REPORT NUMBER TR-P27001-01-NC

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

TOYOTA MOTOR CORPORATION
2007 LEXUS ES 350
4-DOOR SEDAN

NHTSA NUMBER: M75107

PREPARED BY:
KARCO ENGINEERING, LLC
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AUGUST 9, 2006

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
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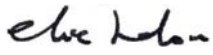
Prepared by:  Date: August 9, 2006

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16. Abstract

A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2007 Lexus ES 350 4-Door Sedan at Karco Engineering, LLC on 8/09/06. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 55.92 km/h. The ambient temperature at the barrier face at the time of impact is 39.0 degrees Celcius. The vehicle's maximum post-test static crush is 431 mm to the left of 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	389.5	390.9
Max. Chest Accel. (3 msec Clip)	G's	60	39.5	38.5
Left Femur Force	Newtons	10008	-3102.6	-4200.6
Right Femur Force	Newtons	10008	-2794.2	-3256.4

17. Key Words
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SECTION 1
PURPOSE AND SUMMARY OF TEST M75107

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 45 load cells was impacted by a 2007 Lexus ES 350 4-Door Sedan at a velocity of 55.92 km/h. The test was performed at Karco Engineering, LLC on August 9, 2006.

Three (3) real-time and fifteen (15) 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 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 431 mm to the left of 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 airbag.

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

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	389.5	39.5	-24.5	-3102.6	-2794.2
Passenger	390.9	38.5	-28.2	-4200.6	-3256.4

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

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

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	^oF	^oC	=(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 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	55.92
Test Weight	kg	1854
Impact Angle	degrees	0
Average Rebound	mm	1260
Maximum Static Crush	mm	431

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 Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

MOVIE COVERAGE

Cameras	Standard	Additional
High Speed	13	2
Real Time	1	2
Total	14	4

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 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M75107	Anti-Lock Brakes	Yes
Make	Lexus	All Wheel Drive	No
Model	ES 350	Power Steering	Yes
Body Style	4-Door Sedan	Driver Front Airbag	Yes
Vin No.	JTHBJ46G472032142	Driver Side Airbag	Yes
Color	Dark Gray	Driver Head Airbag	No
Delivery Date	8/3/2006	Driver Curtain Airbag	Yes
Odometer (Miles)	56.0	Pass. Airbag	Yes
Dealer	Crown Lexus	Pass. Side Airbag	Yes
Transmission	6-Speed Automatic	Pass. Head Airbag	No
Final Drive	Front	Pass. Curtain Airbag	Yes
Type/No. Cyl.	V6	Pre-Tensioners	Yes
Engine Disp. (L)	3.5	Load Limiters	Yes
Engine Placement	Transverse	Bucket Seats	Yes
Roof Rack	No	Air. Cond.	Yes
Sunroof/T-Top	Yes	AM/FM Cassette	Yes
Tinted Glass	No	Tilt Steering	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	Yes
Rear Disc	Yes	Other	Knee Airbags

Does Owners Manual provide instructions to turn off automatic door locks. No

DATA FROM MANUFACTURER

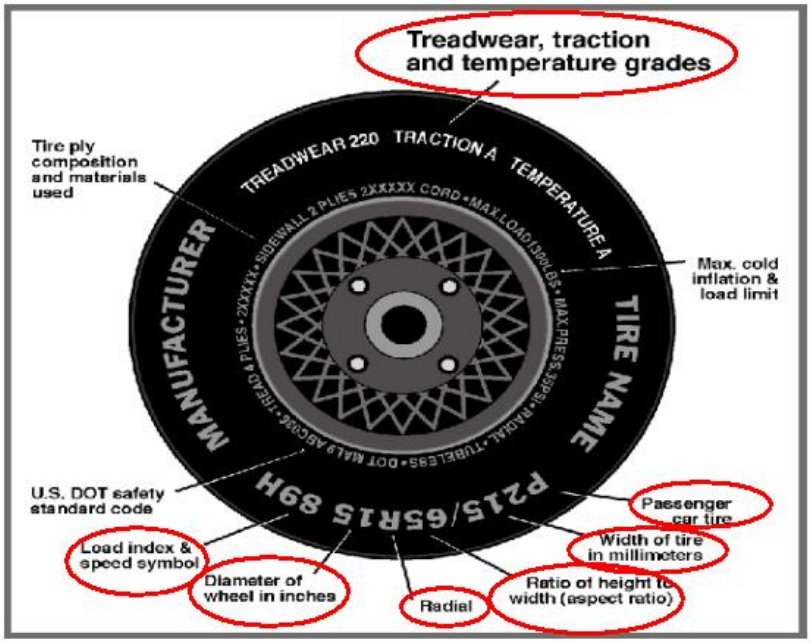
Manufactured By	Toyota Motor Corporation	GVWR (kg)	2123
		GAWR Front (kg)	1210
Date of Manufacture	Jun-06	GAWR Rear (kg)	1070

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number of Occupants	2	3		5
Capacity Weight (VCW) (kg)				410
Cargo Weight (RCLW) (kg)				68

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

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	P215/55R17	P215/55R17
Tire Size on Vehicle	P215/55R17	P215/55R17
Tire Manufacturer	TOYO	TOYO
Treadwear	220	220
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester + 2 Steel + 1 Nylon	2 Polyester + 2 Steel + 1 Nylon
Load Index/Speed Symbol	93V	93V
Tire Material	Polyester + Steel + Nylon	Polyester + Steel + Nylon
DOT Safety Code Right	DOT CXLM C6Y2106	DOT CXLM C6Y2106
DOT Safety Code Left	DOT CXLM C6Y2106	DOT CXLM C6Y2106

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

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107

Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	484	326	810	511	410	921
Right	kg	510	322	832	531	402	933
Ratio	%	60.5	39.5	100	56.2	43.8	100
Totals	kg	994	648	1642	1042	812	1854

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1642
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	68
Calculated Vehicle Target Wt. (TVTW)	kg	1862

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	715	715	720	730	1109
As Tested	mm	695	696	691	692	1218

Vehicle Wheel Base (mm): 2780

Weight of Ballast Secured in cargo area (kg): 9

Weight of Items Removed (kg): 59

Vehicle Components Removed: Spare tire, jack, rear bumper, rear hatch, top of rear seat, floor mats, and rear bumper support.

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

FUEL SYSTEM DATA

Fuel System Capacity From Owners Manual (L): 70.02

Actual Test Volume with entire fuel System Filled (L): 65.10

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 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No.1 Velocity (Primary)	km/h	55.51 to 57.12	55.92
Trap No.2 Velocity (Redun.)	km/h	55.51 to 57.12	55.92

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	4660	4249	-411
Center	mm	4845	4445	-400
Right Side	mm	4661	4335	-326

VEHICLE REBOUND FROM BARRIER

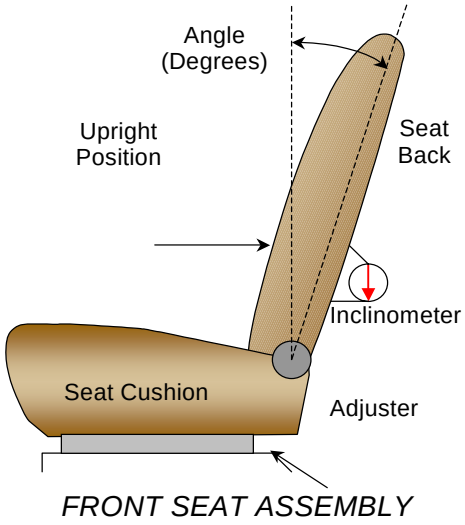
Measured Parameter	Units	Value
Left Side	mm	1260
Center	mm	1220
Right Side	mm	1300
Average	mm	1260

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

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.



FRONT SEAT ASSEMBLY

SEAT BACK ANGLES

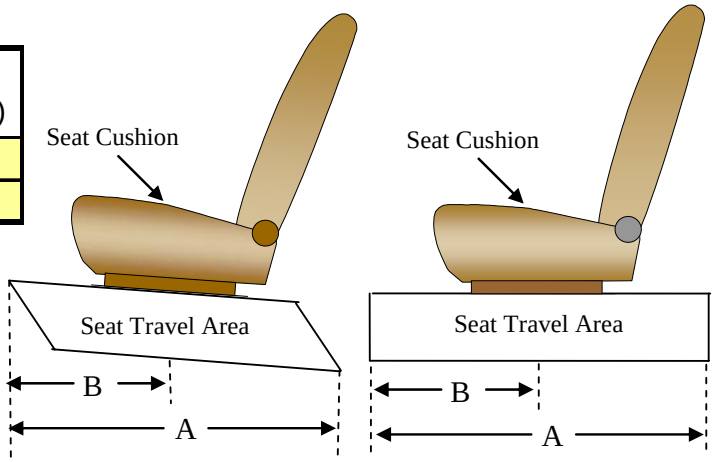
	Deg.
Driver w/seated Dummy	4.4 @ headrest
Passenger w/seated Dummy	4.1 @ headrest

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	286	143
Passenger Seat	286	143



SEAT BELT UPPER ANCHORAGE

Position number one (1) is the uppermost position.

SEAT BELT UPPER ANCHORAGE

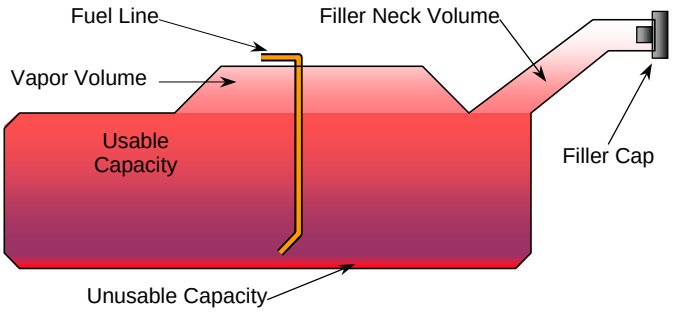
	Total # of Positions	Placed in Position #
Driver Seat	4	1
Passenger Seat	4	1

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	70.02
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	64.42 to 65.82
Actual Amount of Solvent used	65.10

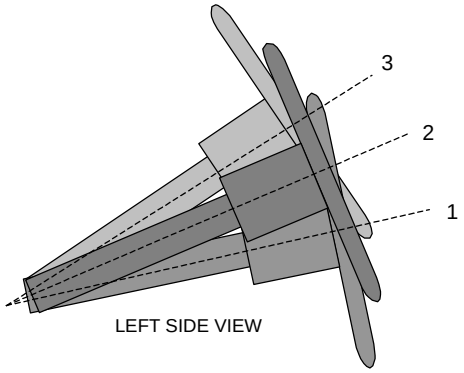
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the “ON” position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies 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 positon No. 1	57.5	167
Geometric center position No. 2	65.0	186
Uppermost position No. 3	72.0	206

DATA SHEET NO. 5
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

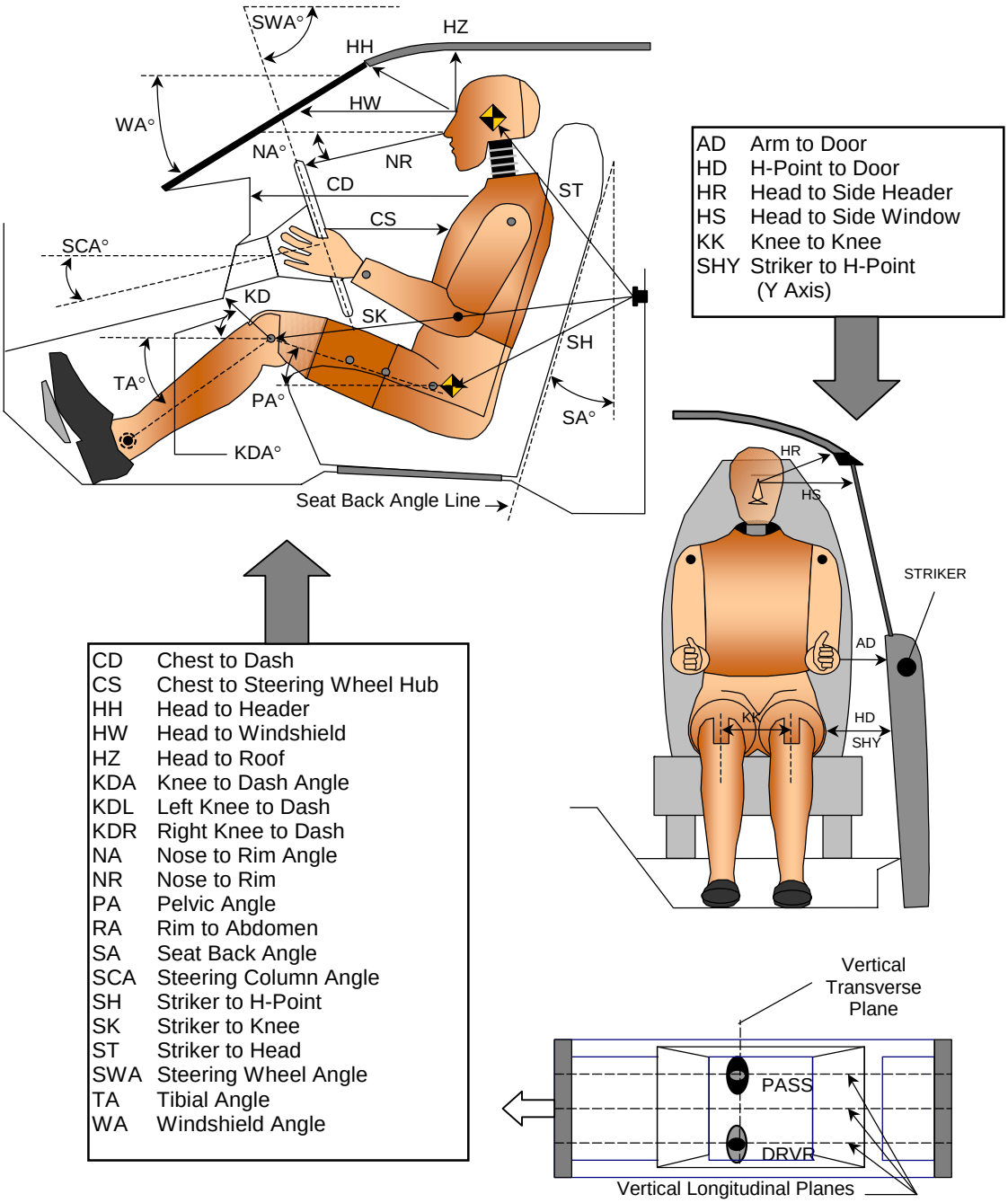
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (deg)	Length (mm)	Angle (deg)
WA	Windshield Angle		26.1		
SWA	Steering Wheel Angle		25.0		
SCA	Steering Column Angle		65.0		
SA	Seat Back Angle		4.4 @ headrest		4.1 @ headrest
HZ	Head to Roof (Z)	165	90.0	170	90.0
HH	Head to Header	288		280	
HW	Head to Windshield	542		575	
HR	Head to Side Header (Y)	278		290	
NR	Nose to Rim	390	3.6		
CD	Chest to Dash	615		575	
CS	Chest to Steering Hub	320			
RA	Rim to Abdomen	188			
KDL	Left Knee to Dash	160	0.2	175	
KDR	Right Knee to Dash	130		190	0.3
PA	Pelvic Angle		23.6		24.3
TA	Tibia Angle		54.6		45.1
KK	Knee to Knee (Y)	270		270	
SK	Striker to Knee	660	8.3	672	13.3
ST	Striker to Head	438	61.4	420	6.1
SH	Striker to H-Point	368	52.2	390	47.3
SHY	Striker to H-Point (Y)	258		230	
HS	Head to Side Window	356		330	
HD	H-Point to Door (Y)	158		175	
AD	Arm to Door (Y)	123		110	

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

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107

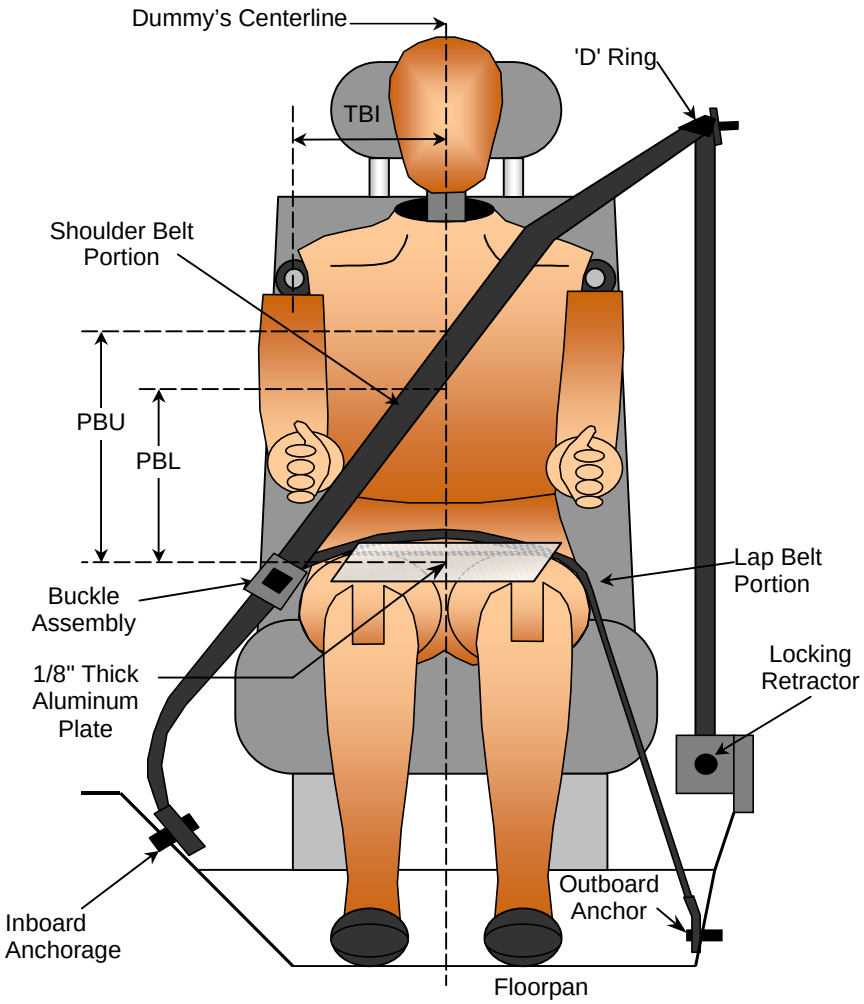
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06



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	350	350
PBL - Top Surface of reference to belt lower edge	mm	240	222
Lap Belt Tension	Newtons	10	10
Shoulder Belt Tension	N/A	Retractor	Retractor

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATION

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107

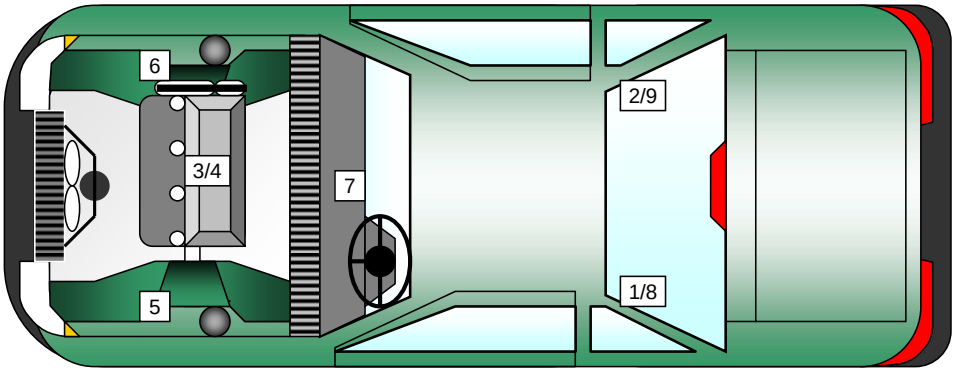
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

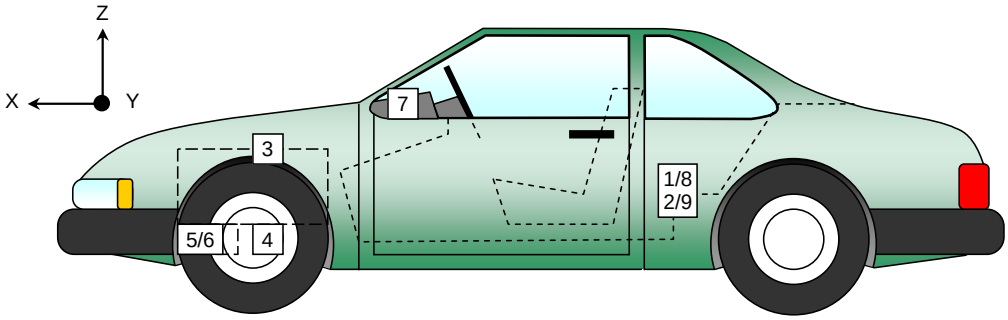
VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)			
		X	Y	Z	
1	Left Rear X-Member	2036	-745	335	
2	Right Rear X-Member	2036	745	335	
3	Engine Top				2
4	Engine Bottom	4131	-240	175	
5	Left Brake Caliper	4095	-693	295	
6	Right Brake Caliper	4095	693	295	
7	Instrument Panel				1
8	Left Rear X-Member (Z-Axis)	2036	-745	335	
9	Right Rear X-Member (Z-Axis)	2036	745	335	

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

1.) Instrument Panel no longer used by NHTSA 2.) Insufficient room for installation





DATA SHEET NO. 8
SEAT BELT ASSESSMENT TEST DATA

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
Retractor Reel to "D" ring	mm	850	850
Shoulder Belt length as measured on ATD	mm	930	970
Lap Belt length as measured on ATD	mm	620	620
Remainder of belt on reel	mm	1030	930
Total belt length for continuous webbing systems	mm	3430	3370

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	40	80
As determined electronically	mm	144	173

BELT STRETCH DATA

Measuerment 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 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

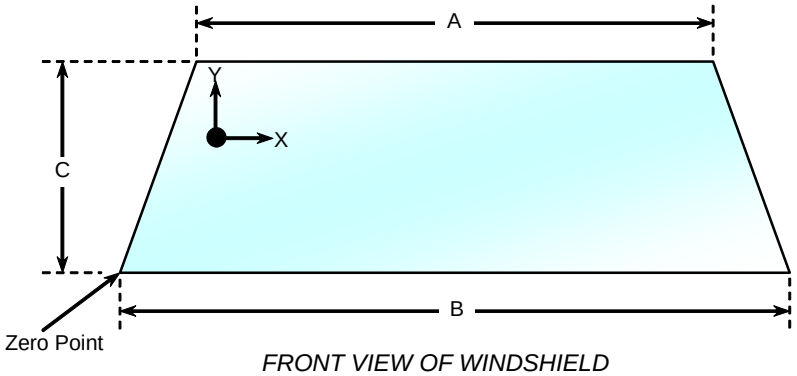
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

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	2146	2146	100
Right Side	2146	2146	100
Total	4292	4292	100



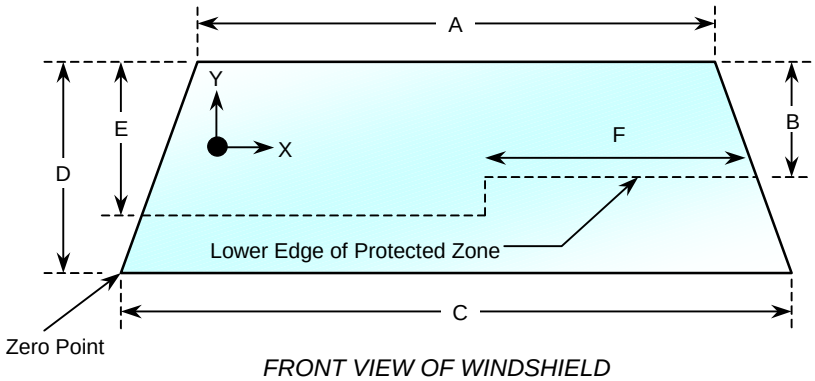
FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1240	
B	mm	1500	10
C-Left	mm	776	
C-Right	mm	776	

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

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06



FRONT VIEW OF WINDSHIELD

WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1240
B	mm	538
C	mm	1500
D	mm	776
E	mm	480
F	mm	545

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: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

Test Time: 3:40 PM Temperature: 39.0 Deg. C.

STODDARD SOLVENT SPILLAGE MEASUREMENTS

A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)

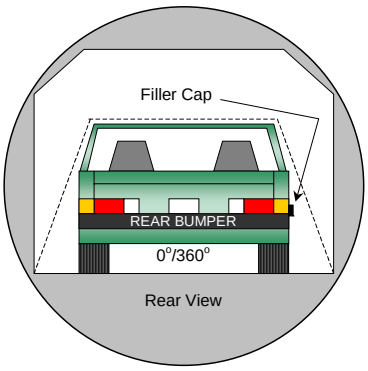
B. For the 5 minute period after motion ceases: 0.0 oz.
(Maximum Allowable = 5 ounces)

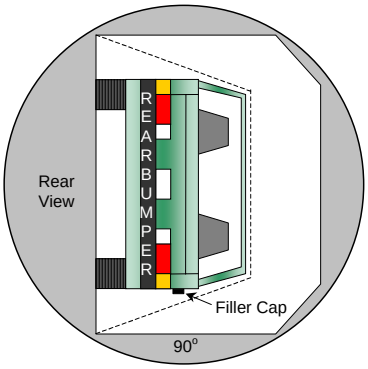
C. For the following 25 minutes: 0.0 oz.
(Maximum Allowable = 1 oz./minute)

D. Spillage Location Details: No leakage occurred

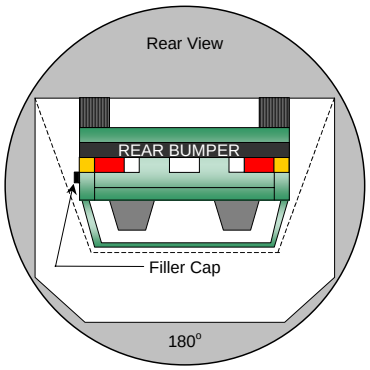
DATA SHEET NO. 12
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

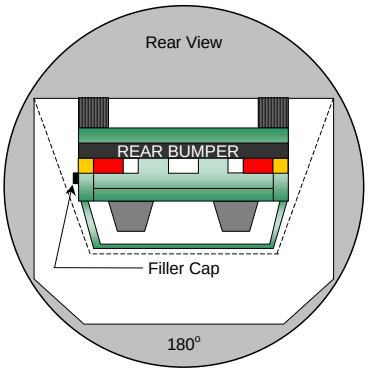




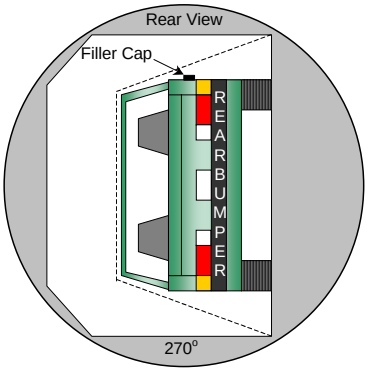
0° to 90°

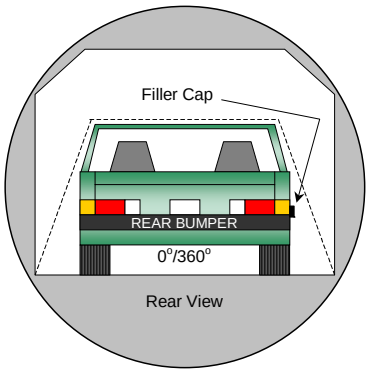


90° to 180°



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: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	80	300	380
90° to 180°	83	300	383
180° to 270°	78	300	378
270° to 360°	76	300	376

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 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

VEHICLE MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length of vehicle at centerline	mm	4845	4445	-400
2	RSOV to front of engine	mm	4350	4131	-219
3	RSOV to firewall centerline	mm	3725	3748	23
4	RSOV to leading edge of right door	mm	3400	3400	0
5	RSOV to leading edge of left door	mm	3400	3395	-5
6	RSOV to lower leading edge of right door	mm	3385	3381	-4
7	RSOV to lower leading edge of left door	mm	3382	3383	1
8	RSOV to upper trailing edge of right door	mm	2257	2265	8
9	RSOV to upper trailing edge of left door	mm	2257	2256	-1
10	RSOV to lower trailing edge of right door	mm	2245	2243	-2
11	RSOV to lower trailing edge of left door	mm	2244	2243	-1
12	RSOV to bottom of right 'A' pillar	mm	3346	3343	-3
13	RSOV to bottom of left 'A' pillar	mm	3346	3346	0
14	RSOV to firewall on right side	mm	3678	3730	52
15	RSOV to firewall on left side	mm	3688	3899	211
16	RSOV to steering column	mm	2880	2958	78
17	Center of steering column to left 'A' pillar	mm	445	420	-25
18	Center of steering column to headlining	mm	430	425	-5
19	RSOV to right side of front bumper	mm	4661	4335	-326
20	RSOV to left side of front bumper	mm	4660	4249	-411
21	Length of engine block	mm	640	640	0
RD	RSOV to right side of dash panel	mm	3121	3139	18
CD	RSOV to center of dash panel	mm	3090	3100	10
LD	RSOV to left side of dash panel	mm	3126	3128	2

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

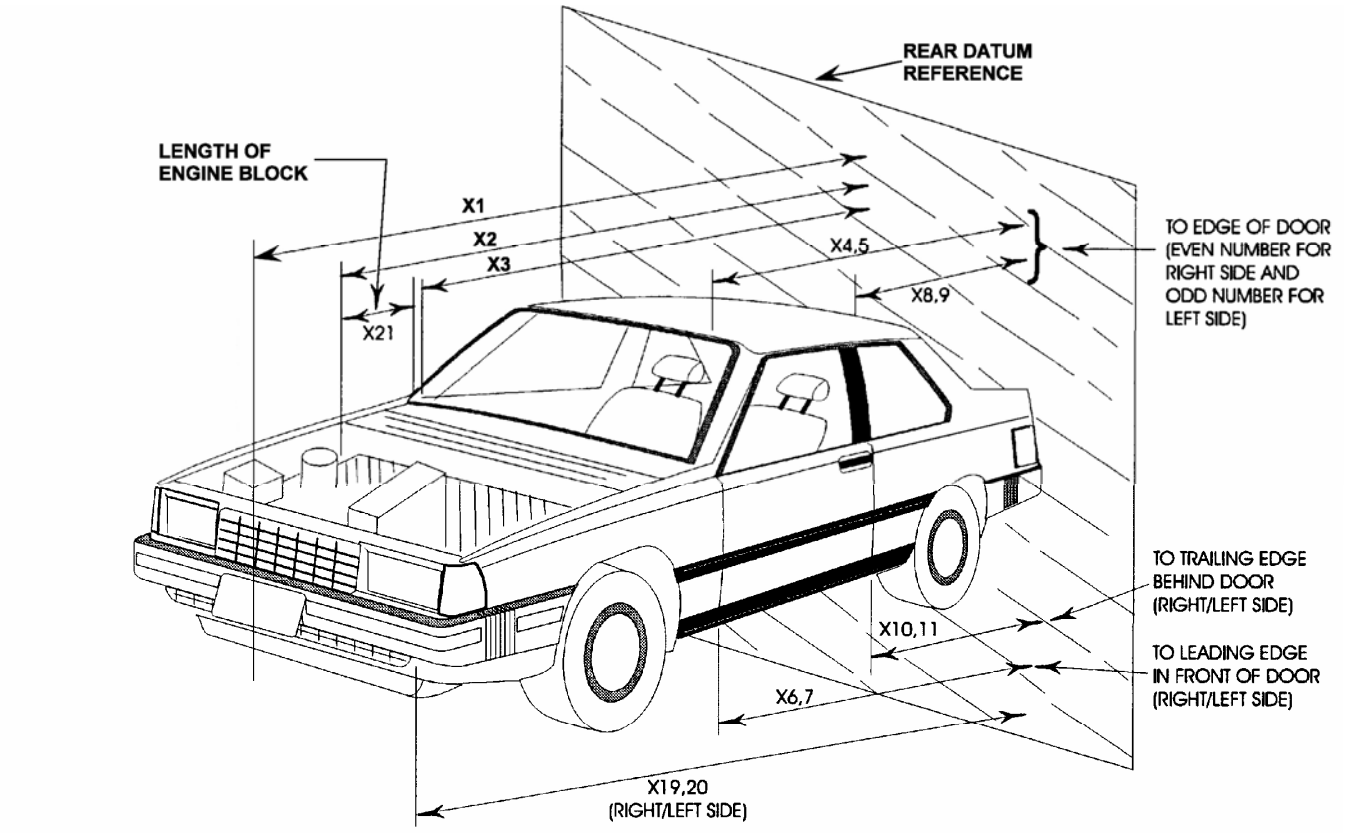
Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

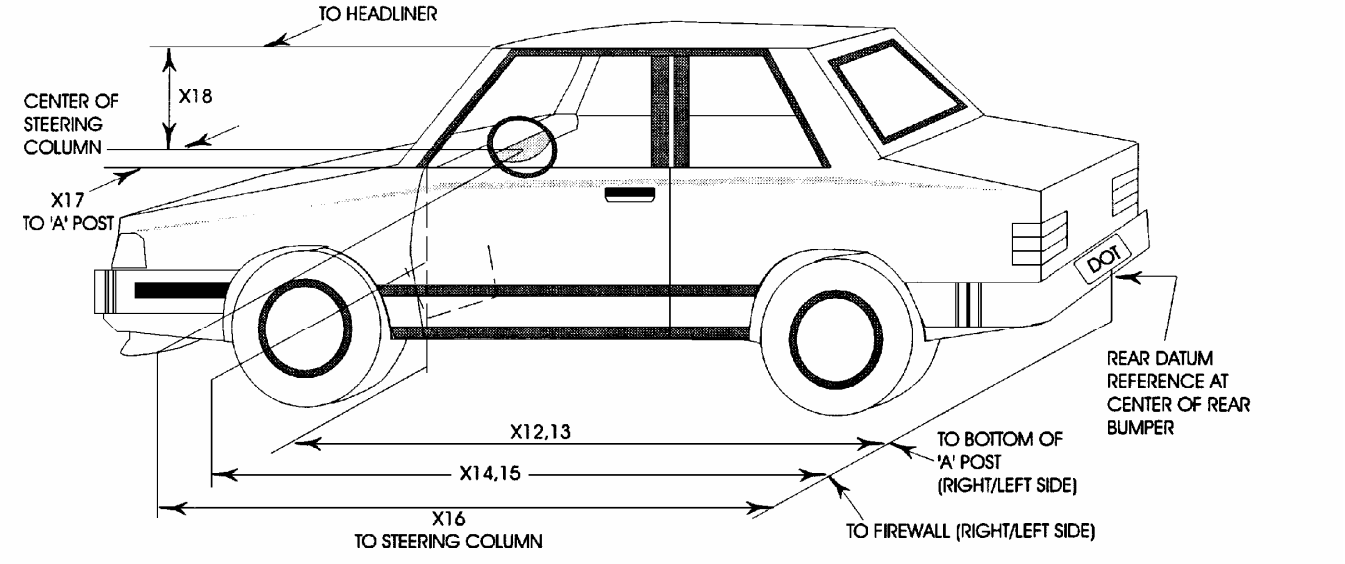
VEHICLE STRUCTURAL MEASUREMENT TABLE

No.	Measurement Description	Units	Pre-Test	Post-Test	Diff.
1	Total length	mm	4845	4445	-400
2	Total width	mm	1807	1810	3
3	Bumper top height	mm	652	490	-162
4	Bumper bottom height	mm	171	170	-1
5	Longitudinal member top height	mm	587	561	-26
6	Longitudinal member bottom height	mm	462	436	-26
7	Distance between longitudinal members	mm	875	883	8
8	Longitudunal member width	mm	107	108	1
9	Engine top height	mm	890	864	-26
10	Engine bottom height	mm	149	159	10
11	Engine and gear box width	mm	910	910	0
12	Front bumper to engine distance	mm	484	340	-144
13	Front shock absorber fixing width	mm	905	920	15
14	Bonnet leading edge height	mm	740	733	-7
15	Front shock absorber fixing width	mm	1195	1120	-75
16	Front bumper to front axle distance	mm	974	547	-427
17	Front axle to 'A' pillar distance	mm	465	430	-35
18	'A' pillar to 'B' pillar distance	mm	1145	1135	-10
19	'B' pillar to rear axle distance	mm	1142	1140	-2
20	'B' pillar to 'C' pillar distance	mm	1135	1134	-1
21	Roof sill bottom height	mm	1295	1295	0
22	Roof sill top height	mm	1400	1400	0
23	Floor sill bottom height	mm	200	179	-21
24	Floor sill top height	mm	350	342	-8

DATA SHEET NO. 13…(CONTINUED)
VEHICLE MEASUREMENTS

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06





DATA SHEET NO. 14
CAMERA LOCATIONS

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

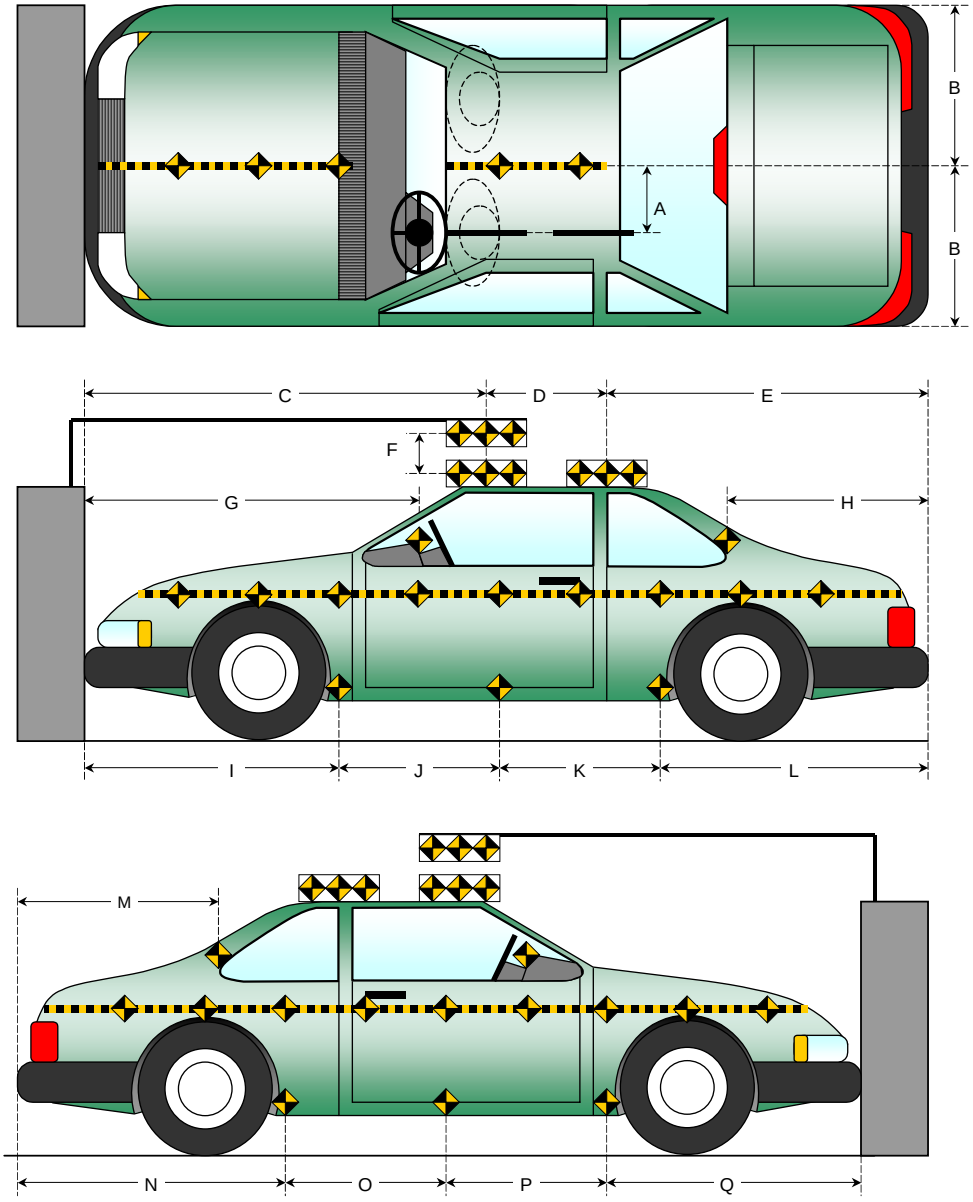
VEHICLE CAMERA MEASUREMENT TABLE

No.	Camera View	Location (mm)			Angle (deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Real Time Camera (Panning)	-15284	-7942	-1593	0			30
2	Overall Left Side	-1805	-7191	-1134	0	6733	20mm	1000
3	Left Side View	-1524	-7124	-1167	-3	6685	50mm	1000
4	Driver and Interior View	-8696	-12562	-4511	-13	14142	ZOOM	1000
5	Steering Column (Bottom)	-1631	-8234	-2682	-13	7914	35mm	1000
6	Overall Right Side	-1663	-8153	-3078	-17	7915	35mm	1000
7	Right Side View	-2572	6864	-1104	-2	6412	20mm	1000
8	Passenger and Interior View	-2006	6524	-1245	-4	6059	50mm	1000
9	Right Side View	-5330	9365	-2407	-10	9537	ZOOM	1000
10	Windshield View	-2006	6967	-1463	-6	6508	ZOOM	1000
11	Driver Front View	-589	0	-5556	-75		24mm	1000
12	Passenger Front View	378	-286	-2438	-35		25mm	1000
13	Pit View of Engine	375	413	-2439	-35		25mm	1000
14	Pit View of Fuel Tank	-748	0	1495	90		12mm	1000
15	Real Time Camera	-3348	0	1495	90		8mm	1000
16	Real Time Camera	-2726	401	-1238	-7		12mm	1000
17	Driver On-Board	-2726	-401	-1238	-7		12mm	1000
18	Passenger On-Board	1742	6528	-1104	-1	7194		30

DATA SHEET NO. 15
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

All Dimensions in (mm)	
Item	Value
A	
B	1807
C	
D	
E	
F	
G	1835
H	1060
I	1445
J	950
K	950
L	1535
M	1060
N	1534
O	950
P	950
Q	1446



DATA SHEET NO. 16
VEHICLE INTRUSION MEASUREMENTS

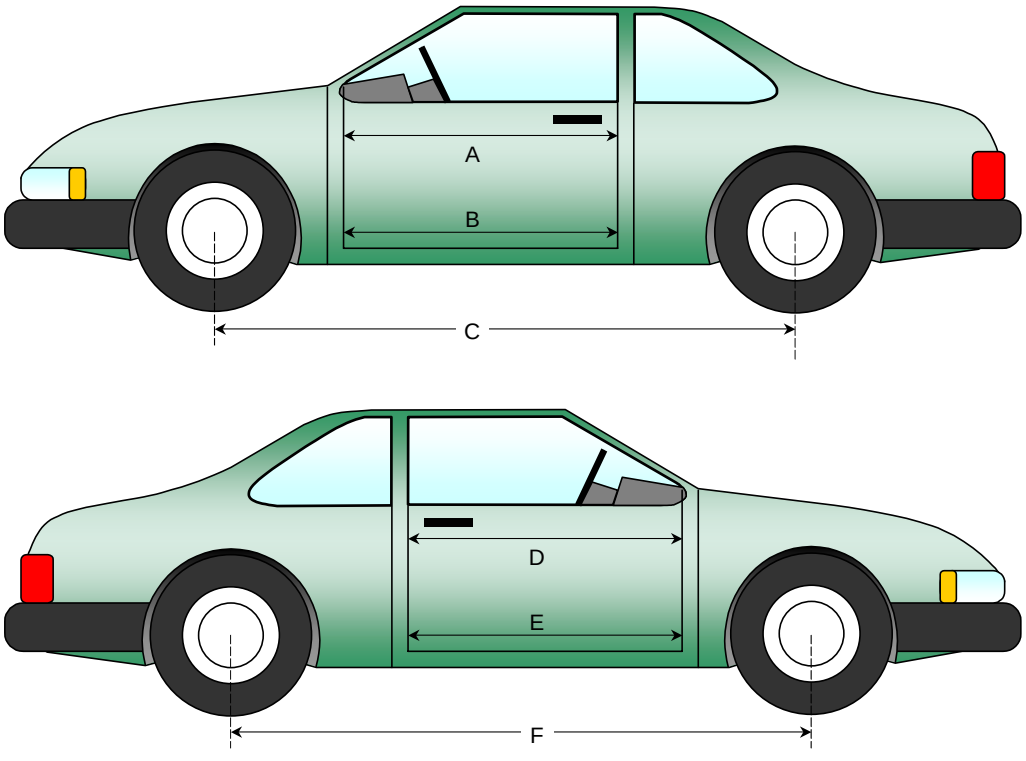
Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

DOOR OPENING WIDTH TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
A	Left Side Upper	mm	1039	1049	10
B	Left Side Lower	mm	920	926	6
D	Right Side Upper	mm	1040	1044	4
E	Right Side Lower	mm	922	949	27

WHEELBASE MEASUREMENT TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
C	Left Side Wheel Base	mm	2780	2710	-70
F	Right Side Wheel Base	mm	2780	2708	-72

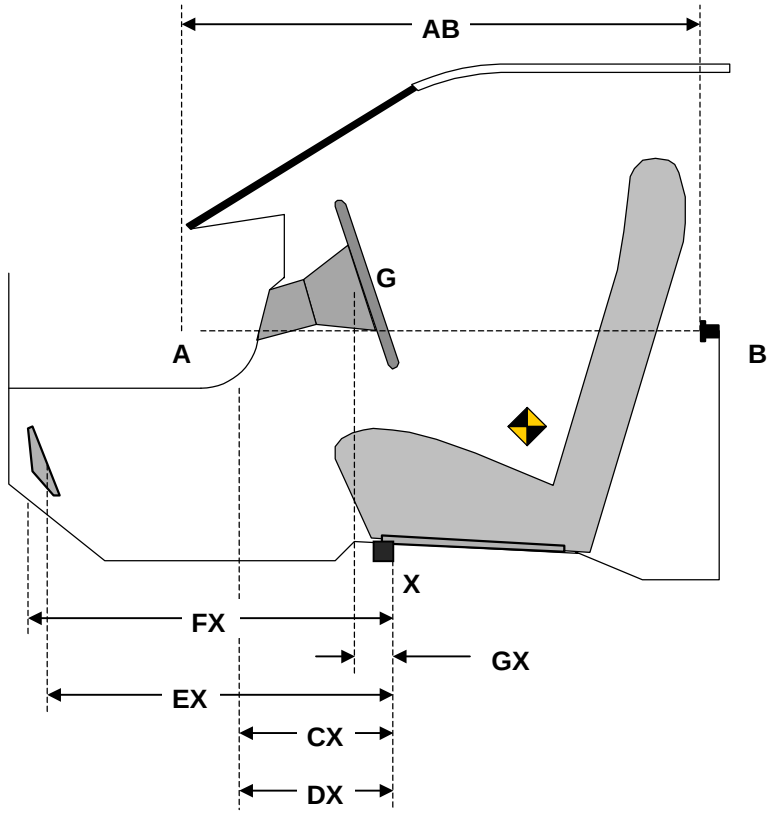


DATA SHEET NO. 16…(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

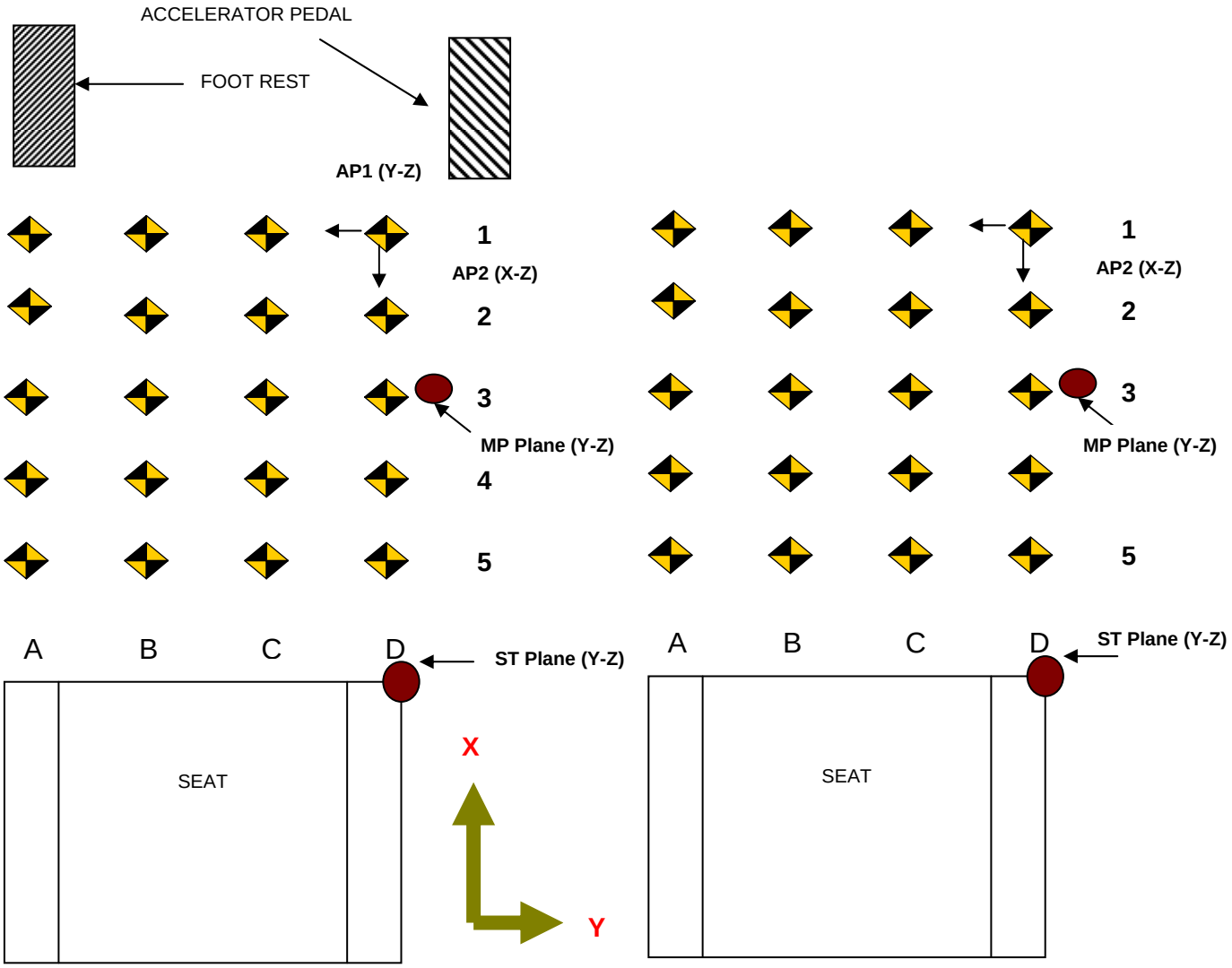
DRIVER COMPARTMENT INTRUSION TABLE

Item	Description	Units	Pre-Test	Post-Test	Diff.
AB	Door Opening (Inside window jam)	mm	1039	973	-66
CX	Left Knee Bolster to X	mm	210	250	40
DX	Right Knee Bolster to X	mm	315	288	-27
EX	Brake Pedal to X	mm	581	455	-126
FX	Foot Rest to X	mm	596	567	-29
GX	Center of Steering Wheel Hub to X	mm	76	88	12



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

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06



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: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

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	-541	-594	-614	-684	580	624	611	599	1121	1218	1225	1283
2	-492	-507	-516	-610	558	556	539	519	1050	1063	1055	1129
3	-408	-414	-424	-520	502	476	464	437	910	890	888	957
4	-274	-285	-296	-298	359	342	325	307	633	627	621	605
5	-137	-152	-162	-254	217	201	191	176	354	353	353	430

DRIVER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	148	214	225	-82	91	217	318	484	-57	3	93	566
2	179	239	240	254	89	187	307	481	-90	-52	67	227
3	235	233	252	296	74	181	297	459	-161	-52	45	163
4	192	198	193	250	51	167	277	445	-141	-31	84	195
5	157	146	154	174	44	156	266	427	-113	10	112	253

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-76	24	145	236	-12	41	38	48	64	17	-107	-188
2	-75	36	152	247	39	95	106	120	114	59	-46	-127
3	-65	41	156	275	141	145	161	156	206	104	5	-119
4	-57	65	182	294	165	160	163	169	222	95	-19	-125
5	-37	84	197	320	177	177	184	164	214	93	-13	-156

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

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

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	677	675	666	651	547	551	550	558	-130	-124	-116	-93
2	594	588	581	562	460	467	485	506	-134	-121	-96	-56
3	504	496	482	476	369	389	405	412	-135	-107	-77	-64
4	375	362	354	343	259	267	275	283	-116	-95	-79	-60
5	243	228	217	203	124	137	140	144	-119	-91	-77	-59

PASSENGER FLOOR PAN Y-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-273	-174	-48	42	-418	-315	-182	-87	-145	-141	-134	-129
2	-294	-182	-53	68	-416	-300	-174	-59	-122	-118	-121	-127
3	-308	-186	-58	63	-407	-289	-167	-46	-99	-103	-109	-109
4	-321	-196	-71	53	-405	-286	-165	-40	-84	-90	-94	-93
5	-344	-201	-86	40	-399	-274	-160	-39	-55	-73	-74	-79

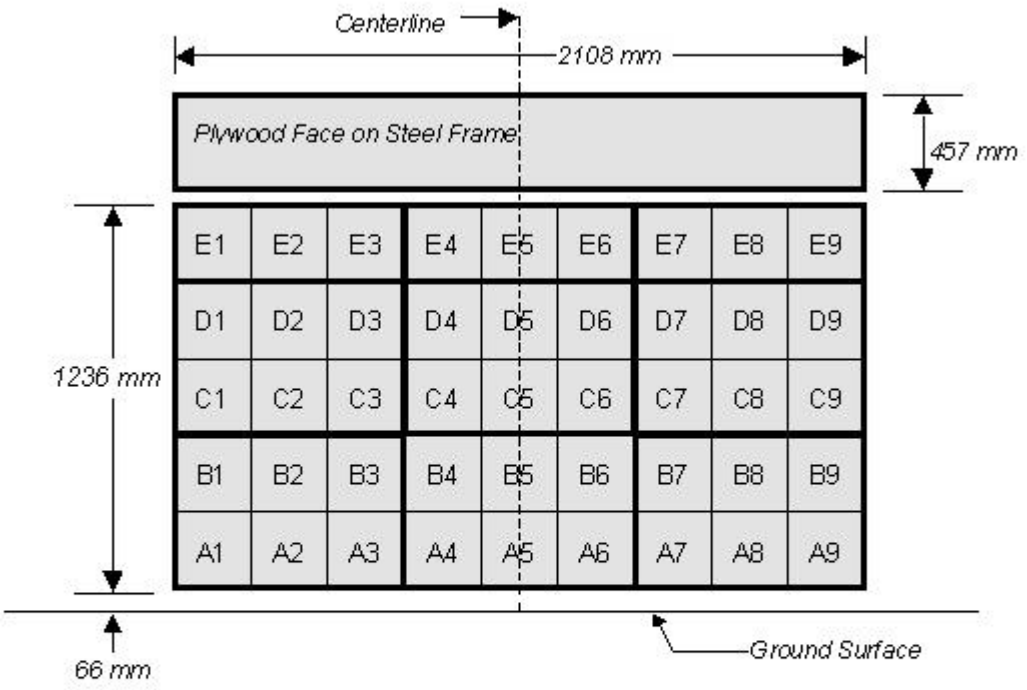
PASSENGER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-33	-22	-27	-20	76	74	69	79	109	96	96	99
2	38	38	32	33	147	150	143	142	109	112	111	109
3	59	57	56	57	147	173	167	163	88	116	111	106
4	80	68	64	72	170	190	184	187	90	122	120	115
5	53	79	78	87	152	193	191	182	99	114	113	95

DATA SHEET NO. 17
FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

45 Load Cell Rigid Barrier (NTHSA Standard)
Load Cell Locations on Fixed Barrier



Group 4 C1 – D3	Group 5 C4 – D6	Group 6 C7 – D9	R&D Additonal Group E1 - E9
Group 1 A1 – B3	Group 2 A4 – B6	Group 3 A7 – B9	

6 Groups of 6 Load Cells Each

DATA SHEET NO. 18
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06

VEHICLE INFORMATION

VIN: JTHBJ46G472032142 Wheel base (mm): 2780
Vehicle Size Category: 4-Door Test Weight (kg): 1854

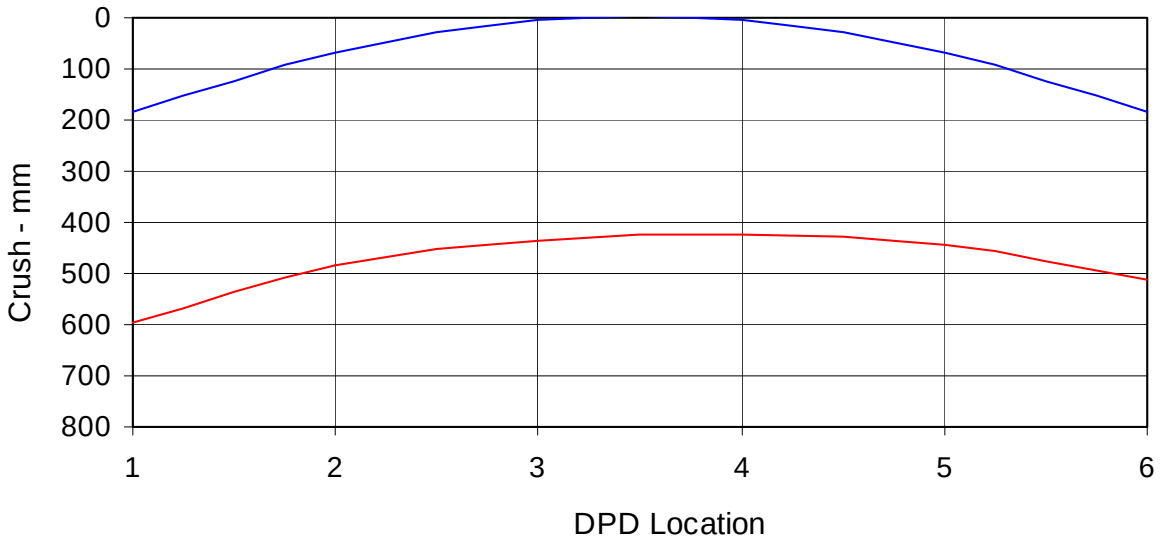
ACCELEROMETER DATA

Accelerometer Location: Left rear cross member
Cal. Procedure/Interval: 6 months / drop test
Integration Algorithm: NHTSA Standard Linearity: Good
Impact Velocity (km/h): 55.92
Velocity Change (km/h): 61.9 Time of Separation (msec): 68.1

CRUSH PROFILE

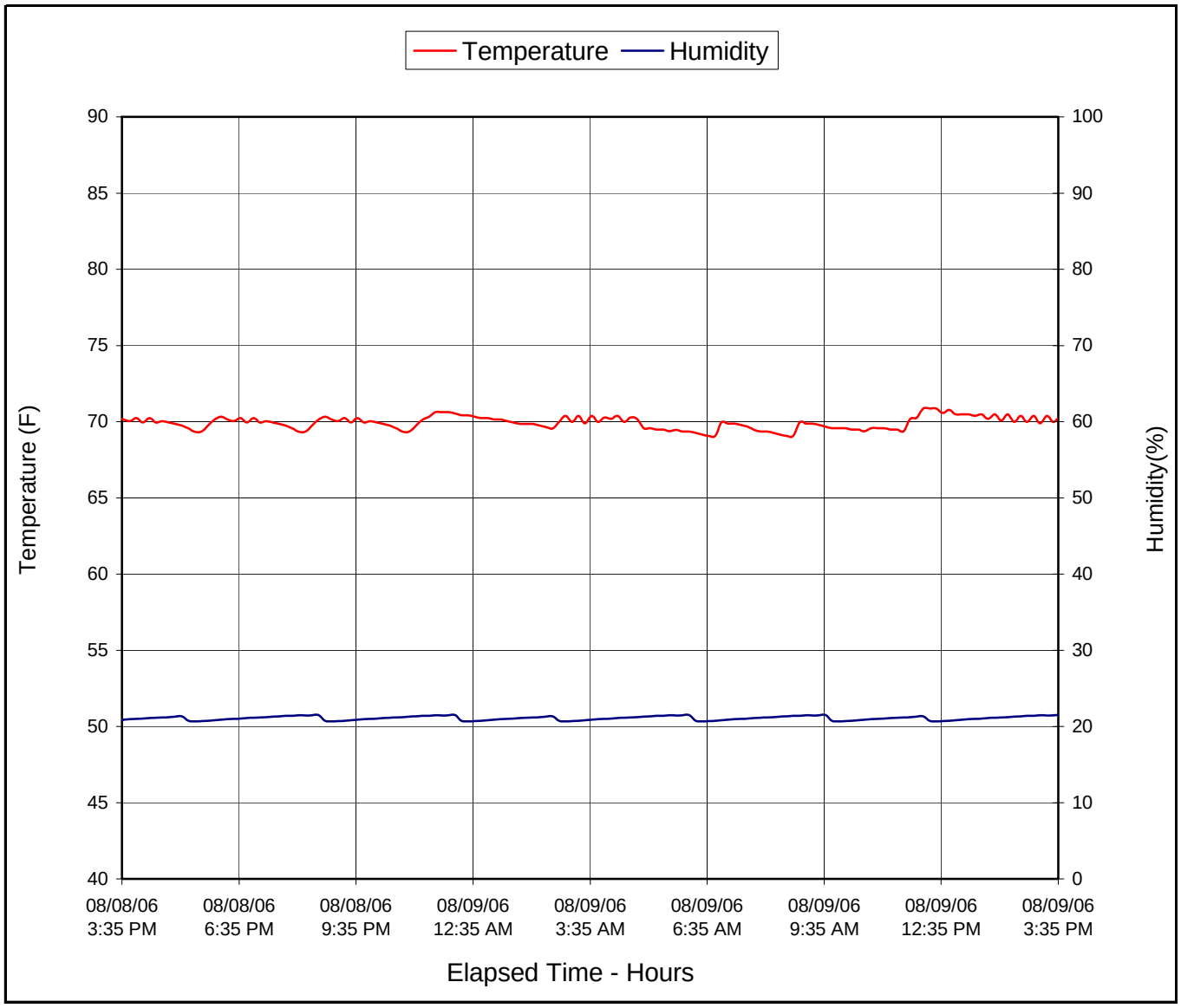
Collision Deformation Classification: 12FDEW6 Midpoint of Damage: Vehicle Centerline
Damage Region Length (mm): 1507 Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	185	596	-411
C2	Crush zone 2 on left side	mm	66	485	-419
C3	Crush zone 3 on left side	mm	4	435	-431
C4	Crush zone 4 on right side	mm	4	424	-420
C5	Crush zone 5 on right side	mm	66	444	-378
C6	Crush zone 6 at right side	mm	184	510	-326



DATA SHEET NO. 19
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2007 Lexus ES 350 4-Door Sedan NHTSA No.: M75107
Test Program: 2007 NHTSA 35mph NCAP Test Date: 8/9/06



APPENDIX A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

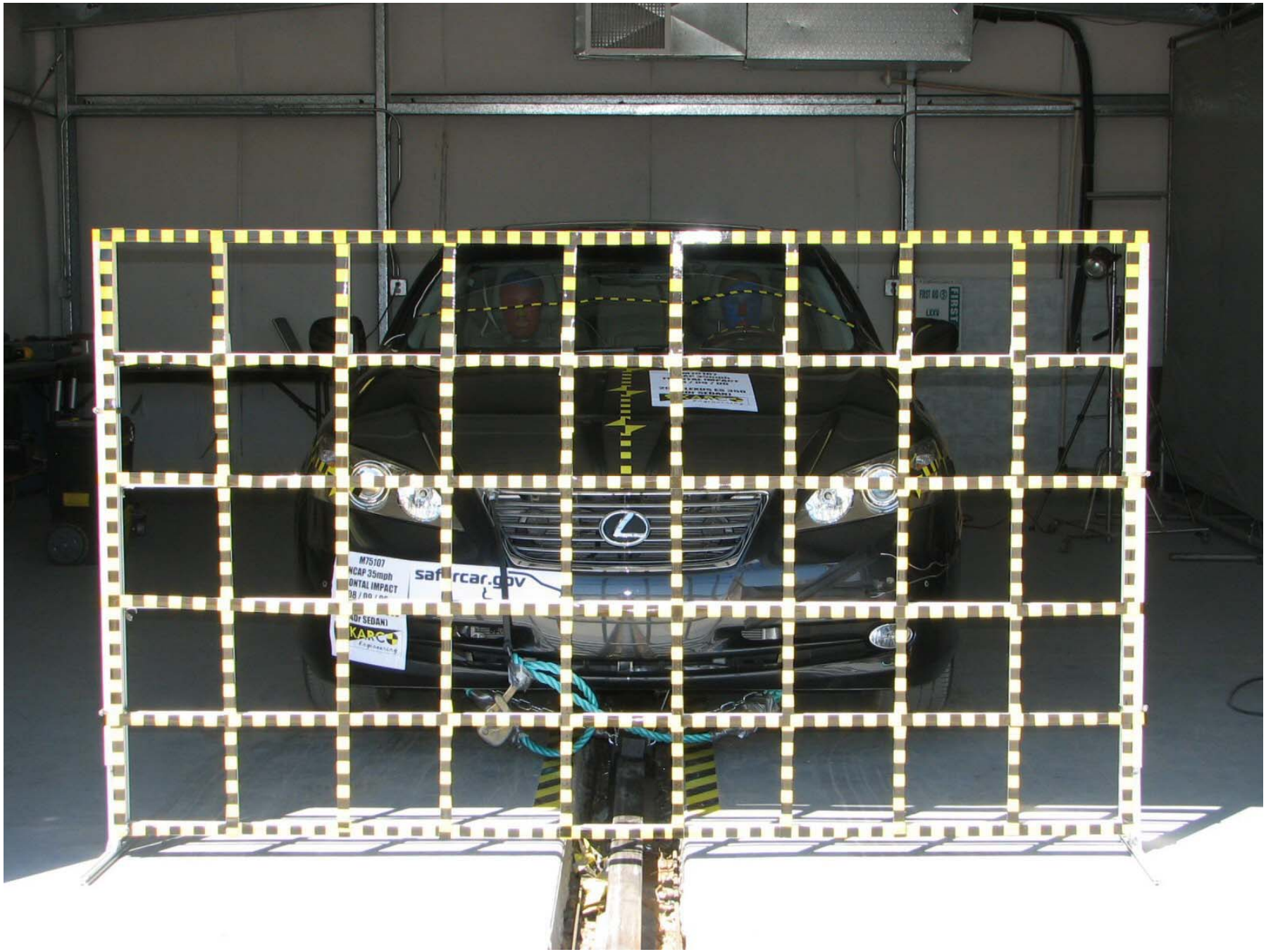


Figure A-1: Load Cell Location

Figure A-2: Manufacturer's Label

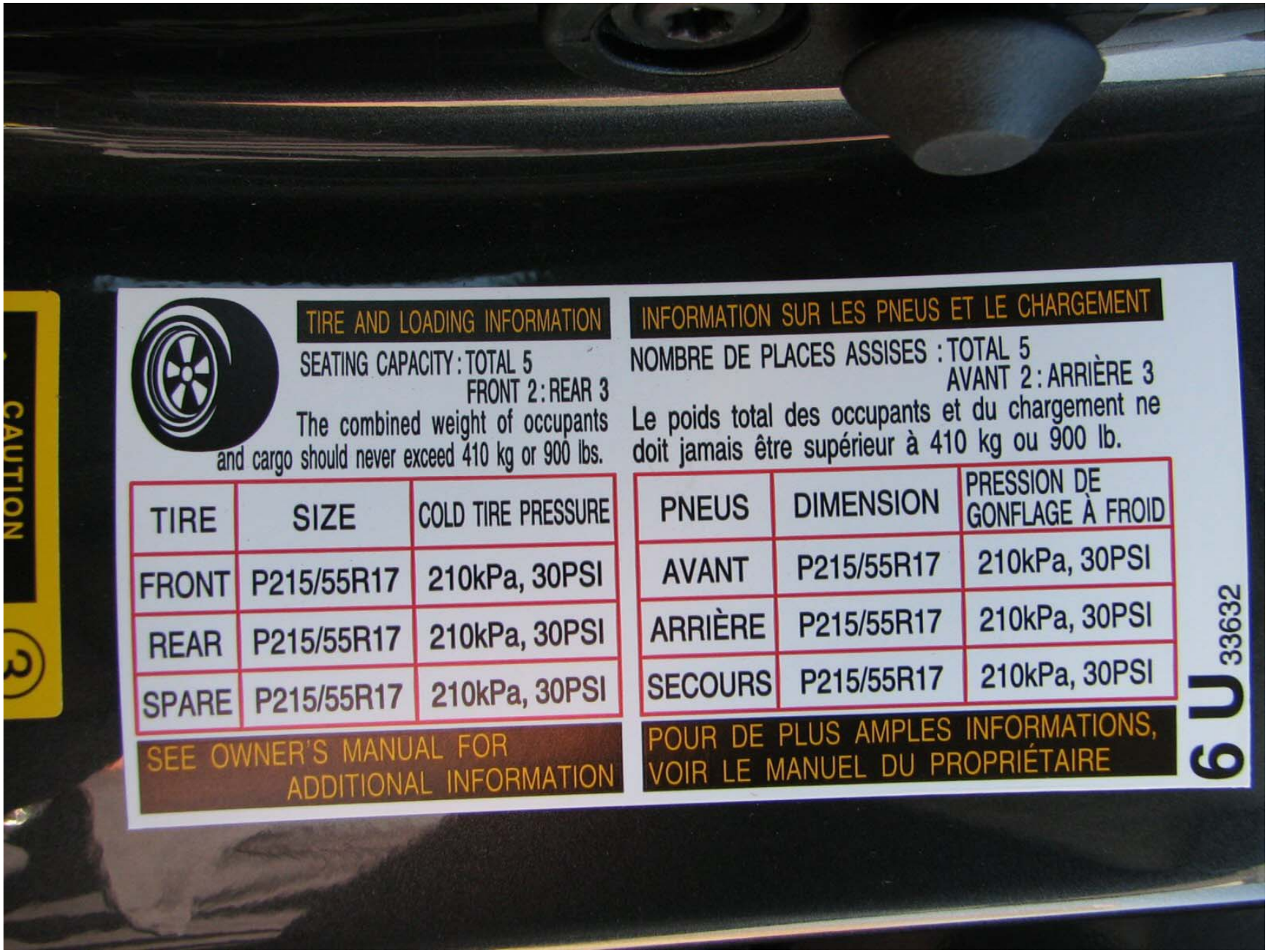


Figure A-3: Tire Placard

Figure A-4: Right Front ¾ View, As Received

Figure A-5: Left Rear ¾ View, as Received

Figure A-6: Pre-Test Front View

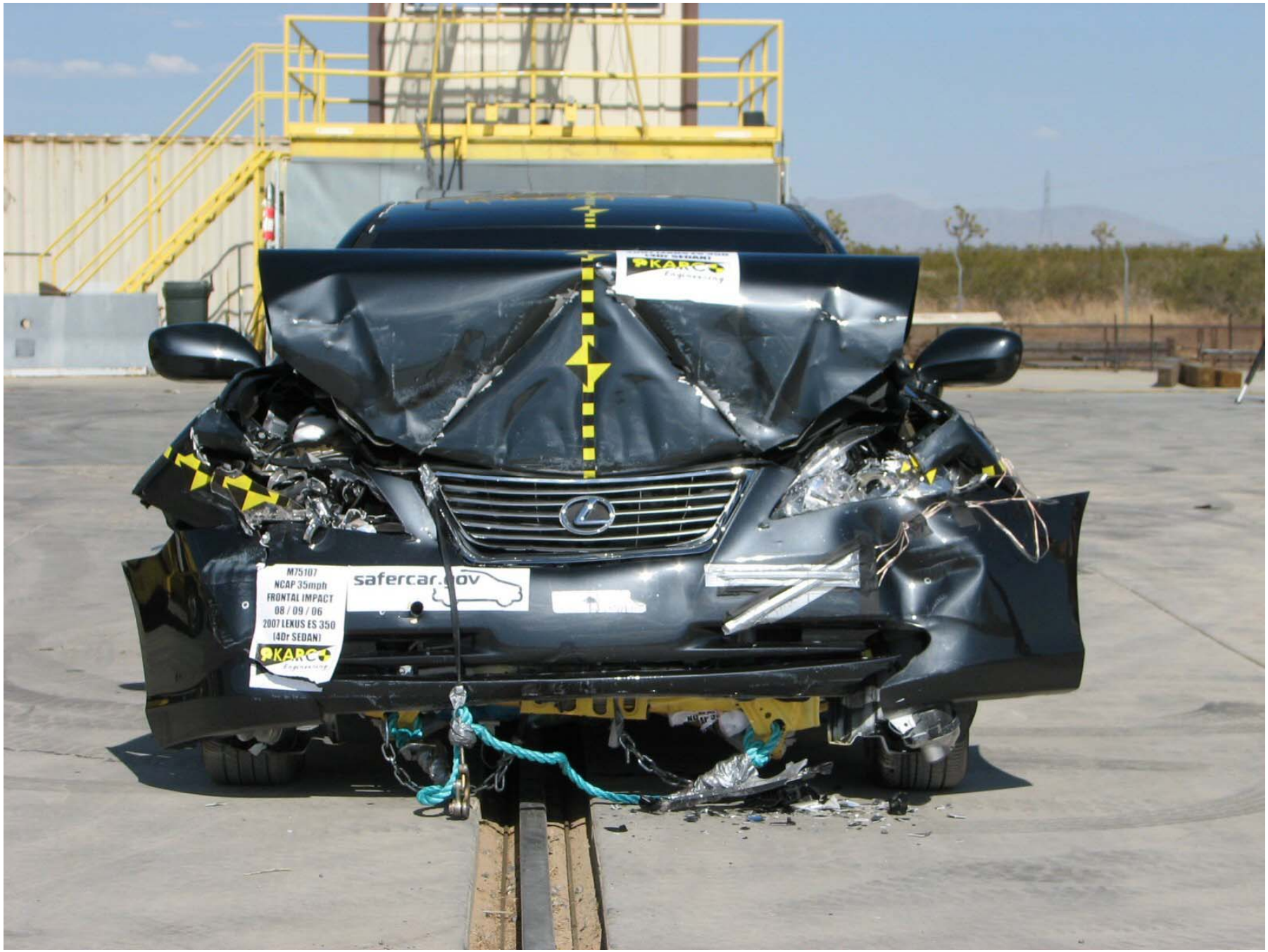


Figure A-7: Post-Test Front View

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 ¾ View

Figure A-13: Post-Test Right Front ¾ View

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

Figure A-15: Post-Test Left Rear ¾ 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

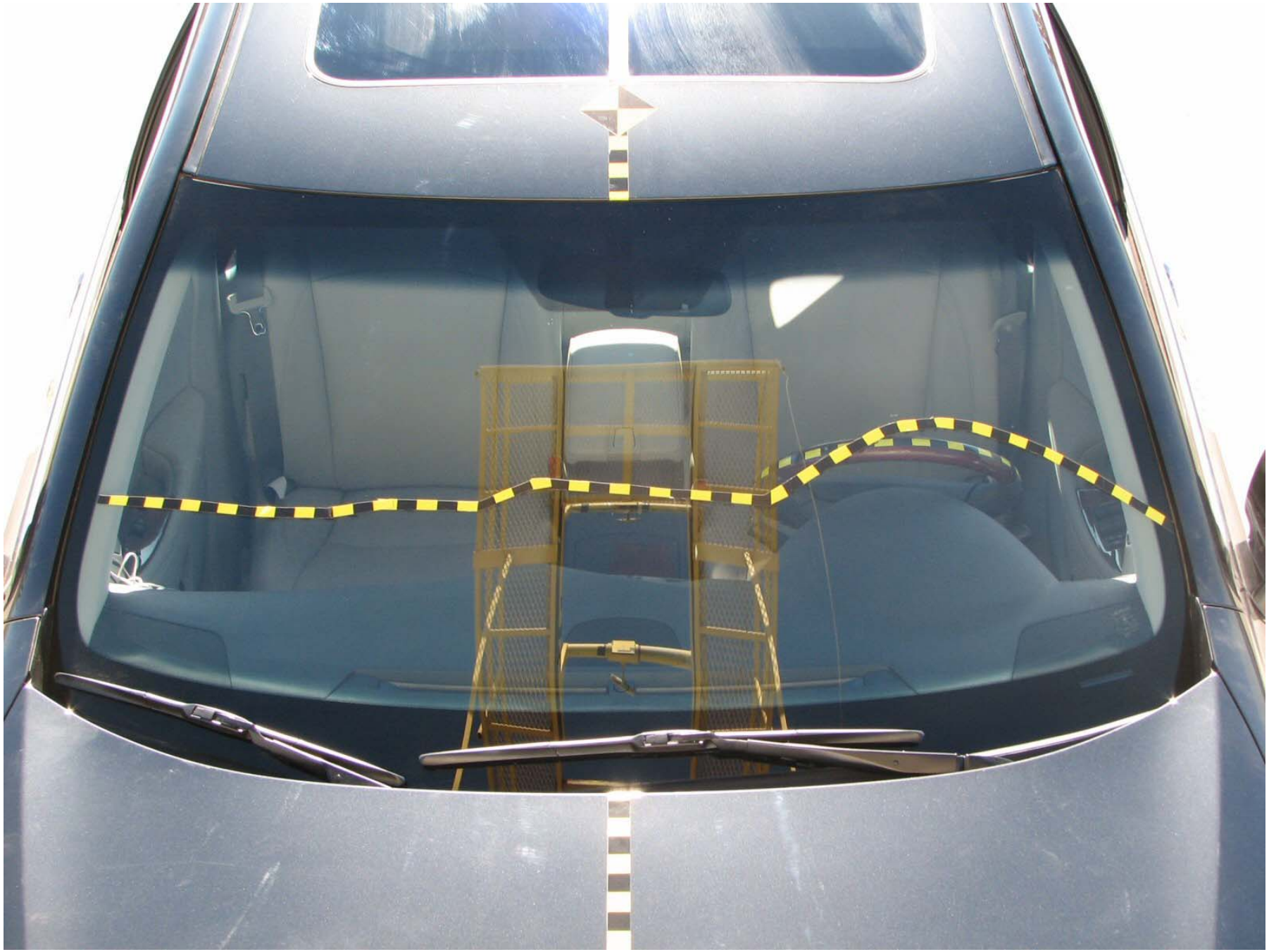


Figure A-18: Pre-Test Windshield

Figure A-19: Post-Test Windshield

Figure A-20: Pre-Test Engine Compartment

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

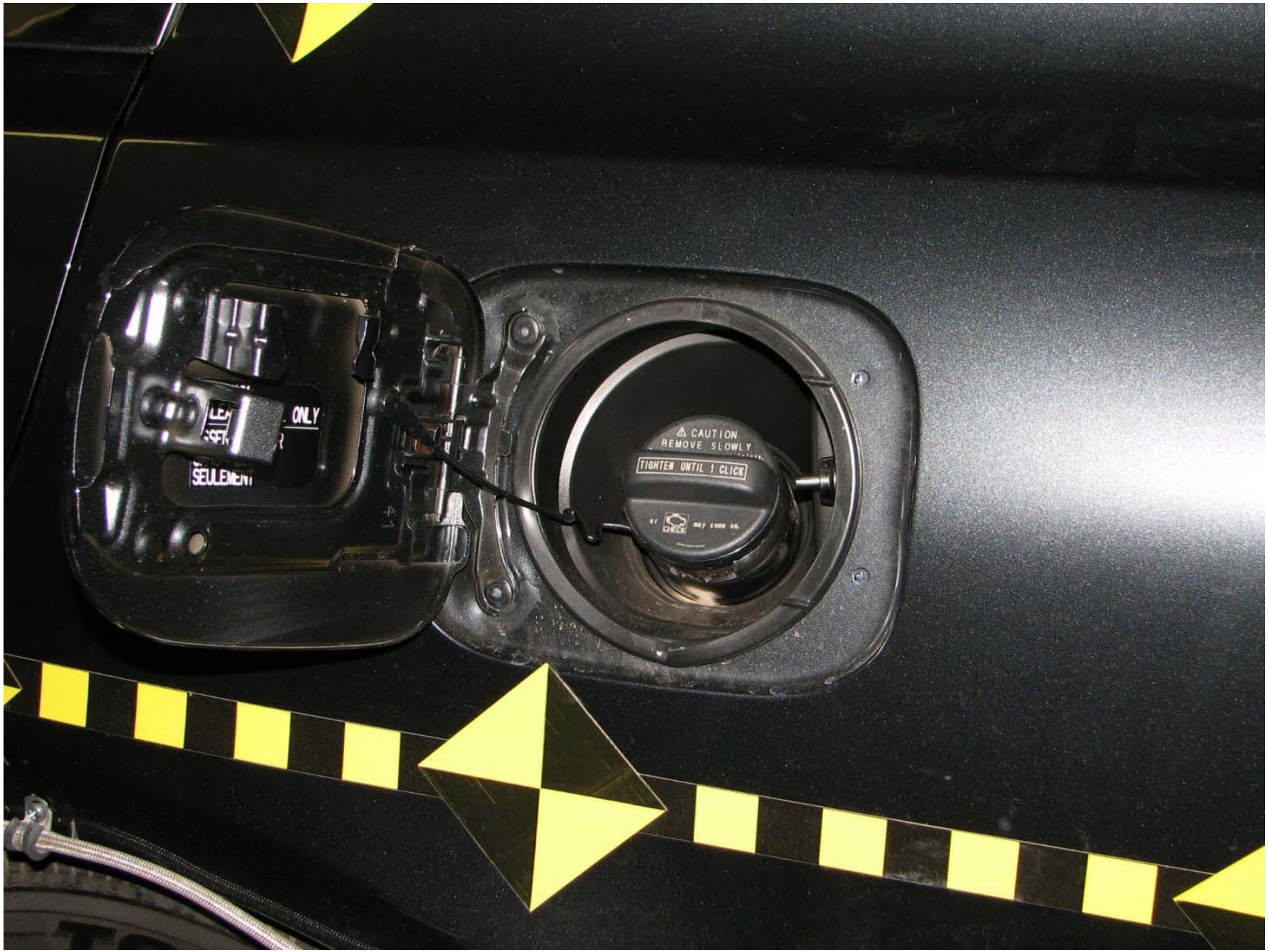


Figure A-22: Pre-Test Fuel Cap

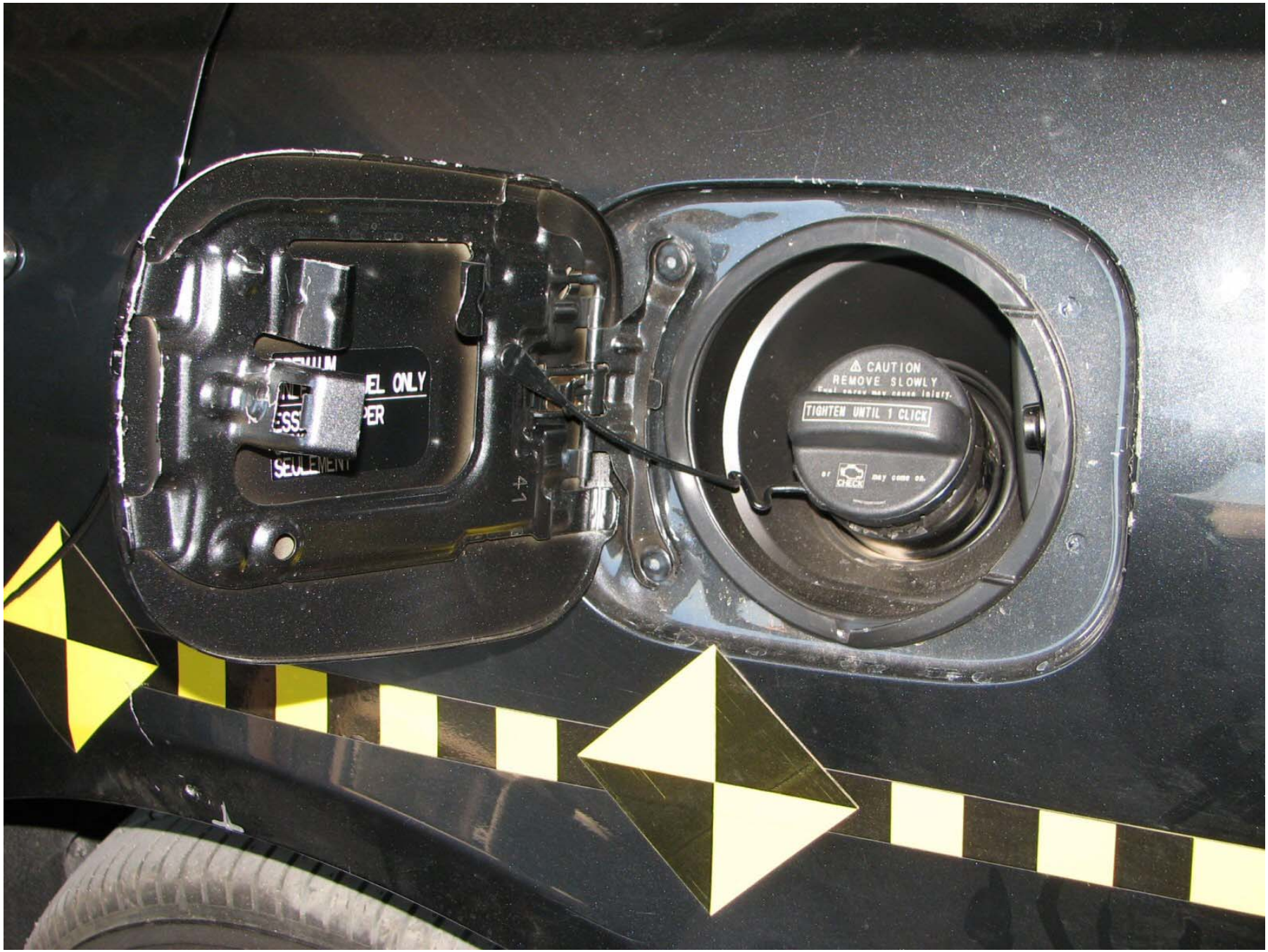


Figure A-23: Post-Test Fuel Cap

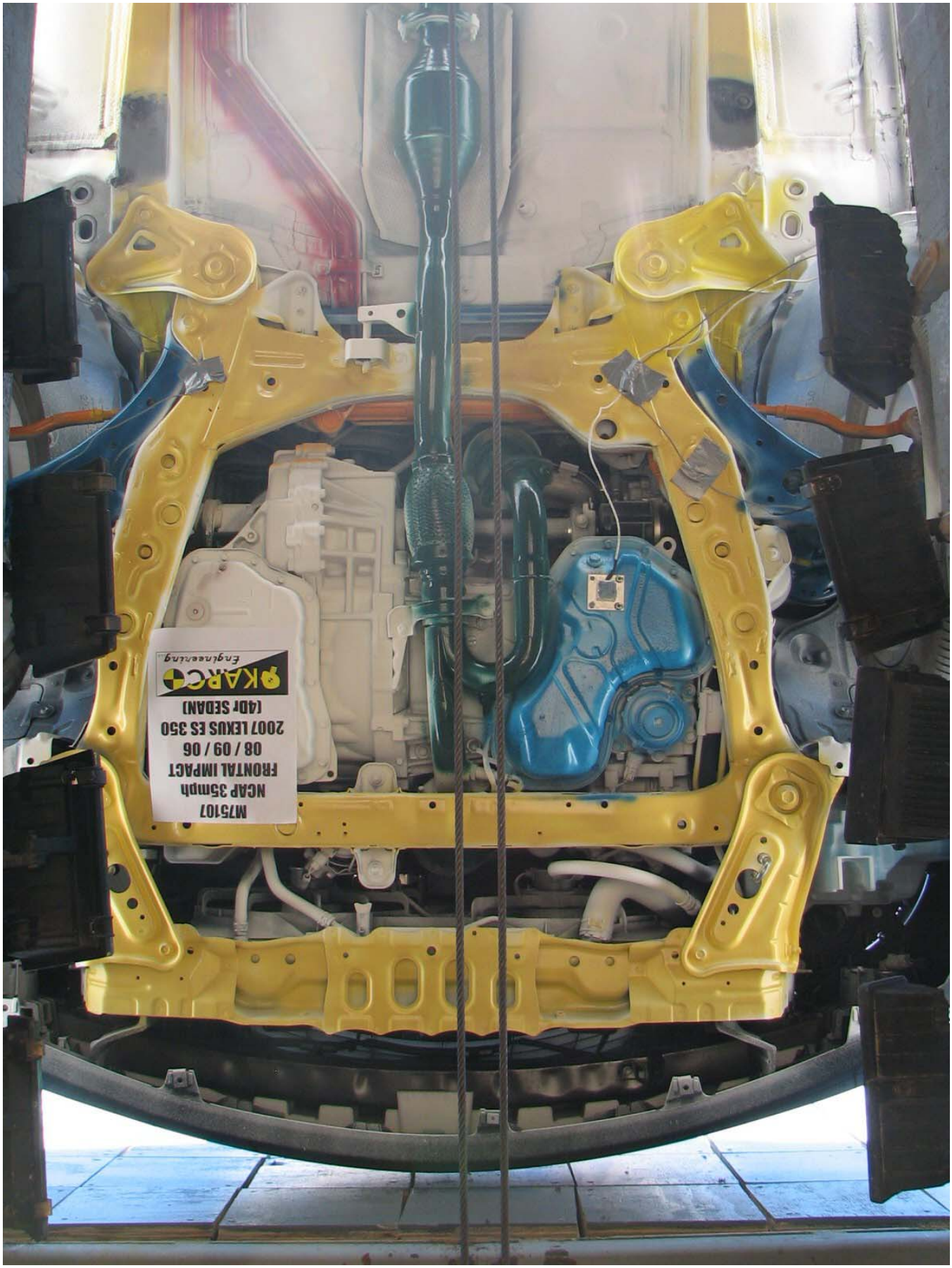


Figure A-24: Pre-Test Front Underbody

Figure A-25: Post-Test Front Underbody

Figure A-26: Pre-Test Mid Underbody

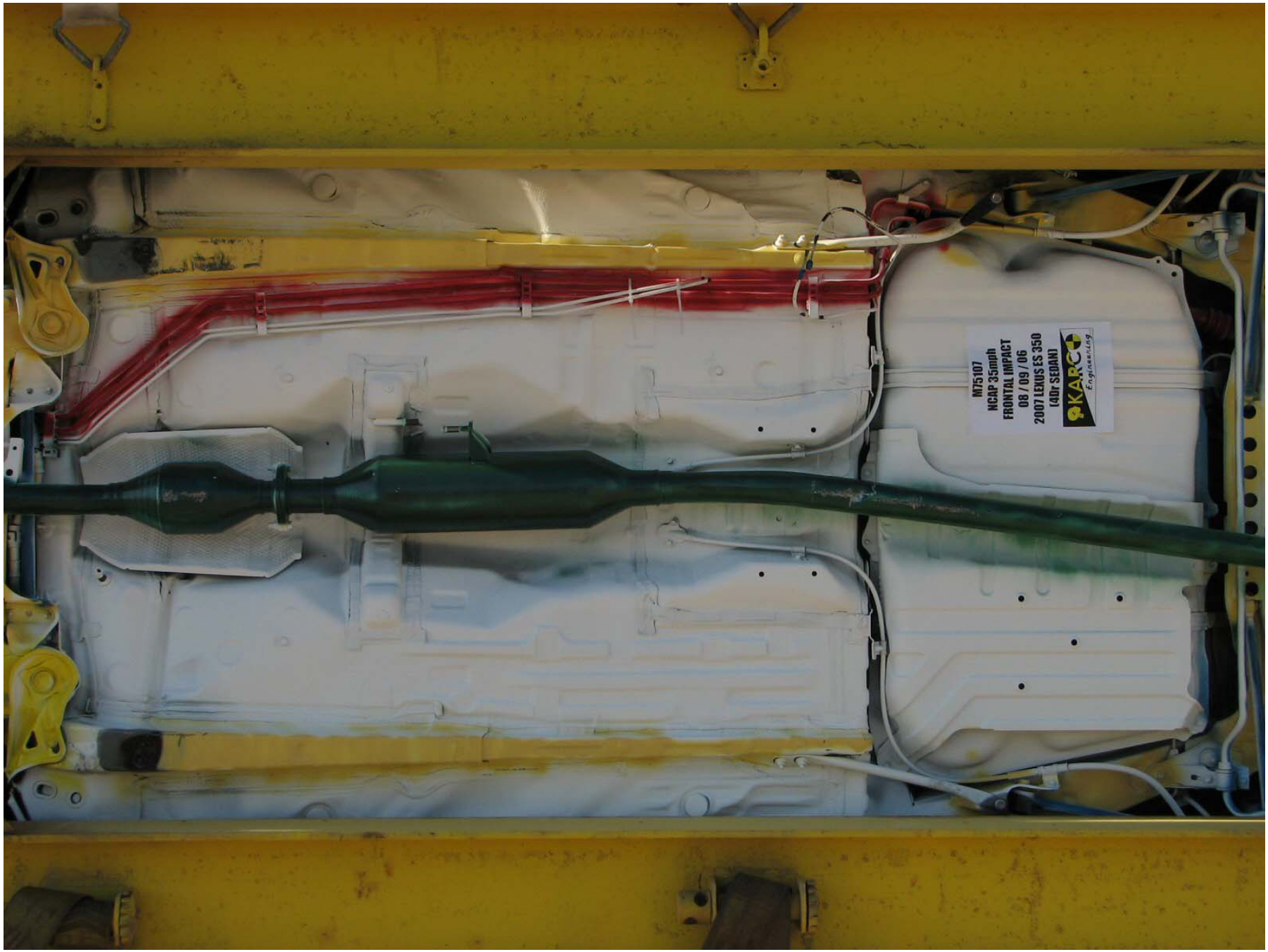


Figure A-27: Post-Test Mid Underbody

Figure A-28: Pre-Test Rear Underbody

Figure A-29: Post-Test Rear Underbody

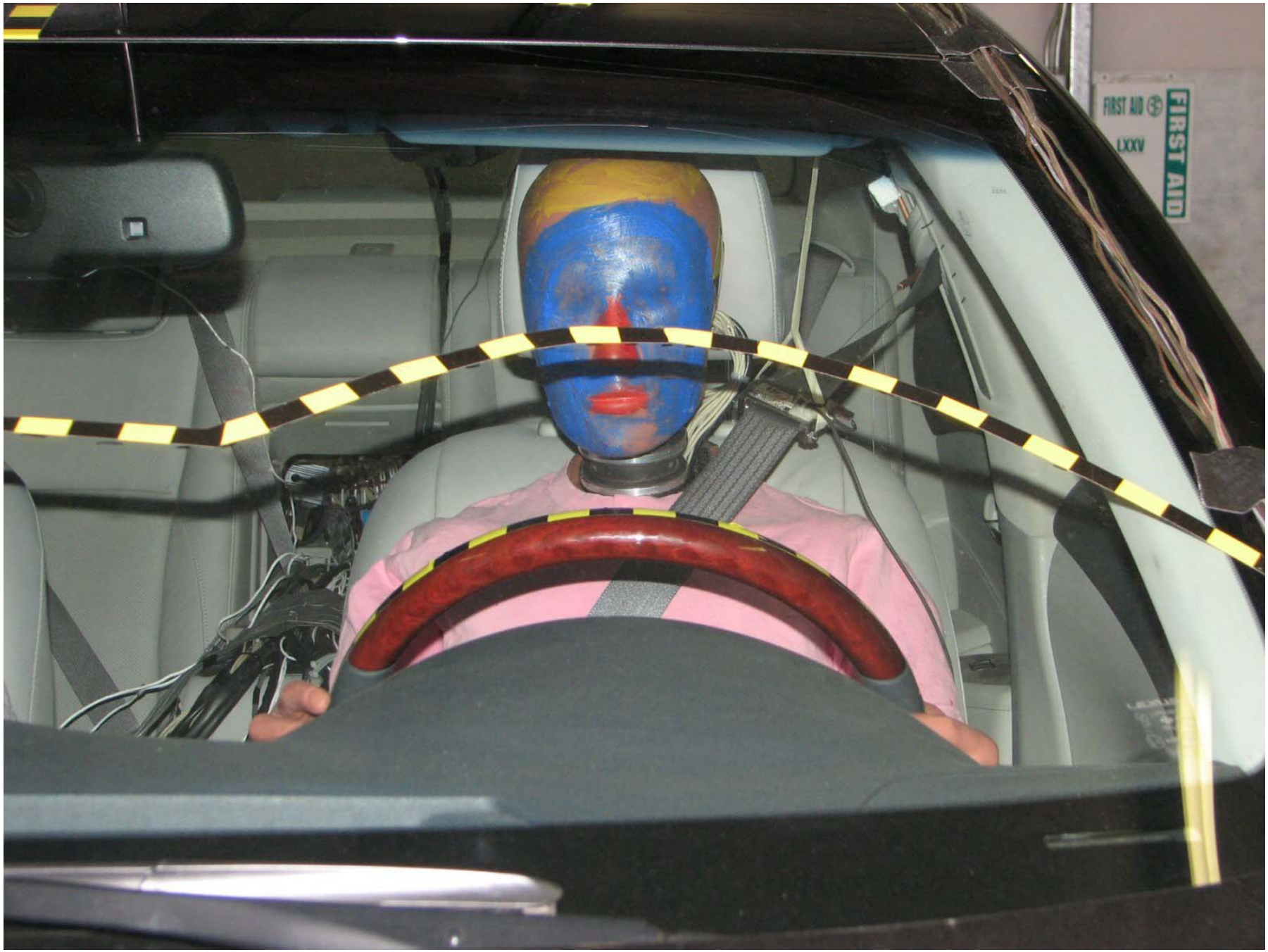


Figure A-30: Pre-Test Driver Dummy Front View (Head Position)

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)

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)

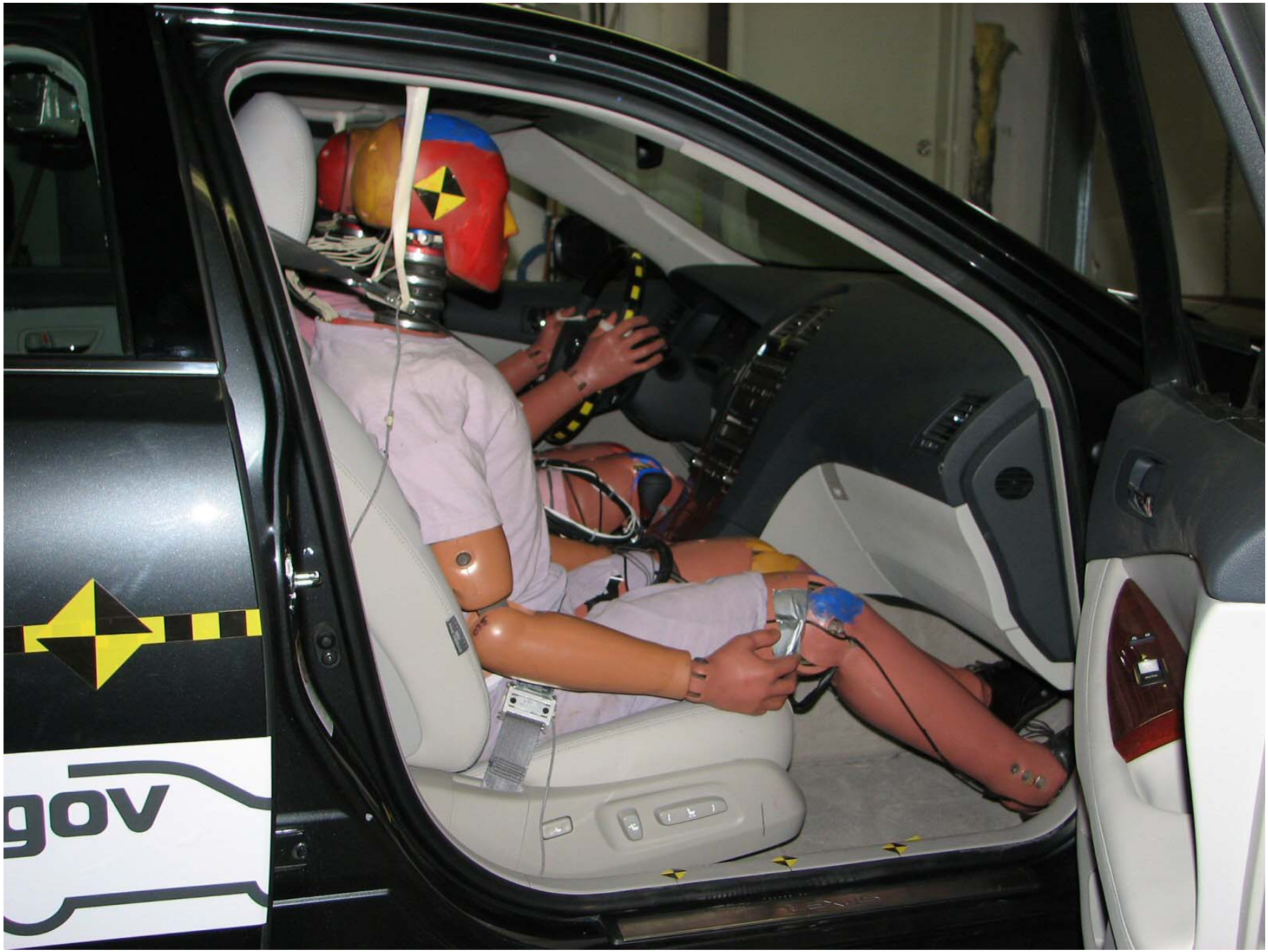


Figure A-48: Pre-Test Passenger Dummy (Door Open)

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

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

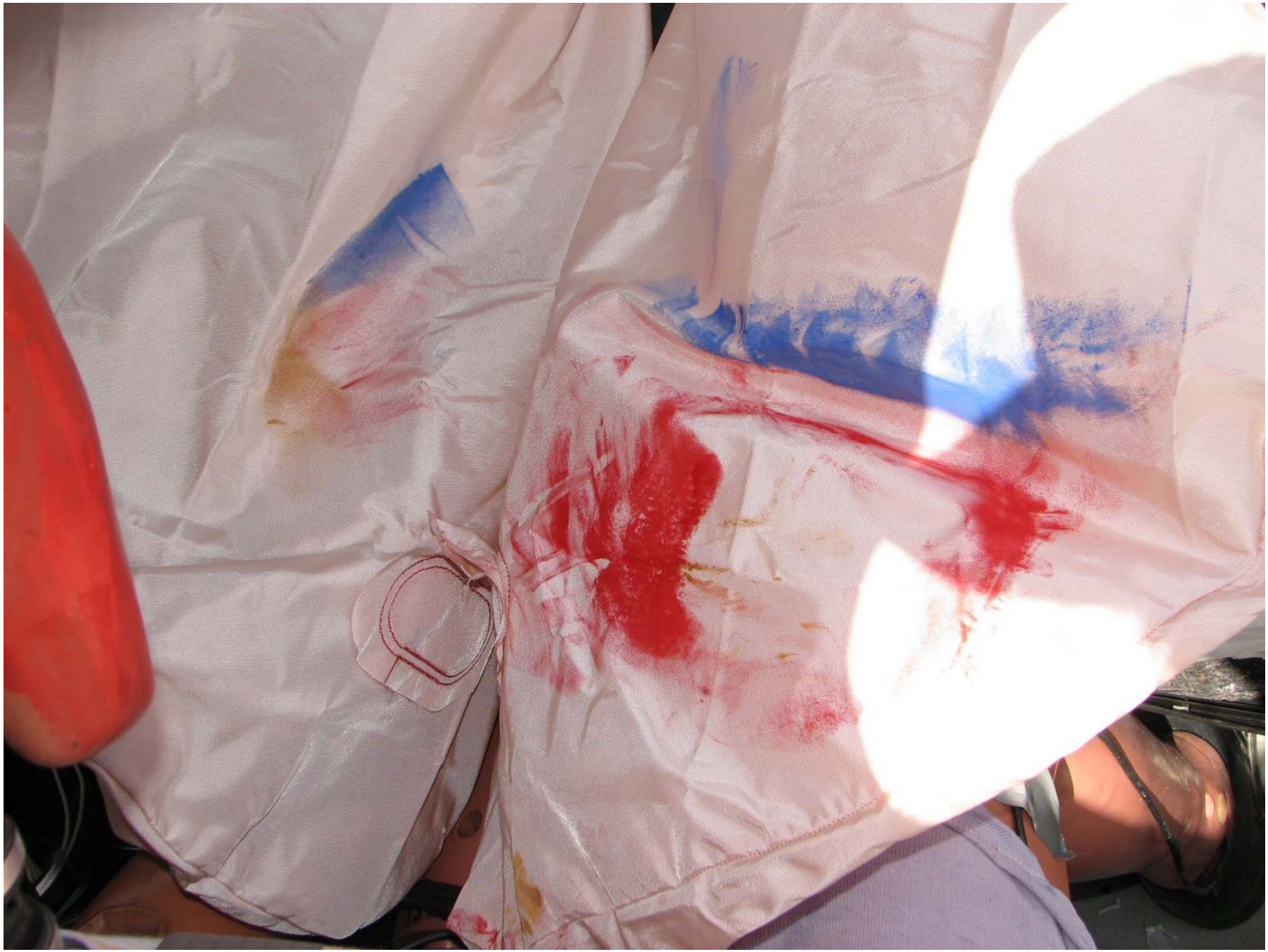


Figure A-57: Post-Test Passenger Dummy Airbag Contact

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

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

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

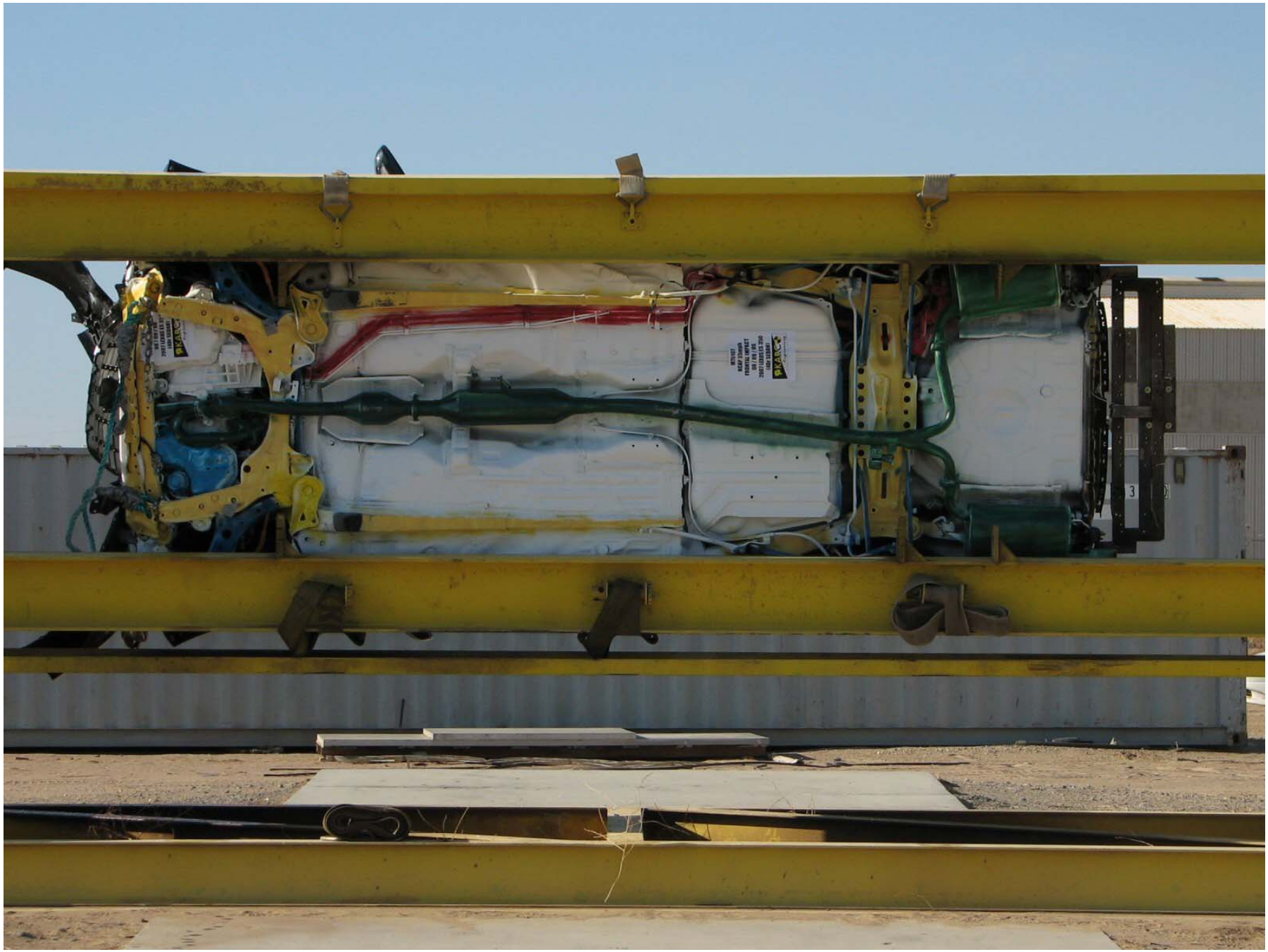


Figure A-61: Vehicle on Rollover Device (270°)

Figure A-62: Vehicle Impact

APPENDIX B

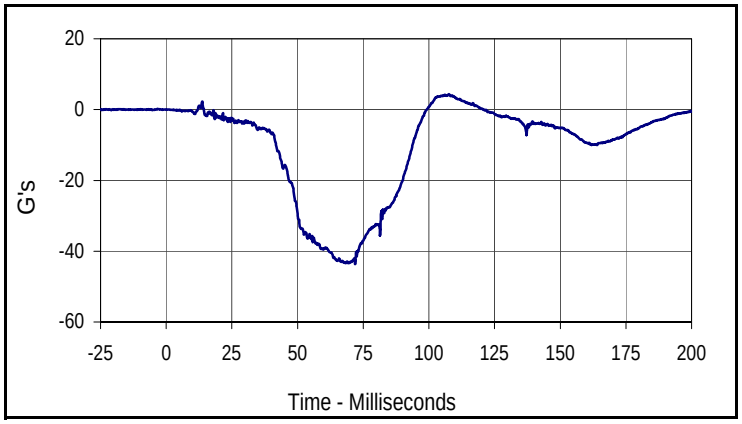
DATA PLOTS

LIST OF DATA PLOTS

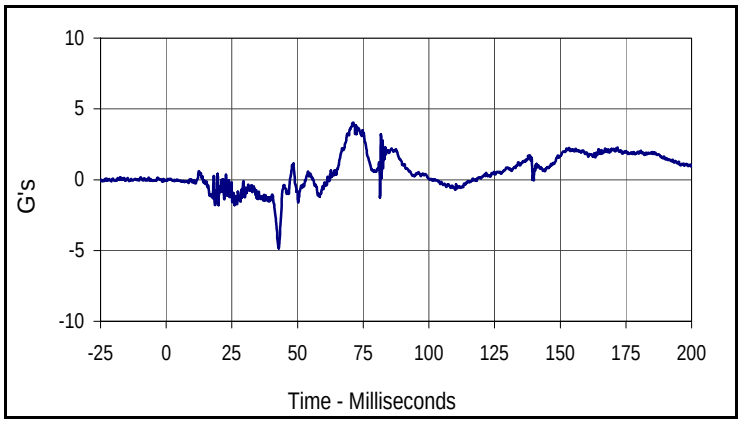
The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov.

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

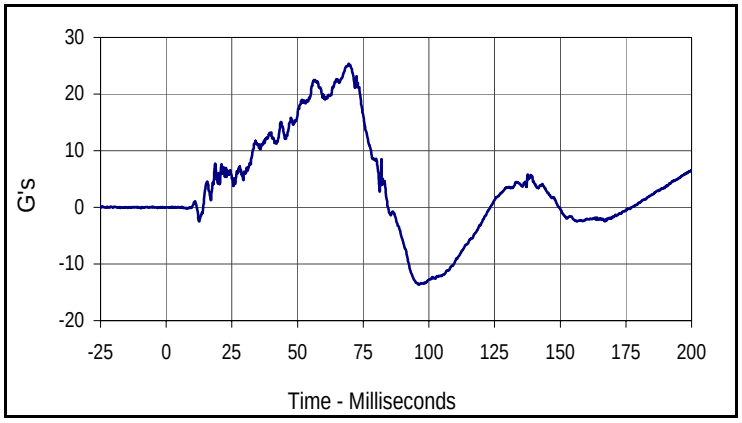
Test Vehicle:	2007 Lexus ES 350 4-Door Sedan	Test Date:	8/9/06
Test Program:	2007 NHTSA 35mph NCAP	NHTSA No.:	M75107



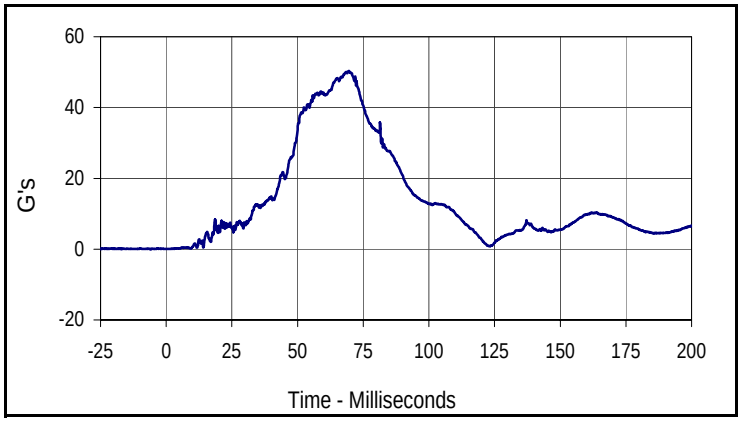
Curve Description			
Driver Head Primary X			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
4.4	107.6	-43.7	72.0



Curve Description			
Driver Head Primary Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.0	71.1	-4.8	42.9

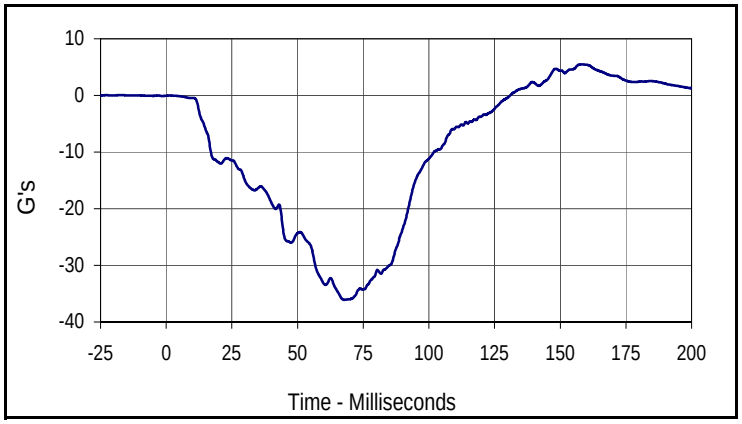


Curve Description			
Driver Head Primary Z			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
25.3	69.5	-13.7	96.1

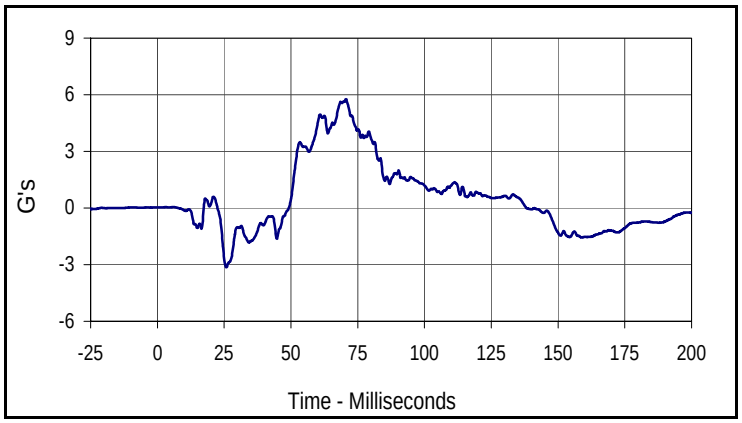


Curve Description			
Driver Head Resultant Primary			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
50.3	69.5	0.1	0.5

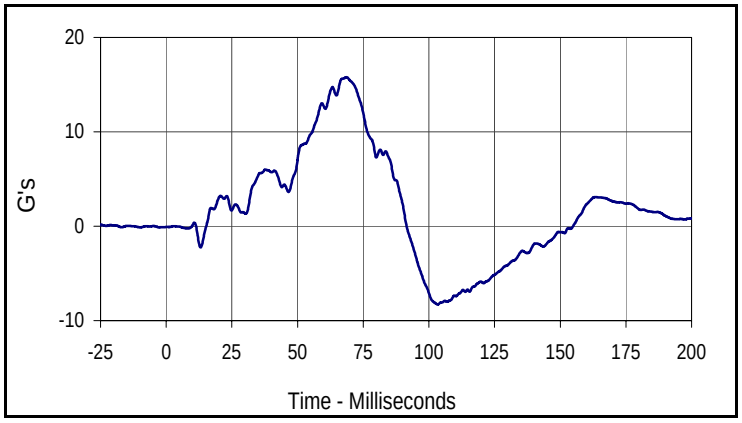
Test Vehicle:	2007 Lexus ES 350 4-Door Sedan	Test Date:	8/9/06
Test Program:	2007 NHTSA 35mph NCAP	NHTSA No.:	M75107



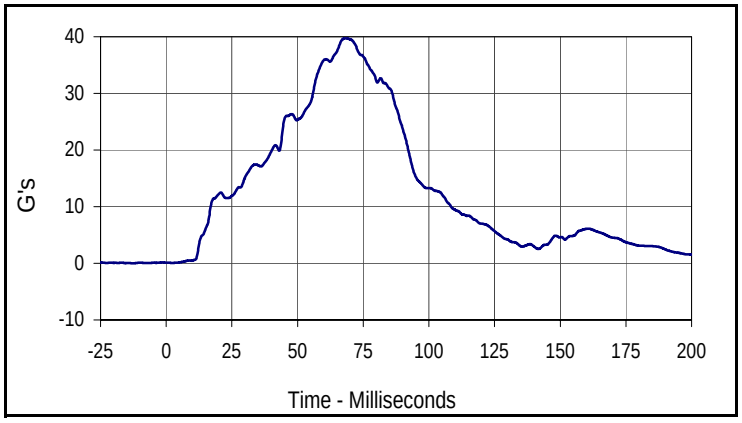
Curve Description			
Driver Chest Primary X			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
5.5	158.5	-36.1	67.7



Curve Description			
Driver Chest Primary Y			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
5.8	70.6	-3.1	25.8

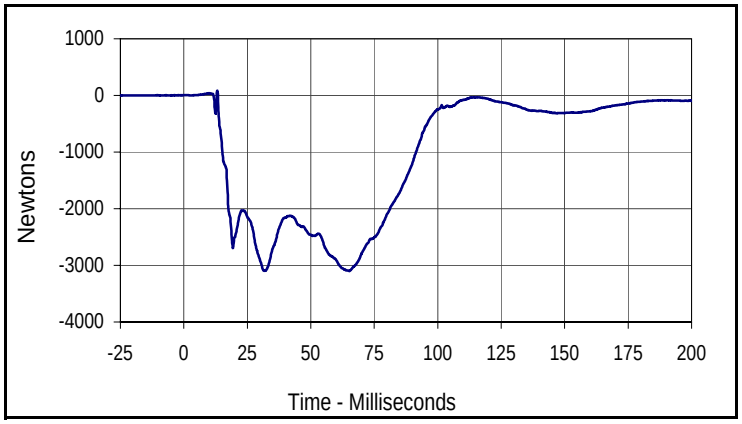


Curve Description			
Driver Chest Primary Z			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
15.8	68.6	-8.3	103.3



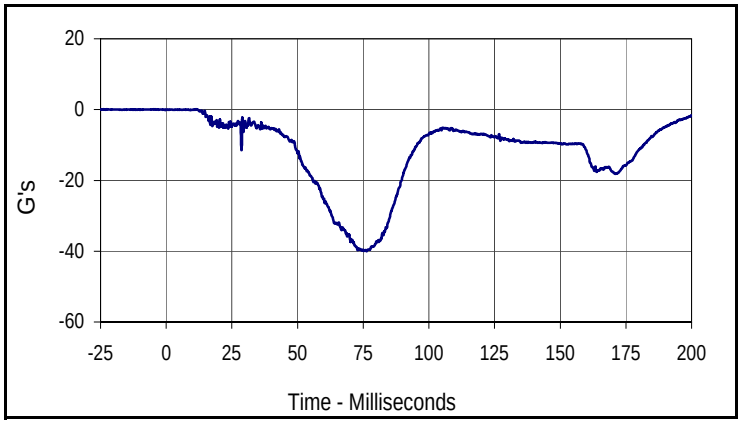
Curve Description			
Driver Chest Resultant Primary			
CURNO	Type	SAE Class	Units
004	RES	180	G's
Max	Time	Min	Time
39.7	68.7	0.1	2.1

Test Vehicle:	2007 Lexus ES 350 4-Door Sedan	Test Date:	8/9/06
Test Program:	2007 NHTSA 35mph NCAP	NHTSA No.:	M75107

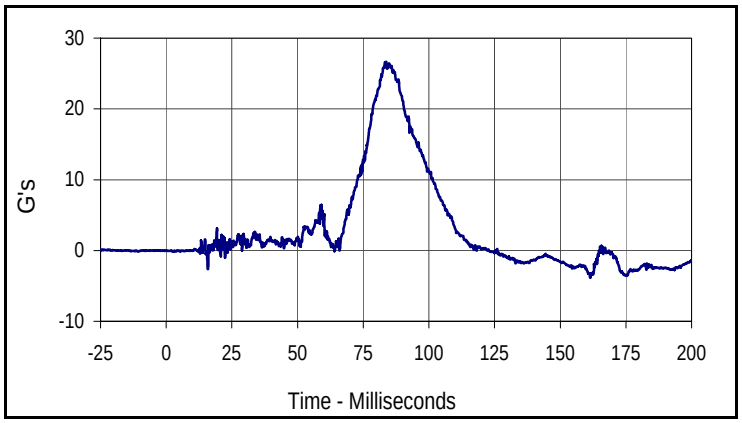


Curve Description			
Driver Left Femur Force Z			
CURNO	Type	SAE Class	Units
007	FIL	600	Newtons
Max	Time	Min	Time
81.9	13.2	-3102.6	65.2

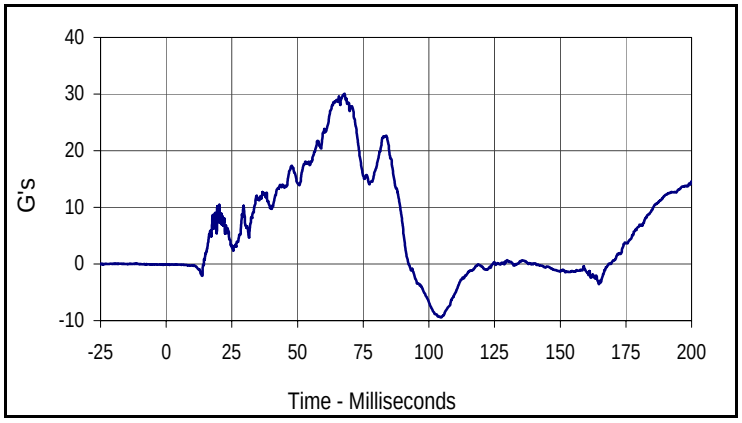
Curve Description			
Driver Right Femur Force Z			
CURNO	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
34.9	11.1	-2794.2	50.0



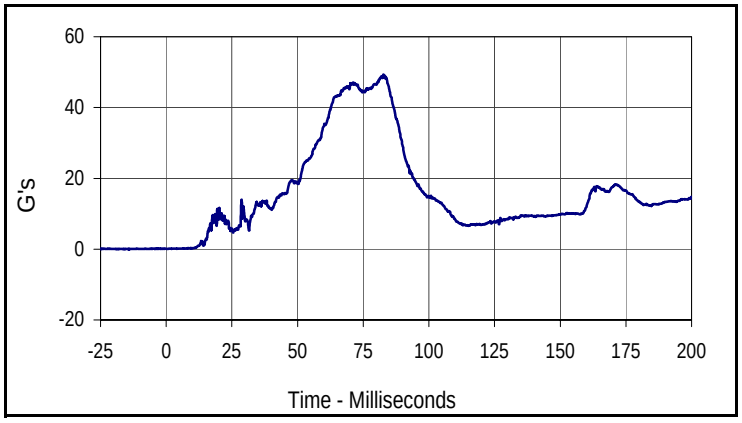
Curve Description			
Passenger Head Primary X			
CURNO	Type	SAE Class	Units
009	FIL	1000	G's
Max	Time	Min	Time
0.1	11.4	-40.0	76.3



Curve Description			
Passenger Head Primary Y			
CURNO	Type	SAE Class	Units
010	FIL	1000	G's
Max	Time	Min	Time
26.7	83.8	-3.9	161.4

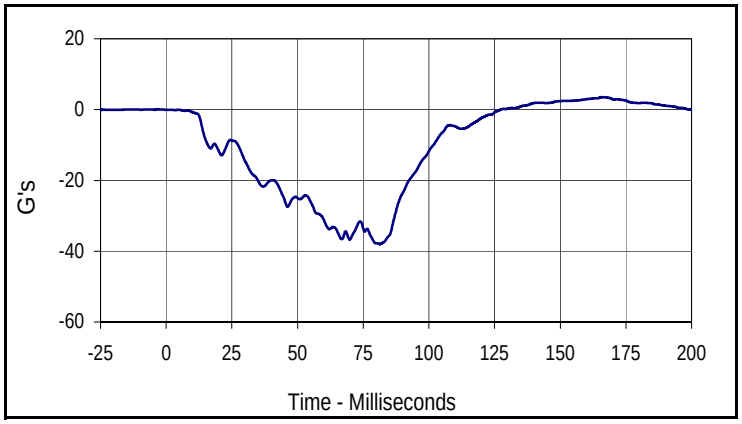


Curve Description			
Passenger Head Primary Z			
CURNO	Type	SAE Class	Units
011	FIL	1000	G's
Max	Time	Min	Time
30.1	67.9	-9.4	104.6

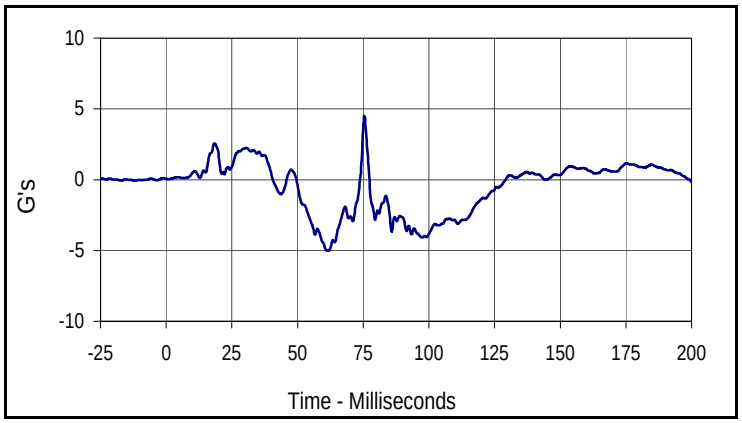


Curve Description			
Passenger Head Resultant Primary			
CURNO	Type	SAE Class	Units
009	RES	1000	G's
Max	Time	Min	Time
49.3	82.7	0.1	0.4

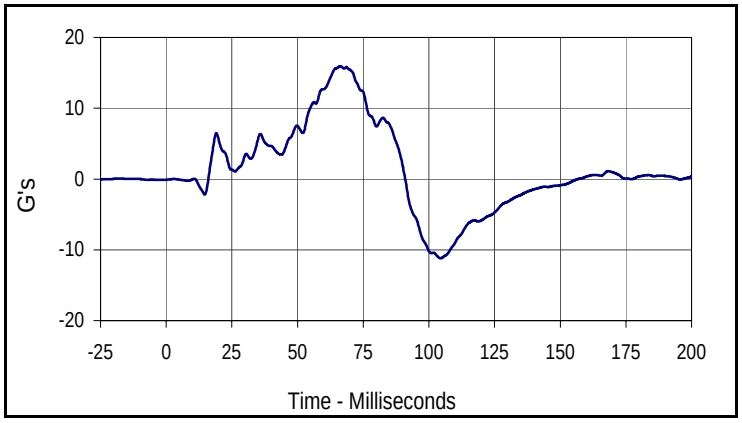
Test Vehicle:	2007 Lexus ES 350 4-Door Sedan	Test Date:	8/9/06
Test Program:	2007 NHTSA 35mph NCAP	NHTSA No.:	M75107



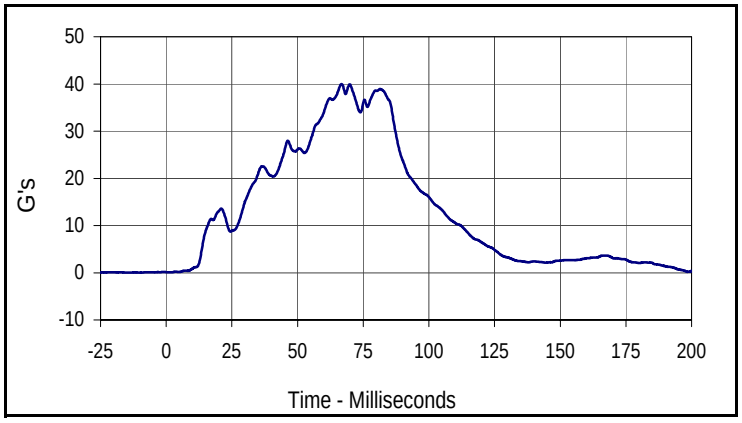
Curve Description			
Passenger Chest Primary X			
CURNO	Type	SAE Class	Units
012	FIL	180	G's
Max	Time	Min	Time
3.5	165.9	-38.0	81.3



Curve Description			
Passenger Chest Primary Y			
CURNO	Type	SAE Class	Units
013	FIL	180	G's
Max	Time	Min	Time
4.5	75.4	-5.0	61.2

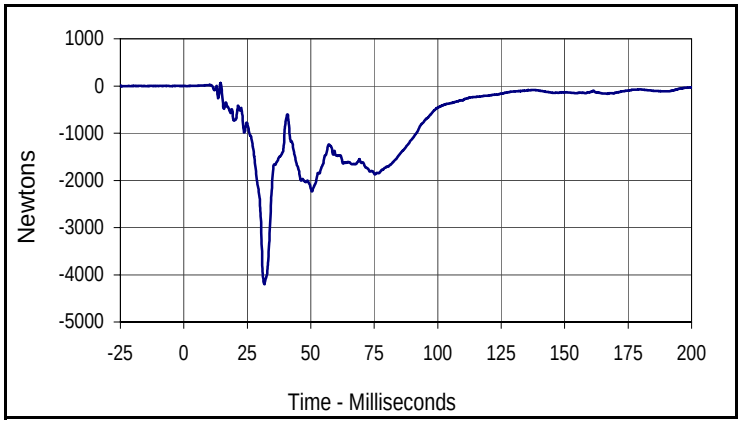


Curve Description			
Passenger Chest Primary Z			
CURNO	Type	SAE Class	Units
014	FIL	180	G's
Max	Time	Min	Time
15.9	66.3	-11.2	104.5

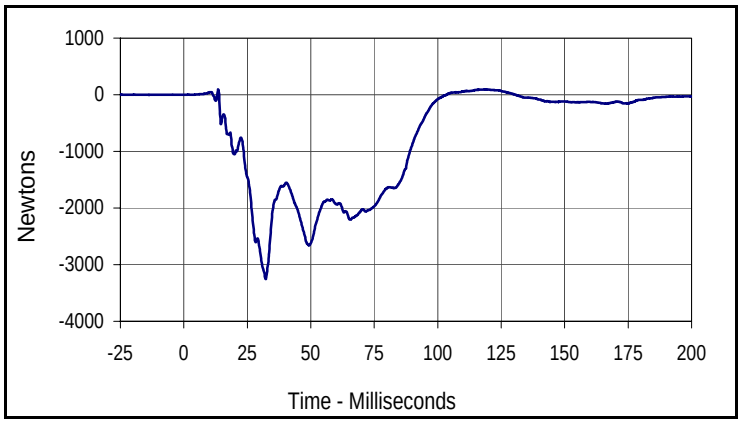


Curve Description			
Passenger Chest Resultant Primary			
CURNO	Type	SAE Class	Units
012	RES	180	G's
Max	Time	Min	Time
40.0	66.8	0.1	1.6

Test Vehicle:	2007 Lexus ES 350 4-Door Sedan	Test Date:	8/9/06
Test Program:	2007 NHTSA 35mph NCAP	NHTSA No.:	M75107



Curve Description			
Passenger Left Femur Force Z			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
67.3	14.5	-4200.6	31.8



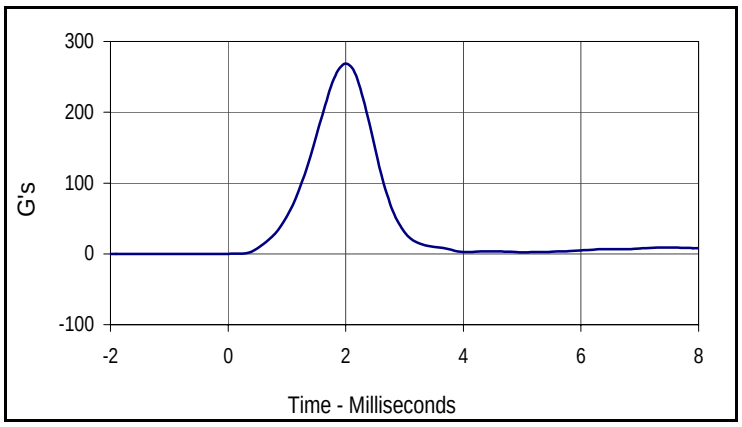
Curve Description			
Passenger Right Femur Force Z			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
94.6	13.5	-3256.4	32.3

APPENDIX C

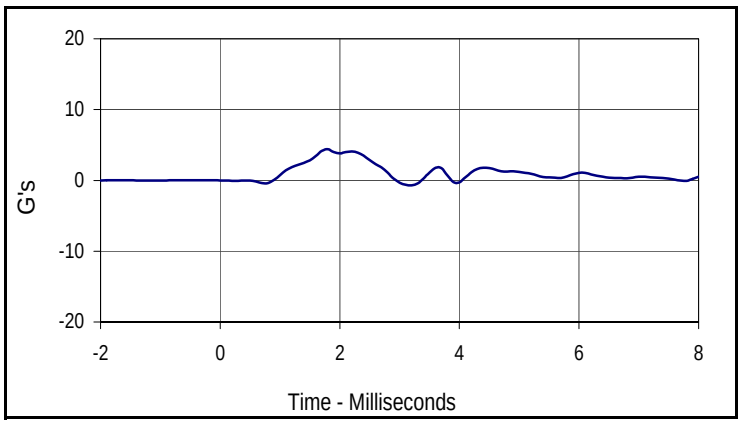
DUMMY CALIBRATION DATA

Test Program:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	8/2/06
ATD Serial No.:	034	Test I.D.:	HD08A

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	268.9	Pass
Peak Lateral Acceleration	G's	≤15.0	4.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass



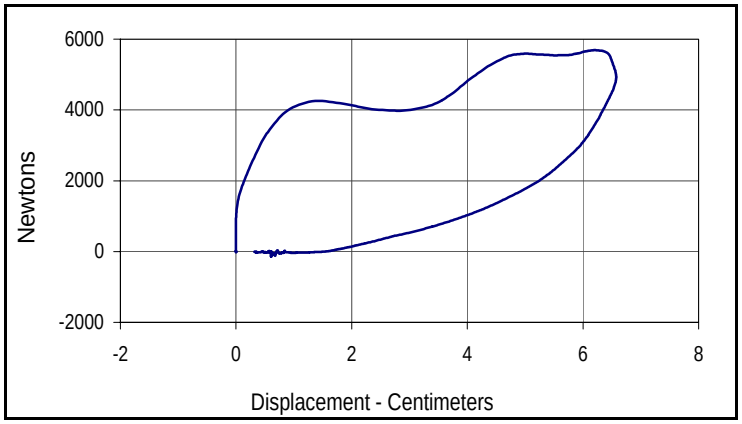
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
268.9	2.0	0.0	-0.1



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.4	1.8	-0.7	3.2

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	8/3/06
ATD Serial No.:	034	Test I.D.:	CH08A

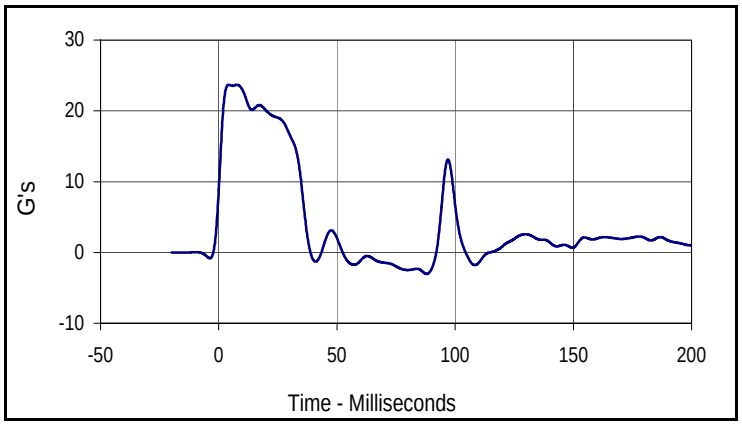
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.70	Pass
Peak Probe Force	Newtons	5159 to 5893	5689	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.58	Pass
Internal Hysterysis	%	69 to 85	76.1	Pass
		Overall Test Results		Pass



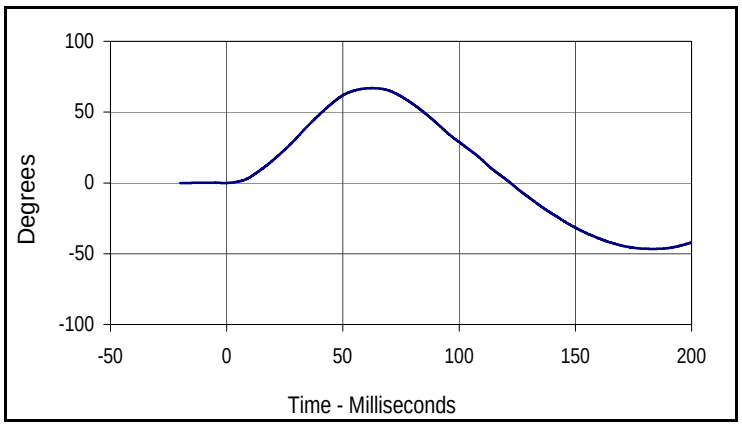
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
001	FIL	180	76.1
Peak Probe Force		Peak Chest Deflection	
5689		6.58	

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	8/4/06
ATD Serial No.:	034	Test I.D.:	NF08A

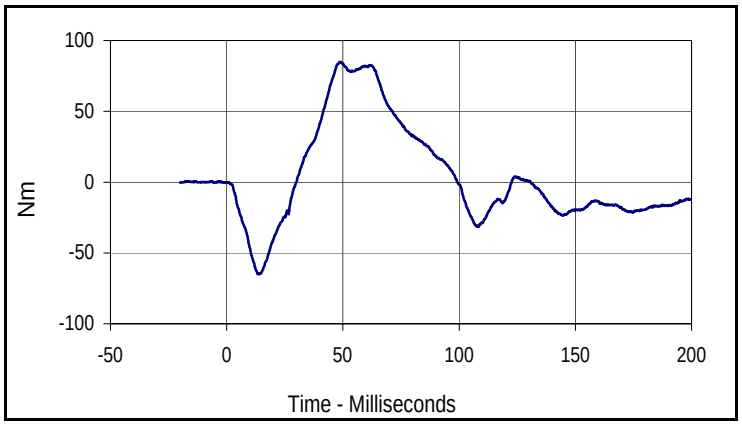
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.0	Pass
	20 Msec.	G's	17.6 to 22.6	20.1	Pass
	30 Msec.	G's	12.5 to 18.5	16.6	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	16.6	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	66.9	Pass
	Time	Msec.	57.0 to 64.0	62.6	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	122.1	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	84.9	Pass
	Time	Msec.	47.0 to 58.0	48.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	99.3	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
23.7	7.7	-3.0	87.9



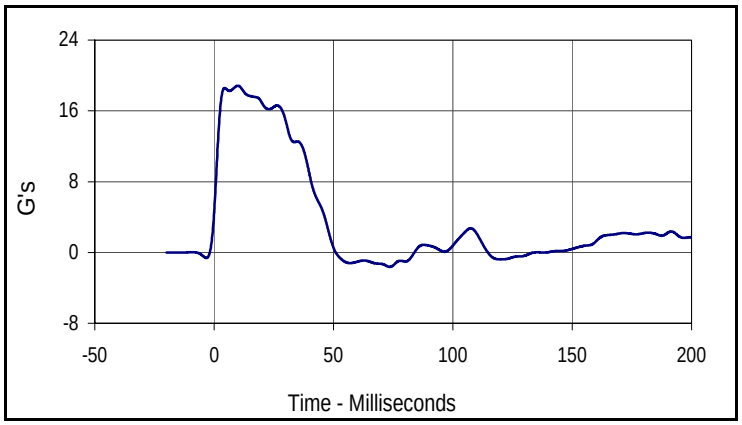
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
66.9	62.6	-46.6	183.5



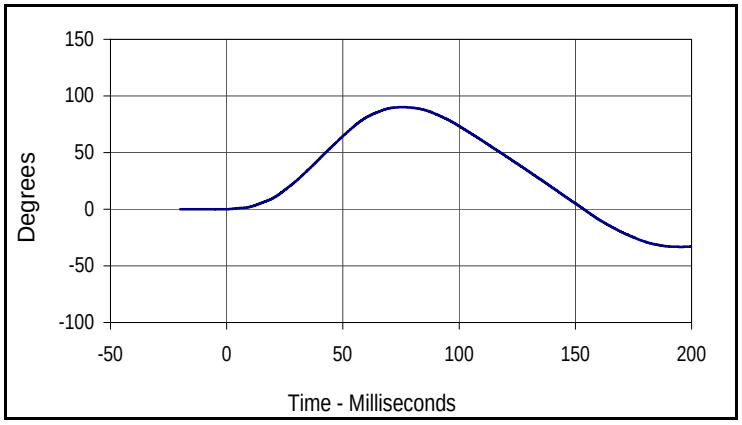
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
84.9	48.8	-64.9	14.0

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	8/4/06
ATD Serial No.:	034	Test I.D.:	NE08A

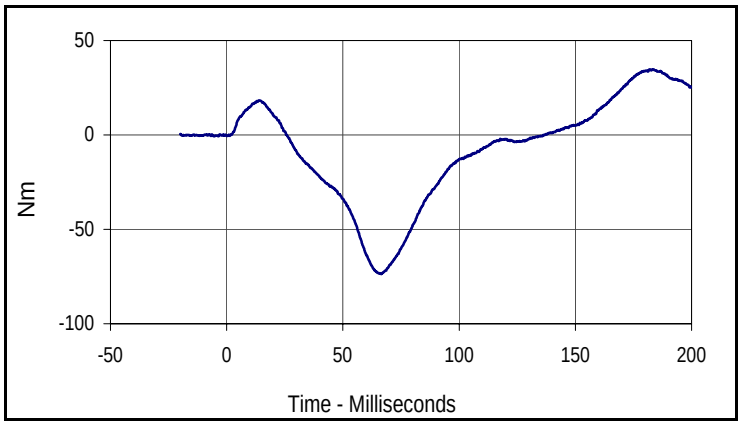
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.14	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.8	Pass
	20 Msec.	G's	14.0 to 19.0	16.9	Pass
	30 Msec.	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	45.1	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	90.1	Pass
	Time	Msec.	72.0 to 82.0	75.6	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	153.7	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-73.7	Pass
	Time	Msec.	65.0 to 79.0	66.5	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	136.2	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
18.8	10.0	-1.6	73.6



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
90.1	75.6	-33.2	195.5



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
34.7	183.6	-73.7	66.5

Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	8/2/06
ATD Serial No.:	034	Test I.D.:	LK08A , RK08B

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	5602	Pass
		Overall Test Results		Pass

Right Knee

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5743	Pass
		Overall Test Results		Pass

Curve Description			
Left Knee Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
5601.6	2.5	-26.0	7.6

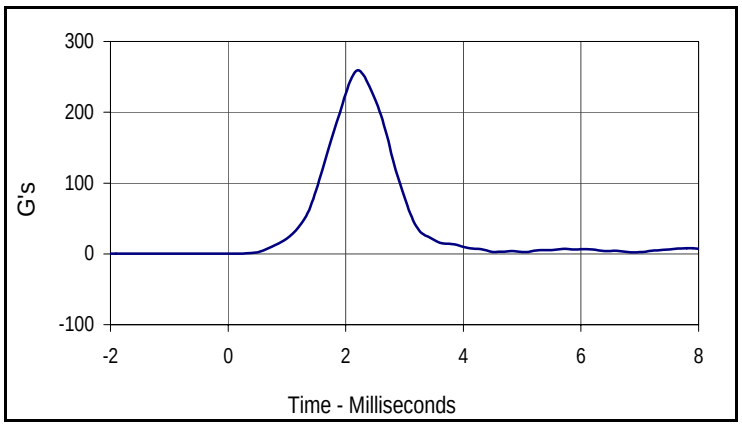
Curve Description			
Right Knee Probe Force			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
5743.4	2.4	-17.3	9.1

Test Program:	Hybrid III 50th Percentile Male External Measurements	Test Date:	8/7/06
ATD Serial No.:	034	Test I.D.:	N/A

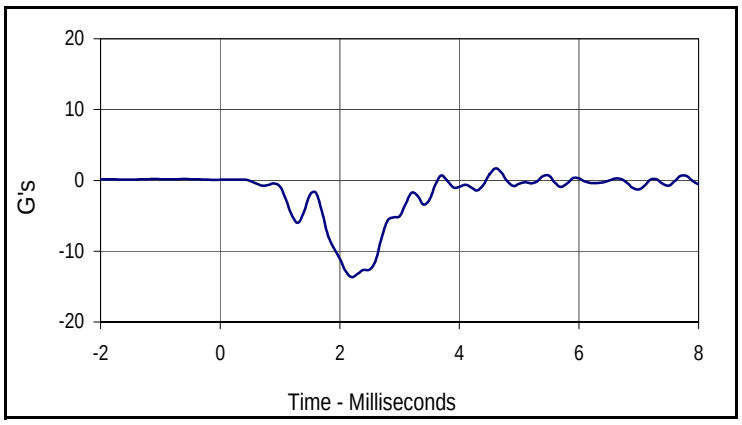
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	884	Pass
B - Shoulder pivot height	mm	505 to 521	512	Pass
C - "H" point height	mm	84 to 89	84	Pass
D - "H" point from seat back	mm	135 to 140	139	Pass
E - Shoulder pivot from back	mm	84 to 94	86	Pass
F - Thigh clearance	mm	140 to 155	151	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	334	Pass
J - Elbow rest height	mm	190 to 211	206	Pass
K - Buttock to knee length	mm	579 to 604	600	Pass
L - Poplipteal length	mm	429 to 455	451	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock poplipteal length	mm	452 to 477	475	Pass
O - Chest depth	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	255	Pass
V - Shoulder breadth	mm	422 to 437	434	Pass
W - Foot breadth	mm	91 to 107	103	Pass
Y - Chest circumference	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	851	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:	Hybrid III 50th Percentile Male Head Drop Test	Test Date:	8/2/06
ATD Serial No.:	035	Test I.D.:	HD08C

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	259.1	Pass
Peak Lateral Acceleration	G's	≤15.0	13.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass



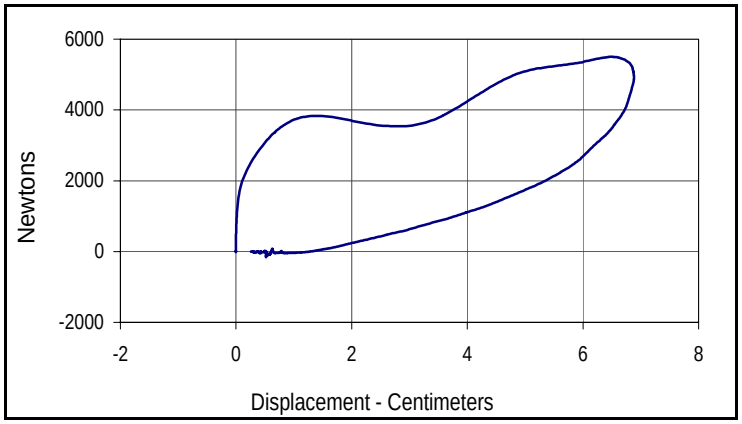
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
259.1	2.2	0.2	-1.6



Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.7	4.6	-13.7	2.2

Test Program:	Hybrid III 50th Percentile Male Thorax Impact Test	Test Date:	8/3/06
ATD Serial No.:	035	Test I.D.:	CH08B

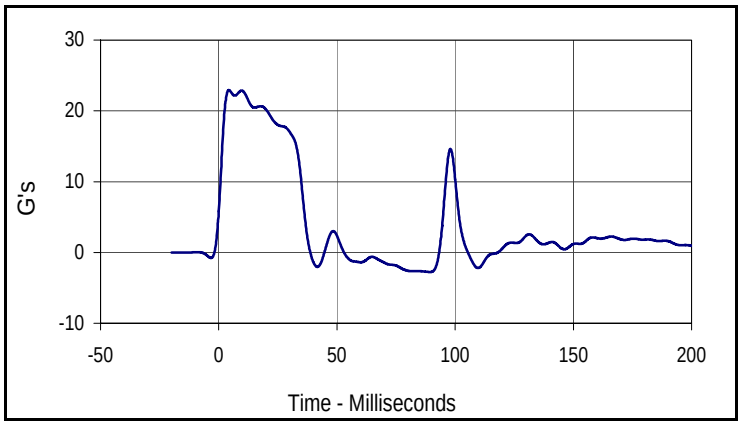
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force	Newtons	5159 to 5893	5500	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.88	Pass
Internal Hysterysis	%	69 to 85	72.2	Pass
		Overall Test Results		Pass



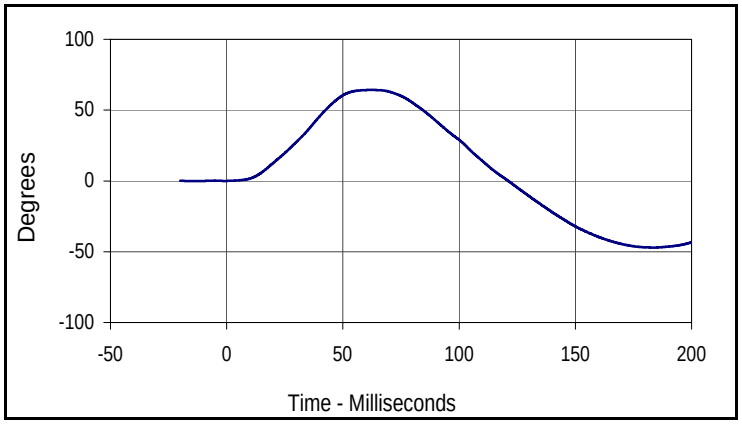
Curve Description			
Probe Force vs. Chest Deflection			
CURNO	Type	SAE Class	Hysterysis
001	FIL	180	72.2
Peak Probe Force		Peak Chest Deflection	
5500		6.88	

Test Program:	Hybrid III 50th Percentile Male Neck Flexion Test	Test Date:	8/4/06
ATD Serial No.:	035	Test I.D.:	NF08D

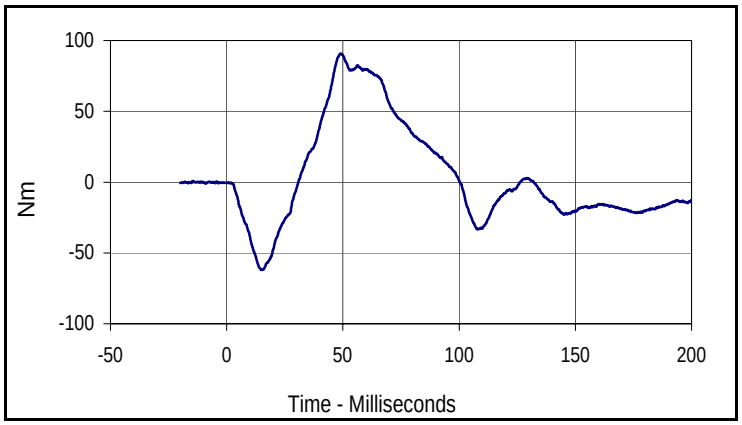
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.8	Pass
	20 Msec.	G's	17.6 to 22.6	20.2	Pass
	30 Msec.	G's	12.5 to 18.5	17.0	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	17.0	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	64.2	Pass
	Time	Msec.	57.0 to 64.0	62.0	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	121.1	Pass
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	90.8	Pass
	Time	Msec.	47.0 to 58.0	48.9	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.3	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
22.9	4.2	-2.8	89.4



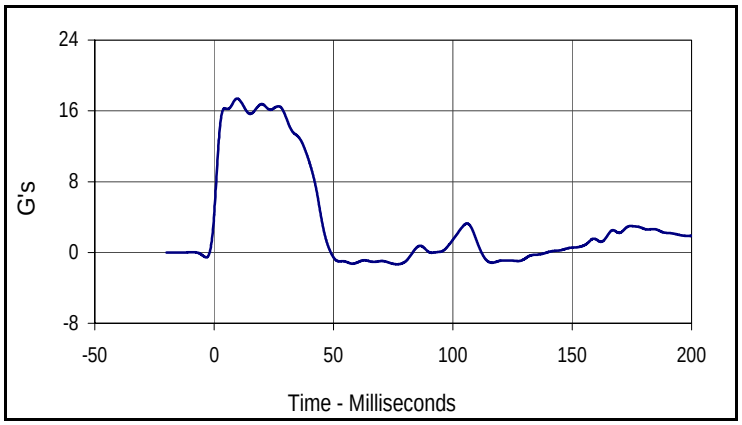
Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
64.2	62.0	-47.1	183.7



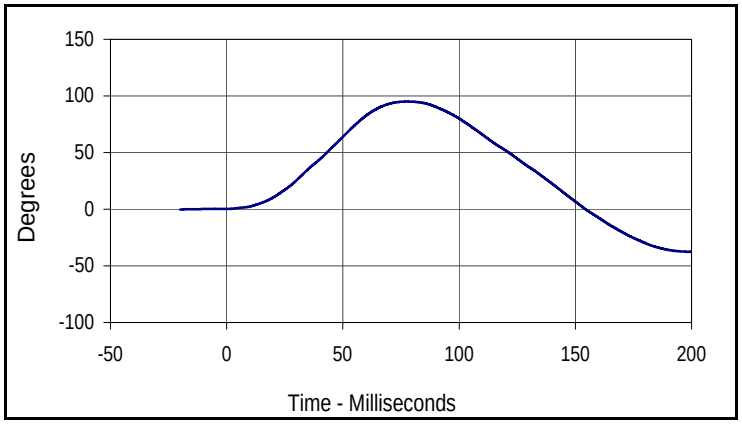
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
90.8	48.9	-61.9	15.0

Test Program:	Hybrid III 50th Percentile Male Neck Extension Test	Test Date:	8/4/06
ATD Serial No.:	035	Test I.D.:	NE08D

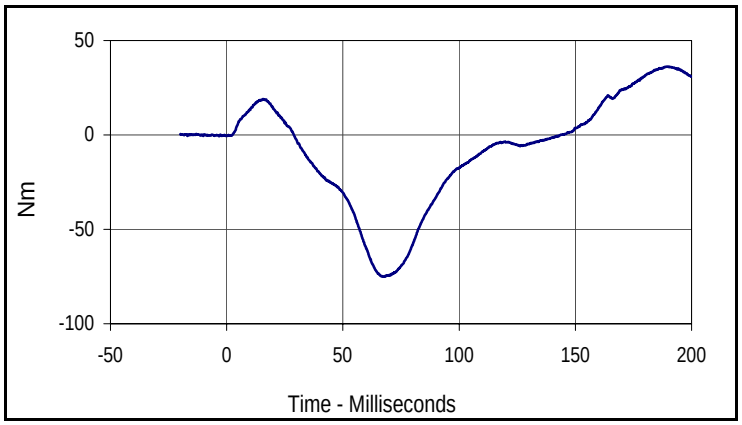
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.94 to 6.19	6.14	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.4	Pass
	20 Msec.	G's	14.0 to 19.0	16.8	Pass
	30 Msec.	G's	11.0 to 16.0	15.3	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.3	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	44.2	Pass
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	95.1	Pass
	Time	Msec.	72.0 to 82.0	77.4	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	154.4	Pass
Moment About Occ. Condyle	Max	Nm	-52.9 to- 79.9	-75.1	Pass
	Time	Msec.	65.0 to 79.0	67.9	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	143.7	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Deceleration			
CURNO	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
17.4	9.6	-1.3	76.6



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
95.1	77.4	-37.6	200.0



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
36.2	189.5	-75.1	67.9

Test Program:	Hybrid III 50th Percentile Male Knee Impact Test	Test Date:	8/2/06
ATD Serial No.:	035	Test I.D.:	LK08D , RK08E

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	5418	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	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
5418.4	2.5	-27.2	9.5

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:	8/7/06
ATD Serial No.:	035	Test I.D.:	N/A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	879 to 889	883	Pass
B - Shoulder pivot height	mm	505 to 521	511	Pass
C - "H" point height	mm	84 to 89	85	Pass
D - "H" point from seat back	mm	135 to 140	137	Pass
E - Shoulder pivot from back	mm	84 to 94	85	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	205	Pass
K - Buttock to knee length	mm	579 to 604	600	Pass
L - Poplipteal length	mm	429 to 455	451	Pass
M - Knee pivot height	mm	485 to 500	492	Pass
N - Buttock poplipteal length	mm	452 to 477	475	Pass
O - Chest depth	mm	213 to 229	229	Pass
P - Foot length	mm	251 to 267	255	Pass
V - Shoulder breadth	mm	422 to 437	435	Pass
W - Foot breadth	mm	91 to 107	105	Pass
Y - Chest circumference	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	852	Pass
AA - Location for chest circumference	mm	429 to 434	430	Pass
BB - Location for waist circumference	mm	226 to 231	229	Pass
		Overall Test Results		Pass

Test Program:	Dummy Damage Checklist	Test Date:	8/7/06
ATD Serial No.:	034	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	Test Date:	8/7/06
ATD Serial No.:	035	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: