REPORT NUMBER: 214D-CAL-24-009

SAFETY COMPLIANCE TESTING FOR FMVSS 305
SIDE IMPACT MDB TEST INDICANT

Mitsubishi Motors Corporation
2024 Mitsubishi Outlander PHEV
5 Door SUV

NHTSA No: C20245601

PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
BUFFALO, NEW YORK 14225

November 5, 2024

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE. S.E.
WEST Bldg. (NEF-240)
WASHINGTON, D.C. 20590

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Prepared by: Matthew Pronko Date: November 5, 2024
Matthew Pronko, Test Engineer

Approved by: Vanessa Hansen Date: November 5, 2024
Vanessa Hansen, Operations Manager

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15. ***Supplementary Notes***		

16. Abstract

An FMVSS No. 305 Indicant test, in conjunction with Side MDB Impact Test was conducted on the subject 2024 Mitsubishi Outlander PHEV 5 Door SUV in accordance with the specifications of the applicable Office of Vehicle Safety Compliance Test Procedures for the generation of consumer information. No test failures were reported.

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TABLE OF CONTENTS

SECTION 1

TEST PURPOSE AND PROCEDURE

An FMVSS No. 305 Indicant test, in conjunction with a FMVSS 214 Side MDB test was conducted on the subject 2024 Mitsubishi Outlander PHEV 5 Door SUV.

The Indicant test was conducted in accordance with the Office of Vehicle Safety Compliance Standards Laboratory Test Procedure, dated June 27, 2023 to determine compliance to the requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 305, “Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection” (TP-305-2) for the purpose of providing consumer information.

SECTION 2

SUMMARY OF TEST RESULTS

A moving deformable barrier side impact test was conducted on a 2024 Mitsubishi Outlander PHEV 5 Door SUV. The subject vehicle was impacted on the left side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 53.06 kph (32.97 mph). Electrical isolation measurements were taken immediately post-impact and observations were made related to electrolyte spillage and battery retention. A static rollover was subsequently performed on the subject vehicle and electrical isolation measurements were taken at each stage of the rollover.

Based on the test results, the 2024 Mitsubishi Outlander PHEV 5 Door SUV appears to meet the requirements for electrolyte spillage, electrical isolation, and battery retention during FMVSS No.305 Indicant testing.

Data sheets, along with pre-test and post-test photographs of the test vehicle are included in this report to document the test.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 - General Test and Vehicle Parameter Data

Data Sheet No. 2 – Pre-Impact Electric Isolation Measurements and Calculations

Data Sheet No. 3 – Post-Impact Electric Isolation Measurements and Calculations

Data Sheet No. 4 – FMVSS No. 305 Static Rollover Results for Electric Vehicles

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV
Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305
NHTSA No.: C20245601
Test Date: 10/15/2024

TEST VEHICLE INFORMATION AND OPTIONS

Make	Mitsubishi
Model	Outlander PHEV
Body Style	SUV
VIN	JA4T5UA98RZ066706
Body Color	Black
Engine Displacement (L)	2.4
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	1-Speed
Overdrive	Yes
Final Drive	All Wheel Drive
Odometer Reading (km/mi)	9 mi

Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	Yes
Traction Control System (TCS)	Yes
Electric Stability Control (ECS)	Yes
Side Curtain Airbags	Yes
Torso Airbags – Front Seats	Yes
Torso Airbags – Rear Seats	Yes
Combination/Head Torso Bag	No
Pelvic Airbag – Front Seats	No
Pelvis Airbag – Rear Seats	No
Knee Airbag – Driver	Yes
Knee Airbag – Front Passenger	Yes
Seat Belt Pretensioners – Front Seats	Yes
Seat Belt Pretensioners – Rear Seats	Yes
Seat Belt Load Limiter – Front Seats	Yes
Seat Belt Load Limiter – Rear Seats	Yes
Tire Pressure Monitoring System (TPMS)	Yes
Tilt Steering Wheel	Yes
Automatic Door Locks (ADL)	Yes
Power Window Auto-reverse	Yes
Power Seats	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Mitsubishi Motors Corporation
Date of Manufacture	April 2024
Vehicle Type	MPV

GVWR (kg)	2750
GAWR Front (kg)	1385
GAWR Rear (kg)	1495

VEHICLE SEATING AND CAPACITY WEIGHT DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats (Bench or Bucket)	Bucket	Split Bench	Bench	
Designated Seating Capacity (DSC)	2	3	2	7
Capacity Weight (VCW) (kg)				525

DATA SHEET NO. 1 (Continued)
ELECTRIC VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV NHTSA No.: C20245601
Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305 Test Date: 10/15/2024

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Gas-Electric Hybrid
Propulsion Battery Type	Lithium Ion
Nominal Voltage (Volts)	350
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Rear Floor Pan
Auxiliary Battery Type	12V Lead Acid

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	Lithium hexafluorophosphate & Solvents
Electrolyte Fluid Specific Gravity	1.206 @ 25°C
Electrolyte Fluid Kinematic Viscosity (centistokes)	4.5 mPa s @ 25°C
Electrolyte Fluid Color	Colorless
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	HFO-1234yf, Clear
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	Not Provided
Maximum State of Charge	V	403
95% of Maximum	V	382.85
Test Voltage *	V	400.3
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery :		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

* *For all battery types-No less than 95% of Maximum Operating Voltage; for batteries that are rechargeable ONLY by an energy source on the vehicle-maximum practicable state of charge within normal operating range*.

VEHICLE CHASSIS GROUND PT(S) LOCATION(S) & PROPULSION BATTERY SYSTEM

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Ground point located on vehicle chassis under hood.
Details of Propulsion Battery Components	Located on the underside of vehicle.

DATA SHEET NO. 2
PRE-IMPACT ISOLATION MEASUREMENTS AND CALCULATIONS

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV NHTSA No.: C20245601
Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305 Test Date: 10/15/2024

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		49210189
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		04/06/2024

NOTES:

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

PROPULSION BATTERY VOLTAGE, RESISTANCE & ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	403
Propulsion Battery Voltage : (ready to drive position)	V_b	V	400.3
Propulsion Battery to Vehicle Chassis	V_1	V	273.0
Propulsion Battery to Vehicle Chassis	V_2	V	372.0
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	200,300
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	81.0
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	80.0
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	1,121,745
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	1,267,624
Lesser value of R_{i1} and R_{i2}	R_i	Ω	1,121,745
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	2,802

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

NOTES:

- *The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.*
- *If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.*
- *The known resistance Ro (in Ohms) should be approximately 500 times the nominal operating voltage of the vehicle (in volts) per SAE J1766*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*

COMMENTS: None

DATA SHEET NO. 3
POST-IMPACT ISOLATION MEASUREMENTS AND CALCULATIONS

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV NHTSA No.: C20245601
Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305 Test Date: 10/15/2024

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		49210189
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		04/06/2024

NOTES:

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

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V_b =	3.3	V	Impact Time:	1	Minutes	25	Seconds
V_1 =	1.1	V	Impact Time:	1	Minutes	32	Seconds
V_2 =	1.9	V	Impact Time:	1	Minutes	36	Seconds
R_o =	200,300	Ω	Impact Time:		Minutes		Seconds
V_1' =	0.4	V	Impact Time:	1	Minutes	43	Seconds
V_2' =	0.4	V	Impact Time:	1	Minutes	47	Seconds
R_{i1} =	955,977	Ω	Impact Time:	1	Minutes	43	Seconds
R_{i2} =	1,185,987	Ω	Impact Time:	1	Minutes	47	Seconds
R_i =	955,977	Ω	Impact Time:	1	Minutes	43	Seconds
R_i/V_b =	289,690	Ω/V	Impact Time:	1	Minutes	43	Seconds

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

NOTES:

- *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'], R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical Isolation Value is 500 Ω/V*

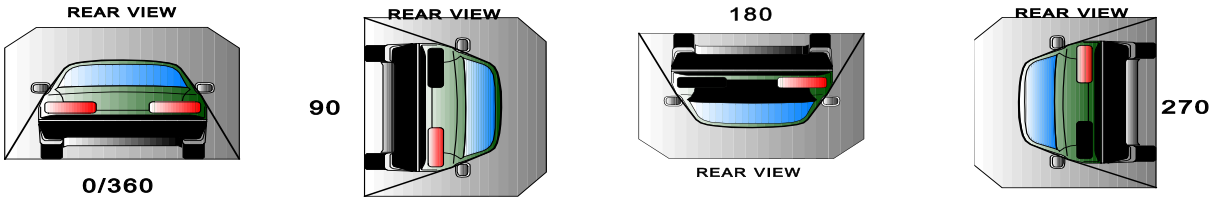
. **PROPULSION BATTERY SYSTEM COMPONENTS**

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	None	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	None	X	
Is propulsion battery electrolyte spillage visible in the passenger compartment?	None	X	

DATA SHEET NO. 4
FMVSS NO. 305 STATIC ROLLOVER RESULTS FOR ELECTRIC POWERED VEHICLES

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV NHTSA No.: C20245601

Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305 Test Date: 10/15/2024



Rear View

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
	Minutes	Seconds	Minutes	Minutes	Seconds	Minutes
0° to 90°	1	11	5	6	11	7
90° to 180°	1	4	5	6	4	7
180° to 270°	1	4	5	6	4	7
270° to 360°	1	7	5	6	7	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0.0	Liters	None
90° to 180°	0.0	Liters	None
180° to 270°	0.0	Liters	None
270° to 360°	0.0	Liters	None
Total Spillage	0.0	Liters	None

** FMVSS 305 Requirements: Maximum allowable propulsion battery electrolyte spillage is **5.0 Liters***

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 passenger compartment? [ ] Yes (Fail) [X] No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		49210189
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		04/06/2024

NOTES:

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

DATA SHEET NO. 4 (Continued)
FMVSS NO. 305 STATIC ROLLOVER RESULTS FOR ELECTRIC POWERED VEHICLES

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV NHTSA No.: C20245601
Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305 Test Date: 10/15/2024

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units	R_o=200,300 Ω	Minutes	Seconds
V_b =	90°	0.0	V	Time	4	2
	180°	200300	V		10	40
	270°	0.1	V		19	49
	360°	0.0	V		24	59
V_1 =	90°	0.1	V	Time:	4	11
	180°	0.0	V		11	6
	270°	0.0	V		20	6
	360°	0.0	V		25	14
V_2 =	90°	0.0	V	Time:	4	20
	180°	0.1	V		11	13
	270°	0.0	V		20	19
	360°	0.0	V		25	25
V_1' =	90°	0.0	V	Time:	4	34
	180°	0.0	V		11	21
	270°	0.0	V		20	38
	360°	0.0	V		25	41
V_2' =	90°	0.0	V	Time:	4	35
	180°	0.0	V		11	23
	270°	0.0	V		20	44
	360°	0.0	V		25	43
R_{i1} =	90°	Zero Volts	Ω	Time:	4	34
	180°	Zero Volts	Ω		11	21
	270°	Zero Volts	Ω		20	38
	360°	Zero Volts	Ω		25	41
R_{i2} =	90°	Zero Volts	Ω	Time:	4	35
	180°	Zero Volts	Ω		11	23
	270°	Zero Volts	Ω		20	44
	360°	Zero Volts	Ω		25	43
R_i =	90°	Zero Volts	Ω	Time:	4	35
	180°	Zero Volts	Ω		11	23
	270°	Zero Volts	Ω		20	44
	360°	Zero Volts	Ω		25	43
R_i/V_b =	90°	Zero Volts	Ω/V	Time:	4	35
	180°	Zero Volts	Ω/V		11	23
	270°	Zero Volts	Ω/V		20	44
	360°	Zero Volts	Ω/V		25	43

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

DATA SHEET NO. 4 (Continued)
FMVSS NO. 305 STATIC ROLLOVER RESULTS FOR ELECTRIC POWERED VEHICLES

Test Vehicle: 2024 Mitsubishi Outlander PHEV 5 Door SUV NHTSA No.: C20245601
Test Program: FMVSS 214 MDB Side Impact Test - FMVSS No. 305 Test Date: 10/15/2024

NOTES:

- *$R_{i1} = R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$, $R_{i2} = R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$, R_i = Lesser value of R_{i1} and R_{i2},*
  Ri/Vb = Electrical Isolation Value/ Nominal Battery Voltage

- *V1, V2, V1', & V2' voltage measurements were recorded at the start of each successive increment of **90º**, **180º**, **270º**, and **360º** of the static rollover test. The increment of rotation for each turn was completed within a maximum of 3 minutes.*

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

- *Minimum Electrical Isolation Value is 500 Ω/ V*

COMMENTS: None

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure 305-1: Auxiliary Power Module Warning Label

Figure 305-2: Power Inverter Warning Label

Photo Not Applicable

Figure 305-3 First Responder Warning Label

Photo Not Applicable

Figure 305-4: First Responder Warning Label Location

Photo Not Applicable

Figure 305-5: Other Vehicle Label Related to Electric Propulsion System

Figure 305-6: Manual High Voltage Service Disconnect in Place

Figure 305-7: Manual High Voltage Service Disconnect Removed (Show Plug)

Figure 305-8: Manual High Voltage Service Disconnect Removed Location

Figure 305-9: Pre-Impact View of Propulsion Battery

Figure 305-10: Post-Impact Front View of Propulsion Battery

Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)

Photo Not Applicable

Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

Figure 305-14: Pre-Impact View of Propulsion Battery Module(s)

Photo Not Applicable

Figure 305-15: Post-Impact View of Propulsion Battery Module(s)

Figure 305-16: Pre-Impact View of Electric Propulsion Drive

Figure 305-17: Post-Impact View of Electric Propulsion Drive

Figure 305-18: Pre-Impact View of High Voltage Interconnects

Photo Not Applicable

Figure 305-19: Pre-Impact View of Propulsion Battery Venting System

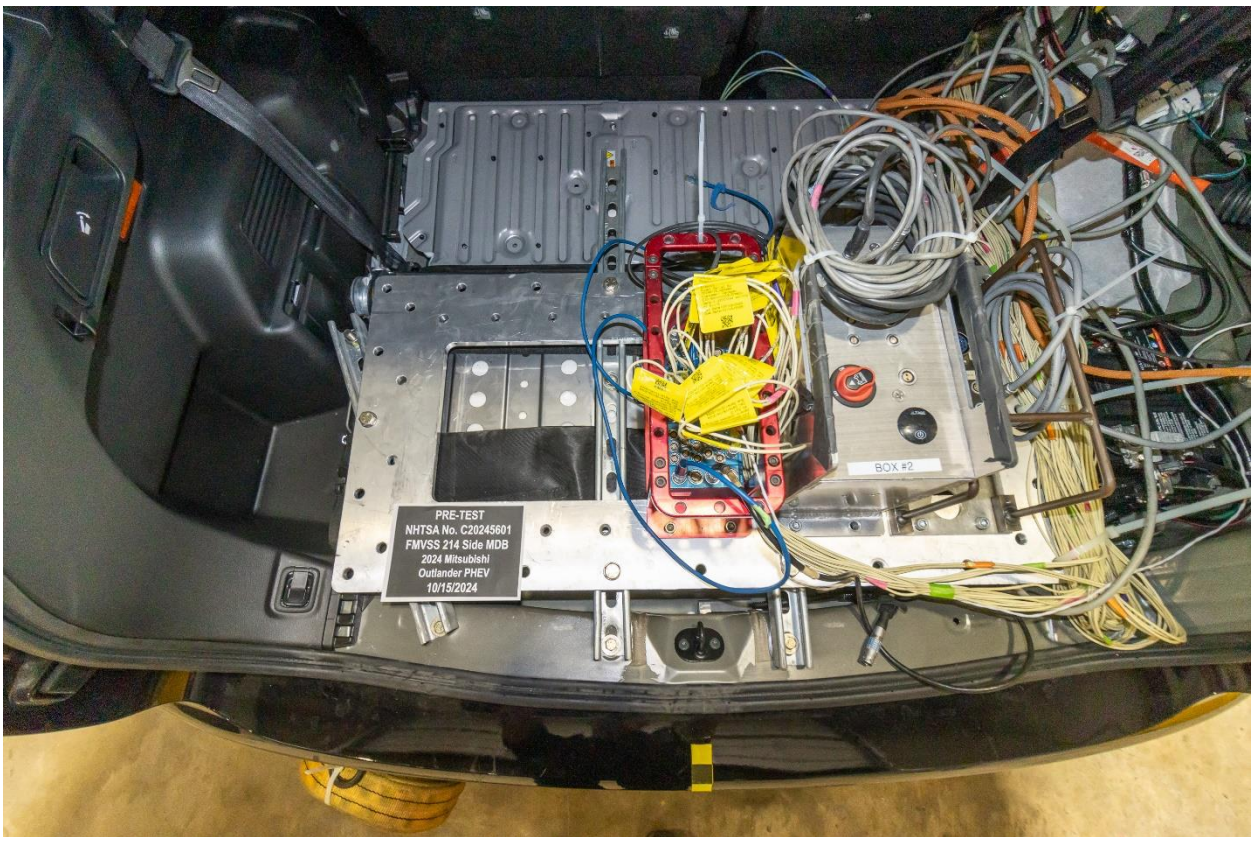


Figure 305-20: Pre-Impact View of Other Visible Electric Propulsion Components

Figure 305-21: Pre-Impact View of Ground Lead Attached

Figure 305-22: Pre-Impact View of High Voltage Leads Attached

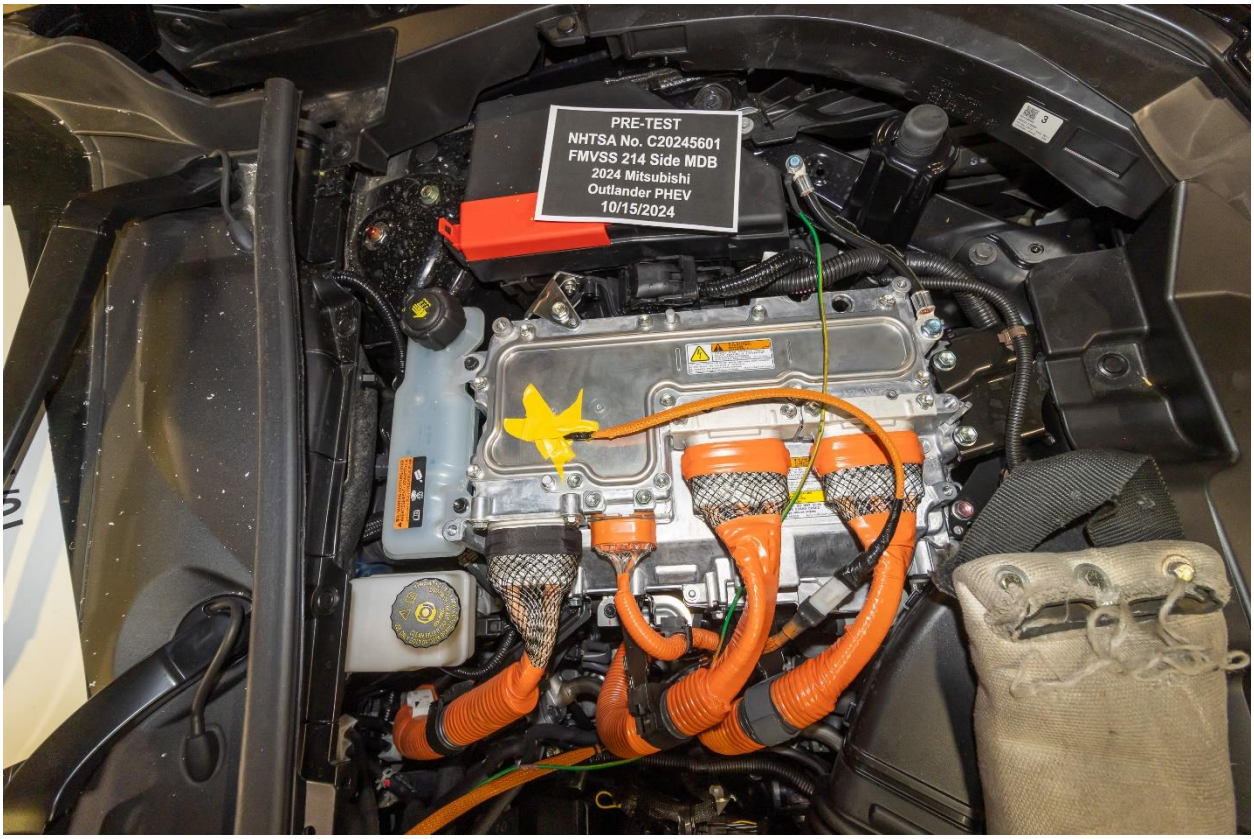


Figure 305-23: Pre-Impact Close Up View of High Voltage Leads Attached

Figure 305-24: Pre-Impact View of Installed Test Interface Port

Figure 305-25: Post-Impact View of Installed Test Interface Port

Photo Not Applicable

Figure 305-26: Pre-Impact View of Other Test Devices

Photo Not Applicable

Figure 305-27: Post-Impact View of Other Test Devices

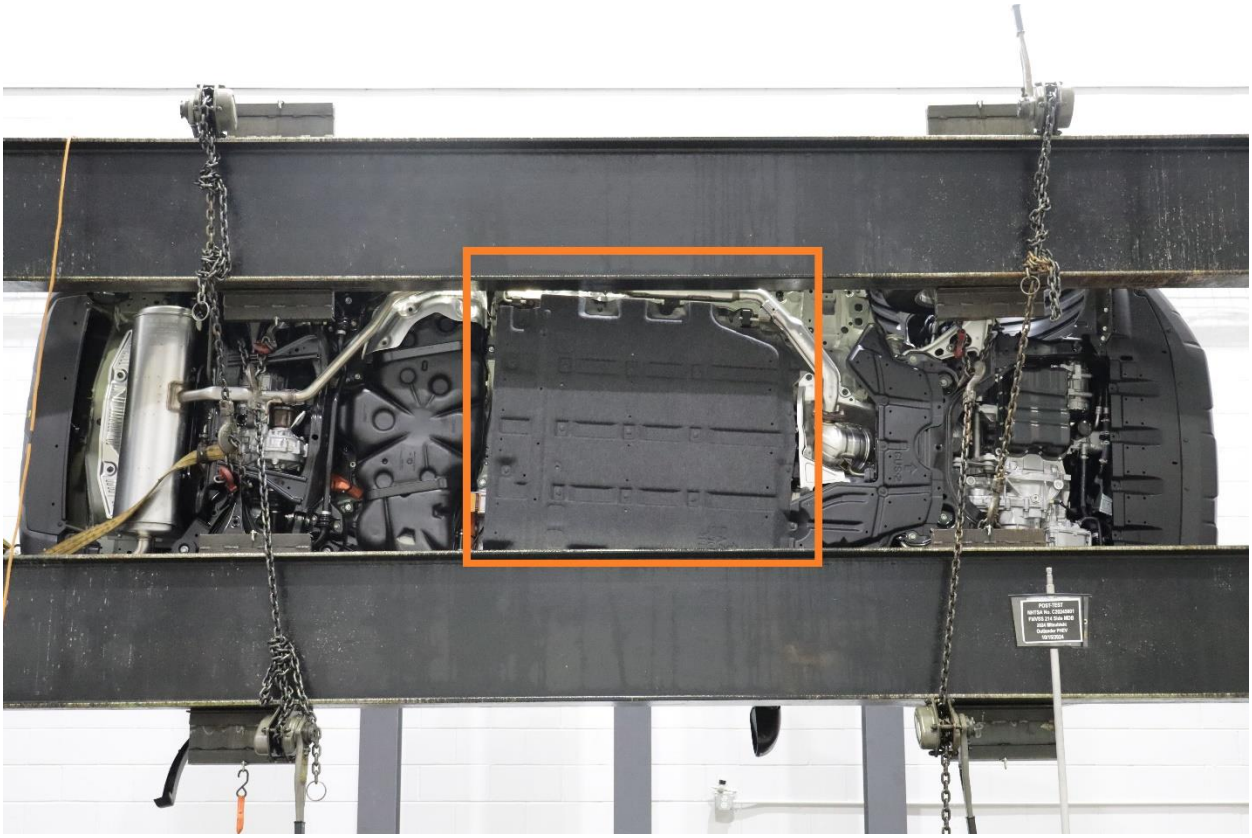


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

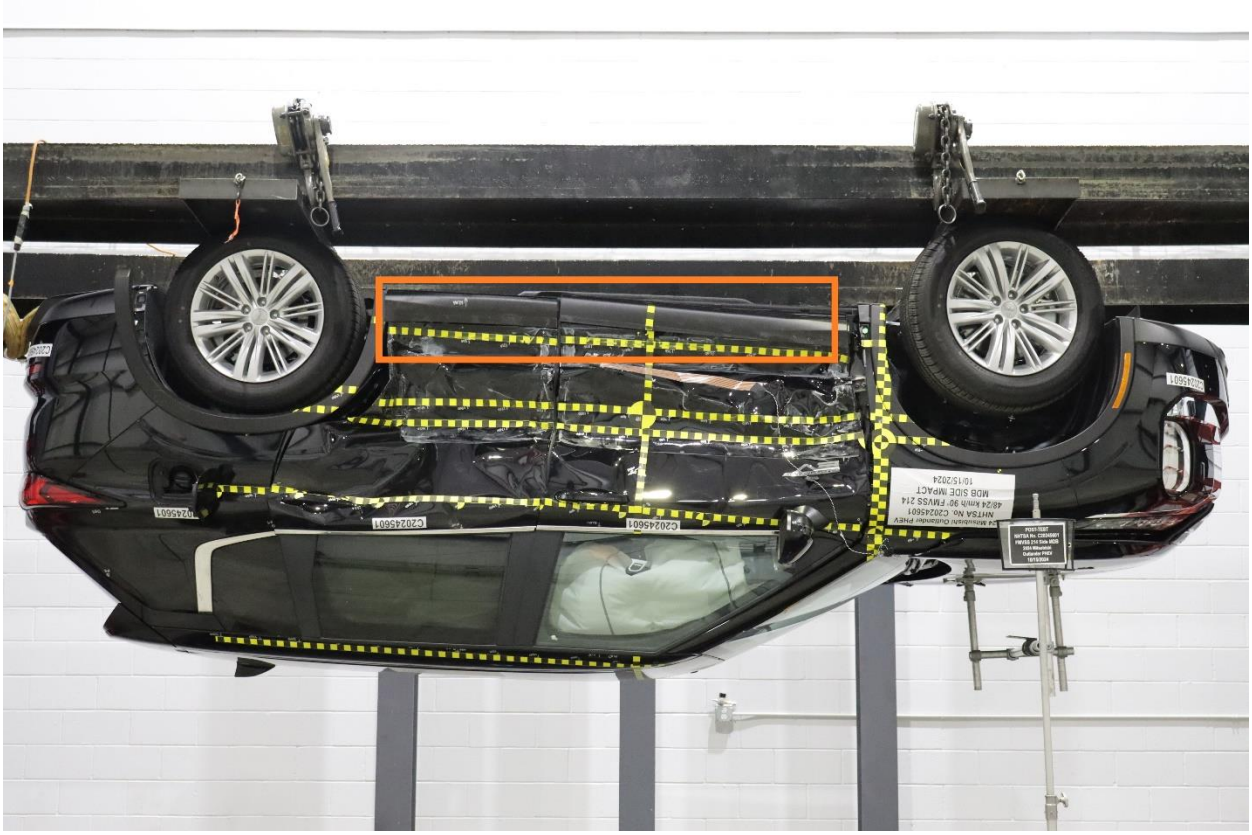


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees

Figure 305-32: Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Figure 305-33: Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photo Not Applicable

Figure 305-34: Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

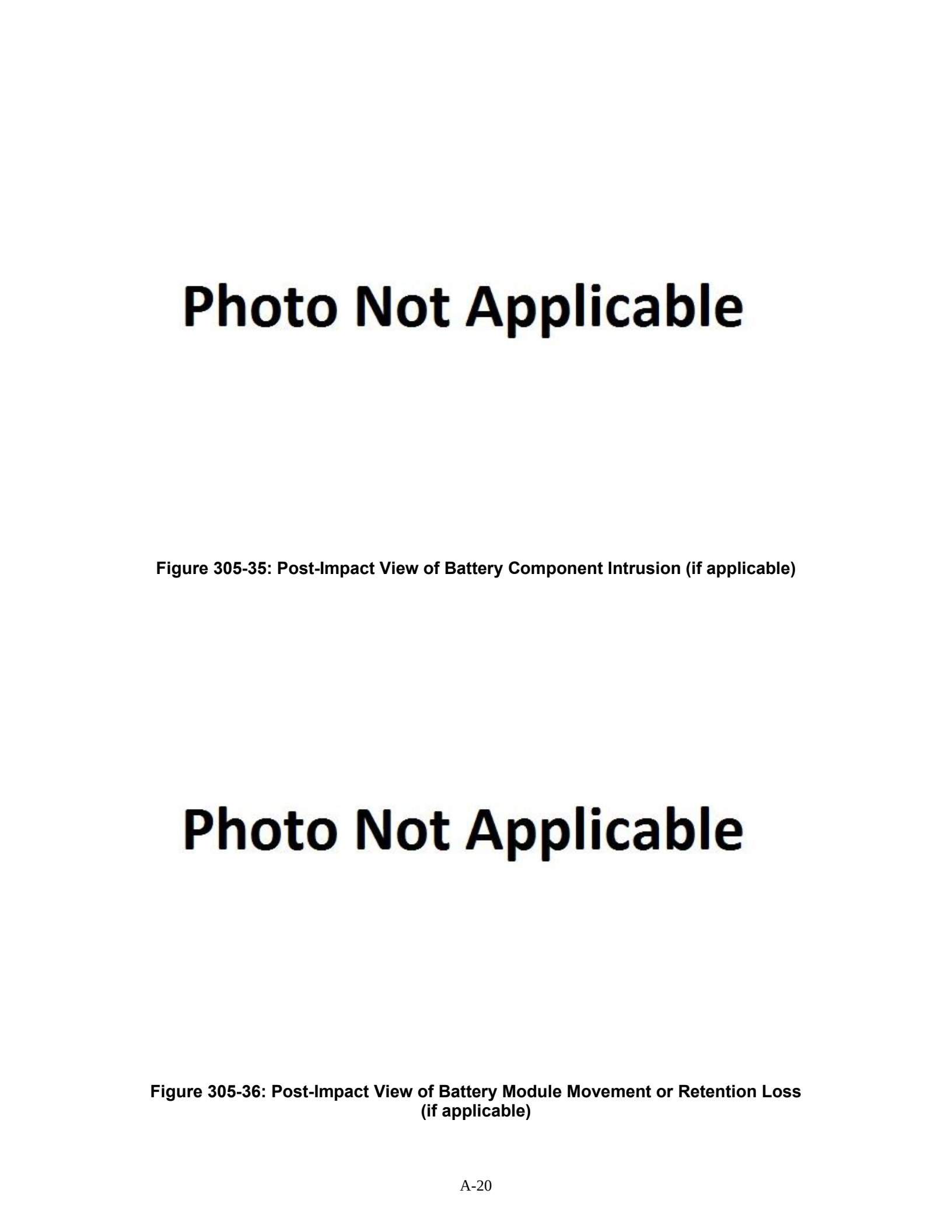


Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

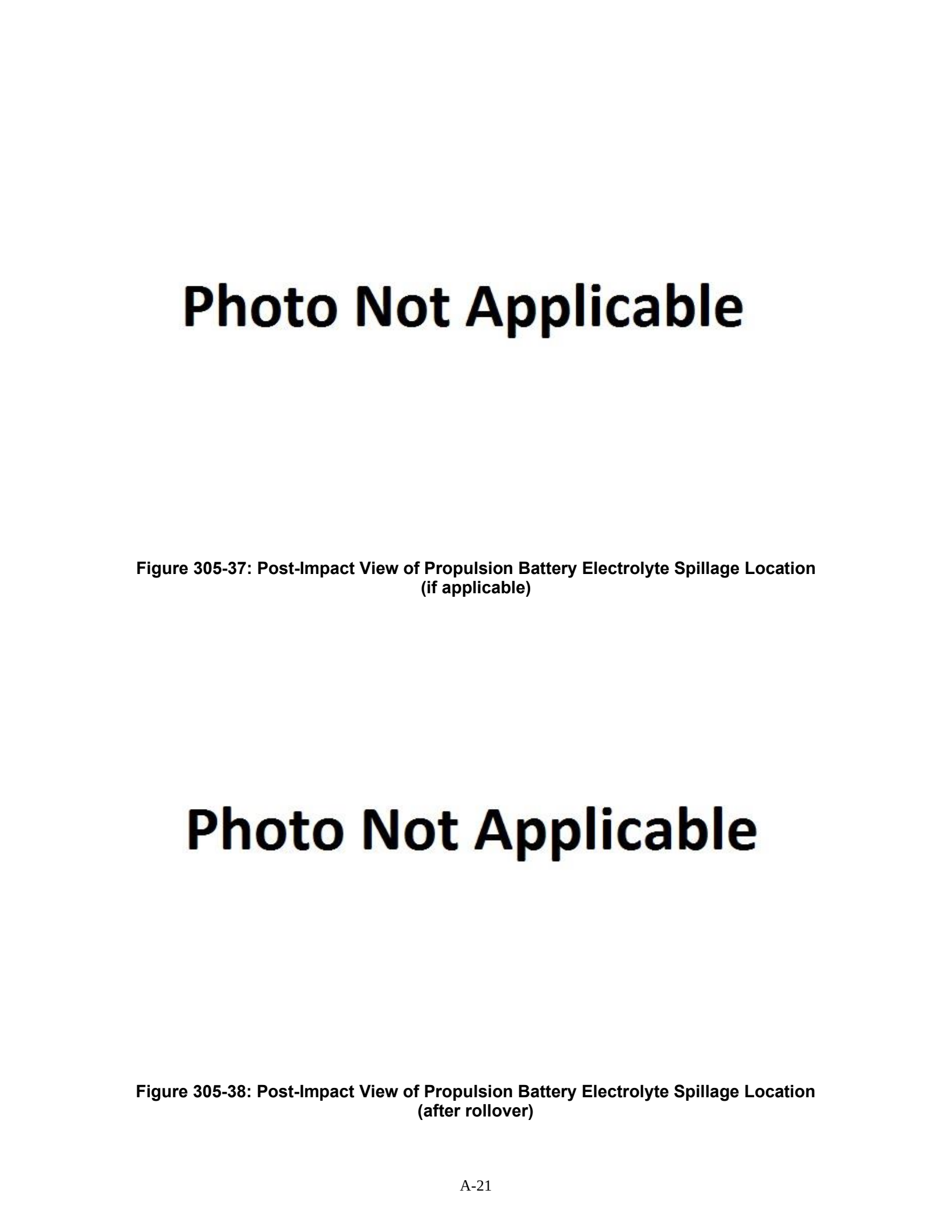


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)

Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (after rollover)