

REPORT NUMBER: SPNCAP-KAR-13-017

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

**BAYERISCHE MOTOREN WERKE AG
2013 BMW X5 XDRIVE 35I AWD 5-DOOR MPV**

NHTSA No: MD0501

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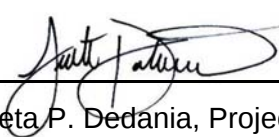


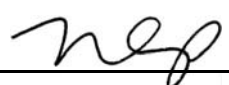
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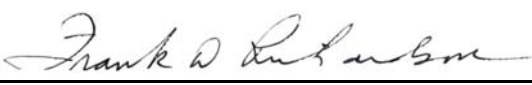
FINAL REPORT

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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WASHINGTON, D.C. 20590**

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Approval Date: October 10, 2012

FINAL REPORT ACCEPTANCE BY OCWS:


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

Date: 


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

Date: 

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				14. Sponsoring Agency Code NVS-111																												
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16. Abstract A 32.2 km/h (20 mph) 75 deg. oblique impact Side NCAP Test was conducted on the subject 2013 BMW X5 xDrive 35i AWD 5-door MPV 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 September 26, 2012. The impact velocity was 32.57 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 28.6 deg. C. The target vehicle's maximum post-test static crush was 470 mm located at levels 2 and 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>353.4</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>51.6</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetabular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>4093</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>34</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45</td> <td>29</td> </tr> </tbody> </table> 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.						Measurement Description	Driver ATD (ES-2re)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	353.4	Resultant Lower Spine Acceleration	g	82	51.6	Total Pelvic Force (Sum of Acetabular and Iliac Forces)	N	5525	4093	Maximum Thoracic Rib Deflection	mm	38	34	Maximum Abdominal Rib Deflection	mm	45	29
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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 Admin. Tech Infor Services Division, NPO-411 1200 New Jersey Ave., SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Occupant and Vehicle Information	4
<u>Data Sheet</u>		<u>Page</u>
1	General Test and Vehicle Parameter Data	5
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	9
3	Dummy Longitudinal Clearance Dimensions	13
4	Dummy Lateral Clearance Dimensions	14
5	Camera and Instrumentation Data	15
6	Test Vehicle Accelerometer Locations	16
7	Rigid Pole Load Cell Data	17
8	Post-Test Observations	18
9	Test Vehicle Profile Measurements	20
10	Test Vehicle Exterior Crush Measurements	21
11	FMVSS No. 301 Static Rollover Results	24
12	Dummy/Vehicle Temperature and Humidity Stabilization	25
<u>Appendix</u>		<u>Page</u>
A	Photographs	A
B	Vehicle and Dummy Response Data Plots	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration Data	D

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 BMW X5 xDrive 35i AWD 5-Door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated May 2012.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2013 BMW X5 xDrive 35i AWD 5-Door MPV. The subject vehicle was towed into the rigid pole at an angle of 75.4° and a velocity of 32.57 km/h. The test was conducted by KARCO Engineering, LLC. in Adelanto, California on September 26, 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 May 2012. Camera locations and other pertinent camera information are included in this report.

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

- 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.

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	353.4
Lower Spine (T12) Resultant Acceleration	g	82	52
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4093
Maximum Thoracic Rib Deflection	mm	38*	34
Maximum Abdominal Rib Deflection	mm	45*	29

*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	No		No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other				

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 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

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 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MD0501
Model Year	2013
Make	BMW
Model	X5 xDrive 35i
Body Style	5-Door MPV
VIN	5UXZV4C54D0B06207
Body Color	Titanium Silver Metallic
Odometer Reading (km / mi)	175 / 109
Engine Displacement (L)	3.0
Type / No. of Cylinders	Inline 6
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
All Wheel Drive (AWD)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	iDrive System
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	No
Driver Knee Airbag	No
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	Hill Descent Control

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Bayerische Motoren Werke AG
Date of Manufacture	Jun-12
Vehicle Type	MPV

GVWR (kg)	2745
GAWR Front (kg)	1270
GAWR Rear (kg)	1560

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	A
Capacity Weight (VCW) (kg)				500.0	B
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				136.0	A-B

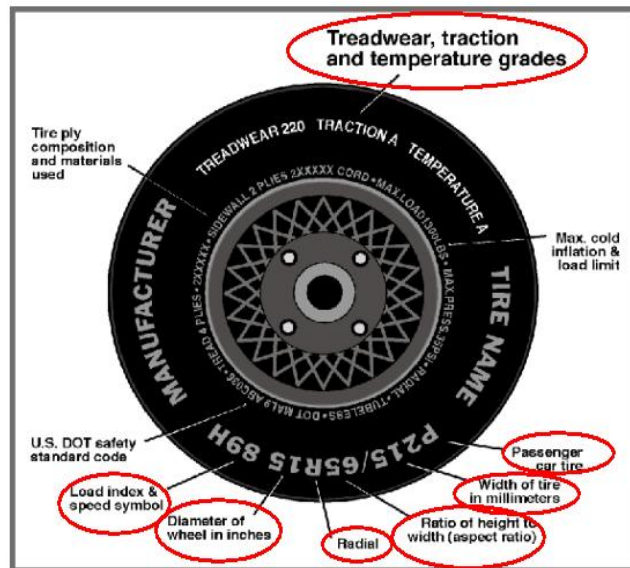
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
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 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	220	250
Recommended Tire Size	255/55R18	255/55R18

VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	340	340
Tire Size on Vehicle	255/55R18	255/55R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Name	Dueler H/L	Dueler H/L
Tire Type	Passenger	Passenger
Tire Width	255	255
Aspect Ratio	55	55
Radial	Yes	Yes
Wheel Diameter	18	18
Load Index/Speed Symbol	109H	109H
Treadware	300	300
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Steel, Rayon, Nylon	Steel, Rayon, Nylon

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	235	235	270	275
Tire Placard	kPa	220	220	250	250
Owner's Manual	kPa	220	220	250	250
As Tested	kPa	220	220	250	250

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	525.5	531.5		543.5	596.5		533.5	622.5	
Right	kg	522.0	528.0		542.0	602.5		521.0	614.0	
Ratio	%	49.7%	50.3%	100.0%	47.5%	52.5%	100.0%	46.0%	54.0%	100.0%
Total	kg	1047.5	1059.5	2107.0	1085.5	1199.0	2284.5	1054.5	1236.5	2291.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2107.0	A
Actual Weight of 1 P572 O ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	136.0	C
Calculated Vehicle Target Wt (TVTW)	kg	2292.0	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

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Rear Carpeting	9.0
Door Panels	9.5
Ballast / Equipment Added	143.2

DATA SHEET NO. 1 ... (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12**TEST VEHICLE ATTITUDE AND CG**

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	°	0.3	0.3	0.7	Yes
Front Passenger Sill Angle (front-to-rear)*	°	-0.2	0.3	0.3	Yes
Front Bumper-Line Angle (left-to-right)**	°	0.0	0.0	0.2	Yes
Rear Bumper-Line Angle (left-to-right)**	°	0.0	0.1	0.1	Yes
Vehicle CG (Aft of Front Axle)	mm	1476	1541	1585	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	3	-2	8	

*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. 2**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA**

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

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	16.1	0.0	8.1
Front Passenger Seat	16.1	0.0	8.1
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	8.1	779	Max	790	797	804
			Mid	765	772	779
			Min	740	747	754
Front Passenger Seat	8.1	765	Max	779	786	793
			Mid	751	758	765
			Min	723	730	737
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

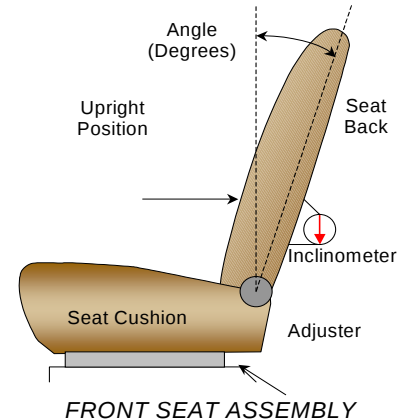
Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	242		0	
Front Passenger Seat	242		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	60.0		17.6	
Front Passenger Seat	59.0		17.6	
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed to LR		Fixed to LR	

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	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

HEAD RESTRAINT ADJUSTMENT

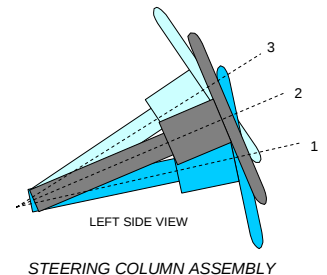
The driver's head restraint is adjusted to the lowest and most full forward in-use position.

	Total No. of Positions	Placed in Position
Driver Seat - Vertical	Infinite	Full Down
Driver Seat - Horizontal	23	Full Forward

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	20.6	71
Geometric Center - Position 2	23.0	91
Uppermost - Position 3	25.5	111
Telescoping Steering Wheel Travel		40
Test Position	23.0	91



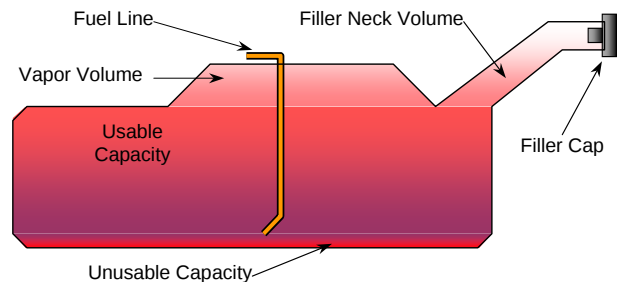
DATA SHEET NO. 2 ... (CONTINUED)**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA**Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	85.16
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	79.20
Actual amount of Solvent Used in Test	79.20
1/3 of Usable Capacity	28.39

Is the Actual Amount of Solvent Used in the test equal to $93\% \pm 1\%$ of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

FUEL PUMP

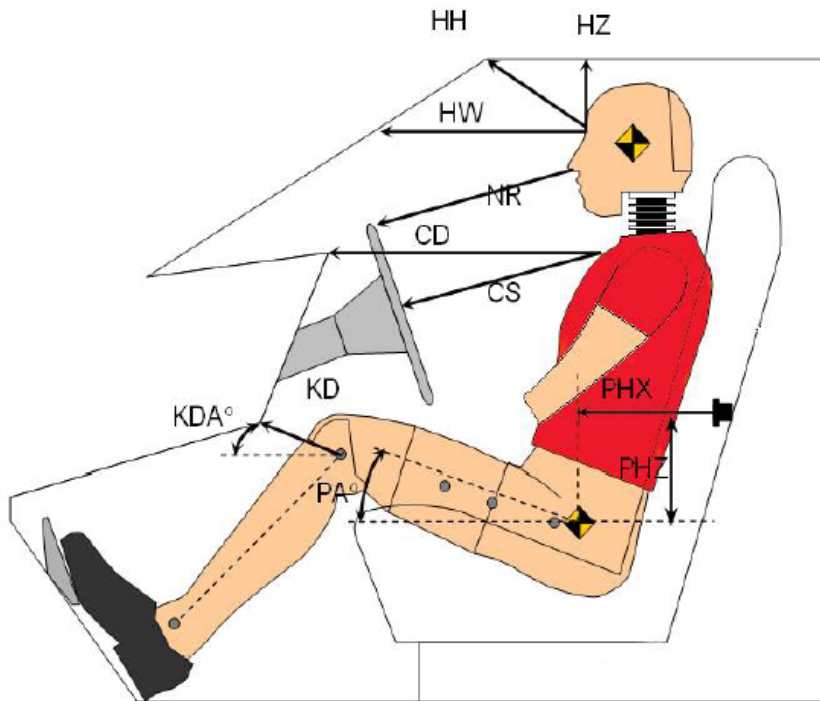
The vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel pump will operate for 5 seconds. After pressure has been built up, the fuel pump switches to sleep mode until the engine is started or the pressure decreases.

**VEHICLE FUEL TANK ASSEMBLY**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	340	
HW	Head to Windshield	636	
HZ	Head to Roof	238	
NR	Nose to Rim	272	
CD	Chest to Dash	422	
CS	Chest to Steering Wheel	200	
KD(L)/KDA(L)°	Left Knee to Dash	129	34.1
KD(R)/KDA(R)°	Right Knee to Dash	100	29.8
PAX°	Pelvic Tilt Angle (x-axis)		21.7
PAY°	Pelvic Tilt Angle (y-axis)		0.2
PHX	Hip Point to Striker (x-axis)	301	
PHZ	Hip Point to Striker (z-axis)	155	

DATA SHEET NO. 4

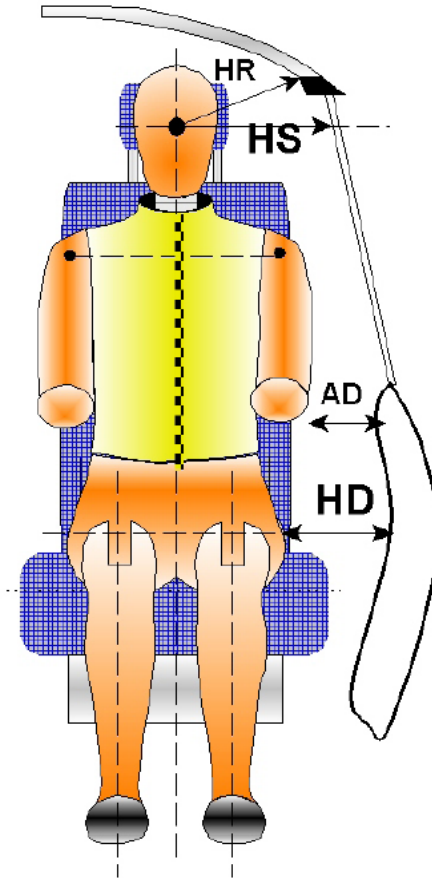
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV

NHTSA No. MD0501

Test Program: NCAP Side Pole Impact Test

Test Date: 09/26/12



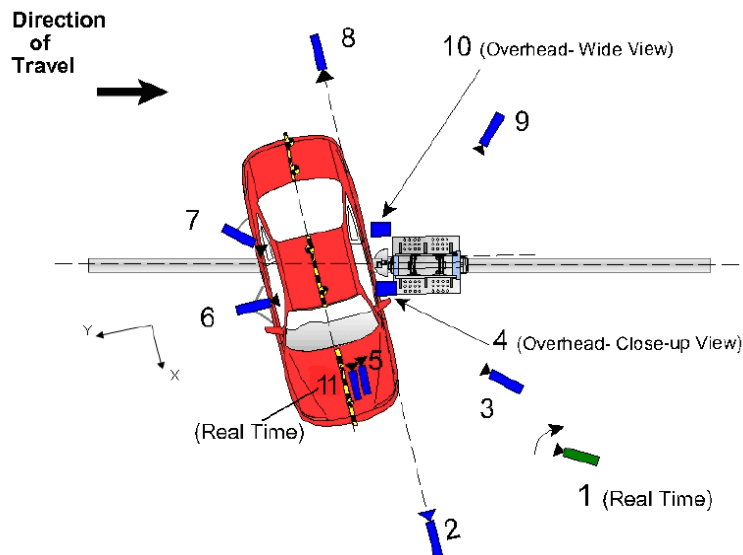
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	269
HS	Head to Side Window	mm	386
AD	Arm to Door	mm	178
HD	H-Point to Door	mm	240

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



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	1.37	0.56	-1.47	35	1000
6	On-Board - Dummy Side View	0.10	1.74	-1.25	14	1000
7	On-Board - Dummy Rear Oblique View	-0.92	1.75	-1.33	20	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	1.48	0.60	-1.50		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

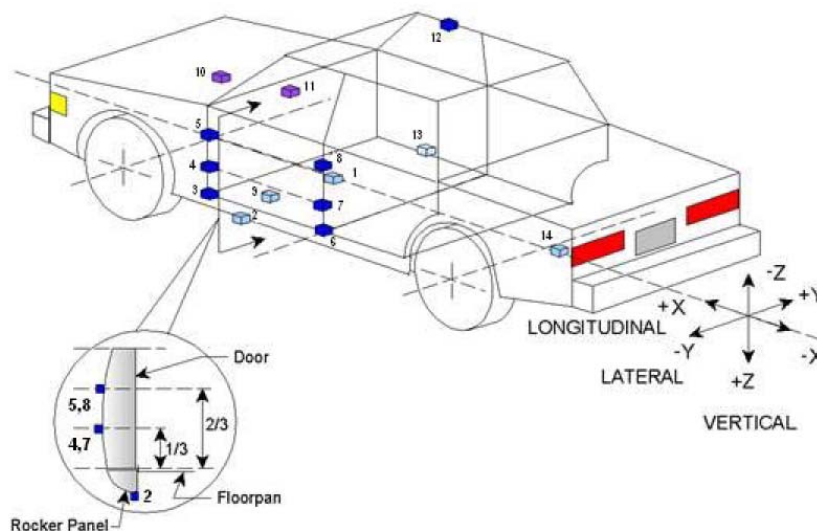
INSTRUMENTATION

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 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1958	15	-428
2	Left Floor Sill	2826	-775	-265
3	A-Pillar Sill	3285	-868	-505
4	A-Pillar Low	3285	-868	-700
5	A-Pillar Mid	3285	-868	-930
6	B-Pillar Sill	2162	-735	-515
7	B-Pillar Low	2162	-735	-755
8	B-Pillar Mid	2162	-735	-1050
9	Driver Seat Track	2528	-610	-435
10	Engine Top	4005	175	-905
11	Firewall	3509	126	-920
12	Right Roof	2165	480	-1702
13	Right Floor Sill	2035	735	-415
14	Rear Floorpan	1010	365	-540

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

DATA SHEET NO. 7

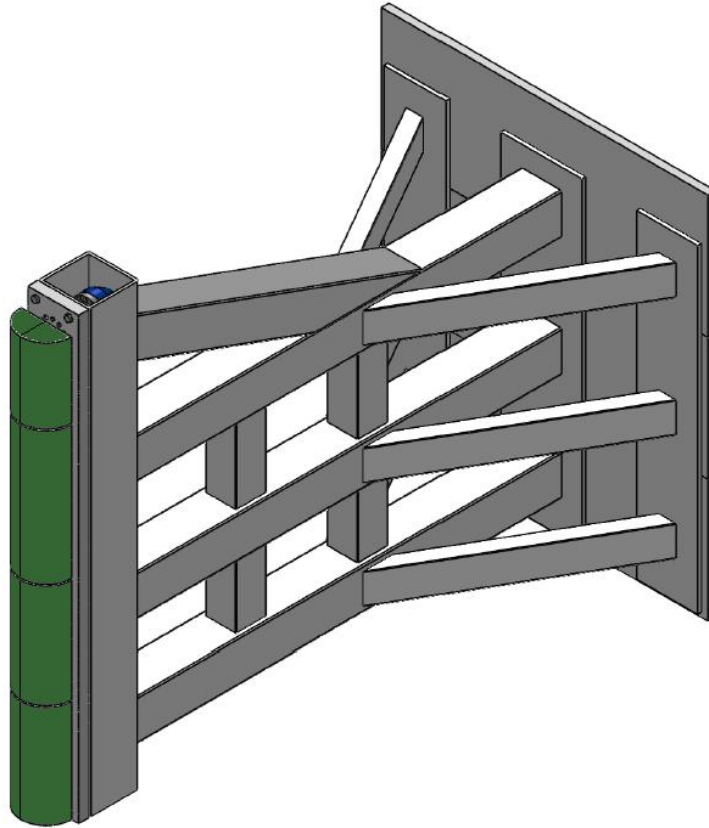
RIGID POLE LOAD CELL DATA

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV

NHTSA No. MD0501

Test Program: NCAP Side Pole Impact Test

Test Date: 09/26/12



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 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

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, Head Restraint
Left Shoulder	Torso Airbag, Door Panel
Upper Torso	Torso Airbag
Lower Torso	Torso Airbag, Door Panel
Left Hip	Seat, Torso Airbag, Door Panel
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	None

DATA SHEET NO. 8 ... (CONTINUED)**POST-TEST OBSERVATIONS**

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

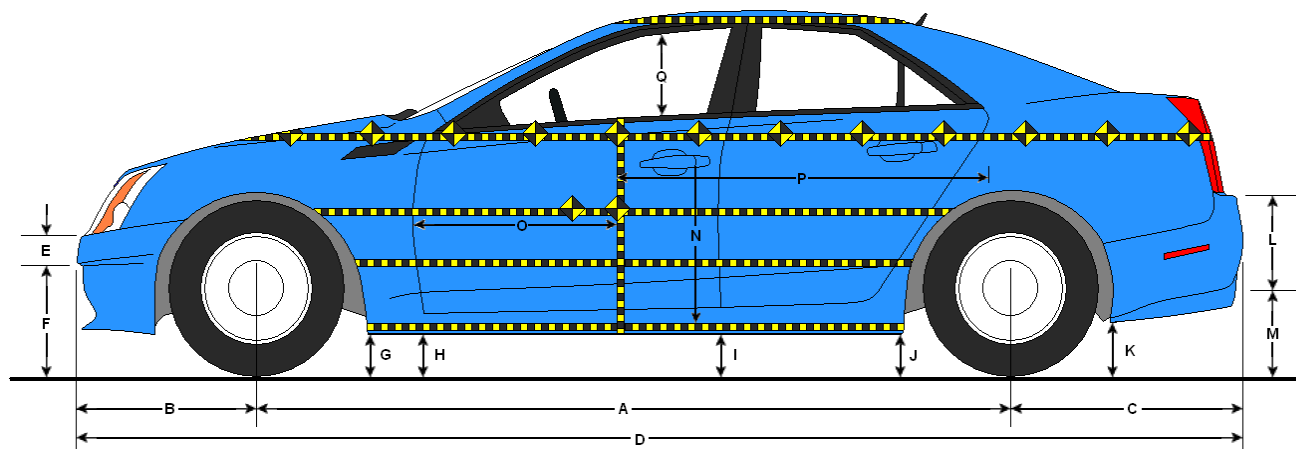
IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1349
Actual Impact Point (Aft of Front Axle)	mm		1344
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	5
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	75.4
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.57
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.52

DATA SHEET NO. 9

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

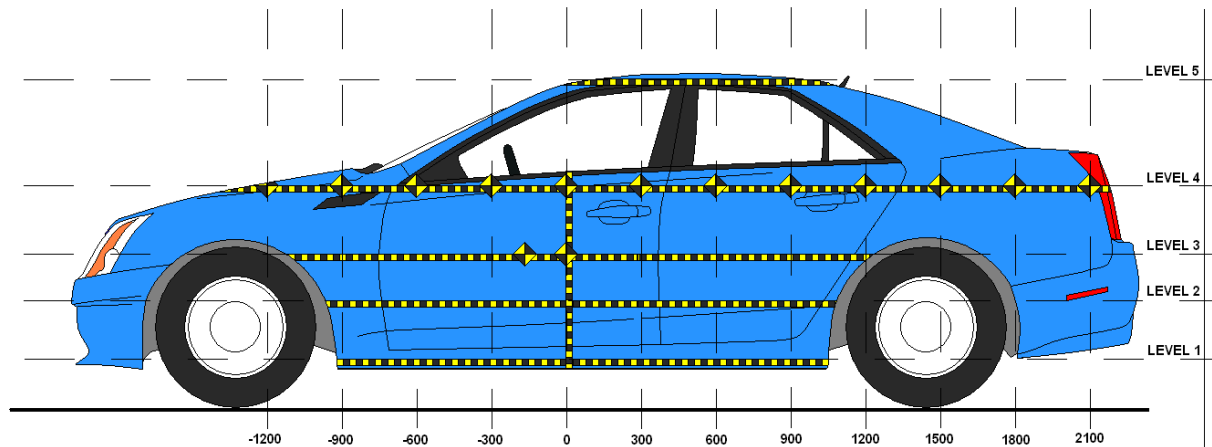
Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2936	2863	-73
B	Front Axle to FSOV	861	871	10
C	Rear Axle to RSOV	1057	1086	29
D	Total Length at Centerline	4816	4820	4
E	Front Bumper Thickness	142	144	2
F	Front Bumper Bottom to Ground	465	502	37
G	Sill Height at Front Wheel Well	231	258	27
H	Sill Height at Front Door Leading Edge	324	339	15
I	Sill Height at B-Pillar	353	378	25
J1	Sill Height at Rear Wheel Well	266	305	39
J2	Pinch Weld Height at Rear Wheel Well	237	265	28
K	Sill Height Aft of Rear Wheel Well	334	371	37
L	Rear Bumper Thickness	231	233	2
M	Rear Bumper Bottom to Ground	375	407	32
N	Sill Height to Bottom of Front Window Sill	666	710	44
O	Front Door Leading Edge to Impact CL	707	600	-107
P	Rear Door Trailing Edge to Impact CL	1567	1441	-126
Q	Front Window Opening	534	557	23
R	Right Side Length	3612	3634	22
S	Left Side Length	3610	3501	-109
T	Vehicle Width at B-Pillar	1916	1783	-133

All measurements in mm with tolerance of $\pm 3\text{mm}$

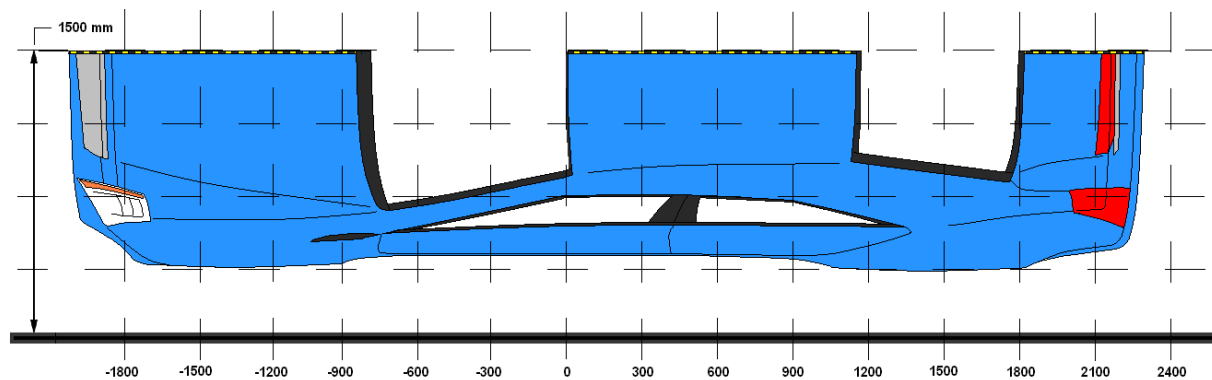
DATA SHEET NO. 10

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



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	400	401	0
2	Occupant H-Point	768	470	0
3	Mid-Door	782	470	0
4	Window Sill	1075	414	0
5	Window Top	1657	209	150

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

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	579	546	548	641		641	610	612	695		62	64	64	54	
-750	597	566	567	628		669	633	634	690		72	67	67	62	
-600	614	563	564	617		733	679	680	707		119	116	116	90	
-450	609	556	556	611		790	757	756	760		181	201	200	149	
-300	605	550	550	605		846	834	834	832		241	284	284	227	
-150	601	545	546	599		914	925	925	919		313	380	379	320	
0	598	541	542	596	848	999	1011	1012	1010	1041	401	470	470	414	193
150	599	539	540	592	844	938	965	965	973	1053	339	426	425	381	209
300	599	538	539	589	849	808	823	824	840	1003	209	285	285	251	154
450	600	539	540	587	850	743	688	690	737	977	143	149	150	150	127
600	602	541	542	586	852	718	661	663	712	953	116	120	121	126	101
750	604	544	545	586	853	698	632	634	687	936	94	88	89	101	83
900	600	548	549	586	855	670	605	607	665	927	70	57	58	79	72
1050	571	548	550	586	858	620	579	578	642	918	49	31	28	56	60
1200		533	535	589	866		578	568	621	918		45	33	32	52
1350		526	526	595	868		568	569	603	920		42	43	8	52
1500				595	877				581	922				-14	45
1650				604	890				641	927				37	37
1800				612	904				643	936				31	32
1950				623					648					25	
2100															
2250															
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

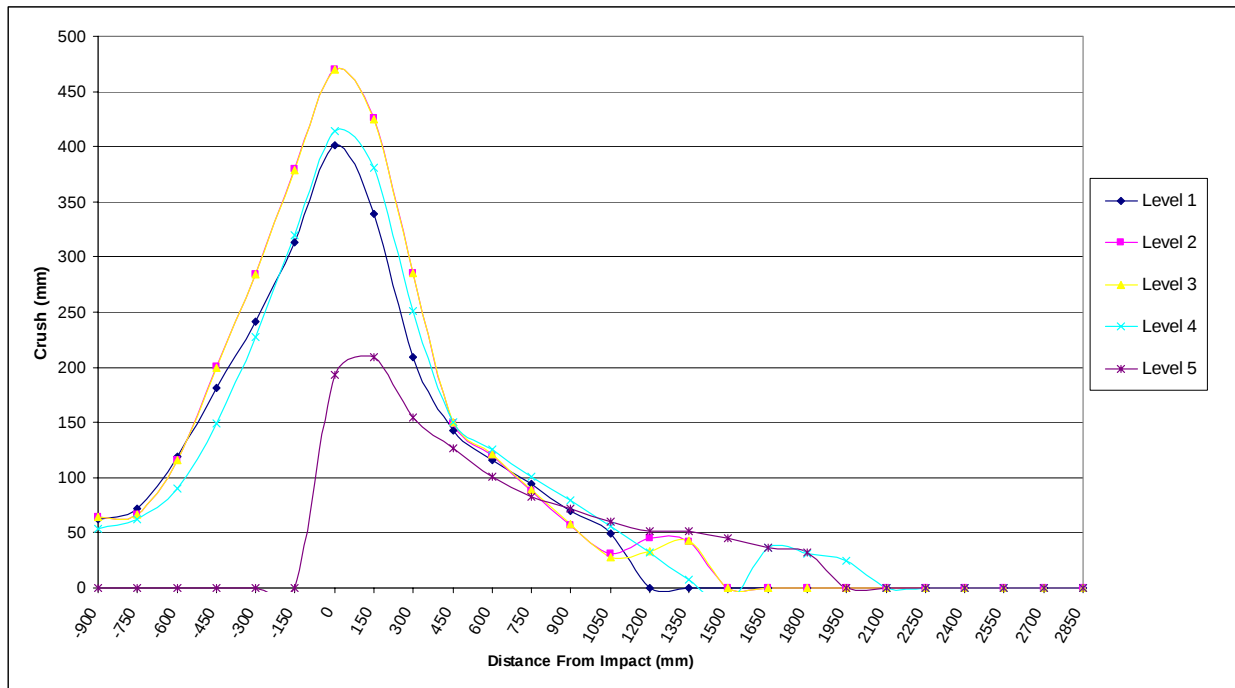
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV

NHTSA No. MD0501

Test Program: NCAP Side Pole Impact Test

Test Date: 09/26/12



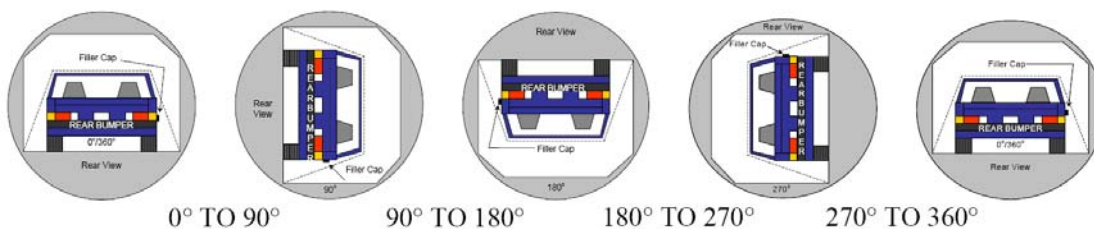
DATA SHEET NO. 11

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501
 Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12

Temperature at Time of Impact: 28.6° C Test Time: 11:42 AM

- 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°	82	300	382
90° To 180°	81	300	381
180° To 270°	83	300	383
270° To 360°	81	300	381

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

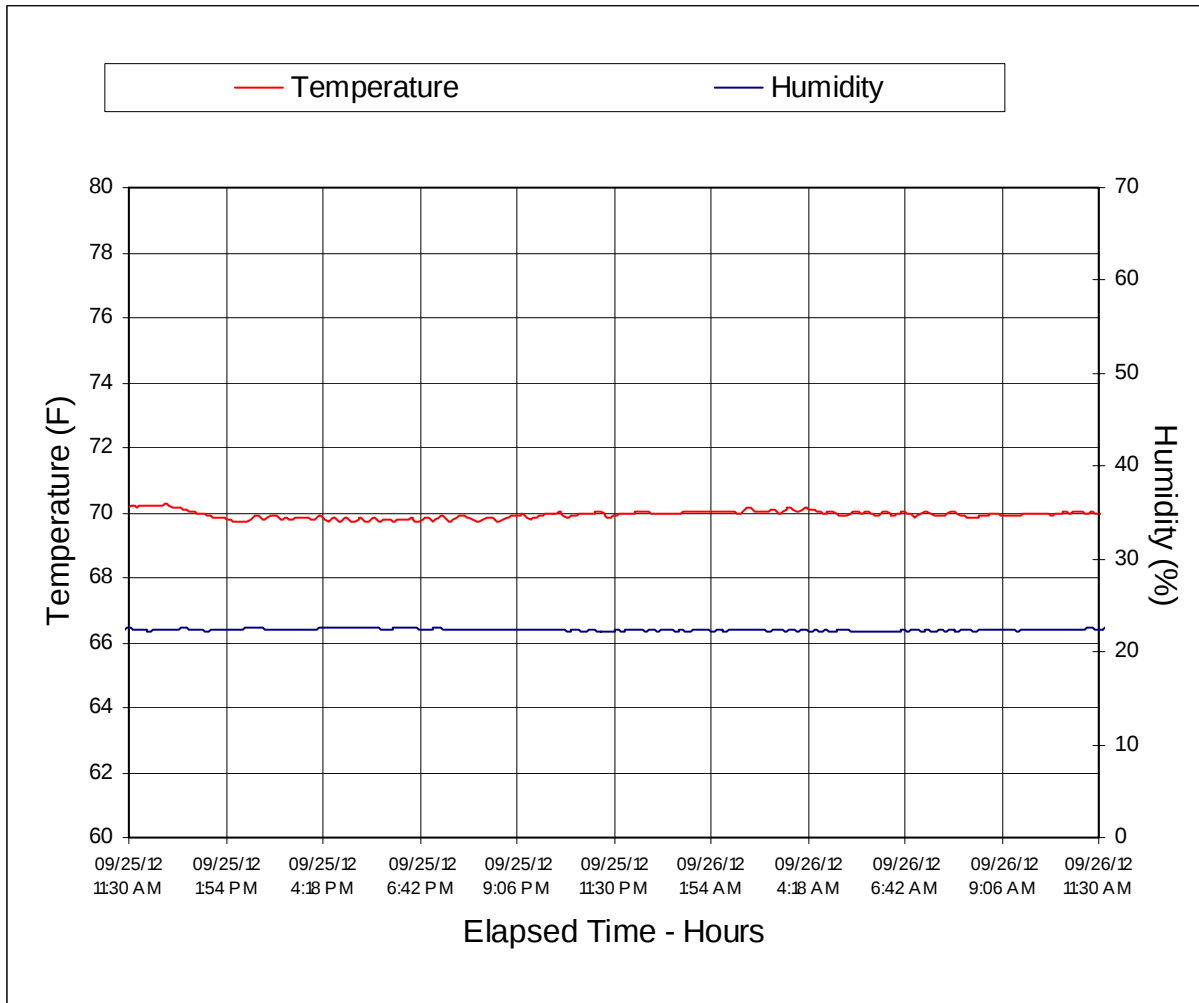
Test Phase	Spillage Location
0° To 90°	No Spillage Occurred
90° To 180°	No Spillage Occurred
180° To 270°	No Spillage Occurred
270° To 360°	No Spillage Occurred

DATA SHEET NO. 14

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV NHTSA No. MD0501

Test Program: NCAP Side Pole Impact Test Test Date: 09/26/12



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure		Page
1	As Delivered Right Front 3-4 View of Test Vehicle	A-1
2	As Delivered Left Rear 3-4 View of Test Vehicle	A-1
3	Pre-Test Frontal View of Test Vehicle	A-2
4	Post-Test Frontal View of Test Vehicle	A-2
5	Pre-Test Left Front 3-4 View of Test Vehicle	A-3
6	Post-Test Left Front 3-4 View of Test Vehicle	A-3
7	Pre-Test Left Side View of Test Vehicle	A-4
8	Post-Test Left Side View of Test Vehicle	A-4
9	Pre-Test Left Rear 3-4 View of Test Vehicle	A-5
10	Post-Test Left Rear 3-4 View of Test Vehicle	A-5
11	Pre-Test Rear View of Test Vehicle	A-6
12	Post-Test Rear View of Test Vehicle	A-6
13	Pre-Test Right Side View of Test Vehicle	A-7
14	Post-Test Right Side View of Test Vehicle	A-7
15	Pre-Test Overhead View of Test Area	A-8
16	Post-Test Overhead View of Test Area	A-8
17	Pre-Test Left Side View of Pole Positioned Against Side of Test Vehicle	A-9
18	Pre-Test Right Side View of Pole Positioned Against Side of Test Vehicle	A-9
19	Pre-Test Close-Up View of Impact Point Target	A-10
20	Post-Test Close-Up View of Impact Point Target	A-10
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-11
22	Post-Test Front Close-Up View of Dummy	A-11
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-12
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-12
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-13
26	Pre-Test Frontal View of Seat Back Prior to Dummy Positioning	A-13
27	Pre-Test Frontal View of Dummy Head and Shoulders in Relation to Head Restraint	A-14
28	Pre-Test Front View of Seat Pan Prior to Dummy Positioning	A-14
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-15
30	Pre-Test View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-15
31	Pre-Test View of Dummy's Head Showing Dummy's Head is Level	A-16
32	Pre-Test Placement of Dummy's Feet	A-16
33	Pre-Test View of Belt Anchorage for Dummy	A-17
34	Pre-Test Left Side View of Steering Wheel	A-17
35	Pre-Test View of Disengaged Parking Brake	A-18

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
35a	Pre-Test View of Disengaged Parking Brake	A-18
36	Pre-Test View of Parking Brake	A-19
36a	Pre-Test View of Parking Brake	A-19
37	Pre-Test Close-Up Left Side View of Driver Seat Track	A-20
38	Pre-Test Close-Up View of Driver Seat Back	A-20
39	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-21
40	Pre-Test Driver Dummy and Door Clearance View	A-21
41	Post-Test Driver Dummy and Door Clearance View	A-22
42	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-22
43	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-23
44	Pre-Test Inner Door Panel View	A-23
45	Post-Test Inner Door Panel View	A-24
46	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-24
47	Post-Test Dummy Close-Up Head Contact with Side Airbag View	A-25
48	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-25
49	Post-Test Dummy Close-Up Torso Contact with Side Airbag View	A-26
50	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-26
51	Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View	A-27
52	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-27
53	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-28
54	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-28
55	Close-Up View of Vehicle's Certification Label	A-29
56	Close-Up View of Vehicle's Tire Information Placard or Label	A-29
57	Pre-Test Pole Barrier Front View	A-30
58	Post-Test Pole Barrier Front View	A-30
59	Pre-Test Pole Barrier Side View	A-31
60	Post-Test Pole Barrier Side View	A-31
61	Pre-Test Ballast View	A-32
62	Post-Test Primary and Redundant Speed Trap Read-Out	A-32
63	FMVSS No. 301 Rollover 0 Degrees	A-33
64	FMVSS No. 301 Rollover 90 Degrees	A-33
65	FMVSS No. 301 Rollover 180 Degrees	A-34
66	FMVSS No. 301 Rollover 270 Degrees	A-34
67	FMVSS No. 301 Rollover 360 Degrees	A-35
68	Impact Event	A-35

TABLE OF PHOTOGRAPHS ... (CONTINUED)

69	Monroney Label	A-36
70	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-36



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

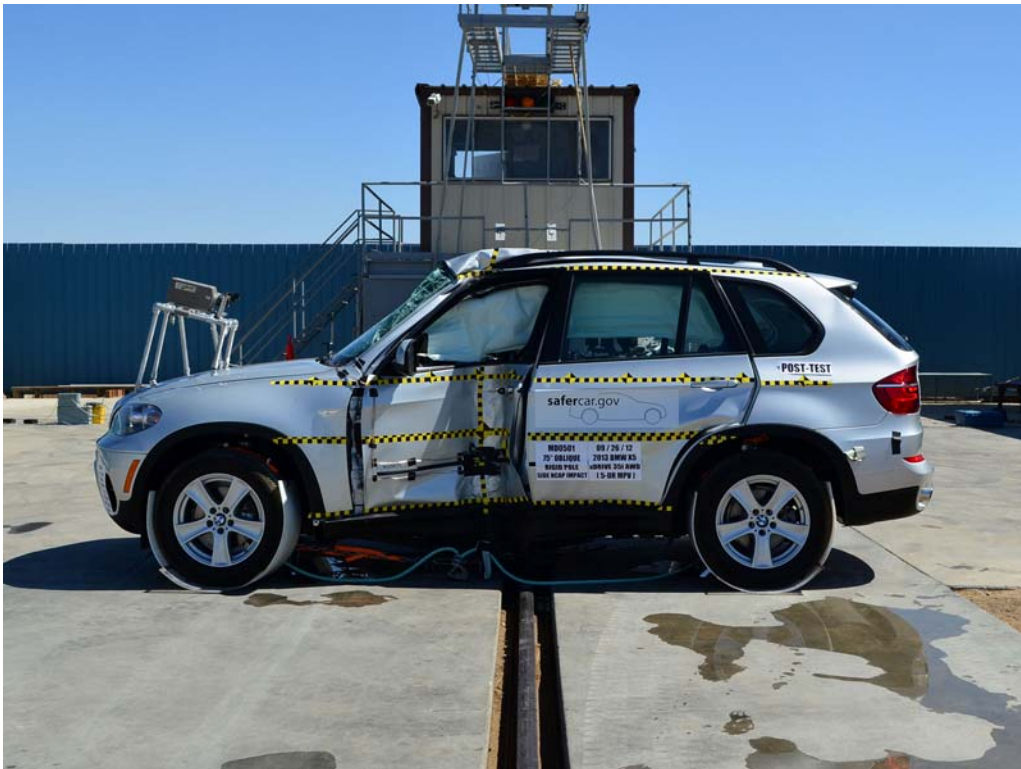


FIGURE 8. Post-Test Left Side View of Test Vehicle



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

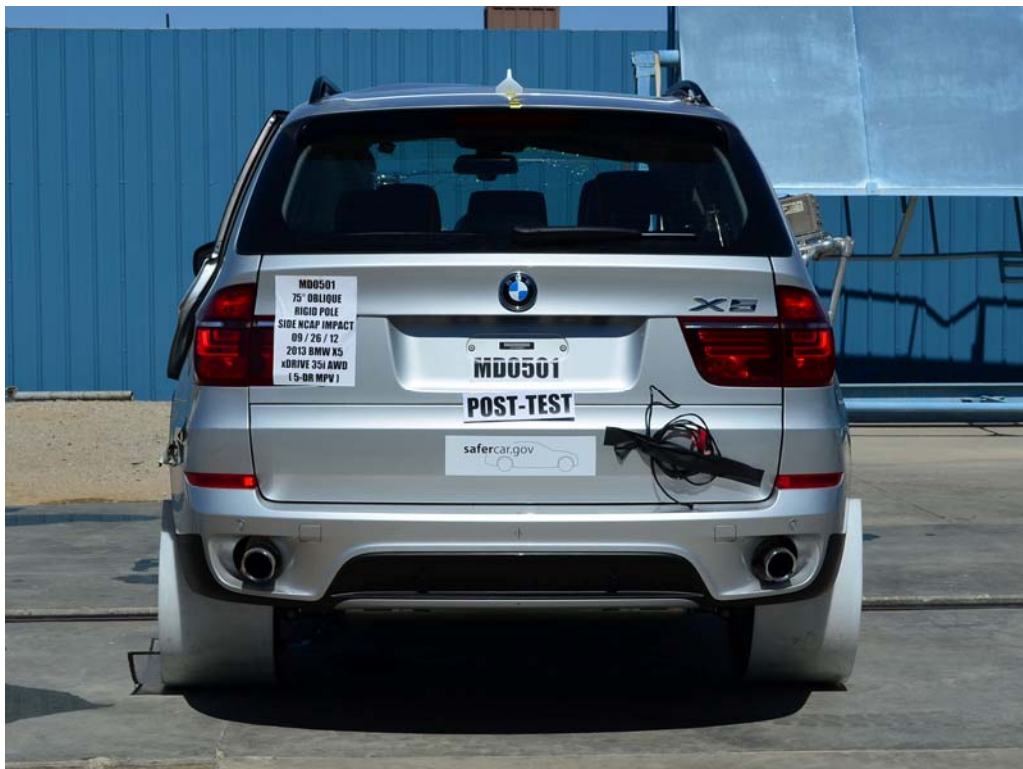


FIGURE 12. Post-Test Rear View of Test Vehicle



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, Chalking, and Contact Switches



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 Overhead View of Seat Pan



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



FIGURE 30. Pre-Test 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 35a. Pre-Test View of Disengaged Parking Brake



FIGURE 36. Pre-Test View of Parking Brake



FIGURE 36a. 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 View



FIGURE 41. Post-Test Dummy and Door Clearance View



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 Driver Door Panel View



FIGURE 45. Post-Test Inner Driver 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

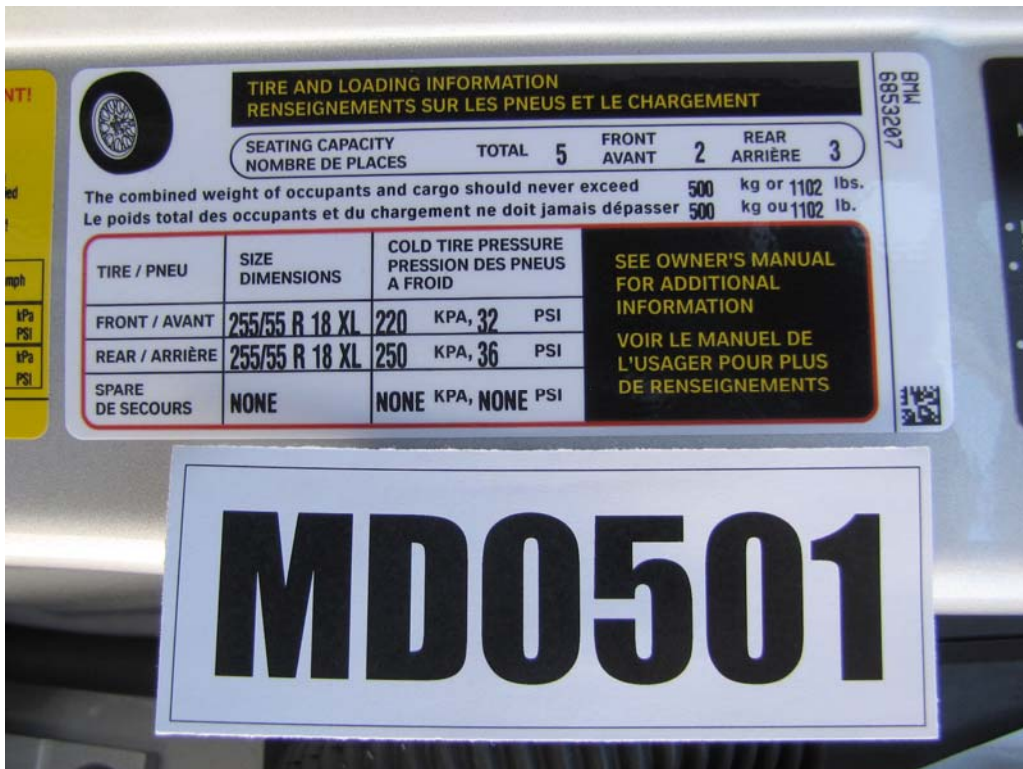


FIGURE 56. Close-Up View of Vehicle's Tire Information Placard



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

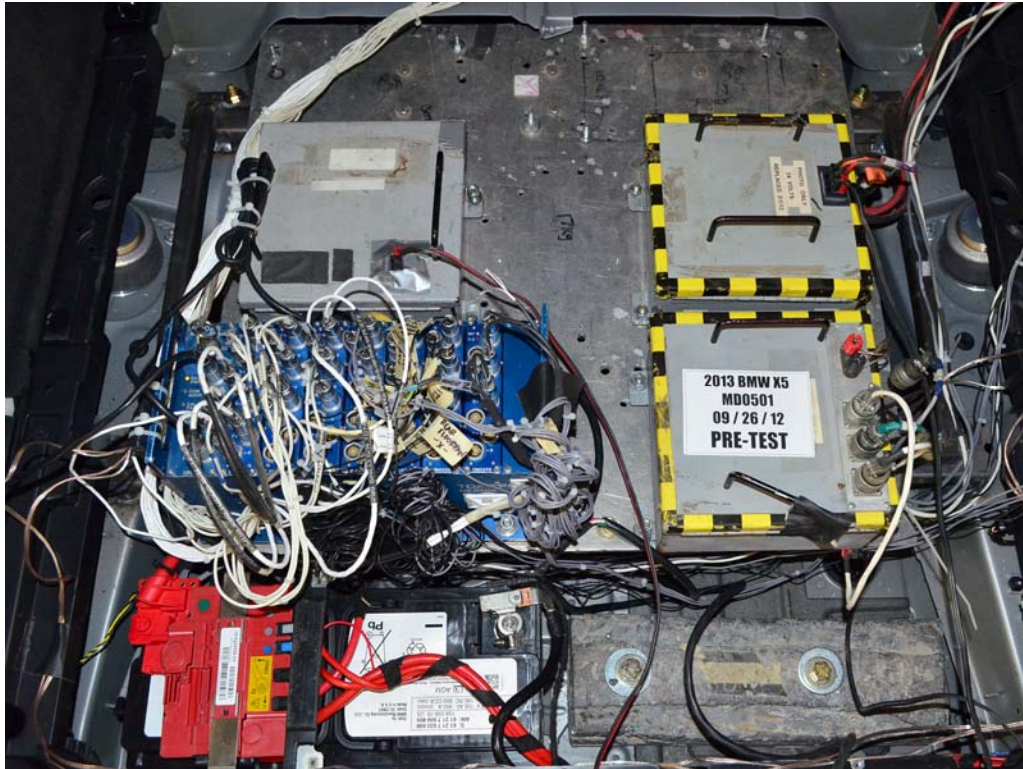


FIGURE 61. Pre-Test Ballast View



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



FIGURE 63. FMVSS No. 301-305 Rollover 0 Degrees



FIGURE 64. FMVSS No. 301-305 Rollover 90 Degrees



FIGURE 65. FMVSS No. 301-305 Rollover 180 Degrees

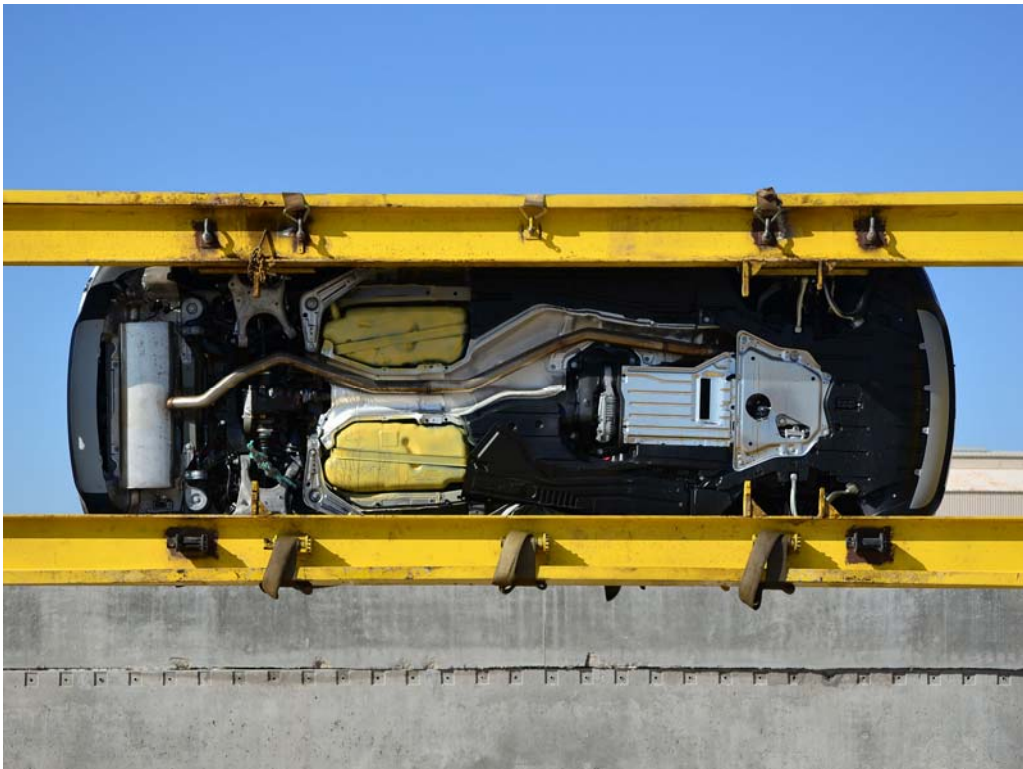


FIGURE 66. FMVSS No. 301-305 Rollover 270 Degrees



FIGURE 67. FMVSS No. 301-305 Rollover 360 Degrees



FIGURE 68. Impact Event

The Ultimate Driving Machine®

2013 BMW X5 xDrive35i

Manufacturer's Suggested Retail Price \$ 47,500.00

Options and Additional Charges: (Optional equipment may upgrade standard equipment; check with your authorized BMW center.)

Titanium Silver Metallic	Included
Black Leatherette	Included
Power tailgate	\$ 500.00
Lower front seats	Included
Park Distance Control	\$ 750.00
Automatic climate control	Included
BMW Assist with Bluetooth	Included
Pod and USB adapter	\$ 895.00
Destination Charge	Included
Total Suggested Retail Price	\$ 49,645.00

Standard Features

- 3.0-liter dual overhead cam (DOHC), 24-valve inline 6-cylinder engine with TwinPower Turbo technology, Valvetronic, piezo direct fuel injection, and Double VANOS continuously variable valve timing
- 8-speed Automatic transmission
- xDrive all-wheel-drive system
- Dynamic Stability Control (DSC), including Brake/Steering Compensation, Start-off Assistant, Brake Drying, and Brake Standby features, with Dynamic Traction Control (DTC) and Dynamic Brake Control
- Hill Descent Control (HDC)
- Double wishbone front suspension
- 4-wheel anti-lock ventilated disc brakes
- Xenon Adaptive Headlights with auto-leveling
- Halogen free-form foglights with LED Corona headlight-rings

BMW Delivery Quality Assurance
The BMW vehicle has been designed, engineered and manufactured under strict quality control guidelines. It has been prepared and inspected to ensure that it is free of defects in workmanship and materials in accordance with the New Vehicle Limited Warranty issued by BMW of North America, LLC.

BMW Ultimate Service

- 4 year/50,000 mile Full Maintenance Program
- 4 year/50,000 mile limited warranty
- 12 year rust perforation limited warranty
- 4 year/unlimited mile BMW Roadside Assistance Program

Intermittent rain-sensing windshield wipers

- 3-spoke leather-wrapped multi-function steering wheel
- Cruise Control
- Service Interval Indicator and Check Control vehicle monitor
- Drive system with on-board computer and Controller, and 6 programmable memory buttons
- AM/FM/CD/MP3 player audio system with HD Radio
- iPod and USB adapter
- Driver's and passenger's front airbag supplemental restraint system (SRS) with advanced technology
- Front- and rear-compartment Head Protection System (HPS) with front side-impact airbags
- Adaptive Brake/steering
- BMW Assist with Bluetooth wireless technology

PARTS CONTENT INFORMATION
For Vehicles in this Car Line:
US/Canadian Parts Content: **25%**
Major Source of Foreign Parts Content:
GERMANY: 50%

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

For this Vehicle:
Final Assembly Point: **SPARTANBURG, SC, USA**
Country of Origin: **AUSTRIA**
Engine: **GERMANY**
Transmission: **GERMANY**

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	Driver	Not Rated
Crash	Passenger	Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side	Front seat	Not Rated
Crash	Rear seat	Not Rated
Based on the risk of injury in a side impact.		
Rollover		★★★★
Based on the risk of rollover in a single-vehicle crash.		

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4235

EPA DOT Fuel Economy and Environment

Fuel Economy

19 MPG Standard EPA range from 12 to 26 MPG. The best vehicle rates 112 MPG.

combined city 16 23 highway

5.4 gallons per 100 miles

You spend \$3,400 in fuel costs over 5 years compared to the average new vehicle

Annual fuel cost \$3,000

Fuel Economy & Greenhouse Gas Rating (source: EPA) Smog Rating (source: CARB)

1 4 10 15 (EPA) **1 5 10** (CARB)

This vehicle emits 418 grams CO₂ per mile. The best under 8 grams per mile (midsize only). Producing and distributing fuel also emits emissions, learn more at fueleconomy.gov

Actual results may vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and uses \$1,688 in fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.69 per gallon. MPGe is miles per gallon gasoline equivalent. Vehicle emissions are a significant cause of air pollution and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

1. No vehicle is equipped with bumpers that can absorb an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

VIN: 5UXZV4C54D0B06207

Sold To: BMW South County 875 El Capon Blvd El Cerrito, CA Ship To: BMW South County 720 El Capon Blvd El Cerrito, CA

Environmental Performance
Protect the environment, choose vehicles with higher scores:

Global Warming Score **5** (1-10 scale, 10 is best)

Smog Score **5** (1-10 scale, 10 is best)

Using alternative fuels may improve scores. Visit www.DriveClean.ca.gov. Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on the vehicle's registered emissions. Please visit www.drivecleancalifornia.com or www.DriveClean.ca.gov for more information. AIR RESOURCES BOARD

BMW of North America, LLC
Woodcliff Lake, NJ 07677

FIGURE 69. Monroney Label

Adjusting Controls

Height
Adjust the head restraint so that its center is approx. at ear level.

Distance
Adjust the distance so that the head restraint is as close as possible to the back of the head.

Active front head restraints
In the event of a rear-end collision of sufficient severity, the active head restraint reduces the distance to the head.

Reduced protective function

- Do not use seat or head restraint covers.
- Do not hang objects, e.g., clothes hangers, directly on the head restraints.
- Only attach accessories approved by BMW to the seat or head restraint.

Otherwise, the protective function of the active head restraint will be impaired and the personal safety of the occupants will be endangered. Have the active head restraints reset after they are triggered in a rear-end collision. Have this work performed by the service center only; otherwise, this safety feature with not be operational. ◀

Please contact the service center if the front head restraints need to be removed or installed.

Front seats: adjusting the height
Adjust the head restraint so that its center is approx. at ear level.

Electrical

Adjusting electrically.

Front seats: adjusting the distance from the back of the head

Press the button and pull the headrest cushion forward or push it back.

Compromised performance
Do not place any objects behind the headrest cushion. Otherwise, you can impair the proper function of the head restraint. ◀

Comfort seat
The distance from the back of the seat occupant's head can be adjusted using the shoulder support, refer to page 47.

Controls Adjusting

Adjusting side extensions

You can fold the side extensions on the head-restraint forward for increased lateral support in the resting position.

BMW X5: rear seats and 3rd row seats Adjusting the height

- To raise: pull.
- To lower: press the button, arrow 1, and push the head restraint down.

In vehicles equipped with 3rd row seats, the height of the middle head restraint is not adjustable.

Removing

- Pull the head restraint upward to the stop.
- Press the button, arrow 1, and pull the head restraint out completely.

BMW X6: rear seats
The head restraints in the rear cannot be adjusted and cannot be removed.

Seat, mirror, and steering wheel memory

General information
Two different driver's seat and front passenger seat positions, exterior mirror positions and steering wheel positions can be stored and retrieved. The adjustment of the backrest width and the lumbar support is not stored in the memory.

Storing

- Switch on the radio ready state or the ignition, refer to page 64.
- Set the desired seat, exterior mirror and steering wheel positions.
- Press the button. The LED in the button lights up.
- Press the desired memory button 1 or 2. The LED goes out.

If the M button is pressed accidentally:

- Press the button again. The LED goes out.

Calling up settings

- Do not retrieve the memory setting while driving.
- Do not retrieve the memory setting while driving, as an unexpected seat movement could result in an accident. ◀

FIGURE 70. Head Restraint Use and Adjustment Information from Vehicle 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)

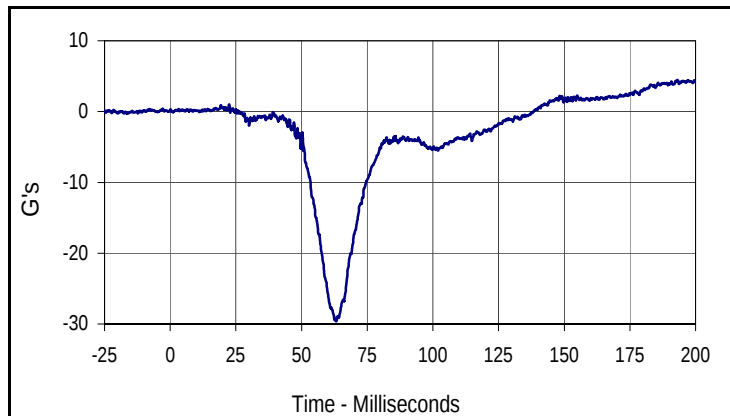
Left B-Pillar Sill Acceleration
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration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

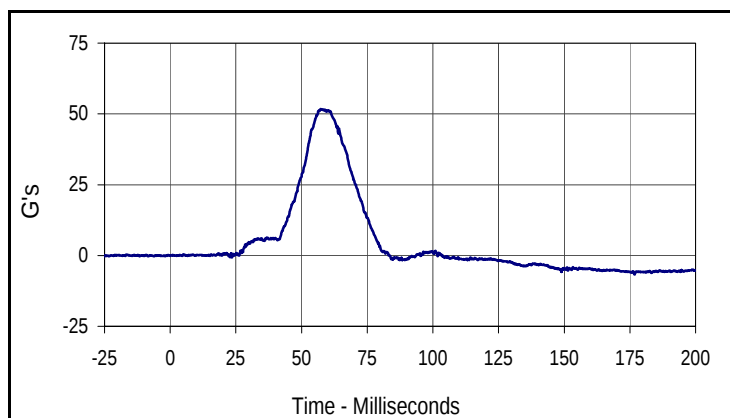
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

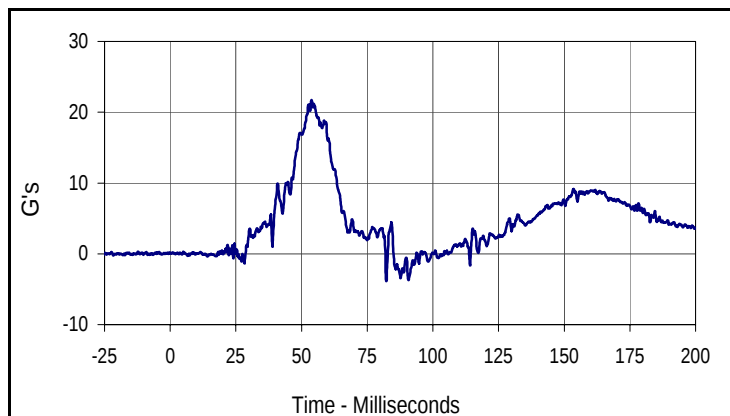
Test Date: 9/26/12
 NHTSA No.: MD0501



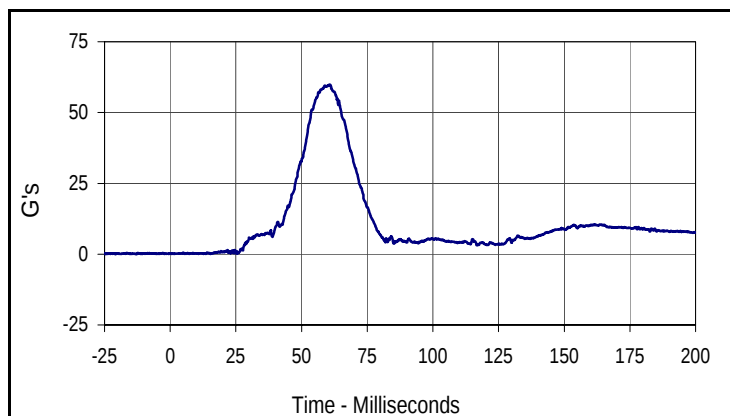
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
4.5	193.1	-29.6	63.2



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
51.8	57.3	-6.7	176.7



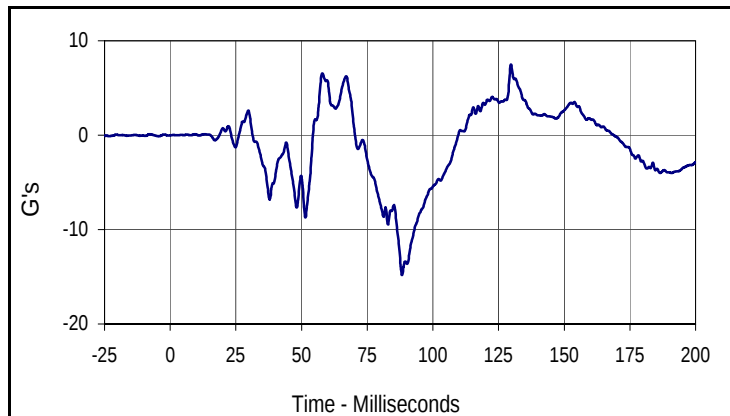
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
21.7	53.8	-3.9	82.2



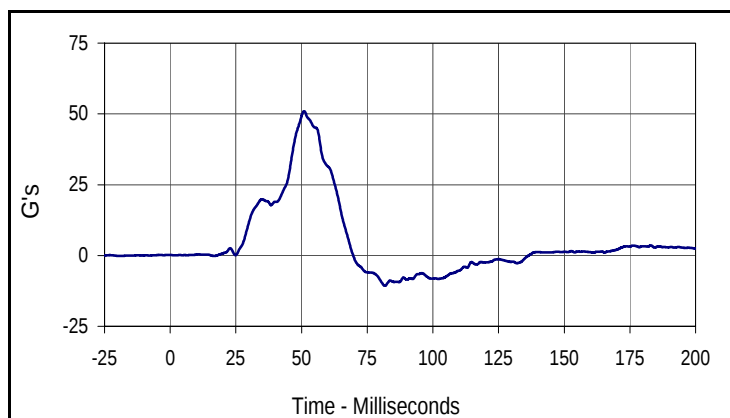
Curve Description			
Driver Head Acceleration Primary Res.			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
59.9	60.6	0.1	1.3

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

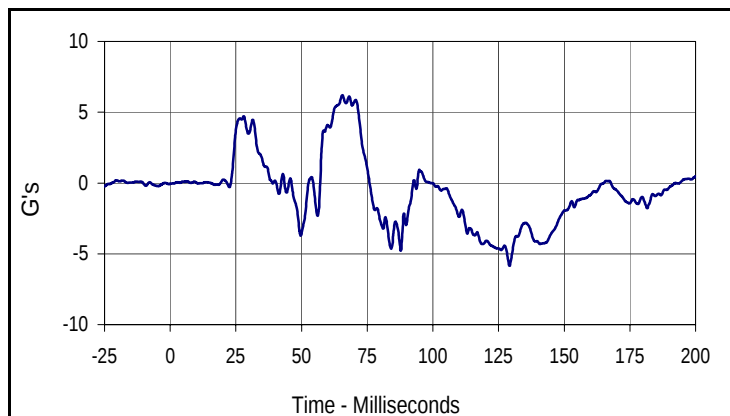
Test Date: 9/26/12
 NHTSA No.: MD0501



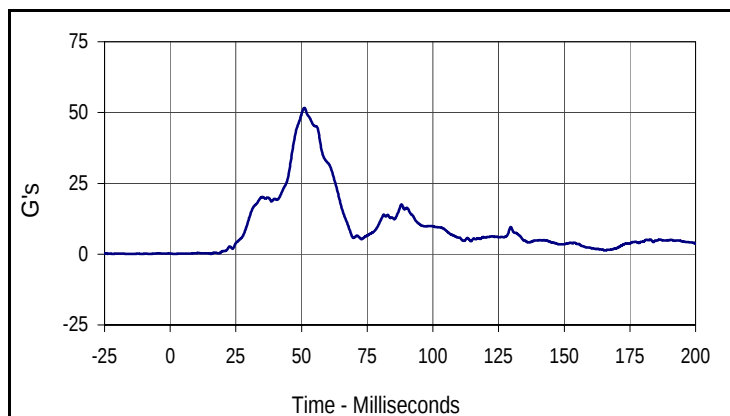
Curve Description			
Driver Lower Spine T12 Acceleration X			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
7.5	129.7	-14.8	88.2



Curve Description			
Driver Lower Spine T12 Acceleration Y			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
51.0	51.0	-10.7	81.7



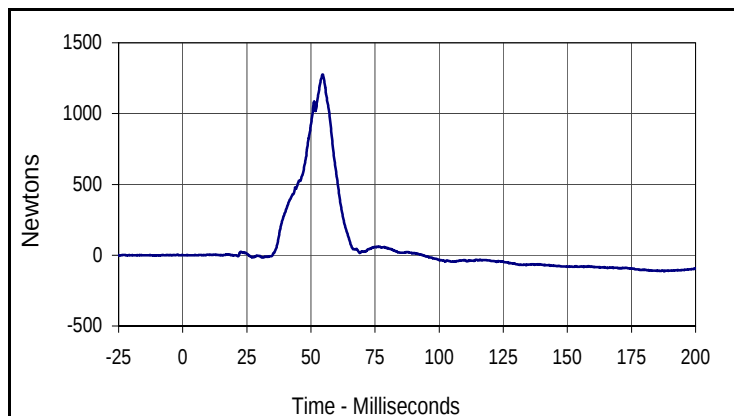
Curve Description			
Driver Lower Spine T12 Acceleration Z			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
6.2	65.5	-5.8	129.2



Curve Description			
Driver Lower Spine T12 Acceleration Res.			
Plot No.	Type	SAE Class	Units
008	RES	180	G's
Max	Time	Min	Time
51.6	51.1	0.1	15.5

Test Vehicle: 2013 BMW X5 xDrive 35i AWD 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

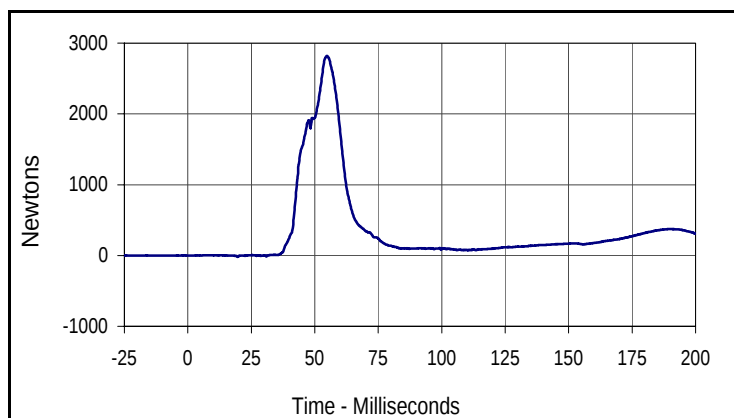
Test Date: 9/26/12
 NHTSA No.: MD0501



Curve Description

Driver Iliac Wing Force on Impact Side Y

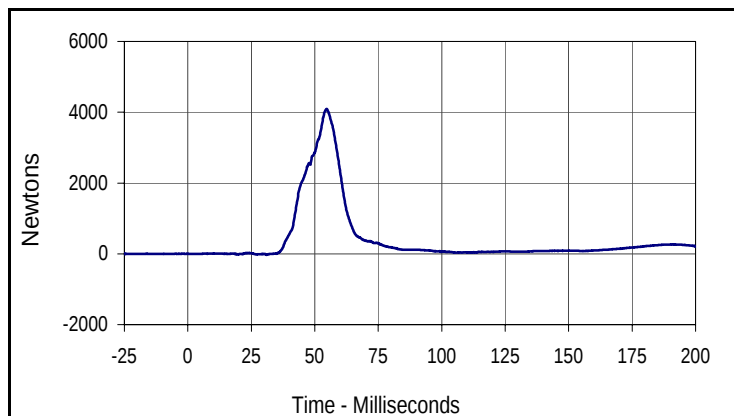
Plot No.	Type	SAE Class	Units
009	FIL	600	Newtons
Max	Time	Min	Time
1276.7	54.6	-113.0	187.8



Curve Description

Driver Acetabulum Force on Impact Side Y

Plot No.	Type	SAE Class	Units
010	FIL	600	Newtons
Max	Time	Min	Time
2820.6	54.8	-19.8	19.6



Curve Description

Driver Total Pelvic Force on Impact Side Y

Plot No.	Type	SAE Class	Units
011	SUM	600	Newtons
Max	Time	Min	Time
4093.4	54.7	-29.2	31.0

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Test Program: SID IIs External Measurements
 ATD Serial No.: 299

Test Date: 8/31/12
 Test I.D.: N/A



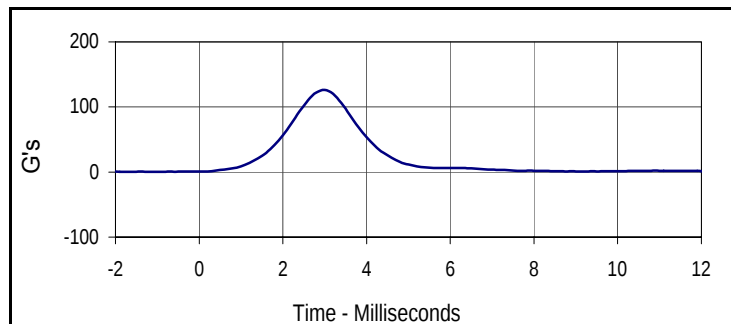
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
A	Sitting Height	mm	772 - 788	781	Pass
B	Shoulder Pivot Height	mm	437 - 453	444	Pass
C	H-Point Height	mm	79 - 89	84	Pass
D	H-Point from Seatback	mm	141 - 151	145	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F	Thigh Clearance	mm	119 - 135	127	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	183	Pass
J	Head Circumference	mm	541 - 551	546	Pass
K	Buttock to Knee Length	mm	514 - 540	526	Pass
L	Popliteal Height	mm	343 - 369	351	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	401	Pass
N	Buttock Popliteal Length	mm	416 - 442	430	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	204	Pass
P	Foot Length	mm	216 - 232	221	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	318	Pass
R	Arm Length	mm	249 - 259	252	Pass
S	Knee Joint to Seatback	mm	477 - 493	484	Pass
V	Shoulder Width	mm	341 - 357	351	Pass
W	Foot Width	mm	78 - 94	89	Pass
Y	Chest Circumference with Jacket	mm	851 - 881	872	Pass
Z	Waist Circumference	mm	760 - 791	775	Pass
Overall Test Results					Pass

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

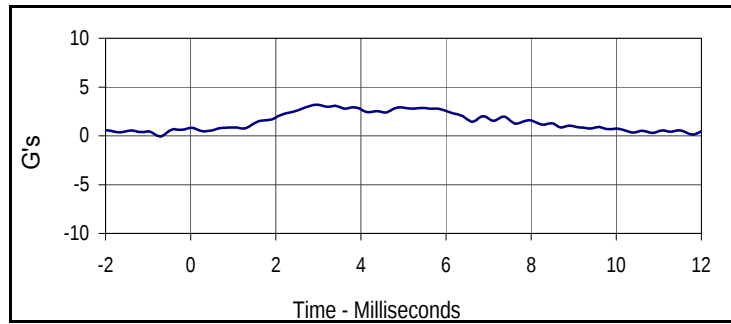
Test Date: 8/31/12
 Test I.D.: 299HD045



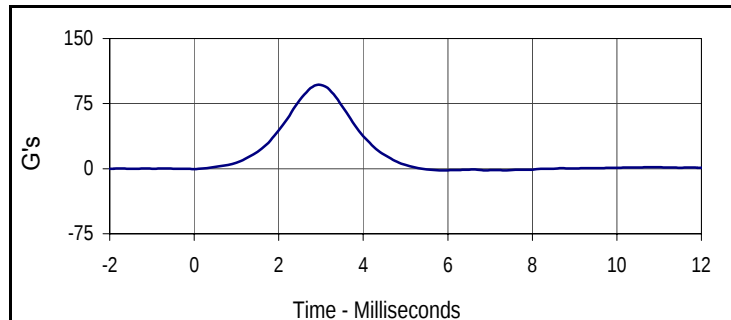
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	250	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	20.8	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	28.4	Pass
Peak Head Resultant Acceleration		G's	115 to 137	126.0	Pass
Peak Head X Acceleration		G's	<15	3.2	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse		%	<15	2.8	Pass
Overall Test Results					Pass



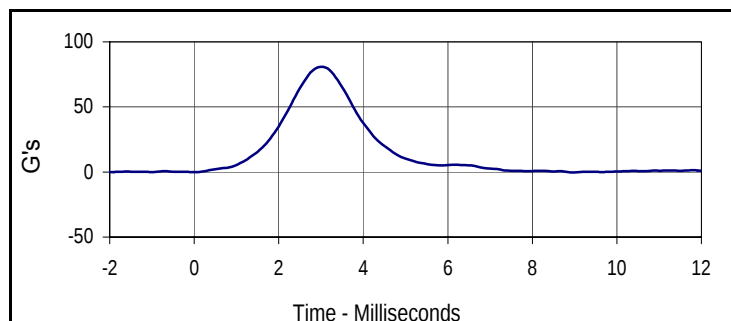
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
126.0	3.0	0.3	-0.9



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.2	3.0	-0.1	-0.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
96.6	3.0	-2.0	5.9



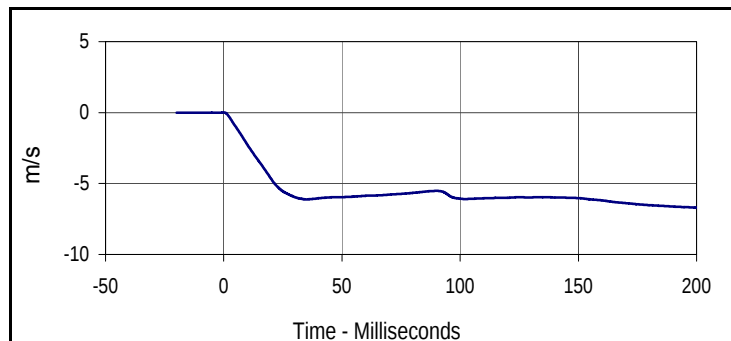
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
80.8	3.0	-0.2	8.9

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

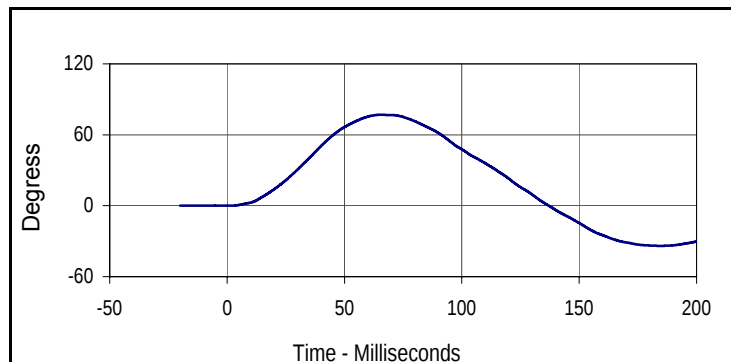
Test Date: 8/31/12
 Test I.D.: 299NB045



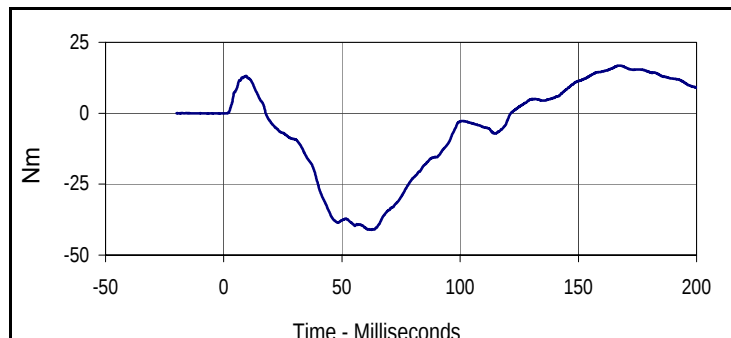
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	280	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.0	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.27	Pass
	15 msec	m/s	-3.30 to -4.10	-3.45	Pass
	20 msec	m/s	-4.40 to -5.40	-4.66	Pass
	25 msec	m/s	-5.40 to -6.10	-5.55	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.12	Pass
D-Plane Rotation	Max	Degrees	71 to 81	76.9	Pass
	Time	msec	50 to 70	65.5	Pass
Peak Occipital Condyle Moment		Nm	-36 to -44	-41.1	Pass
Decaying Moment Time to Cross 0 Nm		msec	102 to 126	121.5	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
76.9	65.5	-33.9	184.7



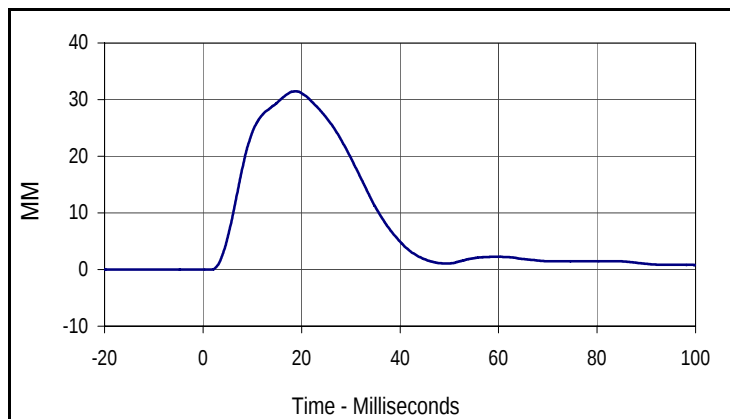
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
16.8	167.2	-41.1	62.5

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

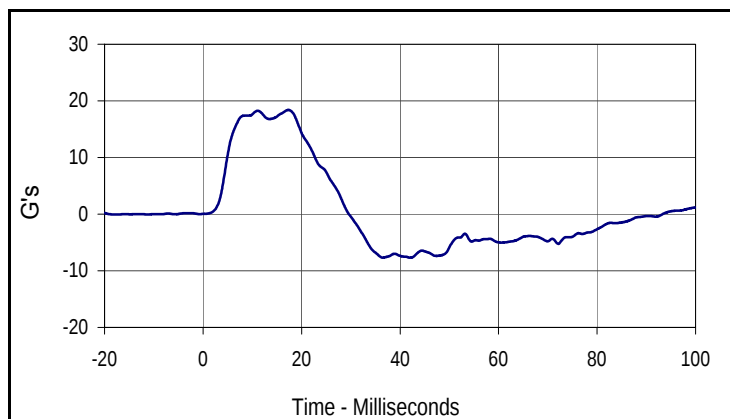
Test Date: 8/31/12
 Test I.D.: 299SH045



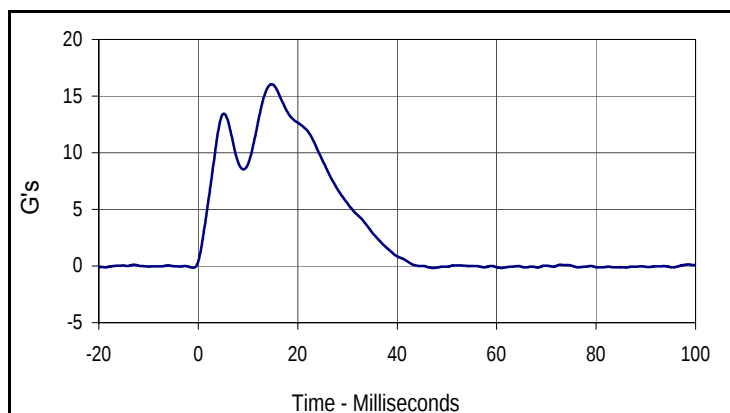
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	315	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	20.9	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	28.7	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.27	Pass
Peak Shoulder Deflection		mm	28 to 37	31.5	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	18.4	Pass
Peak Impactor Acceleration		G's	13 to 18	16.1	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
31.5	18.7	0.0	-2.2



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.4	17.3	-7.7	42.1



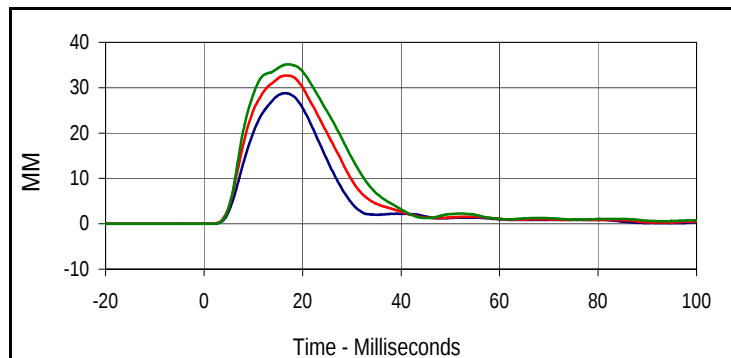
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.1	14.7	-0.2	47.2

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

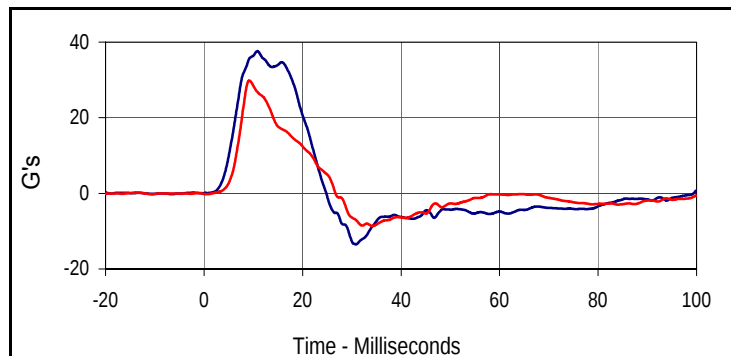
Test Date: 8/31/12
 Test I.D.: 299TWA045



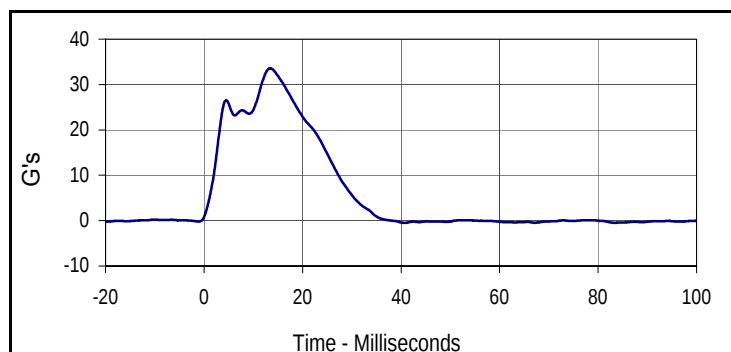
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	335	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	28.4	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Shoulder Deflection	mm	31 to 40	35.5	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	28.8	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	32.7	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	35.1	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	37.6	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	29.8	Pass
Peak Impactor Acceleration	G's	30 to 36	33.6	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
28.8	16.4	0.0	-2.0
Middle Thorax Deflection			
Max	Time	Min	Time
32.7	16.7	0.0	-2.7
Lower Thorax Deflection			
Max	Time	Min	Time
35.1	17.0	0.0	-1.7



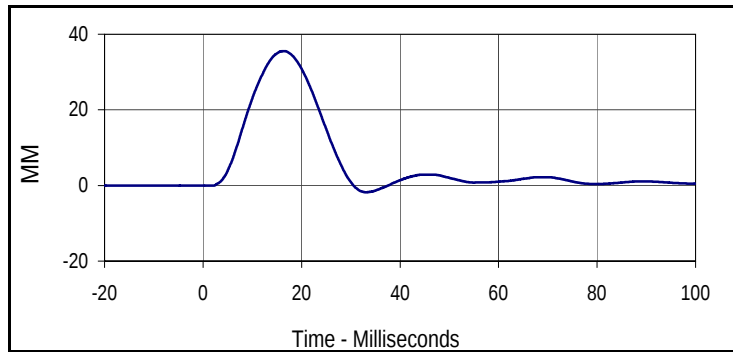
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
37.6	10.8	-13.5	30.9
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
29.8	9.2	-8.6	34.2



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
33.6	13.4	-0.5	40.7

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

Test Date: 8/31/12
 Test I.D.: 299TWA045



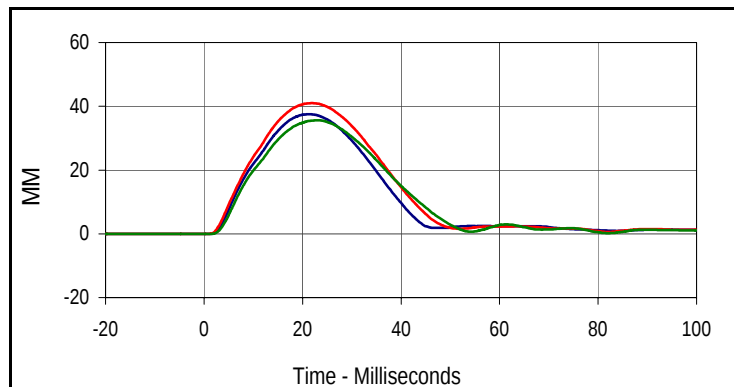
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
35.5	16.5	-1.8	33.2

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

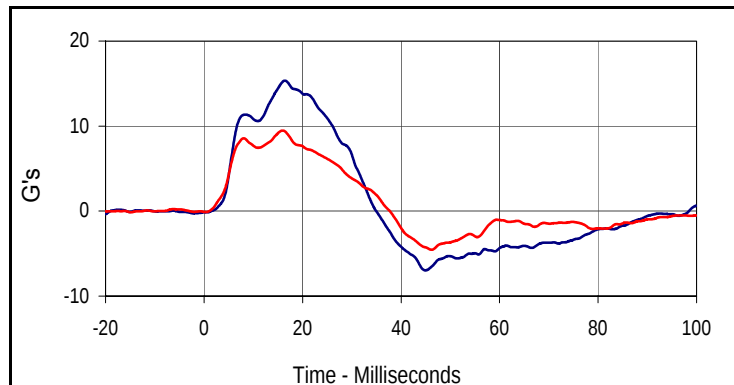
Test Date: 8/31/12
 Test I.D.: 299TWOA045



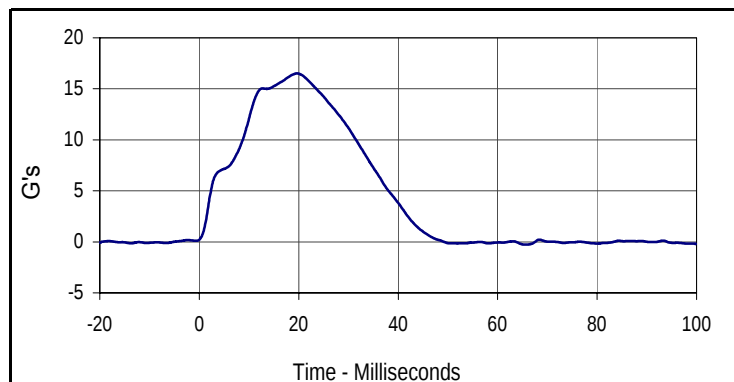
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	370	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	28.5	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.3	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	37.5	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	41.0	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	35.6	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	15.3	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	9.5	Pass
Peak Impactor Acceleration		G's	14 to 18	16.5	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
37.5	21.3	0.0	-14.5
Middle Thorax Deflection			
Max	Time	Min	Time
41.0	21.9	0.0	-6.5
Lower Thorax Deflection			
Max	Time	Min	Time
35.6	23.1	0.0	-8.7



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.3	16.4	-7.0	44.9
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.5	16.0	-4.5	46.2



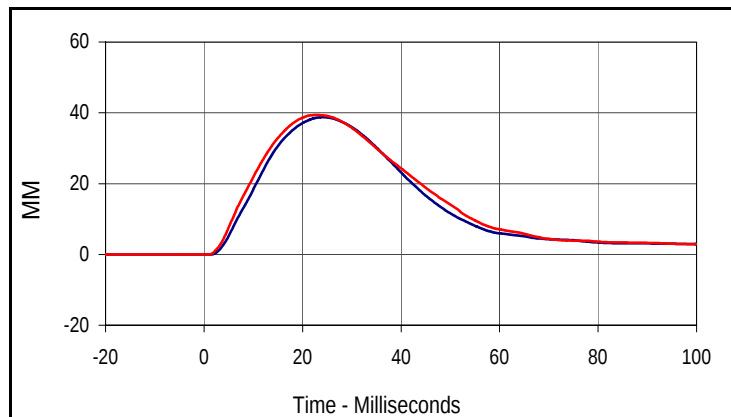
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.5	19.6	-0.3	65.6

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

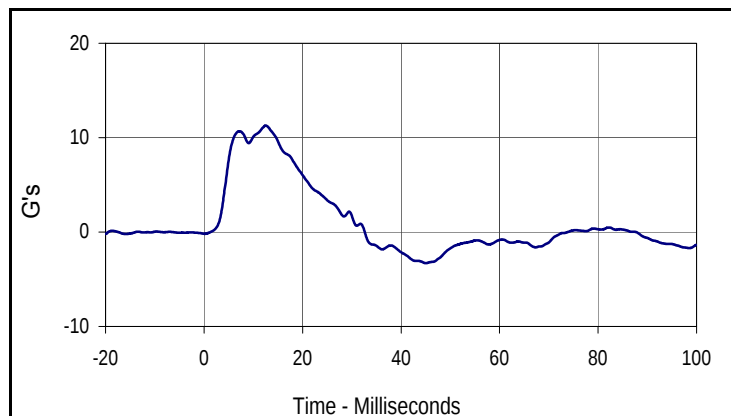
Test Date: 8/31/12
 Test I.D.: 299ABD045



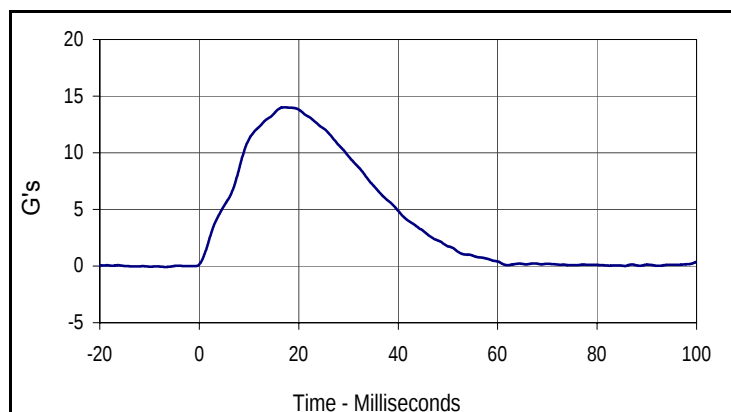
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	390	Pass
Temperature During Soak	Max °C	20.6 to 22.2	21.7	Pass
	Min °C		20.7	Pass
Humidity During Soak	Max %	10.0 to 70.0	30.0	Pass
	Min %		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.1	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	38.7	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	39.4	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	11.3	Pass
Peak Impactor Acceleration	G's	12 to 16	14.0	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
38.7	24.1	0.0	-11.2
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
39.4	22.8	0.0	-10.8



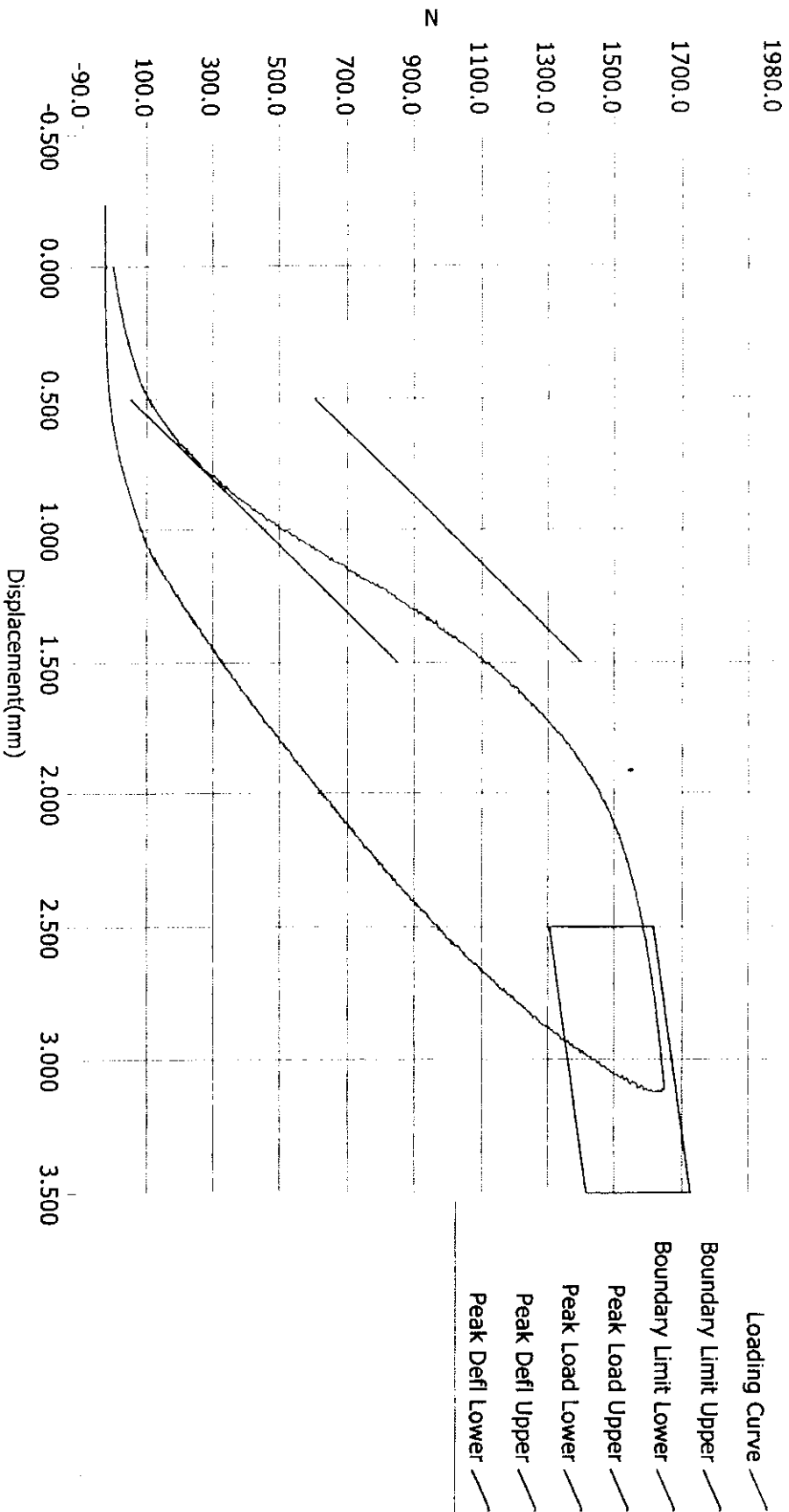
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
11.3	12.5	-3.3	45.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.0	17.0	-0.1	0.0

MD0501 PRE TEST

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	49064	12/7/2011	8:35 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/7/2011

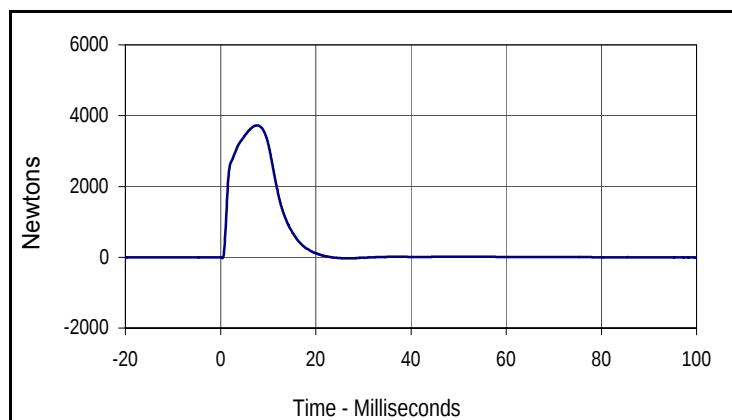
Current Time : 20:36:04

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

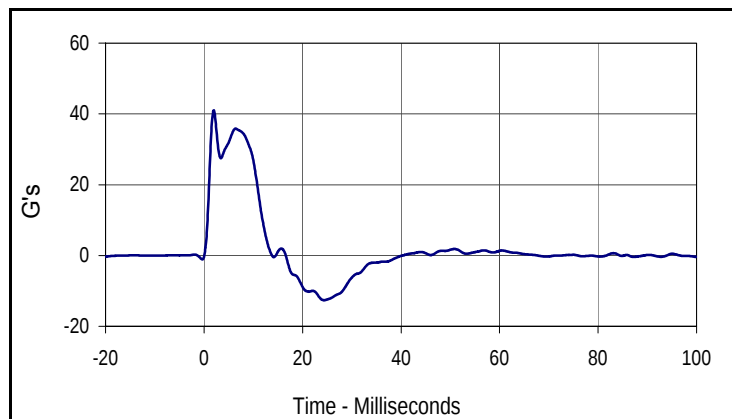
Test Date: 8/31/12
 Test I.D.: 299ACET045



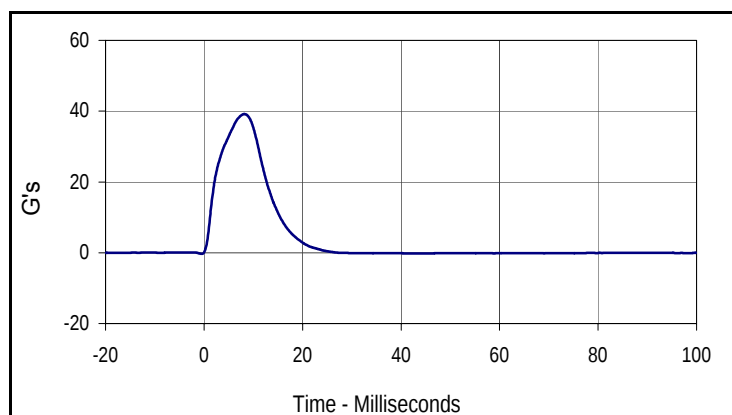
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	415	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.3	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3724.9	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	35.8	Pass
Peak Impactor Acceleration	G's	38 to 47	39.2	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3724.9	7.7	-33.1	27.0



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
41.0	2.0	-12.6	24.3



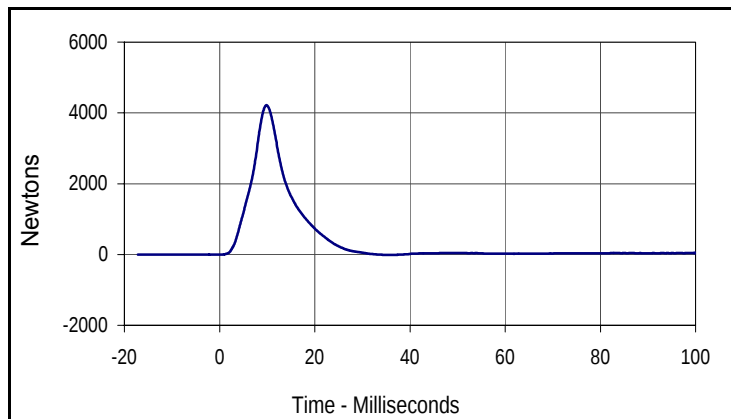
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.2	8.2	-0.3	-0.5

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

Test Date: 8/31/12
 Test I.D.: 299PL045



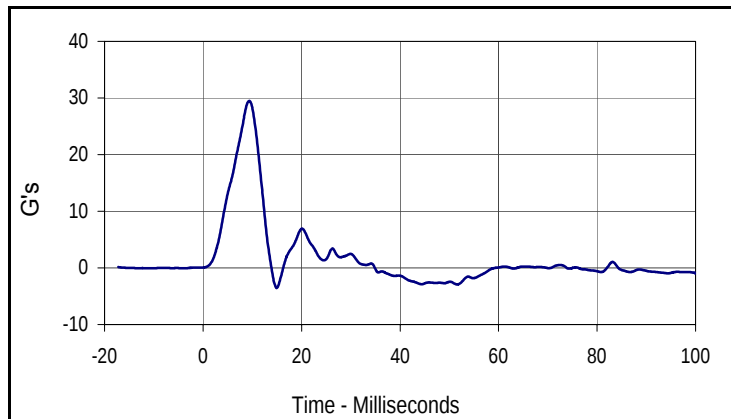
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	440	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.1	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.3	Pass
Peak Iliac Force		Newtons	4100 to 5100	4217.1	Pass
Peak Pelvis Y Acceleration		G's	28 to 39	29.5	Pass
Peak Impactor Acceleration		G's	36 to 45	40.3	Pass
Overall Test Results				Pass	



Curve Description

Pelvis Iliac Force

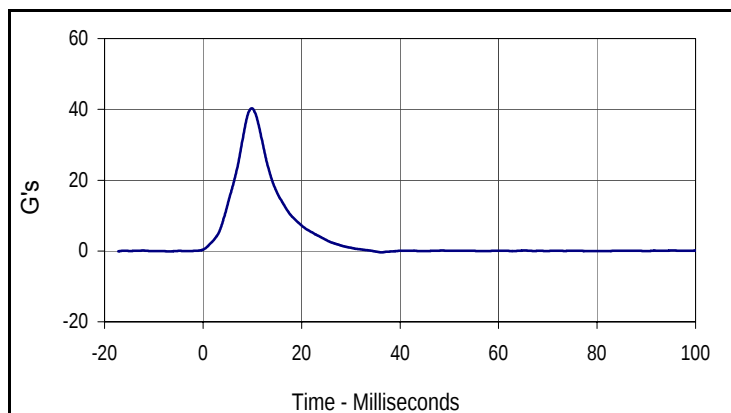
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4217.1	9.8	-12.4	34.9



Curve Description

Pelvis Y Acceleration

Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
29.5	9.4	-3.5	14.9



Curve Description

Impactor Acceleration

Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
40.3	9.9	-0.4	36.2

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

Test Program: SID IIs External Measurements
 ATD Serial No.: 299

Test Date: 9/28/12
 Test I.D.: N/A



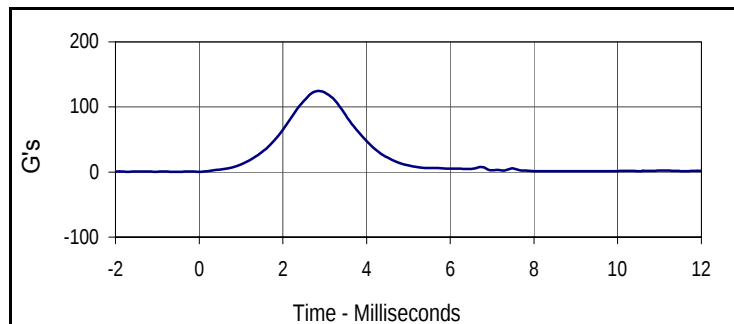
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
A	Sitting Height	mm	772 - 788	780	Pass
B	Shoulder Pivot Height	mm	437 - 453	444	Pass
C	H-Point Height	mm	79 - 89	84	Pass
D	H-Point from Seatback	mm	141 - 151	145	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F	Thigh Clearance	mm	119 - 135	126	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	183	Pass
J	Head Circumference	mm	541 - 551	546	Pass
K	Buttock to Knee Length	mm	514 - 540	526	Pass
L	Popliteal Height	mm	343 - 369	351	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	400	Pass
N	Buttock Popliteal Length	mm	416 - 442	430	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	204	Pass
P	Foot Length	mm	216 - 232	221	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	318	Pass
R	Arm Length	mm	249 - 259	252	Pass
S	Knee Joint to Seatback	mm	477 - 493	484	Pass
V	Shoulder Width	mm	341 - 357	351	Pass
W	Foot Width	mm	78 - 94	89	Pass
Y	Chest Circumference with Jacket	mm	851 - 881	872	Pass
Z	Waist Circumference	mm	760 - 791	775	Pass
Overall Test Results					Pass

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

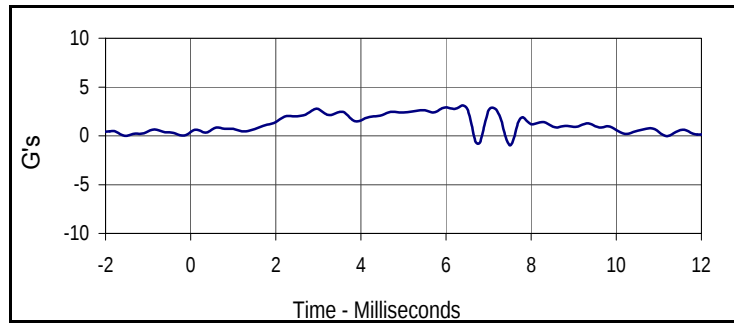
Test Date: 9/28/12
 Test I.D.: 299HD046



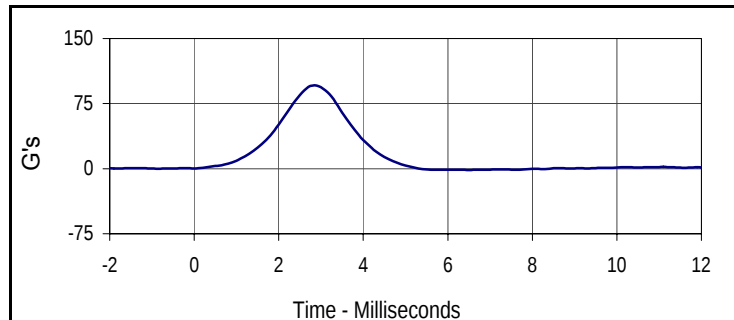
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	265	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	20.9	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.8	Pass
Peak Head Resultant Acceleration		G's	115 to 137	124.2	Pass
Peak Head X Acceleration		G's	<15	2.9	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse		%	<15	4.5	Pass
Overall Test Results				Pass	



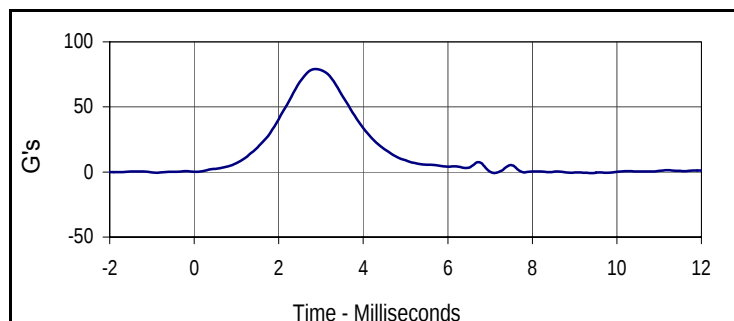
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
124.2	2.9	0.5	-0.5



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.9	6.0	0.0	-1.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
95.9	2.8	-1.4	6.5



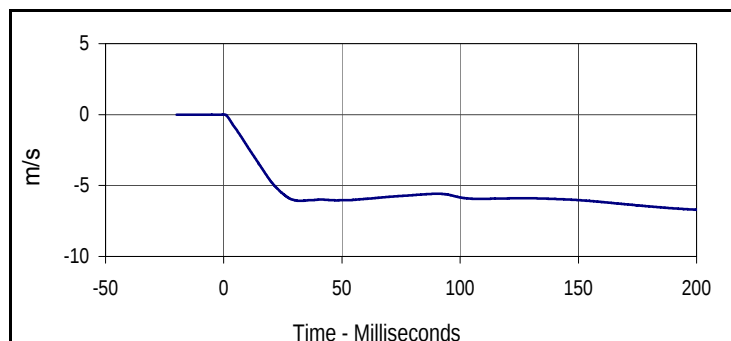
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
79.2	2.9	-0.7	9.4

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

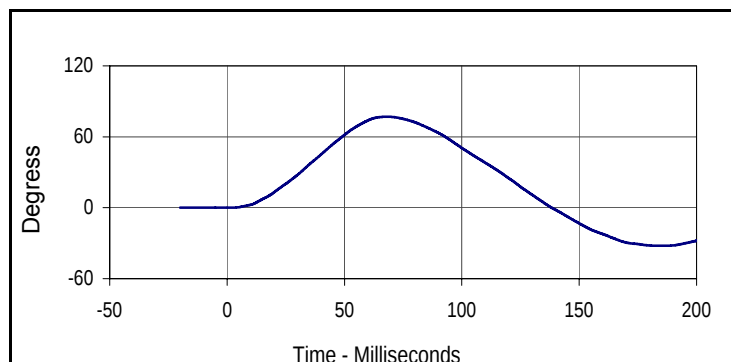
Test Date: 9/28/12
 Test I.D.: 299NB046



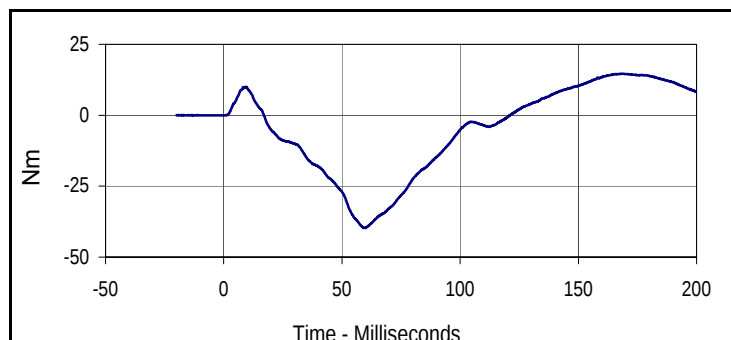
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	290	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.4	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.56	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.24	Pass
	15 msec	-3.30 to -4.10	-3.50	Pass
	20 msec	-4.40 to -5.40	-4.72	Pass
	25 msec	-5.40 to -6.10	-5.58	Pass
	25-100 msec	-5.50 to -6.20	-6.08	Pass
D-Plane Rotation	Max	71 to 81	77.0	Pass
	Time	50 to 70	68.2	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-39.7	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	121.2	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
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
77.0	68.2	-32.1	182.6



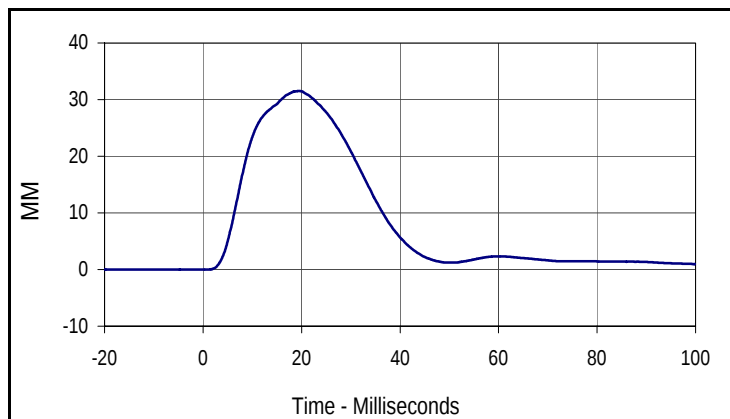
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
14.6	168.2	-39.7	59.8

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

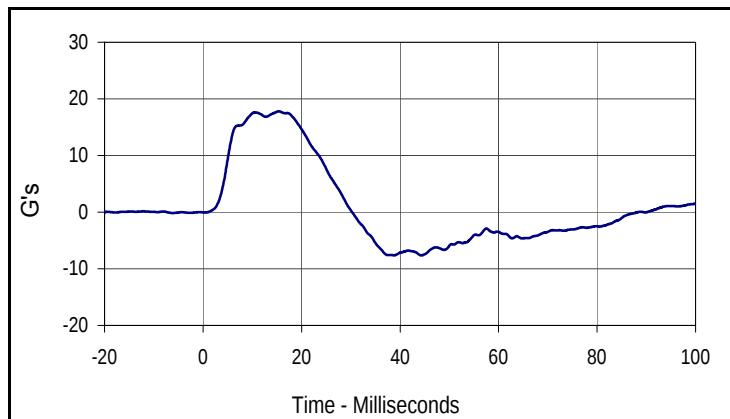
Test Date: 9/28/12
 Test I.D.: 299SH046



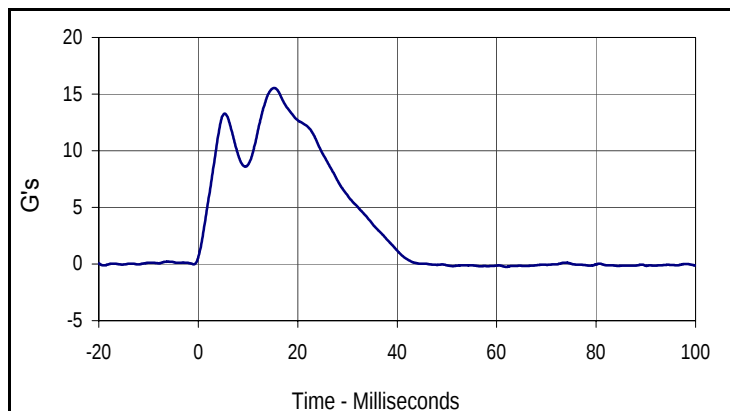
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	330	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.30	Pass
Peak Shoulder Deflection		mm	28 to 37	31.5	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	17.8	Pass
Peak Impactor Acceleration		G's	13 to 18	15.5	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
31.5	19.4	0.0	-14.4



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
17.8	15.4	-7.6	44.3



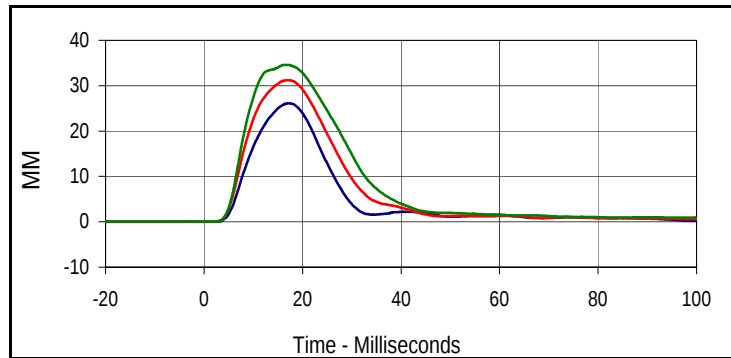
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
15.5	15.3	-0.2	62.0

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

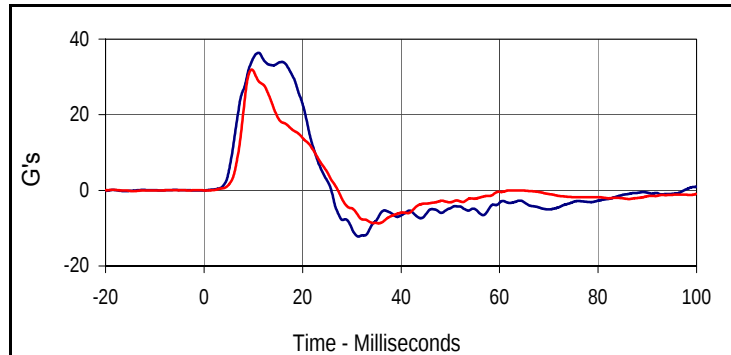
Test Date: 9/28/12
 Test I.D.: 299TWA046



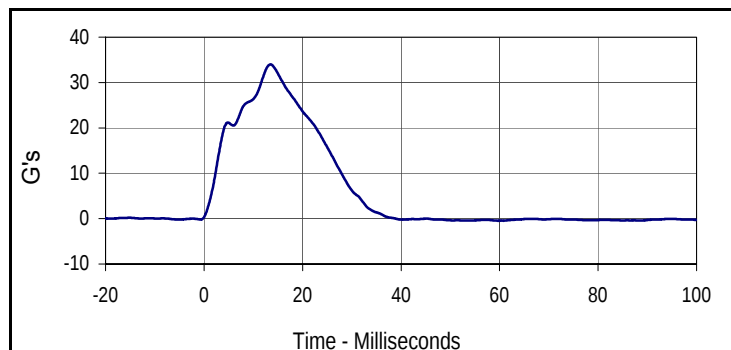
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	360	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Shoulder Deflection	mm	31 to 40	32.9	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	26.1	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.2	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	34.6	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	36.4	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	32.0	Pass
Peak Impactor Acceleration	G's	30 to 36	34.0	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	17.2	0.0	-0.3
Middle Thorax Deflection			
Max	Time	Min	Time
31.2	17.0	0.0	-3.9
Lower Thorax Deflection			
Max	Time	Min	Time
34.6	16.4	0.0	-20.0



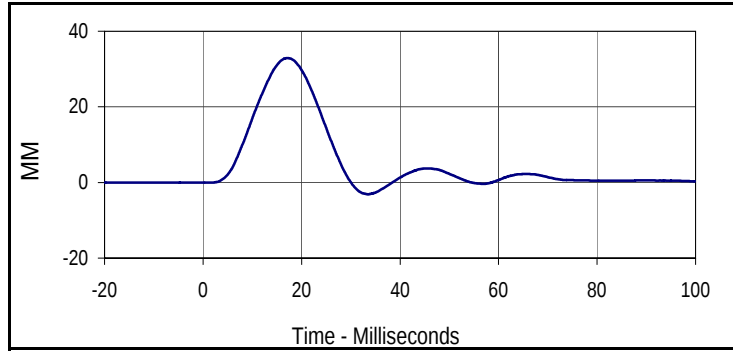
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
36.4	11.0	-12.3	31.3
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
32.0	9.7	-8.7	35.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
34.0	13.5	-0.4	59.7

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

Test Date: 9/28/12
Test I.D.: 299TWA046



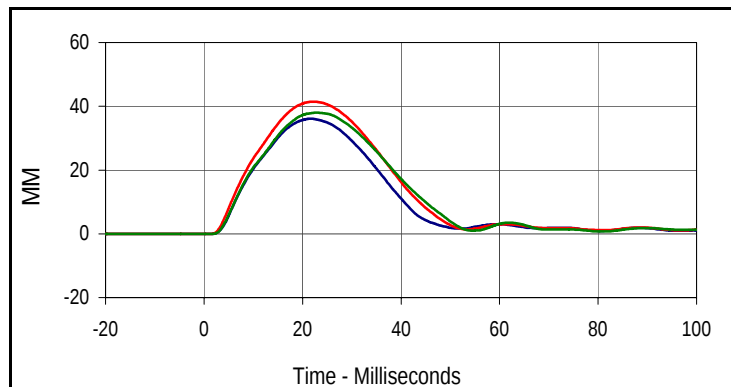
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
32.9	17.1	-3.1	33.5

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

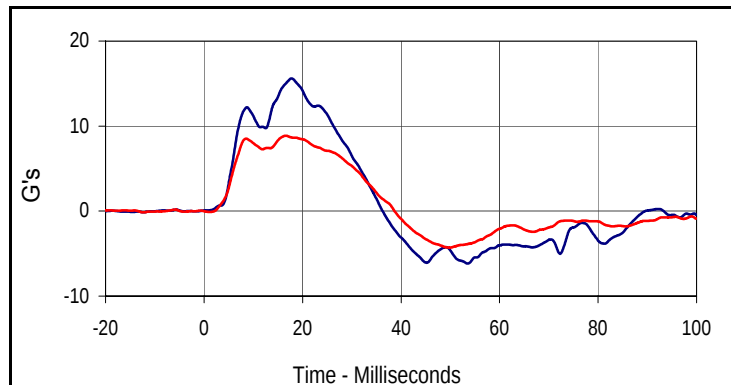
Test Date: 9/28/12
 Test I.D.: 299TWOA046



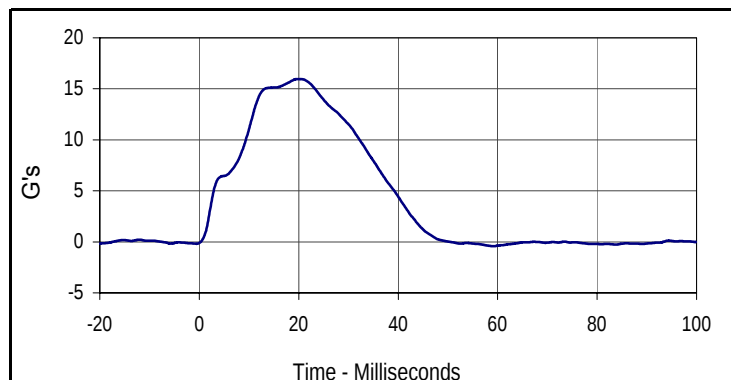
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	410	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		28.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.7	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.3	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	36.1	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	41.5	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	38.0	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	15.6	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	8.9	Pass
Peak Impactor Acceleration		G's	14 to 18	16.0	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
36.1	21.5	0.0	-1.4
Middle Thorax Deflection			
Max	Time	Min	Time
41.5	22.2	0.0	-2.8
Lower Thorax Deflection			
Max	Time	Min	Time
38.0	22.8	0.0	-18.8



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.6	17.8	-6.2	53.5
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
8.9	16.6	-4.3	49.8



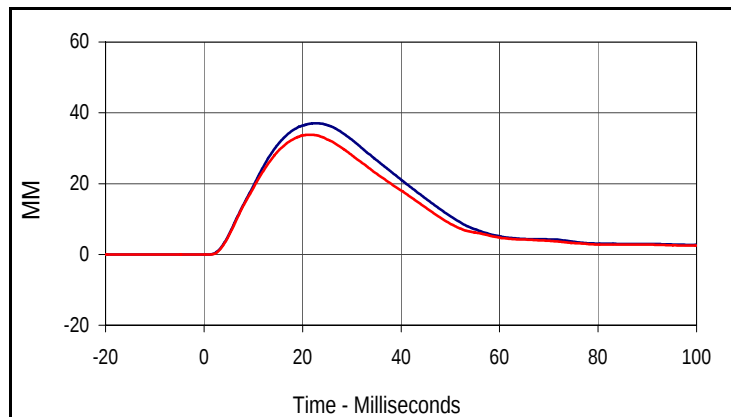
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.0	20.2	-0.4	59.1

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

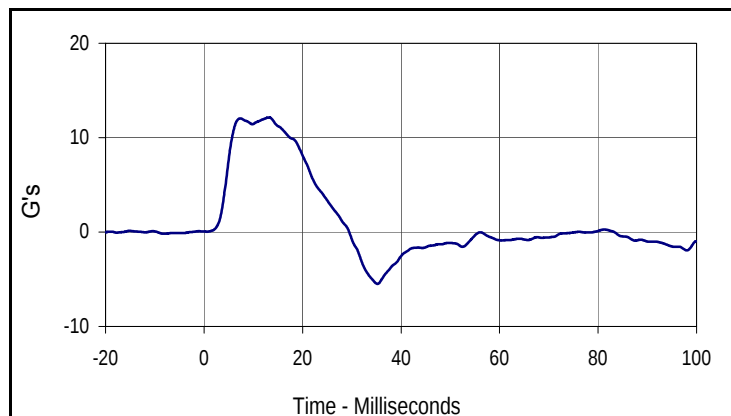
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 Test I.D.: 299ABD046



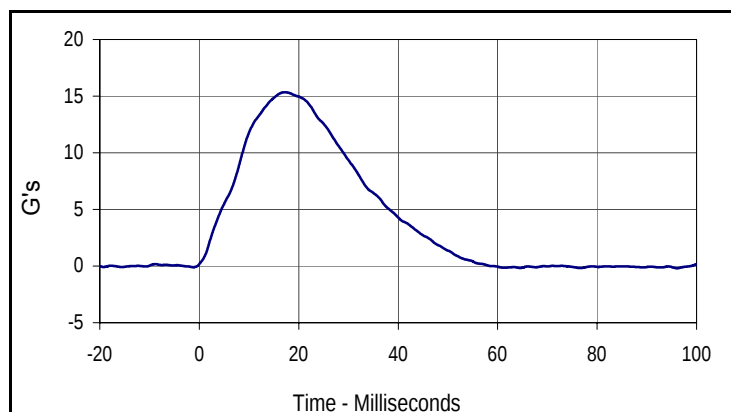
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	450	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.6	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.0	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	33.8	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
37.0	22.9	0.0	-19.7
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
33.8	21.5	0.0	-14.2



Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
12.1	13.2	-5.5	35.2



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.3	17.2	-0.2	96.1

MD0501 POST TEST

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>
45950		9/20/2011	8:08 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
N/A		SIDIIs	

Current Date : 9/20/2011

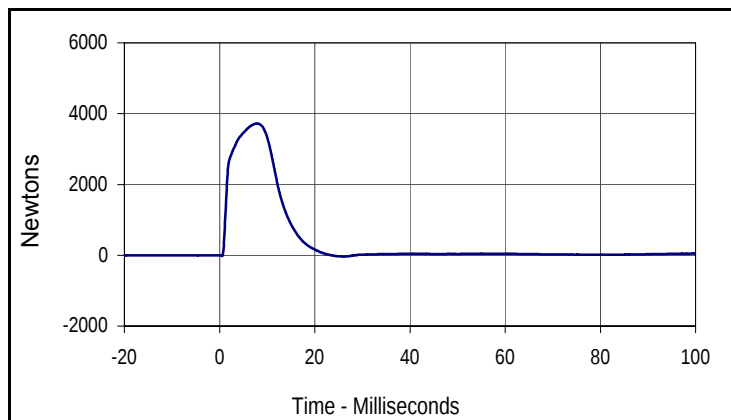
Current Time : 20:08:56

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

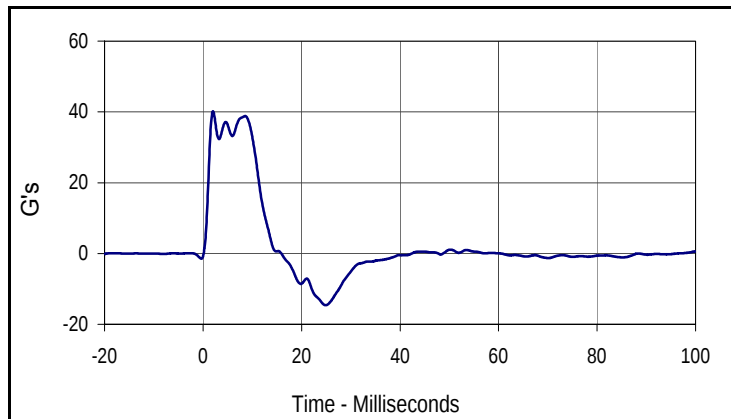
Test Date: 9/28/12
 Test I.D.: 299ACET046



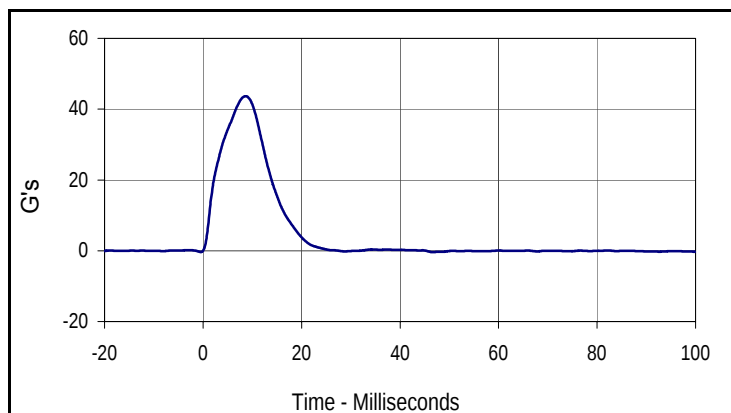
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	495	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.4	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3724.1	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	38.8	Pass
Peak Impactor Acceleration	G's	38 to 47	43.7	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3724.1	7.9	-39.0	26.1



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
40.2	2.0	-14.6	24.9



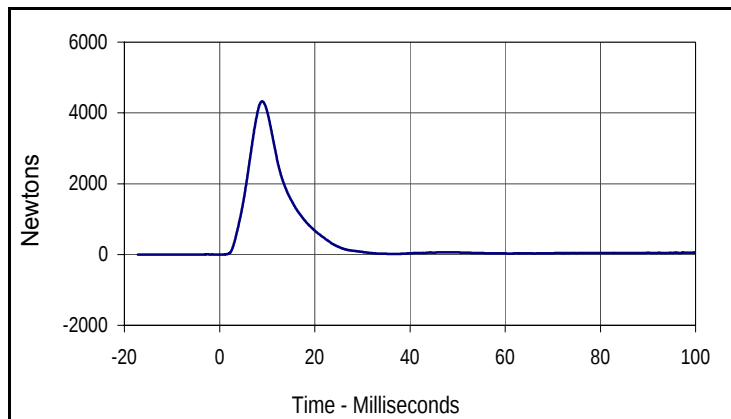
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
43.7	8.7	-0.4	46.6

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

Test Date: 9/28/12
 Test I.D.: 299PL046



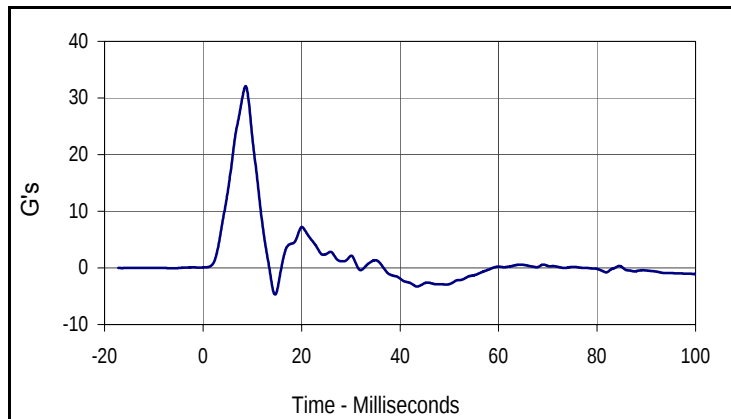
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	525	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.5	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Iliac Force	Newtons	4100 to 5100	4324.6	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	32.1	Pass
Peak Impactor Acceleration	G's	36 to 45	39.4	Pass
Overall Test Results			Pass	



Curve Description

Pelvis Iliac Force

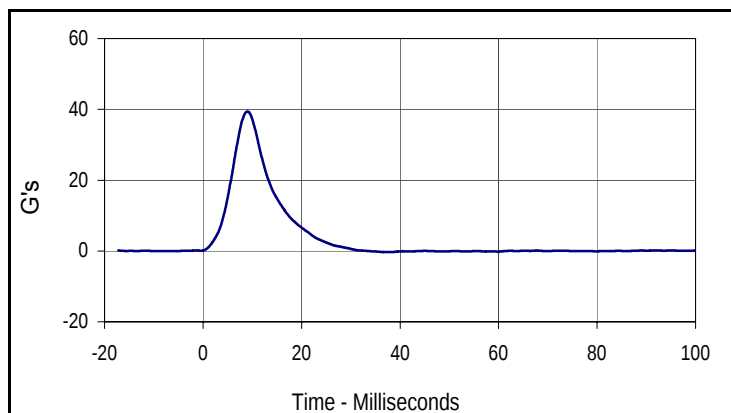
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4324.6	9.0	-3.4	-14.0



Curve Description

Pelvis Y Acceleration

Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
32.1	8.6	-4.7	14.6



Curve Description

Impactor Acceleration

Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.4	9.0	-0.3	37.1

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	6/25/12
			Y	P51929	Endevco	6/25/12
			Z	P51934	Endevco	6/25/12
Displacement Potentiometers	Shoulder		Y	1074	FTSS	6/26/12
	Thoracic Rib	Upper	Y	1143	FTSS	6/26/12
		Middle	Y	1160	FTSS	6/26/12
		Lower	Y	1213	FTSS	6/26/12
	Abdominal Rib	Upper	Y	1218	FTSS	6/26/12
		Lower	Y	1234	FTSS	6/26/12
Lower Spine Accelerometers (T12)			X	P63999	Endevco	6/25/12
			Y	P58872	Endevco	6/25/12
			Z	P58795	Endevco	6/25/12
Acetabulum Load Cell			Y	272	Denton	5/24/12
Iliac Wing Load Cell			Y	284	Denton	5/24/12
Pelvis Plug (Struck Side)				49171	FTSS	12/8/11
Pelvis Plug (Non-Struck Side)				46075	FTSS	9/21/12

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	Ketx5a	Endevco	8/20/12
Vehicle Center of Gravity	Y	Ketx5b	Endevco	8/20/12
Vehicle Center of Gravity	Z	Ketx5c	Endevco	8/20/12
Left Floor Sill	Y	12418	Endevco	2/14/12
A-Pillar Sill	Y	13319	Endevco	6/18/12
A-Pillar Low	Y	12913	Endevco	2/29/12
A-Pillar Mid	Y	12903	Endevco	1/11/12
B-Pillar Sill	Y	13339	Endevco	6/28/12
B-Pillar Low	Y	13000	Endevco	12/17/11
B-Pillar Mid	Y	13372	Endevco	6/26/12
Driver Seat	Y	BY98H	Endevco	4/16/12
Engine Top	X	13381	Endevco	7/9/12
Engine Top	Y	13373	Endevco	6/26/12
Firewall	Y	13378	Endevco	6/26/12
Right Roof	Y	12458	Endevco	4/2/12
Right Floor Sill	Y	13329	Endevco	6/18/12
Rear Floorpan	X	13330	Endevco	6/18/12
Rear Floorpan	Y	13320	Endevco	6/18/12

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