

REPORT NUMBER TR-P27083-01-NC

**NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST**

**HYUNDAI MOTOR COMPANY
2007 HYUNDAI VERACRUZ
5-DOOR MPV**

NHTSA NUMBER: U70500

**PREPARED BY:
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MARCH 6, 2007


FINAL REPORT


**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2007 Hyundai Veracruz 5-Door MPV at Karco Engineering, LLC on 03/06/07. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 56.70 km/h. The ambient temperature at the barrier face at the time of impact is 25.6 degrees Celcius. The vehicle's maximum post-test static crush is 609 mm at the vehicle's centerline. The test vehicle is equipped with a 3-point continuous belt system and second generation supplemental airbags in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:				
Measurement Description	Units	Threshold	Driver ATD	Passenger ATD
Head Injury Criteria (HIC)	N/A	1000	503.1	287.7
Max. Chest Accel. (3 msec Clip)	G's	60	42.3	43.5
Left Femur Force	Newtons	10008	-4804.6	-5507.0
Right Femur Force	Newtons	10008	-5452.6	-3984.4
17. Key Words 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2007 Hyundai Veracruz 5-Door MPV NHTSA No. U70500			18. Distribution of Statement Copies of this report available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5108 Washington, D.C. 20590	
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SECTION 1

PURPOSE AND SUMMARY OF TEST U70500

1.1 PURPOSE

This 35 mph (56.3 km/h) frontal barrier impact test is part of the New Car Assessment Program (NCAP) sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-D-00027. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph (48.3 km/h) requirements.

The 35 mph (56.3 km/h) frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Indicant Test Procedure, dated July 2005. Data was obtained indicant of FMVSS 208 "Occupant Crash Protection", FMVSS 212, "Windshield Retention", FMVSS 219, "Windshield Zone Intrusion (Partial)", and FMVSS 301 "Fuel System Integrity", performance. Procedures for receiving, inspection, testing and reporting of test results are described in the test procedures and are not repeated in this report.

1.2 SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2007 Hyundai Veracruz 5-Door MPV at a velocity of 55.70 km/h. The test was performed at Karco Engineering, LLC on March 6, 2007.

Three (3) real-time and fourteen (14) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet number 14 (page number 24) of this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head (primary and redundant), chest (primary and redundant) and pelvis triaxial accelerometers, chest displacement potentiometers, six-axis upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were placed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. Shoulder belt spool-off was measured for the driver and passenger dummies. The driver (position 1) ATD (Serial No. 034) and the right-front passenger (position 2) ATD (Serial No. 035) were calibrated prior to this test.

One hundred and forty one (141) channels of data were recorded using a TDAS data acquisition system. Appendix A contains Pre and Post-Test Photographs, Appendix B contains the Dummy

Response data traces, Appendix C contains the Dummy Calibration data, and Appendix D contains the Child Restraint System Report.

There was 100 percent windshield retention and there was no intrusion into the protected zone of the windshield during the impact event. There was no stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 609 mm at the vehicle's centerline and both the driver and the passenger side doors remained closed and latched during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver ATD's head and chest contacted the airbag and the abdomen had no contact. Both knees contacted the knee bolster.

The passenger's visible contact points were as follows: The passenger ATD's head, and chest contacted the airbag. Both knees contacted the glove box.

Occupant injury data is contained in table below.

OCCUPANT DATA SUMMARY

ATD Position	HIC 36	Clip (g)	Chest Defl. (mm)	Left Femur (N)	Right Femur (N)
Driver	503.0	42.3	-27.5	-4804.6	-5507.0
Passenger	287.7	43.5	-22.9	-5452.6	-3984.4

Additional data plots for this test are available in the research and development section of the NHTSA website. The website can be found at: www.NHTSA.Dot.Gov

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(tf - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.70
Test Weight	kg	2155
Impact Angle	degrees	0
Average Rebound	mm	2547
Maximum Static Crush	mm	609

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door opening	Remained closed and latched, opened w/o tools	Remained closed and latched, opened w/o tools
Rear Door Opening	Remained closed and latched, opened w/o tools	Remained closed and latched, opened w/o tools
Seat Track Shift (mm)	None	None
Seat Back Failure	No	No

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type/ Serial No.	50% Male Hybrid III No. 034	50% Male Hybrid III No. 035
Head Contact	Airbag	Airbag
Chest Contact	Airbag	Airbag
Abdomen Contact	None	None
Left Knee Contact	Knee Bolster	Glovebox
Right Knee Contact	Knee Bolster	Glovebox

MOVIE COVERAGE

Cameras	Standard	Additional
High Speed	14	0
Real Time	1	2
Total	15	2

DATA CHANNELS

Driver ATD Sensors	40
Passenger ATD Sensors	40
Belt Assessment Sensors	8
Vehicle Structure Accelerometers	8
Rigid Barrier Load Cells	36
Total	132

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	U70500
Make	Hyundai
Model	Veracruz
Body Style	5-Door MPV
Vin No.	KM8NU13C37U006539
Color	Light Green
Delivery Date	2/28/2007
Odometer (Miles)	37.0
Dealer	Hyundai Motor America
Transmission	6-Speed Automatic
Final Drive	Front
Type/No. Cyl.	V6
Engine Disp. (L)	3.8
Engine Placement	Transverse
Roof Rack	No
Sunroof/T-Top	No
Tinted Glass	Yes
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Head Airbag	No
Driver Curtain Airbag	Yes
Pass. Airbag	No
Pass. Side Airbag	No
Pass. Head Airbag	No
Pass. Curtain Airbag	Yes
Pre-Tensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes
Air. Cond.	Yes
AM/FM Cassette	Yes
Tilt Steering	Yes
Automatic Door Locks	Yes
Power Windows	Yes
Power Seats	No
Other	None

Does Owners Manual provide instructions to turn off automatic door locks.

Yes

DATA FROM MANUFACTURER

Manufactured By	Hyundai Motor Company
Date of Manufacture	Jan-07

GVWR (kg)	2600
GAWR Front (kg)	1465
GAWR Rear (kg)	1450

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	Bench	
Number of Occupants	2	3	2	7
Capacity Weight (VCW) (kg)				526
Cargo Weight (RCLW) (kg)				50

DATA SHEET NO. 2...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

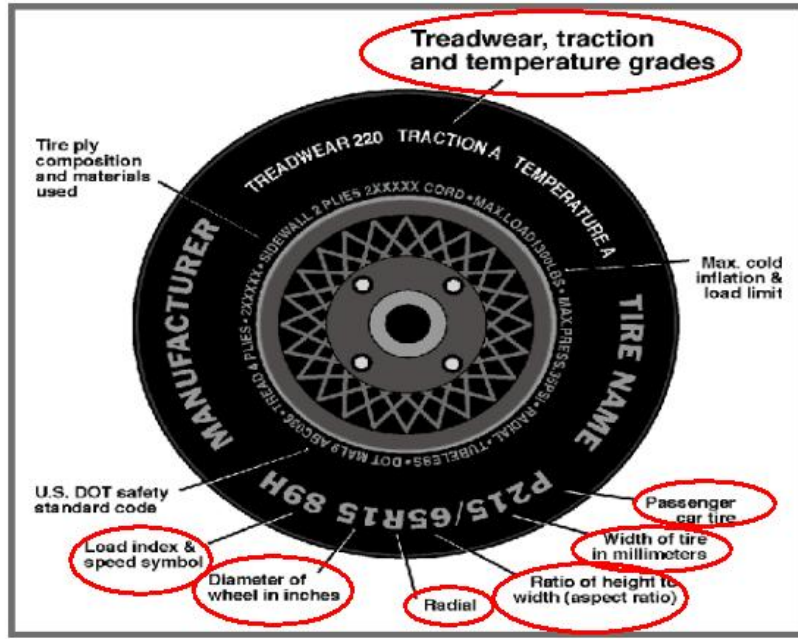
Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	308	308
Cold Pressure (kpa)	210	210
Recommended Tire Size	P245/65R17	P245/65R17
Tire Size on Vehicle	P245/65R17	P245/65R17
Tire Manufacturer	Hankook	Hankook
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Ply Polyester	2 Ply Polyester
Tire Plies Body	2 Polyester + 2 Steel + 1 Nylon	2 Polyester + 2 Steel + 1 Nylon
Load Index/Speed Symbol	105T	105T
Tire Material	Polyester + Steel + Nylon	Polyester + Steel + Nylon
DOT Safety Code Right	T7D6-NAH-3506	T7D6-NAH-3506
DOT Safety Code Left	T7D6-NAH-3506	T7D6-NAH-3506

DATA SHEET NO. 2...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV NHTSA No.: U70500
 Test Program: 2007 NHTSA 35mph NCAP Test Date: 3/06/07

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	559	416	975	610	472	1082
Right	kg	573	412	985	616	457	1073
Ratio	%	58	42	100	57	43	100
Totals	kg	1132	828	1960	1226	929	2155

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1960
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	50
Calculated Vehicle Target Wt. (TVTW)	kg	2162

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	866	866	881	891	1189
As Tested	mm	855	850	875	880	1214

Vehicle Wheel Base (mm) 2815
 Weight of Ballast Secured in cargo area (kg) 37
 Weight of Items Removed (kg) 69
 Vehicle Components Removed Spare Tire, Car Jack / Tools, Rear Hatch, Third Row Seat
Rear Bumper

* Ballast weight does not include cameras, instrumentation and brake abort system.

FUEL SYSTEM DATA

Fuel System Capacity From Owners Manual (L) 77.97
 Actual Test Volume with entire fuel System Filled (L) 72.49
 Test Fluid Type: Stoddard Solvent
 Kinematic Viscosity: as per ASTM Standard D484-71 Red
 Is Vehicle Fuel Pump Electric or Mechanical? Electric
 If electric, does pump operate with ignition switch "On" & engine "OFF" Yes
 Fuel System Particulars: Electric fuel pump. Activated when electrical system is activated
Fuel pump will run for 3 seconds when ignition is in "on" position.

DATA SHEET NO. 3

POST-TEST IMPACT DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No.1 Velocity (Primary)	km/h	55.51 to 57.12	56.70
Trap No.2 Velocity (Redun.)	km/h	55.51 to 57.12	56.52

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4660	4221	-439
Center	mm	4830	4221	-609
Right Side	mm	4705	4220	-485

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	2520
Center	mm	2590
Right Side	mm	2530
Average	mm	2547

DATA SHEET NO. 4

TEST VEHICLE INFORMATION

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

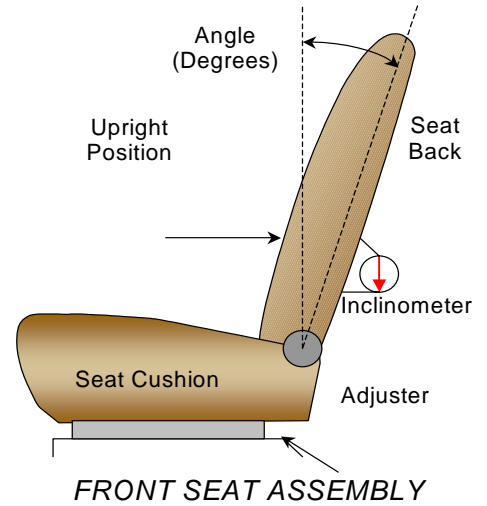
NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturer’s designated angle. The procedure is as follows:
Seat back angle was measured at the seat back of the seat using a digital inclinometer.



SEAT BACK ANGLES

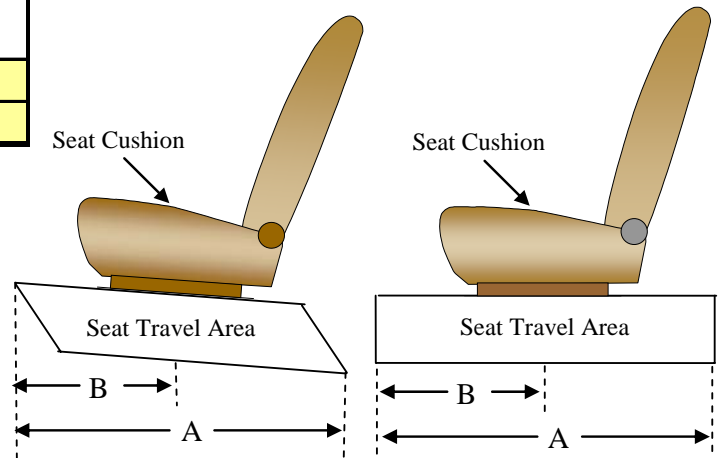
	Deg.
Driver w/seated Dummy	23.1 @ Seat Back
Passenger w/seated Dummy	23.5 @ Seat Back

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 the vertical adjustment at the lowest position obtainable for the driver and passenger.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position
Driver Seat	24 Detents	11 th Detent
Passenger Seat	24 Detents	12 th Detent



SEAT BELT UPPER ANCHORAGE

Position number one (1) is the uppermost position.

SEAT BELT UPPER ANCHORAGE

	Total # of Positions	Placed in Position #
Driver Seat	5	2
Passenger Seat	5	2

DATA SHEET NO. 4...(CONTINUED)

TEST VEHICLE INFORMATION

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

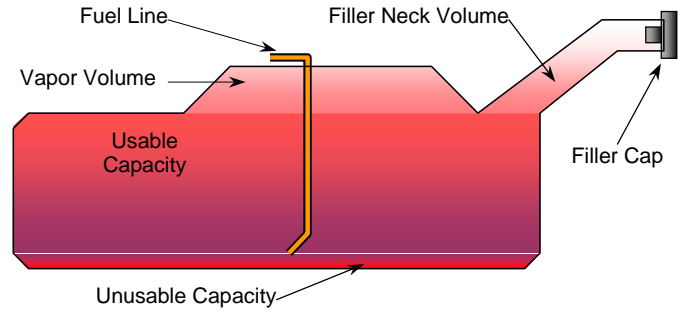
Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	77.97
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	71.92 to 73.43
Actual Amount of Solvent used	72.49

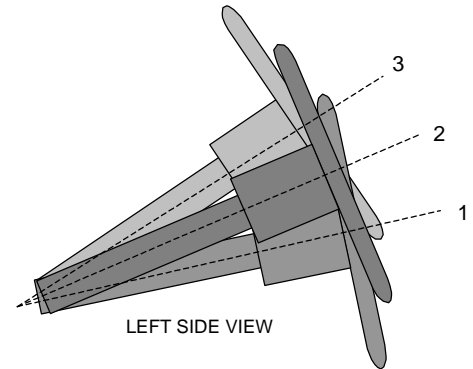
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. 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 POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost position No. 1	22.7	17.5
Geometric center position No. 2	29.6	0
Uppermost position No. 3	36.5	35

DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (deg)	Length (mm)	Angle (deg)
WA	Windshield Angle		27.8		
SWA	Steering Wheel Angle		28.8		
SCA	Steering Column Angle		29.6		
SA	Seat Back Angle		23.1 @ Seat back		23.5 @ Seat back
HZ	Head to Roof (Z)	210	90.0	200	90.0
HH	Head to Header	358		330	
HW	Head to Windshield	555		550	
HR	Head to Side Header (Y)	285		300	
NR	Nose to Rim	390	12.0		
CD	Chest to Dash	535		600	
CS	Chest to Steering Hub	295			
RA	Rim to Abdomen	160			
KDL	Left Knee to Dash	95	47.0	100	
KDR	Right Knee to Dash	75		105	30.1
PA	Pelvic Angle		23.4		23.1
TA	Tibia Angle		57.4		52.5
KK	Knee to Knee (Y)	350		350	
SK	Striker to Knee	670	5.0	665	8.0
ST	Striker to Head	485	79.0	515	75.0
SH	Striker to H-Point	305	33.5	295	42.0
SHY	Striker to H-Point (Y)	270		270	
HS	Head to Side Window	345		350	
HD	H-Point to Door (Y)	160		180	
AD	Arm to Door (Y)	60		65	

DATA SHEET NO. 5...(CONTINUED)

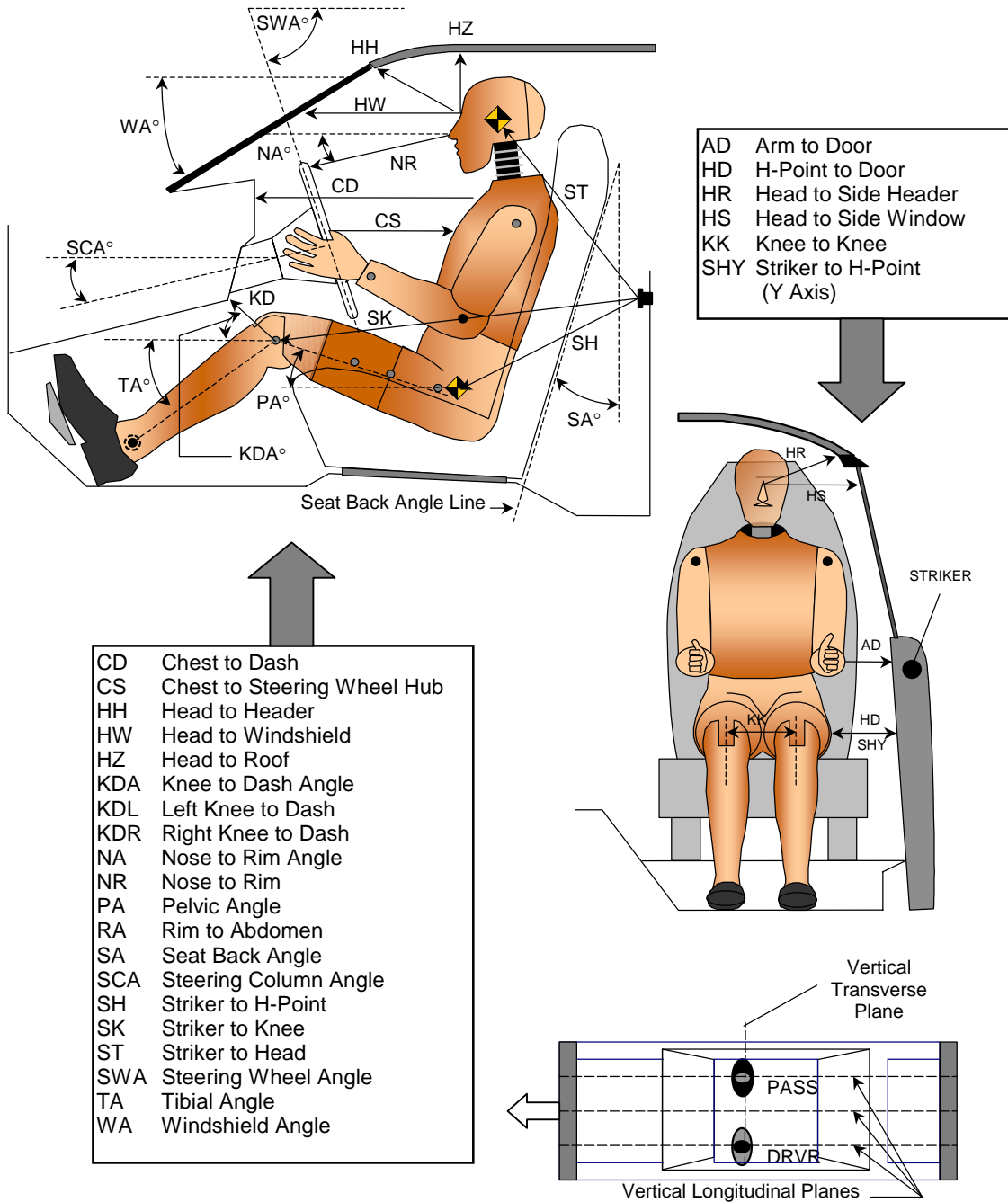
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

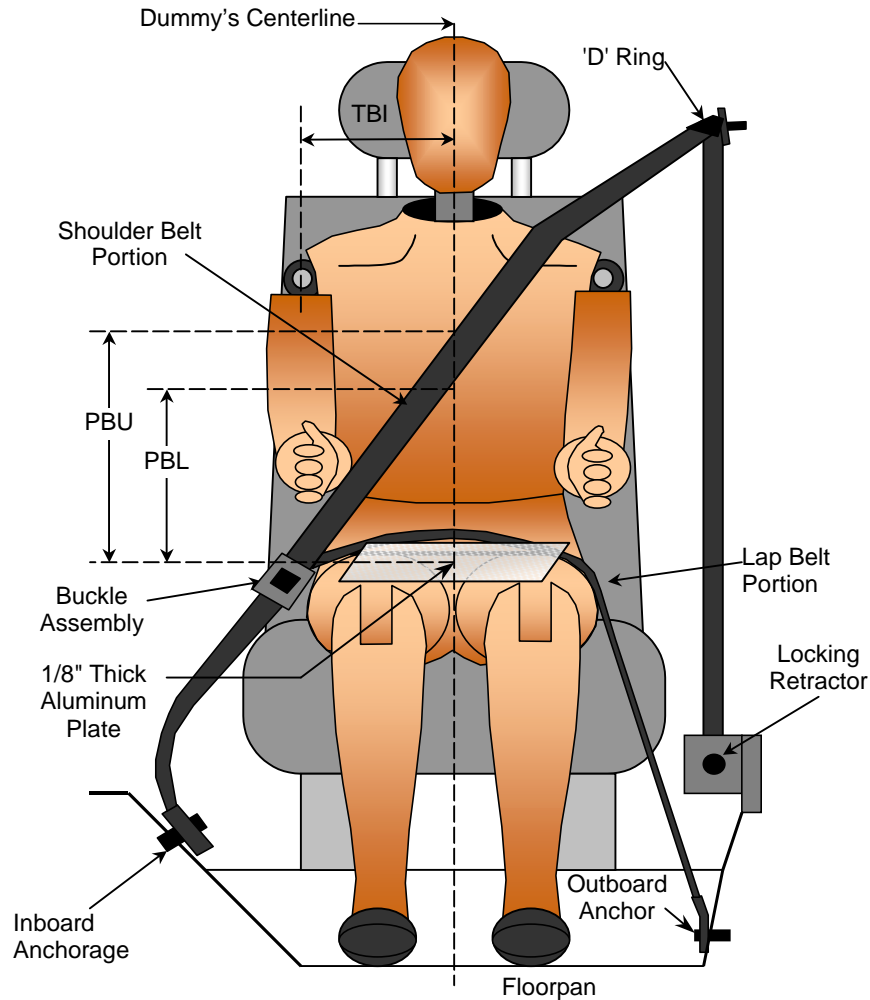


DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
 Test Date: 3/06/07



SEAT BELT POSITIONING MEASUREMENTS

Measured Parameter	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	190	185
PBU - Top Surface of reference to belt upper edge	mm	330	310
PBL - Top Surface of reference to belt lower edge	mm	250	230
Lap Belt Tension	Newtons	10	10
Shoulder Belt Tension	N/A	Retractor	Retractor

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATION

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

Test Date: 3/6/07

Test Program: 2007 NHTSA 35mph NCAP

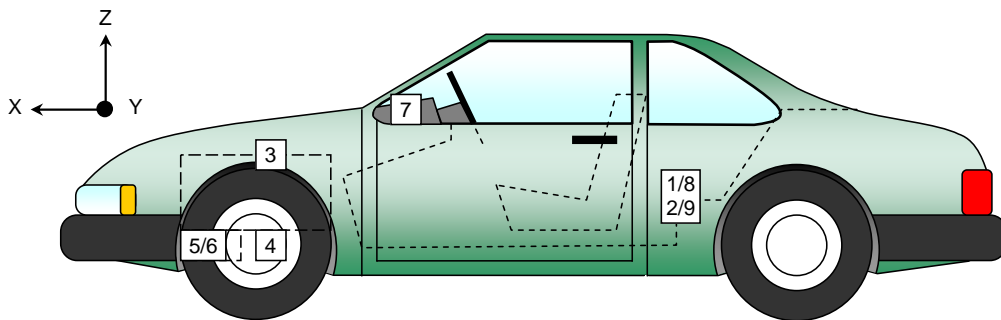
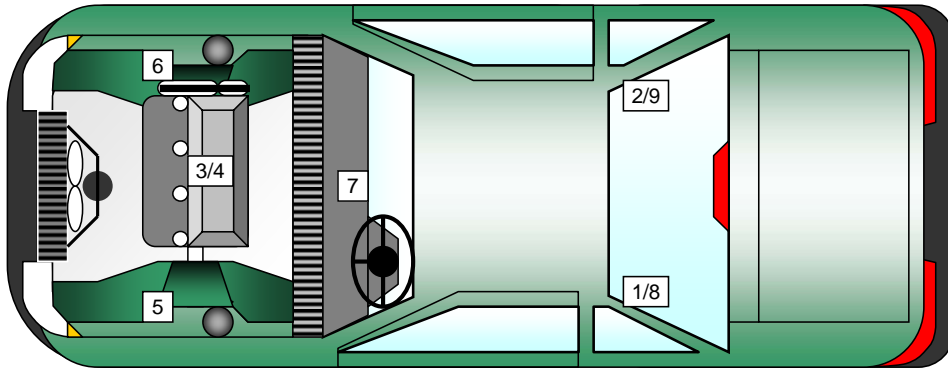
NHTSA No.: U70500

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member	1736	-779	490
2	Right Rear X-Member	1736	779	490
3	Engine Top	4005	210	995
4	Engine Bottom	4055	205	253
5	Left Brake Caliper	3712	-700	400
6	Right Brake Caliper	3712	700	400
7	Instrument Panel			
8	Left Rear X-Member (Z-Axis)	1736	-779	490
9	Right Rear X-Member (Z-Axis)	1736	779	490

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

1.) Instrument Panel no longer used by NHTSA



DATA SHEET NO. 8**SEAT BELT ASSESSMENT TEST DATA**Test Vehicle: 2007 Hyundai Veracruz 5-Door MPVNHTSA No.: U70500Test Program: 2007 NHTSA 35mph NCAPTest Date: 3/06/07**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
Retractor Reel to "D" ring	mm	770	770
Shoulder Belt length as measured on ATD	mm	870	885
Lap Belt length as measured on ATD	mm	675	800
Remainder of belt on reel	mm	860	800
Total belt length for continuous webbing systems	mm	3175	3255

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	85	190
As determined electronically	mm	174	265

BELT STRETCH DATA

Measurement Description	Units	Driver	Passenger
Electronically between belt load cell and "D" ring	mm/cm	*	*
Mechanically	mm/cm		

* Not used with shoulder belt pre-tensioner systems

DATA SHEET NO. 9

SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

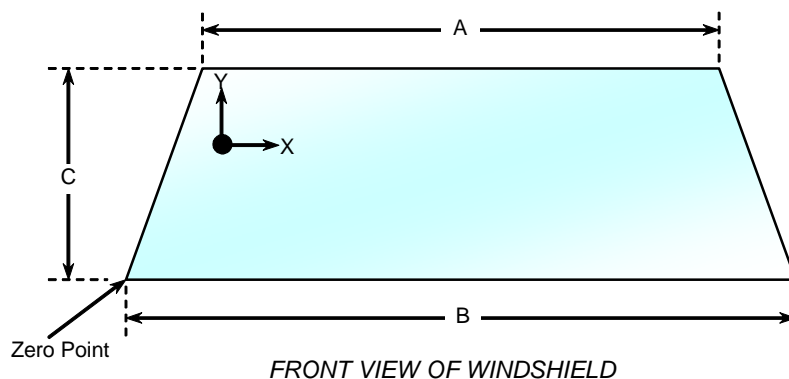
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles that are equipped with occupant passive restraints.

Temperature of windshield molding during test: 26.0 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test(mm)	Post-Test(mm)	% of Retention
Left Side	2405	2405	100
Right Side	2405	2405	100
Total	4810	4810	100



WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1398	20
B	mm	1505	15
C-Left	mm	830	16
C-Right	mm	830	16

DATA SHEET NO. 10

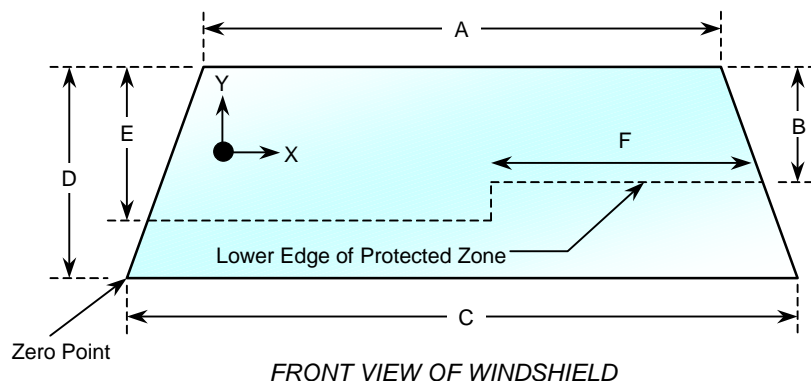
WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07



WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1398
B	mm	495
C	mm	1505
D	mm	830
E	mm	510
F	mm	515

AREA OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 in. by a vehicle component other than one that is normally in contact with the windshield.

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the component. area beneath the protected zone that windshield was penetrated by a vehicle

X	Y

DATA SHEET NO. 11

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP Test Date: 3/06/07

Test Time: 4:20 PM

Temperature: 26.0

STODDARD SOLVENT SPILLAGE MEASUREMENTS

A. From impact until vehicle motion ceases: 0.0 oz.

(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0.0 oz.

(Maximum Allowable = 5 ounces)

C. For the following 25 minutes: 0.0 oz.

(Maximum Allowable = 1 oz./minute)

D. Spillage Location Details: No leakage occurred

DATA SHEET NO. 12

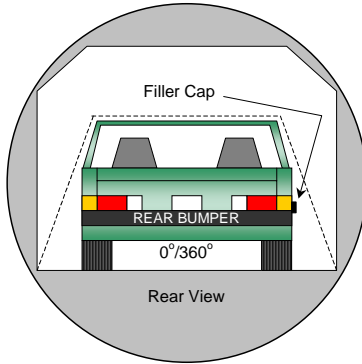
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

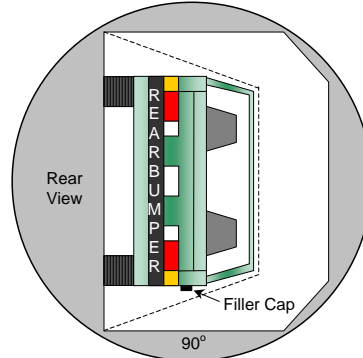
NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

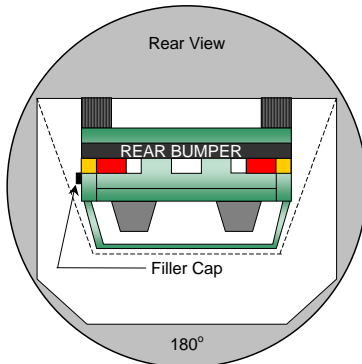
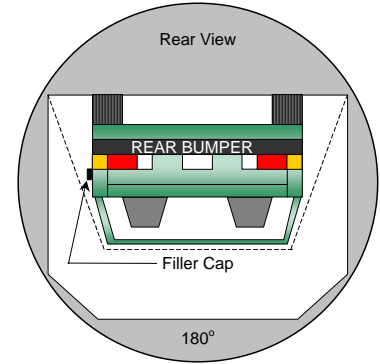
Test Date: 3/06/07



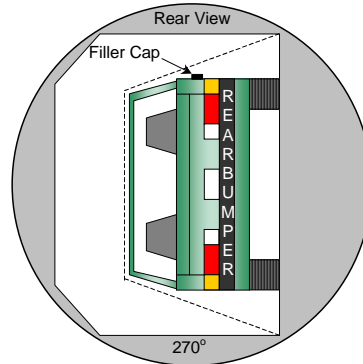
0° to 90°



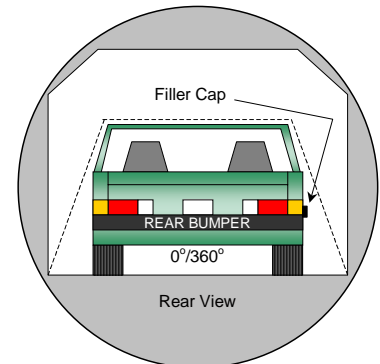
90° to 180°



180° to 270°



270° to 360°



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

DATA SHEET NO. 12...(CONTINUED)

FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	78	300	378
90° to 180°	80	302	382
180° to 270°	79	303	382
270° to 360°	79	300	379

FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

ACTUAL TEST VEHICLE SOLVENT SPILLAGE TABLE (oz.)

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

SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 13
VEHICLE MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length of vehicle at centerline	mm	4830	4221	-609
2	RSOV to front of engine	mm	4360	4120	-240
3	RSOV to firewall centerline	mm	3760	3670	-90
4	RSOV to leading edge of right door	mm	3350	3339	-11
5	RSOV to leading edge of left door	mm	3355	3350	-5
6	RSOV to lower leading edge of right door	mm	3305	3285	-20
7	RSOV to lower leading edge of left door	mm	3320	3300	-20
8	RSOV to upper trailing edge of right door	mm	2265	2260	-5
9	RSOV to upper trailing edge of left door	mm	2280	2275	-5
10	RSOV to lower trailing edge of right door	mm	2259	2238	-21
11	RSOV to lower trailing edge of left door	mm	2280	2255	-25
12	RSOV to bottom of right 'A' pillar	mm	3281	3315	34
13	RSOV to bottom of left 'A' pillar	mm	3291	3271	-20
14	RSOV to firewall on right side	mm	3700	3670	-30
15	RSOV to firewall on left side	mm	3670	3680	10
16	RSOV to steering column	mm	2920	2960	40
17	Center of steering column to left 'A' pillar	mm	370	360	-10
18	Center of steering column to headlining	mm	436	436	0
19	RSOV to right side of front bumper	mm	4705	4220	-485
20	RSOV to left side of front bumper	mm	4660	4318	-342
21	Length of engine block	mm	630	630	0
RD	RSOV to right side of dash panel	mm	3065	3070	5
CD	RSOV to center of dash panel	mm	3050	3076	26
LD	RSOV to left side of dash panel	mm	3070	3100	30

DATA SHEET NO. 13...(CONTINUED)

VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

VEHICLE STRUCTURAL MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length	mm	4830	4221	-609
2	Total width	mm	1907	1890	-17
3	Bumper top height	mm	761	715	-46
4	Bumper bottom height	mm	416	530	114
5	Longitudinal member top height	mm	1022	1011	-11
6	Longitudinal member bottom height	mm	720	701	-19
7	Distance between longitudinal members	mm	1215	1161	-54
8	Longitudinal member width	mm	215	215	0
9	Engine top height	mm	915	900	-15
10	Engine bottom height	mm	231	281	50
11	Engine and gear box width	mm	895	900	5
12	Front bumper to engine distance	mm	460	330	-130
13	Front shock absorber fixing width	mm	1022	1011	-11
14	Bonnet leading edge height	mm	930	990	60
15	Front shock absorber fixing width	mm	1215	1161	-54
16	Front bumper to front axle distance	mm	920	595	-325
17	Front axle to 'A' pillar distance	mm	550	480	-70
18	'A' pillar to 'B' pillar distance	mm	966	951	-15
19	'B' pillar to rear axle distance	mm	1220	1280	60
20	'B' pillar to 'C' pillar distance	mm	998	966	-32
21	Roof sill bottom height	mm	1051	1076	25
22	Roof sill top height	mm	1111	1121	10
23	Floor sill bottom height	mm	301	301	0
24	Floor sill top height	mm	488	461	-27

DATA SHEET NO. 13...(CONTINUED)

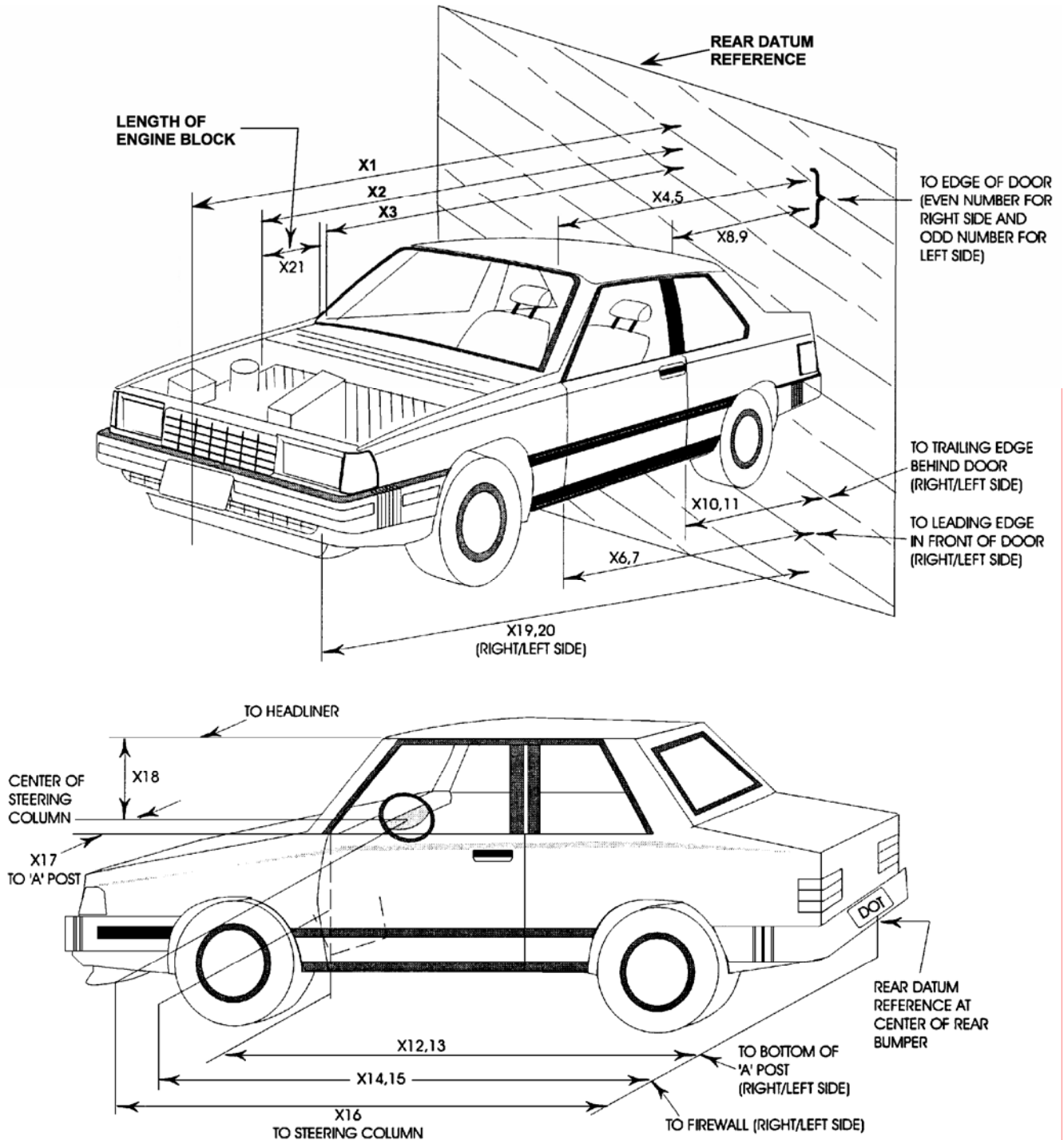
VEHICLE MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07



DATA SHEET NO. 14
CAMERA LOCATIONS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
Test Date: 3/06/07

VEHICLE CAMERA MEASUREMENT TABLE

No.	Camera View	Location (mm)			Angle (deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Real Time Camera (Panning)	-16589	-7485	-1475	0			30
2	Overall Left Side	-2648	-7482	-1048	0	8006	20mm	1000
3	Closeup Left Side	-1387	-7279	-1247	0	7514	50mm	1000
4	Driver and Interior View	-8696	-12562	-4511	-17	15930	ZOOM	1000
5	Steering Column (Bottom)	-1631	-8234	-2682	-13	8812	35mm	1000
6	Steering Column (Top)	-1663	-8153	-3078	-13	8872	35mm	1000
7	Overall Right Side	-2612	3851	-1034	0	4767	20mm	1000
8	Closeup Right Side	-1350	6258	-1250	0	6523	50mm	1000
9	Passenger and Interior View	-5330	9365	-2407	-10	11041	ZOOM	1000
10	Right Side View	-2006	6967	-1463	-6	7396	ZOOM	1000
11	Windshield View	-589	0	-5556	-90		24mm	1000
12	Driver Front View	378	-286	-2438	-34		25mm	1000
13	Passenger Front View	375	413	-2439	-34		25mm	1000
14	Pit View of Engine	-756	0	1495	90		12mm	1000
15	Pit View of Fuel Tank	-3398	0	1495	90		8mm	1000
16	Real Time Driver	-2458	-7598	1301	-1			30
17	Real Time Passenger	-2985	3981	-1284	-1			30

All measurements are made relative to the point of impact.

DATA SHEET NO. 15

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

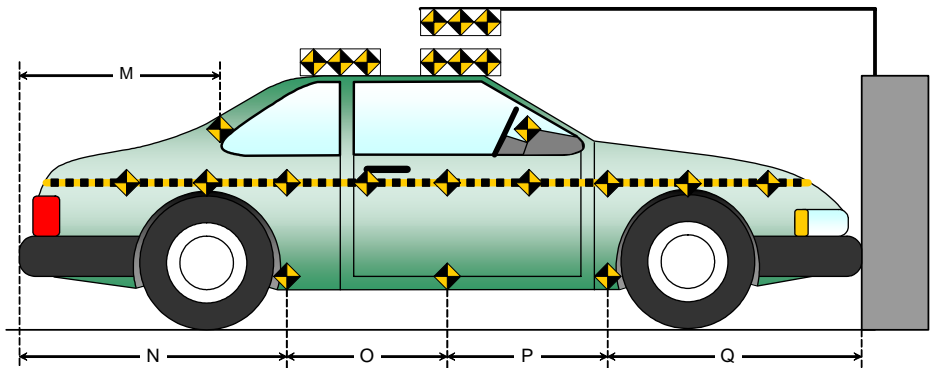
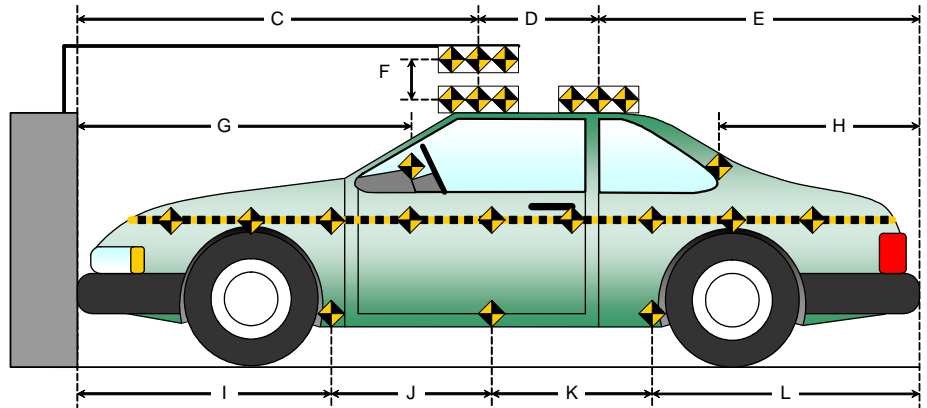
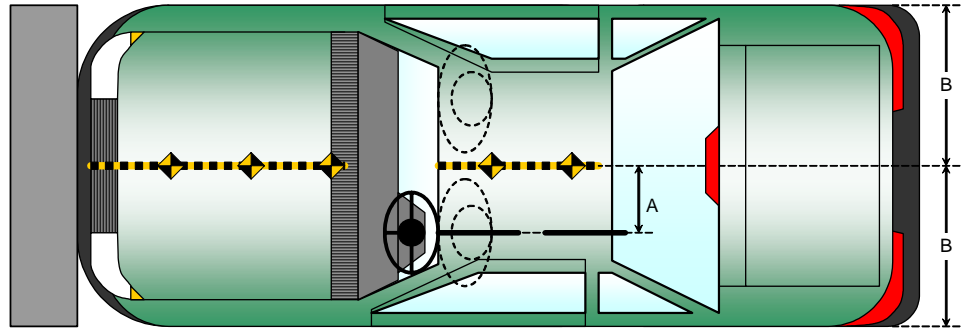
Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

All Dimensions in (mm)	
Item	Value
A	430
B	953.5
C	2330
D	615
E	1960
F	155
G	1760
H	595
I	1475
J	913
K	913
L	1550
M	595
N	1550
O	913
P	913
Q	1475



DATA SHEET NO. 16

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

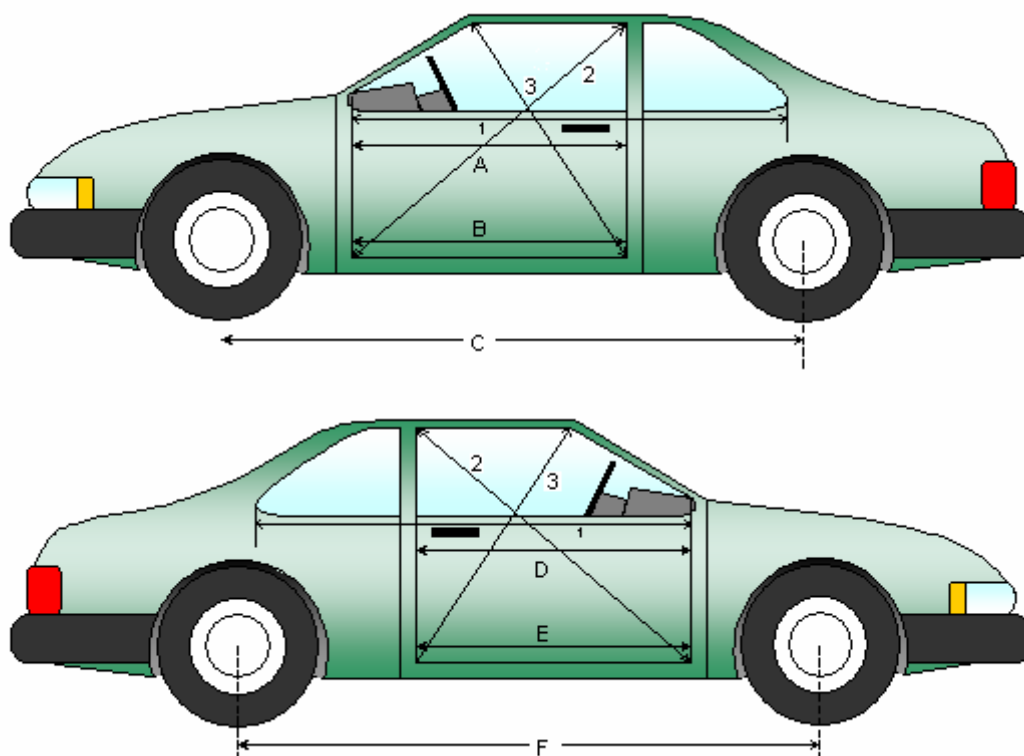
Test Date: 3/06/07

DOOR OPENING WIDTH TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
1L	Left Side	mm	869	876	7
2L	Left Side (Diagonally)	mm	1396	1401	5
3L	Left Side (Diagonally)	mm	964	966	2
1R	Right Side	mm	869	861	-8
2R	Right Side (Diagonally)	mm	1396	1403	7
3R	Right Side (Diagonally)	mm	964	961	-3

WHEELBASE MEASUREMENT TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
C	Left Side Wheel Base	mm	2815	2760	-55
F	Right Side Wheel Base	mm	2815	2745	-70



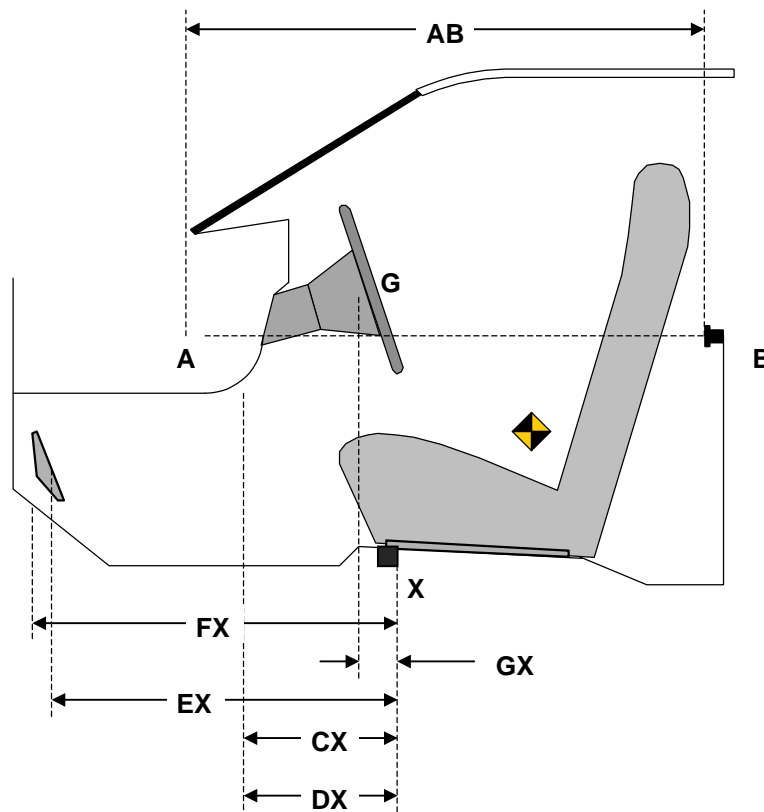
DATA SHEET NO. 16...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
 Test Date: 3/06/07

DRIVER COMPARTMENT INTRUSION TABLE

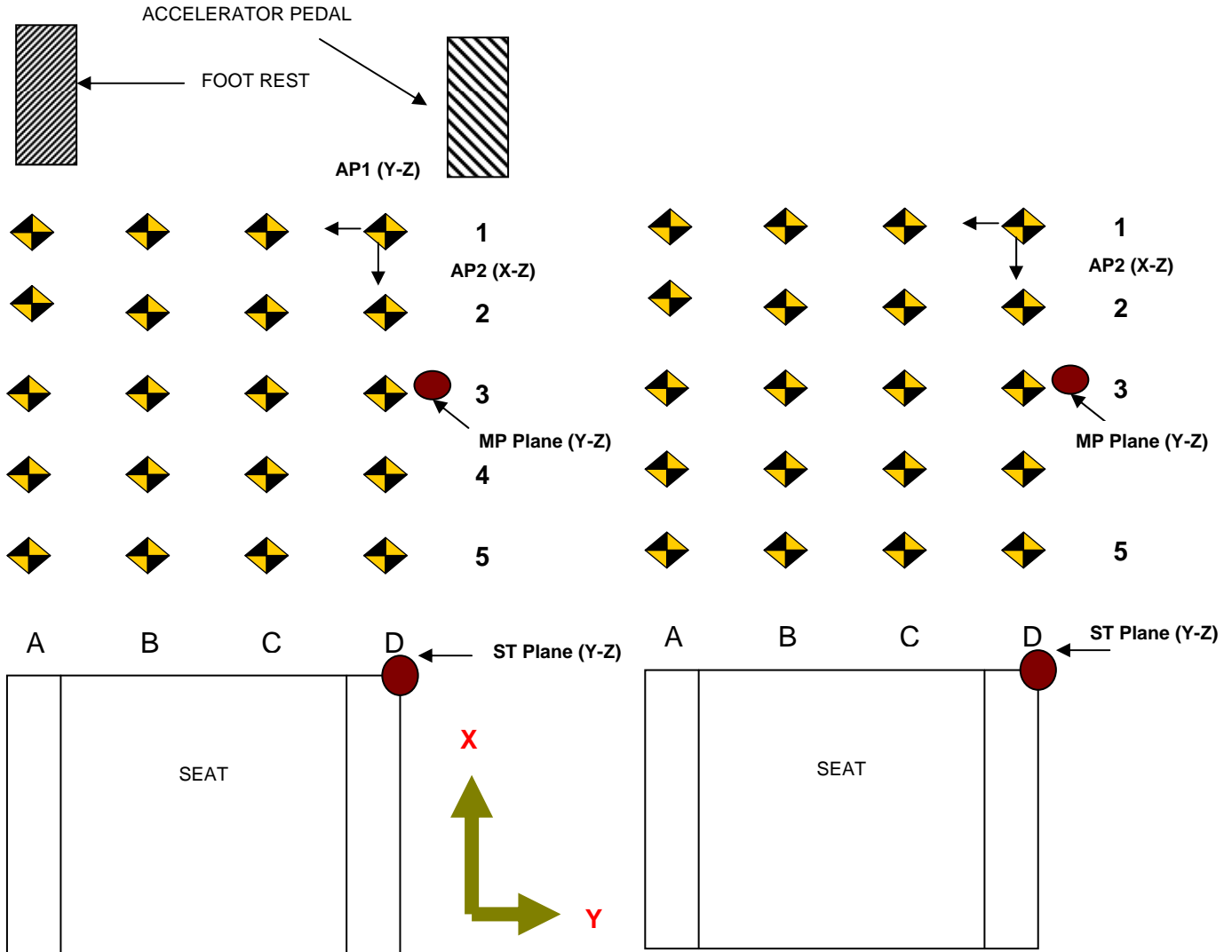
Item	Description	Units	Pre-Test	Post-Test	Diff.
AB	Door Opening (Inside window jam)	mm	2850	2820	-30
CX	Left Knee Bolster to X	mm	956	951	-5
DX	Right Knee Bolster to X	mm	206	250	44
EX	Brake Pedal to X	mm	575	220	-355
FX	Foot Rest to X	mm	530	505	-25
GX	Center of Steering Wheel Hub to X	mm	130	475	345



DATA SHEET NO. 16...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
 Test Date: 3/06/07



- AP1: Y-Z Plane passing through D1
- AP2: X-Z Plane passing through D1
- AP3: X-Y plane passing through D1
- MP: Y-Z plane, halfway between the ST plane and AP1 plane
- CF Plane: X-Z plane passes through center of footrest.
- BP Plane: X-Z plane passes through center of brake pedal
- TP Plane: Y-Z plane, intersection of BP Plane and the intersection of the toe pan and floorboard
- Column A: intersection of vehicle and CF plane
- Column D: Intersection of vehicle and AP2 plane
- Row 1: intersection of the vehicle and the AP3 Plane
- Row 3: intersection of the vehicle and TP plane
- Row 5: intersection of the vehicle and MP plane
- Row 2: evenly spaced between row 1 and 3
- Row 4: evenly spaced between row 3 and 5

DATA SHEET NO. 16...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
 Test Date: 3/06/07

All measurements in mm

DRIVER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	577	679	682	563	559	684	745	764	-18	5	63	201
2	501	536	539	532	497	568	605	612	-4	32	66	80
3	430	438	444	446	434	473	516	554	4	35	72	108
4	323	322	319	326	334	367	404	440	11	45	85	114
5	221	225	231	239	235	276	320	357	14	51	89	118

DRIVER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-19	105	236	409	-35	93	223	393	-16	-12	-13	-16
2	-25	109	250	412	-40	96	238	401	-15	-13	-12	-11
3	-32	112	245	415	-45	95	227	400	-13	-17	-18	-15
4	-31	115	261	413	-44	104	247	403	-13	-11	-14	-10
5	-28	120	263	411	-42	103	251	397	-14	-17	-12	-14

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-53	13	22	-78	-69	-6	16	-74	-16	-19	-6	4
2	7	97	99	94	14	104	97	-16	7	7	-2	-110
3	83	101	105	102	99	105	103	74	16	4	-2	-28
4	105	105	102	104	119	115	108	92	14	10	6	-12
5	112	103	102	85	134	122	123	80	22	19	21	-5

DATA SHEET NO. 18

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 03/06/07

VEHICLE INFORMATION

VIN: KM8NU13C37U006539

Wheel base (mm): 2815

Vehicle Size Category: 5-Door MPV

Test Weight (kg): 2155

ACCELEROMETER DATA

Accelerometer Location: Left rear cross member

Cal. Procedure/Interval: 6 months / drop test

Integration Algorithm: NHTSA Standard

Linearity: Good

Impact Velocity (km/h): 56.70

Velocity Change (km/h): 63.5

Time of Separation (msec): 68.1

CRUSH PROFILE

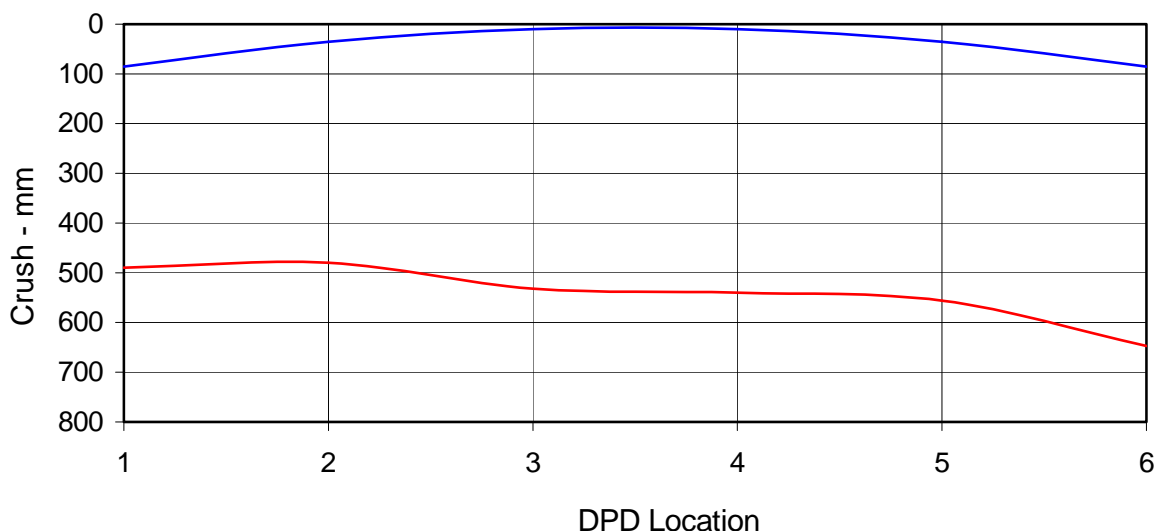
Collision Deformation Classification: 12FDEW6

Midpoint of Damage: Vehicle Centerline

Damage Region Length (mm): 1135

Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	85	490	-405
C2	Crush zone 2 on left side	mm	35	480	-445
C3	Crush zone 3 on left side	mm	10	532	-522
C4	Crush zone 4 on right side	mm	10	540	-530
C5	Crush zone 5 on right side	mm	35	556	-521
C6	Crush zone 6 at right side	mm	85	647	-562



DATA SHEET NO. 17

FIXED BARRIER LOAD CELL LOCATIONS

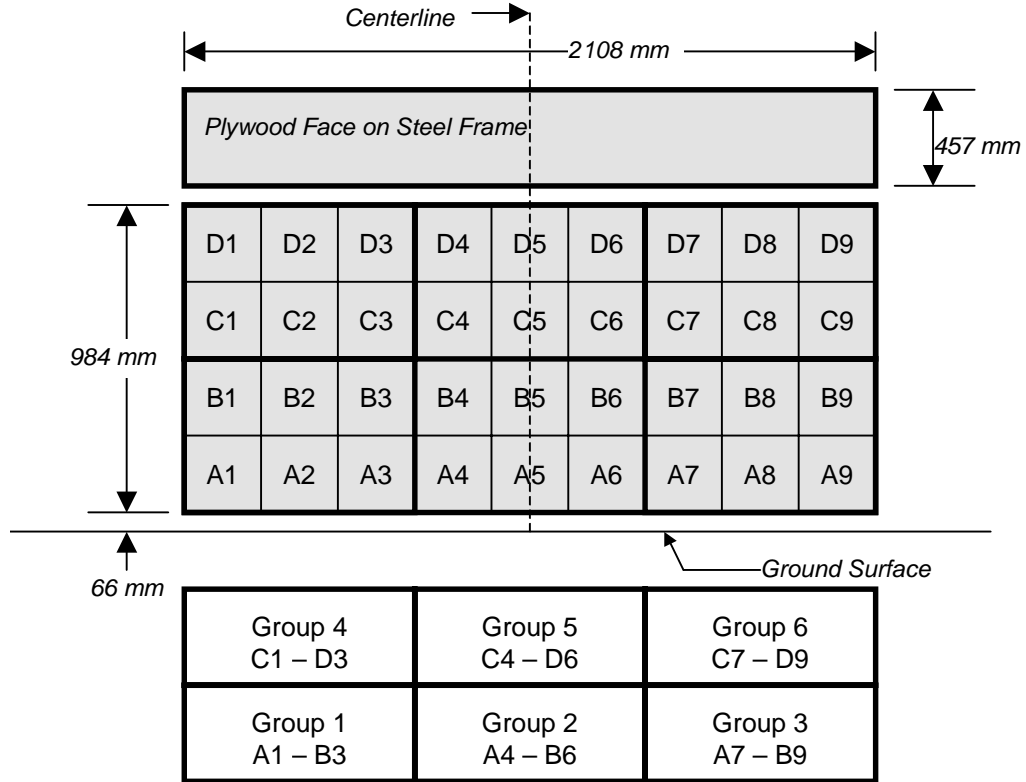
Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

**36 Load Cell Rigid Barrier (NHTSA Standard)
Load Cell Locations on Fixed Barrier**



6 Groups of 6 Load Cells Each

DATA SHEET NO. 18

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 03/06/07

VEHICLE INFORMATION

VIN: KM8NU13C37U006539

Wheel base (mm): 2815

Vehicle Size Category: 5-Door MPV

Test Weight (kg): 2155

ACCELEROMETER DATA

Accelerometer Location: Left rear cross member

Cal. Procedure/Interval: 6 months / drop test

Integration Algorithm: NHTSA Standard

Linearity: Good

Impact Velocity (km/h): 56.70

Velocity Change (km/h): 63.5

Time of Separation (msec): 68.1

CRUSH PROFILE

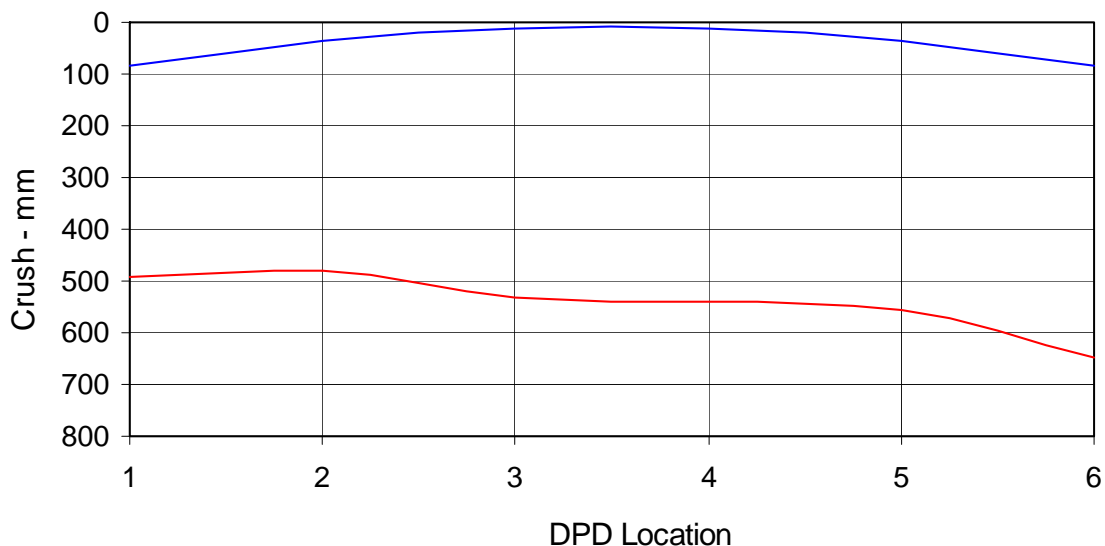
Collision Deformation Classification: 12FDEW6

Midpoint of Damage: Vehicle Centerline

Damage Region Length (mm): 1135

Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	85	490	-405
C2	Crush zone 2 on left side	mm	35	480	-445
C3	Crush zone 3 on left side	mm	10	532	-522
C4	Crush zone 4 on right side	mm	10	540	-530
C5	Crush zone 5 on right side	mm	35	556	-521
C6	Crush zone 6 at right side	mm	85	647	-562



DATA SHEET NO. 19

DUMMY/VEHICLE TEMPERATURE STABILIZATION

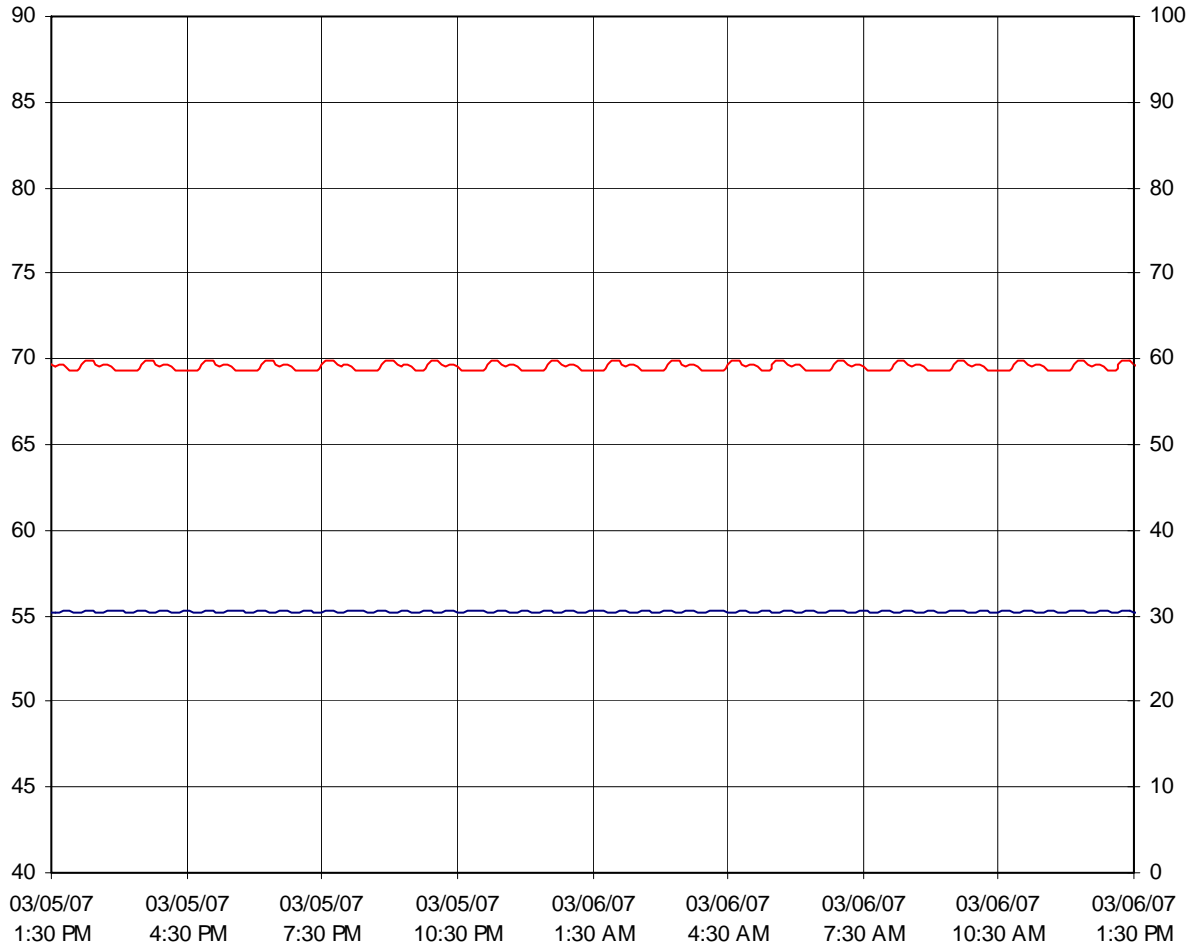
Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/06/07

— Temperature — Humidity



APPENDIX A
PHOTOGRAPHS

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A-7	Post-Test Front View	A-7
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A-9	Post-Test Left Side View	A-9
A-10	Pre-Test Right Side View	A-10
A-11	Post-Test Right Side View	A-11
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A-60	Vehicle on Rollover Device (180°)	A-60
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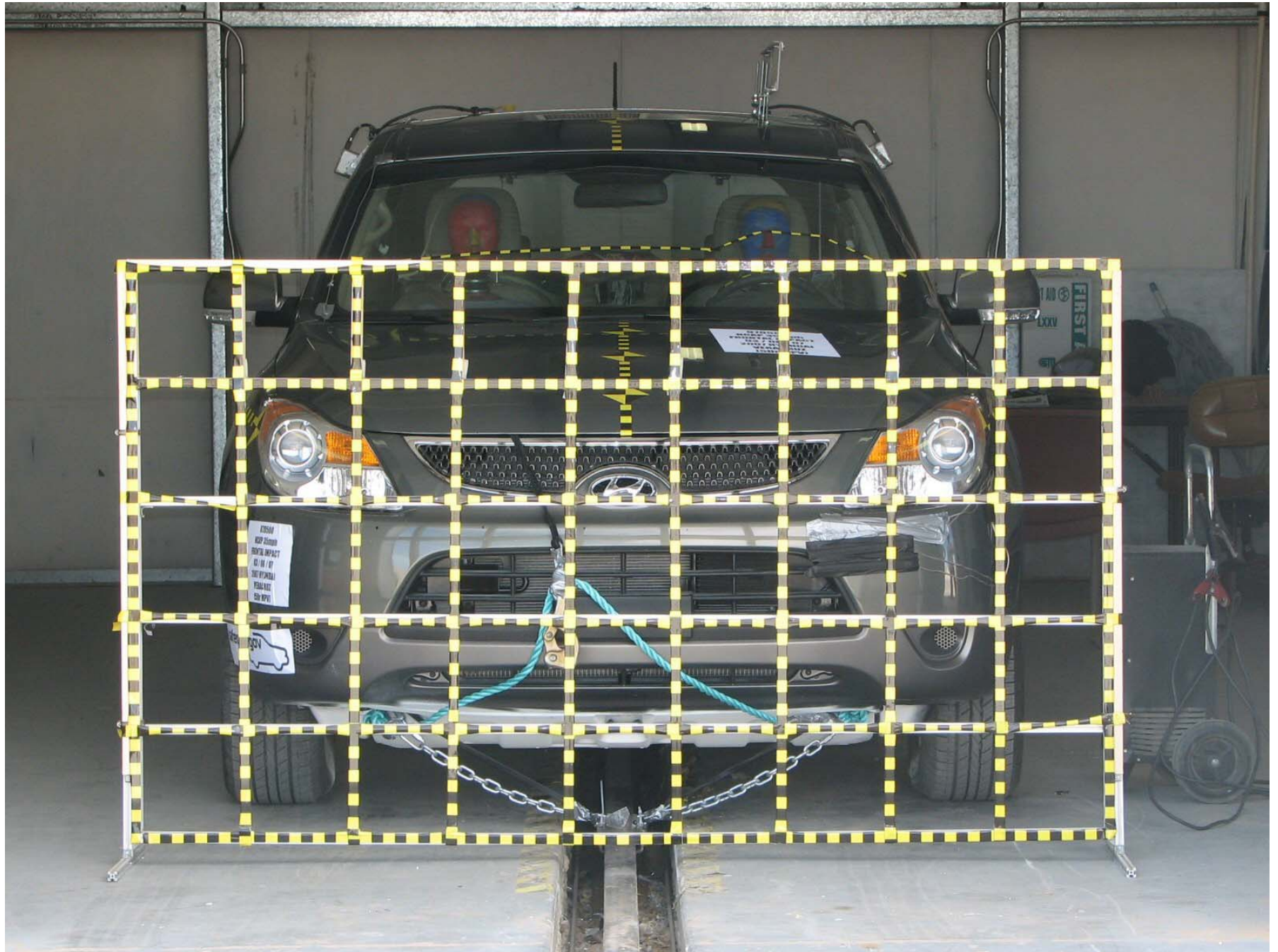


Figure A-1: Load Cell Location



MANUFACTURED IN KOREA BY
HYUNDAI MOTOR COMPANY

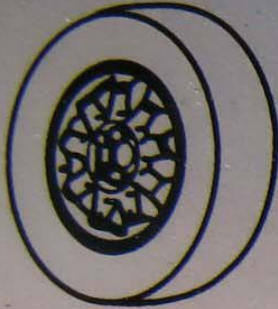
JAN/22/07	GVWR 5732 lbs	PAINT 2H	TRIM 7Q
GAWR	TIRES	RIMS	COLD TIRE INFL
FRONT 3230 lbs	P245/65R17	7.0JX17	30psi SINGLE
REAR 3197 lbs	P245/65R17	7.0JX17	30psi SINGLE

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.A. FEDERAL
MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS
IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE

V.I.N KM8NU13C37U006539 TYPE : MPV



Figure A-2: Manufacturer's Label



TIRE AND LOADING INFORMATION/ PNEUS ET CHARGE-INFORMATION

SEATING CAPACITY	TOTAL 7	FRONT 2	REAR 5
NOMBRE DE SIÈGES	TOTAL 7	AVANT 2	ARRIÈRE 5

The combined weight of occupants and cargo should never exceed 526 kg or 1160lbs.
Le poids combiné des occupants et du chargement ne doit jamais excéder 526 kg ou 1160lb.

TIRE/ PNEU	SIZE/ DIMENSION	COLD TIRE PRESSURE/ PRESSION À FROID	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION <hr/> CONSULTER LE GUIDE DU PROPRIÉTAIRE POUR OBTENIR DES RENSEIGNEMENTS ADDITIONNELS
FRONT/ AVANT	P245/65R17	210kPa, 30psi	
REAR/ ARRIÈRE	P245/65R17	210kPa, 30psi	
SPARE/ SECOURS	T165/90R17	420kPa, 60psi	

EN-E04

Figure A-3: Tire Placard



Figure A-4: Right Front $\frac{3}{4}$ View, As Received



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TR-P27083-01-NC

Figure A-5: Left Rear $\frac{3}{4}$ View, as Received



Figure A-6: Pre-Test Front View



Figure A-7: Post-Test Front View (Vehicle Moved)



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TR-P27083-01-NC

Figure A-8: Pre-Test Left Side View



Figure A-9: Post-Test Left Side View



Figure A-10: Pre-Test Right Side View



Figure A-11: Post-Test Right Side View



Figure A-12: Pre-Test Right Front 3/4 View



Figure A-13: Post-Test Right Front ¾ View (Vehicle Moved)



Figure A-14: Pre-Test Left Rear ¾ View



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TR-P27083-01-NC

Figure A-15: Post-Test Left Rear 3/4 View



Figure A-16: Post-Test Left Side ¾ View of Doors After Impact



Figure A-17: Post-Test Right Side ¾ View of Doors After Impact

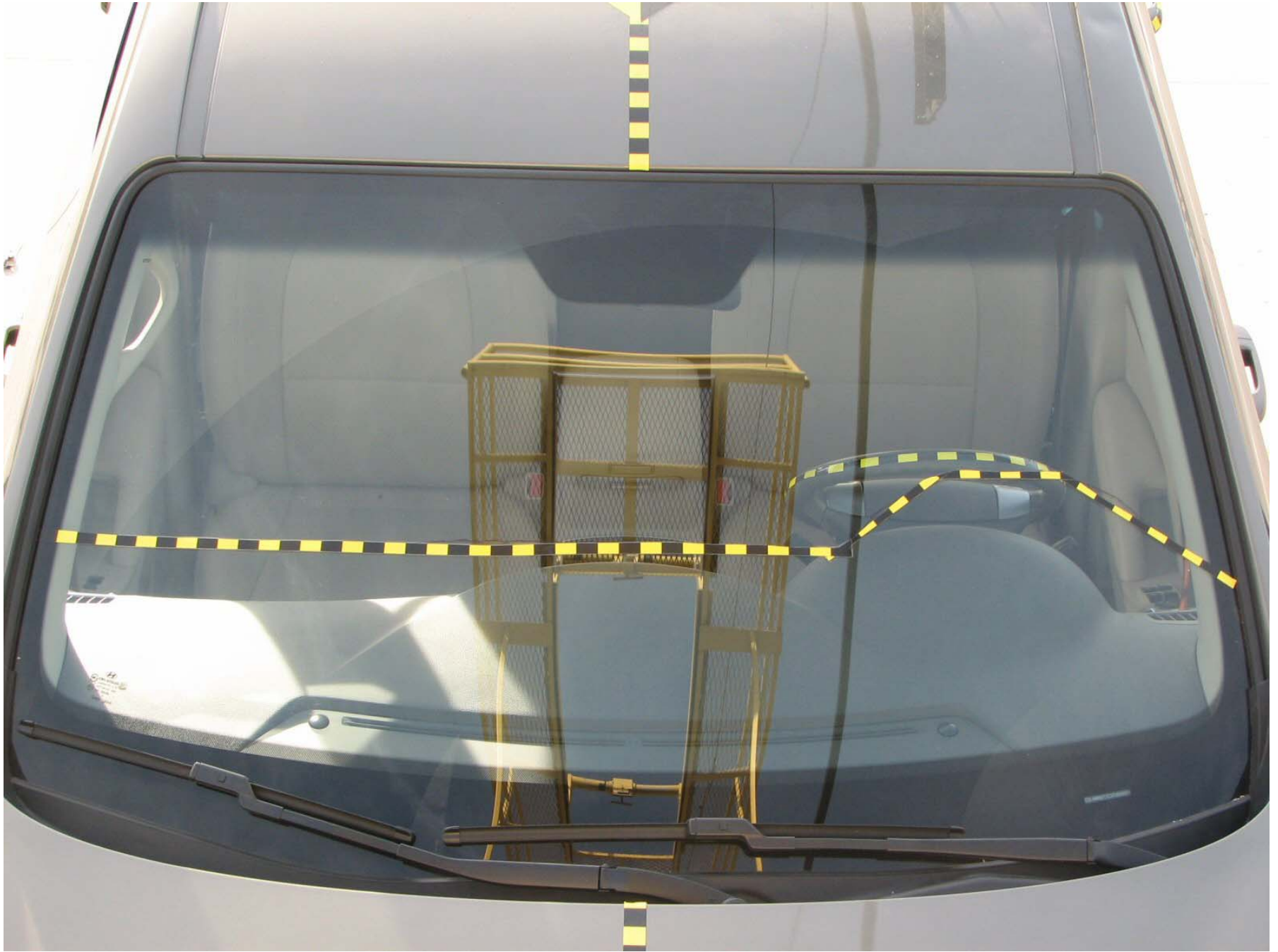


Figure A-18: Pre-Test Windshield

**Photograph Not
Available**

Figure A-19: Post-Test Windshield



Figure A-20: Pre-Test Engine Compartment



Figure A-21: Post-Test Engine Compartment (Vehicle Moved)



Figure A-22: Pre-Test Fuel Cap



2007 HYUNDA
U705
STODDARD SOI
14.15 GAL
[7249 L

Figure A-23: Post-Test Fuel Cap

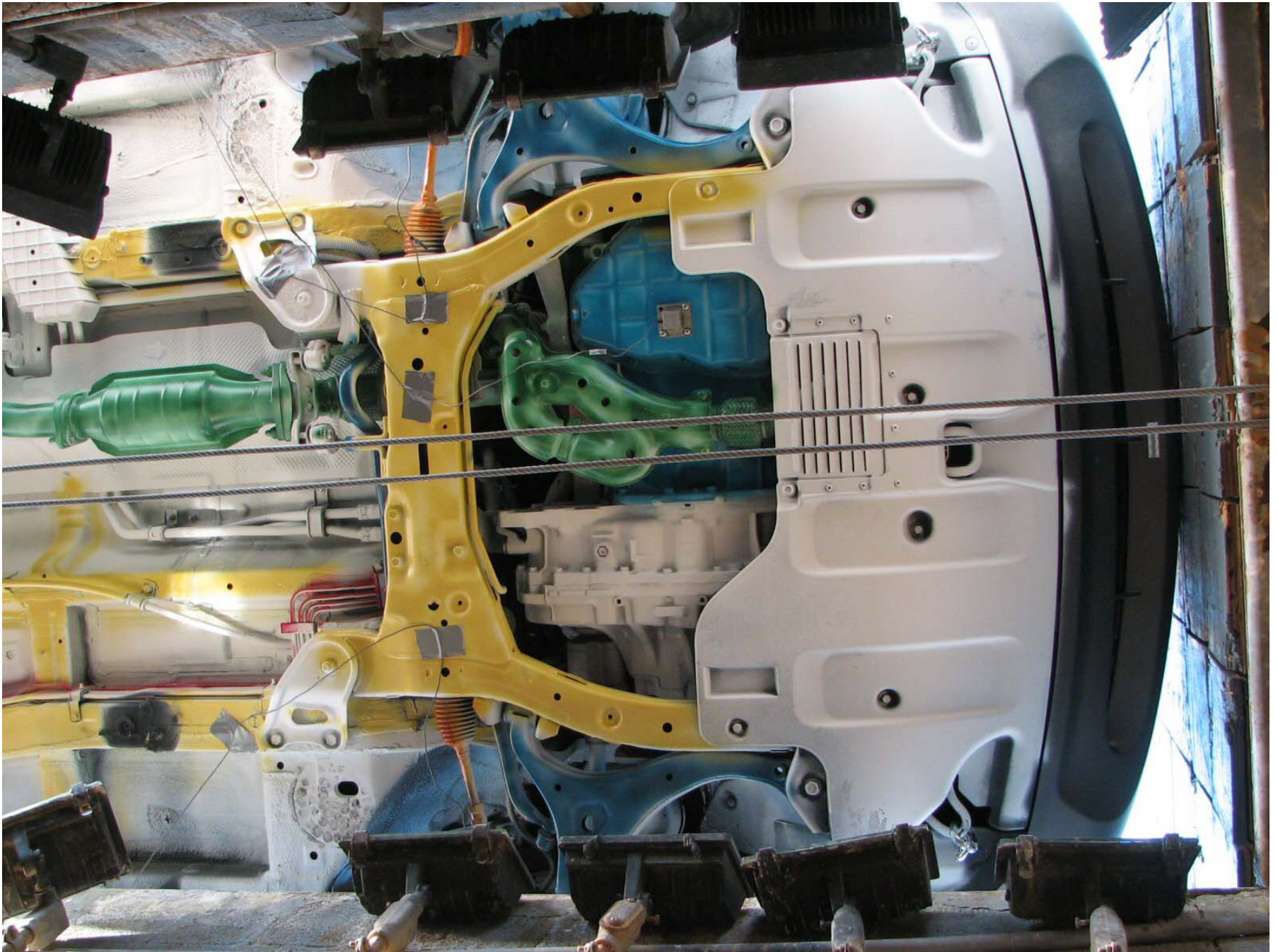


Figure A-24: Pre-Test Front Underbody



Figure A-25: Post-Test Front Underbody

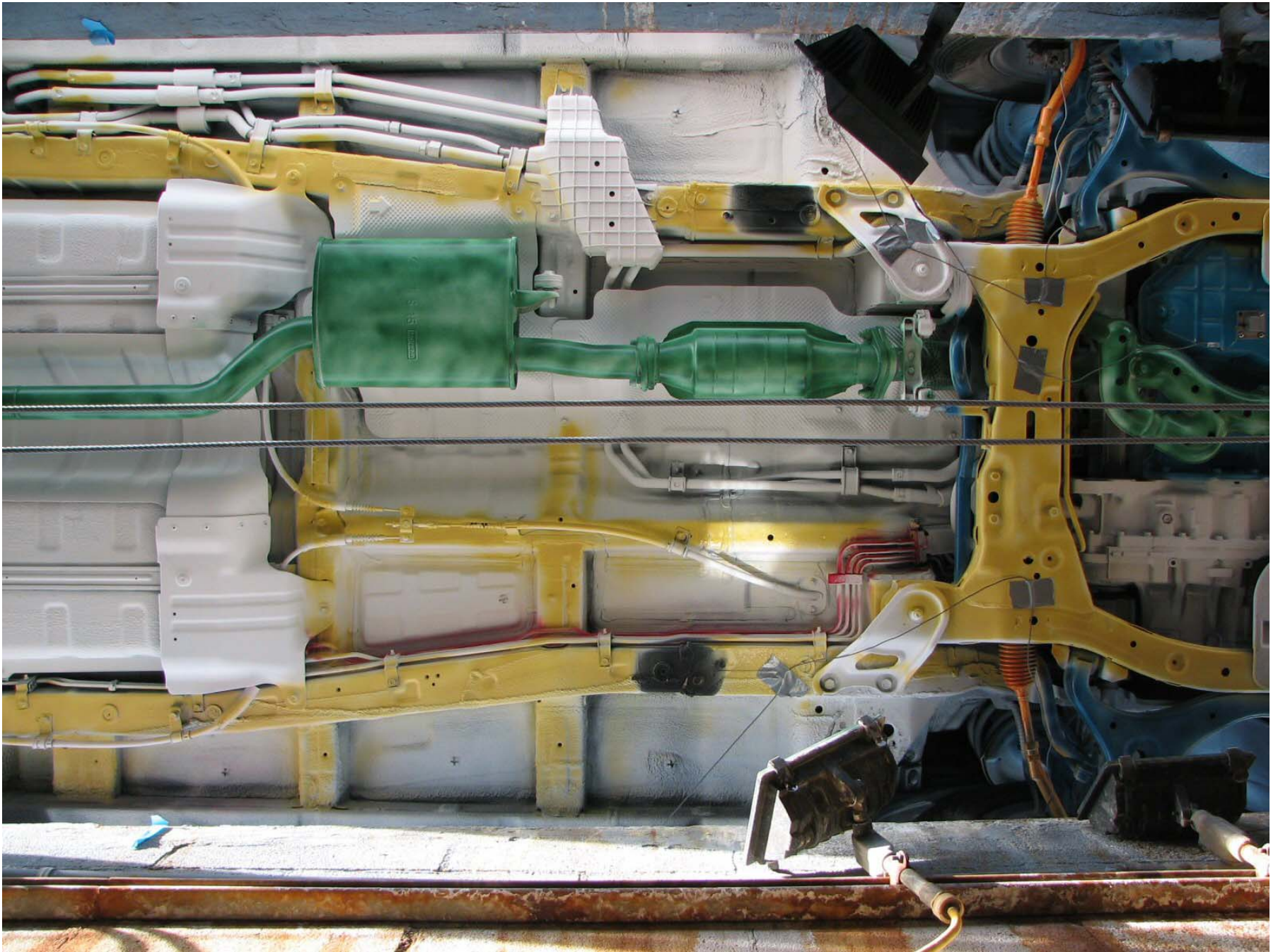


Figure A-26: Pre-Test Mid Underbody

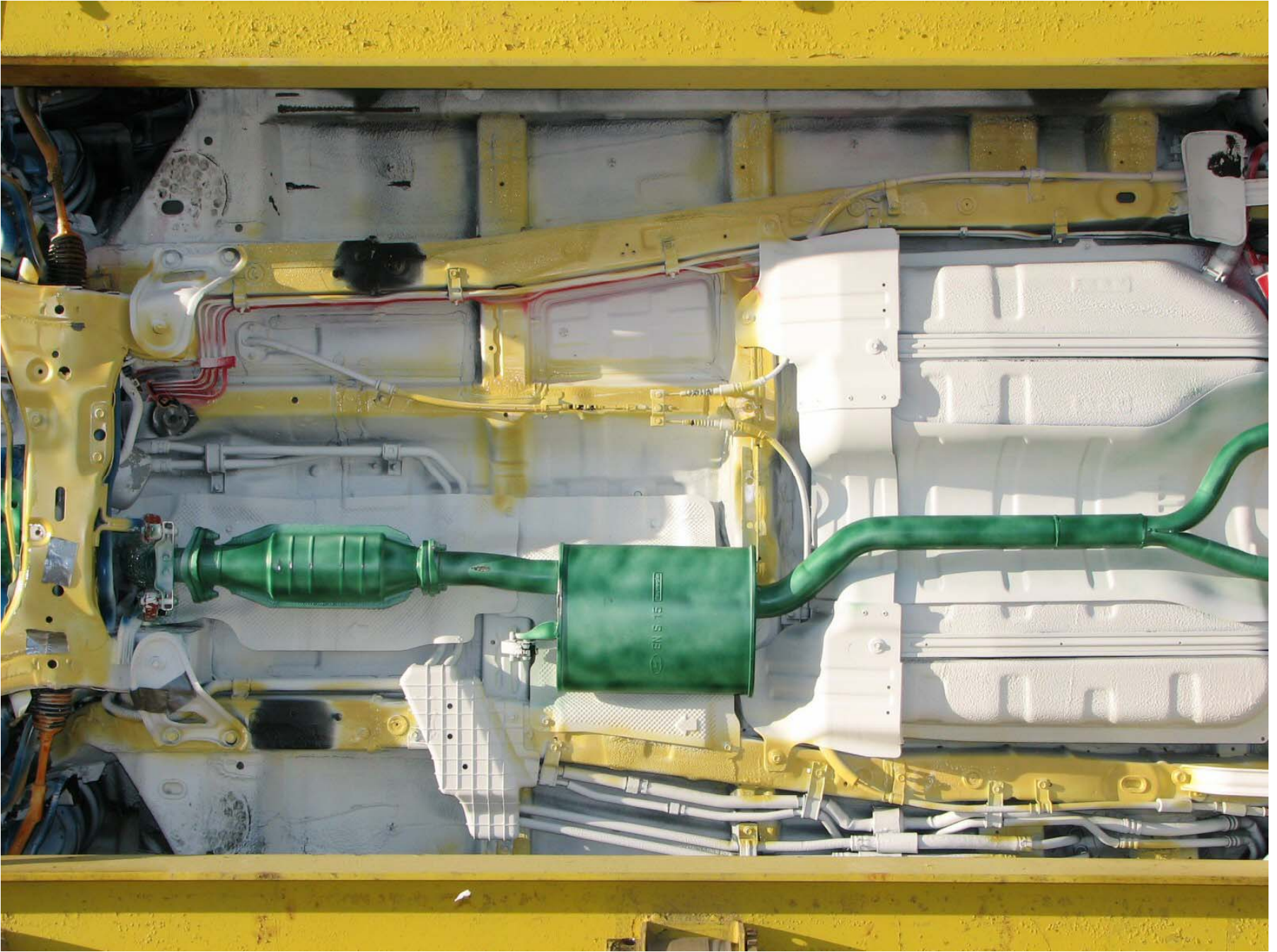


Figure A-27: Post-Test Mid Underbody

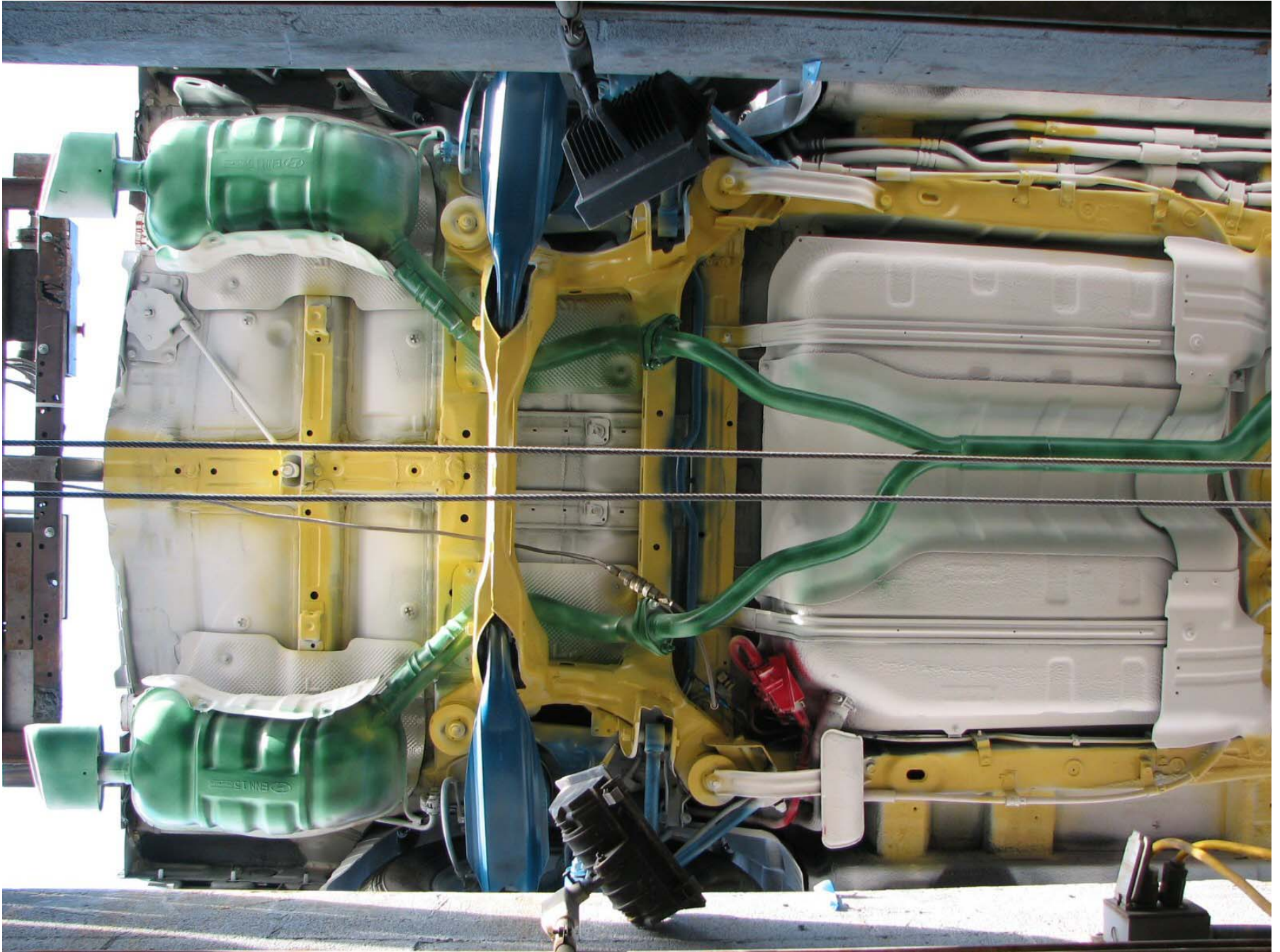


Figure A-28: Pre-Test Rear Underbody

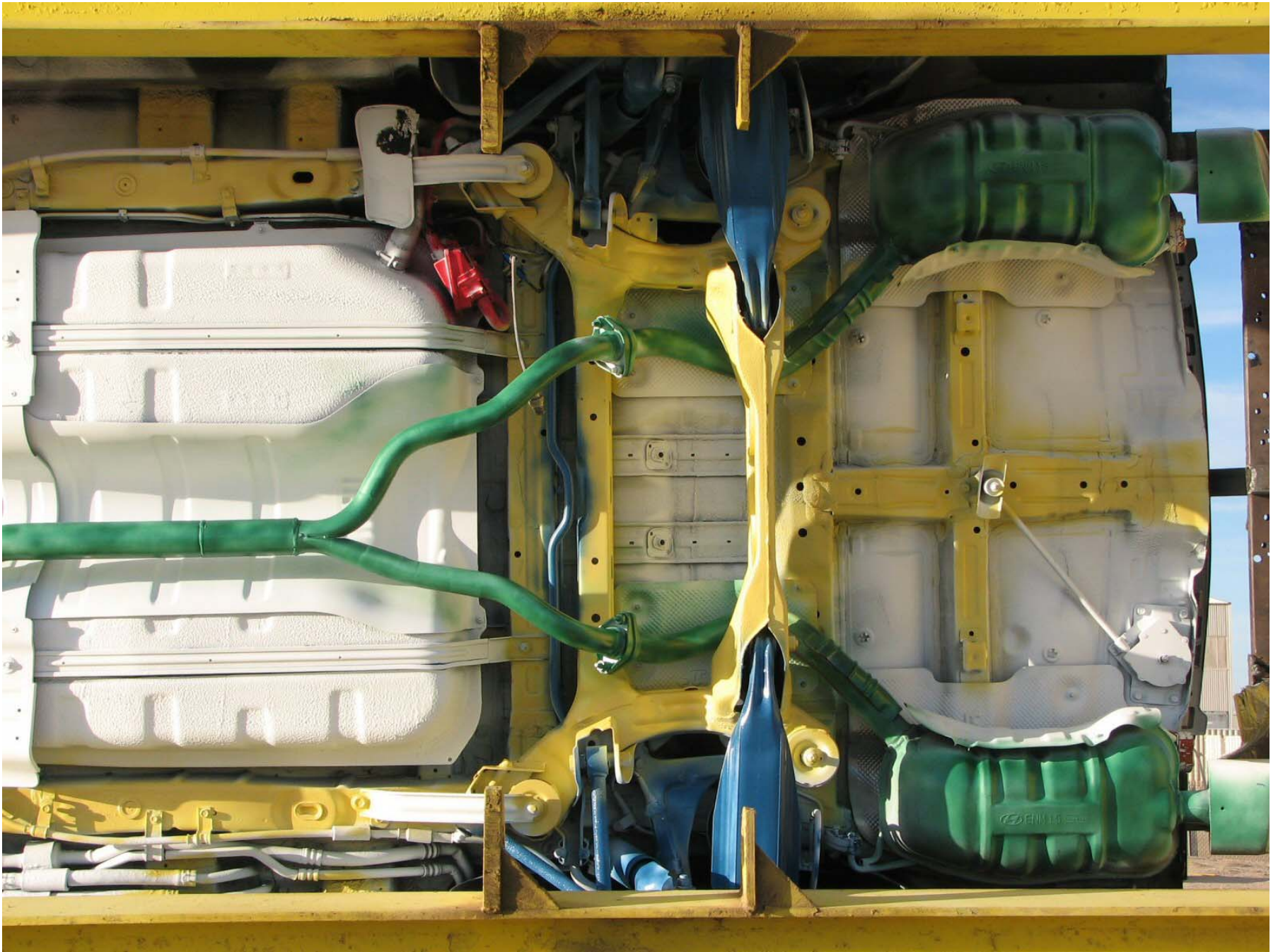


Figure A-29: Post-Test Rear Underbody



Figure A-30: Pre-Test Driver Dummy Front View (Head Position)



Figure A-31: Post-Test Driver Dummy Front View (Head Position)



Figure A-32: Pre-Test Driver Dummy (Through Window)

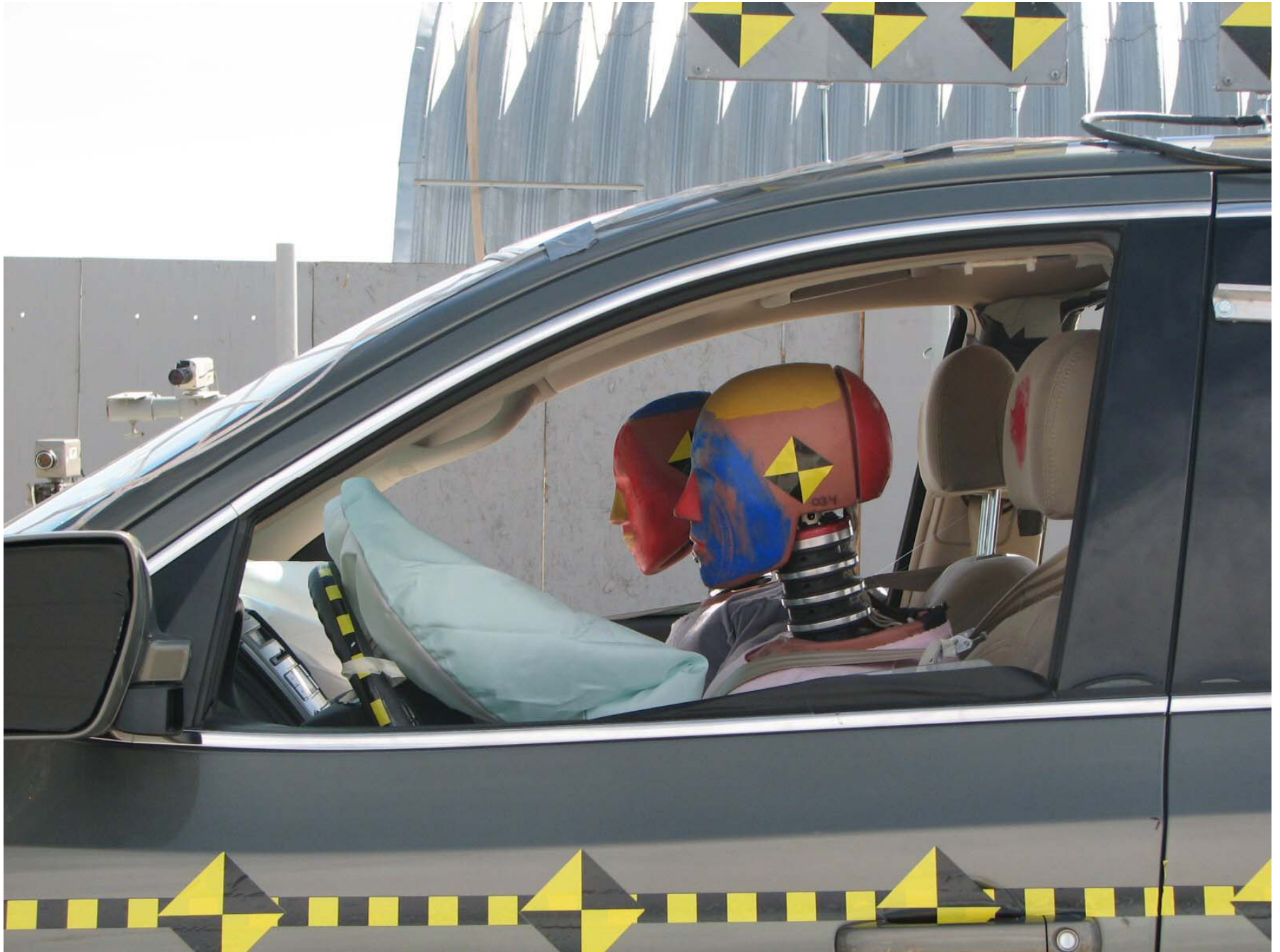


Figure A-33: Post-Test Driver Dummy (Through Window)



Figure A-34: Pre-Test Driver Dummy (Door Open)



Figure A-35: Post-Test Driver Dummy (Door Open)



A-36

TR-P27083-01-NC

Figure A-36: Pre-Test Driver Dummy Feet



Figure A-37: Post-Test Driver Dummy Feet



Figure A-38: Pre-Test Driver Side Knee Bolster



Figure A-39: Post-Test Driver Side Knee Bolster



Figure A-40: Pre-Test Driver Side Floor Pan



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Figure A-41: Post-Test Driver Side Floor Pan



Figure A-42: Post-Test Driver Dummy Head



Figure A-43: Post-Test Driver Dummy Airbag Contact



Figure A-44: Pre-Test Passenger Dummy Front View (Head Position)

**Photograph Not
Available**

Figure A-45: Post-Test Passenger Dummy Front View (Head Position)



Figure A-46: Pre-Test Passenger Dummy (Through Window)



Figure A-47: Post-Test Passenger Dummy (Through Window)



Figure A-48: Pre-Test Passenger Dummy (Door Open)



Figure A-49: Post-Test Passenger Dummy (Door Open)



Figure A-50: Pre-Test Passenger Dummy Feet



Figure A-51: Post-Test Passenger Dummy Feet



Figure A-52: Pre-Test Passenger Side Glove Box



Figure A-53: Post-Test Passenger Side Glove Box

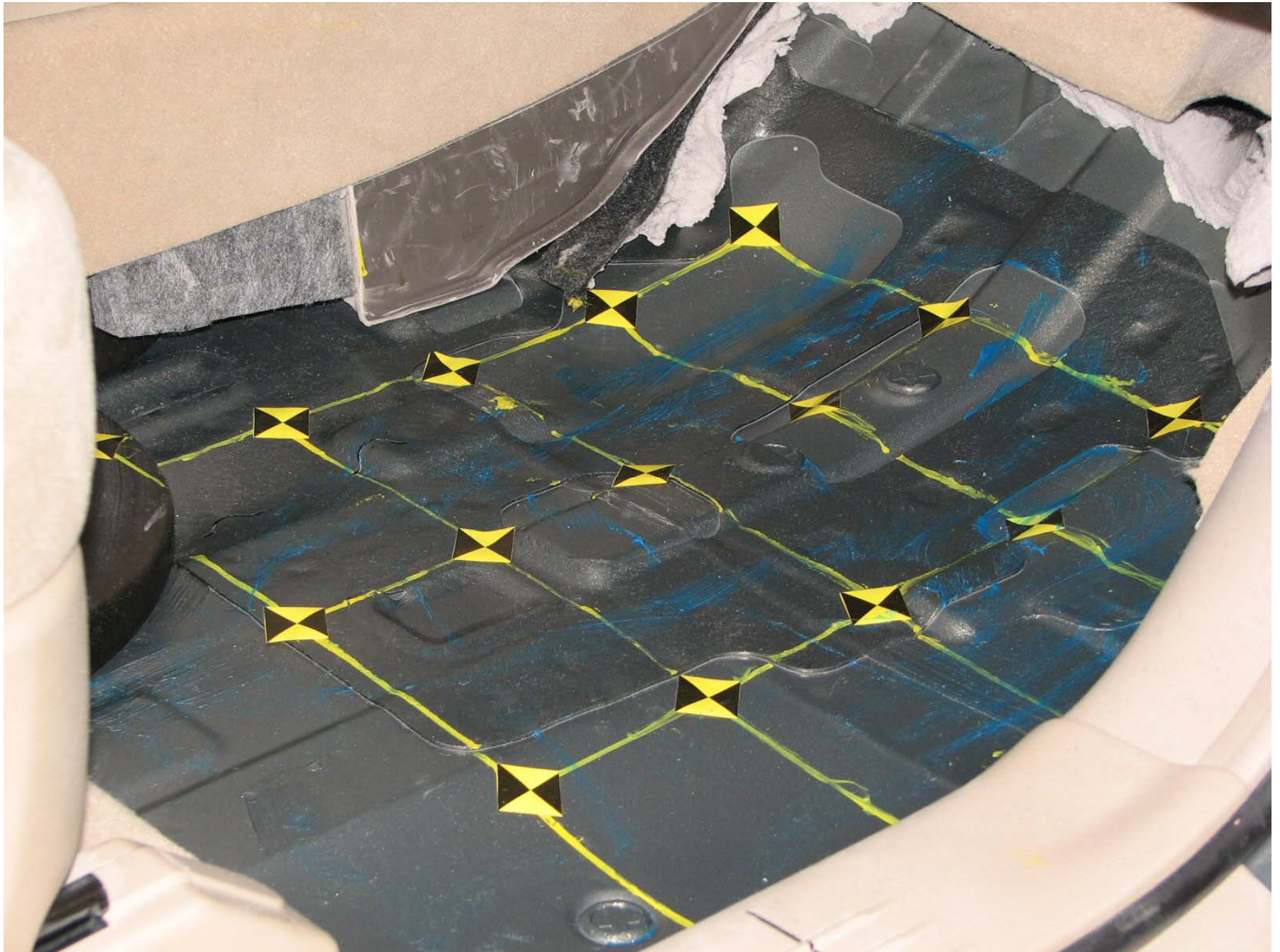


Figure A-54: Pre-Test Passenger Side Floor Pan



A-55

TR-P27083-01-NC

Figure A-55: Post-Test Passenger Side Floor Pan



Figure A-56: Post-Test Passenger Dummy Head



Figure A-57: Post-Test Passenger Dummy Airbag Contact



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Figure A-58: Vehicle on Rollover Device (0°)



Figure A-59: Vehicle on Rollover Device (90°)



Figure A-60: Vehicle on Rollover Device (180°)



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TR-P27083-01-NC

Figure A-61: Vehicle on Rollover Device (270°)



Figure A-62: Vehicle Impact

APPENDIX B
DATA PLOTS

LIST OF DATA PLOTS

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	Driver Chest Primary Z	B-2
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	Passenger Chest Primary Z	B-5
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B-6	Passenger Left Femur Force Z	B-6
	Passenger Right Femur Force Z	B-6

LIST OF DATA PLOTS...(CONTINUED)

The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov.

- Driver Head Primary X Velocity
- Driver Head Primary X Displacement
- Driver Head Redundant X
- Driver Head Redundant Y
- Driver Head Redundant Z
- Driver Head Resultant Redundant
- Driver Head Redundant X Velocity
- Driver Head Redundant X Displacement
- Driver Upper Neck Force X
- Driver Upper Neck Force Y
- Driver Upper Neck Force Z
- Driver Upper Neck Force Resultant
- Driver Upper Neck Moment X
- Driver Upper Neck Moment Y
- Driver Upper Neck Moment Z
- Driver Upper Neck Moment Resultant
- Driver Chest Primary X Velocity
- Driver Chest Primary X Displacement
- Driver Chest Redundant X
- Driver Chest Redundant Y
- Driver Chest Redundant Z
- Driver Chest Resultant Redundant
- Driver Chest Redundant X Velocity
- Driver Chest Redundant X Displacement
- Driver Chest Displacement
- Driver Pelvis X
- Driver Pelvis Y
- Driver Pelvis Z
- Driver Pelvis Resultant
- Driver Pelvis X Velocity
- Driver Pelvis X Displacement
- Driver Left Upper Tibia Moment X
- Driver Left Upper Tibia Moment Y
- Driver Right Upper Tibia Moment X

LIST OF DATA PLOTS...(CONTINUED)

Driver Right Upper Tibia Moment Y
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Left Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Right Foot Fore Z
Driver Lap Belt Force
Driver Shoulder Belt Force
Driver Shoulder Belt Pullout
Driver Shoulder Belt Elongation
Passenger Head Primary X Velocity
Passenger Head Primary X Displacement
Passenger Head Redundant X
Passenger Head Redundant Y
Passenger Head Redundant Z
Passenger Head Resultant Redundant
Passenger Head Redundant X Velocity
Passenger Head Redundant X Displacement
Passenger Upper Neck Force X
Passenger Upper Neck Force Y
Passenger Upper Neck Force Z
Passenger Upper Neck Force Resultant
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Y
Passenger Upper Neck Moment Z
Passenger Upper Neck Moment Resultant
Passenger Chest Primary X Velocity
Passenger Chest Primary X Displacement
Passenger Chest Redundant X

LIST OF DATA PLOTS...(CONTINUED)

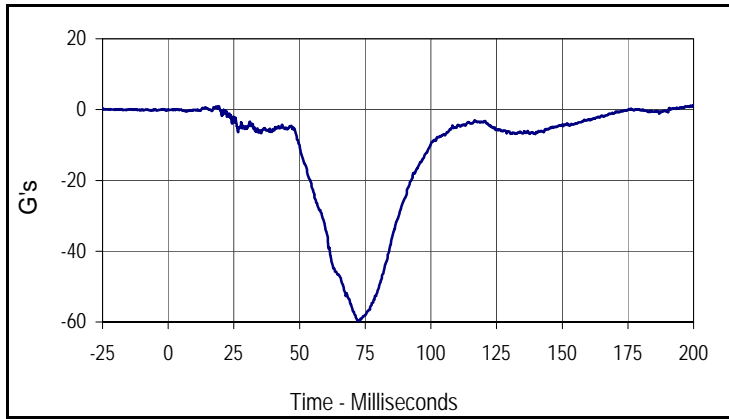
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Passenger Chest Redundant Z
Passenger Chest Resultant Redundant
Passenger Chest Redundant X Velocity
Passenger Chest Redundant X Displacement
Passenger Chest Displacement
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Passenger Pelvis Y
Passenger Pelvis Z
Passenger Pelvis Resultant
Passenger Pelvis X Velocity
Passenger Pelvis X Displacement
Passenger Left Femur Force
Passenger Right Femur Force
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Left Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Right Foot Fore Z
Passenger Lap Belt Force
Passenger Shoulder Belt Force
Passenger Shoulder Belt Pullout
Passenger Shoulder Belt Elongation
Vehicle Left Rear X
Vehicle Left Rear X Velocity

LIST OF DATA PLOTS...(CONTINUED)

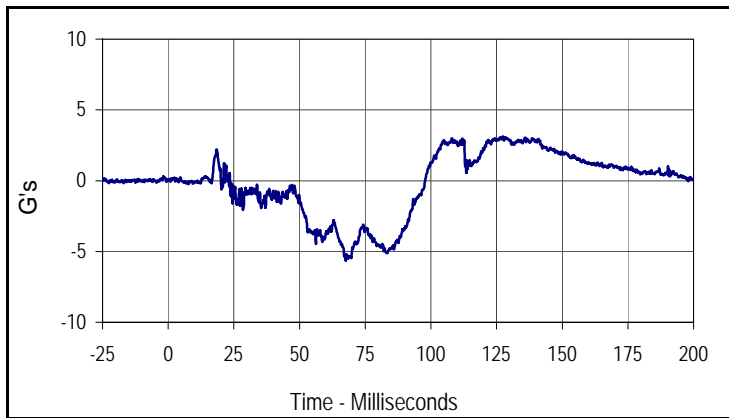
Vehicle Left Rear X Displacement
Vehicle Right Rear X
Vehicle Right Rear X Velocity
Vehicle Right Rear X Displacement
Vehicle Engine Top
Vehicle Engine Top Velocity
Vehicle Engine Top Displacement
Vehicle Engine Bottom
Vehicle Engine Bottom Velocity
Vehicle Engine Bottom Displacement
Vehicle Left Brake Caliper
Vehicle Left Brake Caliper Velocity
Vehicle Left Brake Caliper Displacement
Vehicle Right Brake Caliper
Vehicle Right Brake Caliper Velocity
Vehicle Right Brake Caliper Displacement
Vehicle Instrument Panel
Vehicle Instrument Panel Velocity
Vehicle Instrument Panel Displacement
Vehicle Left Rear Z
Vehicle Left Rear Z Velocity
Vehicle Left Rear Z Displacement
Vehicle Right Rear Z
Vehicle Right Rear Z Velocity
Vehicle Right Rear Z Displacement

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

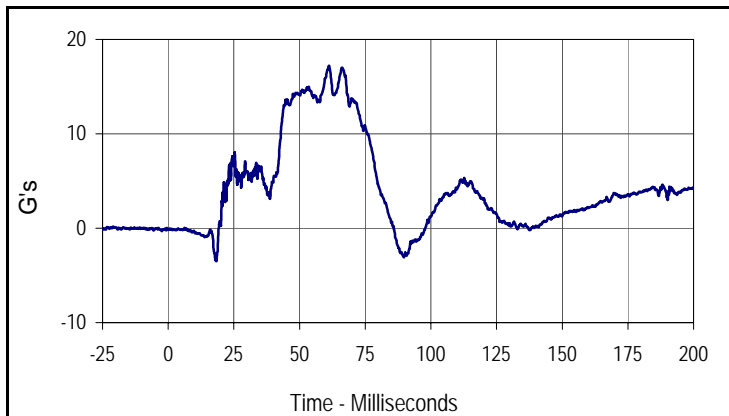
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 NHTSA No.: U70500



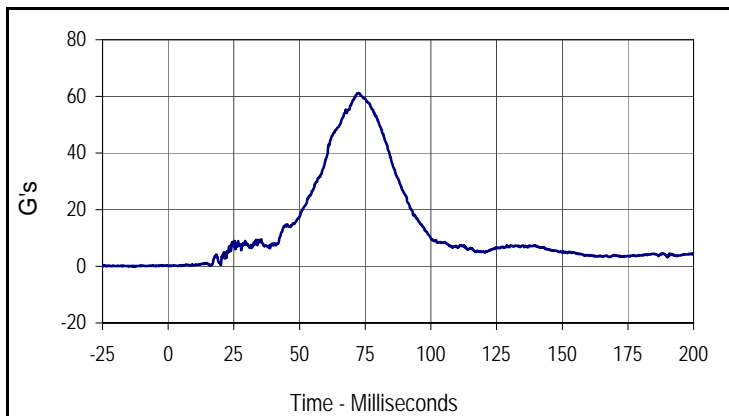
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Driver Head Primary X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
1.3	200.0	-59.8	72.7



Curve Description			
Driver Head Primary Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.1	127.4	-5.6	67.6



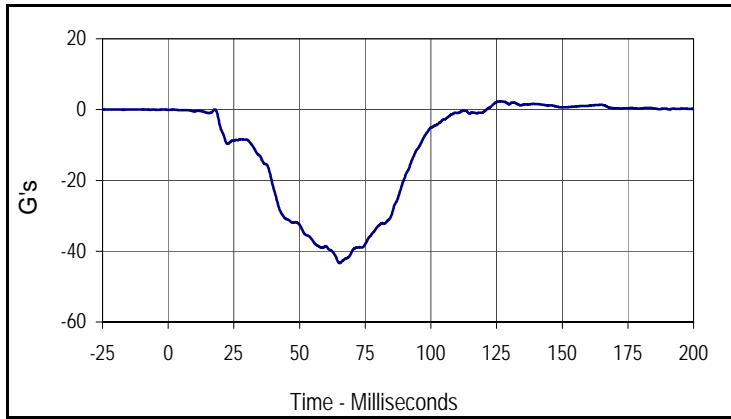
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Max	Time	Min	Time
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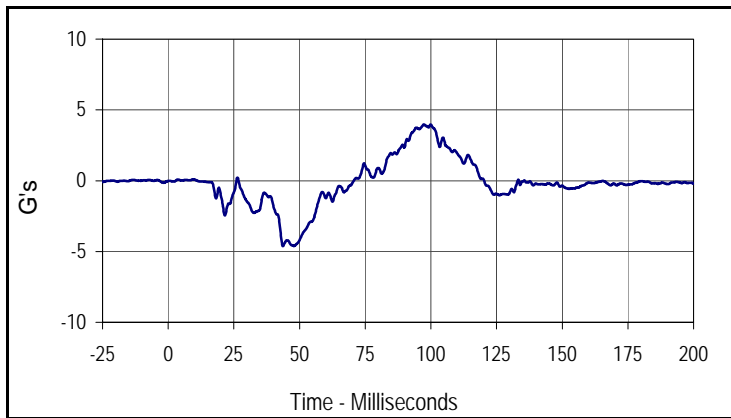
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Driver Head Resultant Primary			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
61.1	72.2	0.1	0.5

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

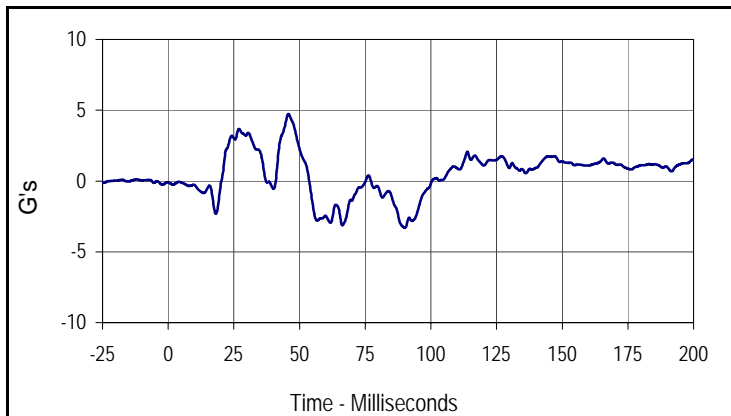
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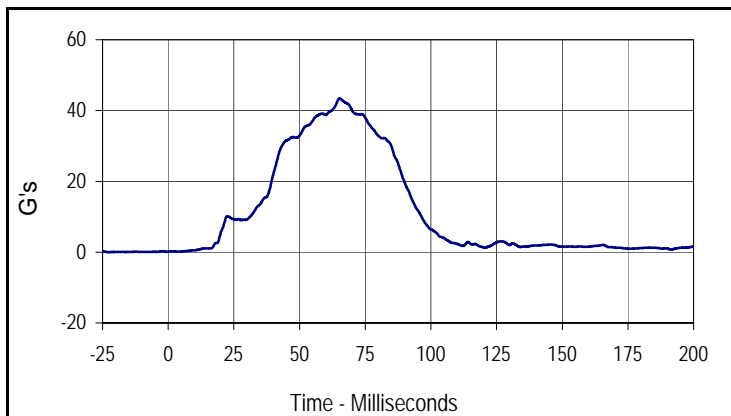
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Driver Chest Primary X			
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Max	Time	Min	Time
2.3	126.6	-43.4	65.2



Curve Description			
Driver Chest Primary Y			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
4.0	99.9	-4.6	43.7



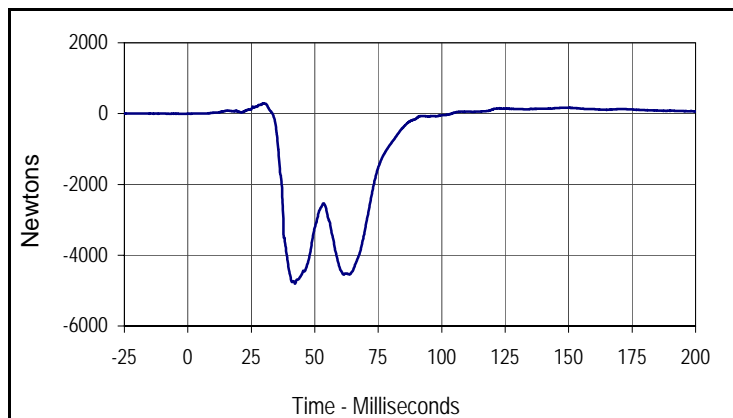
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CURNO	Type	SAE Class	Units
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Max	Time	Min	Time
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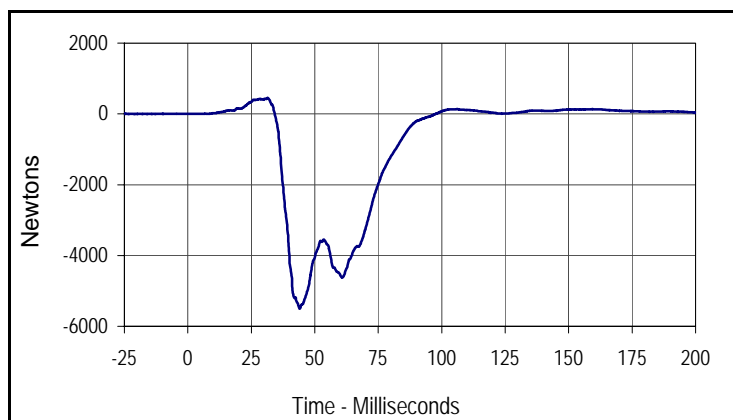
Curve Description			
Driver Chest Resultant Primary			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
43.4	65.2	0.1	0.0

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/6/07
 NHTSA No.: U70500



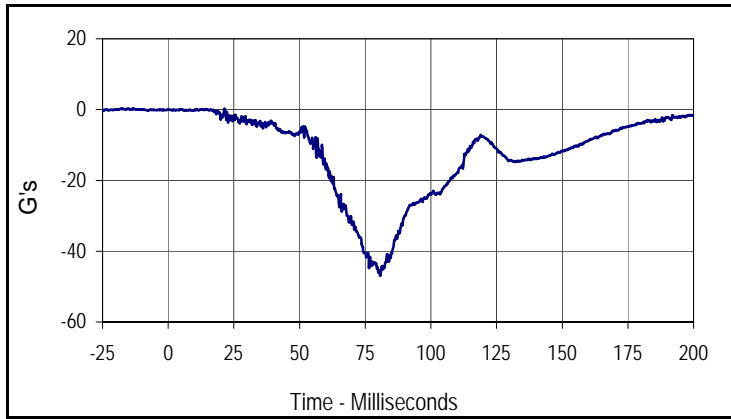
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007	FIL	600	Newtons
Max	Time	Min	Time
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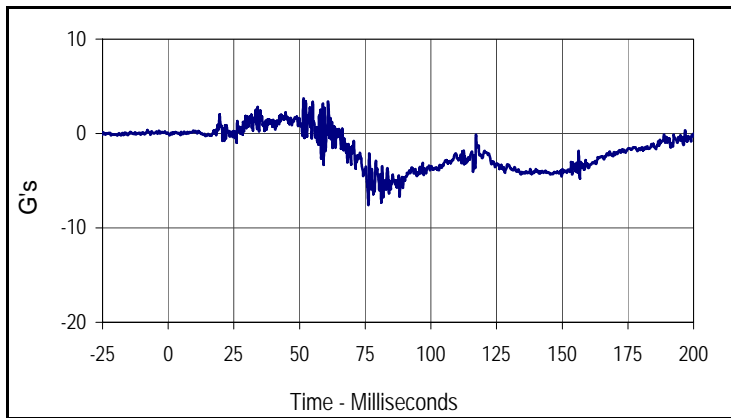
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Driver Right Femur Force Z			
CURNO	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
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Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

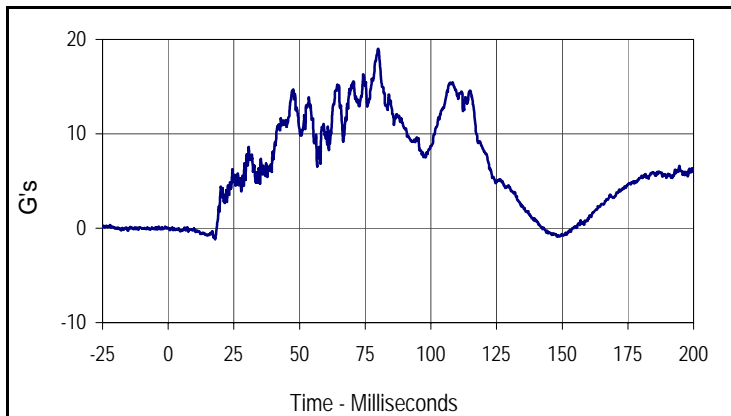
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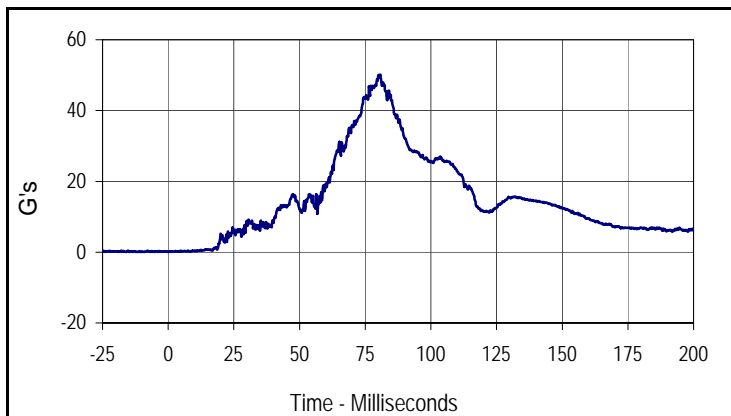
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009	FIL	1000	G's
Max	Time	Min	Time
0.3	21.4	-47.0	80.7



Curve Description			
Passenger Head Primary Y			
CURNO	Type	SAE Class	Units
010	FIL	1000	G's
Max	Time	Min	Time
3.7	51.5	-7.6	76.2



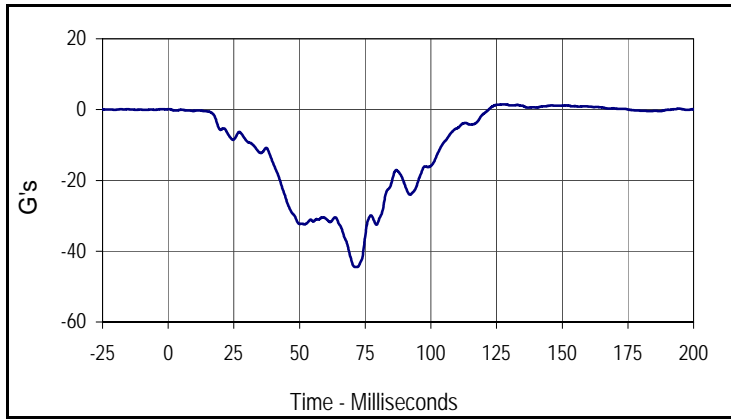
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011	FIL	1000	G's
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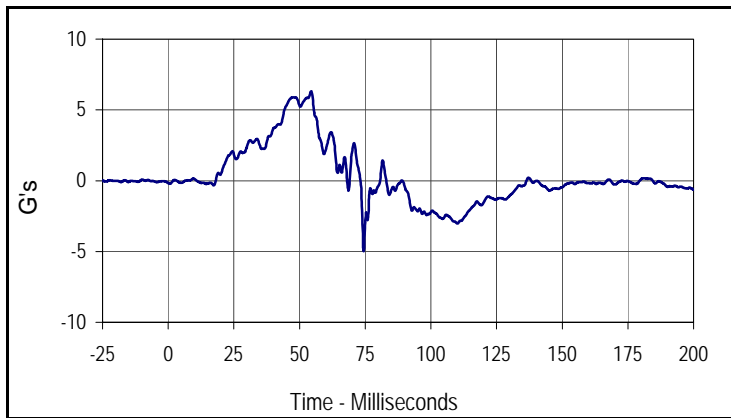
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Passenger Head Resultant Primary			
CURNO	Type	SAE Class	Units
009	RES	1000	G's
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50.2	80.6	0.0	0.0

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

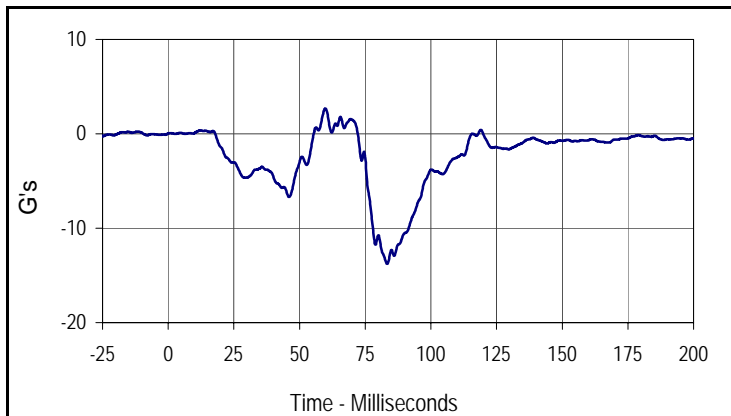
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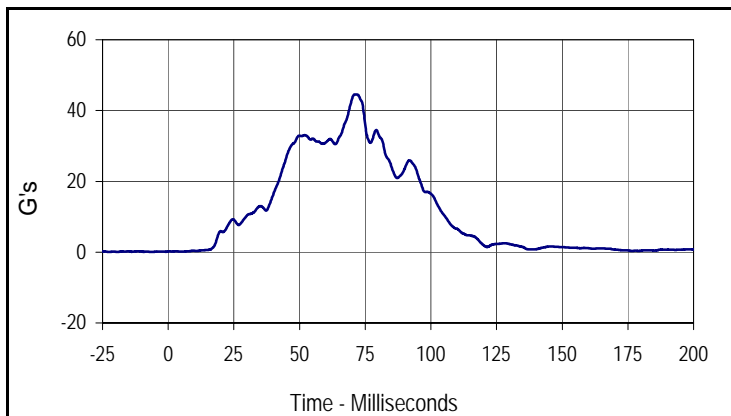
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CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
1.5	128.3	-44.5	72.0



Curve Description			
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013	FIL	180	G's
Max	Time	Min	Time
6.3	54.4	-5.0	74.4



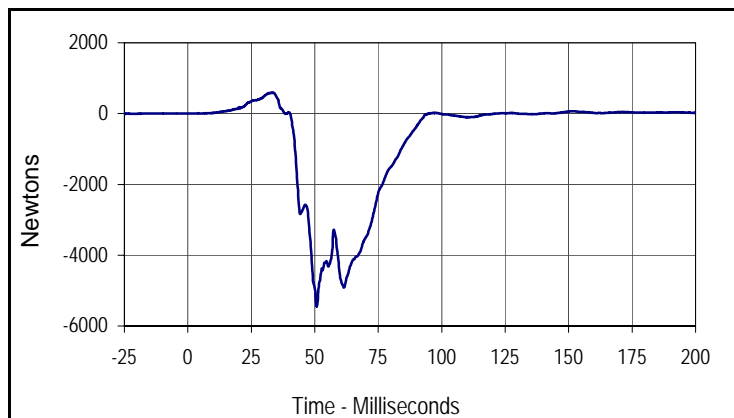
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Max	Time	Min	Time
2.7	59.8	-13.8	83.4



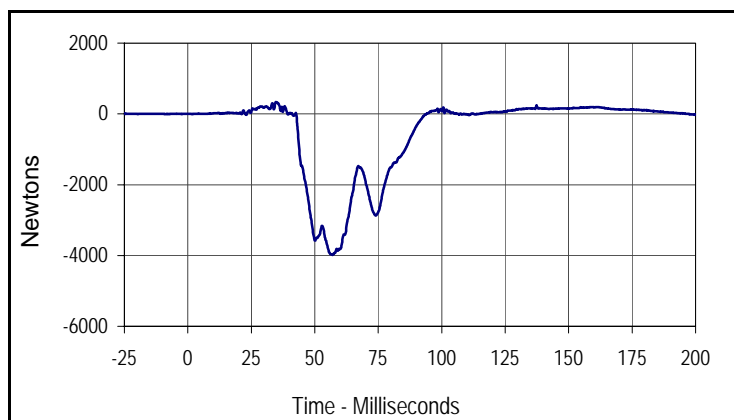
Curve Description			
Passenger Chest Resultant Primary			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
44.5	71.1	0.1	5.8

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/6/07
 NHTSA No.: U70500



Curve Description			
Passenger Left Femur Force Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
597.2	33.0	-5452.6	50.8



Curve Description			
Passenger Right Femur Force Z			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
339.6	34.7	-3984.4	57.0

APPENDIX C
DUMMY CALIBRATION DATA

Test Program: Hybrid III 50th Percentile Male Head Drop Test

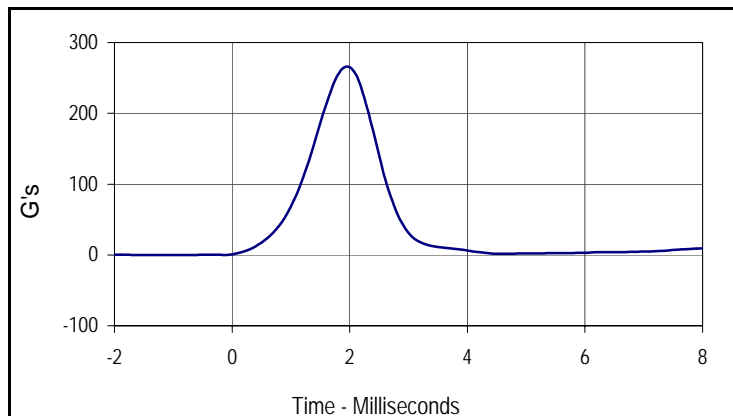
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ATD Serial No.: 034

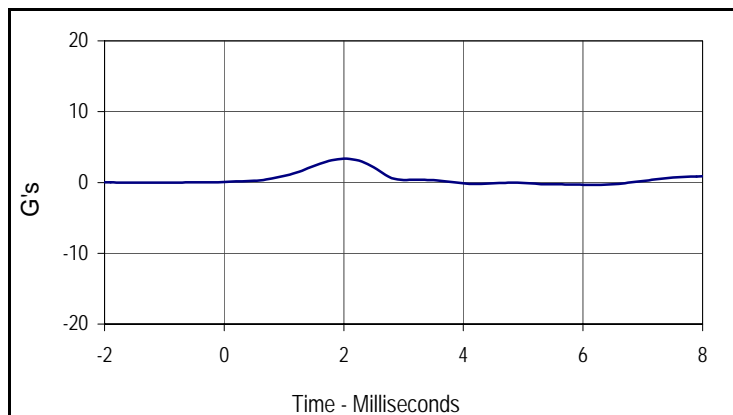
Test I.D.: HD02D



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	265.2	Pass
Peak Lateral Acceleration	G's	≤15.0	3.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
265.2	2.0	0.0	-0.7



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.3	2.0	-0.3	6.0

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

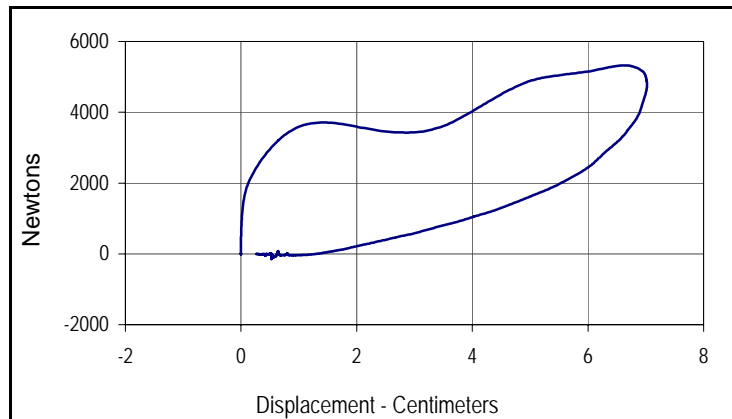
Test Date: 2/27/07

ATD Serial No.: 034

Test I.D.: CH02G



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.70	Pass
Peak Probe Force	Newtons	5159 to 5893	5326	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	7.02	Pass
Internal Hysteresis	%	69 to 85	72.2	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysteresis
001	FIL	180	72.2
Peak Probe Force		Peak Chest Deflection	
5326		7.02	

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

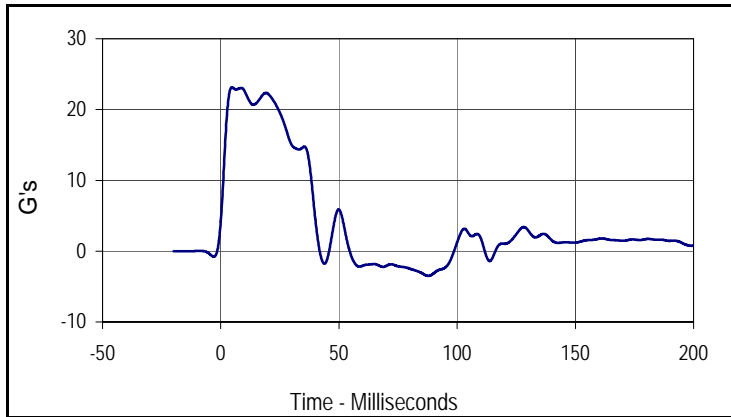
Test Date: 3/1/07

ATD Serial No.: 034

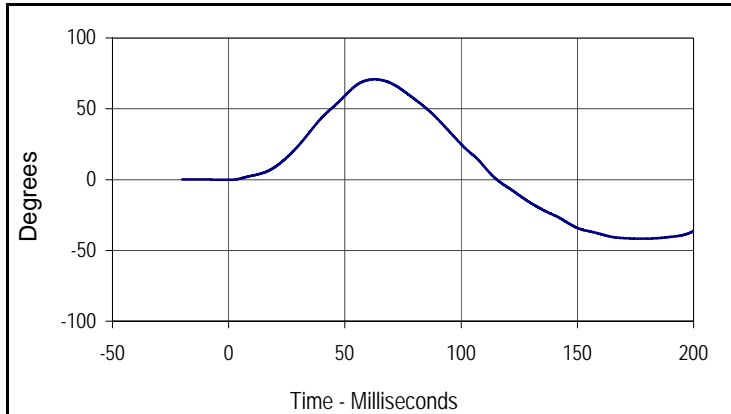
Test I.D.: NF03D



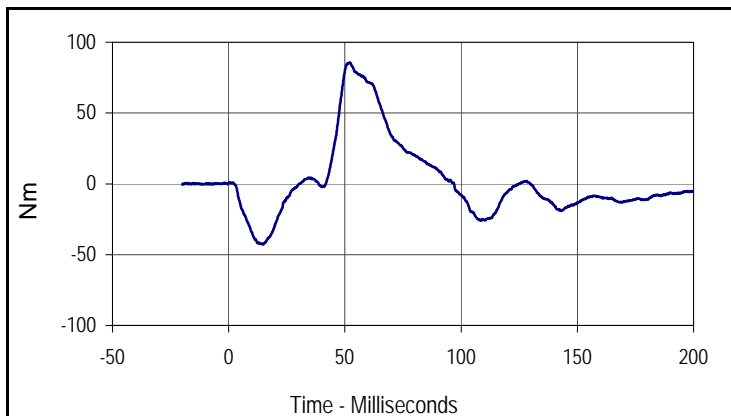
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.05	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.6	Pass
	20 Msec.	G's	17.6 to 22.6	22.2	Pass
	30 Msec.	G's	12.5 to 18.5	15.0	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	15.0	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	39.9	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	70.8	Pass
	Time	Msec.	57.0 to 64.0	62.7	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	115.4	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	85.7	Pass
	Time	Msec.	47.0 to 58.0	52.1	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	97.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.1	4.7	-3.5	87.8



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
70.8	62.7	-41.7	178.6



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
85.7	52.1	-42.7	14.7

Test Program: Hybrid III 50th Percentile Male Neck Extension Test

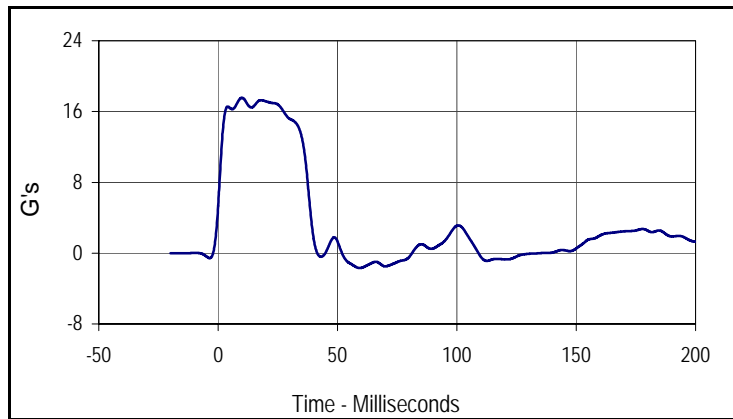
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ATD Serial No.: 034

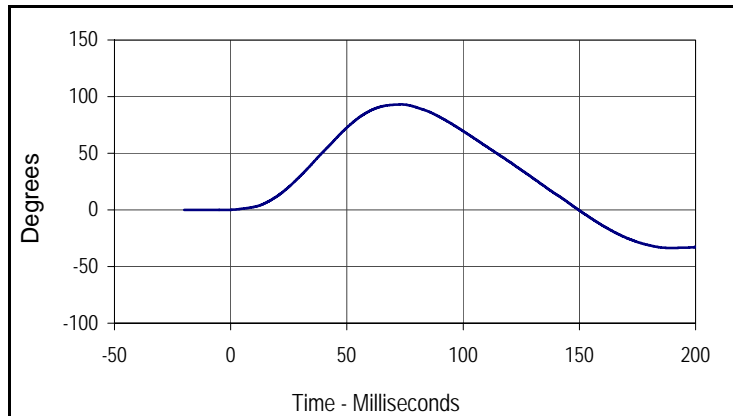
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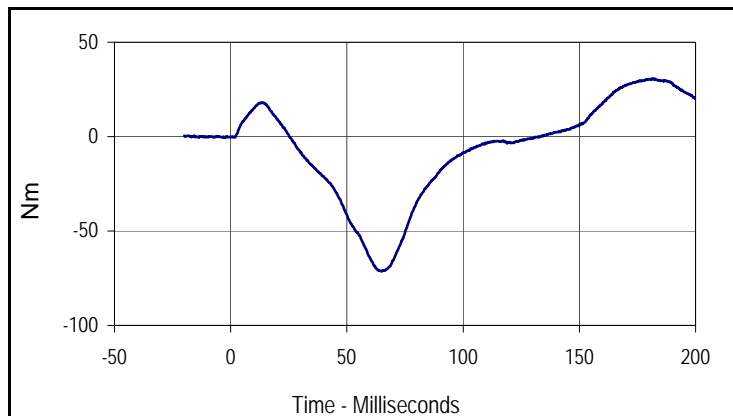
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.18	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.6	Pass
	20 Msec.	G's	14.0 to 19.0	17.2	Pass
	30 Msec.	G's	11.0 to 16.0	15.2	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	15.2	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	38.6	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	93.1	Pass
	Time	Msec.	72.0 to 82.0	73.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	149.7	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-71.3	Pass
	Time	Msec.	65.0 to 79.0	65.0	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	133.5	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
17.6	10.0	-1.7	59.3



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
93.1	73.5	-33.6	189.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
30.9	181.6	-71.3	65.0

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 2/27/07

ATD Serial No.: 034

Test I.D.: LK02B , RK02B

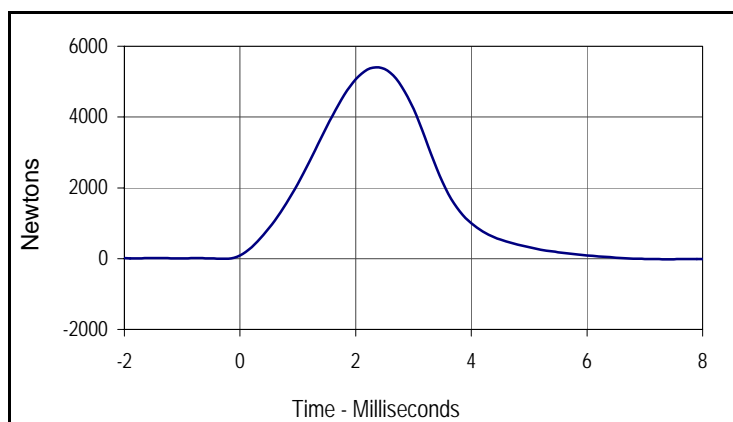


Left Knee

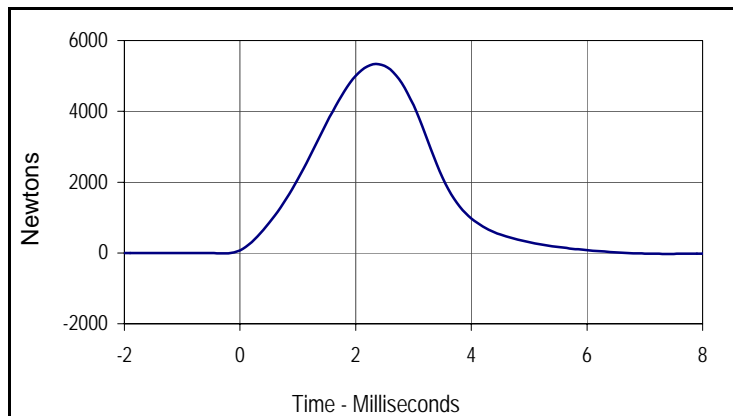
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.13	Pass
Peak Probe Force	Newtons	4715 to 5782	5402	Pass
Overall Test Results				Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5335	Pass
Overall Test Results				Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5402.4	2.4	-16.7	7.4



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5335.1	2.4	-26.7	7.4

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 3/2/07

ATD Serial No.: 034

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	880	Pass
B - Shoulder pivot height	mm	505 to 521	510	Pass
C - "H" point height	mm	84 to 89	85	Pass
D - "H" point from seat back	mm	135 to 140	139	Pass
E - Shoulder pivot from back	mm	84 to 94	89	Pass
F - Thigh clearance	mm	140 to 155	150	Pass
G - Elbow back to wrist pivot	mm	290 to 305	300	Pass
H - Skull cap to back line	mm	41 to 46	44	Pass
I - Shoulder to elbow length	mm	330 to 345	339	Pass
J - Elbow rest height	mm	190 to 211	204	Pass
K - Buttock to knee length	mm	579 to 604	601	Pass
L - Popliteal length	mm	429 to 455	454	Pass
M - Knee pivot height	mm	485 to 500	485	Pass
N - Buttock popliteal length	mm	452 to 477	470	Pass
O - Chest depth	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	263	Pass
V - Shoulder breadth	mm	422 to 437	431	Pass
W - Foot breadth	mm	91 to 107	104	Pass
Y - Chest circumference	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	850	Pass
AA - Location for chest circumference	mm	429 to 434	432	Pass
BB - Location for waist circumference	mm	226 to 231	229	Pass
Overall Test Results				Pass

Test Program: Hybrid III 50th Percentile Male Head Drop Test

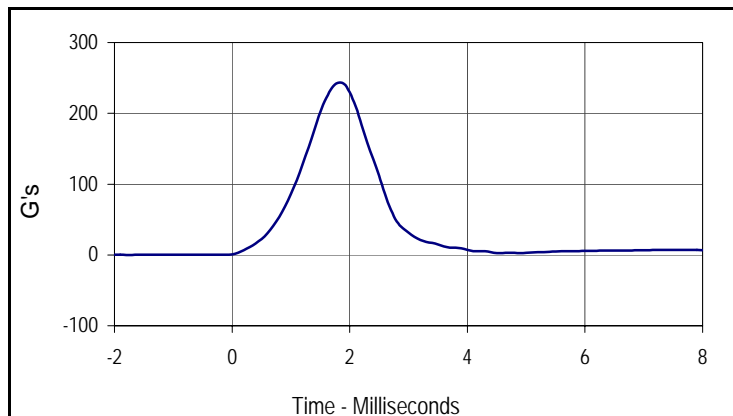
Test Date: 2/26/07

ATD Serial No.: 035

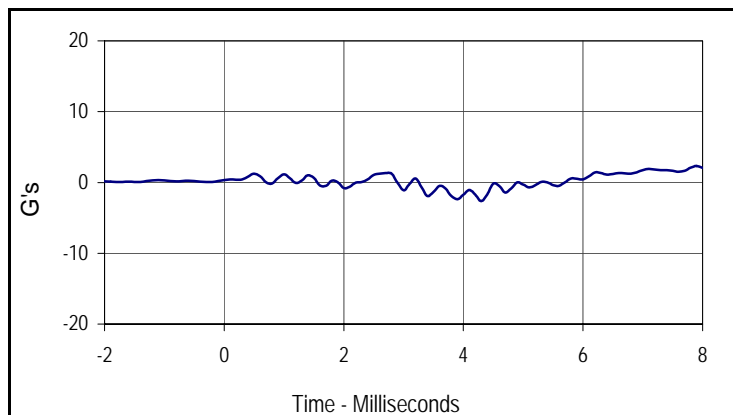
Test I.D.: HD02F



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	243.2	Pass
Peak Lateral Acceleration	G's	≤15.0	2.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
243.2	1.8	0.1	-1.8



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.3	2.7	-2.7	4.3

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

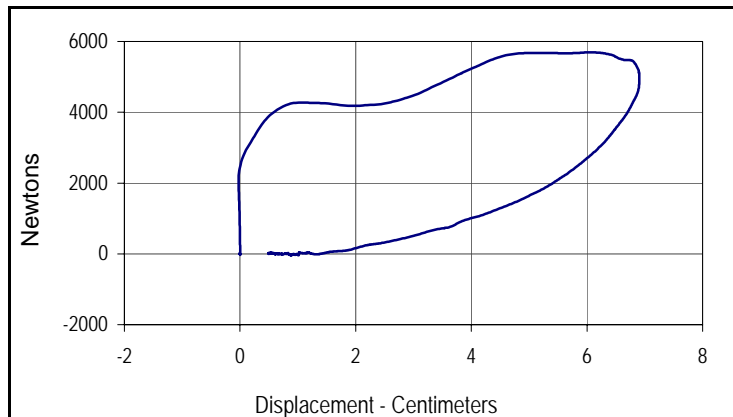
Test Date: 2/27/07

ATD Serial No.: 035

Test I.D.: CH02G



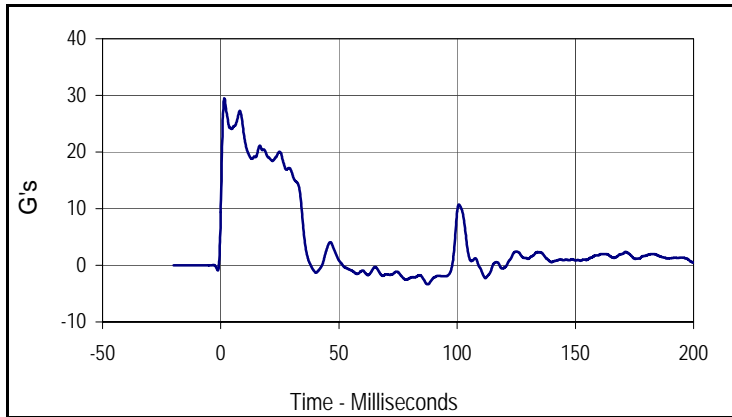
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.76	Pass
Peak Probe Force	Newtons	5159 to 5893	5694	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.90	Pass
Internal Hysteresis	%	69 to 85	76.8	Pass
Overall Test Results				Pass



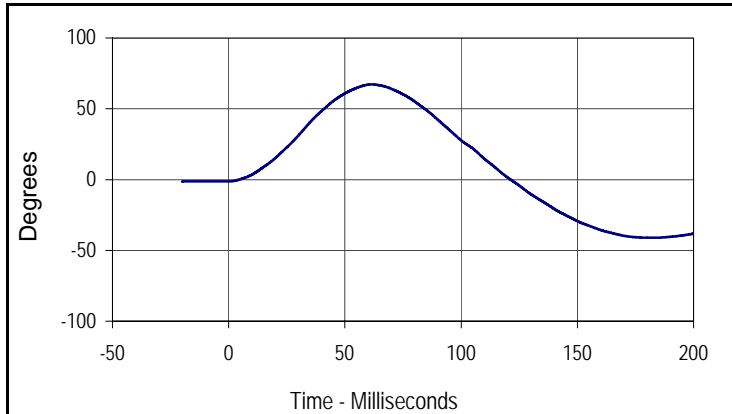
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysteresis
001	FIL	180	76.8
Peak Probe Force		Peak Chest Deflection	
5694		6.90	



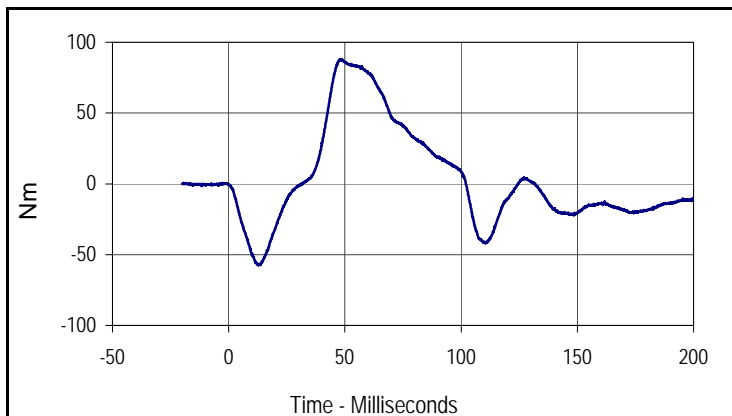
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.96	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.5	Pass
	20 Msec.	G's	17.6 to 22.6	19.1	Pass
	30 Msec.	G's	12.5 to 18.5	16.4	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	16.4	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	35.4	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	67.2	Pass
	Time	Msec.	57.0 to 64.0	61.4	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	121.3	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	87.9	Pass
	Time	Msec.	47.0 to 58.0	48.5	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	102.1	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
29.5	1.5	-3.4	87.6



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
67.2	61.4	-41.1	182.6



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	60	Nm
Max	Time	Min	Time
87.9	48.5	-57.5	12.7

Test Program: Hybrid III 50th Percentile Male Neck Extension Test

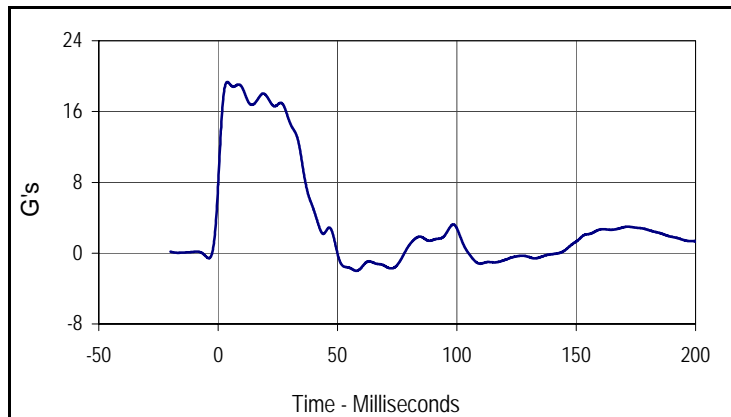
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ATD Serial No.: 035

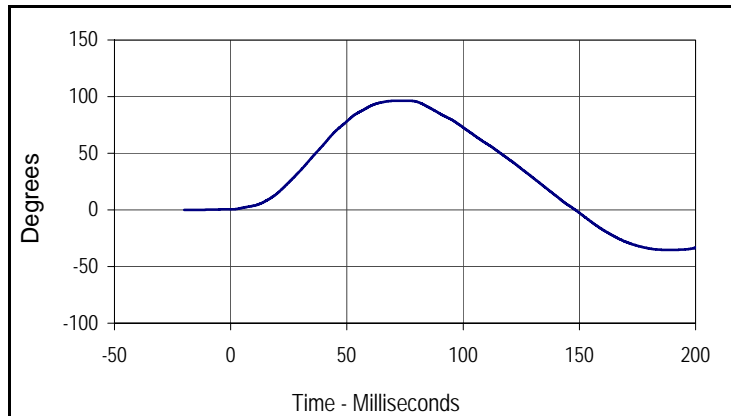
Test I.D.: NE03G



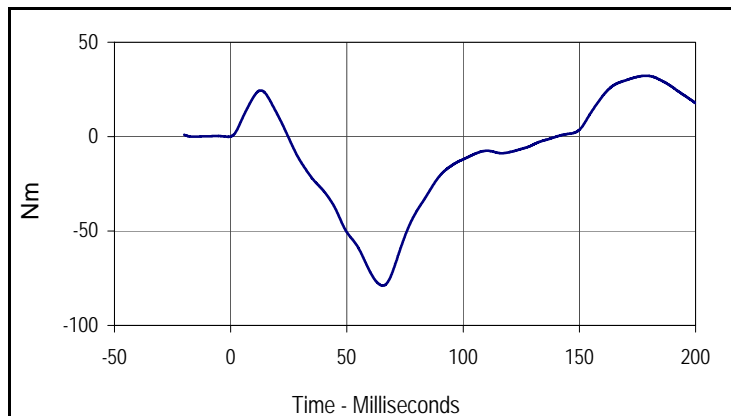
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.18	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.7	Pass
	20 Msec.	G's	14.0 to 19.0	17.9	Pass
	30 Msec.	G's	11.0 to 16.0	14.8	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	14.8	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	40.0	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	96.4	Pass
	Time	Msec.	72.0 to 82.0	75.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	148.3	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-78.9	Pass
	Time	Msec.	65.0 to 79.0	65.5	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	140.1	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
19.3	3.8	-2.0	57.9



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
96.4	75.2	-35.3	189.8



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	60	Nm
Max	Time	Min	Time
32.3	178.6	-78.9	65.5

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 2/27/07

ATD Serial No.: 035

Test I.D.: LK02A , RK02A



Left Knee

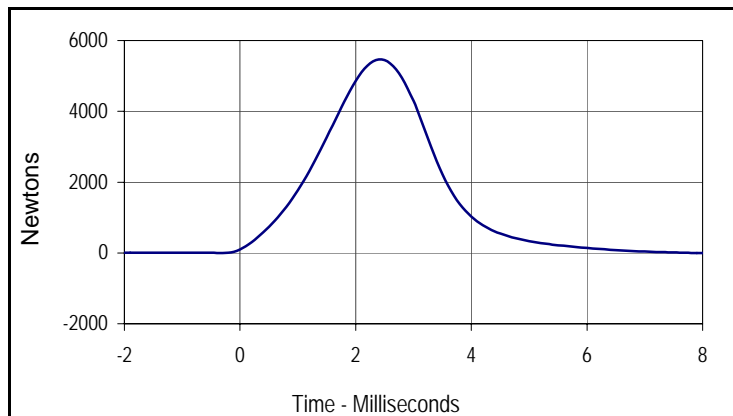
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.13	Pass
Peak Probe Force	Newtons	4715 to 5782	5524	Pass
Overall Test Results				Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5465	Pass
Overall Test Results				Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5524.4	2.4	-193.8	9.6



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5465.1	2.4	-195.0	9.6

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 3/2/07

ATD Serial No.: 035

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	512	Pass
C - "H" point height	mm	84 to 89	84	Pass
D - "H" point from seat back	mm	135 to 140	135	Pass
E - Shoulder pivot from back	mm	84 to 94	85	Pass
F - Thigh clearance	mm	140 to 155	152	Pass
G - Elbow back to wrist pivot	mm	290 to 305	301	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	336	Pass
J - Elbow rest height	mm	190 to 211	205	Pass
K - Buttock to knee length	mm	579 to 604	600	Pass
L - Popliteal length	mm	429 to 455	454	Pass
M - Knee pivot height	mm	485 to 500	485	Pass
N - Buttock popliteal length	mm	452 to 477	470	Pass
O - Chest depth	mm	213 to 229	226	Pass
P - Foot length	mm	251 to 267	264	Pass
V - Shoulder breadth	mm	422 to 437	432	Pass
W - Foot breadth	mm	91 to 107	100	Pass
Y - Chest circumference	mm	970 to 1001	986	Pass
Z - Waist circumference	mm	836 to 866	849	Pass
AA - Location for chest circumference	mm	429 to 434	432	Pass
BB - Location for waist circumference	mm	226 to 231	231	Pass
Overall Test Results				Pass

Test Program: Dummy Damage Checklist
 ATD Serial No.: 034

Test Date: 3/2/07
 Test I.D.: N/A



GENERAL	DAMAGED	OK
Outer skin on entire dummy		X
Head ballast secure		X
Gashes, rips, general appearance, etc.		X
Neck-Broken or cracks in rubber		X
Check that upper neck bracket is firmly attached to lwr neck bracket		X
Three rubber bumpers in place		X
Spine- Broken or cracks in rubber		X
Check for looseness at the condyle joint		X
Nodding blocks- cracked or out of position		X
Ribs- Check all ribs and rib supports for damage (bent or broken)		X
Check damping material or separation or cracks		X
OTHER		
CHEST DISPLACEMENT ASSEMBLY		
Bent shaft		X
Slider arm riding correctly, in track		X
TRANSDUCER LEADS		
Torn cables		X
ACCELEROMETER MOUNTINGS		
Check for secure mounting		X
KNEES		
Check outer skin, insert and casting (without removing insert)		X
Knee sliders - Wires intact		X
Knee sliders- Rubber returned to "at rest position"		X
LIMBS		
Check for normal movement and adjustment		X
PELVIS		
Inspect for breakage, especially at iliac crest		X

Comments on repair or replacement parts:

Test Program: Dummy Damage Checklist
 ATD Serial No.: 035

Test Date: 3/2/07
 Test I.D.: N/A



GENERAL	DAMAGED	OK
Outer skin on entire dummy		X
Head ballast secure		X
Gashes, rips, general appearance, etc.		X
Neck-Broken or cracks in rubber		X
Check that upper neck bracket is firmly attached to lwr neck bracket		X
Three rubber bumpers in place		X
Spine- Broken or cracks in rubber		X
Check for looseness at the condyle joint		X
Nodding blocks- cracked or out of position		X
Ribs- Check all ribs and rib supports for damage (bent or broken)		X
Check damping material or separation or cracks		X
OTHER		
CHEST DISPLACEMENT ASSEMBLY		
Bent shaft		X
Slider arm riding correctly, in track		X
TRANSDUCER LEADS		
Torn cables		X
ACCELEROMETER MOUNTINGS		
Check for secure mounting		X
KNEES		
Check outer skin, insert and casting (without removing insert)		X
Knee sliders - Wires intact		X
Knee sliders- Rubber returned to "at rest position"		X
LIMBS		
Check for normal movement and adjustment		X
PELVIS		
Inspect for breakage, especially at iliac crest		X

Comments on repair or replacement parts:

APPENDIX D
CHILD RESTRAINT SYSTEM

REPORT NUMBER TR-P27083-01-NC

**NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST**

**HYUNDAI MOTOR COMPANY
2007 HYUNDAI VERACRUZ
5-DOOR MPV**

NHTSA NUMBER: U70500

**PREPARED BY:
KARCO ENGINEERING, LLC
9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301**




MARCH 06, 2007


FINAL REPORT


**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
400 SEVENTH STREET, SW, ROOM 5311
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 DTNH22-06-D-00027

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Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

Technical Report Documentation Page

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7. Authors Mr. Johnny H. Dutto, Project Engineer, Karco Mr. Frank Richardson, Program Manager, Karco				8. Performing Organization Report No. TR-P27083-01-NC	
9. Performing Organization Name and Address Karco Engineering, LLC 9270 Holly Rd. Adelanto, CA, 92301				10. Work Unit No.	
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12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Rulemaking Office of Crashworthiness Standards Mail Code NPS-111 400 Seventh Street, SW, Room 5311 Washington, D.C 20590				13. Type of Report and Period Covered Final Test Report Base Year	
				14. Sponsoring Agency Code DOT/NHTSA/NRM/OCS	
15. Supplementary Notes					
16. Abstract A frontal impact test was conducted on two (2) Graco Snugride CRS in conjunction with frontal barrier impact NCAP testing on a 2007 Hyundai Veracruz 5-Door MPV and in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the determination of CRS crashworthiness. This test was conducted at Karco Engineering, LLC on March 06, 2007.					
Measurement Description		Units	Threshold	Left Rear (P4)	Right Rear (P3)
Head Injury Criteria (HIC15)			390	584.7	577.4
3 msec. Chest Clip		G's	50	63.3	55.5
17. Key Words New Car Assessment Program (Frontal NCAP) Frontal Barrier Impact Test Final Report of a Graco Snugride CRS				18. Distribution of Statement Copies of this report available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5108 Washington, D.C. 20590	
19. Security Classification (this report) Unclassified		20. Security Classification (this page) Unclassified		21. No. of Pages 67	22. Price

Form DOT F1700.7 (8-72)

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SECTION D-1

PURPOSE AND SUMMARY OF TEST U70500

The purpose of this test is to obtain CRS performance data during 35 mph (56.3 km/h) frontal barrier impact NCAP test.

The frontal barrier impact NCAP test was conducted in accordance with the Office of Crashworthiness Standards (OCS) NCAP Laboratory Test Procedure.

SUMMARY

Two 12-month old CRABIs (P3 & P4) were each instrumented with head, chest, and six-axis upper neck load cells. A tri-axial accelerometer was installed on the CRS and the CRS base. Seat belt load cells were placed on the inboard and outboard lower anchors.

The left rear (Serial No. 017) CRABI was calibrated prior to this test. The right rear (Serial No. 022) CRABI calibrated one test before this test. CRABI calibration information is found in Section D-4.

CHILD DUMMY VALUES		
Location	HIC15 Values	3 Msec. Chest Clip
CRABI (P3)	577.4	55.5
CRABI (P4)	584.7	63.3

**DATA SHEET NO.1
CRASH TEST SUMMARY**

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 03/06/07

CHILD RESTRAINT SYSTEM INFORMATION

Description	Position #3 CRS	Position #4 CRS
Manufacturer	Graco	Graco
Model Name	Snugride	Snugride
Serial No.	8465WSR3	8465EME3
Type	Infant	Infant
Forward/Rearward	Rearward	Rearward

VISIBLE DUMMY CONTACT POINTS

Description	Position #3 CRS	Position #4 CRS
Head Contact	Rear Headrest	Rear Headrest
Chest Contact	None	None
Abdomen Contact	None	None
Left Knee Contact	None	None
Right Knee Contact	None	None
Left Toe Contact	None	None
Right Toe Contact	None	None

POST-TEST DOOR OPENINGS

Description	Position #3 CRS	Position #4 CRS
Right Rear Door	Remained closed and latched, opened w/o tools	Remained closed and latched, opened w/o tools

CAMERA COVERAGE

Description	Standard
High Speed	4
Real Time	0
Total	4

DATA CHANNELS

CRABI (P3 & P4) Sensors	26
Belt Sensors	4
CRS Sensors	12
Total	42

DATA SHEET NO.2
CRS PARAMETER DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
 Test Date: 03/06/07

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	559	416	975	610	472	1082
Right	kg	573	412	985	616	457	1073
Ratio	%	58	42	100	57	43	100
Totals	kg	1132	828	1960	1226	929	2155

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1960
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	50
Calculated Vehicle Target Wt. (TVTWT)	kg	2162

DATA SHEET NO.3

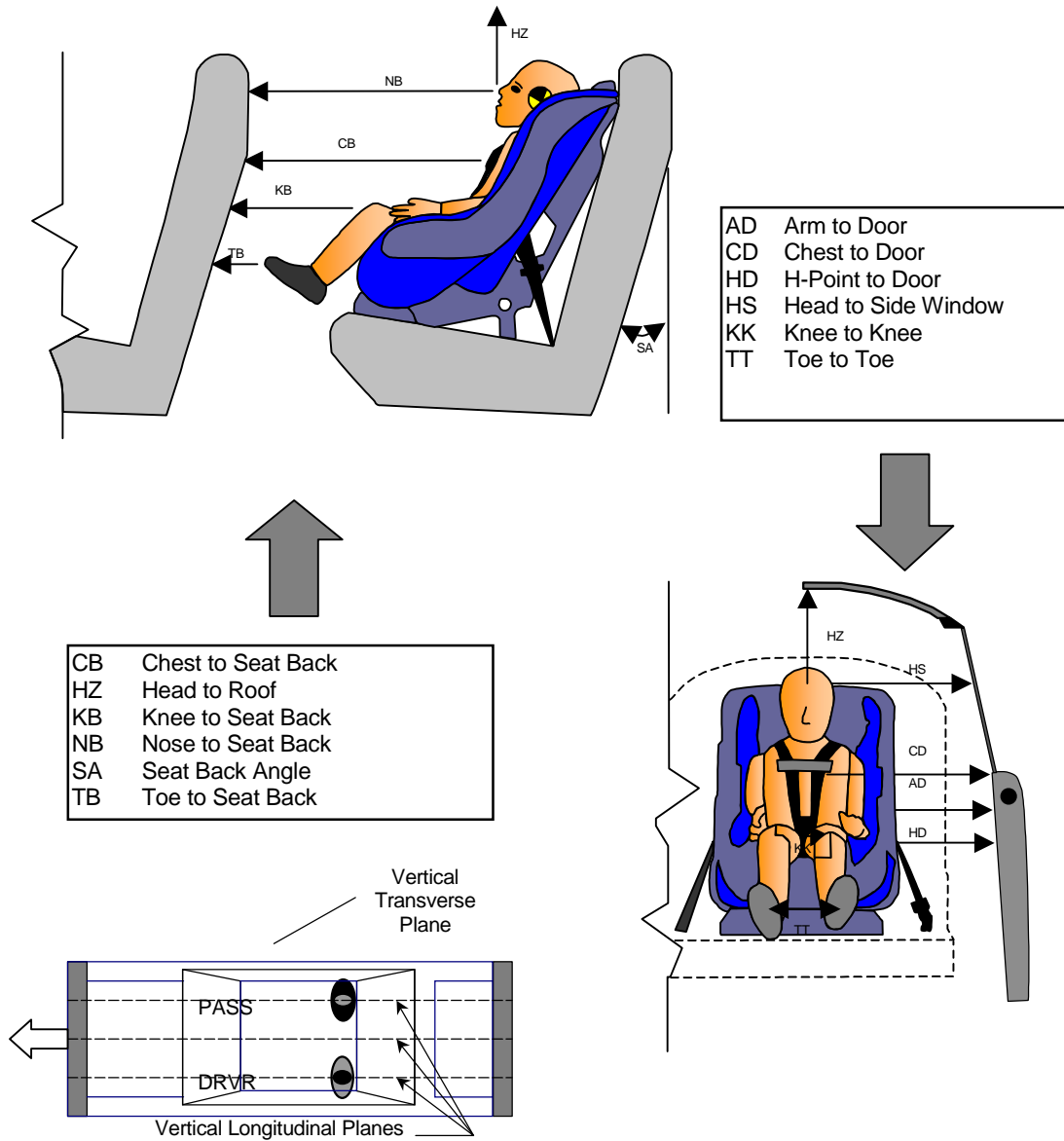
CRABI POSITIONING IN VEHICLE

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 03/06/07



DUMMY MEASUREMENTS FOR REAR SEAT OCCUPANTS

DATA SHEET NO.3

CRABI POSITIONING IN VEHICLE...(CONTINUED)

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 03/06/07

CRABI MEASUREMENTS

Code	Measurement	Units	CRABI (P3) Serial No. 022	CRABI (P4) Serial No. 017
SA	Seat Back Angle	deg.	15.9	15.9
HZ	Head to Roof (Z)	mm	470	475
CD	Chest to Door	mm	430	420
KK	Knee to Knee (Y)	mm	160	175
HS	Head to Side Window	mm	435	440
HD	H-Point to Door (Y)	mm	340	340
AD	Arm to Door	mm	310	310
NB	Nose to Seat Back	mm	520	500
CB	Chest to Seat Back	mm	445	425
FF	Foot to Foot	mm	110	145
KB-Left	Knee to Seat Back	mm	200	190
KB-Right	Knee to Seat Back	mm	210	190
TB-Left	Toe to Seat Back	mm	10	35
TB-Right	Toe to Seat Back	mm	20	35
CCA	Car Cushion Angle	deg.	15	15
BA	Back Angle	deg.	33.5	25
SCA	Seat Cushion Angle	deg.	18	22.5

DATA SHEET NO.4
CRS PERFORMANCE DATA

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
Test Program: 2007 NHTSA 35mph NCAP

NHTSA No.: U70500
Test Date: 03/06/07

CRS PERFORMANCE DATA

Location	CRS (P3)		CRS (P4)	
	Damage	Post-Test	Damage	Post-Test
Upper Tether Strap				
Upper Tether Buckle				
Upper Tether Hook				
Veh. Upper Tether Anchor				
Lower Anchor Strap				
Lower Anchor Buckle				
Lower Anchor Hooks				
Veh. Lower CRS Anchors				
5-Point Harness Connections				
Cracks on CRS	No	None	No	None
Fabric Tears on CRS	No	None	No	None
Vehicle Seat Structure	No	None	No	None
Vehicle Seat Fabric Tears	No	None	No	None

DATA SHEET NO. 7...(CONTINUED)
CRS ACCELEROMETER LOCATIONS

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV

NHTSA No.: U70500

Test Program: 2007 NHTSA 35mph NCAP

Test Date: 3/6/07

CRS ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	CRS (P4)	1950	563	1020
2	CRS Base (P4)	1830	563	880
3	CRS (P3)	1945	563	1025
4	CRS Base (P3)	1830	563	880

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

DATA SHEET NO.6**CRS CAMERA LOCATIONS AND DATA**Test Vehicle: 2007 Hyundai Veracruz 5-Door MPVNHTSA No.: U70500Test Program: 2007 NHTSA 35mph NCAPTest Date: 03/06/07**CAMERA LOCATIONS**

No.	Camera View	Location(mm)			Angle (Deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Passenger Side Upper CRS View	-2819	965	-1602	-2	n/a	12	1000
2	Passenger Side Lower CRS View	-2819	965	-685	-2	n/a	12	1000
3	Driver Side Upper CRS View	-2819	-965	-1602	-2	n/a	12	1000
4	Driver Side Upper CRS View	-2819	-965	-685	-2	n/a	12	1000

X = Barrier Face Y = Monorail Centerline Z = Ground DNR = Did Not Run NTM = No Time Marks

SECTION D-2
PHOTOGRAPHS

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MODEL **8465WSR3**

NAME **SNUGRIDE**

Manufactured in 122706 10

GRACO CHILDREN'S PRODUCTS, INC.

EXTON, PA 19341 1-888-224-6549

Made in U.S.A.

PB-25777

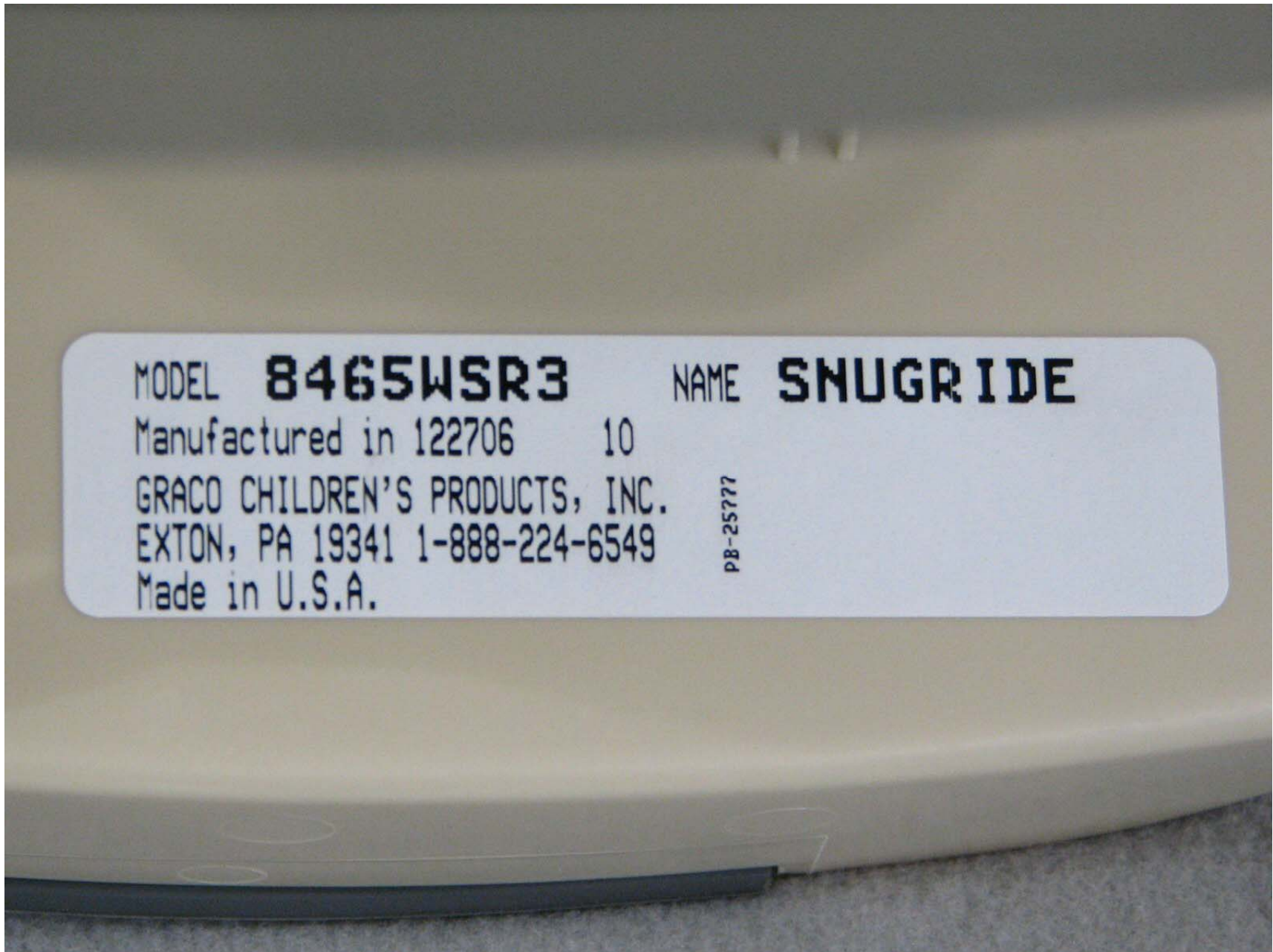


Figure D2-1: Position 3 CRS Label



Figure D2-2: Pre-Test Frontal View of Position 3 CRS



Figure D2-3: Post-Test Frontal View of Position 3 CRS



Figure D2-4: Pre-Test Rear View of Position 3 CRS



Figure D2-5: Post-Test Rear View of Position 3 CRS



D2-6

TR-P27083-01-NC

Figure D2-6: Pre-Test Left Side View of Position 3 CRS



Figure D2-7: Post-Test Left Side View of Position 3 CRS



D2-8

TR-P27083-01-NC

Figure D2-8: Pre-Test Right Side View of Position 3 CRS



Figure D2-9: Post-Test Right Side View of Position 3 CRS



Figure D2-10: Pre-Test Position 3 Front View (Head and Seat Belt Position)



Figure D2-11: Post-Test Position 3 Front View (Head and Seat Belt Position)



Figure D2-12: Pre-Test Position 3 Front View (Seat Belt Position)



Figure D2-13: Post-Test Position 3 Front View (Seat Belt Position)



D2-14

TR-P27083-01-NC

Figure D2-14: Pre-Test Position 3 Right Side View



D2-15

TR-P27083-01-NC

Figure D2-15: Post-Test Position 3 Right Side View



D2-16

TR-P27083-01-NC

Figure D2-16: Pre-Test Position 3 Right Side View (Through Window)



D2-17

TR-P27083-01-NC

Figure D2-17: Post-Test Position 3 Right Side View (Through Window)



Figure D2-18: Post-Test Position 3 Dummy Legs

MODEL **8465EME3**

NAME **SNUGRIDE**

Manufactured in 010807 10

GRACO CHILDREN'S PRODUCTS, INC.

EXTON, PA 19341 1-888-224-6549

Made in U.S.A.

PB-25777

Figure D2-19: Position 4 CRS Label



Figure D2-20: Pre-Test Frontal View of Position 4 CRS



Figure D2-21: Post-Test Frontal View of Position 4 CRS



Figure D2-22: Pre-Test Rear View of Position 4 CRS



Figure D2-23: Post-Test Rear View of Position 4 CRS



D2-24

TR-P27083-01-NC

Figure D2-24: Pre-Test Left Side View of Position 4 CRS



D2-25

TR-P27083-01-NC

Figure D2-25: Post-Test Left Side View of Position 4 CRS



D2-26

TR-P27083-01-NC

Figure D2-26: Pre-Test Right Side View of Position 4 CRS



D2-27

TR-P27083-01-NC

Figure D2-27: Post-Test Right Side View of Position 4 CRS



Figure D2-28: Pre-Test Position 4 Front View (Head & Seat Belt Position)



Figure D2-29: Post-Test Position 4 Front View (Head & Seat Belt Position)



Figure D2-30: Pre-Test Position 4 Front View (Seat Belt Position)



Figure D2-31: Post-Test Position 4 Front View (Seat Belt Position)



Figure D2-32: Pre-Test Position 4 Left Side View



D2-33

TR-P27083-01-NC

Figure D2-33: Post-Test Position 4 Left Side View



D2-34

TR-P27083-01-NC

Figure D2-34: Pre-Test Position 4 Right Side View



D2-35

TR-P27083-01-NC

Figure D2-35: Post-Test Position 4 Right Side View



Figure D2-36: Post-Test Position 4 Dummy Legs

SECTION D-3

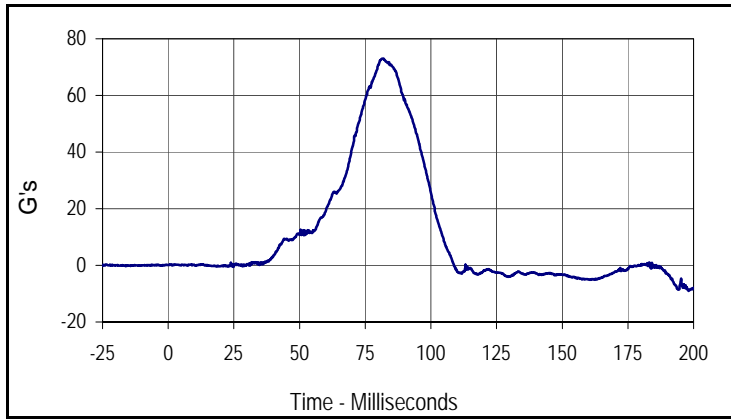
CRABI RESPONSE AND CRS DATA TRACES

LIST OF DATA PLOTS

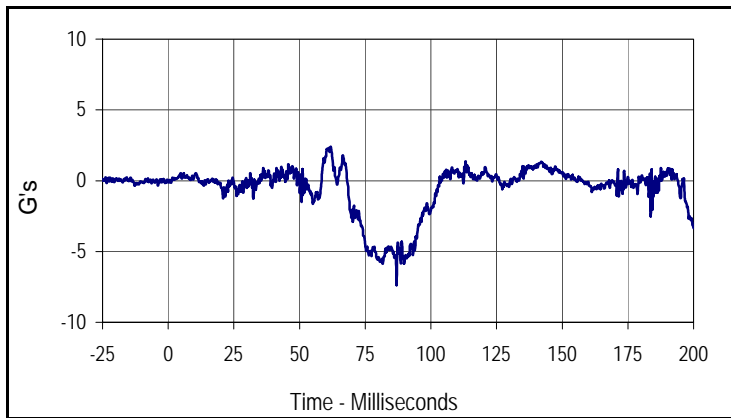
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D3-1	Left Rear CRABI (P4) Head X	D3-1
	Left Rear CRABI (P4) Head Y	D3-1
	Left Rear CRABI (P4) Head Z	D3-1
	Left Rear CRABI (P4) Head Resultant	D3-1
D3-2	Left Rear CRABI (P4) Chest X	D3-2
	Left Rear CRABI (P4) Chest Y	D3-2
	Left Rear CRABI (P4) Chest Z	D3-2
	Left Rear CRABI (P4) Chest Resultant	D3-2
D3-3	Right Rear CRABI (P3) Head X	D3-3
	Right Rear CRABI (P3) Head Y	D3-3
	Right Rear CRABI (P3) Head Z	D3-3
	Right Rear CRABI (P3) Head Resultant	D3-3
D3-4	Right Rear CRABI (P3) Chest X	D3-4
	Right Rear CRABI (P3) Chest Y	D3-4
	Right Rear CRABI (P3) Chest Z	D3-4
	Right Rear CRABI (P3) Chest Resultant	D3-4

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

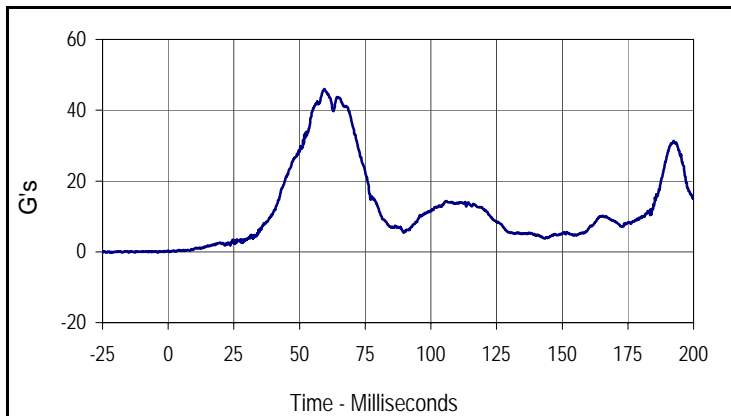
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 NHTSA No.: U70500



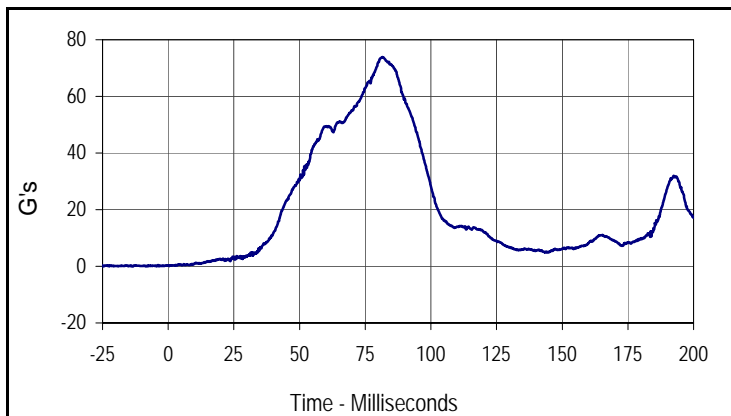
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CRABI Head X (P4)			
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142	FIL	1000	G's
Max	Time	Min	Time
73.0	81.6	-9.1	198.1



Curve Description			
CRABI Head Y (P4)			
CURNO	Type	SAE Class	Units
143	FIL	1000	G's
Max	Time	Min	Time
2.4	61.9	-7.4	87.0



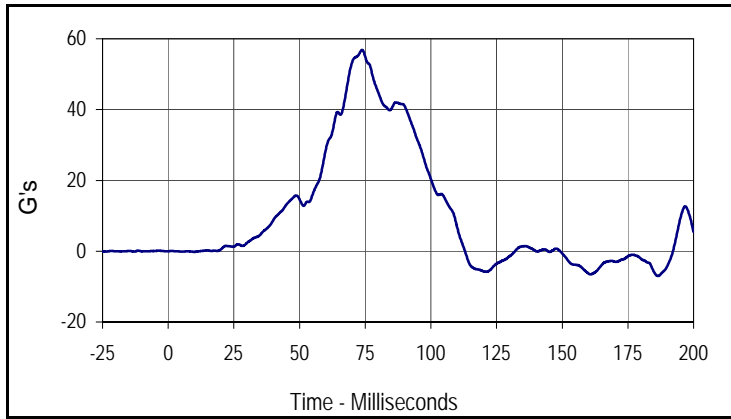
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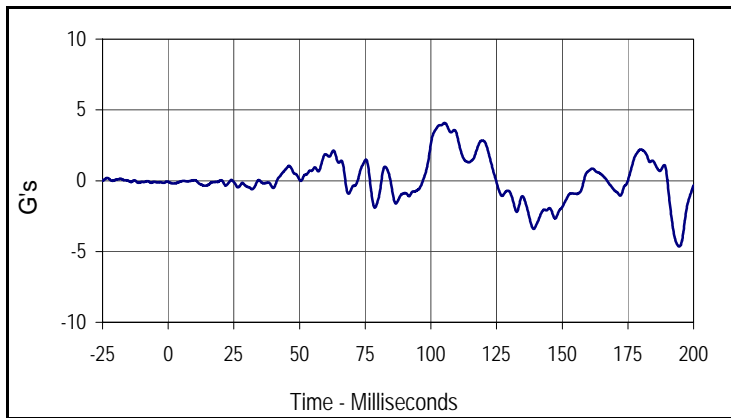
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CRABI Head Resultant (P4)			
CURNO	Type	SAE Class	Units
142	RES	1000	G's
Max	Time	Min	Time
73.9	81.6	0.1	0.4

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

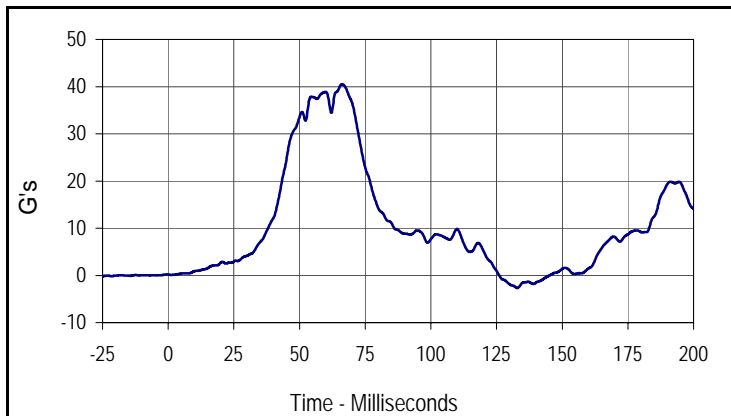
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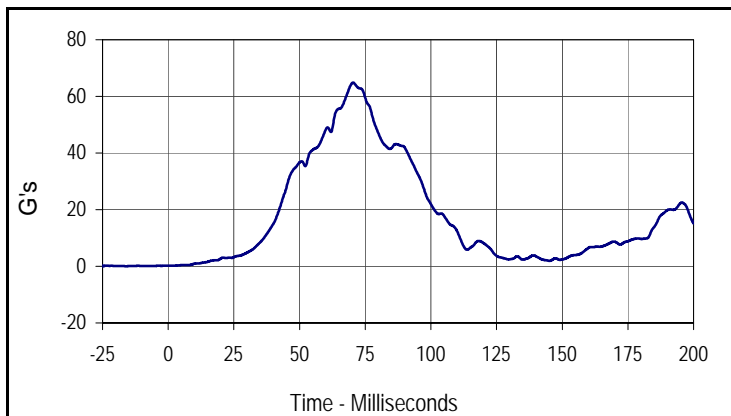
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CRABI Chest X (P4)			
CURNO	Type	SAE Class	Units
145	FIL	180	G's
Max	Time	Min	Time
56.9	73.8	-7.0	186.4



Curve Description			
CRABI Chest Y (P4)			
CURNO	Type	SAE Class	Units
146	FIL	180	G's
Max	Time	Min	Time
4.1	105.3	-4.6	194.6



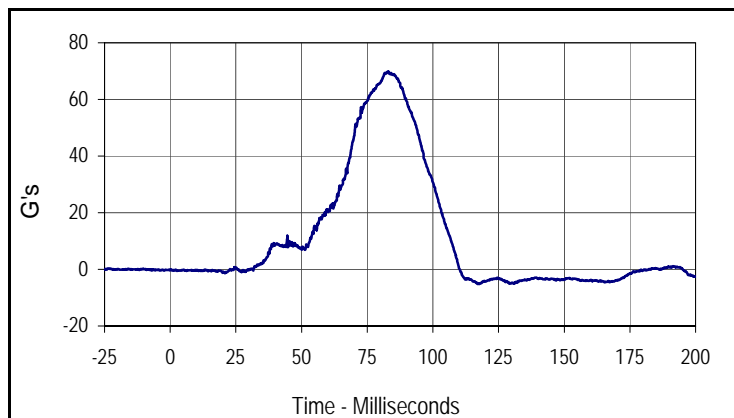
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Max	Time	Min	Time
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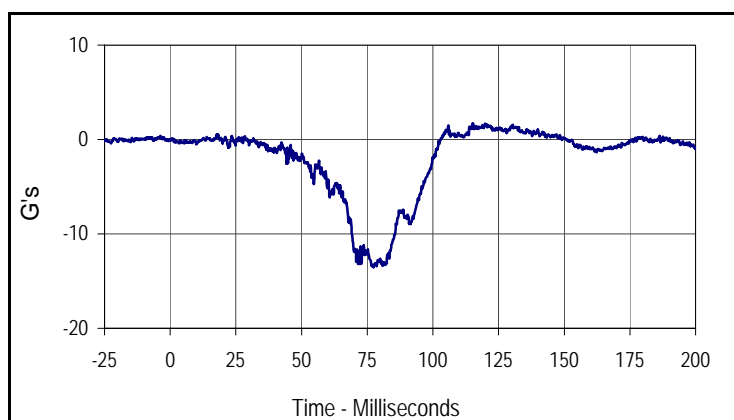
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CRABI Chest Resultant (P4)			
CURNO	Type	SAE Class	Units
145	RES	180	G's
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64.9	70.4	0.2	0.7

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
 Test Program: 2007 NHTSA 35mph NCAP

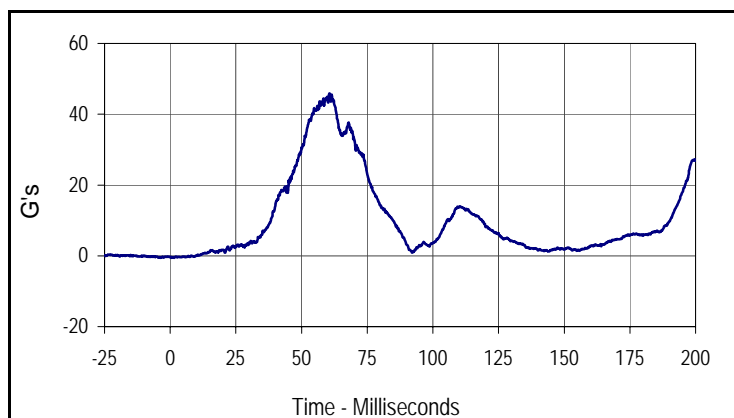
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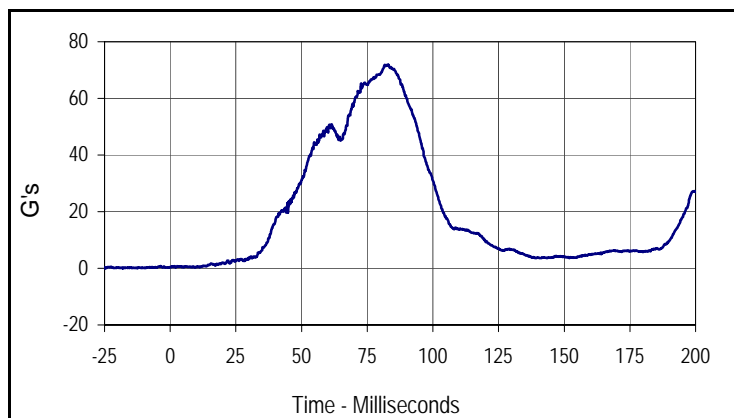
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CRABI Head X (P3)			
CURNO	Type	SAE Class	Units
163	FIL	1000	G's
Max	Time	Min	Time
69.8	83.0	-5.3	117.6



Curve Description			
CRABI Head Y (P3)			
CURNO	Type	SAE Class	Units
164	FIL	1000	G's
Max	Time	Min	Time
1.7	115.2	-13.5	77.4



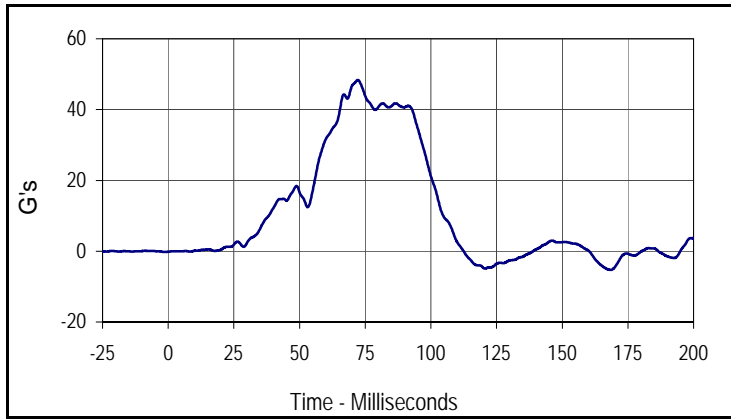
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CRABI Head Z (P3)			
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165	FIL	1000	G's
Max	Time	Min	Time
45.9	60.6	-0.5	1.5



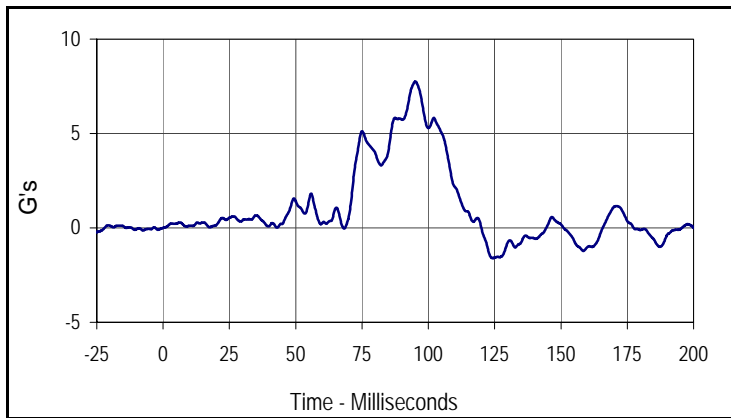
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CRABI Head Resultant (P3)			
CURNO	Type	SAE Class	Units
163	RES	1000	G's
Max	Time	Min	Time
71.9	82.6	0.3	9.6

Test Vehicle: 2007 Hyundai Veracruz 5-Door MPV
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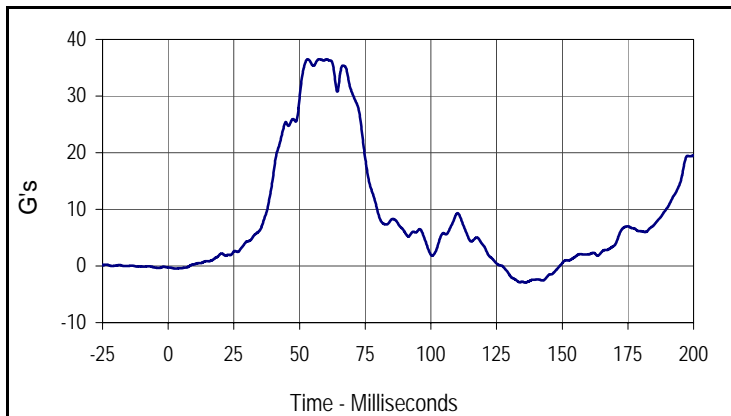
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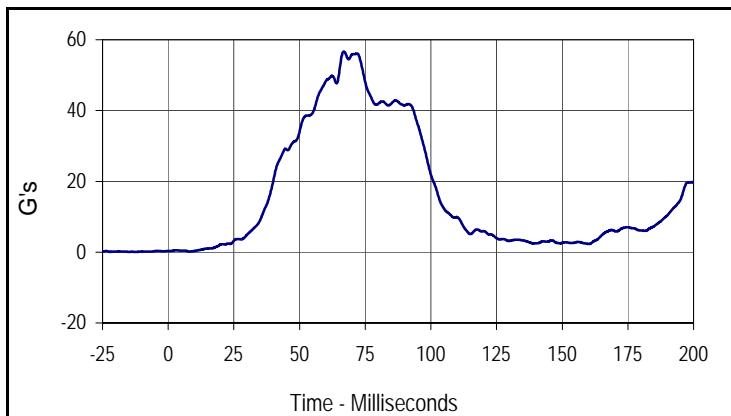
Curve Description			
CRABI Chest X (P3)			
CURNO	Type	SAE Class	Units
166	FIL	180	G's
Max	Time	Min	Time
48.4	72.1	-5.3	168.4



Curve Description			
CRABI Chest Y (P3)			
CURNO	Type	SAE Class	Units
167	FIL	180	G's
Max	Time	Min	Time
7.8	95.1	-1.6	124.3



Curve Description			
CRABI Chest Z (P3)			
CURNO	Type	SAE Class	Units
168	FIL	180	G's
Max	Time	Min	Time
36.5	60.3	-2.9	135.9



Curve Description			
CRABI Chest Resultant (P3)			
CURNO	Type	SAE Class	Units
166	RES	180	G's
Max	Time	Min	Time
56.7	66.8	0.2	8.1

SECTION D-4

CRABI CALIBRATION INFORMATION

Test Program: CRABI 12 Month Old Frontal Head Drop Test

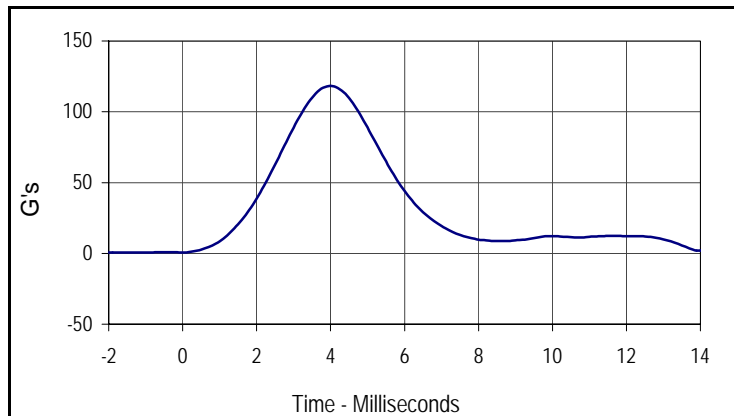
Test Date: 2/26/07

ATD Serial No.: 017

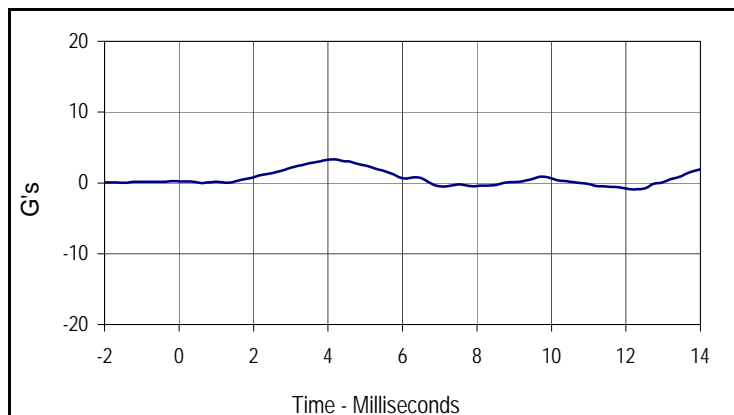
Test I.D.: HD017A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	100.0 to 120.0	118.3	Pass
Peak Lateral Acceleration	G's	≤15.0	3.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
118.3	4.0	0.5	0.0



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.3	4.1	0.0	0.6

Test Program: CRABI 12 Month Old Rear Head Drop Test

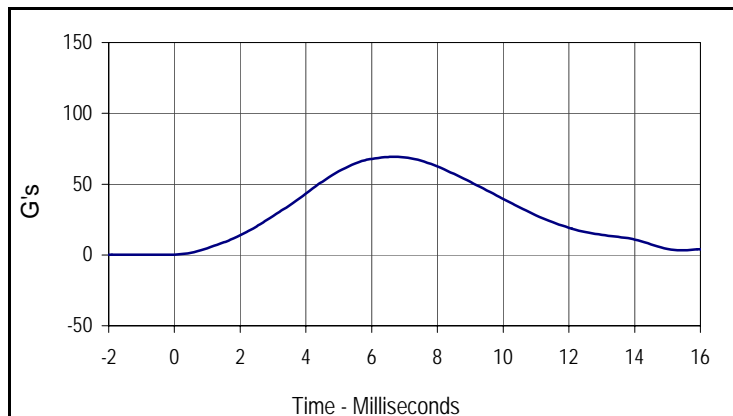
Test Date: 2/28/07

ATD Serial No.: 017

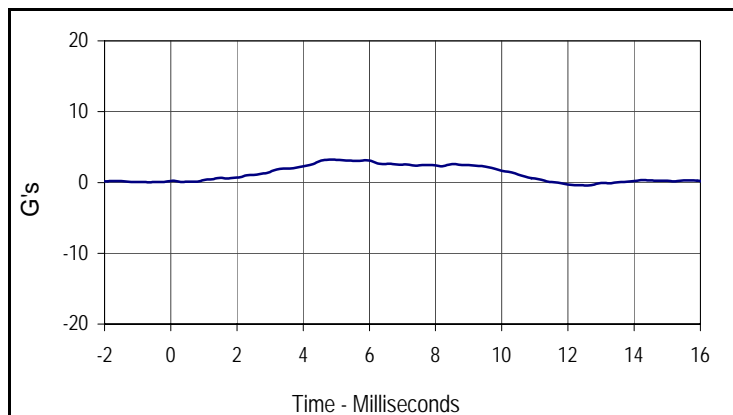
Test I.D.: HDR17A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	100.0 to 120.0	67.8	Pass
Peak Lateral Acceleration	G's	≤15.0	3.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
67.8	6.0	0.1	-1.1



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.2	4.8	0.0	-0.6

Test Program: 12 Month Old CRABI Thorax Impact Test

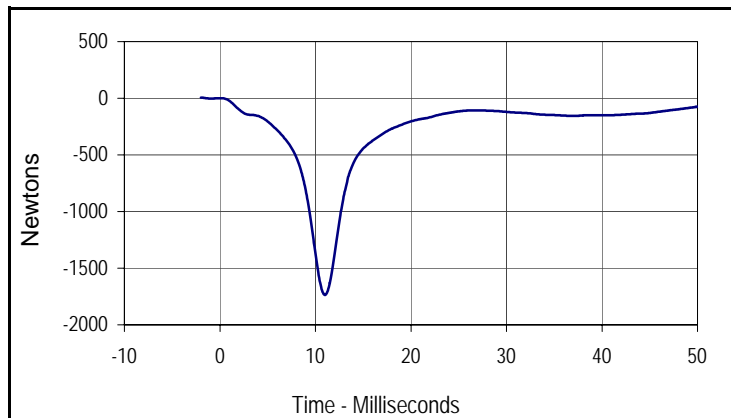
Test Date: 2/27/07

ATD Serial No.: 017

Test I.D.: TH02K



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	4.90 to 5.10	4.90	Pass
Peak Probe Force	Newtons	-1514 to -1796	-1736	Pass
Overall Test Results				Pass



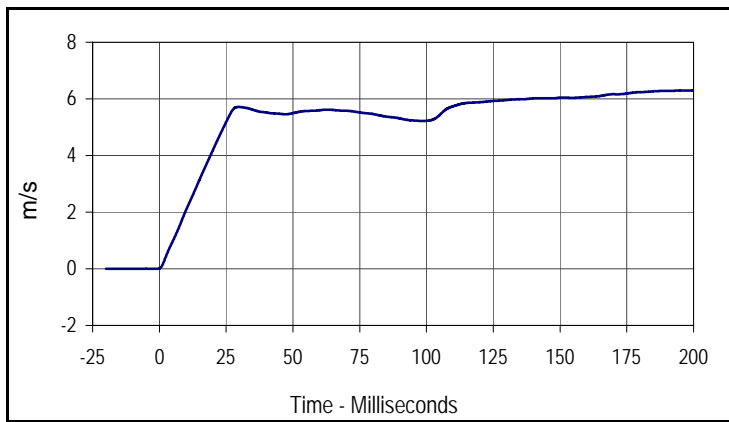
Curve Description			
Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
7.0	-2.0	-1736.1	11.0

Test Program: CRABI 12-Month Old Neck Flexion Test
 ATD Serial No.: 017

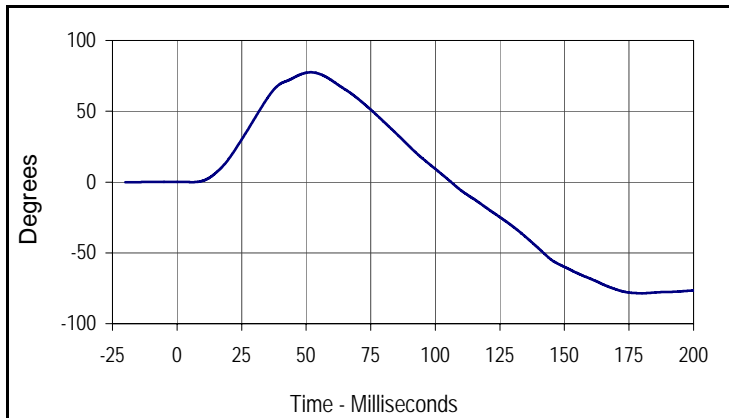
Test Date: 2/28/07
 Test I.D.: NF08A



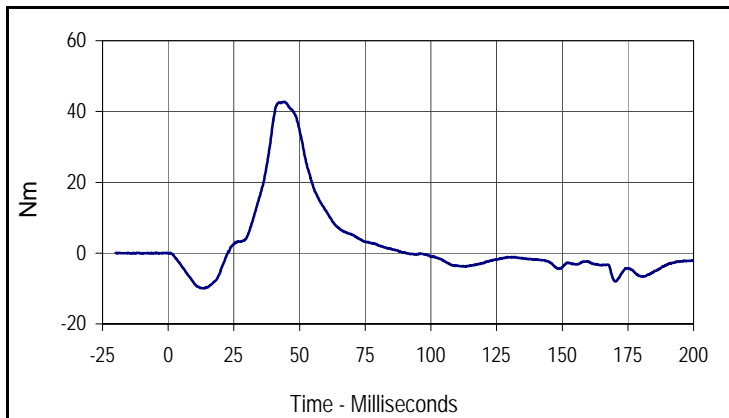
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.10 to 5.30	5.18	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.6 to 2.3	2.1	Pass
	20 Msec.	m/s	3.4 to 4.2	4.2	Pass
	25 Msec.	m/s	4.3 to 5.2	5.2	Pass
"D" Plane Rotation	Max	Degrees	75.0 to 86.0	77.5	Pass
Peak Moment in Rotation	Max	Nm	36.0 to 45.0	40.7	Pass
Positive Moment Decay, Time To 5 Nm	Msec.	60.0 to 80.0	70.7	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.3	199.3	0.0	-0.7



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
77.5	51.8	-78.5	179.8



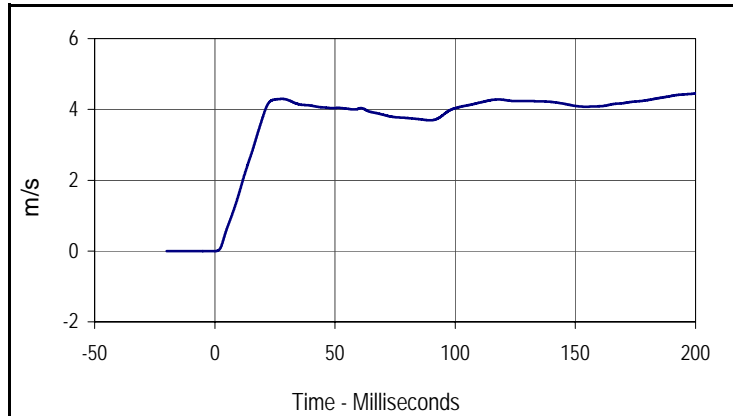
Curve Description			
Upper Neck Force Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
42.8	44.3	-9.9	13.5

Test Program: CRABI 12-Month Old Neck Extension Test
 ATD Serial No.: 017

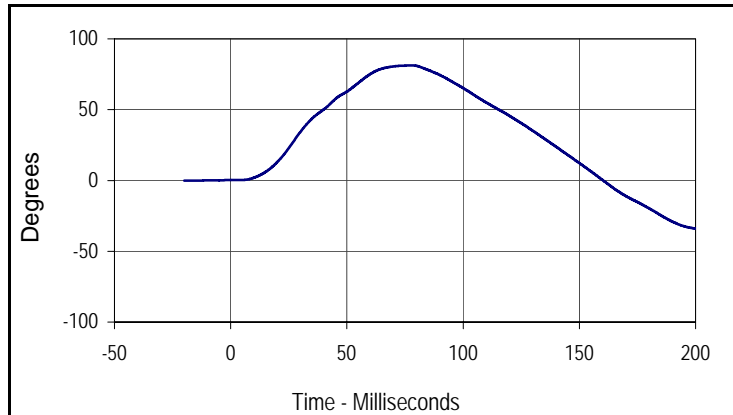
Test Date: 2/28/07
 Test I.D.: NE02C



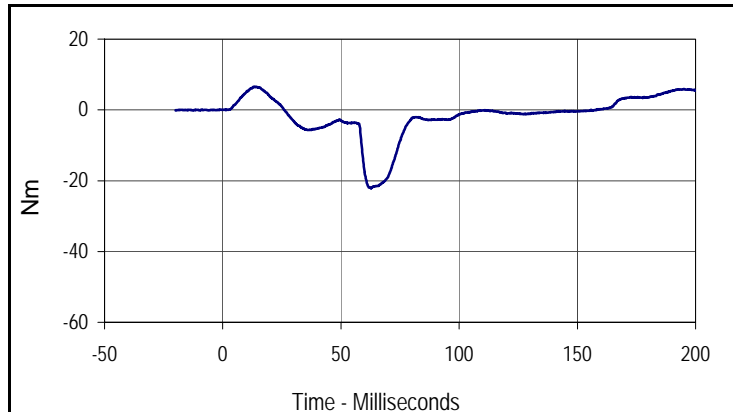
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	2.4 to 2.6	2.45	Pass	
Pendulum Deceleration	6 Msec.	m/s	0.8 to 1.2	0.8	Pass
	10 Msec.	m/s	1.5 to 2.1	1.6	Pass
	14 Msec.	m/s	2.2 to 2.9	2.5	Pass
"D" Plane Rotation	Max	Degrees	80.0 to 92.0	81.3	Pass
Peak Moment in Rotation	Max	Nm	-12 to -23	-20.4	Pass
Positive Moment Decay, Time To -5 Nm	Msec.		76.0 to 90.0	77.3	Pass
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
4.4	200.0	0.0	0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
81.3	77.8	-34.0	200.0



Curve Description			
Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
6.5	13.2	-22.1	62.8

Test Program: CRABI 12 Month Old Frontal Head Drop Test

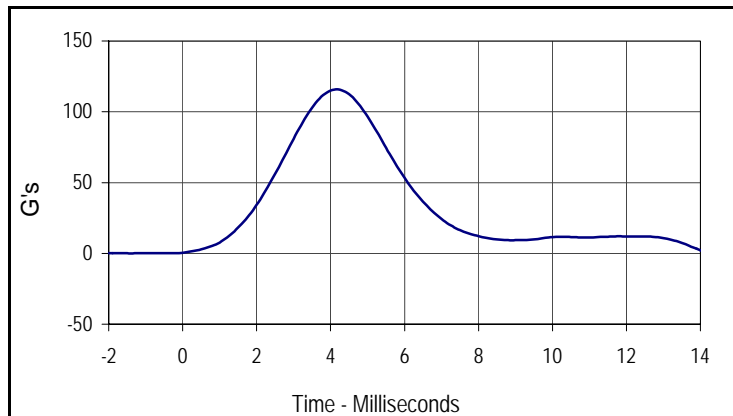
Test Date: 2/26/07

ATD Serial No.: 022

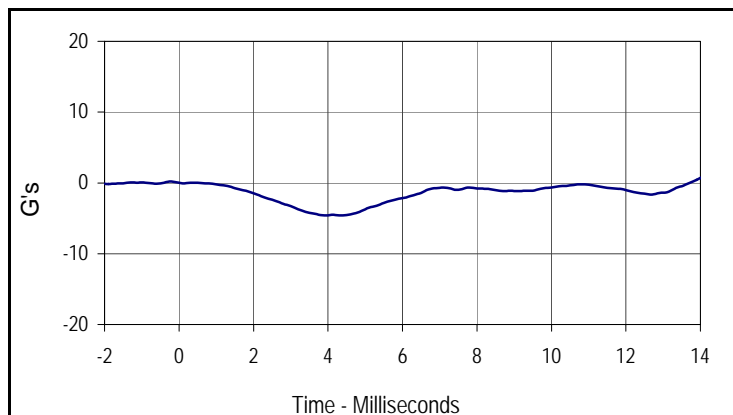
Test I.D.: HD022H



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	100.0 to 120.0	115.8	Pass
Peak Lateral Acceleration	G's	≤15.0	4.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
115.8	4.2	0.0	-1.4



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	-0.2	-4.6	3.9

Test Program: CRABI 12 Month Old Rear Head Drop Test

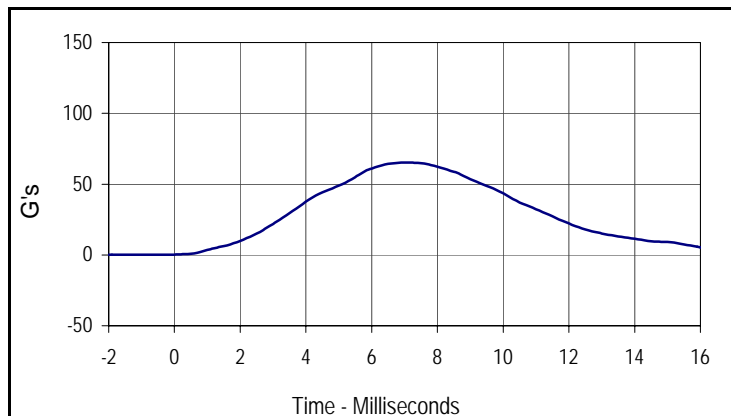
Test Date: 2/26/07

ATD Serial No.: 022

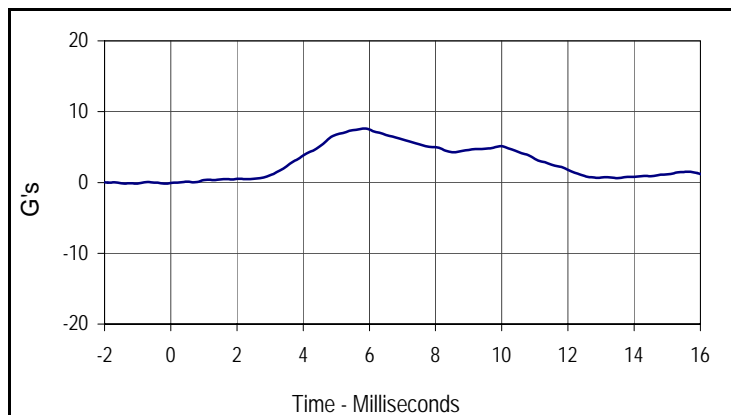
Test I.D.: HDR22S



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	55.0 to 71.0	61.1	Pass
Peak Lateral Acceleration	G's	≤15.0	7.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
61.1	6.0	0.1	-0.9



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
7.6	5.8	-0.2	-1.4

Test Program: 12 Month Old CRABI Thorax Impact Test

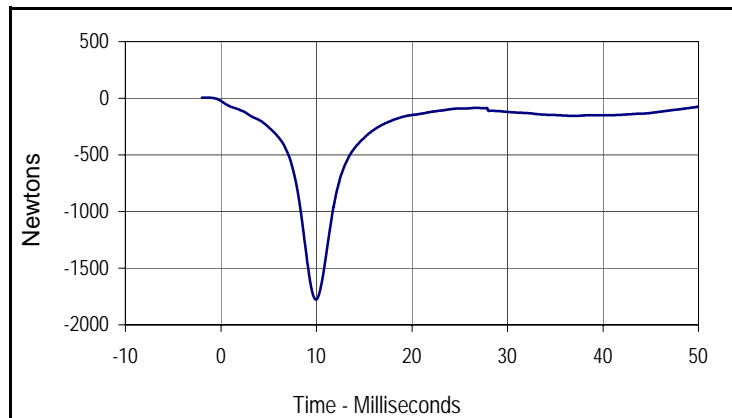
Test Date: 2/27/07

ATD Serial No.: 022

Test I.D.: TH02X



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	4.90 to 5.10	4.90	Pass
Peak Probe Force	Newtons	-1514 to -1796	-1776	Pass
Overall Test Results				Pass



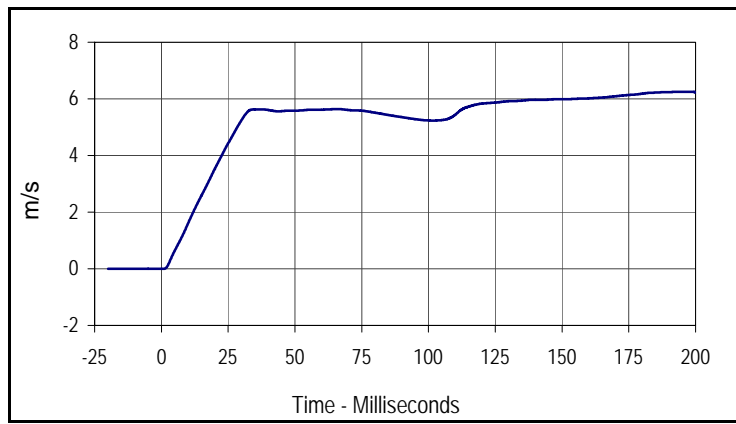
Curve Description			
Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
6.1	-1.6	-1776.2	10.0

Test Program: CRABI 12-Month Old Neck Flexion Test
 ATD Serial No.: 022

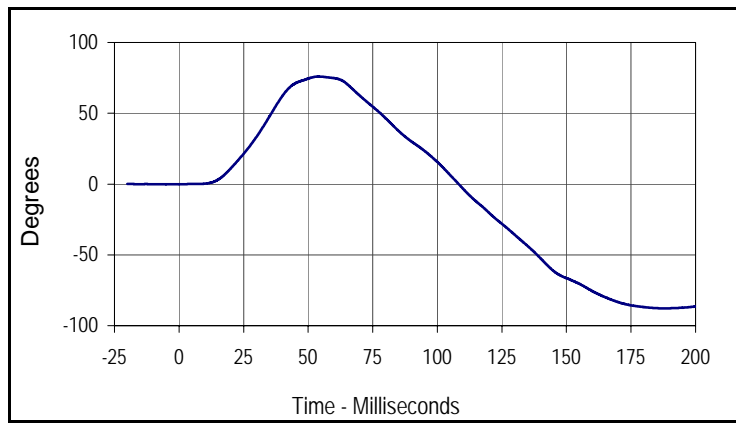
Test Date: 2/28/07
 Test I.D.: NF02P



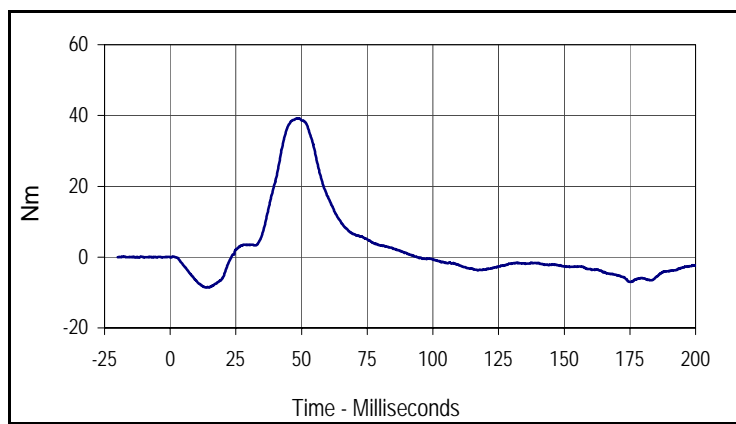
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.10 to 5.30	5.29	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.6 to 2.3	1.6	Pass
	20 Msec.	m/s	3.4 to 4.2	3.5	Pass
	25 Msec.	m/s	4.3 to 5.2	4.4	Pass
"D" Plane Rotation	Max	Degrees	75.0 to 86.0	75.9	Pass
Peak Moment in Rotation	Max	Nm	36.0 to 45.0	38.4	Pass
Positive Moment Decay, Time To 5 Nm	Msec.	60.0 to 80.0	75.1	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.2	197.7	0.0	0.6



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
75.9	54.0	-87.8	188.0



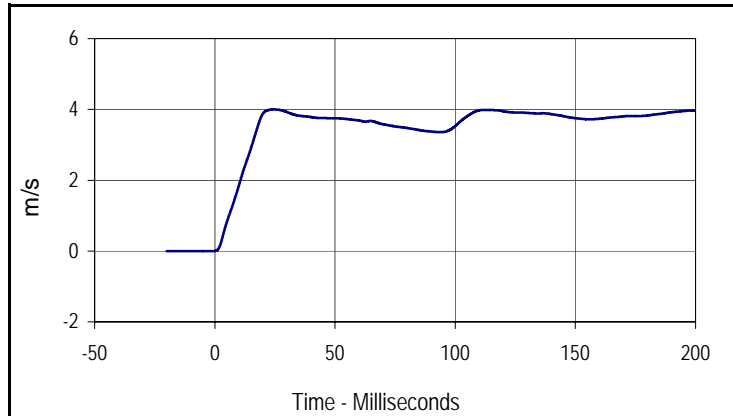
Curve Description			
Upper Neck Force Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
39.2	48.7	-8.6	13.7

Test Program: CRABI 12-Month Old Neck Extension Test
 ATD Serial No.: 022

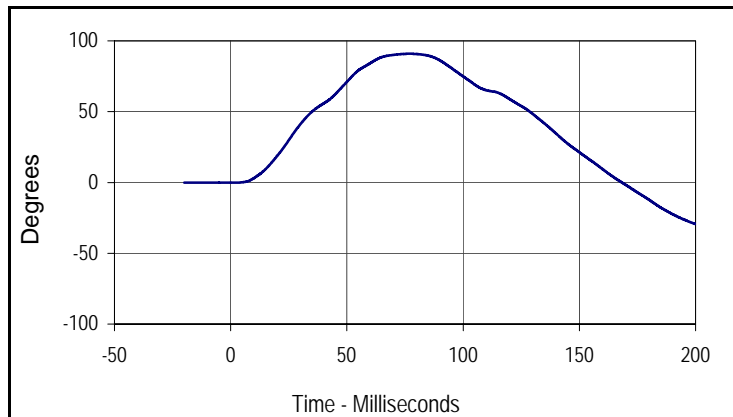
Test Date: 2/28/07
 Test I.D.: NE02G



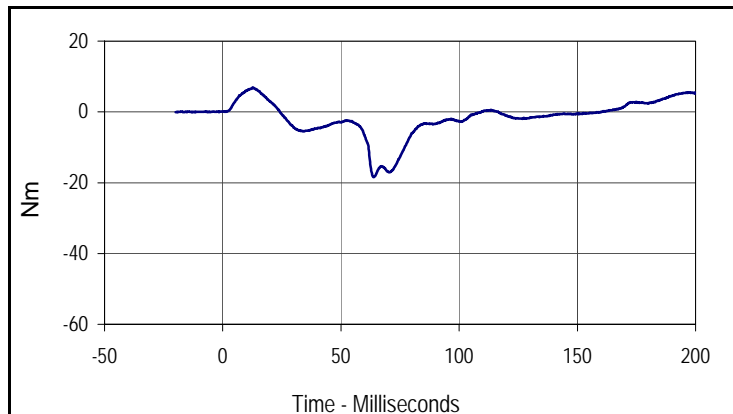
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	2.4 to 2.6	2.43	Pass	
Pendulum Deceleration	6 Msec.	m/s	0.8 to 1.2	1.0	Pass
	10 Msec.	m/s	1.5 to 2.1	1.8	Pass
	14 Msec.	m/s	2.2 to 2.9	2.7	Pass
"D" Plane Rotation	Max	Degrees	80.0 to 92.0	90.9	Pass
Peak Moment in Rotation	Max	Nm	-12 to -23	-18.4	Pass
Positive Moment Decay, Time To -5 Nm	Msec.		76.0 to 90.0	80.1	Pass
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
4.0	24.6	0.0	-0.7



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
90.9	77.0	-29.3	200.0



Curve Description			
Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
6.8	12.8	-18.4	63.8