

REPORT NUMBER: NCAPSIDE-MGA-2010-003

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**GENERAL MOTORS COMPANY
2010 BUICK LACROSSE CX 4-DR SEDAN
NHTSA NUMBER: MA0102**

**PREPARED BY:
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BURLINGTON, WI 53105**



Test Date: October 1, 2009

Report Date: October 22, 2009

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**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-09-D-00124.

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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2010 Buick Lacrosse CX 4-Dr Sedan 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 October 1, 2009. The impact velocity of the Moving Deformable Barrier (MDB) was 61.8 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 221 mm at level 3. The test vehicle's occupant performance is as follows: <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th></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;">34.1</td> <td style="text-align: center;">45.8</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">36.2</td> <td style="text-align: center;">43.6</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">34.0</td> <td style="text-align: center;">51.7</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">35</td> <td style="text-align: center;">49</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">44.3</td> <td style="text-align: center;">55.2</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">283</td> <td style="text-align: center;">291</td> </tr> </tbody> </table> 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.					<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	34.1	45.8	Left Lower Rib (LLR) Accel., g	36.2	43.6	Lower Spine (T ₁₂) Accel., g	34.0	51.7	Thoracic Trauma Index (TTI)	35	49	Pelvis (PEV) Accel., g	44.3	55.2	HIC	283	291
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17. Key Words New Car Assessment Program (NCAP) Side Impact Side Impact Hybrid III Dummy (SID/HIII) Occupant Side Impact Protection		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave, SE Washington, D.C. 20590																						
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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00124. The purpose of this test was to evaluate side impact protection in a 2010 Buick Lacrosse CX 4-Dr Sedan manufactured by General Motors Company.

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 2010 Buick Lacrosse CX 4-Dr Sedan 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 61.8 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 2009.0 kg and the test weight of the MDB was 1361.5 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on October 1, 2009.

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 221 mm at level 3, 1650 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 ¹	T ²	TTI (G's)	Peak Pelvis (G's)
Driver	283	44.3	66.5	35	44.3
Passenger	291	45.2	62.9	49	55.2

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.

TEST NOTES

There was no valid data collected for:

Passenger Lower Rib Y Redundant after 90 msec.

Left Rear Sill Y

Left Front Sill Y after 5 msec.

Left Mid B-Post Y

The thorax contacts were not installed per manufacturer's request.

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

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

TEST VEHICLE INFORMATION

Make	Buick
Model	Lacrosse CX
Body Style	Sedan
NHTSA No.	MA0102
VIN	1G4GB5EG6AF110668
Color	Summit White
Delivery Date	9/17/2009
Odometer Reading (mile)	91miles
Dealer	Zimbrick Inc.
Transmission	Automatic
Final Drive	Front
Number of Cylinders	6
Engine Displacement (L)	3.0
Engine Placement	Lateral
Automatic Door Locks (ADL)	Yes
Owner's Manual Details Instructions on Disabling ADLs	No

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	Yes
Pretensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors Company
Date of Manufacture	07/09

GVWR (kg)	2216
GAWR Front (kg)	1154
GAWR Rear (kg)	1062

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				420
Cargo Wt. (RCLW) (kg)				80

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

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	528.0	377.8		572.5	480.3	
Right	kg	518.9	348.4		525.7	430.5	
Ratio	%	59.0	41.0		54.7	45.3	
Totals	kg	1046.9	726.2	1773.1	1098.2	910.8	2009.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1773.1
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	80
Calculated Vehicle Target Weight (TVTW)	kg	2014.6

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

Weight of Ballast in Trunk (kg): 52.2

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	726	728	737	746	1161
As Tested	mm	718	727	703	721	1285
Fully Loaded	mm	716	727	696	718	

TEST VEHICLE VERTICAL IMPACT LINE DATA

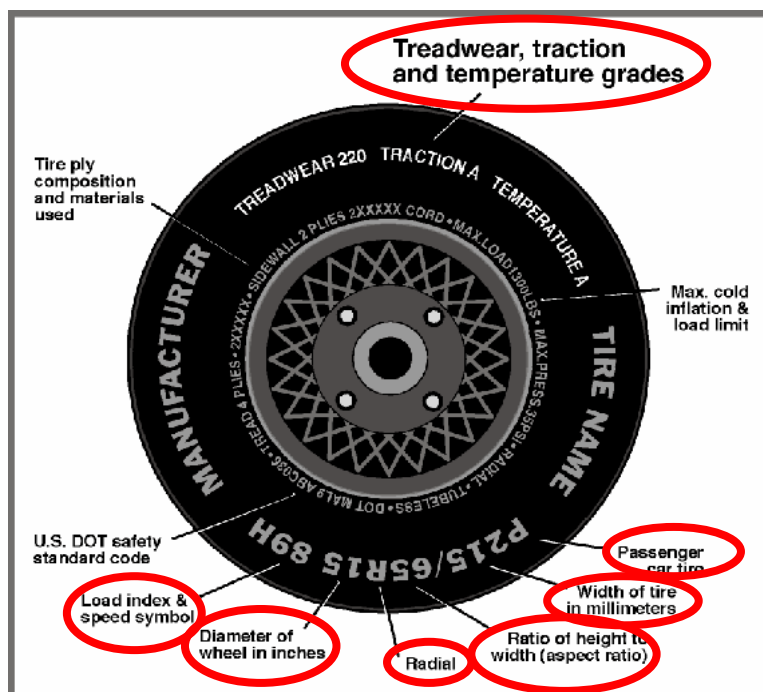
Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2834
Target Impact Point Aft of Front Axle	mm	477
Actual Impact Point Aft of Front Axle	mm	452

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Test Pressure (kPa)	230	230
Recommended Tire Size	P245/50R17	P245/50R17
Tire Size on Vehicle	P245/50R17	P245/50R17
Tire Manufacturer	Michelin	Michelin
Tire Name	Primacy MXM4	Primacy MXM4
Tire Type	Passenger	Passenger
Tire Width (mm)	245	245
Ratio of Height to Width (aspect ratio)	50	50
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	98H	98H
Treadwear	500	500
Traction Grade	A	A
Temperature Grade	A	A

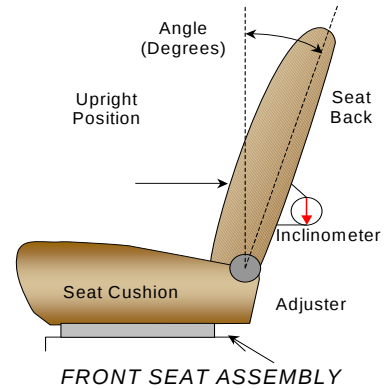
DATA SHEET NO. 3 **TEST VEHICLE INFORMATION**

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

NOMINAL DESIGN RIDING POSITION

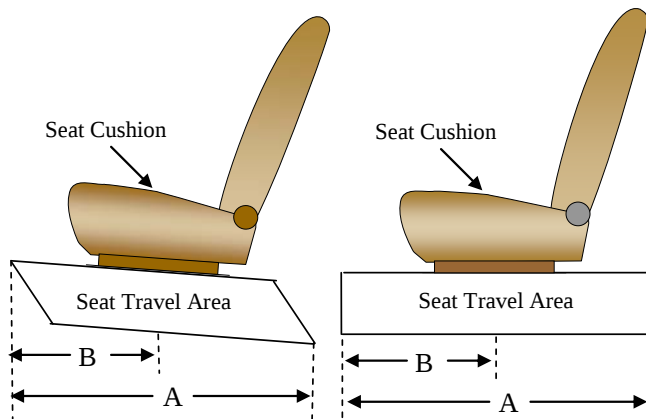
The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: For the driver's seat, set seat back at 13.9 degrees from upright position measured at the headrest post. The left rear passenger's seat is not adjustable.



Driver seat back angle: 13.9 degrees at the headrest post
 Passenger seat back angle: Fixed

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	330 mm	165 mm (from forward-most position)
Rear Seat	Fixed	Fixed



DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

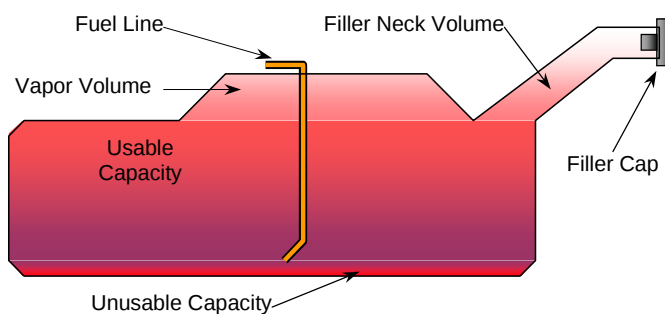
Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
Test Program: NCAP Side Impact

NHTSA No. MA0102
Test Date: 10/01/2009

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	70.4
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	64.8 to 66.2
Actual Amount of Solvent used	65.5
1/3 of Usable Capacity	23.5

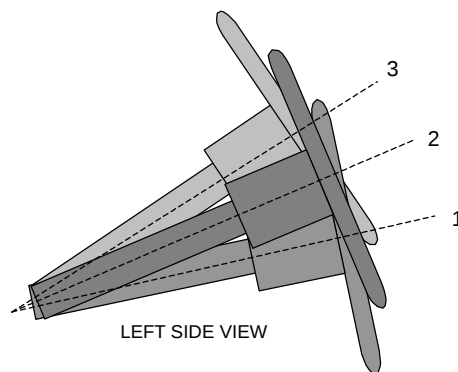
The test vehicle is equipped with an electric fuel pump. If ignition key is at "on" position and engine is not running, the fuel pump only operates for a short duration to prime the fuel system. If the engine is running, then the fuel pump will operate continuously.



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	153	66.0
Geometric center position No. 2	179	68.1
Uppermost position No. 3	206	70.2

DATA SHEET NO. 4**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
Test Program: NCAP Side Impact

NHTSA No. MA0102
Test Date: 10/01/2009

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	61.8
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.8
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.8

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

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	25 forward
Vertical Offset	mm	+/-20	13 down

DATA SHEET NO. 5

POST TEST OBSERVATIONS

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

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	Curtain Airbag, Headliner, Headrest
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Side Airbag	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 door was locked; Non-struck side door was unlocked	Struck side door was locked; Non-struck side door was 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	None
Window Damage	Left Front and Left Rear Windows were broken.
Other Notable Effects	None

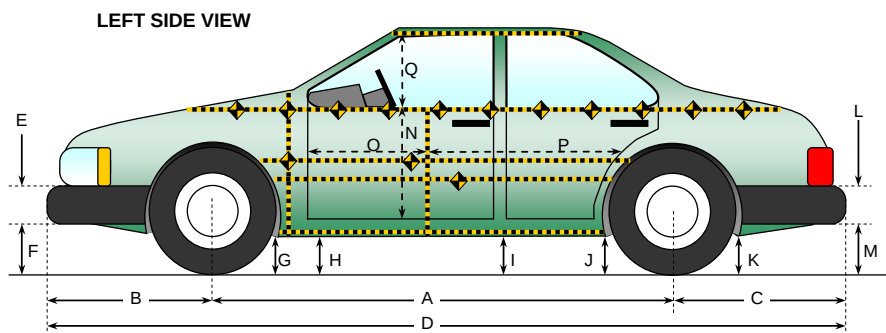
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



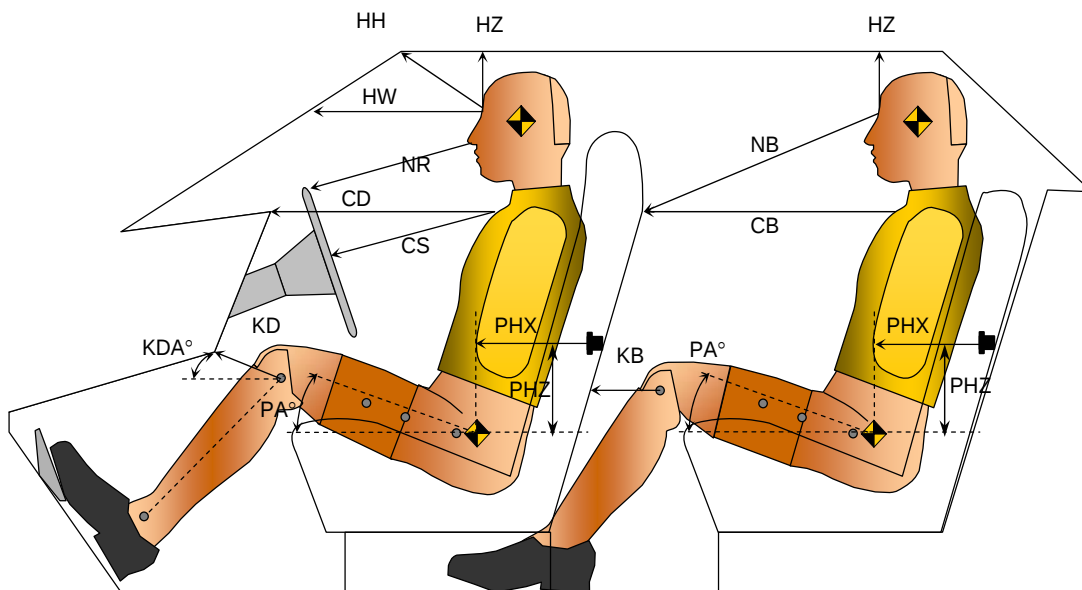
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2834	2822	12
B	Front Axle to FSOV	1040	1053	-13
C	Rear Axle to RSOV	1078	1100	-22
D	Total Length at Centerline	4952	4975	-23
E	Front Bumper Thickness	156	156	0
F	Front Bumper Bottom to Ground	228	238	-10
G	Sill Height at Front Wheel Well	178	184	-6
H	Sill Height at Front Door Leading Edge	168	180	-12
I	Sill Height at "B" Pillar	170	180	-10
J1	Sill Height at Rear Wheel Well	172	172	0
J2	Pinch Weld Height at Rear Wheel Well	163	175	-12
K	Sill Height Aft of Rear Wheel Well	225	230	-5
L	Rear Bumper Thickness	190	190	0
M	Rear Bumper Bottom to Ground	432	432	0
N	Sill Height to Window Bottom Sill	790	758	32
O	Front Door Leading Edge to Impact CL	864	845	19
P	Rear Door Trailing Edge to Impact CL	1220	1240	-20
Q	Front Window Opening	385	376	9
R	Right Side Length	3725	3725	0
S	Left Side Length	3725	3710	15
T	Vehicle Width at "B" Post	1810	1731	79

DATA SHEET NO. 7
SID/HII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

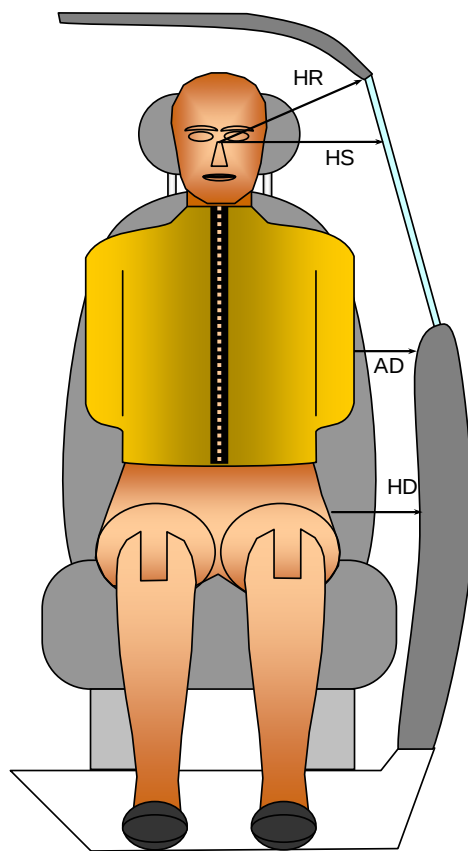


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 272	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	462			
HW		Head to Windshield	775			
HZ	HZ	Head to Roof	177		126	
NR	NB	Nose to Rim/Nose to Seatback	471		621	
CD	CB	Chest to Dash or Seatback	547		558	
CS		Chest to Steering Wheel	362			
KDL	KBL	Left Knee to Dash or Seatback	166	31.1	260	27.8
KDR	KBR	Right Knee to Dash or Seatback	177	30.2	261	27.4
PA	PA	Pelvic Angle		24.8		23.9
PHX	PHX	H-Point to Striker (X-Axis)	171		194	
PHZ	PHZ	H-Point to Striker (Z-Axis)	167		270	

DATA SHEET NO. 8
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



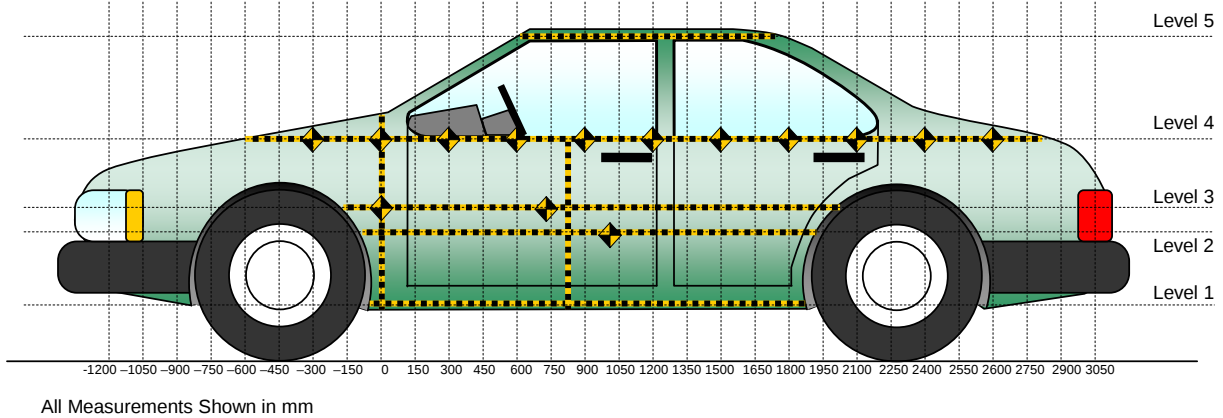
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 272
HR	Head to Side Header	mm	191	288
HS	Head to Side Window	mm	311	320
AD	Arm to Door	mm	77	153
HD	H-Point to Door	mm	167	105

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

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



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	1350	1400
4	Window Sill	83	1500	1003
3	Mid Door	221	1650	650
2	Occupant H-Point	196	300	510
1	Sill Top	50	1800	235
	Maximum Penetration	221		

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-600				309					310					1	
-450				397					302					5	
-300				286					305					19	
-150			179	278				193	298				14	20	
0	232	198	196	270		245	235	215	225		13	37	19	-45	
150	233	208	200	272		248	358	353	244		15	150	153	-28	
300	233	209	199	271		247	405	390	276		14	196	191	5	
450	234	209	198	269		248	402	386	296		14	193	188	27	
600	234	207	197	270	490	249	398	394	313	508	15	191	197	43	18
750	234	207	195	270	478	246	372	404	306	491	12	165	209	36	13
900	234	206	194	273	473	250	375	407	299	490	16	169	213	26	17
1050	235	205	193	276	469	252	385	377	303	490	17	180	184	27	21
1200	236	205	193	278	469	255	361	386	323	493	19	156	193	45	24
1350	236	205	193	281	469	261	389	386	344	494	25	184	193	63	25
1500	236	205	194	283	471	260	370	411	366	490	24	165	217	83	19
1650	235	205	196	288	473	264	369	417	370	490	29	164	221	82	17
1800	230	200	195	293	480	280	371	403	358	495	50	171	208	65	15
1950	223	183	187	297	491	218	200	294	325	504	-5	17	107	28	13
2100			173	303	504			199	276	516			26	-27	12
2250				308	528				322	534				14	6
2400				317					329					12	
2550				329					344					15	
2700				343					356					13	
2850				359					370					11	
3000				383					390					7	

Reference plane is parallel to test vehicle longitudinal centerline.

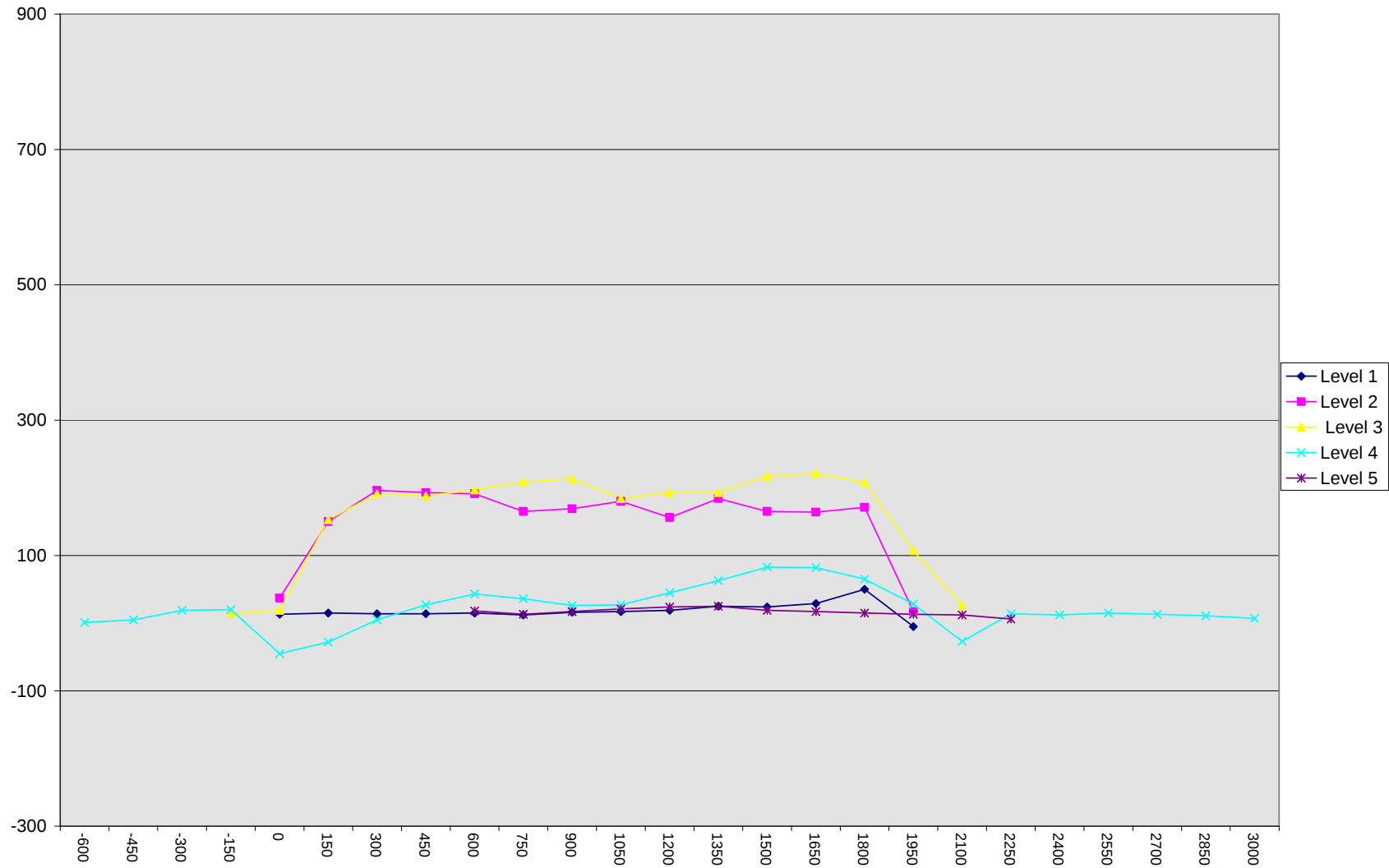
Given dimensions = Reference plane to car body

DATA SHEET NO. 10... (continued)
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
Test Program: NCAP Side Impact

NHTSA No. MA0102
Test Date: 10/01/2009

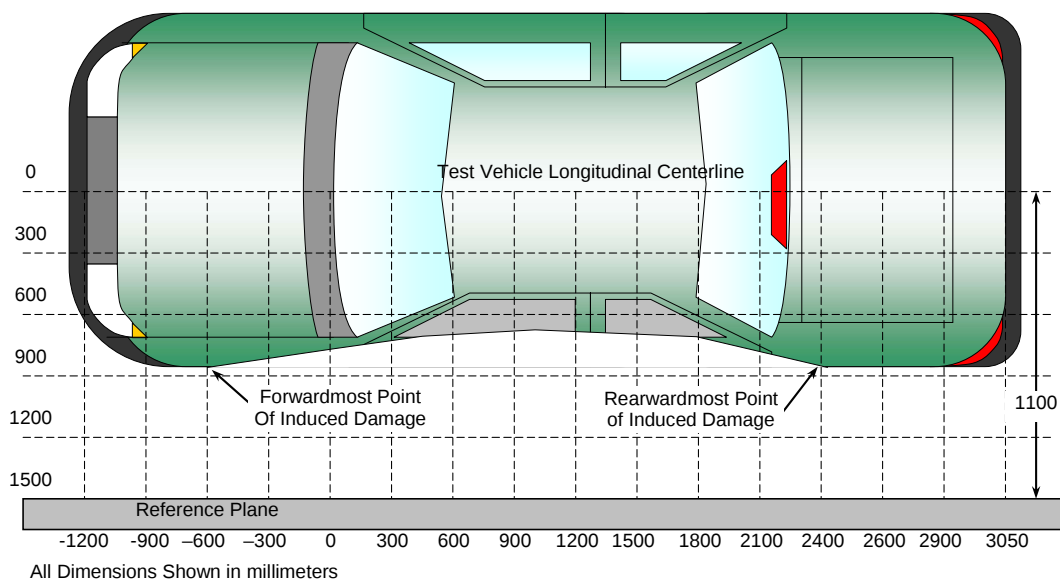
16



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

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	3000	4	383	390	7
2	2278	3	312	329	17
3	1535	3	238	424	186
4	862	3	194	409	215
5	70	1	233	256	23
6	-600	4	309	310	1

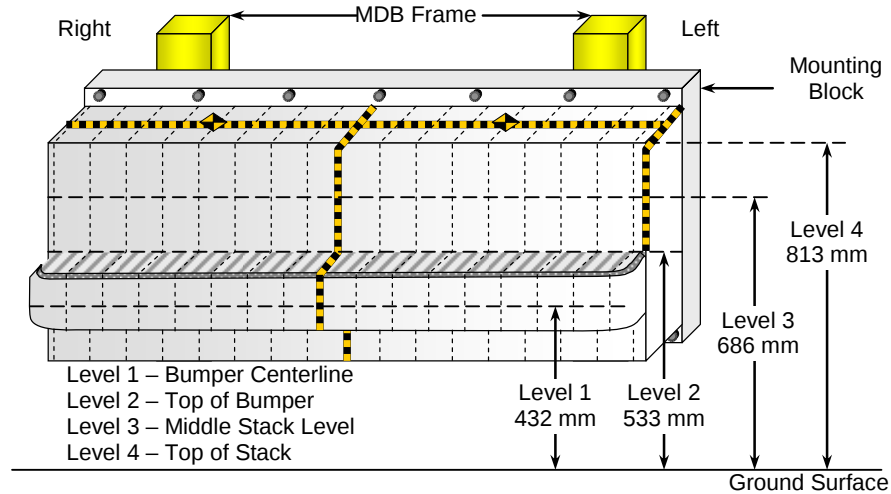
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



DEFORMABLE BARRIER STATIC CRUSH

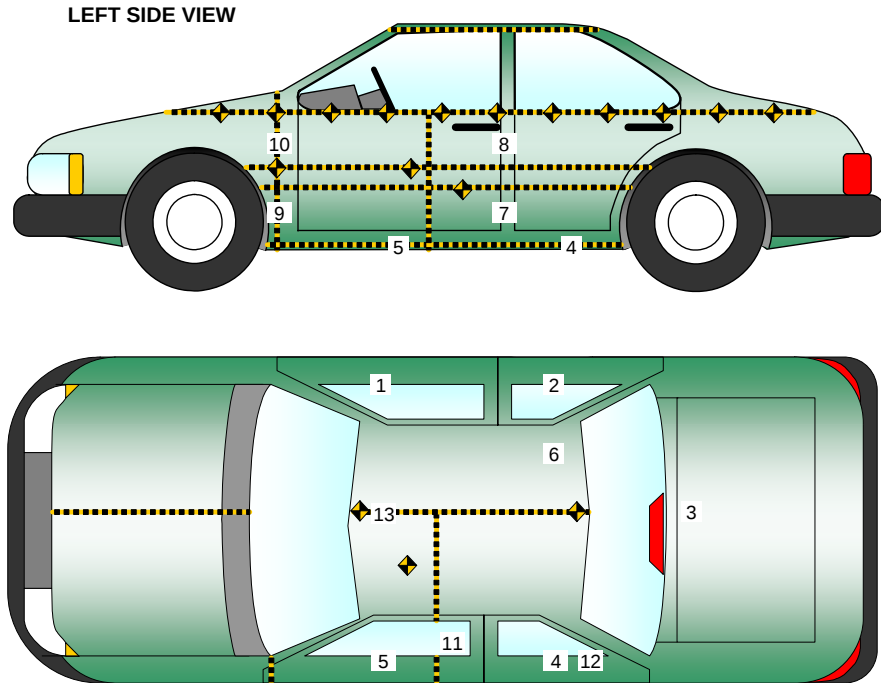
Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	244	240	232	232	224	228	220	214	211	209	200	197	190	182	179	175	181
2	147	143	131	124	121	107	104	108	90	97	98	98	97	94	87	85	85
3	57	48	43	42	56	64	75	67	72	39	25	22	23	26	38	64	102
4	43	27	25	27	38	53	83	100	105	83	50	38	41	40	67	92	116

All Dimensions in mm

DATA SHEET NO. 13
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



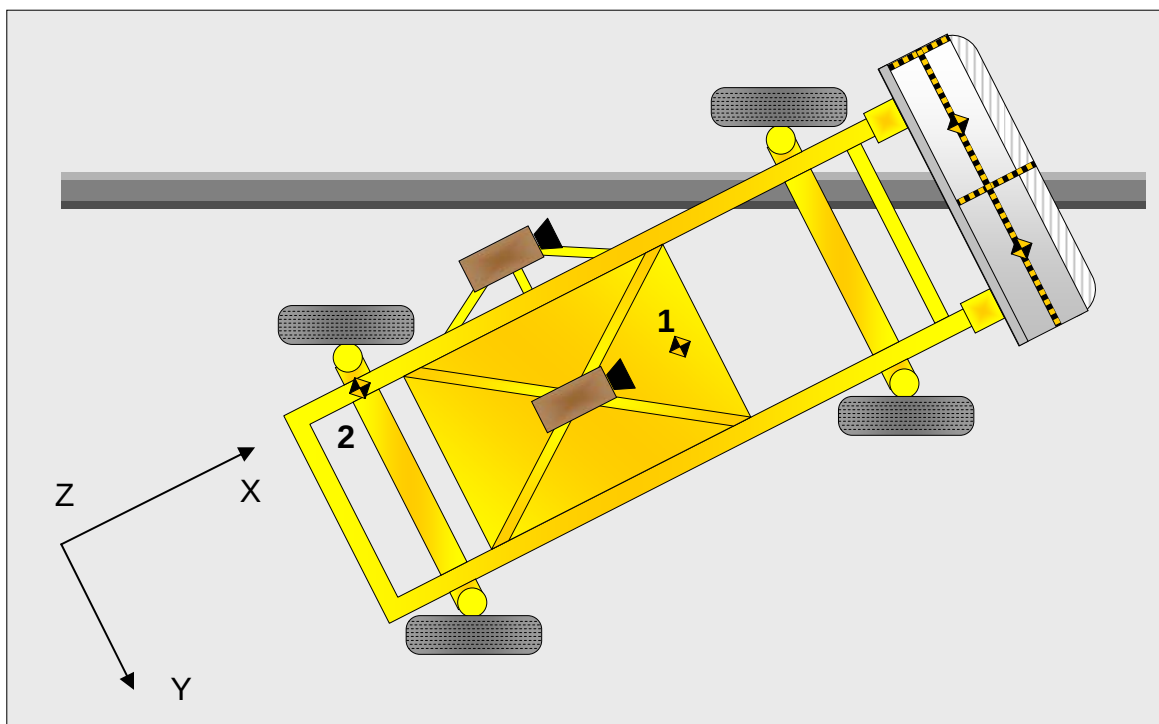
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2805	751	-211
2	Right Sill at Rear Seat	1924	750	-223
3	Rear Floorpan Above Axle	1093	0	-513
4	Left Sill at Rear Door	1875	-750	-215
5	Left Sill at Front Door	2874	-751	-208
6	Rear Occupant Compartment	1940	363	-443
7	Left Lower B-Post	2307	-725	-526
8	Left Middle B-Post	2286	-734	-769
9	Left Lower A-Post	3355	-717	-534
10	Left Middle A-Post	3385	-794	-805
11	Front Seat Track	2545	-509	-353
12	Rear Seat Track or Structure			
13	Vehicle CG	2643	0	-350

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: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



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: 2010 Buick Lacrosse CX 4-Dr Sedan
Test Program: NCAP Side Impact

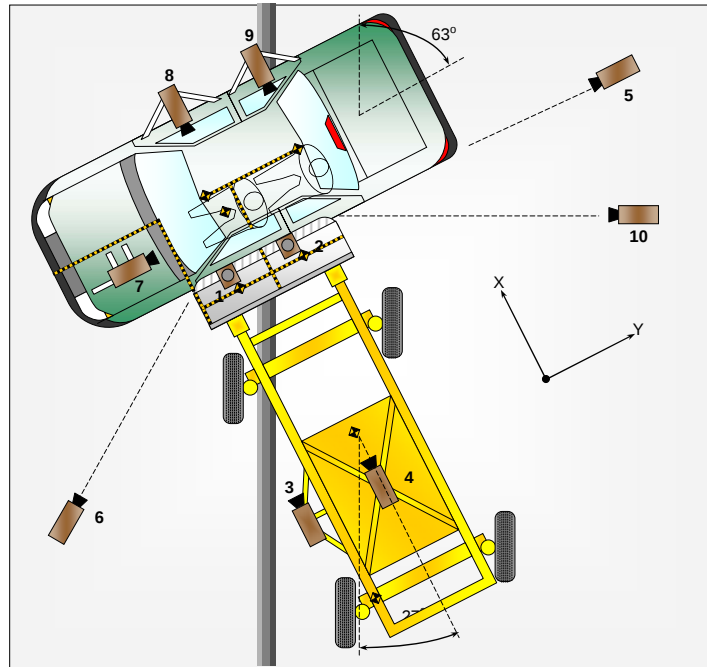
NHTSA No. MA0102
Test Date: 10/01/2009

	Elements	Pre-Test (mm)
1	Total Length	4952
2	Total Width	1834
3	Bumper Top Height	575
4	Bumper Bottom Height	415
5	Longitudinal Member Top Height	540
6	Distance between Longitudinal Members	1070
7	Longitudinal Member Width	85
8	Engine Top Height	884
9	Engine Bottom Height	200
10	Engine and gearbox width	822
11	Front bumper-engine distance	600
12	Front shock absorber fixing height	915
13	Bonnet leading edge height	830
14	Front shock absorber fixing width	1190
15	Front bumper – front axle distance	1040
16	Front axle – a pillar distance	443
17	A-pillar – B-pillar distance	1110
18	B-Pillar – rear axle distance	1272
19	B-pillar – C-pillar distance	1135
20	Roof sill bottom height	1311
21	Roof sill top height	1448
22	Floor sill bottom height	205
23	Floor sill top height	375

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	-530	-280	-5055	50	1000
2	Overhead Overall	650	1275	-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	55	7245	-1220	24	1000
6	Left Side, Ground Level, Overall	-3175	-4745	-1210	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

DATA SHEET NO. 17
SUMMARY OF FMVSS 301 DATA

Test Vehicle: 2010 Buick Lacrosse CX 4-Dr Sedan
 Test Program: NCAP Side Impact

NHTSA No. MA0102
 Test Date: 10/01/2009

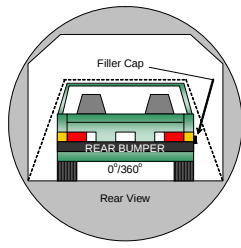
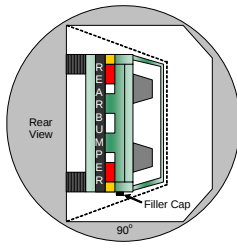
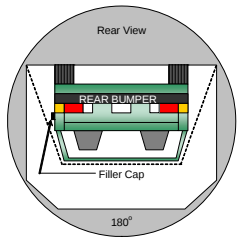
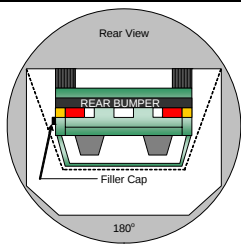
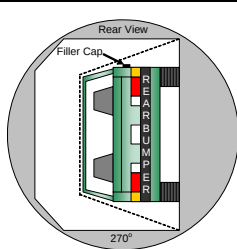
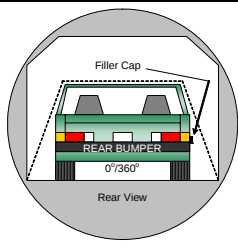
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 11:16 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

			1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds. 2. The position hold time at each position is 300 seconds (minimum). 3. Details of Stoddard Solvent spillage locations: None	
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°	123	300	First 5	0
90° to 180°	116	300	First 5	0
180° to 270°	113	300	First 5	0
270° to 360°	110	300	First 5	0

APPENDIX A
PHOTOGRAPHS

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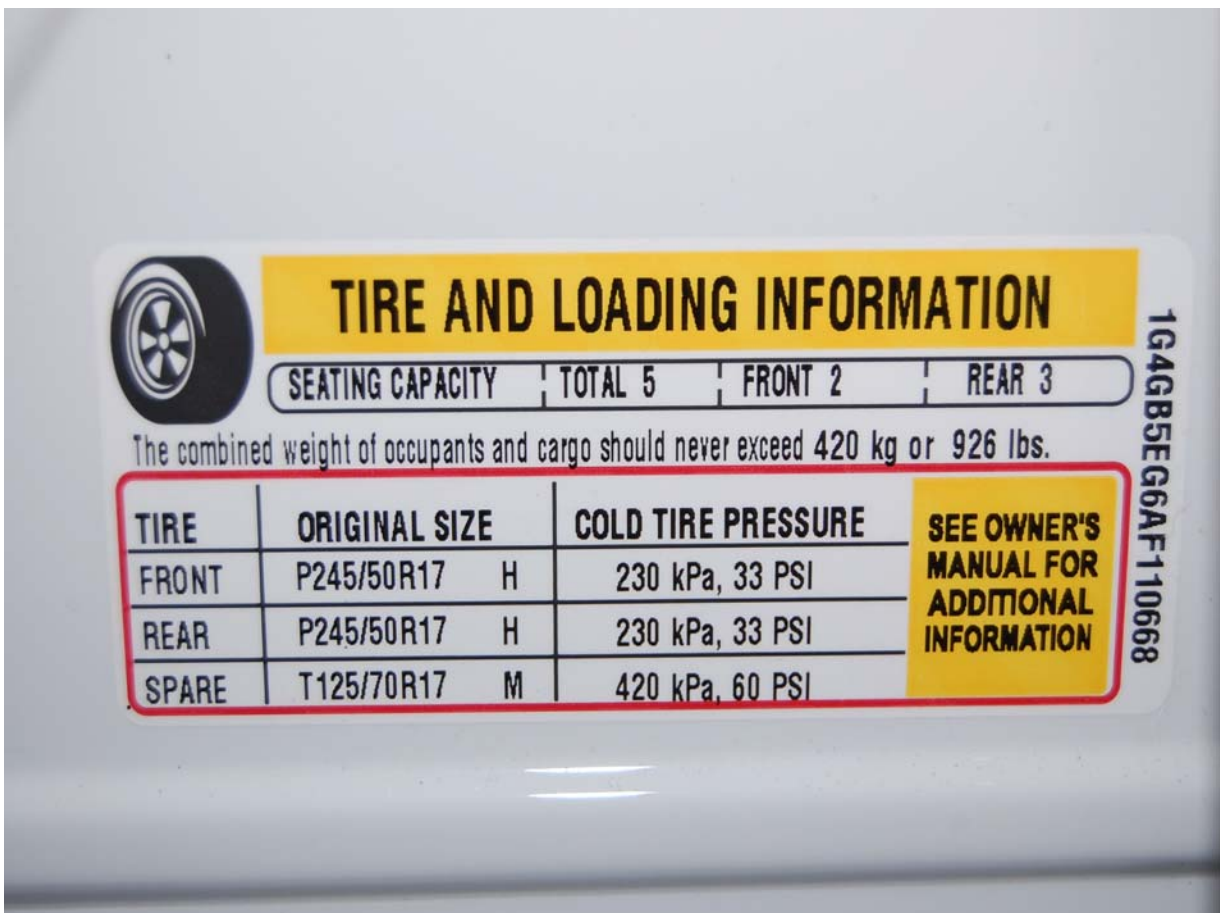
Right Front $\frac{3}{4}$ View, As Received



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



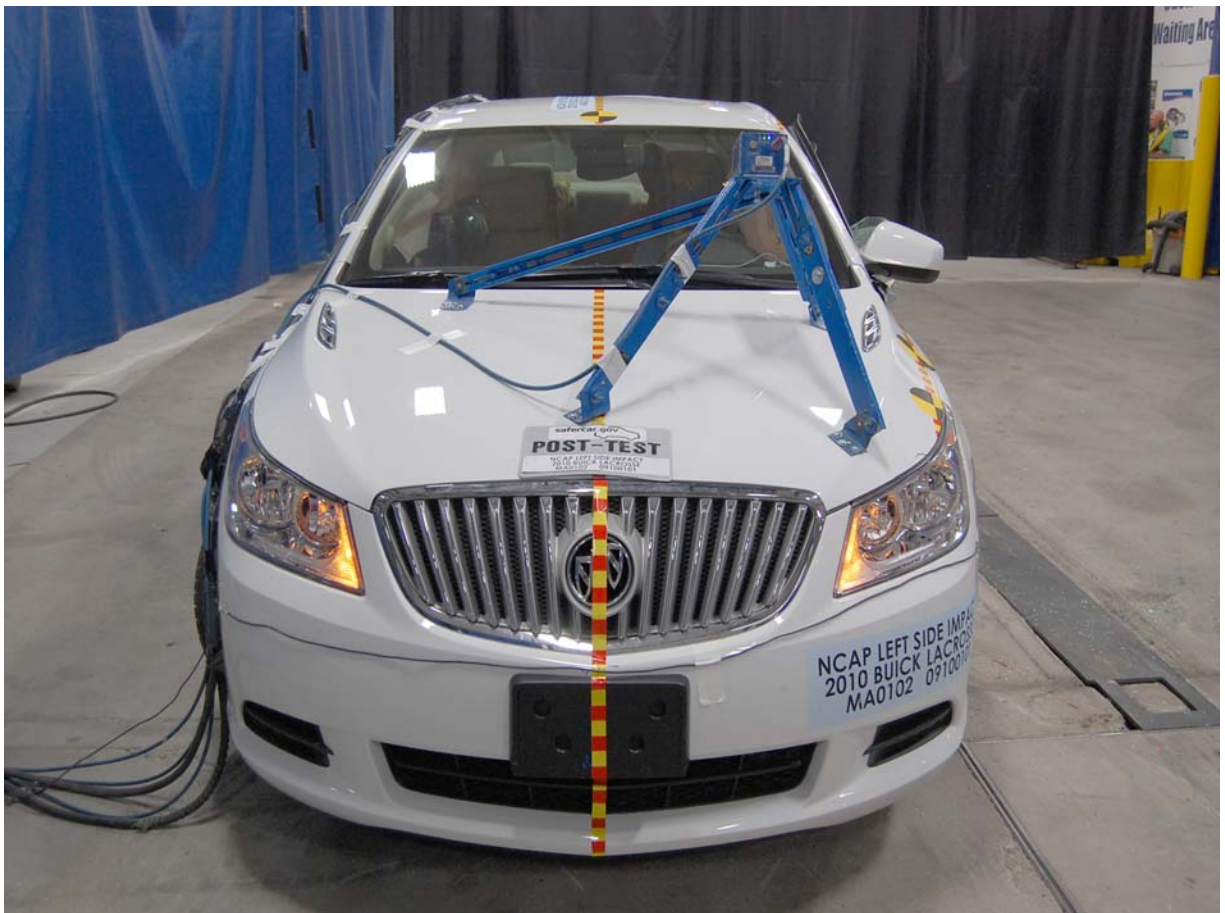
Manufacturer's Label



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 $\frac{3}{4}$ View



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



Post-Test Right Front $\frac{3}{4}$ 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



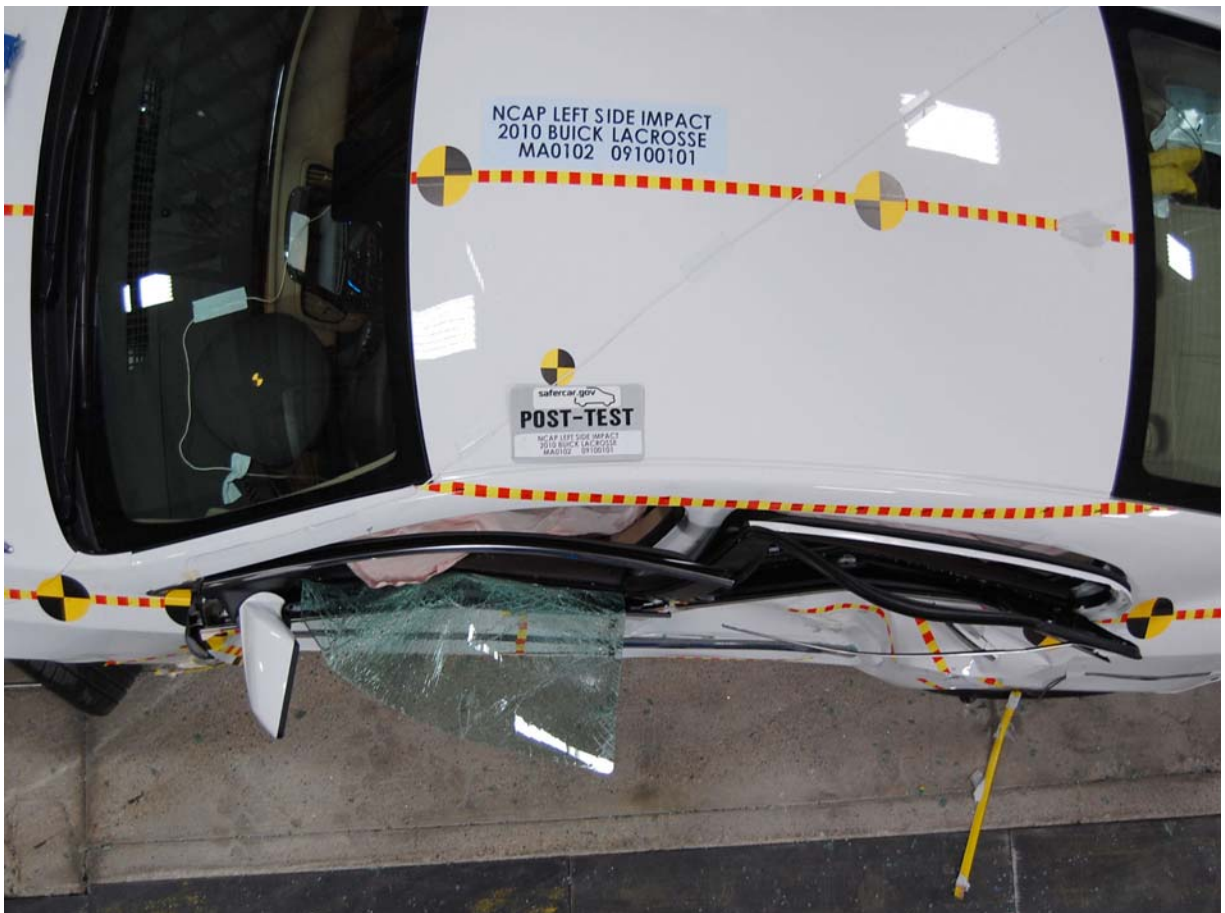
Pre-Test Overhead View



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



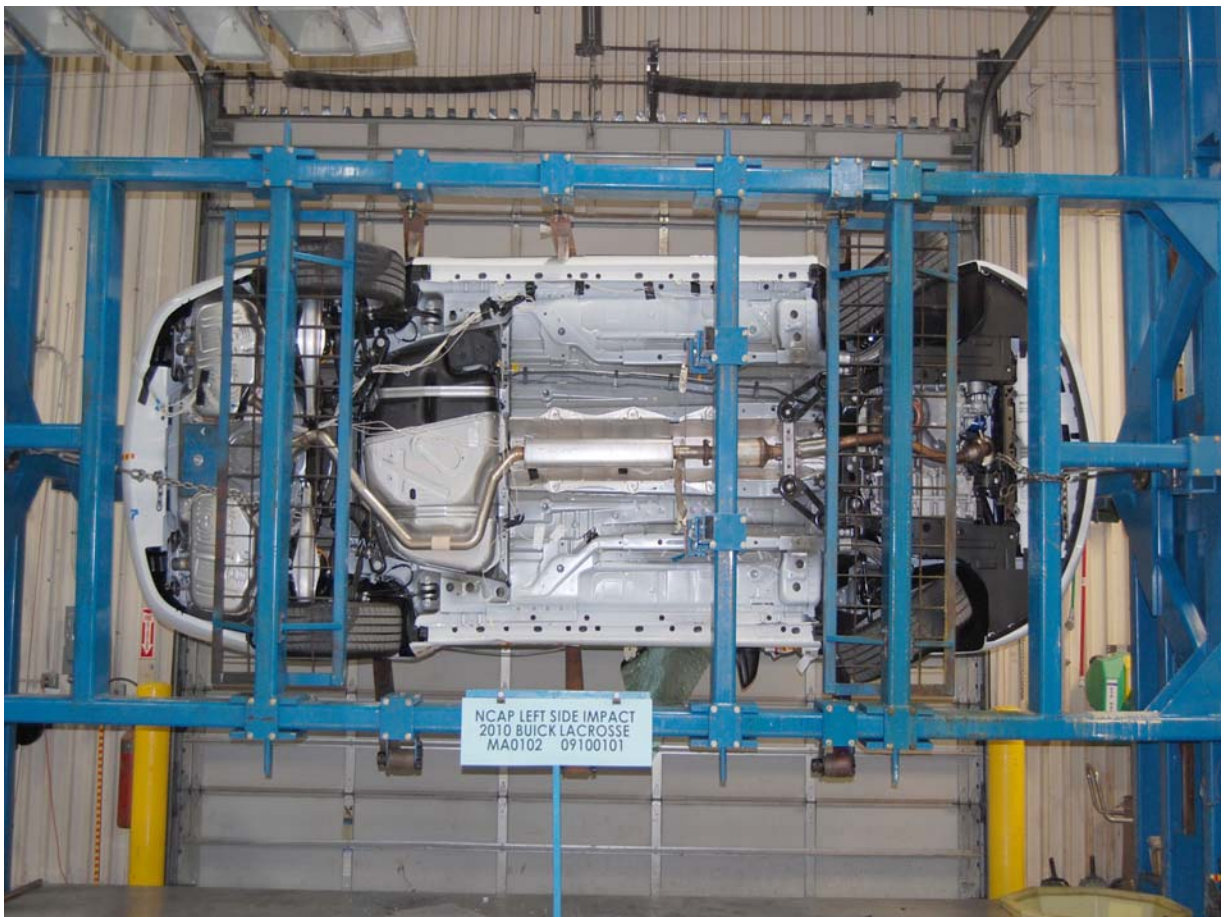
Post-Test Left Side View of Deformable Barrier



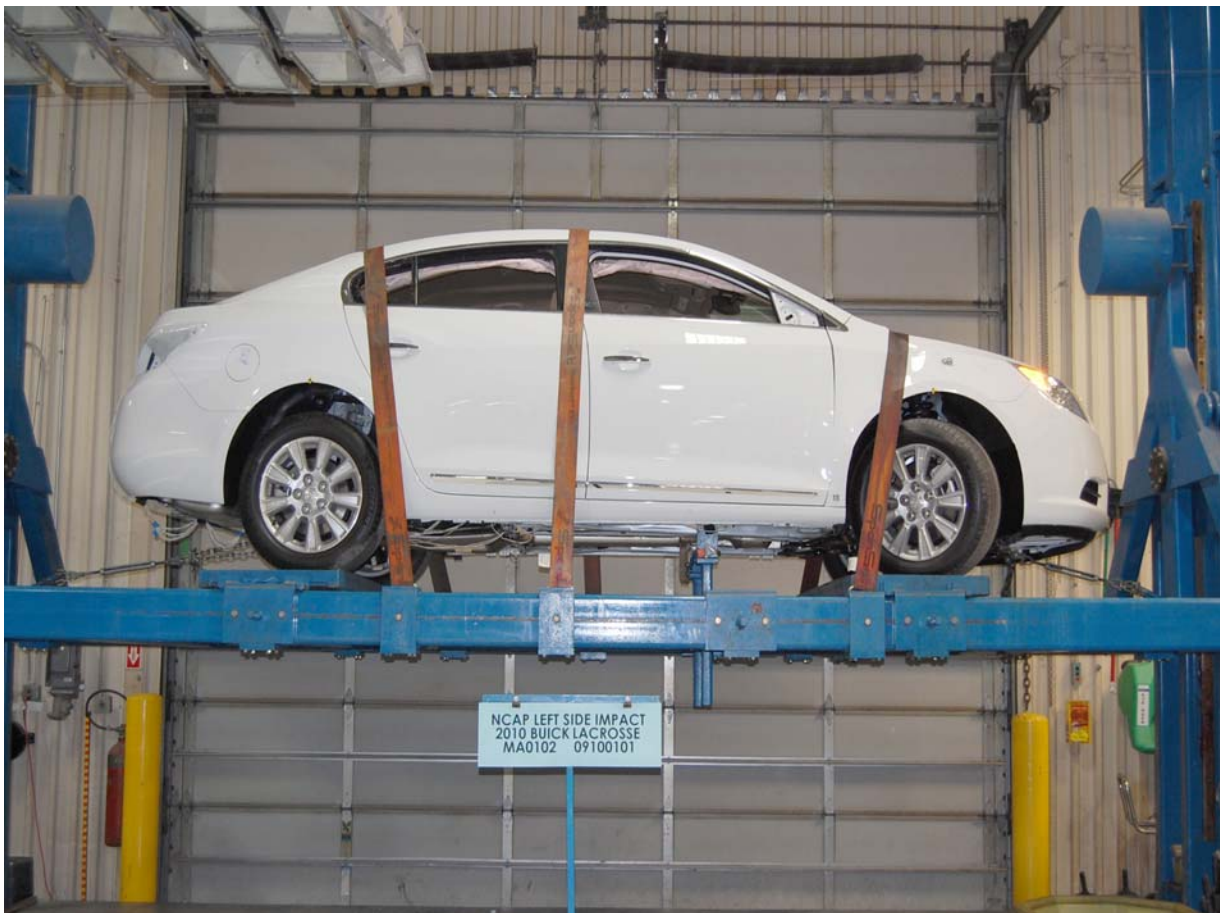
Vehicle on Rollover Device (90 Degrees)



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 View



Post-Test Driver Dummy Torso Contact



Post-Test Driver Dummy Contact



Post-Test Passenger Dummy Head Contact View



Post-Test Passenger Dummy Torso Contact



Post-Test Passenger Dummy Contact

APPENDIX B
SID/HIII RESPONSE DATA TRACES

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The following dummy and vehicle response data can be found in the R&D section of the NHTSA website at 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

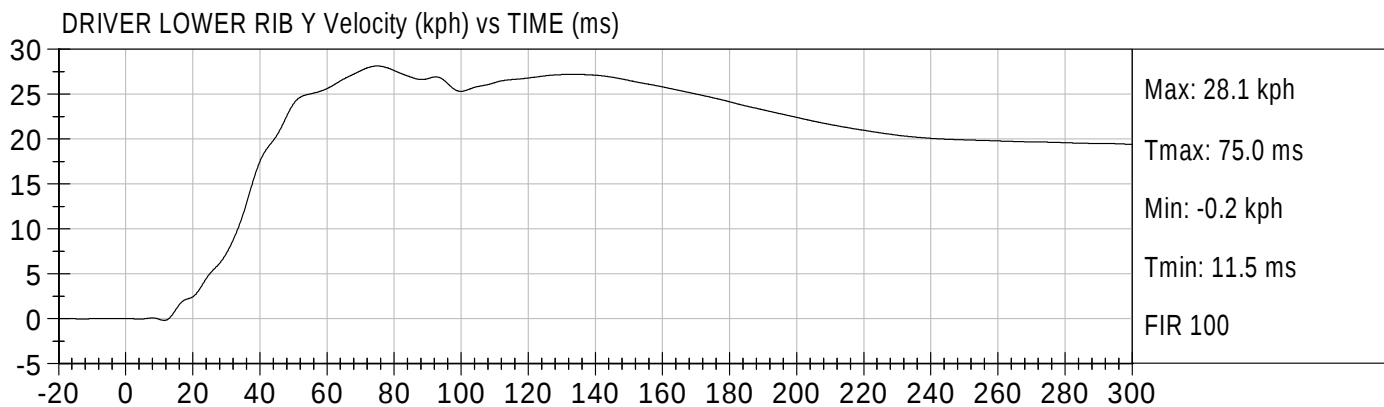
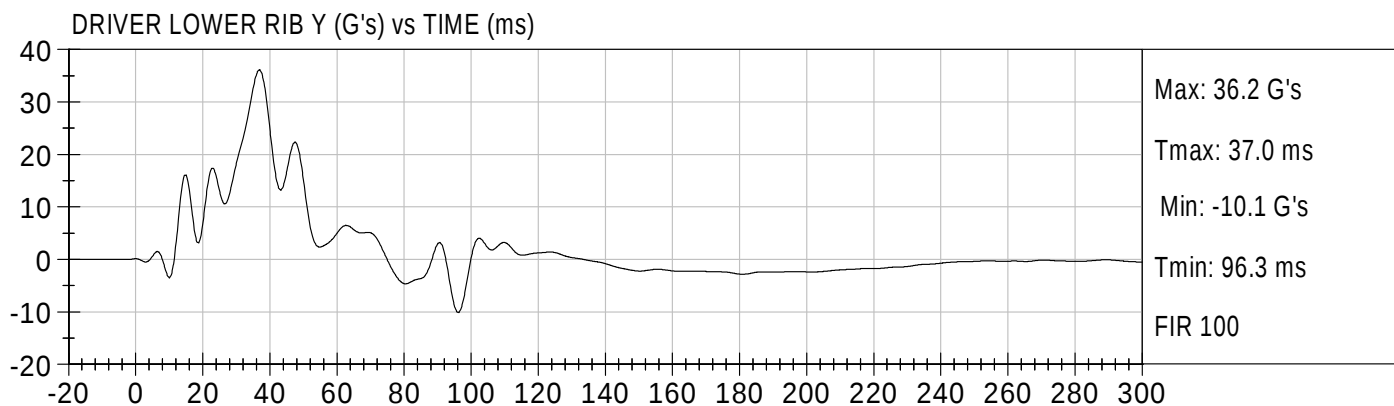
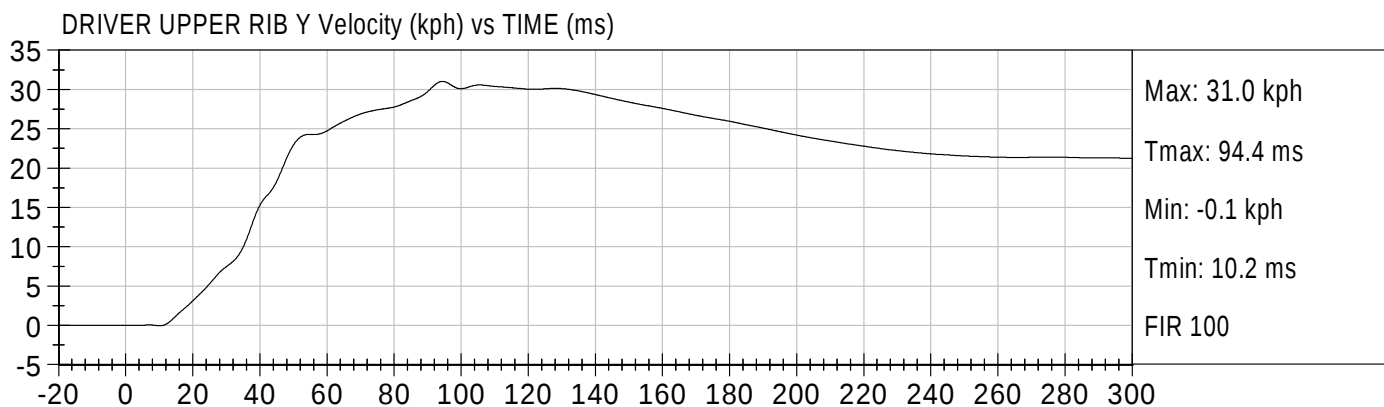
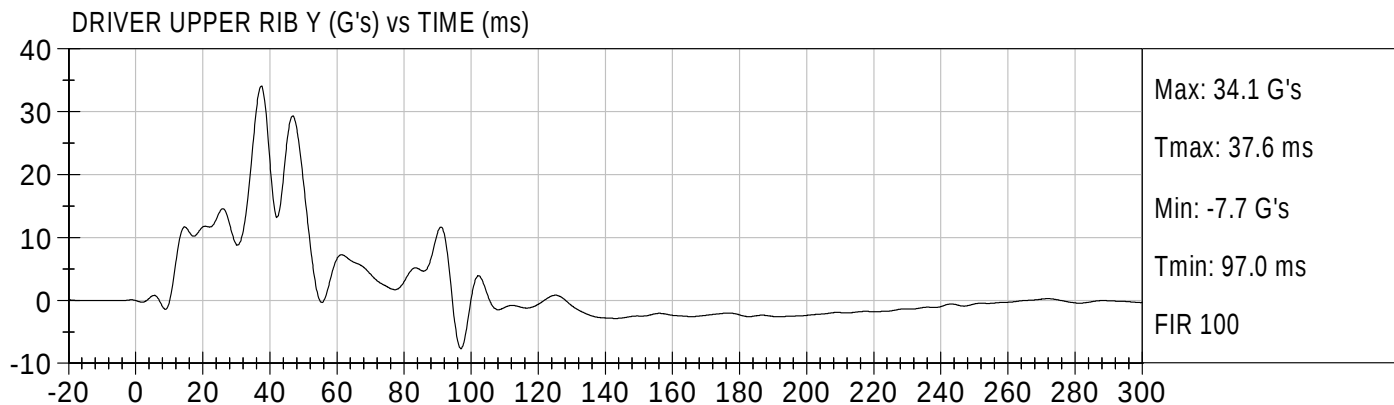
Driver Upper Neck Force Y

Driver Upper Neck Force Z

Driver Upper Neck Moment X

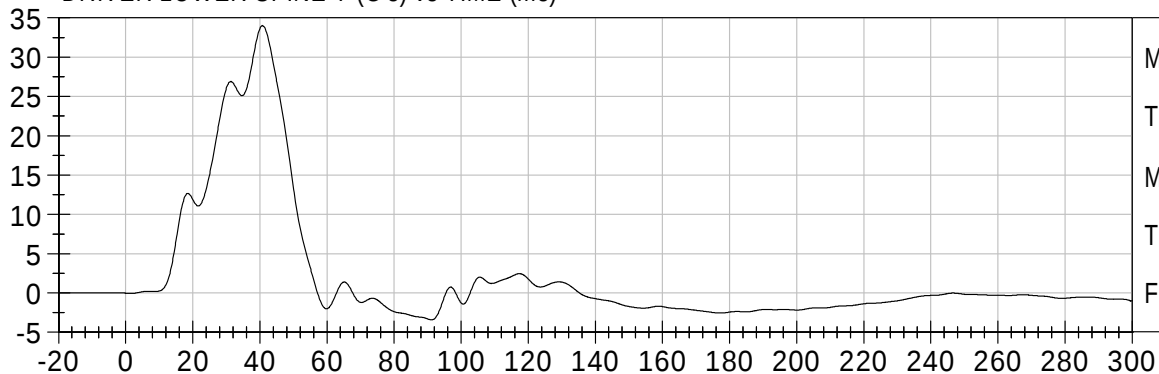
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head X Redundant
Passenger 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 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

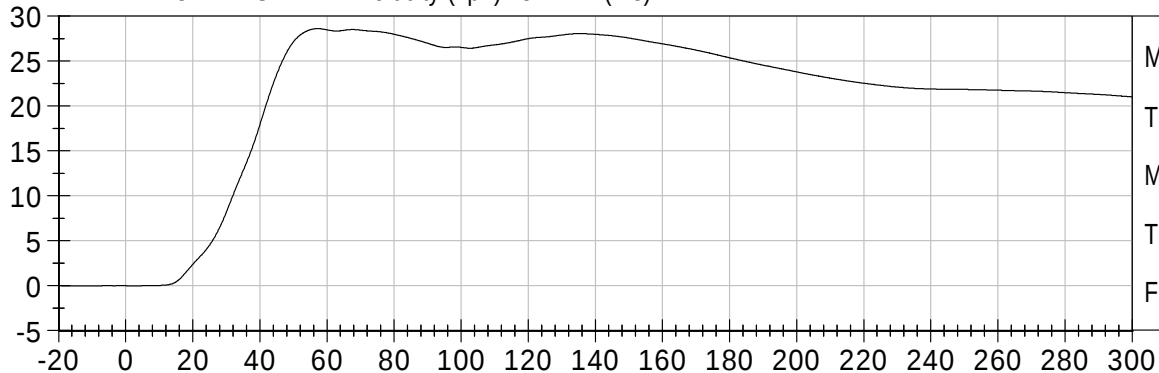




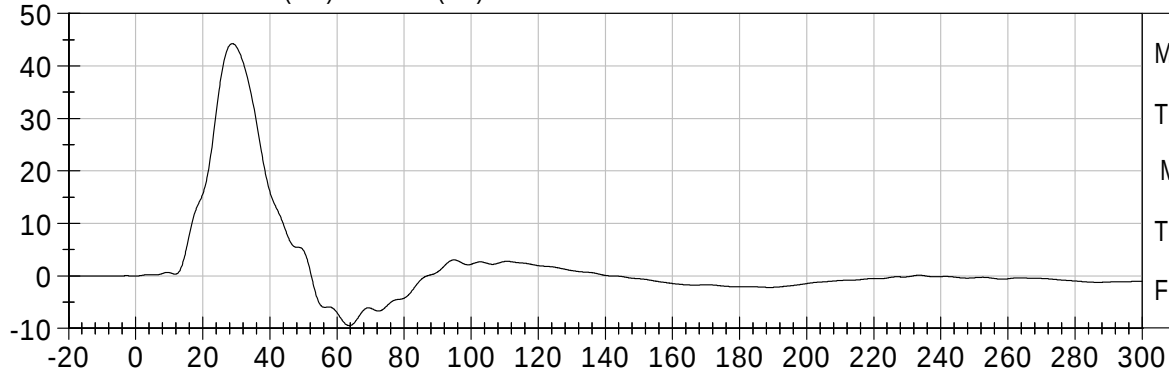
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



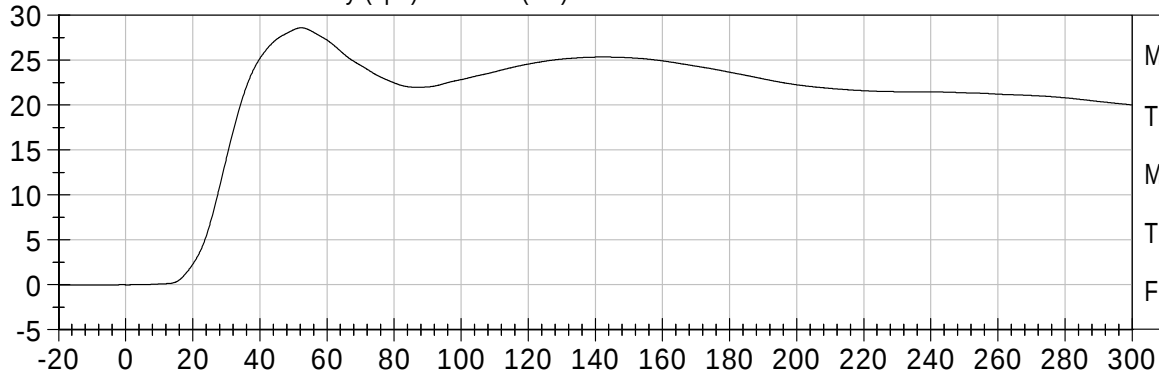
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)

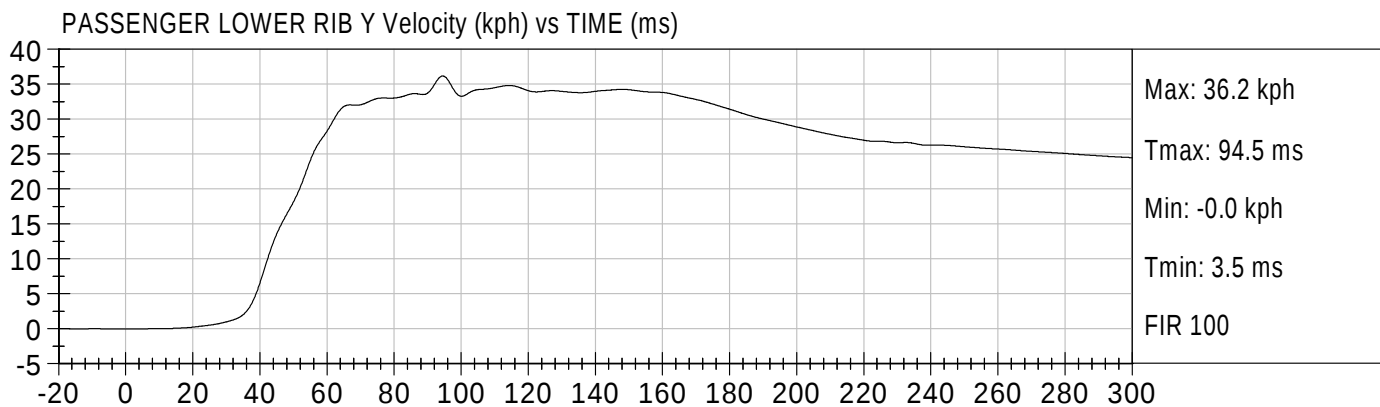
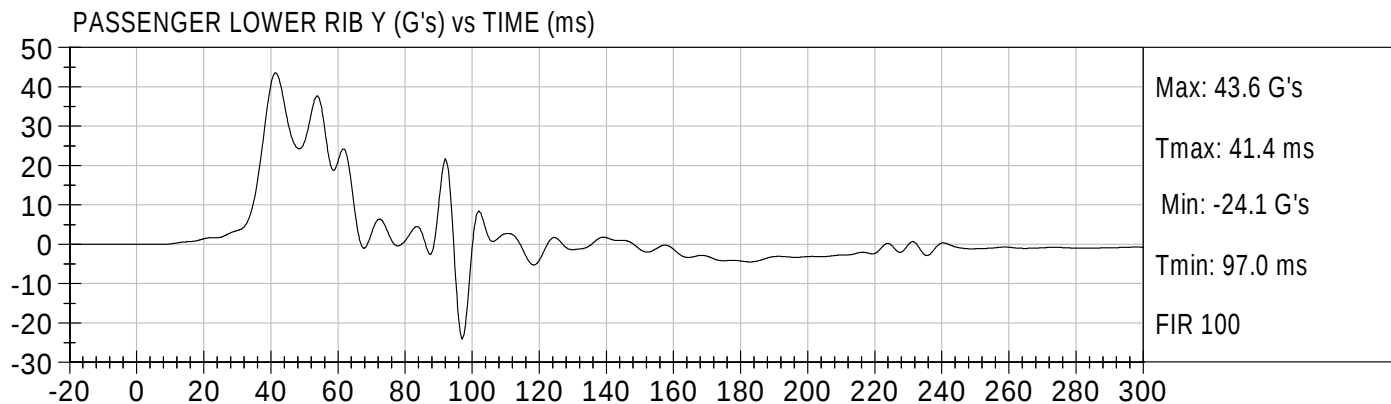
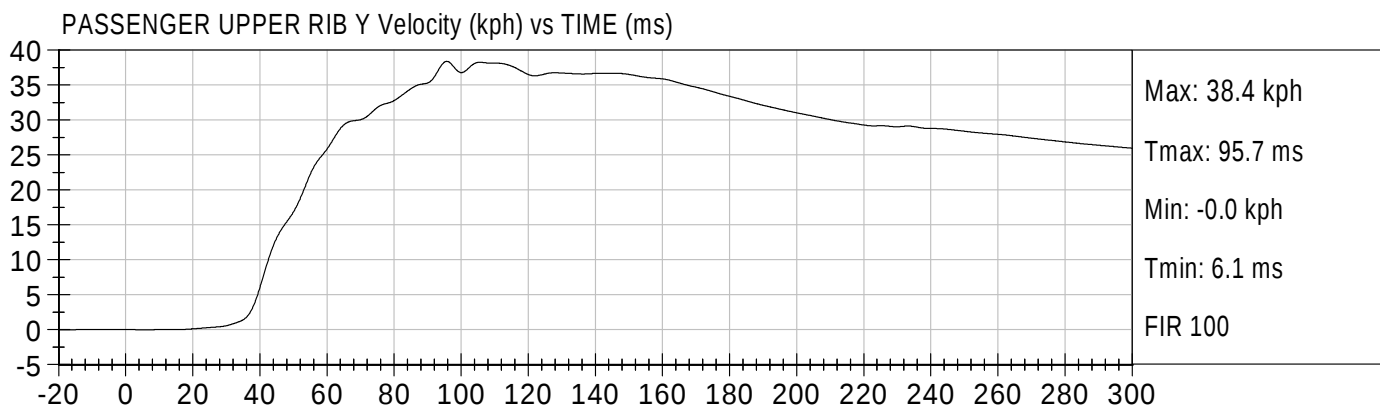
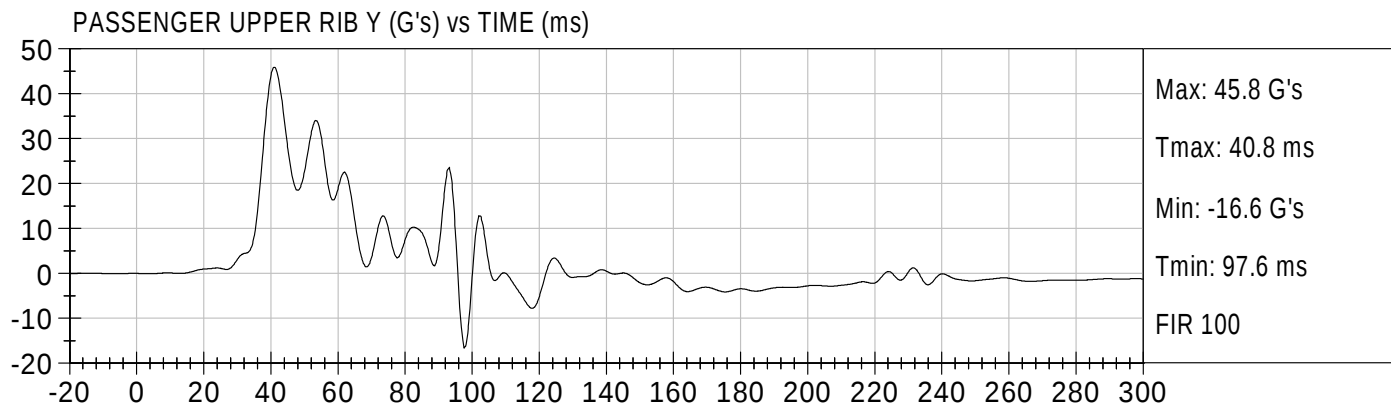


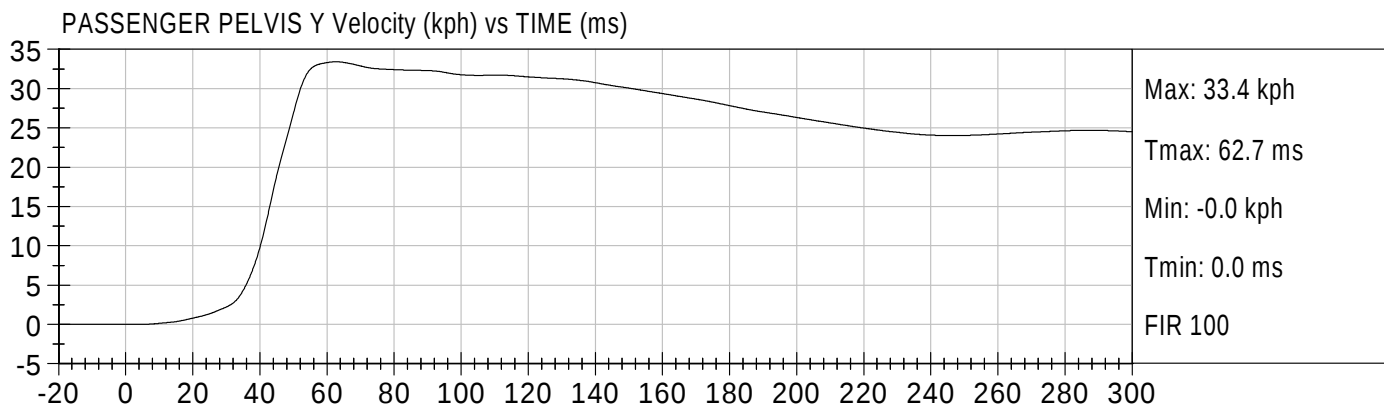
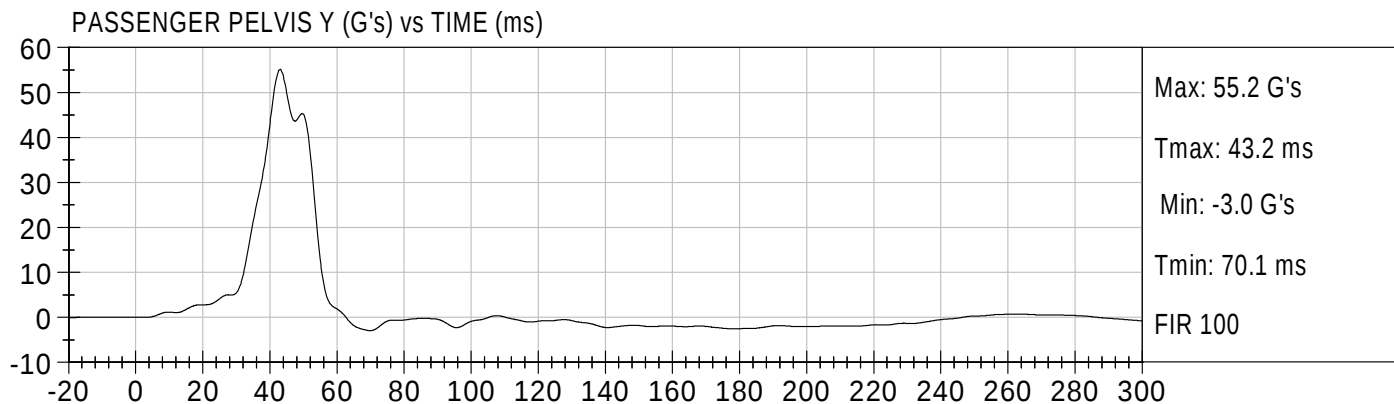
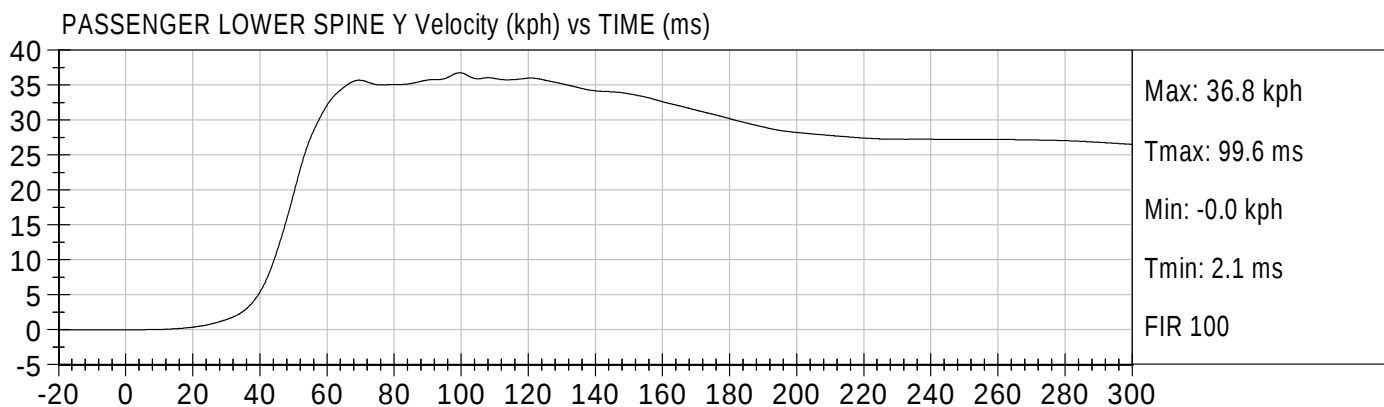
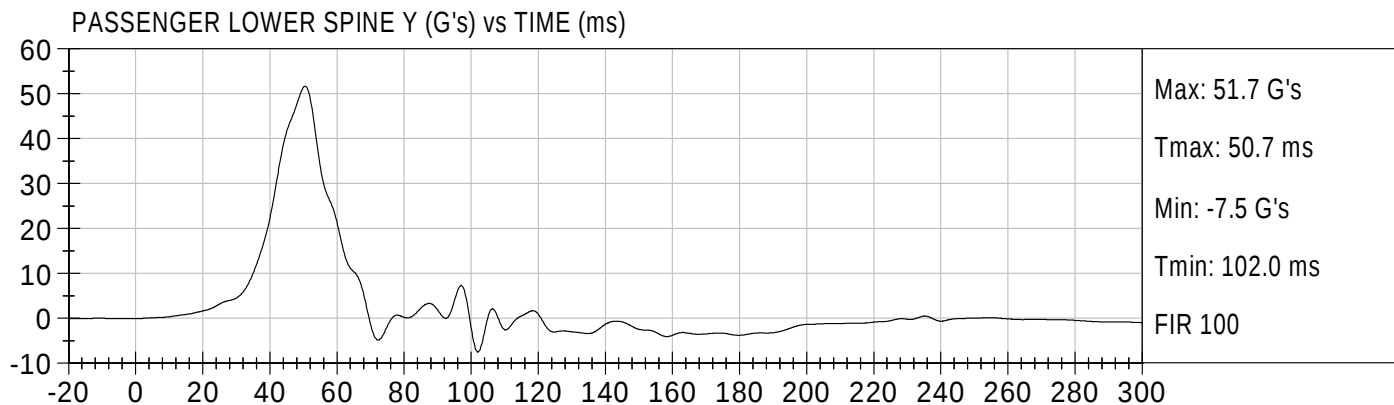
DRIVER PELVIS Y (G's) vs TIME (ms)



DRIVER PELVIS Y Velocity (kph) vs TIME (ms)







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/HIII Calibration Data Sheet
Side Impact Dummy
External Measurements

ATD Serial No: 271

Test I.D: D09234

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	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

9/21/2009
Test Date

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

ATD Serial No: 271

Test I.D: D092341

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	52	Pass
Peak Resultant Acceleration	G's	120 to 150	142	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-8.7	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

9/21/09
Test Date



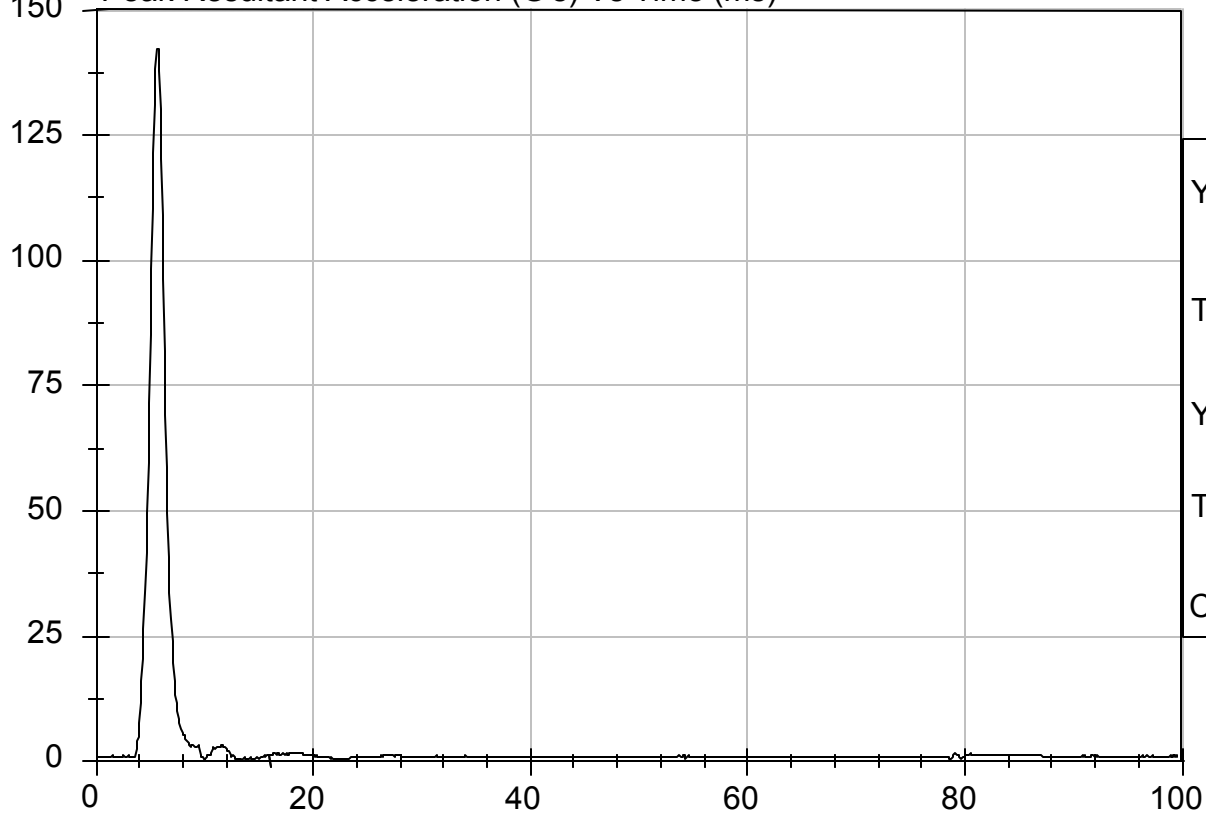
Test Description: Head Drop

Test Date: 9/21/09

Component: D092341

Speed: 0 ft/s, 0 m/s

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



YMax: 142.1 G

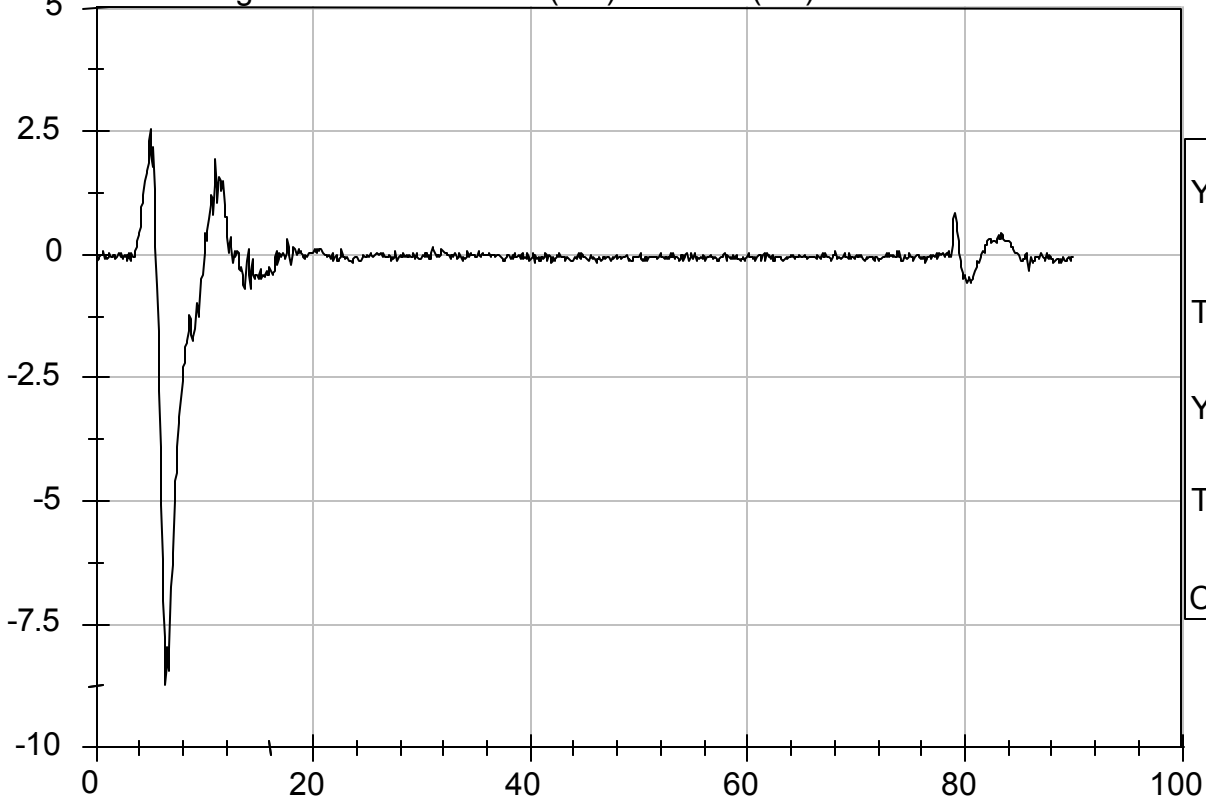
Tmax: 5.6 ms

YMin: 0.2 G

Tmin: 10.0 ms

CFC 1000

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



YMax: 2.5 G

Tmax: 5.0 ms

YMin: -8.7 G

Tmin: 6.4 ms

CFC 1000

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

ATD Serial No: 271

Test I.D: D092342

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Probe Velocity	m/s	4.22 - 4.31	4.23	Pass
Upper Rib	G's	37 - 46	39	Pass
Lower Rib	G's	37 - 46	37	Pass
Lower Spine	G's	15 - 22	18	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

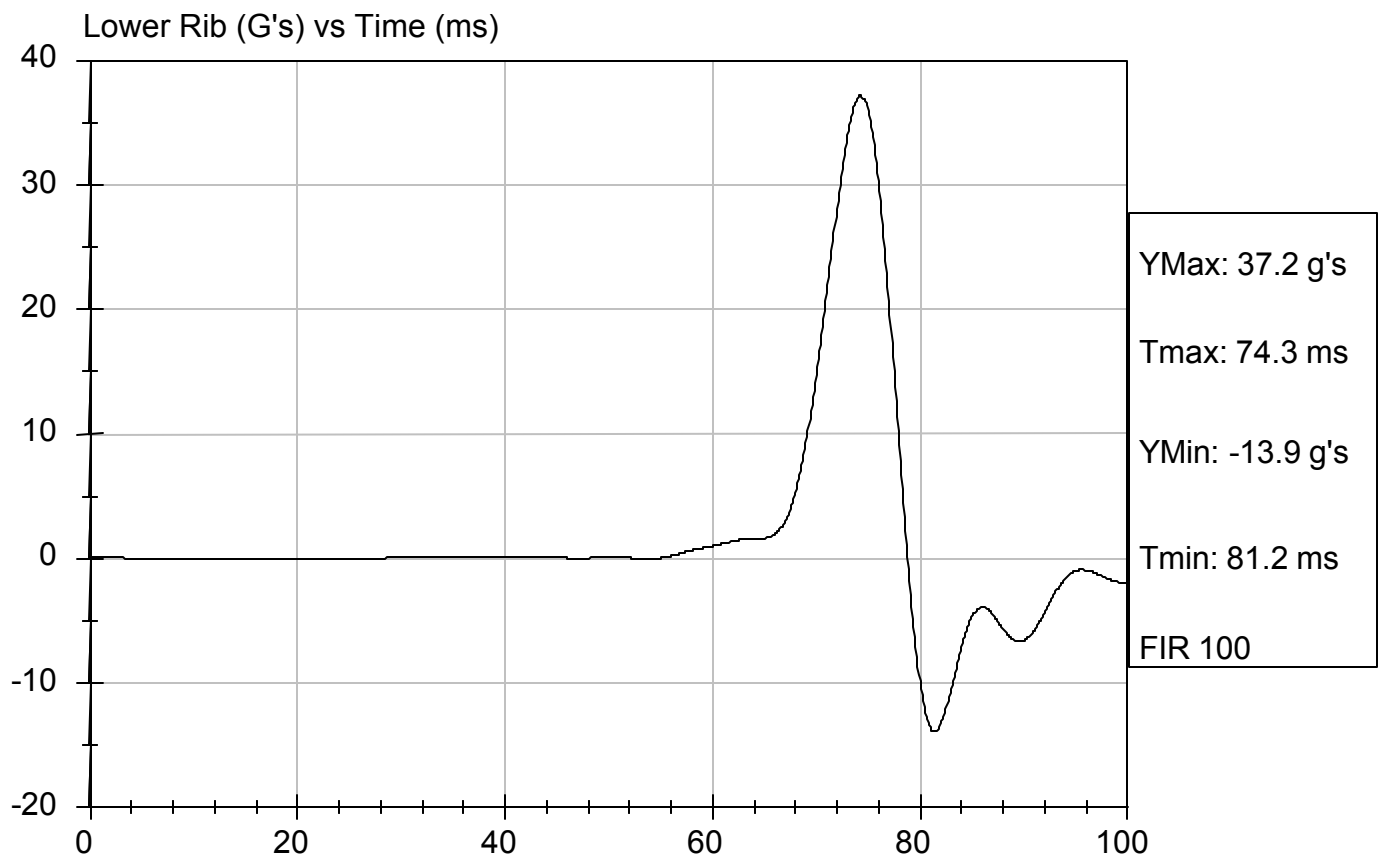
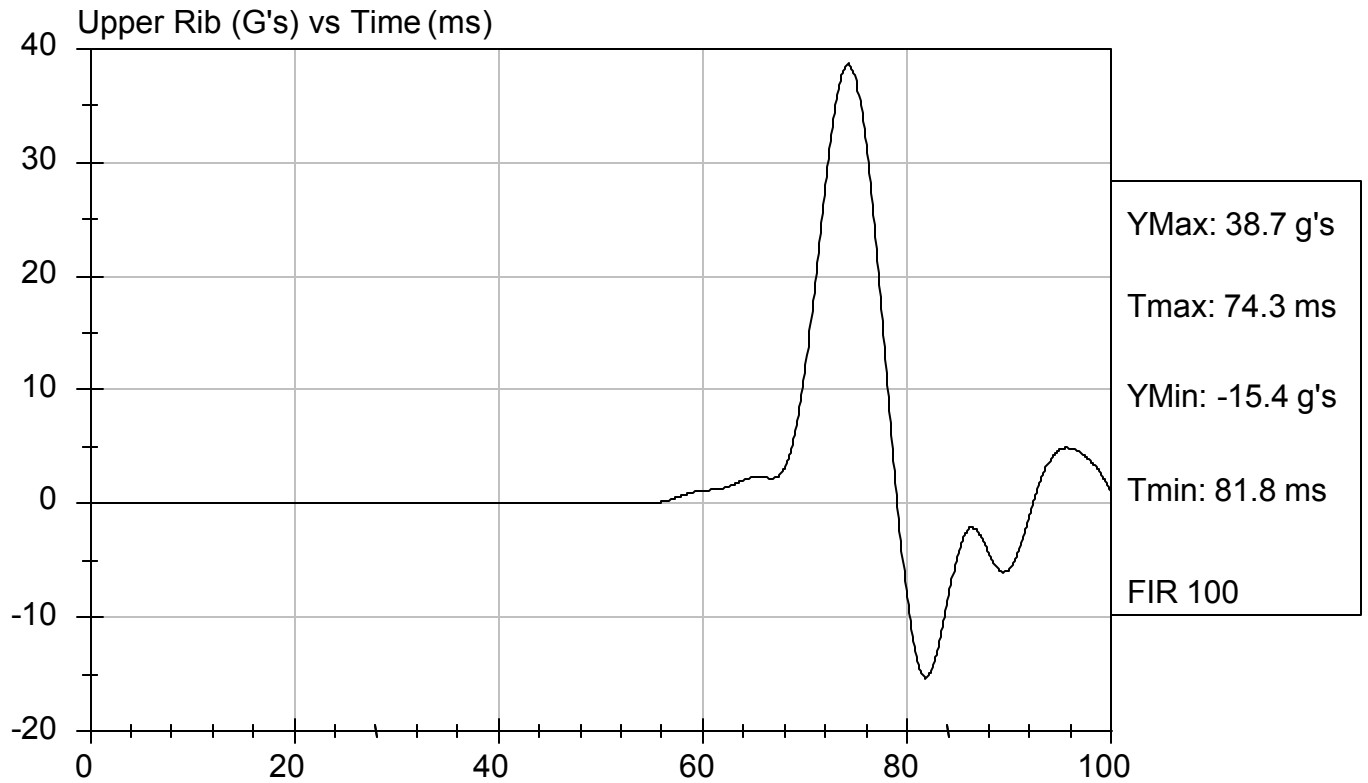
David Winkelbauer
Approved By

9/21/09
Test Date



Test Desc: Thorax Impact
Component ID: D092342

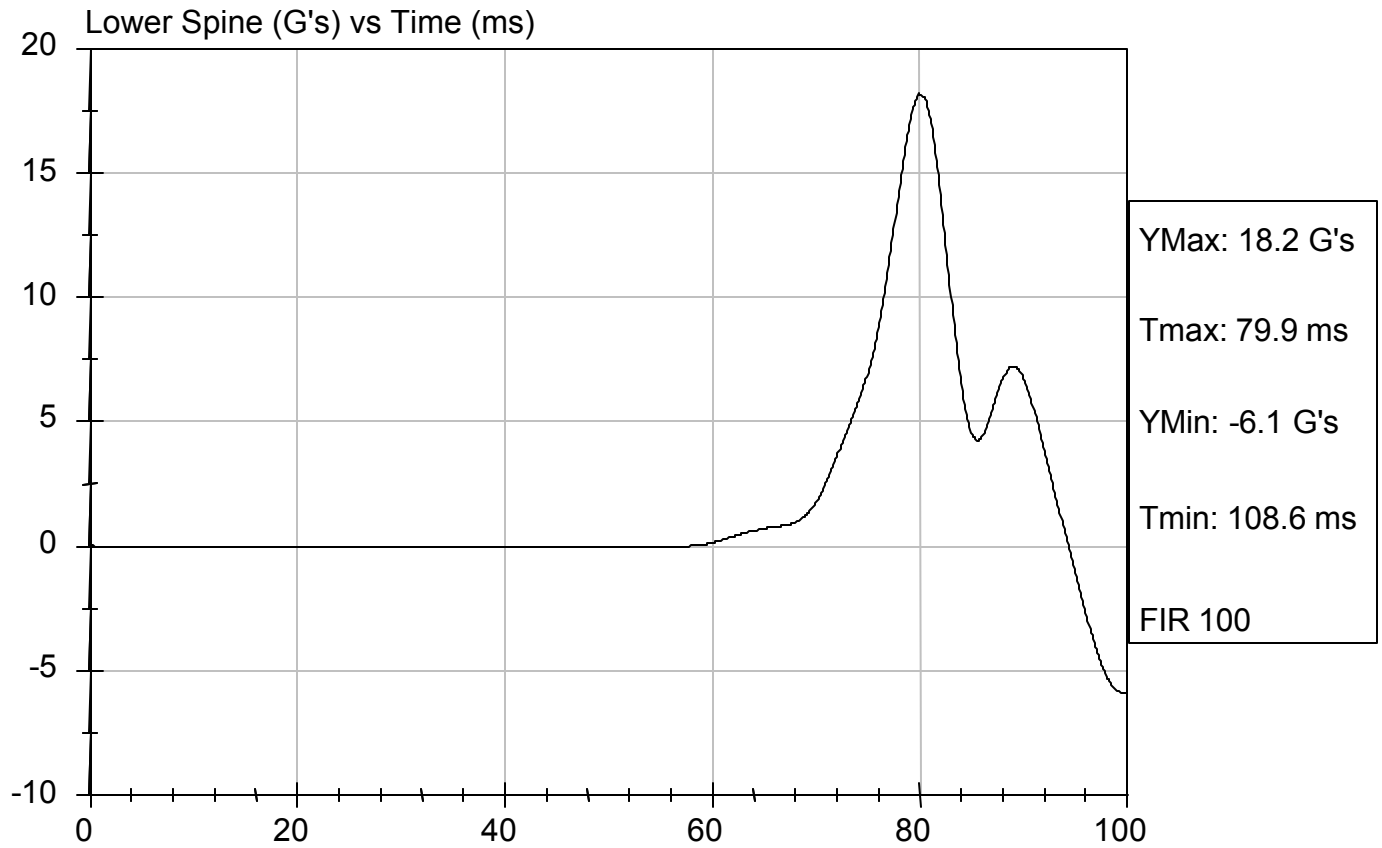
Test Date: 9/21/09
Speed: 13.88 ft/s, 4.23 m/s





Test Desc: Thorax Impact
Component ID: D092342

Test Date: 9/21/09
Speed: 13.88 ft/s, 4.23 m/s



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

ATD Serial No: 271

Test I.D: D092343

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	52	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	43	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

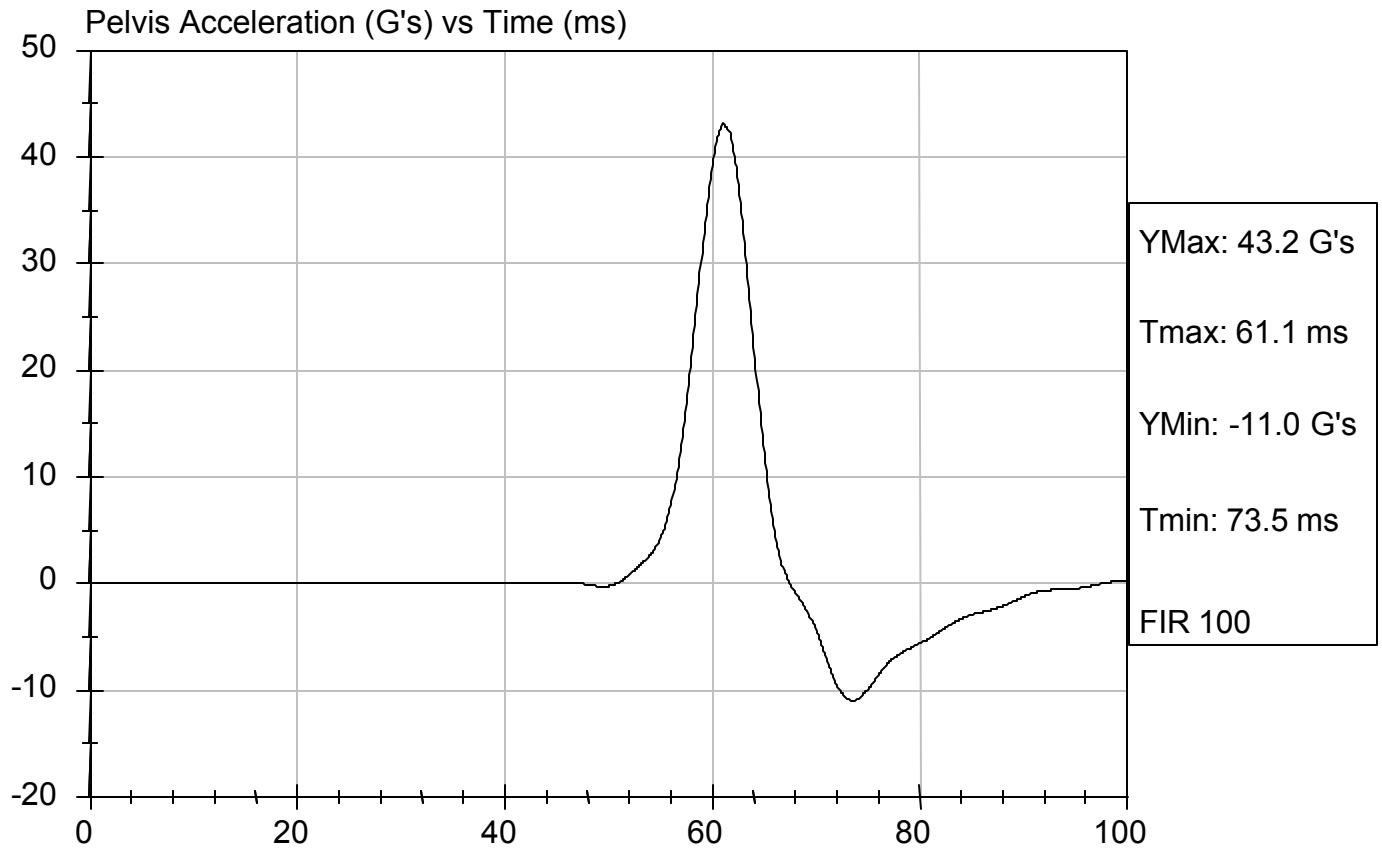
David Winkelbauer
Approved By

9/21/09
Test Date



Test Desc: Pelvis Impact
Component ID: D092343

Test Date: 9/21/09
Speed: 14.12 ft/s, 4.30 m/s



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

ATD Serial No: 271

Test I.D: D092344

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Force At 12.7 mm	N	104 -162	142	Pass
Force At 19 mm	N	163 - 222	202	Pass
Force At 25.4 mm	N	222 - 280	277	Pass
Force At 33 mm	N	325 - 391	382	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

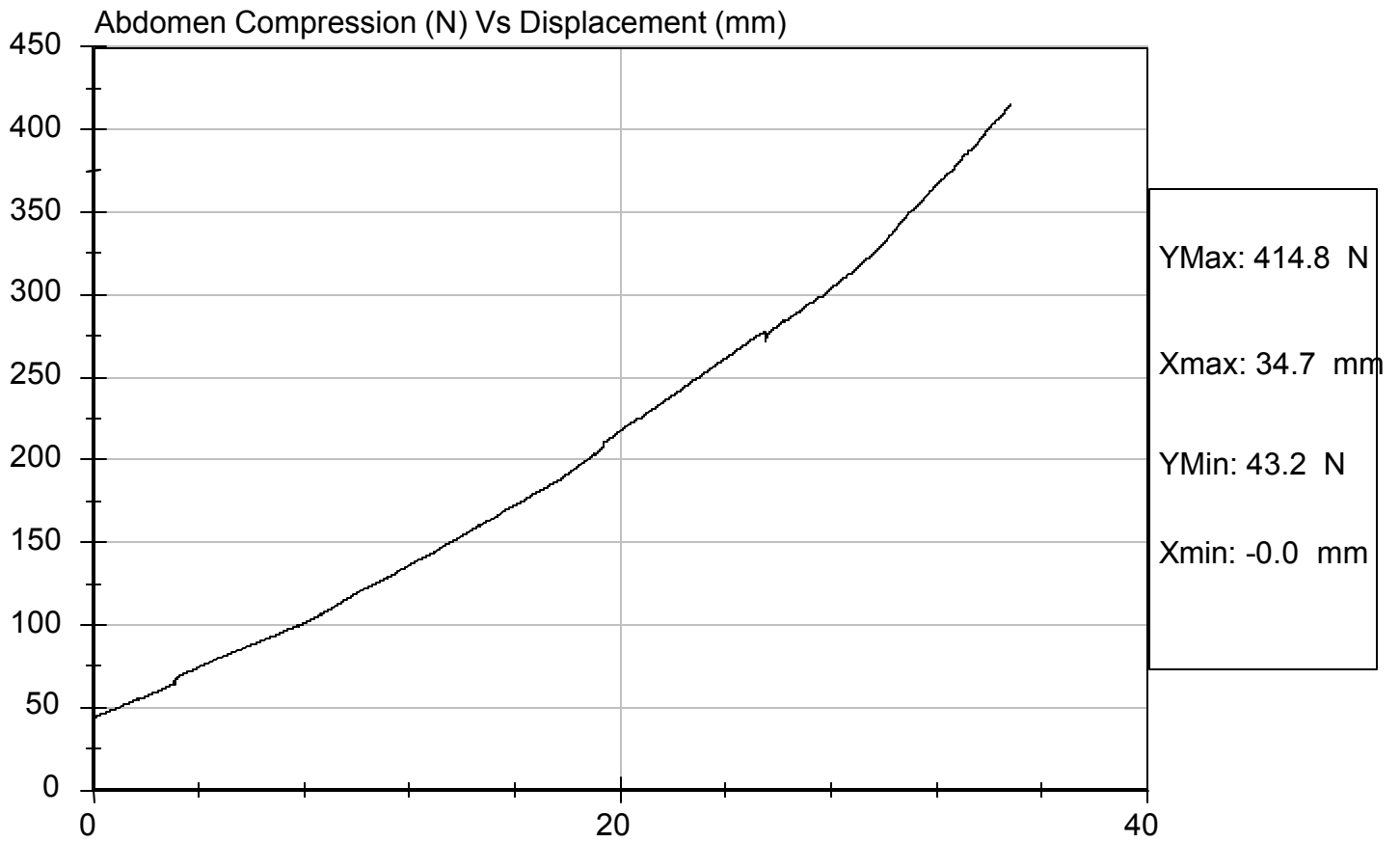
9/21/09
Test Date



Test Description: Abdomen Compression Test Date: 9/21/09

Component: D092344

Speed: 0 ft/s, 0 m/s



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

ATD Serial No: 271

Test I.D: D092345

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	108.9	Pass
Force At 30 deg	N	151.2 - 204.6	151.5	Pass
Force At 40 deg	N	204.6 - 258.0	212.4	Pass
Return Angle	Deg	12 Maximum	5	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

9/21/09
Test Date

David Winkelbauer
Approved By

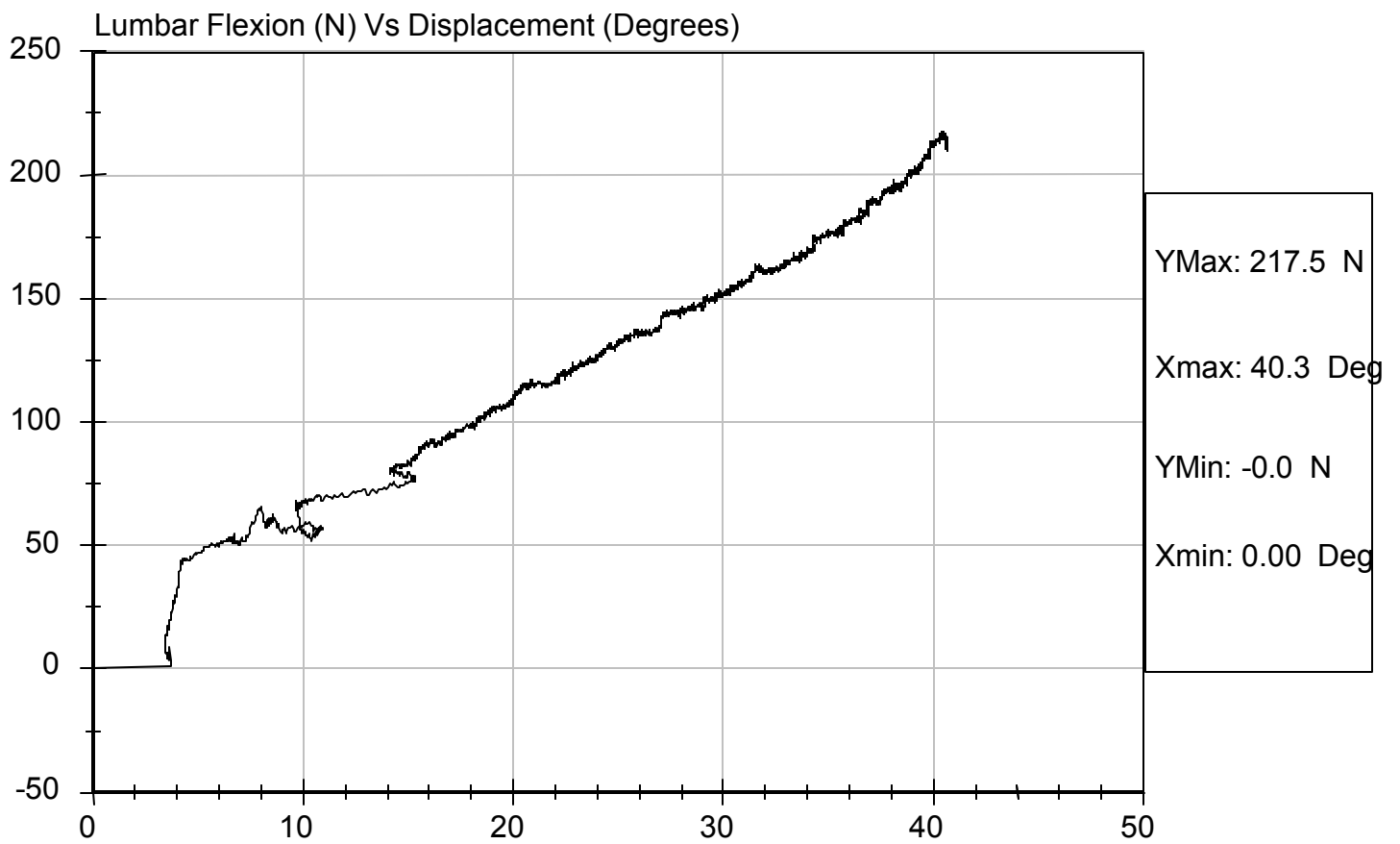


Test Description: Lumbar Flexion

Test Date: 9/21/09

Component: D092345

Speed: 0 ft/s, 0 m/s



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

ATD Serial No: 271

Test I.D: D092349

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	52	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.43	Pass
	20 ms	m/s	4.12 to 5.10	4.76	Pass
	30 ms	m/s	5.73 to 7.01	6.58	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.86	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	73	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	66	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	81	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	55	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	4	Pass

Jessica Hall
Laboratory Technician

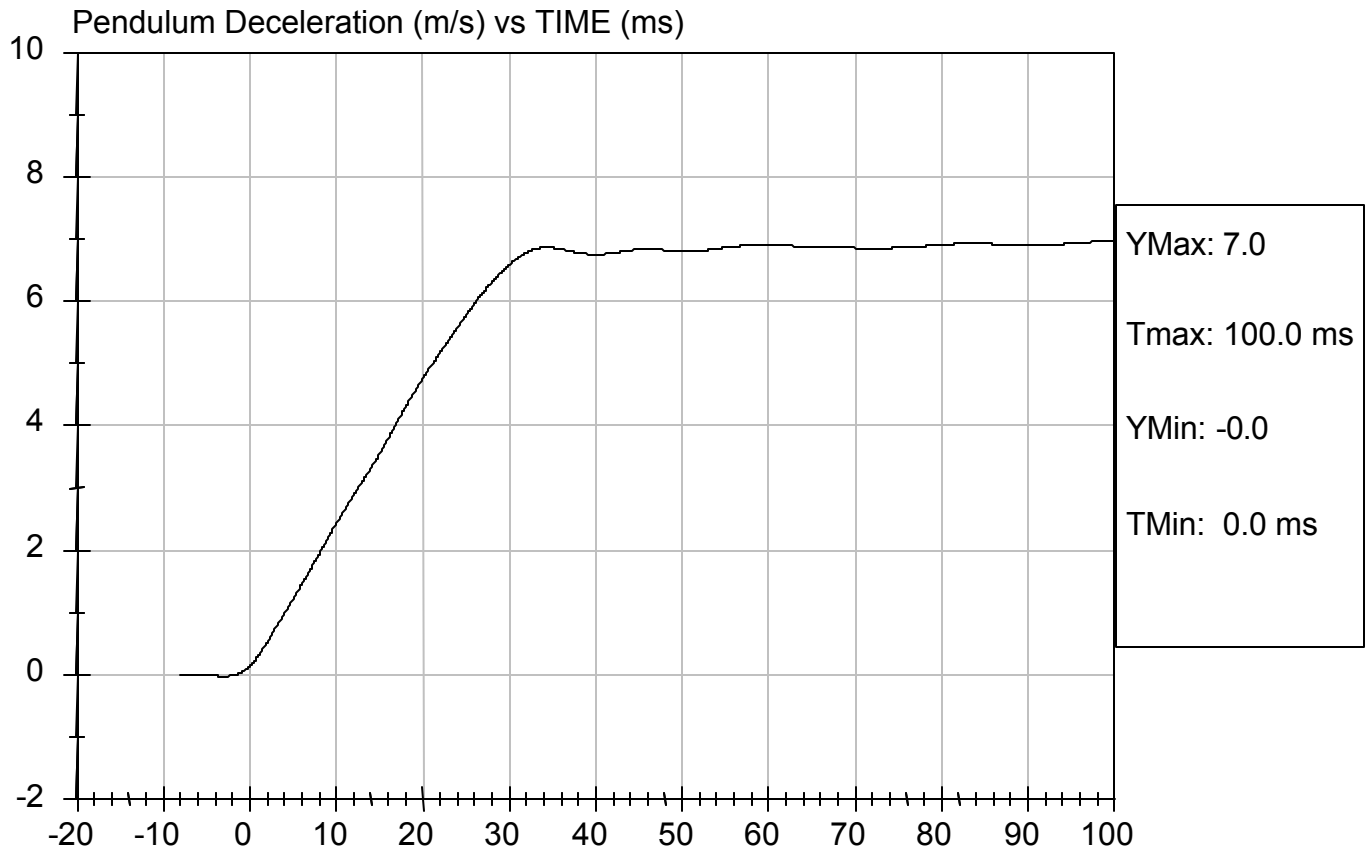
David Winkelbauer
Approved By

9/21/09
Test Date



Test Desc: Neck Bending
Component ID: D092349

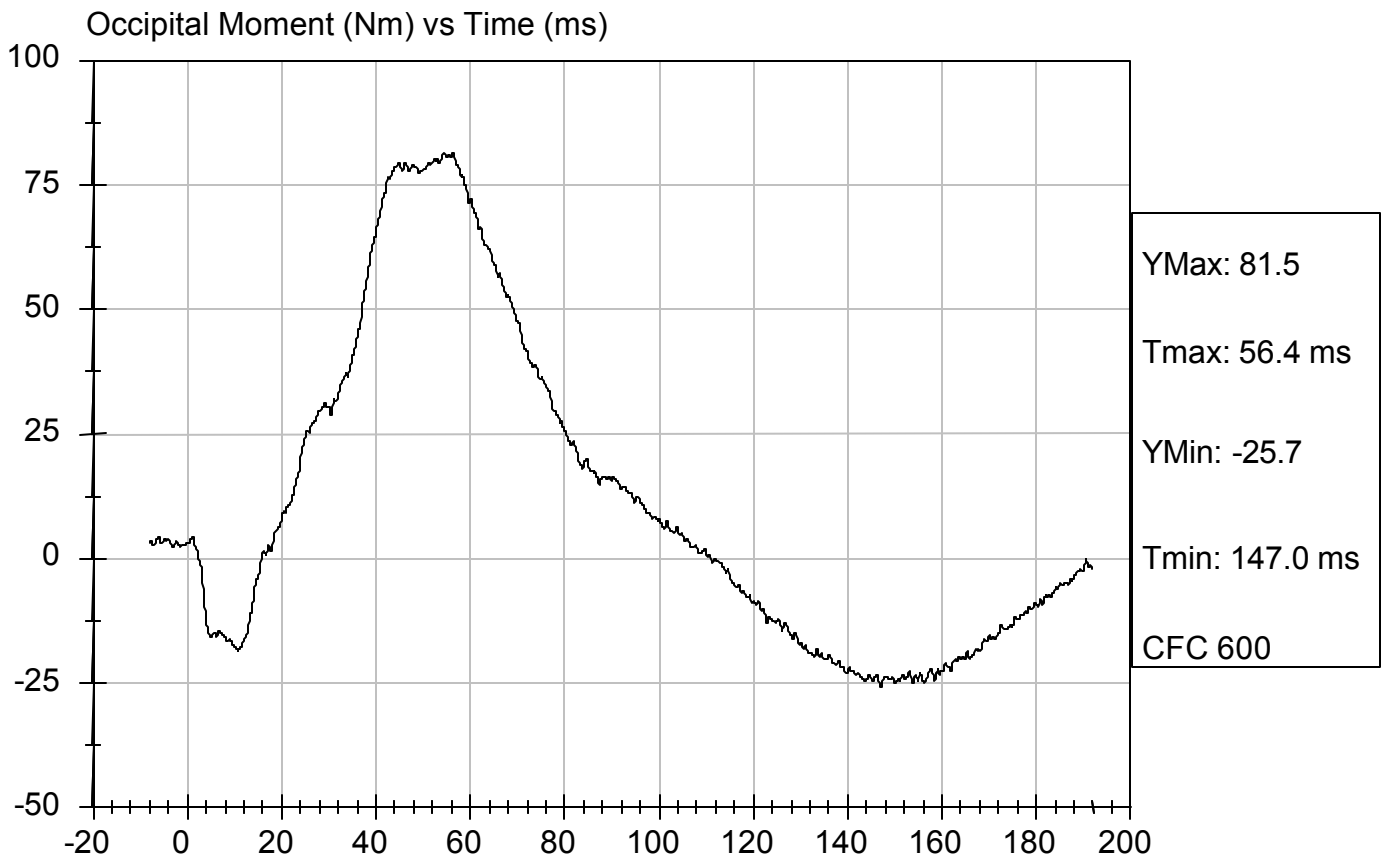
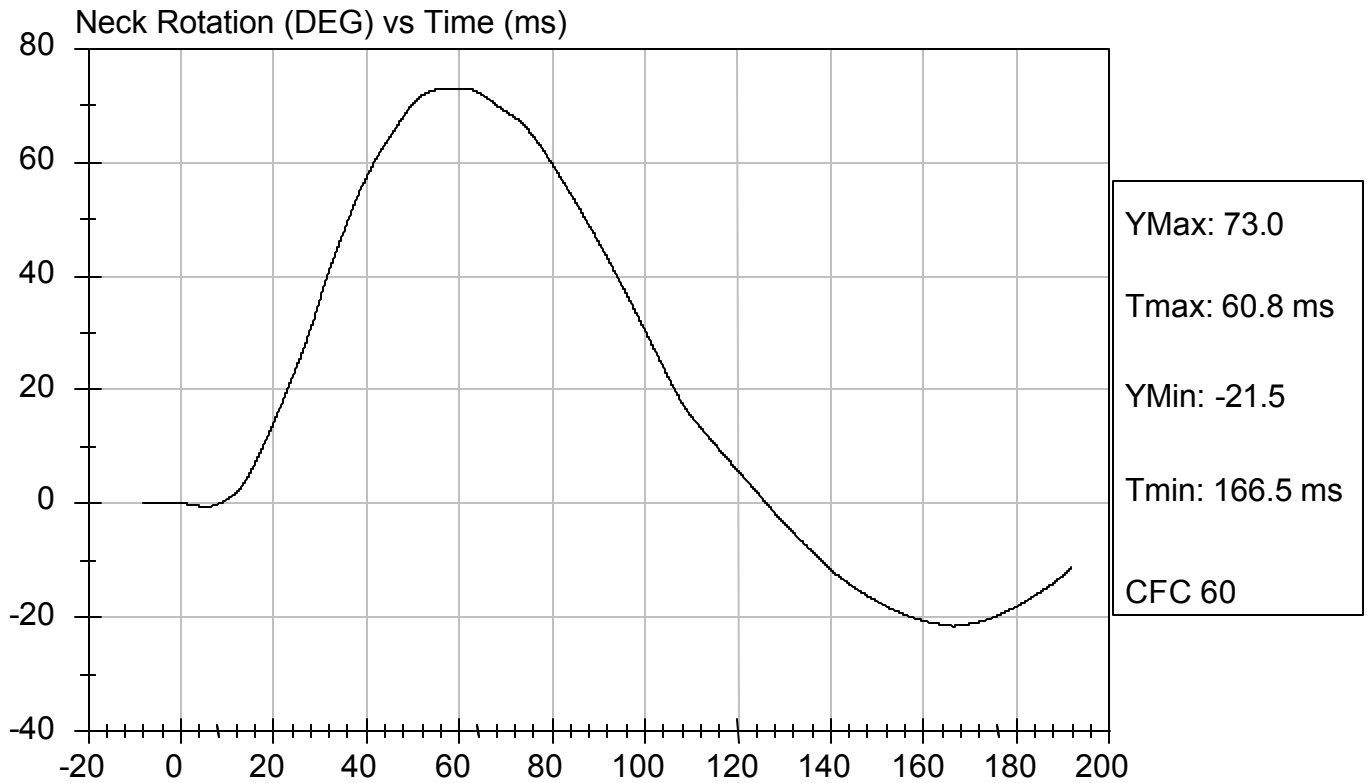
Test Date: 9/21/09
Speed: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Bending
Component ID: D092349

Test Date: 9/21/09
Speed: 23.15 ft/s, 7.06 m/s



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: D092421

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	120 to 150	136	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-6.9	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

10/2/09
Test Date



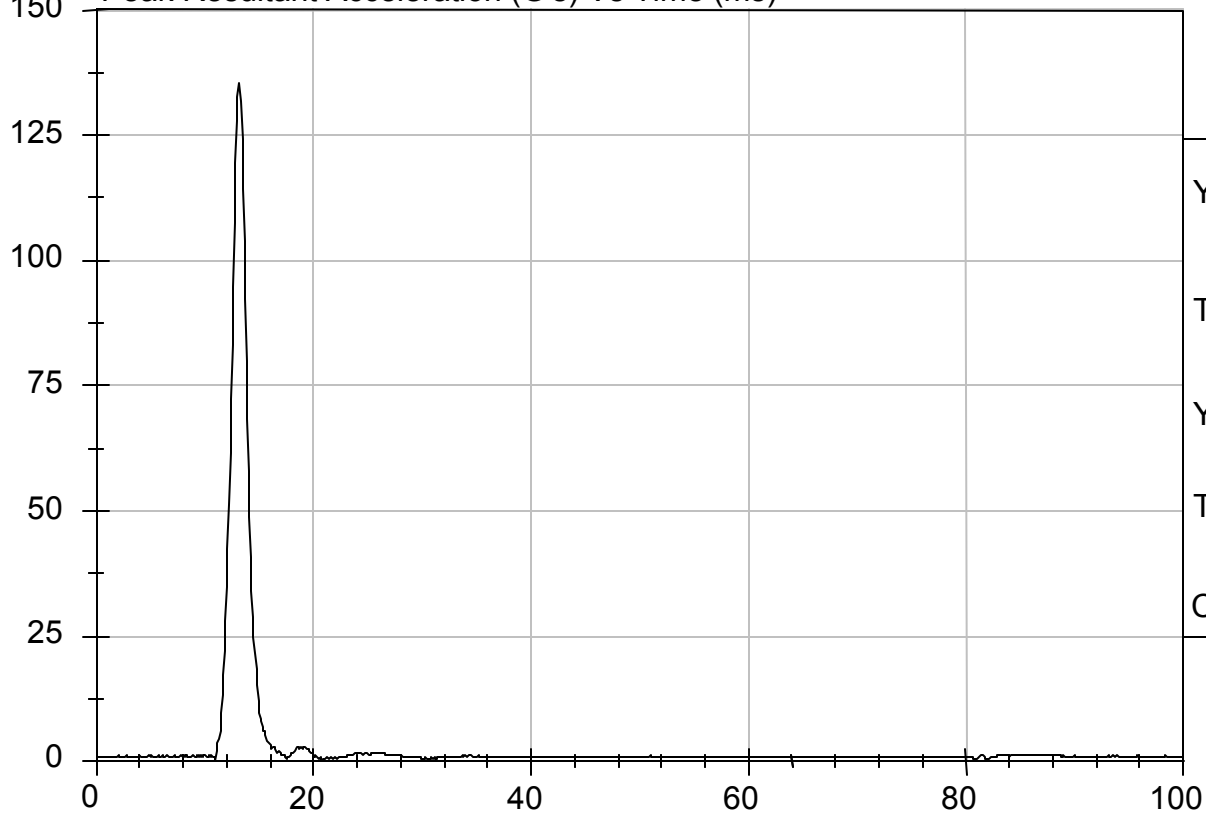
Test Description: Head Drop

Test Date: 10/2/09

Component: D092421

Speed: 0 ft/s, 0 m/s

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



YMax: 135.5 G

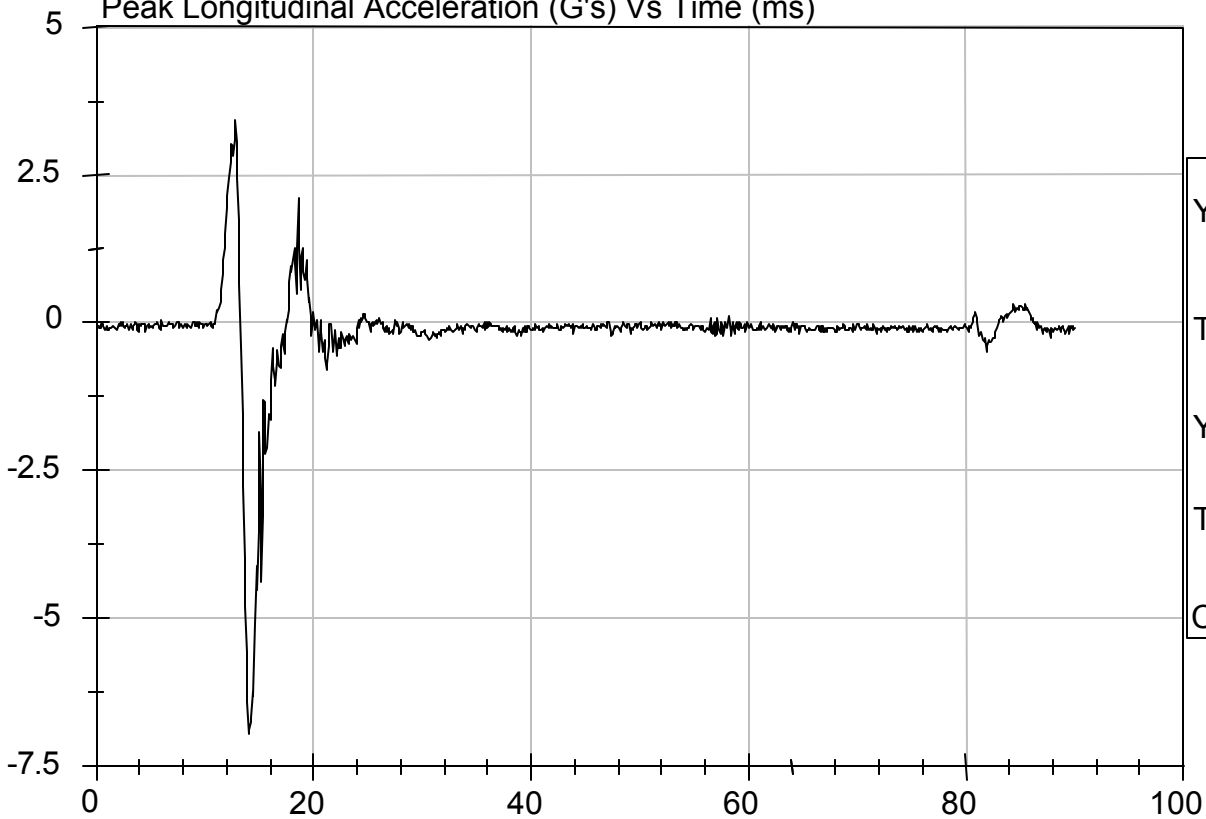
Tmax: 13.2 ms

YMin: 0.3 G

Tmin: 11.0 ms

CFC 1000

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



YMax: 3.4 G

Tmax: 12.8 ms

YMin: -6.9 G

Tmin: 14.0 ms

CFC 1000

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

ATD Serial No: 271

Test I.D: D092422

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.22 - 4.31	4.23	Pass
Upper Rib	G's	37 - 46	39	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	19.8	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

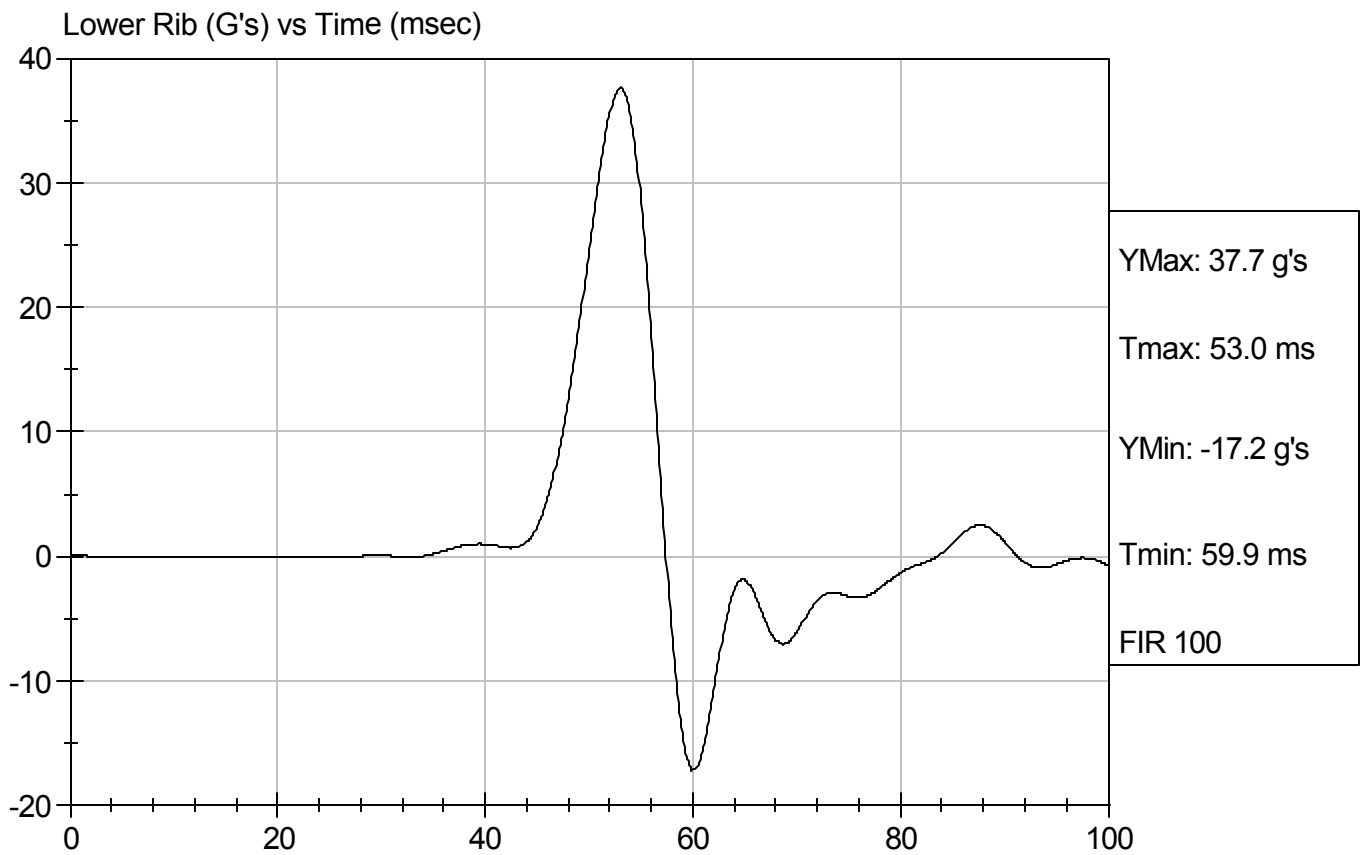
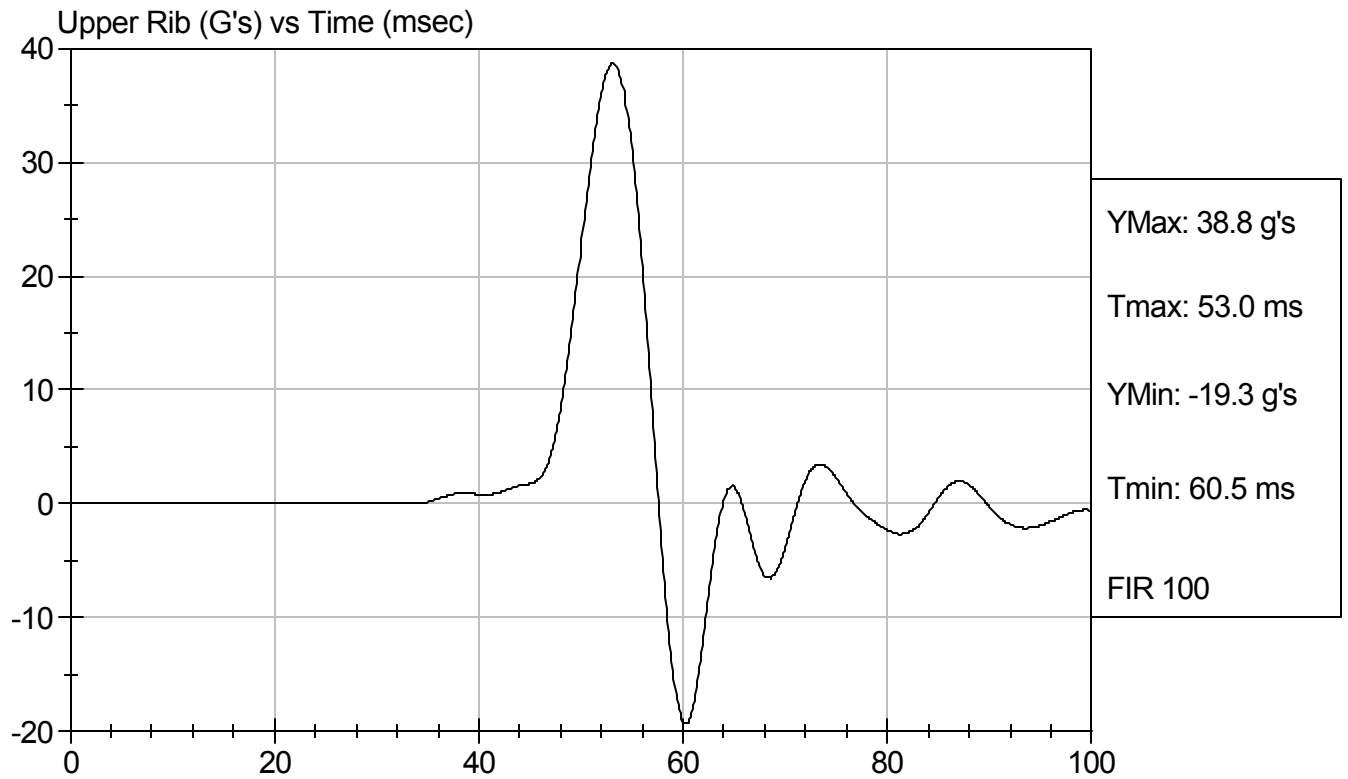
David Winkelbauer
Approved By

10/2/09
Test Date



Test Desc: Thorax Impact
Component ID: D092422

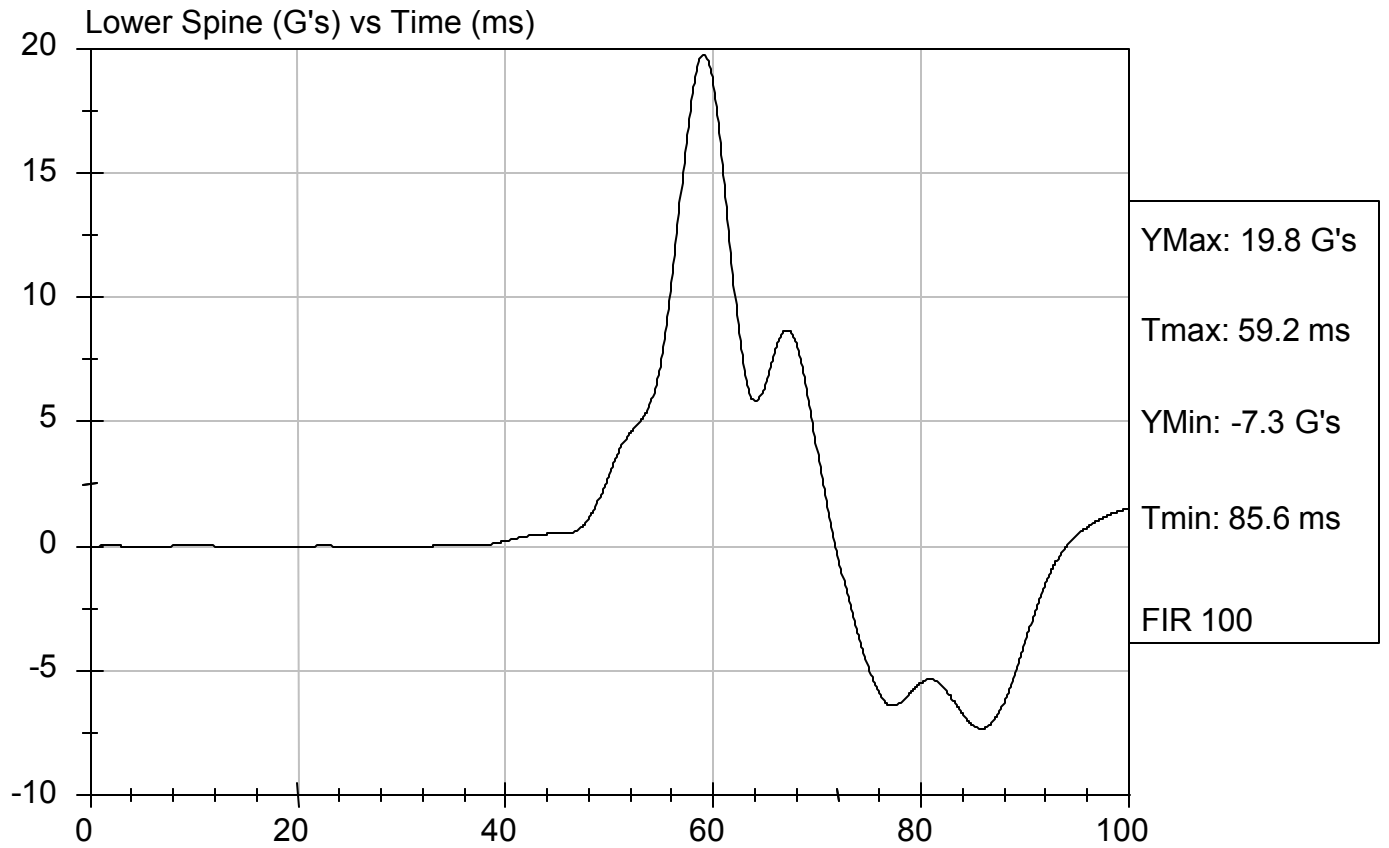
Test Date: 10/2/09
Speed: 13.89 ft/sec, 4.23 m/sec





Test Desc: Thorax Impact
Component ID: D092422

Test Date: 10/2/09
Speed: 13.89 ft/sec, 4.23 m/sec



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

ATD Serial No: 271

Test I.D: D092423

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	41	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

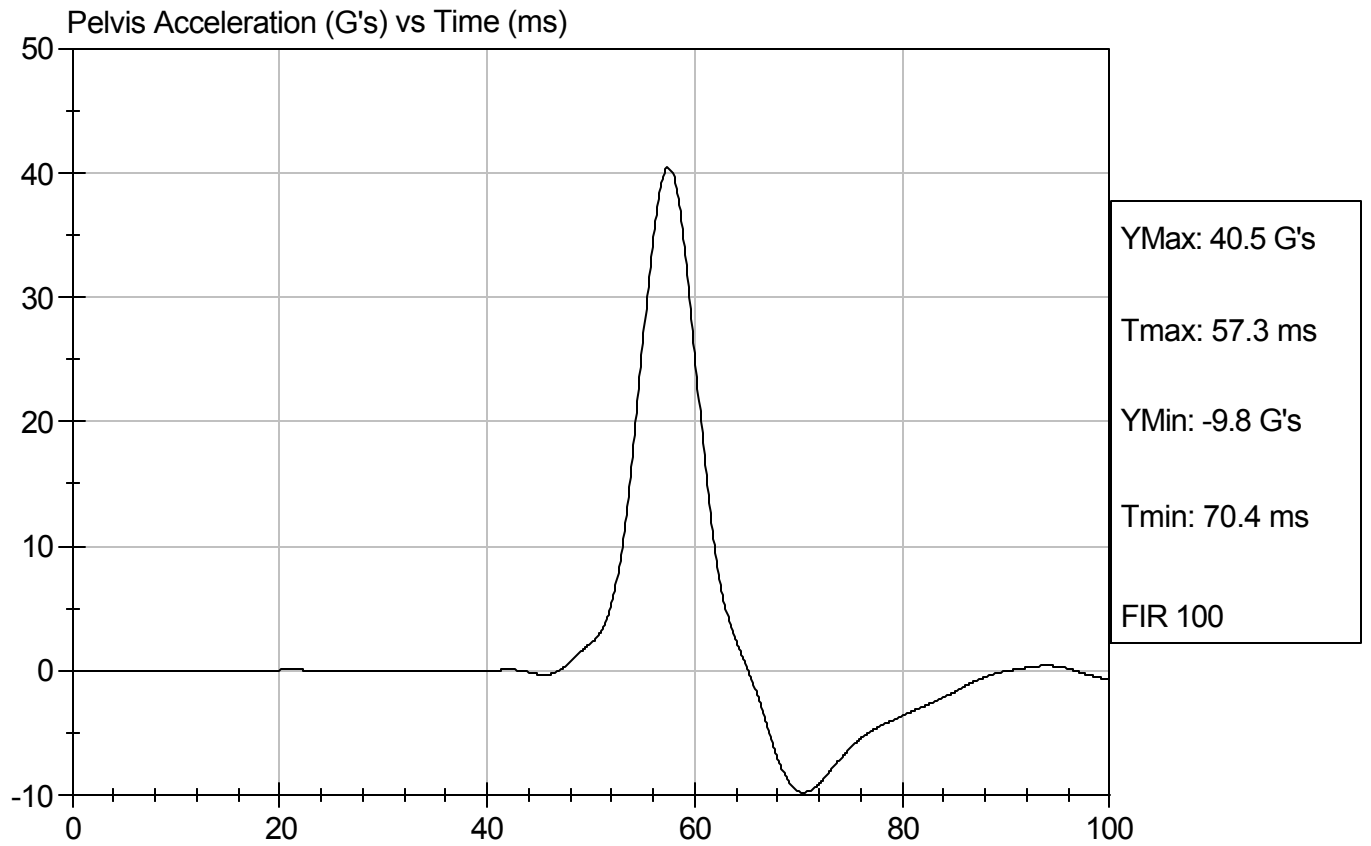
10/2/09
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D092423

Test Date: 10/2/09
Speed: 14.1 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: D092424

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Force At 12.7 mm	N	104 -162	144	Pass
Force At 19 mm	N	163 - 222	200	Pass
Force At 25.4 mm	N	222 - 280	272	Pass
Force At 33 mm	N	325 - 391	378	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

10/2/09
Test Date

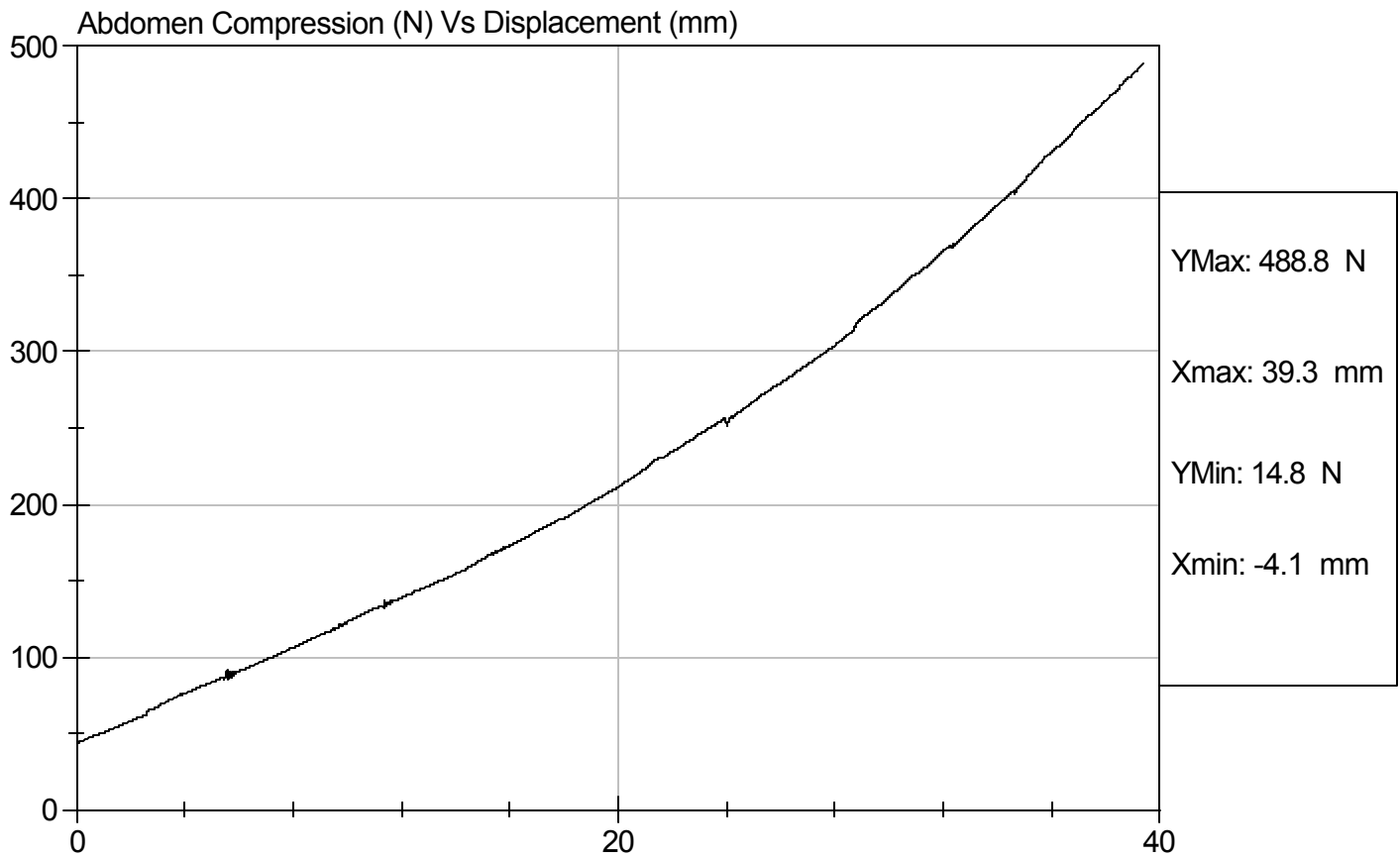


Test Description: Abdomen Compression

Test Date: 10/2/09

Component: D092424

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: D092425

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.9	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	117.5	Pass
Force At 30 deg	N	151.2 - 204.6	162.2	Pass
Force At 40 deg	N	204.6 - 258.0	230.5	Pass
Return Angle	Deg	12 Maximum	2	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

10/2/09
Test Date

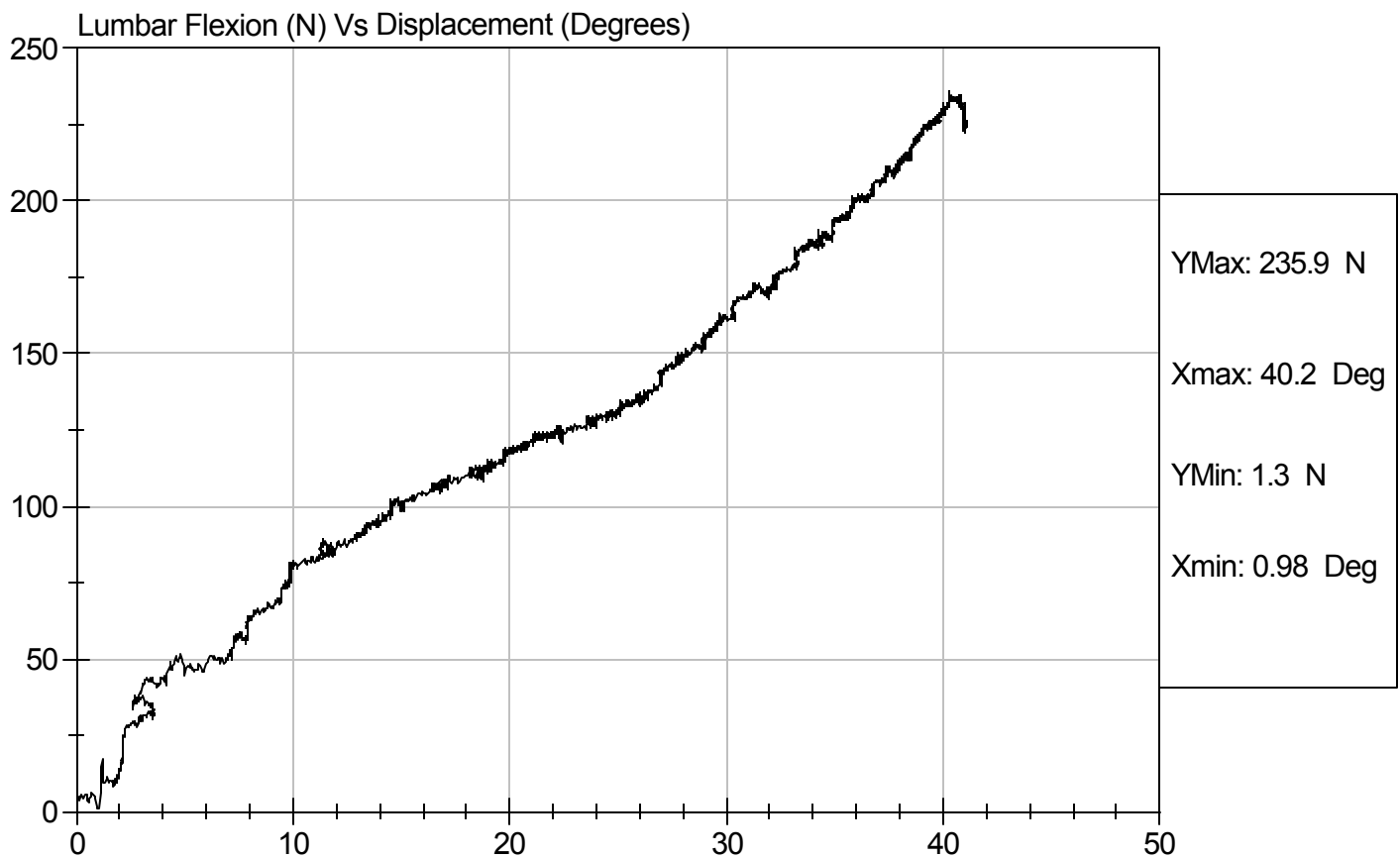


Test Description: Lumbar Flexion

Test Date: 10/2/09

Component: D092425

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: D092429

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.24	Pass
	20 ms	m/s	4.12 to 5.10	4.57	Pass
	30 ms	m/s	5.73 to 7.01	6.38	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.84	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	78	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	67	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	78	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	49	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	5	Pass


 Laboratory Technician

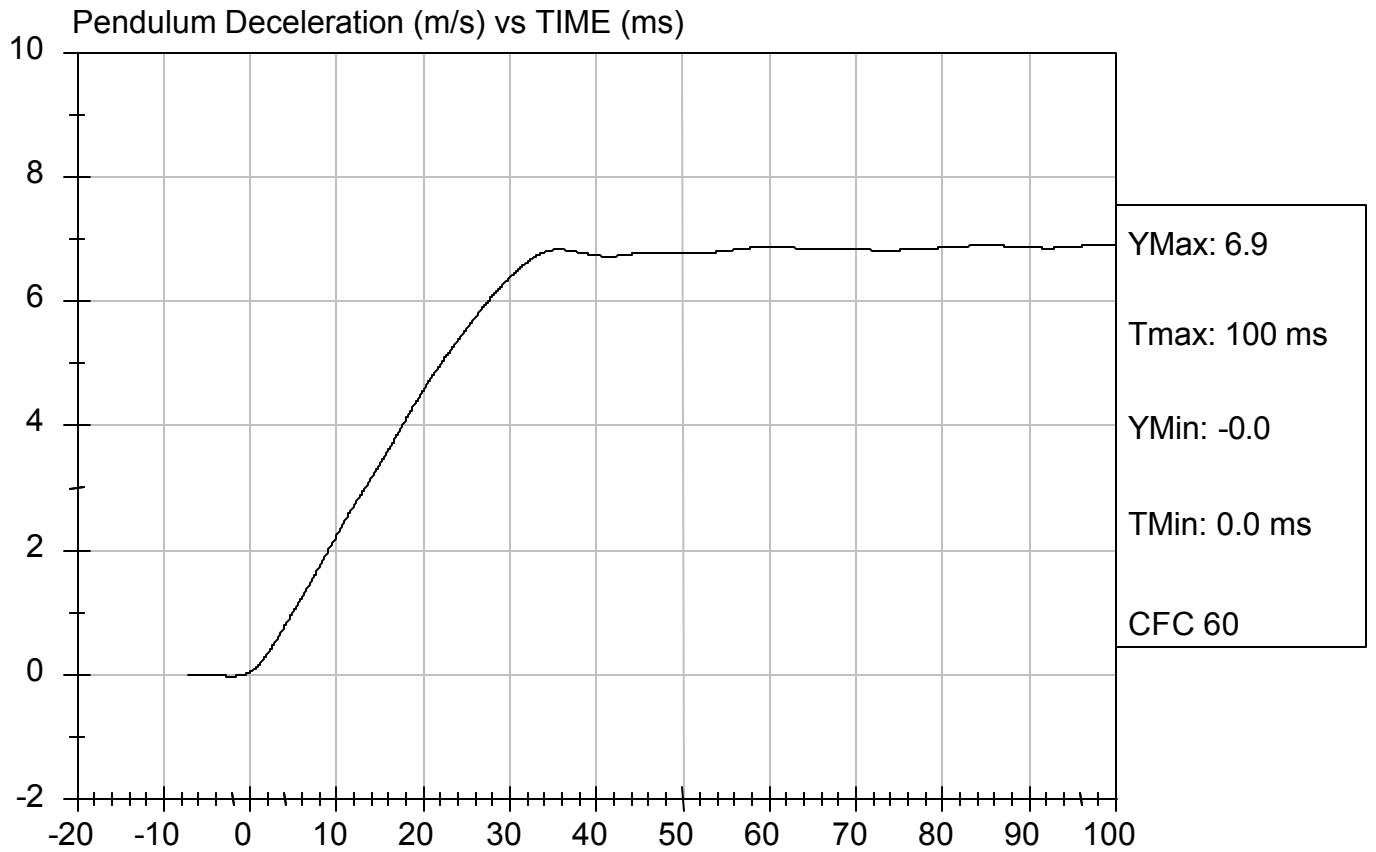

 Approved By

10/2/09
 Test Date



Test Desc: Neck Bending
Component ID: D092429

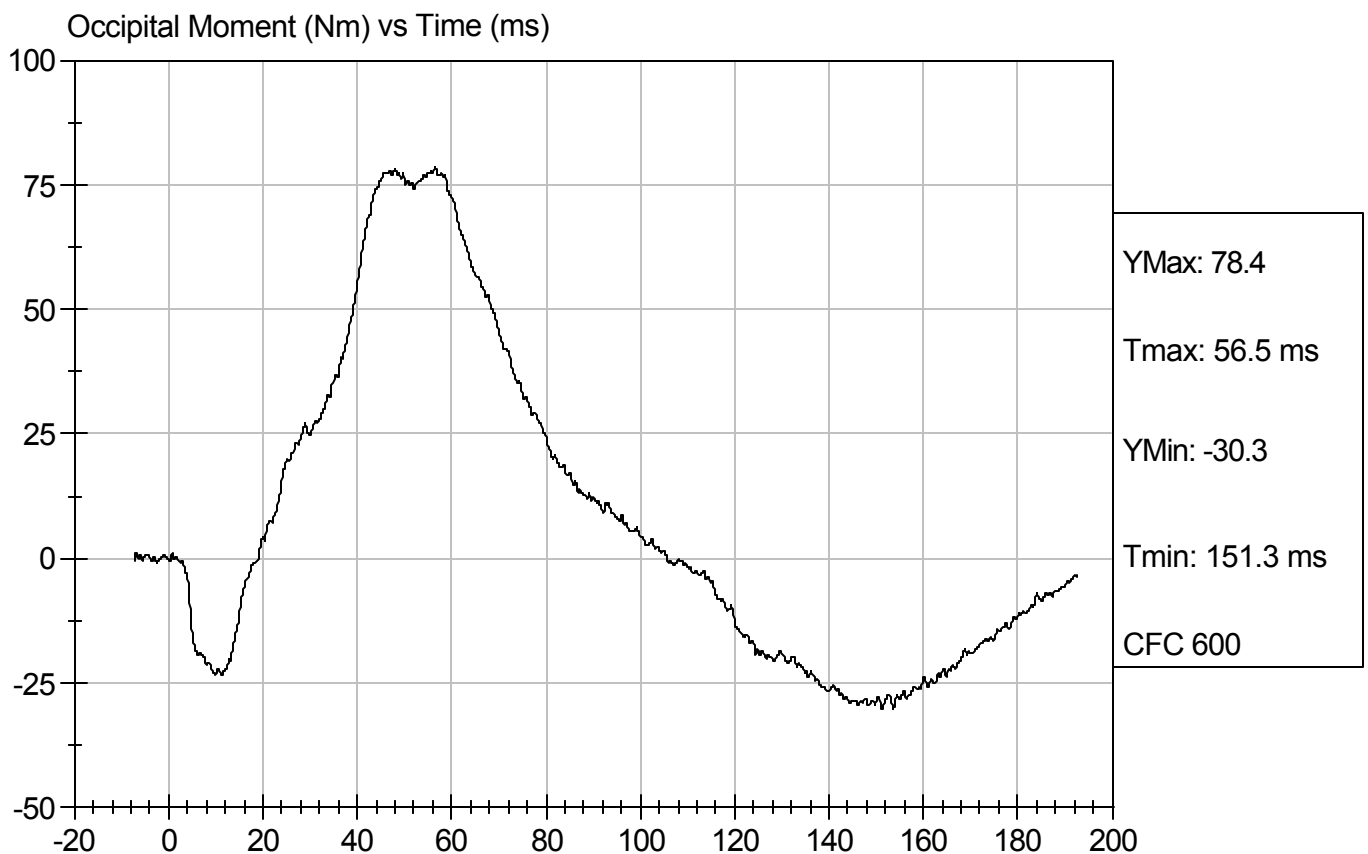
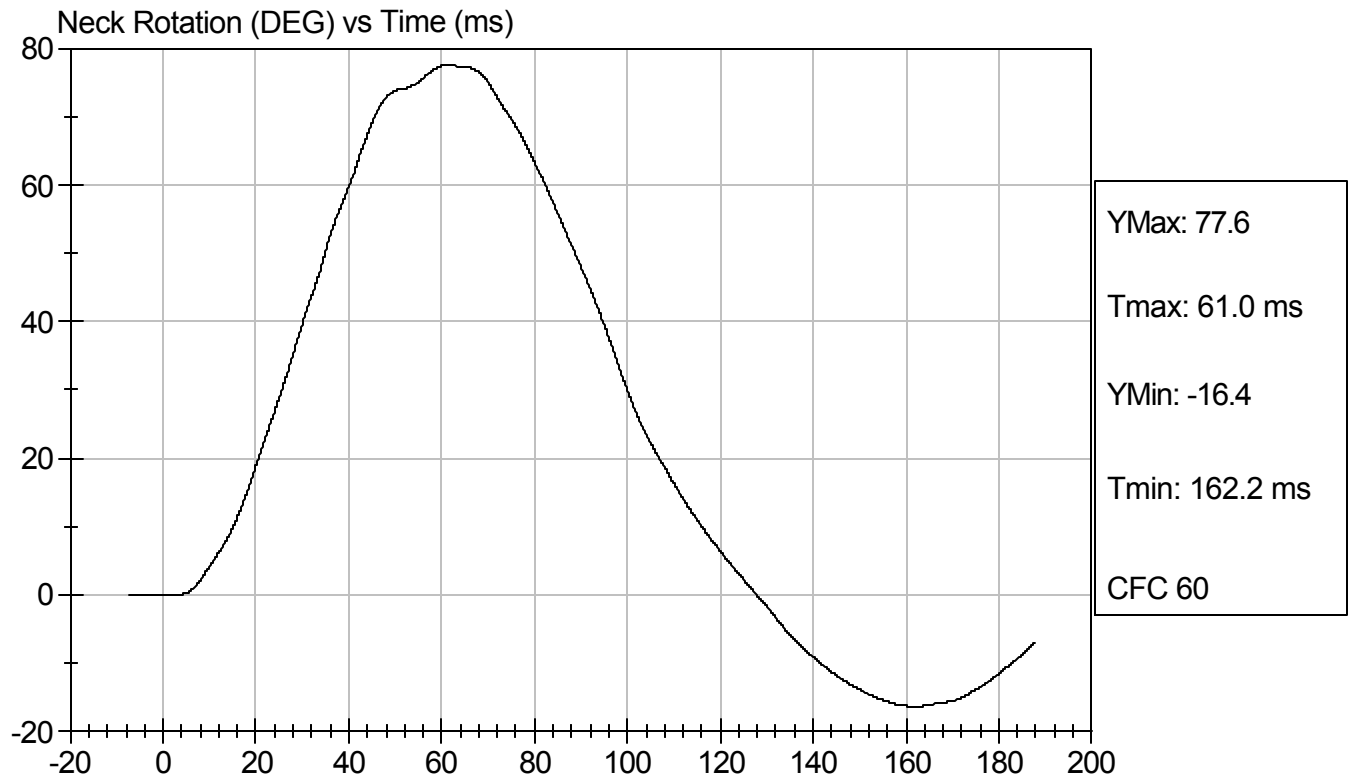
Test Date: 10/2/09
Speed: 23.15 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D092429

Test Date: 10/2/09
Speed: 23.15 ft/sec, 7.06 m/sec



SID/HIII 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

10/2/2009
 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/HIII Calibration Data Sheet
Side Impact Dummy
External Measurements

ATD Serial No: 272

Test I.D: D09235

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	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

9/21/2009
Test Date

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

ATD Serial No: 272

Test I.D: D092351

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	52	Pass
Peak Resultant Acceleration	G's	120 to 150	146	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	8.0	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

9/21/09
Test Date

David Winkelbauer
Approved By



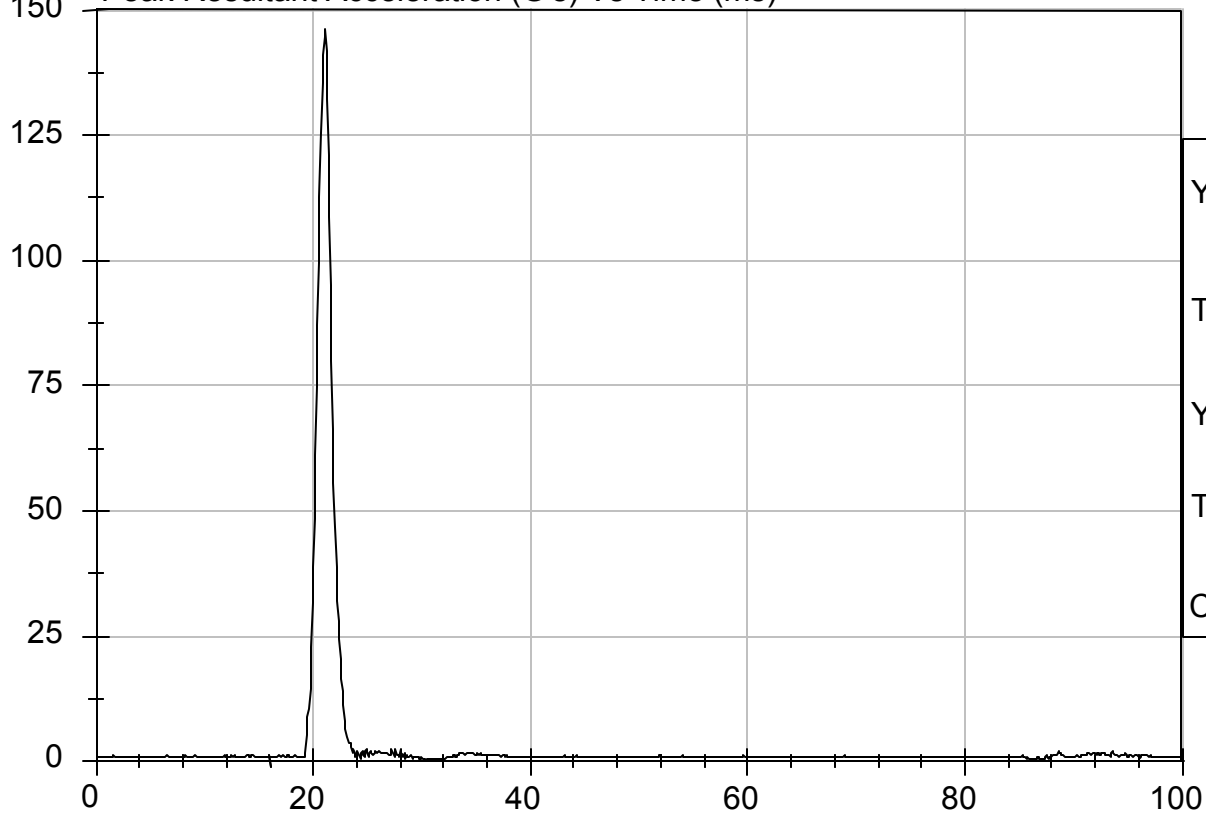
Test Description: Head Drop

Test Date: 9/21/09

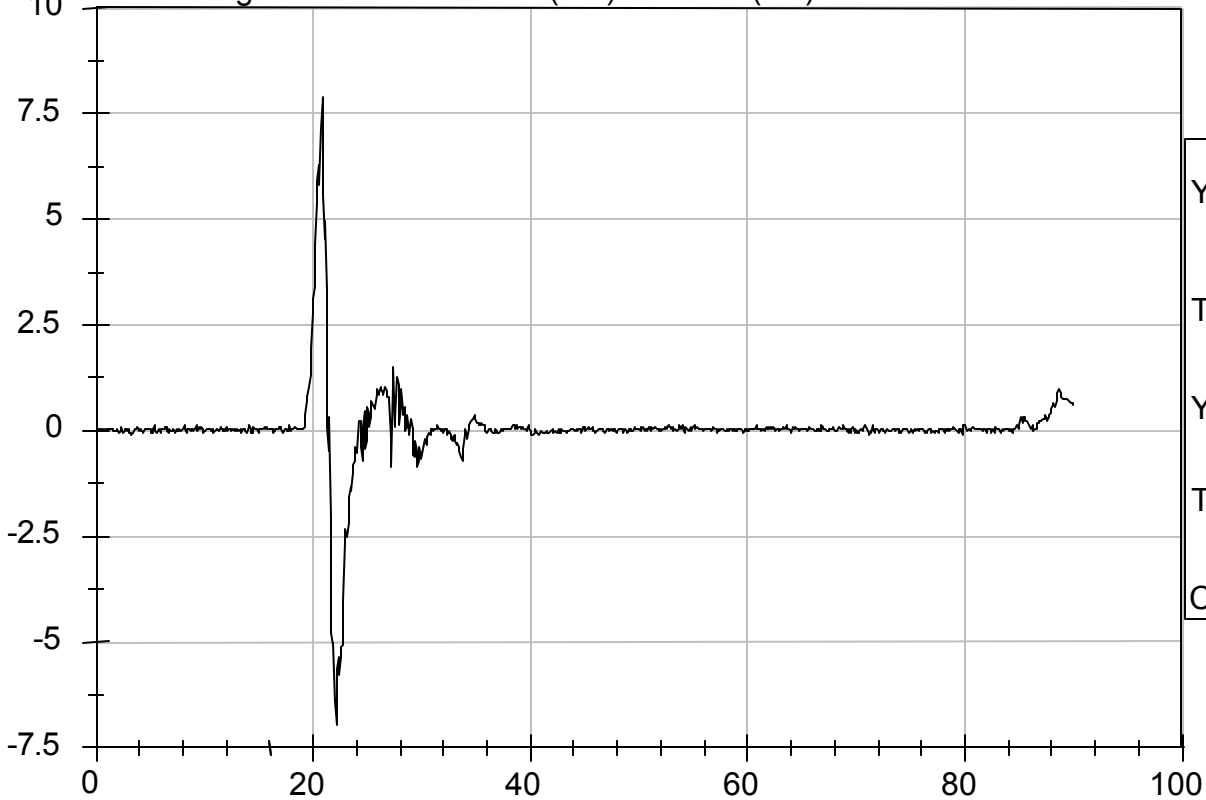
Component: D092351

Speed: 0 ft/s, 0 m/s

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



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



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

ATD Serial No: 272

Test I.D: D092352

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Probe Velocity	m/s	4.22 - 4.31	4.23	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	39	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

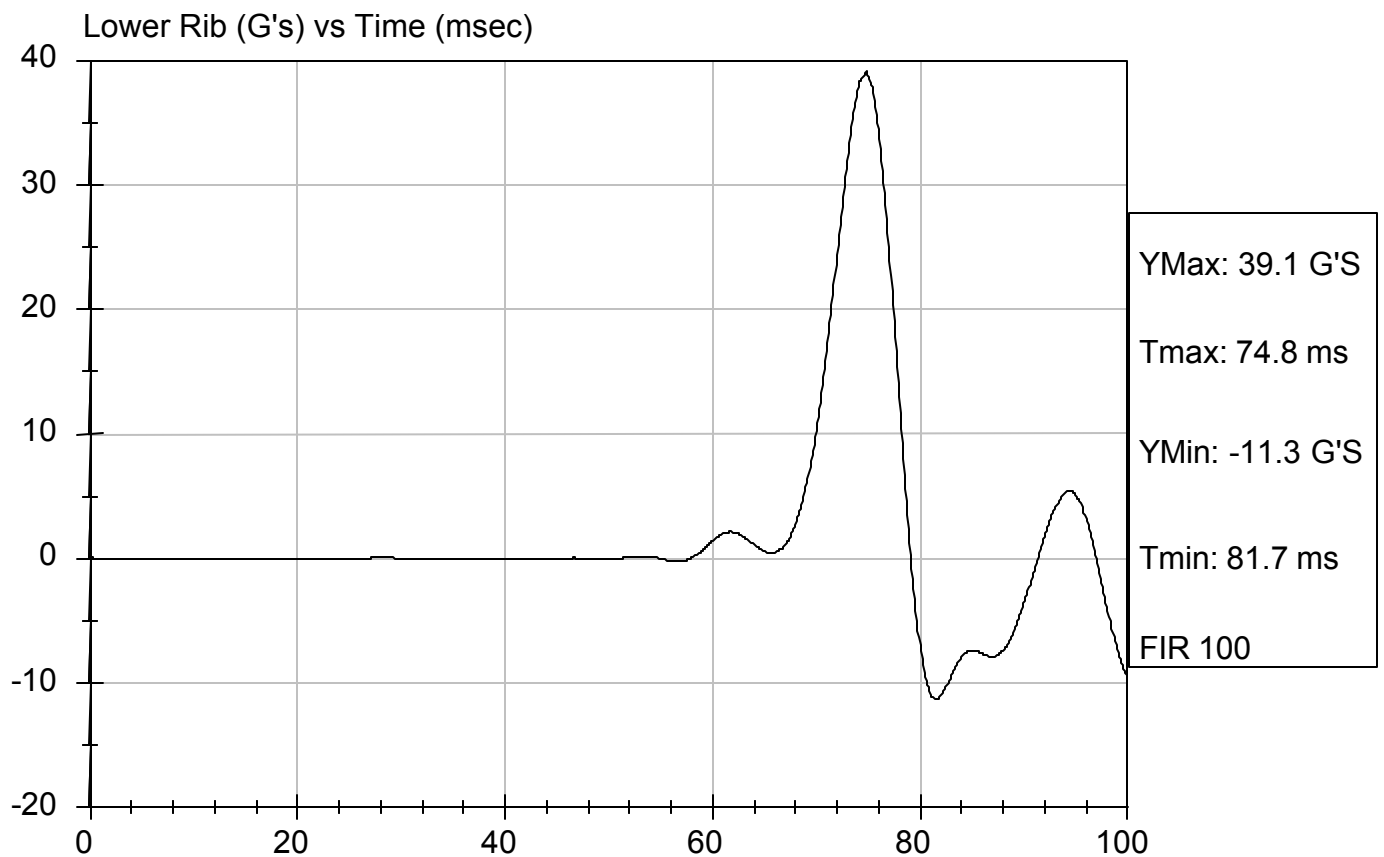
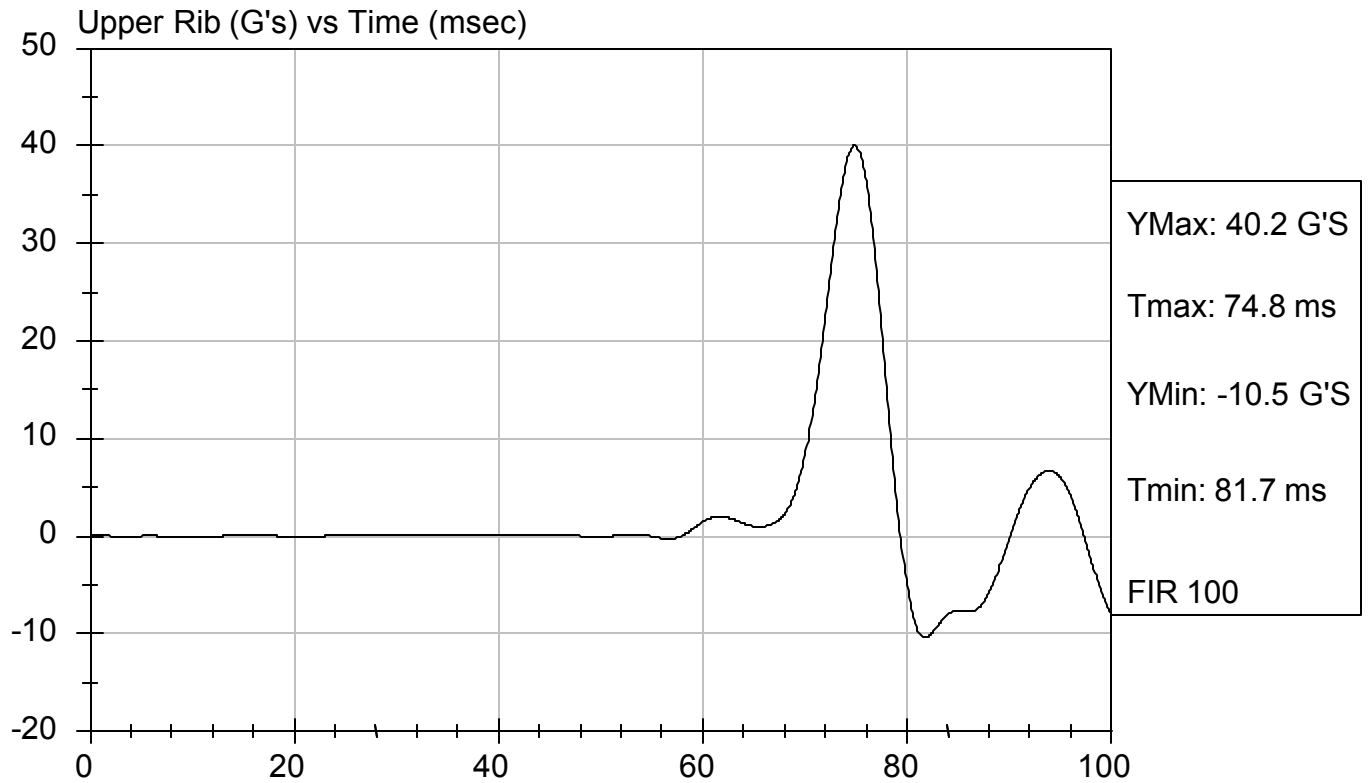
David Winkelbauer
Approved By

9/21/09
Test Date



Test Desc: Thorax Impact
Component ID: D092352

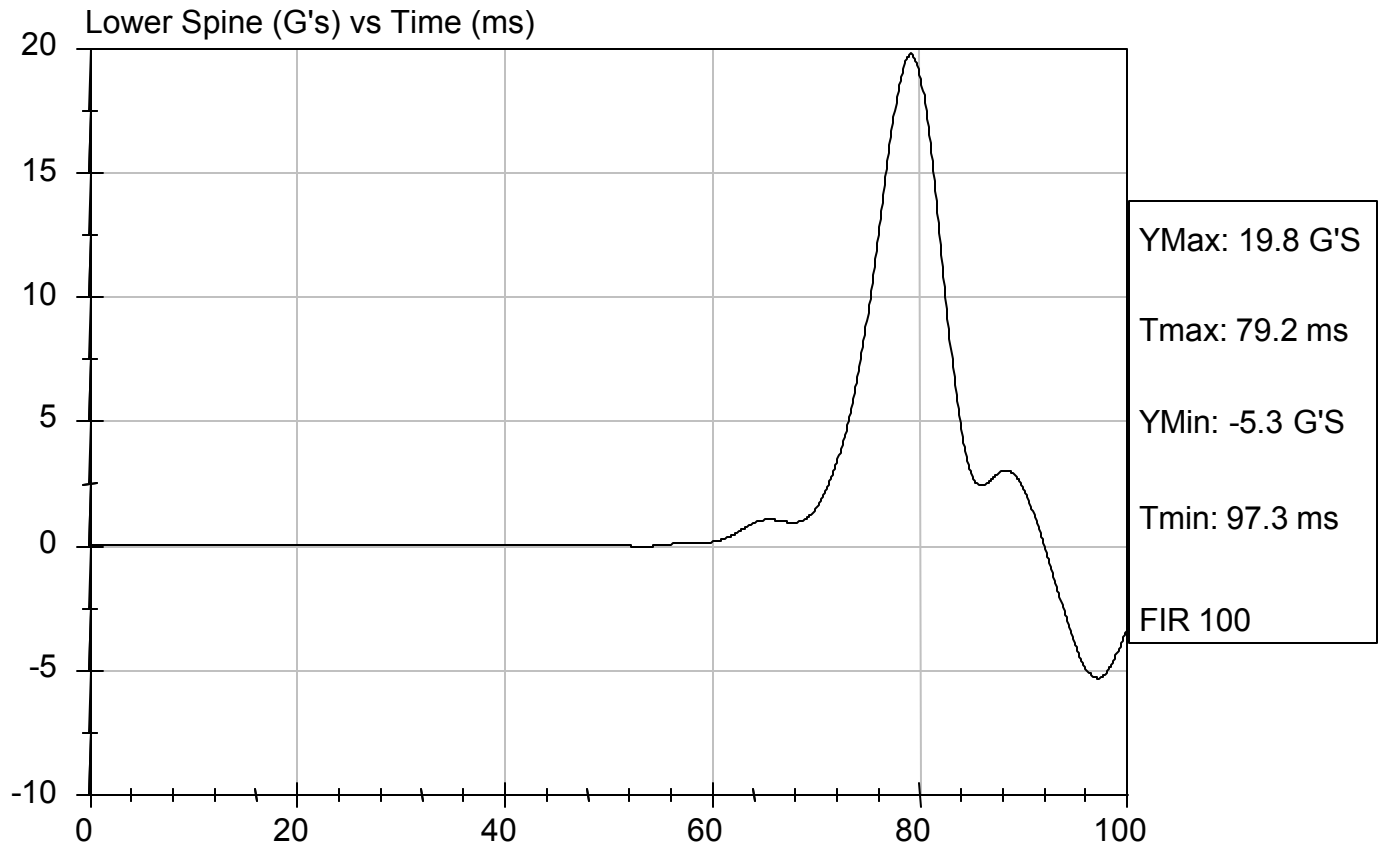
Test Date: 9/21/09
Speed: 13.88 ft/s, 4.23 m/s





Test Desc: Thorax Impact
Component ID: D092352

Test Date: 9/21/09
Speed: 13.88 ft/s, 4.23 m/s



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

ATD Serial No: 272

Test I.D: D092353

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	52	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	42	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

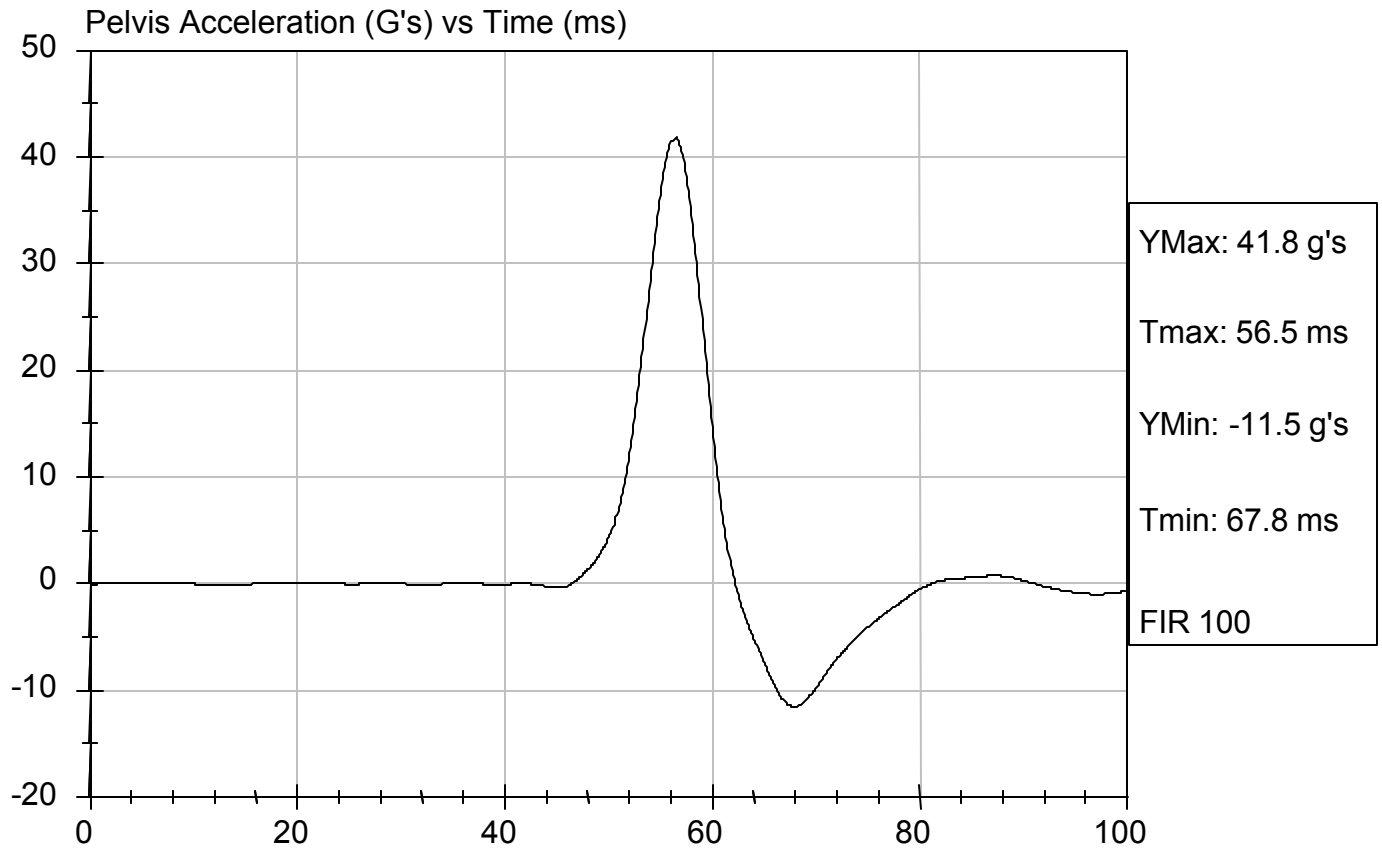
David Winkelbauer
Approved By

9/21/09
Test Date



Test Desc: Pelvis Impact
Component ID: D092353

Test Date: 9/21/09
Speed: 14.12 ft/s, 4.30 m/s



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

ATD Serial No: 272

Test I.D: D092354

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Force At 12.7 mm	N	104 -162	133	Pass
Force At 19 mm	N	163 - 222	184	Pass
Force At 25.4 mm	N	222 - 280	250	Pass
Force At 33 mm	N	325 - 391	339	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

9/21/09
Test Date

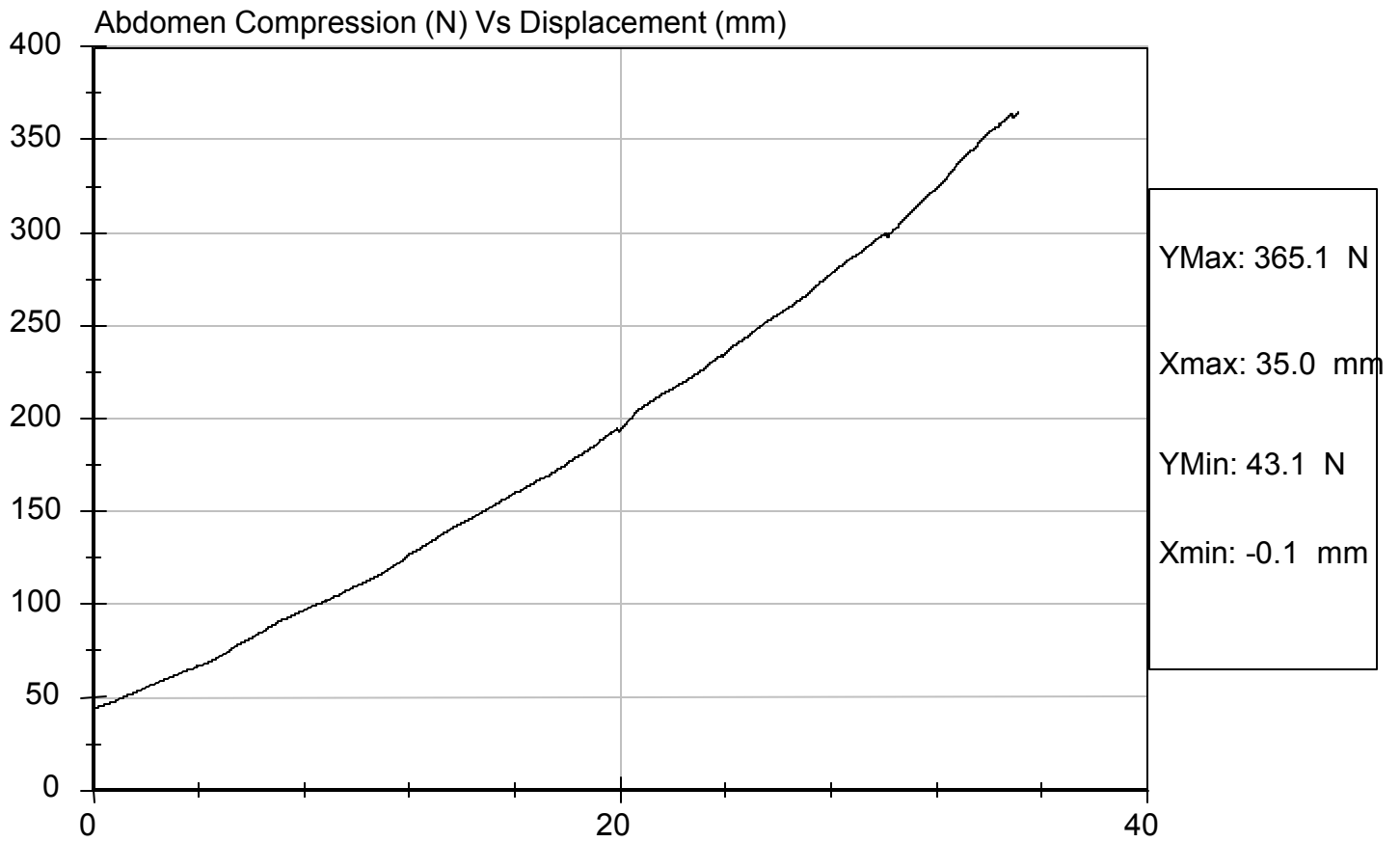
David Winkelbauer
Approved By



Test Description: Abdomen Compression Test Date: 9/21/09

Component: D092354

Speed: 0 ft/s, 0 m/s



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

ATD Serial No: 272

Test I.D: D092355

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	120.9	Pass
Force At 30 deg	N	151.2 - 204.6	168.5	Pass
Force At 40 deg	N	204.6 - 258.0	209.8	Pass
Return Angle	Deg	12 Maximum	4	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

9/21/09
Test Date

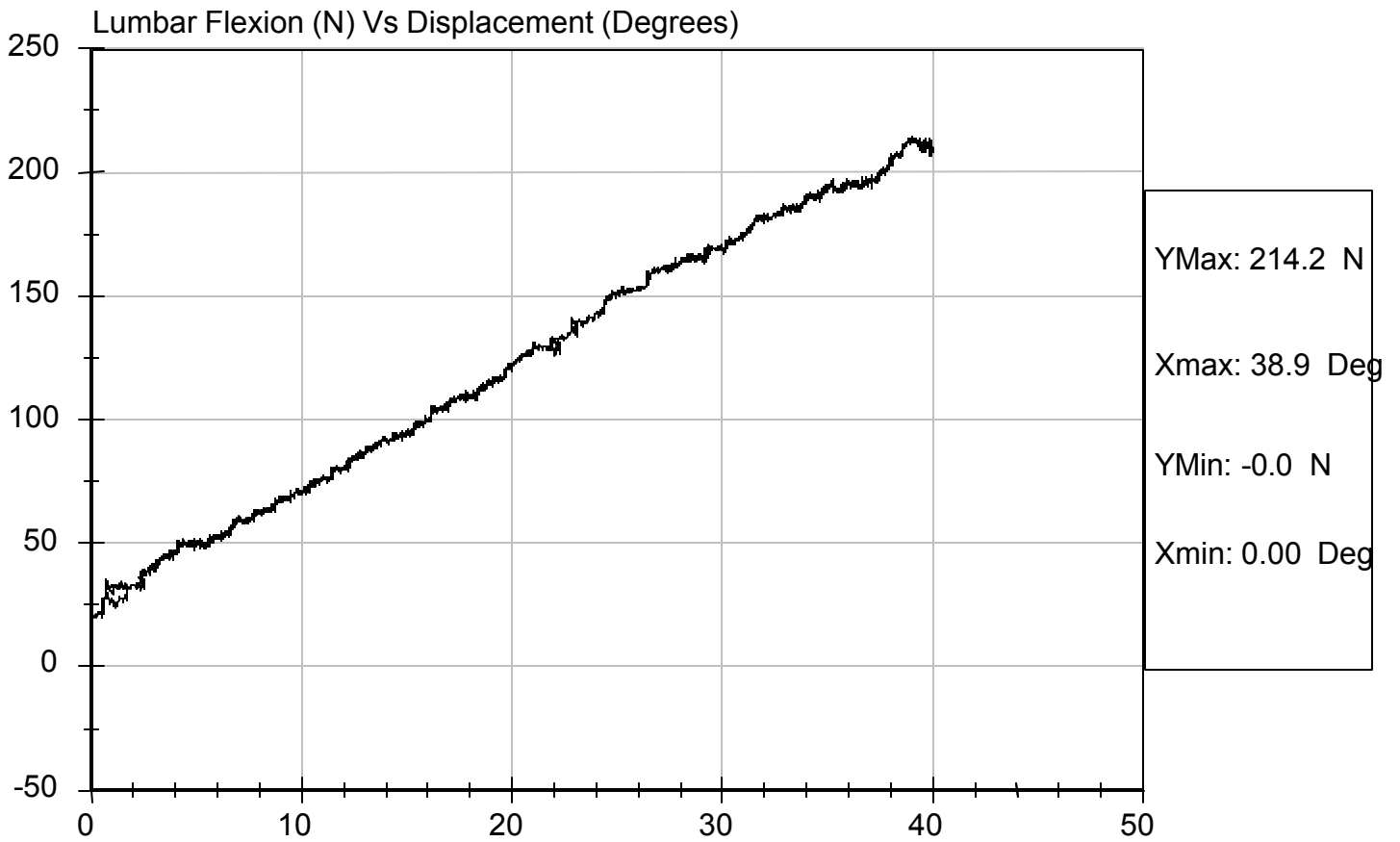


Test Description: Lumbar Flexion

Test Date: 9/21/09

Component: D092355

Speed: 0 ft/s, 0 m/s

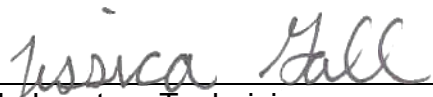


SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 272

Test I.D: D092359

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	52	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.36	Pass
	20 ms	m/s	4.12 to 5.10	4.73	Pass
	30 ms	m/s	5.73 to 7.01	6.52	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.83	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	74	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	60	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	76	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	50	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	5	Pass


 Laboratory Technician

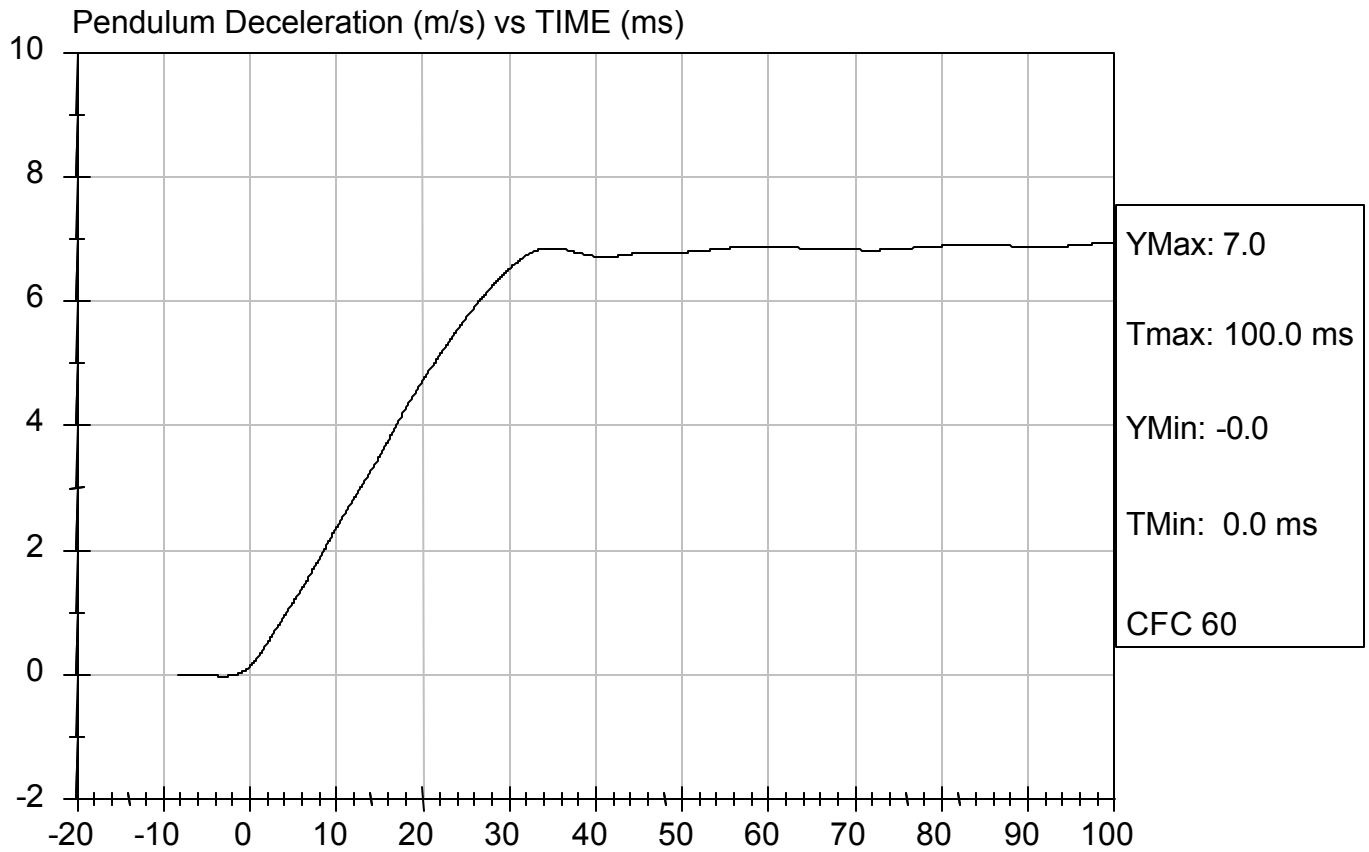

 Approved By

9/21/09
 Test Date



Test Desc: Neck Bending
Component ID: D092359

Test Date: 9/21/09
Speed: 23.15 ft/s, 7.06 m/s

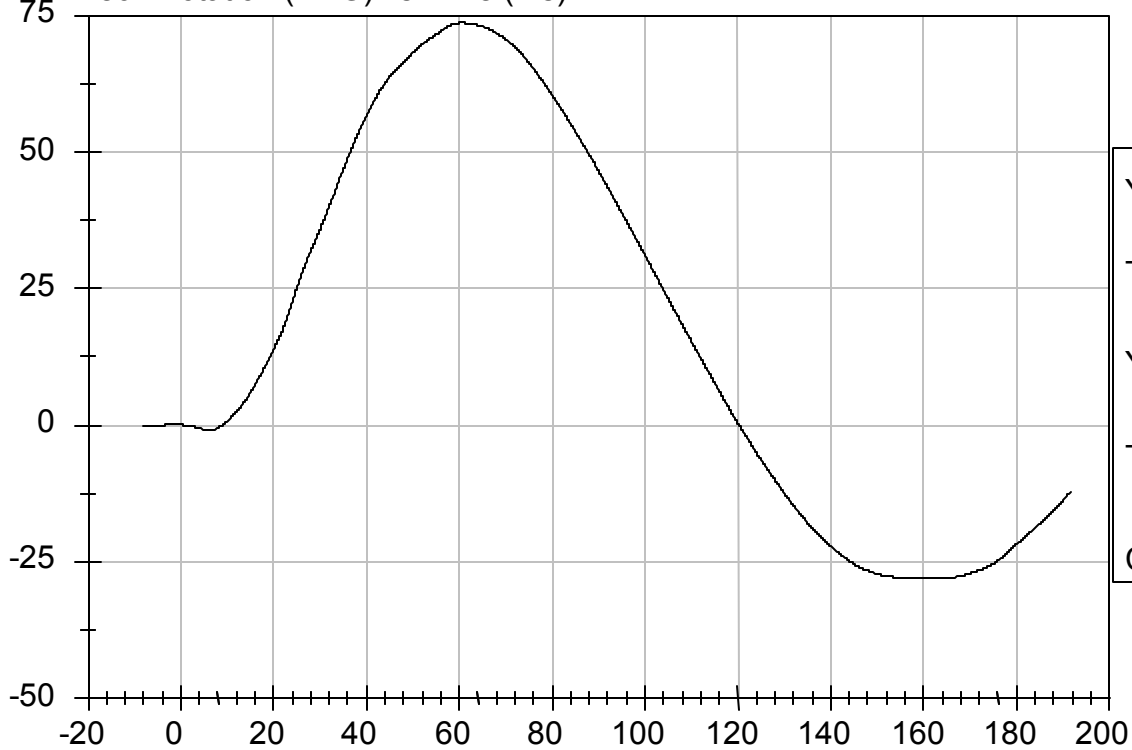




Test Desc: Neck Bending
Component ID: D092359

Test Date: 9/21/09
Speed: 23.15 ft/s, 7.06 m/s

Neck Rotation (DEG) vs Time (ms)



YMax: 73.7

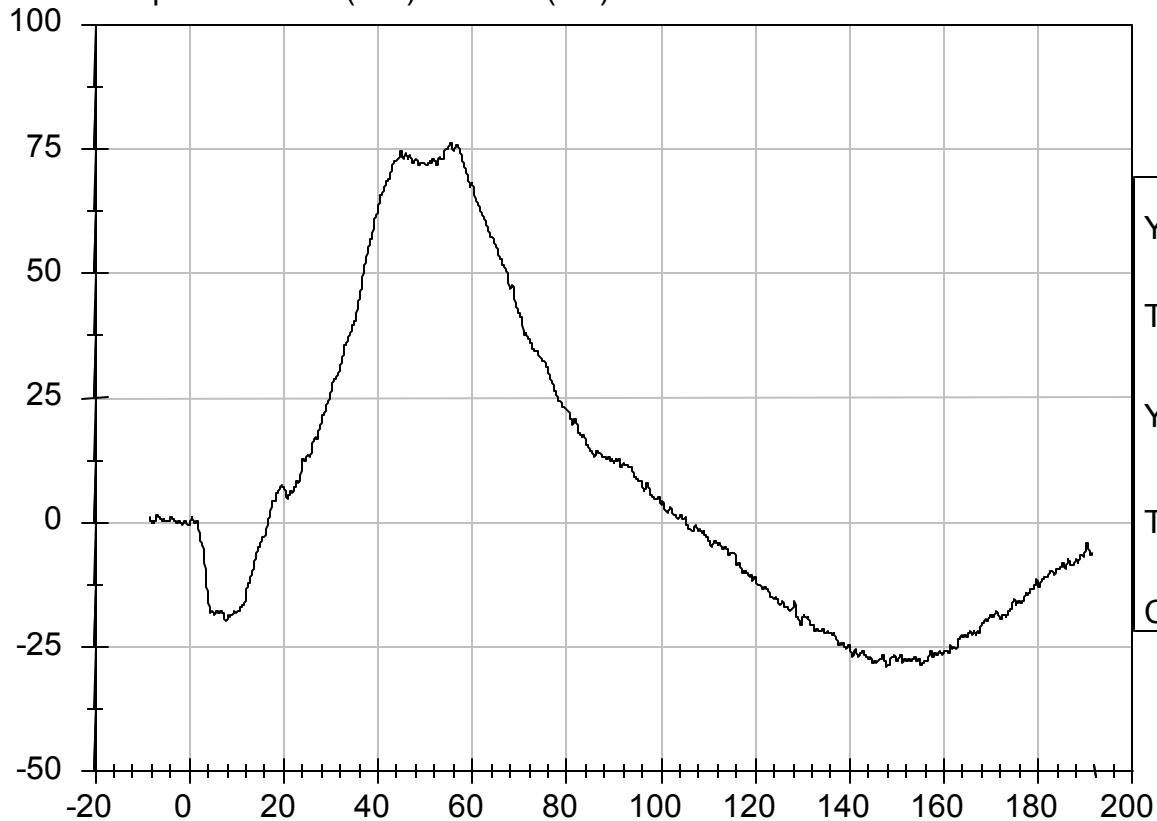
Tmax: 60.7 ms

YMin: -28.0

Tmin: 156.4 ms

CFC 60

Occipital Moment (Nm) vs Time (ms)



YMax: 76.2

Tmax: 55.5 ms

YMin: -28.9

Tmin: 147.9 ms

CFC 600

Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

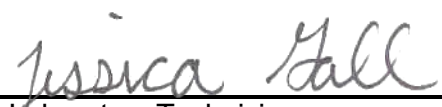
External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis 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: D092431

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	120 to 150	136	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-11.0	Pass
			Overall Test Results	Pass


Laboratory Technician


Approved By

10/2/09
Test Date



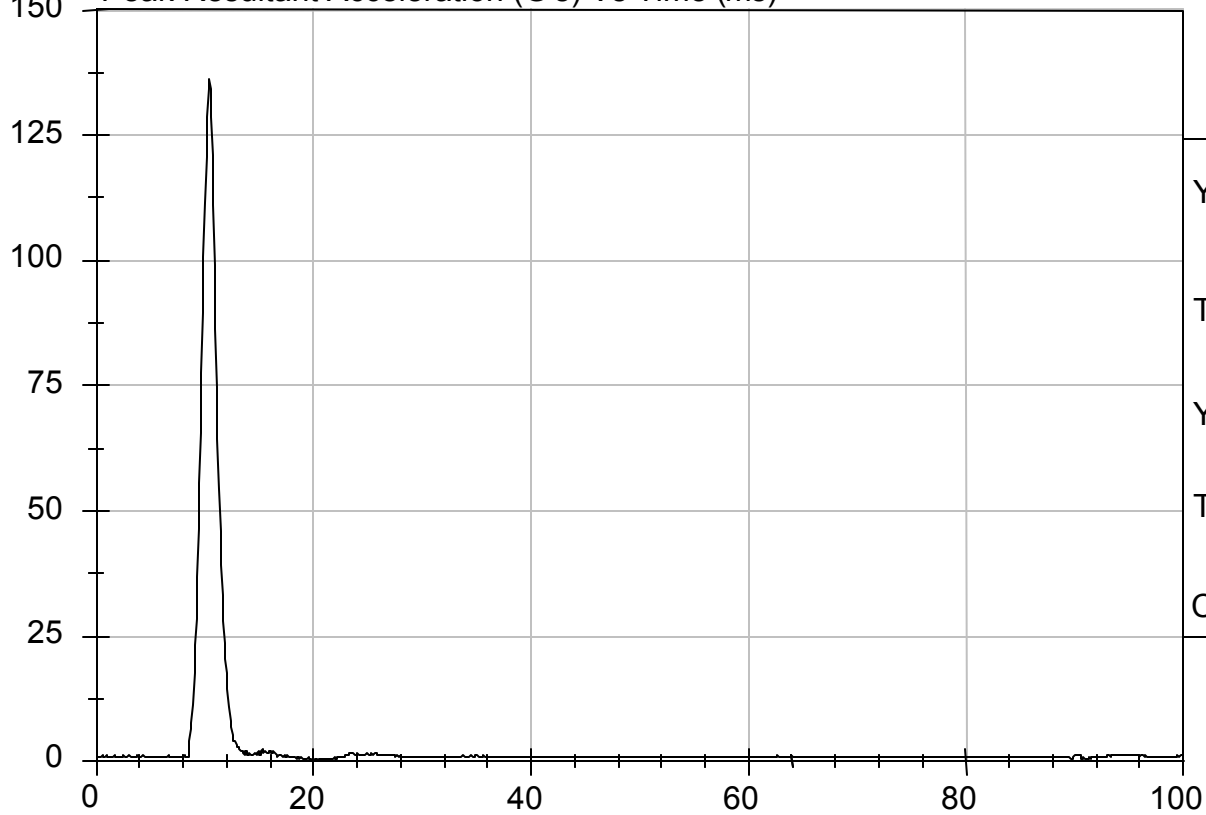
Test Description: Head Drop

Test Date: 10/2/09

Component: D092431

Speed: 0 ft/s, 0 m/s

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



YMax: 136.3 G

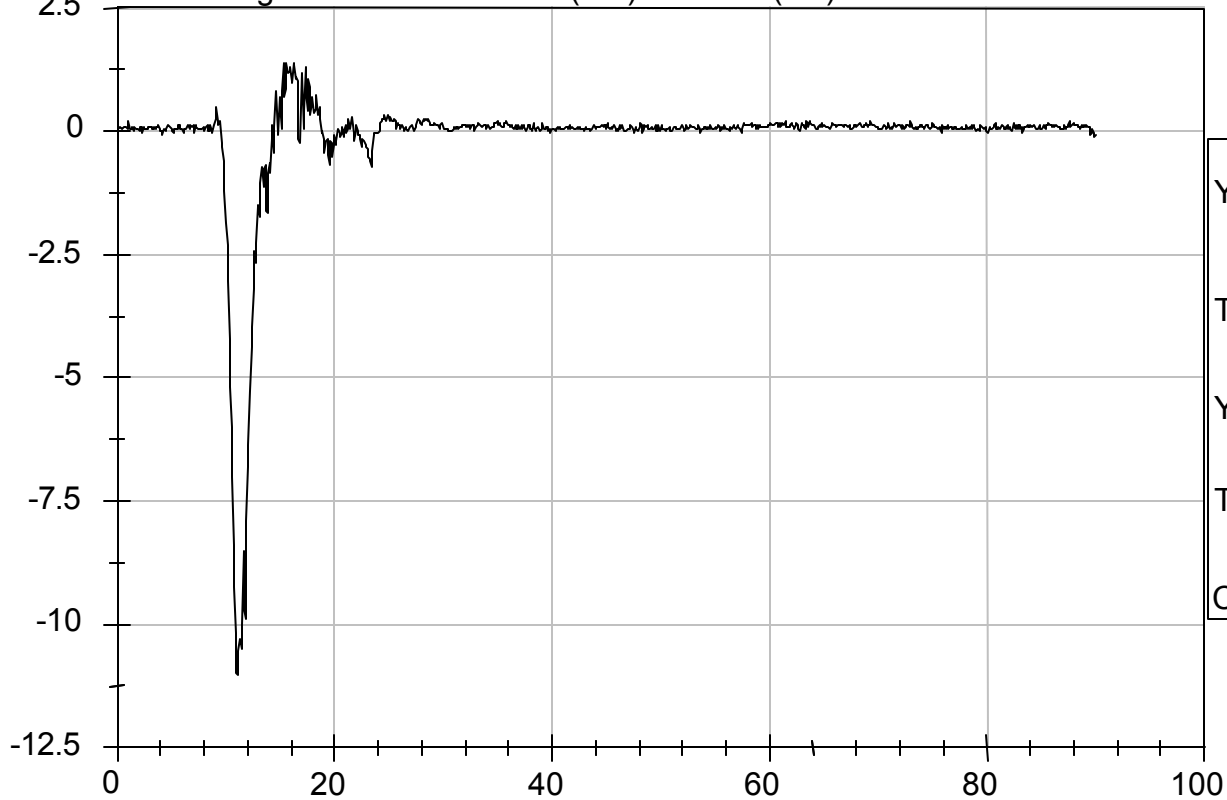
Tmax: 10.4 ms

YMin: 0.2 G

Tmin: 20.0 ms

CFC 1000

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



YMax: 1.4 G

Tmax: 15.3 ms

YMin: -11.0 G

Tmin: 11.1 ms

CFC 1000

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

ATD Serial No: 272

Test I.D: D092432

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	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	40	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

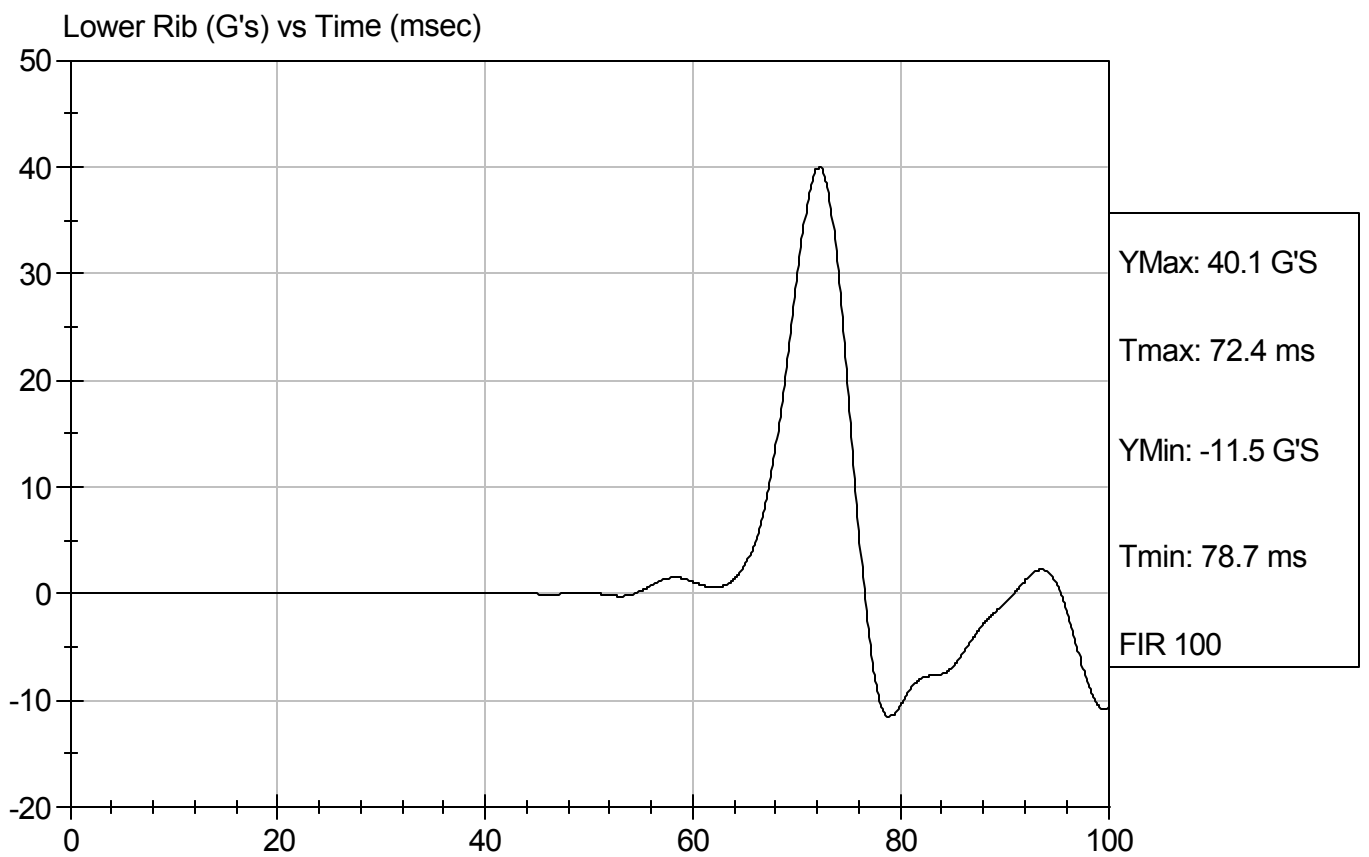
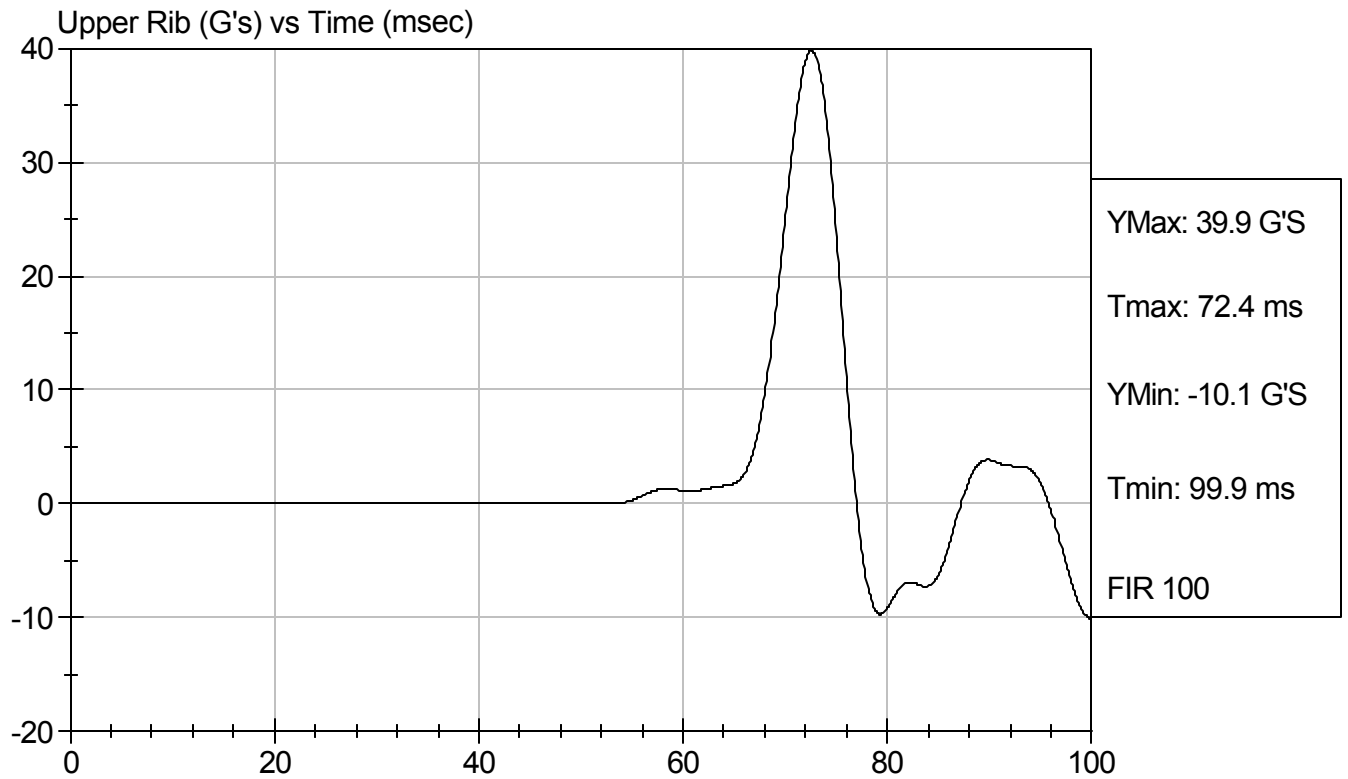
David Winkelbauer
Approved By

10/2/09
Test Date



Test Desc: Thorax Impact
Component ID: D092432

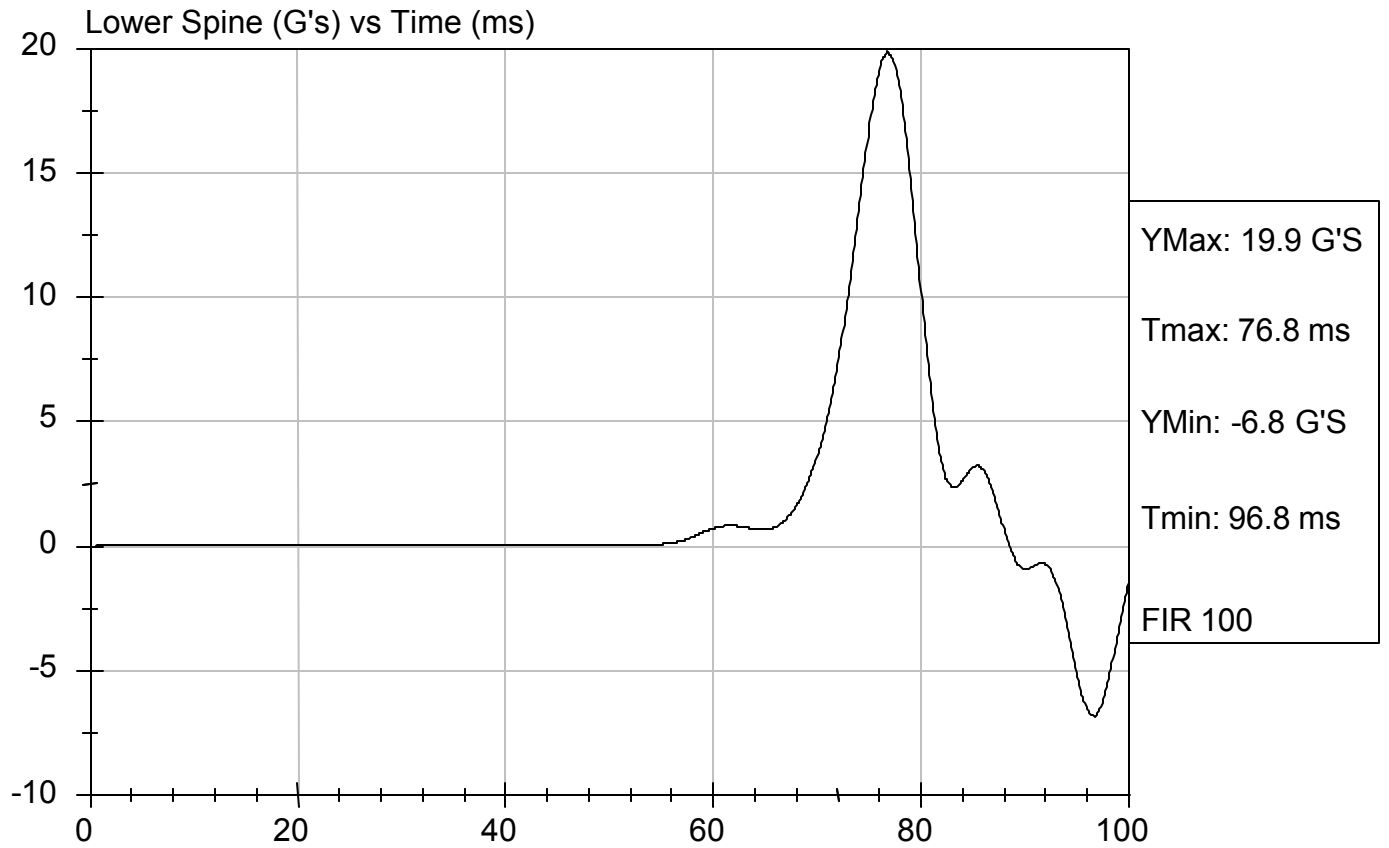
Test Date: 10/2/09
Speed: 14.1 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D092432

Test Date: 10/2/09
Speed: 14.1 ft/sec, 4.30 m/sec



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

ATD Serial No: 272

Test I.D: D092433

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	41	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

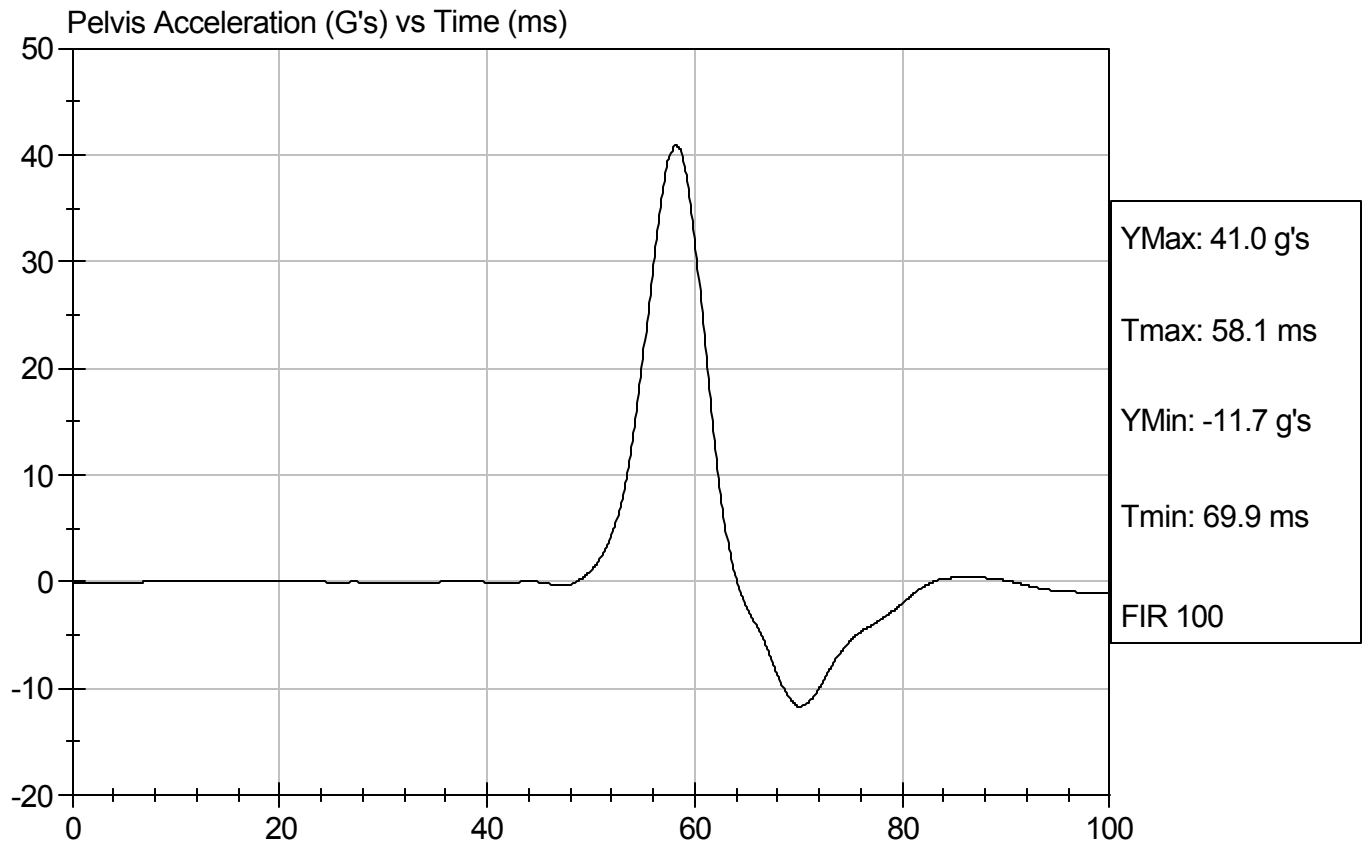
David Winkelbauer
Approved By

10/2/09
Test Date



Test Desc: Pelvis Impact
Component ID: D092433

Test Date: 10/2/09
Speed: 14.1 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: D092434

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Force At 12.7 mm	N	104 -162	135	Pass
Force At 19 mm	N	163 - 222	189	Pass
Force At 25.4 mm	N	222 - 280	260	Pass
Force At 33 mm	N	325 - 391	370	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

David Winkelbauer
Approved By

10/2/09
Test Date

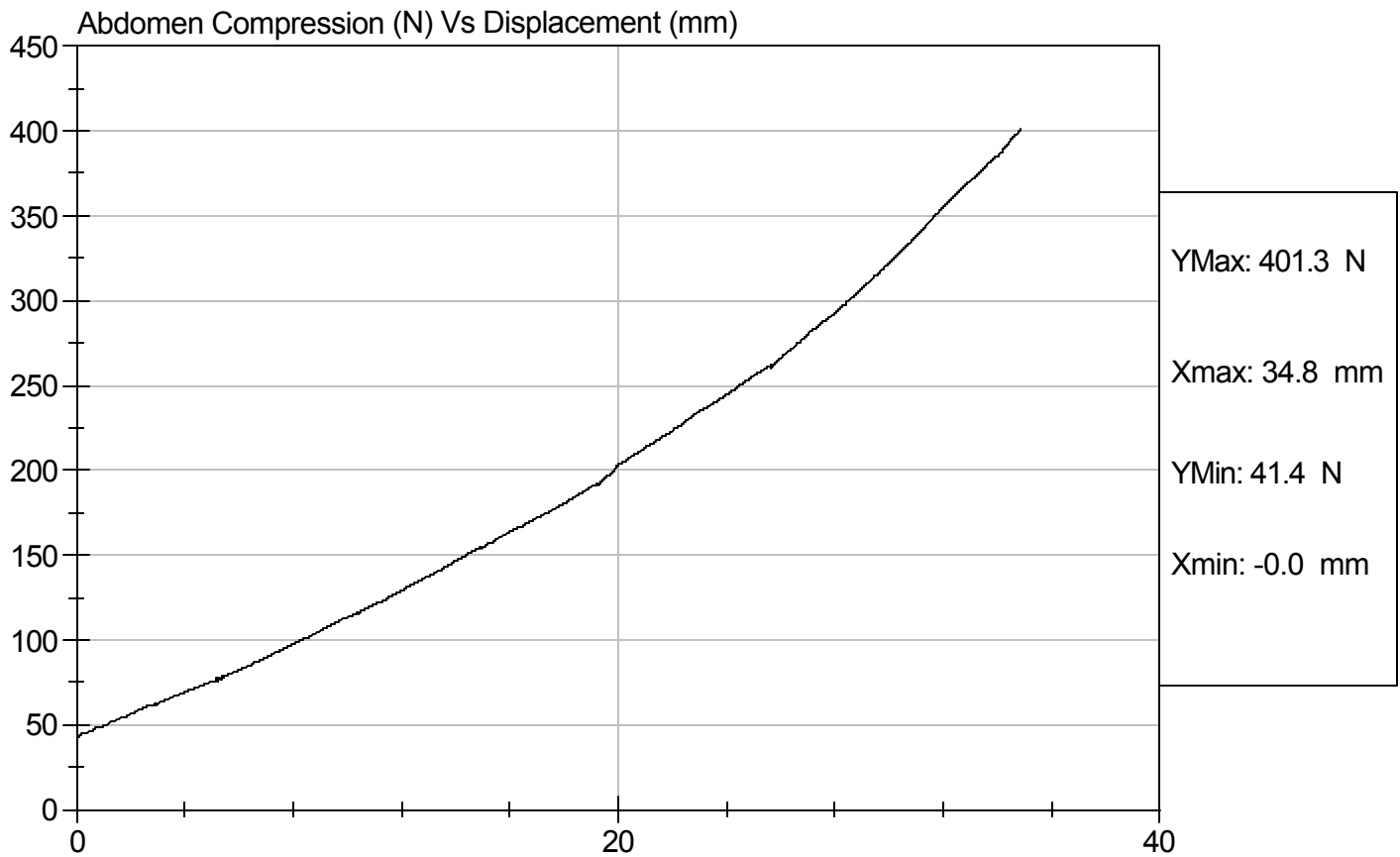


Test Description: Abdomen Compression

Test Date: 10/2/09

Component: D092434

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: D092435

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.9	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	129.2	Pass
Force At 30 deg	N	151.2 - 204.6	175.6	Pass
Force At 40 deg	N	204.6 - 258.0	229.5	Pass
Return Angle	Deg	12 Maximum	3	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

David Winkelbauer
Approved By

10/2/09
Test Date

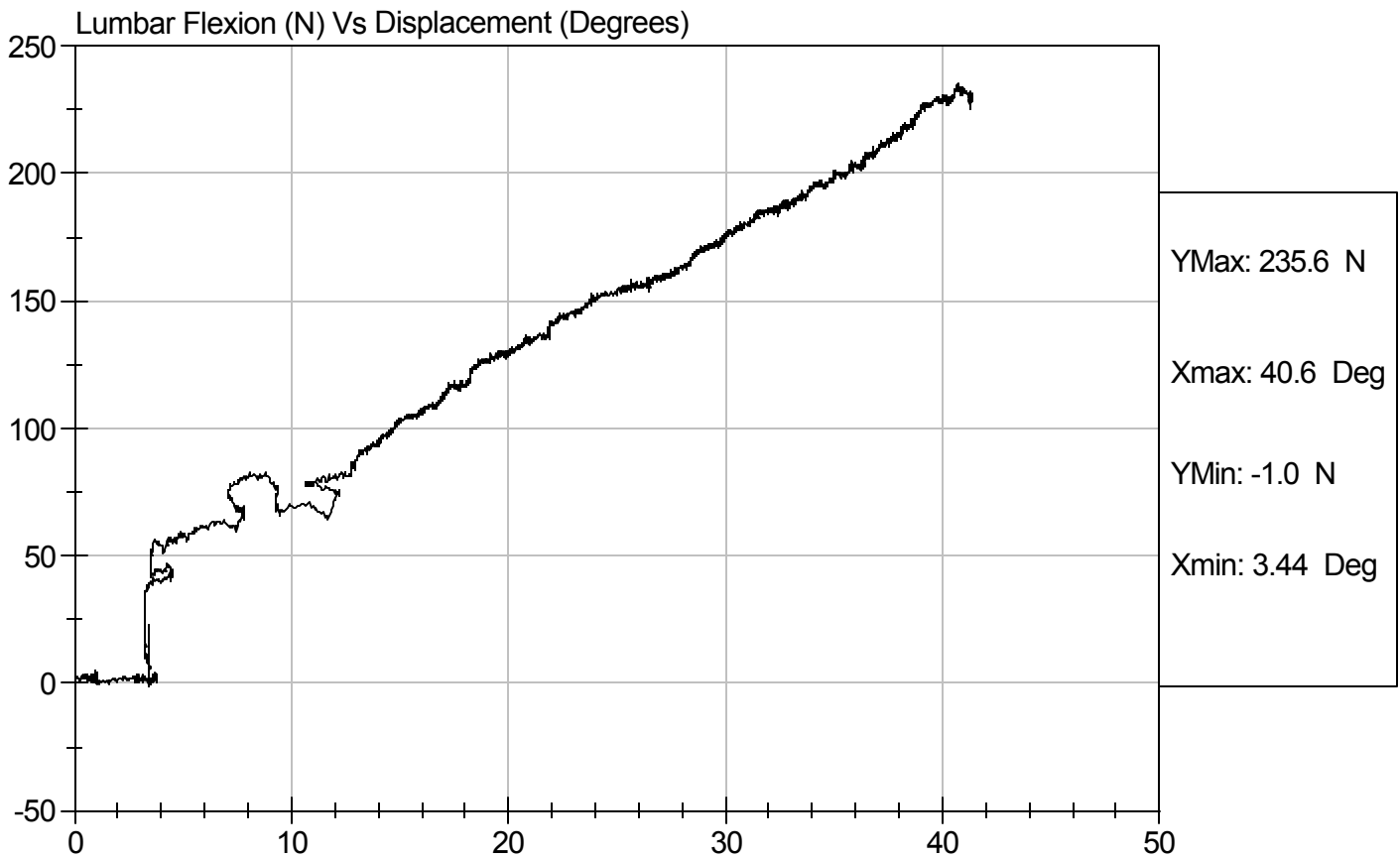


Test Description: Lumbar Flexion

Test Date: 10/2/09

Component: D092435

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: D092439

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.38	Pass
	20 ms	m/s	4.12 to 5.10	4.69	Pass
	30 ms	m/s	5.73 to 7.01	6.61	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.81	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	74	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	77	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	56	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	15	Pass

Jessica Hall
Laboratory Technician

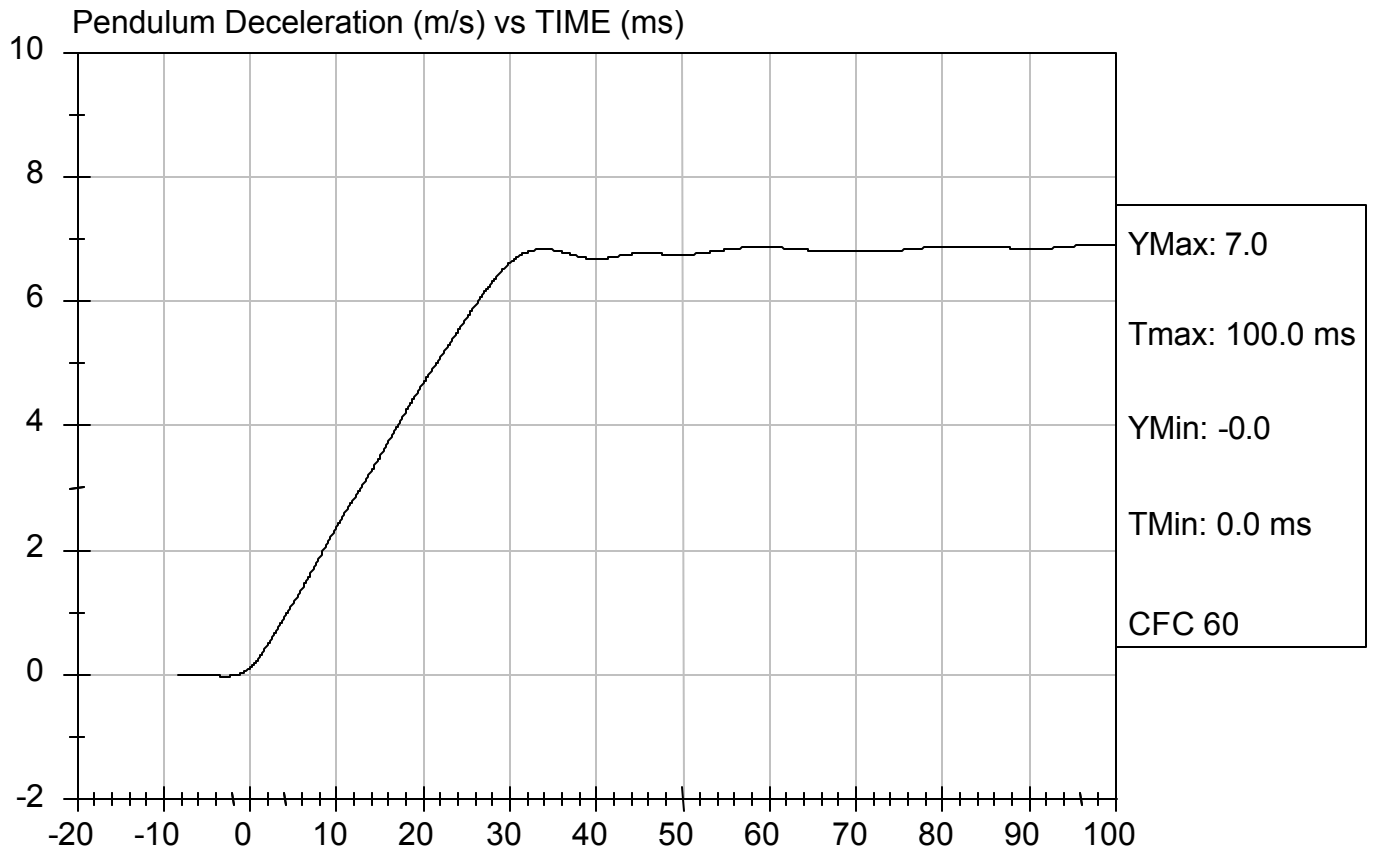
David Winkelbauer
Approved By

10/2/09
Test Date



Test Desc: Neck Bending
Component ID: D092439

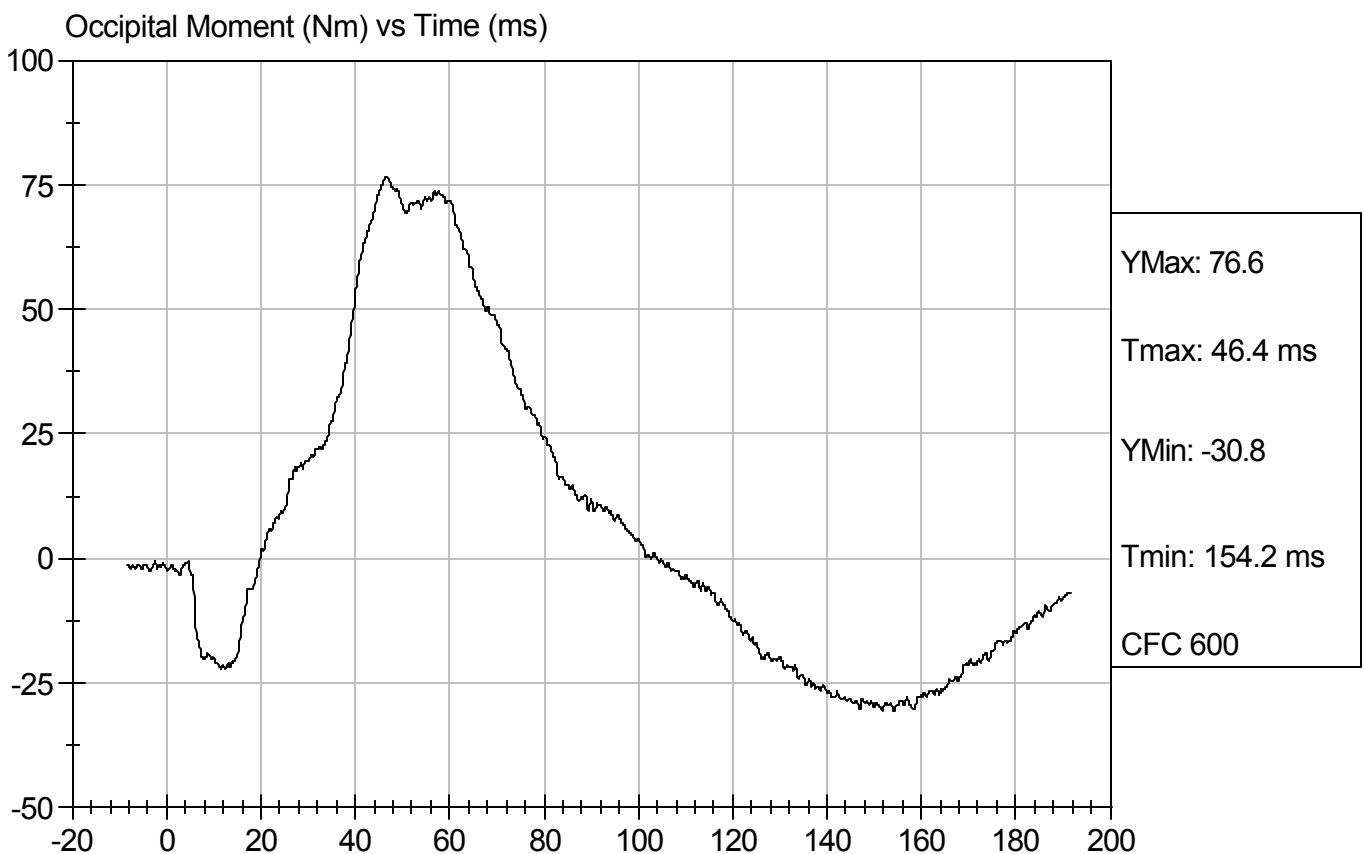
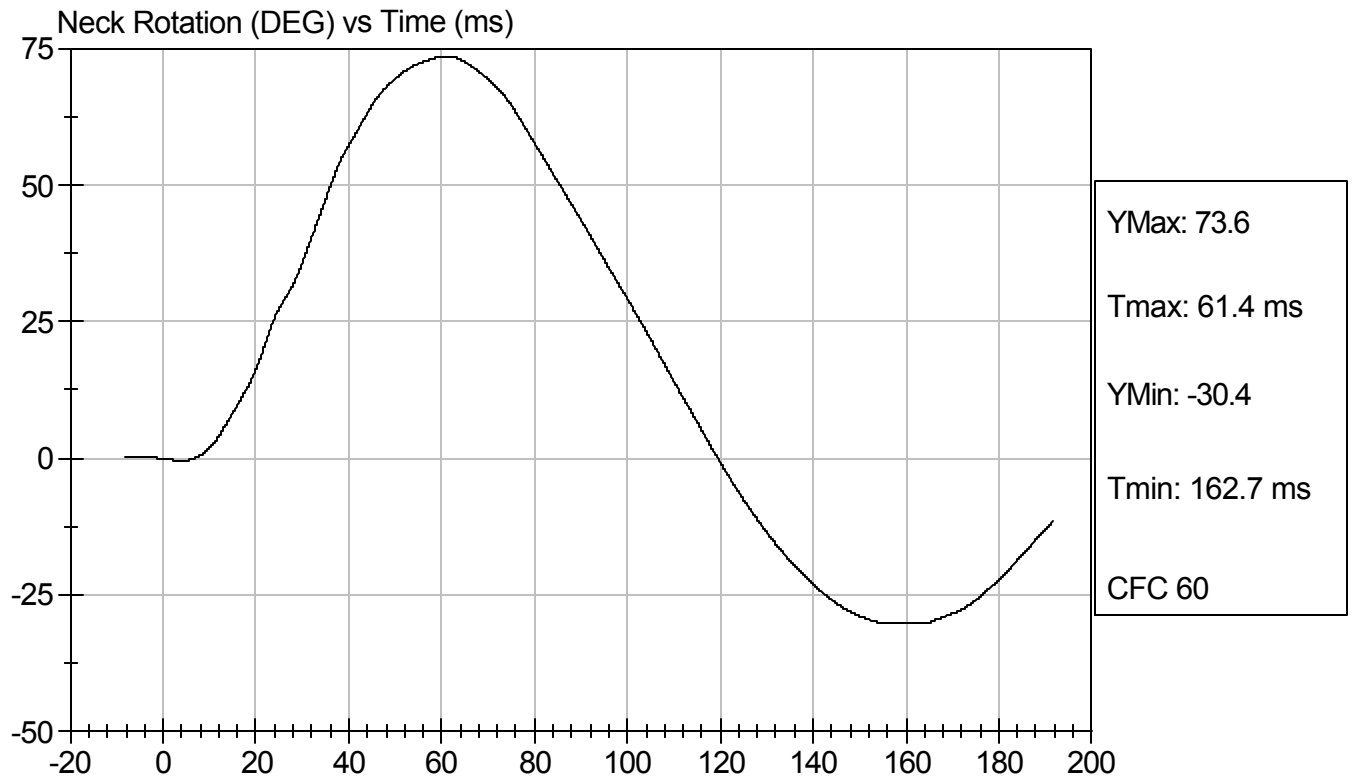
Test Date: 10/2/09
Speed: 23.15 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D092439

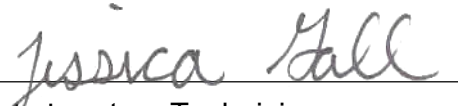
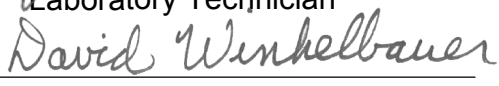
Test Date: 10/2/09
Speed: 23.15 ft/sec, 7.06 m/sec



SID/HIII 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


Laboratory Technician

Approved By

10/2/2009
Test Date