

REPORT NUMBER: SPNCAP-KAR-11-031

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

**KIA MOTORS CORPORATION
2011 KIA SOUL PLUS 5-DOOR MPV**

NHTSA No: MB0515

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



OCTOBER 19, 2010

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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15. Supplementary Notes																						
16. Abstract A 32.2 km/h (20 mph) 75° oblique impact Side NCAP test was conducted on the subject 2011 Kia Soul Plus 5-Door MPV in accordance with the specifications of the Office of Crashworthiness 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 October 19, 2010. The impact velocity was 31.77 km/h and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.1° C. The test vehicle's post-test maximum crush was 460 mm at level 3. The test vehicle's performance was as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Passenger ATD</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>316.7</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>49</td> </tr> <tr> <td>Combined Acetabulum and Iliac Pelvic Force</td> <td>N</td> <td>5525</td> <td>3933</td> </tr> </tbody> </table> The two doors on the struck side of the vehicle did not separate from the vehicle at the hinges or latches. The opposite side doors did not open during the impact event.				Measurement Description	Passenger ATD			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	316.7	Resultant Lower Spine Acceleration	G	82	49	Combined Acetabulum and Iliac Pelvic Force	N	5525	3933
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	Units	Threshold	Result																			
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Combined Acetabulum and Iliac Pelvic Force	N	5525	3933																			
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. Technical Reference Division 1200 New Jersey Ave., SE Washington, DC 20590																				
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2011 Kia Soul Plus 5-Door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated January 25, 2010.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2011 Kia Soul Plus 5-Door MPV. The subject vehicle was towed into the rigid pole at an angle of 75.3° and a velocity of 31.77 km/h. The test was conducted by KARCO Engineering, LLC. in Adelanto, California, on October 19, 2010. Pre-test 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 January 25, 2010. Camera location and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented as follows:

- Head CG Triaxial Accelerometers
- Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
- Abdomen Upper and Lower Rib Displacement Potentiometers
- Lower Spine Triaxial Accelerometers
- Illiic 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.

The following table summarizes the results of the test:

Dummy	HIC (36ms)	Resultant Lower Spine Acceleration	Pelvic Force (N)	
SID-IIs 5th Percentile Adult Female	317	49	Iliac Wing	1233
			Acetabulur	2893
			Sum	3933

SUPPLEMENTAL RESTRAINT INFORMATION

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 (Torso/Pelvis)	Yes	Yes	No	
Side Airbag 2 (Curtain)	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other				

GENERAL COMMENTS

Both of the struck side doors of the test vehicle remained closed and latched and were jammed shut after the impact. There was no separation at the hinges or the latches. The non-struck side doors remained closed and latched. There were no driver injury values that exceeded their limits. There was no FMVSS 301 Stoddard solvent spillage as a result of the impact.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole Test Date: 10/19/10

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	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(t_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMATER DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole Test Date: 10/19/10

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MB0515
Model Year	2011
Make	Kia
Model	Soul Plus
Body Style	5-Door MPV
VIN	KNDJT2A28B7199638
Body Color	Molten
Delivery Date	9/14/2010
Odometer Reading (km / mi)	196/122
Dealer	Car Pros Kia
Transmission	5-Speed Manual
Final Drive	Front
Type / No. of Cylinders	Inline 4
Engine Displacement (L)	2.0
Engine Placement	Transverse
Roof Rack	No
Sunroof / T-Top	No
Tinted Glass	Yes
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
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. Toso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Pretensioners	Yes
Load Limiters	Yes
Automatic Door Locks	Yes
Bucket Seats	Yes
Tilt Steering	Yes
Other	
Other	

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

☐

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motors Corporation
Date of Manufacture	Jun-10

GVWR (kg)	3836
GAWR Front (kg)	2161
GAWR Rear (kg)	2138

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				385.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				44.8

A

B

A-B

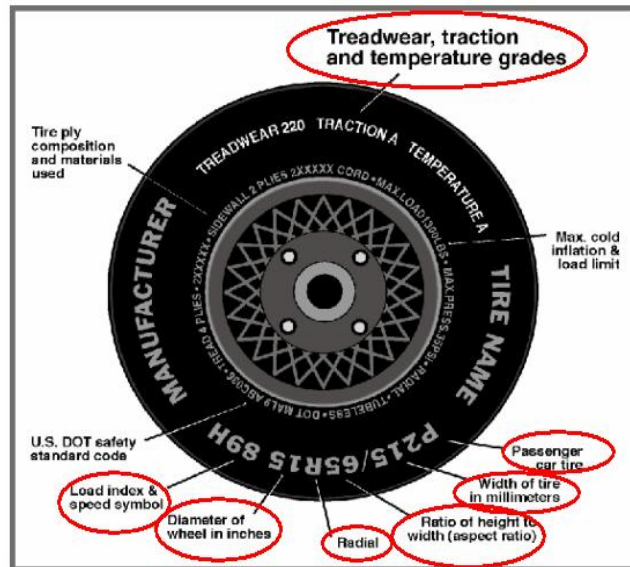
VEHICLE SEAT TYPE

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

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMATER DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole Test Date: 10/19/10



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kpa)	230	230
Recommended Tire Size	P205/55R16	P205/55R16
Tire Size on Vehicle	P205/55R16	P205/55R16
Tire Model	Optimo	Optimo
Tire Manufacturer	Hankook	Hankook
Treadwear	440	440
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	H426	H426
Tire Material	Steel, Polyester, Nylon	Steel, Polyester, Nylon
DOT Safety Code Right	5MBC DLH	5MBC DLH
DOT Safety Code Left	5MBC DLH	5MBC DLH

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMATER DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole Test Date: 10/19/10

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	395.0	246.5		419.0	275.5		412.5	290.0	
Right	kg	387.5	248.0		402.5	267.5		393.5	274.0	
Ratio	%	61.3%	38.7%	100.0%	60.2%	39.8%	100.0%	58.8%	41.2%	100.0%
Total	kg	782.5	494.5	1277.0	821.5	543.0	1364.5	806.0	564.0	1370.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1277.0	A
Actual Weight of 1 P572V ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	44.8	C
Calculated Vehicle Target Wt (TVTW)	kg	1370.8	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	As Delivered	As Tested	Fully Loaded
Driver Door Sill Angle (front-to-rear)	Deg	0.8	1.0	1.2
Front Passenger Sill Angle (front-to-rear)	Deg	-2.2	-1.8	-1.6
Front Bumper Angle (left-to-right)	Deg	-1.3	-1.4	-1.4
Rear Bumper Angle (left-to-right)	Deg	1.6	1.4	1.4
Vehicle CG (Aft of Front Axle)	mm	988	1015	1050
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	4	14	20

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Weight of Ballast in Cargo Area	kg	47.1
Weight of Vehicle Components Removed	kg	49.0

Vehicle components removed to make Target Vehicle Test Weight:

Spare tire and tools (17.0 kg), Non-struck side door panels (5.0 kg), Non-struck side windows (5.0 kg), Trunk liner (1.0 kg), Tail lights (4.0 kg), Speakers (1.0 kg), Non-struck side mirror (1.5 kg), Rear bumper and cover (13.5 kg), Rear wiper and motor (1.0 kg)

TEST VEHICLE IMPACT POINT DATA

Measurement Description	Units	Value
Vertical Impact Reference Line (Aft of Front Axle)	mm	1043
Actual Impact Point (Aft of Front Axle)	mm	1035
Impact Point Difference (- forward/+ rearward)	mm	-8

DATA SHEET NO. 2

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

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV

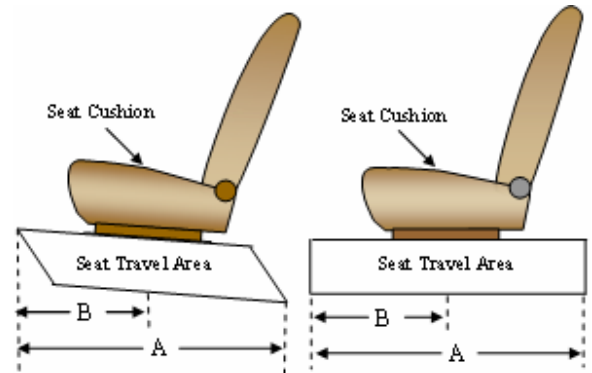
NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole

Test Date: 10/19/10

SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rearmost possible position with the seat set at mid angle and lowest height. The driver's seat is set to the forward most position where the ATD will not contact any interior panels at the mid angle and mid height positions.

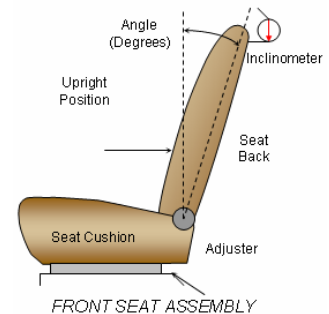


SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position	Cushion Range	Placed in Position
Driver Seat	197 mm	0 mm	7.9 - 13.4	10.7
Front Passenger Seat	192 mm	0 mm	Fixed	Fixed
Rear Seat - Struck Side	Fixed	Fixed	Fixed	Fixed
Rear Seat - Non-Struck Side	Fixed	Fixed	Fixed	Fixed

SEAT BACK ANGLE POSITIONING

The procedure for the driver is as follows: the seat back is set to level the driver ATD's (SID-IIs) head transverse instrumentation platform; seat back angle is measured at the headrest post using a digital inclinometer.



SEAT BACK ANGLE POSITIONS

Seating Position	Degrees	Detent
Driver Seat Back Angle w/Seated Dummy	7.6	
Front Passenger Seat Back Angle	7.6	
Struck Side Rear Seat Back Angle	Fixed	Fixed
Non-Struck Side Rear Seat Back Angle	Fixed	Fixed

SEAT BELT UPPER ANCHORAGE POSITIONING

The seat belt upper anchorage is positioned to the manufacturer's design position for a 5th percentile adult female ATD. Position zero (0) is the uppermost position.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	4	3

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV

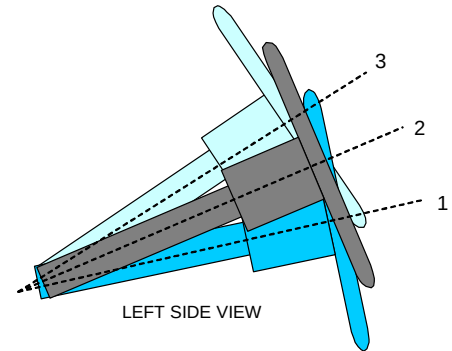
NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole

Test Date: 10/19/10

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. A digital inclinometer is used to measure a plate placed across the rim of the steering wheel for angle.



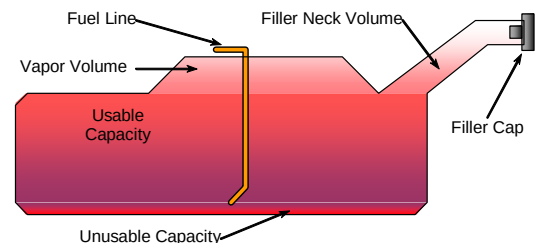
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Angle (°)	Fore-Aft Position (mm)
Lowermost Position, No. 1	24.8	
Geometric Center Position, No. 2	27.1	
Uppermost Position, No. 3	29.4	
Steering Wheel Travel	4.6	
Test Position	27.1	

FUEL PUMP

The test vehicle is equipped with an electric fuel pump. The fuel pump operates when the vehicle is running. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



VEHICLE FUEL TANK ASSEMBLY

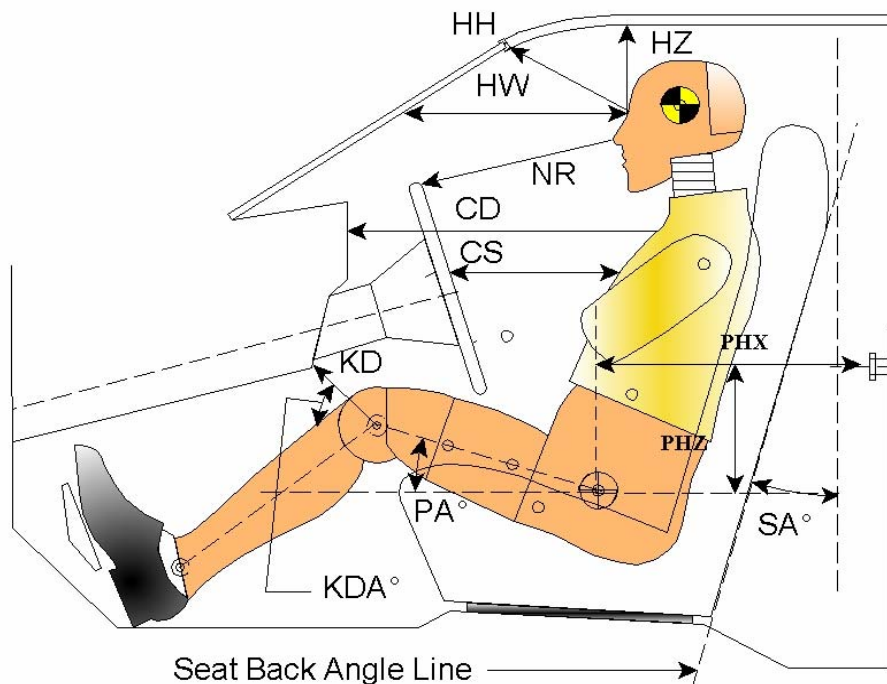
FUEL CAPACITY DATA

Description	Liters
Usable Capacity of "Standard Tank"	47.99
Usable Capacity of "Optional Tank"	
Usable Capacity of Standard Tank as Specified In Owner's Manual	
Usable Capacity of Optional Tank as Specified in Owner's Manual	
92 - 94% of Usable Capacity	44.15 to 45.11
Actual Amount of Stoddard Solvent Used	44.63
1/3 of Usable Capacity	16.00

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test Date: 10/19/10



DUMMY LONGITUDINAL CLEARANCE DIMENSIONS (S/N: 307)

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	311	43.3
HW	Head to Windshield	584	0.0
HZ	Head to Roof	245	90.0
NR	Nose to Rim	265	14.6
CD	Chest to Dash	405	11.3
CS	Chest to Steering Wheel	200	23.7
KDL / KDAL°	Left Knee to Dash	128	23.4
KDR / KDAR°	Right Knee to Dash	103	48.7
PA°	Pelvic Angle		17.7
PHX	H-Point to Striker (x-direction)	352	
PHZ	H-Point to Striker (z-direction)	108	
SA°	Seat Back Angle		7.6

DATA SHEET NO. 4

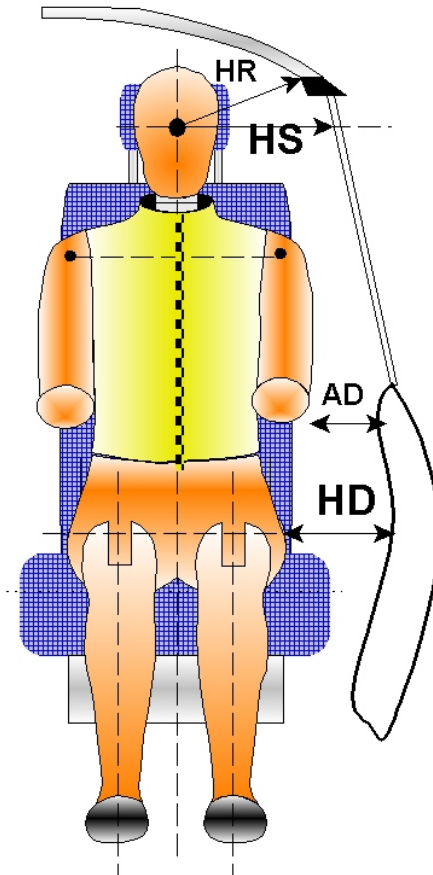
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV

NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole

Test Date: 10/19/10



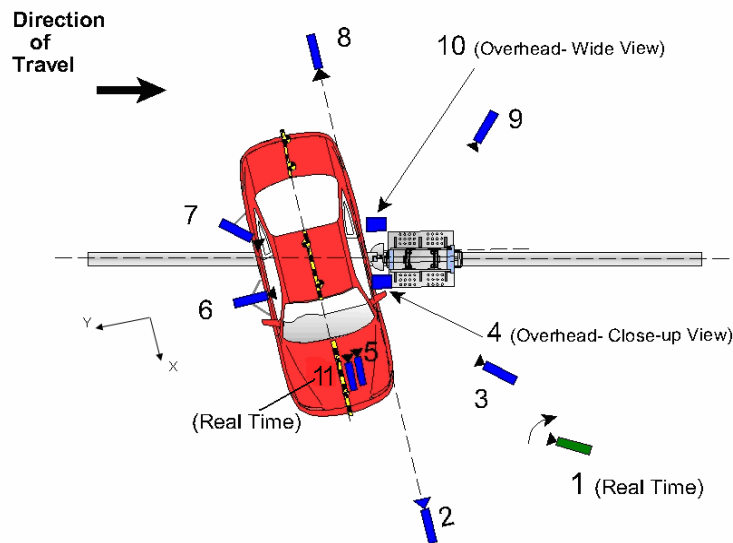
DUMMY LATERAL CLEARANCE DIMENSIONS (S/N: 307)

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	311
HS	Head to Side Window	mm	353
AD	Arm to Door	mm	158
HD	H-Point to Door	mm	205

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test Date: 10/19/10



CAMERA LOCATIONS

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	1.16	0.48	-1.32	35	400
6	On-Board - Dummy Side View	0.03	1.40	-1.11	14	1000
7	On-Board - Dummy Rear Oblique View	-0.89	1.47	-1.21	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	1.24	0.50	-1.35		30

Reference: +X = Forward of Vehicle
 +Y = Right of Vehicle
 +Z = Down

* All Measurements accurate to ± 6 mm

NOTE: Vehicle was at a 15° angle to the rigid pole

INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Vehicle Structure	21
Pole Load Cells	8
Contact Switches	3
Airbag Timing Sensor	2
Total No. of Data Channels	50

DATA SHEET NO. 6

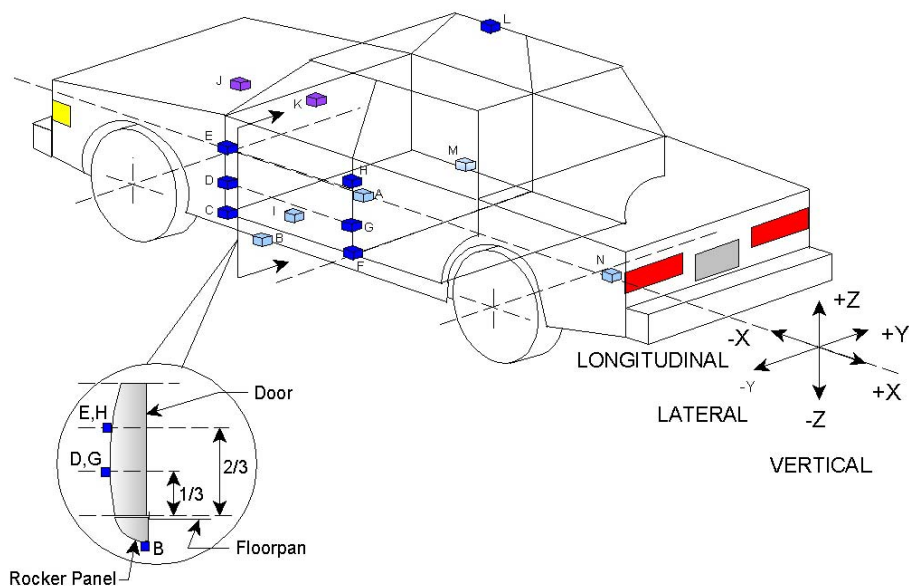
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV

NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole

Test Date: 10/19/10



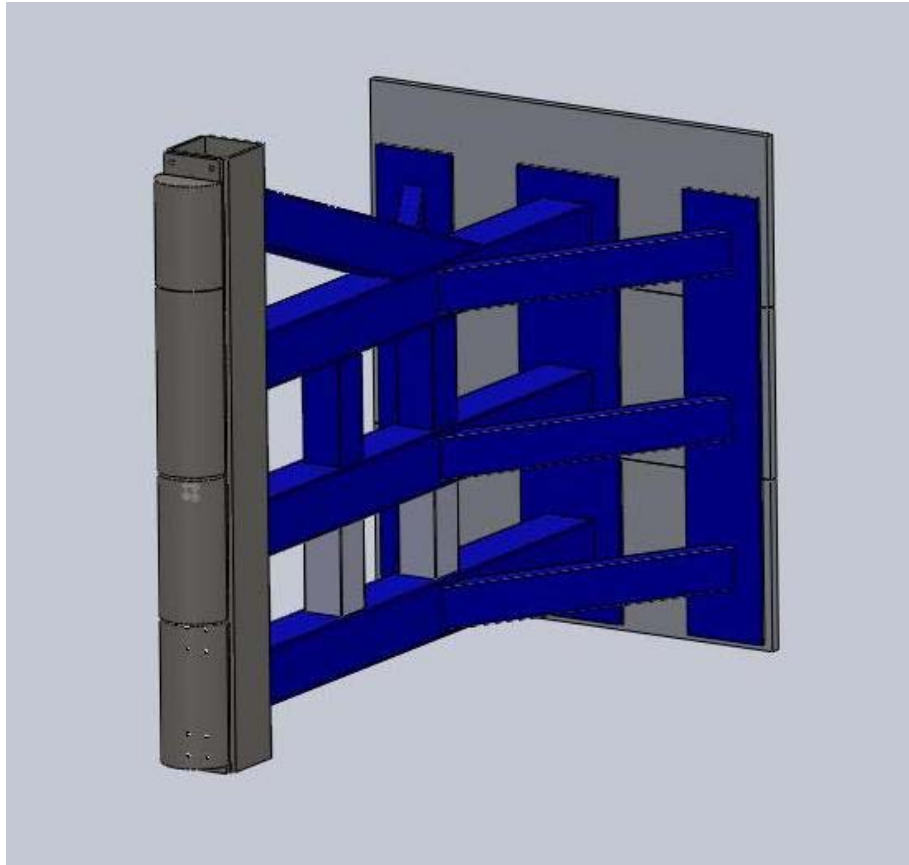
VEHICLE ACCELEROMETER LOCATIONS

	Sensor Description	Coordinates (mm)		
		X	Y	Z
A	Vehicle CG Accelerometer	1655	0	402
	Vehicle CG ARS	1655	0	402
B	Left Floor Sill	2365	705	224
C	A-Pillar Sill	2730	803	442
D	A-Pillar Lower	2730	796	675
E	A-Pillar Mid	2730	796	863
F	B-Pillar Sill	1688	715	425
G	B-Pillar Lower	1705	715	692
H	B-Pillar Mid	1705	715	909
I	Driver Seat	1968	549	435
J	Engine Top	3341	-45	858
K	Firewall	3056	8	870
L	Right Roof Sill	1810	520	1585
M	Right Floor Sill	1675	715	432
N	Rear Floorpan	664	295	537

Reference: +X = Forward
 • +Y = To Right
 • +Z = Down

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test Date: 10/19/10



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: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole Test Date: 10/19/10

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver Dummy
Dummy Type/Serial No.	P572V (SID-IIs) / Serial No. 299
Head Contact	Curtain Airbag, Headrest, Seat Back
Upper Torso Contact	Torso/Pelvis Airbag
Lower Torso Contact	Torso/Pelvis Airbag
Left Knee Contact	Door Panel, Knee Bolster, Right Knee
Right Knee Contact	Left knee

POST-TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Jammed shut	Jammed shut
Right Side Door Opening	Remained closed and operational	Remained closed and operational
Seat Movement	None	None
Seatback Failure	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation occurred
Sill Separation	No separation occurred
Windshield Damage	Broken
Window Damage	Left front window broken
Other Notable Effects	Front right roof skin separation

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

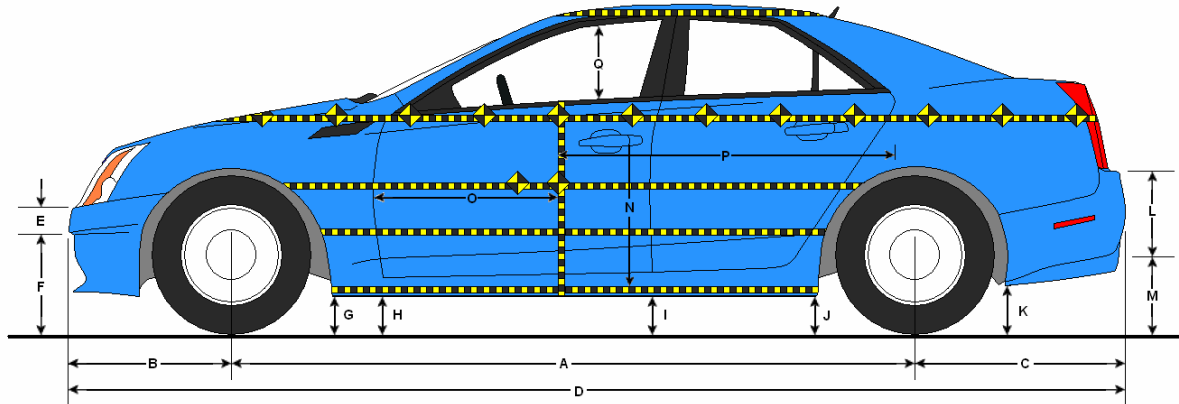
VEHICLE SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset From Vertical Reference Line	mm	+/- 38	-8 (Left)
Trap No. 1 Velocity (Primary)	km/h	30.4 to 33.0	31.8
Trap No. 2 Velocity (Redundant)	km/h	30.4 to 33.0	31.7

DATA SHEET NO. 9

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole Test Date: 10/19/10



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2551	2465	-86
B	Front Axle to FSOV	832	847	15
C	Rear Axle to RSOV	617	635	18
D1	Total Vehicle Length at Left Side	2875	2739	-136
D2	Total Vehicle Length at Centerline	3880	3947	67
D3	Total Vehicle Length at Right Side	2872	2891	19
E	Front Bumper Thickness	224	221	-3
F	Front Bumper Bottom to Ground	362	415	53
G	Sill Height at Front Wheel Well	253	274	21
H	Sill Height at Front Door Leading Edge	259	281	22
I	Sill Height at B-Pillar	268	316	48
J1	Sill Height at Rear Wheel Well	278	344	66
J2	Pinch Weld Height at Rear Wheel Well	220	279	59
K	Sill Aft of Rear Wheel Well	470	534	64
L	Rear Bumper Thickness	218	218	0
M	Rear Bumper Bottom to Ground	461	518	57
N	Sill Height to Window Bottom Sill	664	723	59
O	Front Door Leading Edge to Impact CL	609	480	-129
P	Rear Door Trailing Edge to Impact CL	1412	1283	-129
Q	Front Window Opening	427	456	29
R	Right Side Length	2872	2891	19
S	Left Side Length	2875	2739	-136
T	Vehicle Width at B-Pillar	1742	1601	-141

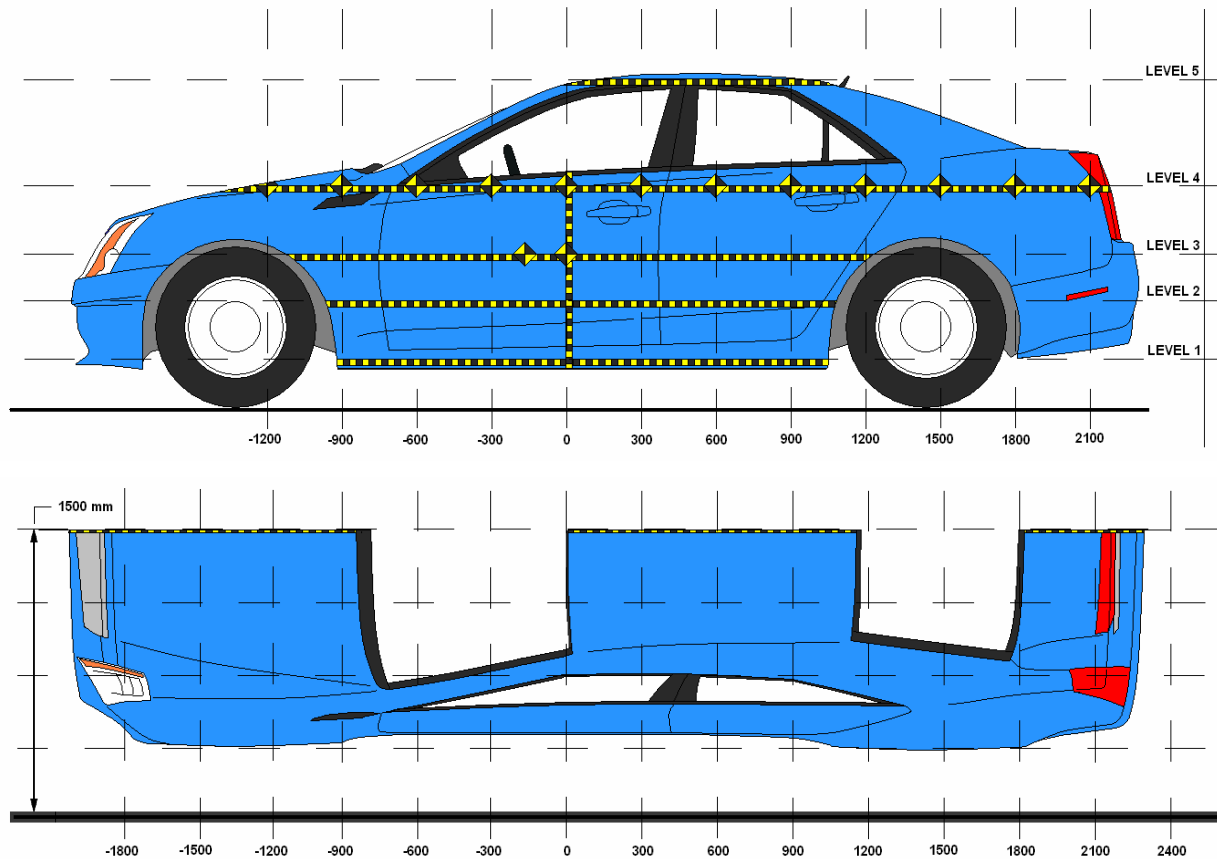
All measurements in (mm) with tolerance of ± 3 mm

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test Date: 10/19/10



NOTE: All measurements are in millimeters (mm)

Level	Description	Height Above Ground (mm)
1	Sill Top Height	304
2	Occupant H-Point Height	661
3	Mid-Door Height	702
4	Window Sill Height	1018
5	Window Top Height	1534

DATA SHEET NO. 10 ... (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV

NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75°Rigid Pole

Test Date: 10/19/10

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900		603	606	762			673	678	823			70	72	61	
-750		615	620	735			691	694	807			76	74	72	
-600	672	650	650	719		753	740	742	802		81	90	92	83	
-450	684	649	647	708		860	817	819	831		176	168	172	123	
-300	681	646	644	699		934	903	903	911		253	257	259	212	
-150	678	644	642	691		1017	1011	1010	1009		339	367	368	318	
0	677	642	640	684	894	1090	1097	1100	1102	1121	413	455	460	418	227
150	675	641	638	678	882	1027	1044	1044	1062	1054	352	403	406	384	172
300	675	640	637	673	878	940	930	929	945	1002	265	290	292	272	124
450	675	641	638	669	875	878	827	822	850	969	203	186	184	181	94
600	677	641	639	668	873	829	796	792	809	949	152	155	153	141	76
750	680	642	640	667	870	788	764	762	781	937	108	122	122	114	67
900	685	643	642	667	868	752	734	733	755	928	67	91	91	88	60
1050	678	641	643	669	868	708	699	705	730	922	30	58	62	61	54
1200		610	613	673	867		637	643	706	917		27	30	33	50
1350		604	604	678	867		645	600	684	908		41	-4	6	41
1500			602	686	867			636	718	900			34	32	33
1650			604	699	870			629	724	912			25	25	42
1800				723					742					19	
1950															
2100															
2250															
2400															
2550															
2700															
2850															

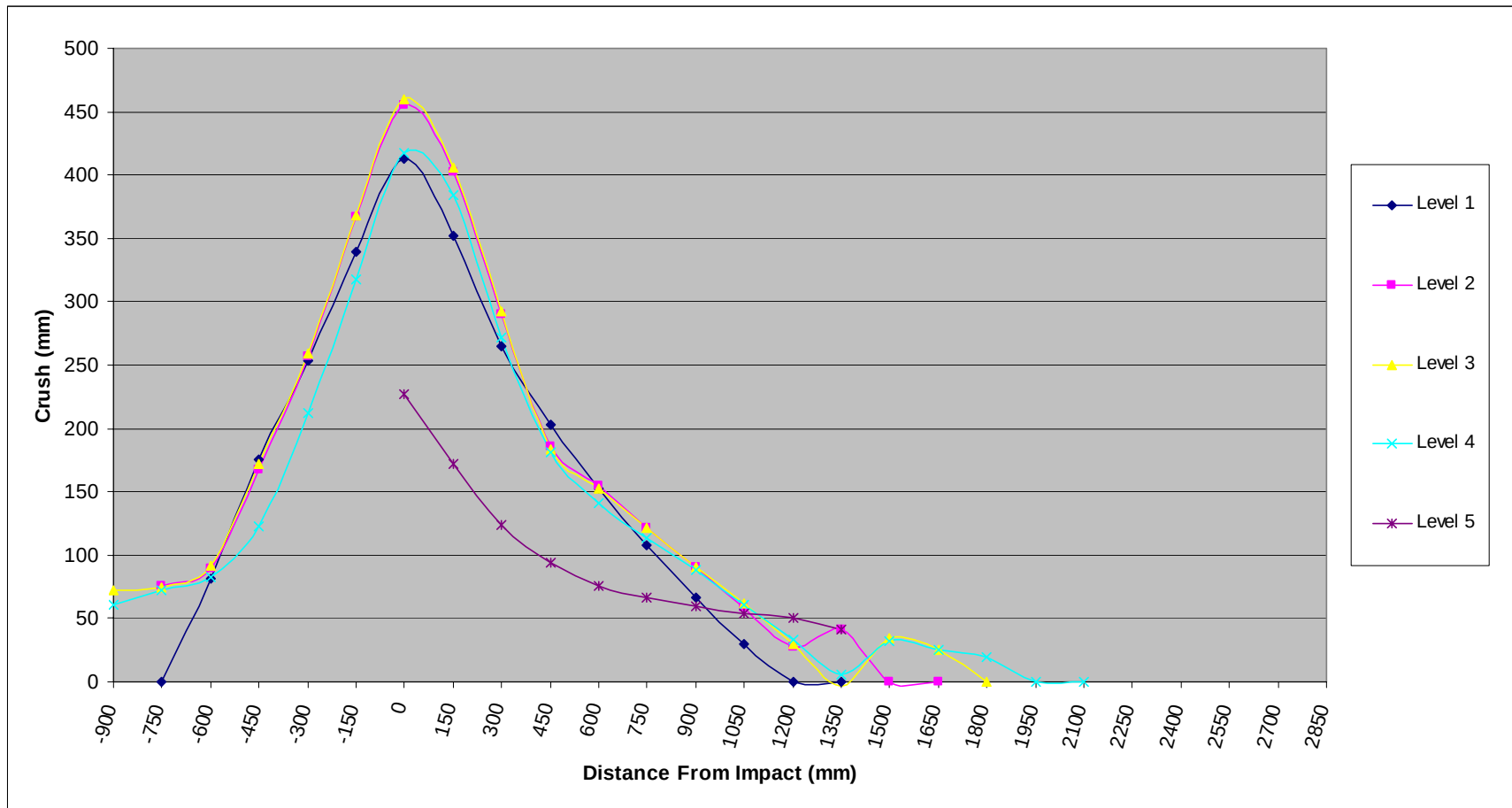
MAXIMUM CRUSH DATA

	Units	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush	mm	413	455	460	418	227
Distance From Impact	mm	0	0	0	0	0

DATA SHEET NO. 10 ... (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV
Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole

NHTSA No. MB0515
Test Date: 10/19/10



DATA SHEET NO. 11

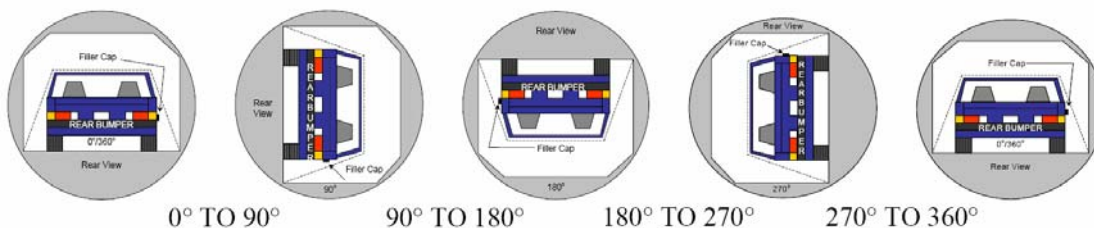
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV NHTSA No. MB0515
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test Date: 10/19/10

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.1° C Test Time: 1:13 PM

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
 (Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
 (Maximum allowable = 1 oz./minute)
- D. Spillage Details: No spillage occurred



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	82	305	387
90° To 180°	82	300	382
180° To 270°	78	300	378
270° To 360°	77	300	377

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 12

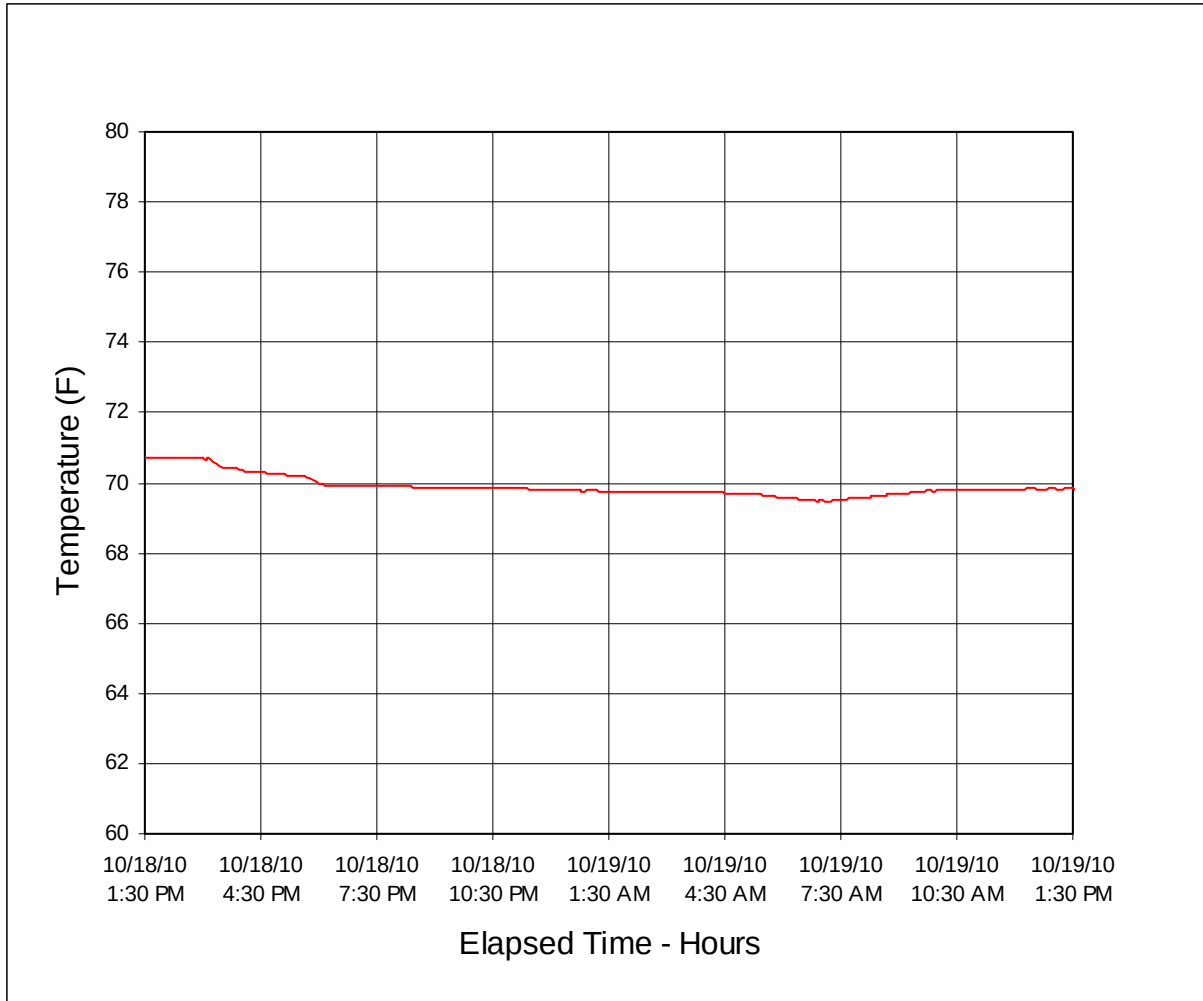
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV

NHTSA No. MB0515

Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole

Test Date: 10/19/10



APPENDIX A
PHOTOGRAPHS

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FIGURE 1. As-Delivered Right Front Three-Quarter View of Test Vehicle



FIGURE 2. As-Delivered Left Rear Three-Quarter 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 Three-Quarter View of Test Vehicle



FIGURE 6. Post-Test Left Front Three-Quarter 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 Three-Quarter View of Test Vehicle



FIGURE 10. Post-Test Left Rear Three-Quarter 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 Vehicle and Pole

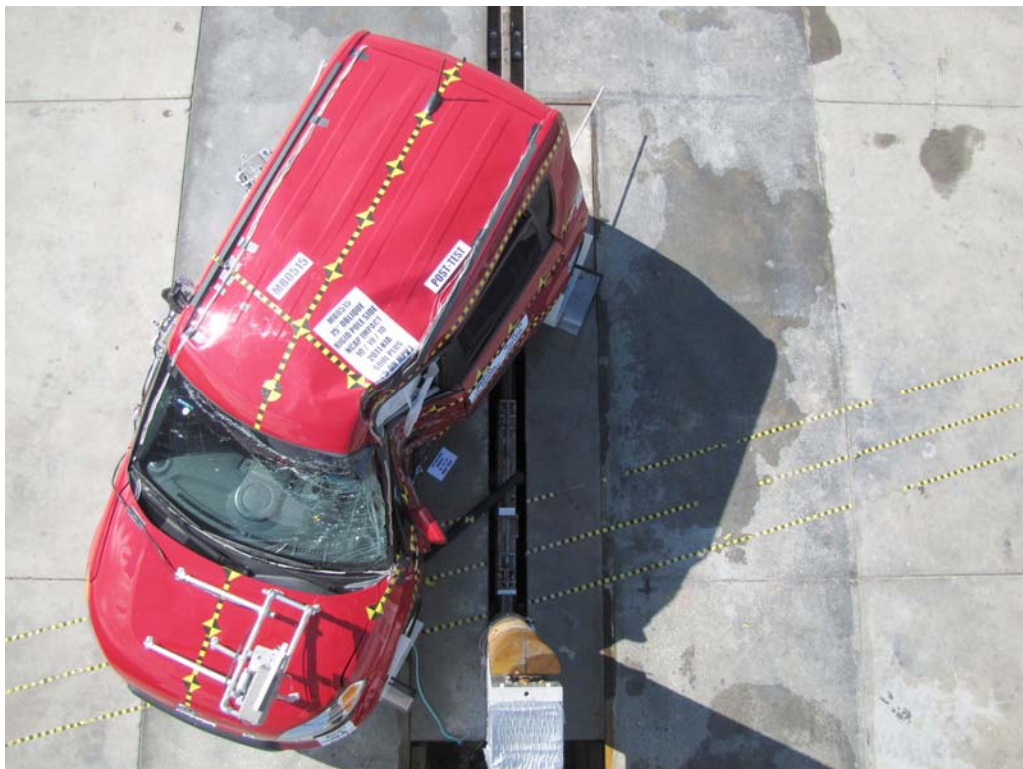


FIGURE 16. Post-Test Overhead View of Test Vehicle and Pole



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



FIGURE 18. Pre-Test Right Side View of Pole
Positioned Against Side of Vehicle at Ideal Impact Point



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



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 Driver Door Top View



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

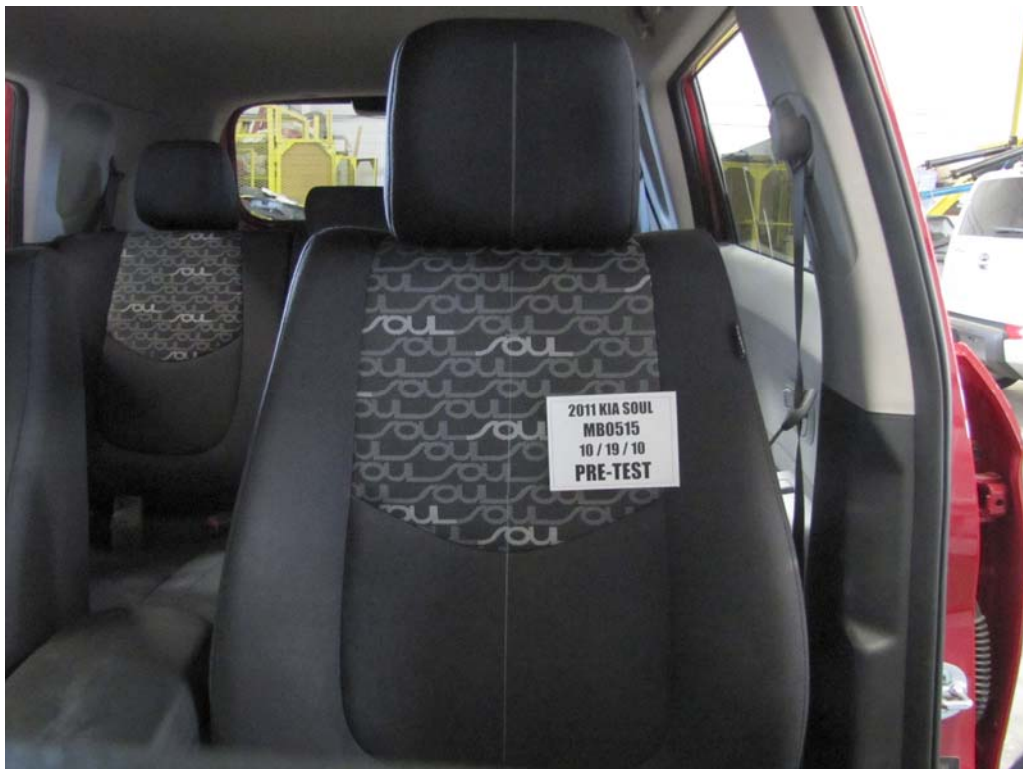


FIGURE 26. Pre-Test Frontal View of Seat Back Prior to Dummy



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



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



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



FIGURE 30. Pre-Test 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 Parking Brake



FIGURE 36. Pre-Test Close-Up Left Side View of Driver Seat Track



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



FIGURE 38. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 39. Pre-Test Driver Dummy and Door Clearance



FIGURE 40. Post-Test Driver Dummy and Door Clearance



FIGURE 41. Pre-Test Right Side View of Dummy and Front Seat Occupant Compartment



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



FIGURE 43. Pre-Test Inner Driver Door Panel View



FIGURE 44. Post-Test Inner Driver Door Panel View
Showing Dummy Contact Locations



FIGURE 45. Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



FIGURE 46. Post-Test Dummy Close-Up Head Contact with Side Airbag View

Photograph Not Applicable

No Dummy Torso Contact
with Vehicle Interior

FIGURE 47. Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



FIGURE 48. Post-Test Dummy Close-Up Torso Contact with Side Airbag View

Photograph Not Applicable

No Dummy Pelvis Contact with Vehicle Interior

FIGURE 49. Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



FIGURE 50. Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



FIGURE 51. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 52. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 53. Close-Up View of Vehicle's Certification Label



FIGURE 54. Close-Up View of Vehicle's Tire Information Placard



FIGURE 55. Pre-Test Pole Barrier Front View



FIGURE 56. Post-Test Pole Barrier Front View



FIGURE 57. Pre-Test Pole Barrier Side View



FIGURE 58. Post-Test Pole Barrier Side View



FIGURE 59. Pre-Test Ballast View



FIGURE 60. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 61. FMVSS No. 301-305 Rollover 0 Degrees



FIGURE 62. FMVSS No. 301-305 Rollover 90 Degrees



FIGURE 63. FMVSS No. 301-305 Rollover 180 Degrees



FIGURE 64. FMVSS No. 301-305 Rollover 270 Degrees



FIGURE 65. FMVSS No. 301-305 Rollover 360 Degrees



FIGURE 66. Impact Event



FIGURE 67. Monroney Label

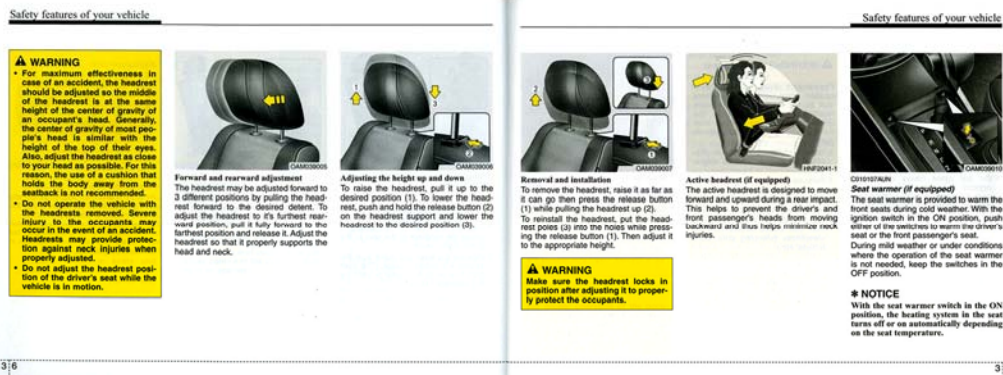


FIGURE 68. Head Restraint Use and Adjustment Information from Vehicle Manual

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

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3	Driver Head Acceleration(Z) Primary	B-1
4	Driver Head Resultant Primary	B-1
5	Driver Lower Spine T12 Acceleration (X)	B-2
6	Driver Lower Spine T12 Acceleration (Y)	B-2
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8	Driver Lower Spine Y12 Resultant Acceleration	B-2
9	Driver Iliac Wing Force on Impact Side (Y)	B-3
10	Driver Acetabulum Force on Impact Side (Y)	B-3
11	Driver Total Pelvis Force on Impact Side (Y)	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 (X) Redundant
 Driver Head Acceleration (Y) Redundant
 Driver Head Acceleration (Z) Redundant
 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)
 Driver Shoulder Contact Switch
 Driver Torso Contact Switch
 Driver Pelvis Contact Switch
 Center of Gravity Acceleration (X)
 Vehicle Center of Gravity Acceleration (Y)
 Vehicle Center of Gravity Acceleration (Z)
 Vehicle Center of Gravity Angular Rate About X (Roll)
 Vehicle Center of Gravity Angular Rate About Y (Pitch)
 Vehicle Center of Gravity Angular Rate About Z (Yaw)

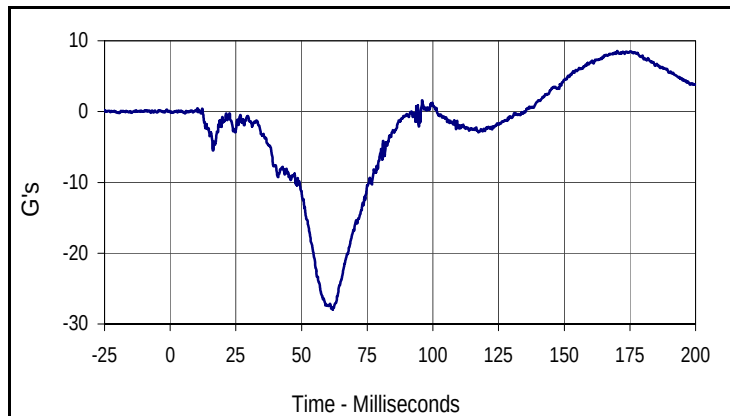
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy H-Point Acceleration (Y)
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)
Driver Side Airbag Timing
Driver Side Curtain Airbag Timing

Pole Instrumentation Data

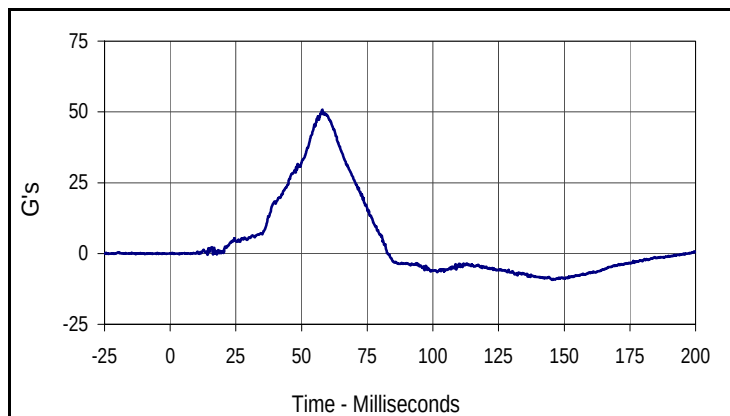
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

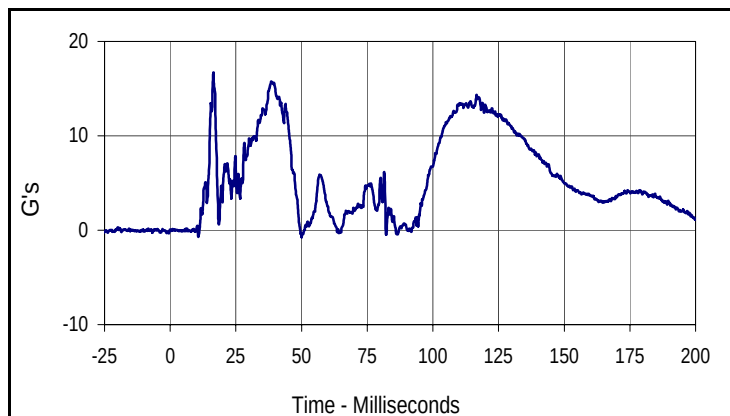
Test Date: 10/19/10
 NHTSA No.: MB0515



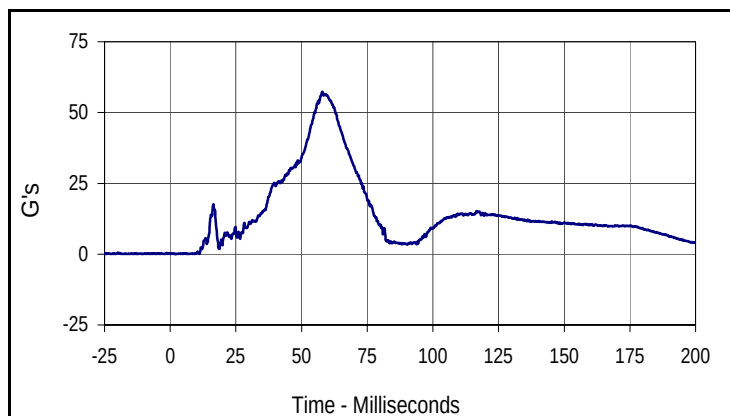
Curve Description			
Driver Head Acceleration X Primary			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
8.5	170.2	-28.0	61.9



Curve Description			
Driver Head Acceleration Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
50.8	57.9	-9.3	145.4



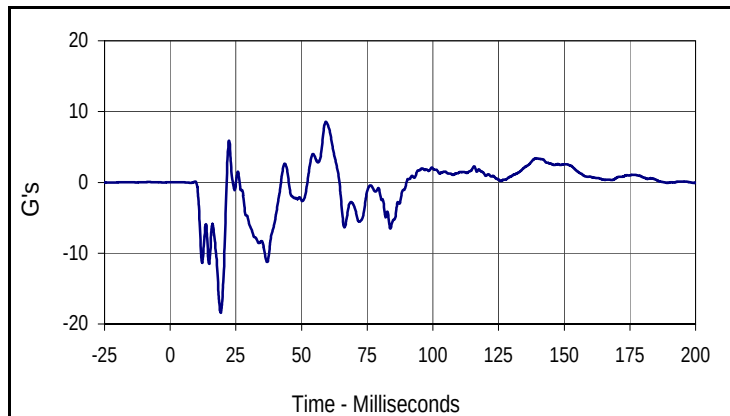
Curve Description			
Driver Head Acceleration Z Primary			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
16.7	16.4	-0.8	50.1



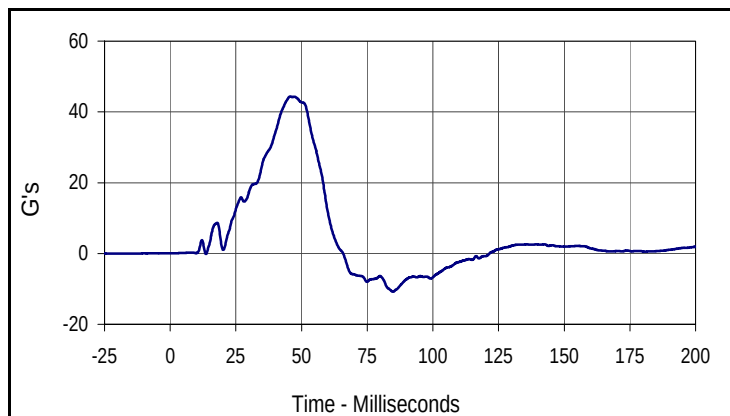
Curve Description			
Driver Head Acceleration Primary Res.			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
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Test Vehicle: 2011 Kia Soul Plus 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

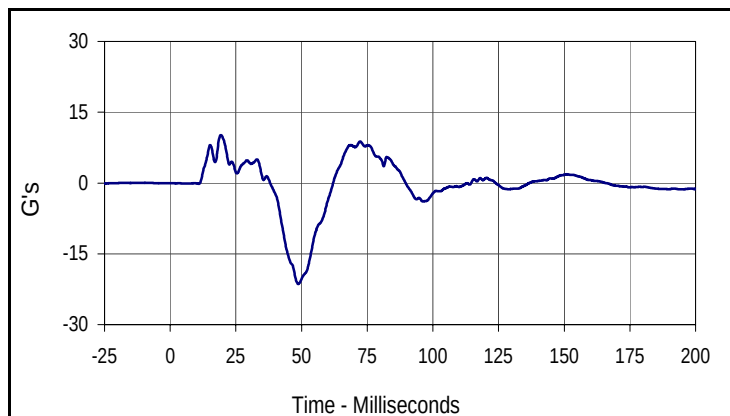
Test Date: 10/19/10
 NHTSA No.: MB0515



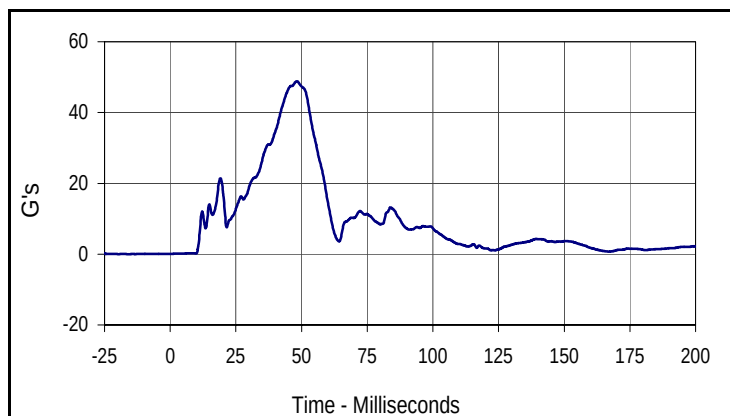
Curve Description			
Driver Lower Spine T12 Acceleration X			
CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
8.6	59.3	-18.4	19.2



Curve Description			
Driver Lower Spine T12 Acceleration Y			
CURNO	Type	SAE Class	Units
013	FIL	180	G's
Max	Time	Min	Time
44.3	45.7	-10.8	84.8



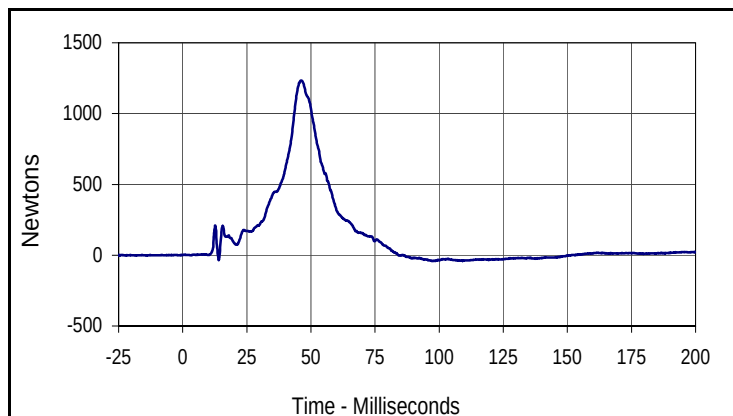
Curve Description			
Driver Lower Spine T12 Acceleration Z			
CURNO	Type	SAE Class	Units
014	FIL	180	G's
Max	Time	Min	Time
10.2	19.3	-21.4	48.8



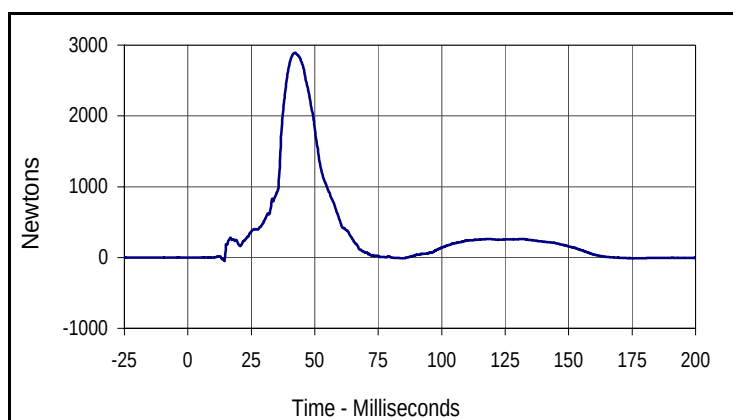
Curve Description			
Driver Lower Spine T12 Acceleration Res.			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
48.8	48.2	0.1	0.0

Test Vehicle: 2011 Kia Soul Plus 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

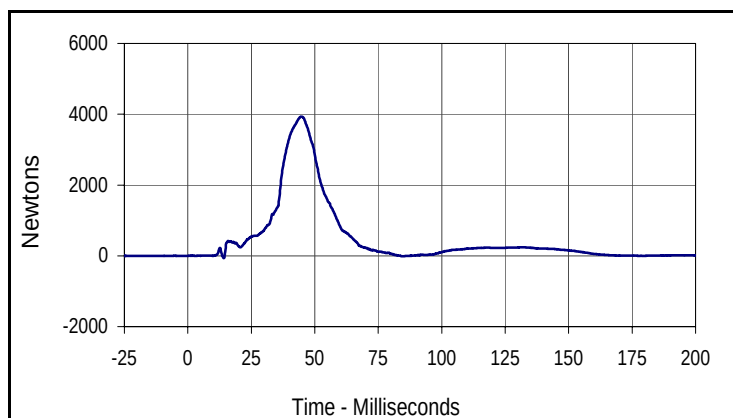
Test Date: 10/19/10
 NHTSA No.: MB0515



Curve Description			
Driver Iliac Wing Force on Impact Side Y			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
1233.5	46.1	-41.7	97.5



Curve Description			
Driver Acetabulum Force on Impact Side Y			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
2893.2	42.2	-50.2	14.4



Curve Description			
Driver Total Pelvic Force on Impact Side Y			
CURNO	Type	SAE Class	Units
015	SUM	600	Newtons
Max	Time	Min	Time
3932.7	44.9	-67.5	14.2

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

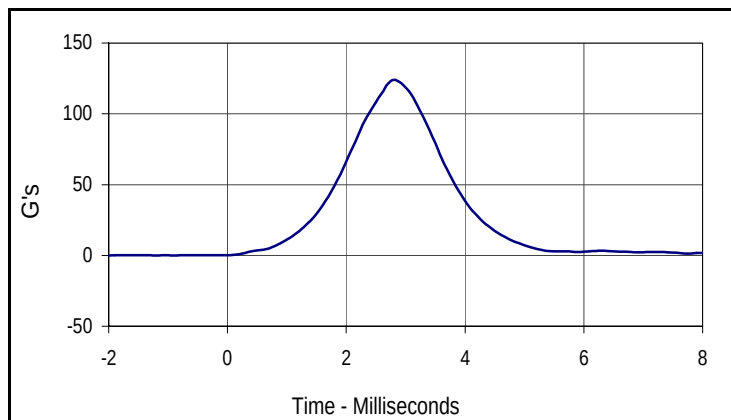
APPENDIX C
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

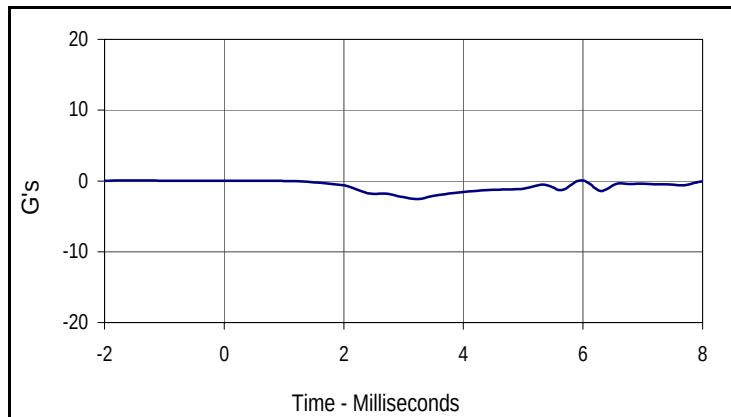
Test Date: 10/18/10
 Test I.D.: HDP10C



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	115 to 137	124.0	Pass
Peak Longitudinal Acceleration	G's	≤15	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	5.8	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
124.0	2.8	0.0	-2.0



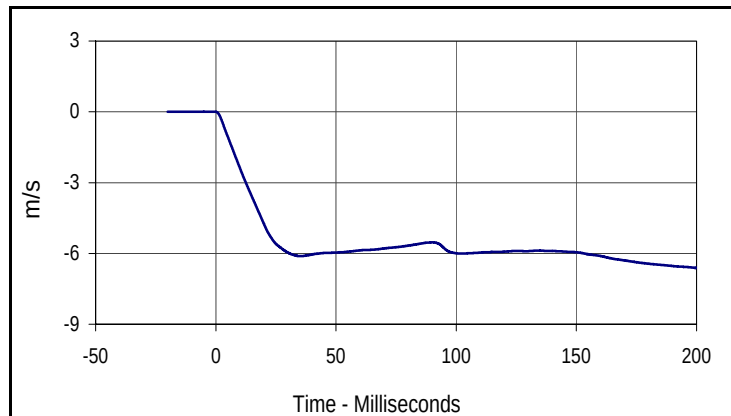
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.1	-1.5	-2.6	3.2

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

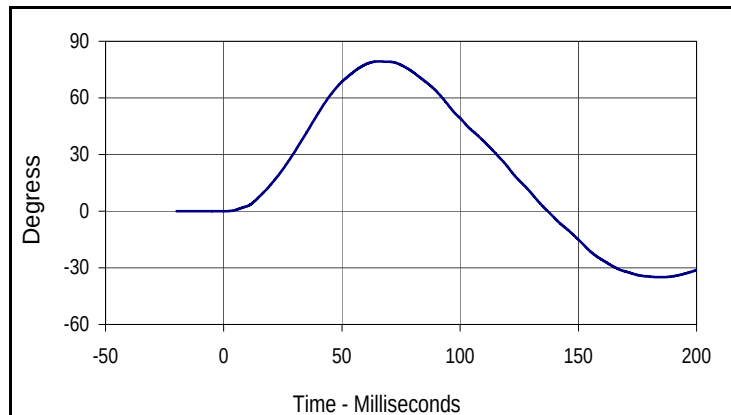
Test Date: 10/18/10
 Test I.D.: NBP10C



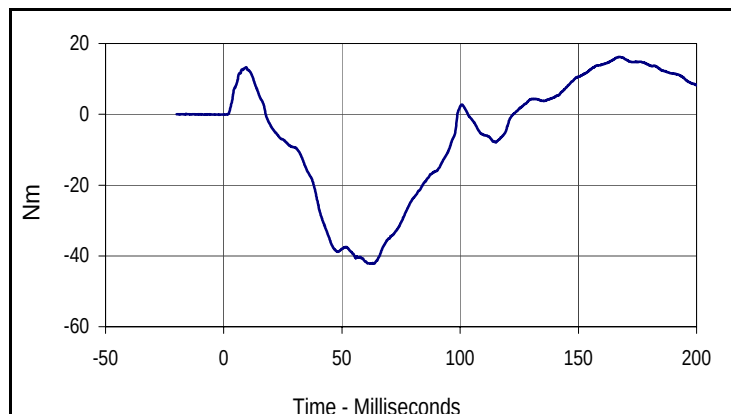
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.6	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.4	Pass
	15 msec	m/s	-3.30 to -4.10	-3.6	Pass
	20 msec	m/s	-4.40 to -5.40	-4.7	Pass
	25 msec	m/s	-5.40 to -6.10	-5.6	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.1	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	79.3	Pass
	Time	msec	50.0 to 70.0	65.5	Pass
Peak Occipital Condyle Moment		Nm	-36.0 to -44.0	-42.2	Pass
Decaying Moment Time to Cross 0 Nm		msec	102.0 to 126.0	122.5	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.4	-6.6	200.0



Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
79.3	65.5	-34.9	184.8



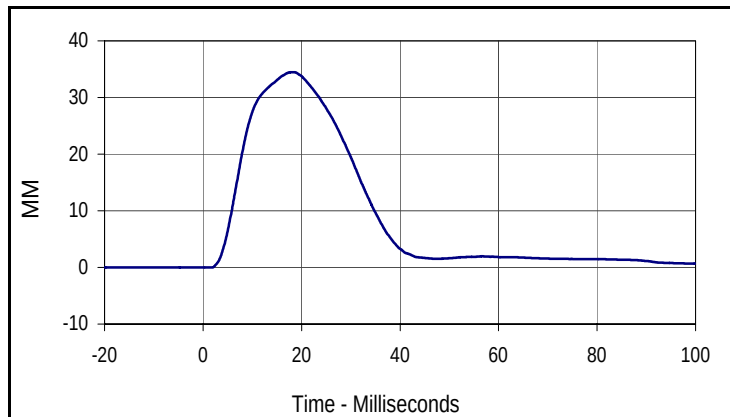
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
16.2	167.2	-42.2	62.5

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

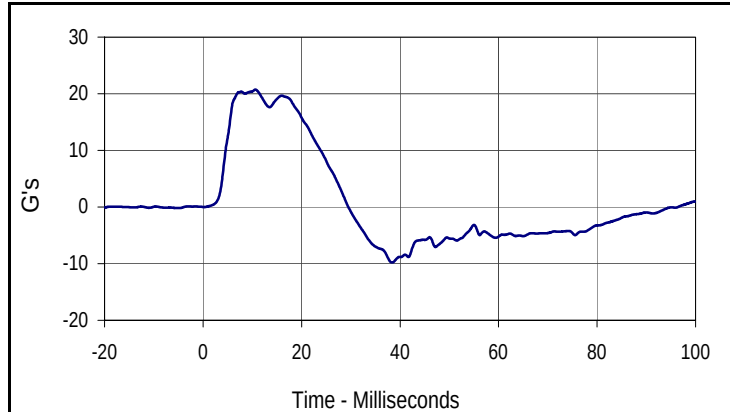
Test Date: 10/18/10
 Test I.D.: SHP10C



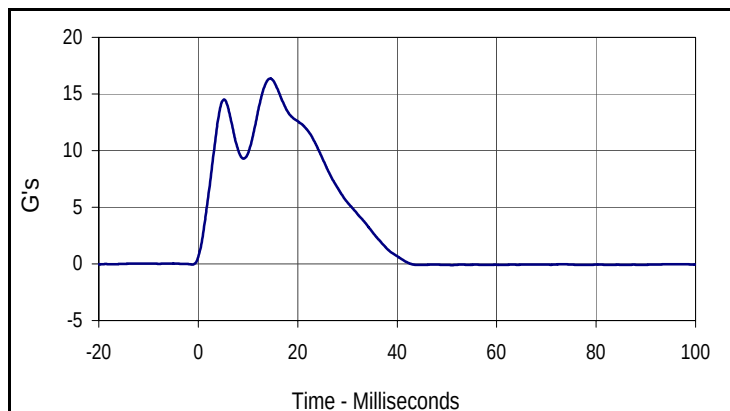
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.39	Pass
Shoulder Deflection	MM	28 to 37	34.5	Pass
Peak Upper Spine Y Acceleration	G's	17 to 22	20.7	Pass
Peak Impactor Acceleration	G's	13 to 18	16.4	Pass
Overall Test Results			Pass	



Curve Description			
Shoulder Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
34.5	18.3	0.0	1.8



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
20.7	10.6	-9.8	38.4



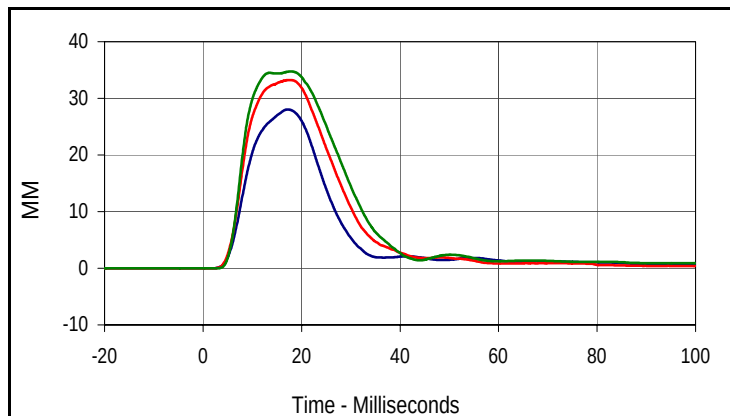
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.4	14.5	-0.1	51.1

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

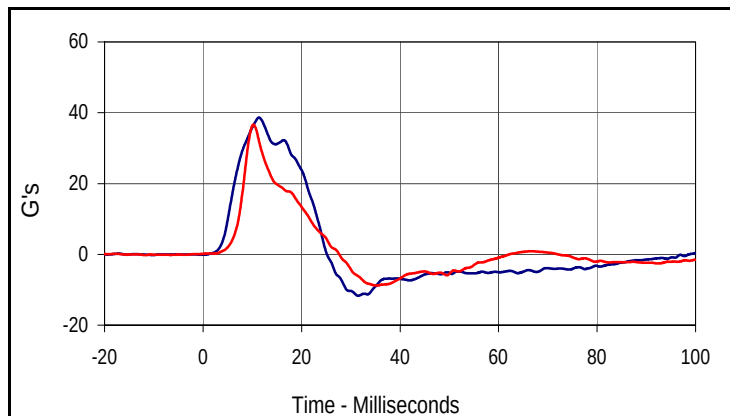
Test Date: 10/18/10
 Test I.D.: TWAP10C



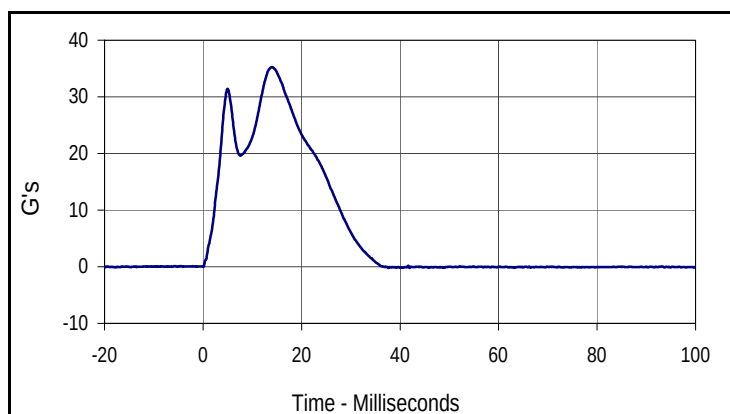
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.64	Pass
Shoulder Deflection	MM	31 to 40	38.4	Pass
Upper Thorax Rib Deflection	MM	25 to 32	28.0	Pass
Middle Thorax Rib Deflection	MM	30 to 36	33.2	Pass
Lower Thorax Rib Deflection	MM	32 to 38	34.8	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	38.6	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	36.6	Pass
Peak Impactor Acceleration After 5 msec.	G's	30 to 36	35.3	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
28.0	17.2	0.0	-16.6
Middle Thorax Deflection			
Max	Time	Min	Time
33.2	17.7	0.0	-18.9
Lower Thorax Deflection			
Max	Time	Min	Time
34.8	17.7	0.0	-18.0



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
38.6	11.3	-11.7	31.5
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
36.6	10.2	-8.8	35.2



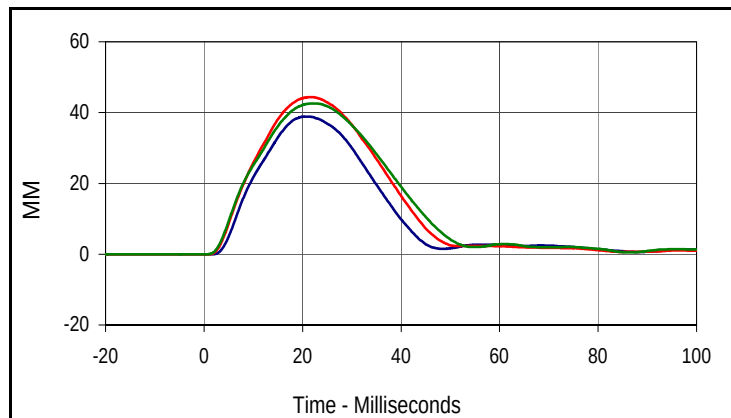
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
35.3	14.1	-0.2	37.6

Test Program: SID IIs Thorax w/o Arm Calibration
 ATD Serial No.: 299

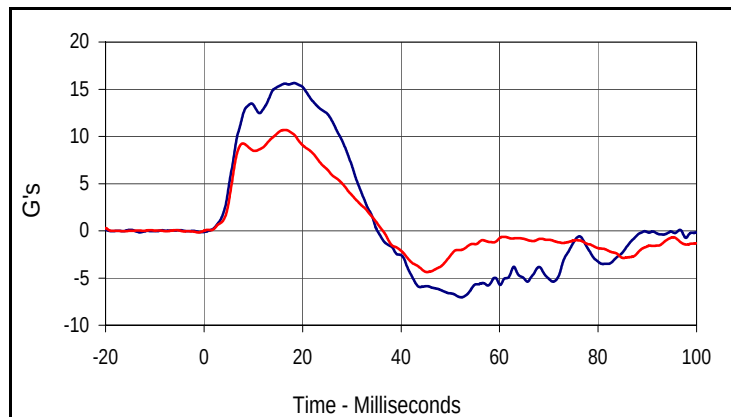
Test Date: 10/18/10
 Test I.D.: TOAP10C



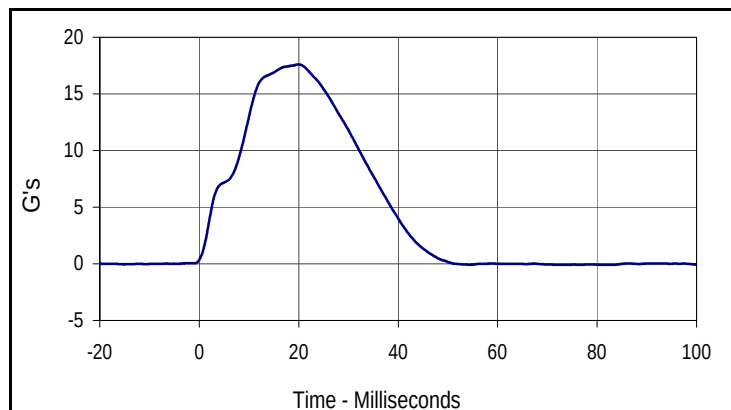
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.32	Pass
Upper Thorax Rib Deflection	MM	32 to 40	38.9	Pass
Middle Thorax Rib Deflection	MM	39 to 45	44.4	Pass
Lower Thorax Rib Deflection	MM	35 to 43	42.6	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	15.6	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	10.7	Pass
Peak Impactor Acceleration	G's	14 to 18	17.6	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
38.9	20.8	0.0	-10.4
Middle Thorax Deflection			
Max	Time	Min	Time
44.4	21.7	0.0	-15.8
Lower Thorax Deflection			
Max	Time	Min	Time
42.6	22.2	0.0	-10.1



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.6	18.3	-7.0	52.2
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
10.7	16.5	-4.4	45.2



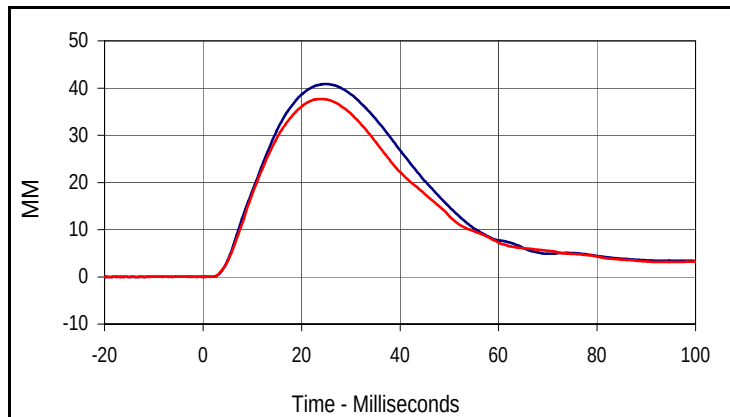
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
17.6	19.9	-0.1	0.0

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

Test Date: 10/18/10
 Test I.D.: ABDP10C

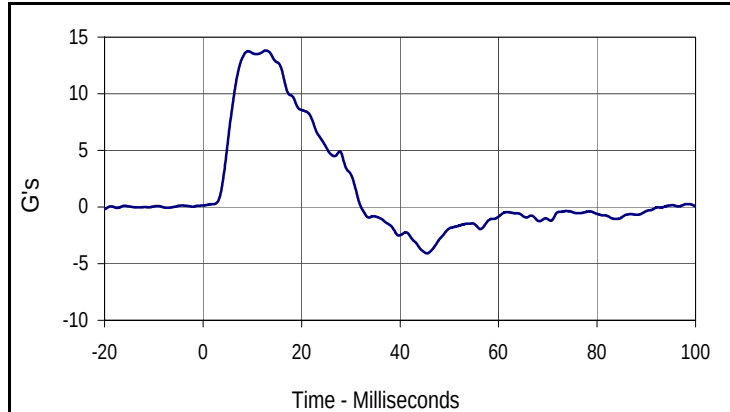


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.28	Pass
Upper Abdominal Rib Deflection	MM	36 to 47	40.9	Pass
Lower Abdominal Rib Deflection	MM	33 to 44	37.7	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	13.8	Pass
Peak Impactor Acceleration	G's	12 to 16	15.0	Pass
Overall Test Results			Pass	

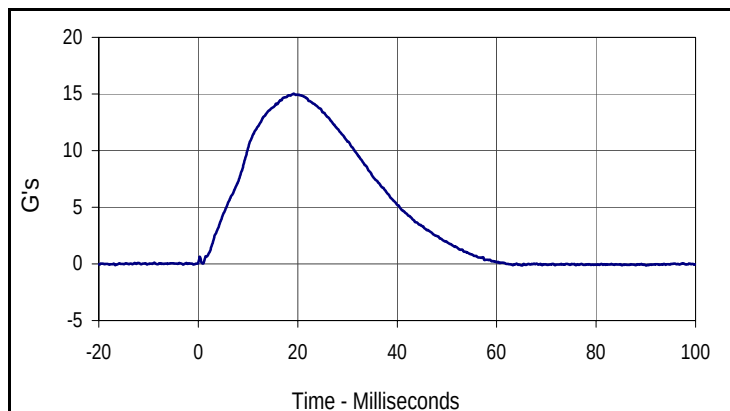


Curve Description			
Upper Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
40.9	25.0	0.0	-20.0

Curve Description			
Lower Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
37.7	23.8	0.0	-19.1



Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
13.8	12.7	-4.1	45.5



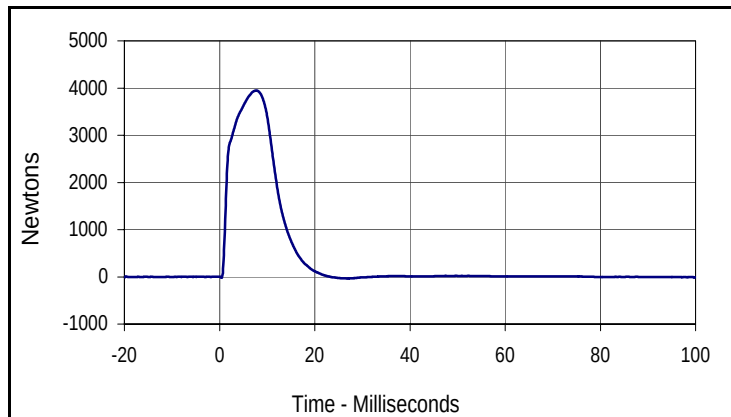
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
15.0	19.2	-0.1	90.1

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

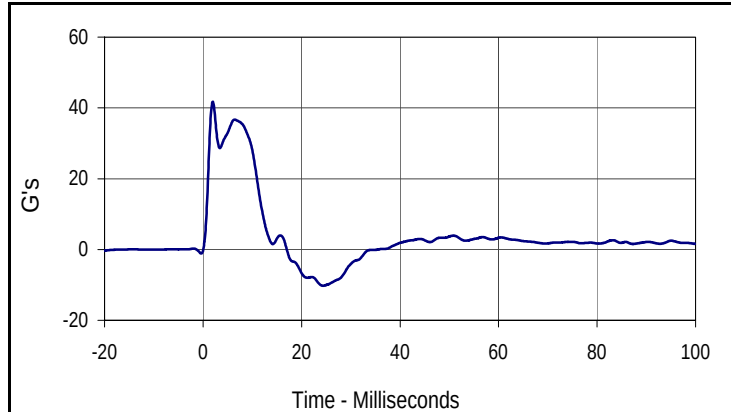
Test Date: 10/18/10
 Test I.D.: PAP10C



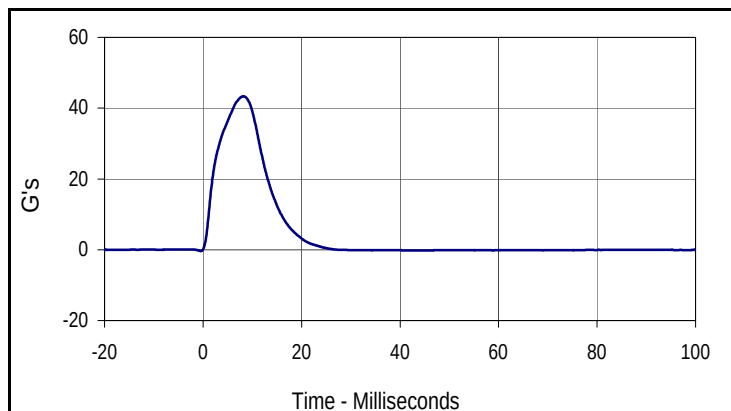
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.65	Pass
Peak Acetabulum Force	Newtons	3600 to 4300	3947.8	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	36.7	Pass
Peak Impactor Acceleration	G's	38 to 47	43.3	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3947.8	7.7	-35.3	27.0



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
41.7	2.0	-10.2	24.3



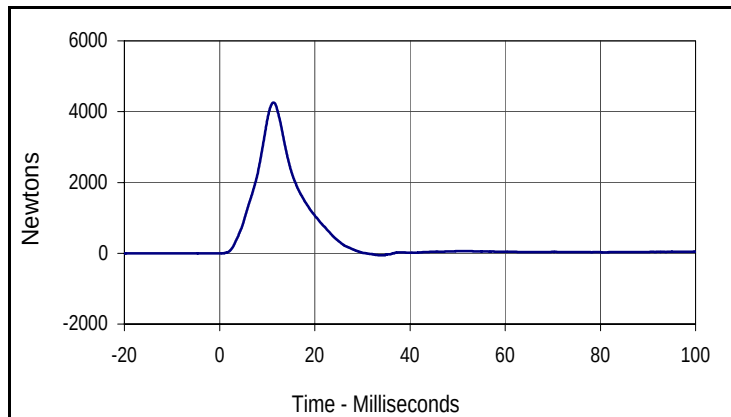
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
43.3	8.2	-0.4	-0.5

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

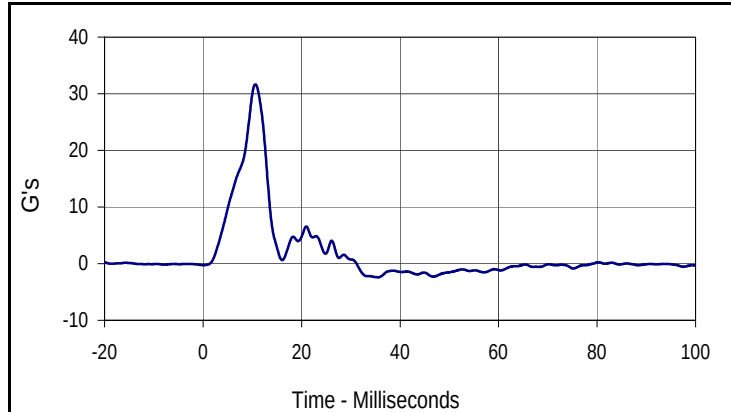
Test Date: 10/18/10
 Test I.D.: PLP10C



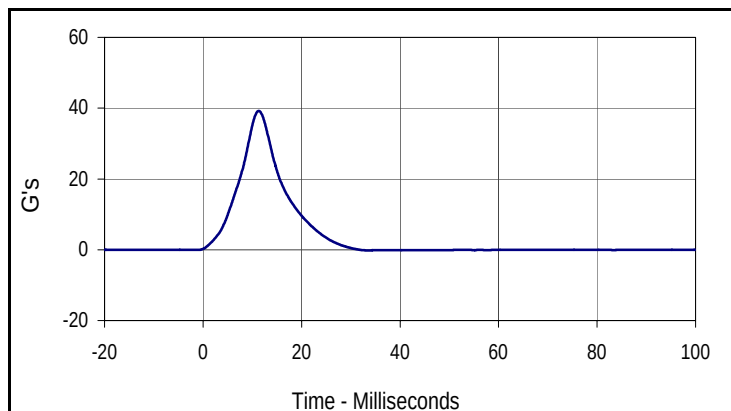
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.29	Pass
Peak Iliac Force	Newtons	4100 to 5100	4258.0	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	31.7	Pass
Peak Impactor Acceleration	G's	36 to 45	39.2	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4258.0	11.3	-59.6	34.4



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
31.7	10.6	-2.4	35.6



Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.2	11.3	-0.2	33.3

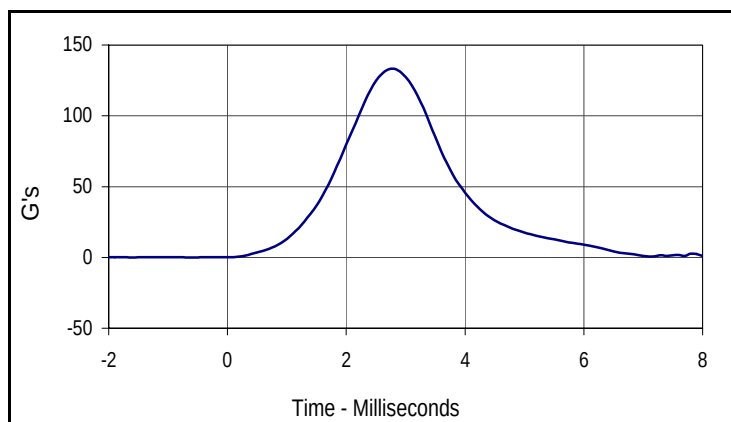
APPENDIX C
POST-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

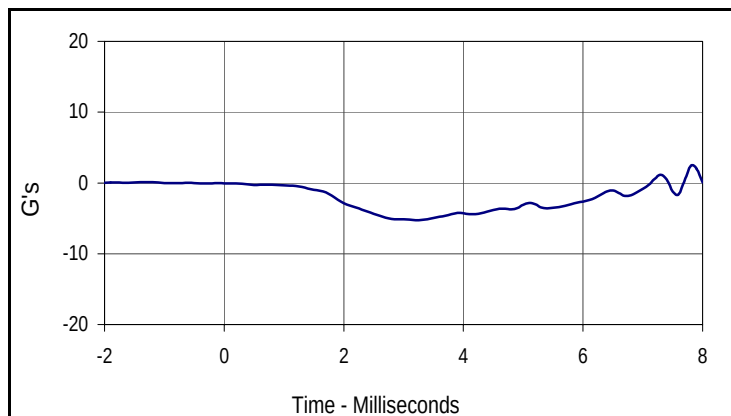
Test Date: 10/20/10
 Test I.D.: HDP10D



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	115 to 137	133.3	Pass
Peak Longitudinal Acceleration	G's	≤15	5.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	13.1	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
133.3	2.8	0.0	-0.6



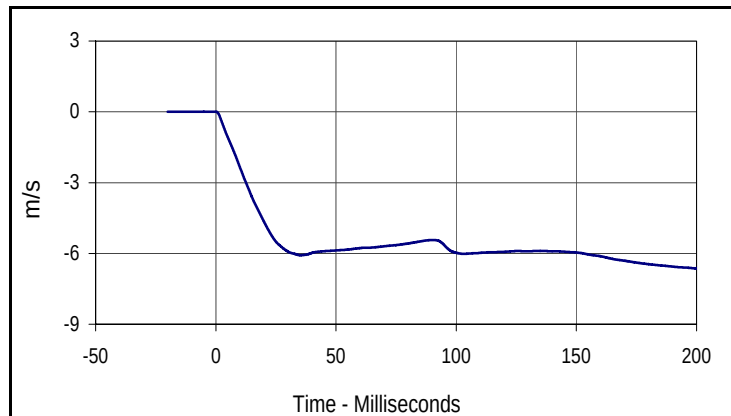
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.1	-1.3	-5.3	3.2

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

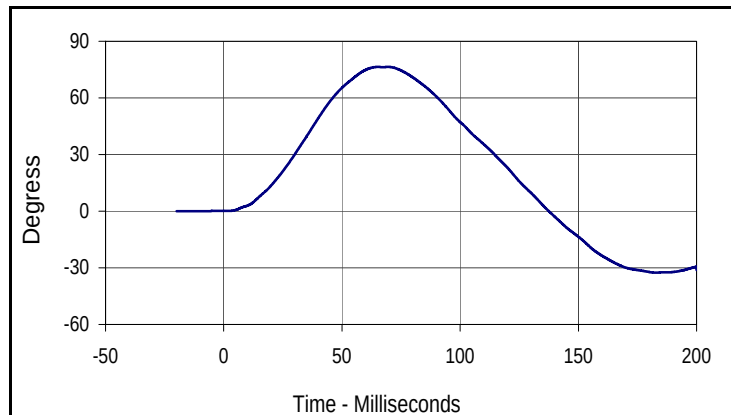
Test Date: 10/20/10
 Test I.D.: NBP10D



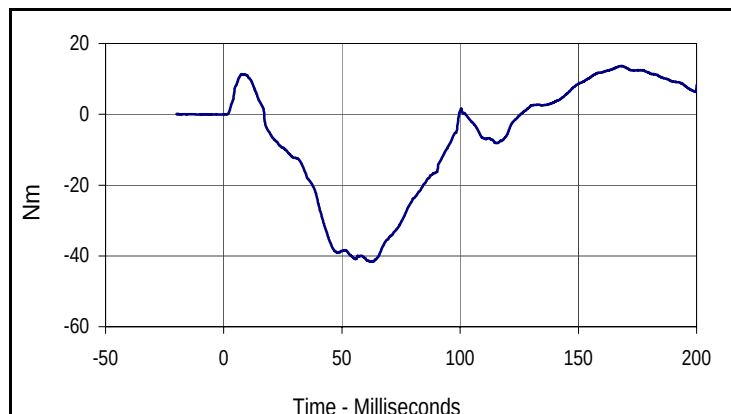
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.6	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.3	Pass
	15 msec	m/s	-3.30 to -4.10	-3.6	Pass
	20 msec	m/s	-4.40 to -5.40	-4.6	Pass
	25 msec	m/s	-5.40 to -6.10	-5.5	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.1	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	76.4	Pass
	Time	msec	50.0 to 70.0	65.1	Pass
Peak Occipital Condyle Moment		Nm	-36.0 to -44.0	-41.7	Pass
Decaying Moment Time to Cross 0 Nm		msec	102.0 to 126.0	125.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.2	-6.6	199.9



Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
76.4	65.1	-32.5	182.7



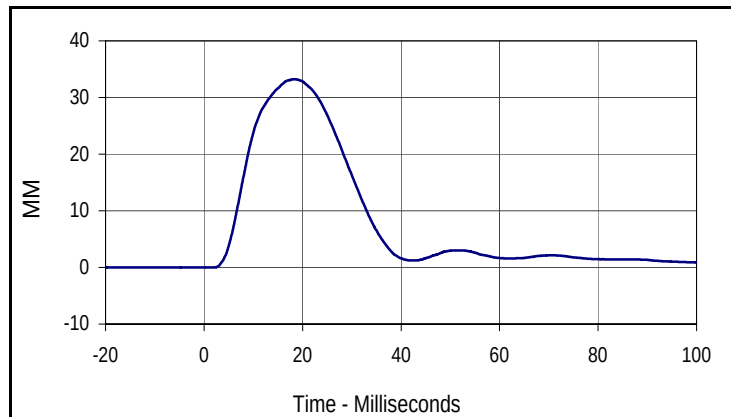
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
13.7	168.3	-41.7	61.9

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

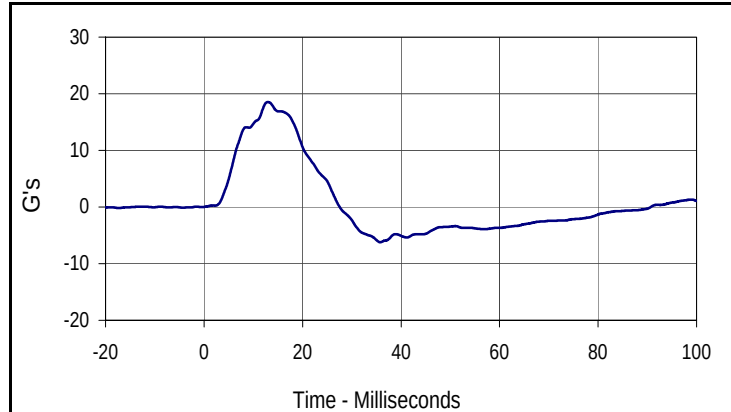
Test Date: 10/20/10
 Test I.D.: SHP10D



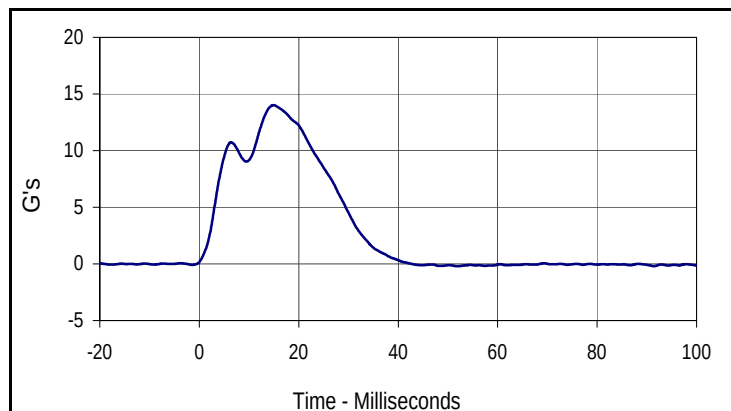
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.33	Pass
Shoulder Deflection	MM	28 to 37	33.2	Pass
Peak Upper Spine Y Acceleration	G's	17 to 22	18.5	Pass
Peak Impactor Acceleration	G's	13 to 18	14.0	Pass
Overall Test Results			Pass	



Curve Description			
Shoulder Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
33.2	18.3	0.0	-2.1



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.5	13.0	-6.2	35.7



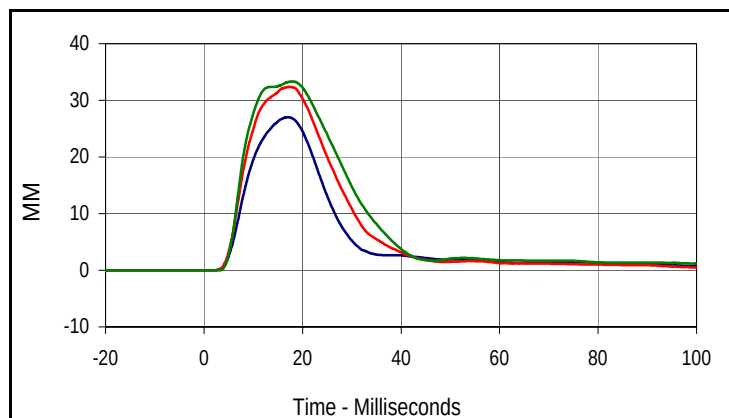
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
14.0	14.9	-0.2	52.0

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

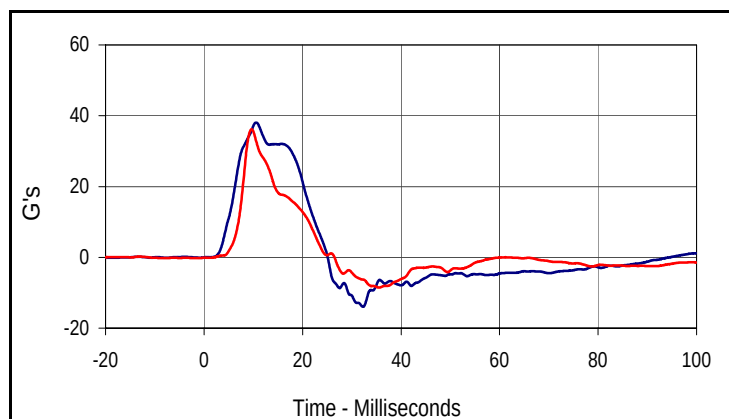
Test Date: 10/20/10
 Test I.D.: TWAP10D



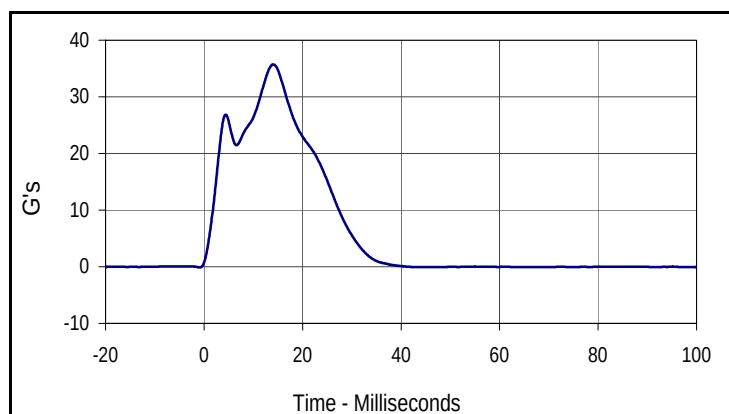
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.64	Pass
Shoulder Deflection	MM	31 to 40	37.5	Pass
Upper Thorax Rib Deflection	MM	25 to 32	27.0	Pass
Middle Thorax Rib Deflection	MM	30 to 36	32.4	Pass
Lower Thorax Rib Deflection	MM	32 to 38	33.3	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	38.1	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	36.2	Pass
Peak Impactor Acceleration After 5 msec.	G's	30 to 36	35.7	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
27.0	17.0	0.0	-15.7
Middle Thorax Deflection			
Max	Time	Min	Time
32.4	17.2	0.0	-18.9
Lower Thorax Deflection			
Max	Time	Min	Time
33.3	18.0	0.0	-0.9



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
38.1	10.5	-14.0	32.3
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
36.2	9.6	-8.5	35.6



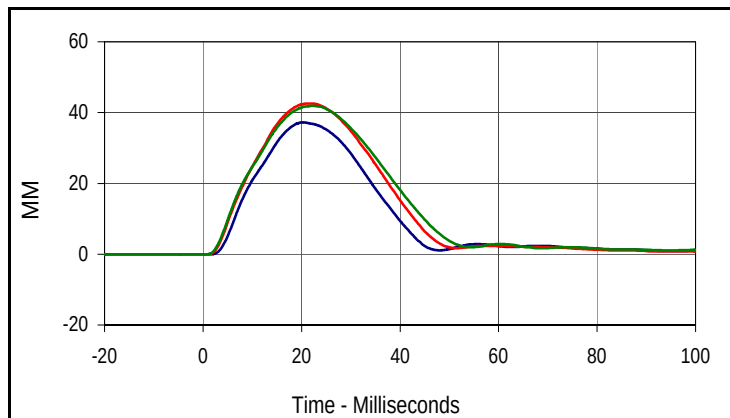
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
35.7	14.1	-0.1	-0.9

Test Program: SID IIs Thorax w/o Arm Calibration
 ATD Serial No.: 299

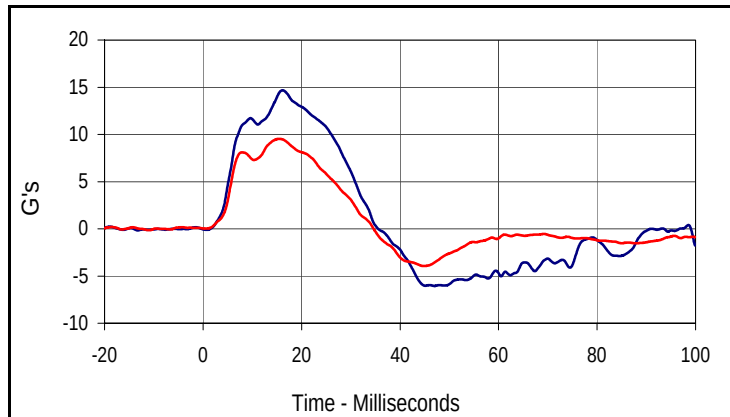
Test Date: 10/20/10
 Test I.D.: TOAP10D



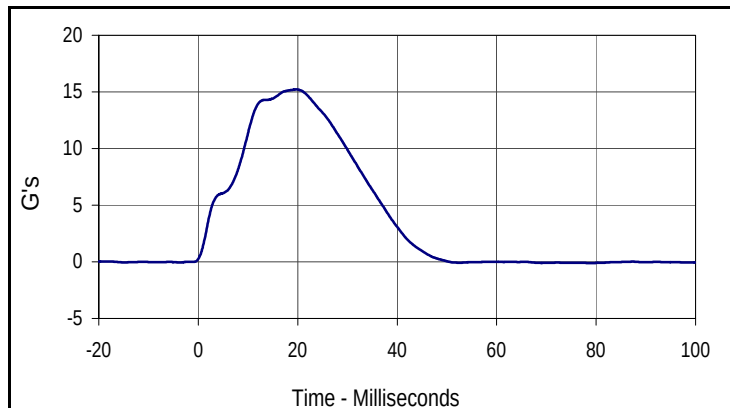
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.28	Pass
Upper Thorax Rib Deflection	MM	32 to 40	37.2	Pass
Middle Thorax Rib Deflection	MM	39 to 45	42.6	Pass
Lower Thorax Rib Deflection	MM	35 to 43	41.9	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	14.7	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.5	Pass
Peak Impactor Acceleration	G's	14 to 18	15.2	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
37.2	20.3	0.0	-10.1
Middle Thorax Deflection			
Max	Time	Min	Time
42.6	21.6	0.0	-14.5
Lower Thorax Deflection			
Max	Time	Min	Time
41.9	22.2	0.0	0.8



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.7	16.1	-6.1	47.0
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.5	15.4	-3.9	44.8



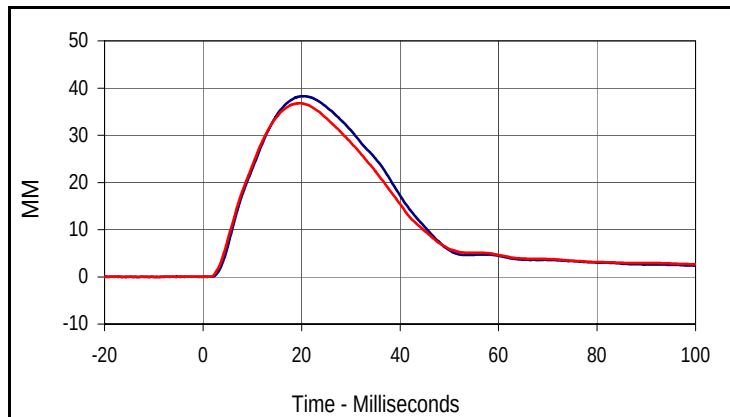
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
15.2	19.7	-0.1	0.0

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

Test Date: 10/20/10
 Test I.D.: ABDP10D

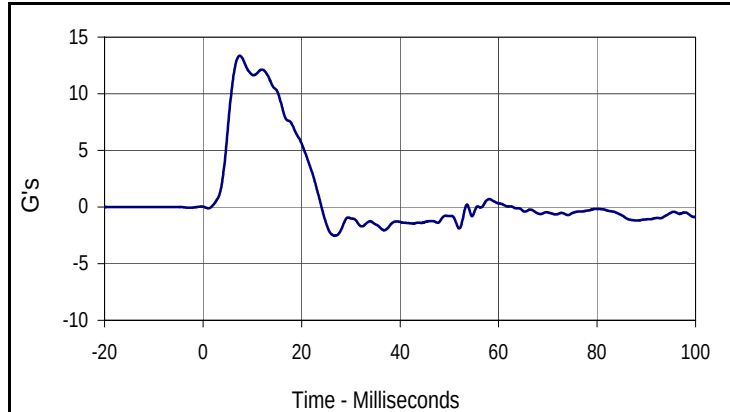


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.26	Pass
Upper Abdominal Rib Deflection	MM	36 to 47	38.3	Pass
Lower Abdominal Rib Deflection	MM	33 to 44	36.8	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	13.4	Pass
Peak Impactor Acceleration	G's	12 to 16	14.5	Pass
Overall Test Results			Pass	

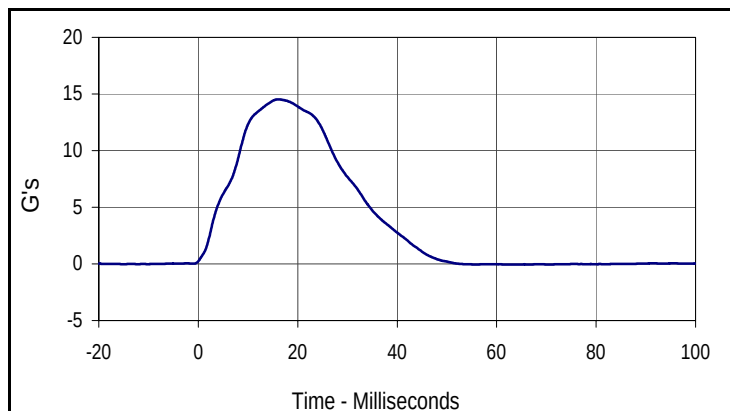


Curve Description			
Upper Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
38.3	20.2	0.0	-8.9

Curve Description			
Lower Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
36.8	19.7	0.0	-9.8



Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
13.4	7.5	-2.5	26.8



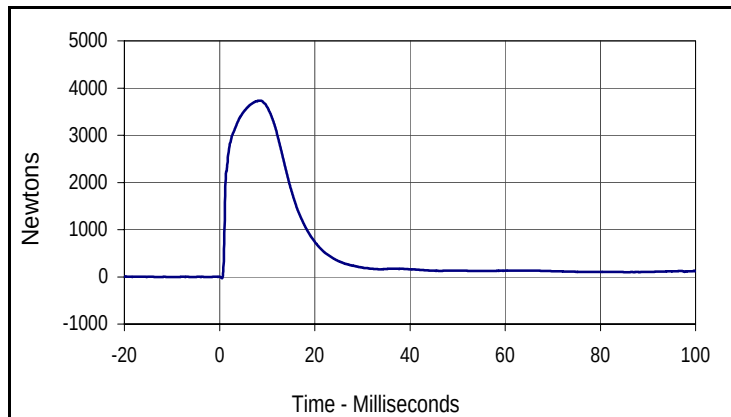
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.5	16.1	-0.1	64.2

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

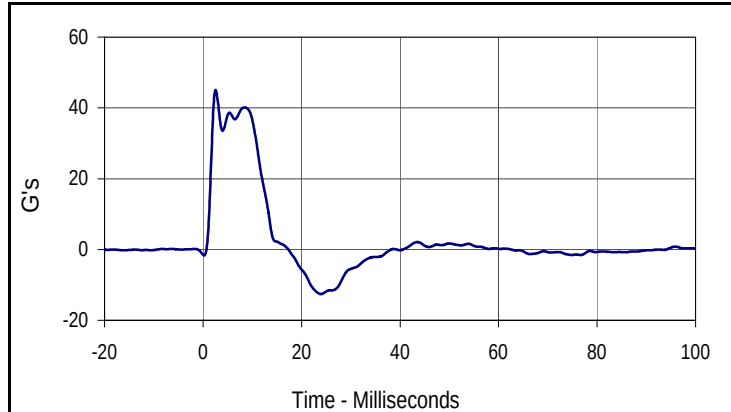
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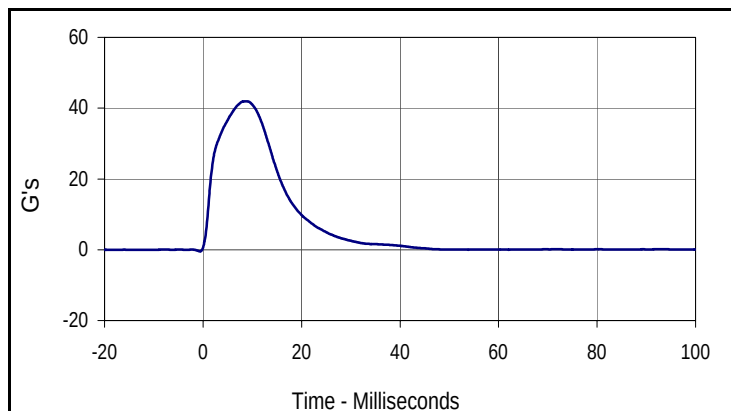
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.61	Pass
Peak Acetabulum Force	Newtons	3600 to 4300	3732.3	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	40.1	Pass
Peak Impactor Acceleration	G's	38 to 47	42.0	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3732.3	8.6	-28.5	0.5



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
45.0	2.5	-12.6	23.9



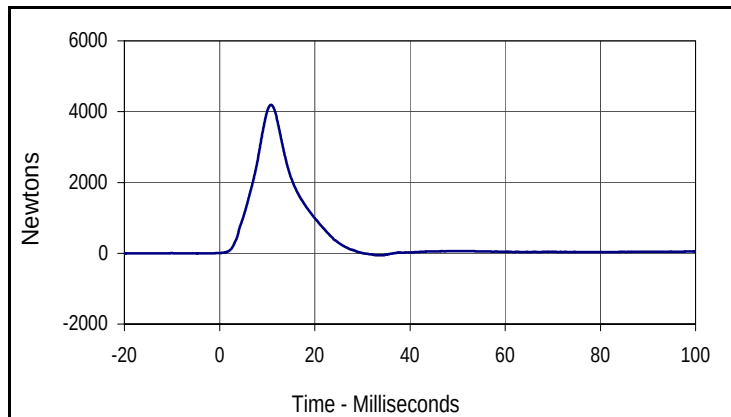
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
42.0	8.8	-0.4	-0.6

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

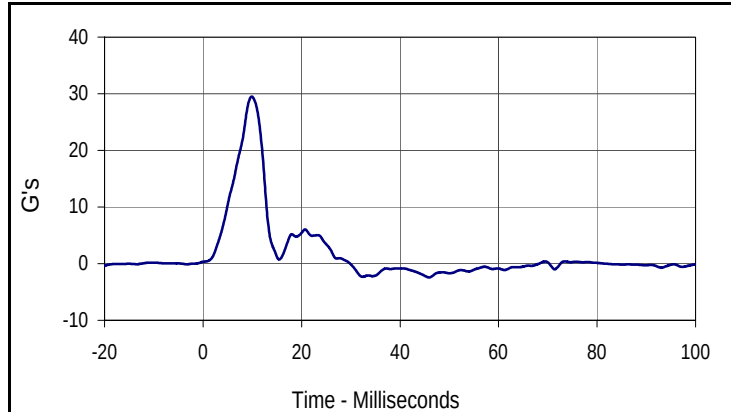
Test Date: 10/20/10
 Test I.D.: PLP10D



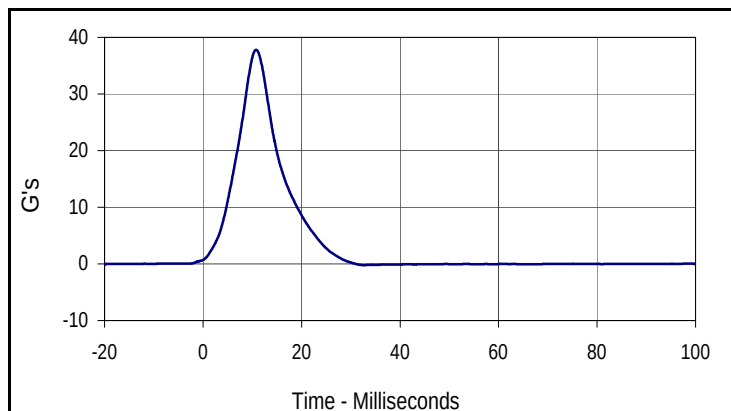
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.26	Pass
Peak Iliac Force	Newtons	4100 to 5100	4194.5	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	29.5	Pass
Peak Impactor Acceleration	G's	36 to 45	37.8	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4194.5	10.8	-59.9	34.1



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
29.5	9.9	-2.4	45.9



Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
37.8	10.8	-0.2	32.6