REPORT NUMBER: 208-2360673-TEST

VEHICLE SAFETY COMPLIANCE TESTING
FOR
FMVSS 208, OCCUPANT CRASH PROTECTION
FMVSS 212, WINDSHIELD MOUNTING
FMVSS 219, WINDSHIELD INTRUSION (PARTIAL)
FMVSS 305, ELECTROLYTE SPILLAGE & ELECTRICAL SHOCK PROTECTION

HYUNDAI MOTOR COMPANY
2023 HYUNDAI IONIQ 5 MPV
NHTSA NO.: C20234204

PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

TEST DATE: NOVEMBER 3, 2023

FINAL REPORT DATE: FEBRUARY 14, 2024

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, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number 693JJ919D000012.

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Technical Report Documentation Page

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17. Key Words Frontal Impact 40 kmph Vehicle Safety Compliance Testing FMVSS 208, “Occupant Crash Protection” FMVSS 212, “Windshield Mounting” FMVSS 219, (partial), “Windshield Zone Intrusion” FMVSS 305, “Electrolyte Spillage & Electrical Shock Protection”		*18. Distribution Statement* Copies of this report are available from the following: U.S. Department of Transportation National Highway Traffic Safety Administration Technical Information Services (TIS) Mail Code: NIO-120 1200 New Jersey Avenue, S.E. Washington, DC 20590 Phone: 202-366-2588	
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TABLE OF CONTENTS

Section		Page No
1	Purpose of Compliance Tests	1
2	Tests Performed	2
3	Injury Result Summary for FMVSS 208 Tests	4
4	Discussion of Tests (if applicable)	5
5	Test Data Sheets	6
Data Sheet		
1	COTR Vehicle Work Order	7
2	Report of Vehicle Condition	12
3	Certification Label and Tire Placard Information	14
32	Vehicle Weight, Fuel Tank, and Attitude Data	15
33	Vehicle Accelerometer Locations and Measurements	19
34	Photographic Targets	22
35	Camera Locations	27
36	Dummy Positioning	29
37	Dummy Measurements	45
38	Crash Test	48
40	Accident Investigation Measurements	50
41	Windshield Mounting (FMVSS 212)	52
42	Windshield Zone Intrusion (FMVSS 219)	54
1-5	Electrolyte Spillage and Electrical Shock Protection (FMVSS 305)	56
Appendix		
A	Crash Test Data	A-1
B	Crash Test Photographs	B-1
C	Instrumentation Calibration	C-1
D	Notice of Test Failure (If Applicable)	D-1

SECTION 1
PURPOSE OF COMPLIANCE TESTS

This Federal Motor Vehicle Safety Standard 208 compliance test is part of a program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No.: 693JJ919D000012. The purpose of this test was to determine whether the subject vehicle, a 2023 Hyundai Ioniq 5, NHTSA No.: C20234204, meets certain performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219, "Windshield Zone Intrusion"; and FMVSS 305, “Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection.” The compliance test was conducted in accordance with OVSC Laboratory Test Procedure No.: TP208-14 dated April 16, 2008.

SECTION 2

TESTS PERFORMED

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Dates: 11/3/23

The following checked items indicate the tests that were performed:

- [ ] 1. Rear seating position seat belts
- [ ] 2. Air bag labels (S4.5.1)
- [ ] 3. Readiness indicator (S4.5.2)
- [ ] 4. Passenger air bag manual cut-off device (S4.5.4)
- [ ] 5. Lap belt lockability (S7.1.1.5)
- [ ] 6. Seat belt warning system (S7.3)
- [ ] 7. Seat belt contact force (S7.4.3)
- [ ] 8. Seat belt latch plate access (S7.4.4)
- [ ] 9. Seat belt retraction (S7.4.5)
- [ ] 10. Seat belt guides and hardware (S7.4.6)
- [ ] 11. Air bag suppression telltale (S19.2.2)
- [ ] 12. Suppression tests with 12-month-old CRABI dummy (Part 572, Subpart R)
- [ ] 13. Suppression tests with Newborn infant (Part 572, Subpart K)
- [ ] 14. Suppression tests with 3-year-old dummy (Part 572, Subpart P)
- [ ] 15. Suppression tests with 6-year-old dummy (Part 572, Subpart N)
- [ ] 16. Test of Reactivation of the passenger air bag system with an unbelted 5th percentile female dummy
- [ ] 17. Low risk deployment test with 12-month-old dummy (Part 572, Subpart R)
- [ ] 18. Low risk deployment test with 3-year-old dummy (Part 572, Subpart P)
- [ ] 19. Low risk deployment test with 6-year-old dummy (Part 572, Subpart N)
- [ ] 20. Low risk deployment test with 5th female dummy (Part 572, Subpart O)
- [X] 21. Impact Tests
  - [ ] Frontal Oblique
    - [ ] Belted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.1(a))
    - [ ] Unbelted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.2(a)(1))
    - [ ] Unbelted 50th male dummy driver and passenger (32 to 56 kmph) (S5.1.2(a)(1) or S5.1.2(b))
  - [X] Frontal 0°
    - [ ] Belted 50th male dummy driver (0 to 56 kmph (S5.1.1(b)(2))
    - [ ] Belted 50th male dummy passenger (0 to 56 kmph) (S5.1.1.(b)(2))
    - [ ] Belted 5th female dummy driver (0 to 56 kmph) (S16.1(a)(2))
    - [ ] Belted 5th female dummy passenger (0 to 56 kmph) (S16.1(a)(2))
    - [ ] Unbelted 50th male dummy driver (32 to 40 kmph) (S5.1.2(b))
    - [ ] Unbelted 50th male dummy passenger (32 to 40 kmph) (S5.1.2(b))
    - [X] Unbelted 5th female dummy driver (32 to 40 kmph) (S16.1(b))
    - [X] Unbelted 5th female dummy passenger (32 to 40 kmph) (S16.1(b))
  - [ ] 40% Offset 0° Belted 5th female dummy driver and passenger (0 to 56 kmph) (S18.1)
- [ ] 22. FMVSS 204 Indicant Test
- [X] 23. FMVSS 212 Indicant Test
- [X] 24. FMVSS 219 Indicant Test
- [ ] 25. FMVSS 301 Frontal Test
- [X] 26. FMVSS 305 Frontal Indicant Test

For the crash tests, the vehicle was instrumented with 8 accelerometers. The data from the vehicle and dummies were sampled at 10,000 samples per second and processed as specified in SAE J211/1 MAR95 and FMVSS 208, S4.13.

The dynamic tests were recorded using high-speed digital video.

The vehicle appears to meet the performance requirements to which it was tested.

SECTION 3

INJURY RESULT SUMMARY FOR FMVSS 208 TESTS

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 11/3/23

40 kmph Frontal Crash

Impact Angle:	0º			
Belted Dummies:		Yes	X	No

Speed Range:		0 to 40 kmph	X	32 to 40 kmph
		0 to 48 kmph		0 to 56 kmph

Test Speed (kmph):	39.4	Test Weight (kg):	2088.4

Driver Dummy:	X	5th female		50th male
Passenger Dummy:	X	5th female		50th male

5th Percentile Female Frontal Crash Test
Vehicles certified to S16.1 (a) (1), S16.1 (a) (2), S16.1 (b), or S18.1

Injury Criteria	Max. Allowable Injury Assessment Values	Driver	Passenger
HIC15	700	95	72
N_{te}	1.0	0.5	0.8
N_{tf}	1.0	0.3	0.3
N_{ce}	1.0	0.3	0.1
N_{cf}	1.0	0.1	0.3
Neck Tension	2620 N	1060	493
Neck Compression	2520 N	299	349
Chest g	60 g	28	28
Chest Displacement	52 mm	18	2
Left Femur	6805 N	3166	3623
Right Femur	6805 N	2230	2923

SECTION 4

DISCUSSION OF TESTS

Test Vehicle:	2023 Hyundai Ioniq 5	NHTSA No.:	C20234204
Test Program:	FMVSS 208 Compliance	Test Dates:	11/3/23

The 2023 Hyundai Ioniq 5 (C20234204) was tested to FMVSS 305 in conjunction with the FMVSS 208 frontal impact. The test was performed in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-305-01 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 305, “Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection”.

The FMVSS 305 Static Rollover was not conducted.

Based on the test results, the 2023 Hyundai Ioniq 5 (C20234204) appears to meet the partial requirements of FMVSS 305 testing.

SECTION 5

TEST DATA SHEETS

Test Vehicle:	2023 Hyundai Ioniq 5	NHTSA No.:	C20234204
Test Program:	FMVSS 208 Compliance	Test Dates:	11/3/23

DATA SHEET 1

COTR VEHICLE WORK ORDER

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Dates: 11/3/23

COTR Signature: Syed Rahaman

Test to be performed for this vehicle are checked below:

- ☐ 1. Rear Seating Position Seat Belts
- ☐ 2. Air Bag Labels (S4.5.1)
- ☐ 3. Readiness Indicator (S4.5.2)
- ☐ 4. Passenger Air Bag Manual Cut-off Device (S4.5.4)
- ☐ 5. Lap Belt Lockability (S7.1.1.5)
- ☐ 6. Seat Belt Warning System (S7.3)
- ☐ 7. Seat Belt Contact Force (S7.4.3)
- ☐ 8. Seat Belt Latch Plate Access (S7.4.4)
- ☐ 9. Seat Belt Retraction (S7.4.5)
- ☐ 10. Seat Belt Guides and Hardware (S7.4.6)
- ☐ 11. Air bag suppression telltale (S19.2.2)
- ☐ 12. Suppression tests with 12-month-old CRABI dummy (Part 572, Subpart R) using the following indicated child restraints (mid-height seat position):

Section B – Rear Facing (unbelted and belted rear facing, unbelted forward facing)

☐	Century Smart Fit 4543	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Arriva 22-013	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Discovery Adjust Right 212	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Infant 8457	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Snugride	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Peg Perego Viaggio	☐ Full Rearward	☐ Mid Position	☐ Full Forward

Section C – Convertible (unbelted and belted rear facing, unbelted and belted forward facing)

☐	Britax Roundabout E9L02	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco High Back Booster 22-209	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Summit Deluxe 22-262	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Touriva 02519	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Generations 352	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Medallion 254	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Tribute V 379	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco ComfortSport	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Platinum Cargo	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Safeseat Step 2	☐ Full Rearward	☐ Mid Position	☐ Full Forward

- ☐ 13. Suppression tests with newborn infant (Part 572, Subpart K) using the following indicated child restraints (mid-height seat position).

Section A – Car Bed (Belted)

☐	Angel Guard Angel Ride	☐ Full Rearward	☐ Mid Position	☐ Full Forward

☐ 14. Suppression tests with 3-year-old dummy (Part 572, Subpart P) using the following indicated child restraints where a child restraint is required (mid-height seat position):

Section C – Convertible (Belted forward-facing)

☐	Britax Roundabout E9L02	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco High Back Booster 22-209	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Summit Deluxe 22-262	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Touriva 02519	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Generations 352	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Medallion 254	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Tribute V 379	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco ComfortSport	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Platinum Cargo	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Safeseat Step 2	☐ Full Rearward	☐ Mid Position	☐ Full Forward

Section D – Toddler/Belt Positioning Booster (Belted)

☐	Britax Roadster 9004	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco High Back Booster 22-209	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Summit Deluxe 22-262	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Generations 352	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Right Fit 245	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Platinum Cargo	☐ Full Rearward	☐ Mid Position	☐ Full Forward

☐ 15. Suppression tests with representative 3-year-old child using the following indicated child restraints where a child restraint is required (mid-height position). (Appendix H, Data Sheet 19H and 20H)

Section C – Convertible (Belted forward-facing)

☐	Britax Roundabout E9L02	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco High Back Booster 22-209	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Summit Deluxe 22-262	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco Touriva 02519	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Generations 352	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Medallion 254	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Tribute V 379	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco ComfortSport	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Platinum Cargo	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Graco Safeseat Step 2	☐ Full Rearward	☐ Mid Position	☐ Full Forward

Section D – Toddler/Belt Positioning Booster (Belted)

☐	Britax Roadster 9004	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Cosco High Back Booster 22-209	☐ Full Rearward	☐ Mid Position	☐ Full Forward
☐	Evenflo Right Fit 245	☐ Full Rearward	☐ Mid Position	☐ Full Forward

☐ 16. Suppression tests with 3-year-old dummy (Part 572, Subpart P) in the following positions (mid-height seat position):

☐ Sitting on seat with back against seat back (S22.2.2.1)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Sitting on seat with back against reclined seat back (S22.2.2.2)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Sitting on seat with back not against seat back (S22.2.2.3)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Standing on seat, facing forward (S22.2.2.5)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Kneeling on seat facing forward (S22.2.2.6)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Kneeling on seat facing rearward (S22.2.2.7)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Lying on seat (S22.2.2.8)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ 17. Suppression tests with representative 3-year-old child in the following positions (mid-height seat position):

☐ Sitting on seat with back against seat back (S22.2.2.1)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Sitting on seat with back against reclined seat back (S22.2.2.2)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Sitting on seat with back not against seat back (S22.2.2.3)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Standing on seat, facing forward (S22.2.2.5)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Kneeling on seat facing forward (S22.2.2.6)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Kneeling on seat facing rearward (S22.2.2.7)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ Lying on seat (S22.2.2.8)
☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ 18. Suppression tests with 6-year-old dummy (Part 572, Subpart N) using the following indicated child restraints where a child restraint is required (mid-height seat position):
Section D

☐ Britax Roadster 9004 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
☐ Cosco High Back Booster 22-209 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
☐ Cosco Summit Deluxe 22-262 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
☐ Evenflo Generations 352 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
☐ Evenflo Right Fit 245 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
☐ Graco Platinum Cargo ☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ 19. Suppression tests with representative 6-year-old child using the following indicated child restraints where a child restraint is required (mid-height seat position):

Section D

- ☐ Britax Roadster 9004 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Cosco High Back Booster 22-209 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Cosco Summit Deluxe 22-262 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Evenflo Generations 352 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Evenflo Right Fit 245 ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Graco Platinum Cargo ☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ 20. Suppression tests with 6-year-old dummy (Part 572, Subpart N) in the following positions (mid-height seat position):

- ☐ Sitting on seat with back against seat back (S22.2.2.1)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Sitting on seat with back against reclined seat back (S22.2.2.2)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Sitting back in the seat and leaning on the right front passenger door (S24.2.3)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward

☐ 21. Suppression tests with representative 6-year-old child in the following positions (mid-height seat position):

- ☐ Sitting on seat with back against seat back (S22.2.2.1)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Sitting on seat with back against reclined seat back (S22.2.2.2)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Sitting on seat edge, spine vertical, hands by the child's side (S22.2.2.4)
  - ☐ Full Rearward ☐ Mid Position ☐ Full Forward
- ☐ Sitting back in the seat and leaning on the right front passenger door (S24.2.3)

☐ 22. Test of Reactivation of the Passenger Air Bag System with an unbelted 5th percentile female dummy (S20.3, 22.3, S24.3) (mid-height seat position). Perform this test after the following suppression tests: After each restraint.

☐ 23. Test of Reactivation of the Passenger Air Bag System with an unbelted 5th percentile female human subject (S20.3, 22.3, S24.3) (mid-height seat position). Perform this test after the following suppression tests: After each restraint.

☐ 24. Low risk deployment test with 12-month-old dummy (Part 572, Subpart R) using the following indicated child restraints (full forward, mid-height seat position)(S20.4):

Section B

- ☐ Century Smart Fit 4543
- ☐ Cosco Arriva 22-013
- ☐ Evenflo Discovery Adjust Right 212
- ☐ Graco Infant 8457
- ☐ Graco Snugride
- ☐ Peg Perego Viaggio

Section C

- ☐ Britax Roundabout E9L02
- ☐ Cosco Touriva 02519
- ☐ Evenflo Medallion 254
- ☐ Evenflo Tribute V 379
- ☐ Graco ComfortSport

[ ] 25. Low risk deployment test with 3-year-old dummy (Part 572, Subpart P) in the following positions:
- [ ] Position 1 (rearmost, lowest seat position)
- [ ] Position 2 (mid-height seat position)

[ ] 26. Low risk deployment test with 6-year-old dummy (Part 572, Subpart N) in the following positions:
- [ ] Position 1(rearmost, lowest seat position)
- [ ] Position 2 (mid-height seat position)

[ ] 27. Low risk deployment test with 5th female dummy (Part 572, Subpart O) in the following positions:
- [ ] Position 1 (mid-height seat position)
- [ ] Position 2 (mid-height seat position)

[X] 28. Impact Tests
- [ ] Frontal Oblique Impact Angle: Test Speed:
  - [ ] Belted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.1(a))
  - [ ] Unbelted 50th male dummy driver and passenger (0 to 48 kmph) (S5.1.2(a)(1))
  - [ ] Unbelted 50th male dummy driver and passenger (32 to 56 kmph) (S5.1.2(a)(2) or S5.1.2(b))
- [X] Frontal 0° - Test Speed: 39.4 kmph
  - [ ] Belted 50th male dummy driver (0 to 56 kmph (S5.1.1(b)(2))
  - [ ] Belted 50th male dummy passenger (0 to 56 kmph) (S5.1.1.(b)(2))
  - [ ] Belted 5th female dummy driver (0 to 56 kmph) (S16.1(a)(2))
  - [ ] Belted 5th female dummy passenger (0 to 56 kmph) (S16.1(a)(2))
  - [ ] Unbelted 50th male dummy driver (32 to 40 kmph) (S5.1.2(b))
  - [ ] Unbelted 50th male dummy passenger (32 to 40 kmph) (S5.1.2(b))
  - [X] Unbelted 5th female dummy driver (32 to 40 kmph) (S16.1(b))
  - [X] Unbelted 5th female dummy passenger (32 to 40 kmph) (S16.1(b))
- [ ] 40% Offset 0° Belted 5th female dummy driver and passenger (0 to 56 kmph) (S18.1) Test Speed:

[ ] 29. FMVSS 204 Indicant Test
[X] 30. FMVSS 212 Indicant Test
[X] 31. FMVSS 219 Indicant Test
[ ] 32. FMVSS 301 Frontal Test
[X] 33. FMVSS 305 Frontal Indicant Test

DATA SHEET 2

REPORT OF VEHICLE CONDITION

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 11/3/23

CONTRACT NO.: 693JJ919D000012 Date: 11/10/23
FROM (Lab and rep name): MGA Research Corporation
TO: NHTSA, OVSC, NVS-220

PURPOSE: ( ) Initial Receipt ( ) Received via Transfer (X) Present vehicle condition

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2023 Hyundai Ioniq 5 MPV
MANUFACTURE DATE: DEC/2022

NHTSA NO.	C20234204	GVWR:	2430 kg (5357 lbs)
BODY COLOR:	Atlas White	GAWR (Fr):	1280 kg (2822 lbs)
VIN:	KM8KM4AE2PU167277	GAWR (Rr):	1370 kg (3020 lbs)

ODOMETER READINGS: ARRIVAL (miles): 167 DATE: 10/6/23
COMPLETION (miles): 170 DATE: 11/3/23
PURCHASE PRICE: ($) 47,690
DEALER'S NAME: Rosen Hyundai
6133 S 27th St, Greenfield, WI 53221

A. All options listed on window sticker are present on the test vehicle:
_X_ Yes ___ No
B. Tires and wheel rims are new and the same as listed: _X_ Yes ___ No
C. There are no dents or other interior or exterior flaws: _X_ Yes ___ No
D. The vehicle has been properly prepared and is in running condition:
_X_ Yes ___ No
E. Keyless remote is available and working: _X_ Yes __ No
F. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys: _X_ Yes ___ No
G. Proper fuel filler cap is supplied on the test vehicle: _X_ Yes ___ No
H. Using permanent marker, identify vehicle with NHTSA number and FMVSS test type(s) on roof line above driver door or for school buses, place a placard with NHTSA number inside the windshield and to the exterior front and rear side of bus:
_X_ Yes ___ No
I. Place vehicle in storage area: _X_ Yes ___ No
J. Inspect the vehicle's interior and exterior, including all windows, seats, doors, etc. to confirm that each system is complete and functional per the manufacturer's specifications. Any damage, misadjustment, or other unusual condition that could influence the test program or test results shall be recorded. Report any abnormal condition to the NHTSA COTR before beginning any test:
_X_ Vehicle OK ___ Conditions reported below in comment section

Identify the letter above to which any of the following comments apply.
Comments:_____

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

LIST OF FMVSS TESTS PERFORMED BY THIS LAB: FMVSS 208, 212, 219, 305

VEHICLE: 2023 Hyundai Ioniq 5 NHTSA NO.: C20234204

REMARKS:

Equipment that is no longer on the test vehicle as noted on previous page:

Tire Repair Kit, Cargo Area Carpet and Organizer, Right Tail Light

Explanation for equipment removal:

Components removed for instrumentation installation and to meet target weight.

Test Vehicle Condition:

25 mph frontal impact damage- front suspension & structure damaged, hood & front quarter panels damaged, air bags & pretensioners deployed

RECORDED BY: Jose Galvez DATE: 11/10/23

APPROVED BY: David Winkelbauer DATE: 11/10/23

# #

RELEASE OF TEST VEHICLE

The vehicle described above is released from MGA to be delivered to:

Date: Time: Odometer:

Lab Rep's Signature:

Title:

Carrier/Customer Rep:

Date:

DATA SHEET 3

CERTIFICATION LABEL AND TIRE PLACARD INFORMATION

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Chad Williams

NHTSA No.: C20234204
Test Date: 11/3/23

Certification Label (Part 567)	
Manufacturer:	Hyundai Motor Company
Date of Manufacture:	DEC/2022
VIN:	KM8KM4AE2PU167277
Vehicle Certified As (Pass. Car/MPV/Truck/Bus):	MPV
Front Axle GVWR:	1280 kg (2822 lbs)
Rear Axle GVWR:	1370 kg (3020 lbs)
Total GVWR:	2430 kg (5357 lbs)

Tire Placard for Motor Vehicles with GVWR of 10,000 lb or Less and Passenger Cars (571.110)	
Vehicle Capacity Weight:	390 kg (859 lbs)
Designated Seating Capacity Front:	2
Designated Seating Capacity Rear:	3
Total Designated Seating Capacity:	5
Recommended Cold Tire Inflation Pressure Front:	260 kpa (38 psi)
Recommended Cold Tire Inflation Pressure Rear:	260 kpa (38 psi)
Recommended Tire Size:	235/55R19
Tire Size on Vehicle:	235/55R19

Signature: Chad Williams Date: 11/3/23

DATA SHEET 32

VEHICLE WEIGHT, FUEL TANK, AND ATTITUDE DATA

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Chad Williams

NHTSA No.: C20234204
Test Date: 11/3/23

IMPACT ANGLE:	0°							
BELTED DUMMIES (YES/NO):	NO							
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph		
DRIVER DUMMY:	X		5th female			50th male		
PASSENGER DUMMY:	X		5th female			50th male		

NA	1.	Fill the transmission with transmission fluid to the satisfactory range.
NA	2.	Drain fuel from vehicle.
NA	3.	Run the engine until fuel remaining in the fuel delivery system is used and the engine stops.
NA	4.	Record the useable fuel tank capacity supplied by the COTR.
NA		Useable Fuel Tank Capacity supplied by COTR: Not Applicable Electric Vehicle
NA	5.	Record the fuel tank capacity supplied in the owner's manual.
NA		Useable Fuel Tank Capacity in owner's manual: Not Applicable Electric Vehicle
NA	6.	Using purple dyed Stoddard solvent having the physical and chemical properties of Type 1 solvent or cleaning fluid, Table 1, ASTM Standard D484-71, "Standard Specifications for Hydrocarbon Dry-cleaning Solvents," or gasoline, fill the fuel tank.
NA		Amount Added: Not Applicable Electric Vehicle
X	7.	Fill the coolant system to capacity.
X	8.	Fill the engine with motor oil to the Max. mark on the dip stick.
X	9.	Fill the brake reservoir with brake fluid to its normal level.
X	10.	Fill the windshield washer reservoir to capacity.
X	11.	Inflate the tires to the tire pressure on the tire placard. If no tire placard is available, inflate the tires to the recommended pressure in the owner's manual.

Tire placard pressure:	RF:	38 psi	LF:	38 psi	RR:	38 psi	LR:	38 psi
Owner's manual pressure:	RF:	38 psi	LF:	38 psi	RR:	38 psi	LR:	38 psi
Actual inflated pressure:	RF:	38 psi	LF:	38 psi	RR:	38 psi	LR:	38 psi

X	12.	Record the vehicle weight at each wheel to determine the unloaded vehicle weight (UVW), i.e. "as delivered" weight).

Right Front (kg):	449.5	Right Rear (kg):	518.9
Left Front (kg):	475.4	Left Rear (kg):	503.5
Total Front (kg):	924.9	Total Rear (kg):	1022.4
% Total Weight:	47.5	% Total Weight:	52.5
UVW = TOTAL FRONT PLUS TOTAL REAR (KG):			1947.3

X	13.	UVW Test Vehicle Attitude: (All dimensions in millimeters)
X	13.1	Mark a point on the vehicle above the center of each wheel.
X	13.2	Place the vehicle on a level surface.
X	13.3	Measure perpendicular to the level surface to the 4 points marked on the body and record the measurements.

RF:	790	LF:	786	RR:	803	LR:	806

X 14. Calculate the Rated Cargo and Luggage Weight (RCLW): 50 kg

X 14.1 Does the vehicle have the vehicle capacity weight (VCW) on the certification label or tire placard?

X [X] Yes, go to 14.3
[ ] No, go to 14.2

[ ] 14.2 VCW = Gross Vehicle Weight - UVW

VCW = _____ - _____ = _____

X 14.3 VCW = 390 kg (859 lbs)

X 14.4 Does the certification or tire placard contain the Designated Seating Capacity (DSC)?

[X] Yes, go to 14.6
[ ] No, go to 14.5 and skip 14.6

[ ] 14.5 DSC = Total number of seat belt assemblies = _____

X 14.6 DSC = 5

X 14.7 RCLW = VCW - (68 kg x DSC) = 390 kg - (68 kg x 5) = 50 kg

X 14.8 Is the vehicle certified as a truck, MPV or bus (see the certification label on the door jamb)?

[X] Yes, if the calculated RCLW is greater than 136 kg, use 136 kg as the RCLW. (S8.1.1)
[ ] No, use the RCLW calculated in 14.7

X 15. Fully Loaded Weight (100% fuel fill): 2094.7 kg

X 15.1 Place the appropriate test dummy in both front outboard seating positions.

Driver: X 5th female __ 50th male
Passenger: X 5th female __ 50th male

X 15.2 Load the vehicle with the RCLW from 14.7 or 14.8 whichever is applicable.

X 15.3 Place the RCLW in the cargo area. Center the load over the longitudinal centerline of the vehicle. (S8.1.1 (d))

X 15.4 Record the vehicle weight at each wheel to determine the Fully Loaded Weight.

Right Front (kg):	475.8	Right Rear (kg):	565.7
Left Front (kg):	500.3	Left Rear (kg):	552.9
Total Front (kg):	976.1	Total Rear (kg):	1118.6
% Total Weight:	46.6	% Total Weight:	53.4
% GVW	52.7	% GVW	56.4
(% GVW = Axle GVW divided by Vehicle GVW)			
Fully Loaded Weight = Total Front Plus Total Rear (kg):			2094.7

X 16. Fully Loaded Test Vehicle Attitude: (All dimensions in millimeters)

X 16.1 Place the vehicle on a level surface.

X 16.2 Measure perpendicular to the level surface to the 4 points marked on the body (see 13.1 above) and record the measurements.

RF:	787	LF:	782	RR:	800	LR:	802

NA 17. Drain the fuel system.

NA 18. Using purple dyed Stoddard solvent having the physical and chemical properties of Type 1 solvent or cleaning fluid, Table 1, ASTM Standard D484-71, "Standard Specifications for Hydrocarbon Dry-cleaning Solvents," fill the fuel tank to 92 - 94 percent of useable capacity.

NA Fuel tank capacity x .94 = 0 liters (0 gallons) Not Applicable Electric Vehicle

NA Amount added: 0 liters (0 gallons) Not Applicable Electric Vehicle

NA 19. Crank the engine to fill the fuel delivery system with Stoddard solvent.

X 20. Calculate the test weight range.

X 20.1 Calculated Weight = UVW (see 12 above) + RCLW (see 14 above) + 2x(dummy weight)

2095.3 kg = 1947.3 kg + 50.0 kg + 98.0 kg

X 20.2 Test Weight Range = Calculated Weight (- 4.5 kg, - 9 kg.)

Max. Test Weight = Calculated Test Weight - 4.5 kg = 2090.8 kg

Min. Test Weight = Calculated Test Weight - 9 kg = 2086.3 kg

X 21. Remove the RCLW from the cargo area.

X 22. Drain transmission fluid, engine coolant, motor oil, and windshield washer fluid from the test vehicle so that Stoddard solvent leakage from the fuel system will be evident.

X 23. Vehicle Components Removed For Weight Reduction:
Tire Repair Kit, Cargo Area Carpet and Organizer, Right Tail Light

X 24. Secure the equipment and ballast in the load carrying area and distribute it, as nearly as possible, to obtain the proportion of axle weight indicated by the gross axle weight ratings and center it over the longitudinal centerline of the vehicle.

X 25. If necessary, add ballast to achieve the actual test weight.

[ ] N/A

[X] Weight of Ballast: 23.6 kg

X 26. Ballast, including test equipment, must be contained so that it will not shift during the impact event or interfere with data collection or interfere with high-speed film recordings or affect the structural integrity of the vehicle or do anything else to affect test results. Care must be taken to assure that any attachment hardware added to the vehicle is not in the vicinity of the fuel tank or lines.

X 27. Record the vehicle weight at each wheel to determine the actual test weight.

Right Front (kg):	478.1	Right Rear (kg):	557.9
Left Front (kg):	502.6	Left Rear (kg):	549.8
Total Front (kg):	980.7	Total Rear (kg):	1107.7
% Total Weight:	47.0	% Total Weight:	53.0
% GVW	52.7	% GVW	56.4
(% GVW = Axle GVW divided by Vehicle GVW)			
TOTAL FRONT PLUS TOTAL REAR (kg):			2088.4

X 28. Is the test weight between the Max. Weight and the Min. Weight (See 20.2)?

[X] Yes

[ ] No, explain why not.

X 29. Test Weight Vehicle Attitude: (all dimensions in millimeters)

X 29.1 Place the vehicle on a level surface.

X 29.2 Measure perpendicular to the level surface to the 4 points marked on the body (see 13 above) and record the measurements.

RF:	788	LF:	782	RR:	801	LR:	803

X 30. Summary of test attitude

X 30.1 AS DELIVERED:

RF:	790	LF:	786	RR:	803	LR:	806

AS TESTED:

RF:	788	LF:	782	RR:	801	LR:	803

FULLY LOADED:

RF:	787	LF:	782	RR:	800	LR:	802

X 30.2 Is the “as tested” test attitude equal to or between the “fully loaded” and “as delivered” attitude?

X Yes

☐ No, explain why not.

REMARKS:

Signature: Chad Williams Date: 11/3/23

I certify that I have read and performed each instruction.

DATA SHEET 33

VEHICLE ACCELEROMETER LOCATION AND MEASUREMENT

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 11/3/23
Test Technician: Chad Williams

IMPACT ANGLE:	0°							
BELTED DUMMIES (YES/NO):	NO							
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph		
DRIVER DUMMY:	X	5^{th} female			50^{th} male			
PASSENGER DUMMY:	X	5^{th} female			50^{th} male			

X 1. Find the location where the vertical plane parallel to the longitudinal centerline of the vehicle and through the center of the left front outboard seating position intersects the left rear seat cross member. Install an accelerometer at this intersection on the rear seat cross member to record x-direction accelerations. Record the location on the following chart.

X 2. Find the location where the vertical plane parallel to the longitudinal centerline of the vehicle and through the center of the right front outboard seating position intersects the right rear seat cross member. Install an accelerometer at this intersection on the rear seat cross member to record x-direction accelerations. Record the location on the following chart.

X 3. Find the location where a vertical plane through the longitudinal centerline of the vehicle and a vertical transverse plane through the center of the two wheels on opposite sides of the engine intersect at the top of the engine. Install an accelerometer at this intersection to record x-direction accelerations. Record the location on the following chart.

X 4. Find the location where a vertical plane through the longitudinal centerline of the vehicle and a vertical transverse plane through the center of the two wheels on opposite sides of the engine intersect the bottom of the engine. Install an accelerometer at this intersection to record x-direction accelerations. Record the location on the following chart.

X 5. Install an accelerometer on the right front brake caliper to record x-direction accelerations. Record the location on the following chart.

X 6. Find the location where a vertical plane through the longitudinal centerline of the vehicle intersects the top of the instrument panel. Install an accelerometer at this intersection to record x-direction accelerations. Record the location on the following chart.

X 7. Install an accelerometer on the left front brake caliper to record x-direction accelerations. Record the location on the following chart.

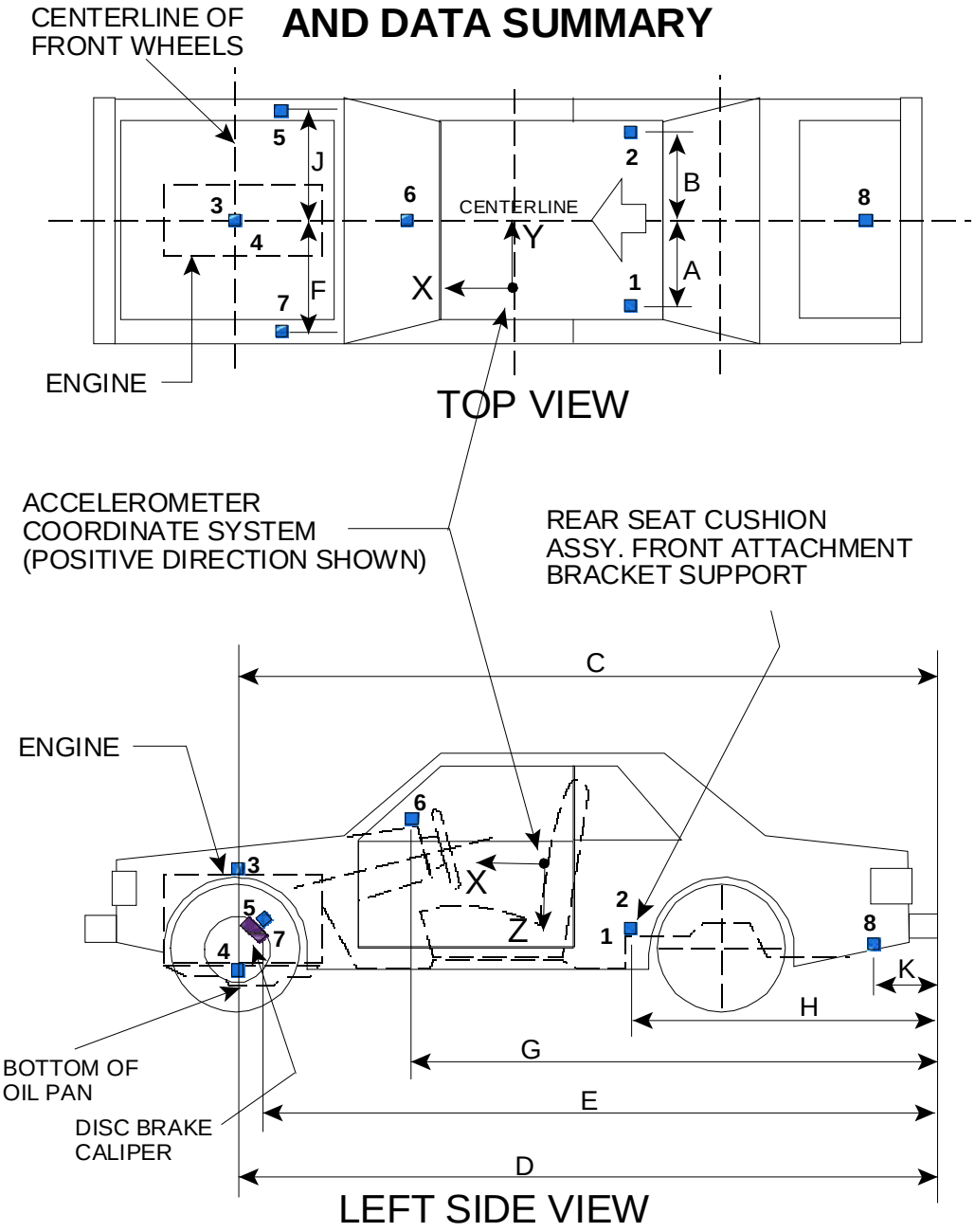
X 8. Find the location where a vertical plane through the longitudinal centerline of the vehicle intersects the floor of the trunk. Install an accelerometer on the trunk floor at this intersection to record z-direction accelerations. Record the location on the following chart.

REMARKS:

I certify that I have read and performed each instruction.

Signature: Chad Williams Date: 11/3/23

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



Dimensions Corresponding To The Letters “A” Through “K” (Excluding “I”) Are Recorded In The Table On The Following Page.
Accelerometers Corresponding To The Numbers 1 Through 8 Are Specified On The Preceding Page.

VEHICLE ACCELEROMETER LOCATION AND MEASUREMENTS

DIMENSION	LENGTH (mm)	
PRETEST VALUES		
A (LH Rear Seat Xmbr)	334	
B (RH Rear Seat Xmbr)	334	
C (Engine Top)	3846	
D (Engine Bottom)	3850	
E (Caliper)	Right Side: 3885	Left Side: 3885
F (Left Caliper)	732	
G (IP)	3091	
H (Seat)	1766	
J (Right Caliper)	732	
K (Trunk)	663	
POST TEST VALUES		
A (LH Rear Seat Xmbr)	334	
B (RH Rear Seat Xmbr)	334	
C (Engine Top)	3738	
D (Engine Bottom)	3740	
E (Caliper)	Right Side: 3780	Left Side: 3778
F (Left Caliper)	730	
G (IP)	3090	
H (Seat)	1766	
J (Right Caliper)	730	
K (Trunk)	663	

DATA SHEET 34

PHOTOGRAPHIC TARGETS

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Chad Williams

NHTSA No.: C20234204
Test Date: 11/3/23

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X		5th female			50th male	
PASSENGER DUMMY:	X		5th female			50th male	

X	1.	**FMVSS 208 vehicle targeting requirements** (See Figures 28A and 28B)
X	1.1	Targets A1 and A2 are on flat rectangular panels.
X	1.2	Three circular targets at least 90 mm in diameter and with black and yellow quadrants are mounted at the front on the outboard sides of A1 and A2. The center of each circular target is 100 mm from the one next to it.
X		Distance between targets (mm): 100 mm
X	1.3	Three circular targets at least 90 mm in diameter and with black and yellow quadrants are mounted at the back on the outboard sides of on A1 and A2. The center of each circular target is 100 mm from the one next to it.
X		Distance between targets (mm): 100 mm
X	1.4	The distance between the first circular target at the front of A1 and A2 and the last circular target at the back of A1 and A2 is at least 915 mm.
X		Distance between the first and last circular targets (mm): 915 mm
X	1.5	Firmly fix target A1 on the vehicle roof in the vertical longitudinal plane that is coincident with the midsagittal plane of the driver dummy.
X	1.6	Firmly fix target A2 on the vehicle roof in the vertical longitudinal plane that is coincident with the midsagittal plane of the passenger dummy.
X	1.7	Two circular targets (C1 and C2) at least 90 mm in diameter and with black and yellow quadrants are mounted on the outside of the driver door. The centers of each circular target are at least 610 mm apart.
X		Distance between targets (mm): 610 mm
X	1.8	Two circular targets (C1 and C2) at least 90 mm in diameter and with black and yellow quadrants are mounted on the outside of the passenger door. The centers of each circular target are at least 610 mm apart.
X		Distance between targets (mm): 610 mm
X	1.9	Place tape with squares having alternating colors on the top portion of the steering wheel.
X	1.10	Chalk the bottom portion of the steering wheel.
X	1.11	Is this an offset test?
		Yes, continue with this section
X		**No, go to 2.**
	1.12	Measure the width of the vehicle.
		Vehicle width (mm):
	1.13	Find the centerline of the vehicle. (½ of the vehicle width)
	1.14	Find the line parallel to the centerline of the vehicle and 0.1 x vehicle width from the centerline of the vehicle.
	1.15	Apply 25 mm wide tape with alternating black and yellow squares parallel to and on each side of the line found in 1.14. The edge of each tape shall be 50 mm from the line found in 1.14. The tape shall extend from the bottom of the bumper to the front edge of the windshield. (Figure 28D)

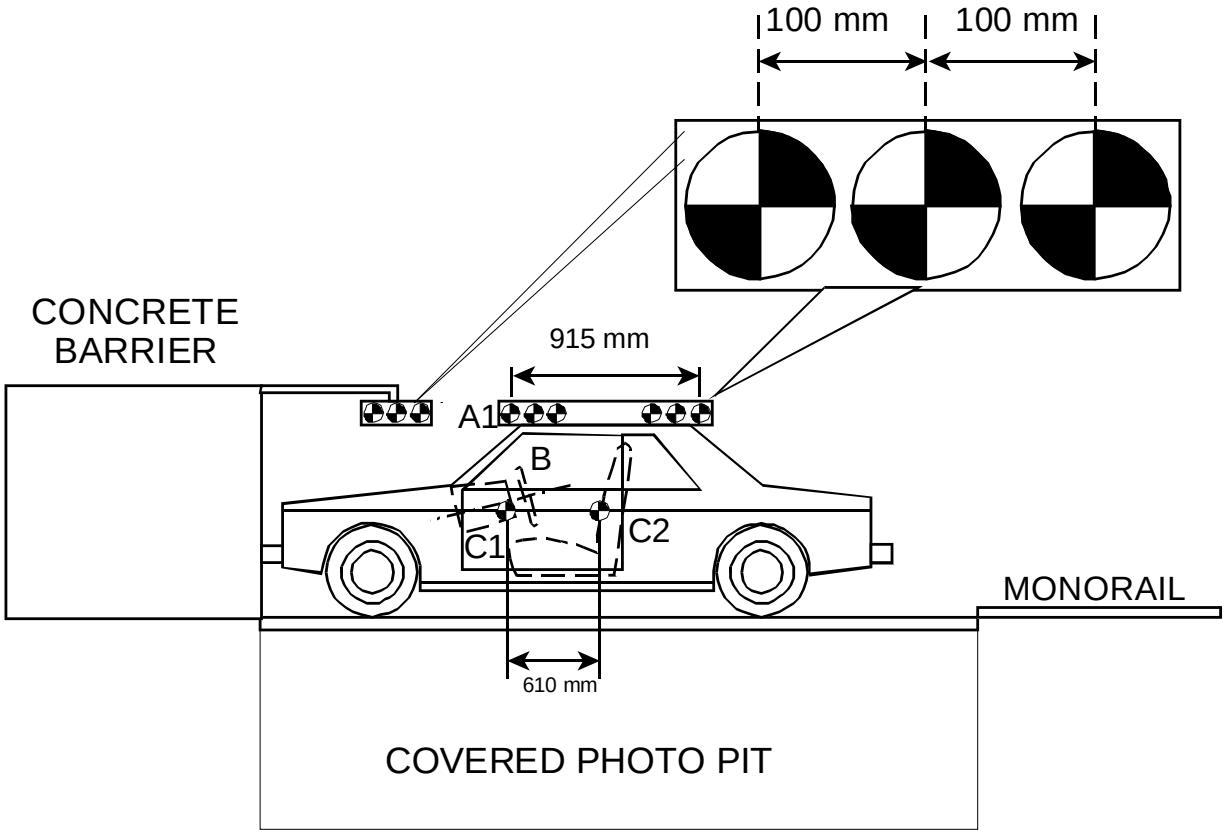
X	2.	**Barrier Targeting**
X	2.1	Fix two stationary targets D1 and D2 to the barrier as shown in the Figure 28A. One target is in the vertical longitudinal plane that is coincident with the midsagittal plane of the driver dummy. The other is in the vertical longitudinal plane that is coincident with the midsagittal plane of the passenger dummy.
X	2.2	Targets D1 and D2 are on a rectangular panel.
X	2.3	Three circular targets at least 90 mm in diameter and with black and yellow quadrants are mounted on the sides of the rectangular panel away from the longitudinal centerline of the vehicle. The center of each circular target is 100 mm from the one next to it.
X		Distance between circular targets on D1 (mm): 100 mm
X		Distance between circular targets on D2 (mm): 100 mm
X	3.	**FMVSS 208 Dummy Targeting Requirements**
X	3.1	Place a circular target with black and yellow quadrants on both sides of the driver dummy head as close as possible to the center of gravity of the head in the x and z direction (relative to the measuring directions of the accelerometers).
X	3.2	Place a circular target with black and yellow quadrants on both sides of the passenger dummy head as close as possible to the center of gravity of the head in the x and z direction (relative to the measuring directions of the accelerometers).
X	3.3	Place a circular target with black and yellow quadrants on the outboard shoulder of the driver dummy. Place the target as high up on the arm as possible at the intersection of the arm and shoulder. The sleeve of the shirt on the dummy may be cut to make the target visible, but do not remove any material.
X	3.4	Place a circular target with black and yellow quadrants on the outboard shoulder of the passenger dummy. Place the target as high up on the arm as possible at the intersection of the arm and shoulder. The sleeve of the shirt on the dummy may be cut to make the target visible, but do not remove any material.
X	4.	**FMVSS 204 Targeting Requirements**
X	4.1	Is an FMVSS 204 indicant test ordered on the "COTR Vehicle Work Order?"
		☐ Yes, continue with this form.
		X No, this form is complete.
	4.2	Resection panel (Figure 28C)
	4.2.1	The panel deviates no more than 6 mm from perfect flatness when suspended vertically
	4.2.2	The 8 targets on the panel are circular targets at least 90 mm in diameter and with black and yellow quadrants.
	4.2.3	The center of each of the 4 outer targets are placed within 1 mm of the corners of a square measuring 914 mm on each side.
	4.2.4	Locate another square with 228 mm sides and with the center of this square coincident with the center of the 914 mm square.
	4.2.5	The center of the 4 inner targets are placed at the midpoints of each of the 228 mm sides.
	4.3	Place a circular target at least 90 mm in diameter and with black and yellow quadrants on a material (cardboard, metal, etc.) that can be taped to the top of the steering column.
	4.4	Tape the target from 4.3 to the top of the steering column in a manner that does not interfere with the movement of the steering column in a crash.

REMARKS:

Signature: Chad Will Date: 11/3/23

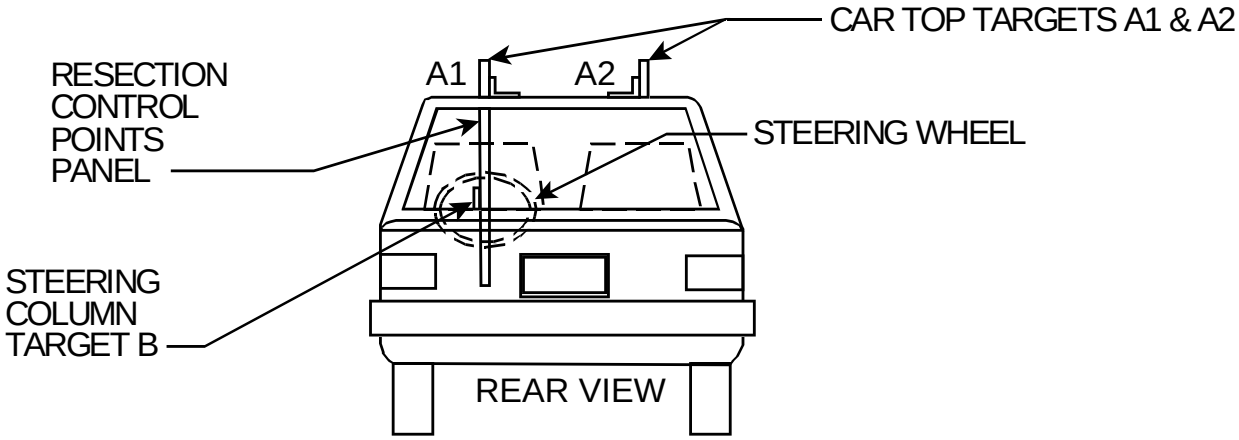
I certify that I have read and performed each instruction.

REFERENCE PHOTO TARGETS

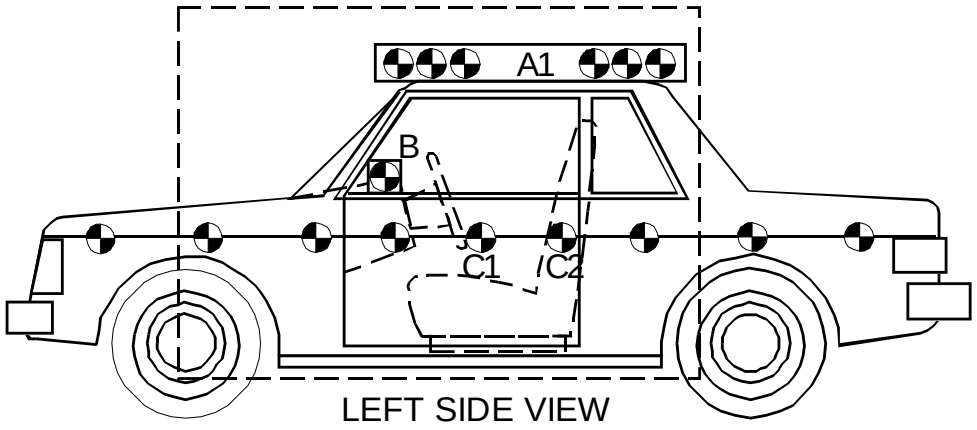


LEFT SIDE VIEW

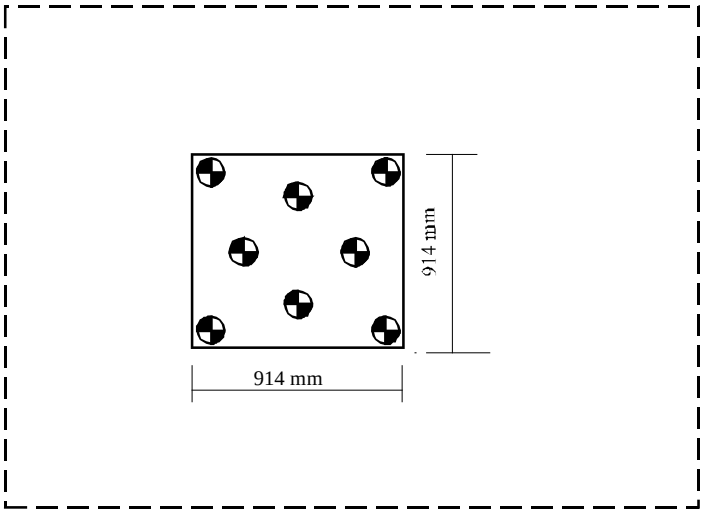
RESECTION PANEL TARGETING ALIGNMENT



TEST RUN STEERING COLUMN CAMERA VIEW OF TYPICAL TIME ZERO VEHICLE POSITION



PRE-RUN STEERING COLUMN HIGH SPEED CAMERA VIEW



LEFT SIDE VIEW

DATA SHEET 35

CAMERA LOCATIONS

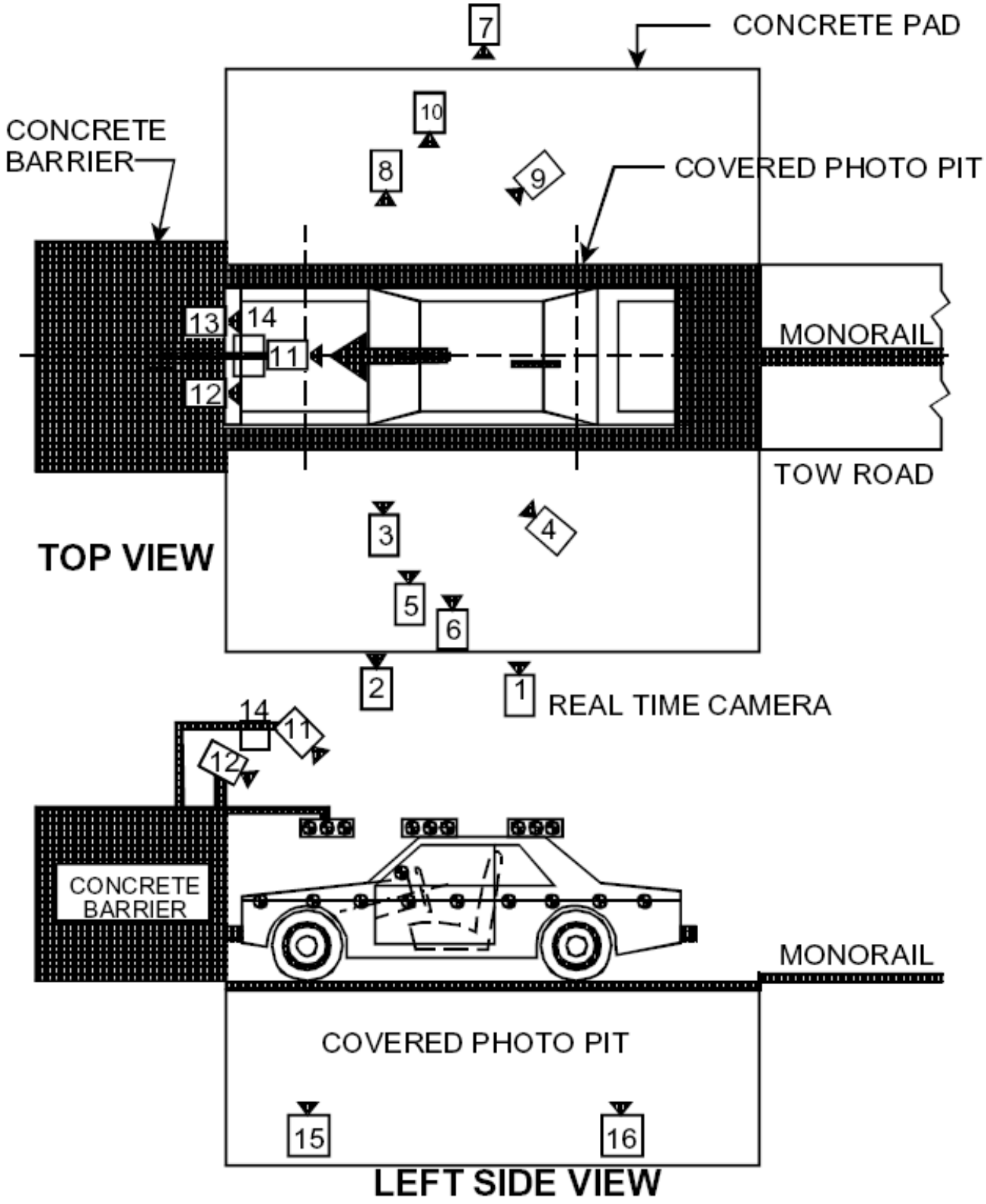
Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance

NHTSA No.: C20234204
Test Date: 11/3/23
Time: 10:20 am

CAMERA NO.	VIEW	CAMERA POSITIONS (mm) *			LENS (mm)	SPEED (fps)
		X	Y	Z		
1	Real Time Left Side View				13	30
2	Left Side View (Barrier face to front seat backs)	1310	-5230	1450	24	1000
3	Left Side View (Driver)	1530	-7150	1830	50	1000
4	Left Side View (B-post aimed toward center of steering wheel)	7560	-5850	1970	75	1000
5	Left Side View (Steering Column)	990	-5480	1220	50	1000
6	Left Side View (Steering Column)	900	-5480	780	50	1000
7	Right Side View (Overall)	2160	6190	1570	16	1000
8	Right Side View (Passenger)	1260	6900	1930	50	1000
9	Right Side View (Angle)	7610	5480	1900	75	1000
10	Right Side View (Front door)	970	5480	1410	24	1000
11	Front View Windshield	-110	0	2310	11	1000
12	Front View Driver	-70	-370	2230	25	1000
13	Front View Passenger	-70	370	2230	25	1000
14	Overhead Barrier Impact View	3030	0	6820	11	1000
15	Pit Camera Engine View	1050	0	-3340	24	1000
16	Pit Camera Fuel Tank View	3160	0	-3340	24	1000

*COORDINATES:
+X - forward of impact plane
+Y - right of monorail centerline
+Z - above ground level

CAMERA POSITIONS FOR FMVSS 208



DATA SHEET 36 - APPENDIX G

DUMMY POSITIONING PROCEDURES

FOR 5th PERCENTILE FEMALE DRIVER TEST DUMMY CONFORMING TO SUBPART O OF PART 572

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 11/3/23
Test Technician: Dane Wieting

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X	5th female			50th male		
PASSENGER DUMMY:	X	5th female			50th male		

1. Seat Position

X 1.1 Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment positions. (S16.2.10.1, S20.1.9.1, S20.4.1, S22.1.7.1)
__N/A – No lumbar adjustment

X 1.2 Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position. (S16.2.10.2, S20.1.9.2, S20.4.1, S22.1.7.1, S22.4.2.1, S22.4.3.1, S24.4.2.1, S26.2.3, S26.3.1)
X N/A – No additional support adjustment

X 1.3 Position an adjustable leg support system in its rearmost position. (8/27/04 interpretation to Toyota)
X N/A – No adjustable leg support system

X 1.4 **Mark** a point (seat cushion reference point) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion. (S16.3.1.12)

X 1.5 Draw a line (seat cushion reference line) through the seat cushion reference point. (S16.3.1.13)

X 1.6 Use only the controls that primarily move the seat in the fore-aft direction to move the seat cushion reference point to the rearmost position. (S16.2.10.3.1, S22.1.7.3)

X 1.7 If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the seat cushion reference point to the rearmost position. (S16.2.10.3.1, S20.1.9.3)
X N/A – No independent fore-aft seat cushion adjustment

X 1.8 Use any part of any control, other than the parts just used for fore-aft positioning, to determine the range of angles of the seat cushion reference line and to set the seat cushion reference line at the mid-angle. (S16.2.10.3.1)
Maximum angle: 21.5°
Minimum angle: 11.7°
Mid-angle: 16.6°

X 1.9 If the seat and/or seat cushion height is adjustable, use any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, to put the seat cushion reference point in its lowest position with the seat cushion reference line angle at the mid-angle found in 1.8. (S16.2.10.3.1)
__N/A – No seat height adjustment

X 1.10 Use only the controls that primarily move the seat in the fore-aft direction to verify the seat is in the rearmost position.

X 1.11 Use only the controls that primarily move the seat in the fore-aft direction to **mark** the fore-aft seat positions. **Mark** each position so that there is a visual indication when the seat is at a particular position. For manual seats, move the seat forward one detent at a time and **mark** each detent. For power seats, **mark** only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the closest adjustment position to the rear of the mid-point), and R for rearmost.

X 1.12 Use only the controls that primarily move the seat in the fore-aft direction to place the seat in the rearmost position.

X 1.13 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.8. (S20.1.9.4, S22.1.2, S22.1.7.4, S22.3.1, S22.4.3.1, S24.1.2, S24.3.1, S24.4.3.1, S26.2.3, S26.3.1)
__N/A – No seat height adjustment. Go to 1.18

X 1.14 Use only the controls that primarily move the seat and/or seat cushion in the fore-aft direction to place the seat in the mid-fore-aft position.

X 1.15 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.8. (S20.1.9.4, S22.1.2, S22.1.7.4, S22.3.1, S24.1.2, S24.3.1)

X 1.16 Use only the control that change the seat in the fore-aft direction to place the seat in the foremost position. (S16.2.10.3.2)

X 1.17 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.8. (S16.2.10.3.3, S20.1.9.4, S22.1.2, S22.1.7.4, S22.3.1, S24.1.2, S24.3.1)

X 1.18. Is the seat a bucket seat?
X Yes, go to 1.19 and skip 1.20
__No, go to 1.20 and skip 1.19

X 1.19 Bucket seats:
Locate and **mark** for future reference the longitudinal centerline of the seat cushion. The intersection of the vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface determines the longitudinal centerline of a bucket seat cushion. (S16.3.1.10 & S20.1.10)

__1.20 Bench seats (complete ONLY the one that is applicable to the seat being marked): Locate and **mark** for future reference the longitudinal line on the seat cushion that marks the intersection of the vertical longitudinal plane through the centerline of the steering wheel and the seat cushion upper surface.

2. Head Restraint Position

__N/A Vehicle contains automatic head restraints.
__N/A, there is no head restraint adjustment Go to 3

_X_ 2.1 Adjust the head restraint to its lowest position. (S16.2.10.2, S20.1.9.6, S20.4.1, S22.1.7.6, S22.4.2.1, S22.4.3.1, S24.4.3.1, S26.2.3, S26.3.1)

_X_ 2.2 All adjustments of the head restraint shall be used to position it full forward. For example, if it rotates, rotate it such that the head restraint extends as far forward as possible. **Mark** the foremost position. (S16.2.10.2 & S16.3.4.4 & S20.1.9.6, S20.4.1, S22.4.2.1, S22.4.3.1, S24.4.3.1, S26.2.3, S26.3.1)

_X_ 2.3 Measure the vertical distance from the top most point of the head restraint to the bottom most point. Locate and **mark** a horizontal plane through the midpoint of this distance. (S16.3.4.3)

Vertical height of head restraint: 200 mm
Mid-point height: 100 mm

_X_ 3. Is the **steering wheel** adjustable up and down and/or in and out?

_X_ Yes – go to 3.1
__No – Go to 4

_X_ 3.1. Find and **mark** for future reference each up and down position. Label three of the positions with the following: H for highest, M for mid-position (if there is no mid-position, label the next lowest adjustment position), and L for lowest.
__N/A – steering wheel is not adjustable up and down

_X_ 3.2. Find and **mark** for future references each in and out position. Label three of the Positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the next rearmost adjustment position), and R for rearmost.
__N/A – steering wheel is not adjustable in and out.

_X_ 3.3. Use the markings to position the steering controls in the mid-position or if applicable next lowest detent position. (S16.2.9)

_X_ 4. Place the SCRP in the full rearward, mid-height position, and mid-seat cushion angle, determined in Item 1. (S16.3.2.1.1)

_X_ 5. If the vehicle has an adjustable accelerator pedal, place it in the full forward position. (S16.3.2.2.1)
_X_ N/A accelerator pedal not adjustable

_X_ 6. Fully recline the seat back. (S16.3.2.1.2)
__ N/A seat back not adjustable.

_X_ 7. Place the dummy in the seat with the legs at an angle of 120 degrees to the thighs. The calves should not be touching the seat cushion. (S16.3.2.1.2)

_X_ 8. Position the dummy in the seat such that the midsagittal plane is coincident with the longitudinal seat cushion markings as determined in Item 1.19 or 1.20. (S16.3.2.1.3 and S16.3.2.1.4)

X 9. Hold down the dummy's thighs and push rearward on the upper torso to maximize the pelvic angle. (S16.3.2.1.5)

X 10. Set the angle between the legs and the thighs to 120 degrees. (S16.3.2.1.6)

X 11. Set the transverse distance between the centers of the front of the knees at 160 to 170 mm. (6.3 to 6.7 inches) Center the knee separation with respect to the longitudinal seat cushion marking as determined in Item 1.19 or 1.20. (S16.3.2.1.6)

Record Knee Separation: 165 mm

X 12. Push rearward on the dummy's knees until the pelvis contacts the seat back, or the backs of the calves contact the seat cushion, whichever occurs first. (S16.3.2.1.6)

__ Pelvis contacted seat back.

X Calves contacted seat cushion.

X 13. Gently rock the upper torso ± 5 degrees (approximately 51 mm (2 inches)) side-to-side three times. (S16.3.2.1.7)

X 14. If needed, extend the legs until the feet do not contact the floor pan. The thighs should be resting on the seat cushion. (S16.3.2.1.8)

X 15. Position the right foot until the foot is in line with a longitudinal vertical plane passing through the center of the accelerator pedal. Maintain the leg and thigh in a vertical plane. (S16.3.2.1.8)

X 16. Rotate the left leg and thigh laterally to equalize the distance between each knee and the longitudinal seat cushion marking as determined in Item 1.19 or 1.20. (S16.3.2.1.8)

X 17. Attempt to return the seat to the foremost fore-aft position, mid-height, and seat cushion mid-angle as determined in Item 1. The foot may contact and depress the accelerator and/or change the angle of the foot with respect to the leg. (S16.3.2.1.8)

X Foremost position achieved. Proceed to step 22.

__ Foremost not achieved because of foot interference. Proceed to step 19.

__ Foremost not achieved because of steering wheel contact.

__ 18. If either of the dummy's legs contact the steering wheel, move the steering wheel up the minimum amount required to avoid contact. If the steering wheel is not adjustable separate the knees the minimum required to avoid contact. (S16.3.2.1.8)

__N/A- there was no leg contact

__Steering wheel repositioned

__Knees separated

__19. If the left foot interferes with the clutch or brake pedals, rotate the left foot about the leg to provide clearance. If this is not sufficient, rotate the thigh outboard at the hip the minimum amount required for clearance. (S16.3.2.1.8)

__ N/A, No foot interference with pedals.

__ Foot adjusted to provide clearance.

__ Foot and Thigh adjusted to provide clearance.

__20. Continue to move the seat. Use seat controls to line up the seat markings determined during item 1 to set the foremost fore-aft position, mid-height position and the seat cushion mid-angle. If the dummy contacts the interior move the seat rearward until a maximum clearance of 5 mm (0.2 inches) is achieved or the seat is in the closest detent position that does not cause dummy contact. (S16.3.2.1.8)
__Foremost, mid-height position and the seat cushion mid-angle reached
__Dummy contact. Clearance set at maximum of 5 mm
Measured Clearance:_____
__Dummy Contact. Seat set at nearest detent position.
Seat position: ___ detent positions rearward of foremost
(foremost is position zero)

__21. If the steering wheel was repositioned in step 18, return the steering wheel to the original position. If the steering wheel contacts the dummy before reaching the original position, position the wheel until a maximum clearance of 5 mm (.2 inches) is achieved, or the steering wheel is in the closest detent position that does not cause dummy contact. (S16.3.2.1.8)
__N/A Steering wheel was not repositioned.
__Original position achieved.
__Dummy contact. Clearance set at maximum of 5 mm
Measured Clearance:_____
__Dummy Contact. Steering wheel set at nearest detent position.
Steering wheel position: ___ detent positions upward of original position.
(Original position is position zero)

_X_22. If the seat back is adjustable, rotate the seat back forward while holding the thighs in place. Continue rotating the seat back forward until the transverse instrument platform of the dummy head is level ± 0.5 degrees. If the head cannot be leveled using the seat back adjustment, or the seat back is not adjustable, use the lower neck bracket adjustment to level the head. If a level position cannot be achieved, minimize the angle. (S16.3.2.1.9)
_X_Head Level Achieved. (Check all that apply)
_X_Head leveled using the adjustable seat back
__Head leveled using the neck bracket.
Head Angle: _0.0_ degrees
__Head Level NOT Achieved. (Check all that apply)
__Head adjusted using the adjustable seat back
__Head adjusted using the neck bracket.
Head Angle: _____ degrees

_X_23. Verify the pelvis is not interfering with the seat bight. (S16.3.2.1.9)
_X_No interference
__Pelvis moved forward the minimum amount so that it is not caught in the seat bight.

_X_24. Verify the dummy abdomen is properly installed. (S16.3.2.1.9)
_X_Abdomen still seated properly into dummy
__Abdomen was adjusted because it was not seated properly into dummy

_X_25. Head Angle
_X_N/A, neither the pelvis nor the abdomen were adjusted.

_X_25.1 Head still level (Go to 26)

__25.2 Head level adjusted
__Head Level Achieved. (Check all that apply)
__Head leveled using the adjustable seat back
__Head leveled using the neck bracket.
Head Angle: _____ degrees
__Head Level NOT Achieved. (Check all that apply)
__Head level adjusted using the adjustable seat back
__Head level adjusted using the neck bracket.
Head Angle: _____ degrees

_X_ 26. If the dummy torso contacts the steering wheel while performing step 22, reposition the steering wheel in the following order to eliminate contact. (S16.3.2.1.9)
_X_ N/A, No dummy torso contact with the steering wheel.

__26.1 Adjust telescoping mechanism.
__N/A No telescoping adjustment.
__Adjustment performed (fill in appropriate change)
Steering wheel moved ____ detent positions in the forward direction.
Steering wheel moved ____ mm in the forward direction.

__26.2 Adjust tilt mechanism.
__N/A No tilt adjustment.
__No adjustment performed.
__Adjustment performed. (circle one)
Steering wheel moved ____ detent positions Upward/Downward.
Steering wheel moved ____ degrees Upward/Downward

__26.3 Adjust Seat in the aft direction.
__No Adjustment performed.
__Seat moved aft ___ mm from original position.
__Seat moved aft ___ detent positions from the original position.

_X_ 27. Measure and set the pelvic angle using the pelvic angle gage TE-2504. The pelvic angle should be 20.0 degrees ± 2.5 degrees. If the pelvic angle cannot be set to the specified range because the head will not be level or because the dummy will have need major repositioning, adjust the pelvis as closely as possible to the angle range, but keep the head level. (S16.3.2.1.11)
_X_ Pelvic angle set to 20.0 degrees ± 2.5 degrees.
__Pelvic angle of 20.0 degrees not achieved, the angular difference was minimized.
_X_ Record the pelvic angle: 21.0 degrees

_X_ 28. Check the dummy for contact with the interior after completing adjustments. (S16.3.2.1.12)
_X_ No contact.
__Dummy in contact with interior.
__Seat moved aft ___ mm from the previous position.
__Seat moved aft ___ detent positions from the previous position.

_X_ 29. Check the dummy to see if additional interior clearance is obtained, allowing the seat to be moved forward. (S16.3.2.1.12)
_X_ N/A, Seat already at foremost position.
__Clearance unchanged. No adjustments required.
__Additional clearance available
__Seat moved Forward ___ mm from the previous position.
__Seat moved Forward ___ detent positions from the previous position.

_X_ 30. Driver's foot positioning, right foot. Place the foot perpendicular to the leg and determine if the heel contacts the floor pan at any leg position. If the heel contacts the floor pan proceed to step 31 otherwise, proceed to step 32. (S16.3.2.2.1)

_X_ 31. Perform the following steps until either all steps are completed, or the foot contacts the accelerator pedal. Step 31.6 shall be completed in all cases. (S16.3.2.2.1(a))

_X_ 31.1 With the rear of the heel contacting the floor pan, move the foot forward until pedal contact occurs or the foot is at the full forward position.

__ 31.2 If the vehicle has an adjustable accelerator pedal, move the pedals rearward until pedal contact occurs or the pedals reach the full rearward position.

__ 31.3 Extend the leg, allowing the heel to lose contact with the floor until the foot contacts the pedal. Do not raise the toe of the foot higher than the top of the accelerator pedal. If the foot does not contact the pedal, proceed to the next step. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.3)

__ 31.4 Angle the foot to achieve contact between the foot and the pedal. If the foot does not contact the pedal, return the foot to the perpendicular orientation. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.3)

__ 31.5 Align the centerline of the foot with the vertical-longitudinal plane passing through the center of the accelerator pedal. Place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.3)

_X_ 31.6 Record foot position

_X_ Pedal Contact achieved. Contact occurred at step 31.1

_X_ Heel contacts floor pan

__ Heel set _____ mm from floor pan.

__ Pedal Contact not achieved. Heel set _____ mm from the floor pan.

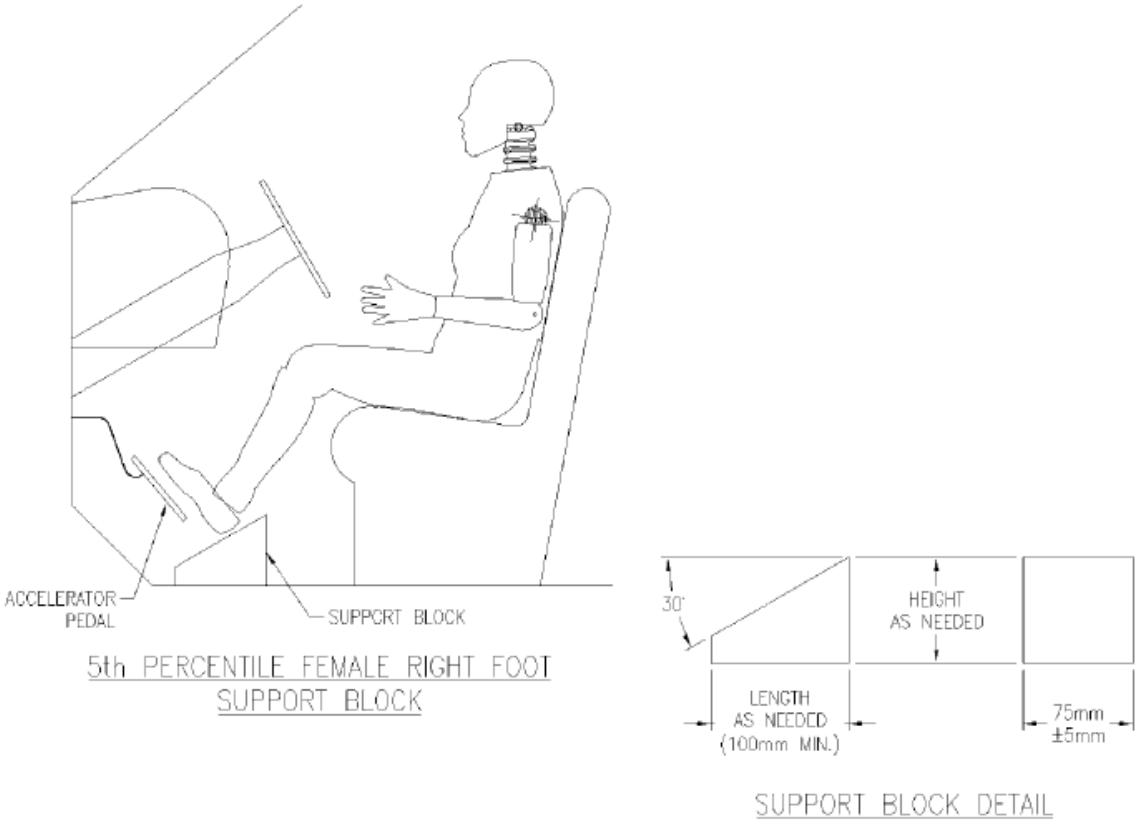


FIGURE G1

_X_ 32. Perform the following steps until either all steps are completed, or the foot contacts the accelerator pedal. Step 32.5 shall be completed in all cases.

__32.1 Extend the leg until the foot contacts the pedal. Do not raise the toe of the foot higher than the top of the accelerator pedal. If the foot does not contact the pedal, proceed to the next step. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.1(b) & S16.3.2.2.3)

__32.2 If the vehicle has an adjustable accelerator pedal, move the pedals rearward until pedal contact occurs or the pedals reach the full rearward position. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.1(b) & S16.3.2.2.3)

__N/A No pedal adjustment

__32.3 Angle the foot to achieve contact between the foot and the pedal. If the foot does not contact the pedal, return the foot to the perpendicular orientation. If pedal contact does occur, place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.2 & S16.3.2.2.3)

__32.4 Align the centerline of the foot in the same horizontal plane as the centerline of the accelerator pedal. Place a tapered foam block as shown in Figure G1 under the heel with the shallow part of the taper facing forward. (S16.3.2.2.3)

_X_ 32.5 Record foot position

_X_ Pedal Contact achieved. Contact occurred at step _31.1_ .

__ Heel set _____ mm from floor pan.

__Pedal Contact not achieved. Heel set ___ mm from the floor pan.

_X_ 33. Driver's foot positioning, left foot.

_X_ 33.1 Place the foot perpendicular to the leg and determine if the heel contacts the floor pan at any leg position. If the heel contacts the floor pan proceed to step 33.2, otherwise position the leg as perpendicular to the thigh as possible with the foot parallel to the floor pan. (S16.2.2.6)

_X_ 33.2 Place the foot on the toe board with the heel resting on the floor pan as close to the intersection of the floor pan and the toe board as possible. Adjust the angle of the foot if necessary to contact the toe board. If the foot will not contact the toe board, set the foot perpendicular to the leg, and set the heel on the floor pan as far forward as possible. Avoid contact with the brake pedal, clutch pedal, wheel well projection, and footrest. To avoid this contact use the following three manipulations in the order listed, with each subsequent option incorporating the previous, until contact is avoided: rotate the foot about the lower leg (abduction/adduction), plantar flex the foot, rotate the leg outboard about the hip. Movement should be the minimum amount necessary. If it is not possible to avoid all foot contact, give priority to avoiding brake or clutch pedal contact. (S16.2.2.4 & S16.2.2.5 & S16.2.2.7)

_X_ No contact
__ Foot rotated about the leg (abduction/adduction)
__ Foot rotated about the leg, and foot plantar flexed
__ Foot rotated about the leg, foot plantar flexed, and the leg rotated about the hip.

_X_ 33.3 Record foot position.

__ Heel does not contact floor pan.
__ Heel on floor pan and foot on toe board.
_X_ Heel on floor pan and foot not on toe board.

_X_ 34. Driver arm/hand positioning.

_X_ 34.1 Place the dummy's upper arms adjacent to the torso with the arm centerlines as close to a vertical longitudinal plane as possible. (S16.3.2.3.1)

_X_ 34.2 Place the palms of the dummy in contact with the outer part of the steering wheel rim at its horizontal centerline with the thumbs over the steering wheel rim. (S16.3.2.3.2)

_X_ 34.3 If it is not possible to position the thumbs inside the steering wheel rim at its horizontal centerline, then position them above and as close to the horizontal centerline of the steering wheel rim as possible. (S16.3.2.3.3)

_X_ 34.4 Lightly tape the hands to the steering wheel rim so that if the hand of the test dummy is pushed upward by a force of not less than 9 N (2 lb) and not more than 22 N (5 lb), the tape releases the hand from the steering wheel rim. (S16.3.2.3.4)

_X_ 35. Adjustable head restraints
__ N/A, there is no head restraint adjustment

__ 35.1 If the head restraint has an automatic adjustment, leave it where the system positions the restraint after the dummy is placed in the seat. (S16.3.4.1) Go to 36.

__ 35.2 Adjust each head restraint vertically so that the mid-horizontal plane determined in Item 2 is aligned with the center of gravity (CG) of the dummy head. (S16.3.4.3)

_X_ 35.3 If the above position is not attainable, move the vertical center of the head restraint to the closest detent below the center of the head CG. (S16.3.4.3)

__N/A midpoint position attained in previous step

_X_ Headrest set at nearest detent below the head CG

_X_ 35.4 If the head restraint has a fore and aft adjustment, place the restraint in the foremost position or until contact with the head is made, whichever occurs first. (S16.3.4.4)

_X_ 36. Driver and passenger manual belt adjustment (for tests conducted with a belted dummy). (S16.3.5)

X N/A Dummies are unbelted for this test.

X 36.1 If an adjustable seat belt D-ring anchorage exists, place it in the manufacturer's design position for a 5th percentile adult female. (S16.3.5.1) **This information will be supplied by the COTR.**

Manufacturer's specified position: 0 of 4; Upper-most defined as 0

Actual Position: 0 of 4; Upper-most defined as 0

__36.2 Place the Type 2 manual belt around the test dummy and fasten the latch. (S16.3.5.2)

__36.3 Ensure that the dummy's head remains as level as possible. (S16.3.5.3)

__36.4 Remove all slack from the lap belt. Pull the upper torso webbing out of the retractor and allow it to retract; repeat this operation four times. Apply a 9 N (2 lbf) to 18 N (4 lbf) tension load to the lap belt. If the belt system is equipped with a tension-relieving device, introduce the maximum amount of slack into the upper torso belt that is recommended by the manufacturer. If the belt system is not equipped with a tension-relieving device, allow the excess webbing in the shoulder belt to be retracted by the retractive force of the retractor. (S16.3.5.4)

I certify that I have read and performed each instruction.

Signature: DWj Date: 11/3/23

DATA SHEET 36 - APPENDIX G

DUMMY POSITIONING PROCEDURES

FOR 5th PERCENTILE FEMALE PASSENGER TEST DUMMY CONFORMING TO SUBPART O OF PART 572

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 3/4/20
Test Technician: Dane Wieting

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X		5th female			50th male	
PASSENGER DUMMY:	X		5th female			50th male	

__**The passenger seat adjustments are controlled by the adjustments made to the driver's seat. Therefore, positioning of the passenger dummy is made simultaneously with the driver dummy. Adjustments made to the seat to position the driver will override any adjustments that would normally be made to position the passenger. (S16.2.10.3)**

1. Seat Position

X 1.1 Position the seat's adjustable lumbar supports so that the lumbar supports are in the lowest, retracted or deflated adjustment positions. (S16.2.10.1, S20.1.9.1, S20.4.1, S22.1.7.1)
X N/A – No lumbar adjustment

X 1.2 Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position. (S16.2.10.2, S20.1.9.2, S20.4.1, S22.1.7.1, S22.4.2.1, S22.4.3.1, S24.4.2.1, S26.2.3, S26.3.1)
X N/A – No additional support adjustment

X 1.3 Position an adjustable leg support system in its rearmost position. (8/27/04 interpretation to Toyota)
X N/A – No adjustable leg support system

X 1.4 **Mark** a point (seat cushion reference point) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion. (S16.3.1.12)

X 1.5 Draw a line (seat cushion reference line) through the seat cushion reference point. (S16.3.1.13)

X 1.6 Use only the controls that primarily move the seat in the fore-aft direction to move the seat cushion reference point to the rearmost position. (S16.2.10.3.1, S22.1.7.3)

X 1.7 If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the seat cushion reference point to the rearmost position. (S16.2.10.3.1, S20.1.9.3)
X N/A – No independent fore-aft seat cushion adjustment

X 1.8 Use any part of any control, other than the parts just used for fore-aft positioning, to determine the range of angles of the seat cushion reference line and to set the seat cushion reference line at the mid-angle. (S16.2.10.3.1)

Maximum angle: 15.6°
Minimum angle: 12.2°
Mid-angle: 13.9°

X 1.9 If the seat and/or seat cushion height is adjustable, use any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, to put the seat cushion reference point in its lowest position with the seat cushion reference line angle at the mid-angle found in 1.8. (S16.2.10.3.1)

___ N/A – No seat height adjustment

X 1.10 Use only the controls that primarily move the seat in the fore-aft direction to verify the seat is in the rearmost position.

X 1.11 Use only the controls that primarily move the seat in the fore-aft direction to **mark** the fore-aft seat positions. **Mark** each position so that there is a visual indication when the seat is at a particular position. For manual seats, move the seat forward one detent at a time and **mark** each detent. For power seats, **mark** only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the closest adjustment position to the rear of the mid-point), and R for rearmost.

X 1.12 Use only the controls that primarily move the seat in the fore-aft direction to place the seat in the rearmost position.

X 1.13 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.8. (S20.1.9.4, S22.1.2, S22.1.7.4, S22.3.1, S22.4.3.1, S24.1.2, S24.3.1, S24.4.3.1, S26.2.3, S26.3.1)

___ N/A – No seat height adjustment. Go to 1.18

X 1.14 Use only the controls that primarily move the seat and/or seat cushion in the fore-aft direction to place the seat in the mid-fore-aft position.

X 1.15 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.8. (S20.1.9.4, S22.1.2, S22.1.7.4, S22.3.1, S24.1.2, S24.3.1)

X 1.16 Use only the controls that change the seat in the fore-aft direction to place the seat in the foremost position. (S16.2.10.3.2)

X 1.17 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the seat cushion reference point with the seat cushion reference line at the mid-angle determined in 1.8. (S16.2.10.3.3, S20.1.9.4, S22.1.2, S22.1.7.4, S22.3.1, S24.1.2, S24.3.1)

X 1.18. Is the seat a bucket seat?

X Yes, go to 1.19 and skip 1.20
__No, go to 1.20 and skip 1.19

X 1.19 Bucket seats:

Locate and **mark** for future reference the longitudinal centerline of the seat cushion. The intersection of the vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface determines the longitudinal centerline of a bucket seat cushion. (S16.3.1.10 & S20.1.10)

__1.20 Bench seats:

Locate and **mark** the longitudinal centerline of the passenger seat cushion. The longitudinal centerline is the same distance from the longitudinal centerline of the vehicle as the center of the steering wheel. (S20.2.1.4, S22.2.1.3, S24.2.3, S20.4.4, S22.2.2.1 (b), S22.2.2.3 (b), S22.2.2.4 (a), S22.2.2.5 (a), S22.2.2.6 (a), S22.2.2.7 (a), S24.2.3 (a))

Record the distance from the longitudinal centerline of the vehicle to the center of the steering wheel. _____

Record the distance from the longitudinal centerline of the vehicle to the longitudinal centerline of the seat cushion. (The vertical plane through this longitudinal centerline is Plane B for suppression.) _____

2. Head Restraint Position

__N/A Vehicle contains automatic head restraints.

__N/A, there is no head restraint adjustment Go to 3

X 2.1 Adjust the head restraint to its lowest position. (S16.2.10.2, S20.1.9.6, S20.4.1, S22.1.7.6, S22.4.2.1, S22.4.3.1, S24.4.3.1, S26.2.3, S26.3.1)

X 2.2 All adjustments of the head restraint shall be used to position it full forward. For example, if it rotates, rotate it such that the head restraint extends as far forward as possible. **Mark** the foremost position. (S16.2.10.2 & S16.3.4.4 & S20.1.9.6, S20.4.1, S22.4.2.1, S22.4.3.1, S24.4.3.1, S26.2.3, S26.3.1)

X 2.3 Measure the vertical distance from the top most point of the head restraint to the bottom most point. Locate and **mark** a horizontal plane through the midpoint of this distance. (S16.3.4.3)

Vertical height of head restraint: 200 mm

Mid-point height: 100 mm

X 3. Place the SCRP in the full rearward, mid-height position, and mid-seat cushion angle. (S16.3.3.1.1)

X 4. Fully recline the seat back. (S16.3.3.1.2)

___N/A seat back not adjustable.

X 5. Place the dummy in the seat with the legs at an angle of 120 degrees to the thighs. The calves should not be touching the seat cushion. (S16.3.3.1.2)

X 6. Position the dummy in the seat such that the midsagittal plane is coincident with the longitudinal seat cushion marking that was determined in item 1.19 or 1.20. (S16.3.3.1.3 and S16.3.3.1.4)

X 7. Hold down the dummy's thighs and push rearward on the upper torso to maximize the pelvic angle. (S16.3.3.1.5)

X 8. Set the angle between the legs and the thighs to 120 degrees. (S16.3.3.1.6)

X 9. Set the transverse distance between the centers of the front of the knees at 160 to 170 mm. (6.3 to 6.7 inches). Center the knee separation with respect to the longitudinal seat cushion marking that was determined in item 1.19 or 1.20. (S16.3.3.1.6)

Record Knee Separation: 168 mm

X 10. Push rearward on the dummy's knees until the pelvis contacts the seat back, or the backs of the calves contact the seat cushion, whichever occurs first. (S16.3.3.1.6)

___Pelvis contacted seat back.

_X_Calves contacted seat cushion.

X 11. Gently rock the upper torso ± 5 degrees (approximately 51 mm (2 inches)) side-to-side three times. (S16.3.3.1.7)

X 12. If needed, extend the legs until the feet do not contact the floor pan. The thighs should be resting on the seat cushion. (S16.3.3.1.8)

X 13. Use seat controls to line up the seat markings determined during the completion of item 1 to set the foremost fore-aft position, mid-height position and the seat cushion mid-angle. If the dummy contacts the interior move the seat rearward until a maximum clearance of 5 mm (0.2 inches) is achieved or the seat is in the closest detent position that does not cause dummy contact. (S16.3.3.1.8)

_X_Foremost, mid-height position and the seat cushion mid-angle reached

__Dummy contact. Clearance set at maximum of 5 mm

Measured Clearance:_____

__Dummy Contact. Seat set at nearest detent position.

Seat position __ detent positions rearward of foremost

(foremost is position zero)

X 14. If the seat back is adjustable, rotate the seat back forward while holding the thighs in place. Continue rotating the seat back forward until the transverse instrument platform of the dummy head is level ± 0.5 degrees. If head cannot be leveled using the seat back adjustment, or the seat back is not adjustable, use the lower neck bracket adjustment to level the head. If a level position cannot be achieved, adjust the head as closely as possible to the ± 0.5 degree range. (S16.3.3.1.9 and S16.3.3.1.10)

(Check All That Apply)

__Seat back not adjustable

__Seat back not independent of driver side seat back

_X_Head Level Achieved. (Check all that apply)

_X_Head leveled using the adjustable seat back

__Head leveled using the neck bracket.

Head Angle: 0.5 degrees

__Head Level NOT Achieved. (Check all that apply)

__ Head adjusted using the adjustable seat back

__ Head adjusted using the neck bracket.

Head Angle: _____ degrees

X 15. Verify the pelvis is not interfering with the seat bight. (S16.3.3.1.9)

_X_No interference

__Pelvis moved forward the minimum amount so that it is not caught in the seat bight.

X 16. Verify the dummy abdomen is properly installed. (S16.3.3.1.9)

_X_Abdomen still seated properly into dummy

__Abdomen was adjusted because it was not seated properly into dummy

X 17. Head Angle

_X_N/A, neither the pelvis nor the abdomen were adjusted.

_X_ 17.1 Head still level (Go to 18)

__ 17.2 Head level adjusted

__Head Level Achieved. (Check all that apply)

__Head leveled using the adjustable seat back

__Head leveled using the neck bracket.

Head Angle: _____ degrees

__Head Level NOT Achieved. (Check all that apply)

__Head adjusted using the adjustable seat back

__Head adjusted using the neck bracket.

Head Angle: _____ degrees

_X_ 18. Measure and set the pelvic angle using the pelvic angle gage TE-2504. The pelvic angle should be 20.0 degrees ± 2.5 degrees. If the pelvic angle cannot be set to the specified range because the head will not be level or because the dummy will have need major repositioning, adjust the pelvis as closely as possible to the angle range, but keep the head level.

_X_ Pelvic angle set to 20.0 degrees ± 2.5 degrees.

__Pelvic angle of 20.0 degrees not achieved, the angular difference was minimized.

_X_ Record the pelvic angle: 20.0 degrees

_X_ 19. Check the dummy for contact with the interior after completing adjustments.

X No contact.

__Dummy in contact with interior.

__Seat moved aft ___ mm from the previous position.

__Seat moved aft ___ detent positions from the previous position.

_X_ 20. Verify the transverse instrument platform of the dummy head is level +/- 0.5 degrees. Use the lower neck bracket adjustment to level the head. If a level position cannot be achieved, minimize the angle. (S16.3.3.1.9, S16.3.3.1.10, and S16.3.3.1.11)

_X_ Head Level Achieved

Head Angle: 0.4 degrees

__Head Level NOT Achieved.

Head Angle: _____ degrees

_X_ 21. Check the dummy to see if additional interior clearance is obtained, allowing the seat to be moved forward. (S16.3.3.1.12)

__N/A Bench Seat

_X_ N/A Seat already at full forward position.

__Clearance unchanged. No adjustments required.

__Additional clearance available

__Seat moved Forward ___ mm from the previous position.

__Seat moved Forward ___ detent positions from the previous position.

__Seat moved Forward, Full Forward position reached.

_X_ 22. Passenger foot positioning. (Indicate final position achieved) (S16.3.3.2)

__22.1 Place feet flat on the toe board; OR (S16.3.3.2.1)

_X_ 22.2 If the feet cannot be placed flat on the toe board, set the feet perpendicular to the lower leg, and rest the heel as far forward on the floor pan as possible; OR (S16.3.3.2.2)

__22.3 If the heels do not touch the floor pan, set the legs as perpendicular to the thighs as possible and set the feet parallel to the floor pan. (S16.3.3.2.2)

X 23. Passenger arm/hand positioning. (S16.3.3.3)

X 23.1 Place the dummy's upper arms adjacent to the torso with the arm centerlines as close to a vertical longitudinal plane as possible. (S16.3.3.3.1)

X 23.2 Place the palms of the dummy in contact with the outer part of the thighs (S16.3.3.3.2)

X 23.3 Place the little fingers in contact with the seat cushion. (S16.3.3.3.3)

X 24. Adjustable head restraints (S16.3.4)
__N/A, there is no head restraint adjustment

___24.1 If the head restraint has an automatic adjustment, leave it where the system positions the restraint after the dummy is placed in the seat. (S16.3.4.1) Go to 25.

__24.2 Adjust each head restraint vertically so that the horizontal plane determined in Item 2 is aligned with the center of gravity (CG) of the dummy head. (S16.3.4.3)

X 24.3 If the above position is not attainable, move the vertical center of the head restraint to the closest detent below the center of the head CG. (S16.3.4.3)
__N/A midpoint position attained in previous step
X Headrest set at nearest detent below the head CG

X 24.4 If the head restraint has a fore and aft adjustment, place the restraint in the foremost position or until contact with the head is made, whichever occurs first. (S16.3.4.4)

X 25. Manual belt adjustment (for tests conducted with a belted dummy) (S16.3.5)
X N/A, Unbelted test

X 25.1 If an adjustable seat belt D-ring anchorage exists, place it in the manufacturer's design position for a 5th percentile adult female. **This information will be supplied by the COTR.** (S16.3.5.1)
Manufacturer's specified position: 0 of 4; Upper-most defined as 0
Actual Position: 0 of 4; Upper-most defined as 0

__25.2 Place the Type 2 manual belt around the test dummy and fasten the latch. (S16.3.5.2)

__25.3 Ensure that the dummy's head remains as level as possible. (S16.3.5.3)

___25.4 Remove all slack from the lap belt. Pull the upper torso webbing out of the retractor and allow it to retract; repeat this operation four times. Apply a 9 N (2 lbf) to 18 N (4 lbf) tension load to the lap belt. If the belt system is equipped with a tension-relieving device, introduce the maximum amount of slack into the upper torso belt that is recommended by the manufacturer. If the belt system is not equipped with a tension-relieving device, allow the excess webbing in the shoulder belt to be retracted by the retractive force of the retractor. (S16.3.5.4)

I certify that I have read and performed each instruction.

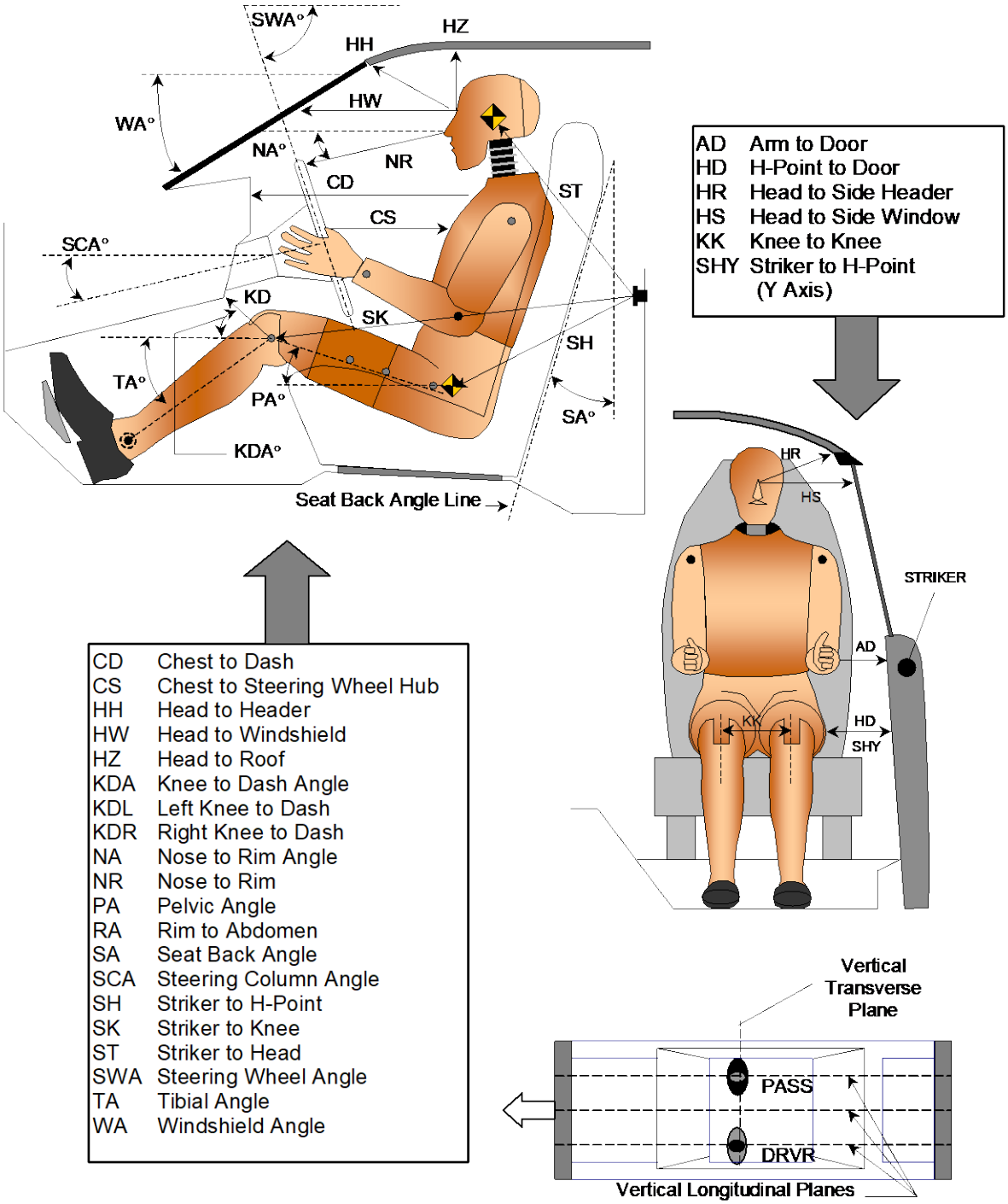
Signature:  Date: 11/3/23

DATA SHEET 37

DUMMY MEASUREMENTS

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 11/3/23
Test Technician: Dane Wieting

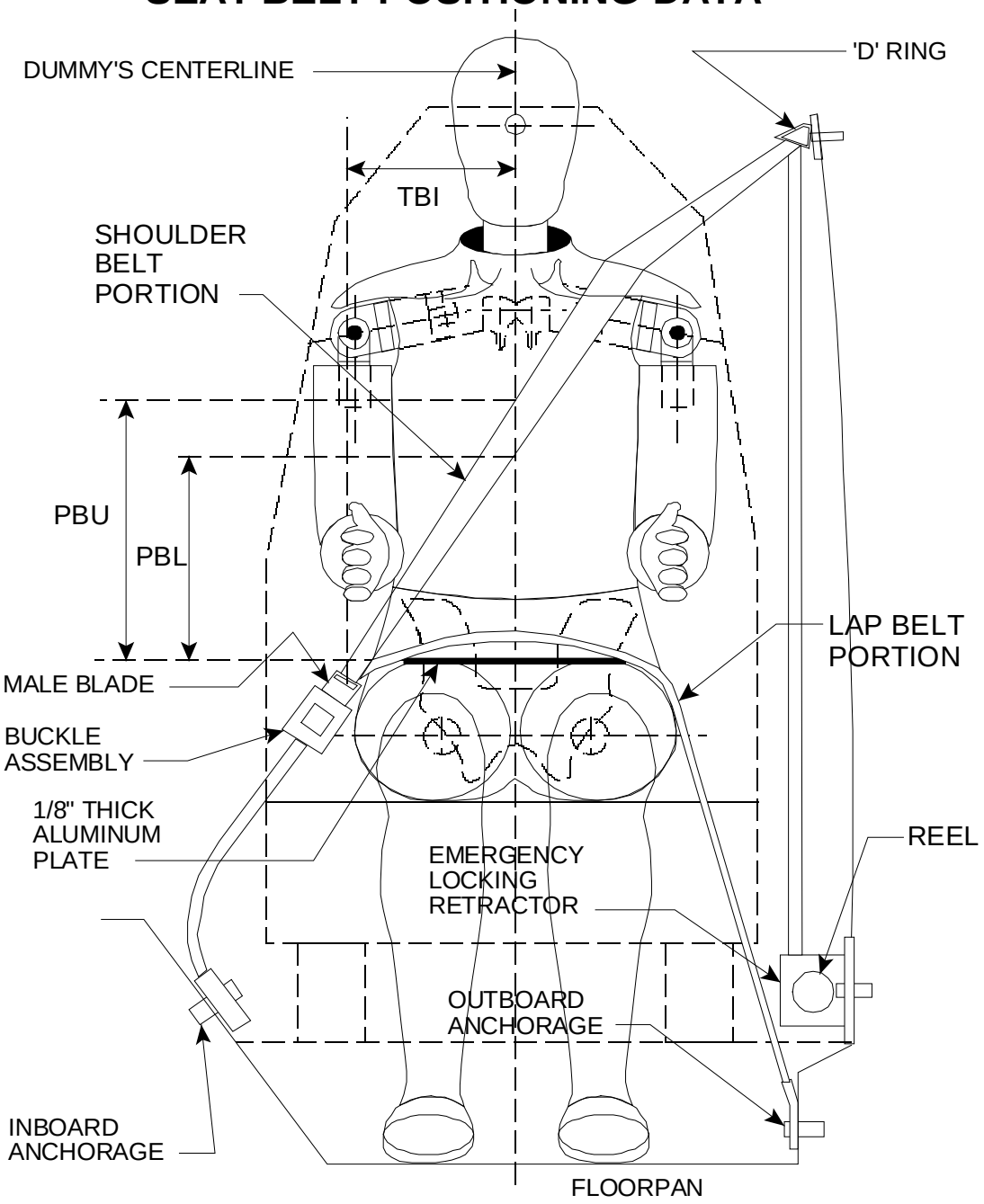
DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver SN ER6928		Passenger SN ER7897	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		26.5		
SWA	Steering Wheel Angle		64.8		
SCA	Steering Column Angle		25.2		
SA	Seat Back Angle (On Headrest Post)		3.5		6.5
HZ	Head to Roof (Z)	215		230	
HH	Head to Header	307	38.6	301	39.3
HW	Head to Windshield	701	0.0	686	0.0
HR	Head to Side Header (Y)	265		280	
NR	Nose to Rim	262	4.2		
CD	Chest to Dash	472		440	
CS	Chest to Steering Hub	173	1.1		
RA	Rim to Abdomen	89	0.0		
KDL	Left Knee to Dash	106	29.1	125	
KDR	Right Knee to Dash	80		133	40.7
PA	Pelvic Angle		21.0		20.0
TA	Tibia Angle		62.4		54.2
KK	Knee to Knee (Y)	325		230	
SK	Striker to Knee	704	86.0	723	78.6
ST	Striker to Head	489	34.5	476	34.8
SH	Striker to H-Point	427	70.5	430	65.6
SHY	Striker to H-Point (Y)	310		311	
HS	Head to Side Window	395		398	
HD	H-Point to Door (Y)	223		229	
AD	Arm to Door (Y)	68		80	
AA	Ankle to Ankle	318		175	

SEAT BELT POSITIONING DATA



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	N/A	N/A
PBL - Top surface of reference to belt lower edge	mm	N/A	N/A

DATA SHEET 38

CRASH TEST

Test Vehicle: 2023 Hyundai Ioniq 5 NHTSA No.: C20234204
Test Program: FMVSS 208 Compliance Test Date: 11/3/23
Test Technician: Chad Williams

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X		5th female			50th male	
PASSENGER DUMMY:	X		5th female			50th male	

X 1. Vehicle underbody painted.
X 2. The speed measuring devices are in place and functioning.
X 3. The speed measuring devices are 1.0 m from the barrier (spec. 1.5 m) and 30 cm from the barrier (spec. is 30 cm).
X 4. Convertible top is in the closed position.
X N/A, not a convertible.
X 5. Instrumentation and wires are placed so motion of dummies during impact is not affected.
X 6. Tires inflated to pressure on tire placard or if it does not have a tire placard because it is not a passenger car, then inflated to the tire pressure specified in the owner information.

260 kpa front left tire 260 kpa specified on tire placard or in owner information
260 kpa front right tire 260 kpa specified on tire placard or in owner information
260 kpa rear left tire 260 kpa specified on tire placard or in owner information
260 kpa rear right tire 260 kpa specified on tire placard or in owner information

X 7. Time zero contacts on barrier in place.
X 8. Pre test zero and shunt calibration adjustments performed and recorded.
X 9. Dummy temperature meets requirements of section 12.2 of the test procedure.
X 10. Vehicle hood closed and latched.
X 11. Transmission placed in neutral.
X 12. Parking brake off.
X 13. Are the heads still level?
X Yes, go to 14
No, Adjust dummy so that head is at the angle recorded in the Appendix F or G data sheets and then continue.
X 14. Ignition in the ON position.
X 15. Doors closed and latched but not locked.
X 16. Post test zero and shunt calibration checks performed and recorded.
X 17. Actual test speed: 39.4 kmph
X 18. Vehicle rebound from the barrier: 135 cm
X 19. Describe whether the doors open after the test and what method is used to open the doors.
X Left Front Door: Door remained closed and latched; Door opened without tools.
X Right Front Door: Door remained closed and latched; Door opened without tools.
X Left Rear Door: Door remained closed and latched; Door opened without tools.
X Right Rear Door: Door remained closed and latched; Door opened without tools.

[X] 20. Describe the contact points of the dummy with the interior of the vehicle.

- [X] Driver Dummy: Head to Air Bag and Headrest; Chest to Air Bag; Knees to Knee Bolster
- [X] Passenger Dummy: Head to Air Bag; Chest to Air Bag; Knees to Glovebox

REMARKS:

Signature: Chad Williams Date: 11/3/23

I certify that I have read and performed each instruction.

DATA SHEET 40

ACCIDENT INVESTIGATION MEASUREMENTS

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Chad Williams

NHTSA No.: C20234204
Test Date: 11/3/23

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X		5th female			50th male	
PASSENGER DUMMY:	X		5th female			50th male	

Vehicle Year/Make/Model/Body Style:	2023 Hyundai Ioniq 5 MPV
VIN:	KM8KM4AE2PU167277
Wheelbase:	3004 mm
Build Date:	DEC/2022
Vehicle Size Category:	5
Test Weight:	2088.4 kg
Front Overhang:	835 mm
Overall Width:	1874 mm
Overall Length Center:	4634 mm

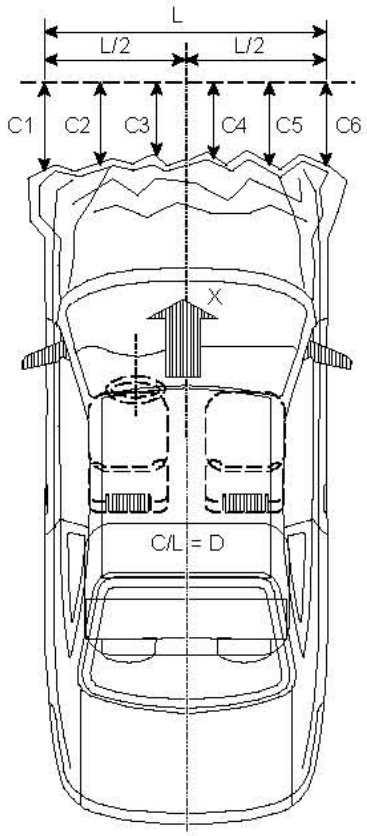
Accelerometer Data	
Location:	As per measurements on Data Sheet 33
Linearity:	>99.9%

Integration Algorithm:	Trapezoidal
Vehicle Impact Speed:	39.4 kmph
Time of Separation:	137.2 ms
Velocity Change:	47.6 kmph

CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: Vehicle Longitudinal Centerline
Damage Region Length (mm): 1368
Impact Mode: Frontal Barrier

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4527	4252	275
C2	Crush zone 2 at left side	mm	4606	4246	360
C3	Crush zone 3 at left side	mm	4630	4280	350
C4	Crush zone 4 at right side	mm	4630	4274	356
C5	Crush zone 5 at right side	mm	4606	4227	379
C6	Crush zone 6 at right side	mm	4527	4180	347



REMARKS:

Signature: Chad Williams Date: 11/3/23

I certify that I have read and performed each instruction.

DATA SHEET 41

WINDSHIELD MOUNTING (FMVSS 212)

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Chad Williams

NHTSA No.: C20234204
Test Date: 11/3/23

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X		5th female			50th male	
PASSENGER DUMMY:	X		5th female			50th male	

1. Pre-Crash

[X] 1.1 Describe from visual inspection how the windshield is mounted and describe any trim material.

Retained with glue, rubber and plastic trim

[X] 1.2 Mark the longitudinal centerline of the windshield.

[X] 1.3 Measure pre-crash A, B, and C for the left side and record in the chart below.

[X] 1.4 Measure pre-crash C, D, and E for the right side and record in the chart below.

[X] 1.5 Measure from the edge of the retainer or molding to the edge of the windshield.

[X] Dimension G (mm): 5 mm

2. Post Crash

[X] 2.1 Can a single thickness of copier type paper (as small a piece as necessary) slide between the windshield and the vehicle body?

- [X] No - Pass. Skip to the table of measurements, complete it by repeating the pre-crash measurements in the post crash column, and calculate the retention percentage, which will be 100%.
- [ ] Yes, go to 2.2

[ ] 2.2 Visibly mark the beginning and end of the portions of the periphery where the paper slides between the windshield and the vehicle body.

[ ] 2.3 Measure and record post-crash A, B, C, D, E, and F such that the measurements do not include any of the parts of the windshield where the paper slides between the windshield and the vehicle body.

[ ] 2.4 Calculate and record the percent retention for the right and left side of the windshield.

[ ] 2.5 Is total right side percent retention less than 50%?

- [ ] Yes, Fail
- [ ] No, Pass

[ ] 2.6 Is total left side percent retention less than 50%?

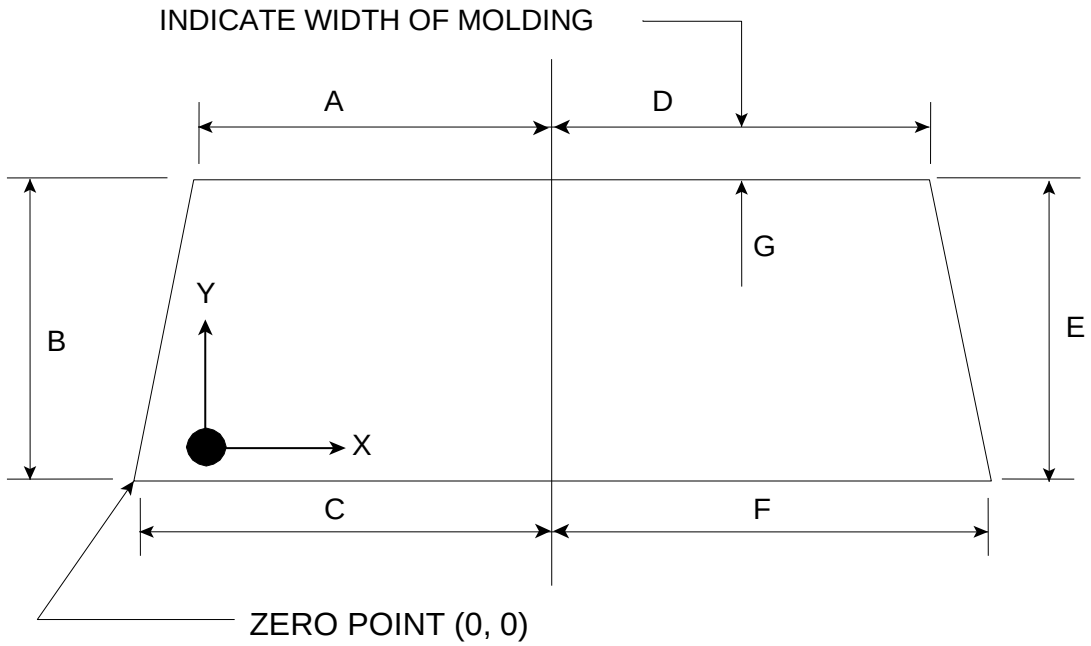
- [ ] Yes, Fail
- [ ] No, Pass

WINDSHIELD RETENTION MEASUREMENTS

	Dimension	Pre-Crash (mm)	Post-Crash (mm)	Percent Retention (Post-Test ÷ Pre-Crash)
Left Side	A	640	640	100%
	B	842	842	100%
	C	843	843	100%
	Total	2325	2325	100%
Right Side	D	640	640	100%
	E	842	842	100%
	F	843	843	100%
	Total	2325	2325	100%

Indicate area of mounting failure: NONE

FRONT VIEW OF WINDSHIELD



REMARKS: NONE

Signature: Chad Williams Date: 11/3/23

I certify that I have read and performed each instruction.

DATA SHEET 42

WINDSHIELD ZONE INTRUSION (FMVSS 219)

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Chad Williams

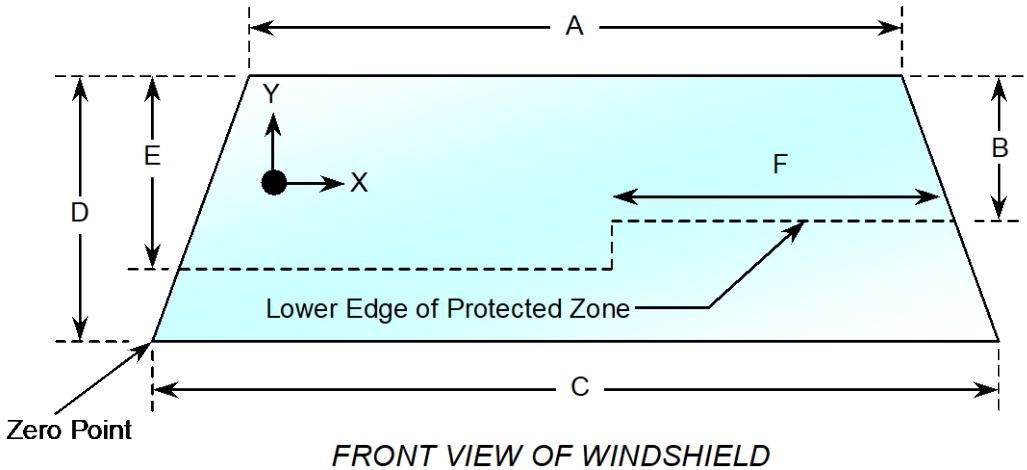
NHTSA No.: C20234204
Test Date: 11/3/23

IMPACT ANGLE:	0°						
BELTED DUMMIES (YES/NO):	NO						
TEST SPEED:	X	32 to 40 kmph		0 to 48 kmph		0 to 56 kmph	
DRIVER DUMMY:	X		5th female			50th male	
PASSENGER DUMMY:	X		5th female			50th male	

This standard specifies limits for the displacement of vehicle components into the windshield area during a frontal barrier impact test at any speed up to and including 48 kmph.

X	1.	Place a 165 mm diameter rigid sphere, with a mass of 6.8 kg on the instrument panel so that it is simultaneously touching the instrument panel and the windshield. (571.219 S6.1(a))
X	2.	Roll the sphere from one side of the windshield to the other while marking on the windshield where the sphere contacts the windshield. (571.219 S6.1(b))
X	3.	From the outermost contactable points on the windshield draw a horizontal line to the edges of the windshield. (571.219 S6.1(b))
X	4.	Draw a line on the inner surface of the windshield that is 13 mm below the line determined in items 2 and 3.
X	5.	After the crash test, record any points where a part of the exterior of the vehicle has marked, penetrated, or broken the windshield.

Provide all dimensions necessary to reproduce the protected area.



FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

Item	Units	Value
A	mm	1280
B	mm	523
C	mm	1686
D	mm	842
E	mm	523
F	mm	402

AREA OF PROTECTED ZONE FAILURES:

B. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one which is normally in contact with the windshield.

X	Y
NONE	

C. Provide coordinates of the area beneath the protected zone template that the inner surface of the windshield was penetrated by a vehicle component.

X	Y
NONE	

REMARKS:

I certify that I have read and performed each instruction.

Signature: Chad Williams Date: 11/3/23

FMVSS 305

ELECTRIC POWERED VEHICLES: ELECTROLYTE SPILLAGE AND ELECTRICAL SHOCK PROTECTION

This electric vehicle, a 2023 Hyundai Ioniq 5 (NHTSA No. C20234204), in conjunction with the FMVSS 208, was tested to FMVSS 305.

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

Based on the test results, the 2023 Hyundai Ioniq 5 appears to meet the partial requirements of FMVSS 305 testing.

If a measured voltage was zero and resulted in a division by zero “Zero Volts” was reported. This condition is considered being compliant as stated in TP-305-01 12.4 F.

The following data sheets document the results of the FMVSS 305 test.
NOTE: The FMVSS 305 Static Rollover was not conducted.

DATA SHEET 1

ELECTRIC VEHICLE PROPULSION SYSTEM

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Dane Wieting

NHTSA No.: C20234204
Test Date: 11/3/23

VEHICLE PROPULSION SYSTEM

Type of Electric Vehicle (Electric/Hybrid):	Electric
Propulsion Battery Type:	Lithium-Ion Polymer
Nominal Voltage (V):	697.0 V
Physical Location of Automatic Propulsion Battery Disconnect:	Inside the propulsion battery case (Rear side)
Auxiliary Battery Type:	12 V Lead Acid Battery

DATA SHEET 2

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

Electrolyte Fluid Type:	Liquid Solution; LiPF6 Salt; Carbonate Solvent	
Electrolyte Fluid Specific Gravity:	1.9 g/cm^3	
Electrolyte Kinematic Viscosity (centistokes):	2~3cP @ 25° C	
Electrolyte Fluid Color:	Colorless	
Electric Energy Storage/Conversion System Coolant Type, Color, Specific Gravity (if applicable):	Transparent & Pale Yellow	
Location of Battery Modules:		Inside Passenger Compartment
	X	Outside Passenger Compartment
	The high voltage battery is mounted on the underside of the vehicle.	
Electric Energy Storage/Conversion System State of Charge:		Maximum State of Charge
	X	Range of Normal Operating Voltage
Maximum	N/A	
Test Voltage - No less than 95% of maximum State of Charge:	N/A	
Range of Normal Operating Voltage:	480-826 Volts	
Test Voltage – Within Normal Operative Voltage Range:	794.0 Volts	
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)	The Body Structure was used as Vehicle Ground

ELECTRIC ENERGY STORAGE/CONVERSION TEST POINTS

Details of Electric Energy Storage/Conversion System Test Points:	At the Rear Side of the Propulsion Battery System at the Positive and Negative Locations

DATA SHEET 3

PRE-IMPACT ELECTRIC ISOLATION MEASUREMENTS & CALCULATIONS

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Dane Wieting

NHTSA No.: C20234204
Test Date: 11/3/23

VOLTMETER INFORMATION

Make:	Fluke
Model:	177
Serial Number:	62100018
Internal Impedance Value (MΩ):	50 MΩ
Resolution (V):	.001 Volts
Last Calibration Date:	07/14/2023

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):	794.0

ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM TO VEHICLE CHASSIS

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

V1 (V):	233.5
V2 (V):	460.0

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):	542,700 Ω

V1 (V) Pre-Impact:	233.5
V2 (V): Pre-Impact:	460.0

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):	16.4
Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’]	
Ri1 (Ω):	21,337,099
V2’ (V):	16.6
Ri2 = R0 (1 + V1/V2) [(V2-V2’)/V2’]	
Ri2 (Ω):	21,854,258
Ri = The lesser of Ri1 and Ri2	
Ri Pre-Test (Ω):	21,337,099
Ri/Vb (Ω/V):	26,873
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		

DATA SHEET 4

POST-IMPACT DATA

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Dane Wieting

NHTSA No.: C20234204
Test Date: 11/3/23

VOLTMETER INFORMATION

Make:	Fluke
Model:	177
Serial Number:	62100018
Internal Impedance Value (MΩ):	50 MΩ
Nominal Propulsion Battery Voltage (Vb) (V):	697.0
Resolution (V):	.001 Volts
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 Post (V):	14.0

ELECTRIC ENERGY STORAGE/CONVERSION SYSTEM VOLTAGE

V1 =	2.7	V	Impact Time:	0	Minutes	59	s
V2 =	9.3	V	Impact Time:	1	Minutes	04	s
V1' =	0.2	V	Impact Time:	1	Minutes	21	s
V2' =	0.4	V	Impact Time:	1	Minutes	11	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.

Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']							
Ri1 =	30,150,000	Ω	Impact Time:	1	Minutes	21	s
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2 =	15,580,742	Ω	Impact Time:	1	Minutes	11	s
Ri = The lesser of Ri1 and Ri2							
Ri =	15,580,742	Ω	Impact Time:	1	Minutes	11	s
Ri/Vb = electrical Isolation Value/Nominal Battery Voltage							
Minimum Electrical Value is 500 Ω/V							
Ri/Vb =	19,623	Ω/V	Impact Time:	1	Minutes	11	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]:
No Movement

	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

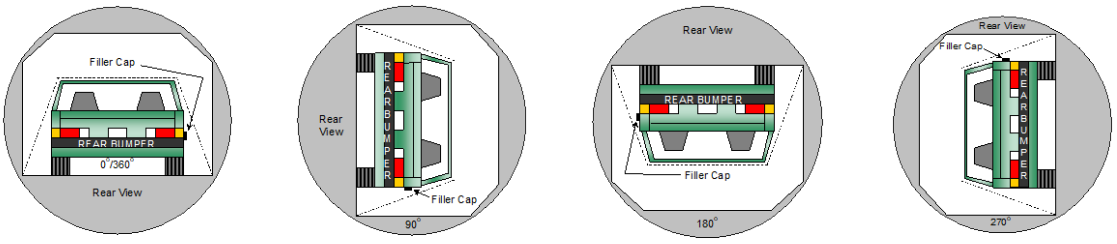
DATA SHEET 5

STATIC ROLLOVER TEST DATA

NOTE: The FMVSS 305 Static Rollover was not conducted.

Test Vehicle: 2023 Hyundai Ioniq 5
Test Program: FMVSS 208 Compliance
Test Technician: Dane Wieting

NHTSA No.: C20234204
Test Date: 11/3/23



0/360 **90** **180** **270**

REAR VIEW

DETERMINATION OF ELECTRIC ENERGY STORAGE / CONVERSION DEVICE ELECTROYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1-3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0° - 90°		minutes		seconds		minutes		minutes		seconds		minutes
90° - 180°		minutes		seconds		minutes		minutes		seconds		minutes
180° - 270°		minutes		seconds		minutes		minutes		seconds		minutes
270° - 360°		minutes		seconds		minutes		minutes		seconds		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°		
90° to 180°		
180° to 270°		
270° to 360°		

Total Spillage: _____L

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

DATA SHEET 5 (CONTINUED)

STATIC ROLLOVER TEST DATA

NOTE: The FMVSS 305 Static Rollover was not conducted.

VOLTMETER INFORMATION

Make:	
Model:	
Serial Number:	
Internal Impedance Value (MΩ):	
Nominal Electric Energy Storage/Conversion Device Voltage (Vb) (V):	
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 =		V	0°	Time:		Minutes		s
V1 =		V	90°	Time:		Minutes		s
V1 =		V	180°	Time:		Minutes		s
V1 =		V	270°	Time:		Minutes		s
V1 =		V	360°	Time:		Minutes		s
V2 =		V	0°	Time:		Minutes		s
V2 =		V	90°	Time:		Minutes		s
V2 =		V	180°	Time:		Minutes		s
V2 =		V	270°	Time:		Minutes		s
V2 =		V	360°	Time:		Minutes		s
V1' =		V	0°	Time:		Minutes		s
V1' =		V	90°	Time:		Minutes		s
V1' =		V	180°	Time:		Minutes		s
V1' =		V	270°	Time:		Minutes		s
V1' =		V	360°	Time:		Minutes		s
V2' =		V	0°	Time:		Minutes		s
V2' =		V	90°	Time:		Minutes		s
V2' =		V	180°	Time:		Minutes		s
V2' =		V	270°	Time:		Minutes		s
V2' =		V	360°	Time:		Minutes		s
Vb =		V	0°	Time:		Minutes		s
Vb =		V	90°	Time:		Minutes		s
Vb =		V	180°	Time:		Minutes		s
Vb =		V	270°	Time:		Minutes		s
Vb =		V	360°	Time:		Minutes		s

DATA SHEET 5 (CONTINUED)

STATIC ROLLOVER TEST DATA

NOTE: The FMVSS 305 Static Rollover was not conducted.

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.

Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’]								
Ri1 =		Ω	0°	Time:		Minutes		s
Ri1 =		Ω	90°	Time:		Minutes		s
Ri1 =		Ω	180°	Time:		Minutes		s
Ri1 =		Ω	270°	Time:		Minutes		s
Ri1 =		Ω	360°	Time:		Minutes		s
Ri2 = Ro (1 + V1/V2) [(V2-V2’)/V2’]								
Ri2 =		Ω	0°	Time:		Minutes		s
Ri2 =		Ω	90°	Time:		Minutes		s
Ri2 =		Ω	180°	Time:		Minutes		s
Ri2 =		Ω	270°	Time:		Minutes		s
Ri2 =		Ω	360°	Time:		Minutes		s
Ri = The lesser of Ri1 and Ri2								
Ri =		Ω	0°	Time:		Minutes		s
Ri =		Ω	90°	Time:		Minutes		s
Ri =		Ω	180°	Time:		Minutes		s
Ri =		Ω	270°	Time:		Minutes		s
Ri =		Ω	360°	Time:		Minutes		s
Ri/Vb = Electrical Isolation Value/Nominal Battery Voltage Minimum Electrical Isolation Value is 500 Ω /V								
Ri/Vb =		Ω/V	0°	Time:		Minutes		s
Ri/Vb =		Ω/V	90°	Time:		Minutes		s
Ri/Vb =		Ω/V	180°	Time:		Minutes		s
Ri/Vb =		Ω/V	270°	Time:		Minutes		s
Ri/Vb =		Ω/V	360°	Time:		Minutes		s

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

APPENDIX A

CRASH TEST DATA

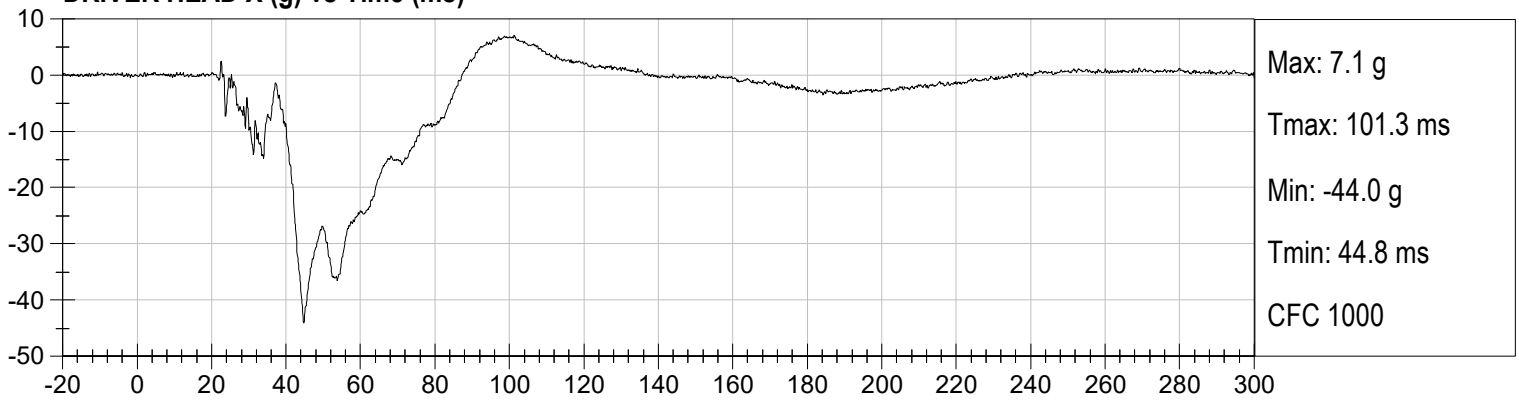
TABLE OF DATA PLOTS

		Page No.
Figure No. 1.	Driver Head X Acceleration vs. Time	A-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	A-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	A-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	A-1
Figure No. 5.	Driver Head X Velocity vs. Time	A-2
Figure No. 6.	Driver Head Y Velocity vs. Time	A-2
Figure No. 7.	Driver Head Z Velocity vs. Time	A-2
Figure No. 8.	Driver Neck Force X vs. Time	A-3
Figure No. 9.	Driver Neck Force Y vs. Time	A-3
Figure No. 10.	Driver Neck Force Z vs. Time	A-3
Figure No. 11.	Driver Neck Force Resultant vs. Time	A-3
Figure No. 12.	Driver Neck Moment X vs. Time	A-4
Figure No. 13.	Driver Neck Moment Y vs. Time	A-4
Figure No. 14.	Driver Neck Moment Z vs. Time	A-4
Figure No. 15.	Driver Neck Moment Resultant vs. Time	A-4
Figure No. 16.	Driver Chest X Acceleration vs. Time	A-5
Figure No. 17.	Driver Chest Y Acceleration vs. Time	A-5
Figure No. 18.	Driver Chest Z Acceleration vs. Time	A-5
Figure No. 19.	Driver Chest Resultant Acceleration vs. Time	A-5
Figure No. 20.	Driver Chest X Velocity vs. Time	A-6
Figure No. 21.	Driver Chest Y Velocity vs. Time	A-6
Figure No. 22.	Driver Chest Z Velocity vs. Time	A-6
Figure No. 23.	Driver Chest Displacement vs. Time	A-6
Figure No. 24.	Driver Left Femur Force vs. Time	A-7
Figure No. 25.	Driver Right Femur Force vs. Time	A-7
Figure No. 26.	Passenger Head X Acceleration vs. Time	A-8
Figure No. 27.	Passenger Head Y Acceleration vs. Time	A-8
Figure No. 28.	Passenger Head Z Acceleration vs. Time	A-8
Figure No. 29.	Passenger Head Resultant Acceleration vs. Time	A-8
Figure No. 30.	Passenger Head X Velocity vs. Time	A-9

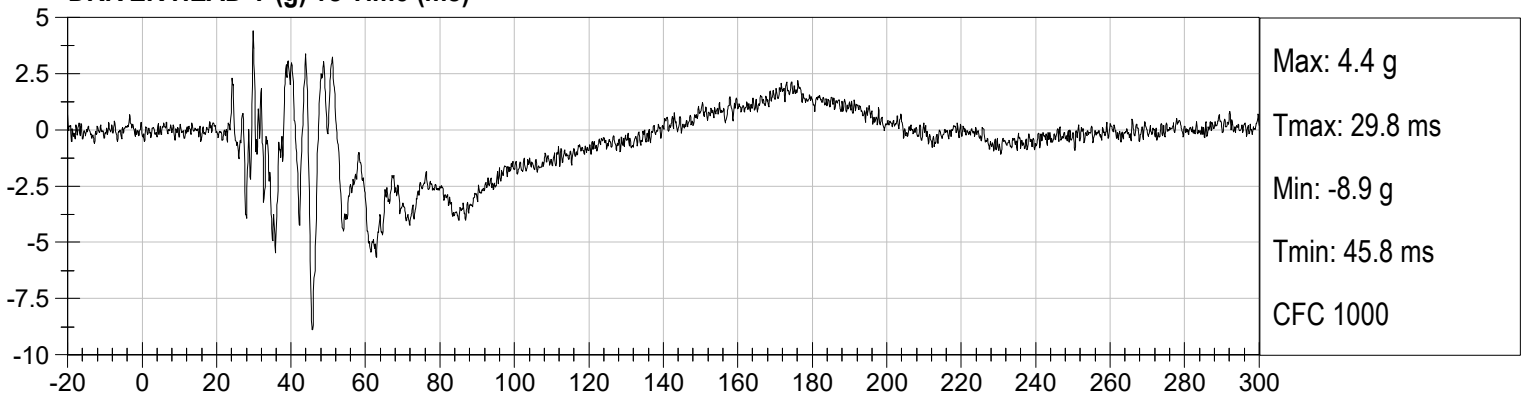
		Page No.
Figure No. 31.	Passenger Head Y Velocity vs. Time	A-9
Figure No. 32.	Passenger Head Z Velocity vs. Time	A-9
Figure No. 33.	Passenger Neck Force X vs. Time	A-10
Figure No. 34.	Passenger Neck Force Y vs. Time	A-10
Figure No. 35.	Passenger Neck Force Z vs. Time	A-10
Figure No. 36.	Passenger Neck Force Resultant vs. Time	A-10
Figure No. 37.	Passenger Neck Moment X vs. Time	A-11
Figure No. 38.	Passenger Neck Moment Y vs. Time	A-11
Figure No. 39.	Passenger Neck Moment Z vs. Time	A-11
Figure No. 40.	Passenger Neck Moment Resultant vs. Time	A-11
Figure No. 41.	Passenger Chest X Acceleration vs. Time	A-12
Figure No. 42.	Passenger Chest Y Acceleration vs. Time	A-12
Figure No. 43.	Passenger Chest Z Acceleration vs. Time	A-12
Figure No. 44.	Passenger Chest Resultant Acceleration vs. Time	A-12
Figure No. 45.	Passenger Chest X Velocity vs. Time	A-13
Figure No. 46.	Passenger Chest Y Velocity vs. Time	A-13
Figure No. 47.	Passenger Chest Z Velocity vs. Time	A-13
Figure No. 48.	Passenger Chest Displacement vs. Time	A-13
Figure No. 49.	Passenger Left Femur Force vs. Time	A-14
Figure No. 50.	Passenger Right Femur Force vs. Time	A-14
Figure No. 51.	Driver Nij (N_{TF}) vs. Time	A-15
Figure No. 52.	Driver Nij (N_{TE}) vs. Time	A-15
Figure No. 53.	Driver Nij (N_{CF}) vs. Time	A-15
Figure No. 54.	Driver Nij (N_{CE}) vs. Time	A-15
Figure No. 55.	Passenger Nij (N_{TF}) vs. Time	A-16
Figure No. 56.	Passenger Nij (N_{TE}) vs. Time	A-16
Figure No. 57.	Passenger Nij (N_{CF}) vs. Time	A-16
Figure No. 58.	Passenger Nij (N_{CE}) vs. Time	A-16
Figure No. 59.	Driver Occipital Condyle Moment vs. Time	A-17
Figure No. 60.	Passenger Occipital Condyle Moment vs. Time	A-17
Figure No. 61.	Left Rear Seat Crossmember X Acceleration vs. Time	A-18
Figure No. 62.	Left Rear Seat Crossmember X Velocity vs. Time	A-18
Figure No. 63.	Right Rear Seat Crossmember X Acceleration vs. Time	A-18
Figure No. 64.	Right Rear Seat Crossmember X Velocity vs. Time	A-18
Figure No. 65.	Top of Engine X Acceleration vs. Time	A-19

		Page No.
Figure No. 66.	Top of Engine X Velocity vs. Time	A-19
Figure No. 67.	Bottom of Engine X Acceleration vs. Time	A-19
Figure No. 68.	Bottom of Engine X Velocity vs. Time	A-19
Figure No. 69.	Left Brake Caliper X Acceleration vs. Time	A-20
Figure No. 70.	Left Brake Caliper X Velocity vs. Time	A-20
Figure No. 71.	Right Brake Caliper X Acceleration vs. Time	A-20
Figure No. 72.	Right Brake Caliper X Velocity vs. Time	A-20
Figure No. 73.	Instrument Panel X Acceleration vs. Time	A-21
Figure No. 74.	Instrument Panel X Velocity vs. Time	A-21
Figure No. 75.	Trunk Z Acceleration vs. Time	A-21
Figure No. 76.	Trunk Z Velocity vs. Time	A-21

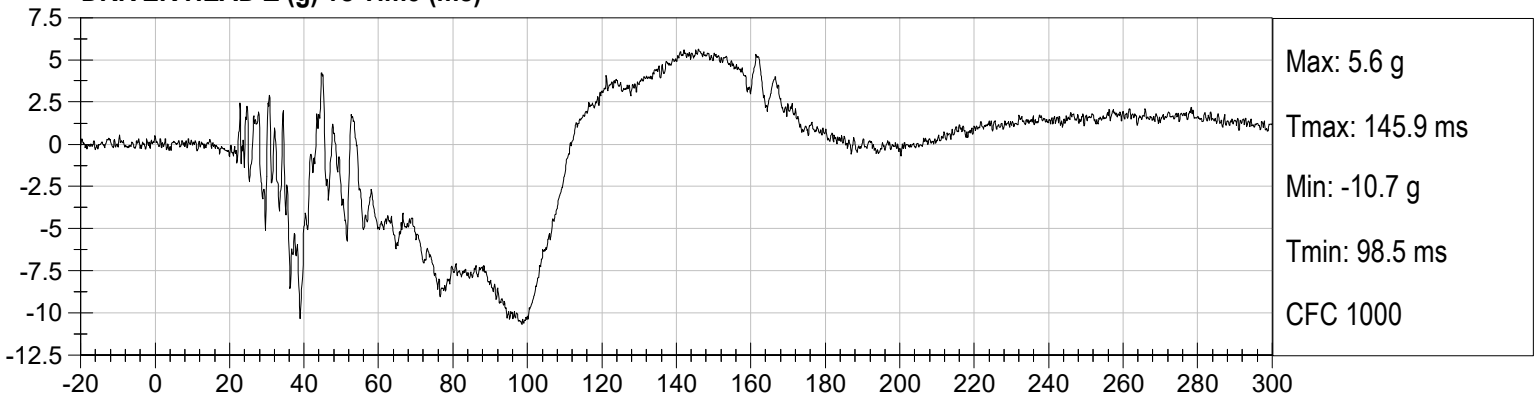
DRIVER HEAD X (g) vs Time (ms)



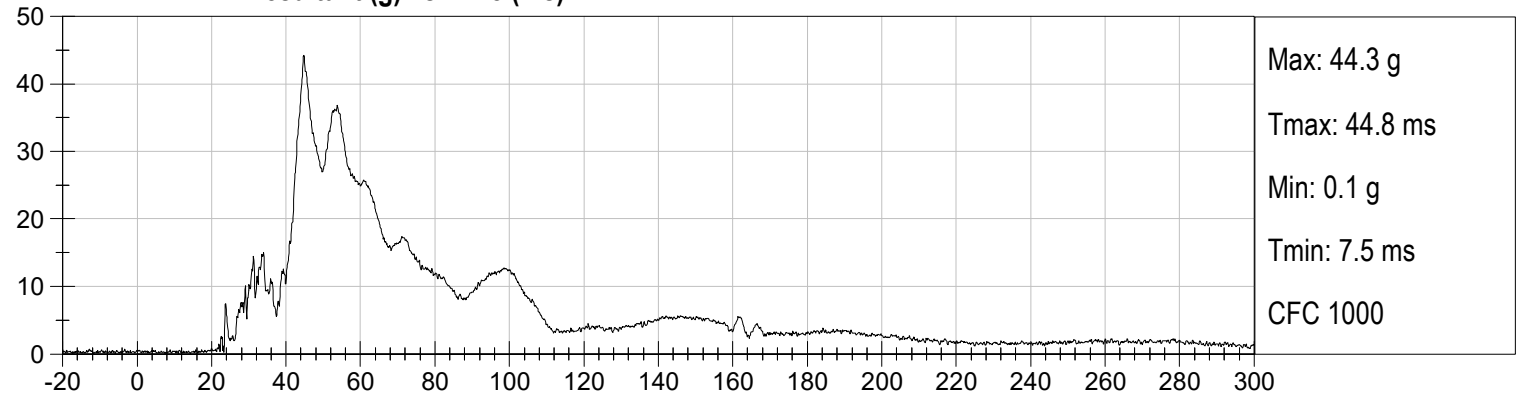
DRIVER HEAD Y (g) vs Time (ms)



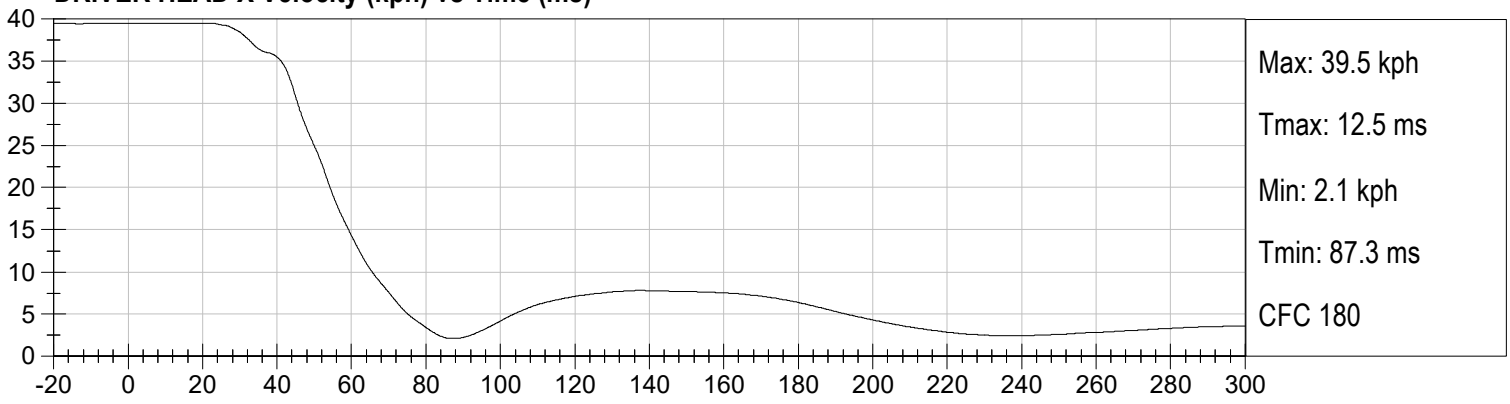
DRIVER HEAD Z (g) vs Time (ms)



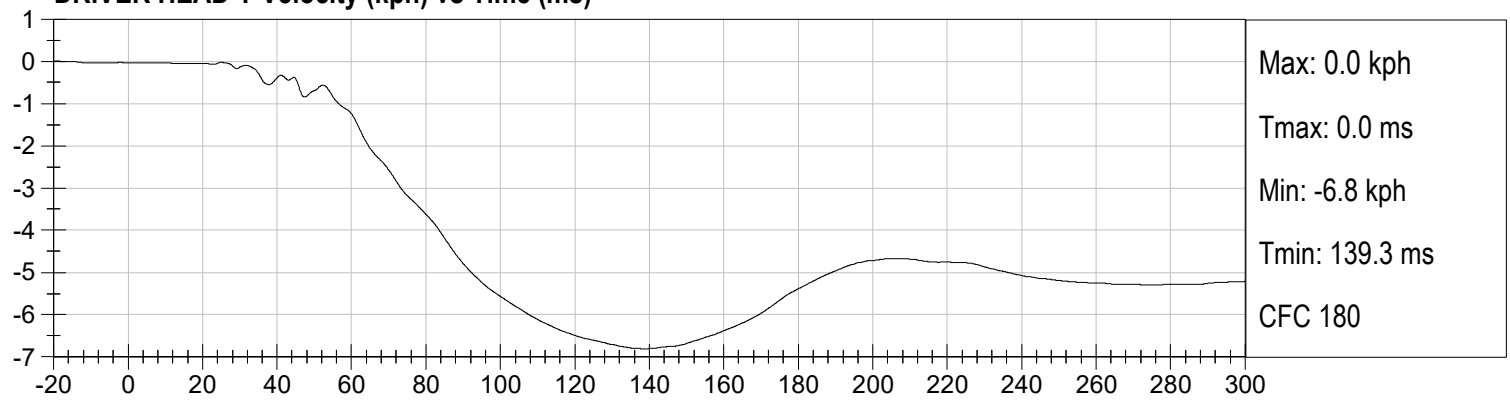
DRIVER HEAD Resultant (g) vs Time (ms)



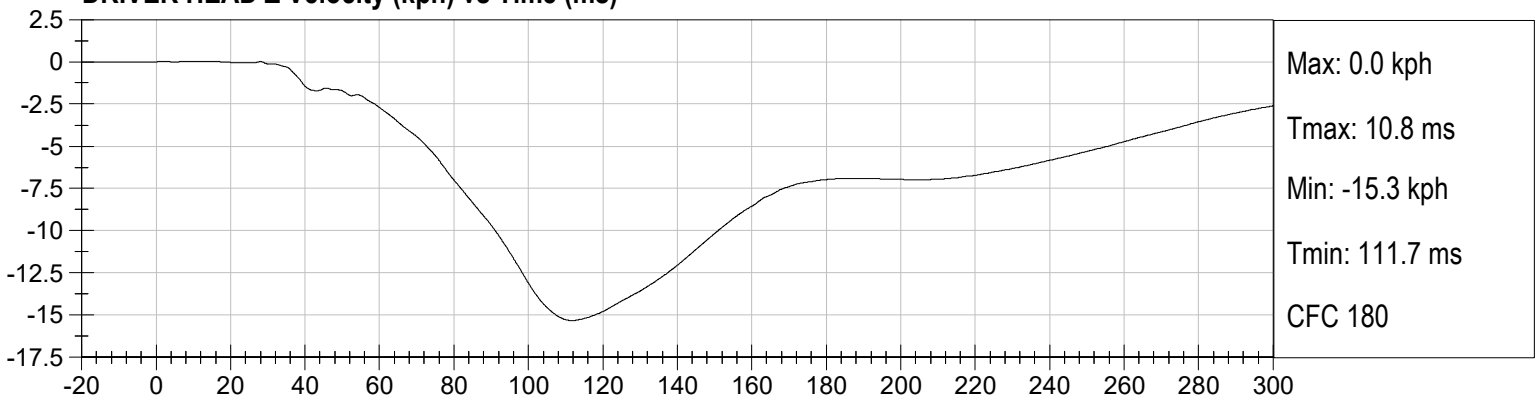
DRIVER HEAD X Velocity (kph) vs Time (ms)



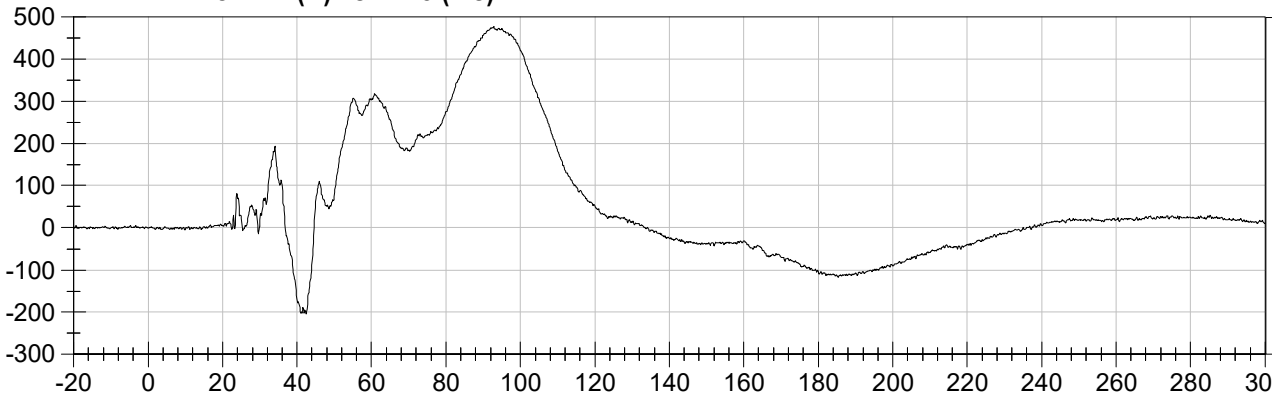
DRIVER HEAD Y Velocity (kph) vs Time (ms)



DRIVER HEAD Z Velocity (kph) vs Time (ms)

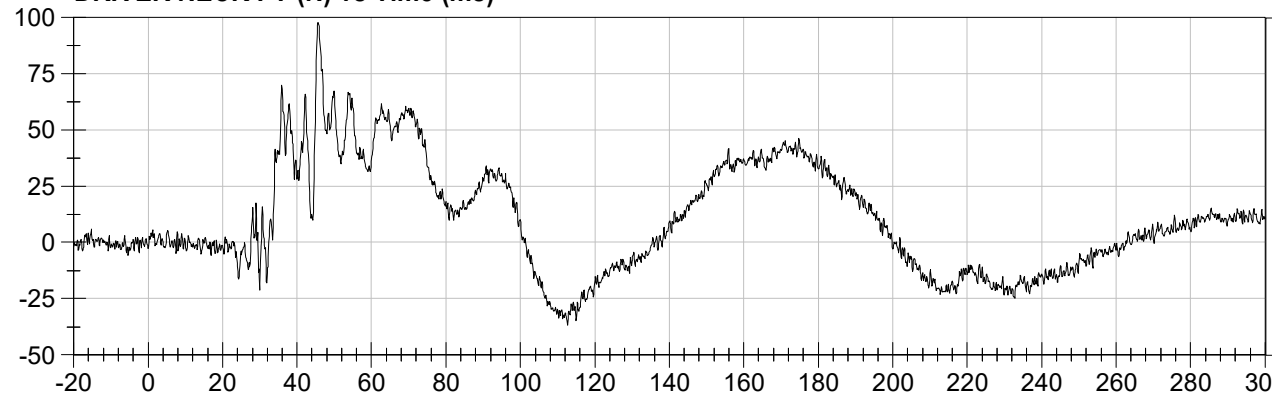


DRIVER NECK FX (N) vs Time (ms)



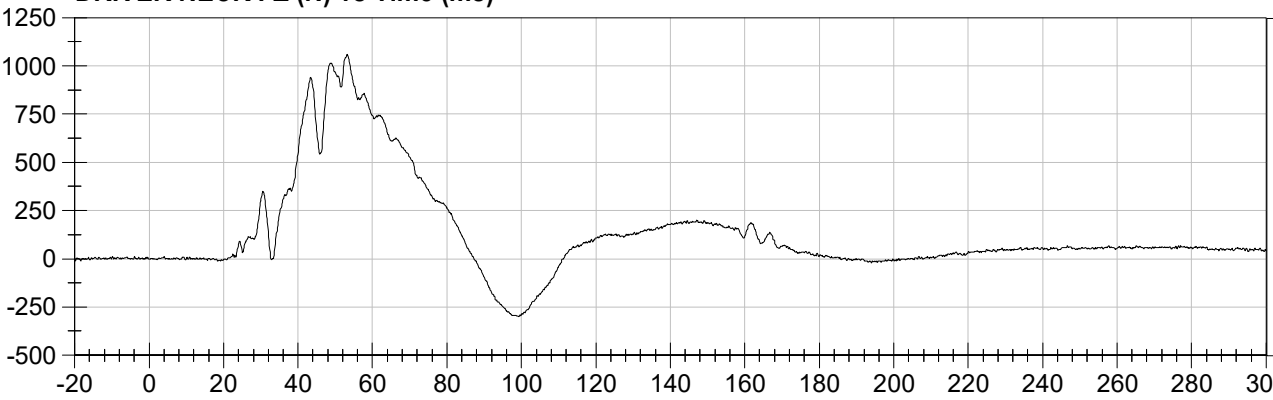
Max: 476.3 N
Tmax: 92.8 ms
Min: -204.5 N
Tmin: 42.4 ms
CFC 1000

DRIVER NECK FY (N) vs Time (ms)



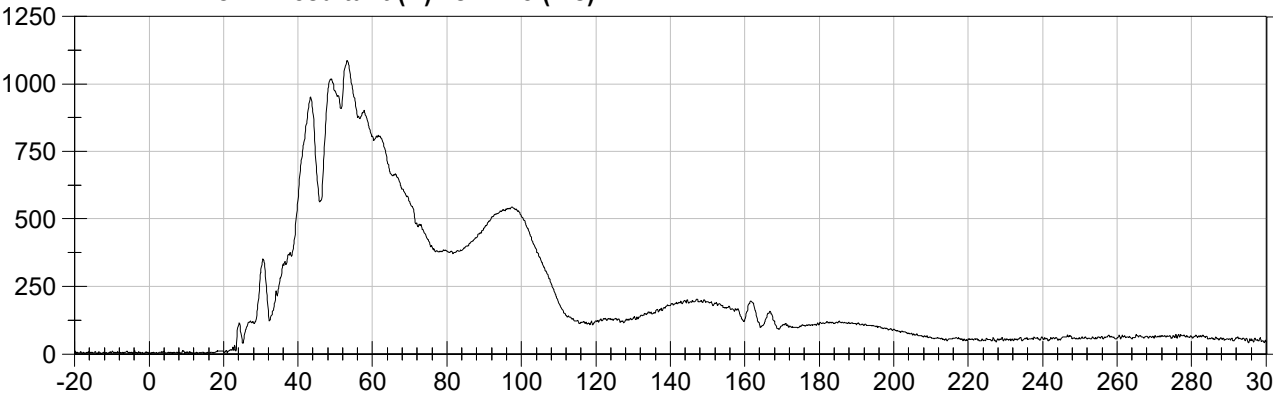
Max: 97.6 N
Tmax: 45.6 ms
Min: -36.9 N
Tmin: 112.7 ms
CFC 1000

DRIVER NECK FZ (N) vs Time (ms)



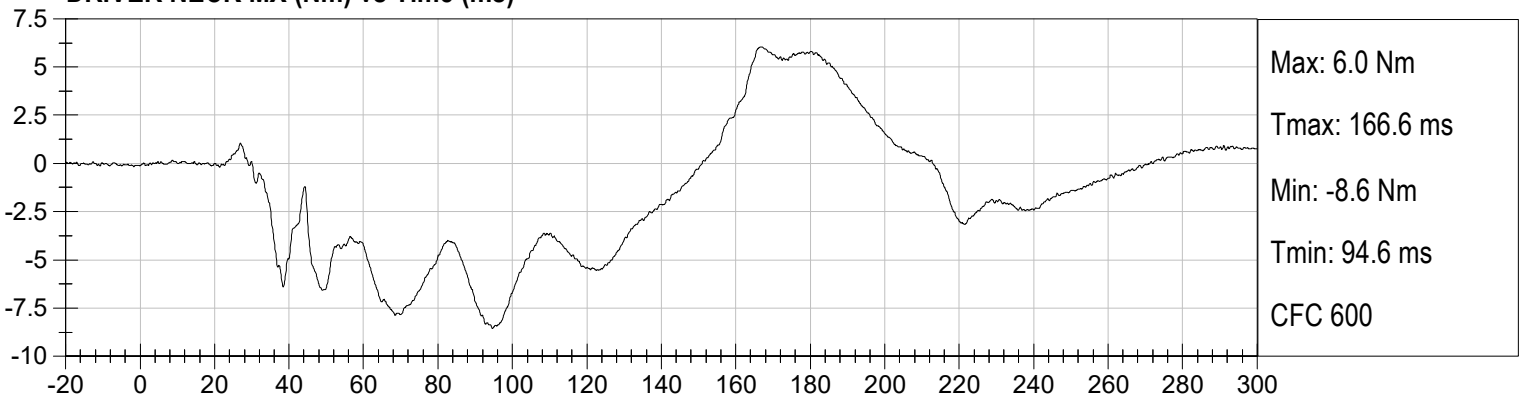
Max: 1059.9 N
Tmax: 53.2 ms
Min: -298.5 N
Tmin: 99.2 ms
CFC 1000

DRIVER NECK FResultant (N) vs Time (ms)

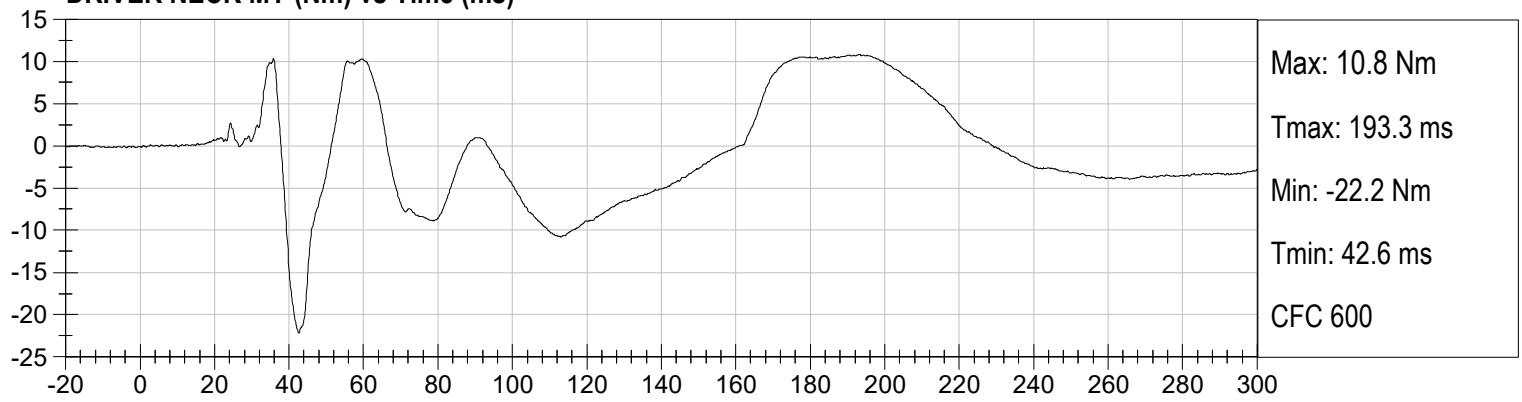


Max: 1087.0 N
Tmax: 53.2 ms
Min: 0.5 N
Tmin: 0.2 ms
CFC 1000

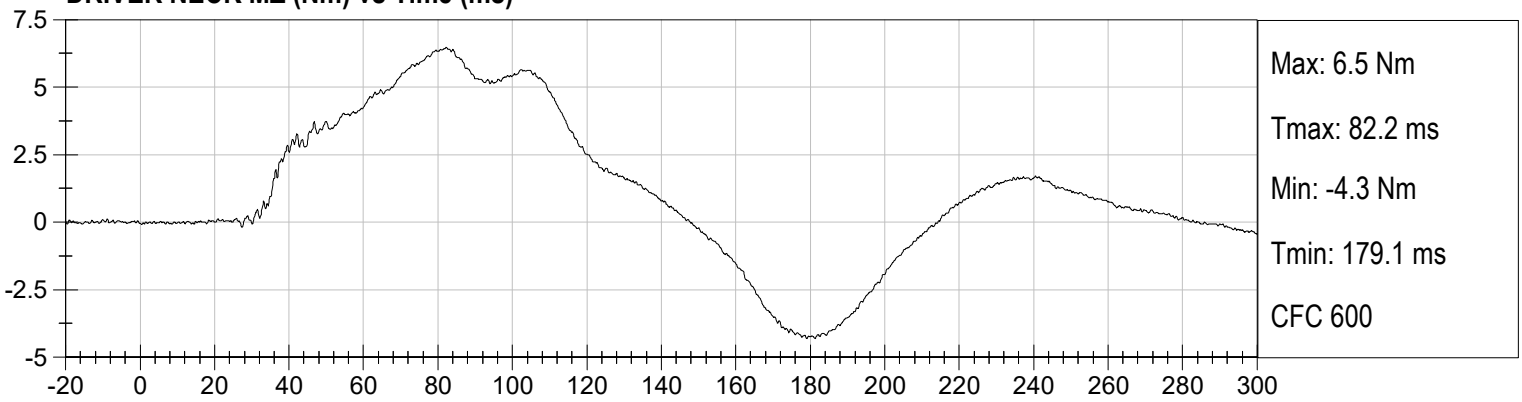
DRIVER NECK MX (Nm) vs Time (ms)



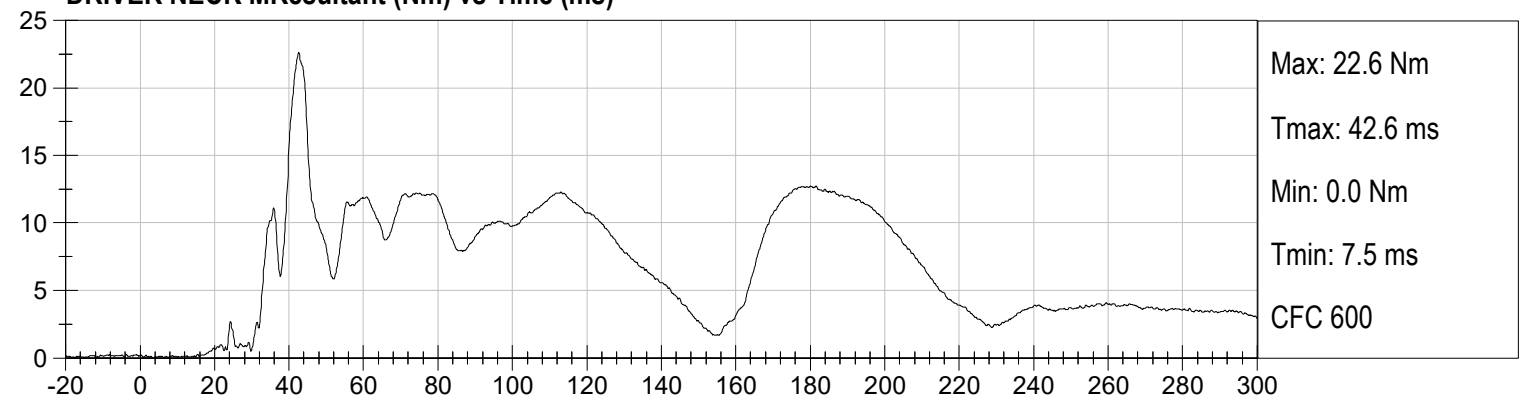
DRIVER NECK MY (Nm) vs Time (ms)



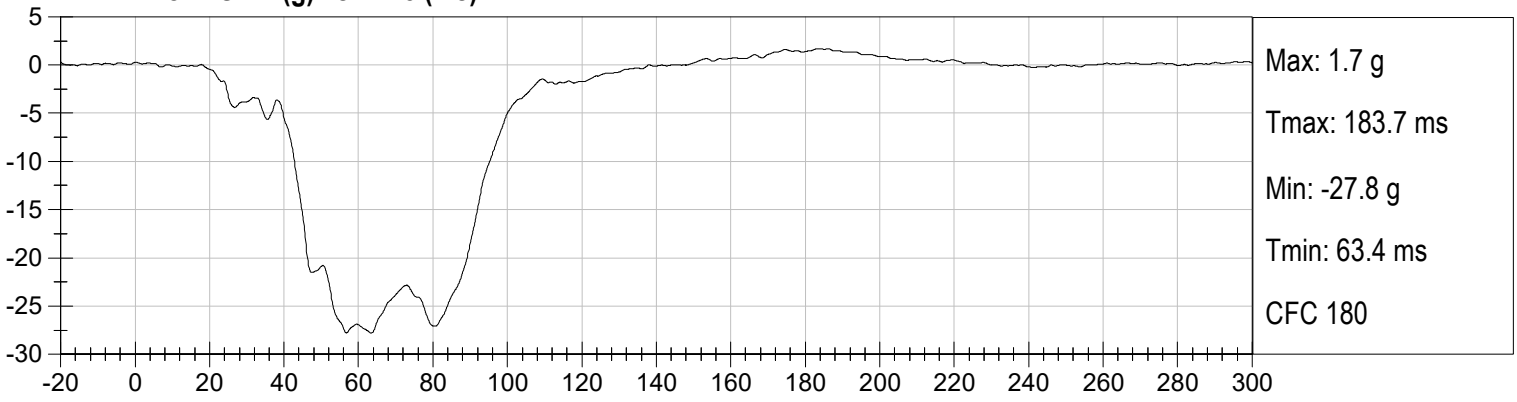
DRIVER NECK MZ (Nm) vs Time (ms)



DRIVER NECK MResultant (Nm) vs Time (ms)

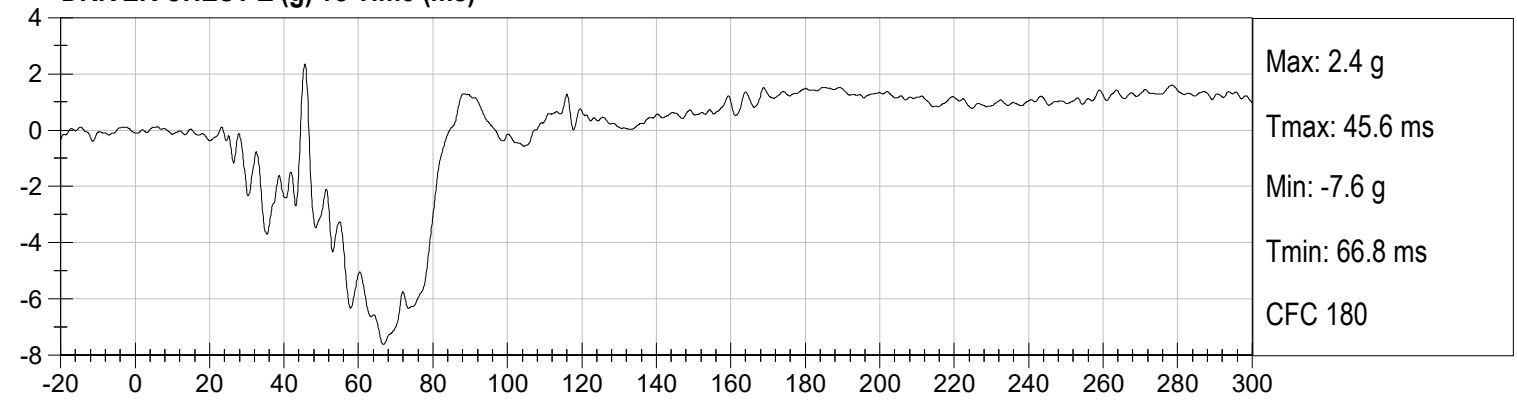


DRIVER CHEST X (g) vs Time (ms)

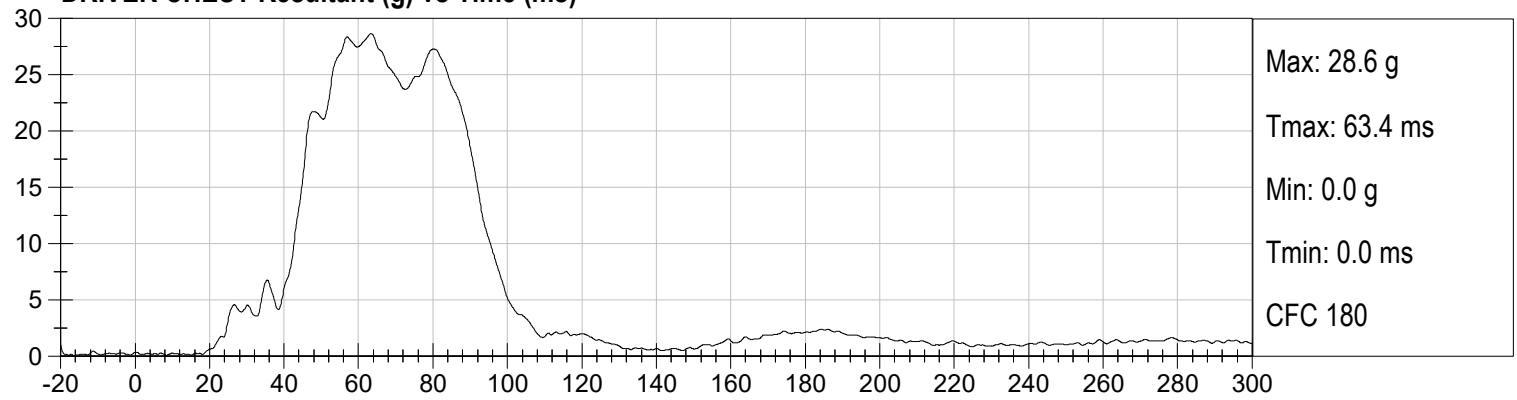


DRIVER CHEST Y (g) vs Time (ms)

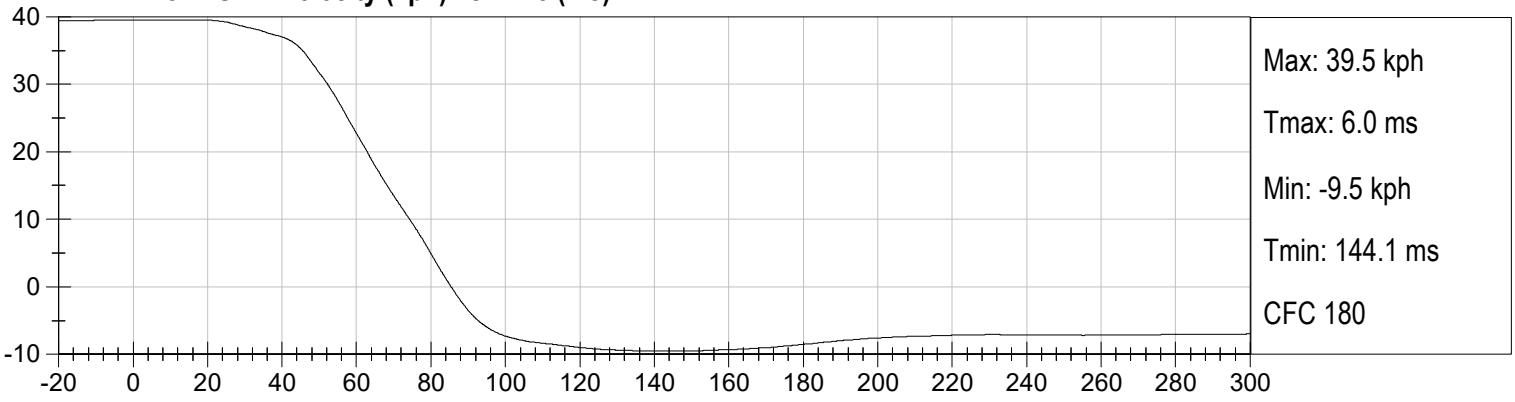
DRIVER CHEST Z (g) vs Time (ms)



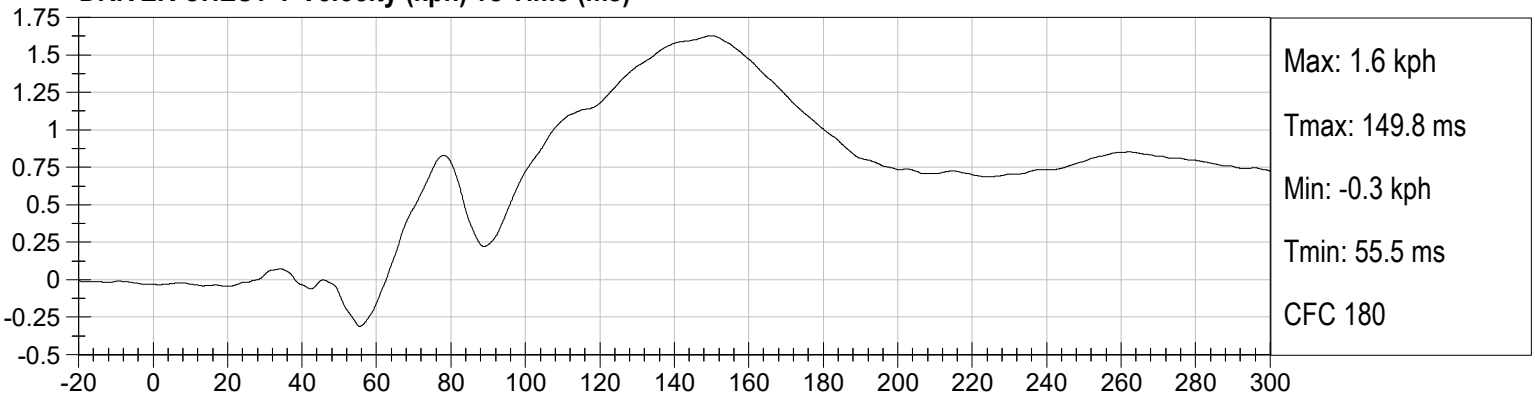
DRIVER CHEST Resultant (g) vs Time (ms)



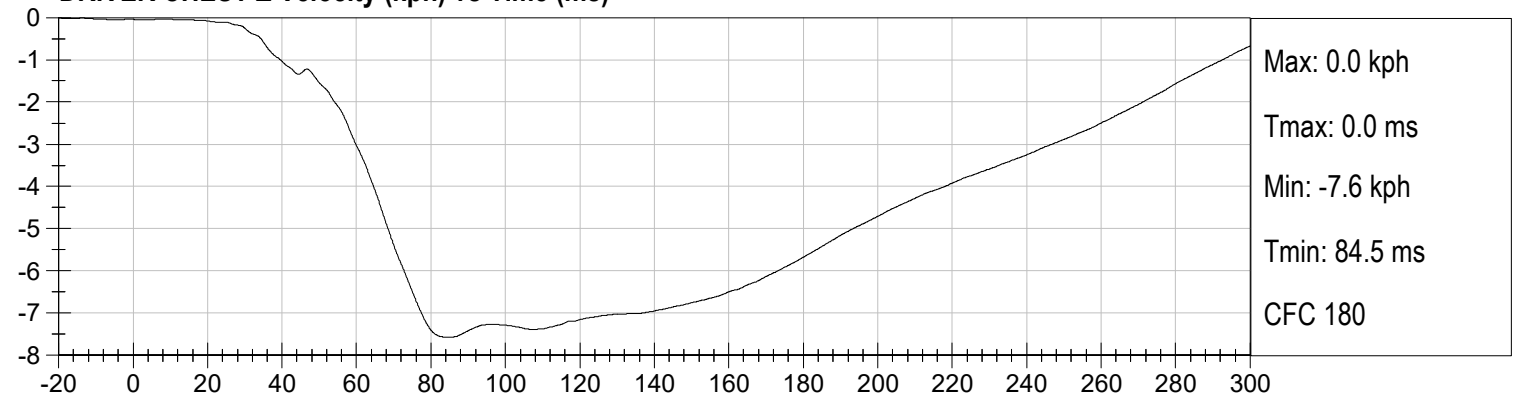
DRIVER CHEST X Velocity (kph) vs Time (ms)



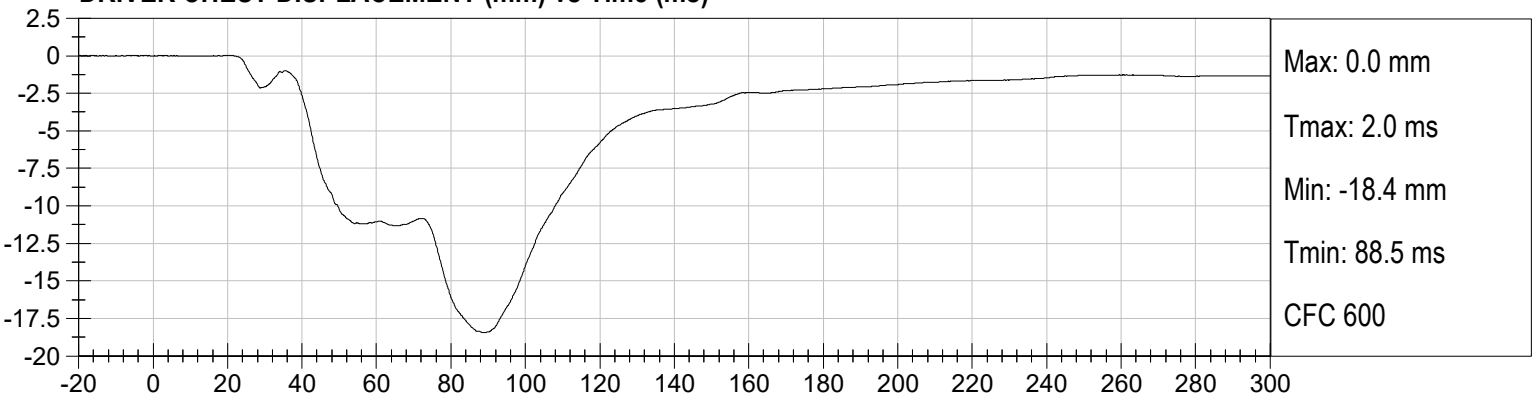
DRIVER CHEST Y Velocity (kph) vs Time (ms)



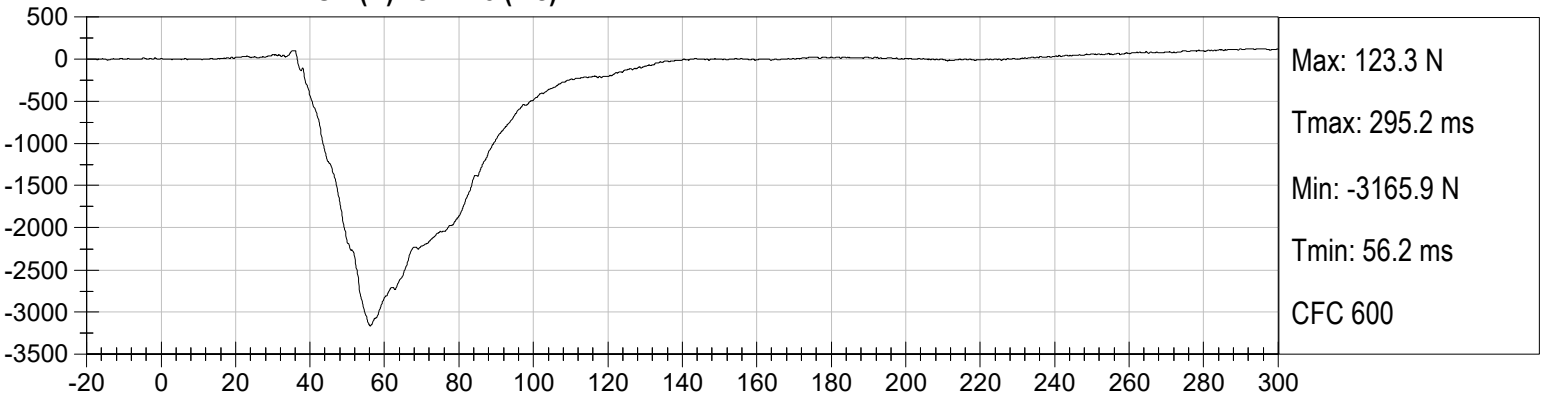
DRIVER CHEST Z Velocity (kph) vs Time (ms)



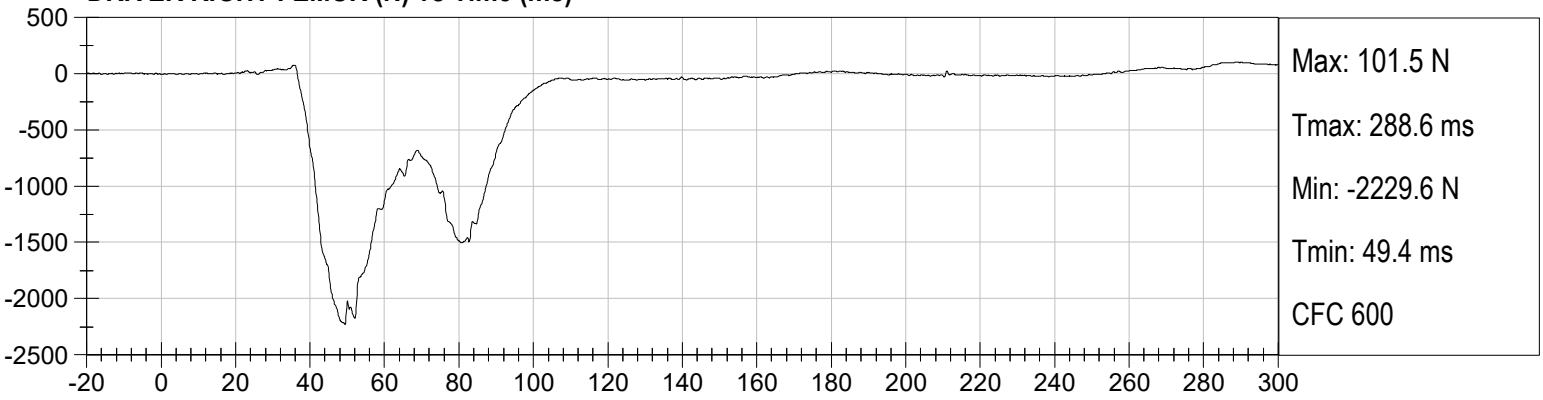
DRIVER CHEST DISPLACEMENT (mm) vs Time (ms)



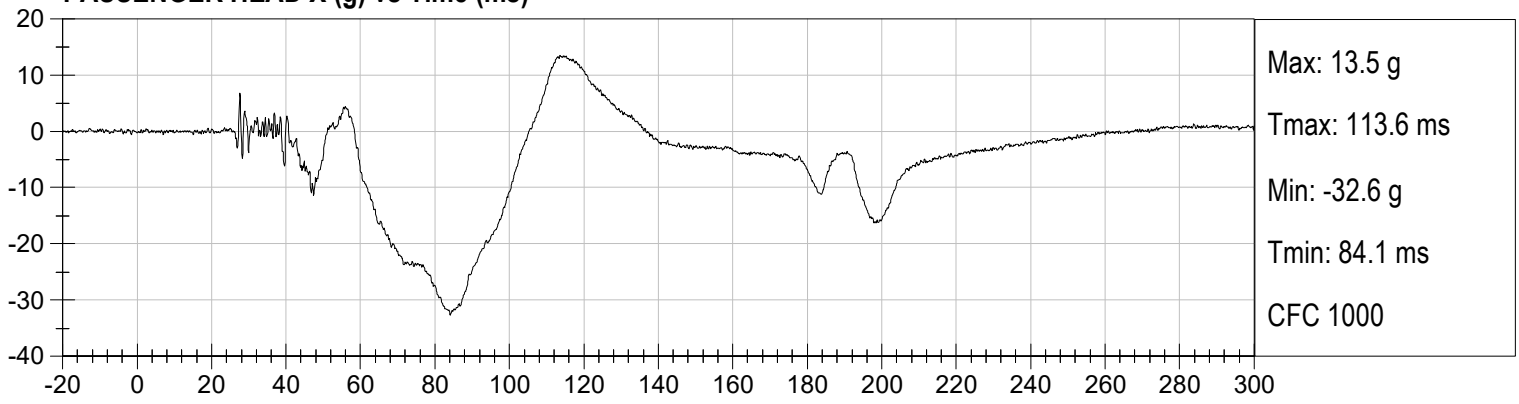
DRIVER LEFT FEMUR (N) vs Time (ms)



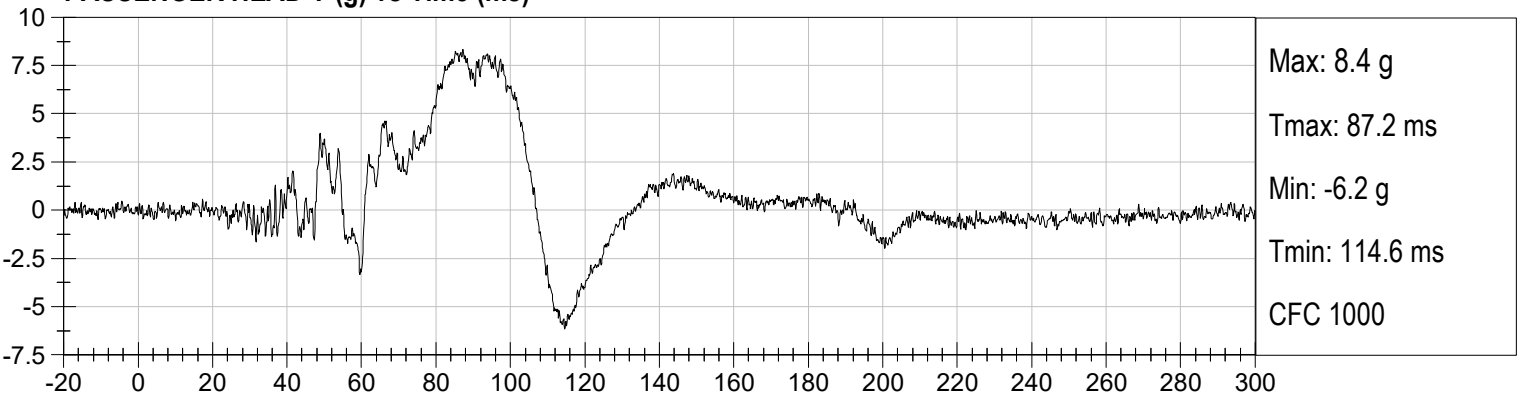
DRIVER RIGHT FEMUR (N) vs Time (ms)



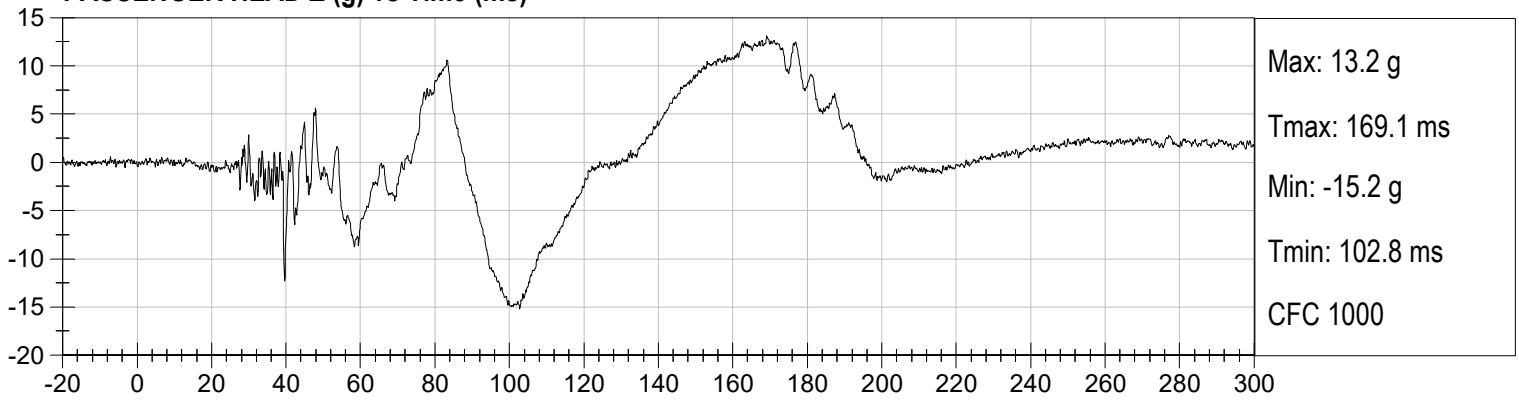
PASSENGER HEAD X (g) vs Time (ms)



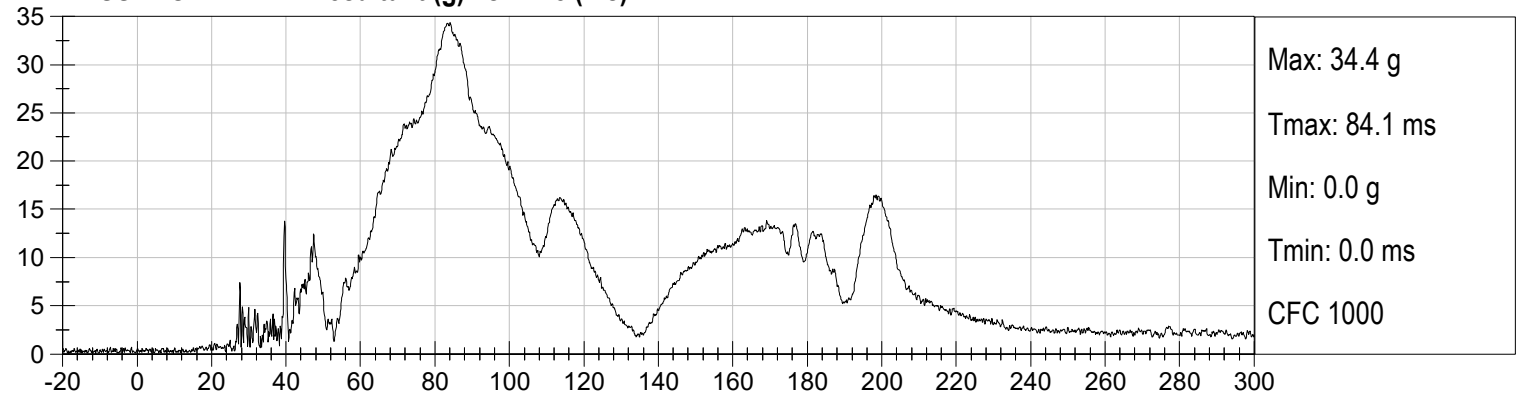
PASSENGER HEAD Y (g) vs Time (ms)



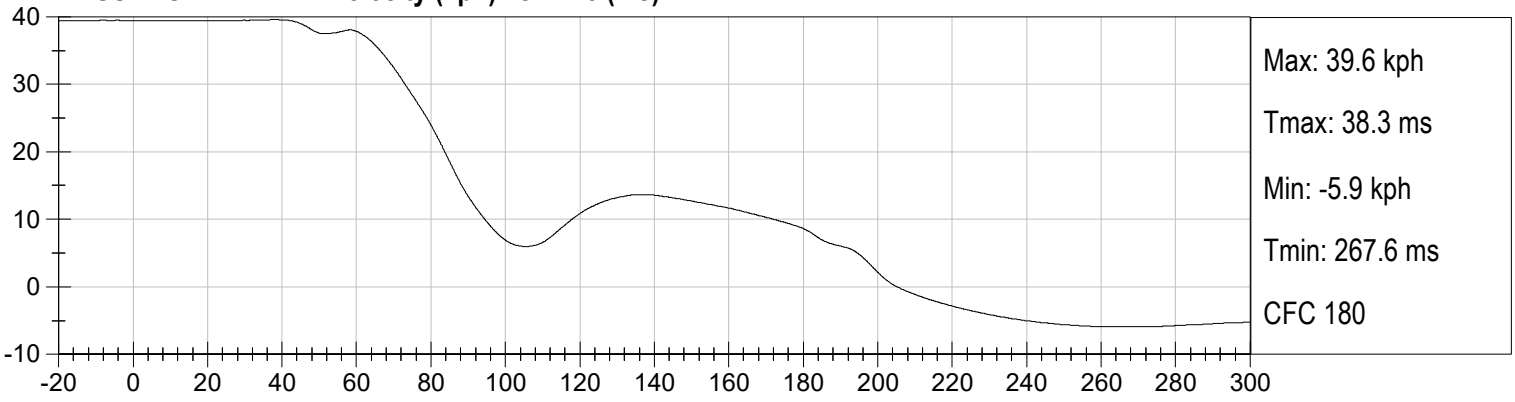
PASSENGER HEAD Z (g) vs Time (ms)



PASSENGER HEAD Resultant (g) vs Time (ms)

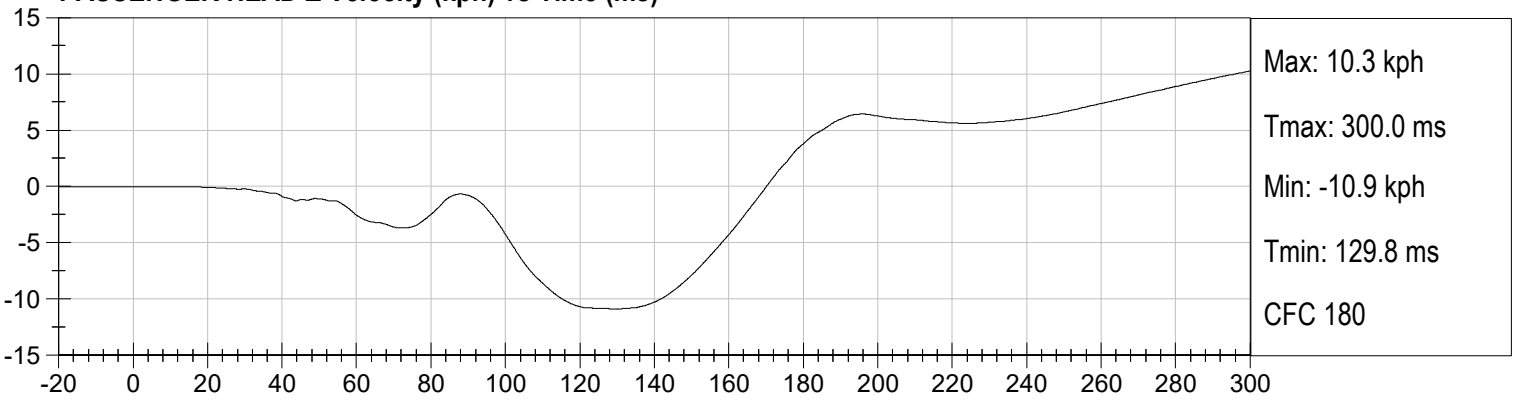


PASSENGER HEAD X Velocity (kph) vs Time (ms)

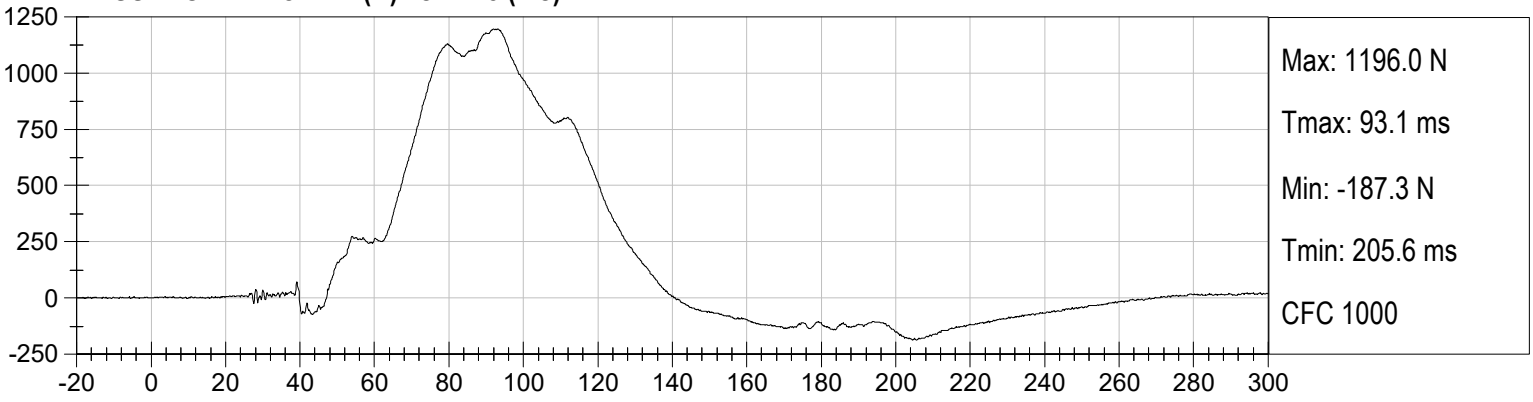


PASSENGER HEAD Y Velocity (kph) vs Time (ms)

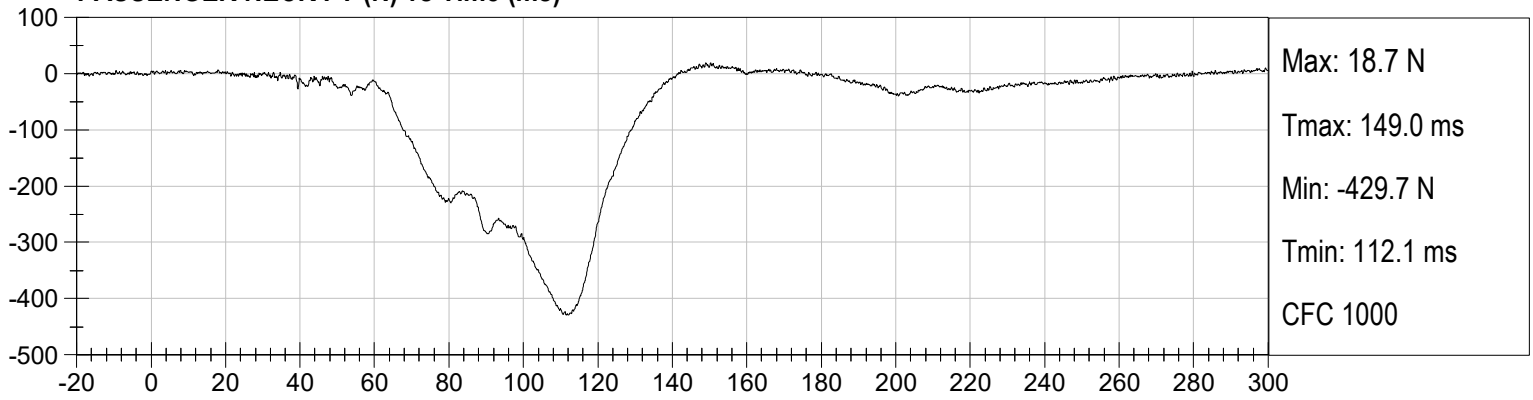
PASSENGER HEAD Z Velocity (kph) vs Time (ms)



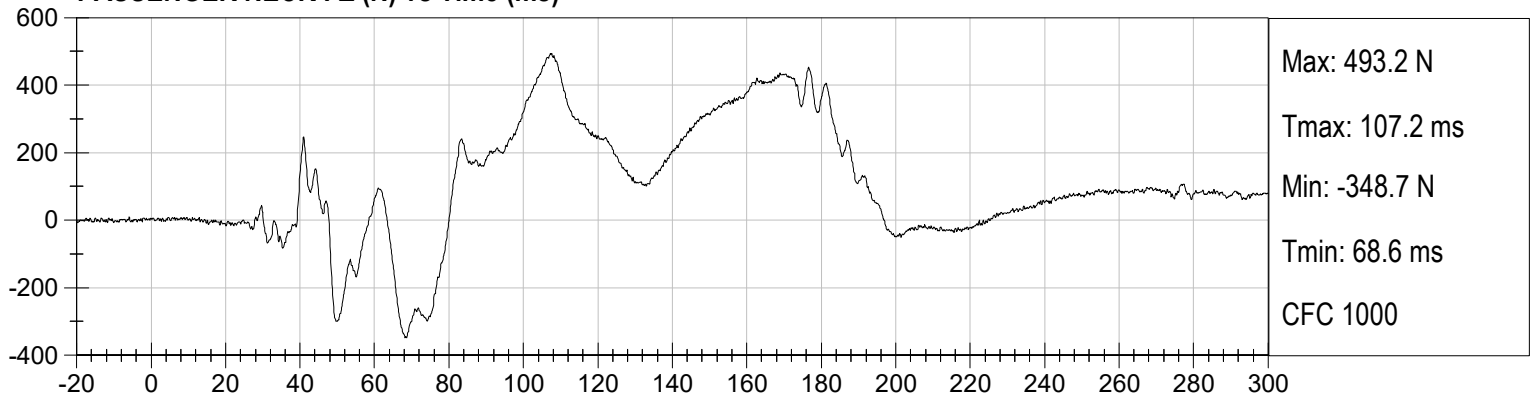
PASSENGER NECK FX (N) vs Time (ms)



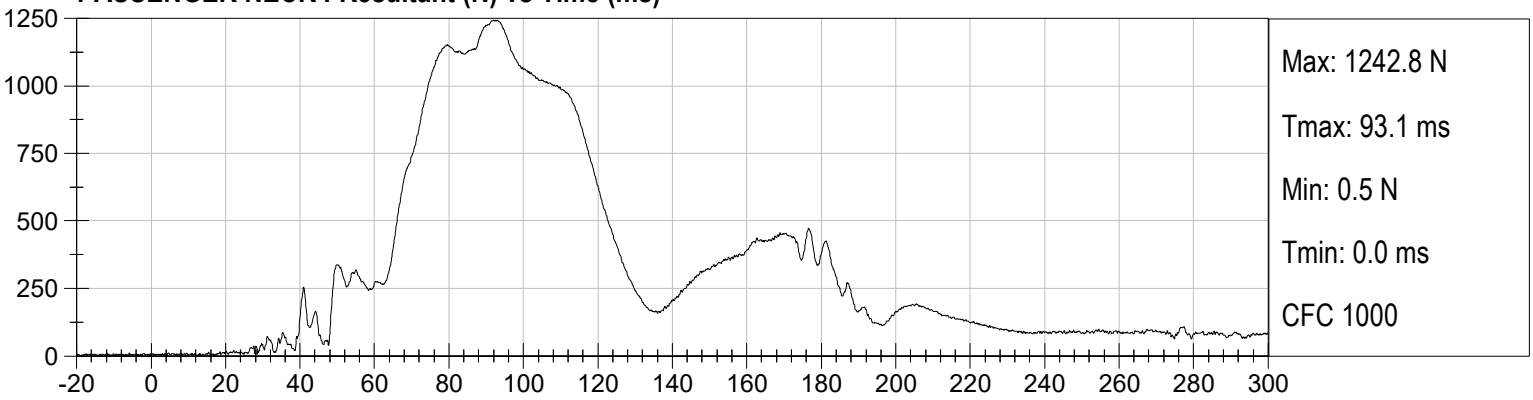
PASSENGER NECK FY (N) vs Time (ms)



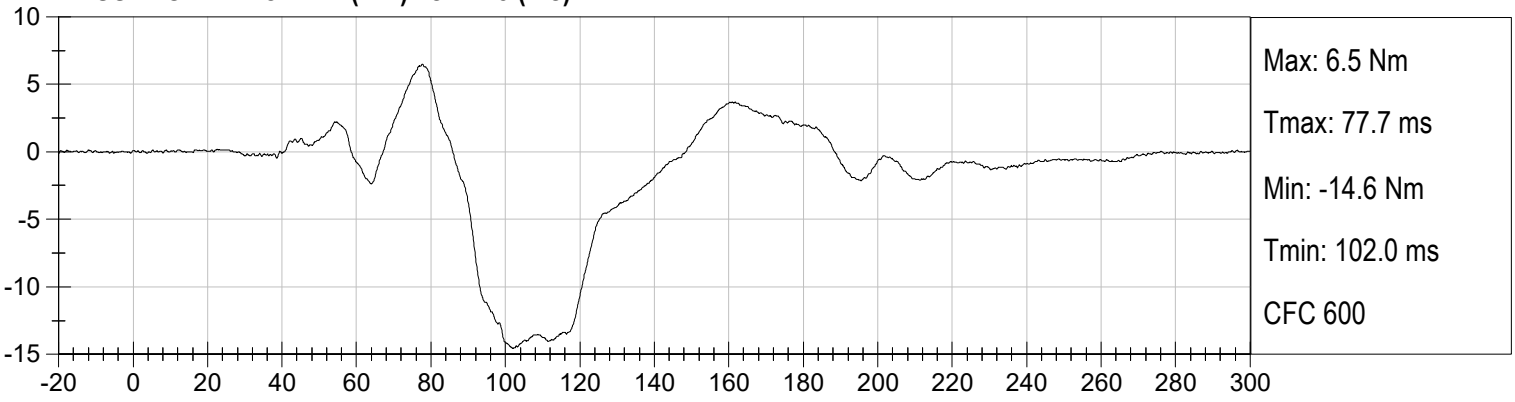
PASSENGER NECK FZ (N) vs Time (ms)



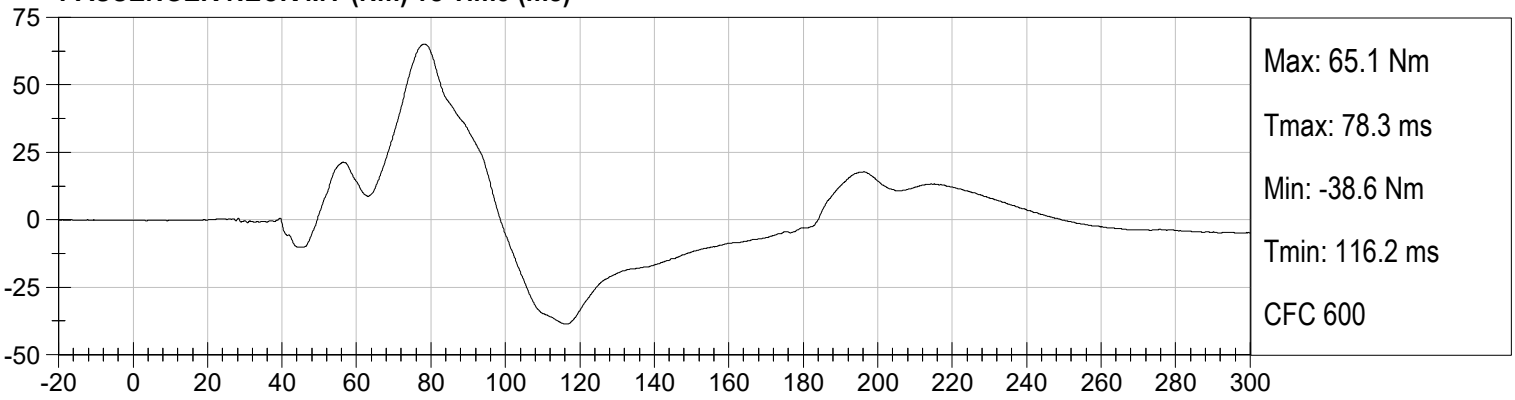
PASSENGER NECK FResultant (N) vs Time (ms)



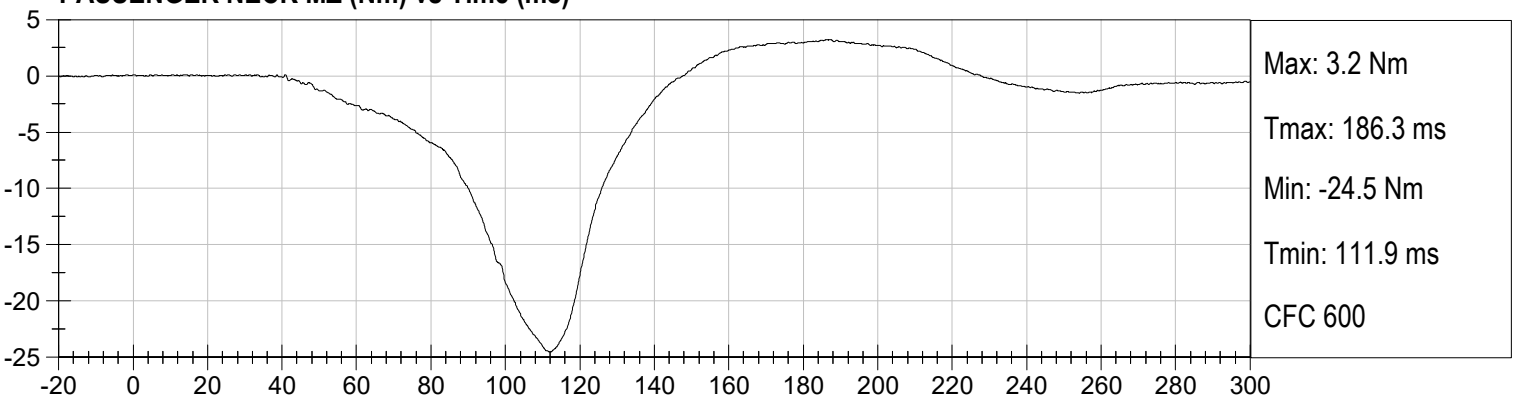
PASSENGER NECK MX (Nm) vs Time (ms)



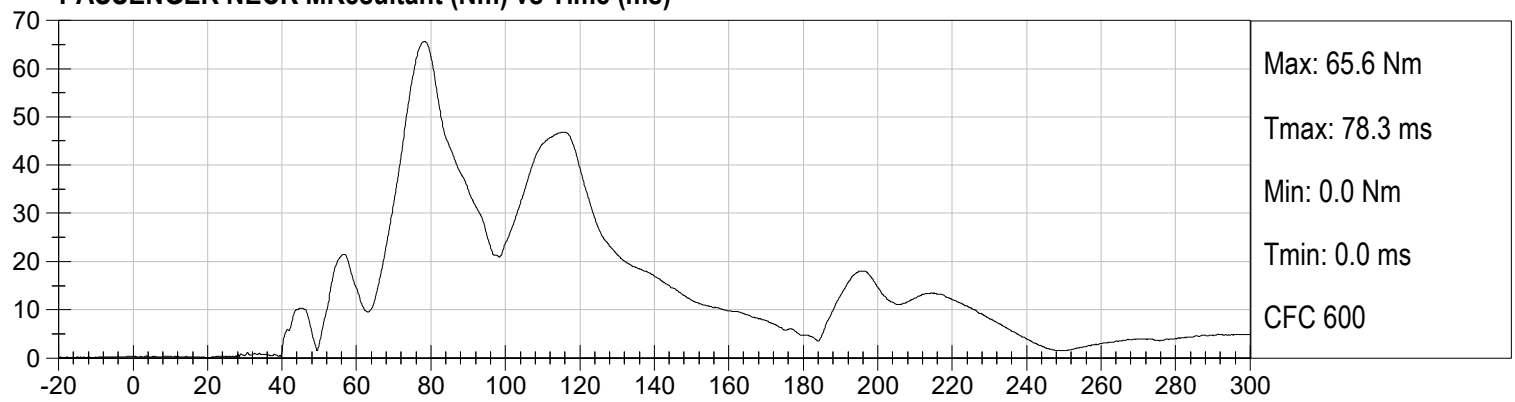
PASSENGER NECK MY (Nm) vs Time (ms)



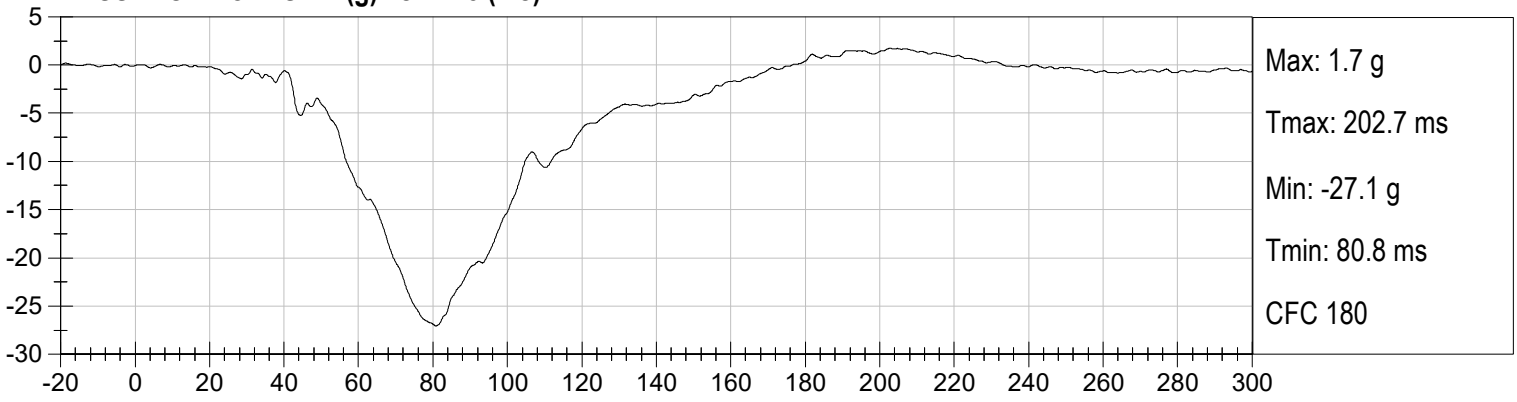
PASSENGER NECK MZ (Nm) vs Time (ms)



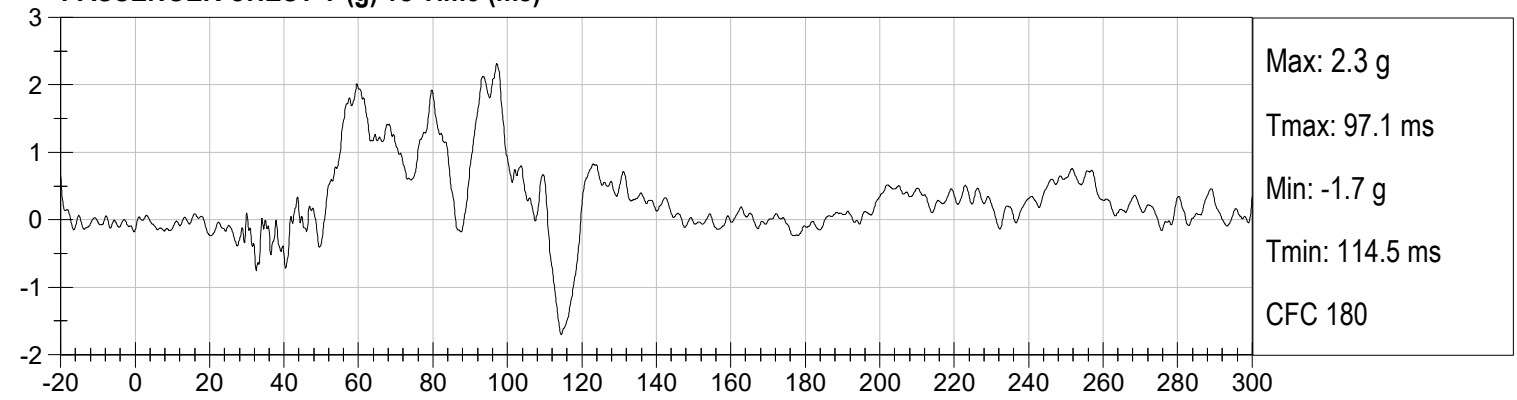
PASSENGER NECK MResultant (Nm) vs Time (ms)



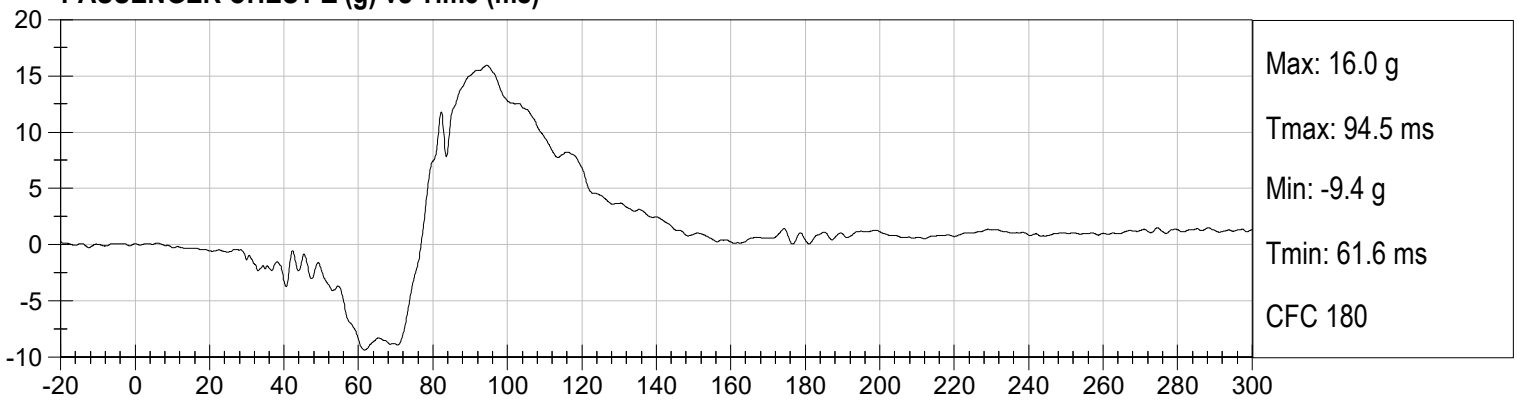
PASSENGER CHEST X (g) vs Time (ms)



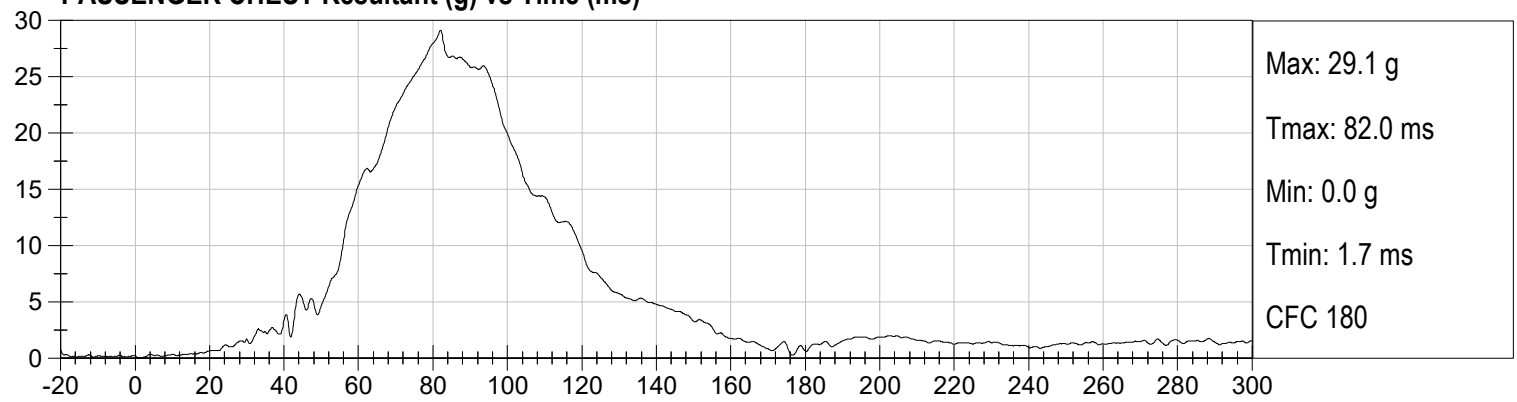
PASSENGER CHEST Y (g) vs Time (ms)



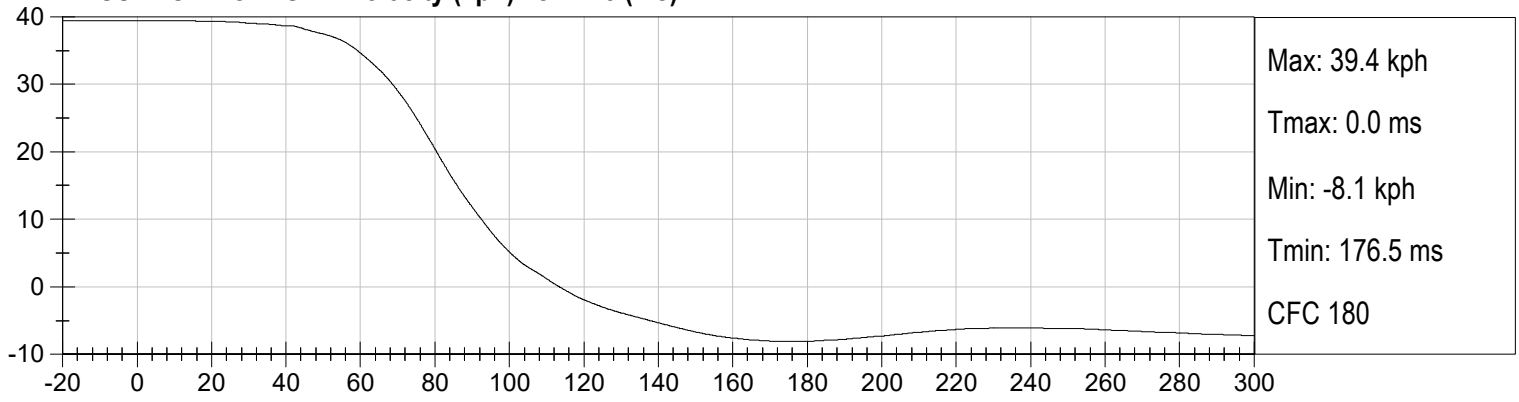
PASSENGER CHEST Z (g) vs Time (ms)



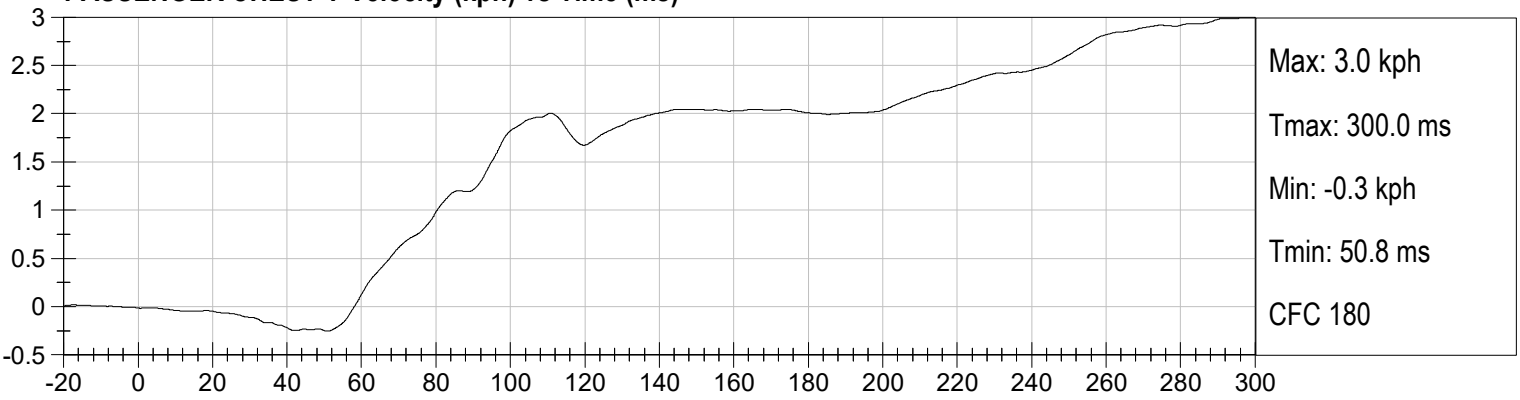
PASSENGER CHEST Resultant (g) vs Time (ms)



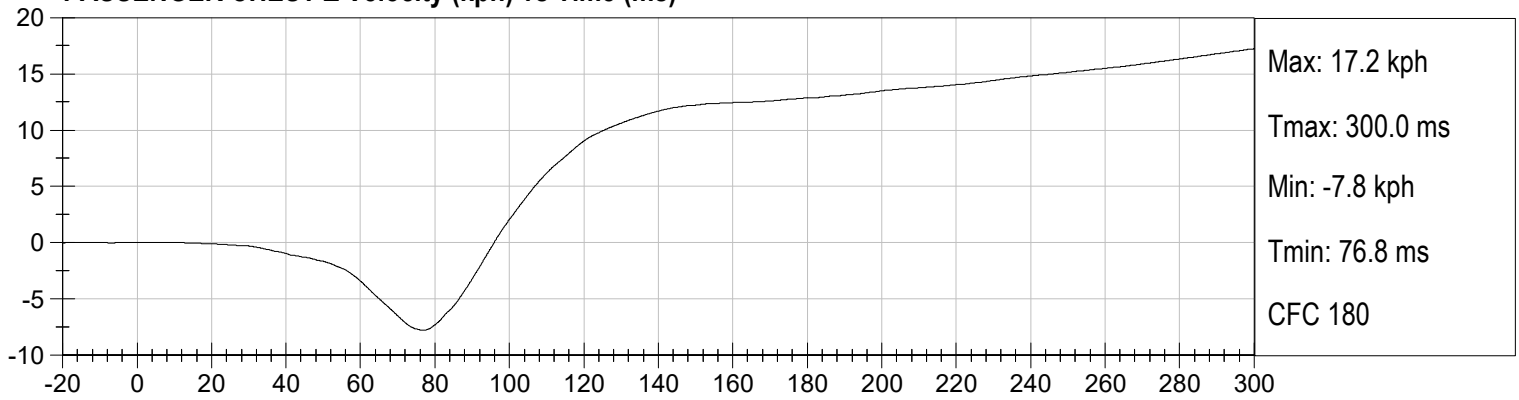
PASSENGER CHEST X Velocity (kph) vs Time (ms)



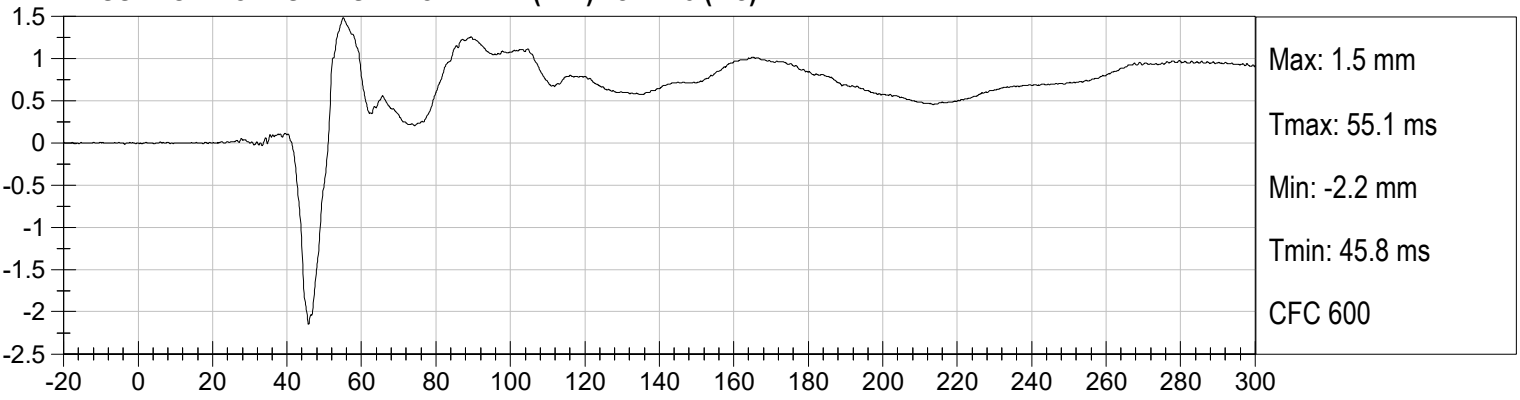
PASSENGER CHEST Y Velocity (kph) vs Time (ms)



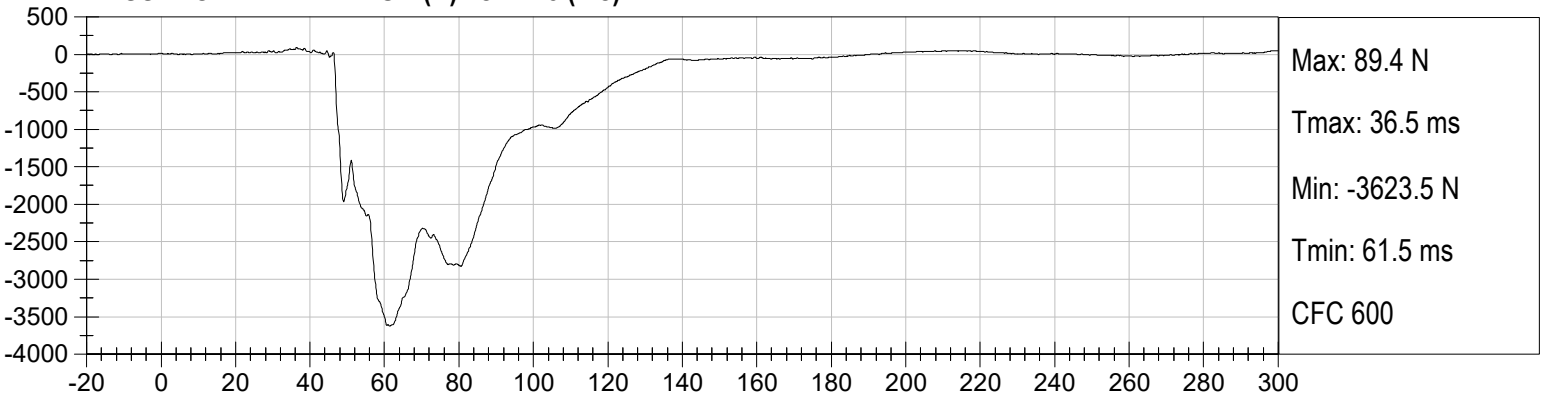
PASSENGER CHEST Z Velocity (kph) vs Time (ms)



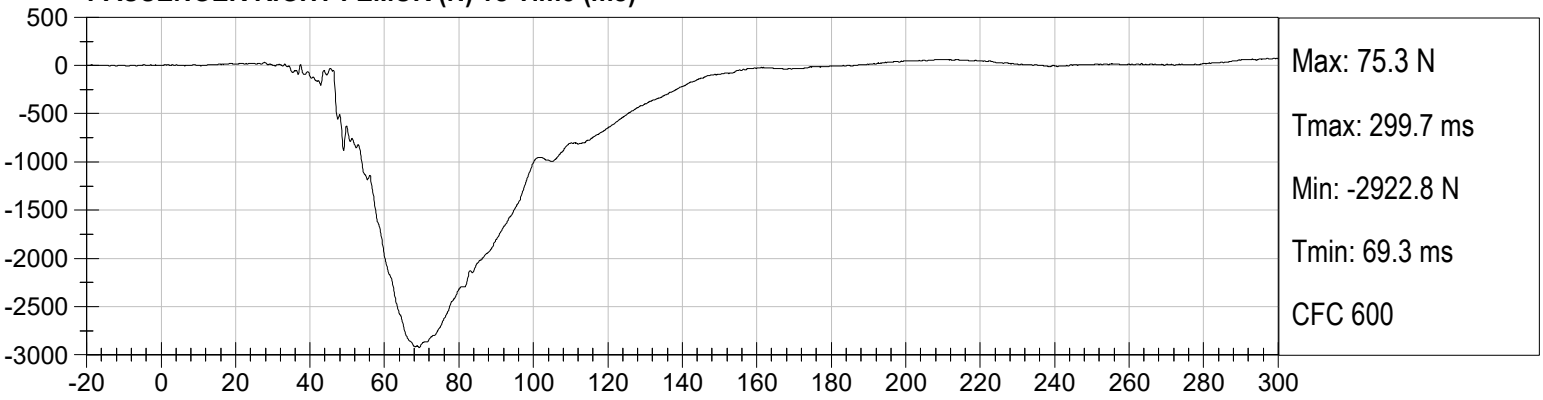
PASSENGER CHEST DISPLACEMENT (mm) vs Time (ms)



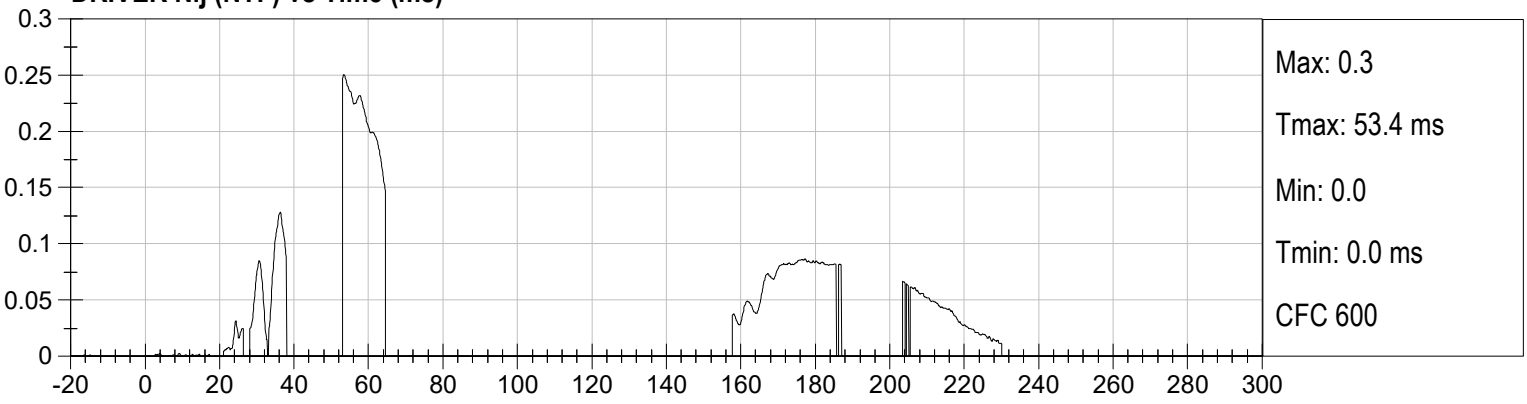
PASSENGER LEFT FEMUR (N) vs Time (ms)



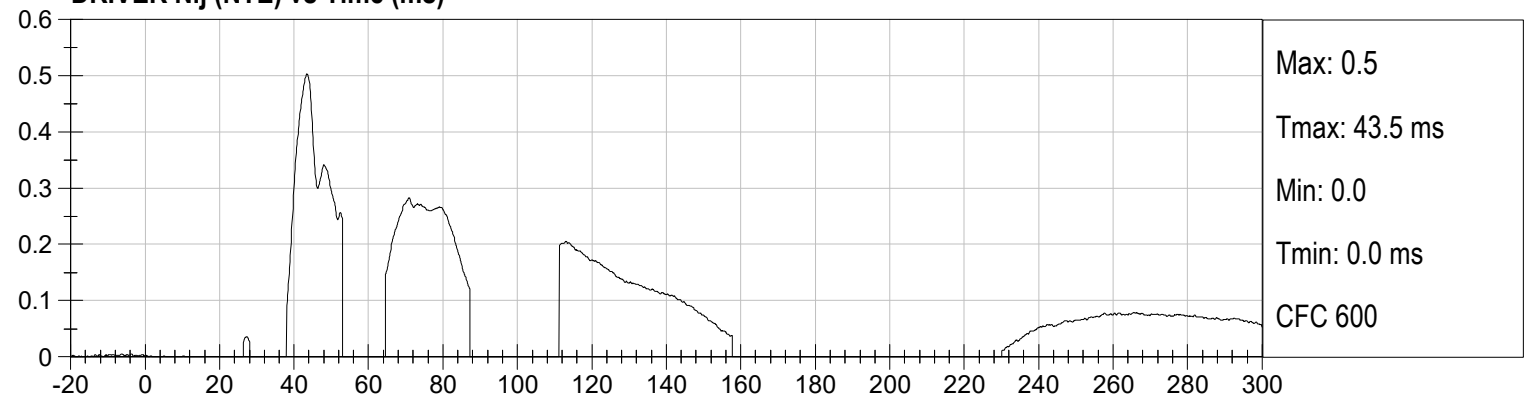
PASSENGER RIGHT FEMUR (N) vs Time (ms)



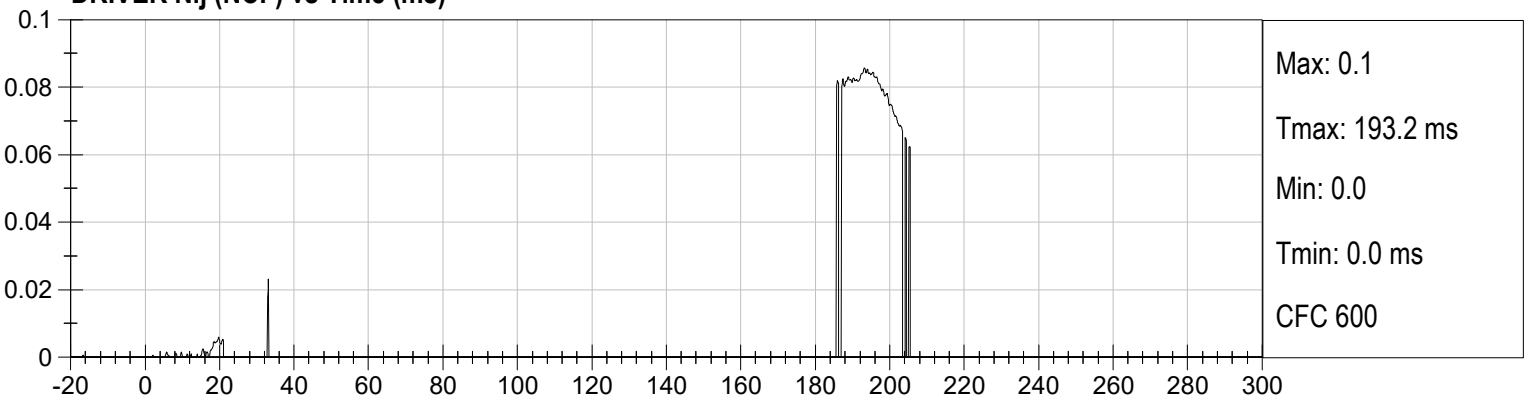
DRIVER Nij (NTF) vs Time (ms)



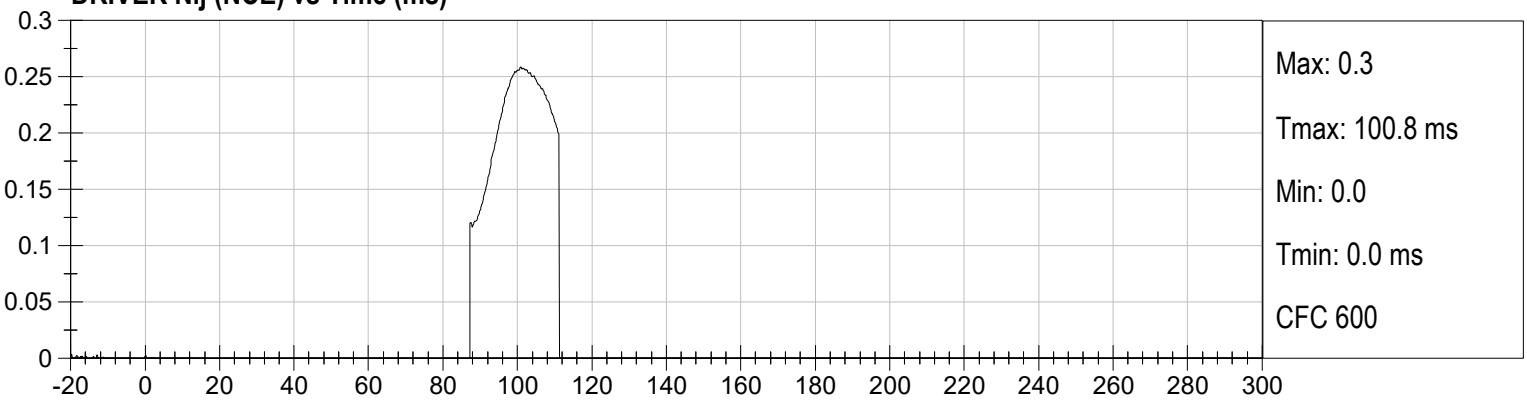
DRIVER Nij (NTE) vs Time (ms)



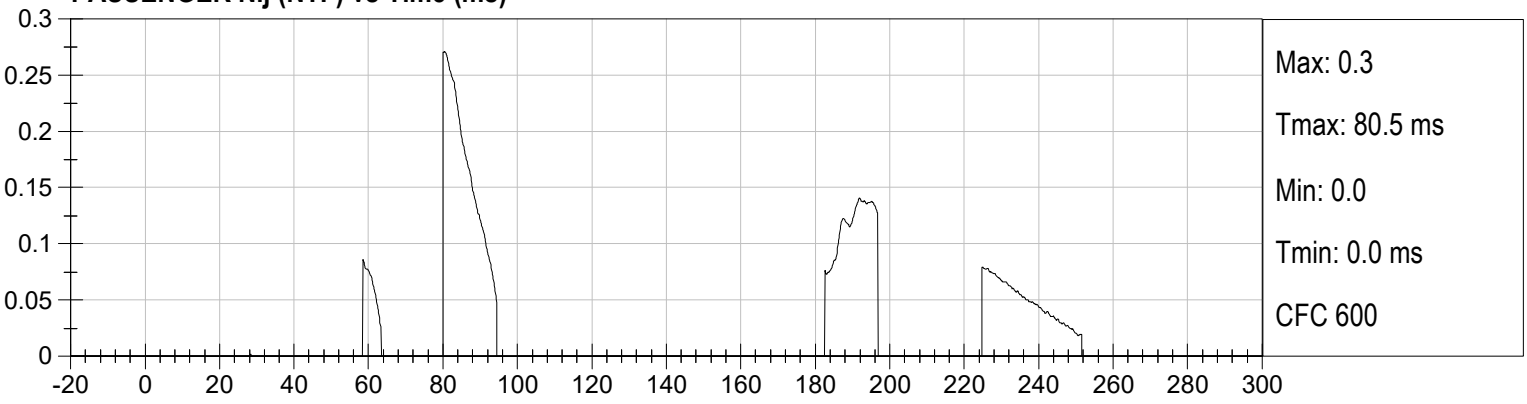
DRIVER Nij (NCF) vs Time (ms)



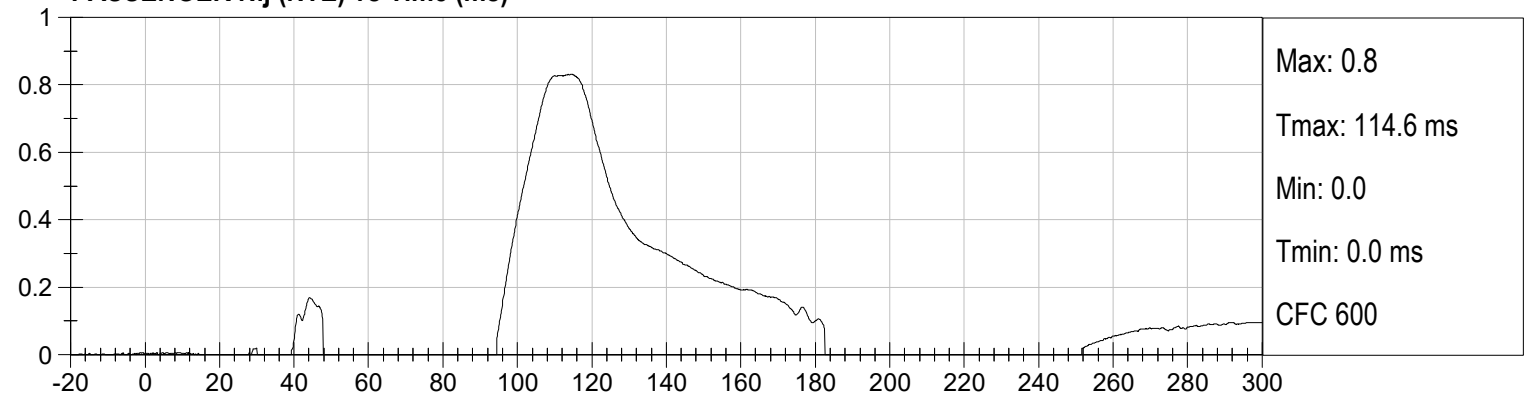
DRIVER Nij (NCE) vs Time (ms)



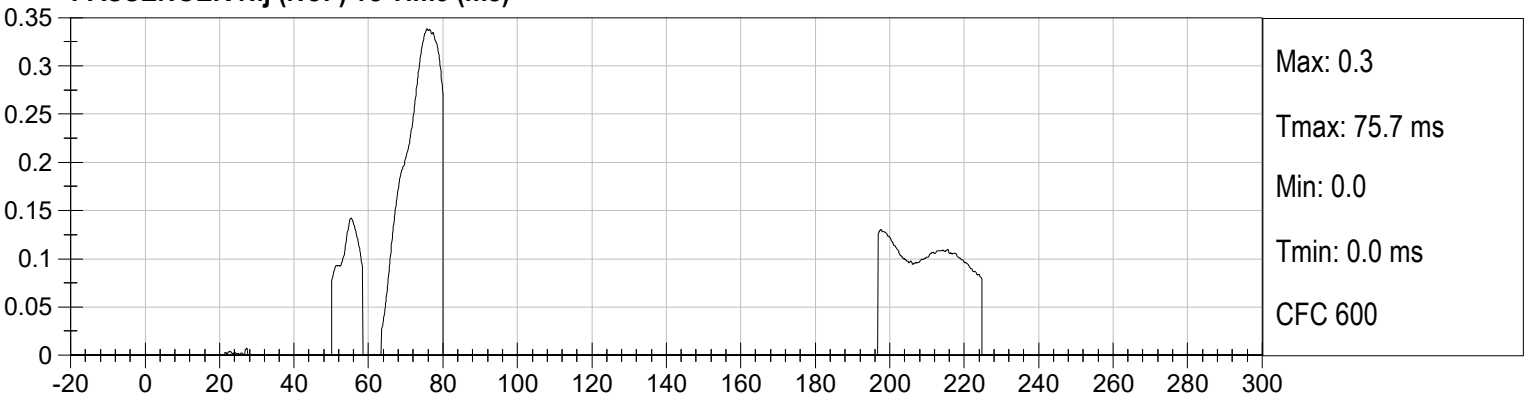
PASSENGER Nij (NTF) vs Time (ms)



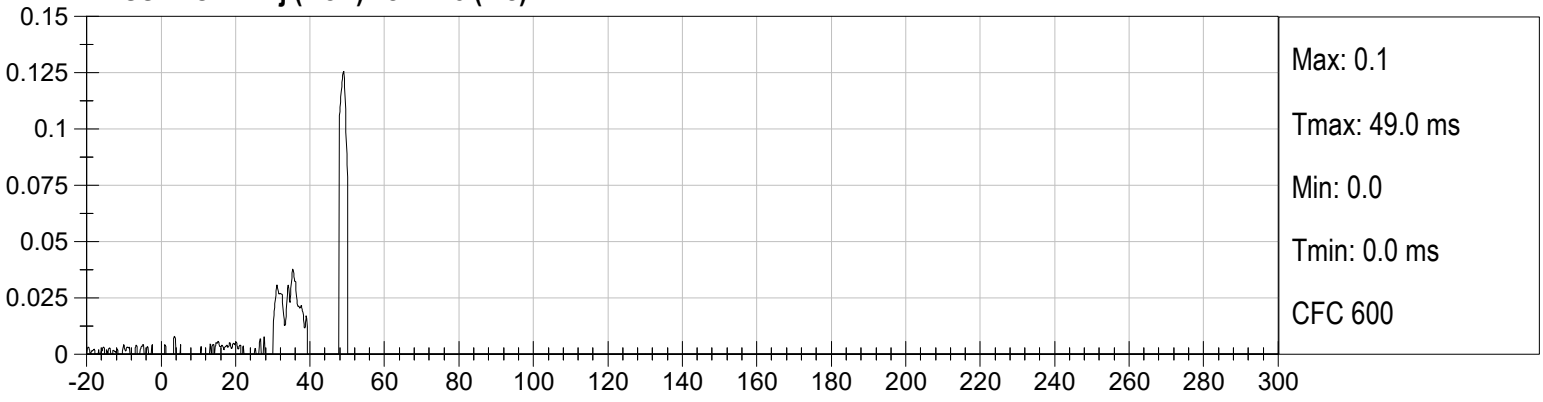
PASSENGER Nij (NTE) vs Time (ms)



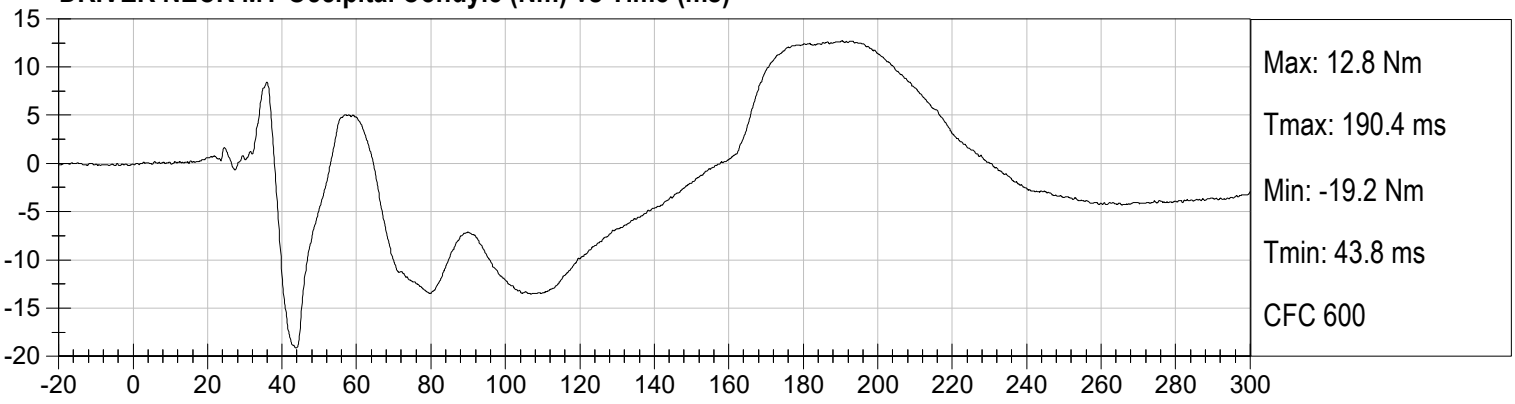
PASSENGER Nij (NCF) vs Time (ms)



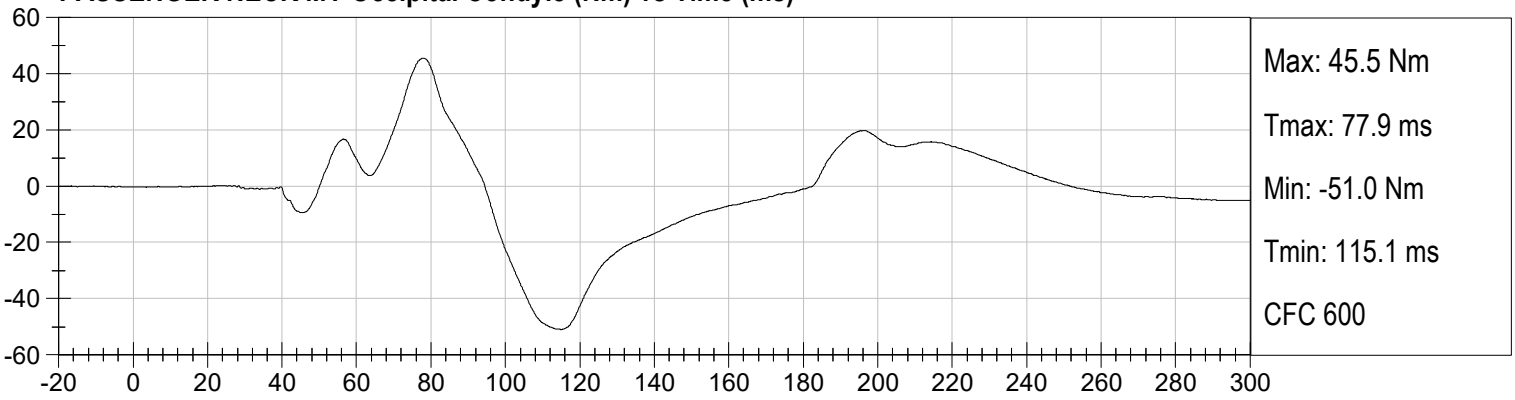
PASSENGER Nij (NCE) vs Time (ms)



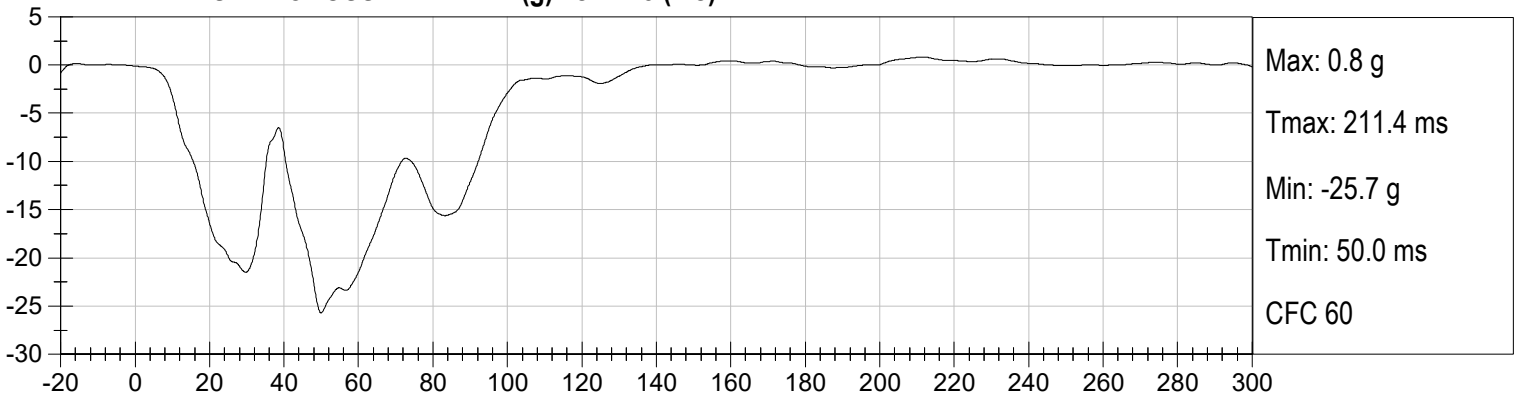
DRIVER NECK MY Occipital Condyle (Nm) vs Time (ms)



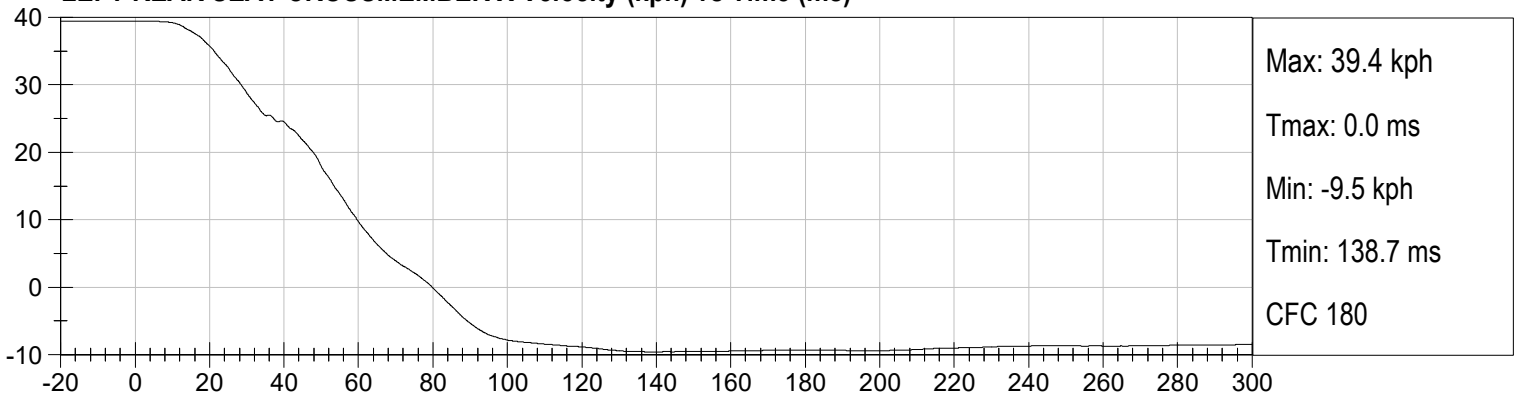
PASSENGER NECK MY Occipital Condyle (Nm) vs Time (ms)



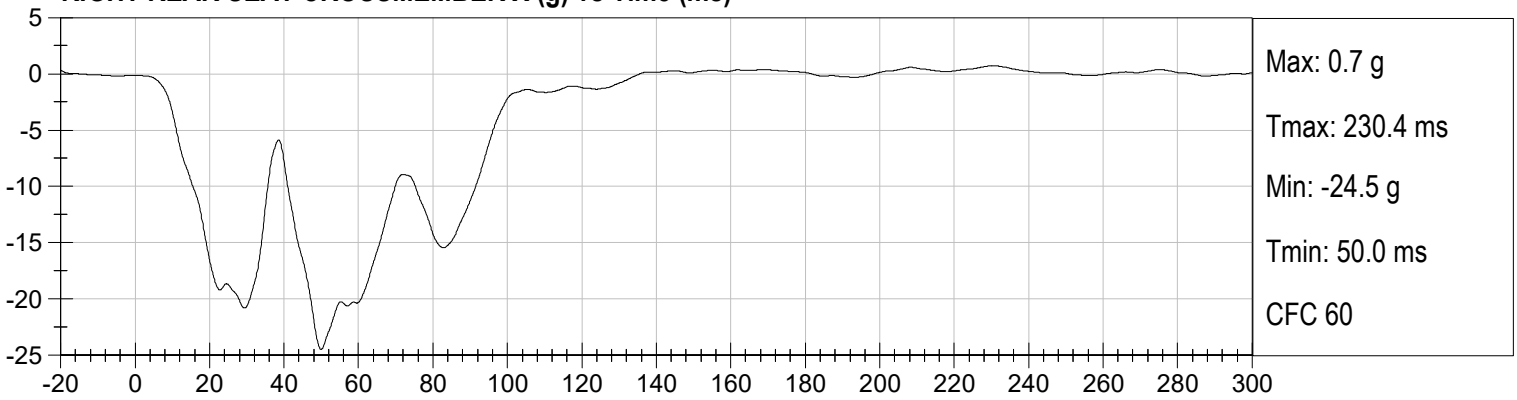
LEFT REAR SEAT CROSSMEMBER X (g) vs Time (ms)



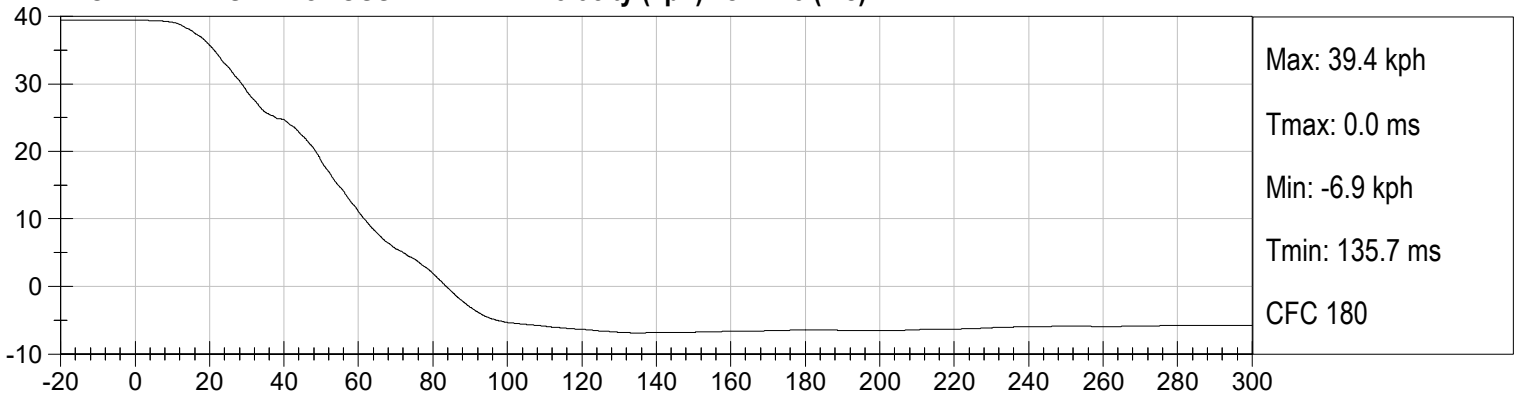
LEFT REAR SEAT CROSSMEMBER X Velocity (kph) vs Time (ms)



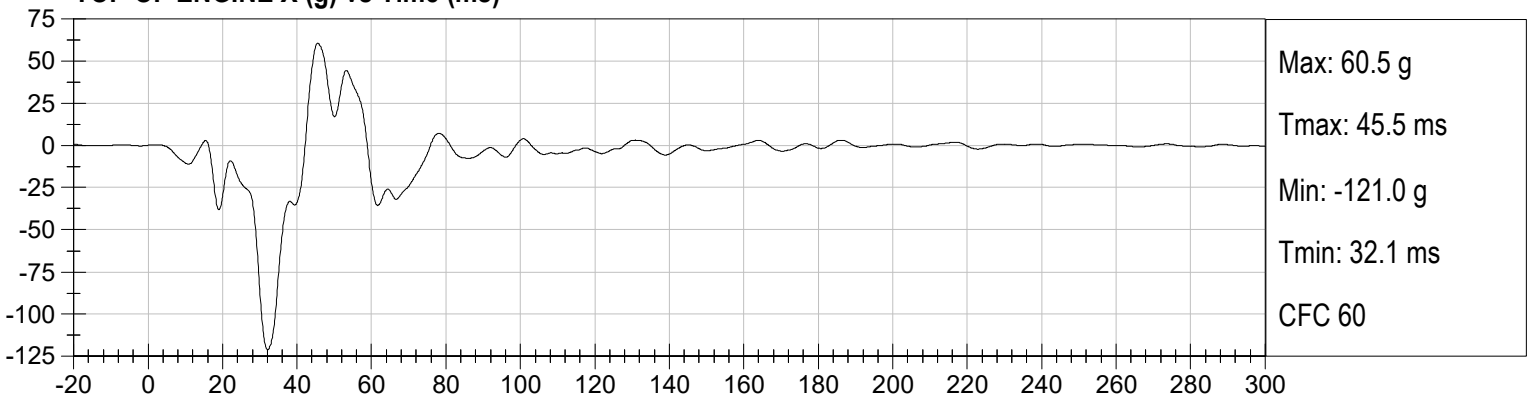
RIGHT REAR SEAT CROSSMEMBER X (g) vs Time (ms)



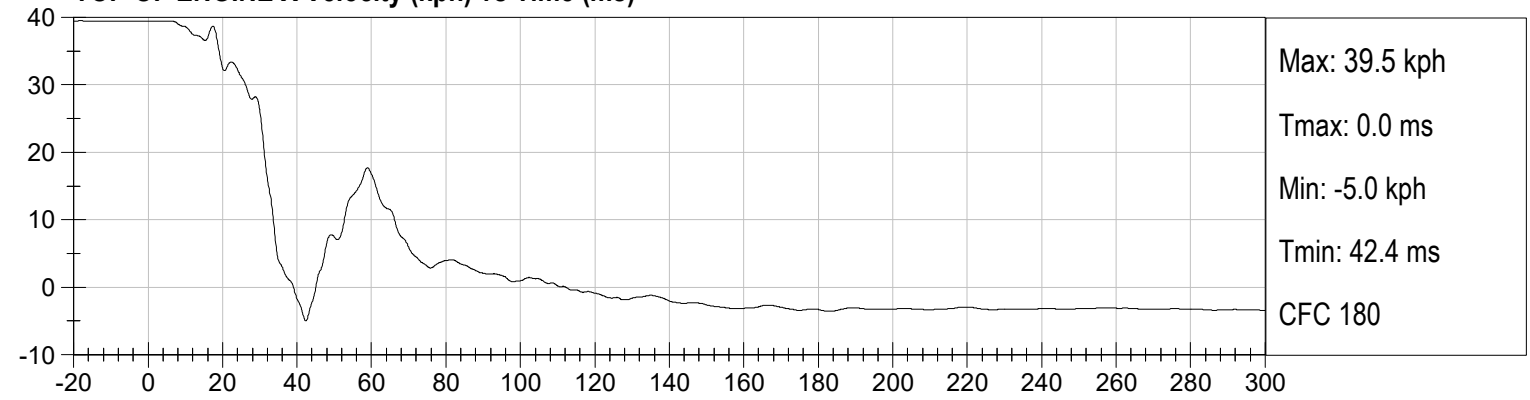
RIGHT REAR SEAT CROSSMEMBER X Velocity (kph) vs Time (ms)



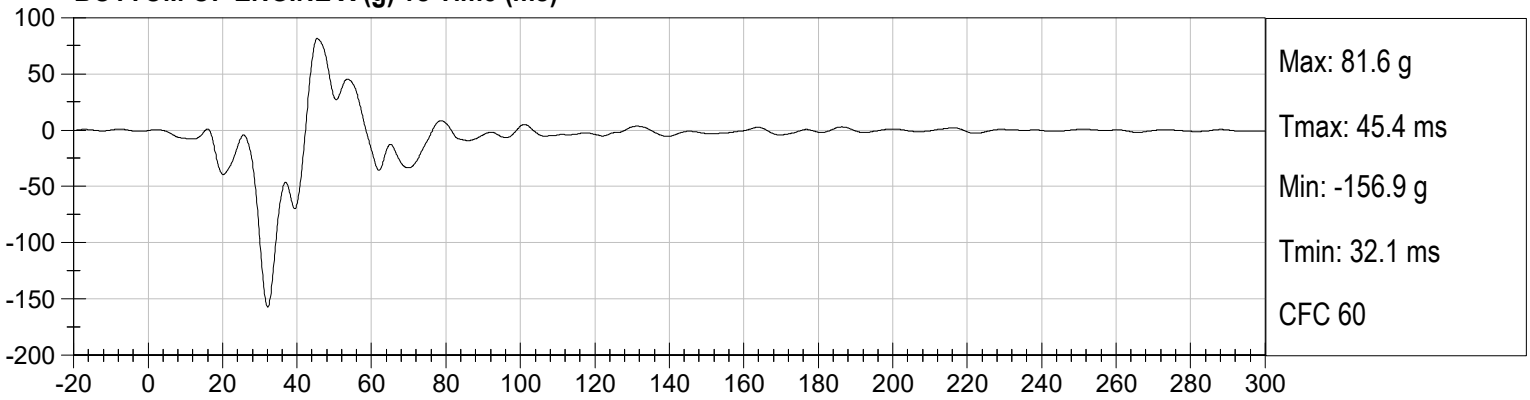
TOP OF ENGINE X (g) vs Time (ms)



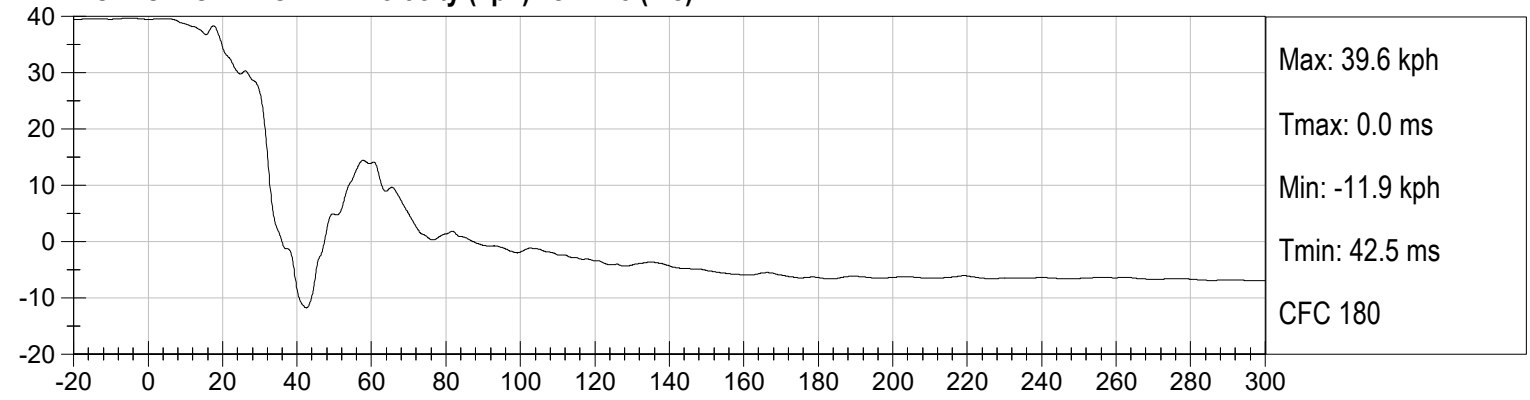
TOP OF ENGINE X Velocity (kph) vs Time (ms)



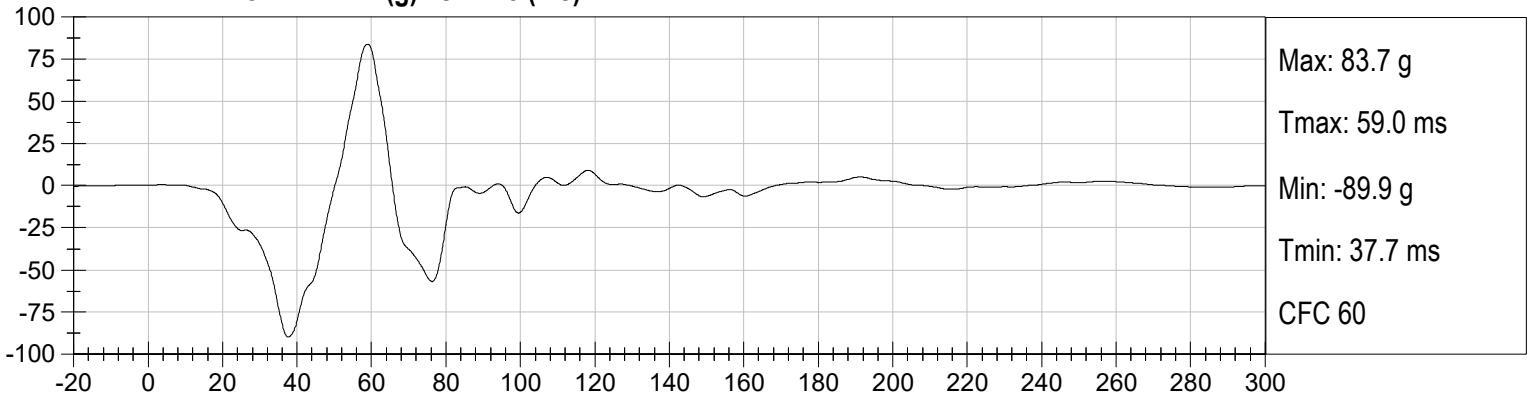
BOTTOM OF ENGINE X (g) vs Time (ms)



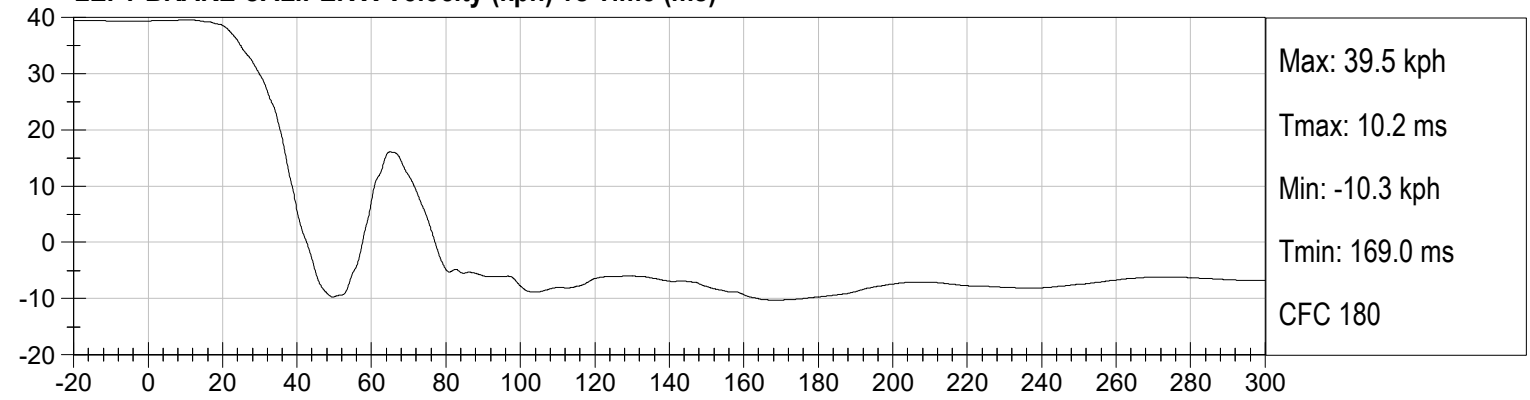
BOTTOM OF ENGINE X Velocity (kph) vs Time (ms)



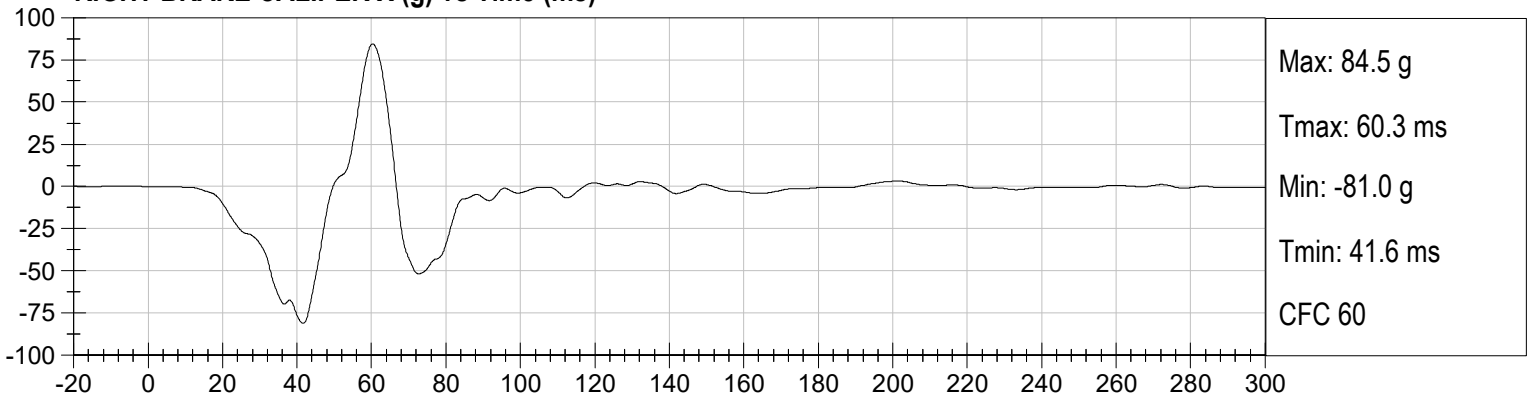
LEFT BRAKE CALIPER X (g) vs Time (ms)



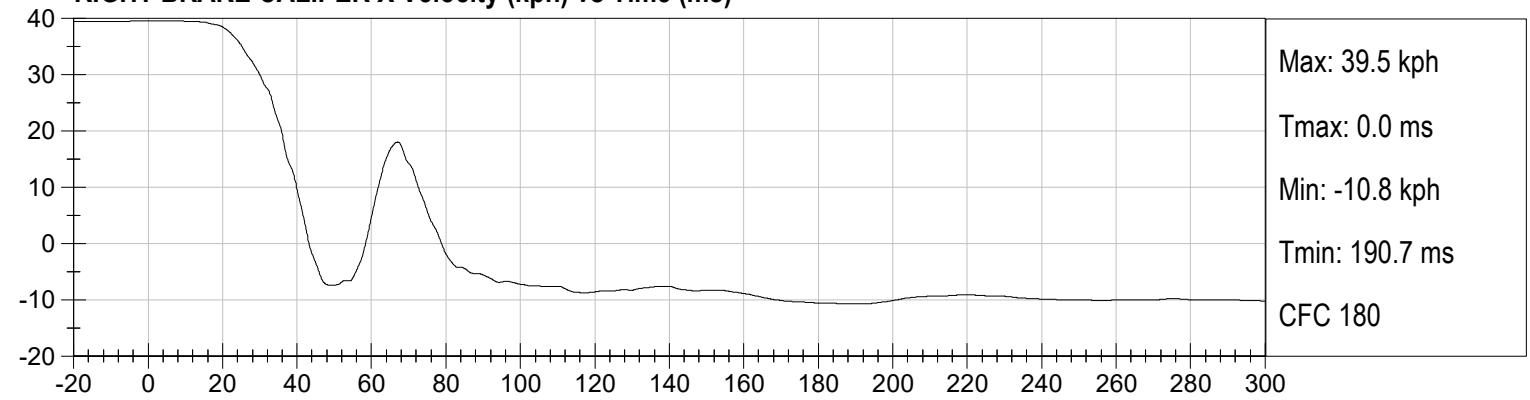
LEFT BRAKE CALIPER X Velocity (kph) vs Time (ms)



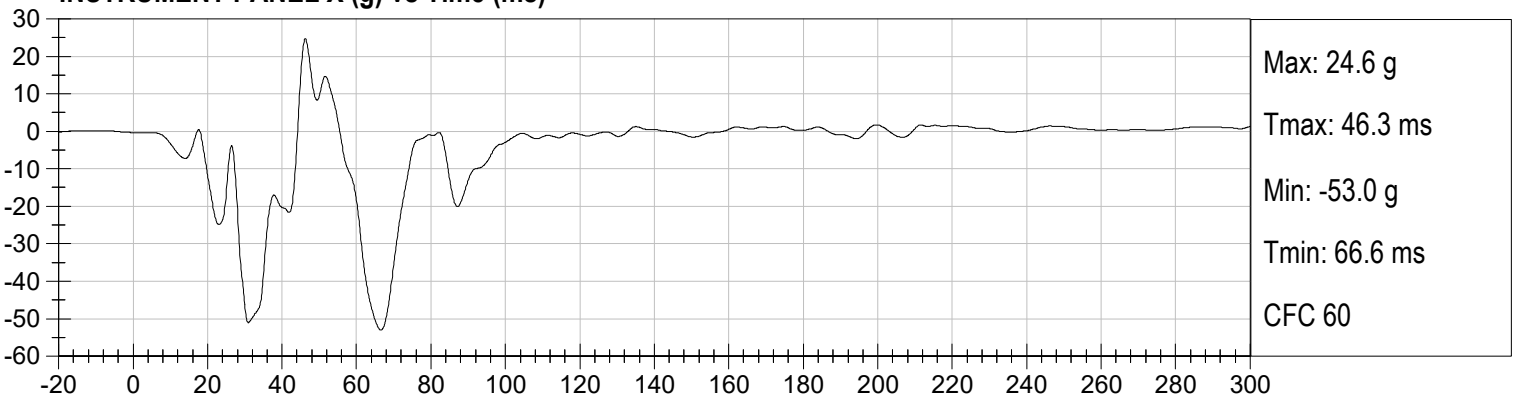
RIGHT BRAKE CALIPER X (g) vs Time (ms)



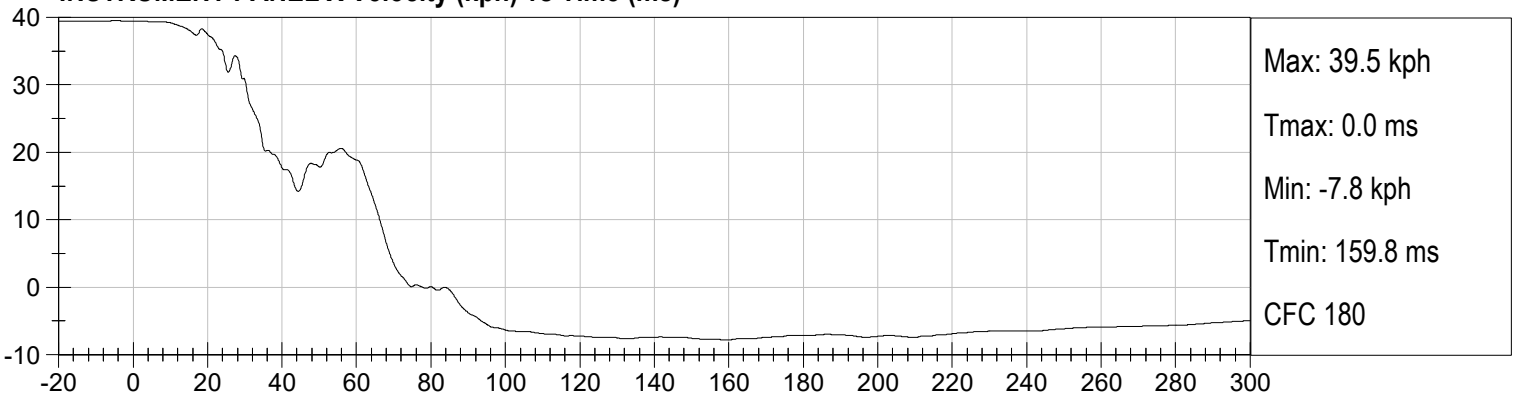
RIGHT BRAKE CALIPER X Velocity (kph) vs Time (ms)



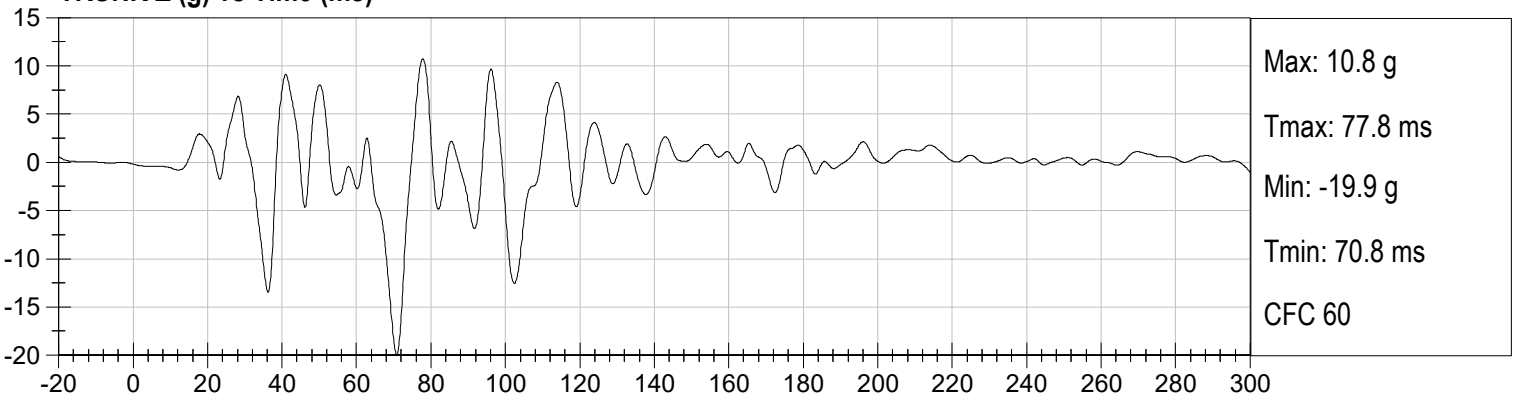
INSTRUMENT PANEL X (g) vs Time (ms)



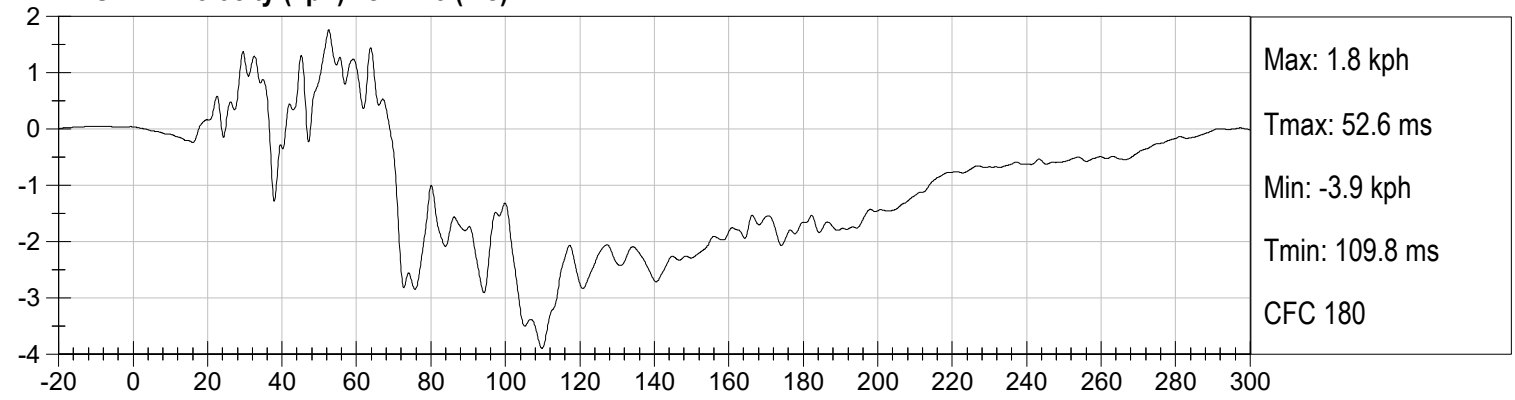
INSTRUMENT PANEL X Velocity (kph) vs Time (ms)



TRUNK Z (g) vs Time (ms)



TRUNK Z Velocity (kph) vs Time (ms)



APPENDIX B

CRASH TEST PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

		Page No.
Photo No. 1.	Vehicle Certification Label	B-1
Photo No. 2.	Tire Placard	B-2
Photo No. 3.	Pre-Test Front View of Test Vehicle	B-3
Photo No. 4.	Post-Test Front View of Test Vehicle	B-4
Photo No. 5.	Pre-Test Left Side View of Test Vehicle	B-5
Photo No. 6.	Post-Test Left Side View of Test Vehicle	B-6
Photo No. 7.	Pre-Test Right Side View of Test Vehicle	B-7
Photo No. 8.	Post-Test Right Side View of Test Vehicle	B-8
Photo No. 9.	Pre-Test Left Front Three-Quarter View of Test Vehicle	B-9
Photo No. 10.	Post-Test Left Front Three-Quarter View of Test Vehicle	B-10
Photo No. 11.	Pre-Test Right Front Three-Quarter View of Test Vehicle	B-11
Photo No. 12.	Post-Test Right Front Three-Quarter View of Test Vehicle	B-12
Photo No. 13.	Pre-Test Right Rear Three-Quarter View of Test Vehicle	B-13
Photo No. 14.	Post-Test Right Rear Three-Quarter View of Test Vehicle	B-14
Photo No. 15.	Pre-Test Left Rear Three-Quarter View of Test Vehicle	B-15
Photo No. 16.	Post-Test Left Rear Three-Quarter View of Test Vehicle	B-16
Photo No. 17.	Pre-Test Rear View of Test Vehicle	B-17
Photo No. 18.	Post-Test Rear View of Test Vehicle	B-18
Photo No. 19.	Pre-Test Windshield View	B-19
Photo No. 20.	Post-Test Windshield View	B-20
Photo No. 21.	Pre-Test Frunk Compartment View	B-21
Photo No. 22.	Post-Test Frunk Compartment View	B-22
Photo No. 23.	Pre-Test Charging Port View	B-23
Photo No. 24.	Post-Test Charging Port View	B-24
Photo No. 25.	Pre-Test Front Underbody View	B-25
Photo No. 26.	Post-Test Front Underbody View	B-26
Photo No. 27.	Pre-Test Mid Underbody View	B-27
Photo No. 28.	Post-Test Mid Underbody View	B-28
Photo No. 29.	Pre-Test Mid Rear Underbody View	B-29
Photo No. 30.	Post-Test Mid Rear Underbody View	B-30
Photo No. 31.	Pre-Test Rear Underbody View	B-31
Photo No. 32.	Post-Test Rear Underbody View	B-32
Photo No. 33.	Pre-Test Driver Dummy Front View (head position)	B-33

		Page No.
Photo No. 34.	Post-Test Driver Dummy Front View (head position)	B-34
Photo No. 35.	Pre-Test Driver Dummy Position Left Side View	B-35
Photo No. 36.	Post-Test Driver Dummy Position Left Side View	B-36
Photo No. 37.	Pre-Test Driver Dummy Position Left Side View (door open)	B-37
Photo No. 38.	Post-Test Driver Dummy Position Left Side View (door open)	B-38
Photo No. 39.	Pre-Test Driver Dummy Seat Position	B-39
Photo No. 40.	Post-Test Driver Dummy Seat Position	B-40
Photo No. 41.	Pre-Test Driver Dummy Feet Position	B-41
Photo No. 42.	Post-Test Driver Dummy Feet Position	B-42
Photo No. 43.	Pre-Test Driver Side Knee Bolster View	B-43
Photo No. 44.	Post-Test Driver Side Knee Bolster View	B-44
Photo No. 45.	Post-Test Driver Dummy Airbag Contact	B-45
Photo No. 46.	Post-Test Driver Dummy Knee Contact	B-46
Photo No. 47.	Post-Test Driver Dummy Head Contact (headrest)	B-47
Photo No. 48.	Pre-Test Passenger Dummy Front View (head position)	B-48
Photo No. 49.	Post-Test Passenger Dummy Front View (head position)	B-49
Photo No. 50.	Pre-Test Passenger Dummy Position Right Side View	B-50
Photo No. 51.	Post-Test Passenger Dummy Position Right Side View	B-51
Photo No. 52.	Pre-Test Passenger Dummy Position Right Side View (door open)	B-52
Photo No. 53.	Post-Test Passenger Dummy Position Right Side View (door open)	B-53
Photo No. 54.	Pre-Test Passenger Dummy Seat Position	B-54
Photo No. 55.	Post-Test Passenger Dummy Seat Position	B-55
Photo No. 56.	Pre-Test Passenger Dummy Feet Position	B-56
Photo No. 57.	Post-Test Passenger Dummy Feet Position	B-57
Photo No. 58.	Pre-Test Passenger Side Knee Bolster View	B-58
Photo No. 59.	Post-Test Passenger Side Knee Bolster View	B-59
Photo No. 60.	Post-Test Passenger Dummy Airbag Contact	B-60
Photo No. 61.	Post-Test Passenger Dummy Knee Contact	B-61
Photo No. 62.	Temperature Plot	B-62
Photo No. 63.	High Voltage Warning Label	B-63
Photo No. 64.	Pre-Test Voltage Monitoring Leads Attached to Electric Energy Storage System	B-64
Photo No. 65.	Post-Test Voltage Monitoring Leads Attached to Electric Energy Storage System	B-65
Photo No. 66.	Pre-Test View of Installed Isolation Interface Port	B-66
Photo No. 67.	Post-Test View of Installed Isolation Interface Port	B-67

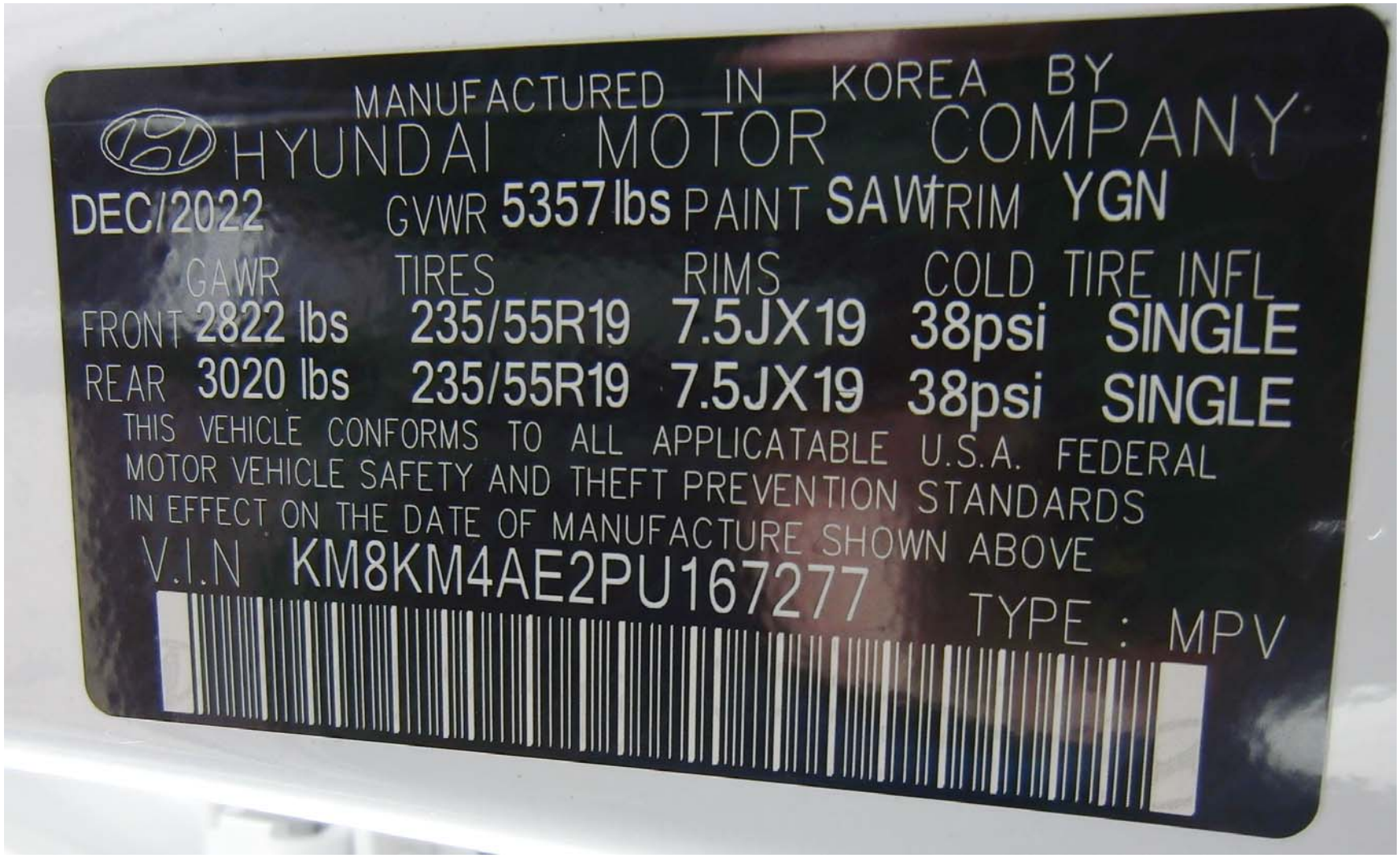


Photo No. 1. Vehicle Certification Label

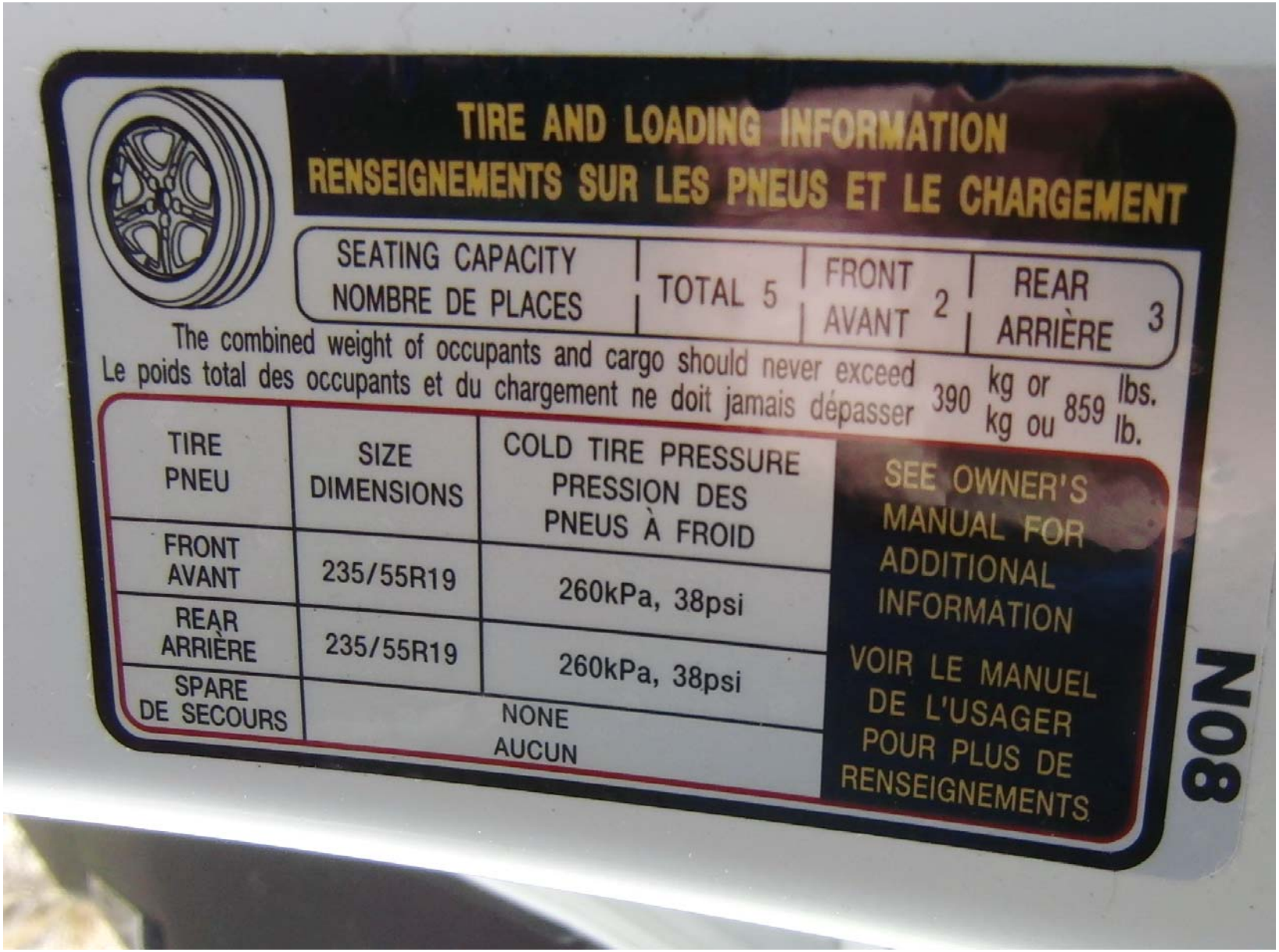


Photo No. 2. Tire Placard

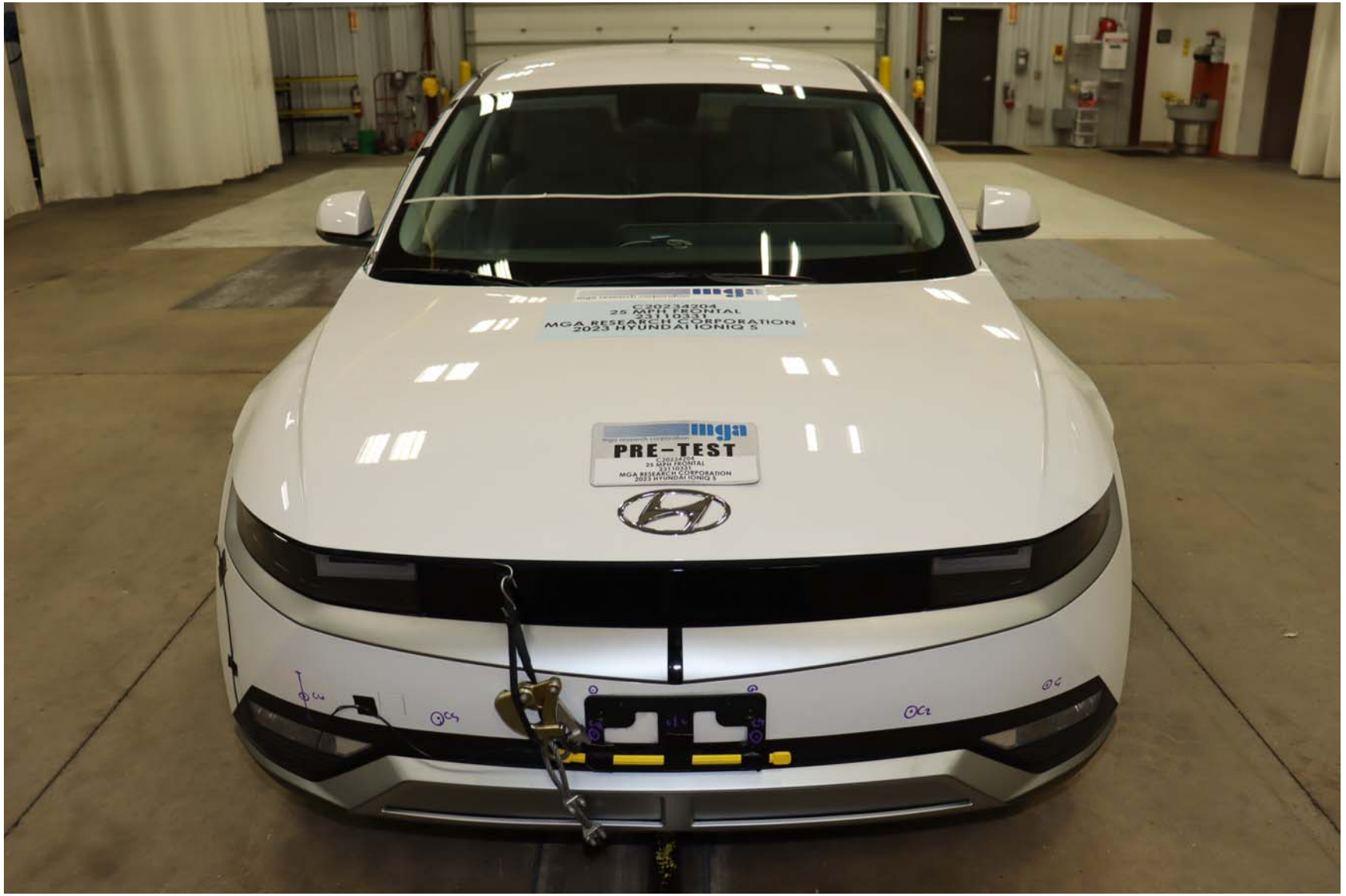


Photo No. 3. Pre-Test Front View of Test Vehicle

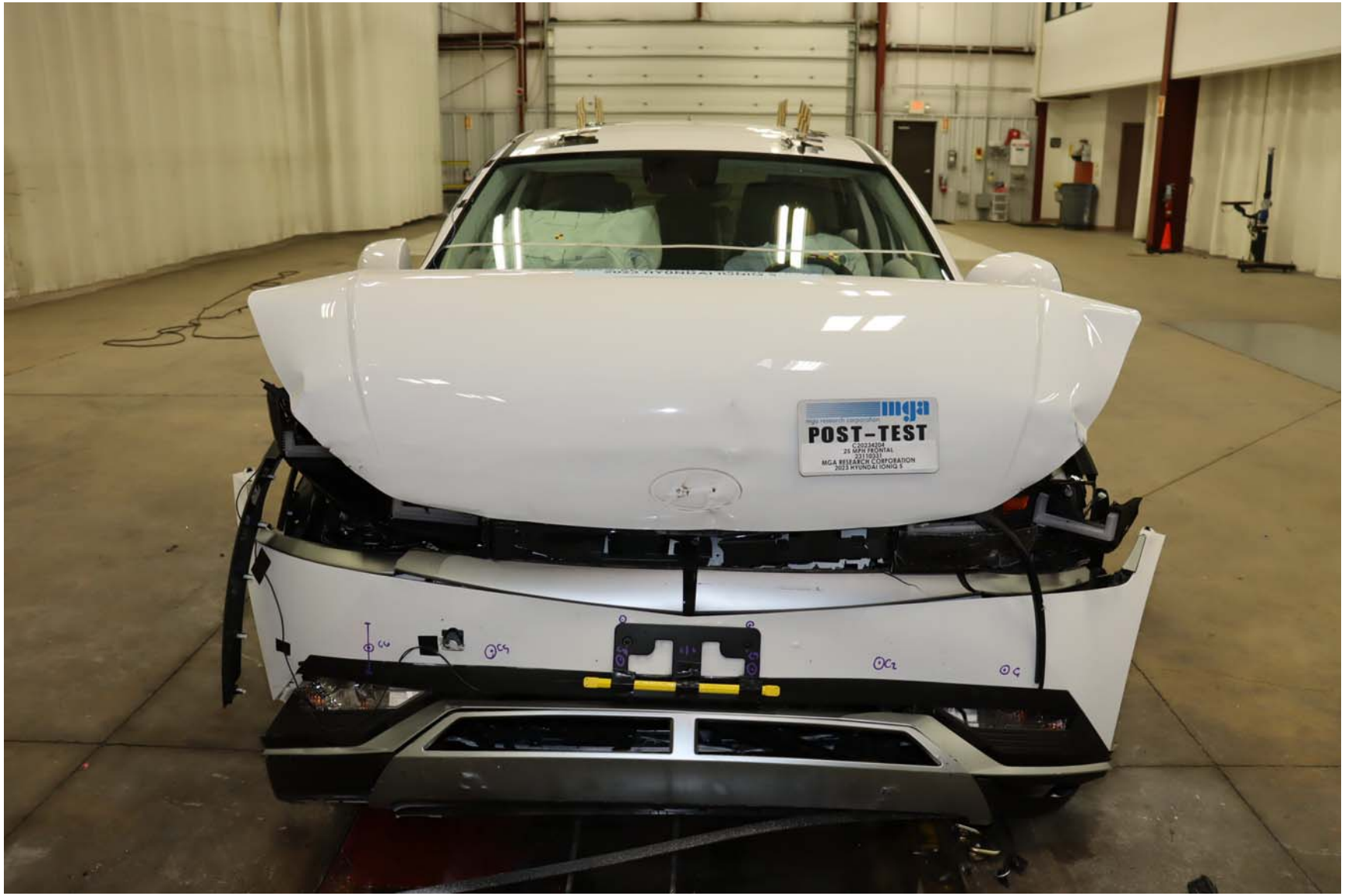


Photo No. 4. Post-Test Front View of Test Vehicle

Photo No. 5. Pre-Test Left Side View of Test Vehicle

Photo No. 6. Post-Test Left Side View of Test Vehicle

Photo No. 7. Pre-Test Right SIde View of Test Vehicle

Photo No. 8. Post-Test Right Side View of Test Vehicle

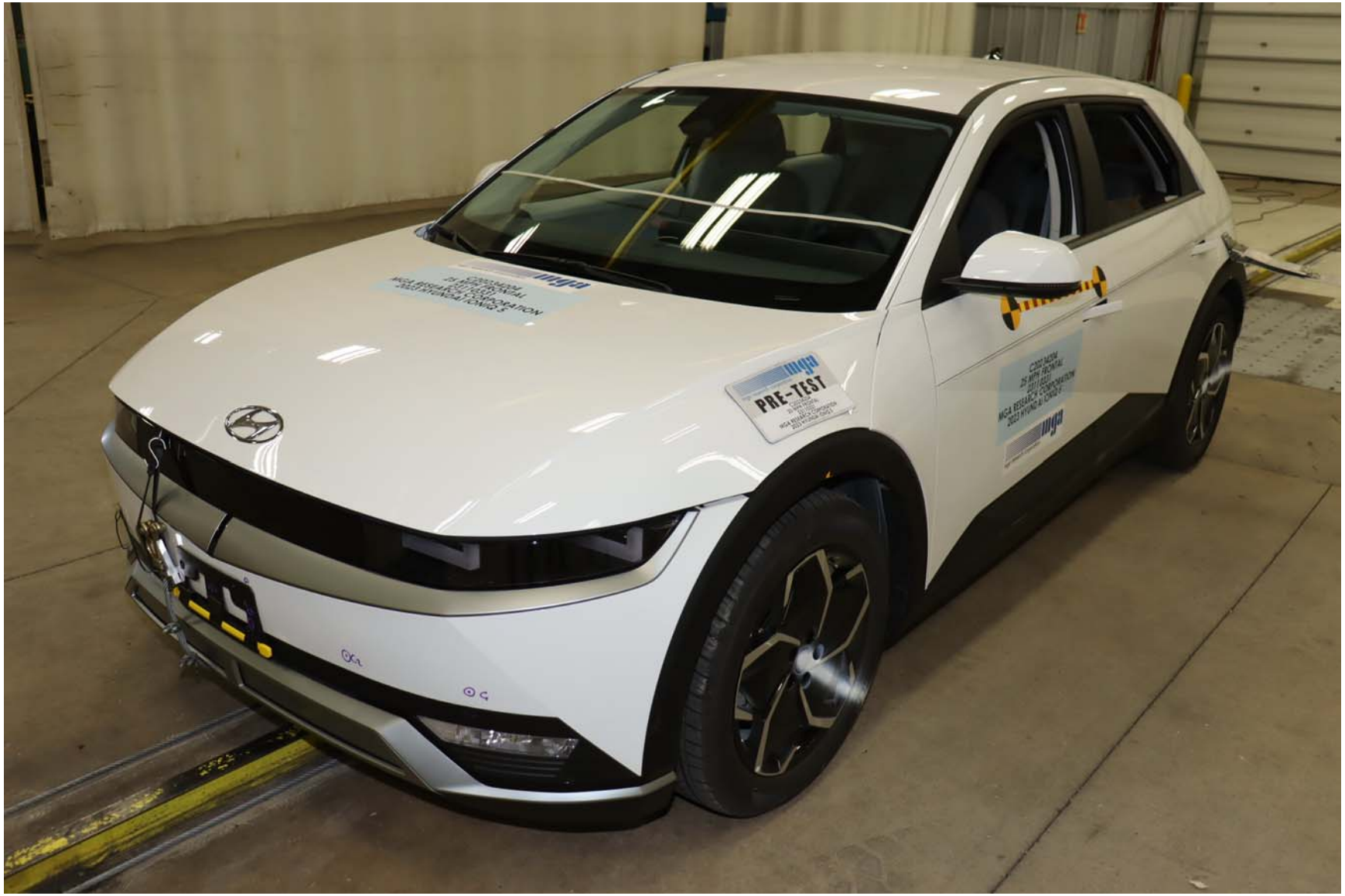


Photo No. 9. Pre-Test Left Front Three-Quarter View of Test Vehicle

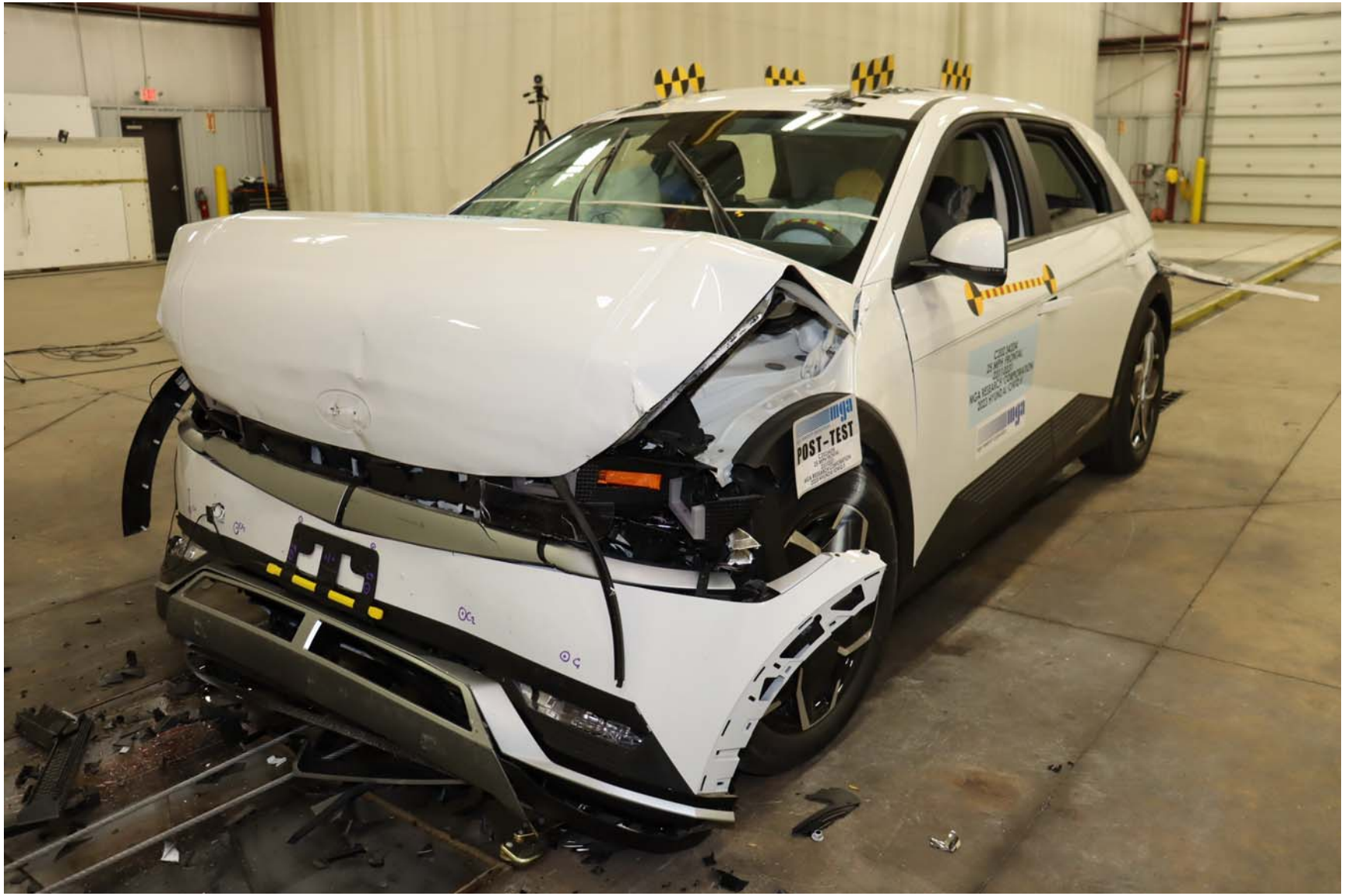


Photo No. 10. Post-Test Left Front Three-Quarter View of Test Vehicle

Photo No. 11. Pre-Test Right Front Three-Quarter View of Test Vehicle

Photo No. 12. Post-Test Right Front Three-Quarter View of Test Vehicle

Photo No. 13. Pre-Test Right Rear Three-Quarter View of Test Vehicle

Photo No. 14. Post-Test Right Rear Three-Quarter View of Test Vehicle

Photo No. 15. Pre-Test Left Rear Three-Quarter View of Test Vehicle

Photo No. 16. Post-Test Left Rear Three-Quarter View of Test Vehicle

Photo No. 17. Pre-Test Rear View of Test Vehicle

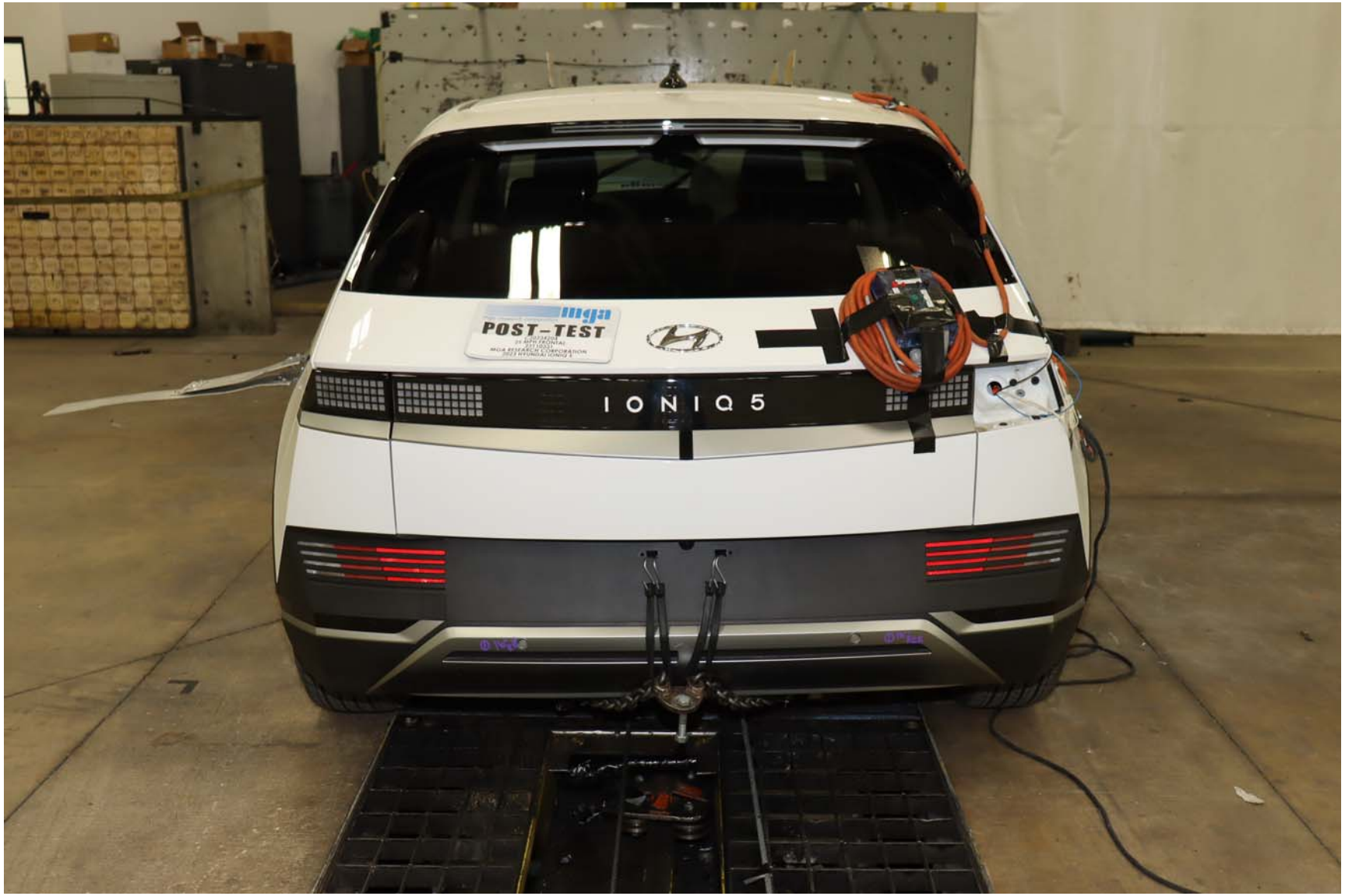


Photo No. 18. Post-Test Rear View of Test Vehicle

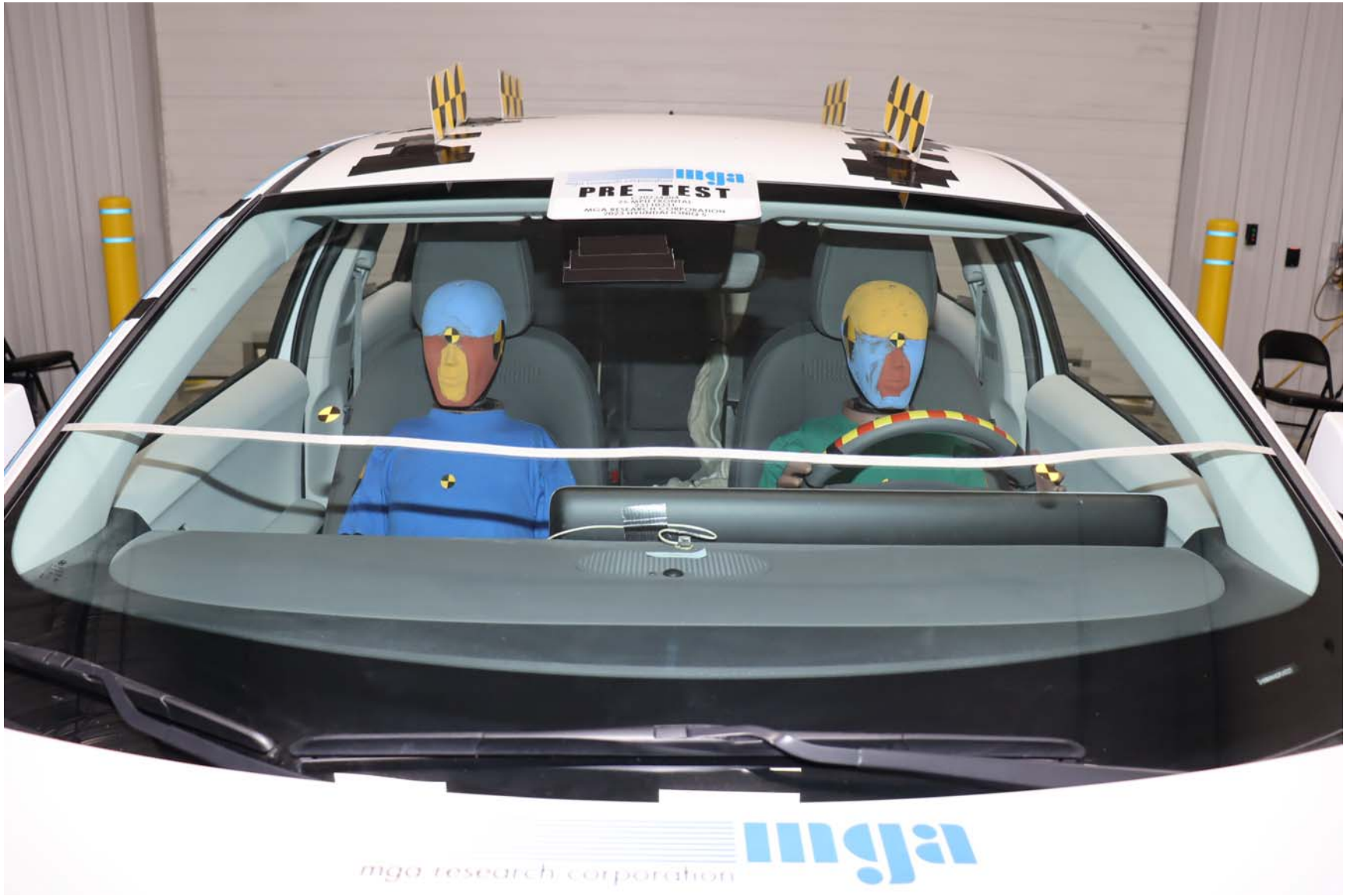


Photo No. 19. Pre-Test Windshield View

Photo No. 20. Post-Test Windshield View

Photo No. 21. Pre-Test Frunk Compartment View

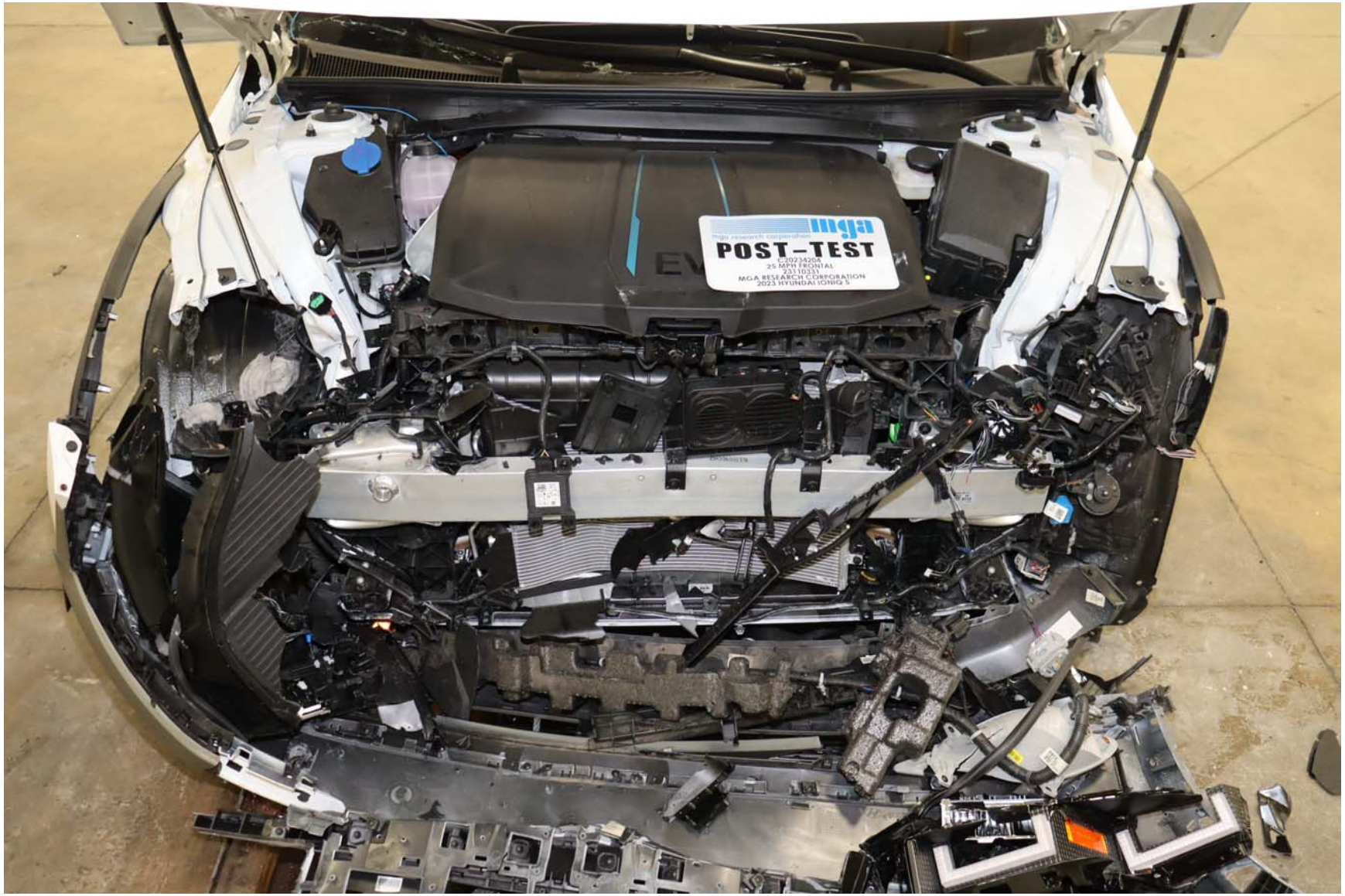


Photo No. 22. Post-Test Frunk Compartment View

Photo No. 23. Pre-Test Charging Port View

Photo No. 24. Post-Test Charging Port View

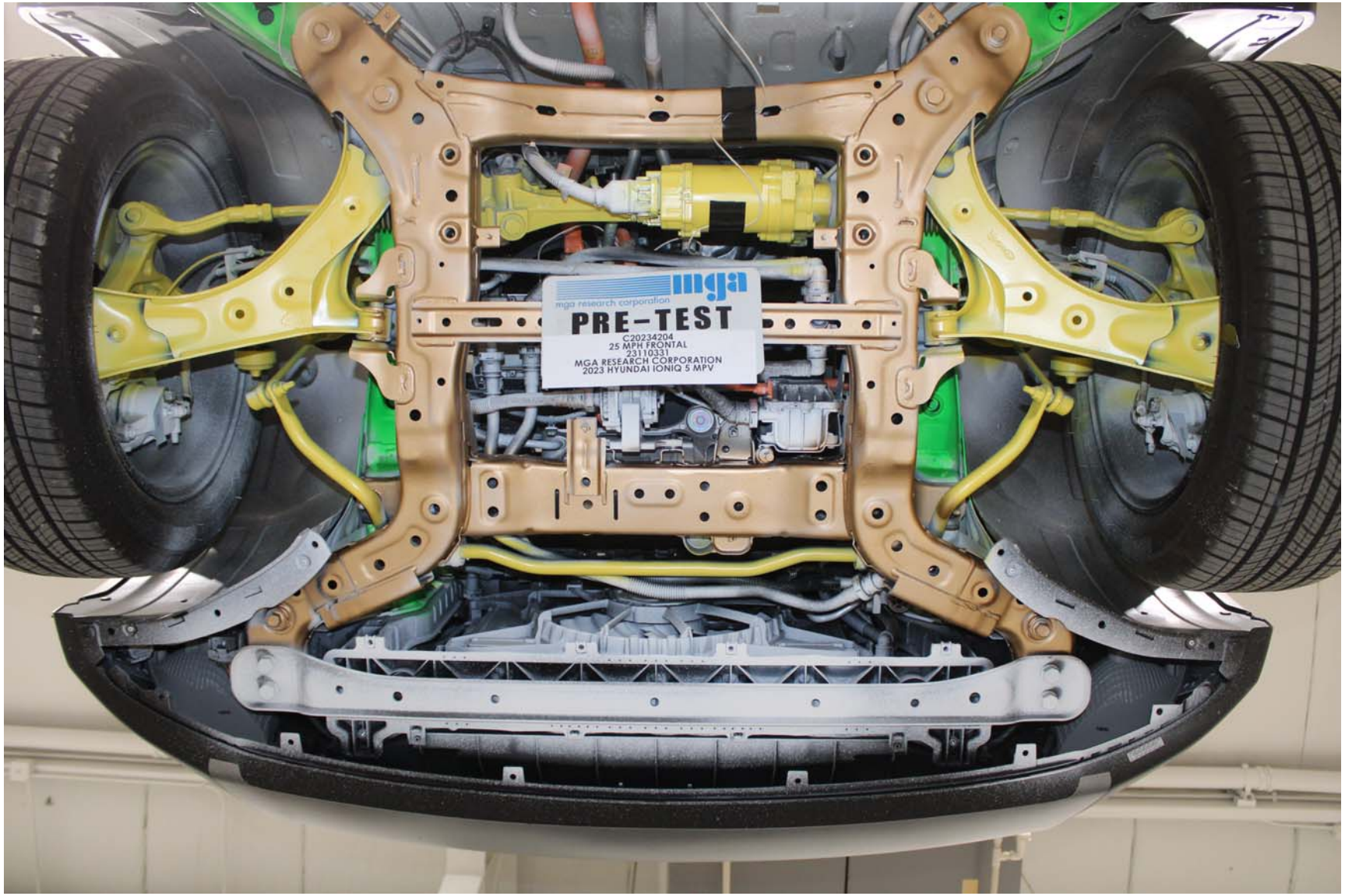


Photo No. 25. Pre-Test Front Underbody View

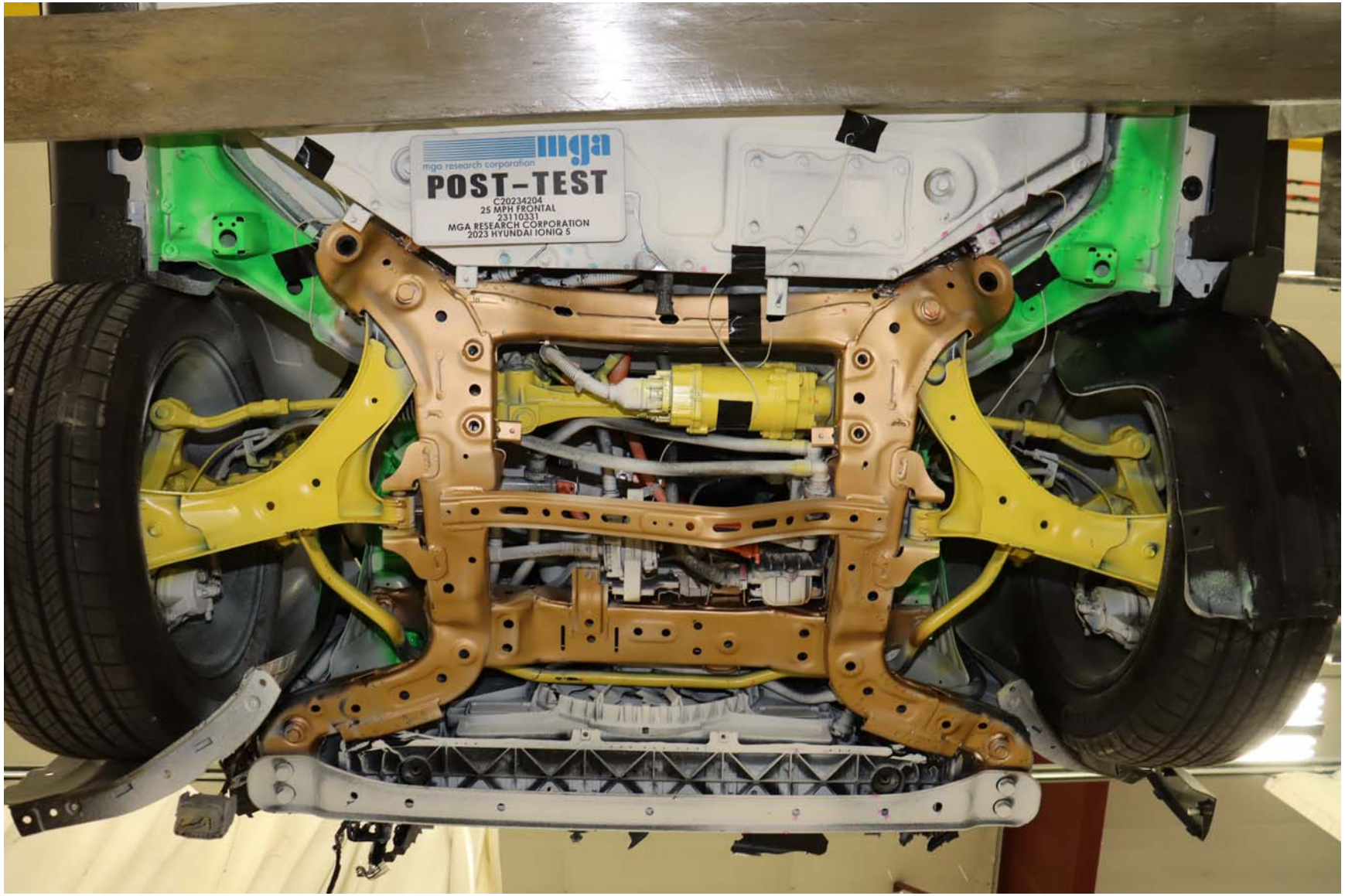


Photo No. 26. Post-Test Front Underbody View

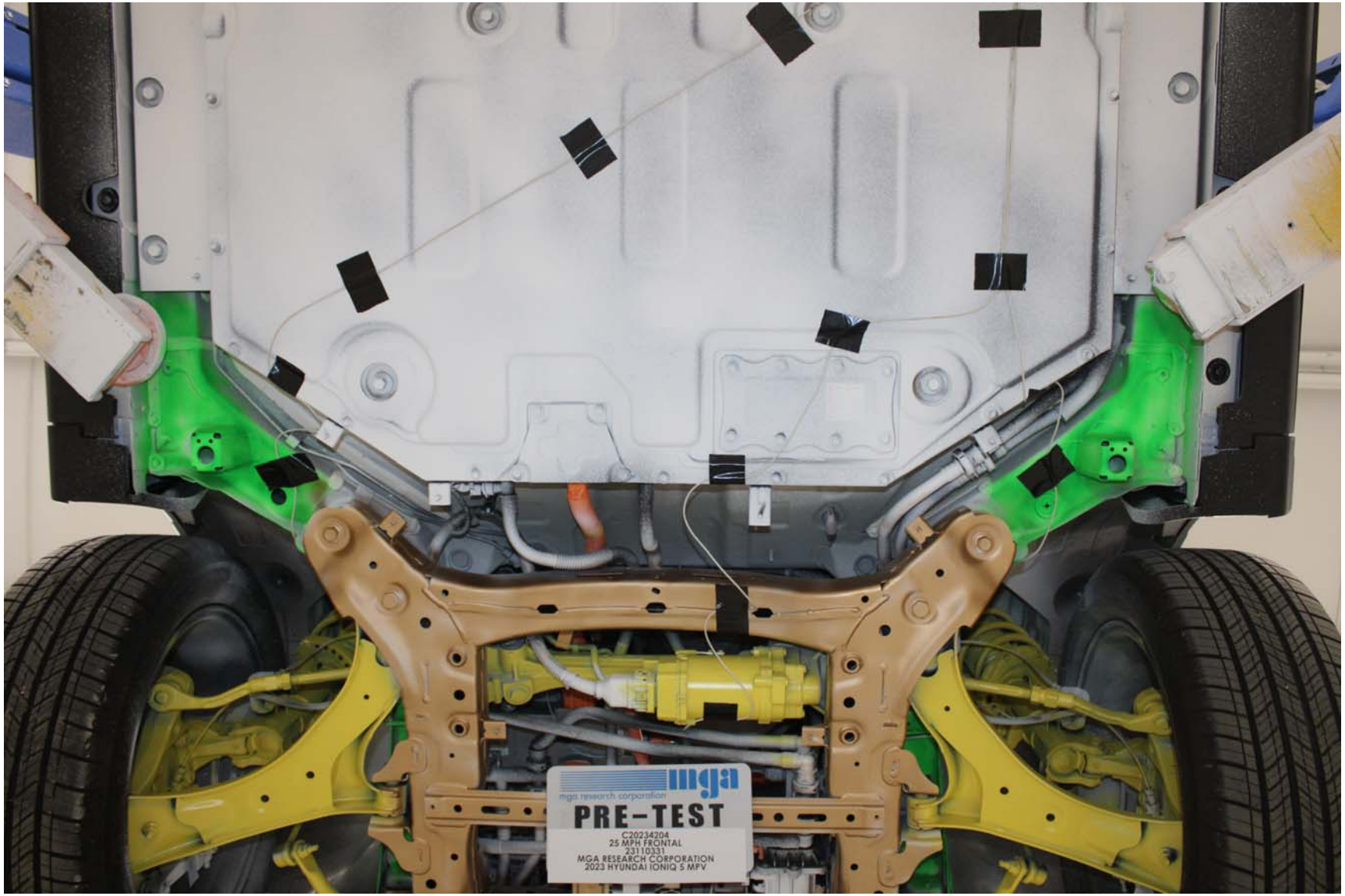


Photo No. 27. Pre-Test Mid Underbody View

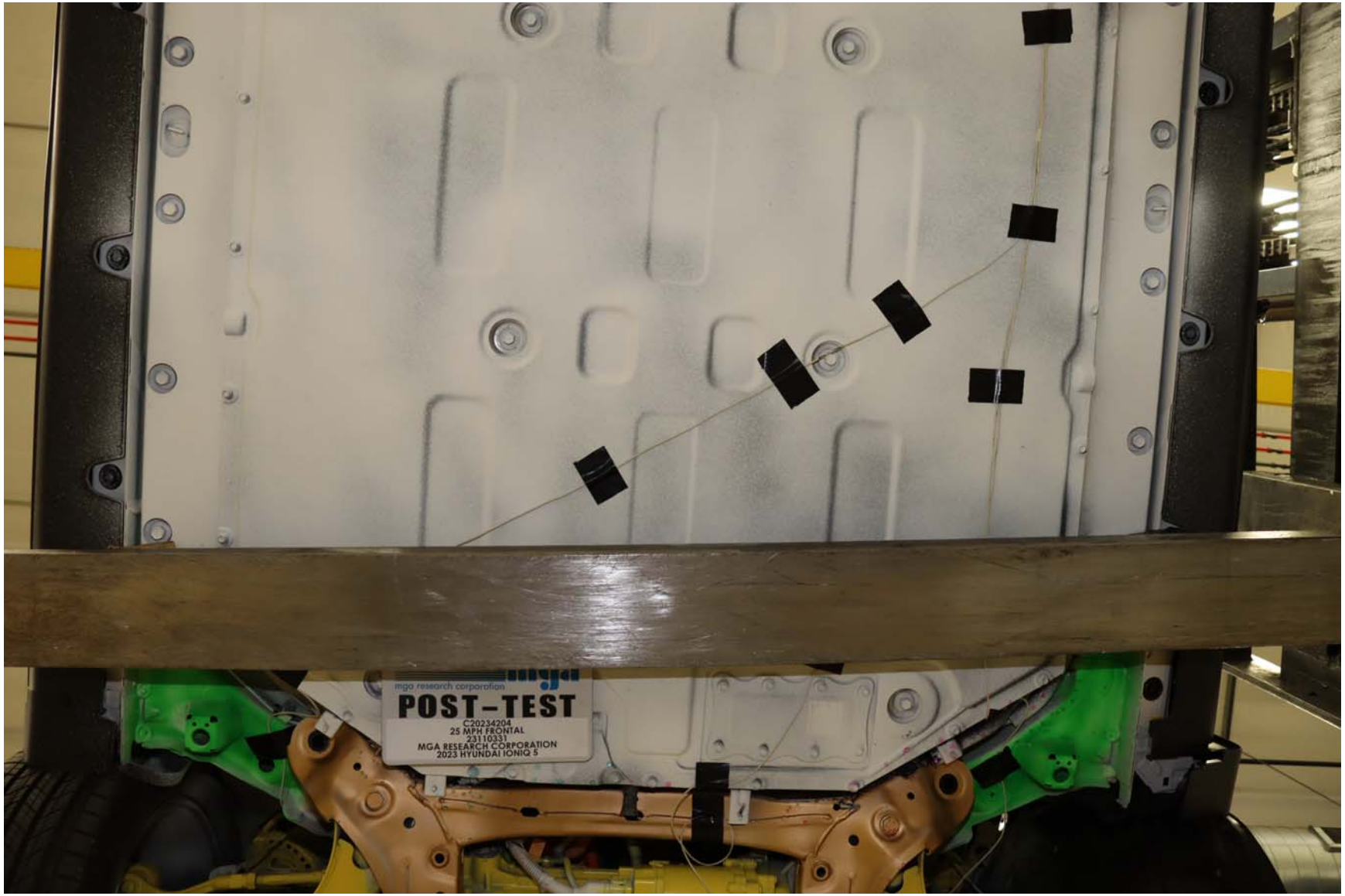


Photo No. 28. Post-Test Mid Underbody View

Photo No. 29. Pre-Test Mid Rear Underbody View

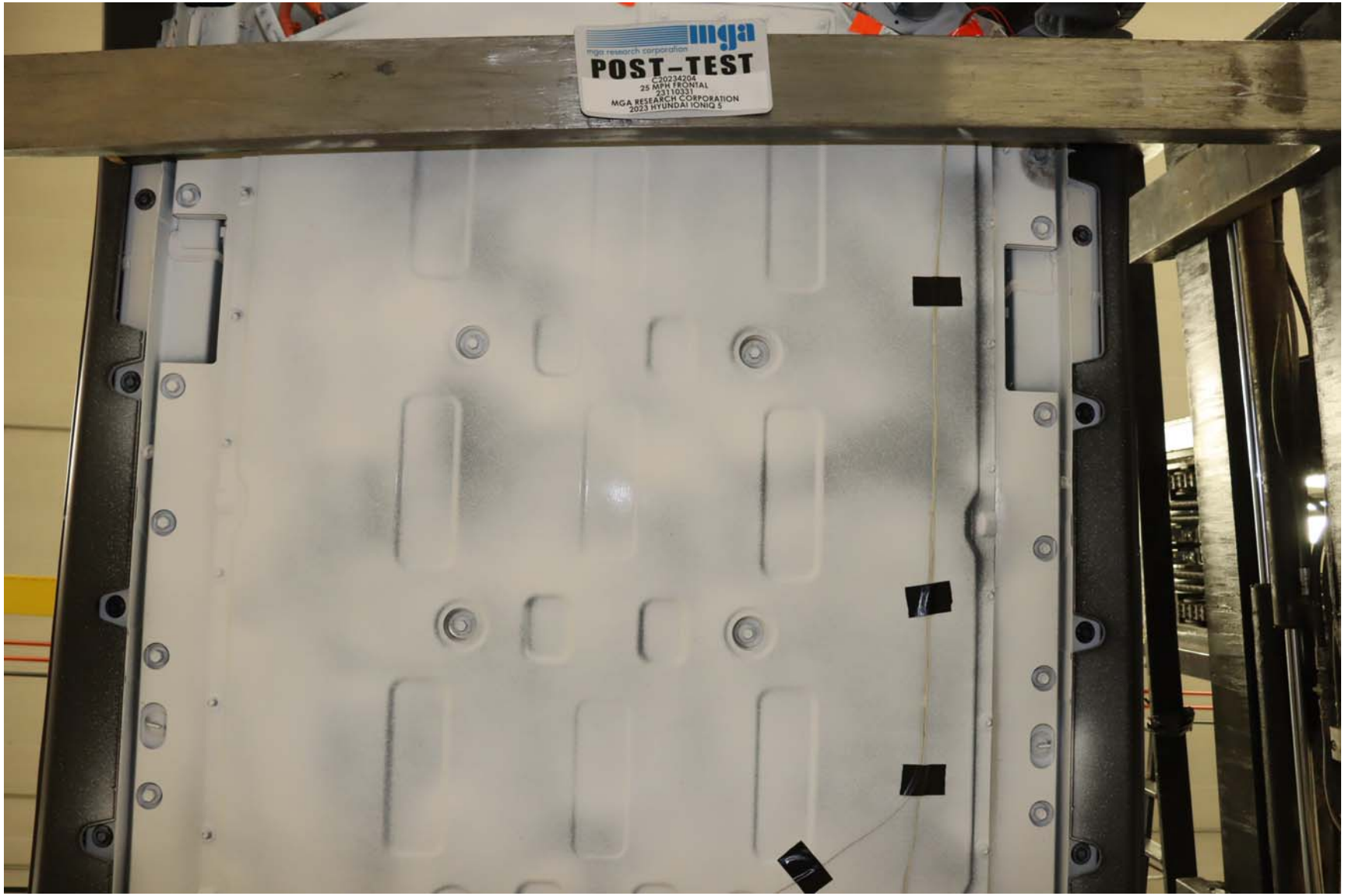


Photo No. 30. Post-Test Mid Rear Underbody View

Photo No. 31. Pre-Test Rear Underbody View

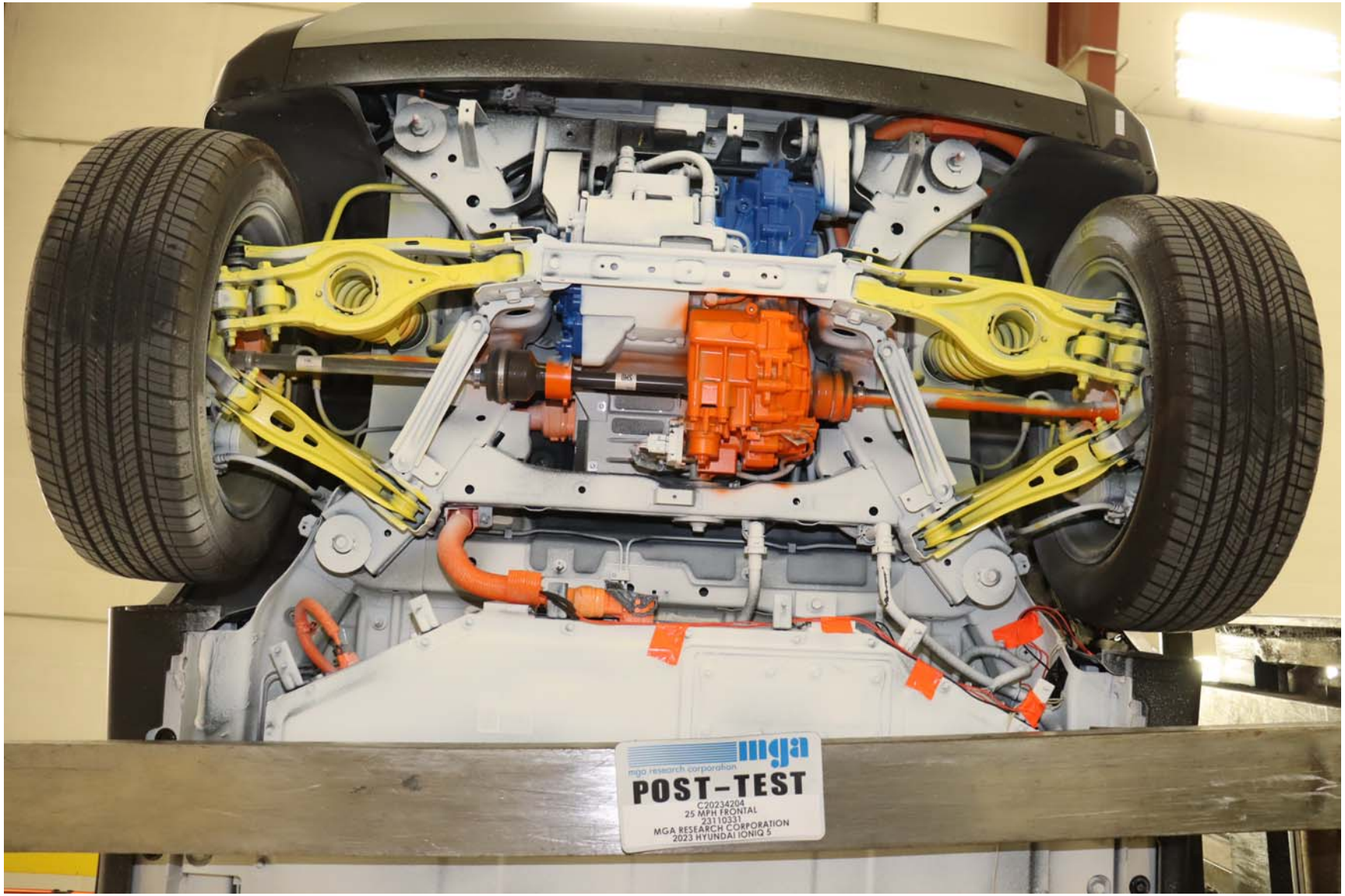


Photo No. 32. Post-Test Rear Underbody View

Photo No. 33. Pre-Test Driver Dummy Front View (head position)

Photo No. 34. Post-Test Driver Dummy Front View (head position)

Photo No. 35. Pre-Test Driver Dummy Position Left Side View

Photo No. 36. Post-Test Driver Dummy Position Left Side View

Photo No. 37. Pre-Test Driver Dummy Position Left Side View (door open)

Photo No. 38. Post-Test Driver Dummy Position Left Side View (door open)

Photo No. 39. Pre-Test Driver Dummy Seat Position

Photo No. 40. Post-Test Driver Dummy Seat Position

Photo No. 41. Pre-Test Driver Dummy Feet Position

Photo No. 42. Post-Test Driver Dummy Feet Position

Photo No. 43. Pre-Test Drive Side Knee Bolster View

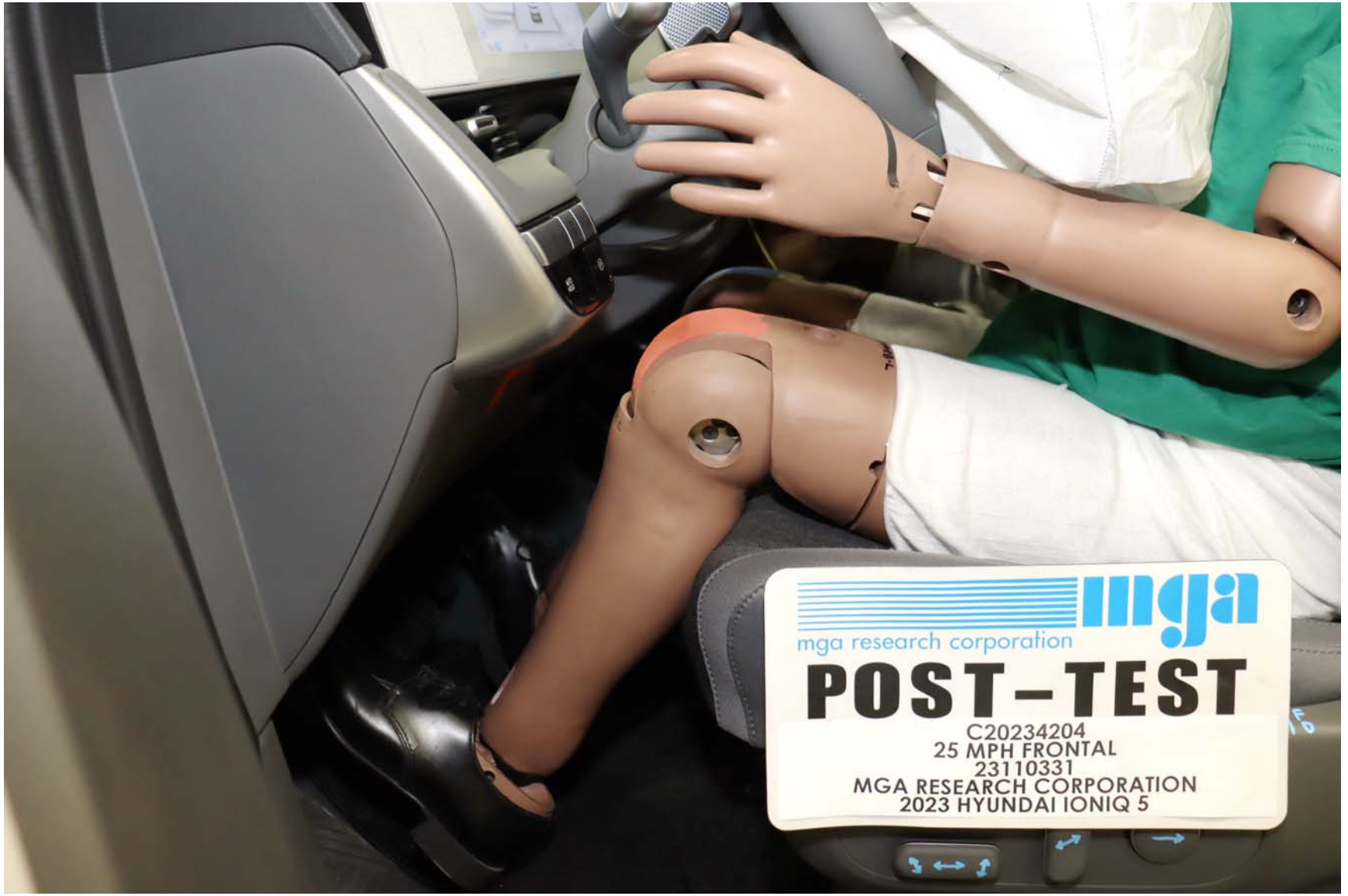


Photo No. 44. Post-Test Driver Side Knee Bolster View

Photo No. 45. Post-Test Driver Dummy Airbag Contact

Photo No. 46. Post-Test Driver Dummy Knee Contact

Photo No. 47. Post-Test Driver Dummy Head Contact (headrest)

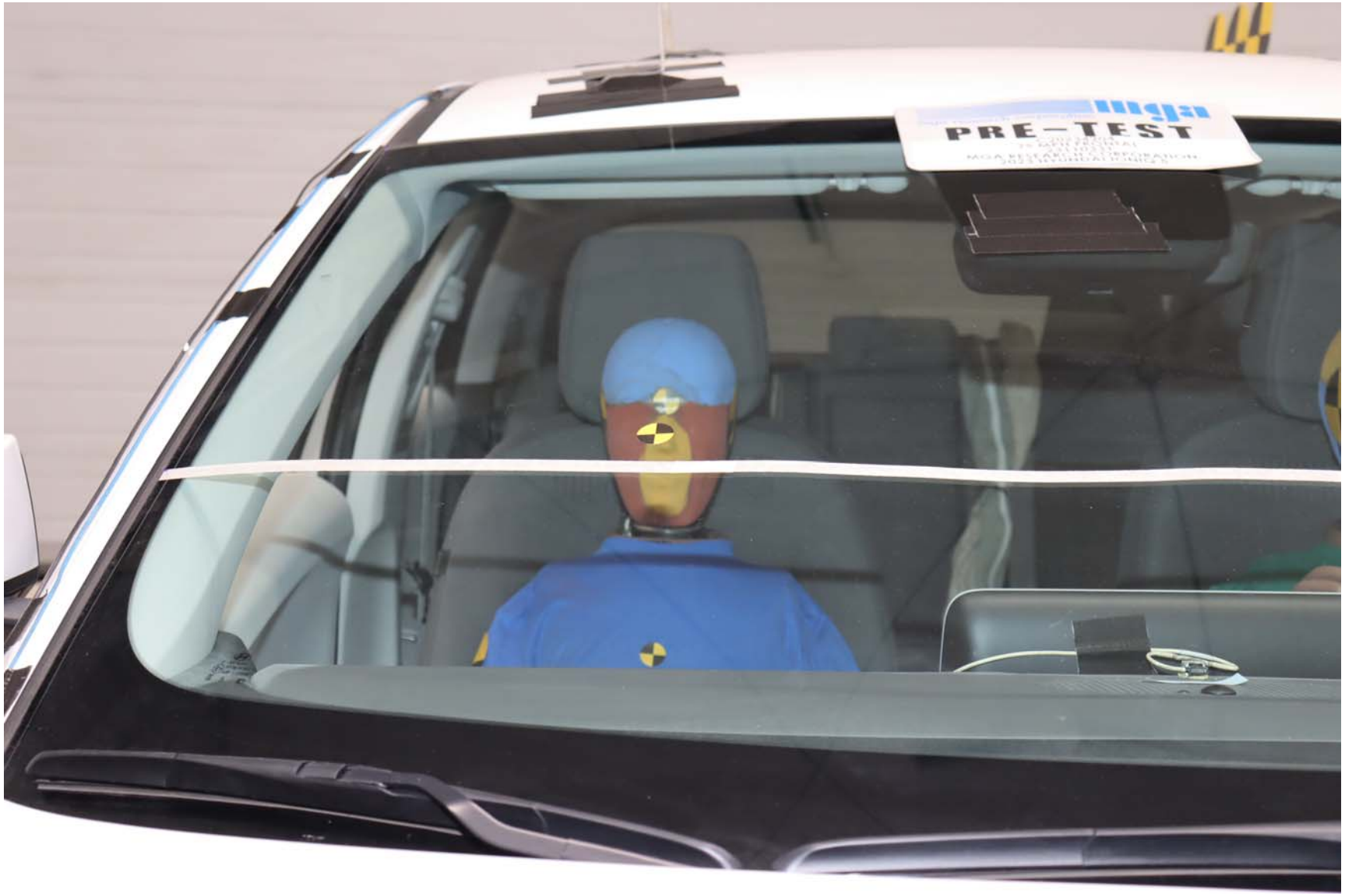


Photo No. 48. Pre-Test Passenger Dummy Front View (head position)

Photo No. 49. Post-Test Passenger Dummy Front View (head position)

Photo No. 50. Pre-Test Passenger Dummy Position Right Side View

Photo No. 51. Post-Test Passenger Dummy Position Right Side View

Photo No. 52. Pre-Test Passenger Dummy Position Right Side View (door open)

Photo No. 53. Post-Test Passenger Dummy Position Right Side View (door open)

Photo No. 54. Pre-Test Passenger Dummy Seat Position

Photo No. 55. Post-Test Passenger Dummy Seat Position

Photo No. 56. Pre-Test Passenger Dummy Feet Position

Photo No. 57. Post-Test Passenger Dummy Feet Position

Photo No. 58. Pre-Test Passenger Side Knee Bolster View

Photo No. 59. Post-Test Passenger Side Knee Bolster View

Photo No. 60. Post-Test Passenger Dummy Airbag Contact

Photo No. 61. Post-Test Passenger Dummy Knee Contact

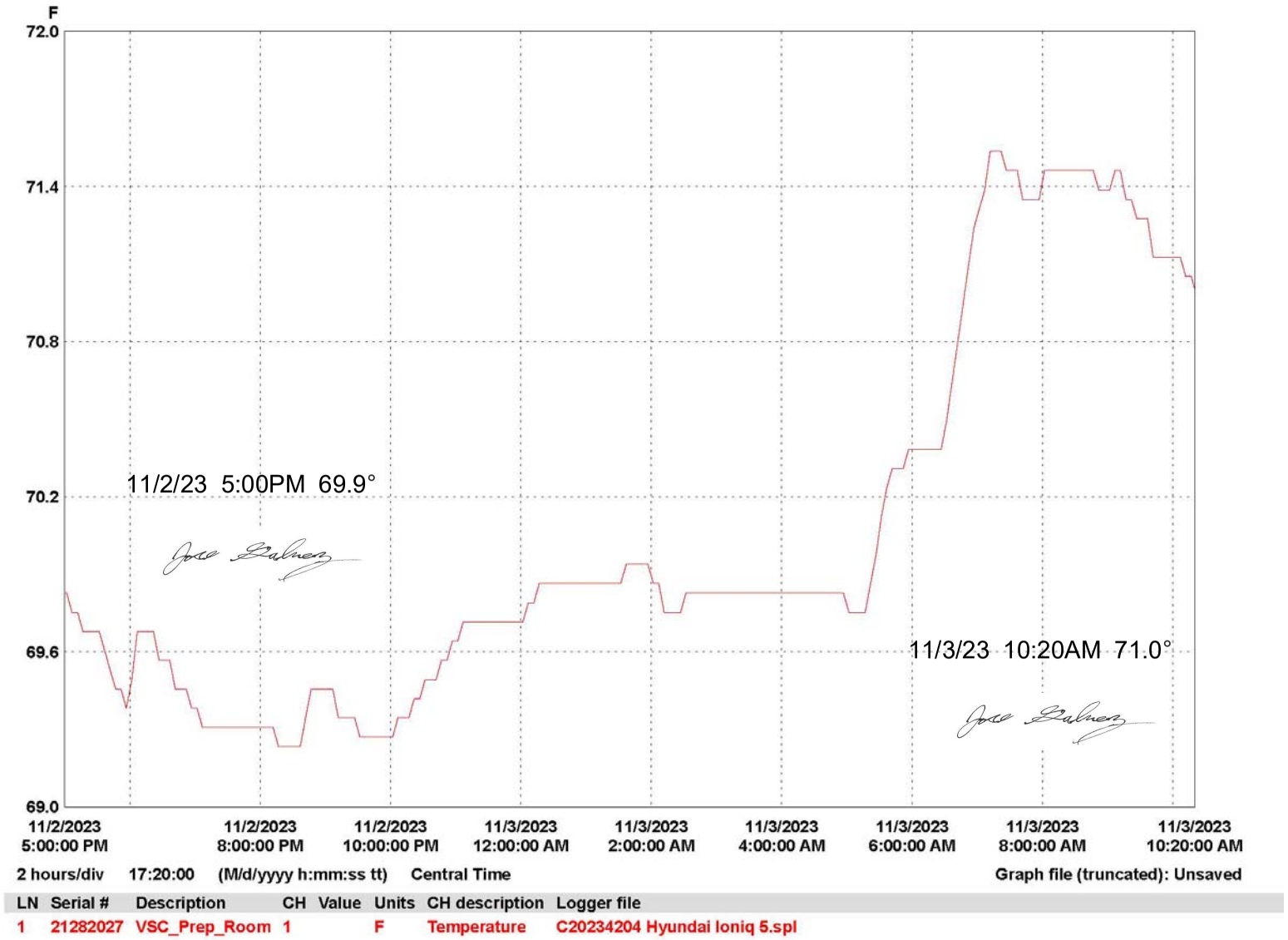


Photo No. 62. Temperature Plot

Photo No. 63. High Voltage Warning Label

Photo No. 64. Pre-Test Voltage Monitoring Leads Attached to Electric Energy Storage System

Photo No. 65. Post-Test Voltage Monitoring Leads Attached to Electric Energy Storage System

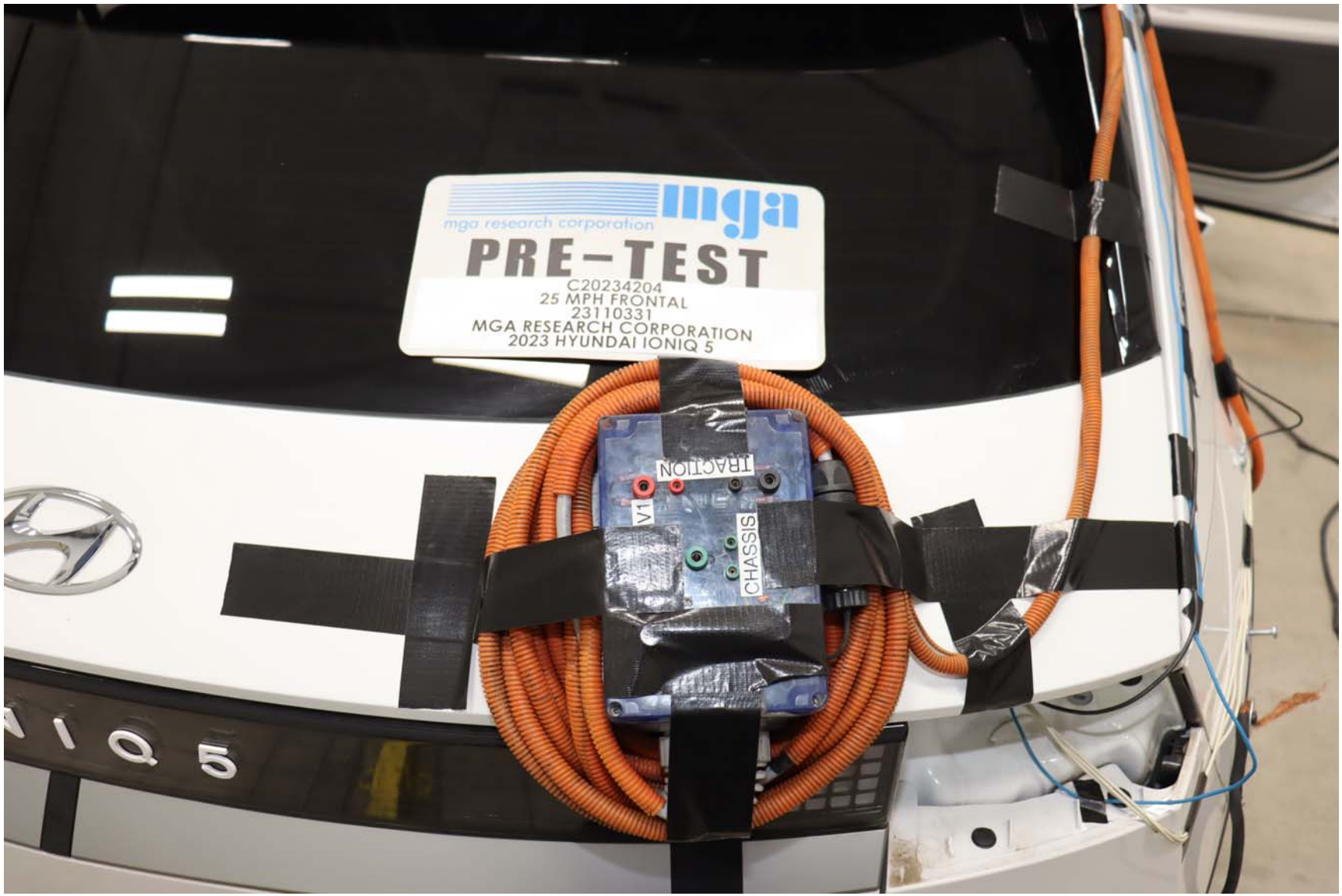


Photo No. 66. Pre-Test View of Installed Isolation Interface Port

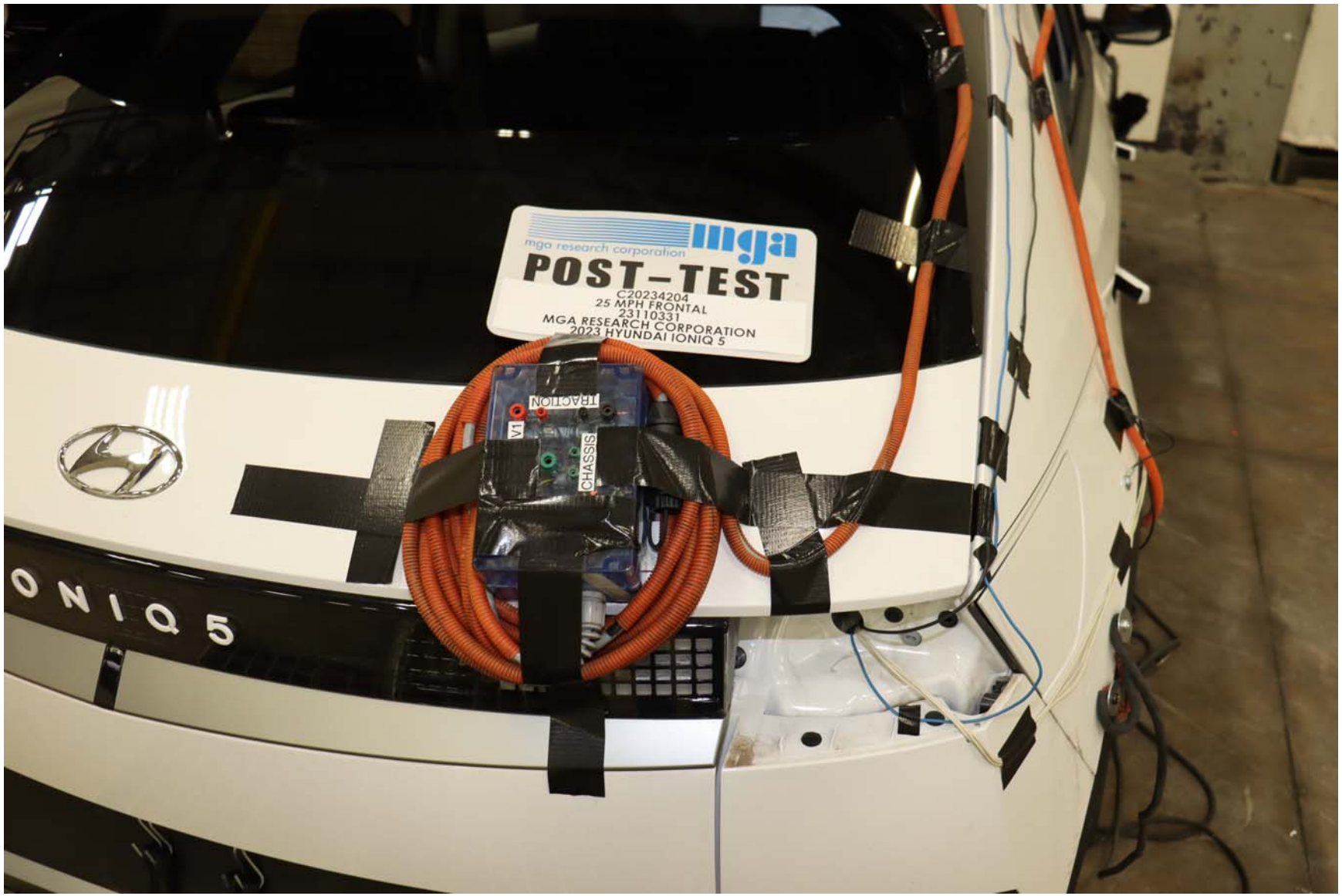


Photo No. 67. Post-Test View of Installed Isolation Interface Port

APPENDIX C

INSTRUMENTATION CALIBRATION

INSTRUMENTS FOR DRIVER DUMMY NO.: ER6928

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	T16416	Endevco	06/09/2023
Head Y	T16420	Endevco	06/09/2023
Head Z	T22499	Endevco	06/09/2023
Neck Load Cell	N7489	Denton	07/27/2023
Chest X	T24766	Endevco	06/08/2023
Chest Y	T24816	Endevco	06/09/2023
Chest Z	T24796	Endevco	06/09/2023
Chest Displacement	ER6928	Humanetics	06/08/2023
Left Femur Load Cell	F9428	GSE	06/08/2023
Right Femur Load Cell	F2181	Humanetics	06/08/2023

INSTRUMENTS FOR PASSENGER DUMMY NO.: ER7897

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	T16403	Endevco	06/08/2023
Head Y	T16406	Endevco	06/08/2023
Head Z	T16413	Endevco	06/08/2023
Neck Load Cell	N1175	Denton	09/25/2023
Chest X	T30954	Endevco	06/08/2023
Chest Y	P82304	Endevco	06/08/2023
Chest Z	P88172	Endevco	06/08/2023
Chest Displacement	ER7897	Humanetics	06/08/2023
Left Femur Load Cell	F1750	Denton	06/08/2023
Right Femur Load Cell	F977	Denton	06/08/2023

VEHICLE INSTRUMENTS

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	A393860	MSI	07/28/2023
Right Rear Seat Crossmember X	T34114	Endevco	04/18/2023
Top of Engine X	PCB1255	PCB	08/10/2023
Bottom of Engine X	T34161	Endevco	04/14/2023
Right Brake Caliper X	T33482	Endevco	10/23/2023
Instrument Panel X	A390923	MSI	08/15/2023
Left Brake Caliper X	T33458	Endevco	10/23/2023
Trunk Z	T35250	Endevco	10/23/2023