

REPORT NUMBER: 301-MGA-2008-006

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

**GENERAL MOTORS CORPORATION
2008 TAHOE HYBRID
NHTSA NUMBER: C80111**

**PREPARED BY:
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BURLINGTON, WI 53105**



Test Date: November 18, 2008

Final Report Date: December 5, 2008

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Technical Report Documentation Page

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16. Abstract A rear impact was conducted on a 2008 Chevrolet Tahoe Hybrid at MGA Research Corporation on November 18, 2008. This test was conducted to obtain data indicant of FMVSS 301R. The impact velocity was 79.8 km/h. The ambient temperature at the time of impact was 0.6 degrees Celsius. FMVSS 305 was conducted in conjunction with the FMVSS 301R.					
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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 2008 Chevrolet Tahoe Hybrid was impacted by a Moving Deformable Barrier (MDB) at a velocity of 79.8 km/h. The test was performed at MGA Research Corporation on November 18, 2008. 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 three 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 rear Half 1000 fps
- Right Rear Half 1000 fps
- Overhead Overall 1000 fps
- Real Time Pan 24 fps

Two ballast 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.

There was no Stoddard Solvent or electrolyte 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: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

TEST VEHICLE INFORMATION

Manufacturer	General Motors Corporation
Model	Tahoe
Body Style	Hybrid
Major Options	Stabilitrak-Stability Control
NHTSA No.	C80111
VIN	1GNFC13518R218459
Color	Graystone Metallic
Delivery Date	11/4/2008
Odometer Reading (mile)	725
Dealer	TRC
Transmission	Automatic
Final Drive	2 Wheel Drive
Number of Cylinders	8
Engine Displacement (L)	6.0
Engine Placement	Longitudinal

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	General Motors Corporation
Date of Manufacture	02/08

GVWR (kg)	3221
GAWR Front (kg)	1542
GAWR Rear (kg)	1860

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	Split Bench	
Number of Occupants	2	3	3	8
Capacity Wt. (VCW) (kg)				646
Number of Occupants x 68 kg.				544
Cargo Wt. (RCLW) (kg)				102

DATA SHEET NO. 1 (continued)
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

DATA FROM VEHICLE'S TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P265/65R18	P265/65R18
Recommended Load Range	Not Listed	Not Listed
Tire Size on Vehicle	P265/65R18	P265/65R18
Tire Manufacturer	Bridgestone	Bridgestone
Location of Placard of Vehicle	Front Driver door	
Type of Spare Tire (full size/space saver)	None	

DATA SHEET NO. 2

PRE-TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

WEIGHT OF TEST VEHICLE

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	656.8	639.1		714.0	699.9	
Right	kg	660.9	623.7		711.7	698.5	
Ratio	%	51.1	48.9		50.5	49.5	
Totals	kg	1317.7	1262.8	2580.5	1425.7	1398.4	2824.1

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2580.5
Rated Cargo/Luggage Weight (RCLW)	kg	102
Weight of 2 P572E ATDs	kg	148
Calculated Vehicle Target Weight (TVTW)	kg	2830.5

Vehicle Wheelbase	2950 mm
Vehicle Width	2007
Weight of Ballast Secured	101.6 kg
Method of Securing Ballast	Ratchet Straps
Vehicle Components Removed for Weight Reduction	None

VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	908	913	939	943
As Tested	mm	893	887	916	876

DATA SHEET NO. 2 (continued)

PRE-TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

FUEL SYSTEM DATA

	Units: Liters
Usable Capacity of "Standard Tank" (Owner's Manual)	98.4
Usable Capacity Figure Furnished by COTR	98.4
Usable Capacity of "Optional" Tank	
90-95% of Usable Capacity	88.6 to 93.9
Actual Test Volume (entire fuel system filled)	91.2

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: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

MOVING BARRIER'S TEST WEIGHT

	Units	Front	Rear	Total
Left	kg	374.2	308.8	
Right	kg	389.5	291.2	
Ratio	%	56.0	44.0	
Totals	kg	763.7	600.0	1363.7

Tires (Mfr, line, size)	Yokohama
Tire Pressure (kPa)	207
Brake Abort System (Yes/No)?	Yes
Date of Last Calibration	8/6/2008

DATA SHEET NO. 4

POST-TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

IMPACT VELOCITY

	Units: km/h
Required Impact Velocity	80.0
Actual Impact Velocity (Trap No. 1)	79.8
Actual Impact Velocity (Trap No. 2)	79.6
Average Impact Speed	79.7

Temperature at Time of Impact (°C)	0.6
Test Time	10:20am

WELDING ROD IMPACT POINT

	Units: mm
Vertical distance from target center (+ above target / - below target)	1 mm above
Horizontal distance from target center (+ to the right / - to the left)	14 mm to the left

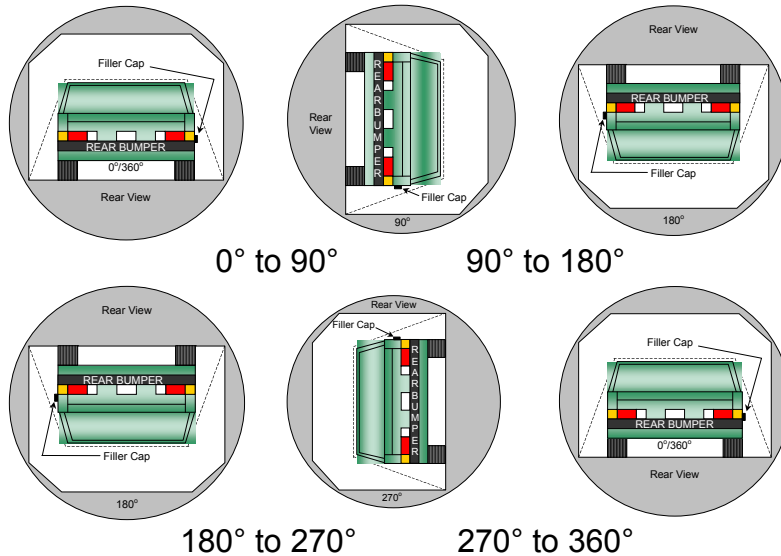
DATA SHEET NO. 5
STATIC ROLLOVER TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

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



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: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

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

0° TO 90° Rotation Time (sec) = 112 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) = 114 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) = 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	

270° TO 360° Rotation Time (sec) = 117sec

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

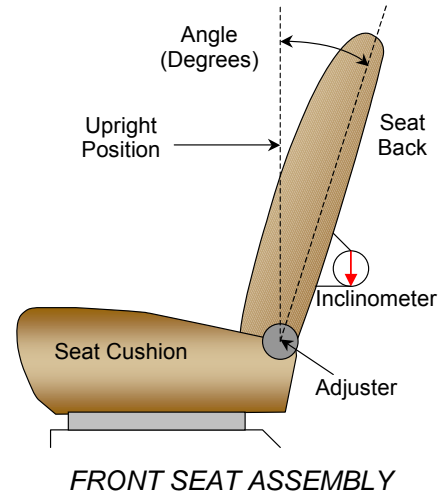
Test Vehicle: 2008 Chevrolet Tahoe Hybrid
Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80111
Test Date: 11/18/2008

NORMAL DESIGN RIDING POSITION

With the seat in the mid fore-aft seat track position the angle of the driver's seat back when it is in the nominal riding position is 9.3°. Place inclinometer at the top end of the vertical portion of the metal frame.

Driver Seat Back Angle	19.3°
Passenger Seat Back Angle	19.3°



SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	259	129
Passenger Seat	259	129

STEERING COLUMN ADJUSTMENT

The steering column was placed in the mid position.

APPENDIX A

FMVSS 305

ELECTRIC POWERED VEHICLES: ELECTROLYTE SPILLAGE AND ELECTRICAL SHOCK PROTECTION

This hybrid vehicle, a 2008 Chevrolet Tahoe Hybrid (NHTSA No. C80111), 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-305-01 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 2008 Chevrolet Tahoe Hybrid appears to meet the requirements of FMVSS 305 testing.

If a measured voltage was zero and resulted in a division by zero "Zero Volts" was reported. This condition is considered being compliant as stated in TP-305-01 12.4 F.

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: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

Type of Electric Vehicle (Electric/Hybrid):	Gas-Electric
Propulsion Battery Type:	NiMH (Nickel Metal Hydride)
Nominal Voltage (V):	288 V
Physical Location of Automatic Propulsion Battery Disconnect:	The connectors (+, -, and pre charge) are located inside of the battery system.
Auxiliary Battery Type:	Lead Acid

DATA SHEET 2
PRE-TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED DATA)

Electrolyte Fluid Type:	Potassium Hydroxide	
Electrolyte Fluid Specific Gravity:	1.28 g/m ^L	
Electrolyte Kinematic Viscosity:	2.4 mPas	
Electrolyte Fluid Color:	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
	X	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:	216 - 390 V	
Test Voltage Within normal operative voltage range:	303.6 V	

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Locations(s) [Supply photographs as appropriate]:	Ground stud located in the rear of the Energy Storage System (battery pack). See photo B-38.
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PROPULSION BATTERY SYSTEM

Details of Propulsion Battery Components [Supply photographs as appropriate]:	High voltage service disconnect located at right rear battery pack. See photo B-44.
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DATA SHEET 3

PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENT & CALCULATIONS

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

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:	Fluke 11
Serial Number:	68541895
Internal Impedance Value (MΩ):	100 MΩ < 100 pF
Resolution (V):	0.001
Last Calibration Date:	9/10/08

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):	303.6
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PROPULSION BATTERY TO VEHICLE CHASSIS

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

V1 (V):	140.1
V2 (V):	150.2

DATA SHEET 3 (Continued)

PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENT & CALCULATIONS

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

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

Ro (Ω):	155 K Ω
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ELECTRICAL ISOLATION MEASUREMENT

V1' (V):	18.3 V
$R_{i1} = R_0 (1 + V_2/V_1) [(V_1 - V_1')/V_1']$	
Ri1 (Ω):	2138 K Ω
V2' (V):	24.6 V
$R_{i2} = R_0 (1 + V_1/V_2) [(V_2 - V_2')/V_2']$	
Ri2 (Ω):	1530K Ω
$R_i = \text{The lesser of } T_{i1} \text{ and } R_{i2}$	
Ri Pre-Test ((Ω):	1530 K Ω
Ri/Vb (Ω/V):	5038 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 \geq 500 Ω/V?	X	

DATA SHEET 4
POST-TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

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:	Fluke 11
Serial Number:	68541895
Internal Impedance Value (MΩ):	100 MΩ < 100 pF
Nominal Propulsion Battery Voltage (Vb) (V):	288
Record V1, V2, V1', V2' voltage measurements immediately after the impacted vehicle comes to rest .	

PROPULSION BATTERY VOLTAGE

V1 =	140.2	V Impact	Time:	1	Minutes	33	s
V2 =	156.1	V Impact	Time:	1	Minutes	42	s
V1' =	22.3	V Impact	Time:	1	Minutes	52	s
V2' =	19.6	V Impact	Time:	2	Minutes	01	s
Attach complete data acquisition to final test report							

ELECTRICAL ISOLATION MEASUREMENT

$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$							
Ri1 =	1732K	Ω Impact		2		01	s
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$							
Ri2 =	2043K	Ω Impact		2		01	s
Ri = The lesser of Ri1 and Ri2							
Ri =	1732K	Ω Impact		2		01	s
Ri/Vb = electrical Isolation Value/Nominal Battery Voltage							
Minimum Electrical Value is 500 Ω/V							
Ri/Vb =	5763	Ω/V Impact		2		01	s

DATA SHEET 4 (Continued)

POST-TEST DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

	Yes (Pass)	No (Fail)
Is the measured Electrical Isolation Value $\geq 500 \Omega/V$?	X	

PROPULSION BATTERY SYSTEM COMPONENTS

Describe Propulsion Battery Module movement within the passenger compartment [Supply photographs as appropriate]:
Battery pack did not move, see photos B-41 and B-45.

	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 into 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

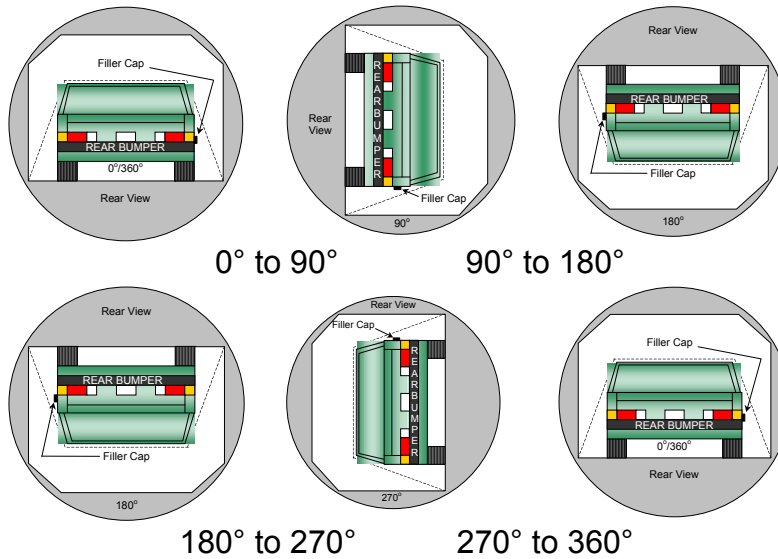
Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

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**



Rollover Stage	Rotation Time (sec)	Hold Time (sec)	Total Time (sec)	Next Whole Minute Interval
0° to 90°	112	300	412	7
90° to 180°	114	300	414	7
180° to 270°	115	300	415	7
270° to 360°	117	300	417	7

DATA SHEET 5 (Continued)

FUEL SYSTEM DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

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:	Fluke 11
Serial Number:	68541895
Internal Impedance Value (MΩ):	100 MΩ > 100 pF
Nominal Propulsion Battery Voltage (Vb) (V):	288

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: 2008 Chevrolet Tahoe Hybrid
 Test Program: FMVSS 301 Fuel System Integrity

NHTSA No.: C80111
 Test Date: 11/18/2008

ELECTRICAL ISOLATION MEASUREMENT

V1 =	143.1	V 90°	Time:	2	Minutes	2	s
V1 =	3.1	V 180°	Time:	2	Minutes	8	s
V1 =	1.6	V 270°	Time:	2	Minutes	13	s
V1 =	.08	V 360°	Time:	2	Minutes	20	s
V2 =	152.2	V 90°	Time:	2	Minutes	16	s
V2 =	8.3	V 180°	Time:	2	Minutes	23	s
V2 =	6.4	V 270°	Time:	2	Minutes	22	s
V2 =	4.0	V 360°	Time:	2	Minutes	23	s
V1' =	17.8	V 90°	Time:	2	Minutes	36	s
V1' =	.4	V 180°	Time:	3	Minutes	01	s
V1' =	.2	V 270°	Time:	2	Minutes	25	s
V1' =	.01	V 360°	Time:	2	Minutes	37	s
V2' =	20.2	V 90°	Time:	2	Minutes	44	s
V2' =	1.1	V 180°	Time:	3	Minutes	11	s
V2' =	1.8	V 270°	Time:	2	Minutes	36	s
V2'' =	.8	V 360°	Time:	2	Minutes	44	s
Attach complete data acquisition to final test report of governing barrier test.							

DATA SHEET 5 (Continued)

FUEL SYSTEM DATA

Test Vehicle: 2008 Chevrolet Tahoe Hybrid NHTSA No.: C80111
 Test Program: FMVSS 301 Fuel System Integrity Test Date: 11/18/2008

ELECTRICAL ISOLATION CALCULATION

Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']							
Ri1 =	2252	KΩ 90°		Time:	7	Minutes	44 s
Ri1 =	3848	KΩ 180°		Time:	15	Minutes	55 s
Ri1 =	5425	KΩ 270°		Time:	23	Minutes	31 s
Ri1 =	5534	KΩ 360°		Time:	31	Minutes	15 s
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2 =	1965	KΩ 90°		Time:	7	Minutes	44 s
Ri2 =	1393	KΩ 180°		Time:	15	Minutes	55 s
Ri2 =	495	KΩ 270°		Time:	23	Minutes	31 s
Ri2 =	632	KΩ 360°		Time:	31	Minutes	15 s
Ri = The lesser of Ri1 and Ri2							
Ri =	1965	KΩ 90°		Time:	7	Minutes	44 s
Ri =	1393	KΩ 180°		Time:	15	Minutes	55 s
Ri =	495	KΩ 270°		Time:	23	Minutes	31 s
Ri =	632	KΩ 360°		Time:	31	Minutes	15 s
Ri/Vb = Electrical Isolation Value/Nominal Battery Voltage Minimum Electrical Isolation Value is 500 Ω/V							
Ri/Vb =	6677	M Ω/V 90°		Time:	7	Minutes	44 s
Ri/Vb =	117098	Ω/V 180°		Time:	15	Minutes	55 s
Ri/Vb =	62675	Ω/V 270°		Time:	23	Minutes	31 s
Ri/Vb =	152753	Ω/V 360°		Time:	31	Minutes	15 s
Attach complete data acquisition to final test report of governing barrier test.							

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

APPENDIX B
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MFD BY GENERAL MOTORS CORP.

02/08

GVWR
3221KG(7100LB)

GAWR FRT
1542KG(3400LB)

GAWR RR
1860KG(4100LB)

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

1GNFC13518R218459

TYPE: M.P.V.

MODEL: C10706

CB9G TIRE SIZE SPEED RTG

FRT P265/65R18 S

RR P265/65R18 S

SPA NONE

RIM

18X8J

18X8J

NO RIMKPA(PSI)

COLD TIRE PRESSURE

220KPA(32PSI)

220KPA(32PSI)

SEE OWNER'S MANUAL  FOR MORE INFORMATION.

F 301 LB
T 224 LB

B-1.

Vehicle's Certification Label

1GNFC13518R218459

TIRE AND LOADING INFORMATION



SEATING CAPACITY | TOTAL 8 | FRONT 2 | REAR 6

The combined weight of occupants and cargo should never exceed 646 kg or 1424 lbs.

TIRE	ORIGINAL SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P265/65R18 S	220 kPa, 32 PSI	
REAR	P265/65R18 S	220 kPa, 32 PSI	
SPARE	NONE	NONE	

This vehicle may include mercury-containing devices installed by the manufacturer:
- High intensity discharge headlamps
- Pool lift instruments

Vehicle's Tire Placard

B-3.



Pre-Test Front View of Vehicle

B-4.



Post-Test Front View of Vehicle

B-5.



Pre-Test Left Side View of Test Vehicle

B-6.



Post-Test Left Side View of Test Vehicle

B-7.



Post-Test Left Rear Closeup View of Vehicle

B-8.



Pre-Test Right Side View of Vehicle

B-9.



Post-Test Right Side View of Vehicle

B-10.



Post-Test Right Rear Closeup View of Vehicle

B-11.



Pre-Test Rear View of Vehicle

B-12.



Post-Test Rear View of Vehicle

B-13.



Pre-Test ¼ Frontal View From Right Side of Vehicle

B-14.



Post-Test $\frac{3}{4}$ Frontal View From Right Side of Vehicle



Pre-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle



Post-Test $\frac{3}{4}$ Rear View From Left Side of Vehicle

B-17.



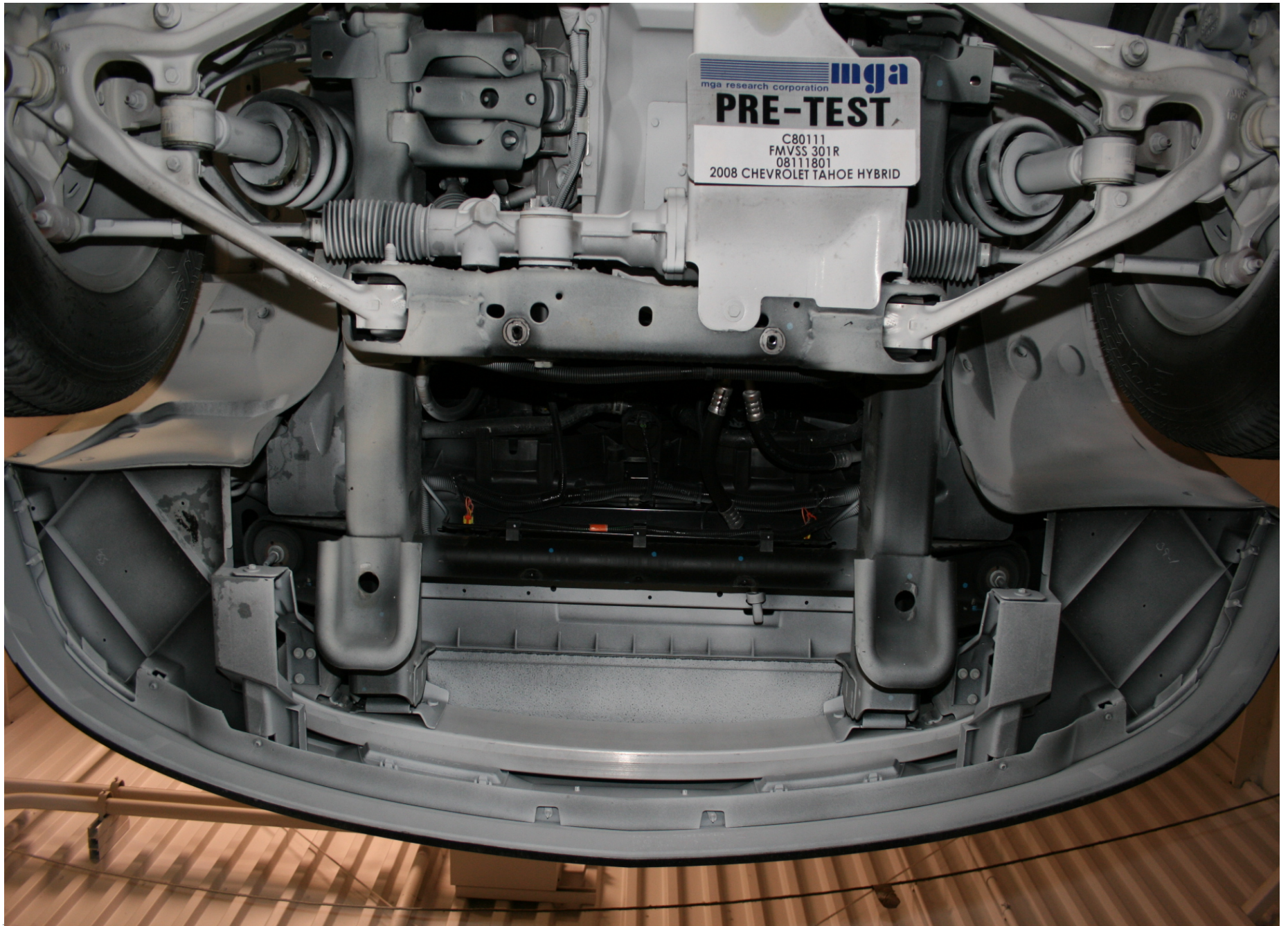
Pre-Test Impact Point

B-18.



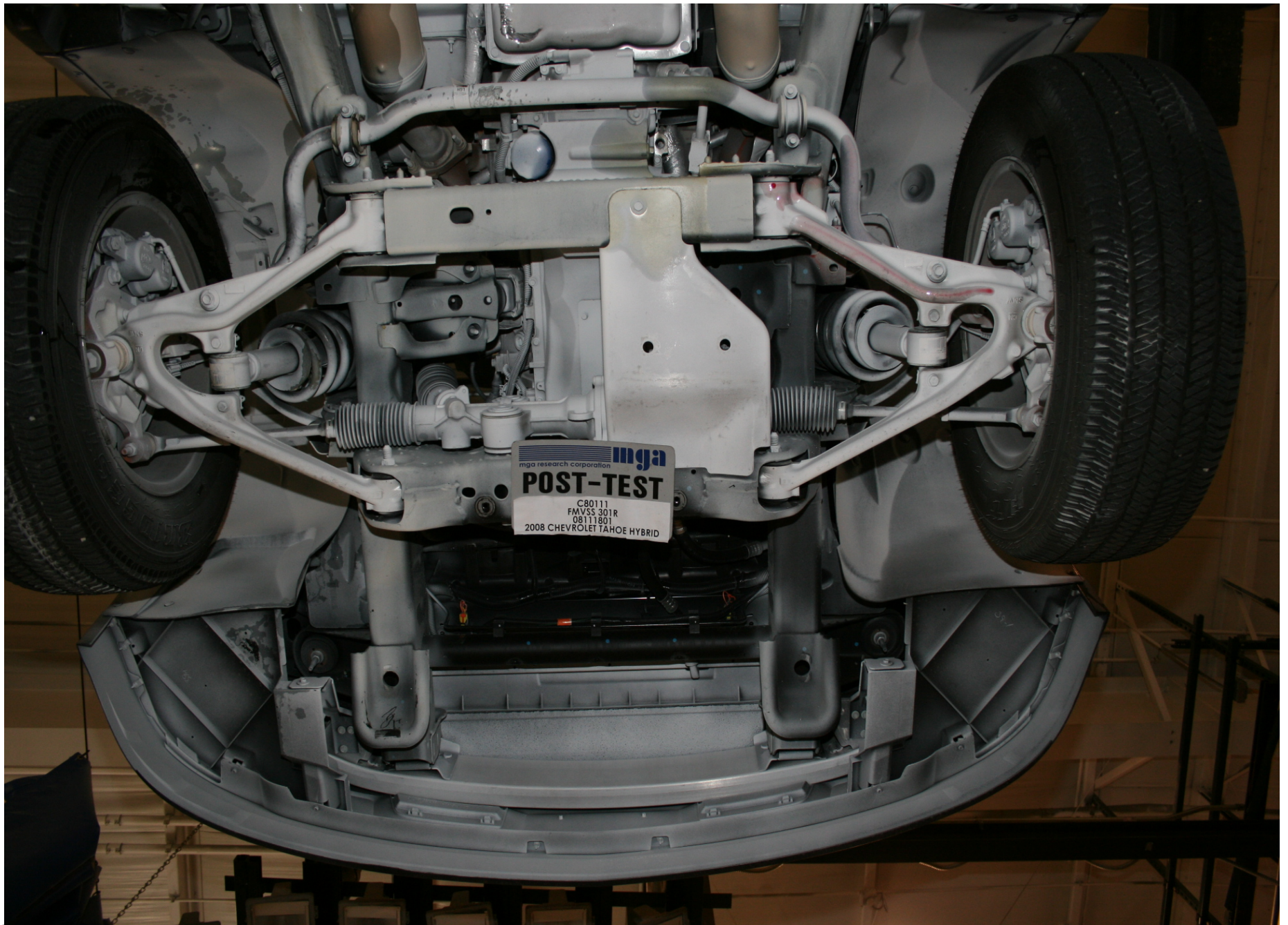
Post-Test Impact Point

B-19.



Pre-Test Underbody View 1

B-20.



Post-Test Underbody View 1

B-21.



Pre-Test Underbody View 2

B-22.



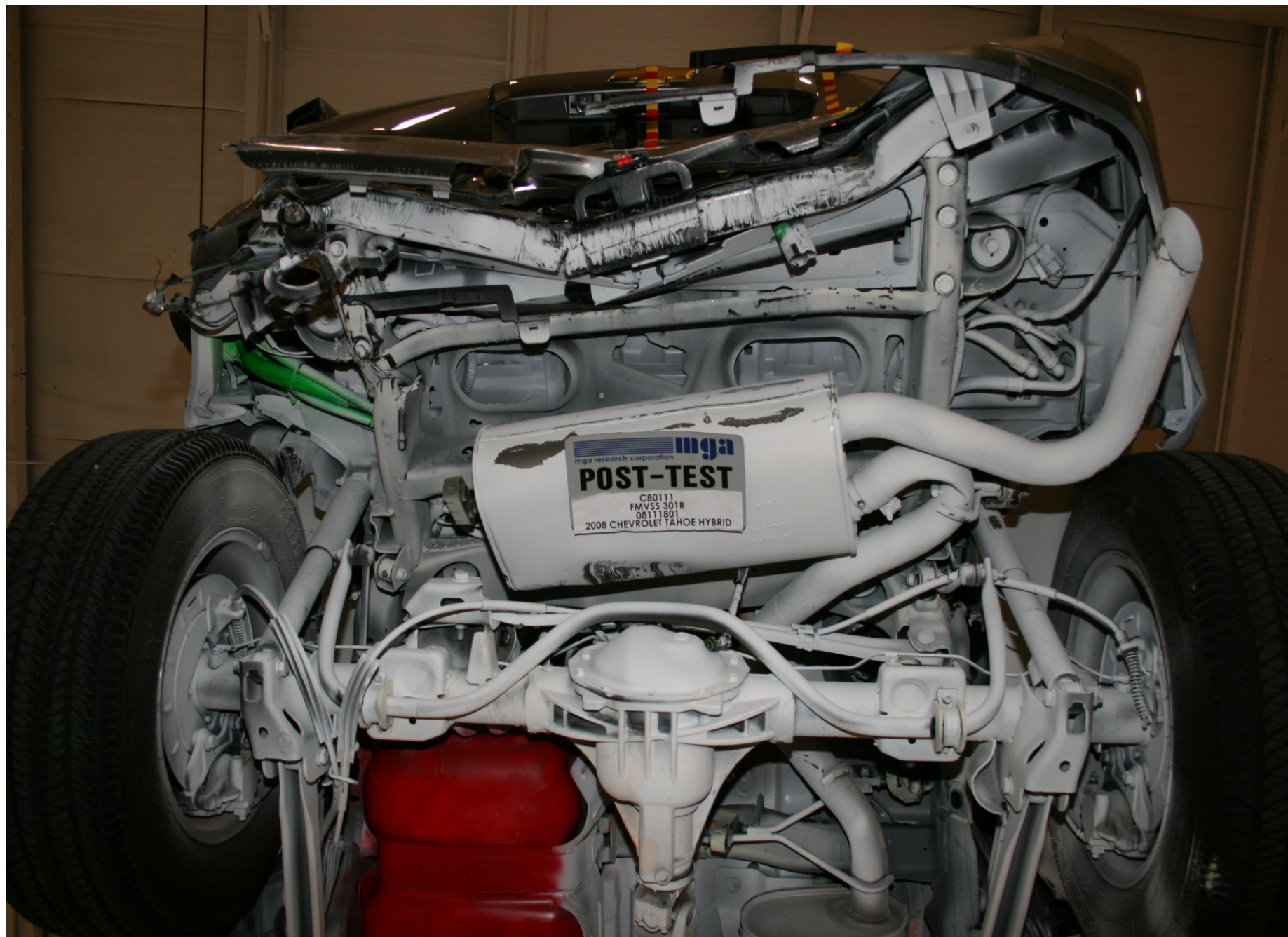
Post-Test Underbody View 2

B-23.



Pre-Test Underbody View 3

B-24.



Post-Test Underbody View 3

B-25.



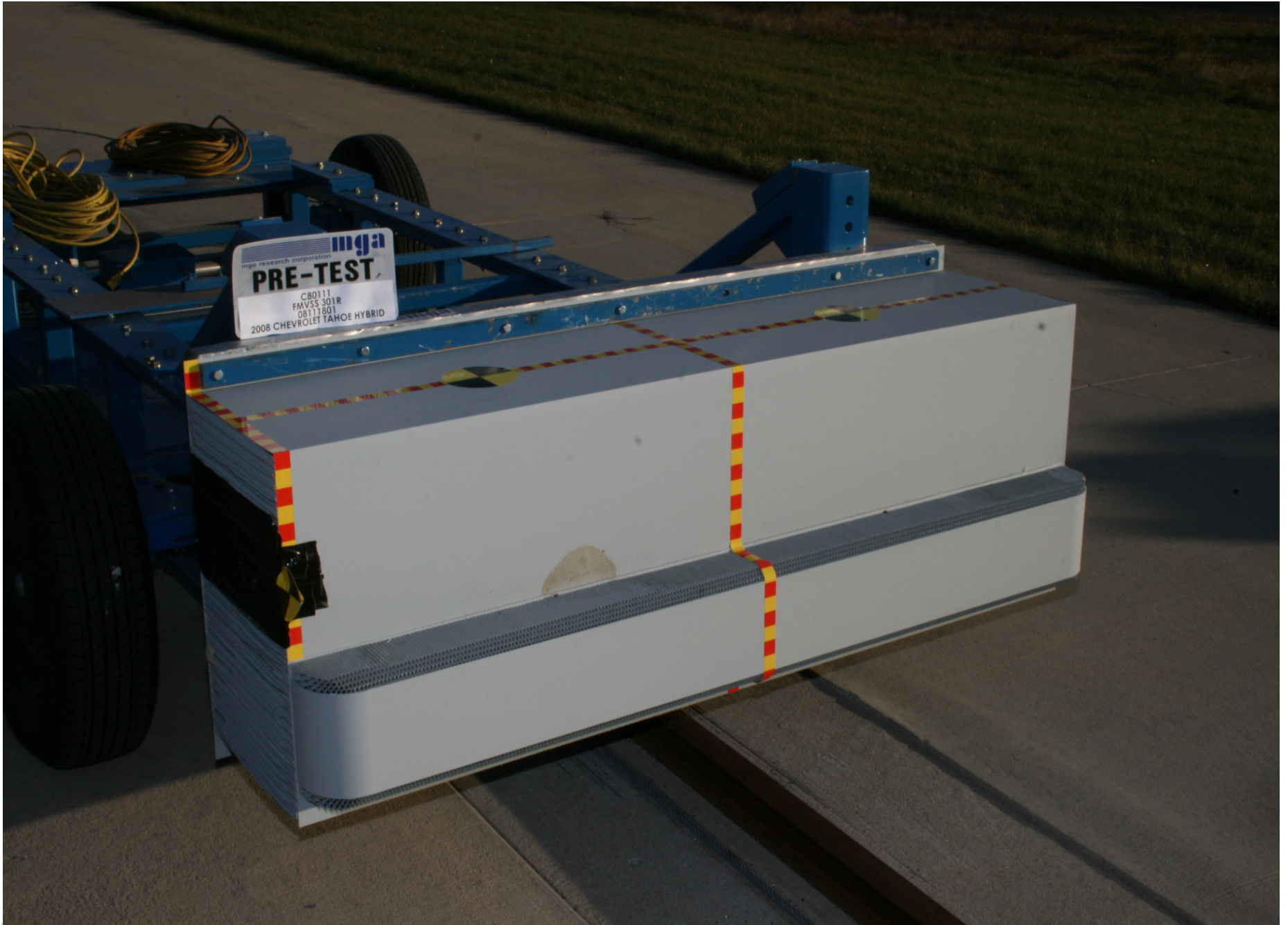
Pre-Test Front View of MDB

B-26.



Post-Test Front View of MDB

B-27.



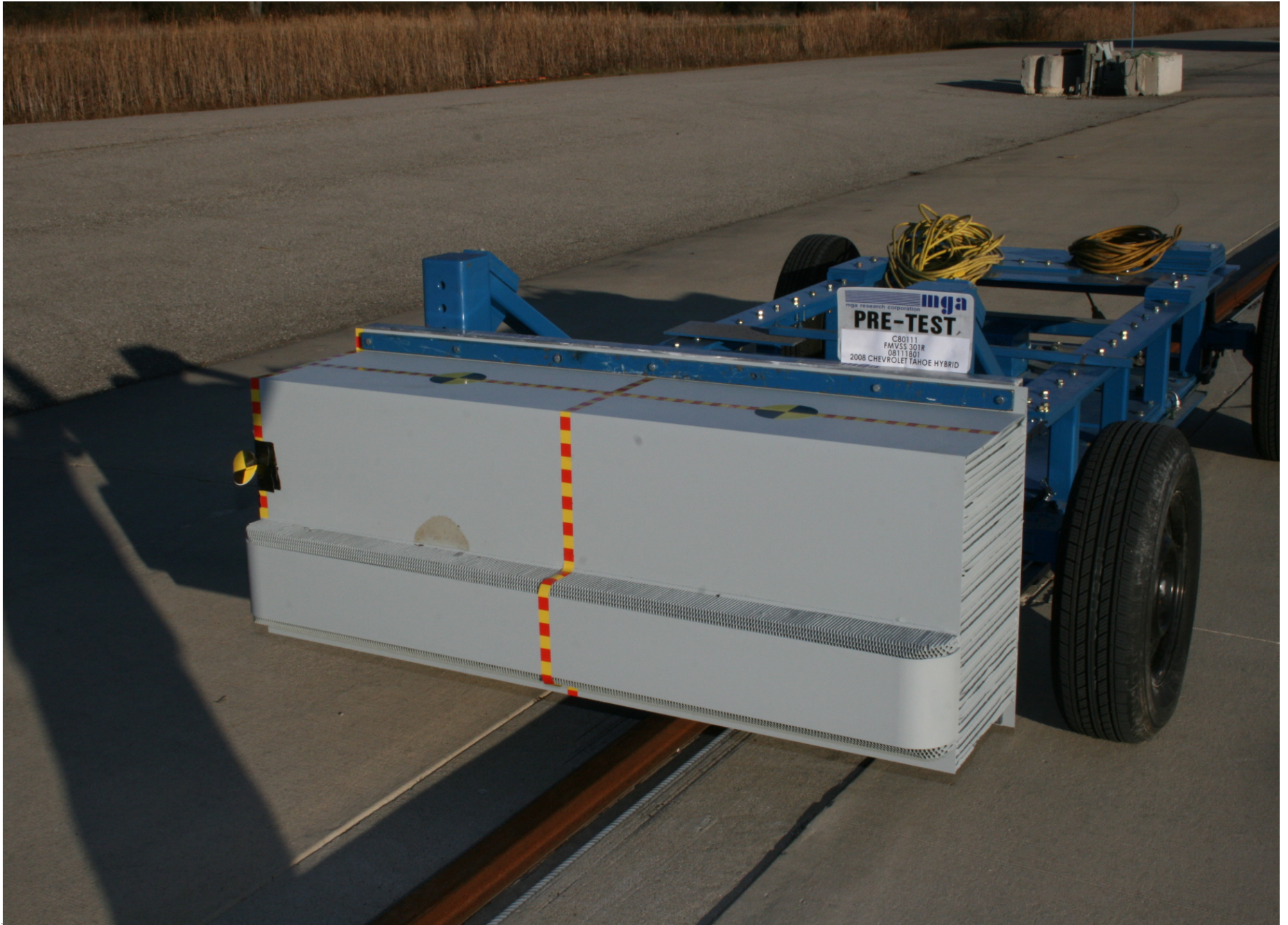
Pre-Test $\frac{3}{4}$ Right Side View of MDB

B-28.



Post-Test ¾ Right Side View of MDB

B-29.



Pre-Test ¾ Left Side View of MDB

B-30.



Post-Test $\frac{3}{4}$ Left Side View of MDB

B-31.



Pre-Test Top View of MDB

B-32.



Post-Test Top View of MDB

B-33.



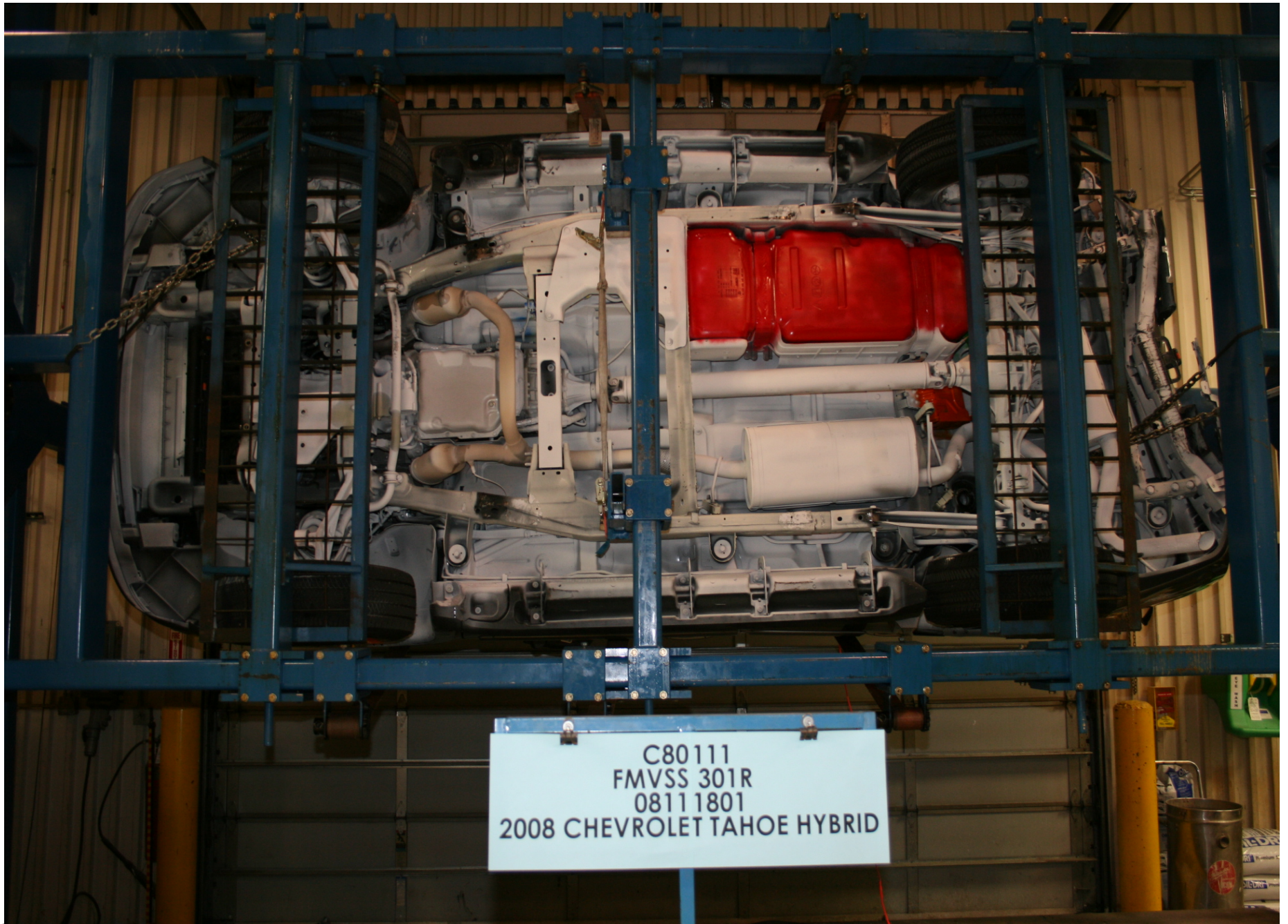
Static Rollover at 90 Degrees

B-34.



Static Rollover at 180 Degrees

B-35.



Static Rollover at 270 Degrees

B-36.



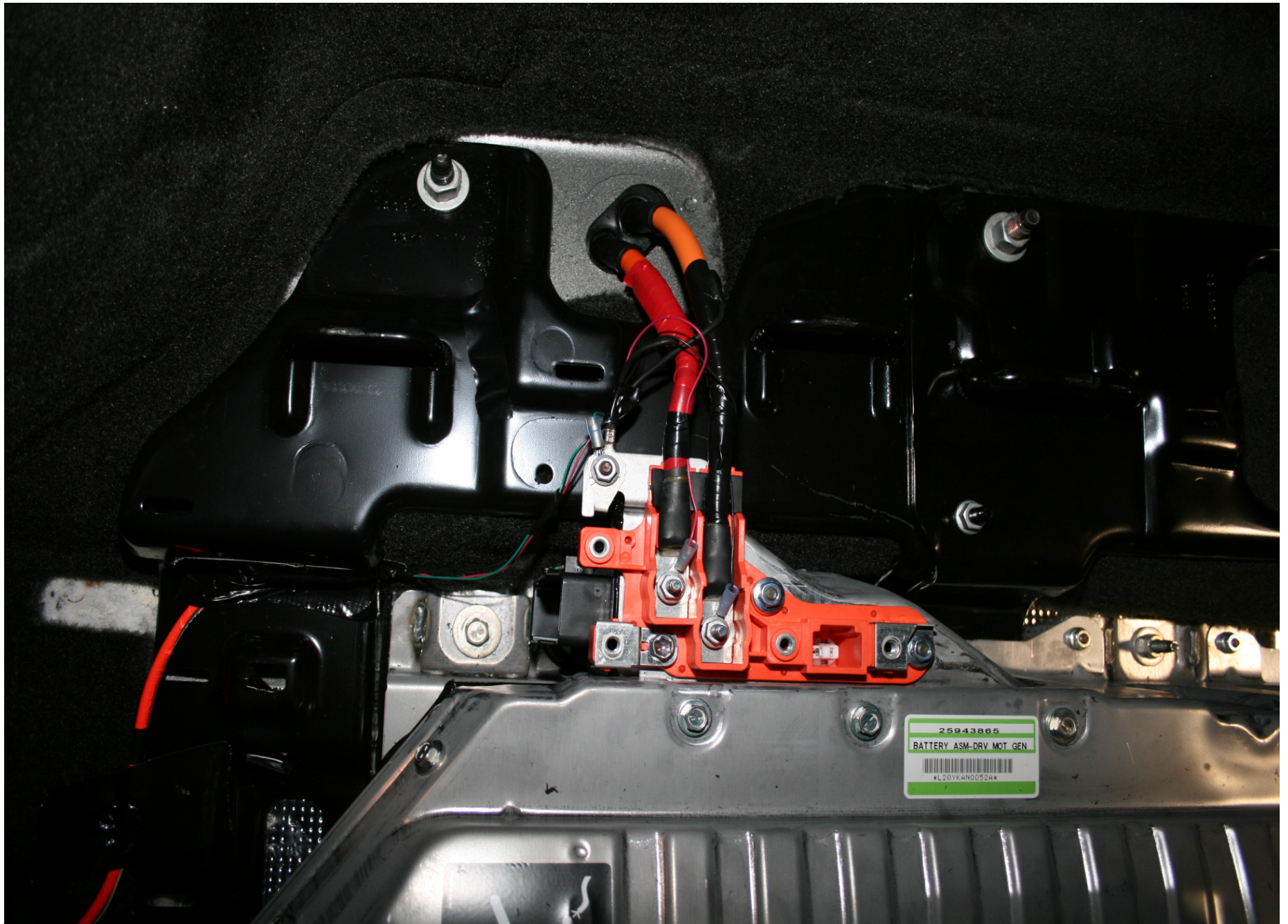
Static Rollover at 360 Degrees

B-37.



Pre-Test Propulsion Battery Module

B-38.



Pre-Test High Voltage Interconnect

B-39.



Pre-Test Installed Test Interface Port

B-40.



Pre-Test Vehicle Pass. Compartment Adjacent to Propulsion Battery

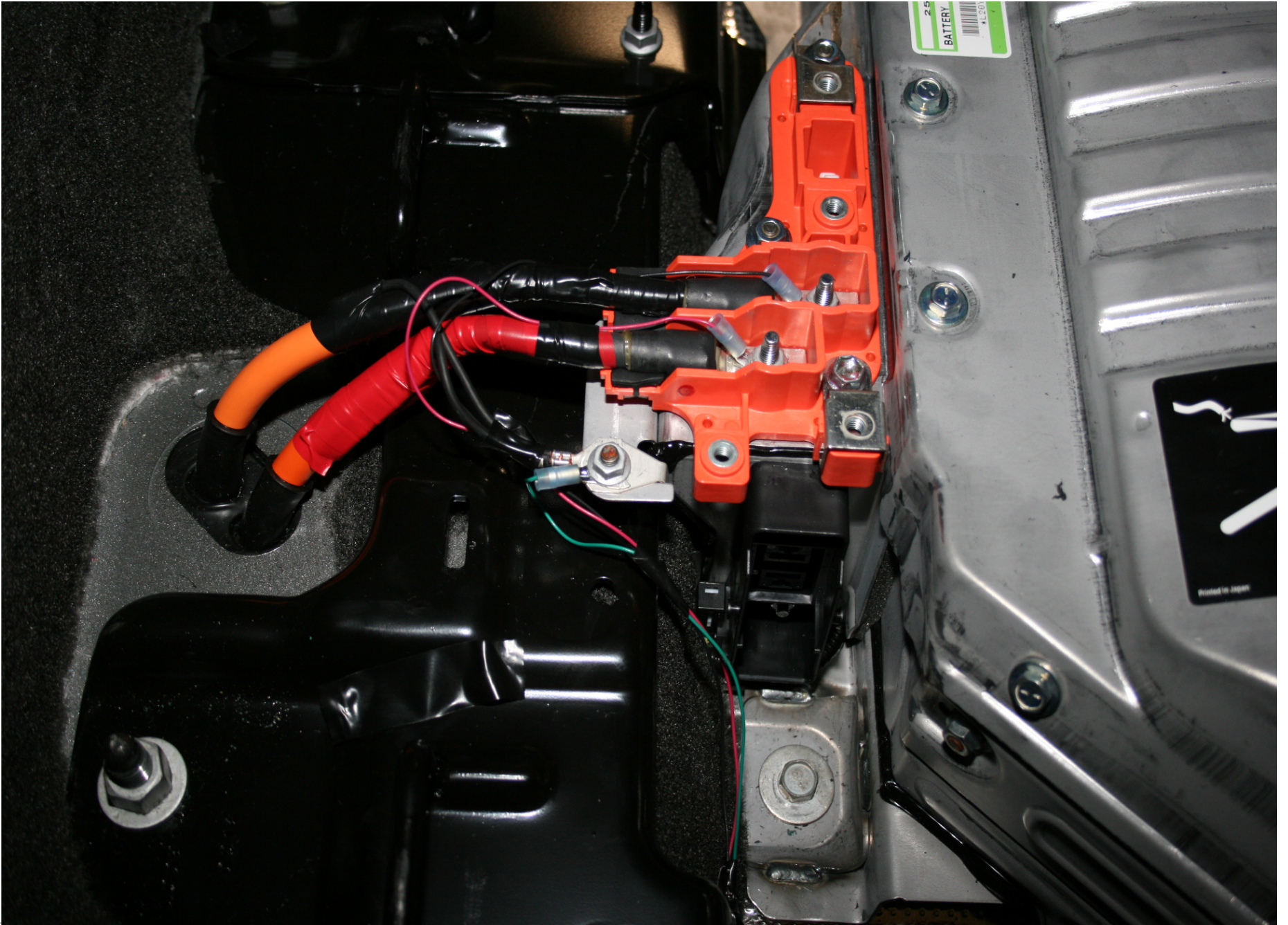


Post-Test Vehicle Pass. Compartment Adjacent to Propulsion Battery

B-42.



Post-Test Vehicle Pass. Compartment Adjacent to Propulsion Battery



B-43.

Pre-Test Vehicle Chassis Ground Points Location

B-44.



Pre-Test Service Switch Disconnect

B-45.



Post-Test Propulsion Battery Module View 1