

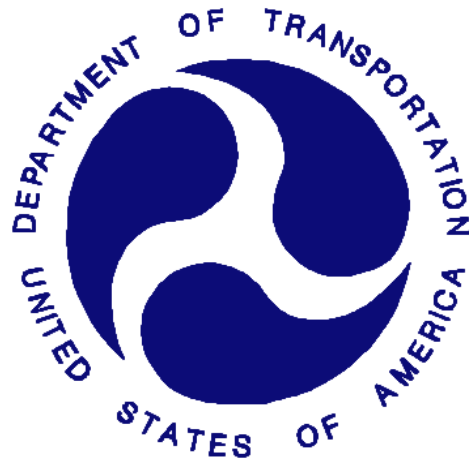
REPORT NUMBER: MCW-DOT-10SN01

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

2010 NISSAN FRONTIER 4-DOOR KING CAB PICKUP

NHTSA NUMBER: MA 5202

**PREPARED BY:
MEDICAL COLLEGE OF WISCONSIN
5000 WEST NATIONAL AVENUE
RESEARCH 151
MILWAUKEE, WISCONSIN 53295**



TEST DATE: 13 OCTOBER 2009

REPORT DATE: 19 OCTOBER 2009

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
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OFFICE OF CRASHWORTHINESS STANDARDS
NVS-111
1200 NEW JERSEY AVE, SE, ROOM W43-410
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Date:

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Date:

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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier (MDB) New Car Assessment Program (NCAP) side impact was conducted on the subject 2010 Nissan Frontier 4-door king cab pickup to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at the Medical College of Wisconsin (MCW) in Milwaukee, Wisconsin on 13 October 2009. The impact velocity of the Moving Deformable Barrier (MDB) was 62.2 km/h, and the ambient temperature at the struck side of the vehicle was 20 °C. The target vehicle's maximum post test static crush was 298 mm at level 3. The test vehicle's occupant performance is as follows: <table border="1" data-bbox="149 1255 1508 1522"> <thead> <tr> <th></th> <th><u>Units</u></th> <th><u>DRIVER</u></th> <th><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left upper rib (LUR) acceleration</td> <td>G</td> <td>30.5</td> <td>N/a</td> </tr> <tr> <td>Left lower rib (LLR) acceleration</td> <td>G</td> <td>29.6</td> <td>N/a</td> </tr> <tr> <td>Lower spine (T₁₂) acceleration</td> <td>G</td> <td>24.1</td> <td>N/a</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td></td> <td>27.3</td> <td>N/a</td> </tr> <tr> <td>Pelvis (PEV) acceleration</td> <td>G</td> <td>40.7</td> <td>N/a</td> </tr> <tr> <td>HIC</td> <td></td> <td>62.7</td> <td>N/a</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>Units</u>	<u>DRIVER</u>	<u>PASS.</u>	Left upper rib (LUR) acceleration	G	30.5	N/a	Left lower rib (LLR) acceleration	G	29.6	N/a	Lower spine (T ₁₂) acceleration	G	24.1	N/a	Thoracic Trauma Index (TTI)		27.3	N/a	Pelvis (PEV) acceleration	G	40.7	N/a	HIC		62.7	N/a
	<u>Units</u>	<u>DRIVER</u>	<u>PASS.</u>																														
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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: U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards, NVS-111 1200 New Jersey Ave, SE, Room W43-410 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 FY'09 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00123. The purpose of this test was to evaluate side impact protection of a manufactured by Nissan Motor Corporation, LTD.

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. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

SECTION 2

SUMMARY OF NCAP SIDE IMPACT TEST

A 2010 Nissan Frontier 4-door king cab pickup was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) modeling a 90° impact as if the test vehicle were moving forward at 28 km/h perpendicular to and across the path of the MDB traveling forward at 55 km/h. Here the test vehicle was stationary and positioned 27° from perpendicular to the MDB tow road guidance system and the MDB was towed 27° ("crabbed") from the guidance system. [See p 26.] The 2004.5 kg test vehicle was impacted by the 1358.1 kg MDB traveling at a speed of 62.2 km/h (measured inline with the guidance system.) The test was conducted at the Medical College of Wisconsin on 13 October 2009.

One (1) 50th percentile adult male Hybrid III-Side Impact Dummy (SID/HIII) was placed in the designated seating position within the test vehicle: one (1) driver; serial number 056. The SID/HIII was instrumented in the following locations:

- Left upper rib uni-axial (Y) accelerometers (primary and redundant)
- Left lower rib uni-axial (Y) accelerometers (primary and redundant)
- Lower thoracic spine uni-axial (Y) accelerometers (primary and redundant)
- Pelvis uni-axial (Y) accelerometers (primary and redundant)
- Head center of gravity tri-axial (X, Y, Z) accelerometers (primary and redundant)
- Upper neck tri-axial (X, Y, Z) force load cells and tri-axial (X, Y, Z) moment load cells

The test vehicle was instrumented with twenty-one (21) structural accelerometers and the MDB was instrumented with six (6) accelerometers. All data channels were recorded with a fully self contained on-board DTS TDAS Pro Data Acquisition System. The data were digitally sampled at 12.5 kHz and processed according to SAEJ211-1 (March 1995).

One (1) real-time video camera and eight (8) high-speed video 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 dummies can be found in Appendix A.

All of the above was conducted in accordance to the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002.

2.2 GENERAL COMMENTS

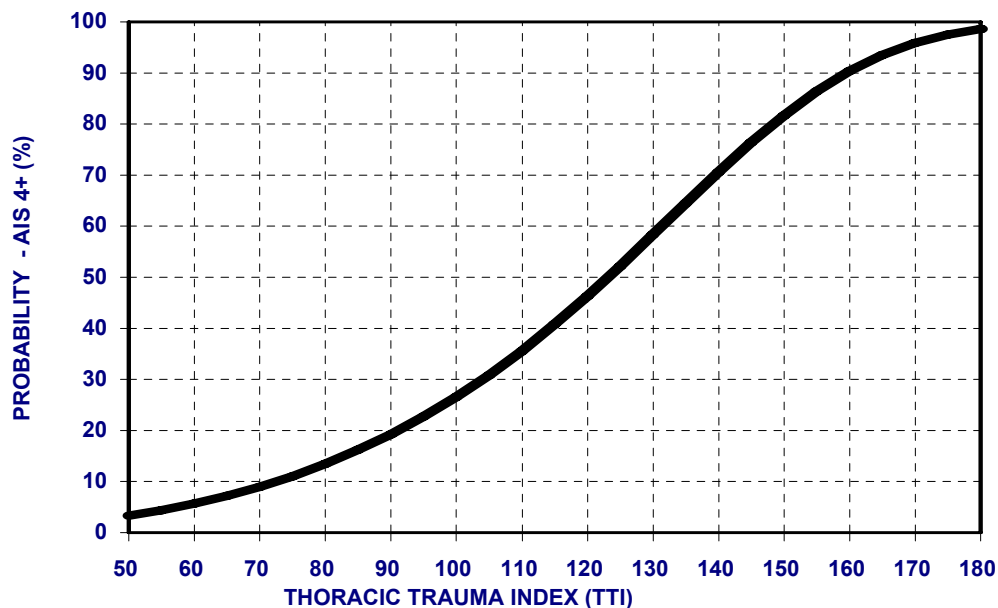
The test vehicle sustained a maximum static crush of 298 mm at level 3, 900 mm rearward of the vertical impact line.

Test summaries, post test observations, vehicle, MDB, camera, and occupant measurements are presented in datasheets 1-16. Appendix A contains the still photograph prints. Appendix B contains selected driver and passenger SID/HIII's response data traces. Appendix C contains the SID/HIII's configuration and performance verification data.

OCCUPANT SUMMARY		
Injury criteria	Driver (P1)	Left rear passenger (P4)
HIC36	62.7	N/a
T1 (ms)	32.1	N/a
T2 (ms)	67.1	N/a
TTI	27.3	N/a
Maximum pelvic acceleration (G)	40.7	N/a

Head Injury Criterion (HIC) is the standardized calculation using resultant head acceleration to assess head injury. Generally, a higher HIC represents an increase in the likelihood of a serious head injury. HIC36 specifies a time 'window' of 36 milliseconds over which the integral is calculated. T1 and T2 represent the time of the lower and upper bounds of the window in which the HIC is calculated.

The Thoracic Trauma Index (TTI) is computed from the crash test dummy's accelerations at the upper rib, lower rib, and lower spine to quantify the risk of a serious thorax injury during a typical near side impact crash. The injury risk curve is shown below. The vertical axis of the curve is the probability of sustaining an Abbreviated Injury Scale (AIS) level 4 or greater injury. AIS is an anatomical scoring system used to assess a 'threat to life' associated with a specific injury; injuries are ranked on a scale of 1 to 6, with 1 being 'minor', 4 'severe' and 6 an 'unsurvivable' injury. A lower TTI corresponds to a decreased probability of a severe thorax injury. (www.trauma.org)



The maximum pelvic acceleration is used to assess the likelihood of injury to the pelvis during a side impact crash. Higher pelvic accelerations correspond to an increase in the likelihood of sustaining a severe pelvis injury.

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION				
Restraint type	Left front (driver) occupant Location 01		Left rear (passenger) occupant Location 04	
	Installed	Operation	Installed	Operation
Front airbag	Yes – steering wheel	Did not deploy	No	N/a
Pelvis/torso airbag	Yes – seat back	Deployed	No	N/a
Head airbag	No	N/a	No	N/a
Curtain airbag	Yes – side header	Deployed	Yes – side header	Deployed
Seat belt pretensioner	Yes	Deployed	No	N/a
Seat belt load limiter	Yes	N/a	Yes	N/a

These test data and report can be found in detail on the NHTSA website at www.nhtsa.dot.gov.

A brief summary of the crash test can be located at www.safercar.gov

TEST NOTES

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

VEHICLE INFORMATION		VEHICLE OPTIONS	
Year	2010	Air conditioning	Yes
Make	Nissan	Anti-lock brakes	Yes
Model	Frontier	AM/FM radio	Yes
Body style	4-door pickup	All wheel drive	No
NHTSA number	MA 5202	Combo bag	No
MCW test ID	10sn01	Console	Yes
VIN	1N6BD0CT8AC403935	Cruise/speed control	Yes
Color	Black	Curtain bag	Yes
Build date	September 2009	Disc brakes	Yes - front and rear
Engine No. of cylinders	4	Frontal bag	Yes
Engine Displacement (L)	2.5	Power brakes	Yes
Engine Placement	Longitudinal	Power door locks	No
Transmission	Automatic 5 speed	Power steering	Yes
Final drive	Rear wheel drive	Power windows	No
Delivery date	September, 29 2009	Pelvis/torso bag	Yes
Odometer reading	22.8	Tilt steering wheel	No

CERTIFICATION LABEL INFORMATION			
Manufacturer	Nissan Motor Co., Ltd	GVWR (kg)	2132
		GAWR front(kg)	1148
Date of manufacture	September 2009	GAWR rear (kg)	1148

SEAT INFORMATION			
	Number of occupants	Seat type	Seat back type
Front	2	Bucket	Adjustable
Back	0	Bucket	Fixed
Third	0		
Total	2		

CARGO CAPACITY CALCULATION			
	Units	Value	Reference label
Vehicle maximum capacity	kg	375.1	(A)
Number of occupants (7) X 68.04 kg	kg	136.1	(B)
Cargo capacity (RCLW) †	kg	136.1	(C) = (A)-(B) †

† Note if RCLW is > 136.1 kg (300 lbs), use 136.1 kg

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

TEST VEHICLE MASS INFORMATION				
	Units	As delivered	As tested	Fully loaded
Left front	kg	466.8	527.1	545.2
Right front	kg	469.5	479.0	486.3
Left rear	kg	391.9	518.0	503.5
Right rear	kg	381.5	480.4	474.9
Total front	kg	936.3	1006.1	1031.5
% Total front	%	54.8	50.2	51.3
Total rear	kg	773.4	998.4	978.4
% Total rear	%	45.2	49.8	48.7
Total	kg	1709.7	2004.5	2009.9

As delivered mass is vehicle mass with maximum fluids

Fully loaded mass is the as delivered mass + 1 or 2 ATD's + RCLW

As tested mass is the mass of test vehicle with 1 or 2 ATD's + instrumentation + ballast (if necessary)

CALCULATION OF TEST VEHICLE TARGET MASS			
	Units	Value	Reference label
As delivered test vehicle mass	kg	1709.7	(D)
Maximum cargo capacity (RCLW)	kg	136.1	(C)
Mass of SID HIII's (1 or 2)	kg	164.1	(E)
Test vehicle target mass (TVTW)	kg	2009.9	(D) + (C) + (E)

As tested mass must be 4.5 kg to 9 kg less than the test vehicle target mass

BALLAST INFORMATION	
Mass of ballast added (kg)	92.5 kg
Location	Center bed of truck
<u>Components removed from test vehicle</u> Non-struck front and rear door glasses	

IMPACT LOCATION ON TEST VEHICLE	
Wheelbase	3204 mm
Nominal impact point	508 mm rearward of front axle
Actual impact point	488 mm rearward of front axle

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

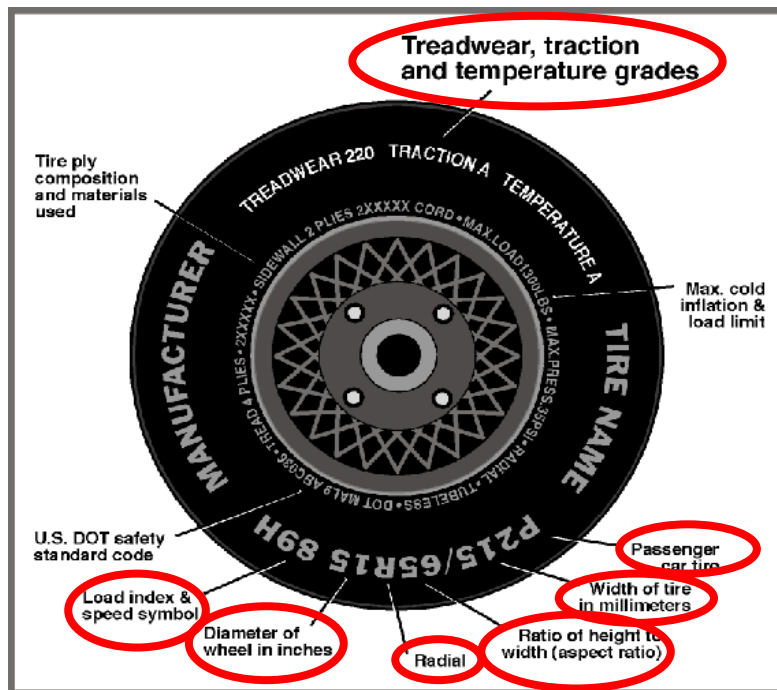
TEST VEHICLE ATTITUDES				
	Units	As delivered	As tested	Fully loaded
Left front	mm	866	848	843
Right front	mm	866	861	854
Left rear	mm	905	862	856
Right rear	mm	903	875	868
CG (X)	mm	1448	1596	1560

As tested attitudes must be between as delivered and fully loaded attitudes

CG (X) measured rearward from front axle centerline

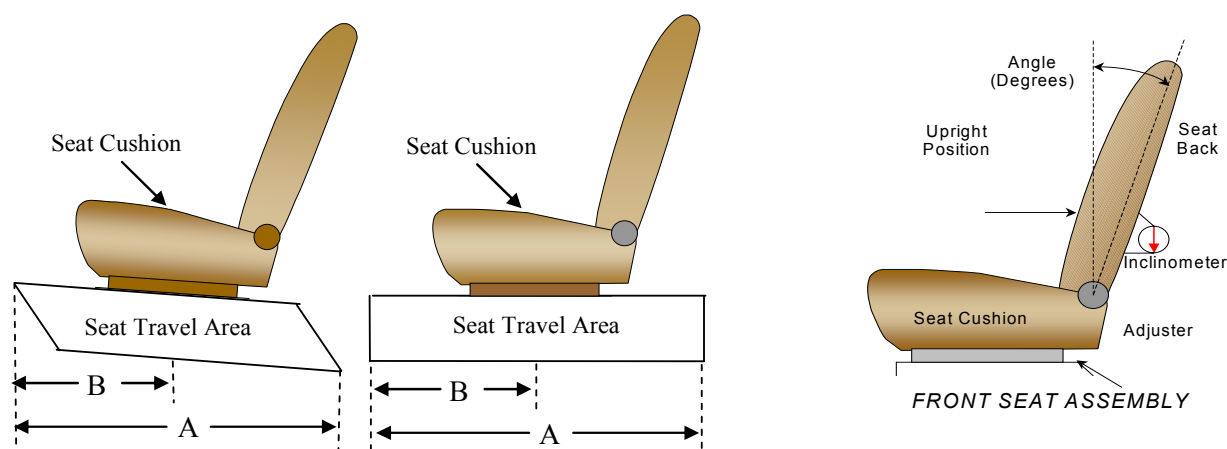
AUTOMATIC DOOR LOCK (ADL) INFORMATION				
	Left front	Left rear	Right front	Right rear
ADL present	No	No	No	No
ADL deactivated	N/a	N/a	N/a	N/a
Deactivation method	N/a			
Door lock status	unlocked	unlocked	unlocked	unlocked

DATA SHEET NO. 2
TEST VEHICLE TIRE INFORMATION



TIRE INFORMATION		
Measured Parameter	Front	Rear
Maximum tire pressure (kPa)	300	300
Cold / test pressure (kPa)	240	240
Recommended tire size	P235/75R15	P235/75R15
Tire size on vehicle	P235/75R15	P235/75R15
Tire manufacturer	General	General
Tire name	Grabber AW	Grabber AW
Tire type	Tubeless radial	Tubeless radial
Tire width (mm)	235	235
Ratio of height to width (aspect ratio)	75	75
Radial	Yes	Yes
Wheel diameter (inches)	15	15
Load index & speed symbol	105S	105S
Tread wear	420	420
Traction grade	B	B
Temperature grade	B	B

DATA SHEET NO. 3 TEST VEHICLE INFORMATION



Seat fore/aft positions

The total seat travel was measured from forward most position to rearmost position, irrespective of vertical seat height in those positions. The seat was set at the longitudinal mid position with vertical adjustment at the lowest position obtainable for both the driver and passenger.

SEAT FORE/AFT POSITION		
	Left front seat	Left rear seat
Type	Manual/adjustable	Non-adjustable
Fore/aft total travel (mm)	240	N/a
Number of detents	21	N/a
Test position	10th notch from full forward	N/a

‡Full forward = notch 0

Seat back position

The driver and passenger seat back is positioned according to the manufacturers designated angle.

SEAT BACK POSITION		
	Left front seat	Left rear seat
Seat back angle @ head rest post	5.9°	N/a
Test position	6th notch from full upright	Non-adjustable

‡Full upright = notch 0

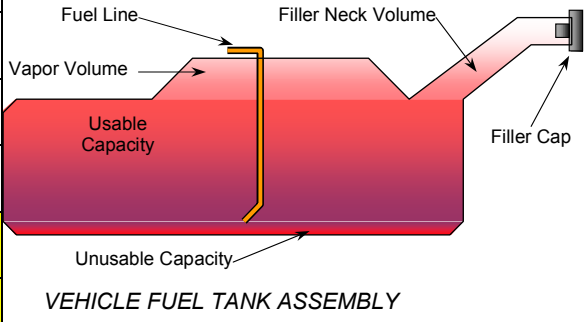
Seat belt position

The adjustable anchorage locations are positioned according to the manufacture's specifications.

SEAT BELT ADJUSTABLE ANCHORAGE (D-RING)		
	Left Front Seat	Left Rear Seat
Adjustable anchor present	Yes	No
Total travel (mm)	75	N/a
Test position	Highest position	As positioned

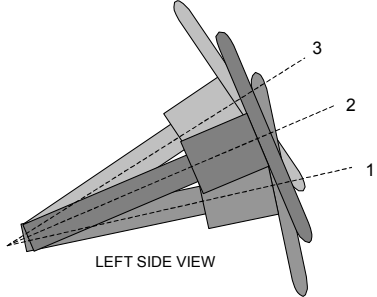
DATA SHEET NO. 3
TEST VEHICLE INFORMATION (CONTINUED)

Fuel tank information

STODDARD INFORMATION			
Description	Units	Value	
Usable capacity of standard equipment fuel tank	L	79.9	
Usable capacity of optional equipment fuel tank	L	0	
Usable capacity of vehicle used for certification testing to requirements	L	79.9	
Amount of stoddard added for test	L	74.2	
% Usable capacity (92%-94%)	%	92.9	
Operational instructions	None		
Electric fuel pump present	Yes		
Operating condition of test vehicle for fuel pump operation	The fuel pump is activated when the ignition is turned on.		

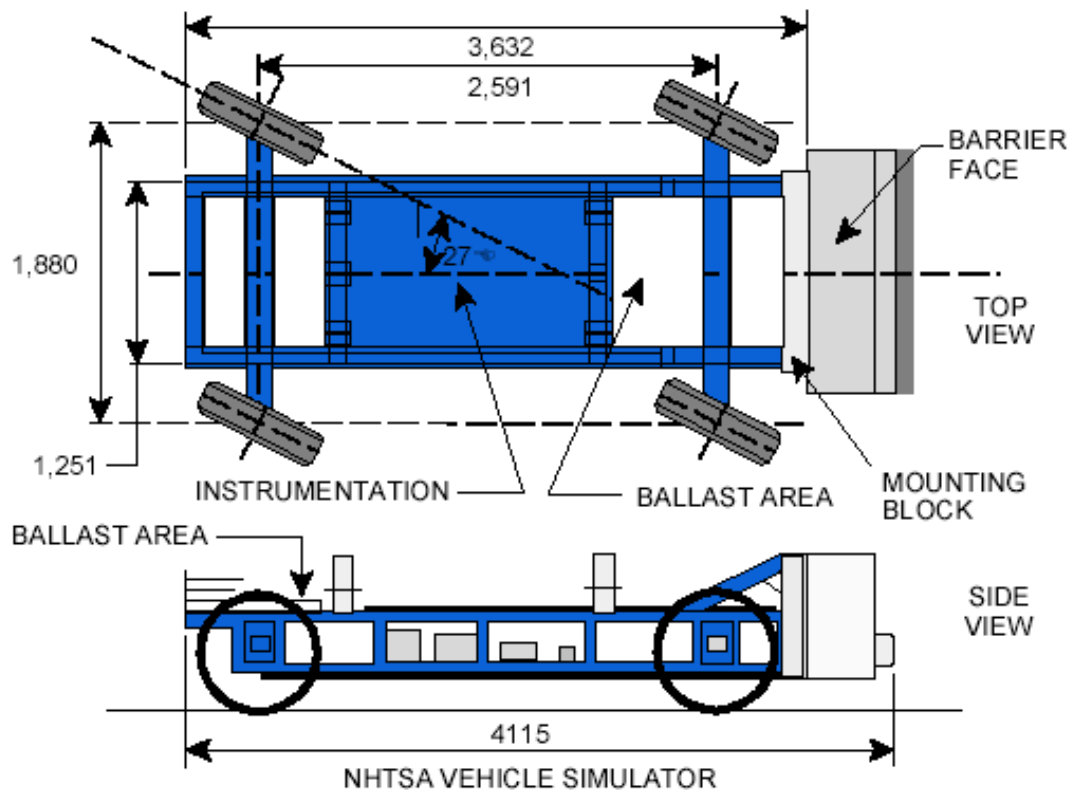
Steering wheel information

Steering wheel and column adjustments are placed according to the manufacturer's specifications.

ADJUSTABLE STEERING COLUMN		
Adjustable column	Non-adjustable	 LEFT SIDE VIEW STEERING COLUMN ASSEMBLY
Steering wheel angle in upper most position	N/a	
Steering wheel fore/aft travel	N/a	
Number of detents	N/a	
Test position	Non-adjustable steering column	

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

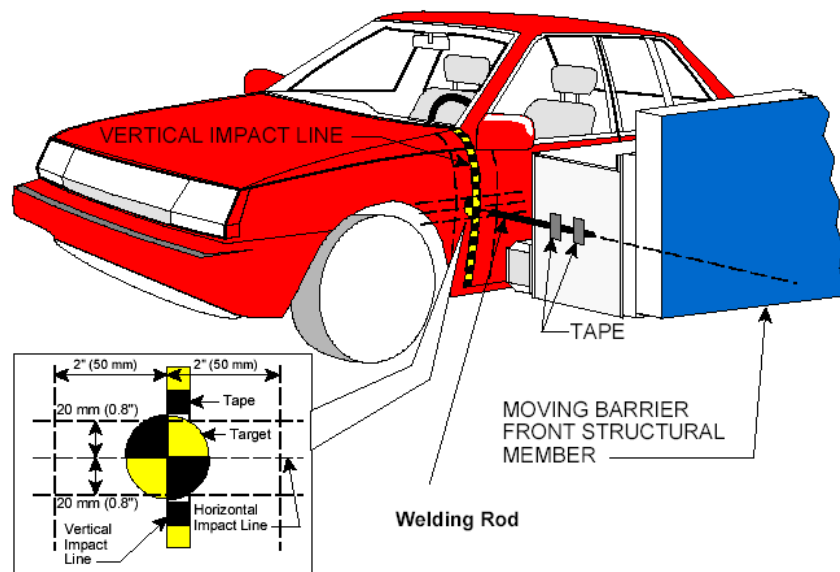
MDB SPECIFICATIONS				
	Units	Specification	Range	Value
Overall Width of Framework Carriage	mm	1251	1226-1276	1245
Overall Length w/Impactor Face	mm	4115	4090-4140	4101
Overall Length w/o Impactor Face	mm	3632	3607-3657	3617
Longitudinal Cg from Front Axle	mm	1123	1098-1148	1135
Track Width	mm	1880	1855-2005	1864
Mass	kg	1361	1356.5-1365.5	1358.1
MOI (X)	kg-m ²	508	483-533	496
MOI (Y)	kg-m ²	2263	2150-2376	2227
MOI (Z)	kg-m ²	2572	2443-2701	2609



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

MDB MASS INFORMATION		
	Units	As tested
Left front	kg	435.0
Right front	kg	326.1
Left rear	kg	245.9
Right rear	kg	351.1
Total front	kg	761.1
% Total front	%	56.0
Total rear	kg	597
%Total rear	%	44.0
Total	kg	1358.1

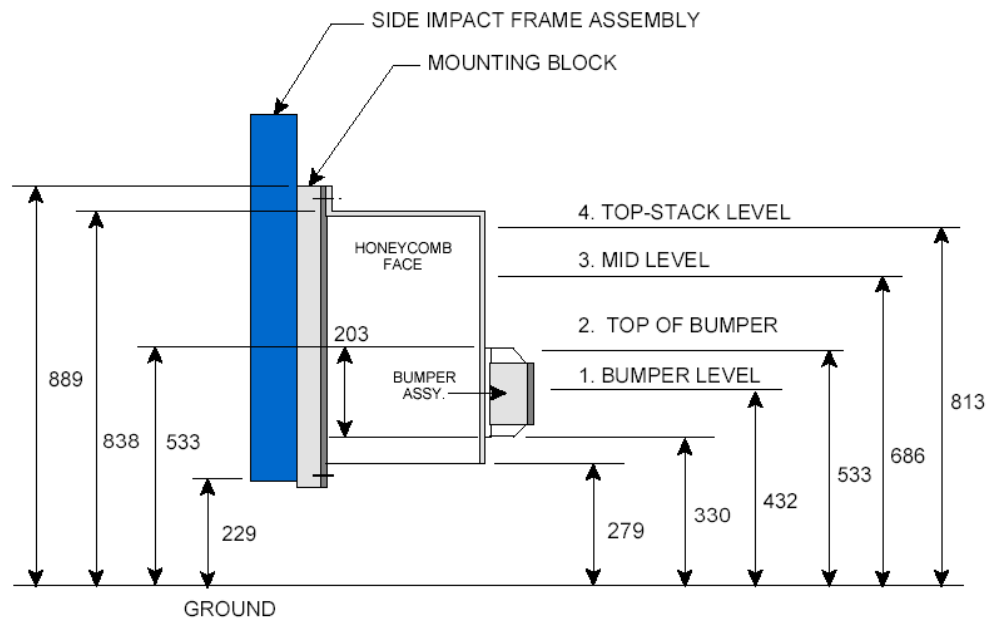
IMPACT SPEED				
	Units	Specification	Range	Value
Primary speed trap	kmh	61.9	61.1-62.7	62.2
Redundant speed trap	kmh	61.9	61.1-62.7	62.0



IMPACT POINT INFORMATION		
Vertical impact line is	508 mm rearward of front axle	
Actual impact is	488 mm rearward of front axle	
Measurement	Value	Tolerance
Impact point distance from vertical impact line	20 mm forward	+/- 50 mm
Impact point distance from horizontal impact line	5 mm below	+/- 20 mm

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

HONEYCOMB FACE CLEARANCE					
	Units	Specification	Range	Left	Right
Bottom of barrier	mm	279	276-282	276	280
Bottom of bumper	mm	330	327-333	330	330
Top of bumper	mm	533	530-536	531	531
Top of barrier	mm	838	835-841	836	838



RIGHT SIDE VIEW

**DATA SHEET NUMBER 5
POST TEST OBSERVATIONS**

TEST DUMMY INFORMATION AND CONTACT POINTS		
Description	Left front seat	Left rear seat
Dummy type / serial no.	SID HIII/056	No ATD
Head contact	To curtain airbag; top to roof rail	N/a
Upper torso contact	To seat mounted pelvis/torso airbag	N/a
Lower torso contact	To seat mounted pelvis/torso airbag	N/a
Left leg contact	To left front door along bottom of armrest	N/a
Left knee contact	To left front door panel 256 mm below window sill	N/a

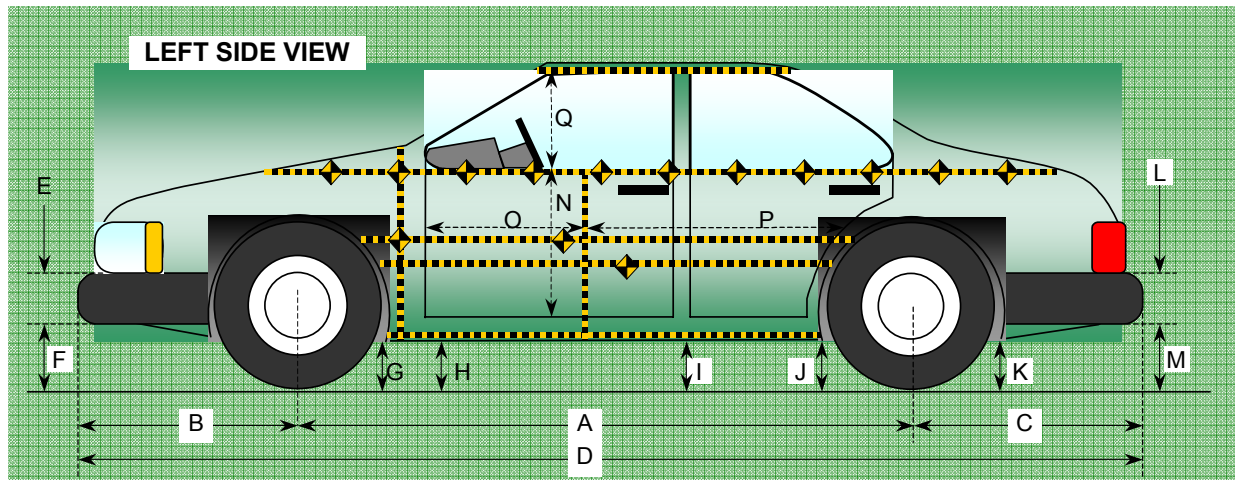
POST TEST DOOR OPENING AND SEAT TRACK INFORMATION		
Description	Front	Rear
Locked/unlocked doors	Unlocked	Unlocked
Left side door opening	Closed/latched/inoperable	Closed/latched/operable
Right side door opening	Latched	Latched
Seat movement	11 mm of seat crush	15 mm of seat crush
Seat back failure	None	None

POST TEST STRUCTURAL OBSERVATIONS	
Critical areas of performance	Observations/conclusions
Pillar performance	No damage
Sill separation	Max. separation of 181 mm at rear upper door by b-pillar
Windshield damage	No damage
Window damage	No damage
Other notable effects	None noted

DATA SHEET NUMBER 5
POST TEST OBSERVATIONS (CONTINUED)

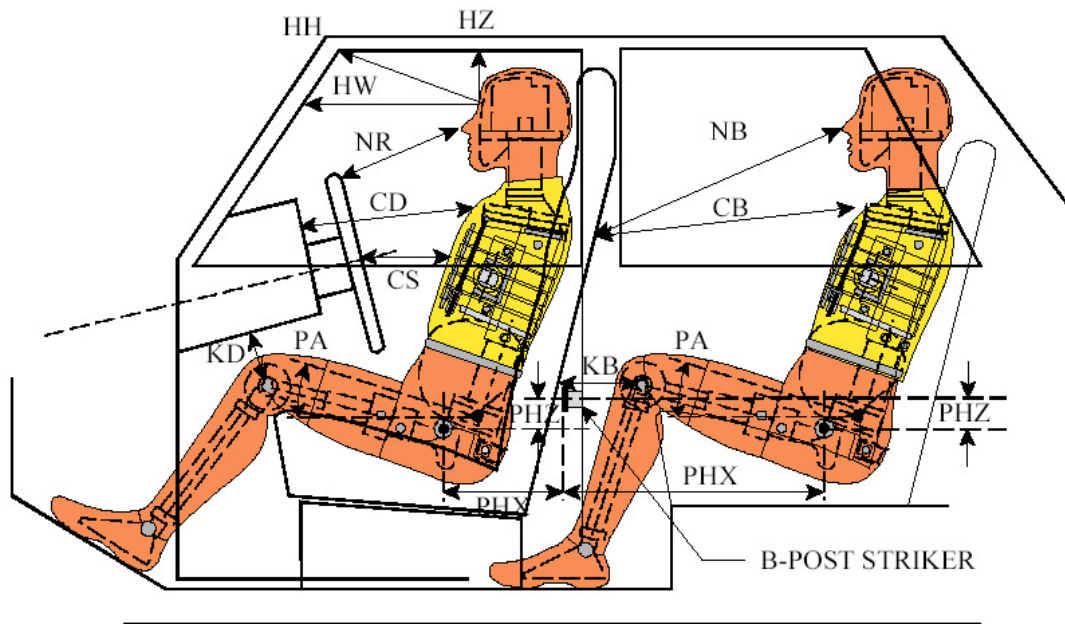
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION				
Restraint Type	Left front (Driver) occupant Location 01		Left rear (passenger) occupant Location 04	
	Installed	Operation	Installed	Operation
Front airbag	Yes - steering wheel	Did not deploy	No	N/a
Pelvis/torso airbag	Yes - seat back	Deployed	No	N/a
Head airbag	No	N/a	No	N/a
Curtain airbag	Yes - roof rail	Deployed	Yes - roof rail	Deployed
Seat belt pretensioner	Yes	Deployed	No	N/a
Seat belt load limiter	Yes	N/a	Yes	N/a

DATA SHEET NUMBER 6
VEHICLE PRE AND POST MEASUREMENTS



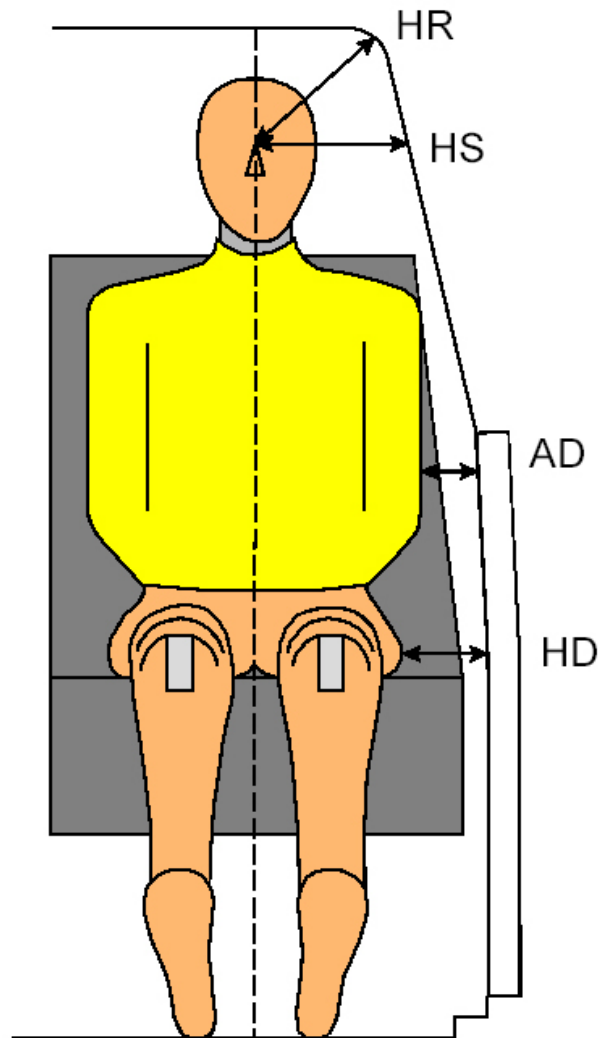
VEHICLE DIMENSIONS				
Code	Description	Pre test	Post test	Change
		mm	mm	mm
A	Wheelbase	3204	3106	-98
B	Front axle to front side of vehicle	641	649	8
C	Rear axle to rear side of vehicle	1198	1253	55
D	Total length at centerline	5228	5210	-18
E	Front bumper thickness	283	283	0
F	Front bumper bottom to ground	392	392	0
G	Sill height at front wheel well	368	353	-15
H	Sill height at front door leading edge	344	321	-23
I	Sill height at b-pillar	376	336	-40
J1	Sill height at rear wheel well	344	303	-41
J2	Pinch weld height at rear wheel well	383	334	-49
K	Sill height aft of rear wheel well	495	479	-16
L	Rear bumper thickness	170	170	0
M	Rear bumper bottom to ground	495	454	-41
N	Sill height to window bottom sill	750	730	-20
O	Front door leading edge to impact C/L	1116	1085	-31
P	Rear door trailing edge to impact C/L	583	574	-9
Q	Front window opening	547	551	4
R	Right side length	5043	5043	0
S	Left side length	5043	5008	-35
T	Vehicle width at b-pillar	1775	1700	-75

DATA SHEET NUMBER 7
SID HIII LONGITUDINAL CLEARANCES



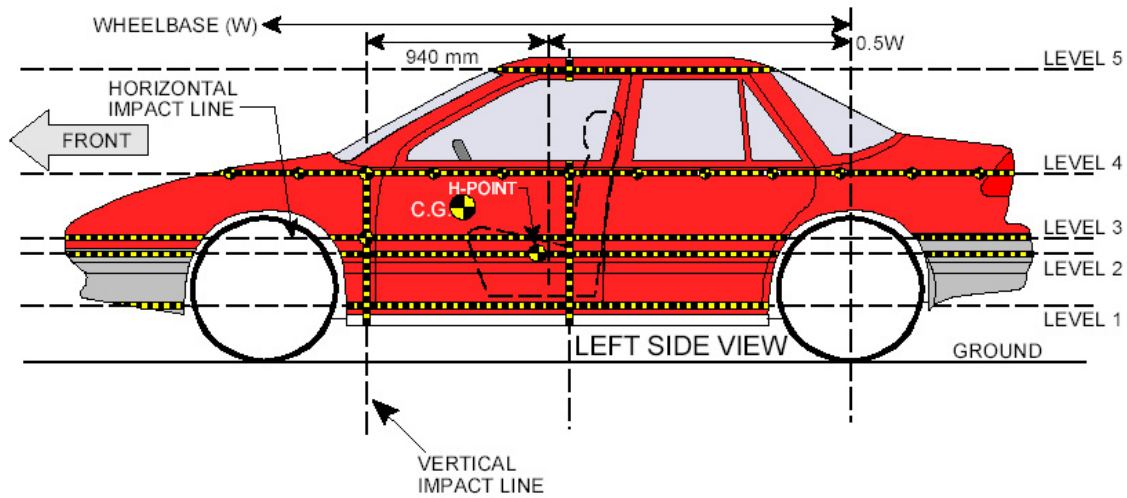
SID HIII LONGITUDINAL CLEARANCE MEASUREMENTS					
Driver code	Pass. code	Measurement description	Units	Left front seat	Left rear seat
		ATD serial number	-	056	No ATD
HH	-	Head to header	mm	361	N/a
HW	-	Head to windshield	mm	596	N/a
HZ	HZ	Head to roof	mm	153	N/a
NR	NB	Nose to rim/nose to seatback	mm	419	N/a
CD	CB	Chest to dash or seatback	mm	571	N/a
CS	-	Chest to steering wheel	mm	337	N/a
KDL	KBL	Left knee to dash or seatback length	mm	146	N/a
KDA	KBA	Left knee to dash or seatback angle	°	24.2	N/a
KDR	KBR	Right Knee to dash or seatback length	mm	126	N/a
KDA	KDA	Right knee to dash or seatback angle	°	24.1	N/a
PA	PA	Pelvic angle	°	23.4	N/a
PHX	PHX	H-Point to striker (x-axis)	mm	237	N/a
PHZ	PHZ	H-Point to striker (z-axis)	mm	69	N/a

DATA SHEET NUMBER 8
SID HIII LATERAL CLEARANCES



SID HIII LATERAL CLEARANCE MEASUREMENTS				
Code	Measurement description	Units	Left front seat	Left rear seat
-	ATD serial number	-	056	No ATD
HR	Head to side header	mm	205	N/a
HS	Head to side window	mm	318	N/a
-	Shoulder to door	mm	158	N/a
AD	Arm to door	mm	114	N/a
HD	H-point to door	mm	174	N/a

DATA SHEET 9 VEHICLE SIDE MEASUREMENTS



VEHICLE STATIC CRUSH SUMMARY				
Level	Description	Height above ground (mm)	Maximum static crush (mm)	Longitudinal (X) distance from impact point (mm)
5	Window top	1615	175	1800
4	Window sill	1084	201	1800
3	Mid-door	749	298	900
2	Driver H-point	766	294	900
1	Axle centerline or sill top	374	277	1500
Maximum static crush		298 mm at level 3 900 mm rearward from vertical impact line		

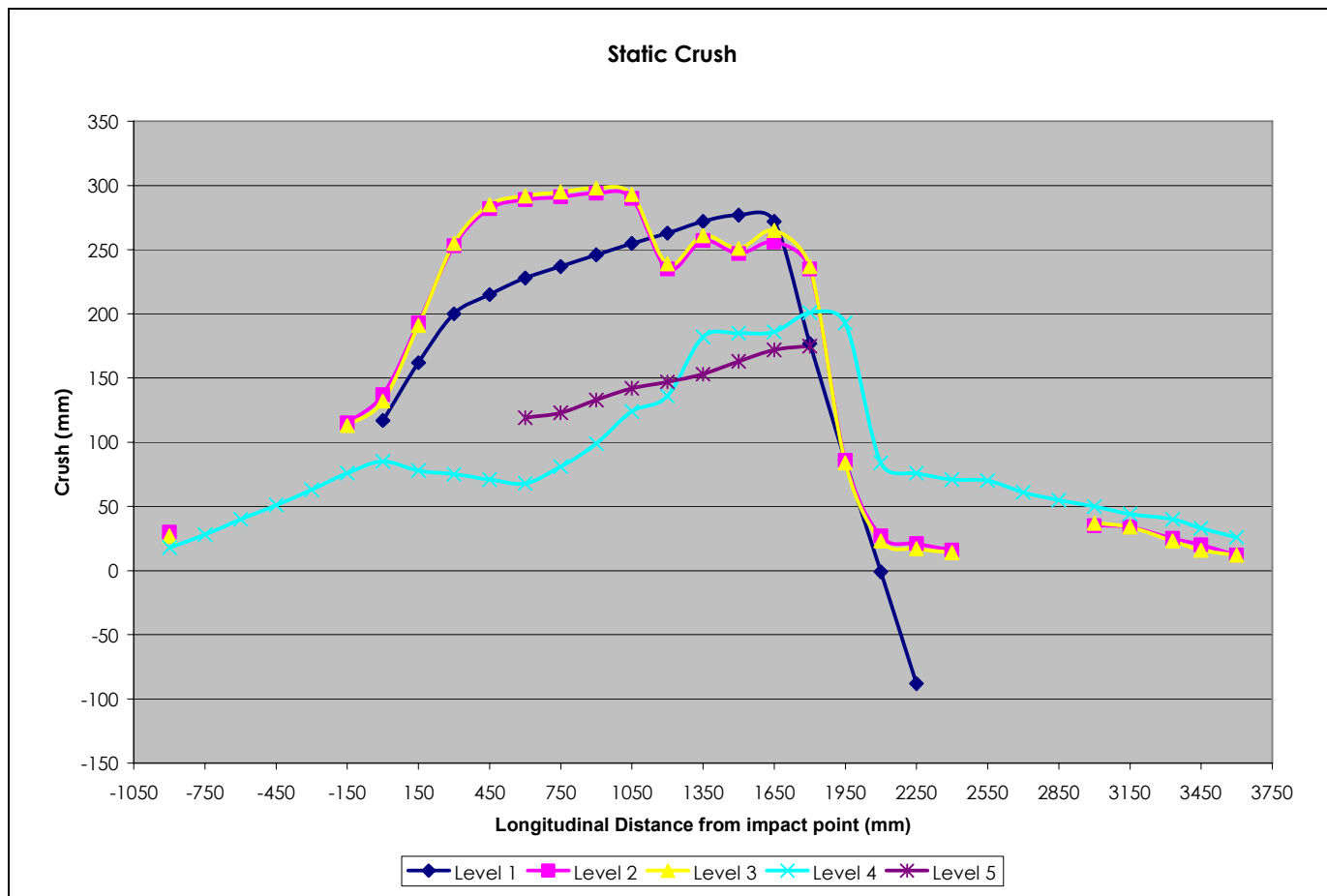
Height measurements taken 750 mm rearward from vertical impact line.

DATA SHEET 10
VEHICLE STATIC CRUSH PROFILE

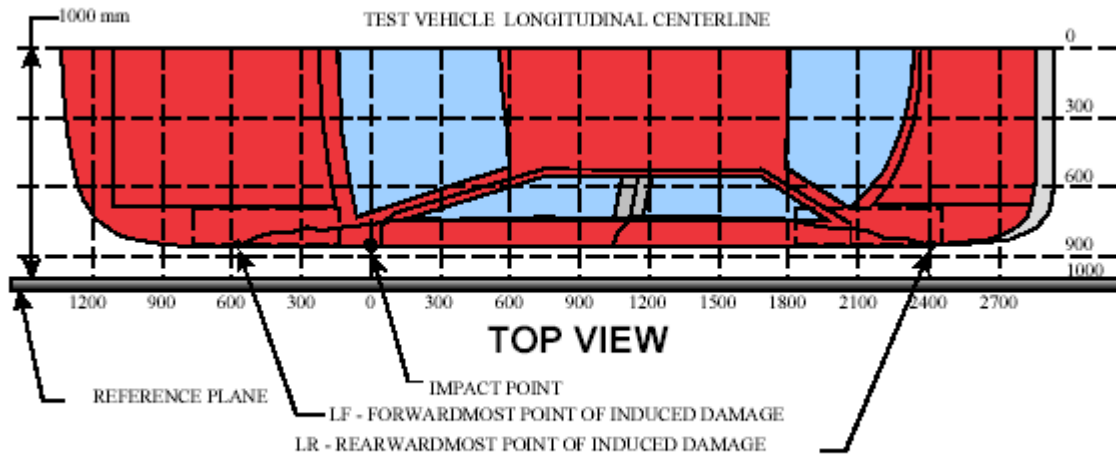
Note: All dimensions are in millimeters with a tolerance of ± 3 mm

TEST VEHICLE STATIC CRUSH																
Level	1			2			3			4			5			
Height	374			766			749			1084			1615			
	Pre	Post	Crush	Pre	Post	Crush	Pre	Post	Crush	Pre	Post	Crush	Pre	Post	Crush	
DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT	-1050															
	-900			260	290	30	256	283	27	390	408	18				
	-750									372	400	28				
	-600									356	396	40				
	-450									345	396	51				
	-300									338	401	63				
	-150			247	362	115	246	359	113	333	409	76				
	0	302	419	117	288	425	137	290	422	132	332	417	85			
	150	343	505	162	285	478	193	285	476	191	325	403	78			
	300	342	542	200	281	534	253	282	537	255	339	414	75			
	450	340	555	215	279	561	282	279	564	285	334	405	71			
	600	338	566	228	276	565	289	276	568	292	334	402	68	506	625	119
	750	337	574	237	274	565	291	275	570	295	333	414	81	521	644	123
	900	333	579	246	273	567	294	274	572	298	329	428	99	525	658	133
	1050	332	587	255	272	562	290	272	565	293	326	450	124	527	669	142
	1200	332	595	263	272	507	235	272	511	239	311	447	136	530	677	147
	1350	331	603	272	272	529	257	273	534	261	324	506	182	531	684	153
	1500	331	608	277	272	519	247	273	524	251	319	504	185	531	694	163
	1650	332	604	272	273	529	256	274	539	265	311	497	186	532	704	172
	1800	349	526	177	285	520	235	285	522	237	324	525	201	545	720	175
	1950	348	434	86	290	376	86	292	376	84	334	527	193			
	2100	335	334	-1	289	316	27	291	314	23	333	417	84			
	2250	295	207	-88	279	300	21	275	292	17	332	408	76			
	2400				247	263	16	244	258	14	331	402	71			
	2550										330	400	70			
	2700										330	391	61			
	2850										331	386	55			
	3000				247	282	35	244	281	37	332	382	50			
	3150				288	322	34	283	317	34	334	378	44			
	3330				289	314	25	289	312	23	335	375	40			
	3450				292	312	20	292	308	16	339	372	33			
	3600				297	309	12	296	308	12	343	369	26			

DATA SHEET 10 **VEHICLE STATIC CRUSH PROFILE**

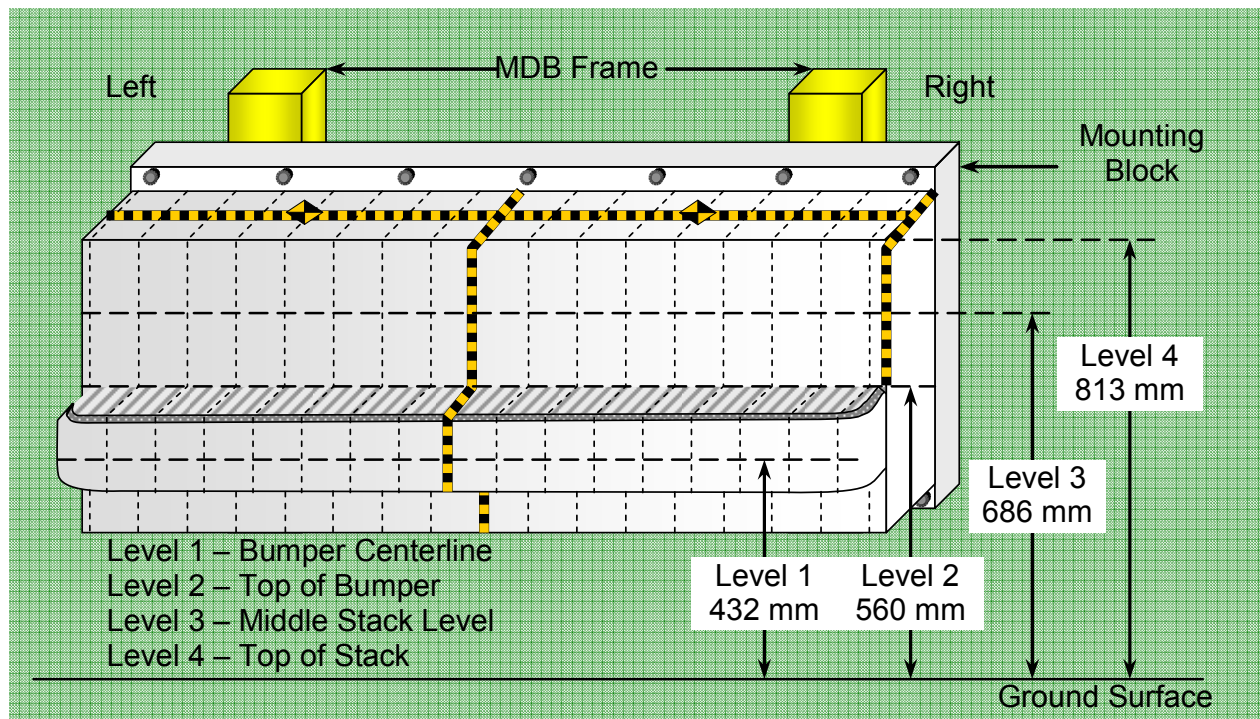


DATA SHEET 11
VEHICLE DAMAGE PROFILE DISTANCES (DPD)



DPD MEASUREMENTS				
	DPD measurement (mm)	Pre test (mm)	Post test (mm)	Crush (mm)
1	-600	277	277	0
2	0	274	424	150
3	600	272	557	285
4	1200	266	521	255
5	1800	262	529	267
6	2400	254	254	0

DATA SHEET 12
DEFORMABLE BARRIER STATIC CRUSH

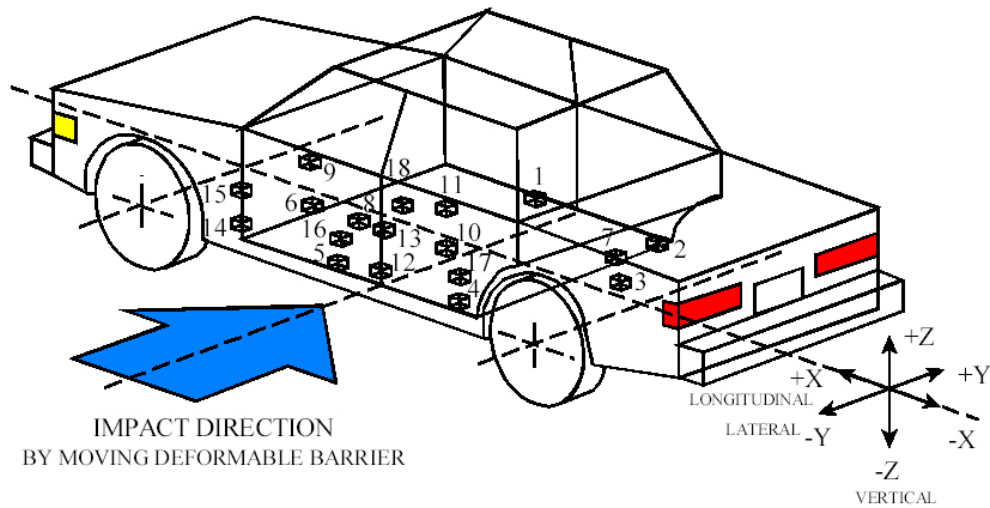


DEFORMABLE BARRIER FACE SUMMARY		
Barrier face manufacturer		Plascore
Serial number		A0908055
Level	Description	Maximum crush
1	Center of bumper	144
2	Top of bumper	122
3	Middle of stack	130
4	Top of stack	151
Maximum post test intrusion is 151 mm at level 4		

BARRIER STATIC CRUSH																	
	Distance left of center								C _L	Distance right of center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
4	149	121	119	110	90	109	74	134	124	120	123	125	128	131	151	76	113
3	130	95	63	55	53	65	31	23	18	14	18	16	17	20	26	49	100
2	122	104	94	85	64	56	57	57	56	65	77	82	86	87	93	97	73
1	144	135	120	113	115	116	115	114	114	115	116	119	121	122	125	128	137

***all values in mm

DATA SHEET 13
VEHICLE ACCELEROMETER LOCATIONS



TEST VEHICLE ACCELEROMETER LOCATIONS				
Loc. no.	Accelerometer location	Measurements (mm)		
		X	Y	Z
1	Right sill at front seat	3283	725	182
2	Right sill at rear seat	2449	725	163
3	Rear floor pan above axle	1241	15	-243
4	Left sill at rear door	2338	-729	159
5	Left sill at front door	3257	-728	176
6	Left front door C/L	†	†	†
7	Rear occupant compartment	2272	353	-139
8	Left front door mid-rear	‡	†	†
9	Left front door upper C/L	†	†	†
10	Left rear door mid-rear	†	†	†
11	Left rear door upper C/L	†	†	†
12	Left lower b-pillar	2816	-750	-209
13	Left middle b-pillar	2779	-745	-393
14	Left lower a-pillar	3711	-783	-304
15	Left middle a-pillar	3757	-784	-500
16	Front seat track	3082	-657	1
17	Rear seat track or structure	2271	-360	-104
18	Vehicle CG	3146	58	-124

Origin

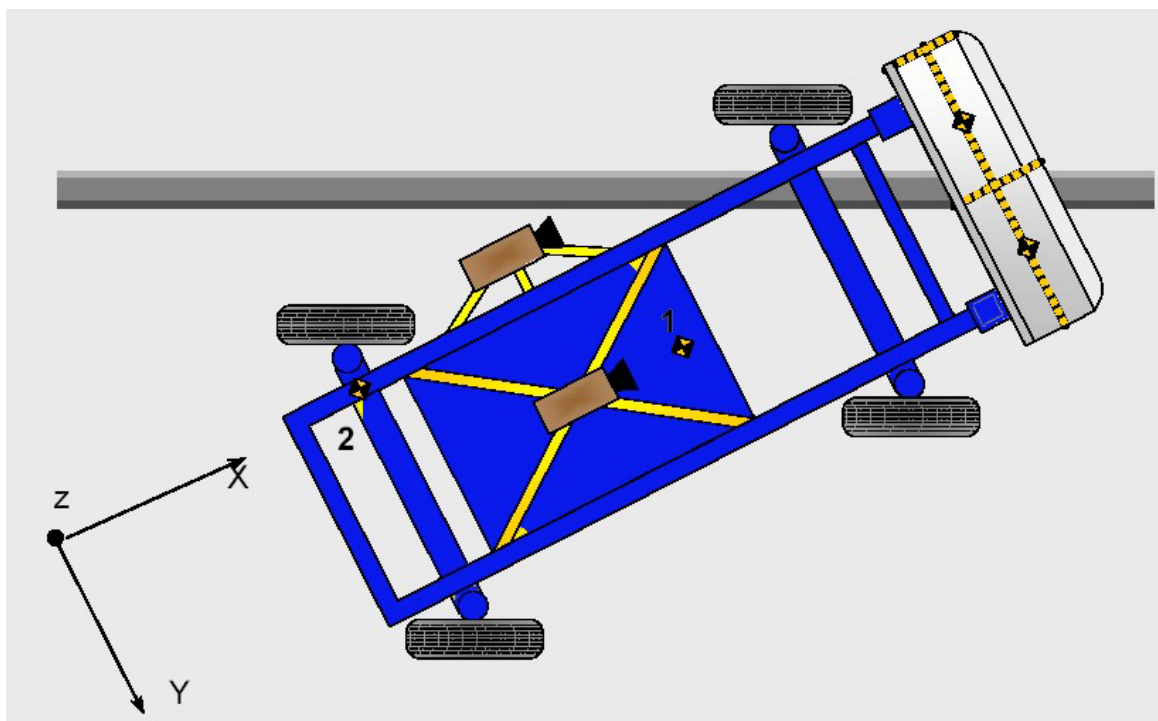
X Rear bumper
 Y Midline of vehicle
 Z Top of rear bumper

Orientation

X +(X) Forward
 Y +(Y) Right
 Z +(Z) Down

† Front and rear door accelerometers not installed as per NCAP policy (02Nov05)

DATA SHEET 14
MDB ACCELEROMETER LOCATIONS



MDB ACCELEROMETER LOCATIONS			
Location	Measurements (mm)		
	X	Y	Z
Center of gravity	1844	-10	126
Right rear	387	-639	57

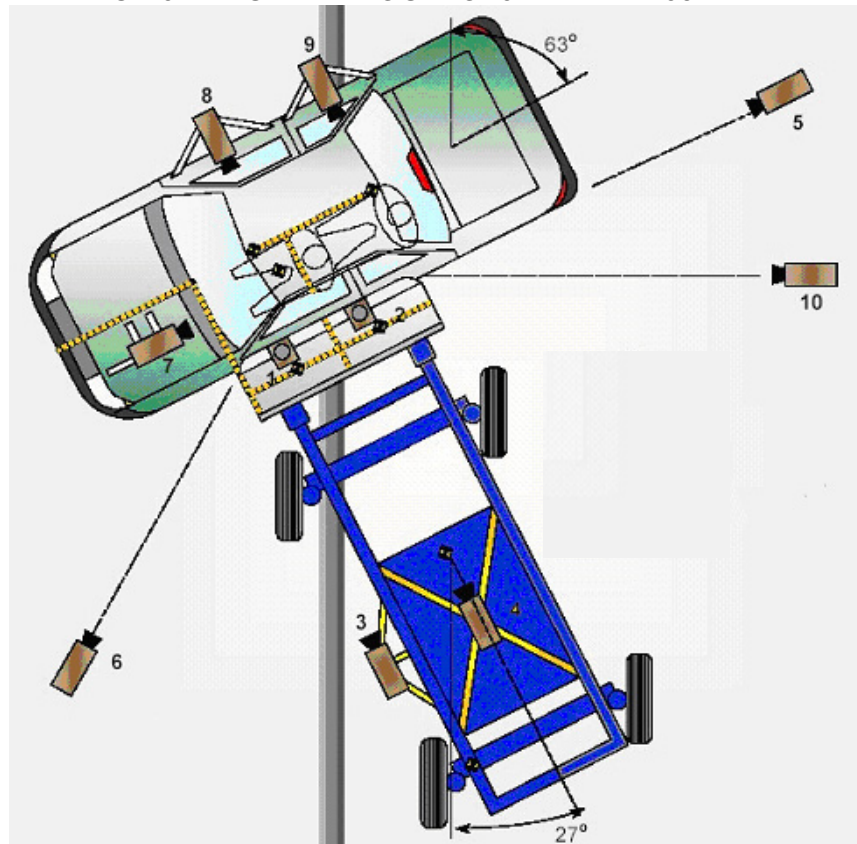
Origin

X Rear structural member
Y Midline of MDB
Z Middle of rear structural member

Orientation

X +(X) Forward
Y +(Y) Right
Z +(Z) Down

DATA SHEET 15
HIGH-SPEED CAMERA LOCATIONS AND DATA SUMMARY



	View	Coordinates			Angle °	Lens mm	Rate fps
		X	Y	Z			
		mm	mm	mm			
1	Overhead view of test vehicle	-203	-3761	-4125	74.8	8	1000
2	Overhead close-up view of impact plane	-610	-1736	-4578	90	12.5	1000
3	MDB onboard close-up view of impact point	-2420	-3504	-295	0.6	35	1000
4	MDB onboard view of driver dummy	-2280	-2614	-780	3.9	13	1000
5	Right side ground level overall view	888	7620	-615	3	50	1000
6	Left side ground level overall view	-408	-3658	-695	2.9	25	1000
7	Test vehicle onboard driver front view	-420	-4338	-766	4.3	25	1000
8	Test vehicle onboard driver side view †	908	-3150	-755	12.2	12.5	1000
9	Test vehicle onboard passenger side view ††						1000
10	Real-time film coverage of test	-	-	-	-	-	-

Origin

X

Y

Z

Impact Point

Impact Point

Impact Point

Orientation

X

Y

Z

+(X) Forward

+(Y) Right

+(Z) Down

† Did not fire on impact

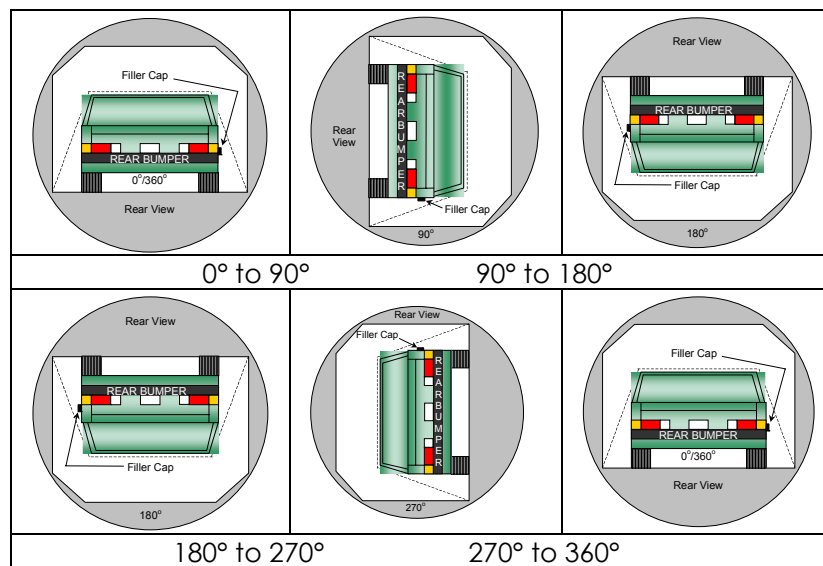
†† Not installed due to no rear ATD

DATA SHEET 16
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 20° C Test Time: 2:30 pm

STODDARD SOLVENT SPILLAGE MEASUREMENTS				
Period	Description	Maximum allowable spillage	Spillage	
			Amount	Location
A	From impact until vehicle motion ceases	1 oz	0	N/a
B	5 minutes after vehicle motion ceases	5 oz	0	N/a
C	Next 25 minutes	1 oz/minute	0	N/a

FMVSS 301 STATIC ROLLOVER



FMVSS301 STATIC ROLLOVER DATA			
Test phase	Rotation time (sec.)	Hold time (sec.)	Total time (sec.)
Tolerance	60-180	>= 300	-
0° to 90°	64	300	364
90° to 180°	64	300	364
180° to 270°	64	300	364
270° to 360°	64	300	364

DATA SHEET 16
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA (CONTINUED)

FMVSS301 STATIC ROLLOVER - SPILLAGE				
	First five minutes (oz)	Sixth minute (oz)	Seventh minute (oz)	Eighth minute (oz)
Max allowable leakage	5.0	1.0	1.0	1.0
0° to 90°	0	0	0	N/a
90° to 180°	0	0	0	N/a
180° to 270°	0	0	0	N/a
270° to 360°	0	0	0	N/a

SPILLAGE LOCATION(s)	
0° to 90°	N/a
90° to 180°	N/a
180° to 270°	N/a
270° to 360°	N/a

APPENDIX A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

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A-2	Right rear $\frac{3}{4}$, as delivered	A-4
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A-4	Tire placard	A-5
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A-6	Post test front view of test vehicle	A-6
A-7	Pre test left front $\frac{3}{4}$ view of test vehicle	A-7
A-8	Post test left front $\frac{3}{4}$ view of test vehicle	A-7
A-9	Pre test left side view of test vehicle	A-8
A-10	Post test left side view of test vehicle	A-8
A-11	Pre test left rear $\frac{3}{4}$ view of test vehicle	A-9
A-12	Post test left rear $\frac{3}{4}$ view of test vehicle	A-9
A-13	Pre test rear view of test vehicle	A-10
A-14	Post test rear view of test vehicle	A-10
A-15	Pre test right rear $\frac{3}{4}$ view of test vehicle	A-11
A-16	Post test right rear $\frac{3}{4}$ view of test vehicle	A-11
A-17	Pre test right side view of test vehicle	A-12
A-18	Post test right side view of test vehicle	A-12
A-19	Pre test right front $\frac{3}{4}$ view of test vehicle	A-13
A-20	Post test right front $\frac{3}{4}$ view of test vehicle	A-13
A-21	Pre test overhead view	A-14
A-22	Post test overhead view	A-14
A-23	Pre test overhead close-up	A-15
A-24	Post test overhead close-up	A-15
A-25	Pre test impact point	A-16
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A-27	Pre test front $\frac{3}{4}$ view of left side door	A-17
A-28	Post test front $\frac{3}{4}$ view of left side door	A-17
A-29	Pre test rear $\frac{3}{4}$ view of left side door	A-18
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A-31	Pre test driver, left side view	A-19
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A-33	Pre test driver shoulder clearance	A-20
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A-38	Post test driver contact locations (2)	A-22
A-39	Pre test front view of MDB barrier face	A-23
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A-41	Pre test overhead view of MDB barrier face	A-24
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A-44	Post test right side view of MDB barrier face	A-25

Figure	Photograph Description	Page
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A-47	FMVSS301 0 degrees	A-27
A-48	FMVSS301 90 degrees	A-27
A-49	FMVSS301 180 degrees	A-28
A-50	FMVSS301 270 degrees	A-28
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A-52	Impact	A-29



Figure A-1: Left front 3/4 view, as delivered



Figure A-2: Right rear 3/4 view, as delivered

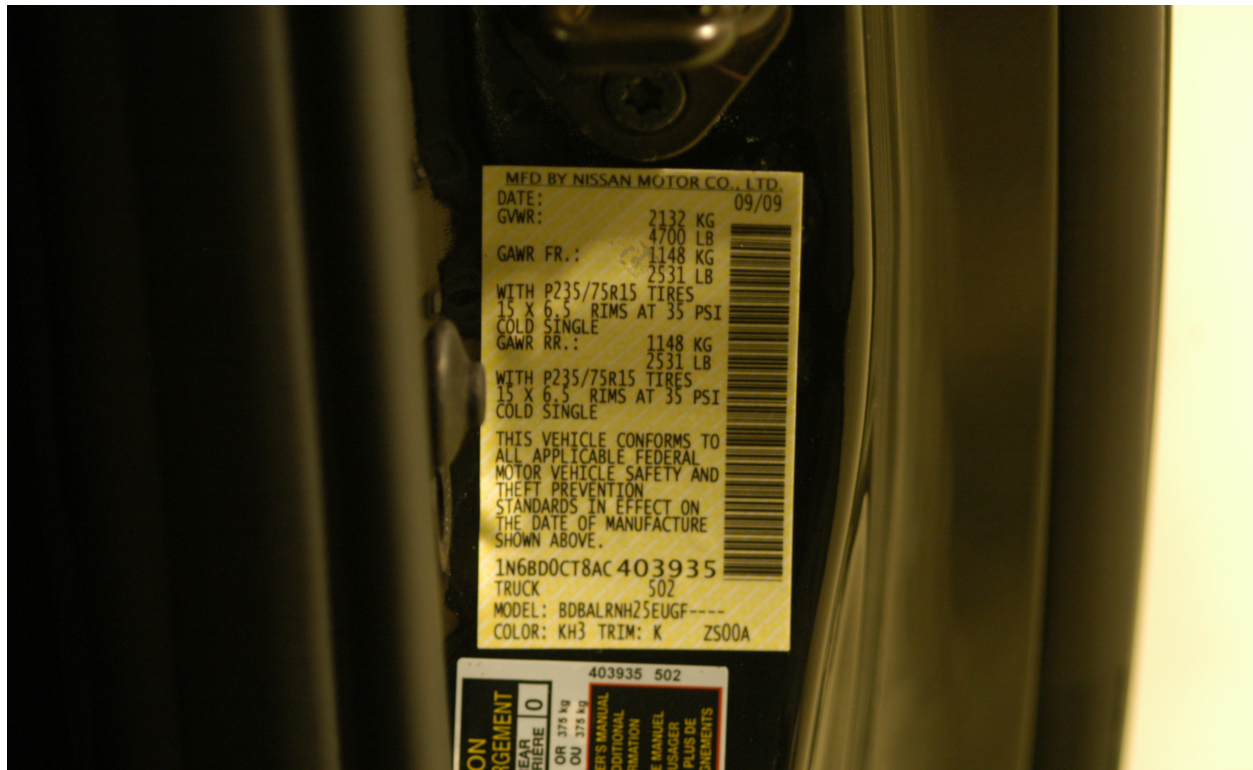


Figure A-3: Manufacturer's label

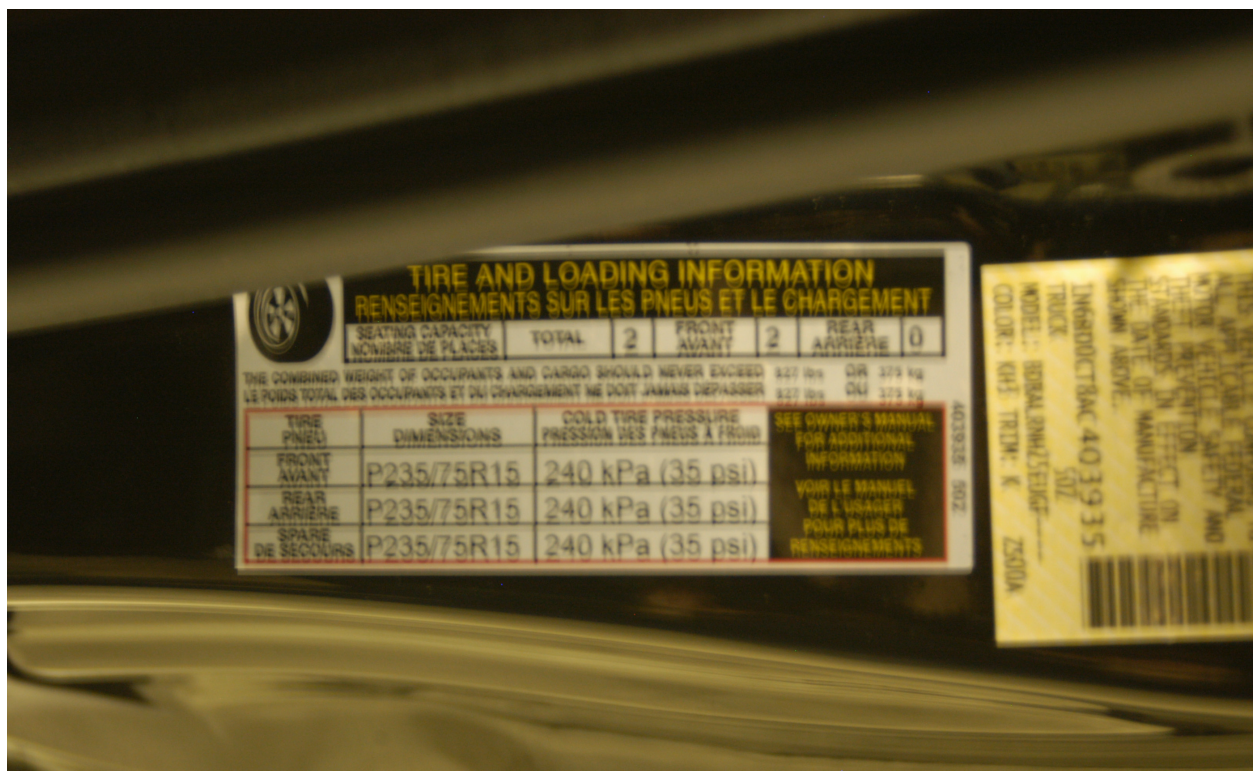


Figure A-4: Tire placard



Figure A-5: Pre test front view of test vehicle



Figure A-6: Post test front view of test vehicle



Figure A-7: Pre test left front 3/4 view of test vehicle



Figure A-8: Post test left front 3/4 view of test vehicle



Figure A-9: Pre test left side view of test vehicle



Figure A-10: Post test left side view of test vehicle



Figure A-11: Pre test left rear 3/4 view of test vehicle



Figure A-12: Post test left rear 3/4 view of test vehicle



Figure A-13: Pre test rear view of test vehicle



Figure A-14: Post test rear view of test vehicle



Figure A-15: Pre test right rear 3/4 view of test vehicle



Figure A-16: Post test right rear 3/4 view of test vehicle



Figure A-17: Pre test right side view of test vehicle



Figure A-18: Post test right side view of test vehicle



Figure A-19: Pre test right front 3/4 view of test vehicle



Figure A-20: Post test right front 3/4 view of test vehicle

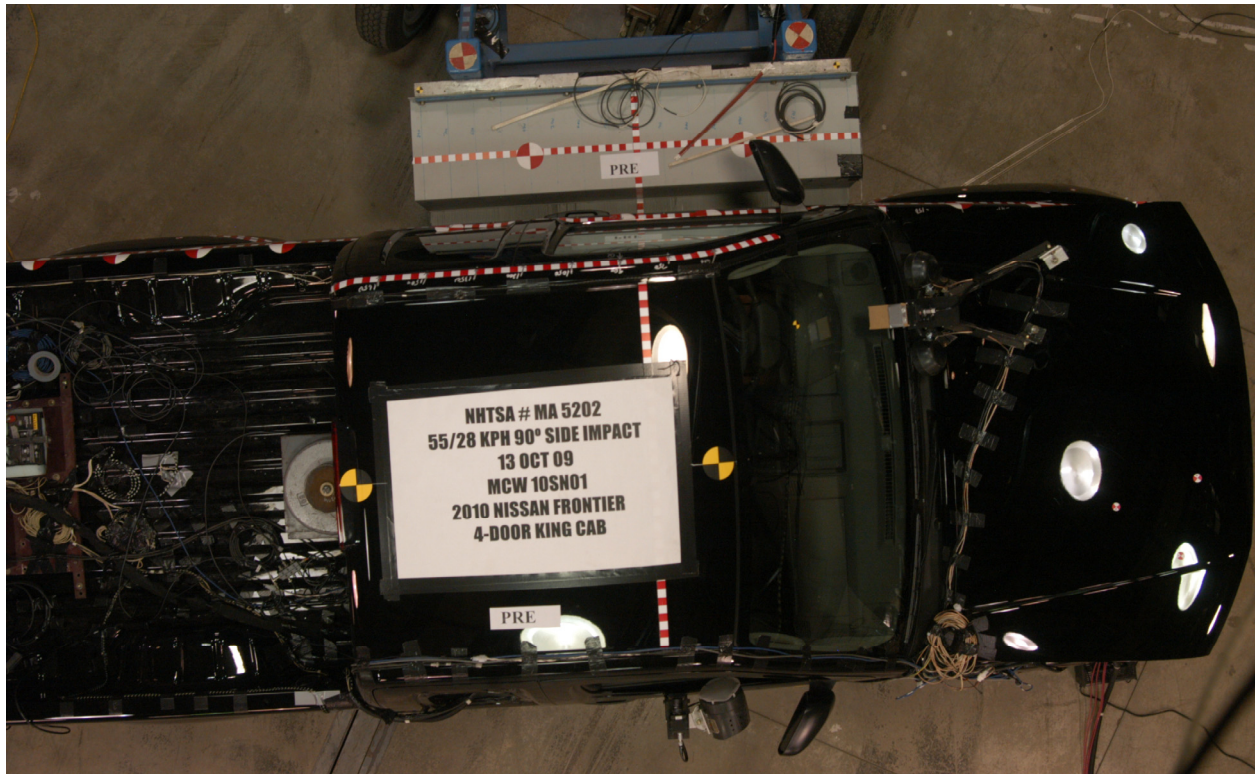


Figure A-21: Pre test overhead view



Figure A-22: Post test overhead view

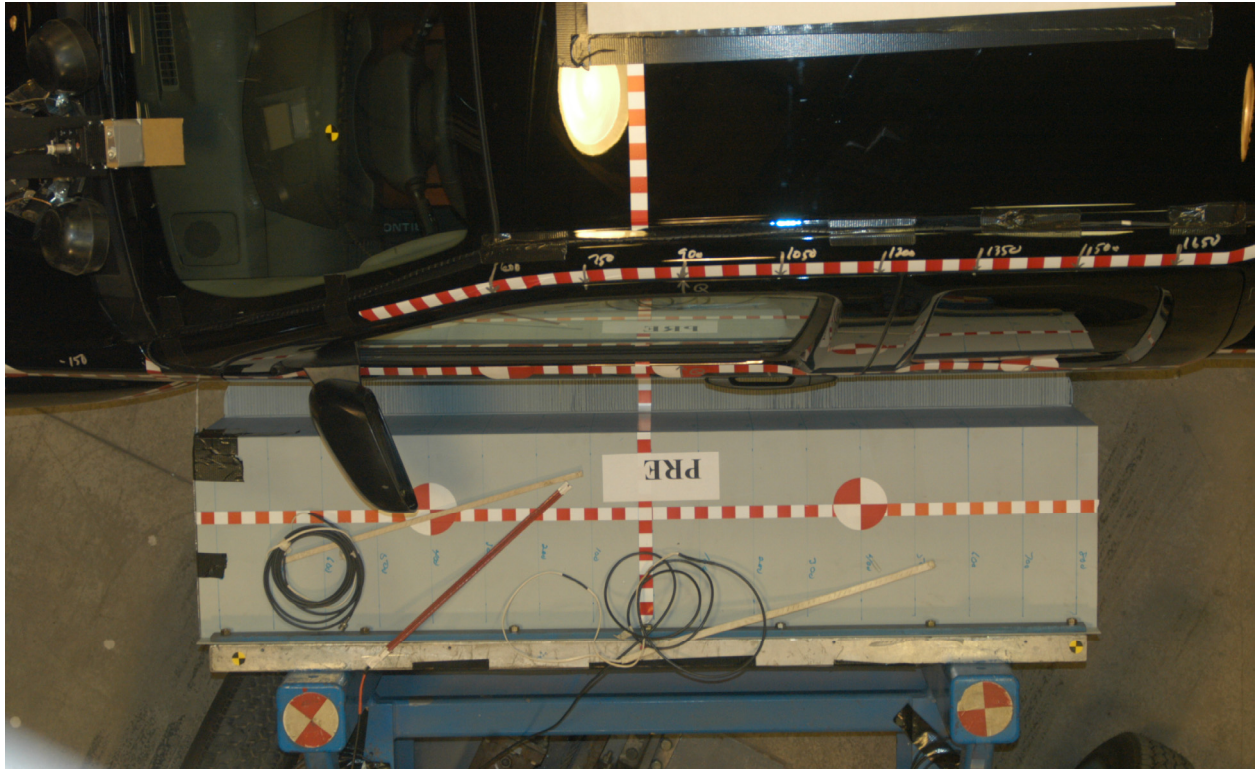


Figure A-23: Pre test overhead close-up view

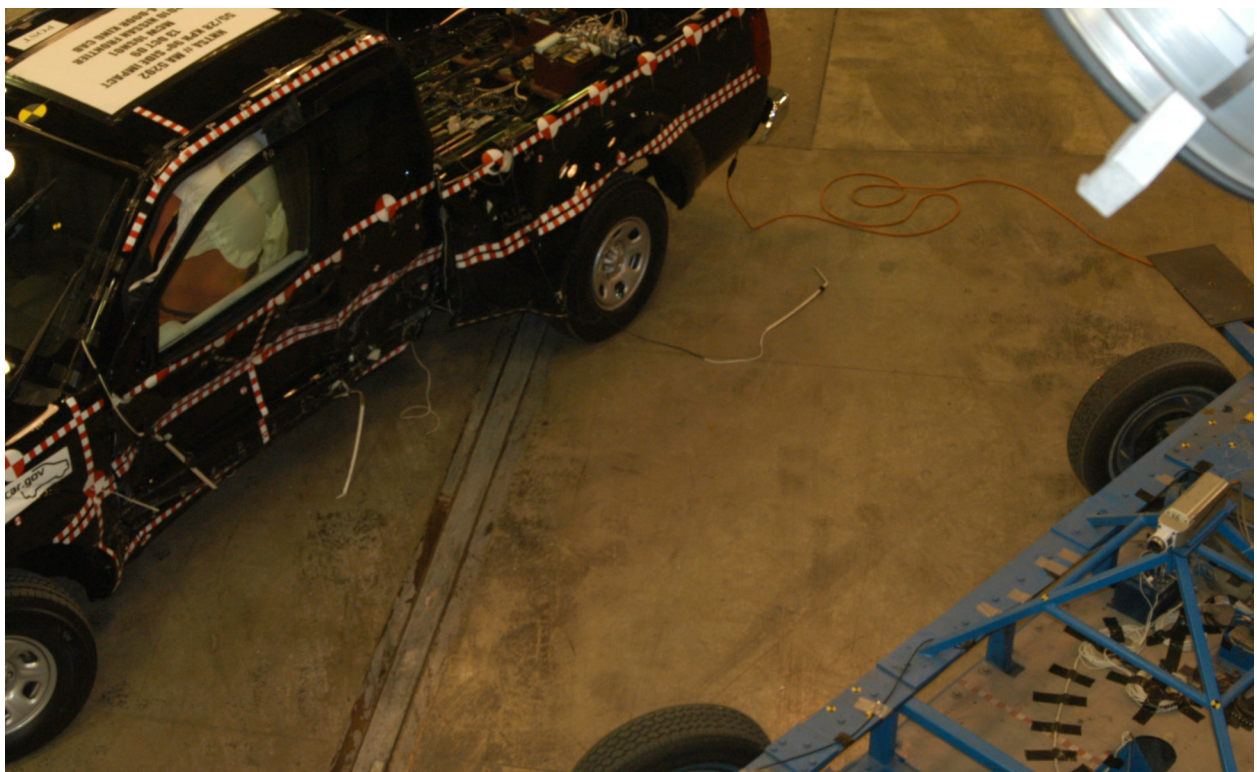


Figure A-24: Post test overhead close-up view



Figure A-25: Pre test impact point



Figure A-26: Post test impact point



Figure A-27: Pre test front 3/4 view of left side door



Figure A-28: Post test front 3/4 view of left side door



Figure A-29: Pre test rear 3/4 view of left side door



Figure A-30: Post test rear 3/4 view of left side door



Figure A-31: Pre test driver left side view



Figure A-32: Post test driver left side view

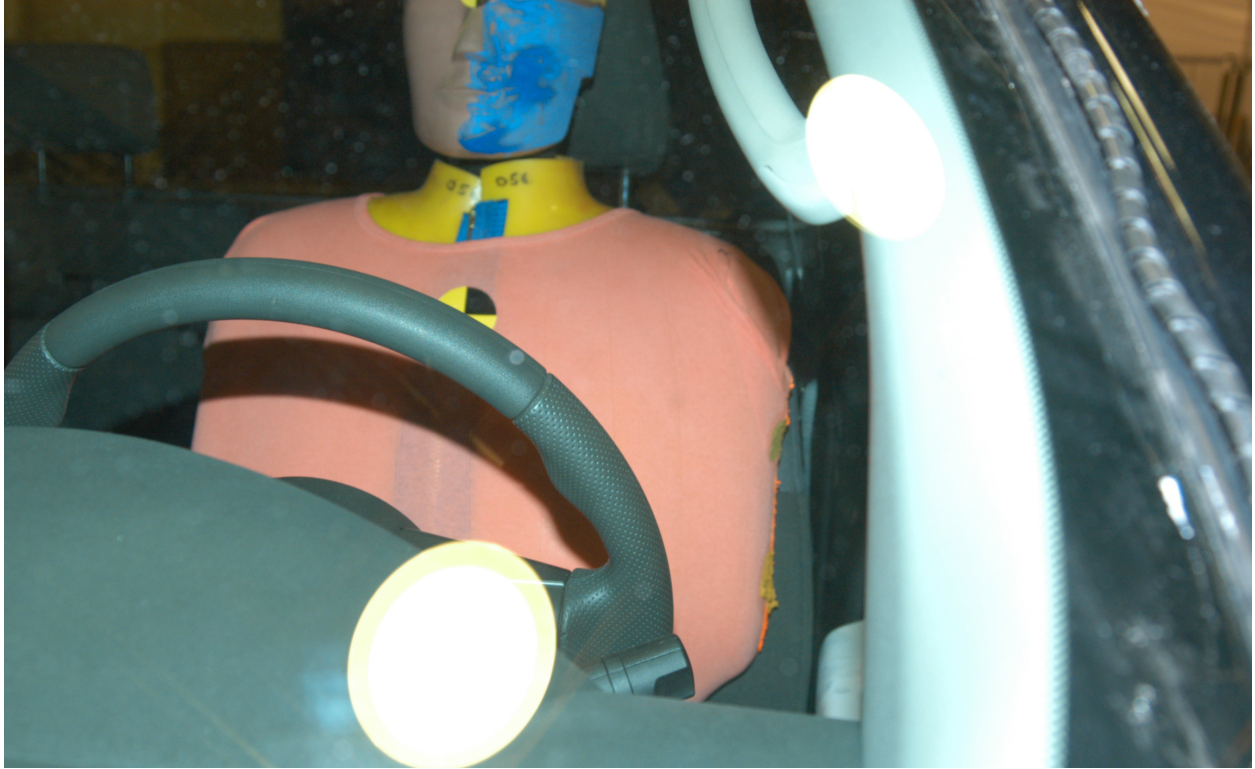


Figure A-33: Pre test driver shoulder clearance



Figure A-34: Post test driver shoulder clearance



Figure A-35: Pre test driver right side view



Figure A-36: Post test driver right side view



Figure A-37: Post test driver contact locations (1)



Figure A-38: Post test driver contact locations (2)



Figure A-39: Pre test front view of MDB barrier face



Figure A-40: Post test front view of MDB barrier face

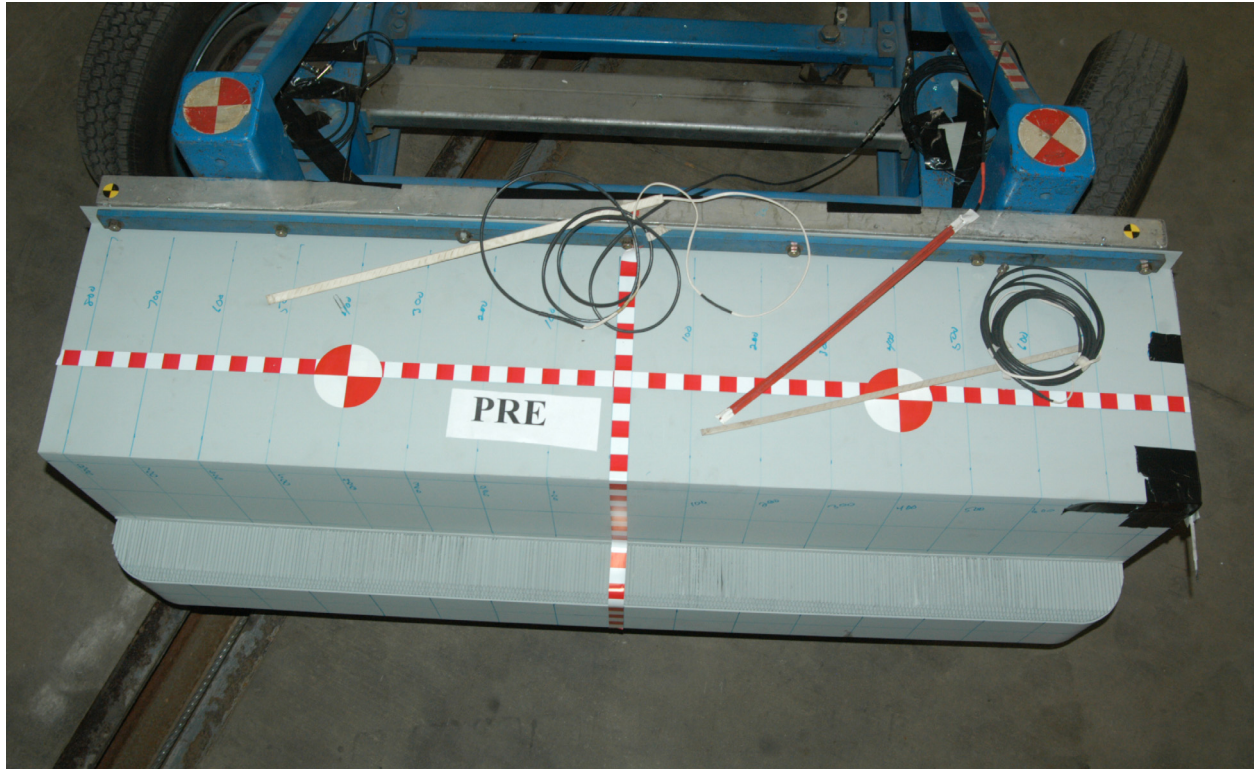


Figure A-41: Pre test overhead view of MDB barrier face



Figure A-42: Post test overhead view of MDB barrier face



Figure A-43: Pre test right side view of MDB barrier face



Figure A-44: Post test right side view of MDB barrier face



Figure A-45: Pre test left side view of MDB barrier face



Figure A-46: Post test left side view of MDB barrier face



Figure A-47: FMVSS 301 0 degrees

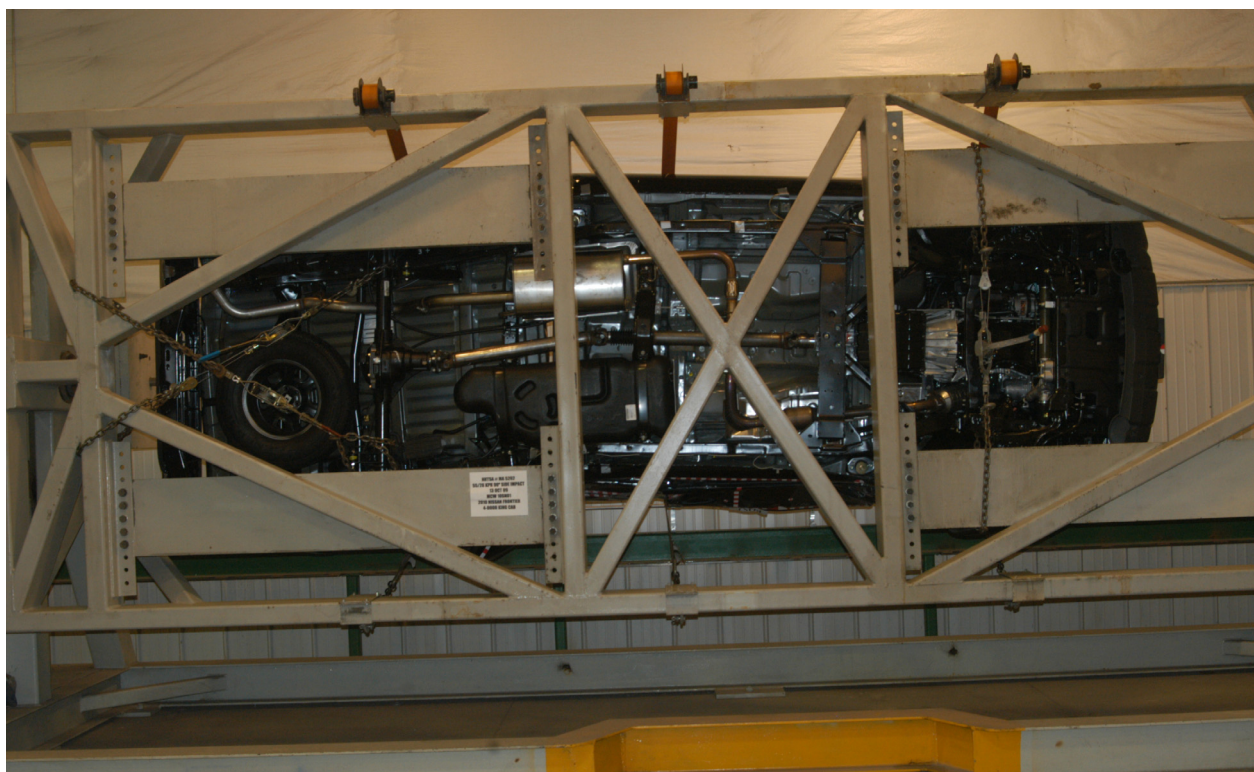


Figure A-48: FMVSS 301 90 degrees



Figure A-49: FMVSS 301 180 degrees

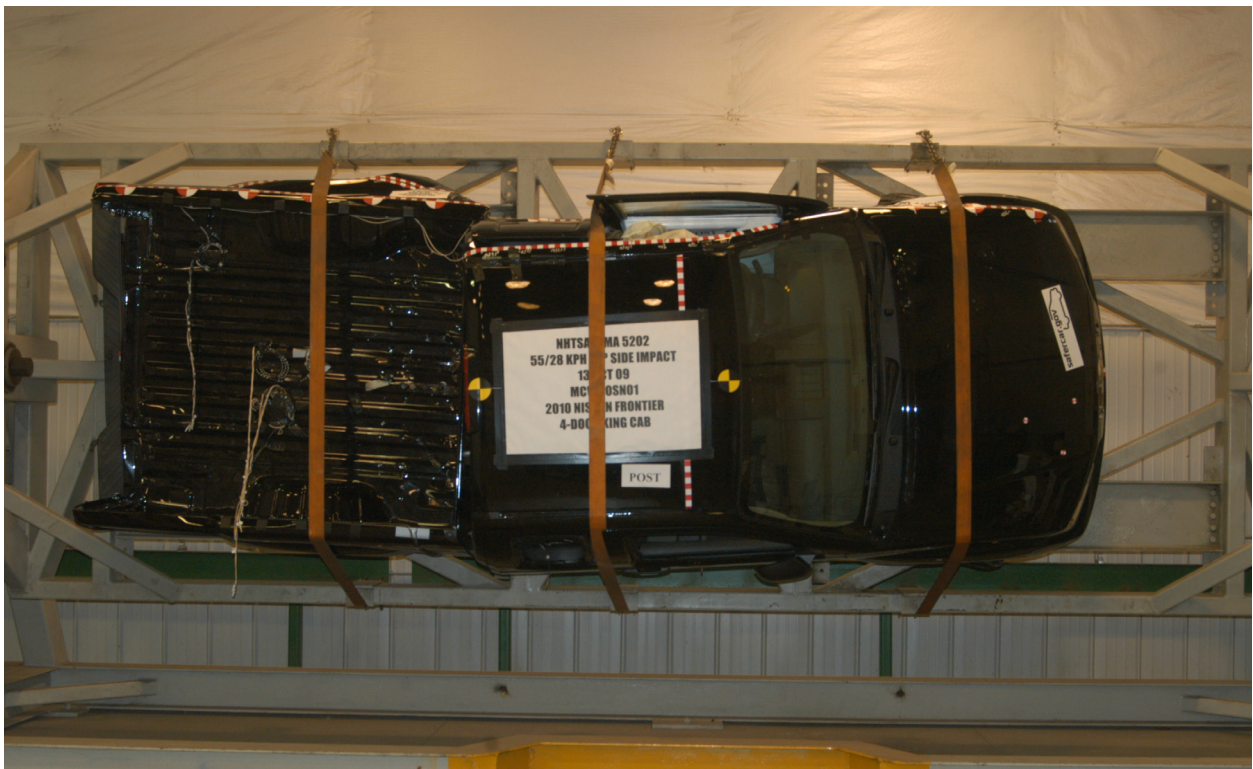


Figure A-50: FMVSS 301 270 degrees



Figure A-51: FMVSS 301 360 degrees



Figure A-52: Impact

APPENDIX B

SID/HIII, VEHICLE AND MDB RESPONSE DATA

The following plots are provided in the test report

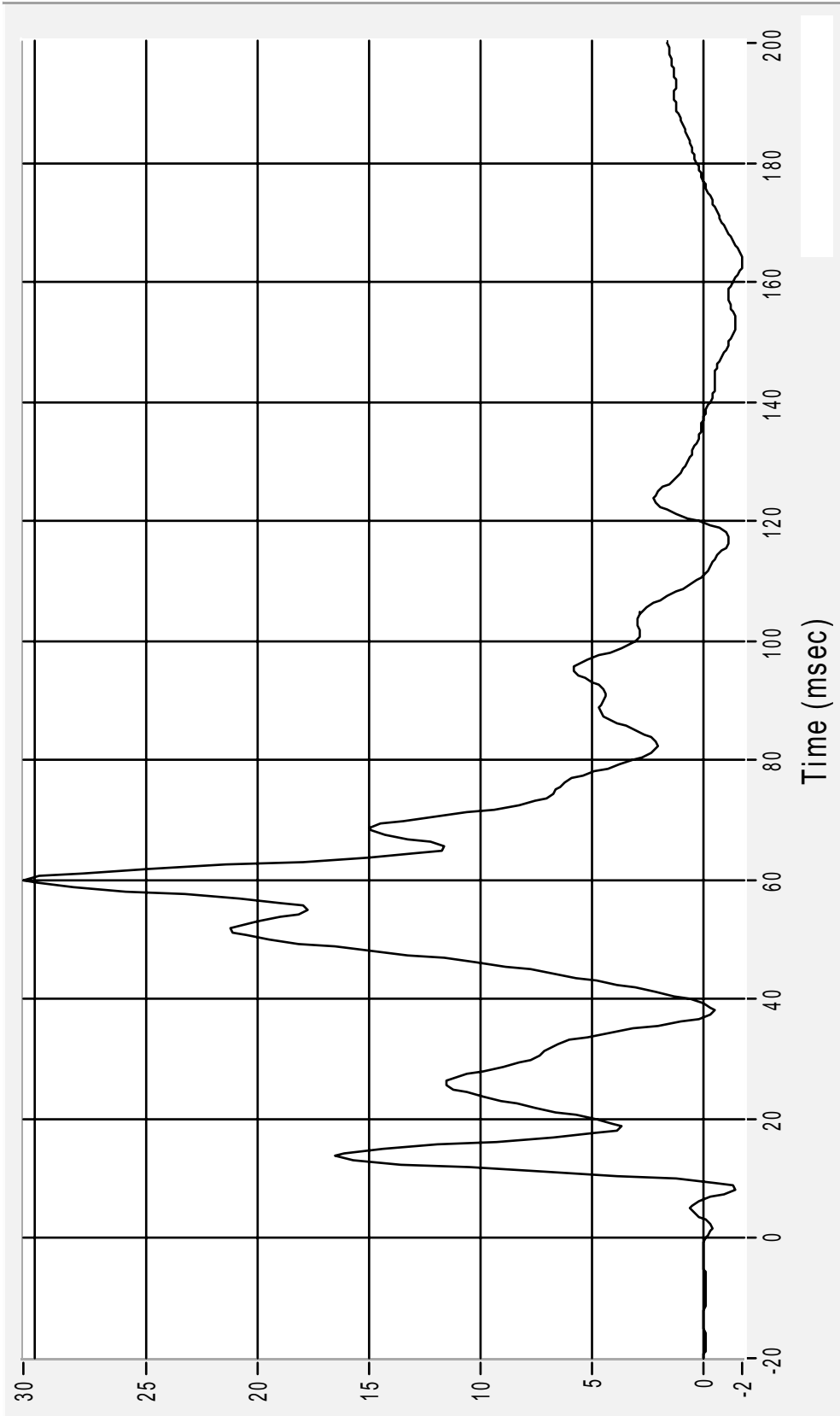
Data Plot	Description	Page
B-1	Driver upper rib acceleration (P) – FIR100	B-3
B-2	Driver lower rib acceleration (P) – FIR100	B-4
B-3	Driver lower spine acceleration (P) – FIR100	B-5
B-4	Driver pelvis acceleration (P) – FIR100	B-6

The following dummy, vehicle, and MDB response data can be found in the R&D section of the NHTSA website at: www-nrd.nhtsa.dot.gov/database/nrd-11/veh_db.html.

Description
Driver head (x) acceleration
Driver head (y) acceleration
Driver head (z) acceleration
Driver upper neck (x) force
Driver upper neck (y) force
Driver upper neck (z) force
Driver upper neck (x) moment
Driver upper neck (y) moment
Driver upper neck (z) moment
Driver upper rib (y) acceleration – redundant
Driver lower rib (y) acceleration – redundant
Driver lower spine (y) acceleration – redundant
Driver pelvis (y) acceleration – redundant
Vehicle right side sill at front seat (x) acceleration
Vehicle right side sill at front seat (y) acceleration
Vehicle right side sill at front seat (z) acceleration
Vehicle right side sill at rear seat (x) acceleration
Vehicle right side sill at rear seat (y) acceleration
Vehicle right side sill at rear seat (z) acceleration
Vehicle rear floor pan above axle (x) acceleration
Vehicle rear floor pan above axle (y) acceleration
Vehicle rear floor pan above axle (z) acceleration
Vehicle left side sill at rear seat (y) acceleration
Vehicle left side sill at front seat (y) acceleration
Vehicle right rear occupant compartment (y) acceleration
Vehicle left lower b-pillar (y) acceleration
Vehicle left middle b-pillar (y) acceleration
Vehicle left lower a-pillar (y) acceleration
Vehicle left middle a-pillar (y) acceleration
Vehicle front seat track (y) acceleration
Vehicle rear seat track/structure (y) acceleration
Vehicle center of gravity (x) acceleration
Vehicle center of gravity (y) acceleration
Vehicle center of gravity (z) acceleration
MDB center of gravity (x) acceleration
MDB center of gravity (y) acceleration
MDB center of gravity (z) acceleration
MDB rear (x) acceleration
MDB rear (y) acceleration

Driver Upper Rib (Y) Acceleration
 Acceleration (G's) FIR100

Max	30.5	G	at	60.0	msec
Min	-1.7	G	at	163.8	msec



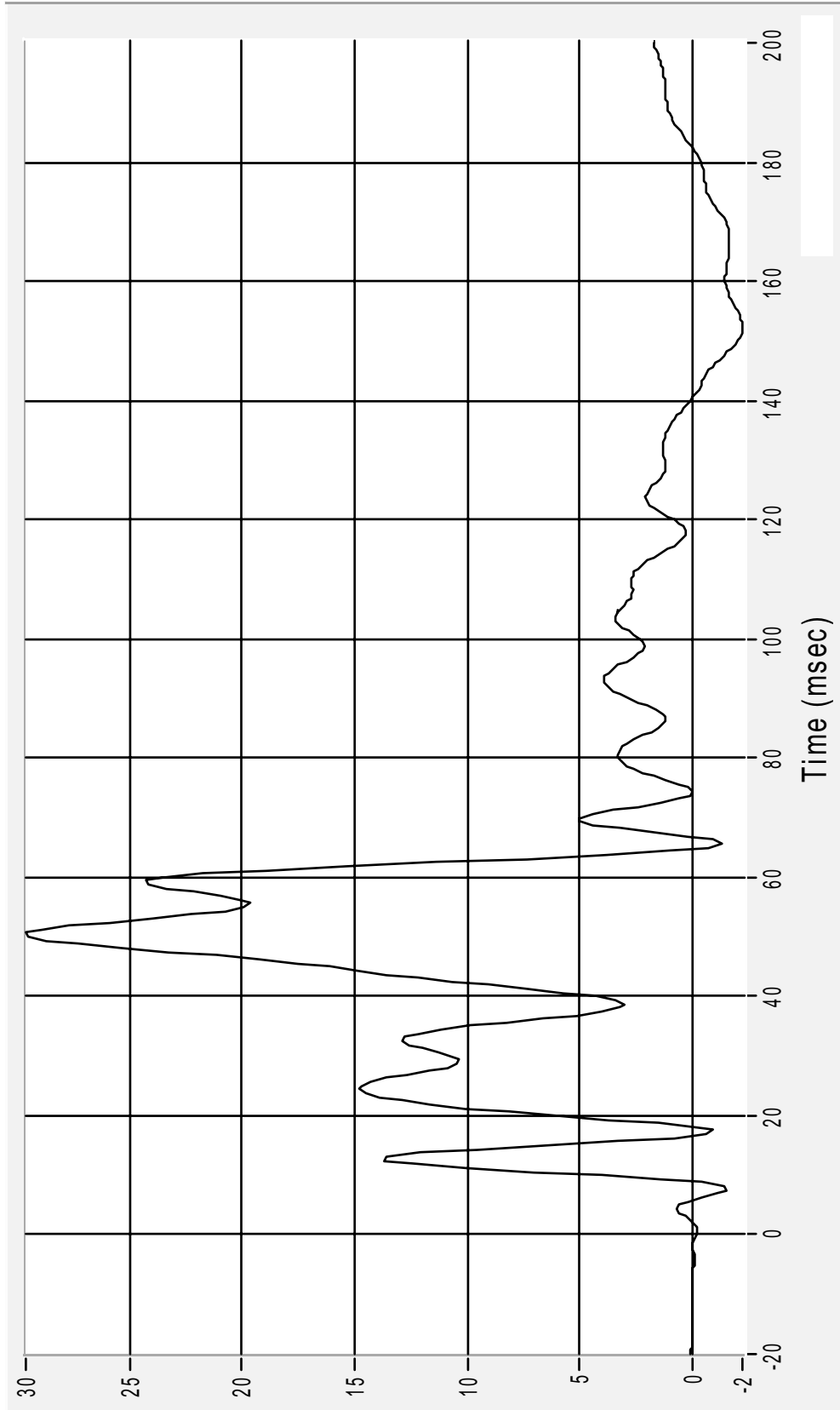
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Driver Lower Rib (Y) Acceleration
 Acceleration (G's) FIR100

Max	29.6	G	at	50.6	msec
Min	-2.2	G	at	152.5	msec



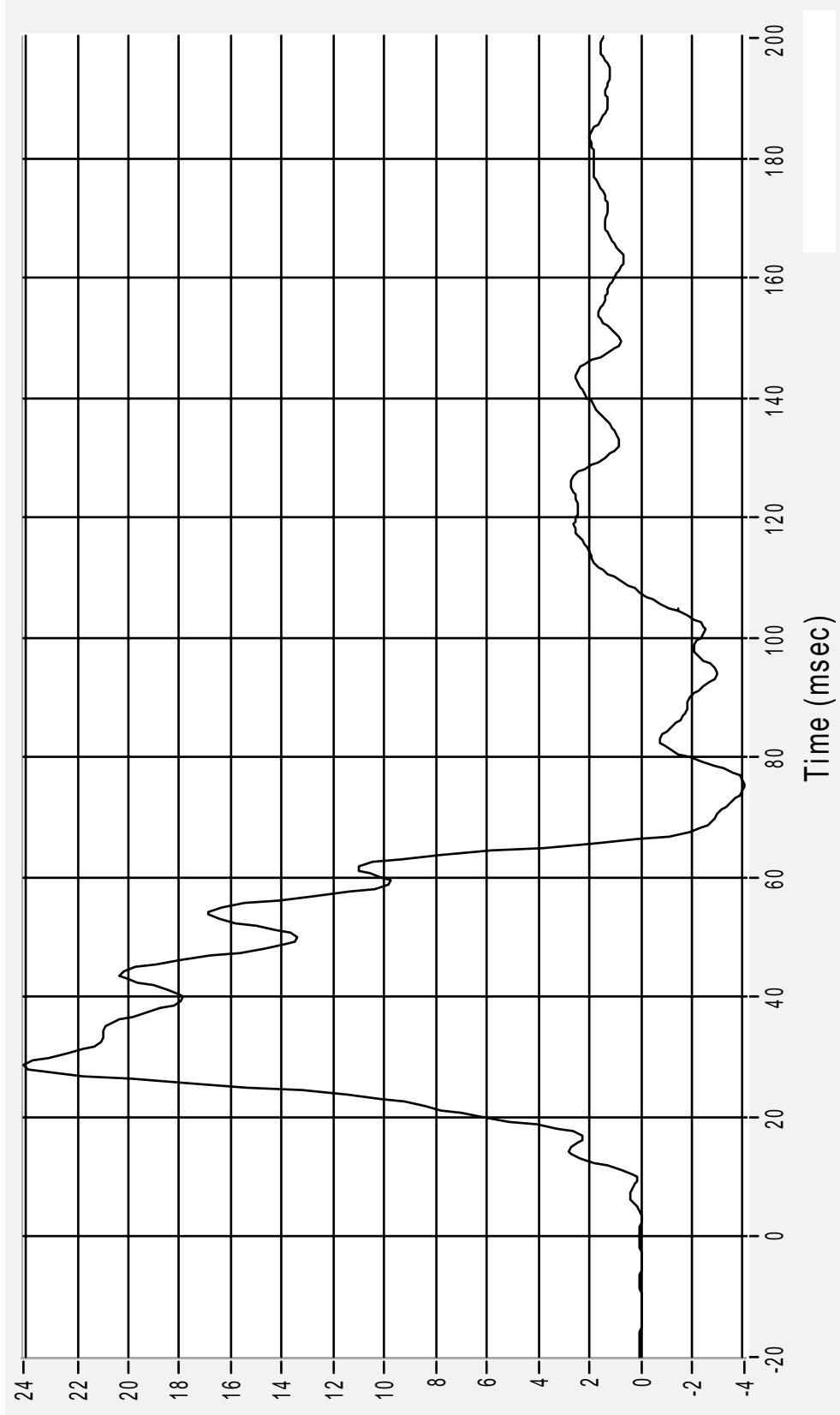
10SN01 - 2010 NISSAN FRONTIER 4-DOOR KING CAB PICKUP

13 October 2009

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 Vehicle Crashworthiness Lab

Driver Lower Spine (Y) Acceleration
 Acceleration (G's) FIR100

Max	24.1	G	at	28.8	msec
Min	-4.1	G	at	75.6	msec

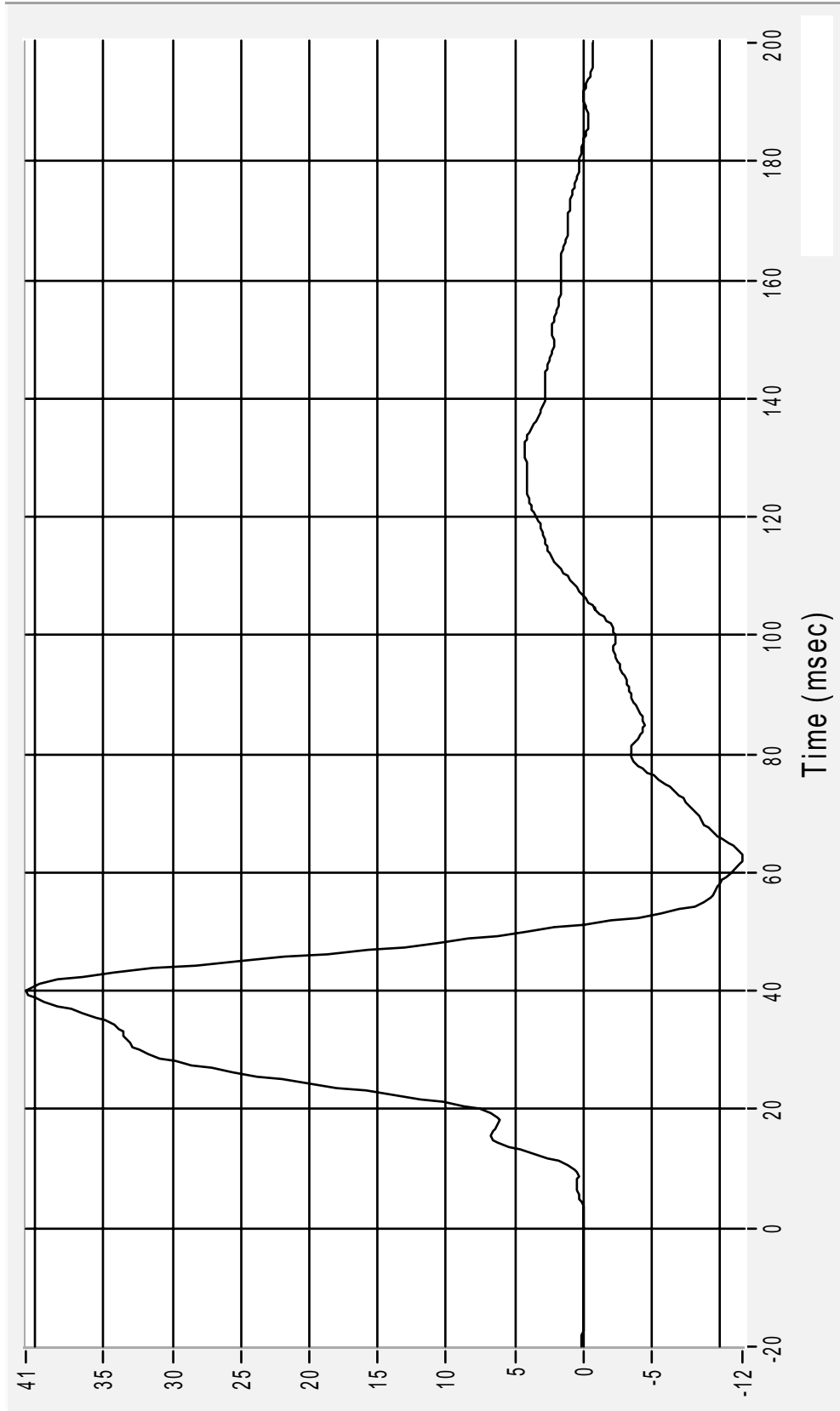


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 13 October 2009

Driver Pelvic (Y) Acceleration
 Acceleration (G's) FIR100

Max	40.7	G	at	40.0	msec
Min	-11.6	G	at	62.5	msec



10SN01 - 2010 NISSAN FRONTIER 4-DOOR KING CAB PICKUP

13 October 2009

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

APPENDIX C
DUMMY CALIBRATION DATA

**VERIFICATION TEST RESULTS SUMMARY
PRE AND POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial Number 056Test Sequences 1 and 2

TEST	PRE		POST	
	COMMENTS	BY	COMMENTS	BY
EXTERNAL DIMENSIONS	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
THORACIC SHOCK ABSORBER TEST	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
LATERAL THORAX IMPACT TEST	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
LATERAL PELVIS IMPACT TEST	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
ABDOMINAL COMPRESSION	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
LUMBAR FLEXION	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
HYBRID III LATERAL NECK TEST	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski
HYBRID III LATERAL HEAD DROP	Pass all requirements	Mike Rawski	Pass all requirements	Mike Rawski

SID Serial Number N/aTest Sequences N/a

TEST	PRE		POST	
	COMMENTS	BY	COMMENTS	BY
EXTERNAL DIMENSIONS				
THORACIC SHOCK ABSORBER TEST				
LATERAL THORAX IMPACT TEST				
LATERAL PELVIS IMPACT TEST				
ABDOMINAL COMPRESSION				
LUMBAR FLEXION				
HYBRID III LATERAL NECK TEST				
HYBRID III LATERAL HEAD DROP				

SUMMARY
SID H3 PRE AND POST VERIFICATION

CONFIGURED FOR LEFT SIDE IMPACT

TEST PARAMETER	SPEC	SID HIII/056		N/a	
		PRE	POST	PRE	POST
MEASUREMENTS					
Date	-	20Sept09	22Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	21.6	23.3		
Relative Humidity (%)	10-70	55.9	35.2		
SH – Seated Height (mm)	889-909	903	908		
RH – Rib Height (mm)	501-521	505	518		
HP – Hip Pivot Height (mm)	99	99/99	99/99		
RD – Rib From Back Line (mm)	229-241	229	230		
KH – Knee Pivot from Back Line (mm)	511-526	525/525	515/520		
KV – Knee Pivot to Floor (mm)	490-505	500/503	495/490		
HW – Hip Width (mm)	356-391	360	360		
THORAX IMPACTS					
Date	-	17Oct08	22Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	20.5	23.3		
Relative Humidity (%)	10-70	56.4	35.2		
Probe Speed (m/s)	4.21-4.33	4.29	4.28		
Upper Rib Acceleration (G)	37-46	42.3	38.3		
Lower Rib Acceleration (G)	37-46	39.4	37.3		
Lower Spine Acceleration (G)	15-22	18.9	19.7		
PELVIS IMPACTS					
Date	-	19Sept08	22Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	20.5	23.3		
Relative Humidity (%)	10-70	56.4	35.2		
Probe Speed (m/s)	4.21-4.33	4.27	4.27		
Pelvis Acceleration (G)	40-60	45.9	43.6		
THORACIC SHOCK ABSORBER					
Shock Absorber ID Number	-	A1/2 X2-1746			
Damper Setting	1-10	1			
Date	-	17Sept09			
Sequential Test Number	-	1			
Temperature	18.9-25.5	21.6			
Relative Humidity	10-70	60.5			
Probe Speed (m/s) Low	3.05	3.06			
Force (N)	836 – 1125	979.2			
Displacement (mm)	30 – 35	30.1			
Probe Speed (m/s) Middle	4.27	4.24			
Force (N)	1730 – 2099	1731.5			
Displacement (mm)	32 – 37	33.5			
Probe Speed (m/s) High	6.10	6.10			
Force (N)	3741 – 4448	3846.9			
Displacement (mm)	33 - 40	36.7			

TEST PARAMETER	SPEC	SID Hill/056		N/a	
		PRE	POST	PRE	POST
ABDOMINAL COMPRESSION					
Date	-	31July09	16Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	20.2	22.4		
Relative Humidity (%)	10-70	51.2	26.4		
Force at 13 mm (N)	104-162	136.2	131.6		
Force at 19 mm (N)	163-221	199.6	196.1		
Force at 25 mm (N)	222-280	260.4	271.6		
Force at 33 mm (N)	325-391	378.1	387.8		
LUMBAR FLEXION					
Date	-	30July09	16Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	22.7	22.2		
Relative Humidity (%)	10-70	50.6	27.1		
Force at 0° (N)	0-26.7	0	0		
Force at 0° (N)	97.8-151.2	110.2	111.5		
Force at 0° (N)	151.2-204.6	154.4	187.1		
Force at 0° (N)	204.6-258	209.1	226.1		
Return Angle	12° Maximum	4.5	4.4		
HYBRID III LATERAL NECK					
Date	-	31July09	19Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	21.3	23.8		
Relative Humidity (%)	10-70	52.0	28.7		
Pendulum Speed (m/s)	6.89-7.13	7.02	7.01		
Pendulum Pulse 10ms (m/s)	1.96-2.55	2.17	2.06		
Pendulum Pulse 20ms (m/s)	4.12-5.10	4.62	4.68		
Pendulum Pulse 30ms (m/s)	5.73-7.01	6.80	6.98		
Pendulum Pulse 40 –70 ms (m/s)	6.27-7.64	6.81	6.94		
Max Head rotation (deg)	66-82	77.9	74.7		
Head angle crosses zero (ms)	58-67	64.6	61.8		
Peak Moment (Nm)	73-88	86.3	85.6		
Moment crosses zero (ms)	49-63	56.2	56.0		
Max rotation wrt pk. moment (ms)	2-15	14.2	8.08		
HYBRID III LATERAL HEAD DROP					
Date	-	18July09	16Oct09		
Sequential Test Number	-	1	2		
Temperature (°C)	18.9-25.5	23.0	22.3		
Relative Humidity (%)	10-70	59.5	26.5		
Resultant Max (G)	120-150	137.2	138.8		
Longaitudinal Max (G)	<15	5.90	4.84		

**DUMMY INSPECTION LIST
PRE AND POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

		SID H3 056		N/a	
		PRE	POST	PRE	POST
	Date	13Oct09	13Oct09		
	Performed By	Mike Rawski	Mike Rawski		
PART	INSPECTION	RESULT	RESULT		
Skin	Visual	Pass	Pass		
Head	Visual, Ballast, Accelerometer Mount	Pass	Pass		
Neck	Visual and Palpated, Cable Torque	Pass	Pass		
Spine Box	Visual, Ballast, Weldment, Accelerometer Mount	Pass	Pass		
Rib Cage	Visual, Palpated, Measured, Stiffness	Pass	Pass		
Sternum	Visual	Pass	Pass		
Lumbar Spine	Visual	Pass	Pass		
Abdomen	Visual	Pass	Pass		
Pelvis	Visual, Palpated, Accelerometer Mount	Pass	Pass		
Upper Legs	Visual	Pass	Pass		
Knees	Visual, Stops, Inserts	Pass	Pass		
Lower Legs	Visual, Range of Motion	Pass	Pass		
Ankles	Visual, Range of Motion	Pass	Pass		
Feet	Visual, Range of Motion	Pass	Pass		
Joints	1 to 2 G Range	Pass	Pass		
Other		N/a	N/a		