

**REPORT NUMBER: NCAPSIDE-MGA-2008-018**

**NEW CAR ASSESSMENT PROGRAM  
SIDE IMPACT TEST**

**MAZDA MOTOR CORPORATION  
2009 MAZDA6 SEDAN SPORT  
NHTSA NUMBER: M95401**

**PREPARED BY:  
MGA RESEARCH CORPORATION  
5000 WARREN ROAD  
BURLINGTON, WI 53105**



**Test Date: August 28, 2008**


**Report Date: October 10, 2008**

**FINAL REPORT**

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

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### Technical Report Documentation Page

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<p>15. <i>Supplementary Notes</i></p>																								
<p>16. <i>Abstract</i> A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2009 Mazda6 Sedan Sport to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on August 28, 2008. The impact velocity of the Moving Deformable Barrier (MDB) was 62.3 km/h, and the ambient temperature at the struck side (drivers) of the vehicle was 21°C. The target vehicle's maximum post test static crush was 263 mm at level 2. The test vehicle's occupant performance is as follows:</p> <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th style="text-align: left;"></th> <th style="text-align: center;"><u>DRIVER</u></th> <th style="text-align: center;"><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td style="text-align: center;">36.5</td> <td style="text-align: center;">41.4</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">34.5</td> <td style="text-align: center;">44.3</td> </tr> <tr> <td>Lower Spine (T<sub>12</sub>) Accel., g</td> <td style="text-align: center;">59.4</td> <td style="text-align: center;">55.5</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">48</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">63.7</td> <td style="text-align: center;">54.7</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">165</td> <td style="text-align: center;">462</td> </tr> </tbody> </table> <p>The 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.</p>					<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	36.5	41.4	Left Lower Rib (LLR) Accel., g	34.5	44.3	Lower Spine (T <sub>12</sub> ) Accel., g	59.4	55.5	Thoracic Trauma Index (TTI)	48	50	Pelvis (PEV) Accel., g	63.7	54.7	HIC	165	462
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<p>17. <i>Key Words</i> New Car Assessment Program (NCAP) Side Impact Side Impact Hybrid III Dummy (SID/HIII) Occupant Side Impact Protection</p>		<p>18. <i>Distribution Statement</i> Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave, SE Washington, D.C. 20590</p>																						
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## TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Test Procedure	1
2	Summary of NCAP Side Impact Test	2
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Test Vehicle Tire Information	6
3	Test Vehicle Information	7
4	Moving Deformable Barrier (MDB) Summary of Results	9
5	Post Test Observations	10
6	Vehicle Pre-Test and Post Test Measurements	11
7	SID/HIII Longitudinal Clearance Dimensions	12
8	SID/HIII Lateral Clearance Dimensions	13
9	Vehicle Side Measurements	14
10	Vehicle Exterior Crush Profiles	15
11	Vehicle Damage Profile Distances	17
12	Deformable Barrier Honeycomb Face Static Crush	18
13	Vehicle Accelerometer Locations	19
14	MDB Accelerometer Locations	20
15	Vehicle Structural Measurements	21
16	High Speed Camera Locations and Data	22
17	Summary of FMVSS 301 Data	23
<u>Appendix</u>		
A	Photographs	A
B	SID/HIII Response Data Traces	B
C	Dummy Calibration Data	C

## **SECTION 1**

### **PURPOSE AND TEST PROCEDURE**

#### **PURPOSE**

This side impact test was conducted as part of the test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-03-D-12005. The purpose of this test was to evaluate side impact protection in a 2009 Mazda6 Sedan Sport manufactured by Mazda Motor Corporation.

#### **TEST PROCEDURE**

The side impact test was conducted in accordance with the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA5. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

## SECTION 2

### SUMMARY OF NCAP SIDE IMPACT TEST

A model year 2009 Mazda6 Sedan Sport 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 62.3 km/h. The specified impact velocity range is from 61.1 to 62.7 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 1677.4 kg and the test weight of the MDB was 1361.5 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on August 28, 2008.

One (1) real-time motion picture camera and nine (9) high-speed motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SID/HIIIs) can be found in Appendix A. Two 50th percentile adult male SID/HIIIs were placed in the driver and left rear passenger designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002. Each SID/HIII was instrumented in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X, Y and Z axes primary and redundant)
- Upper Neck load cell (Fx, Fy, Fz, Mx, My, Mz)

The test vehicle was instrumented with twenty (20) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board DTS TDAS Pro Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

#### **2.2 GENERAL COMMENTS**

The test vehicle sustained a maximum static crush of 263 mm at level 2, 1050 mm rearward of the vertical impact point. The driver and passenger SID/HIIIs, Serial Nos. 271 and 272 respectively, were calibrated just prior to this test.

Appendix A contains the still photograph prints. Appendix B contains the SID/HIII response data traces. Appendix C contains the dummy calibration data.

The occupant data is summarized below:

ATD position	HIC	T <sup>1</sup>	T <sup>2</sup>	TTI (G's)	Peak Pelvis (G's)
Driver	165	29.5	65.5	48	63.7
Passenger	462	46.4	57.5	50	54.7

#### SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Information	Left Front (Driver)		Left Rear (Passenger)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	No	
Side Torso Airbag	Yes	Yes	No	
Curtain Airbag	Yes	Yes	Yes	Yes

The test data can be found on the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov).

#### TEST NOTES

The struck side curtain airbag deployment was partially obstructed by the B-Pillar trim.

**DATA SHEET NO. 1**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008

**TEST VEHICLE INFORMATION**

Make	Mazda
Model	6
Body Style	Sedan Sport
NHTSA No.	M95401
VIN	1YVHP81A095M02017
Color	Onyx Black
Delivery Date	8/7/08
Odometer Reading (mile)	18
Dealer	Morries Mazda
Transmission	Manual
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.5
Engine Placement	Lateral
Automatic Door Locks (ADL)	No
Owner's Manual Details Instructions on Disabling ADLs	N/A

**TEST VEHICLE OPTIONS**

Driver Front Airbag	Yes
Driver Side Curtain Airbag	Yes
Driver Side Torso Airbag	Yes
Rear Passenger Side Curtain Airbag	Yes
Rear Passenger Side Torso Airbag	No
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Anti-lock Brakes	Yes
Traction Control	Yes
All Wheel Drive	No
Power Seats	No
Pretensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Auto Alliance International, Inc. for Mazda Motor Corporation
Date of Manufacture	06/08

GVWR (kg)	1969
GAWR Front (kg)	1037
GAWR Rear (kg)	935

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				385
Cargo Wt. (RCLW) (kg)				45

**DATA SHEET NO. 1 (continued)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008

**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	435.9	297.6		474.5	396.4	
Right	kg	441.8	301.6		452.2	354.3	
Ratio	%	59.4	40.6		55.2	44.8	
Totals	kg	877.7	599.2	1476.9	926.7	750.7	1677.4

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1476.9
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Vehicle Target Weight (TVTW)	kg	1683.4

\* Actual As Tested Weight (ATW) will be TVTW -5/-10 kg

Weight of Ballast in Cargo Area: 4.5 kg

**TEST VEHICLE ATTITUDES AND CG**

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	725	723	728	726	1130
As Tested	mm	709	716	688	697	1246
Fully Loaded	mm	707	716	687	697	

**TEST VEHICLE VERTICAL IMPACT LINE DATA**

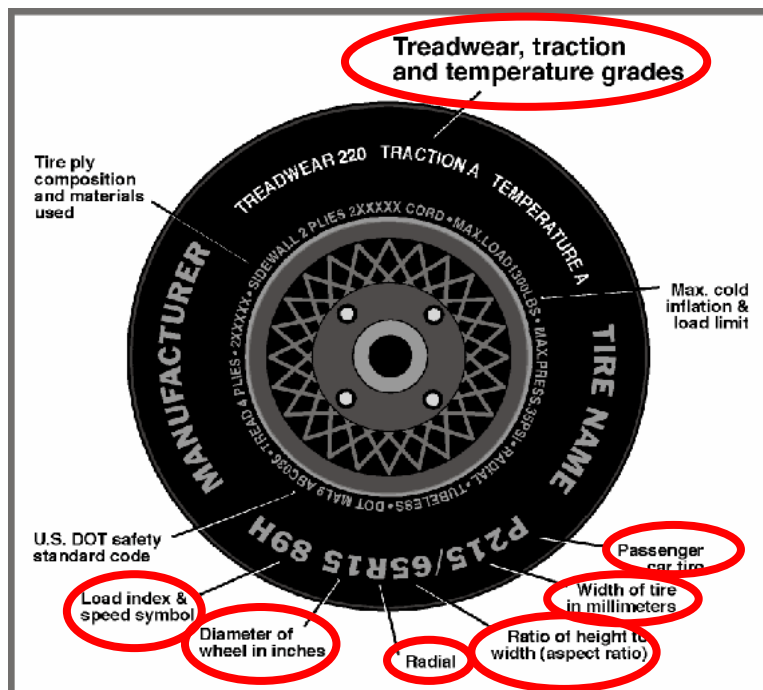
Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2785
Target Impact Point Aft of Front Axle	mm	453
Actual Impact Point Aft of Front Axle	mm	438

## DATA SHEET NO. 2

### TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



### DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Test Pressure (kPa)	220	220
Recommended Tire Size	P205/65R16	P205/65R16
Tire Size on Vehicle	P205/65R16	P205/65R16
Tire Manufacturer	Michelin	Michelin
Tire Name	Energy MXV4	Energy MXV4
Tire Type	Passenger	Passenger
Tire Width (mm)	205	205
Ratio of Height to Width (aspect ratio)	65	65
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	94H	94H
Treadwear	440	440
Traction Grade	A	A
Temperature Grade	A	A

**DATA SHEET NO. 3**  
**TEST VEHICLE INFORMATION**

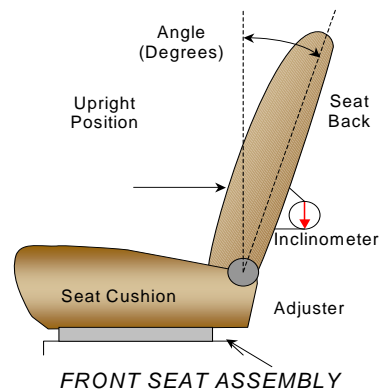
Test Vehicle: 2009 Mazda6 Sedan Sport  
Test Program: NCAP Side Impact

NHTSA No. M95401  
Test Date: 8/28/2008

**NORMAL DESIGN RIDING POSITION**

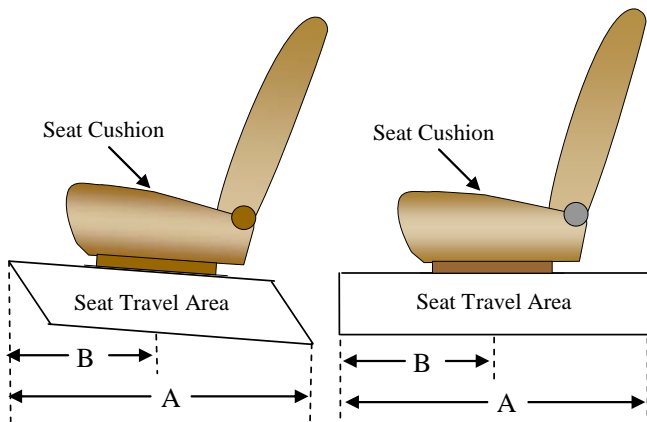
The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows:  
Set at 10.7 degrees on headrest post.

Driver seat back angle: 10.8 degrees from headrest post  
Passenger seat back angle: Fixed



**SEAT FORE/AFT POSITIONS**

	Total Fore/Aft Travel	Placed in position #
Driver Seat	24 detents	11 <sup>th</sup> detent (forward-most as 0)
Rear Seat	Fixed	Fixed



## DATA SHEET NO. 3 (CONTINUED)

### TEST VEHICLE INFORMATION

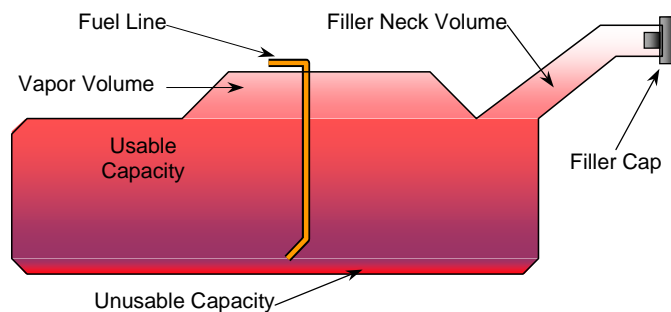
Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008

### FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	70.0
Usable Capacity of "Optional" Tank	64.4 – 65.8
92-94% of Usable Capacity	65.1
Actual Amount of Solvent used	23.3
1/3 of Usable Capacity	23.3

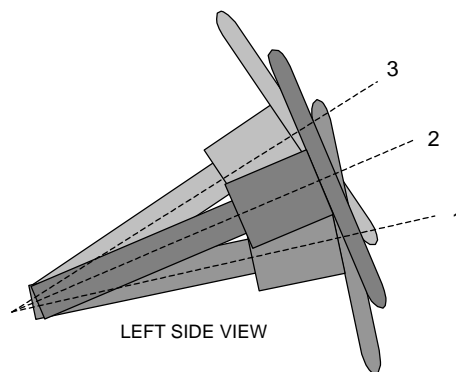
The test vehicle is equipped with an electric fuel pump. The fuel pump operates when starter or engine is activated.



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. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

### STEERING COLUMN POSITION

	Fore/Aft (mm)	Degrees
Lowermost position No. 1	214	65.2
Geometric center position No. 2	239	67.8
Uppermost position No. 3	264	70.4

## DATA SHEET NO. 4

### MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2009 Mazda6 Sedan Sport  
Test Program: NCAP Side Impact

NHTSA No. M95401  
Test Date: 8/28/2008

#### MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2592
C.G. Location aft of Front Axle	1129

#### MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	411.8	281.6	
Right	kg	356.8	311.3	
Ratio	%	56.5	43.5	
Totals	kg	768.6	592.9	1361.5

#### SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.3
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.4
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.7

#### POST TEST OBSERVATIONS MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	15 forward
Vertical Offset	mm	+/-20	3 up

**DATA SHEET NO. 5**

**POST TEST OBSERVATIONS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008

**TEST DUMMY INFORMATION AND CONTACT POINTS**

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID HIII / 271	SID HIII / 272
Head Contact	Curtain Airbag, Headrest, Passenger Seatback	Curtain Airbag, Headrest, Headliner
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Door Panel	Door Panel
Left Knee Contact	Door Panel	Door Panel
Right Knee Contact	Left Knee	Left Knee

**POST TEST DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Front	Rear
Locked/Unlocked Doors	Struck side doors were unlocked; Non-struck side doors were unlocked	Struck side doors were unlocked; Non-struck side doors were unlocked
Left Side Door Opening	Door remained closed and latched	Door remained closed and latched
Right Side Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Movement	0	0
Seat Back Failure	None	None

**POST TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	None
Windshield Damage	Cracked
Window Damage	Left Rear Window Broke
Other Notable Effects	The struck side curtain airbag deployment was partially obstructed by the B-Pillar trim.

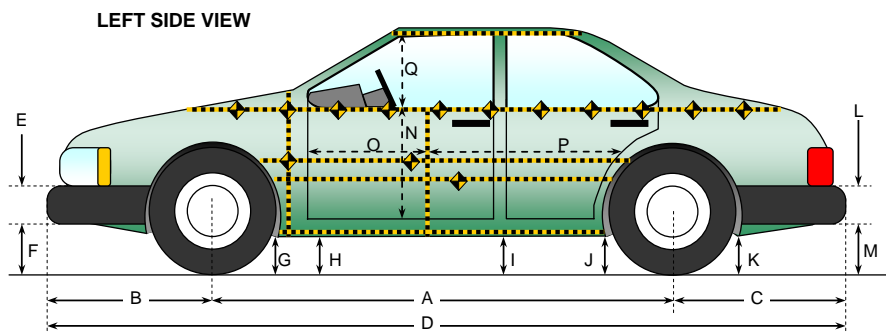
**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Information	Left Front (Driver)		Left Rear (Passenger)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	No	
Side Torso Airbag	Yes	Yes	No	
Curtain Airbag	Yes	Yes	Yes	Yes

**DATA SHEET NO. 6**  
**VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



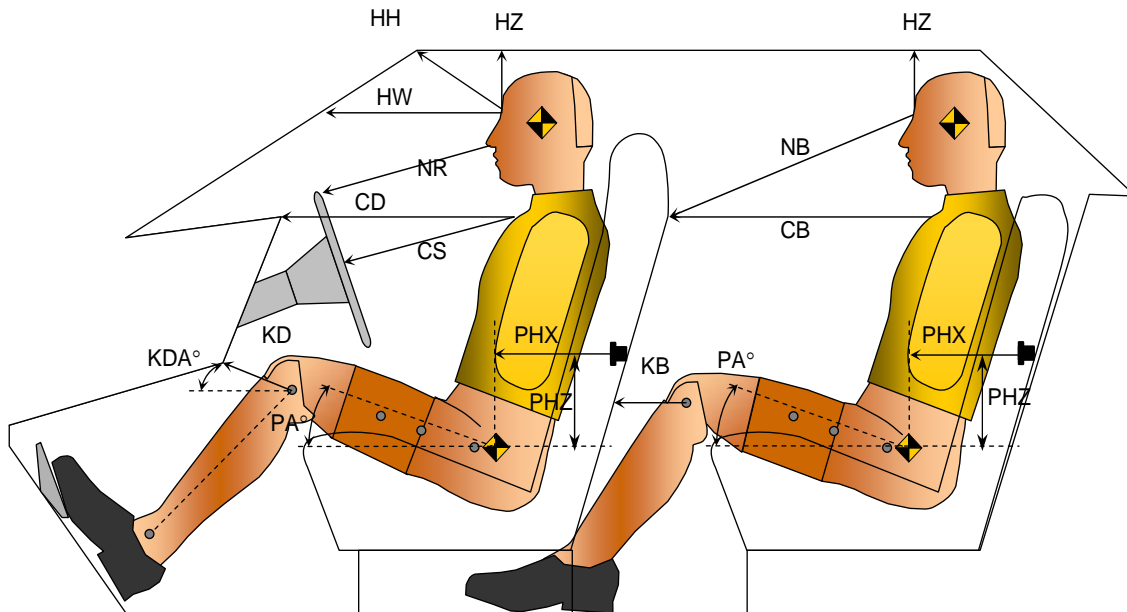
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2785	2774	11
B	Front Axle to FSOV	992	995	-3
C	Rear Axle to RSOV	1093	1095	-2
D	Total Length at Centerline	4870	4864	6
E	Front Bumper Thickness	283	283	0
F	Front Bumper Bottom to Ground	335	335	0
G	Sill Height at Front Wheel Well	172	171	1
H	Sill Height at Front Door Leading Edge	170	170	0
I	Sill Height at "B" Pillar	168	164	4
J1	Sill Height at Rear Wheel Well	150	151	-1
J2	Pinch Weld Height at Rear Wheel Well	155	153	2
K	Sill Height Aft of Rear Wheel Well	194	194	0
L	Rear Bumper Thickness	263	263	0
M	Rear Bumper Bottom to Ground	340	350	-10
N	Sill Height to Window Bottom Sill	699	571	128
O	Front Door Leading Edge to Impact CL	852	776	76
P	Rear Door Trailing Edge to Impact CL	1218	1137	81
Q	Front Window Opening	411	396	15
R	Right Side Length	3574	3575	-1
S	Left Side Length	3574	3543	31
T	Vehicle Width at "B" Post	1840	1613	227

**DATA SHEET NO. 7**  
**SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008

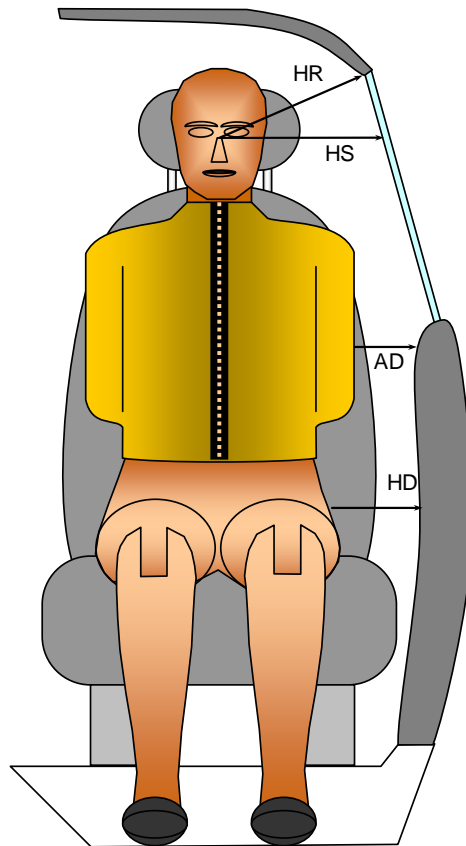


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 272	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	324			
HW		Head to Windshield	614			
HZ	HZ	Head to Roof	158		133	
NR	NB	Nose to Rim/Nose to Seatback	432		691	
CD	CB	Chest to Dash or Seatback	510		606	
CS		Chest to Steering Wheel	318			
KDL	KBL	Left Knee to Dash or Seatback	172	24.3	251	13.8
KDR	KBR	Right Knee to Dash or Seatback	125	30.1	255	21.6
PA	PA	Pelvic Angle		24.0		23.8
PHX	PHX	H-Point to Striker (X-Axis)	264		298	
PHZ	PHZ	H-Point to Striker (Z-Axis)	206		345	

**DATA SHEET NO. 8**  
**SID/HIII LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



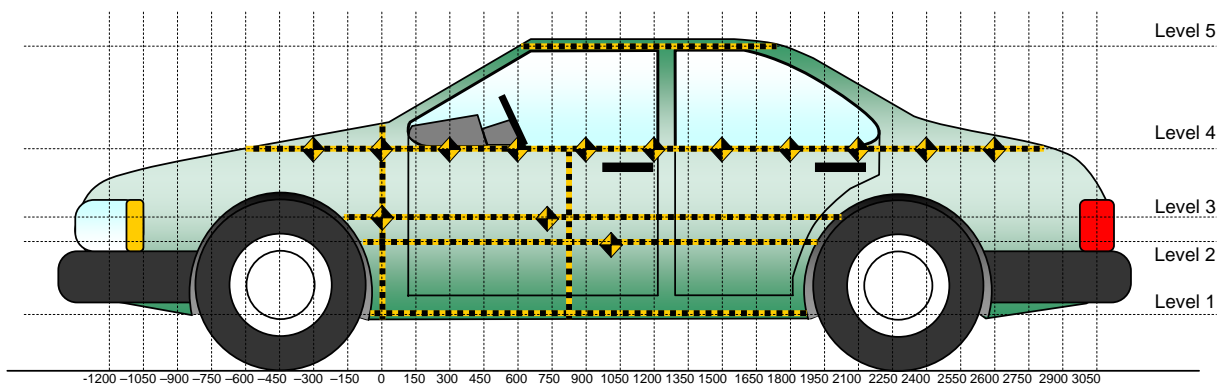
*FRONT VIEW OF DUMMY*

Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 272
HR	Head to Side Header	mm	173	186
HS	Head to Side Window	mm	303	326
AD	Arm to Door	mm	118	117
HD	H-Point to Door	mm	172	204

**DATA SHEET NO. 9**  
**VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
Test Program: NCAP Side Impact

NHTSA No. M95401  
Test Date: 8/28/2008



All Measurements Shown in mm

**LEFT SIDE VIEW**

Measurements are taken with vehicle in the as tested condition.  
Measurements along the vertical 800 mm.  
All measurements below in mm.

Level	Measurement Description	Maximum Exterior Static Crush	Distance From Impact	Height Above Ground
5	Window	25	1650	1365
4	Window Sill	137	1650	940
3	Mid Door	250	1650	620
2	Occupant H-Point	263	1050	480
1	Sill Top	96	1200	275
	Maximum Penetration	263		

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

Test Vehicle: 2009 Mazda6 Sedan Sport  
Test Program: NCAP Side Impact

NHTSA No. M95401  
Test Date: 8/28/2008

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-450				341					345					4	
-300				326					340					14	
-150			180	311				195	335				15	24	
0	221	194	196	296		246	186	225	314		25	-8	29	18	
150	231	200	197	285		196	310	310	326		-35	110	113	41	
300	233	195	191	278		232	356	352	350		-1	161	161	72	
450	233	191	187	274		252	377	363	365		19	186	176	91	
600	236	187	184	272		268	395	374	374		32	208	190	102	
750	233	185	181	272	515	288	410	385	379	529	55	225	204	107	14
900	235	183	180	271	515	303	427	405	390	531	68	244	225	119	16
1050	234	182	180	271	515	329	445	417	386	534	95	263	237	115	19
1200	234	185	181	271	514	330	444	425	390	539	96	259	244	119	25
1350	236	187	183	275	516	319	449	429	391	540	83	262	246	116	24
1500	237	187	184	276	516	310	442	433	406	541	73	255	249	130	25
1650	234	189	187	279	517	316	437	437	416	542	82	248	250	137	25
1800	221	192	190	281	519	290	385	414	415	542	69	193	224	134	25
1950	201	183	183	281	524	225	248	302	355	540	24	65	119	74	16
2100			180	283				219	305				39	22	
2250				284					274					-10	
2400				286					305					19	
2550				293					307					14	
2700				299					307					8	
2850				313					318					5	

Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

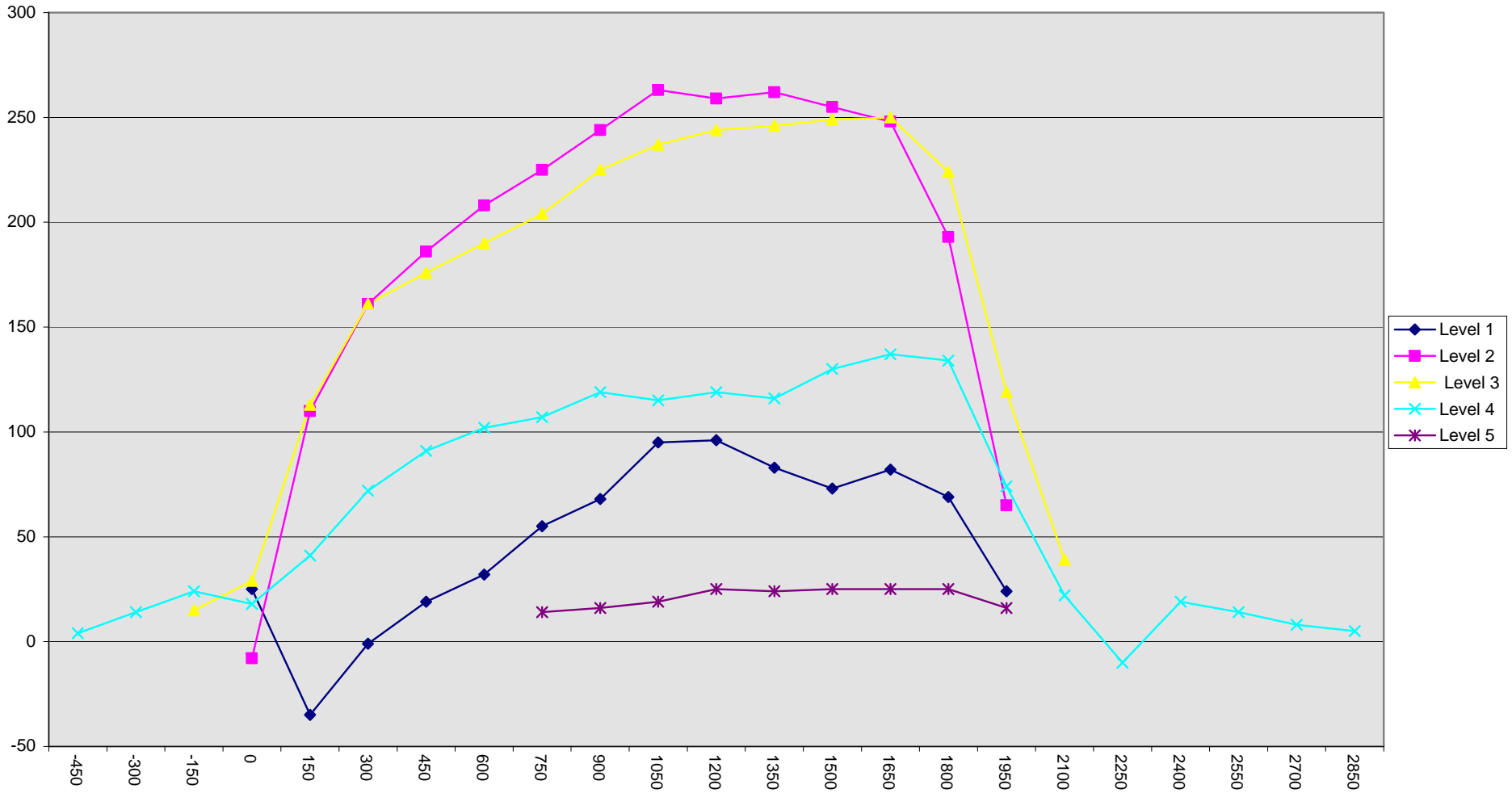
DATA SHEET NO. 10... (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2009 Mazda6 Sedan Sport  
Test Program: NCAP Side Impact

NHTSA No. M95401  
Test Date: 8/28/2008

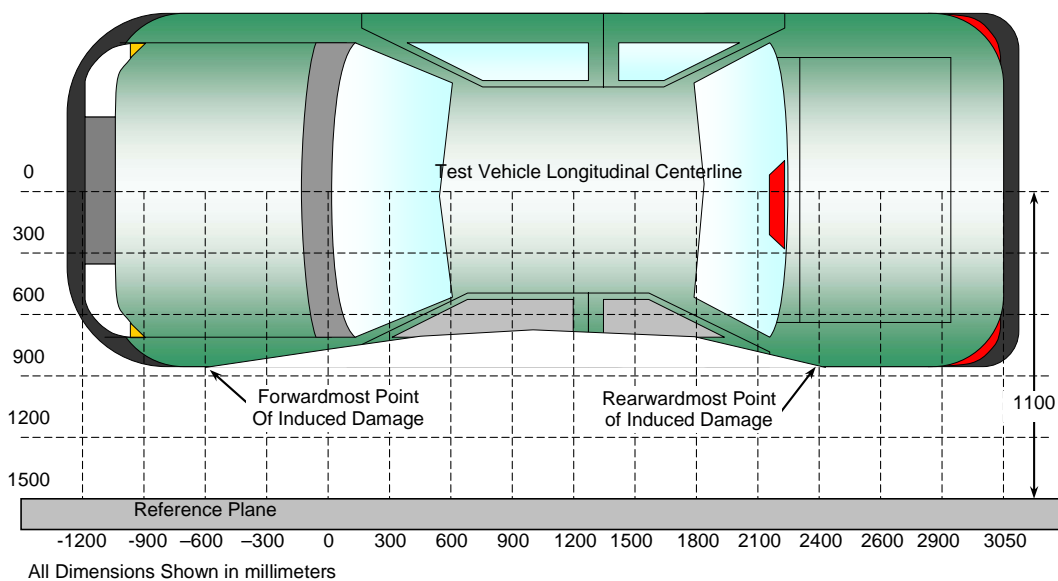
16



**DATA SHEET NO. 11**  
**VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



**TOP VIEW**

**DAMAGE PROFILE DISTANCES**

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2850	4	313	318	5
2	2215	4	180	244	64
3	1525	2	187	453	266
4	850	2	183	434	251
5	185	4	285	370	85
6	-450	4	341	345	4

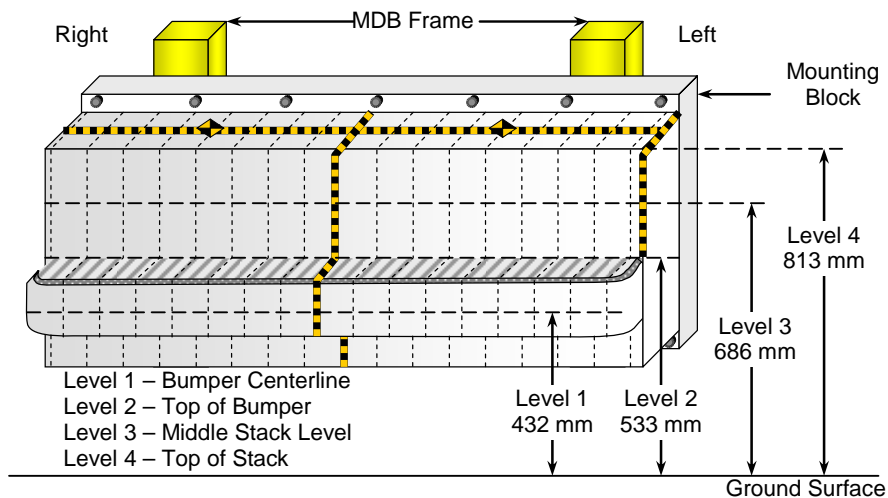
Reference plane is parallel to test vehicle longitudinal centerline.  
 Given dimensions = Reference plane to car body.

## DATA SHEET NO. 12

### DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



### DEFORMABLE BARRIER STATIC CRUSH

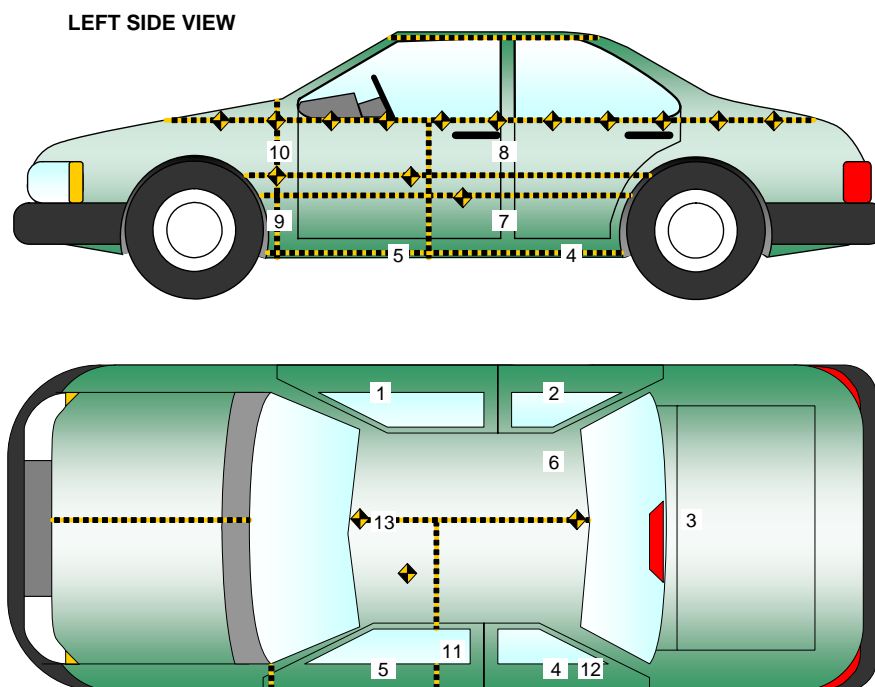
Stack Level	Distance Right of Center								C <sub>L</sub>	Distance Left of Center							
	800	700	600	500	400	300	200	100		0	100	200	300	400	500	600	700
1	166	152	148	139	139	142	138	135	132	133	129	128	127	124	126	130	130
2	82	77	65	57	53	53	65	60	65	73	72	77	78	76	77	81	95
3	30	5	10	15	18	39	41	25	23	19	21	25	31	41	60	82	95
4	20	-2	1	13	31	67	79	71	55	32	33	39	45	50	65	80	101

All Dimensions in mm

**DATA SHEET NO. 13**  
**VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



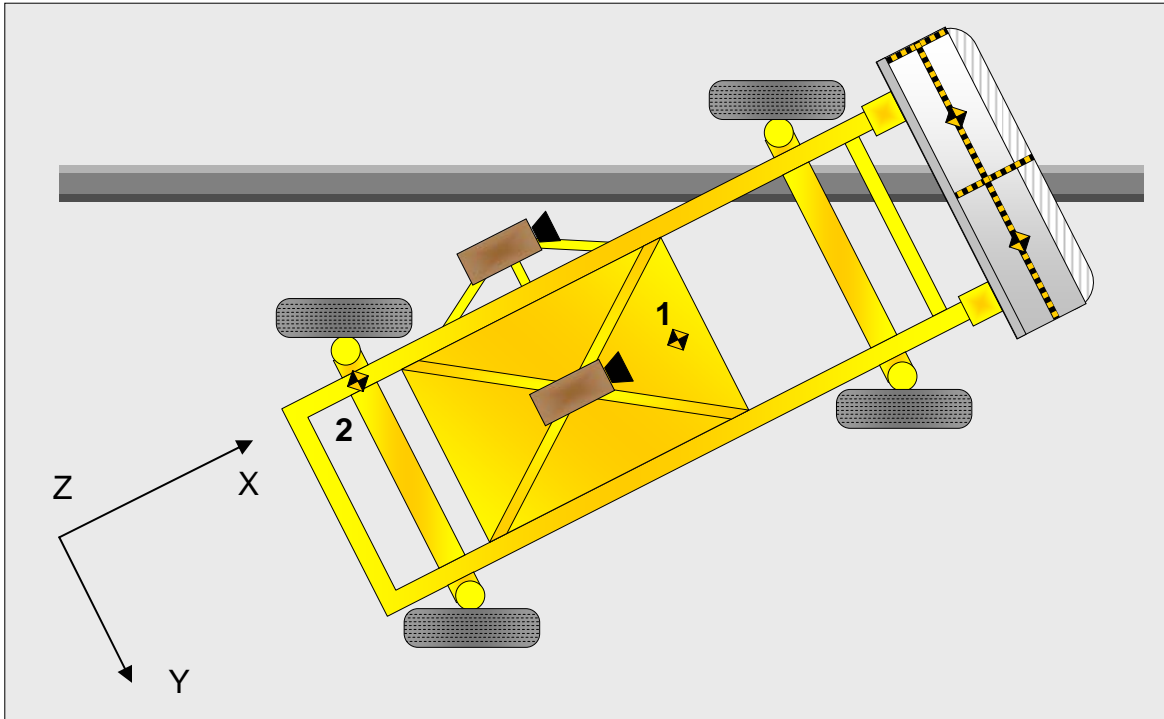
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2648	703	-203
2	Right Sill at Rear Seat	1753	707	-218
3	Rear Floorpan Above Axle	997	0	-510
4	Left Sill at Rear Door	1734	-707	-202
5	Left Sill at Front Door	2683	-703	-203
6	Rear Occupant Compartment	1961	-394	-341
7	Left Lower B-Post	2246	-724	-508
8	Left Middle B-Post	2218	-738	-753
9	Left Lower A-Post	3363	-718	-527
10	Left Middle A-Post	3378	-796	-760
11	Front Seat Track	2567	-556	-306
12	Rear Seat Track or Structure			
13	Vehicle CG	2700	0	-395

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

**DATA SHEET NO. 14**  
**MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1105	0	-330
2	MDB Rear	-2580	-650	-625

Reference Points    X - MDB Front Axle (+ forward)  
                           Y - MDB Centerline (+ to right)  
                           Z - Ground Plane (+ down)

**DATA SHEET NO. 15**  
**VEHICLE STRUCTURAL MEASUREMENTS**

Test Vehicle: 2009 Mazda6 Sedan Sport  
Test Program: NCAP Side Impact

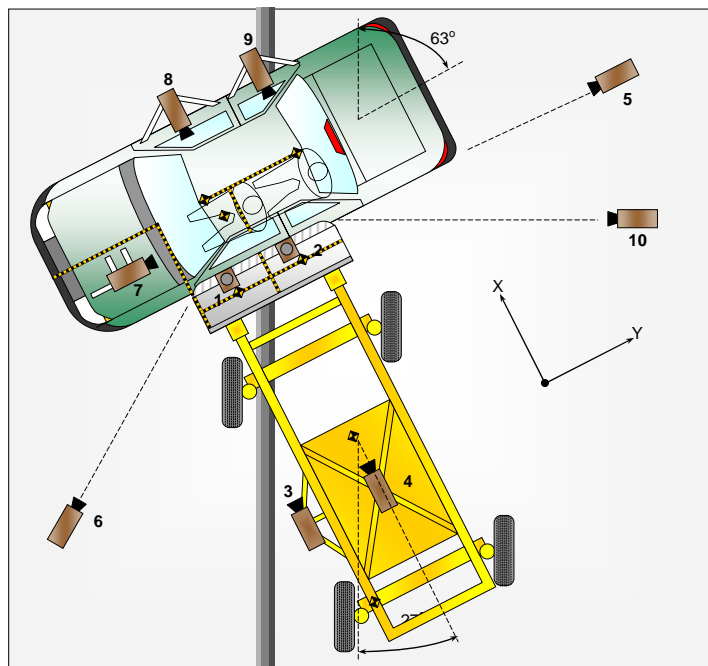
NHTSA No. M95401  
Test Date: 8/28/2008

	Elements	Pre-Test (mm)
1	Total Length	4870
2	Total Width	1840
3	Bumper Top Height	510
4	Bumper Bottom Height	426
5	Longitudinal Member Top Height	566
6	Distance between Longitudinal Members	1085
7	Longitudinal Member Width	82
8	Engine Top Height	842
9	Engine Bottom Height	213
10	Engine and gearbox width	857
11	Front bumper-engine distance	479
12	Front shock absorber fixing height	897
13	Bonnet leading edge height	752
14	Front shock absorber fixing width	990
15	Front bumper – front axle distance	992
16	Front axle – a pillar distance	431
17	A-pillar – B-pillar distance	1189
18	B-Pillar – rear axle distance	1170
19	B-pillar – C-pillar distance	998
20	Roof sill bottom height	1396
21	Roof sill top height	1438
22	Floor sill bottom height	217
23	Floor sill top height	306

**DATA SHEET NO. 16**  
**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	690	1170	5050	50	1000
2	Overhead Overall	-890	0	5050	14	1000
3	MDB Onboard, Impact Point Close-up				50	1000
4	MDB Onboard, Centerline of Impact				16	1000
5	Right Side, Ground Level, Overall	-3530	5380	1280	20	1000
6	Left Side, Ground Level, Overall	3510	-4340	1150	24	1000
7	Vehicle Onboard Front SID/HIII, Front				12.5	1000
8	Vehicle Onboard Front SID/HIII, Side				8	1000
9	Vehicle Onboard Rear SID/HIII, Side				8	1000
10	Real Time Coverage				13	24

Reference Points X - Impact Line  
 Y - MDB Left Edge Impact Point  
 Z - Ground Plane

Camera #7 did not record video.

**DATA SHEET NO. 17**  
**SUMMARY OF FMVSS 301 DATA**

Test Vehicle: 2009 Mazda6 Sedan Sport  
 Test Program: NCAP Side Impact

NHTSA No. M95401  
 Test Date: 8/28/2008

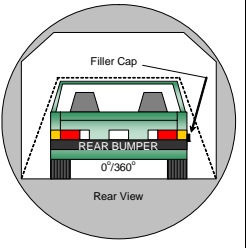
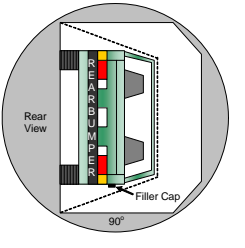
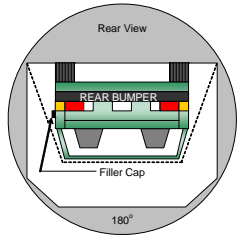
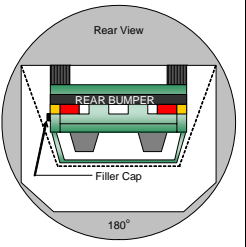
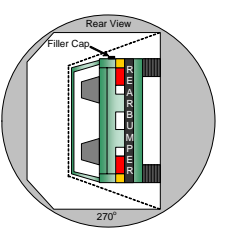
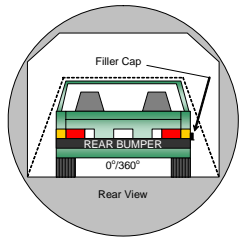
**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 21° C      Test Time: 10:49 am

Stoddard Solvent Spillage Measurements

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

**FMVSS 301 STATIC ROLLOVER DATA**

			<p>1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.</p> <p>2. The position hold time at each position is 300 seconds (minimum).</p> <p>3. Details of Stoddard Solvent spillage locations: <b>None</b></p>	
0° to 90°		90° to 180°		
				
180° to 270°		270° to 360°		

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage Collection Time (min)	Spillage (oz.)
0° to 90°	121	300	First 5	0
90° to 180°	117	300	First 5	0
180° to 270°	119	300	First 5	0
270° to 360°	120	300	First 5	0

**APPENDIX A**  
**PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 1.	Left Front $\frac{3}{4}$ View, As Received	A-1
Photo No. 2.	Right Rear $\frac{3}{4}$ View, As Received	A-1
Photo No. 3.	Manufacturer's Label	A-2
Photo No. 4.	Tire Placard	A-2
Photo No. 5.	Pre-Test Front View	A-3
Photo No. 6.	Post-Test Front View	A-3
Photo No. 7.	Pre-Test Left Front $\frac{3}{4}$ View	A-4
Photo No. 8.	Post-Test Left Front $\frac{3}{4}$ View	A-4
Photo No. 9.	Pre-Test Left Side View	A-5
Photo No. 10.	Post-Test Left Side View	A-5
Photo No. 11.	Pre-Test Left Rear $\frac{3}{4}$ View	A-6
Photo No. 12.	Post-Test Left Rear $\frac{3}{4}$ View	A-6
Photo No. 13.	Pre-Test Rear View	A-7
Photo No. 14.	Post-Test Rear View	A-7
Photo No. 15.	Pre-Test Right Rear $\frac{3}{4}$ View	A-8
Photo No. 16.	Post-Test Right Rear $\frac{3}{4}$ View	A-8
Photo No. 17.	Pre-Test Right Side View	A-9
Photo No. 18.	Post-Test Right Side View	A-9
Photo No. 19.	Pre-Test Right Front $\frac{3}{4}$ View	A-10
Photo No. 20.	Post-Test Right Front $\frac{3}{4}$ View	A-10
Photo No. 21.	Pre-Test Left Impact Point	A-11
Photo No. 22.	Post-Test Left Impact Point	A-11
Photo No. 23.	Pre-Test Front $\frac{3}{4}$ View of Left Side Doors	A-12
Photo No. 24.	Post-Test Front $\frac{3}{4}$ View of Left Side Doors	A-12
Photo No. 25.	Pre-Test Rear $\frac{3}{4}$ View of Left Side Doors	A-13
Photo No. 26.	Post-Test Rear $\frac{3}{4}$ View of Left Side Doors	A-13
Photo No. 27.	Pre-Test Left Side Impact Close-up	A-14
Photo No. 28.	Post-Test Left Side Impact Close-up	A-14
Photo No. 29.	Pre-Test Overhead View	A-15

	<u>Page No.</u>
Photo No. 30. Post-Test Overhead View	A-15
Photo No. 31. Pre-Test Overhead Close-up View	A-16
Photo No. 32. Post-Test Overhead Close-up View	A-16
Photo No. 33. Pre-Test Driver Dummy (Door Open)	A-17
Photo No. 34. Pre-Test Driver Dummy Clearance From Door	A-18
Photo No. 35. Post-Test Driver Dummy Clearance From Door	A-18
Photo No. 36. Pre-Test Driver Dummy (Through Window)	A-19
Photo No. 37. Post-Test Driver Dummy (Through Window)	A-19
Photo No. 38. Pre-Test Driver Dummy Right Side View	A-20
Photo No. 39. Post-Test Driver Dummy Right Side View	A-20
Photo No. 40. Pre-Test Passenger Dummy (Door Open)	A-21
Photo No. 41. Pre-Test Passenger Dummy Clearance From Door	A-22
Photo No. 42. Post-Test Passenger Dummy Clearance From Door	A-22
Photo No. 43. Pre-Test Passenger Dummy (Through Window)	A-23
Photo No. 44. Post-Test Passenger Dummy (Through Window)	A-23
Photo No. 45. Pre-Test Passenger Dummy Right Side View	A-24
Photo No. 46. Post-Test Passenger Dummy Right Side View	A-24
Photo No. 47. Pre-Test Front View of Deformable Barrier	A-25
Photo No. 48. Post-Test Front View of Deformable Barrier	A-25
Photo No. 49. Pre-Test Top View of Deformable Barrier	A-26
Photo No. 50. Post-Test Top View of Deformable Barrier	A-26
Photo No. 51. Pre-Test Right Side View of Deformable Barrier	A-27
Photo No. 52. Post-Test Right Side View of Deformable Barrier	A-27
Photo No. 53. Pre-Test Left Side View of Deformable Barrier	A-28
Photo No. 54. Post-Test Left Side View of Deformable Barrier	A-28
Photo No. 55. Vehicle on Rollover Device (90 Degrees)	A-29
Photo No. 56. Vehicle on Rollover Device (180 Degrees)	A-29
Photo No. 57. Vehicle on Rollover Device (270 Degrees)	A-30
Photo No. 58. Vehicle on Rollover Device (360 Degrees)	A-30
Photo No. 59. Vehicle Impact	A-31
Photo No. 60. Post-Test Driver Dummy Head Contact	A-32

	<u>Page No.</u>
Photo No. 61. Post-Test Driver Dummy Head Contact	A-32
Photo No. 62. Post-Test Driver Dummy Upper Torso Contact	A-33
Photo No. 63. Post-Test Driver Dummy Lower Torso Contact	A-33
Photo No. 64. Post-Test Driver Dummy Contact	A-34
Photo No. 65. Post-Test Passenger Dummy Head Contact	A-35
Photo No. 66. Post-Test Passenger Dummy Head Contact	A-35
Photo No. 67. Post-Test Passenger Dummy Torso Contact	A-36
Photo No. 68. Post-Test Passenger Dummy Contact	A-36



Left Front  $\frac{3}{4}$  View, As Received



Right Rear  $\frac{3}{4}$  View, As Received



Manufacturer's Label



Tire Placard



Pre-Test Front View



Post-Test Front View



Pre-Test Left Front  $\frac{3}{4}$  View



Post-Test Left Front  $\frac{3}{4}$  View



Pre-Test Left Side View



Post-Test Left Side View



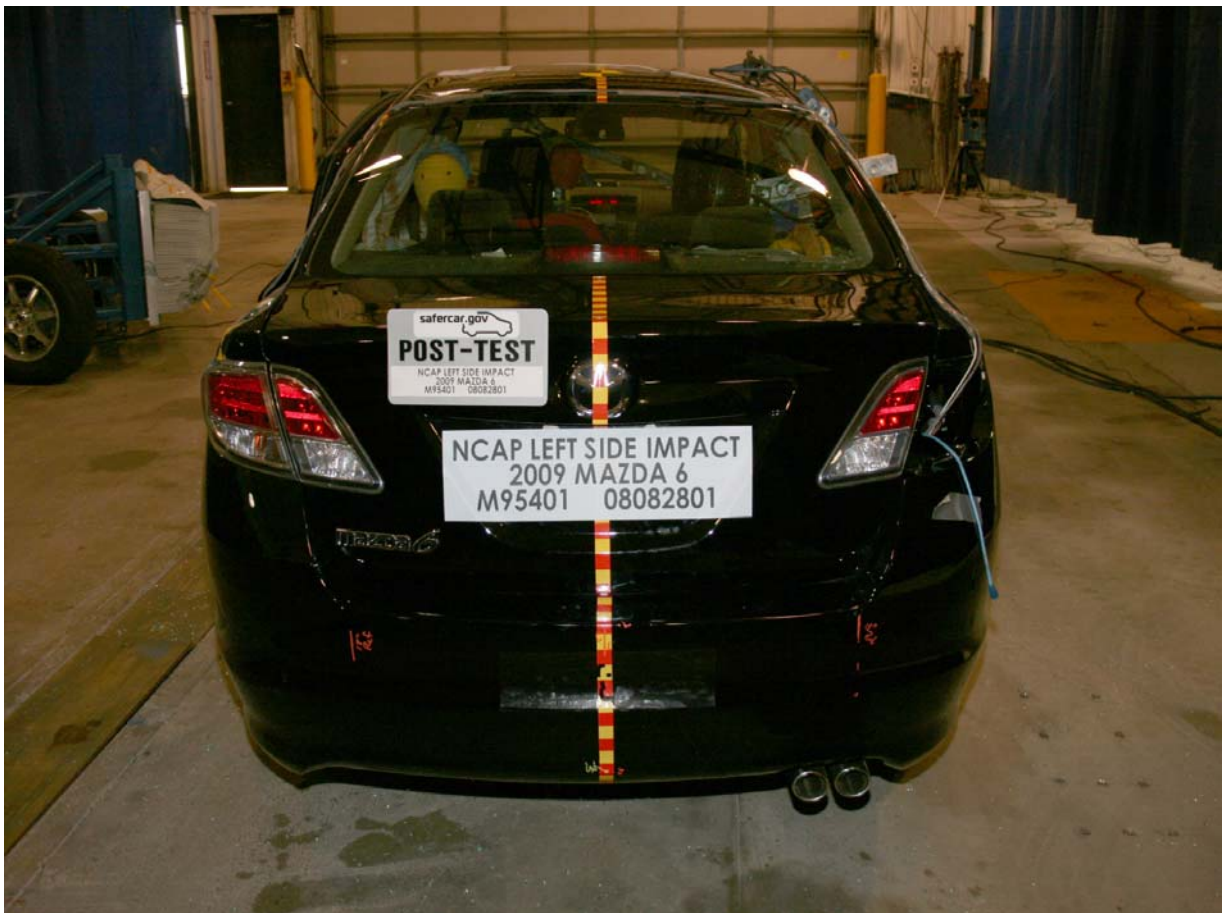
Pre-Test Left Rear 3/4 View



Post-Test Left Rear 3/4 View



Pre-Test Rear View



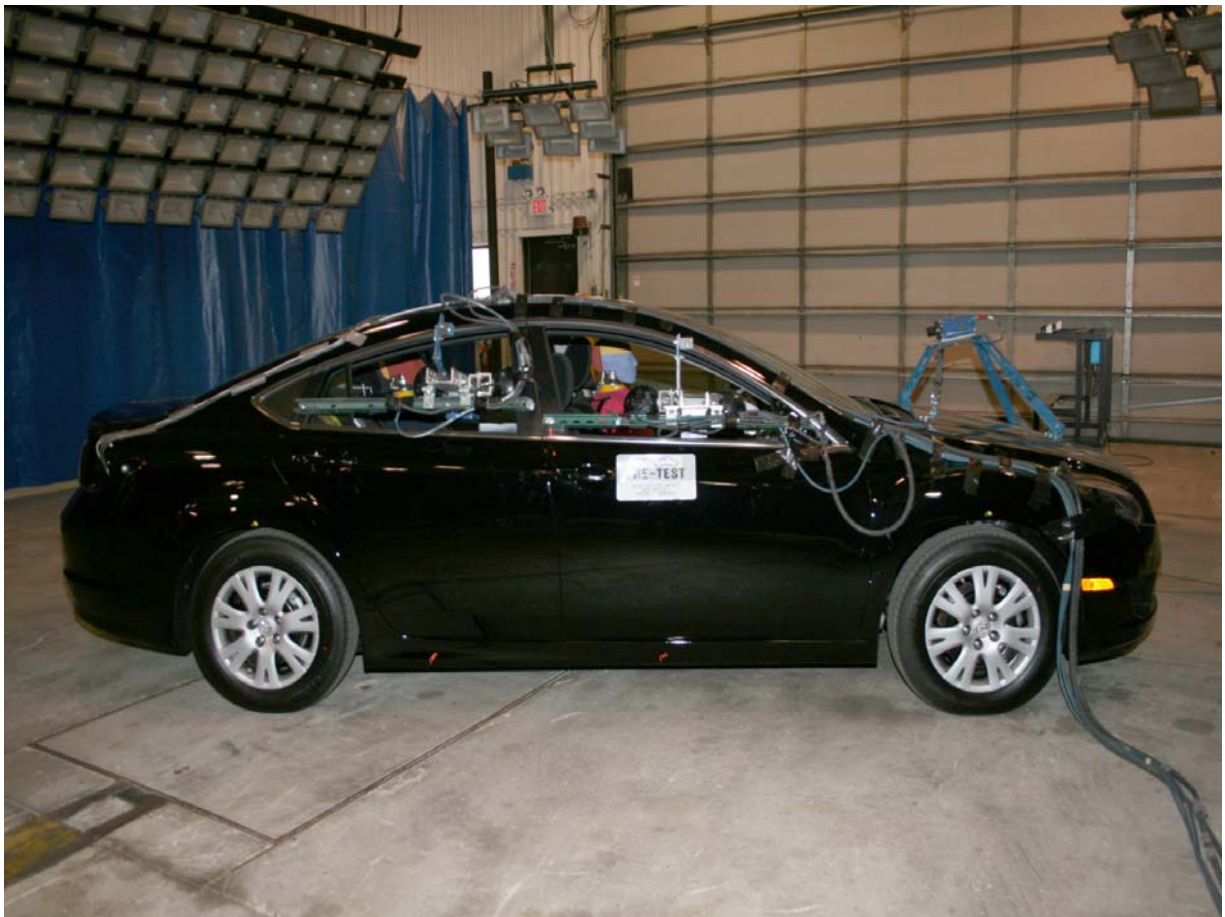
Post-Test Rear View



Pre-Test Right Rear  $\frac{3}{4}$  View



Post-Test Right Rear  $\frac{3}{4}$  View



Pre-Test Right Side View



Post-Test Right Side View



Pre-Test Right Front 3/4 View



Post-Test Right Front 3/4 View



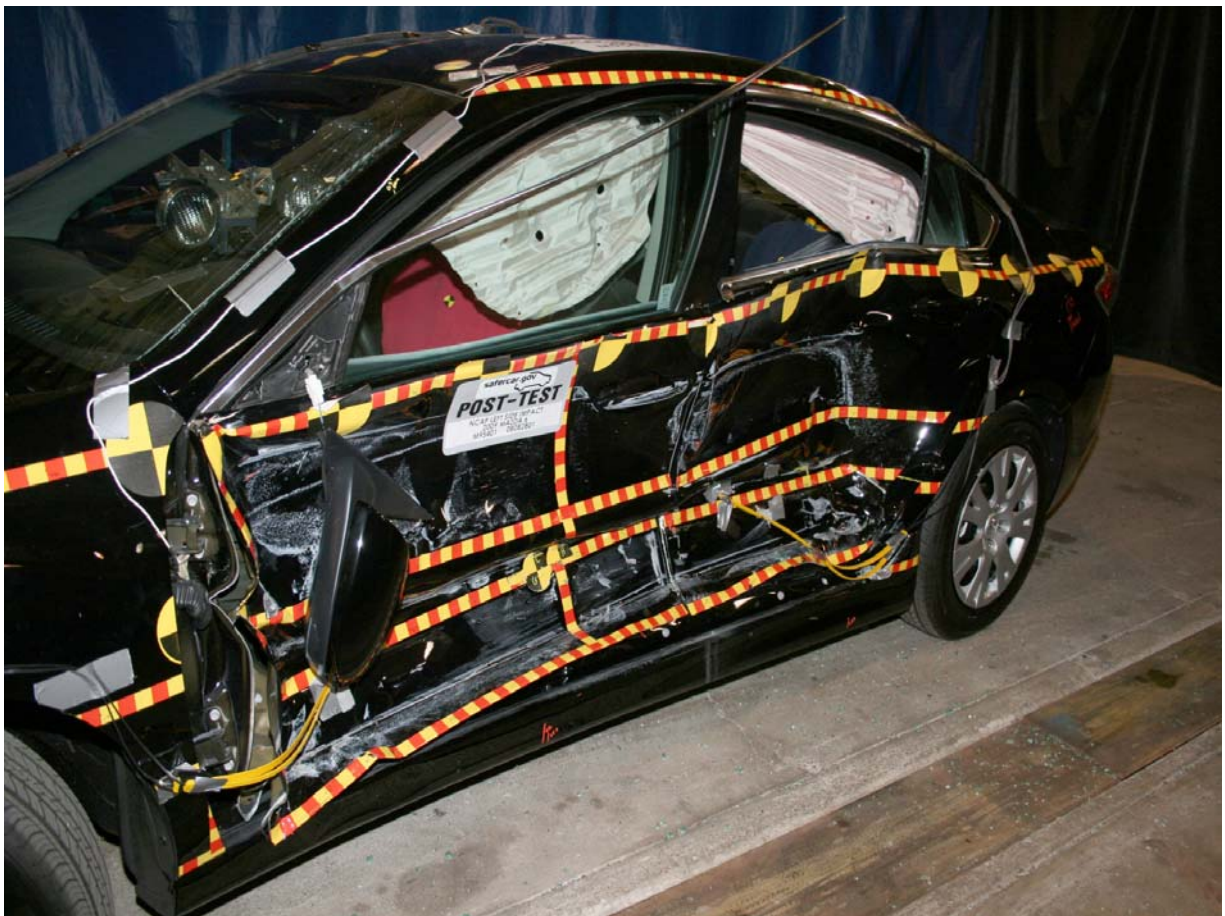
Pre-Test Left Impact Point



Post-Test Left Impact Point



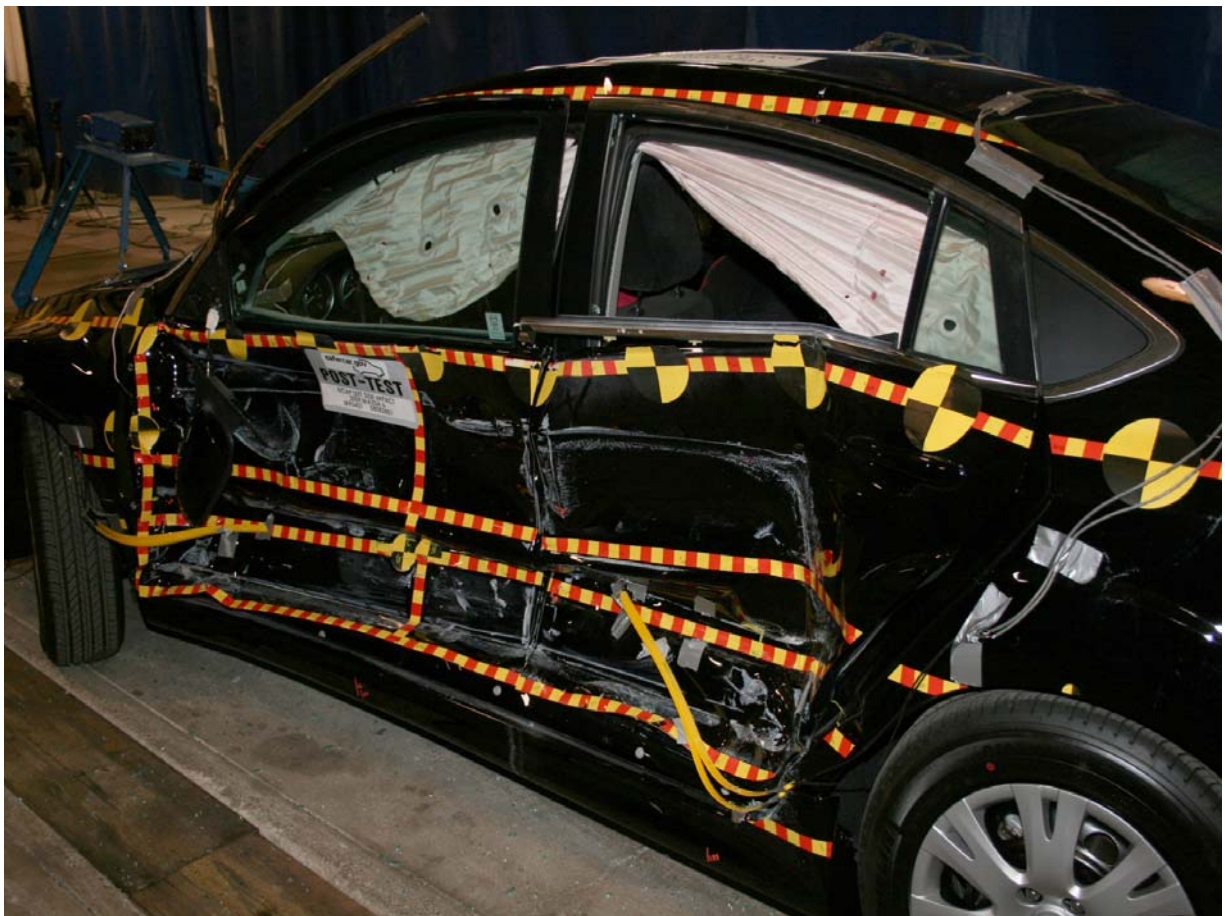
Pre-Test Front  $\frac{3}{4}$  View of Left Side Doors



Post-Test Front  $\frac{3}{4}$  View of Left Side Doors



Pre-Test Rear  $\frac{3}{4}$  View of Left Side Doors



Post-Test Rear  $\frac{3}{4}$  View of Left Side Doors



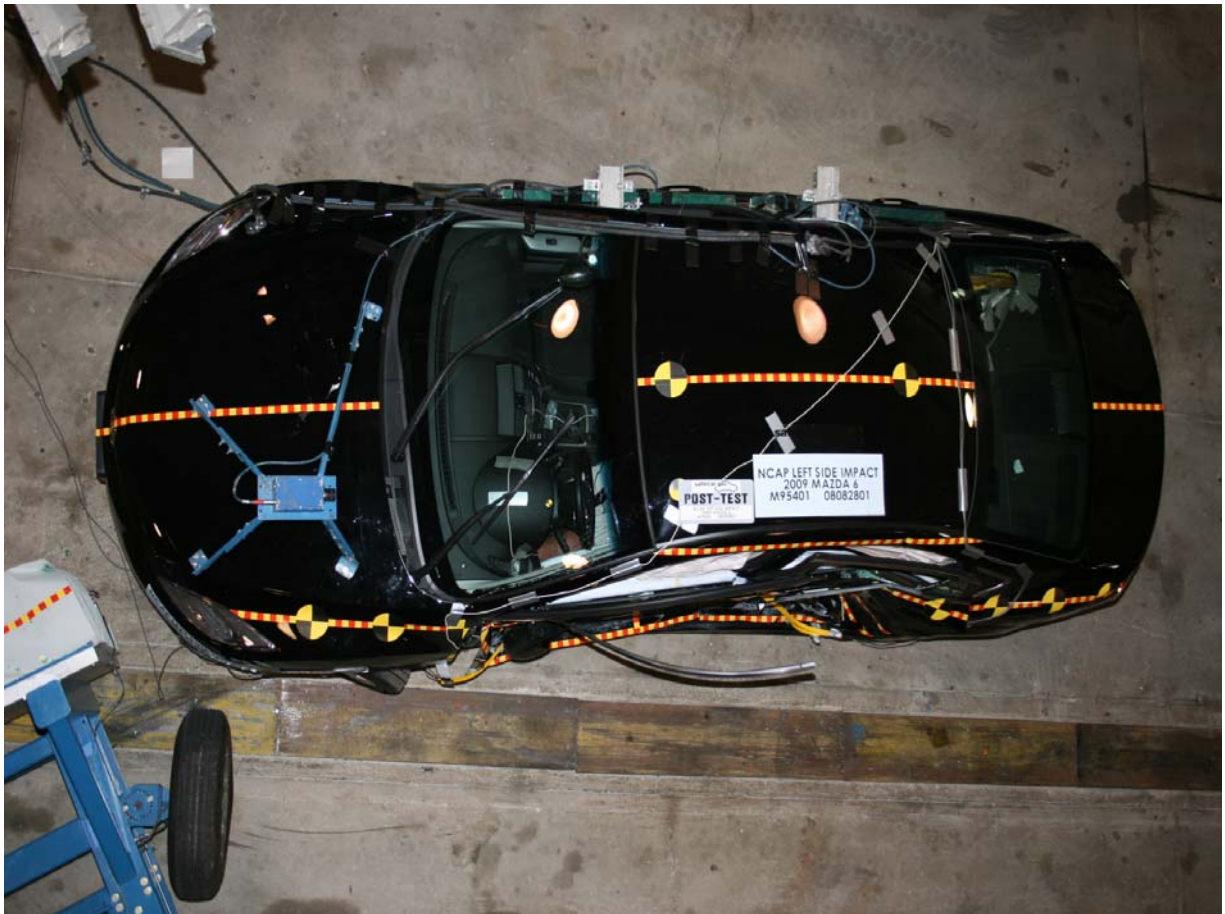
Pre-Test Left Side Impact Close-up



Post-Test Left Side Impact Close-up



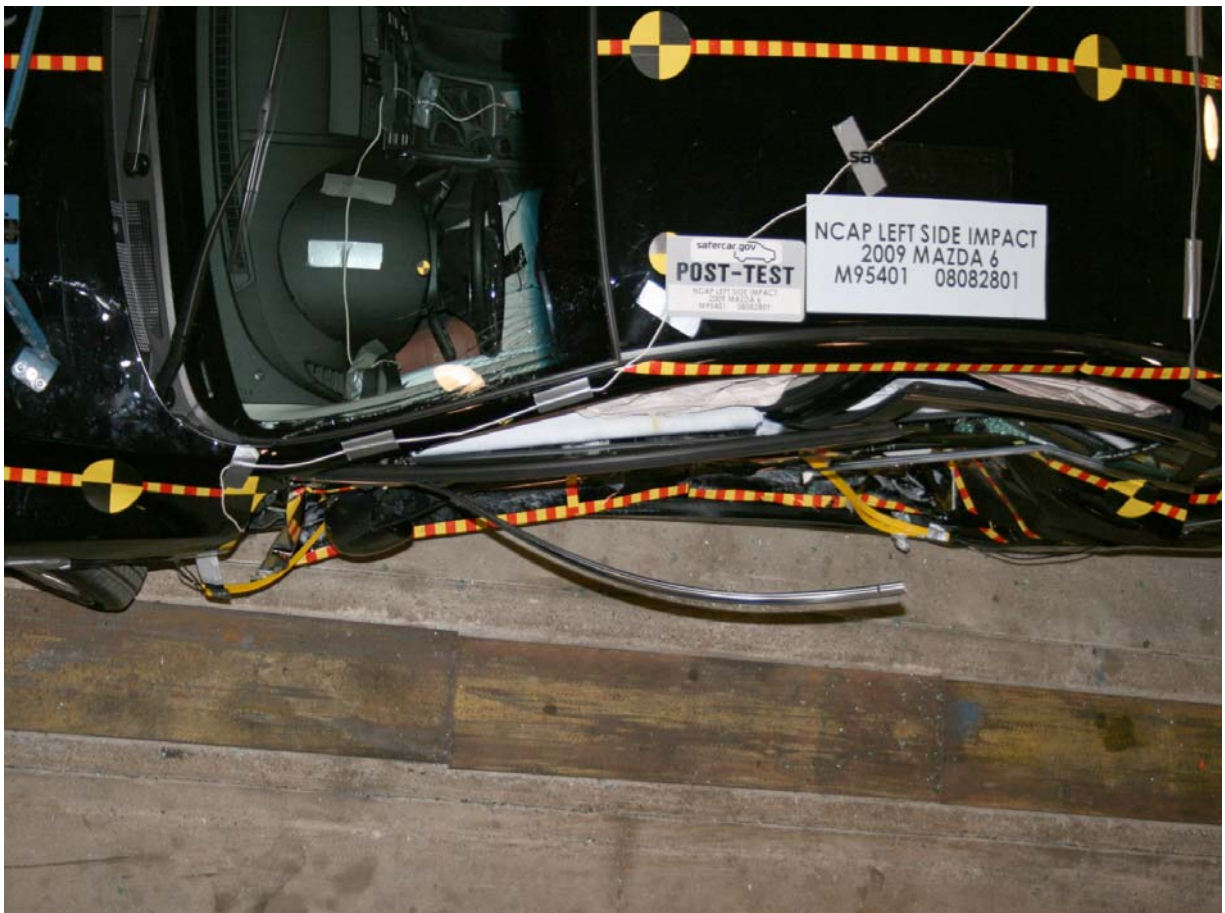
Pre-Test Overhead View



Post-Test Overhead View



Pre-Test Overhead Close-up View



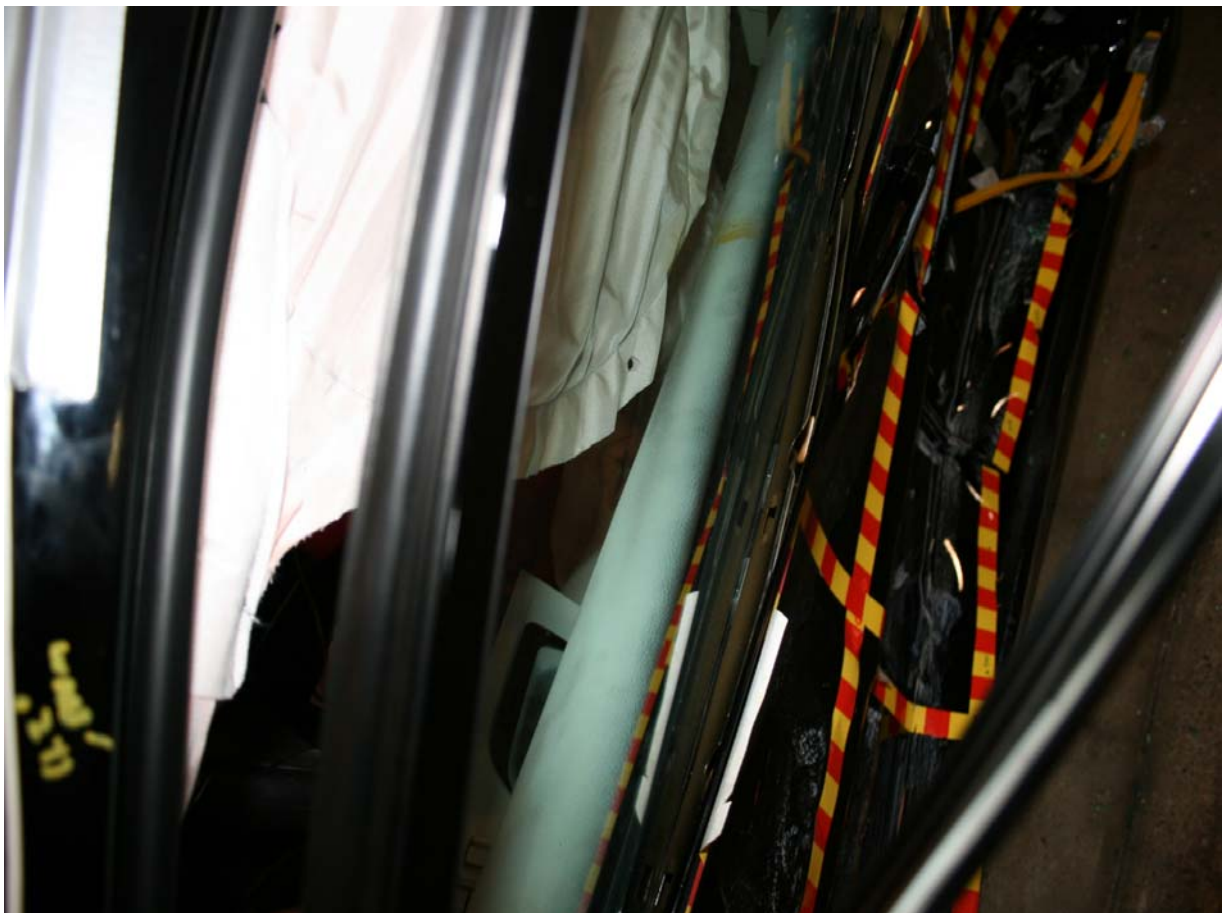
Post-Test Overhead Close-up View



Pre-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Clearance From Door



Post-Test Driver Dummy Clearance From Door



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy Clearance From Door



Post-Test Passenger Dummy Clearance From Door



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Pre-Test Passenger Dummy Right Side View



Post-Test Passenger Dummy Right Side View



Pre-Test Front View of Deformable Barrier



Post-Test Front View of Deformable Barrier



Pre-Test Top View of Deformable Barrier



Post-Test Top View of Deformable Barrier



Pre-Test Right Side View of Deformable Barrier



Post-Test Right Side View of Deformable Barrier



Pre-Test Left Side View of Deformable Barrier

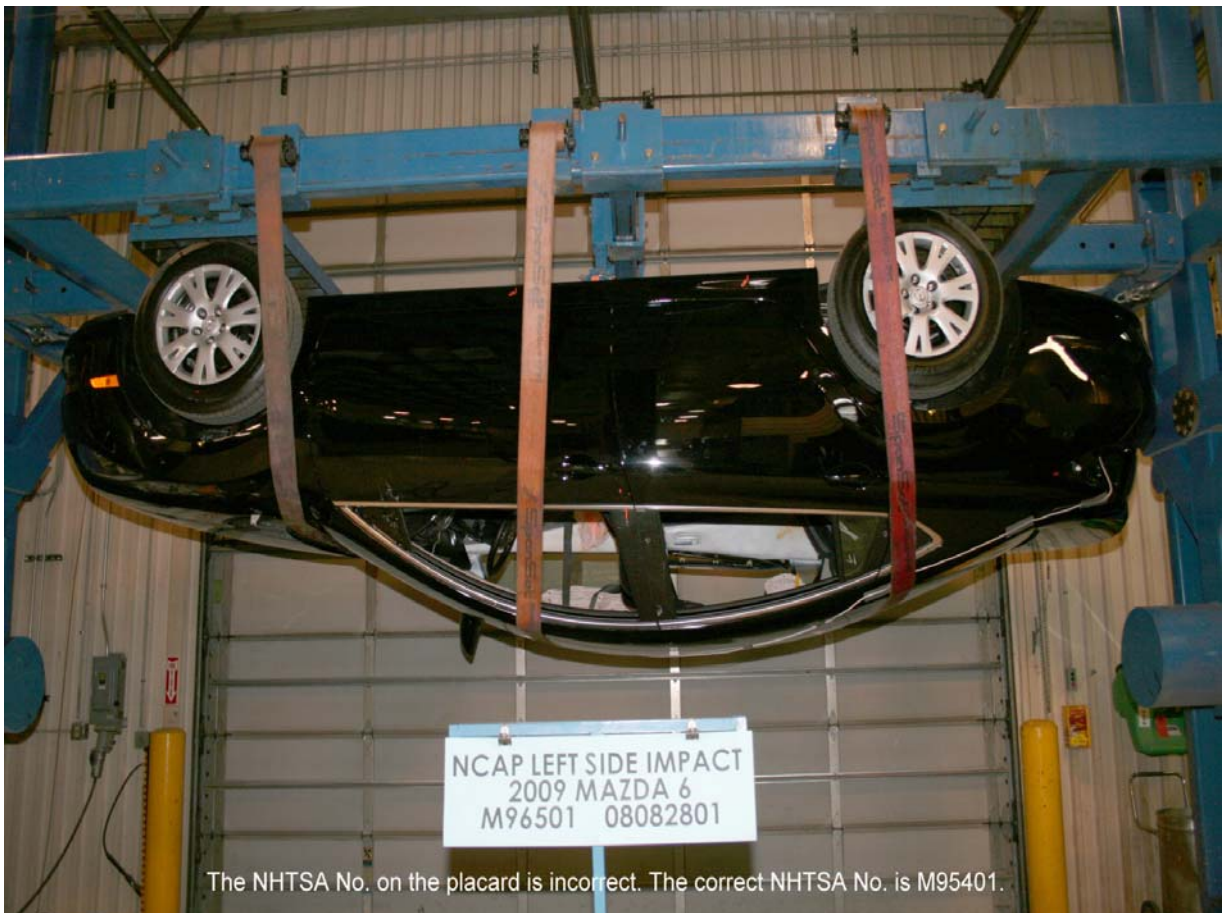


Post-Test Left Side View of Deformable Barrier



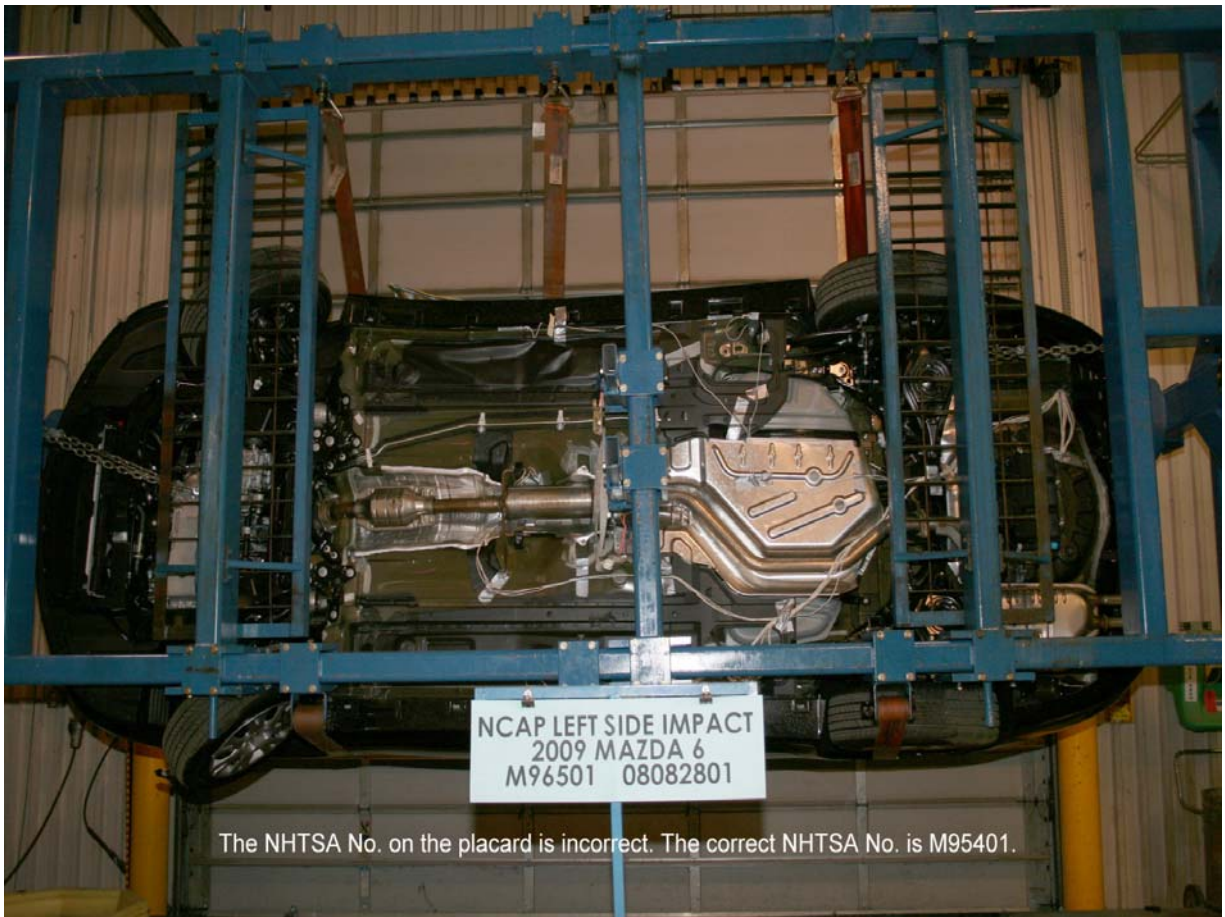
The NHTSA No. on the placard is incorrect. The correct NHTSA No. is M95401.

Vehicle on Rollover Device (90 Degrees)



The NHTSA No. on the placard is incorrect. The correct NHTSA No. is M95401.

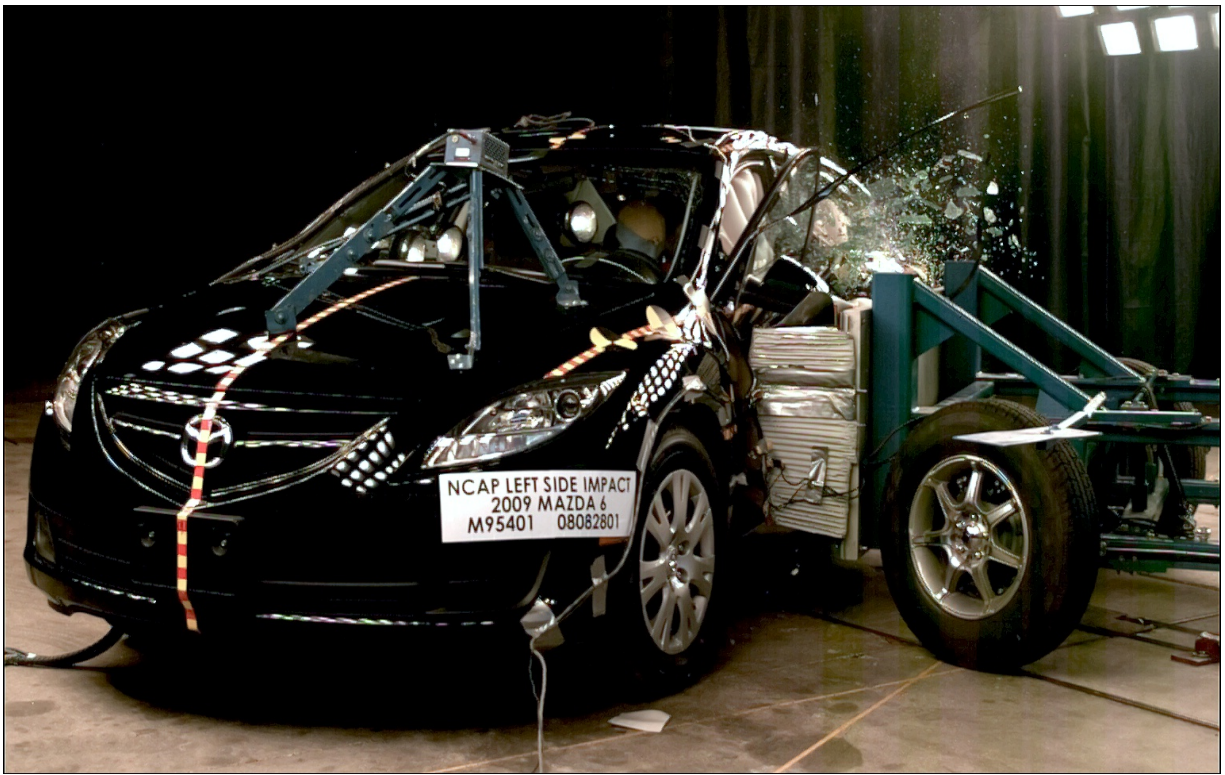
Vehicle on Rollover Device (180 Degrees)



Vehicle on Rollover Device (270 Degrees)



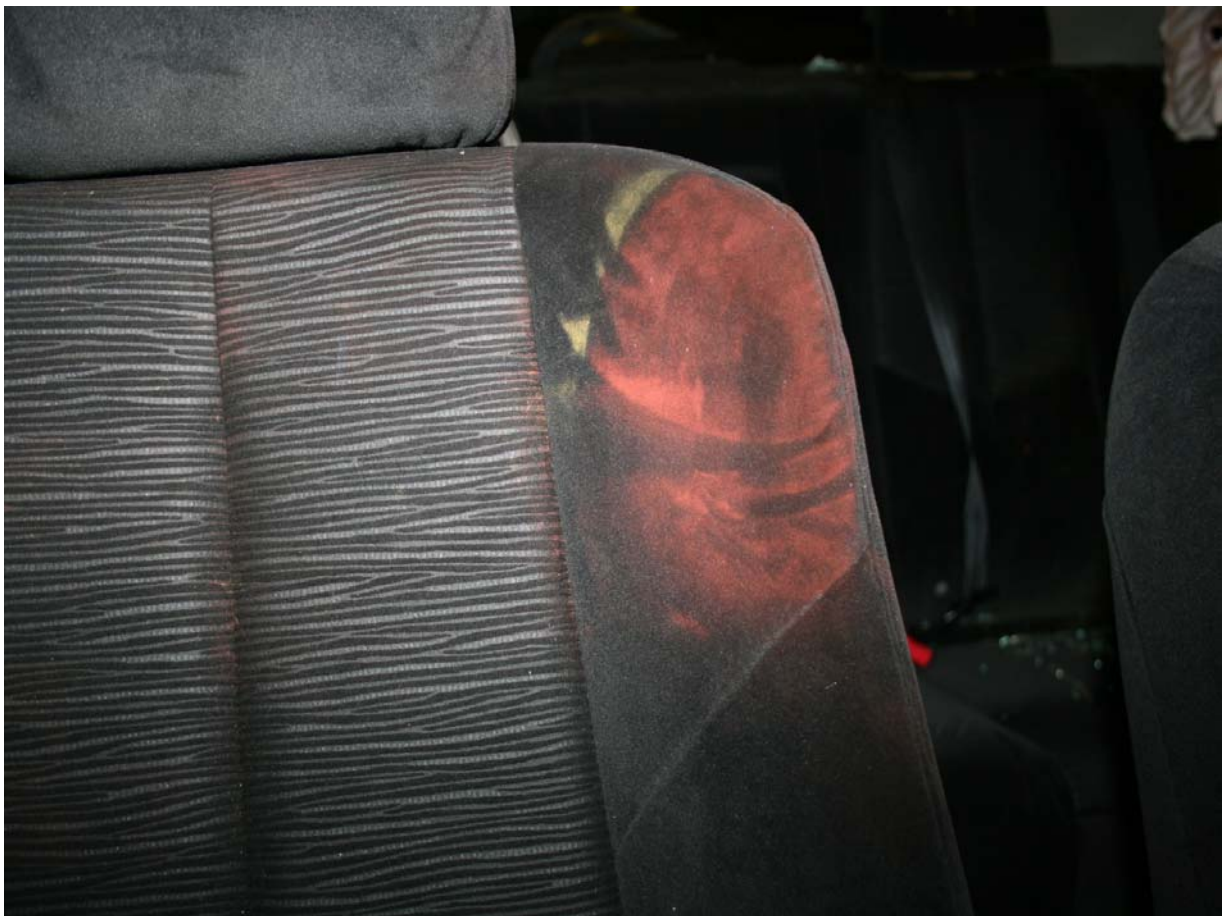
Vehicle on Rollover Device (360 Degrees)



Vehicle Impact



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Upper Torso Contact



Post-Test Driver Dummy Lower Torso Contact



Post-Test Driver Dummy Contact



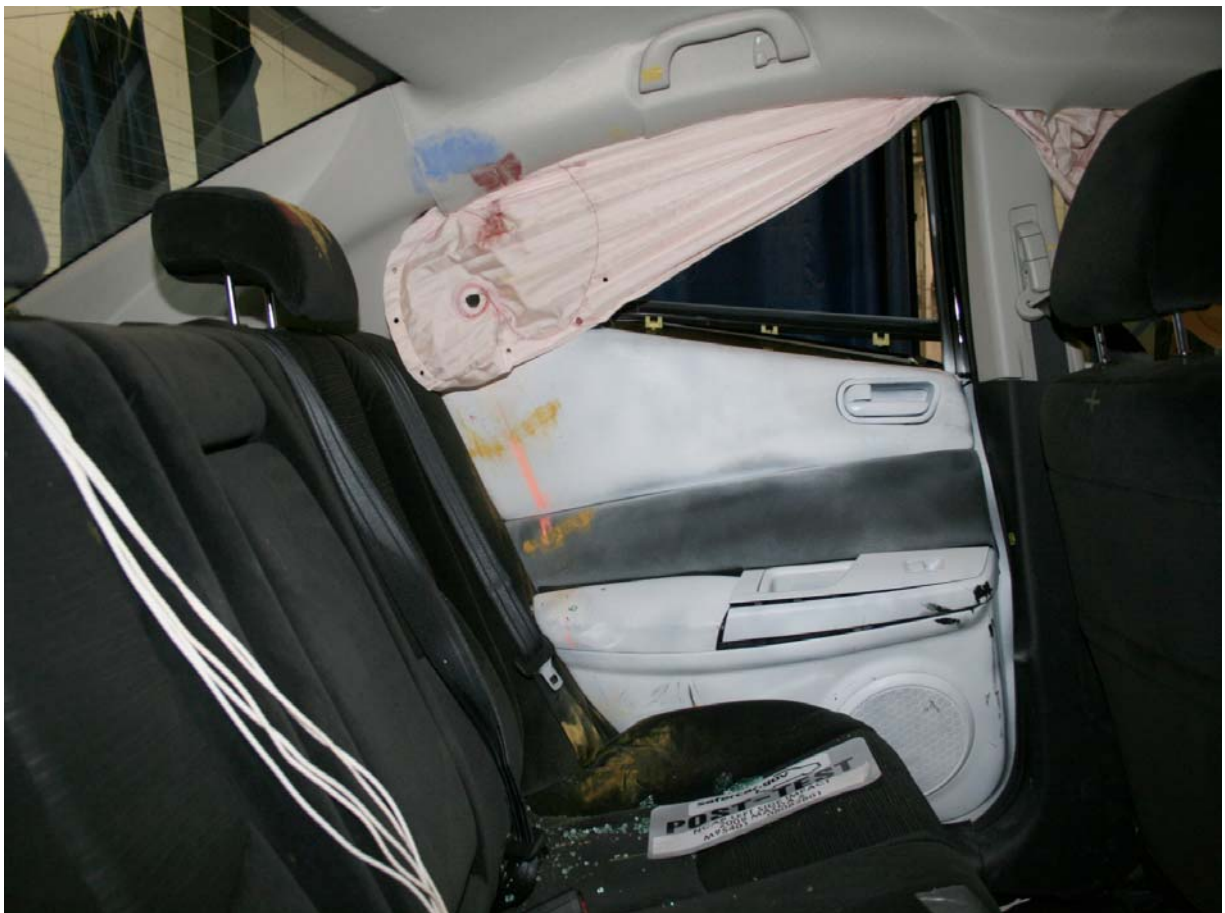
Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy Torso Contact



Post-Test Passenger Dummy Contact

**APPENDIX B**  
**SID/HIII RESPONSE DATA TRACES**

## TABLE OF DATA PLOTS

Page No.

### List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Upper Rib Y Acceleration vs. Time	B-1
Figure No. 2.	Driver Upper Rib Y Velocity vs. Time	B-1
Figure No. 3.	Driver Lower Rib Y Acceleration vs. Time	B-1
Figure No. 4.	Driver Lower Rib Y Velocity vs. Time	B-1
Figure No. 5.	Driver Lower Spine Y Acceleration vs. Time	B-2
Figure No. 6.	Driver Lower Spine Y Velocity vs. Time	B-2
Figure No. 7.	Driver Pelvis Y Acceleration vs. Time	B-2
Figure No. 8.	Driver Pelvis Y Velocity vs. Time	B-2
Figure No. 9.	Passenger Upper Rib Y Acceleration vs. Time	B-3
Figure No. 10.	Passenger Upper Rib Y Velocity vs. Time	B-3
Figure No. 11.	Passenger Lower Rib Y Acceleration vs. Time	B-3
Figure No. 12.	Passenger Lower Rib Y Velocity vs. Time	B-3
Figure No. 13.	Passenger Lower Spine Y Acceleration vs. Time	B-4
Figure No. 14.	Passenger Lower Spine Y Velocity vs. Time	B-4
Figure No. 15.	Passenger Pelvis Y Acceleration vs. Time	B-4
Figure No. 16.	Passenger Pelvis Y Velocity vs. Time	B-4

**The following dummy and vehicle response data can be found in the R&D section of the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)**

Driver Head X Primary

Driver Head Y Primary

Driver Head Z Primary

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force X

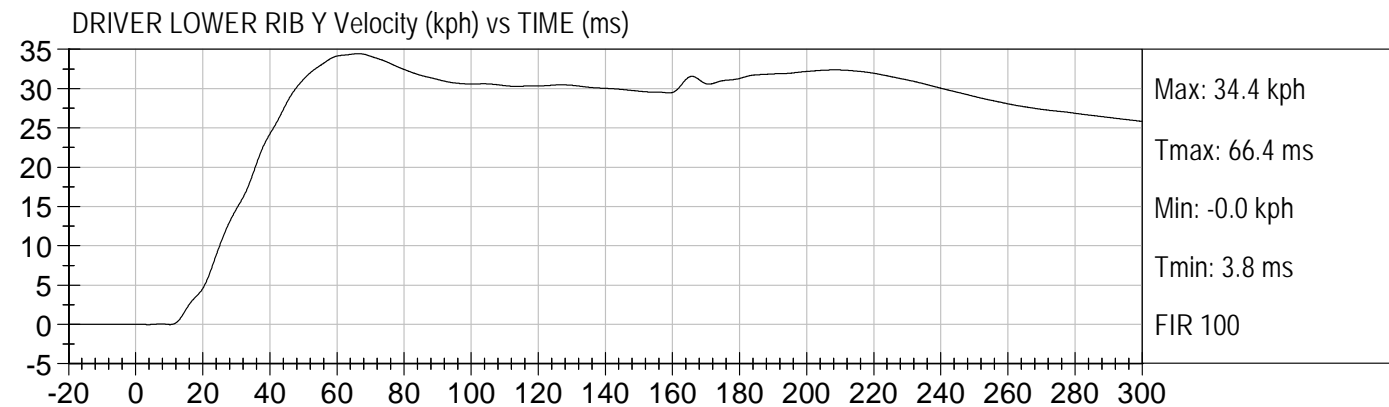
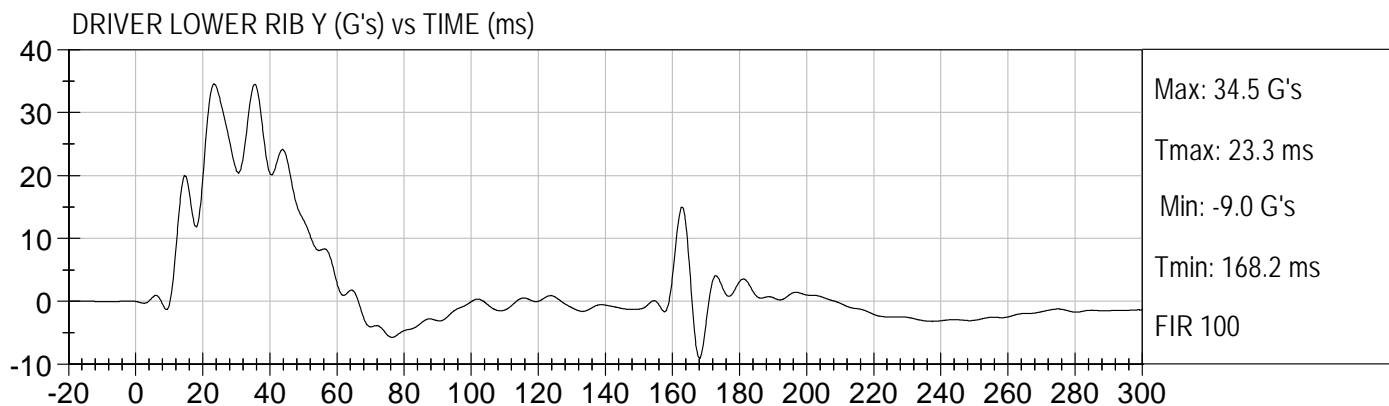
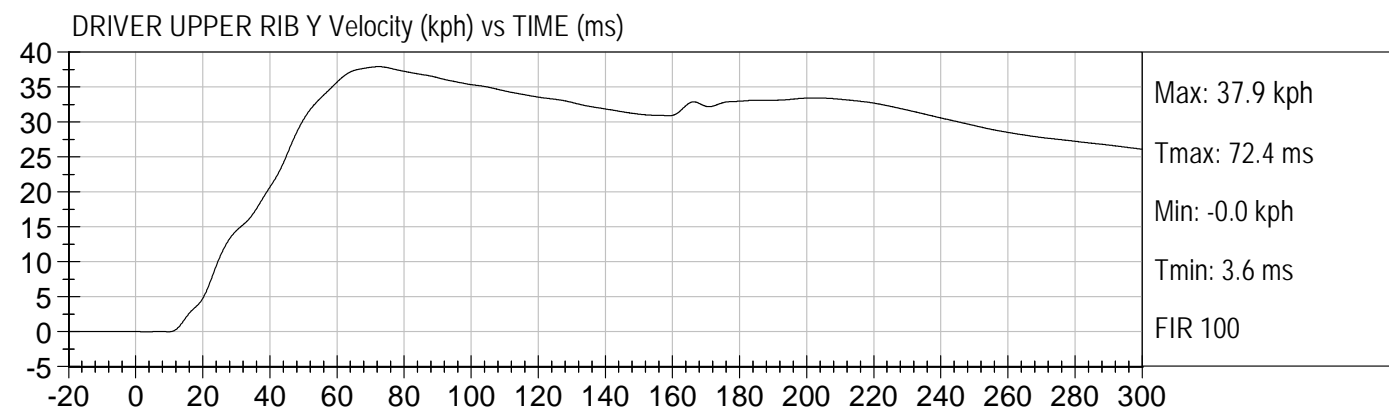
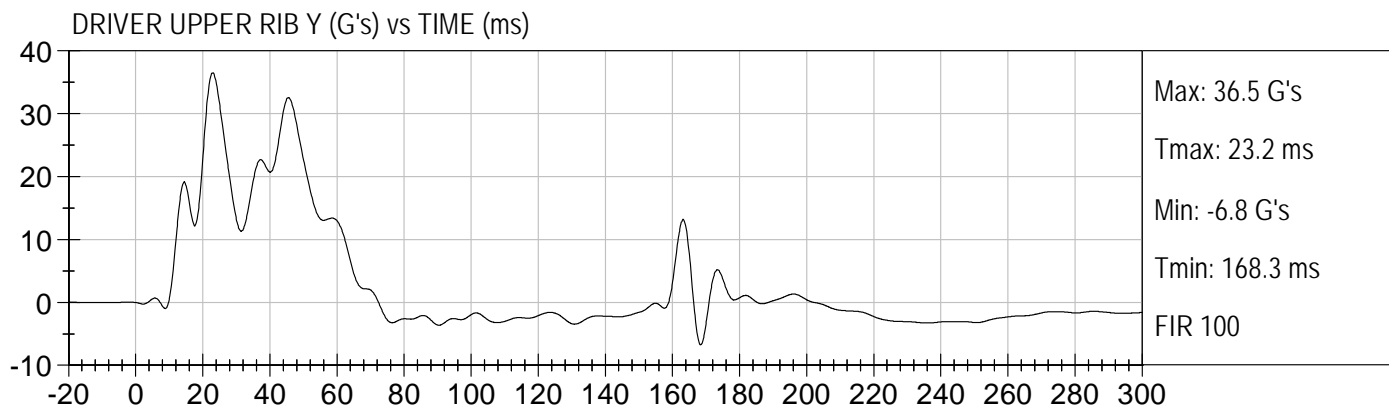
Driver Upper Neck Force Y

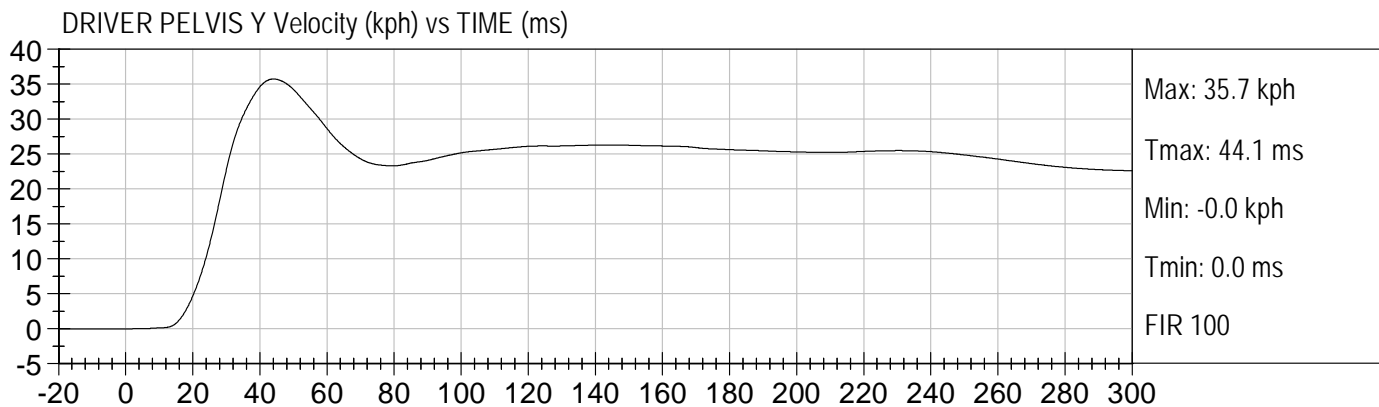
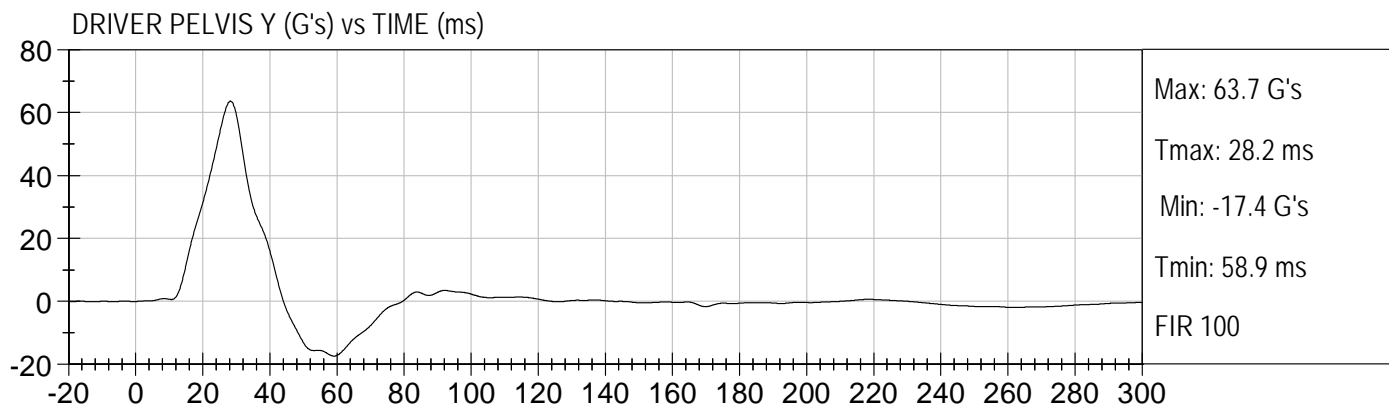
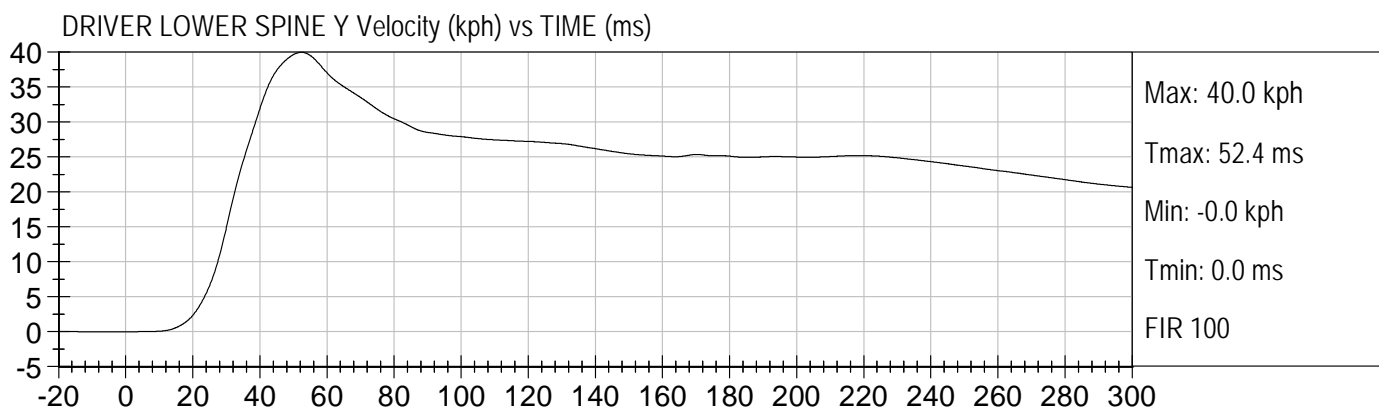
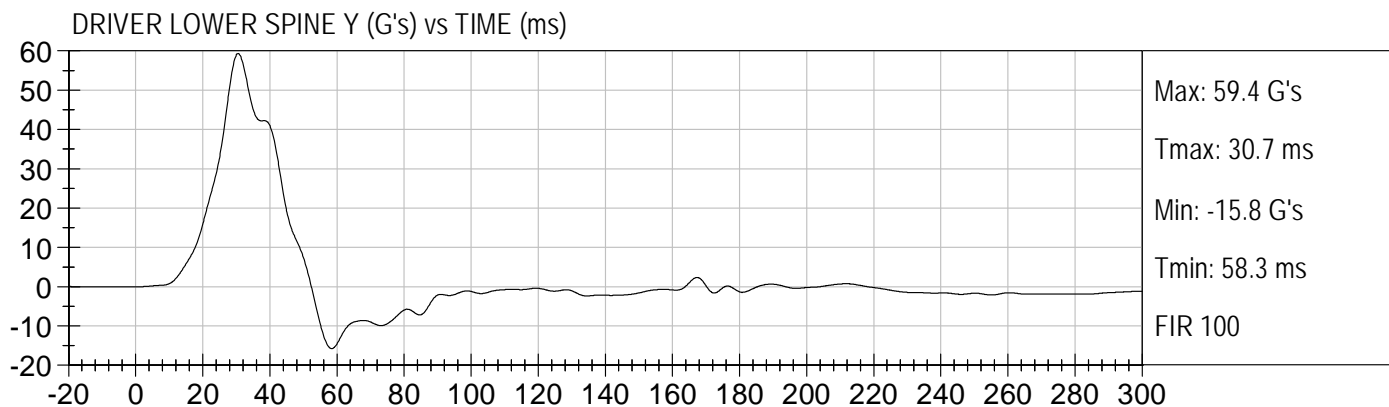
Driver Upper Neck Force Z

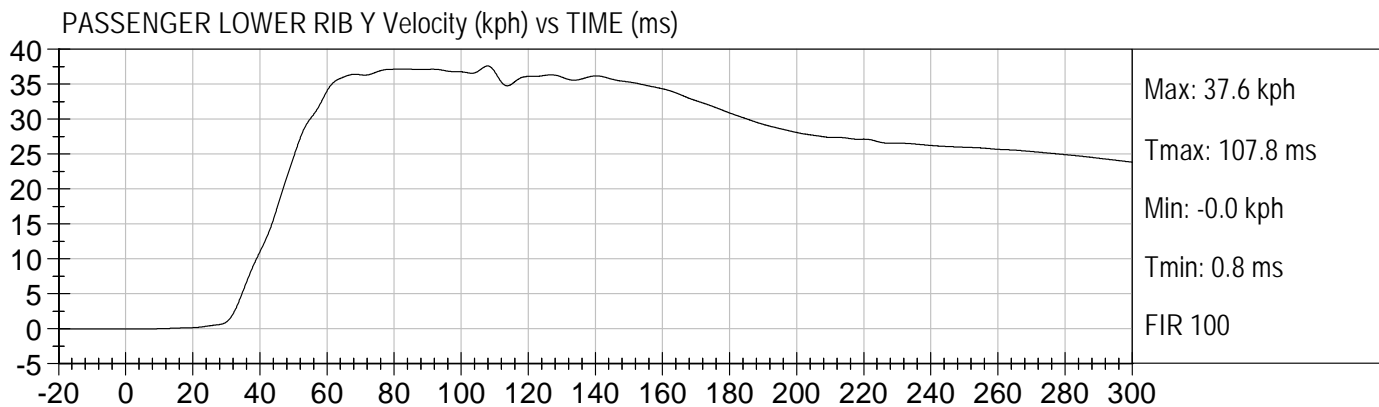
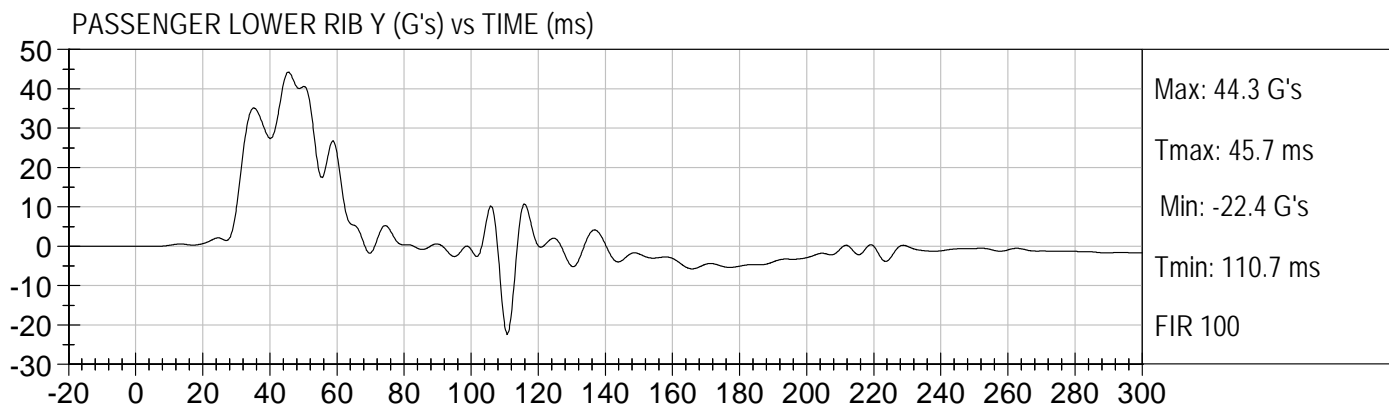
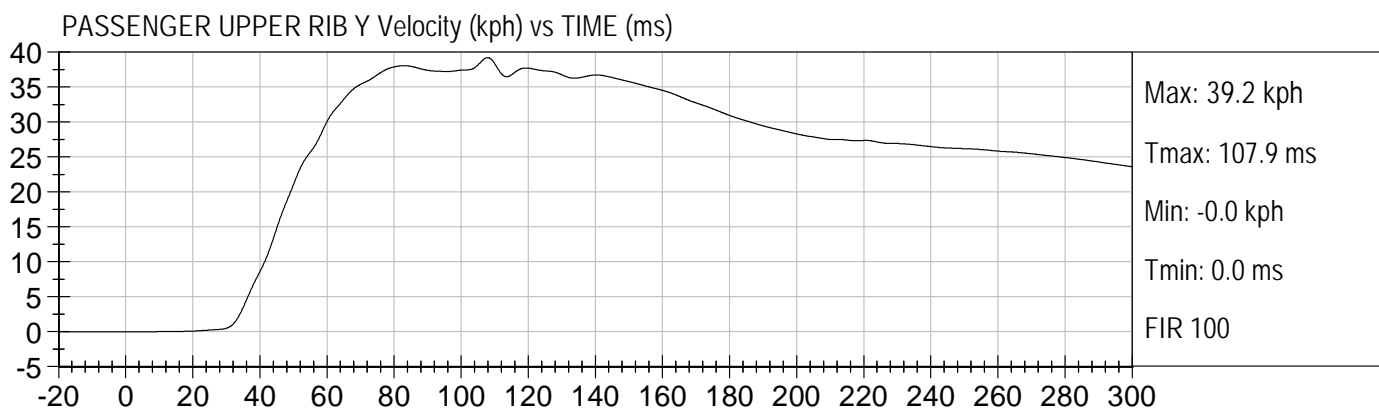
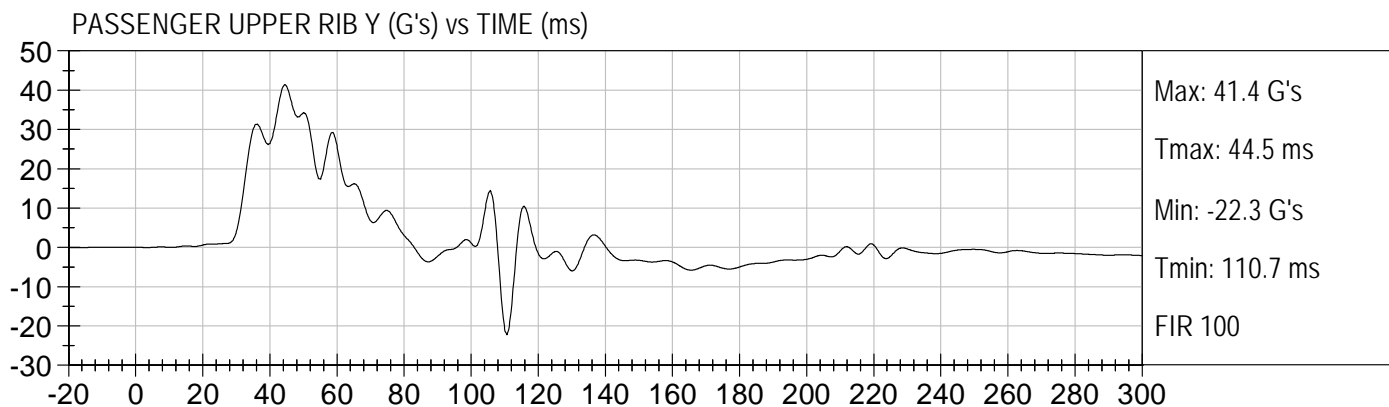
Driver Upper Neck Moment X

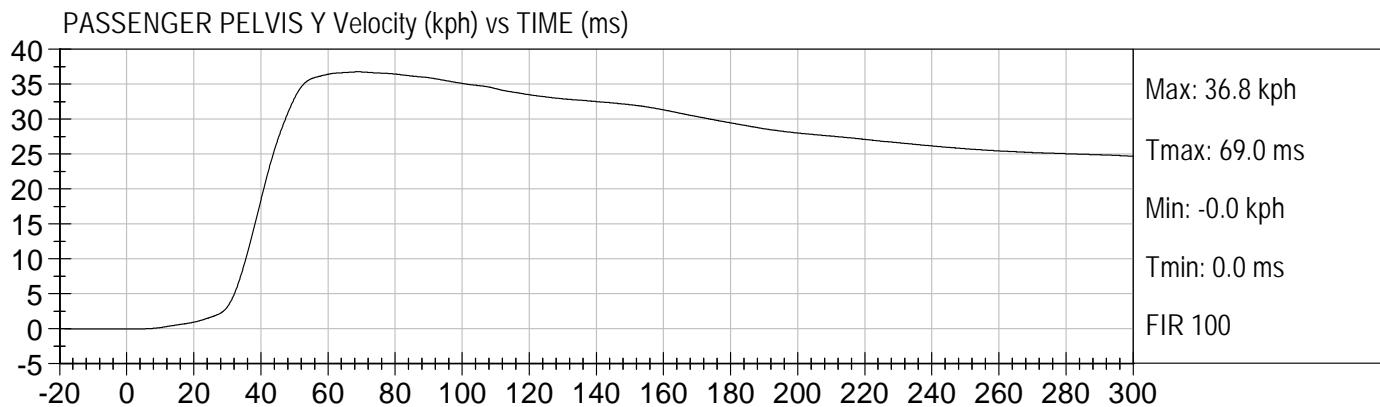
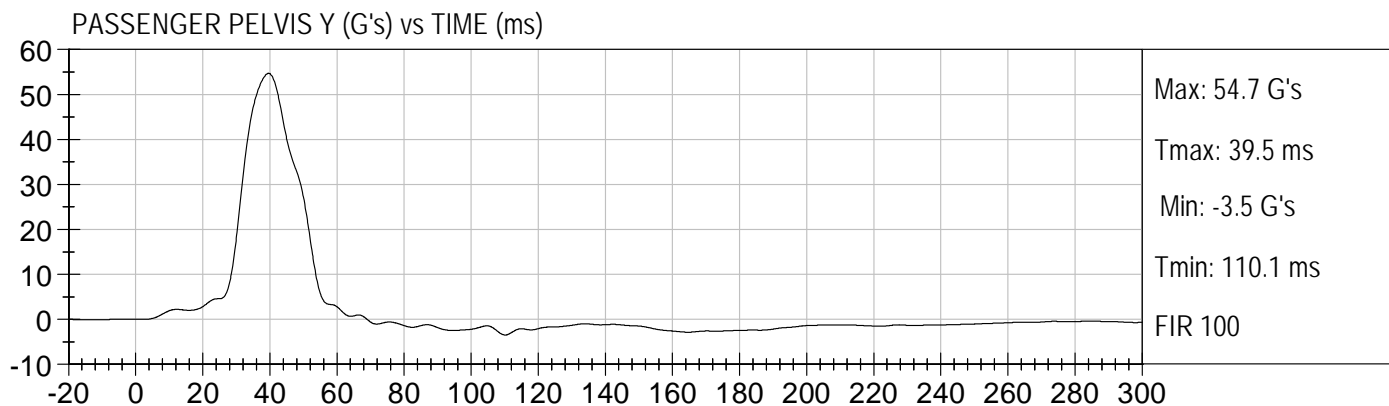
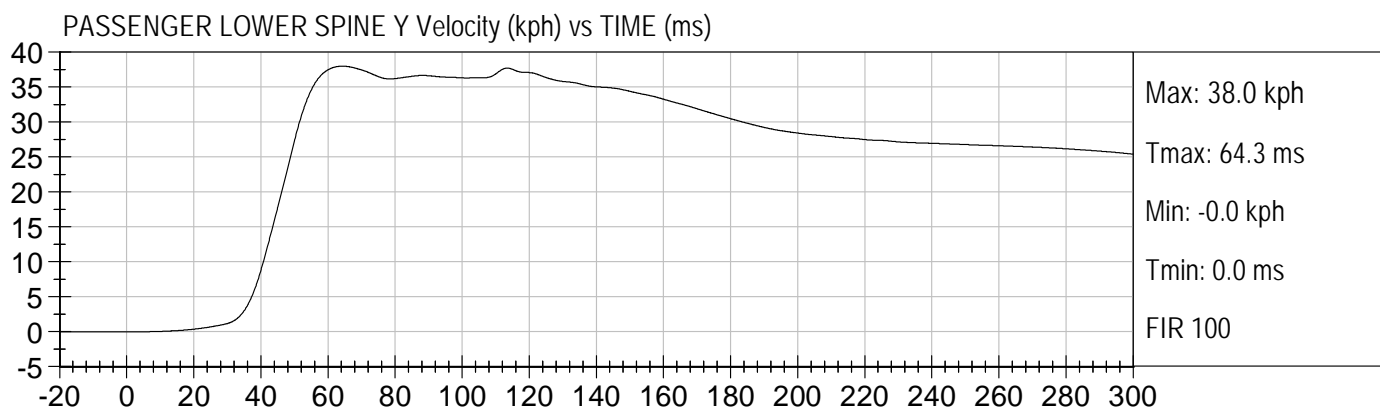
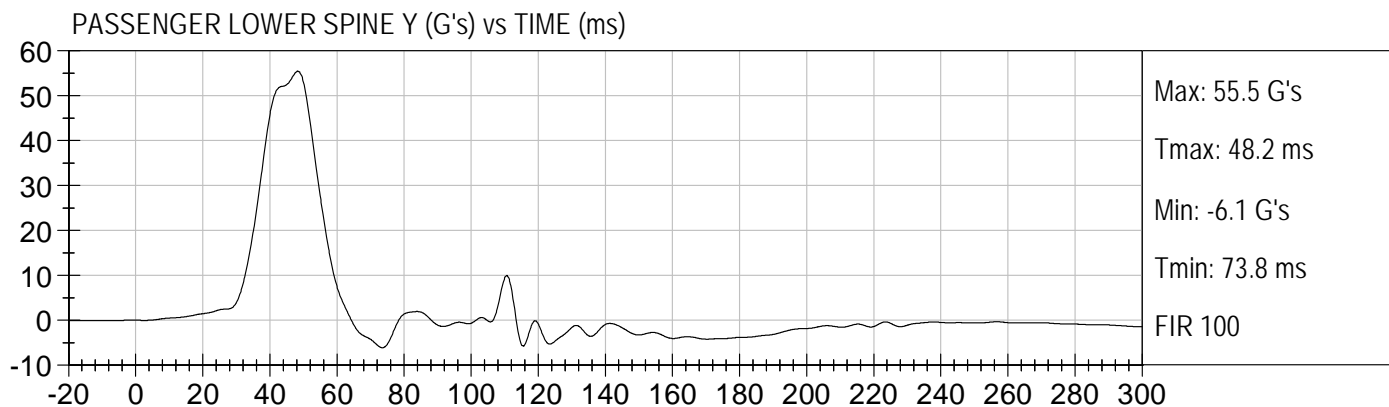
Driver Upper Neck Moment Y  
Driver Upper Neck Moment Z  
Driver Upper Rib Redundant Y  
Driver Lower Rib Redundant Y  
Driver Lower Spine Redundant Y  
Driver Pelvis Redundant Y  
Driver Thorax Contact  
Driver Pelvis Contact  
Passenger Head X Primary  
Passenger Head Y Primary  
Passenger Head Z Primary  
Passenger Head X Redundant  
Passenger Head Y Redundant  
Passenger Head Z Redundant  
Passenger Upper Neck Force X  
Passenger Upper Neck Force Y  
Passenger Upper Neck Force Z  
Passenger Upper Neck Moment X  
Passenger Upper Neck Moment Y  
Passenger Upper Neck Moment Z  
Passenger Upper Rib Redundant Y  
Passenger Lower Rib Redundant Y  
Passenger Lower Spine Redundant Y  
Passenger Pelvis Redundant Y  
Passenger Thorax Contact  
Passenger Pelvis Contact  
Vehicle Right Sill at Front Seat X  
Vehicle Right Sill at Front Seat Y  
Vehicle Right Sill at Front Seat Z  
Vehicle Right Sill at Rear Seat X  
Vehicle Right Sill at Rear Seat Y  
Vehicle Right Sill at Rear Seat Z

Vehicle Rear Floor Above Axle X  
Vehicle Rear Floor Above Axle Y  
Vehicle Rear Floor Above Axle Z  
Vehicle Left Sill at Rear Door Y  
Vehicle Left Sill at Front Door Y  
Vehicle Right Rear Occupant Compartment  
Vehicle B-Post Lower Y  
Vehicle B-Post Middle Y  
Vehicle A-Post Lower Y  
Vehicle A-Post Middle Y  
Vehicle Left Front Seat Track  
Vehicle CG X  
Vehicle CG Y  
Vehicle CG Z  
MDB CG X  
MDB CG Y  
MDB CG Z  
MDB Rear X  
MDB Rear Y  
MDB Left Bumper Contact  
MDB Right Bumper Contact









**APPENDIX C**  
**DUMMY CALIBRATION DATA**

CERTIFICATION DATA

Dummy Serial Number: 271

## Calibration Test Results Summary

Dummy Serial Number: 271

### Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**External Measurements**

ATD Serial No: 271

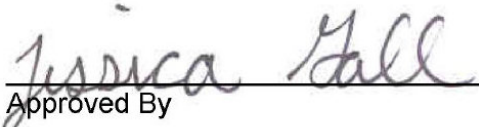
Test I.D.: D08243

Tested Parameter	Units	Specification	Result	Pass/Fail
SH - Seated Height	mm	889 - 909	905	Pass
RH - Rib Height	mm	501 - 521	502	Pass
HP - Hip Pivot Height	mm	99 ref.	99	Pass
RD - Rib from Back Line	mm	229 - 241	239	Pass
KV - Knee Pivot to Back Line	mm	511 - 526	526	Pass
SW - Knee Pivot to Floor	mm	490 - 505	497	Pass
HW - Hip Width	mm	356 - 391	371	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/22/08

Test Date

  
 Approved By

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

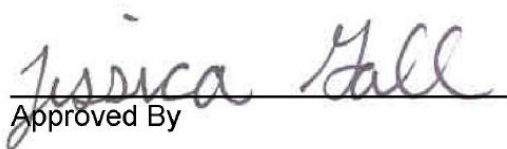
ATD Serial No: 271

Test I.D: D082431

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	120 to 150	138	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-9.4	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

8/20/08  
 Test Date

  
 Approved By



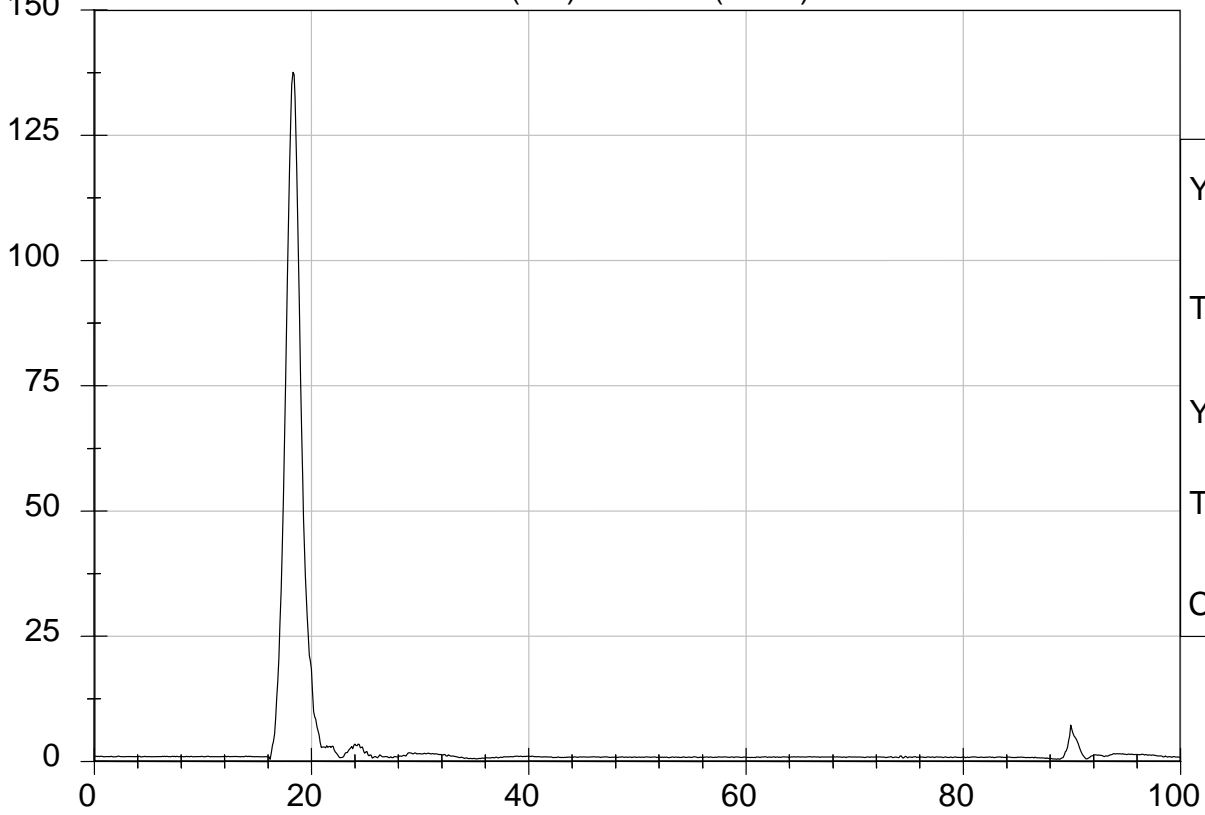
Test Description: Head Drop

Test Date: 8/20/08

Component: D082431

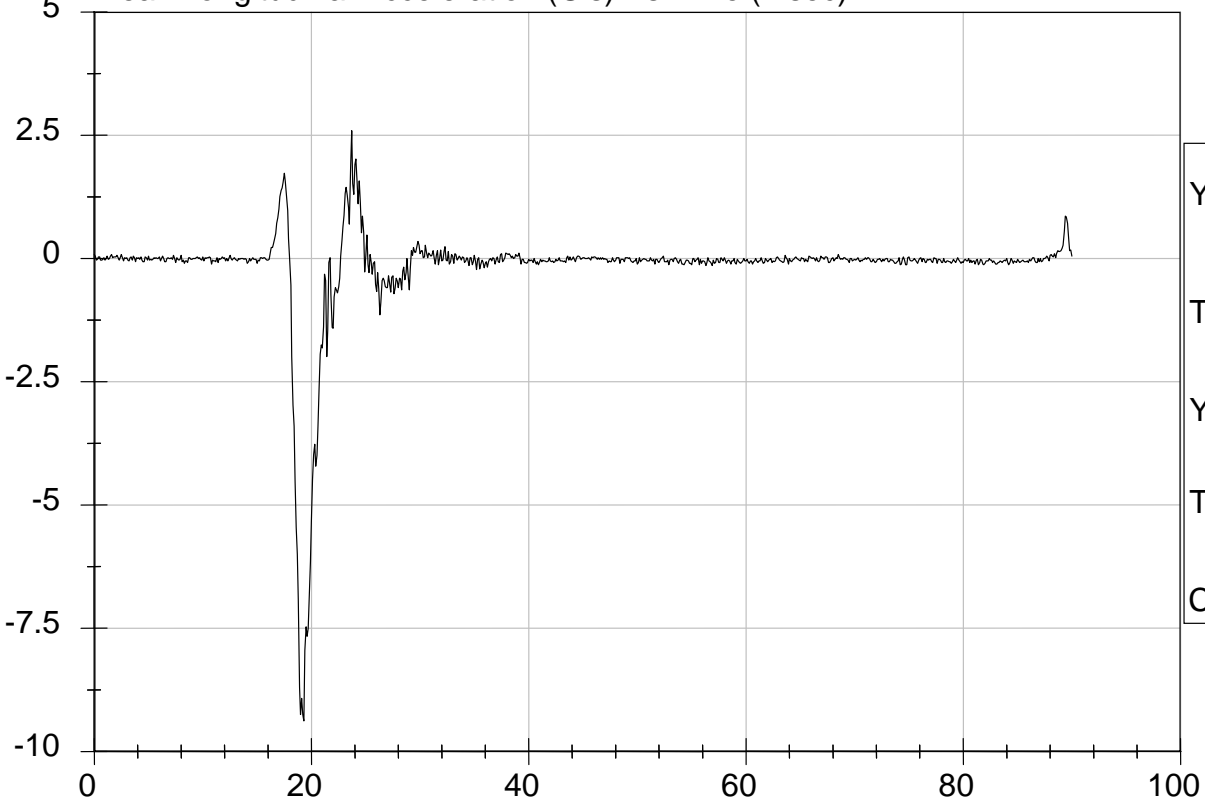
Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



YMax: 137.6 G  
Tmax: 18.3 ms  
YMin: 0.4 G  
Tmin: 16.2 ms  
CFC 1000

Peak Longitudinal Acceleration (G's) Vs Time (msec)



YMax: 2.6 G  
Tmax: 23.7 ms  
YMin: -9.4 G  
Tmin: 19.3 ms  
CFC 1000

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

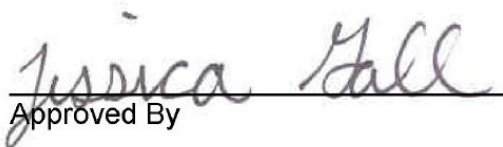
**ATD Serial No:** 271

**Test I.D:** D082432

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	37	Pass
Lower Rib	G's	37 - 46	37	Pass
Lower Spine	G's	15 - 22	17	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

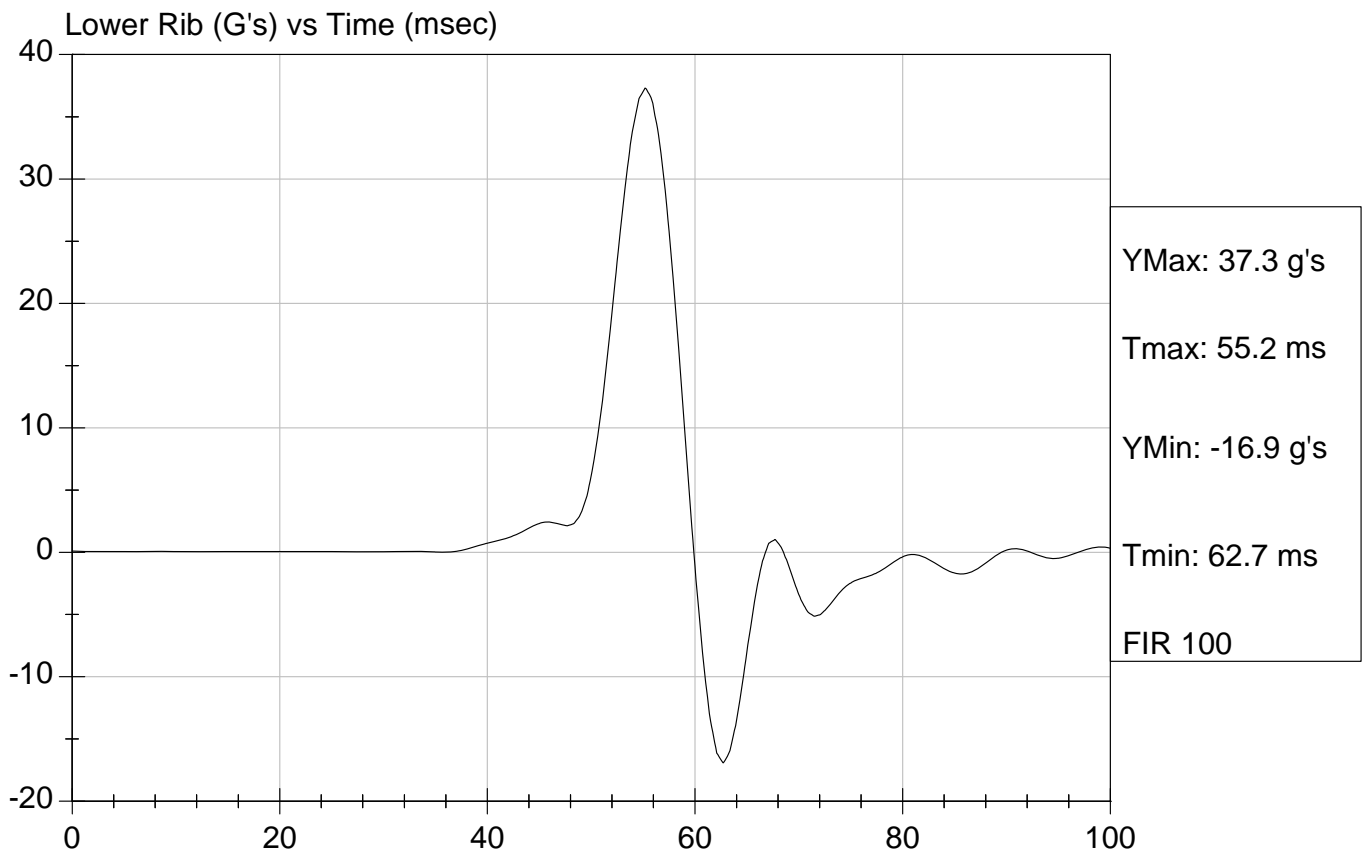
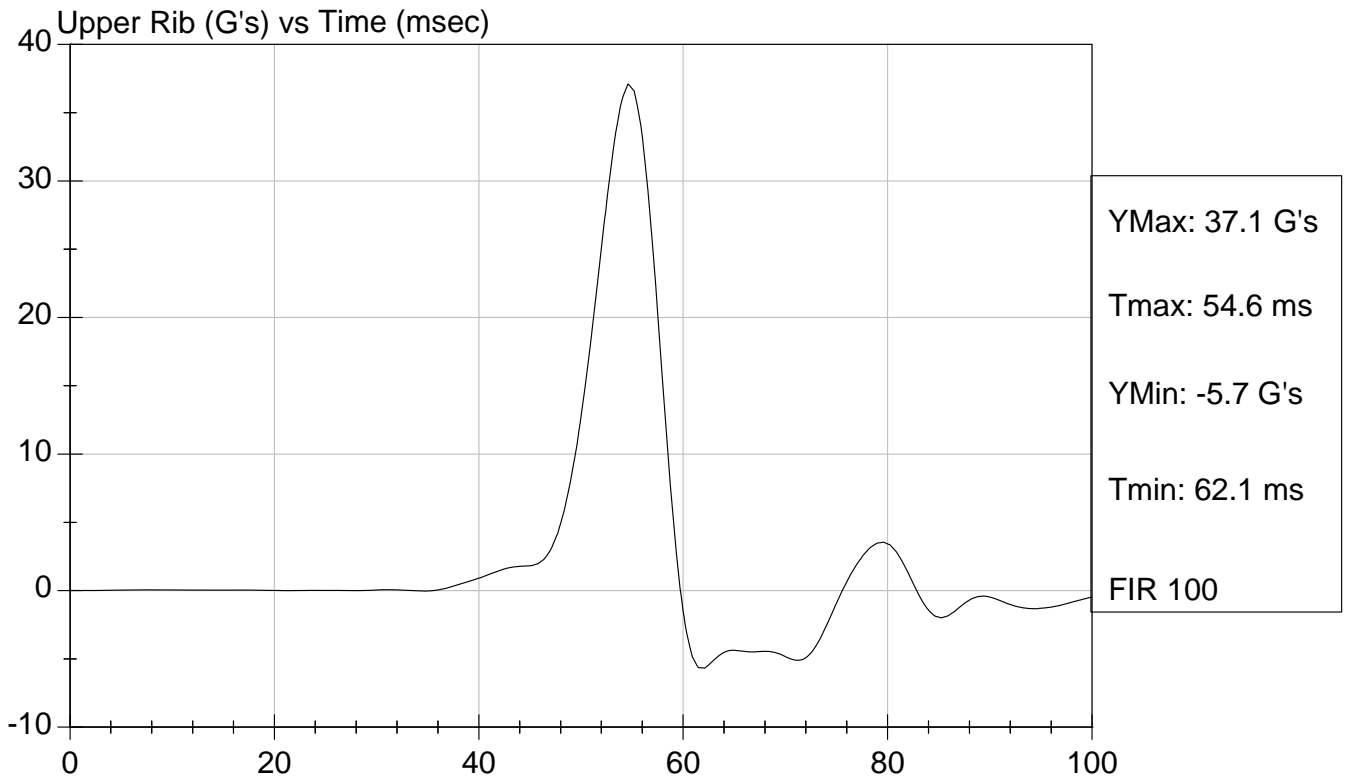
8/21/08  
 Test Date

  
 Approved By



Test Desc: Thorax Impact  
Component ID: D082432

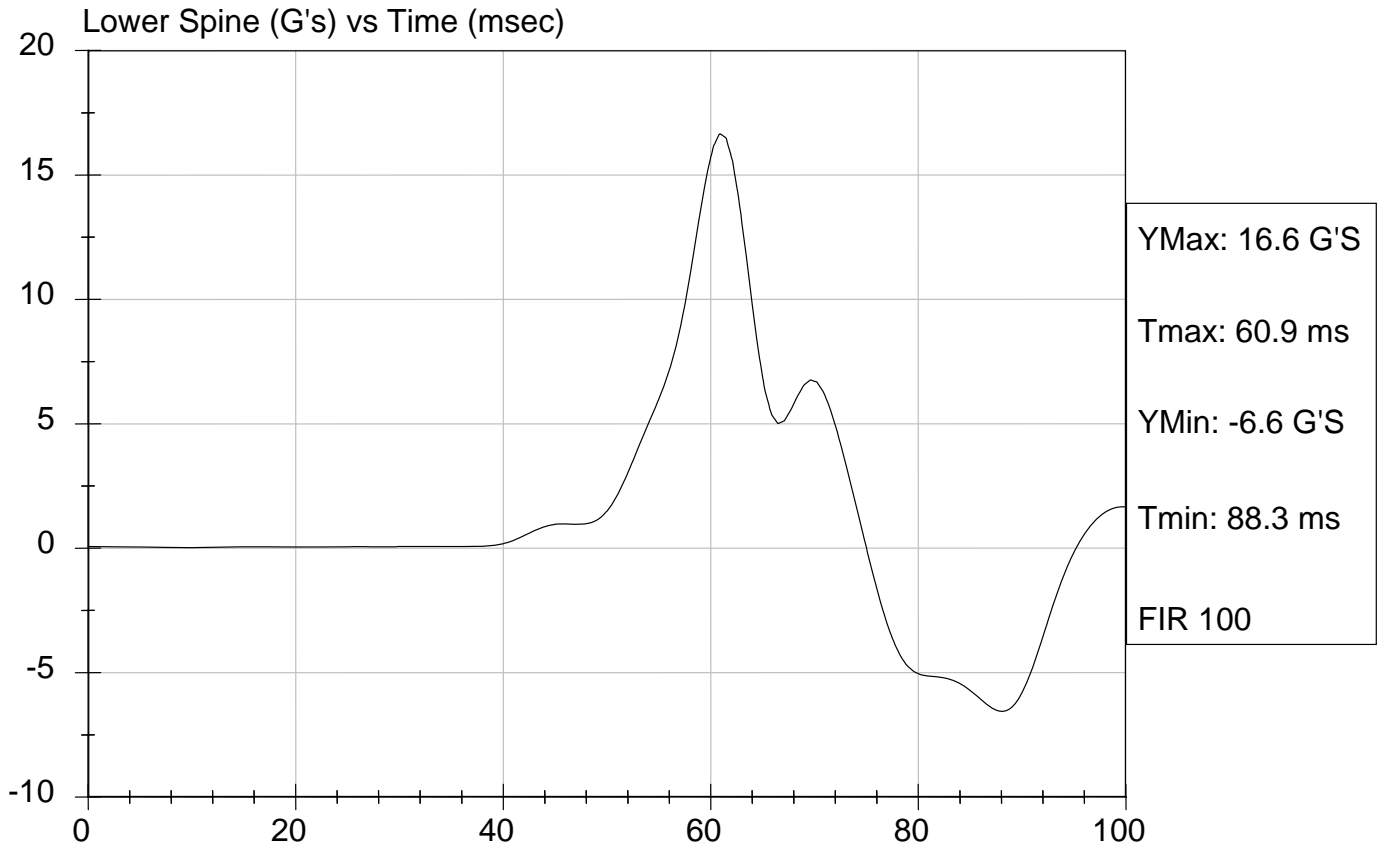
Test Date: 8/21/08  
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact  
Component ID: D082432

Test Date: 8/21/08  
Speed: 14.12 ft/sec, 4.30 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

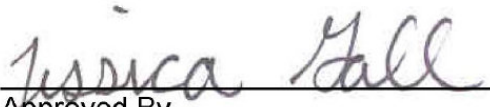
ATD Serial No: 271

Test I.D.: D082433

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	45	Pass
Overall Test Results				Pass

  
 Laboratory Technician

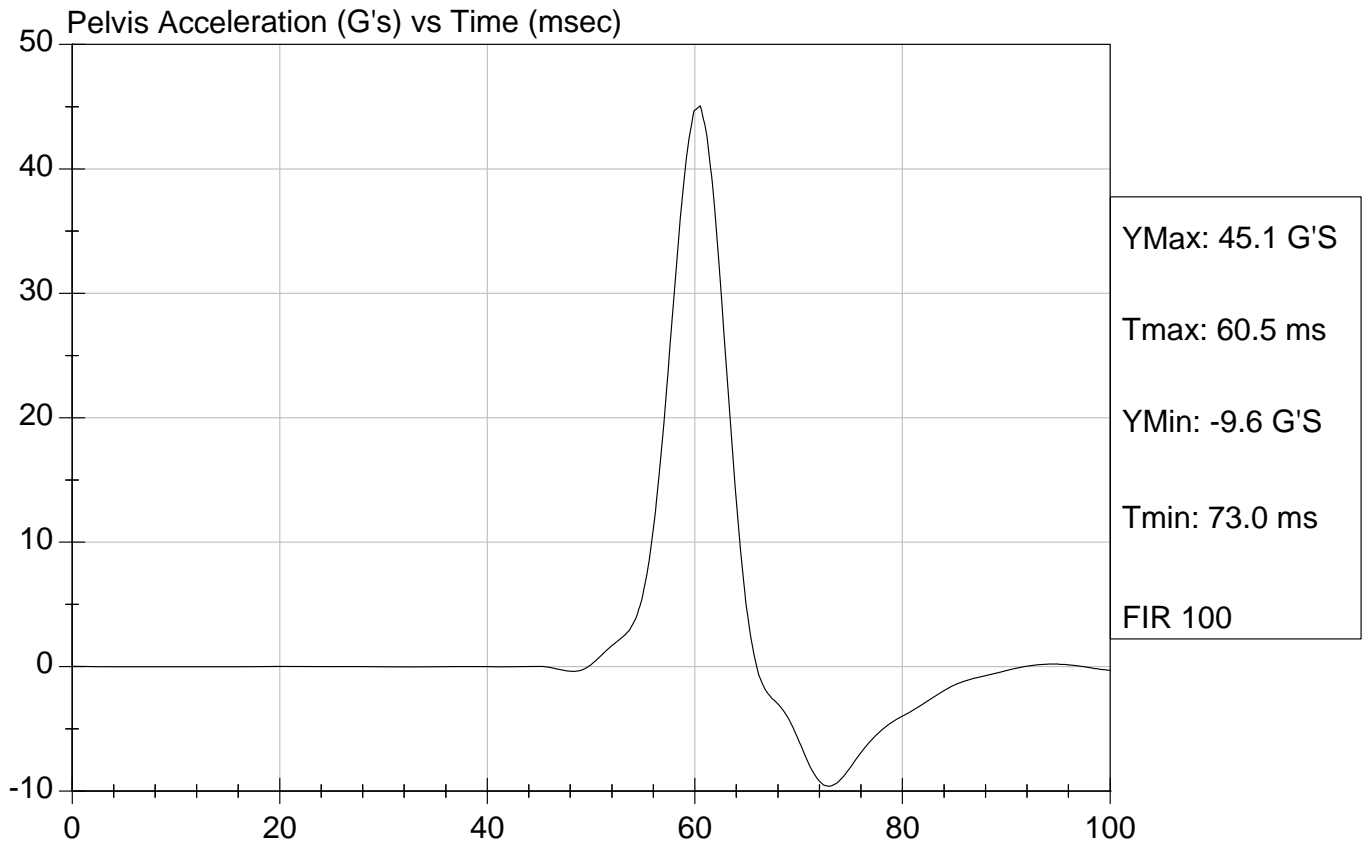
8/21/08  
 Test Date

  
 Approved By



Test Desc: Pelvis Impact  
Component ID: D082433

Test Date: 8/21/08  
Speed: 14.01 ft/sec, 4.27 m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**


ATD Serial No: 271

Test I.D.: D082434

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Force At 12.7 mm	N	104 -162	134	Pass
Force At 19 mm	N	163 - 222	181	Pass
Force At 25.4 mm	N	222 - 280	242	Pass
Force At 33 mm	N	325 - 391	329	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/22/08  
 Test Date

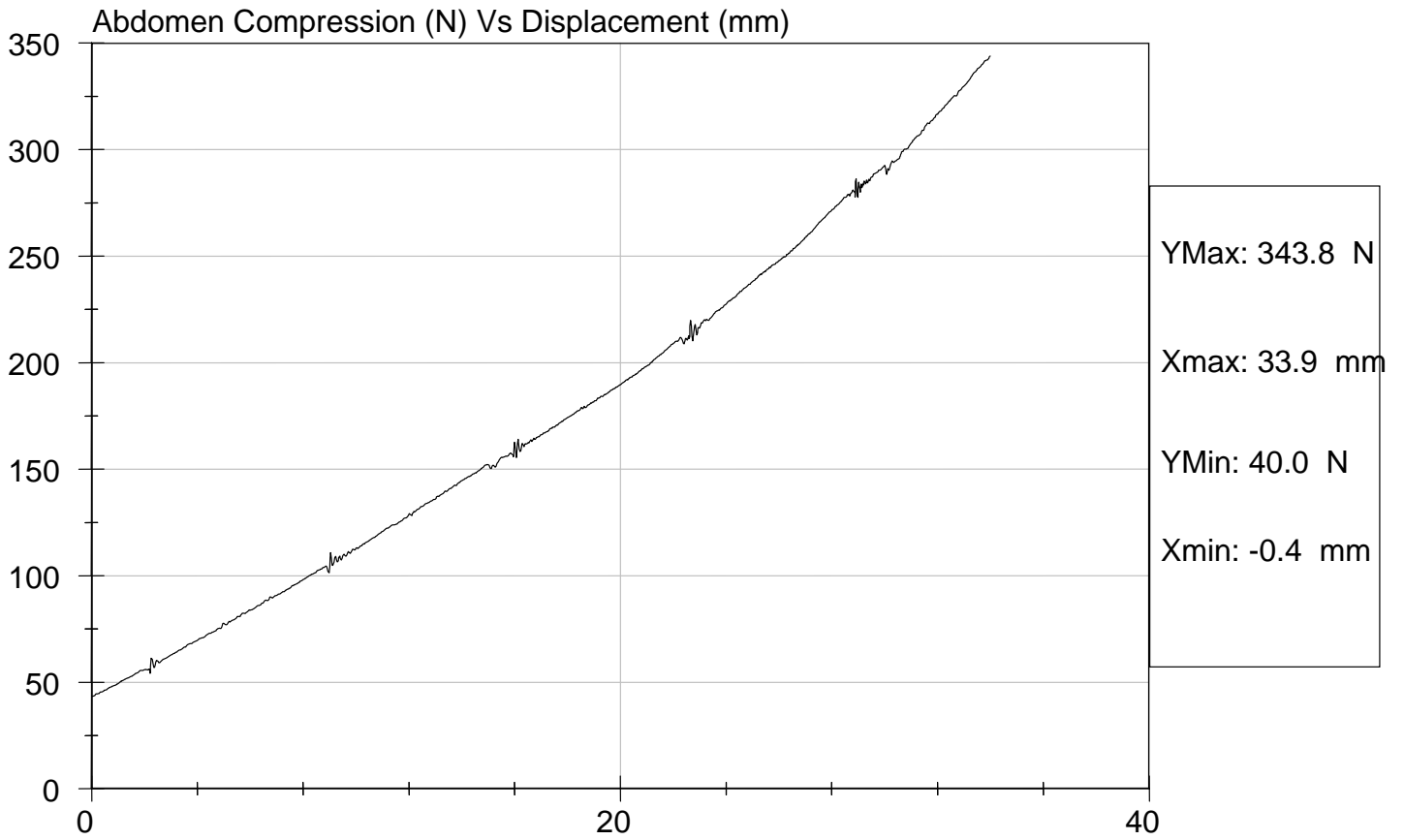
  
 Approved By



Test Description: Abdomen Compression Test Date: 8/22/08

Component: D082434

Speed: 0 ft/sec, 0 m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

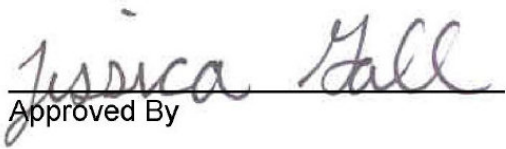
ATD Serial No: 271

Test I.D.: D082435

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	112.6	Pass
Force At 30 deg	N	151.2 - 204.6	174.6	Pass
Force At 40 deg	N	204.6 - 258.0	245.0	Pass
Return Angle	Deg	12 Maximum	8	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/22/08  
 Test Date

  
 Approved By

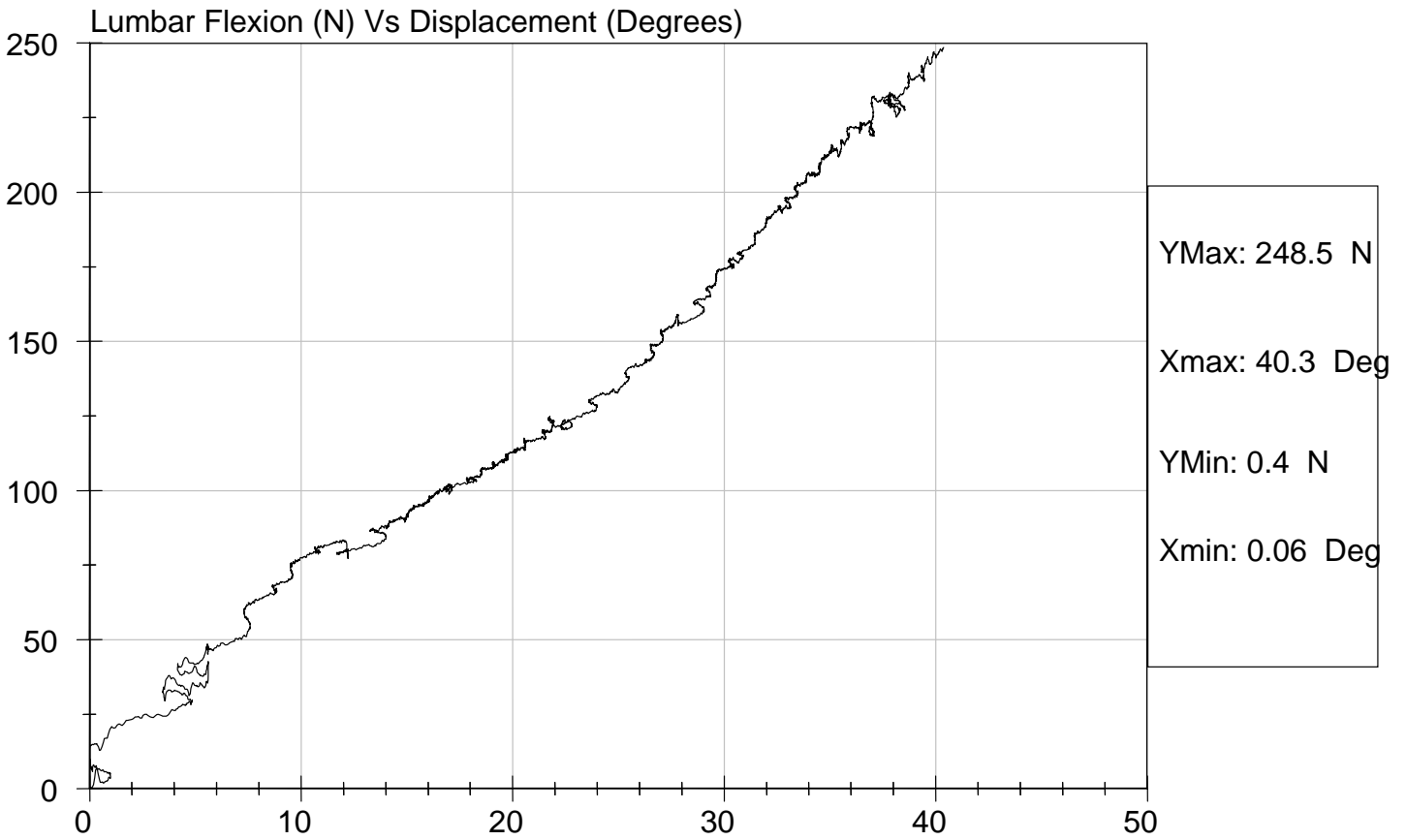


Test Description: Lumbar Flexion

Test Date: 8/22/08

Component: D082435

Speed: 0 ft/sec, 0 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Neck Pendulum Test**

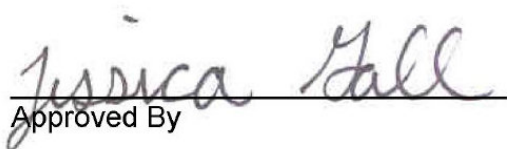
**ATD Serial No:** 271

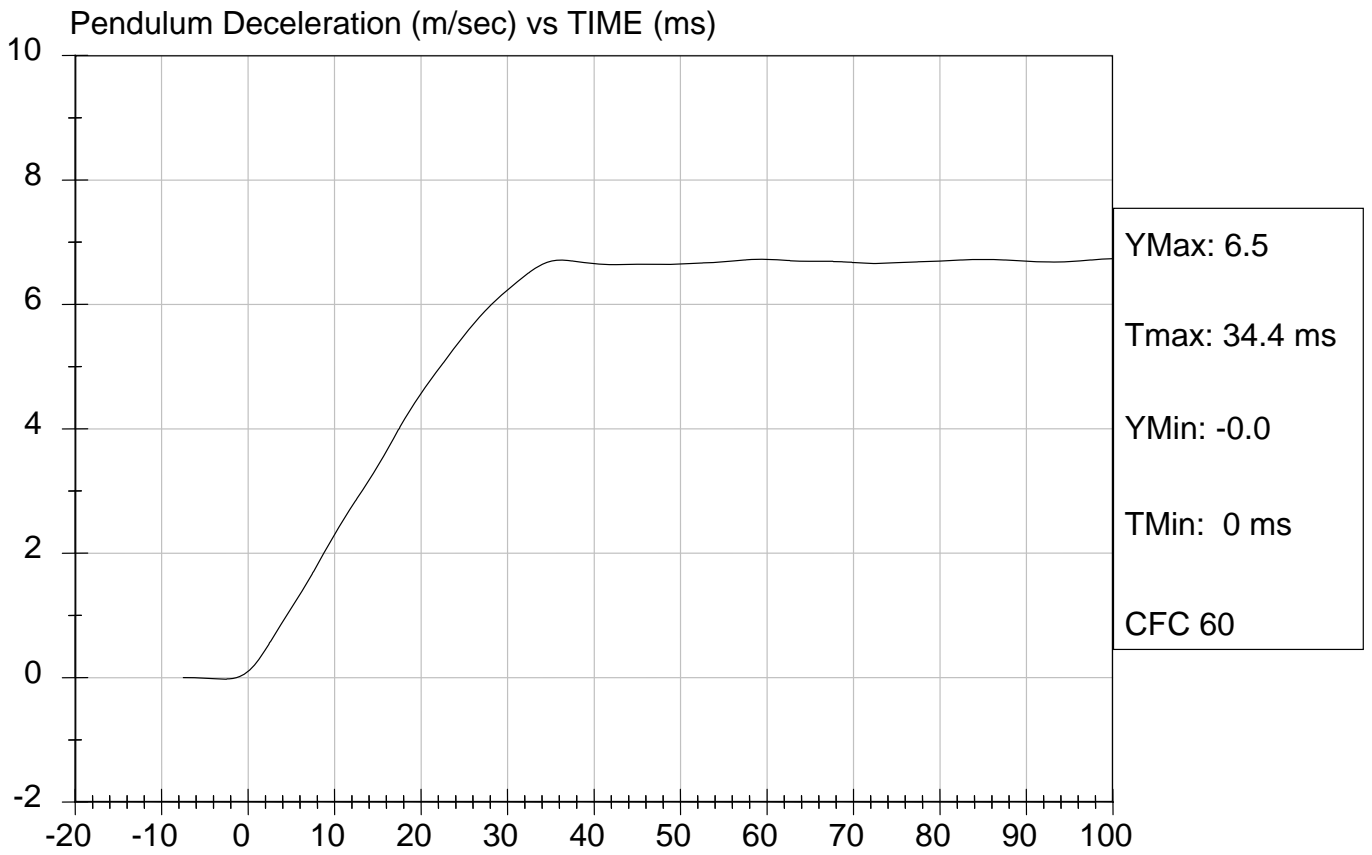
**Test I.D:** D082439

Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass	
Laboratory Relative Humidity	%	10 to 70	42	Pass	
Impact Velocity	m/s	6.89 to 7.13	7.06	Pass	
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.30	Pass
	20 msec	m/s	4.12 to 5.10	4.57	Pass
	30 msec	m/s	5.73 to 7.01	6.23	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.67	Pass
Midsaggital Plane Max Rotation	deg	66 to 82	73	Pass	
Head Rotation Peak to Zero - Decay Time	msec	58 to 67	62	Pass	
Max. Mx at Occipital Condyles	Nm	73 to 88	74	Pass	
Mx Peak To Zero - Decay Time	msec	49 to 64	59	Pass	
Mx Peak to Max. Head Rotation	msec	2 to 16	10	Pass	

  
 Laboratory Technician

8/22/08  
 Test Date

  
 Approved By

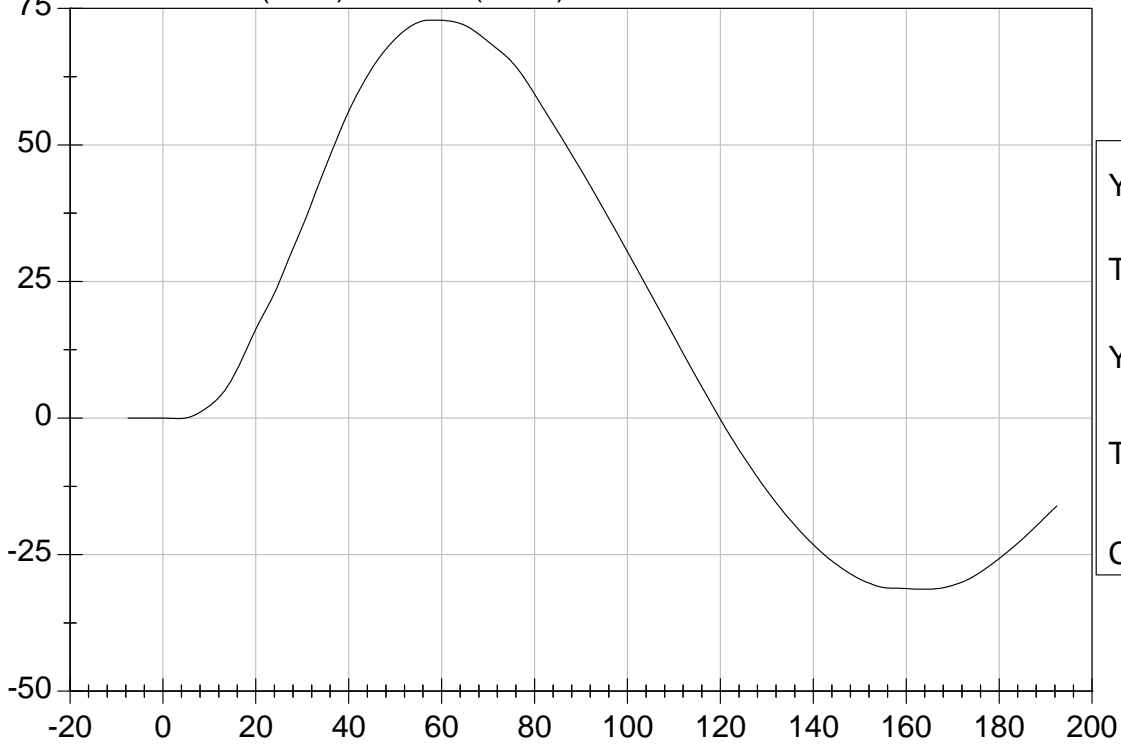




Test Desc: Neck Bending  
Component ID: D082439

Test Date: 8/22/08  
Speed: 23.15 ft/sec, 7.06 m/sec

Neck Rotation (DEG) vs Time (msec)



YMax: 72.9

Tmax: 57.7 ms

YMin: -31.3

Tmin: 163.8 ms

CFC 60

Occipital Moment (Nm) vs Time (msec)



YMax: 74.2

Tmax: 48.1 ms

YMin: -26.8

Tmin: 154.1 ms

CFC 600

## Calibration Test Results Summary

Dummy Serial Number: 271

### Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

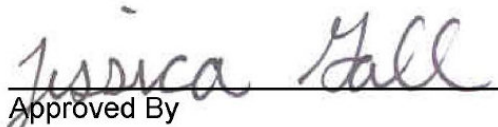
**ATD Serial No:** 271

**Test I.D:** D082511

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Peak Resultant Acceleration	G's	120 to 150	147	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	7	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

8/29/08  
 Test Date

  
 Approved By



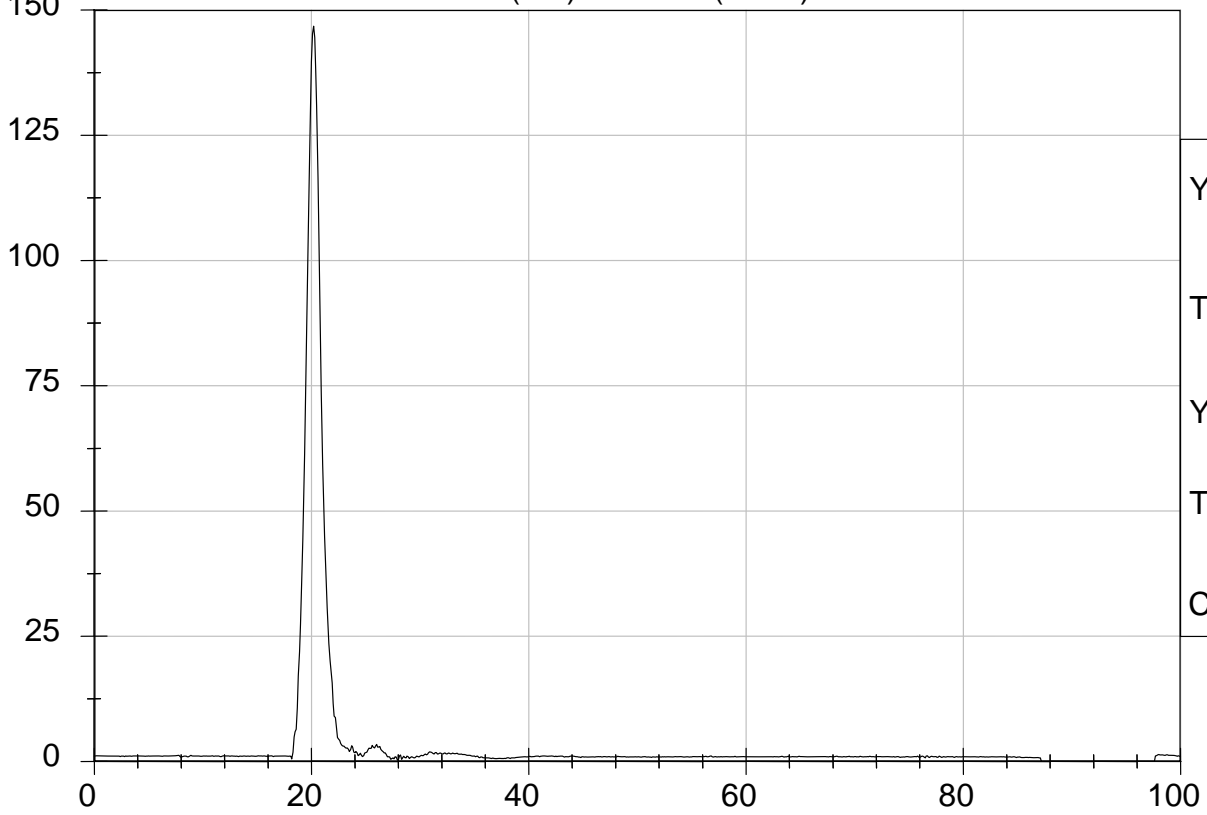
Test Description: Head Drop

Test Date: 8/29/08

Component: D082511

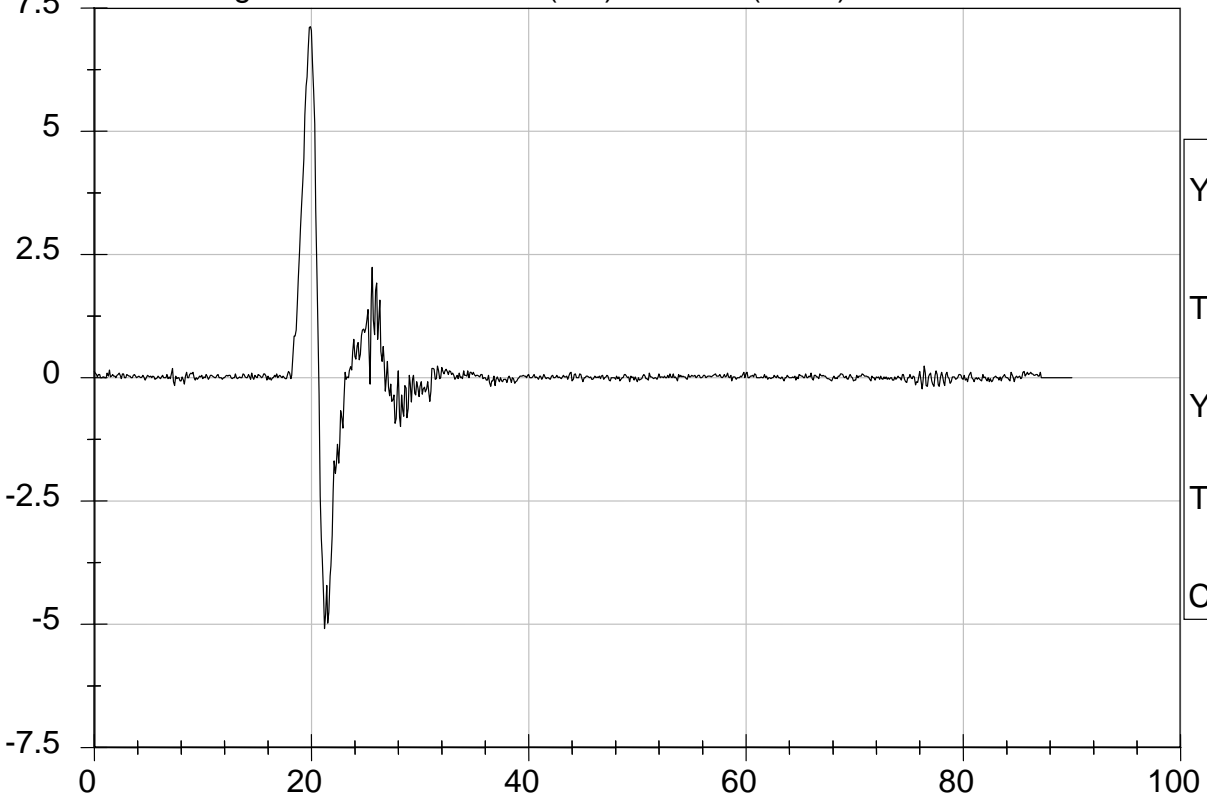
Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



YMax: 146.7 G  
Tmax: 20.2 ms  
YMin: 0.0 G  
Tmin: 87.2 ms  
CFC 1000

Peak Longitudinal Acceleration (G's) Vs Time (msec)




YMax: 7.1 G  
Tmax: 19.9 ms  
YMin: -5.1 G  
Tmin: 21.2 ms  
CFC 1000

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

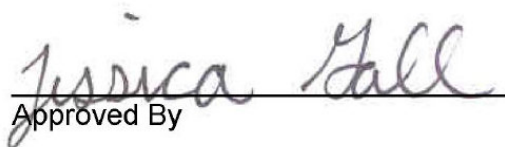
**ATD Serial No:** 271

**Test I.D:** D082512

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	37	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	16	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

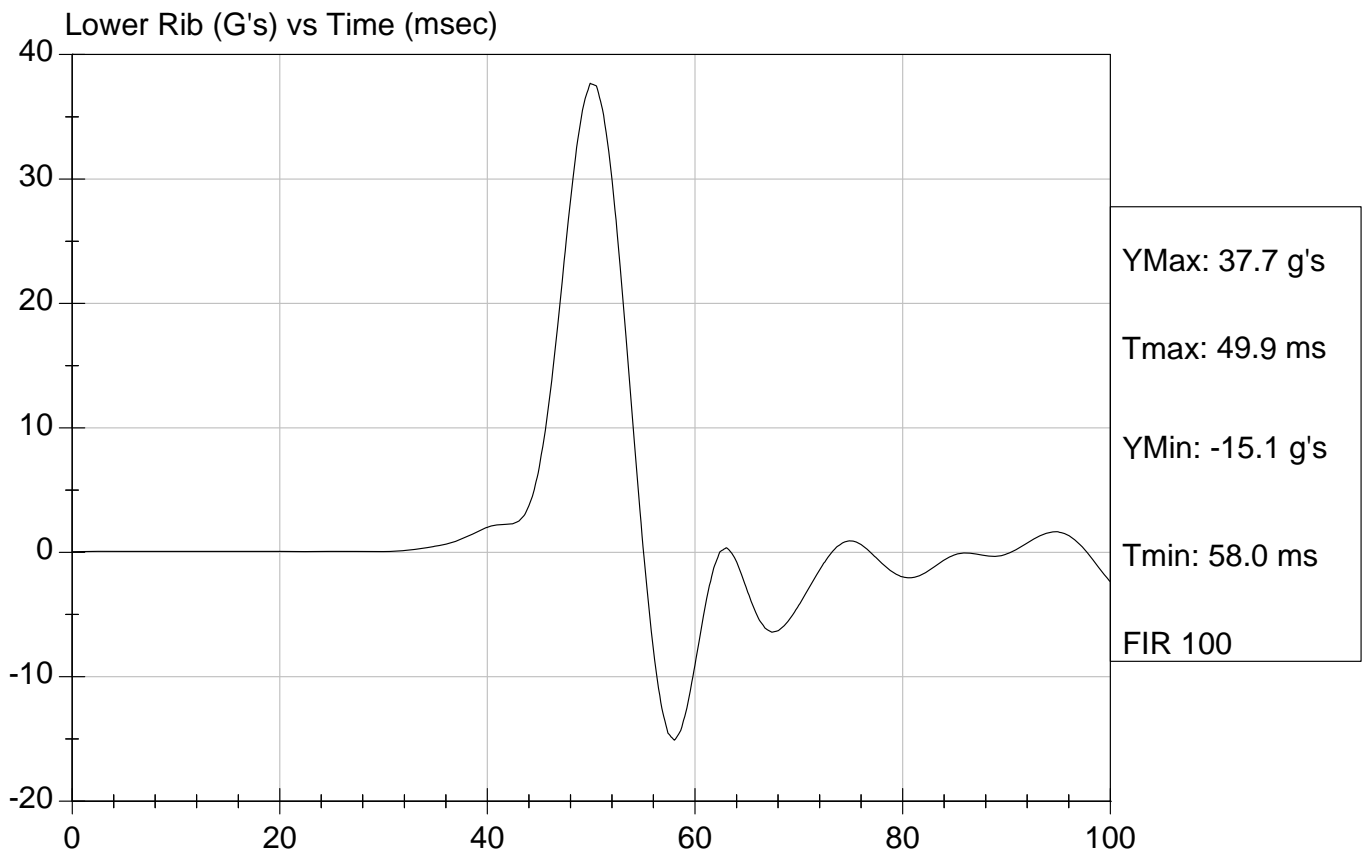
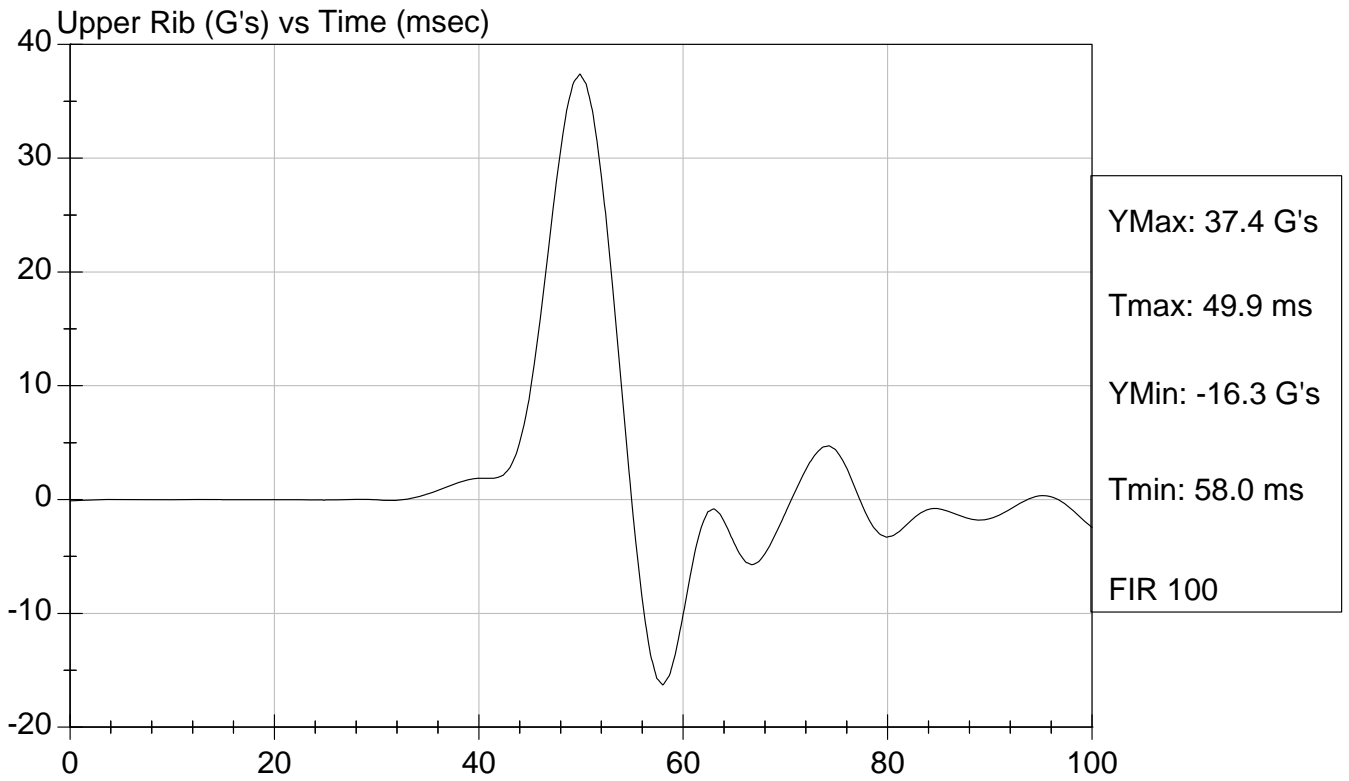
8/29/08  
 Test Date

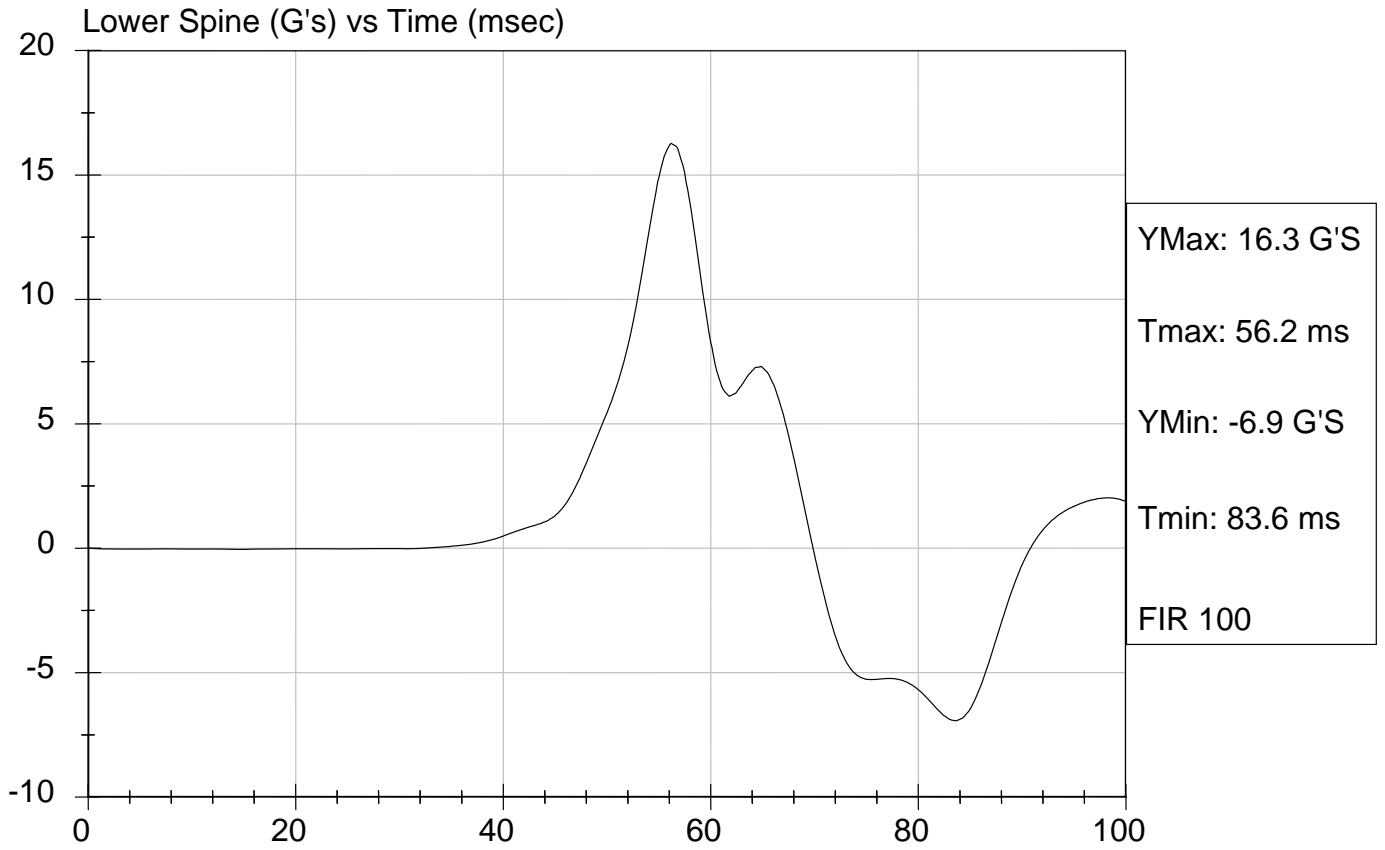
  
 Approved By



Test Desc: Thorax Impact  
Component ID: D082512

Test Date: 8/29/08  
Speed: 14.00 ft/sec, 4.27 m/sec





**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

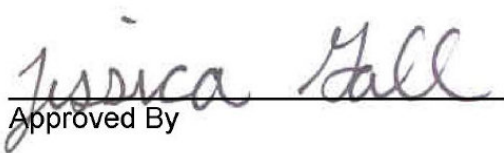
**ATD Serial No:** 271

**Test I.D.:** D082513

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	45	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

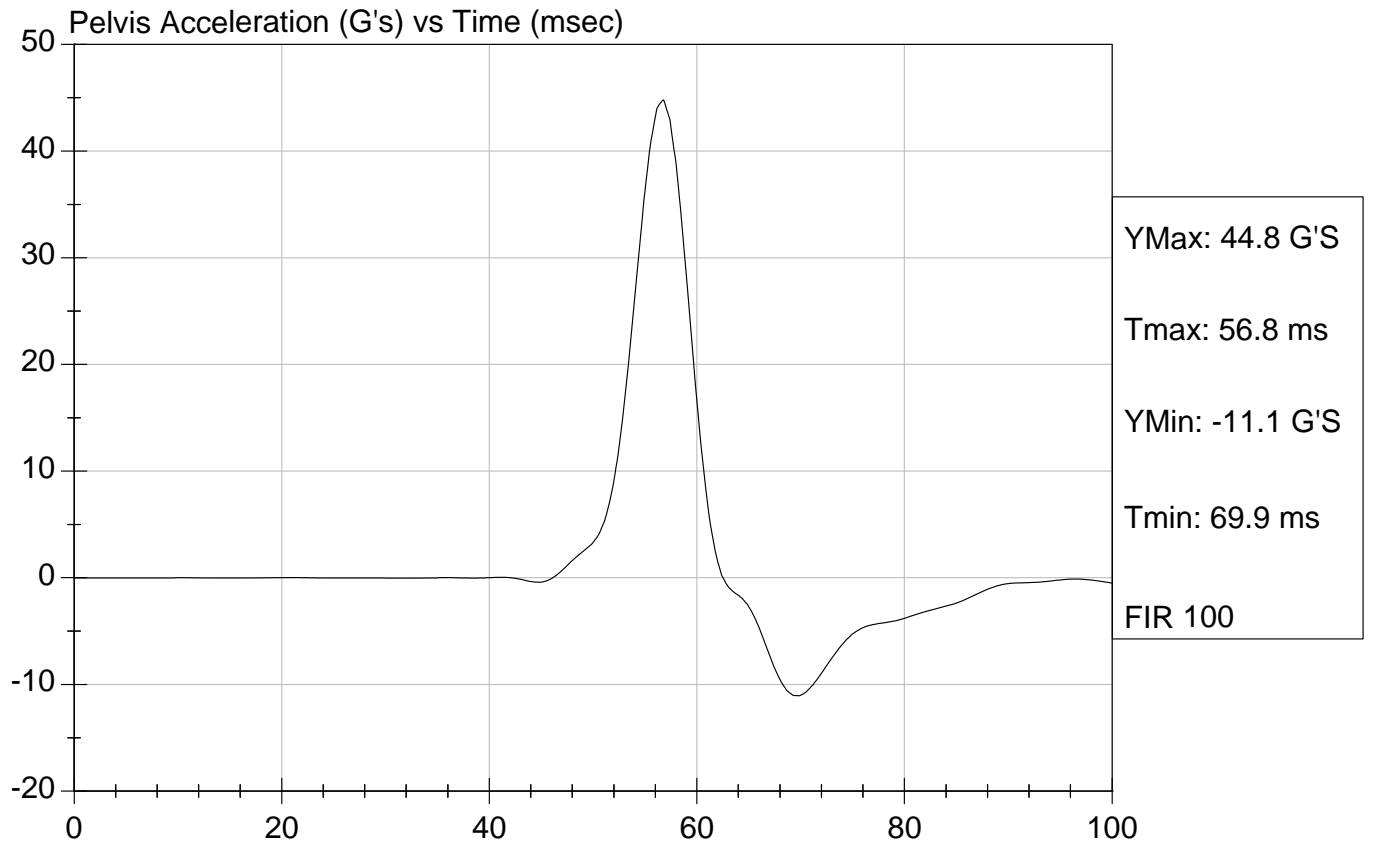
8/29/08  
 Test Date

  
 Approved By



Test Desc: Pelvis Impact  
Component ID: D082513

Test Date: 8/29/08  
Speed: 14.12 ft/sec, 4.30 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

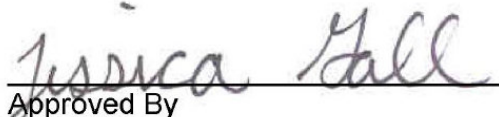
ATD Serial No: 271

Test I.D.: D082514

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Force At 12.7 mm	N	104 - 162	139	Pass
Force At 19 mm	N	163 - 222	196	Pass
Force At 25.4 mm	N	222 - 280	261	Pass
Force At 33 mm	N	325 - 391	360	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/29/08  
 Test Date

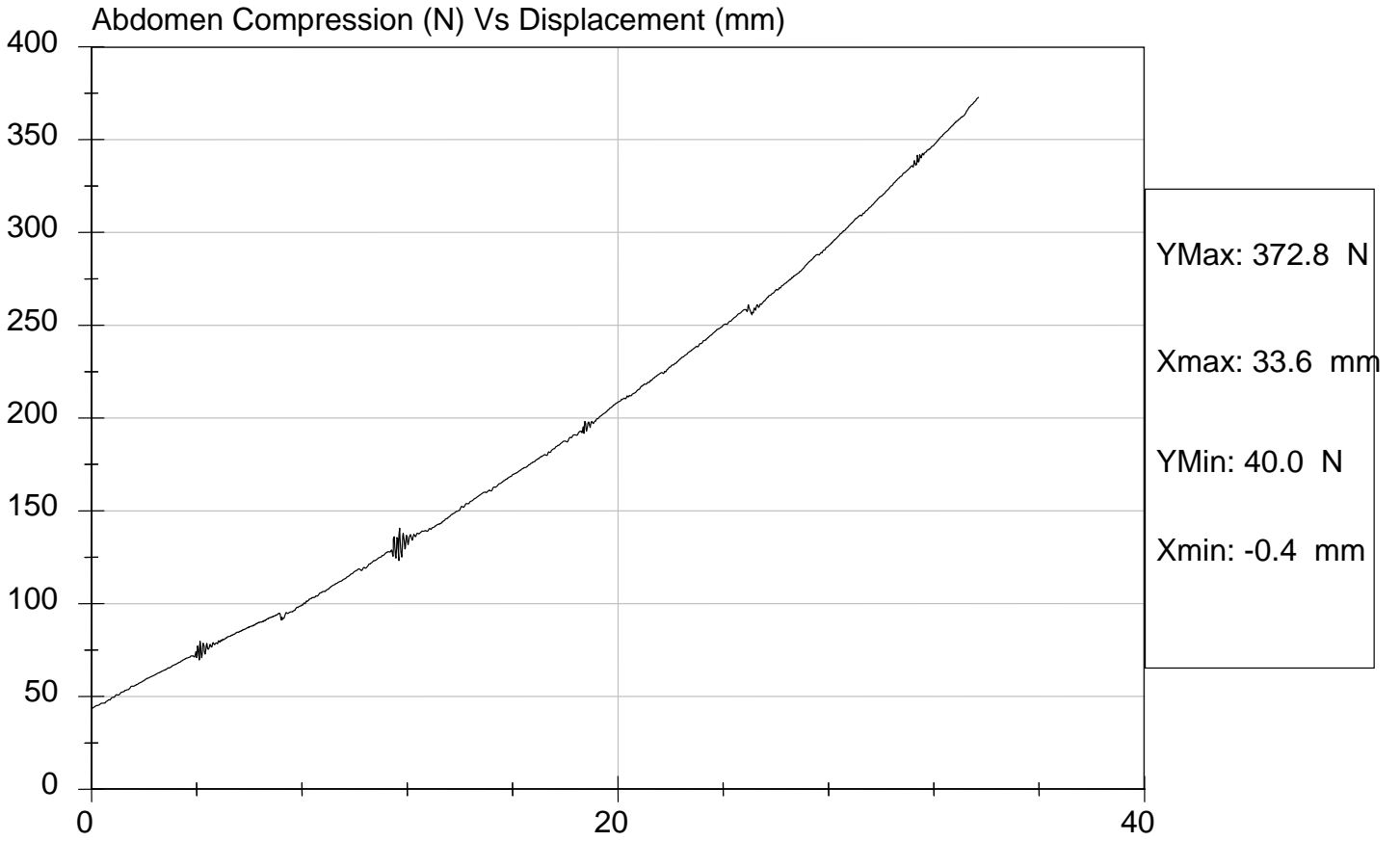
  
 Approved By



Test Description: Abdomen Compression Test Date: 8/29/08

Component: D082514

Speed: 0 ft/sec, 0 m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

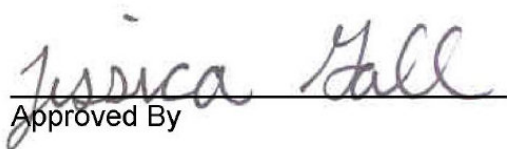
ATD Serial No: 271

Test I.D.: D082515

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	116.6	Pass
Force At 30 deg	N	151.2 - 204.6	151.8	Pass
Force At 40 deg	N	204.6 - 258.0	220.5	Pass
Return Angle	Deg	12 Maximum	7	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/29/08  
 Test Date

  
 Approved By

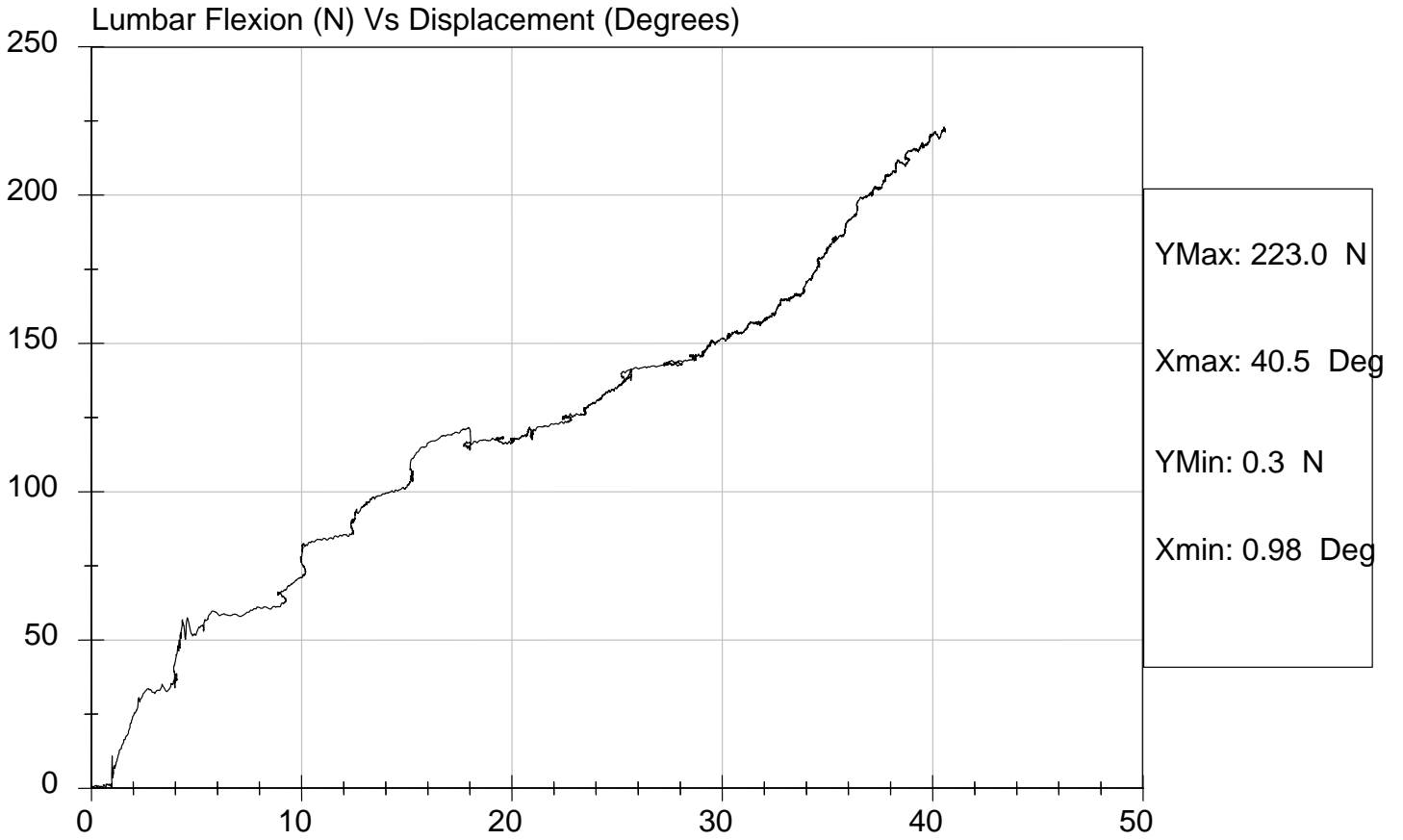


Test Description: Lumbar Flexion

Test Date: 8/29/08

Component: D082515

Speed: 0 ft/sec, 0 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Neck Pendulum Test**

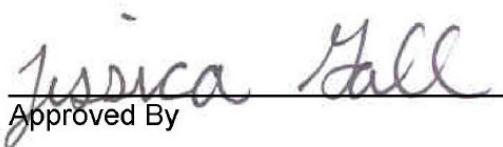
**ATD Serial No:** 271

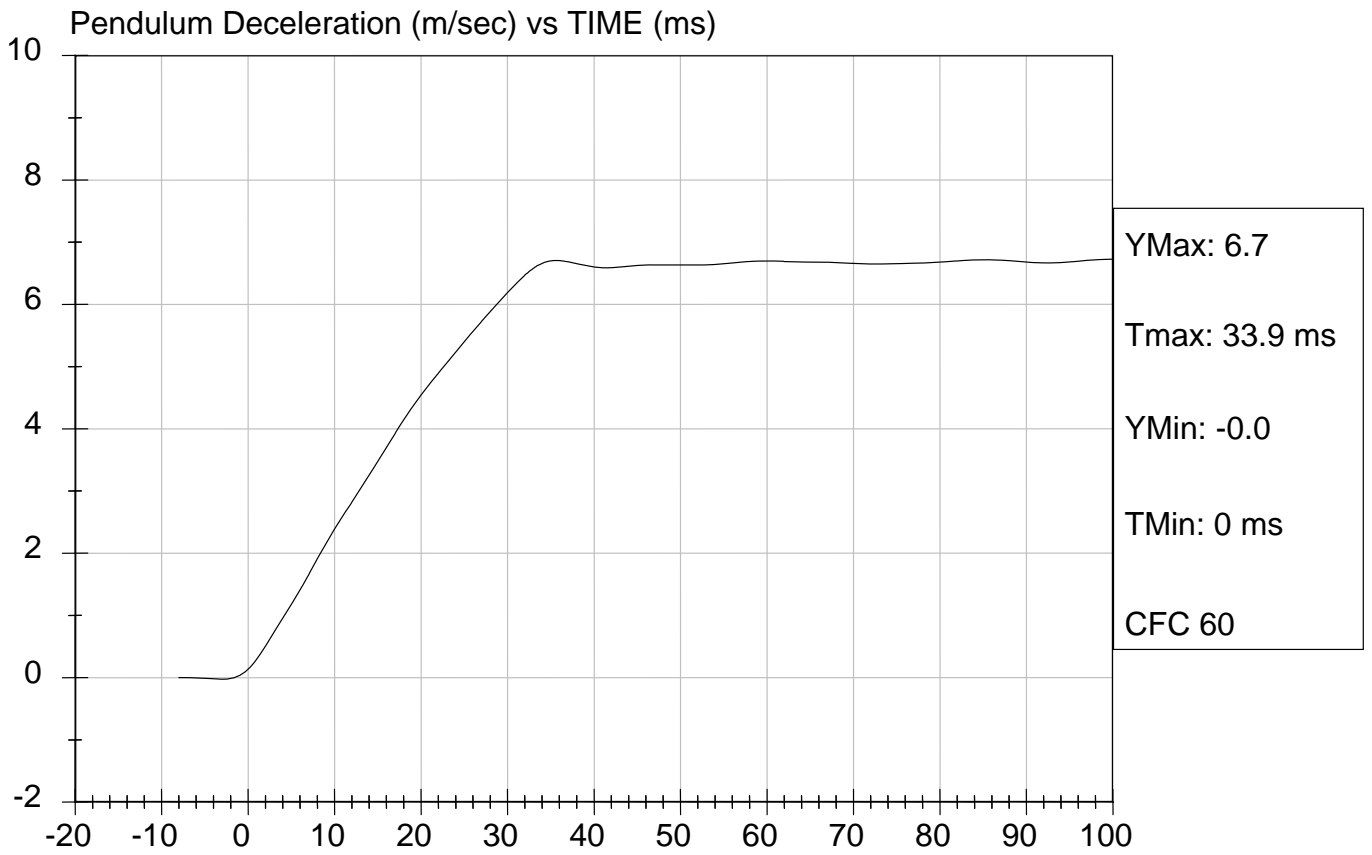
**Test I.D:** D082519

Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass	
Laboratory Relative Humidity	%	10 to 70	33	Pass	
Impact Velocity	m/s	6.89 to 7.13	7.06	Pass	
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.39	Pass
	20 msec	m/s	4.12 to 5.10	4.54	Pass
	30 msec	m/s	5.73 to 7.01	6.19	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.66	Pass
Midsaggital Plane Max Rotation	deg	66 to 82	71	Pass	
Head Rotation Peak to Zero - Decay Time	msec	58 to 67	61	Pass	
Max. Mx at Occipital Condyles	Nm	73 to 88	75	Pass	
Mx Peak To Zero - Decay Time	msec	49 to 64	60	Pass	
Mx Peak to Max. Head Rotation	msec	2 to 16	11	Pass	

  
 Laboratory Technician

8/29/08  
 Test Date

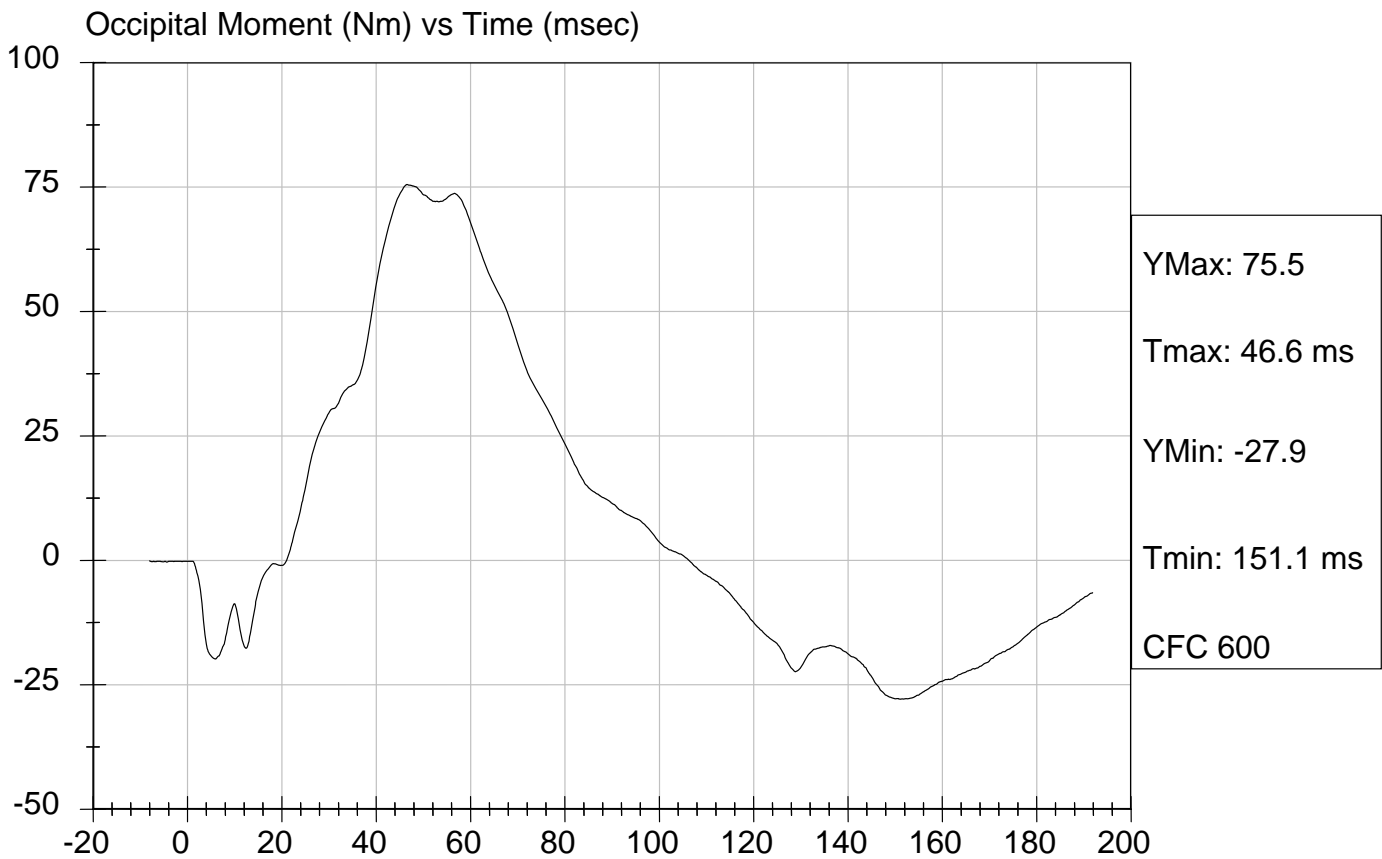
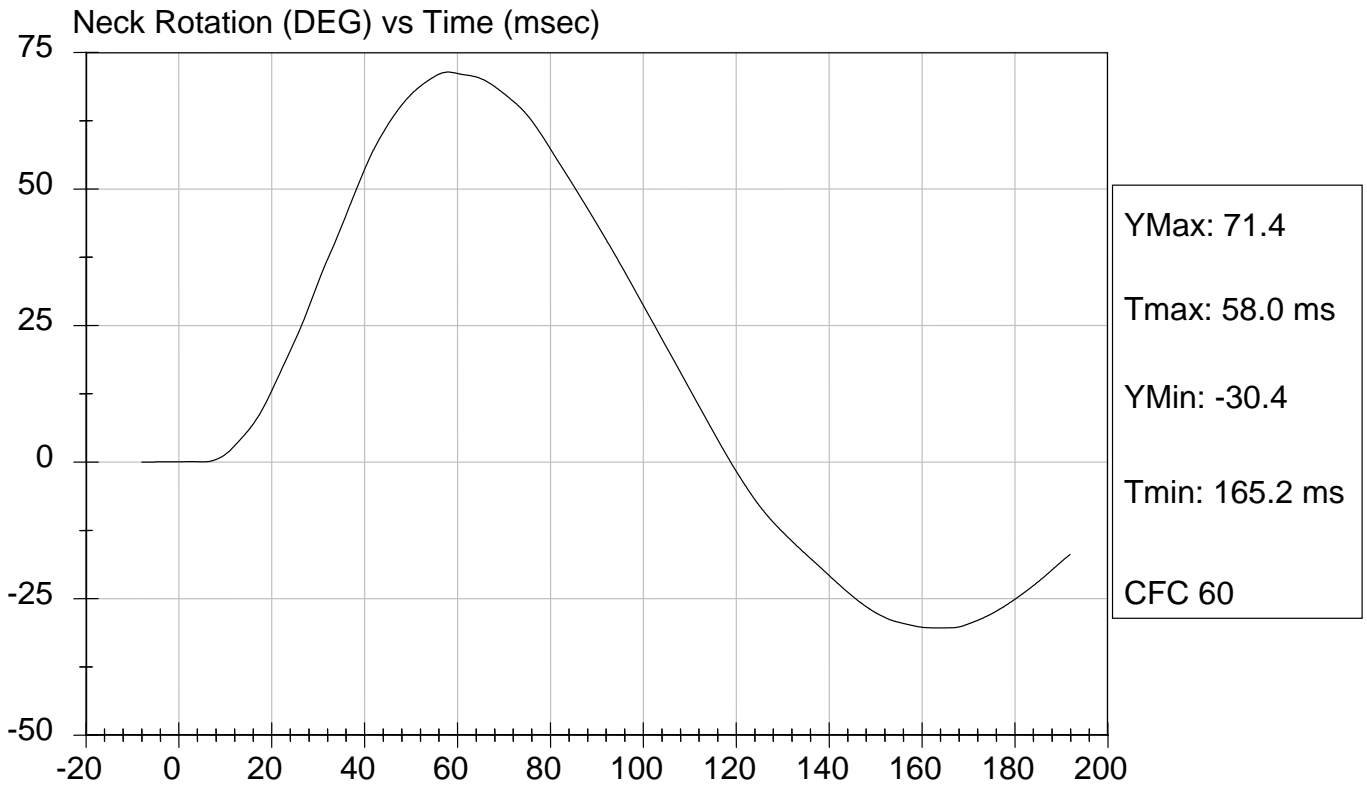
  
 Approved By





Test Desc: Neck Bending  
Component ID: D082519

Test Date: 8/29/08  
Speed: 23.15 ft/sec, 7.06 m/sec



**SID Calibration Data Sheet  
Side Impact Dummy  
Inspection Checklist**

**ATD Serial No:** 271

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

*Jessica Hall*  
 \_\_\_\_\_  
 Laboratory Technician  
*David Winkelbauer*  
 \_\_\_\_\_  
 Approved By

8/29/08  
 \_\_\_\_\_  
 Test Date

CERTIFICATION DATA

Dummy Serial Number: 272

## Calibration Test Results Summary

Dummy Serial Number: 272

### Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**External Measurements**

ATD Serial No: 272


Test I.D: D08244

Tested Parameter	Units	Specification	Result	Pass/Fail
SH - Seated Height	mm	889 - 909	907	Pass
RH - Rib Height	mm	501 - 521	520	Pass
HP - Hip Pivot Height	mm	99 ref.	99	Pass
RD - Rib from Back Line	mm	229 - 241	230	Pass
KV - Knee Pivot to Back Line	mm	511 - 526	525	Pass
SW - Knee Pivot to Floor	mm	490 - 505	495	Pass
HW - Hip Width	mm	356 - 391	358	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/22/08

Test Date


  
 Approved By

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

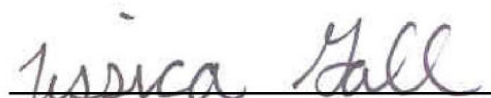
**ATD Serial No:** 272

**Test I.D:** D082441

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	120 to 150	135	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-12.1	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

8/22/08  
 Test Date

  
 Approved By



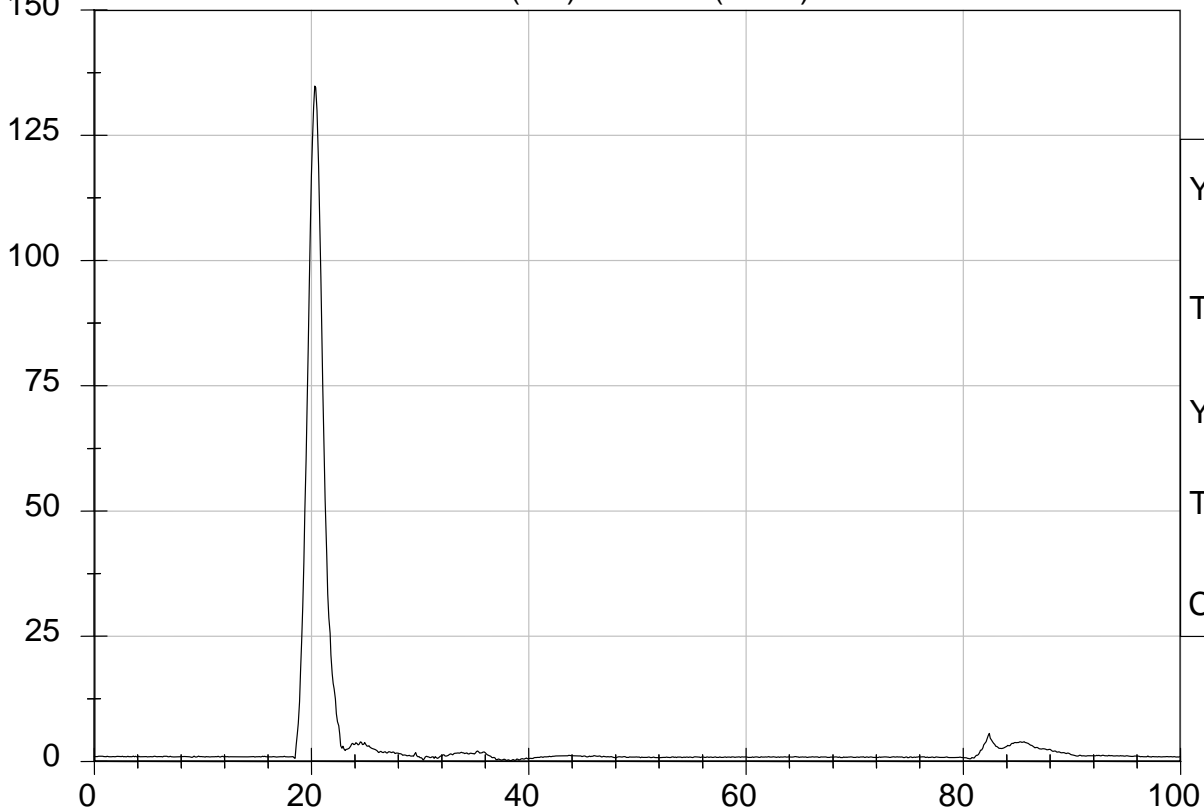
Test Description: Head Drop

Test Date: 8/22/08

Component: D082441

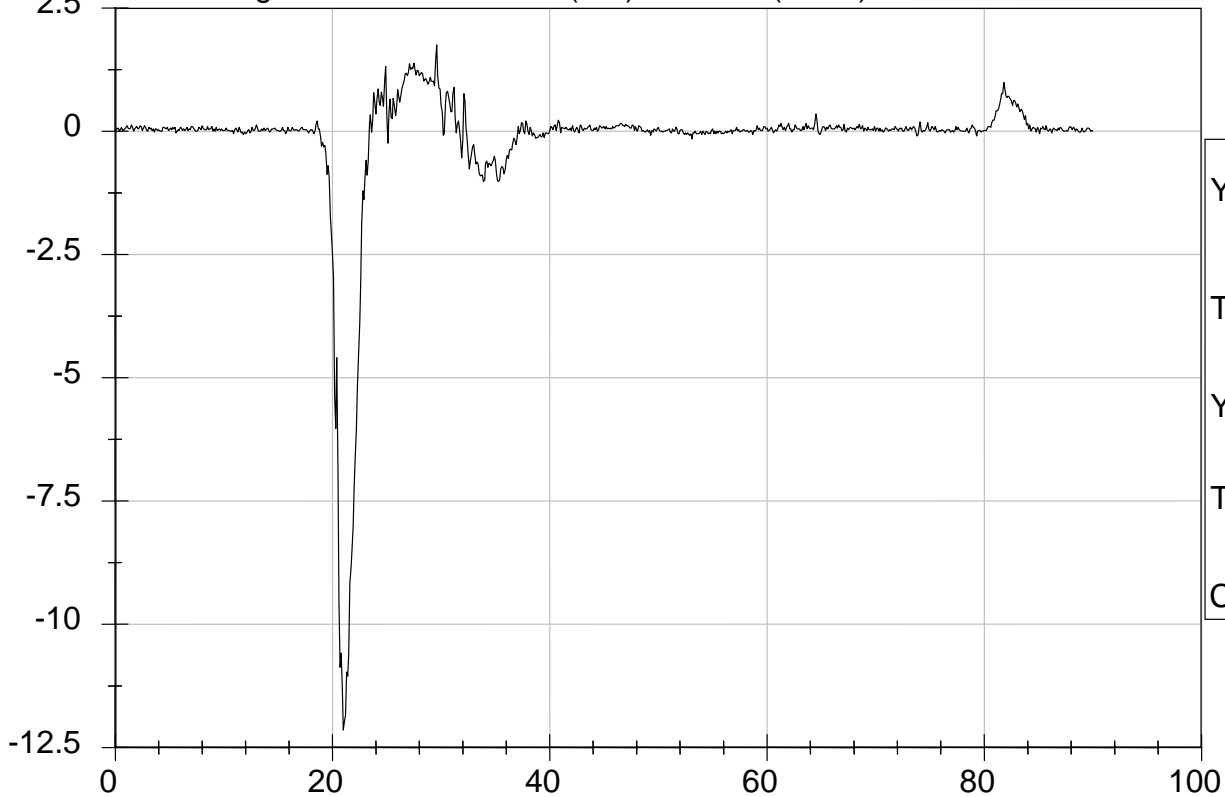
Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



YMax: 134.8 G  
Tmax: 20.3 ms  
YMin: 0.2 G  
Tmin: 38.4 ms  
CFC 1000

Peak Longitudinal Acceleration (G's) Vs Time (msec)



YMax: 1.7 G  
Tmax: 29.6 ms  
YMin: -12.1 G  
Tmin: 21.0 ms  
CFC 1000

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

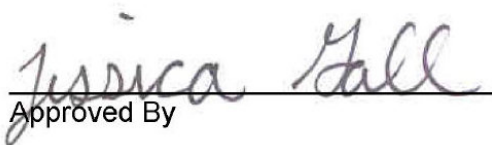
**ATD Serial No:** 272

**Test I.D:** D082442

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	39	Pass
Lower Rib	G's	37 - 46	37	Pass
Lower Spine	G's	15 - 22	19	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

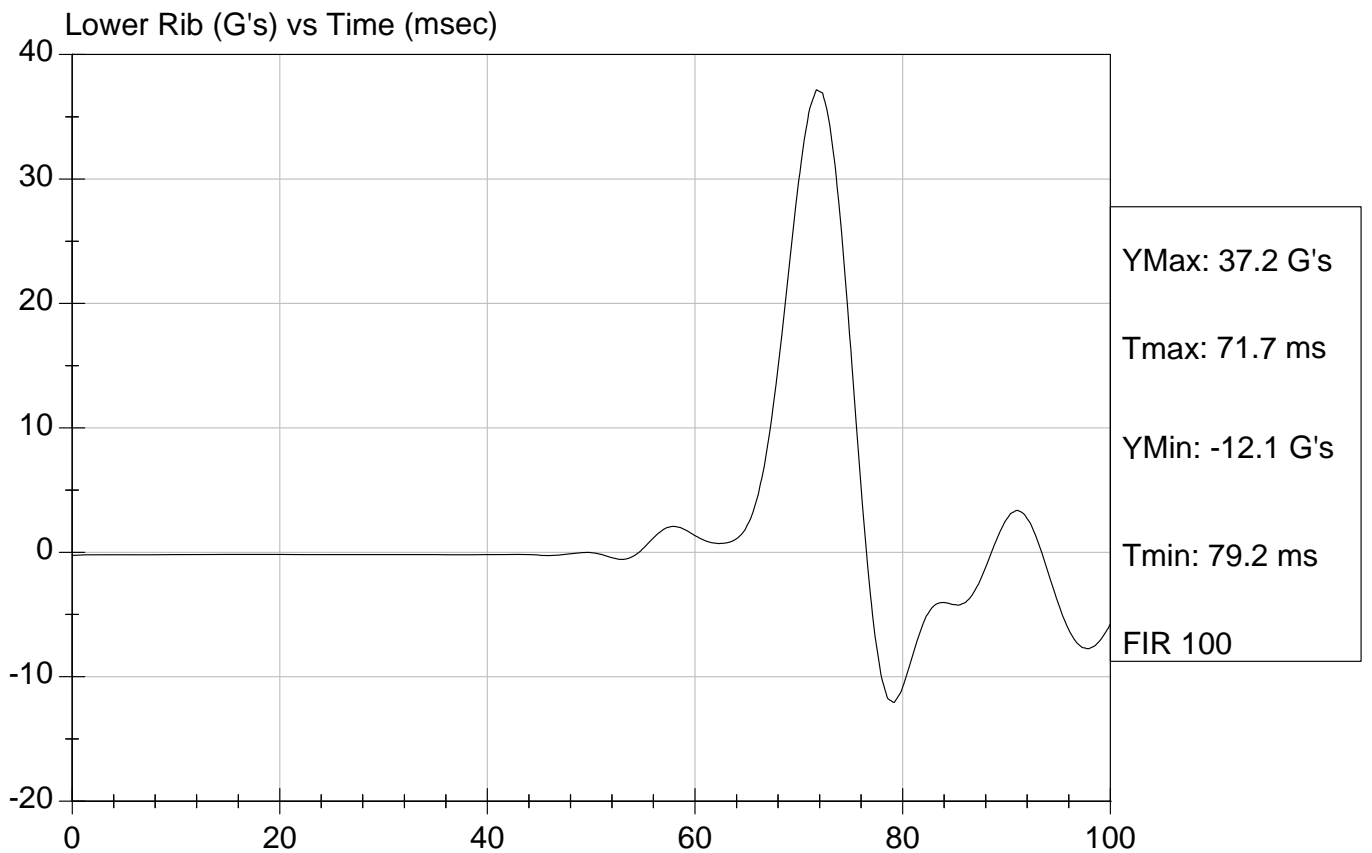
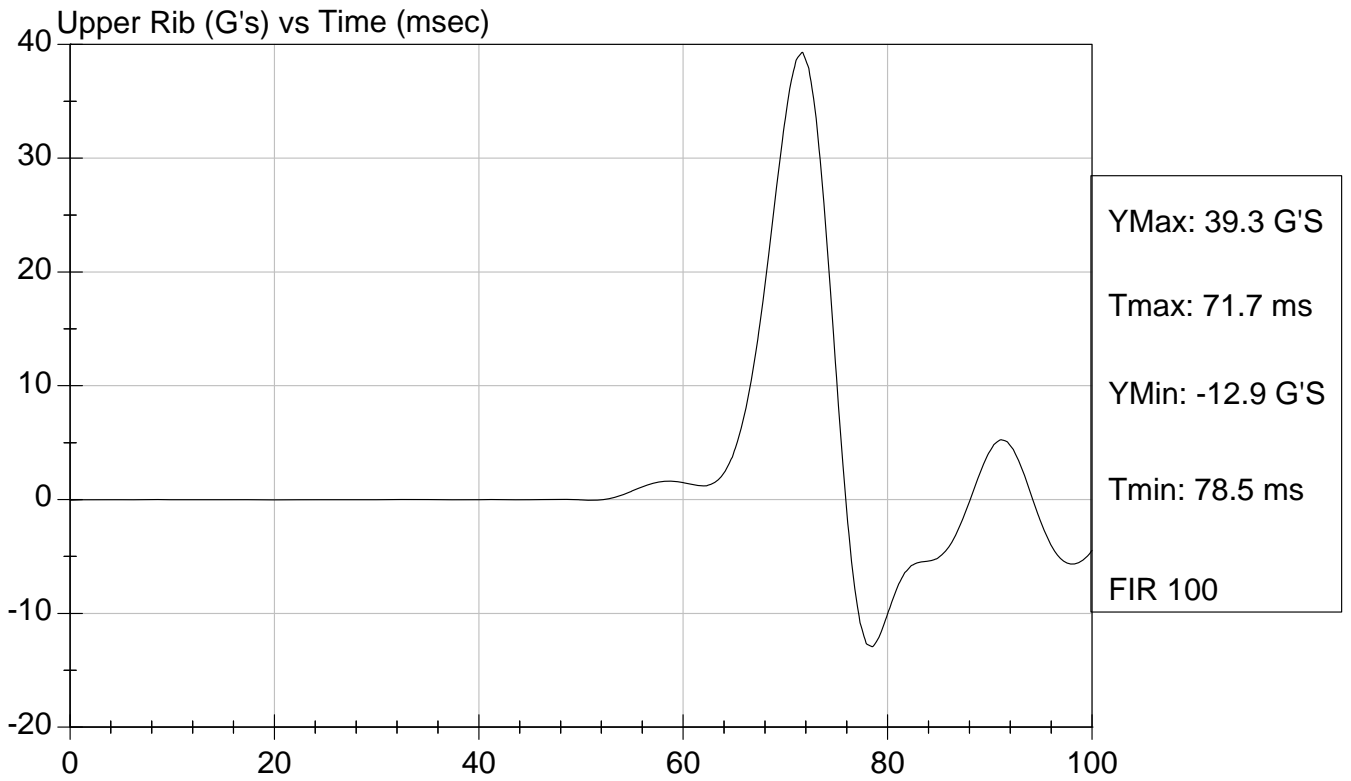
8/21/08  
 Test Date

  
 Approved By



Test Desc: Thorax Impact  
Component ID: D082442

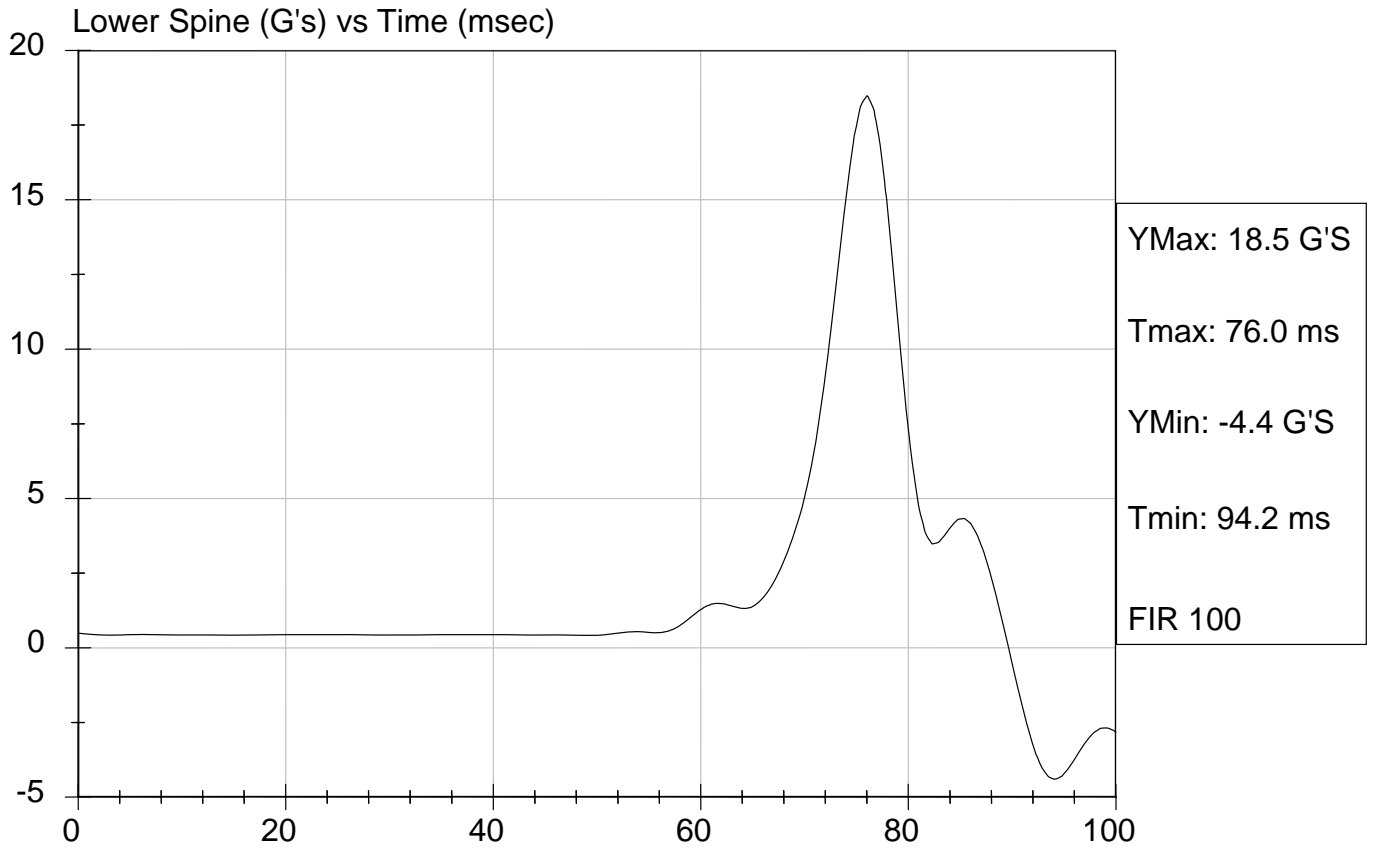
Test Date: 8/21/08  
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact  
Component ID: D082442

Test Date: 8/21/08  
Speed: 14.12 ft/sec, 4.30 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

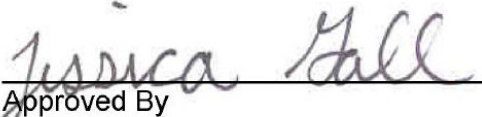
ATD Serial No: 272

Test I.D.: D082443

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	44	Pass
Overall Test Results				Pass

  
 Laboratory Technician

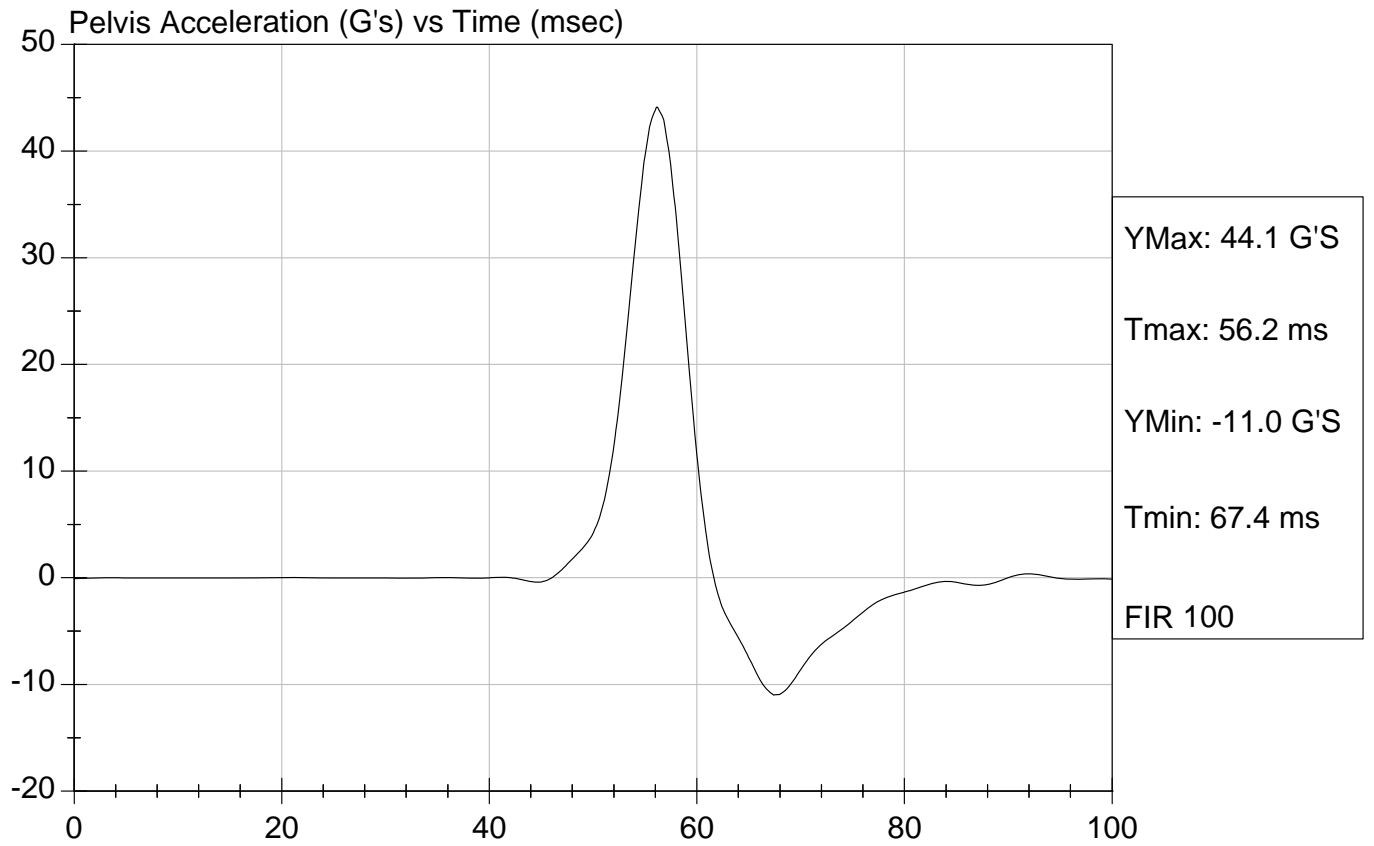
8/21/08  
 Test Date

  
 Approved By



Test Desc: Pelvis Impact  
Component ID: D082443

Test Date: 8/21/08  
Speed: 14.12 ft/sec, 4.30 m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**


ATD Serial No: 272

Test I.D.: D082444

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Force At 12.7 mm	N	104 -162	131	Pass
Force At 19 mm	N	163 - 222	184	Pass
Force At 25.4 mm	N	222 - 280	249	Pass
Force At 33 mm	N	325 - 391	340	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/22/08  
 Test Date

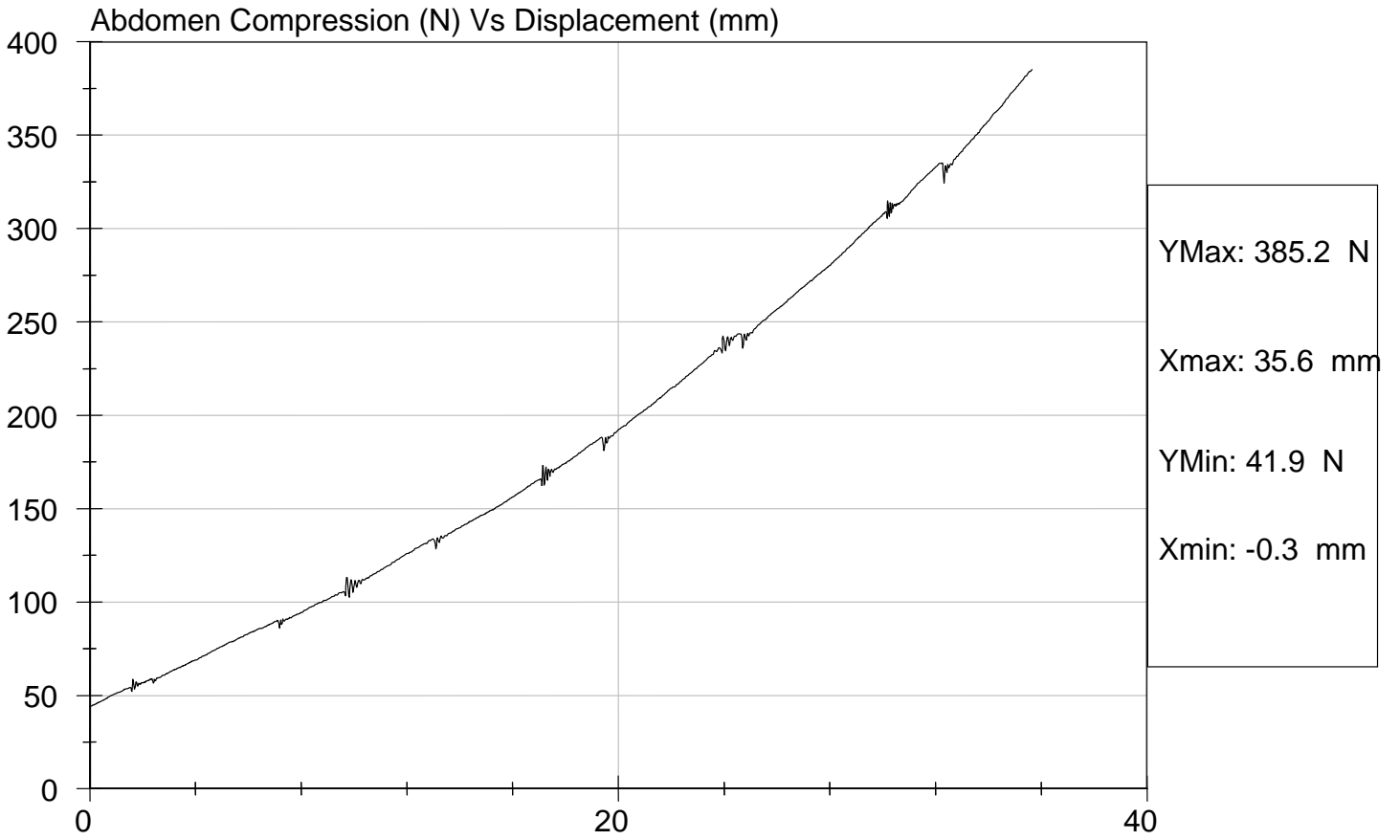
  
 Approved By



Test Description: Abdomen Compression Test Date: 8/22/08

Component: D082444

Speed: 0 ft/sec, 0 m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

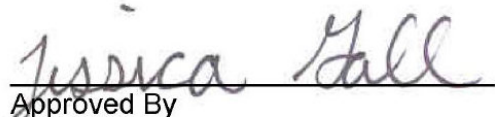
ATD Serial No: 272

Test I.D.: D082445

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	135.7	Pass
Force At 30 deg	N	151.2 - 204.6	179.3	Pass
Force At 40 deg	N	204.6 - 258.0	238.5	Pass
Return Angle	Deg	12 Maximum	6	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/22/08  
 Test Date

  
 Approved By

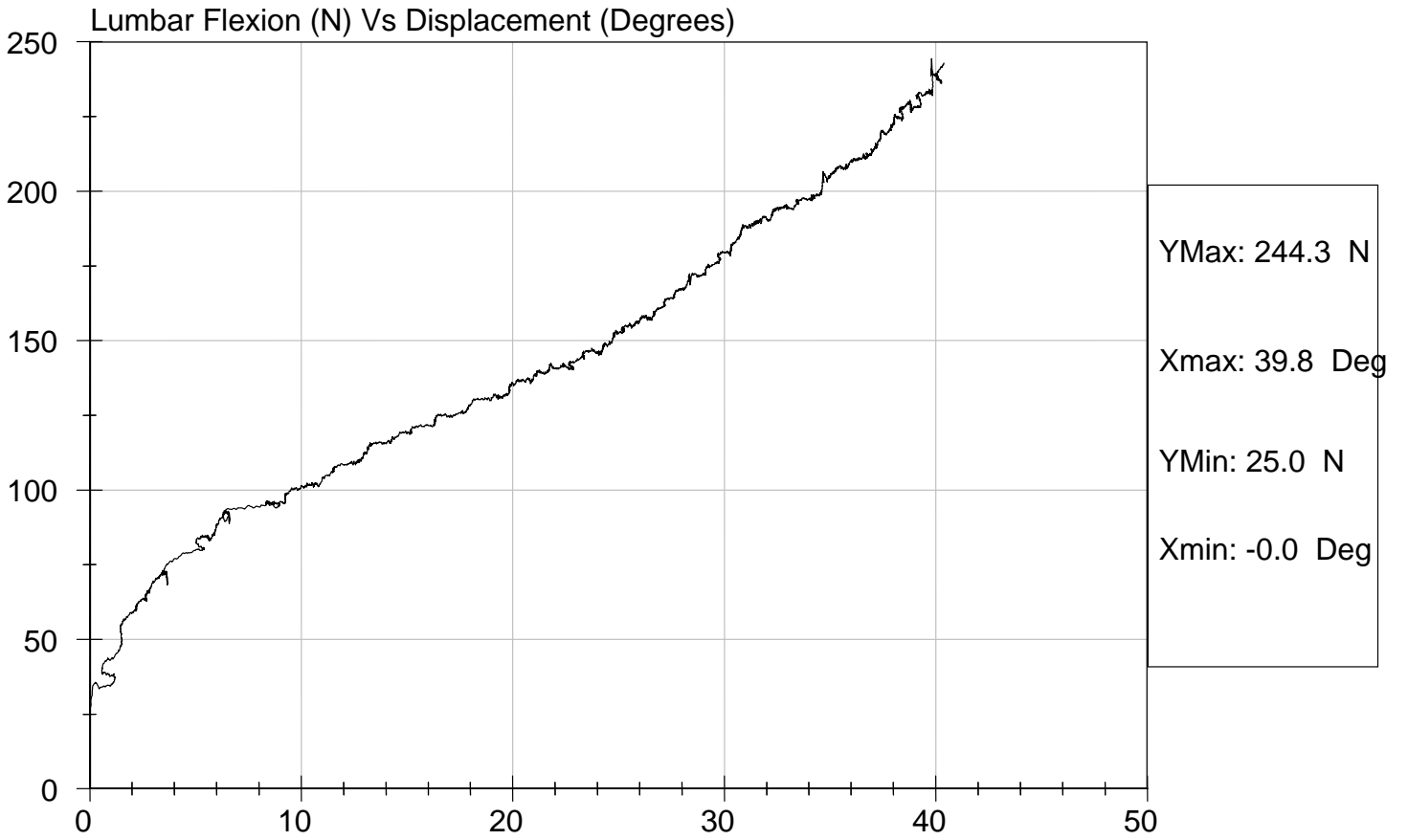


Test Description: Lumbar Flexion

Test Date: 8/22/08

Component: D082445

Speed: 0 ft/sec, 0m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Neck Pendulum Test**

**ATD Serial No:** 272

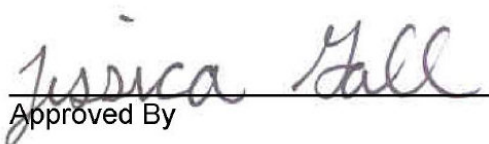
**Test I.D:** D082449

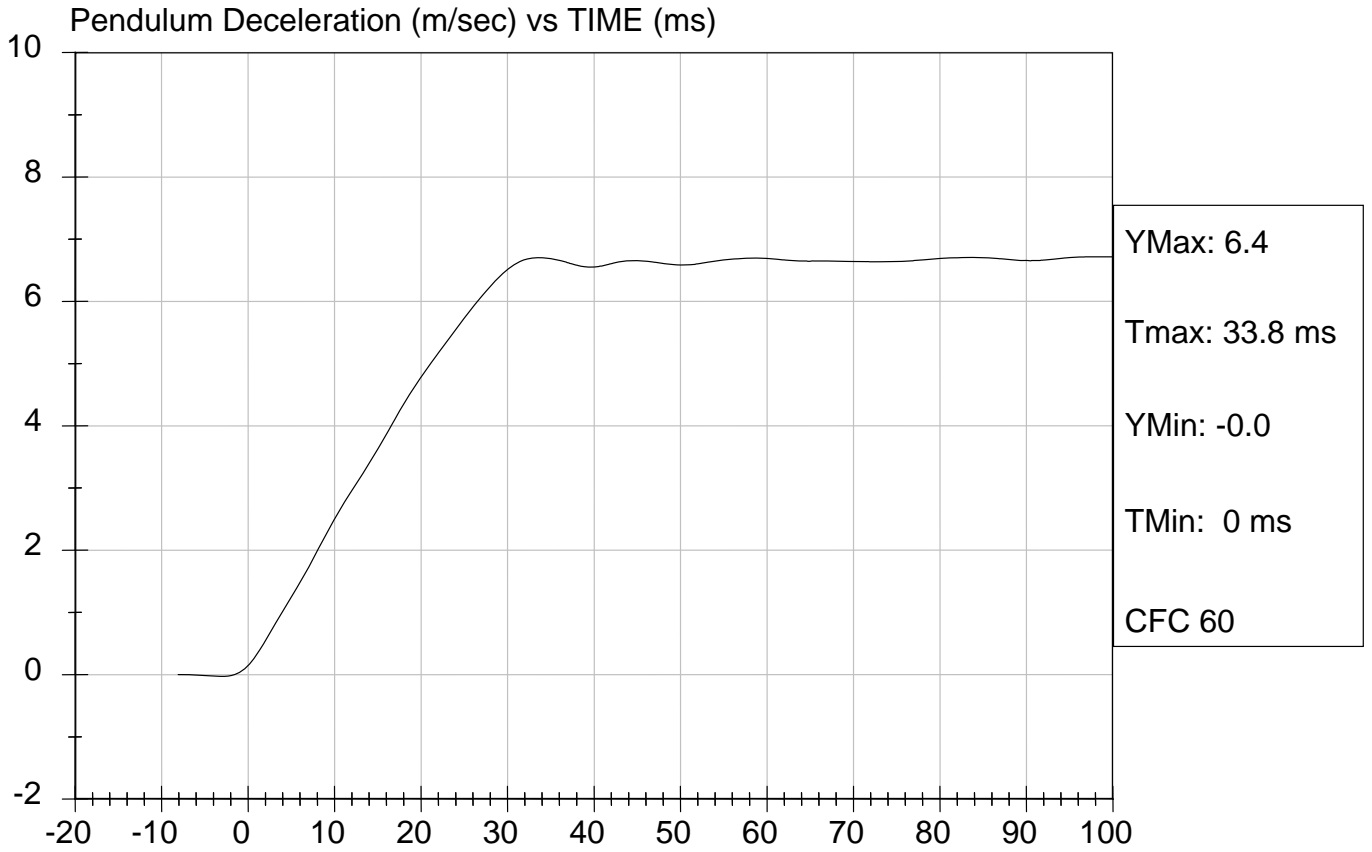
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass	
Laboratory Relative Humidity	%	10 to 70	42	Pass	
Impact Velocity	m/s	6.89 to 7.13	7.06	Pass	
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.50	Pass
	20 msec	m/s	4.12 to 5.10	4.78	Pass
	30 msec	m/s	5.73 to 7.01	6.51	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.64	Pass
Midsaggital Plane Max Rotation	deg	66 to 82	71	Pass	
Head Rotation Peak to Zero - Decay Time	msec	58 to 67	61	Pass	
Max. Mx at Occipital Condyles	Nm	73 to 88	75	Pass	
Mx Peak To Zero - Decay Time	msec	49 to 64	59	Pass	
Mx Peak to Max. Head Rotation	msec	2 to 16	13	Pass	

  
 Laboratory Technician

8/22/08

Test Date

  
 Approved By

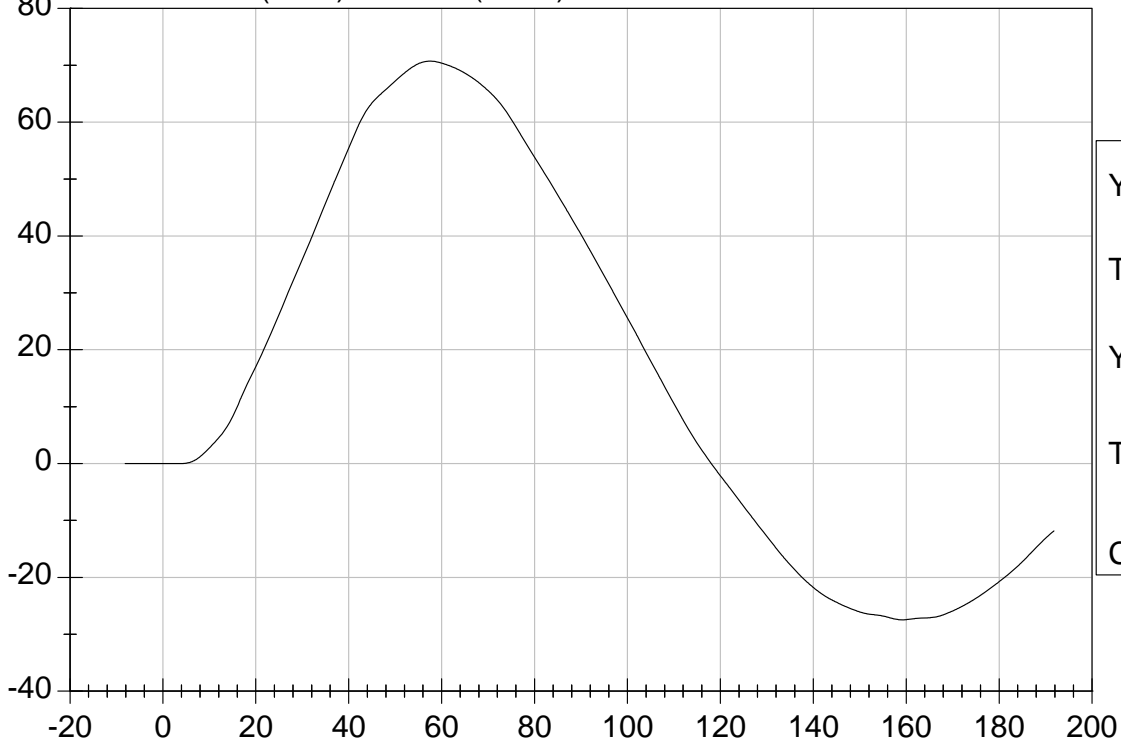




Test Desc: Neck Bending  
Component ID: D082449

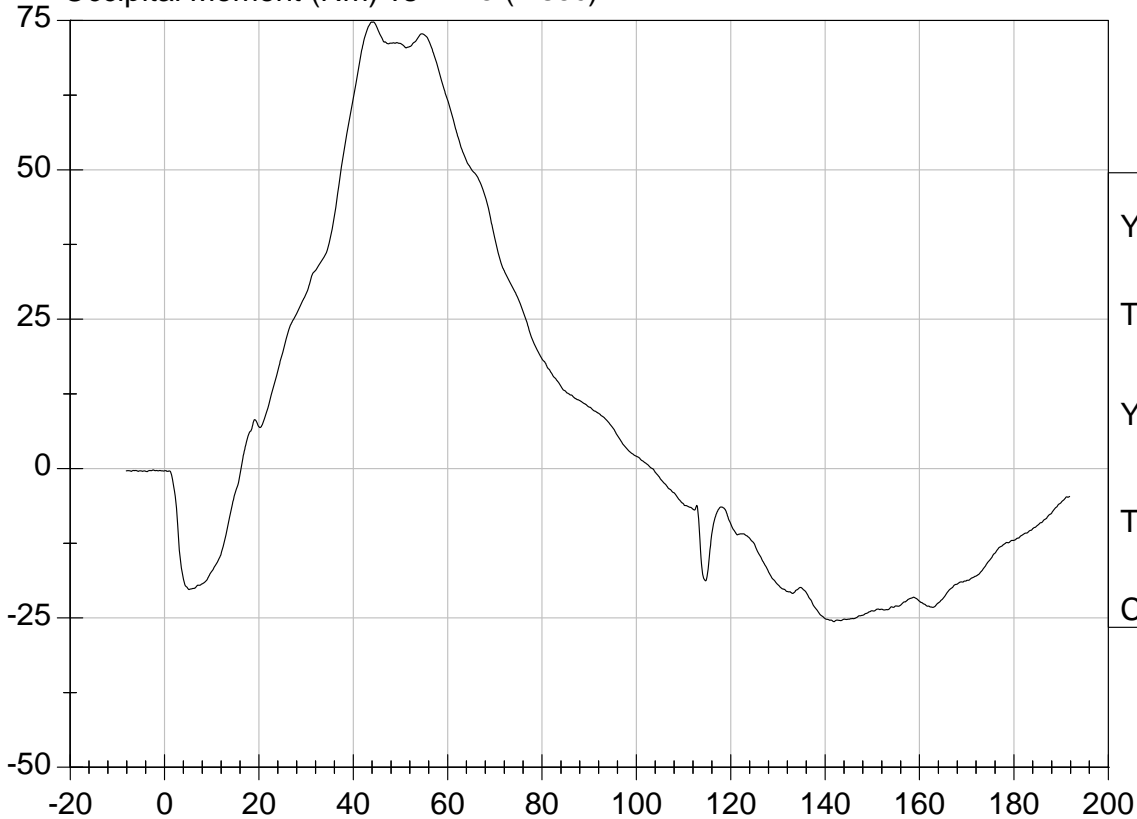
Test Date: 8/22/08  
Speed: 23.15 ft/sec, 7.06 m/sec

Neck Rotation (DEG) vs Time (msec)



YMax: 70.7  
Tmax: 57.6 ms  
YMin: -27.5  
Tmin: 159.2 ms  
CFC 60

Occipital Moment (Nm) vs Time (msec)



YMax: 74.8  
Tmax: 44.3 ms  
YMin: -25.6  
Tmin: 141.9 ms  
CFC 600

## Calibration Test Results Summary

Dummy Serial Number: 272

### Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

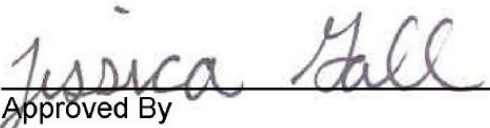
ATD Serial No: 272

Test I.D: D082521

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Peak Resultant Acceleration	G's	120 to 150	145	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-10.5	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/29/08  
 Test Date

  
 Approved By



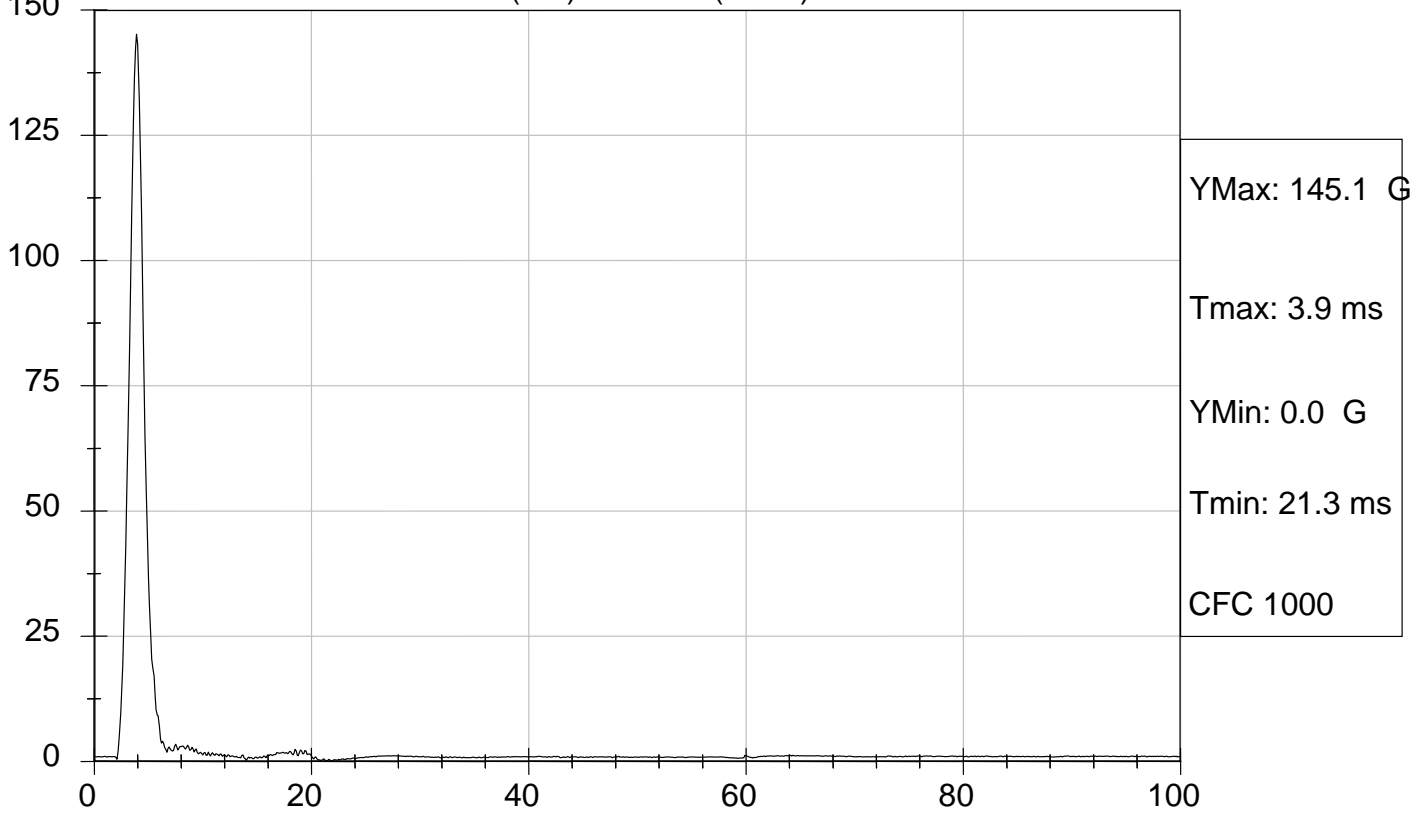
Test Description: Head Drop

Test Date: 8/29/08

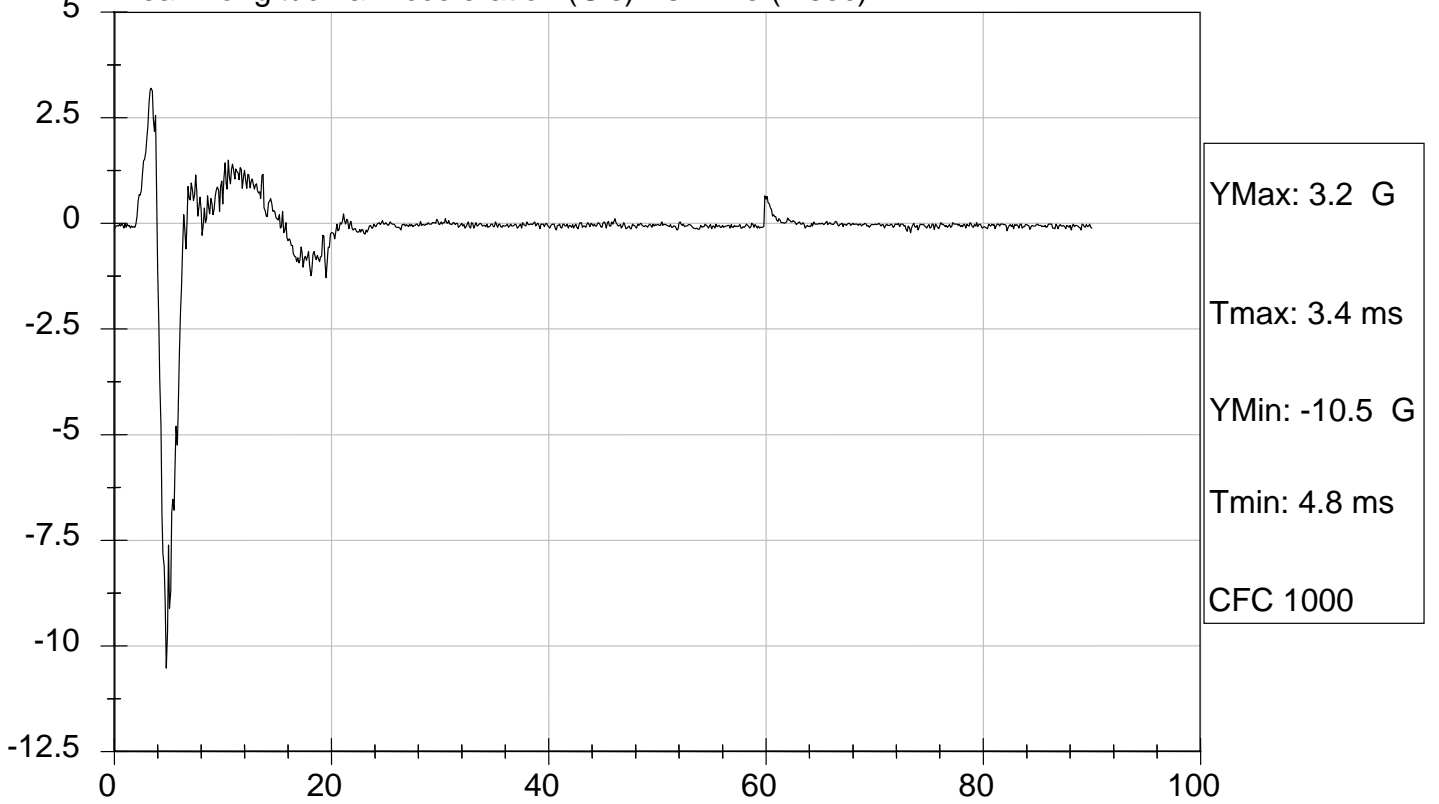
Component: D082521

Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



Peak Longitudinal Acceleration (G's) Vs Time (msec)



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

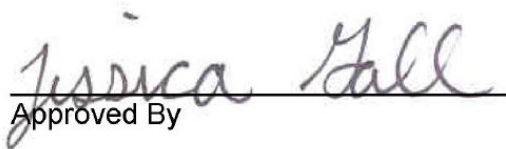
**ATD Serial No:** 272

**Test I.D:** D082522

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	20	Pass
<b>Overall Test Results</b>				<b>Pass</b>

  
 Laboratory Technician

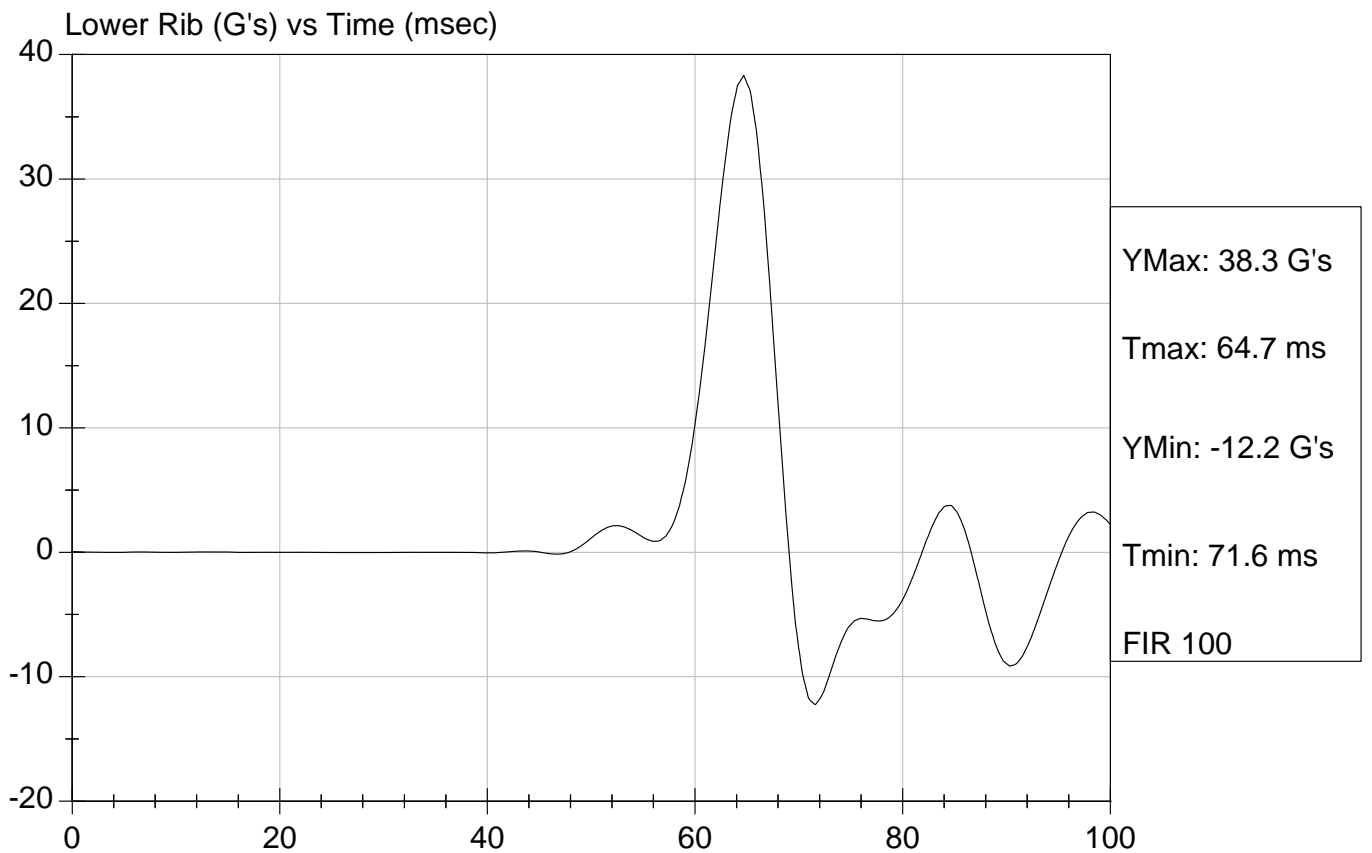
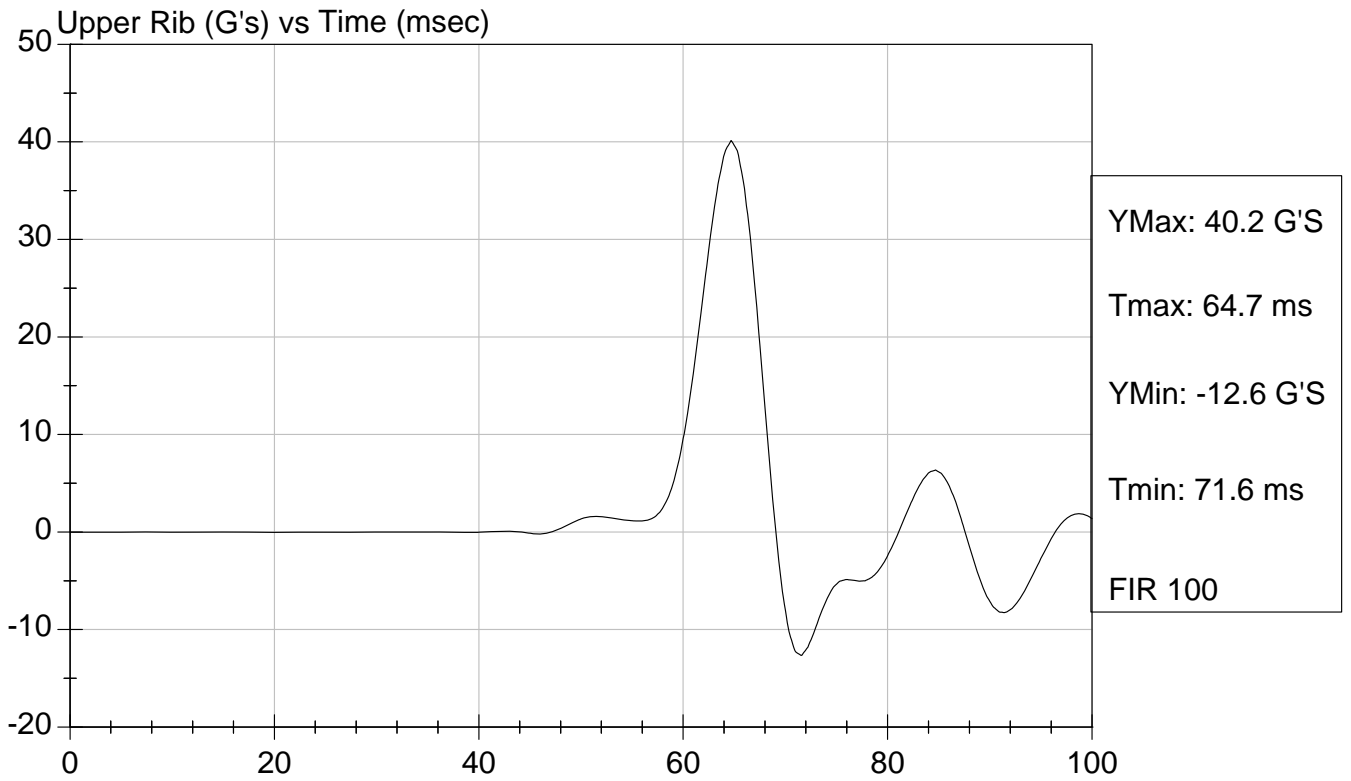
8/29/08  
 Test Date

  
 Approved By



Test Desc: Thorax Impact  
Component ID: D082522

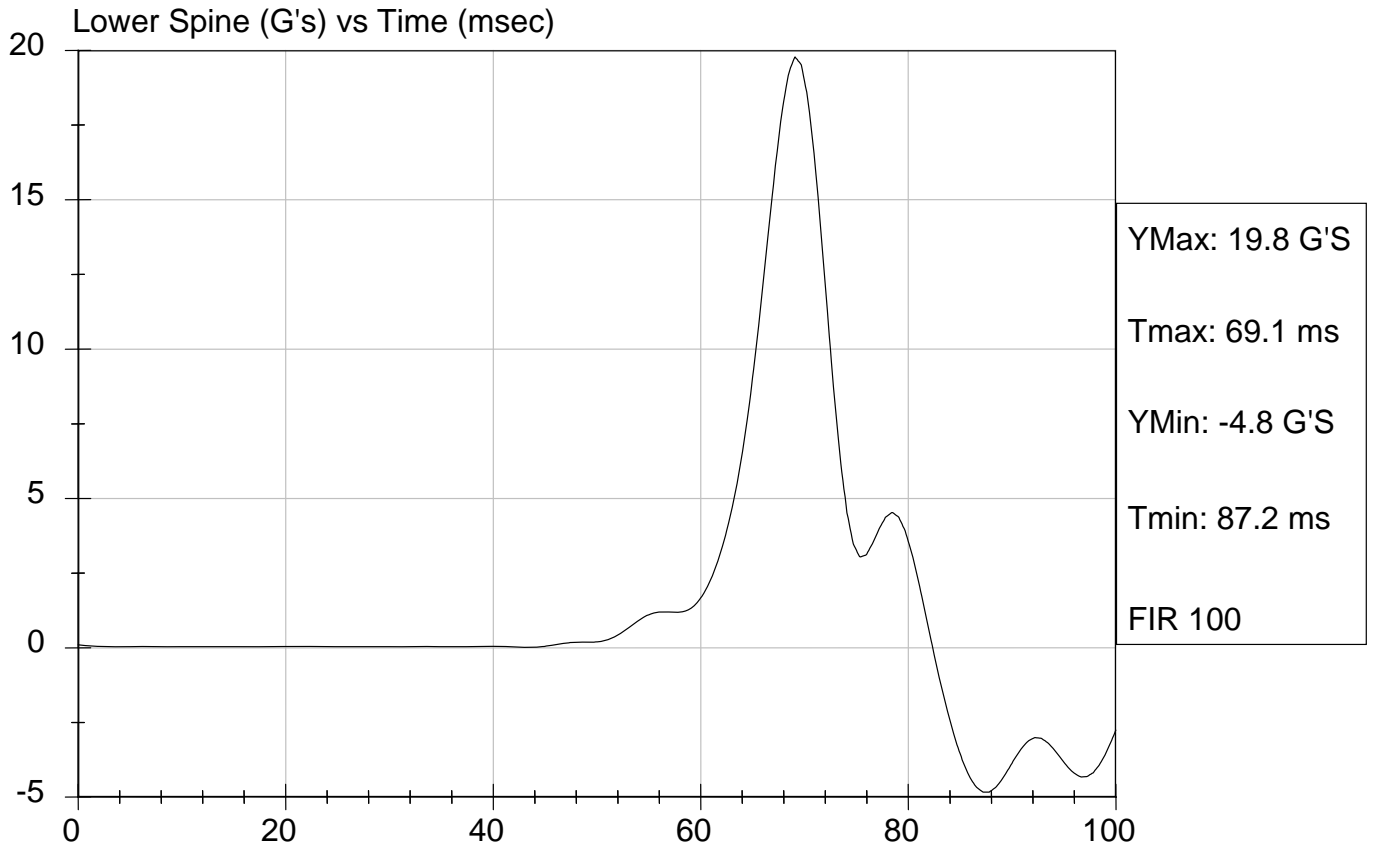
Test Date: 8/29/08  
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact  
Component ID: D082522

Test Date: 8/29/08  
Speed: 14.12 ft/sec, 4.30 m/sec



**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

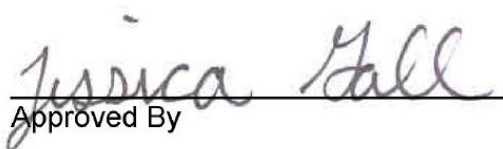
ATD Serial No: 272

Test I.D.: D082523

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	43	Pass
Overall Test Results				Pass

  
Laboratory Technician

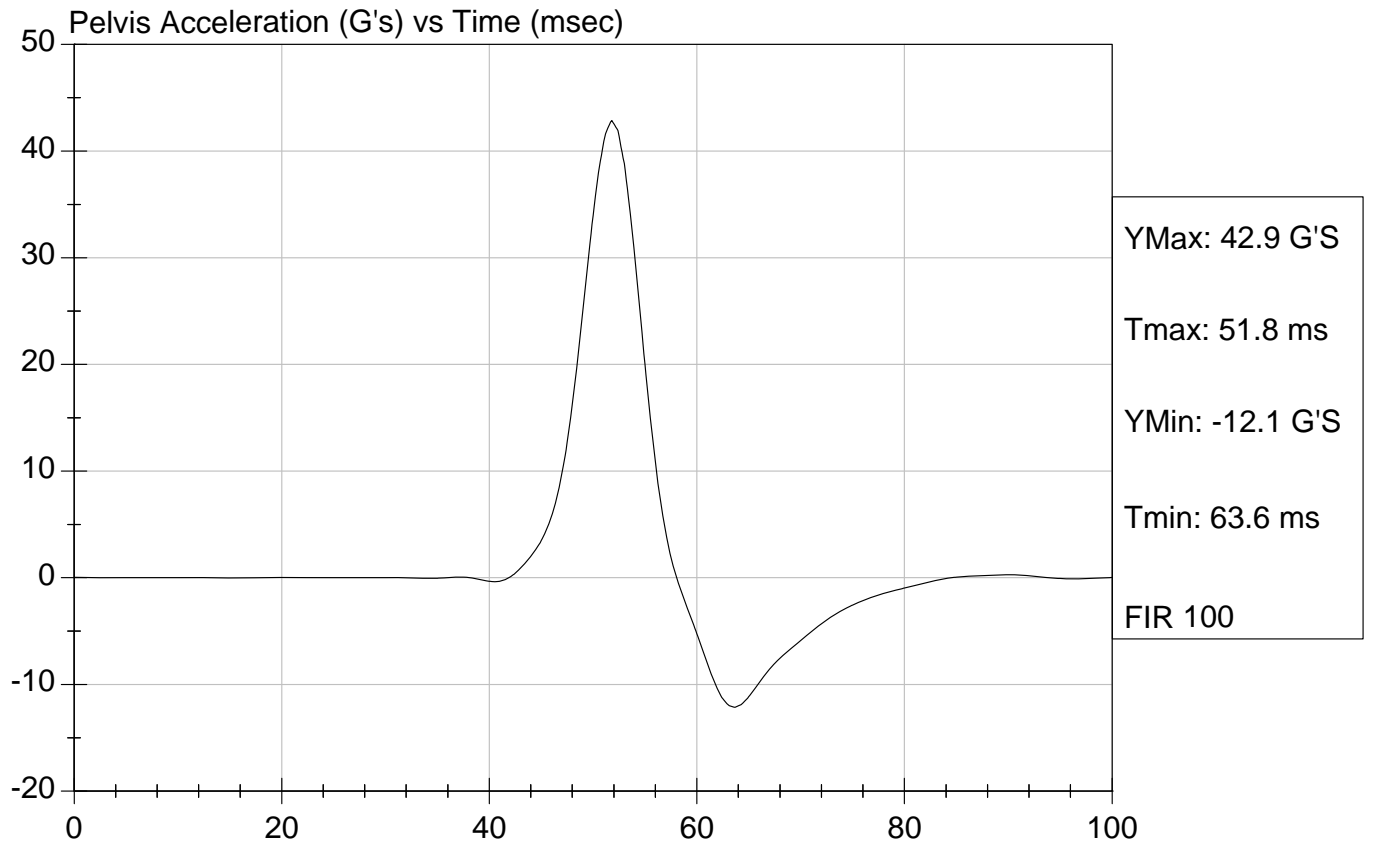
8/29/08  
Test Date

  
Approved By



Test Desc: Pelvis Impact  
Component ID: D082523

Test Date: 8/29/08  
Speed: 14.12 ft/sec, 4.30 m/sec

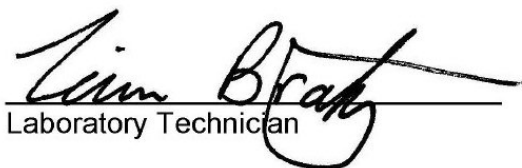


**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

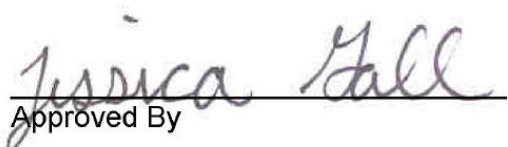
ATD Serial No: 272

Test I.D: D082524

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Force At 12.7 mm	N	104 - 162	140	Pass
Force At 19 mm	N	163 - 222	197	Pass
Force At 25.4 mm	N	222 - 280	270	Pass
Force At 33 mm	N	325 - 391	374	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/29/08  
 Test Date

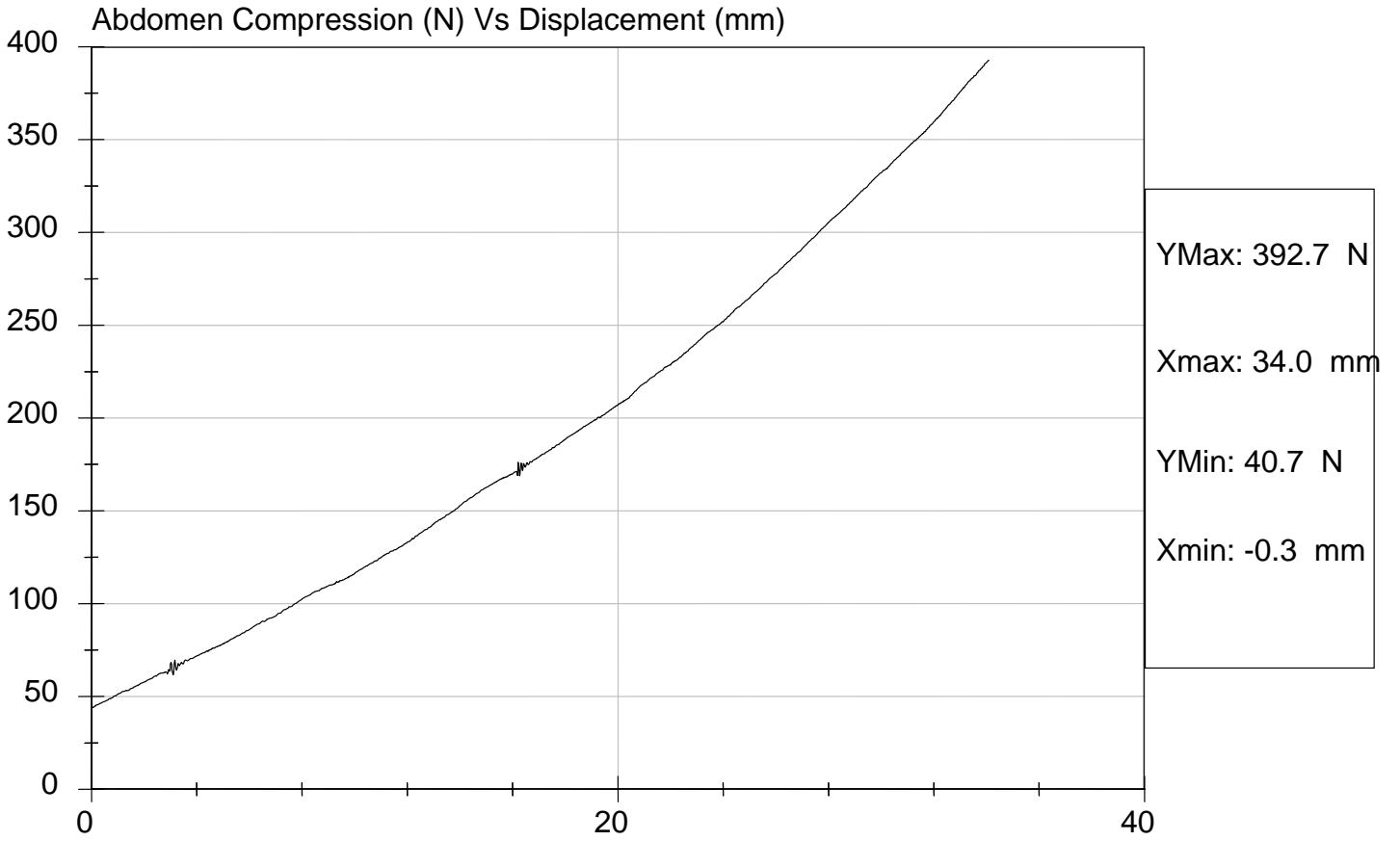
  
 Approved By



Test Description: Abdomen Compression Test Date: 8/29/08

Component: D082524

Speed: 0 ft/sec, 0 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

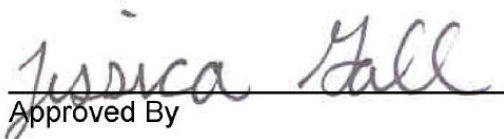
ATD Serial No: 272

Test I.D: D082525

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	110.7	Pass
Force At 30 deg	N	151.2 - 204.6	157.4	Pass
Force At 40 deg	N	204.6 - 258.0	215.4	Pass
Return Angle	Deg	12 Maximum	5	Pass
Overall Test Results				Pass

  
 Laboratory Technician

8/29/08  
 Test Date

  
 Approved By

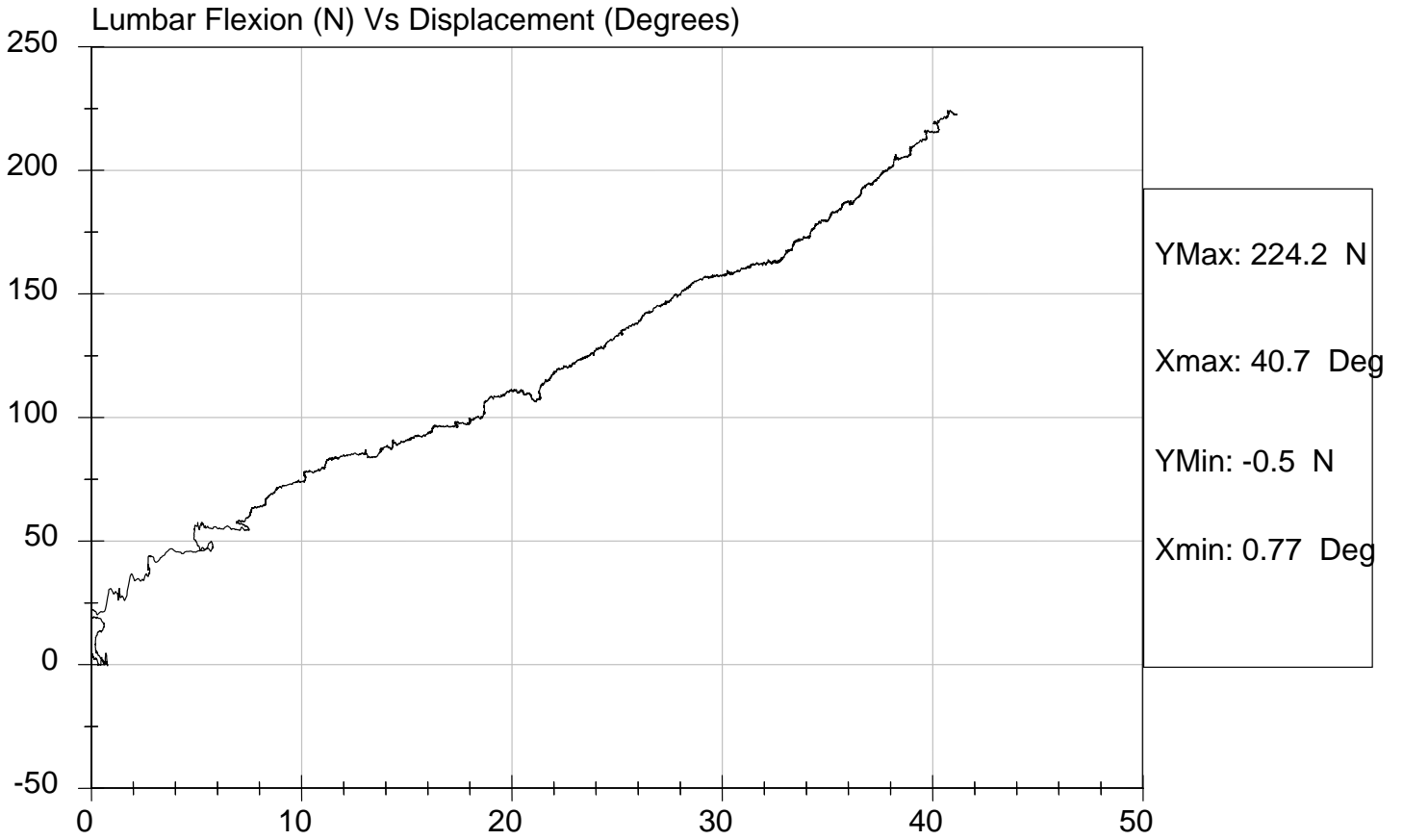


Test Description: Lumbar Flexion

Test Date: 8/29/08

Component: D082525

Speed: 0 ft/sec, 0 m/sec




**SID/HIII Calibration Data Sheet**  
**Side Impact Dummy**  
**Neck Pendulum Test**

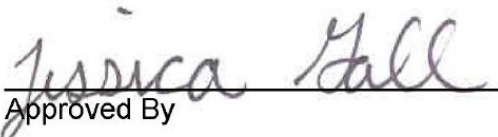
**ATD Serial No:** 272

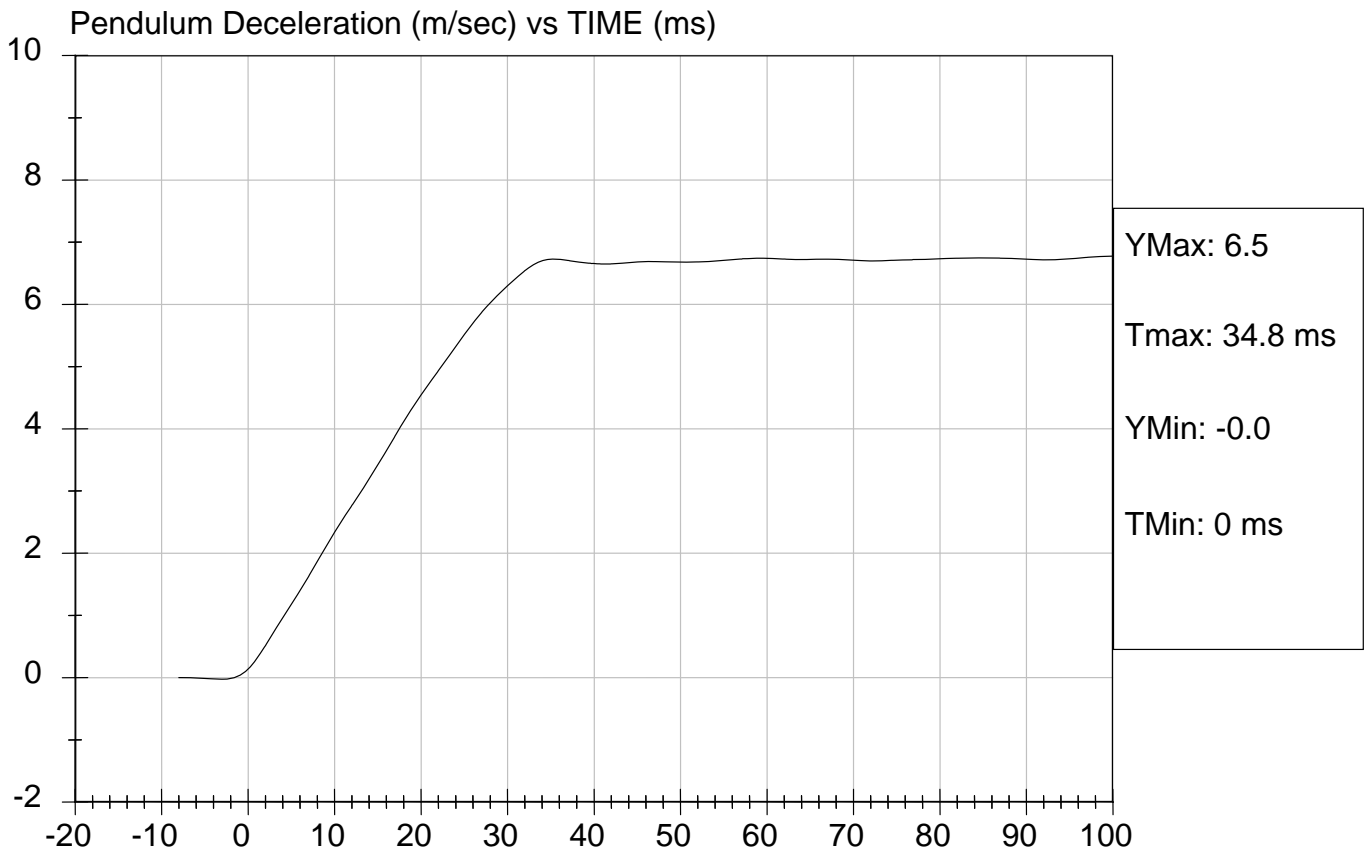
**Test I.D:** D082529

Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass	
Laboratory Relative Humidity	%	10 to 70	32	Pass	
Impact Velocity	m/s	6.89 to 7.13	7.06	Pass	
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.34	Pass
	20 msec	m/s	4.12 to 5.10	4.54	Pass
	30 msec	m/s	5.73 to 7.01	6.30	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.71	Pass
Midsaggital Plane Max Rotation	deg	66 to 82	69	Pass	
Head Rotation Peak to Zero - Decay Time	msec	58 to 67	59	Pass	
Max. Mx at Occipital Condyles	Nm	73 to 88	75	Pass	
Mx Peak To Zero - Decay Time	msec	49 to 64	57	Pass	
Mx Peak to Max. Head Rotation	msec	2 to 16	13	Pass	

  
 Laboratory Technician

8/29/08  
 Test Date

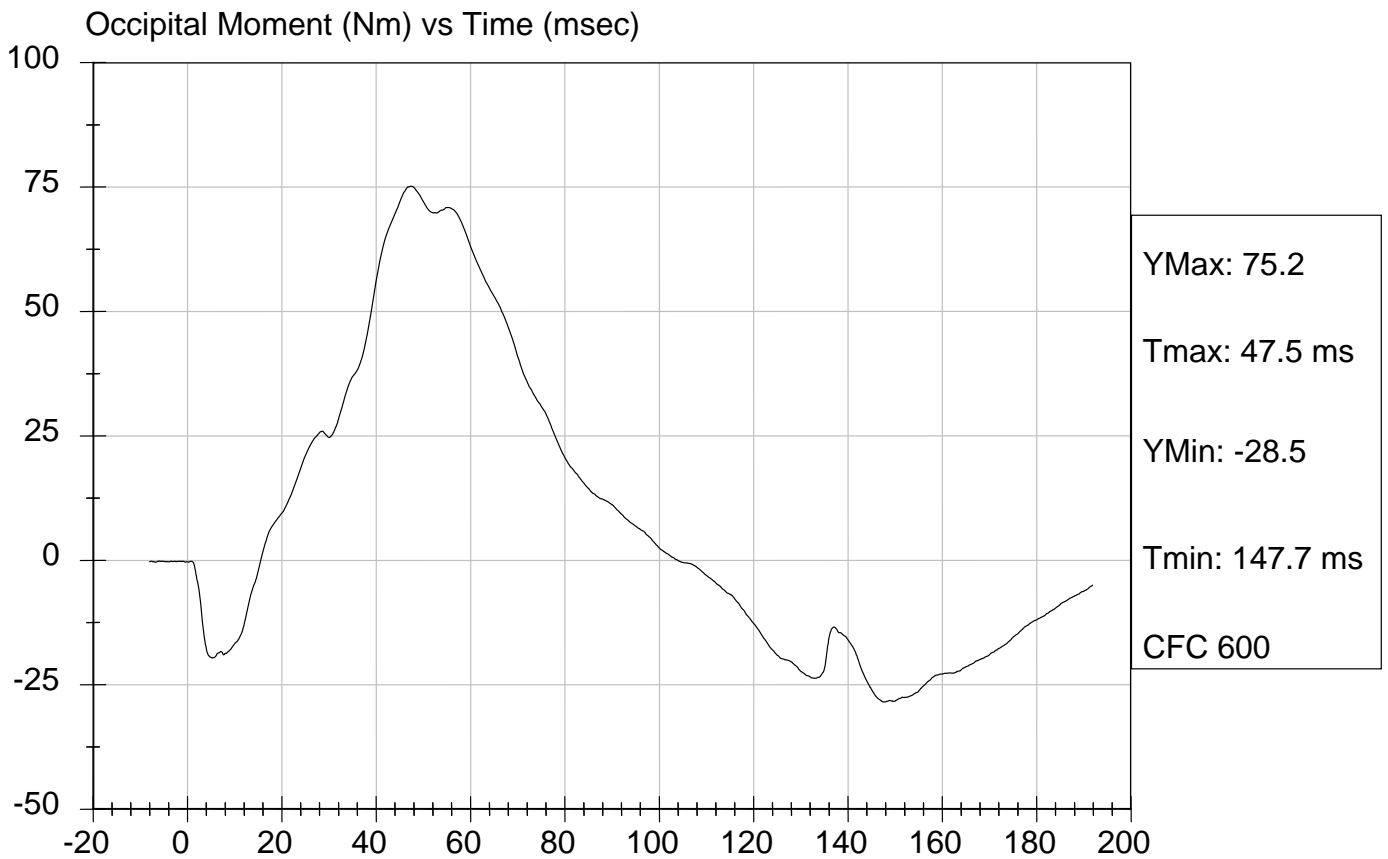
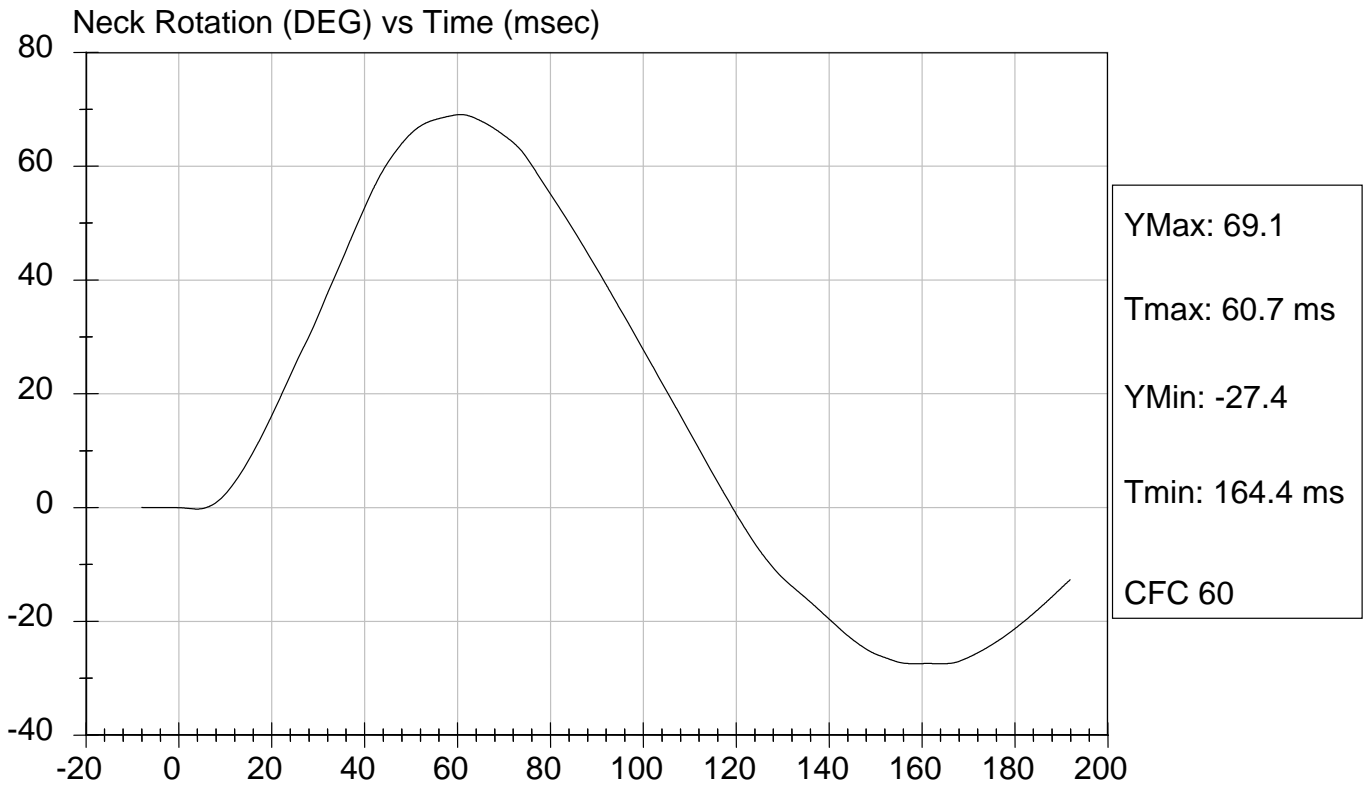
  
 Approved By





Test Desc: Neck Bending  
Component ID: D082529

Test Date: 8/29/08  
Speed: 23.15 ft/sec, 7.06 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Inspection Checklist**

**ATD Serial No:** 272

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

*Jessica Hall*  
 \_\_\_\_\_  
 Laboratory Technician  
*David Winkelbauer*  
 \_\_\_\_\_  
 Approved By

8/29/08  
 \_\_\_\_\_  
 Test Date