

REPORT NUMBER: 305-MGA-2012-004

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

**HONDA MOTOR CO., LTD
2012 Honda Civic IMA Hybrid 4-Dr Sedan
NHTSA NUMBER: CC5303**

**PREPARED BY:
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Test Date: June 27, 2012

Report Date: July 19, 2012

FINAL REPORT

**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
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16. Abstract An indicant compliance test was conducted on the subject 2012 Honda Civic IMA 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 2012 Honda Civic IMA Hybrid 4-Dr Sedan, (NHTSA No. CC5303), 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 2012 Honda Civic IMA 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: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303

TEST VEHICLE INFORMATION

Year/Make/Model/Body Style	2012 Honda Civic IMA Hybrid 4-Dr Sedan
NHTSA No.	CC5303
Color	Cool Mist Metallic
Date Received	02/14/2012
Odometer Reading	135 miles
Selling Dealer	Wilde Honda

DATA FROM CERTIFICATION LABEL

Manufactured By	HONDA MOTOR CO., LTD	GVWR (kg)	1740
Date of Manufacture	10/'11	GAWR Front (kg)	910
VIN:	JHMFB4F22CS004837	GAWR Rear (kg)	840

DATA FROM VEHICLE'S TIRE PLACARD & SIDEWALL

Measured Parameter	Front	Rear
Location of Placard of Vehicle	Left Side B-Post	
Recommended Tire Size	P195/65R15	P195/65R15
Recommended Cold Tire Pressure	220 kPa	220 kPa
Size of Tires on Test Vehicle	P195/65R15	P195/65R15
Type of Spare Tire	T135/80D15	

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: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303

CALCULATION OF TARGET TEST WEIGHT (TTW)

Measured Parameter	Units	Value
Unloaded Vehicle Weight (UVW)	kg	1285.0
Rated Cargo & Luggage Weight (RCLW)	kg	45
Weight of 1 P572U ATD (ES-2re) Dummy	kg	77.1
TARGET TEST WEIGHT	kg	1407.1

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	395.1	256.7		424.6	306.6		422.3	305.3	
Right	kg	366.9	266.3		375.1	301.2		374.2	298.0	
Ratio	%	59.3	40.7		56.8	43.2		56.9	43.1	
Totals	kg	762.0	523.0	1285.0	799.7	607.8	1407.5	796.5	603.3	1399.8

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 ³	
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:	☐	Inside Passenger Compartment
	☒	Outside Passenger Compartment
	Behind Rear Seat Back	
Electric Energy Storage/Conversion System State of Charge:	☐	Maximum State of Charge
	☒	Range of Normal Operating Voltage
Maximum State of Charge	172.0 V	
Test Voltage - No less than 95% of maximum State of Charge:	144.0 V	
Range of Normal Operating Voltage:	172.0 – 108.0 V	
Test Voltage – Within Normal Operative Voltage Range:	151.5 V	
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: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303

VOLTMETER INFORMATION

Make:	Fluke
Model:	11
Serial Number:	68541895
Internal Impedance Value (M Ω):	> 10 M Ω < 100 pF
Resolution (V):	.001 Volts
Last Calibration Date:	01/23/2012

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):	151.5
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ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM TO VEHICLE CHASSIS

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

V1 (V):	54.3
V2 (V):	56.5

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):	10.3
$R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$	
Ri1 (Ω):	675549
V2' (V):	10.2
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$	
Ri2 (Ω):	689880
Ri = The lesser of Ri1 and Ri2	
Ri Pre-Test ((Ω):	675549
Ri/Vb (Ω/V):	4459
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
$\geq 500 \Omega/V$ without electrical isolation monitoring	X	
$\geq 100 \Omega/V$ with electrical isolation monitoring		

DATA SHEET 4
POST-IMPACT DATA

Test Vehicle: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303

VOLTMETER INFORMATION

Make:	Fluke
Model:	11
Serial Number:	68541895
Internal Impedance Value (MΩ):	> 10 MΩ < 100 pF
Nominal Propulsion Battery Voltage (Vb) (V):	151.5
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):	151.5
---------	-------

ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM VOLTAGE

V1 =	54.9	V	Impact Time:	0	Minutes	52	s
V2 =	55.3	V	Impact Time:	0	Minutes	46	s
V1' =	8.8	V	Impact Time:	1	Minutes	15	s
V2' =	6.6	V	Impact Time:	1	Minutes	21	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 =	814947	Ω	Impact Time:	1	Minutes	15	s
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$							
Ri2 =	1139576	Ω	Impact Time:	1	Minutes	21	s
Ri = The lesser of Ri1 and Ri2							
Ri =	814947	Ω	Impact Time:	1	Minutes	15	s
Ri/Vb = electrical Isolation Value/Nominal Battery Voltage							
Minimum Electrical Value is 500 Ω/V							
Ri/Vb =	5379	Ω/V	Impact Time:	1	Minutes	15	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		

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

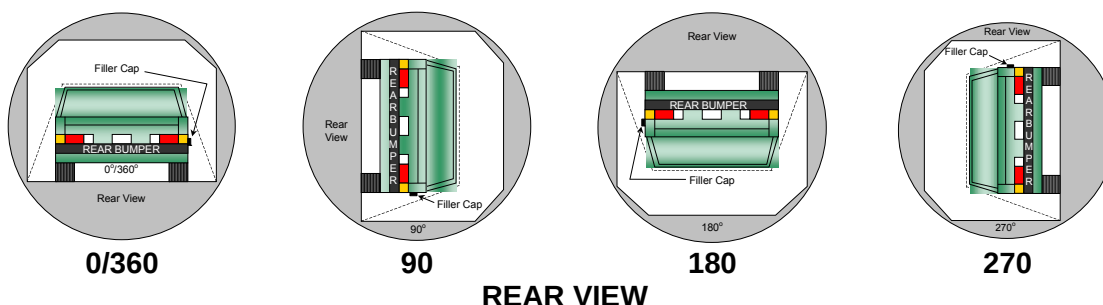
	Yes, Fail	No, Pass
Has an outside Electric Energy Storage/Conversion Device intruded into the passenger compartment?		X

	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: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303



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	
0° - 90°	2	minutes	46	seconds	5	minutes	7	minutes	46	seconds	8	minutes
90° - 180°	2	minutes	31	seconds	5	minutes	7	minutes	31	seconds	8	minutes
180° - 270°	2	minutes	14	seconds	5	minutes	7	minutes	14	seconds	8	minutes
270° - 360°	2	minutes	34	seconds	5	minutes	7	minutes	34	seconds	8	minutes

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: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303

VOLTMETER INFORMATION

Make:	Fluke
Model:	11
Serial Number:	68541895
Internal Impedance Value (MΩ):	> 10 MΩ < 100 pF
Nominal Electric Energy Storage/Conversion Device Voltage (Vb) (V):	144.0
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 =	18.8	V	0°	Time:		Minutes		s
V1 =	18.4	V	90°	Time:	2	Minutes	59	s
V1 =	18.3	V	180°	Time:	2	Minutes	40	s
V1 =	18.7	V	270°	Time:	2	Minutes	27	s
V1 =	20.0	V	360°	Time:	2	Minutes	47	s
V2 =	17.8	V	0°	Time:		Minutes		s
V2 =	18.3	V	90°	Time:	3	Minutes	7	s
V2 =	26.4	V	180°	Time:	2	Minutes	47	s
V2 =	18.7	V	270°	Time:	2	Minutes	34	s
V2 =	18.6	V	360°	Time:	2	Minutes	58	s
V1' =	0.1	V	0°	Time:		Minutes		s
V1' =	0.2	V	90°	Time:	3	Minutes	20	s
V1' =	0.05	V	180°	Time:	3	Minutes	1	s
V1' =	0.01	V	270°	Time:	2	Minutes	50	s
V1' =	0.01	V	360°	Time:	3	Minutes	12	s
V2' =	0.2	V	0°	Time:		Minutes		s
V2' =	0.05	V	90°	Time:	3	Minutes	30	s
V2' =	0.07	V	180°	Time:	3	Minutes	9	s
V2' =	0.01	V	270°	Time:	3	Minutes	2	s
V2' =	0.06	V	360°	Time:	3	Minutes	21	s
Vb =	151.6	V	0°	Time:		Minutes		s
Vb =	151.6	V	90°	Time:	2	Minutes	51	s
Vb =	151.6	V	180°	Time:	2	Minutes	37	s
Vb =	151.6	V	270°	Time:	2	Minutes	20	s
Vb =	151.7	V	360°	Time:	2	Minutes	40	s

DATA SHEET 5 (CONTINUED)
STATIC ROLLOVER TEST DATA

Test Vehicle: 2012 Honda Civic IMA Hybrid 4-Dr Sedan

NHTSA No. CC5303

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 =	28214122	Ω	0°	Time:		Minutes		s
Ri1 =	14066671	Ω	90°	Time:	3	Minutes	20	s
Ri1 =	69095697	Ω	180°	Time:	3	Minutes	1	s
Ri1 =	289695000	Ω	270°	Time:	2	Minutes	50	s
Ri1 =	299000425	Ω	360°	Time:	3	Minutes	12	s
$R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$								
Ri2 =	14023146	Ω	0°	Time:		Minutes		s
Ri2 =	56729577	Ω	90°	Time:	3	Minutes	30	s
Ri2 =	49358064	Ω	180°	Time:	3	Minutes	9	s
Ri2 =	289695000	Ω	270°	Time:	3	Minutes	2	s
Ri2 =	49697500	Ω	360°	Time:	3	Minutes	21	s
Ri = The lesser of Ri1 and Ri2								
Ri =	14023146	Ω	0°	Time:		Minutes		s
Ri =	14066671	Ω	90°	Time:	3	Minutes	20	s
Ri =	49358064	Ω	180°	Time:	3	Minutes	9	s
Ri =	289695000	Ω	270°	Time:	3	Minutes	2	s
Ri =	49697500	Ω	360°	Time:	3	Minutes	21	s
Ri/Vb = Electrical Isolation Value/Nominal Battery Voltage Minimum Electrical Isolation Value is 500 Ω /V								
Ri/Vb =	92562	Ω/V	0°	Time:		Minutes		s
Ri/Vb =	92849	Ω/V	90°	Time:	3	Minutes	20	s
Ri/Vb =	49358064	Ω/V	180°	Time:	3	Minutes	9	s
Ri/Vb =	289695000	Ω/V	270°	Time:	3	Minutes	2	s
Ri/Vb =	328036	Ω/V	360°	Time:	3	Minutes	21	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



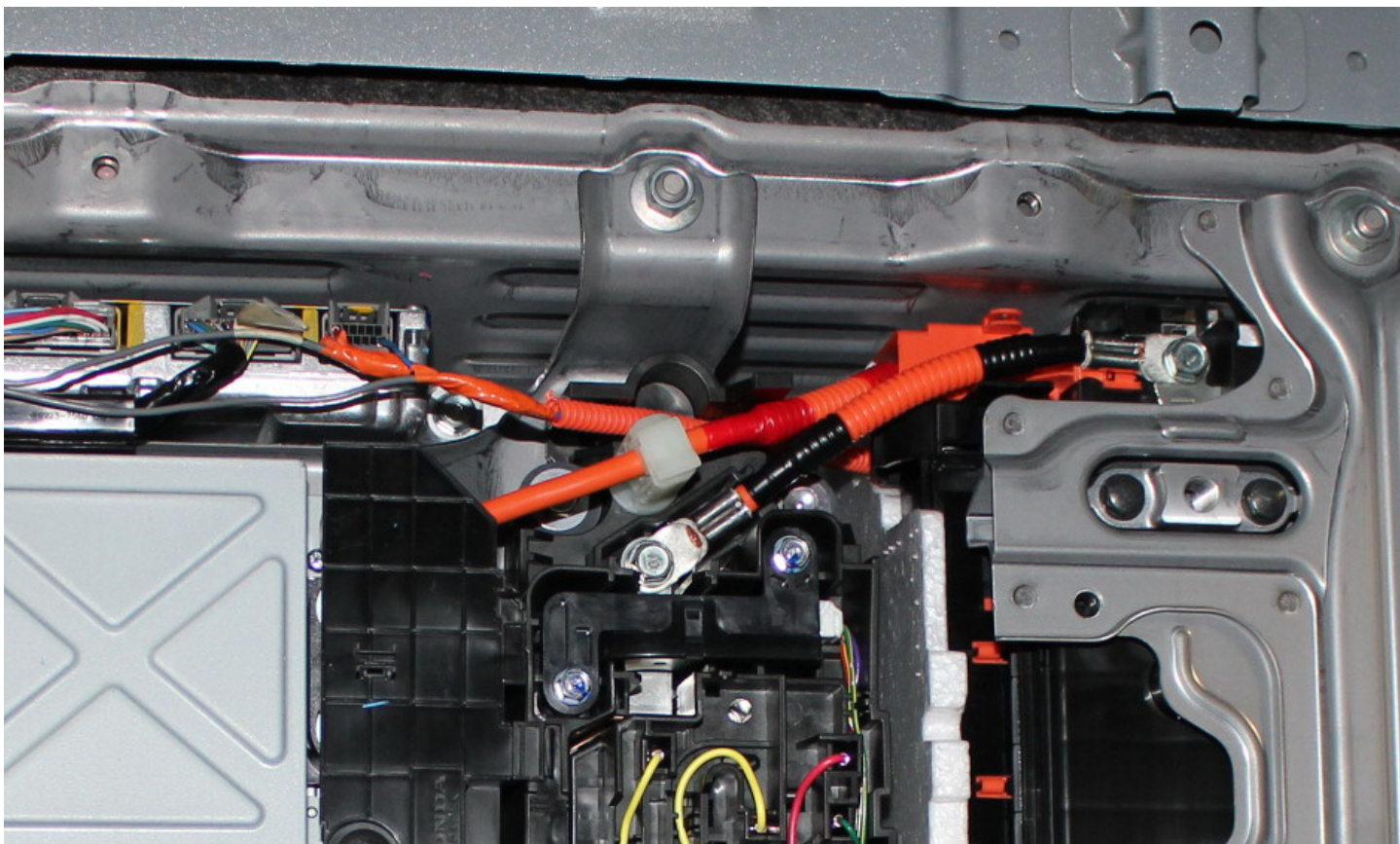
Pre-Impact View of Propulsion Battery



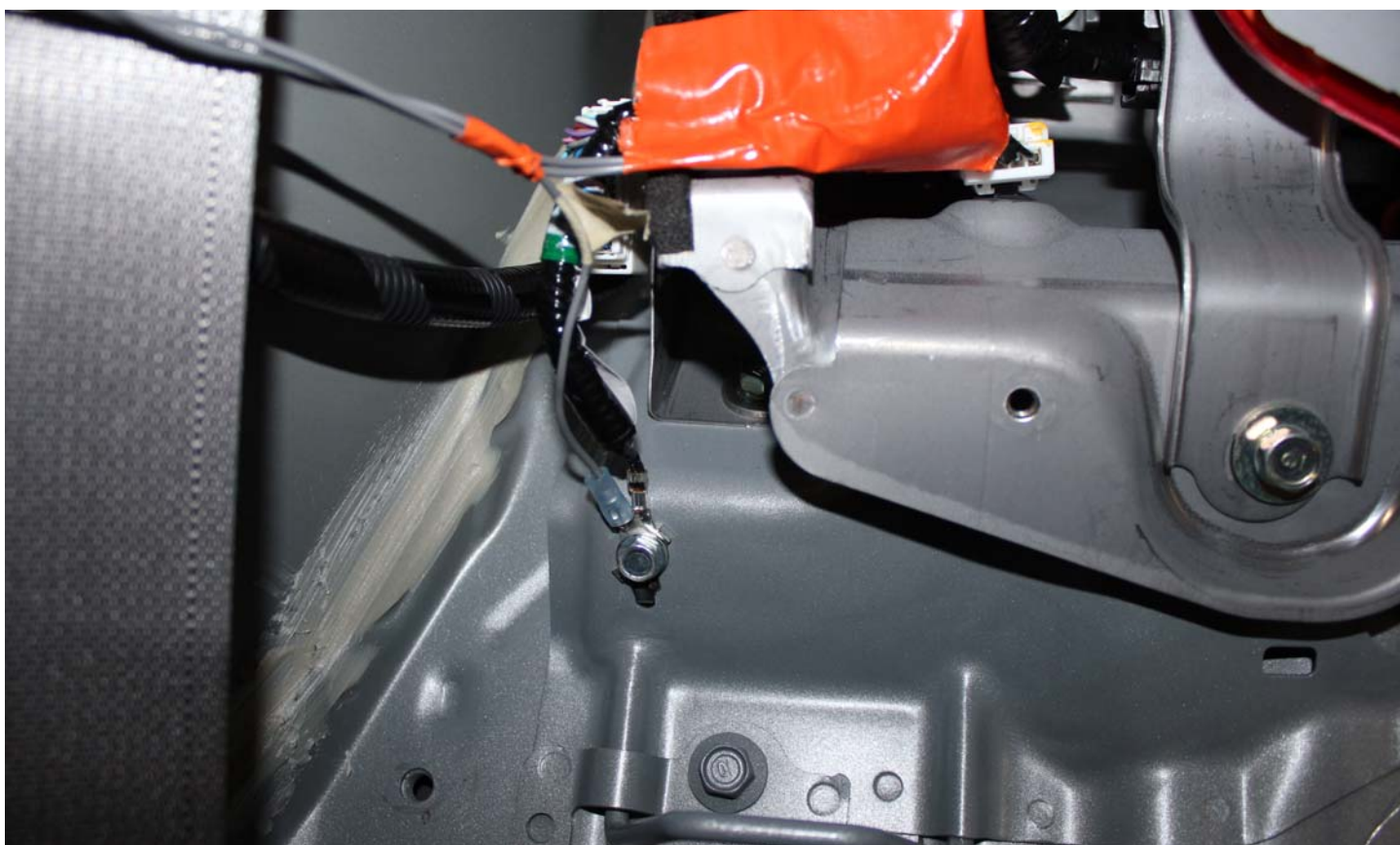
Pre-Impact View of Passenger Compartment



Post-Impact View of Passenger Compartment



Pre-Impact View of Ground Lead and High Voltage Leads Attached Close-Up



Pre-Impact View of Ground Lead and High Voltage Leads Attached



Pre-Impact View of Installed Impact Interface Port



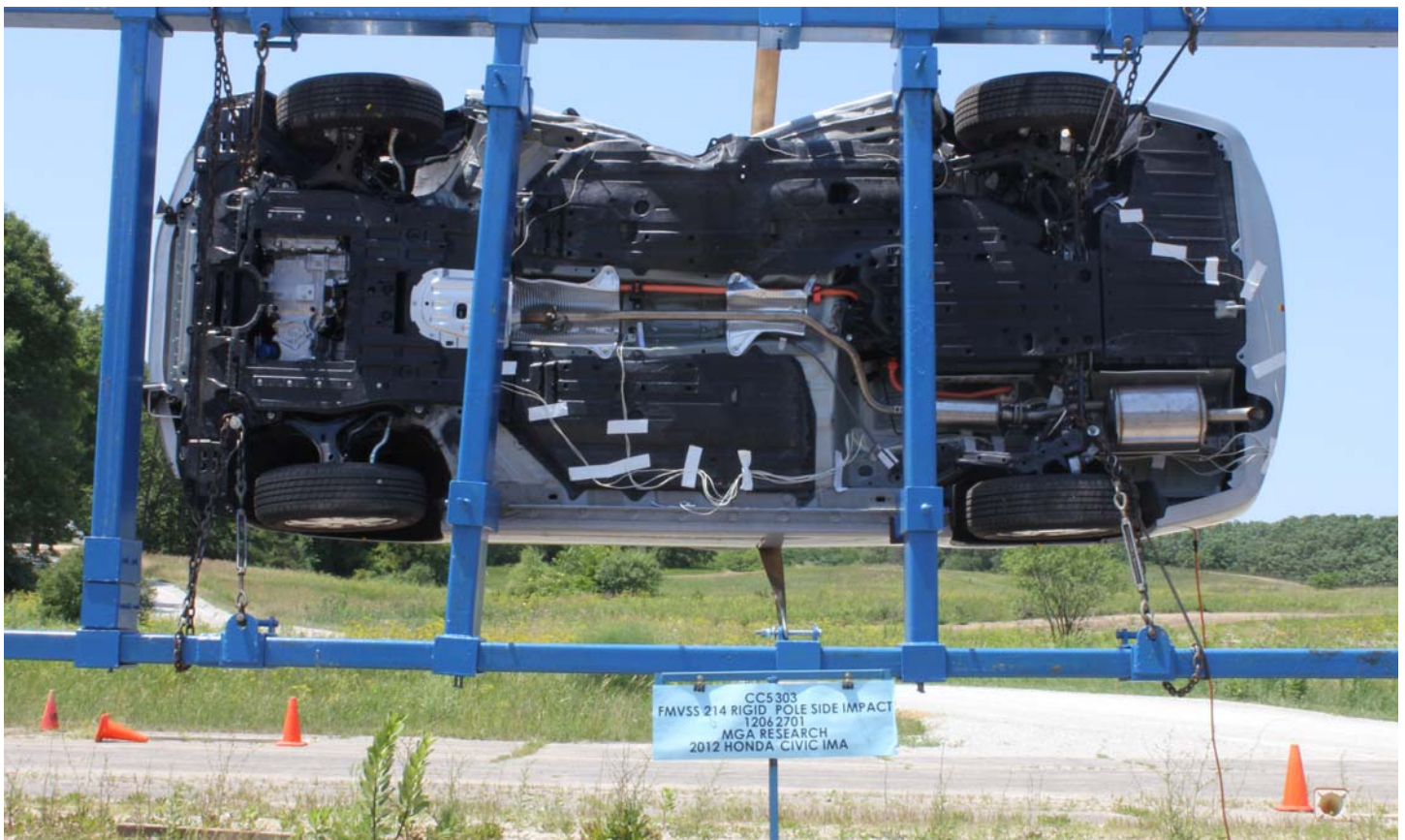
Post-Impact View of Installed Impact Interface Port



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