

REPORT NUMBER: SPNCAP-KAR-12-010

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

**HYUNDAI MOTOR COMPANY
2012 HYUNDAI TUCSON GLS 5-DOOR MPV**

NHTSA No: MC0508

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



NOVEMBER 2, 2011

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
1200 NEW JERSEY AVE, SE, ROOM W43-410
WASHINGTON, D.C. 20590**

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SPNCAP-KAR-12-010	2. Government Accession No.	3. Recipient's Catalog No.																												
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of 2012 Hyundai Tucson GLS 5-Door MPV NHTSA No. MC0508		5. Report Date November 2, 2011																												
		6. Performing Organization Code KAR																												
7. Authors Mr. Denver Schaffarzick, Project Engineer, KARCO Mr. Frank Richardson, Program Manager, KARCO		8. Performing Organization Report No. TR-P31007-04-NC																												
9. Performing Organization Name and Address KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		10. Work Unit No.																												
		11. Contract or Grant No. DTNH22-09-D-00122																												
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NVS-111) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered Final Test Report, Oct. 19 - Nov. 2, 2011																												
		14. Sponsoring Agency Code NVS-111																												
15. Supplementary Notes																														
16. Abstract A 32.2 km/h (20 mph) 75 deg. oblique impact Side NCAP Test was conducted on the subject 2012 Hyundai Tucson GLS 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 October 19, 2011. The impact velocity was 32.5 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 27.2 deg. C. The target vehicle's maximum post-test static crush was 484 mm located at level 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>443.5</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>mm</td> <td>82</td> <td>43.4</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetubular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>3412</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>N</td> <td>38</td> <td>30</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, and 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	443.5	Resultant Lower Spine Acceleration	mm	82	43.4	Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	3412	Maximum Thoracic Rib Deflection	N	38	30	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. Technical Reference Division 1200 New Jersey Ave., SE Room W43-410 Washington, DC 20590																												
19. Security Classification of this report UNCLASSIFIED	20. Security Classification of this page UNCLASSIFIED	21. No. of Pages 101	22. Price																											

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SECTION 1
TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2012 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 2012 Hyundai Tucson GLS 5-door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated August 2011.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2012 Hyundai Tucson GLS 5-door MPV. The subject vehicle was towed into the rigid pole at an angle of 74.4° and a velocity of 32.5 km/h. The test was conducted by KARCO Engineering, LLC. in Adelanto, California, on October 19, 2011. 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 August 2011. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) was instrumented in the 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	443.5
Lower Spine (T12) Resultant Acceleration	g	82	43
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3412
Maximum Thoracic Rib Deflection	mm	38*	30
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 (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 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: 2012 Hyundai Tucson GLS 5-Door MPV NHTSA No. MC0508
Test Program: NCAP Side Pole Impact Test Test Date: 10/19/11

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
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 PARAMETER DATA

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MC0508
Model Year	2012
Make	Hyundai
Model	Tucson GLS
Body Style	5-Door MPV
VIN	KM8JU3AC1CU365508
Body Color	Diamond Silver
Odometer Reading (km / mi)	109 / 68
Engine Displacement (L)	2.4
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Front
Roof Rack	Yes
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
All Wheel Drive (AWD)	No

Traction Control System (TCS)	Yes
Auto-Levelling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	Active Head Restraint
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. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	None

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company
Date of Manufacture	Aug-11
Vehicle Type	MPV

GVWR (kg)	2040
GAWR Front (kg)	1055
GAWR Rear (kg)	1125

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				420.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				79.8	A-B

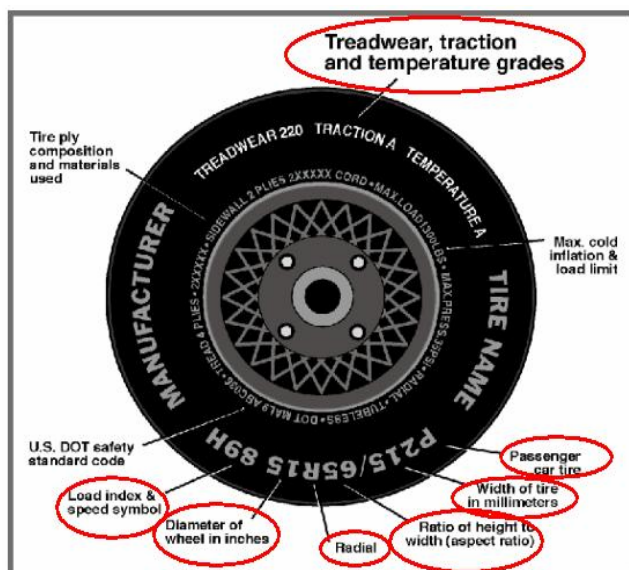
VEHICLE SEAT TYPE

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							

GENERAL TEST AND VEHICLE PARAMETER DATA

NHTSA No. MC0508

Test Date: 10/19/11



Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	230	230
Recommended Tire Size	225/60R17	225/60R17

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Tire Size on Vehicle	225/60R17	225/60R17
Tire Manufacturer	Kumho	Kumho
Tire Name	KL21	KL21
Tire Type	Passenger	Passenger
Tire Width	225	225
Aspect Ratio	60	60
Radial	Yes	Yes
Wheel Diameter	17	17
Load Index/Speed Symbol	99H	99H
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	220	210	230
Tire Placard	kPa	230	230	230	230
Owner's Manual	kPa	230	230	230	230
As Tested	kPa	230	230	230	230

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	448.5	316.0		467.0	360.0		462.0	375.0	
Right	kg	431.0	291.0		444.0	337.5		434.0	342.0	
Ratio	%	59.2%	40.8%	100.0%	56.6%	43.4%	100.0%	55.5%	44.5%	100.0%
Total	kg	879.5	607.0	1486.5	911.0	697.5	1608.5	896.0	717.0	1613.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1486.5	A
Actual Weight of 1 P572 O ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	79.8	C
Calculated Vehicle Target Wt (TVTW)	kg	1615.3	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 kg)?

☒ Yes

☐ No

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Non-Struck Side Door Panels	5.5
Spare Tire and Tools	17.5
Trunk Lining	2.5
Ballast / Equipment Added	107.5

DATA SHEET NO. 1 ... (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPVNHTSA No. MC0508Test Program: NCAP Side Pole Impact TestTest Date: 10/19/11**TEST VEHICLE ATTITUDE AND CG**

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement** *
Driver Door Sill Angle (front-to-rear)*	°	-1.3	-0.2	-0.1	Yes
Front Passenger Sill Angle (front-to-rear)*	°	-0.7	-0.4	-0.4	Yes
Front Bumper-Line Angle (left-to-right)**	°	0.2	0.1	0.1	Yes
Rear Bumper-Line Angle (left-to-right)**	°	0.1	0.0	-0.1	Yes
Vehicle CG (Aft of Front Axle)	mm	1080	1147	1175	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	23	22	30	

*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: 2012 Hyundai Tucson GLS 5-Door MPVNHTSA No. MC0508Test Program: NCAP Side Pole Impact TestTest Date: 10/19/11**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	2.8	0.0	1.4
Front Passenger Seat	Fixed	Fixed	Fixed
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	1.4	696	Max	676	686	696
			Mid	676	686	696
			Min	676	686	696
Front Passenger Seat	Fixed	693	Max	673	683	693
			Mid	673	683	693
			Min	673	683	693
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: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

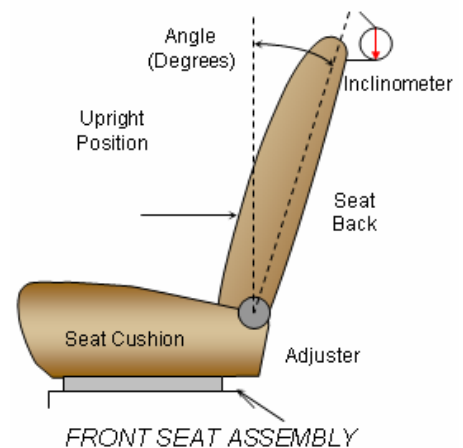
Test Date: 10/19/11

SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	25	0	0
Front Passenger Seat	220	23	0	0
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	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	63.6	33	0.2	7
Front Passenger Seat	63.6	33	0.2	7
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1.

	Total No. of Positions	Placed in Position
Driver Seat	4	H

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11

HEAD RESTRAINT ADJUSTMENT

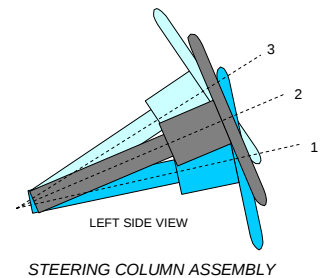
The driver's head restraint is adjusted to the lowest and most full forward in-use position.

	Total No. of Positions	Placed in Position
Driver Seat	7 Vertical, 4 Horizontal	Full Down, Full Forward

STEERING COLUMN ADJUSTMENT

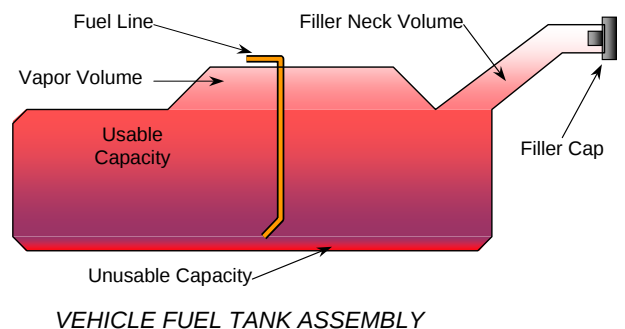
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	25.0	0
Geometric Center - Position 2	27.1	21
Uppermost - Position 3	29.2	42
Telescoping Steering Wheel Travel		42
Test Position	27.1	21



FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel when the ignition key is turned to the "on" position.



DATA SHEET NO. 2 ... (CONTINUED)**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA**Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPVNHTSA No. MC0508Test Program: NCAP Side Pole Impact TestTest Date: 10/19/11**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	57.99
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	53.93
Actual amount of Solvent Used in Test	53.90
1/3 of Usable Capacity	19.33

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**

DATA SHEET NO. 3

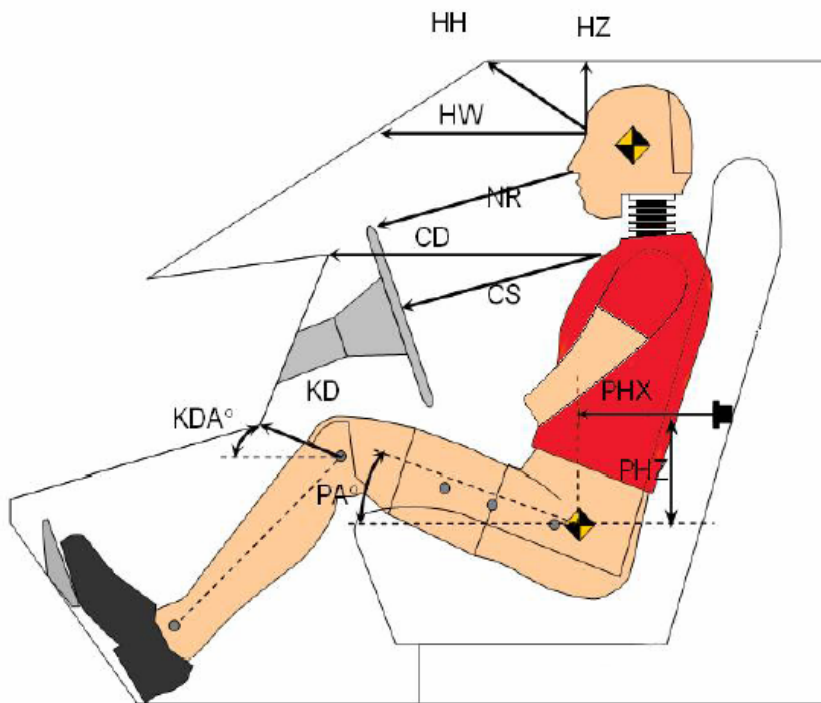
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	302	
HW	Head to Windshield	640	
HZ	Head to Roof	229	
NR	Nose to Rim	281	
CD	Chest to Dash	451	
CS	Chest to Steering Wheel	216	
KD(L)/KDA(L)°	Left Knee to Dash	129	30.8
KD(R)/KDA(R)°	Right Knee to Dash	104	45.0
PAX°	Pelvic Tilt Angle (x-axis)		21.7
PAY°	Pelvic Tilt Angle (y-axis)		0.6
PHX	Hip Point to Striker (x-axis)	349	
PHZ	Hip Point to Striker (z-axis)	211	

DATA SHEET NO. 4

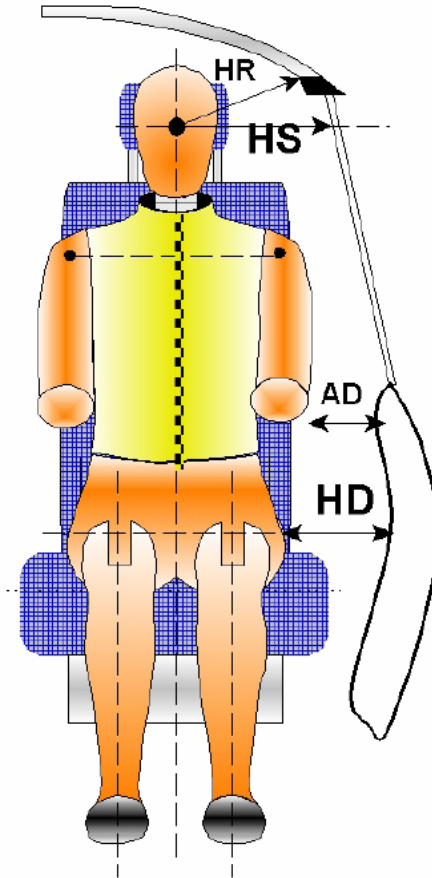
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	265
HS	Head to Side Window	mm	352
AD	Arm to Door	mm	182
HD	H-Point to Door	mm	257

DATA SHEET NO. 5

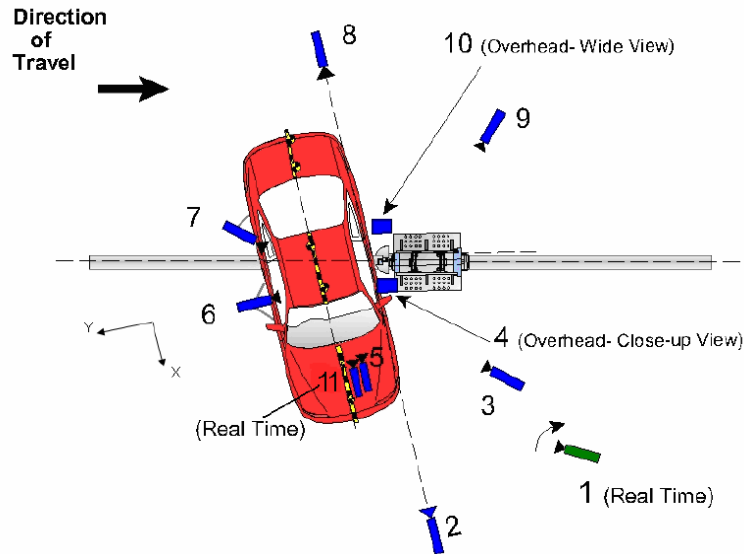
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



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	1.33	0.51	-1.40	35	400
6	On-Board - Dummy Side View	0.05	1.50	-1.24	14	1000
7	On-Board - Dummy Rear Oblique View	-0.94	1.57	-1.32	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	1.34	0.53	-1.39		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

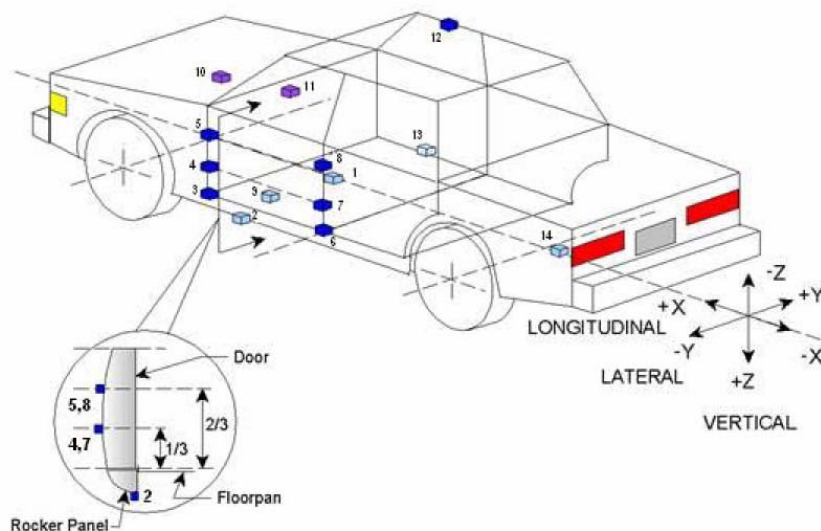
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1706	0	-418
2	Left Floor Sill	2672	-493	-255
3	A-Pillar Sill	2982	-813	-465
4	A-Pillar Low	2982	-813	-682
5	A-Pillar Mid	2982	-813	-883
6	B-Pillar Sill	1859	-728	-422
7	B-Pillar Low	1859	-728	-587
8	B-Pillar Mid	1859	-728	-893
9	Driver Seat Track	2277	-576	-426
10	Engine Top	3724	265	-805
11	Firewall	3282	230	-819
12	Right Roof	2085	422	-1597
13	Right Floor Sill	1672	740	-428
14	Rear Floorpan	614	-418	-535

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

DATA SHEET NO. 7

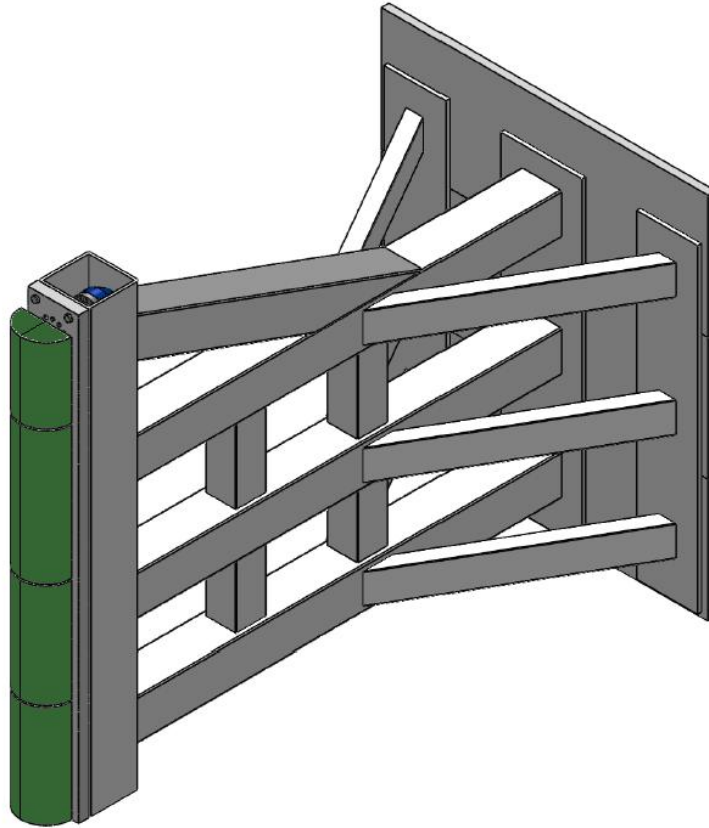
RIGID POLE LOAD CELL DATA

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



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: 2012 Hyundai Tucson GLS 5-Door MPVNHTSA No. MC0508Test Program: NCAP Side Pole Impact TestTest Date: 10/19/11**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	Head restraint
Left Shoulder	Curtain Airbag, Side Airbag
Upper Torso	Side Airbag, Seat
Lower Torso	Side Airbag
Left Hip	Side Airbag, Seat
Left Knee	Door Panel, Steering Column

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	Partial Door Skin Separation

DATA SHEET NO. 8 ... (CONTINUED)**POST-TEST OBSERVATIONS**Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPVNHTSA No. MC0508Test Program: NCAP Side Pole Impact TestTest Date: 10/19/11**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	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				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1111
Actual Impact Point (Aft of Front Axle)	mm		1113
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	-2
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	74.4
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.5
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.4

DATA SHEET NO. 9

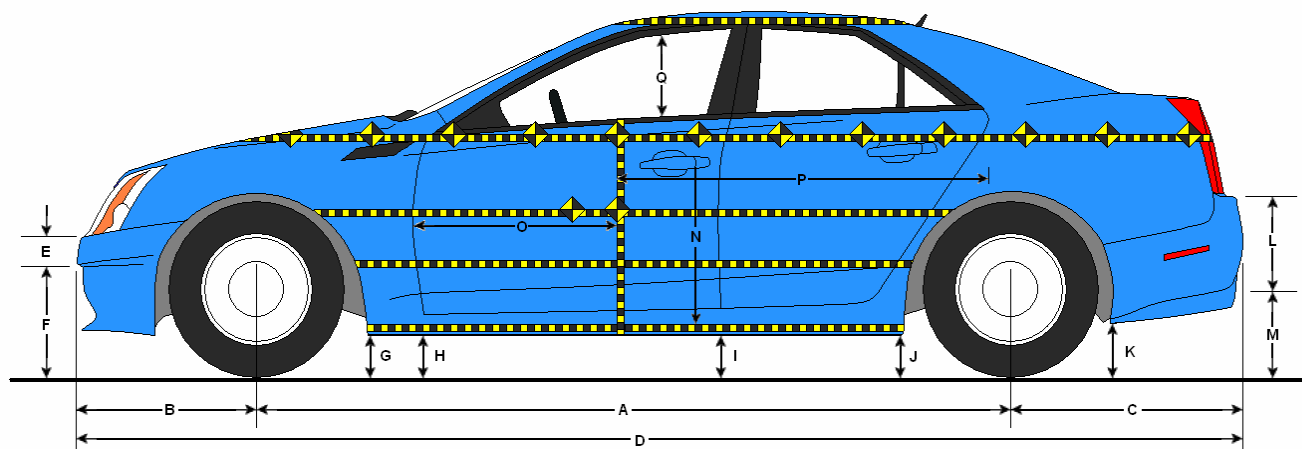
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2644	2545	-99
B	Front Axle to FSOV	875	894	19
C	Rear Axle to RSOV	879	911	32
D	Total Length at Centerline	4307	4351	44
E	Front Bumper Thickness	108	109	1
F	Front Bumper Bottom to Ground	435	458	23
G	Sill Height at Front Wheel Well	258	271	13
H	Sill Height at Front Door Leading Edge	274	279	5
I	Sill Height at B-Pillar	278	301	23
J1	Sill Height at Rear Wheel Well	278	312	34
J2	Pinch Weld Height at Rear Wheel Well	265	299	34
K	Sill Height Aft of Rear Wheel Well	271	286	15
L	Rear Bumper Thickness	302	300	-2
M	Rear Bumper Bottom to Ground	349	361	12
N	Sill Height to Bottom of Front Window Sill	662	709	47
O	Front Door Leading Edge to Impact CL	624	514	-110
P	Rear Door Trailing Edge to Impact CL	1480	1350	-130
Q	Front Window Opening	424	448	24
R	Right Side Length	2955	2973	18
S	Left Side Length	2954	2815	-139
T	Vehicle Width at B-Pillar	1801	1676	-125

All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO. 10

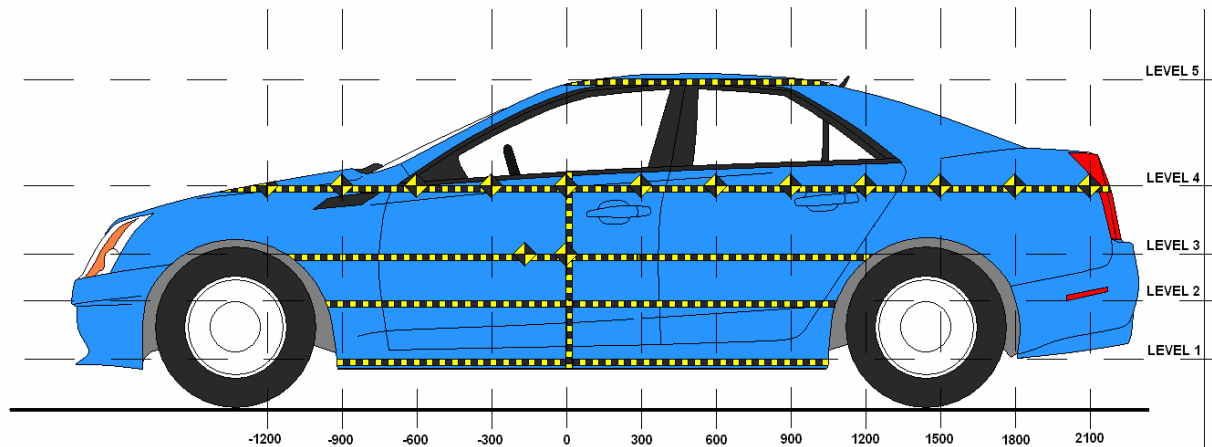
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

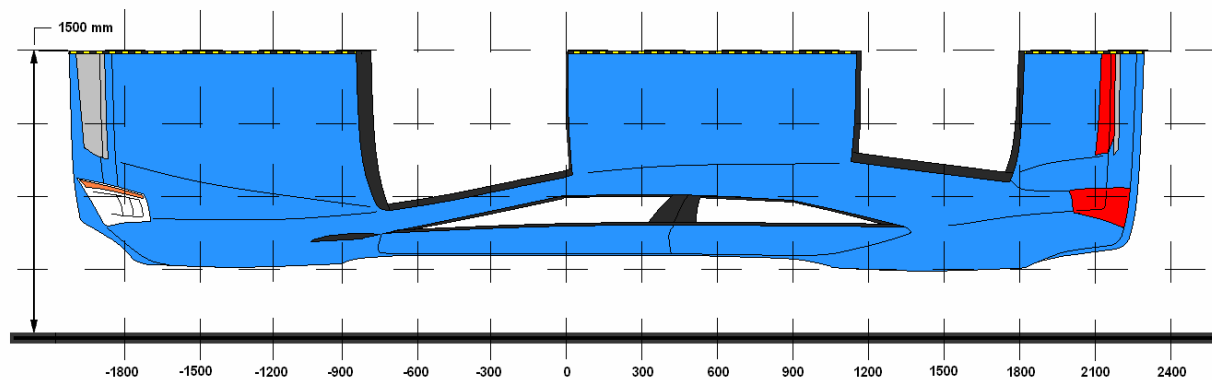
NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



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	359	436	0
2	Occupant H-Point	699	480	0
3	Mid-Door	780	484	0
4	Window Sill	1080	422	0
5	Window Top	1589	240	0

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11

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		590	590	703			669	673	770			79	83	67	
-750		592	597	693			680	686	777			88	89	84	
-600	615	603	603	687		730	677	679	789		115	74	76	102	
-450	619	606	604	684		799	774	770	826		180	168	166	142	
-300	622	605	604	678		870	874	875	903		248	269	271	225	
-150	624	605	603	674		955	988	990	996		331	383	387	322	
0	627	605	603	671	900	1063	1085	1087	1093	1140	436	480	484	422	240
150	628	605	603	668	897	993	1051	1058	1075	1075	365	446	455	407	178
300	629	605	602	665	897	892	927	933	948	1040	263	322	331	283	143
450	629	607	603	665	899	816	797	792	855	1011	187	190	189	190	112
600	629	609	606	666	902	763	769	766	817	993	134	160	160	151	91
750	629	611	608	666	906	720	741	739	791	986	91	130	131	125	80
900	629	613	610	665	910	682	712	712	764	978	53	99	102	99	68
1050	630	610	611	656	914	653	678	685	730	980	23	68	74	74	66
1200		596	603	651	922		634	648	702	980		38	45	51	58
1350		590	591	651	930		641	646	677	981		51	55	26	51
1500			589	652	938			639	697	984			50	45	46
1650			591	658	947			633	695	990			42	37	43
1800			604	667				637	697				33	30	
1950															
2100															
2250															
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

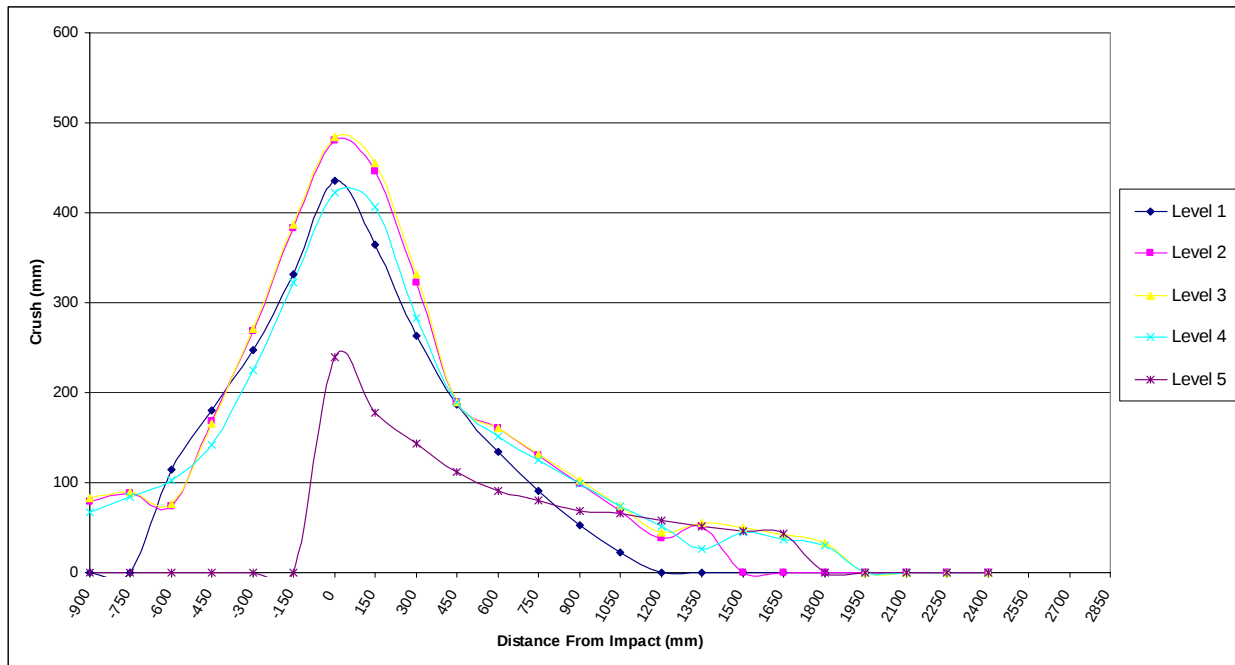
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



DATA SHEET NO. 11

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

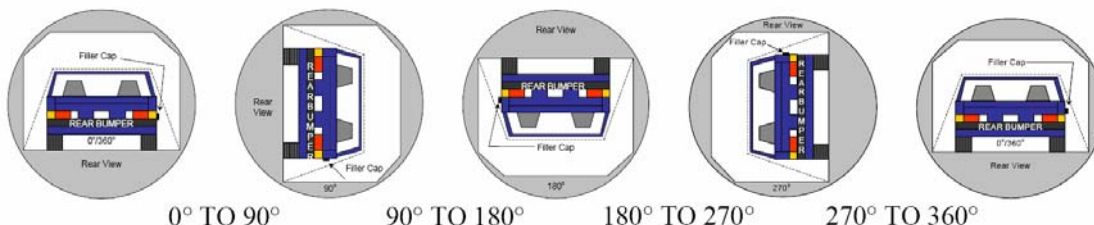
Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11

Temperature at Time of Impact: 27.2° C

Test Time: 10:50 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	310	391
180° To 270°	78	300	378
270° To 360°	78	300	378

FMVSS 301 SPILLAGE TABLE

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

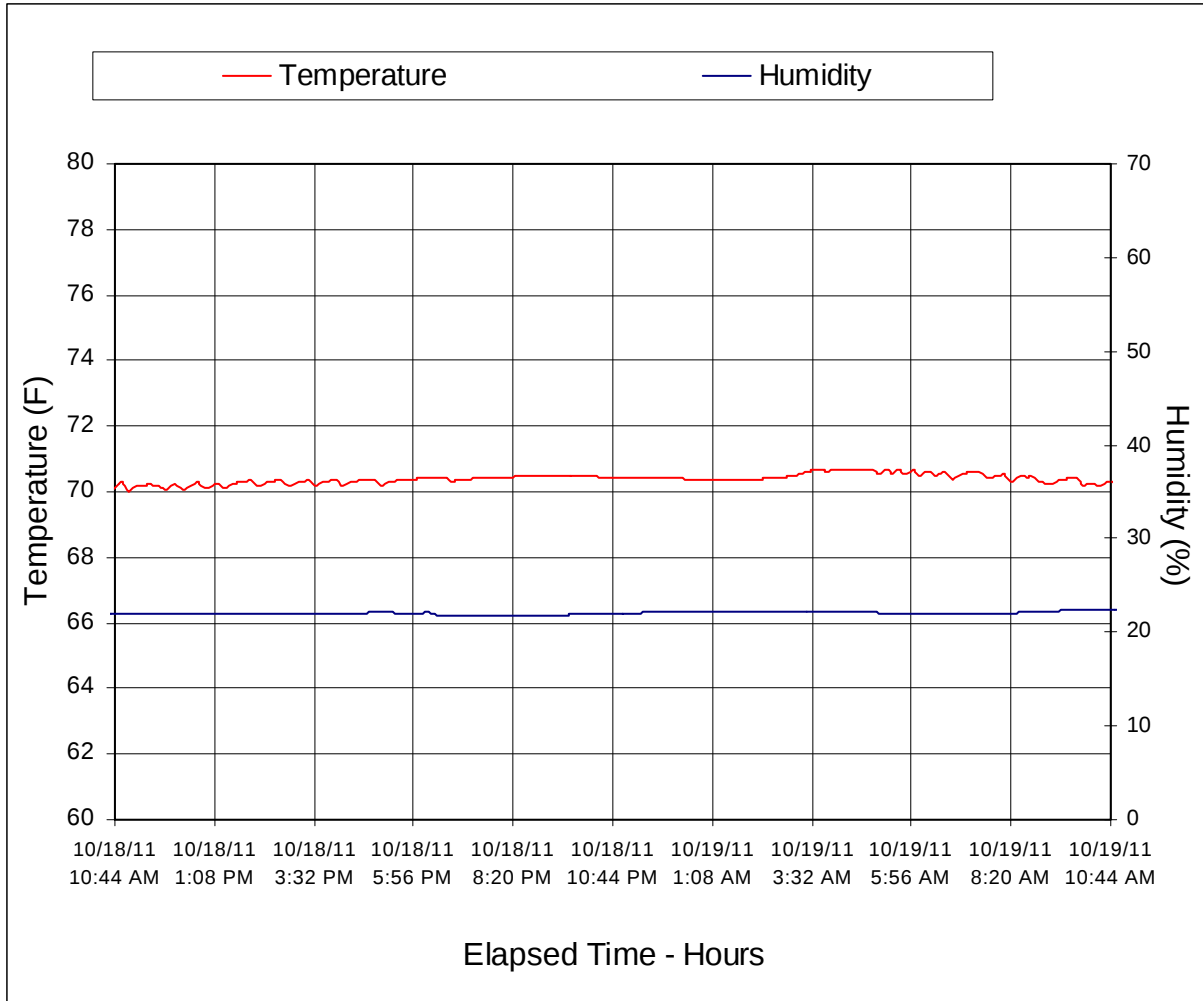
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2012 Hyundai Tucson GLS 5-Door MPV

NHTSA No. MC0508

Test Program: NCAP Side Pole Impact Test

Test Date: 10/19/11



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

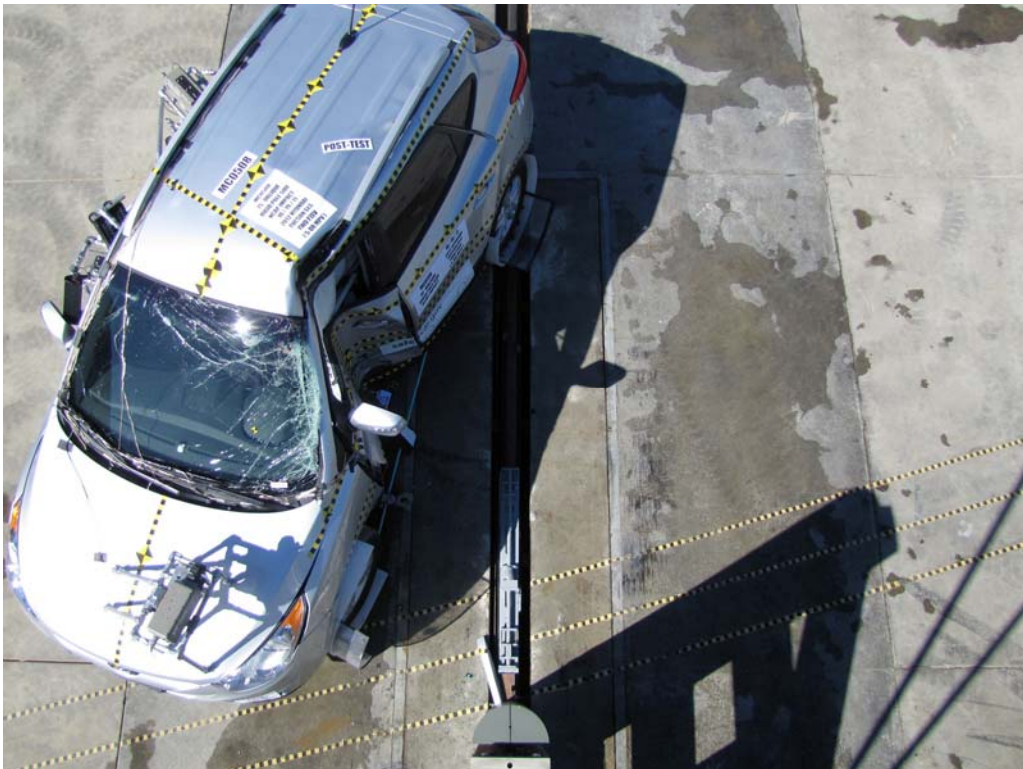


FIGURE 16. Post-Test Overhead View of Test Vehicle and Pole



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 Positioning



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

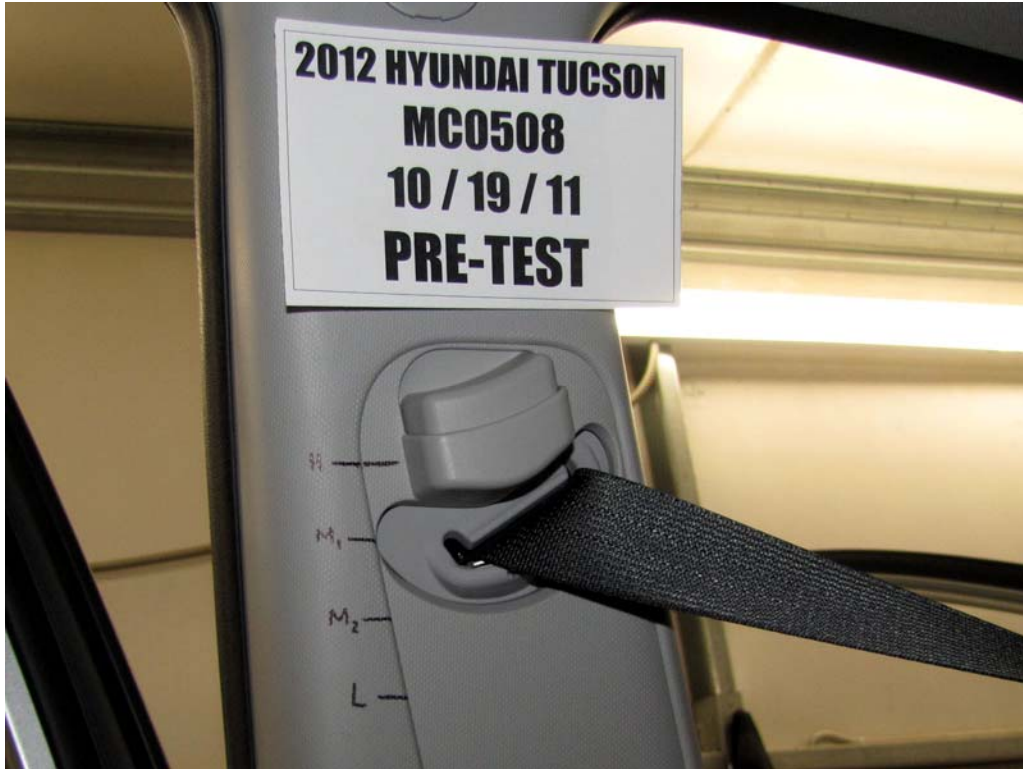


FIGURE 33. Pre-Test View of Belt Anchorage for Dummy



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



FIGURE 35. View of Disengaged Parking Brake



FIGURE 36. Pre-Test View of Parking Brake



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



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



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



FIGURE 40. Pre-Test Driver Dummy and Door Clearance



FIGURE 41. Post-Test Driver Dummy and Door Clearance



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



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



FIGURE 44. Pre-Test Inner 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

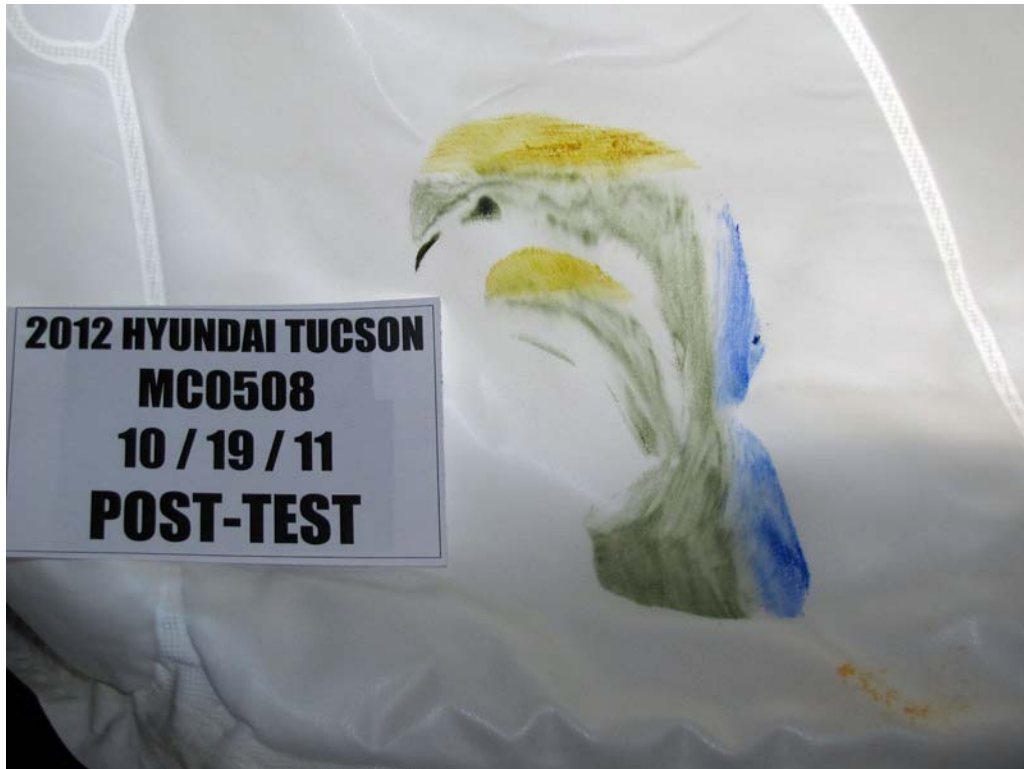


FIGURE 47. Post-Test Dummy Close-Up Head Contact with Side Airbag View



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



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



FIGURE 54. Close-Up View of Vehicle's Certification Label



FIGURE 55. Close-Up View of Vehicle's Tire Information Placard



FIGURE 56. Pre-Test Pole Barrier Front View



FIGURE 57. Post-Test Pole Barrier Front View



FIGURE 58. Pre-Test Pole Barrier Side View



FIGURE 59. Post-Test Pole Barrier Side View

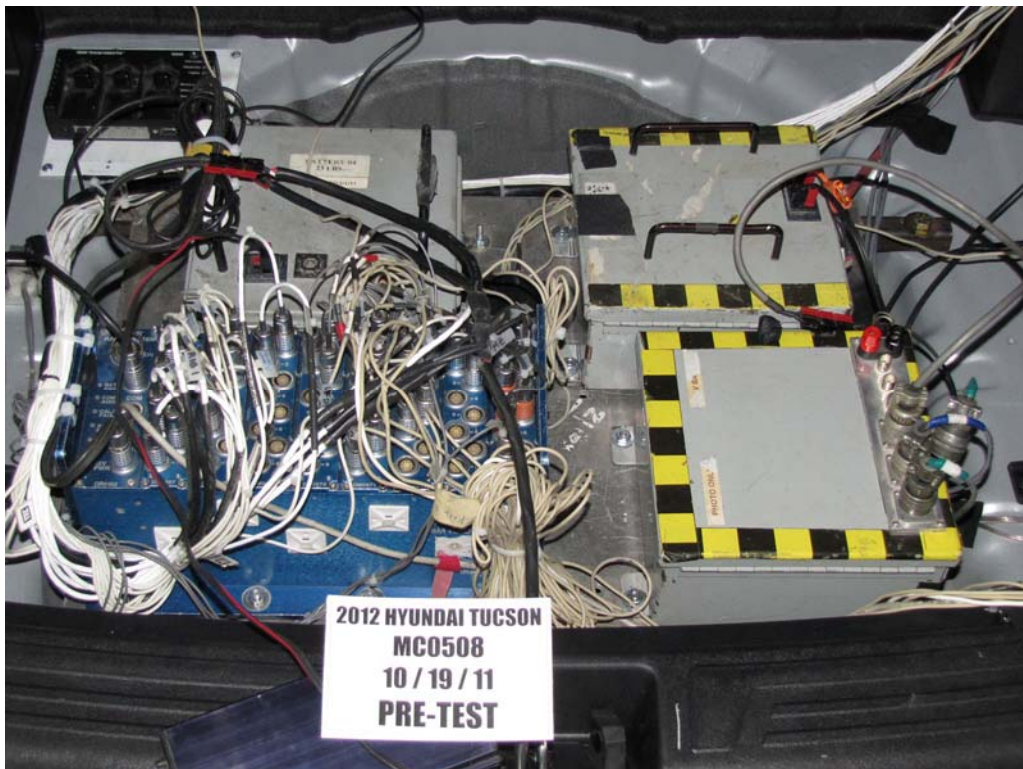


FIGURE 60. Pre-Test Ballast View



FIGURE 61. Post-Test Primary and Redundant Speed Trap Read-Out

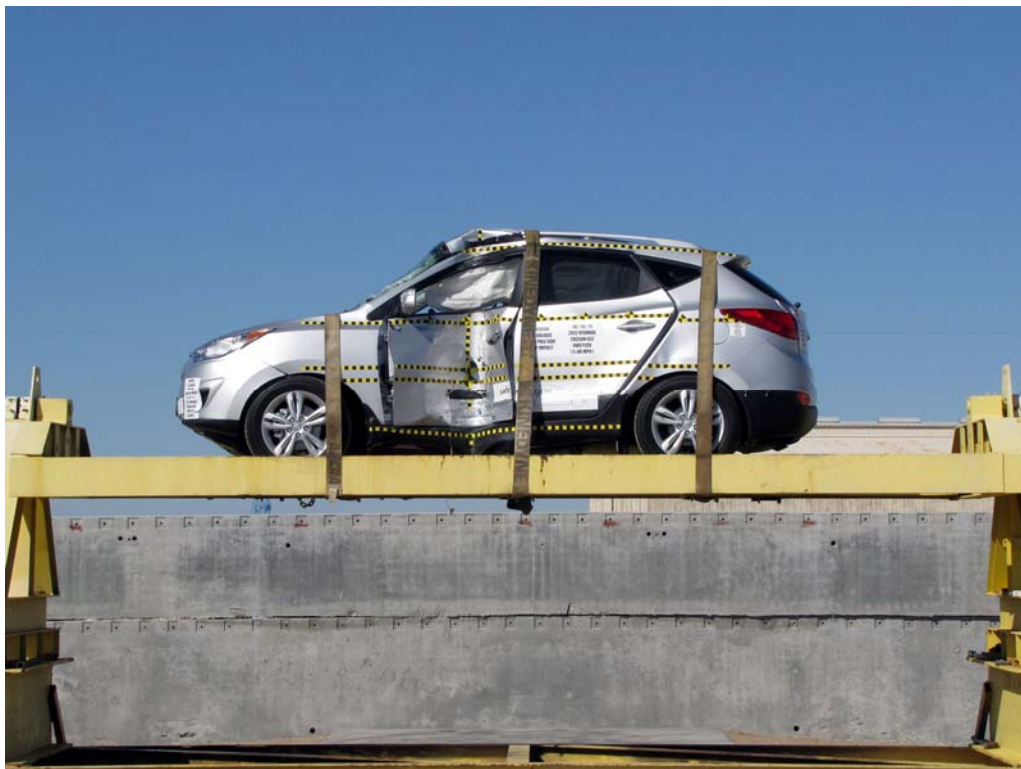


FIGURE 62. FMVSS No. 301-305 Rollover 0 Degrees



FIGURE 63. FMVSS No. 301-305 Rollover 90 Degrees

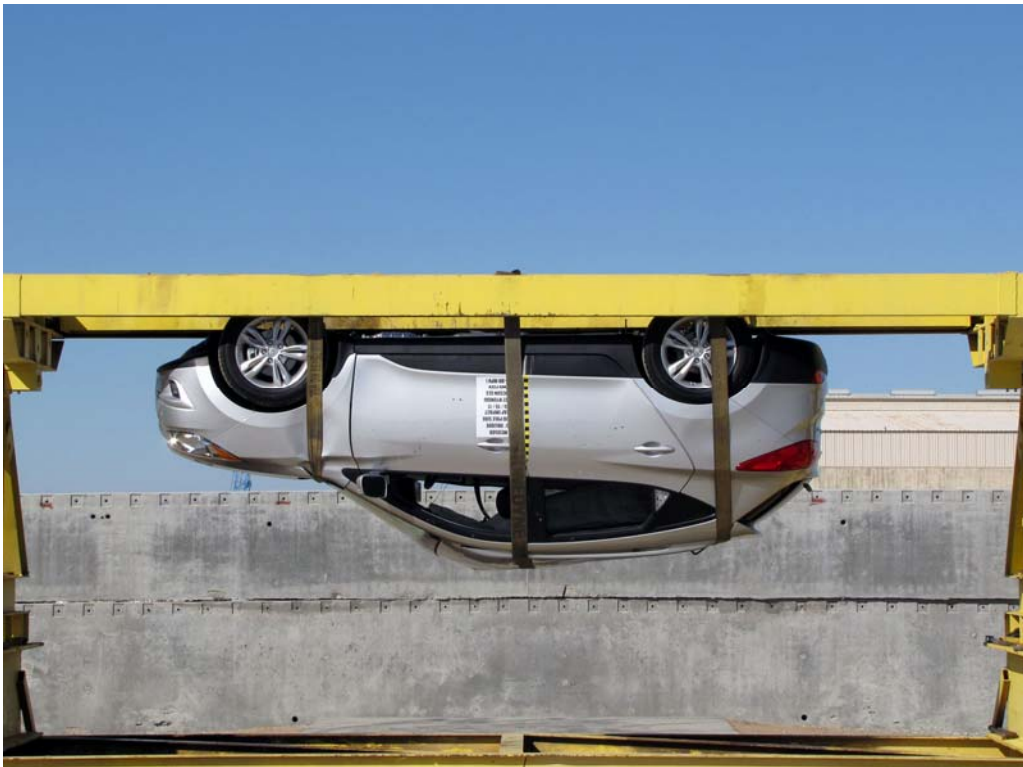


FIGURE 64. FMVSS No. 301-305 Rollover 180 Degrees



FIGURE 65. FMVSS No. 301-305 Rollover 270 Degrees

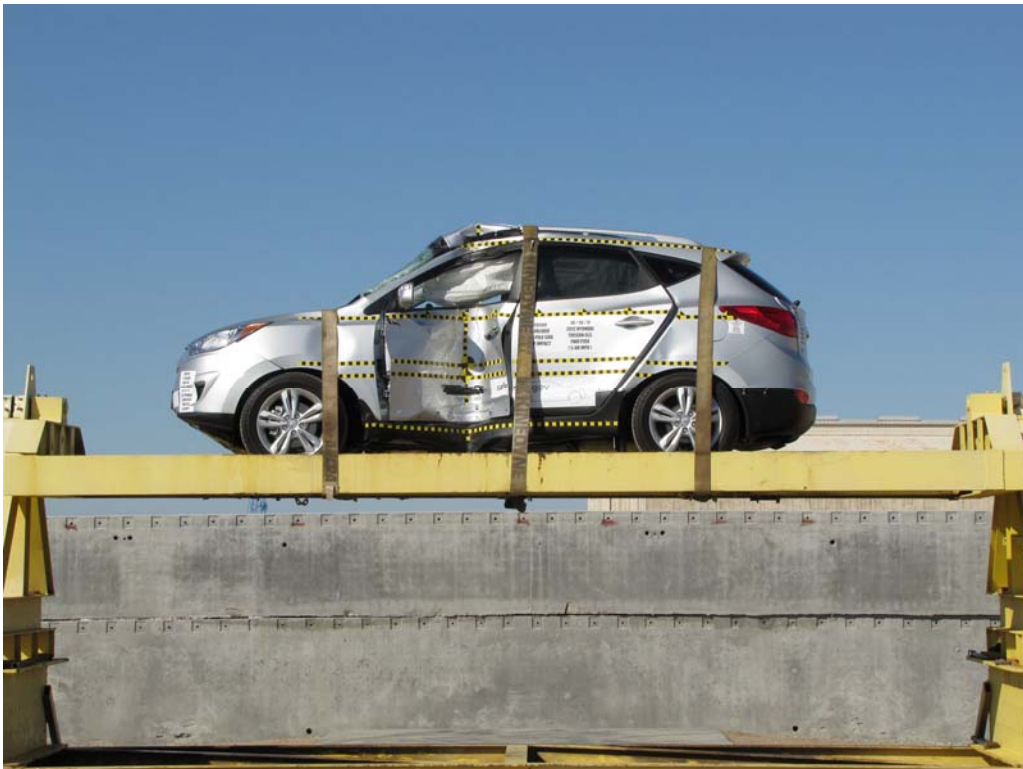


FIGURE 66. FMVSS No. 301-305 Rollover 360 Degrees



FIGURE 67. Impact Event

HYUNDAI

2012 TUCSON GLS FWD PZEV

Tucson delivers sleek European design coupled to excellent safety and efficient operation.

SOLD TO: CA219
 GLENDORA HYUNDAI
 1255 SOUTH LONE HILL AVENUE
 GLENDORA, CA 91740

SHIPPED TO: CA219

VIN: KMJLUSAC1C066508
MODEL: E3422F4P
ENGINE: G4K6BU493592
PORT OF ENTRY: HSJ
EXTERIOR COLOR: DIAMOND SILVER
INTERIOR COLOR: BLACK
MODE OF TRANSPORT: TRUCK
ACCESSORY WEIGHT: 23 lbs
EMISSIONS: This vehicle meets California Emissions regulations and is Certified as a Partial Zero Emission Vehicle (PZEV).

STANDARD FEATURES
 AMERICA'S BEST WARRANTY
 "3-year/50,000-mile New Vehicle Warranty"
 "10-year/100,000-mile Powertrain Warranty"
 "7-year/100,000-mile Anti-rust/perforation Warranty"
 "3-year/50,000-mile Roadside Assistance"
 "3-year/50,000-mile Dealer for details"

ADVANCED SAFETY TECHNOLOGY
 Electronic Stability Control with Traction Control System
 ABS w/ Electronic Brake-Force Distribution & Brake Assist
 Overhead Brake Control & Hillstart Assist Control
 Advanced Front Airbag System
 Front Side-Impact Airbags
 Side Curtain Airbags with Roll-over Sensors
 Tire Pressure Monitor System
 Active Front Head Restraints

POWERTRAIN TECHNOLOGY
 2.4L D4CB 18 Valve 4-Cylinder Engine w/ Engine Cover
 6-Speed Automatic Transmission w/ ECTRONIC Shift Function
 Premium Select Suspension Dampers
 17" Wheel Drive
 17" Alloy Wheels with Low Rolling Resistance Tires

COMFORT & CONVENIENCE
 Air Conditioning with Cabin Air Filter
 AM/FM Stereo with 6-disc In-Dash Input Jack
 XM® Satellite Radio w/ 30 Day Trial, Not Available in AK & HI
 Bluetooth® Hands-Free Phone System and USB Cable
 Leatherette Bucket/Club Inlet Seating Surfaces
 Split Touch Interior Panel & Front Seatback Pockets
 Leather Wrapped Steering Wheel and Gear Shift Knob
 Trip & Telematics Steering Wheel w/ Audio & Cruise Controls
 Keyless Entry System with Alarm
 Body-color Heated Power Mirrors with Turn Signal Repeaters
 Power Door/Luggage Locks & Remote Door Handles
 Multi-Function Tap Computer & Audio ECO System
 Power Windows with Driver's Auto Up/Down
 60/40 Split Folding Rear Seat
 6-Speakers w/ 6-disc In-Dash Stereo
 Roof Rack Side Rails & Black Side Gammah
 Front Side & Rear Privacy Glass, Rear Wiper w/ Washer
 Body-color Floor Mats with LED Lights
 Pull Truck of Gear

MANUFACTURER'S SUGGESTED RETAIL PRICE: \$22,195.00

ADDED FEATURES:
 Customized Floor Mats \$100.00
 Cargo Net \$100.00
 Rear Cargo Tray \$100.00
 Rear Air Kit \$250.00
 Auto-Dimming Mirror w/ HomeLink & Compass \$60.00
 Mudguards \$50.00
 Wheel Locks \$50.00

PART CONTENT INFORMATION
 FOR VEHICLES IN THIS CABLINE: U.S./CANADIAN PARTS CONTENT: 1 %
 MAJOR SOURCES OF FOREIGN PARTS CONTENT: Korea 96 %

Notes: Parts content does not include final assembly, distribution, or other non-parts costs.
 FOR THIS VEHICLE: FINAL ASSEMBLY POINT: Ulsan, Korea

COUNTRY OF ORIGIN: ENGINE: Korea **TRANSMISSION:** Korea

EPA Fuel Economy Estimates

CITY MPG
22
 Expected range for most drivers
 18 to 26 MPG

Estimated Annual Fuel Cost
\$ 2220.00
 Based on 15,000 miles at \$3.70 per gallon

Combined Fuel Economy
25
 This vehicle

HIGHWAY MPG
32
 Expected range for most drivers
 26 to 38 MPG

Your actual mileage will vary
 depending on how you drive and maintain your vehicle.

See the Free Fuel Economy Guide at dealers or www.fueleconomy.gov

Environmental Performance

Protect the Environment, choose vehicles with higher scores:
 Global Warming Score Smog Score

Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on this vehicle's measured emissions. Please visit www.drivecleantools.com for more information. **AIR RESOURCE BOARD**

254 A 2452KSLVLE 11

GOVERNMENT SAFETY RATINGS

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

Star ratings based on the risk of injury in a crash impact.
 Star ratings range from 1 to 5 stars. 5 stars is the highest.
 Source: National Highway Traffic Safety Administration (NHTSA)

www.safercar.gov or 1-888-327-4236

FIGURE 68. Monroney Label

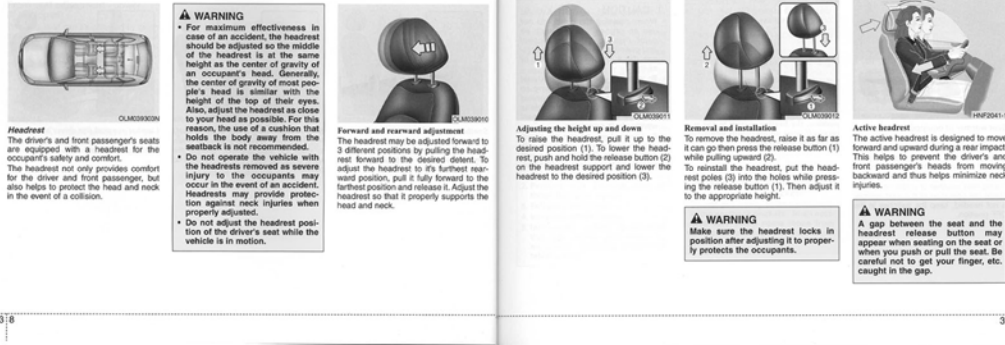


FIGURE 69. Head Restraint Use and Adjustment
Information from Vehicle Manual

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)

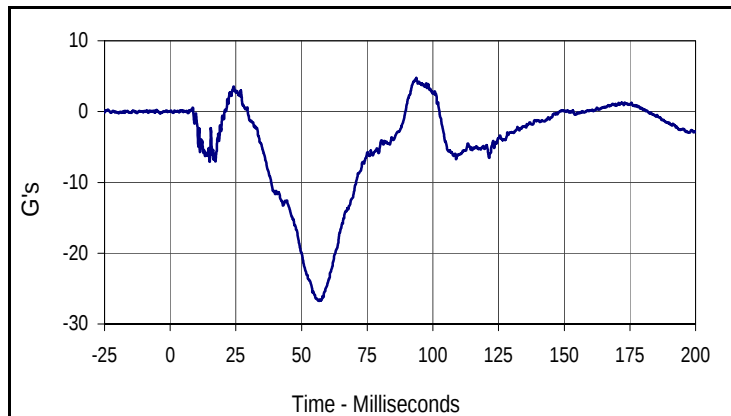
Left B-Pillar Sill Acceleration
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration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

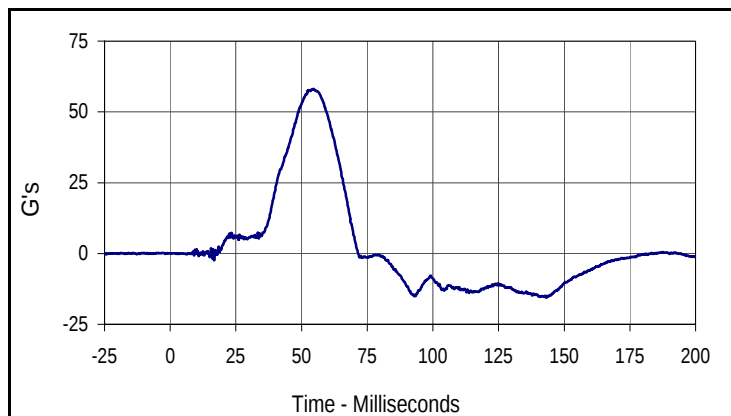
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

Test Vehicle: 2012 Hyundai Tucson GLS FWD PZEV 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

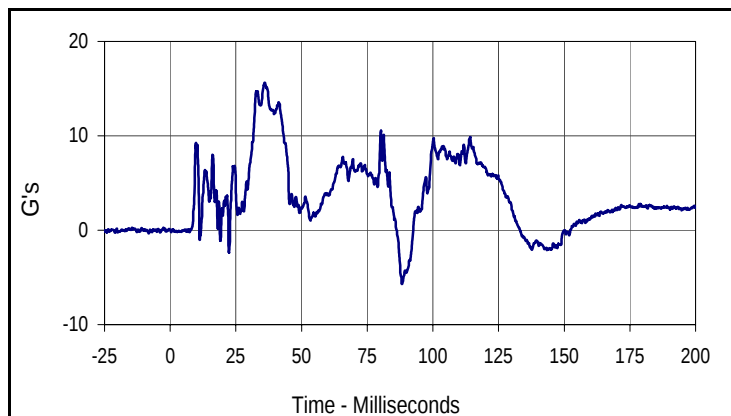
Test Date: 10/19/11
 NHTSA No.: MC0508



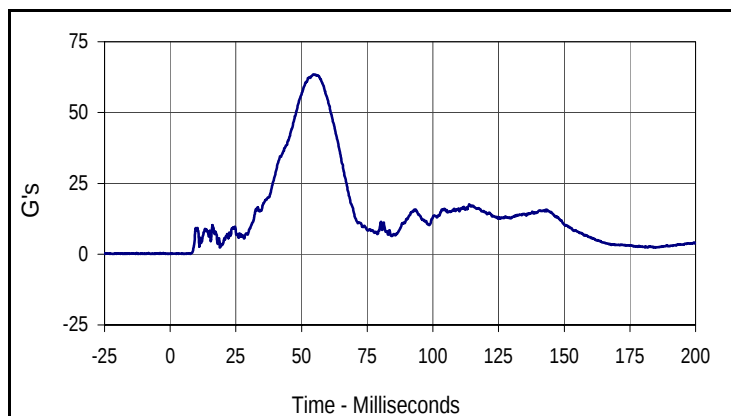
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
4.8	93.6	-26.8	56.7



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
58.2	54.5	-15.5	142.9



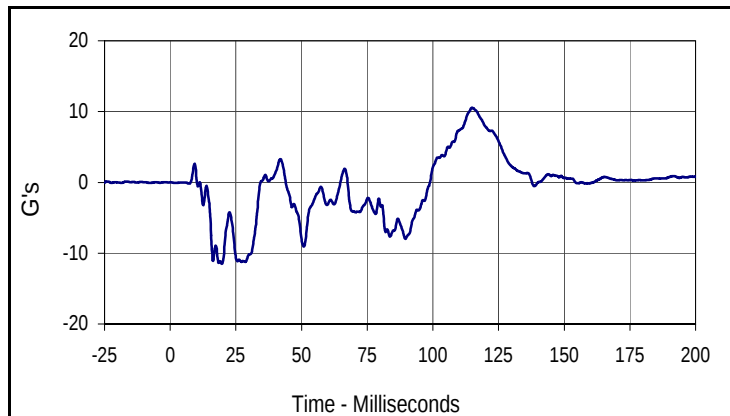
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
15.6	36.0	-5.7	88.3



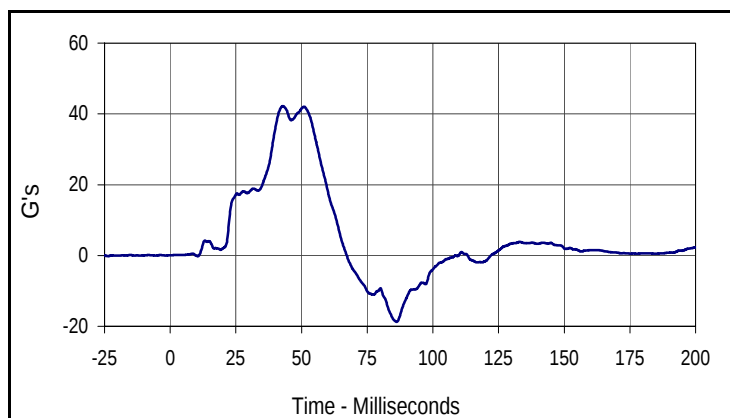
Curve Description			
Driver Head Acceleration Primary Res.			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
63.5	54.5	0.1	7.6

Test Vehicle: 2012 Hyundai Tucson GLS FWD PZEV 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

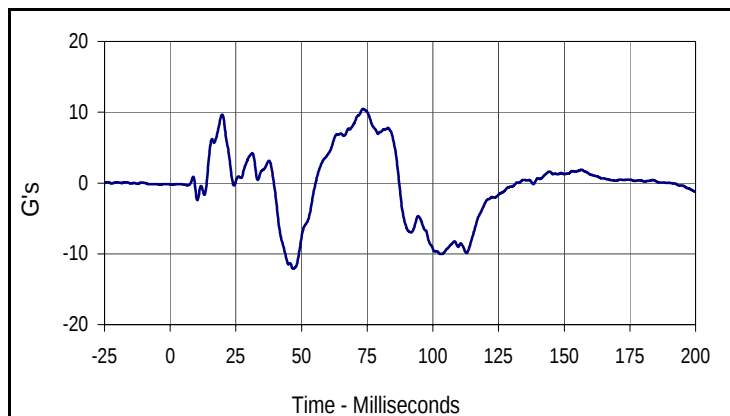
Test Date: 10/19/11
 NHTSA No.: MC0508



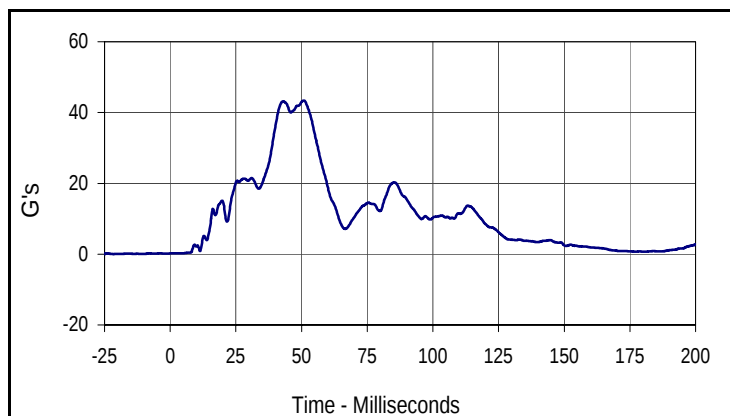
Curve Description			
Driver Lower Spine T12 Acceleration X			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
10.5	114.9	-11.5	19.6



Curve Description			
Driver Lower Spine T12 Acceleration Y			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
42.2	42.9	-18.8	86.2



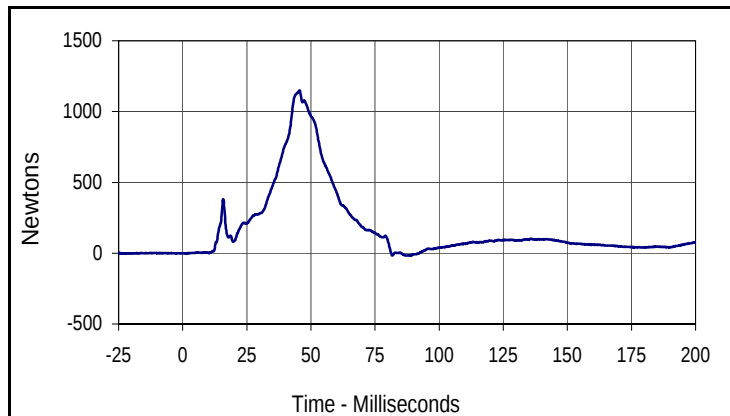
Curve Description			
Driver Lower Spine T12 Acceleration Z			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
10.5	73.3	-12.1	46.8



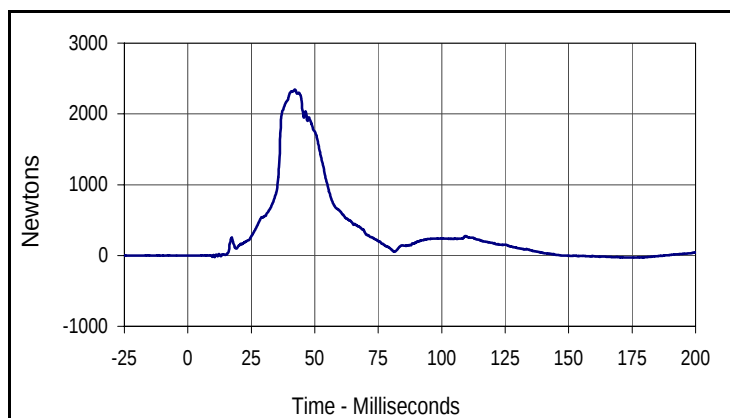
Curve Description			
Driver Lower Spine T12 Acceleration Res.			
Plot No.	Type	SAE Class	Units
008	RES	180	G's
Max	Time	Min	Time
43.4	50.9	0.2	4.0

Test Vehicle: 2012 Hyundai Tucson GLS FWD PZEV 5-Door MPV
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

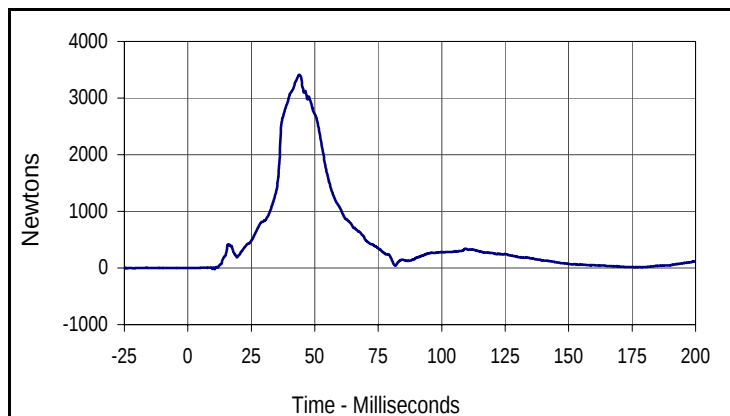
Test Date: 10/19/11
 NHTSA No.: MC0508



Curve Description			
Driver Iliac Wing Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
009	FIL	600	Newtons
Max	Time	Min	Time
1149.7	45.5	-18.2	88.9



Curve Description			
Driver Acetabulum Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Newtons
Max	Time	Min	Time
2345.6	42.2	-28.8	177.1



Curve Description			
Driver Total Pelvic Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
011	SUM	600	Newtons
Max	Time	Min	Time
3412.2	43.8	-22.0	10.6

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: 10/11/11
 Test I.D.: N/A



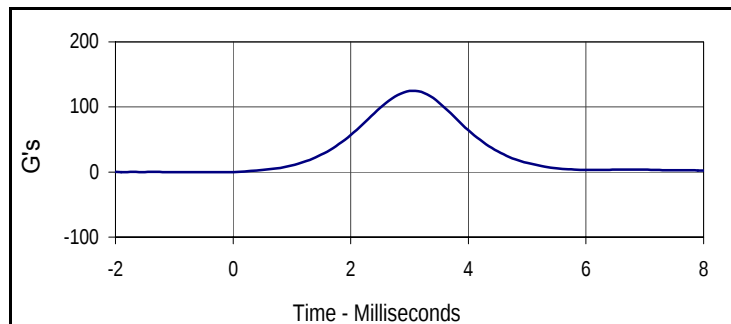
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
A	Sitting Height	mm	772 - 788	775	Pass
B	Shoulder Pivot Height	mm	437 - 453	441	Pass
C	H-Point Height	mm	79 - 89	80	Pass
D	H-Point from Seatback	mm	141 - 151	147	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	101	Pass
F	Thigh Clearance	mm	119 - 135	125	Pass
G	Head Breadth	mm	140 - 148	146	Pass
H	Head Back from Backline	mm	40 - 46	45	Pass
I	Head Depth	mm	178 - 188	186	Pass
J	Head Circumference	mm	541 - 551	549	Pass
K	Buttock to Knee Length	mm	514 - 540	527	Pass
L	Popliteal Height	mm	343 - 369	352	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	399	Pass
N	Buttock Popliteal Length	mm	416 - 442	429	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	200	Pass
P	Foot Length	mm	216 - 232	220	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	315	Pass
R	Arm Length	mm	249 - 259	256	Pass
S	Knee Joint to Seatback	mm	477 - 493	485	Pass
V	Shoulder Width	mm	341 - 357	350	Pass
W	Foot Width	mm	78 - 94	92	Pass
Y	Chest Circumference with Jacket	mm	851 - 881	878	Pass
Z	Waist Circumference	mm	760 - 791	773	Pass
Overall Test Results					Pass

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

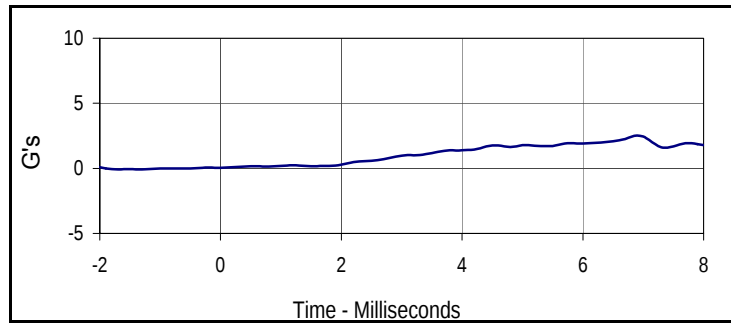
Test Date: 10/11/11
 Test I.D.: 299HD020



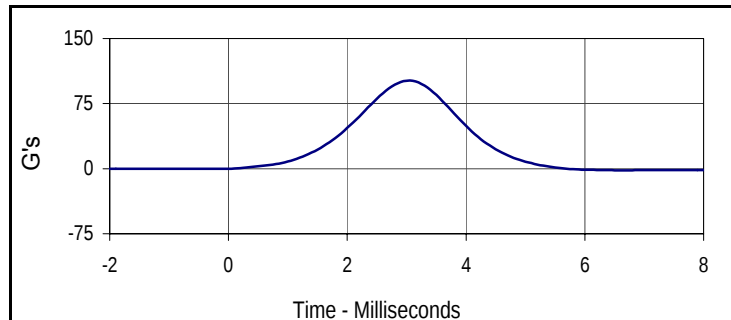
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	260	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.6	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.0	Pass
Peak Head Resultant Acceleration	G's	115 to 137	124.9	Pass
Peak Head X Acceleration	G's	<15	1.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	11.4	Pass
Overall Test Results				Pass



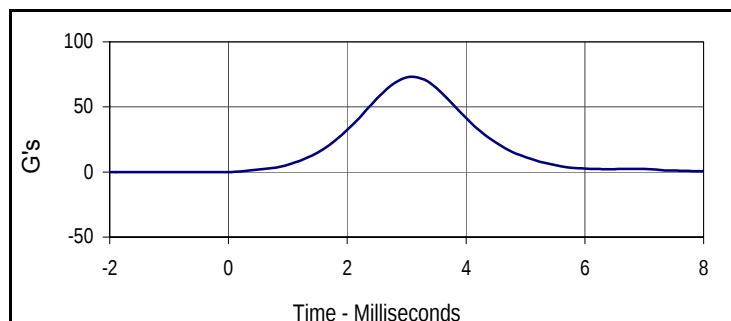
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
124.9	3.1	0.0	-0.4



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.9	5.8	-0.1	-1.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
101.3	3.0	-1.9	6.6



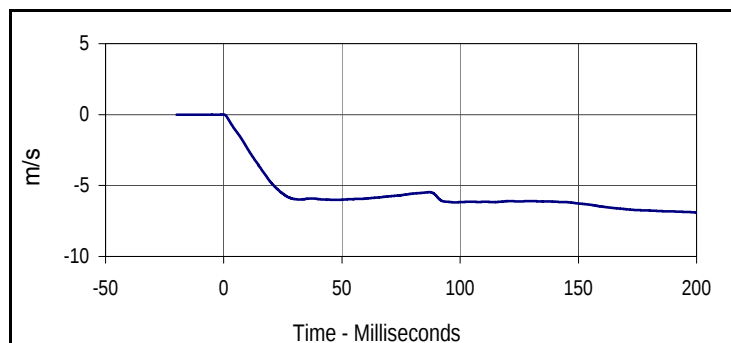
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
73.1	3.1	-0.7	0.0

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

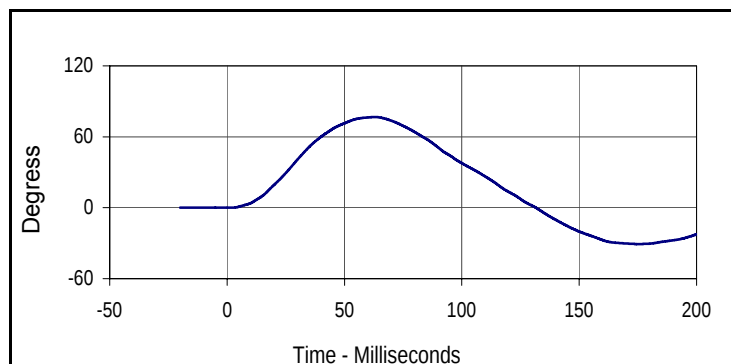
Test Date: 10/11/11
 Test I.D.: 299NB020



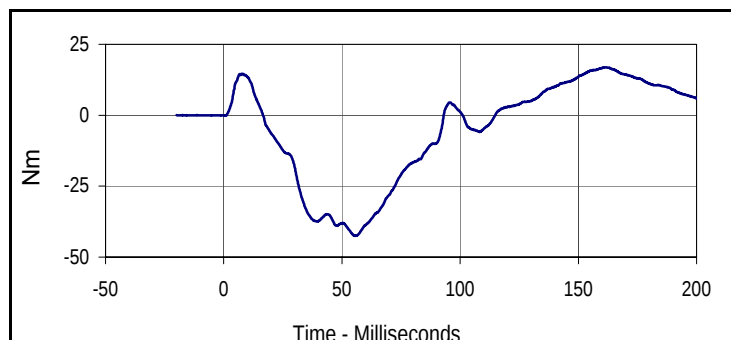
Tested Parameter		Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time		Minutes	≥240	345	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.0	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.55	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.38	Pass
	15 msec	m/s	-3.30 to -4.10	-3.63	Pass
	20 msec	m/s	-4.40 to -5.40	-4.79	Pass
	25 msec	m/s	-5.40 to -6.10	-5.58	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.18	Pass
D-Plane Rotation	Max	Degrees	71 to 81	76.7	Pass
	Time	msec	50 to 70	63.1	Pass
Peak Occipital Condyle Moment		Nm	-36 to -44	-42.5	Pass
Decaying Moment Time to Cross 0 Nm		msec	102 to 126	114.9	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.4	-6.9	200.0



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
76.7	63.1	-30.7	175.3



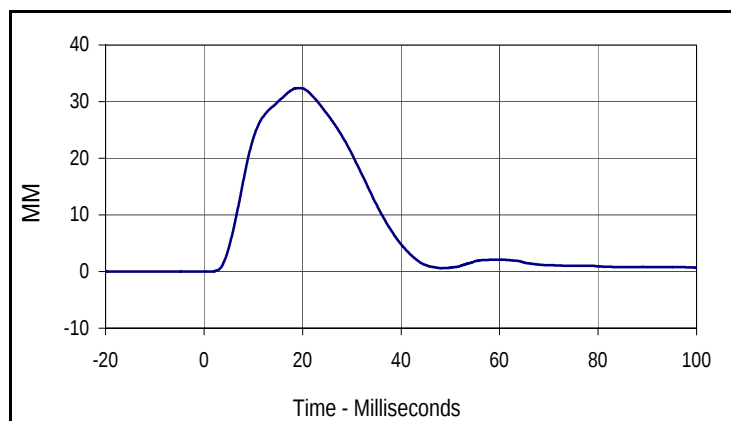
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
16.9	161.7	-42.5	55.5

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

Test Date: 10/11/11
 Test I.D.: 299SH020



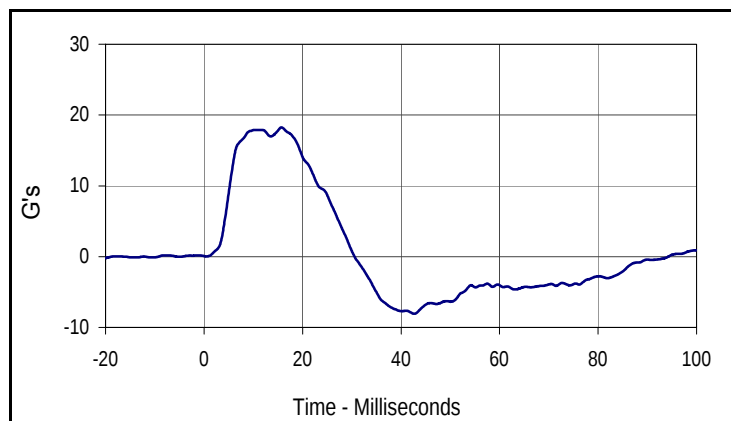
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	375	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.5	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.32	Pass
Peak Shoulder Deflection		mm	28 to 37	32.4	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	18.2	Pass
Peak Impactor Acceleration		G's	13 to 18	15.7	Pass
Overall Test Results				Pass	



Curve Description

Shoulder Deflection

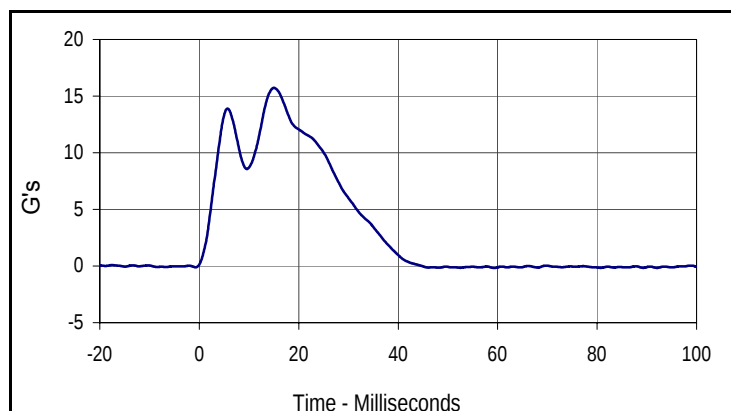
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
32.4	19.1	0.0	-6.3



Curve Description

Upper Spine Y Acceleration

Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.2	15.7	-8.1	42.6



Curve Description

Impactor Acceleration

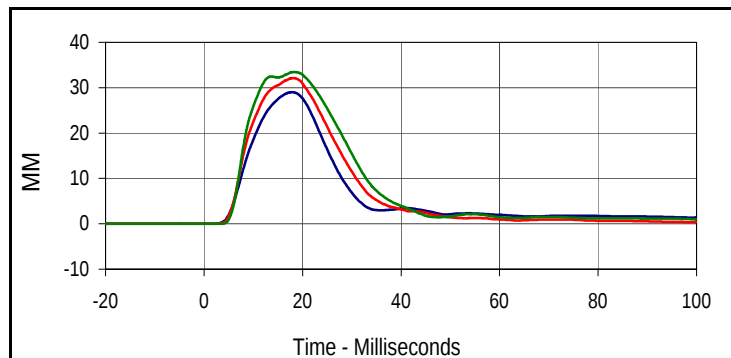
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
15.7	15.0	-0.2	59.3

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

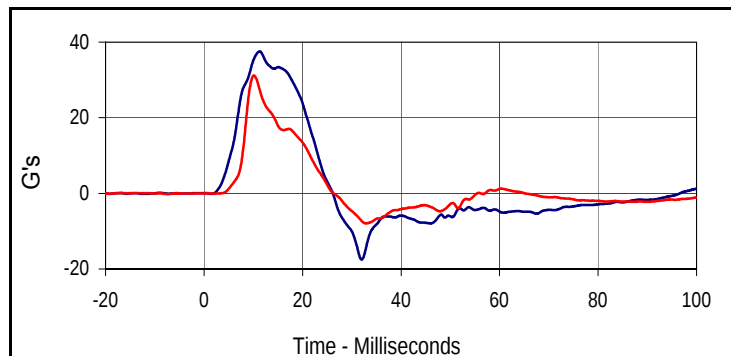
Test Date: 10/11/11
 Test I.D.: 299TWA020



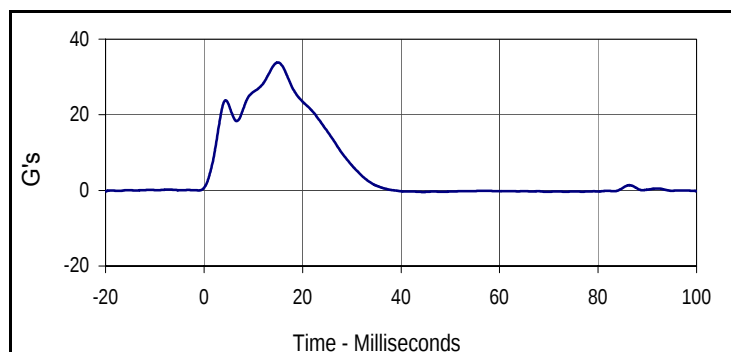
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	400	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity 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	35.0	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	29.0	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	32.1	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	33.4	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	37.5	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	31.2	Pass
Peak Impactor Acceleration	G's	30 to 36	33.9	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
29.0	17.8	0.0	-18.3
Middle Thorax Deflection			
Max	Time	Min	Time
32.1	18.0	0.0	-17.2
Lower Thorax Deflection			
Max	Time	Min	Time
33.4	18.3	0.0	-19.0



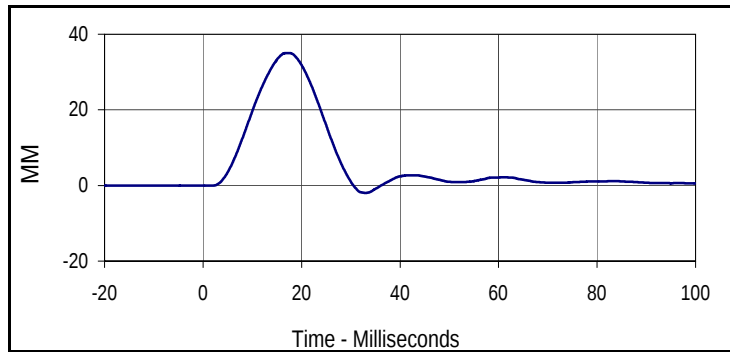
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
37.5	11.3	-17.5	32.0
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
31.2	10.1	-7.9	32.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
33.9	15.0	-0.4	44.5

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

Test Date: 10/11/11
 Test I.D.: 299TWA020



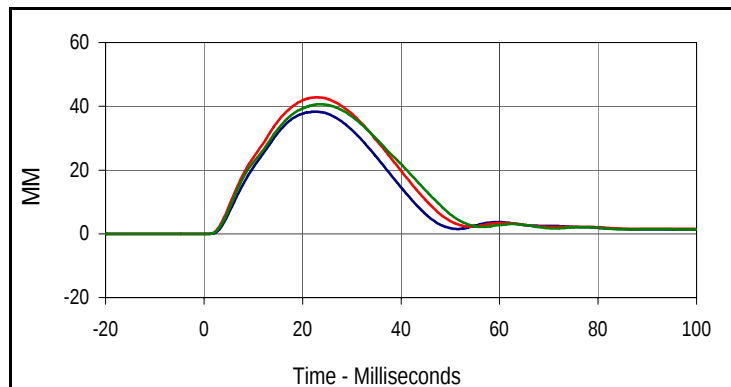
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
35.0	17.3	-2.0	33.0

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

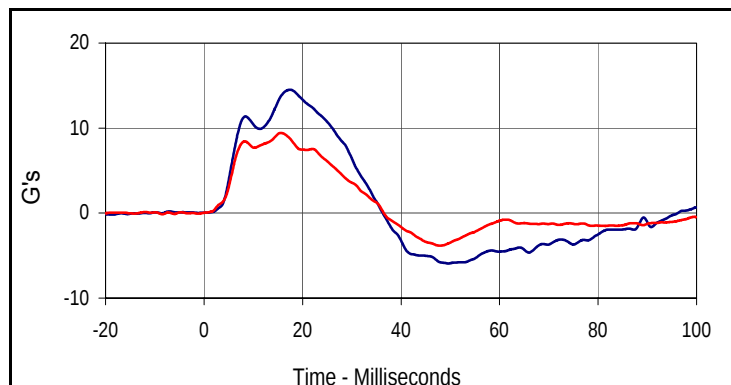
Test Date: 10/11/11
 Test I.D.: 299TWOA020



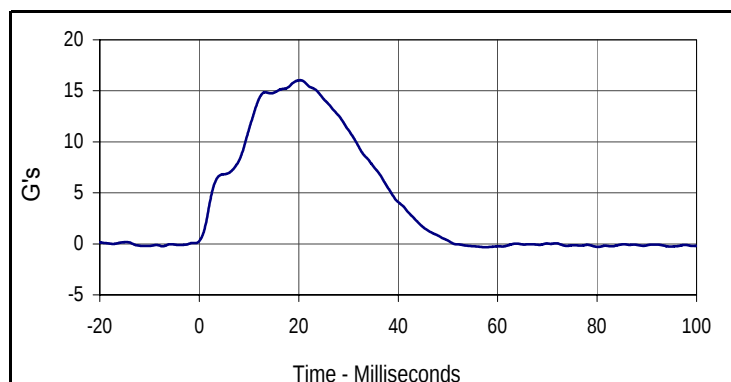
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	435	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.0	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.2	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	38.3	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	42.8	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	40.6	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	14.5	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	9.4	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
38.3	22.6	0.0	-8.5
Middle Thorax Deflection			
Max	Time	Min	Time
42.8	22.9	0.0	-8.3
Lower Thorax Deflection			
Max	Time	Min	Time
40.6	23.7	0.0	-10.9



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.5	17.5	-5.9	49.6
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.4	15.6	-3.8	47.9



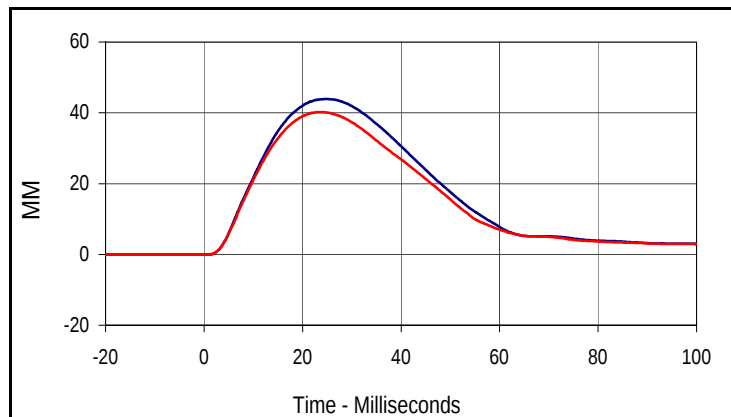
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.0	20.3	-0.3	57.5

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

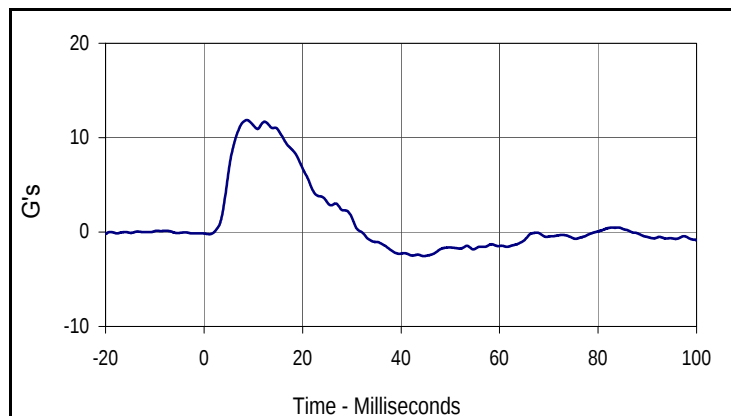
Test Date: 10/11/11
 Test I.D.: 299ABD020



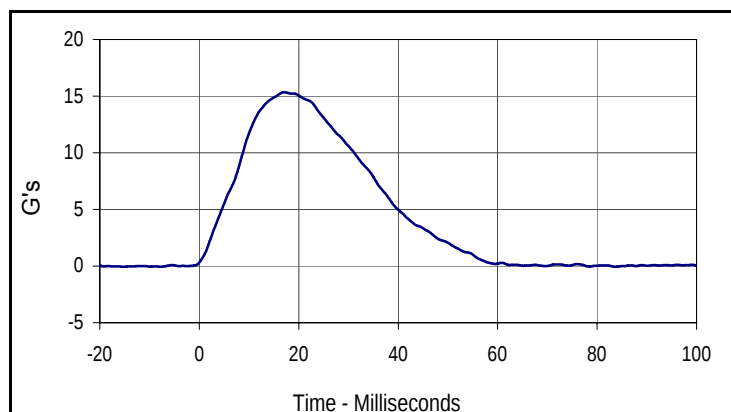
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	470	Pass
Temperature During Soak	Max	20.6 to 22.2	21.9	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.0	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	43.9	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	40.2	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	11.9	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
43.9	24.7	0.0	-19.7
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
40.2	23.5	0.0	-13.4

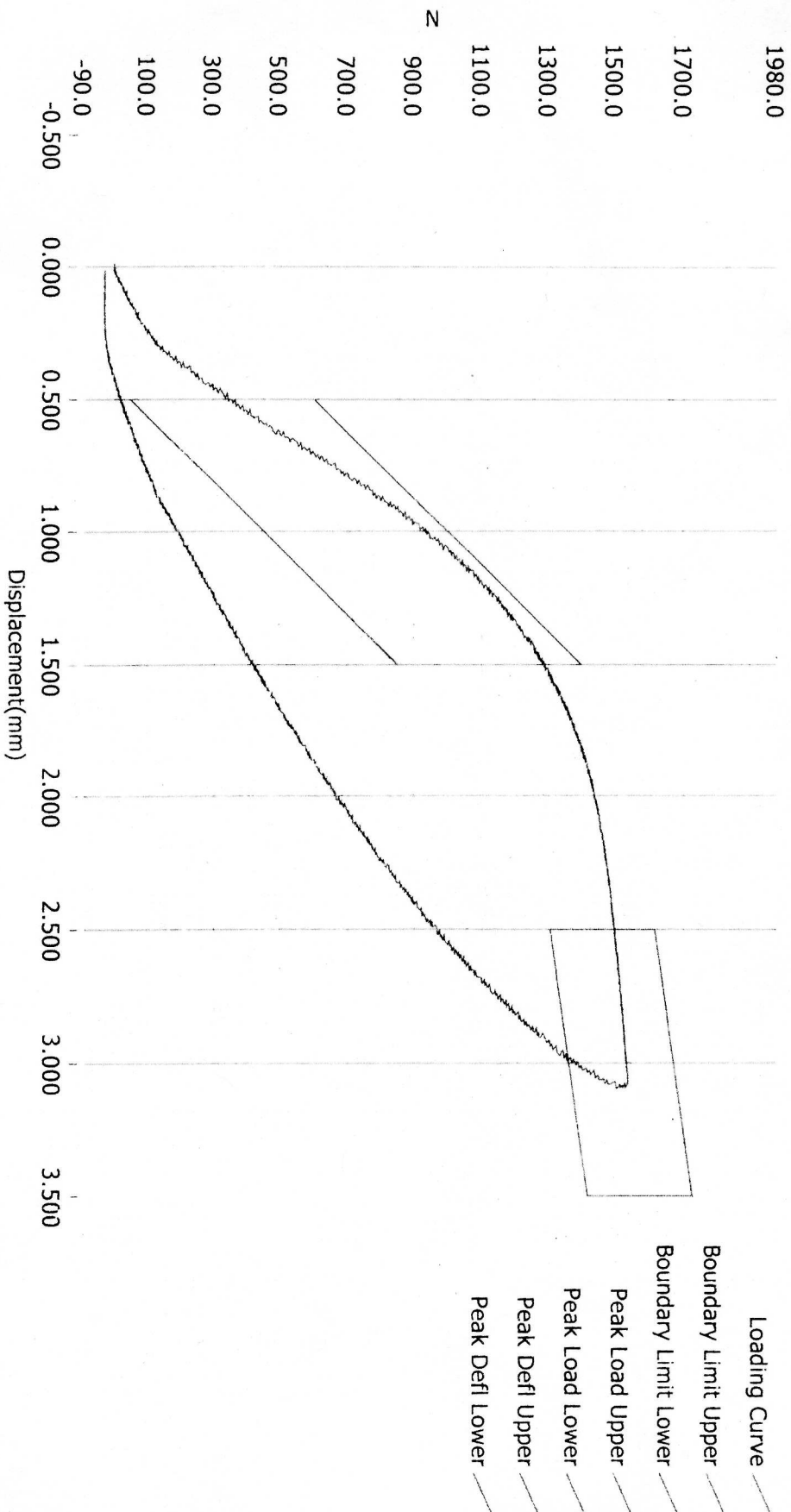


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
11.9	8.7	-2.6	44.6



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.3	17.1	-0.1	0.0

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID

Part Serial Number

Test Date

Test Time

Cert ID

ATD Serial Number

ATD Type

36733

SIDIIs

Current Date : 10/5/2010

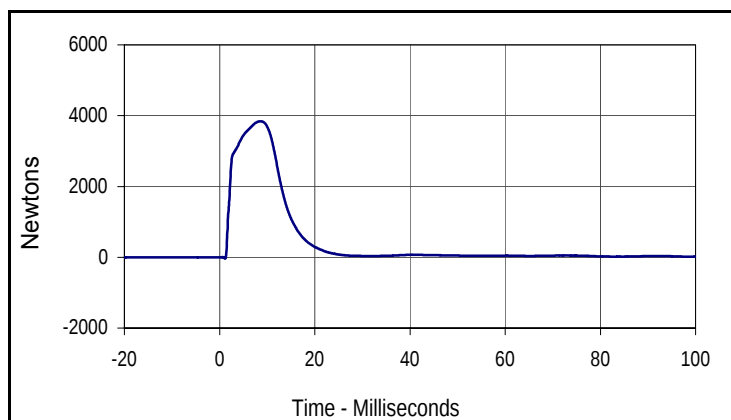
Current Time : 06:34:52

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

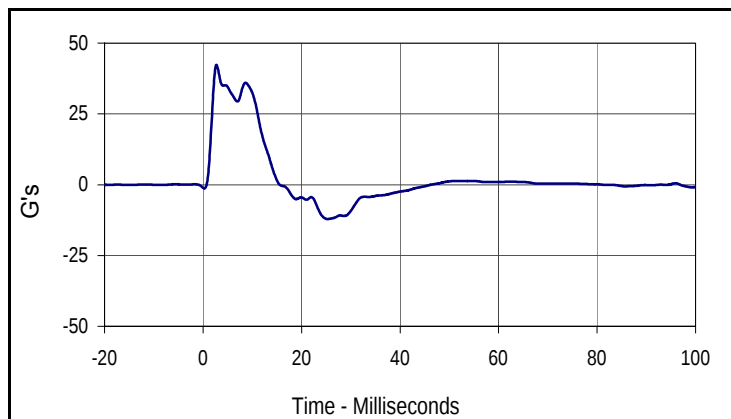
Test Date: 10/11/11
 Test I.D.: 299ACET020



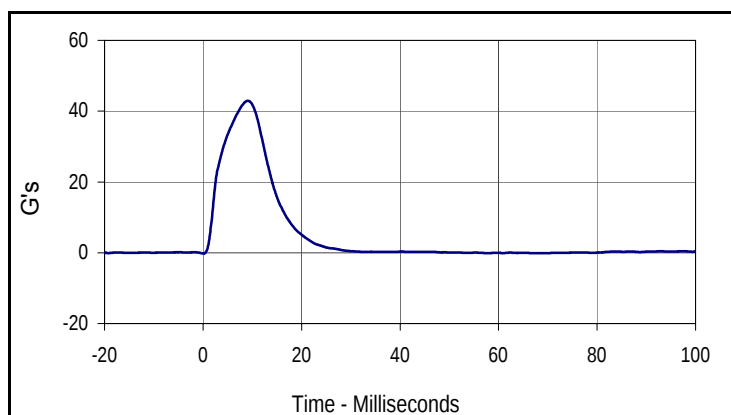
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	495	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.7	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.6	Pass
Peak Acetabulum Force Y	Newtons	3400 to 4200	3842.2	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	36.0	Pass
Peak Impactor Acceleration	G's	38 to 47	42.9	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3842.2	8.6	-37.4	1.2



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
42.3	2.7	-12.1	25.3



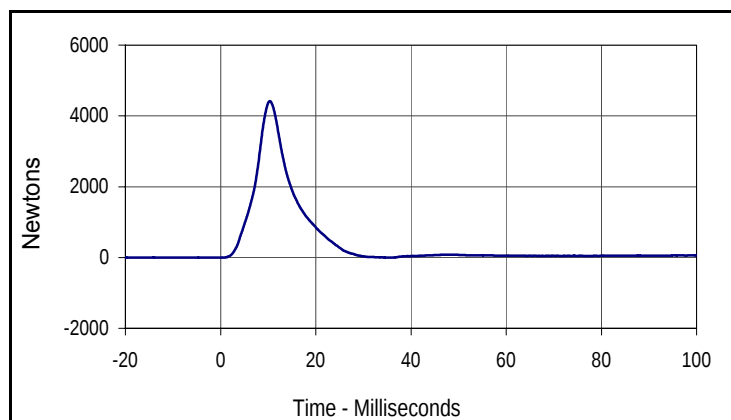
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
42.9	9.1	-0.2	0.1

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

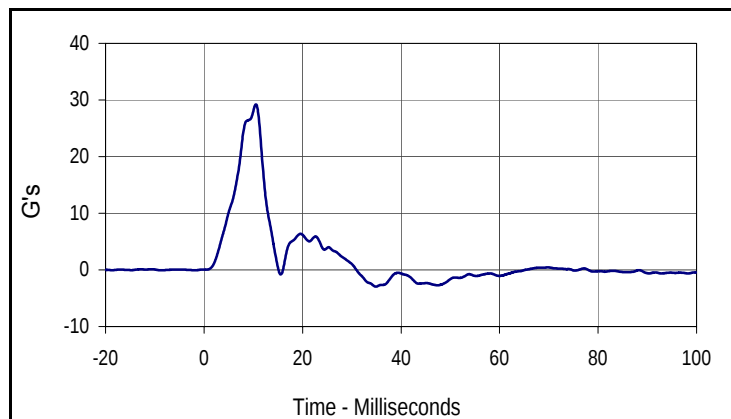
Test Date: 10/11/11
 Test I.D.: 299PL020



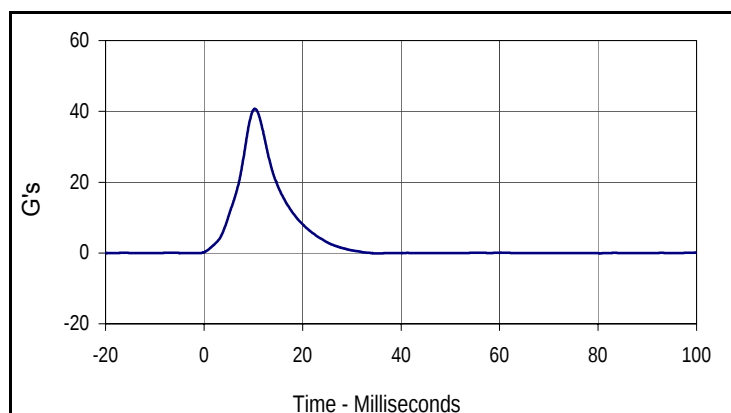
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	525	Pass
Temperature During Soak	Max	20.6 to 22.2	21.9	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.0	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Iliac Force	Newtons	4100 to 5100	4417.5	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	29.2	Pass
Peak Impactor Acceleration	G's	36 to 45	40.7	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4417.5	10.3	-2.8	35.8



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
29.2	10.5	-3.0	34.9



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
40.7	10.3	-0.1	34.9

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

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

Test Date: 10/19/11
 Test I.D.: N/A



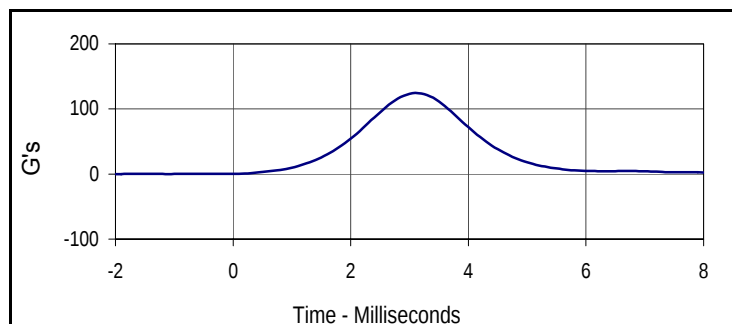
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
A	Sitting Height	mm	772 - 788	776	Pass
B	Shoulder Pivot Height	mm	437 - 453	442	Pass
C	H-Point Height	mm	79 - 89	80	Pass
D	H-Point from Seatback	mm	141 - 151	147	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	101	Pass
F	Thigh Clearance	mm	119 - 135	125	Pass
G	Head Breadth	mm	140 - 148	146	Pass
H	Head Back from Backline	mm	40 - 46	45	Pass
I	Head Depth	mm	178 - 188	186	Pass
J	Head Circumference	mm	541 - 551	548	Pass
K	Buttock to Knee Length	mm	514 - 540	527	Pass
L	Popliteal Height	mm	343 - 369	351	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	399	Pass
N	Buttock Popliteal Length	mm	416 - 442	429	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	200	Pass
P	Foot Length	mm	216 - 232	220	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	316	Pass
R	Arm Length	mm	249 - 259	256	Pass
S	Knee Joint to Seatback	mm	477 - 493	485	Pass
V	Shoulder Width	mm	341 - 357	350	Pass
W	Foot Width	mm	78 - 94	92	Pass
Y	Chest Circumference with Jacket	mm	851 - 881	878	Pass
Z	Waist Circumference	mm	760 - 791	773	Pass
Overall Test Results					Pass

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

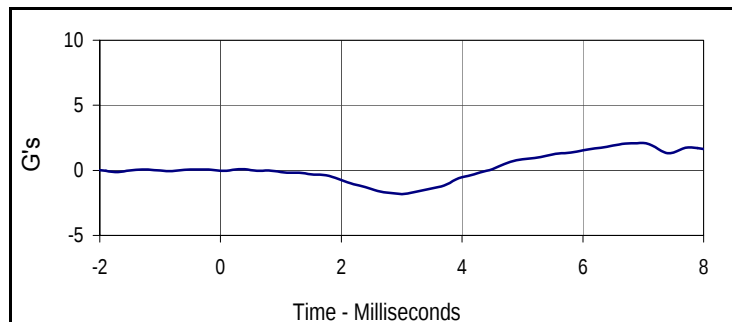
Test Date: 10/19/11
 Test I.D.: 299HD021



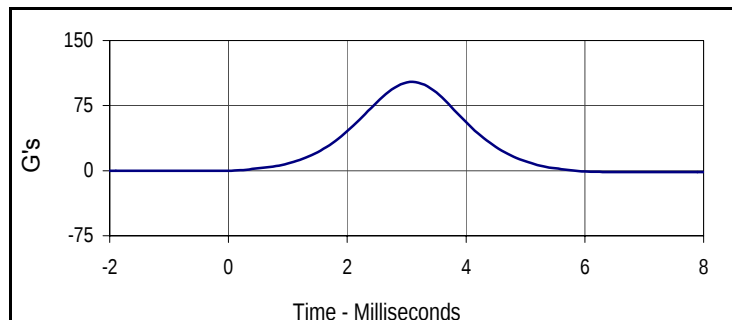
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	240	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.6	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Peak Head Resultant Acceleration	G's	115 to 137	124.6	Pass
Peak Head X Acceleration	G's	<15	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	14.5	Pass
Overall Test Results				Pass



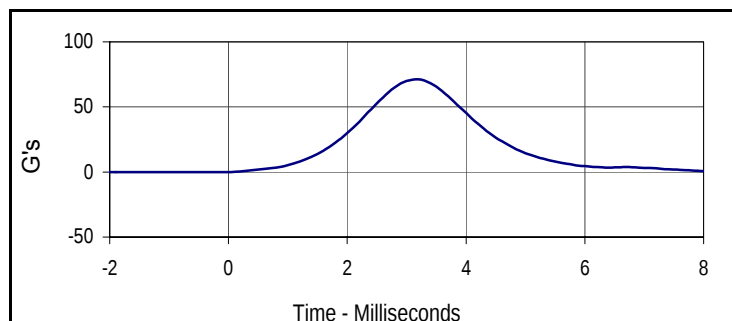
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
124.6	3.1	0.0	-2.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.5	6.0	-1.8	3.0



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
102.3	3.1	-1.7	6.6



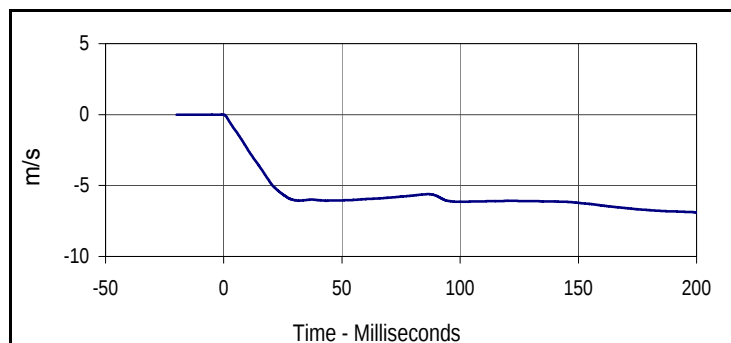
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
71.2	3.2	-0.5	0.0

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

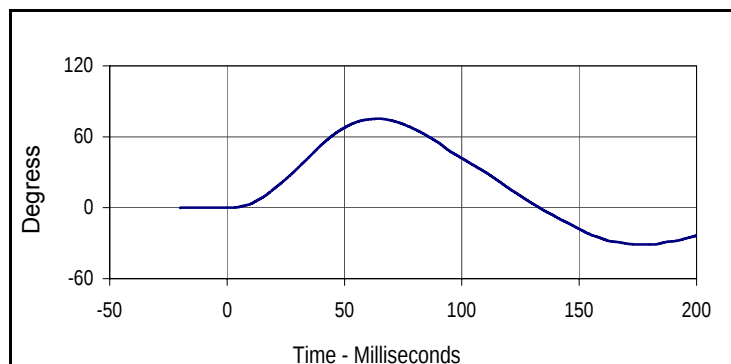
Test Date: 10/19/11
 Test I.D.: 299NB021



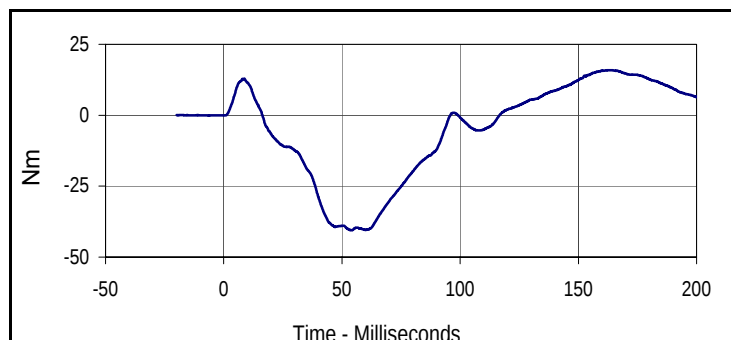
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	270	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.57	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.42	Pass
	15 msec	-3.30 to -4.10	-3.62	Pass
	20 msec	-4.40 to -5.40	-4.86	Pass
	25 msec	-5.40 to -6.10	-5.63	Pass
	25-100 msec	-5.50 to -6.20	-6.15	Pass
D-Plane Rotation	Max	71 to 81	75.3	Pass
	Time	50 to 70	64.7	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-40.5	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	116.7	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	-0.6	-6.9	200.0



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
75.3	64.7	-31.1	180.8



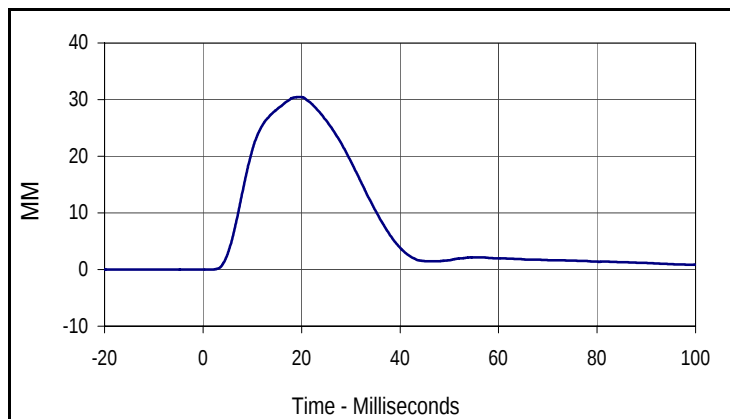
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
15.9	162.4	-40.5	53.8

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

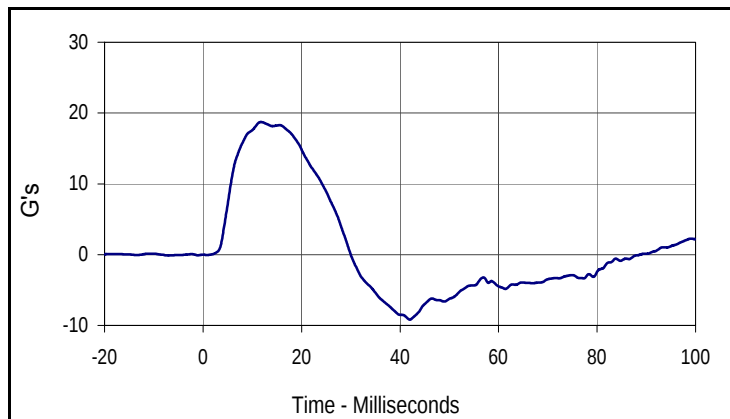
Test Date: 10/19/11
 Test I.D.: 299SH021



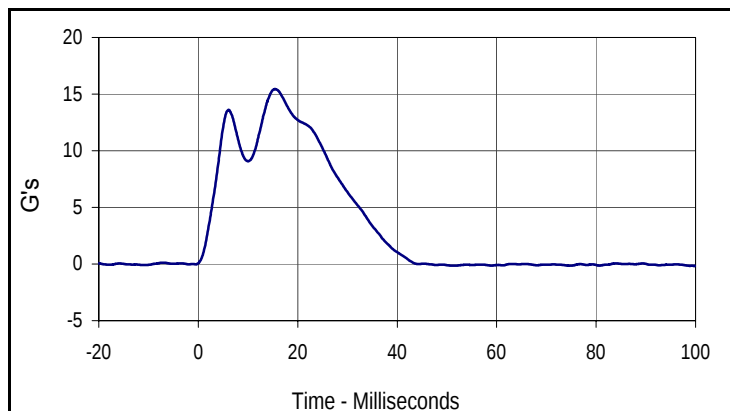
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	305	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.4	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.30	Pass
Peak Shoulder Deflection		mm	28 to 37	30.5	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	18.7	Pass
Peak Impactor Acceleration		G's	13 to 18	15.4	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
30.5	19.4	0.0	-18.1



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.7	11.7	-9.2	42.0



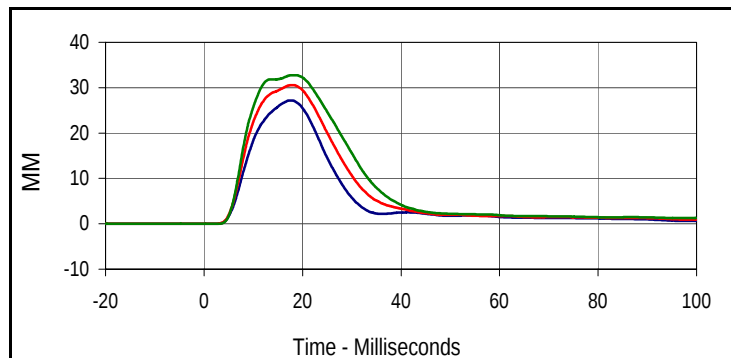
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
15.4	15.4	-0.2	99.9

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

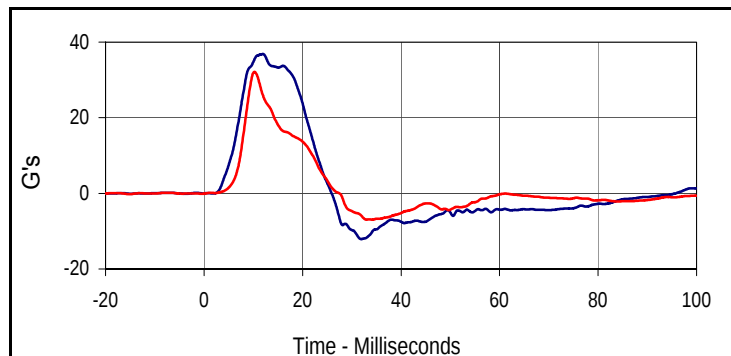
Test Date: 10/19/11
 Test I.D.: 299TWA021



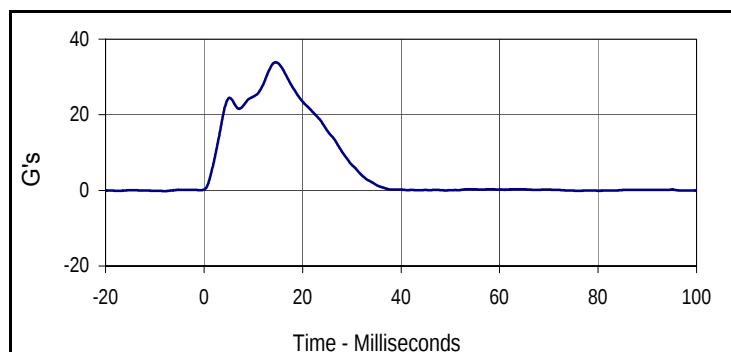
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	350	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.6	Pass
Peak Shoulder Deflection	mm	31 to 40	34.9	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	27.2	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	30.6	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	32.7	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	36.8	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	32.1	Pass
Peak Impactor Acceleration	G's	30 to 36	33.9	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
27.2	17.6	0.0	-7.4
Middle Thorax Deflection			
Max	Time	Min	Time
30.6	17.9	0.0	-8.8
Lower Thorax Deflection			
Max	Time	Min	Time
32.7	17.7	0.0	-7.7



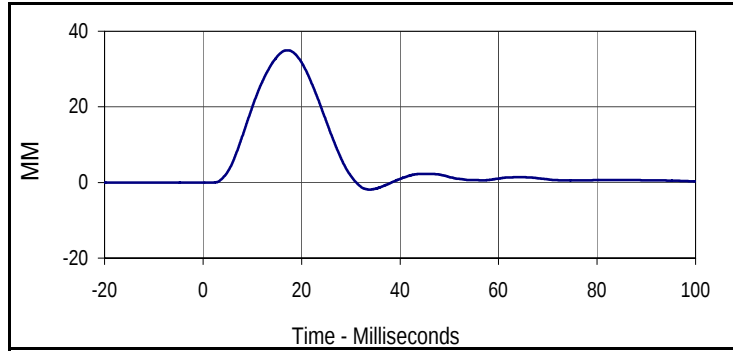
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
36.8	11.9	-12.1	32.0
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
32.1	10.2	-6.9	34.2



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
33.9	14.5	-0.2	-8.0

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

Test Date: 10/19/11
 Test I.D.: 299TWA021



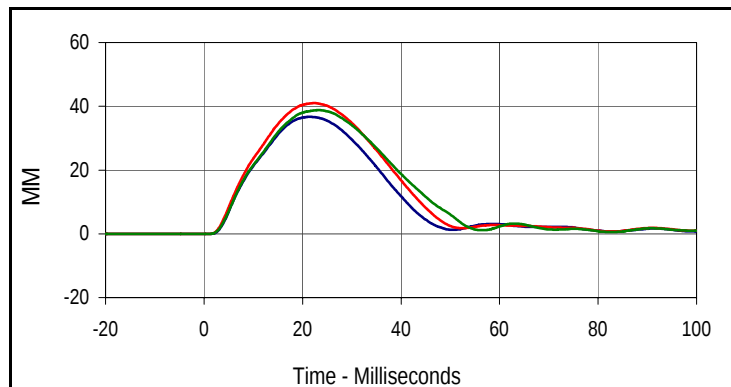
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
34.9	16.9	-1.9	33.8

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

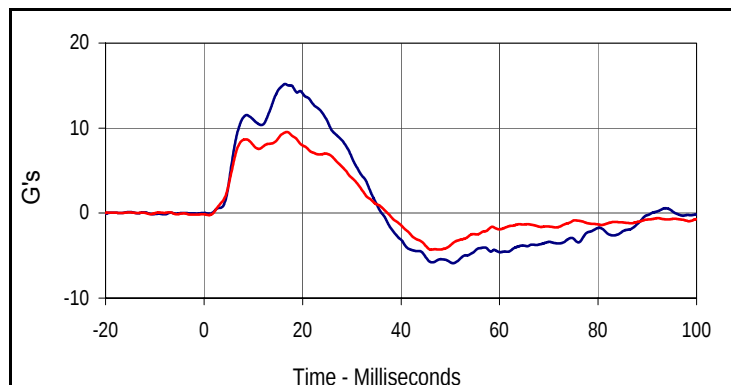
Test Date: 10/19/11
 Test I.D.: 299TWOA021



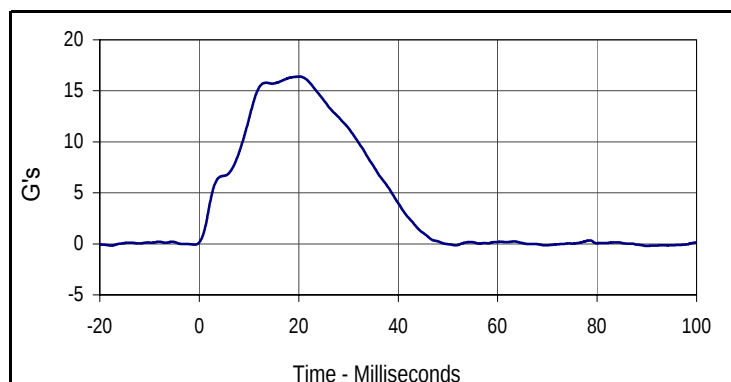
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	385	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	30.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.9	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.2	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	36.7	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	41.0	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	38.8	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	15.2	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	9.5	Pass
Peak Impactor Acceleration		G's	14 to 18	16.4	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
36.7	21.3	0.0	-4.0
Middle Thorax Deflection			
Max	Time	Min	Time
41.0	22.4	0.0	-19.5
Lower Thorax Deflection			
Max	Time	Min	Time
38.8	23.4	0.0	-5.6



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.2	16.5	-5.9	50.6
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.5	16.8	-4.3	46.1



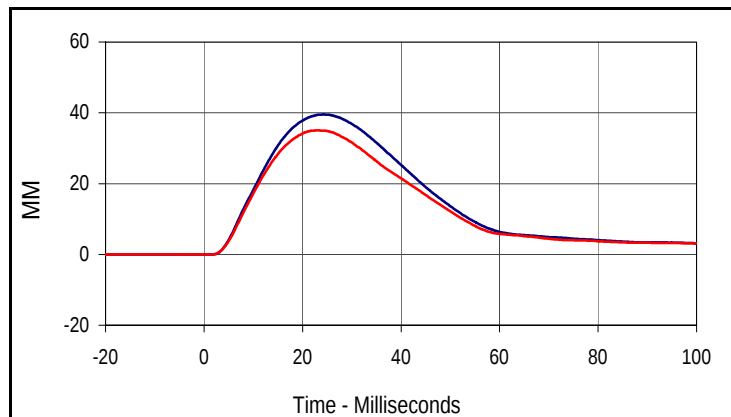
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.4	20.1	-0.2	90.0

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

Test Date: 10/19/11
 Test I.D.: 299ABD021

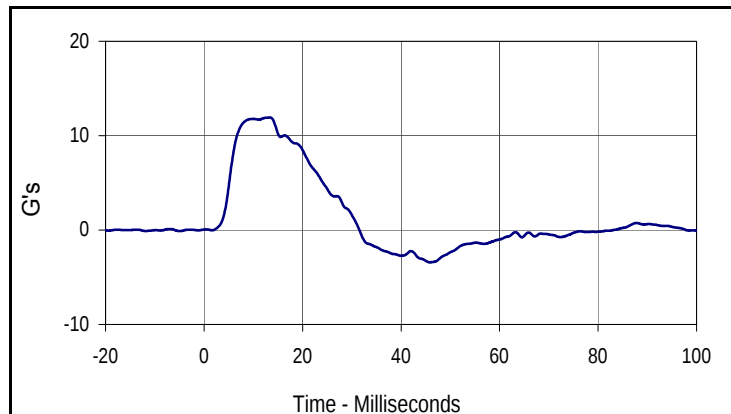


Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	470	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	39.5	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	35.0	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	11.9	Pass
Peak Impactor Acceleration	G's	12 to 16	15.7	Pass
Overall Test Results			Pass	

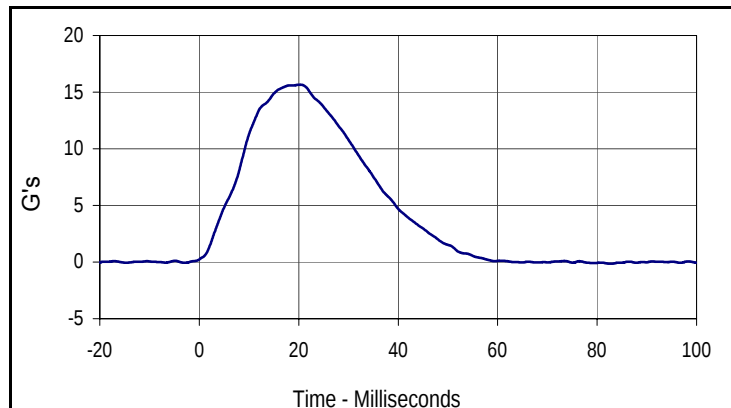


Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
39.5	24.3	0.0	-10.9

Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
35.0	23.1	0.0	-8.6

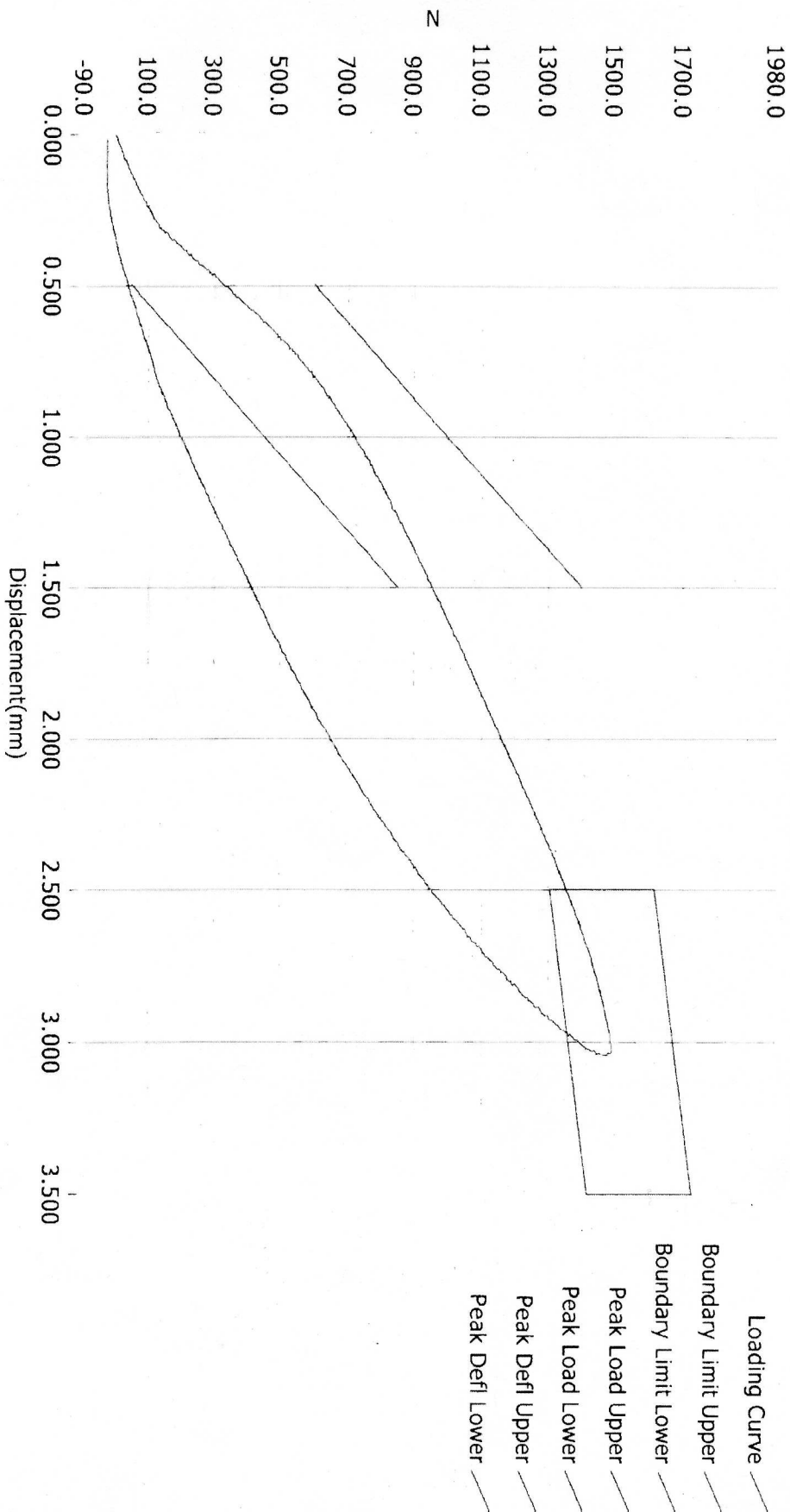


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
11.9	13.4	-3.4	45.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.7	20.2	-0.2	82.8

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID

Part Serial Number

Test Date

Test Time

9/24/2010

2:31 AM

Cert ID

ATD Serial Number

ATD Type

36532

SIDIIs

Current Date : 9/24/2010

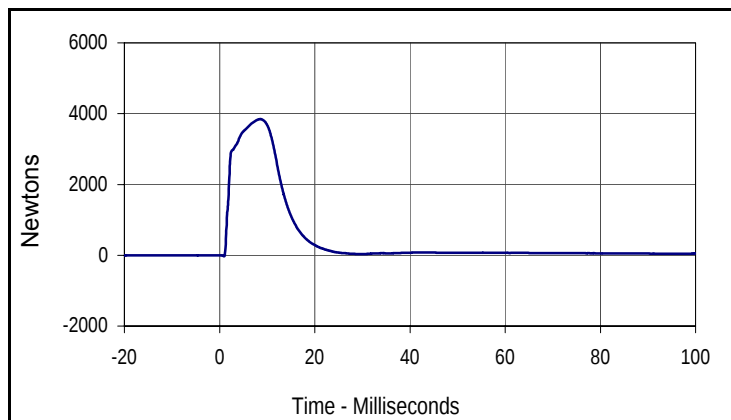
Current Time : 02:32:13

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

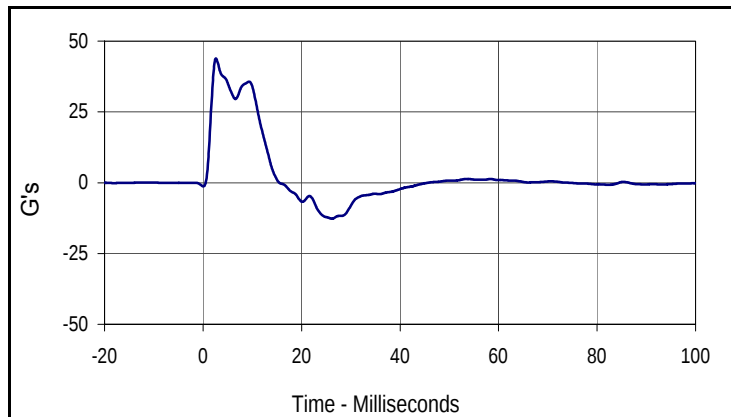
Test Date: 10/19/11
 Test I.D.: 299ACET021



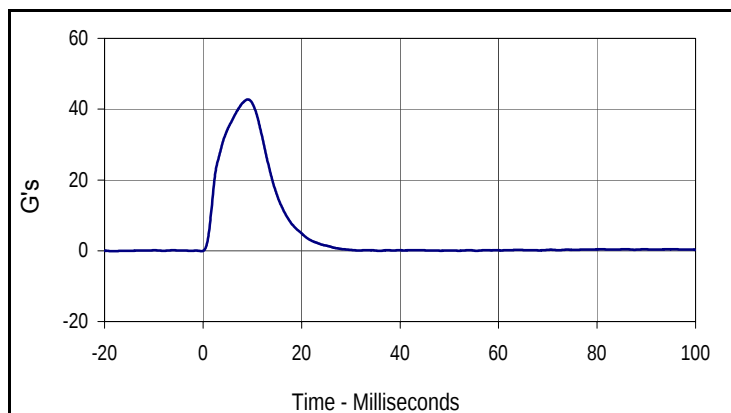
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	455	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.6	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Acetabulum Force Y	Newtons	3400 to 4200	3845.4	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	35.7	Pass
Peak Impactor Acceleration	G's	38 to 47	42.7	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3845.4	8.6	-30.1	1.0



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
43.9	2.6	-12.7	26.2



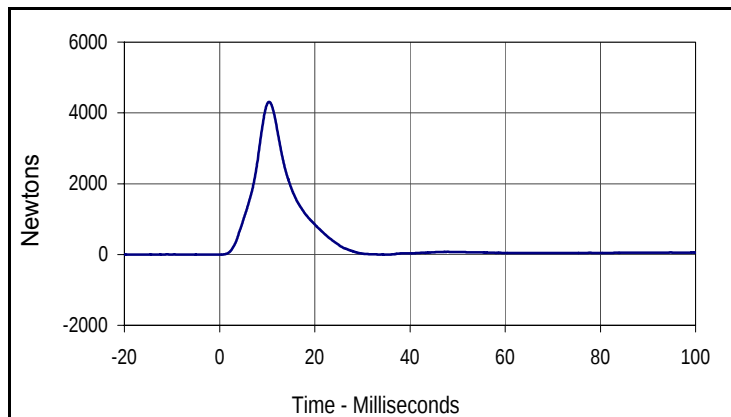
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
42.7	9.1	-0.1	-17.9

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

Test Date: 10/19/11
 Test I.D.: 299PL021



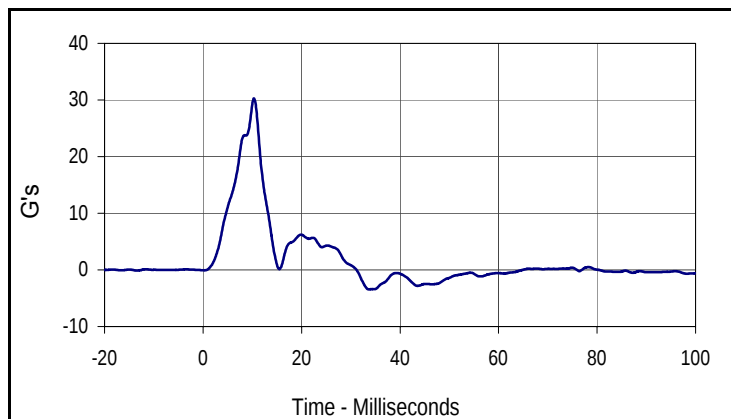
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	490	Pass
Temperature During Soak	Max	20.6 to 22.2	21.9	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	30.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.6	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Iliac Force	Newtons	4100 to 5100	4313.9	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	30.3	Pass
Peak Impactor Acceleration	G's	36 to 45	40.2	Pass
Overall Test Results			Pass	



Curve Description

Pelvis Iliac Force

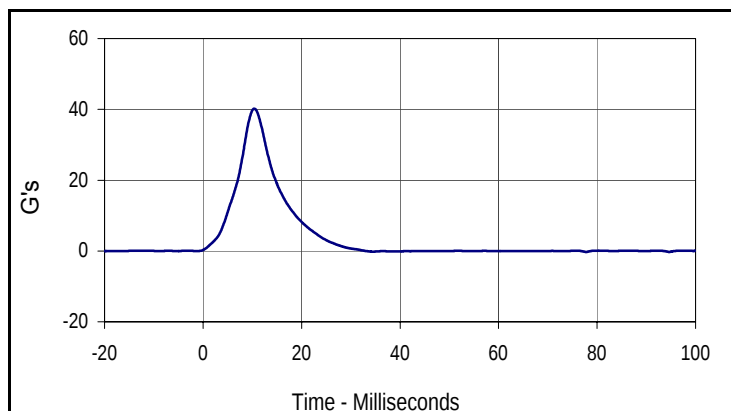
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4313.9	10.4	-6.7	35.2



Curve Description

Pelvis Y Acceleration

Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
30.3	10.3	-3.4	33.7



Curve Description

Impactor Acceleration

Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
40.2	10.4	-0.3	77.8

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	8/8/11
			Y	P51929	Endevco	8/8/11
			Z	P51934	Endevco	8/8/11
Displacement Potentiometers	Shoulder		Y	1074	FTSS	8/8/11
	Thoracic Rib	Upper	Y	1143	FTSS	8/8/11
		Middle	Y	1160	FTSS	8/8/11
		Lower	Y	1213	FTSS	8/8/11
	Abdominal Rib	Upper	Y	1218	FTSS	8/8/11
		Lower	Y	1234	FTSS	8/8/11
Lower Spine Accelerometers (T12)			X	P63999	Endevco	8/5/11
			Y	P58872	Endevco	8/4/11
			Z	P58795	Endevco	8/4/11
Acetabulum Load Cell			Y	272	Denton	7/22/11
Iliac Wing Load Cell			Y	284	Denton	7/22/11
Pelvis Plug (Struck Side)				36278	FTSS	9/22/10
Pelvis Plug (Non-Struck Side)				36445	FTSS	9/23/10

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	Ketx5a	ICSensor	6/20/11
Vehicle Center of Gravity	Y	Ketx5b	ICSensor	6/20/11
Vehicle Center of Gravity	Z	Ketx5c	ICSensor	6/20/11
Left Floor Sill	Y	J36724	Endevco	3/30/11
A-Pillar Sill	Y	J36641	Endevco	4/4/11
A-Pillar Low	Y	BY98H	Endevco	3/15/11
A-Pillar Mid	Y	J24288	Endevco	3/22/11
B-Pillar Sill	Y	BF59J	Endevco	4/29/11
B-Pillar Low	Y	CY06H	Endevco	3/15/11
B-Pillar Mid	Y	AK96	Endevco	3/15/11
Driver Seat	Y	J21907	Endevco	3/30/11
Engine Top	X	BI60H	Endevco	7/22/11
Engine Top	Y	AR17	Endevco	7/22/11
Firewall	Y	BJ54H	Endevco	5/30/11
Right Roof	Y	J24583	Endevco	5/2/11
Right Floor Sill	Y	BG29H	Endevco	5/6/11
Rear Floorpan	X	Ketx11a	Endevco	7/19/11
Rear Floorpan	Y	Ketx11b	Endevco	7/19/11

TABLE 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	131822A	Interface	8/8/11
Load Cell 2	132304A	Interface	8/8/11
Load Cell 3	19477	Interface	8/8/11
Load Cell 4	19325	Interface	8/8/11
Load Cell 5	131827A	Interface	8/8/11
Load Cell 6	132302A	Interface	8/8/11
Load Cell 7	19267	Interface	8/8/11
Load Cell 8	19321	Interface	8/8/11