

REPORT NUMBER: NCAP305I-KAR-19-022

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FMVSS NO. 305 INDICANT TEST**

**TESLA, INC.
2019 TESLA MODEL 3 LONG RANGE AWD 4-DOOR SEDAN**

NHTSA NUMBER: O20195000

**PREPARED BY:
APPLUS IDIADA KARCO ENGINEERING, LLC.
9270 HOLLY ROAD
ADELANTO, CA 92301**



MAY 14, 2019

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF RULEMAKING
MAIL CODE: NRM-110
1200 NEW JERSEY AVE, SE
ROOM W43-410
WASHINGTON, DC 20590**

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 manufacturers' 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: Amjad A. Jadallah

Mr. Amjad A. Jadallah, Project Engineer
Applus IDIADA KARCO Engineering, LLC.

Reviewed By: Michael L. Dunlap

Mr. Michael L. Dunlap, Director of Operations
Applus IDIADA KARCO Engineering, LLC.

Approved By: Steven D. Matsusaka

Mr. Steven D. Matsusaka, Engineering Manager
Applus IDIADA KARCO Engineering, LLC.

Approval Date: May 14, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

Division Chief, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

COTR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. NCAP305I-KAR-19-022	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of New Car Assessment Program FMVSS 305 Indicant Testing of a 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No. O20195000		5. Report Date May 14, 2019	
		6. Performing Organization Code KAR	
7. Authors Mr. Amjad A. Jadallah, Project Engineer, Applus IDIADA KARCO Mr. Steven D. Matsusaka, Engineering Manager, Applus IDIADA KARCO		8. Performing Organization Report No. TR-P39134-01E-NC	
9. Performing Organization Name and Address Applus IDIADA KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		10. Work Unit No.	
		11. Contract or Grant No. DTNH22-12-D-00259	
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards Mail Code: NRM-110 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered Final Test Report, April 30 - May 14, 2019	
		14. Sponsoring Agency Code NRM-110	
15. Supplementary Notes			
16. Abstract An FMVSS No. 305 Indicant test, in conjunction with an NCAP frontal barrier impact test was conducted on the subject 2019 Tesla Model 3 Long Range AWD 4-door sedan in accordance with the specifications of the applicable Office of Crashworthiness Standards Test Procedure for the generation of consumer information for the New Car Assessment Program (NCAP). No test failures were reported.			
17. Key Words New Car Assessment Program (NCAP) FMVSS 305 Indicant		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave., SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833	
19. Security Classification of this report UNCLASSIFIED	20. Security Classification of this page UNCLASSIFIED	21. No. of Pages 42	22. Price

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	Test Vehicle Information	4
2	Pre-Impact Data	6
3	Pre-Impact Electrical Isolation Measurements and Calculations	7
4	Post-Impact Data	8
5	Static Rollover Test Data	9
<u>Appendix</u>		<u>Page No.</u>
A	Photographs	A

SECTION 1

TEST PURPOSE AND PROCEDURE

An FMVSS No. 305 Indicant test, in conjunction with an NCAP frontal barrier impact test was conducted on the subject 2019 Tesla Model 3 Long Range AWD 4-door sedan.

The indicant test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Test Procedure, dated September 2012, to determine compliance to the requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 305, 'Electric-Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection' for the purpose of providing consumer information.

This FMVSS No. 305 Indicant test is part of the MY 2019 New Car Assessment Program Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract no. DTNH22-12-D-00259.

SECTION 2

SUMMARY OF TEST RESULTS

A frontal barrier impact test was performed by Applus IDIADA KARCO Engineering, LLC. on a 2019 Tesla Model 3 Long Range AWD 4-door sedan on April 30, 2019. Electrical isolation measurements were taken immediately post-impact and observations were made relating 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 2019 Tesla Model 3 Long Range AWD 4-door sedan 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 DATA SHEETS

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in ²	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

ELECTRICAL CODES

Code	Units	Description
V_b	V	Propulsion Battery Voltage
V_1	V	Propulsion Battery Negative to Chassis
V_2	V	Propulsion Battery Positive to Chassis
R_o	Ω	Resistance of Grounding Circuit
V_1'	V	Propulsion Battery Negative to Chassis with R_o installed
V_2'	V	Propulsion Battery Positive to Chassis with R_o installed
R_{i1}	Ω	Electrical Isolation Value of Propulsion Battery Negative to Chassis Ground
R_{i2}	Ω	Electrical Isolation Value of Propulsion Battery Positive to Chassis Ground
R_i	Ω	Electrical Isolation Value of Propulsion Battery - The Minimum of R_{i1} and R_{i2}
R_i/V_b	Ω/v	Electrical Isolation per Volt of Propulsion Battery

DATA SHEET NO. 1**TEST VEHICLE INFORMATION**Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19**TEST VEHICLE INFORMATION**

NHTSA Number	O20195000
Model Year	2019
Make	Tesla
Model	Model 3 Long Range AWD
Body Style	4-Door Sedan
Body Color	Midnight Silver Metallic
Odometer Reading (km / mi)	10 / 6

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Tesla, Inc.
Date of Manufacture	Apr-19
VIN	5YJ3E1EB7KF359414
GVWR (kg)	2265

ELECTRIC VEHICLE PROPULSION SYSTEM

Type of Electrical Vehicle	Electric
Propulsion Battery Type	Lithium-Ion
Nominal Voltage (V)	350
Automatic Propulsion Battery Disconnect	Yes
Physical Location of Automatic Propulsion Battery Disconnect	Internal to HV Battery
Auxiliary Battery Type	12 Volt Lead Acid

PROPULSION BATTERY SYSTEM DATA

Electrolyte Fluid Type	Organic Electrolyte
Electrolyte Fluid Specific Gravity (g/cc)	1.2
Electrolyte Fluid Dynamic Viscosity (mPa s)	2.6
Electrolyte Fluid Color	Clear
Propulsion Battery Coolant Type	G48 Ethylene Glycol
Propulsion Battery Coolant Color	Light Blue
Propulsion Battery Coolant Specific Gravity	1.122 / 1.0

LOCATION OF BATTERY MODULES

Location	Beneath the occupant compartment underneath the vehicle; floor-mounted HV battery
----------	---

DATA SHEET NO. 1 ... (CONTINUED)**TEST VEHICLE INFORMATION**Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19*For all battery types:*

Description	Volts
Minimum Operating Voltage	240.0
Maximum Operating Voltage	403.2
95% of Maximum Operating Voltage	383.0
Test Voltage (no less than 95% of Maximum)	399.7

For batteries that are rechargeable ONLY by an energy source on the vehicle:

Description	Volts
Minimum Operating Voltage	
Maximum Operating Voltage	
Test Voltage (Maximum practicable state of charge within normal operating range)	

DATA SHEET NO. 2

PRE-IMPACT DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

DETAILS OF VEHICLE CHASSIS GROUND POINT(S) AND LOCATION(S):

The chassis ground used for the electrical isolation measurements was a pre-existing chassis ground point located under the rear seat cushion next to the battery penthouse cover.

PROPULSION BATTERY SYSTEM

DETAILS OF PROPULSION BATTERY COMPONENTS:

The electrical propulsion system utilizes one Lithium-Ion (Li-Ion) battery and a traction motor to propel the vehicle. The propulsion battery is located on the underside of the vehicle between the axles. The battery is equipped with an automatic disconnect located within the battery enclosure. The first responder disconnect is located in the front trunk area, near the base of the windshield on the left side of the vehicle. Another first responder disconnect is located in the C-Pillar of the vehicle on the passenger's side.

DATA SHEET NO. 3**PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS**Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19**VOLTMETER INFORMATION**

Make	Fluke
Model	115
Serial No.	42120259WS
Internal Impedence Value	10 MΩ
Resolution	0.001

HV BATTERY ELECTRICAL ISOLATION DATA

Code	Units	Threshold	Pre-Test
V_b	V		400.80
V_1	V		191.10
V_2	V		206.40
R_o	Ω		219,300
V_1'	V		56.10
V_2'	V		57.40
R_{i1}	Ω		1,097,706
R_{i2}	Ω		1,096,328
R_i	Ω		1,096,328
R_i/V_b	Ω/V	500	2,735

Is the Measured Electrical Isolation Value \geq 500 Ω/V?	Yes
--	-----

DATA SHEET NO. 4**POST-IMPACT DATA**Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19**VOLTMETER INFORMATION**

Make	Fluke
Model	16
Serial No.	82810107
Internal Impedance Value	10 MΩ
Resolution	0.001

HV BATTERY ELECTRICAL ISOLATION DATA

Code	Units	Threshold	Post-Test
V_b	V		0.27
V_1	V		0.00
V_2	V		0.26
R_o	Ω		219,300
V_1'	V		0.00
V_2'	V		0.04
R_{i1}	Ω		*Zero Volts
R_{i2}	Ω		1,116,900
R_i	Ω		*Zero Volts
R_i/V_b	Ω/V	500	*Zero Volts

* "Zero Volts" is considered as being compliant.

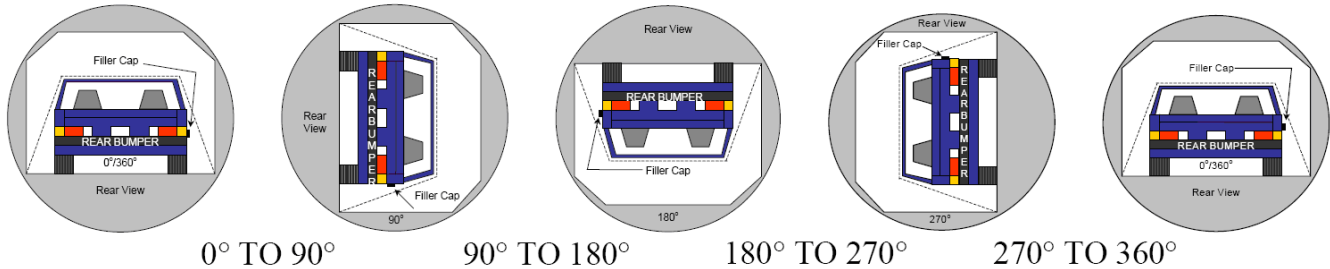
Is the Measured Electrical Isolation Value \geq 500 Ω/V?	Yes
--	-----

PROPULSION BATTERY SYSTEM COMPONENTSHas the propulsion battery module moved within the passenger compartment: NoDescribe any movement: There was no movement of the propulsion battery.Has an outside propulsion battery component intruded into the passenger compartment: NoDescribe any intrusion: There was no intrusion of the propulsion battery into the occupant compartment.Is there propulsion battery electrolyte spillage visible in the passenger compartment: No

DATA SHEET NO. 5
STATIC ROLLOVER TEST DATA

Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000

Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19



PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	81	300	381
90° To 180°	82	300	382
180° To 270°	80	300	380
270° To 360°	78	300	378

TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Test Phase	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0° To 90°	0.0	N/A
90° To 180°	0.0	N/A
180° To 270°	0.0	N/A
270° To 360°	0.0	N/A

Is the Total Propulsion Battery Electrolyte Spillage Greater Than 5.0 Liters?	No spillage occurred
Is the Propulsion Battery Electrolyte Spillage Visible in the Passenger Compartment?	N/A

DATA SHEET NO. 5 ... (CONTINUED)**STATIC ROLLOVER TEST DATA**Test Vehicle: 2019 Tesla Model 3 Long Range AWD 4-Door Sedan NHTSA No.: O20195000Test Program: FMVSS No. 305 Indicant Test Test Date: 04/30/19**VOLTMETER INFORMATION**

Make	Fluke
Model	16
Serial No.	82810107
Internal Impedance Value	10 MΩ
Resolution	0.001

HV BATTERY ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS

Code	Units	Threshold	0°	90°	180°	270°	360°
V _b	V		0.19	0.15	0.18	0.18	0.18
V ₁	V		0.00	0.04	0.00	0.00	0.00
V ₂	V		0.18	0.18	0.18	0.18	0.18
R _o	Ω		219,300	219,300	219,300	219,300	219,300
V ₁ '	V		0.00	0.02	0.00	0.00	0.00
V ₂ '	V		0.03	0.03	0.03	0.03	0.03
R _{i1}	Ω		*Zero Volts	852,833	*Zero Volts	*Zero Volts	*Zero Volts
R _{i2}	Ω		1,075,277	1,345,993	1,125,740	1,068,203	1,075,277
R _i	Ω		*Zero Volts	852,833	*Zero Volts	*Zero Volts	*Zero Volts
R _i /V _b	Ω/V	500	*Zero Volts	5,762,387	*Zero Volts	*Zero Volts	*Zero Volts

* "Zero Volts" is considered as being compliant.

Is the Measured Electrical Isolation Value ≥ 500 Ω/V?	Yes
---	-----

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure		Page
1	Auxiliary Power Module Warning Label	A-1
2	Power Inverter Warning Label	A-1
3	First Responder Warning Label	A-2
4	First Responder Warning Location	A-2
5	Other Vehicle Label(s) Related to Electrical Propulsion System	A-3
6	Other Vehicle Label(s) Related to Electrical Propulsion System	A-3
7	Manual High Voltage Service Disconnect in Place	A-4
8	Manual High Voltage Service Disconnect Removed	A-4
9	Manual High Voltage Service Disconnect Removed	A-5
10	Pre-Impact View of Propulsion Battery	A-5
11	Pre-Impact Front View of Propulsion Battery	A-6
12	Post-Impact Front View of Propulsion Battery	A-6
13	Pre-Impact Rear View of Propulsion Battery	A-7
14	Post-Impact Rear View of Propulsion Battery	A-7
15	Pre-Impact View of Battery Box(s) or Containers(s) Which Holds Individual Battery Modules	A-8
16	Post-Impact View of Battery Box(s) or Containers(s) Which Holds Individual Battery Modules	A-8
17	Pre-Impact View of Propulsion Battery Module(s)	A-9
18	Post-Impact View of Propulsion Battery Module(s)	A-9
19	Pre-Impact View of Electric Propulsion Drive	A-10
20	Pre-Impact View of Electric Propulsion Drive	A-10
21	Post-Impact View of Electric Propulsion Drive	A-11
22	Post-Impact View of Electric Propulsion Drive	A-11
23	Pre-Impact View of High Voltage Interconnect(s)	A-12
24	Pre-Impact View of High Voltage Interconnect(s)	A-12
25	Pre-Impact View of High Voltage Interconnect(s)	A-13
26	Pre-Impact View of High Voltage Interconnect(s)	A-13
27	Pre-Impact View of High Voltage Interconnect(s)	A-14
28	Pre-Impact View of Propulsion Battery Venting System(s)	A-14
29	Pre-Impact View of Propulsion Battery Venting System(s)	A-15
30	Pre-Impact View of Other Visible Electric Propulsion Components	A-15
31	Pre-Impact View of Ground Lead Attached	A-16
32	Pre-Test View of High Voltage Leads Attached	A-16
33	Pre-Impact Close-Up View of High Voltage Leads Attached	A-17
34	Pre-Impact Close-Up View of High Voltage Leads Attached	A-17

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
35	Pre-Impact View of Installed Test Interface Port	A-18
36	Post-Impact View of Installed Test Interface Port	A-18
37	Pre-Impact View of Other Test Devices	A-19
38	Post-Impact View of Other Test Devices	A-19
39	FMVSS No. 305 Static Rollover at 0°	A-20
40	FMVSS No. 305 Static Rollover at 90°	A-20
41	FMVSS No. 305 Static Rollover at 180°	A-21
42	FMVSS No. 305 Static Rollover at 270°	A-21
43	FMVSS No. 305 Static Rollover at 360°	A-22
44	Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-22
45	Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-23
46	Post-Impact Propulsion Battery System Mounting and or Intrusion Failure(s)	A-23
47	Post-Impact View of Battery Component Intrusion	A-24
48	Post-Impact View of Battery Module Movement or Retention Loss	A-24
49	Post-Impact View of Propulsion Battery Electrolyte Spillage Location	A-25
50	Post-Test View of Propulsion Battery Electrolyte Spillage Location	A-25

Photograph Not Applicable

No Auxiliary Power Module Warning Label

FIGURE 1. Auxiliary Power Module Warning Label



FIGURE 2. Power Inverter Warning Label

Photograph Not Available

No First Responder
Warning Label

FIGURE 3. First Responder Warning Label

Photograph Not Applicable

No First Responder
Warning Label

FIGURE 4. First Responder Warning Location



FIGURE 5. Other Vehicle Label(s) Related to Electrical Propulsion System



FIGURE 6. Other Vehicle Label(s) Related to Electrical Propulsion System



FIGURE 7. Manual High Voltage Service Disconnect in Place



FIGURE 8. Manual High Voltage Service Disconnect Removed



FIGURE 9. Manual High Voltage Service Disconnect Removed

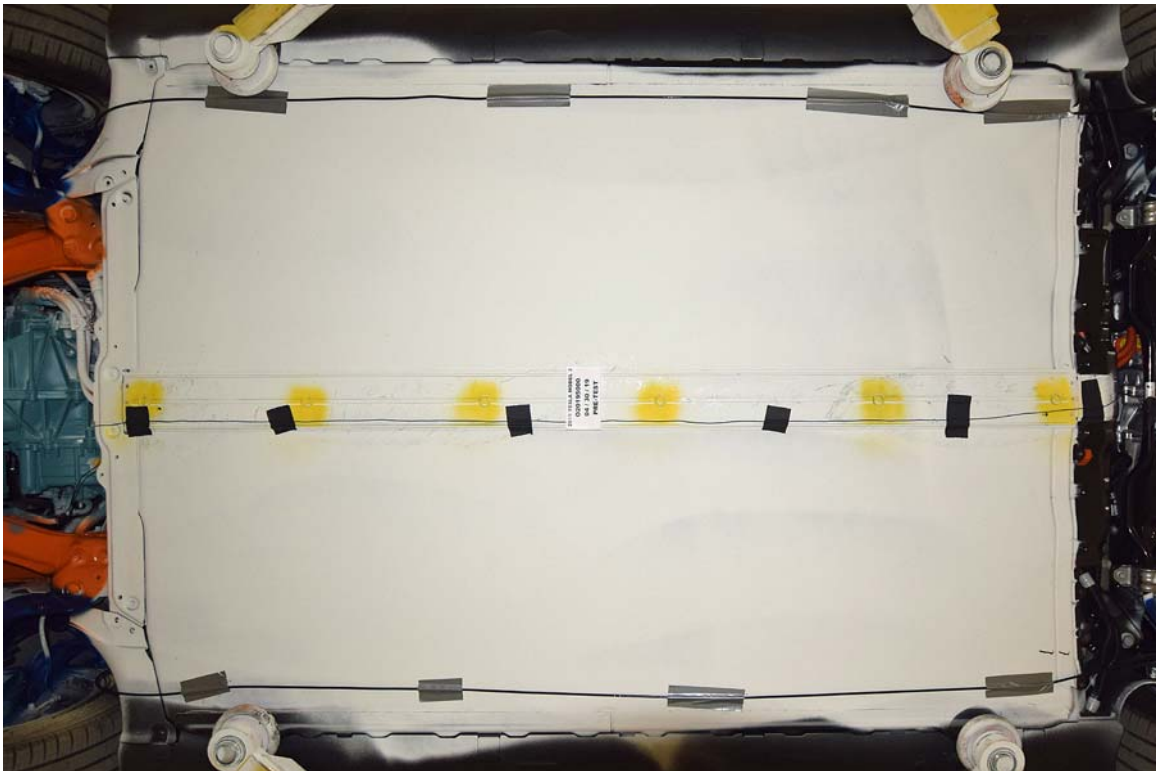


FIGURE 10. Pre-Impact View of Propulsion Battery

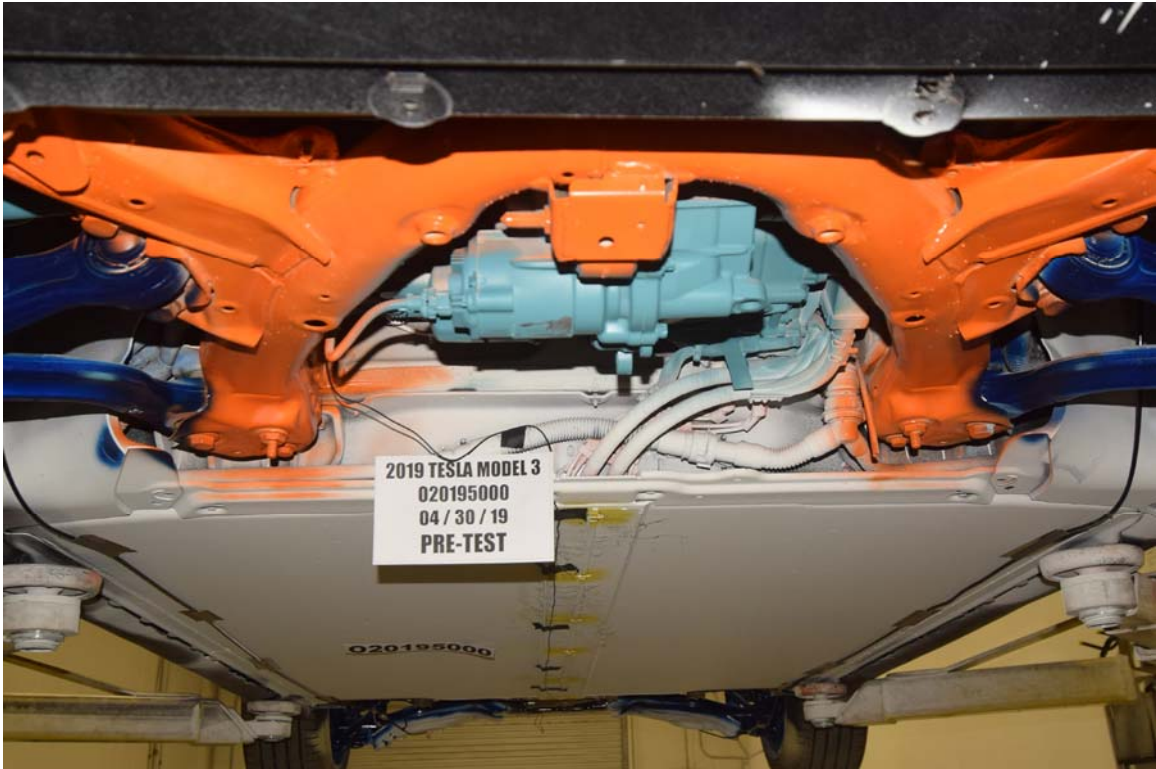


FIGURE 11. Pre-Impact Front View of Propulsion Battery

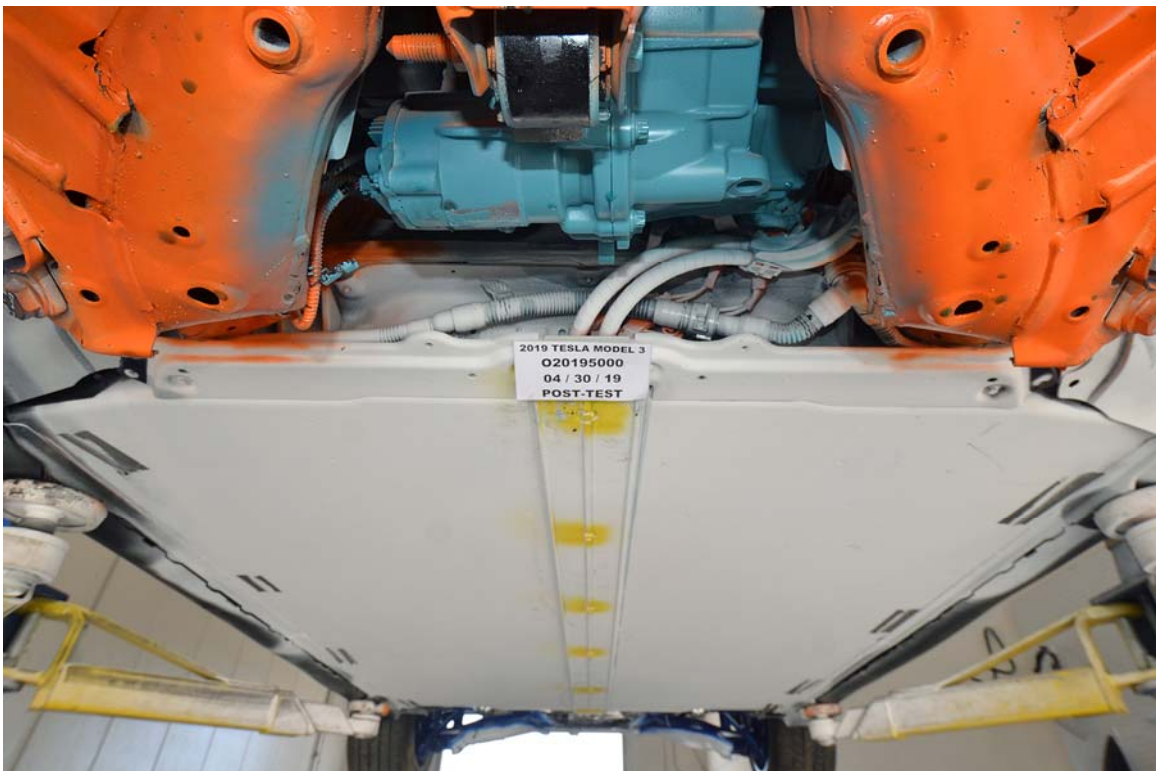


FIGURE 12. Post-Impact Front View of Propulsion Battery

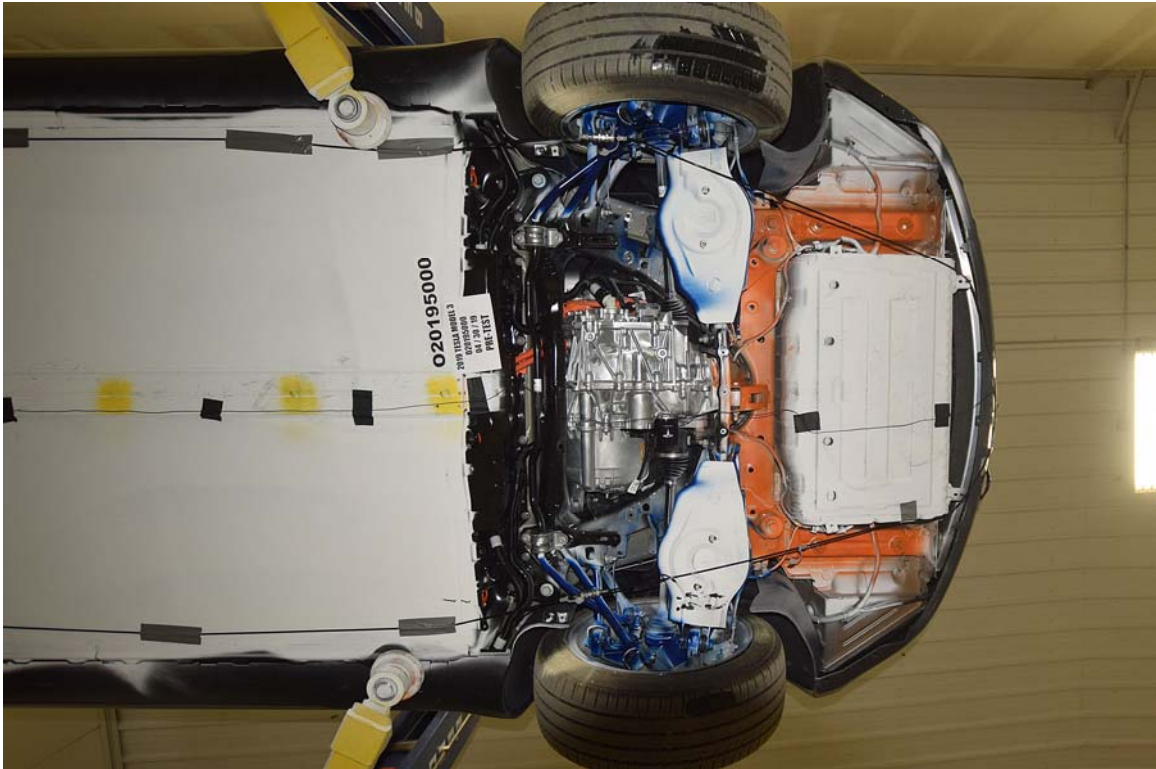


FIGURE 13. Pre-Impact Rear View of Propulsion Battery

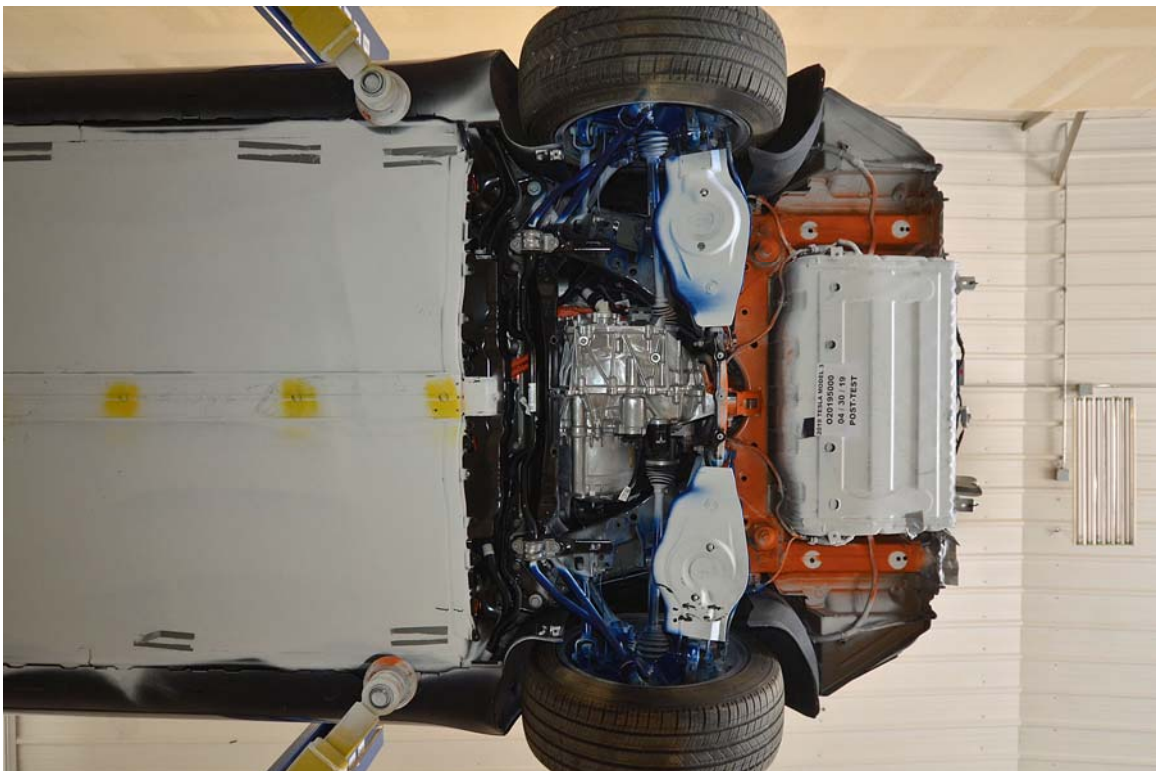


FIGURE 14. Post-Impact Rear View of Propulsion Battery

Photograph Not Applicable

**Battery Not Removed
From Vehicle**

FIGURE 15. Pre-Impact View of Battery Box(s) or Containers(s)
Which Holds Individual Battery Modules

Photograph Not Applicable

**Battery Not Removed
From Vehicle**

FIGURE 16. Post-Impact View of Battery Box(s) or Containers(s)
Which Holds Individual Battery Modules

Photograph Not Applicable

Battery Not Removed
From Vehicle

FIGURE 17. Pre-Impact View of Propulsion Battery Module(s)

Photograph Not Applicable

Battery Not Removed
From Vehicle

FIGURE 18. Post-Impact View of Propulsion Battery Module(s) L



FIGURE 19. Pre-Impact View of Electric Propulsion Drive

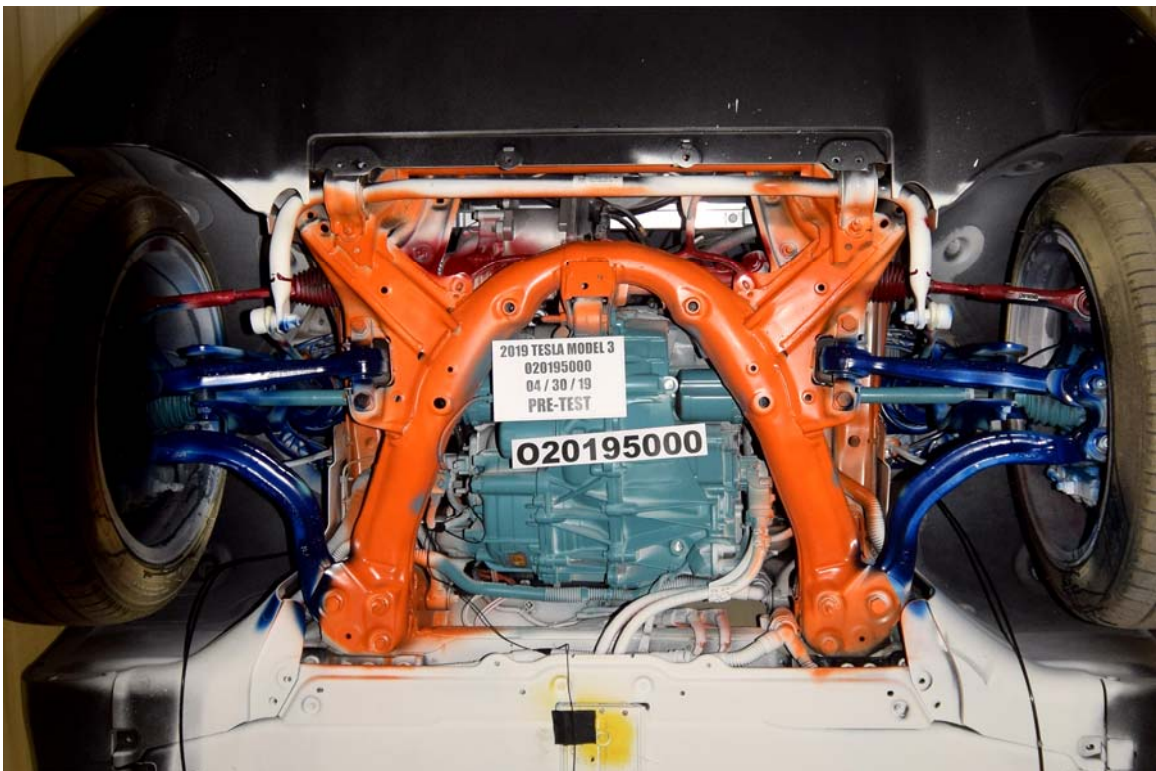


FIGURE 20. Pre-Impact View of Electric Propulsion Drive

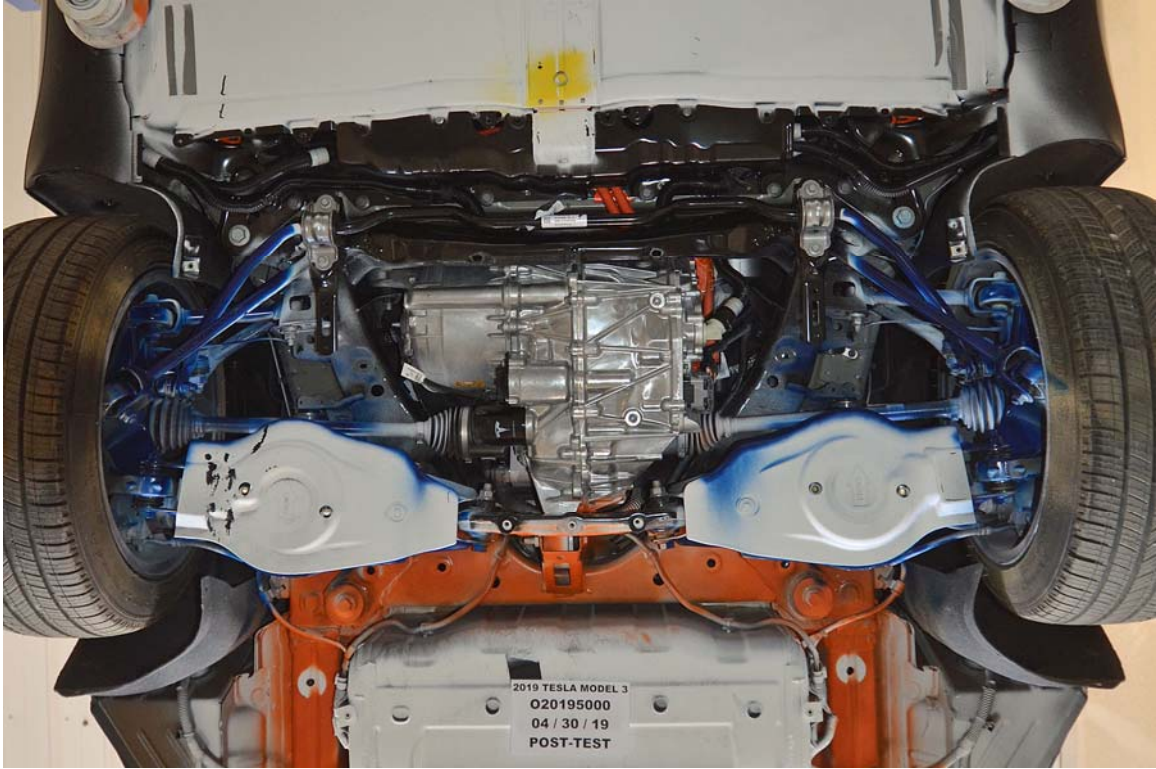


FIGURE 21. Post-Impact View of Electric Propulsion Drive



FIGURE 22. Post-Impact View of Electric Propulsion Drive



FIGURE 23. Pre-Impact View of High Voltage Interconnect(s)

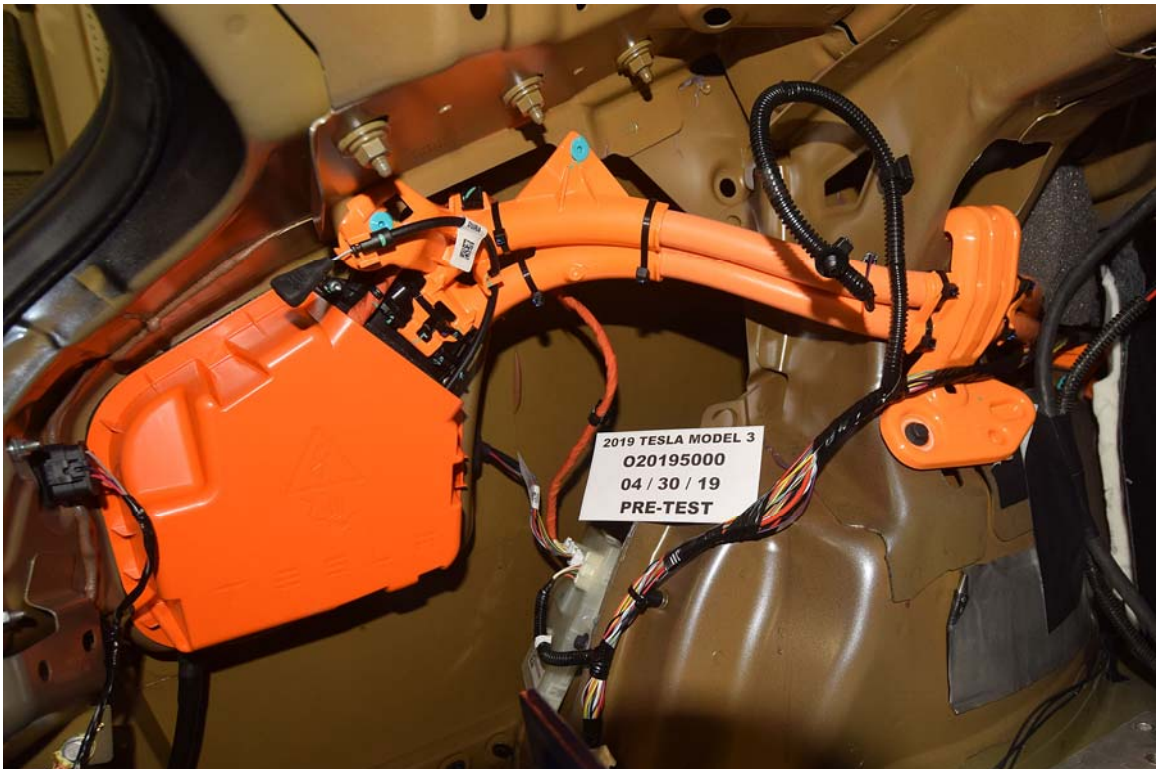


FIGURE 24. Pre-Impact View of High Voltage Interconnect(s)

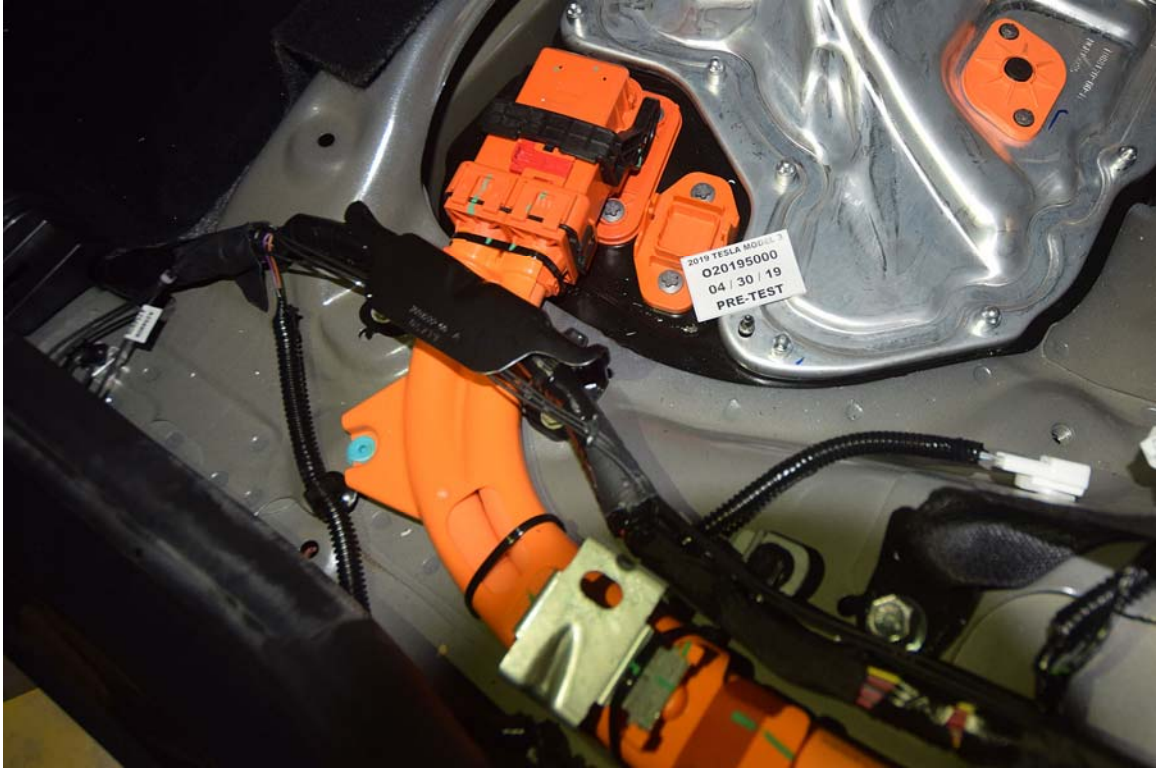


FIGURE 25. Pre-Impact View of High Voltage Interconnect(s)

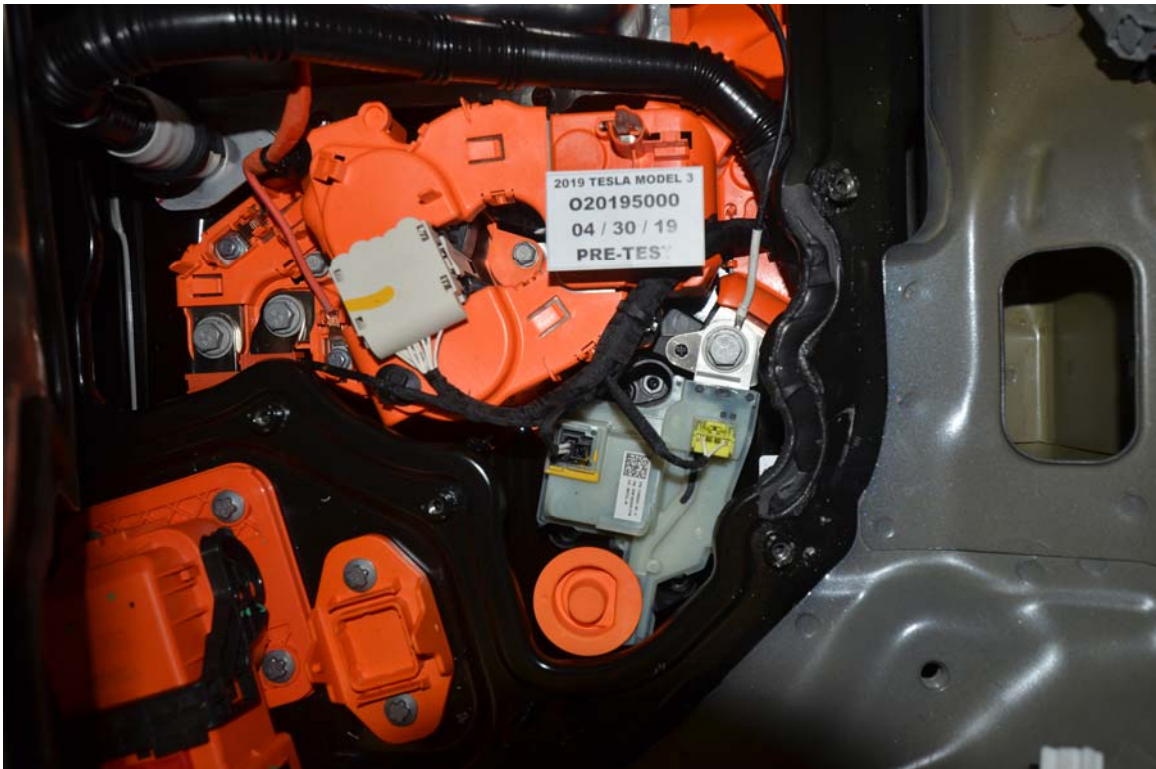


FIGURE 26. Pre-Impact View of High Voltage Interconnect(s)



FIGURE 27. Pre-Impact View of High Voltage Interconnect(s)



FIGURE 28. Pre-Impact View of Propulsion Battery Venting System(s)



FIGURE 29. Pre-Impact View of Propulsion Battery Venting System(s)



FIGURE 30. Pre-Impact View of Other Visible Electric Propulsion Component(s)



FIGURE 31. Pre-Impact View of Ground Lead Attached



FIGURE 32. Pre-Test View of High Voltage Leads Attached



FIGURE 33. Pre-Impact Close-Up View of High Voltage Leads Attached



FIGURE 34. Pre-Impact Close-Up View of High Voltage Leads Attached



FIGURE 35. Pre-Impact View of Installed Test Interface Port

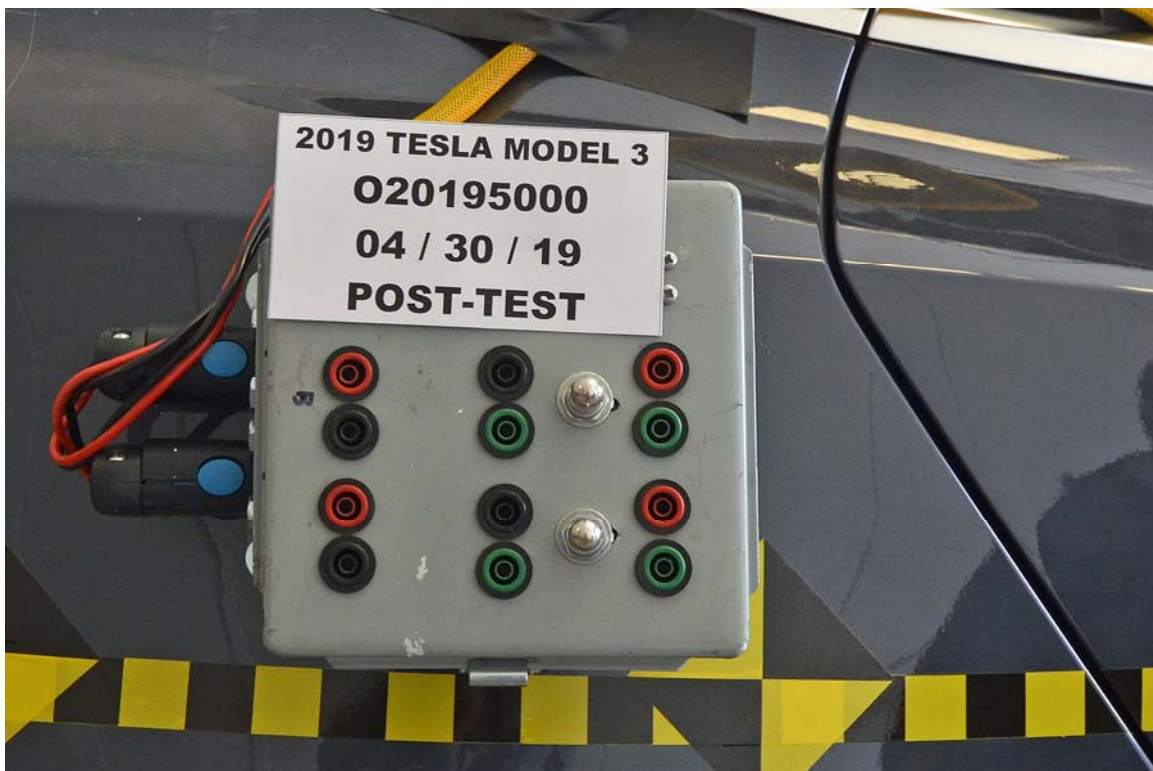


FIGURE 36. Post-Impact View of Installed Test Interface Port



FIGURE 37. Pre-Impact View of Other Test Devices



FIGURE 38. Post-Impact View of Other Test Devices



FIGURE 39. FMVSS No. 305 Static Rollover at 0°

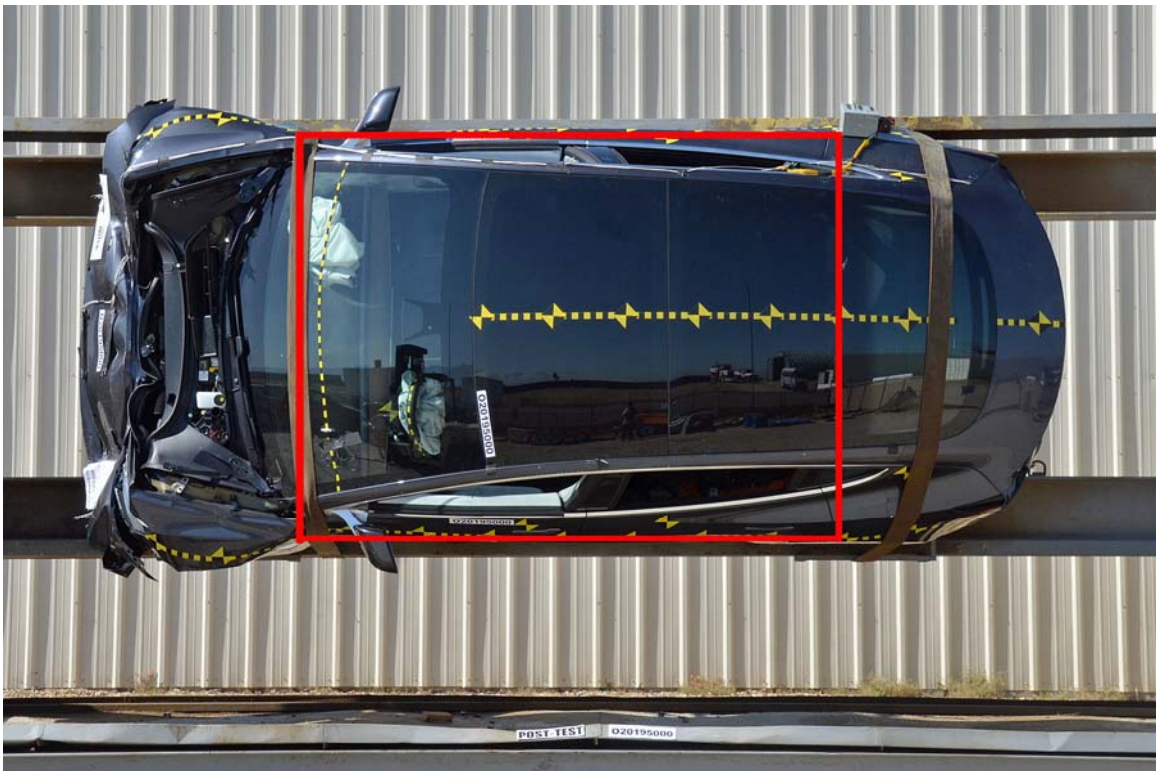


FIGURE 40. FMVSS No. 305 Static Rollover at 90°

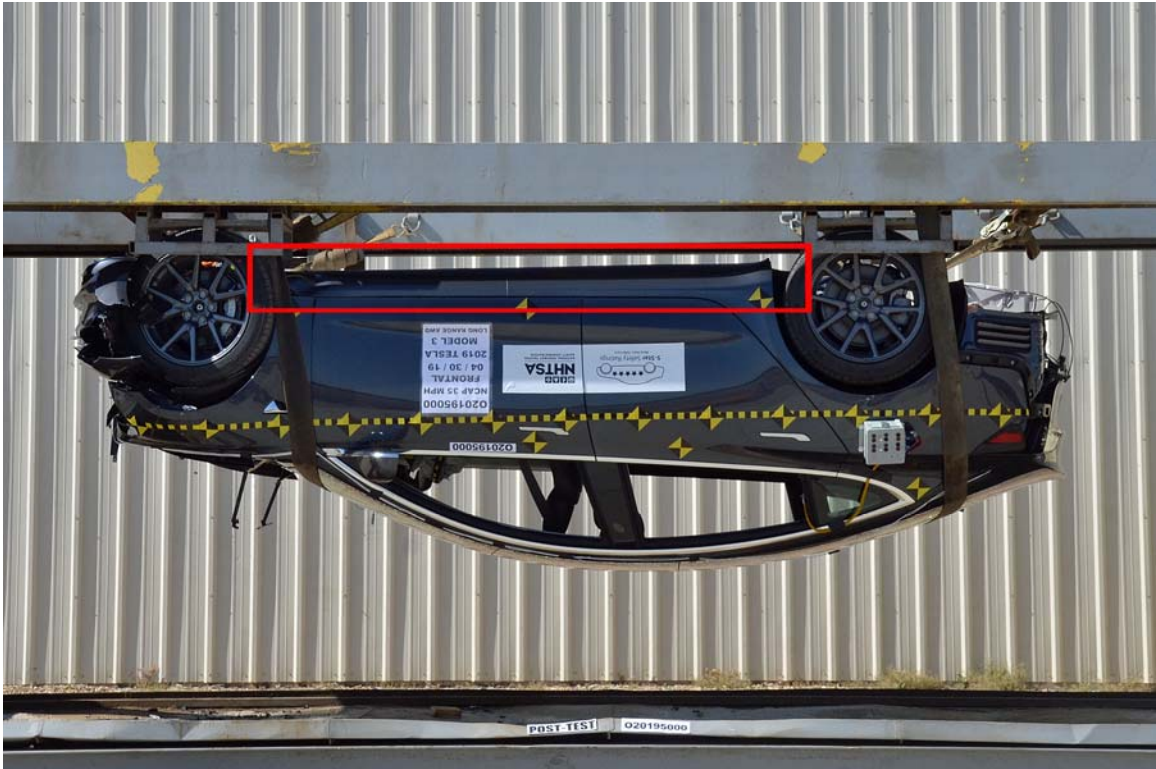


FIGURE 41. FMVSS No. 305 Static Rollover at 180°



FIGURE 42. FMVSS No. 305 Static Rollover at 270°



FIGURE 43. FMVSS No. 305 Static Rollover at 360°

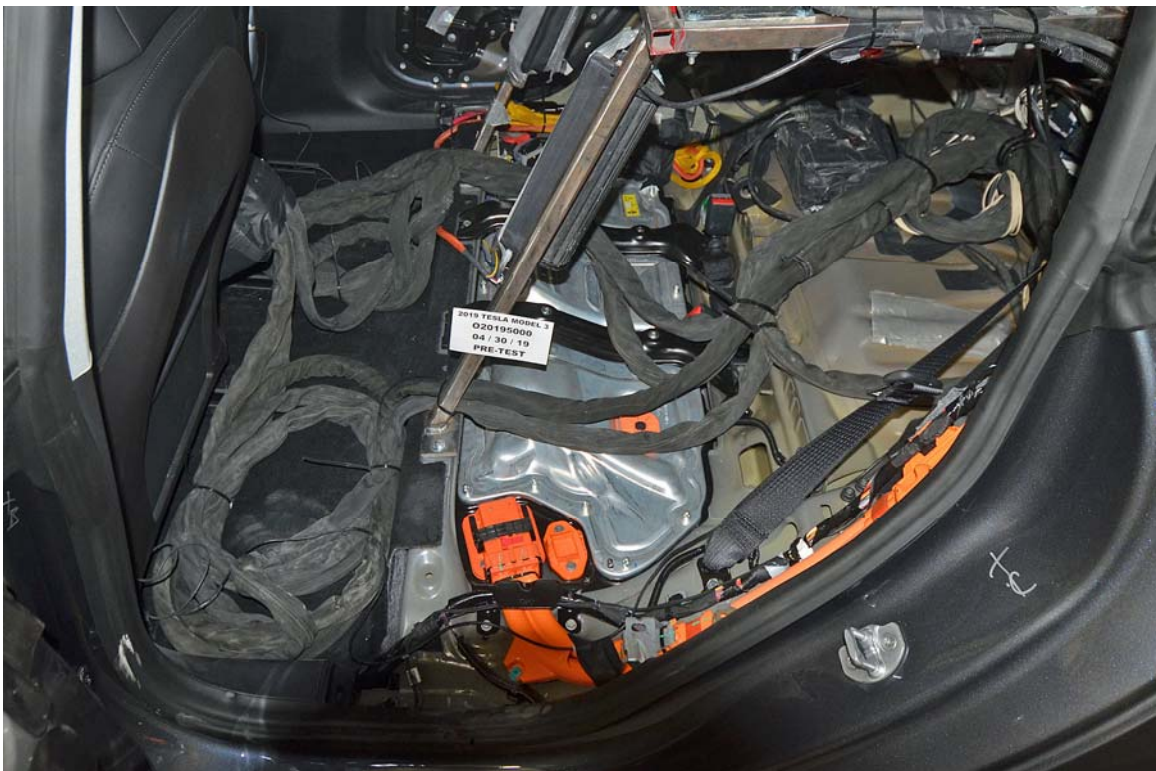


FIGURE 44. Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



FIGURE 45. Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photograph Not Applicable

No Propulsion Battery
Mounting and/or
Intrusion Failure

FIGURE 46. Post-Impact Propulsion Battery System Mounting and or Intrusion Failure(s)

Photograph Not Applicable

No Battery Component
Intrusion

FIGURE 47. Post-Impact View of Battery Component Intrusion

Photograph Not Applicable

No Propulsion
Battery Movement or
Retention loss

FIGURE 48. Post-Impact View of Battery Module Movement or Retention Loss

Photograph Not Applicable

No Propulsion Battery
Electrolyte Spillage

FIGURE 49. Post-Impact View of Propulsion Battery Electrolyte Spillage Location

Photograph Not Applicable

No Propulsion Battery
Electrolyte Spillage

FIGURE 50. Post-Test View of Propulsion Battery Electrolyte Spillage Location