REPORT NUMBER: 301-MGA-2007-003

SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY – REAR IMPACT

TOYOTA MOTOR CORPORATION
2007 TOYOTA PRIUS HYBRID
NHTSA NUMBER: C75108

PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: May 23, 2007

Final Report Date: June 7, 2007

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6111
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-C-00030.

Prepared by: Joe Fleck
Joe Fleck, Project Engineer

Date: 6/07/07

Reviewed by: David Winkelbauer
David Winkelbauer, Facility Director

Date: 6/07/07

FINAL REPORT ACCEPTED BY:

Edward E. Chan

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DN: CN = Edward E. Chan, C = US, O = National Highway Traffic Safety Administration, OU = Office of Vehicle Safety Compliance
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COTR

Date of Acceptance

Technical Report Documentation Page

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7. Author(s) Joe Fleck, Project Engineer		*8. Performing Organization Report No.* 301-MGA-2007-003	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-06-C-00030	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement, Office of Vehicle Safety Compliance 400 Seventh Street, SW, Room 6111 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report 5/23/07 to 6/07/07 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract A rear impact was conducted on a 2007 Toyota Prius Hybrid at MGA Research Corporation on May 23, 2007. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 47.3 km/h. The ambient temperature at the time of impact was 21 degrees Celsius. FMVSS 305 was conducted in conjunction with the FMVSS 301R.			
17. Key Words Fuel System Integrity Test 2007 Toyota Prius Hybrid NHTSA No: C75108		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, Room 5108 (NPO-230) 400 Seventh Street, S.W. Washington, D.C. 20590	
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This rear impact test is sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-C-00030. The purpose of this test is to reduce deaths and injuries occurring from fires that result from fuel spillage during and after motor vehicle crashes and resulting from ingestion of fuels during siphoning.

SUMMARY

A 2007 Toyota Prius Hybrid was impacted by a Moving Deformable Barrier (MDB) at a velocity of 47.3 km/h. The test was performed at MGA Research Corporation on May 23, 2007. Appendix A contains FMVSS 305, "Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection" data. Pre-and post-test photographs of the vehicle, dummies, and propulsion system can be found in Appendix B.

One real-time camera and seven high-speed cameras were used to document the impact event. In addition, real-time video was taken of the gas cap closing and static rollover.

- Left Overall 1000 fps
- Right Overall 1000 fps
- Onboard Cart Close Up 1000 fps
- Overhead Overall 1000 fps
- Pit Front 1000 fps
- Pit Middle 1000 fps
- Pit Rear 1000 fps
- Real Time Pan 24 fps

Two ballast Part 572B, 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.

There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

SECTION 2

DATA SHEETS

DATA SHEET NO. 1

TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

TEST VEHICLE INFORMATION

Manufacturer	Toyota
Model	Prius
Body Style	Hybrid
Major Options	None
NHTSA No.	C75108
VIN	JTDKB20U477597379
Color	Classic Silver Met
Delivery Date	3/16/2007
Odometer Reading (mile)	98
Dealer	Jack Safro Toyota
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1.5
Engine Placement	Lateral

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation
Date of Manufacture	12/06

GVWR (kg)	1721
GAWR Front (kg)	1059
GAWR Rear (kg)	1021

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				365
Number of Occupants x 68 kg.				340
Cargo Wt. (RCLW) (kg)				27.2

DATA SHEET NO. 1 (continued)

TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

DATA FROM VEHICLE'S TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	230
Recommended Tire Size	P185/65R15	P185/65R15
Recommended Load Range	86	86
Tire Size on Vehicle	P185/65R15	P185/65R15
Tire Manufacturer	Goodyear	Goodyear
Location of Placard of Vehicle	Driver Door, B-Post	
Type of Spare Tire (full size/space saver)	Space Saver T125/70D16	

DATA SHEET NO. 2

PRE-TEST DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

WEIGHT OF TEST VEHICLE

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	406.0	276.2		450.4	323.0	
Right	kg	389.2	257.2		426.4	300.3	
Ratio	%	59.9	40.1		58.4	41.6	
Totals	kg	795.2	533.4	1328.6	876.8	623.3	1500.1

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1328.6
Rated Cargo/Luggage Weight (RCLW)	kg	27.2
Weight of 2 P572B ATDs	kg	148.8
Calculated Vehicle Target Weight (TVTW)	kg	1504.6

Vehicle Wheelbase	2695 mm
Weight of Ballast Secured	14.5 kg
Method of Securing Ballast	On rearmost seat with ratchet straps
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	673	680	657	668
As Tested	mm	671	676	657	667

DATA SHEET NO. 2 (continued)

PRE-TEST DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

FUEL SYSTEM DATA

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	45.0
Usable Capacity Figure Furnished by COTR	45.0
Usable Capacity of "Optional" Tank	
90-95% of Usable Capacity	40.5 to 42.8
Actual Test Volume (entire fuel system filled)	41.6

Test Fluid Type	Stoddard Solvent
Test Fluid Kinematic Viscosity (centistokes)	2.1 cSt @ 20° C
Test Fluid Color	Purple
Type of Vehicle Fuel Pump	Electrical
Activate Electric Fuel Pump Operation with Ignition Switch ON, but Engine OFF	Yes

Comments (noticeable attributes of fuel system components, capacity, etc.)	None

DATA SHEET NO. 3

MOVING BARRIER DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

MOVING BARRIER'S TEST WEIGHT

	Units	Front	Rear	Total
Left	kg	495.3	401.7	
Right	kg	496.2	401.3	
Ratio	%	55.3	44.7	
Totals	kg	991.5	803.0	1794.5

Tires (Mfr, line, size)	Yokohama, AVID Touring, 205/75R15
Tire Pressure (kPa)	207
Brake Abort System (Yes/No)?	Yes

DATA SHEET NO. 4

POST-TEST DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

IMPACT VELOCITY

	Units: km/h
Required Impact Velocity	47.3 ± 0.8 km/h
Actual Impact Velocity (Trap No. 1)	47.3
Actual Impact Velocity (Trap No. 2)	47.2
Average Impact Speed	47.25

Temperature at Time of Impact (°C)	21
Test Time	1:57 pm

DATA SHEET NO. 5

STATIC ROLLOVER TEST DATA

Test Vehicle:	2007 Toyota Prius Hybrid	NHTSA No.:	C75108
Test Program:	FMVSS 301 Fuel System Integrity	Test Date:	5/23/2007

STODDARD SOLVENT SPILLAGE MEASUREMENT

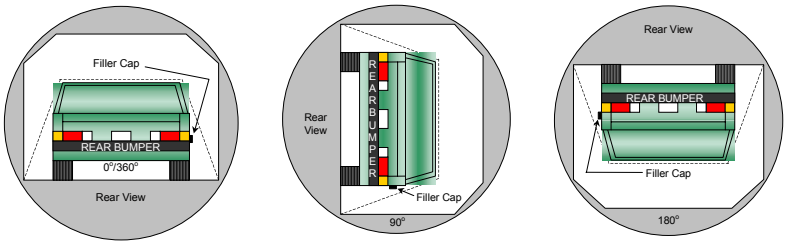
A. From impact until vehicle motion ceases: 0 g
(Maximum Allowable = 28 grams)

B. For the 5 minute period after motion ceases: 0 g
(Maximum Allowable = 28 grams)

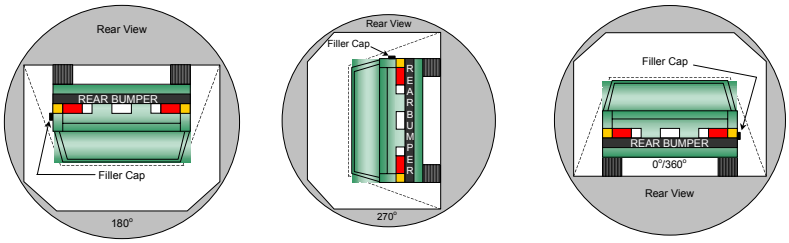
C. For the following 25 minutes: 0 g
(Maximum Allowable = 28 grams/minute)

D. Spillage: **None**

FMVSS 301 STATIC ROLLOVER DATA



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 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations: **Not Applicable**

DATA SHEET NO. 5 (continued)

STATIC ROLLOVER TEST DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 301 Fuel System Integrity Test Date: 5/23/2007

STODDARD SOLVENT SPILLAGE MEASUREMENT
Hold Time = 5 minutes at all intervals

0° TO 90° Rotation Time (sec) = 122 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

90° TO 180° Rotation Time (sec) = 117 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

180° TO 270° Rotation Time (sec) = 113 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

270° TO 360° Rotation Time (sec) = 115 sec

Test Phase	Spillage (g)	Spillage Details
First 5 minutes from onset of rotation	0	
Sixth minute from onset of rotation	0	
Seventh minute from onset of rotation	0	
Eight minute if required	N/A	

FORM 1

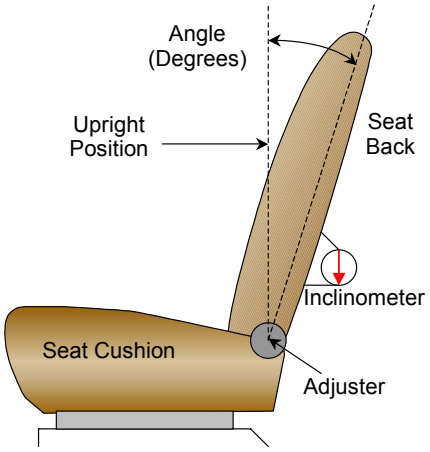
TEST VEHICLE INFORMATION

Test Vehicle:	2007 Toyota Prius Hybrid	NHTSA No.:	C75108
Test Program:	FMVSS 301 Fuel System Integrity	Test Date:	5/23/2007

NORMAL DESIGN RIDING POSITION

For both driver and passenger seat backs: Use the door sill as the reference for measuring the seat back angle.

Driver Seat Back Angle	88.9°
Passenger Seat Back Angle	89.1°



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	17 detents	8th detent, 1st as 0
Passenger Seat	17 detents	8th detent, 1st as 0

D-RING ADJUSTMENT

The driver and passenger D-rings were placed in the uppermost position.

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position at 61.8 degrees.

APPENDIX A

FMVSS 305
ELECTRIC POWERED VEHICLES: ELECTROLYTE SPILLAGE AND ELECTRICAL SHOCK PROTECTION

This hybrid vehicle, a 2007 Toyota Prius (NHTSA No. C75108), in conjunction with the rear impact, was tested to FMVSS 305.

The test was performed in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-305-00 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 305, “Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection”.

Based on the test results, the 2007 Toyota Prius Hybrid appears to meet the requirements of FMVSS 305 testing.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-06-C-00030.

The following data sheets document the results of the FMVSS 305 test.

DATA SHEET 1

ELECTRIC VEHICLE PROPULSION SYSTEM

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

Type of Electric Vehicle (Electric/Hybrid):	Hybrid
Propulsion Battery Type:	Alkaline Electrolyte
Nominal Voltage (V):	201.6 V
Physical Location of Automatic Propulsion Battery Disconnect:	Left Rear of High Voltage Battery
Auxiliary Battery Type:	Glass Matt

DATA SHEET 2

PRE-TEST DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED DATA)

Electrolyte Fluid Type:	Nickel Metal Hydride (NiMH)	
Electrolyte Fluid Specific Gravity:	1.269	
Electrolyte Kinematic Viscosity (centistokes):	1.906	
Electrolyte Fluid Color:	Gray / Clear	
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable):	Air	
Location of Battery Modules:	X	Inside Passenger Compartment
		Outside Passenger Compartment
Propulsion Battery State of Charge:		Maximum State of Charge
		Range of Normal Operating Voltage
Maximum State of Charge:		
Test Voltage No less than 95% of maximum state of charge:		
Range of Normal Operating Voltage:	168 – 280 V	
Test Voltage Within normal operative voltage range:	224.7 V	

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Locations(s) [Supply photographs as appropriate]:	Bolt stud outboard of battery terminals; unpainted 14 mm nut

PROPULSION BATTERY SYSTEM

Details of Propulsion Battery Components [Supply photographs as appropriate]:	See Photos

DATA SHEET 3

PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENT & CALCULATIONS

Test Vehicle:	2007 Toyota Prius Hybrid	NHTSA No.:	C75108
Test Program:	FMVSS 305	Test Date:	5/23/2007

VOLTMETER INFORMATION

The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10MΩ.
NOTE: An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

Make:	Fluke
Model:	87III
Serial Number:	76270715
Internal Impedance Value (MΩ):	10 MΩ < 100 °F
Resolution (V):	0.0001
Last Calibration Date:	5/15/07

PROPULSION BATTERY VOLTAGE

Measurement shall be made with propulsion battery connected to the vehicle propulsion system, and the vehicle in the “ready-to-drive” (Propulsion motor(s) activated) position.
If voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.

Vb (V):	224.7

PROPULSION BATTERY TO VEHICLE CHASSIS

Vehicle chassis point(s) determined and supplied to contractor by COTR.

V1 (V):	120
V2 (V):	103

DATA SHEET 3 (Continued)

PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENT & CALCULATIONS

Test Vehicle:	2007 Toyota Prius Hybrid	NHTSA No.:	C75108
Test Program:	FMVSS 305	Test Date:	5/23/2007

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

The known resistance Ro (in ohms) should be approximately 500 times the normal operating voltage of the vehicle (in volts) per SAE J1766.

Ro (Ω):	118 K Ω

ELECTRICAL ISOLATION MEASUREMENT

V1' (V):	21 V
Ri1 = R0 (1 + V2/V1) [(V1-V1')/V1']	
Ri1 (Ω):	1034 K Ω
V2' (V):	20 V
Ri2 = R0 (1 + V1/V2) [(V2-V2')/V2']	
Ri2 (Ω):	1060 K Ω
Ri = The lesser of Ti1 and Ri2	
Ri Pre-Test ((Ω):	1034 K Ω
Ri/Vb (Ω/V):	4602 Ω/V (Electrical Isolation Value)
Minimum Electrical Isolation Value is 500 Ω/V	

Note: Measured 6 minutes 24 seconds before impact.

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

DATA SHEET 4

POST-TEST DATA

Test Vehicle:	2007 Toyota Prius Hybrid	NHTSA No.:	C75108
Test Program:	FMVSS 305	Test Date:	5/23/2007

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

VOLTMETER INFORMATION

The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10MΩ.
NOTE: An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

Make:	Fluke
Model:	87III
Serial Number:	76270715
Internal Impedance Value (MΩ):	100 MΩ < 100 °F
Nominal Propulsion Battery Voltage (Vb) (V):	224.7
Record V1, V2, V1', V2' voltage measurements immediately after the impacted vehicle **comes to rest.**	

PROPULSION BATTERY VOLTAGE

V1 =	115	V Impact	Time:	3	Minutes	11	s
V2 =	100	V Impact	Time:	3	Minutes	11	s
V1' =	23	V Impact	Time:	3	Minutes	11	s
V2' =	23	V Impact	Time:	3	Minutes	11	s
Attach complete data acquisition to final test report							

ELECTRICAL ISOLATION MEASUREMENT

Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']							
Ri1 =	882 K	Ω Impact	Time:	3	Minutes	11	s
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2 =	849 K	Ω Impact	Time:	3	Minutes	11	s
Ri = The lesser of Ri1 and Ri2							
Ri =	848 K	Ω Impact	Time:	3	Minutes	11	s
Ri/Vb = electrical Isolation Value/Nominal Battery Voltage							
Minimum Electrical Value is 500 Ω/V							
Ri/Vb =	3778	Ω/V Impact	Time:	3	Minutes	11	s

DATA SHEET 4 (Continued)

POST-TEST DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

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

PROPULSION BATTERY SYSTEM COMPONENTS

Describe Propulsion Battery Module movement within the passenger compartment [Supply photographs as appropriate]:
No Movement

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

Describe intrusion of an outside Propulsion Battery Component into the passenger compartment [Supply photographs as appropriate]:
Not Applicable

	Yes (Fail)	No (Pass)
Has an outside Propulsion Battery Component intruded iinto the passenger compartment?		X

	Yes (Fail)	No (Pass)
Is propulsion battery electrolyte spillage visible in the passenger compartment?		X

DATA SHEET 5

FUEL SYSTEM DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

STODDARD SOLVENT SPILLAGE MEASUREMENT

A. From impact until vehicle motion ceases: 0 oz.

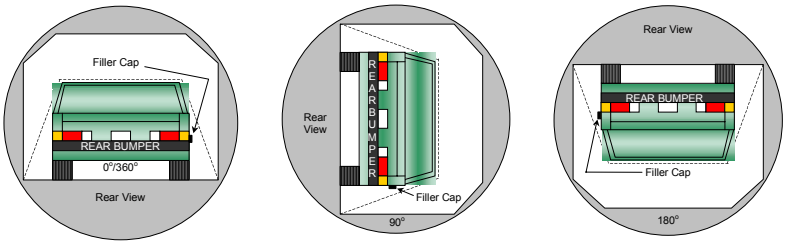
B. For the 5 minute period after motion ceases: 0 oz.

C. For the following 25 minutes: 0 oz.

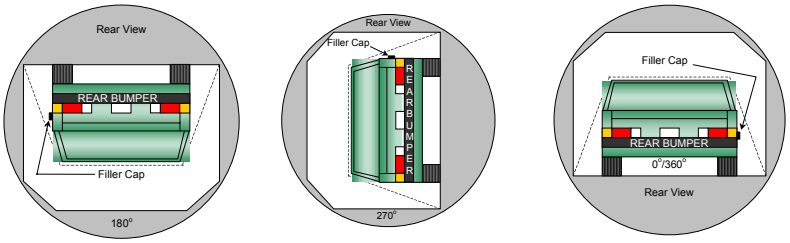
D. Spillage: None

STATIC ROLLOVER TEST DATA

DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD



0° to 90° 90° to 180°



180° to 270° 270° to 360°

Rollover Stage	Rotation Time (sec)	Hold Time (sec)	Total Time (sec)	Next Whole Minute Interval
0° to 90°	122	300	422	8
90° to 180°	117	300	417	7
180° to 270°	113	300	413	7
270° to 360°	115	300	415	7

DATA SHEET 5 (Continued)

FUEL SYSTEM DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0° to 90°	0	Not Applicable
90° to 180°	0	Not Applicable
180° to 270°	0	Not Applicable
270° to 360°	0	Not Applicable

TOTAL SPILLAGE (L): 0

	Yes (Fail)	No (Pass)
Is the total spillage of propulsion battery electrolyte greater than 5.0 L?		X

	Yes (Fail)	No (Pass)
Is propulsion battery electrolyte spillage visible in the passenger compartment?		X

VOLTMETER INFORMATION

The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10MΩ.
NOTE: An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

Make:	Fluke
Model:	87III
Serial Number:	76270715
Internal Resistance Value (Ro) (MΩ):	100 MΩ < 100°F
Nominal Propulsion Battery Voltage (Vb) (V):	224.7
Record V1, V2, V1', V2' voltage measurements at the start of each successive increment of **90°**. **180°**, **270°**, and **360°** of the static rollover test.	

DATA SHEET 5 (Continued)

FUEL SYSTEM DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

ELECTRICAL ISOLATION MEASUREMENT

V1 =	66	V 90°		Time:	2	Minutes	2	s
V1 =	172	V 180°		Time:	8	Minutes	59	s
V1 =	134	V 270°		Time:	14	Minutes	52	s
V1 =	180	V 360°		Time:	21	Minutes	47	s
V2 =	166	V 90°		Time:	2	Minutes	2	s
V2 =	54	V 180°		Time:	8	Minutes	59	s
V2 =	95	V 270°		Time:	14	Minutes	52	s
V2 =	43	V 360°		Time:	21	Minutes	47	s
V1' =	22	V 90°		Time:	2	Minutes	2	s
V1' =	22	V 180°		Time:	8	Minutes	59	s
V1' =	22	V 270°		Time:	14	Minutes	52	s
V1' =	21	V 360°		Time:	21	Minutes	47	s
V2' =	21	V 90°		Time:	2	Minutes	2	s
V2' =	29	V 180°		Time:	8	Minutes	59	s
V2' =	23	V 270°		Time:	14	Minutes	52	s
V2'' =	22	V 360°		Time:	21	Minutes	47	s
Attach complete data acquisition to final test report of governing barrier test.								

DATA SHEET 5 (Continued)

FUEL SYSTEM DATA

Test Vehicle: 2007 Toyota Prius Hybrid NHTSA No.: C75108
Test Program: FMVSS 305 Test Date: 5/23/2007

ELECTRICAL ISOLATION CALCULATION

Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']								
Ri1 =	830	KΩ 90°		Time:	2	Minutes	2	s
Ri1 =	1057	KΩ 180°		Time:	59	Minutes	59	s
Ri1 =	1027	KΩ 270°		Time:	52	Minutes	52	s
Ri1 =	1107	KΩ 360°		Time:	47	Minutes	47	s
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']								
Ri2 =	353	KΩ 90°		Time:	2	Minutes	2	s
Ri2 =	426	KΩ 180°		Time:	59	Minutes	59	s
Ri2 =	890	KΩ 270°		Time:	52	Minutes	52	s
Ri2 =	584	KΩ 360°		Time:	47	Minutes	47	s
Ri = The lesser of Ri1 and Ri2								
Ri =	353	KΩ 90°		Time:	2	Minutes	2	s
Ri =	426	KΩ 180°		Time:	59	Minutes	59	s
Ri =	890	KΩ 270°		Time:	52	Minutes	52	s
Ri =	584	KΩ 360°		Time:	47	Minutes	47	s
Ri/Vb = Electrical Isolation Value/Nominal Battery Voltage Minimum Electrical Isolation Value is 500 Ω/V								
Ri/Vb =	1571	Ω/V 90°		Time:	2	Minutes	2	s
Ri/Vb =	1896	Ω/V 180°		Time:	59	Minutes	59	s
Ri/Vb =	3961	Ω/V 270°		Time:	52	Minutes	52	s
Ri/Vb =	2599	Ω/V 360°		Time:	47	Minutes	47	s
Attach complete data acquisition to final test report of governing barrier test.								

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

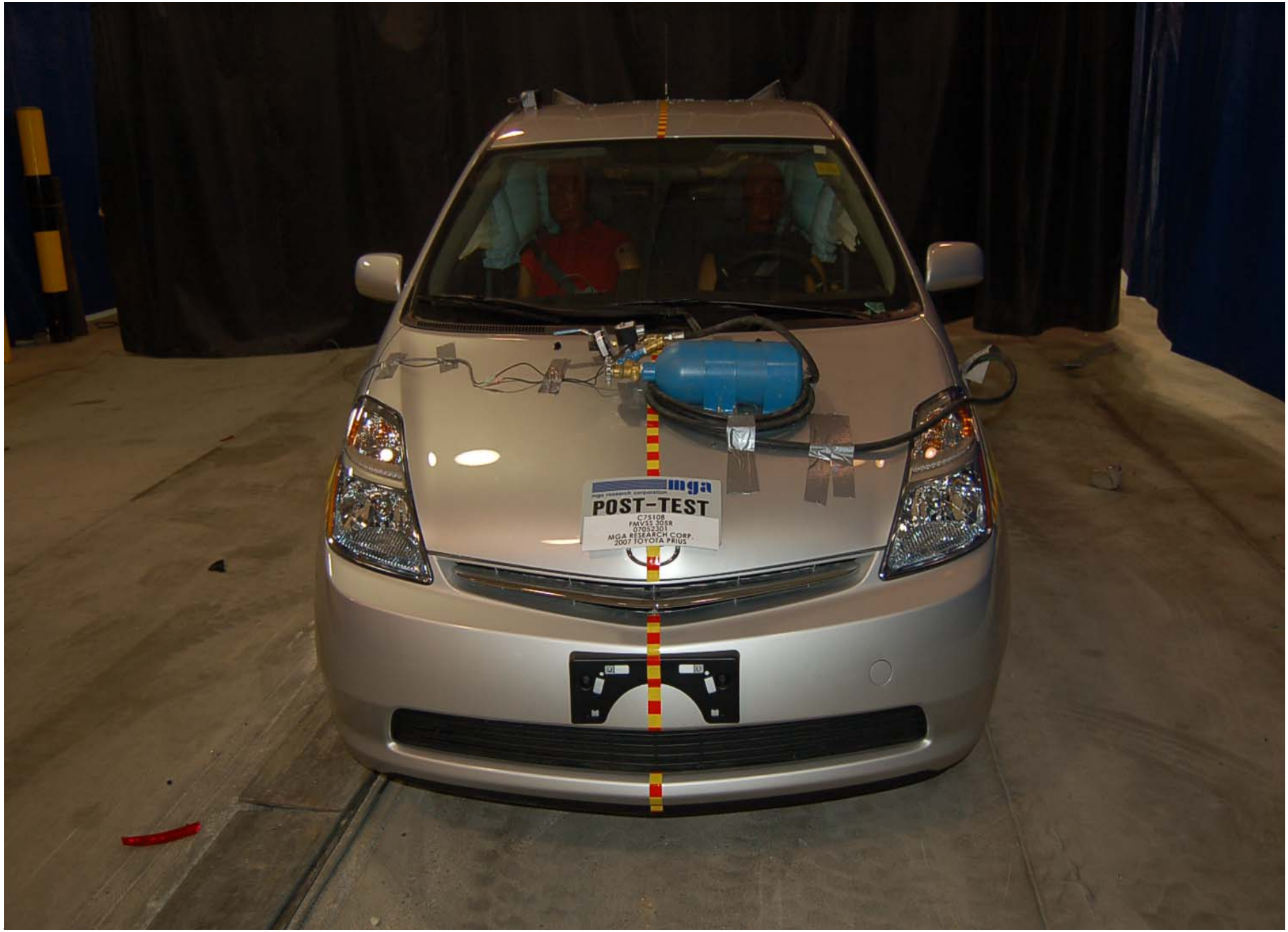
APPENDIX B
TABLE OF PHOTOGRAPHS

B-3.

Vehicle's Certification Label

Vehicle's Tire Placard

Pre-Test Front View of Vehicle



Post-Test Front View of Vehicle

Pre-Test Left Rear Closeup View of Vehicle

Post-Test Left Rear Closeup View of Vehicle

Pre-Test Right Side View of Vehicle

Post-Test Right Side View of Vehicle

Pre-Test Rear View of Vehicle

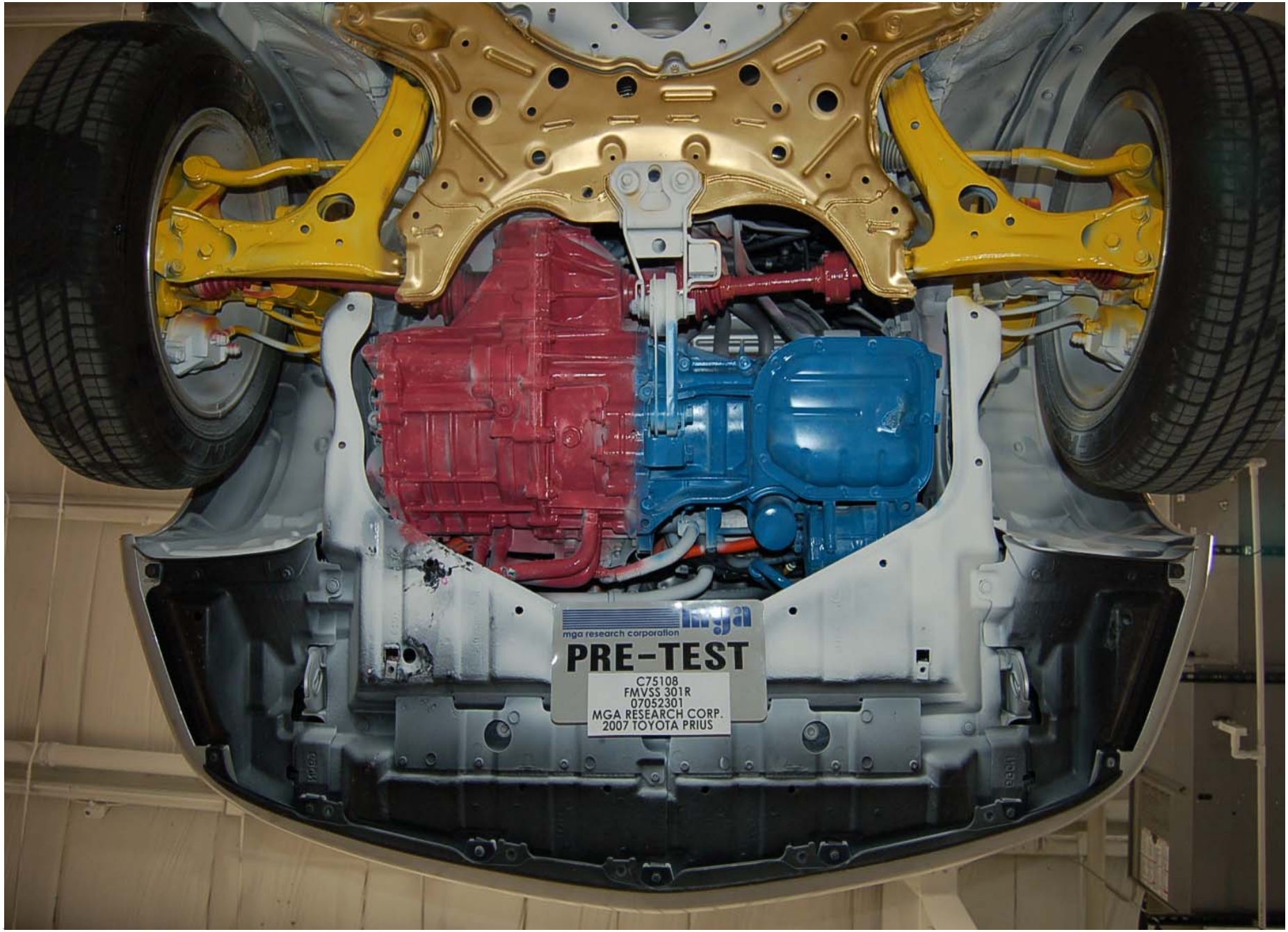
Post-Test Rear View of Vehicle

Pre-Test ¾ Frontal View From Right Side of Vehicle

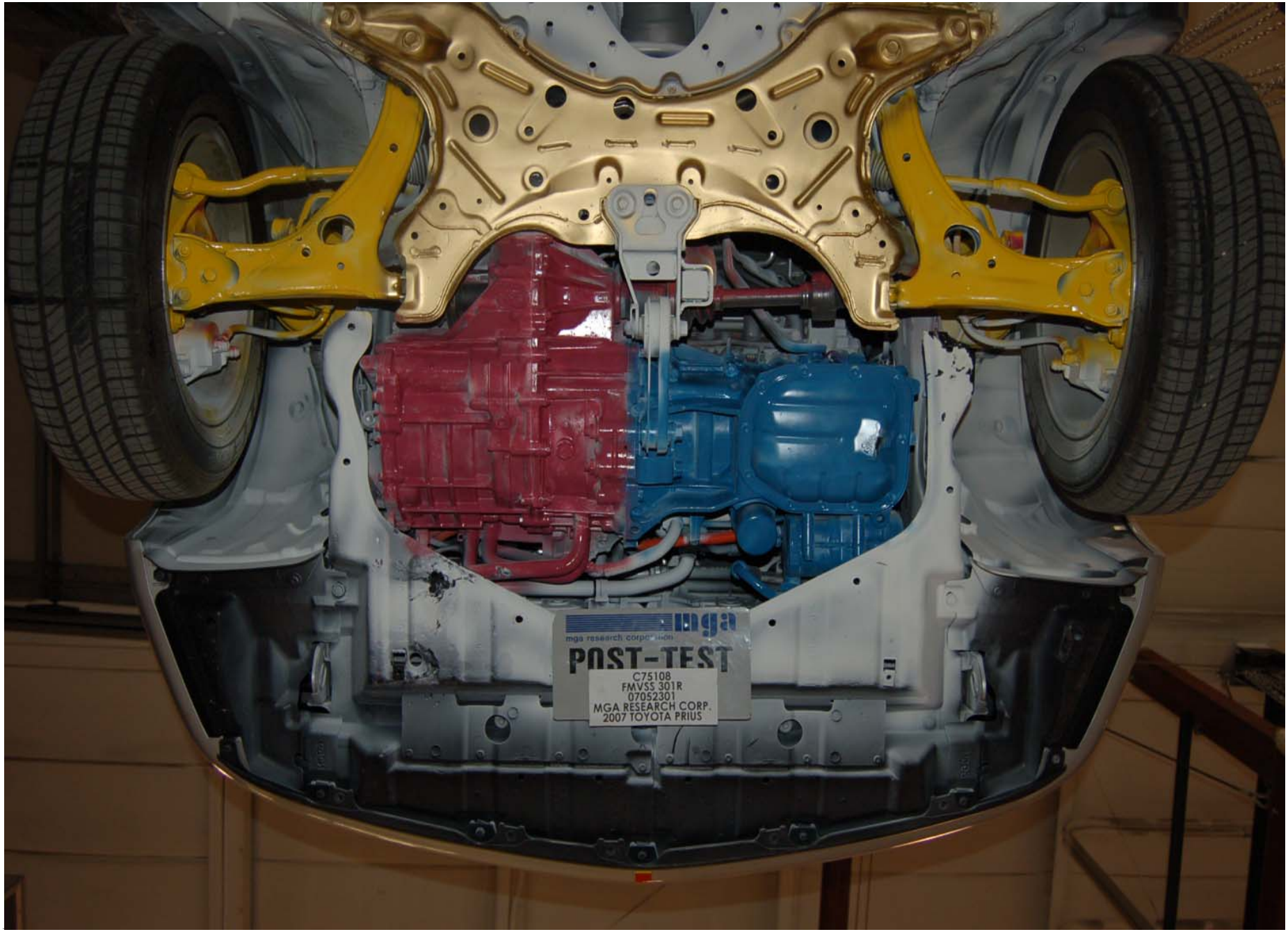
Post-Test ¾ Frontal View From Right Side of Vehicle

Pre-Test ¾ Rear View From Left Side of Vehicle

Post-Test ¾ Rear View From Left Side of Vehicle



Pre-Test Underbody View 1



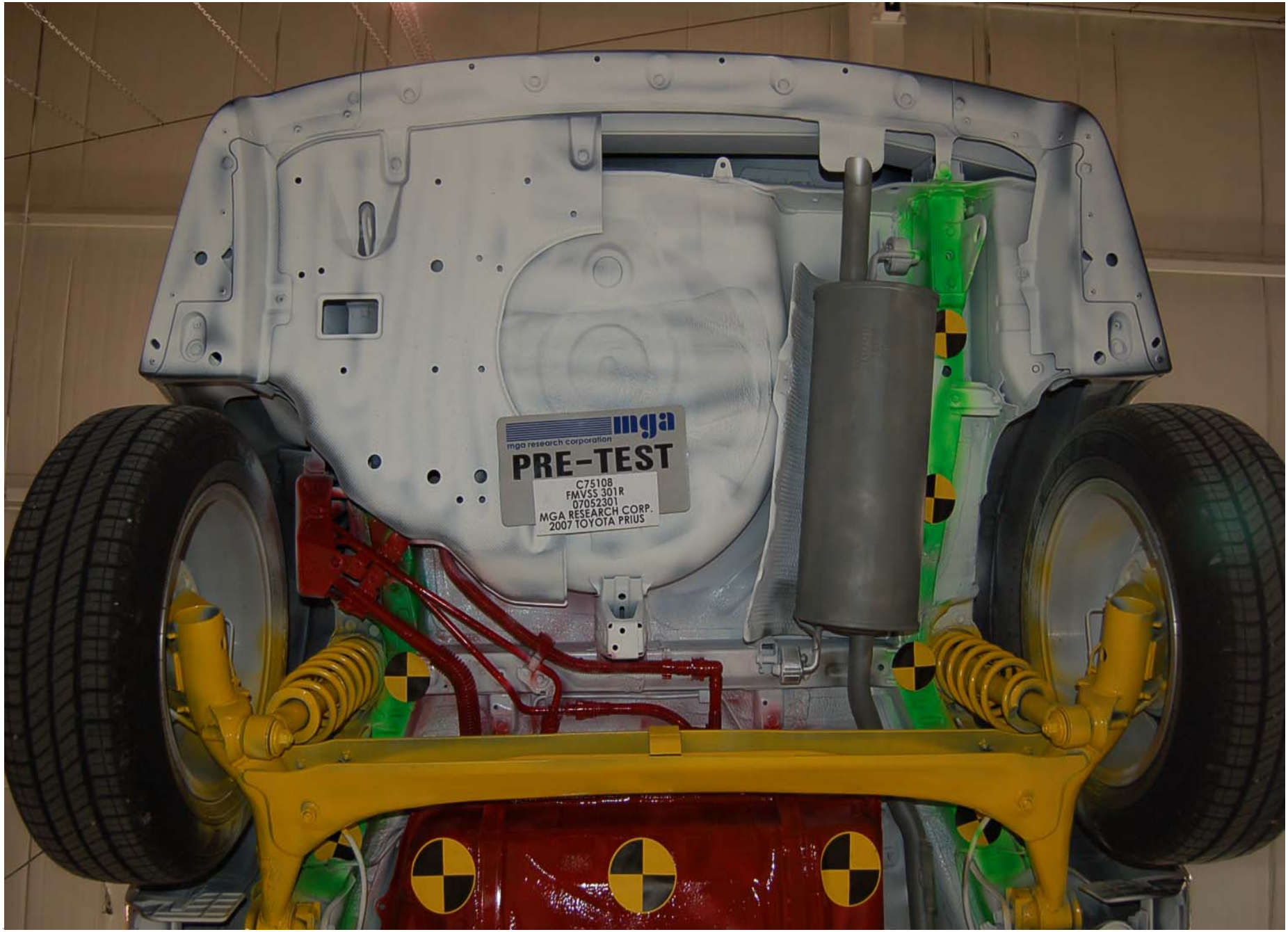
Post-Test Underbody View 1

Pre-Test Underbody View 2

Post-Test Underbody View 2

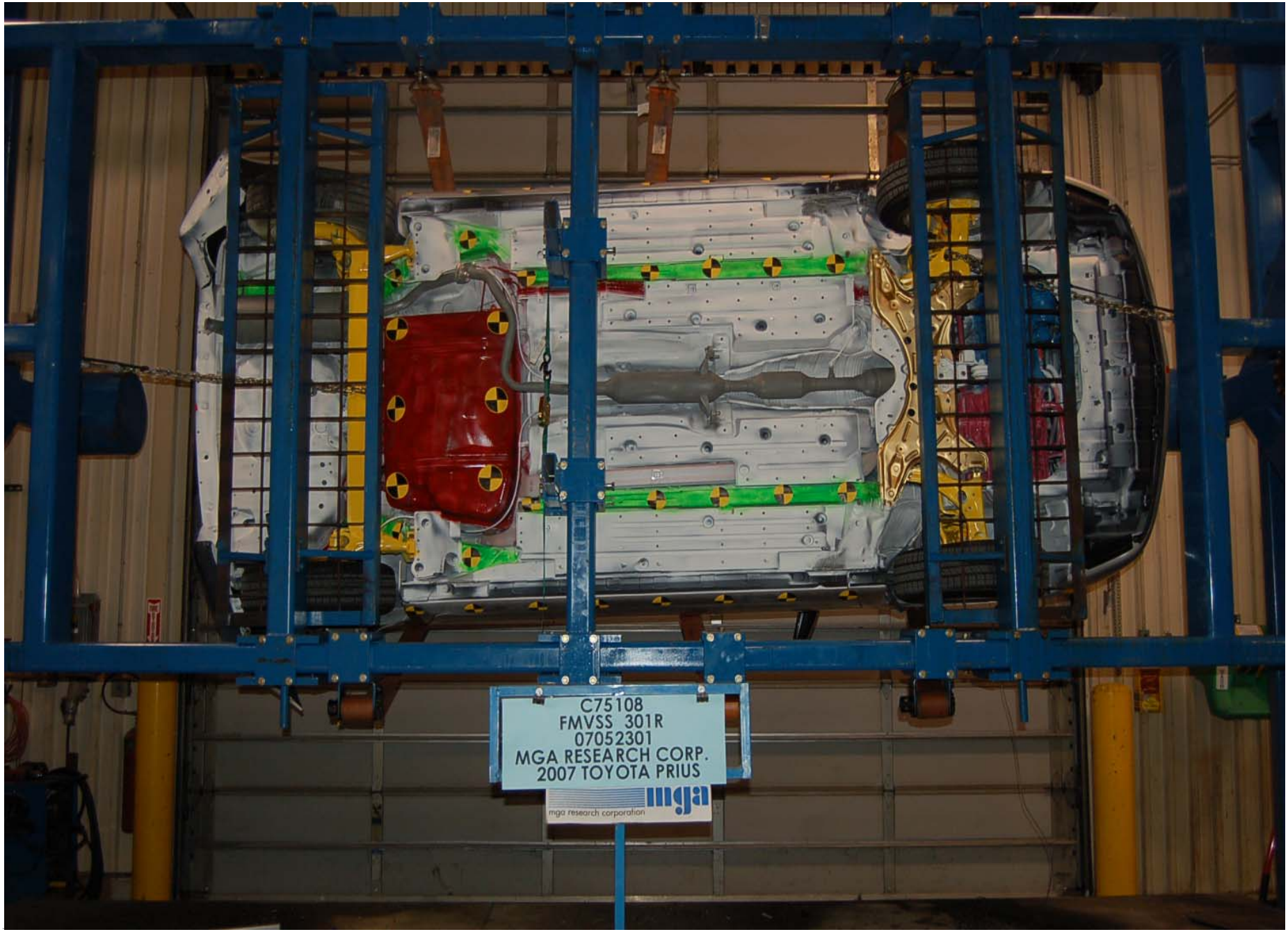
Pre-Test Underbody View 3

Post-Test Underbody View 3



Pre-Test Underbody View 4

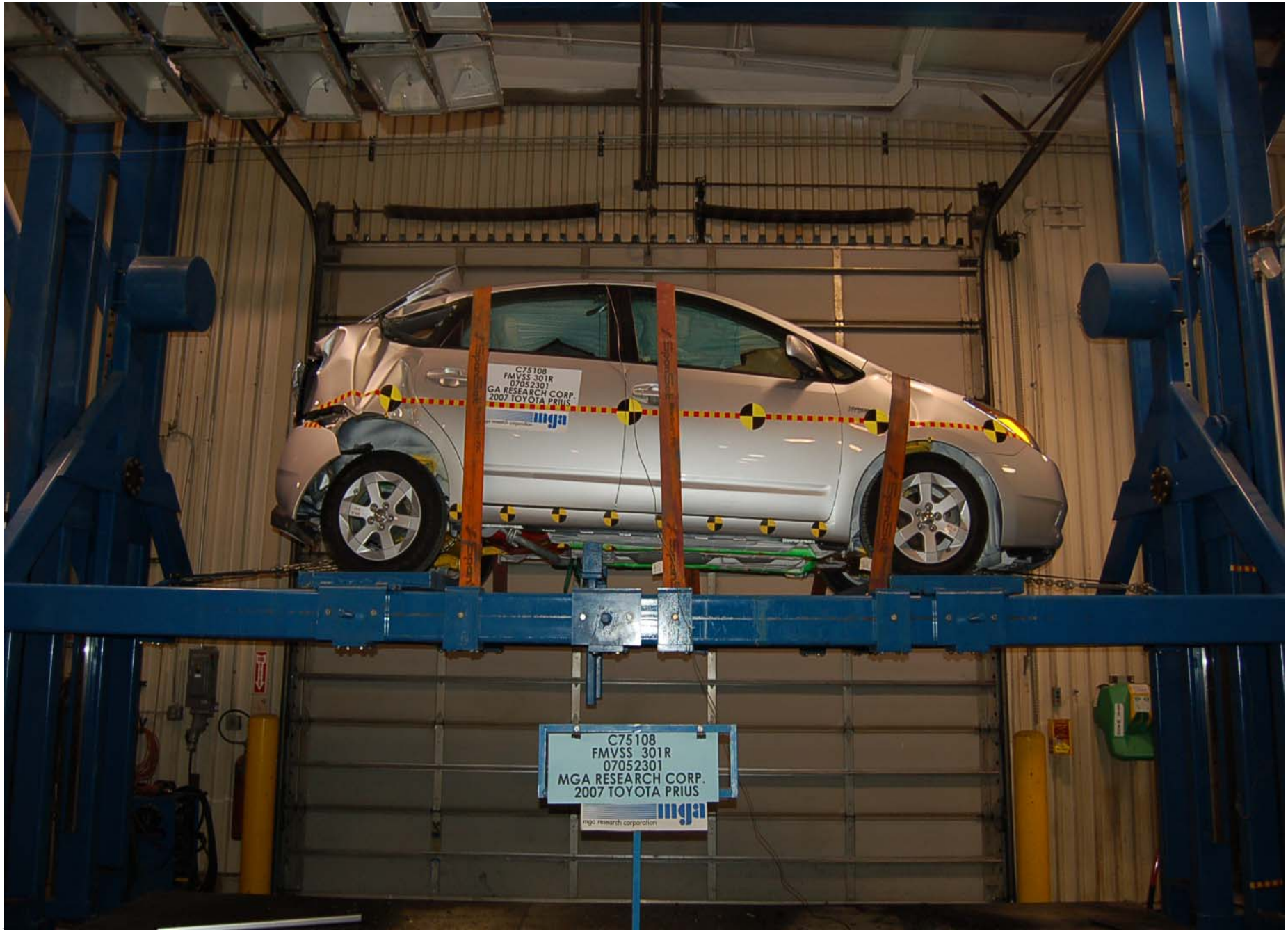
Post-Test Underbody View 4



Static Rollover at 90 Degrees

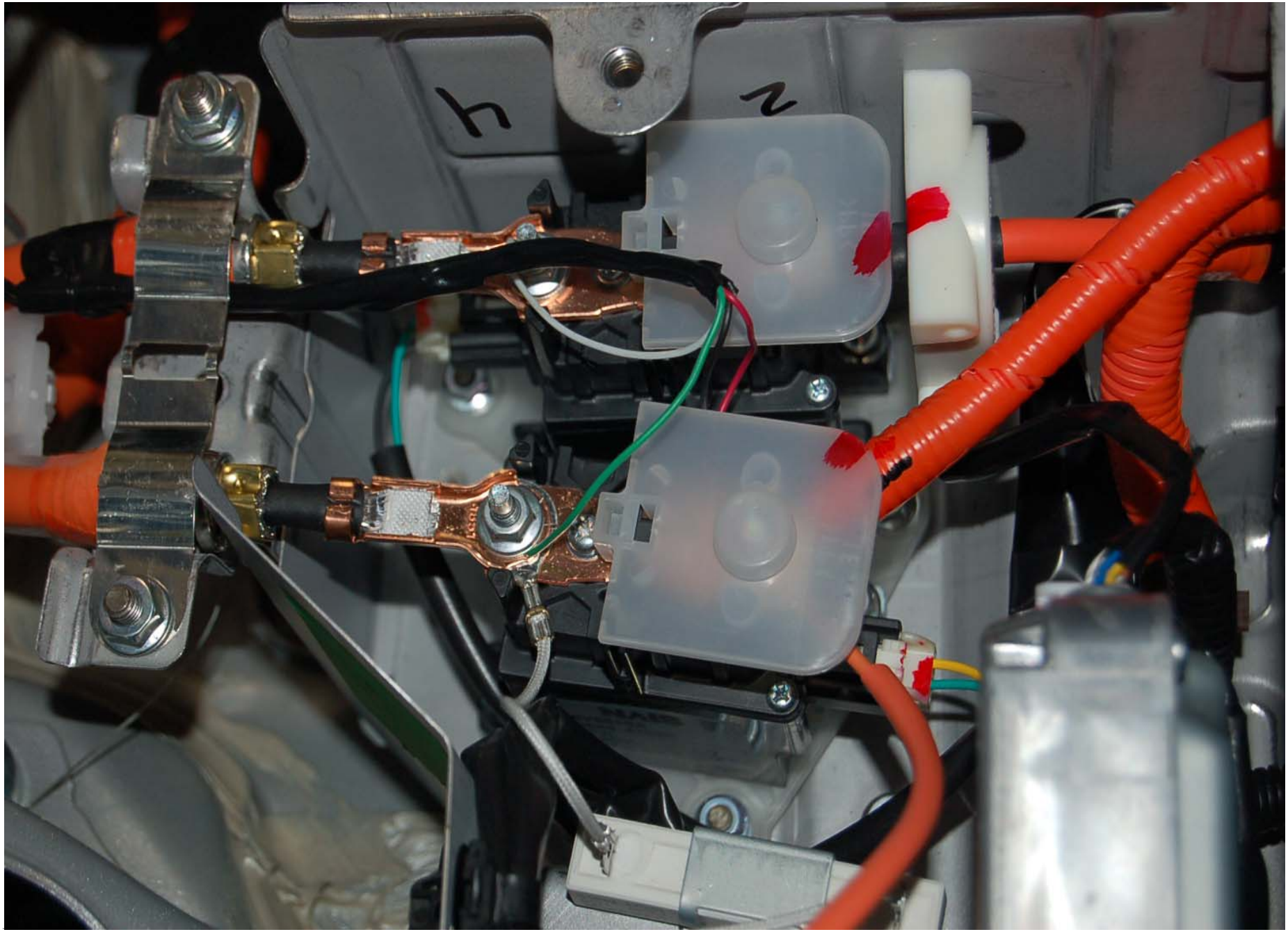
Static Rollover at 180 Degrees

Static Rollover at 270 Degrees



Static Rollover at 360 Degrees

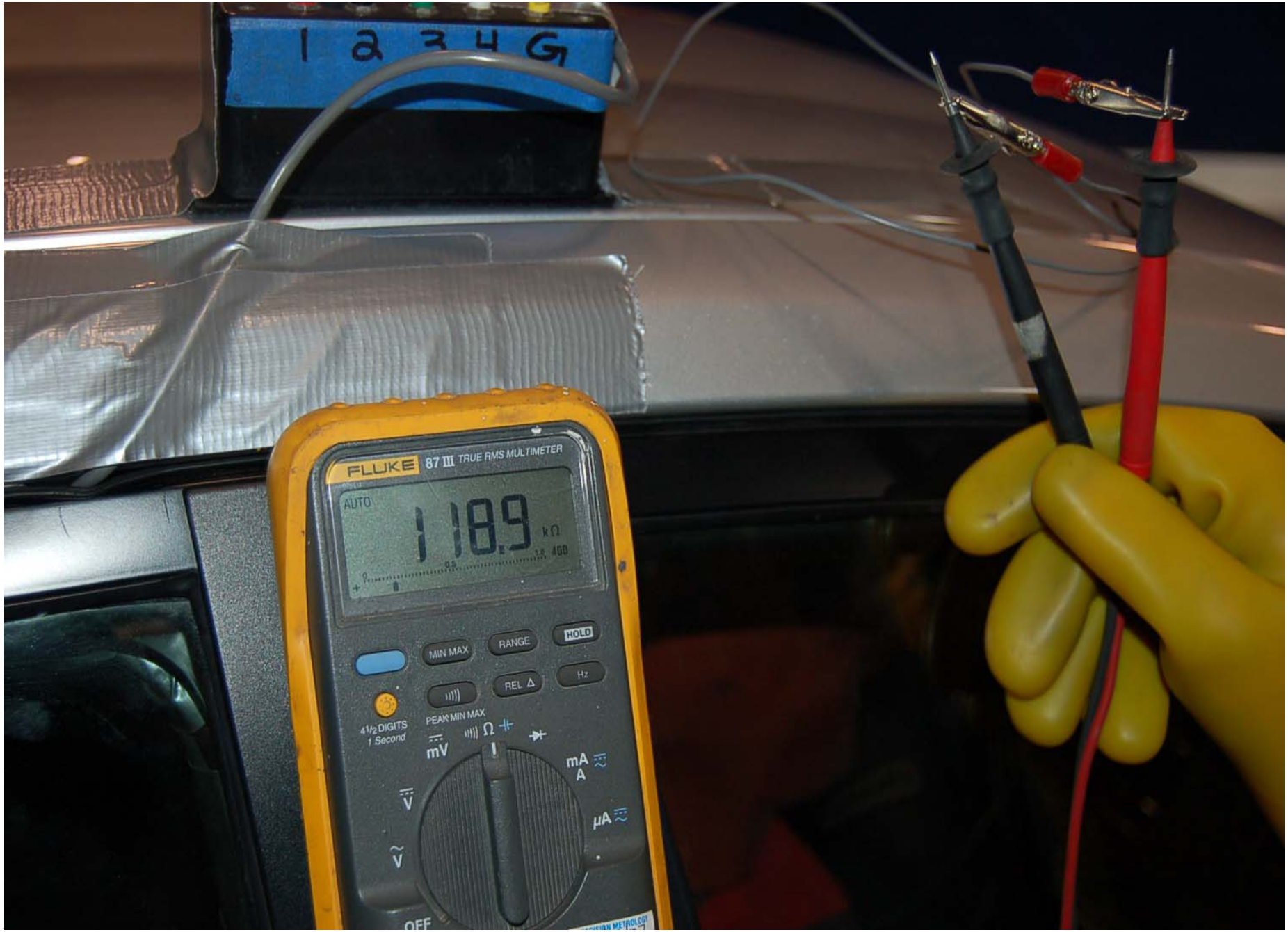
Pre-Test Propulsion Battery Module



Pre-Test High Voltage Interconnect

Pre-Test Propulsion Battery Venting System

Pre-Test Electrical Propulsion Components



Pre-Test Installed Test Interface Port

Pre-Test Vehicle Pass. Compartment Adjacent to Propulsion Battery

Post-Test Vehicle Pass. Compartment Adjacent to Propulsion Battery

Post-Test Vehicle Pass. Compartment Adjacent to Propulsion Battery