

REPORT NUMBER TR-P28003-08-NC

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**DAIMLER AG
2008 SMART FORTWO PURE COUPE
2-DOOR COUPE**

NHTSA NUMBER: M80511

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MARCH 27, 2008

FINAL REPORT

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16. Abstract A 55/28 km/h 90 deg. Moving Deformable Barrier Side Impact NCAP Test was conducted on the subject 2008 Smart Fortwo Pure Coupe 2-Door Coupe in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedures for the generation of consumer information on vehicle side crash protection. The test was conducted at KARCO Engineering, LLC in Adelanto, CA, on March 27, 2008. The impact velocity of the Moving Deformable Barrier was 62.26 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 15.6 deg. C. The target vehicle's maximum post-test static crush was 90 mm located at level 4. The test vehicle's occupant performance data is as follows:*					
*During the side impact test the driver door unlatched and opened approximately 7 inches.					
Measurement Description		Driver SID/HIII	Pass. SID/HIII		
Left Upper Rib (LUR) G's		49.5			
Left Lower Rib (LLR) G's		57.2			
Lower Spine (T ₁₂) G's		56.9			
Thoracic Trauma Index (TTI) G's		57.0			
Pelvis (PEV) G's		69.0			
17. Key Words New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) Side Impact Dummy (SID/HIII)				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. NHTSA Technical Reference Division 1200 New Jersey Ave., SE, Room W43-410 Washington, DC 20590	
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SECTION 1

PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This Side Impact NCAP test is conducted as part of the FY' 2008 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-03-D-32005. The purpose of this test is to generate comparative side impact data on a 2008 Smart Fortwo Pure Coupe 2-Door Coupe manufactured by Daimler AG.

1.2 TEST PROCEDURE

The side impact test was conducted in accordance with the current National Highway Traffic Safety Administration (NHTSA), Office of Crashworthiness Standards (OCS), laboratory test procedure NCAP Side Impact Testing, dated November 2002. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

2.1 SUMMARY OF SIDE IMPACT NCAP TEST

A model year 2008 Smart Fortwo Pure Coupe 2-Door Coupe was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.26 km/h. The specified impact velocity range is from 61.14 to 62.75 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 994 kg and the test weight of the MDB was 1361 kg. The test was conducted at KARCO Engineering, LLC in Adelanto, California, on March 27, 2008.

Two (2) real-time cameras and ten (10) high-speed video cameras were used to document the impact event. Camera locations and pertinent camera information is documented in the data sheets. Pre- and post-test photographs of the vehicle and SID/HIIIs can be found in Appendix A. One 50th percentile adult male Side Impact Dummy, Hybrid III (SID/HIII) was placed in the driver's designated seating position according to the test procedure. The SID/HIII is instrumented with contact switches on the pelvis, thorax and six-axis neck load cells, and fourteen accelerometers in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X, Y, and Z axes primary and redundant)

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front Driver		Left Rear (Passenger)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No		
Side Torso Airbag	Yes	Yes		
Head Airbag	No			
Curtain Airbag	No			

SECTION 2...(CONTINUED)

The test vehicle was instrumented with twenty-one (21) structural accelerometers and the MDB was instrumented with five (5) accelerometers and one (1) contact switch on the right bumper to compare left side to right side bumper impact timing. All data channels were recorded with the fully self contained on-board Data Acquisition System (DAS). The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The driver door opened a total of 190 mm, at the striker, during impact. The test vehicle sustained a maximum static crush of 90 mm at level 4, 1650 mm rearward of the left vertical impact point. The driver SID/Hybrid III, Serial No. 274, was calibrated prior to this test. The SID/Hybrid III injury criteria are summarized as follows:

Measurement	Units	Driver	Passenger
Thoracic Trauma Index (TTI)	G's	57	
Peak Pelvic G's (PEV)	G's	69	

Test summaries and post-test observations are presented in Section 3. Appendix A contains the still photograph prints. Appendix B contains the driver SID/HIII, vehicle, and MDB response data traces. Appendix C contains the SID Configuration and performance verification data.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION SHEETS

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(t_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M80511
Make	Smart
Model	Fortwo Pure Coupe
Body Style	2-Door Coupe
Vin No.	WMEEJ31X18K112453
Color	Yellow/Black
Delivery Date	3/12/2008
Odometer (Miles)	8.0
Dealer	Smart Center West Covina
Transmission	5-Speed Automatic
Final Drive	Rear
Type/No. Cyl.	Inline 3
Engine Disp. (L)	1.0
Engine Placement	Transverse
Roof Rack	No
Sunroof/T-Top	No
Tinted Glass	No
Traction Control	No
Power Brakes	Yes
Front Disc	Yes
Rear Disc	No

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	No
Driver Front Airbag	Yes
*Driver Side Torso Airbag	Yes
*Driver Side Head Airbag	No
Driver Curtain/Airbag	No
Rear Pass. Airbag	
Rear Pass. Side Airbag	
Rear Pass. Head Airbag	
Rear Pass. Curtain/Airbag	
Pre-Tensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes
Air Cond.	Yes
AM/FM CD	No
Tilt Steering	No
Automatic Door Locks	Yes
Power Windows	No
Power Seats	No
Other	None

* Combination Airbag

Does Owners Manual provide instructions to turn off automatic door locks.

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler AG
Date of Manufacture	Jan-08

GVWR (kg)	1050
GAWR Front (kg)	440
GAWR Rear (kg)	660

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket			
Number of Occupants	2			2
Capacity Weight (VCW) (kg)				235
Cargo Weight (RCLW) (kg)				99

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

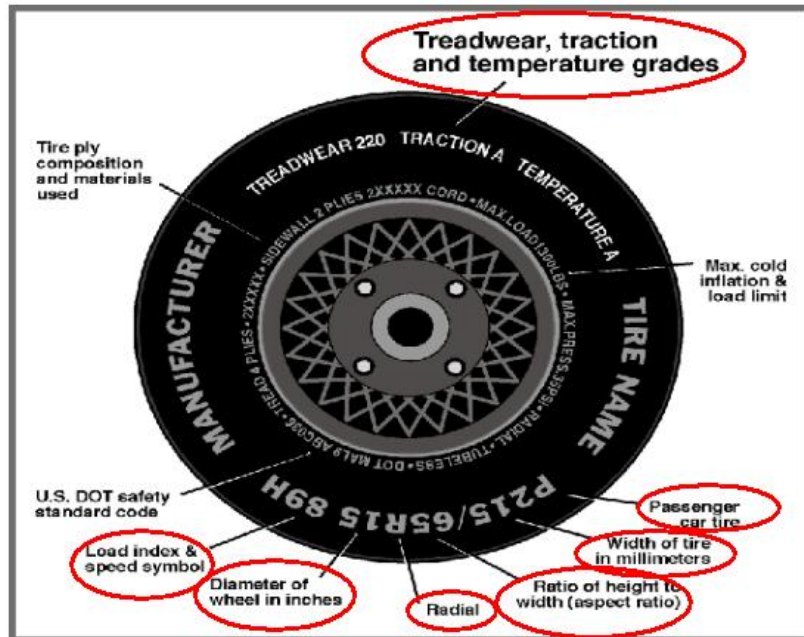
Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kpa)	200	250
Recommended Tire Size	155/60R15	175/55R15
Tire Size on Vehicle	155/60R15	175/55R15
Tire Manufacturer	Continental	Continental
Treadwear	400	400
Traction	AA	AA
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	74T	77T
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Right	DOT CN93 PVH6	DOT CN93 PVH6
DOT Safety Code Left	DOT CN93 PVH6	DOT CN93 PVH6

DATA SHEET NO. 1...(CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door CoupeNHTSA No.: M80511Test Program: 55/28 km/h Side Impact NCAPTest Date: 3/27/08**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	168	233	401	196	321	517
Right	kg	184	234	418	181	296	477
Ratio	%	43.0	57.0	100.0	37.9	62.1	100.0
Totals	kg	352	467	819	377	617	994

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	819
Weight of 1 P572 ATD's	kg	81
Rated Cargo/Luggage Wt. (RCLW)	kg	99
Calculated Vehicle Target Wt. (TVTW)	kg	999

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	620	620	650	648	1066
As Tested	mm	601	604	611	609	1161
Fully Loaded	mm	600	604	606	608	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	1870
Total Vehicle Length at Left Side	mm	2508
Total Vehicle Length at Centerline	mm	2707
Total Vehicle Length at Right Side	mm	2508
Weight of Ballast In Cargo Area	kg	77
Amount of Stoddard Solvent in Fuel Tank	liters	30.70

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	1870
Target Impact Point Aft of Front Axle	mm	-5
Actual Impact Point Aft of Front Axle	mm	12

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

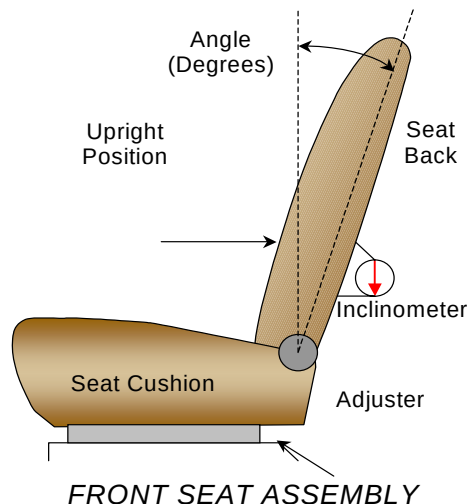
NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturer's designated angle. The procedure is as follows: Seat back angle was measured at the headrest using a digital inclinometer.



SEAT BACK ANGLES

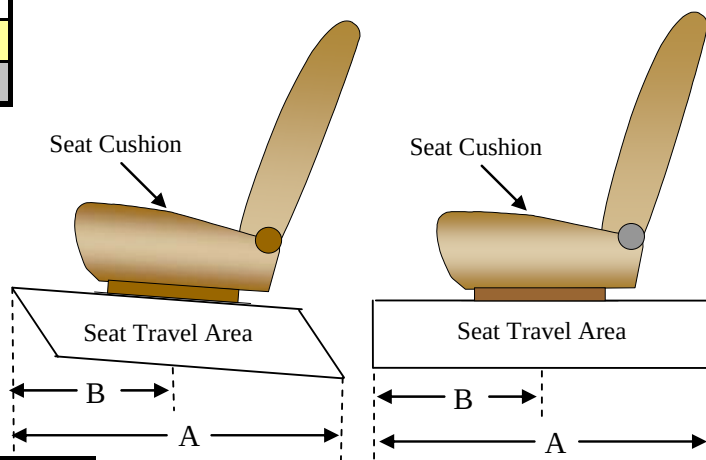
	Deg.
Driver w/seated Dummy	81.0 @ Seat Back
Passenger w/seated Dummy	

SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position at the highest vertical seat height to rearmost position at the lowest vertical seat height. The seat was set at the longitudinal mid position. There were vertical adjustments on the driver seat that was equipped with the vehicle. There were no adjustments on the passenger seat. The driver seat was placed at the lowermost position.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	26 Detents	13th Detent
Rear Seat		



SEAT BELT UPPER ANCHORAGE

Seat belt anchorage was fixed.

SEAT BELT UPPER ANCHORAGE

	Total # of Positions	Placed in Position #
Driver Seat	Fixed	Fixed
Rear Seat		

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

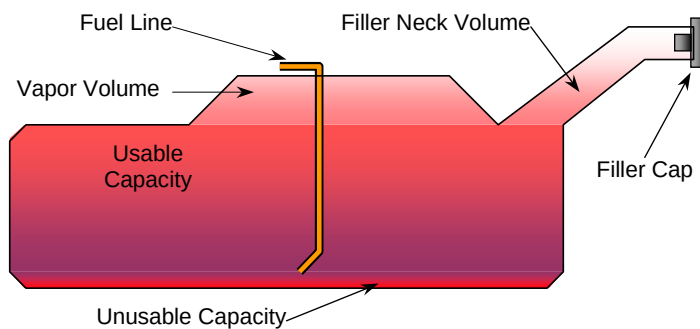
Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	33.01
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	30.36 to 31.04
Actual Amount of Solvent used	30.70

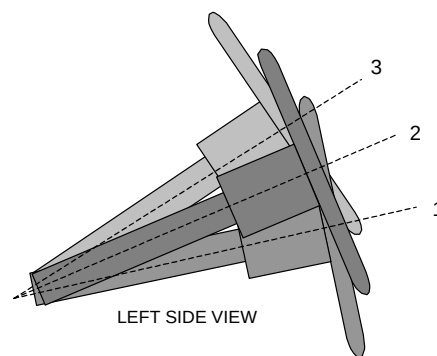
The test vehicle is equipped with an electric fuel pump. The fuel pump will operate for approximately two (2) seconds with the ignition in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the right rear fender. The standard fuel tank occupies the area under the rear seat and pickup bed.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost position No. 1	Fixed	Fixed
Geometric center position No. 2	Fixed	Fixed
Uppermost position No. 3	Fixed	Fixed

DATA SHEET NO. 2

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	13	226
Level 2	Occupant H-Point	mm	53	632
Level 3	Mid Door	mm	35	678
Level 4	Window Sill	mm	90	960
Level 5	Window top	mm	-3	1455
N/A	Maximum Penetration	mm	90	

INSTRUMENTATION

Driver SID/Hybrid III Accelerometers	20
Passenger SID/Hybrid III Accelerometers	0
Vehicle Structure Accelerometers	15
MDB Accelerometers	5
Total No. of Contact Switches	3
Total	43

CAMERA COVERAGE

High Speed, Vehicle On-Board	1
High Speed, Off-Board	5
High Speed, MDB On-Board	3
Real Time, Panning	2
Total	11

DATA SHEET NO. 3**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door CoupeNHTSA No.: M80511Test Program: 55/28 km/h Side Impact NCAPTest Date: 3/27/08**MDB SPECIFICATIONS (mm)**

Measurement Description	Length
Overall Width of Framework Carriage	1252
Overall Length including Honeycomb Face	4115
Wheel Base of Framework Carriage	2590
C.G. location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	384	308	
Right	kg	385	284	
Ratio	%	56.5	43.5	
Totals	kg	769	592	1361

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.26
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.21
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.5

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE (mm)

Vertical Location			From Centerline		Max. Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	208
B	Top of Bumper	533	800	Left	106
C	Mid Level	686	800	Left	120
D	Top of Stack	813	700	Right	96

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	1
High Speed Cameras	2

DATA SHEET NO. 4

POST-TEST OBSERVATIONS

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/Hybrid III	Rear Seat SID/Hybrid III
Dummy Type/Serial No.	P572F, SID / No. 274	
Head Contact	*Side Airbag	
Upper Torso Contact	*Side Airbag	
Lower Torso Contact	*Side Airbag, Door Panel	
Left Knee Contact	Door Panel, Right Knee	
Right Knee Contact	Left Knee	

POST-TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	190 mm at door latch	
Right Side Door Opening	Remained closed and latched, operational	
Seat Movement	None	
Seatback Failure	None	

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation occurred
Sill Separation	Left front sill separated
Windshield Damage	None
Window Damage	Driver side window broken
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 2	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No		
Side Airbag	*Yes	*Yes		
Head Airbag	*Yes	*Yes		
Curtain Airbag	No			
Pre-Tensioners	Yes			
Load Limiters	Yes			

MDB LEFT EDGE IMPACT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	+13 (right)
Vertical Offset	mm	+/-20	+17 (above)

*Combination airbag for side and head

DATA SHEET NO. 5

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

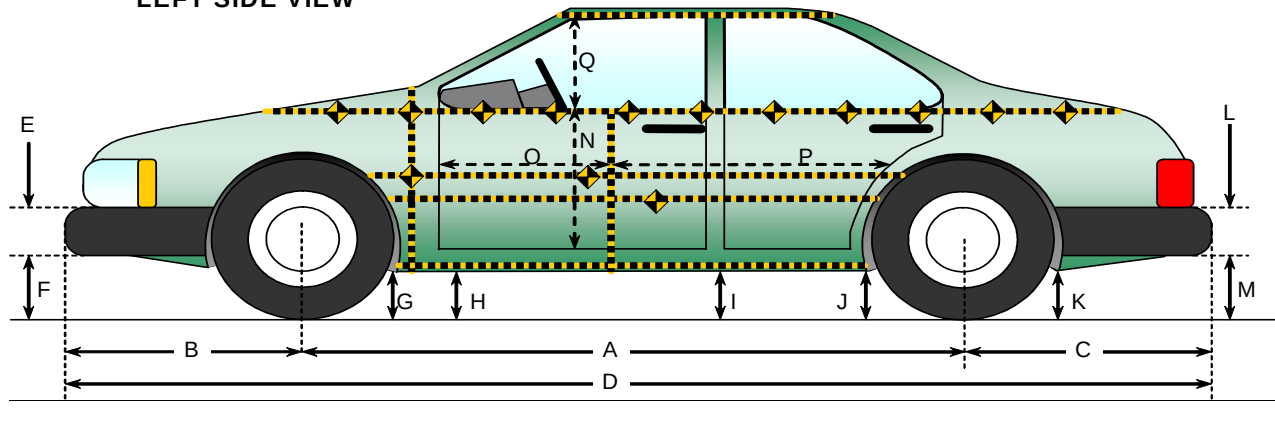
Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

LEFT SIDE VIEW



VEHICLE PRE AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	1870	1880	10
B	Front Axle to FSOV	436	454	18
C	Rear Axle to RSOV	399	403	4
D	Total Length at Centerline	2707	2730	23
E	Front Bumper Thickness	154	154	0
F	Front Bumper Bottom to Ground	180	199	19
G	Sill Height at Front Wheel Well	165	199	34
H	Sill Height at Front Door Leading Edge	163	196	33
I	Sill Height at "B" Pillar	154	195	41
J1	Sill Height at Rear Wheel Well	143	173	30
J2	Pinch Weld Height at Rear Wheel Well	158	188	30
K	Sill Height aft of Rear Wheel Well	271	301	30
L	Rear Bumper Thickness	370	370	0
M	Rear Bumper Bottom to Ground	207	258	51
N	Sill Height to Window Bottom Sill	685	705	20
O	Front Door Leading Edge to Impact CL	490	494	4
P	Rear Door Trailing Edge to Impact CL	n/a	n/a	n/a
Q	Front Window Opening	400	425	25
R	Right Side Length	2508	2525	17
S	Left Side Length	2508	2520	12
T	Vehicle Width at "B" Post	1555	1555	0

All Dimensions shown in millimeters

DATA SHEET NO. 6

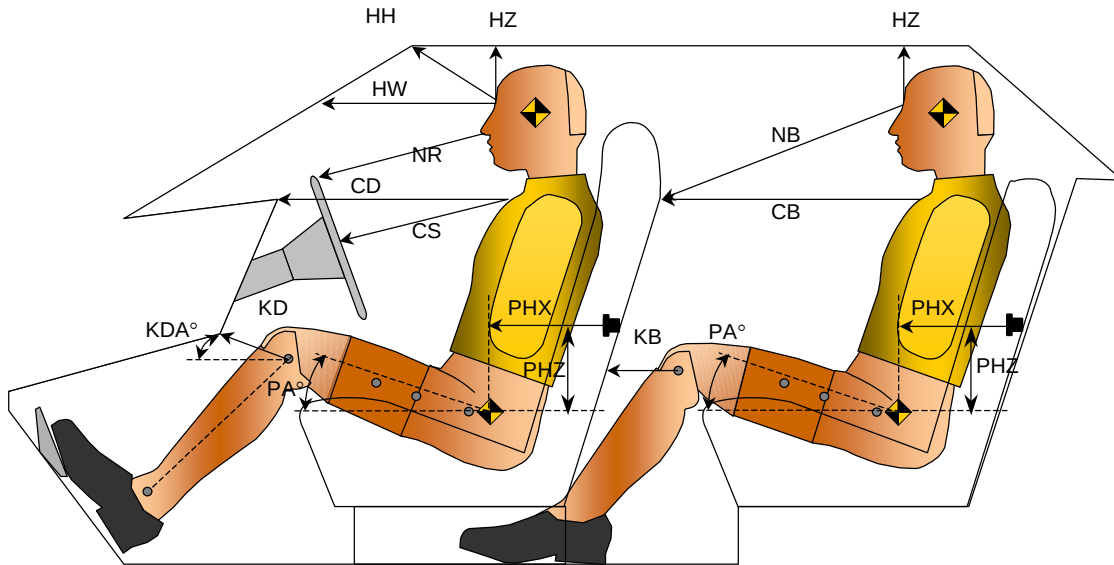
SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length(mm)	Angle	Length(mm)	Angle
HH		Head to Header	545	7.4		
HW		Head to Windshield	685	0.0		
HZ	HZ	Head to Roof	190	90.0		
NR	NB	Nose to Rim/Nose to Seat Back	492	14.5		
CD	CB	Chest to Dash or Seat Back	612	5.8		
CS		Chest to Steering Wheel	309	0.0		
KDL	KBL	Left Knee to Dash or Seat Back	146	2.0		
KDR	KBR	Right Knee to Dash or Seat Back	135			
PA	PA	Pelvic Angle		23.6		
PHX	PHX	H-Point to Striker (X-Axis)	360			
PHZ	PHZ	H-Point to Striker (Z-Axis)	220			

All Dimensions shown in millimeters

DATA SHEET NO. 7

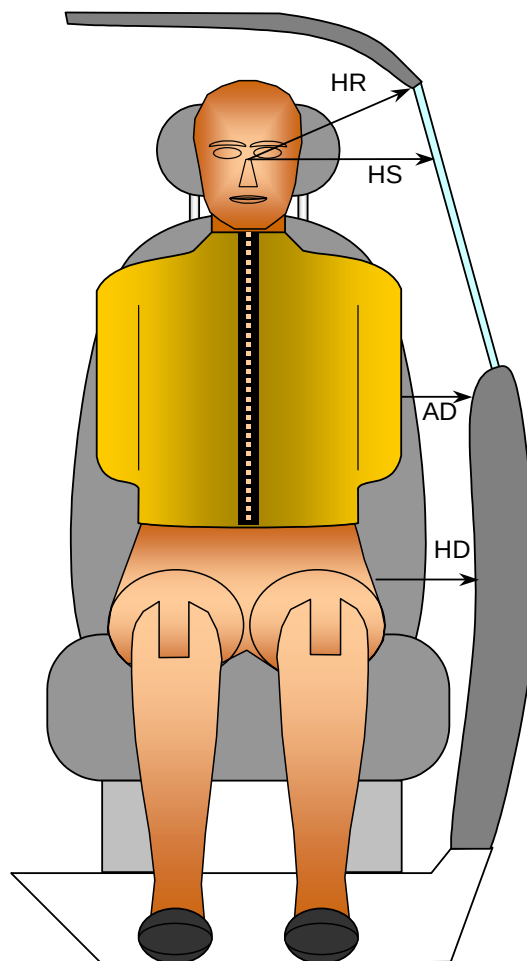
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



FRONT VIEW OF DUMMY

LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	240	
HS	Head to Side Window	mm	270	
AD	Arm to Door	mm	64	
HD	H-Point to Door	mm	104	

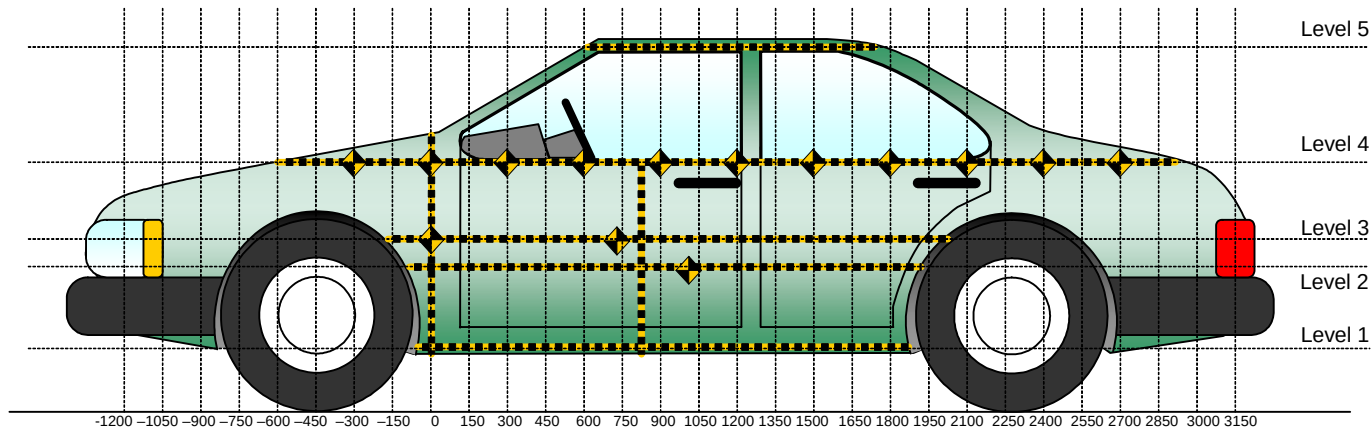
DATA SHEET NO. 8 **VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



All Measurements Shown in mm

LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.

Measurements taken 900 mm right of impact reference.

All measurements below in mm.

Level	Measurement Description	Height Above Ground
1	Sill Top	226
2	Occupant H-Point	632
3	Mid Door	678
4	Window Sill	960
5	Window Top	1455

All Dimensions shown in millimeters

DATA SHEET NO. 9
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150		786	826				796	816				10	-10		
0		766	776	896			801	801	921			35	25	25	
150		768	776	860			816	811	848			48	35	-12	
300	798	774	776	826		791	827	811	833		-7	53	35	7	
450	794	784	776	811		786	766	756	791		-8	-18	-20	-20	
600	793	780	774	796		796	761	756	781		3	-19	-18	-15	
750	791	774	770	793		796	761	758	771		5	-13	-12	-22	
900	790	770	766	786	992	792	766	758	760	986	2	-4	-8	-26	-6
1050	790	771	766	784	986	791	777	766	756	989	1	6	0	-28	3
1200	790	770	766	783	986	796	796	781	753	883	6	26	15	-30	-103
1350	790	774	770	783	986	801	821	716	754	980	11	47	-54	-29	-6
1500	773	774	771	783	987	786	741	741	766	982	13	-33	-30	-17	-5
1650		771	770	791	999		721	738	881	981		-50	-32	90	-18
1800		731	751	796	1008		706	731	841	996		-25	-20	45	-12
1950		716	736	804			701	726	856			-15	-10	52	
2100															
2250															
2400															
2550															
2700															
2850															
3000															

All Dimensions shown in millimeters.

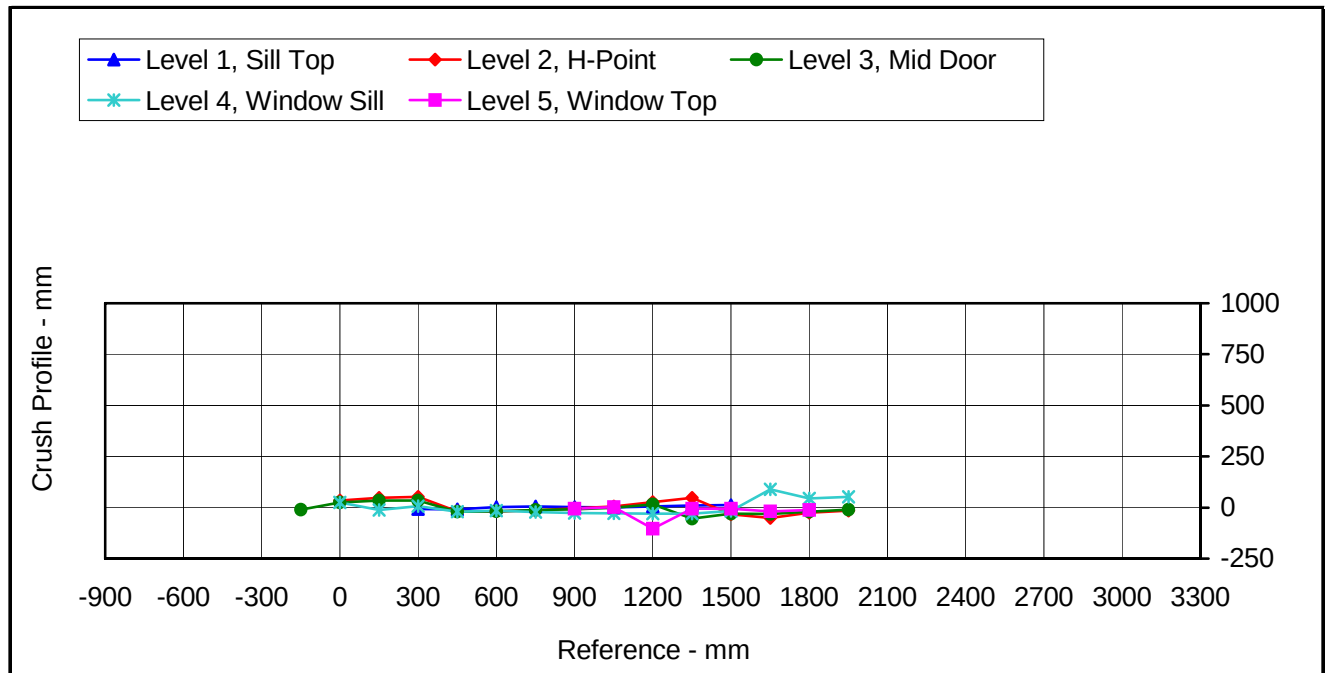
DATA SHEET NO. 9...(CONTINUED)
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



	Units	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush	mm	13	53	35	90	3
Distance from Impact	mm	1500	300	300	1650	1050

DATA SHEET NO. 10

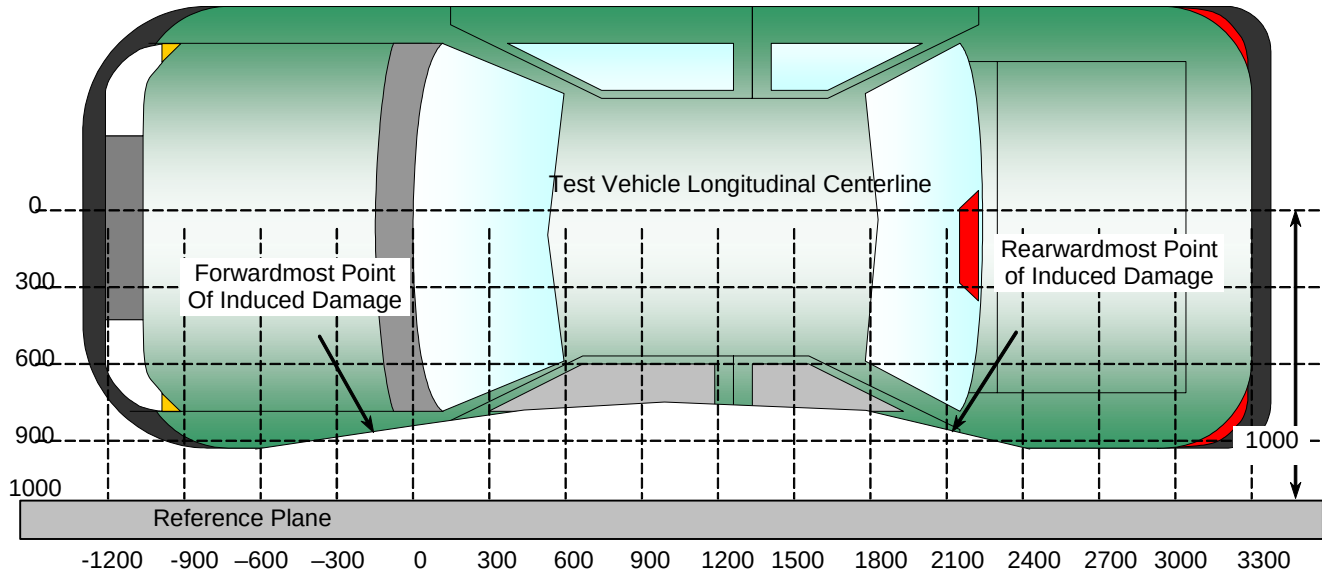
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



All Dimensions Shown in millimeters

TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2100	n/a	n/a	n/a	n/a
2	1650	4	791	881	90
3	1200	2	770	796	26
4	750	1	791	796	5
5	300	2	774	827	53
6	-150	2	786	796	10

DATA SHEET NO. 11

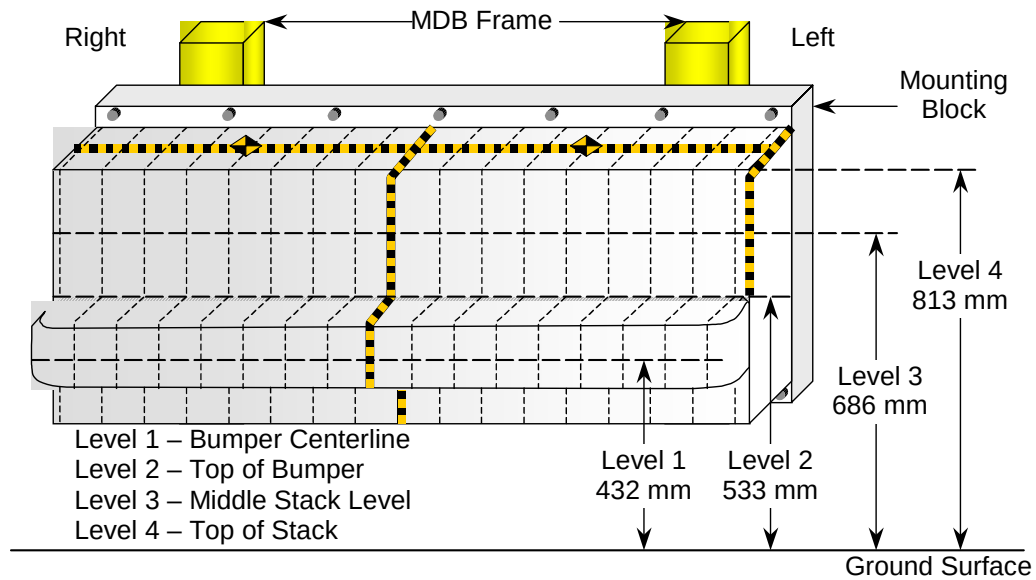
DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	726	706	701	701	701	683	670	665	673	664	663	663	661	661	661	658	666
2	726	720	715	714	711	691	687	686	686	688	691	690	691	690	690	700	691
3	740	733	696	696	681	666	654	643	636	632	634	637	644	666	677	675	686
4	648	711	711	709	684	670	651	660	656	648	653	658	671	679	705	716	712

All Dimensions in mm

DATA SHEET NO. 12

VEHICLE ACCELEROMETER LOCATIONS

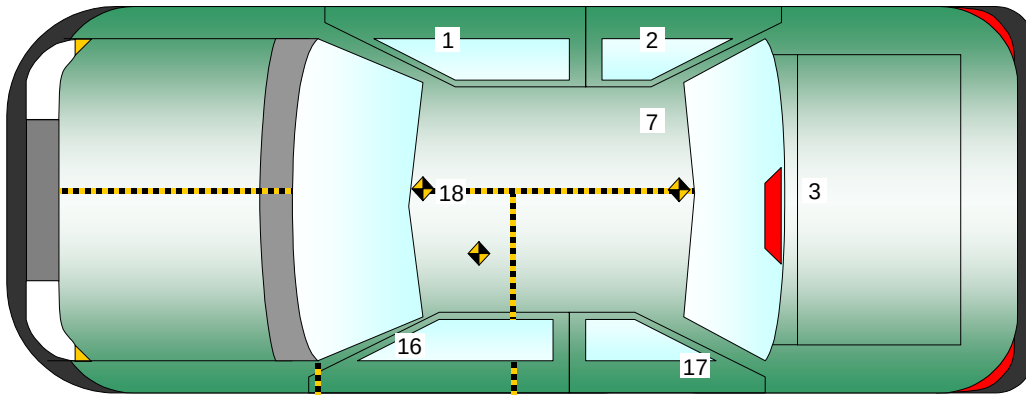
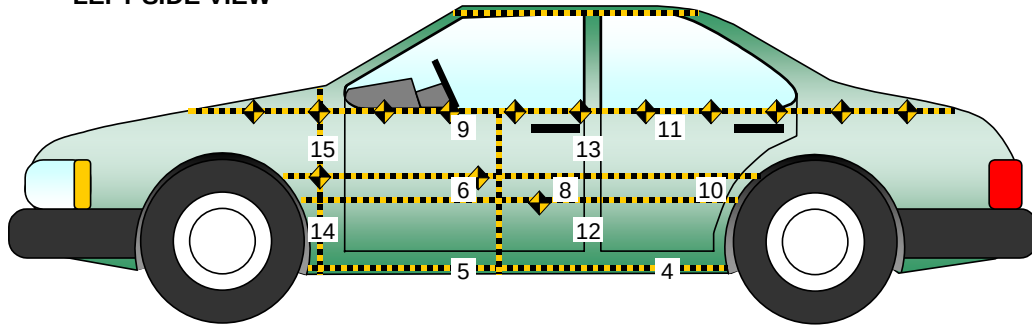
Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

LEFT SIDE VIEW



No.	Location
1	Right Sill at Front Seat
2	Right Sill at Rear Seat
3	Rear Floorpan Above Axle
4	Left Sill at Rear Door
5	Left Sill at Front Door
6	Left Front Door Centerline
7	Right Rear Occupant Compartment
8	Left Front Door Mid-Rear
9	Left Front Door Upper Centerline

No.	Location
10	Left Rear Door Mid-Rear
11	Left Rear Door Upper Centerline
12	Left Lower B-Post
13	Left Middle B-Post
14	Left Lower A-Post
15	Left Middle A-Post
16	Front Seat Track
17	Rear Seat Track or Structure
18	Vehicle CG

DATA SHEET NO. 12.....(CONTINUED)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

VEHICLE ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	1551	533	370
2	Right Sill at Rear Seat			
3	Rear Floorpan Above Axle	772	0	720
4	Left Sill at Rear Door			
5	Left Sill at Front Door	1551	-580	145
6	Front Door Centerline			
7	Rt. Rear Occ. Compartment			
8	Front Door Mid-Rear			
9	Front Door Upper Centerline			
10	Rear Door Mid-Rear			
11	Rear Door Upper Centerline			
12	B-Post Lower	789	-600	501
13	B-Post Middle	768	-600	703
14	A-Post Lower	1910	-620	563
15	A-Post Middle	1910	-620	835
16	Front Seat Track	1240	-548	460
17	Rear Seat Structure			
18	Vehicle CG	1551	120	370

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

1.) Not installed

DATA SHEET NO. 13

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

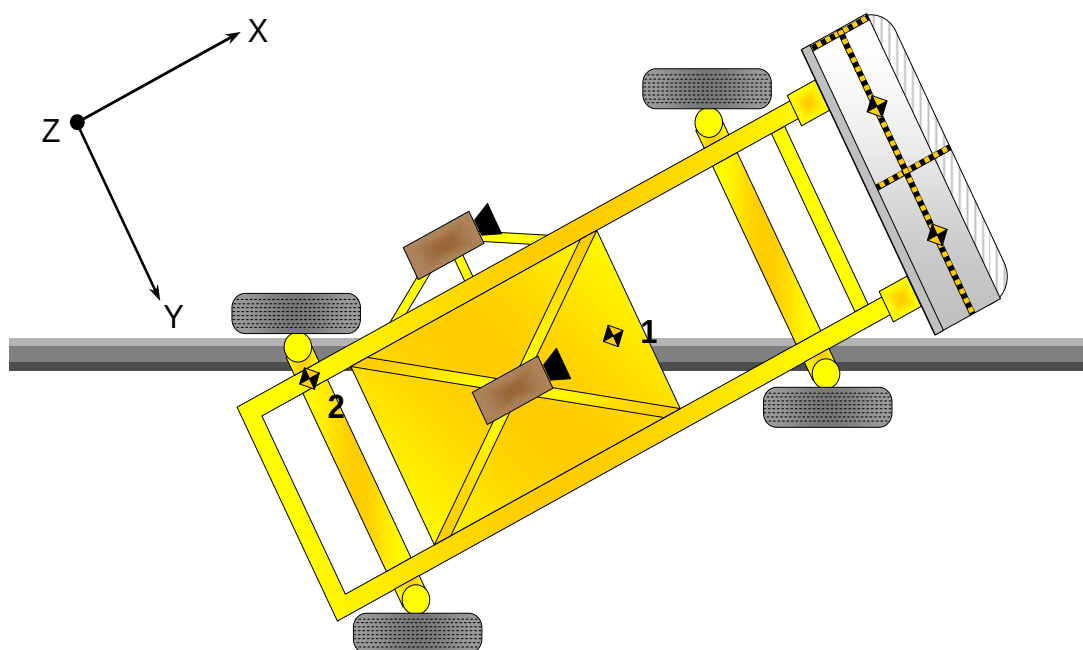
NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08

Loc. No.	Accelerometer Locations	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1195	0	430
2	MDB Rear	-2642	-593	608

Reference Points:
X - MDB Front Axle
Y - MDB Centerline
Z - Ground Plane



DATA SHEET NO. 14

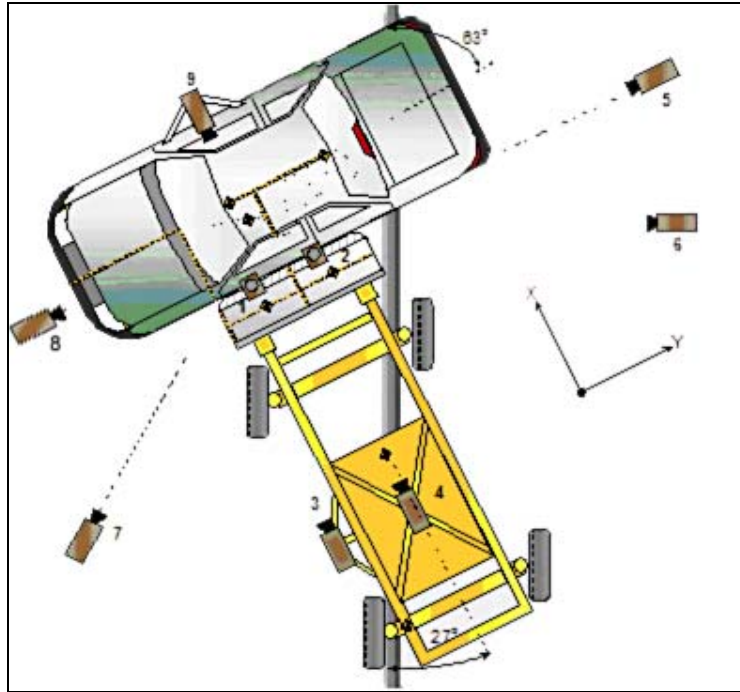
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



No.	Camera View	Location (mm)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X	Y	Z			
Doc	Real Time Inrun	-2484	-3958	-1506			30
Doc	Real Time Left Front	-2266	3548	-1475	-2		30
1	Overhead Overall	1220	2287	-5486	-90	14mm	1000
2	Overhead Close Up	609	2287	-5486	-90	Zoom	1000
3	Left Impact Point (MDB)	-2134	0	-1143	-2	12mm	1000
4	Side Overall (MDB)	-3912	838	-1829	-4	12mm	1000
5	Rear	-64	20485	-1348	0	105mm	1000
6	Left Rear (MDB)	-2137	-1302	-339	-4	85mm	1000
7	Left Front	-2266	-3564	-1475	-2	24mm	1000
8	Driver Front	1554	-1009	-1341	-2	35mm	1000
9	Driver Side (O.B.)	419	57	-1273	-2	20mm	1000

All measurements are made relative to the point of impact.

DATA SHEET NO. 15

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP Test Date: 3/27/08

Test Time: 11:52 AM Temperature: 15.6 Deg. C.

Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0.0 oz.
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0.0 oz.
(Maximum Allowable = 1 oz./minute)
- D. Spillage Details: No leakage occurred

DATA SHEET NO. 16

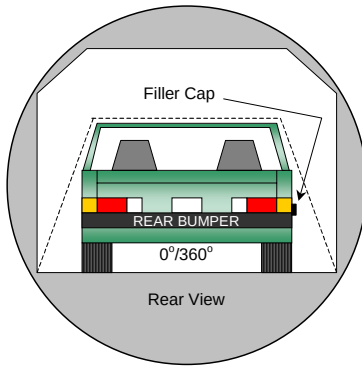
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

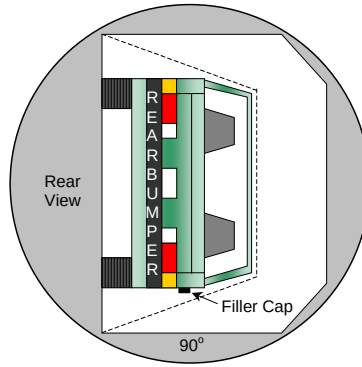
NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

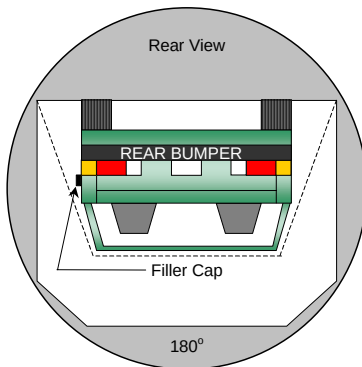
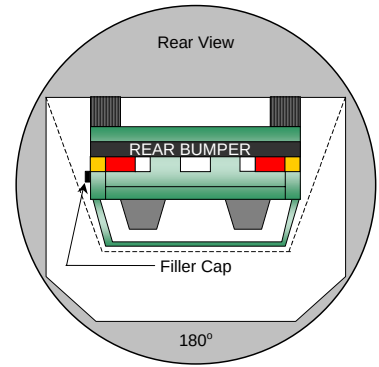
Test Date: 3/27/08



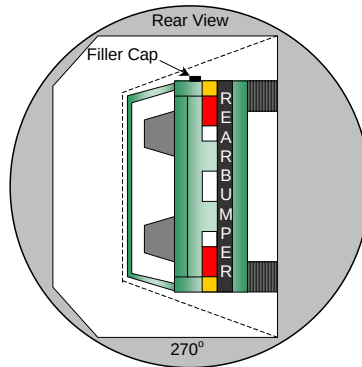
0° to 90°



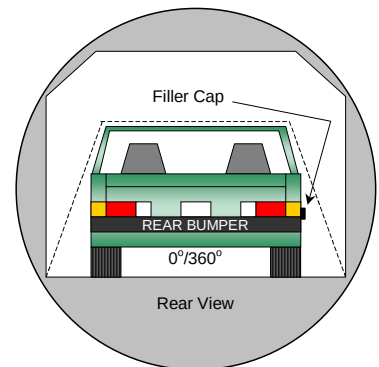
90° to 180°



180° to 270°



270° to 360°



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
 2. The position hold time at each position is 300 seconds (minimum).
 3. Details of Stoddard Solvent spillage locations.
- No solvent leakage occurred during static rollover testing.

DATA SHEET NO. 16...(CONTINUED)**FMVSS 301 STATIC ROLLOVER DATA SHEET**Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door CoupeNHTSA No.: M80511Test Program: 55/28 km/h Side Impact NCAPTest Date: 3/27/08**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	85	302	387
90° to 180°	82	305	387
180° to 270°	81	306	387
270° to 360°	83	300	383

FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

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

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 17

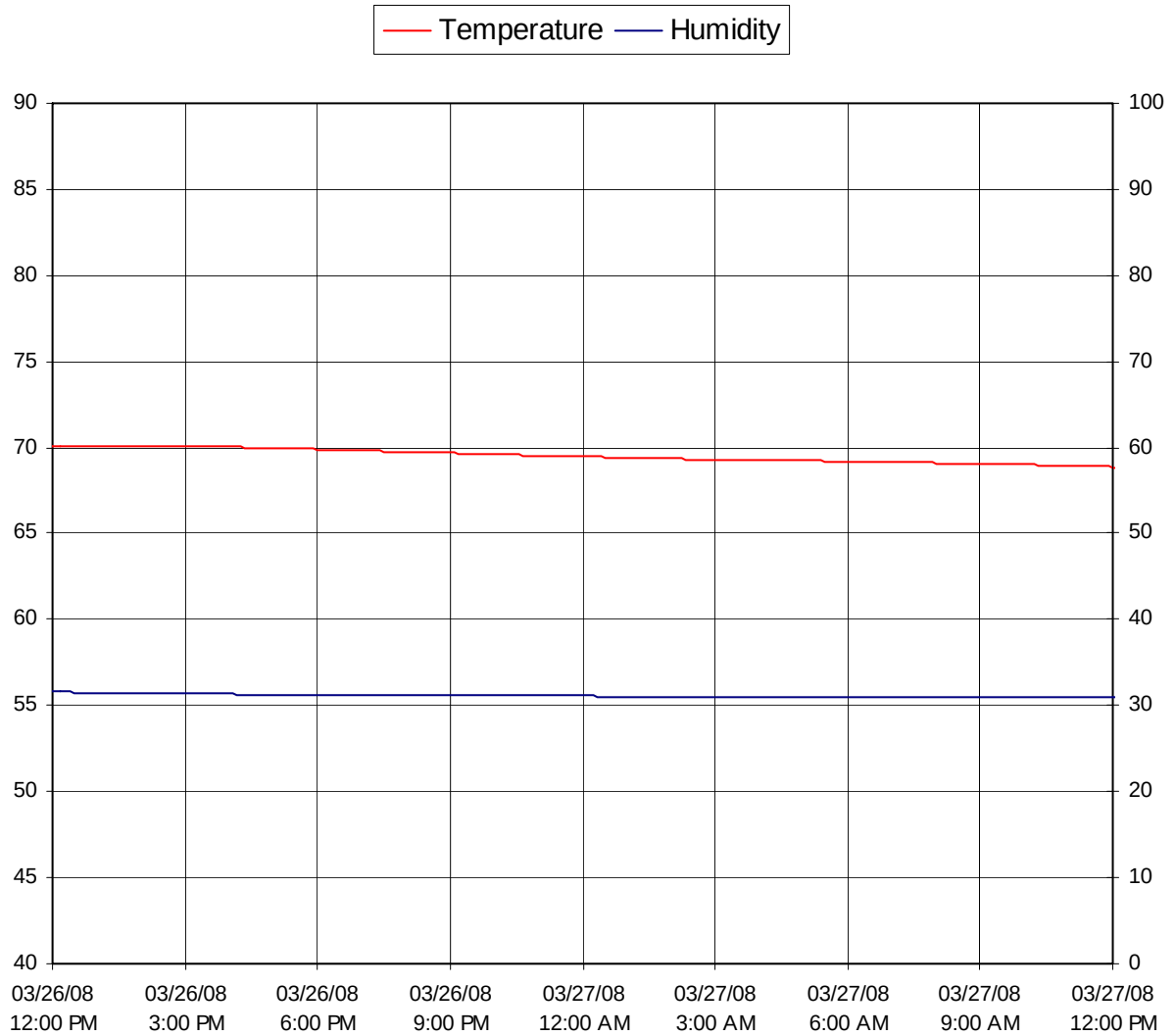
DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2008 Smart Fortwo Pure Coupe 2-Door Coupe

NHTSA No.: M80511

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 3/27/08



APPENDIX A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

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A-16	Post-Test Right Rear $\frac{3}{4}$ View	A-16
A-17	Pre-Test Right Side View	A-17
A-18	Post-Test Right Side View	A-18
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A-22	Post-Test Overhead View	A-22
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A-34	Pre-Test Driver Dummy (Through Window)	A-34

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Figure A-1: Right Front $\frac{3}{4}$ View, as Received



Figure A-2: Left Rear $\frac{3}{4}$ View, as Received



Figure A-3: Manufacturer's Label



TIRE AND LOADING INFORMATION

SEATING CAPACITY	TOTAL	2	FRONT	2
------------------	-------	---	-------	---

The combined weight of occupants and cargo should never exceed **235** kg or **518** lbs.

ORIGINAL TIRE SIZE	COLD TIRE INFLATION PRESSURE	
155/60 R15	FRONT	200 KPA, 29 PSI
175/55 R15	REAR	250 KPA, 36 PSI
COMPACT SPARE TIRE	NONE	

**SEE OWNER'S
MANUAL FOR
ADDITIONAL
INFORMATION**

A 451 584 02 17

Figure A-4: Tire Placard



Figure A-5: Pre-Test Front View



Figure A-6: Post-Test Front View



Figure A-7: Pre-Test Left Front $\frac{3}{4}$ View



Figure A-8: Post-Test Left Front ¾ View



Figure A-9: Pre-Test Left Side View



Figure A-10: Post-Test Left Side View



Figure A-11: Pre-Test Left Rear $\frac{3}{4}$ View



Figure A-12: Post-Test Left Rear $\frac{3}{4}$ View



Figure A-13: Pre-Test Rear View



Figure A-14: Post-Test Rear View



Figure A-15: Pre-Test Right Rear $\frac{3}{4}$ View



Figure A-16: Post-Test Right Rear $\frac{3}{4}$ View



Figure A-17: Pre-Test Right Side View



Figure A-18: Post-Test Right Side View



Figure A-19: Pre-Test Right Front $\frac{3}{4}$ View



Figure A-20: Post-Test Right Front $\frac{3}{4}$ View



Figure A-21: Pre-Test Overhead View



Figure A-22: Post-Test Overhead View



Figure A-23: Pre-Test Overhead Close-up View



Figure A-24: Post-Test Overhead Close-up View

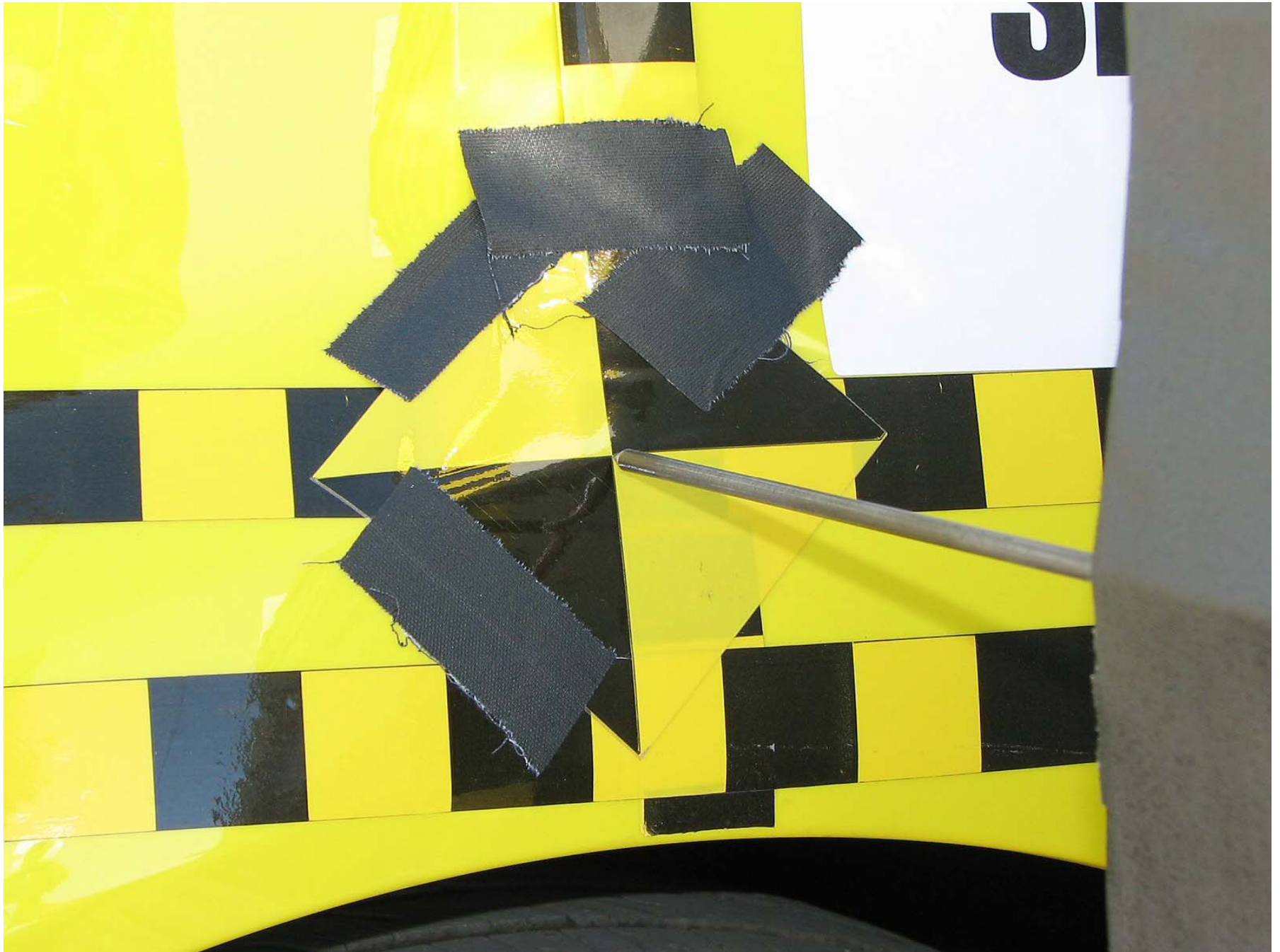


Figure A-25: Pre-Test Left Impact Point



Figure A-26: Post-Test Left Impact Point



Figure A-27: Pre-Test Front $\frac{3}{4}$ View of Left Side Door



Figure A-28: Post-Test Front $\frac{3}{4}$ View of Left Side Door



Figure A-29: Pre-Test Rear $\frac{3}{4}$ View of Left Side Door



Figure A-30: Post-Test Rear $\frac{3}{4}$ View of Left Side Door



Figure A-31: Pre-Test Left Front Door



Figure A-32: Post-Test Left Front Door



Figure A-33: Pre-Test Driver Dummy (Door Open)



Figure A-34: Pre-Test Driver Dummy (Through Window)



Figure A-35: Post-Test Driver Dummy (Through Window)



Figure A-36: Pre-Test Driver Dummy Clearance From Door



Figure A-37: Post-Test Driver Dummy Clearance From Door



Figure A-38: Pre-Test Driver Dummy Right Side View



Figure A-39: Post-Test Driver Dummy Right Side View



Figure A-40: Pre-Test Front Door Panel (Interior)



Figure A-41: Post-Test Front Door Panel (Interior)



Figure A-42: Pre-Test Front View of Deformable Barrier



Figure A-43: Post-Test Front View of Deformable Barrier



Figure A-44: Pre-Test Top View of Deformable Barrier



Figure A-45: Post-Test Top View of Deformable Barrier



Figure A-46: Pre-Test Right Side View of Deformable Barrier



Figure A-47: Post-Test Right Side View of Deformable Barrier



Figure A-48: Pre-Test Left Side View of Deformable Barrier



Figure A-49: Post-Test Left Side View of Deformable Barrier



Figure A-50: Vehicle on Rollover Device (0°)



Figure A-51: Vehicle on Rollover Device (90°)



Figure A-52: Vehicle on Rollover Device (180°)

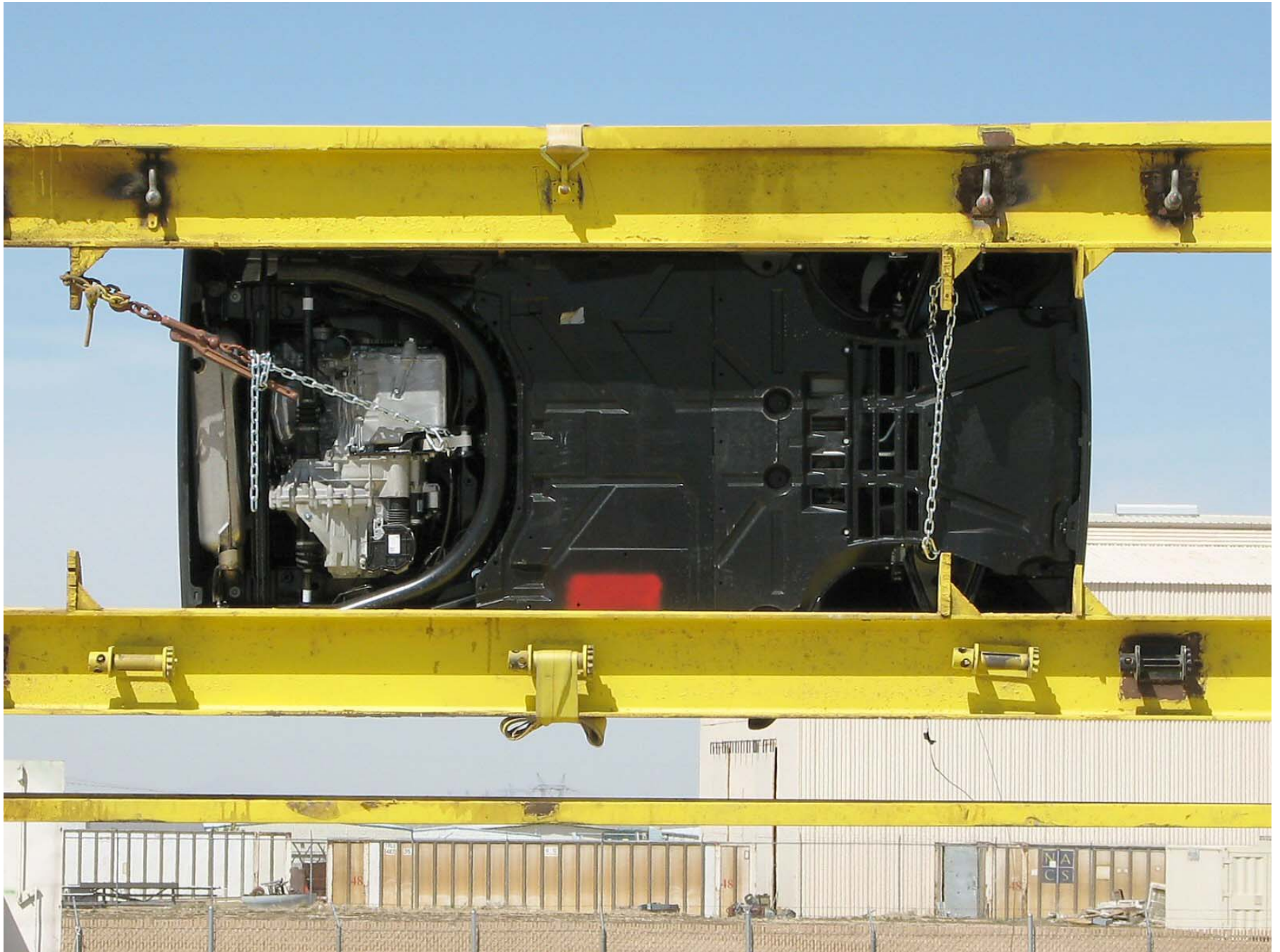


Figure A-53: Vehicle on Rollover Device (270°)



Figure A-54: Vehicle Impact

APPENDIX B
SID/HIII, VEHICLE AND MDB RESPONSE DATA

LIST OF DATA PLOTS

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B-1 Driver Upper Rib Primary Y	B-1
Driver Lower Rib Primary Y	B-1
Driver Lower Spine Primary Y	B-1
Driver Pelvis Primary Y	B-1

The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov

LIST OF DATA PLOTS...(CONTINUED)

Driver Head X Primary
Driver Head Y Primary
Driver Head Z Primary
Driver Head Resultant Primary
Driver Head Primary X Velocity
Driver Head Primary Y Velocity
Driver Head Primary Z Velocity
Driver Head X Redundant
Driver Head Y Redundant
Driver Head Z Redundant
Driver Head Resultant Redundant
Driver Head Redundant X Velocity
Driver Head Redundant Y Velocity
Driver Head Redundant Z Velocity
Driver Upper Neck Force X
Driver Upper Neck Force Y
Driver Upper Neck Force Z
Driver Upper Neck Force Resultant
Driver Upper Neck Moment X
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Neck Moment Resultant
Driver Upper Rib Primary Y Velocity
Driver Lower Rib Primary Y Velocity
Driver Lower Spine Primary Y Velocity
Driver Pelvis Primary Y Velocity
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y

LIST OF DATA PLOTS...(CONTINUED)

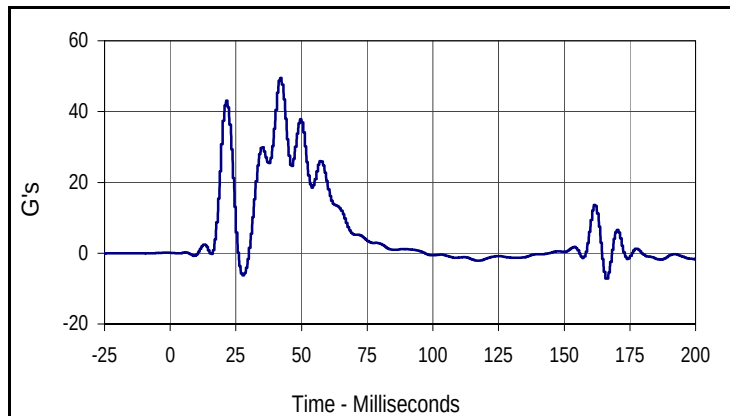
Driver Upper Rib Redundant Y Velocity
Driver Lower Rib Redundant Y Velocity
Driver Lower Spine Redundant Y Velocity
Driver Pelvis Redundant Y Velocity
Driver Thorax Contact
Driver Pelvis Contact
Vehicle Right Sill at Front Seat X
Vehicle Right Sill at Front Seat Y
Vehicle Right Sill at Front Seat Z
Vehicle Right Sill Front Seat Resultant
Vehicle Right Sill at Front Seat X Velocity
Vehicle Right Sill at Front Seat Y Velocity
Vehicle Right Sill at Front Seat Z Velocity
Vehicle Rear Floor Above Axle X
Vehicle Rear Floor Above Axle Y
Vehicle Rear Floor Above Axle Z
Vehicle Rear Floor Above Axle Resultant
Vehicle Rear Floor Above Axle X Velocity
Vehicle Rear Floor Above Axle Y Velocity
Vehicle Rear Floor Above Axle Z Velocity
Vehicle Left Sill at Front Door Y
Vehicle Left Sill at Front Door Y Velocity
Vehicle Left Front Door C/L Y
Vehicle Left Front Door Mid Rear Y
Vehicle Left Front Door Upper CL Y
Vehicle Left Front Door CL Y Velocity
Vehicle Left Front Door Mid Rear Y Velocity
Vehicle B-Post Lower Y
Vehicle B-Post Middle Y
Vehicle B-Post Lower Y Velocity
Vehicle B-Post Middle Y Velocity
Vehicle A-Post Lower Y
Vehicle A-Post Middle Y
Vehicle A-Post Lower Y Velocity
Vehicle A-Post Middle Y Velocity

LIST OF DATA PLOTS...(CONTINUED)

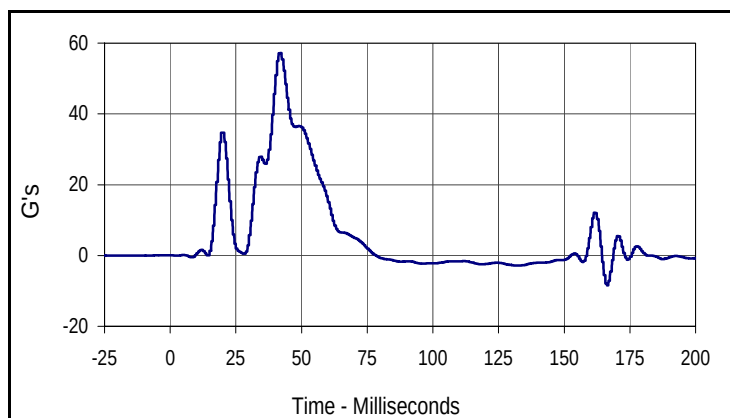
Vehicle Left Front Seat Track
Vehicle Left Front Seat Track Y Velocity
Vehicle CG X
Vehicle CG Y
Vehicle CG Z
Vehicle CG Resultant
Vehicle CG X Velocity
Vehicle CG Y Velocity
Vehicle CG Z Velocity
Driver Upper Rib Primary Y
Driver Lower Rib Primary Y
Driver Lower Spine Primary Y
Driver Pelvis Primary Y
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
MDB CG X
MDB CG Y
MDB CG Z
MDB CG Resultant
MDB CG X Velocity
MDB CG Y Velocity
MDB CG Z Velocity
MDB Rear X
MDB Rear Y
MDB Rear X Velocity
MDB Rear Y Velocity
MDB Right Bumper Contact

Test Vehicle: 2008 Smart ForTwo Pure 2-Door Coupe
 Test Program: 55/28 km/h Side Impact NCAP

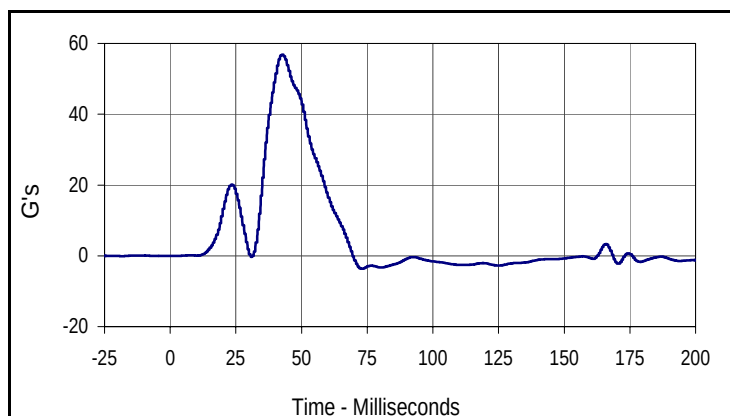
Test Date: 3/27/08
 NHTSA No.: M80511



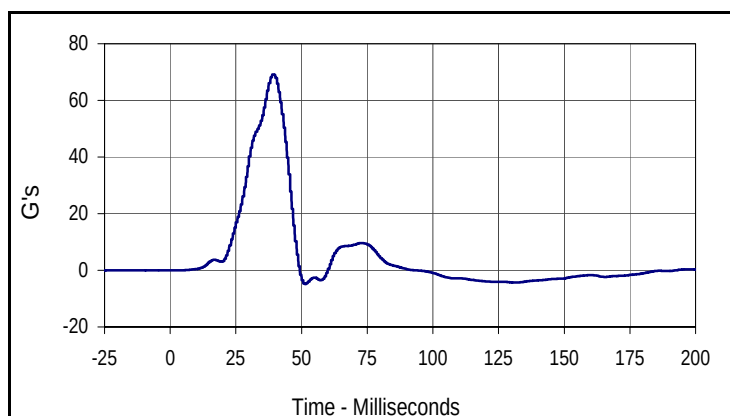
Curve Description			
Driver Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIR	FIR100	G's
Max	Time	Min	Time
49.5	41.9	-7.2	166.3



Curve Description			
Driver Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIR	FIR100	G's
Max	Time	Min	Time
57.2	41.9	-8.4	166.3



Curve Description			
Driver Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIR	FIR100	G's
Max	Time	Min	Time
56.9	42.5	-3.6	72.5



Curve Description			
Driver Pelvis Y Primary			
CURNO	Type	SAE Class	Units
004	FIR	FIR100	G's
Max	Time	Min	Time
69.1	38.8	-4.9	51.3

APPENDIX C
SID/HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST SID / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID / HIII External Measurements
ATD Serial No.: 274

Test Date: 3/18/08
Test I.D.: N/A



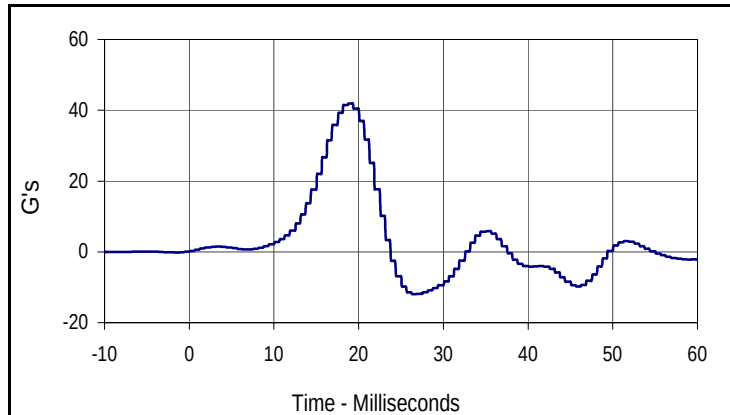
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	894	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	517	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	520	Pass
KV- Knee Pivot From Floor	mm	490 to 505	499	Pass
HW- Hip Width	mm	356 to 391	364	Pass
Overall Test Results				Pass

Test Program: SID / HIII Thorax Lateral Impact
 ATD Serial No.: 274

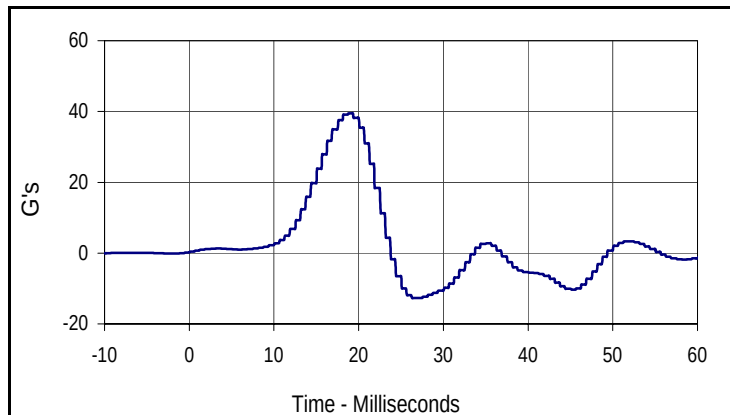
Test Date: 3/18/08
 Test I.D.: TH03D



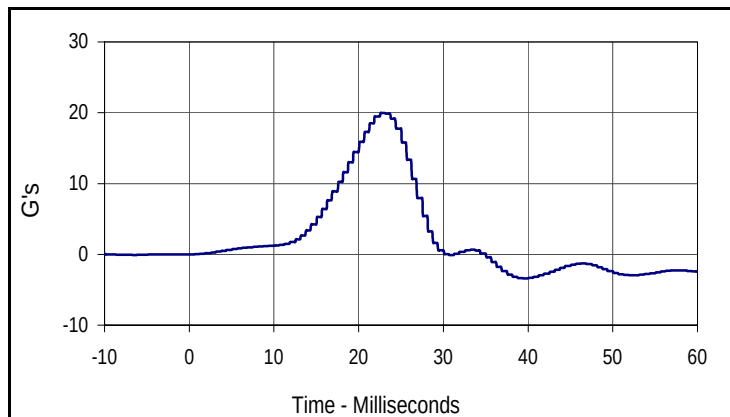
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.33	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	41.9	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	39.5	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	19.9	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
41.9	18.8	-12.0	26.3



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
39.5	18.8	-12.7	26.9



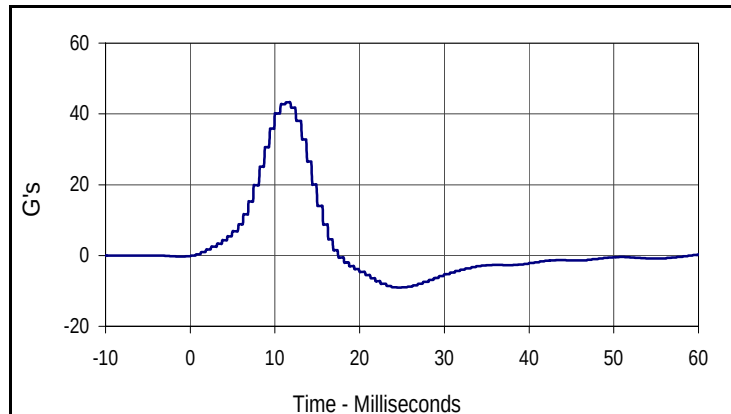
Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
19.9	22.6	-3.4	39.4

Test Program: SID / HIII Pelvis Lateral Impact
 ATD Serial No.: 274

Test Date: 3/18/08
 Test I.D.: PL03D



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.32	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	43.3	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	6.70	Pass
Overall Test Results				Pass



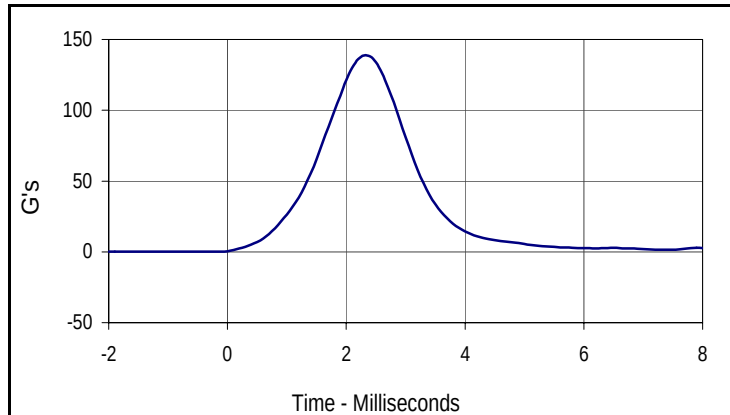
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
43.3	11.3	-9.1	24.4

Test Program: SID / HIII Head Drop Lateral Impact Test
 ATD Serial No.: 274

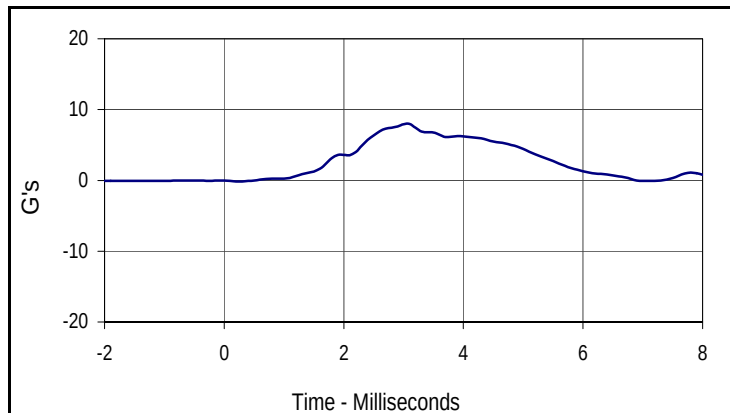
Test Date: 3/18/08
 Test I.D.: HD03D



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	120.0 to 150.0	138.8	Pass
Peak Longitudinal Acceleration	G's	≤15.0	8.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	4.0	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
138.8	2.3	0.1	-0.9



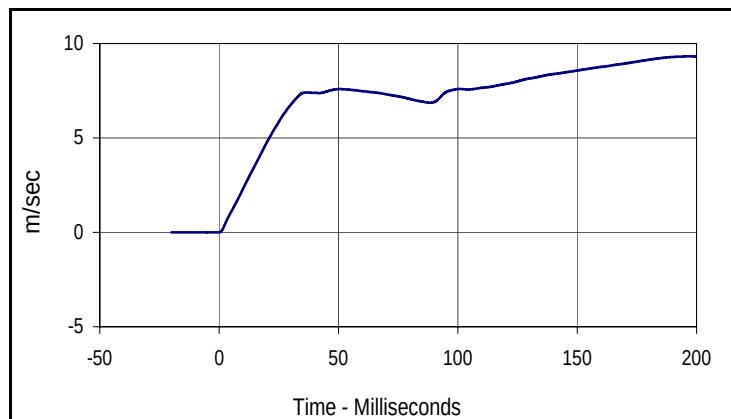
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
8.0	3.1	-0.1	0.2

Test Program: SID / HIII Neck Pendulum Lateral Test
 ATD Serial No.: 274

Test Date: 3/18/08
 Test I.D.: NB03D



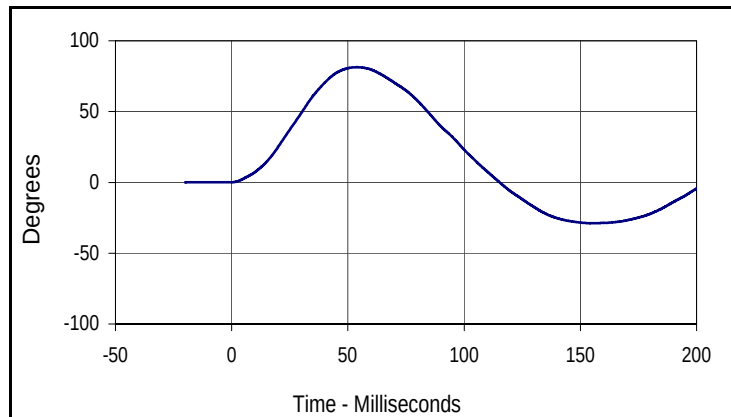
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.09	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.31	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.77	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.76	Pass
	40 to 70	m/sec	6.27 to 7.64	7.59	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	81.4	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.5	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	61.5	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	86.8	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.4	Pass
Overall Test Results					Pass



Curve Description

Pendulum Velocity

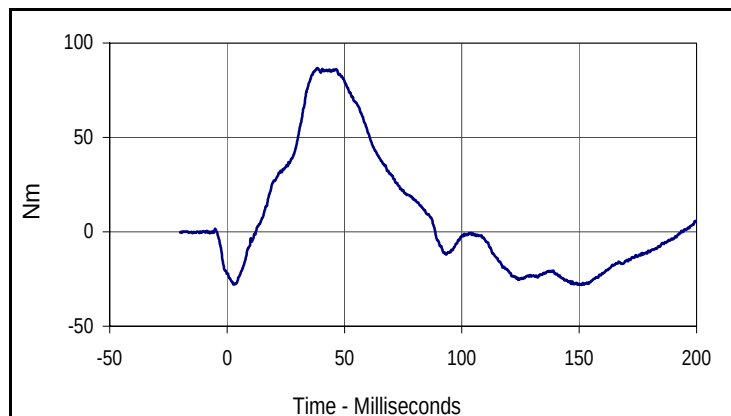
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
9.3	196.6	0.0	-0.1



Curve Description

"D" Plane Rotation

CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
81.4	53.8	-28.9	155.3



Curve Description

Moment About Occipital Condyle

CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
86.8	38.3	-28.1	151.0

APPENDIX C
POST-TEST SID / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID / HIII External Measurements
 ATD Serial No.: 274

Test Date: 4/1/08
 Test I.D.: N/A



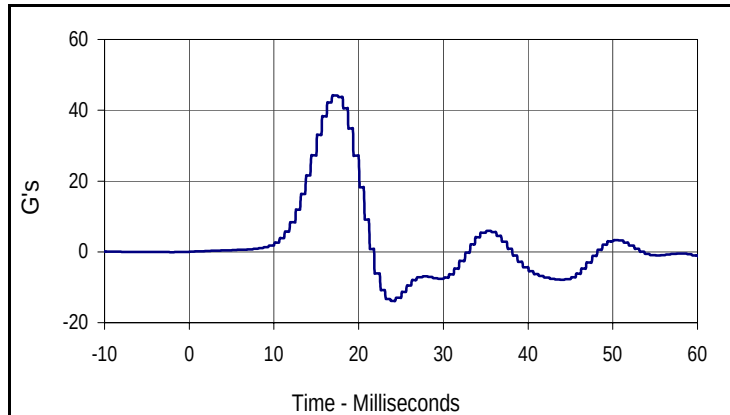
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	898	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	518	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	520	Pass
KV- Knee Pivot From Floor	mm	490 to 505	495	Pass
HW- Hip Width	mm	356 to 391	363	Pass
Overall Test Results				Pass

Test Program: SID / HIII Thorax Lateral Impact
 ATD Serial No.: 274

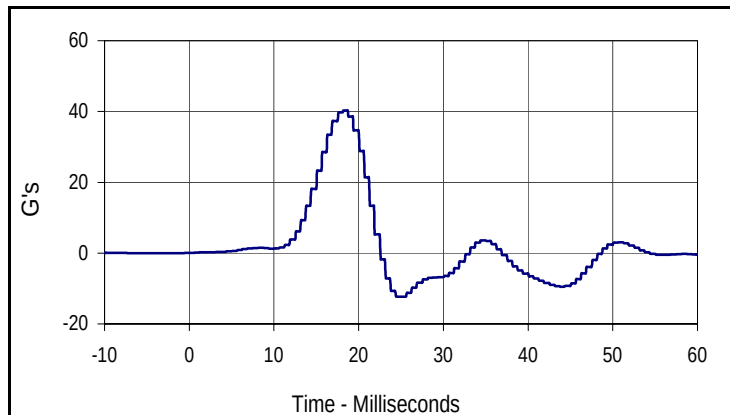
Test Date: 4/1/08
 Test I.D.: TH04A



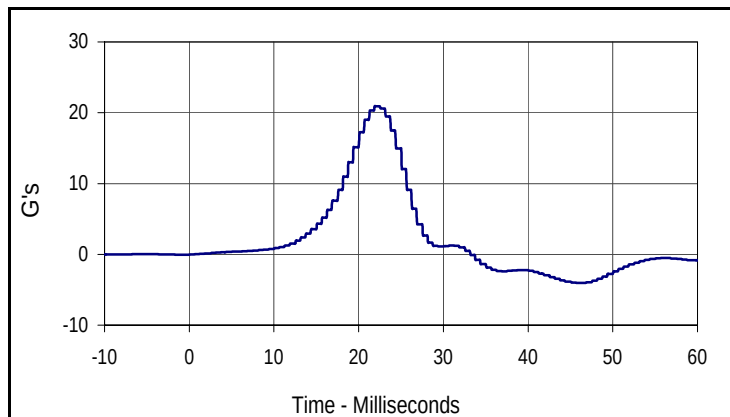
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.33	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	44.2	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	40.3	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	20.9	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
44.2	16.9	-13.9	23.8



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
40.3	18.2	-12.3	25.1



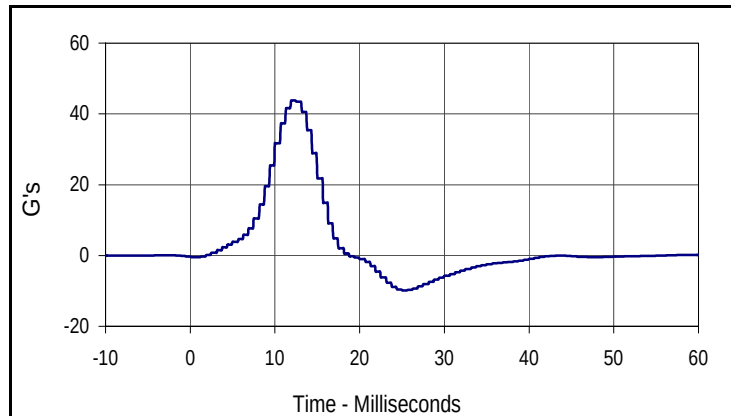
Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
20.9	21.9	-4.1	45.7

Test Program: SID / HIII Pelvis Lateral Impact
 ATD Serial No.: 274

Test Date: 4/1/08
 Test I.D.: PL04A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.32	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	43.8	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	5.50	Pass
Overall Test Results				Pass



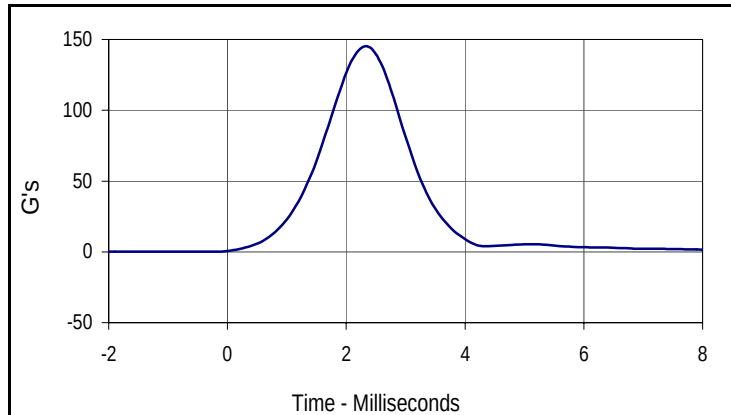
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
43.8	11.9	-9.9	25.0

Test Program: SID / HIII Head Drop Lateral Impact Test
 ATD Serial No.: 274

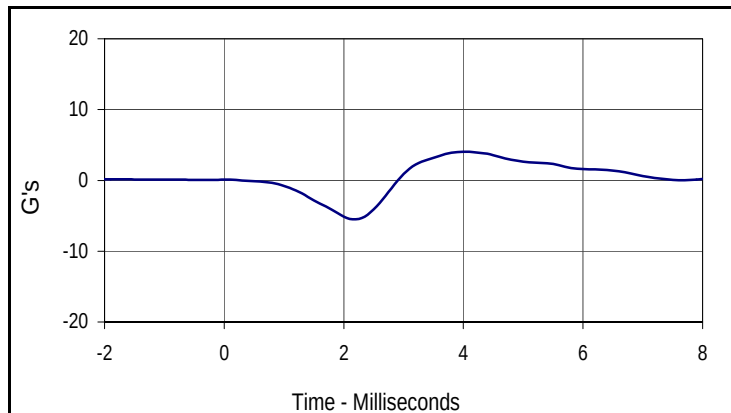
Test Date: 4/1/08
 Test I.D.: HD04A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	120.0 to 150.0	145.1	Pass
Peak Longitudinal Acceleration	G's	≤15.0	5.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.7	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
145.1	2.3	0.1	-1.1



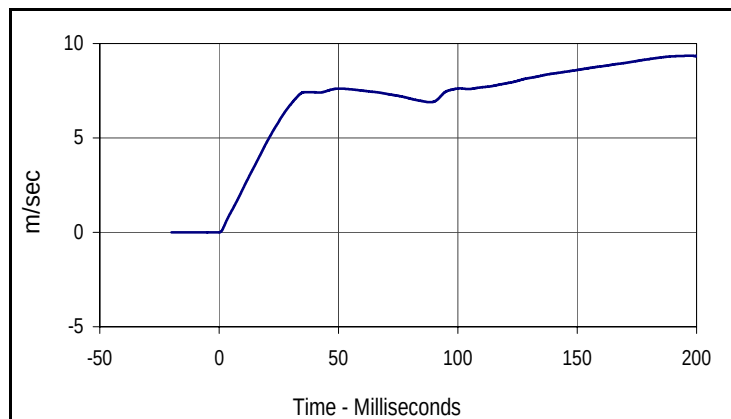
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.0	4.0	-5.5	2.2

Test Program: SID / HIII Neck Pendulum Lateral Test
 ATD Serial No.: 274

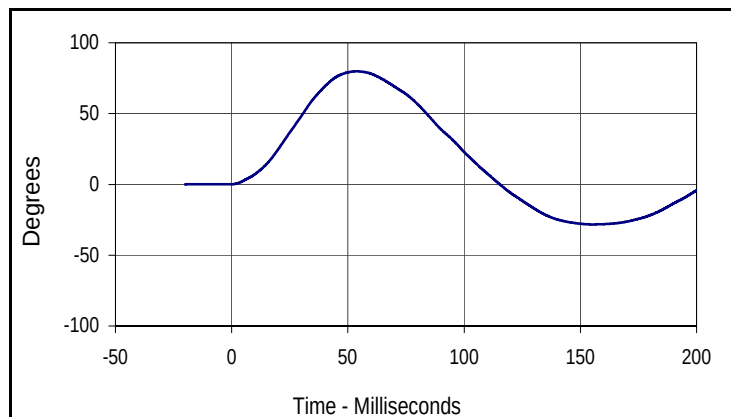
Test Date: 4/1/08
 Test I.D.: NB04A



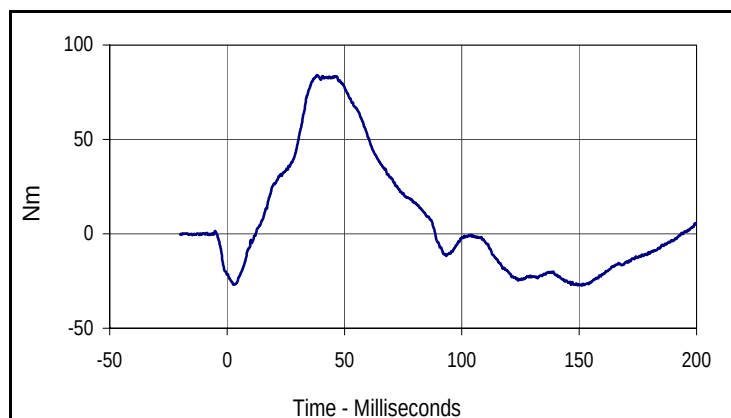
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.09	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.32	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.79	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.79	Pass
	40 to 70	m/sec	6.27 to 7.64	7.61	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	79.8	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.5	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	61.6	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	84.1	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.4	Pass
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
9.3	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
79.8	53.8	-28.3	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
84.1	38.3	-27.4	151.0