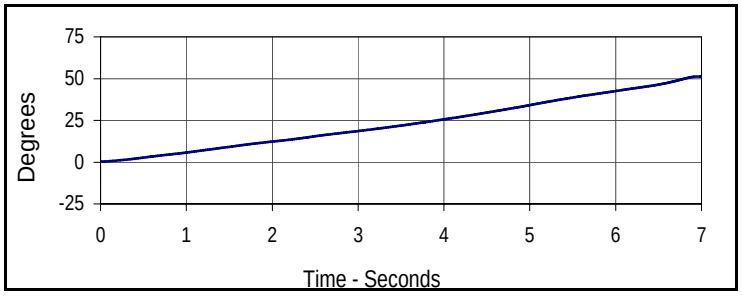
Rotation Rate	deg/sec	5 to 10	7.4	Pass
Femur Torque at 30°	Nm	≤ 95	92.1	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	47.5	Pass
		Overall Test Results		Pass



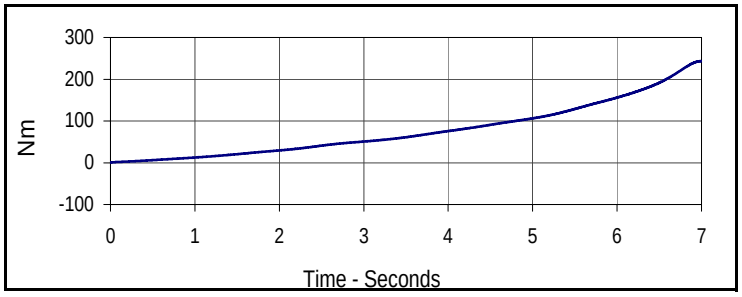
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	Degrees
Max	Time	Min	Time
52.0	6.9	0.2	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
236.3	7.0	0.2	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
51.3	7.0	0.2	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
243.1	7.0	1.1	0.0

Test Program: Hybrid III 5th Percentile Female Dummy Damage Checklist Test Date: 11/20/12

ATD Serial No.: 141 Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

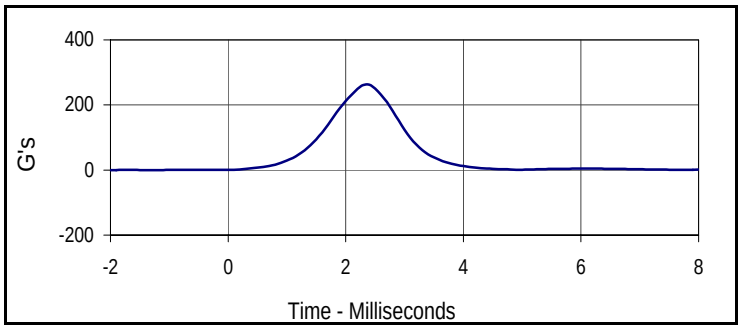
Test Program: Hybrid III 5th Percentile Female External Measurements Test Date: 11/20/12

ATD Serial No.: 141 Test I.D.: N/A

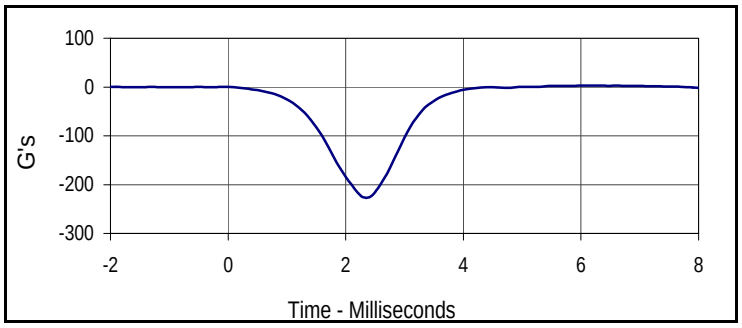
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.16	Pass
Laboratory Relative Humidity	%	10 to 70	29.9	Pass
A - Total sitting height	mm	774.7 to 800.1	786	Pass
B - Shoulder pivot height	mm	431.8 to 457.2	450	Pass
C - H point height	mm	81.3 to 86.3	85	Pass
D - H point location from backline	mm	144.8 to 149.8	146	Pass
E - Shoulder pivot from backline	mm	68.6 to 83.8	77	Pass
F - Thigh clearance	mm	119.4 to 134.6	126	Pass
G - Back of elbow to wrist pivot	mm	243.9 to 259.1	250	Pass
H - Head back to backline	mm	40.7 to 45.7	44	Pass
I - Shoulder to elbow length	mm	276.8 to 297.2	285	Pass
J - Elbow rest height	mm	182.8 to 203.2	198	Pass
K - Buttock to knee length	mm	520.7 to 546.1	531	Pass
L - Popliteal length	mm	355.6 to 376.0	371	Pass
M - Knee pivot height	mm	393.7 to 419.1	402	Pass
N - Buttock popliteal length	mm	414.0 to 439.4	420	Pass
O - Chest depth without jacket	mm	175.3 to 190.5	186	Pass
P - Foot length	mm	218.5 to 233.7	221	Pass
R - Buttock to Knee Pivot Length	mm	457.2 to 482.6	473	Pass
S - Head Breadth	mm	137.1 to 147.3	144	Pass
T - Head Depth	mm	177.8 to 188.0	180	Pass
U - Hip Breadth	mm	299.7 to 314.9	302	Pass
V - Shoulder breadth	mm	350.5 to 365.7	359	Pass
W - Foot breadth	mm	78.8 to 94.0	90	Pass
X - Head circumference	mm	528.3 to 548.7	541	Pass
Y - Chest circumference (with chest jacket)	mm	850.8 to 881.3	864	Pass
Z - Waist circumference	mm	759.5 to 789.9	766	Pass
AA - Location for chest circumference	mm	299.7 to 309.9	300	Pass
BB - Location for waist circumference	mm	160.1 to 170.2	164	Pass
		Overall Test Results		Pass

Test Program:	Hybrid III 5th Percentile Female Head Drop Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141HD049

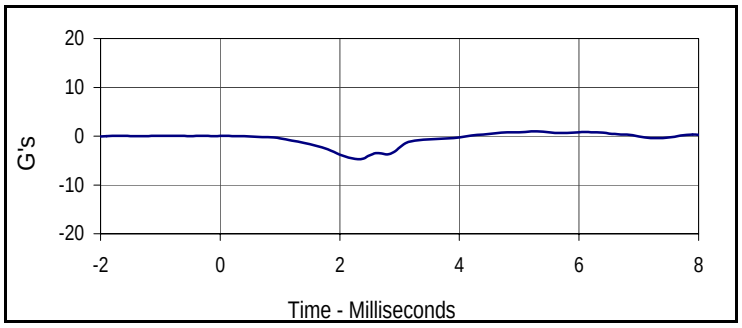
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	260	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Peak Resultant Acceleration		G's	250.0 to 300.0	261.9	Pass
Peak Lateral Acceleration		G's	≤15.0	4.7	Pass
Oscillations After Main Pulse		%	<10% of peak Res. Acceleration	1.8	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
			Overall Test Results		Pass



Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
261.9	2.4	0.0	-1.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.9	6.0	-226.0	2.3

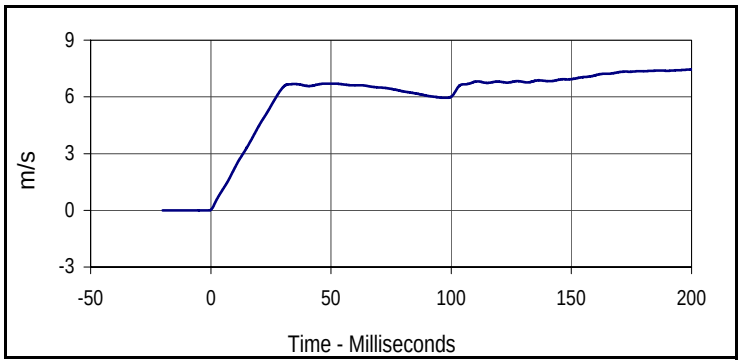


Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
1.0	5.3	-4.7	2.3

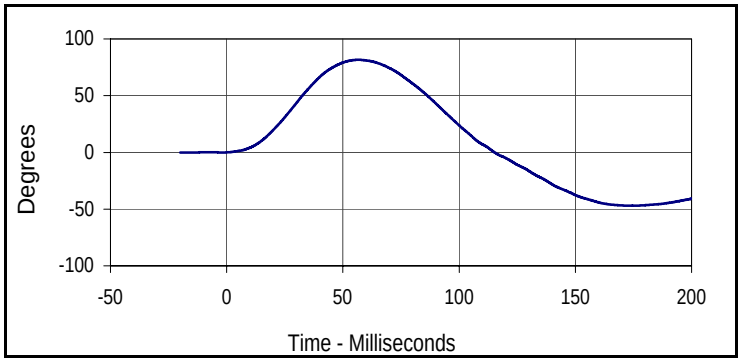
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
132.6	2.4	-3.4	5.9

Test Program:	Hybrid III 5th Percentile Female Neck Flexion Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141NF049

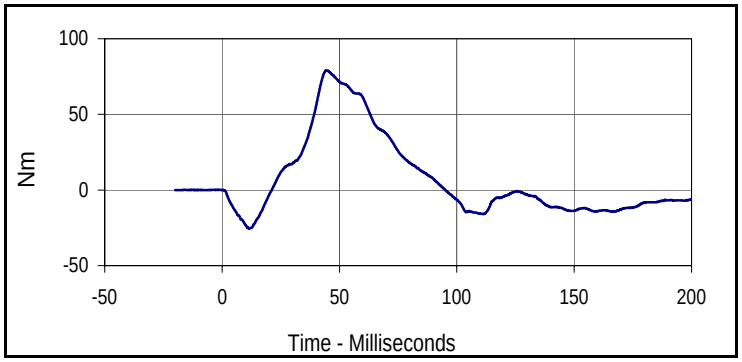
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	305	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.03	Pass
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.2	Pass
	20 Msec.	m/s	4.0 to 5.0	4.5	Pass
	30 Msec.	m/s	5.8 to 7.0	6.5	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	81.6	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	75.4	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	80.0 to 100.0	86.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.4	200.0	0.0	-0.9

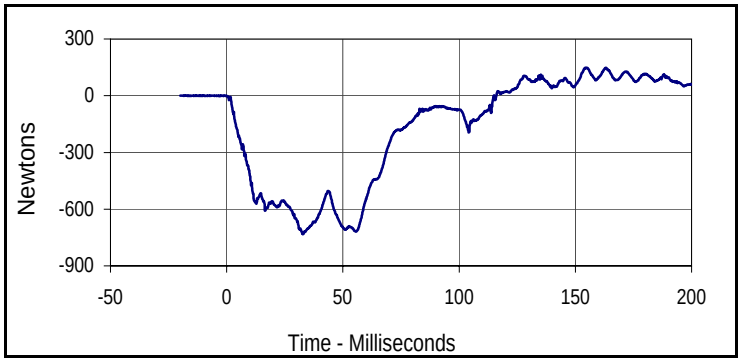


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
81.6	56.7	-47.0	174.2

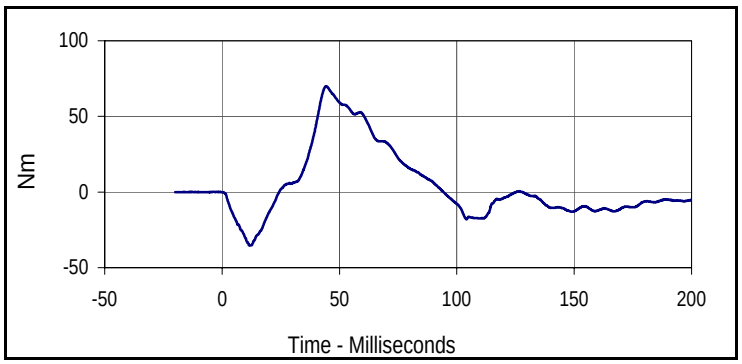


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
79.1	44.6	-25.7	11.5

Test Program:	Hybrid III 5th Percentile Female Neck Flexion Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141NF049



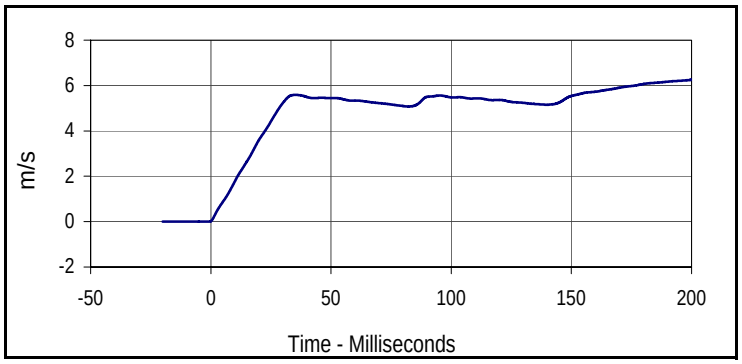
Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
148.3	154.3	-732.9	32.9



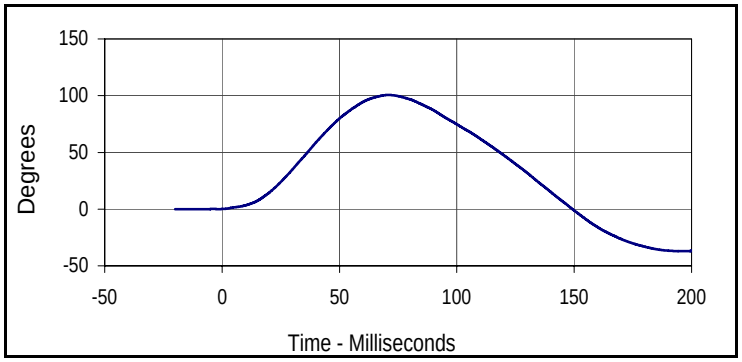
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
69.9	44.3	-35.2	12.1

Test Program:	Hybrid III 5th Percentile Female Neck Extension Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141NE049

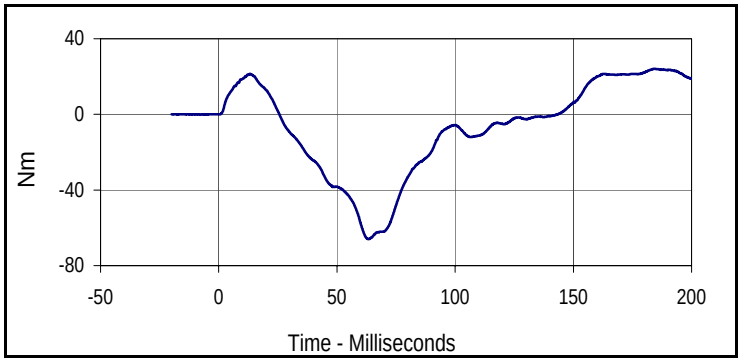
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	340	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.03	Pass
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.8	Pass
	20 Msec.	m/s	3.1 to 3.9	3.6	Pass
	30 Msec.	m/s	4.6 to 5.6	5.2	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	100.6	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-63.4	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	94.0 to 114.0	112.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.3	200.0	0.0	-0.9

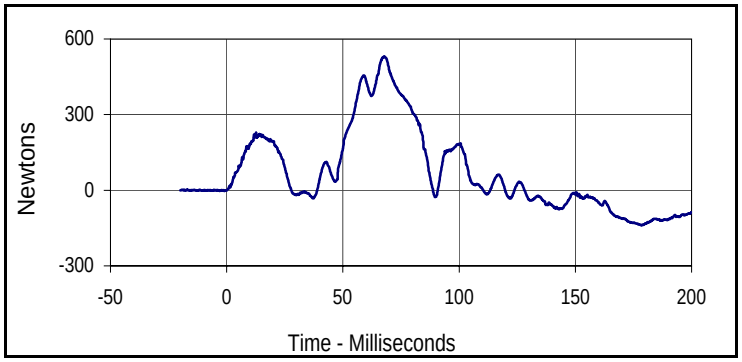


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
100.6	70.9	-37.1	196.7

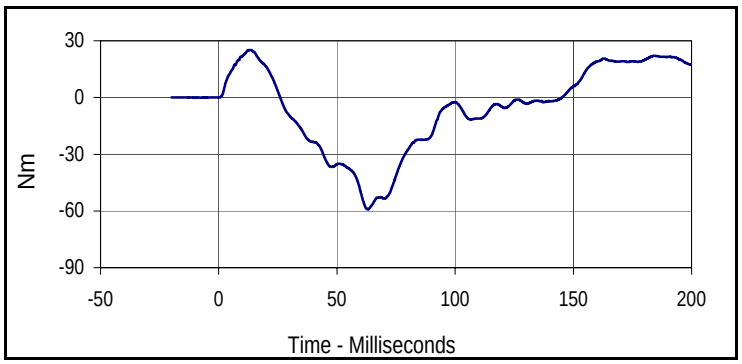


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
24.1	184.1	-66.0	63.3

Test Program:	Hybrid III 5th Percentile Female Neck Extension Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141NE049



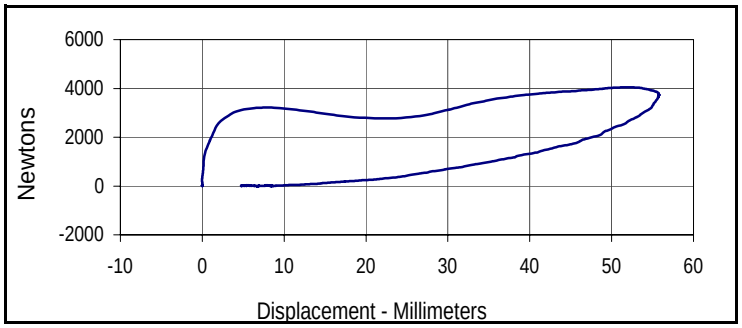
Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
532.0	67.8	-138.4	178.2



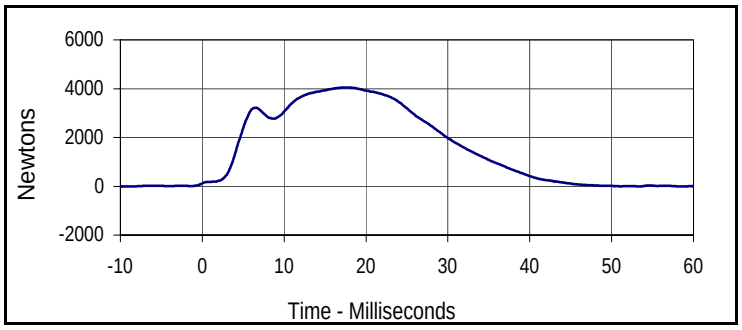
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
25.1	13.0	-59.1	63.0

Test Program:	Hybrid III 5th Percentile Female Thorax Impact Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141CH049

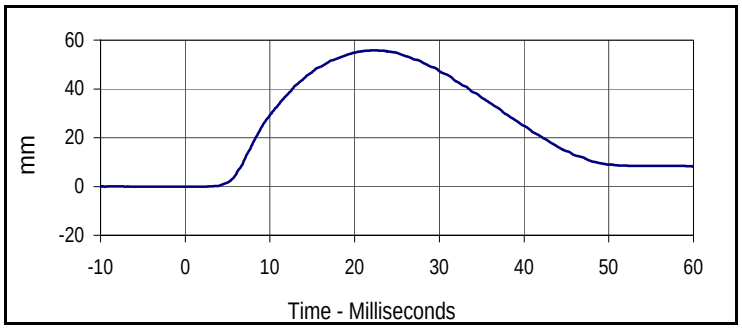
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	390	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Probe Velocity		m/s	6.59 to 6.83	6.69	Pass
Peak Chest Deflection		mm	50.0 to 58.0	55.8	Pass
Peak Force Between 50 and 58 MM		Newtons	3900 to 4400	4025	Pass
Peak Force Between 18 and 50 MM		Newtons	≤4600	4050	Pass
Internal Hysterysis		%	69 to 85	72.8	Pass
			Overall Test Results		Pass



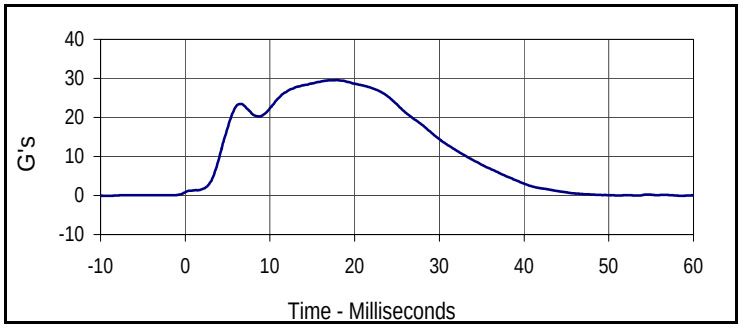
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysterysis
001	FIL	180	72.8
Peak Probe Force		Peak Chest Deflection	
4049.6		55.8	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4049.6	17.8	-13.2	72.8



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
55.8	22.3	0.0	1.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
29.6	17.8	-0.1	72.8

Test Program:	Hybrid III 5th Percentile Female Knee Impact Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141LK049 , F141RK049

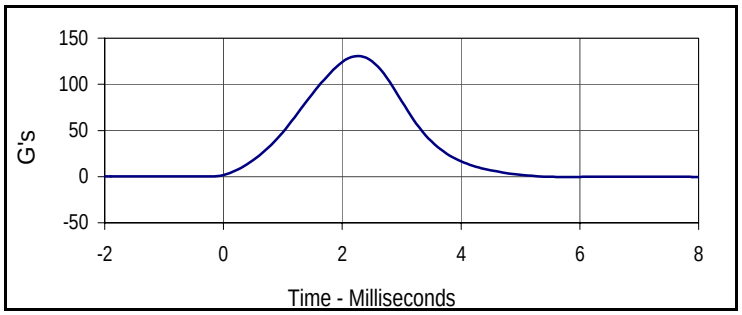
Left Knee

Tested Parameter		Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time		Minutes	≥240	420	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity at T=0		m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force		Newtons	3450 to 4060	3825	Pass
			Overall Test Results		Pass

Right Knee

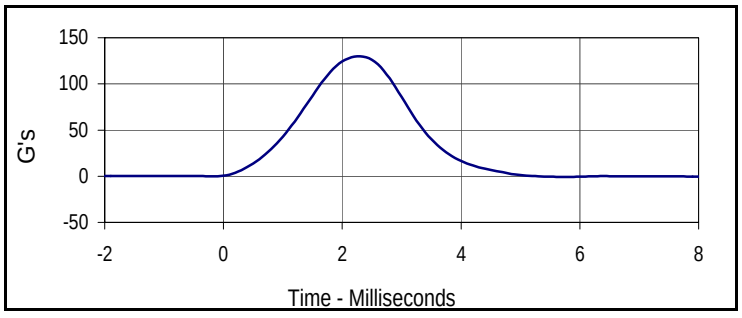
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	3450 to 4060	3808	Pass
		Overall Test Results		Pass

Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3825.1	2.3	-16.8	10.0



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
130.5	2.3	-0.6	10.0

Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3807.6	2.3	-25.9	5.7



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
129.9	2.3	-0.9	5.7

Test Program:	Hybrid III 5th Percentile Female Torso Flexion Test	Test Date:	11/20/12
ATD Serial No.:	141	Test I.D.:	F141TF049

Left Hip Joint-Femur Results

Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	445	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Initial Reference Plane Angle		Degrees	≤ 20	0.6	Pass
Peak Force at 45° +/-0.5°		Newtons	320.0 to 390.0	345.0	Pass
Torso Rotation Rate		deg/sec	0.5 to 1.5	0.8	Pass
Final Reference Plane Angle		Degrees	+/-8	1.2	Pass
			Overall Test Results		Pass

APPENDIX C
POST-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: Hybrid III 50th Percentile Male Dummy Damage Checklist Test Date: 11/28/12

ATD Serial No.: 034 Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

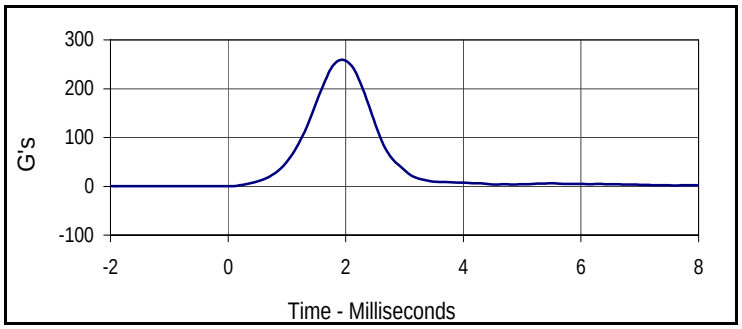
Test Program: Hybrid III 50th Percentile Male External Measurements Test Date: 11/28/12

ATD Serial No.: 034 Test I.D.: N/A

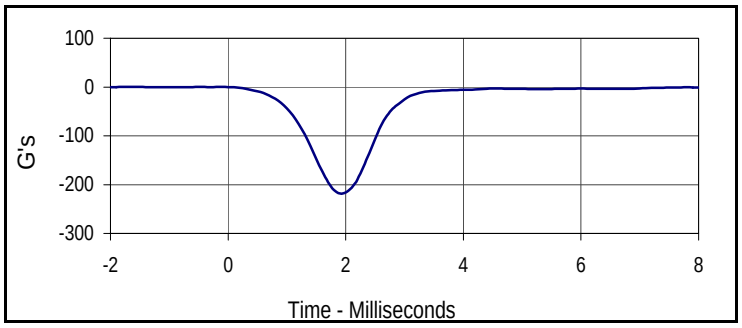
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.12	Pass
Laboratory Relative Humidity	%	10 to 70	29.8	Pass
A - Total sitting height	mm	879 to 889	884	Pass
B - Shoulder pivot height	mm	505 to 521	512	Pass
C - H point height	mm	84 to 89	85	Pass
D - H point location from backline	mm	135 to 140	137	Pass
E - Shoulder pivot from backline	mm	84 to 94	89	Pass
F - Thigh clearance	mm	140 to 155	146	Pass
G - Back of elbow to wrist pivot	mm	290 to 305	297	Pass
H - Head back to backline	mm	41 to 46	43	Pass
I - Shoulder to elbow length	mm	330 to 345	336	Pass
J - Elbow rest height	mm	190 to 211	201	Pass
K - Buttock to knee length	mm	579 to 604	586	Pass
L - Popliteal length	mm	429 to 455	438	Pass
M - Knee pivot height	mm	485 to 500	493	Pass
N - Buttock popliteal length	mm	452 to 477	472	Pass
O - Chest depth without jacket	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	260	Pass
V - Shoulder breadth	mm	422 to 437	433	Pass
W - Foot breadth	mm	91 to 107	99	Pass
Y - Chest circumference (with chest jacket)	mm	970 to 1001	981	Pass
Z - Waist circumference	mm	836 to 866	864	Pass
AA - Location for chest circumference	mm	429 to 434	429	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
		Overall Test Results		Pass

Test Program:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034HD036

Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	250	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.5	Pass
	Min	%		29.2	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Peak Resultant Acceleration		G's	225.0 to 275.0	258.8	Pass
Peak Lateral Acceleration		G's	≤15.0	3.8	Pass
Oscillations After Main Pulse		%	<10% of peak Res. Acceleration	2.9	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
			Overall Test Results		Pass



Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
258.8	1.9	0.0	-1.5



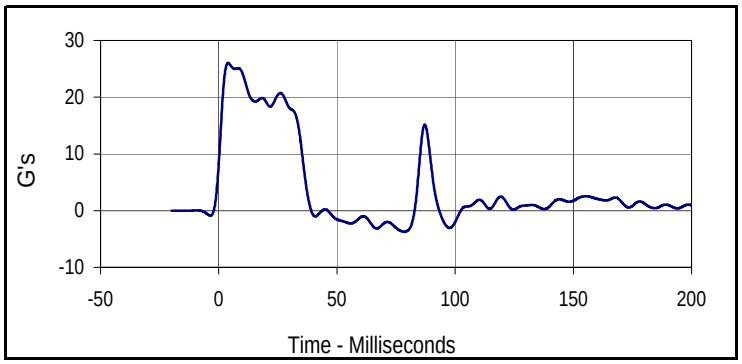
Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.1	-1.7	-217.9	1.9

Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
3.1	1.7	-3.8	5.5

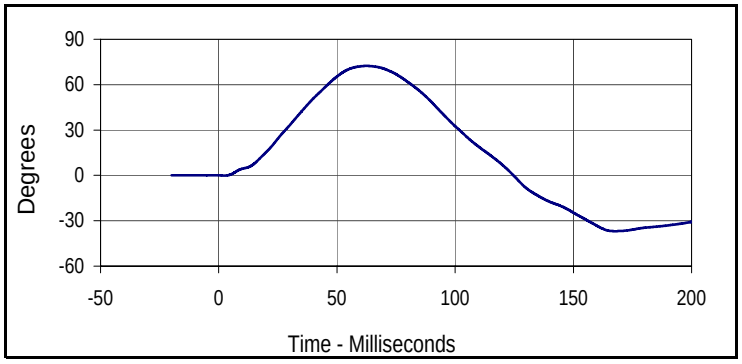
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
139.6	2.0	-3.0	5.6

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034NF036

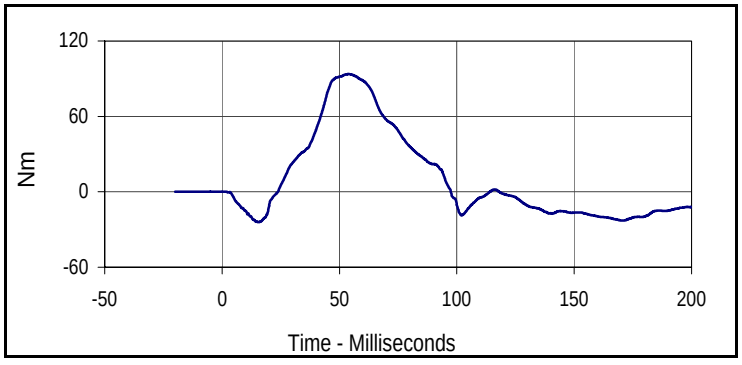
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	295	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.5	Pass
	Min	%		29.2	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.03	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	24.3	Pass
	20 Msec.	G's	17.6 to 22.6	19.2	Pass
	30 Msec.	G's	12.5 to 18.5	18.1	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.1	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.8	Pass
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	72.4	Pass
	Time	Msec.	57.0 to 64.0	62.4	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	124.7	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	93.8	Pass
	Time	Msec.	47.0 to 58.0	53.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	97.5	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
26.0	3.9	-3.7	78.5

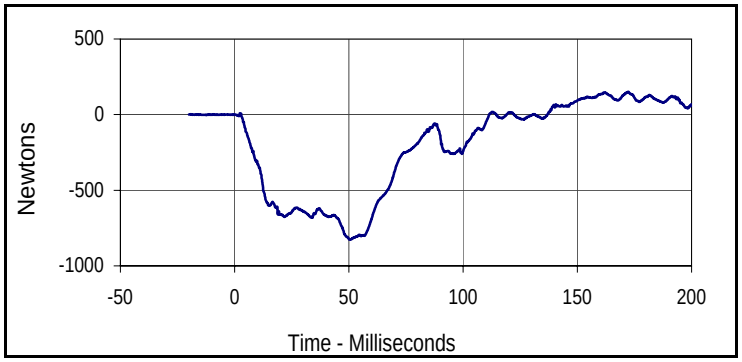


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
72.4	62.4	-36.9	167.6

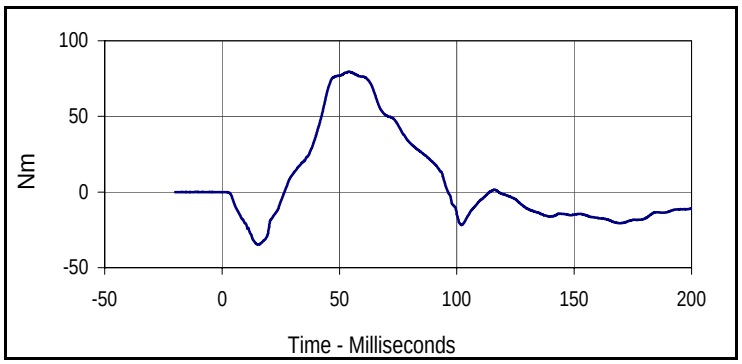


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
93.8	53.8	-24.1	15.5

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034NF036



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
151.7	172.2	-827.5	50.4

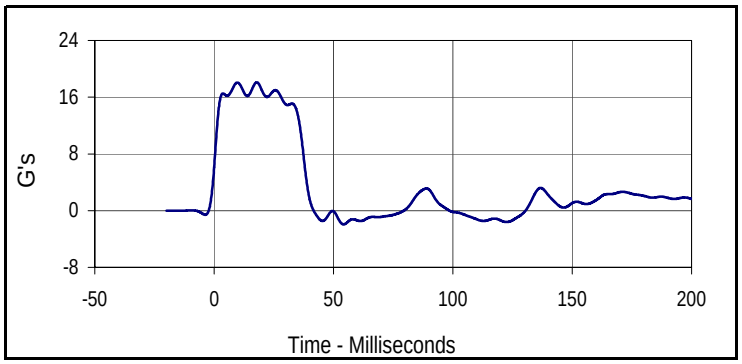


Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
79.5	54.0	-34.8	15.6

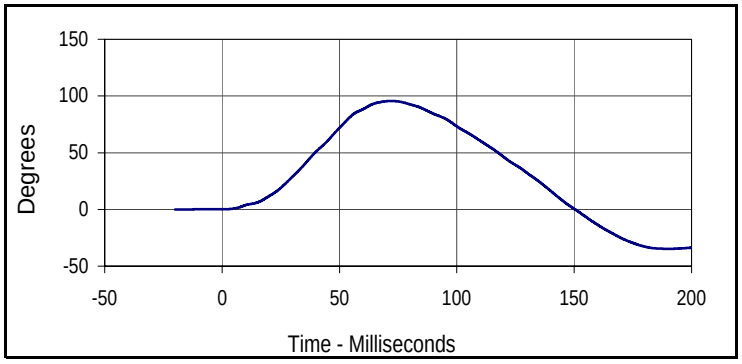
Test Program: Hybrid III 50th Percentile Male Neck Extension Test Test Date: 11/28/12

ATD Serial No.: 034 Test I.D.: M034NE036

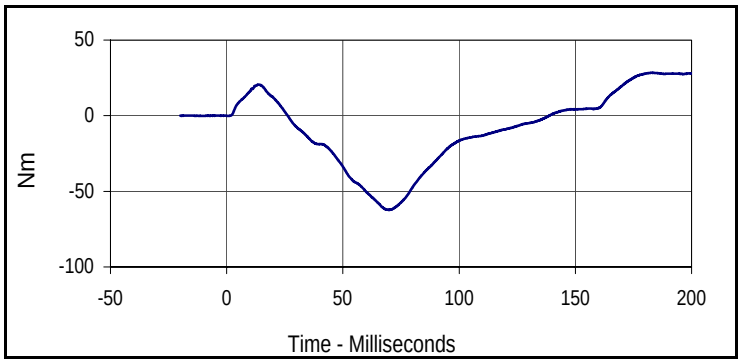
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	330	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.5	Pass
	Min	%		29.2	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.09	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.0	Pass
	20 Msec.	G's	14.0 to 19.0	17.0	Pass
	30 Msec.	G's	11.0 to 16.0	15.0	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.1	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	38.4	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	95.6	Pass
	Time	Msec.	72.0 to 82.0	72.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	150.4	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-62.3	Pass
	Time	Msec.	65.0 to 79.0	69.6	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	138.8	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
18.1	17.8	-1.9	54.2

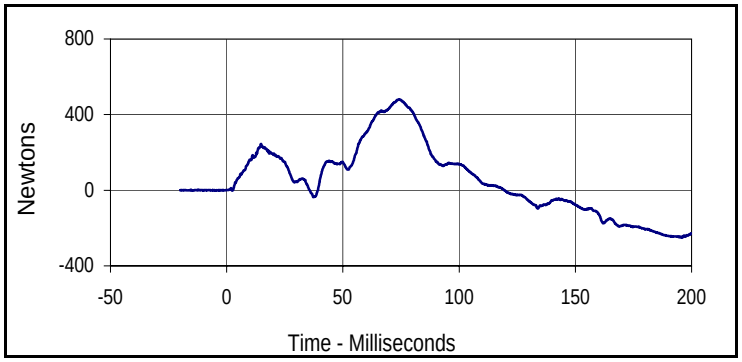


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
95.6	72.2	-34.7	190.4

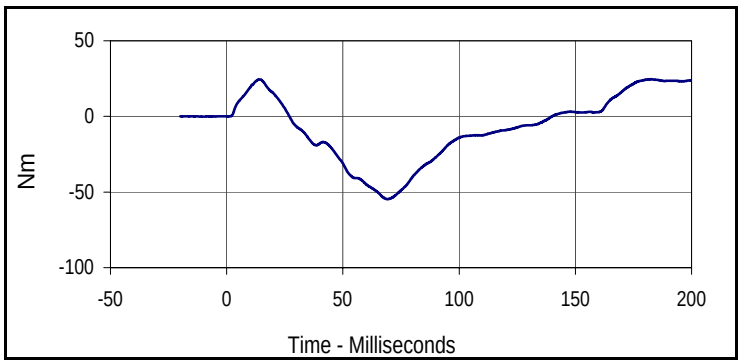


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
28.4	182.9	-62.3	69.6

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034NE036



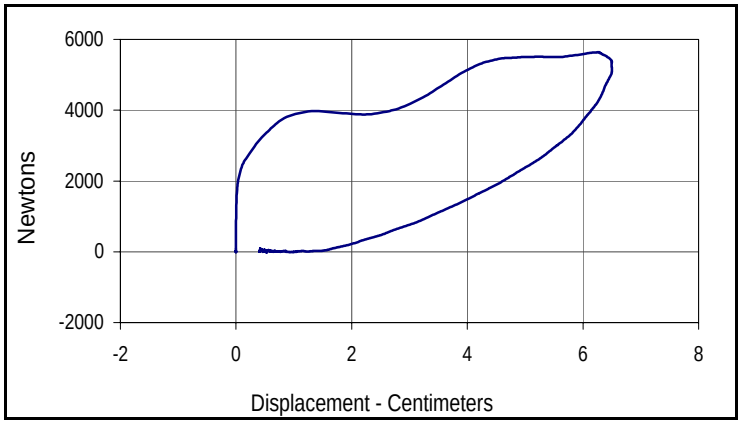
Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
479.3	74.6	-251.1	196.0



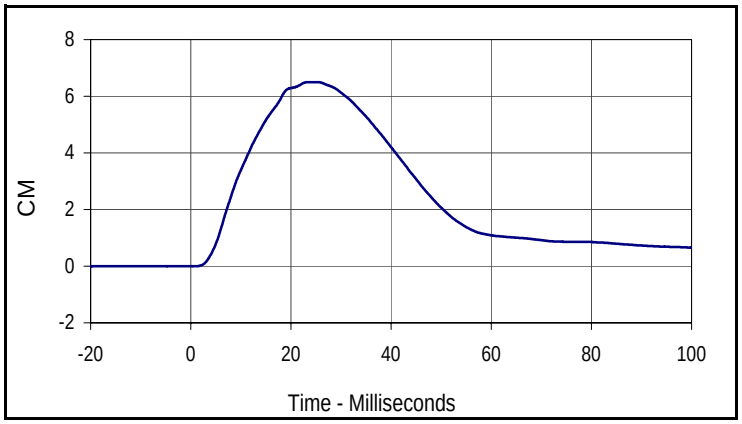
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
24.6	182.8	-54.7	69.1

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034CH036

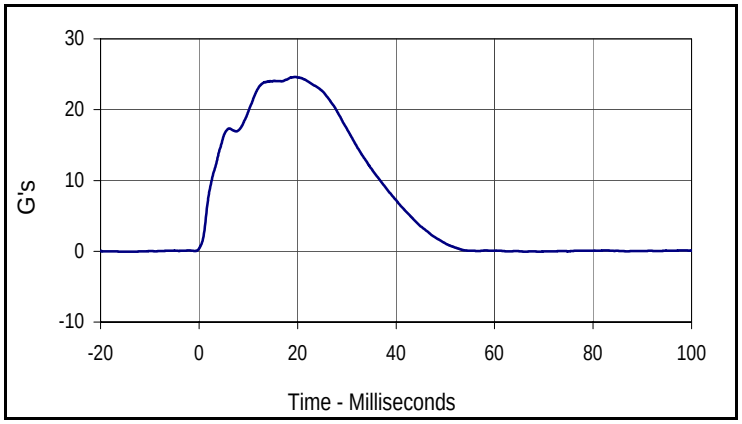
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	380	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.5	Pass
	Min	%		29.2	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Probe Velocity		m/s	6.58 to 6.82	6.65	Pass
Peak Probe Force		Newtons	5159 to 5893	5641	Pass
Peak Sternum Deflection		CM	6.35 to 7.26	6.50	Pass
Internal Hysterysis		%	69 to 85	70.4	Pass
			Overall Test Results		Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysterysis
001	FIL	180	70.4
Peak Probe Force		Peak Chest Deflection	
5641		6.50	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.5	25.3	0.0	0.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
24.6	19.5	-0.1	69.2

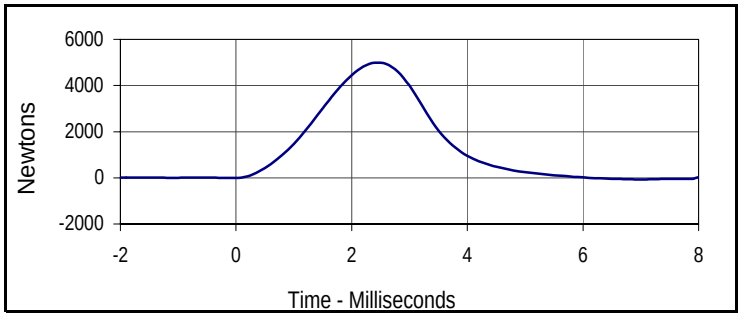
Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034LK036 , M034RK036

Left Knee

Tested Parameter		Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time		Minutes	≥240	415	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.5	Pass
	Min	%		29.2	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Pendulum Velocity at T=0		m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force		Newtons	4715 to 5782	4994	Pass
			Overall Test Results		Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5028	Pass
		Overall Test Results		Pass



Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4993.5	2.5	-68.7	7.0

Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
102.1	2.5	-1.4	7.0

Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
5028.5	2.6	-44.5	10.0

Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
102.8	2.6	-0.9	10.0

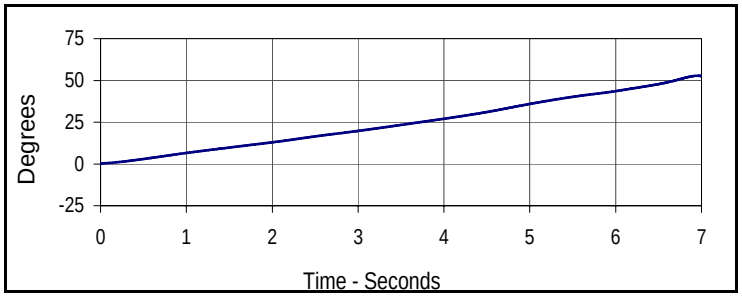
Test Program:	Hybrid III 50th Percentile Male Hip Joint-Femur Flexion Test	Test Date:	11/28/12
ATD Serial No.:	034	Test I.D.:	M034LF036 , M034RF036

Left Hip Joint-Femur Results

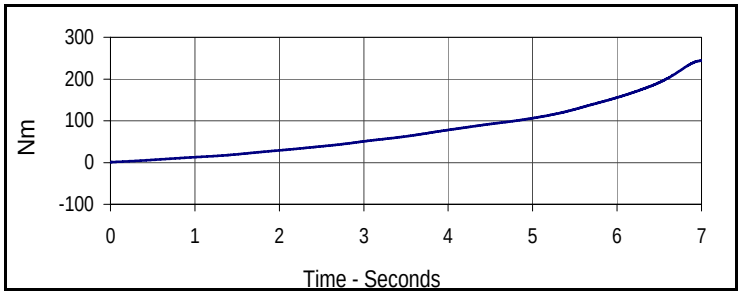
Tested Parameter		Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time		Minutes	≥240	465	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.5	Pass
	Min	%		29.2	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Rotation Rate		deg/sec	5 to 10	7.6	Pass
Femur Torque at 30°		Nm	≤ 95	89.0	Pass
Rotation at 203 Nm		Degrees	40.0 to 50.0	49.0	Pass
			Overall Test Results		Pass

Right Hip Joint-Femur Results

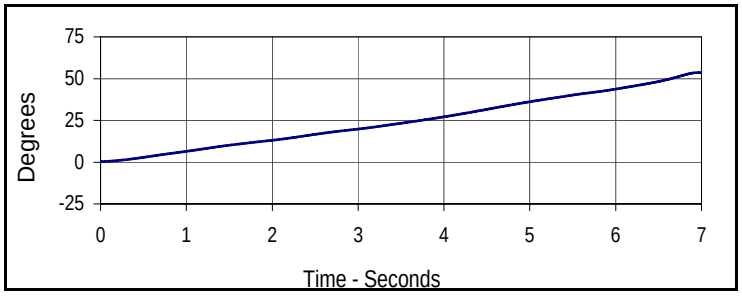
Rotation Rate	deg/sec	5 to 10	7.7	Pass
Femur Torque at 30°	Nm	≤ 95	90.7	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	49.2	Pass
		Overall Test Results		Pass



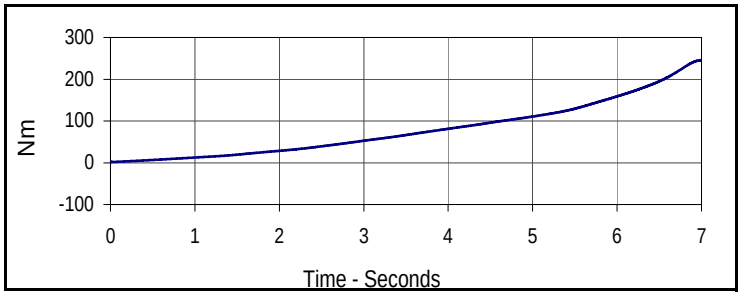
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	Degrees
Max	Time	Min	Time
52.8	7.0	0.2	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
243.8	7.0	1.0	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
53.6	7.0	0.2	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
245.3	7.0	1.6	0.0

Test Program: Hybrid III 5th Percentile Female Dummy Damage Checklist Test Date: 11/29/12

ATD Serial No.: 141 Test I.D.: N/A

Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

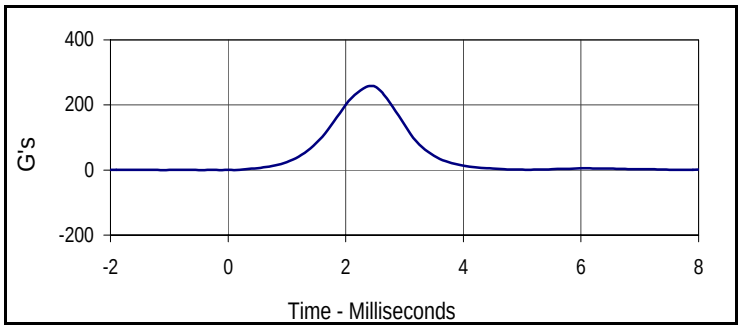
Test Program: Hybrid III 5th Percentile Female External Measurements Test Date: 11/29/12

ATD Serial No.: 141 Test I.D.: N/A

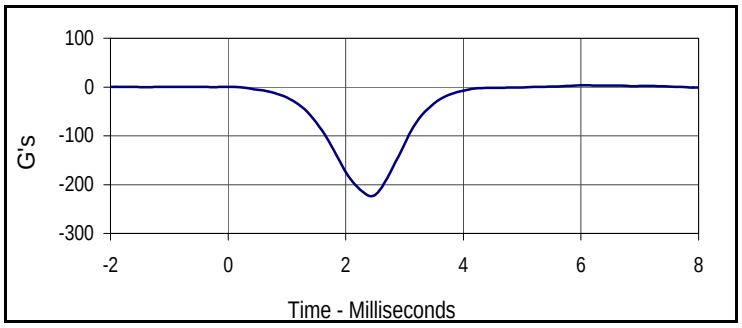
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.11	Pass
Laboratory Relative Humidity	%	10 to 70	29.8	Pass
A - Total sitting height	mm	774.7 to 800.1	784	Pass
B - Shoulder pivot height	mm	431.8 to 457.2	450	Pass
C - H point height	mm	81.3 to 86.3	85	Pass
D - H point location from backline	mm	144.8 to 149.8	146	Pass
E - Shoulder pivot from backline	mm	68.6 to 83.8	77	Pass
F - Thigh clearance	mm	119.4 to 134.6	126	Pass
G - Back of elbow to wrist pivot	mm	243.9 to 259.1	250	Pass
H - Head back to backline	mm	40.7 to 45.7	44	Pass
I - Shoulder to elbow length	mm	276.8 to 297.2	285	Pass
J - Elbow rest height	mm	182.8 to 203.2	197	Pass
K - Buttock to knee length	mm	520.7 to 546.1	531	Pass
L - Popliteal length	mm	355.6 to 376.0	371	Pass
M - Knee pivot height	mm	393.7 to 419.1	401	Pass
N - Buttock popliteal length	mm	414.0 to 439.4	420	Pass
O - Chest depth without jacket	mm	175.3 to 190.5	185	Pass
P - Foot length	mm	218.5 to 233.7	221	Pass
R - Buttock to Knee Pivot Length	mm	457.2 to 482.6	473	Pass
S - Head Breadth	mm	137.1 to 147.3	144	Pass
T - Head Depth	mm	177.8 to 188.0	180	Pass
U - Hip Breadth	mm	299.7 to 314.9	302	Pass
V - Shoulder breadth	mm	350.5 to 365.7	359	Pass
W - Foot breadth	mm	78.8 to 94.0	90	Pass
X - Head circumference	mm	528.3 to 548.7	541	Pass
Y - Chest circumference (with chest jacket)	mm	850.8 to 881.3	864	Pass
Z - Waist circumference	mm	759.5 to 789.9	768	Pass
AA - Location for chest circumference	mm	299.7 to 309.9	300	Pass
BB - Location for waist circumference	mm	160.1 to 170.2	165	Pass
		Overall Test Results		Pass

Test Program:	Hybrid III 5th Percentile Female Head Drop Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141HD050

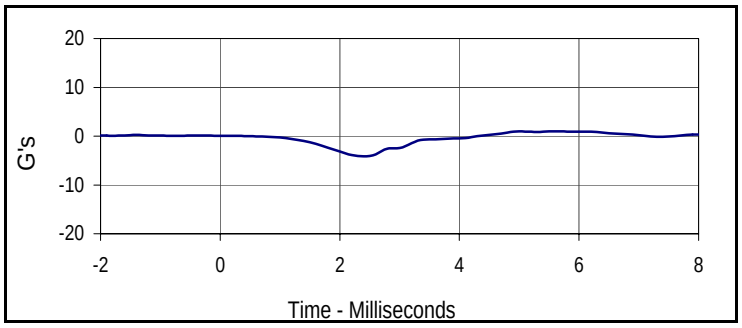
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	245	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.3	Pass
	Min	%		29.4	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Peak Resultant Acceleration		G's	250.0 to 300.0	258.4	Pass
Peak Lateral Acceleration		G's	≤15.0	4.1	Pass
Oscillations After Main Pulse		%	<10% of peak Res. Acceleration	2.0	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
			Overall Test Results		Pass



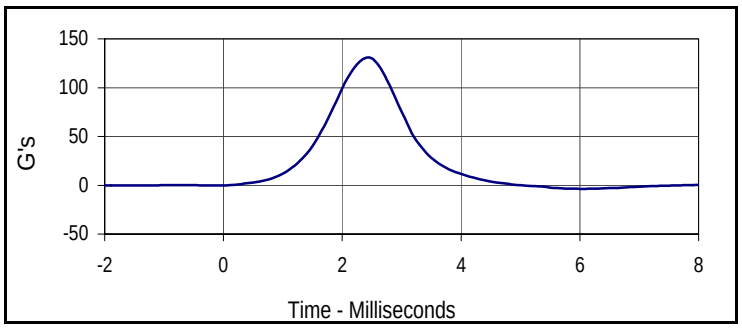
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
258.4	2.4	0.1	0.1



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.6	6.0	-223.0	2.4



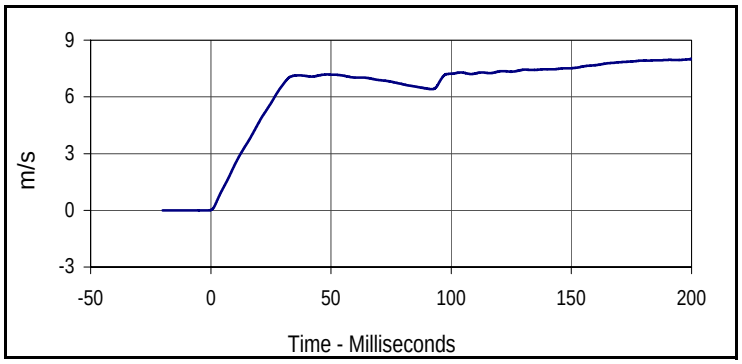
Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
1.0	5.6	-4.1	2.4



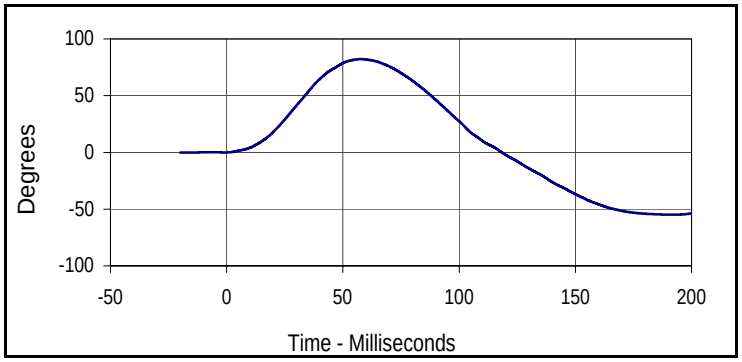
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
130.6	2.4	-3.7	6.0

Test Program:	Hybrid III 5th Percentile Female Neck Flexion Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141NF050

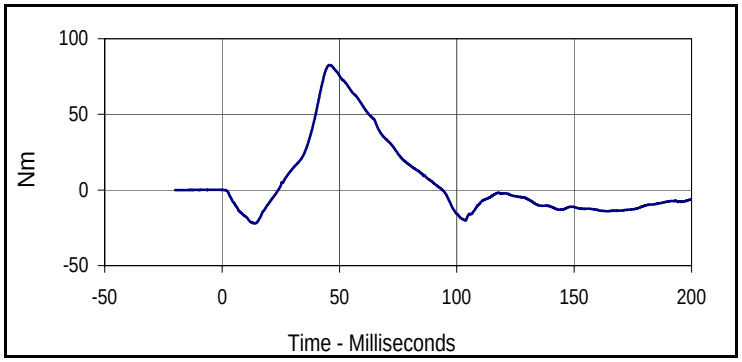
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	290	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.3	Pass
	Min	%		29.4	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.4	Pass
	20 Msec.	m/s	4.0 to 5.0	4.7	Pass
	30 Msec.	m/s	5.8 to 7.0	6.7	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	82.2	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	78.6	Pass
Positive Moment Decay, Time To 10 Nm		Msec.	80.0 to 100.0	84.9	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
8.0	200.0	0.0	-1.1

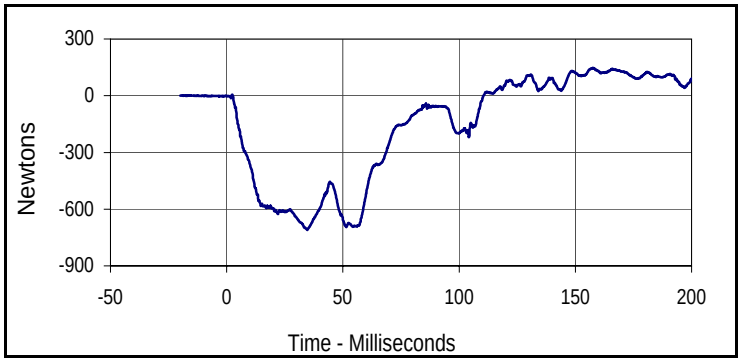


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
82.2	57.6	-54.9	192.5

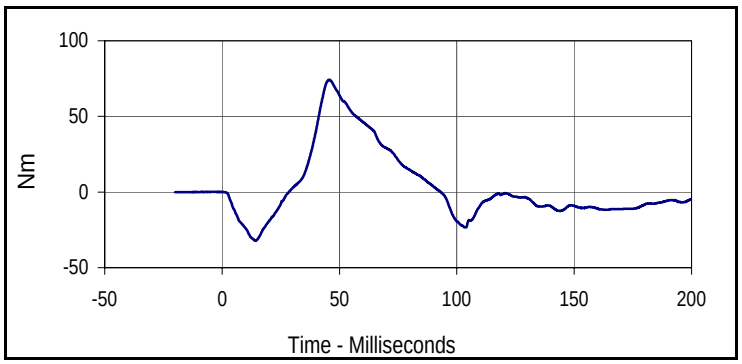


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
82.7	45.8	-22.2	14.0

Test Program:	Hybrid III 5th Percentile Female Neck Flexion Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141NF050



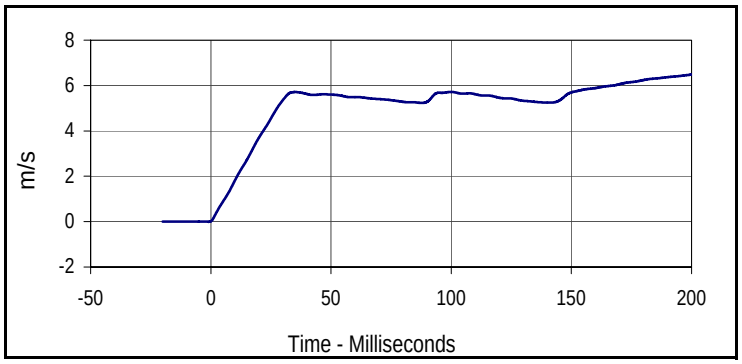
Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
147.1	157.5	-711.0	34.6



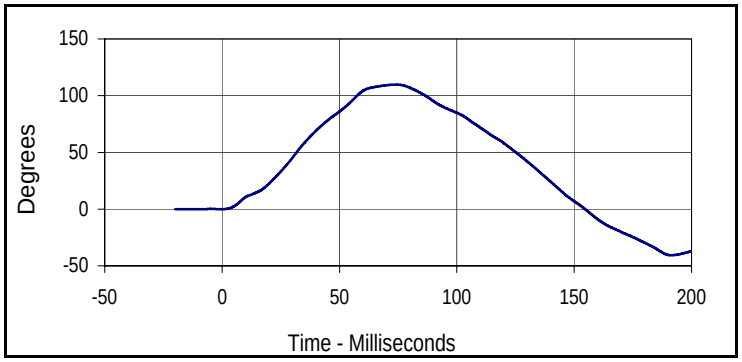
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
74.3	45.6	-32.2	14.4

Test Program:	Hybrid III 5th Percentile Female Neck Extension Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141NE050

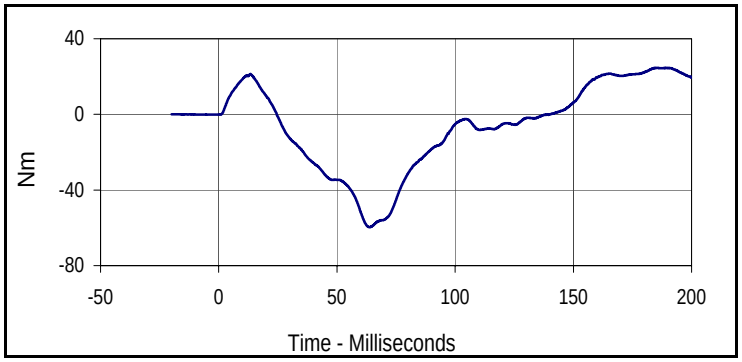
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	325	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.3	Pass
	Min	%		29.4	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.8	Pass
	20 Msec.	m/s	3.1 to 3.9	3.7	Pass
	30 Msec.	m/s	4.6 to 5.6	5.4	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	109.8	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-59.7	Pass
Positive Moment Decay, Time To -10 Nm		Msec.	94.0 to 114.0	96.9	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.5	200.0	0.0	-0.9

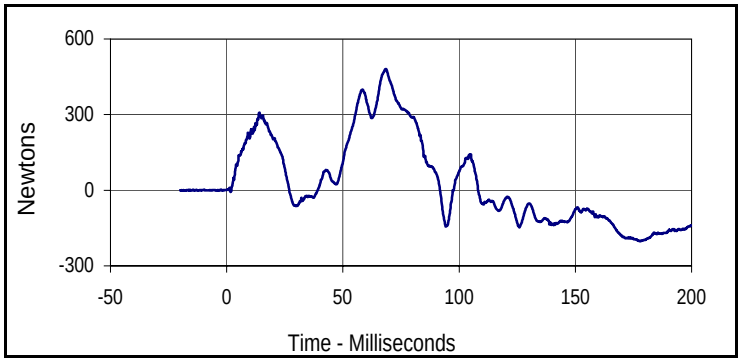


Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
109.8	74.0	-40.6	191.2

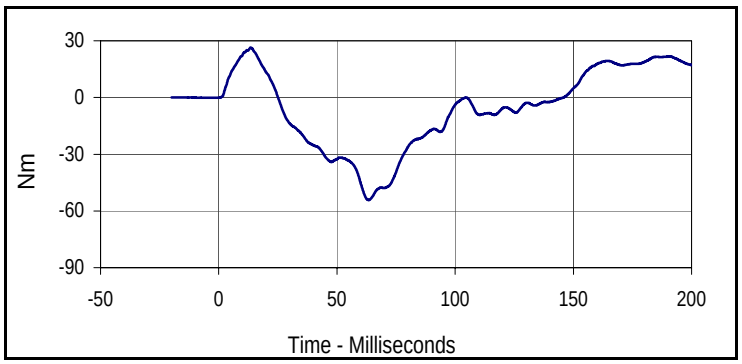


Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
24.6	185.1	-59.7	63.8

Test Program:	Hybrid III 5th Percentile Female Neck Extension Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141NE050



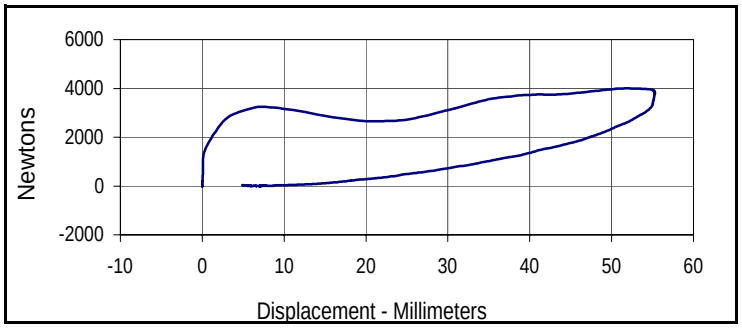
Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
480.9	68.5	-201.8	177.9



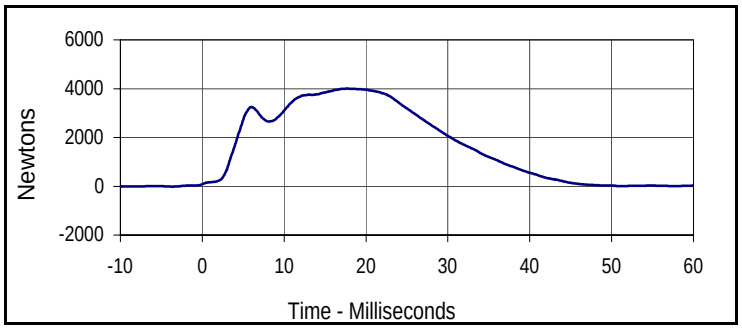
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
26.4	13.5	-54.2	63.4

Test Program:	Hybrid III 5th Percentile Female Thorax Impact Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141CH050

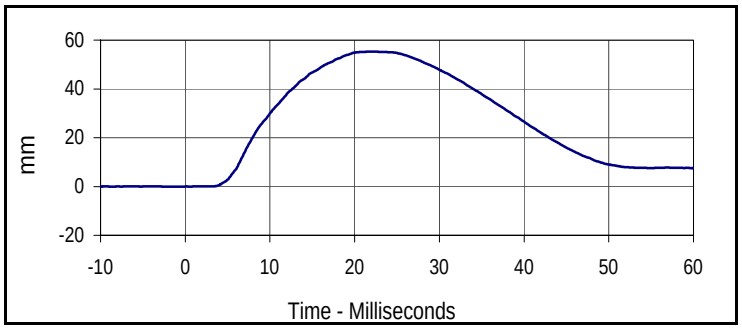
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	375	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.3	Pass
	Min	%		29.4	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Probe Velocity		m/s	6.59 to 6.83	6.68	Pass
Peak Chest Deflection		mm	50.0 to 58.0	55.3	Pass
Peak Force Between 50 and 58 MM		Newtons	3900 to 4400	3964	Pass
Peak Force Between 18 and 50 MM		Newtons	≤4600	4003	Pass
Internal Hysterysis		%	69 to 85	72.4	Pass
			Overall Test Results		Pass



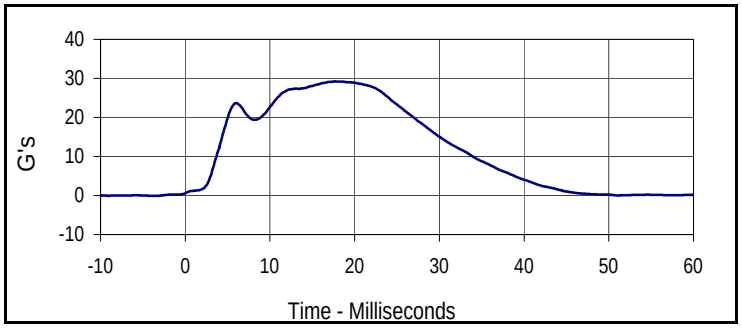
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysterysis
001	FIL	180	72.4
Peak Probe Force		Peak Chest Deflection	
4003.4		55.3	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4003.4	17.7	-13.7	-3.6



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
55.3	22.2	0.0	-2.1



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
29.2	17.7	-0.1	-3.6

Test Program:	Hybrid III 5th Percentile Female Knee Impact Test	Test Date:	11/29/12
ATD Serial No.:	141	Test I.D.:	F141LK050 , F141RK050

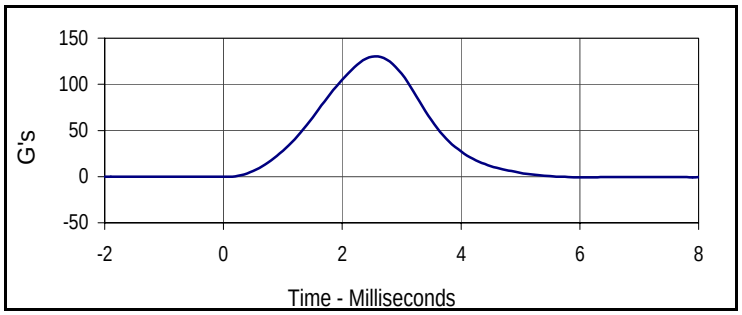
Left Knee

Tested Parameter		Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time		Minutes	≥240	405	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.3	Pass
	Min	%		29.4	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Pendulum Velocity at T=0		m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force		Newtons	3450 to 4060	3815	Pass
			Overall Test Results		Pass

Right Knee

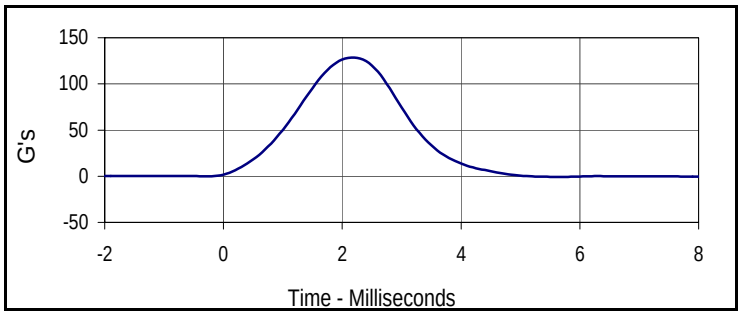
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	3450 to 4060	3770	Pass
		Overall Test Results		Pass

Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3815.0	2.6	-23.7	6.0



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
130.2	2.6	-0.8	6.0

Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3769.7	2.2	-25.6	5.6



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
128.6	2.2	-0.9	5.6

Test Program:	Hybrid III 5th Percentile Female Torso Flexion Test		Test Date:	11/29/12	
ATD Serial No.:	141		Test I.D.:	F141TF050	

Left Hip Joint-Femur Results

Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	430	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.3	Pass
	Min	%		29.4	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Initial Reference Plane Angle		Degrees	≤ 20	1.2	Pass
Peak Force at 45° +/-0.5°		Newtons	320.0 to 390.0	346.0	Pass
Torso Rotation Rate		deg/sec	0.5 to 1.5	0.9	Pass
Final Reference Plane Angle		Degrees	+/-8	2.8	Pass
			Overall Test Results		Pass