

**REPORT NUMBER: 305-MGA-2013-001**

**SAFETY COMPLIANCE TESTING FOR FMVSS 305  
Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection**

**HONDA MFG. OF INDIANA, LLC  
2013 Acura ILX Hybrid 4-Dr Sedan  
NHTSA NUMBER: CD5302**

**PREPARED BY:  
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5000 WARREN ROAD  
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**Test Date: August 27, 2012**

**Report Date: September 6, 2012**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
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WASHINGTON, DC 20590**

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**Technical Report Documentation Page**

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4. Title and Subtitle Final Report of FMVSS 305 Compliance Testing of 2013 Acura ILX Hybrid 4-Dr Sedan; NHTSA No.: CD5302				5. Report Date September 6, 2012	
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7. Author(s) Joe Fleck, Project Engineer David Winkelbauer, Project Manager				8. Performing Organization Report No. 305-MGA-2013-001	
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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NVS-220) 1200 New Jersey Ave, SE Washington, DC 20590				13. Type of Report and Period Covered: Final Test Report August 27, 2012 to September 6, 2012	
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15. Supplementary Notes					
16. Abstract  An indicant compliance test was conducted on the subject 2013 Acura ILX Hybrid 4-Dr Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-305-01 for the determination of FMVSS 305 compliance. Test failures identified were as follows:  None.					
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**SECTION 1**  
**PURPOSE OF COMPLIANCE TEST**

This electric vehicle, a 2013 Acura ILX Hybrid 4-Dr Sedan, (NHTSA No. CD5302), in conjunction with the FMVSS 214P impact, was tested to FMVSS 305.

The test was performed in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedure TP-305-01 to determine indicant compliance to the requirements of Federal Motor Vehicle Safety Standard (FMVSS) 305, "Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection".

Based on the test results, the 2013 Acura ILX Hybrid 4-Dr Sedan appears to meet the requirements of FMVSS 305 testing.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-07-D-00062.

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

**TEST NOTES**

None.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

**SECTION 2**  
**DATA SHEETS**

**DATA SHEET NO. 1**  
**TEST VEHICLE SPECIFICATIONS**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302

**TEST VEHICLE INFORMATION**

Year/Make/Model/Body Style	2013 Acura ILX Hybrid 4-Dr Sedan
NHTSA No.	CD5302
Color	Polished Metal Metallic
Date Received	07/23/2012
Odometer Reading	207 miles
Selling Dealer	Bergstrom Acura

**DATA FROM CERTIFICATION LABEL**

Manufactured By	HONDA MFG. OF INDIANA, LLC
Date of Manufacture	05/12
VIN:	19VDE3F76DE300303

GVWR (kg)	1800
GAWR Front (kg)	970
GAWR Rear (kg)	890

**DATA FROM VEHICLE'S TIRE PLACARD & SIDEWALL**

Measured Parameter	Front	Rear
Location of Placard of Vehicle	Left Side B-Post	
Recommended Tire Size	P205/55R16	P205/55R16
Recommended Cold Tire Pressure	220 kPa	220 kPa
Size of Tires on Test Vehicle	P205/55R16	P205/55R16
Type of Spare Tire	None	

**VEHICLE CAPACITY DATA**

Measured Parameter	Front	Rear	Third	Total
Type of Front Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Weight (VCW) (kg)				385
Number of Occupants x 68 kg				340
Cargo Weight (RCLW) (kg)				45

**ELECTRIC VEHICLE PROPULSION SYSTEM**

Type of Electric Vehicle (Electric/Hybrid):	Gas-Electric Hybrid
Electric Energy Storage/Device:	Lithium-Ion (Li-Ion) Battery
Nominal Voltage (V):	144.0 V
Physical Location of the High Voltage Source Automatic Disconnect:	There is no Automatic Propulsion Battery Disconnect.
Auxiliary Battery Type:	Lead-Acid Battery

**DATA SHEET 2**  
**PRE-TEST DATA**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302

**CALCULATION OF TARGET TEST WEIGHT (TTW)**

Measured Parameter	Units	Value
Unloaded Vehicle Weight (UVW)	kg	1349.5
Rated Cargo & Luggage Weight (RCLW)	kg	45
Weight of 1 P572U ATD (ES-2re) Dummy	kg	77.1
<b>TARGET TEST WEIGHT</b>	kg	<b>1471.6</b>

Note: The target weight is calculated including tolerances as specified in each vehicle crash test procedure.

**TEST VEHICLE WEIGHTS**

	Units	As Delivered			Fully Loaded			As Tested		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	404.2	285.8		438.2	337.5		441.8	332.0	
Right	kg	385.5	274.0		391.4	304.8		396.0	296.2	
Ratio	%	58.5	41.5		56.4	43.6		57.1	42.9	
<b>Totals</b>	kg	<b>789.7</b>	<b>559.8</b>	<b>1349.5</b>	<b>829.6</b>	<b>642.3</b>	<b>1471.9</b>	<b>837.8</b>	<b>628.2</b>	<b>1466.0</b>

**TIRE PRESSURES**

	Units	LF	RF	RR	LR
As Delivered	kPa	220	220	220	220
As Tested	kPa	220	220	220	220

**DATA SHEET 2 (CONTINUED)**

**PRE-TEST DATA**

**ELECTRIC ENERGY STORAGE CONVERSION/DEVICE SYSTEM DATA  
(COTR SUPPLIED DATA)**

Electrolyte Fluid Type:	LiPF6 + Carbonic Acid Esters Solution	
Electrolyte Fluid Specific Gravity:	1.2 g/cm <sup>3</sup>	
Electrolyte Kinematic Viscosity (centistokes):	2.9cSt (25° C)	
Electrolyte Fluid Color:	Clear	
Electric Energy Storage/Conversion System Coolant Type, Color, Specific Gravity (if applicable):	Air Cooling	
Location of Battery Modules:	<input type="checkbox"/>	Inside Passenger Compartment
	<input checked="" type="checkbox"/>	Outside Passenger Compartment
	Behind Rear Seat	
Electric Energy Storage/Conversion System State of Charge:	<input type="checkbox"/>	Maximum State of Charge
	<input checked="" type="checkbox"/>	Range of Normal Operating Voltage
Maximum State of Charge	144.0 V	
Test Voltage - No less than 95% of maximum State of Charge:	144.5 V	
Range of Normal Operating Voltage:		
Test Voltage – Within Normal Operative Voltage Range:		
Test Vehicle Equipped with Electrical Isolation Monitoring	Not Stated	

**VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)**

Details of Vehicle Chassis Ground Point(s) & Location(s)	Vehicle ground is on the right hand side, behind the rear seat back.
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**ELECTRIC ENERGY STORAGE/CONVERSION TEST POINTS**

Details of Electric Energy Storage/Conversion System Test Points:	Motor ECU Connector C Points 6 and 7
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**DATA SHEET 3**

**PRE-IMPACT ELECTRIC ISOLATION MEASUREMENTS & CALCULATIONS**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302

**VOLTMETER INFORMATION**

Make:	Fluke
Model:	177
Serial Number:	17210161
Internal Impedance Value (MΩ):	> 10 MΩ < 100 pF
Resolution (V):	.001 Volts
Last Calibration Date:	06/29/2012

**ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM VOLTAGE**

Measurement shall be made with Energy Storage/Conversion System connected to the vehicle propulsion system, and the vehicle in the “ready-to-drive” (propulsion system energized) 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):	144.5
---------	-------

**ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM TO VEHICLE CHASSIS**

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

V1 (V):	71.9
V2 (V):	71.7

**ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM 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):	77500
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**DATA SHEET 3 (CONTINUED)**

**PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS**

**ELECTRICAL ISOLATION MEASUREMENT**

Note: If measured voltage is zero and results in a division by zero, record "Zero Volts". This "zero voltage" condition is considered as being compliant.

V1' (V):	1.1
$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$	
Ri1 (Ω):	9962488
V2' (V):	1.1
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$	
Ri2 (Ω):	9704971
Ri = The lesser of Ri1 and Ri2	
Ri Pre-Test ((Ω):	9704971
Ri/Vb (Ω/V):	67162
Minimum Electrical Isolation Value is 500 Ω/V	

Note: Measurements completed within 15 minutes prior to impact.

Is the measured Electrical Isolation Value:	Yes, Pass	No, Fail
≥500 Ω/V without electrical isolation monitoring	X	
≥100 Ω/V with electrical isolation monitoring	X	

**DATA SHEET 4  
POST-IMPACT DATA**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302

**VOLTMETER INFORMATION**

Make:	Fluke
Model:	177
Serial Number:	17210161
Internal Impedance Value (MΩ):	> 10 MΩ < 100 pF
Nominal Propulsion Battery Voltage (Vb) (V):	279.4
Resolution (V):	0.001
NOTE: Record V1, V2, V1', V2' voltage measurements at a minimum of 5 seconds after impact.	

**ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM  
VOLTAGE LOCATION OF MEASUREMENT**

Measurement is made from the side of the automatic disconnect connected to the electric powertrain.

Vb (V):	144.4 V
---------	---------

**ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM VOLTAGE**

V1 =	73.8	V	Impact Time:	1	Minutes	23	s
V2 =	72.4	V	Impact Time:	1	Minutes	36	s
V1' =	1.1	V	Impact Time:	2	Minutes	2	s
V2' =	1.1	V	Impact Time:	2	Minutes	19	s

**ELECTRICAL ISOLATION MEASUREMENT**

Note: If measured voltage is zero and results in a division by zero, record "Zero Volts". This "zero voltage" condition is considered as being compliant.

$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$							
Ri1 =	10146925	Ω	Impact Time:	1	Minutes	23	s
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$							
Ri2 =	9882176	Ω	Impact Time:	1	Minutes	36	s
Ri = The lesser of Ri1 and Ri2							
Ri =	9882176	Ω	Impact Time:	1	Minutes	36	s
Ri/Vb = electrical Isolation Value/Nominal Battery Voltage							
Minimum Electrical Value is 500 Ω/V							
Ri/Vb =	68389	Ω/V	Impact Time:	1	Minutes	36	s

Is the measured Electrical Isolation Value:	Yes, Pass	No, Fail
≥500 Ω/V without electrical isolation monitoring	X	
≥100 Ω/V with electrical isolation monitoring	X	

**DATA SHEET 4 (CONTINUED)**

**POST-IMPACT DATA**

**ELECTRIC ENERGY STORAGE/CONVERSION DEVICE**

	Inside Passenger Compartment	Outside Passenger Compartment
Location of Electric Energy Storage/Conversion Device:		X

	Yes, Pass	No, Fail
All Components of Electrical Energy Storage/Conversion Device remained attached to the vehicle with at least one mounting location.	X	

Describe Electric Energy Storage/Conversion Device movement within the passenger compartment [Supply photographs as appropriate]:
Not Applicable

	Yes, Fail	No, Pass
Has the Electric Energy Storage/Conversion Device moved within the passenger compartment?		X

Describe intrusion of an outside Electric Energy Storage/Conversion Device into the passenger compartment [Supply photographs as appropriate]:
No Movement

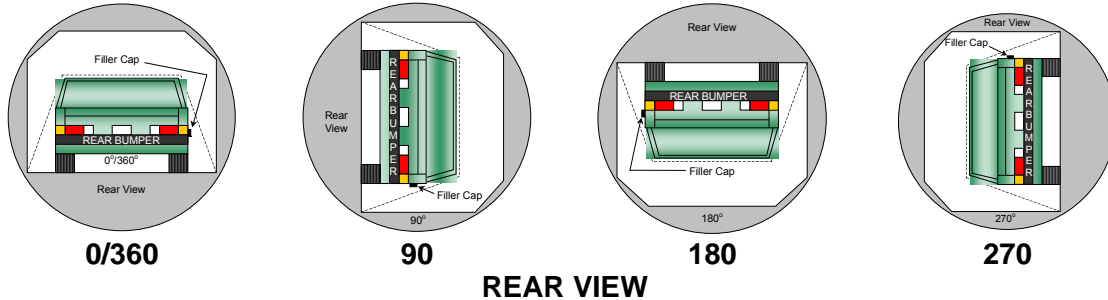
	Yes, Fail	No, Pass
Has an outside Electric Energy Storage/Conversion Device intruded into the passenger compartment?		X

	Yes, Fail	No, Pass
Is Electric Energy Storage/Conversion Device electrolyte spillage visible in the passenger compartment?		X

**DATA SHEET 5**  
**STATIC ROLLOVER TEST DATA**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302



**DETERMINATION OF ELECTRIC ENERGY STORAGE/CONVERSION DEVICE  
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°	2	44	5	7	2	44	5	7	2	44	5	8
90° - 180°	2	25	5	7	2	25	5	7	2	25	5	8
180° - 270°	2	17	5	7	2	17	5	7	2	17	5	8
270° - 360°	2	48	5	7	2	48	5	7	2	48	5	8

**ACTUAL TEST VEHICLE ELECTRIC ENERGY STORAGE/CONVERSION DEVICE  
ELECTROLYTE SPILLAGE**

Rollover Stage	Electric Energy Storage/Conversion Device 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:   0   L

	Yes, Fail	No, Pass
Is the total spillage of Electric Energy Storage/Conversion Device electrolyte greater than 5.0 Liters?		X
Is Electric Energy Storage/Conversion Device electrolyte spillage visible in the passenger compartment?		X

**DATA SHEET 5 (CONTINUED)**  
**STATIC ROLLOVER TEST DATA**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302

**VOLTMETER INFORMATION**

Make:	Fluke
Model:	177
Serial Number:	17210161
Internal Impedance Value (MΩ):	> 10 MΩ < 100 pF
Nominal Electric Energy Storage/Conversion Device Voltage (Vb) (V):	144.5
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.	

**ELECTRICAL ISOLATION MEASUREMENT**

V1 =	71.7	V	0°	Time:		Minutes		s
V1 =	71.7	V	90°	Time:	0	Minutes	57	s
V1 =	71.7	V	180°	Time:	0	Minutes	40	s
V1 =	71.7	V	270°	Time:	0	Minutes	32	s
V1 =	71.6	V	360°	Time:	0	Minutes	18	s
V2 =	71.7	V	0°	Time:		Minutes		s
V2 =	71.6	V	90°	Time:	1	Minutes	6	s
V2 =	71.6	V	180°	Time:	0	Minutes	50	s
V2 =	71.7	V	270°	Time:	0	Minutes	42	s
V2 =	71.7	V	360°	Time:	0	Minutes	31	s
V1' =	1.1	V	0°	Time:		Minutes		s
V1' =	1.1	V	90°	Time:	1	Minutes	26	s
V1' =	1.1	V	180°	Time:	1	Minutes	21	s
V1' =	1.1	V	270°	Time:	1	Minutes	4	s
V1' =	1.1	V	360°	Time:	0	Minutes	58	s
V2' =	1.1	V	0°	Time:		Minutes		s
V2' =	1.1	V	90°	Time:	1	Minutes	10	s
V2' =	1.1	V	180°	Time:	1	Minutes	33	s
V2' =	1.1	V	270°	Time:	1	Minutes	15	s
V2' =	1.1	V	360°	Time:	0	Minutes	47	s
Vb =	144.4	V	0°	Time:		Minutes		s
Vb =	144.4	V	90°	Time:	0	Minutes	28	s
Vb =	144.4	V	180°	Time:	0	Minutes	30	s
Vb =	144.4	V	270°	Time:	0	Minutes	26	s
Vb =	144.4	V	360°	Time:	0	Minutes	22	s

**DATA SHEET 5 (CONTINUED)**  
**STATIC ROLLOVER TEST DATA**

Test Vehicle: 2013 Acura ILX Hybrid 4-Dr Sedan

NHTSA No. CD5302

**ELECTRICAL ISOLATION CALCULATION**

Note: If measured voltage is zero and results in a division by zero, record "Zero Volts". This "zero voltage" condition is considered as being compliant.

$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$								
Ri1 =	9691455	Ω	0°	Time:		Minutes		s
Ri1 =	9684696	Ω	90°	Time:	0	Minutes	57	s
Ri1 =	9684696	Ω	180°	Time:	0	Minutes	40	s
Ri1 =	9691455	Ω	270°	Time:	0	Minutes	32	s
Ri1 =	9684485	Ω	360°	Time:	0	Minutes	18	s
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$								
Ri2 =	9691455	Ω	0°	Time:		Minutes		s
Ri2 =	9684485	Ω	90°	Time:	1	Minutes	6	s
Ri2 =	9684485	Ω	180°	Time:	0	Minutes	50	s
Ri2 =	9691455	Ω	270°	Time:	0	Minutes	42	s
Ri2 =	9684696	Ω	360°	Time:	0	Minutes	31	s
Ri = The lesser of Ri1 and Ri2								
Ri =	9691455	Ω	0°	Time:		Minutes		s
Ri =	9684485	Ω	90°	Time:	1	Minutes	6	s
Ri =	9684485	Ω	180°	Time:	0	Minutes	50	s
Ri =	9691455	Ω	270°	Time:	0	Minutes	42	s
Ri =	9684485	Ω	360°	Time:	0	Minutes	18	s
Ri/Vb = Electrical Isolation Value/Nominal Battery Voltage Minimum Electrical Isolation Value is 500 Ω/V								
Ri/Vb =	67115	Ω/V	0°	Time:		Minutes		s
Ri/Vb =	67067	Ω/V	90°	Time:	1	Minutes	6	s
Ri/Vb =	67067	Ω/V	180°	Time:	0	Minutes	50	s
Ri/Vb =	67115	Ω/V	270°	Time:	0	Minutes	42	s
Ri/Vb =	67067	Ω/V	360°	Time:	0	Minutes	18	s

Is the measured Electrical Isolation Value:	Yes, Pass	No, Fail
≥500 Ω/V without electrical isolation monitoring	X	
≥100 Ω/V with electrical isolation monitoring		

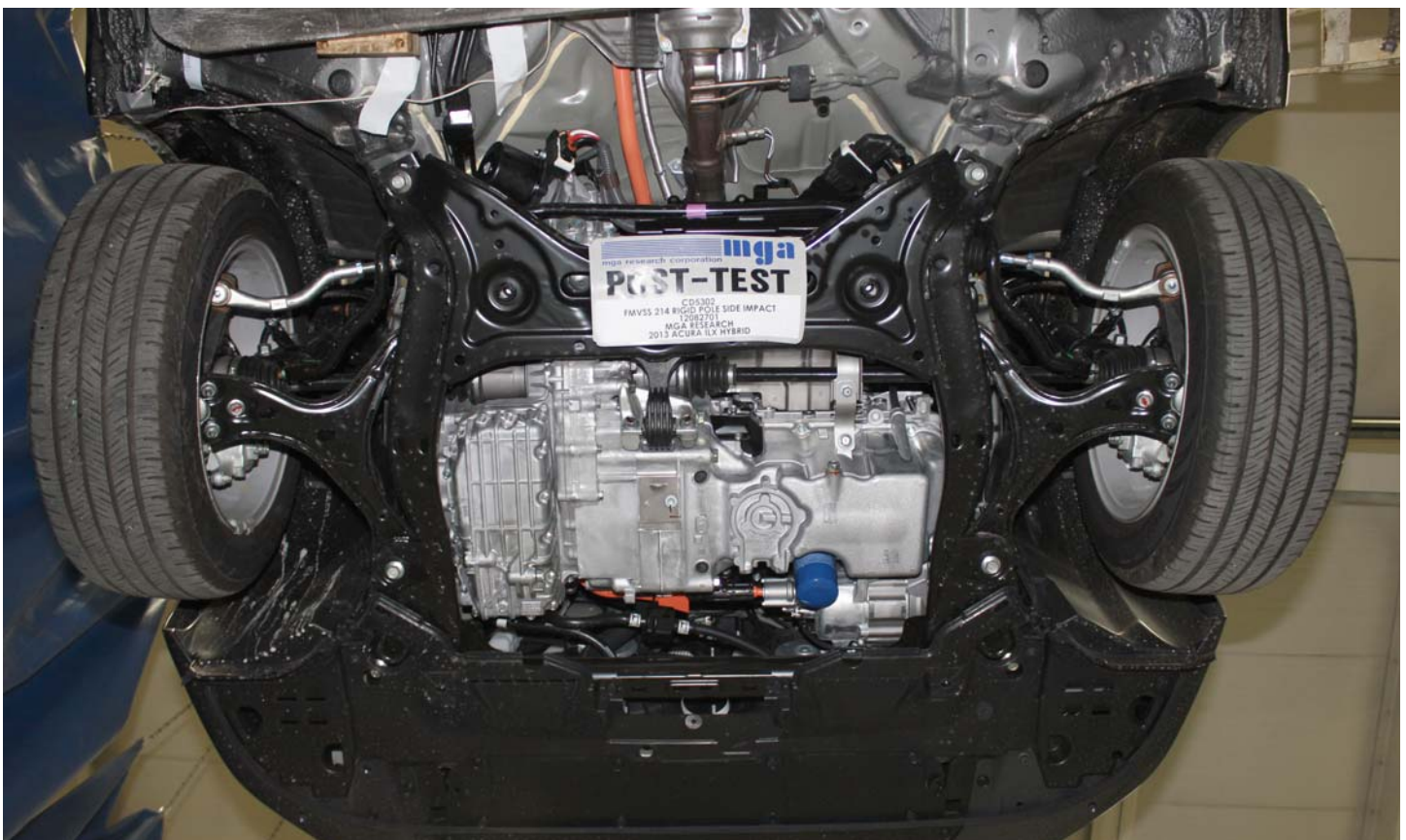
**APPENDIX A**  
**PHOTOGRAPHS**

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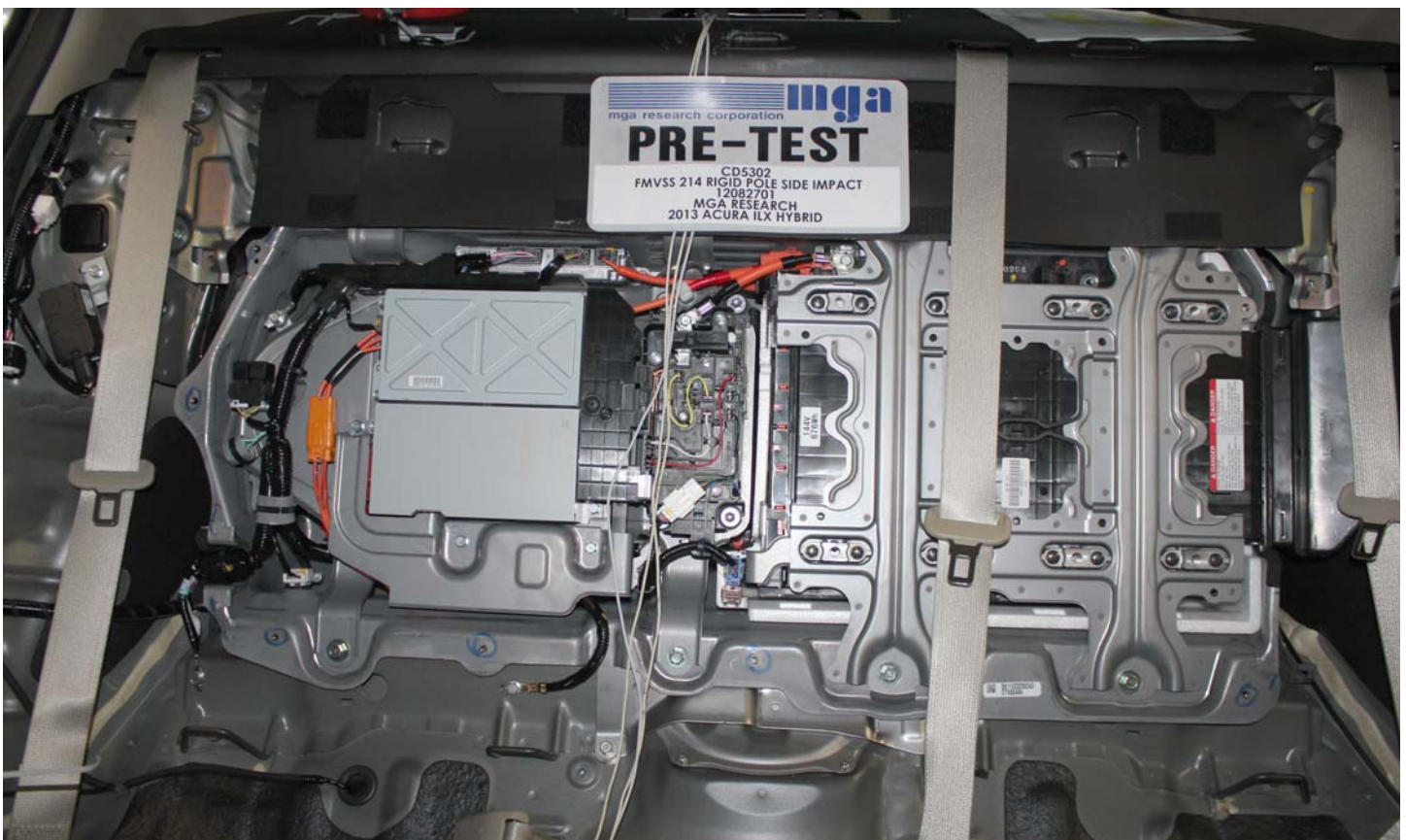
Pre-Impact View of Electric Propulsion Drive



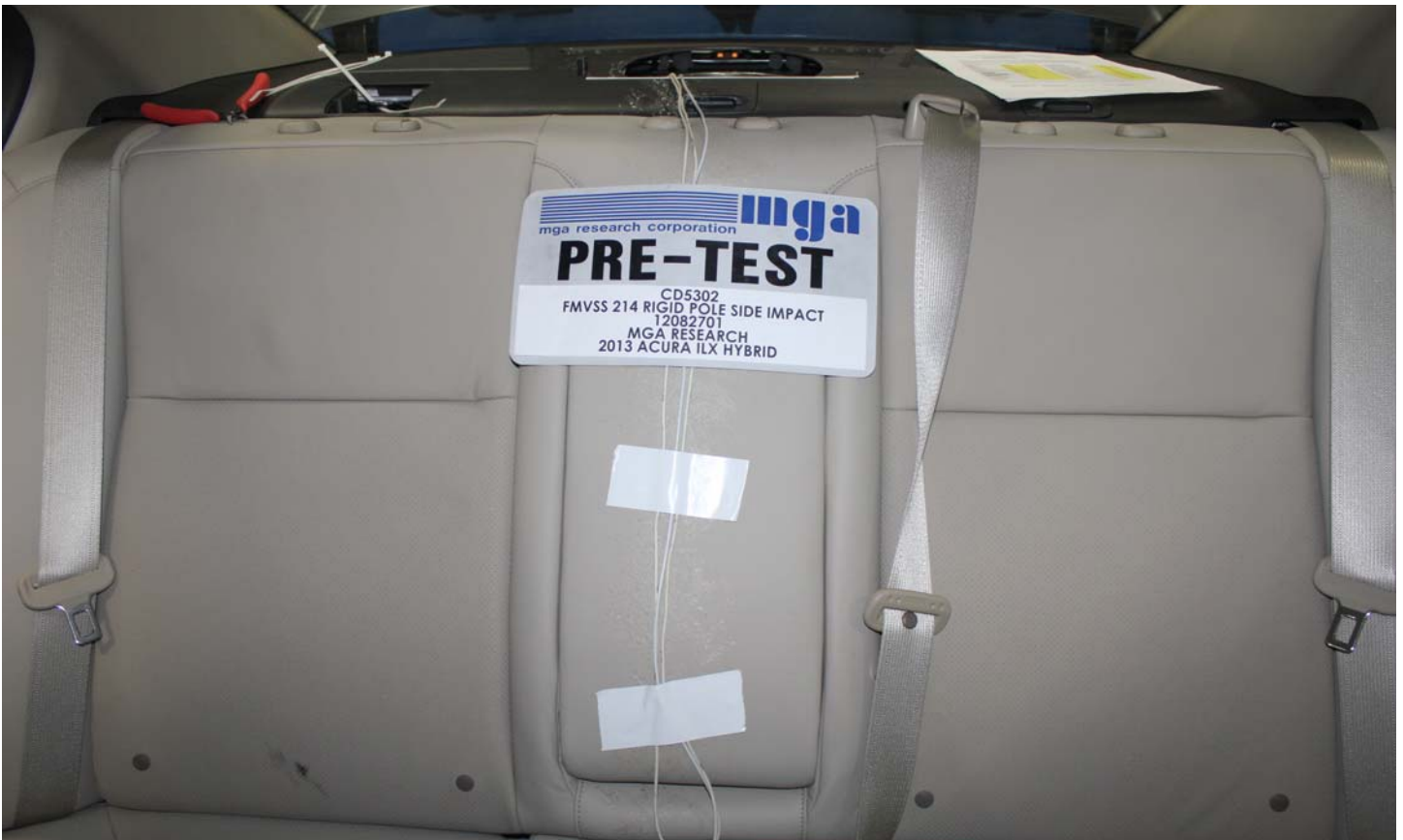
Post-Impact View of Electric Propulsion Drive



Pre-Impact View of Propulsion Battery With Cover



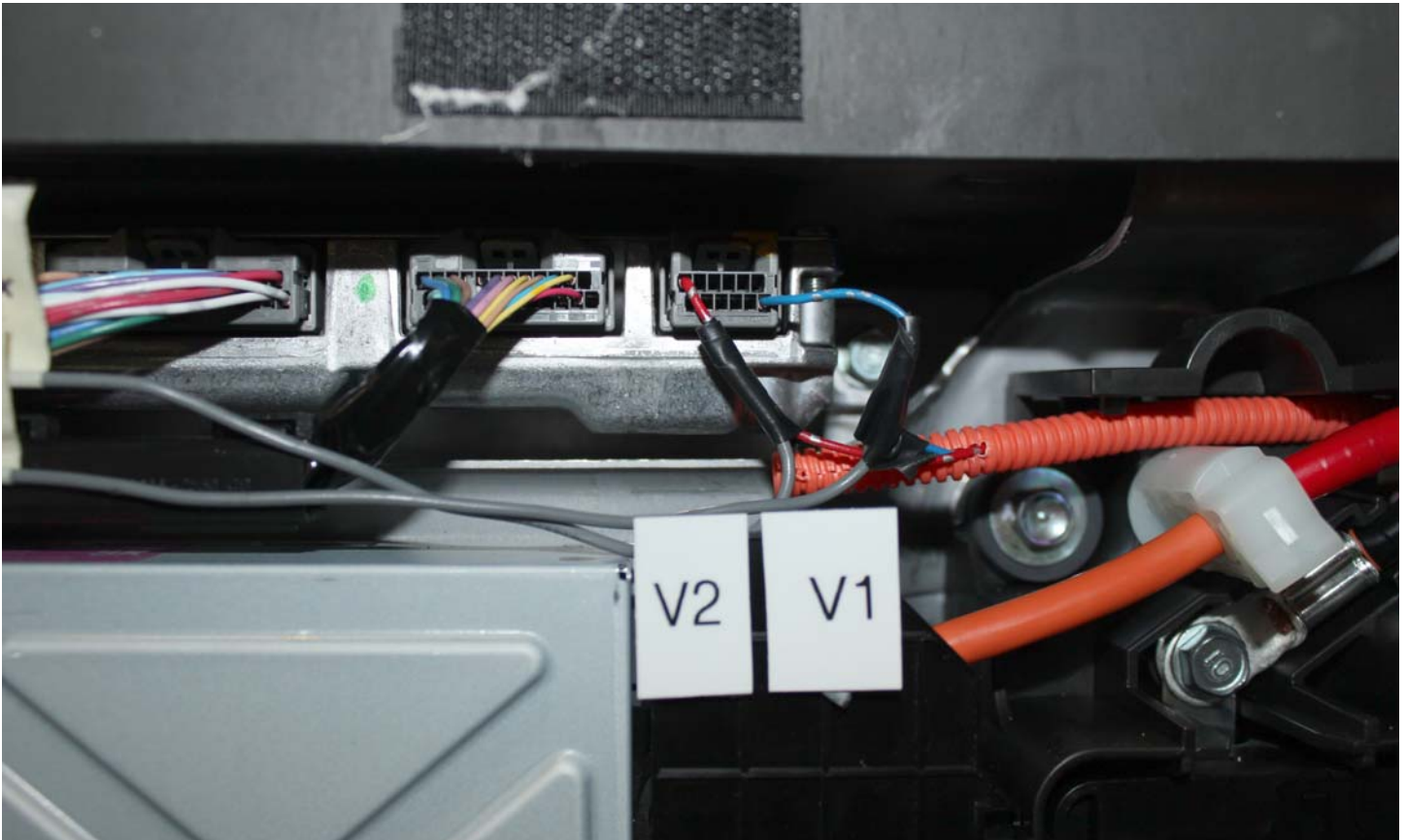
Pre-Impact View of Propulsion Battery



Pre-Impact View of Passenger Compartment



Post-Impact View of Passenger Compartment



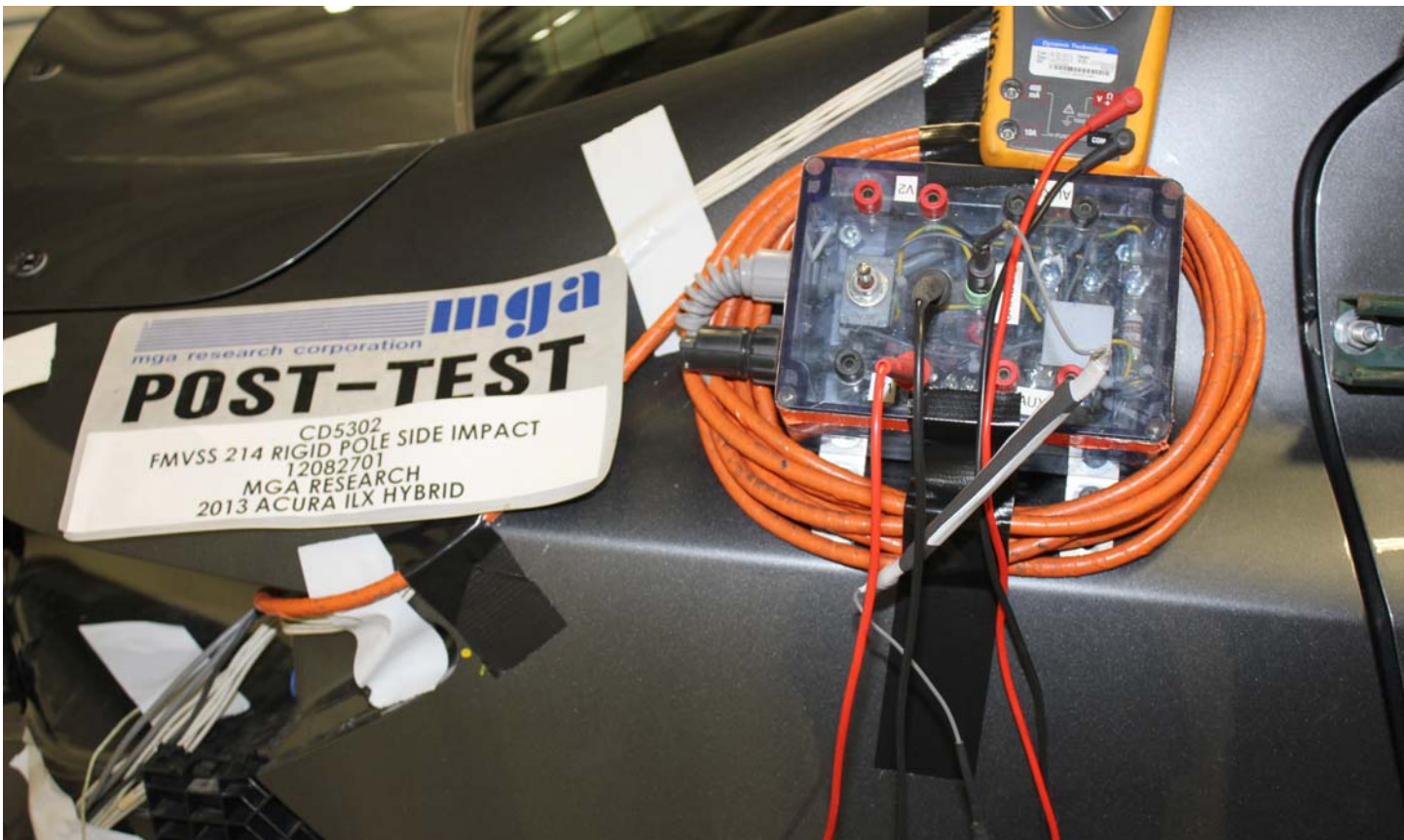
Pre-Impact View of High Voltage Leads Attached



Pre-Impact View of Ground Lead Attached



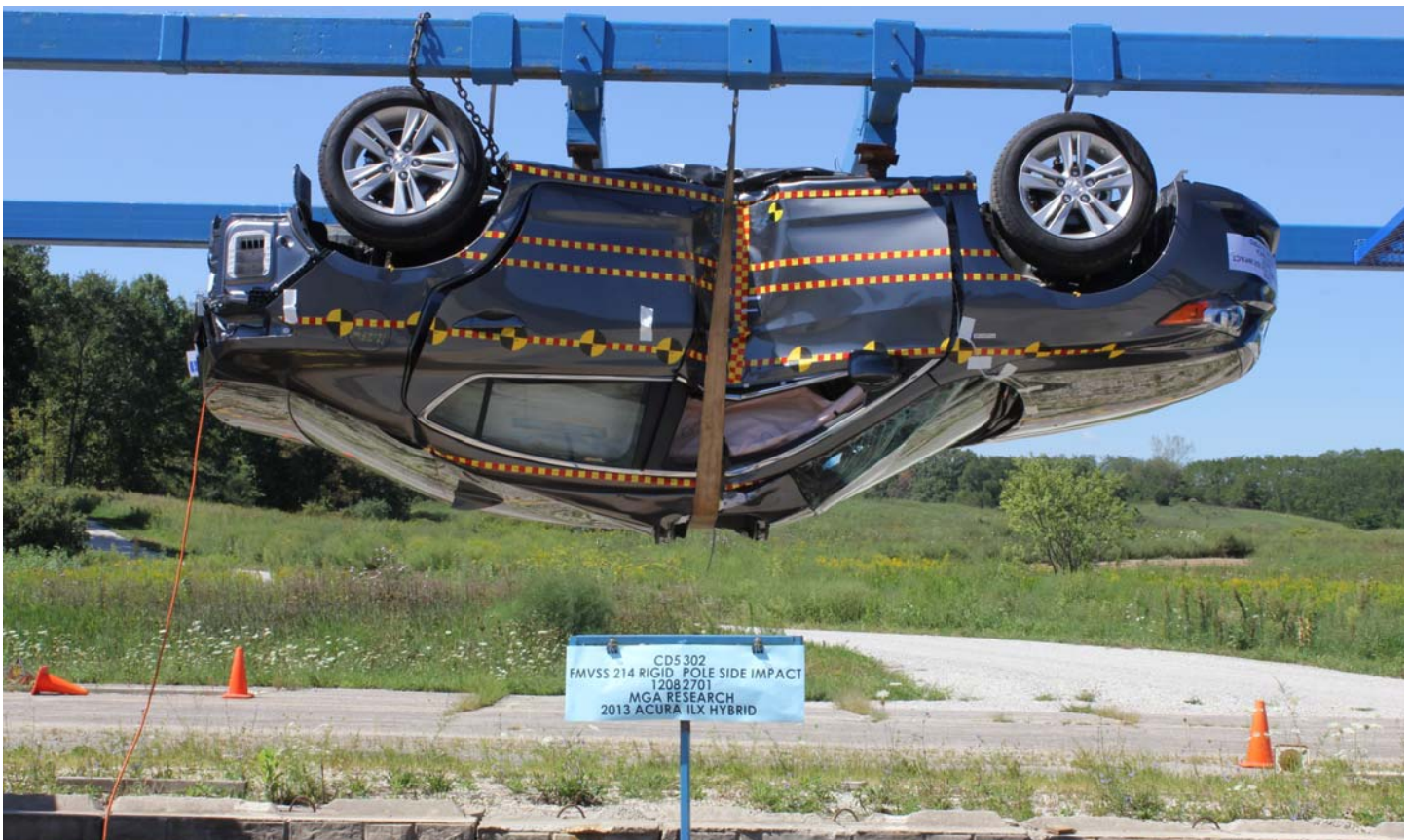
Pre-Impact View of Installed Impact Interface Port



Post-Impact View of Installed Impact Interface Port



FMVSS No. 305 Static Rollover at 90°



FMVSS No. 305 Static Rollover at 180°



FMVSS No. 305 Static Rollover at 270°



FMVSS No. 305 Static Rollover at 360°



As Delivered Right Front  $\frac{3}{4}$  View of Impact Vehicle



As Delivered Left Rear  $\frac{3}{4}$  View of Impact Vehicle



Vehicle's Certification Label



Vehicle's Tire Information Placard or Label