

REPORT NUMBER: SPNCAP-KAR-13-031

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**DAIMLER AG STUTTGART
2013 MERCEDES- BENZ C250 4-DOOR SEDAN**

NHTSA No: MD0507

**PREPARED BY:
KARCO ENGINEERING, LLC.
9270 HOLLY ROAD
ADELANTO, CA 92301**



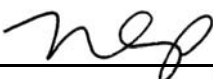
DECEMBER 26, 2012


FINAL REPORT

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U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Prepared By: 
Mr. Kelsey A. Chiu, Engineering Department Supervisor
KARCO Engineering, LLC.

Reviewed By: 
Mr. Michael L. Dunlap, Director of Operations
KARCO Engineering, LLC.

Approved By: 
Mr. Frank D. Richardson, Program Manager
KARCO Engineering, LLC.

Approval Date: December 26, 2012

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

COTR, New Car Assessment Program
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TECHNICAL REPORT DOCUMENTATION PAGE

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		15. Supplementary Notes																												
16. Abstract A 32.2 km/h (20 mph) 75 deg. oblique impact Side NCAP Test was conducted on the subject 2013 Mercedes-Benz C250 4-door sedan in accordance with the specifications of the Office of Crash Worthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on December 12, 2012. The impact velocity was 31.56 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 14.5 deg. C. The target vehicle's maximum post-test static crush was 408 mm located at level 3. The test vehicle's occupant performance data is as follows:																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 35%;">Measurement Description</th> <th colspan="3" style="text-align: center;">Driver ATD (ES-2re)</th> </tr> <tr> <th style="width: 15%;">Units</th> <th style="width: 15%;">Threshold</th> <th style="width: 35%;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td style="text-align: center;">1000</td> <td style="text-align: center;">349.2</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">g</td> <td style="text-align: center;">82</td> <td style="text-align: center;">50.3</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetabular and Iliac Forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">4009</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45</td> <td style="text-align: center;">32</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (ES-2re)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	349.2	Resultant Lower Spine Acceleration	g	82	50.3	Total Pelvic Force (Sum of Acetabular and Iliac Forces)	N	5525	4009	Maximum Thoracic Rib Deflection	mm	38	26	Maximum Abdominal Rib Deflection	mm	45	32
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The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches. The opposite doors did not open during the side impact event.																														
17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		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 Room W43-410 Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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SECTION 1
TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2013 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2013 Mercedes-Benz C250 4-door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated September 2012.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2013 Mercedes-Benz C250 4-door sedan. The subject vehicle was towed into the rigid pole at an angle of 75.2° and a velocity of 31.56 km/h. The test was conducted by KARCO Engineering, LLC. in Adelanto, California on December 12, 2012. Pre- and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated September 2012. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) was instrumented accordingly:

- Primary and Redundant Head CG tri-axial accelerometers
- Thorax upper, middle and lower rib displacement potentiometers
- Abdomen upper and lower rib displacement potentiometers
- Lower spine (12) tri-axial accelerometers
- Iliac load cell
- Acetabulum load cell

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Units	Passenger ATD (SID-IIs)	
		IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	349.2
Lower Spine (T12) Resultant Acceleration	g	82	50
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4009
Maximum Thoracic Rib Deflection	mm	38*	26
Maximum Abdominal Rib Deflection	mm	45*	32

*Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	Yes	No	No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso)	Yes	Yes	No	
Side Airbag 3 (Pelvis)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	

GENERAL COMMENTS

Both the front and rear doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. Both doors on the non-struck side remained closed and latched. There were no ATD values that exceeded limits.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

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	°F	°C	$=(T_f - 32)/1.8$
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 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MD0507
Model Year	2013
Make	Mercedes-Benz
Model	C250
Body Style	4-Door Sedan
VIN	WDDGF4HB2DR254472
Body Color	Mars Red
Odometer Reading (km / mi)	15 / 24
Engine Displacement (L)	1.8
Type / No. of Cylinders	Turbocharge Inline 4
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	7
Overdrive	Yes
Final Drive	Rear
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	Yes
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	Yes
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	No

Does Owner's Manual provide instructions to turn off automatic door locks? Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler Ag Stuttgart
Date of Manufacture	Aug-12
Vehicle Type	Sedan

GVWR (kg)	2020
GAWR Front (kg)	955
GAWR Rear (kg)	1095

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				380.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				39.8

A
B
A-B

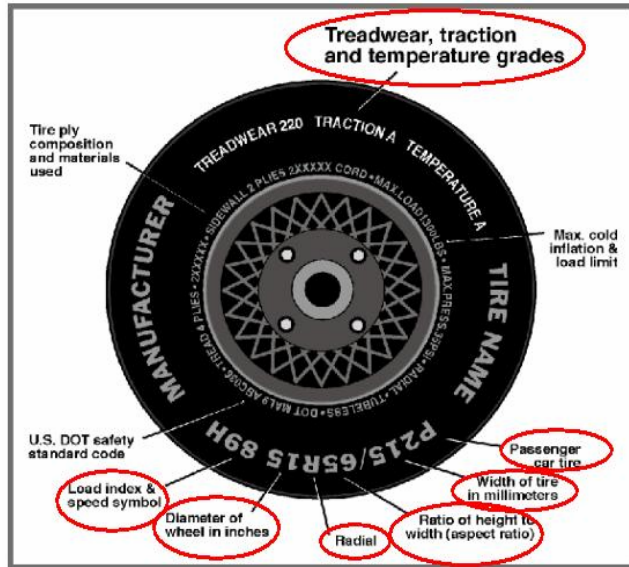
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat		Yes			Yes		
Third Row Seat							

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



VEHICLE TIRE INFORMATION

Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	280
Recommended Tire Size	225/45R17	245/40R17
Tire Size on Vehicle	225/45R17	245/40R17
Tire Manufacturer	Continental	Continental
Tire Model	Conti Pro Contact	Conti Pro Contact
Treadware	500	500
Traction	AA	AA
Temperature Grades	A	A
Tire Plies Sidewall	1 Ply Polyester	1 Ply Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyamide, 2 Steel, 1 Rayon
Load Index/Speed Symbol	91H	91H
Tire Material	Polyester, Steel, Nylon	Rayon, Steel, Polyamide
DOT Safety Code Left	1L7R PXH6 3412	1L7R PXH6 2712
DOT Safety Code Right	1L7R PXH6 3412	1L7R PXH6 3412

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	230	220	255	265
Tire Placard	kPa	230	230	280	280
Owner's Manual	kPa	230	230	280	280
As Tested	kPa	230	230	280	280

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	414.0	374.0		436.5	402.0		429.5	415.5	
Right	kg	407.0	366.0		422.0	384.5		406.5	397.5	
Ratio	%	52.6%	47.4%	100.0%	52.2%	47.8%	100.0%	50.7%	49.3%	100.0%
Total	kg	821.0	740.0	1561.0	858.5	786.5	1645.0	836.0	813.0	1649.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1561.0	A
Actual Weight of 1 P572 O ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	39.8	C
Calculated Vehicle Target Wt (TVT _W)	kg	1649.8	A+B+C

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e.

Calculated Test Vehicle Target Weight -4.5 kg to -9.0 kg)? Yes No

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	°	-1.0	-1.7	-1.7	Yes
Front Passenger Sill Angle (front-to-rear)*	°	1.4	-1.6	-1.8	Yes
Front Bumper-Line Angle (left-to-right)**	°	-0.1	0.0	0.0	Yes
Rear Bumper-Line Angle (left-to-right)**	°	0.2	0.1	0.1	Yes
Vehicle CG (Aft of Front Axle)	mm	1309	1321	1362	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	7	15	19	

*ND=Nose Down (-), NU=Nose Up (+) **LD=Left Down (-), LU=Left Up (+)

***The "As Tested" vehicle attitude angle measurements must be within "As Delivered" and the "Fully Loaded" vehicle attitude measurements at each location. Indicate "Yes" or "No" for "Meets Requirement"

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Non-Struck Door Panels	8.0
Trunk Trim	5.5
Spare Tire and Tools	14.5
Non-Struck Outboard Mirror	1.5
Taillights	3.0
Rear Bumper Cover	4.5
Non-Struck Aluminum Cover w/Speakers and Window Regulator	2.0
Non-Struck Windows	8.0
Trunk Lid and Trim	14.5
Ballast / Equipment Added	84.0

DATA SHEET NO. 2

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

SEAT POSITIONING

The driver's seat is set to the forward most position where the ATD will not contact any interior panels at the mid-height and mid-angle position. The front center seat (if applicable) and right front passenger's seat should be set in a similar manner as the driver's seat. The struck side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rearmost, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	18.2	6.5	12.4
Front Passenger Seat	19	7.2	13.1
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle	As Tested SCRP Height	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	12.4	506	Max	496	513	530
			Mid	473	490	506
			Min	450	466	482
Front Passenger Seat	13.1	506	Max	494	509	529
			Mid	471.5	487.5	506
			Min	449	466	483
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

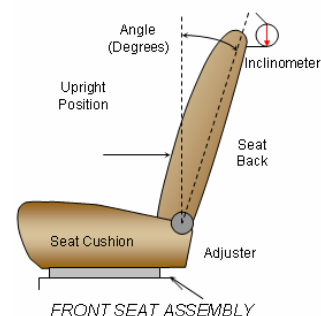
Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	222		0	
Front Passenger Seat	222		0	
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The right front passenger seat back is set to the same angle as the driver's seat.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/Seated Dummy	76.0		11.5	
Front Passenger Seat	76.0		11.5	
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

DATA SHEET NO. 2 ... (CONTINUED)

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. The positions are marked H, M1, ... , L from top to bottom.

	Total No. of Positions	Placed in Position
Driver Seat	5	H

HEAD RESTRAINT ADJUSTMENT

The driver's head restraint is adjusted to the lowest and most full forward in-use position.

	Total No. of Positions	Placed in Position
Driver Seat	6	H

DATA SHEET NO. 2 ... (CONTINUED)

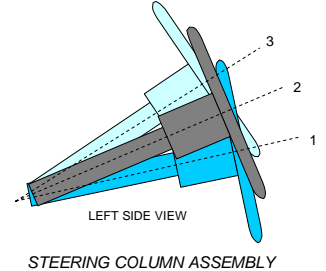
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

STEERING COLUMN ADJUSTMENT

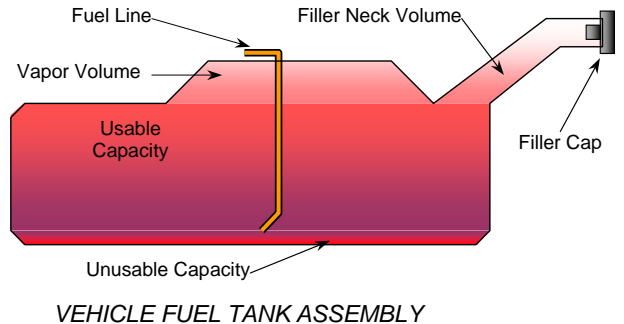
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.



	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	19.6	135
Geometric Center - Position 2	21.9	103
Uppermost - Position 3	24.2	71
Telescoping Steering Wheel Travel		64
Test Position	21.9	103

FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on.



FUEL TANK CAPACITY

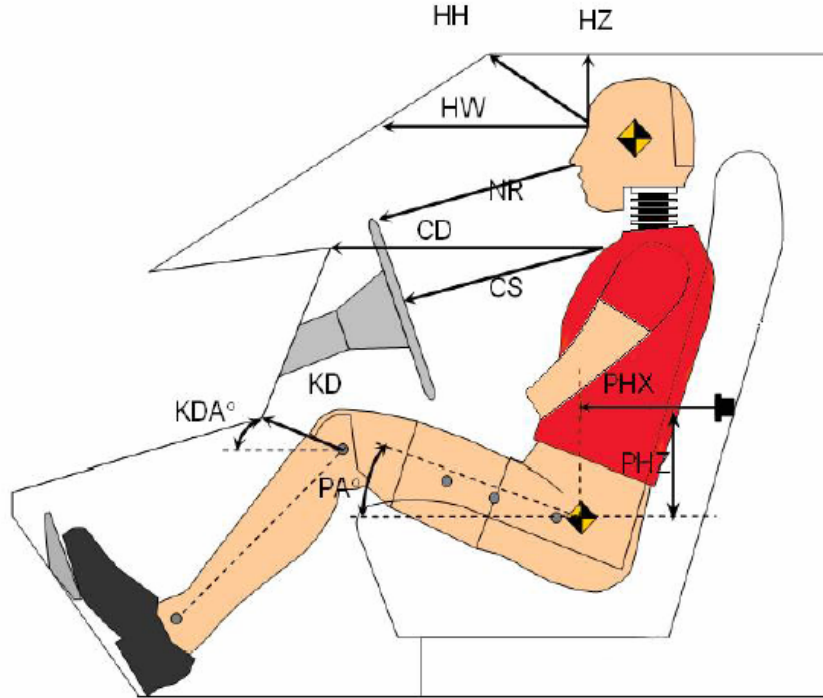
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	66.24
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	61.60
Actual amount of Solvent Used in Test	61.60
1/3 of Usable Capacity	22.08

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? Yes No

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	241	
HW	Head to Windshield	532	
HZ	Head to Roof	161	
NR	Nose to Rim	230	
CD	Chest to Dash	393	
CS	Chest to Steering Wheel	166	
KD(L)/KDA(L)°	Left Knee to Dash	104	39.9
KD(R)/KDA(R)°	Right Knee to Dash	87	34.8
PAX°	Pelvic Tilt Angle (x-axis)		20.9
PAY°	Pelvic Tilt Angle (y-axis)		0.1
PHX	Hip Point to Striker (x-axis)	330	
PHZ	Hip Point to Striker (z-axis)	203	

DATA SHEET NO. 4

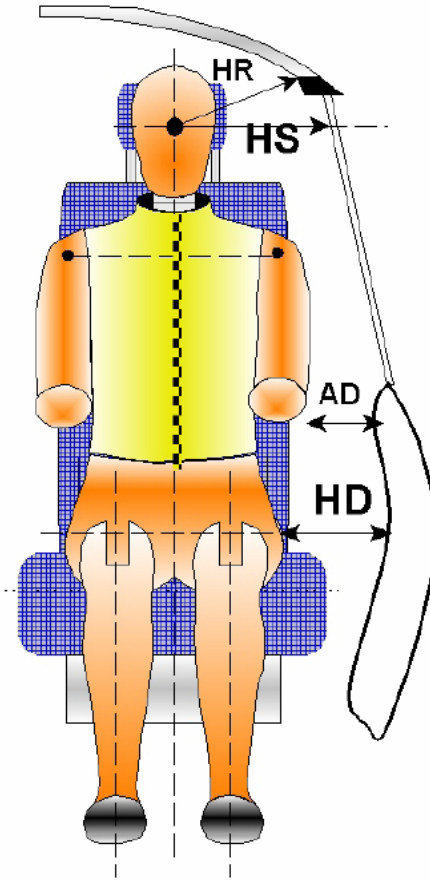
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan

NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test

Test Date: 12/12/12



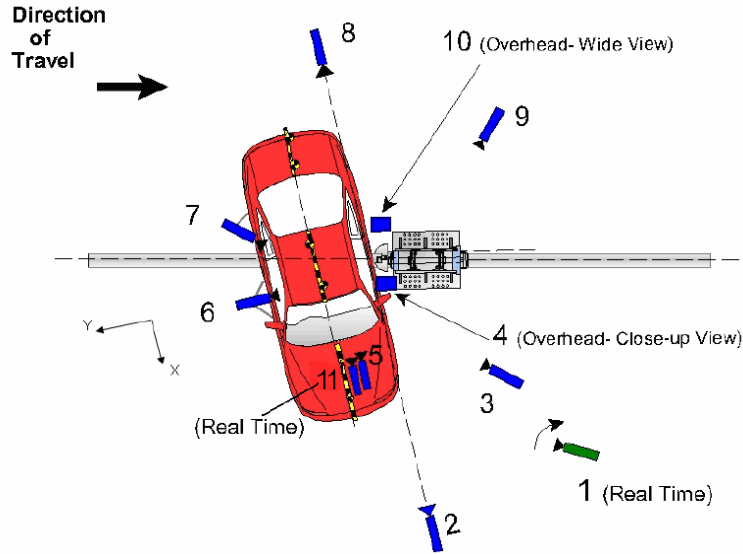
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	227
HS	Head to Side Window	mm	332
AD	Arm to Door	mm	142
HD	H-Point to Door	mm	214

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



CAMERA LOCATIONS AND DATA

Camera No.	View	Coordinates (m)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real Time Pan View of Impact	8.89	46.57	-3.04		30
2	Front Ground Level - Impact View	8.34	-0.05	-0.93	24	1000
3	Impact Side 45° - Forward Pole View	4.10	-2.15	-1.15	8.5	1000
4	Overhead Close-Up View of Impact	0.00	0.00	-5.79	12.5	1000
5	On-Board - Dummy Front View	1.40	0.49	-1.40	24	1000
6	On-Board - Dummy Side View	-0.05	1.55	-1.09	14	1000
7	On-Board - Dummy Rear Oblique View	-0.93	1.56	-1.17	14	1000
8	Rear Ground Level - Impact View	-6.12	-6.23	-0.96	24	1000
9	Impact Side 45° - Rearward Pole View	-8.02	0.04	-1.01	35	1000
10	Overhead Wide View of Impact	-0.06	0.22	-5.79	14	1000
11	Real Time Dummy Front View	1.33	0.55	-1.38		30

Reference from Point of Impact for X and Y; from Ground for Z):

+X = Forward of Vehicle, +Y = Right of Vehicle, +Z = Down

*All measurements accurate to ±6 mm

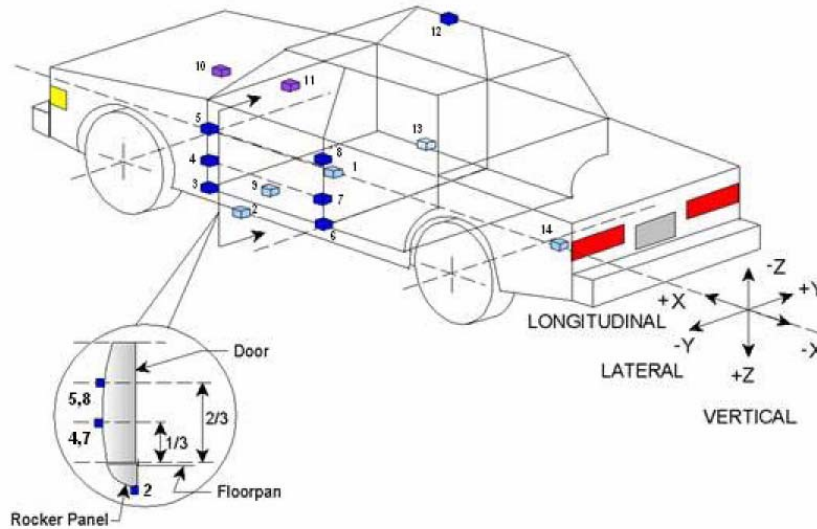
INSTRUMENTATION

Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	42

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



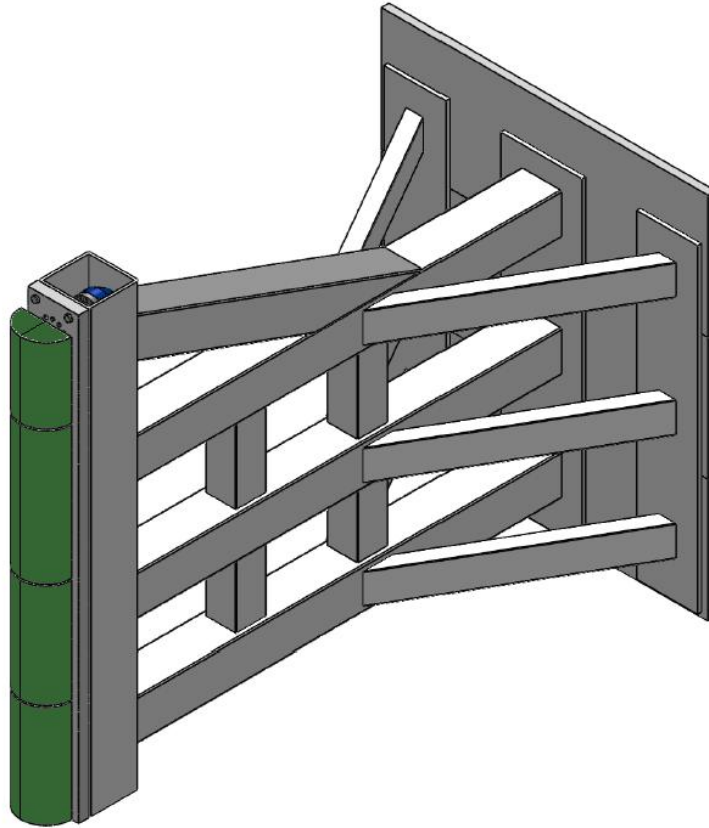
VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2005	0	-390
2	Left Floor Sill	2555	-805	-175
3	A-Pillar Sill	3165	-805	-345
4	A-Pillar Low	3165	-805	-505
5	A-Pillar Mid	3165	-805	-670
6	B-Pillar Sill	2150	-715	-355
7	B-Pillar Low	2150	-715	-620
8	B-Pillar Mid	2150	-715	-760
9	Driver Seat Track	2430	-550	-270
10	Engine Top	3890	155	-680
11	Firewall	3350	440	-835
12	Right Roof	2190	550	-1420
13	Right Floor Sill	2150	715	-400
14	Rear Floorpan	900	0	-560

Reference: X – Rear surface of vehicle (+ forward)
 Y – Vehicle centerline (+ to right)
 Z – Ground plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



RIGID POLE LOAD CELL LOCATIONS

ID	Units	Height From Ground
1	mm	87
2	mm	468
3	mm	648
4	mm	978
5	mm	1168
6	mm	1651
7	mm	1816
8	mm	2057

DATA SHEET NO. 8

POST-TEST OBSERVATIONS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Headrest
Left Shoulder	Torso Airbag
Upper Torso	Seat
Lower Torso	Pelvis Airbag, Door Panel, Seat
Left Hip	Pelvis Airbag
Left Knee	Door Panel, Right Knee

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge System Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	n/a	n/a	n/a	n/a	n/a

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	No Separation
Windshield Damage	Broken
Side Window Damage	Left Front Window Broken
Other Notable Effects	Windshield Separated

DATA SHEET NO. 8 ... (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	Yes	No	No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso)	Yes	Yes	No	
Side Airbag 3 (Pelvis)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other				

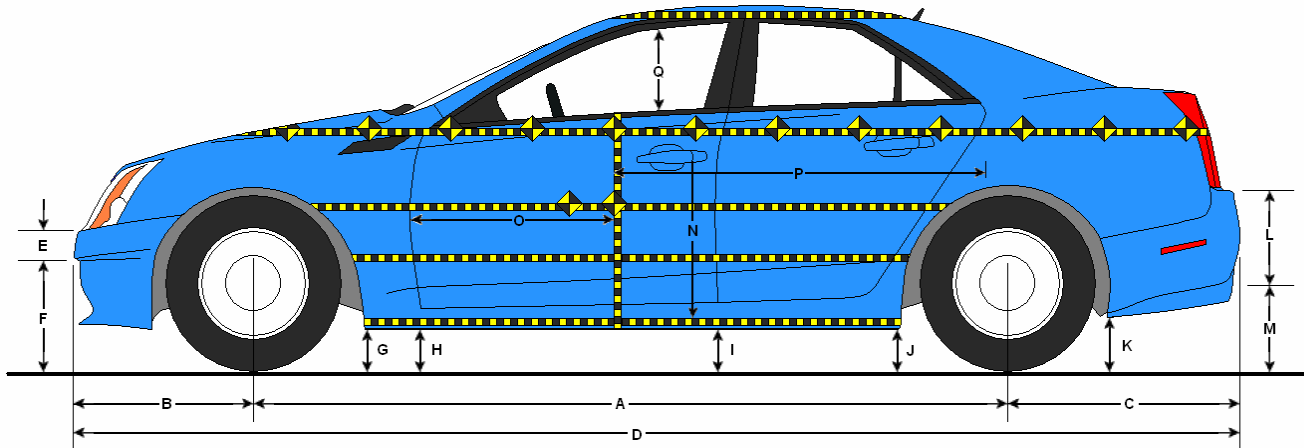
IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1271
Actual Impact Point (Aft of Front Axle)	mm		1261
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	10
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	75.6
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	31.6
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	31.6

DATA SHEET NO. 9

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2762	2716	-46
B	Front Axle to FSOV	785	768	-17
C	Rear Axle to RSOV	1066	1091	25
D	Total Length at Centerline	4577	4574	-3
E	Front Bumper Thickness	110	108	-2
F	Front Bumper Bottom to Ground	381	433	52
G	Sill Height at Front Wheel Well	175	172	-3
H	Sill Height at Front Door Leading Edge	177	171	-6
I	Sill Height at B-Pillar	206	198	-8
J1	Sill Height at Rear Wheel Well	196	218	22
J2	Pinch Weld Height at Rear Wheel Well	157	167	10
K	Sill Height Aft of Rear Wheel Well	490	490	0
L	Rear Bumper Thickness	142	141	-1
M	Rear Bumper Bottom to Ground	380	363	-17
N	Sill Height to Bottom of Front Window Sill	576	591	15
O	Front Door Leading Edge to Impact CL	678	585	-93
P	Rear Door Trailing Edge to Impact CL	1432	1345	-87
Q	Front Window Opening	421	445	24
R	Right Side Length	3095	3106	11
S	Left Side Length	3098	2995	-103
T	Vehicle Width at B-Pillar	1777	1672	-105

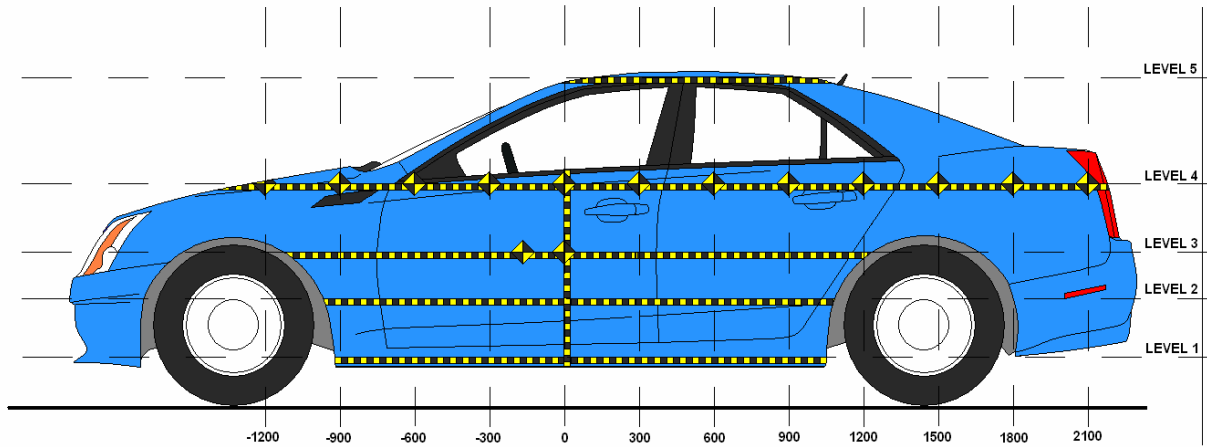
All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO. 10

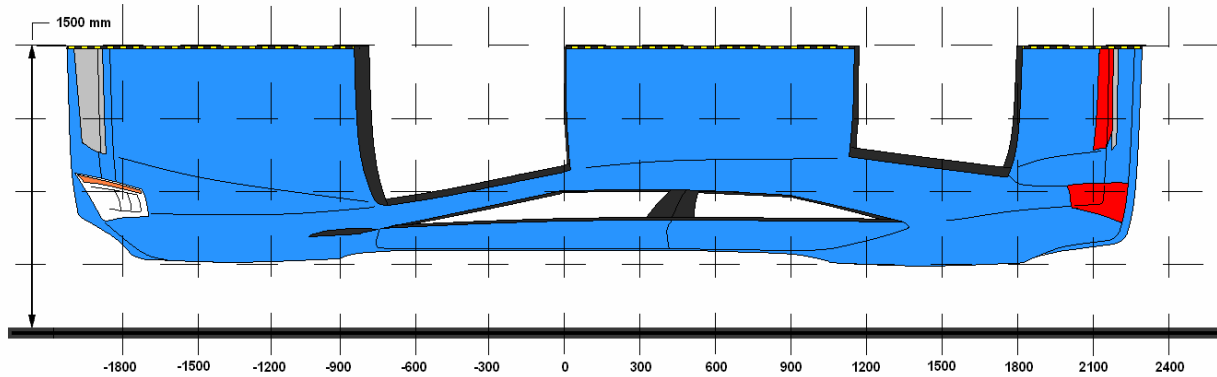
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



LEFT SIDE VIEW



OVERHEAD VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	240	359	0
2	Occupant H-Point	510	395	0
3	Mid-Door	617	408	0
4	Window Sill	839	374	0
5	Window Top	1366	161	150

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900		625	631	703			691	691	739			66	60	36	
-750	654	631	628	693		728	697	686	738		74	66	58	45	
-600	653	629	625	683		769	732	725	745		116	103	100	62	
-450	650	628	622	674		815	793	790	791		165	165	168	117	
-300	648	627	619	664		868	862	862	862		220	235	243	198	
-150	647	627	617	656		929	943	945	940		282	316	328	284	
0	647	627	615	649		1006	1022	1023	1023		359	395	408	374	
150	648	628	615	644	924	942	976	983	993	1085	294	348	368	349	161
300	649	629	614	618	933	851	864	864	868	1066	202	235	250	250	133
450	651	630	614	636	937	795	778	762	785	1047	144	148	148	149	110
600	654	631	615	634	937	758	753	740	761	1031	104	122	125	127	94
750	654	632	616	632	941	726	728	716	738	1016	72	96	100	106	75
900	652	634	618	632	943	700	702	695	716	1002	48	68	77	84	59
1050	647	637	621	635	945	672	685	675	697	993	25	48	54	62	48
1200			619	638	955			650	679	997			31	41	42
1350				643					662					19	
1500				651					686					35	
1650				661					691					30	
1800				672					697					25	
1950				686					705					19	
2100															
2250															
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

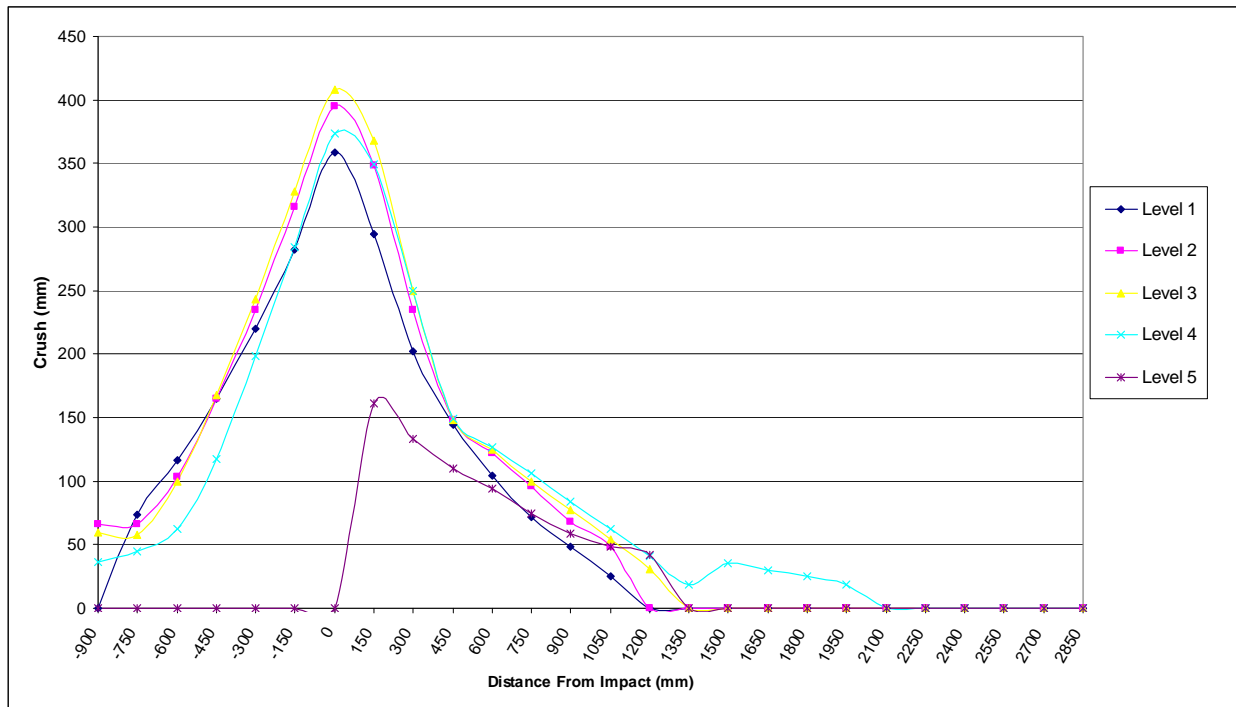
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan

NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test

Test Date: 12/12/12

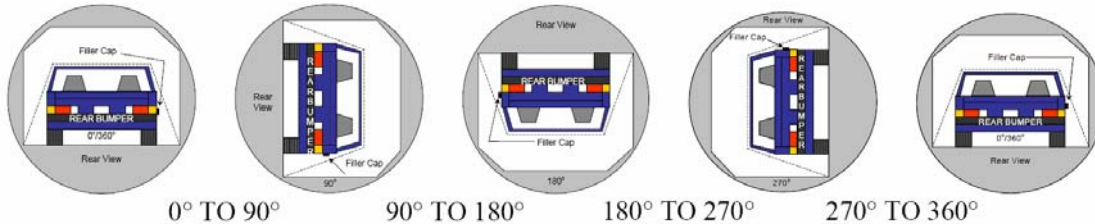


DATA SHEET NO. 11

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507
 Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12
 Temperature at Time of Impact: 14.5° C Test Time: 1:12 PM

- 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 Details: No spillage occurred



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	88	300	388
90° To 180°	87	300	387
180° To 270°	85	300	385
270° To 360°	88	300	388

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

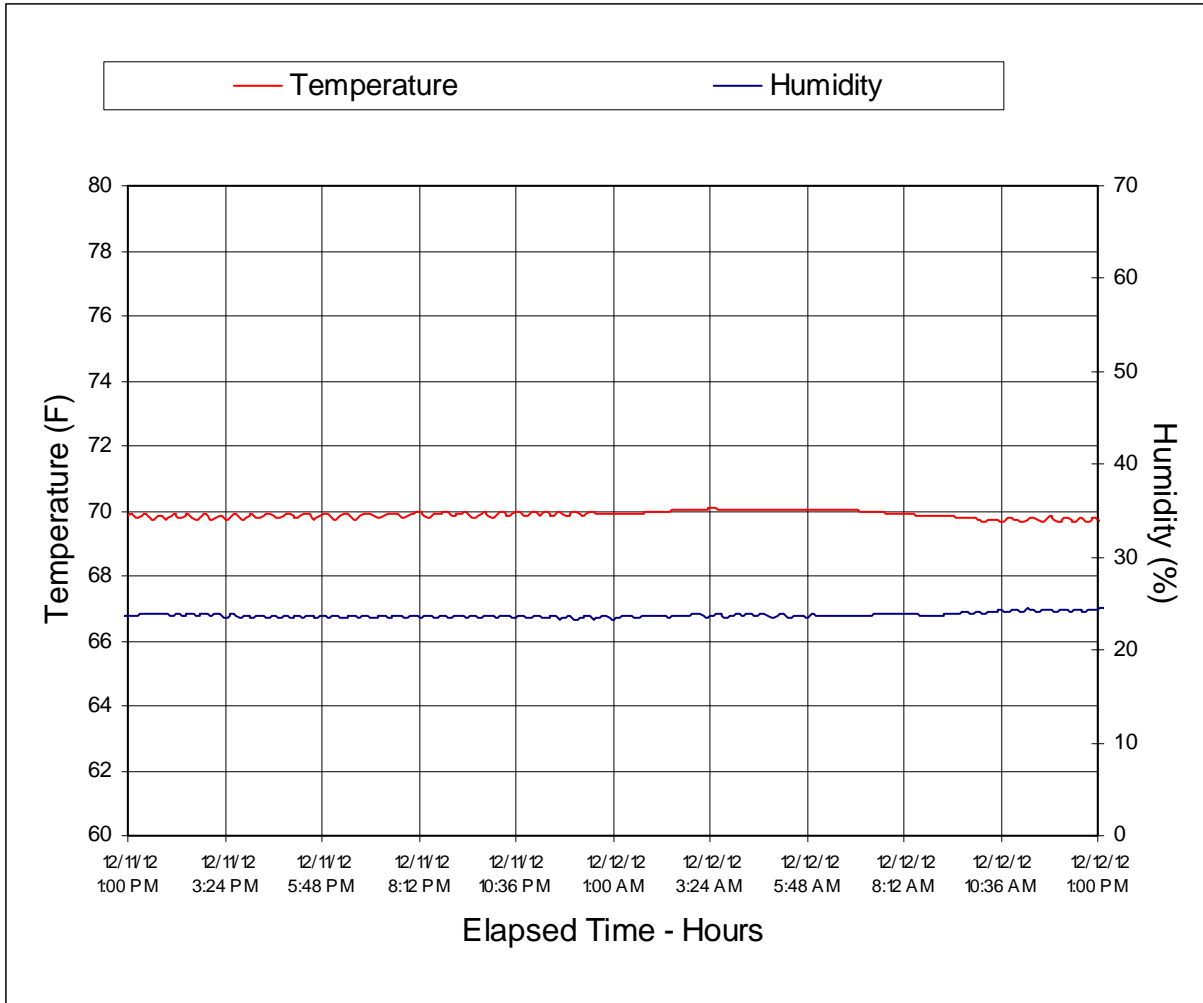
Test Phase	Spillage Location
0° To 90°	No Spillage Occurred
90° To 180°	No Spillage Occurred
180° To 270°	No Spillage Occurred
270° To 360°	No Spillage Occurred

DATA SHEET NO. 12

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan NHTSA No. MD0507

Test Program: NCAP Side Pole Impact Test Test Date: 12/12/12



**APPENDIX A
PHOTOGRAPHS**

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FIGURE 1. As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 2. As-Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



FIGURE 3. Pre-Test Frontal View of Test Vehicle



FIGURE 4. Post-Test Frontal View of Test Vehicle



FIGURE 5. Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 6. Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 7. Pre-Test Left Side View of Test Vehicle



FIGURE 8. Post-Test Left Side View of Test Vehicle



FIGURE 9. Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



FIGURE 10. Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle

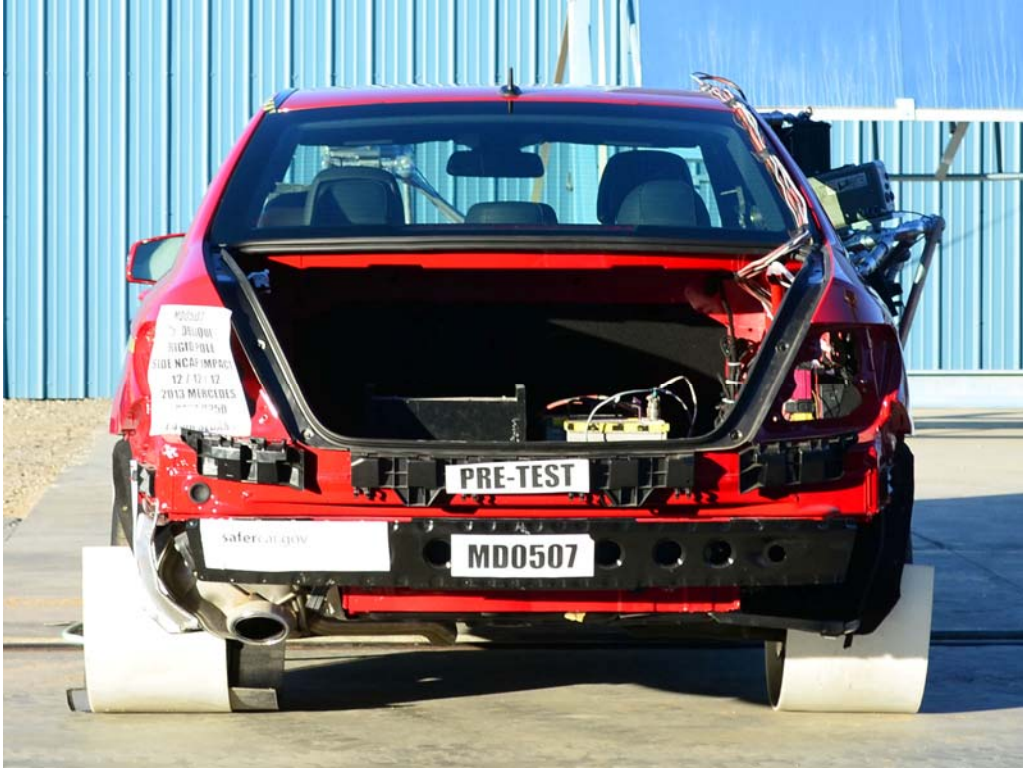


FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle



FIGURE 13. Pre-Test Right Side View of Test Vehicle



FIGURE 14. Post-Test Right Side View of Test Vehicle



FIGURE 15. Pre-Test Overhead View of Test Area



FIGURE 16. Post-Test Overhead View of Test Area



FIGURE 17. Pre-Test Left Side View of Pole
Positioned Against Side of Vehicle



FIGURE 18. Pre-Test Right Side View of Pole
Positioned Against Side of Vehicle



FIGURE 19. Pre-Test Close-Up View of Impact Point Target



FIGURE 20. Post-Test Close-Up View of Impact Point Target
Showing Impact Location



FIGURE 21. Pre-Test Front Close-Up View of Dummy Head and Chest



FIGURE 22. Post-Test Front Close-Up View of Dummy



FIGURE 23. Pre-Test Left Side View of Dummy Showing Belt and Chalking



FIGURE 24. Pre-Test Left Side View of Dummy Shoulder and Door Top View



FIGURE 25. Post-Test Left Side View of Dummy Shoulder and Door Top View



FIGURE 26. Pre-Test Frontal View of Seat Back Prior to Dummy Positioning



FIGURE 27. Pre-Test Frontal Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 28. Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



FIGURE 29. Pre-Test Overhead View of Dummy Thighs on Seat Pan



FIGURE 30. Pre-Test Left Side View of Dummy's Neck
Showing Position of Adjustable Neck Bracket



FIGURE 31. Pre-Test View of Dummy's Head Showing Dummy's Head Is Level



FIGURE 32. Pre-Test Placement of Dummy's Feet



FIGURE 33. Pre-Test View of Belt Anchorage for Dummy



FIGURE 34. Pre-Test Left Side View of Steering Wheel



FIGURE 35. Pre-Test View of Disengaged Parking Brake



FIGURE 36. Pre-Test View of Parking Brake



FIGURE 37. Pre-Test Close-Up Left Side View of Driver Seat Track



FIGURE 38. Pre-Test Close-Up Left Side View of Driver Seat Back

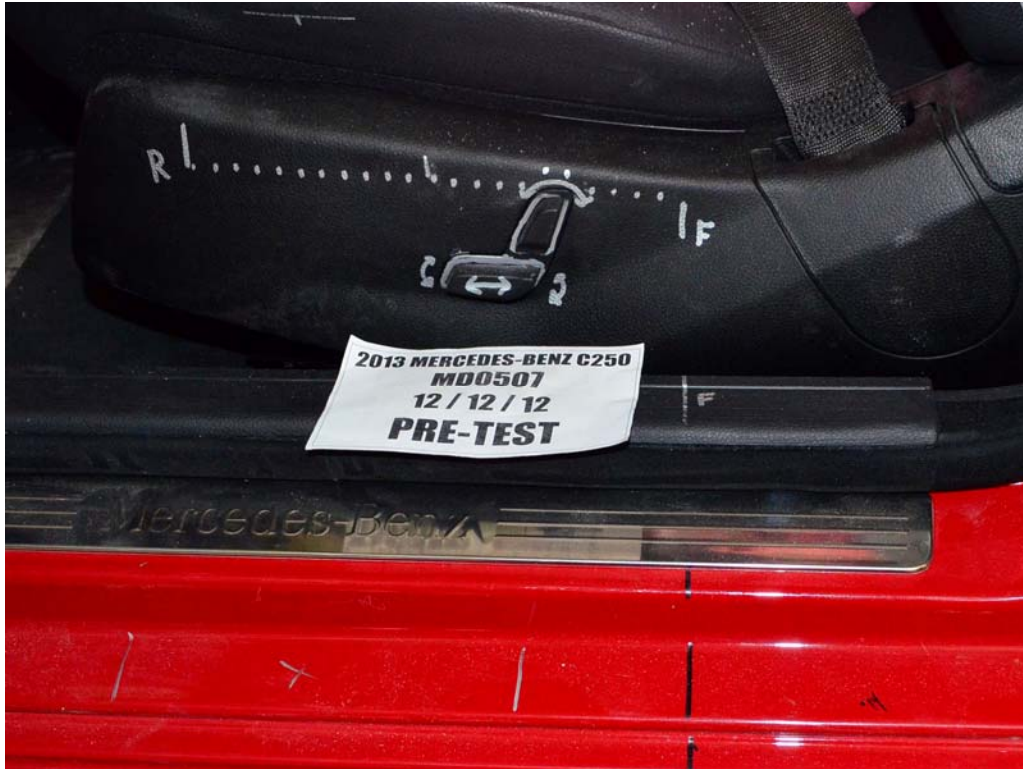


FIGURE 39. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 40. Pre-Test Dummy and Door Clearance



FIGURE 41. Post-Test Dummy and Door Clearance



FIGURE 42. Pre-Test Right Side View of Dummy and Front Seat Occupant Compartment



FIGURE 43. Post-Test Right Side View of Dummy and Front Seat Occupant Compartment



FIGURE 44. Pre-Test Inner Door Panel View



FIGURE 45. Post-Test Inner Door Panel View
Showing Dummy Contact Locations



FIGURE 46. Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



FIGURE 47. Post-Test Dummy Close-Up Head Contact with Side Airbag View



FIGURE 48. Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



FIGURE 49. Post-Test Dummy Close-Up Torso Contact with Side Airbag View



FIGURE 50. Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



FIGURE 51. Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



FIGURE 52. Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



FIGURE 53. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 54. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 55. Close-Up View of Vehicle's Certification Label



FIGURE 56. Close-Up View of Vehicle's Tire Placard Information or Label



FIGURE 57. Pre-Test Pole Barrier Front View



FIGURE 58. Post-Test Pole Barrier Front View



FIGURE 59. Pre-Test Pole Barrier Side View



FIGURE 60. Post-Test Pole Barrier Side View



FIGURE 61. Pre-Test Ballast View

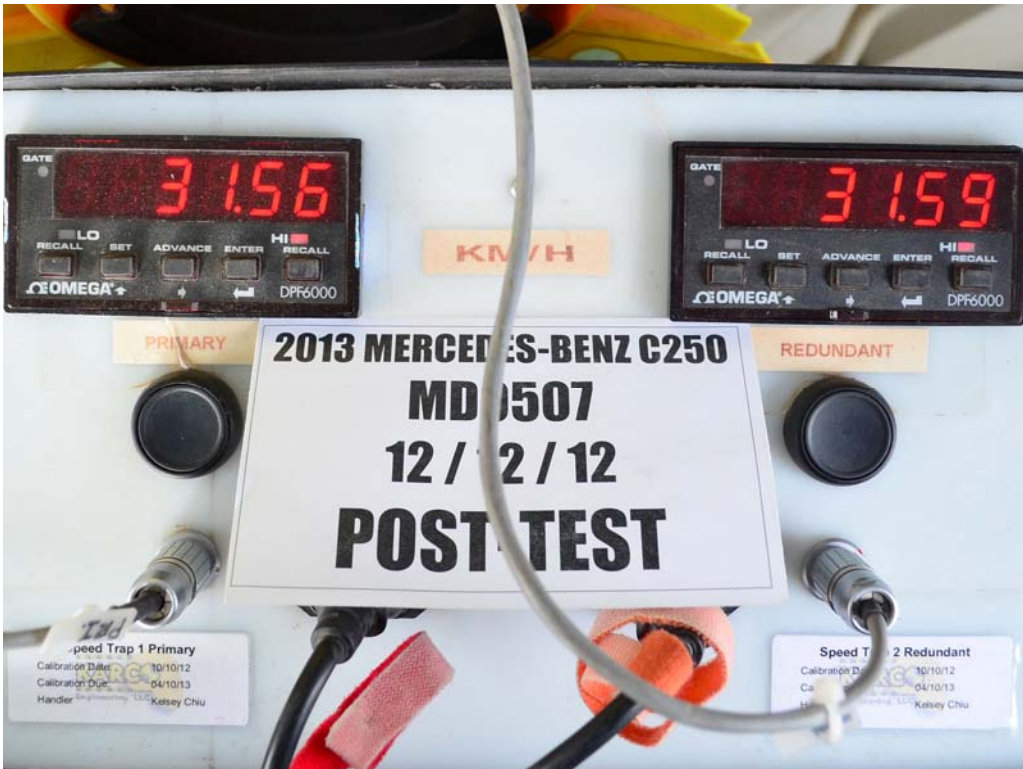


FIGURE 62. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 63. FMVSS No. 301 Rollover 0 Degrees



FIGURE 64. FMVSS No. 301 Rollover 90 Degrees

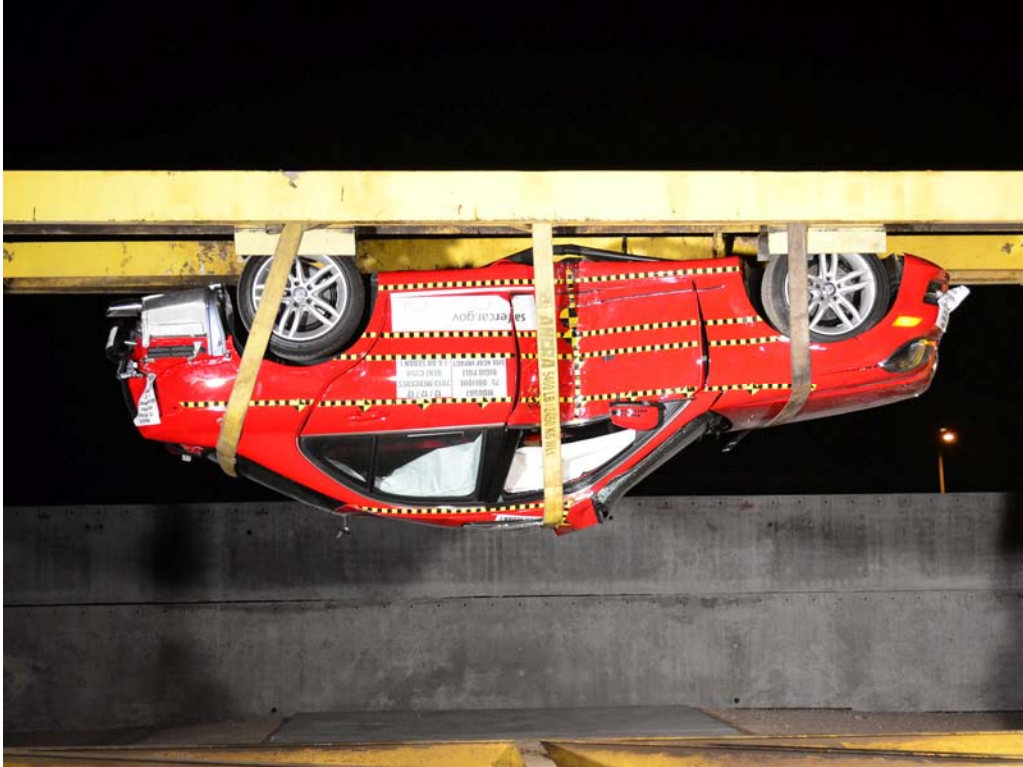


FIGURE 65. FMVSS No. 301 Rollover 180 Degrees

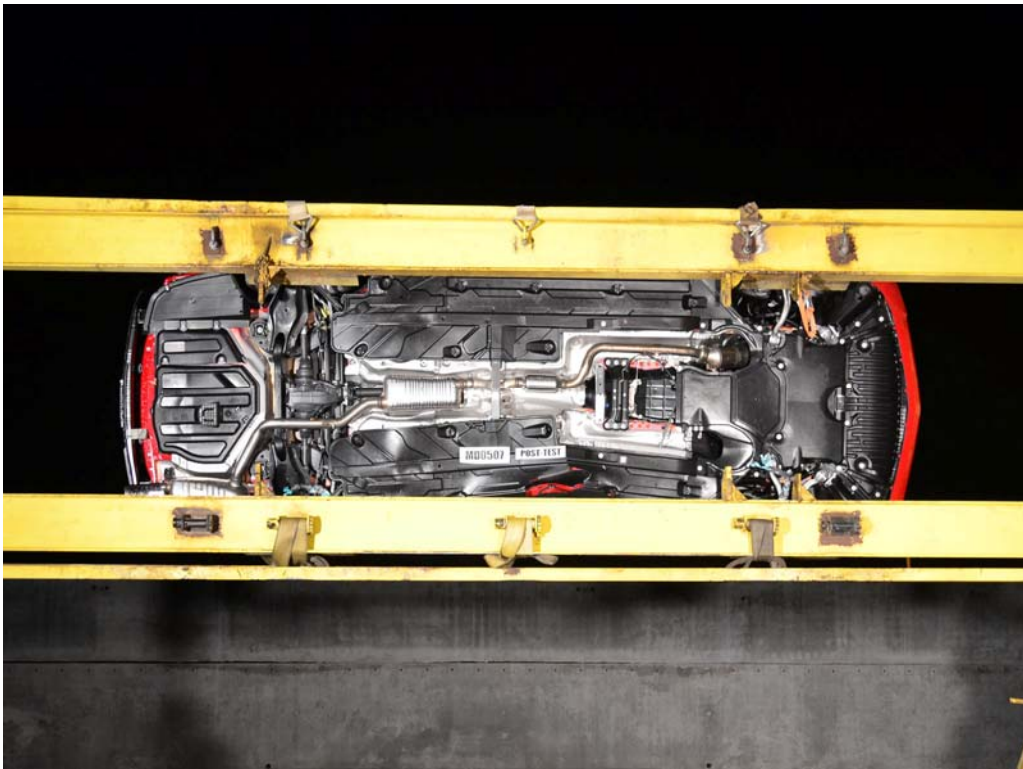


FIGURE 66. FMVSS No. 301 Rollover 270 Degrees



FIGURE 67. FMVSS No. 301 Rollover 360 Degrees



FIGURE 68. Impact Event

2013 C250 Sedan

POB: 0370534232
VIN: WDDGF4H2R2R254472

www.MBUSA.com

Standard Features **Suggested Retail Price**

\$35,350

PERFORMANCE/HANDLING

- 2.5 liter Turbocharged Engine 1 Engine with Direct Injection
- 201 Horsepower
- 220-hp 4-cylinder
- 7-speed automatic Transmission
- Suspension with Stabilizer Bar
- 80 Steer Servo
- 18" Wheels

COMFORT/CONVENIENCE

- Power 100-wheel Steering
- Integrated Garage Door Opener
- Active Steering Assist & Steering Memory
- Bluetooth Connectivity with Audio Streaming
- Bluetooth™ - via USB port by Apple, Windows
- Central Controller with Color Display
- Dual Zone Automatic Climate Control
- Power Front Seats with Lateral Support
- Automatic Headlamps with Twilight
- Interior & Exterior Lighting
- Instrumentation with 160-mph Speedometer

SAFETY/SECURITY

- New Vehicle 4-year/50,000 Mile Warranty
- 24-hour Roadside Assistance Program
- Advanced Air Bag Protection
- High Strength Steel Reinforced Car Case
- SECURE LOCK
- SECURE Anchor System
- Anti-Lock Braking System (ABS)
- Brake Assist System (BAS)
- Electronic Stability Program (ESP)
- ATTENTION ASSIST
- ADAPTIVE BRAKE Technology

PAINT/UPHOLSTERY & TRIM

- 151 Black Star
- 151 Black MB Tex
- 700 Alcantara Trim

OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES

- 200 Black 3.5L V6 24V (not available)
- 333 Sport, 360-hp Sport Body Styling, Mercedes-Benz Star 2.5 L 250, 17" Rims, 17" Rims (Integrated with Alloy Wheel with 80 Steer Servo, Sport Suspension and Braking System, Sport Interior, Alcantara Trim Upholstery and Trim)

Total Retail Price

\$36,455.00

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy

25 22 31

combined city/hwy city highway

4.0 gallons per 100 miles

City range from 16 to 24 MPG
The best vehicle rates 112 MPG

You Save \$100

in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost

\$2,300

This vehicle emits 352 grams CO₂ per mile. The best emits 6 grams per mile (tailpipe only). Fueling and driving habits affect actual mileage.

Fuel Economy & Greenhouse Gas Rating Emissions Rating

This vehicle earns 5 stars per mile. The best earns 10 stars per mile (tailpipe only). Fueling and driving habits affect actual mileage.

Annual vehicle with EPA for more details, including driving conditions and how one drives and maintains your vehicle. The average new vehicle gets 23 MPG and costs \$1,000 to fuel over 5 years. Our estimates are based on 14.99 miles per gallon at \$2.35 per gallon. EPA's 40 miles per gallon is subject to interpretation. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov
Calculate personalized estimates and compare vehicles.

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

Based on the combined ratings of frontal, side and rollover.

Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	Not Rated
Side Crash	Front seat Rear seat	Not Rated
Rollover		★★★★

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-800-327-4238

PARTS CONTENT INFORMATION

For vehicles in this carline: U.S./Canadian Parts Content: 0% Major Sources of Foreign Parts Content: GERMANY: 60%

NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

For this vehicle: Final Assembly Point: EAST LONDON, S. AFRICA Country of Origin: GERMANY Transmission: GERMANY

Map To: 10000 W. 10th Ave. Suite 1000 Denver, CO 80202-3199

Fuel Economy: City 25 Highway 31 Combined 22

Emissions Rating: 5

FIGURE 69. Monroney Label

50 Occupant safety

PRE-SAFE® (preventative occupant protection)

WARNING
The PRE-SAFE® system reduces the impact of an accident on vehicle occupants, as long as their seat belts have been fastened correctly. Although your vehicle is equipped with a PRE-SAFE® system, the possibility of injury in the event of an accident cannot be ruled out. You should therefore always drive carefully and adjust your driving style to the prevailing road, weather and traffic conditions.

PRE-SAFE® takes preventive measures to protect occupants in certain hazardous situations.

PRE-SAFE® activates:

- BAS PLUS intervenes powerfully on vehicles with DISTRONIC PLUS, the radar sensor system detects an imminent danger of collision in certain situations
- In critical driving situations, e.g. when physical limits are exceeded and the vehicle understeers or oversteers severely
- PRE-SAFE® takes the following measures depending on the hazardous situation detected:
 - The front seat belts are pre-tensioned.
 - An vehicles with memory function for the front passenger seat: the front passenger seat is adjusted to its an unfavorable position.
 - If the vehicle skids, the sliding sunroof/panoramic roof with power tilt/tilting panel and the side windows are closed so that only a small gap remains.

If the hazardous situation passes without resulting in an accident, PRE-SAFE® deactivates the belt pre-tensioning. All settings made by PRE-SAFE® can then be reversed.

51 Occupant safety

NECK-PRO head restraints (except AMG vehicles)

NECK-PRO head restraints increase protection of the driver's and front passenger's head and neck. In the event of a rear collision of a certain severity, the NECK-PRO head restraints/NECK-PRO luxury head restraints are moved forwards and backwards. This provides better head support.

WARNING
Do not attach any objects (e.g. a coat hanger) to the NECK-PRO head restraints/NECK-PRO luxury head restraints. Otherwise, the NECK-PRO head restraints/NECK-PRO luxury head restraints may not function properly and in the event of a rear-end collision may not offer the protection they are designed to provide.

WARNING
Seat or head restraint covers can cause a malfunction when the NECK-PRO head restraints/NECK-PRO luxury head restraints are activated or when the side impact air bags

If the seat belts are not released

- Move the backrest or seat back slightly, but only when the vehicle is stationary. The belt positioning is reduced and the locking mechanism is released.

WARNING
Make sure that nobody can become trapped as you adjust the seat.

Make sure that there are no objects in the footwell or behind the seats when resetting the seats. There is a risk that the seats and/or the objects could be damaged.

More information about seat belt adjustment, a convenience function integrated into PRE-SAFE®, can be found in the "Seat belt adjustment" section (→ page 34).

WARNING
For your protection, drive only with properly positioned head restraints.

Adjust the head restraint so that it is as close to the head as possible and the center of the head restraint supports the back of the head at eye level. This will reduce the potential for injury to the head and neck in the event of an impact or similar situation.

Resetting triggered NECK-PRO head restraints/NECK-PRO luxury head restraints

Important safety notes

- In the case of adults, have the NECK-PRO head restraints/NECK-PRO luxury head restraints checked at an authorized Mercedes-Benz Center after a rear-end collision.

WARNING
After pushing back the NECK-PRO head restraint cushions, make sure your fingers do not become caught between the head

rests and the seat cover. Failure to observe this could result in injuries.

NECK-PRO head restraints

Resetting the NECK-PRO head restraints requires a lot of strength. If you have difficulty resetting the NECK-PRO head restraints, have this work carried out at a qualified specialist workshop, e.g. an authorized Mercedes-Benz Center.

NECK-PRO luxury head restraints

If you have difficulty resetting the NECK-PRO luxury head restraints, have this work carried out at a qualified specialist workshop, e.g. an authorized Mercedes-Benz Center.

52 Occupant safety

Seat belts

WARNING
Always fasten your seat belt before driving off. Always make sure all of your passengers are properly restrained. You and your passengers should always wear seat belts.

Failure to wear and properly fasten and position your seat belt greatly increases your risk of injury and that they severely in an accident.

If you are not in an accident, your muscles can be considerably more severe without your seat belt properly buckled. Without your seat belt buckled, you are much more likely to be the victim of the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, the probability of injury or death is halved if you are properly wearing your seat belt. The air bags can only protect an increased if the occupants are properly wearing their seat belts.

WARNING
Never ride in a moving vehicle with the seat backrest in an excessively reclined position as this can be dangerous. You could slide under the seat belt in a collision. If you slide under the seat belt, the seat belt would apply force to the abdomen or neck. That could cause serious or even fatal injuries. The seat backrest and seat belt provide the best protection when the wearer is in a position that is as upright as possible and the seat belt is properly fastened on the body.

WARNING
Never let more people ride in the vehicle than there are seat belts available. Make sure everyone riding in the vehicle is correctly restrained with a separate seat belt. Never use a seat belt for more than one person at a time.

WARNING
See "Children in the vehicle" (→ page 56) for further information on efforts and children traveling in the vehicle as well as on child-restraint systems.

WARNING
Damaged seat belts or seat belts that have been subjected to stress in an accident must

Remove reclining seat from the vehicle document wallet.

Slide reclining seat into gullie between the NECK-PRO luxury head restraint and the rear cover of the head restraint.

Push reclining seat downwards until you hear the head-restraint deployment mechanism engage.

Full out reclining seat

Firmly press the NECK-PRO luxury head restraint cushion back until it engages the second NECK-PRO luxury head restraint.

Repeat this procedure for the second NECK-PRO luxury head restraint.

Put reclining seat back into the vehicle document wallet.

The use of infant or child-restraints is required by law in all 50 states, the District of Columbia, the U.S. territories and all Canadian provinces. Even when this is not the case, all vehicle occupants should have their seat belts fastened when the vehicle is in motion.

See "Children in the vehicle" (→ page 56) for further information on efforts and children traveling in the vehicle as well as on child-restraint systems.

FIGURE 70. Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary vs. Time	B-1
2	Driver Head Acceleration (Y) Primary vs. Time	B-1
3	Driver Head Acceleration (Z) Primary vs. Time	B-1
4	Driver Head Resultant Acceleration Primary vs. Time	B-1
5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-2
6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-2
7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-2
8	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-2
9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-3
10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-3
11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-3

The following additional data 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

Additional Driver Dummy Instrumentation Data

Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)

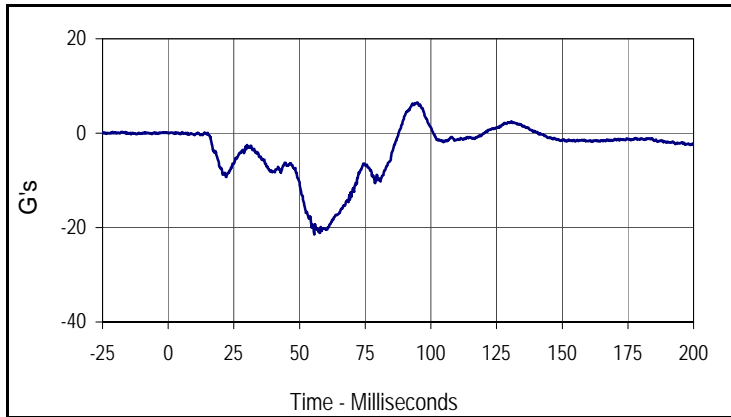
Left B-Pillar Sill Acceleration
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

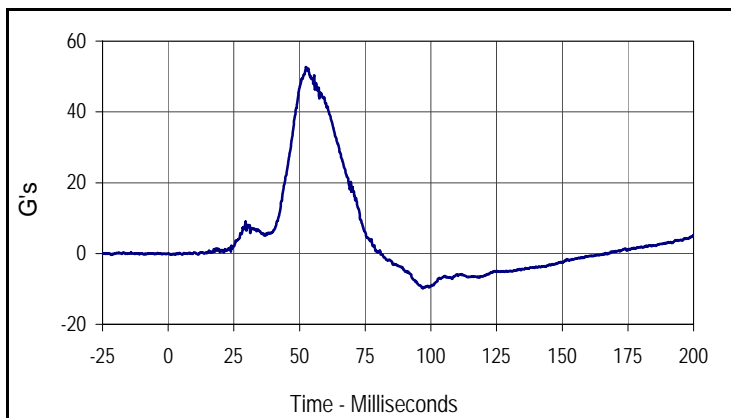
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

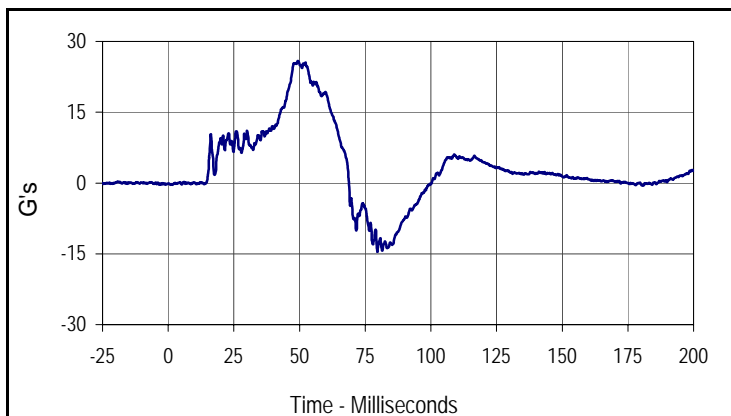
Test Date: 12/12/12
 NHTSA No.: MD0507



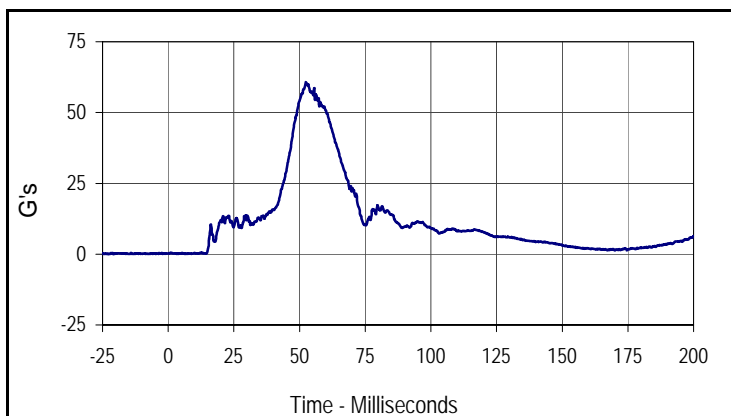
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
6.5	94.8	-21.4	55.6



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
52.6	52.5	-9.9	96.9



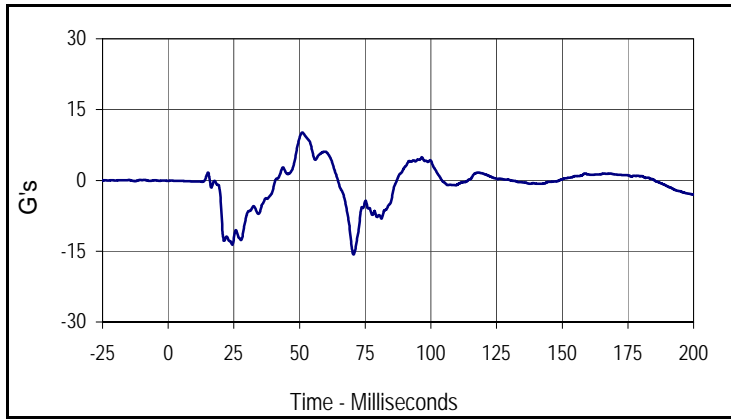
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
25.9	49.3	-14.5	79.6



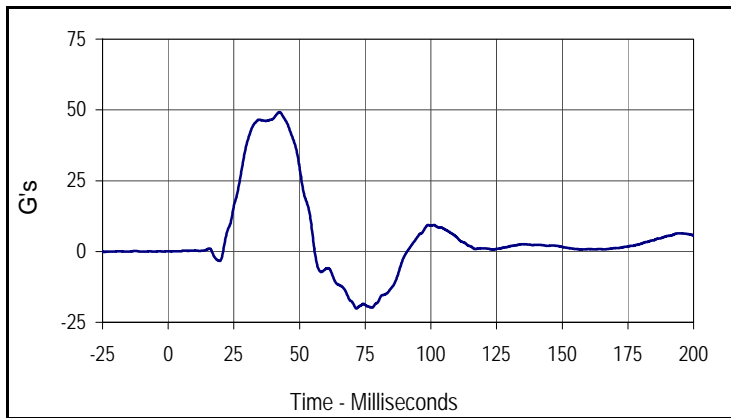
Curve Description			
Driver Head Acceleration Primary Res.			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
60.8	52.4	0.1	6.3

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

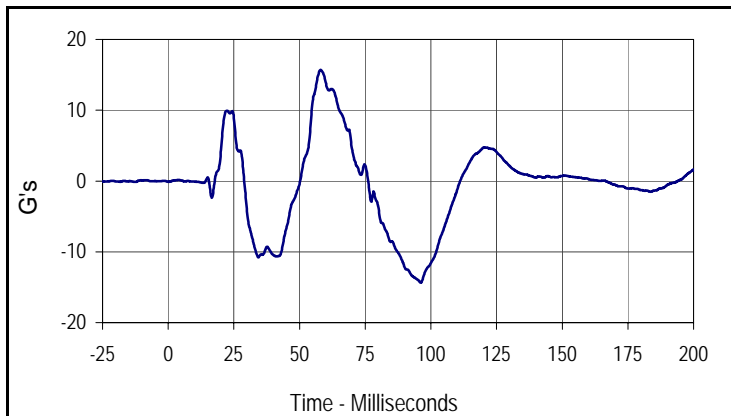
Test Date: 12/12/12
 NHTSA No.: MD0507



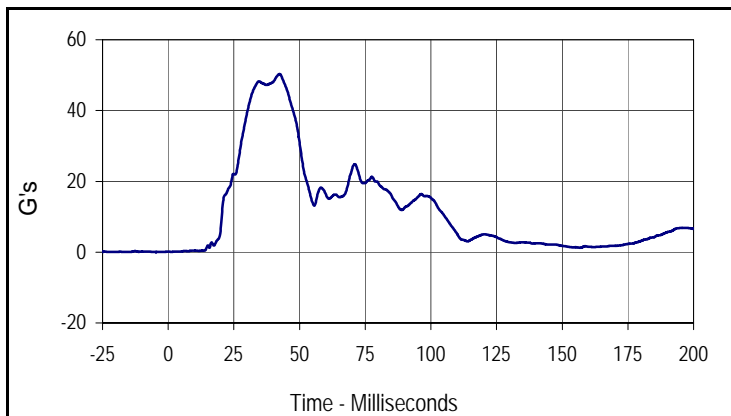
Curve Description			
Driver Lower Spine T12 Acceleration X			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
10.1	51.0	-15.7	70.5



Curve Description			
Driver Lower Spine T12 Acceleration Y			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
49.2	42.4	-20.1	71.6



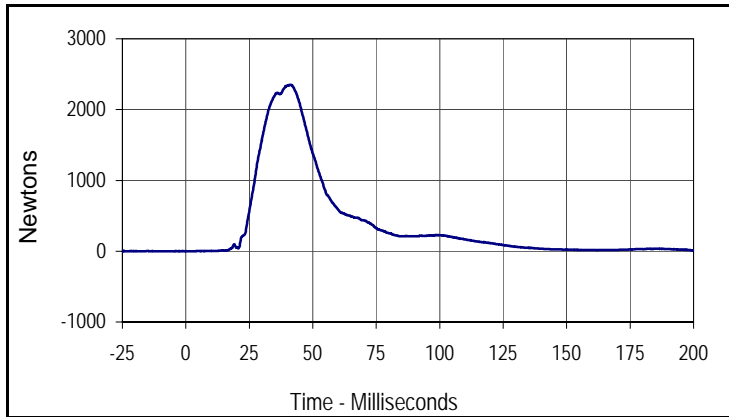
Curve Description			
Driver Lower Spine T12 Acceleration Z			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
15.7	58.0	-14.3	96.1



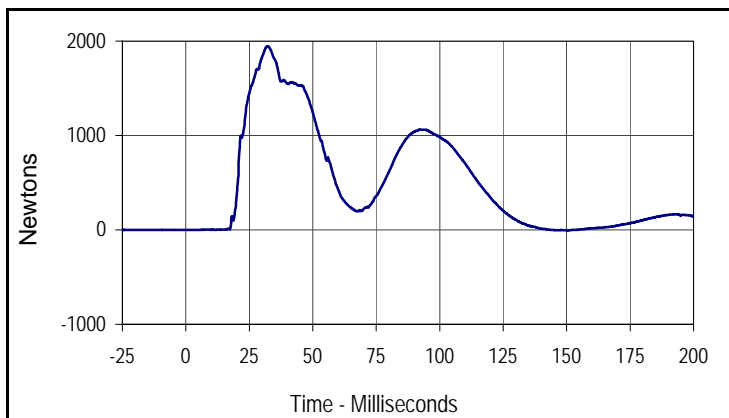
Curve Description			
Driver Lower Spine T12 Acceleration Res.			
Plot No.	Type	SAE Class	Units
008	RES	180	G's
Max	Time	Min	Time
50.3	42.4	0.1	1.2

Test Vehicle: 2013 Mercedes-Benz C250 4-Door Sedan
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

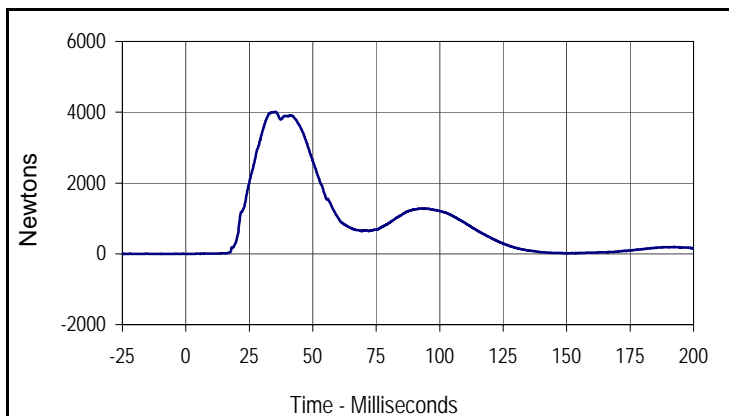
Test Date: 12/12/12
 NHTSA No.: MD0507



Curve Description			
Driver Iliac Wing Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
009	FIL	600	Newtons
Max	Time	Min	Time
2348.7	41.2	-2.2	0.3



Curve Description			
Driver Acetabulum Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Newtons
Max	Time	Min	Time
1945.5	32.4	-5.4	150.4



Curve Description			
Driver Total Pelvic Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
011	SUM	600	Newtons
Max	Time	Min	Time
4008.9	35.3	-3.0	0.4

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Test Program: SID IIs External Measurements

Test Date: 12/10/12



ATD Serial No.: 299

Test I.D.: N/A

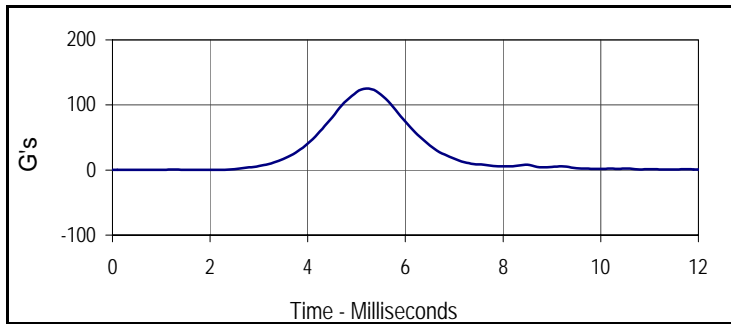
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A Sitting Height	mm	772 - 788	780	Pass
B Shoulder Pivot Height	mm	437 - 453	445	Pass
C H-Point Height	mm	79 - 89	85	Pass
D H-Point from Seatback	mm	141 - 151	145	Pass
E Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F Thigh Clearance	mm	119 - 135	125	Pass
G Head Breadth	mm	140 - 148	145	Pass
H Head Back from Backline	mm	40 - 46	44	Pass
I Head Depth	mm	178 - 188	184	Pass
J Head Circumference	mm	541 - 551	545	Pass
K Buttock to Knee Length	mm	514 - 540	527	Pass
L Popliteal Height	mm	343 - 369	352	Pass
M Knee Pivot to Floor Height	mm	392 - 409	401	Pass
N Buttock Popliteal Length	mm	416 - 442	432	Pass
O Chest Depth w/o Jacket	mm	195 - 211	202	Pass
P Foot Length	mm	216 - 232	221	Pass
Q Hip Breadth with Pelvic Plug	mm	313 - 323	315	Pass
R Arm Length	mm	249 - 259	252	Pass
S Knee Joint to Seatback	mm	477 - 493	481	Pass
V Shoulder Width	mm	341 - 357	352	Pass
W Foot Width	mm	78 - 94	86	Pass
Y Chest Circumference with Jacket	mm	851 - 881	872	Pass
Z Waist Circumference	mm	760 - 791	774	Pass
Overall Test Results				Pass

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 299

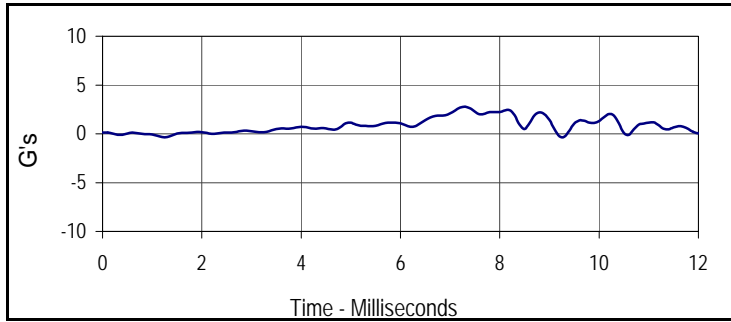
Test Date: 12/10/12
 Test I.D.: 299HD051



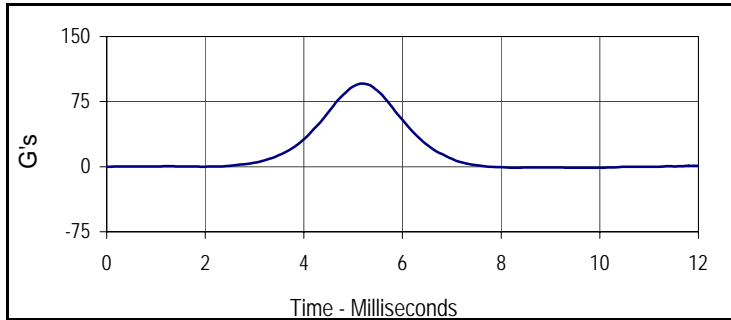
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	285	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Peak Head Resultant Acceleration	G's	115 to 137	125.3	Pass
Peak Head X Acceleration	G's	<15	2.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	4.7	Pass
Overall Test Results				Pass



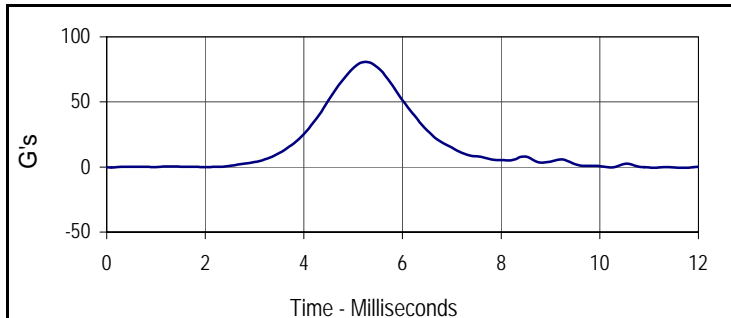
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
125.3	5.2	0.2	0.9



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.8	7.3	-0.3	1.3



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
95.9	5.2	-1.3	9.8



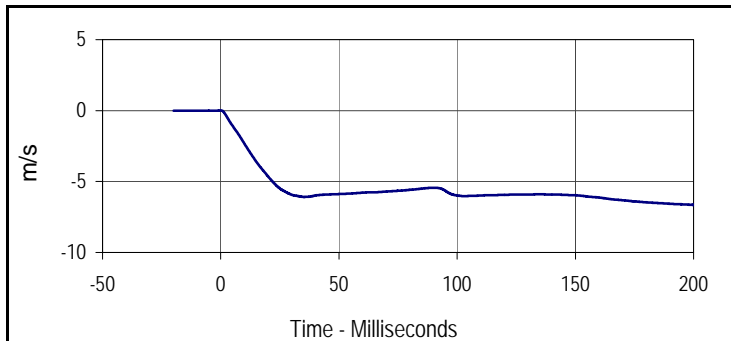
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
80.6	5.2	-0.6	11.7

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 299

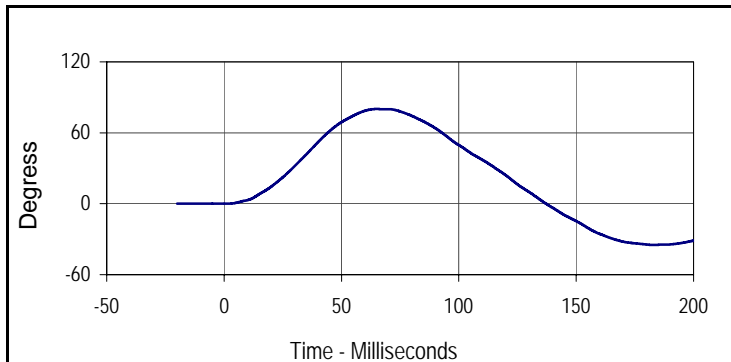
Test Date: 12/10/12
 Test I.D.: 299NB051



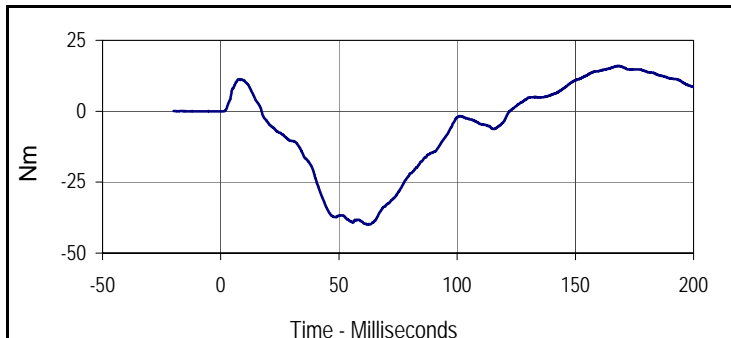
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	330	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass	
	Min		20.8	Pass	
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass	
	Min		28.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.56	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.33	Pass
	15 msec	m/s	-3.30 to -4.10	-3.60	Pass
	20 msec	m/s	-4.40 to -5.40	-4.64	Pass
	25 msec	m/s	-5.40 to -6.10	-5.49	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.09	Pass
D-Plane Rotation	Max	Degrees	71 to 81	80.1	Pass
	Time	msec	50 to 70	64.9	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-40.0	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	122.3	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.2	-6.7	200.0



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
80.1	64.9	-34.8	182.6



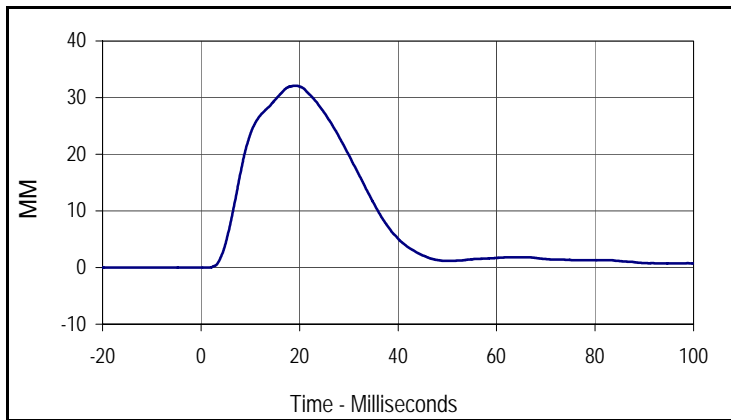
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
16.0	168.3	-40.0	61.9

Test Program: SID IIs Shoulder Impact Test
 ATD Serial No.: 299

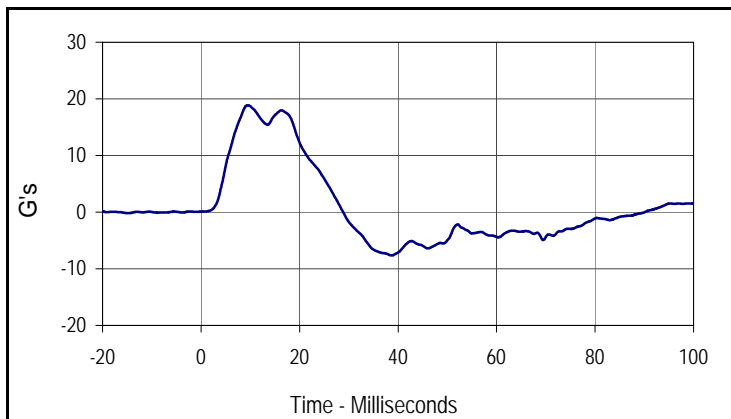
Test Date: 12/10/12
 Test I.D.: 299SH051



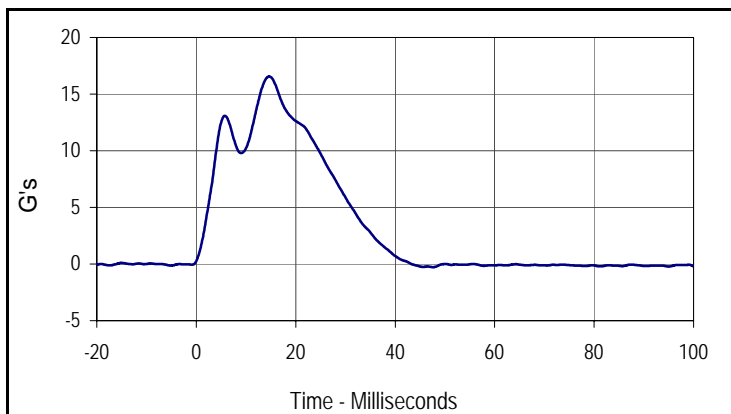
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	385	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Impactor Velocity	m/s	4.20 to 4.40	4.29	Pass
Peak Shoulder Deflection	mm	28 to 37	32.1	Pass
Peak Lateral Spine Acceleration Y	G's	17 to 22	18.9	Pass
Peak Impactor Acceleration	G's	13 to 18	16.6	Pass
Overall Test Results			Pass	Pass



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
32.1	19.2	0.0	-19.1



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.9	9.5	-7.6	38.7



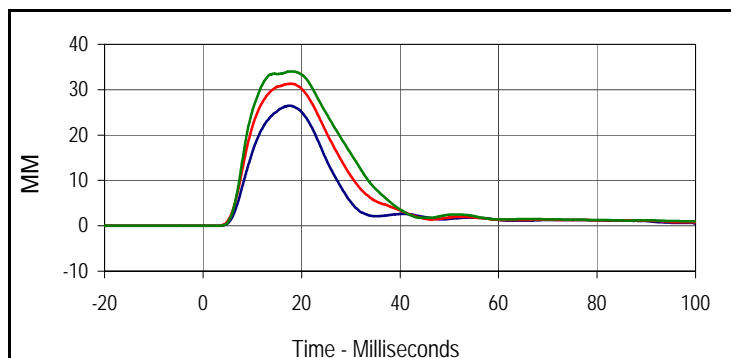
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.6	14.7	-0.3	47.6

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

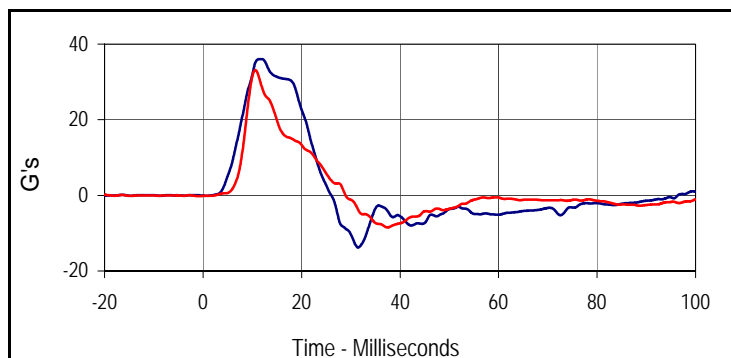
Test Date: 12/10/12
 Test I.D.: 299TWA051



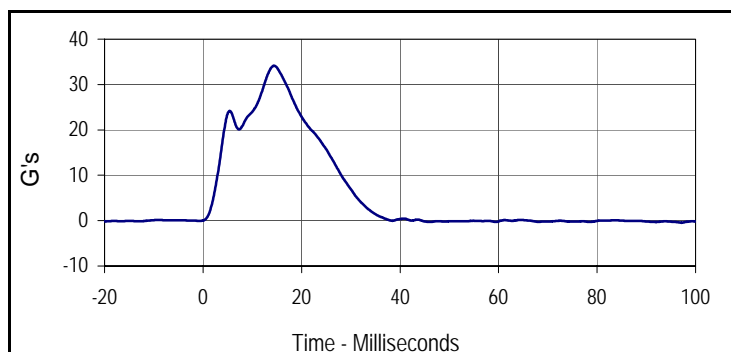
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	410	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.71	Pass
Peak Shoulder Deflection	mm	31 to 40	34.3	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	26.5	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.3	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	34.0	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	36.1	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	33.1	Pass
Peak Impactor Acceleration	G's	30 to 36	34.1	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
26.5	17.5	0.0	-20.0
Middle Thorax Deflection			
Max	Time	Min	Time
31.3	17.8	0.0	-16.5
Lower Thorax Deflection			
Max	Time	Min	Time
34.0	17.7	0.0	-13.3



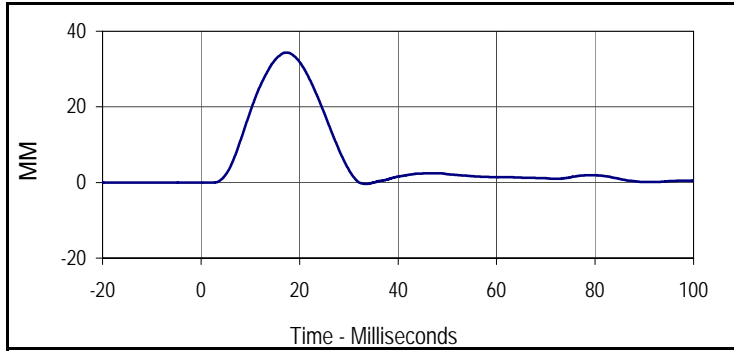
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
36.1	11.4	-13.8	31.5
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
33.1	10.6	-8.5	37.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
34.1	14.4	-0.4	97.1

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

Test Date: 12/10/12
 Test I.D.: 299TWA051



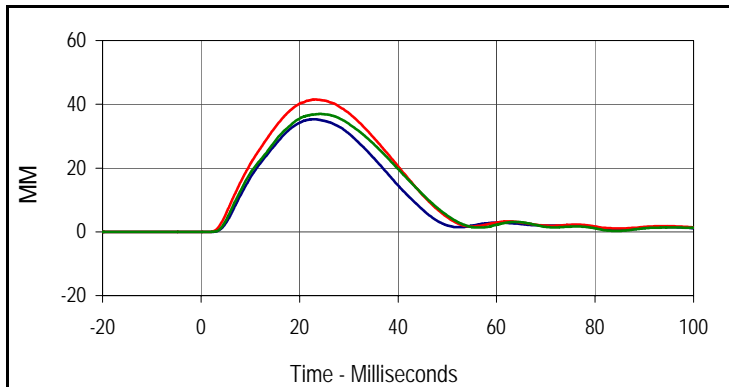
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
34.3	17.3	-0.4	33.6

Test Program: SID IIs Thorax without Arm Impact Test
 ATD Serial No.: 299

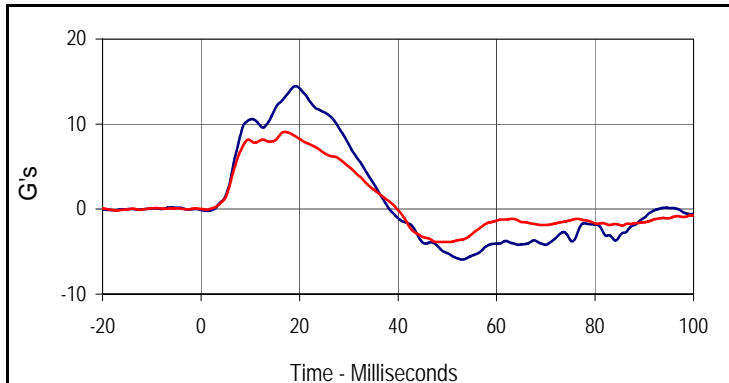
Test Date: 12/10/12
 Test I.D.: 299TWOA051



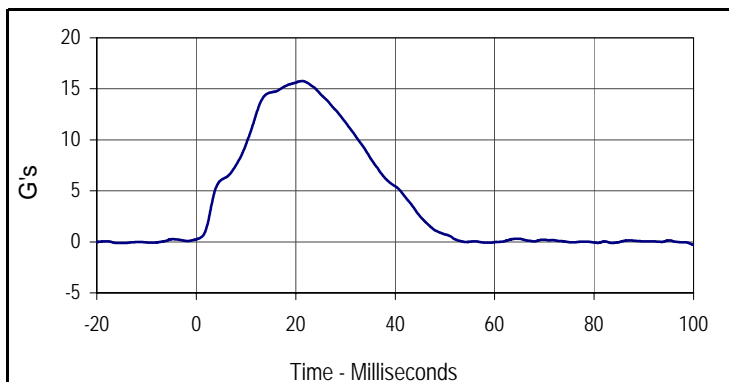
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	435	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.29	Pass
Peak Upper Thorax Rib Deflection	mm	32 to 40	35.3	Pass
Peak Middle Thorax Rib Deflection	mm	39 to 45	41.5	Pass
Peak Lower Thorax Rib Deflection	mm	35 to 43	37.0	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	14.5	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.1	Pass
Peak Impactor Acceleration	G's	14 to 18	15.8	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
35.3	23.1	0.0	-11.9
Middle Thorax Deflection			
Max	Time	Min	Time
41.5	23.1	0.0	-16.5
Lower Thorax Deflection			
Max	Time	Min	Time
37.0	24.2	0.0	-7.4



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.5	19.2	-5.9	53.1
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.1	17.0	-3.9	49.1



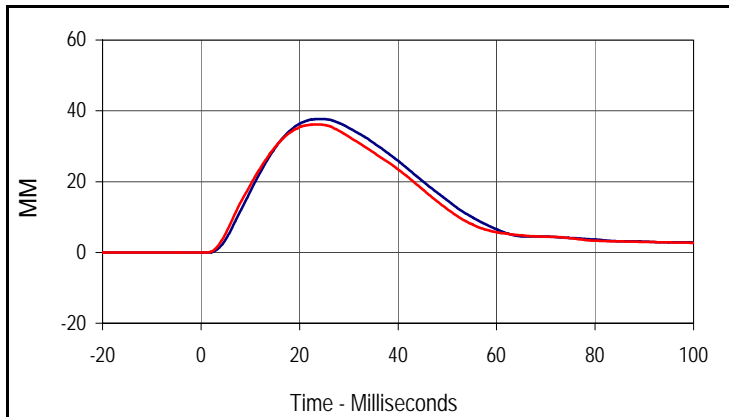
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
15.8	21.3	-0.3	99.9

Test Program: SID IIs Abdomen Impact Test
 ATD Serial No.: 299

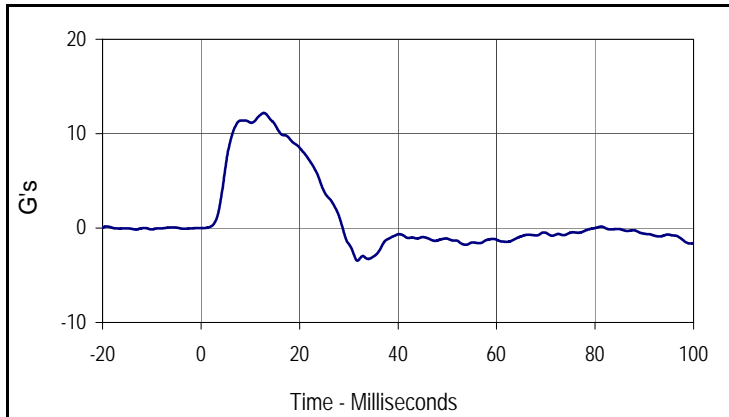
Test Date: 12/10/12
 Test I.D.: 299ABD051



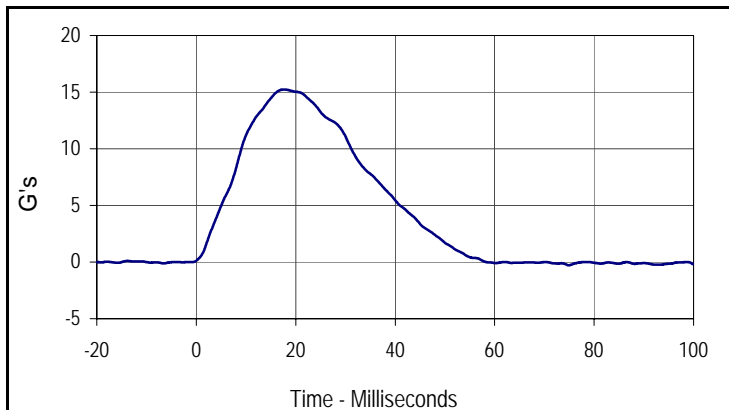
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	460	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.30	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.7	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	36.1	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	12.2	Pass
Peak Impactor Acceleration	G's	12 to 16	15.2	Pass
Overall Test Results				Pass



Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
37.7	24.0	0.0	-20.0
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
36.1	23.1	0.0	0.5

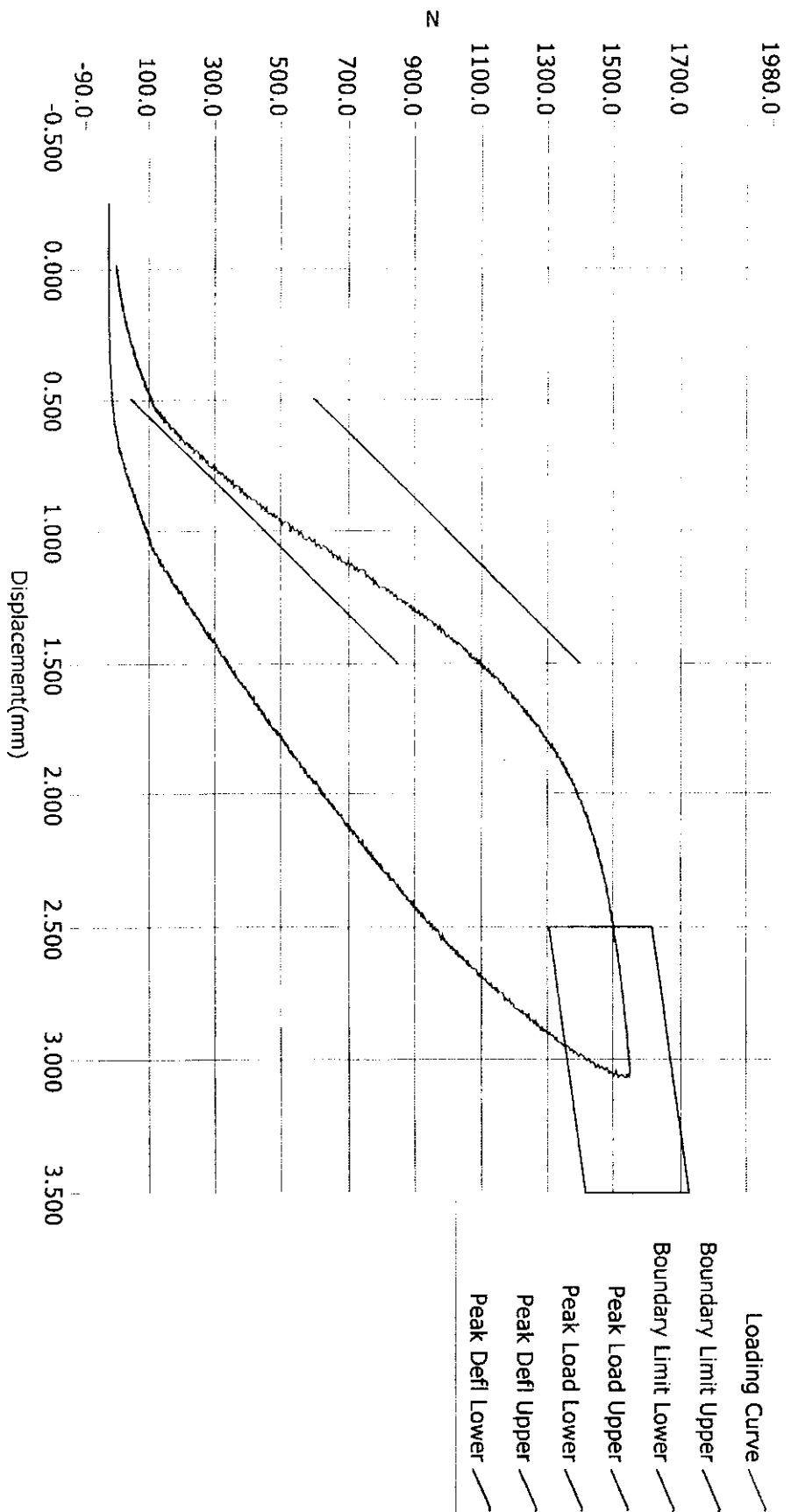


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
12.2	12.8	-3.5	31.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.2	17.6	-0.3	74.9

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID

Part Serial Number

Test Date

Test Time

Cert ID

ATD Serial Number

ATD Type

Current Date : 12/5/2011

Current Time : 19:37:44

48897

12/5/2011

7:37 PM

N/A

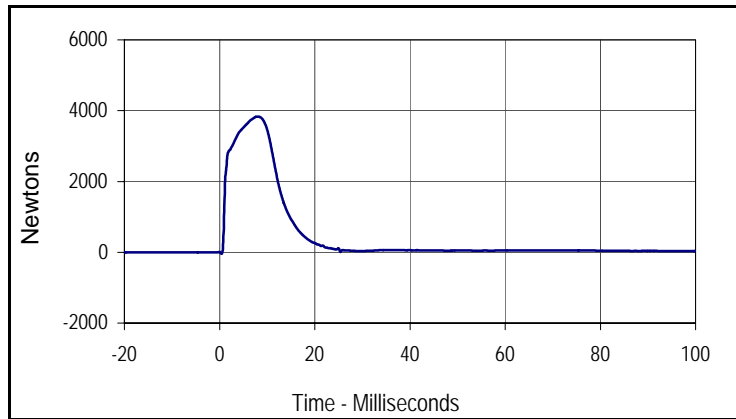
SIDIIs

Test Program: SID IIs Pelvis Acetabulum Impact Test
 ATD Serial No.: 299

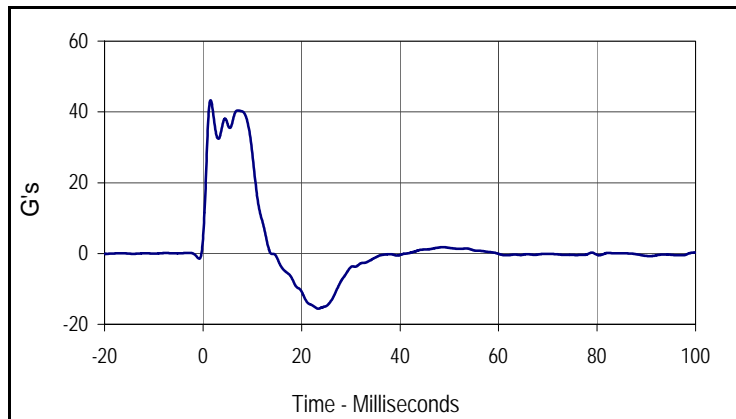
Test Date: 12/10/12
 Test I.D.: 299ACET051



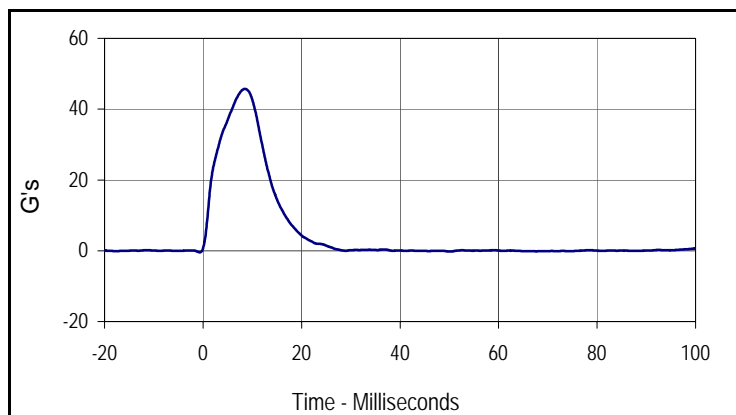
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	485	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.7	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.70	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3832.6	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	40.4	Pass
Peak Impactor Acceleration	G's	38 to 47	45.7	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3832.6	7.9	-36.8	0.5



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
43.3	1.5	-15.6	23.4



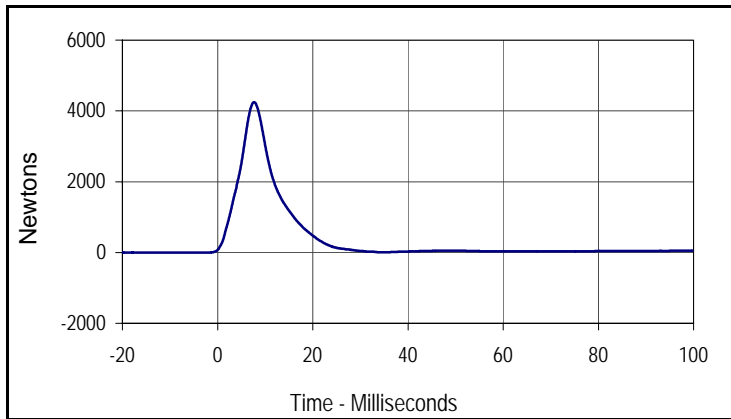
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
45.7	8.5	-0.4	-0.6

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 299

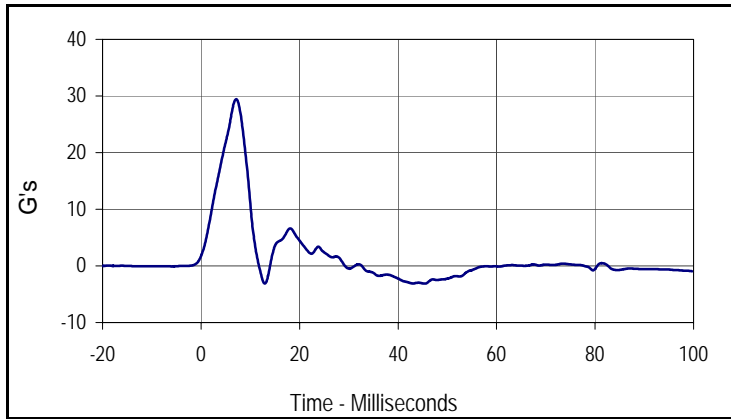
Test Date: 12/10/12
 Test I.D.: 299PL051



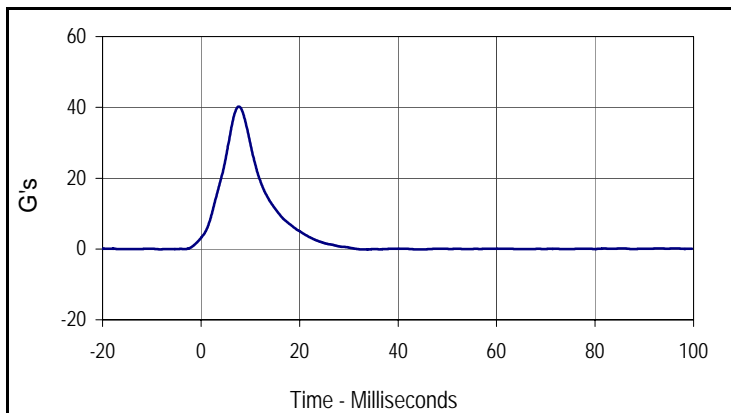
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	540	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.4	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.6	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.35	Pass
Peak Iliac Force	Newtons	4100 to 5100	4247.9	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	29.4	Pass
Peak Impactor Acceleration	G's	36 to 45	40.2	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4247.9	7.6	-3.0	-6.3



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
29.4	7.1	-3.1	45.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
40.2	7.7	-0.2	44.4

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

Test Program: SID IIs External Measurements

Test Date: 12/13/12



ATD Serial No.: 299

Test I.D.: N/A

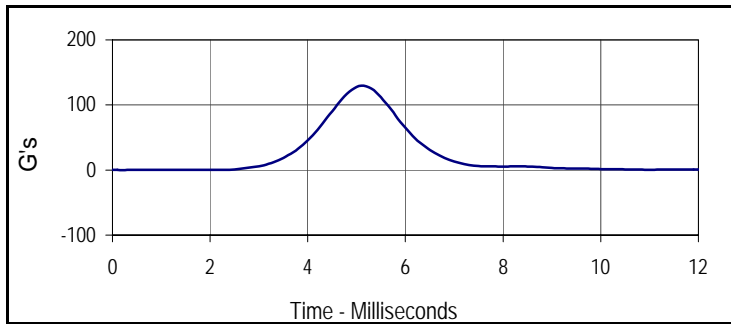
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A Sitting Height	mm	772 - 788	780	Pass
B Shoulder Pivot Height	mm	437 - 453	445	Pass
C H-Point Height	mm	79 - 89	85	Pass
D H-Point from Seatback	mm	141 - 151	145	Pass
E Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F Thigh Clearance	mm	119 - 135	125	Pass
G Head Breadth	mm	140 - 148	145	Pass
H Head Back from Backline	mm	40 - 46	44	Pass
I Head Depth	mm	178 - 188	184	Pass
J Head Circumference	mm	541 - 551	545	Pass
K Buttock to Knee Length	mm	514 - 540	527	Pass
L Popliteal Height	mm	343 - 369	352	Pass
M Knee Pivot to Floor Height	mm	392 - 409	401	Pass
N Buttock Popliteal Length	mm	416 - 442	432	Pass
O Chest Depth w/o Jacket	mm	195 - 211	202	Pass
P Foot Length	mm	216 - 232	221	Pass
Q Hip Breadth with Pelvic Plug	mm	313 - 323	315	Pass
R Arm Length	mm	249 - 259	252	Pass
S Knee Joint to Seatback	mm	477 - 493	481	Pass
V Shoulder Width	mm	341 - 357	352	Pass
W Foot Width	mm	78 - 94	86	Pass
Y Chest Circumference with Jacket	mm	851 - 881	872	Pass
Z Waist Circumference	mm	760 - 791	774	Pass
Overall Test Results				Pass

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 299

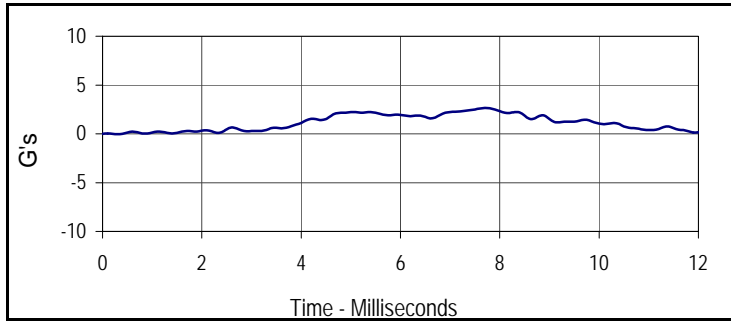
Test Date: 12/13/12
 Test I.D.: 299HD052



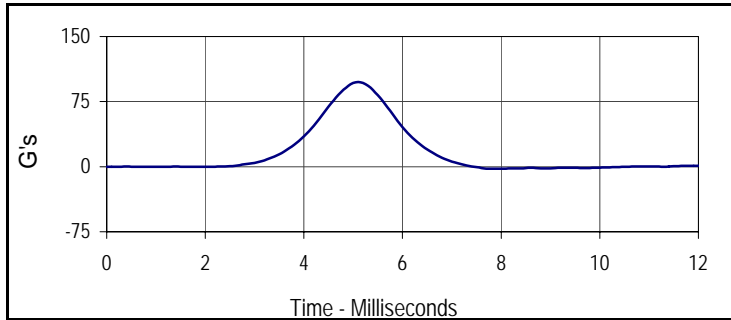
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	270	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Peak Head Resultant Acceleration	G's	115 to 137	129.7	Pass
Peak Head X Acceleration	G's	<15	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	2.7	Pass
Overall Test Results				Pass



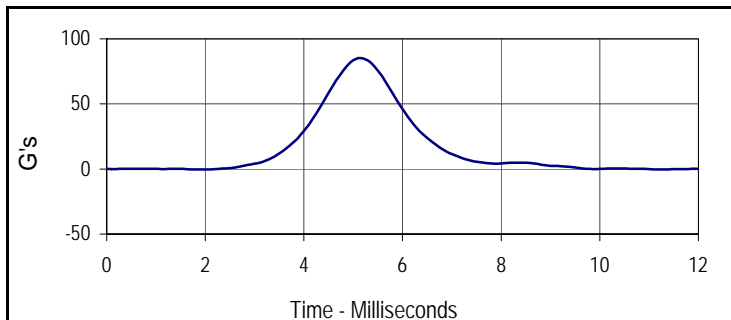
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
129.7	5.1	0.0	0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.6	7.7	0.0	0.3



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
97.8	5.1	-2.5	7.9



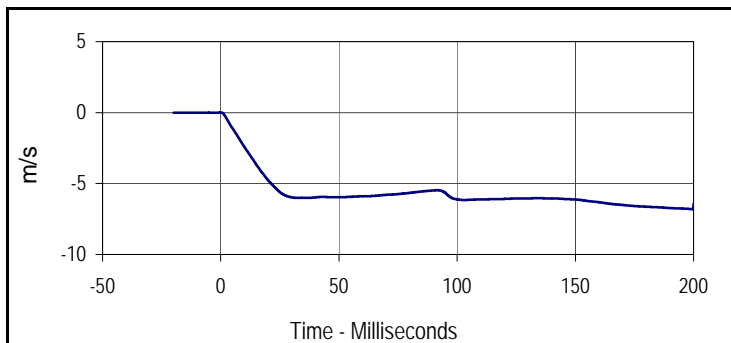
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
85.1	5.1	-0.4	11.3

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 299

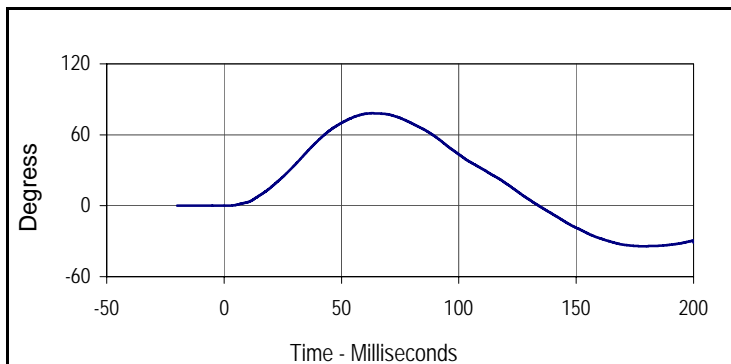
Test Date: 12/13/12
 Test I.D.: 299NB052



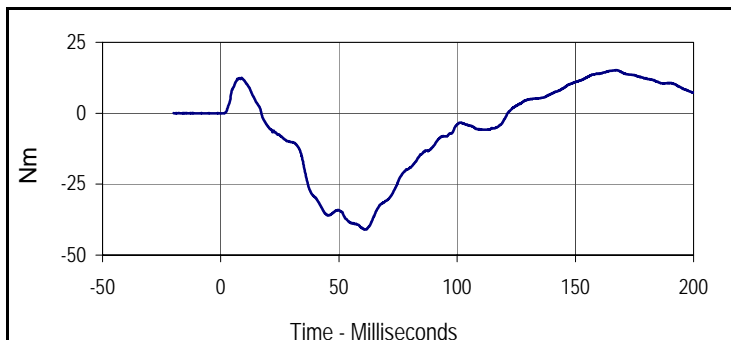
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	315	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass	
	Min		28.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.53	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.42	Pass
	15 msec	m/s	-3.30 to -4.10	-3.65	Pass
	20 msec	m/s	-4.40 to -5.40	-4.76	Pass
	25 msec	m/s	-5.40 to -6.10	-5.61	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.12	Pass
D-Plane Rotation	Max	Degrees	71 to 81	78.2	Pass
	Time	msec	50 to 70	63.1	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-41.0	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	121.4	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.1	-6.8	199.9



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
78.2	63.1	-34.2	178.4



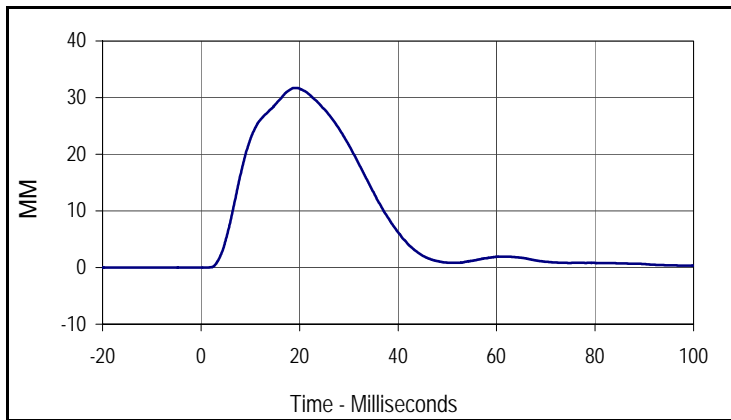
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
15.2	167.3	-41.0	61.5

Test Program: SID IIs Shoulder Impact Test
 ATD Serial No.: 299

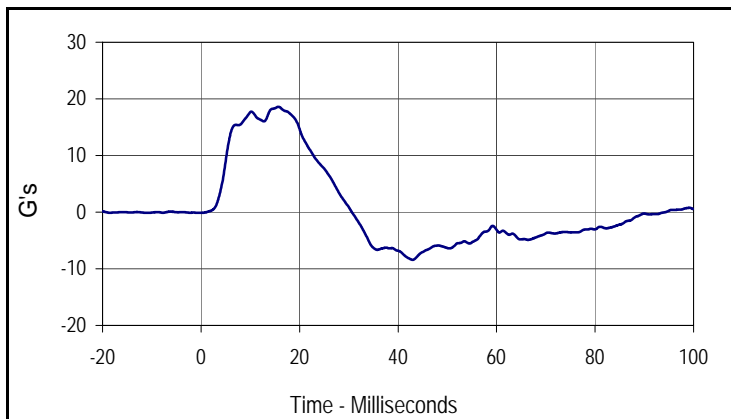
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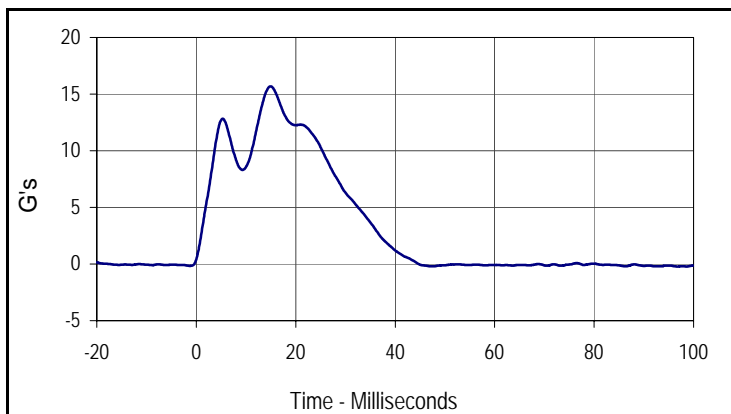
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	370	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Impactor Velocity	m/s	4.20 to 4.40	4.27	Pass
Peak Shoulder Deflection	mm	28 to 37	31.7	Pass
Peak Lateral Spine Acceleration Y	G's	17 to 22	18.6	Pass
Peak Impactor Acceleration	G's	13 to 18	15.7	Pass
Overall Test Results			Pass	Pass



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
31.7	18.8	0.0	-13.3



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.6	15.7	-8.4	43.0



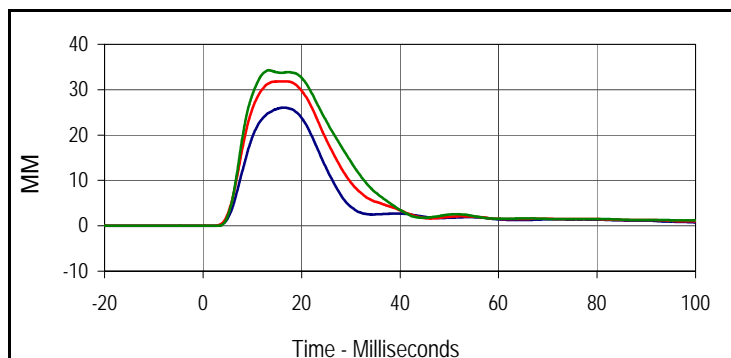
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
15.7	14.9	-0.2	96.8

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

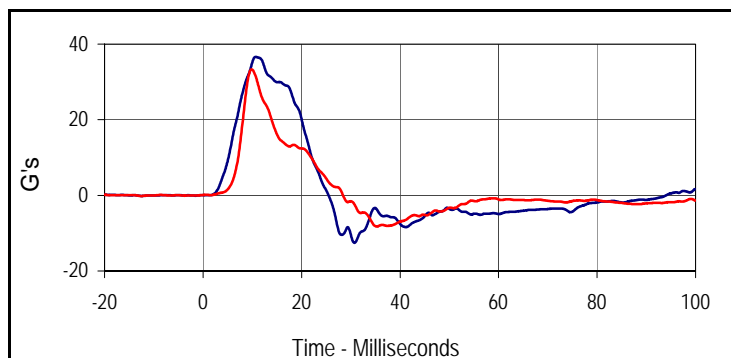
Test Date: 12/13/12
 Test I.D.: 299TWA052



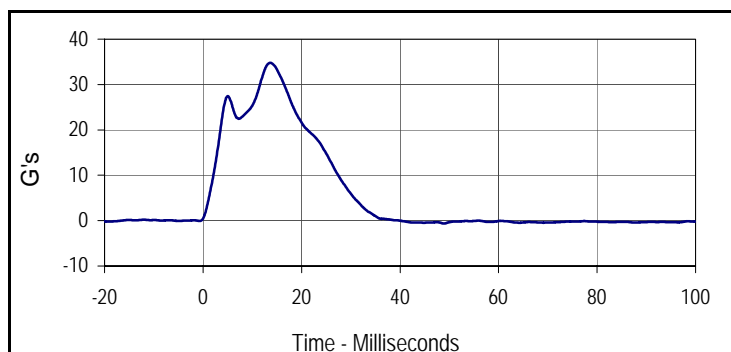
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	395	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.3	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.73	Pass
Peak Shoulder Deflection	mm	31 to 40	34.3	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	26.1	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.8	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	34.3	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	36.6	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	33.3	Pass
Peak Impactor Acceleration	G's	30 to 36	34.8	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
26.1	16.4	0.0	1.0
Middle Thorax Deflection			
Max	Time	Min	Time
31.8	16.5	0.0	-18.4
Lower Thorax Deflection			
Max	Time	Min	Time
34.3	13.3	0.0	-19.6



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
36.6	10.7	-12.6	30.7
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
33.3	9.9	-8.2	35.2



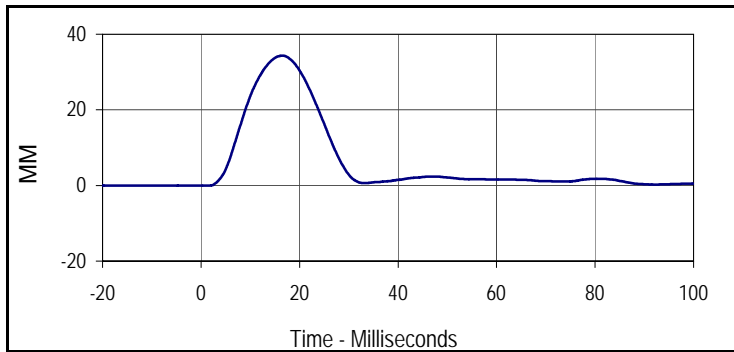
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
34.8	13.6	-0.6	48.9

Test Program: SID IIs Thorax with Arm Impact Test

ATD Serial No.: 299

Test Date: 12/13/12

Test I.D.: 299TWA052



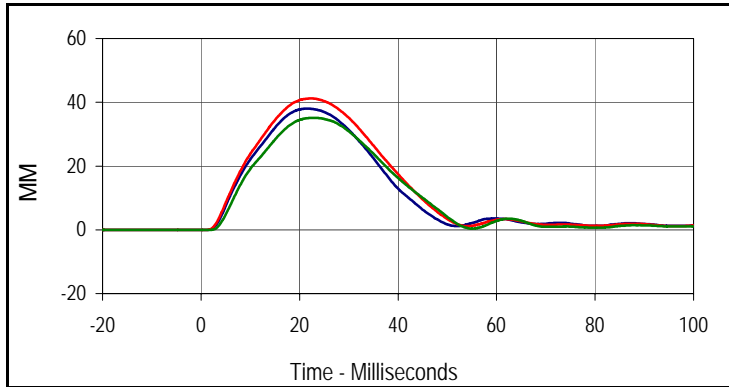
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
34.3	16.5	0.0	-18.6

Test Program: SID IIs Thorax without Arm Impact Test
 ATD Serial No.: 299

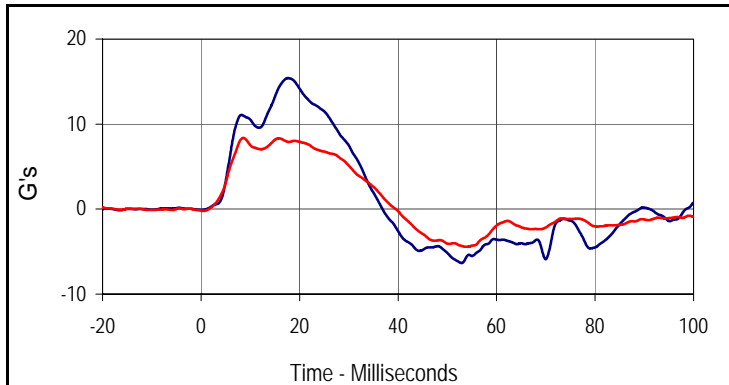
Test Date: 12/13/12
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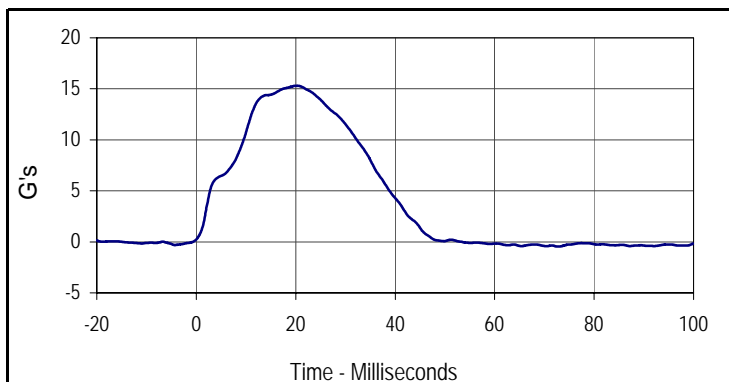
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	420	Pass
Temperature During Soak	Max	18.9 to 25.6	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.2	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Upper Thorax Rib Deflection	mm	32 to 40	38.0	Pass
Peak Middle Thorax Rib Deflection	mm	39 to 45	41.2	Pass
Peak Lower Thorax Rib Deflection	mm	35 to 43	35.1	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	15.4	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	8.4	Pass
Peak Impactor Acceleration	G's	14 to 18	15.3	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
38.0	21.6	0.0	-11.3
Middle Thorax Deflection			
Max	Time	Min	Time
41.2	22.4	0.0	-2.9
Lower Thorax Deflection			
Max	Time	Min	Time
35.1	22.9	0.0	-6.7



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.4	17.7	-6.4	52.9
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
8.4	8.6	-4.4	53.8



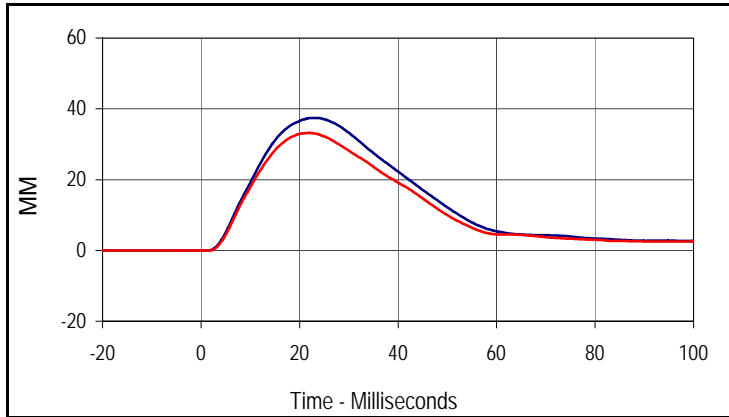
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
15.3	20.1	-0.5	72.9

Test Program: SID IIs Abdomen Impact Test
 ATD Serial No.: 299

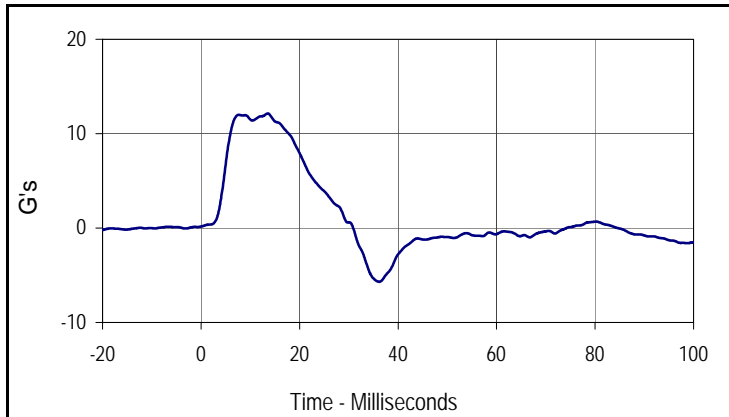
Test Date: 12/13/12
 Test I.D.: 299ABD052



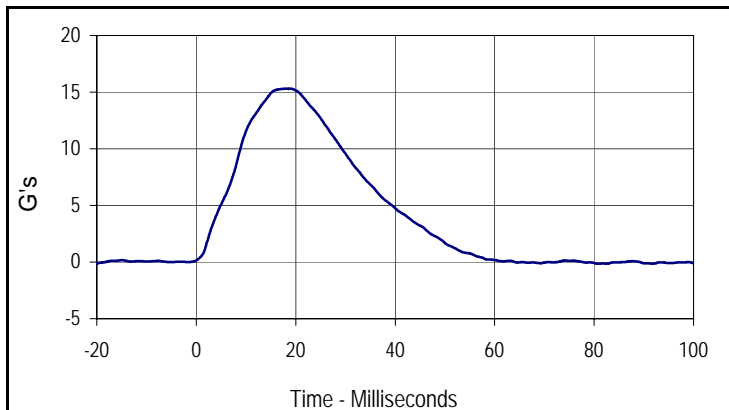
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	445	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.1	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.29	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.4	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	33.2	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	12.1	Pass
Peak Impactor Acceleration	G's	12 to 16	15.3	Pass
Overall Test Results				Pass



Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
37.4	23.2	0.0	0.8
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
33.2	22.0	0.0	1.0

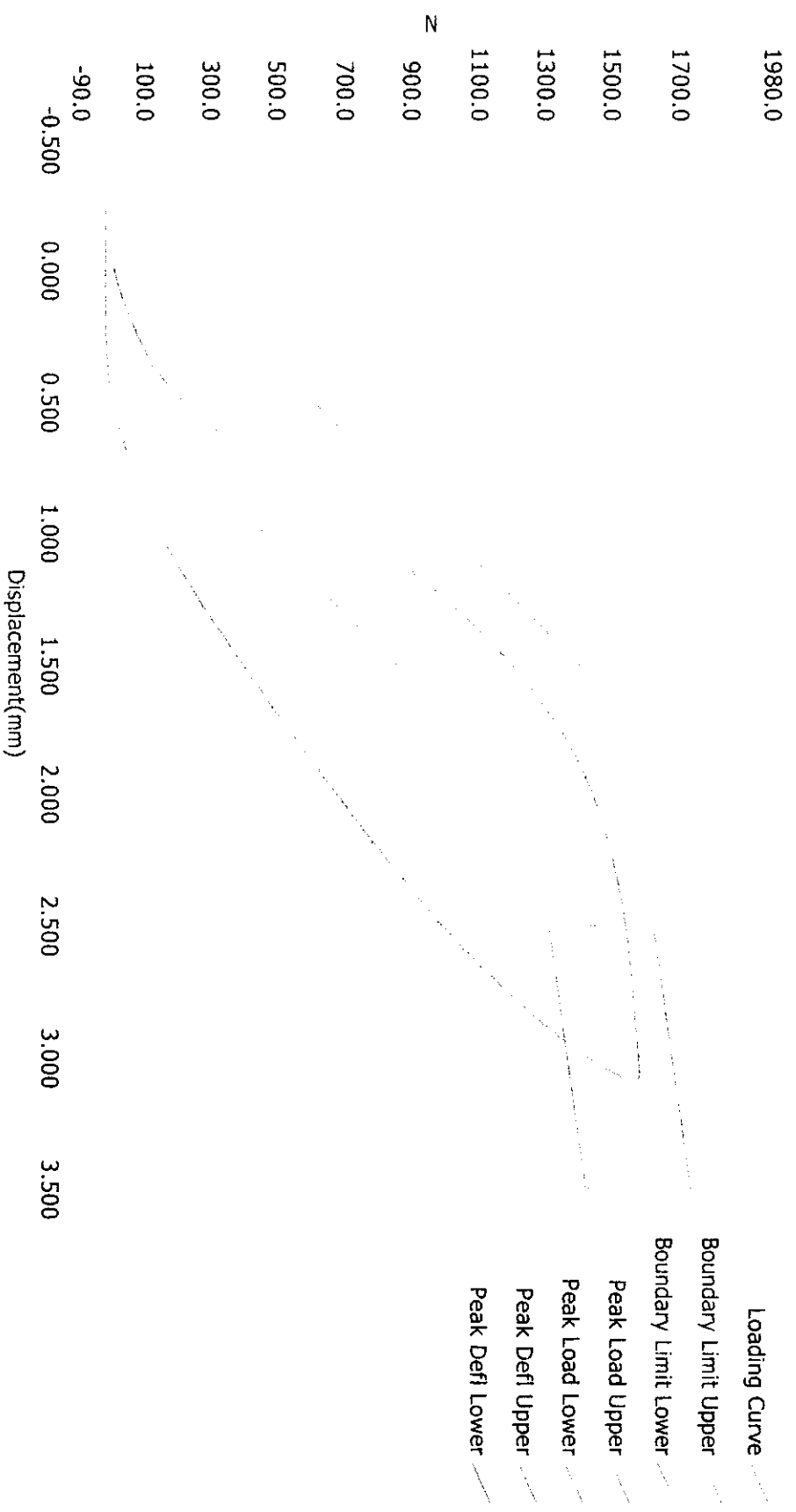


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
12.1	13.5	-5.7	36.2



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.3	19.0	-0.1	81.0

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIs	

Current Date : 9/20/2011

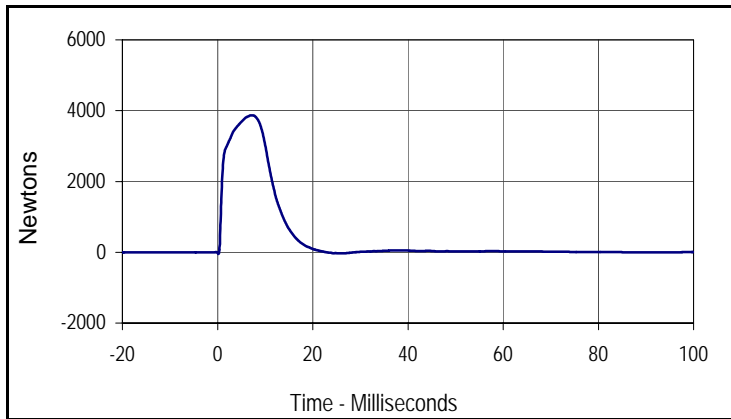
Current Time : 20:40:41

Test Program: SID IIs Pelvis Acetabulum Impact Test
 ATD Serial No.: 299

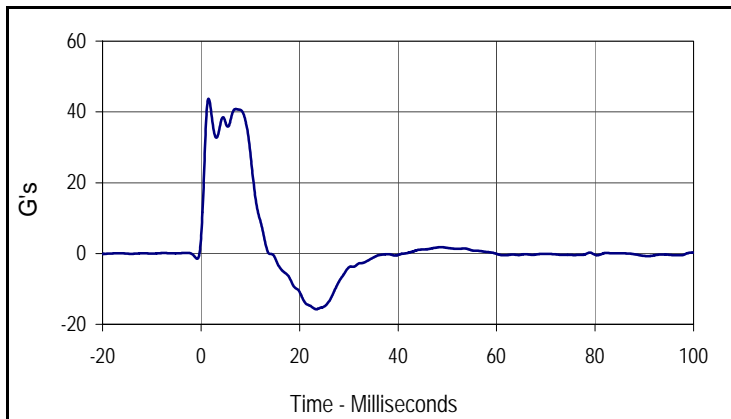
Test Date: 12/13/12
 Test I.D.: 299ACET052



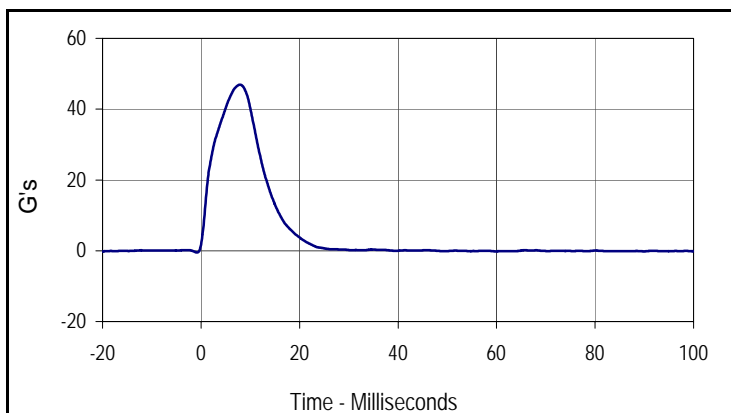
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	470	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.3	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.72	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3870.3	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	40.8	Pass
Peak Impactor Acceleration	G's	38 to 47	46.9	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3870.3	7.2	-50.5	0.2



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
43.7	1.5	-15.7	23.4



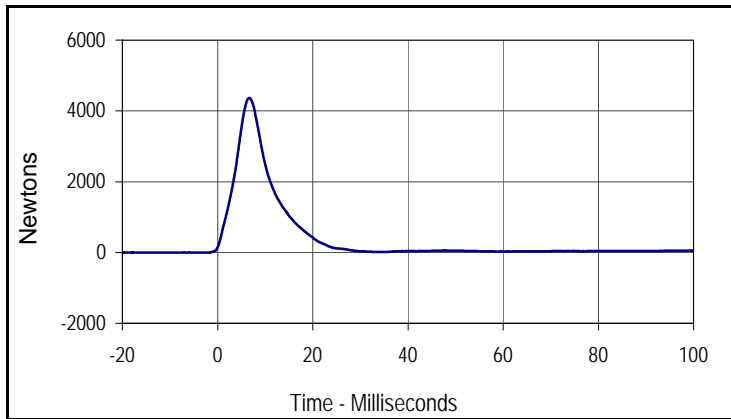
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
46.9	7.9	-0.5	-0.8

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 299

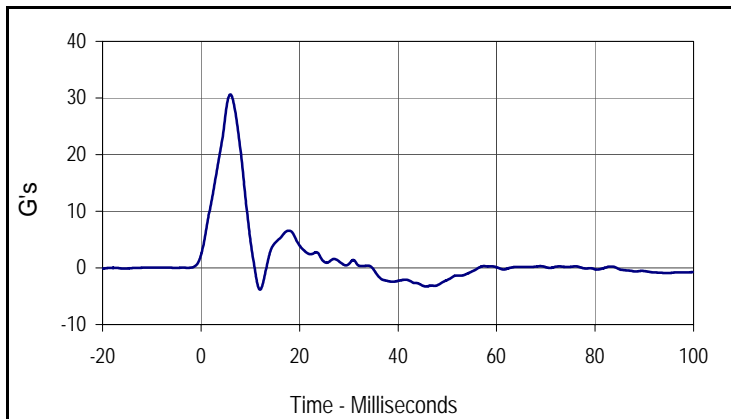
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 Test I.D.: 299PL052



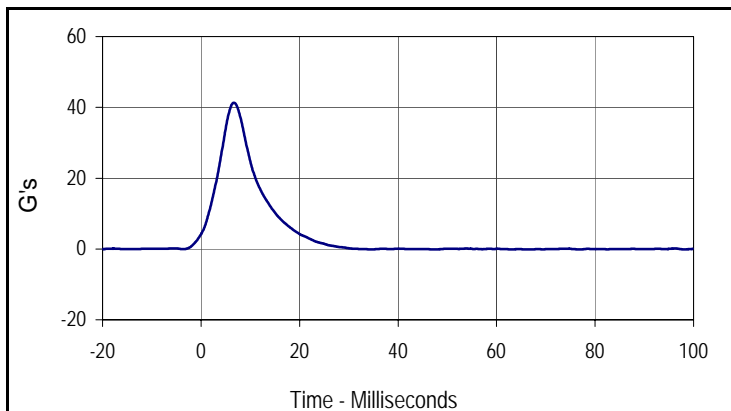
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	525	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.5	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.37	Pass
Peak Iliac Force	Newtons	4100 to 5100	4360.3	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	30.6	Pass
Peak Impactor Acceleration	G's	36 to 45	41.3	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4360.3	6.7	-1.4	-12.3



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
30.6	6.0	-3.8	12.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
41.3	6.7	-0.2	77.0

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N 299			
			Serial Number	Manufacturer	Calibration	
Head Accelerometers			X	P51926	Endevco	10/2/12
			Y	P51929	Endevco	10/2/12
			Z	P51934	Endevco	10/2/12
Displacement Potentiometers	Shoulder		Y	1074	FTSS	10/5/12
	Thoracic Rib	Upper	Y	1143	FTSS	10/5/12
		Middle	Y	1160	FTSS	10/5/12
		Lower	Y	1213	FTSS	10/5/12
	Abdominal Rib	Upper	Y	1218	FTSS	10/5/12
		Lower	Y	1234	FTSS	10/5/12
Lower Spine Accelerometers (T12)			X	P63999	Endevco	10/3/12
			Y	P58872	Endevco	10/3/12
			Z	P58795	Endevco	10/3/12
Acetabulum Load Cell			Y	272	Denton	5/24/12
Iliac Wing Load Cell			Y	284	Denton	5/24/12
Pelvis Plug (Struck Side)				49096	FTSS	12/7/11
Pelvis Plug (Non-Struck Side)				45980	FTSS	9/20/11

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	Ketx5a	ICSensor	8/20/12
Vehicle Center of Gravity	Y	Ketx5b	ICSensor	8/20/12
Vehicle Center of Gravity	Z	Ketx5c	ICSensor	8/20/12
Left Floor Sill	Y	13472	Endevco	8/17/12
A-Pillar Sill	Y	13473	Endevco	8/17/12
A-Pillar Low	Y	13480	Endevco	8/17/12
A-Pillar Mid	Y	13478	Endevco	8/17/12
B-Pillar Sill	Y	13481	Endevco	8/17/12
B-Pillar Low	Y	13470	Endevco	8/20/12
B-Pillar Mid	Y	13651	Endevco	9/24/12
Driver Seat	Y	13485	Endevco	8/17/12
Engine Top	X	12489	Endevco	2/14/12
Engine Top	Y	13322	Endevco	6/18/12
Firewall	Y	13469	Endevco	12/11/12
Right Roof	Y	13471	Endevco	8/17/12
Right Floor Sill	Y	13317	Endevco	6/18/12
Rear Floorpan	X	13341	Endevco	6/18/12
Rear Floorpan	Y	13381	Endevco	7/9/12

TABLE 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	131822A	Interface	9/17/12
Load Cell 2	132304A	Interface	9/17/12
Load Cell 3	19477	Interface	9/18/12
Load Cell 4	19325	Interface	9/18/12
Load Cell 5	131827A	Interface	9/18/12
Load Cell 6	132302A	Interface	9/18/12
Load Cell 7	19267	Interface	9/19/12
Load Cell 8	19321	Interface	9/19/12