REPORT NUMBER: 214I-MGA-2009-002

SAFETY COMPLIANCE TESTING FOR FMVSS 214 INDICANT SIDE IMPACT PROTECTION

TOYOTA MOTOR MANUFACTURING
2009 TOYOTA VENZA MPV FWD
NHTSA NUMBER: C95106

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

Test Date: January 8, 2009

Report Date: February 4, 2009

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVENUE, SE, ROOM W43-503
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 DTNH22-07-D-00062.

Prepared by:  Date: 2/4/09

Joe Fleck, Project Engineer

Reviewed by:  Date: 2/4/09

Jay Nutting, Project Manager

FINAL REPORT ACCEPTED BY:

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COTR, Side Impact

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Date of Acceptance

Technical Report Documentation Page

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7. Author(s) Joe Fleck, Project Engineer		*8. Performing Organization Report No.* 214I-MGA-2009-002	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-07-D-00062	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement, Office of Vehicle Safety Compliance 1200 New Jersey Ave, SE, Room W43-503, NVS-220 Washington, D.C. 20590		*13. Type of Report and Period Covered: Final Report* 1/08/2009 to 2/4/2009 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier side impact was conducted on the subject 2009 Toyota Venza MPV FWD 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 January 8, 2009. The impact velocity of the Moving Deformable Barrier (MDB) was 62.0 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 274 mm at level 3. The test vehicle's occupant performance is as follows:

	DRIVER	PASS.
Left Upper Rib (LUR) Accel., g	25.0	50.0
Left Lower Rib (LLR) Accel., g	29.8	51.2
Lower Spine (T_{12}) Accel., g	37.8	53.0
Thoracic Trauma Index (TTI)	34	52
Pelvis (PEV) Accel., g	59.9	73.6
HIC	105	416

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.

17. Key Words FMVSS 214 Indicant 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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Form DOT F1700.7 (8-72)

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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the FY' 2009 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-07-D-00062. The purpose of this test was to evaluate side impact protection in a 2009 Toyota Venza MPV FWD manufactured by Toyota Motor Manufacturing.

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 FMVSS 214 INDICANT TEST

A model year 2009 Toyota Venza MPV FWD 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 62.0 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 1952.7 kg and the test weight of the MDB was 1361.5 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on January 8, 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 274 mm at level 3, 900 mm rearward of the vertical impact point. The driver and passenger SID/HIIIs, Serial Numbers 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	105	43.4	75.7	34	59.9
Passenger	416	58.5	66.9	52	73.6

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:

Left Rear Sill Y
Left Front Sill Y

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

TEST VEHICLE INFORMATION

Make	Toyota
Model	Venza
Body Style	MPV
NHTSA No.	C95106
VIN	4T3ZK11A49U002096
Color	Aloe Green Metallic
Delivery Date	12/22/08
Odometer Reading (mile)	36
Dealer	Mid-State Toyota
Transmission	Automatic
Final Drive	Front
Number of Cylinders	6
Engine Displacement (L)	3.5
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	Yes
Pretensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Kentucky, Inc.
Date of Manufacture	11/08

GVWR (kg)	2310
GAWR Front (kg)	1400
GAWR Rear (kg)	1270

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				374
Cargo Wt. (RCLW) (kg)				34

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	511.2	377.4		559.7	462.2	
Right	kg	510.8	364.7		515.7	415.1	
Ratio	%	57.9	42.1		55.1	44.9	
Totals	kg	1022.0	742.1	1764.1	1075.4	877.3	1952.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1764.1
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	34
Calculated Vehicle Target Weight (TVTW)	kg	1959.6

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

Weight of Ballast in Spare Tire Well: 0 kg

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	810	810	832	834	1166
As Tested	mm	805	809	818	820	1245
Fully Loaded	mm	802	803	816	818	

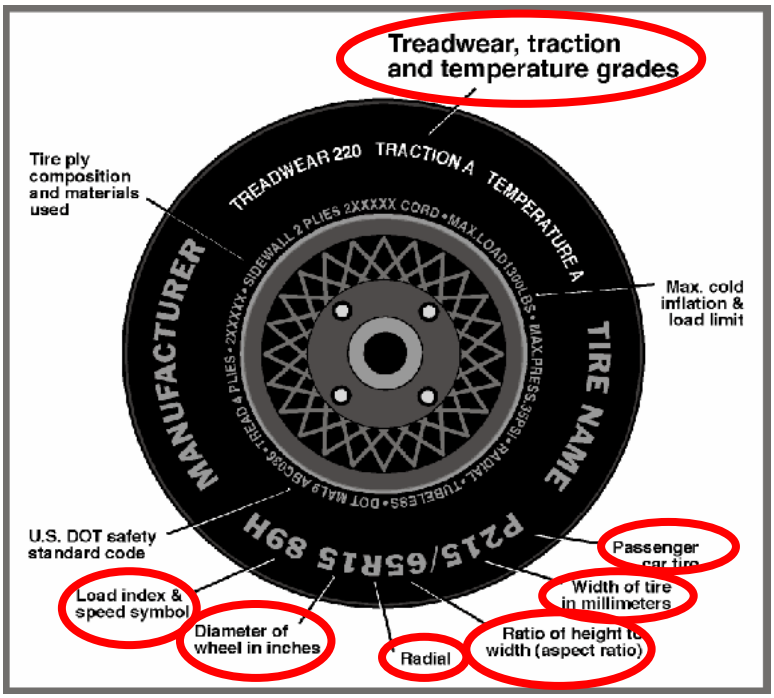
TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2772
Target Impact Point Aft of Front Axle	mm	446
Actual Impact Point Aft of Front Axle	mm	431

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold / Test Pressure (kPa)	220	220
Recommended Tire Size	P245/50R20	P245/50R20
Tire Size on Vehicle	P245/50R20	P245/50R20
Tire Manufacturer	Michelin	Michelin
Tire Name	Latitude	Latitude
Tire Type	Passenger	Passenger
Tire Width (mm)	245	245
Ratio of Height to Width (aspect ratio)	50	50
Radial	R	R
Wheel Diameter	20	20
Load Index & Speed Symbol	120H	120H
Treadwear	440	440
Traction Grade	A	A
Temperature Grade	A	A

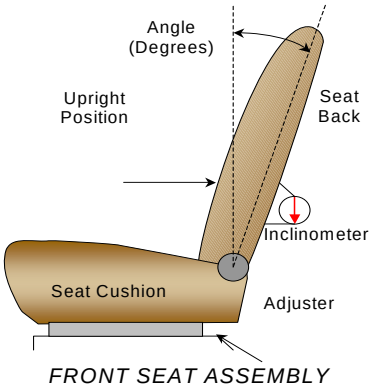
DATA SHEET NO. 3

TEST VEHICLE INFORMATION

Test Vehicle:	2009 Toyota Venza MPV FWD	NHTSA No.	C95106
Test Program:	FMVSS 214 Indicant	Test Date:	1/08/2009

NORMAL 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, set the seat back angle at 3 degrees (measured from upright position). For the rear passenger, set the seat back in the 2nd detent (forward-most detent as 0).

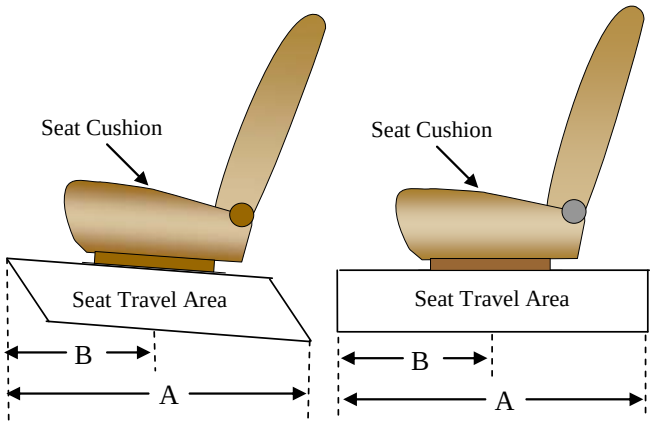


Driver seat back angle: 2.9 degrees (on headrest post)

Passenger seat back angle: 2nd detent (forward-most as 0)

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	268 mm	134 mm
Rear Seat	Fixed	Fixed



DATA SHEET NO. 3 (CONTINUED)

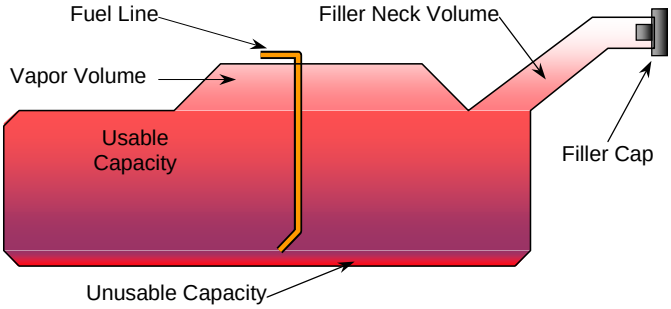
TEST VEHICLE INFORMATION

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	67.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	61.6 to 63.0
Actual Amount of Solvent used	62.5
1/3 of Usable Capacity	22.3

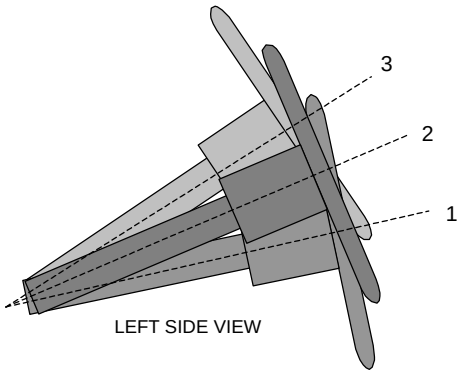
The test vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel when the ignition switch is on.



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	0	63.8
Geometric center position No. 2	20	65.8
Uppermost position No. 3	40	67.8

DATA SHEET NO. 4

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

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	62.0
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.1
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	15 forward
Vertical Offset	mm	+/-20	3 down

DATA SHEET NO. 5

POST TEST OBSERVATIONS

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

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, Headrest
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 door was unlocked	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	Cracked
Window Damage	Left Front Window Broke
Other Notable Effects	None

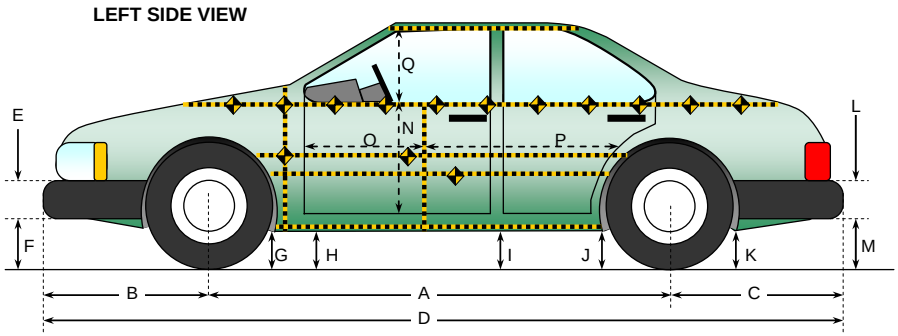
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



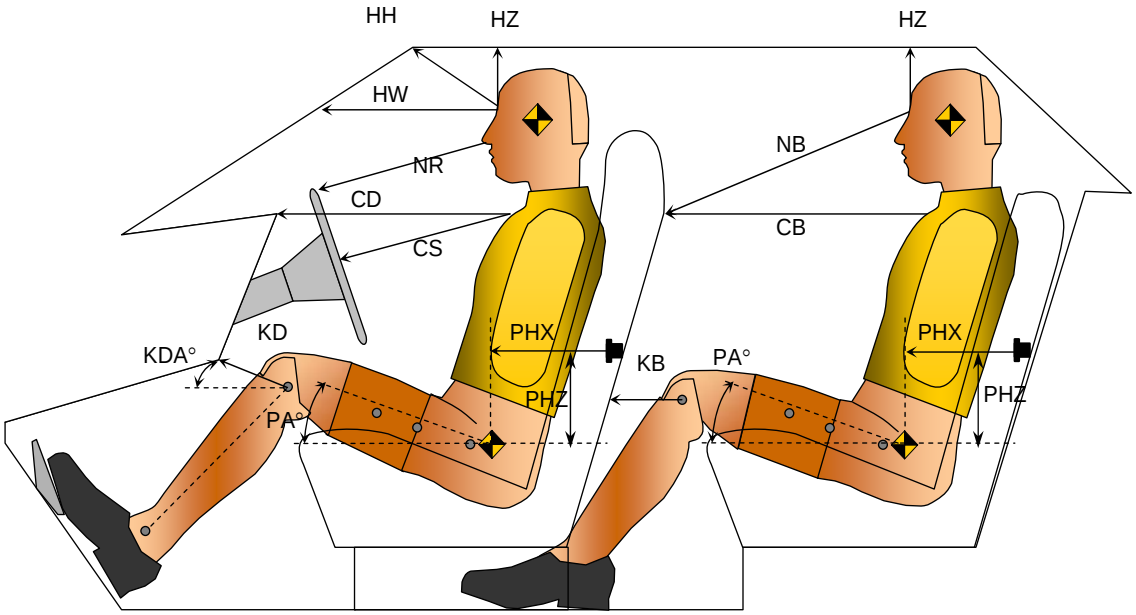
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2772	2754	18
B	Front Axle to FSOV	991	962	29
C	Rear Axle to RSOV	1041	1085	-44
D	Total Length at Centerline	4804	4801	3
E	Front Bumper Thickness	184	184	0
F	Front Bumper Bottom to Ground	235	198	37
G	Sill Height at Front Wheel Well	230	190	40
H	Sill Height at Front Door Leading Edge	218	197	21
I	Sill Height at "B" Pillar	220	202	18
J1	Sill Height at Rear Wheel Well	213	197	16
J2	Pinch Weld Height at Rear Wheel Well	220	206	14
K	Sill Height Aft of Rear Wheel Well	278	258	20
L	Rear Bumper Thickness	205	205	0
M	Rear Bumper Bottom to Ground	338	337	1
N	Sill Height to Window Bottom Sill	873	782	91
O	Front Door Leading Edge to Impact CL	778	750	28
P	Rear Door Trailing Edge to Impact CL	1121	1005	116
Q	Front Window Opening	442	430	12
R	Right Side Length	3634	3631	3
S	Left Side Length	3634	3601	33
T	Vehicle Width at "B" Post	1901	1742	159

DATA SHEET NO. 7

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

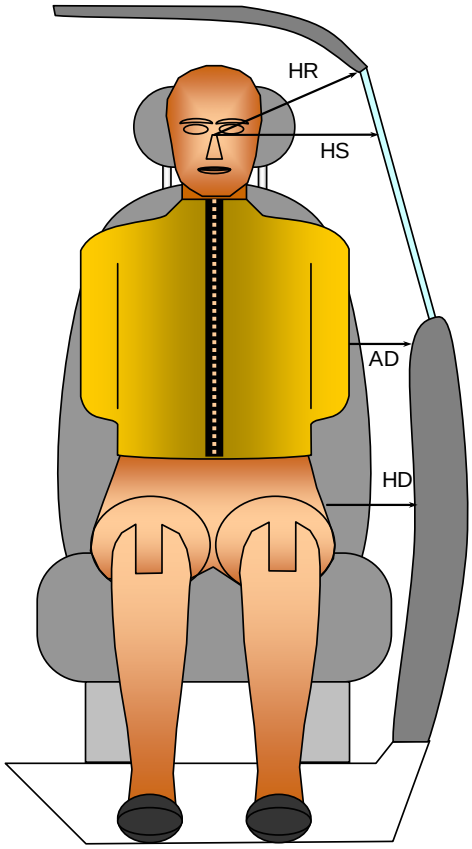


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 272	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	386			
HW		Head to Windshield	716			
HZ	HZ	Head to Roof	188		173	
NR	NB	Nose to Rim/Nose to Seatback	456		709	
CD	CB	Chest to Dash or Seatback	534		614	
CS		Chest to Steering Wheel	348			
KDL	KBL	Left Knee to Dash or Seatback	182	31.2	300	35.1
KDR	KBR	Right Knee to Dash or Seatback	156	30.7	301	36.4
PA	PA	Pelvic Angle		23.5		23.5
PHX	PHX	H-Point to Striker (X-Axis)	219		216	
PHZ	PHZ	H-Point to Striker (Z-Axis)	237		10	

DATA SHEET NO. 8

SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



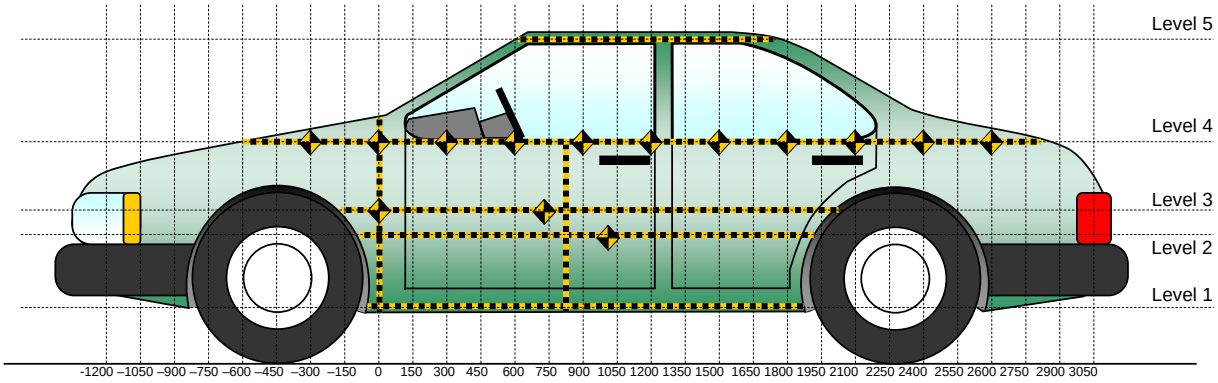
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 272
HR	Head to Side Header	mm	210	201
HS	Head to Side Window	mm	364	241
AD	Arm to Door	mm	153	123
HD	H-Point to Door	mm	154	172

DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



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	24	1350	1542
4	Window Sill	103	1200	1078
3	Mid Door	274	900	681
2	Occupant H-Point	252	1650	624
1	Sill Top	220	1200	385
	Maximum Penetration	274		

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900				284					288					4	
-750				268					274					6	
-600				253					264					11	
-450				247					262					15	
-300				241					264					23	
-150				235					258					23	
0	179	152	149	231		251	214	209	258		72	62	60	27	
150	186	156	152	228		369	361	352	256		183	205	200	28	
300	192	158	152	224		392	387	403	298		200	229	251	74	
450	193	157	152	223		395	399	413	302		202	242	261	79	
600	194	158	151	218		398	408	420	301		204	250	269	83	
750	195	160	152	220	459	398	402	417	304	478	203	242	265	84	19
900	195	161	154	219	454	394	410	428	311	475	199	249	274	92	21
1050	195	166	157	221	453	397	406	418	308	474	202	240	261	87	21
1200	196	170	161	221	452	416	394	400	324	475	220	224	239	103	23
1350	196	174	166	222	453	410	415	433	318	477	214	241	267	96	24
1500	196	179	170	226	453	400	430	442	316	476	204	251	272	90	23
1650	196	177	172	229	453	379	429	438	305	475	183	252	266	76	22
1800	189	164	163	232	455	321	378	382	292	476	132	214	219	60	21
1950		157	154	240	460		238	254	275	478		81	100	35	18
2100				244	464				261	485				17	21
2250				251	470				281	490				30	20
2400				258	480				282	496				24	16
2550				269	490				289	504				44	14
2700				282	503				309	513				27	10
2850				304					316					12	
3000				329					332					3	

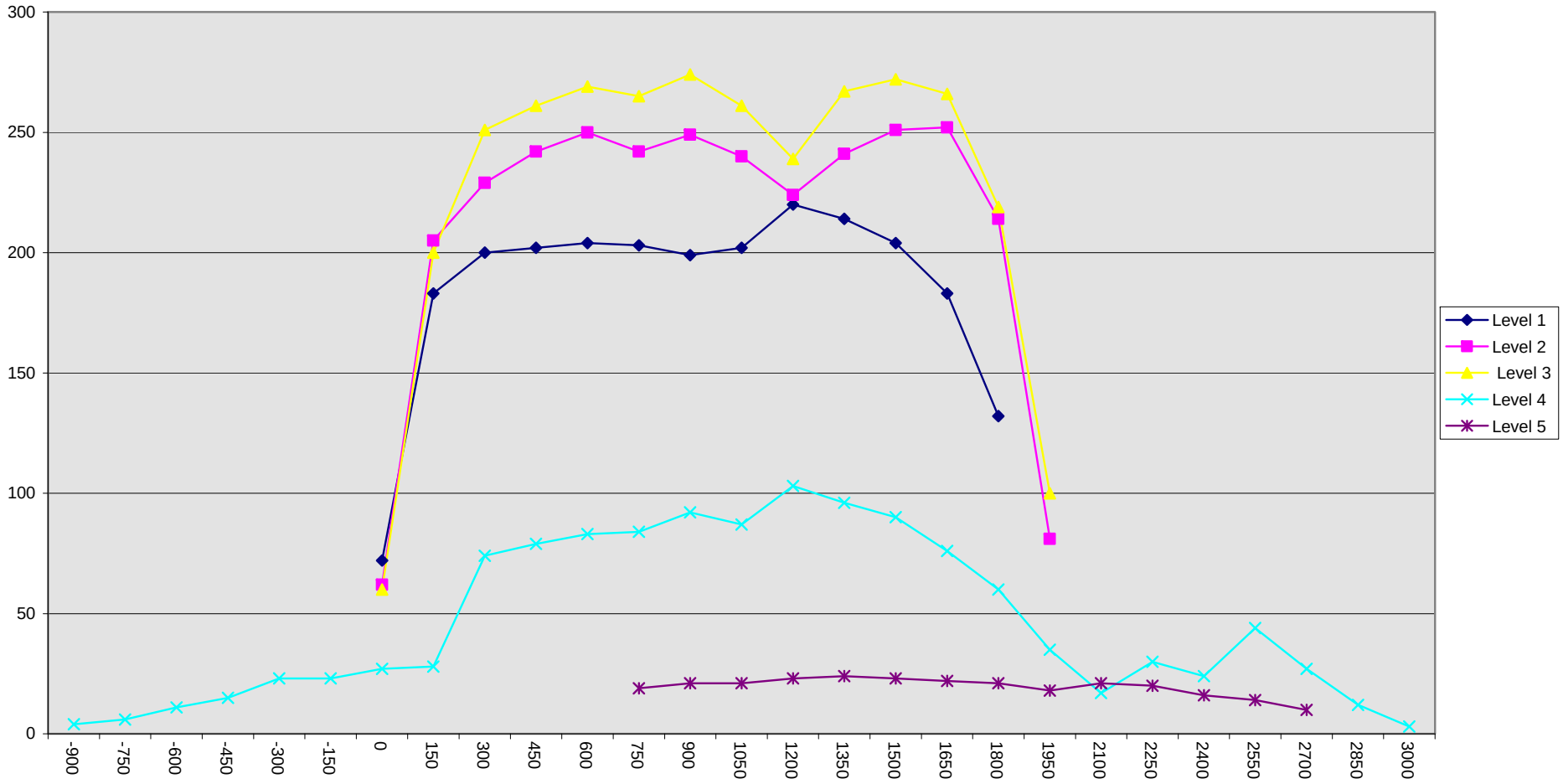
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

DATA SHEET NO. 10... (continued)

VEHICLE EXTERIOR CRUSH PROFILES

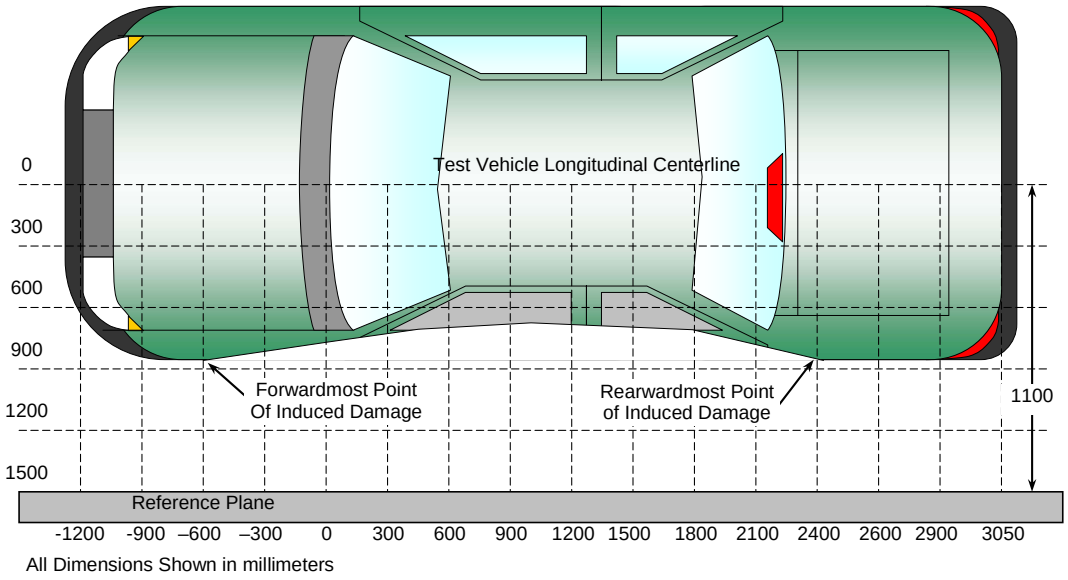
Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



TOP VIEW

DAMAGE PROFILE DISTANCES

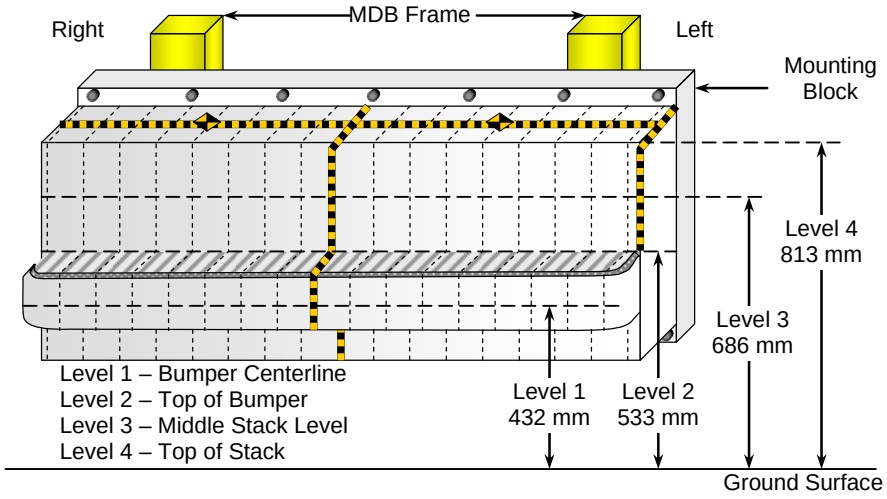
DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	3000	4	329	332	3
2	2215	4	248	278	30
3	1421	2	185	447	262
4	635	2	175	440	265
5	-125	4	235	256	21
6	-900	4	284	288	4

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 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



DEFORMABLE BARRIER STATIC CRUSH

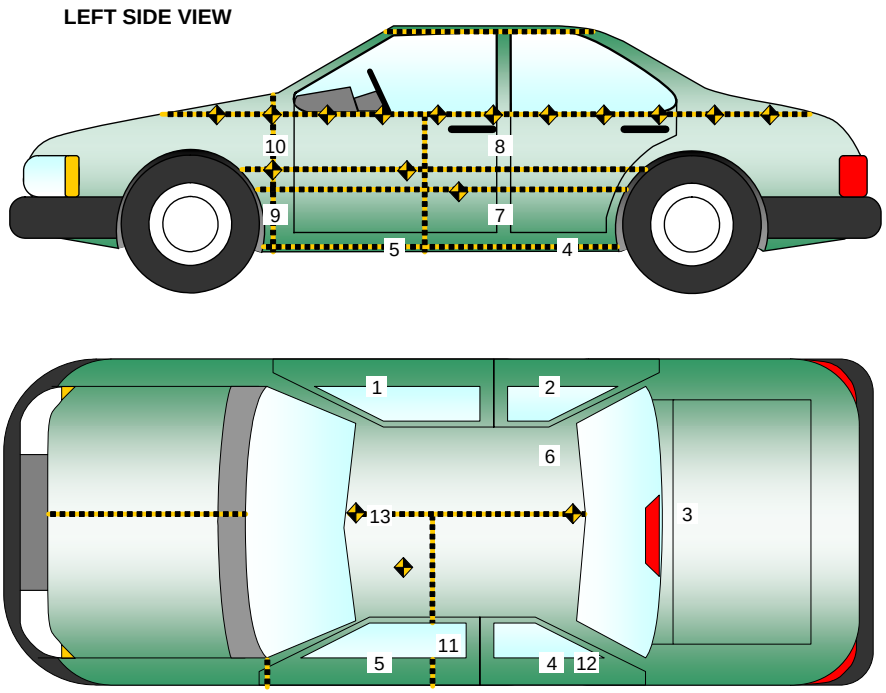
Stack Level	Distance Right of Center								C_L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	170	166	155	151	140	137	137	133	134	129	129	127	131	130	129	139	143
2	95	89	81	70	66	56	51	48	49	52	55	54	57	53	56	60	79
3	30	19	13	21	21	38	50	30	12	10	11	13	13	20	30	49	99
4	27	16	15	21	34	59	80	84	51	31	26	29	33	44	64	90	145

All Dimensions in mm

DATA SHEET NO. 13

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



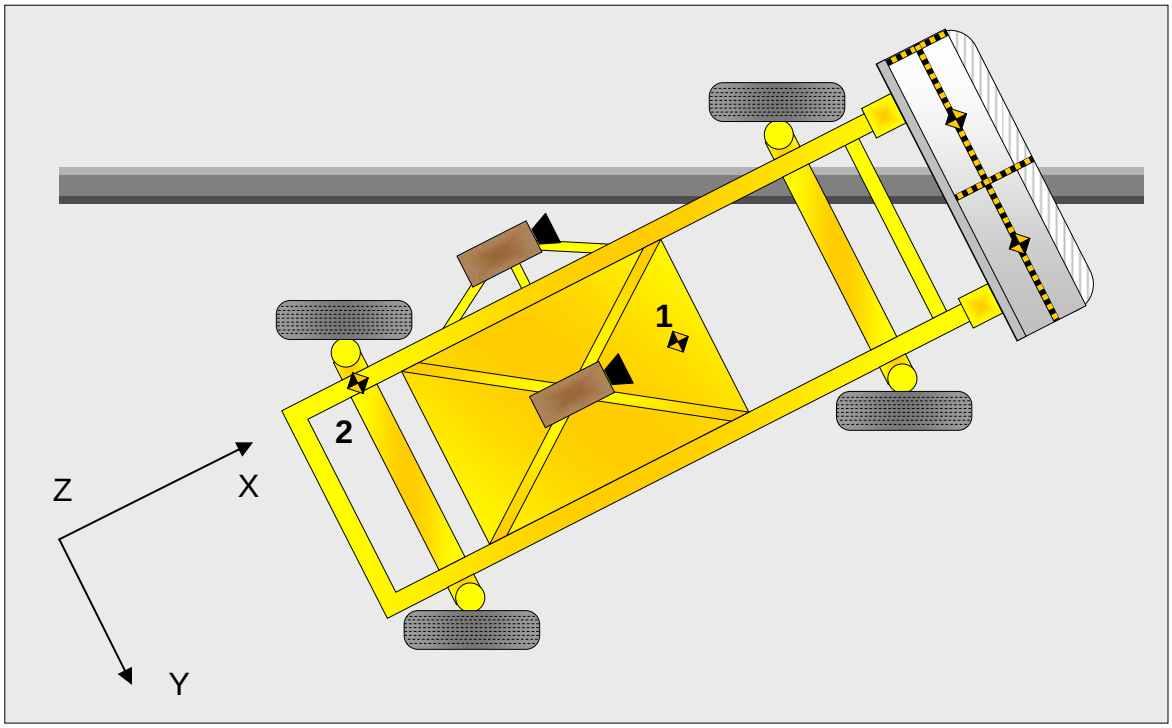
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2574	763	-255
2	Right Sill at Rear Seat	1737	762	-262
3	Rear Floorpan Above Axle	915	0	-606
4	Left Sill at Rear Door	1759	-762	-256
5	Left Sill at Front Door	2636	-763	-253
6	Rear Occupant Compartment	1864	-355	-437
7	Left Lower B-Post	2293	-766	-609
8	Left Middle B-Post	2295	-755	-848
9	Left Lower A-Post	3253	-762	-597
10	Left Middle A-Post	3274	-870	-850
11	Front Seat Track	2374	-572	-412
12	Rear Seat Track or Structure			
13	Vehicle CG	1912	0	-416

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 Toyota Venza MPV FWD
Test Program: FMVSS 214 Indicant
NHTSA No. C95106
Test Date: 1/08/2009



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1092	0	-483
2	MDB Rear	-2591	-625	-622

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

DATA SHEET NO. 15

VEHICLE STRUCTURAL MEASUREMENTS

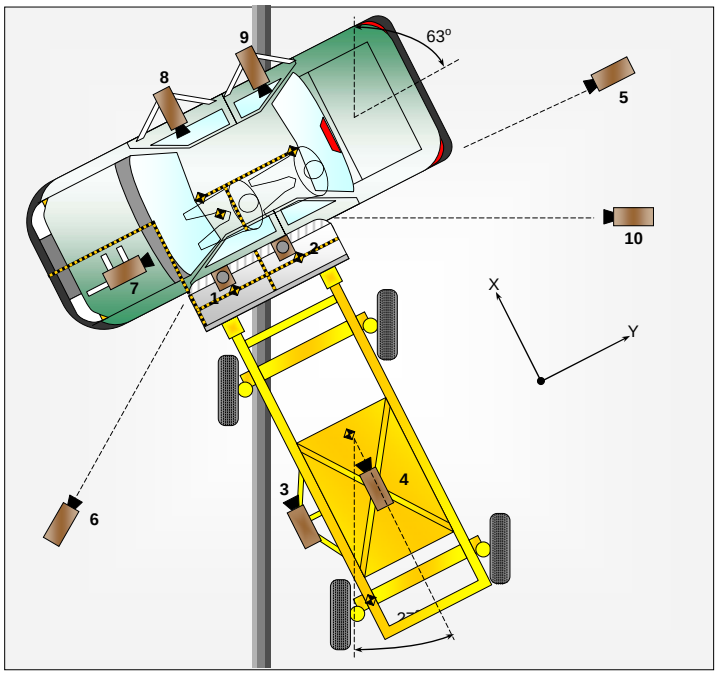
Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

	Elements	Pre-Test (mm)
1	Total Length	4804
2	Total Width	1901
3	Bumper Top Height	628
4	Bumper Bottom Height	450
5	Longitudinal Member Top Height	640
6	Distance between Longitudinal Members	930
7	Longitudinal Member Width	92
8	Engine Top Height	975
9	Engine Bottom Height	226
10	Engine and gearbox width	880
11	Front bumper-engine distance	482
12	Front shock absorber fixing height	1024
13	Bonnet leading edge height	798
14	Front shock absorber fixing width	1230
15	Front bumper – front axle distance	991
16	Front axle – a pillar distance	497
17	A-pillar – B-pillar distance	1126
18	B-Pillar – rear axle distance	1152
19	B-pillar – C-pillar distance	676
20	Roof sill bottom height	1506
21	Roof sill top height	1567
22	Floor sill bottom height	254
23	Floor sill top height	370

DATA SHEET NO. 16

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	-510	-225	-5070	50	1000
2	Overhead Overall	155	1380	-5060	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	10	6660	-1155	24	1000
6	Left Side, Ground Level, Overall	-3370	-4840	-1100	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: 2009 Toyota Venza MPV FWD NHTSA No. C95106
Test Program: FMVSS 214 Indicant Test Date: 1/08/2009

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 11:27 am

Stoddard Solvent Spillage Measurements

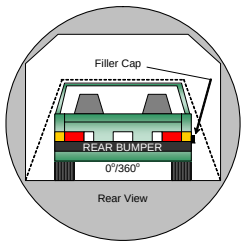
A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)

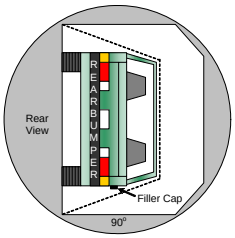
B. For the 5 minute period after motion ceases: None
(Maximum allowable = 5 ounces)

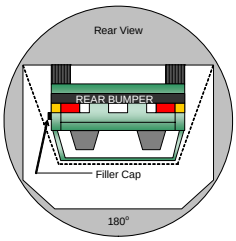
C. For the following 25 minutes: None
(Maximum allowable = 1 oz./minute)

D. Spillage Details: None

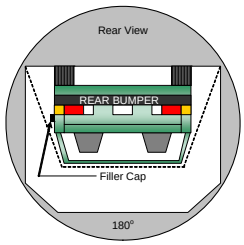
FMVSS 301 STATIC ROLLOVER DATA

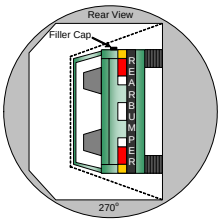


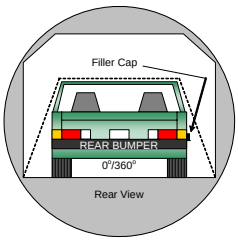




0° to 90° 90° to 180°







180° to 270° 270° to 360°

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**

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage Collection Time (min)	Spillage (oz.)
0° to 90°	118	300	First 5	0
90° to 180°	105	300	First 5	0
180° to 270°	106	300	First 5	0
270° to 360°	115	300	First 5	0

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Left Front ¾ View, As Received

Right Rear ¾ View, As Received

Manufacturer's Label

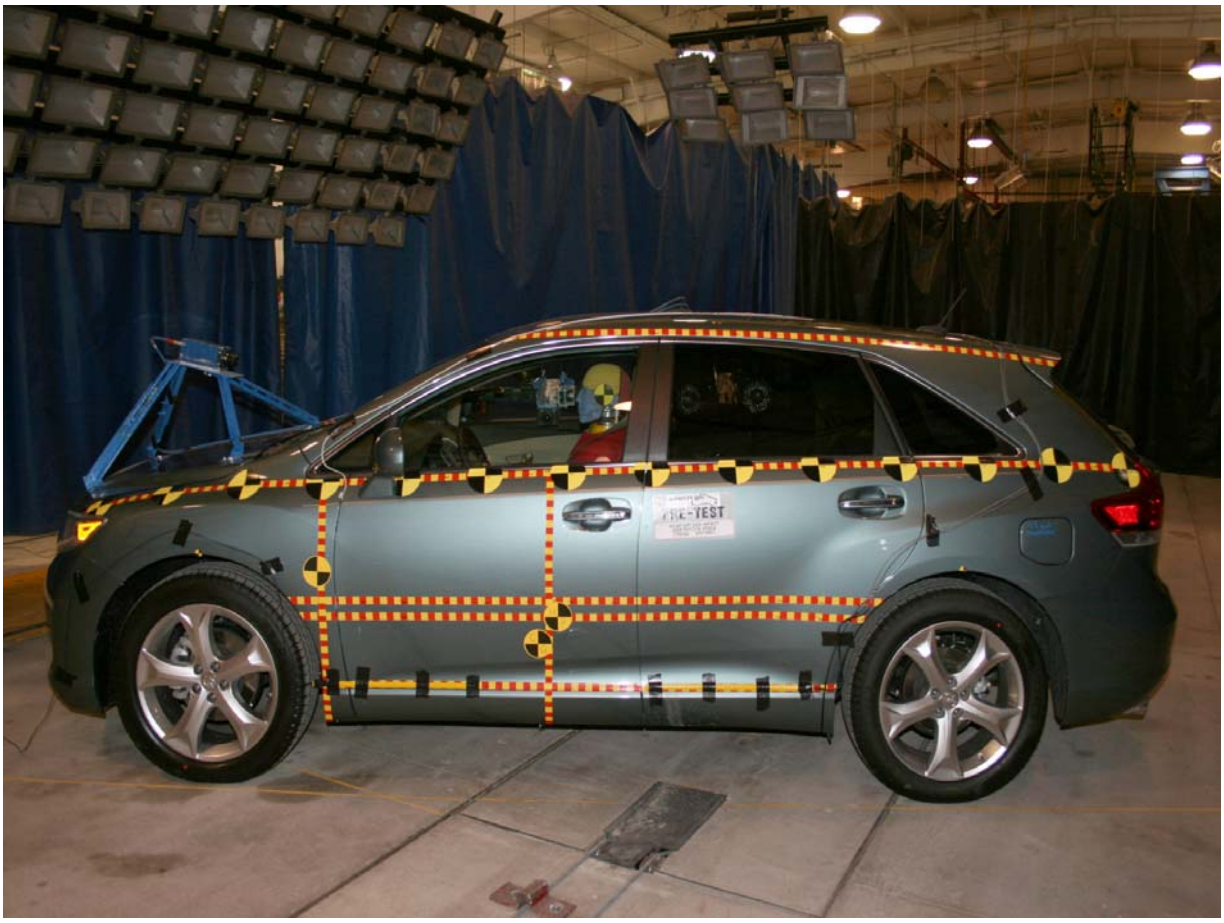
Tire Placard

Pre-Test Front View

Post-Test Front View

Pre-Test Left Front ¾ View

Post-Test Left Front ¾ View



Pre-Test Left Side View

Post-Test Left Side View

Pre-Test Left Rear ¾ View

Post-Test Left Rear ¾ View

Pre-Test Rear View

Post-Test Rear View

Pre-Test Right Rear ¾ View

Post-Test Right Rear ¾ View

Pre-Test Right Side View

Post-Test Right Side View

Pre-Test Right Front ¾ View

Post-Test Right Front ¾ View

Pre-Test Left Impact Point

Post-Test Left Impact Point

Pre-Test Front ¾ View of Left Side Doors

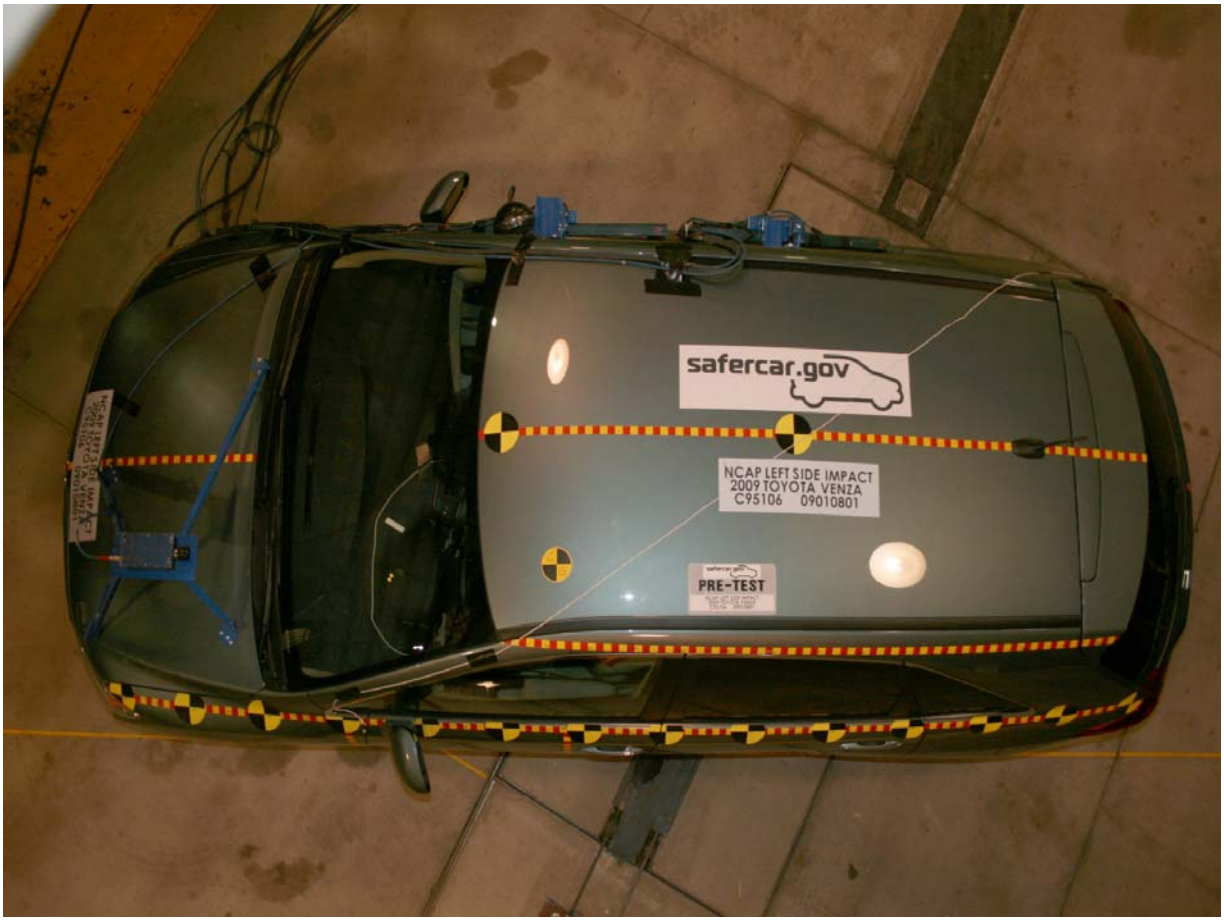
Post-Test Front ¾ View of Left Side Doors

Pre-Test Rear ¾ View of Left Side Doors

Post-Test Rear ¾ 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

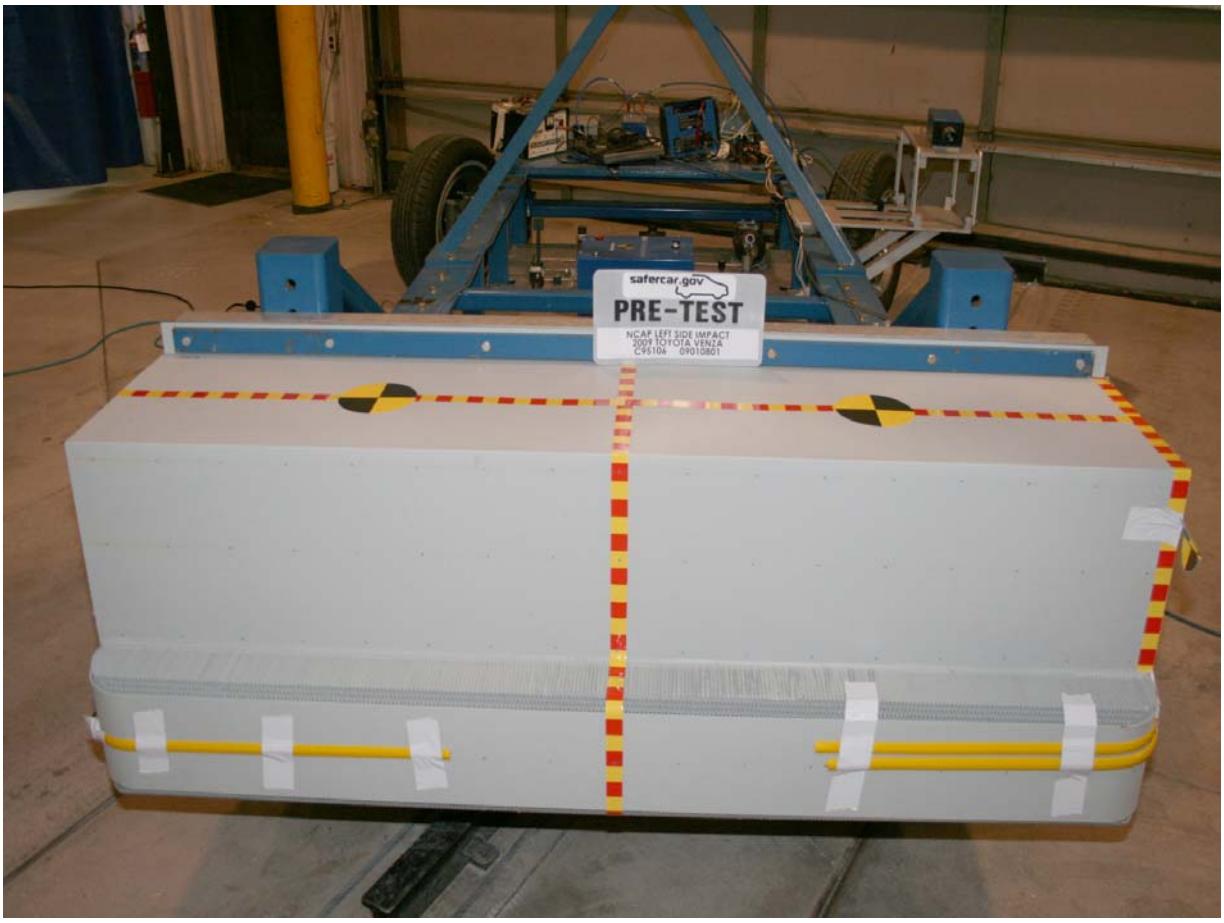
Post-Test Passenger Dummy Clearance From Door

Pre-Test Passenger Dummy (Through Window)

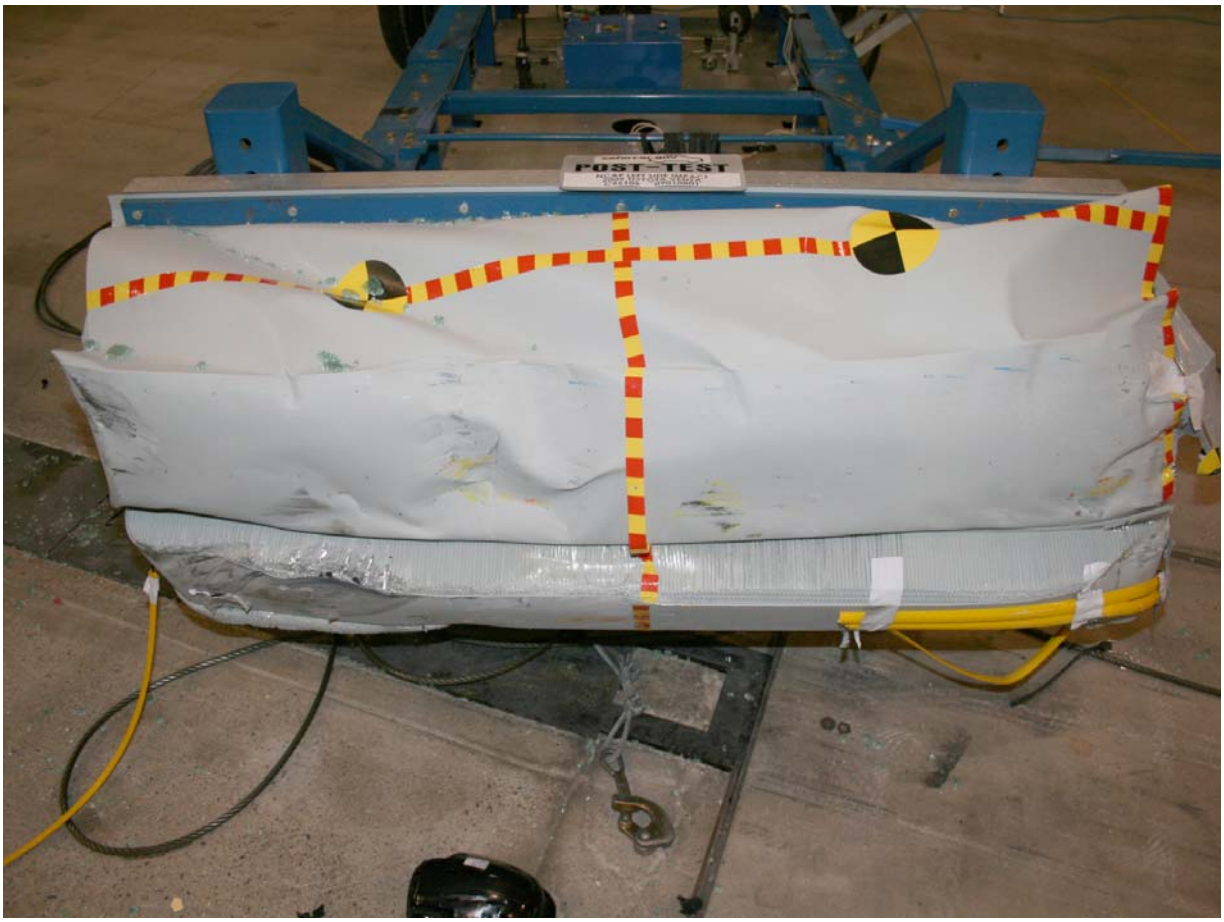
Post-Test Passenger Dummy (Through Window)

Pre-Test Passenger Dummy Right Side View

Post-Test Passenger Dummy Right Side View



Pre-Test Front View of Deformable Barrier

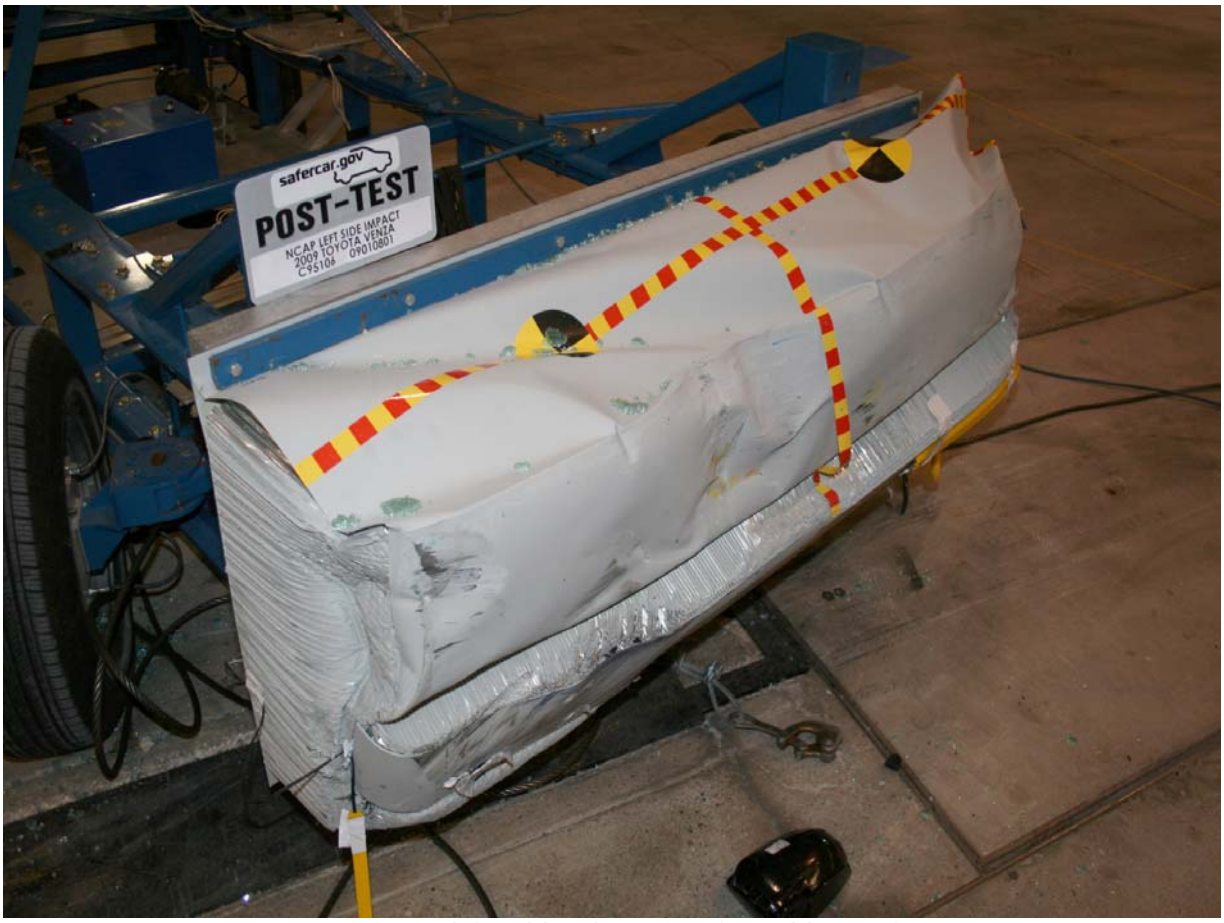


Post-Test Front View of Deformable Barrier

Pre-Test Top View of Deformable Barrier

Post-Test Top View of Deformable Barrier

Pre-Test Right Side View of Deformable Barrier



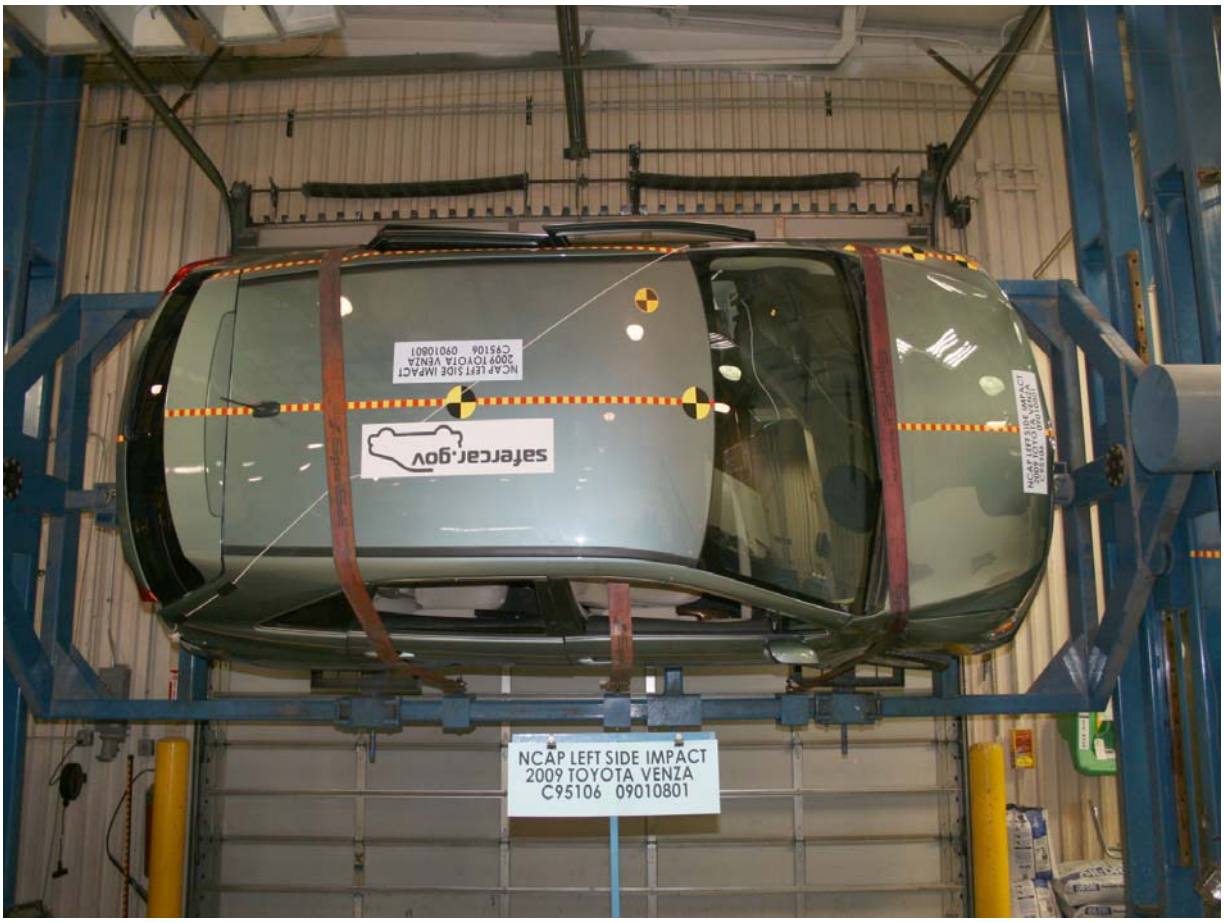
Post-Test Right Side View of Deformable Barrier

Pre-Test Left Side View of Deformable Barrier

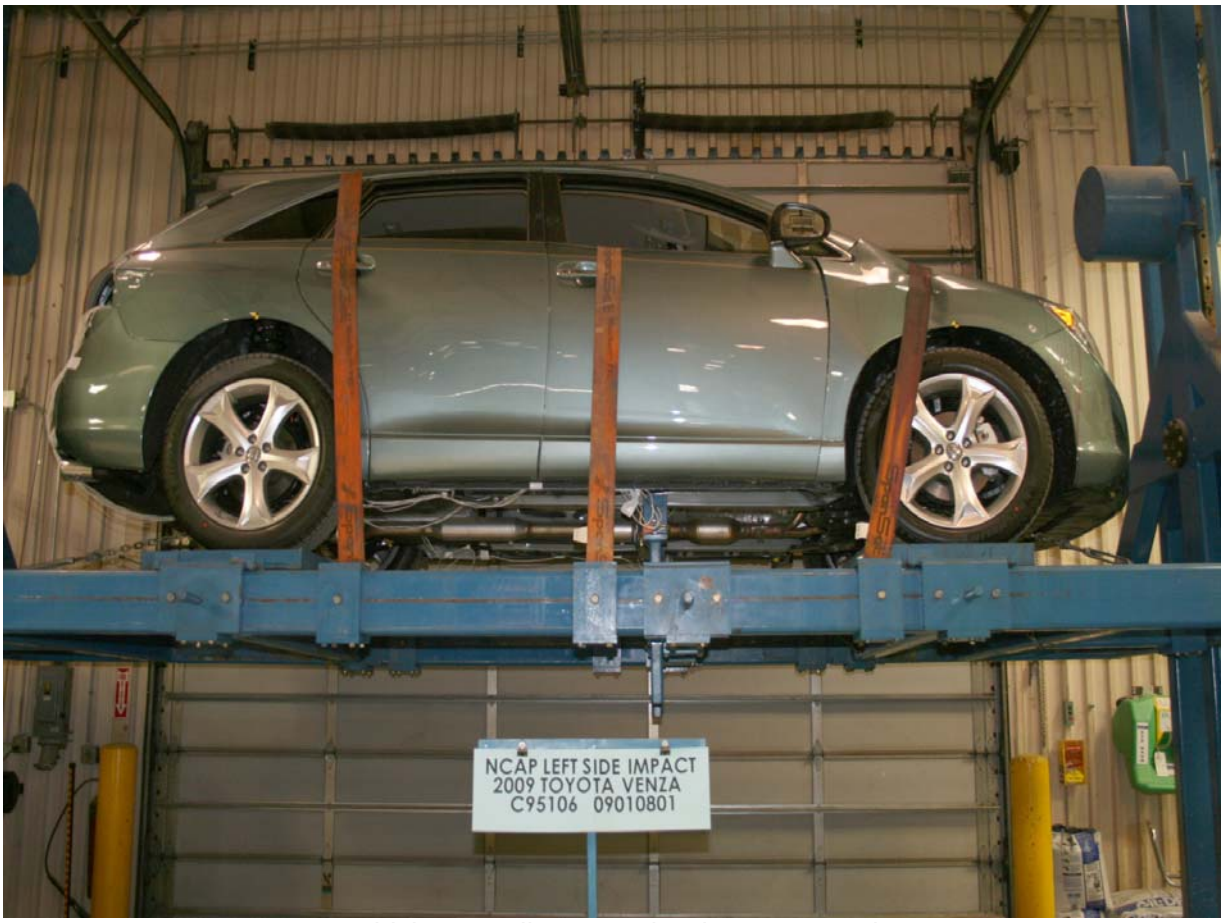
Post-Test Left Side View of Deformable Barrier

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

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 Torso Contact

Post-Test Passenger Dummy Contact

APPENDIX B

SID/HIII RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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 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

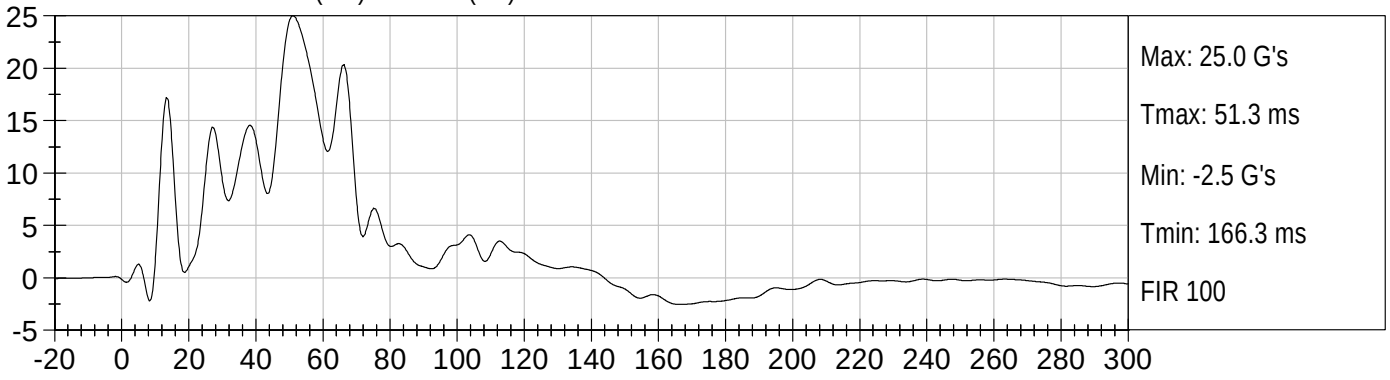
MDB Left Bumper Contact

MDB Right Bumper Contact

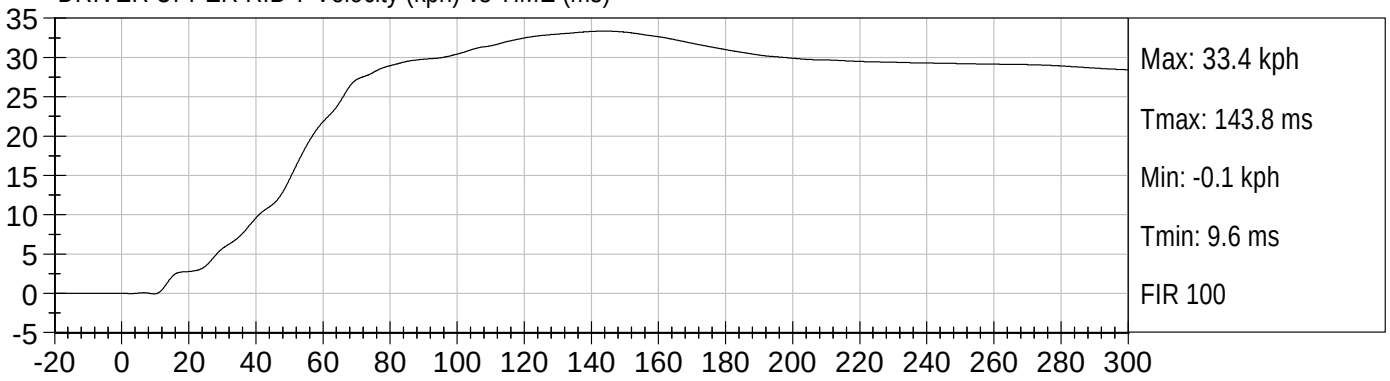
NCAP LEFT SIDE IMPACT
2009 TOYOTA VENZA FWD C95106

Test Date: 01/08/2009
Speed: 38.5 mph (62.0 km/h)

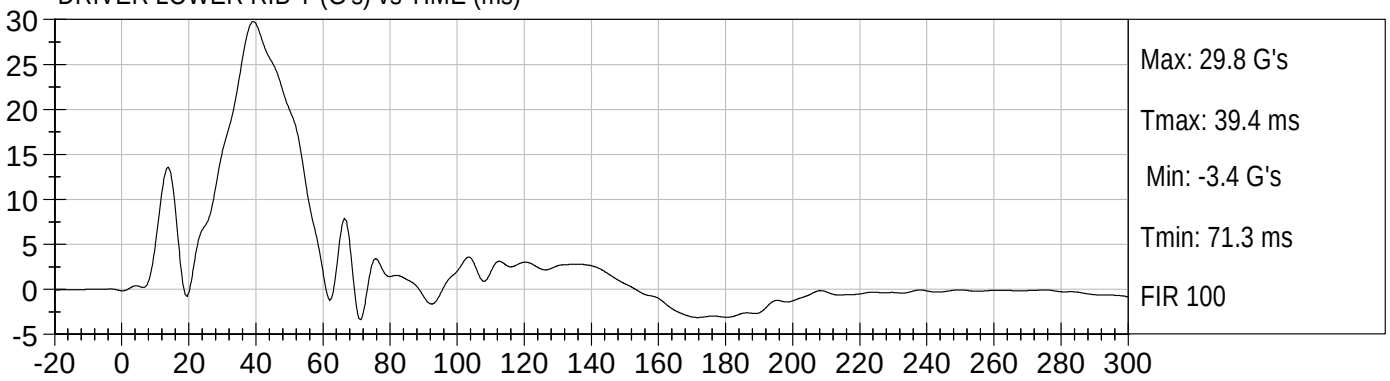
DRIVER UPPER RIB Y (G's) vs TIME (ms)



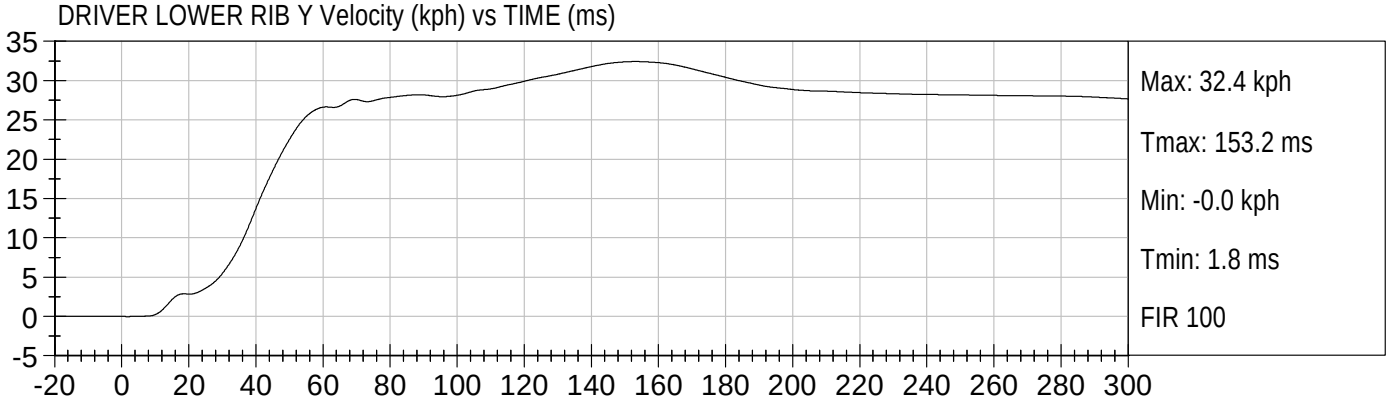
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



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



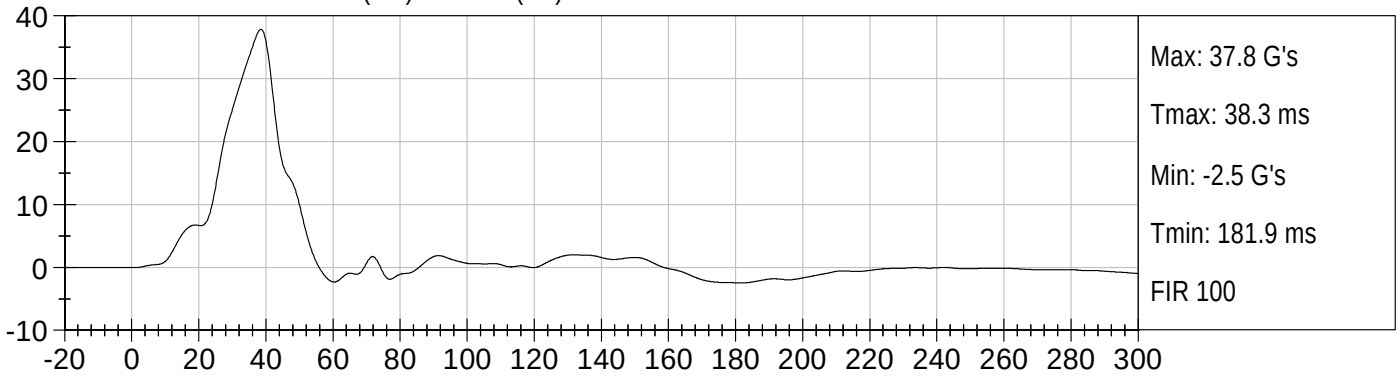
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



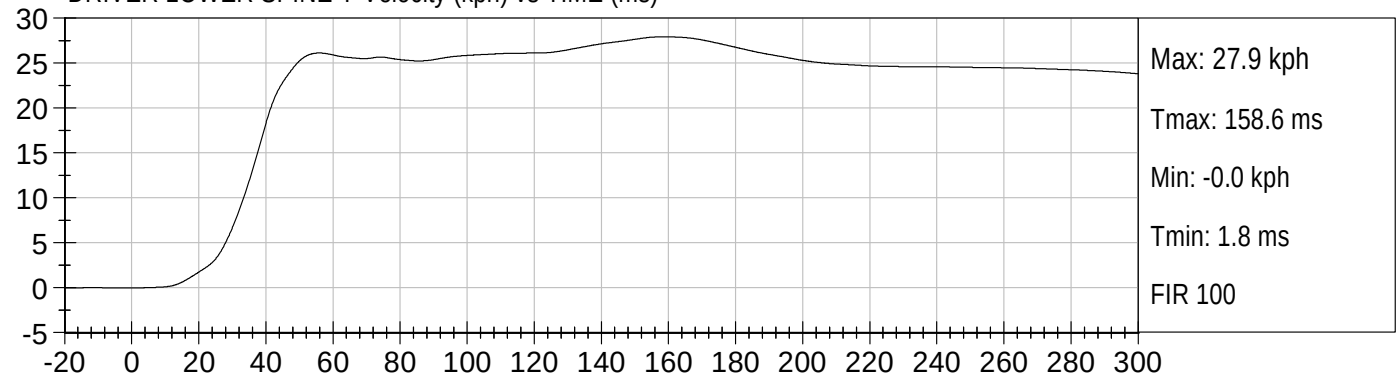
NCAP LEFT SIDE IMPACT
2009 TOYOTA VENZA FWD C95106

Test Date: 01/08/2009
Speed: 38.5 mph (62.0 km/h)

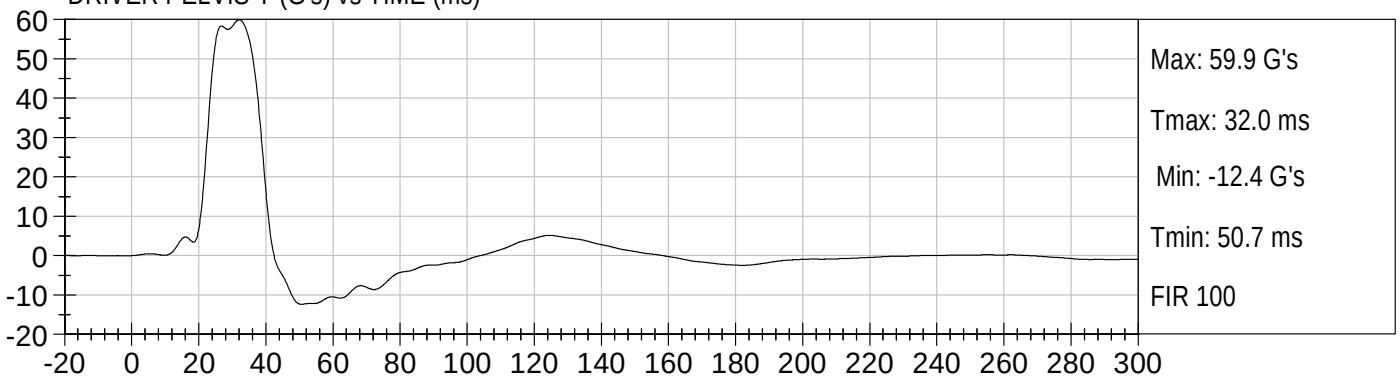
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



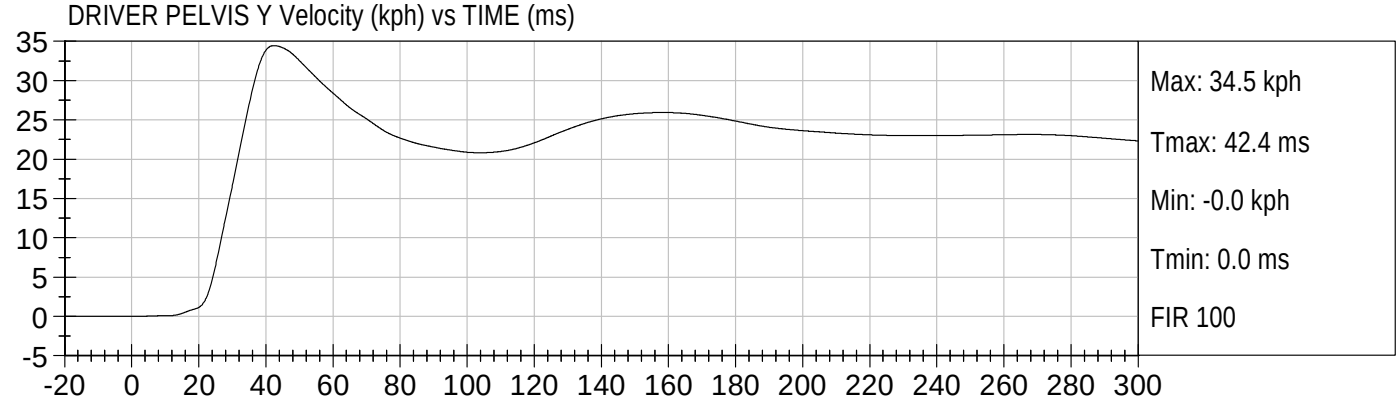
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



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



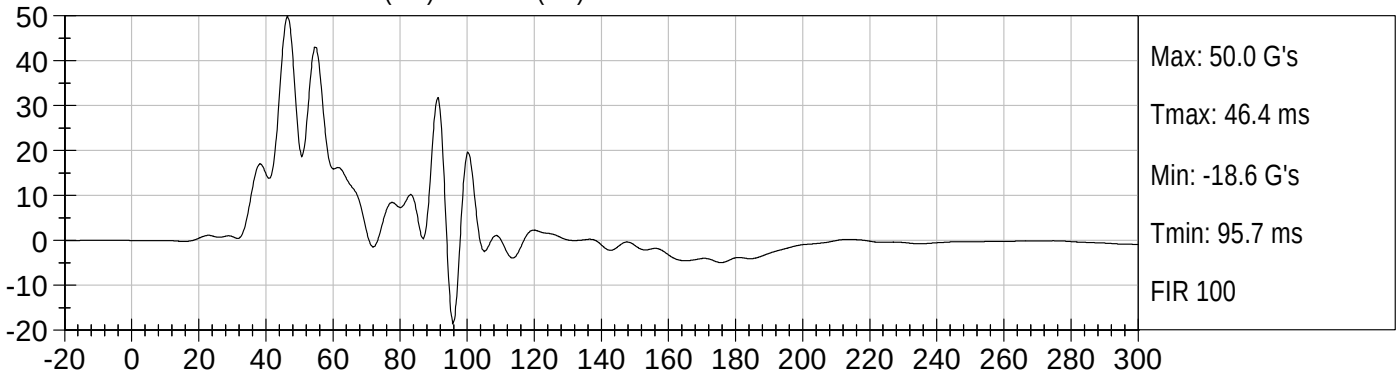
DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



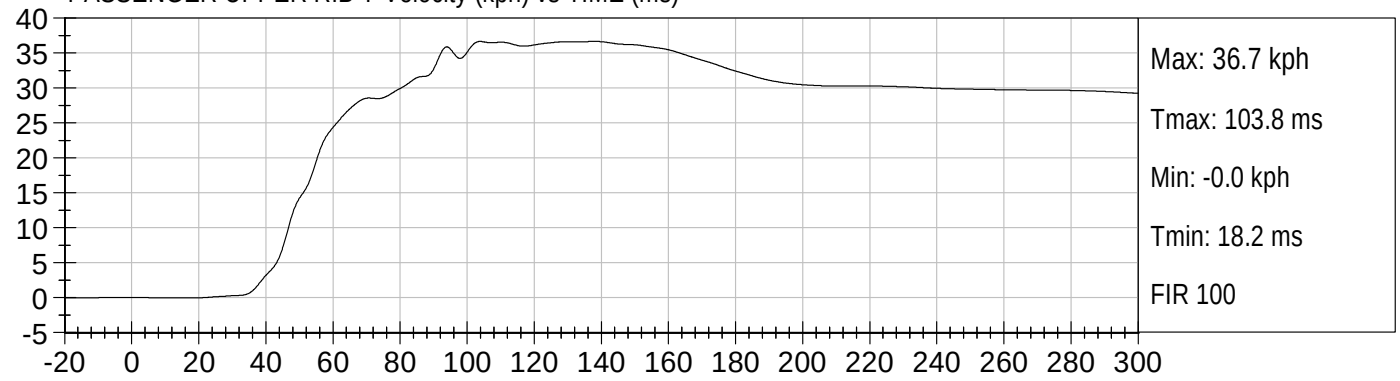
NCAP LEFT SIDE IMPACT
2009 TOYOTA VENZA FWD C95106

Test Date: 01/08/2009
Speed: 38.5 mph (62.0 km/h)

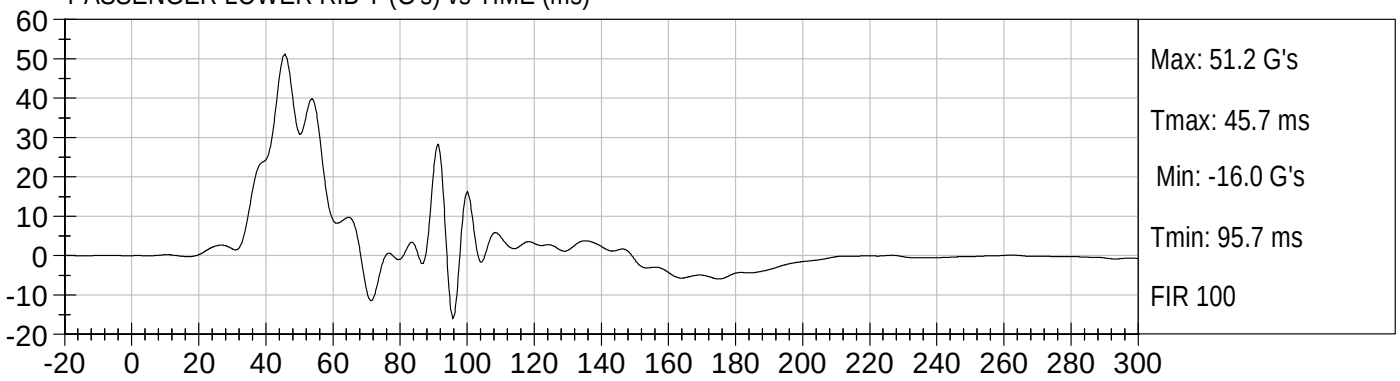
PASSENGER UPPER RIB Y (G's) vs TIME (ms)



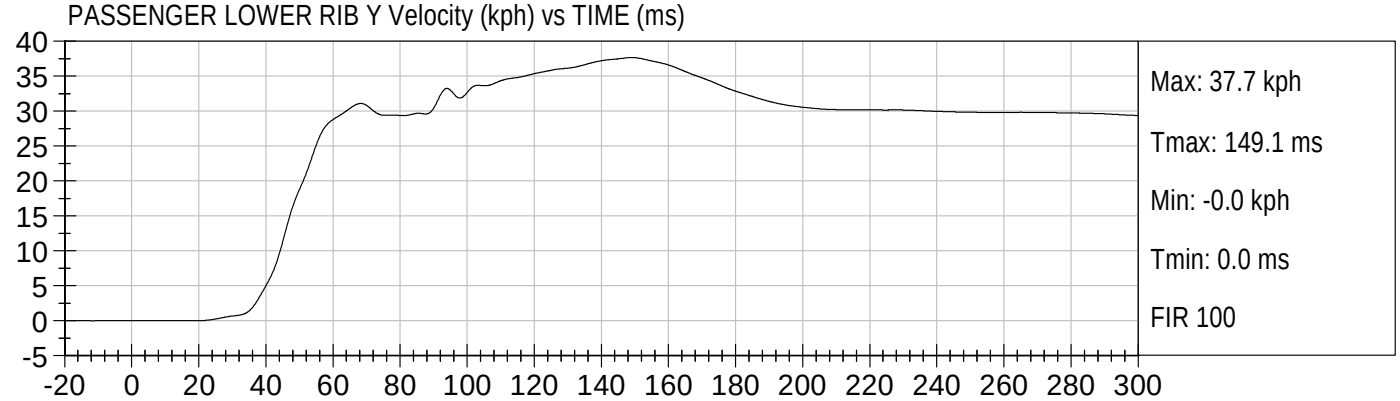
PASSENGER UPPER RIB Y Velocity (kph) vs TIME (ms)



PASSENGER LOWER RIB Y (G's) vs TIME (ms)



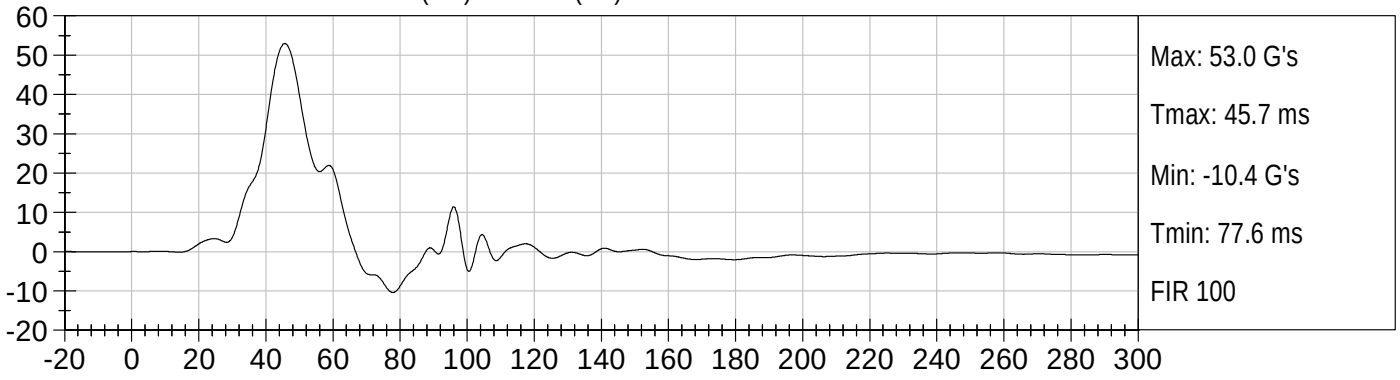
PASSENGER LOWER RIB Y Velocity (kph) vs TIME (ms)



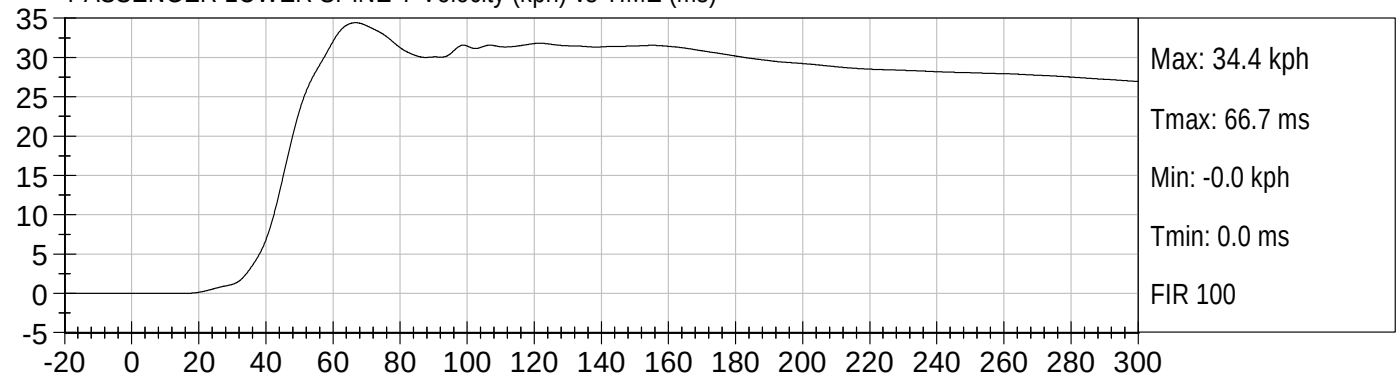
NCAP LEFT SIDE IMPACT
2009 TOYOTA VENZA FWD C95106

Test Date: 01/08/2009
Speed: 38.5 mph (62.0 km/h)

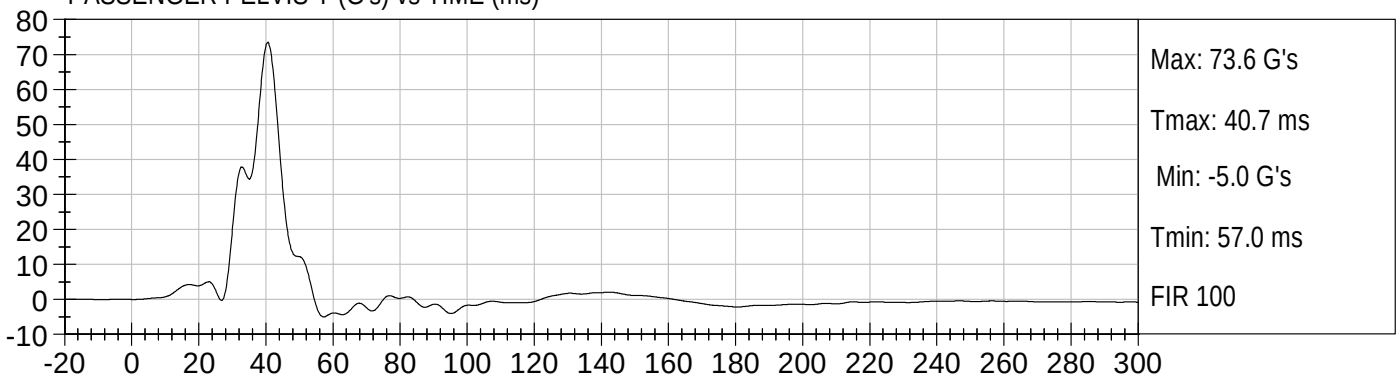
PASSENGER LOWER SPINE Y (G's) vs TIME (ms)



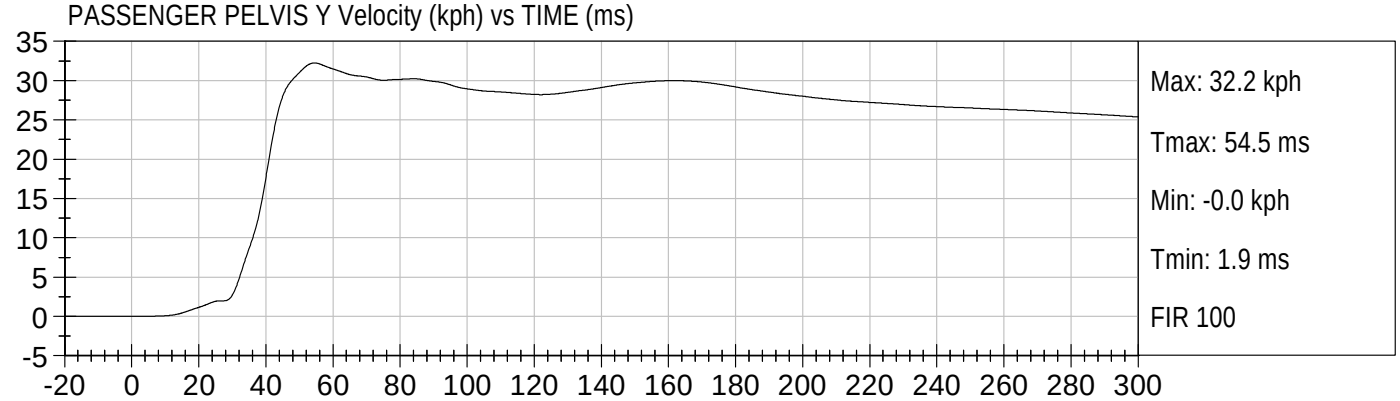
PASSENGER LOWER SPINE Y Velocity (kph) vs TIME (ms)



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



PASSENGER 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:** D08251

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

8/29/08
Test Date

David Winkelbauer
Approved By

SID/HIII Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration (Lateral)

ATD Serial No: 271 **Test I.D:** D083011

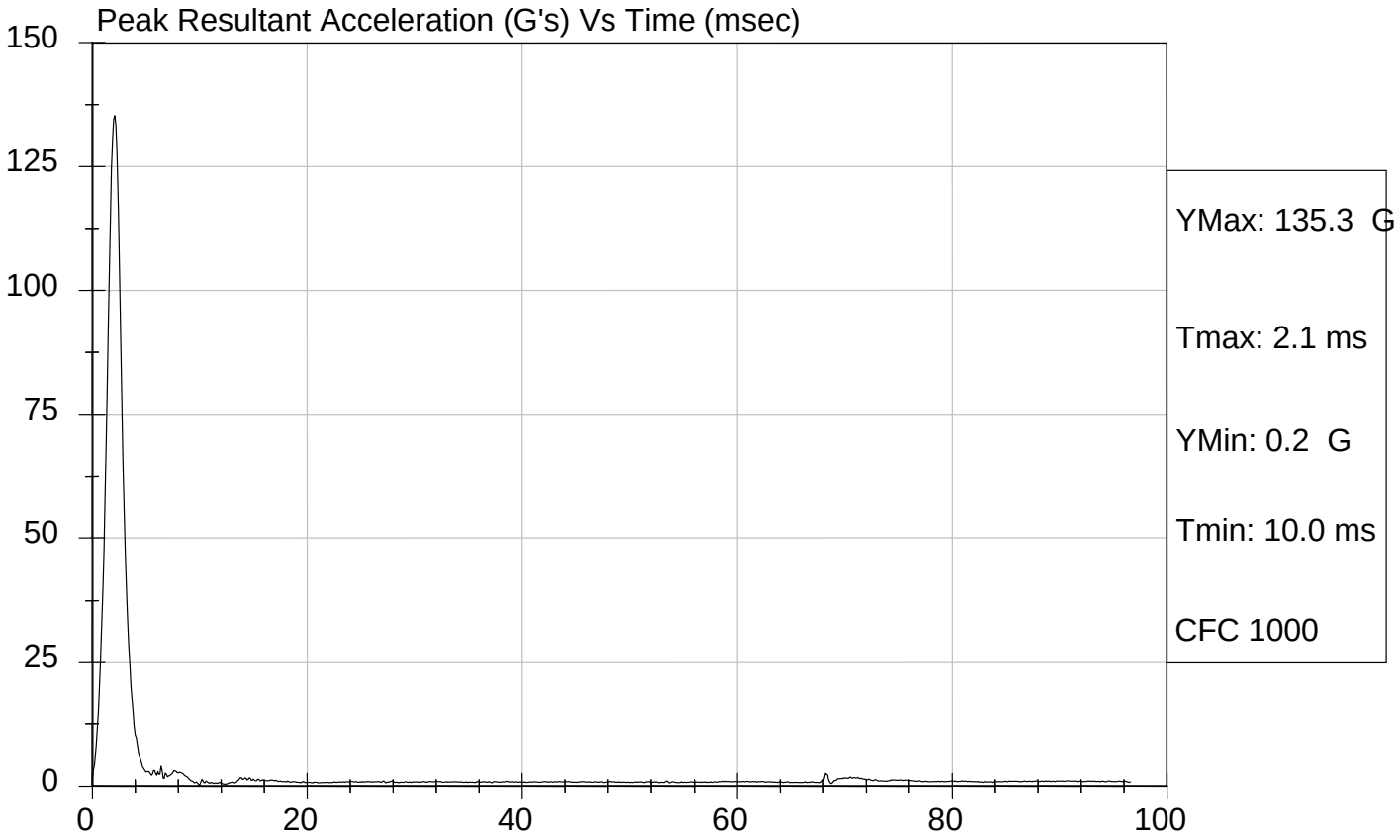
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	120 to 150	135	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-8.1	Pass
		Overall Test Results		Pass

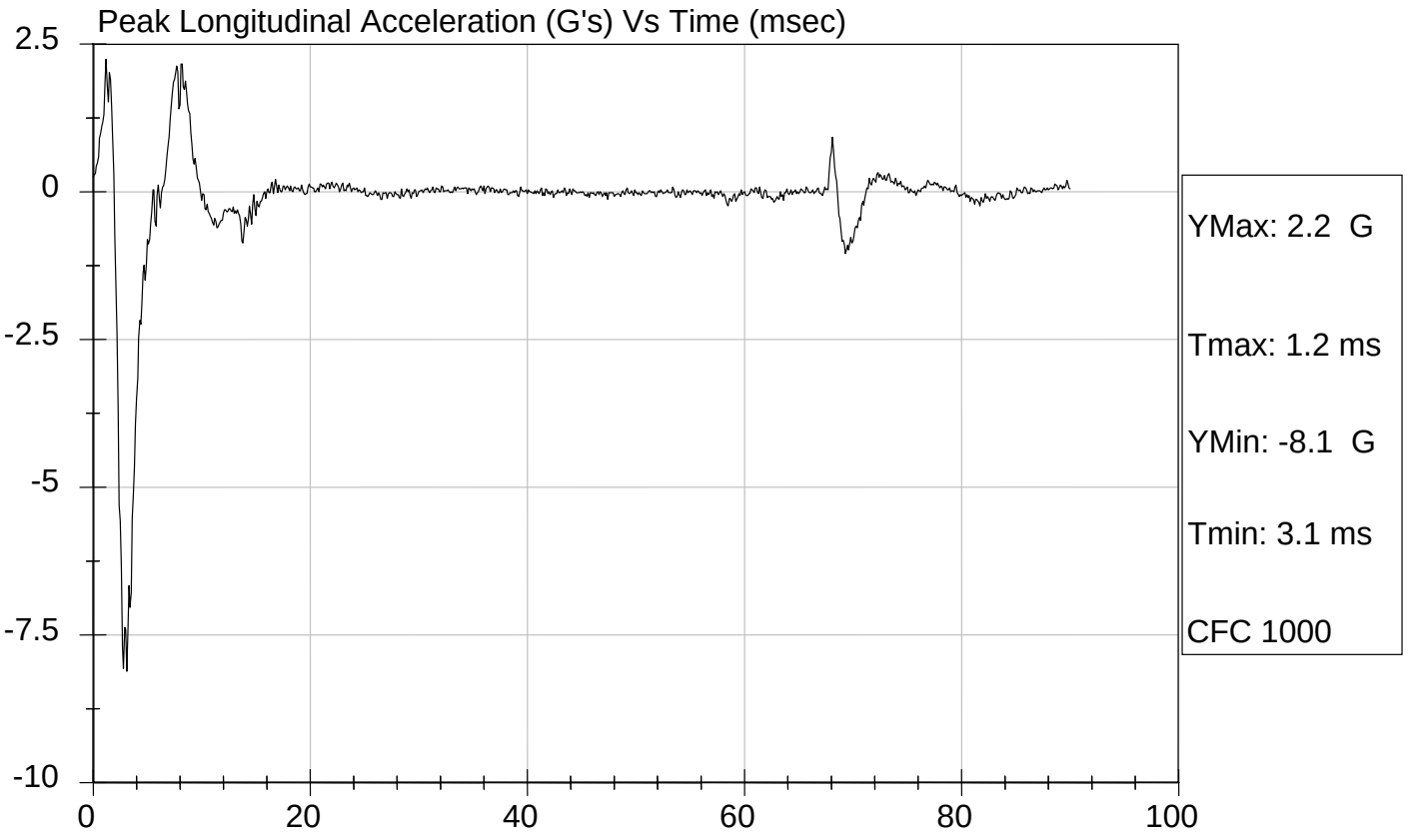
Jessica Gall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

	Test Description: Head Drop	Test Date: 11/17/08
	Component: D083011	Speed: 0 ft/s, 0 m/s





SID/HIII Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 271 **Test I.D:** D083012

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	39	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	19	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

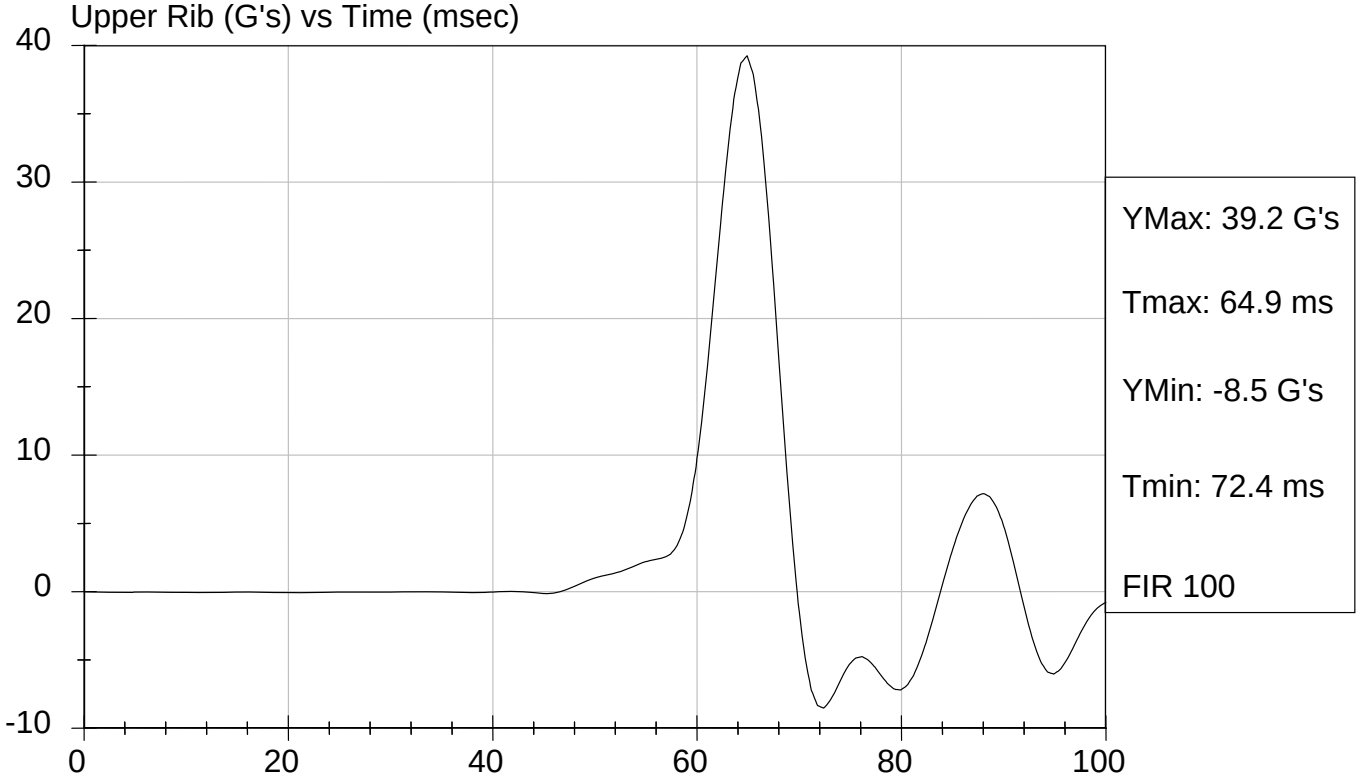
11/17/08
Test Date

David Winkelbauer
Approved By

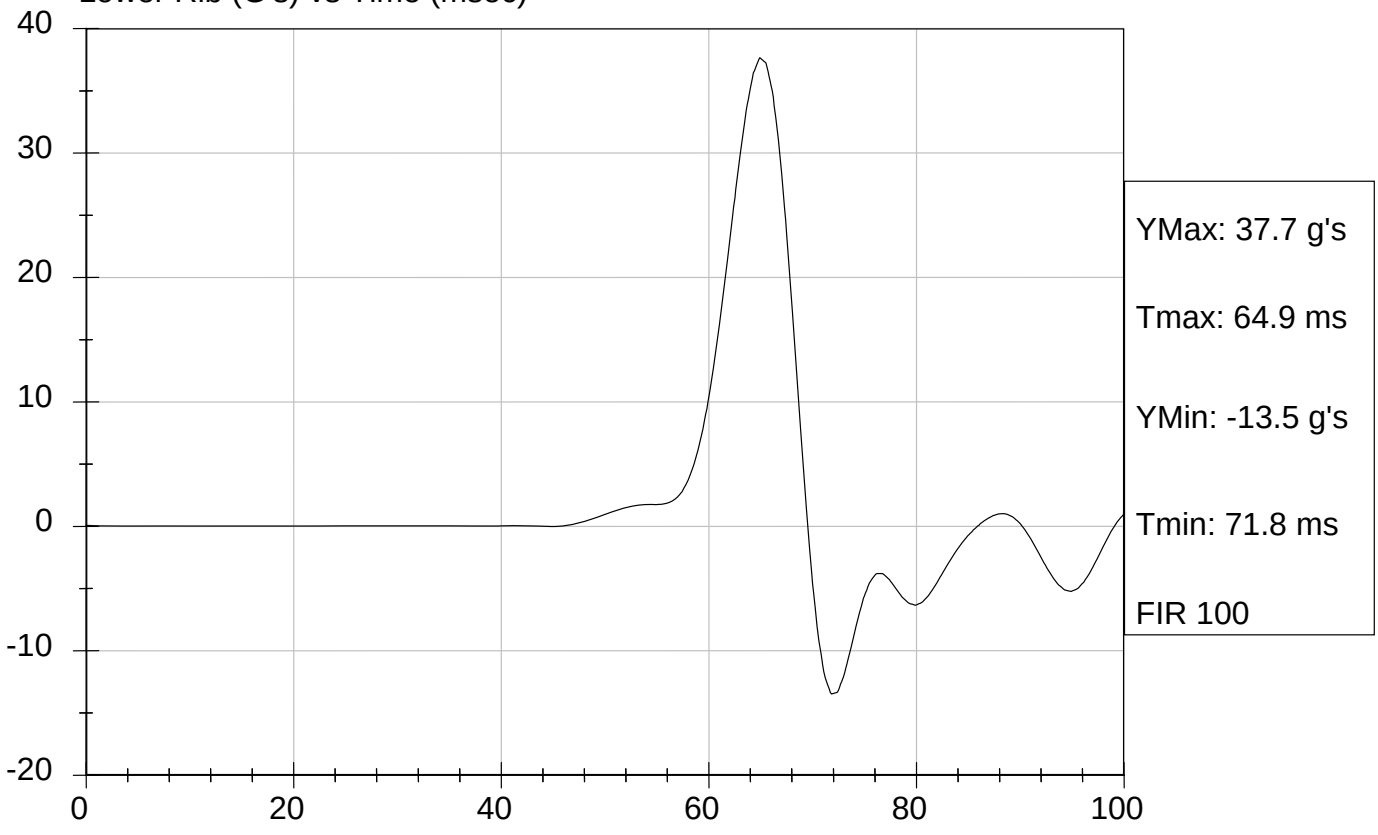
Test Desc: Thorax Impact
Component ID: D083012

Test Date: 11/17/08
Speed: 14.01 ft/sec, 4.27 m/sec

Upper Rib (G's) vs Time (msec)

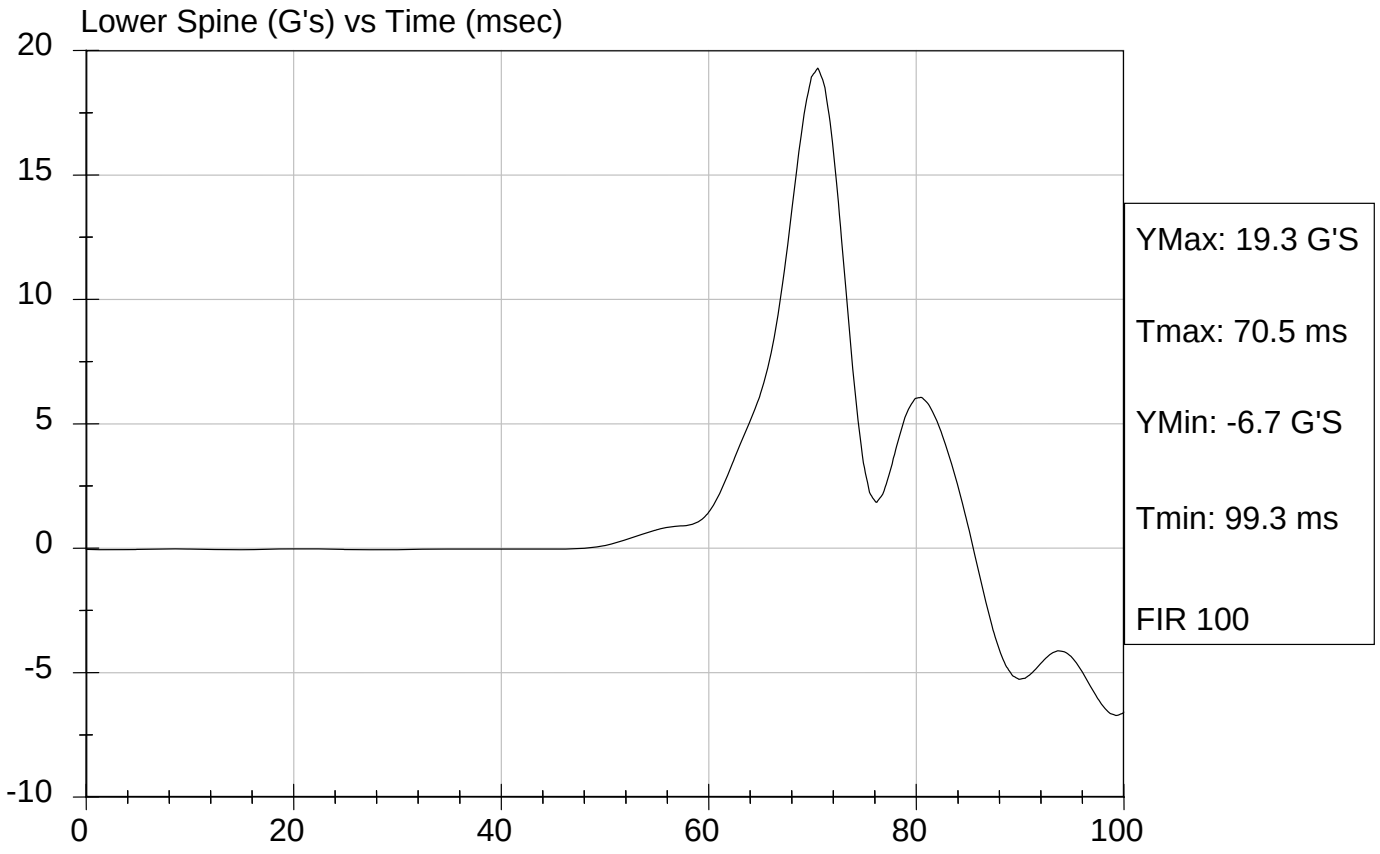


Lower Rib (G's) vs Time (msec)



Test Desc: Thorax Impact
Component ID: D083012

Test Date: 11/17/08
Speed: 14.01 ft/sec, 4.27 m/sec



SID/HIII Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 271 **Test I.D:** D083013

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

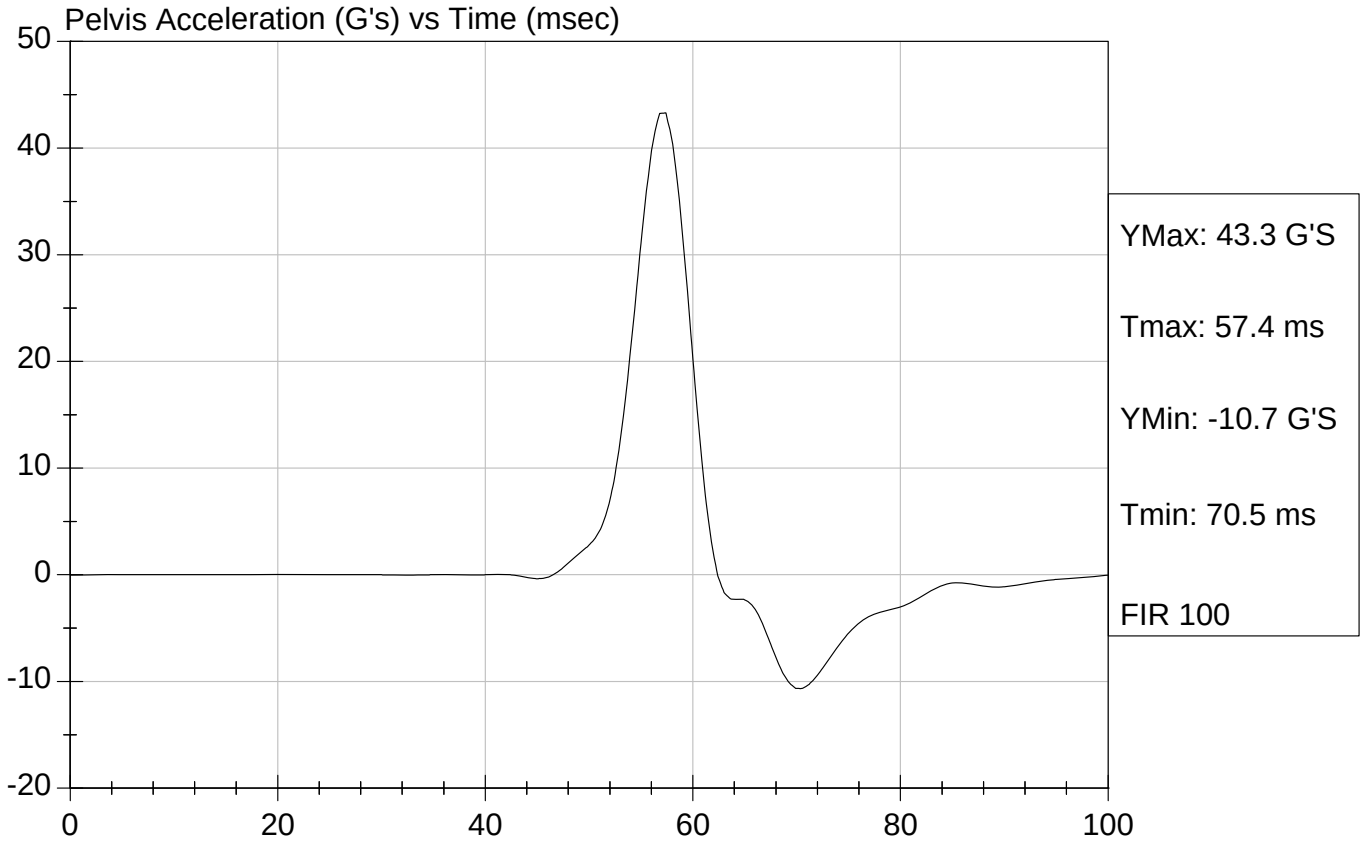
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Component ID: D083013

Test Date: 11/17/08
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:** D083014

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force At 12.7 mm	N	104 -162	143	Pass
Force At 19 mm	N	163 - 222	201	Pass
Force At 25.4 mm	N	222 - 280	268	Pass
Force At 33 mm	N	325 - 391	368	Pass
		Overall Test Results		Pass

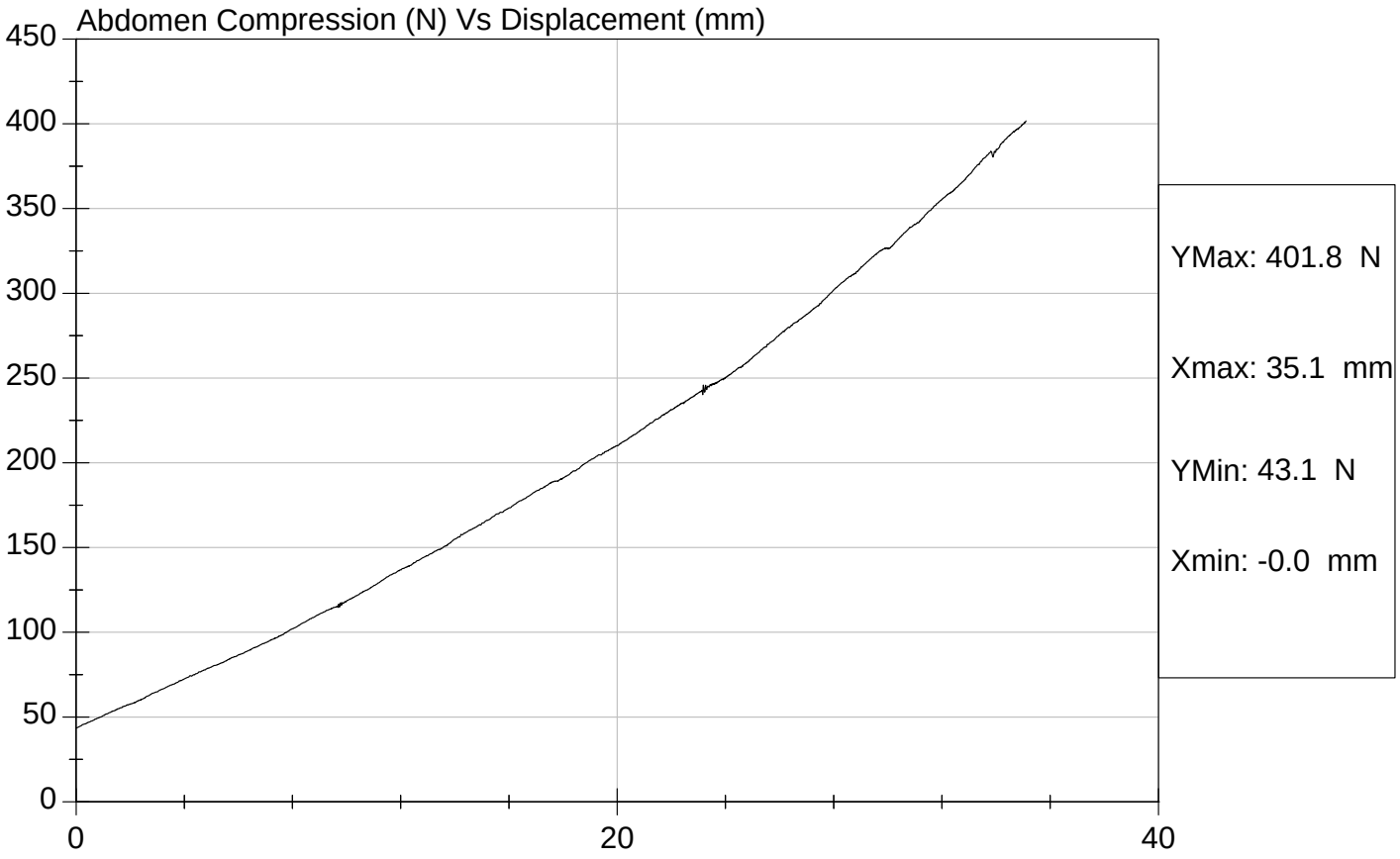
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

Test Description: Abdomen Compression Test Date: 11/17/08

Component: D083014 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:** D083015

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	115.0	Pass
Force At 30 deg	N	151.2 - 204.6	154.8	Pass
Force At 40 deg	N	204.6 - 258.0	232.4	Pass
Return Angle	Deg	12 Maximum	6	Pass
		Overall Test Results		Pass

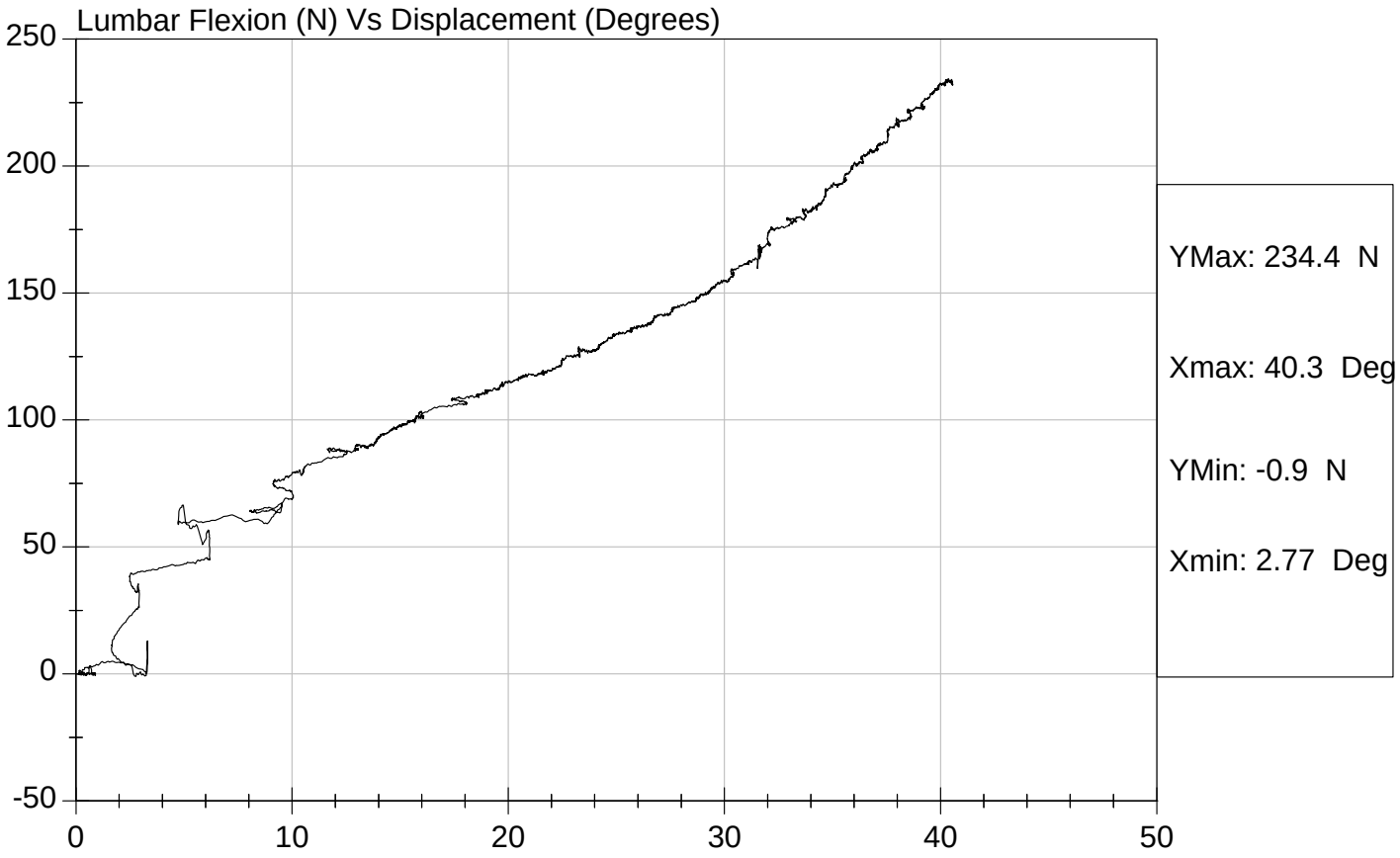
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

Test Description: Lumbar Flexion | Test Date: 11/17/08

Component: D083015 | 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:** D083019

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	22	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.45	Pass
	20 msec	m/s	4.12 to 5.10	4.85	Pass
	30 msec	m/s	5.73 to 7.01	6.61	Pass
	40 to 70 msec	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		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	78	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	50	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	5	Pass

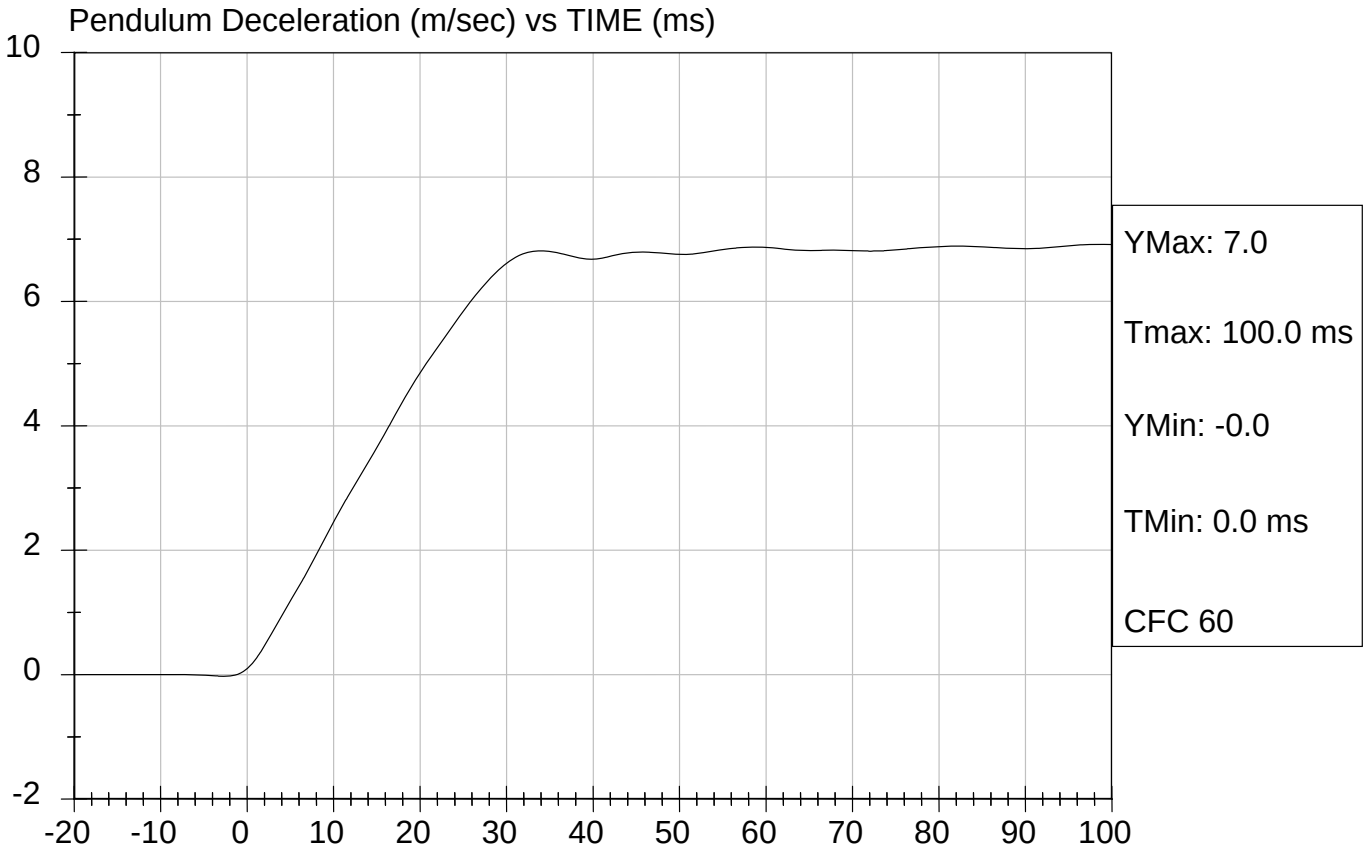
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

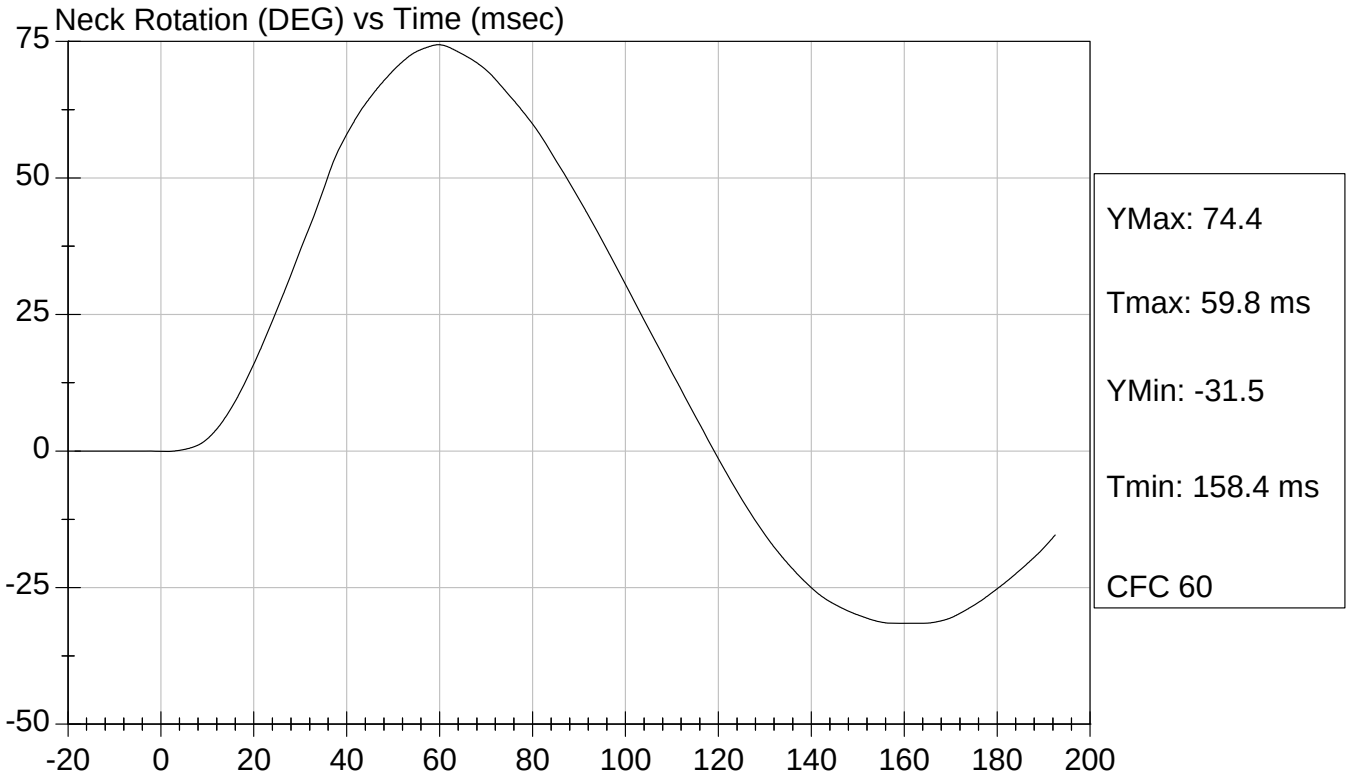
Test Desc: Neck Bending
Component ID: D083019

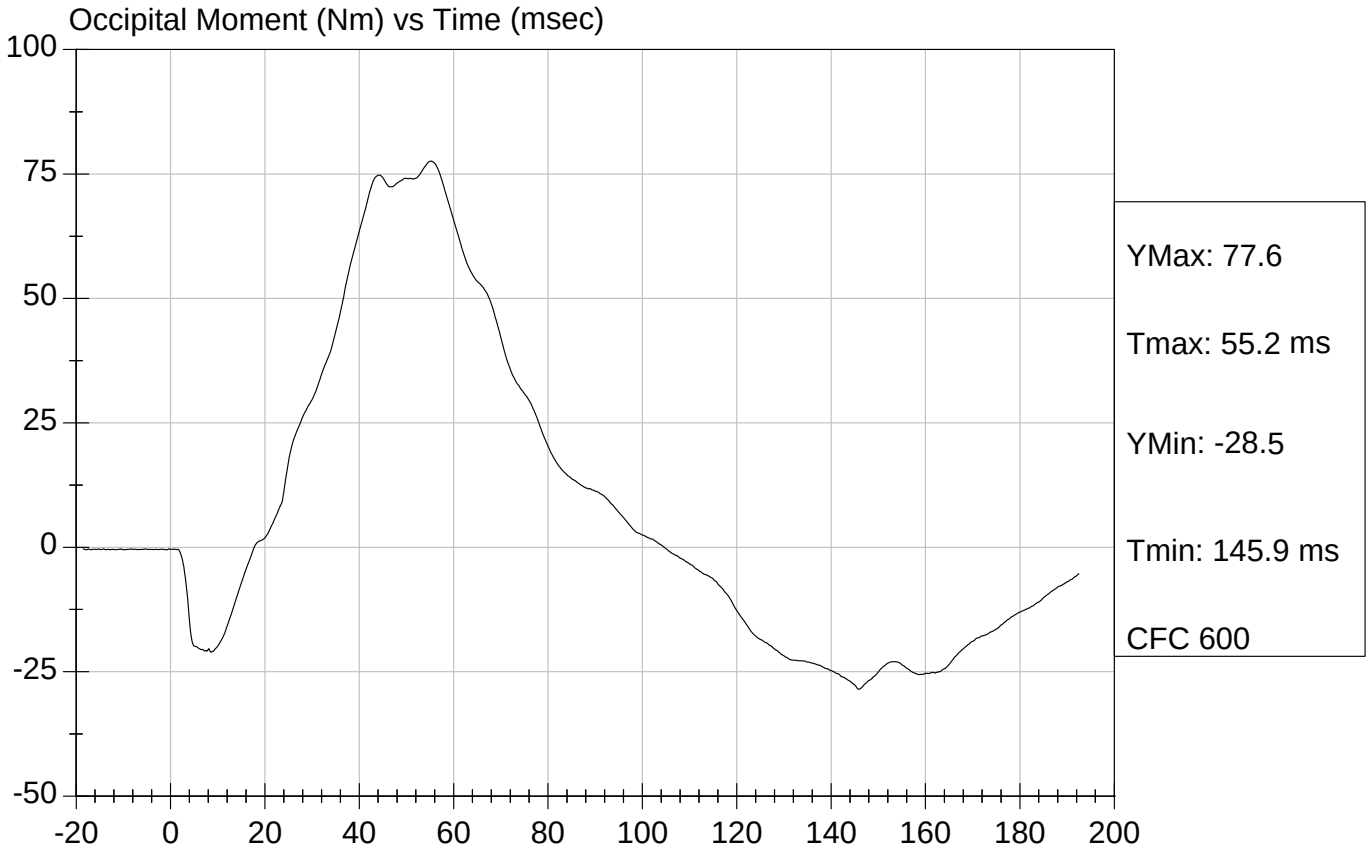
Test Date: 11/17/08
Speed: 23.15 ft/sec, 7.06 m/sec



Test Desc: Neck Bending
Component ID: D083019

Test Date: 11/17/08
Speed: 23.15 ft/sec, 7.06 m/sec





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:** D09001

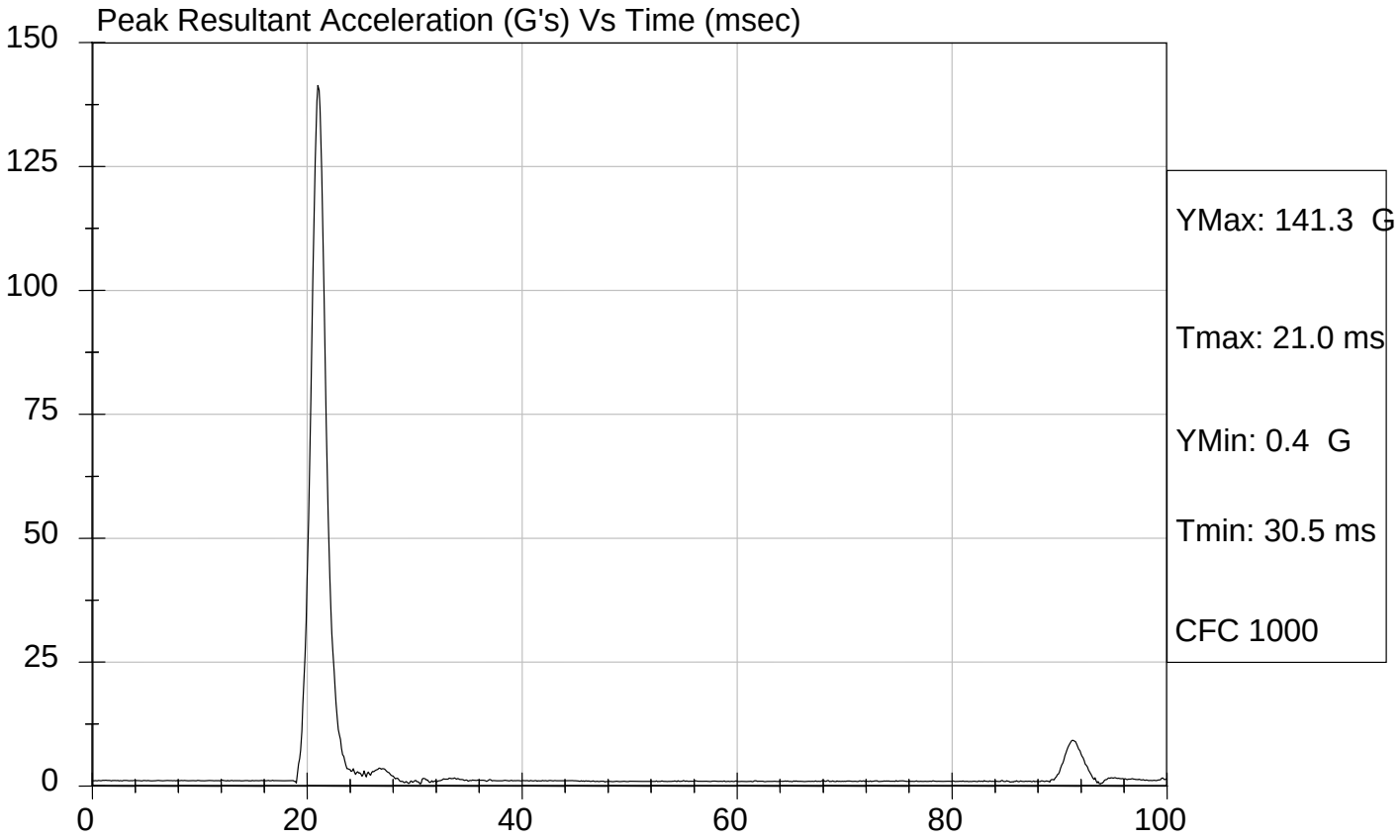
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Peak Resultant Acceleration	G's	120 to 150	141	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	6.9	Pass
		Overall Test Results		Pass

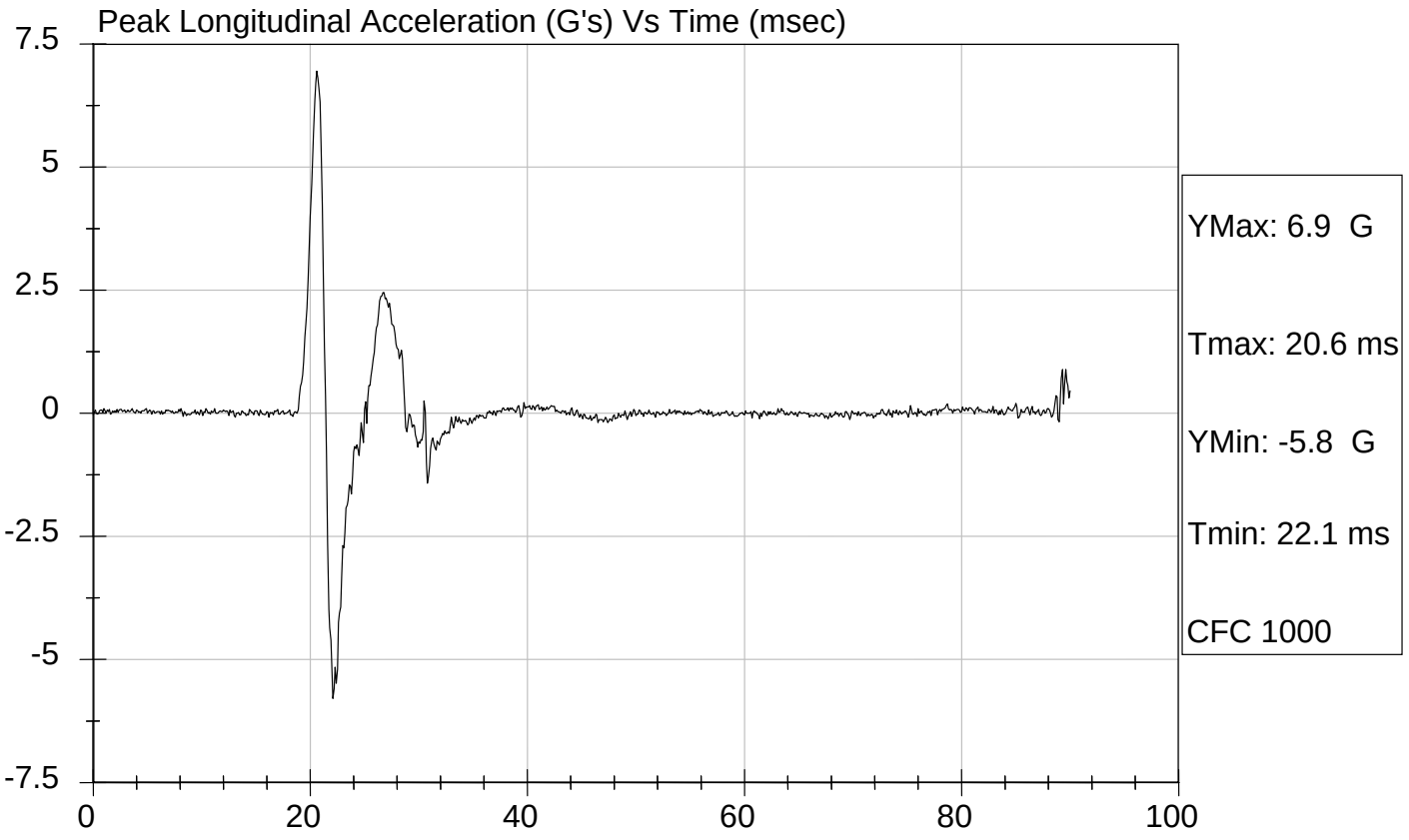
Jessica Hall
Laboratory Technician

1/12/08
Test Date

David Winkelbauer
Approved By

	Test Description: Head Drop	Test Date: 1/12/08
	Component: D09001	Speed: 0 ft/s, 0 m/s





SID/HIII Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 271 **Test I.D:** D09002

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	20	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	38	Pass
Lower Spine	G's	15 - 22	20	Pass
		Overall Test Results		Pass

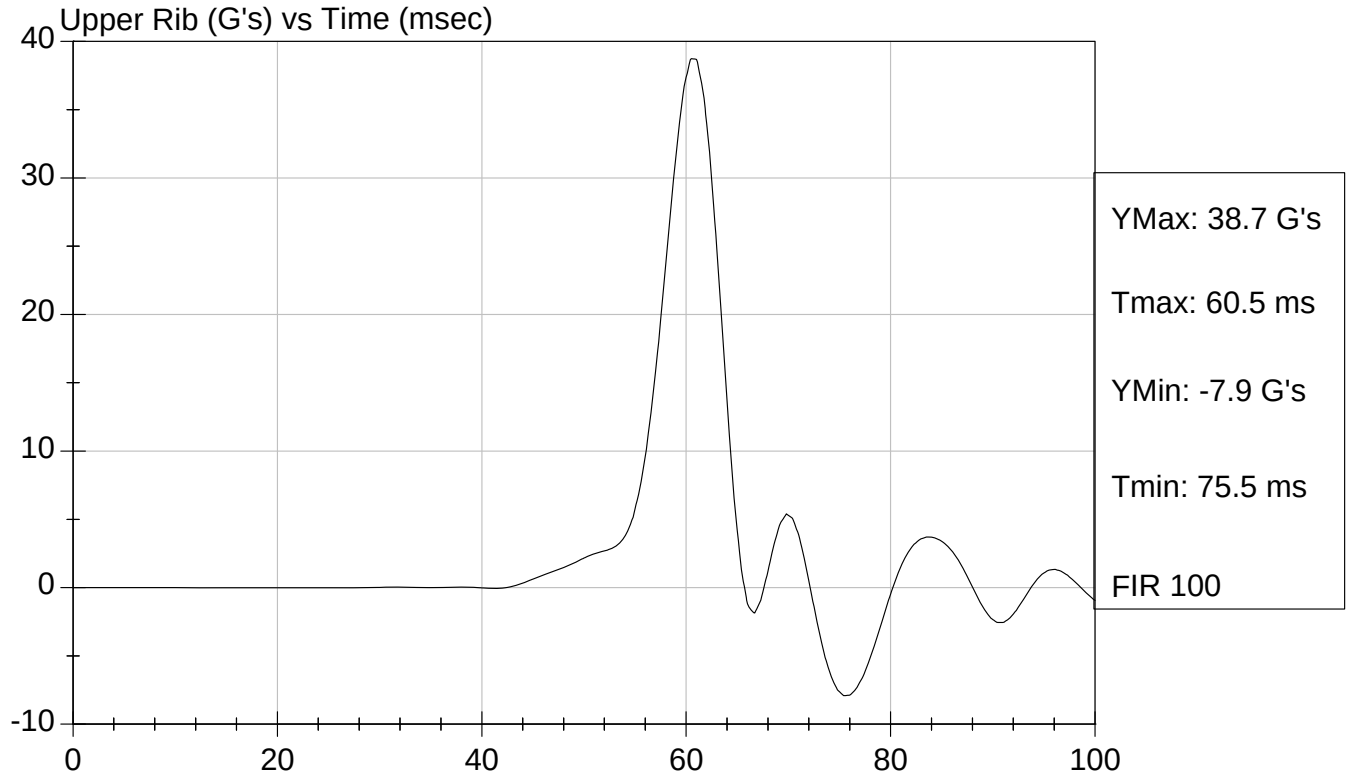
Jessica Gall
Laboratory Technician

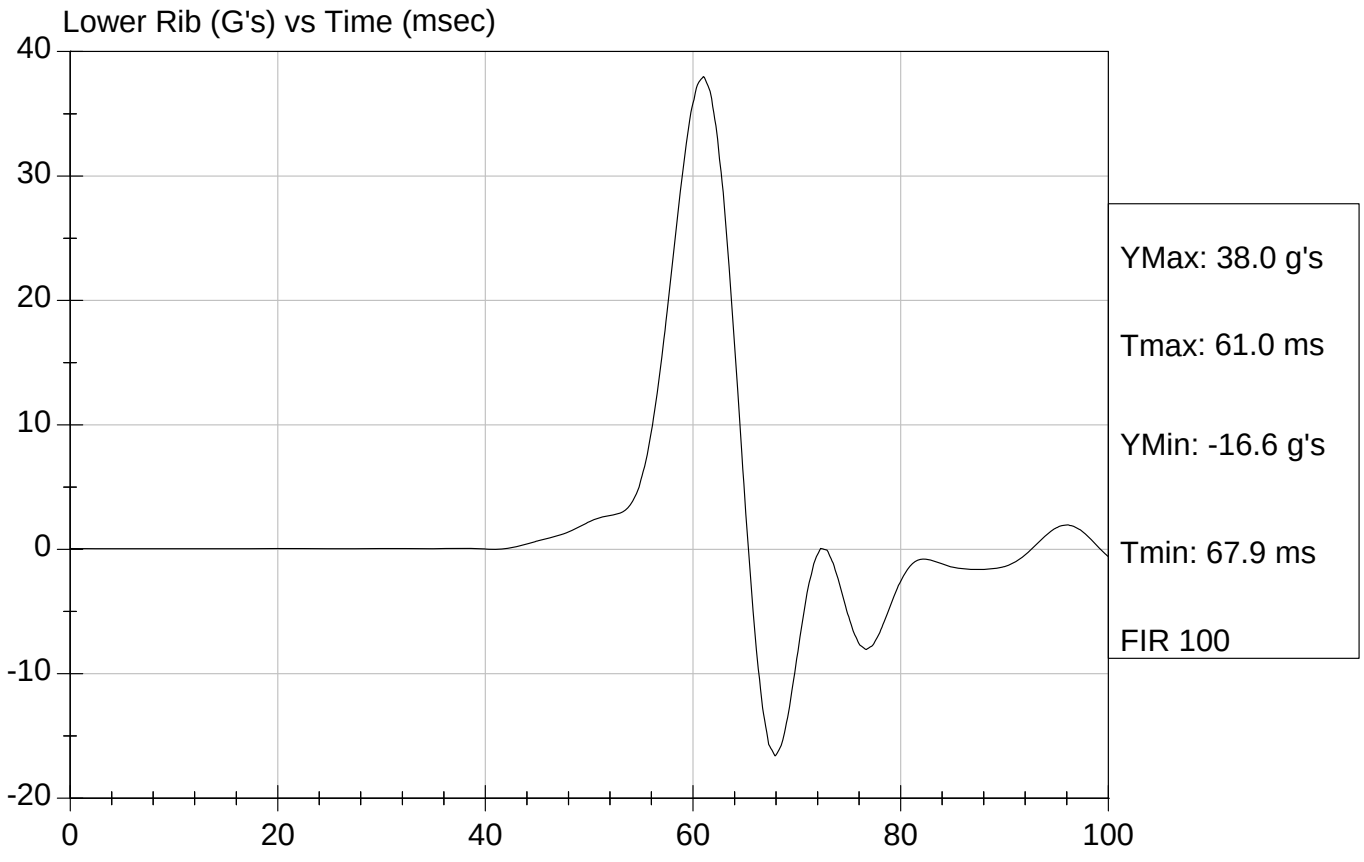
1/9/09
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D09002

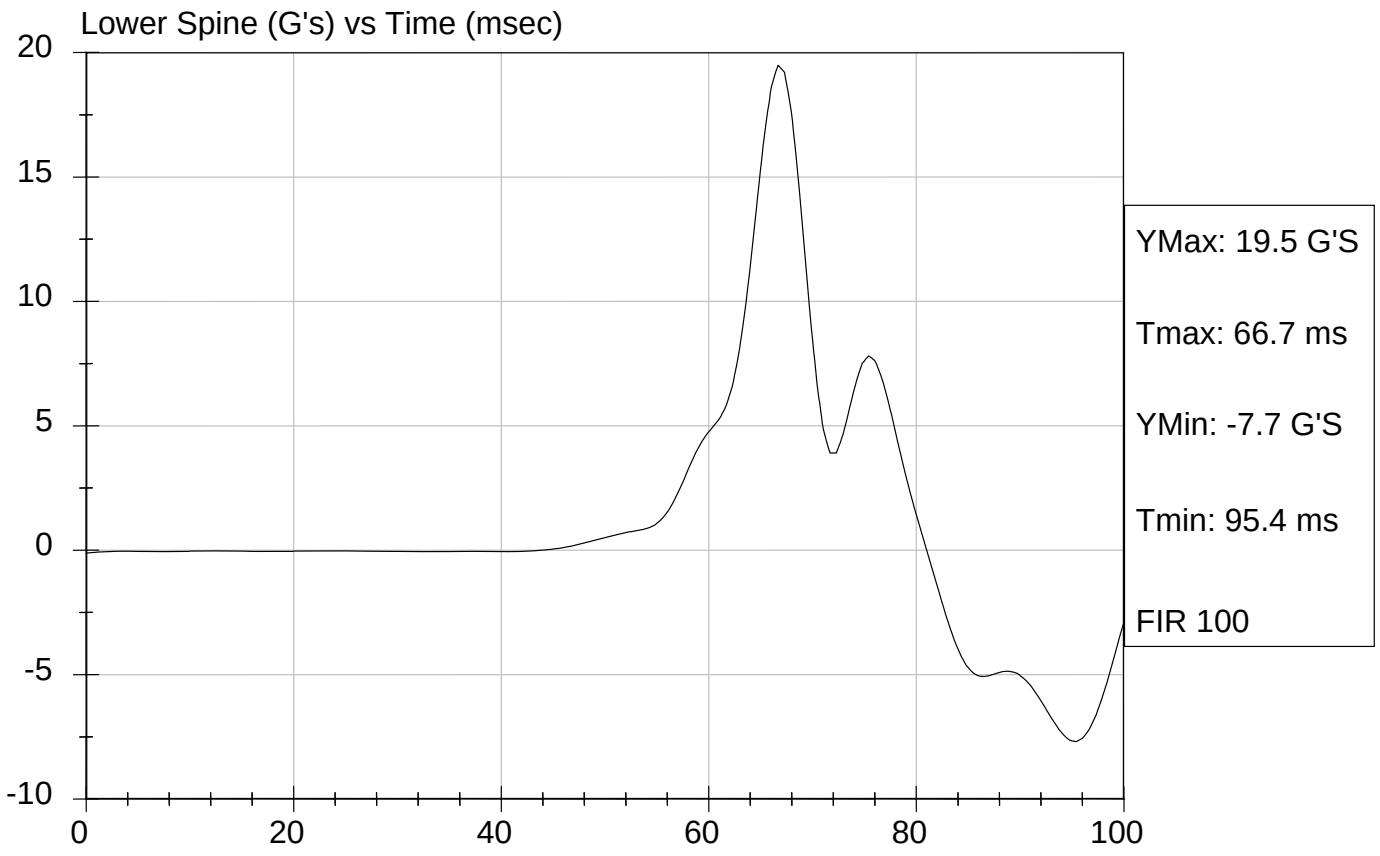
Test Date: 1/9/09
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D09002

Test Date: 1/9/09
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:** D09003

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	43	Pass
		Overall Test Results		Pass

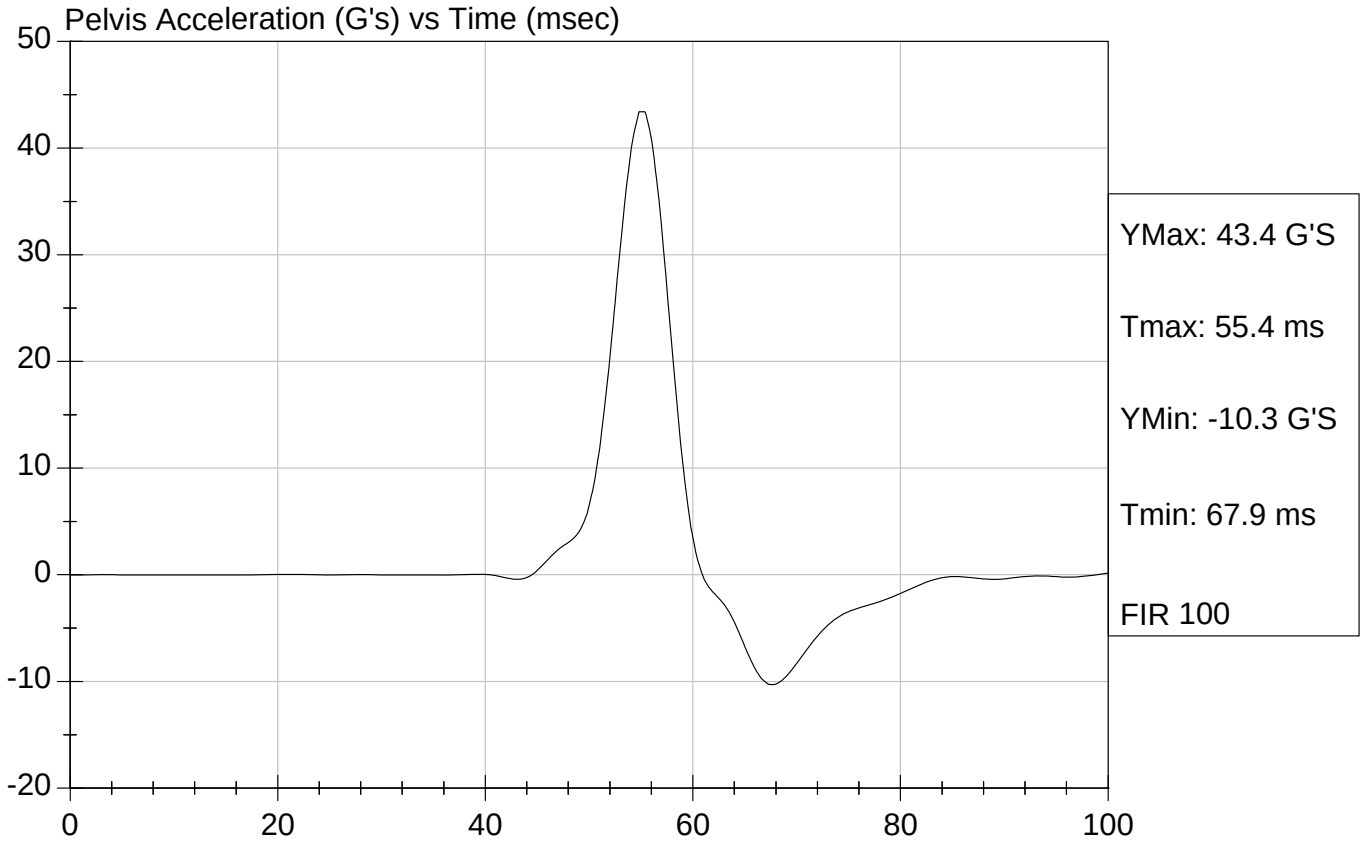
Jessica Hall
Laboratory Technician

1/9/09
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Component ID: D09003

Test Date: 1/9/09
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:** D09004

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force At 12.7 mm	N	104 -162	135	Pass
Force At 19 mm	N	163 - 222	191	Pass
Force At 25.4 mm	N	222 - 280	258	Pass
Force At 33 mm	N	325 - 391	350	Pass
		Overall Test Results		Pass

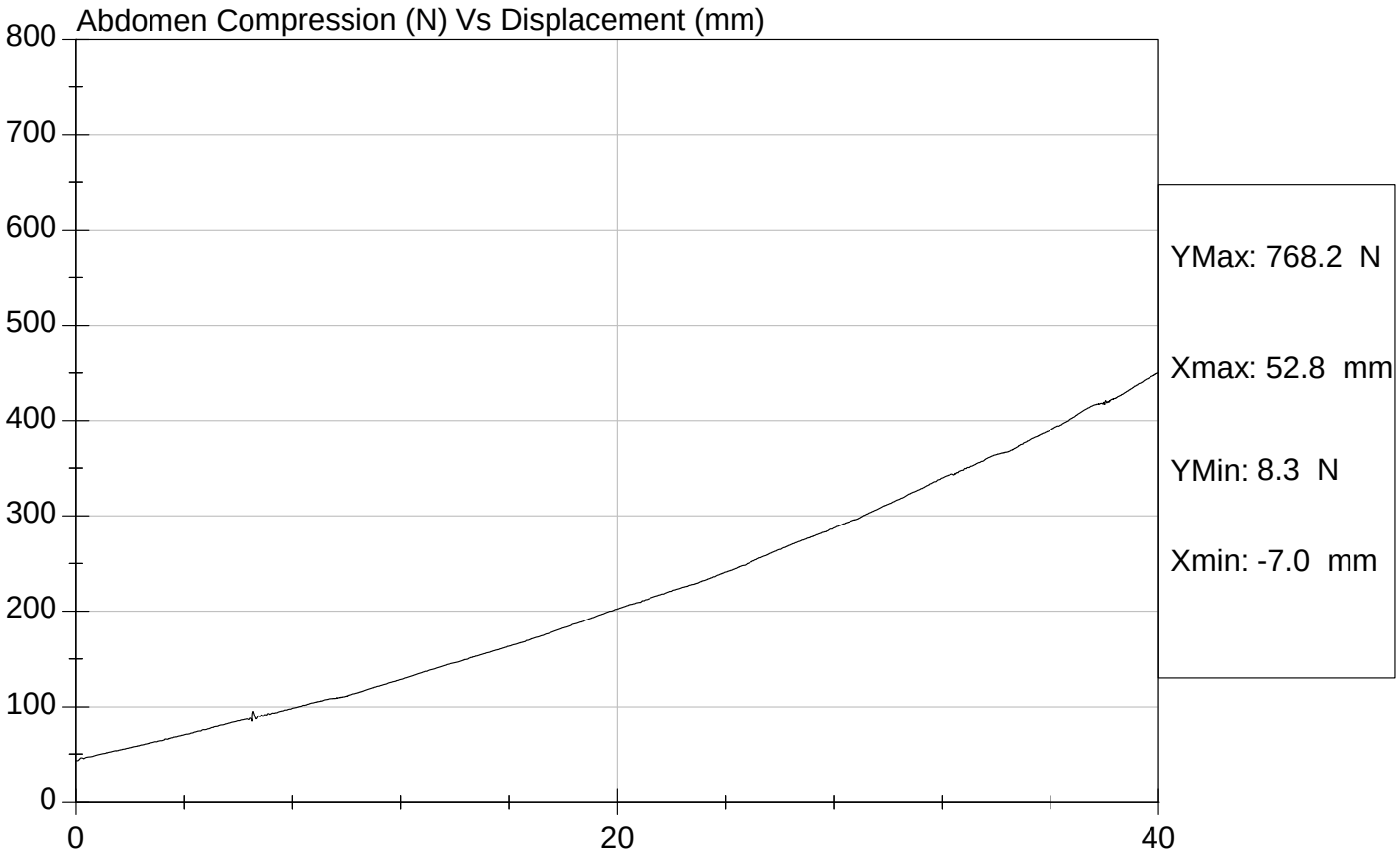
Jessica Hall
Laboratory Technician

1/12/08
Test Date

David Winkelbauer
Approved By

Test Description: Abdomen Compression Test Date: 1/12/08

Component: D09004 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:** D09005

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	118.6	Pass
Force At 30 deg	N	151.2 - 204.6	164.7	Pass
Force At 40 deg	N	204.6 - 258.0	218.1	Pass
Return Angle	Deg	12 Maximum	6	Pass
		Overall Test Results		Pass

Jessica Gall
Laboratory Technician

1/12/08
Test Date

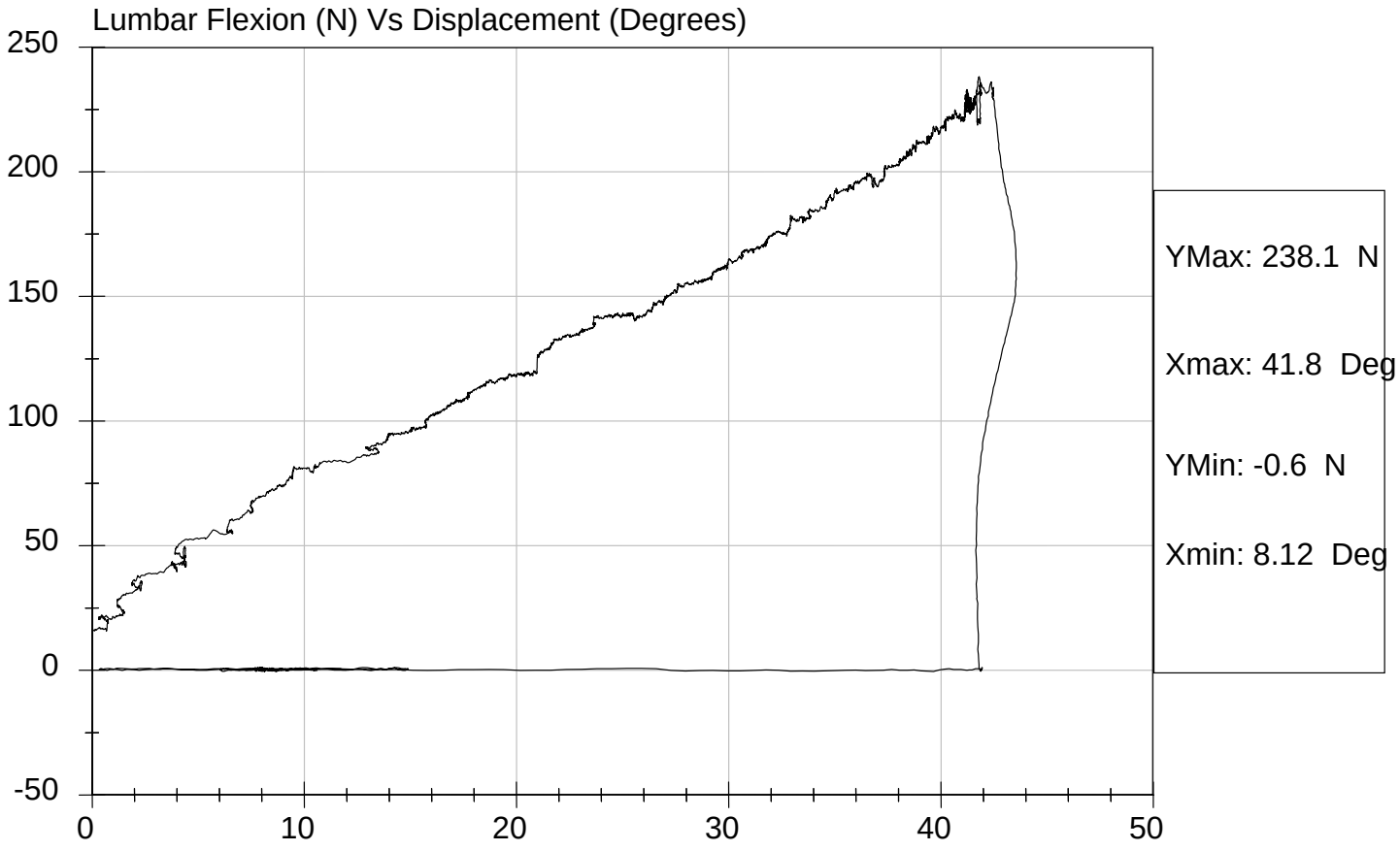
David Winkelbauer
Approved By

Test Description: Lumbar Flexion

Test Date: 1/12/08

Component: D09005

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:** D09009

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	18	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.44	Pass
	20 msec	m/s	4.12 to 5.10	4.82	Pass
	30 msec	m/s	5.73 to 7.01	6.53	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.77	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	73	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	77	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	61	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	16	Pass

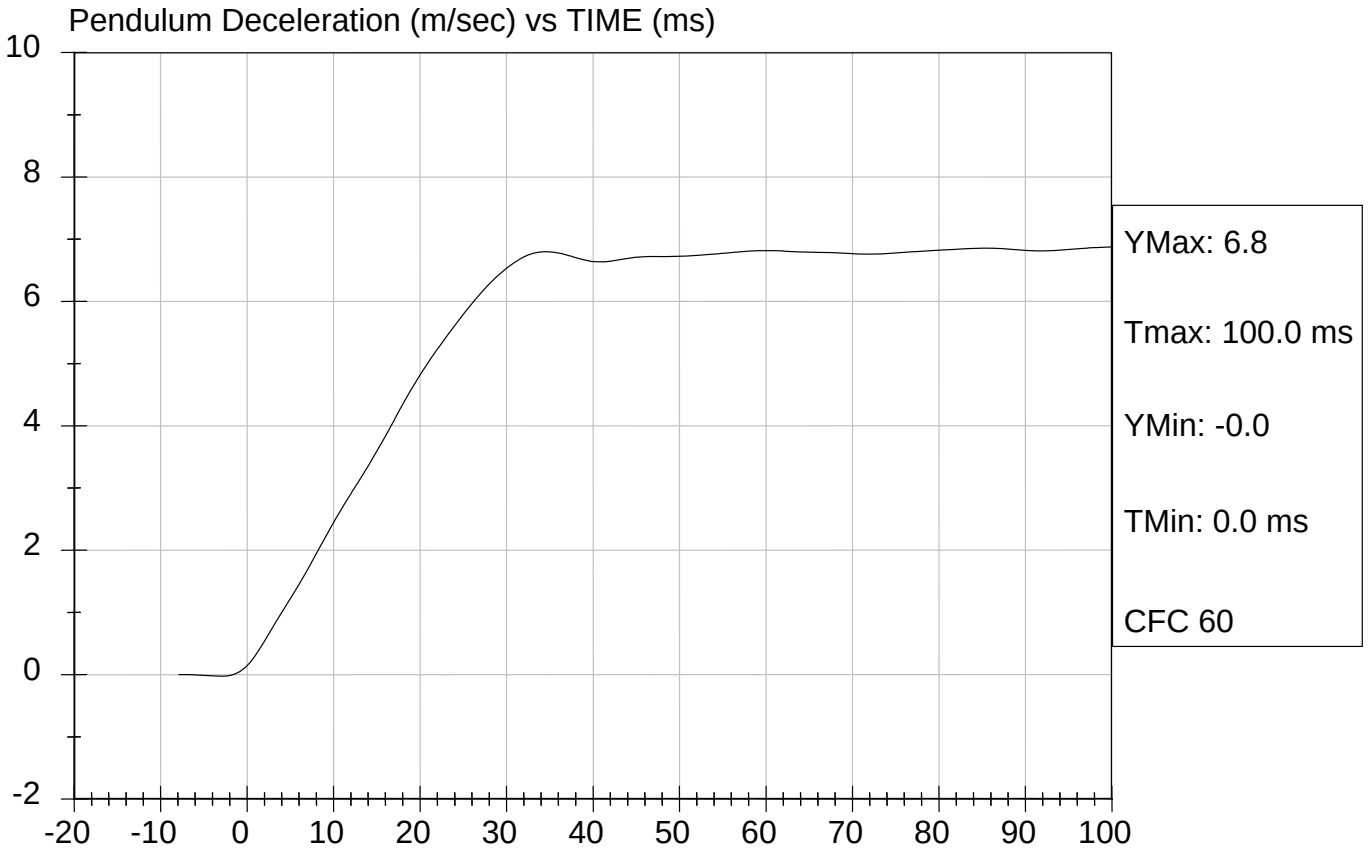
Jessica Gall
Laboratory Technician

1/12/08
Test Date

David Winkelbauer
Approved By

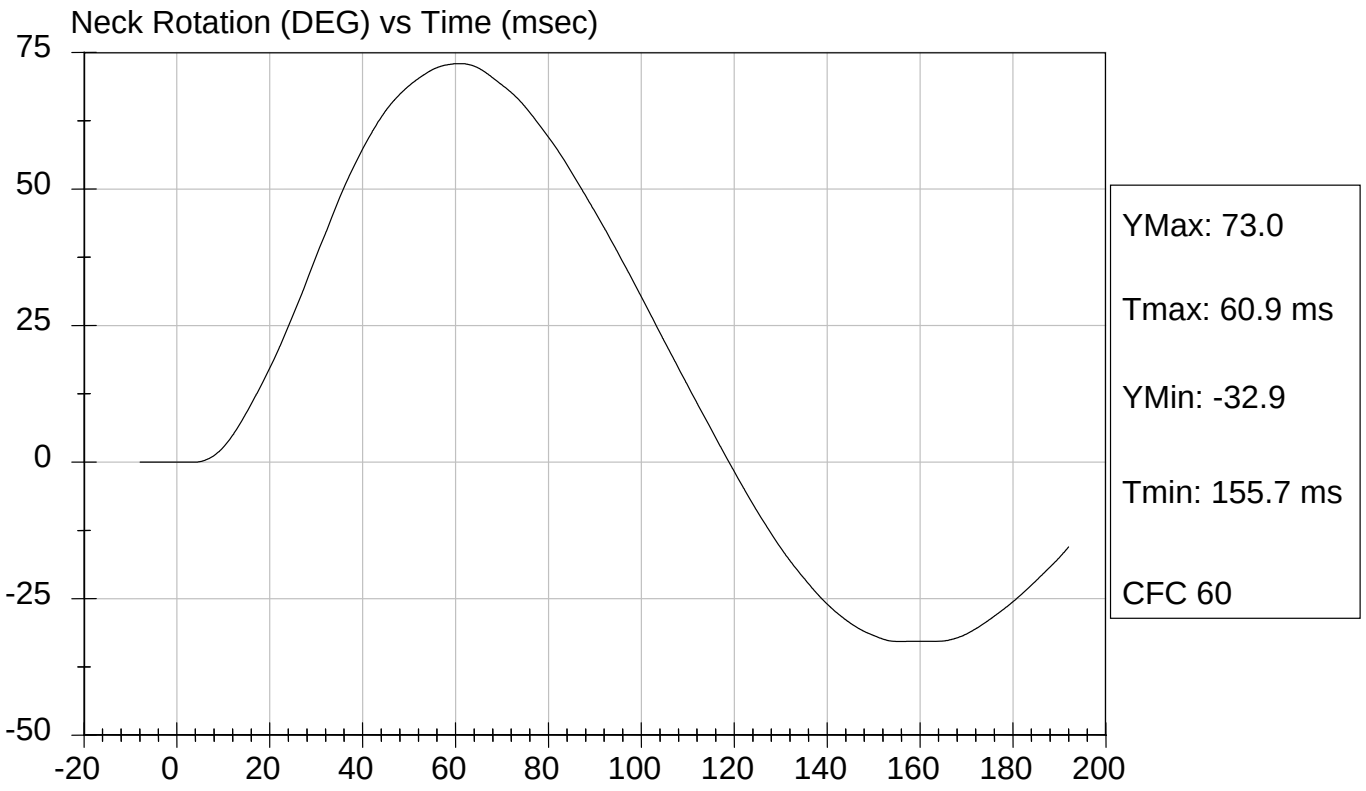
Test Desc: Neck Bending
Component ID: D09009

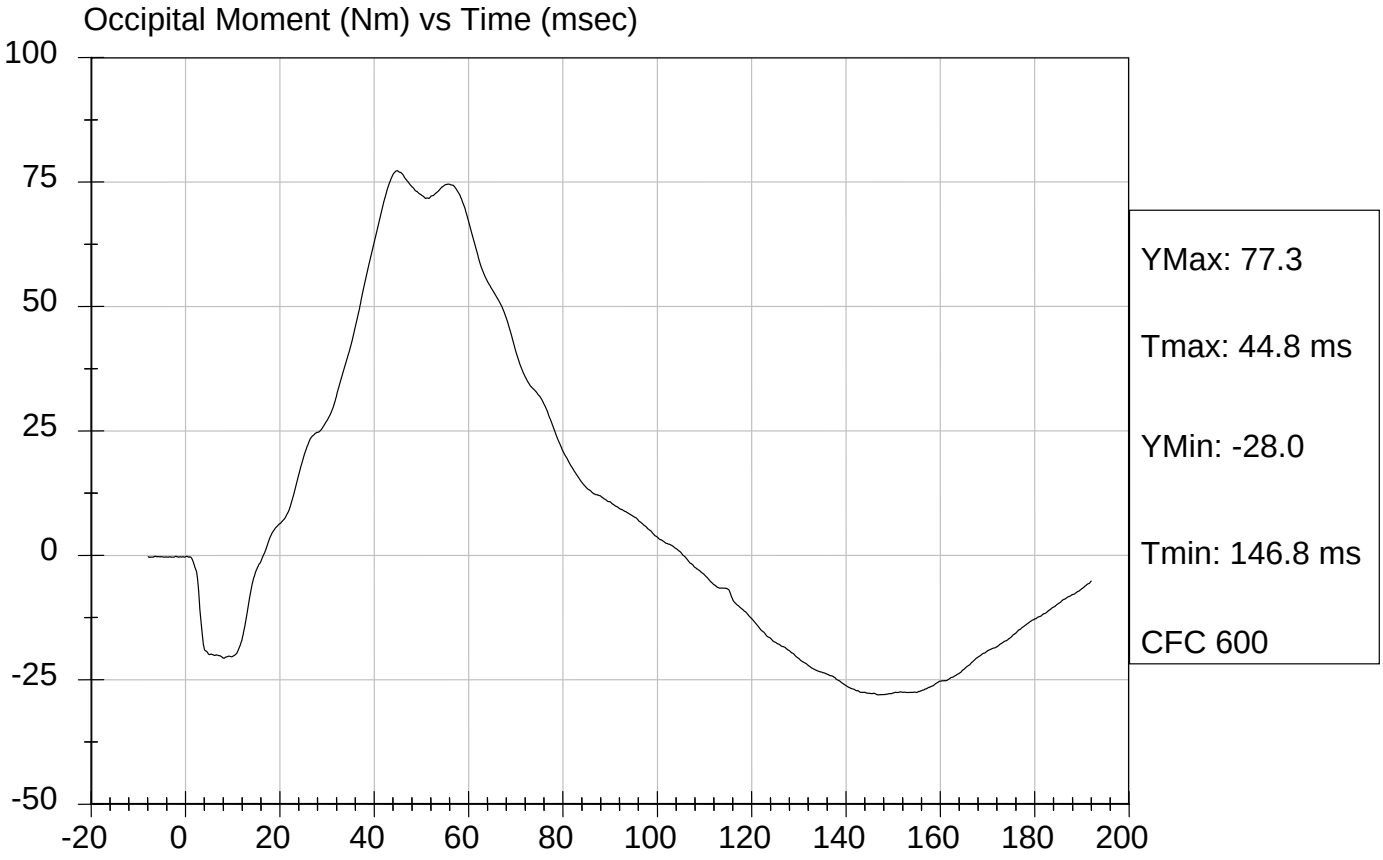
Test Date: 1/12/08
Speed: 23.15 ft/sec, 7.06 m/sec



Test Desc: Neck Bending
Component ID: D09009

Test Date: 1/12/08
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

9/24/08
Test Date

David Winkelbauer
Approved By

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:** D08252

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 Gall
Laboratory Technician

8/29/08
Test Date

David Winkelbauer
Approved By

SID/HIII Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration (Lateral)

ATD Serial No: 272 **Test I.D:** D083021

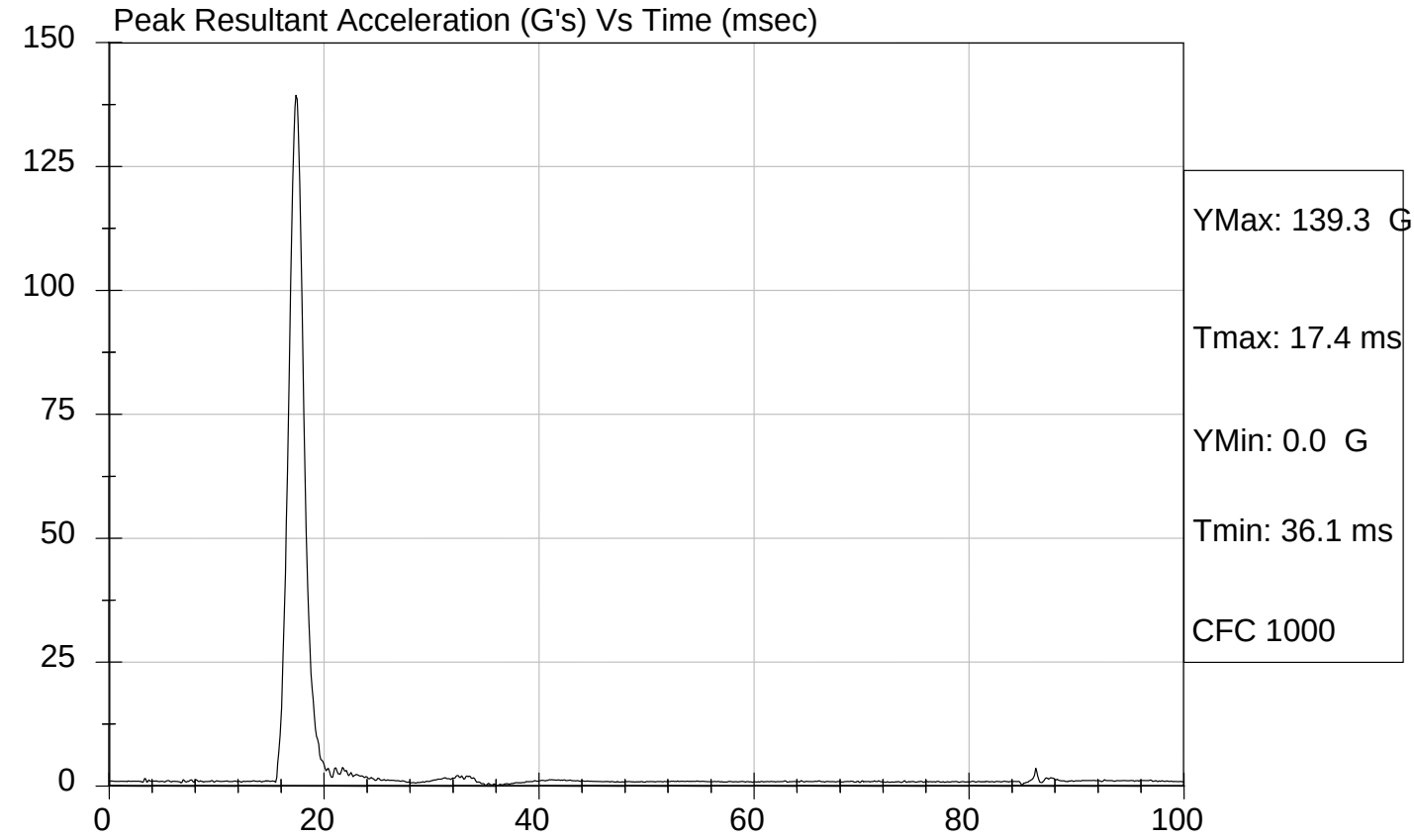
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	120 to 150	139	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-12.8	Pass
		Overall Test Results		Pass

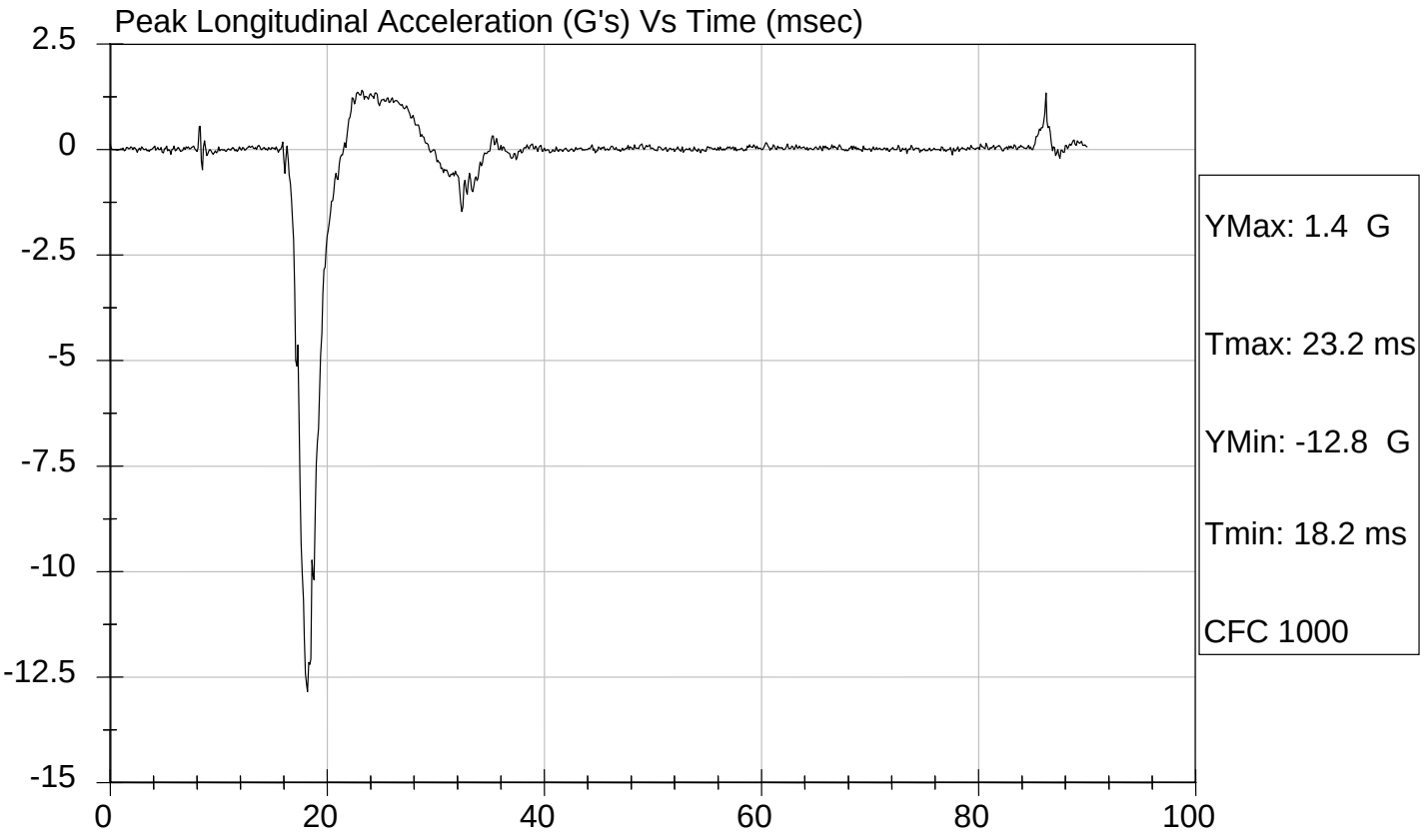
Jessica Gall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

	Test Description: Head Drop	Test Date: 11/17/08
	Component: D083021	Speed: 0 ft/s, 0 m/s





SID/HIII Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 272 **Test I.D:** D083022

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	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	37	Pass
Lower Spine	G's	15 - 22	20	Pass
		Overall Test Results		Pass

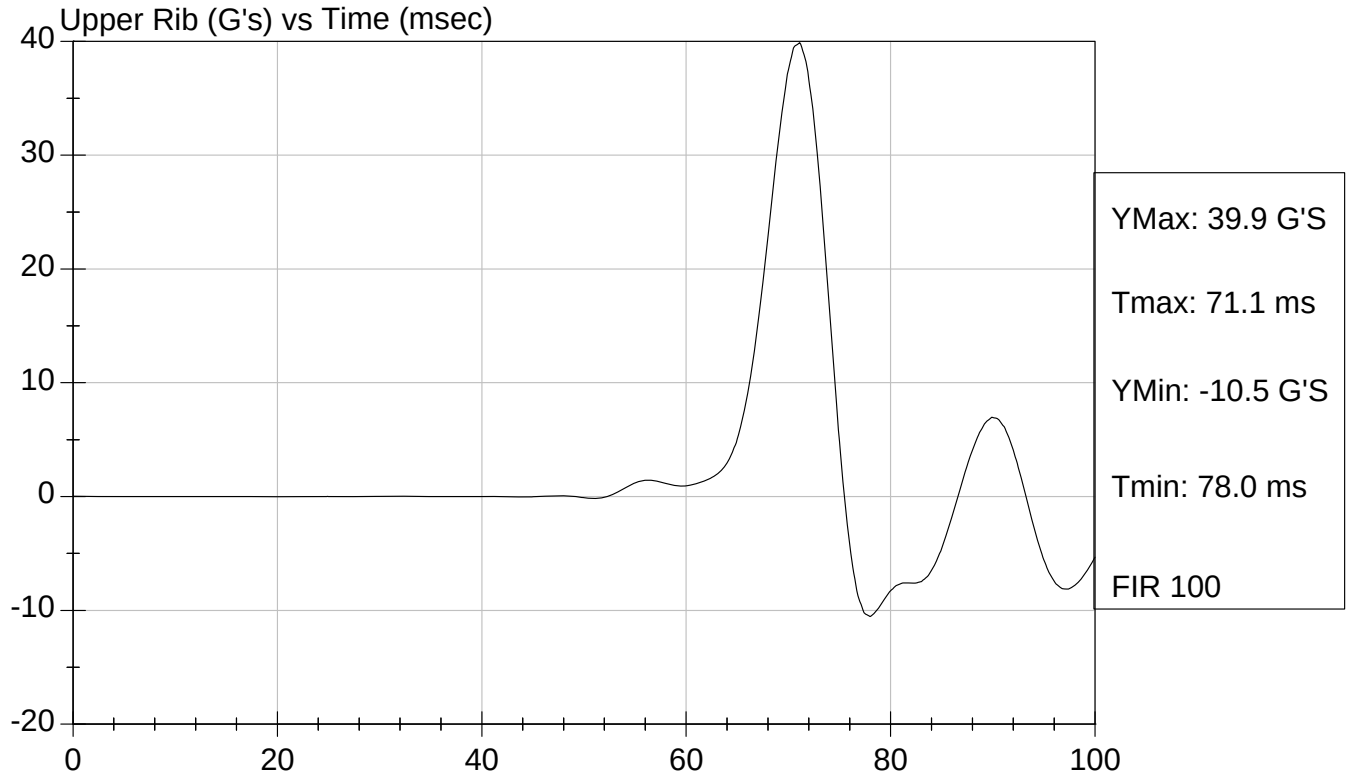
Jessica Hall
Laboratory Technician

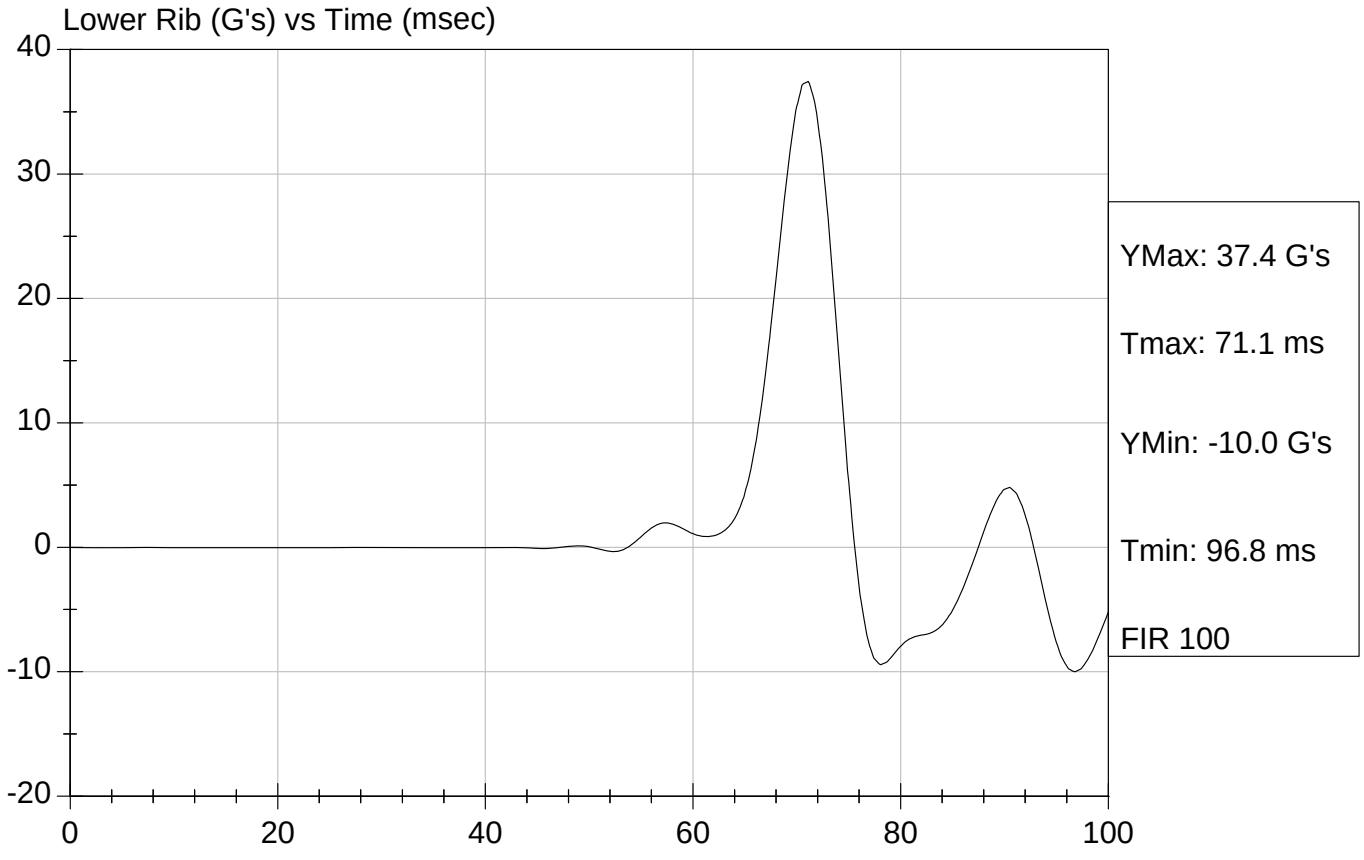
11/17/08
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D083022

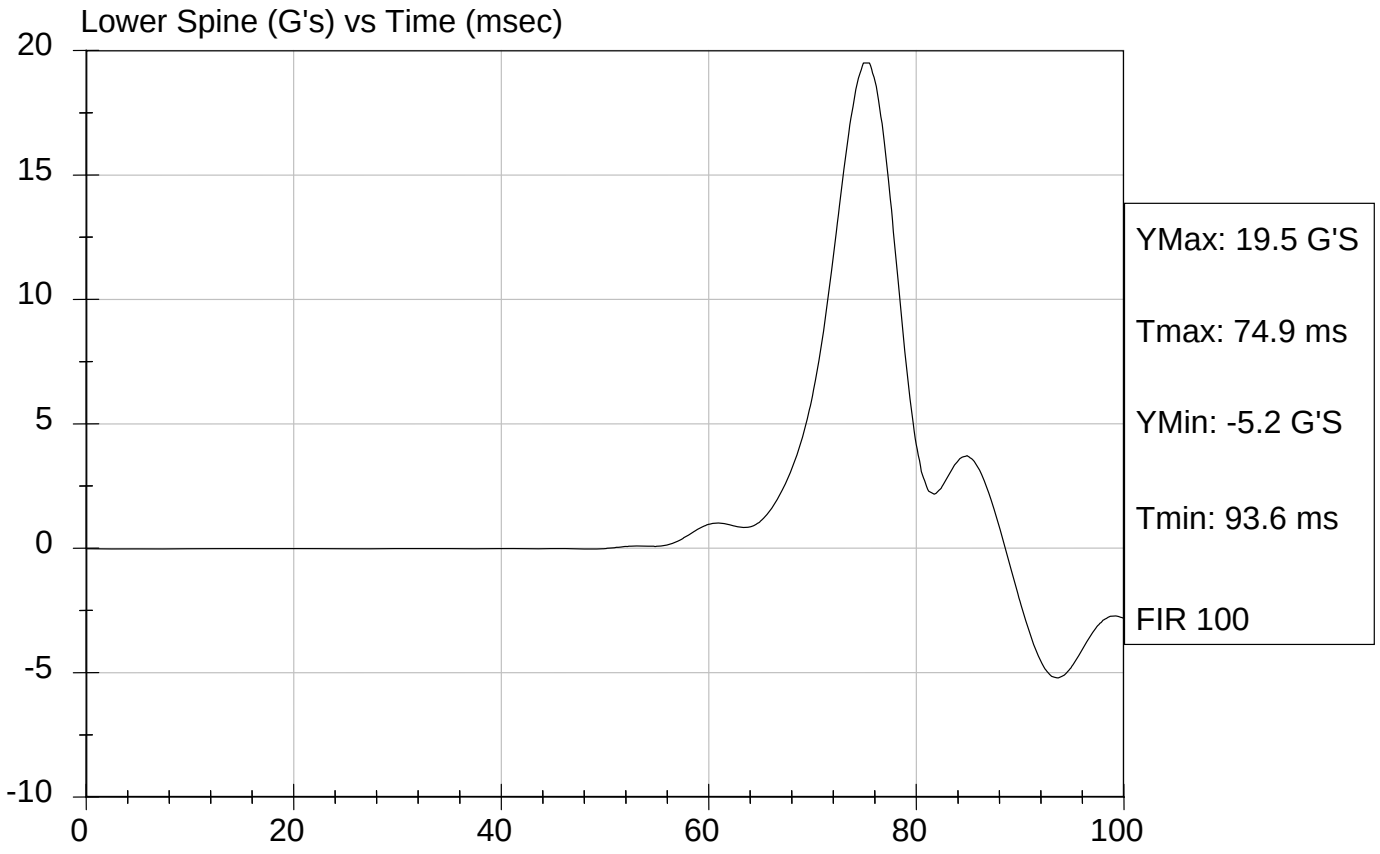
Test Date: 11/17/08
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D083022

Test Date: 11/17/08
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:** D083023

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	44	Pass
		Overall Test Results		Pass

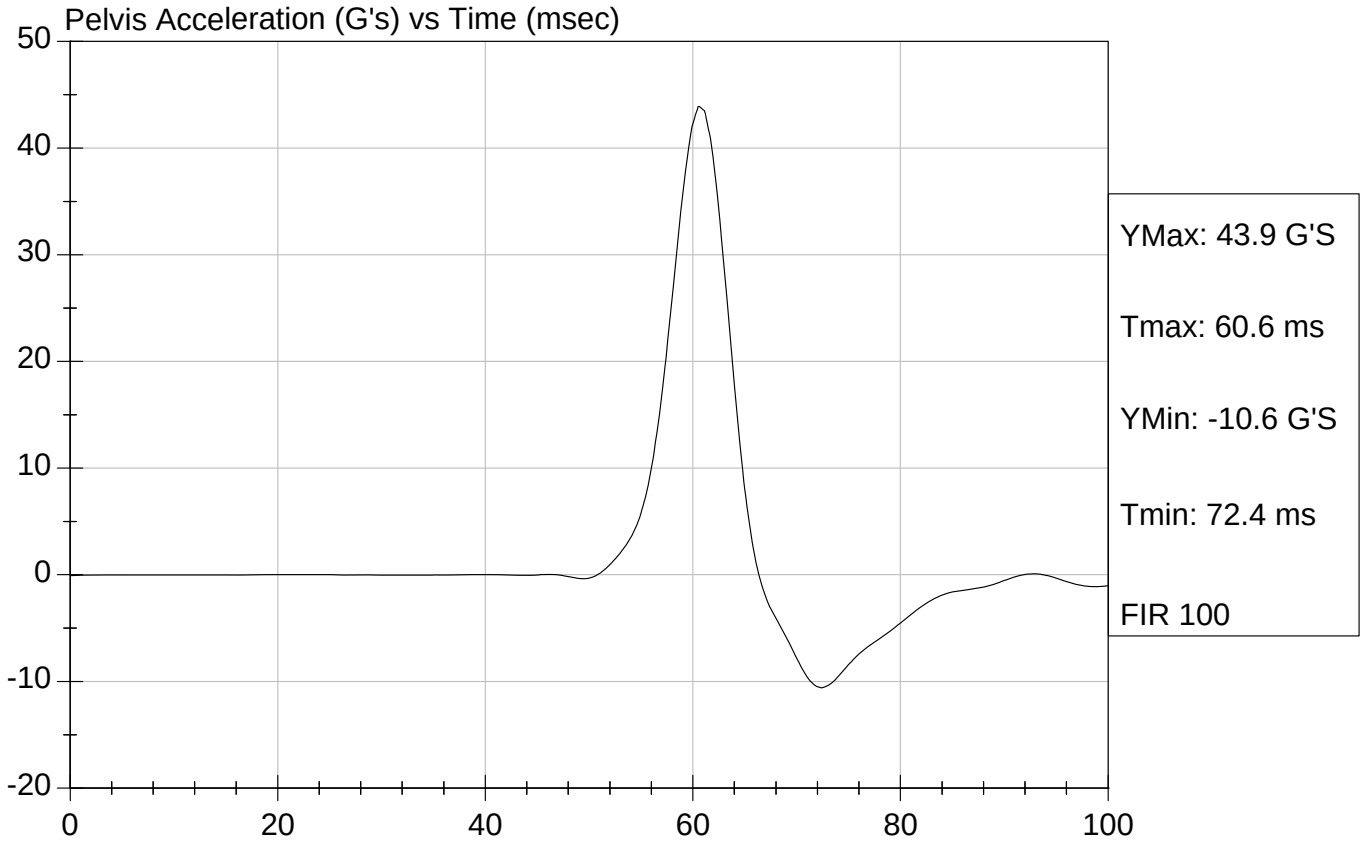
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Component ID: D083023

Test Date: 11/17/08
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:** D083024

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force At 12.7 mm	N	104 -162	131	Pass
Force At 19 mm	N	163 - 222	179	Pass
Force At 25.4 mm	N	222 - 280	245	Pass
Force At 33 mm	N	325 - 391	336	Pass
		Overall Test Results		Pass

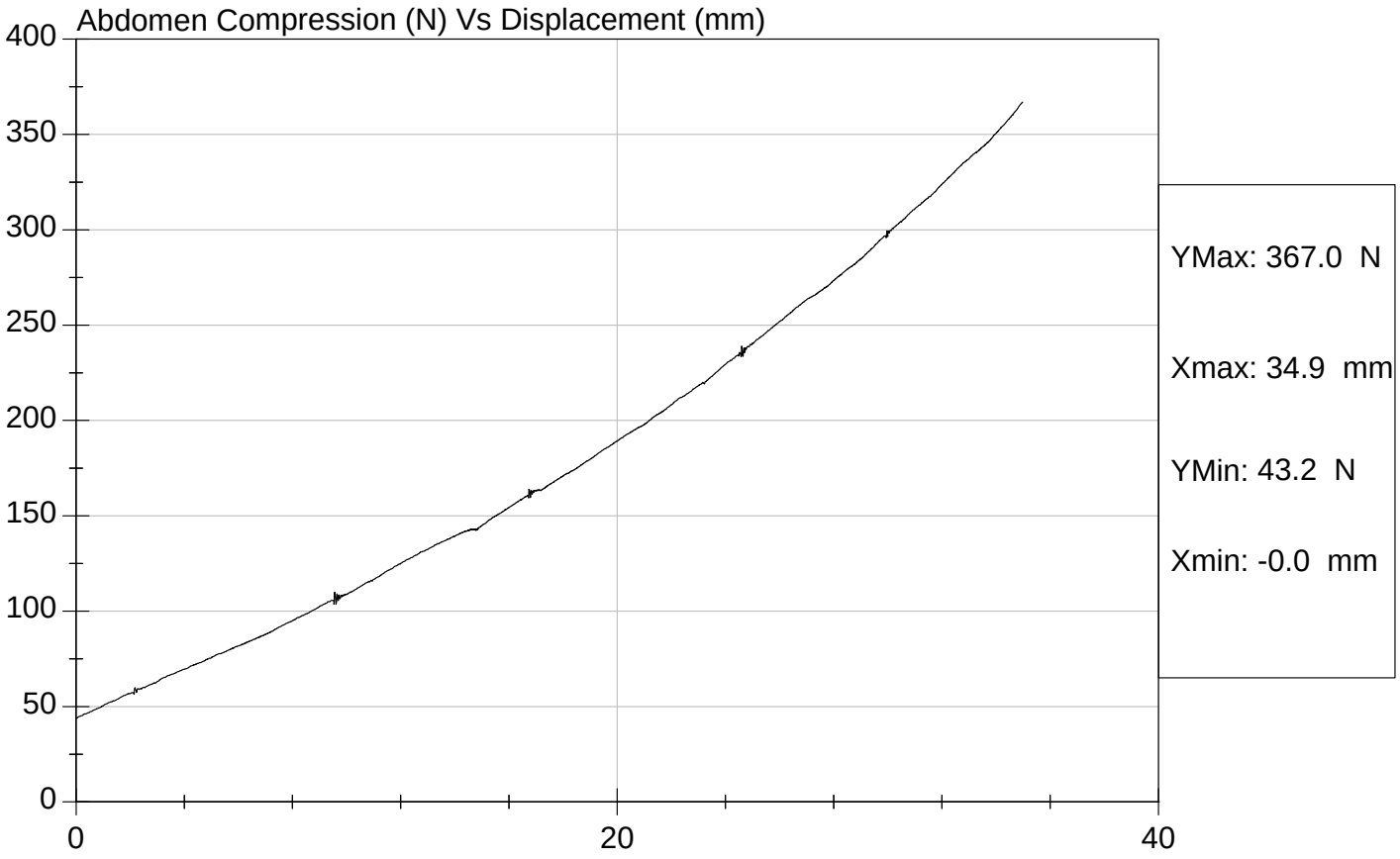
Jessica Gall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

Test Description: Abdomen Compression Test Date: 11/17/08

Component: D083024 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:** D083025

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	131.6	Pass
Force At 30 deg	N	151.2 - 204.6	176.7	Pass
Force At 40 deg	N	204.6 - 258.0	244.4	Pass
Return Angle	Deg	12 Maximum	5	Pass
		Overall Test Results		Pass

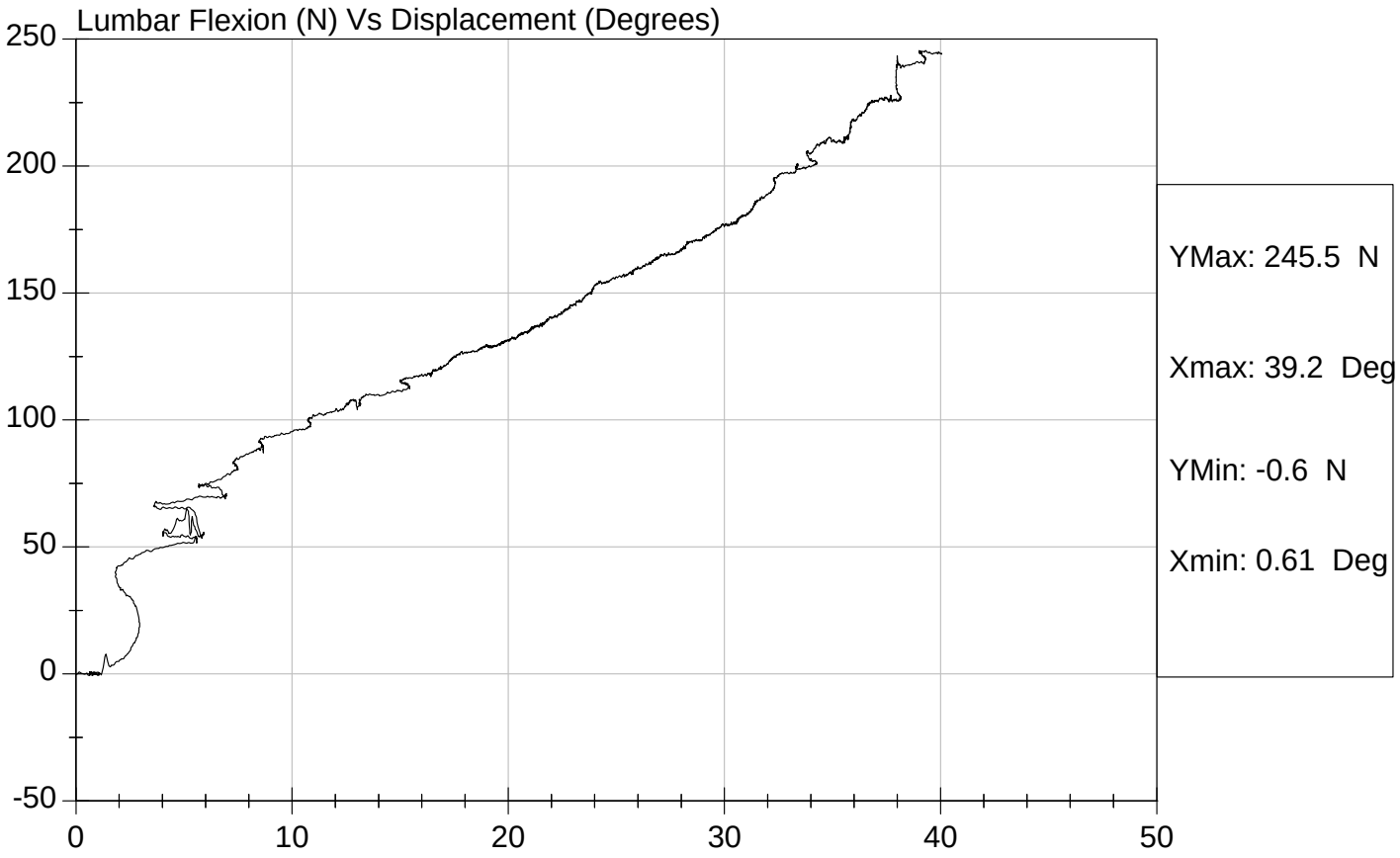
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

Test Description: Lumbar Flexion | Test Date: 11/17/08

Component: D083025 | 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:** D083029

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.44	Pass
	20 msec	m/s	4.12 to 5.10	4.71	Pass
	30 msec	m/s	5.73 to 7.01	6.45	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.82	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	72	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	76	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	58	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	13	Pass

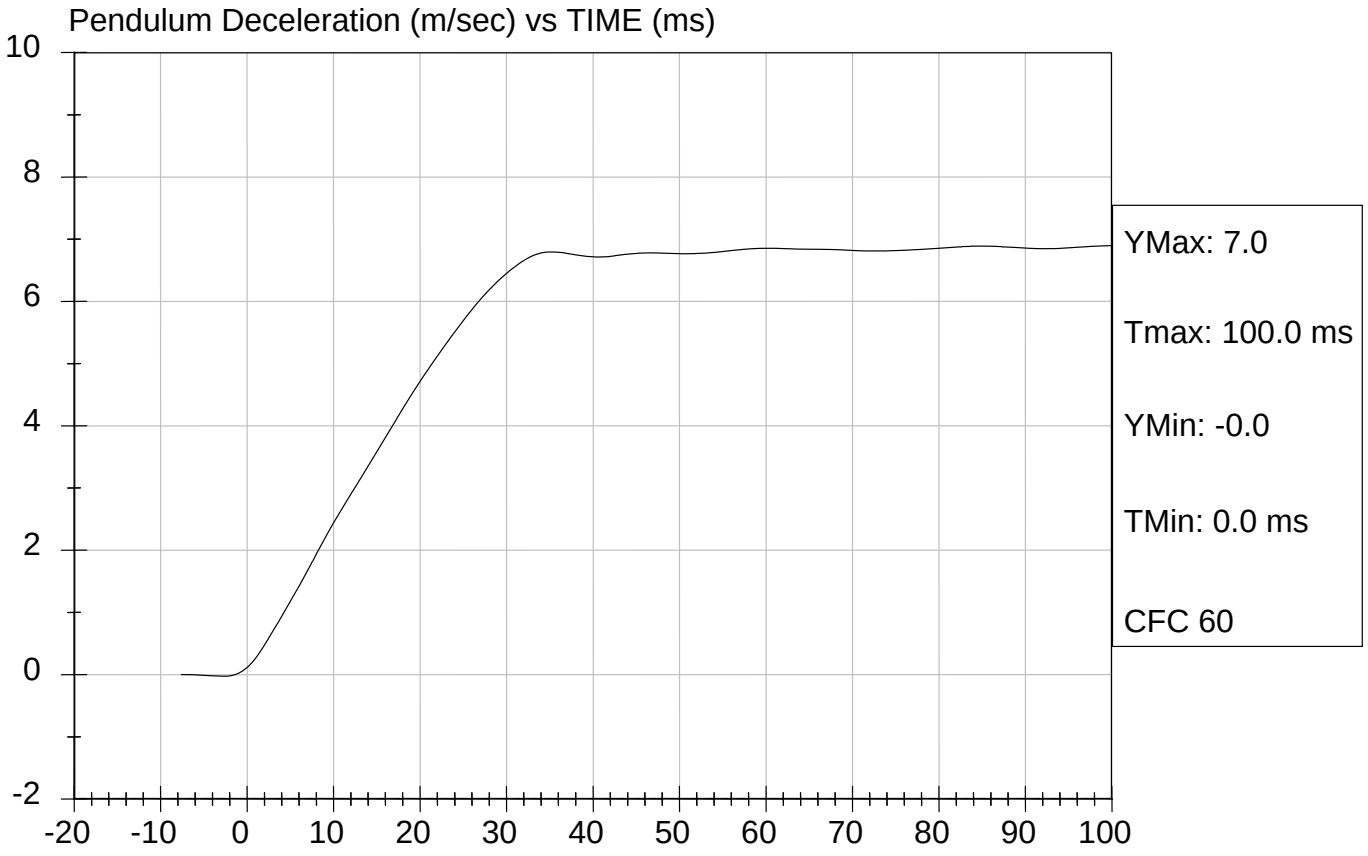
Jessica Hall
Laboratory Technician

11/17/08
Test Date

David Winkelbauer
Approved By

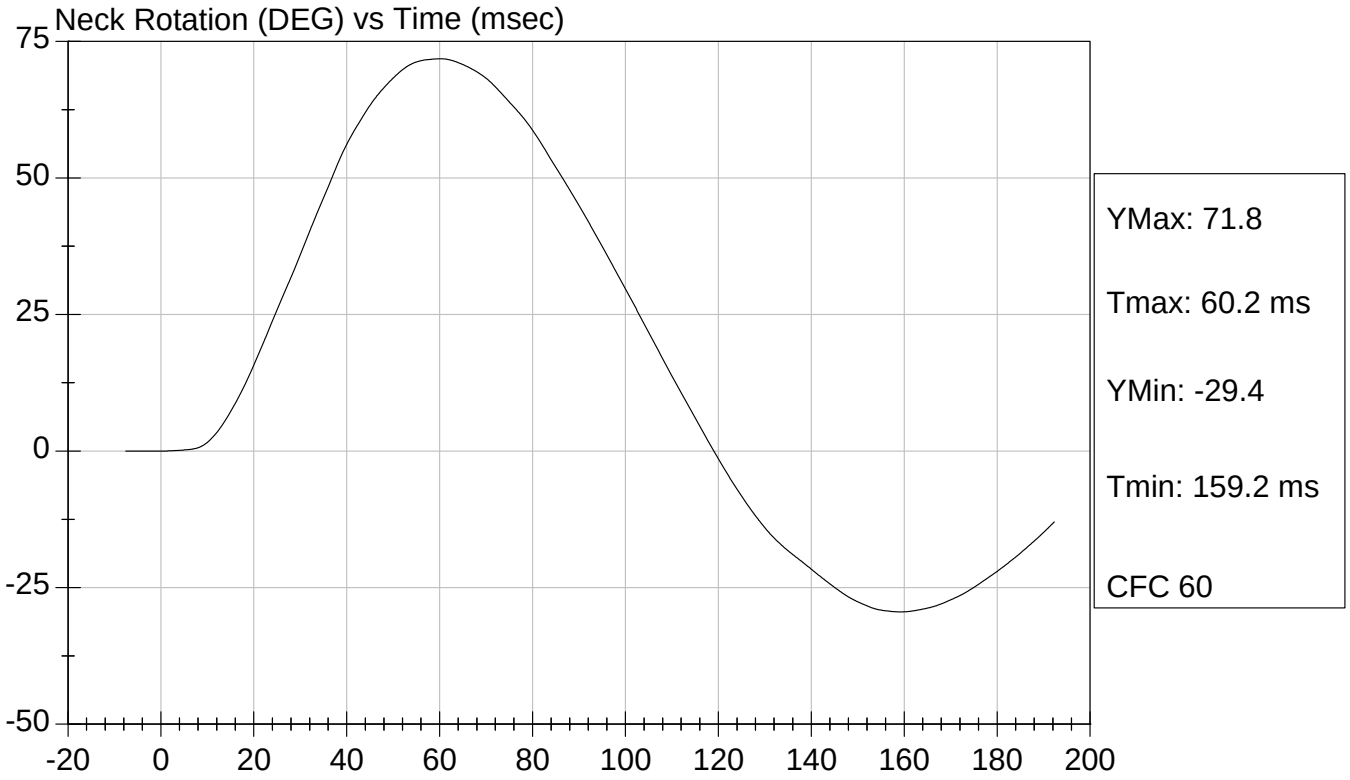
Test Desc: Neck Bending
Component ID: D083029

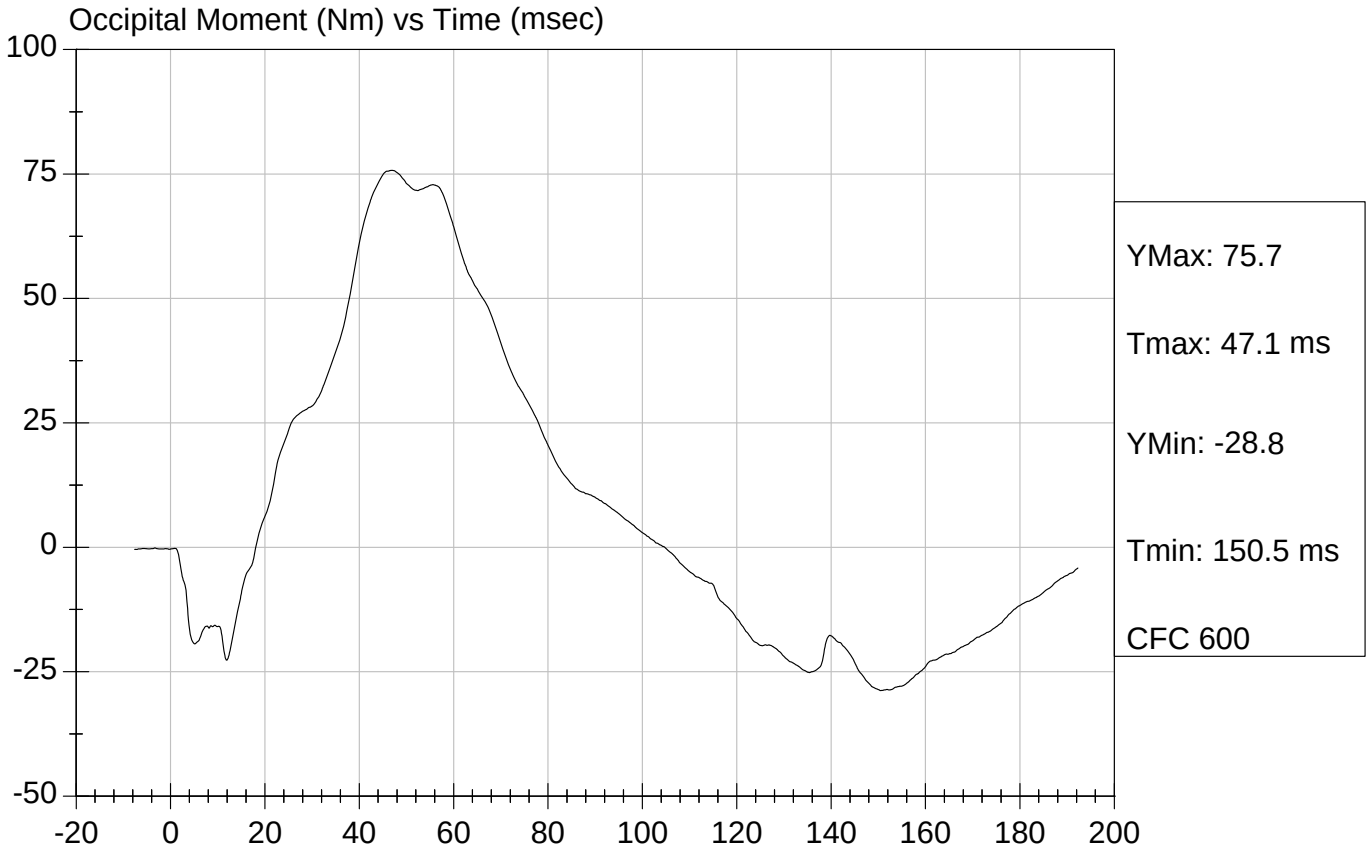
Test Date: 11/17/08
Speed: 23.15 ft/sec, 7.06 m/sec



Test Desc: Neck Bending
Component ID: D083029

Test Date: 11/17/08
Speed: 23.15 ft/sec, 7.06 m/sec





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:** D09011

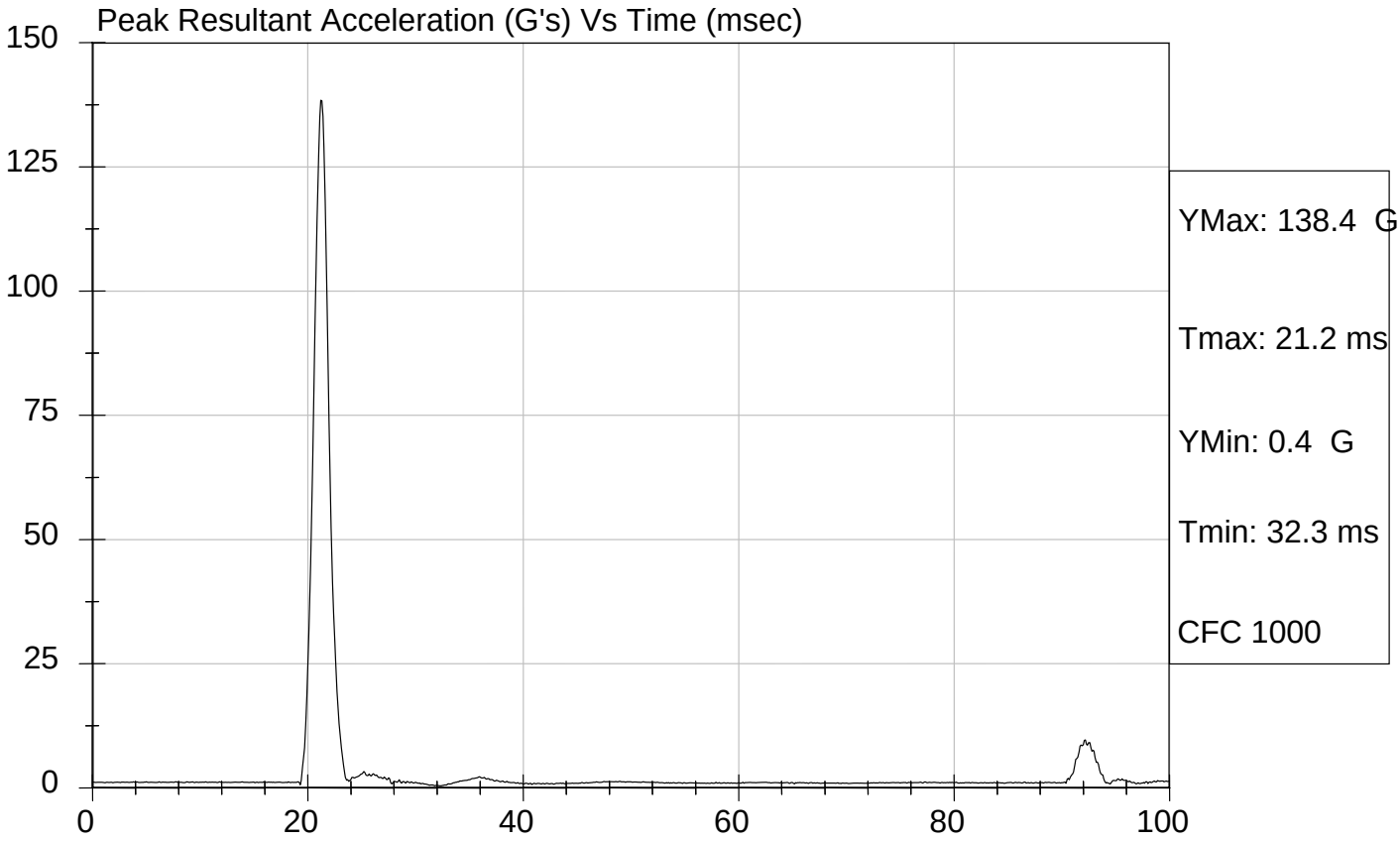
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Peak Resultant Acceleration	G's	120 to 150	138	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-9.4	Pass
		Overall Test Results		Pass

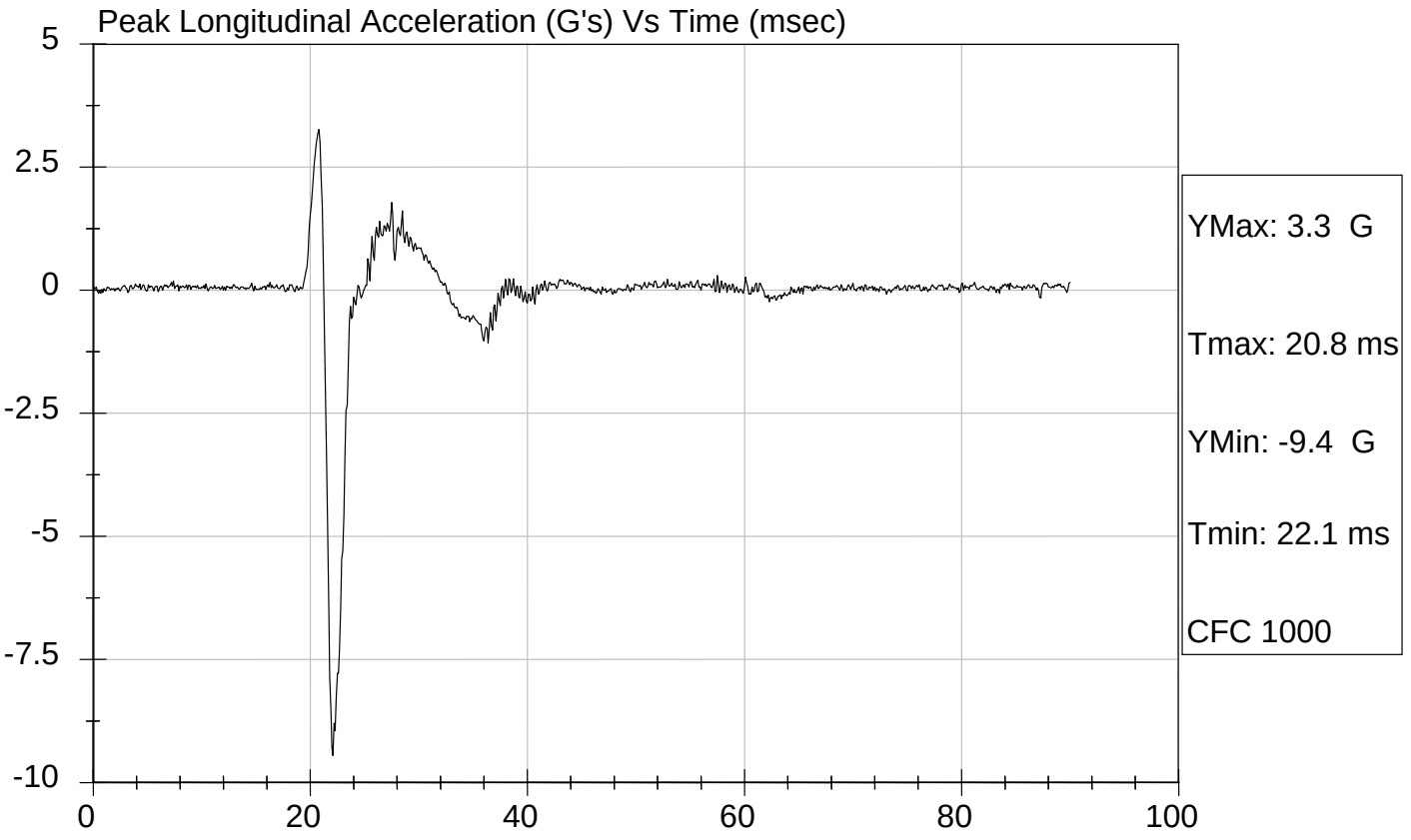
Jessica Hall
Laboratory Technician

1/12/08
Test Date

David Winkelbauer
Approved By

	Test Description: Head Drop	Test Date: 1/12/08
	Component: D09011	Speed: 0 ft/s, 0 m/s





SID/HIII Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 272 **Test I.D:** D09012

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	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	38	Pass
Lower Spine	G's	15 - 22	18	Pass
		Overall Test Results		Pass

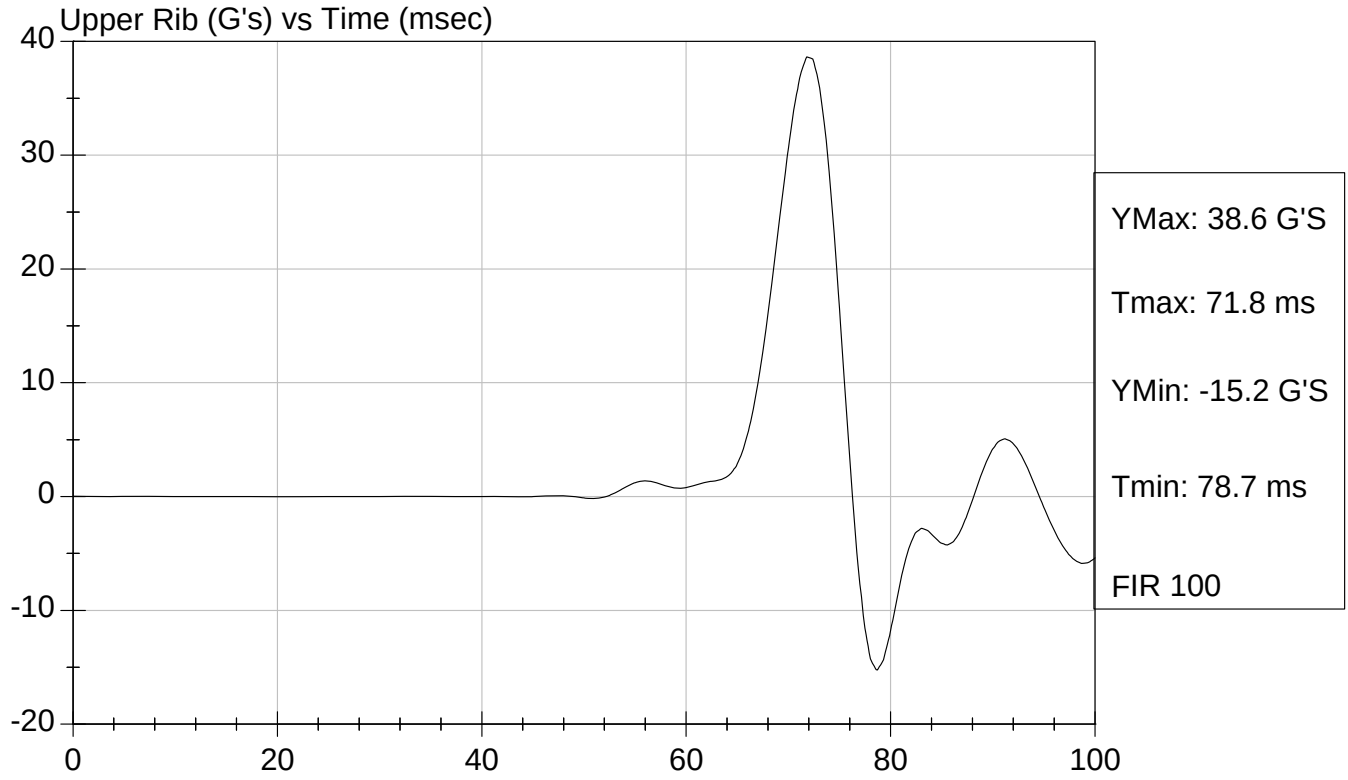
Jessica Gall
Laboratory Technician

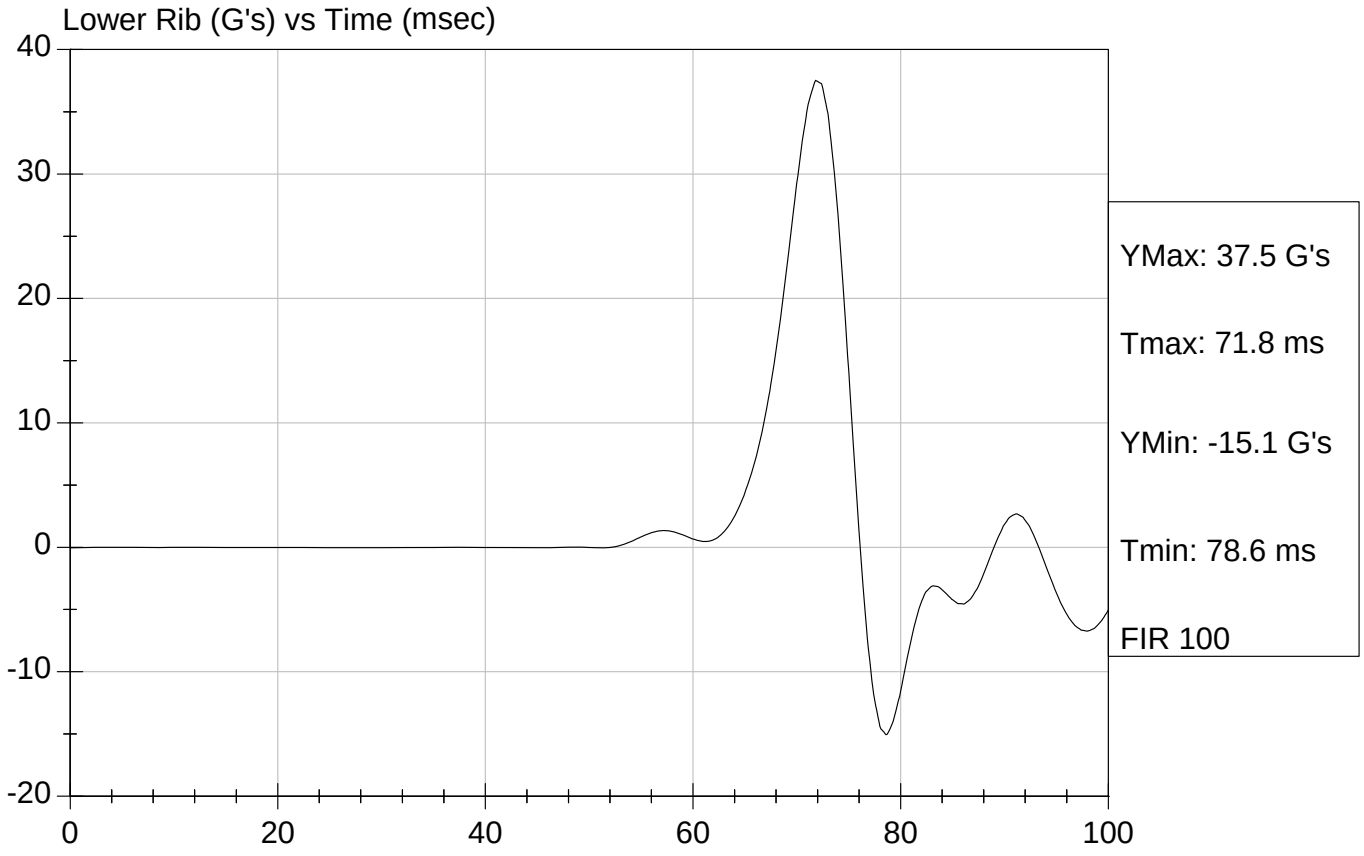
1/9/09
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D09012

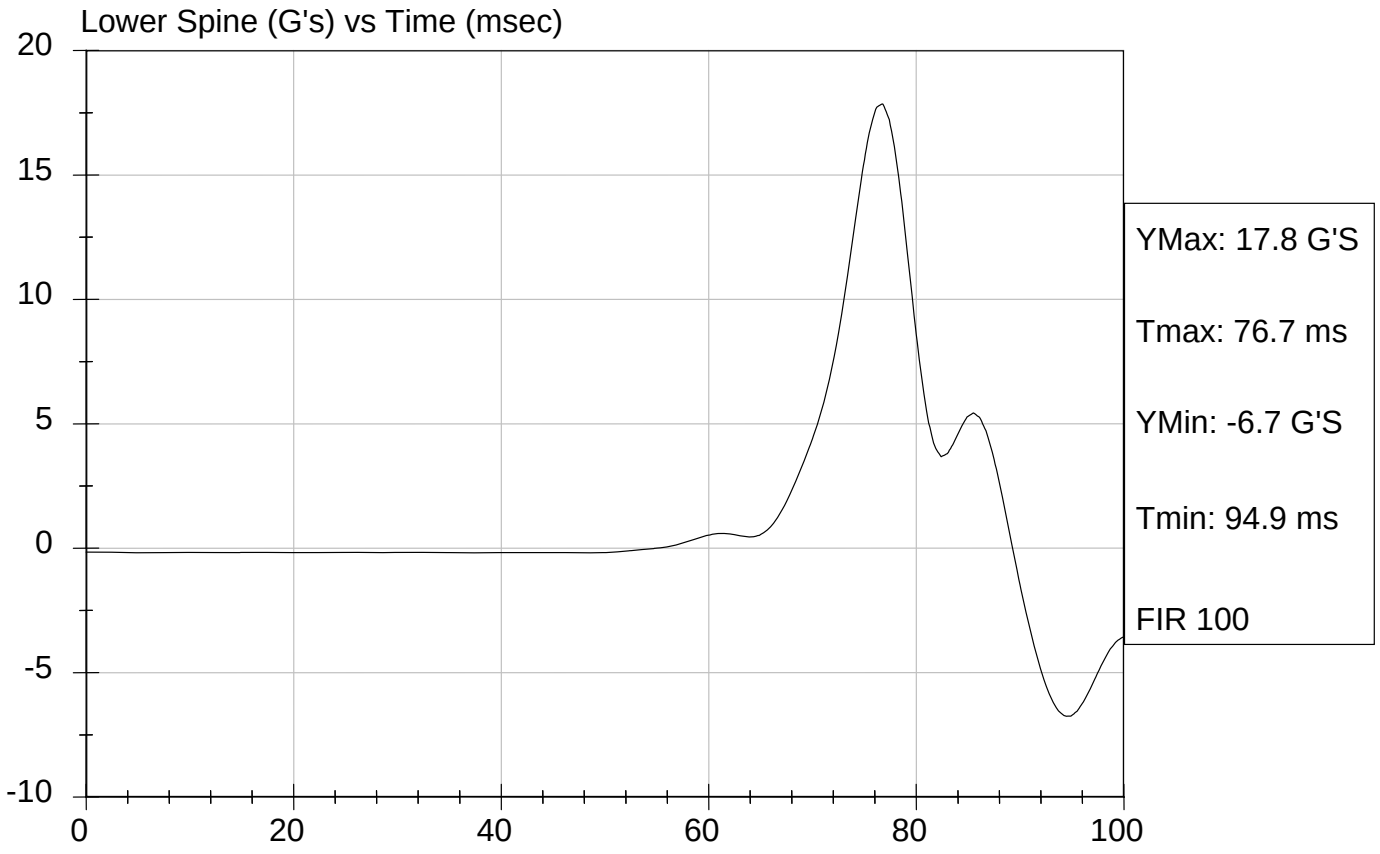
Test Date: 1/9/09
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D09012

Test Date: 1/9/09
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:** D09013

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	44	Pass
		Overall Test Results		Pass

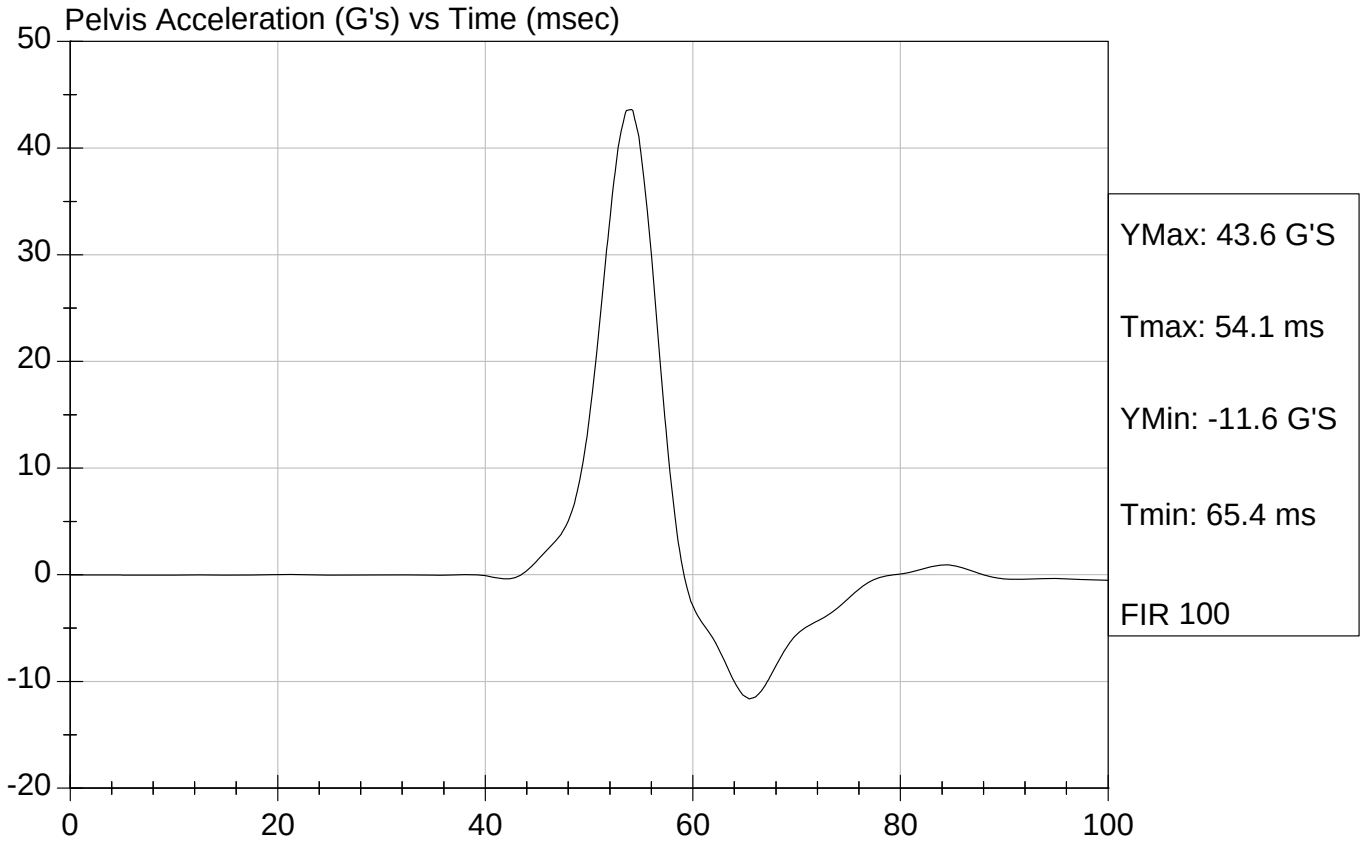
Jessica Hall
Laboratory Technician

1/9/09
Test Date

David Winkelbauer
Approved By

Test Desc: Pelvis Impact
Component ID: D09013

Test Date: 1/9/09
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:** D09014

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Force At 12.7 mm	N	104 -162	128	Pass
Force At 19 mm	N	163 - 222	176	Pass
Force At 25.4 mm	N	222 - 280	239	Pass
Force At 33 mm	N	325 - 391	345	Pass
		Overall Test Results		Pass

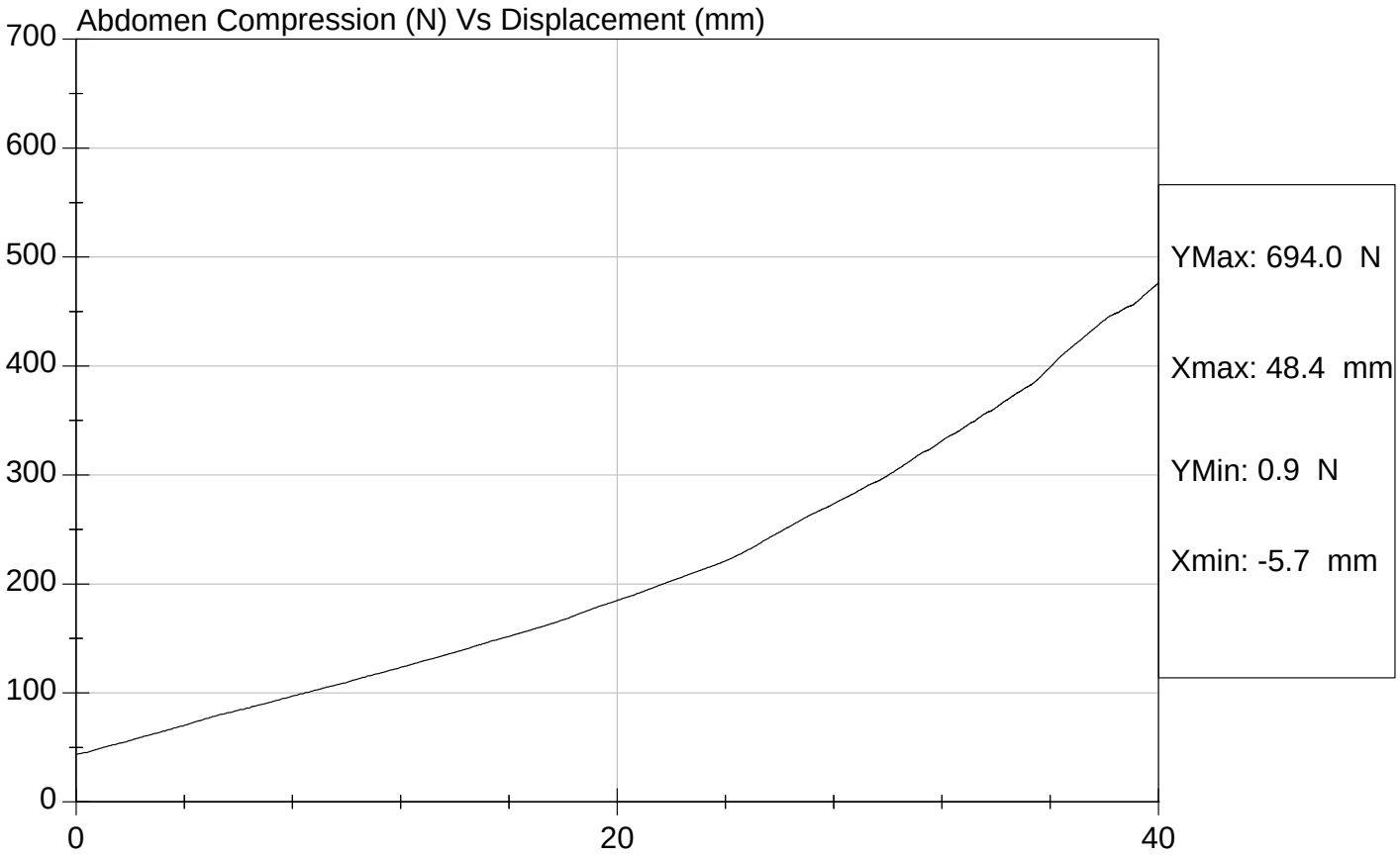
Jessica Gall
Laboratory Technician

1/12/08
Test Date

David Winkelbauer
Approved By

Test Description: Abdomen Compression Test Date: 1/12/08

Component: D09014 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:** D09015

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	143.8	Pass
Force At 30 deg	N	151.2 - 204.6	183.1	Pass
Force At 40 deg	N	204.6 - 258.0	228.6	Pass
Return Angle	Deg	12 Maximum	6	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

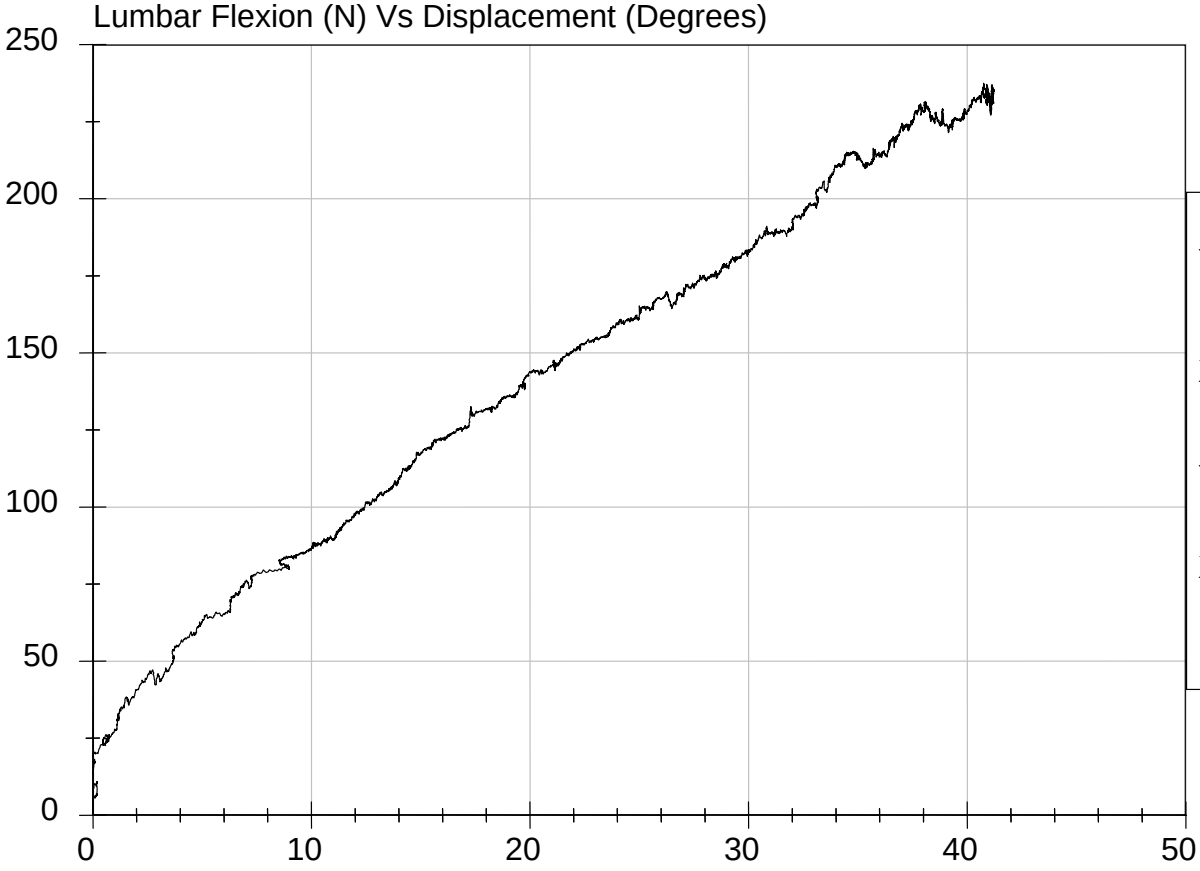
1/12/08
Test Date

David Winkelbauer
Approved By

Test Description: Lumbar Flexion | Test Date: 1/12/08

Component: D09015 | Speed: 0 ft/sec, 0 m/sec

Lumbar Flexion (N) Vs Displacement (Degrees)



YMax: 237.4 N

Xmax: 40.7 Deg

YMin: 0.0 N

Xmin: 0.00 Deg

SID/HIII Calibration Data Sheet

Side Impact Dummy

Neck Pendulum Test

ATD Serial No: 272 **Test I.D:** D09019

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	18	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.45	Pass
	20 msec	m/s	4.12 to 5.10	4.71	Pass
	30 msec	m/s	5.73 to 7.01	6.44	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.74	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	70	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	62	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	78	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	58	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	14	Pass

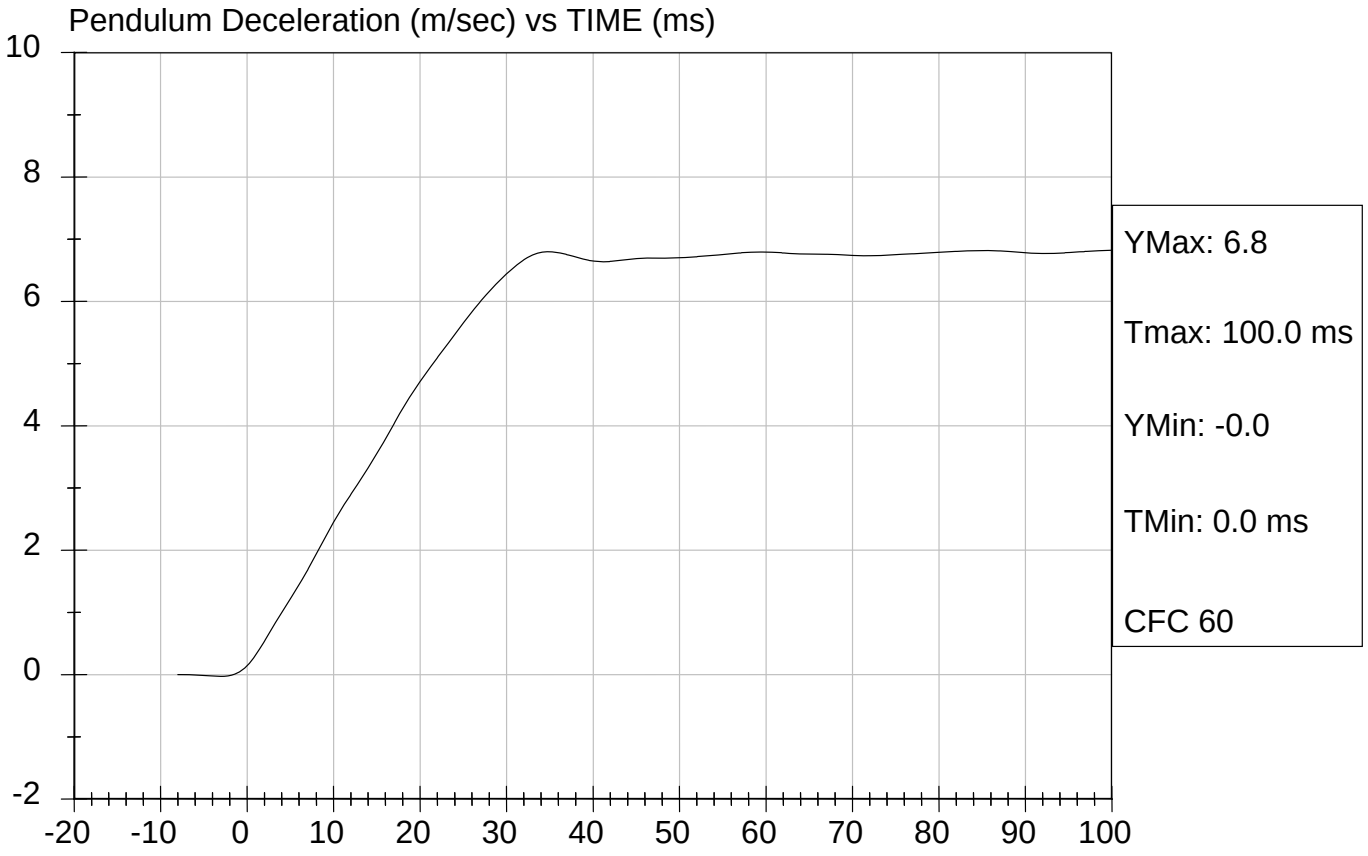
Jessica Hall
Laboratory Technician

1/12/09
Test Date

David Winkelbauer
Approved By

Test Desc: Neck Bending
Component ID: D09019

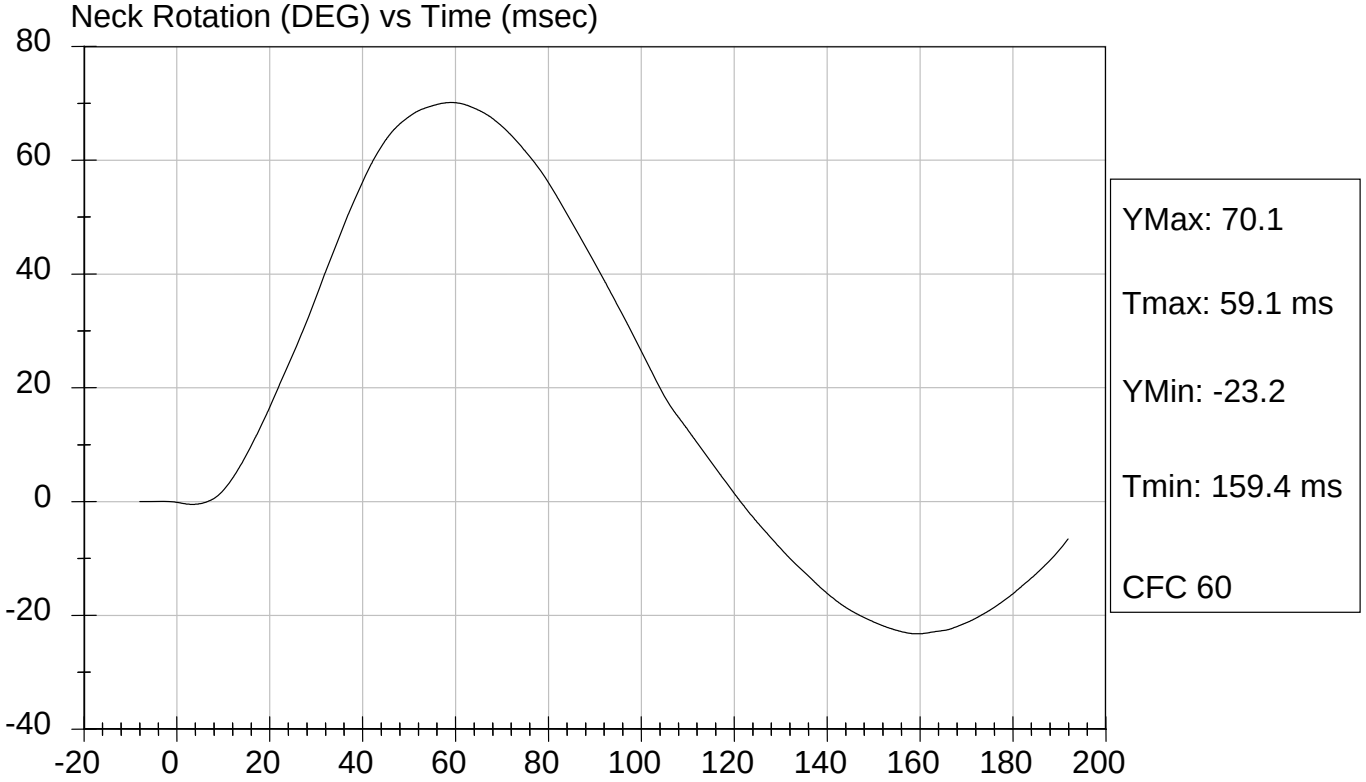
Test Date: 1/12/09
Speed: 23.15ft/sec, 7.06 m/sec



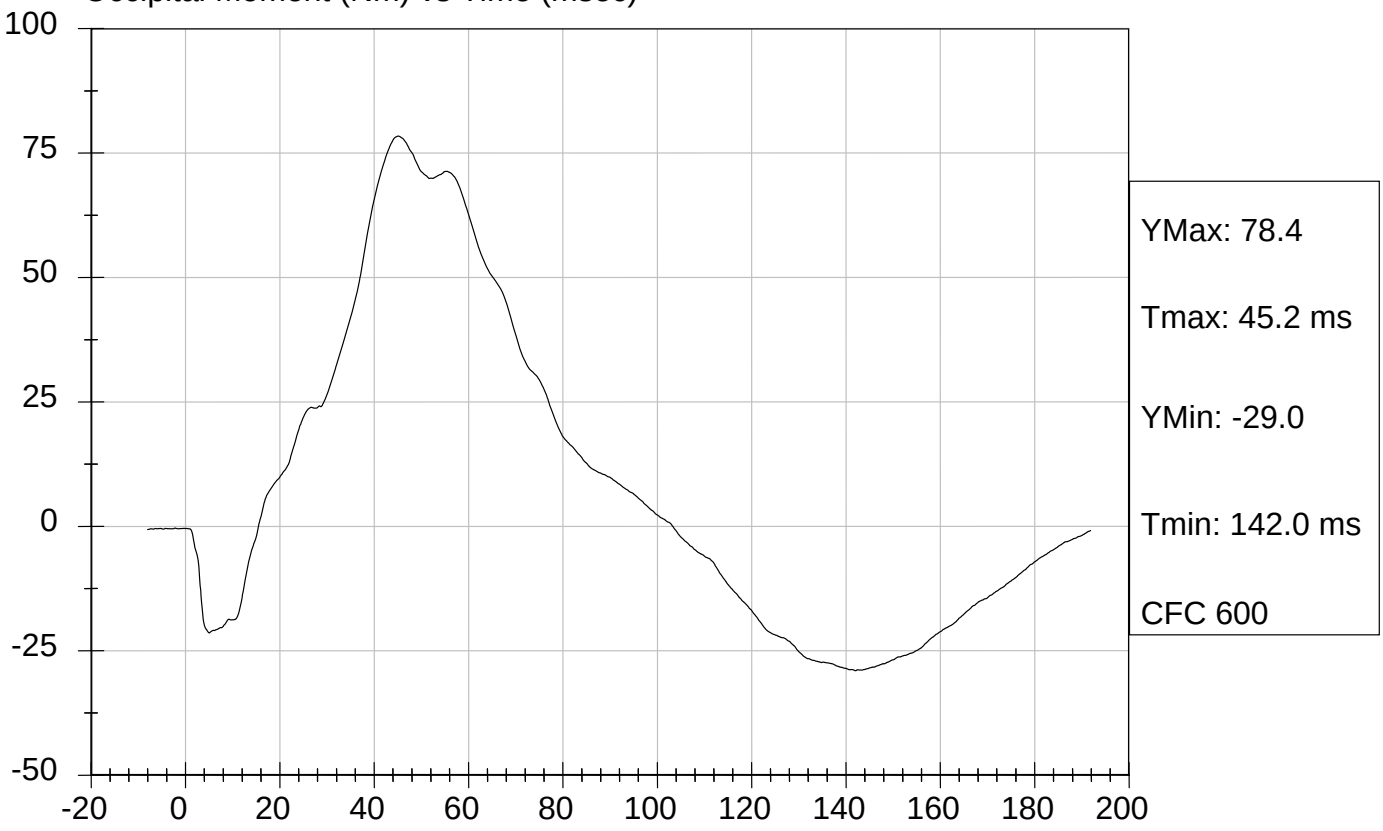
Test Desc: Neck Bending
Component ID: D09019

Test Date: 1/12/09
Speed: 23.15 ft/sec, 7.06 m/sec

Neck Rotation (DEG) vs Time (msec)



Occipital Moment (Nm) vs Time (msec)



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

Jessica Hall

Laboratory Technician

9/24/08

Test Date

David Winkelbauer

Approved By