

REPORT NUMBER: 305-CAL-10-1

**SAFETY COMPLIANCE TESTING FOR FMVSS 305
ELECTRIC POWERED VEHICLES: ELECTROLYTE SPILLAGE
AND ELECTRICAL SHOCK PROTECTION**

Toyota Motor Corporation
2010 Lexus HS250h
Sedan

NHTSA NUMBER: CA5102

CALSPAN
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June 10, 2010

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance (NVS-224)
1200 New Jersey Avenue, SE
Washington, DC 20590

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SECTION 1

PURPOSE AND TEST PROCEDURE

This rear impact test is part of the FMVSS 305 Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-C-00031. The purpose of this test was to determine if the subject vehicle, a 2010 Lexus HS250h 4-Door Sedan, meets the performance requirements of FMVSS No. 305 “Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection.” The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-305D-00, dated December 29, 2005).

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

A 1427 kg 2010 Lexus HS250h 4-Door Sedan was impacted from the rear by a 1357 kg moving barrier at a velocity of 78.7 kph (48.9 mph). The test was performed by Calspan Corporation on June 10, 2010.

The test vehicle was equipped with a 55 liter fuel tank which was filled to 92 percent capacity with stoddard fluid prior to impact. Additional ballast (27.0 kg) was secured in the vehicle cargo area. Two ballast Part 572E 50th percentile male Anthropomorphic Test Device (ATD) were placed in the front occupant seating positions.

The crash event was recorded by three high-speed cameras and one real-time camera. High-speed camera locations and other pertinent camera information are found on page 3-8 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A.

There was 1463 grams of fuel system fluid spillage following the impact or during any portion of the static rollover test. The average vehicle longitudinal crush was 599 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity." There was no electrolyte leakage and the vehicle appeared to comply with all the requirements of FMVSS No. 305.

SECTION 3

SUMMARY OF TEST RESULTS

DATA SHEET 1

TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2010 Lexus HS250h 4-Door Sedan
 Vehicle Body Color: _____ NHTSA Number: CA5102
 Engine Data: 4 Cylinders; _____ CID; 2.4 Liters; _____ cc
 Transmission: VT Speed; _____ Manual; X Automatic; _____ Overdrive
 Final Drive: _____ Rear Wheel Drive; X Front Wheel Drive; _____ Four Wheel Drive

MAJOR TEST VEHICLE OPTIONS:

X AC; X Pwr Steering; X Power Brakes; X Power Locks; X Power Seats
X ABS; X Tilt Wheel; _____ Stab Control _____ Traction Control _____ Anti-Theft

DEALER AND DELIVERY INFORMATION:

Date Received: March 12, 2010 ; Odometer Reading 19 km
 Selling Dealer: Classic Lexus
 Dealer Address: 2551 Som Center Rd; Willoughby, OH 44094

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufacturer: Toyota Motor Corporation
 Vehicle Build Date: 11/09
 VIN:: JTHBB1BA5A2014110
 GVWR: 2125 kg; GAWR: 1160 kg FRONT; 1000 kg REAR

DATA FROM VEHICLE'S TIRE LABEL AND SIDEWALL:

Location of Tire Placard: Driver sill
 Type of Spare Tire: T145/70D17

	<u>Front</u>	<u>Rear</u>
Maximum Tire Pressure (sidewall - kPa)	300	300
Cold Pressure (tire placard - kPa) – test pressure	230	230
Recommended Tire Size (tire placard)	P215/55R17	P215/55R17
Vehicle Tire Size with load index & speed symbol	P215/55R17	P215/55R17
Tire Manufacturer	Michelin	Michelin
Tire Name	Energy MXV4	Energy MXV4
Treadwear, Traction, Temperature	440, A, A	440, A, A

VEHICLE CAPACITY DATA:

Type of Front Seats: _____ Bench; X Bucket; _____ Split Bench
 Number of Occupants: 2 Front; 3 Rear; 5 Total
 Vehicle Capacity Weight (VCW) = 375 kg
 No. of Occupants x 68.04 kg = 340.2 kg
 Rated Cargo/Luggage Weight (RCLW) = 34.8 kg

ELECTRIC VEHICLE PROPULSION SYSTEM:

Electric Vehicle Type: _____ Electric; X Electric/Hybrid
 Propulsion Battery Type: Ni-MH
 Nominal Voltage: 266.4 V
 Location of Automatic Propulsion Battery Disconnect Located in rear cargo compartment.
 Auxiliary Battery Type: Lead acid

DATA SHEET 2

PRE-TEST DATA

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	507.0	501.0	60.6	1008.0
Rear =	338.0	318.5	39.4	656.5
Total Delivered Weight (UDW) =				1664.5

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1664.5	kg
Rated Cargo/Luggage Weight (RCLW) =	34.8	kg
Weight of 2 p.572E Dummies @ 78 each =	156	kg
TARGET TEST WEIGHT =	1856.1	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 27.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	558.5	542.0	59.6	1100.5
Rear =	383.0	362.5	40.4	745.5
Total Vehicle Test Weight (ATW) =				1846.0

Weight of Ballast Secured in Vehicle¹ = 27.0 kg Ballast Type Lead shot

Method of securing Ballast: Secured in rear passenger foot well

Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG ²
AS DELIVERED:	720	728	721	723	1066
AS TESTED:	705	713	701	702	1092

Vehicle's Wheel Base: 2704 mm

¹Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

²Rearward of the front axle centerline.

VEHICLE PRE-TEST WIDTH AND IMPACT OFFSET MEASUREMENT:

Vehicle Width at Widest Point: 1800 mm

Location: Front wheel fender

Centerline offset for impact line: 360 mm

Filler neck side (left/right) left

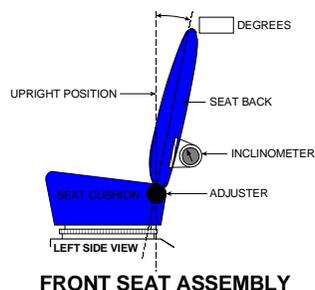
DATA SHEET 2 (continued)

PRE-TEST DATA

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



Seat back angle for driver's seat: See below

Measurement instructions: Headrest post set at 89 degrees with vertical defined as 90 degrees.
4 notches from full up.

Seat back angle for passenger's seat: See below

Measurement instructions: Headrest post set at 89 degrees with vertical defined as 90 degrees.
4 notches from full up.

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Full range of travel 298mm. Seat set in mid fore/aft position, 149 mm. from front. With seat cushion full down.

Positioning of the passenger's seat: Full range of travel 290mm. Seat set in mid fore/aft position, 145 mm. from front. With seat cushion full down.

3. FUEL TANK CAPACITY DATA:

- 3.1 A. "Usable Capacity" of the standard equipment fuel tank is 55.0 liters
- B. "Usable Capacity" of the optional equipment fuel tank is n/a liters
- C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 = 50.6 to 51.7 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 51.1 liters

3.3 Is vehicle equipped with electric fuel pump? Yes- x; No-

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

Hybrid vehicle. Fuel pump starts when vehicle ignition is on and gasoline engine is operating.

4. STEERING COLUMN ADJUSTMENTS:

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Telescoping column set at midrange of travel. Wheel tilt set at mid tilt angle when measured on face of wheel.

DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Anchorage were set to most upright position

6. PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED):

Electrolyte Fluid Type: KOH (mixture of +NaOH and LiOH)

Electrolyte Fluid Specific Gravity: 1.269 (25°C)

Electrolyte Fluid Kinematic Viscosity: 1.906 mPa-s

Electrolyte Fluid Color: Clear

Propulsion Battery Coolant Type, N.A. (Air cool)

Color and Specific Gravity:

Location of Battery Modules: In Occupant Compartment X Outside Occupant Compartment

7. PROPULSION BATTERY STATE OF CHARGE

Maximum State of Charge: Range 204 – 340 V

Test Voltage ($\geq 95\%$ of maximum) 266.4

OR

Range of Normal Operating Voltage: X

Test Voltage (within range) 266.4

8. Details of Chassis Ground Points and Locations:

Located in cargo area on left side of floor.

9. Details of Propulsion Battery Components:

The system contains a Ni-MH battery in the rear cargo compartment, a Hybrid ECU is located in the front portion of the vehicle to control the system operation. Service plugs and quick disconnects on top of the battery system case.

10. Comments:

None

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) DATA

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore 1209043

MDB DETAILS:

Overall Width of Framework Carriage	=	<u>1250</u>	millimeters
Overall Length of MDB (incl. honeycomb impact face)	=	<u>4120</u>	millimeters
Wheelbase of Framework Carriage	=	<u>2591</u>	millimeters
Tread of Framework Carriage (Front & Rear)	=	<u>1875</u>	millimeters
C.G. Location Rearward of Front Axle	=	<u>1136</u>	millimeters

MDB WEIGHT:

Left Front	=	<u>358.0</u>	kg	Left Rear	=	<u>322.0</u>	kg
Right Front	=	<u>404.0</u>	kg	Right Rear	=	<u>273.0</u>	kg
TOTAL FRONT =		<u>762.0</u>	kg	TOTAL REAR =		<u>596.0</u>	kg
TOTAL MDB WEIGHT =		<u>1357.0</u>	kg				

Tires (Mfr, line, size): Dunlop Radial Rover AT P205/75-R15

TIRE PRESSURE:

Left Front	=	<u>207</u>	kPa	Left Rear	=	<u>207</u>	kPa
Right Front	=	<u>207</u>	kPa	Right Rear	=	<u>207</u>	kPa

Brake Abort System? (Yes/No) Yes

Date of Last Calibration: 5/15/2010

DATA SHEET 4

PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

VOLTMETER INFORMATION:

Make:	<u>Fluke</u>	Model:	<u>87</u>	S/N:	<u>400492</u>
Internal Resistance Value:	<u>50Kr</u>	MΩ			
Resolution:	<u>0.001</u>	V			
Last Calibration Date:	<u>10/19/09</u>				

Propulsion Battery Voltage : (ready to drive position)	V_b	=	<u>266.4</u>	V
Propulsion Battery to Vehicle Chassis:	V_1	=	<u>-40.0</u>	V
Propulsion Battery to Vehicle Chassis:	V_2	=	<u>155</u>	V
Propulsion Battery to Vehicle Chassis Across Known Resistor:	R_o	=	<u>120K</u>	Ω
Propulsion Battery to Vehicle Chassis with R_o installed:	V_1'	=	<u>0.3</u>	V
Propulsion Battery to Vehicle Chassis: with R_o installed:	V_2'	=	<u>0.2</u>	V

ELECTRICAL ISOLATION MEASUREMENTS:

R_{i1} :	<u>46345</u>	Ω	$R_{i1} = R_o * (1 + V_2/V_1) * [(V_1 - V_1')/V_1']$
R_{i2} :	<u>68911</u>	Ω	$R_{i2} = R_o * (1 + V_1/V_2) * [(V_2 - V_2')/V_2']$
R_i :	<u>46345</u>	Ω	Lesser value of R_{i1} and R_{i2}
R_i/V_b :	<u>173968</u>	V	Electrical Isolation Value

Is the Electrical Isolation Value $\geq 500 \Omega/V$?

Yes/No

Yes

If NO - Failure

Comments:

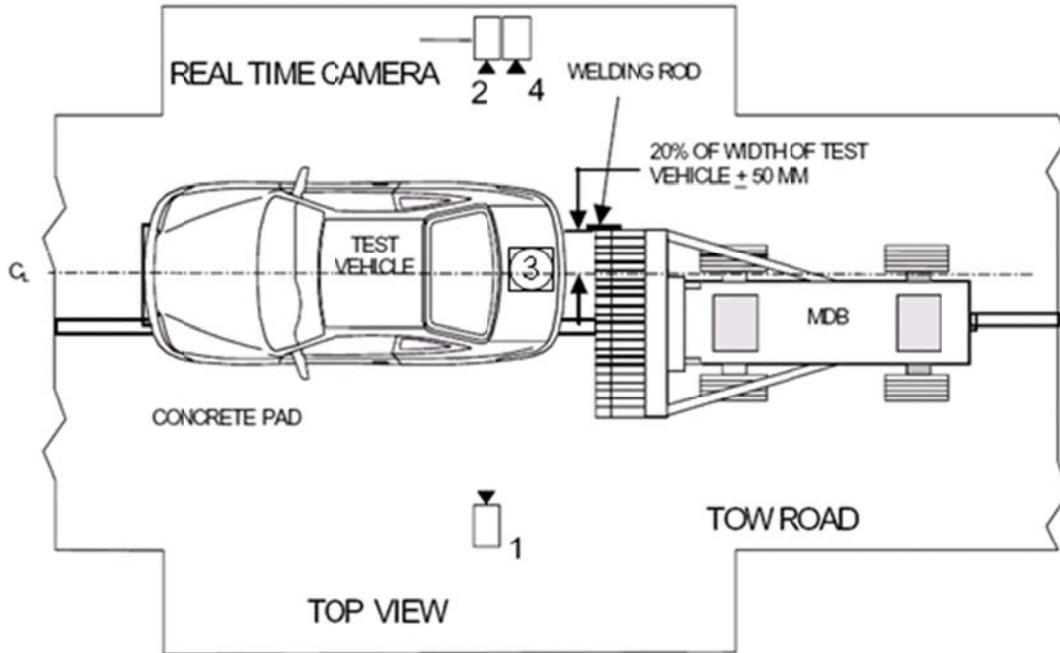
none

DATA SHEET 5

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	8010	1880	975	-0.5	24	1000
2	Real-Time Camera	-	-	-	-	-	30
3	Overhead View	0	775	4900	-90	20	1000
4	Right Side View	8705	1680	1010	-1.5	24	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.

X = (Impact Point) + Forward

Y = (Impact Point) + To Right

Z = (Ground Level) + Down

DATA SHEET 6
POST-TEST DATA

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

REQUIRED IMPACT VELOCITY RANGE:: 78.5 to 80.1 km/h

ACTUAL IMPACT VELOCITY WITHIN 1.5 M OF IMPACT PLANE:

Trap No. 1 = 78.7 km/h Trap No. 2 = 78.8 km/h

Average Impact Speed = 78.75 km/h

WELDING ROD IMPACT POINT:

3 Vertical distance from target center (+ is above) Tolerance: ±40 mm

5 Horizontal distance from target center (+ is right) Tolerance: ±50 mm

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. Front impact until vehicle motion ceases -

Actual = 0 g Maximum Allowable = 28 g

B. For 5 minute period after vehicle motion ceases -

Actual = 0 g Maximum Allowable = 28 g

C. For next 25 minutes -

Actual = 0 g/minute Maximum Allowable = 28 g/minute

D. Provide Spillage Details:

None

ELECTROLYTE SPILLAGE MEASUREMENT:

Is propulsion battery electrolyte spillage visible in occupant compartment? _____ Yes (fail) X No

For 30 minutes until vehicle motion ceases -

Actual = 0 L Maximum Allowable = 5 L

Provide Spillage Details:

None

DATA SHEET 6

POST-TEST DATA (Continued)

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

POST TEST SEAT DATA

LOCATION	SEAT MOVEMENT (mm)	SEAT BACK FAILURE
P1 (Left Front)	None	Slightly reclined
P2 (Right Front)	None	Slightly reclined

POST TEST ATD CONTACT DATA

LOCATION	Position 1 (Driver)	Position 2 (Passenger)
Head	Headrest	Headrest
Chest	n/a	n/a
Abdomen	n/a	n/a
Left Knee	n/a	n/a
Right Knee	n/a	n/a

Curtain bag deployed on driver side.

VEHICLE DIMENSIONS:

Vehicle length:

	Left Side	Centerline	Right Side
Pre-Test	4632	4700	4630
Post-Test	3878	4105	4181
Crush	754	595	449

Vehicle Wheel Base:

	Left Side	Right Side
Pre-Test	2704	2704
Post-Test	2620	2713
Crush	84	-9

DATA SHEET 7

POST-IMPACT ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

VOLTMETER INFORMATION:

Make: Fluke Model: 87 S/N: 400492
 Internal Impedance Value 0.12 MΩ
 Normal Propulsion Battery Voltage (V_b): 266.4 V

ELECTICAL ISOLATION MEASUREMENTS

V ₁ = <u>-110</u> V Impact	Time: <u>2</u> minutes <u>0</u> seconds
V ₂ = <u>150</u> V Impact	Time: <u>2</u> minutes <u>0</u> seconds
V ₁ ' = <u>0.4</u> V Impact	Time: <u>2</u> minutes <u>0</u> seconds
V ₂ ' = <u>0.3</u> V Impact	Time: <u>2</u> minutes <u>0</u> seconds
R _{i1} = <u>12044</u> Ω Impact	R _{i1} = R _o *(1+V ₂ /V ₁)*[(V ₁ -V ₁ ')/V ₁ '] Time: <u>2</u> minutes <u>0</u> seconds
R _{i2} = <u>15968</u> Ω Impact	R _{i2} = R _o *(1+V ₁ /V ₂)*[(V ₂ -V ₂ ')/V ₂ '] Time: <u>2</u> minutes <u>0</u> seconds
R _i = <u>12044</u> Ω Impact	Lesser value of R _{i1} and R _{i2} Time: <u>2</u> minutes <u>0</u> seconds
R _i /V _b = <u>45209</u> Ω Impact	Time: <u>2</u> minutes <u>0</u> seconds

Is the measured Electrical Isolation Value ≥ 500 Ω/V? X Yes No (Fail)

PROPULSION BATTERY SYSTEM COMPONENTS

Describe Propulsion Battery Module movement within occupant compartment:

None

Has the Propulsion Battery Module moved within the occupant compartment? Yes(Fail) X No

Describe intrusion of an outside Propulsion Battery Component into the occupant compartment:

None

Has an outside Propulsion Battery Component intruded into the occupant compartment? Yes(Fail) X No

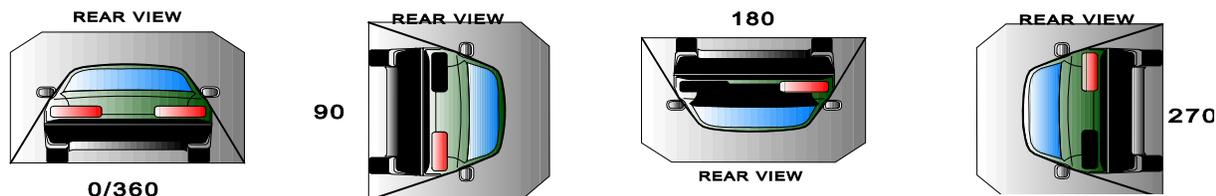
Is Propulsion Battery electrolyte spillage visible in the occupant compartment? Yes(Fail) X No

DATA SHEET 8

FMVSS 301 ROLLOVER DATA

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
	1	minutes	5	seconds	5	minutes	6	minutes	5	seconds	7	minutes
0° - 90°	n/a	minutes		seconds		minutes		minutes		seconds		minutes
90° - 180°	n/a	minutes		seconds		minutes		minutes		seconds		minutes
180°-270°	n/a	minutes		seconds		minutes		minutes		seconds		minutes
270°-360°	n/a	minutes		seconds		minutes		minutes		seconds		minutes

II. FMVSS 301 REQUIREMENTS: (Maximum allowable solvent spillage):

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0° - 90°	1463	340	335	N/A
90° - 180°	Not collected – stage 1 exceeded	n/a	n/a	N/A
180°-270°	Not collected – stage 1 exceeded	n/a	n/a	N/A
270°-360°	Not collected – stage 1 exceeded	n/a	n/a	N/A

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

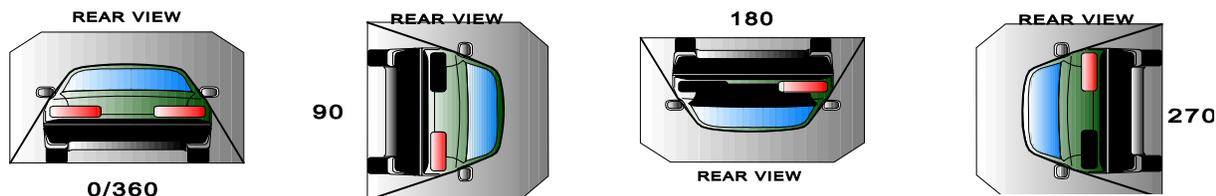
Rollover Stage	Spillage Location
0° - 90°	Stoddard appeared to leak from the fuel filler neck area that was pulled from the left rear fender area during the impact.
90° - 180°	Not collected – stage 1 exceeded
180°-270°	Not collected – stage 1 exceeded
270°-360°	Not collected – stage 1 exceeded

DATA SHEET 9

FMVSS 305 ROLLOVER DATA

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102



I. DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
	minutes	seconds	minutes	seconds	minutes	seconds	minutes	seconds	minutes	seconds	minutes	seconds
0° - 90°	1	9	5	6	9	7						
90° - 180°	1	3	5	6	3	7						
180°-270°	1	2	5	6	2	7						
270°-360°	1	9	5	6	9	7						

II. ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE :

Rollover Stage	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0-90°	0	None
90-180°	0	None
180-270°	0	None
270-360°	0	None

Total Spillage: 0 L

FMVSS 305 permits 5 L maximum

Is the total spillage of Propulsion Battery electrolyte greater than 5.0 liters? YES (Fail) X NO

Is Propulsion Battery electrolyte spillage visible in the occupant compartment? YES (Fail) X NO

DATA SHEET 9

FMVSS 305 ROLLOVER DATA (CONTINUED)

Vehicle: 2010 Lexus HS250h 4-Door Sedan

NHTSA No. CA5102

III. ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS:

VOLTMETER INFORMATION:

Make: Fluke Model: 87 S/N: 400492
 Internal Resistance Value (R_o) 0.12 MΩ
 Normal Propulsion Battery Voltage (V_b): 266.4 V

$R_{i1} = R_o * (1 + V_2/V_1) * [(V_1 - V_1')/V_1']$ $R_{i2} = R_o * (1 + V_1/V_2) * [(V_2 - V_2')/V_2']$ Lesser value of R_{i1} and R_{i2}

Isolation Measurement (Volts)	Stage	R _{i1} Ω	R _{i2} Ω	R _i Ω	R _i /V _b Ω/V	Time (min)	Time (s)
V ₁ = 98	90°	6333	6333	6333	31122	1	9
V ₂ = 98							
V ₁ ' = 3							
V ₂ ' = 3							
V ₁ = 88	180°	5731	5736	5731	28162	1	3
V ₂ = 90							
V ₁ ' = 3							
V ₂ ' = 3							
V ₁ = 87	270°	5761	5772	5761	28309	1	2
V ₂ = 92							
V ₁ ' = 3							
V ₂ ' = 3							
V ₁ = 90	360°	5800	5800	5800	28501	1	9
V ₂ = 90							
V ₁ ' = 3							
V ₂ ' = 3							

Is the measured Electrical Isolation Value ≥ 500 Ω/V? X YES NO (Fail)

COMMENTS:

none

APPENDIX A

PHOTOGRAPHS

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Figure A-1: Vehicle Certification Placard

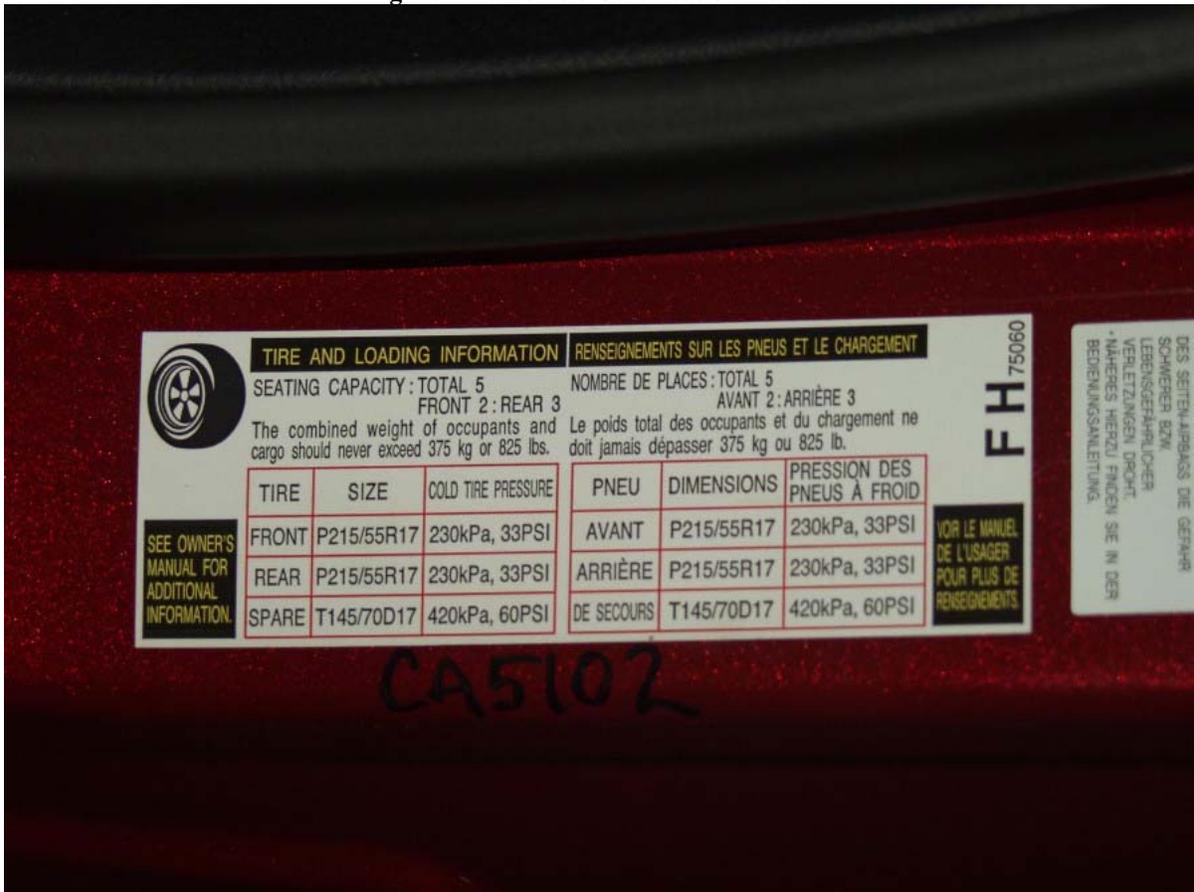


Figure A-2: Vehicle Tire Placard



Figure A-3: Vehicle Electric Propulsion System Label



Figure A-4: Pre-Test Test Port Interface Port Installation View

Photo not available

Figure A-5: Pre-Test Test Device Installation Views



Figure A-6: Pre-Test Chassis Ground Point View



Figure A-7: Pre-Test Front View



Figure A-8: Post-Test Front View



Figure A-9: Pre-Test Left Side View



Figure A-10: Post-Test Left Side View



Figure A-11: Pre-Test Right Side View



Figure A-12: Post-Test Right Side View



Figure A-13: Pre-Test Left Front Three-Quarter View



Figure A-14: Post-Test Left Front Three-Quarter View



Figure A-15: Pre-Test Right Front Three-Quarter View



Figure A-16: Post-Test Right Front Three-Quarter View



Figure A-17: Pre-Test Left Rear Three-Quarter View



Figure A-18: Post-Test Left Rear Three-Quarter View



Figure A-19: Pre-Test Right Rear Three-Quarter View



Figure A-20: Post-Test Right Rear Three-Quarter View



Figure A-21: Pre-Test Rear View



Figure A-22: Post-Test Rear View



Figure A-23: Pre-Test MDB Front View



Figure A-24: Post-Test MDB Front View



Figure A-25: Pre-Test MDB Left Side View



Figure A-26: Post-Test MDB Left Side View



Figure A-27: Pre-Test MDB Right Side View



Figure A-28: Post-Test MDB Right Side View



Figure A-29: Pre-Test MDB Top View



Figure A-30: Post-Test MDB Top View



Figure A-31: Pre-Test Overhead Vehicle and MDB View



Figure A-32: Post-Test Impact Target View



Figure A-33: Pre-Test Battery Propulsion Module(S) View



Figure A-34: Post-Test Battery Propulsion Module(S) View



Figure A-35: Pre-Test Propulsion Battery View



Figure A-36: Post-Test Propulsion Battery View



Figure A-37: Pre-Test High Voltage Interconnect View

Photo not available, rear deck lid not operable after impact.

Figure A-38: Post-Test High Voltage Interconnect View



Figure A-39: Pre-Test Battery Compartment View

Photo not available, rear deck lid not operable after impact.

Figure A-40: Post-Test Battery Compartment View



Figure A-41: Pre-Test Battery Venting System View

Photo not available, rear deck lid not operable after impact.

Figure A-42: Post-Test Battery Venting System View



Figure A-43: Pre-Test Electric Propulsion Component(S) View

Photo not available, rear deck lid not operable after impact.

Figure A-44: Post-Test Electric Propulsion Component(S) View



Figure A-45: Pre-Test Electric Propulsion Drive View



Figure A-46: Post-Test Electric Propulsion Drive View



Figure A-47: Pre-Test Vehicle Passenger Compartment View



Figure A-48: Post-Test Vehicle Passenger Compartment View

Not applicable, no spillage.

Figure A-49: Post-Test Propulsion Battery Electrolyte Spillage Location View

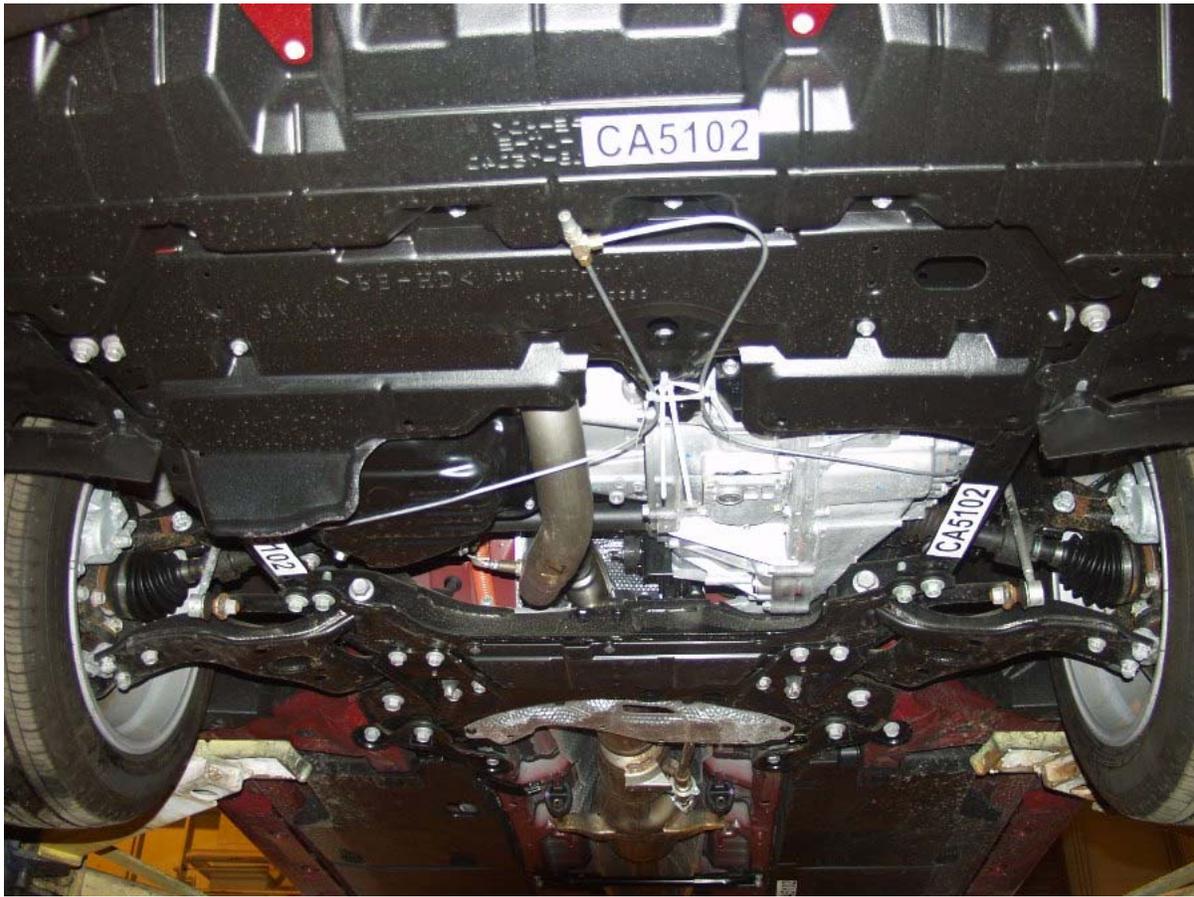


Figure A-50: Pre-Test Front Underbody View



Figure A-51: Post-Test Front Underbody View



Figure A-52: Pre-Test Mid Underbody View



Figure A-53: Post-Test Mid Underbody View



Figure A-54: Pre-Test Rear Underbody View

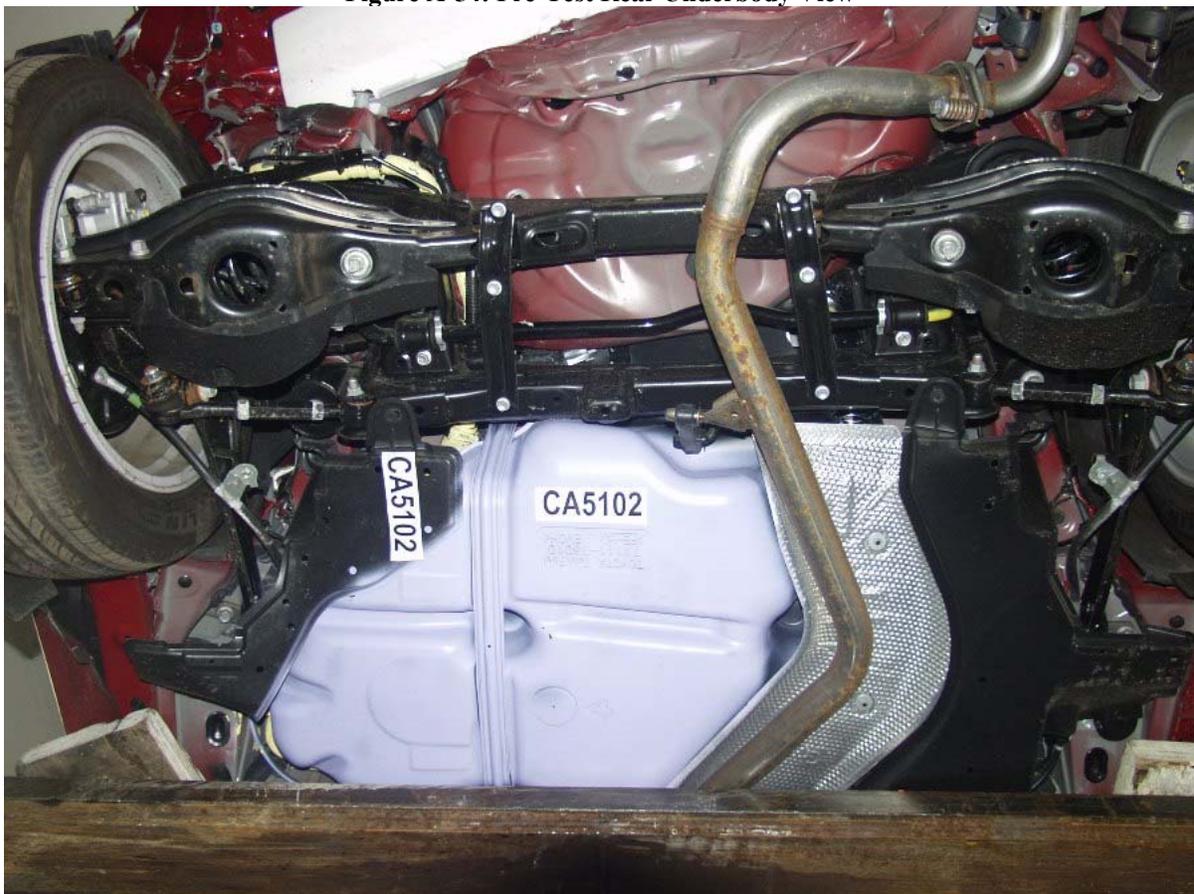


Figure A-55: Post-Test Rear Underbody View



Figure A-56: Pre-Test Fuel Filler Cap View

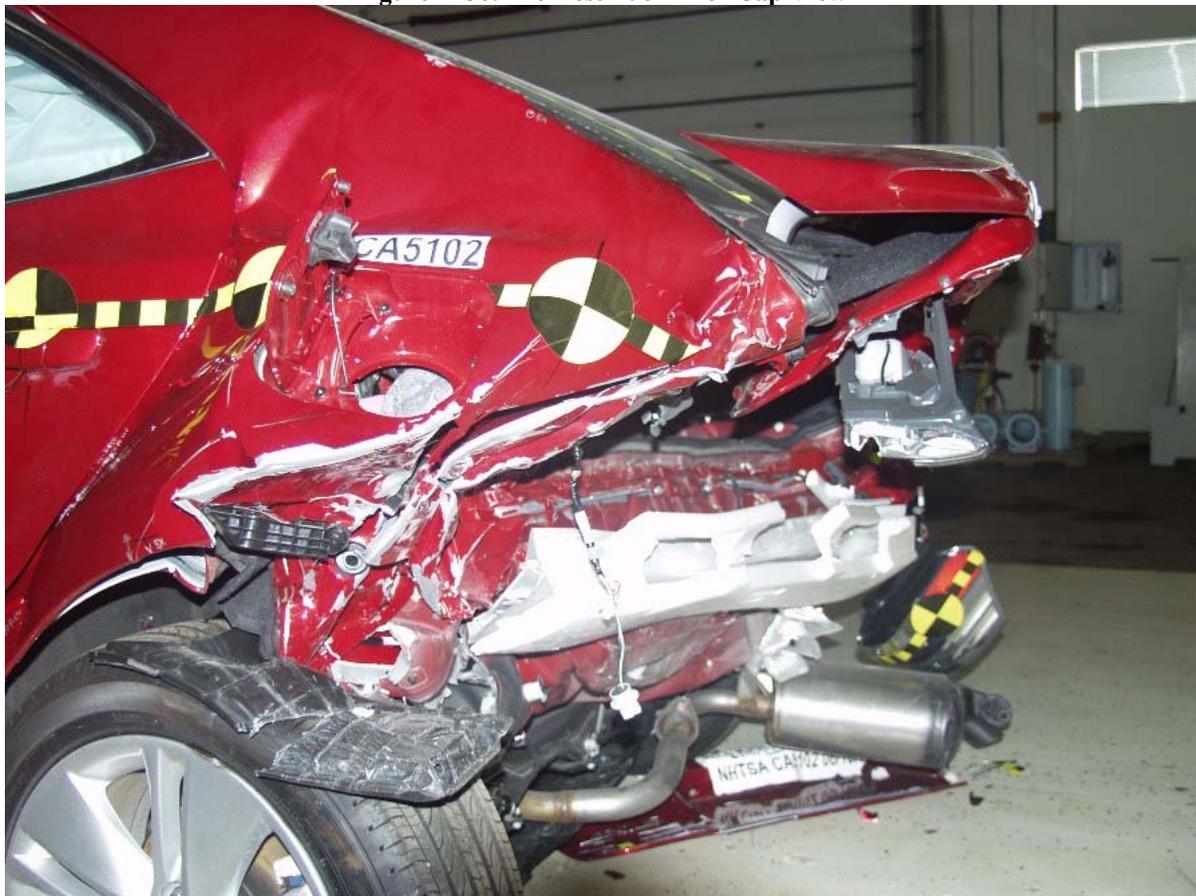


Figure A-57: Post-Test Fuel Filler Cap View



Figure A-58: Impact View



Figure A-59: Rollover View - 90°

Photo not taken, vehicle leaked fuel for FMVSS 301 test, rollover stopped after 90 deg.

Figure A-60: Rollover View - 180°

Photo not taken, vehicle leaked fuel for FMVSS 301 test, rollover stopped after 90 deg.

Figure A-61: Rollover View - 180°

Photo not taken, vehicle leaked fuel for FMVSS 301 test, rollover stopped after 90 deg.

Figure A-62: Rollover View - 360°