REPORT NUMBER: SNCAP-KAR-11-019

NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST

CHRYSLER GROUP LLC
2011 JEEP GRAND CHEROKEE LAREDO 5-DOOR MPV

NHTSA No: MB0310

PREPARED BY:

KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

SEPTEMBER 15, 2010

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF CRASHWORTHINESS STANDARDS

1200 NEW JERSEY AVE, SE

ROOM W43-410

WASHINGTON, D.C. 20590

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Approval Date: September 29, 2010

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date: _____

_____

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

Date: _____

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Final Report of New Car Assessment Program Side Impact Testing of a 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310	September 29, 2010
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7. Authors Mr. Kelsey A. Chiu, Engineering Department Supervisor, KARCO Mr. Frank Richardson, Program Manager, KARCO	**8. Performing Organization Report No.** TR-P30003-11-NC
9. Performing Organization Name and Address KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA, 92301	**10. Work Unit No.**
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15. Supplementary Notes

16. Abstract

A 55/28 km/h 90 deg. Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Jeep Grand Cherokee Laredo 5-Door MPV in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at KARCO Engineering, LLC in Adelanto, CA, on September 15, 2010.

The impact velocity of the Moving Deformable Barrier was 61.75 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 35.0 deg. C. The target vehicle's maximum post-test static crush was 213 mm located at level 2. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC_{36})		1000	58.9
Maximum Thorax Rib Deflection	mm	44	30.6
Total Abdominal Force	N	2500	809
Pubic Symphysis Force	N	6000	955

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC_{36})		1000	121.2
Lower Spine Resultant Acceleration	g	82	34
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	2724

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.

17. Key Words		18. Distribution Statement	
New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) ES-2re SID-IIs		Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division 1200 New Jersey Ave., SE Room W43-410 Washington, DC 20590	
19. Security Classification of this report	**20. Security Classification of this page**	**21. No. of Pages**	**22. Price**
UNCLASSIFIED	UNCLASSIFIED	134	

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2011 Jeep Grand Cherokee Laredo 5-Door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated January 2010.

SUMMARY

A 2011 Jeep Grand Cherokee Laredo 5-Door MPV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.75 km/h (38.37 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by KARCO Engineering, LLC. in Adelanto, California, on September 15, 2010. Pre- and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in Appendix A of this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated January 2010. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Head Accelerometers
Thorax Rib 1 to Rib 3 Potentiometers
Abdomen Forward, Middle, and Rear Load Cells
Lower Spine Accelerometers
Pubic Load Cell

PASSENGER ATD (SID-IIs)
Head Accelerometers
Thorax Upper, Middle and Lower Rib Potentiometers

Abdomen Upper and Lower Rib Potentiometers

Lower Spine Accelerometers

Illiac Load Cell

Acetabulum Load Cell

Dummy injury values were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	58.9
Maximum Thorax Rib Deflection	mm	44	30.6
Combined Abdominal Force	N	2500	809
Pubic Symphysis Force	N	6000	955

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	121.2
Lower Spine (T12) Resultant Acceleration	g	82	34
Total Pelvic Force (sum of acetabular and illiac forces	N	5525	2724

Supplemental restraint information is given below:

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

GENERAL COMMENTS

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

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in^2	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	^oF	^oC	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MB0310	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Jeep	Power Steering	Yes
Model	Grand Cherokee Laredo	Driver Front Airbag	Yes
Body Style	5-Door MPV	Driver Curtain Airbag	Yes
VIN	1J4RS4GG5BC519178	Driver Head/Torso Airbag	No
Body Color	Dark Charcoal Pearl	Driver Torso Airbag	No
Delivery Date	8/18/2010	Driver Torso/Pelvis Airbag	Yes
Odometer Reading (km / mi)	211 / 131	Driver Pelvis Airbag	No
Dealer	Tuttle-Click Chrysler Jeep Dodge	Driver Knee Airbag	No
Transmission	5-Speed Automatic	Rear Pass. Curtain Airbag	Yes
Final Drive	Rear	Rear Pass. Head/Torso Airbag	No
Type / No. of Cylinders	V6	Rear Pass. Torso Airbag	No
Engine Displacement (L)	3.6	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Longitudinal	Rear Pass. Pelvis Airbag	No
Roof Rack	Yes	Pretensioners	Yes
Sunroof / T-Top	No	Load Limiters	Yes
Tinted Glass	Yes	Automatic Door Locks	Yes
Traction Control	Yes	Bucket Seats	Yes
Power Brakes	Yes	Tilt Steering	Yes
Front Disc	Yes	Other	
Rear Disc	Yes	Other	

Does Owner's Manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrslyer Group LLC	GVWR (kg)	2949
Date of Manufacture	Jul-10	GAWR Front (kg)	1452
		GAWR Rear (kg)	1679

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				476.0	*A*
DSC x 68.04 (kg)				340.2	*B*
Cargo Weight (RCLW) (kg)				135.8	*A-B*

VEHICLE SEAT TYPE

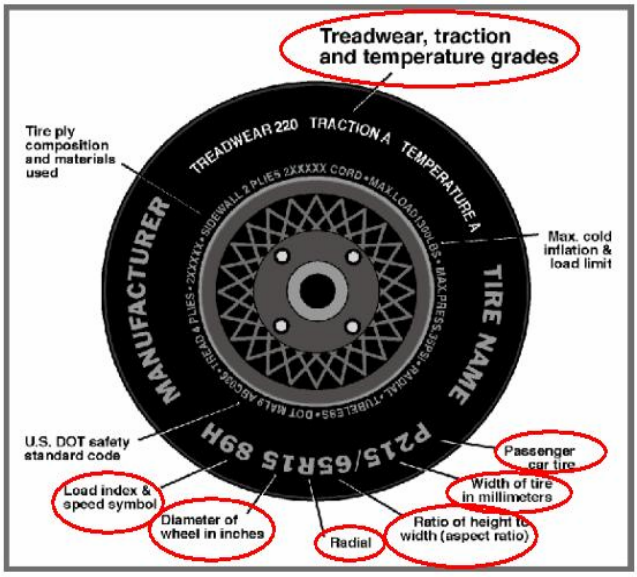
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	Yes						Yes
Rear or Second Row Seat		Yes				Yes	
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kpa)	230	230
Recommended Tire Size	P245/70R17	P245/70R17
Tire Size on Vehicle	P245/70R17	P245/70R17
Tire Model	Fortera AL	Fortera AL
Tire Manufacturer	Goodyear	Goodyear
Treadwear	540	540
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index/Speed Symbol	108T	108T
Tire Material	Polyester, Steel	Polyester, Steel
DOT Safety Code Right	4B83 JD1R 2510	4B83 JD1R 2510
DOT Safety Code Left	4B83 JD1R 2510	4B83 JD1R 2510

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	527.0	512.0		558.5	630.0		555.0	640.0	
Right	kg	512.5	505.5		513.5	607.0		508.5	616.5	
Ratio	%	50.5%	49.5%	100.0%	46.4%	53.6%	100.0%	45.8%	54.2%	100.0%
Total	kg	1039.5	1017.5	2057.0	1072.0	1237.0	2309.0	1063.5	1256.5	2320.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2057.0	A
Actual Weight of 2 P572 ATDs Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	135.8	C
Calculated Vehicle Target Wt (TVTW)	kg	2317.8	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG (Aft of Front Axle
Fully Loaded	mm	885	884	917	923	1581
As Tested	mm	883	876	911	916	1564

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	2919
Total Vehicle Length at Left Side	mm	3519
Total Vehicle Length at Centerline	mm	4826
Total Vehicle Length at Right Side	mm	3517
Weight of Ballast in Cargo Area	kg	166.0
Weight of Vehicle Components Removed	kg	75.5
Amount of Stoddard Solvent in Fuel Tank	L	86.95

Vehicle components removed to make Target Vehicle Test Weight:

Non-struck side door panels (8.0 kg), Non-struck side window (3.5 kg), Trunk lining and mats (26.0 kg), Spare tire and tools (38.0 kg)

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle	mm	508
Actual Impact Point Aft of Front Axle	mm	514

DATA SHEET NO. 2

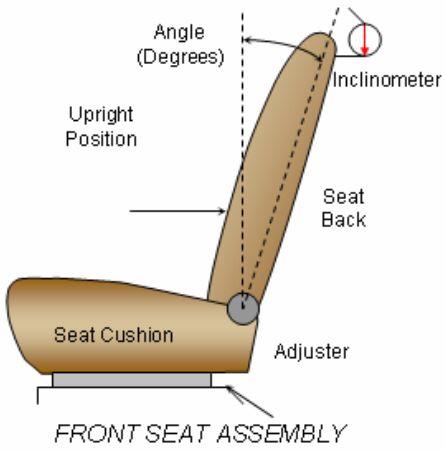
SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

NOMINAL DESIGN RIDING POSITION

The driver's seat back is set to the manufacturer's designated seat angle, measured with a digital inclinometer at the headrest post. The passenger's seat back is set to level the ATD head as close as possible and is measured at the seat back with a digital inclinometer.



SEAT BACK ANGLES

	Degrees (°)
Driver w/Seated Dummy	14.5
Passenger w/Seated Dummy	9.0

SEAT FORE/AFT POSITION

Driver seat travel is measured with the seat cushion at the mid angle and the lowermost position. The seat is set to the middle of the fore-aft travel. The passenger seat is fixed.

SEAT FORE/AFT POSITIONS

Seating Position	Total Fore/Aft Travel	Placed in Position
Driver Seat	264 mm	132 mm
Rear Seat	Fixed	Fixed

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position, the driver for a 50th percentile adult male ATD, the left rear passenger for a 5th percentile adult female ATD. Position zero (0) is the uppermost position. The passenger upper anchorage is fixed.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	5	2
Rear Seat	Fixed	Fixed

DATA SHEET NO. 2 … (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

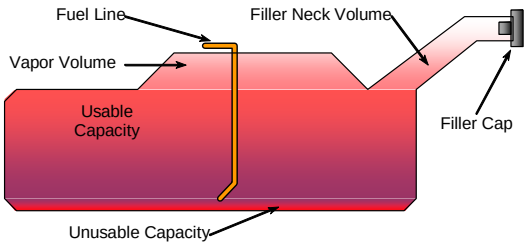
Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	93.49
Usable Capacity of "Optional Tank"	
Usable Capacity Used for FMVSS 301	93.49
Actual Amount of Stoddard Solvent Used	86.95

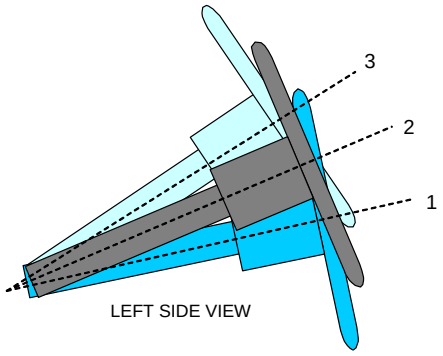
The test vehicle is equipped with an electric fuel pump. The fuel pump starts pumping fuel when the ignition is in the on position. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used with a reference mark on the steering column to measure telescoping travel.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

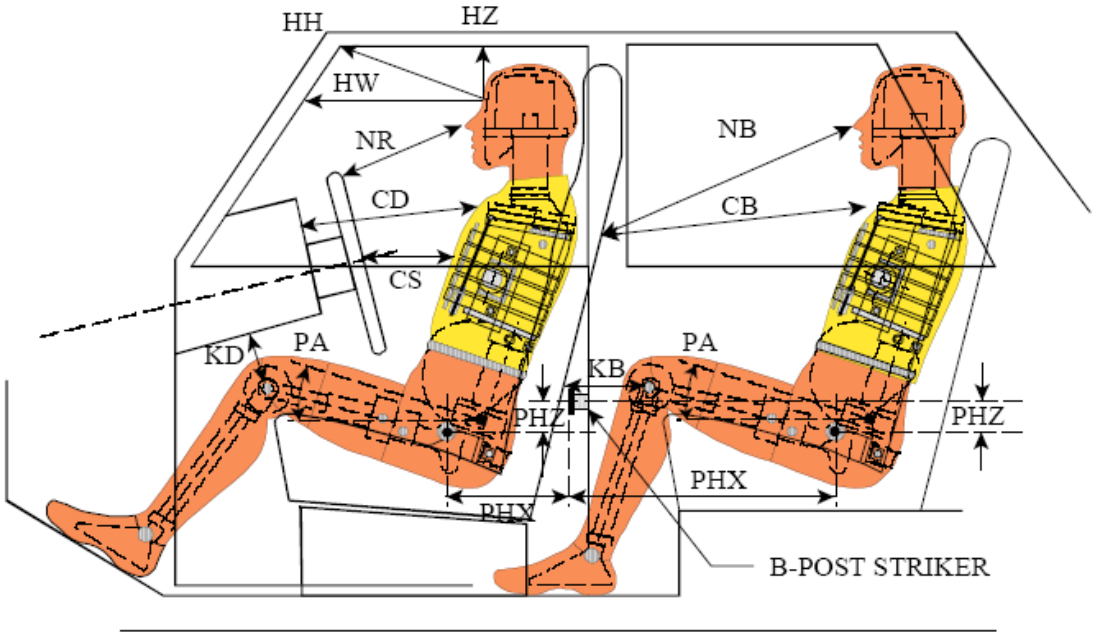
	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.2	0
Geometric Center Position, No. 2	22.4	29
Uppermost Position, No. 3	24.6	58
Telescoping Steering Wheel Travel		58
Test Position	22.4	29

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

LEFT SIDE VIEW

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

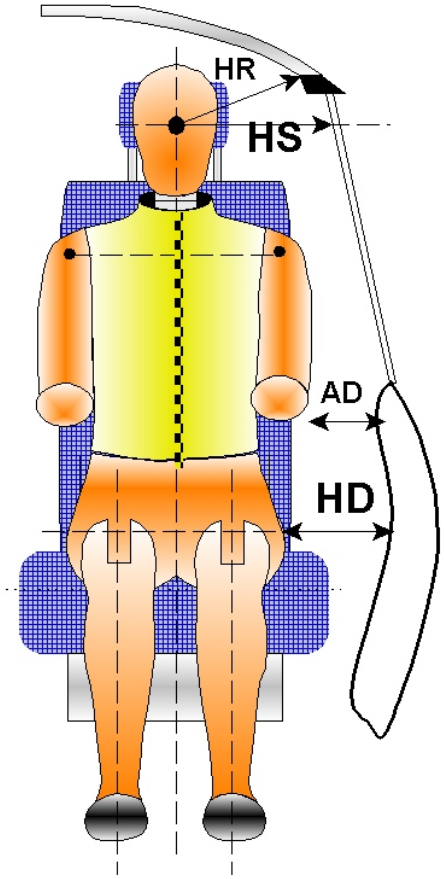
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (º)	Length (mm)	Angle (º)
HH		Head to Header	504	11.0		
HW		Head to Windshield	683	0.0		
HZ	HZ	Head to Roof	220	90.0	310	90.0
NR	NB	Nose to Rim/Seat Back	522	9.0	477	14.1
CD	CB	Chest to Dash/Seat Back	597	8.5	488	2.0
CS		Chest to Steering Wheel	375	6.9		
KDL	KBL	Left Knee to Dash/Seat Back	177	30.3	265	10.7
KDR	KBR	Right Knee to Dash/Seat Back	138	39.0	242	13.5
PA	PA	Pelvic Angle		20.3		20.1
PHX	PHX	H-Point to Striker (x-axis)	185		247	
PHZ	PHZ	H-Point to Striker (z-axis)	90		214	
SA	SA	Seat Back Angle		14.5		9.6

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

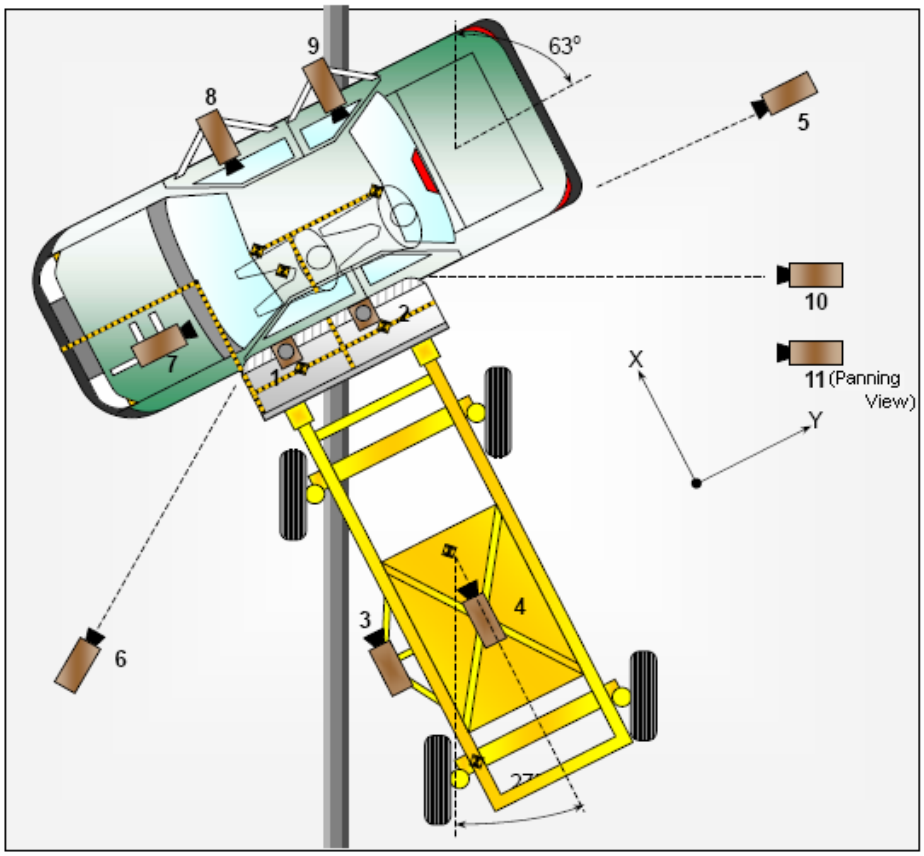
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	236	292
HS	Head to Side Window	mm	366	413
AD	Arm to Door	mm	120	158
HD	H-Point to Door	mm	170	171

DATA SHEET NO. 5

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



CAMERA LOCATIONS AND DATA

Camera No.	View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead Overall	1220	2287	-5486	90	14	1000
2	Overhead Close-Up	609	2287	-5102	90	Zoom	1000
3	Left Impact Point (MDB)	-2134	0	-1143	7.5	25	1000
4	Side Overall (MDB)	-3912	838	-1829	11.9	12	1000
5	Rear	-64	2485	-1348	0	105	1000
6	Left Front	-2266	-3564	-1475	0	24	1000
7	Driver Front (On-Board)	539	-116	-1396	5.5	35	1000
8	Driver Side (On-Board)	1570	1364	-1295	13.8	14	1000
9	Passenger Side (On-Board)	1537	2277	-1311	11.9	20	1000
10	Real Time Left Rear					Zoom	30
11	Real Time Inrun	-2484	-3958	-1506		Zoom	30

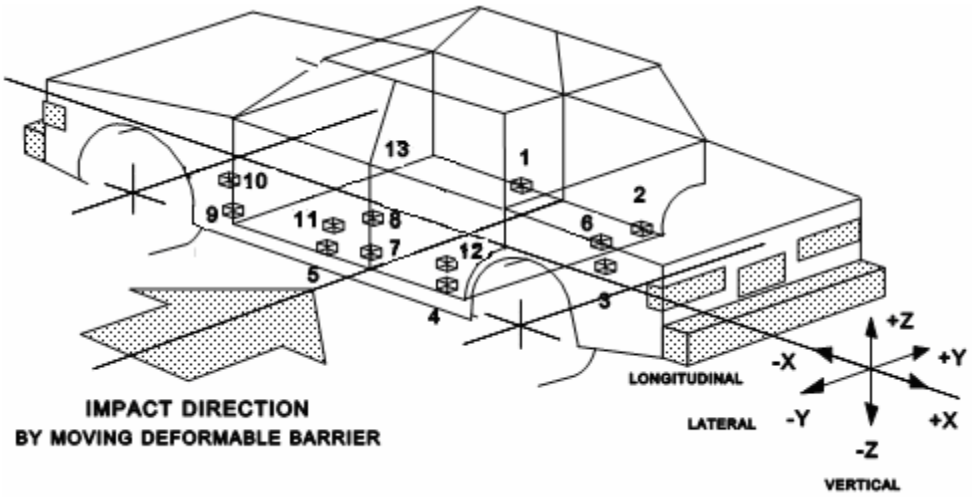
Reference: Impact Point Projected to Ground
+X = To Front of MDB, +Y = To Right of MDB, +Z = Down
*All measurements accurate to ±6 mm

DATA SHEET NO. 6

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2830	740	480
2	Right Sill at Rear Seat	1860	750	500
3	Rear Floorpan Above Axle	1160	-35	680
4	Left Sill at Rear Door	1950	-630	290
5	Left Sill at Front Door	2880	-630	280
6	Right Rear Occupant Compartment	2120	410	360
7	B-Pillar Lower	2130	-760	760
8	B-Pillar Mid	2130	-760	950
9	A-Pillar Lower	3200	-815	720
10	A-Pillar Mid	3200	-815	950
11	Front Seat Track	2400	-610	490
12	Rear Seat Structure	1740	-610	660
13	Vehicle CG	1930	0	560

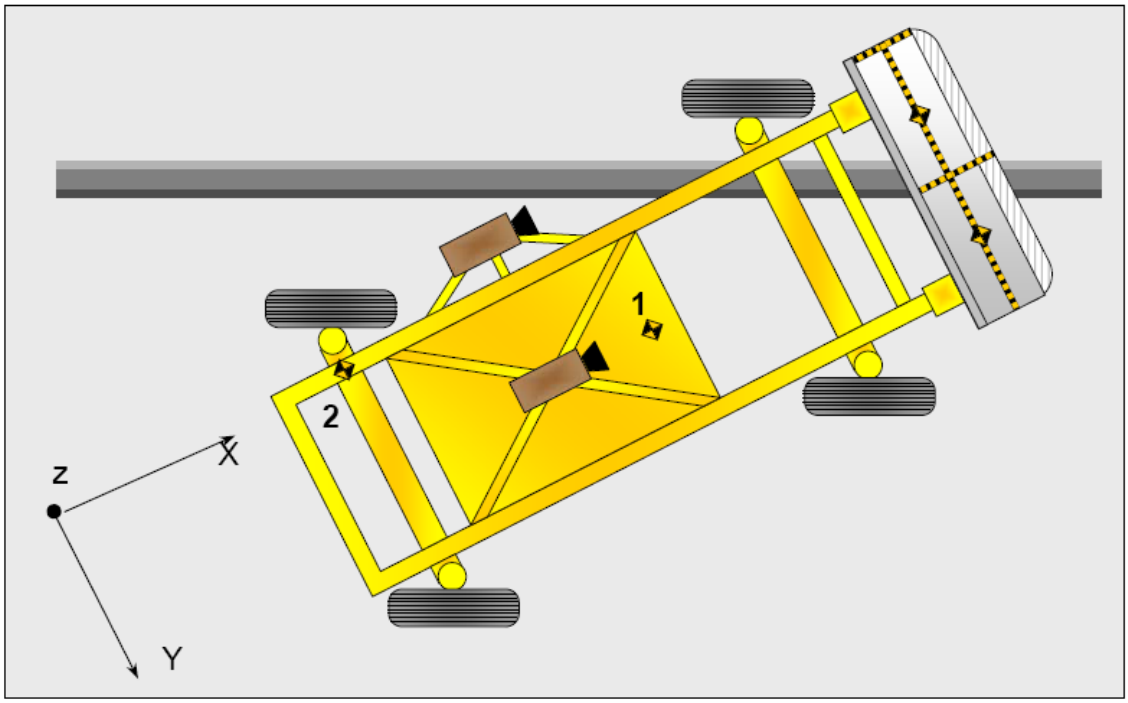
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ up)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurement		
		X	Y	Z
1	MDB CG	-1195	0	430
2	MDB Rear	-2642	-593	608

Reference: X – Face of MDB (+ rearward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ up)

DATA SHEET NO. 8

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

MAXIMUM EXTERIOR CRUSH

Level	Description	Units	Maximum Crush	Above Ground
1	Sill Top Height	mm	53	360
2	Occupant H-Point Height	mm	213	762
3	Mid-Door Height	mm	206	809
4	Window Sill Height	mm	74	1145
5	Window Top Height	mm	16	1653
	Maximum Penetration	mm	213	

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Airbag Timing Sensors	4
Vehicle Structure Accelerometers	21
MDB Accelerometers	5
Total No. of Contact Switches	8
Total	70

CAMERA COVERAGE

High-Speed Vehicle On-Board	3
High-Speed Vehicle Off-Board	5
High-Speed MDB On-Board	2
Real Time Panning	1
Total	11

DATA SHEET NO. 9

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1251
Overall Length including Honeycomb Face	4023
Wheel Base of Framework Carriage	2595
CG location aft of Front Axle	1118

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	402	298	
Right	kg	377	292	
Ratio	%	56.9%	43.1%	
Totals	kg	779	590	1368

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.75
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.63
MDB CL to Target Vehicle CL	degrees	88.5-91.5	91.0

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
1	Center of Bumper	432	800	Right	291
2	Top of Bumper	533	800	Left	151
3	Mid Level	686	800	Left	168
4	Top of Stack	813	800	Left	190

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	2

DATA SHEET NO. 10

POST-TEST OBSERVATIONS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Dummy Type/Serial No.	ES-2re, S/N: F035	SID-IIs, S/N: 307
Head Contact	Curtain Airbag, Head Restraint	Curtain Airbag, Center Seat Head Restraint
Upper Torso Contact	Side Airbag, Door Panel	Door Panel
Lower Torso Contact	Side Airbag	Door Panel
Left Knee Contact	Door Panel, Right Knee	Door Panel, Right Knee
Right Knee Contact	Left Knee	Left Knee

POST-TEST DOOR OPENING AND SEAT TRACK INFORMATION

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

POST-TEST STRUCUTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions	
Pillar Performance	No separation occurred	
Sill Seperation	No separation occurred	
Windshield Damage	None	
Window Damage	None	None
Other Notable Effects	None	

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

MDB LEFT EDGE IMPACT POINT DATA

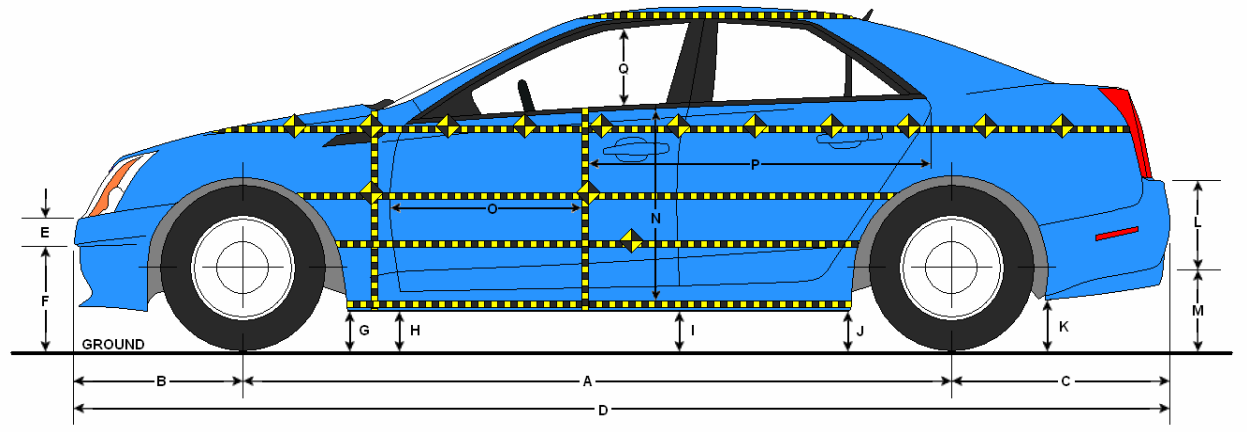
Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	+6 (Right)
Vertical Offset	mm	+/- 20	+10 (Up)

DATA SHEET NO. 11

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



LEFT SIDE VIEW

VEHICLE PRE AND POST-TEST MEASUREMENT INFORMATION

Code	Dimension	Measurement (mm)		
		Pre	Post	Difference
A	Wheelbase	2919	2911	-8
B	Front Axle to FSOV	884	886	2
C	Rear Axle to RSOV	1022	1025	3
D	Total Length at Centerline	4826	4823	-3
E	Front Bumper Thickness	211	210	-1
F	Front Bumper Bottom to Ground	484	528	44
G	Sill Height af Front Wheel Well	259	304	45
H	Sill Height at Front Door Leading Edge	279	327	48
I	Sill Height at B-Pillar	326	393	67
J1	Sill Height at Rear Wheel Well	285	348	63
J2	Pinch Weld Height at Rear Wheel Well	299	351	52
K	Sill Height Aft of Rear Wheel Well	337	392	55
L	Rear Bumper Thickness	129	129	0
M	Bottom of Rear Bumper to Ground	600	647	47
N	Sill Height to Window Bottom Sill	733	756	23
O	Front Door Leading Edge to Impact CL	733	728	-5
P	Rear Door Trailing Edge to Impact CL	1367	1276	-91
Q	Front Window Opening	446	440	-6
R	Right Side Length	3517	3519	2
S	Left Side Length	3519	3511	-8
T	Vehicle Width at B-Pillar	1913	1815	-98

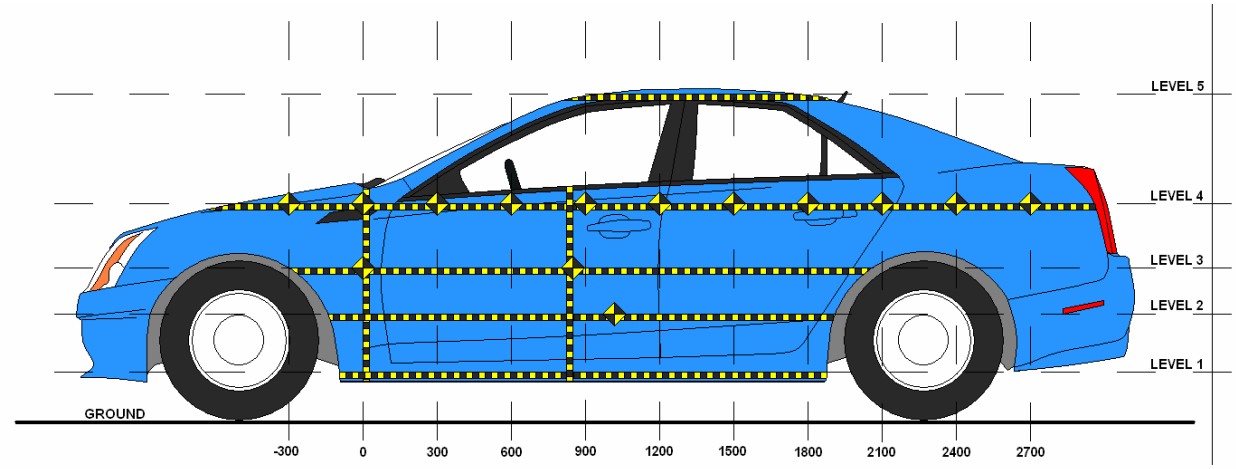
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 12

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)
1	Sill Top Height	360
2	Occupant H-Point Height	762
3	Mid-Door Height	809
4	Window Sill Height	1145
5	Window Top Height	1653

DATA SHEET NO. 12 … (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150		542	540	666			557	556	684			15	16	18	
0	599	549	551	647		608	576	576	666		9	27	25	19	
150	612	568	565	631		641	663	656	626		29	95	91	-5	
300	616	569	564	622		653	691	686	620		37	122	122	-2	
450	616	567	563	615		660	730	727	616		44	163	164	1	
600	615	566	562	604		663	755	751	615		48	189	189	11	
750	616	566	561	601		666	764	763	620		50	198	202	19	
900	617	567	562	597	833	669	774	768	626	840	52	207	206	29	7
1050	619	568	563	595	817	672	781	768	634	828	53	213	205	39	11
1200	621	570	565	593	812	674	772	739	643	738	53	202	174	50	-74
1350	623	575	570	592	809	676	775	743	666	763	53	200	173	74	-46
1500	626	581	576	592	808	677	774	758	656	755	51	193	182	64	-53
1650	629	588	582	594	808	676	783	770	648	750	47	195	188	54	-58
1800	616	574	574	596	811	645	731	742	640	745	29	157	168	44	-66
1950		542	544	565	815		639	648	603	743		97	104	38	-72
2100				572	818				599	823				27	5
2250				601	825				623	832				22	7
2400				605	836				621	845				16	9
2550				613	851				622	857				9	6
2700				620	871				627	887				7	16
2850				634					639					5	

MAXIMUM CRUSH DATA

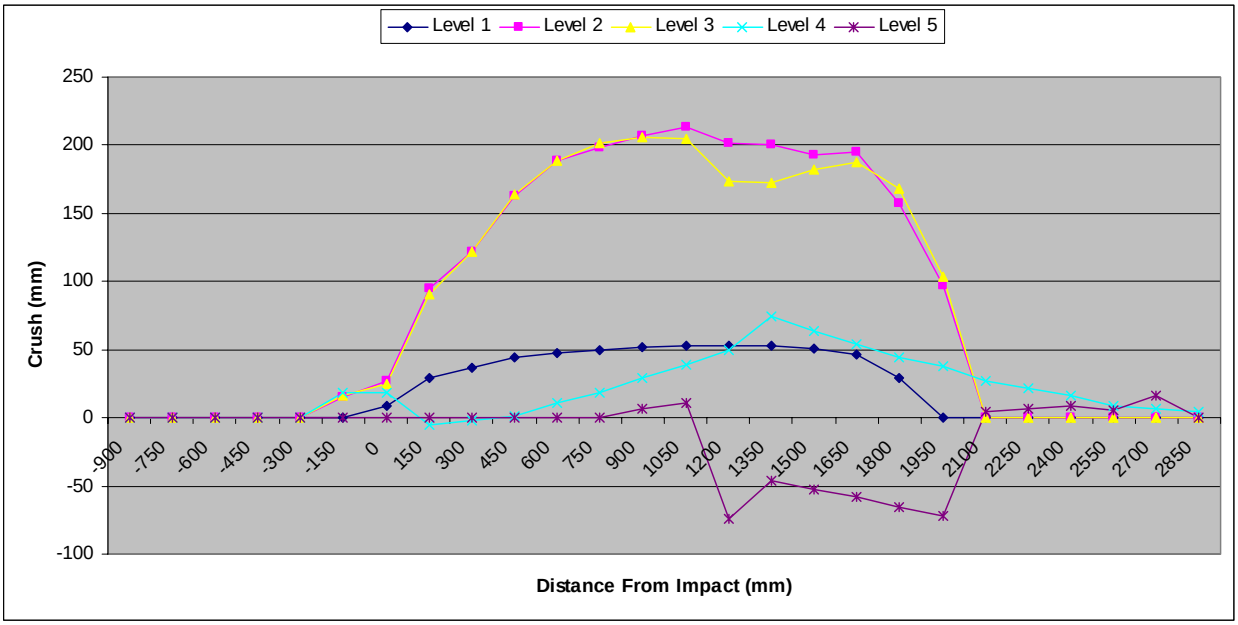
	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	53	213	206	74	16
Distance from Impact (mm)	1050	1050	900	1350	2700

DATA SHEET NO. 12 … (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

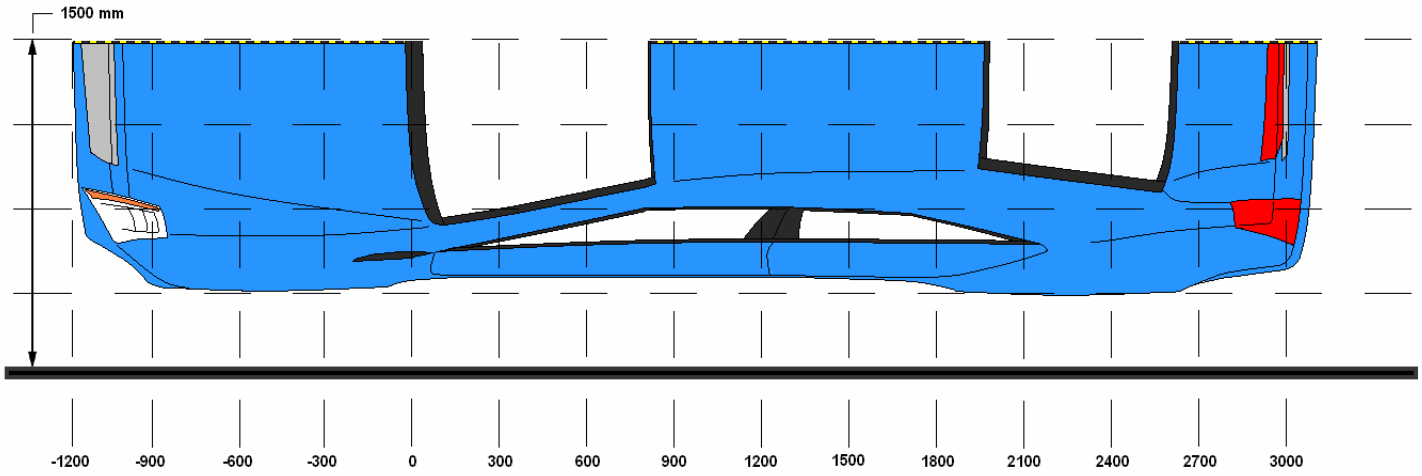


DATA SHEET NO. 13

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



TOP VIEW

DAMAGE PROFILE DISTANCES

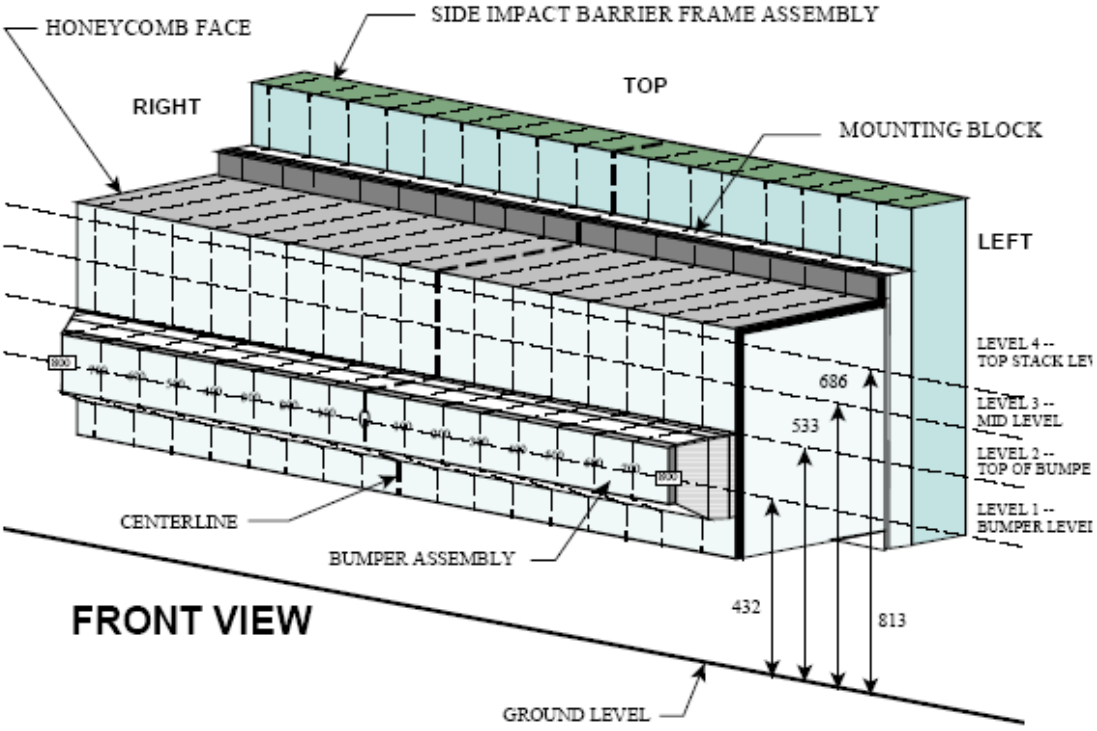
DPD	Distance From Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2100	3	572	599	27
2	1650	2	588	783	195
3	1200	2	570	772	202
4	750	2	561	763	202
5	300	2	569	691	122
6	-150	3	666	684	18

DATA SHEET NO. 14

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



NOTE: Dimensions are shown in millimeters, mm

DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	291	266	261	261	256	256	251	247	246	241	239	232	228	225	228	235	242
2	149	146	147	142	141	149	145	137	134	137	143	143	142	139	138	142	151
3	153	100	84	89	110	122	109	86	86	82	85	79	79	78	99	133	168
4	136	111	109	116	119	116	104	77	64	66	70	78	84	102	125	156	190

All dimensions in millimeters.

DATA SHEET NO. 15

FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

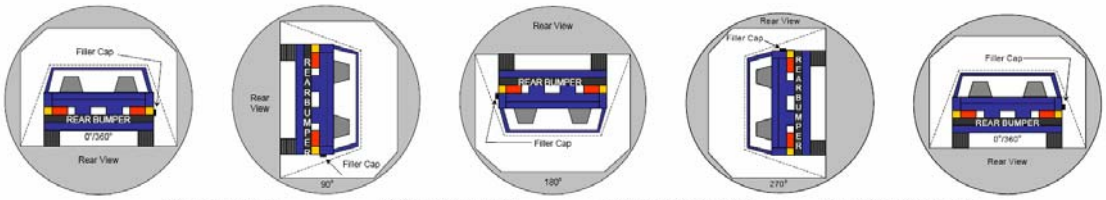
Temperature at Time of Impact: 35.0° C Test Time: 12:50 PM

A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)

B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)

C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)

D. Spillage Details: No spillage occurred



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	82	300	382
90° To 180°	82	300	382
180° To 270°	79	320	399
270° To 360°	81	300	381

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

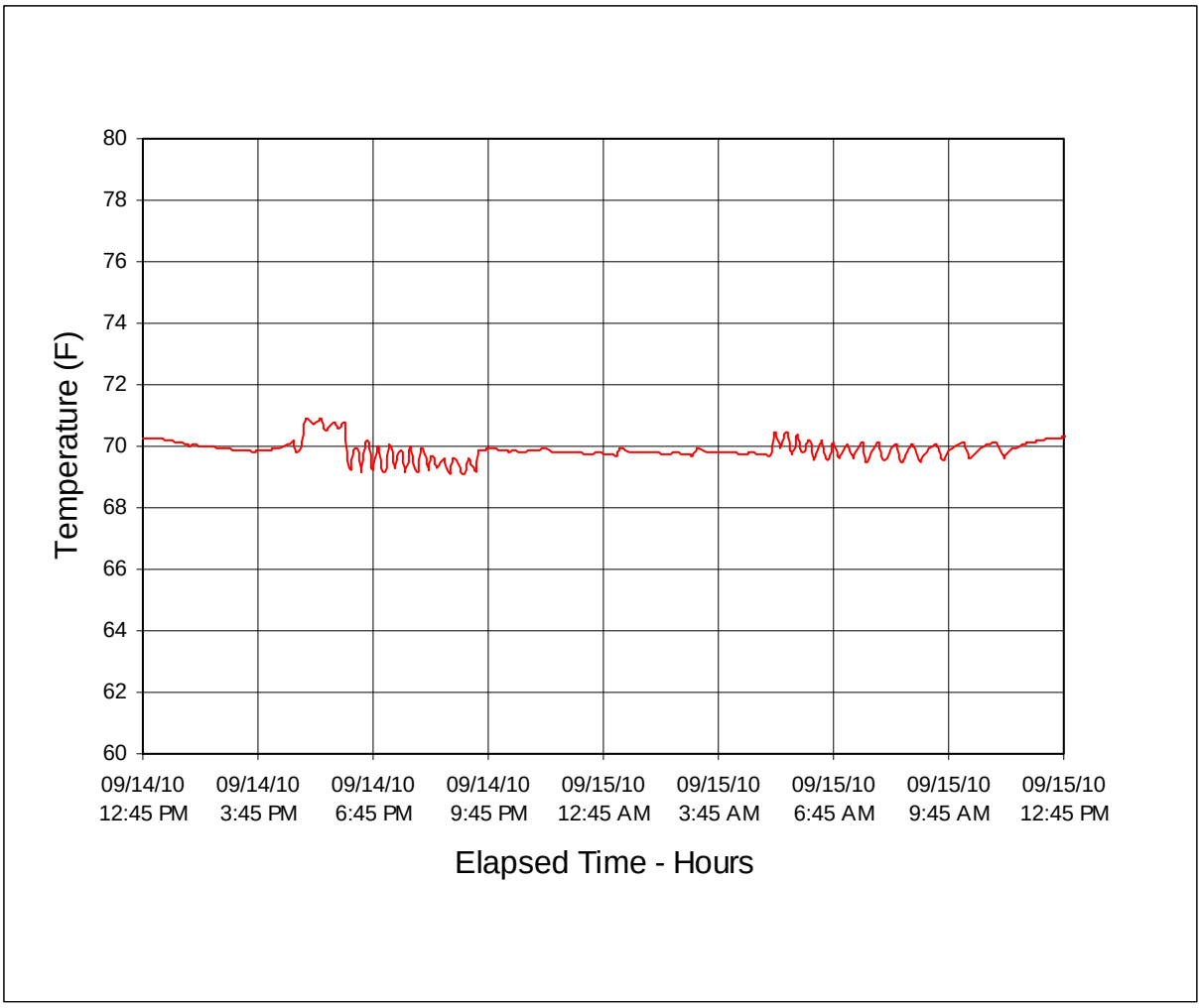
Test Phase	Spillage Location
0° To 90°	None
90° To 180°	None
180° To 270°	None
270° To 360°	None

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2011 Jeep Grand Cherokee Laredo 5-Door MPV NHTSA No. MB0310

Test Program: MDB Side Impact Test Test Date: 09/15/10



APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS … (CONTINUED)

TABLE OF PHOTOGRAPHS … (CONTINUED)

FIGURE 1. 2011 Jeep Grand Cherokee Laredo 4x2 Side MDB As Delivered

FIGURE 2. 2011 Jeep Grand Cherokee Laredo 4x2 Side MDB As Delivered

FIGURE 3. Pre-Test Frontal View of Test Vehicle

FIGURE 4. Post-Test Frontal View of Test Vehicle

FIGURE 5. Pre-Test Left Front Three-Quarter View of Test Vehicle

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

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

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

FIGURE 9. Pre-Test Left Rear Three-Quarter View of Test Vehicle

FIGURE 10. Post-Test Left Rear Three-Quarter View of Impact Zone

FIGURE 11. Pre-Test Rear View of Test Vehicle

FIGURE 12. Post-Test Rear View of Test Vehicle

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

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

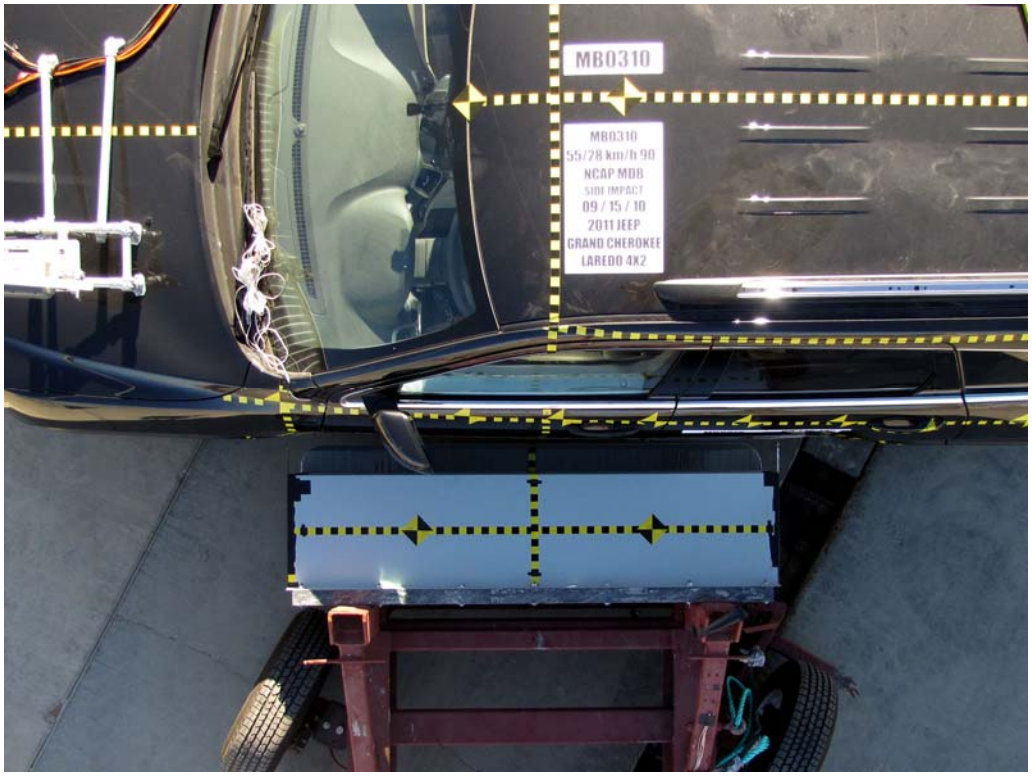


FIGURE 15. Pre-Test Overhead View of Test Vehicle
with MDB Positioned Against Side of Test Vehicle

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

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

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

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

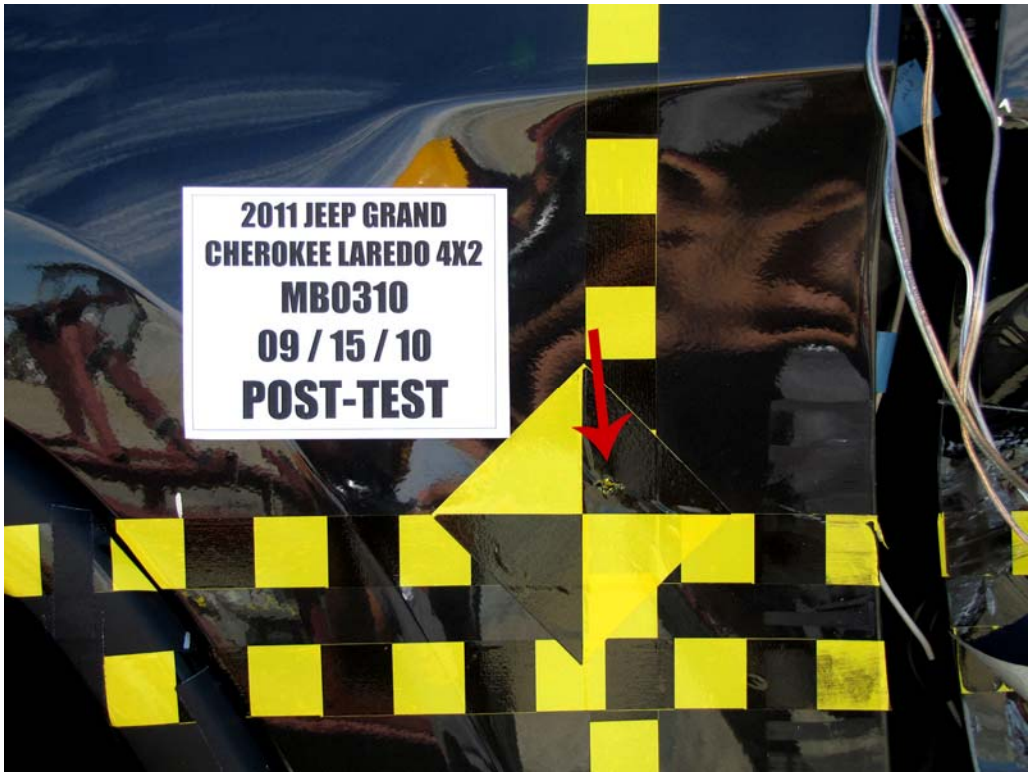


FIGURE 20. Post-Test Close-Up View of Impact Point Target

FIGURE 21. Pre-Test Left Front Door Latch Close-Up

FIGURE 22. Post-Test Left Front Door Latch Close-Up

FIGURE 23. Pre-Test Left Rear Door Latch Close-Up

FIGURE 24. Post-Test Left Rear Door Latch Close-Up

FIGURE 25. Pre-Test Front Close-Up View of Driver Dummy

FIGURE 26. Post-Test Front Close-Up View of Driver Dummy

FIGURE 27. Pre-Test Left Side View of Driver Dummy
Showing Belt, Chalking, and Contact Switches

FIGURE 28. Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View

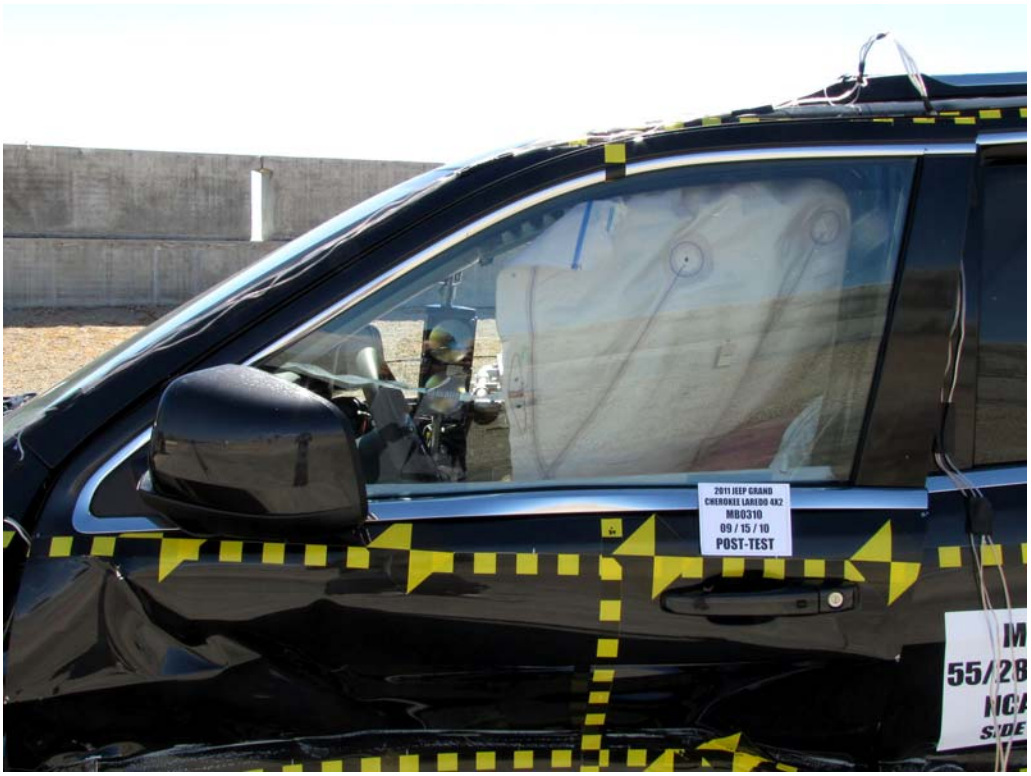


FIGURE 29. Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

FIGURE 30. Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

FIGURE 31. Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

FIGURE 32. Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

FIGURE 33. Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

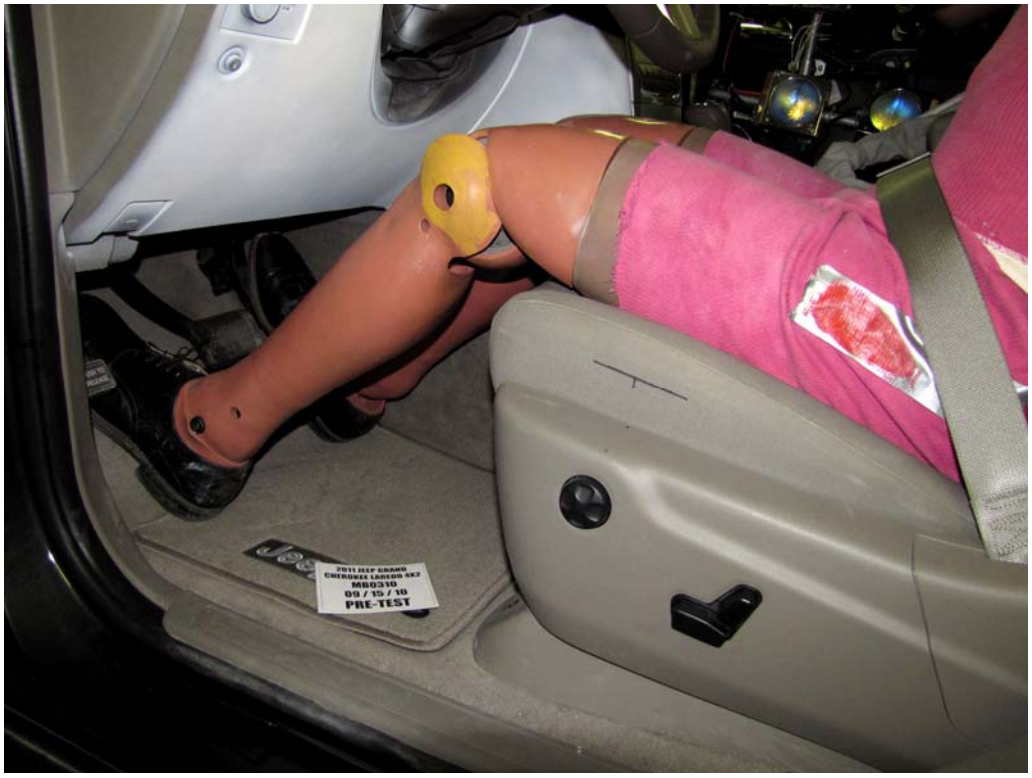


FIGURE 34. Pre-Test Placement of Driver Dummy's Feet

FIGURE 35. Pre-Test View of Belt Anchorage for Driver Dummy

FIGURE 36. Pre-Test Left Side View of Steering Wheel

FIGURE 37. Pre-Test View of Parking Brake

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

FIGURE 39. Pre-Test Close-Up Left Side View of Driver Seat Back

FIGURE 40. Pre-Test Close-Up View of Driver Seat Back or Head Restraint

FIGURE 41. Pre-Test Driver Dummy and Door Clearance View

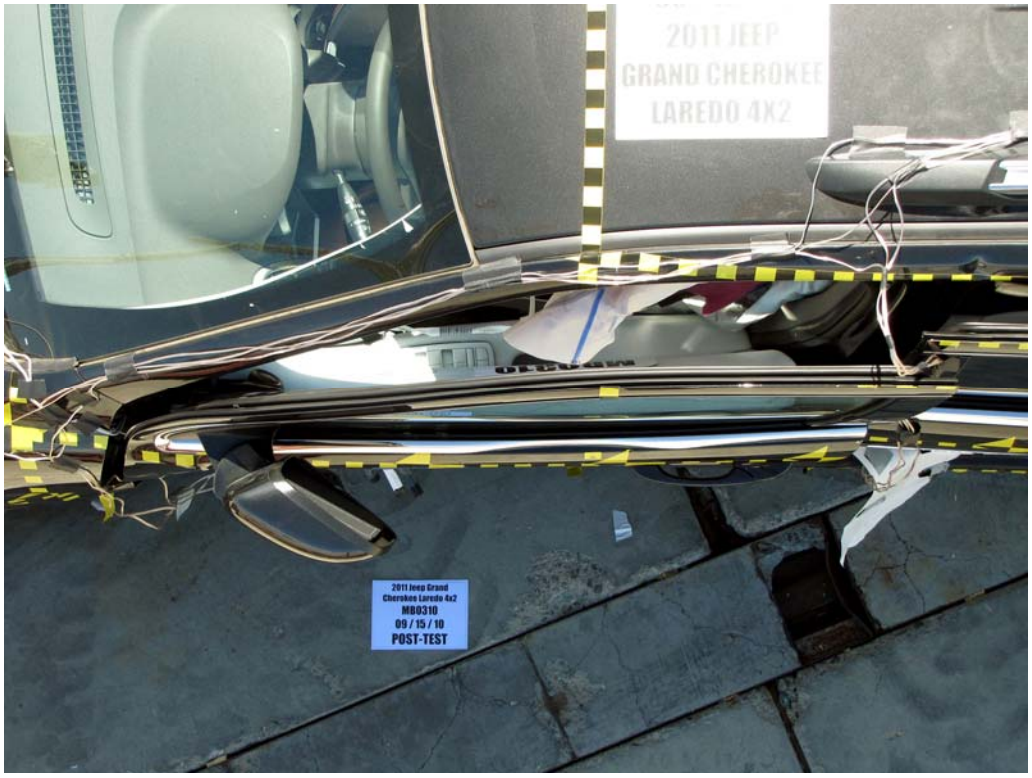


FIGURE 42. Post-Test Driver Dummy and Door Clearance View

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

FIGURE 44. Post-Test Right Side View of Driver Dummy
and Front Seat Occupant Compartment

FIGURE 45. Pre-Test Driver Inner Door Panel View

FIGURE 46. Post-Test Driver Inner Door Panel View
Showing Driver Dummy Contact Locations

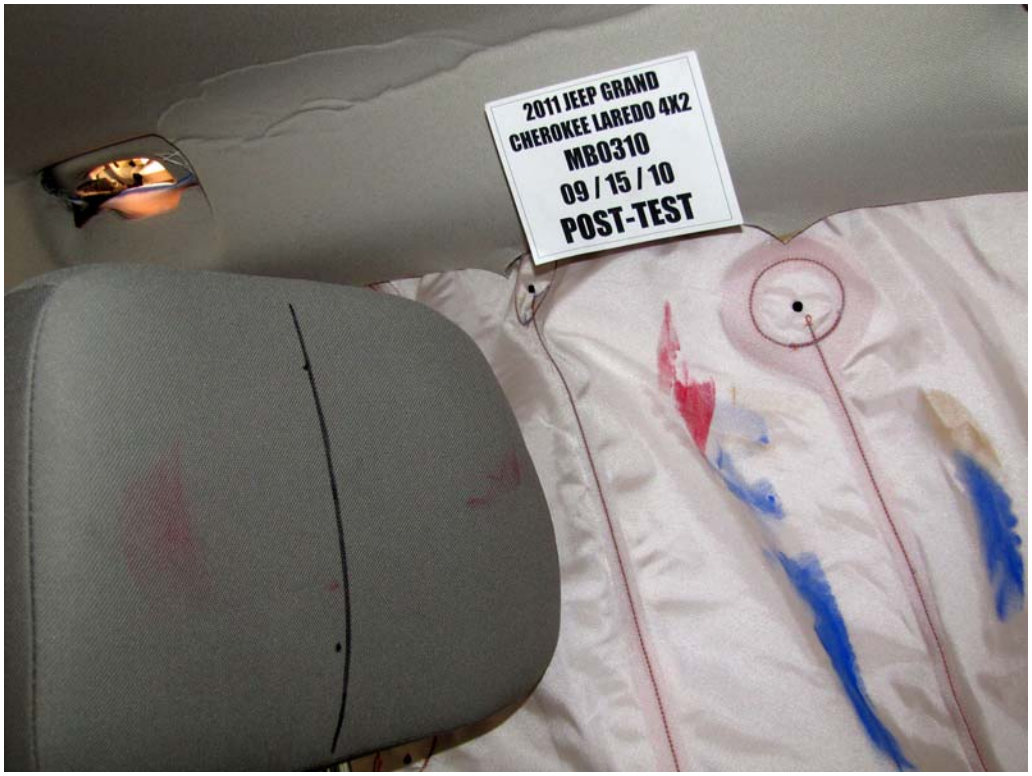


FIGURE 47. Post-Test Driver Dummy Close-Up Head Contact with Vehicle

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

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

Photograph Not Applicable
No Dummy Torso Contact
With Side Airbag

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

Photograph Not Applicable
No Dummy Pelvis Contact

FIGURE 51. Post-Test Driver Dummy Close-Up Pelvis Contact

FIGURE 52. Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

FIGURE 53. Pre-Test Left Side View of Rear Passenger Dummy
Showing Belt, Chalking, and Contact Switches

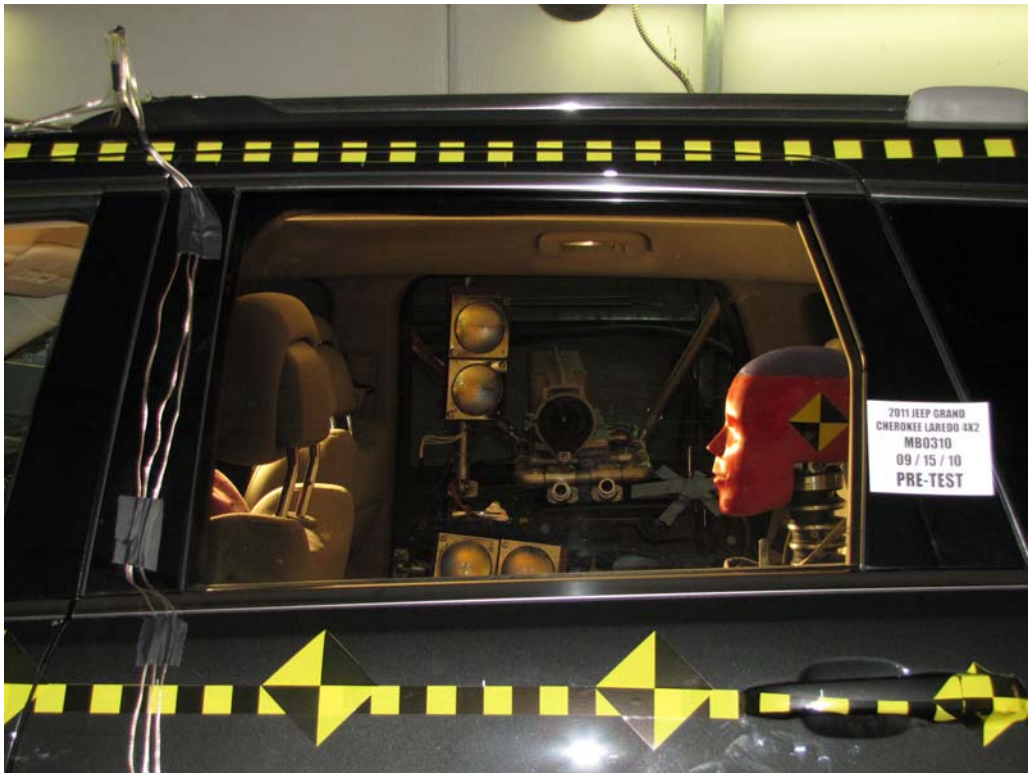


FIGURE 54. Pre-Test Left Side View of Rear Passenger Dummy
Shoulder and Door Top View

FIGURE 55. Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

FIGURE 56. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

FIGURE 57. Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

FIGURE 58. Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

FIGURE 59. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

FIGURE 60. Pre-Test View of Rear Passenger Dummy's Neck
Showing Position of Adjustable Neck Bracket

FIGURE 61. Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level

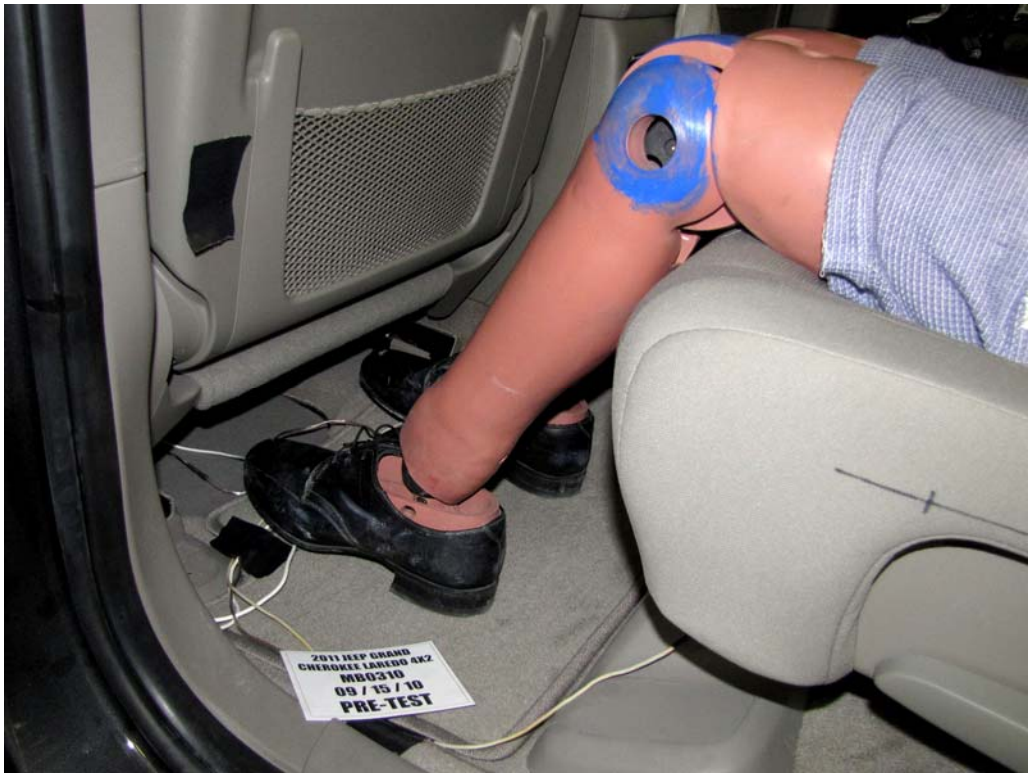


FIGURE 62. Pre-Test Placement of Rear Passenger Dummy's Feet

FIGURE 63. Pre-Test View of Belt Anchorage for Rear Passenger Dummy

FIGURE 64. Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

FIGURE 65. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

FIGURE 66. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

FIGURE 67. Pre-Test Rear Passenger Dummy and Door Clearance View

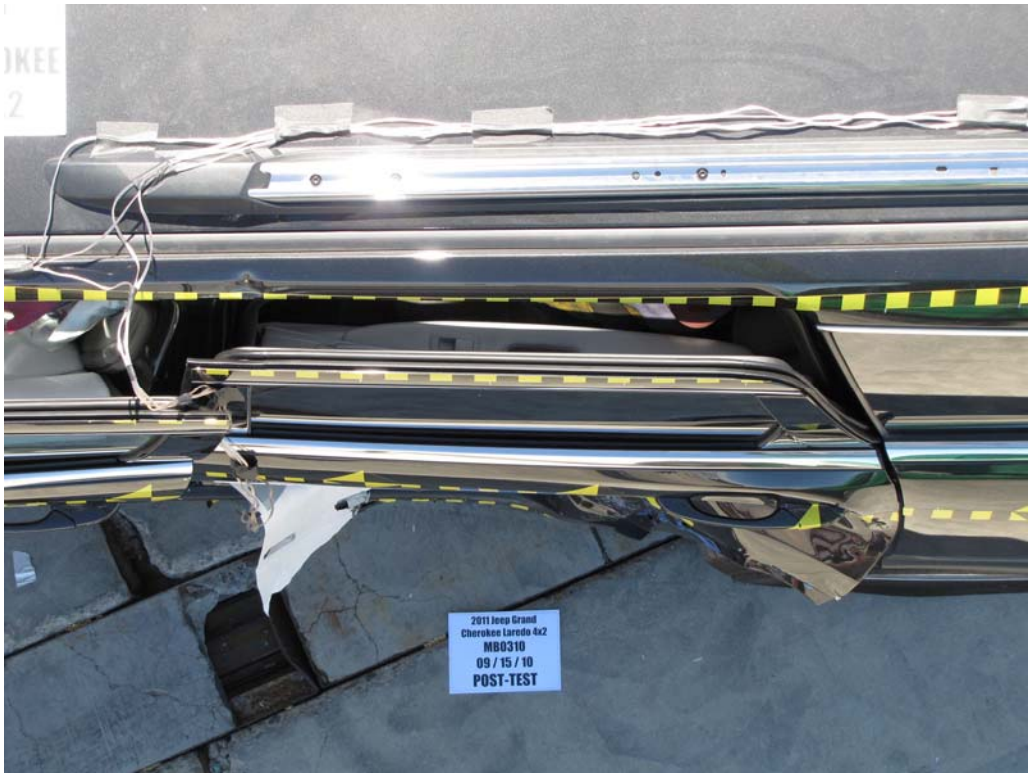


FIGURE 68. Post-Test Rear Passenger Dummy and Door Clearance View

FIGURE 69. Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

FIGURE 70. Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

FIGURE 71. Pre-Test Rear Passenger Inner Door Panel View

FIGURE 72. Post-Test Rear Passenger Inner Door Panel View
Showing Dummy Contact Locations

Photograph Not Applicable
No Dummy Head Contact
With Vehicle Interior

FIGURE 73. Post-Test Rear Passenger Dummy Close-Up
Head Contact with Vehicle View

FIGURE 74. Post-Test Rear Passenger Dummy Close-Up
Head Contact With Side Airbag View

FIGURE 75. Post-Test Rear Passenger Dummy Close-Up
Torso Contact with Vehicle Interior View

Photograph Not Applicable
No Dummy Torso Contact
With Side Airbag

FIGURE 76. Post-Test Rear Passenger Dummy Close-Up
Torso Contact with Side Airbag View

FIGURE 77. Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

Photograph Not Applicable
No Dummy Pelvis Contact
With Side Airbag

FIGURE 78. Post-Test Rear Passenger Dummy Close-Up
Pelvis Contact with Side Airbag View

FIGURE 79. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

FIGURE 80. Post-Test View of Fuel Filler Cap or Fuel Filler Neck

FIGURE 81. Pre-Test Front View of MDB Impactor Face

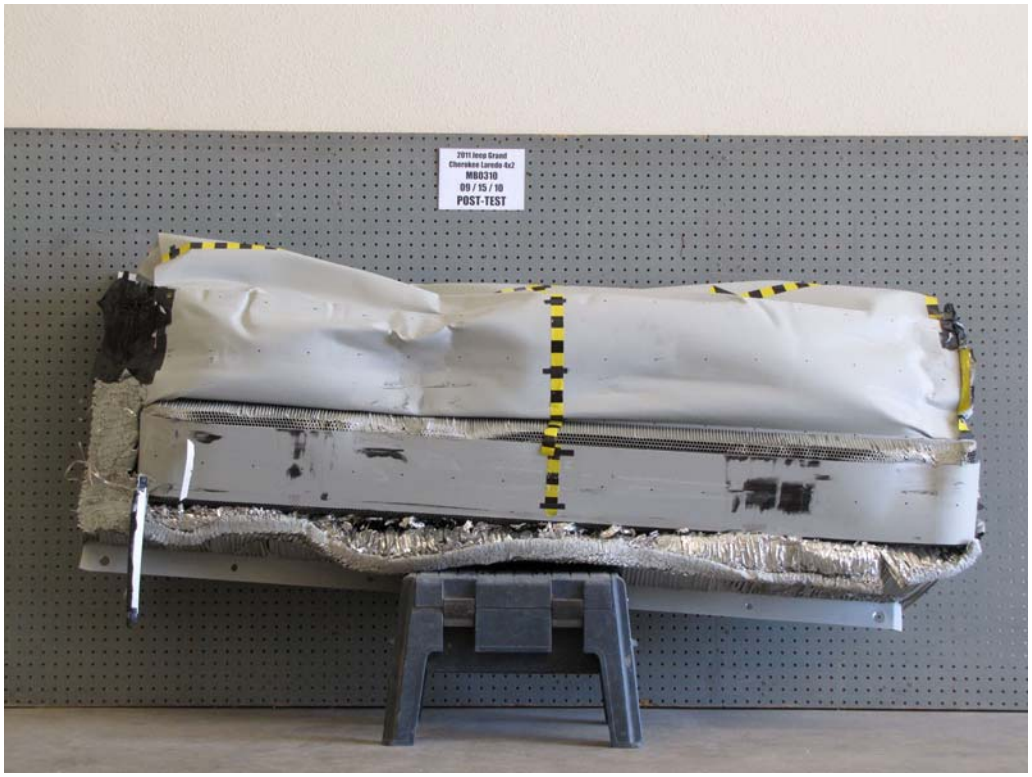


FIGURE 82. Post-Test Front View of MDB Impactor Face

FIGURE 83. Pre-Test Top View of MDB Impactor Face

FIGURE 84. Post-Test Top View of MDB Impactor Face

FIGURE 85. Pre-Test Left Side View of MDB Impactor Face

FIGURE 86. Post-Test Left Side View of MDB Impactor Face

FIGURE 87. Pre-Test Right Side View of MDB Impactor Face

FIGURE 88. Post-Test Right Side View of MDB Impactor Face

FIGURE 89. Close-Up View of Vehicle's Certification Label

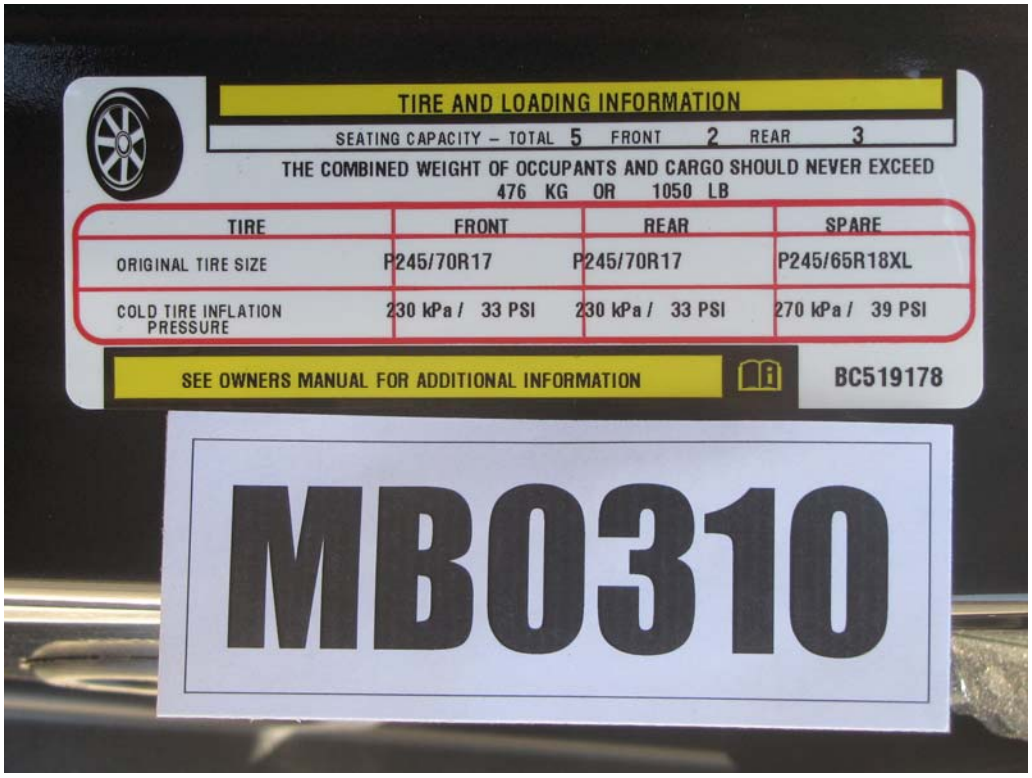


FIGURE 90. Close-Up View of Vehicle's Tire Information Placard

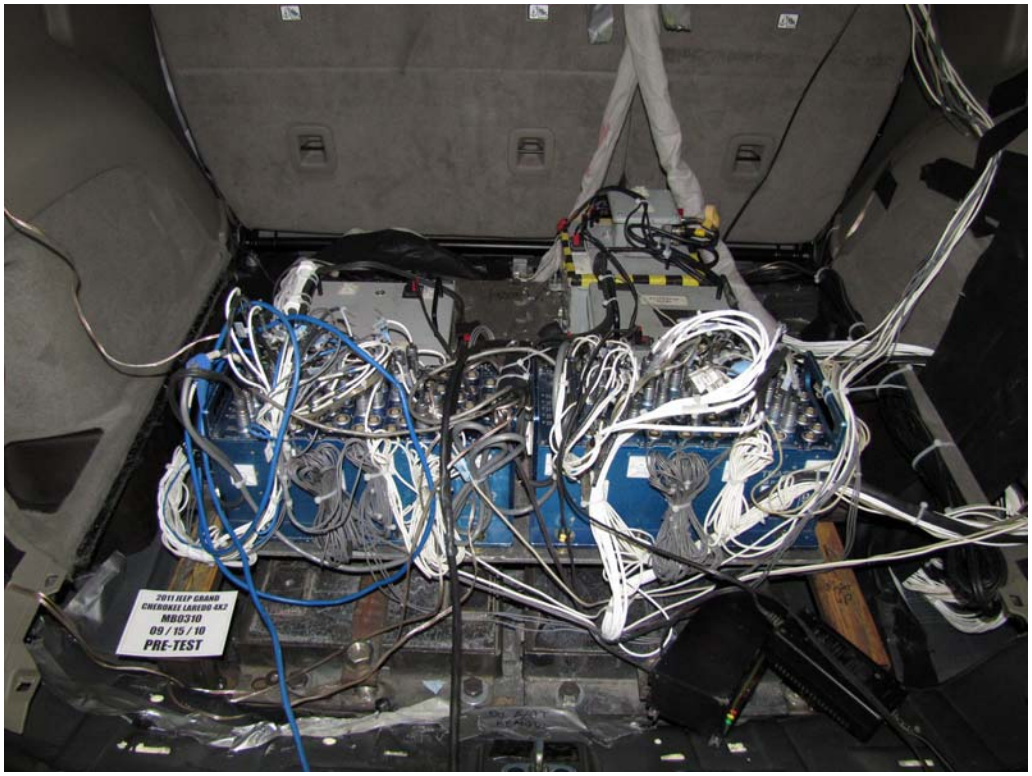


FIGURE 91. Pre-Test Ballast View

FIGURE 92. Post-Test Primary and Redundant Speed Trap Read-Out

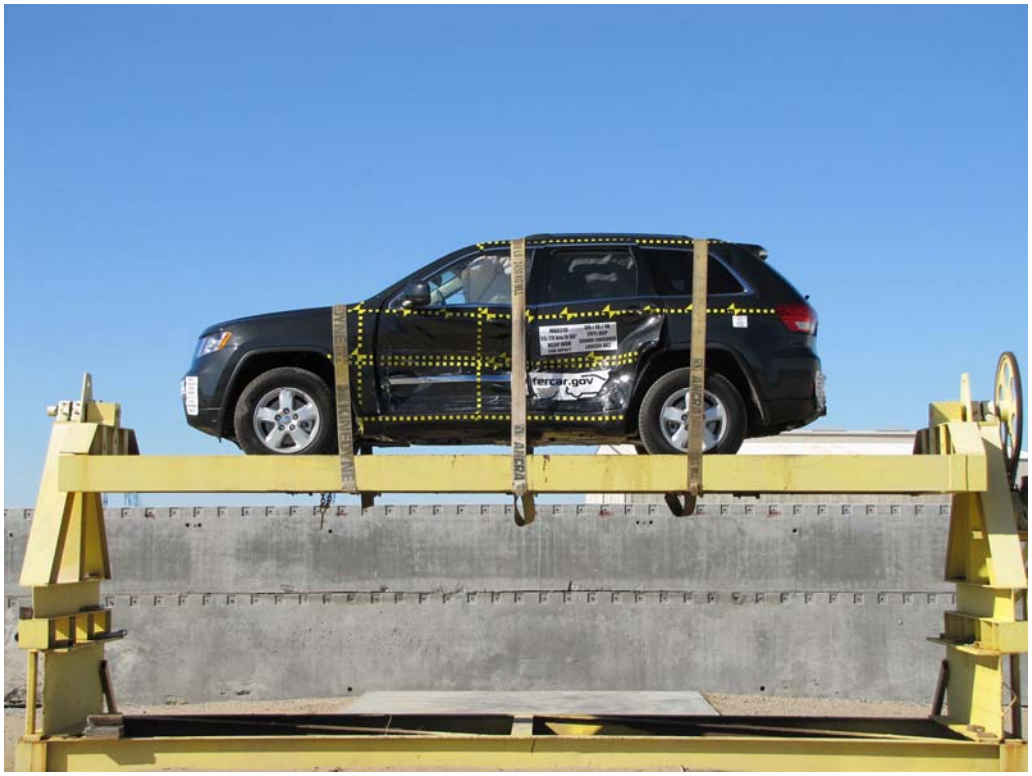


FIGURE 93. FMVSS No. 301-305 Rollover 0 Degrees

FIGURE 94. FMVSS No. 301-305 Rollover 90 Degrees

FIGURE 95. FMVSS No. 301-305 Rollover 180 Degrees

FIGURE 96. FMVSS No. 301-305 Rollover 270 Degrees

FIGURE 97. FMVSS No. 301-305 Rollover 360 Degrees

FIGURE 98. 2011 Jeep Grand Cherokee Laredo 4x2 Side MDB Impact Event

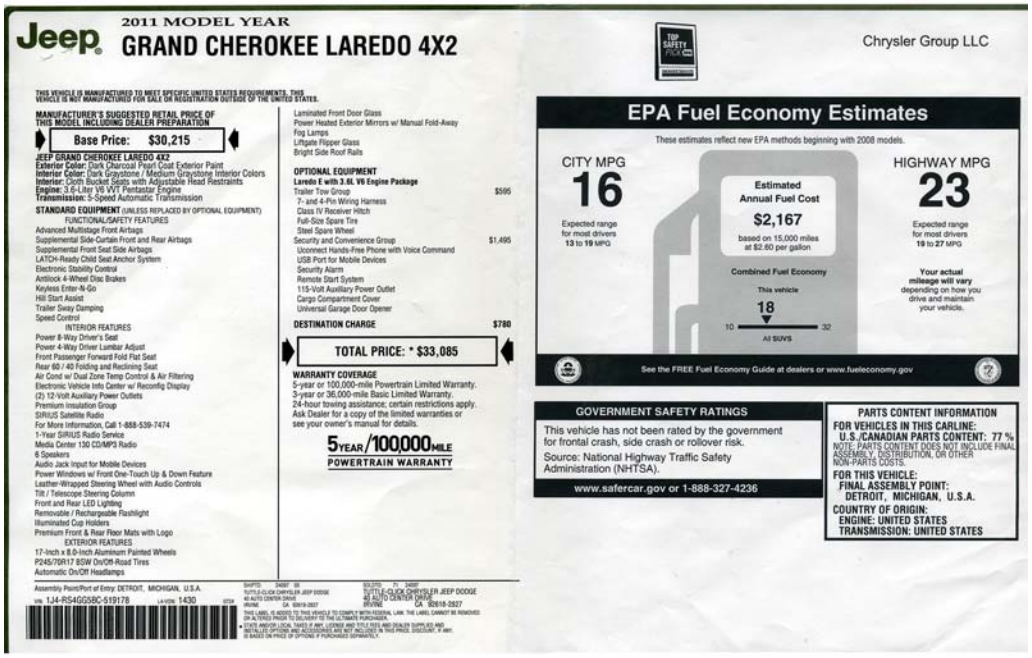
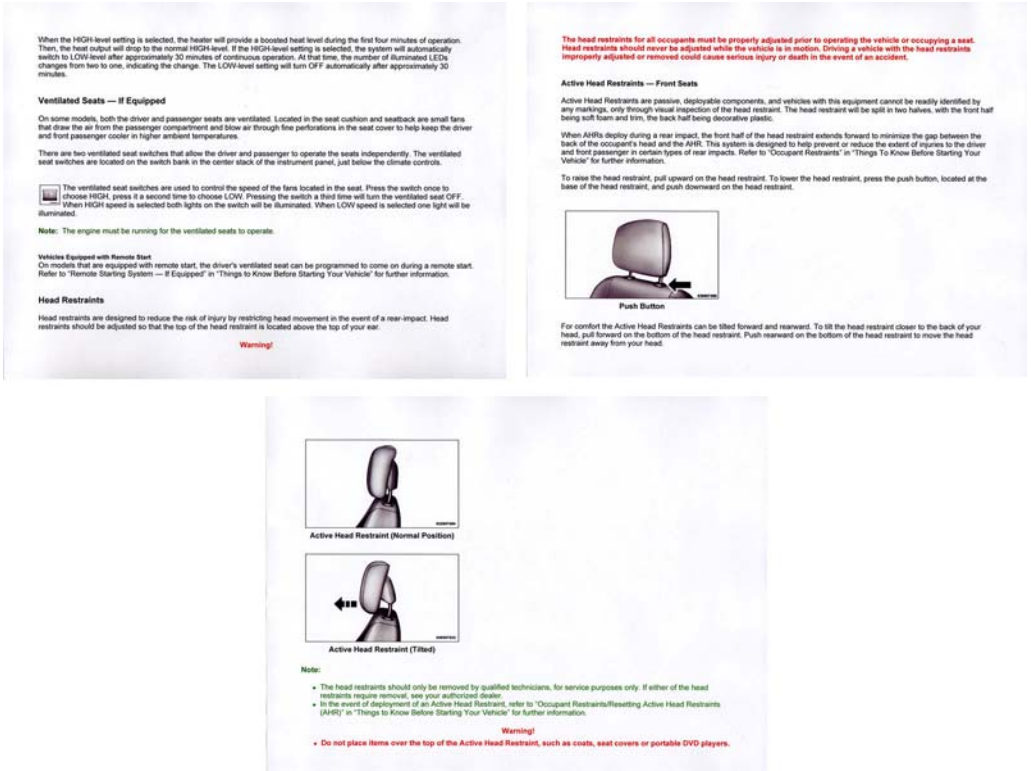


FIGURE 99. Monroney Label


When the HIGH-level setting is selected, the heater will provide a boosted heat level during the first four minutes of operation. Then, the heat output will drop to the normal HIGH-level. If the HIGH-level setting is selected, the system will automatically switch to LOW-level after approximately 30 minutes of continuous operation. At that time, the number of illuminated LEDs changes from two to one, indicating the change. The LOW-level setting will turn OFF automatically after approximately 30 minutes.

Ventilated Seats — If Equipped

On some models, both the driver and passenger seats are ventilated. Located in the seat cushion and seatback are small fans that draw the air from the passenger compartment and blow air through fine perforations in the seat cover to help keep the driver and front passenger cooler in higher ambient temperatures.

There are two ventilated seat switches that allow the driver and passenger to operate the seats independently. The ventilated seat switches are located on the switch bank in the center stack of the instrument panel, just below the climate controls.

The ventilated seat switches are used to control the speed of the fans located in the seat. Press the switch once to choose HIGH, press it a second time to choose LOW. Pressing the switch a third time will turn the ventilated seat OFF. When HIGH speed is selected both lights on the switch will be illuminated. When LOW speed is selected one light will be illuminated.

Note: The engine must be running for the ventilated seats to operate.

Vehicles Equipped with Remote Start
On models that are equipped with remote start, the driver's ventilated seat can be programmed to come on during a remote start. Refer to "Remote Starting System — If Equipped" in "Things to Know Before Starting Your Vehicle" for further information.

Head Restraints

Head restraints are designed to reduce the risk of injury by restricting head movement in the event of a rear-impact. Head restraints should be adjusted so that the top of the head restraint is located above the top of your ear.

Warning!

The head restraints for all occupants must be properly adjusted prior to operating the vehicle or occupying a seat. Head restraints should never be adjusted while the vehicle is in motion. Driving a vehicle with the head restraints improperly adjusted or removed could cause serious injury or death in the event of an accident.

Active Head Restraints — Front Seats

Active Head Restraints are passive, deployable components, and vehicles with this equipment cannot be readily identified by any markings, only through visual inspection of the head restraint. The head restraint will be split in two halves, with the front half being soft foam and trim, the back half being decorative plastic.

When AHRs deploy during a rear impact, the front half of the head restraint extends forward to minimize the gap between the back of the occupant's head and the AHR. This system is designed to help prevent or reduce the extent of injuries to the driver and front passenger in certain types of rear impacts. Refer to "Occupant Restraints" in "Things To Know Before Starting Your Vehicle" for further information.

To raise the head restraint, pull upward on the head restraint. To lower the head restraint, press the push button, located at the base of the head restraint, and push downward on the head restraint.

Push Button

For comfort the Active Head Restraints can be tilted forward and rearward. To tilt the head restraint closer to the back of your head, pull forward on the bottom of the head restraint. Push rearward on the bottom of the head restraint to move the head restraint away from your head.

Active Head Restraint (Normal Position)

Active Head Restraint (Tilted)

Note:

- The head restraints should only be removed by qualified technicians, for service purposes only. If either of the head restraints require removal, see your authorized dealer.
- In the event of deployment of an Active Head Restraint, refer to "Occupant Restraints/Resetting Active Head Restraints (AHR)" in "Things to Know Before Starting Your Vehicle" for further information.

Warning!

- **Do not place items over the top of the Active Head Restraint, such as coats, seat covers or portable DVD players.**

FIGURE 100. Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

These items may interfere with the operation of the Active Head Restraint in the event of an accident and could result in serious injury or death.

- Active Head Restraints may be deployed if they are struck by an object such as a hand, foot or loose cargo. To avoid accidental deployment of the Active Head Restraint ensure that all cargo is secured, as loose cargo could contact the Active Head Restraint during sudden stops. Failure to follow this warning could cause personal injury if the Active Head Restraint is deployed.

Head Restraints — Rear Seats

The head restraints on the outboard seats are not adjustable. They automatically fold forward when the rear seat is folded to a load floor position but do not return to their normal position when the rear seat is raised. After returning either seat to its upright position, raise the head restraint until it locks in place. The outboard headrests are not removable.

The center head restraint has limited adjustment. Lift upward on the head restraint to raise it, or push downward on the head restraint to lower it.

Rear Head Restraint

Warning!

Sitting in a seat with the head restraint in its lowered position could result in serious injury or death in an accident. Always make sure the outboard head restraints are in their upright positions when the seat is to be occupied.

FIGURE 101. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Manual

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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.

Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)

Passenger Upper Abdomen Rib Deflection (Y)

Passenger Lower Abdomen Rib Deflection (Y)

Driver Head Acceleration Redundant (X)

Driver Head Acceleration Redundant (Y)

Driver Head Acceleration Redundant (Z)

Driver Shoulder Contact Switch

Driver Torso Contact Switch

Driver Pelvis Contact Switch

Passenger Head Acceleration Redundant (X)

Passenger Head Acceleration Redundant (Y)

Passenger Head Acceleration Redundant (Z)

Passenger Shoulder Contact Switch

Passenger Torso Contact Switch

Passenger Pelvis Contact Switch

Vehicle Instrumentation Data

Driver Side Airbag Timing

Driver Side Curtain Airbag Timing

Passenger Side Airbag Timing (if applicable)

Passenger Side Curtain Airbag Timing (if different from Driver)

Right Side Sill at Front Seat Acceleration (X)

Right Side Sill at Front Seat Acceleration (Y)

Right Side Sill at Front Seat Acceleration (Z)

Right Side Sill at Rear Seat Acceleration (X)

Right Side Sill at Rear Seat Acceleration (Y)

Right Side Sill at Rear Seat Acceleration (Z)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

Left Side Sill at Front Seat Acceleration (Y)

Left Side Sill at Rear Seat Acceleration (Y)

Right Rear Occupant Compartment Acceleration (Y)

Lower A-Post Acceleration (Y)

Upper A-Post Acceleration (Y)

Lower B-Post Acceleration (Y)

Upper B-Post Acceleration (Y)

Front Seat Track Acceleration (Y)

Rear Seat Track Acceleration (Y)

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

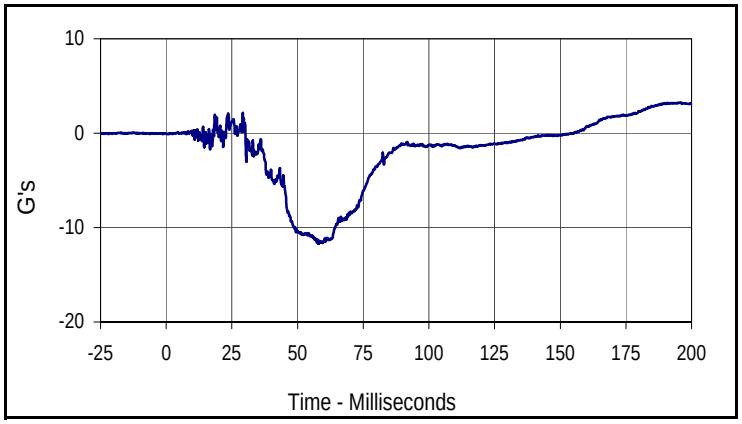
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

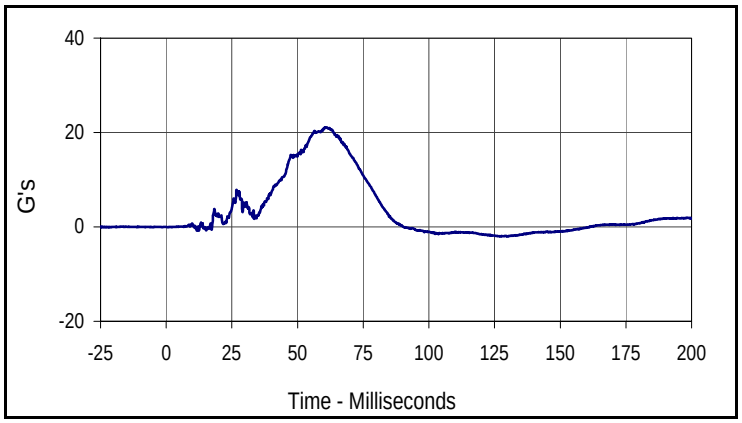
Left MDB Contact Switch

Right MDB Contact Switch

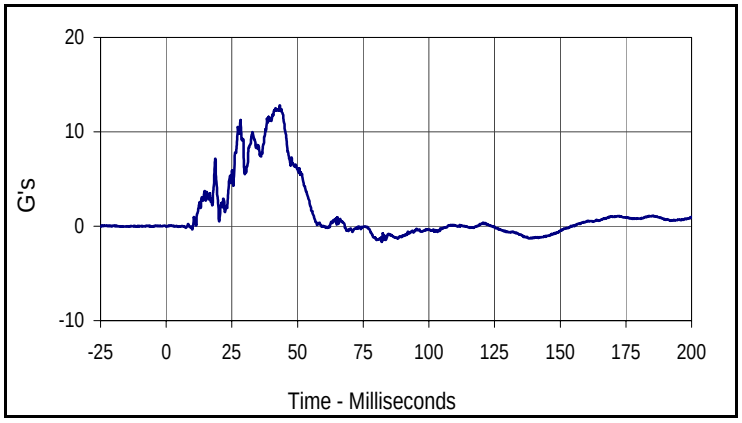
Test Vehicle:	2011 Jeep Grand Cherokee Laredo 5-Door MPV	Test Date:	9/15/10
Test Program:	61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test	NHTSA No.:	MB0310



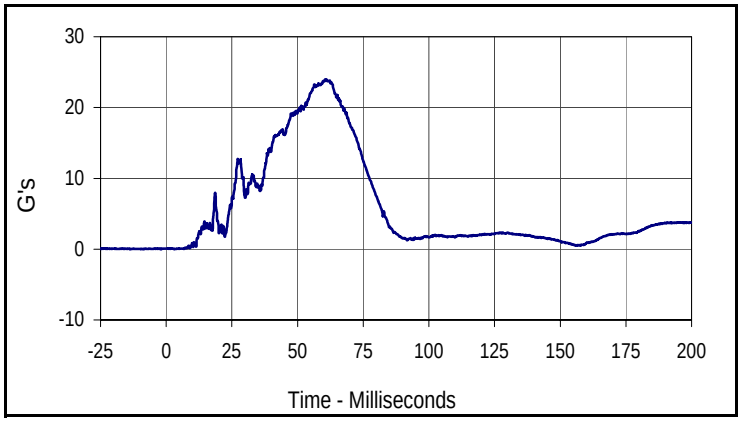
Curve Description			
Driver Head Acceleration X Primary			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
3.2	196.2	-11.7	57.9



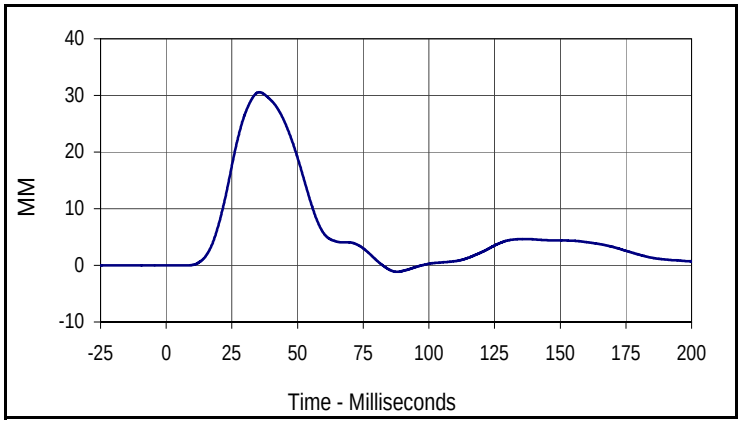
Curve Description			
Driver Head Acceleration Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
21.1	61.1	-2.0	127.3



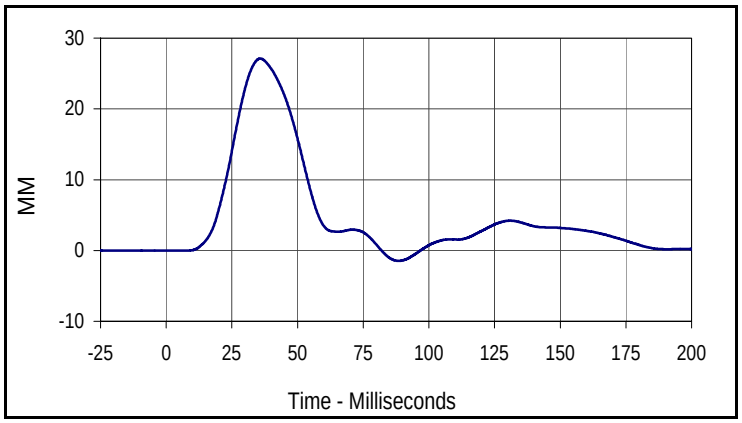
Curve Description			
Driver Head Acceleration Z Primary			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
12.8	43.2	-1.7	82.1



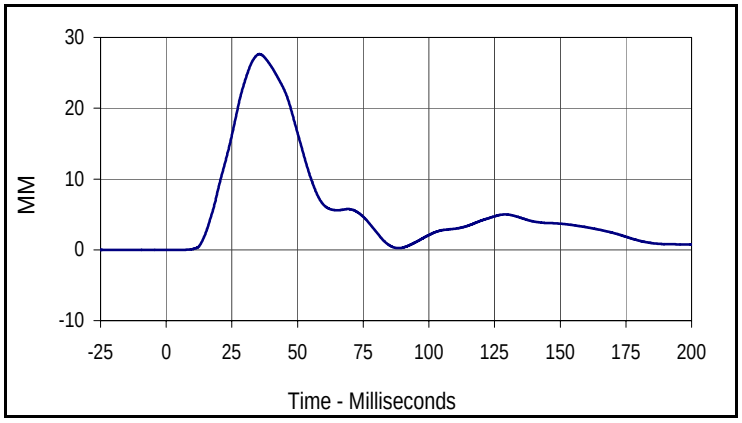
Curve Description			
Driver Head Resultant Accerlation Primary			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
24.0	60.5	0.0	3.2



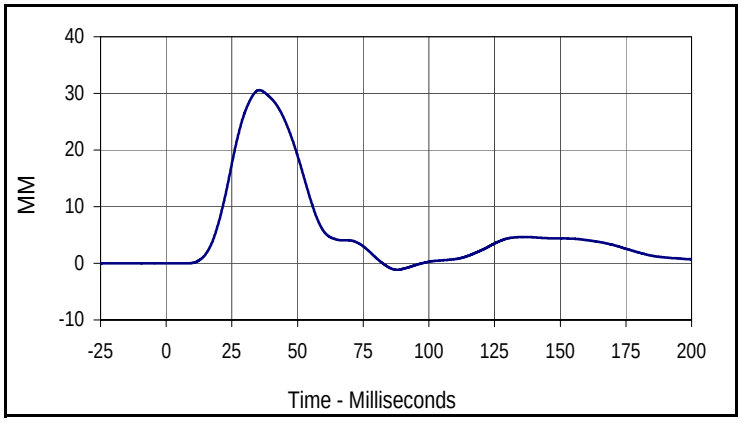
Curve Description			
Driver Upper Thorax Rib Deflection Y			
CURNO	Type	SAE Class	Units
007	FIL	180	MM
Max	Time	Min	Time
30.6	35.4	-1.2	87.9



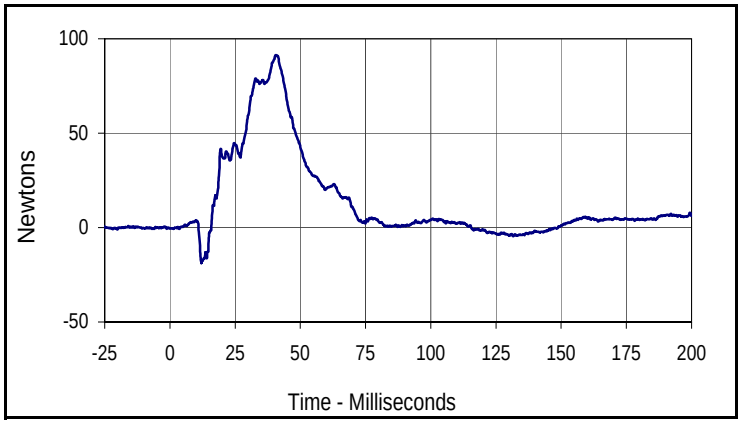
Curve Description			
Driver Middle Thorax Rib Deflection Y			
CURNO	Type	SAE Class	Units
008	FIL	180	MM
Max	Time	Min	Time
27.1	35.8	-1.5	88.6



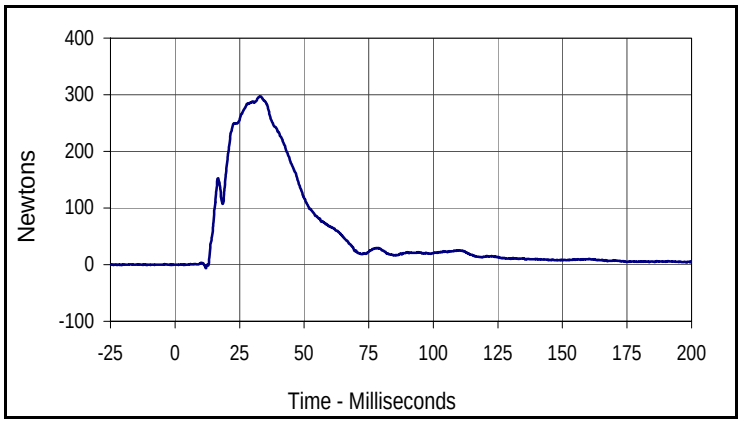
Curve Description			
Driver Lower Thorax Rib Deflection Y			
CURNO	Type	SAE Class	Units
009	FIL	180	MM
Max	Time	Min	Time
27.6	35.5	0.0	1.6



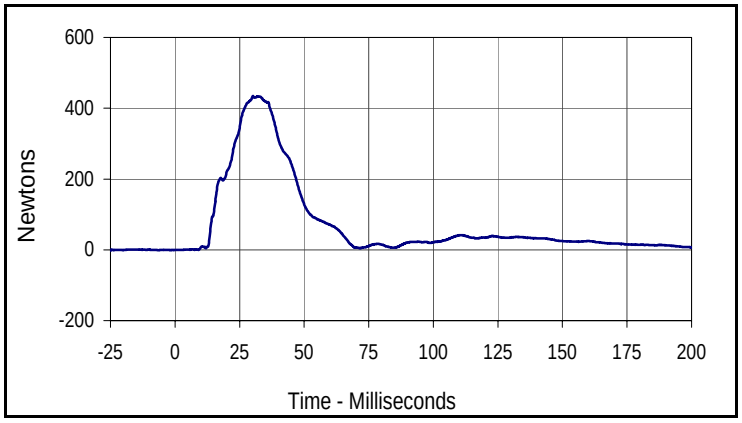
Curve Description			
Driver Thorax Rib Deflection Maximum			
CURNO	Type	SAE Class	Units
010	FIL	180	MM
Max	Time	Min	Time
30.6	35.4	-1.2	87.9



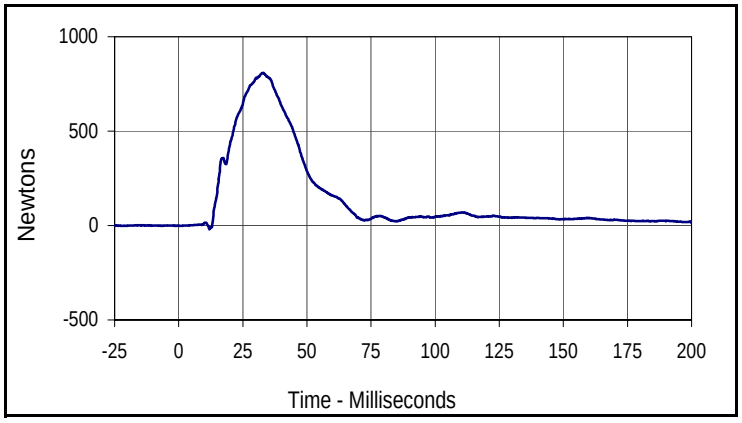
Curve Description			
Driver Anterior Abdminal Force Y			
CURNO	Type	SAE Class	Units
013	FIL	600	Newtons
Max	Time	Min	Time
91.4	40.6	-18.8	12.1



Curve Description			
Driver Middle Abdminal Force Y			
CURNO	Type	SAE Class	Units
014	FIL	600	Newtons
Max	Time	Min	Time
297.0	33.0	-6.3	12.0

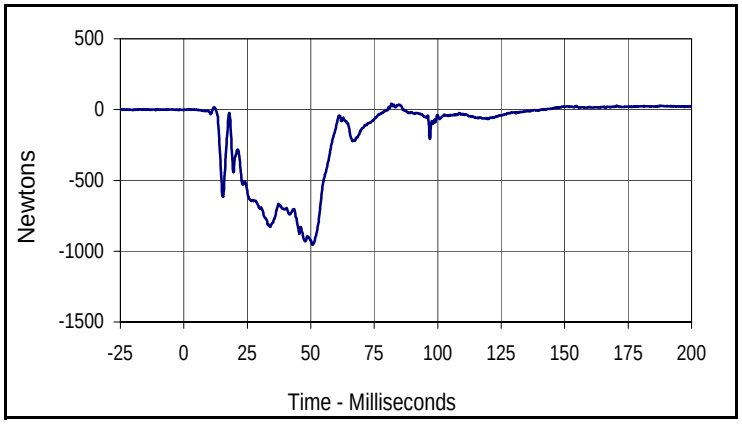


Curve Description			
Driver Posterior Abdminal Force Y			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
434.5	30.2	-0.6	0.2

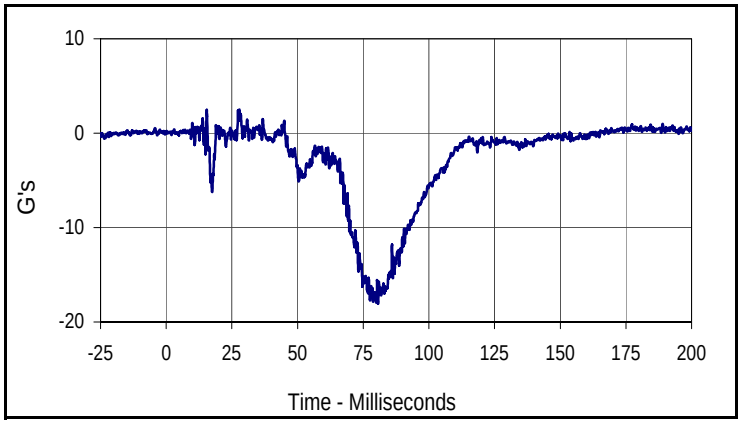


Curve Description			
Driver Total Abdominal Force			
CURNO	Type	SAE Class	Units
013	RES	600	Newtons
Max	Time	Min	Time
808.8	32.9	-20.9	12.0

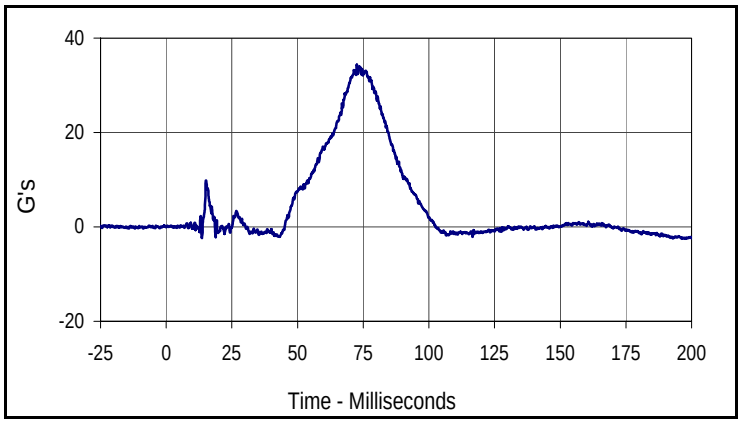
Test Vehicle:	2011 Jeep Grand Cherokee Laredo 5-Door MPV	Test Date:	9/15/10
Test Program:	61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test	NHTSA No.:	MB0310



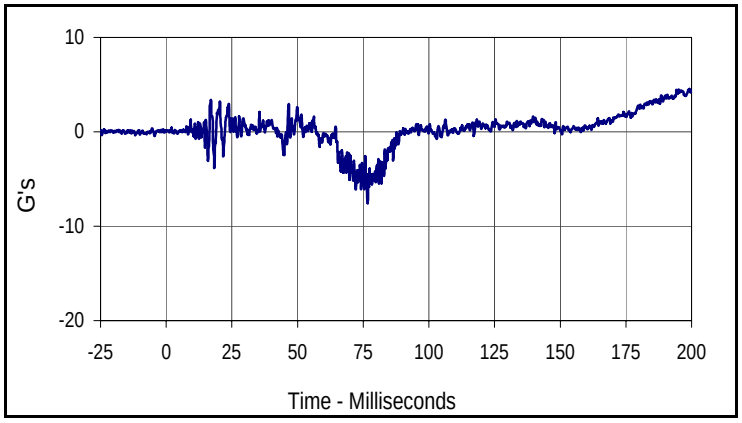
Curve Description			
Driver Pubic Symphysis Force Y			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
40.9	81.8	-955.1	50.7



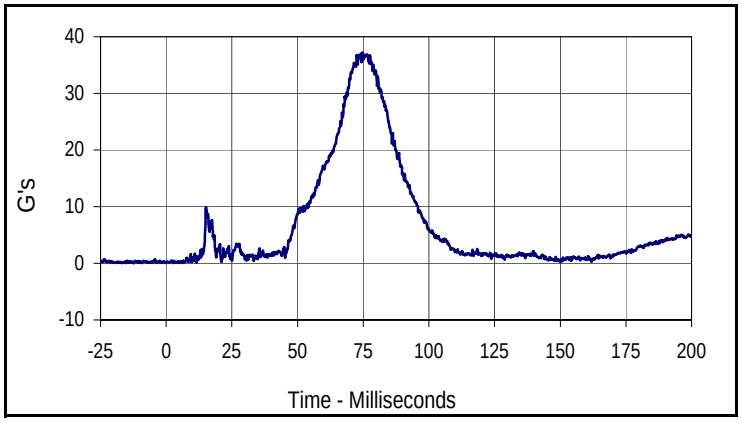
Curve Description			
Passenger Head Acceleration X Primary			
CURNO	Type	SAE Class	Units
021	FIL	1000	G's
Max	Time	Min	Time
2.5	27.9	-18.1	80.6



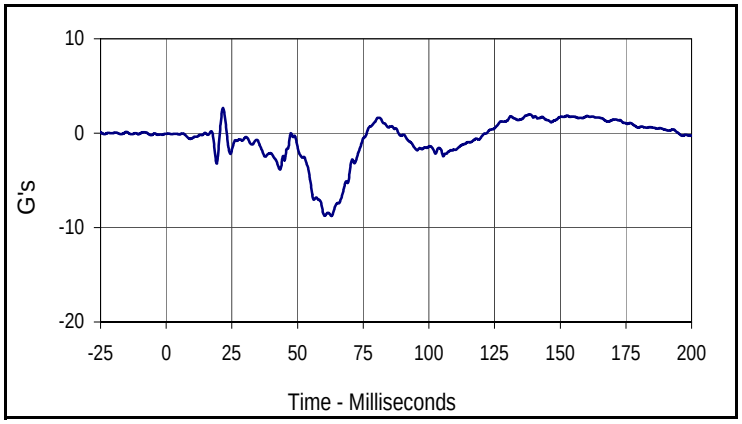
Curve Description			
Passenger Head Acceleration Y Primary			
CURNO	Type	SAE Class	Units
022	FIL	1000	G's
Max	Time	Min	Time
34.4	72.6	-2.5	197.5



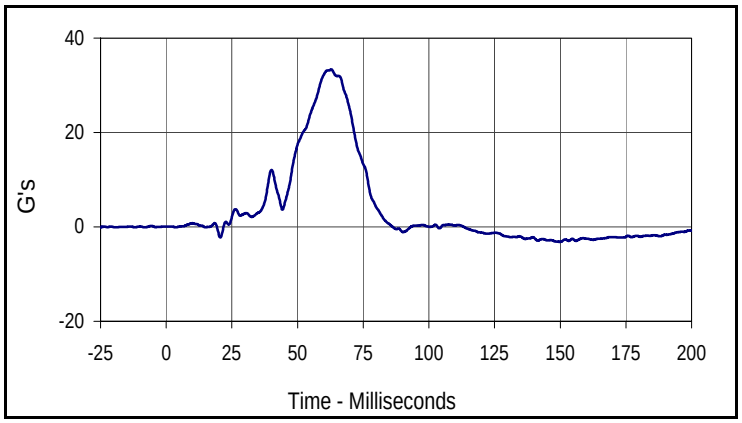
Curve Description			
Passenger Head Acceleration Z Primary			
CURNO	Type	SAE Class	Units
023	FIL	1000	G's
Max	Time	Min	Time
4.6	199.1	-7.5	76.7



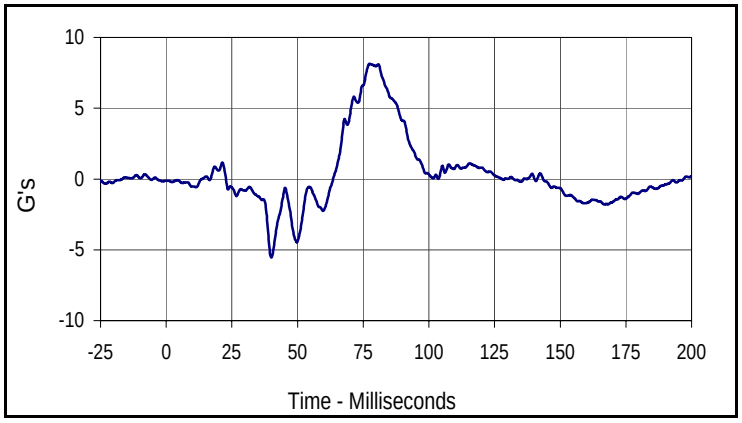
Curve Description			
Passenger Head Acceleration Resultant Primary			
CURNO	Type	SAE Class	Units
021	RES	1000	G's
Max	Time	Min	Time
37.2	74.6	0.0	5.9



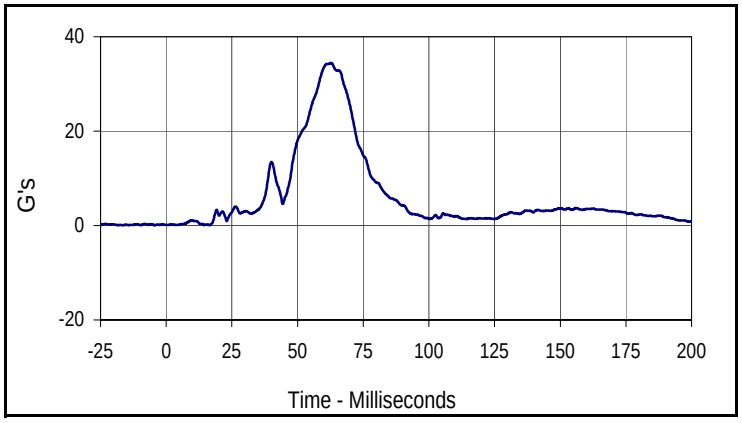
Curve Description			
Passenger Lower Spine T12 Acceleration X			
CURNO	Type	SAE Class	Units
037	FIL	180	G's
Max	Time	Min	Time
2.7	21.6	-8.8	62.9



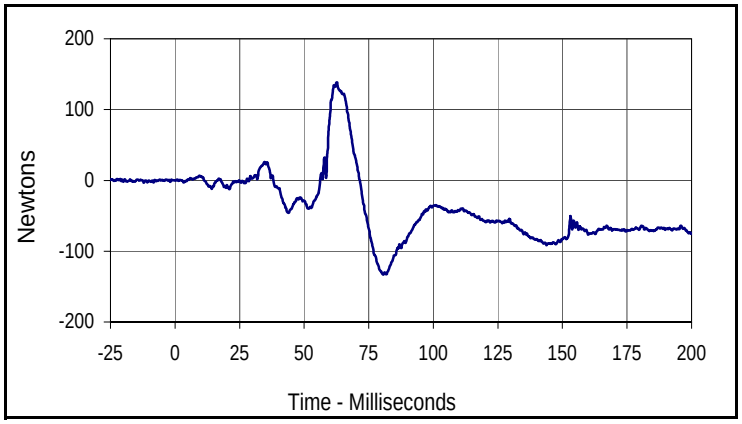
Curve Description			
Passenger Lower Spine T12 Acceleration Y			
CURNO	Type	SAE Class	Units
038	FIL	180	G's
Max	Time	Min	Time
33.3	62.8	-3.2	149.8



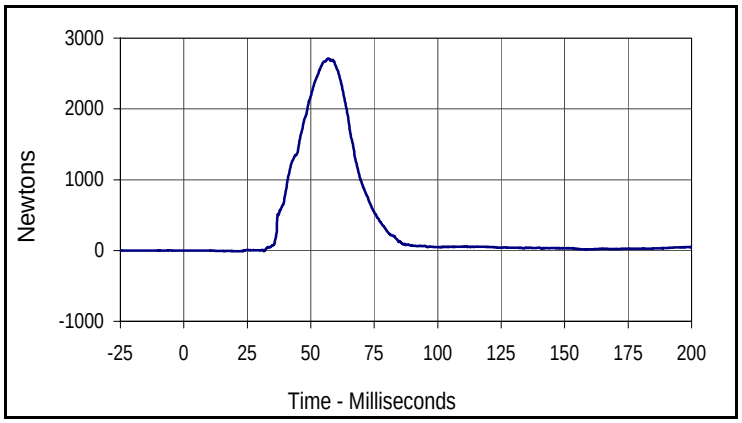
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
CURNO	Type	SAE Class	Units
039	FIL	180	G's
Max	Time	Min	Time
8.1	77.4	-5.5	40.0



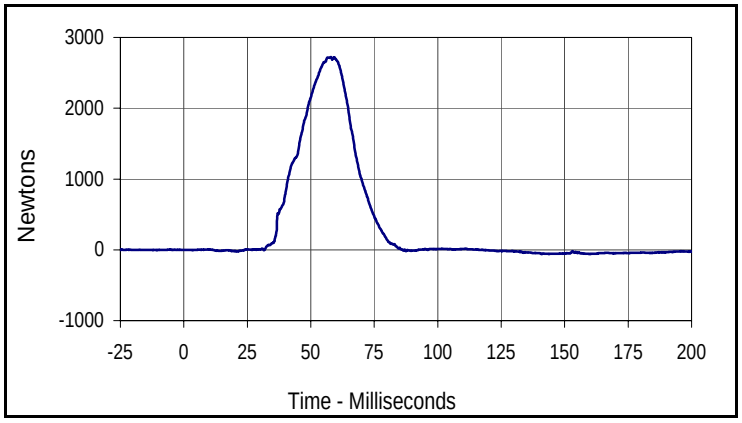
Curve Description			
Passenger Lower Spine T12 Acceleration Resultant			
CURNO	Type	SAE Class	Units
037	RES	180	G's
Max	Time	Min	Time
34.5	62.8	0.1	16.5



Curve Description			
Passenger Iliac Wing Force on Impact Side Y			
CURNO	Type	SAE Class	Units
043	FIL	600	Newtons
Max	Time	Min	Time
138.6	62.6	-133.2	80.6



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
CURNO	Type	SAE Class	Units
042	FIL	600	Newtons
Max	Time	Min	Time
2712.6	57.1	-11.8	21.2



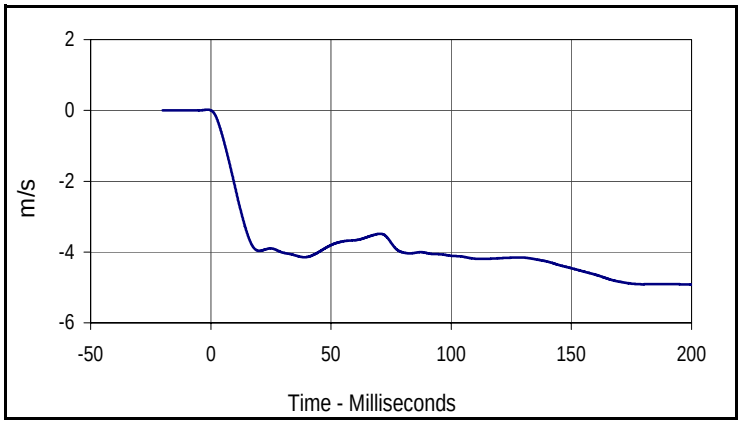
Curve Description			
Passenger Total Pelvic Force			
CURNO	Type	SAE Class	Units
042	SUM	600	Newtons
Max	Time	Min	Time
2723.7	58.0	-60.5	143.8

APPENDIX C
DUMMY CALIBRATION DATA

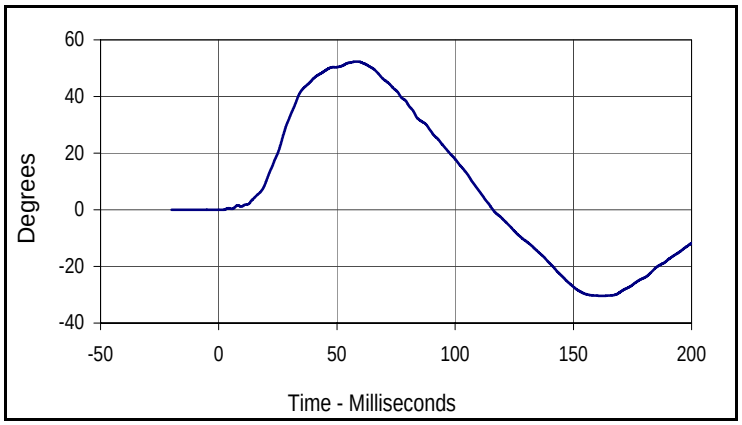
APPENDIX C
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program:	ES2re Neck Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	NB09C

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	3.30 to 3.50	3.38	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.048	Pass
	3 msec	m/s	-.250 to -.375	-0.319	Pass
	14 msec	m/s	-3.20 to -3.70	-3.23	Pass
Headform Rotation	Max	Degrees	49.0 to 58.0	52.4	Pass
	Time	msec	54.0 to 66.0	58.4	Pass
Maximum Rotation To Time Zero Crossing		msec	53.0 to 88.0	57.6	Pass
			Overall Test Results		Pass



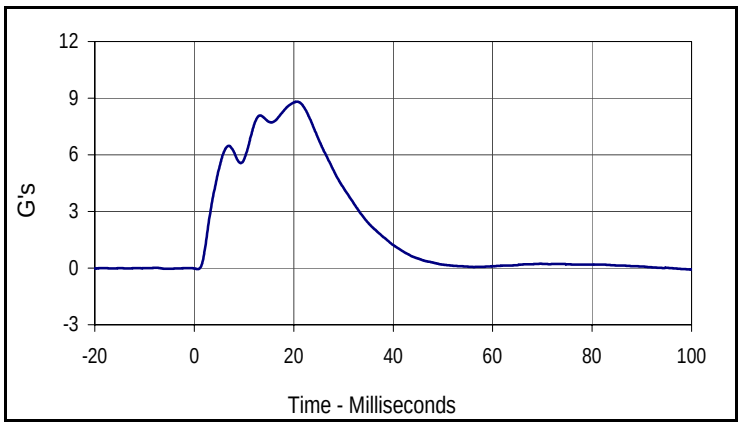
Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.3	-4.9	200.0



Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
52.4	58.4	-30.4	161.9

Test Program:	ES2re Shoulder Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	SH09A

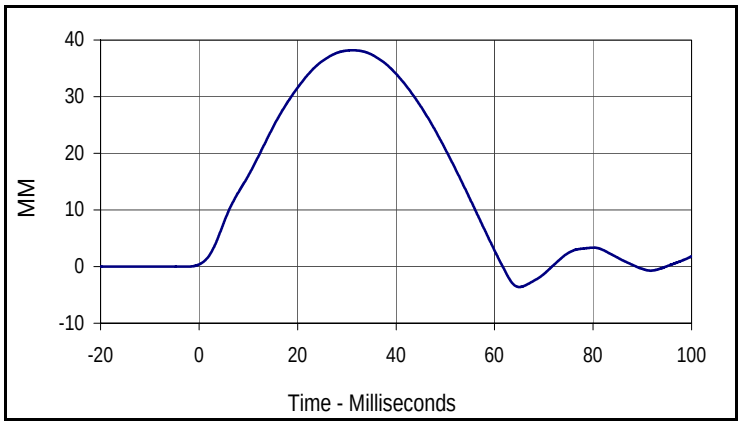
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.20 to 4.40	4.20	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.8	Pass
		Overall Test Results		Pass



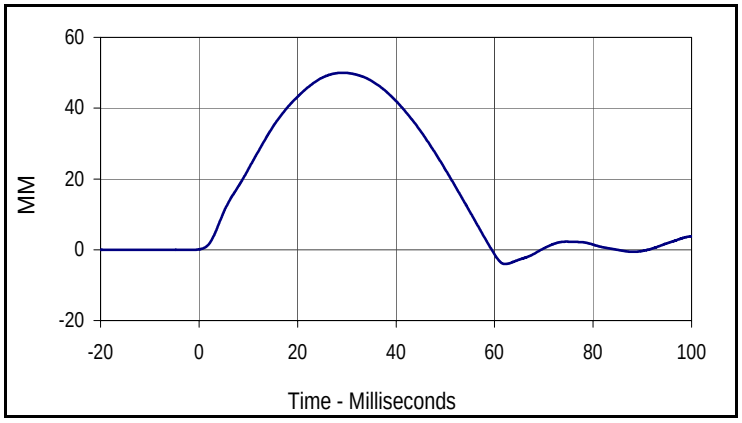
Curve Description			
Probe Impactor Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
8.8	20.7	-0.1	99.9

Test Program:	ES2re Rib Module Calibration	Test Date:	09/13/10
ATD Serial No.:	F035 Rib #1	Test I.D.:	RIB09D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.2	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	50.0	Pass
		Overall Test Results		Pass



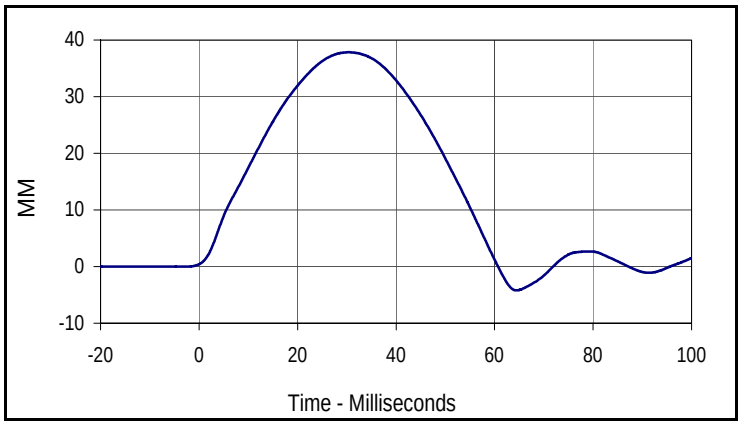
Curve Description			
Upper Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.2	31.3	-3.6	65.0



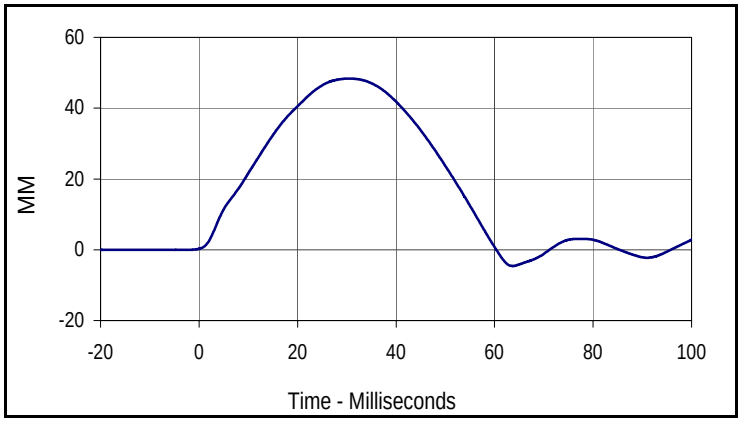
Curve Description			
Upper Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
50.0	29.2	-4.0	62.2

Test Program:	ES2re Rib Module Calibration	Test Date:	09/13/10
ATD Serial No.:	F035 Rib #2	Test I.D.:	RIB09E

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	37.8	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.3	Pass
		Overall Test Results		Pass



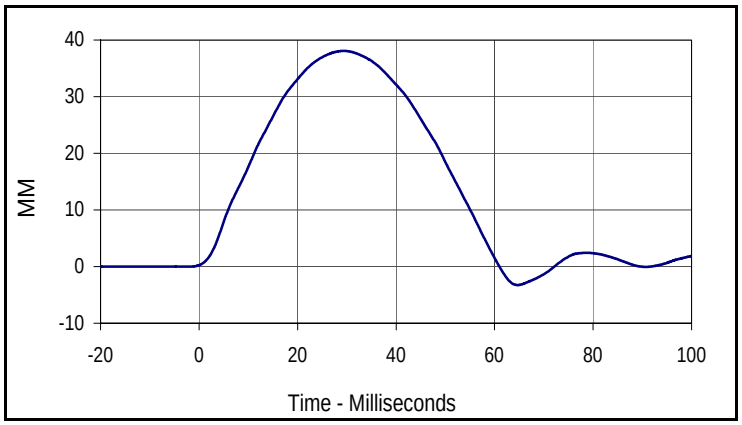
Curve Description			
Middle Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.8	30.4	-4.2	64.5



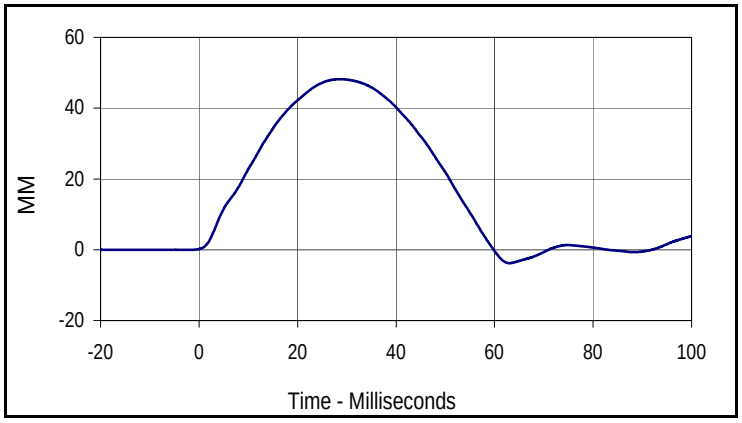
Curve Description			
Middle Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.3	30.5	-4.6	63.6

Test Program:	ES2re Rib Module Calibration	Test Date:	09/13/10
ATD Serial No.:	F035 Rib #3	Test I.D.:	RIB09F

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.1	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.2	Pass
		Overall Test Results		Pass



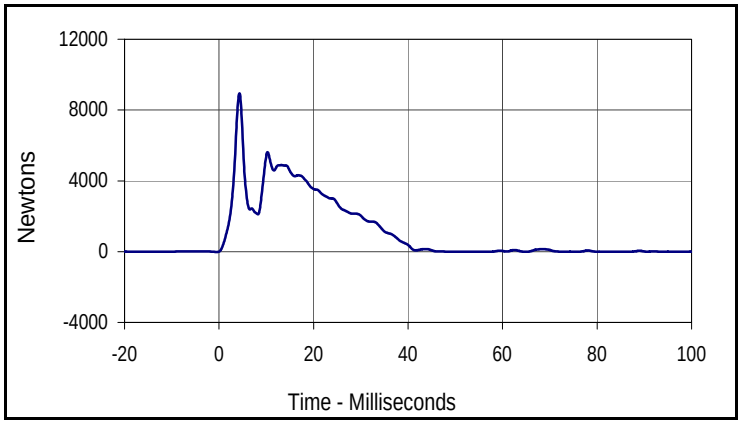
Curve Description			
Lower Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.1	29.4	-3.3	64.7



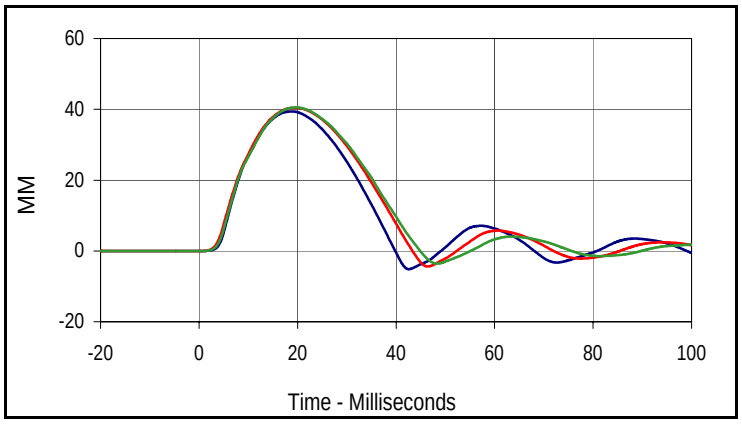
Curve Description			
Lower Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.2	28.6	-3.8	63.0

Test Program:	ES2re Thorax Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	TH09B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	5.40 to 5.60	5.46	Pass
Impactor Force	N	5100 to 6200	5618.8	Pass
	msec	> 6.0 msec	9.9	Pass
Upper Rib Deflection	MM	34 to 41	39.4	Pass
Middle Rib Deflection	MM	37 to 45	40.4	Pass
Lower Rib Deflection	MM	37 to 44	40.5	Pass
		Overall Test Results		Pass



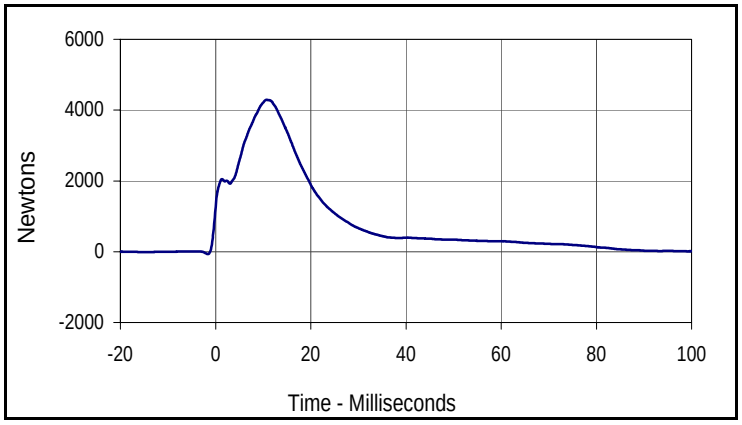
Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
8952.9	4.3	-26.5	-0.4



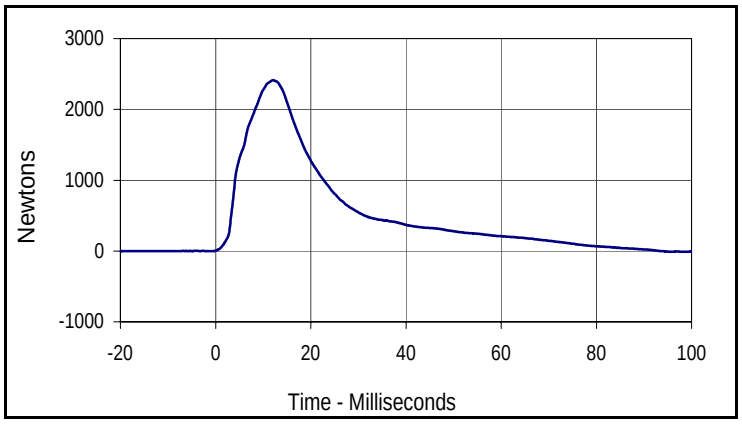
Curve Description			
Upper, Middle, Lower Rib Deflections			
CURNO(s)	Type	SAE Class	Units
002-003-004	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
39.4	18.8	-5.1	42.6
Max (Middle)	Time	Min (Middle)	Time
40.4	19.5	-4.4	46.5
Max (Lower)	Time	Min (Lower)	Time
40.5	19.6	-3.6	48.3

Test Program:	ES2re Abodomen Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	ABD09B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	3.90 to 4.10	3.93	Pass
Impactor Force	N	4000 to 4800	4289.2	Pass
	msec	10.6 to 13.0	10.7	Pass
Abdominal Force	N	2200 to 2700	2411.9	Pass
	msec	10.0 to 12.3	12.1	Pass
		Overall Test Results		Pass



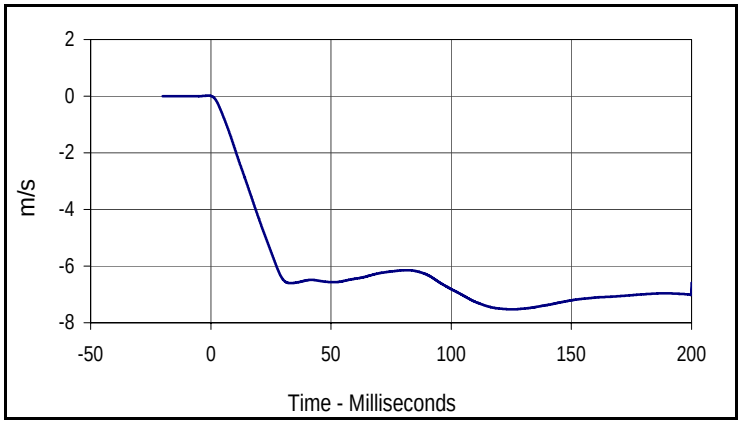
Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4289.2	10.7	-66.0	-1.6



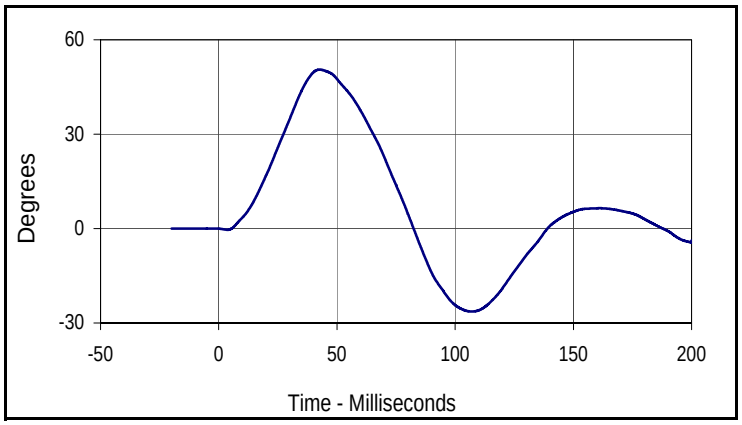
Curve Description			
Abdomen Sum Resultant			
CURNO	Type	SAE Class	Units
002	RES	600	Newtons
Max	Time	Min	Time
2411.9	12.1	-11.0	98.4

Test Program:	ES2re Lumbar Spine Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	SP09B

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.95 to 6.15	5.97	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.031	Pass
	3.7 msec	m/s	-.240 to -.425	-0.407	Pass
	27 msec	m/s	-5.80 to -6.50	-5.94	Pass
	30 msec	m/s	< -6.50	-6.47	Pass
Headform Rotation	Max	Degrees	45.0 to 55.0	50.5	Pass
	Time	msec	39.0 to 53.0	42.7	Pass
Maximum Rotation To Time Zero Crossing		msec	37.0 to 57.0	39.8	Pass
			Overall Test Results		Pass



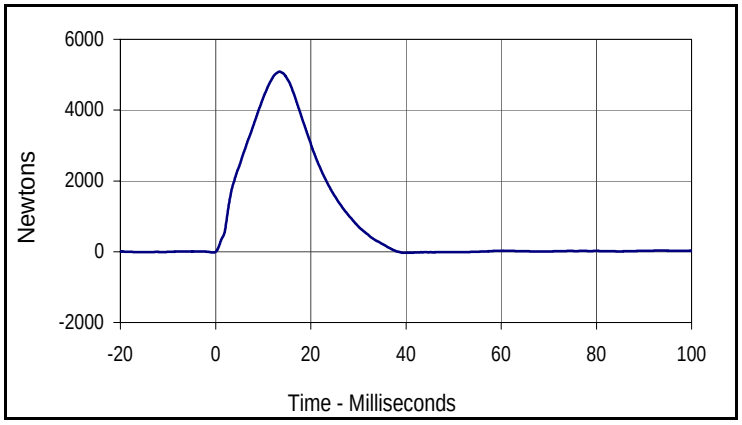
Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.1	-7.5	125.4



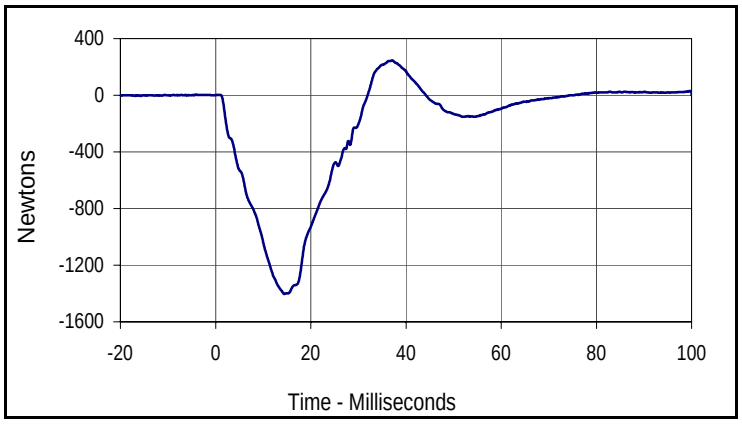
Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
50.5	42.7	-26.4	107.0

Test Program:	ES2re Pelvis Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	PL09B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.20 to 4.40	4.34	Pass
Impactor Force	N	4700 to 5400	5084.1	Pass
	msec	11.8 to 16.1	13.4	Pass
Pubic Symphysis Load	N	-1230 to -1590	-1402.9	Pass
	msec	12.2 to 17.0	14.4	Pass
		Overall Test Results		Pass



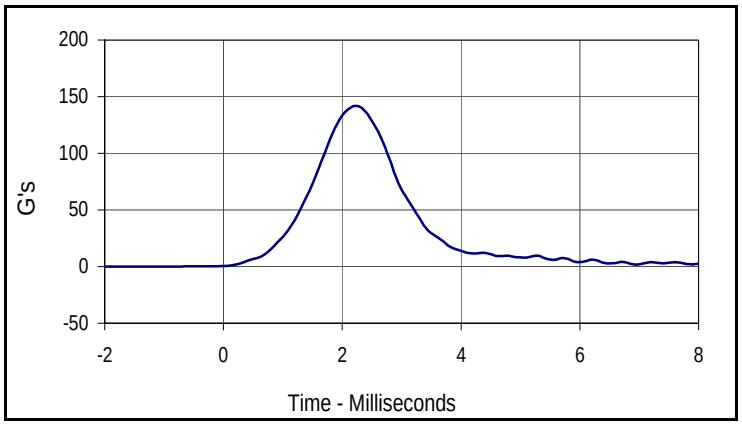
Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
5084.1	13.4	-30.9	40.2



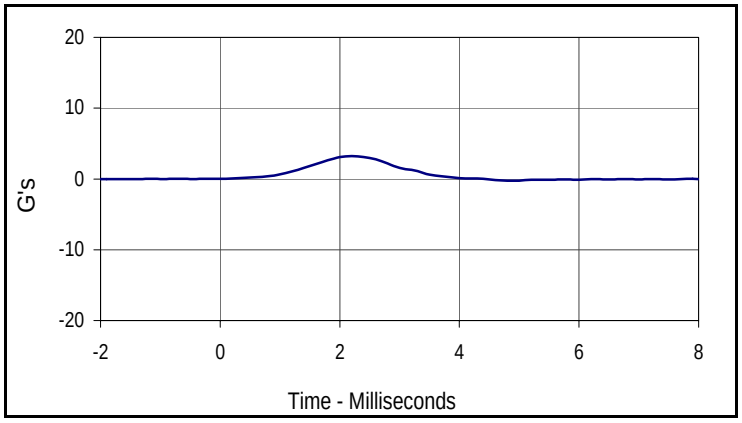
Curve Description			
Pubic FY			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
246.6	37.1	-1402.9	14.4

Test Program:	ES2re Lateral Head Drop Calibration	Test Date:	09/13/10
ATD Serial No.:	F035	Test I.D.:	HD09B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	125 to 155	141.8	Pass
Peak Longitudinal Acceleration	G's	≤15	3.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	6.8	Pass
		Overall Test Results		Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
141.8	2.2	0.0	-2.0

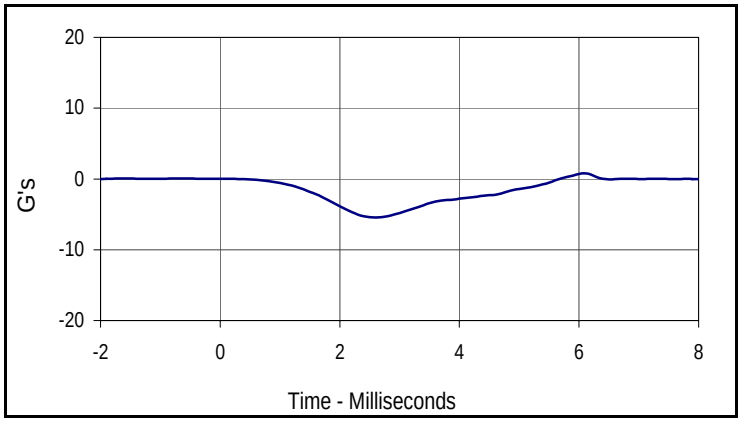


Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.2	2.2	-0.3	4.9

Test Program:	SID IIs Lateral Head Drop Calibration	Test Date:	09/13/10
ATD Serial No.:	307	Test I.D.:	HDF09B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	115 to 137	136.4	Pass
Peak Longitudinal Acceleration	G's	≤15	5.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	9.3	Pass
		Overall Test Results		Pass

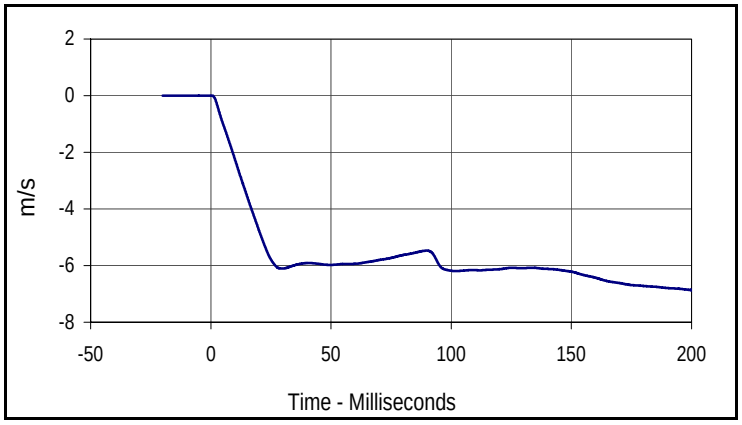
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
136.4	2.5	0.0	-1.9



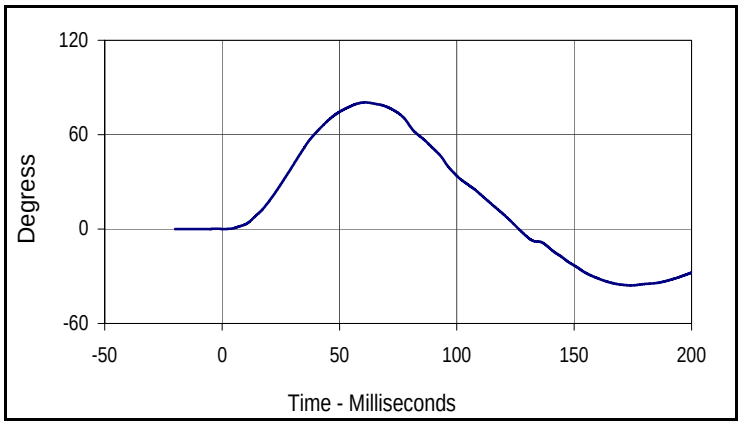
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.7	6.0	-5.4	2.6

Test Program:	SID IIs Neck Calibration	Test Date:	9/13/10
ATD Serial No.:	307	Test I.D.:	NB09B

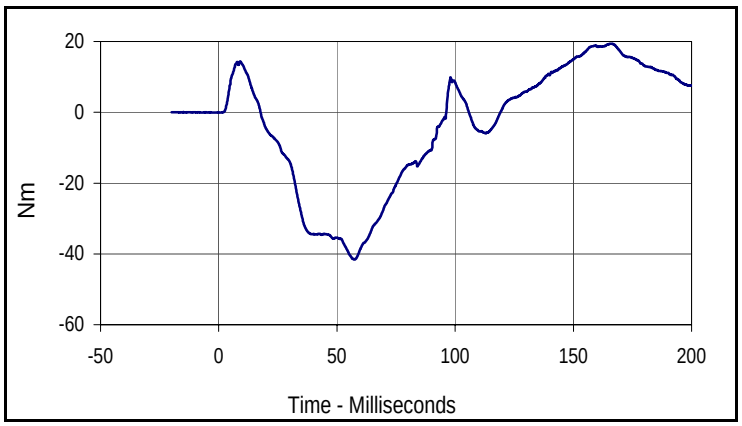
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.52	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.2	Pass
	15 msec	m/s	-3.30 to -4.10	-3.5	Pass
	20 msec	m/s	-4.40 to -5.40	-4.8	Pass
	25 msec	m/s	-5.40 to -6.10	-5.8	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.2	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	80.5	Pass
	Time	msec	50.0 to 70.0	61.0	Pass
Peak Occipital Condyle Moment		Nm	-36.0 to -44.0	-41.5	Pass
Decaying Moment Time to Cross 0 Nm		msec	102.0 to 126.0	119.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	0.2	-6.9	200.0



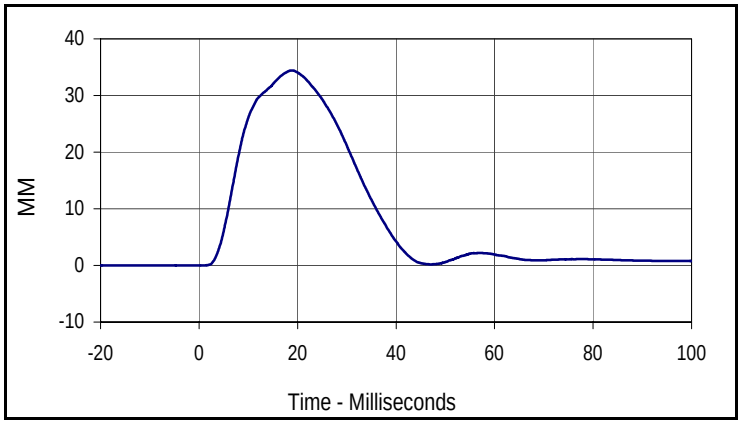
Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
80.5	61.0	-35.8	174.1



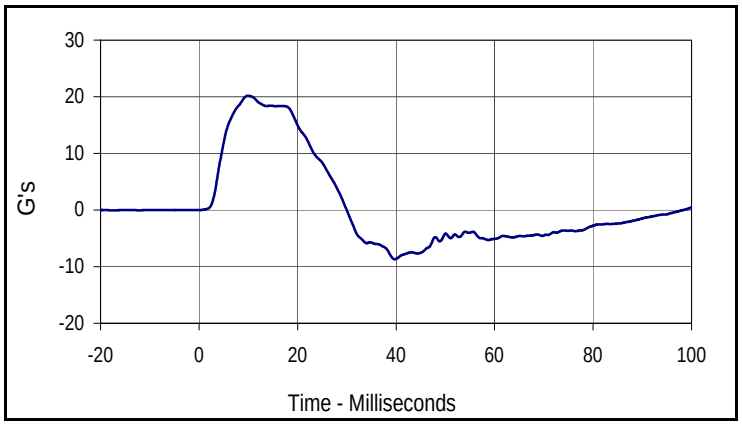
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
19.4	166.3	-41.5	57.4

Test Program:	SID IIs Shoulder Calibration	Test Date:	09/13/10
ATD Serial No.:	307	Test I.D.:	SH09B

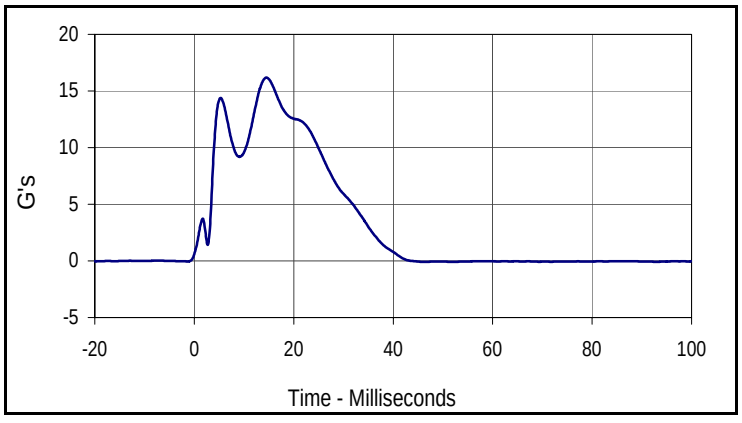
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.23	Pass
Shoulder Deflection	MM	28 to 37	34.4	Pass
Peak Upper Spine Y Acceleration	G's	17 to 22	20.2	Pass
Peak Impactor Acceleration	G's	13 to 18	16.2	Pass
		Overall Test Results		Pass



Curve Description			
Shoulder Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
34.4	18.8	0.0	0.0



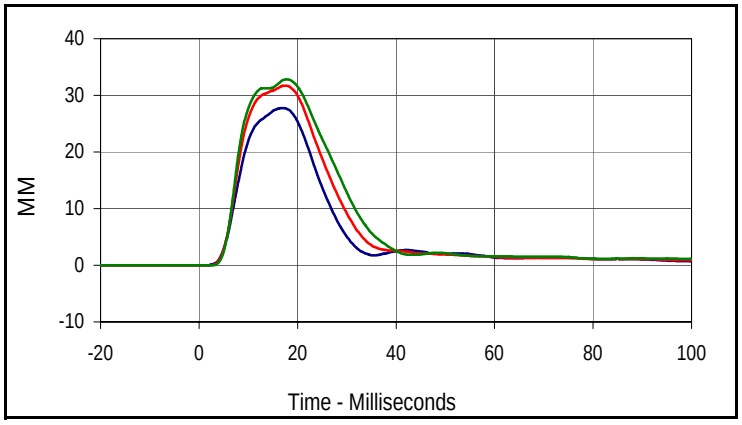
Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
20.2	9.9	-8.7	39.7



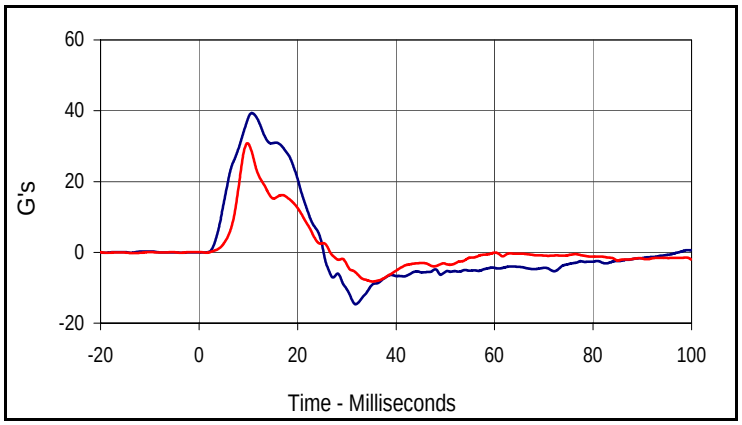
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.2	14.5	-0.1	46.1

Test Program:	SID IIs Thorax with Arm Calibration	Test Date:	9/13/10
ATD Serial No.:	307	Test I.D.:	THF09B

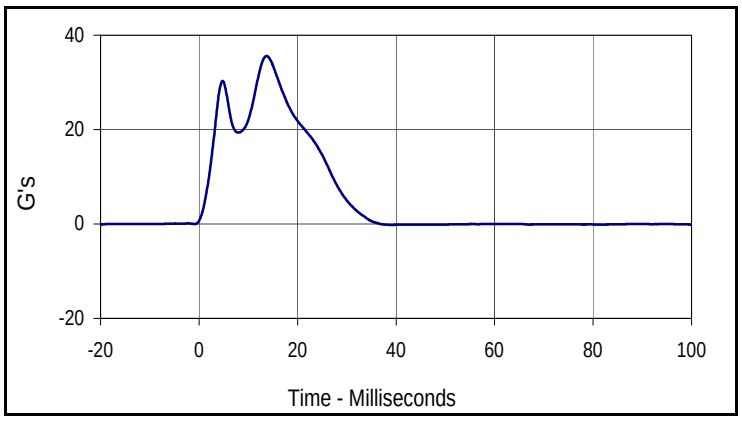
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.61	Pass
Shoulder Deflection	MM	31 to 40	38.8	Pass
Upper Thorax Rib Deflection	MM	25 to 32	27.8	Pass
Middle Thorax Rib Deflection	MM	30 to 36	31.7	Pass
Lower Thorax Rib Deflection	MM	32 to 38	32.8	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	39.4	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	30.8	Pass
Peak Impactor Acceleration After 5 msec.	G's	30 to 36	35.6	Pass
		Overall Test Results		Pass



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
27.8	17.0	0.0	-9.9
Middle Thorax Deflection			
Max	Time	Min	Time
31.7	17.4	0.0	-18.0
Lower Thorax Deflection			
Max	Time	Min	Time
32.8	17.8	0.0	-12.7



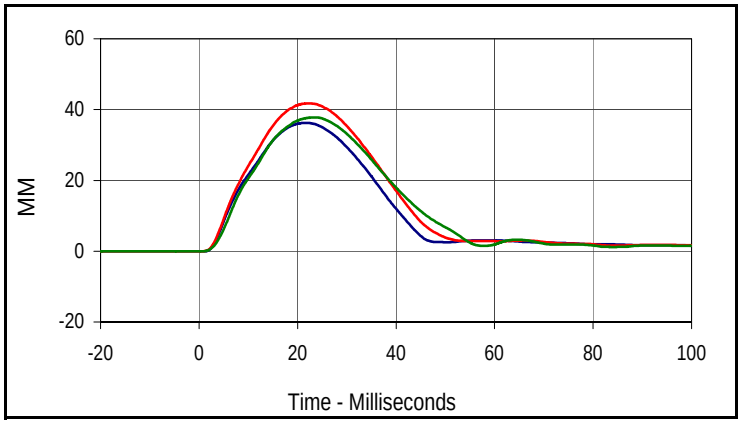
Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
39.4	10.7	-14.6	31.8
Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
30.8	9.8	-8.2	35.3



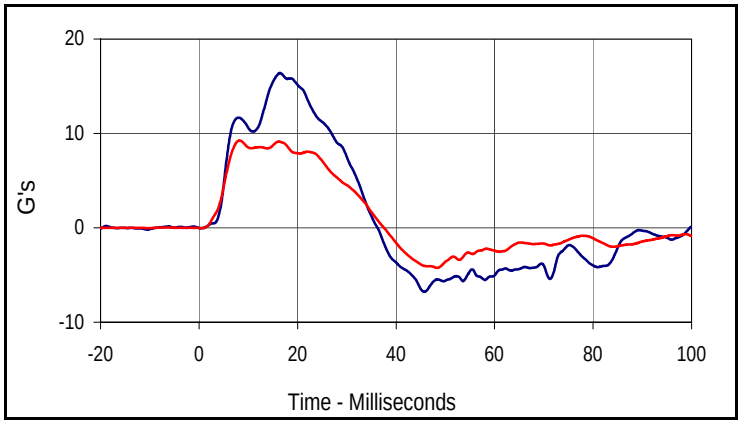
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
35.6	13.7	-0.2	38.8

Test Program:	SID IIs Thorax w/o Arm Calibration	Test Date:	09/13/10
ATD Serial No.:	307	Test I.D.:	TOA09C

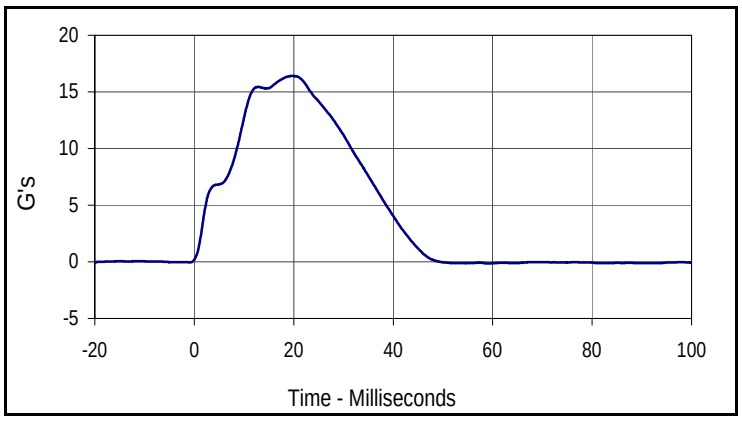
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.25	Pass
Upper Thorax Rib Deflection	MM	32 to 40	36.3	Pass
Middle Thorax Rib Deflection	MM	39 to 45	41.8	Pass
Lower Thorax Rib Deflection	MM	35 to 43	37.8	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	16.4	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.2	Pass
Peak Impactor Acceleration	G's	14 to 18	16.4	Pass
		Overall Test Results		Pass



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
36.3	21.6	0.0	0.3
Middle Thorax Deflection			
Max	Time	Min	Time
41.8	22.2	0.0	-5.7
Lower Thorax Deflection			
Max	Time	Min	Time
37.8	23.4	0.0	-1.3



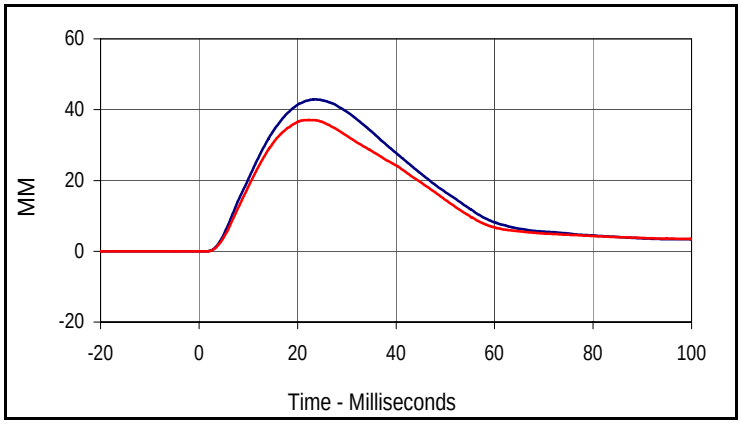
Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
16.4	16.4	-6.8	45.7
Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.2	8.2	-4.2	48.4



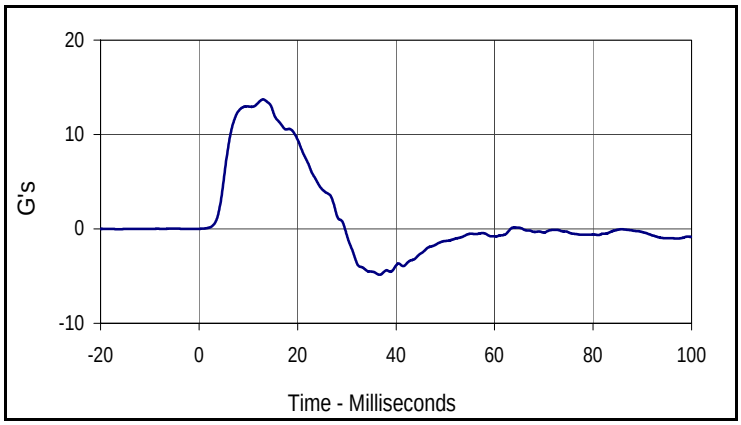
Curve Description			
Impactor Accleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.4	19.7	-0.1	59.0

Test Program:	SID IIs Abdomen Calibration	Test Date:	09/13/10
ATD Serial No.:	307	Test I.D.:	ABD09C

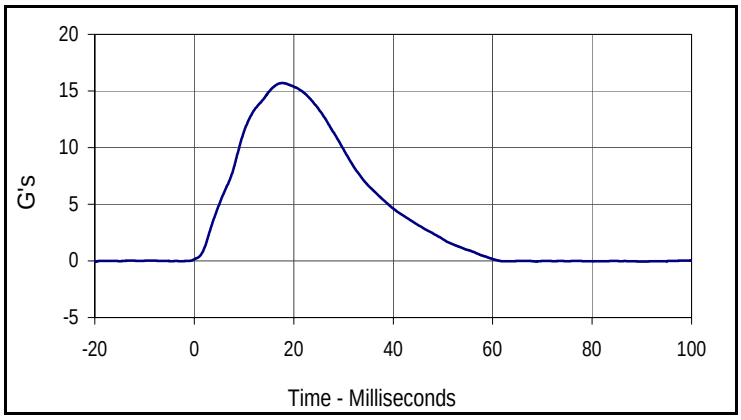
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.28	Pass
Upper Abdominal Rib Deflection	MM	36 to 47	42.9	Pass
Lower Abdominal Rib Deflection	MM	33 to 44	37.1	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	13.7	Pass
Peak Impactor Acceleration	G's	12 to 16	15.7	Pass
		Overall Test Results		Pass



Curve Description			
Upper Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
42.9	23.5	0.0	-6.3
Curve Description			
Lower Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
37.1	22.3	0.0	-5.6



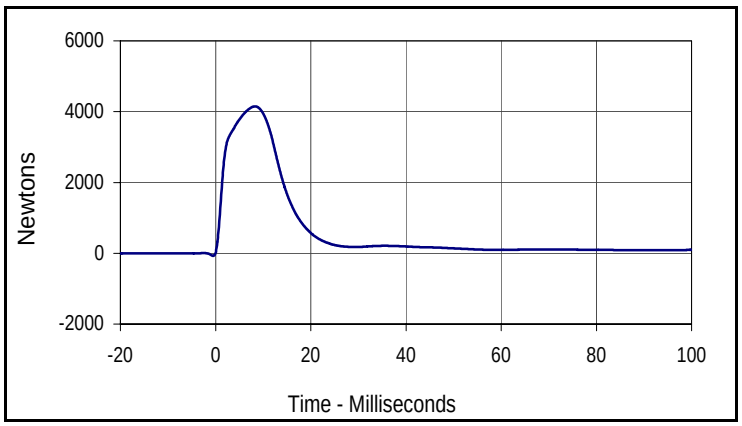
Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
13.7	13.0	-4.9	36.7



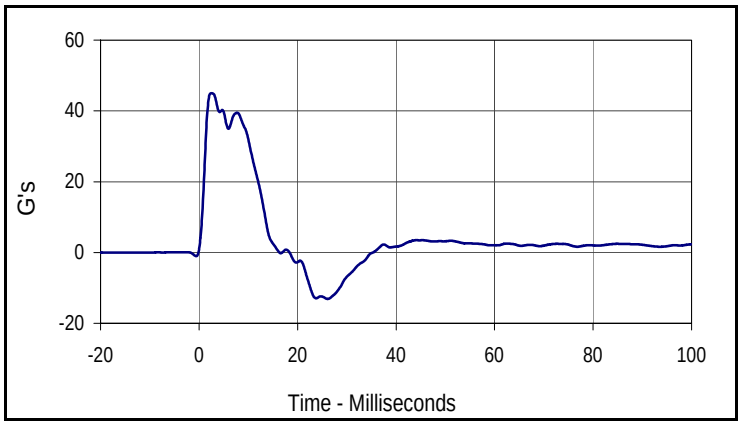
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.7	17.7	-0.1	-20.0

Test Program:	SID IIs Pelvis Acetabulum Calibration	Test Date:	09/13/10
ATD Serial No.:	307	Test I.D.:	PA09B

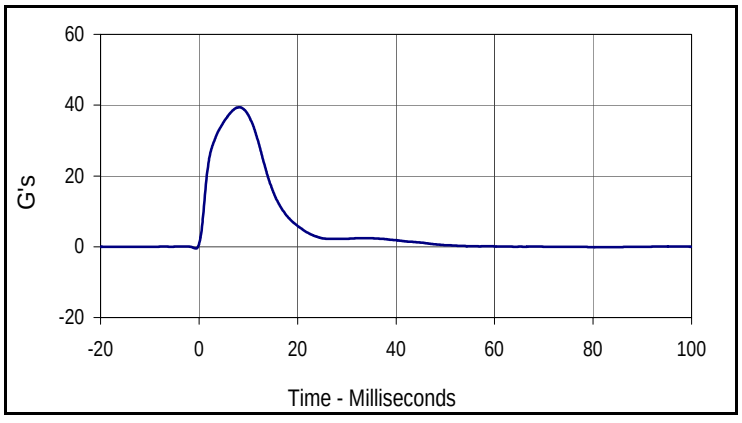
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.61	Pass
Peak Acetabulum Force	Newtons	3600 to 4300	4149.6	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	39.5	Pass
Peak Impactor Acceleration	G's	38 to 47	39.4	Pass
		Overall Test Results		Pass



Curve Description			
Pelvis Acetabulum Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4149.6	8.3	-72.5	-0.5



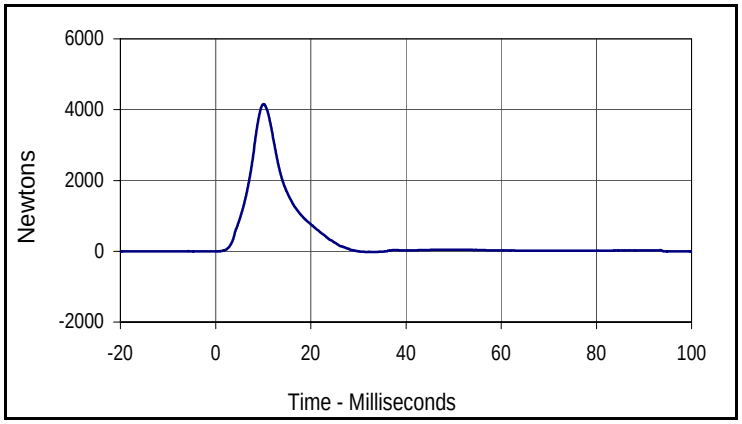
Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
45.0	2.5	-13.1	26.1



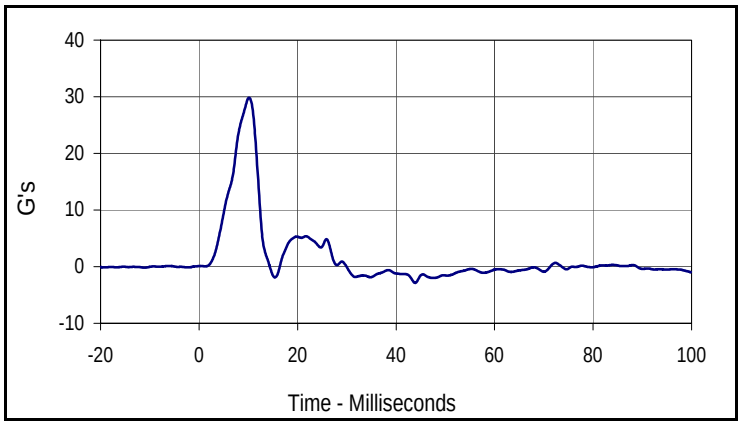
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.4	8.2	-0.5	-0.7

Test Program:	SID IIs Pelvis Iliac Calibration	Test Date:	09/13/10
ATD Serial No.:	307	Test I.D.:	PL09C

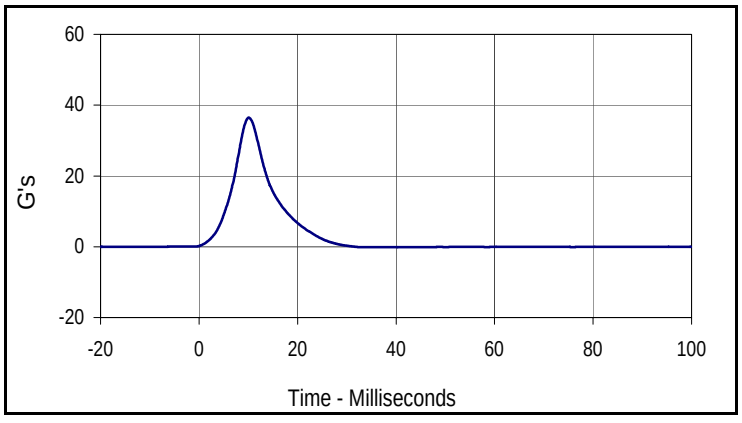
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.20	Pass
Peak Iliac Force	Newtons	4100 to 5100	4158.9	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	29.8	Pass
Peak Impactor Acceleration	G's	36 to 45	36.5	Pass
		Overall Test Results		Pass



Curve Description			
Pelvis Iliac Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4158.9	10.1	-24.0	33.3



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
29.8	10.2	-2.9	43.9

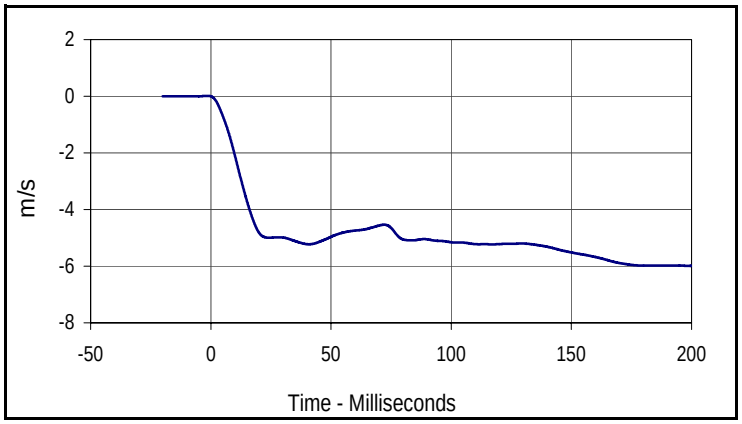


Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
36.5	10.1	-0.2	36.8

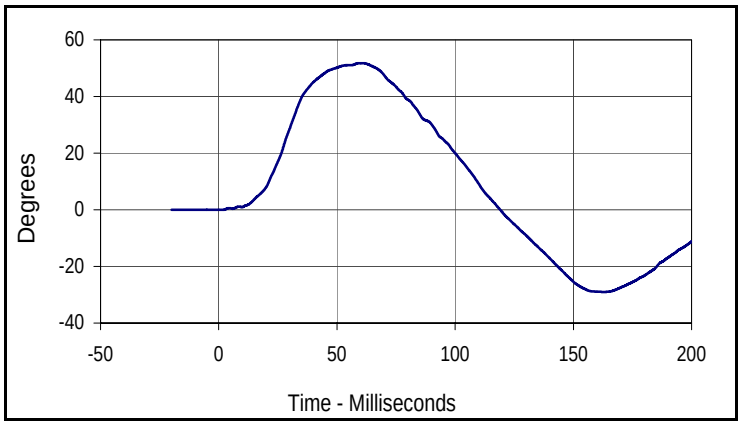
APPENDIX C
POST-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program:	ES2re Neck Calibration	Test Date:	09/20/10
ATD Serial No.:	F035	Test I.D.:	NB09D

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	3.30 to 3.50	3.41	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.046	Pass
	3 msec	m/s	-.250 to -.375	-0.297	Pass
	14 msec	m/s	-3.20 to -3.70	-3.40	Pass
Headform Rotation	Max	Degrees	49.0 to 58.0	51.8	Pass
	Time	msec	54.0 to 66.0	60.8	Pass
Maximum Rotation To Time Zero Crossing		msec	53.0 to 88.0	58.3	Pass
			Overall Test Results		Pass



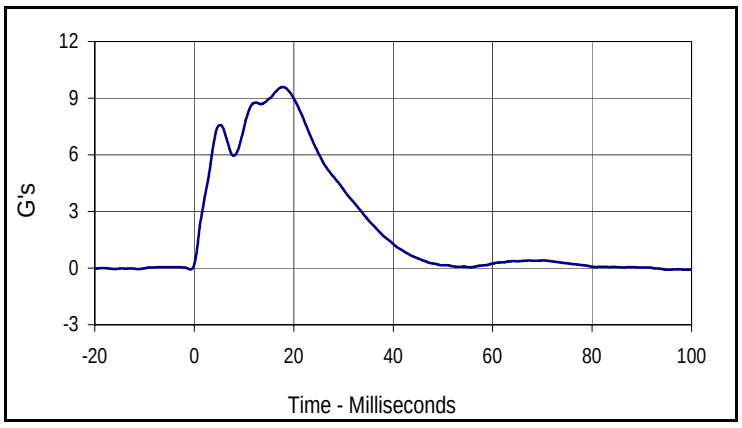
Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.3	-6.0	200.0



Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
51.8	60.8	-29.0	162.5

Test Program:	ES2re Shoulder Calibration	Test Date:	09/20/10
ATD Serial No.:	F035	Test I.D.:	SH09D

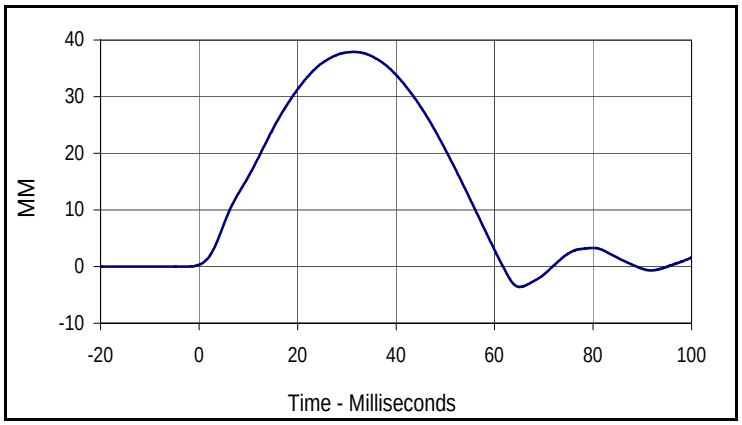
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.20 to 4.40	4.22	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.6	Pass
		Overall Test Results		Pass



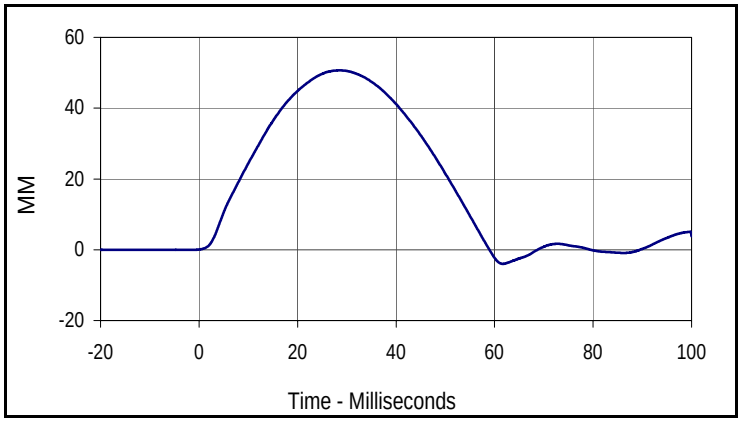
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
9.6	17.7	-0.1	98.7

Test Program:	ES2re Rib Module Calibration	Test Date:	09/20/10
ATD Serial No.:	F035 Rib #1	Test I.D.:	RIB09G

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	37.9	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	50.7	Pass
		Overall Test Results		Pass



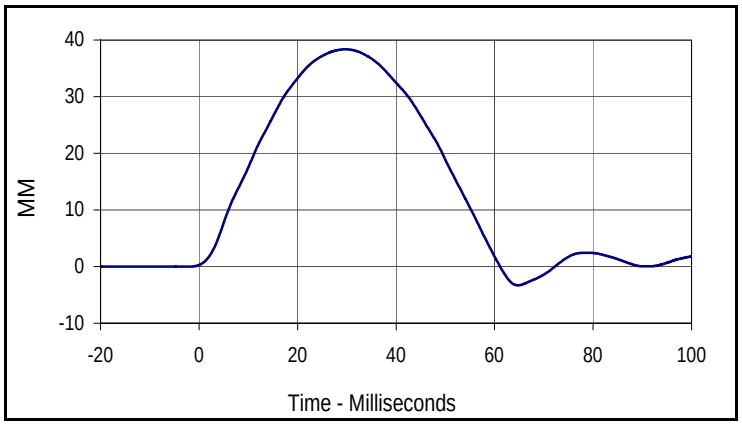
Curve Description			
Upper Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.9	31.4	-3.6	65.1



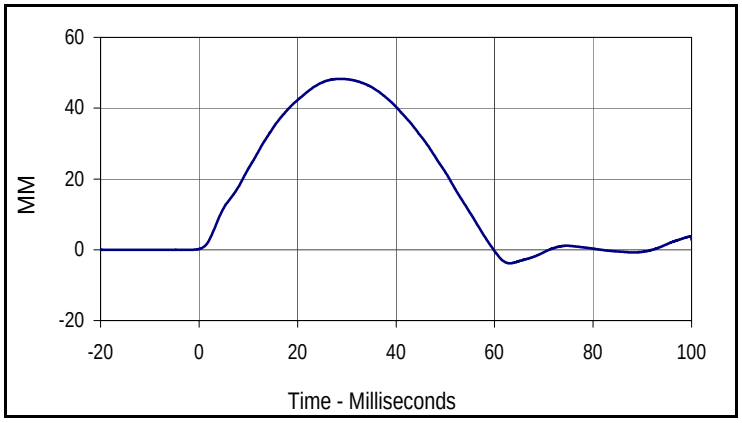
Curve Description			
Upper Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
50.7	28.6	-4.0	61.7

Test Program:	ES2re Rib Module Calibration	Test Date:	09/20/10
ATD Serial No.:	F035 Rib #2	Test I.D.:	RIB09H

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.4	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.3	Pass
		Overall Test Results		Pass



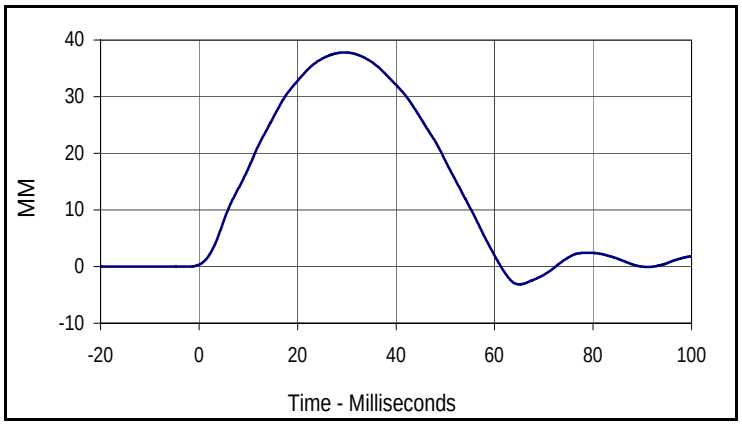
Curve Description			
Middle Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.4	29.7	-3.3	64.7



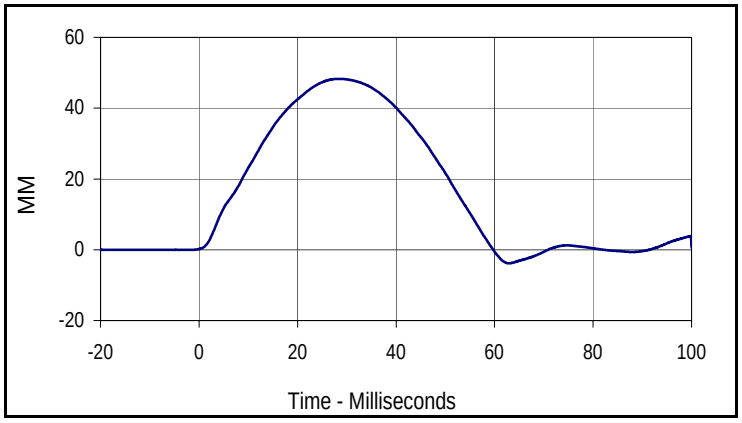
Curve Description			
Middle Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.3	28.7	-3.8	63.1

Test Program:	ES2re Rib Module Calibration	Test Date:	09/20/10
ATD Serial No.:	F035 Rib #3	Test I.D.:	RIB09I

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	37.8	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.3	Pass
		Overall Test Results		Pass



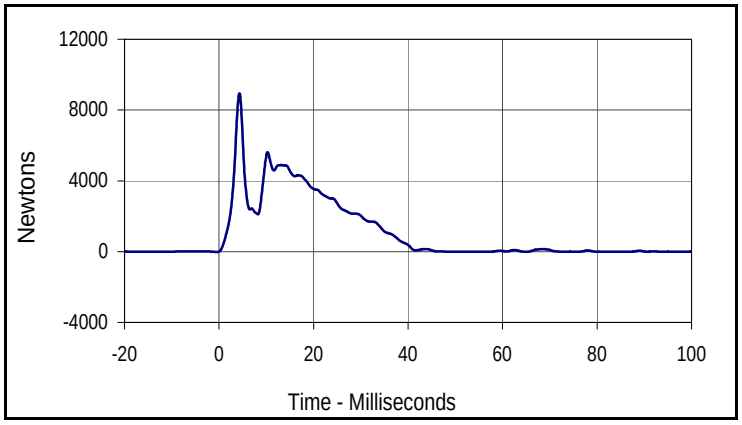
Curve Description			
Lower Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.8	29.6	-3.2	65.0



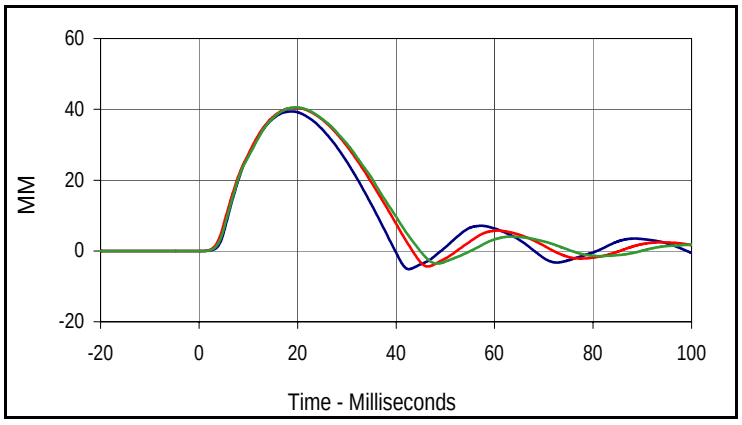
Curve Description			
Lower Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.3	28.4	-3.8	63.0

Test Program:	ES2re Thorax Calibration	Test Date:	09/20/10
ATD Serial No.:	F035	Test I.D.:	TH09D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	5.40 to 5.60	5.45	Pass
Impactor Force	N	5100 to 6200	5618.8	Pass
	msec	> 6.0 msec	9.9	Pass
Upper Rib Deflection	MM	34 to 41	39.4	Pass
Middle Rib Deflection	MM	37 to 45	40.4	Pass
Lower Rib Deflection	MM	37 to 44	40.5	Pass
		Overall Test Results		Pass



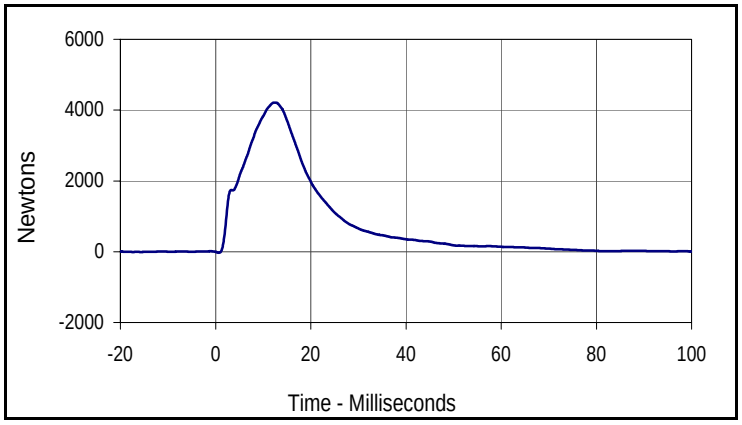
Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
8952.9	4.3	-26.5	-0.4



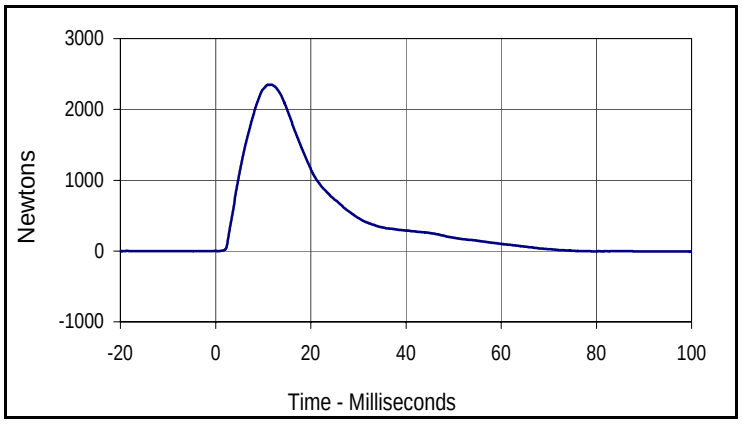
Curve Description			
Upper, Middle, Lower Rib Deflections			
CURNO(s)	Type	SAE Class	Units
002-003-004	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
39.4	18.8	-5.1	42.6
Max (Middle)	Time	Min (Middle)	Time
40.4	19.5	-4.4	46.5
Max (Lower)	Time	Min (Lower)	Time
40.5	19.6	-3.6	48.3

Test Program:	ES2re Abdomen Calibration	Test Date:	09/20/10
ATD Serial No.:	F035	Test I.D.:	ABD09D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	3.90 to 4.10	3.93	Pass
Impactor Force	N	4000 to 4800	4207.7	Pass
	msec	10.6 to 13.0	12.7	Pass
Abdominal Force	N	2200 to 2700	2349.6	Pass
	msec	10.0 to 12.3	11.7	Pass
		Overall Test Results		Pass



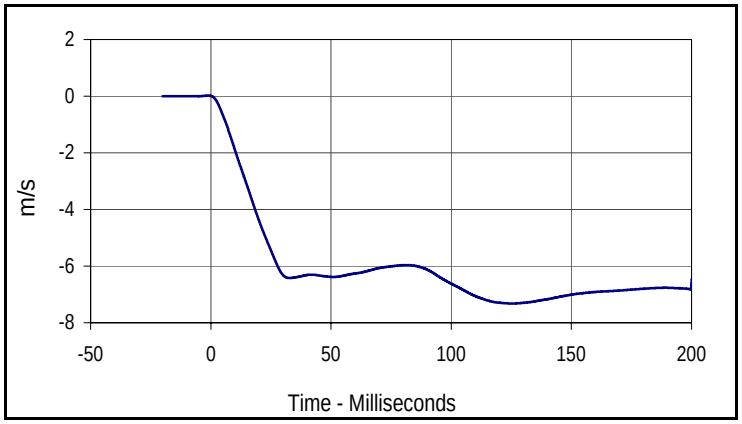
Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4207.7	12.7	-27.9	0.7



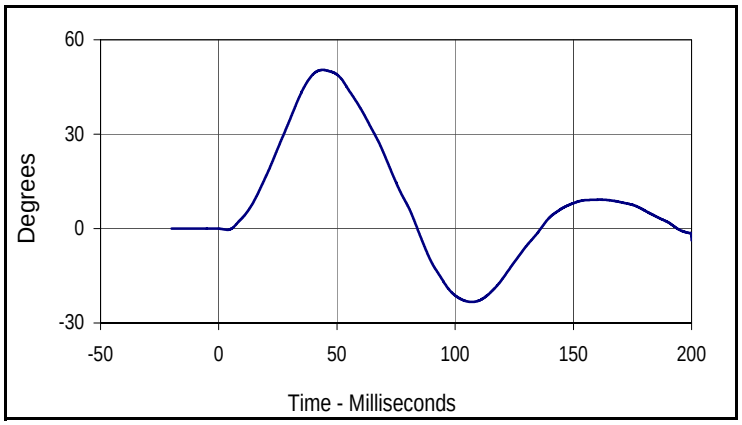
Curve Description			
Abdomen Sum Resultant			
CURNO	Type	SAE Class	Units
002	RES	600	Newtons
Max	Time	Min	Time
2349.6	11.7	-8.1	99.7

Test Program:	ES2re Lumbar Spine Calibration	Test Date:	9/20/10
ATD Serial No.:	F035	Test I.D.:	SP09D

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.95 to 6.15	5.98	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.029	Pass
	3.7 msec	m/s	-.240 to -.425	-0.400	Pass
	27 msec	m/s	-5.80 to -6.50	-5.85	Pass
	30 msec	m/s	< -6.50	-6.32	Pass
Headform Rotation	Max	Degrees	45.0 to 55.0	50.4	Pass
	Time	msec	39.0 to 53.0	44.0	Pass
Maximum Rotation To Time Zero Crossing		msec	37.0 to 57.0	40.1	Pass
			Overall Test Results		Pass



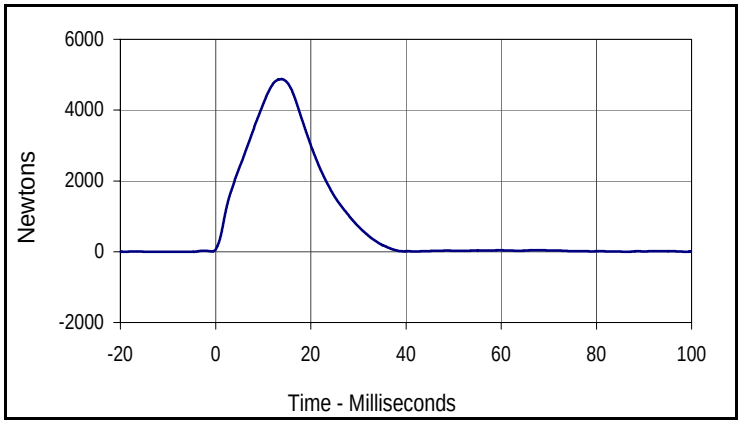
Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.0	-7.3	125.4



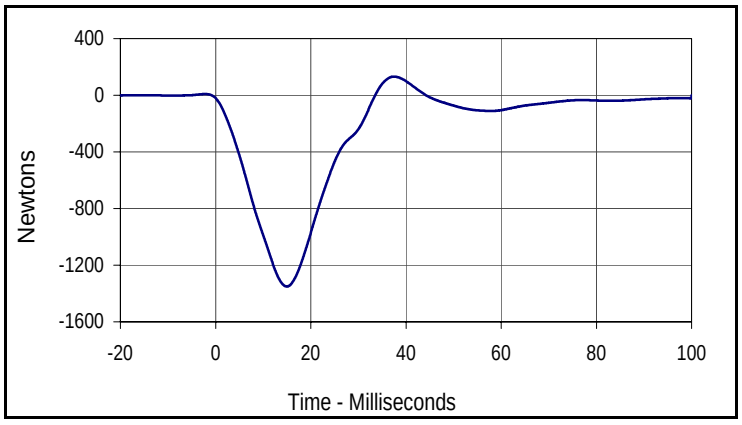
Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
50.4	44.0	-23.3	107.0

Test Program:	ES2re Pelvis Calibration	Test Date:	09/20/10
ATD Serial No.:	F035	Test I.D.:	PL09D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.20 to 4.40	4.31	Pass
Impactor Force	N	4700 to 5400	4875.1	Pass
	msec	11.8 to 16.1	13.8	Pass
Pubic Symphysis Load	N	-1230 to -1590	-1350.3	Pass
	msec	12.2 to 17.0	15	Pass
		Overall Test Results		Pass



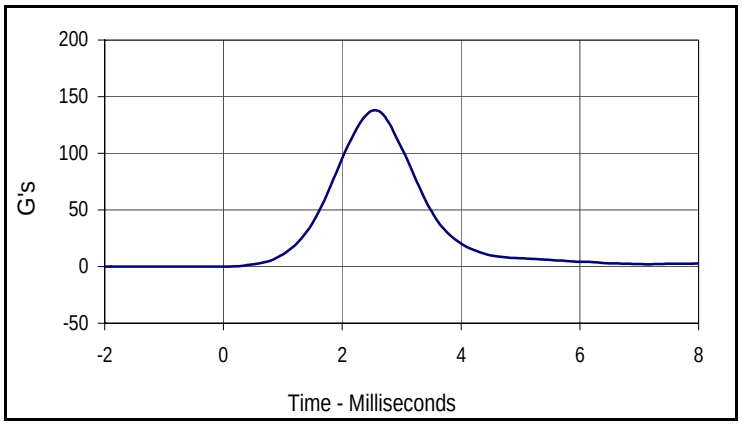
Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4875.1	13.8	-4.1	-20.0



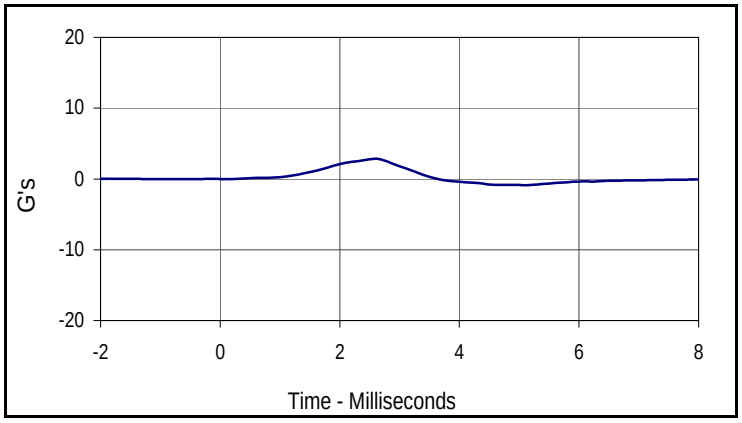
Curve Description			
Pubic FY			
CURNO	Type	SAE Class	Units
002	FIL	60	Newtons
Max	Time	Min	Time
131.5	37.5	-1350.3	15.0

Test Program:	ES2re Lateral Head Drop Calibration	Test Date:	09/20/10
ATD Serial No.:	F035	Test I.D.:	HD09D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	125 to 155	137.7	Pass
Peak Longitudinal Acceleration	G's	≤15	2.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	5.3	Pass
		Overall Test Results		Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
137.7	2.6	0.0	-0.2

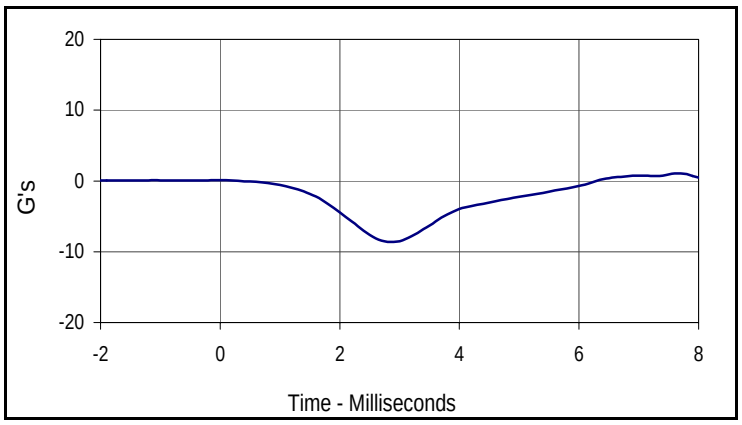


Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.9	2.6	-0.9	5.1

Test Program:	SID IIs Lateral Head Drop Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	HDF09D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	115 to 137	127.7	Pass
Peak Longitudinal Acceleration	G's	≤15	8.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	11.1	Pass
		Overall Test Results		Pass

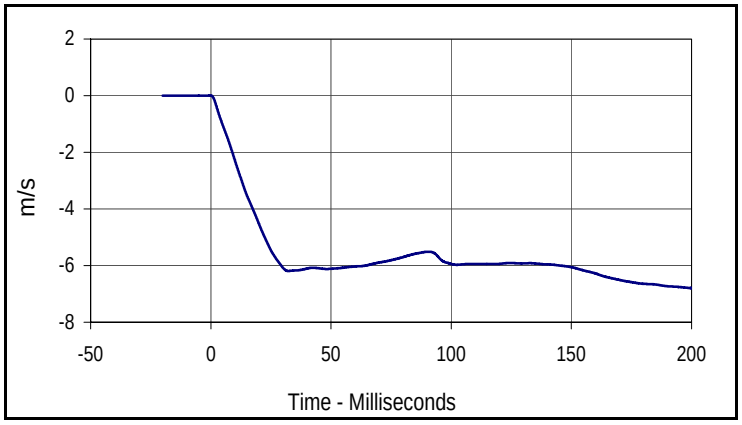
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
127.7	2.8	0.6	0.2



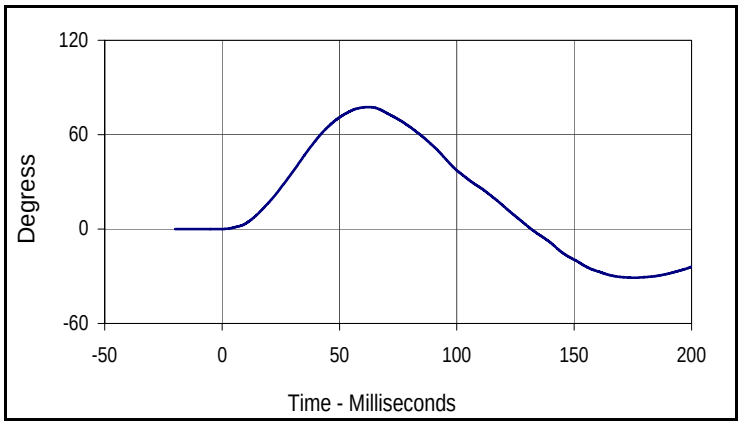
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.1	0.0	-8.6	2.9

Test Program:	SID IIs Neck Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	NBF09D

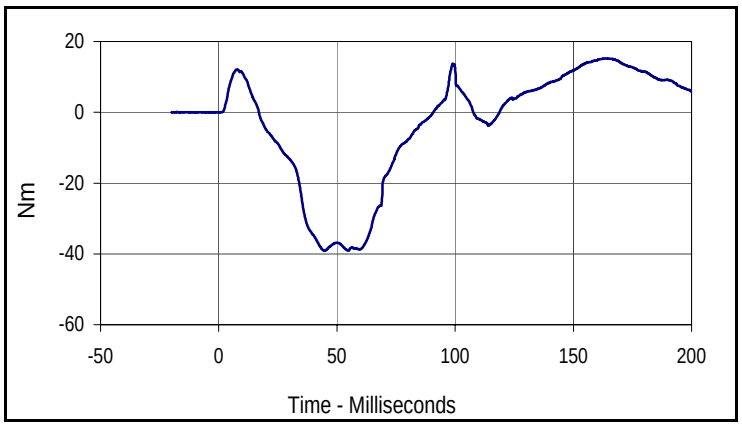
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.51	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.3	Pass
	15 msec	m/s	-3.30 to -4.10	-3.5	Pass
	20 msec	m/s	-4.40 to -5.40	-4.5	Pass
	25 msec	m/s	-5.40 to -6.10	-5.5	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.2	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	77.5	Pass
	Time	msec	50.0 to 70.0	62.4	Pass
Peak Occipital Condyle Moment		Nm	-36.0 to -44.0	-39.1	Pass
Decaying Moment Time to Cross 0 Nm		msec	102.0 to 126.0	118.8	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.2	-6.8	200.0



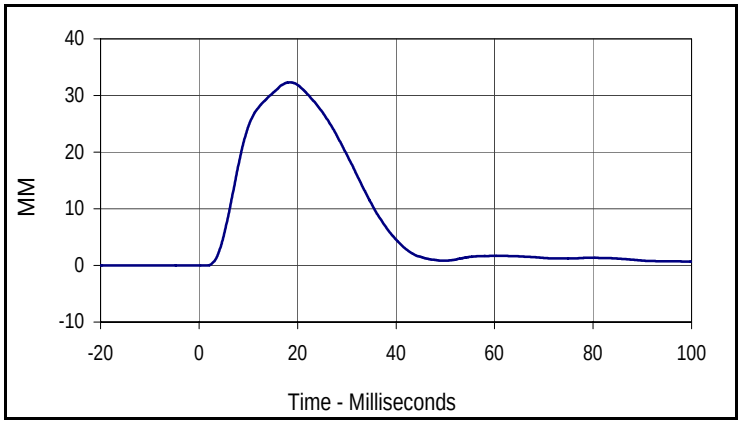
Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
77.5	62.4	-30.9	175.1



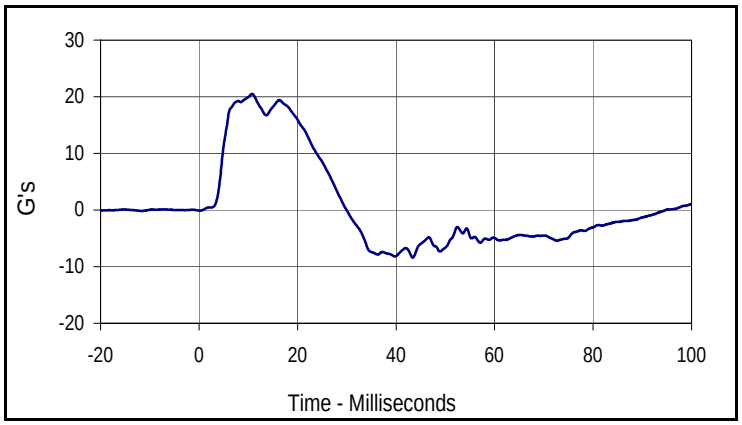
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
15.2	163.0	-39.1	44.6

Test Program:	SID IIs Shoulder Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	SHF09D

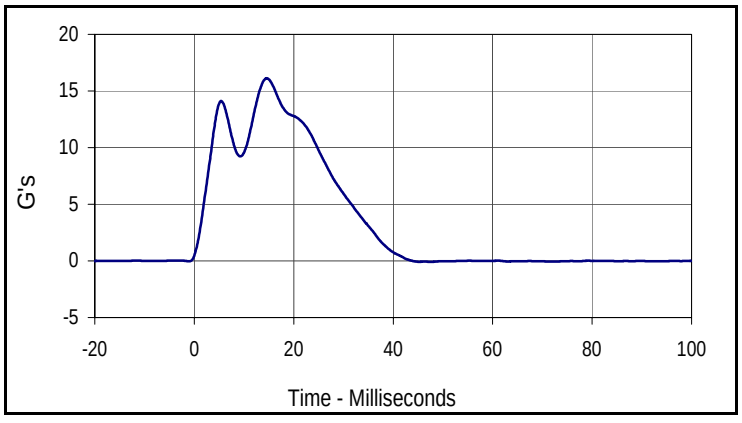
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.27	Pass
Shoulder Deflection	MM	28 to 37	32.3	Pass
Peak Upper Spine Y Acceleration	G's	17 to 22	20.5	Pass
Peak Impactor Acceleration	G's	13 to 18	16.1	Pass
		Overall Test Results		Pass



Curve Description			
Shoulder Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
32.3	18.5	0.0	-14.7



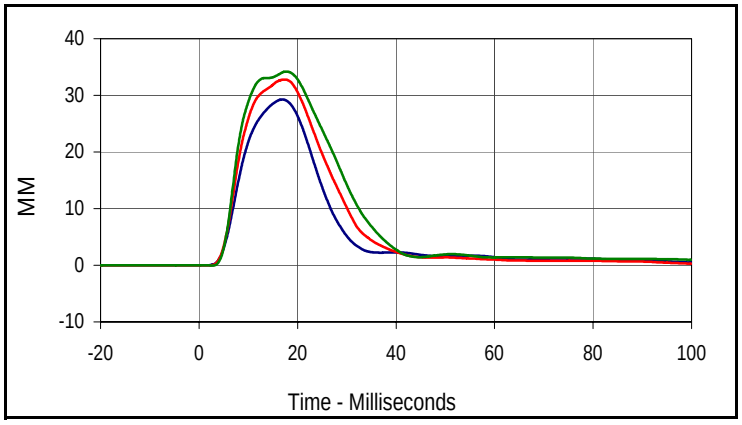
Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
20.5	10.8	-8.4	43.4



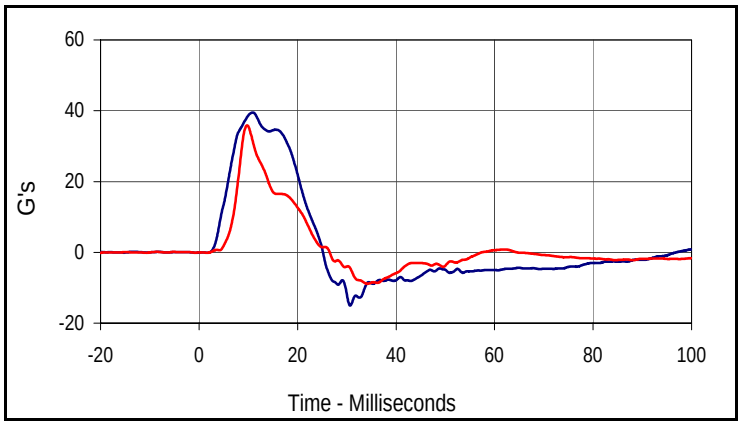
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.1	14.6	-0.1	47.6

Test Program:	SID IIs Thorax with Arm Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	THF09D

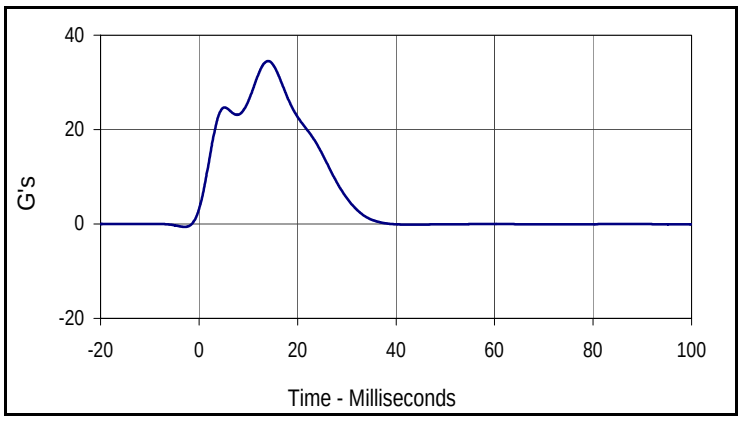
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.63	Pass
Shoulder Deflection	MM	31 to 40	38.7	Pass
Upper Thorax Rib Deflection	MM	25 to 32	29.3	Pass
Middle Thorax Rib Deflection	MM	30 to 36	32.8	Pass
Lower Thorax Rib Deflection	MM	32 to 38	34.2	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	39.5	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	35.9	Pass
Peak Impactor Acceleration After 5 msec.	G's	30 to 36	34.5	Pass
		Overall Test Results		Pass



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
29.3	16.9	0.0	-5.8
Middle Thorax Deflection			
Max	Time	Min	Time
32.8	17.4	0.0	2.2
Lower Thorax Deflection			
Max	Time	Min	Time
34.2	17.7	0.0	2.7



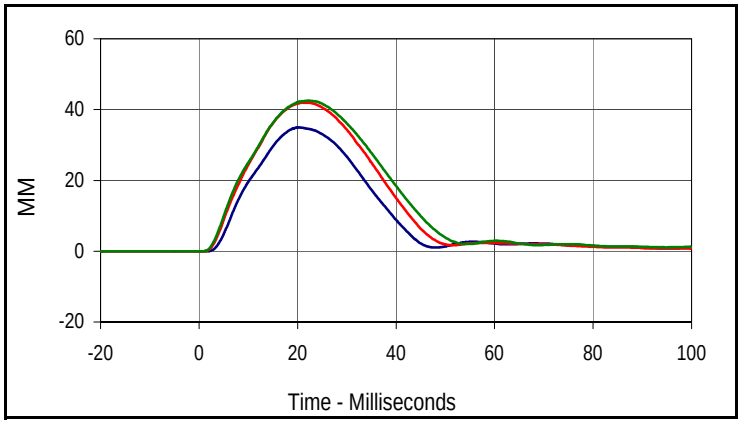
Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
39.5	10.9	-15.1	30.7
Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
35.9	9.7	-8.9	34.2



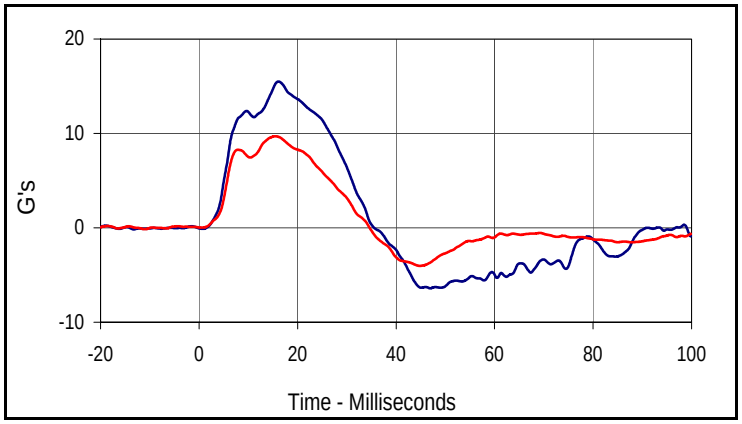
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
34.5	14.0	-0.6	-2.9

Test Program:	SID IIs Thorax w/o Arm Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	TOA09D

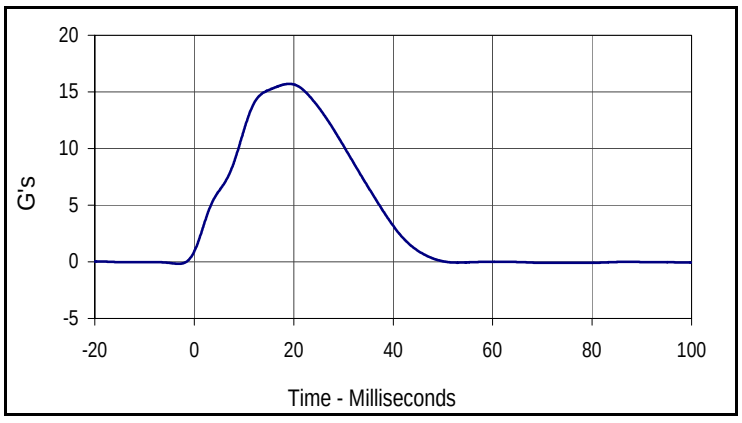
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.27	Pass
Upper Thorax Rib Deflection	MM	32 to 40	34.9	Pass
Middle Thorax Rib Deflection	MM	39 to 45	42.0	Pass
Lower Thorax Rib Deflection	MM	35 to 43	42.5	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	15.5	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.7	Pass
Peak Impactor Acceleration	G's	14 to 18	15.7	Pass
		Overall Test Results		Pass



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
34.9	20.3	0.0	-10.1
Middle Thorax Deflection			
Max	Time	Min	Time
42.0	21.6	0.0	-14.5
Lower Thorax Deflection			
Max	Time	Min	Time
42.5	22.2	0.0	0.8



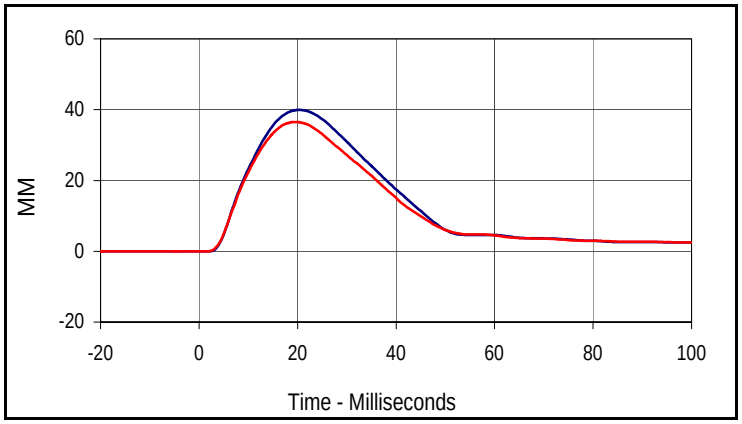
Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.5	16.1	-6.4	47.0
Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.7	15.4	-4.0	44.8



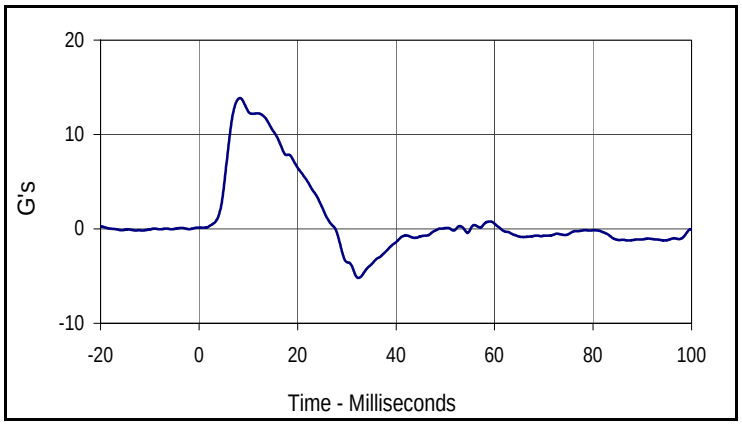
Curve Description			
Impactor Accleration			
CURNO	Type	SAE Class	Units
006	FIL	60	G's
Max	Time	Min	Time
15.7	19.1	-0.2	-3.2

Test Program:	SID IIs Abdomen Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	ABD09D

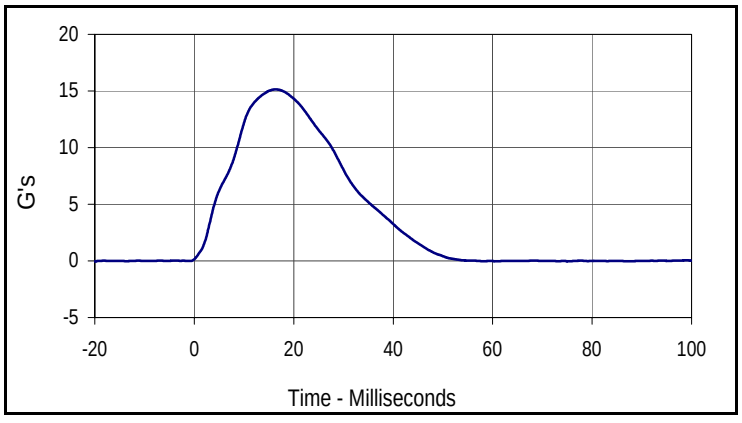
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.31	Pass
Upper Abdominal Rib Deflection	MM	36 to 47	39.9	Pass
Lower Abdominal Rib Deflection	MM	33 to 44	36.5	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	13.9	Pass
Peak Impactor Acceleration	G's	12 to 16	15.1	Pass
		Overall Test Results		Pass



Curve Description			
Upper Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
39.9	20.2	0.0	-2.7
Curve Description			
Lower Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
36.5	19.5	0.0	-2.3



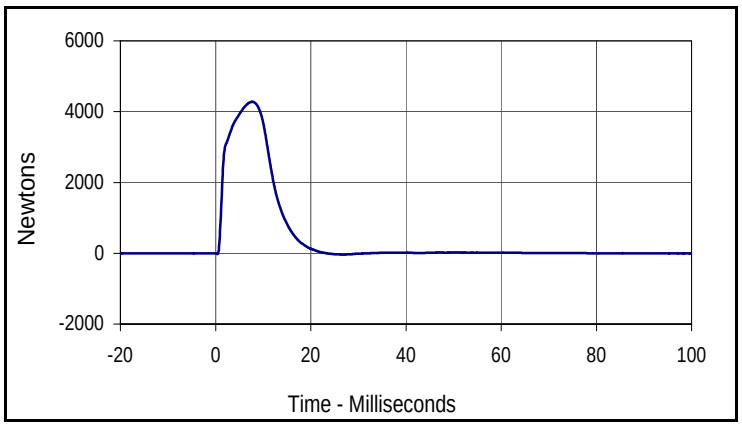
Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
13.9	8.3	-5.2	32.4



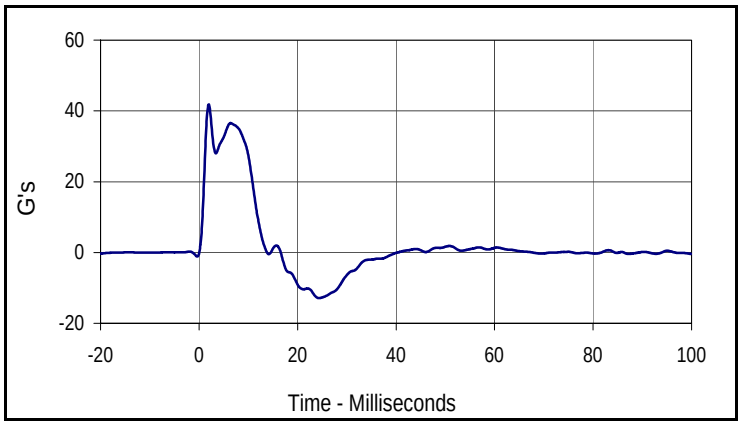
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.1	16.3	0.0	-20.0

Test Program:	SID IIs Pelvis Acetabulum Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	PA09D

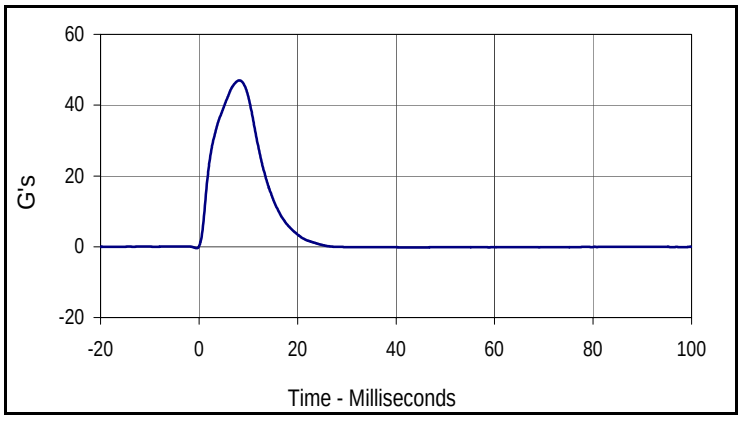
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.74	Pass
Peak Acetabulum Force	Newtons	3600 to 4300	4278.5	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	36.6	Pass
Peak Impactor Acceleration	G's	38 to 47	47.0	Pass
		Overall Test Results		Pass



Curve Description			
Pelvis Acetabulum Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4278.5	7.7	-38.2	27.0



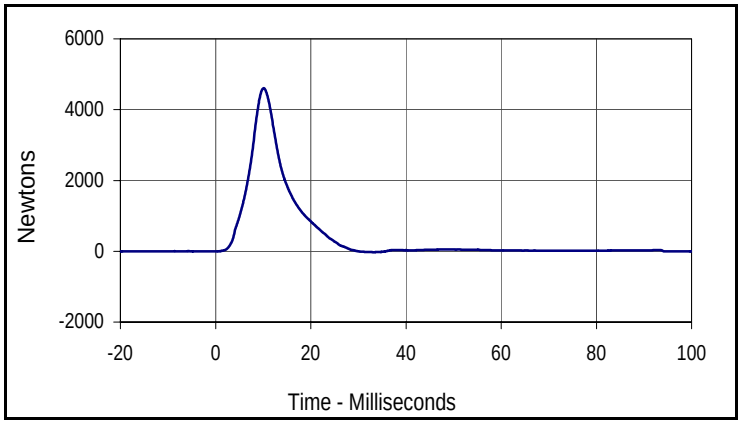
Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
41.8	2.0	-12.9	24.3



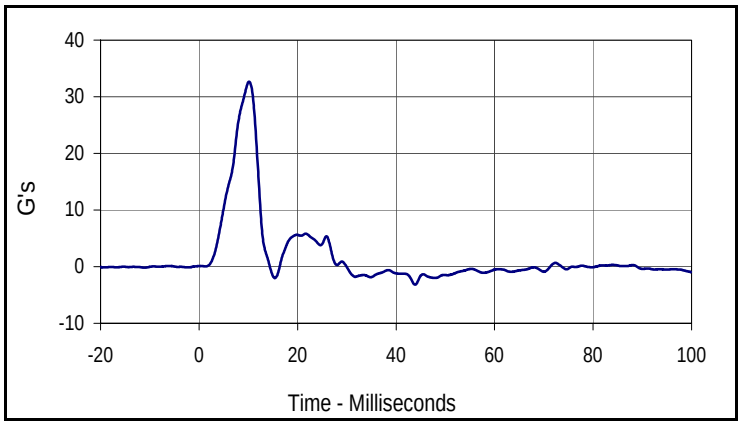
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
47.0	8.2	-0.4	-0.5

Test Program:	SID IIs Pelvis Iliac Calibration	Test Date:	9/20/10
ATD Serial No.:	307	Test I.D.:	PLF09D

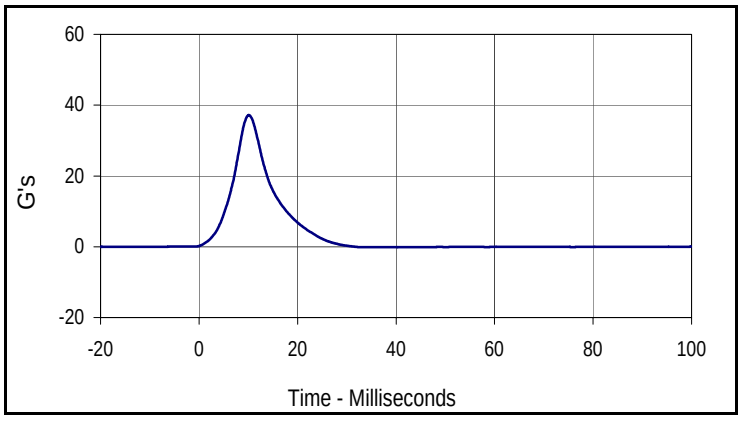
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.30	Pass
Peak Iliac Force	Newtons	4100 to 5100	4607.9	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	32.7	Pass
Peak Impactor Acceleration	G's	36 to 45	37.2	Pass
		Overall Test Results		Pass



Curve Description			
Pelvis Iliac Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4607.9	10.1	-26.7	33.3



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
32.7	10.2	-3.2	43.9



Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
37.2	10.1	-0.2	36.8