REPORT NUMBER: 305-CAL-10-2

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

Honda Motor Co., LTD.
Honda Insight
4-Door Sedan

NHTSA NUMBER: CA5302

CALSPAN
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

August 6, 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

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-06-C-00031. This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufactures' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: Edward Dutton

Edward Dutton, Project Engineer

Approved By:

David J. Travale, Program Manager
Transportation Research Center

Approval Date: 12/22/2010

FINAL REPORT ACCEPTANCE BY:

Accepted By: Edward E. Chan

Digitally signed by Edward E. Chan
DN: cn=Edward E. Chan, o=National Highway Traffic Safety Administration, ou=Office of Vehicle Safety Compliance, email=ed.chan@dot.gov, c=US
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16. Abstract

Compliance tests were conducted on the subject 2010 Honda Insight 4-Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-305-00 for the determination of FMVSS 305 compliance. Test failures identified were as follows:

The test vehicle appeared to comply with all requirements of FMVSS 305 "Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection."

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TABLE OF CONTENTS

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 Honda Insight 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 Honda Insight 4-Door Sedan was impacted from the rear by a 1357 kg moving barrier at a velocity of 78.6 kph (48.9 mph). The test was performed by Calspan Corporation on August 6, 2010.

The test vehicle was equipped with a 40.0 liter fuel tank which was filled to 92 percent capacity with stoddard fluid prior to impact. Additional ballast (40.0kg) 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 no fuel system fluid spillage following the impact or during any portion of the static rollover test. The average vehicle longitudinal crush was 306 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 Honda Insight 4-Door Sedan

Vehicle Body Color: _____ NHTSA Number: CA5302

Engine Data: 4 Cylinders; _____ CID; 1.3 Liters; _____ cc

Transmission: CV 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; X Stab Control X Traction Control X Anti-Theft

DEALER AND DELIVERY INFORMATION:

Date Received: 2-23-2010 ; Odometer Reading 56 km

Selling Dealer: -

Dealer Address: _____

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufacturer: Honda Motors

Vehicle Build Date: 7/09

VIN:: JHMZE2H5XAS018594

GVWR: 1650 kg; GAWR: 855 kg FRONT; 810 kg REAR

DATA FROM VEHICLE'S TIRE LABEL AND SIDEWALL:

Location of Tire Placard: Driver out sill

Type of Spare Tire: T135/80D15 99M

	Front	Rear
Maximum Tire Pressure (sidewall - kPa)	300	300
Cold Pressure (tire placard - kPa) – test pressure	230	230
Recommended Tire Size (tire placard)	175/65R15	175/65R15
Vehicle Tire Size with load index & speed symbol	15 84S	15 84S
Tire Manufacturer	Dunlop	Dunlop
Tire Name	SP37AS	SP37AS
Treadwear, Traction, Temperature	320, A, B	320, A, B

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) = 385 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 44.8 kg

ELECTRIC VEHICLE PROPULSION SYSTEM:

Electric Vehicle Type: _____ Electric; X Electric/Hybrid

Propulsion Battery Type: 14.4V x 7 Ni-MH

Nominal Voltage: 100.8 V

Location of Automatic Propulsion Battery Disconnect Switch in 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 =	377.0	353.0	51.1	730.0
Rear =	254.0	250.0	48.9	504.0
			Total Delivered Weight (UDW) =	1234.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1234	kg
Rated Cargo/Luggage Weight (RCLW) =	44.8	kg
Weight of 2 p.572E Dummies @ 78 each =	156	kg
TARGET TEST WEIGHT =	1434.8	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 40.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	419.0	410.0	54.6	829.0
Rear =	305.0	293.0	45.6	598.0
			Total Vehicle Test Weight (ATW) =	1427.0

Weight of Ballast Secured in Vehicle[1] = 40.0 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:	661	668	672	671	1246.1
AS TESTED:	642	645	650	657	1256.2

Vehicle's Wheel Base: 2550 mm

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

[2]Rearward of the front axle centerline.

VEHICLE PRE-TEST WIDTH AND IMPACT OFFSET MEASUREMENT:

Vehicle Width at Widest Point: 1703 mm Location: B-pillar

Centerline offset for impact line: 340.6 mm

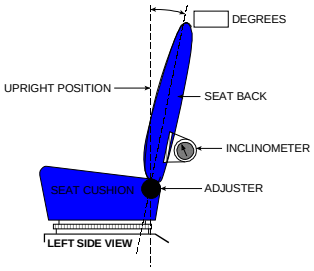
Filler neck side (left/right) left

DATA SHEET 2 (continued)

PRE-TEST DATA

Vehicle: 2010 Honda Insight 4-Door Sedan NHTSA No. CA5302

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.



FRONT SEAT ASSEMBLY

Seat back angle for driver's seat: See below

Measurement instructions: Seat back reclined 8° from full upright position. Measured on headrest post. 4 notches from full up.

Seat back angle for passenger's seat: See below

Measurement instructions: Seat back reclined 8° from full upright position. Measured on headrest post. 4 notches from full up.

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Full fore/aft travel range measured at 276 mm. Seat positioned at 138 mm. In full down position. Notch 10 from 0.

Positioning of the passenger's seat: Notches 0 to 20, set at notch 10 from 0

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 40.0 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 = 36.8 to 37.6 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 37.0 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.

Fuel pump operates with ignition in on position and vehicle engine running .

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 Honda Insight 4-Door Sedan NHTSA No. CA5302

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Anchorages 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:	1.29 (25°C)
Electrolyte Fluid Kinematic Viscosity:	1.8 centistrokes
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:	108.8
Test Voltage (≥95% of maximum)	108.8
OR	
Range of Normal Operating Voltage:	X
Test Voltage (within range)	108.8

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 7 cell 14.4V Ni-MH battery, a motor control unit (MCU); and power drive unit (PDU) which powers the IMA motor.

10. Comments:

None

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) DATA

Vehicle: 2010 Honda Insight 4-Door Sedan NHTSA No. CA5302

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore 1209043

MDB DETAILS:

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

MDB WEIGHT:

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

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

TIRE PRESSURE:

Left Front	=	207	kPa	Left Rear	=	207	kPa
Right Front	=	207	kPa	Right Rear	=	207	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 Honda Insight 4-Door Sedan NHTSA No. CA5302

VOLTMETER INFORMATION:

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

Propulsion Battery Voltage : (ready to drive position)	V_b	=	108.8	V
Propulsion Battery to Vehicle Chassis:	V_1	=	-106.0	V
Propulsion Battery to Vehicle Chassis:	V_2	=	104.0	V
Propulsion Battery to Vehicle Chassis Across Known Resistor:	R_o	=	50000	Ω
Propulsion Battery to Vehicle Chassis with R_o installed:	V_1'	=	0.02	V
Propulsion Battery to Vehicle Chassis: with R_o installed:	V_2'	=	0.02	V

ELECTRICAL ISOLATION MEASUREMENTS:

R_{i1}:	524901	Ω	$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$
R_{i2}:	524899	Ω	$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$
R_i	524899	Ω	Lesser value of R_{i1} and R_{i2}
R_i/V_b	4824440	V	Electrical Isolation Value

	Yes/No
Is the Electrical Isolation Value ≥ 500 Ω/V?	Yes

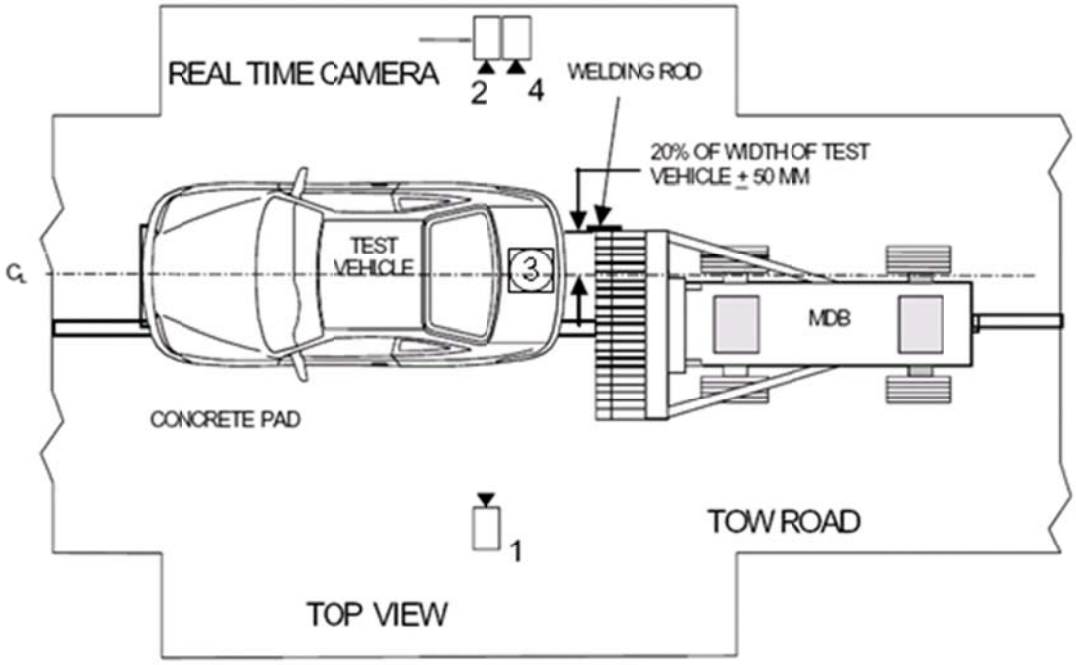
If NO - Failure

Comments:

DATA SHEET 5

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2010 Honda Insight 4-Door Sedan NHTSA No. CA5302



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left Side View	6980	1240	925	-1.5	24	1000
2	Real-Time Camera	-	-	-	-	-	30
3	Overhead View	0	405	4900	-90	20	1000
4	Right Side View	7160	1290	920	-2	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 Honda Insight 4-Door Sedan NHTSA No. CA5302

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

ACTUAL IMPACT VELOCITY WITHIN 1.5 M OF IMPACT PLANE:

Trap No. 1 = 78.6 km/h Trap No. 2 = 78.6 km/h

Average Impact Speed = 78.6 km/h

WELDING ROD IMPACT POINT:

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

0 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 Honda Insight 4-Door Sedan NHTSA No. CA5302

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	4238	4378	4240
Post-Test	3802	3897	3948
Crush	436	481	292

Vehicle Wheel Base:

	Left Side	Right Side
Pre-Test	2550	2548
Post-Test	2507	2550
Crush	43	-2

DATA SHEET 7

POST-IMPACT ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Vehicle: 2010 Honda Insight 4-Door Sedan NHTSA No. CA5302

VOLTMETER INFORMATION:

Make: Fluke Model: 87 S/N: 400492

Internal Impedance Value 0.12 MΩ

Normal Propulsion Battery Voltage (V_b): 108.8 V

ELECTICAL ISOLATION MEASUREMENTS

V_1 =	102.0	V Impact		Time:	2	minutes	0	seconds
V_2 =	102.0	V Impact		Time:	2	minutes	0	seconds
V_1' =	0.2	V Impact		Time:	2	minutes	0	seconds
V_2' =	0.1	V Impact		Time:	2	minutes	0	seconds
R_{i1} =	50900	Ω Impact	$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	Time:	2	minutes	0	seconds
R_{i2} =	101900	Ω Impact	$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	Time:	2	minutes	0	seconds
R_i =	50900	Ω Impact	Lesser value of R_{i1} and R_{i2}	Time:	2	minutes	0	seconds
R_i/V_b=	467831	Ω Impact		Time:	2	minutes	0	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

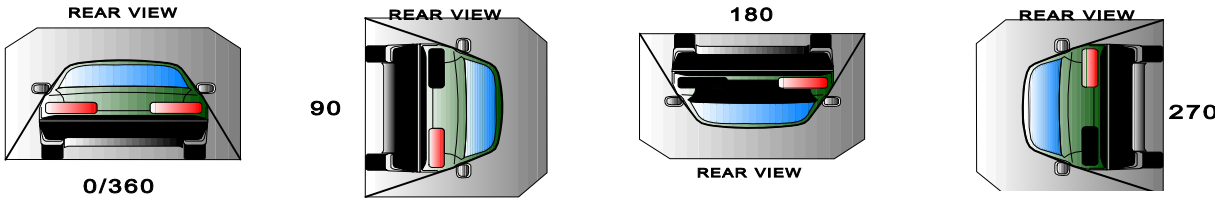
Has an outside Propulsion Battery Component intruded into the occupant compartment? ____ Yes(Fail) X No

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

DATA SHEET 8

FMVSS 301 ROLLOVER DATA

Vehicle: 2010 Honda Insight 4-Door Sedan NHTSA No. CA5302



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	
0º - 90º	1	minutes	9	seconds	5	minutes	6	minutes	9	seconds	7	minutes
90º - 180º	1	minutes	3	seconds	5	minutes	6	minutes	3	seconds	7	minutes
180º-270º	1	minutes	2	seconds	5	minutes	6	minutes	2	seconds	7	minutes
270º-360º	1	minutes	9	seconds	5	minutes	6	minutes	9	seconds	7	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)
0º - 90º	0	0	0	N/A
90º - 180º	0	0	0	N/A
180º-270º	0	0	0	N/A
270º-360º	0	0	0	N/A

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

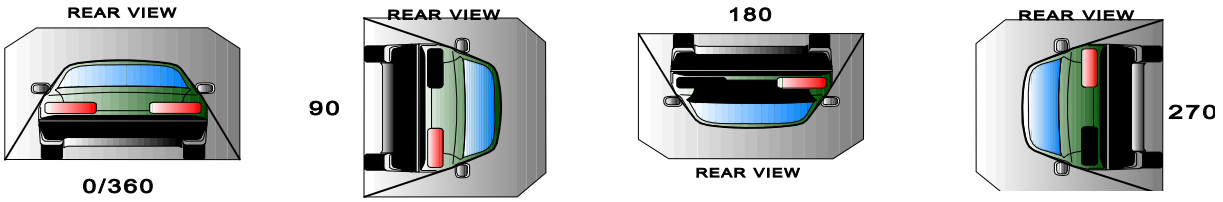
IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0º - 90º	None
90º - 180º	None
180º-270º	None
270º-360º	None

DATA SHEET 9

FMVSS 305 ROLLOVER DATA

Vehicle: 2010 Honda Insight 4-Door Sedan NHTSA No. CA5302



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	
0º - 90º	1	minutes	9	seconds	5	minutes	6	minutes	9	seconds	7	minutes
90º - 180º	1	minutes	3	seconds	5	minutes	6	minutes	3	seconds	7	minutes
180º-270º	1	minutes	2	seconds	5	minutes	6	minutes	2	seconds	7	minutes
270º-360º	1	minutes	9	seconds	5	minutes	6	minutes	9	seconds	7	minutes

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
180-270º	0	None
270-360º	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 Honda Insight 4-Door Sedan NHTSA No. CA5302

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): 108.8 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 =	104.0	90°	346567	346567	346567	3185355	1	09
V_2 =	104.0							
V_1' =	0.03							
V_2' =	0.03							
V_1 =	103.0	180°	344900	344900	344900	3170032	1	03
V_2 =	104.0							
V_1' =	0.03							
V_2' =	0.03							
V_1 =	103.0	270°	344900	344900	344900	3170032	1	02
V_2 =	104.0							
V_1' =	0.03							
V_2' =	0.03							
V_1 =	103.0	360°	344900	344900	344900	3170032	1	09
V_2 =	104.0							
V_1' =	0.03							
V_2' =	0.03							

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

COMMENTS:

none

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (Continued)

Figure A-1: Vehicle Certification Placard

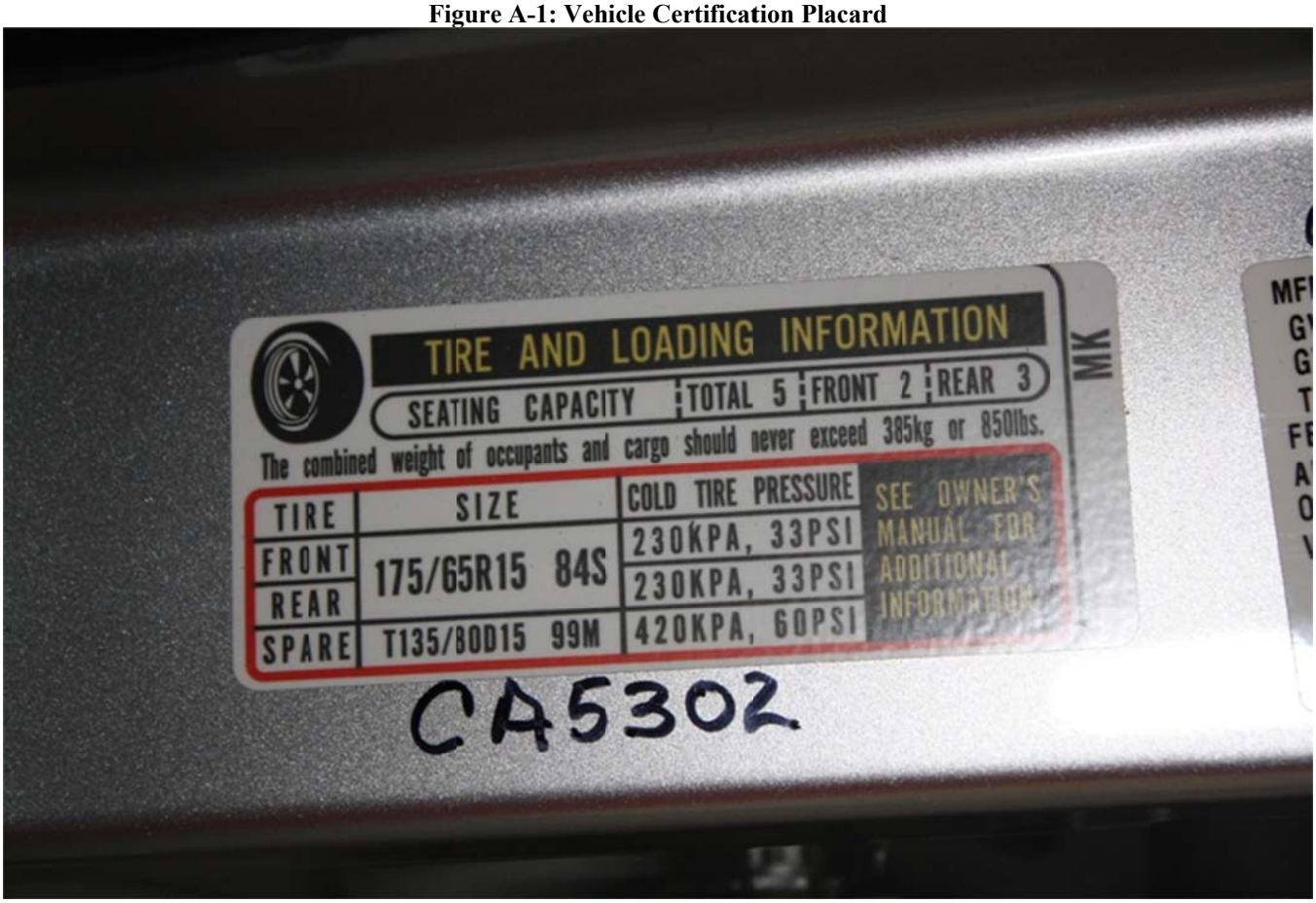


Figure A-2: Vehicle Tire Placard

Photo not available.

Figure A-3: Vehicle Electric Propulsion System Label

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

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

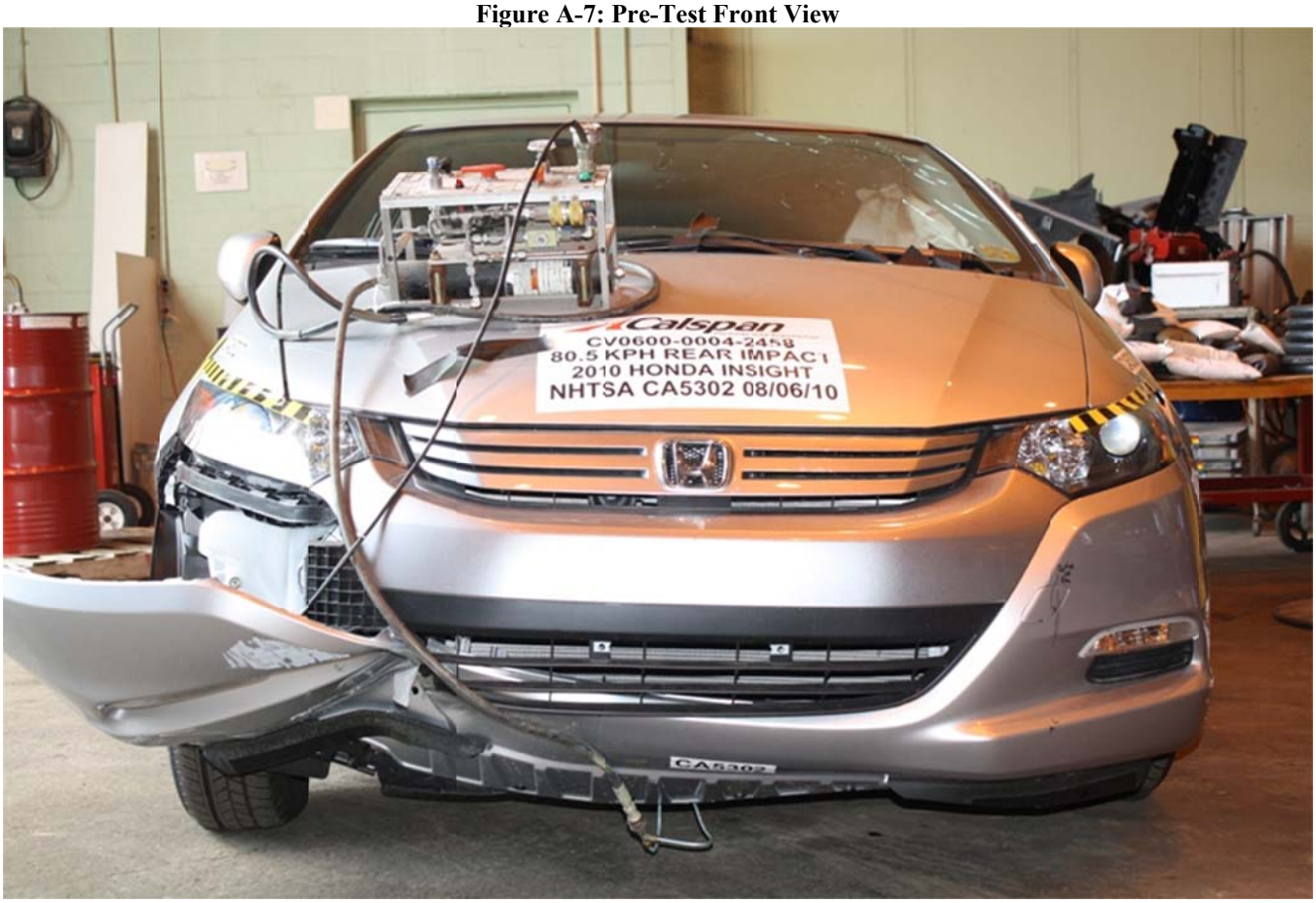


Figure A-8: Post-Test Front View

Figure A-9: Pre-Test Left Side View

Figure A-10: Post-Test Left Side View

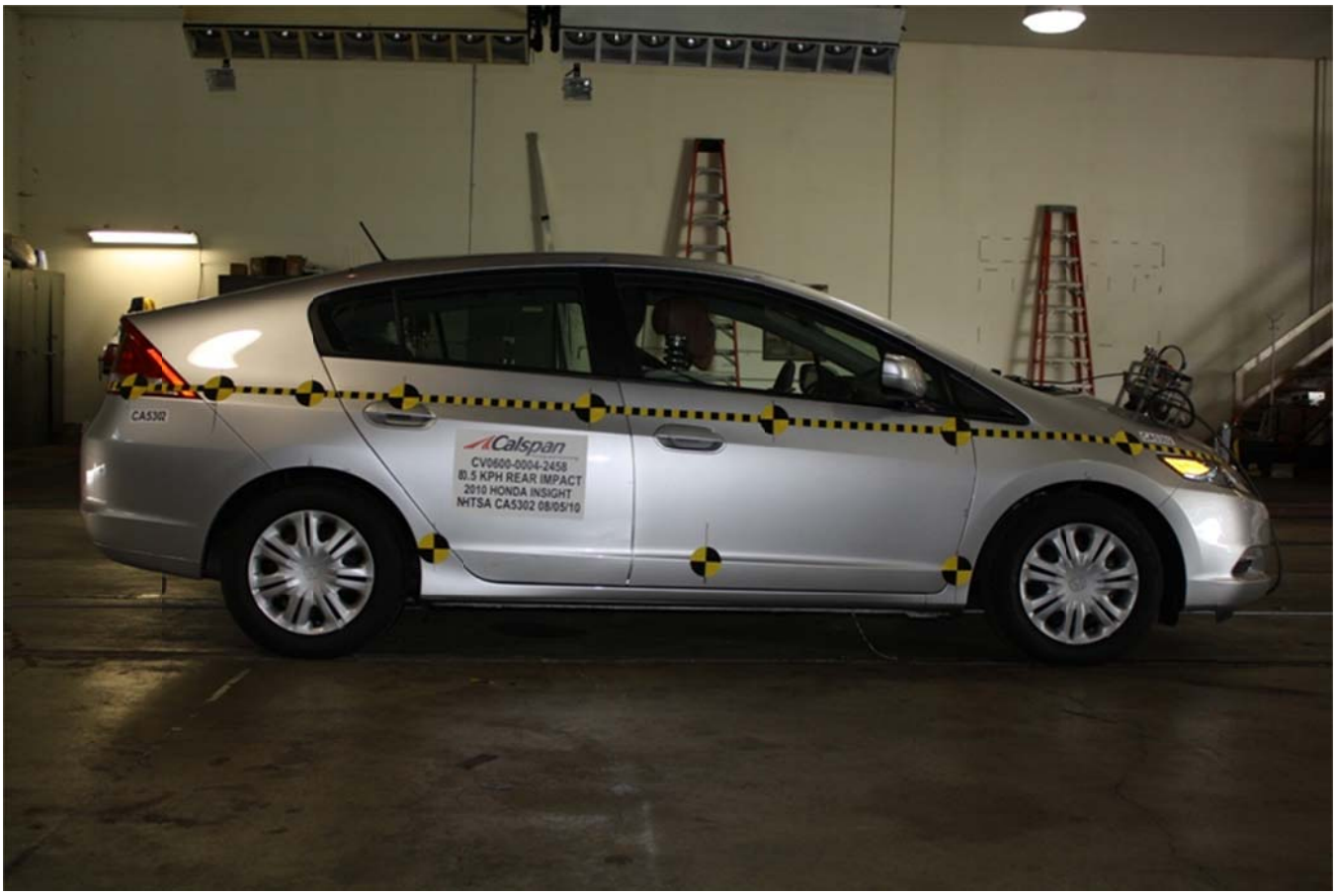


Figure A-11: Pre-Test Right Side View

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

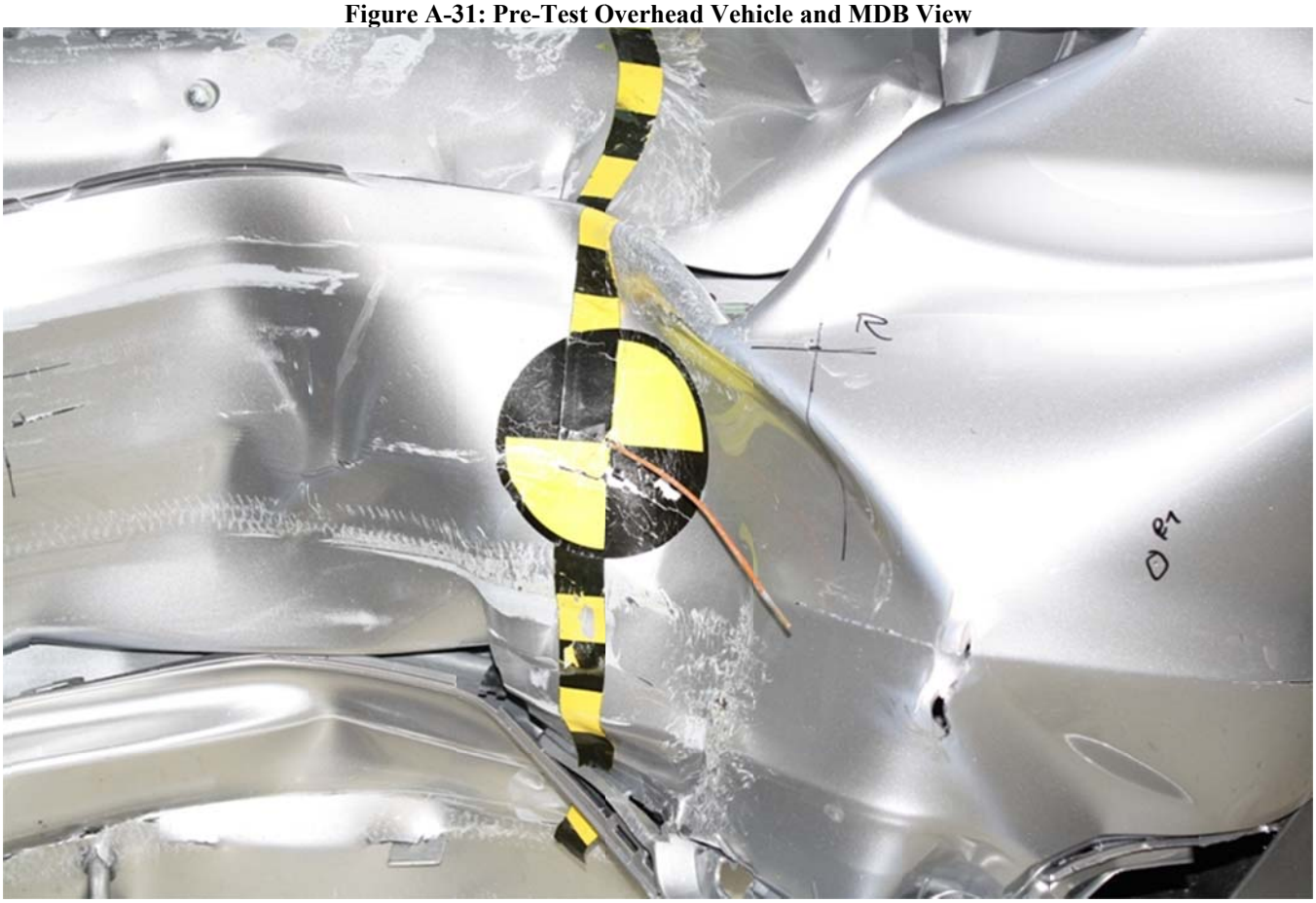


Figure A-32: Post-Test Impact Target View

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

Rear deck lid could not be opened after impact, photo not available.

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

Figure A-35: Pre-Test Propulsion Battery View

Rear deck lid could not be opened after impact, photo not available.

Figure A-36: Post-Test Propulsion Battery View

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

Rear deck lid could not be opened after impact, photo not available.

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

Figure A-39: Pre-Test Battery Compartment View

Rear deck lid could not be opened after impact, photo not available.

Figure A-40: Post-Test Battery Compartment View

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

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

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

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 occurred.

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

Figure A-50: Pre-Test Front Underbody View

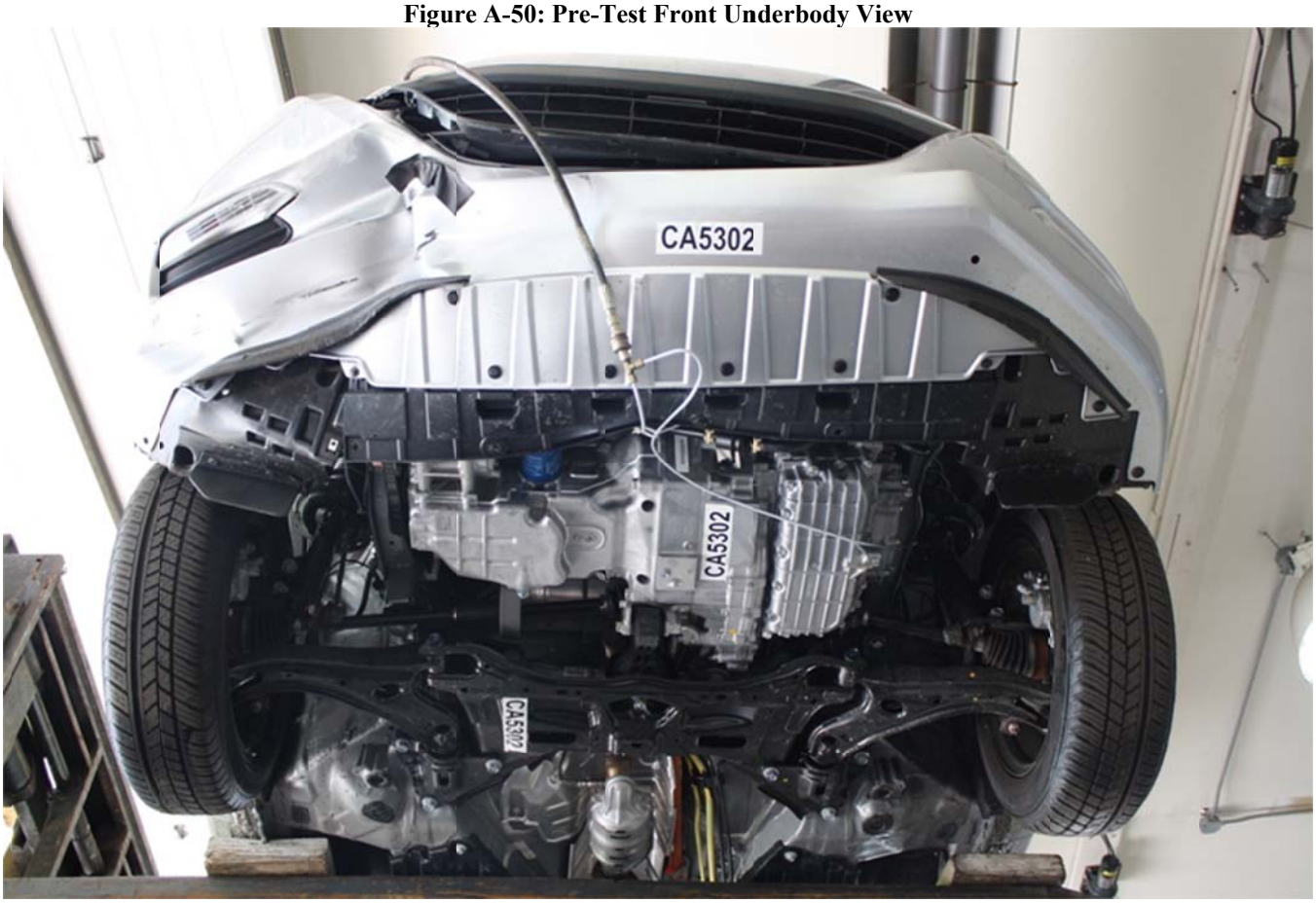


Figure A-51: Post-Test Front Underbody View

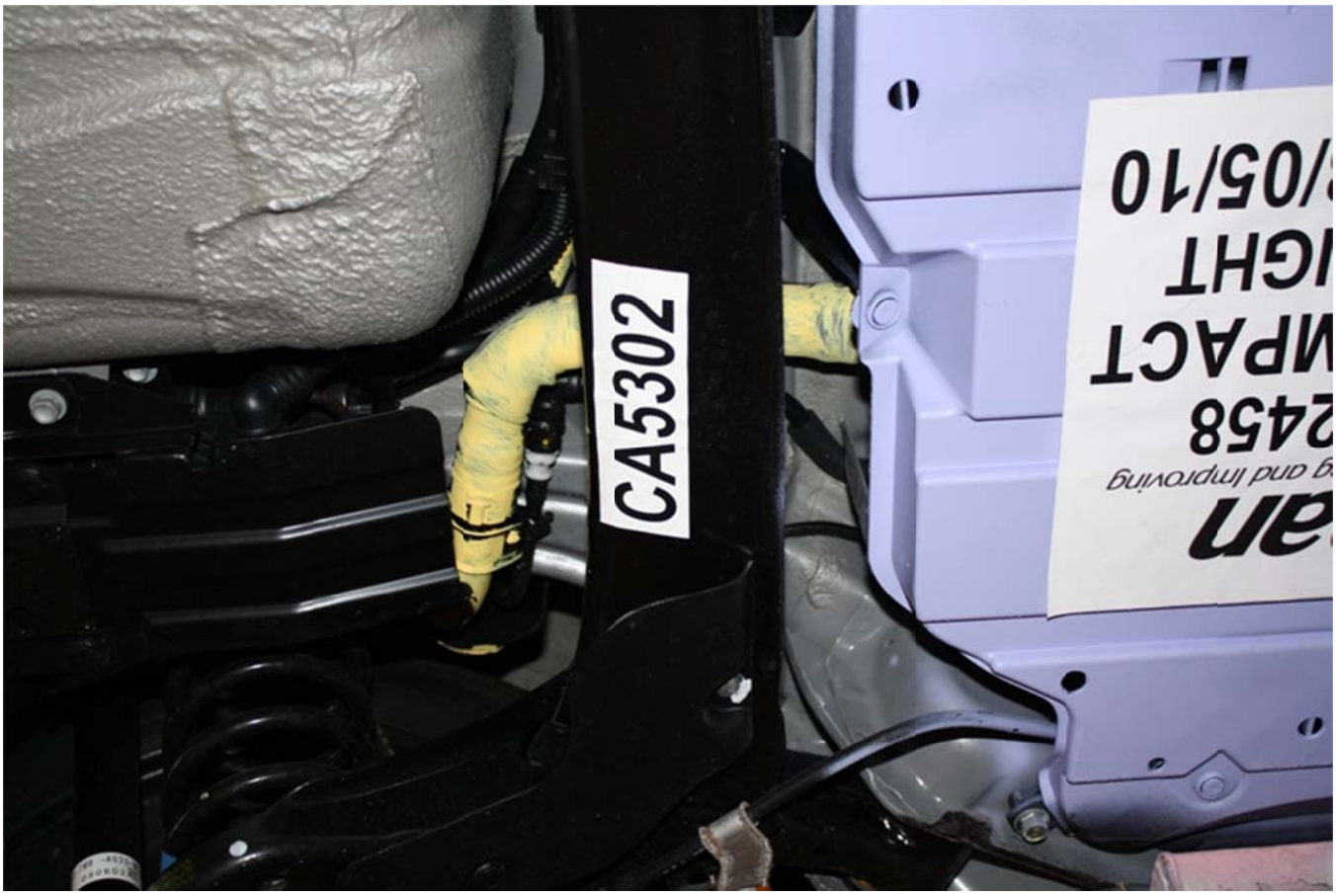


Figure A-52: Pre-Test Mid Underbody View

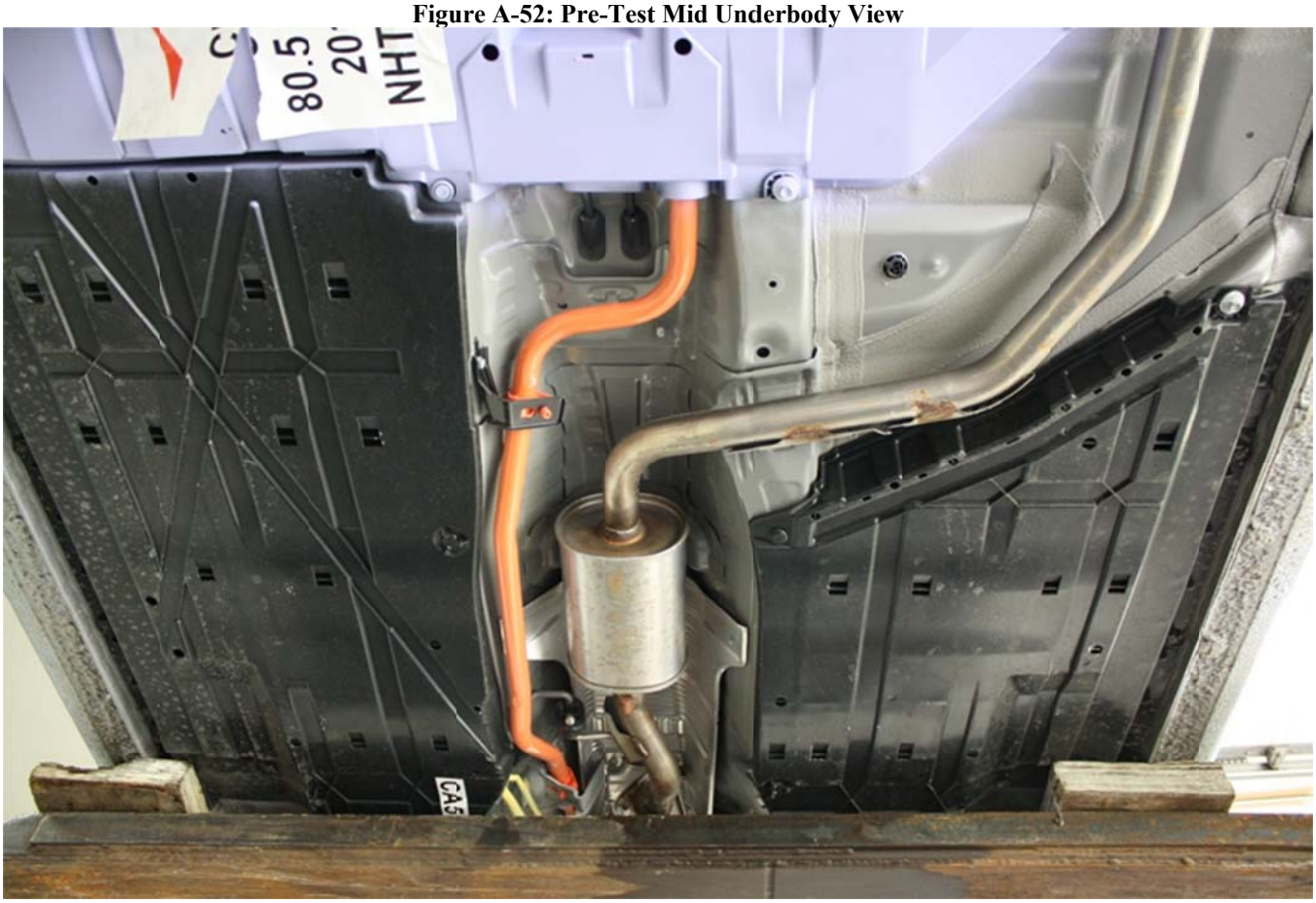


Figure A-53: Post-Test Mid Underbody View

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°

Figure A-60: Rollover View - 180°

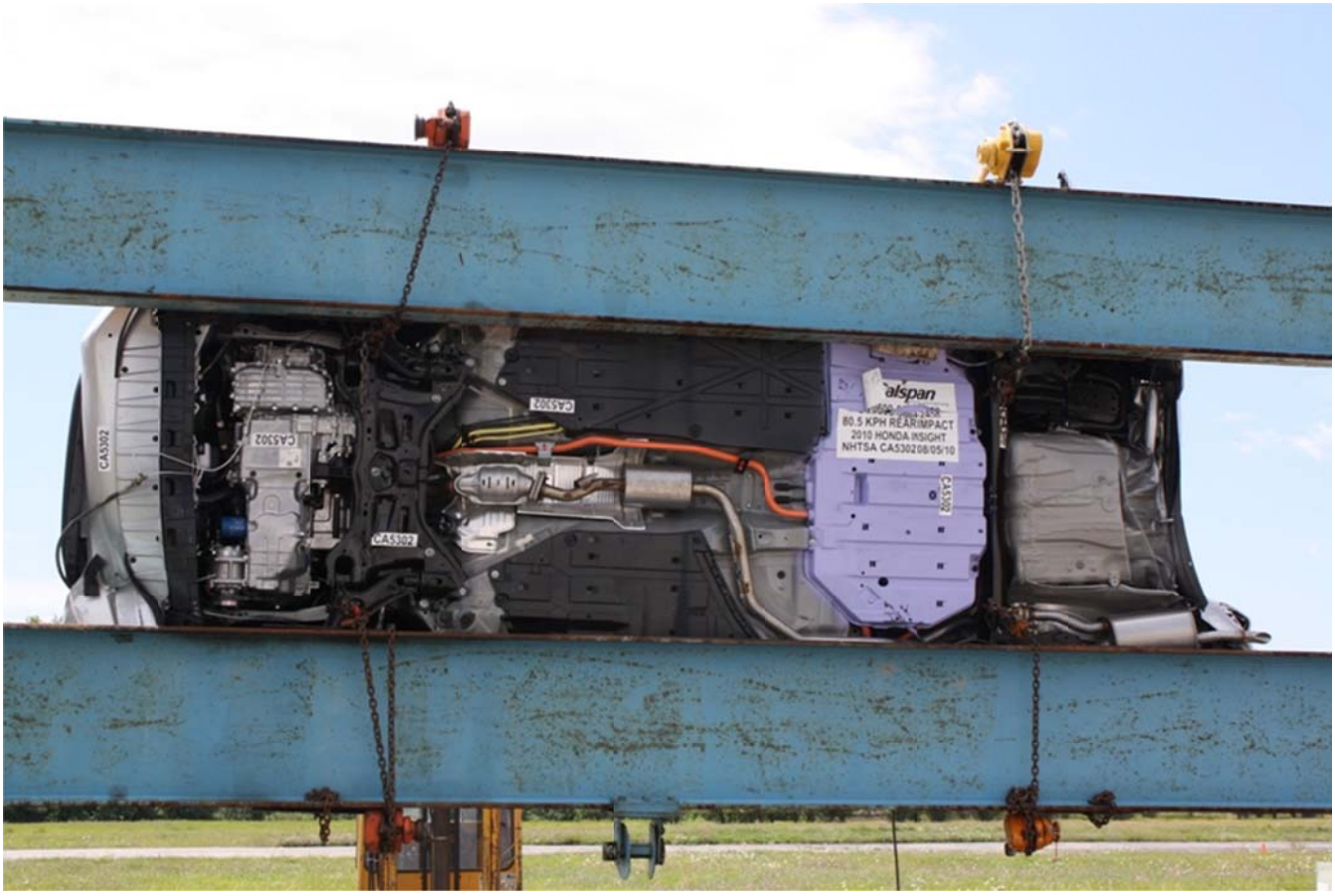


Figure A-61: Rollover View - 270°

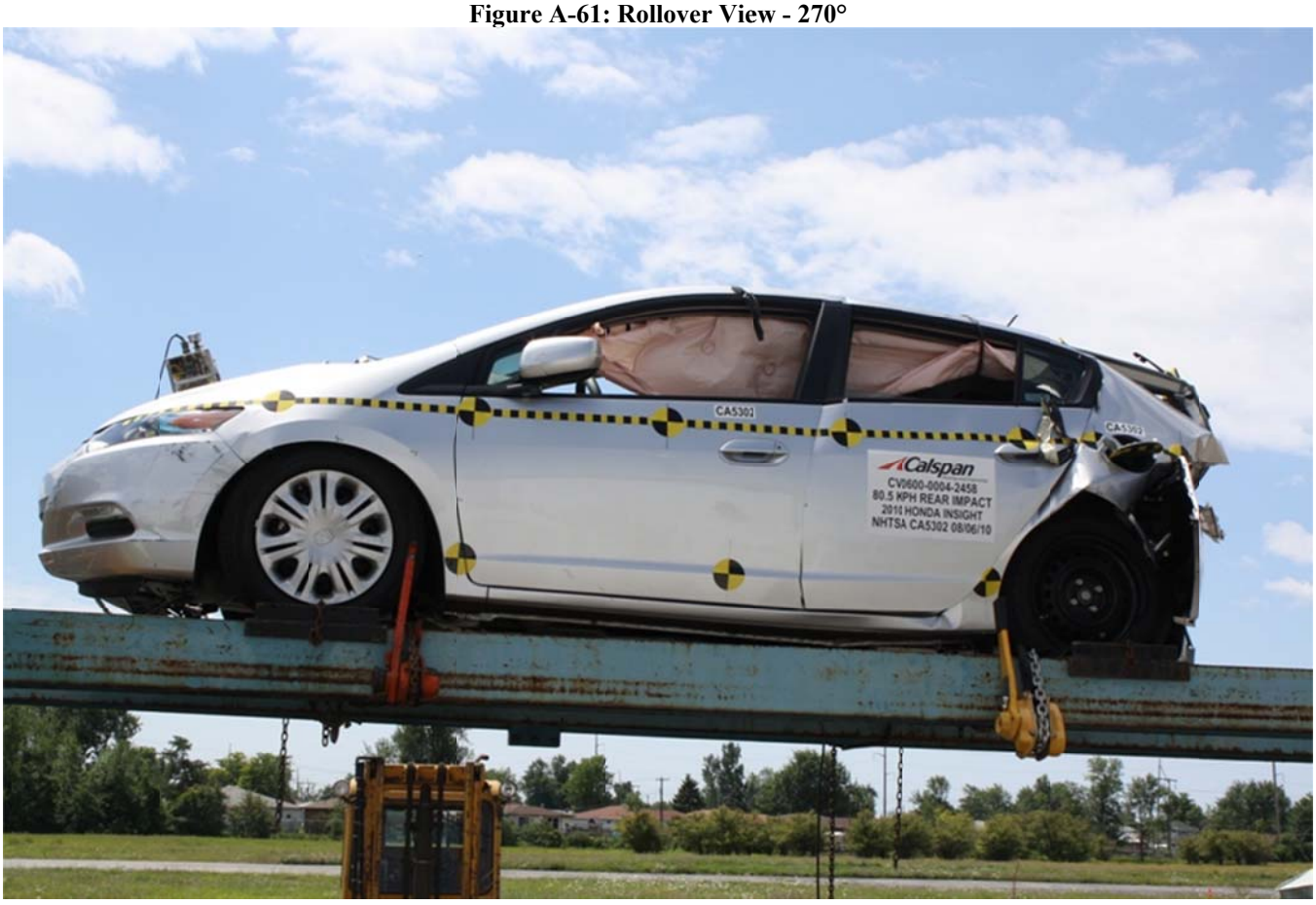


Figure A-62: Rollover View - 360°