

REPORT NUMBER TR-P26001-12-NC

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

**GENERAL MOTORS CORPORATION
2006 CHEVROLET HHR LT
5-DOOR MPV**

NHTSA NUMBER: M60108

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



FEBRUARY 14, 2006

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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400 SEVENTH STREET, SW, ROOM 5311
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Prepared by: _____
Mr. Elie W. Helou, Project Engineer
KARCO Engineering, LLC

Date: February 14, 2006

Reviewed by: _____
Mr. Michael L. Dunlap, T&E Manager
KARCO Engineering, LLC

Date: February 14, 2006

Approved by: _____
Mr. Frank D. Richardson, Program Manager
KARCO Engineering, LLC

Date: February 14, 2006

FINAL REPORT ACCEPTED BY:

Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

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16. Abstract A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2006 Chevrolet HHR LT 5-Door MPV at Karco Engineering, LLC on 2/14/06. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 56.20 km/h. The ambient temperature at the barrier face at the time of impact is 23.0 degrees Celcius. The vehicle's maximum post-test static crush is 667 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	251.3	353.8
Max. Chest Accel. (3 msec Clip)		G's	60	41.3	36.9
Left Femur Force		Newtons	10008	-2980.2	-4619.3
Right Femur Force		Newtons	10008	-3540.2	-2144.6
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SECTION 1
PURPOSE AND SUMMARY OF TEST M60108

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. DTNH22-01-D-02005. 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 2006 Chevrolet HHR LT 5-Door MPV at a velocity of 56.20 km/h. The test was performed at Karco Engineering, LLC on February 14, 2006.

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 also placed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. Also, shoulder belt spool-off was measured for the driver and passenger dummy. The driver (position 1) ATD (Serial No. 34) and the right-front passenger (position 2) ATD (Serial No. 35) were calibrated two tests prior to this test.

One hundred and thirty two (132) 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 and Appendix C contains the Dummy Calibration data.

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 667 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, chest and abdomen 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	251.3	41.3	-30.7	-2980.2	-3540.2
Passenger	353.8	36.9	-30.2	-4619.3	-2144.6

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: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06

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: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.20
Test Weight	kg	1646
Impact Angle	degrees	0
Average Rebound	mm	1610
Maximum Static Crush	mm	667

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. 34	50% Male Hybrid III No. 35
Head Contact	Airbag	Airbag
Chest Contact	Airbag	Airbag
Abdomen Contact	None	Airbag
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

MOVIE COVERAGE

Cameras	Standard	Additional
High Speed	14	
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: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M60108
Make	Chevrolet
Model	HHR LT
Body Style	5-Door MPV
Vin No.	3GNDA23D66S571025
Color	Gold
Delivery Date	2/8/2006
Odometer (Miles)	116.0
Dealer	Crest
Transmission	5-Speed Automatic
Final Drive	Front
Type/No. Cyl.	Inline 4
Engine Disp. (L)	2.2
Engine Placement	Transverse
Roof Rack	No
Sunroof/T-Top	No
Tinted Glass	Yes
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	No

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Airbag	No
Driver Head Airbag	No
Driver Curtain Airbag	Yes
Pass. Airbag	Yes
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	No
Power Windows	Yes
Power Seats	No
Other	None

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors Corporation
Date of Manufacture	Nov-05

GVWR (kg)	1923
GAWR Front (kg)	980
GAWR Rear (kg)	979

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

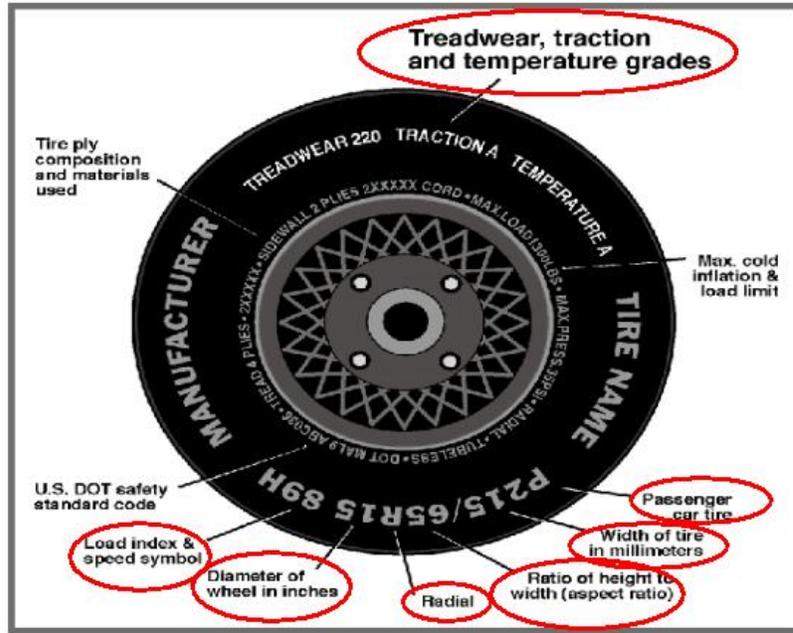
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number of Occupants	3	2		5
Capacity Weight (VCW) (kg)				406
Cargo Weight (RCLW) (kg)				66

DATA SHEET NO. 2...(CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

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)	300	300
Cold Pressure (kpa)	210	210
Recommended Tire Size	P215/55R16	P215/55R16
Tire Size on Vehicle	P215/55R16	P215/55R16
Tire Manufacturer	Firestone	Firestone
Treadwear	500	500
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester + 2 Steel	1 Polyester + 2 Steel
Load Index/Speed Symbol	91S	91S
Tire Material	Polyester + Steel	Polyester + Steel
DOT Safety Code Right	V6B2 AA7 4305	V6B2 AA7 4305
DOT Safety Code Left	V6B2 AA7 4305	V6B2 AA7 4305

DATA SHEET NO. 2...(CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	406	308	714	445	366	810
Right	kg	422	298	720	459	376	836
Ratio	%	57.7	42.3	100	54.9	45.1	100
Totals	kg	828	606	1434	904	742	1646

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1434
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	66
Calculated Vehicle Target Wt. (TVTW)	kg	1652

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	704	695	730	727	1117
As Tested	mm	685	685	700	700	1191

Vehicle Wheel Base (mm) 2640
 Weight of Ballast Secured in cargo area (kg) 9
 Weight of Items Removed (kg) 37
 Vehicle Components Removed Jack and jack tools, floor mats

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

FUEL SYSTEM DATA

Fuel System Capacity From Owners Manual (L) 61.32
 Actual Test Volume with entire fuel System Filled (L) 57.00
 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: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No.1 Velocity (Primary)	km/h	55.51 to 57.12	56.20
Trap No.2 Velocity (Redun.)	km/h	55.51 to 57.12	56.35

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4306	3878	-428
Center	mm	4461	3794	-667
Right Side	mm	4306	3831	-475

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1630
Center	mm	1560
Right Side	mm	1640
Average	mm	1610

**DATA SHEET NO. 4
TEST VEHICLE INFORMATION**

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

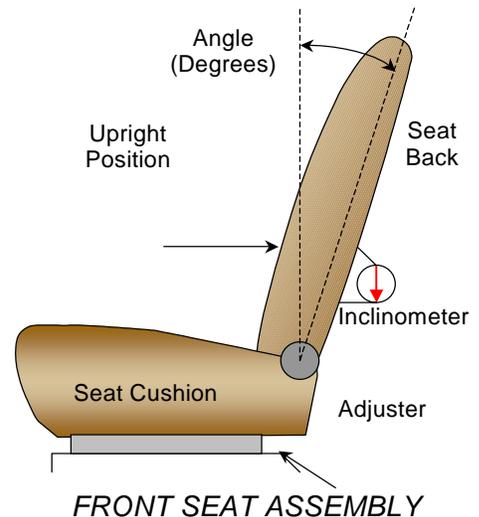
NHTSA No.: M60108
 Test Date: 2/14/06

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 headrest of the seat back using a digital inclinometer.

SEAT BACK ANGLES

	Deg.
Driver w/seated Dummy	6.0 @ headrest
Passenger w/seated Dummy	6.0 @ headrest

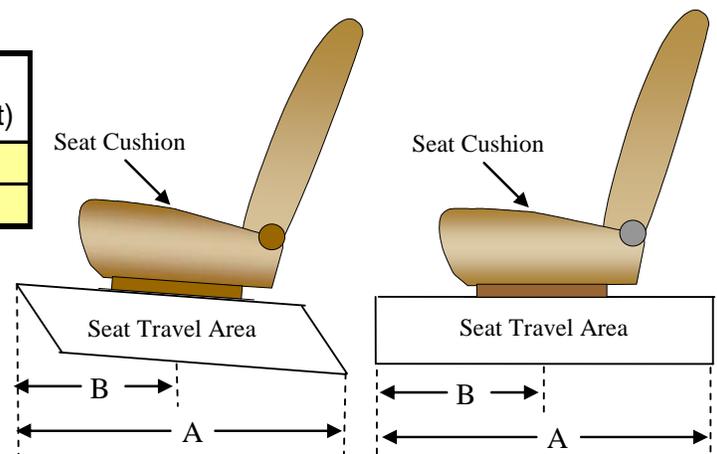


SEAT FORE/AFT POSITIONS

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 (Detent)	Placed in Position (Detent)
Driver Seat	18	6
Passenger Seat	18	6



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	3
Passenger Seat	5	3

DATA SHEET NO. 4...(CONTINUED)
TEST VEHICLE INFORMATION

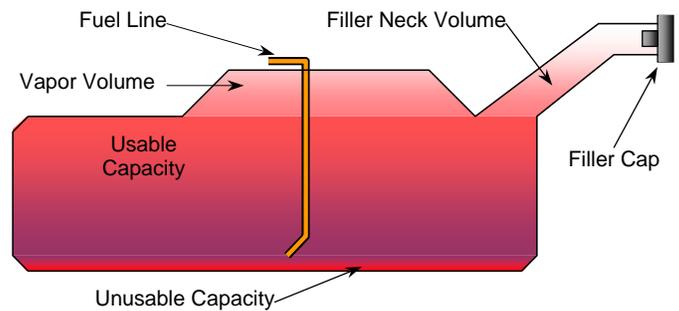
Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	61.32
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	56.40 to 57.61
Actual Amount of Solvent used	57.00

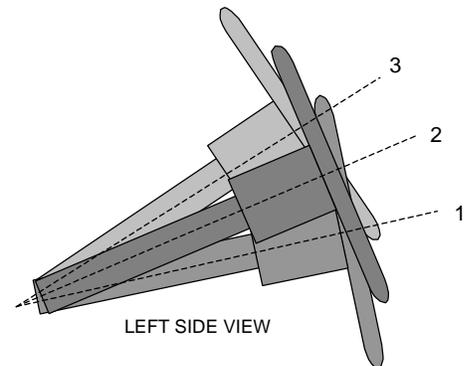
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the right rear fender. The standard fuel tank occupies 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	20.5	
Geometric center position No. 2	22.6	
Uppermost position No. 3	24.8	

DATA SHEET NO. 5
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
Test Date: 2/14/06

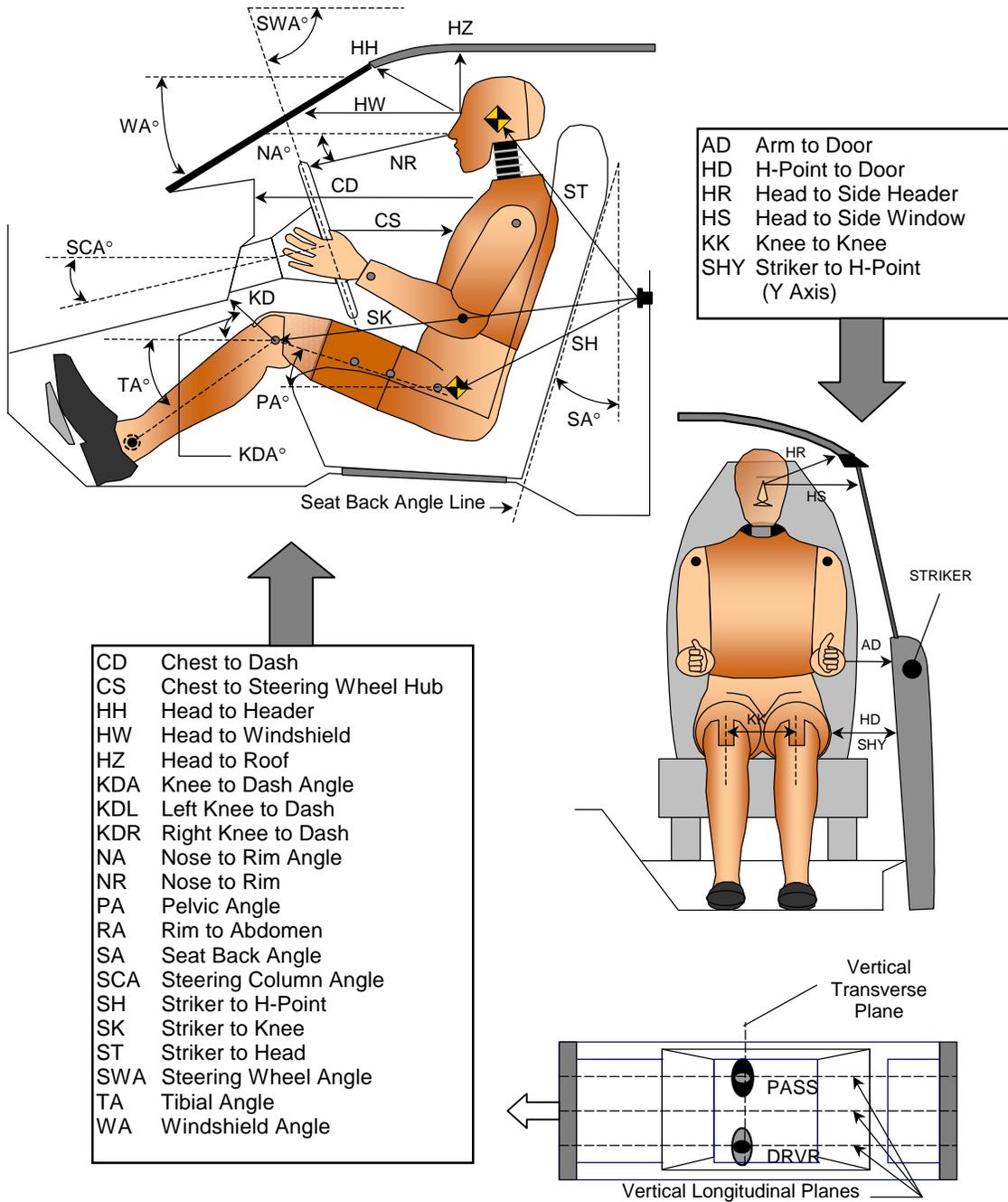
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (deg)	Length (mm)	Angle (deg)
WA	Windshield Angle		38.0		
SWA	Steering Wheel Angle		67.4		
SCA	Steering Column Angle		22.6		
SA	Seat Back Angle		6.0 @ headrest		6.0 @ headrest
HZ	Head to Roof (Z)	223	90.0	200	90.0
HH	Head to Header	500		425	
HW	Head to Windshield	683		640	
HR	Head to Side Header (Y)	315		300	
NR	Nose to Rim	402	8.0		
CD	Chest to Dash	605		550	
CS	Chest to Steering Hub	305			
RA	Rim to Abdomen	200			
KDL	Left Knee to Dash	185	7.5	160	
KDR	Right Knee to Dash	130		200	11.1
PA	Pelvic Angle		23.1		24.2
TA	Tibia Angle		63.7		55.0
KK	Knee to Knee (Y)	282		260	
SK	Striker to Knee	559	0.3	585	1.5
ST	Striker to Head	550	80.4	575	78.0
SH	Striker to H-Point	234	29.0	195	33.0
SHY	Striker to H-Point (Y)	222		230	
HS	Head to Side Window	410		420	
HD	H-Point to Door (Y)	100		80	
AD	Arm to Door (Y)	110		100	

DATA SHEET NO. 5...(CONTINUED)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

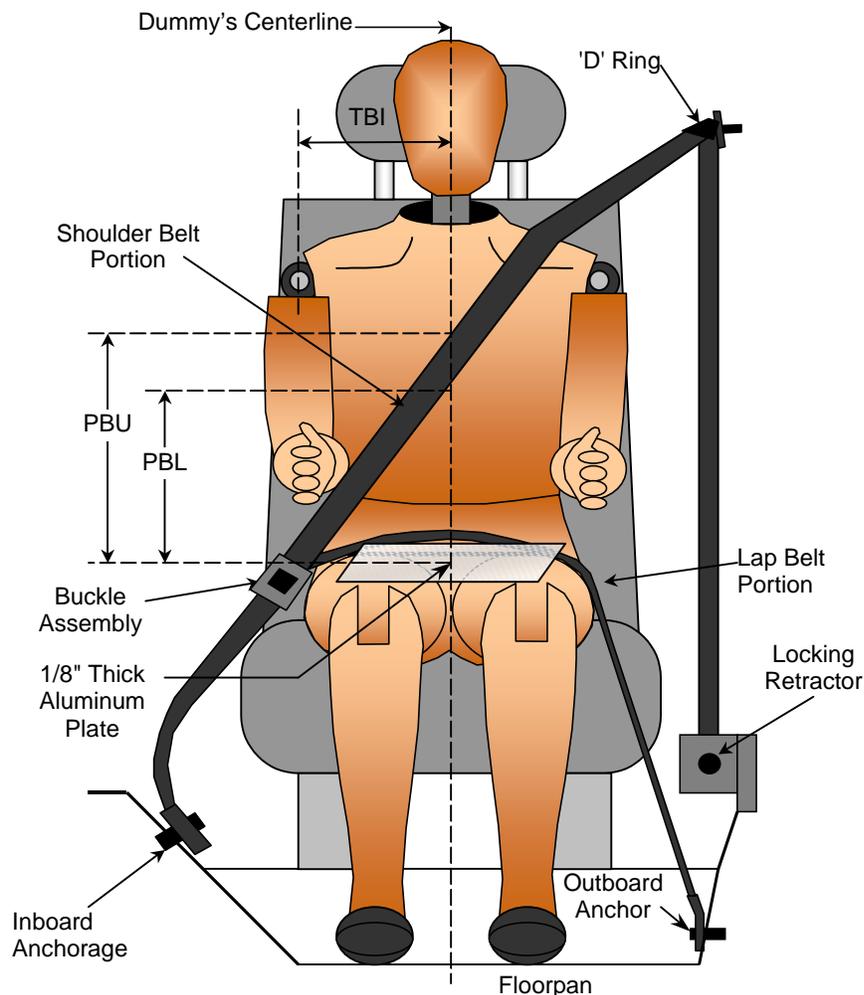
DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06



SEAT BELT POSITIONING MEASUREMENTS

Measured Parameter	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	220	220
PBU - Top Surface of reference to belt upper edge	mm	305	275
PBL - Top Surface of reference to belt lower edge	mm	200	205
Lap Belt Tension	Newtons	10	10
Shoulder Belt Tension	N/A	Retractor	Retractor

**DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATION**

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

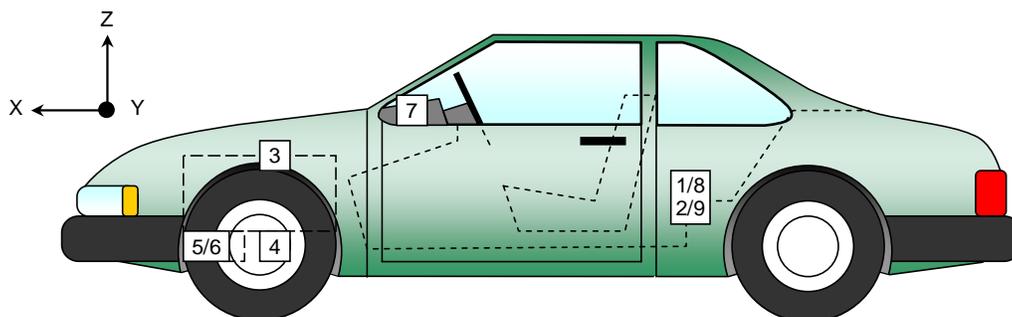
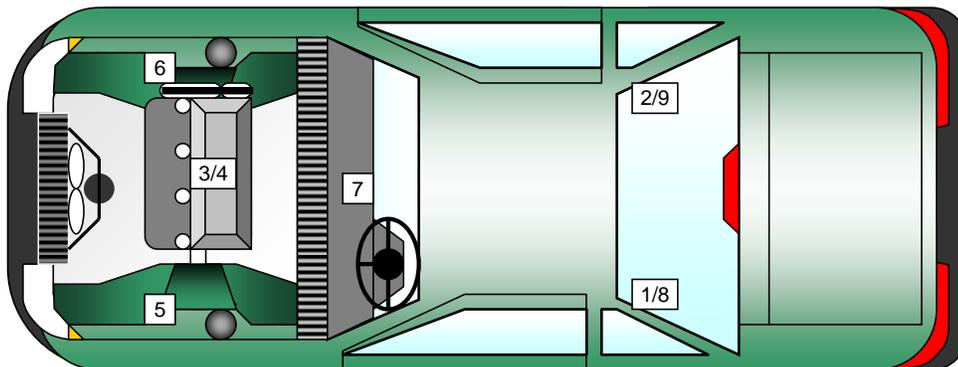
Test Date: 2/14/06

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member	1709	-690	359
2	Right Rear X-Member	1709	690	359
3	Engine Top			
4	Engine Bottom	3750	240	166
5	Left Brake Caliper	3676	-656	329
6	Right Brake Caliper	3676	656	329
7	Instrument Panel			
8	Left Rear X-Member (Z-Axis)	1709	-690	359
9	Right Rear X-Member (Z-Axis)	1709	690	359

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

1.) Not installed



**DATA SHEET NO. 8
SEAT BELT ASSESSMENT TEST DATA**

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
Retractor Reel to "D" ring	mm	680	680
Shoulder Belt length as measured on ATD	mm	780	800
Lap Belt length as measured on ATD	mm	660	700
Remainder of belt on reel	mm	820	800
Total belt length for continuous webbing systems	mm	2940	2980

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	100	100
As determined electronically	mm	150	228

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: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

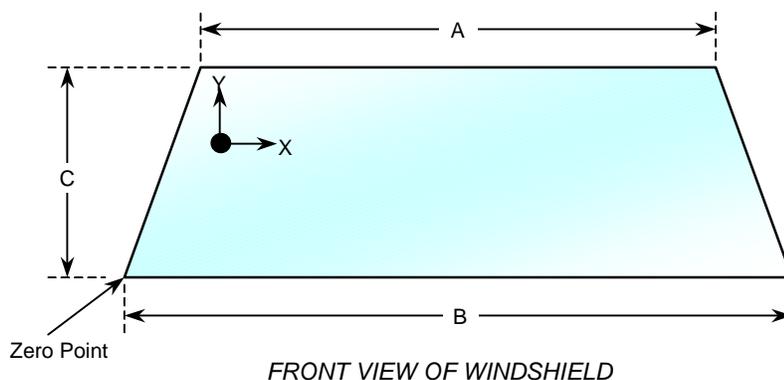
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

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: 21.1 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test(mm)	Post-Test(mm)	% of Retention
Left Side	1805	1805	100
Right Side	1805	1805	100
Total	3610	3610	100



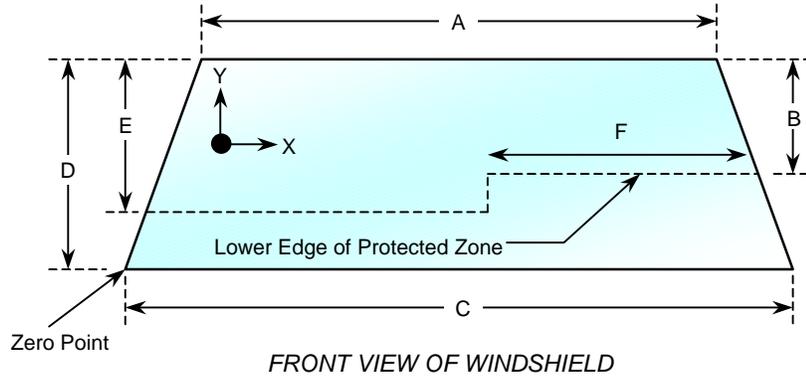
WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1195	0
B	mm	1445	15
C-Left	mm	485	20
C-Right	mm	485	20

DATA SHEET NO. 10
WINDSHIELD ZONE INTRUSION FMVSS 219 DATA (PARTIAL)

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06



**WINDSHIELD AND
 PROTECTED ZONE**

Item	Units	Value
A	mm	1195
B	mm	337
C	mm	1445
D	mm	485
E	mm	335
F	mm	420

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 windshield was penetrated by a vehicle component.

X	Y

DATA SHEET NO. 11
FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV NHTSA No.: M60108
Test Program: 2006 NHTSA 35mph NCAP Test Date: 2/14/06

Test Time: 11:44 AM Temperature: 23.0 Deg. C.

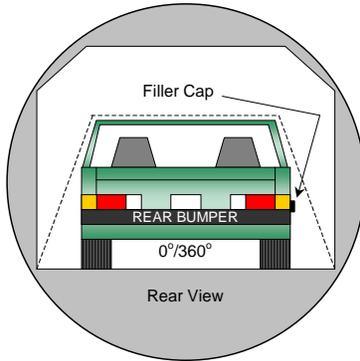
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- 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

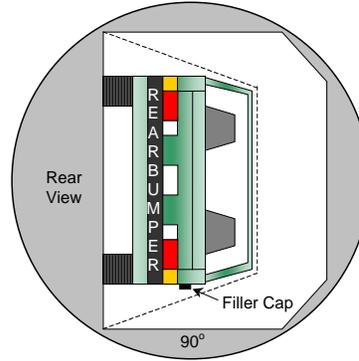
DATA SHEET NO. 12
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

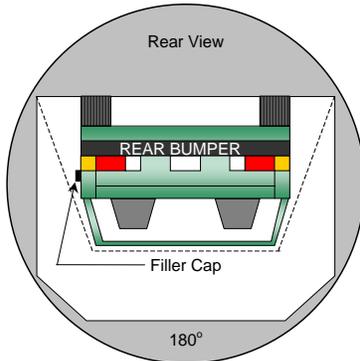
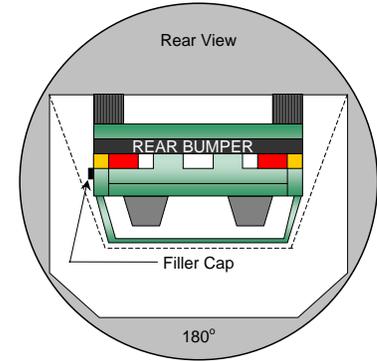
NHTSA No.: M60108
 Test Date: 2/14/06



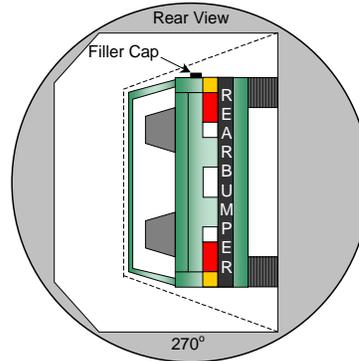
0° to 90°



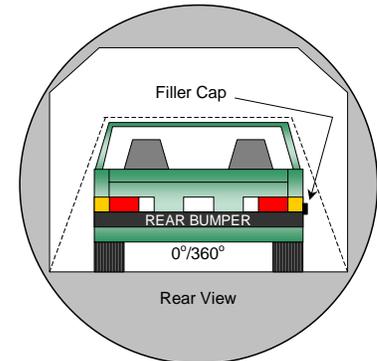
90° to 180°



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: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	84	300	384
90° to 180°	81	300	381
180° to 270°	79	300	379
270° to 360°	80	300	380

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: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length of vehicle at centerline	mm	4461	3794	-667
2	RSOV to front of engine	mm	3971	3680	-291
3	RSOV to firewall centerline	mm	3456	3427	-29
4	RSOV to leading edge of right door	mm	3096	3100	4
5	RSOV to leading edge of left door	mm	3103	3088	-15
6	RSOV to lower leading edge of right door	mm	3066	3070	4
7	RSOV to lower leading edge of left door	mm	3064	3060	-4
8	RSOV to upper trailing edge of right door	mm	2070	2075	5
9	RSOV to upper trailing edge of left door	mm	2082	2062	-20
10	RSOV to lower trailing edge of right door	mm	2060	2064	4
11	RSOV to lower trailing edge of left door	mm	2059	2056	-3
12	RSOV to bottom of right 'A' pillar	mm	3018	3020	2
13	RSOV to bottom of left 'A' pillar	mm	3016	3006	-10
14	RSOV to firewall on right side	mm	3436	3431	-5
15	RSOV to firewall on left side	mm	3431	3411	-20
16	RSOV to steering column	mm	2665	2719	54
17	Center of steering column to left 'A' pillar	mm	365	315	-50
18	Center of steering column to headlining	mm	415	435	20
19	RSOV to right side of front bumper	mm	4306	3831	-475
20	RSOV to left side of front bumper	mm	4306	3878	-428
21	Length of engine block	mm	633	633	0
RD	RSOV to right side of dash panel	mm	2869	2874	5
CD	RSOV to center of dash panel	mm	2810	2830	20
LD	RSOV to left side of dash panel	mm	2880	2870	-10

DATA SHEET NO. 13...(CONTINUED)
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV

NHTSA No.: M60108

Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06

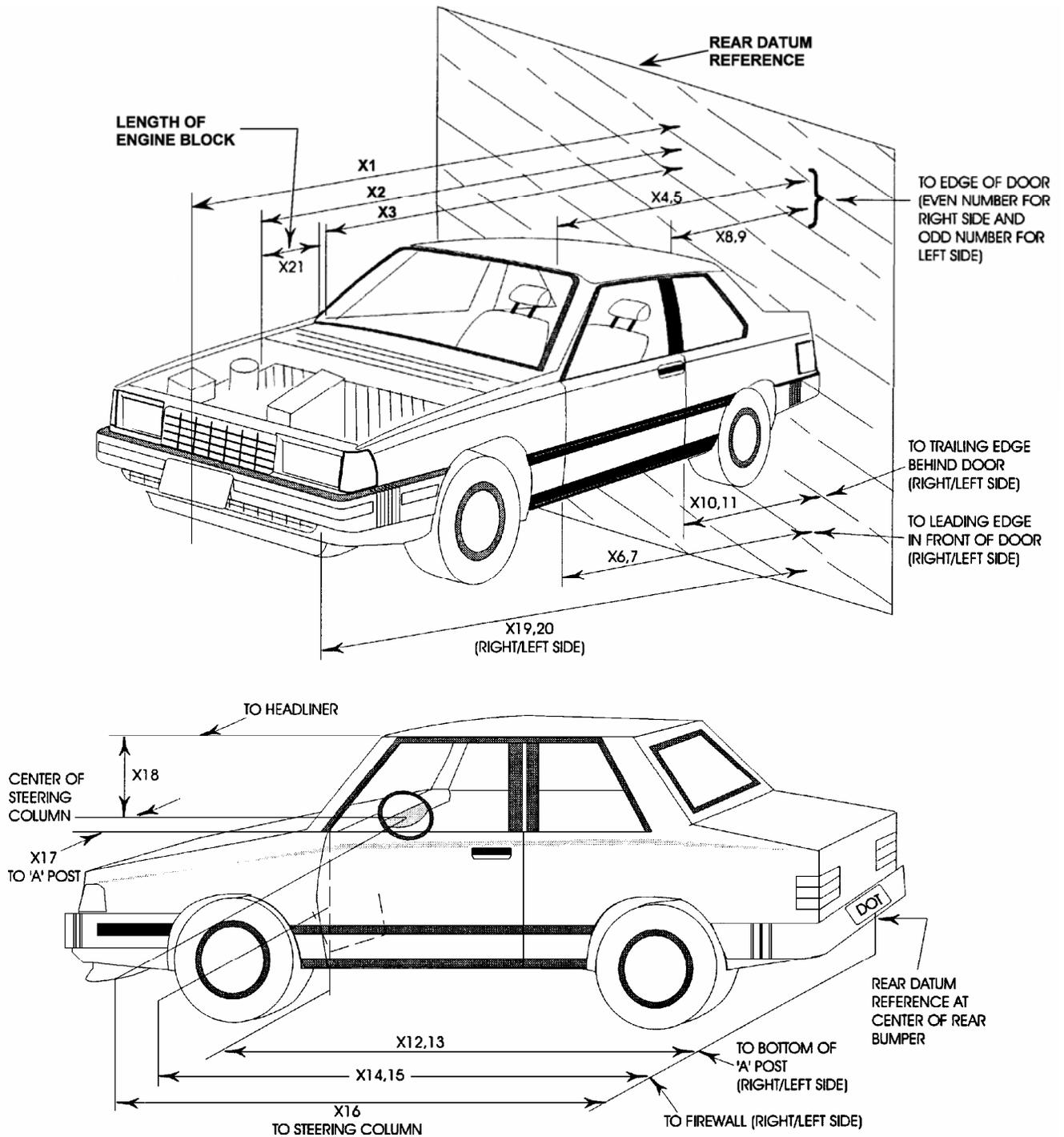
VEHICLE STRUCTURAL MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length	mm	4461	3794	-667
2	Total width	mm	1674	1673	-1
3	Bumper top height	mm	574	615	41
4	Bumper bottom height	mm	155	120	-35
5	Longitudinal member top height	mm	547	248	-299
6	Longitudinal member bottom height	mm	431	9	-422
7	Distance between longitudinal members	mm	830	639	-191
8	Longitudinal member width	mm	116	116	0
9	Engine top height	mm	930	916	-14
10	Engine bottom height	mm	88	74	-14
11	Engine and gear box width	mm	430	432	2
12	Front bumper to engine distance	mm	490	255	-235
13	Front shock absorber fixing width	mm	840	858	18
14	Bonnet leading edge height	mm	857	910	53
15	Front shock absorber fixing width	mm	1085	1102	17
16	Front bumper to front axle distance	mm	922	446	-476
17	Front axle to 'A' pillar distance	mm	480	400	-80
18	'A' pillar to 'B' pillar distance	mm	1023	1022	-1
19	'B' pillar to rear axle distance	mm	1150	1152	2
20	'B' pillar to 'C' pillar distance	mm	923	925	2
21	Roof sill bottom height	mm	1370	1380	10
22	Roof sill top height	mm	1475	1491	16
23	Floor sill bottom height	mm	194	203	9
24	Floor sill top height	mm	381	394	13

DATA SHEET NO. 13...(CONTINUED)
VEHICLE MEASUREMENTS

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06



**DATA SHEET NO. 14
CAMERA LOCATIONS**

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

VEHICLE CAMERA MEASUREMENT TABLE

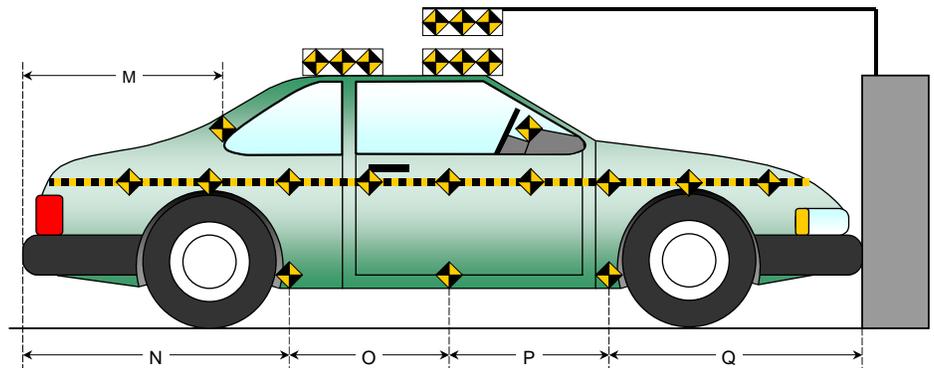
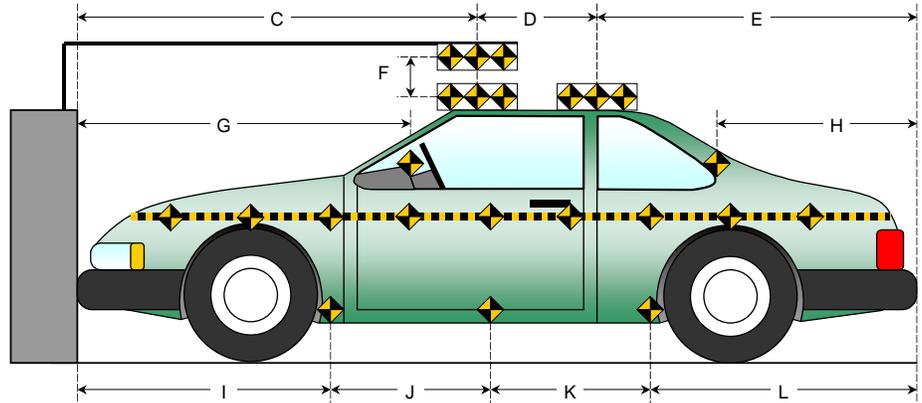
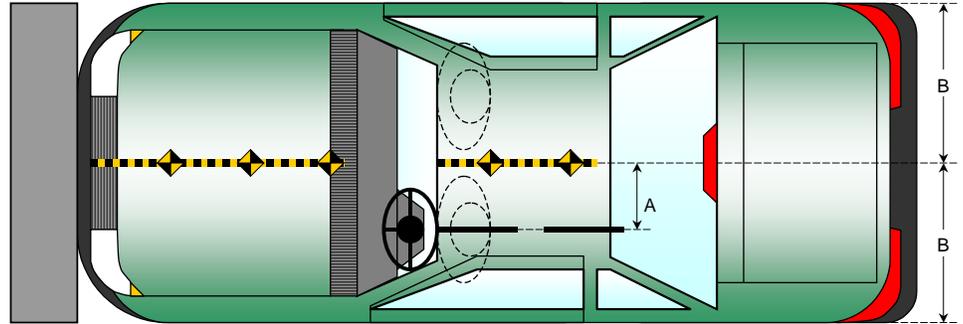
No.	Camera View	Location (mm)			Angle (deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Real Time Camera (Panning)	-15385	-7882	-1598	0			30
2	Overall Left Side	-1894	-7368	-1167	0	7697	20mm	1000
3	Left Side View	-1745	-7146	-1302	0	7470	50mm	1000
4	Driver and Interior View	-8696	-12562	-4511	-13	15930	ZOOM	1000
5	Steering Column (Bottom)	-1631	-8234	-2682	-11	8812	35mm	1000
6	Steering Column (Top)	-1663	-8153	-3078	-13	8872	35mm	1000
7	Overall Right Side	-1879	6831	-1321	0	7207	20mm	1000
8	Right Side View	-1798	6894	-1284	0	7239	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	-601	0	-5556	-75		25mm	1000
12	Driver Front View	378	-286	-2438	-35		25mm	1000
13	Passenger Front View	375	413	-2439	-35		25mm	1000
14	Pit View of Engine	-832	0	1495	90		12mm	1000
15	Pit View of Fuel Tank	-2794	0	1495	90		10mm	1000
16	Real Time Camera	-1585	-8255	-2467	-1	8760		30
17	Real Time Camera	-2153	6888	-1512	-1	7373		30

DATA SHEET NO. 15
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

All Dimensions in (mm)	
Item	Value
A	320
B	837
C	2030
D	612
E	1819
F	155
G	1550
H	1150
I	1374
J	876
K	876
L	1335
M	1150
N	1335
O	876
P	876
Q	1374



DATA SHEET NO. 16
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

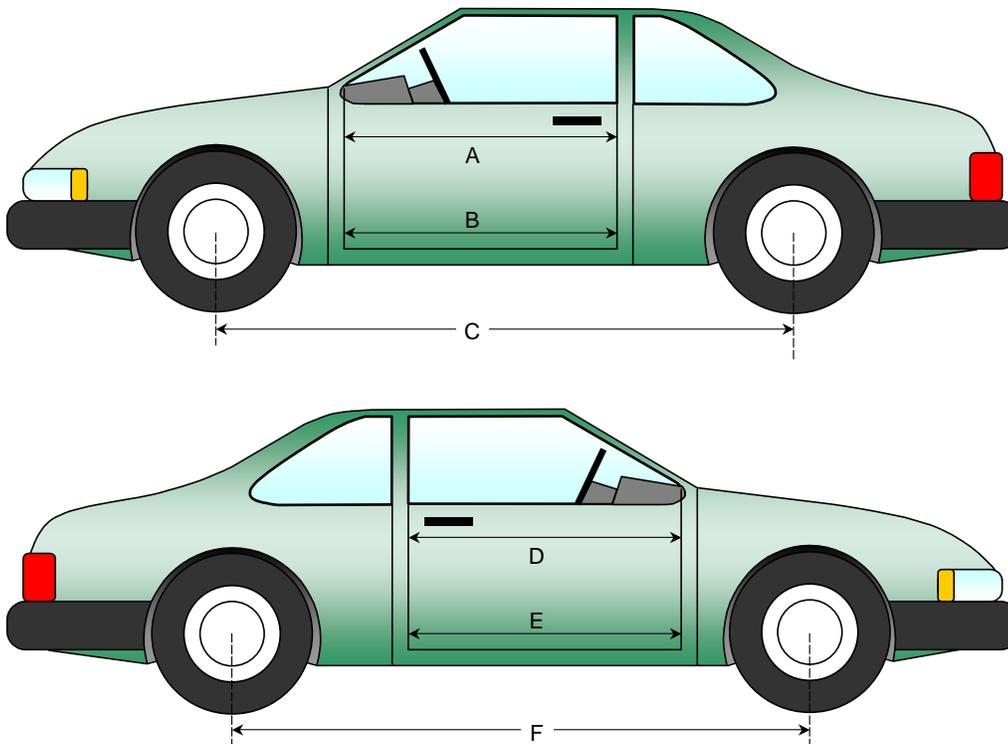
NHTSA No.: M60108
 Test Date: 2/14/06

DOOR OPENING WIDTH TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
A	Left Side Upper	mm	913	911	-2
B	Left Side Lower	mm	746	745	-1
D	Right Side Upper	mm	906	899	-7
E	Right Side Lower	mm	742	739	-3

WHEELBASE MEASUREMENT TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
C	Left Side Wheel Base	mm	2640	2560	-80
F	Right Side Wheel Base	mm	2640	2575	-65



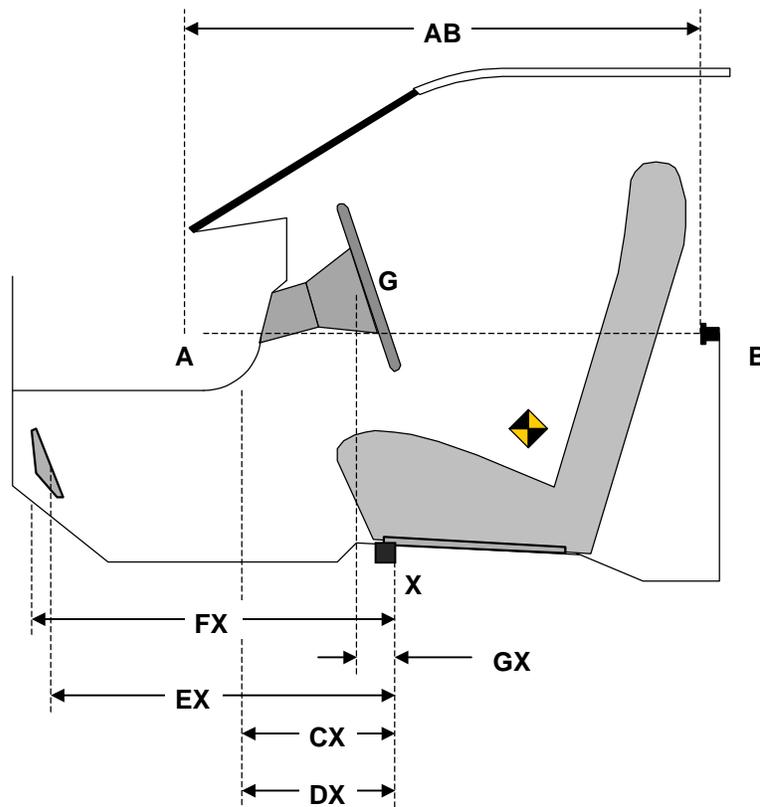
**DATA SHEET NO. 16...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

DRIVER COMPARTMENT INTRUSION TABLE

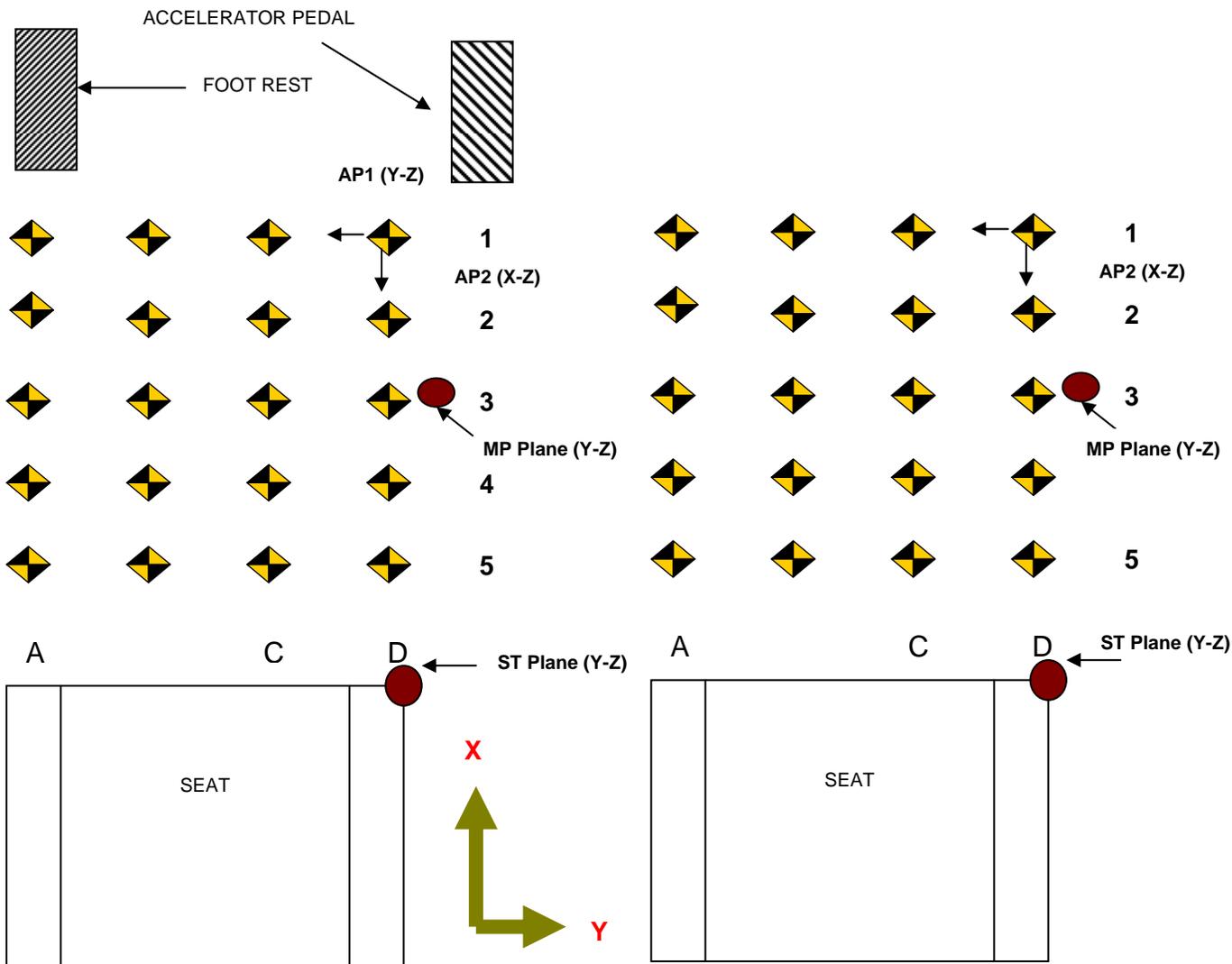
Item	Description	Units	Pre-Test	Post-Test	Diff.
AB	Door Opening (Inside window jam)	mm	913	911	-2
CX	Left Knee Bolster to X	mm	365	345	-20
DX	Right Knee Bolster to X	mm	340	348	8
EX	Brake Pedal to X	mm	685	535	-150
FX	Foot Rest to X	mm	720	705	-15
GX	Center of Steering Wheel Hub to X	mm	200	203	3



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

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06



- 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: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

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	654	702	701	693	654	692	668	614	0	-10	-33	-79
2	626	617	614	621	630	624	614	593	4	7	0	-28
3	545	530	521	519	553	536	532	541	8	6	11	22
4	436	428	424	424	444	437	431	440	8	9	7	16
5	322	320	320	314	327	329	326	337	5	9	6	23

DRIVER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	12	114	230	356	71	177	287	399	59	63	57	43
2	-9	108	230	358	60	175	287	405	69	67	57	47
3	-14	106	229	350	57	179	297	414	71	73	68	64
4	-15	103	224	341	59	180	295	419	74	77	71	78
5	-23	105	228	342	57	180	303	414	80	75	75	72

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-40	7	32	42	-53	-31	-27	-36	-13	-38	-59	-78
2	66	83	93	122	52	53	56	78	-14	-30	-37	-44
3	139	137	144	169	124	118	112	155	-15	-19	-32	-14
4	162	156	161	168	154	142	139	174	-8	-14	-22	6
5	157	158	163	173	155	150	148	182	-2	-8	-15	9

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

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

All measurements in mm

PASSENGER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	793	794	774	697	737	739	710	704	-56	-55	-64	7
2	707	706	703	673	675	680	684	675	-32	-26	-19	2
3	614	616	618	624	597	595	609	621	-17	-21	-9	-3
4	516	513	513	513	505	499	505	515	-11	-14	-8	2
5	411	408	401	396	402	396	394	396	-9	-12	-7	0

PASSENGER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-326	-208	-78	40	-388	-268	-152	-8	-62	-60	-74	-48
2	-334	-205	-76	49	-390	-260	-130	-4	-56	-55	-54	-53
3	-346	-208	-76	63	-391	-256	-129	11	-45	-48	-53	-52
4	-352	-214	-80	57	-394	-257	-123	14	-42	-43	-43	-43
5	-355	-217	-82	56	-395	-260	-124	15	-40	-43	-42	-41

PASSENGER FLOOR PAN Z-AXIS

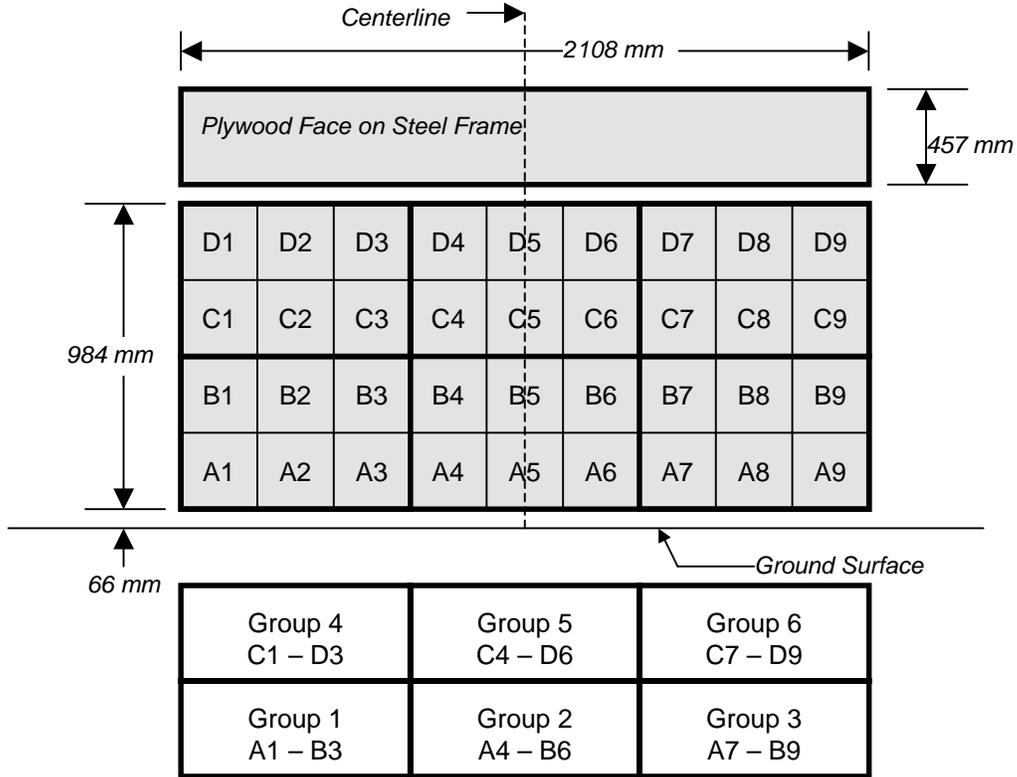
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-41	-31	-54	-115	-19	-15	-29	-69	22	16	25	46
2	39	32	24	-13	77	67	76	35	38	35	52	48
3	101	88	85	89	153	128	128	136	52	40	43	47
4	128	114	114	125	192	169	168	180	64	55	54	55
5	126	115	115	121	199	183	189	178	73	68	74	57

DATA SHEET NO. 17
FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

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



6 Groups of 6 Load Cells Each

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
 Test Date: 2/14/06

VEHICLE INFORMATION

VIN: 3GNDA23D66S571025
 Vehicle Size Category: 5-Door

Wheel base (mm): 2640
 Test Weight (kg): 1646

ACCELEROMETER DATA

Accelerometer Location: Left rear cross member
 Cal. Procedure/Interval: 6 months / drop test
 Integration Algorithm: NHTSA Standard
 Impact Velocity (km/h): 56.20
 Velocity Change (km/h): 64.3

Linearity: Good

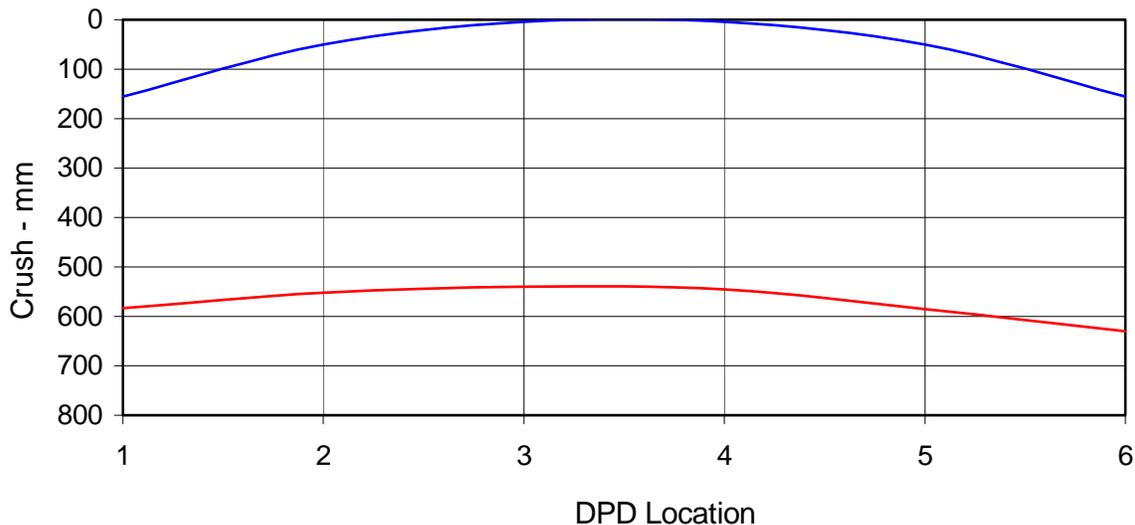
Time of Separation (msec): 74.3

CRUSH PROFILE

Collision Deformation Classification: 12FDEW6
 Damage Region Length (mm): 1234

Midpoint of Damage: Vehicle Centerline
 Impact Mode: Full Frontal

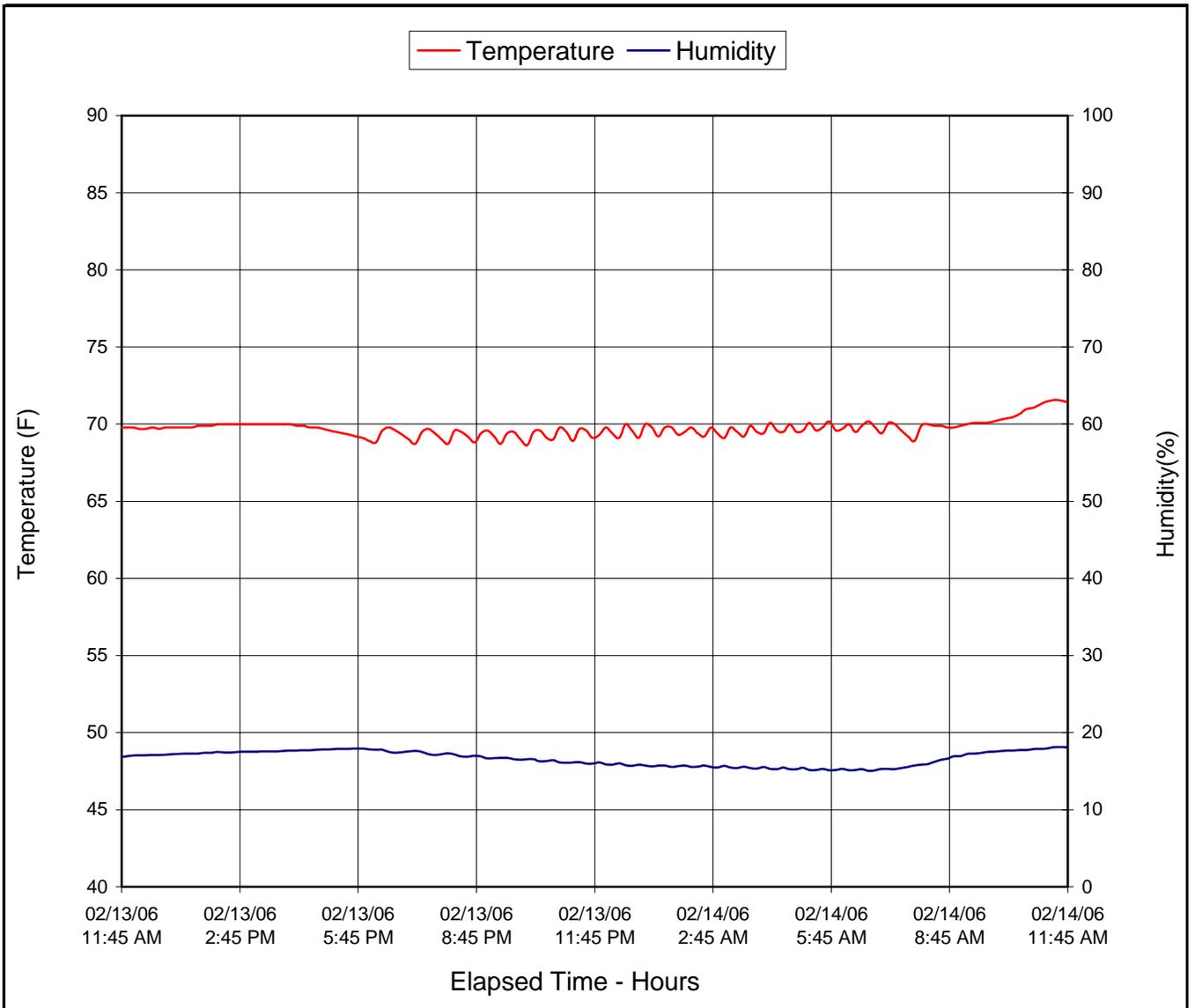
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	155	583	428
C2	Crush zone 2 on left side	mm	50	552	502
C3	Crush zone 3 on left side	mm	4	540	536
C4	Crush zone 4 on right side	mm	4	545	541
C5	Crush zone 5 on right side	mm	50	585	535
C6	Crush zone 6 at right side	mm	155	630	475



DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
Test Program: 2006 NHTSA 35mph NCAP

NHTSA No.: M60108
Test Date: 2/14/06



APPENDIX A
PHOTOGRAPHS

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A-56	Post-Test Passenger Dummy Head	A-56
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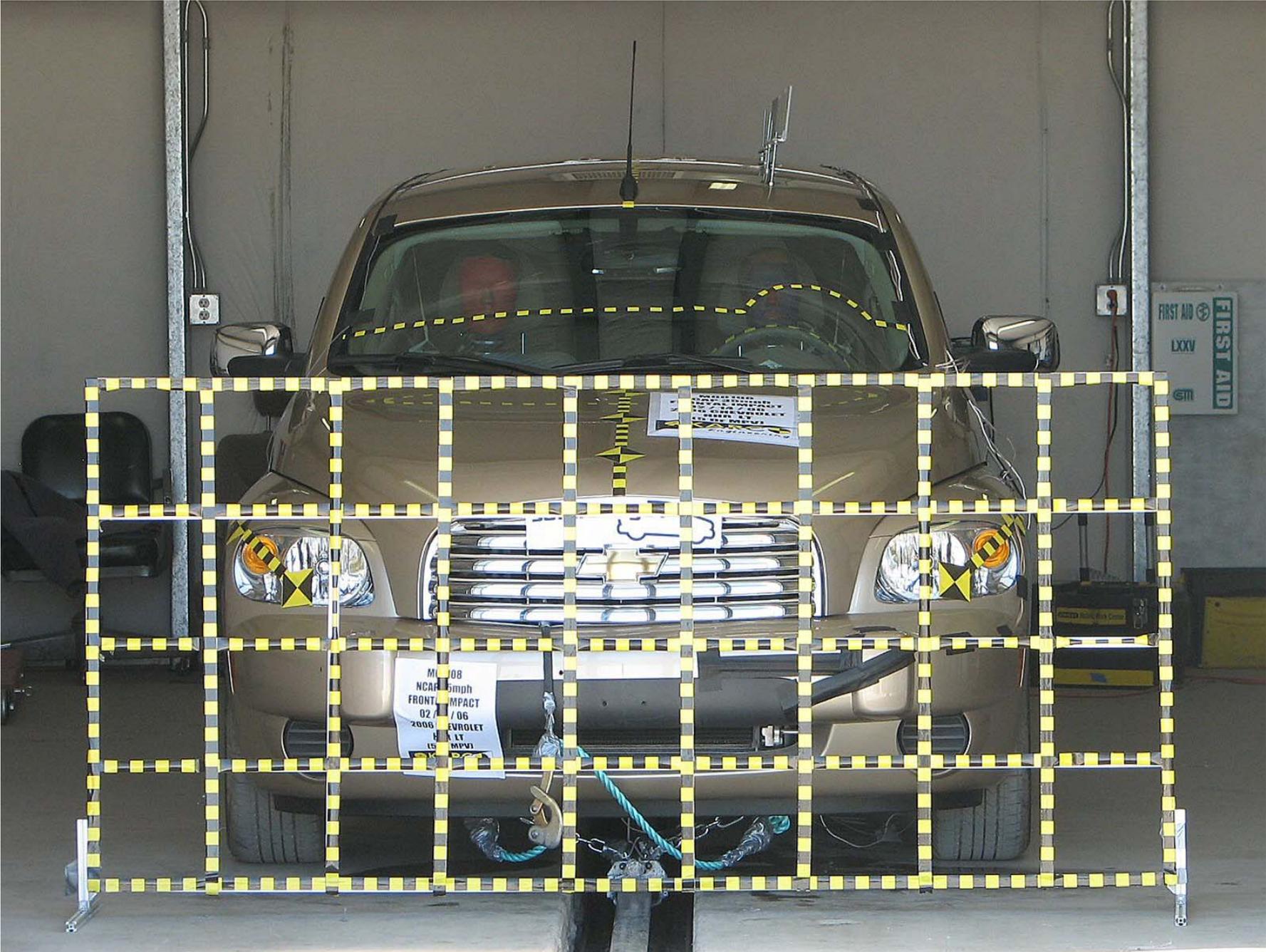


Figure A-1: Load Cell Location

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MFD BY GENERAL MOTORS DE MEXICO, S. DE R.L. DE C.V. 11/05

GVWR	GAWR FRT	GAWR RR
1923KG(4240LB)	980KG(2160LB)	979KG(2158LB)

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

3GNDA23D66S571025 TYPE: M.P.V.

MODEL: AS46

APCC	TIRE SIZE	SPEED RTG	RIM	COLD TIRE PRESSURE
FRT	P215/55R16	S	16X6.5J	210KPA(30PSI)
RR	P215/55R16	S	16X6.5J	210KPA(30PSI)
SPA	T115/70D15	M	15X4T	420KPA(60PSI)

SEE OWNER'S MANUAL  FOR MORE INFORMATION.

Figure A-2: Manufacturer's Label



TIRE AND LOADING INFORMATION

SEATING CAPACITY | TOTAL 5 | FRONT 2 | REAR 3

The combined weight of occupants and cargo should never exceed 406 kg or 895 lbs.

TIRE	ORIGINAL SIZE		COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P215/55R16	S	210 kPa, 30 PSI	
REAR	P215/55R16	S	210 kPa, 30 PSI	
SPARE	T115/70D15	M	420 kPa, 60 PSI	

3GNDA23D66S571025

Figure A-3: Tire Placard



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



A-5

TR-P26001-12-NC

Figure A-5: Left Rear 3/4 View, as Received



Figure A-6: Pre-Test Front View

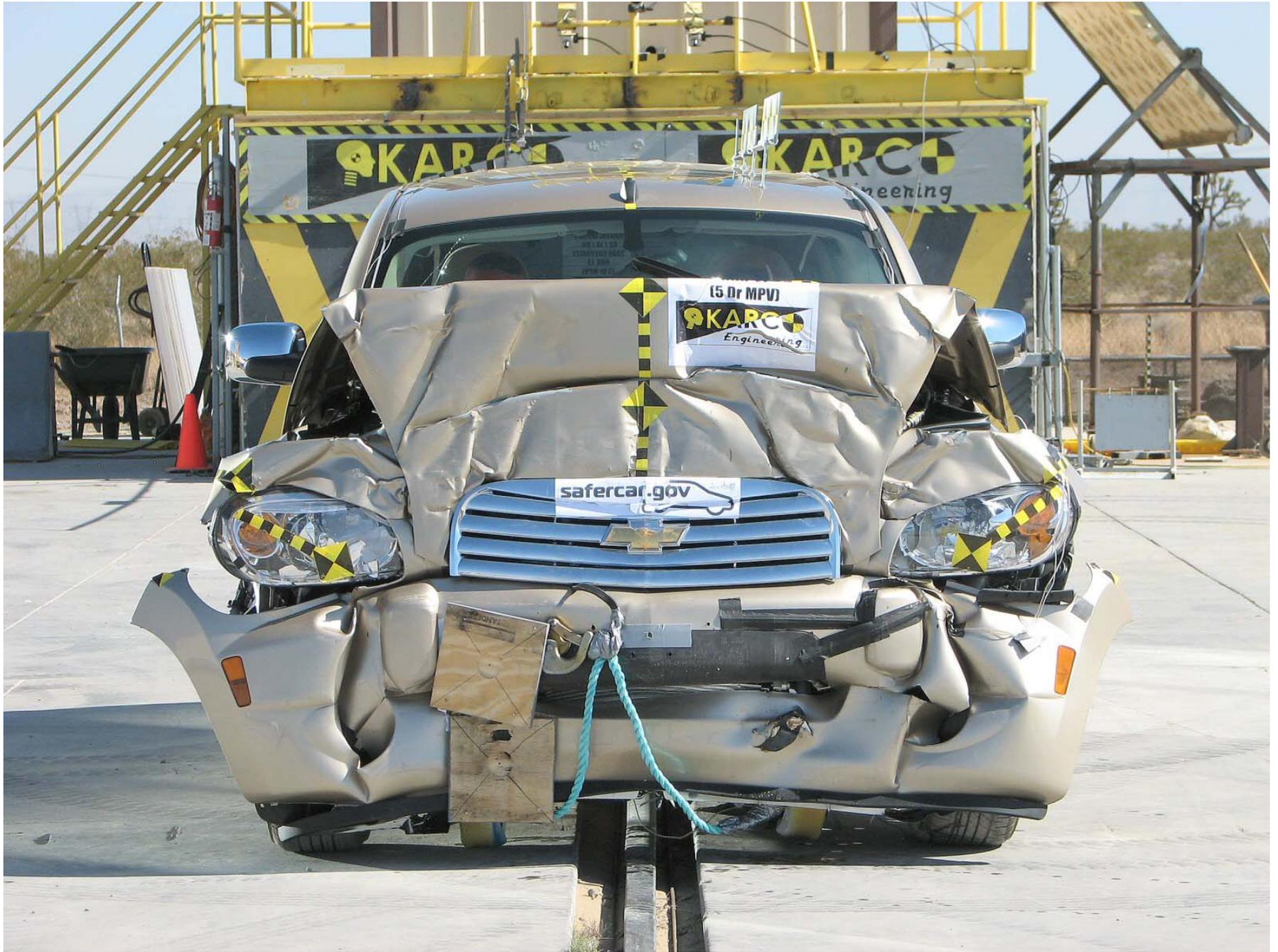


Figure A-7: Post-Test Front View (Vehicle Moved)



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 $\frac{3}{4}$ View



Figure A-15: Post-Test Left Rear ¾ View



Figure A-16: Post-Test Left Side 3/4 View of Doors After Impact



Figure A-17: Post-Test Right Side $\frac{3}{4}$ View of Doors After Impact

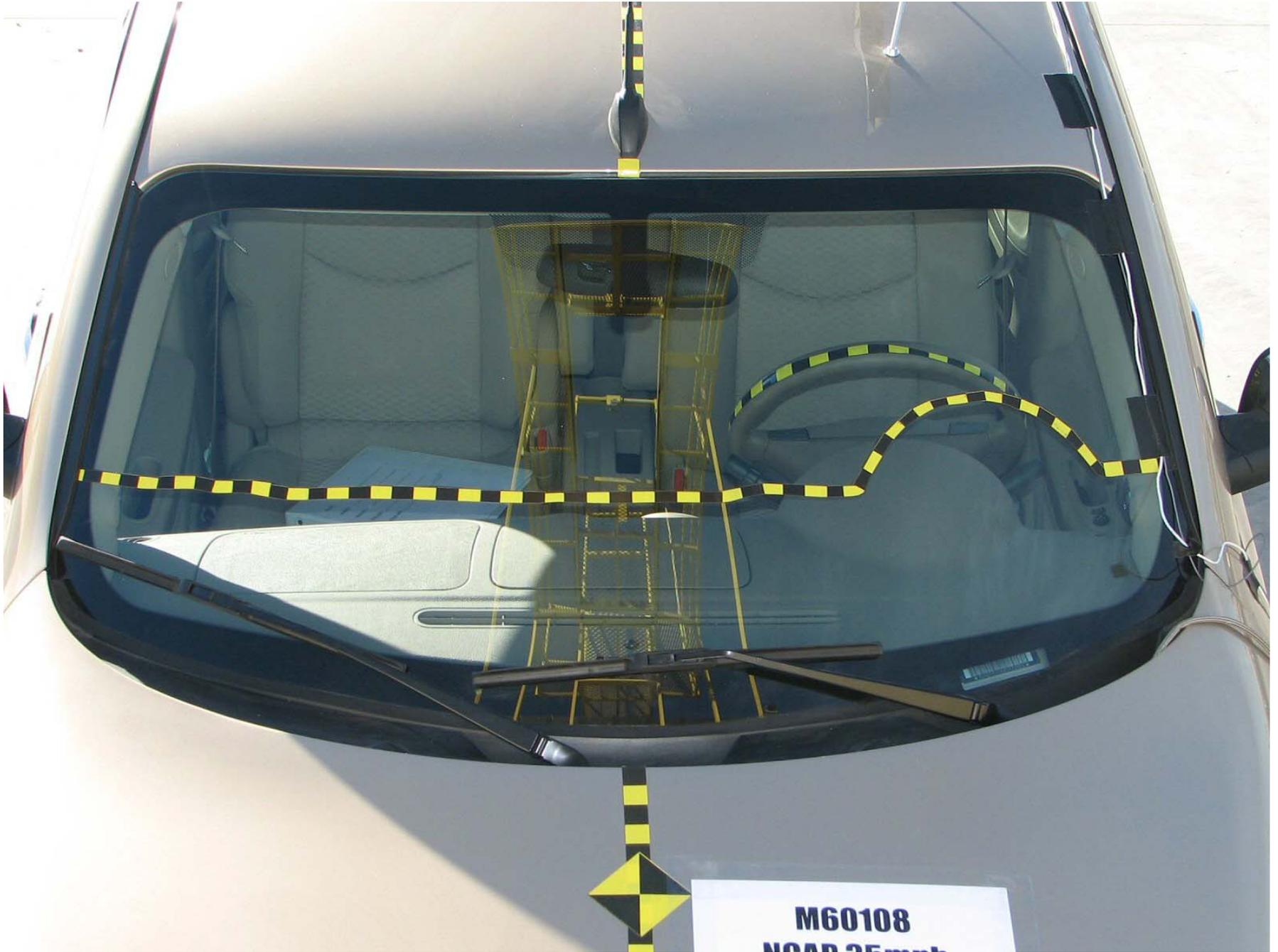


Figure A-18: Pre-Test Windshield



Figure A-19: Post-Test Windshield



Figure A-20: Pre-Test Engine Compartment



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



**2006 CHEVROLET HHR LT
M60108
STODDARD SOLVENT ADDED
15.06 GALLONS
(57.01 LITERS)**



Figure A-22: Pre-Test Fuel Cap



Figure A-23: Post-Test Fuel Cap

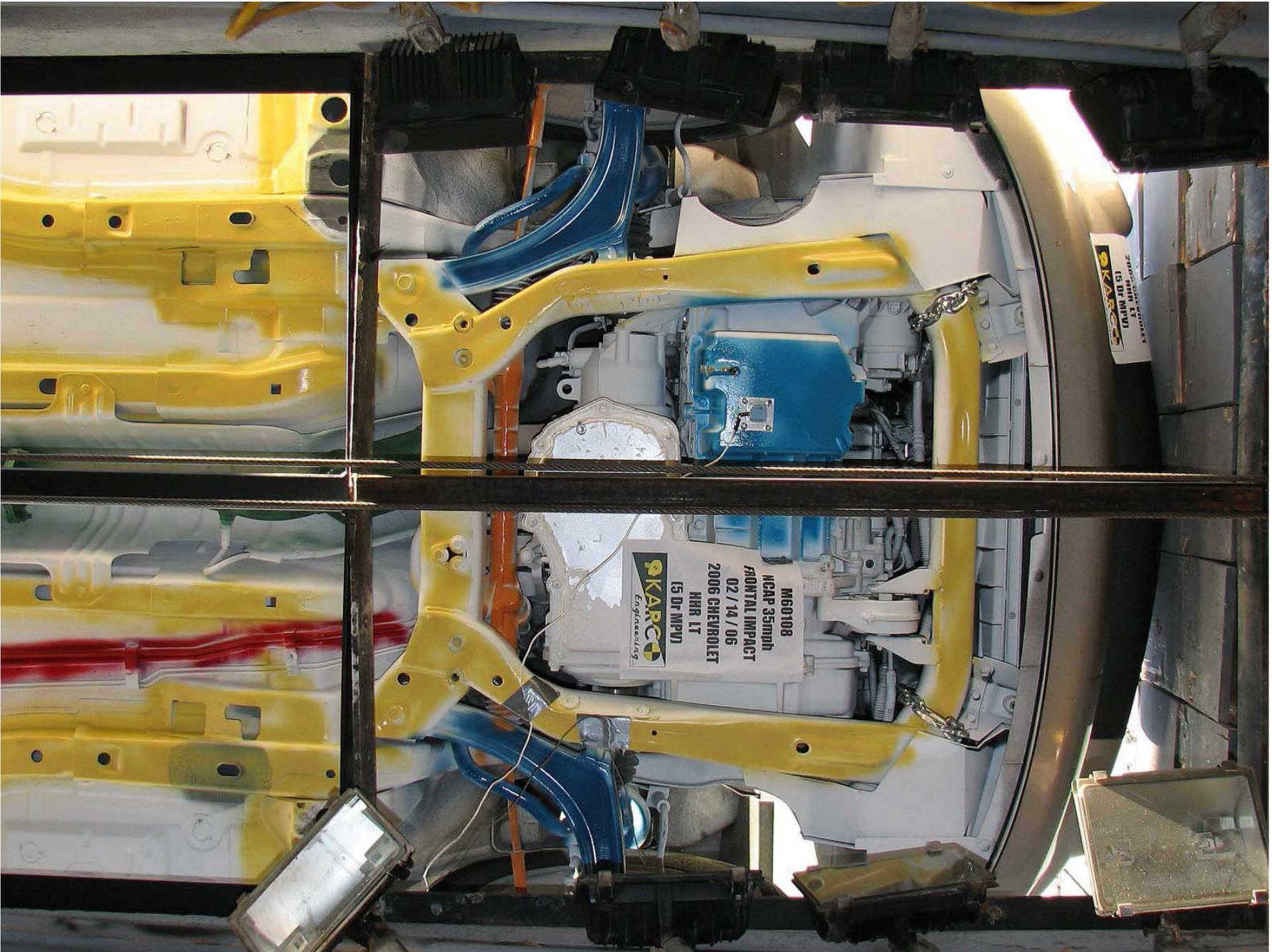


Figure A-24: Pre-Test Front Underbody

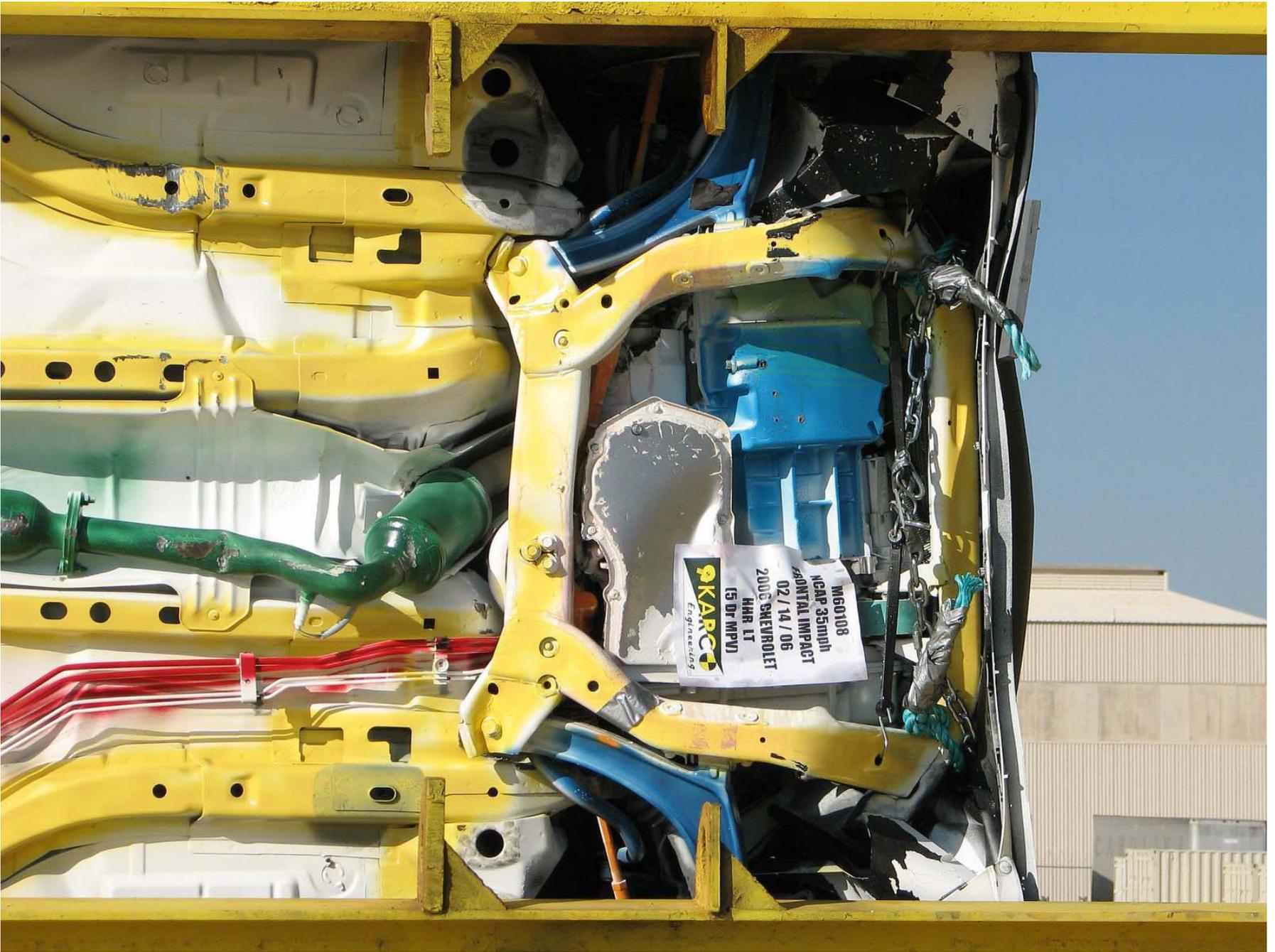


Figure A-25: Post-Test Front Underbody

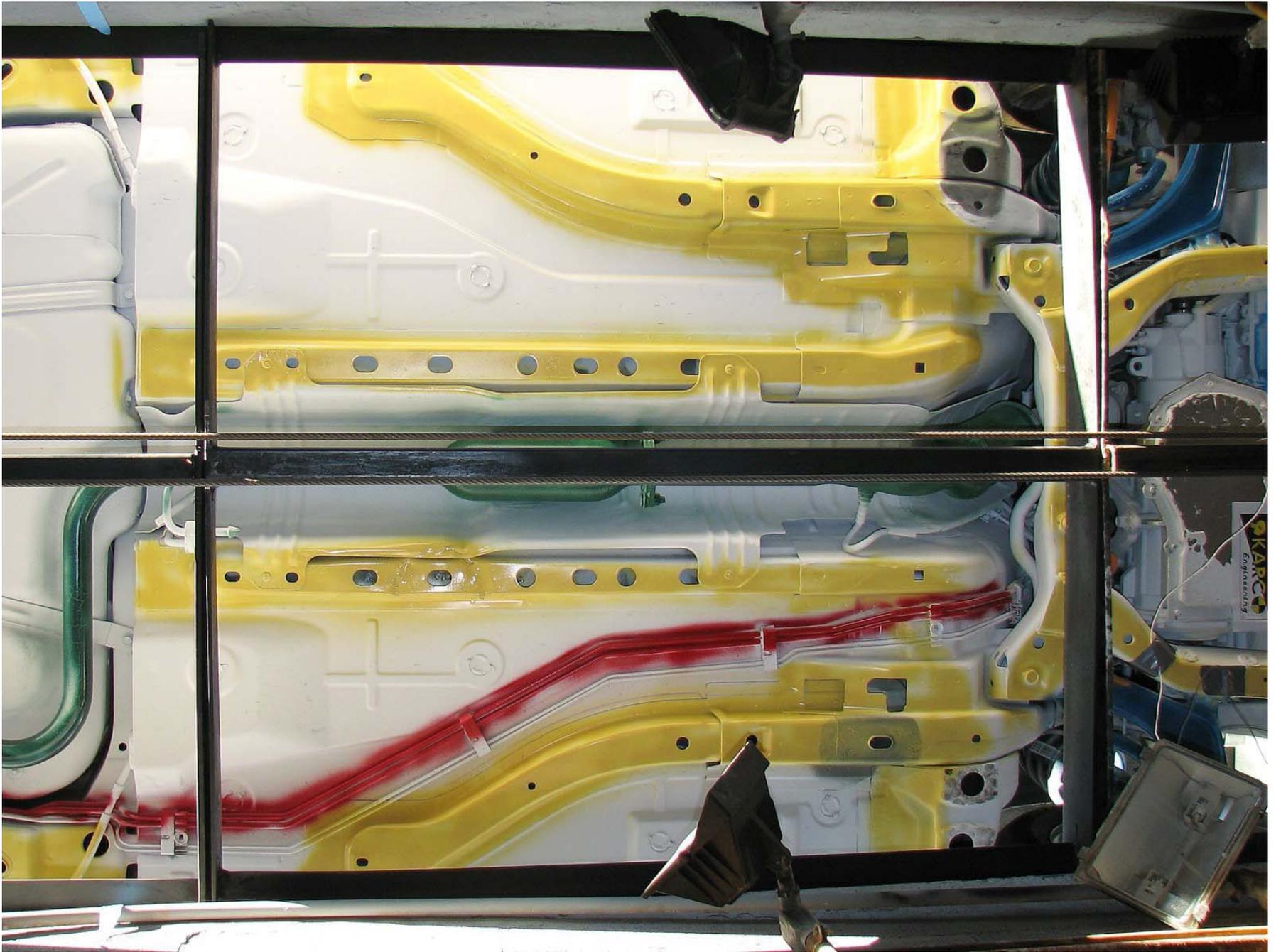


Figure A-26: Pre-Test Mid Underbody

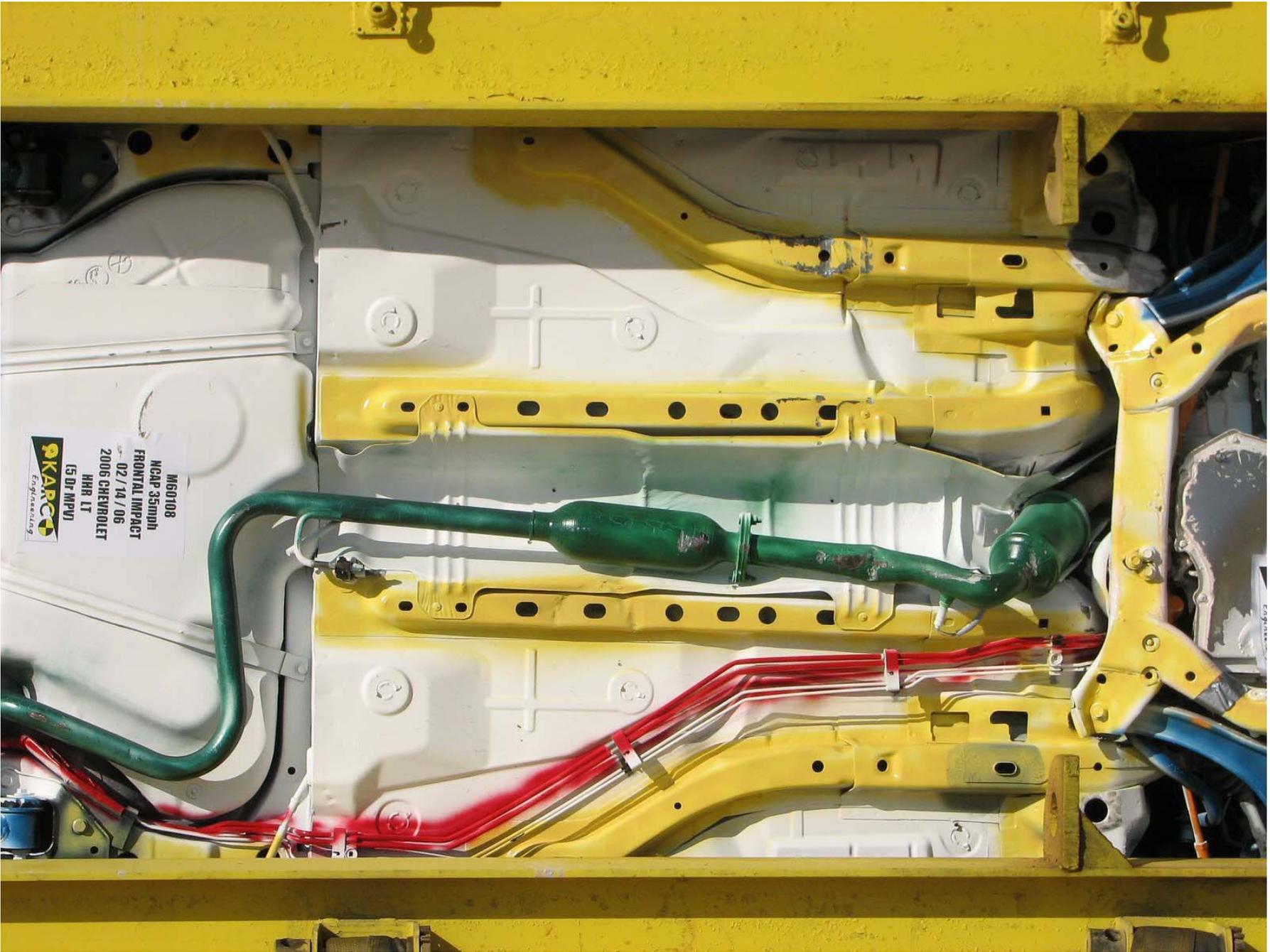


Figure A-27: Post-Test Mid Underbody

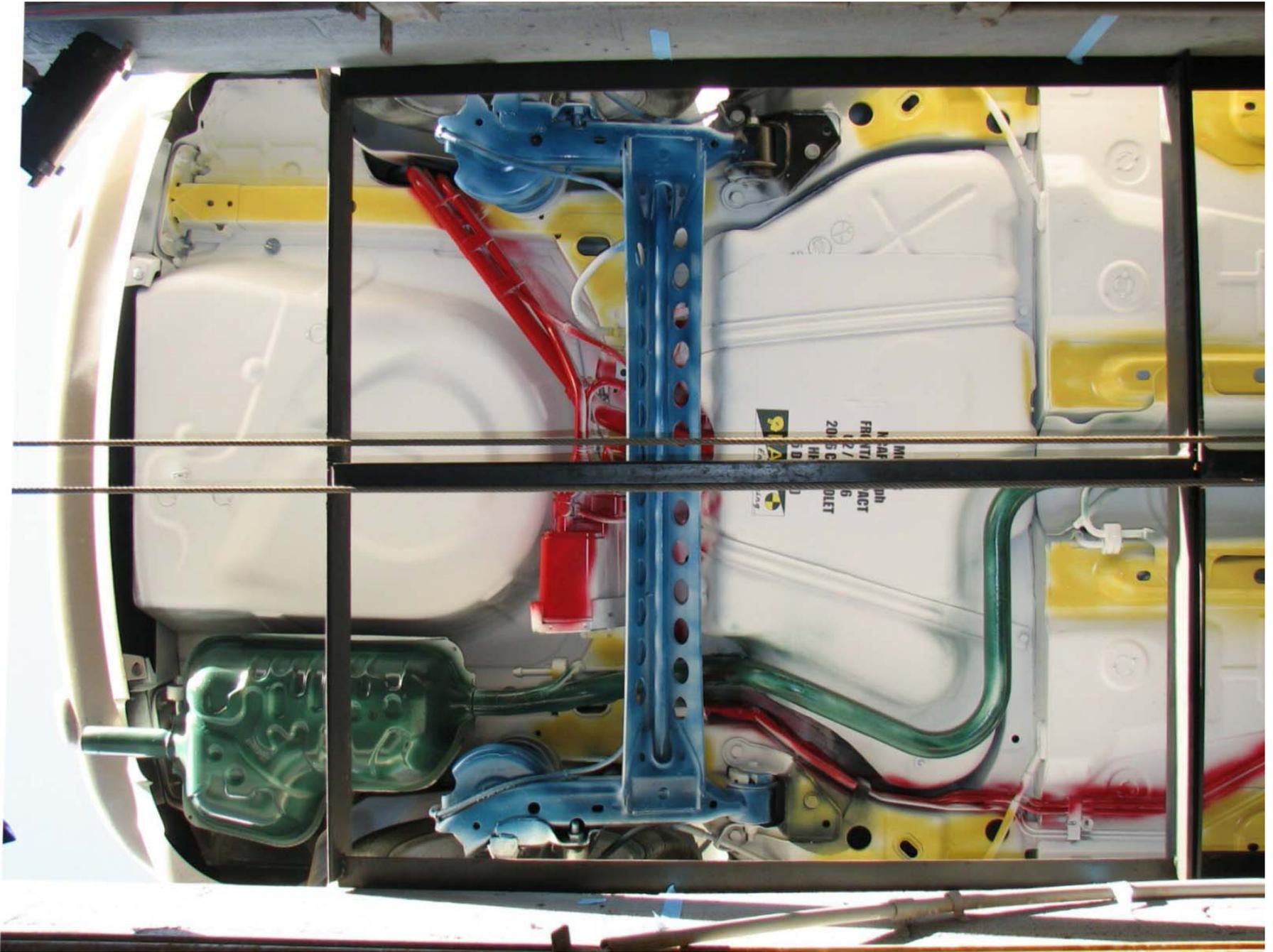


Figure A-28: Pre-Test Rear Underbody

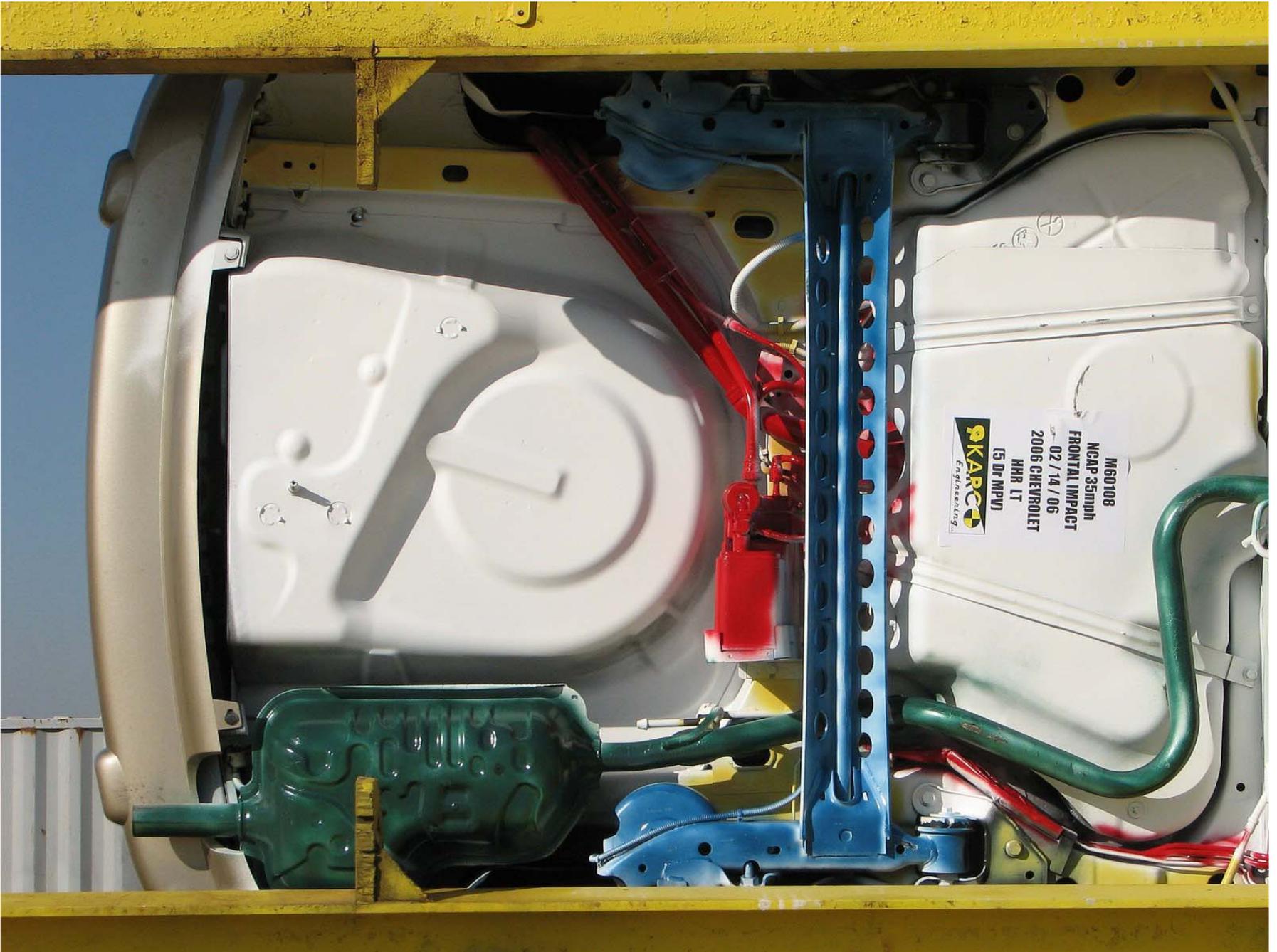


Figure A-29: Post-Test Rear Underbody



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



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

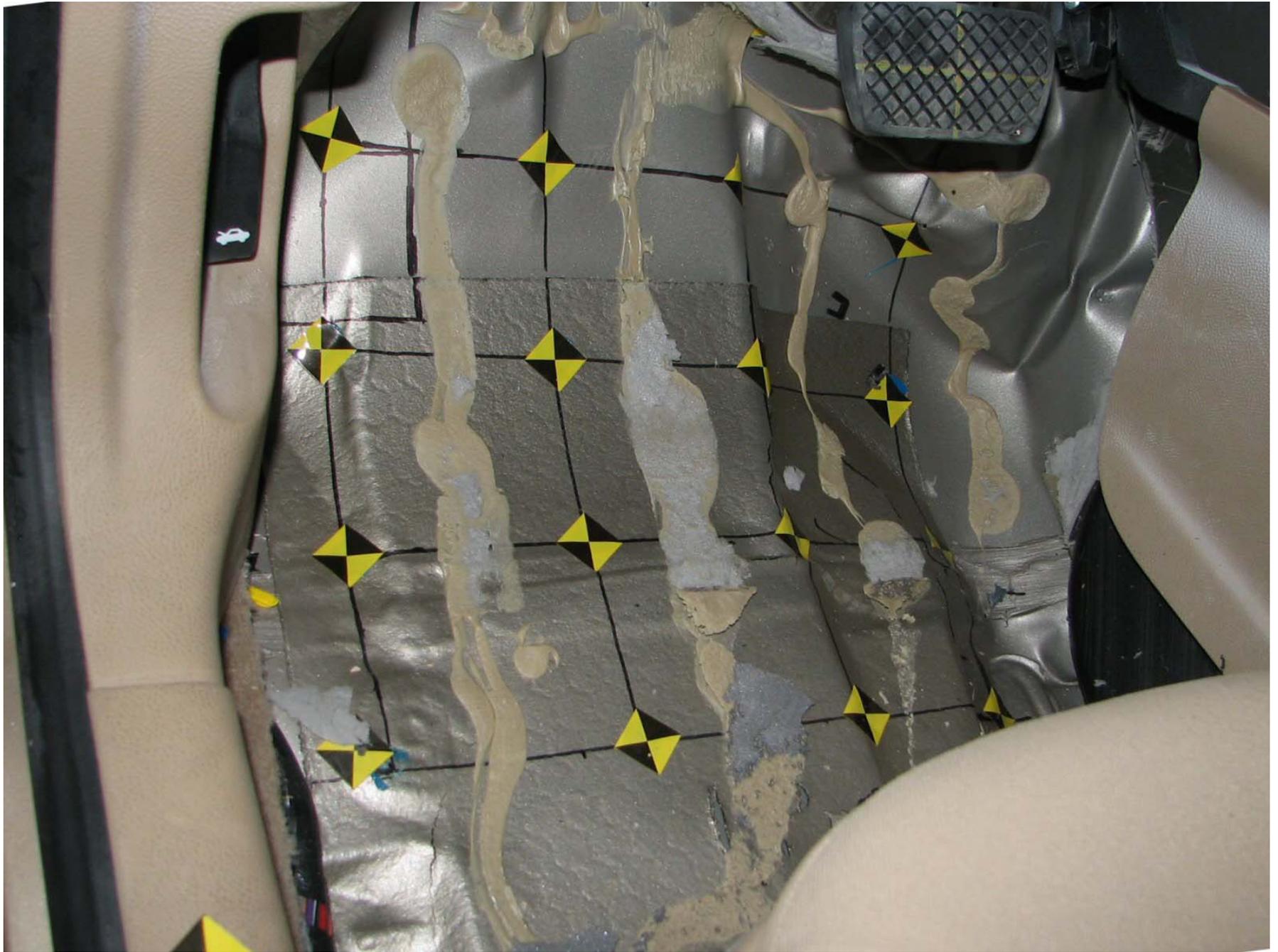


Figure A-41: Post-Test Driver Side Floor Pan



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)



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

Actual Ltd. for more information visit our site
810760
To be removed by
customer only



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



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



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



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



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

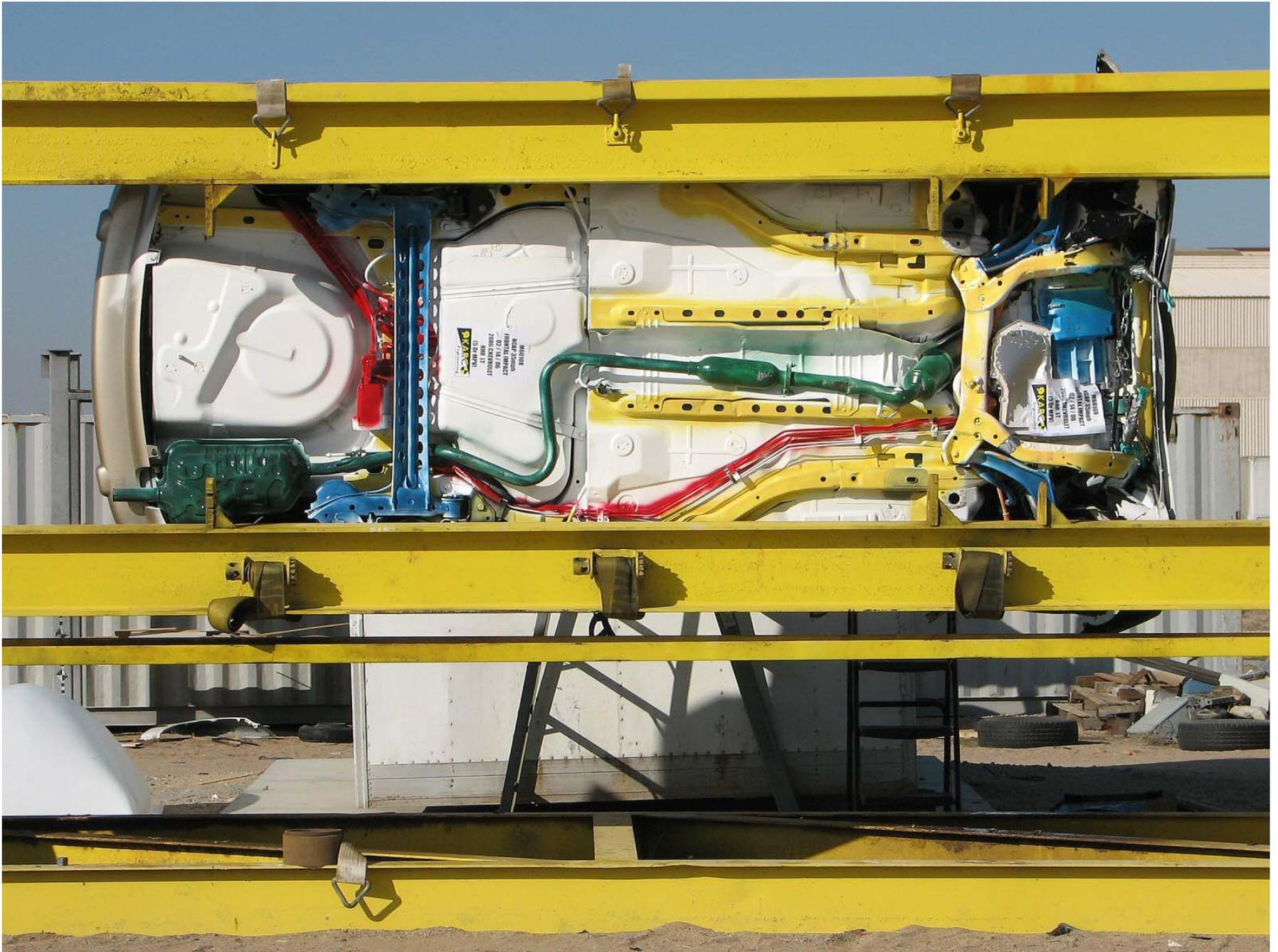


Figure A-61: Vehicle on Rollover Device (270°)



Figure A-62: Vehicle Impact

APPENDIX B

DATA PLOTS

LIST OF DATA PLOTS

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	Driver Chest Primary Y	B-2
	Driver Chest Primary Z	B-2
	Driver Chest Resultant Primary	B-2
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	Driver Right Femur Force Z	B-3
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	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)

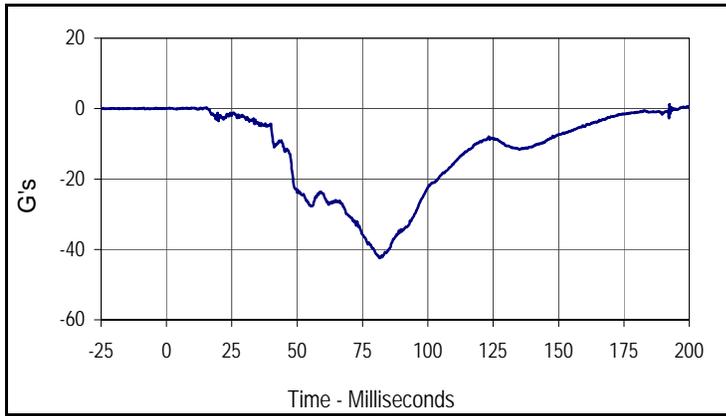
Passenger Chest Redundant Y
Passenger Chest Redundant Z
Passenger Chest Resultant Redundant
Passenger Chest Redundant X Velocity
Passenger Chest Redundant X Displacement
Passenger Chest Displacement
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Passenger Pelvis Y
Passenger Pelvis Z
Passenger Pelvis 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)

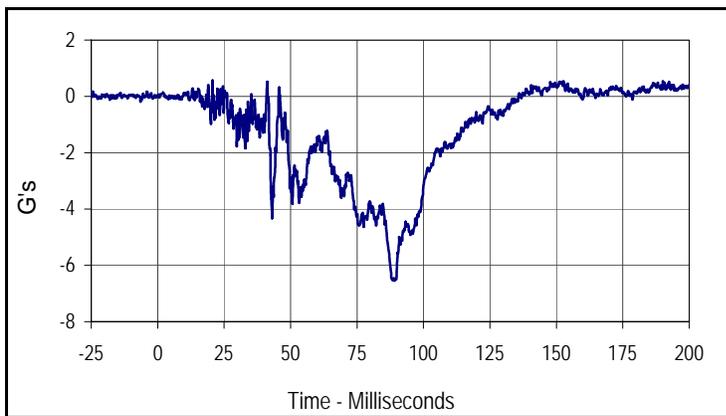
Vehicle Left Rear X Displacement
Vehicle Right Rear X
Vehicle Right Rear X Velocity
Vehicle Right Rear X Displacement
Vehicle Engine Top
Vehicle Engine Top Velocity
Vehicle Engine Top Displacement
Vehicle Engine Bottom
Vehicle Engine Bottom Velocity
Vehicle Engine Bottom Displacement
Vehicle Left Brake 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: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

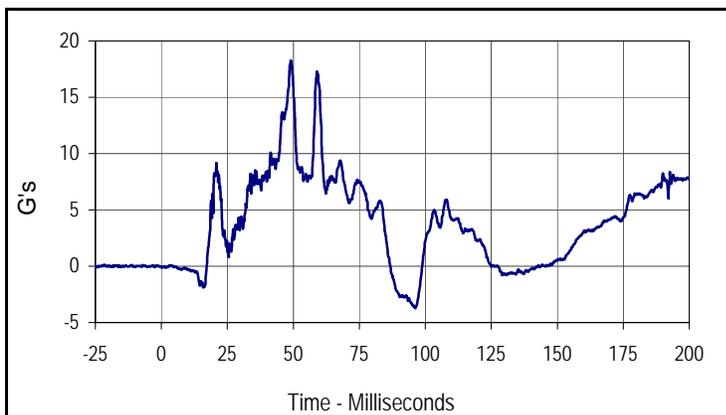
Test Date: 2/14/06
 NHTSA No.: M60108



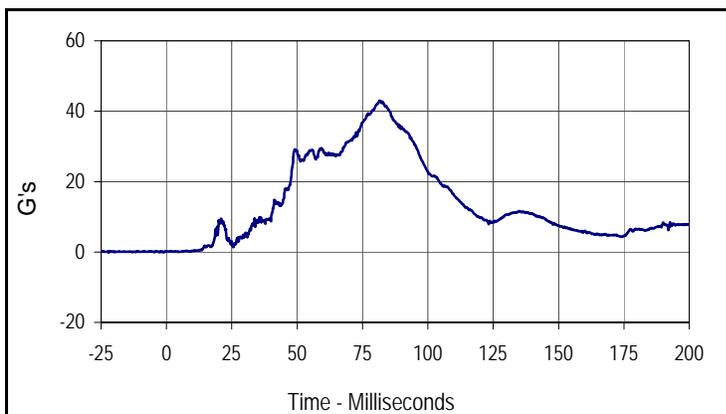
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CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
1.2	192.5	-42.5	81.5



Curve Description			
Driver Head Primary Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
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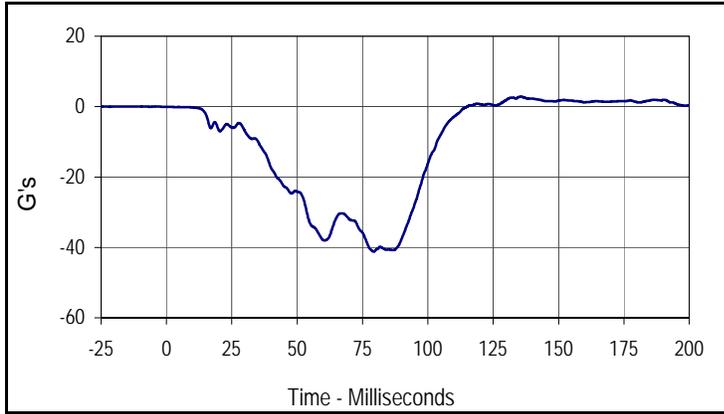
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CURNO	Type	SAE Class	Units
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Max	Time	Min	Time
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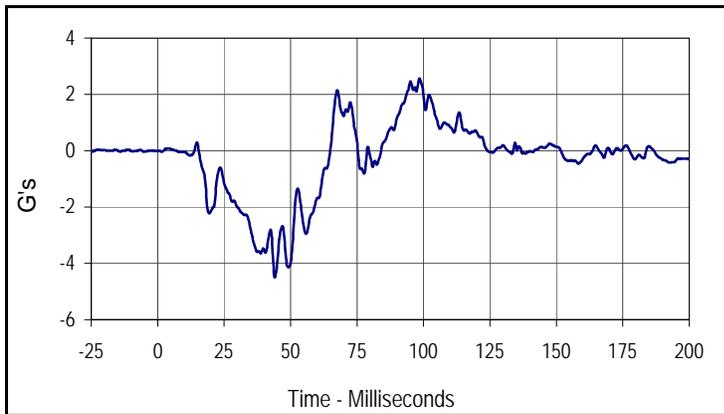
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Driver Head Resultant Primary			
CURNO	Type	SAE Class	Units
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43.0	81.5	0.0	4.4

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

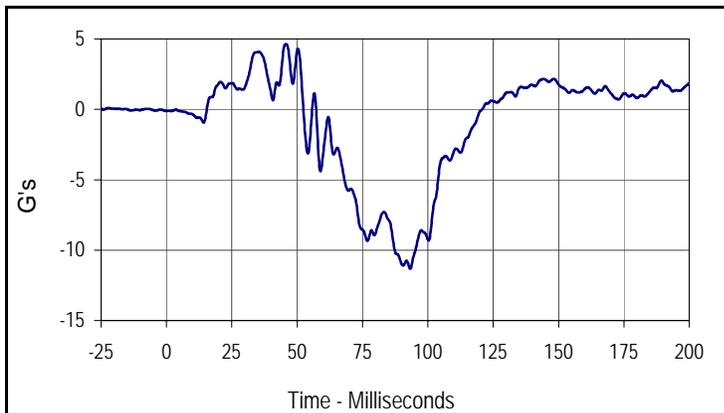
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 NHTSA No.: M60108



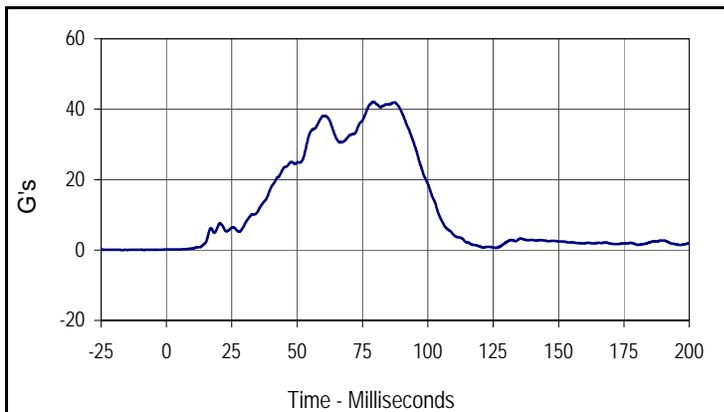
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Max	Time	Min	Time
2.8	135.7	-41.2	79.2



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005	FIL	180	G's
Max	Time	Min	Time
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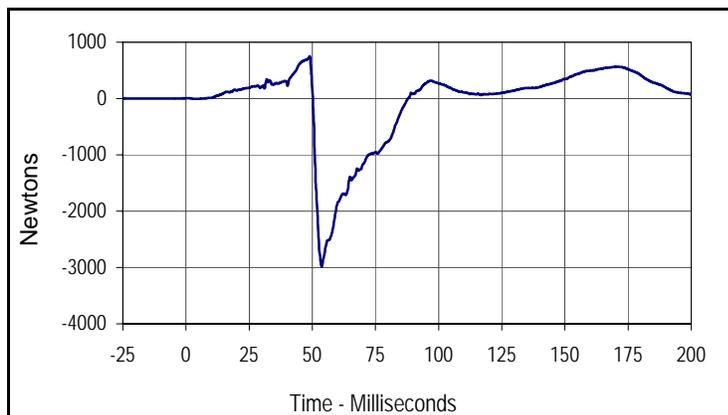
Curve Description			
Driver Chest Primary Z			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
4.6	45.7	-11.3	93.3



Curve Description			
Driver Chest Resultant Primary			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
42.1	79.3	0.1	0.8

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06
 NHTSA No.: M60108



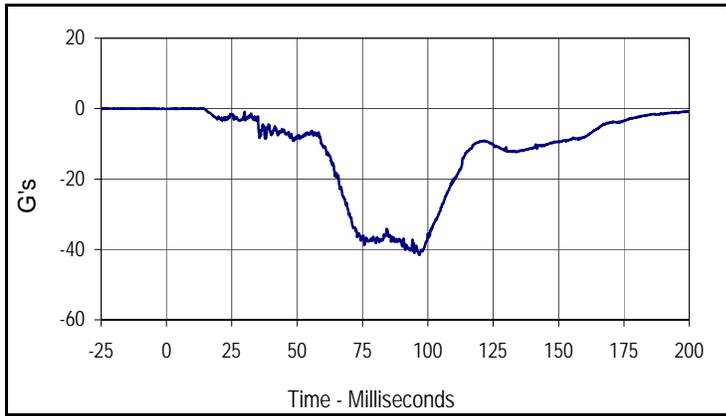
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Driver Left Femur Force Z			
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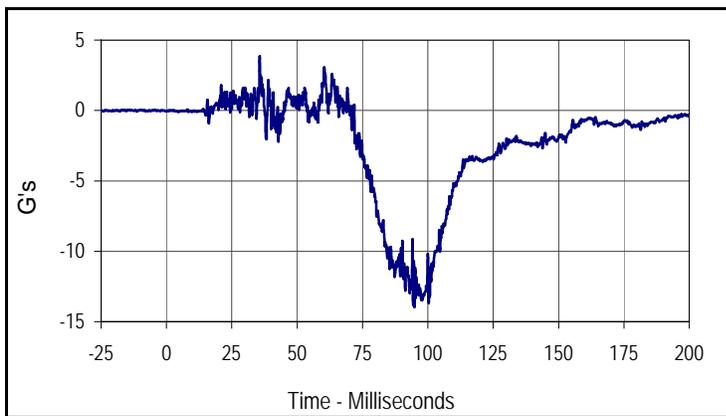
Curve Description			
Driver Right Femur Force Z			
CURNO	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
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Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

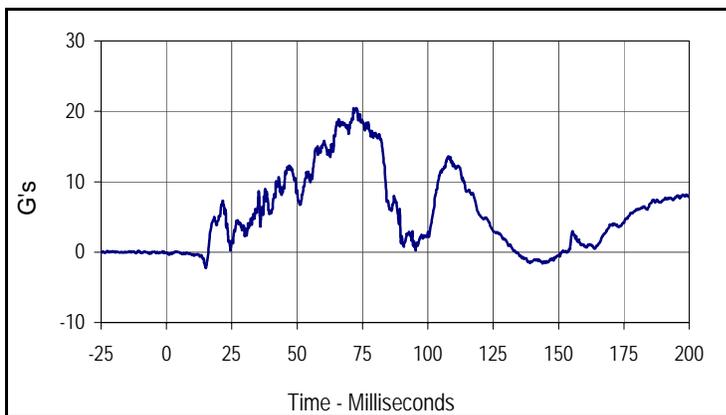
Test Date: 2/14/06
 NHTSA No.: M60108



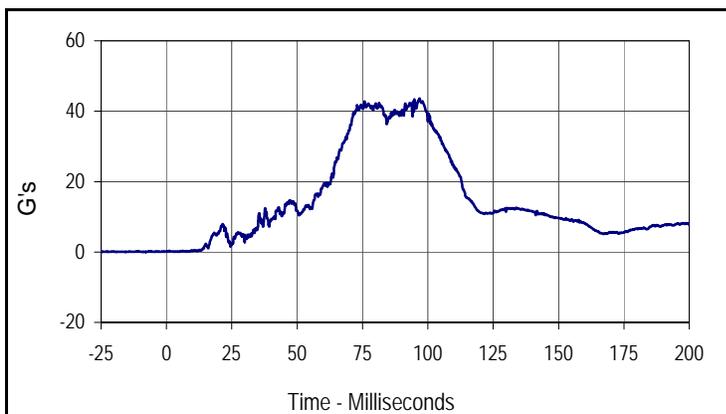
Curve Description			
Passenger Head Primary X			
CURNO	Type	SAE Class	Units
009	FIL	1000	G's
Max	Time	Min	Time
0.1	14.0	-41.6	96.8



Curve Description			
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010	FIL	1000	G's
Max	Time	Min	Time
3.8	35.7	-13.9	94.9



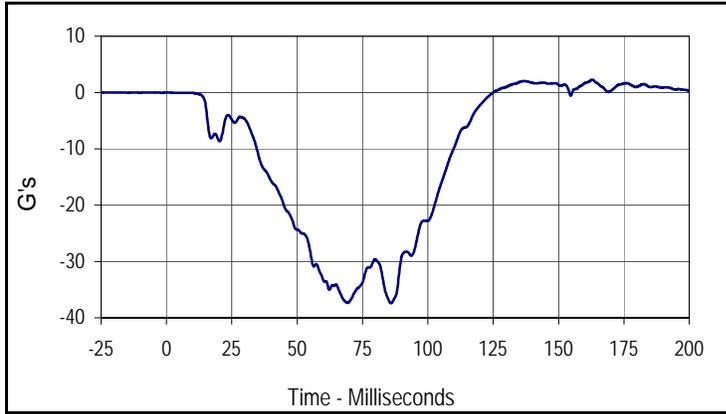
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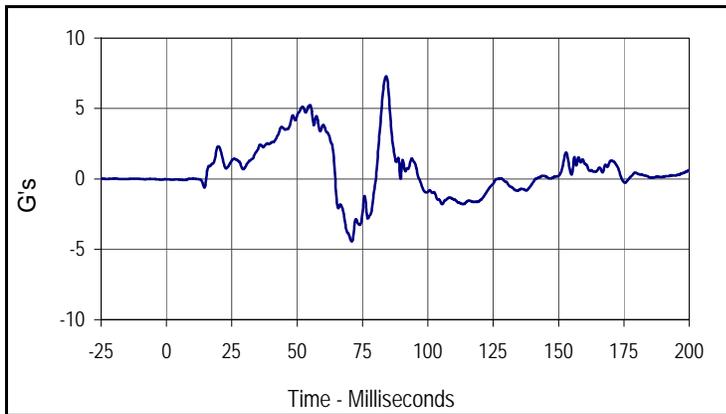
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Passenger Head Resultant Primary			
CURNO	Type	SAE Class	Units
009	RES	1000	G's
Max	Time	Min	Time
43.6	96.8	0.0	2.9

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

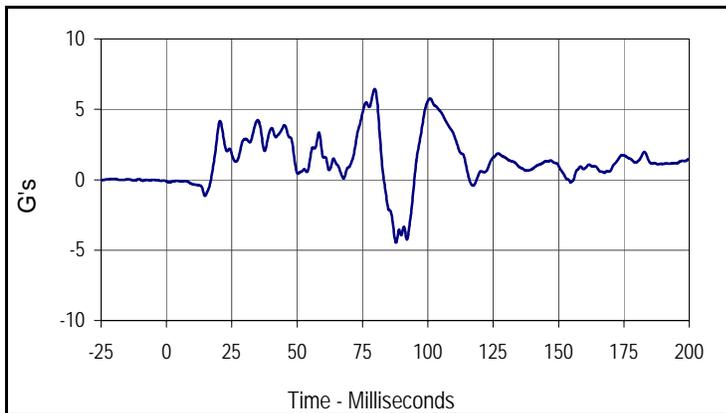
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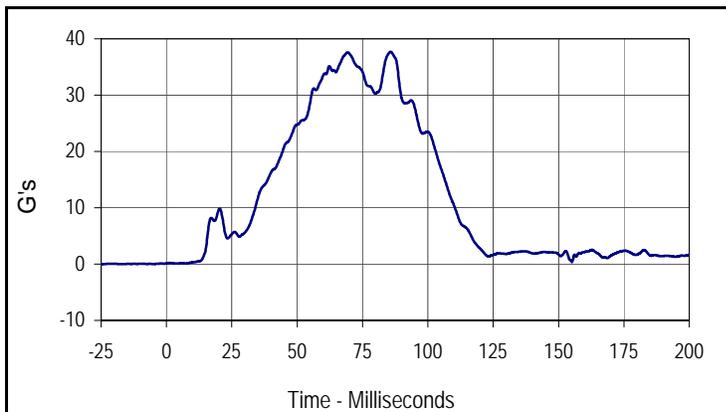
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012	FIL	180	G's
Max	Time	Min	Time
2.3	162.9	-37.4	85.9



Curve Description			
Passenger Chest Primary Y			
CURNO	Type	SAE Class	Units
013	FIL	180	G's
Max	Time	Min	Time
7.3	84.1	-4.4	70.9



Curve Description			
Passenger Chest Primary Z			
CURNO	Type	SAE Class	Units
014	FIL	180	G's
Max	Time	Min	Time
6.4	79.7	-4.5	87.8



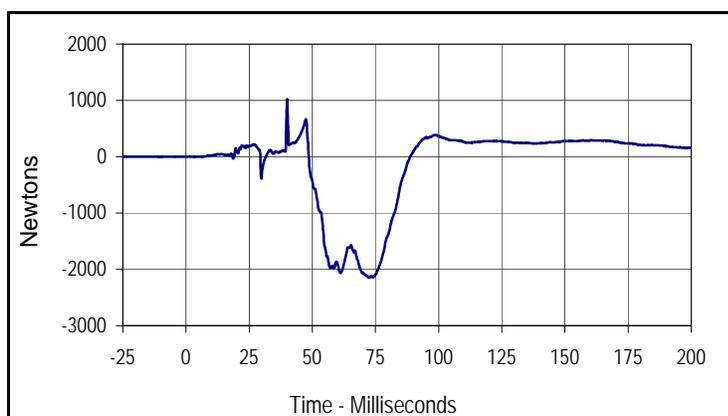
Curve Description			
Passenger Chest Resultant Primary			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
37.7	85.8	0.1	3.9

Test Vehicle: 2006 Chevrolet HHR LT 5-Door MPV
 Test Program: 2006 NHTSA 35mph NCAP

Test Date: 2/14/06
 NHTSA No.: M60108



Curve Description			
Passenger Left Femur Force Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
937.0	40.1	-4619.3	53.7



Curve Description			
Passenger Right Femur Force Z			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
1018.3	40.0	-2144.6	72.4

APPENDIX C
DUMMY CALIBRATION DATA

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

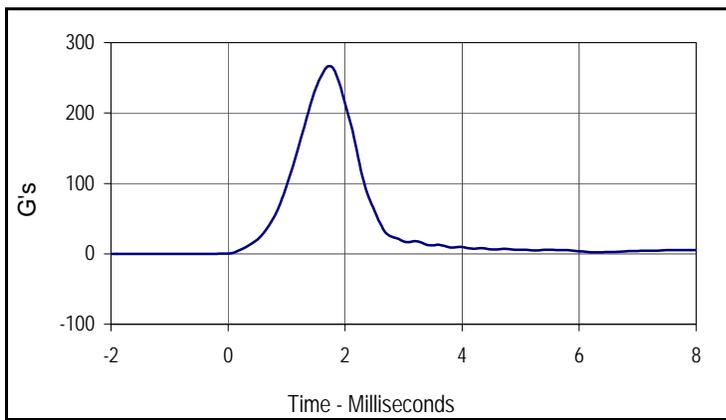
Test Date: 2/1/06

ATD Serial No.: 034

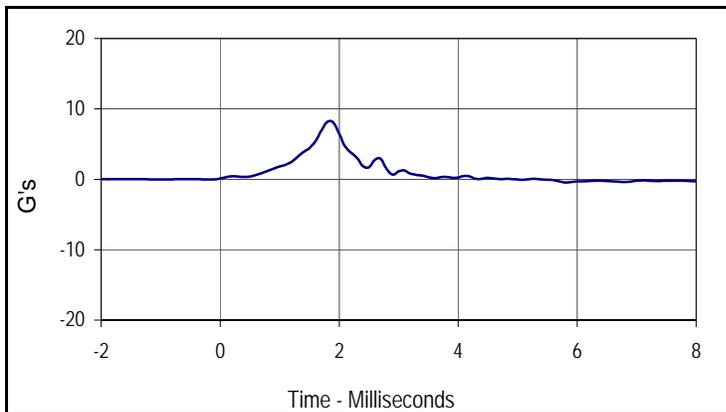
Test I.D.: HD02A



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	266.2	Pass
Peak Lateral Acceleration	G's	≤15.0	8.2	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
266.2	1.7	0.0	-0.8



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
8.2	1.8	-0.5	5.8

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

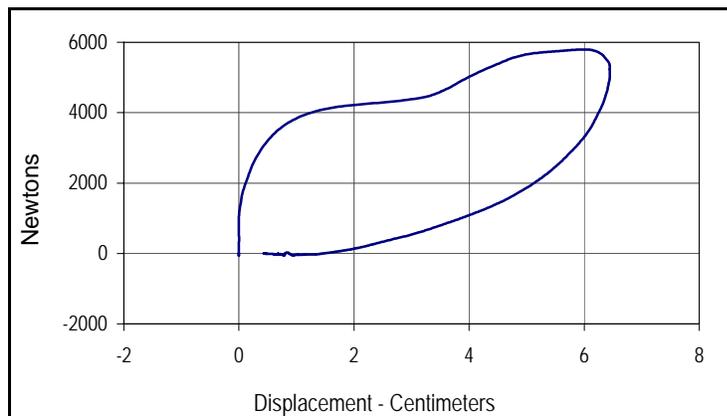
Test Date: 2/3/06

ATD Serial No.: 034

Test I.D.: CH02A



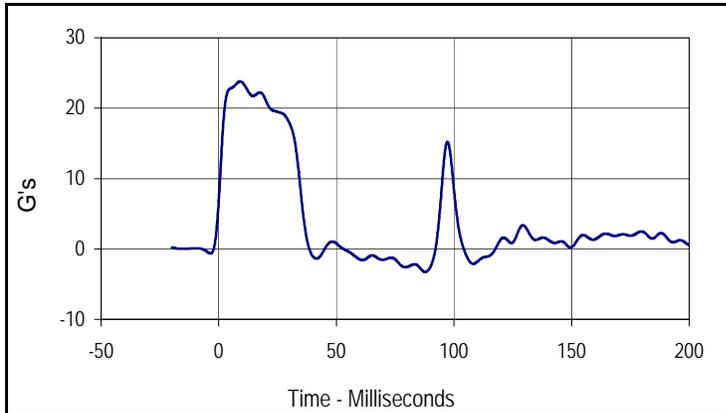
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.75	Pass
Peak Probe Force	Newtons	5159 to 5893	5796	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.45	Pass
Internal Hysteresis	%	69 to 85	76.8	Pass
Overall Test Results				Pass



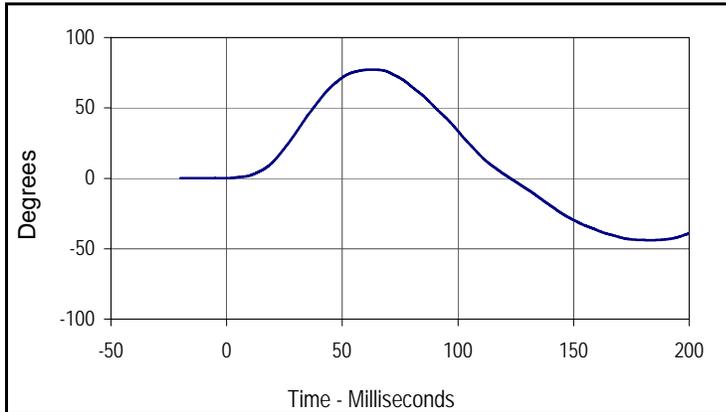
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysteresis
001	FIL	600	76.8
Peak Probe Force		Peak Chest Deflection	
5796		6.45	



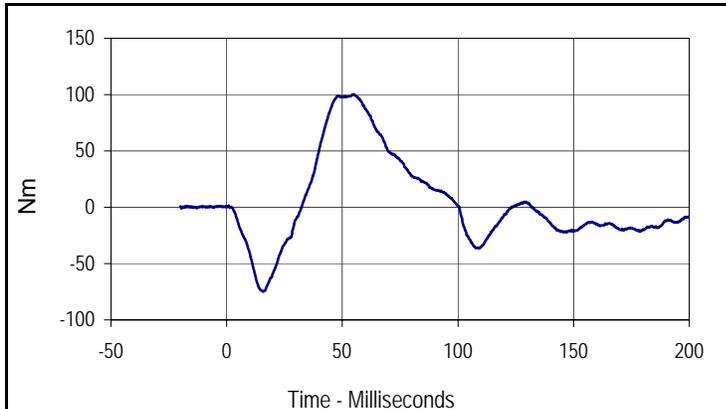
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.98	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.6	Pass
	20 Msec.	G's	17.6 to 22.6	21.1	Pass
	30 Msec.	G's	12.5 to 18.5	17.9	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	17.9	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	35.9	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	77.2	Pass
	Time	Msec.	57.0 to 64.0	62.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	122.7	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	100.4	Pass
	Time	Msec.	47.0 to 58.0	54.9	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	100.7	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.8	9.1	-3.3	87.7



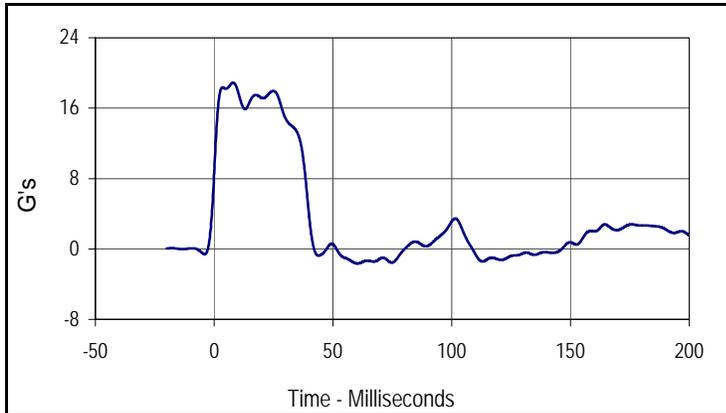
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
77.2	62.2	-43.9	184.2



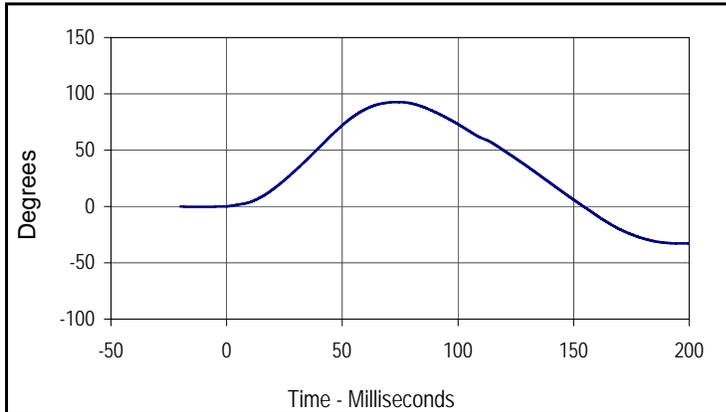
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
100.4	54.9	-74.9	15.9



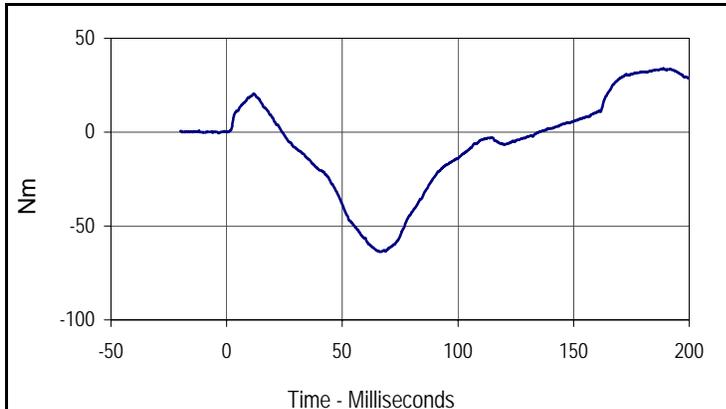
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.11	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.9	Pass
	20 Msec.	G's	14.0 to 19.0	17.2	Pass
	30 Msec.	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	39.6	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	92.7	Pass
	Time	Msec.	72.0 to 82.0	73.7	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	154.3	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-63.8	Pass
	Time	Msec.	65.0 to 79.0	66.4	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	135.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
18.9	8.0	-1.7	60.3



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
92.7	73.7	-32.8	196.1



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
34.0	188.9	-63.8	66.4

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

Test Date: 2/3/06

ATD Serial No.: 034

Test I.D.: LK02A , RK02A

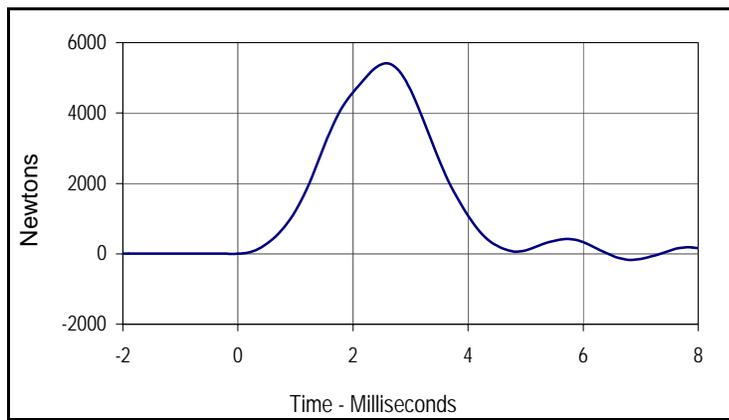


Left Knee

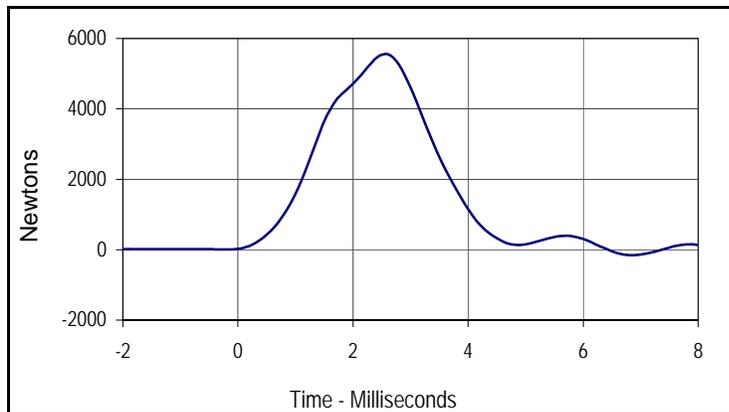
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5409	Pass
Overall Test Results				Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5556	Pass
Overall Test Results				Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5409.4	2.6	-201.6	8.9



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5555.6	2.6	-178.8	8.9

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 2/3/06

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	515	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	86	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	45	Pass
I - Shoulder to elbow length	mm	330 to 345	335	Pass
J - Elbow rest height	mm	190 to 211	208	Pass
K - Buttock to knee length	mm	579 to 604	600	Pass
L - Popliteal length	mm	429 to 455	436	Pass
M - Knee pivot height	mm	485 to 500	489	Pass
N - Buttock popliteal length	mm	452 to 477	475	Pass
O - Chest depth	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	261	Pass
V - Shoulder breadth	mm	422 to 437	431	Pass
W - Foot breadth	mm	91 to 107	100	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	430	Pass
BB - Location for waist circumference	mm	226 to 231	228	Pass
Overall Test Results				Pass

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

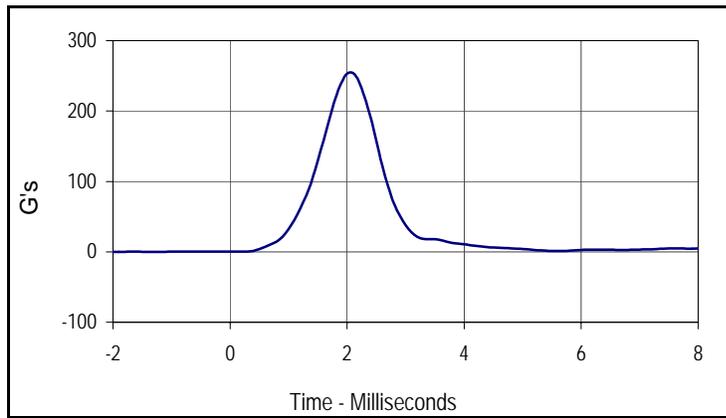
Test Date: 2/1/06

ATD Serial No.: 035

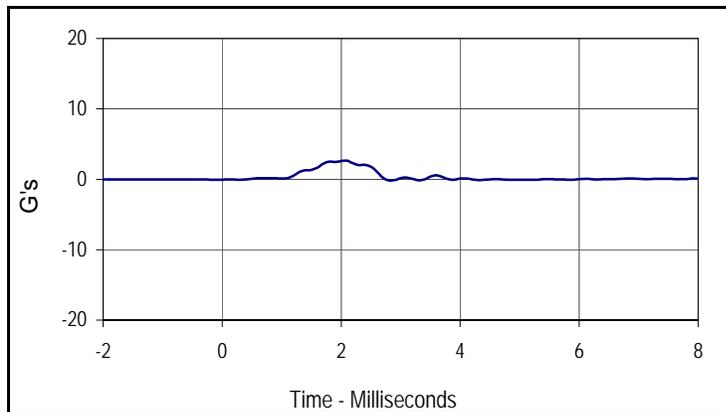
Test I.D.: HD02B



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	254.0	Pass
Peak Lateral Acceleration	G's	≤15.0	2.6	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
254.0	2.1	0.1	-1.3



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.6	2.1	-0.2	3.3

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

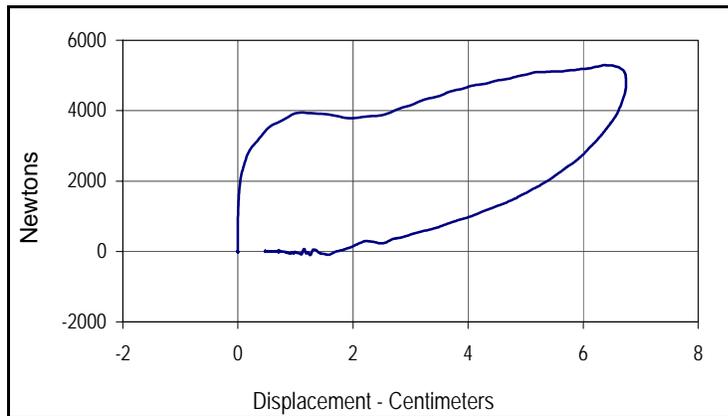
Test Date: 2/3/06

ATD Serial No.: 035

Test I.D.: CH12A



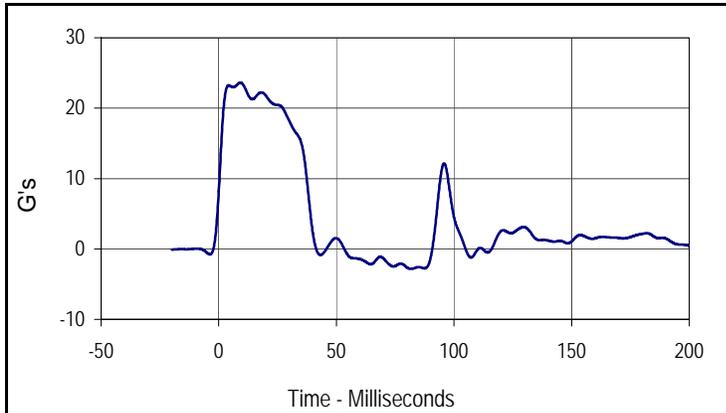
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.64	Pass
Peak Probe Force	Newtons	5159 to 5893	5293	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.75	Pass
Internal Hysteresis	%	69 to 85	75.9	Pass
Overall Test Results				Pass



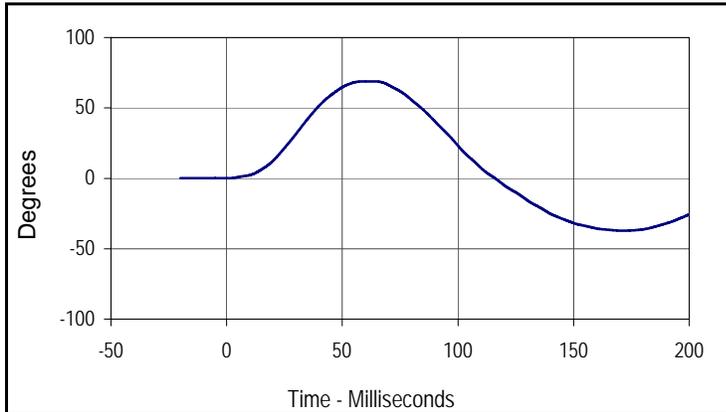
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysteresis
001	FIL	180	75.9
Peak Probe Force		Peak Chest Deflection	
5293		6.75	



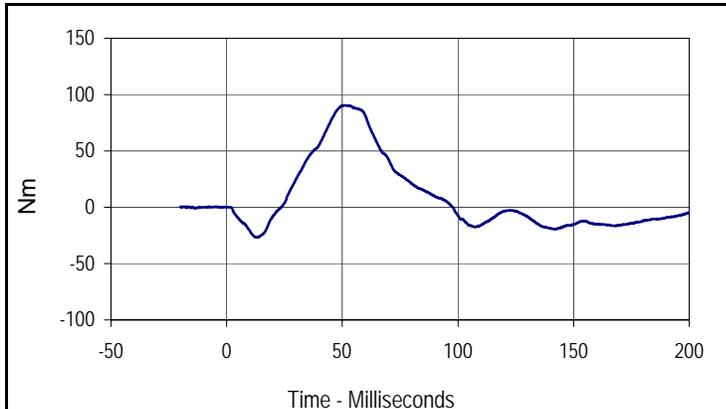
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.98	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.5	Pass
	20 Msec.	G's	17.6 to 22.6	21.8	Pass
	30 Msec.	G's	12.5 to 18.5	18.2	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	18.2	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	39	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	68.9	Pass
	Time	Msec.	57.0 to 64.0	61.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	116.1	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	90.6	Pass
	Time	Msec.	47.0 to 58.0	50.7	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	97.8	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.6	9.3	-2.8	81.6



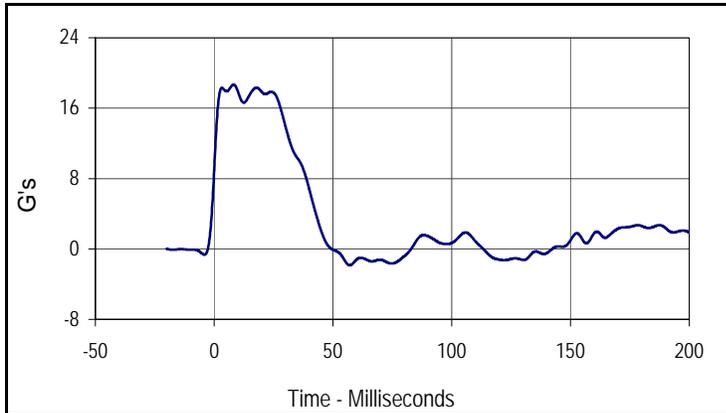
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
68.9	61.1	-37.1	170.9



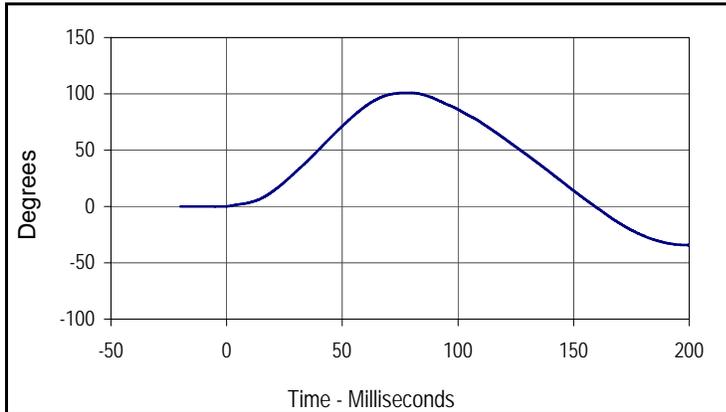
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
90.6	50.7	-26.8	13.1



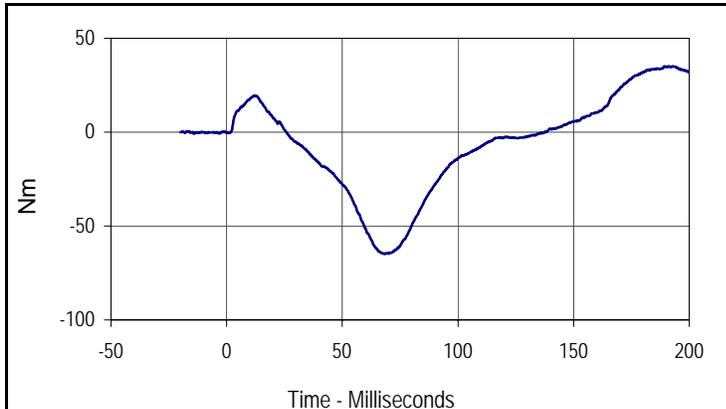
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass	
Laboratory Relative Humidity	%	10 to 70	30	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.11	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.9	Pass
	20 Msec.	G's	14.0 to 19.0	17.9	Pass
	30 Msec.	G's	11.0 to 16.0	13.9	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	13.9	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	41.8	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	101.0	Pass
	Time	Msec.	72.0 to 82.0	78.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	159.3	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-64.8	Pass
	Time	Msec.	65.0 to 79.0	68.3	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	137.5	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
18.7	8.1	-1.9	57.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
101.0	78.1	-34.3	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
35.1	189.2	-64.8	68.3

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

Test Date: 2/3/06

ATD Serial No.: 035

Test I.D.: LK02B , RK02B

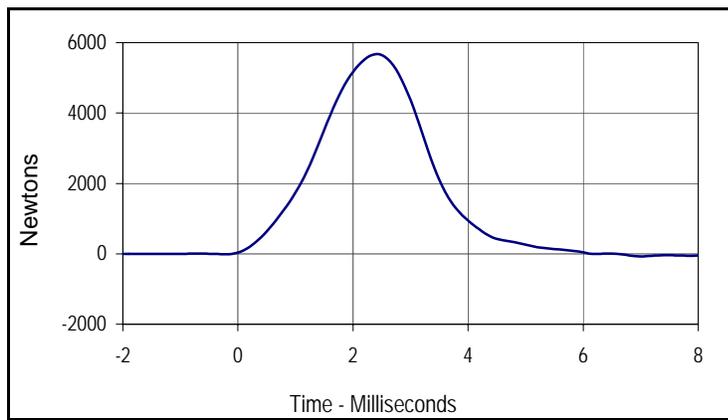


Left Knee

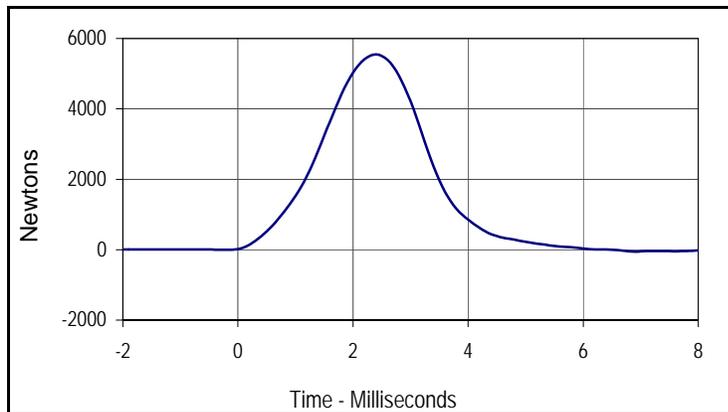
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5671	Pass
Overall Test Results				Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5544	Pass
Overall Test Results				Pass



Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5671.0	2.4	-72.7	7.0



Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5544.5	2.4	-52.0	6.9

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 2/3/06

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	887	Pass
B - Shoulder pivot height	mm	505 to 521	508	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	90	Pass
F - Thigh clearance	mm	140 to 155	143	Pass
G - Elbow back to wrist pivot	mm	290 to 305	298	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	340	Pass
J - Elbow rest height	mm	190 to 211	210	Pass
K - Buttock to knee length	mm	579 to 604	580	Pass
L - Popliteal length	mm	429 to 455	445	Pass
M - Knee pivot height	mm	485 to 500	495	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	260	Pass
V - Shoulder breadth	mm	422 to 437	432	Pass
W - Foot breadth	mm	91 to 107	105	Pass
Y - Chest circumference	mm	970 to 1001	995	Pass
Z - Waist circumference	mm	836 to 866	860	Pass
AA - Location for chest circumference	mm	429 to 434	430	Pass
BB - Location for waist circumference	mm	226 to 231	228	Pass
Overall Test Results				Pass