

REPORT NUMBER: SPNCAP-CAL-12-009

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

**HYUNDAI MOTOR COMPANY
2012 Hyundai Elantra PZEV
Four Door Sedan**

NHTSA NUMBER: MC0502

**PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
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December 28, 2011

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Date: _____

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Transportation Operations

Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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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 2012 Hyundai Elantra PZEV Four Door Sedan 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. This test was conducted at the Calspan Corporation Crash Test Facility in Buffalo, New York, on 11/15/2011. The impact velocity was 32.06 km/h, and the ambient temperature at the struck (driver's) side of the vehicle was 12°C. The test vehicle post-test maximum crush was 321 mm at level 3. The test vehicle's occupant performance is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Measurement Description</th> <th colspan="3" style="text-align: center;">Driver ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">396.38</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">Gs</td> <td style="text-align: center;">82</td> <td style="text-align: center;">52.56</td> </tr> <tr> <td>Total Pelvic Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">3,699.11</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38</td> <td style="text-align: center;">25.77</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45</td> <td style="text-align: center;">33.39</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 (SID-IIs)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	396.38	Resultant Lower Spine Acceleration	Gs	82	52.56	Total Pelvic Force	N	5525	3,699.11	Maximum Thoracic Rib Deflection	mm	38	25.77	Maximum Abdomen Rib Deflection	mm	45	33.39
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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 Adm. Technical Ref. Division, 1200 New Jersey Ave. SE Washington, D.C. 20590																												
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SECTION 1 PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the MY 2012 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00126. The purpose of this test is to generate comparative side impact performance in a 2012 Hyundai Elantra PZEV Four Door Sedan manufactured by Hyundai Motor Company. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated August 2011.

SECTION 2 SUMMARY OF NCAP SIDE IMPACT TEST

A rigid pole side test was conducted on a 2012 Hyundai Elantra PZEV Four Door Sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.06 km/h. The test was conducted by Calspan Corporation Transportation Research Group on 11/15/2011. 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 August 2011. Camera locations and other pertinent camera information are included in this report.

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

Head CG Triaxial Accelerometers
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper and Lower Rib Displacement Potentiometers
Lower Spine Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

Appendix B contains the 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:

Measurement Description	Driver ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	396.38
Resultant Lower Spine Acceleration	Gs	82	52.56
Total Pelvic Force	N	5525	3,699.11
Maximum Thoracic Rib Deflection	mm	38*	25.77
Maximum Abdomen Rib Deflection	mm	45*	33.39

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1	
	Mounted	Deployed
Frontal Airbag	Yes	No
Knee Airbag	No	No
Curtain Airbag	Yes	Yes
Torso/Pelvis Airbag	Yes	Yes
Seat Belt Pretensioner	Yes	Yes
Seat Belt Load Limiter	Yes	Yes

GENERAL COMMENTS:

1. P1 serial number - DG8012

Data Anomalies:

- None

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO.1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
Test Program: Side Pole NCAP Test Date 11/15/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0502	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Hyundai	Automatic Door Locks (ADL)	Yes
Model	Elantra PZEV	Power Window Auto-Reverse	Yes
Body Style	Four Door Sedan	Other Optional Feature	--
VIN	KMHDH4AE4CU258008	Driver Front Airbag	Yes
Body Color	Light blue	Driver Curtain Airbag	Yes
Odometer Reading	145 / 90	Driver Head/Torso Airbag	No
Engine Displacement (L)	1.8	Driver Torso Airbag	No
Type/No. Cylinders	I4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	No
Transmission Speeds	6-Speed	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	Front Wheel Drive	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioners	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioners	No
Power Seats	No	Driver Load Limiters	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiters	No
All-Wheel Drive (AWD)	No	Other Safety Restraint	No

Does owner's manual provide instructions to turn off automatic door locks?

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company	GVWR (kg)	1,720
Date of Manufacture	7/2011	GAWR Front (kg)	940
Vehicle Type	Elantra PZEV	GAWR Rear (kg)	800

VEHICLE SEATING AND WEIGHT CAPACITY DATA

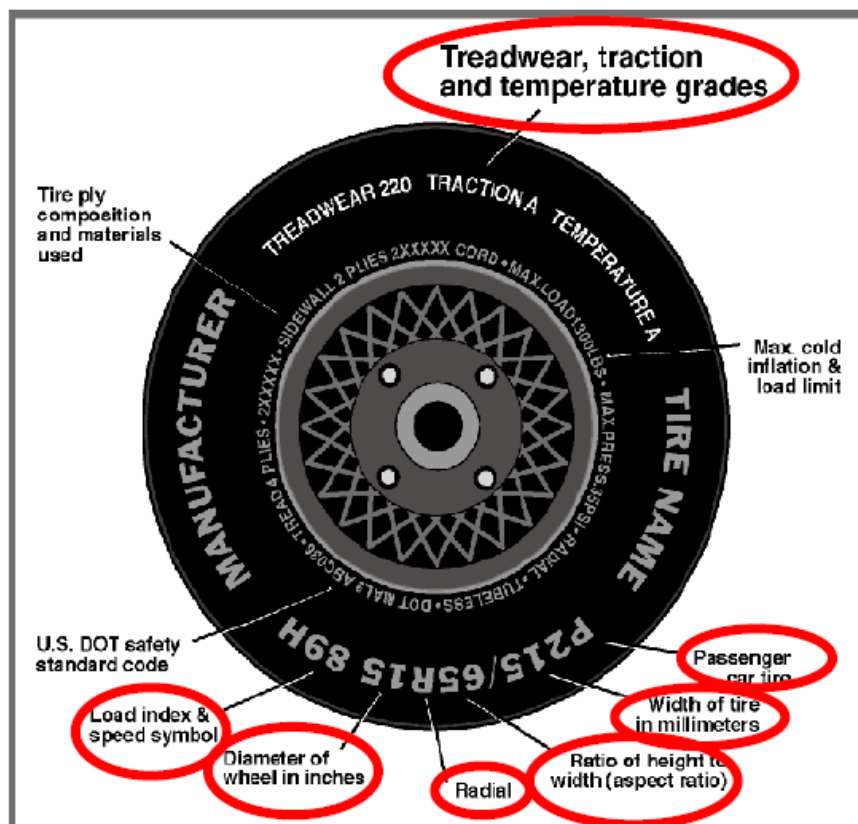
	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	-	5	
Vehicle Capacity Weight (VCW) (kg)				385.0	(A)
DSC X 68.04 kg				340.2	(B)
Rated Cargo and Luggage Weight (RCLW)				44.8	(A-B)

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	X					X	
Rear or Second Row		X			X		
Third Row seat							

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	2012 Hyundai Elantra PZEV	NHTSA No:	MC0502
Test Program:	Side Pole NCAP	Test Date	11/15/2011



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	220	220
Recommended Tire Size	P215/45R17	P215/45R17

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure	300	300
Tire Size on Vehicle	P215/45R17	P215/45R17
Tire Manufacturer	Hankook	Hankook
Tire Name	Optimo H426	Optimo H426
Tire Type	Passenger	Passenger
Tire Width (mm)	215	215
Aspect Ratio	45	45
Radial	Yes	Yes
Wheel Diameter (mm)	630	630
Load Index/Speed Symbol	87H	87H
Treadwear	440	440
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Rubber	Rubber

DATA SHEET NO.1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011

TEST PRESSURES

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	416	248		431	283		436.5	283	
Right	kg	378.5	255		385	280		382.5	285.5	
Ratio	%	61	39		59	41		59	41	
Totals	kg	794.5	503	1,297.5	816	563	1,379	819	568.5	1,387.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1,297.5	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	44.1	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1,386.4	(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)
Ballast (if any)	None

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	Deg.	-0.5	-0.4	-0.4	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	-0.4	-0.4	-0.4	Yes
Front Bumper Angle (left-to-right)**	Deg.	-0.2	-0.3	-0.3	Yes
Rear Bumper Angle (left-to-right)**	Deg.	-0.3	-0.4	-0.5	Yes
Vehicle CG (Aft of Front Axle)	mm	1,046	1,102	1,106	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	19	28	30	

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

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

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for Meets Requirement

DATA SHEET NO. 2
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011

SEAT POSITIONING

The driver's seat, front seat center (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	16.4	13.4	14.9
Front Passenger Seat	-	No Seat Angle control	-
Front Center Seat*			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed

*if applicable

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid- Fore/Aft	Forward -Most
Driver Seat	14.9	36	Max	38	45	54
			Mid	19	26	36
			Min	0	7	17
Front Passenger Seat	No Height or Angle Control		Max			
			Mid			
			Min			
Front Center Seat*	N/A	N/A	Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	Fixed	Fixed	Max			
			Mid			
			Min			

*if applicable

DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011

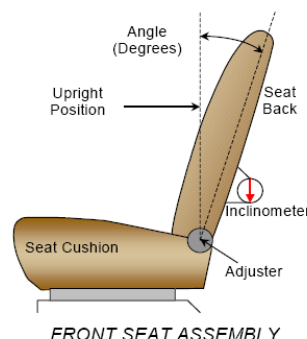
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	220	23	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

*if applicable

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	-7.5	-	4.9	-
Front Passenger Seat	-7.4	-	4.9	-
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

*if applicable

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. For this test zero is defined as the uppermost position.

	Total # of Positions	Placed in Position #
Driver Seat	4	0

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	4	0

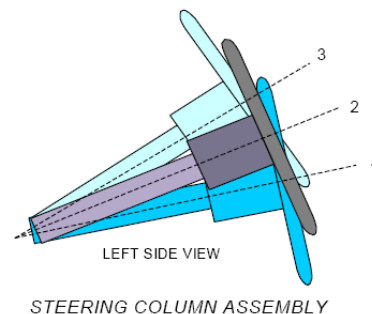
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011

STEERING COLUMN ADJUSTMENTS

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

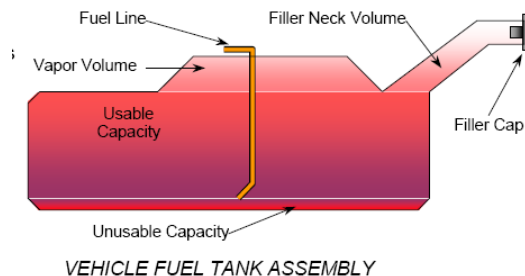
	Degrees	Fore/Aft Position (mm)
Lowermost, Position No. 1	68.4	
Geometric Center, Position No. 2	66.3	
Uppermost, Position No. 3	64.1	
Telescoping Steering Wheel Travel		40
Test Position	66.3	20



FUEL PUMP

Describe the fuel pump type, details about how it operates, and the location of the fuel filler neck.

Electric fuel pump operates with the ignition in the 'on' position and the engine running. The fuel filler neck is located above the left rear wheel.



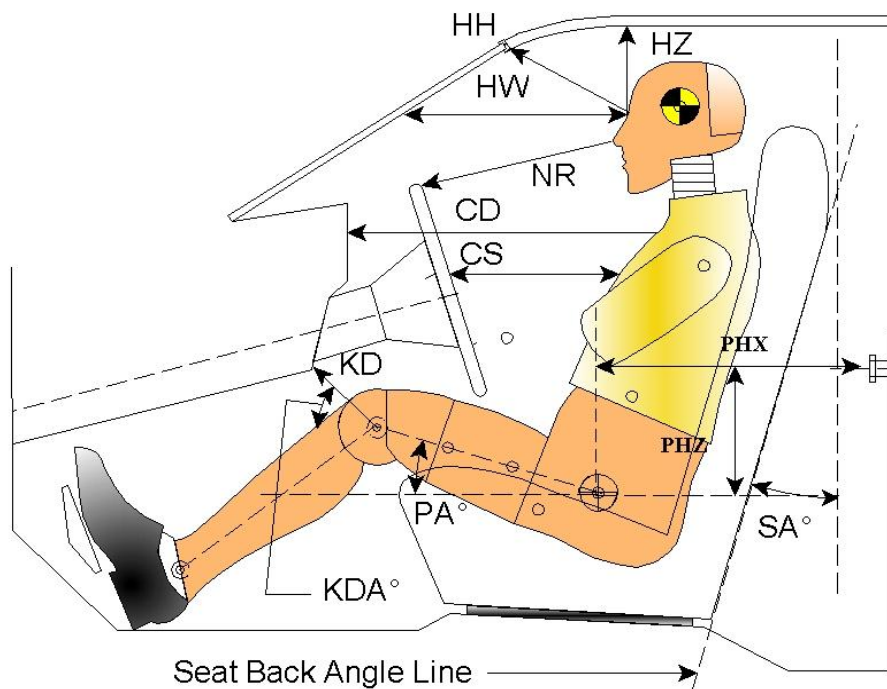
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	48.1
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of Standard Tank (see Owner's Manual)	48.0
Usable Capacity of Optional Tank (see Owner's Manual)	
93% of Usable Capacity	44.7
Actual Amount of Solvent Used in Test	44.7
1/3 of Usable Capacity	16.0

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2012 Hyundai Elantra PZEV	NHTSA No:	MC0502
Test Program:	Side Pole NCAP	Test Date	11/15/2011

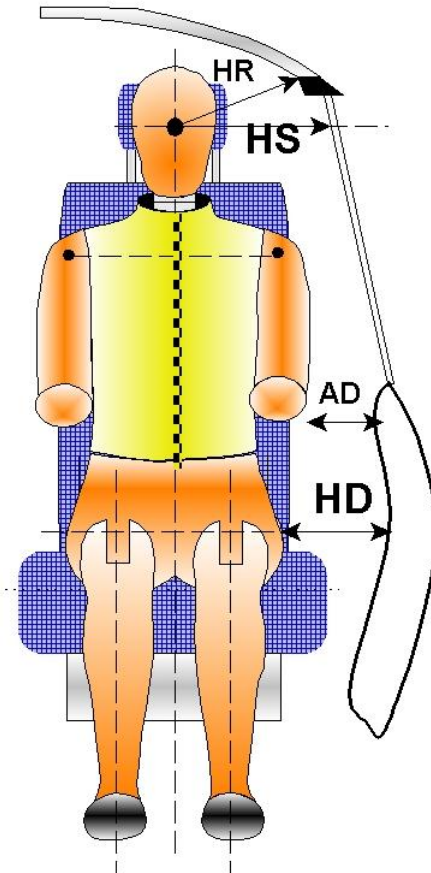


DUMMY ID#: 8012

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	255	
HW	Head to Windshield	612	
HZ	Head to Roof Liner	159	
NR	Nose to Rim	247	
CD	Chest to Dashboard	403	
CS	Chest to Steering Wheel	198	
KDL/KDAL°	Left Knee to Dash	131	33.2
KDR/KDAR°	Right Knee to Dash	116	34.2
PAX°	Pelvic Tilt Angle (X-Axis)		19.8
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	337	
PHZ	Hip Point to Striker (Z-Axis)	243	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2012 Hyundai Elantra PZEV	NHTSA No:	MC0502
Test Program:	Side Pole NCAP	Test Date	11/15/2011

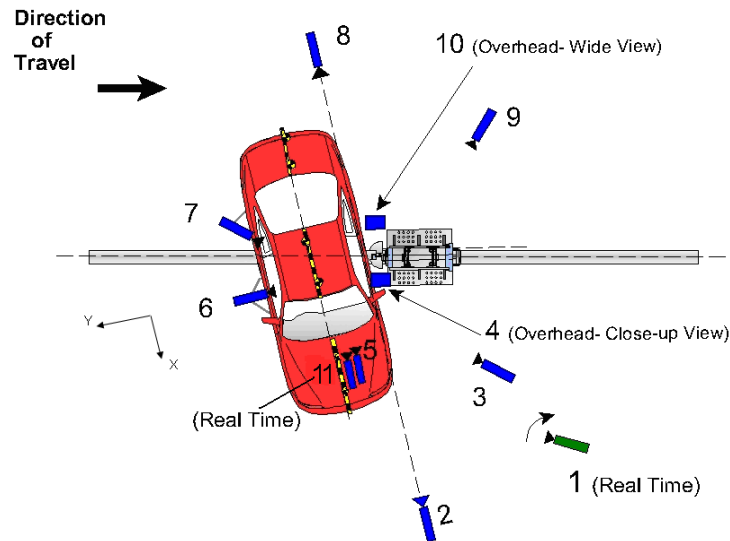


DUMMY ID#: DG8012

Code	Measurement Description	Length (mm)
HR	Head To Side Header	242
HS	Head to Side Window	365
AD	Arm to Door	159
HD	Hip Point to Door	166

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011



REFERENCE (from Point of Impact for X and Y; from Ground for Z):
 + X = Forward of vehicle, + Y = Right of vehicle, + Z = Down

Camera No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real time (24-30 fps) pan view of impact				Zoom	30
2	Front ground level - impact view	-1900	7492	974	50	1000
3	Impact side 45° - forward pole view	-2663	2523	1540	28	1000
4	Overhead Close-up view of impact	0	0	5108	24	1000
5	Onboard – dummy front view				12.5	500
6	Onboard – dummy side view				12.5	500
7	Onboard – dummy rear oblique view				12.5	500
8	Rear ground level – impact view	1828	6295	1029	24	1000
9	Impact side 45° - rearward pole view	-2663	3047	1425	28	1000
10	Overhead wide-view of impact	294	0	5108	14	1000
11	Real-time (24-30 fps) – dummy front view				Zoom	30

* All measurements accurate to ± 6 mm.

NOTE: Vehicle is at a 75° angle to the rigid pole.

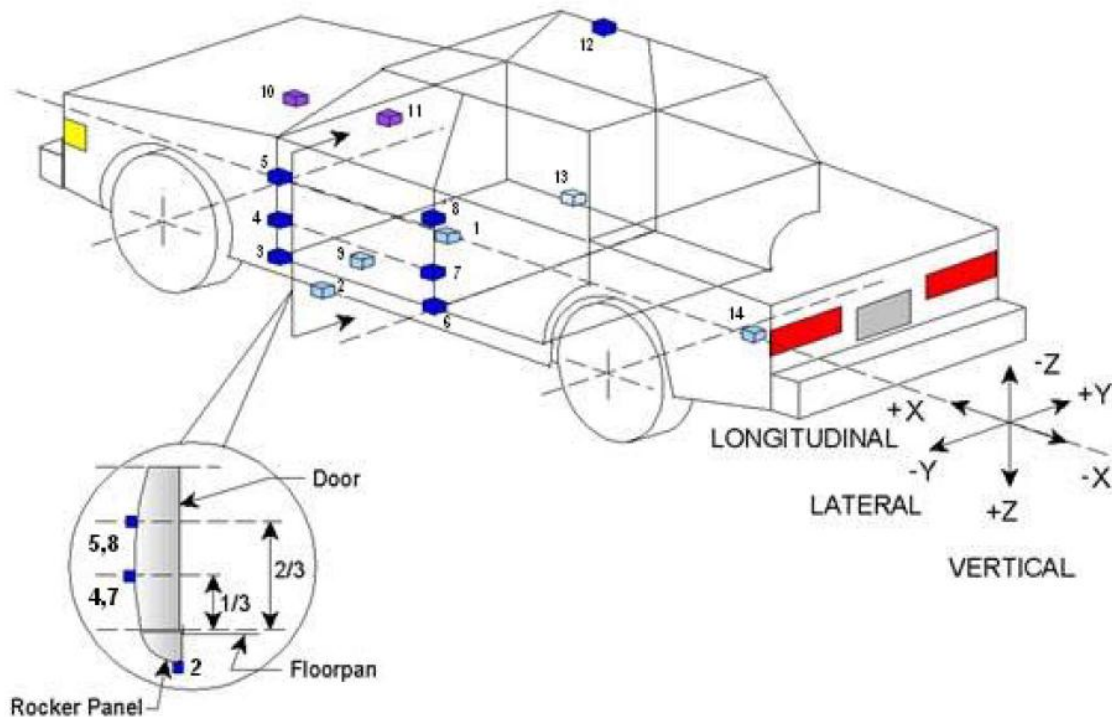
If applicable, explain why camera(s) did not operate as intended:

INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Vehicle Structure	18
Pole Load Cells	6
TOTAL	40

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
Test Program: Side Pole NCAP Test Date: 11/15/2011



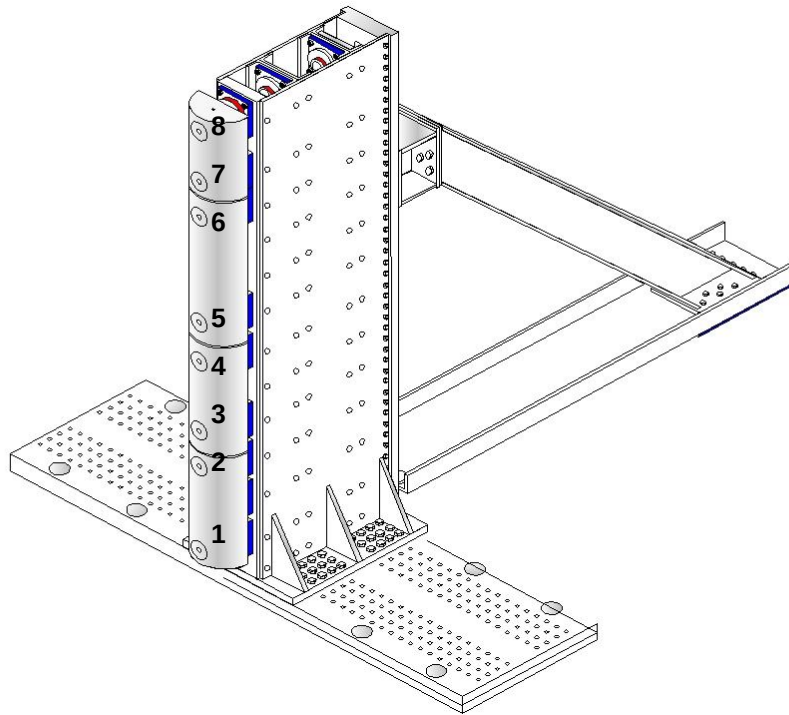
	Accelerometer/Sensor Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2,507	33	453
2	Left Floor Sill	2,828	-685	323
3	A Pillar Sill	3,124	-682	323
4	A Pillar Low	3,204	-650	519
5	A Pillar Mid	3,174	-644	1,009
6	B Pillar Sill	2,065	-640	251
7	B Pillar Low	2,069	-686	368
8	B Pillar Mid	2,025	-670	905
9	Driver Seat Track	2,252	-569	262
10	Engine Top	3,844	125	808
11	Firewall	3,447	73	704
12	Right Roof	2,207	521	1,410
13	Right Floor Sill	2,762	674	302
14	Rear Floorpan	755	14	506

Reference: X – Test Vehicle Rear Bumper (+ forward)
Y – Test Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle:	2012 Hyundai Elantra PZEV	NHTSA No:	MC0502
Test Program:	Side Pole NCAP	Test Date	11/15/2011

FOIL 300K RIGID POLE



Load Cell Locations	
ID	Height From Ground (mm)
1	200
2	590
3	750
4	1075
5	1260
6	1740
7	1920
8	2300

**DATA SHEET NO. 8
POST-TEST OBSERVATIONS**

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
Test Program: Side Pole NCAP Test Date 11/15/2011

TEST DUMMY INFORMATION AND CONTACT POINTS

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

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	None	None	None	None	
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	
Disengaged from Latched Position	No	No	No	No	
Latch Separated from Striker	No	No	No	No	
Jammed Shut	Yes	Yes	No	No	
If Door Opened at Striker, Record Width of Opening at Striker (mm)	None	None	None	None	

* Indicate "Yes", "No", or "N/A".

POST TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other Door
	Front	Rear	Front	Rear	
Seat Movement Along Seat Track	N/R	N/A	No	N/A	
Seat Disengagement from Floor Pan	No	No	No	No	
Seat Back Movement from Initial Position	N/R	No	No	No	
Seat Back Collapse	No	No	No	No	

* Indicate "Yes", "No", "N/A", or N/R (Not Recoverable).

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Slight A-Pillar deformation caused by the Pole
Sill Separation	None
Windshield Damage	Small tear along the A-Pillar
Side Window Damage	Driver's side window shattered on impact
Other Notable Effects	None

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

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
Test Program: Side Pole NCAP Test Date: 11/15/2011

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

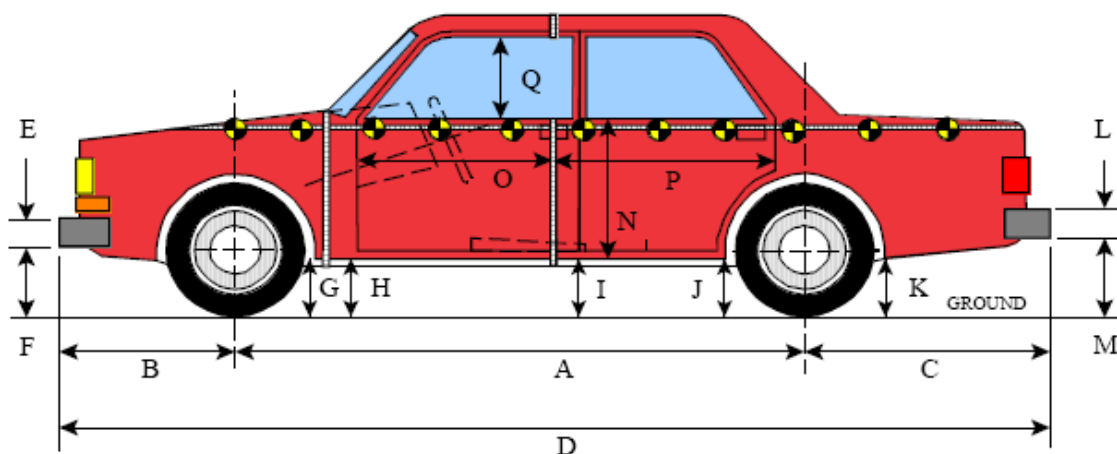
Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	No	No		
Curtain Airbag	Yes	Yes	Yes	Yes
Torso/Pelvis Airbag	Yes	Yes	No	No
Seat Belt Pretensioner	Yes	Yes	No	No
Seat Belt Load Limiter	Yes	Yes	No	No

VEHICLE SPEED, VEHICLE ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		409
Actual Impact Point (Aft of Front Axle)	mm		409
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact Point	0
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.1
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.0

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011



LEFT SIDE VIEW

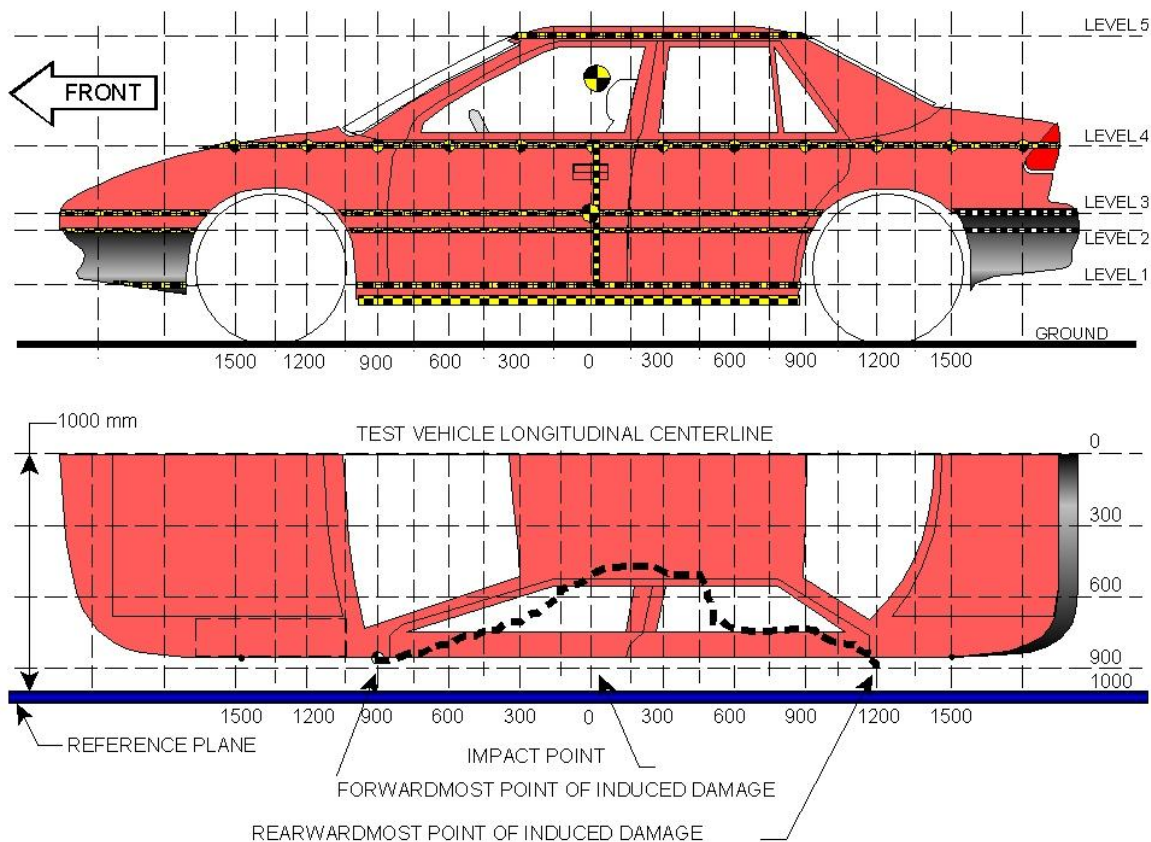
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2,699	2,672	27
B	Front Axle to FSOV	858	901	-42
C	Rear Axle to RSOV	969	963	6
D	Total Length at Centerline	4,525	4,494	31
E	Front Bumper Thickness	135	135	0
F	Front Bumper Bottom to Ground	425	452	-27
G	Sill Height at Front Wheel Well	171	172	-1
H	Sill Height at Front Door Leading	180	179	1
I	Sill Height at B-Pillar	185	198	-13
J1	Sill Height at Rear Wheel Well	177	208	-31
J2	Pinch Weld Height at Rear Wheel	162	188	-26
K	Sill Height Aft of Rear Wheel Well	214	223	-9
L	Rear Bumper Thickness	145	145	0
M	Rear Bumper Bottom to Ground	485	493	-8
N	Sill Height to Bottom of Front Window	722	722	0
O	Front Door Leading Edge to Impact	702	680	22
P	Rear Door Trailing Edge to Impact CL	1311	1309	2
Q	Front Window Opening	398	374	24
R	Right Side Length	4,363	4,356	7
S	Left Side Length	4,374	4,317	57
T	Vehicle Width at B-Pillars	1,770	1,671	99

DATA SHEET NO. 10 **VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle:	2012 Hyundai Elantra PZEV	NHTSA No:	MC0502
Test Program:	Side Pole NCAP	Test Date	11/15/2011



NOTE: All measurements are in millimeters (mm)

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	248	293	0
2	Occupant Hip Point	546	314	0
3	Mid-Door	641	321	0
4	Window Sill	898	287	0
5	Window Top	1,373	108	150

NOTE: The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

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

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011

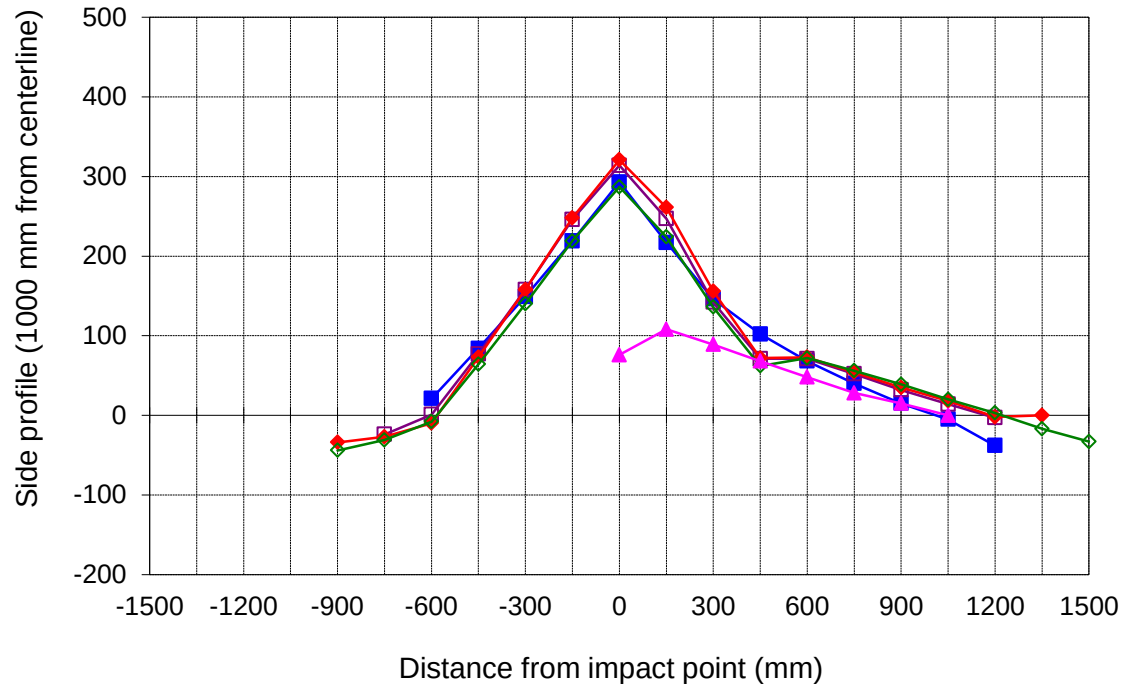
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900			894	810				928	854				-34	-44	
-750		893	886	828			917	913	859			-24	-27	-31	
-600	868	881	876	838		847	880	886	846		21	1	-10	-8	
-450	865	881	878	842		781	804	805	778		84	77	73	64	
-300	863	882	882	843		714	724	724	703		149	158	158	140	
-150	862	884	884	843		643	638	636	624		219	246	248	219	
0	862	884	887	842	575	569	570	566	555	499	293	314	321	287	76
150	860	885	888	842	619	643	638	627	618	511	217	247	261	224	108
300	860	886	890	846	627	714	744	734	710	538	146	142	156	136	89
450	861	886	891	851	628	759	815	819	789	560	102	71	72	62	68
600	861	885	890	861	627	793	814	817	789	579	68	71	73	72	48
750	863	884	888	869	622	823	832	834	813	594	40	52	54	56	28
900	865	883	886	873	617	850	851	851	834	602	15	32	35	39	15
1050	870	884	885	868	571	875	870	867	848	571	-5	14	18	20	0
1200	877	892	886	863		915	895	888	860		-38	-3	-2	3	
1350			892	856				892	873				0	-17	
1500				850					883					-33	

NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to test based on an estimated impact point. The final distance to impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

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

Test Vehicle: <u>2012 Hyundai Elantra PZEV</u>	NHTSA No: <u>MC0502</u>
Test Program: <u>Side Pole NCAP</u>	Test Date: <u>11/15/2011</u>



■ LEVEL 1 Side Sill: 248 mm above ground ◆ LEVEL 3 Mid Door: 641 mm above ground ▲ LEVEL 5 Window Top: 1373 mm above ground	□ LEVEL 2 H-Point: 546 mm above ground ◇ LEVEL 4 Window Sill: 898 mm above ground
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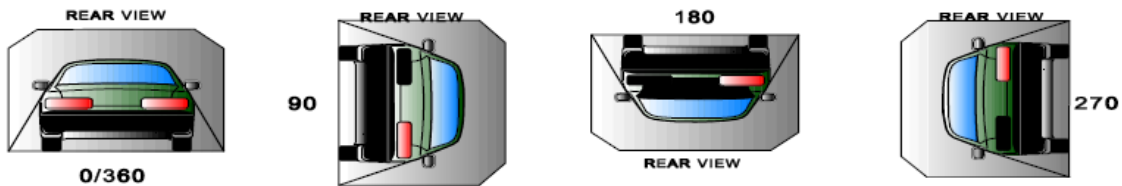
DATA SHEET NO. 11
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Hyundai Elantra PZEV NHTSA No: MC0502
 Test Program: Side Pole NCAP Test Date: 11/15/2011

Test Time: 4:30 PM Temperature: 12°C

- A. From impact until vehicle motion ceases:
 (Maximum allowable is 1 oz.) 0 oz.
- B. For the 5-minute period after motion ceases:
 (Maximum allowable is 5 oz.) 0 oz.
- C. For the following 25 minutes:
 (Maximum allowable is 1 oz./minute) 0 oz.
- D. Spillage
 Details: None

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0 to 90	72	300	372
90 to 180	62	300	362
180 to 270	60	300	360
270 to 360	73	300	373

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

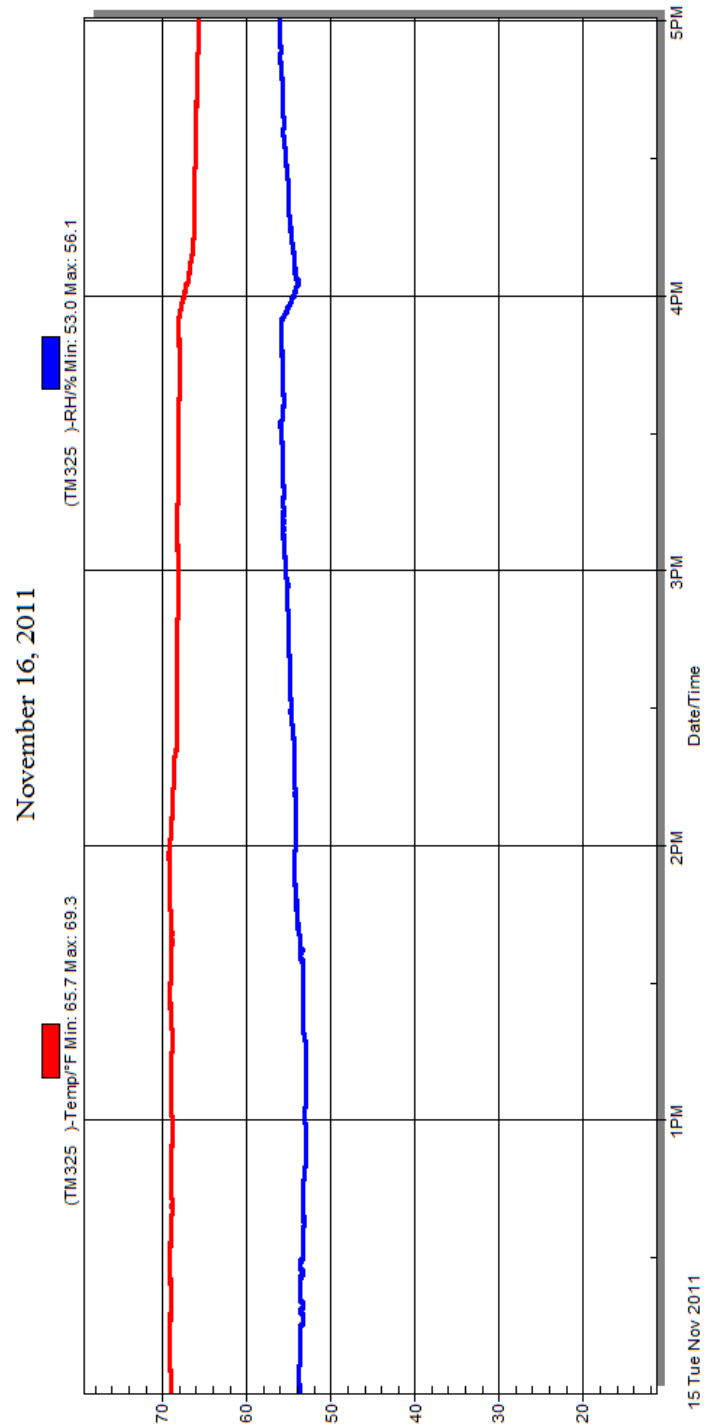
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0		
90 to 180	0	0		
180 to 270	0	0		
270 to 360	0	0		

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	
90 to 180	
180 to 270	
270 to 360	

DATA SHEET NO. 12
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle:	2012 Hyundai Elantra PZEV	NHTSA No:	MC0502
Test Program:	Side Pole NCAP	Test Date	11/15/2011



**APPENDIX A
PHOTOGRAPHS**

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Figure A-1: As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



Figure A-2: As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-3: Pre-Test Frontal View of Test Vehicle



Figure A-4: Post-Test Frontal View of Test Vehicle



Figure A-5: Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-6: Post-Test Left Front $\frac{3}{4}$ View Test Vehicle



Figure A-7: Pre-Test Left Side View of Test Vehicle



Figure A-8: Post-Test Left Side View of Test Vehicle



Figure A-9: Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-10: Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-11: Pre-Test Rear View of Test Vehicle



Figure A-12: Post-Test Rear View of Test Vehicle



Figure A-13: Pre-Test Right Side View of Test Vehicle



Figure A-14: Post-Test Right Side View of Test Vehicle

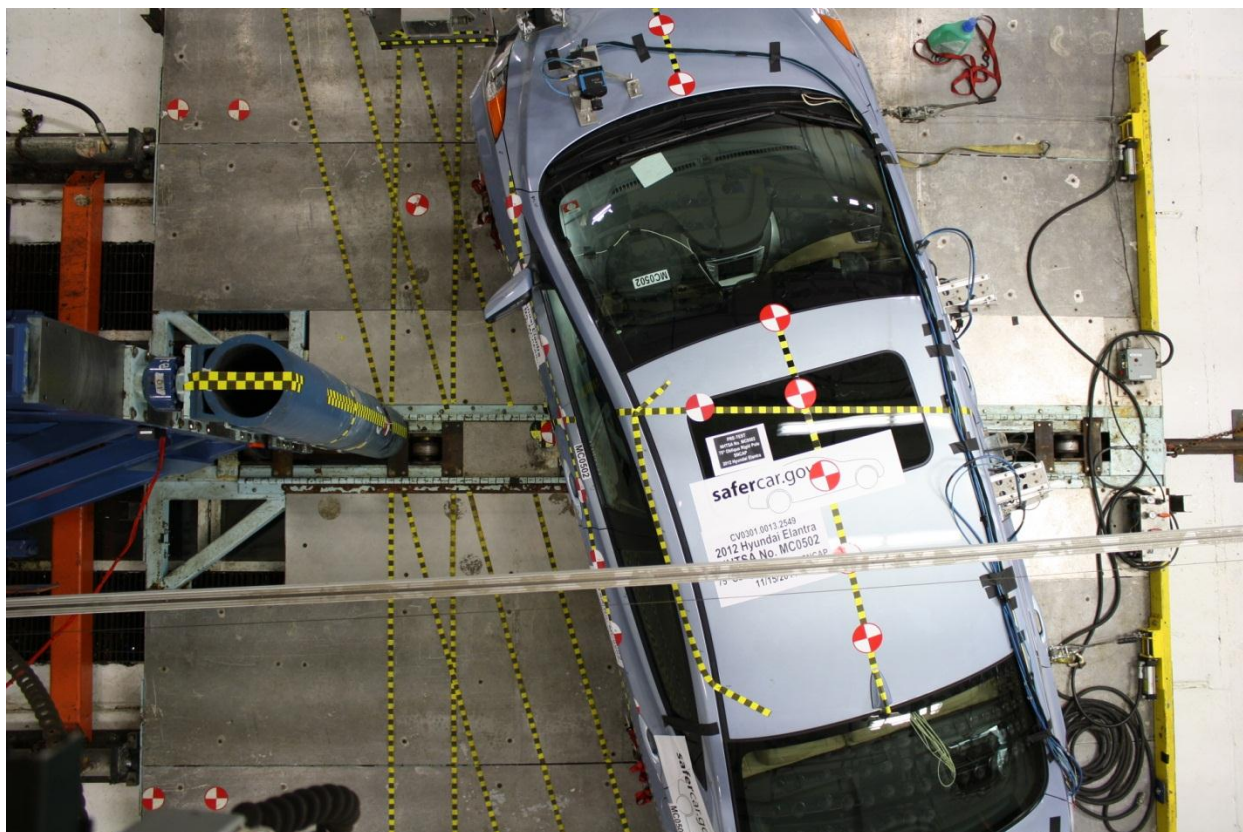


Figure A-15: Pre-Test Overhead View of Test Area

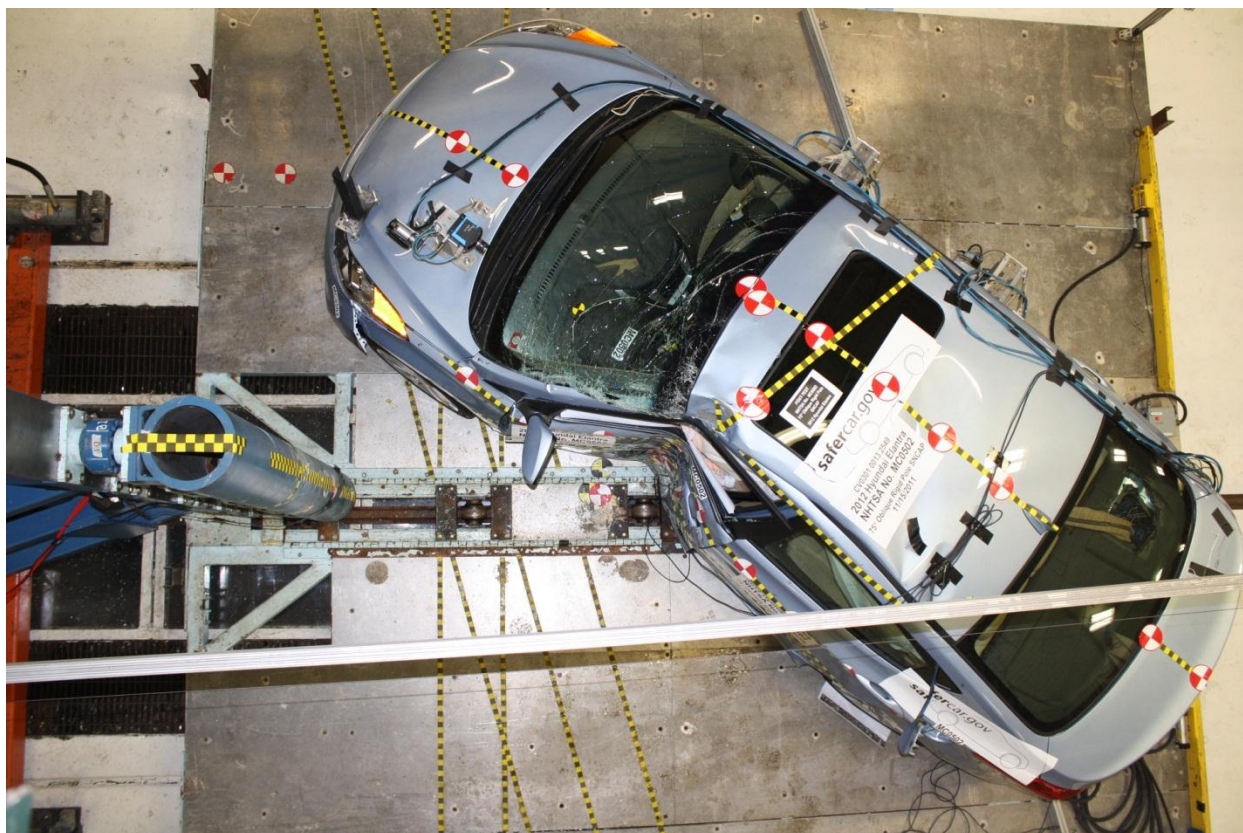


Figure A-16: Post-Test Overhead View of Test Area

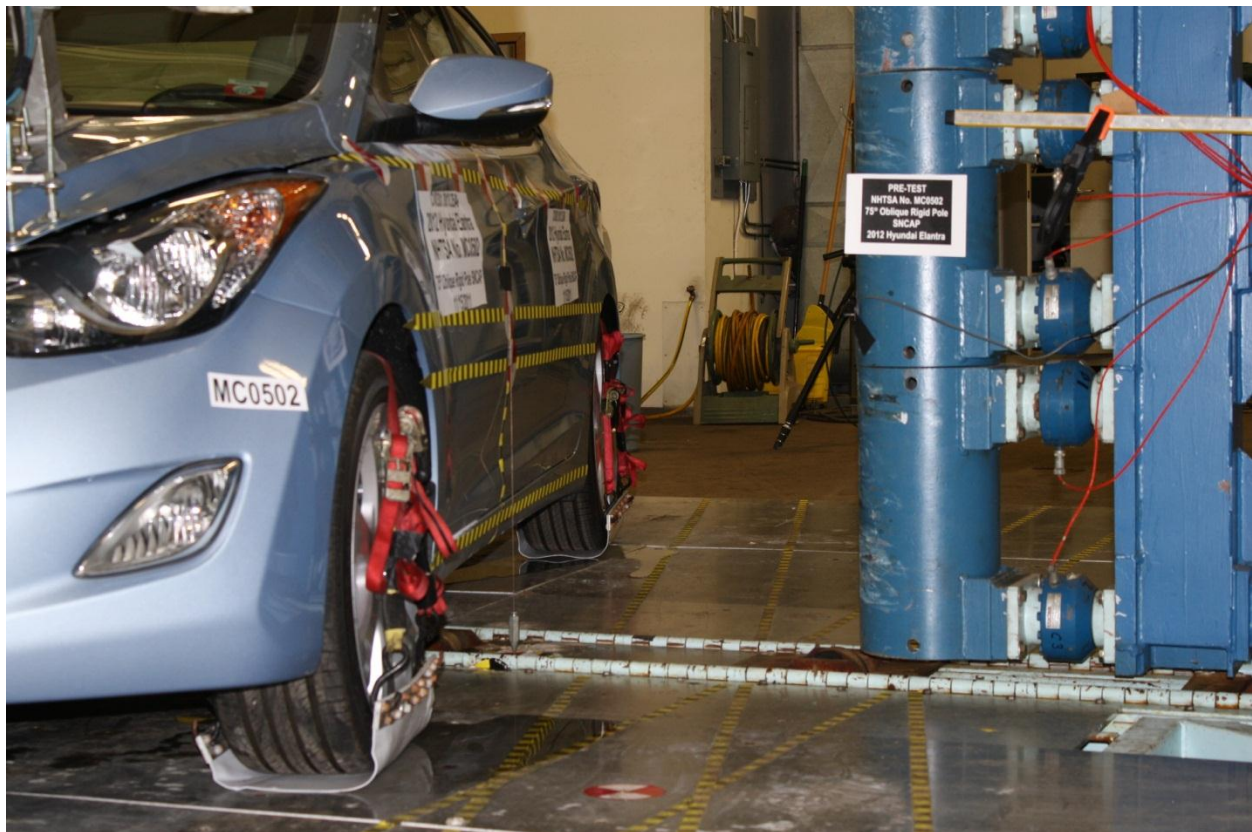


Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



Figure A-19: Pre-Test Close-Up View of Impact Point Target



Figure A-20: Post-Test Close-Up View of Impact Point Target Showing Impact Location



Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest

Photo Not Available

Figure A-22: Post-Test Front Close-Up View of Dummy



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



Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-26: Pre-Test Front View of Seat Back Prior to Dummy Positioning



Figure A-27: Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



Figure A-28: Pre-Test Front View of Seat Pan Prior to Dummy Positioning



Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan

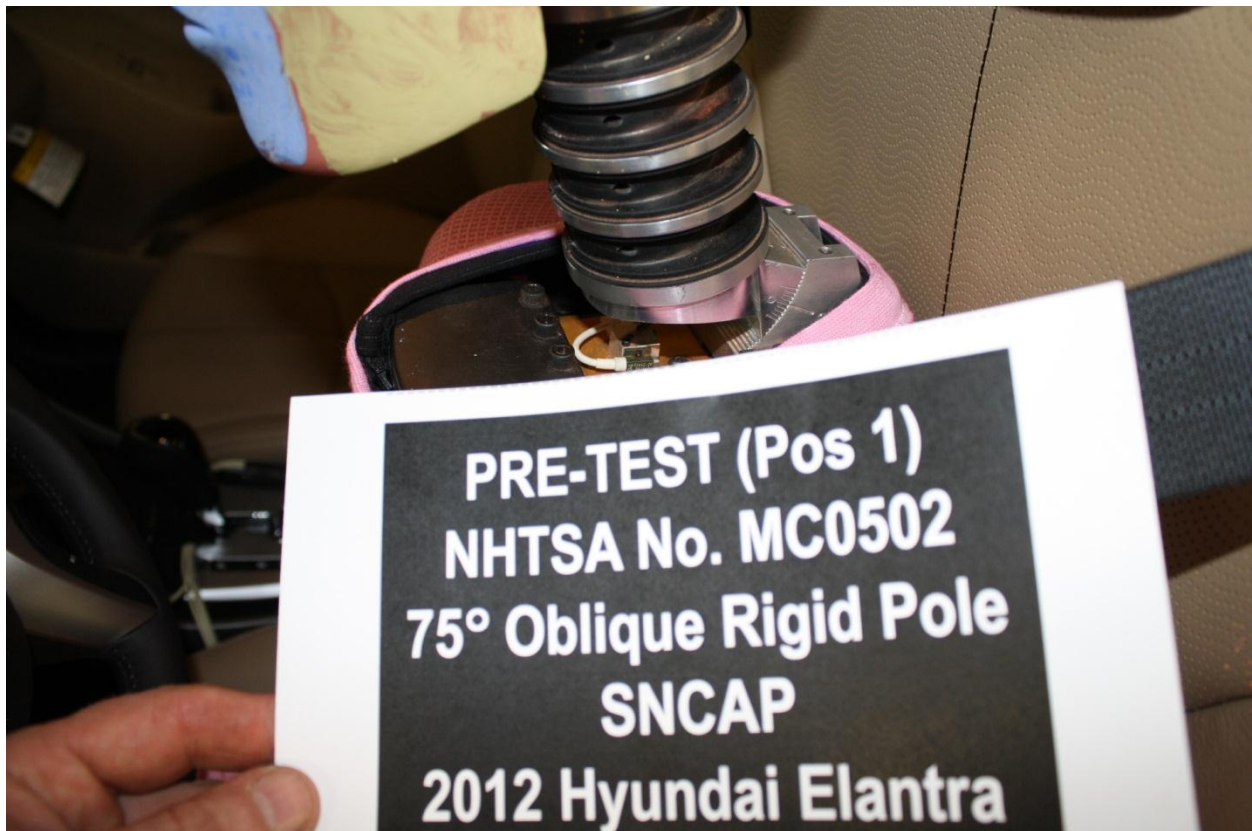


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Figure A-32: Pre-Test Placement of Dummy's Feet



Figure A-33: Pre-Test View of Belt Anchorage for Dummy



Figure A-34: Pre-Test Left Side View of Steering Wheel



Figure A-35: View of Disengaged Parking Brake



**Figure A-36: Pre-Test View of Parking Brake
(Should be engaged see video for verification)**

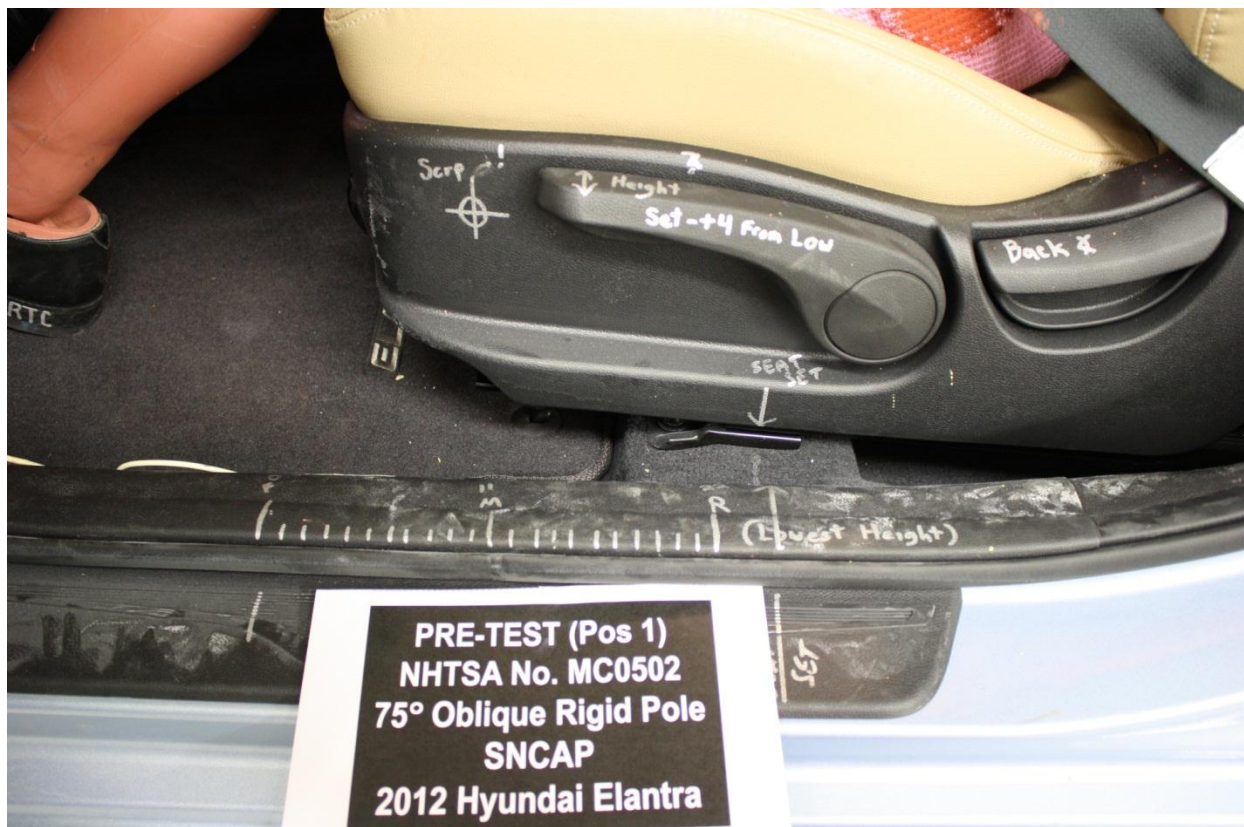


Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Track



Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



Figure A-39: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-40: Pre-Test Dummy and Door Clearance View



Figure A-41: Post-Test Dummy and Door Clearance View



Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-44: Pre-Test Inner Door Panel View



Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



Figure A-46: Post-Test Dummy Close-Up Head Contact with Vehicle View



Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View

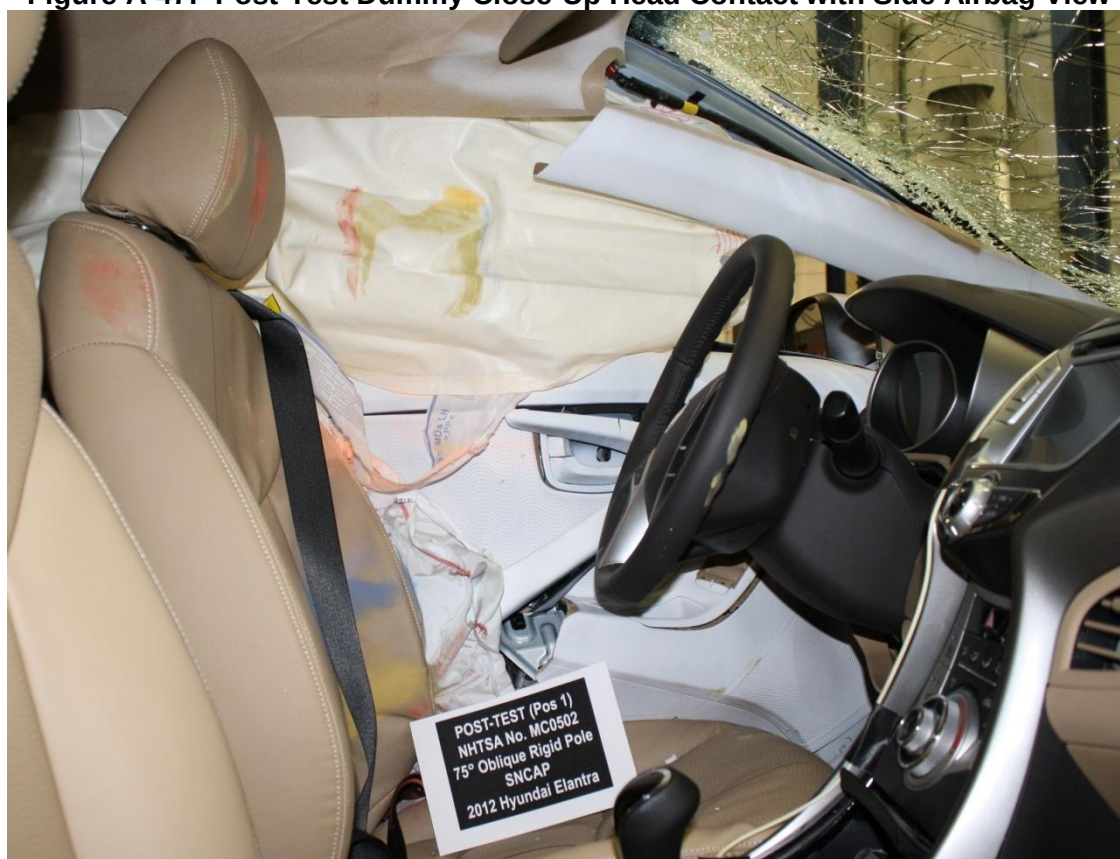


Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



Figure A-50: Post-Test Dummy Close-Up Pelvis Contact View



Figure A-51: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



Figure A-52: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-53: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

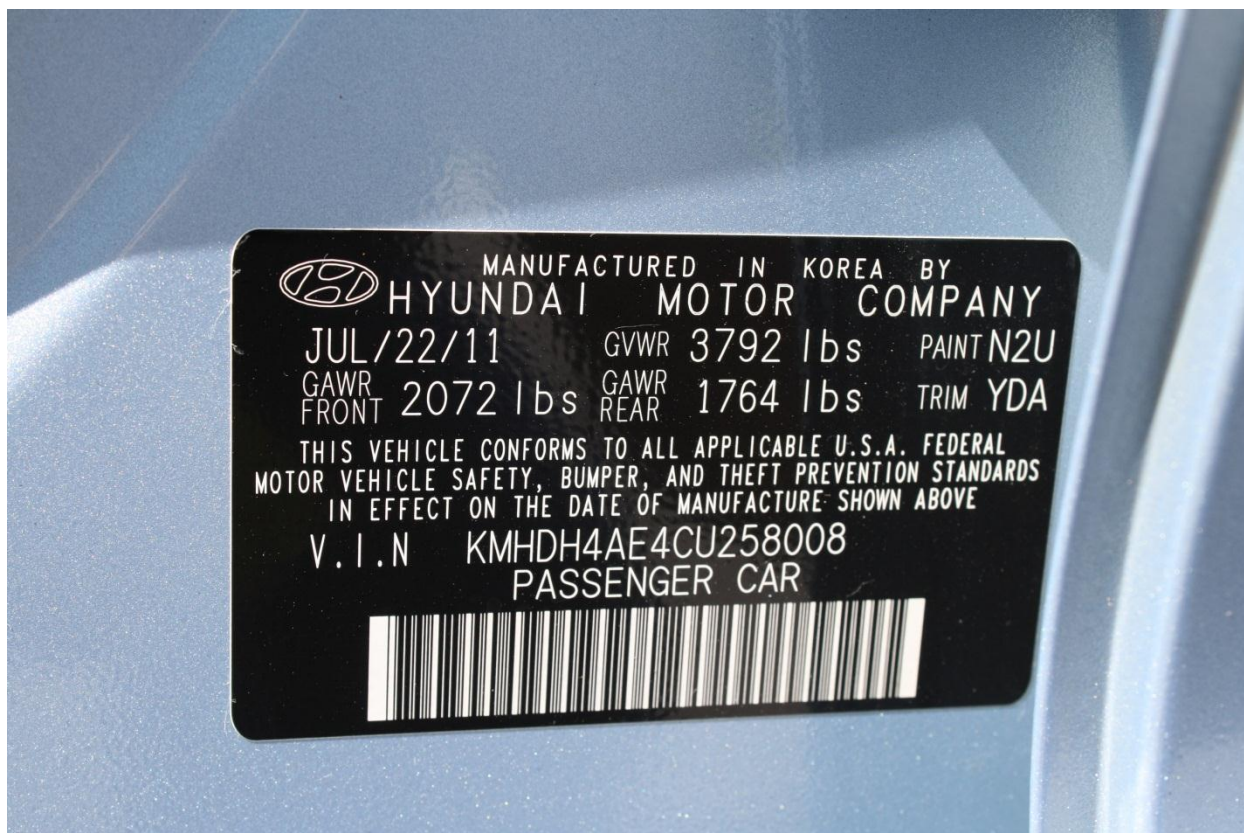


Figure A-54: Close-Up View of Vehicle's Certification Label

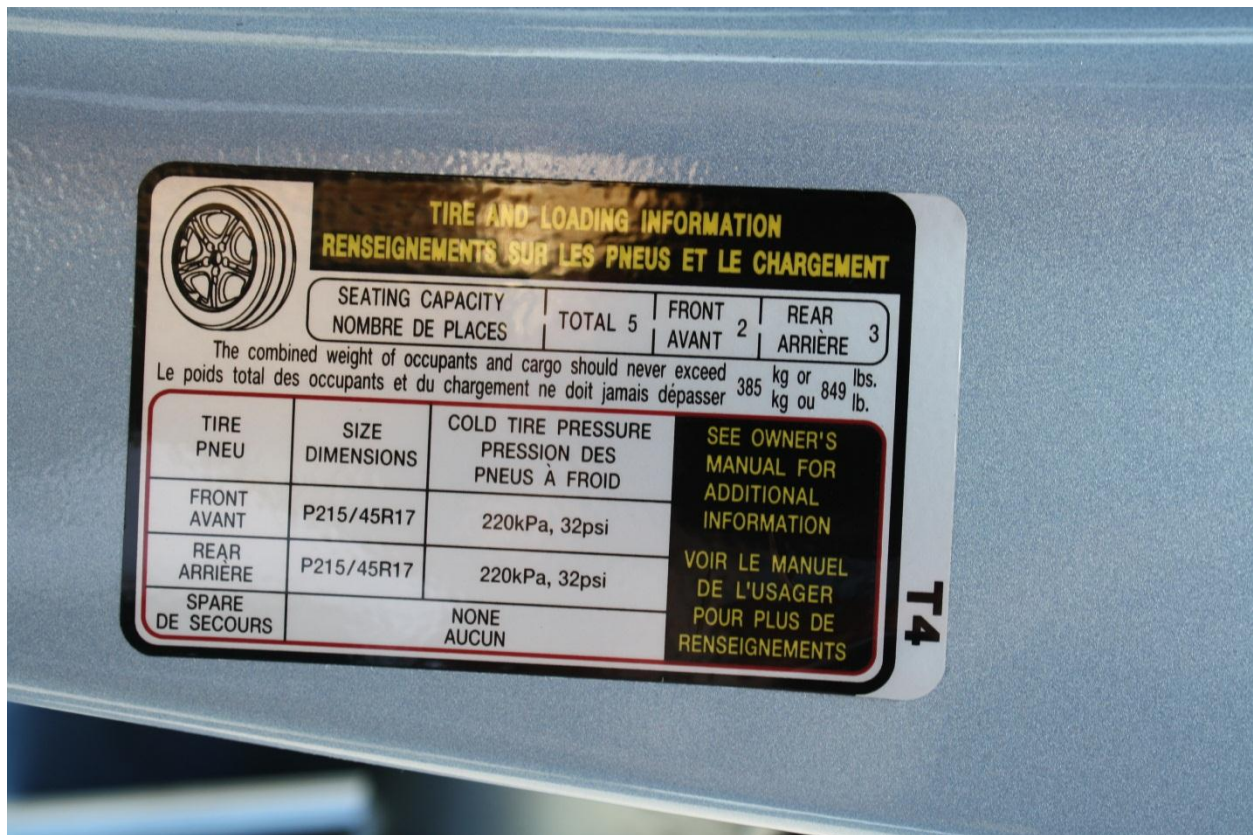


Figure A-55: Close-Up View of Vehicle's Tire Information Placard or Label



Figure A-56: Pre-Test Pole Barrier Front View

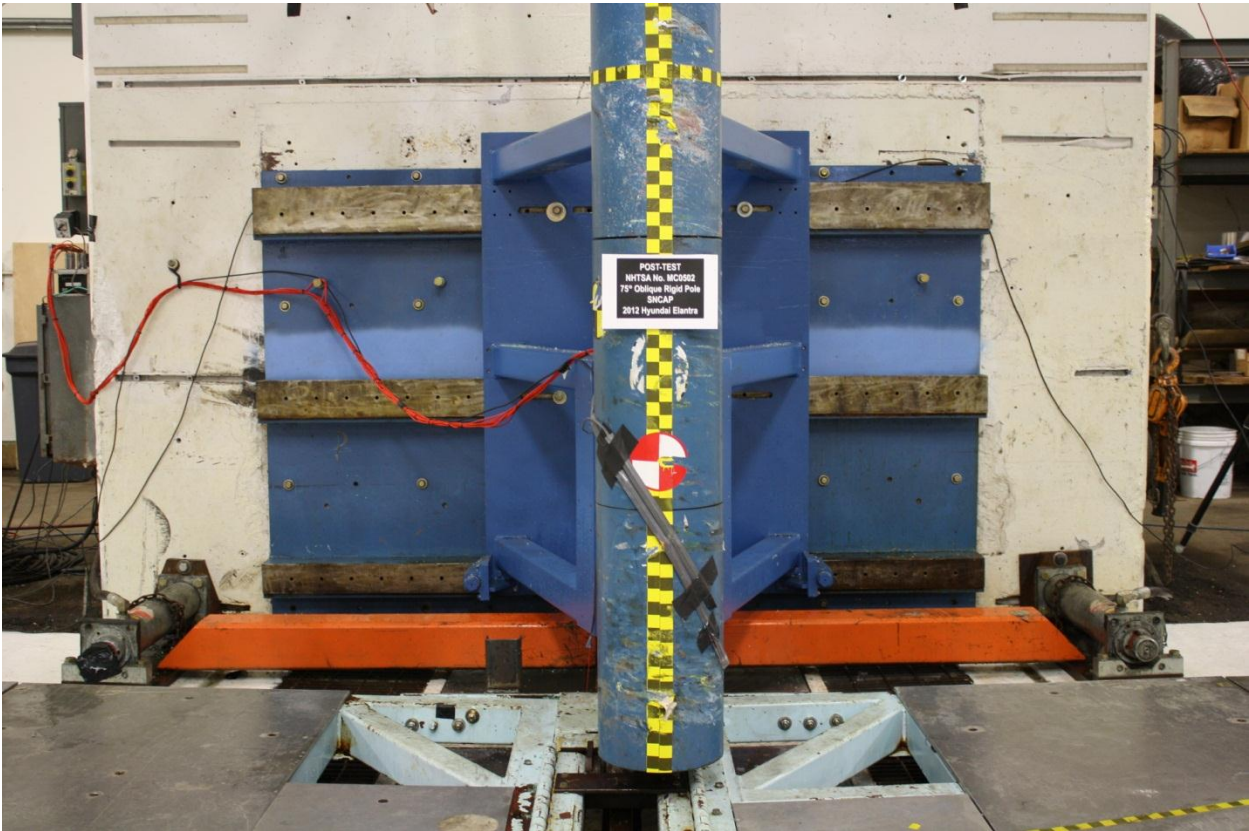


Figure A-57: Post-Test Pole Barrier Front View

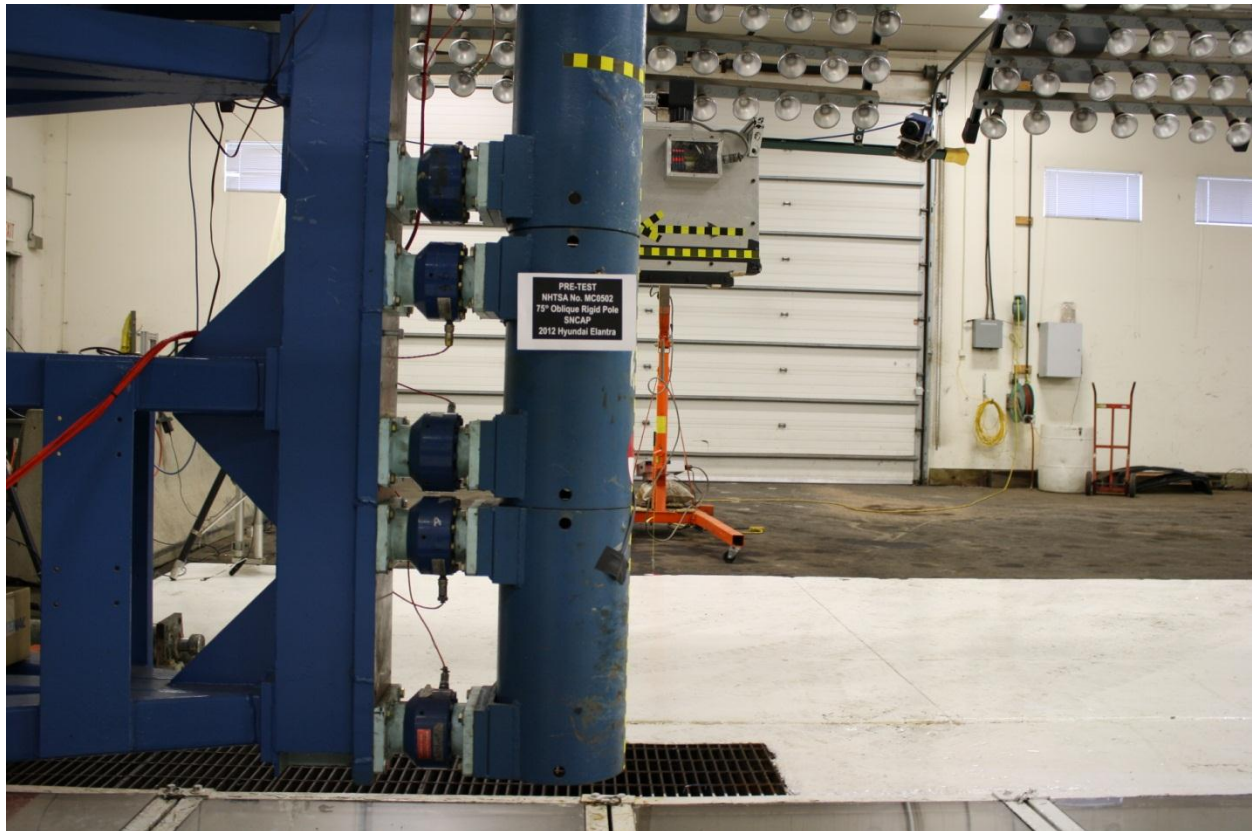


Figure A-58: Pre-Test Pole Barrier Side View

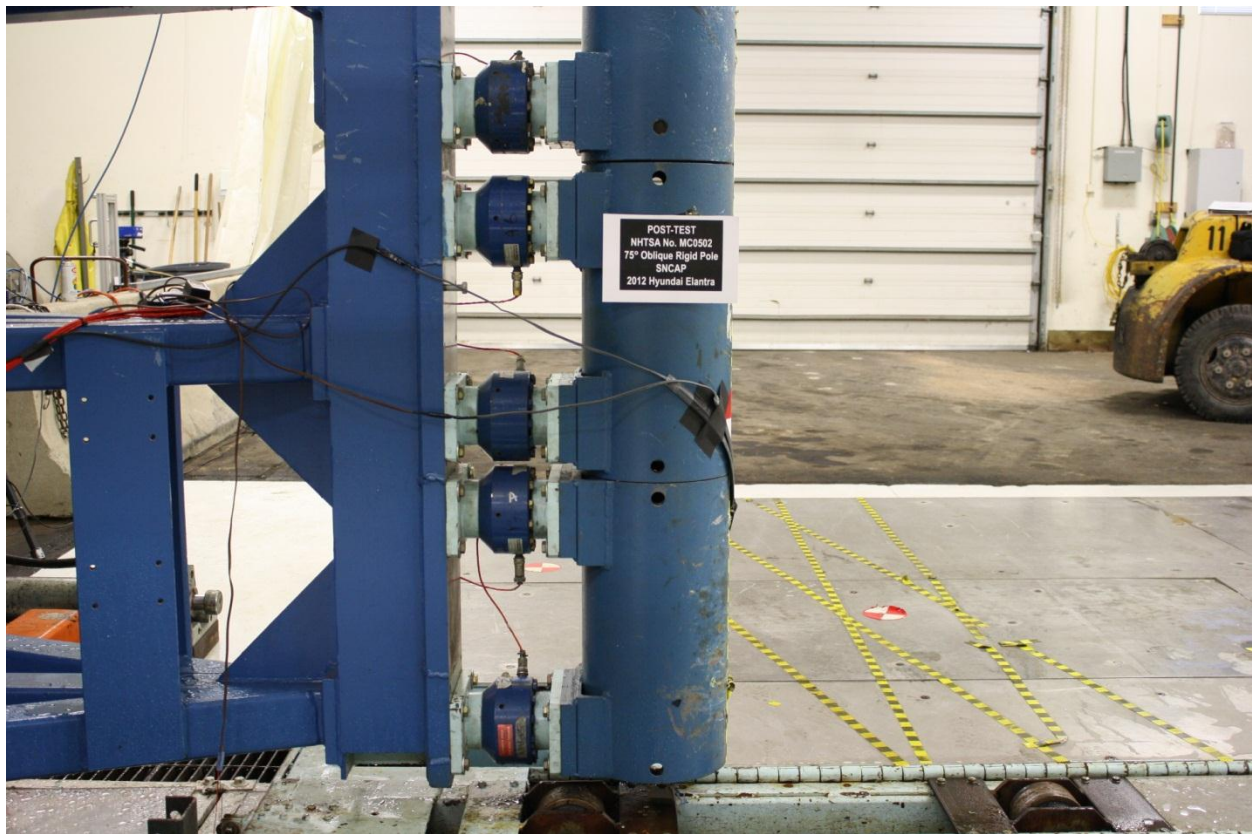


Figure A-59: Post-Test Pole Barrier Side View



Figure A-60: Pre-Test Ballast View



Figure A-61: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-62: FMVSS No. 301 Static Rollover 0 Degrees



Figure A-63: FMVSS No. 301 Static Rollover 90 Degrees



Figure A-64: FMVSS No. 301 Static Rollover 180 Degrees



Figure A-65: FMVSS No. 301 Static Rollover 270 Degrees



Figure A-66: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-67: Impact Event

HYUNDAI 2012 ELANTRA LIMITED PZEV		2011 IIHS Top Safety Pick	
SOLD TO: NY105 FUCICLO HYUNDAI OF GREECE 3875 RIDGE ROAD WEST ROCHESTER NY 14626 SHIPPED TO: NY105		VIN: KMHDH4AE4C258008 MODEL: 4642F4P ENGINE: G4NBB409161 PORT OF ENTRY: PH EXTERIOR COLOR: BLUE SKY METALLIC INTERIOR COLOR: BEIGE MODE OF TRANSPORT: TRUCK ACCESSORY WEIGHT: 15 lbs. EMISSIONS: This vehicle meets California Emissions regulations and is Certified as a Partial Zero Emission Vehicle (PZEV)	
STANDARD FEATURES: AMERICA'S BEST WARRANTY "5-year/60,000-mile New Vehicle Warranty" "10-year/100,000-mile Powertrain Warranty" "7-year/Unlimited-mile Anti-perforation Warranty" "5-year/Unlimited-mile Roadside Assistance" Limited warranty, see dealer for details ADVANCED SAFETY TECHNOLOGY: *Electronic Stability Control (ESC) w/ Traction Control *ABS w/ Electronic Brake Force Distribution & Brake Assist *4-Wheel Disc Brakes *Front, Front Side Impact & Side Curtain Airbags *Front Seatbelt Pre-Tensioners *Tire Pressure Monitoring System *Daytime Running Lights POWERTRAIN TECHNOLOGY: *1.8L, 145 HP, 130lbs-ft Torque, DOHC 4-Cylinder *Dual Continuous Variable Valve Timing *6-Speed Automatic Transmission w/ SHIFTRONIC® COMFORT & CONVENIENCE: *17-inch Alloy Wheels and P215/45R17 Tires *Power Sunroof w/ Tilt & Slide *Side Mirror-Mounted Turn Signal Indicators *Fog Fog Lights *Air Conditioning w/ Cabin Air Filter *AM/FM/XM/CD/MP3 Audio System w/ 6 Speakers *XM Satellite Radio w/90 Day Trial; Not Available in AK & HI *iPod®/USB & Auxiliary Input Jacks *Power Windows, Locks & Heated Mirrors *One Touch Up Drivers Window *Remote Keyless Entry w/ Alarm *Steering Wheel Mounted Cruise, Audio & Phone Controls *Integrated Bluetooth® Hands-Free Phone System *18-and-Telescopic Steering Column *Illuminated Vanity Mirrors with Extensions *Trip Computer *Leather-Wrapped Steering Wheel & Shift Knob *Leather Seating Surfaces w/ Heated Front and Rear Seats *Sliding Front Center Armrest w/ Storage Box *160/40 Split-Folding Rear Seat *Rear Center Armrest w/ Cupholders *Full Tank of Gas		INCLUDED: *Navigation System w/ 7" Screen *Rearview Camera *360W Premium Audio w/ Digital External Amp *Automatic Headlamps *Proximity Key Entry with Electronic Push Button Start w/ Immobilizer *Carpeted Floor Mats *Cargo Net *Cargo Tray *iPod® Cable *Alloy Wheel Locks Manufacturer's Suggested Retail Price: \$20,445.00 ADDED FEATURES: *Technology Package: \$2,100.00 *Navigation System w/ 7" Screen *Rearview Camera *360W Premium Audio w/ Digital External Amp *Automatic Headlamps *Proximity Key Entry with Electronic Push Button Start w/ Immobilizer *Carpeted Floor Mats *Cargo Net *Cargo Tray *iPod® Cable *Alloy Wheel Locks Inland Freight & Handling: \$760.00 Total Price: \$23,605.00	
PART CONTENT INFORMATION FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 2 % MAJOR SOURCES OF FOREIGN PARTS CONTENT: Korea 89 % Note: 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 29 Expected range for most drivers 24 to 34 MPG Estimated Annual Fuel Cost \$1364.00 based on 15,000 miles at \$3.00 per gallon Combined Fuel Economy 33 This Vehicle 10 All Midsize Cars 39 Highway MPG 40 Expected range for most drivers 33 to 47 MPG Your actual mileage will vary depending on how you drive and maintain your vehicle	
Environmental Performance Protect the Environment, choose vehicles with higher scores: Global Warming Score 1 Average new vehicle 10 Cleanest Smog Score 1 Average new vehicle 10 Cleanest 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.DriveClean.ca.gov for more information. AIR RESOURCES BOARD 224 C 23202GRAND 8		GOVERNMENT SAFETY RATINGS Frontal Crash Driver Not Rated Passenger Not Rated Side Crash Front seat Not Rated Rear seat Not Rated Rollover Not Rated Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight. Star ratings based on the risk of injury in a side impact. Star ratings based on the risk of rollover in a single vehicle crash. Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA).	

Figure A-68: Monroney Label

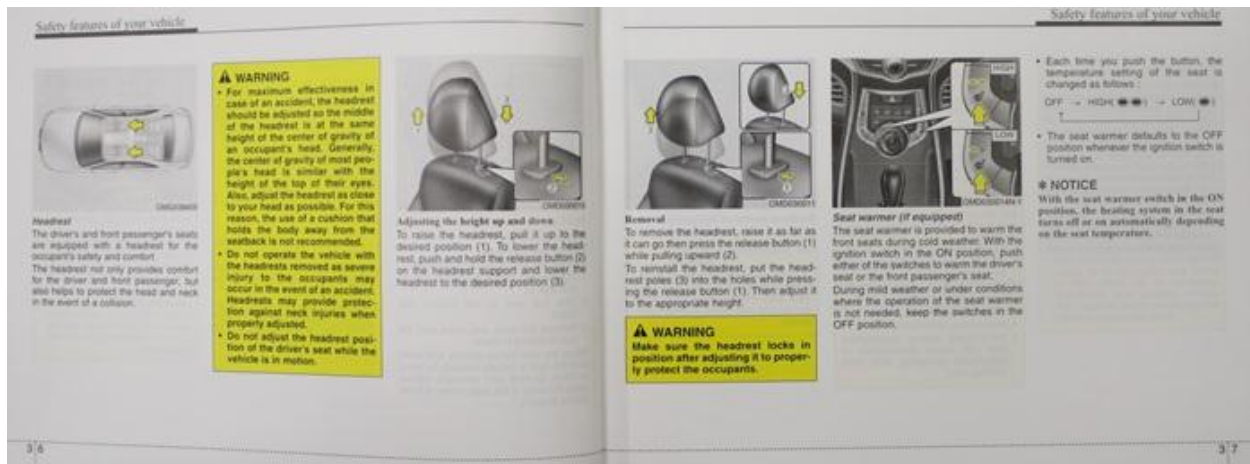


Figure A-69: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

No.		Page
	Driver Dummy Instrumentation Plots	
1	Driver Head Acceleration (X) Primary vs. Time	B-5
2	Driver Head Acceleration (Y) Primary vs. Time	B-5
3	Driver Head Acceleration(Z) Primary vs. Time	B-6
4	Driver Head Resultant Primary vs. Time	B-6
5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-7
6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-7
7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-8
8	Driver Lower Spine Y12 Resultant Acceleration vs. Time	B-8
9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-9
10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-9
11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-10

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

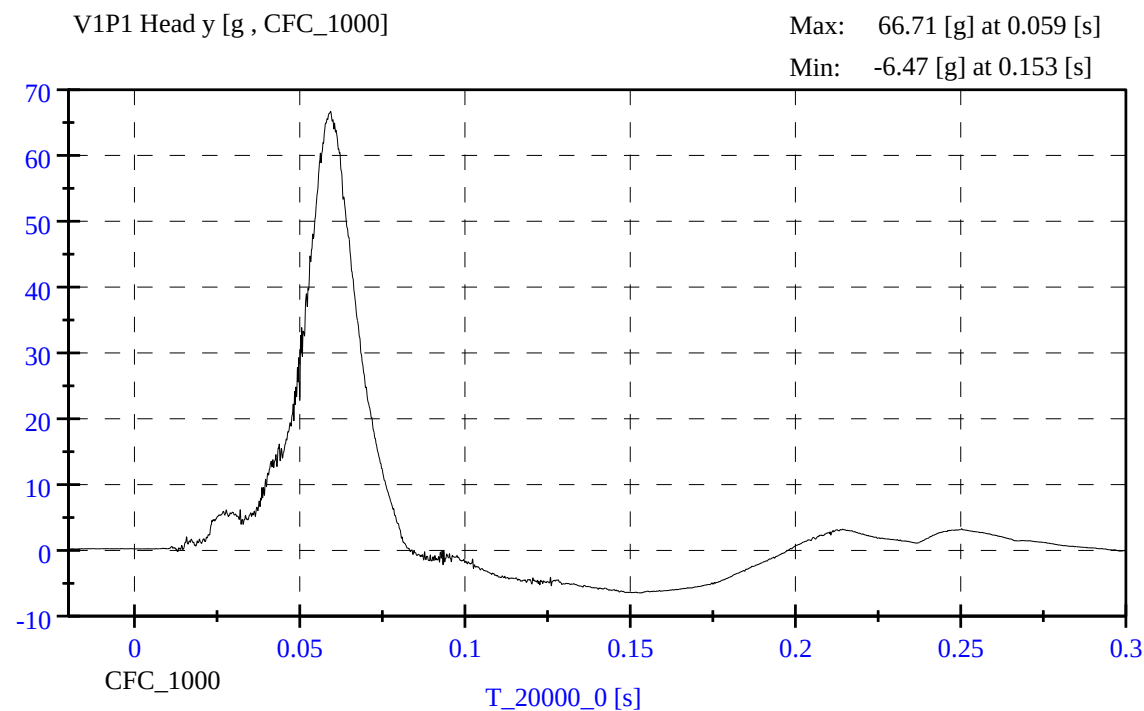
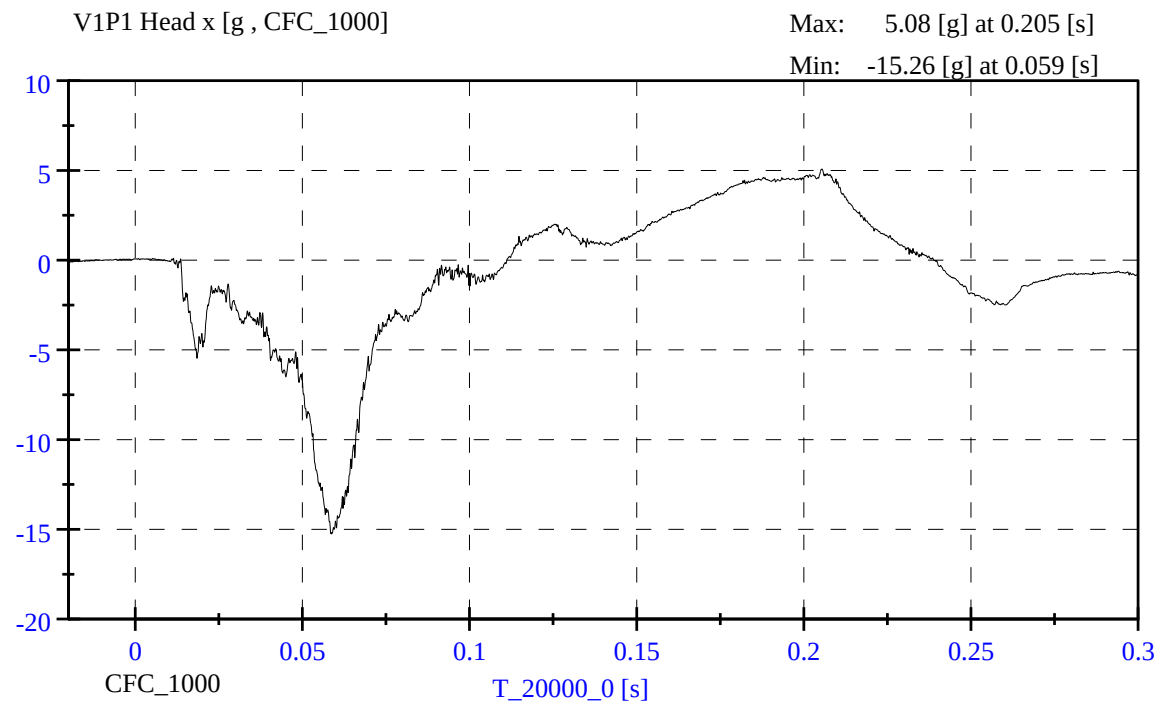
Driver Head Acceleration (X) Redundant
Driver Head Acceleration (Y) Redundant
Driver Head Acceleration (Z) Redundant
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)
Driver Shoulder Contact Switch
Driver Torso Contact Switch
Driver Pelvis Contact Switch

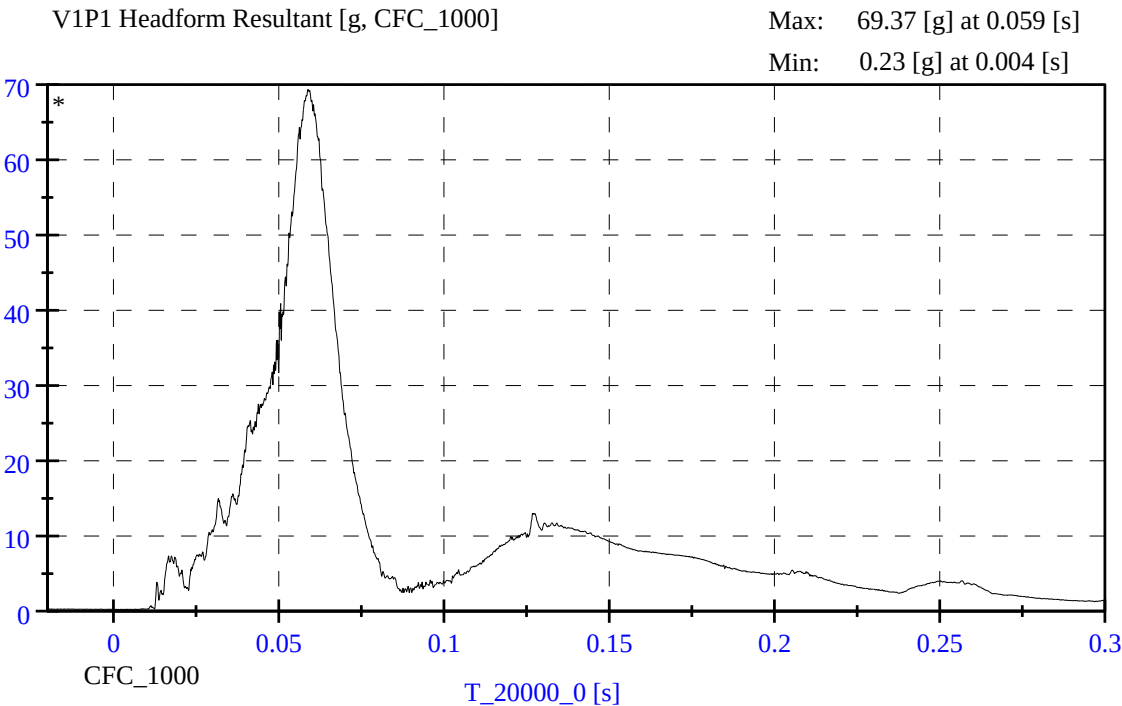
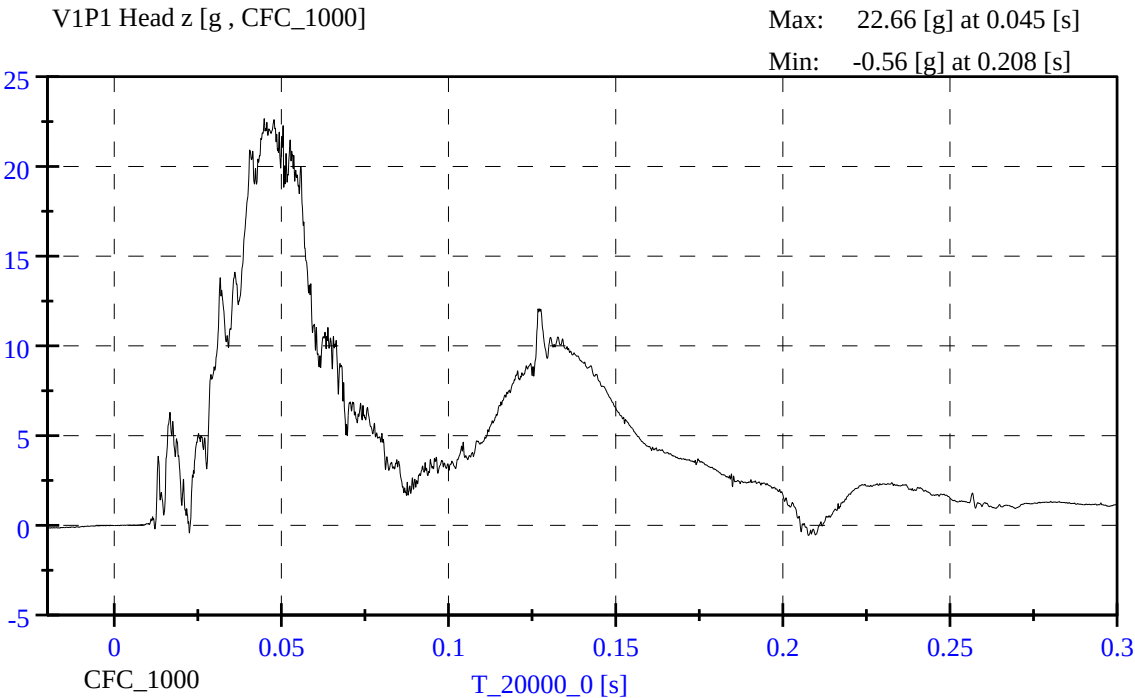
Vehicle Instrumentation Data

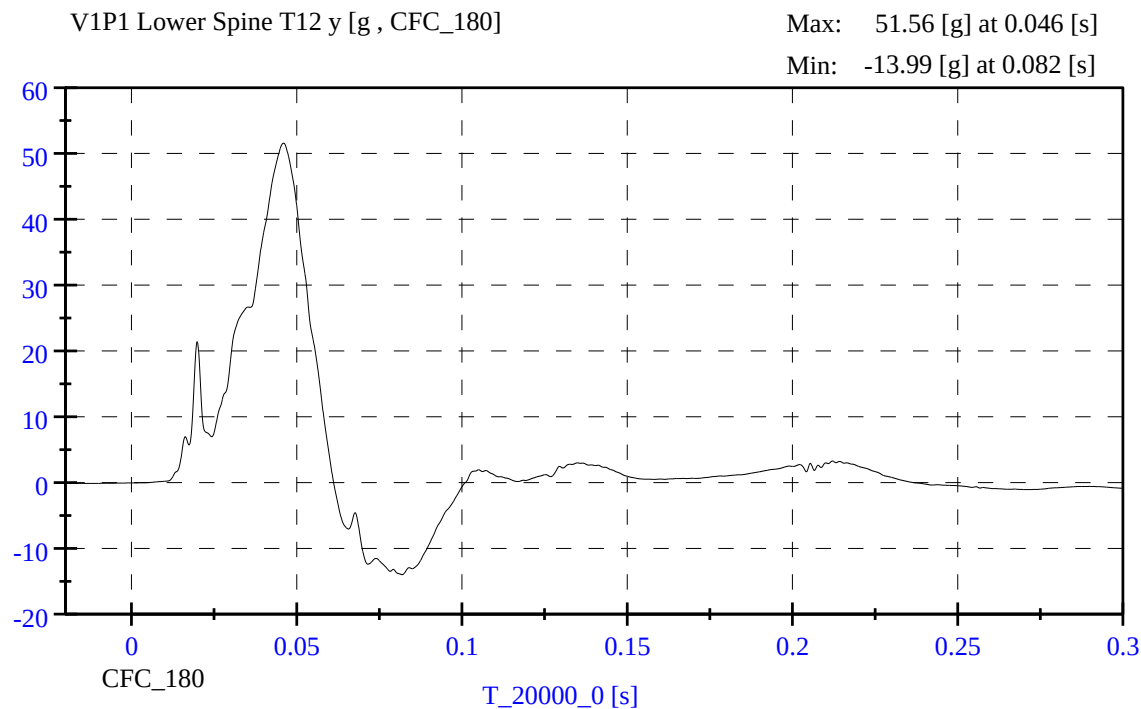
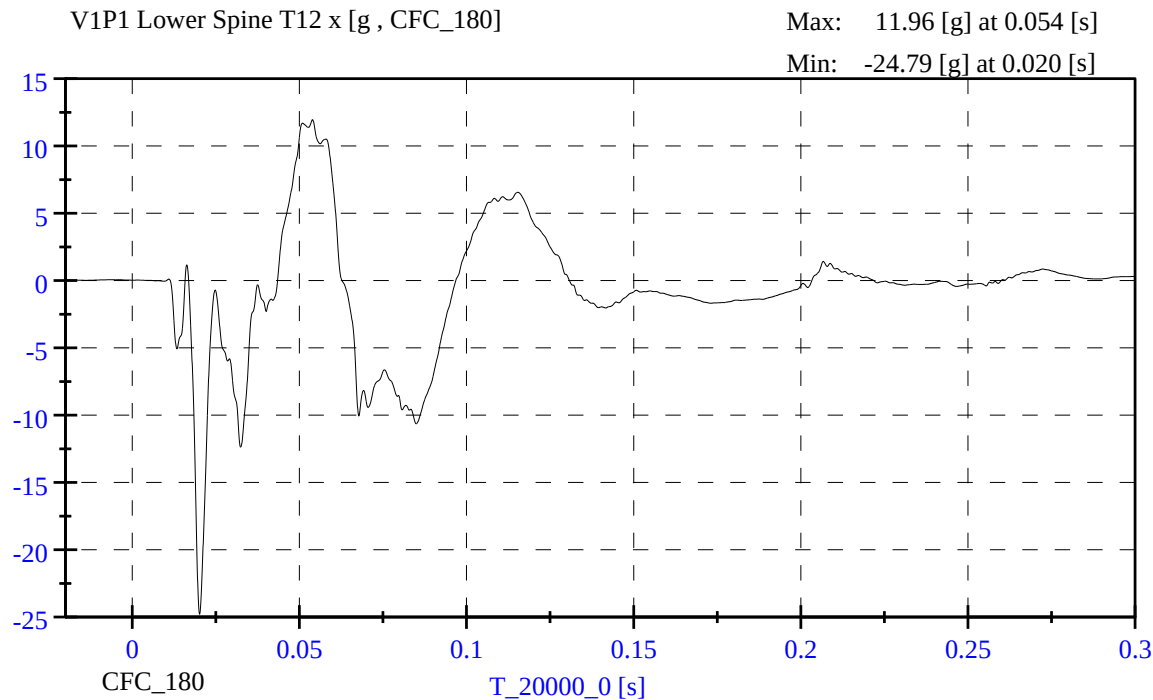
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Vehicle Center of Gravity Angular Rate About X (Roll)
Vehicle Center of Gravity Angular Rate About Y (Pitch)
Vehicle Center of Gravity Angular Rate About Z (Yaw)
Left Floor 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

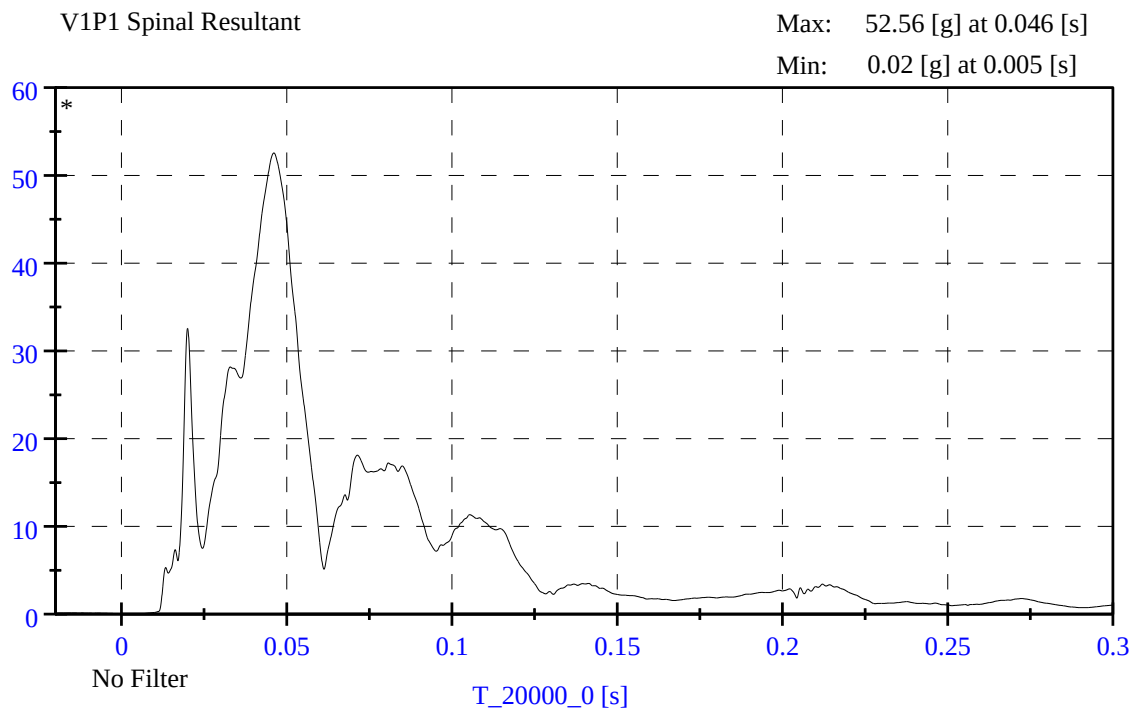
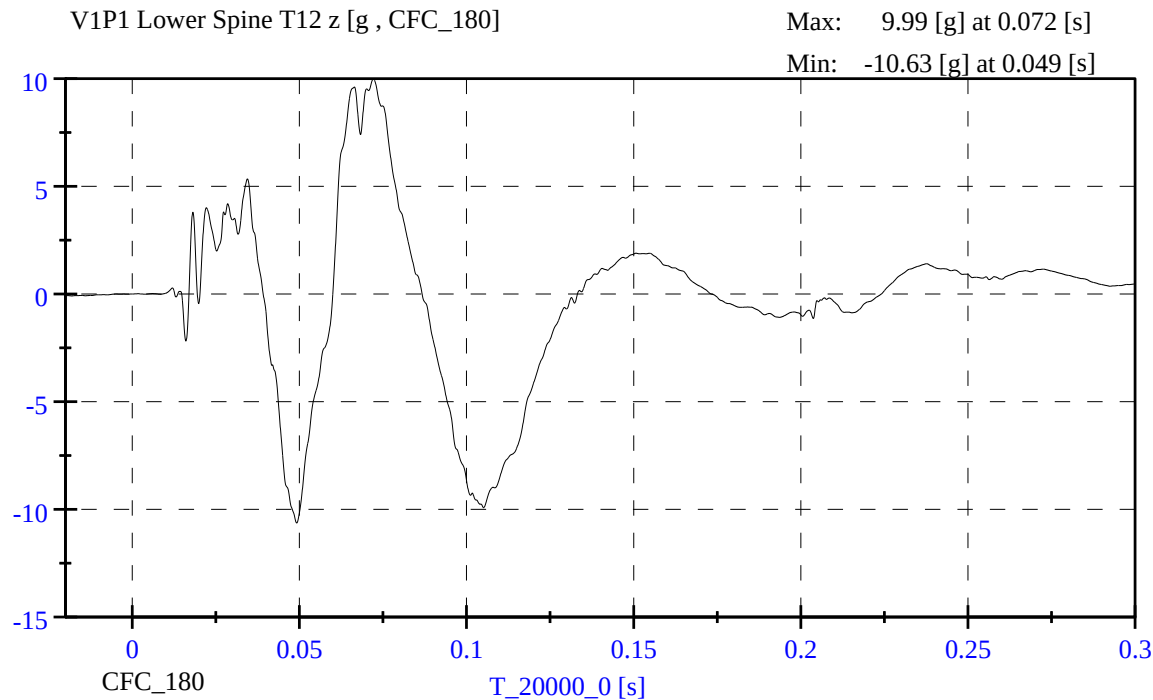
Pole Instrumentation Data

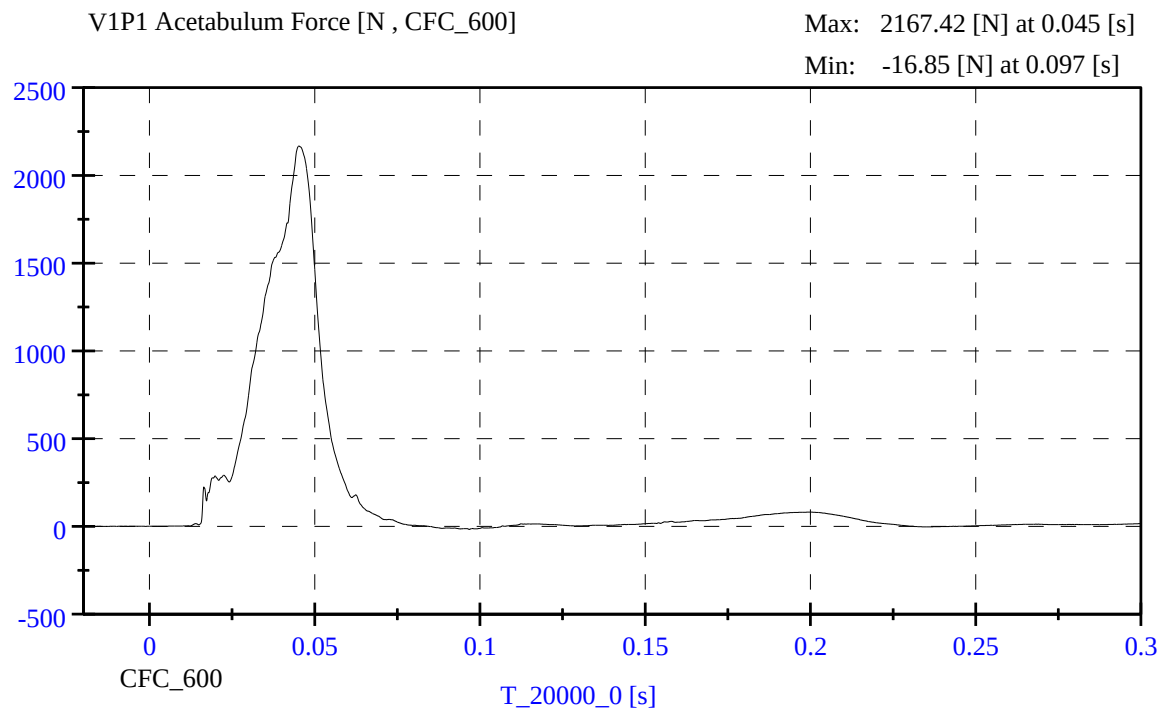
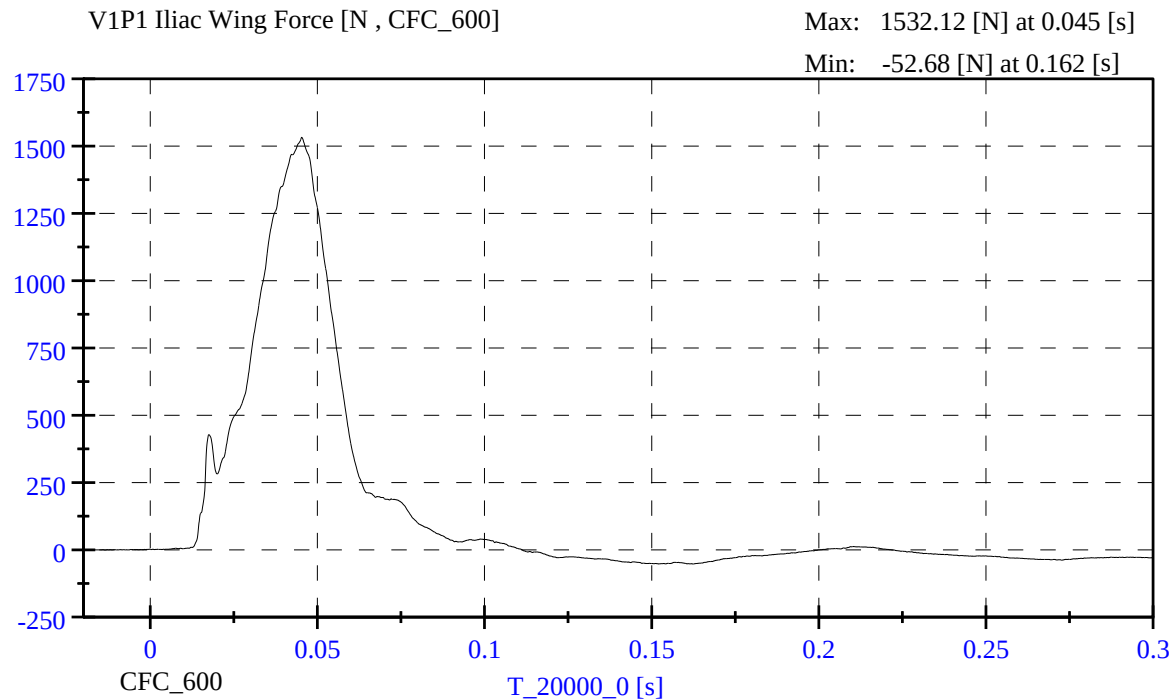
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

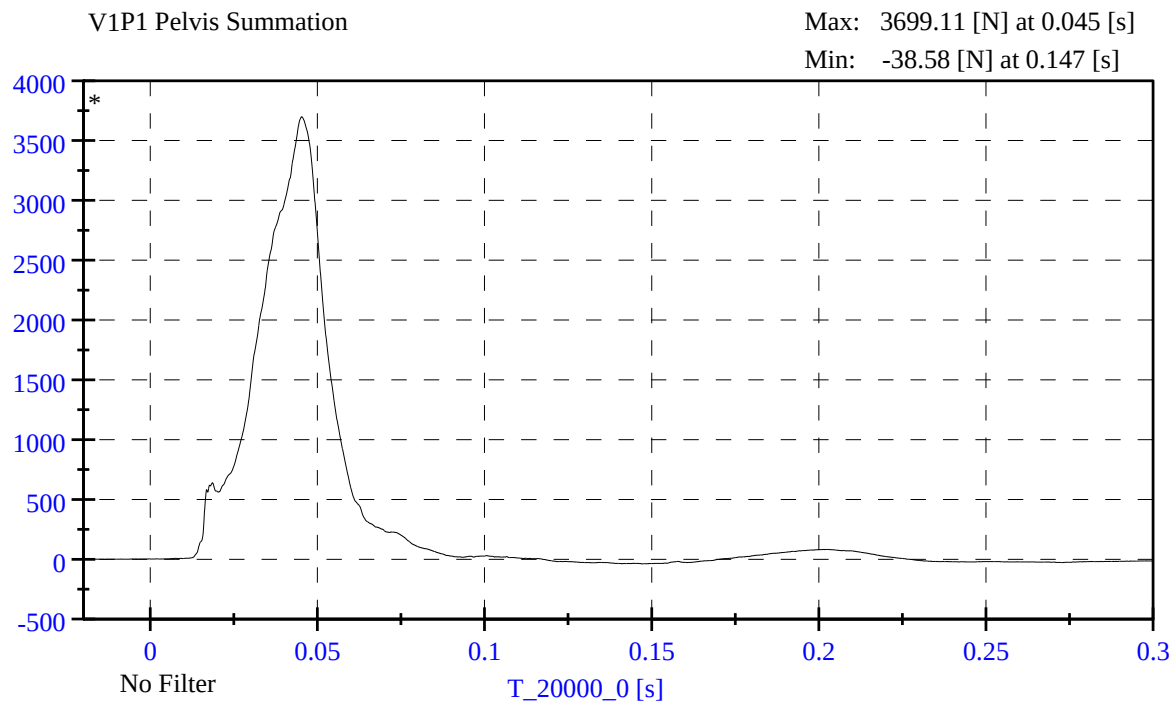












APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-Its No: 8012

CONFIGURED FOR LEFT SIDE IMPACT



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SID-IIsD External Measurements

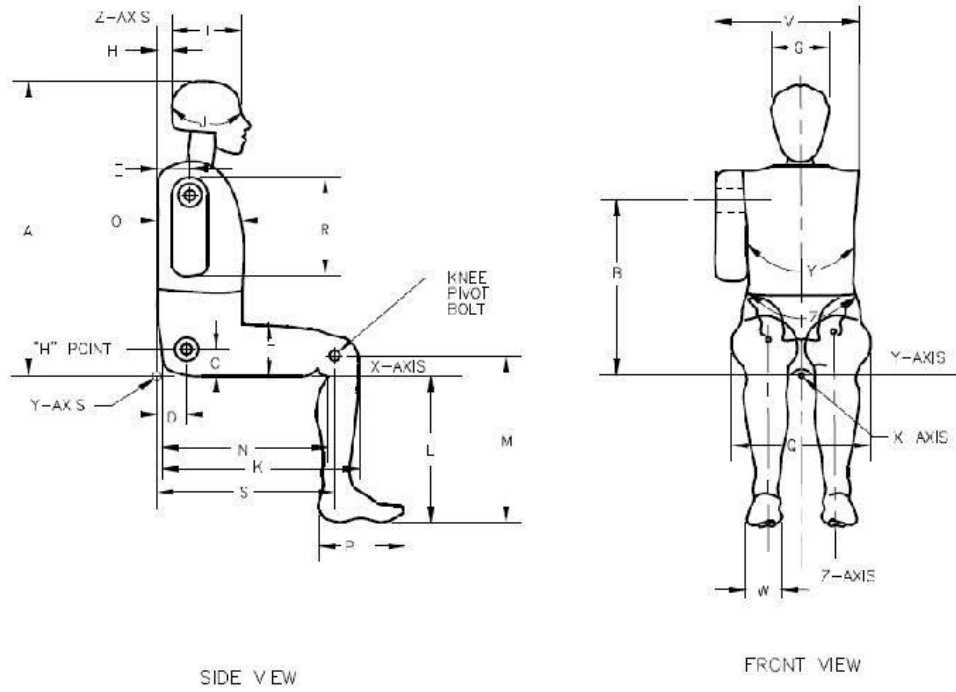
NHTSA ATD S/N DG8012

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	782	Yes
B	Shoulder Pivot Height	437.0 - 453.0	444	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	148	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	98	Yes
F	Thigh Clearance	119.0 - 135.0	132	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	43	Yes
I	Head Depth	178.0 - 188.0	187	Yes
J	Head Circumference	541.0 - 551.0	548	Yes
K	Buttock to Knee Length	514.0 - 540.0	530	Yes
L	Popliteal Height	343.0 - 369.0	359	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	402	Yes
N	Buttock Popliteal Length	416.0 - 442.0	434	Yes
O	Chest Depth without Jacket	195.0 - 211.0	204	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
Q	Hip Breadth	313.0 - 323.0	315	Yes
R	Arm Length	249.0 - 259.0	257	Yes
S	Knee Joint to Seat back	478.0 - 493.0	490	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	872	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

Technician : AR

Date: 11/11/2011

SID-11sD External Dimension Reference Diagram





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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/12/2011
Test Number:	1	Test Time:	10:38:33 AM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1362

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.1 deg C P
Humidity	10 -- 70	25 %RH P
Resultant Acceleration	115.0 -- 137.0	118.1 g P
Oscillation	0.0 -- 15.0	1.8 % P
Fore-Aft Acceleration	-15.0 -- 15.0	4.4 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **10:38:33 AM**

Test Date: **11/12/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P49185	11/3/2011
Endevco	7264-2000	P58839	10/17/2011
Endevco	7264-2000	P51991	10/17/2011

Test ID:

Test Time: 10:38:33 AM

Test Date: 11/12/2011

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2 of 2

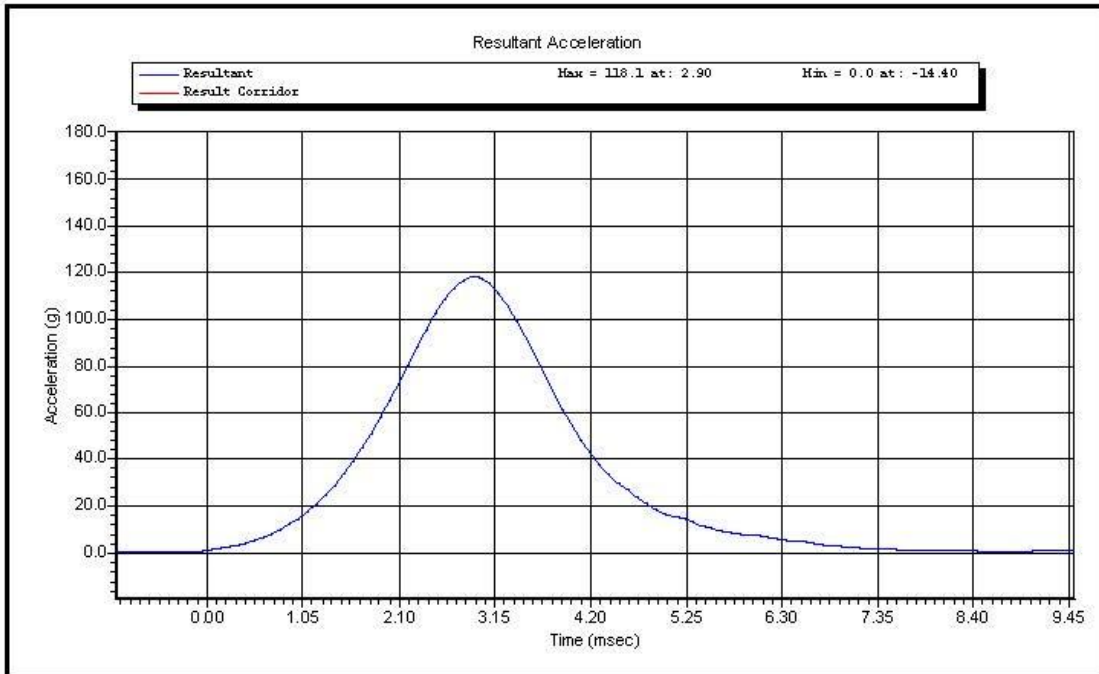


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/12/2011
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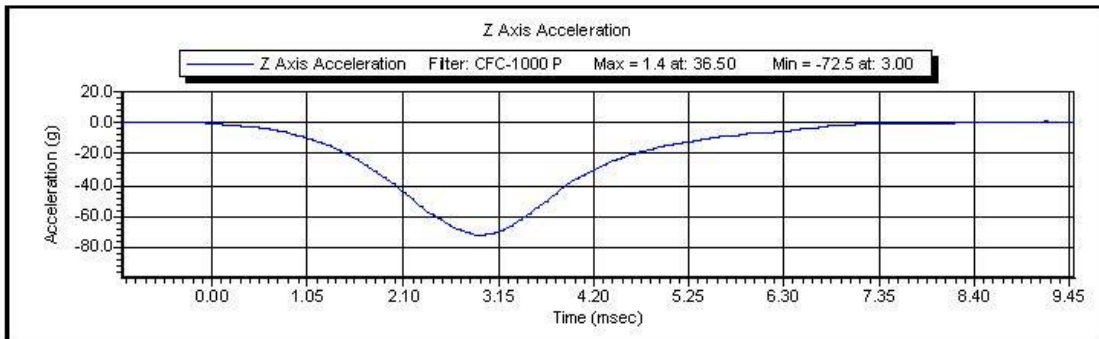
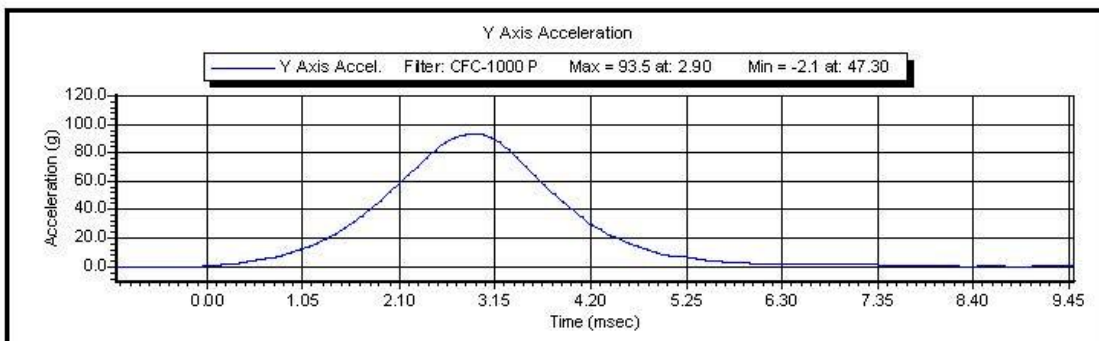
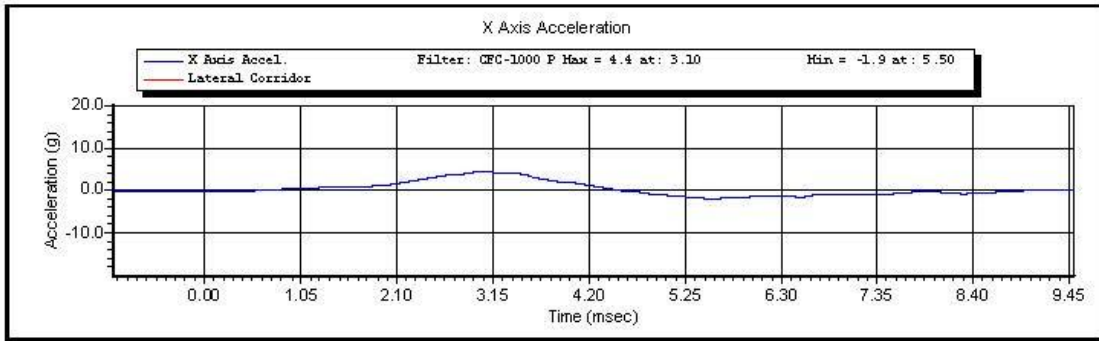
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Test Time: 10:38:33 AM

Test Date: 11/12/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 2



Test ID:

Test Time: **10:38:33 AM**

Test Date: **11/12/2011**

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2 of 2



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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/12/2011
Test Number:	1	Test Time:	9:37:48 AM

Component Part Number	Component Serial Number
Neck - 180-2000	DG7061

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	5.51 -- 5.63	5.57 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.43 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.44 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.61 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.50 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.77 m/s P
Max D Plane Rotation	71.0 -- 81.0	75.0 degrees P
Time at Max Rotation	50.0 -- 70.0	62.8 ms P
Moment about OC	-44.0 -- -36.0	-38.7 Nm P
Moment Decay to Zero	102.0 -- 126.0	114.7 ms P

All test parameters are within specifications

Technician: **A. Rudniski**
 Supervisor: **D. Travale**

Test ID:

Test Time: **9:37:48 AM**

Test Date: **11/12/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
Denton	1716A	LC-2192Fy	8/31/2011
Denton	1716A	LC-2192Mx	8/31/2011
DentonATD	78051-342	184	5/8/2011
DentonATD	78051-342	174	5/8/2011
DentonATD	78051-342	185	5/8/2011

Test ID:

Test Time: 9:37:48 AM

Test Date: 11/12/2011

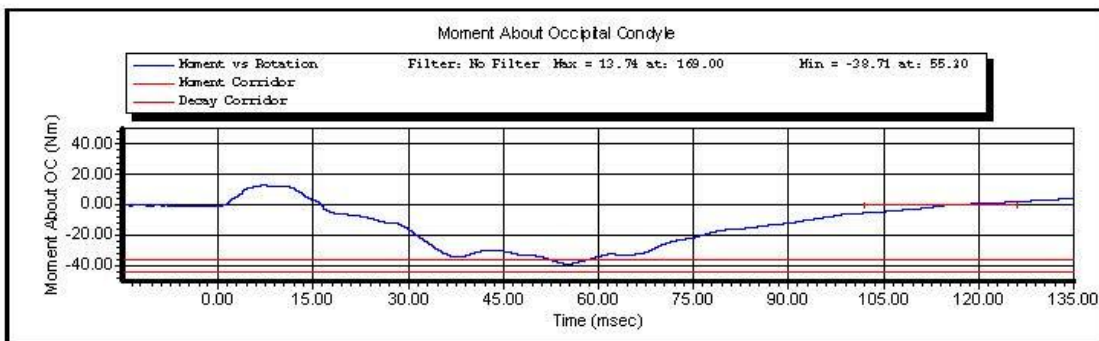
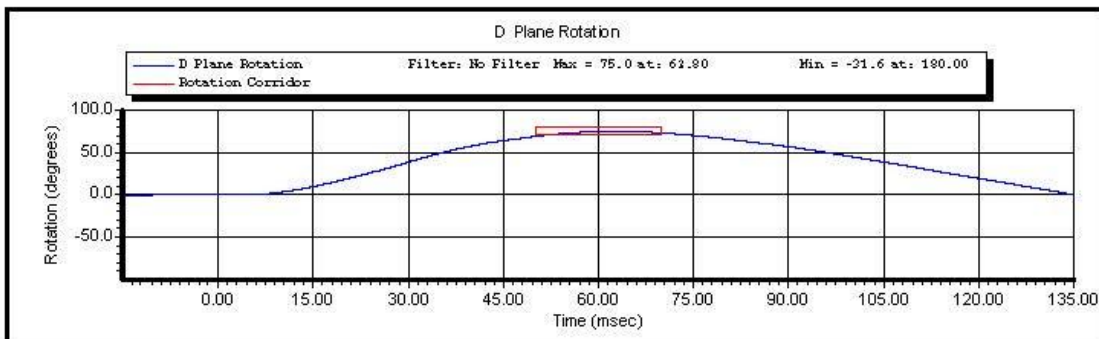


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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/12/2011
Test Number:	1	Test Time:	9:37:48 AM



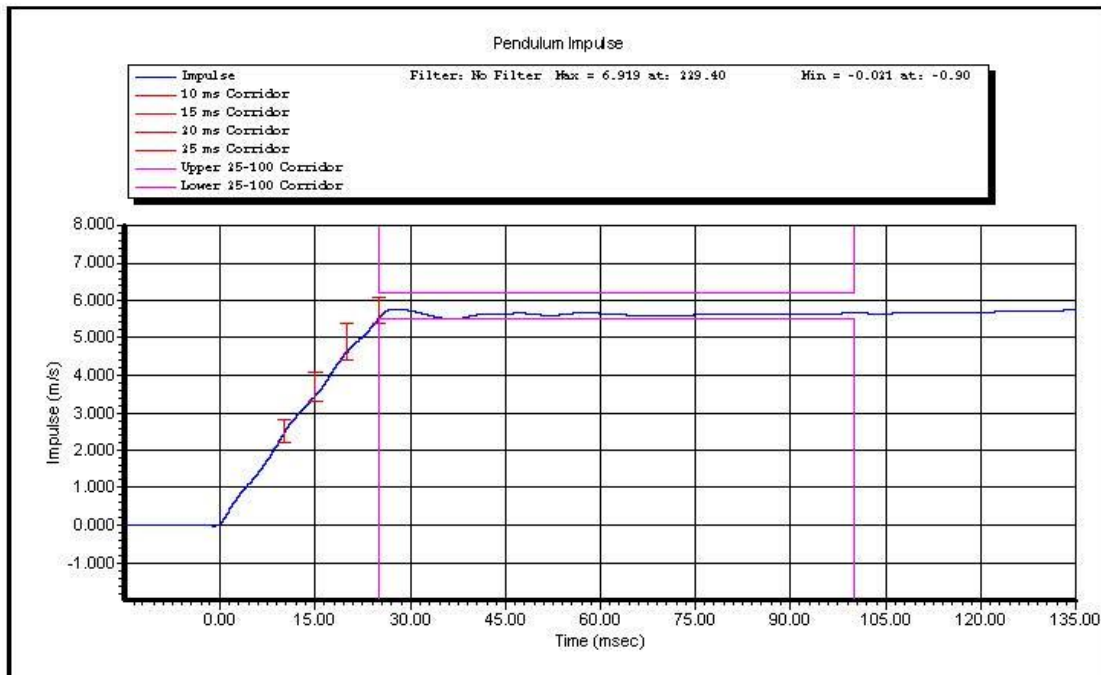
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Test Date: **11/12/2011**

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1 of 2



Test ID:

Test Time: **9:37:48 AM**

Test Date: **11/12/2011**

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG6012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	5:48:27 PM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	DG3210
Shoulder Rib 180-3355	DG6997

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.50 deg C P
Humidity	10.0 -- 70.0	29.0 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Probe Acceleration	13.0 -- 18.0	15.2 g P
Shoulder Deflection	28.0 -- 37.0	29.0 mm P
T1 Acceleration	17.0 -- 22.0	18.7 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **5:48:27 PM**

Test Date: **11/11/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
FTSS	180-3881-1	DS-1845	9/1/2011
Endevco	7264-2000	P63561	10/3/2011

Test ID:

Test Time: 5:48:27 PM

Test Date: 11/11/2011

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2 of 2

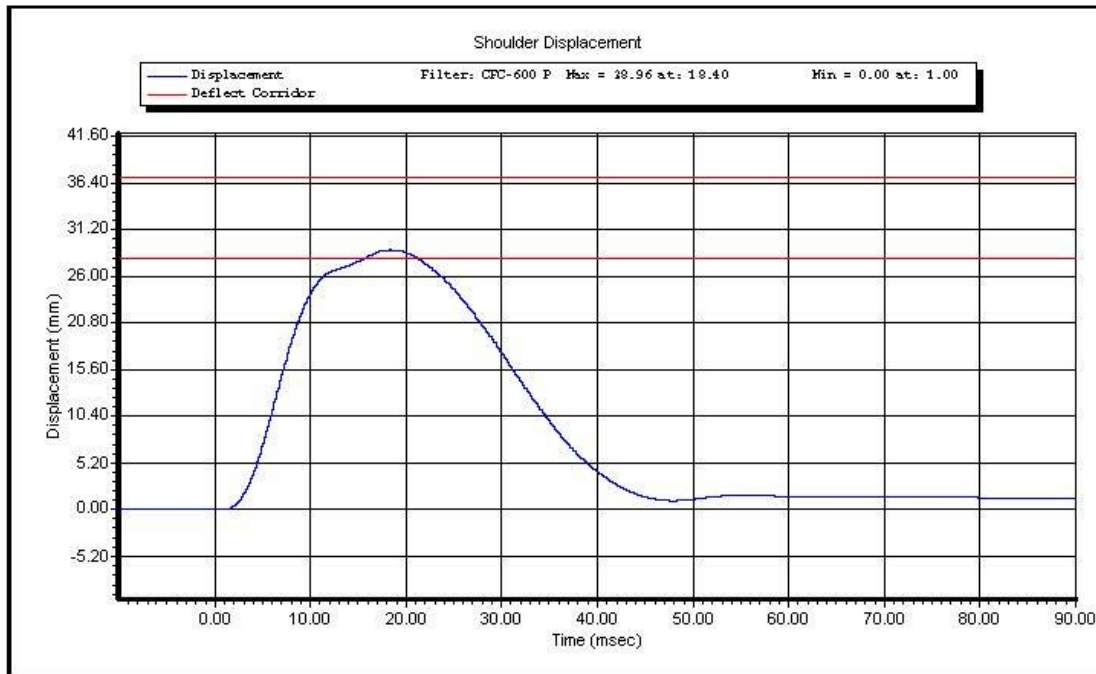


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Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	5:48:27 PM



Test ID:

Test Time: **5:48:27 PM**

Test Date: **11/11/2011**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

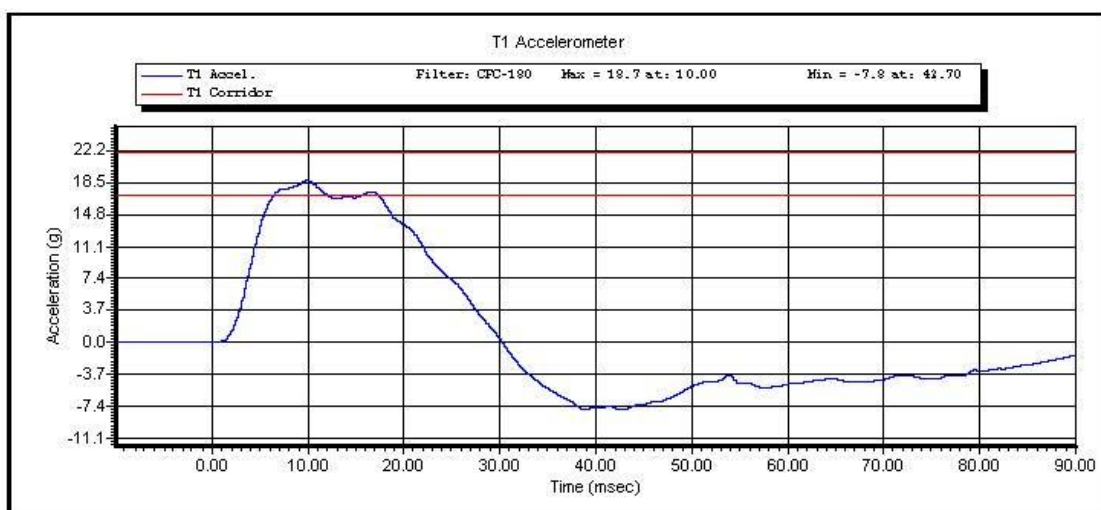
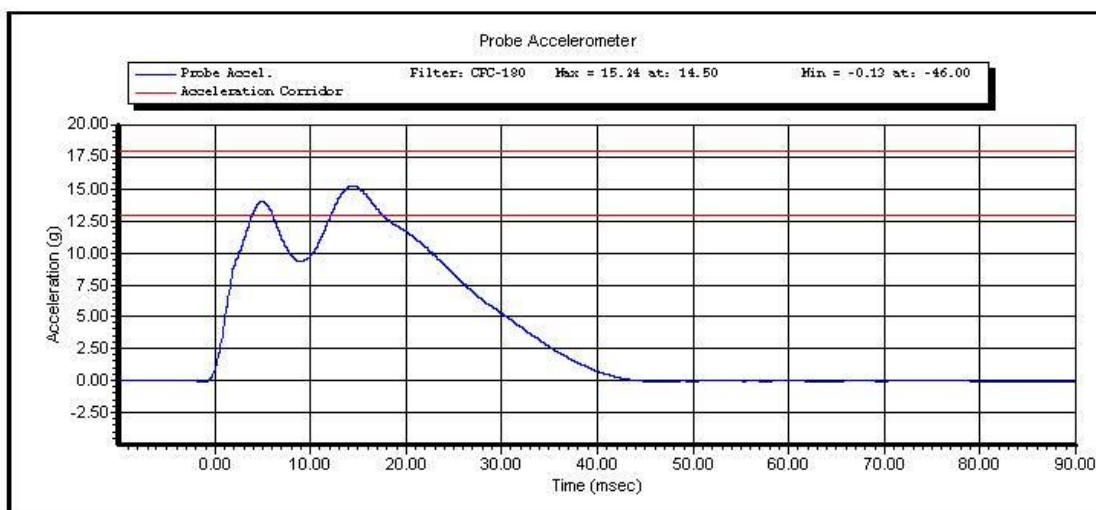
1 of 2



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Test ID:

Test Time: 5:48:27 PM

Test Date: 11/11/2011

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2 of 2



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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG6012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	7:16:05 PM

Component Part Number	Component Serial Number
Thorax Ribs 1, 2, 3 180-3362	DG6080, DG6081, DG7543
Shoulder Rib 180-3355	DG6997
Left Arm 180-6011-1	DG3210

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.5 deg C	P
Humidity	10	--	70	29 %RH	P
Velocity	6.60	--	6.80	6.68 m/s	P
Probe Acceleration after 5ms	30.0	--	36.0	34.6 g	P
Upper Thorax Rib Deflection	25.0	--	32.0	28.3 mm	P
Mid Thorax Rib Deflection	30.0	--	36.0	32.5 mm	P
Lower Thorax Rib Deflection	32.0	--	38.0	35.0 mm	P
Upper Spine Acceleration ("y")	34.0	--	43.0	40.6 g	P
Lower Spine Acceleration ("y")	29.0	--	37.0	34.2 g	P
Shoulder Deflection	31.0	--	40.0	35.0 mm	P

All test parameters are within specifications

Technician: **A. Rudniski**
Supervisor: **D. Travale**

Test ID:

Test Time: **7:16:05 PM**

Test Date: **11/11/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
FTSS	180-3881-1	DS-1849	9/1/2011
FTSS	180-3881-1	DS-1857	9/1/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011
FTSS	180-3881-1	DS-1845	9/1/2011

Test ID:

Test Time: 7:16:05 PM

Test Date: 11/11/2011

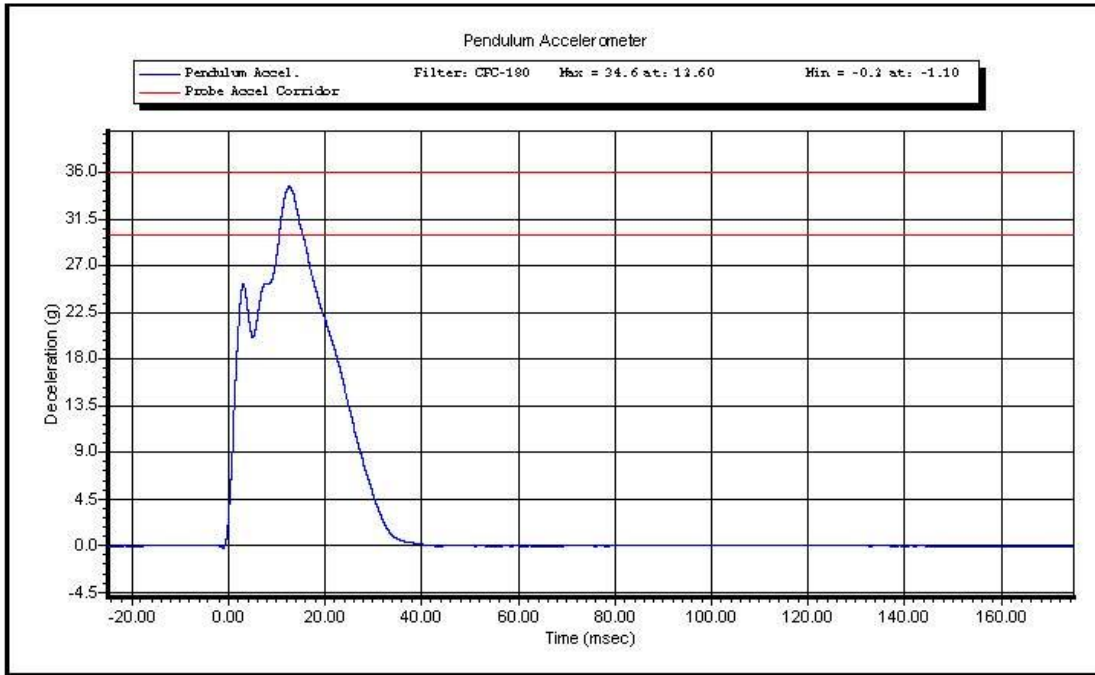


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Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	7:16:05 PM



Test ID:

Test Time: 7:16:05 PM

Test Date: 11/11/2011

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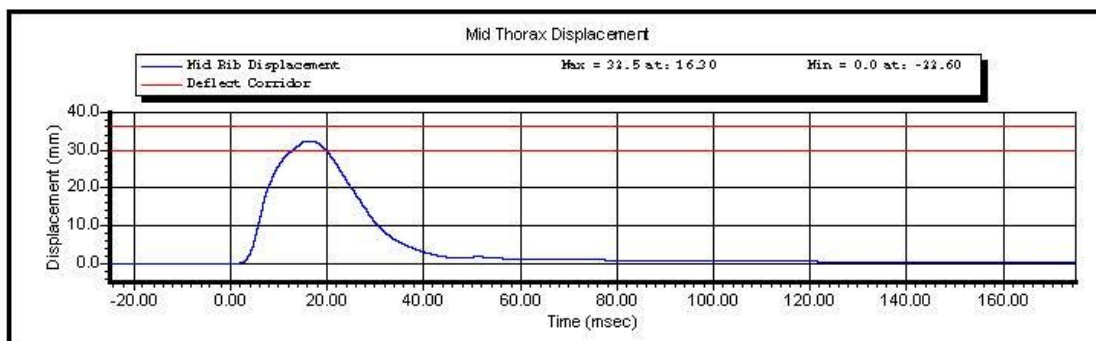
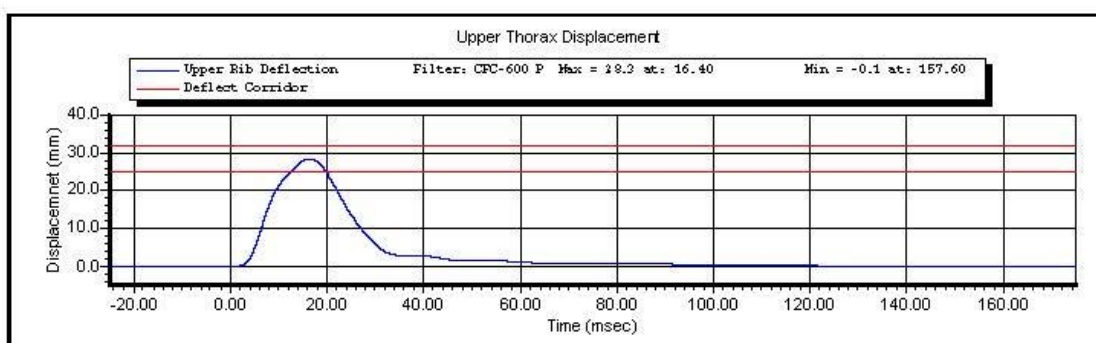
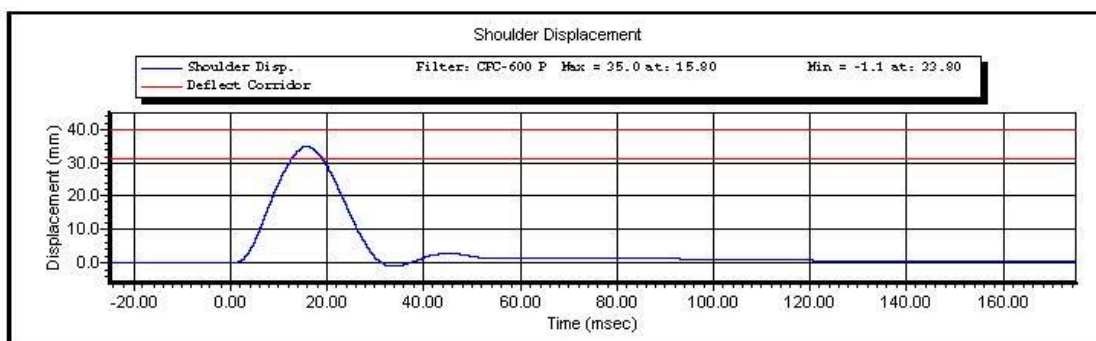
1 of 3



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Test ID:

Test Time: 7:16:05 PM

Test Date: 11/11/2011

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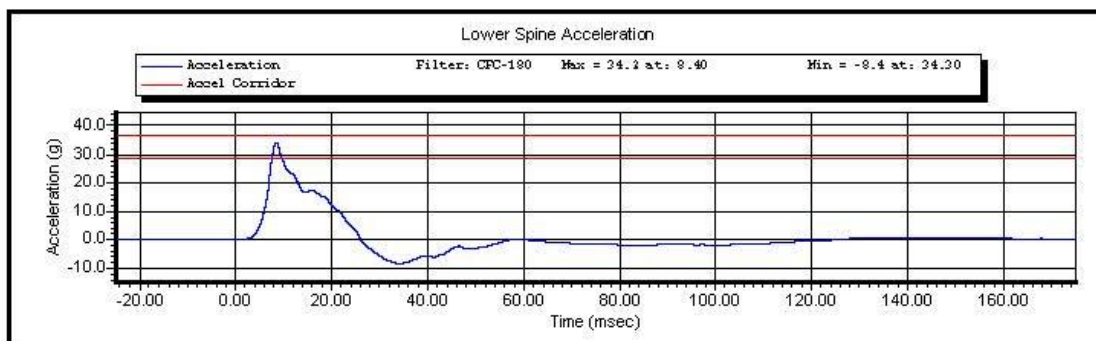
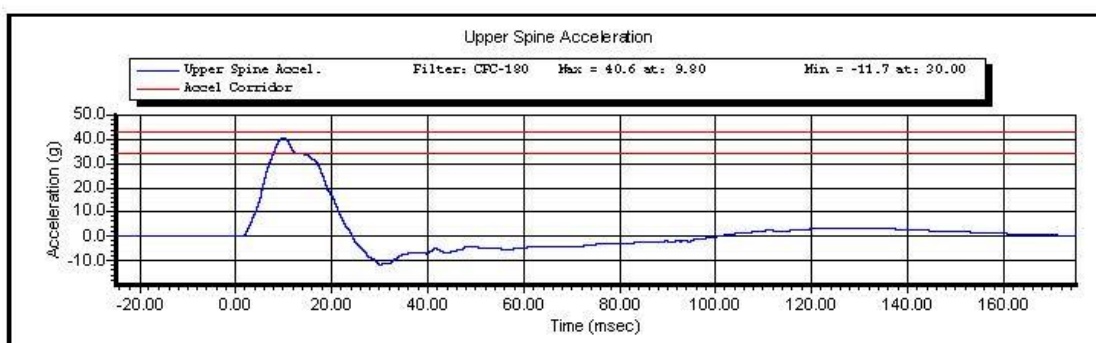
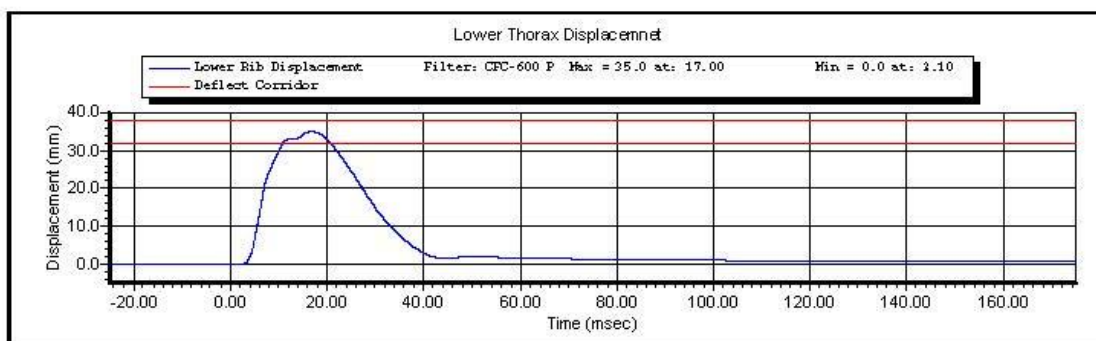
2 of 3



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Test ID:

Test Time: 7:16:05 PM

Test Date: 11/11/2011

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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG6012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	6:37:53 PM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	DG3210
Shoulder Rib 180-3355	DG6997

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.5 deg C	P
Humidity	10	--	70	29 %RH	P
Velocity	4.20	--	4.40	4.31 m/s	P
Probe Acceleration	14.0	--	18.0	16.7 g	P
Upper Thorax Rib Deflection	32.0	--	40.0	36.2 mm	P
Mid Thorax Rib Deflection	39.0	--	45.0	42.4 mm	P
Lower Thorax Rib Deflection	35.0	--	43.0	40.3 mm	P
Upper Spine Acceleration T1	13.0	--	17.0	15.9 g	P
Lower Spine Acceleration T12	7.0	--	11.0	9.7 g	P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **6:37:53 PM**

Test Date: **11/11/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
FTSS	180-3881-1	DS-1849	9/1/2011
FTSS	180-3881-1	DS-1857	9/1/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 6:37:53 PM

Test Date: 11/11/2011

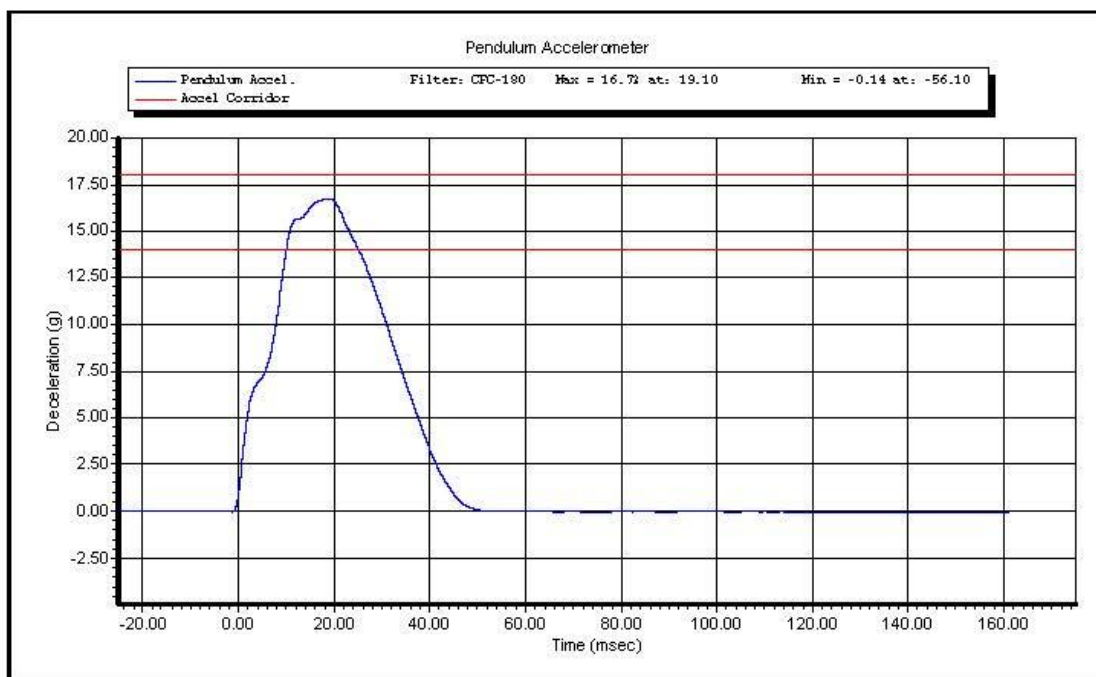


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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	6:37:53 PM



Test ID:

Test Time: **6:37:53 PM**

Test Date: **11/11/2011**

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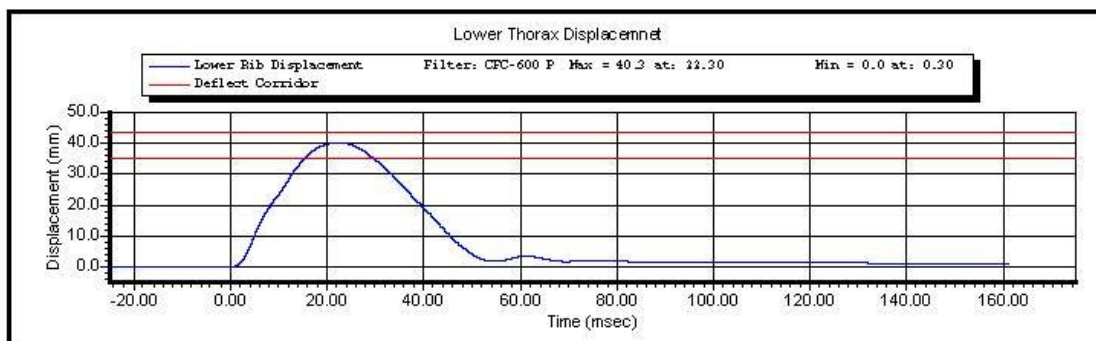
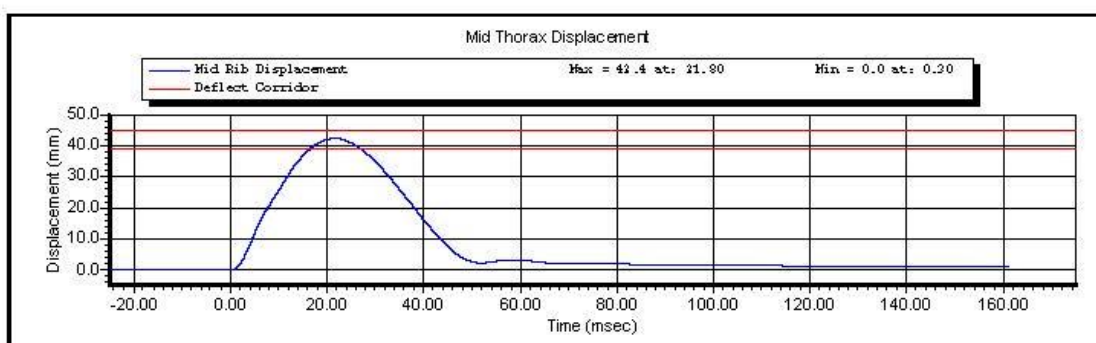
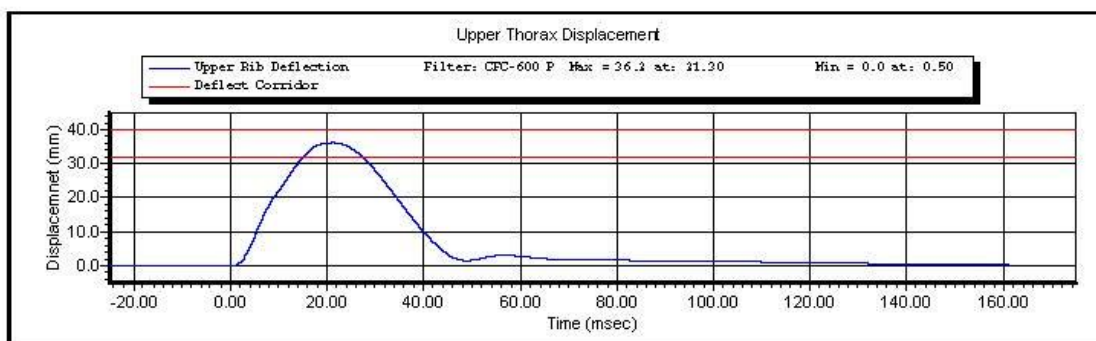
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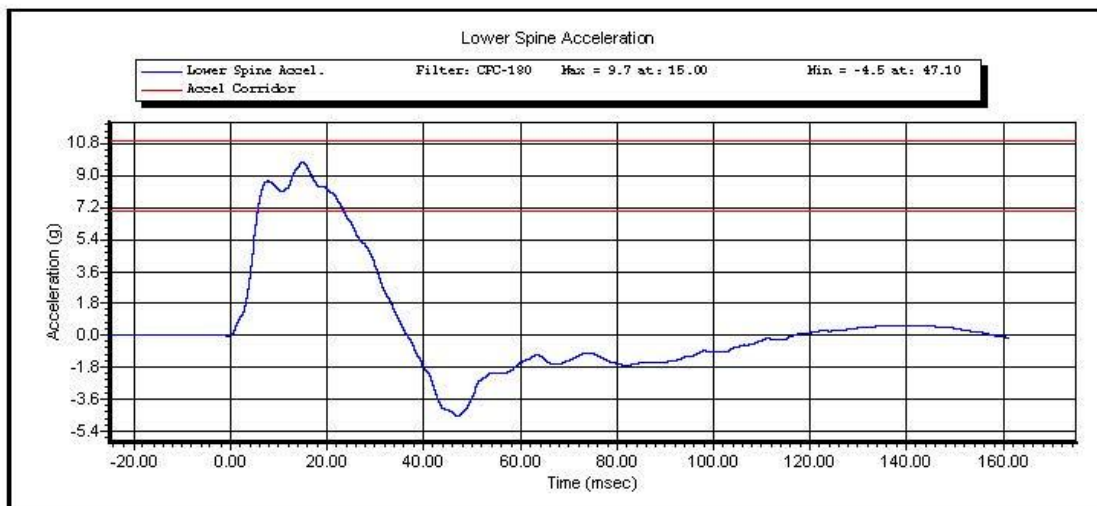
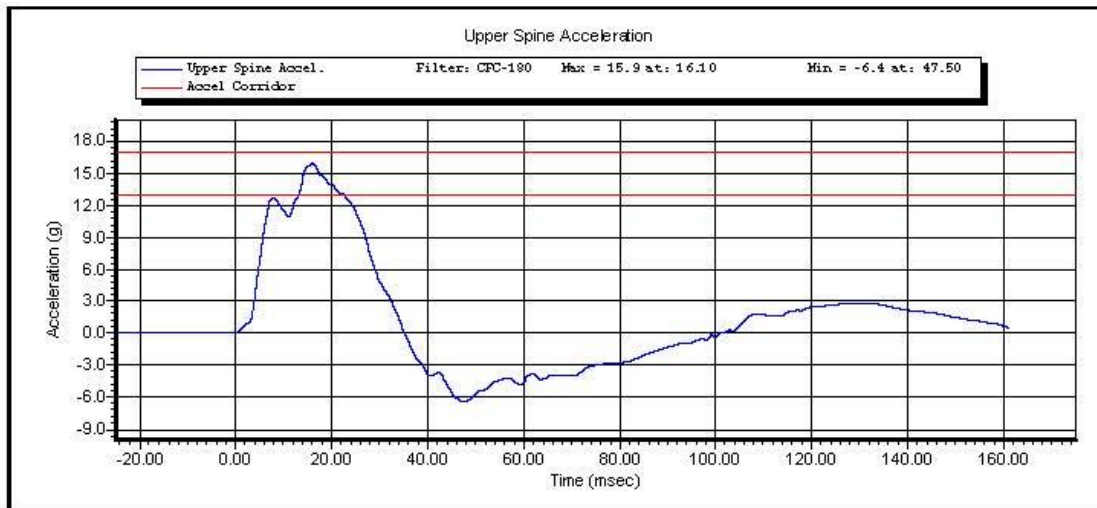
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Test Date: 11/11/2011

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Test ID:

Test Time: **6:37:53 PM**

Test Date: **11/11/2011**

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	7:41:58 PM

Component Part Number	Component Serial Number
Thorax Ribs 4, 5	1581, 1518

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.3 deg C	P
Humidity	10	--	70	28 %RH	P
Velocity	4.20	--	4.40	4.33 m/s	P
Probe Acceleration	12.0	--	16.0	14.8 g	P
Upper Abdominal Rib Deflection	36.0	--	47.0	41.2 mm	P
Lower Abdominal Rib Deflection	33.0	--	44.0	39.8 mm	P
Lower Spine Acceleration - T12	9.0	--	14.0	11.3 g	P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **7:41:58 PM**

Test Date: **11/11/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
FTSS	180-3881-1	DS-1860	9/1/2011
FTSS	180-3881-1	DS-1861	9/1/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 7:41:58 PM

Test Date: 11/11/2011

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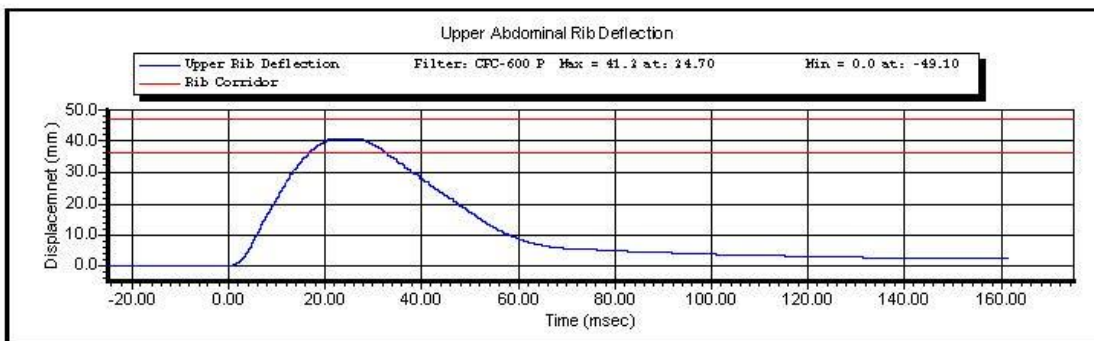
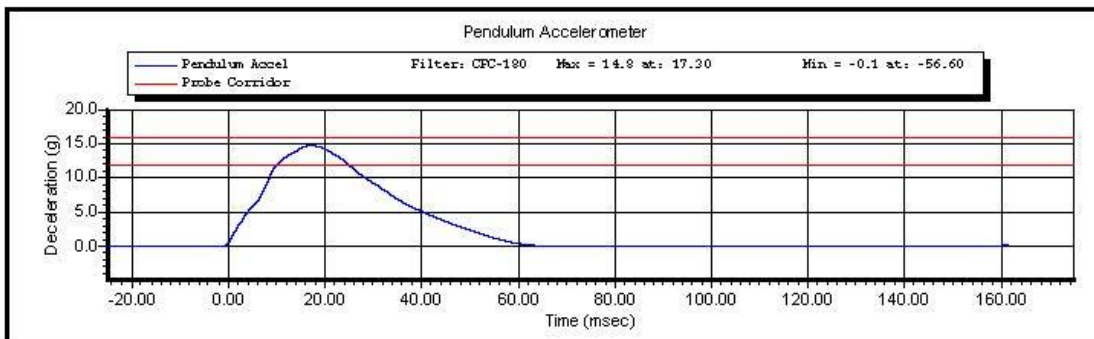


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Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	7:41:58 PM



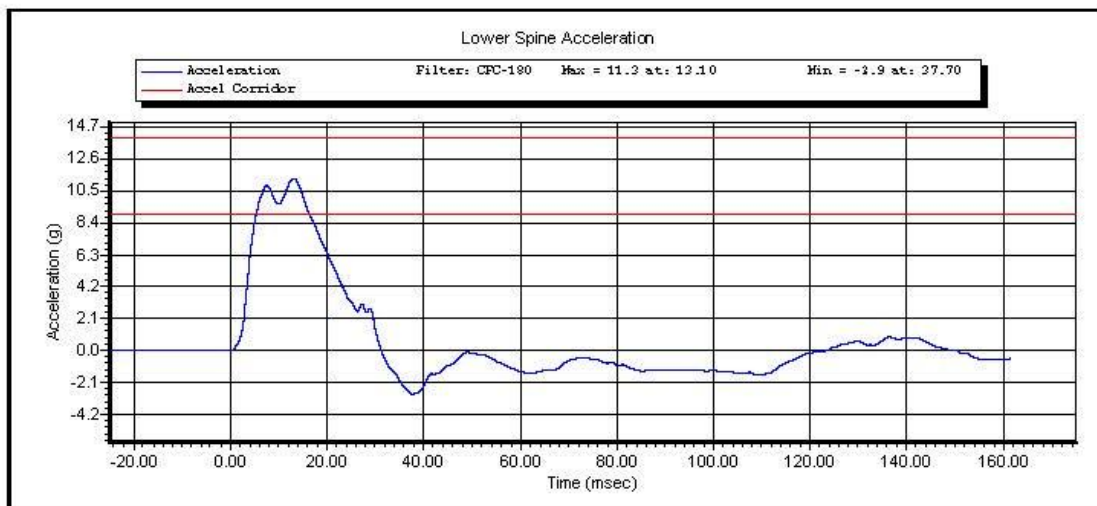
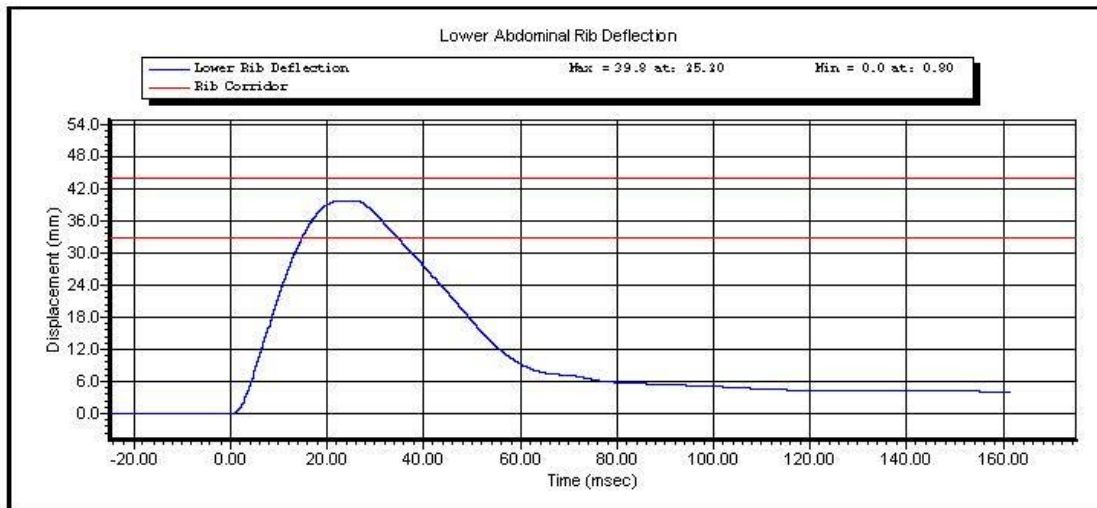
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Test Date: 11/11/2011

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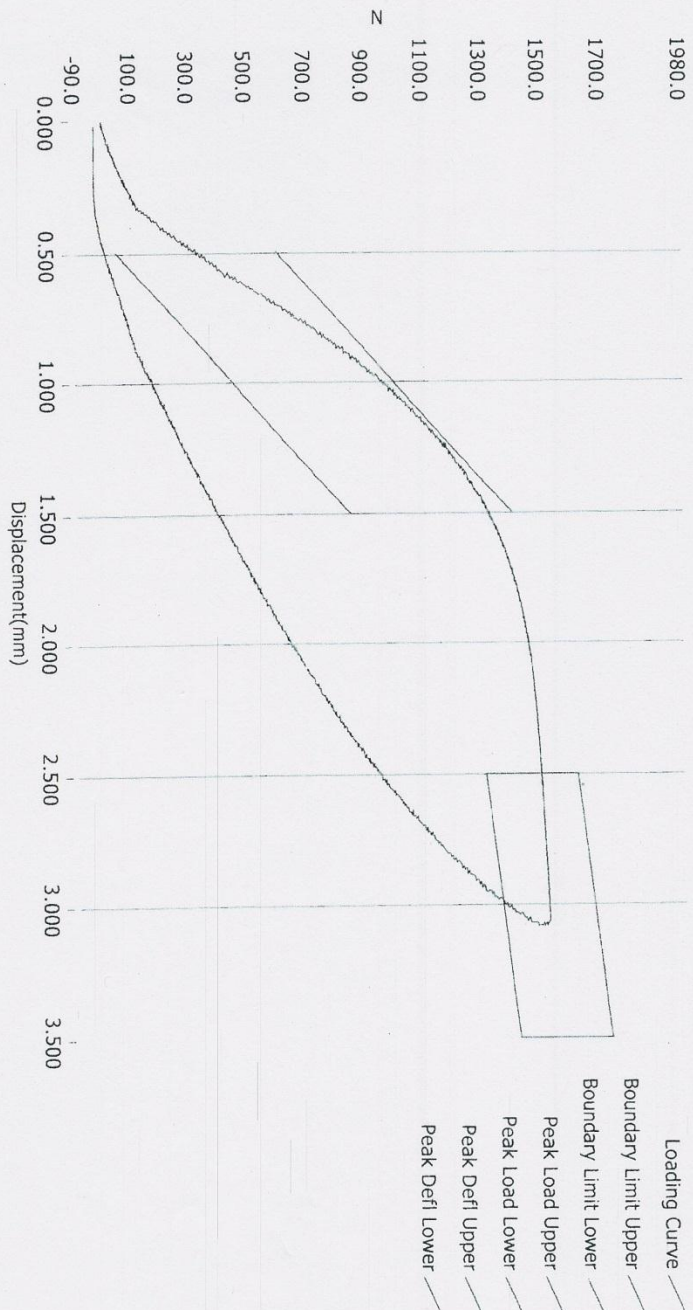
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Test Date: **11/11/2011**

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2 of 2

Resultant Data - SIDIIS Plug Compression



ATD Calibration Lab

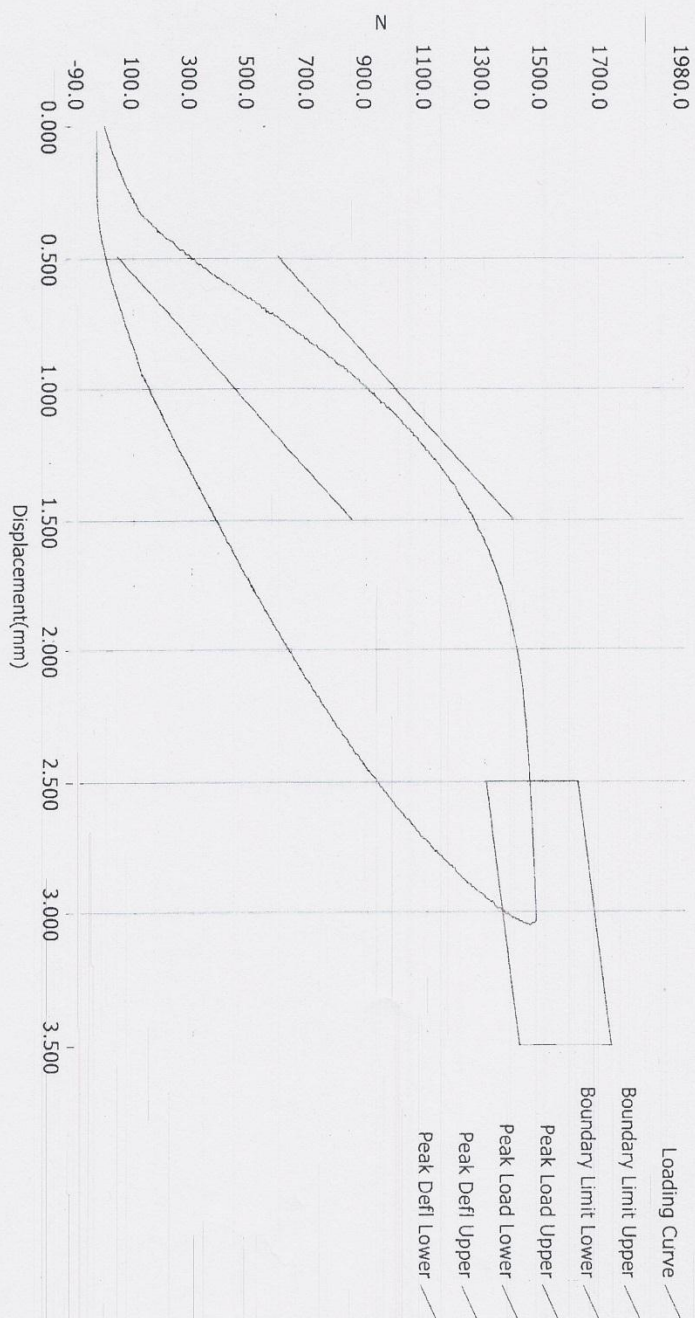
Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	9/22/2010	2:46 PM
	36330	SIDIIS	

Current Date : 9/22/2010

Current Time : 14:47:25

DG8012 cet

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	ATD Type	
	36519	SIDIIs	

Current Date : 9/24/2010

Current Time : 02:17:44

11/11 Pull



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/12/2011
Test Number:	2	Test Time:	11:32:02 AM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207
FTSS Certification Plug - 1517N	36330
FTSS Full Scale Test Plug - 1474N	36519

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	27 %RH P
Velocity	6.60 -- 6.80	6.62 m/s P
Peak Probe Acceleration	38.0 -- 47.0	46.2 g P
Peak Pelvis Acceleration	34.0 -- 42.0	39.8 g P
Peak Acetabulum Force	3.60 -- 4.30	3.76 kN P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **11:32:02 AM**

Test Date: **11/12/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
Endevco	7264-2000	P51875	9/29/2011
FTSS	IF-520	LC-102Fy	3/25/2011

Test ID:

Test Time: 11:32:02 AM

Test Date: 11/12/2011

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2 of 2

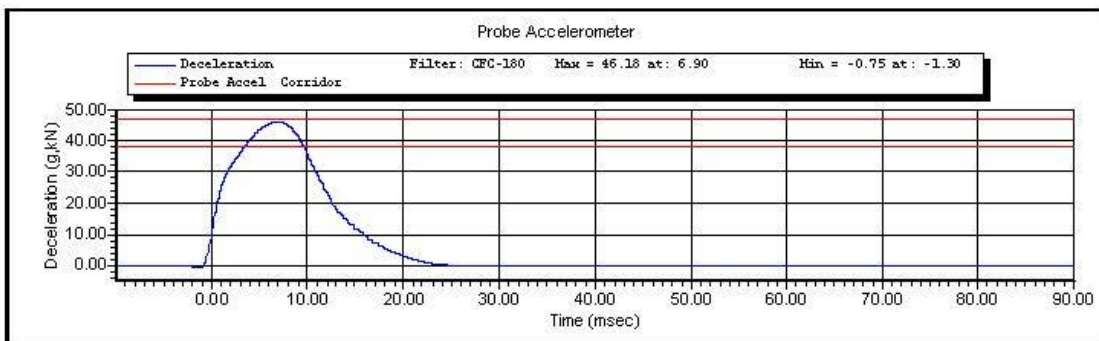
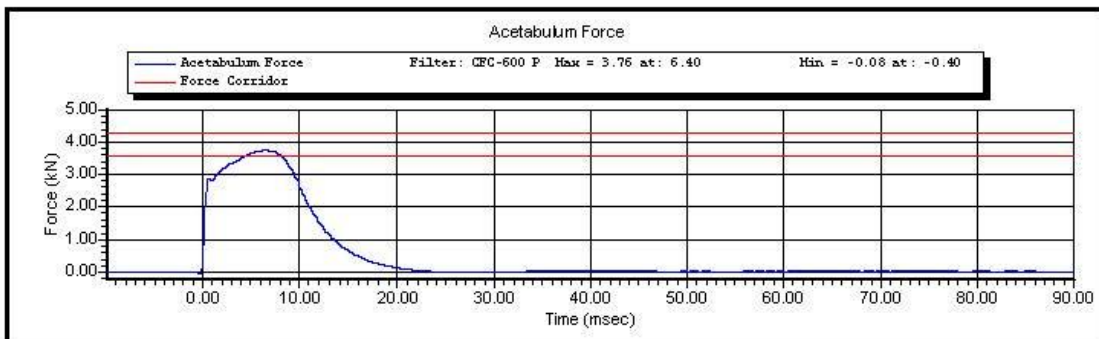


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/12/2011
Test Number:	2	Test Time:	11:32:02 AM



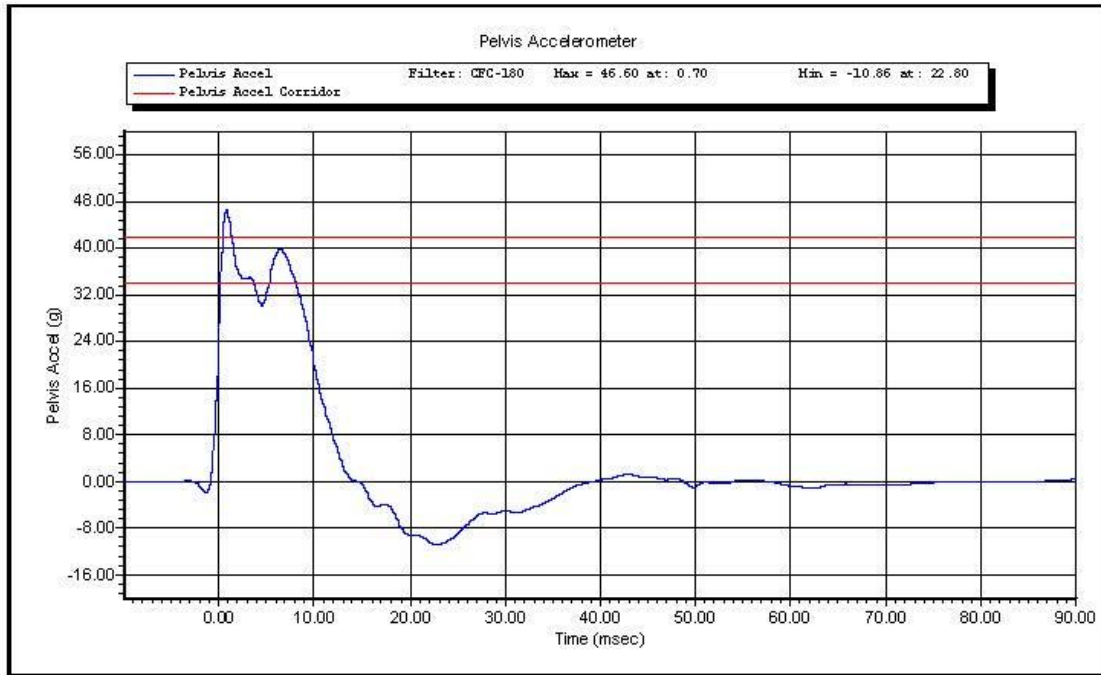
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Test Date: **11/12/2011**

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1 of 2



Test ID:

Test Time: **11:32:02 AM**

Test Date: **11/12/2011**

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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	4:10:27 PM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.5 deg C	P
Humidity	10	--	70	29 %RH	P
Velocity	4.20	--	4.40	4.31 m/s	P
Peak Probe Acceleration	36.0	--	45.0	44.2 g	P
Peak Pelvis Acceleration	28.0	--	39.0	34.9 g	P
Peak Iliac Force	4.10	--	5.10	4.89 kN	P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **4:10:27 PM**

Test Date: **11/11/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
Endevco	7264-2000	P51875	9/29/2011
DentonATD	3228J	LC-281Fy	8/31/2011

Test ID:

Test Time: **4:10:27 PM**

Test Date: **11/11/2011**

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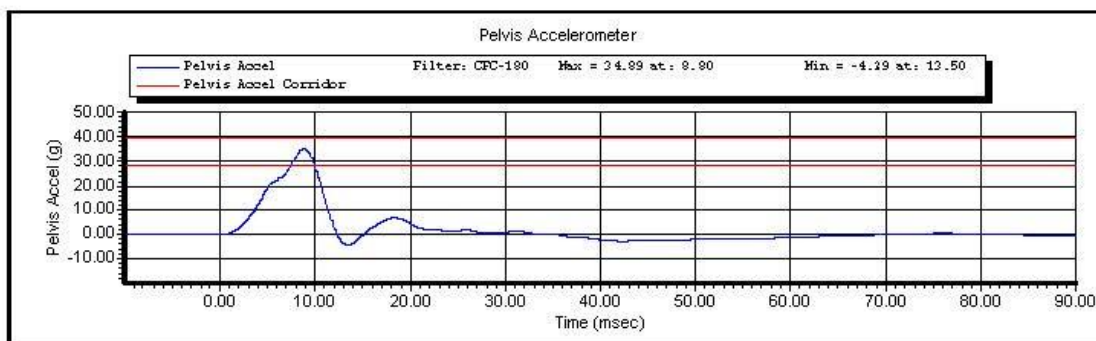
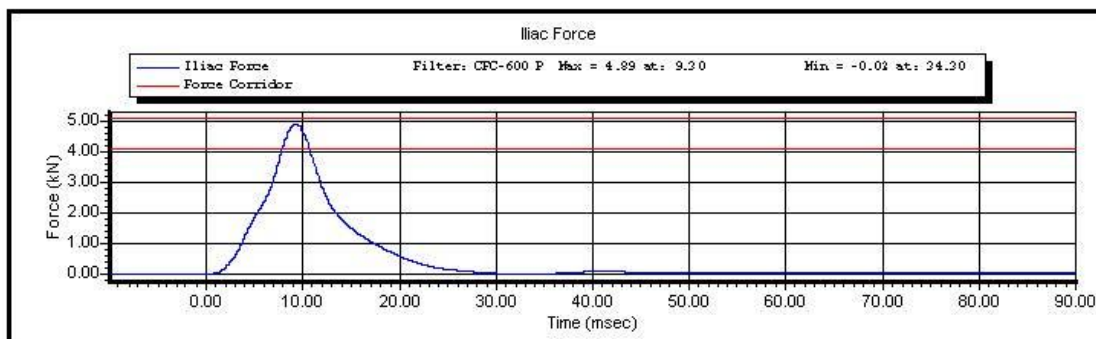


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-Ils		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/11/2011
Test Number:	1	Test Time:	4:10:27 PM



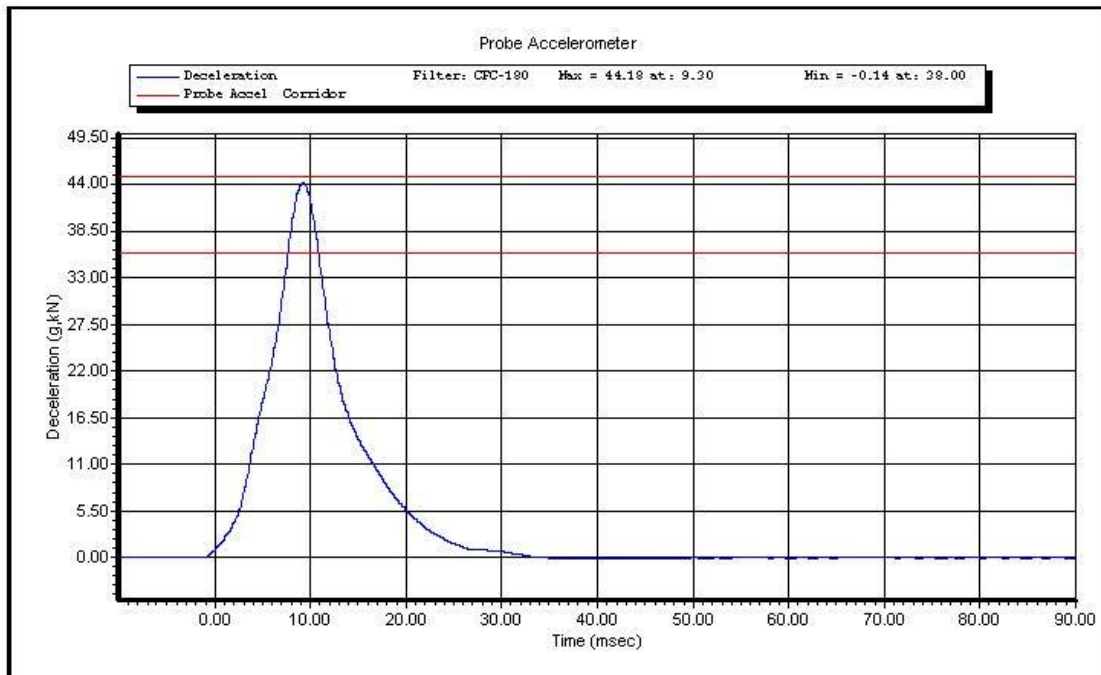
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Test Date: **11/11/2011**

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1 of 2



Test ID:

Test Time: **4:10:27 PM**

Test Date: **11/11/2011**

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CALIBRATION TEST RESULTS

POST-TEST

SID-IIs No: 8012

CONFIGURED FOR LEFT SIDE IMPACT



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SID-IIsD External Measurements

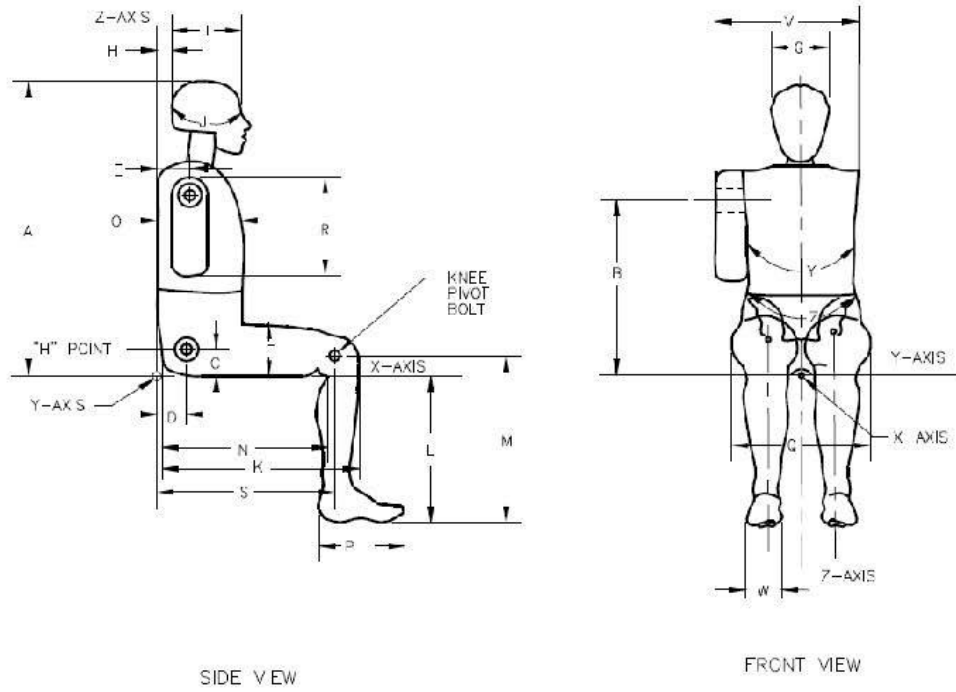
NHTSA ATD S/N DG8012

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	782	Yes
B	Shoulder Pivot Height	437.0 - 453.0	444	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	148	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	98	Yes
F	Thigh Clearance	119.0 - 135.0	132	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	43	Yes
I	Head Depth	178.0 - 188.0	187	Yes
J	Head Circumference	541.0 - 551.0	548	Yes
K	Buttock to Knee Length	514.0 - 540.0	530	Yes
L	Popliteal Height	343.0 - 369.0	359	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	402	Yes
N	Buttock Popliteal Length	416.0 - 442.0	434	Yes
O	Chest Depth without Jacket	195.0 - 211.0	204	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
Q	Hip Breadth	313.0 - 323.0	315	Yes
R	Arm Length	249.0 - 259.0	257	Yes
S	Knee Joint to Seat back	478.0 - 493.0	490	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	872	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

Technician : AR

Date: 11/22/2011

SID-11sD External Dimension Reference Diagram





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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	3:03:54 PM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1362

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.8 deg C P
Humidity	10 -- 70	25 %RH P
Resultant Acceleration	115.0 -- 137.0	125.5 g P
Oscillation	0.0 -- 15.0	8.0 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-2.2 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **3:03:54 PM**

Test Date: **11/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P66931	6/13/2011
Endevco	7264-2000	P66926	6/13/2011
Endevco	7264-2000	P66943	6/13/2011

Test ID:

Test Time: 3:03:54 PM

Test Date: 11/22/2011

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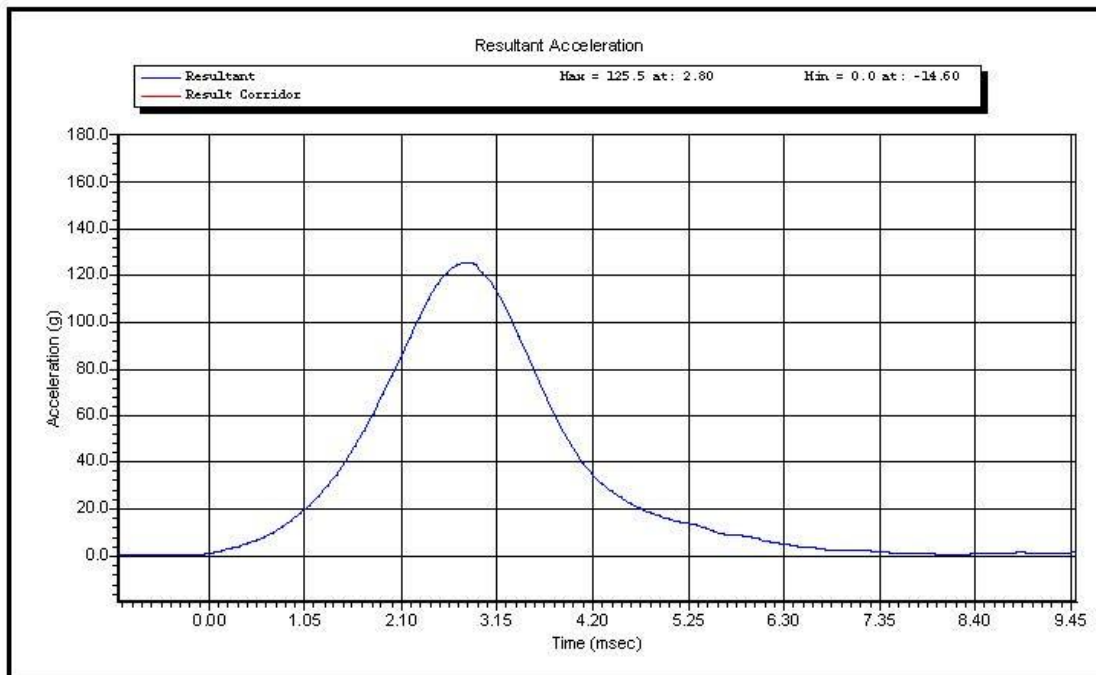


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	3:03:54 PM



Test ID:

Test Time: 3:03:54 PM

Test Date: 11/22/2011

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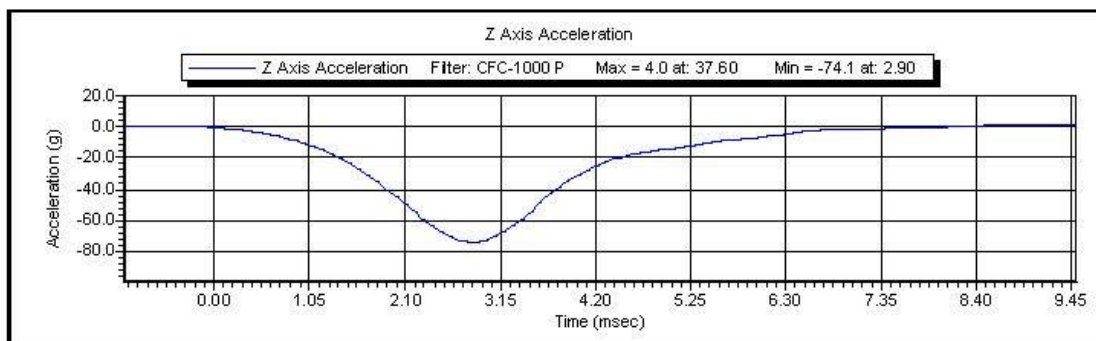
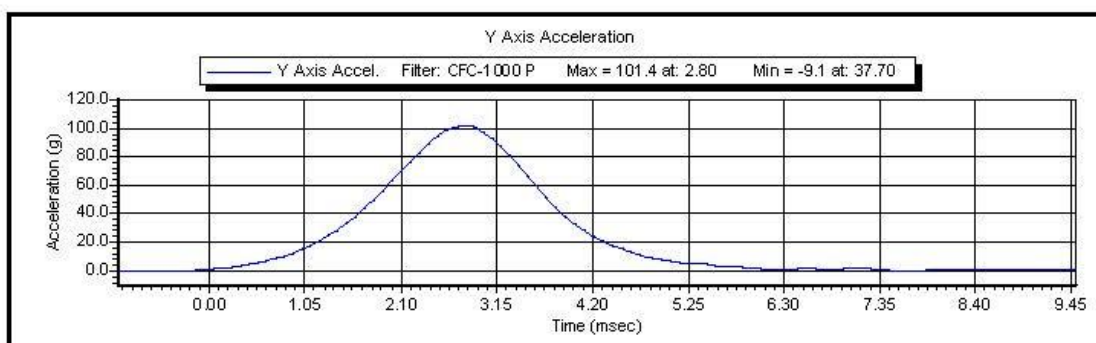
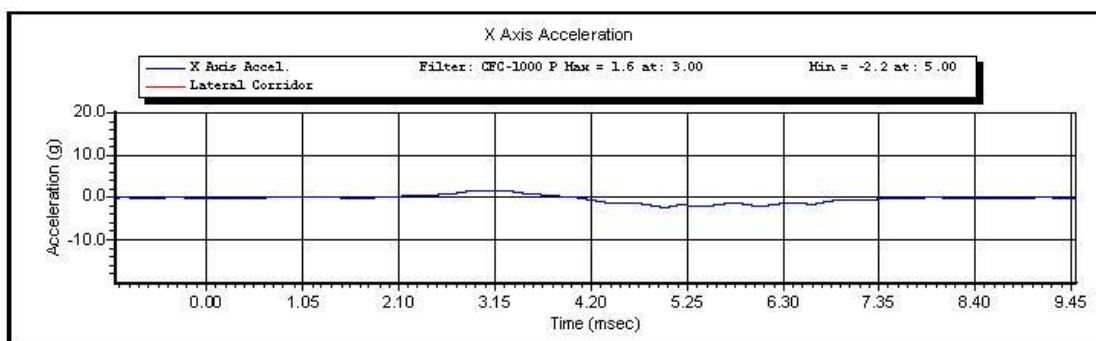
1 of 2



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Test ID:

Test Time: 3:03:54 PM

Test Date: 11/22/2011

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2 of 2



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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/23/2011
Test Number:	1	Test Time:	10:00:51 AM

Component Part Number	Component Serial Number
Neck - 180-2000	DG7061

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	33 %RH P
Velocity	5.51 -- 5.63	5.59 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.41 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.50 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.74 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.57 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.78 m/s P
Max D Plane Rotation	71.0 -- 81.0	75.1 degrees P
Time at Max Rotation	50.0 -- 70.0	62.2 ms P
Moment about OC	-44.0 -- -36.0	-39.2 Nm P
Moment Decay to Zero	102.0 -- 126.0	113.7 ms P

All test parameters are within specifications

Technician: **A. Rudniski**
Supervisor: **D. Travale**

Test ID:

Test Time: **10:00:51 AM**

Test Date: **11/23/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
Denton	1716A	LC-2192Fy	8/31/2011
Denton	1716A	LC-2192Mx	8/31/2011
DentonATD	78051-342	184	5/8/2011
DentonATD	78051-342	174	5/8/2011
DentonATD	78051-342	185	5/8/2011

Test ID:

Test Time: 10:00:51 AM

Test Date: 11/23/2011

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2 of 2

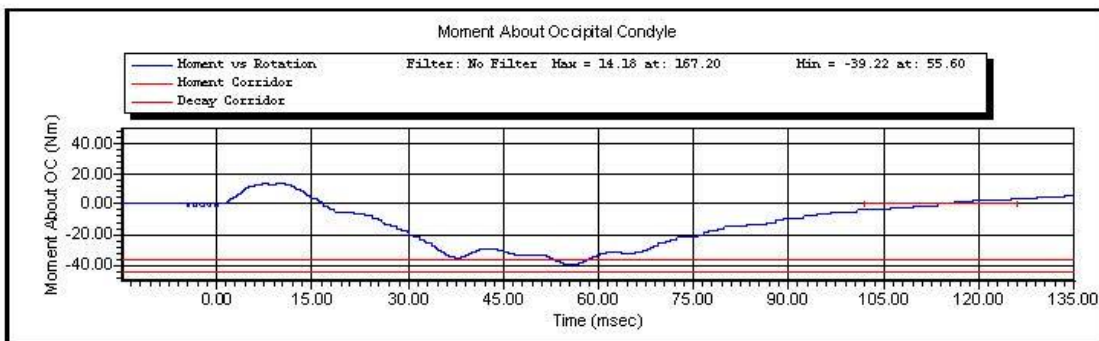
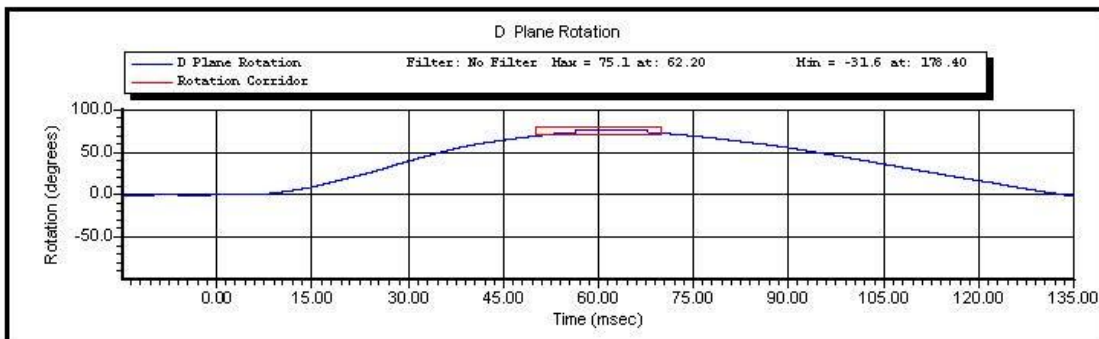


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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/23/2011
Test Number:	1	Test Time:	10:00:51 AM



Test ID:

Test Time: 10:00:51 AM

Test Date: 11/23/2011

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	1:59:37 PM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	DG3210
Shoulder Rib 180-3355	DG6997

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.30 deg C P
Humidity	10.0 -- 70.0	25.7 %RH P
Velocity	4.20 -- 4.40	4.35 m/s P
Probe Acceleration	13.0 -- 18.0	15.3 g P
Shoulder Deflection	28.0 -- 37.0	28.8 mm P
T1 Acceleration	17.0 -- 22.0	18.7 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **1:59:37 PM**

Test Date: **11/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AF5B3	11/18/2011
FTSS	180-3881-1	DS-1845	9/1/2011
Endevco	7264-2000	P63561	10/3/2011

Test ID:

Test Time: 1:59:37 PM

Test Date: 11/22/2011

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2 of 2

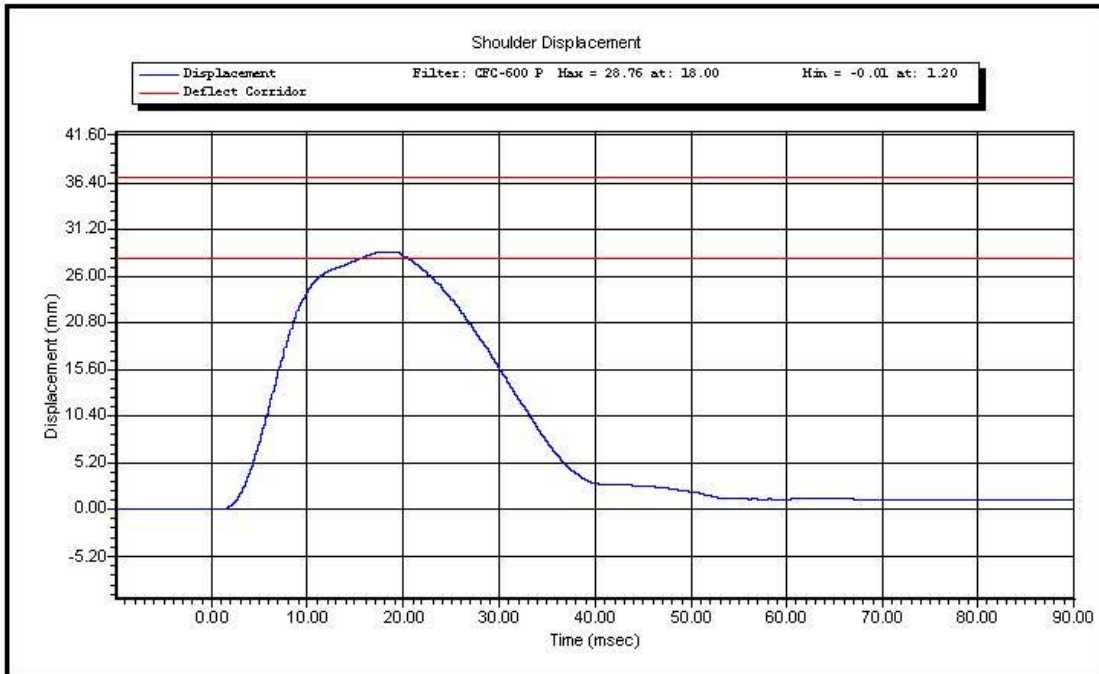


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Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	1:59:37 PM



Test ID:

Test Time: 1:59:37 PM

Test Date: 11/22/2011

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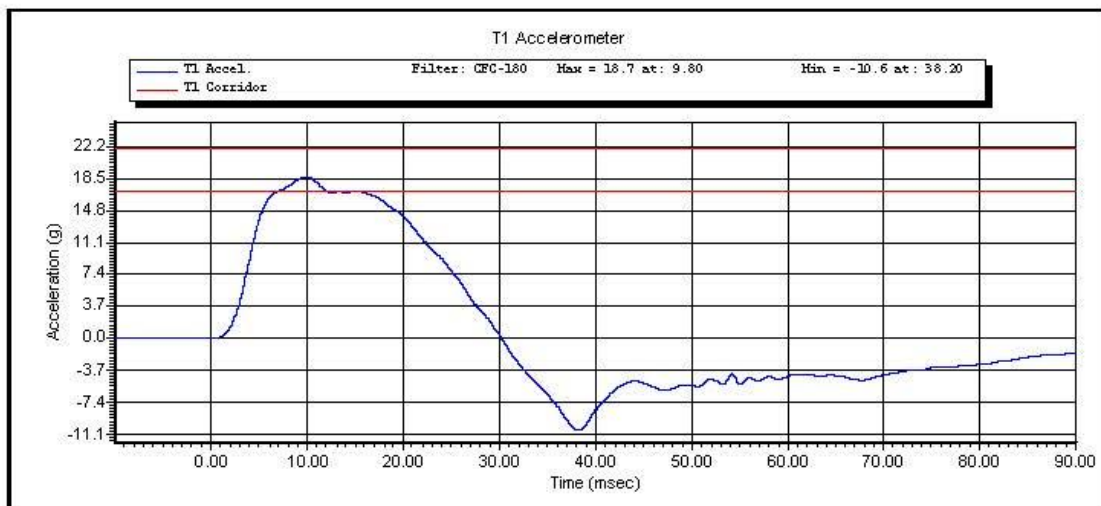
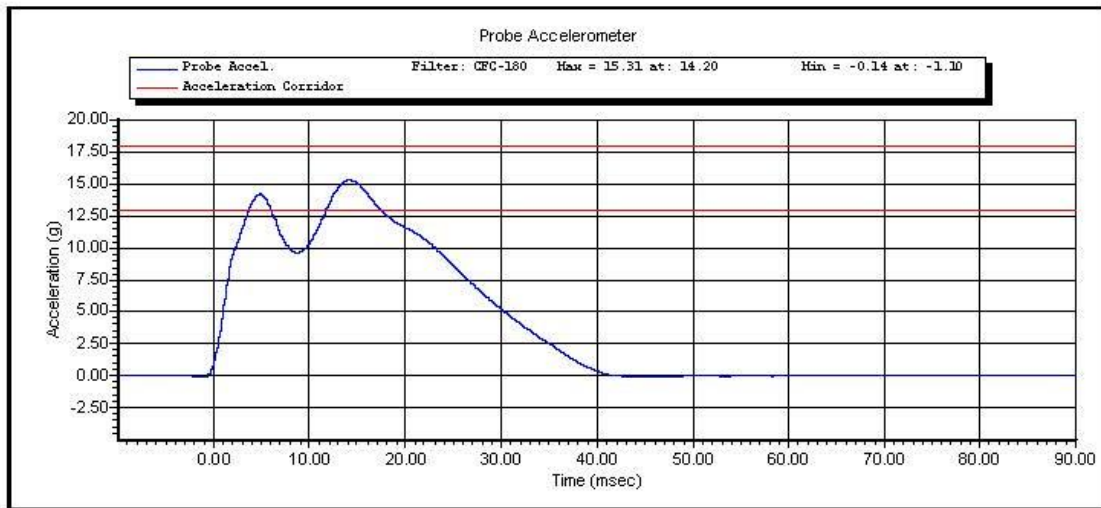
1 of 2



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Test ID:

Test Time: 1:59:37 PM

Test Date: 11/22/2011

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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:			
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	1:21:46 PM

Component Part Number	Component Serial Number
Thorax Ribs 1, 2, 3 180-3362	DG6080, DG6081, DG7543
Shoulder Rib 180-3355	DG6997
Left Arm 180-6011-1	DG3210

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	6.60 -- 6.80	6.73 m/s P
Probe Acceleration after 5ms	30.0 -- 36.0	33.3 g P
Upper Thorax Rib Deflection	25.0 -- 32.0	28.2 mm P
Mid Thorax Rib Deflection	30.0 -- 36.0	32.7 mm P
Lower Thorax Rib Deflection	32.0 -- 38.0	35.1 mm P
Upper Spine Acceleration ("y")	34.0 -- 43.0	40.6 g P
Lower Spine Acceleration ("y")	29.0 -- 37.0	32.3 g P
Shoulder Deflection	31.0 -- 40.0	33.6 mm P

All test parameters are within specifications

Technician: _____

Supervisor: _____

Test ID:

Test Time: **1:21:46 PM**

Test Date: **11/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AF5B3	11/18/2011
FTSS	180-3881-1	DS-1849	9/1/2011
FTSS	180-3881-1	DS-1857	9/1/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011
FTSS	180-3881-1	DS-1845	9/1/2011

Test ID:

Test Time: 1:21:46 PM

Test Date: 11/22/2011

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2 of 2

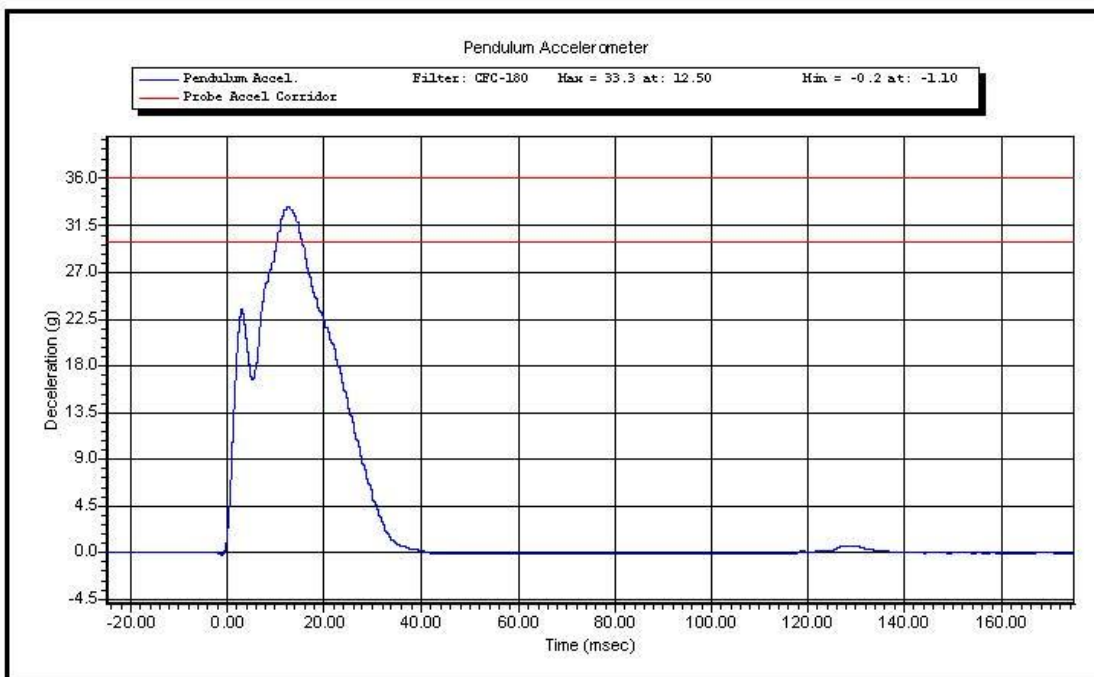


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Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:			
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	1:21:46 PM



Test ID:

Test Time: 1:21:46 PM

Test Date: 11/22/2011

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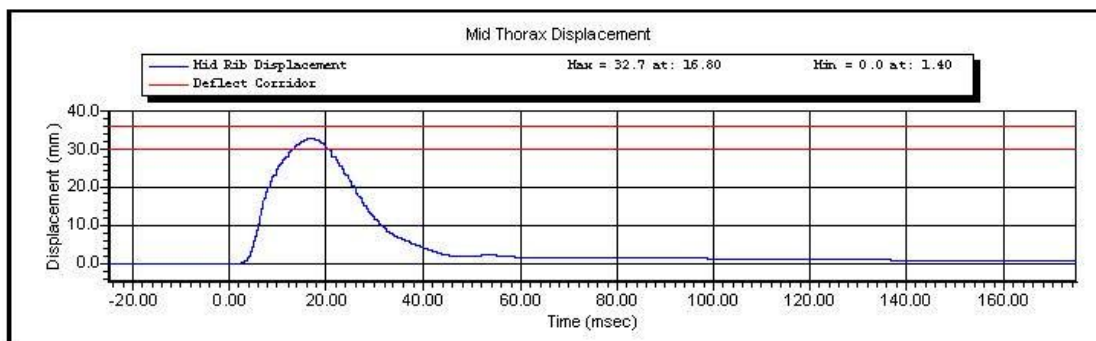
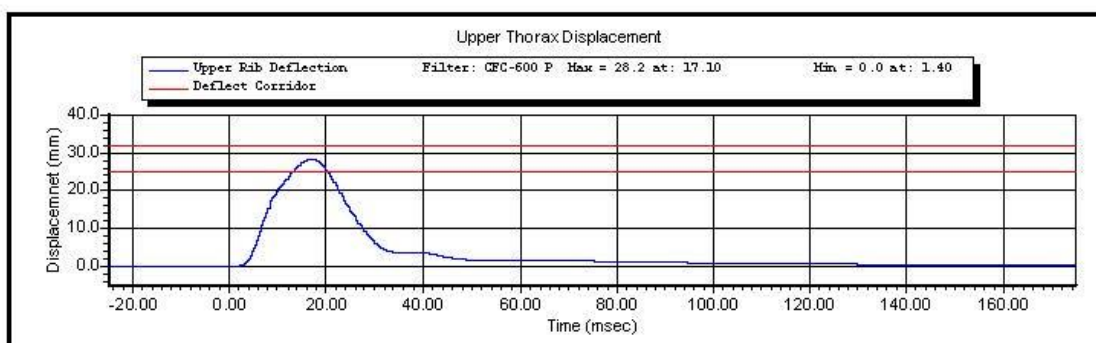
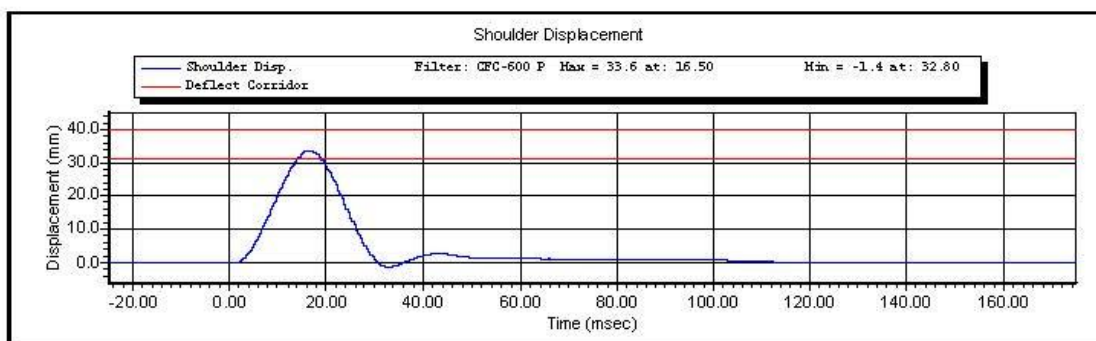
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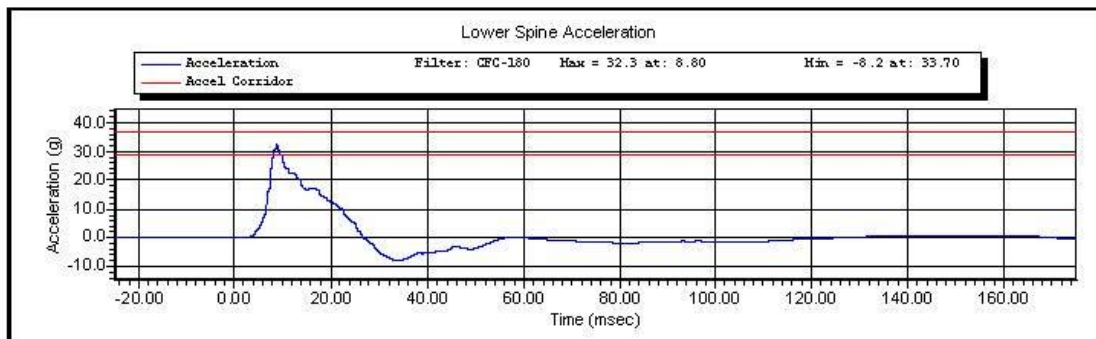
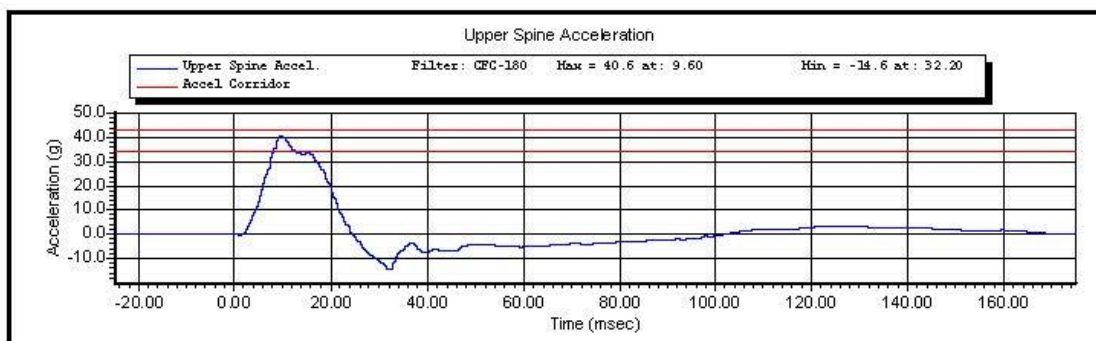
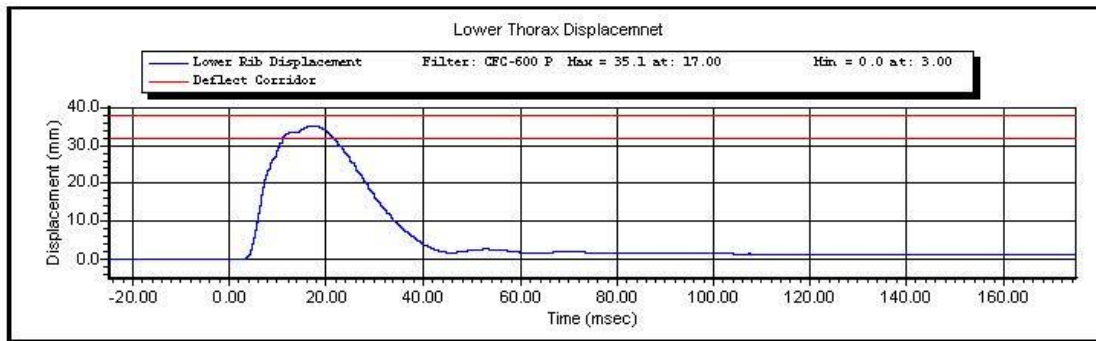
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2 of 3



Test ID:

Test Time: **1:21:46 PM**

Test Date: **11/22/2011**

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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	2	Test Time:	12:16:18 PM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	DG3210
Shoulder Rib 180-3355	DG6997

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	4.20 -- 4.40	4.36 m/s P
Probe Acceleration	14.0 -- 18.0	16.2 g P
Upper Thorax Rib Deflection	32.0 -- 40.0	38.3 mm P
Mid Thorax Rib Deflection	39.0 -- 45.0	43.2 mm P
Lower Thorax Rib Deflection	35.0 -- 43.0	40.0 mm P
Upper Spine Acceleration T1	13.0 -- 17.0	16.1 g P
Lower Spine Acceleration T12	7.0 -- 11.0	9.9 g P

All test parameters are within specifications

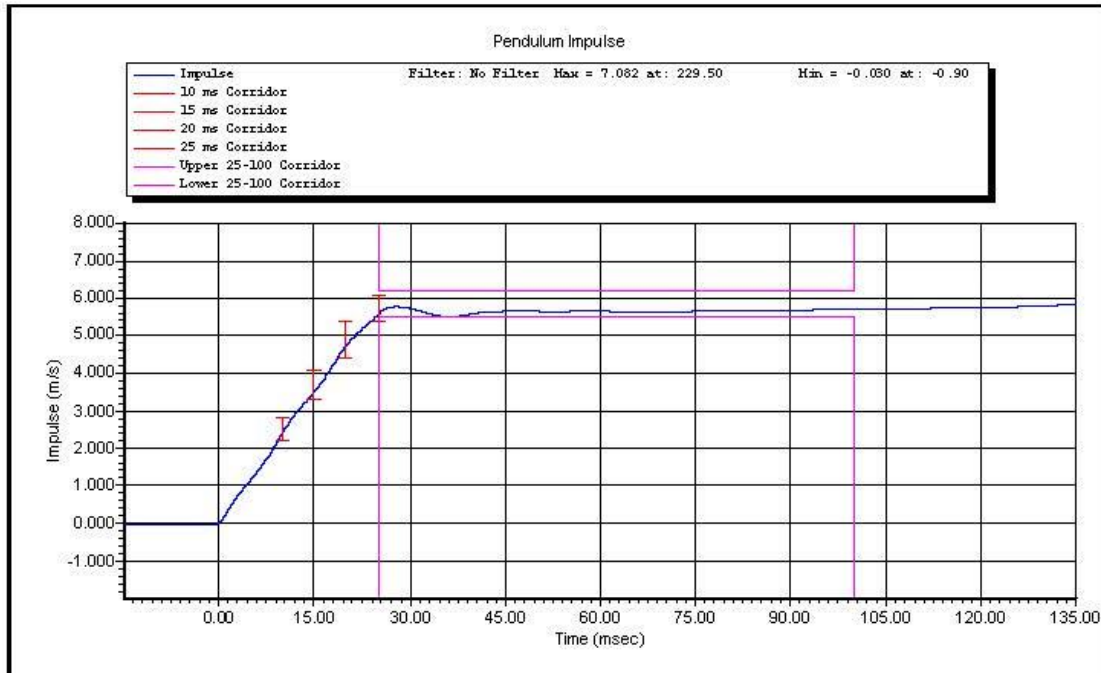
Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **12:16:18 PM**

Test Date: **11/22/2011**



Test ID:

Test Time: **10:00:51 AM**

Test Date: **11/23/2011**

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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AH5M8	11/8/2011
FTSS	180-3881-1	DS-1849	9/1/2011
FTSS	180-3881-1	DS-1857	9/1/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 12:16:18 PM

Test Date: 11/22/2011

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2 of 2

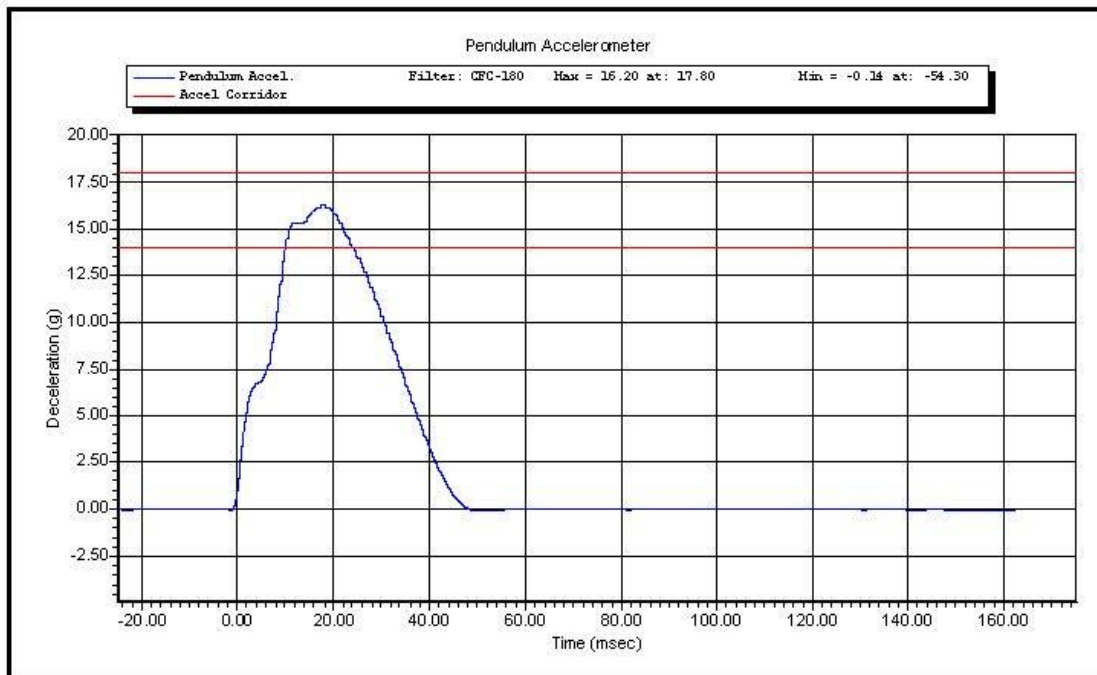


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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	2	Test Time:	12:16:18 PM



Test ID:

Test Time: 12:16:18 PM

Test Date: 11/22/2011

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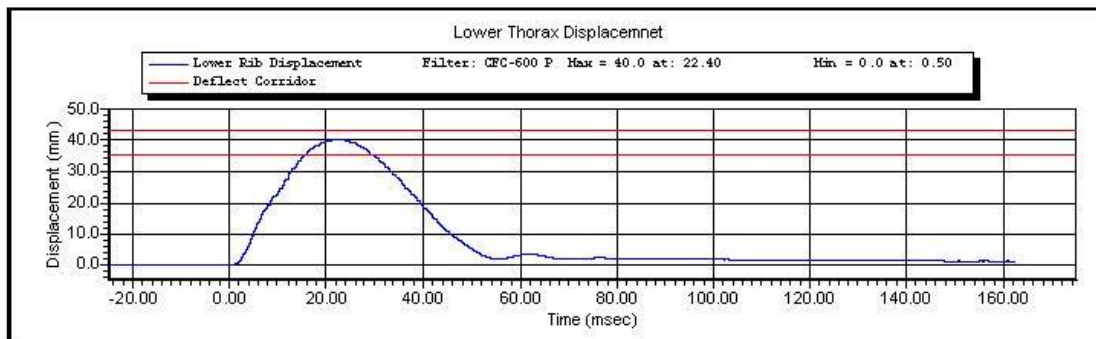
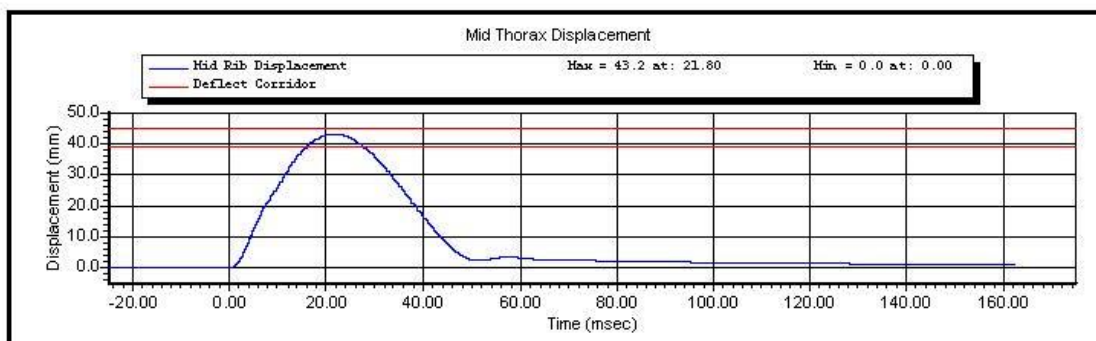
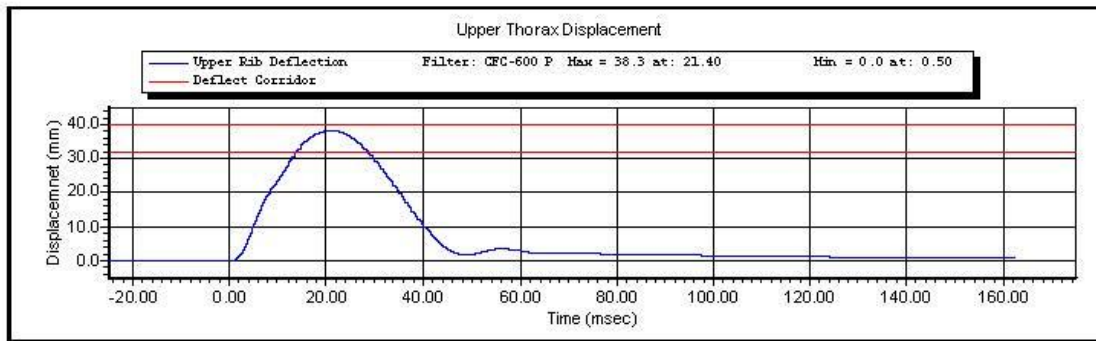
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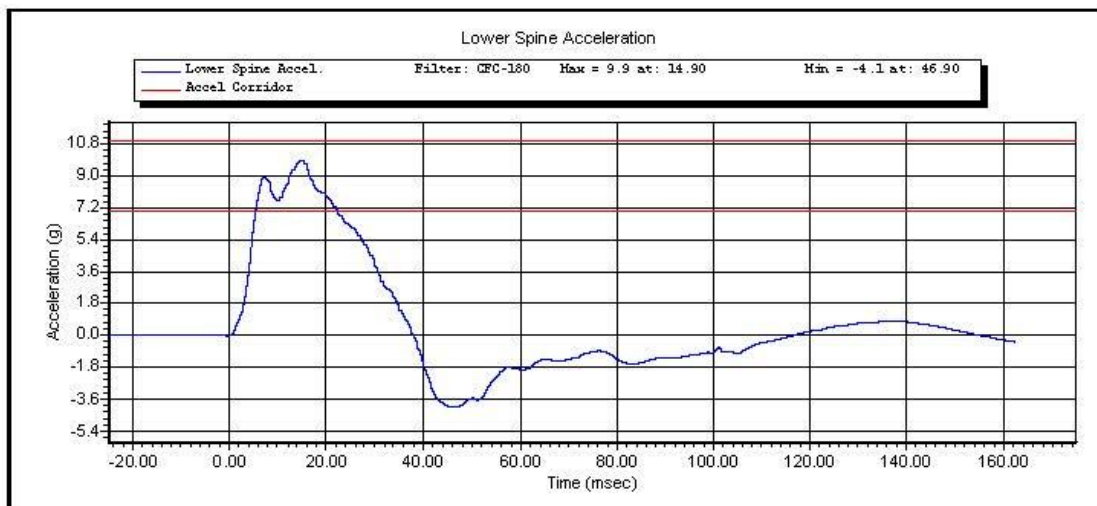
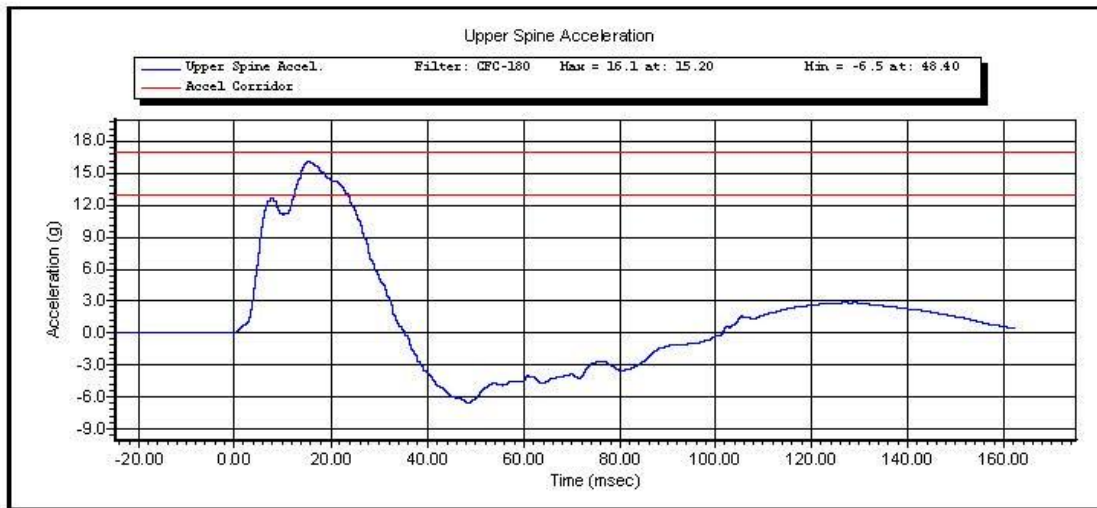
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Test Date: 11/22/2011

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2 of 3



Test ID:

Test Time: **12:16:18 PM**

Test Date: **11/22/2011**

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	11:00:00 AM

Component Part Number	Component Serial Number
Thorax Ribs 4, 5	1761, DG7012

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	4.20 -- 4.40	4.36 m/s P
Probe Acceleration	12.0 -- 16.0	14.8 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	41.8 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	39.1 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	11.4 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **11:00:00 AM**

Test Date: **11/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AF5B3	11/18/2011
FTSS	180-3881-1	DS-1860	9/1/2011
FTSS	180-3881-1	DS-1861	9/1/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 11:00:00 AM

Test Date: 11/22/2011

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2 of 2

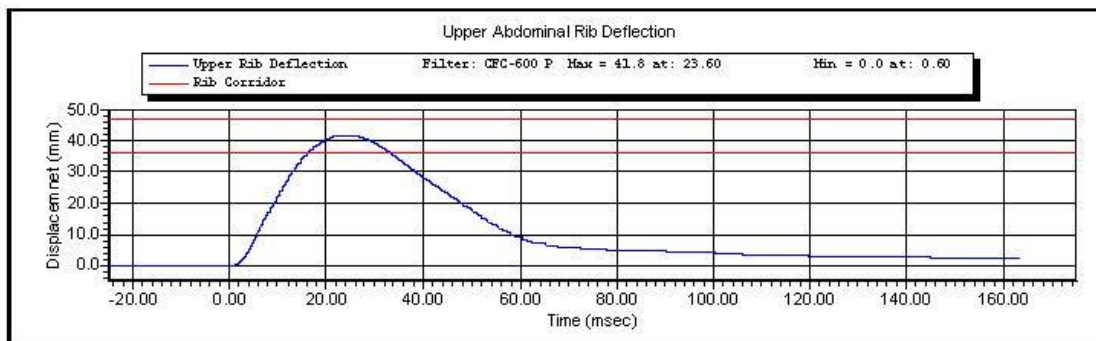
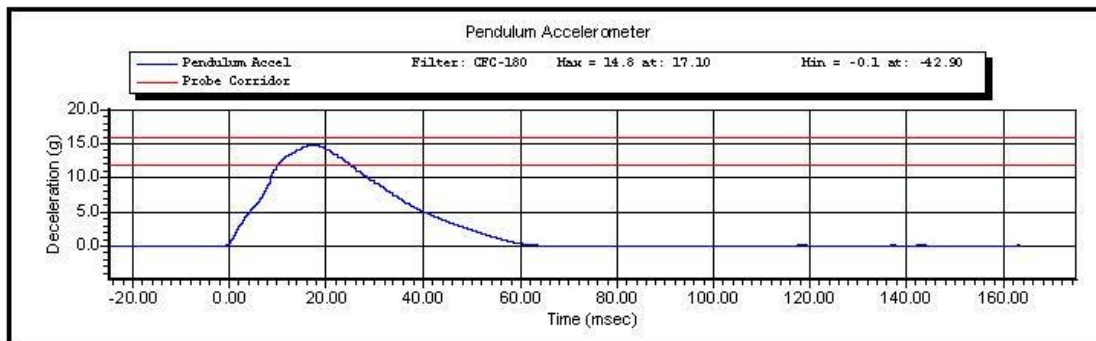


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Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	11:00:00 AM



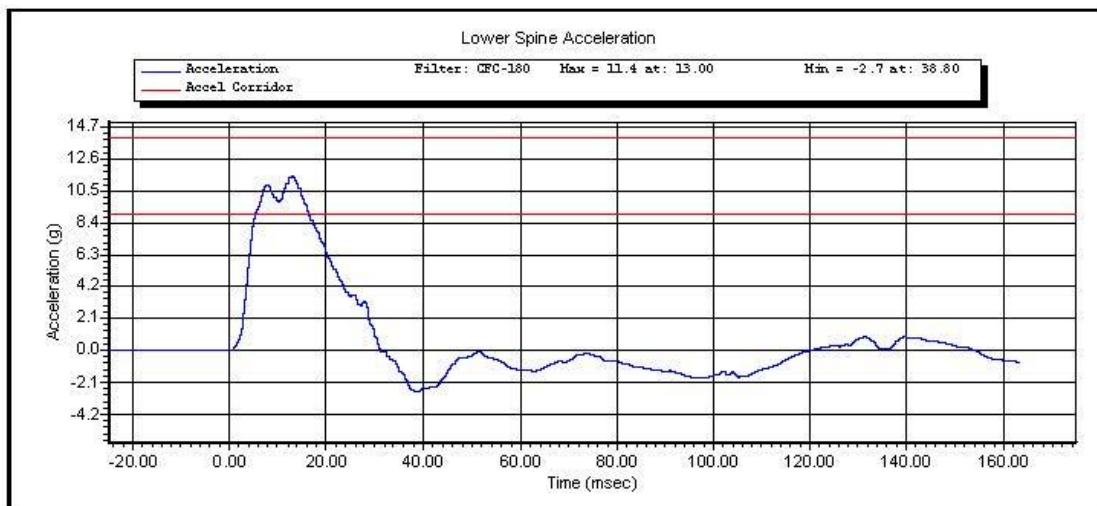
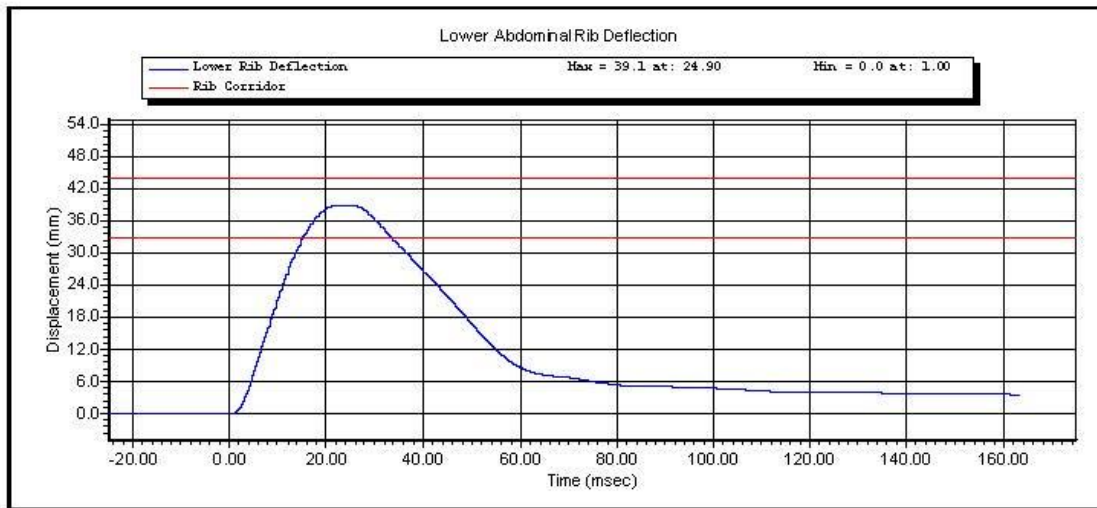
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Test Time: **11:00:00 AM**

Test Date: **11/22/2011**

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1 of 2



Test ID:

Test Time: **11:00:00 AM**

Test Date: **11/22/2011**

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2 of 2

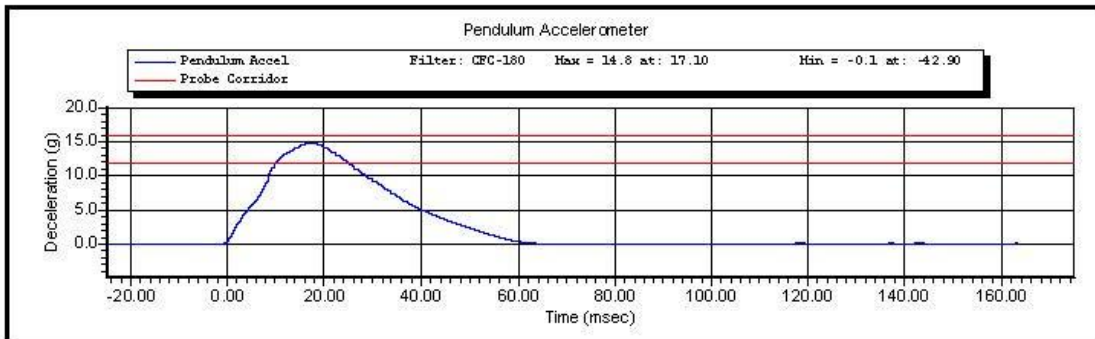


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Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	11:00:00 AM



Test ID:

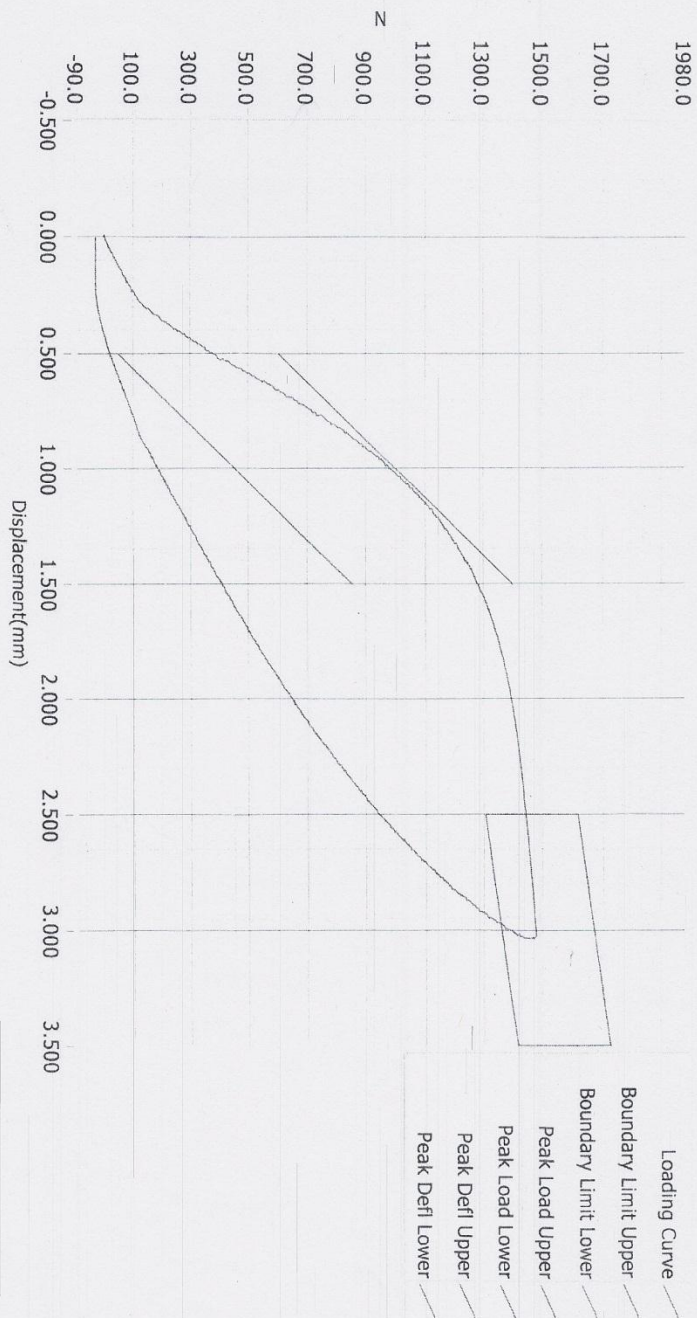
Test Time: **11:00:00 AM**

Test Date: **11/22/2011**

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1 of 2

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	ATD Type	
	36385	SIDIIs	

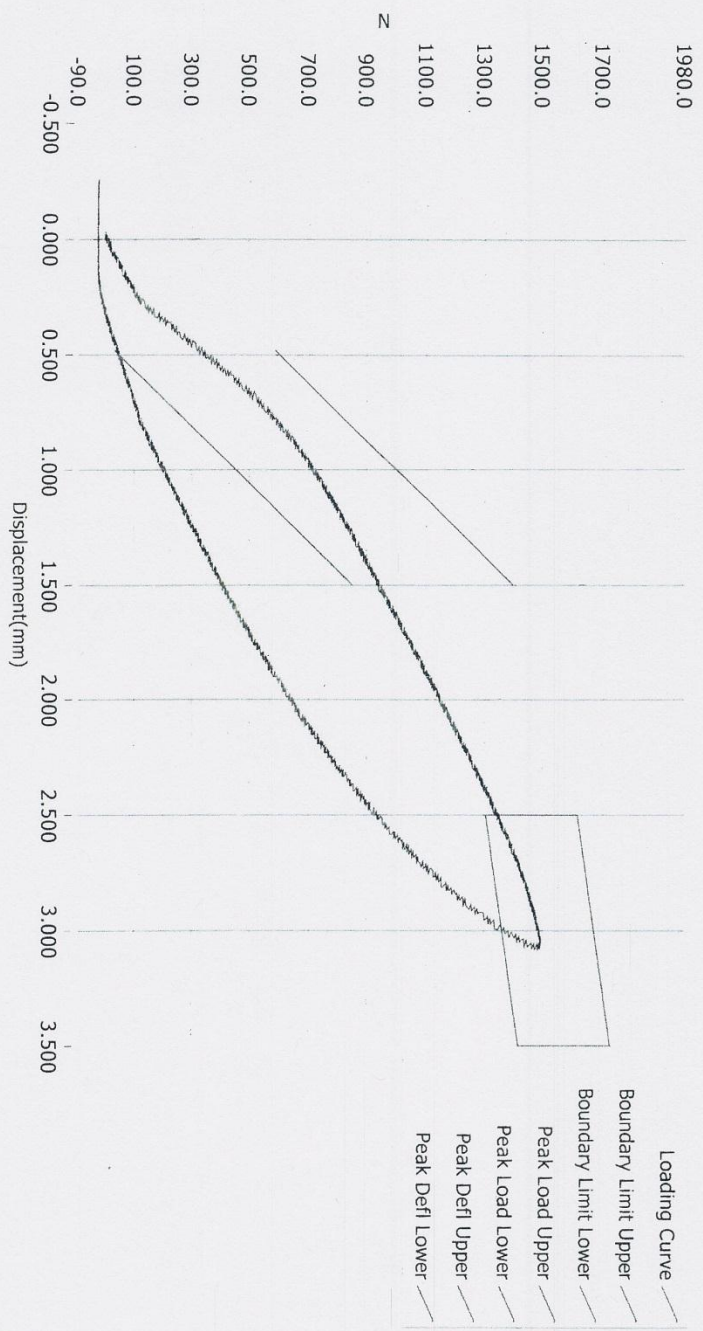
Current Date : 9/23/2010

Current Time : 01:41:11

F

Cert 11/22/2011

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	ATD Type	
	36852	SIDIIs	

Current Date : 10/6/2010

Current Time : 16:58:46



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	9:52:21 AM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207
FTSS Certification Plug - 1484N	36852
FTSS Full Scale Test Plug - 1477 N	36385

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	6.60 -- 6.80	6.61 m/s P
Peak Probe Acceleration	38.0 -- 47.0	45.3 g P
Peak Pelvis Acceleration	34.0 -- 42.0	41.2 g P
Peak Acetabulum Force	3.60 -- 4.30	3.78 kN P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **9:52:21 AM**

Test Date: **11/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AF5B3	11/18/2011
Endevco	7264-2000	P51875	9/29/2011
FTSS	IF-520	LC-102Fy	3/25/2011

Test ID:

Test Time: 9:52:21 AM

Test Date: 11/22/2011

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2 of 2

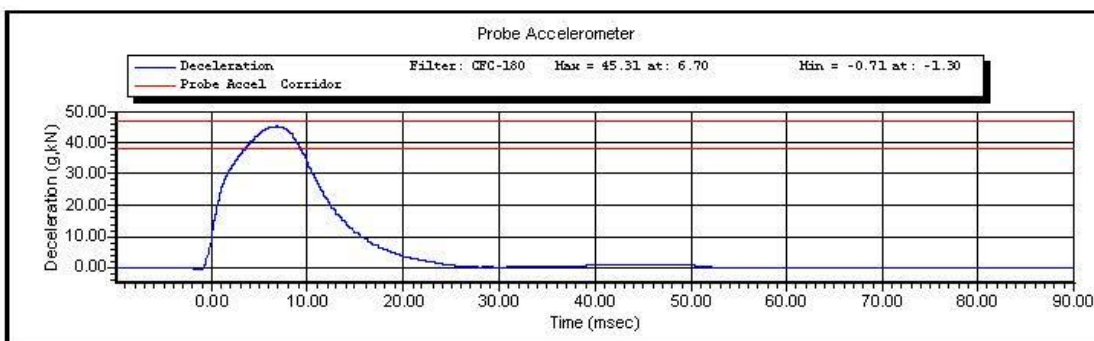
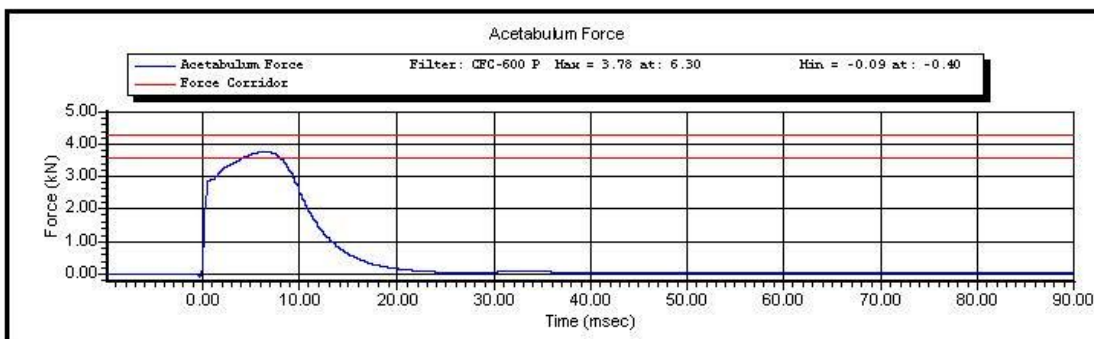


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	9:52:21 AM



Test ID:

Test Time: **9:52:21 AM**

Test Date: **11/22/2011**

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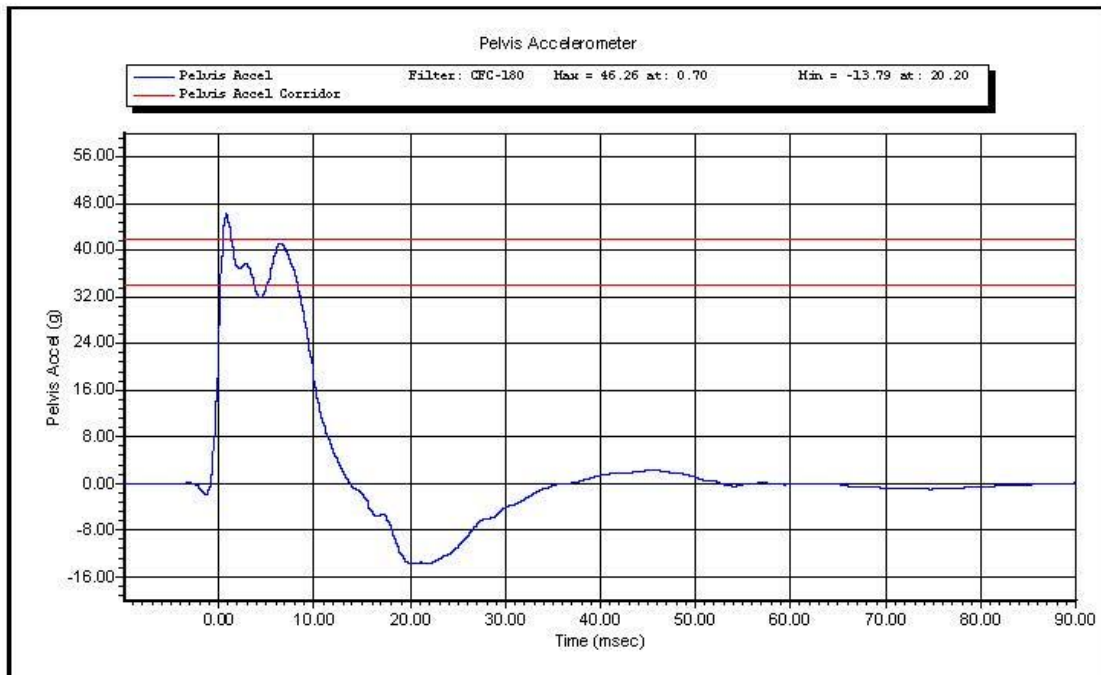
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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	8:41:37 AM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	4.20 -- 4.40	4.31 m/s P
Peak Probe Acceleration	36.0 -- 45.0	43.4 g P
Peak Pelvis Acceleration	28.0 -- 39.0	33.5 g P
Peak Iliac Force	4.10 -- 5.10	4.82 kN P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **8:41:37 AM**

Test Date: **11/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AF5B3	11/18/2011
Endevco	7264-2000	P51875	9/29/2011
DentonATD	3228J	LC-281Fy	8/31/2011

Test ID:

Test Time: **8:41:37 AM**

Test Date: **11/22/2011**

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2 of 2

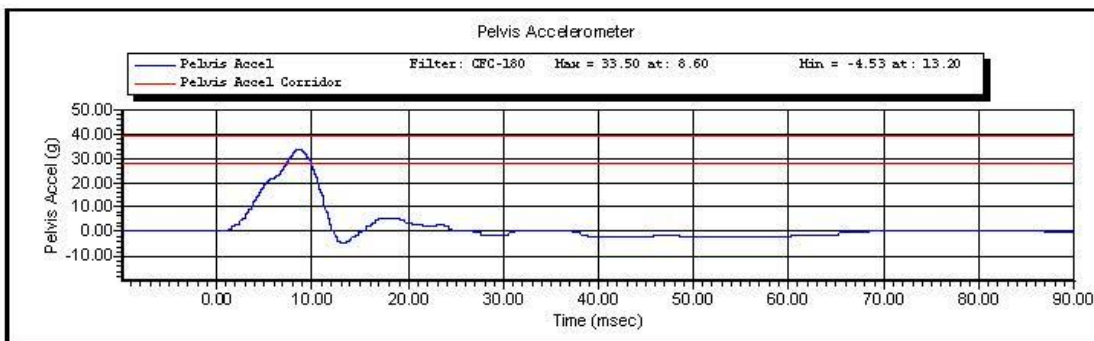
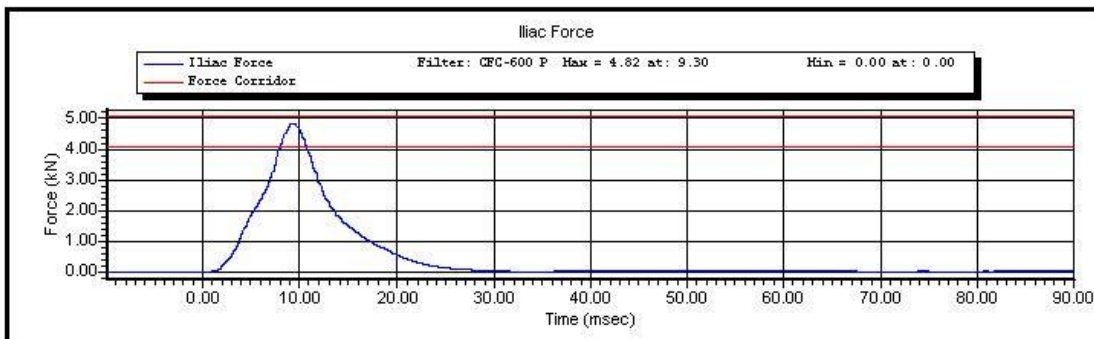


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	11/22/2011
Test Number:	1	Test Time:	8:41:37 AM



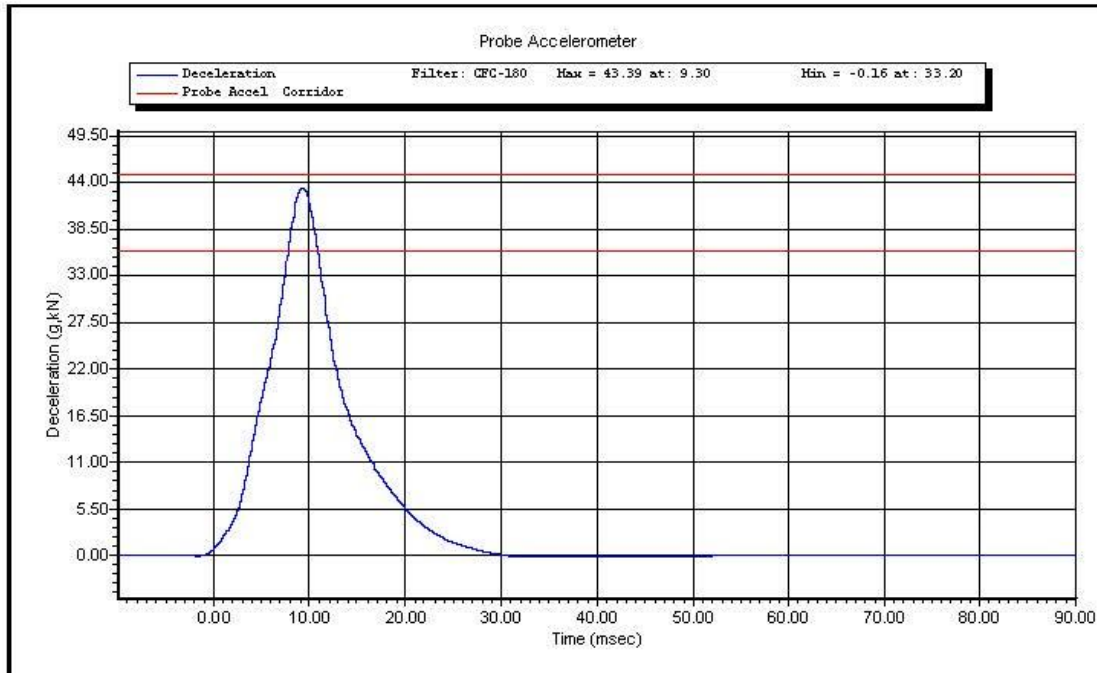
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Test Time: **8:41:37 AM**

Test Date: **11/22/2011**

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1 of 2



Test ID:

Test Time: **8:41:37 AM**

Test Date: **11/22/2011**

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Appendix D
Test Equipment and Instrumentation Calibration Data

Table 1 – Dummy Instrumentation

				SID-IIs S/N: 8012			
				Serial Number	Manufacturer	Calibration Date	
Head Accelerometers				X	AC-P49185	Endevco	11/3/2011
				Y	AC-P58839	Endevco	10/17/2011
				Z	AC-P51991	Endevco	10/17/2011
Head Accelerometers Redundant				RX	AC-P68058	Endevco	10/17/2011
				RY	AC-P61885	Endevco	10/17/2011
				RZ	AC-P68059	Endevco	10/17/2011
Displacement Potentiometer	Shoulder			Y			
	Thoracic Rib	Upper	Y	1849	Denton	9/1/2011	
		Middle	Y	1857	Denton	9/1/2011	
		Lower	Y	1859	Denton	9/1/2011	
	Abdominal Rib	Upper	Y	1860	Denton	9/1/2011	
		Lower	Y	1861	Denton	9/1/2011	
Lower Spine Accelerometers (T12)				X	AC-P5200	Endevco	10/5/2011
				Y	AC-P58796	Endevco	10/5/2011
				Z	AC-P50098	Endevco	10/5/2011
Acetabulum Load Cell				Y	102	Denton	8/31/2011
Lilac Wing Load Cell				Y	281Fy	Denton	3/25/2011

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A005869	MS	10/4/2011
Vehicle Center of Gravity	Y	AC-A081433	MS	10/4/2011
Vehicle Center of Gravity	Z	AC-A081445	MS	10/4/2011
Left Floor Sill	Y	AC-A081464	MS	10/4/2011
A-Pillar Sill	Y	AC-A081417	MS	10/4/2011
A-Pillar Low	Y	AC-A081442	MS	10/4/2011
A-Pillar Mid	Y	AC-A081463	MS	10/4/2011
B-Pillar Sill	Y	AC-A081429	MS	10/4/2011
B-Pillar Low	Y	AC-A081444	MS	10/4/2011
B-Pillar Mid	Y	AC-A016518	MS	10/4/2011
Driver Seat	Y	AC-A081420	MS	10/4/2011
Engine Top	X	AC-A032569	MS	10/4/2011
Engine Top	Y	AC-A035443	MS	10/4/2011
Firewall	Y	AC-A081460	MS	10/4/2011
Right Roof	Y	AC-A081452	MS	10/4/2011
Right Floor Sill	Y	AC-A079084	MS	10/4/2011
Rear Floorpan	X	AC-A081461	MS	10/4/2011
Rear Floorpan	Y	AC-A081425	MS	10/4/2011

Tale 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18880	Interface	9/22/2011
Load Cell 2	LC-18850	Interface	9/22/2011
Load Cell 3	LC-46979	Interface	9/22/2011
Load Cell 4	LC-18857	Interface	9/22/2011
Load Cell 5	LC-18844	Interface	9/22/2011
Load Cell 6	LC-46933	Interface	9/22/2011
Load Cell 7	LC-18866	Interface	9/22/2011
Load Cell 8	LC-46949	Interface	9/22/2011