FINAL REPORT NUMBER: SPNCAP-TRC-23-003

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

HYUNDAI MOTOR COMPANY
2023 Hyundai Kona Electric
NHTSA NUMBER: M20234215

PREPARED BY:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319

Report Date: November 27, 2023

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Washington, D.C. 20590

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Report Prepared By: ILO Project Operations Group

Report Approved By: 

John Shultz

Approval Date: November 27, 2023

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

Technical Report Documentation Page

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16. Abstract

A 32.2 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject vehicle, a 2023 Hyundai Kona Electric, in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on April 5, 2023.

The impact velocity was 32.38 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 20.7° C. The test vehicle's post-test maximum crush was 235 mm at Level 3.

The test or target vehicle's performance is given below:

	Unit	Threshold	Front SID-IIs
Head Injury Criteria (HIC_{36}):	NA	1000	189.045
Resultant Lower Spine Acceleration:	g's	82	41.799
Total Pelvic Force: (sum of acetabular and iliac forces)	N	5525	4530.590
Maximum Thoracic Rib Deflection	mm	38*	19.010
Maximum Abdomen Rib Deflection	mm	45*	24.766

* Proposed IARV

The doors on the struck side did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave Washington, DC 20590

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TEST PURPOSE AND PROCEDURE

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY23 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000018. The purpose of this test is to generate comparative side impact performance in a 2023 Hyundai Kona Electric manufactured by HYUNDAI MOTOR COMPANY. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a model year 2023 Hyundai Kona Electric. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.38 km/h. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, OH, on April 5, 2023. Pre-test and post-test photographs of the test vehicle and the side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated March 2020. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Primary and Redundant Head CG Triaxial Accelerometers
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper and Lower Rib Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	NA	1000	189.045
Lower Spine Acceleration Resultant	G	82	41.799
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4530.590
Maximum Thoracic Rib Deflection	mm	38*	19.010
Maximum Abdominal Rib Deflection	mm	45*	24.766

* Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes		
Knee Airbag	No	N/A		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	No	No	N/A
Other	No	N/A	No	N/A

GENERAL COMMENTS

None

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20234215
Model Year	2023
Make	Hyundai
Model	Kona Electric
Body Style	MPV
VIN	KM8K33AG0PU173108
Body Color	Lunar White
Odometer Reading (km/mi)	18 mi
Engine Displacement (L)	N/A
Type/No. Cylinders	Electric
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	1
Overdrive	No
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other	No

Does owner's manual provide instructions to turn off automatic door locks? Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	HYUNDAI MOTOR COMPANY
Date of Manufacturer	DEC/2022
Vehicle Type	MPV

GVWR (lbs)	4762
GAWR Front (lbs)	2425
GAWR Rear (lbs)	2469

VEHICLE SEATING AND WEIGHT CAPACITY DATA

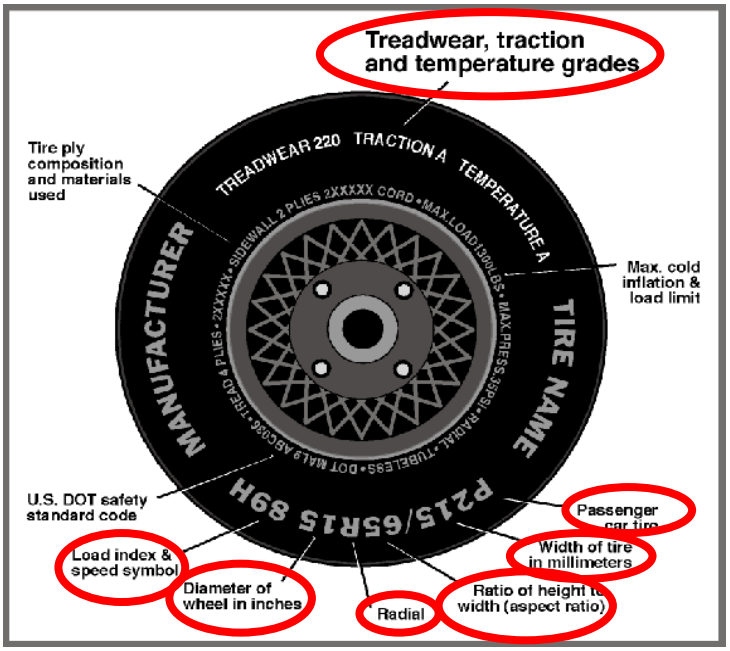
	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	N/A	5
Vehicle Capacity Weight (VCW) (kg)				390.0
DSC X 68.04 kg				340.2
Rated Cargo and Luggage Weight (RCLW) (kg)				49.8

VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	Yes	N/A	N/A		N/A	Yes	N/A
Rear or Second Row Seat	N/A	N/A	Yes	N/A	Yes	N/A	N/A
Third row seat	N/A	N/A	N/A	N/A	N/A	N/A	N/A

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	215/55R17	215/55R17
Tire Size on Vehicle	215/55R17	215/55R17
Tire Manufacturer	Nexen	Nexen
Tire Model	NP RIZ H8	NP RIZ H8
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index/Speed Symbol	94V	94V
Tire Material	Polyester/Steel/Nylon	Polyester/Steel/Nylon
DOT Safety Code Left	UA8V DMFR 4722	UA8V DMFL 4722
DOT Safety Code Right	UA8V DMFR 4722	UA8V CACR 4722

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	276	276	276	276
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	458.6	394.8		480.2	428.8		480.2	434.8	
Right	kg	454.2	379.0		464.8	406.2		467.2	403.2	
Ratio	%	54.1	45.9		53.1	46.9		53.1	46.9	
Totals	kg	912.8	773.8	1686.6	945.0	835.0	1780.0	947.4	838.0	1785.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1686.6	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	49.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	49.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1785.4	(A+B+C)

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 kg)? ☒ YES ☐ NO

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	Deg.	-0.2	-0.2	-0.2	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	-0.1	-0.1	0.0	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	-1.0	-1.1	-1.2	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	-0.3	-0.4	-0.4	Yes
Vehicle CG (Aft of Front Axle)	mm	1197	1224	1225	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	+9	+17	+20	

*ND=Nose Down (-), NU=Nose Up (+) **LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for "Meets Requirements".

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: Steel plates in cargo area	22.4
Components Removed: None	0.0

Test height adjustable suspension setting, if applicable: N/A

TEST SURFACE MARKINGS

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	1610
Aft 25 mm target	1630

DATA SHEET NO. 2

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215

Test Program: SPNCAP Side Impact Test Date: 4/5/2023

SEAT POSITIONING

The driver seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max.	Min.	Mid
Driver Seat	20.7	14.2	17.5
Front Passenger Seat	17.7	15.1	16.4
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	N/A
Non-Struck Side Rear Seat	N/A	N/A	N/A
Rear Center Seat*	N/A	N/A	N/A

* If applicable.

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	17.5	243	Max	260	260	268
			Mid	233	235	243
			Min	205	210	218
Front Passenger Seat	16.4	220	Max	N/A	N/A	N/A
			Mid	213	220	225
			Min	N/A	N/A	N/A
Front Center Seat*	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A

* If applicable.

DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

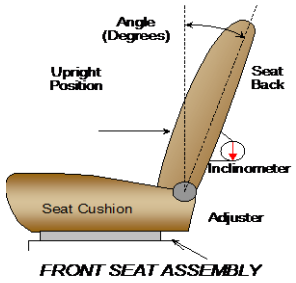
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	N/A	0	N/A
Front Passenger Seat	240	37	0	5
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	N/A	N/A
Non-Struck Side Rear Seat	N/A	N/A	N/A	N/A
Rear Center Seat*	N/A	N/A	N/A	N/A

* If applicable.

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1. For the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detent*
Driver Seat w/ Seated Dummy	62.9	N/A	-3.1	N/A
Front Passenger Seat	61	31	-3.7	5
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	N/A	N/A
Non-Struck Side Rear Seat	N/A	N/A	N/A	N/A
Rear Center Seat*	N/A	N/A	N/A	N/A

* If applicable.

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted with the information provided by the manufacturer on Form No. 1

	Total # of Positions	Placed in Position #
Driver Seat	3	0, Full Up

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	5	4

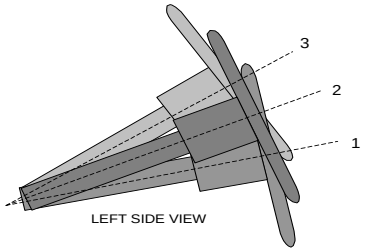
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel geometric locus it describes when moved through its full range of motion.

	Degrees	Fore/Aft Position, mm
Lowermost, Position No. 1	23.2	0
Geometric Center, Position No. 2	26.4	24
Uppermost, Position No. 3	29.6	48
Telescoping Steering Wheel Travel		48
Test Position	26.4	24

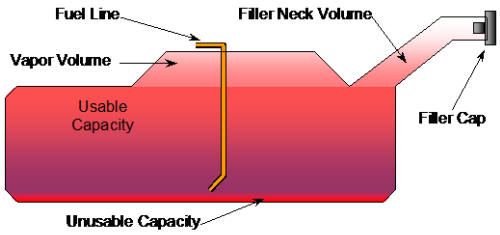


STEERING COLUMN ASSEMBLY

FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler neck:

The vehicle is fully electric. The charge port is on the left side of the front of the vehicle



VEHICLE FUEL TANK ASSEMBLY

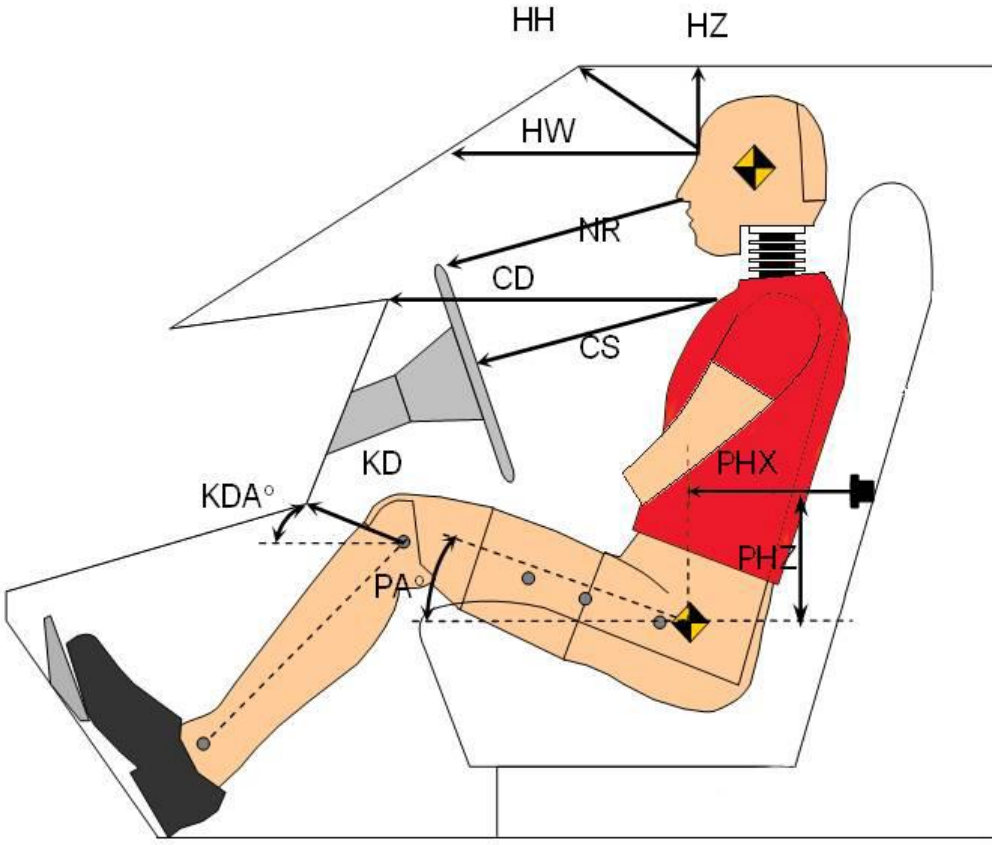
FUEL TANK CAPACITY

	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	N/A
Usable Capacity of “Optional” Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner’s Manual)	N/A
Usable Capacity of Optional Tank (see Owner’s Manual)	N/A
93% of Usable Capacity	N/A
Actual Amount of Solvent Used in Test	N/A
1/3 of Usable Capacity	N/A

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in on Form No. 1? ☐ YES ☒ NO

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

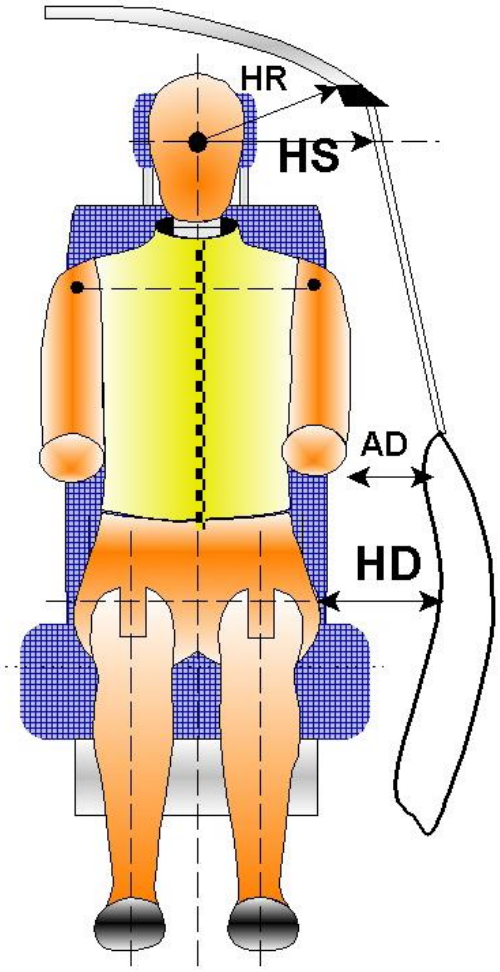
Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	255	
HW	Head to Windshield	560	
HZ	Head to Visor	184	
NR	Nose to Rim	280	
CD	Chest to Dashboard	413	
CS	Chest to Steering Wheel	197	
KDL/KDLA°	Left Knee to Dash	89	31.0
KDR/KDRA°	Right Knee to Dash	70	18.4
PAX°	Pelvic Tilt Angle (X-axis)		0.2
PAY°	Pelvic Tilt Angle (Y-axis)		19.5
PHX	Hip Point to Striker (X-Axis)	329	
PHZ	Hip Point to Striker (Z-Axis)	228	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

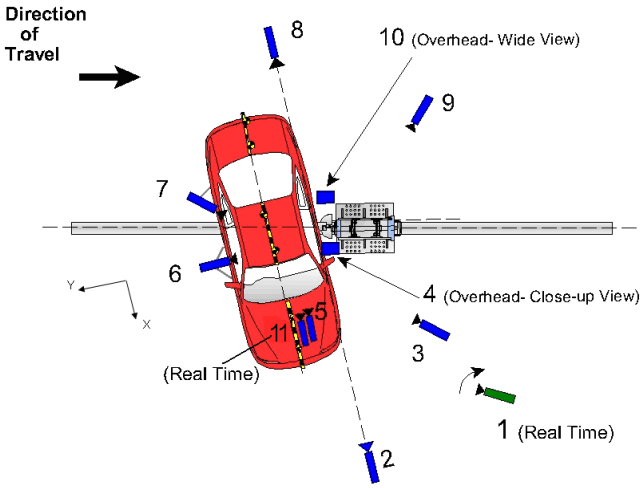
Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



Code	Measurement Description	Length (mm)
HR	Head to Side Header	260
HS	Head to Side Window	345
AD	Arm to Door	166
HD	Hip Point to Door	180

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



REFERENCE: (from point of impact for X and Y; from ground for Z)
+ X = Forward of vehicle, + Y = Right of vehicle, + Z = Down

Camera No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real time (24-30 fps) pan view of impact				Zoom	30
2	Front ground level – impact view	5410	24	-1510	20	1000
3	Impact side 45° – forward pole view	-6020	17	-1354	20	1000
4	Overhead Close-up view of impact	-77	123	-4839	50	1000
5	Onboard – dummy front view				8.5	1000
6	Onboard – dummy side view				8.5	1000
7	Onboard – dummy rear oblique view				8.5	1000
8	Rear ground level – impact view	3140	1288	-1491	20	1000
9	Impact side 45° – rearward pole view	-3434	2328	-1511	20	1000
10	Overhead wide view of impact	0	0	-4823	12.5	1000
11	Real time dummy front view				Zoom	30

All measurements accurate to +/- 6 mm.

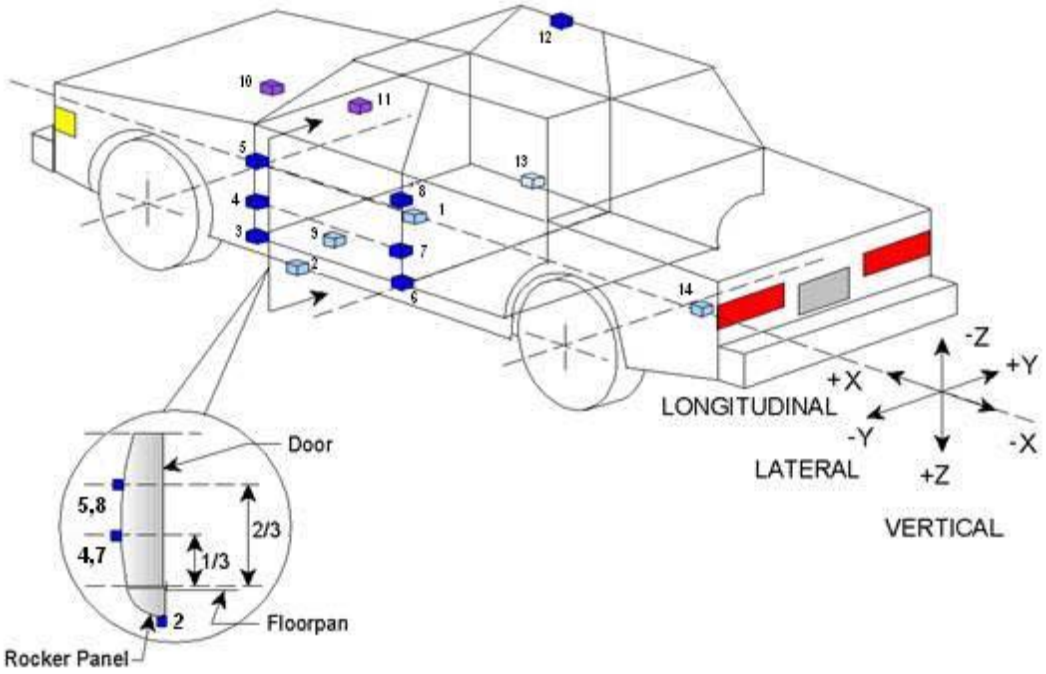
NOTE: Vehicle was at a 75° angle to the rigid pole.
If applicable, explain why camera(s) did not run: N/A

INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Vehicle Structure	18
Pole Load Cells	8
TOTAL	42

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



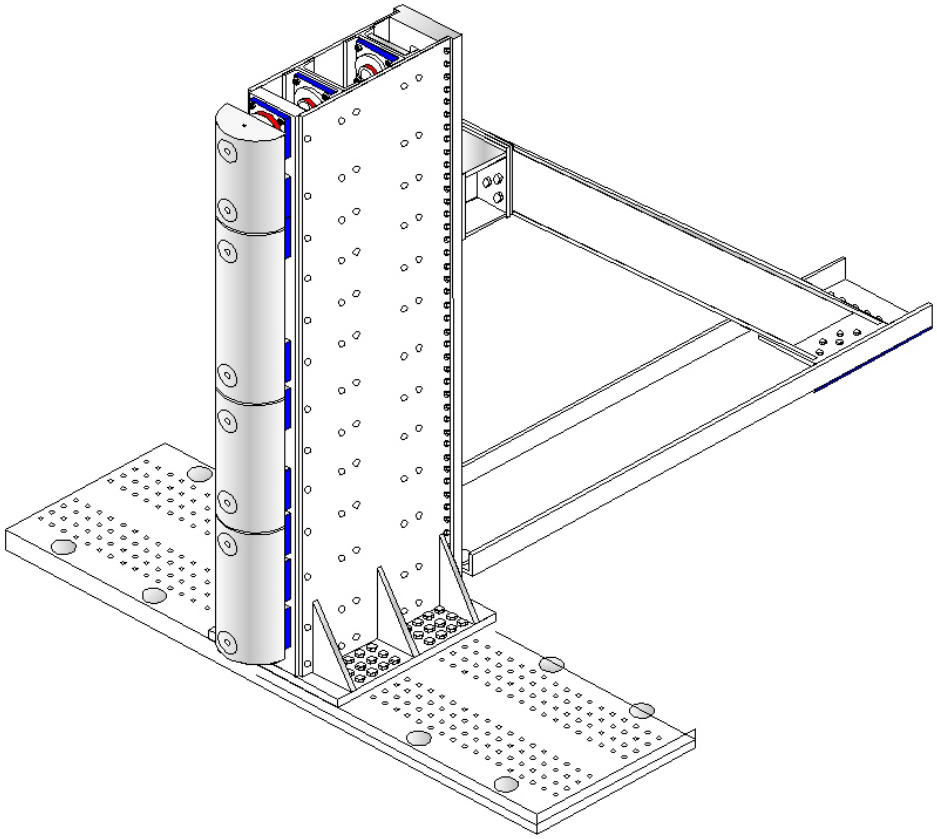
	Accelerometer/Sensor Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2482	85	-404
2	Left Floor Sill	2511	-700	-374
3	A-Pillar Sill	2727	-716	-461
4	A-Pillar Low	2850	-810	-525
5	A-Pillar Mid	2847	-785	-929
6	B-Pillar Sill	1681	-710	-293
7	B-Pillar Low	1790	-800	-602
8	B-Pillar Mid	1767	-781	-1019
9	Driver Seat Track	2070	-558	-431
10	Engine Top	3430	30	-735
11	Firewall	3265	0	-935
12	Right Roof	1855	570	-1545
13	Right Floor Sill	2500	700	-387
14	Rear Floorpan	195	0	-1253

Reference: *X - Test Vehicle Rear Bumper (+ forward)*
Y - Test Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

FOIL 300K RIGID POLE



Load Cell Locations	
ID	**Height From Top of Carrier (mm)**
1	87
2	468
3	648
4	978
5	1168
6	1651
7	1816
8	2057

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	Frontal Airbag
Top of Head	SCAB
Left Side of Head	SCAB
Back of Head	Head Restraint, Side Airbag
Left Shoulder	Side Seat Bolster, Side Airbag
Upper Torso	Side Seat Bolster
Lower Torso	Side Seat Bolster
Left Hip	Side Airbag, Door Panel
Left Knee	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	N/A	N/A	N/A	N/A	N/A

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	None
Windshield Damage	Cracked
Side Window Damage	Blown out
Other Notable Effects	None

DATA SHEET NO. 8 (CONTINUED)
POST-TEST OBSERVATIONS

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

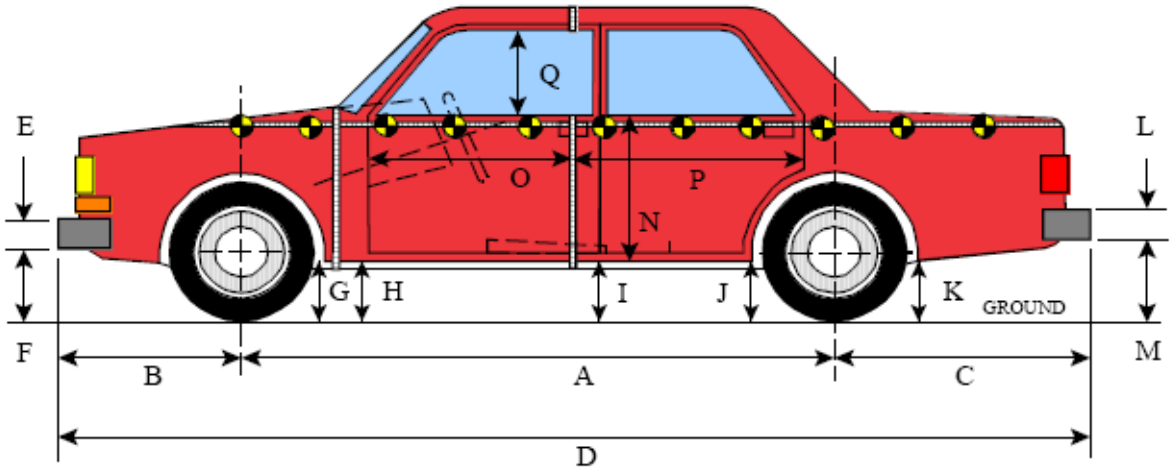
Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	Yes		
Knee Airbag	No	N/A		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	N/A	No	N/A
Other	No	N/A	No	N/A

VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1090
Actual Impact Point (Aft of Front Axle)	mm		1093
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact point	-3
Angle Between Vehicle's Longitudinal Centerline and Line of Motion	degrees	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.38
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.37

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



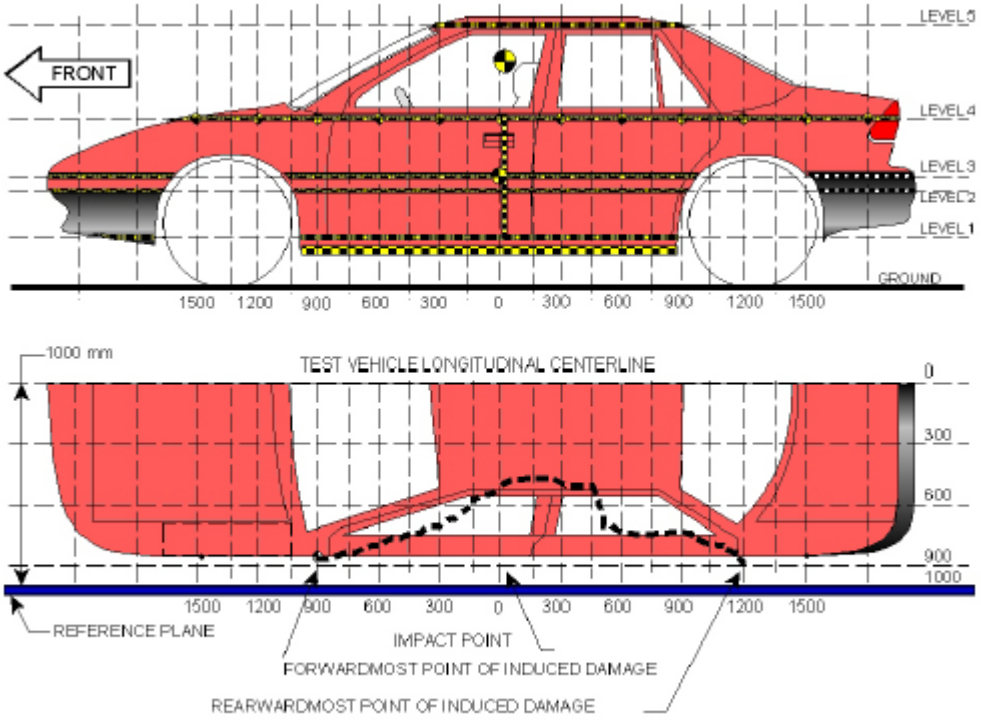
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2610	2590	-20
B	Front Axle to Front Surface of Vehicle	853	853	0
C	Rear Axle to Rear Surface of Vehicle	727	727	0
D	Total Length at Centerline	4190	4190	0
E	Front Bumper Thickness	125	125	0
F	Front Bumper Bottom to Ground	410	426	16
G	Sill Height at Front Wheel Well	290	311	21
H	Sill Height at Front Door Leading Edge	293	310	17
I	Sill Height at B-Pillar	313	364	51
J1	Sill Height at Rear Wheel Well	330	360	30
J2	Pinch Weld Height at Rear Wheel Well	210	236	26
K	Sill Height Aft of Rear Wheel Well	385	413	28
L	Rear Bumper Thickness	205	205	0
M	Rear Bumper Bottom to Ground	365	393	28
N	Sill Height to Bottom of Front Window Sill	800	795	-5
O	Front Door Leading Edge to Impact CL	624	575	-49
P	Rear Door Trailing Edge to Impact CL	1390	1335	-55
Q	Front Window Opening	405	372	-33
R	Right Side Length	4000	3990	-10
S	Left Side Length	4000	3985	-15
T	Vehicle Width at B-Pillars	1770	1740	-30
U	Front Wheel Track Width	1562	1562	0
V	Rear Wheel Track Width	1570	1570	0

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



3 **NOTE:** All measurements are in millimeters (mm)

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	352	150	0
2	Occupant H-Point	659	226	0
3	Mid-Door	723	235	0
4	Window Sill	1023	196	0
5	Window Top	1479	60	0

NOTE: The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

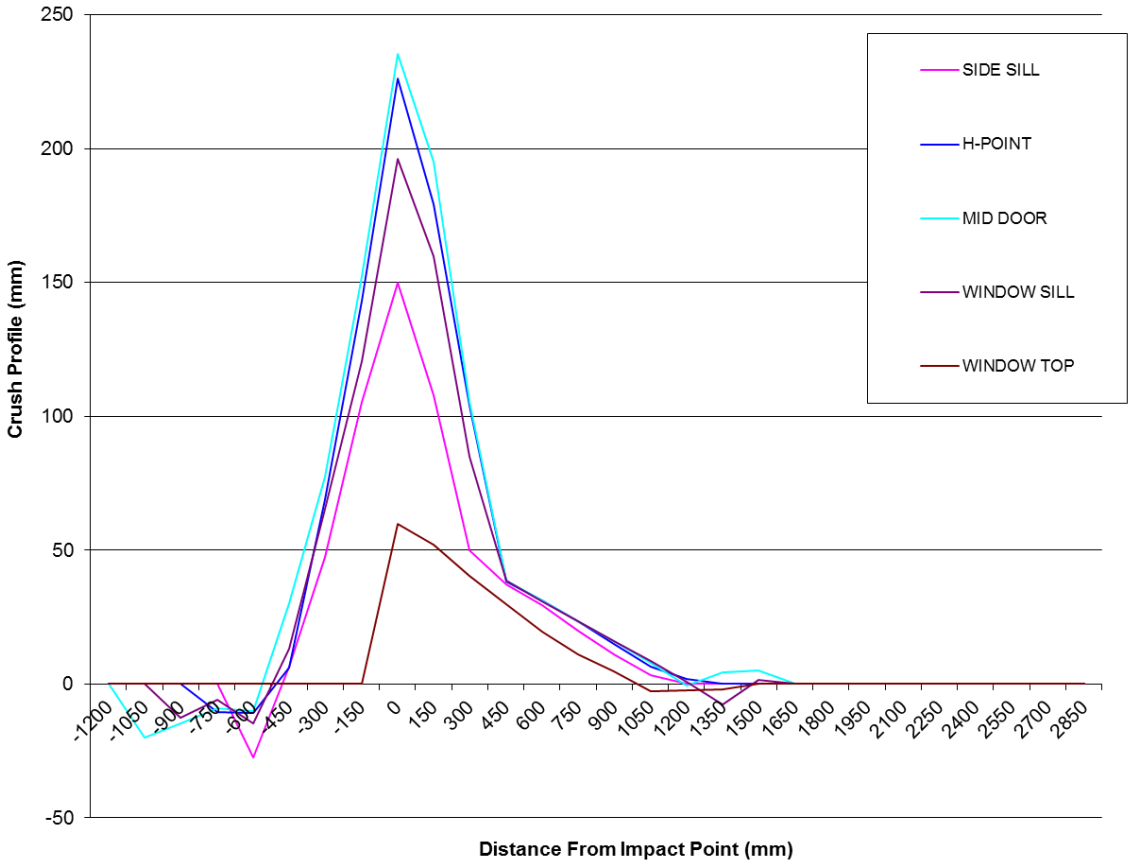
Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

	Pre-Test					Post-Test					Crush				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
-1050	0	0	901	0	0	0	0	921	0	0	0	0	-20	0	0
-900	0	0	901	776	0	0	0	915	788	0	0	0	-14	-12	0
-750	0	902	892	793	0	0	912	901	799	0	0	-10	-9	-6	0
-600	880	887	882	799	0	908	898	892	814	0	-28	-11	-10	-15	0
-450	868	882	883	796	0	861	875	853	783	0	7	7	30	13	0
-300	867	884	887	807	0	820	816	810	742	0	47	68	77	65	0
-150	869	886	890	820	0	764	743	737	699	0	105	143	153	121	0
0	871	887	891	831	596	721	661	656	635	536	150	226	235	196	60
150	873	887	891	839	610	765	707	696	679	558	108	180	195	160	52
300	871	885	890	845	610	821	781	784	760	569	50	104	106	85	41
450	870	882	887	847	608	833	843	848	809	578	37	39	39	38	30
600	868	877	882	845	606	839	846	850	814	586	29	31	32	31	20
750	865	871	875	839	603	846	848	852	815	592	19	23	23	24	11
900	866	872	870	831	596	855	857	853	815	591	11	15	17	16	5
1050	868	885	875	822	583	865	878	867	813	586	3	7	8	9	-3
1200	0	898	886	812	563	0	896	887	811	566	0	2	-1	1	-3
1350	0	0	900	822	528	0	0	896	830	530	0	0	4	-8	-2
1500	0	0	901	828	0	0	0	896	826	0	0	0	5	2	0

NOTE: Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy’s head.

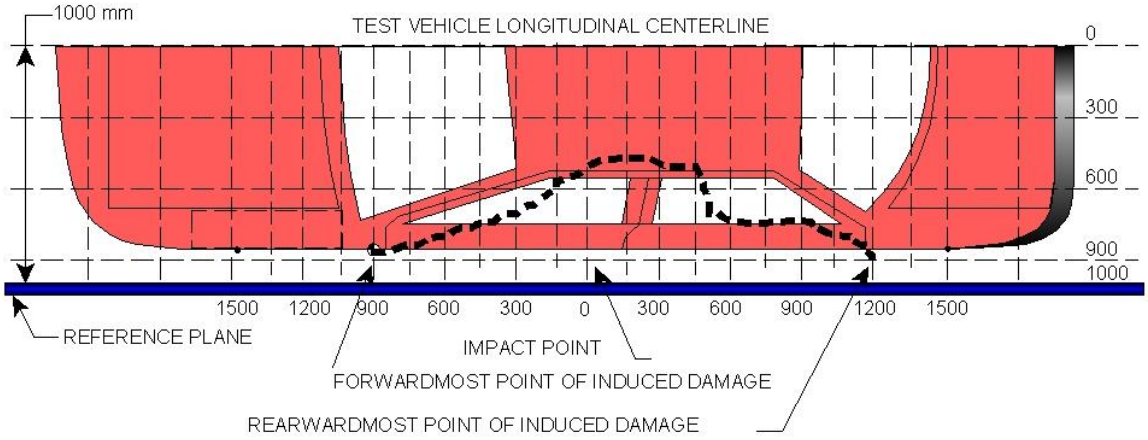
DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	1500	4	826	828	2
2	1050	4	813	822	9
3	750	4	815	839	24
4	300	3	784	890	106
5	0	3	656	891	235
6[1]	-450	3	853	883	0

[1] DPD 6 is defined as zero crush since the crush does not extend to the end of the vehicle.

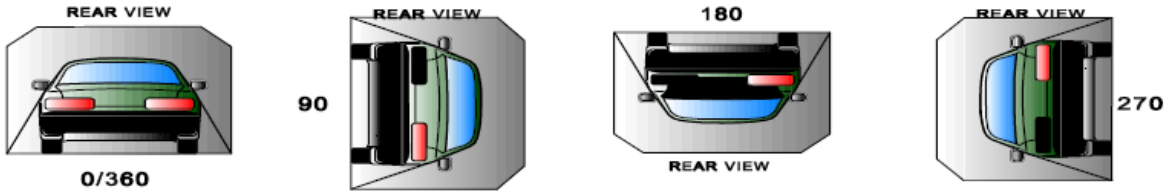
DATA SHEET NO. 12
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

Test Time: 14:50 **Temperature:** 20.7ºC

A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 ounce)
B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable is 5 ounces)
C. For the following 25 minutes: 0 oz.
(Maximum allowable is 1 ounce/minute)
D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0 to 90	90	330	420
90 to 180	90	330	840
180 to 270	90	330	1260
270 to 360	90	330	1680

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

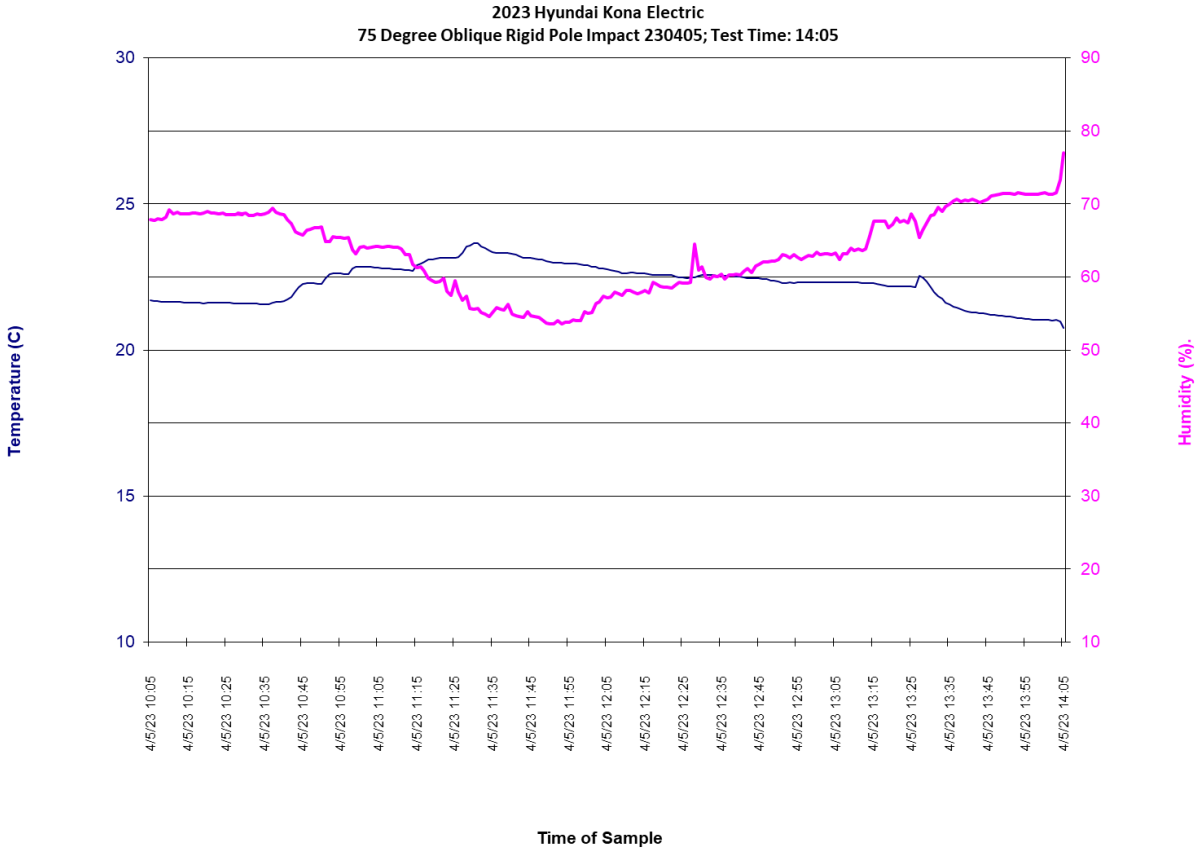
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0	0	0
90 to 180	0	0	0	0
180 to 270	0	0	0	0
270 to 360	0	0	0	0

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	None
90 to 180	None
180 to 270	None
270 to 360	None

DATA SHEET NO. 13
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023



DATA SHEET NO. 305-1
GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

ELECTRIC VEHICLE PROPULSION SYSTEM

Type of Electric Vehicle (Electric/Hybrid): Electric
Propulsion Battery Type: Lithium ion battery
Nominal Voltage: 356 V
Physical Location of Automatic Propulsion Battery Disconnect: Inside battery system
Auxiliary Battery Type: 12V

PROPULSION BATTERY SYSTEM DATA (COTR-supplied):

Electrolyte Fluid Type: Liquid electrolyte containing LiPF6 salt
Electrolyte Fluid Specific Gravity: 1.197g/cm^3
Electrolyte Fluid Kinematic Viscosity: 3.0 cP centistokes
Electrolyte Fluid Color: Transparent pale yellow
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable): Water + ethylene glycol, blue

Location of Battery Modules

☐ Inside Passenger Compartment

☒ Outside Passenger Compartment

Propulsion Battery State of Charge:

☒ Maximum state of charge

Test Voltage (No less than 95% of Maximum State of Charge): 391.4 V

OR

☐ Range of Normal Operating Voltage

Test Voltage (Within Normal Operative Voltage Range):

RECORDED BY: Franklin Xu DATE: 4/5/2023
APPROVED BY: John Shultz DATE: 4/6/2023

DATA SHEET NO. 305-2
PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2023 Hyundai Kona Electric	NHTSA No.:	M20234215
Test Program:	SPNCAP Side Impact	Test Date:	4/5/2023

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S):

Details of Vehicle Chassis Ground Point(s) & Location(s) [Supply photographs as appropriate]:

Next to battery-side high voltage cable connector

PROPULSION BATTERY SYSTEM:

Details of Propulsion Battery Components [Supply photographs as appropriate]:

Comments:

RECORDED BY:	Franklin Xu	DATE:	4/5/2023
APPROVED BY:	John Shultz	DATE:	4/6/2023

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle:	2023 Hyundai Kona Electric	NHTSA No.:	M20234215
Test Program:	SPNCAP Side Impact	Test Date:	4/5/2023

VOLTMETER INFORMATION
The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10MΩ.

> **NOTE:** An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

Make: Fluke ; Model: 87V ; S/N: 15860164
Internal Impedance Value: 50 MΩ
Resolution: 0.00001 V
Last Calibration Date: 9/23/2023

PROPULSION BATTERY VOLTAGE
The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.

NOTE: If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.

Vb = 407.5 V

ELECTRICAL ISOLATION MEASUREMENTS
PROPULSION BATTERY TO VEHICLE CHASSIS

Vehicle chassis point(s) will be determined and supplied to the Contractor by the COTR.

V1 = 290.7 V
V2 = 296.0 V

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

The known resistance Ro (in ohms) should be approximately 500 times the nominal operating voltage of the vehicle (in volts) per SAE J1766.

Ro = 164,800 Ω
V1' = 31.17 V Pre-Impact
V2' = 30.40 V Pre-Impact

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

Test Vehicle:	2023 Hyundai Kona Electric	NHTSA No.:	M20234215
Test Program:	SPNCAP Side Impact	Test Date:	4/5/2023

ELECTRICAL ISOLATION CALCULATIONS

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 = 2769357 Ω Pre-Impact

Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']
Ri2 = 2853882 Ω Pre-Impact

Ri = The lesser of Ri1 and Ri2
Ri = 2769357 Ω Pre-Impact

Ri/Vb = Electrical Isolation Value/ Nominal Battery Voltage
Ri/Vb = 6796 Ω V Pre-Impact

NOTE: The minimum Electrical Isolation Value is 500 Ω/ V.

Is the measured Electrical Isolation Value ≥500 Ω/ V?

☒ Yes ☐ No

Comments:

RECORDED BY:	Franklin Xu	DATE:	4/5/2023
APPROVED BY:	John Shultz	DATE:	4/6/2023

DATA SHEET NO. 305-4
POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

VOLTMETER INFORMATION
The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10MΩ.

NOTE: An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

Make: Fluke ; Model: 87V ; S/N: 15860164
Internal Impedance Value: 50 MΩ
Nominal Propulsion Battery Voltage (Vb): 0.020 V

ELECTRICAL ISOLATION MEASUREMENTS
Record V1, V2, V1', V2' voltage measurements immediately after the impacted vehicle comes to rest.

V1 =	91.0	V	Post-Impact	Time:	3	minutes	59	s
V2 =	17.0	V	Post-Impact	Time:	4	minutes	27	s
V1' =	0.150	V	Post-Impact	Time:	4	minutes	44	s
V2' =	0.010	V	Post-Impact	Time:	5	minutes	13	s

ELECTRICAL ISOLATION CALCULATIONS

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 = 118,460,413 Ω Post-Impact Time: 5 minutes 13 s

Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']
Ri2 = 1,778,793,035 Ω Post-Impact Time: 5 minutes 13 s

Ri = The lesser of Ri1 and Ri2
Ri = 118,460,413 Ω Post-Impact Time: 5 minutes 13 s

Ri/Vb = Electrical Isolation Value/ Nominal Battery Voltage
Ri/Vb = 5,923,020,659 Ω/V Post-Impact Time: 5 minutes 13 s

NOTE: The minimum Electrical Isolation Value is 500 Ω/ V.

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

DATA SHEET NO. 305-4
POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

PROPULSION BATTERY SYSTEM COMPONENTS

Describe any Propulsion Battery Module movement within the passenger compartment. [Supply photographs as appropriate]:

None

Has the Propulsion Battery Module moved within the passenger compartment?

☐ Yes (Fail) ☒ No

Describe any intrusion of an outside Propulsion Battery Component into the passenger compartment. [Supply photographs as appropriate]:

None

Has an outside Propulsion Battery Component intruded into the passenger compartment?

☐ Yes (Fail) ☒ No

Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?

☐ Yes (Fail) ☒ No

RECORDED BY: Franklin Xu DATE: 4/5/2023

APPROVED BY: John Shultz DATE: 4/6/2023

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2023 Hyundai Kona Electric NHTSA No.: M20234215
Test Program: SPNCAP Side Impact Test Date: 4/5/2023

PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time (spec. 1-3 min)				FMVSS No. 301 Hold Time		Total Time				Next Whole Minute Interval	
0°-90°	1	min.	31	sec.	8	min.	10	min.	1	sec.	11	min.
90°-180°	1	min.	29	sec.	8	min.	20	min.	1	sec.	21	min.
180°-270°	1	min.	29	sec.	8	min.	30	min.	56	sec.	31	min.
270°-360°	1	min.	29	sec.	8	min.	41	min.	2	sec.	42	min.

TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

NOTE: The maximum allowable Propulsion Battery Electrolyte Spillage is 5.0 Liters.

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

Total Spillage: 0 **L**

Is the total Propulsion Battery Electrolyte Spillage greater than 5.0 Liters?

☐ Yes (Fail) ☒ No

Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?

☐ Yes (Fail) ☒ No

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

VOLTMETER INFORMATION
The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10MΩ.

NOTE: An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

Make: Fluke ; Model: 87V ; S/N: 15860164
Internal Impedance Value: 50 MΩ
Nominal Propulsion Battery Voltage (Vb): 0.020 V

ELECTRICAL ISOLATION MEASUREMENTS
Record V1, V2, V1', V2' voltage measurements at the start of each successive increment of 90º, 180º, 270º, and 360º of the static rollover test.

V1 =	0.032	V	@ 90º	Time:	3	minutes	2	s
V1 =	0.075	V	@ 180º	Time:	11	minutes	31	s
V1 =	0.071	V	@ 270º	Time:	23	minutes	31	s
V1 =	0.056	V	@ 360º	Time:	33	minutes	50	s
V2 =	0.024	V	@ 90º	Time:	3	minutes	17	s
V2 =	0.068	V	@ 180º	Time:	11	minutes	55	s
V2 =	0.055	V	@ 270º	Time:	23	minutes	49	s
V2 =	0.041	V	@ 360º	Time:	34	minutes	06	s
V1' =	0.019	V	@ 90º	Time:	3	minutes	28	s
V1‘ =	0.001	V	@ 180º	Time:	11	minutes	01	s
V1‘ =	0.006	V	@ 270º	Time:	23	minutes	08	s
V1‘ =	0.017	V	@ 360º	Time:	34	minutes	29	s
V2' =	0.014	V	@ 90º	Time:	3	minutes	37	s
V2' =	0.002	V	@ 180º	Time:	11	minutes	15	s
V2' =	0.032	V	@ 270º	Time:	23	minutes	22	s
V2' =	0.001	V	@ 360º	Time:	34	minutes	23	s

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

ELECTRICAL ISOLATION CALCULATIONS

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 =	197,326	Ω	@ 90º	Time:	3	minutes	37	s
Ri1 =	23,252,181	Ω	@ 180º	Time:	12	minutes	15	s
Ri1 =	3,168,338	Ω	@ 270º	Time:	24	minutes	22	s
Ri1 =	654,872	Ω	@ 360º	Time:	34	minutes	23	s

Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']

Ri2 =	274,667	Ω	@ 90º	Time:	3	minutes	37	s
Ri2 =	11,436,635	Ω	@ 180º	Time:	12	minutes	15	s
Ri2 =	271,358	Ω	@ 270º	Time:	24	minutes	22	s
Ri2 =	15,595,707	Ω	@ 360º	Time:	34	minutes	23	s

Ri = The lesser of Ri1 and Ri2

Ri =	197,326	Ω	@ 90º	Time:	3	minutes	37	s
Ri =	11,436,635	Ω	@ 180º	Time:	12	minutes	15	s
Ri =	271,358	Ω	@ 270º	Time:	24	minutes	22	s
Ri =	654,872	Ω	@ 360º	Time:	34	minutes	23	s

Ri/Vb = Electrical Isolation Value/ Nominal Battery Voltage

RiVb =	9,866,316	Ω	@ 90º	Time:	3	minutes	37	s
RiVb =	571,831,765	Ω	@ 180º	Time:	12	minutes	15	s
RiVb =	13,567,909	Ω	@ 270º	Time:	24	minutes	22	s
RiVb =	32,743,613	Ω	@ 360º	Time:	34	minutes	23	s

NOTE: The minimum Electrical Isolation Value is 500 Ω/ V.

Is the measured Electrical Isolation Value ≥500 Ω/ V?

☒ Yes ☐ No (Fail)

Comments: _____

RECORDED BY: Franklin Xu DATE: 4/5/2023

APPROVED BY: John Shultz DATE: 4/6/2023

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

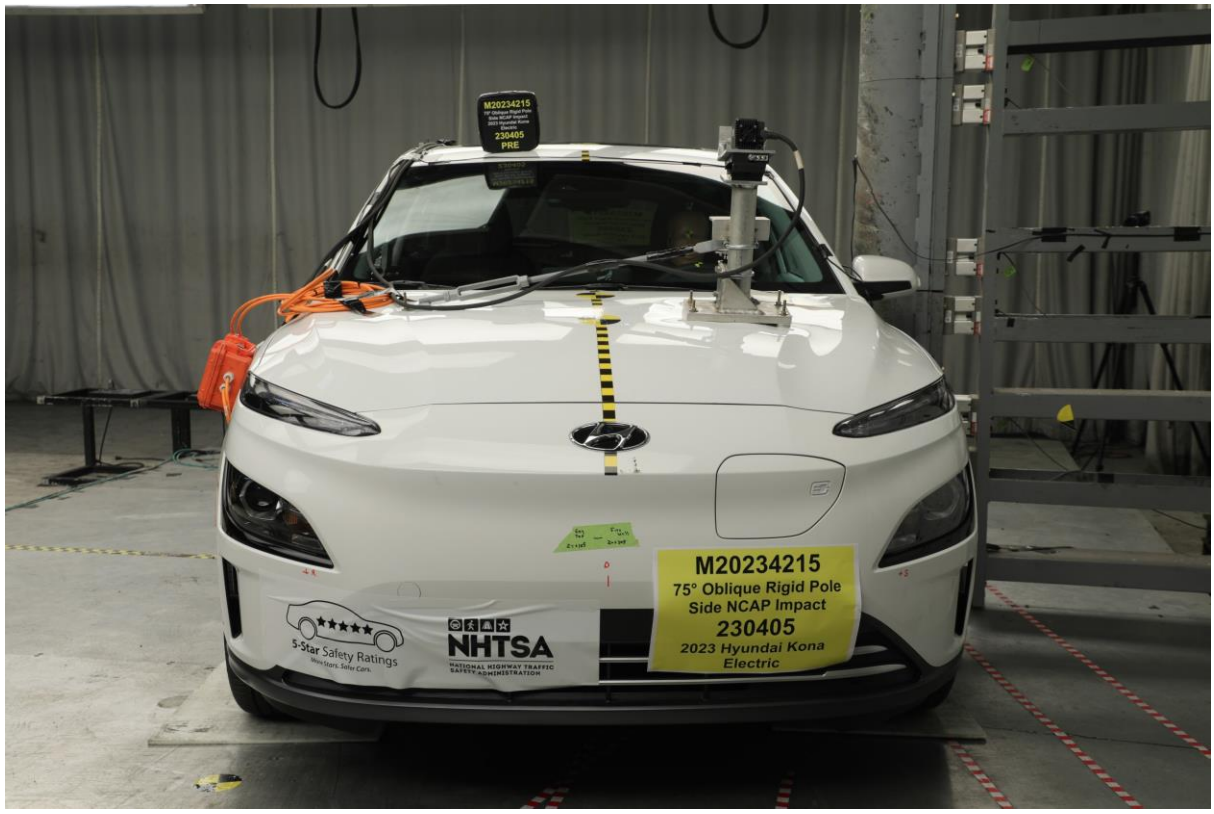
TABLE OF PHOTOGRAPHS, CONTINUED

TABLE OF PHOTOGRAPHS, CONTINUED

TABLE OF PHOTOGRAPHS, CONTINUED

No. 001 As Delivered Right Front ¾ View of Test Vehicle

No. 002 As Delivered Left Rear ¾ View of Test Vehicle

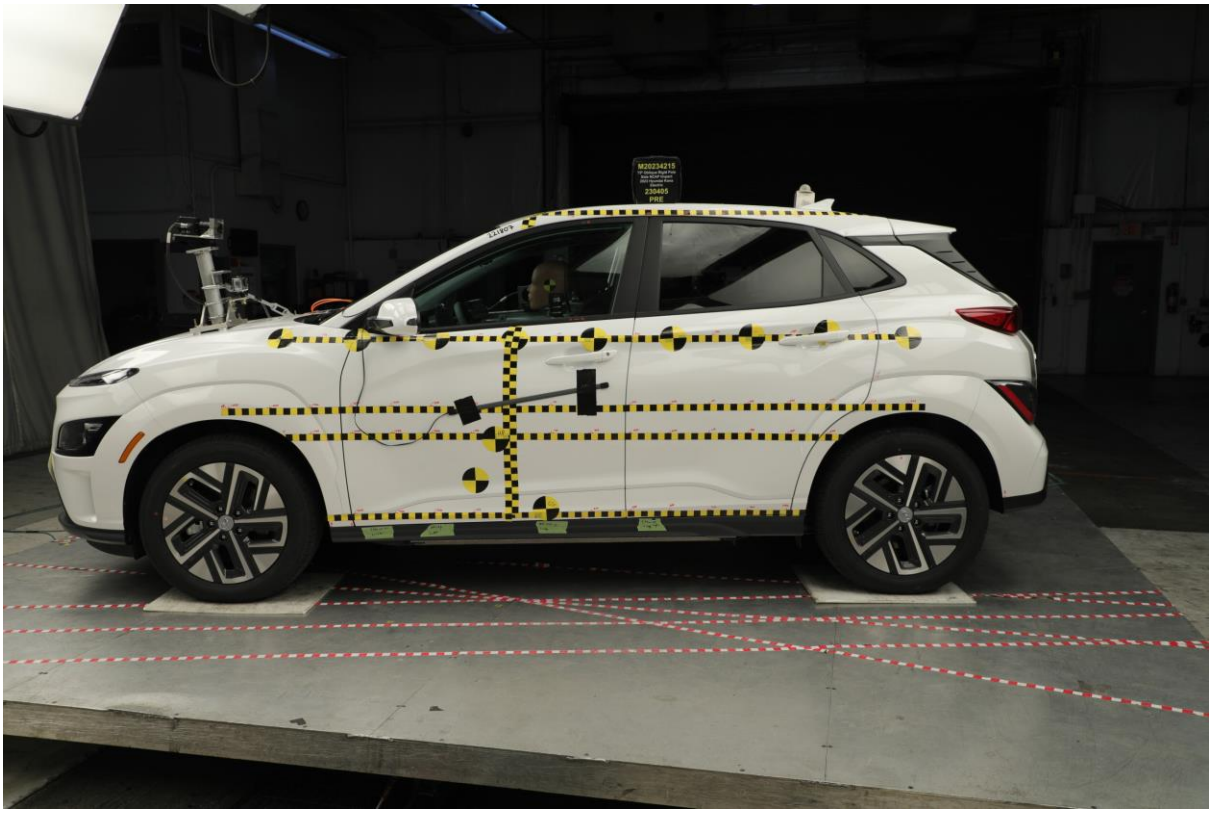


No. 003 Pre-Test Frontal View of Test Vehicle

No. 004 Post-Test Frontal View of Test Vehicle

No. 005 Pre-Test Left Front ¾ View of Test Vehicle

No. 006 Post-Test Left Front ¾ View of Test Vehicle



No. 007 Pre-Test Left Side View of Test Vehicle

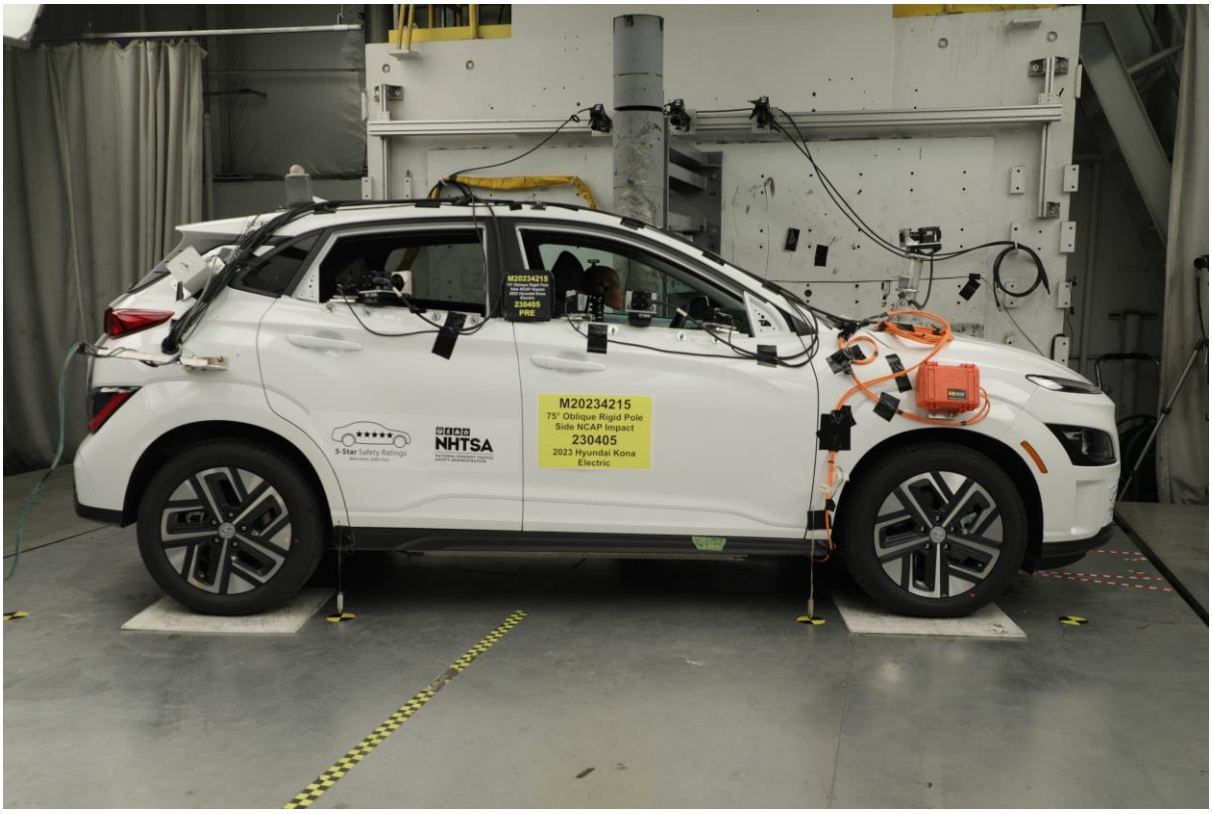
No. 008 Post-Test Left Side View of Test Vehicle

No. 009 Pre-Test Left Rear ¾ View of Test Vehicle

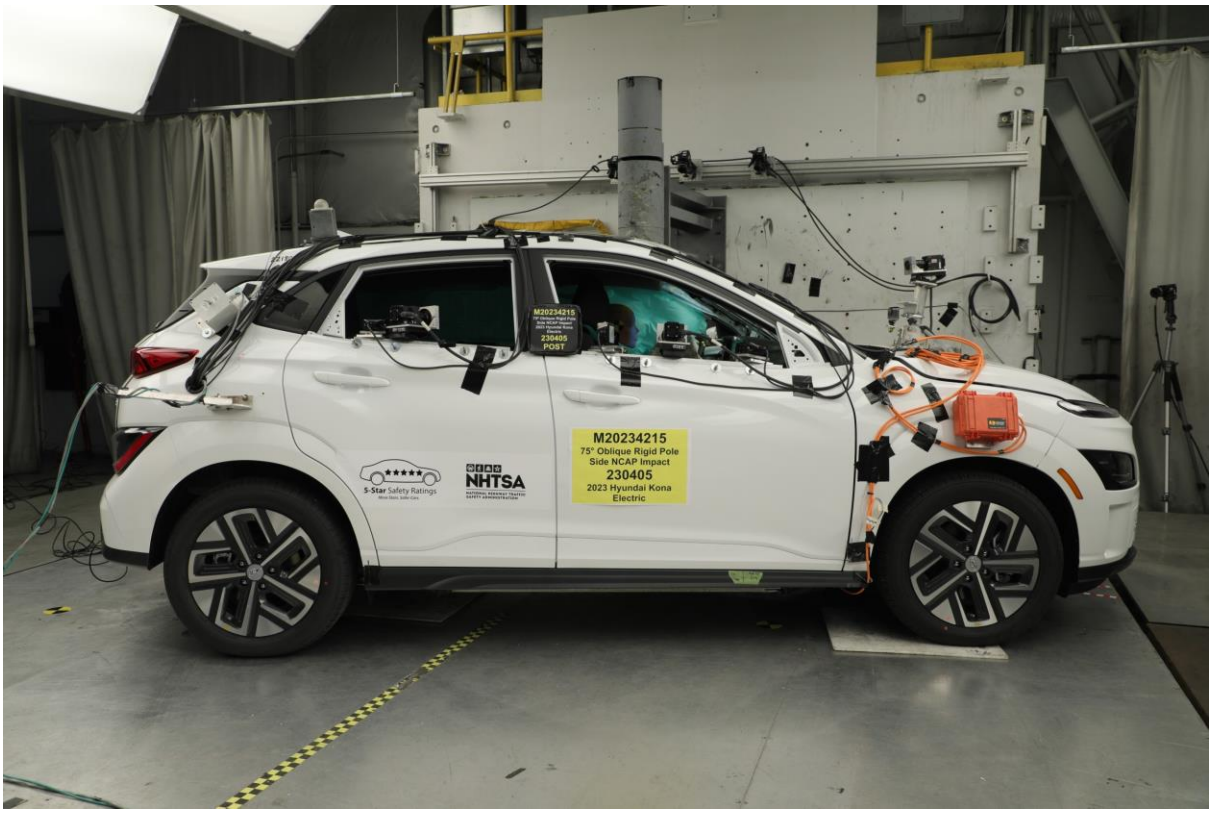
No. 010 Post-Test Left Rear ¾ View of Test Vehicle

No. 011 Pre-Test Rear View of Test Vehicle

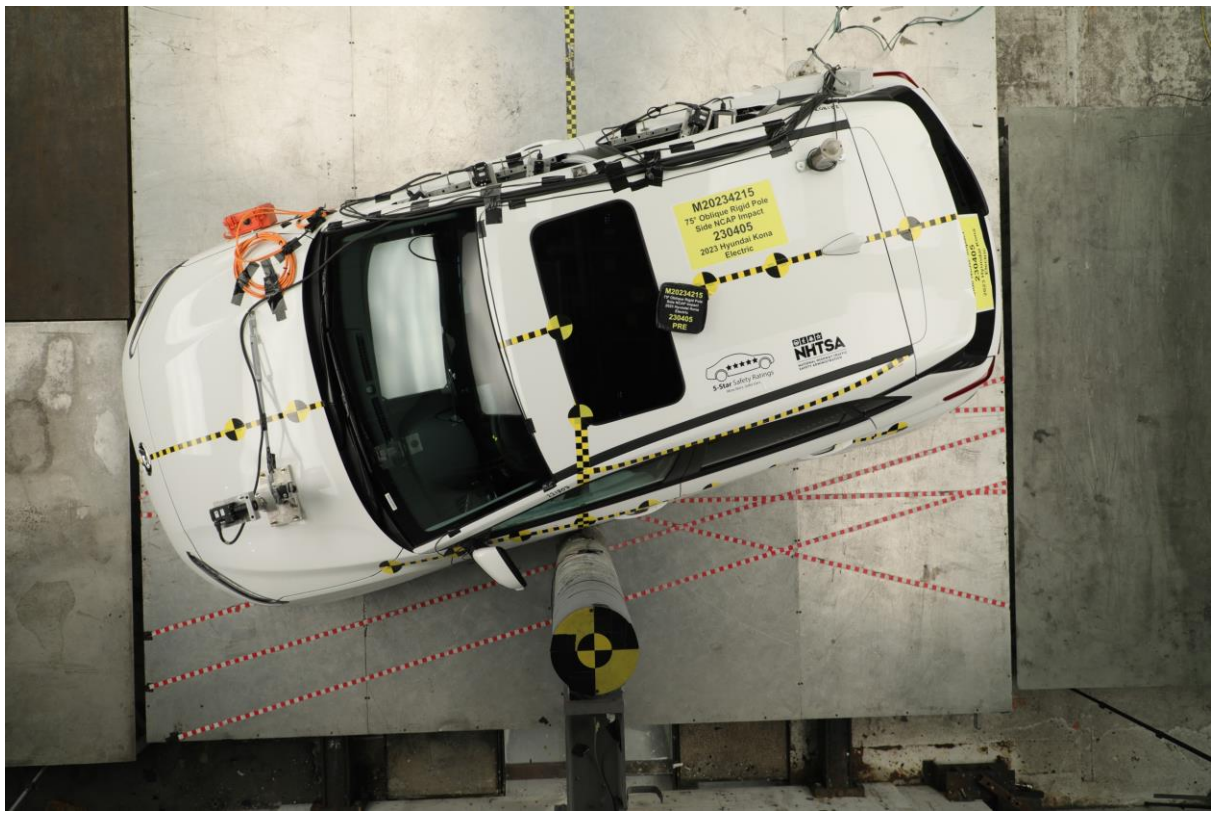
No. 012 Post-Test Rear View of Test Vehicle



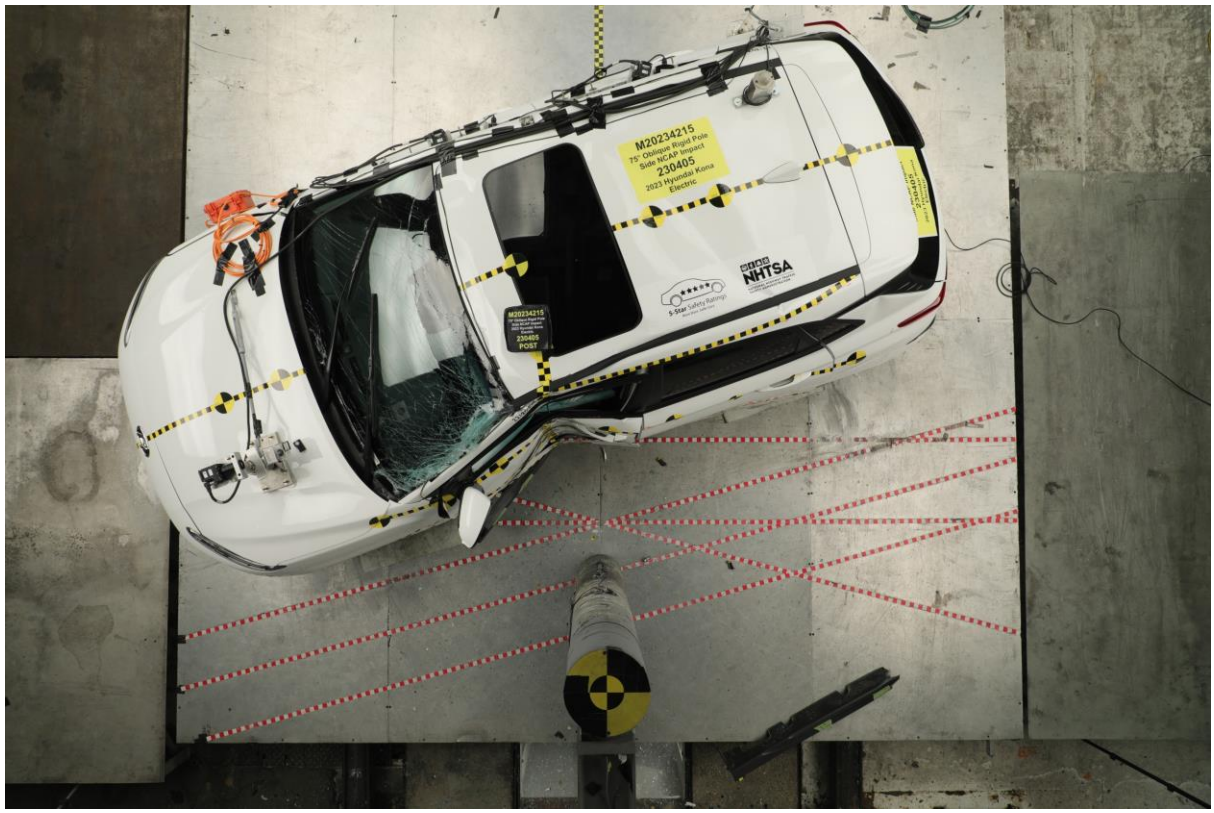
No. 013 Pre-Test Right Side View of Test Vehicle



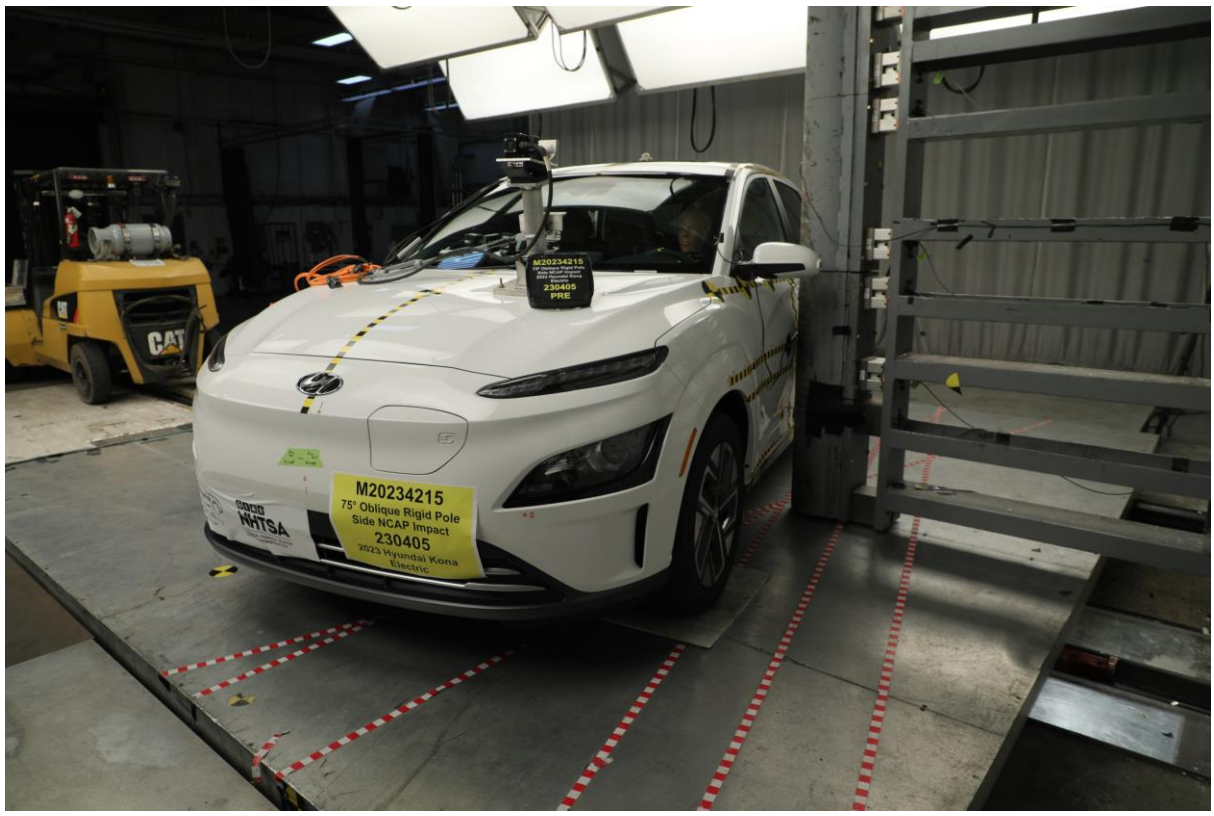
No. 014 Post-Test Right Side View of Test Vehicle



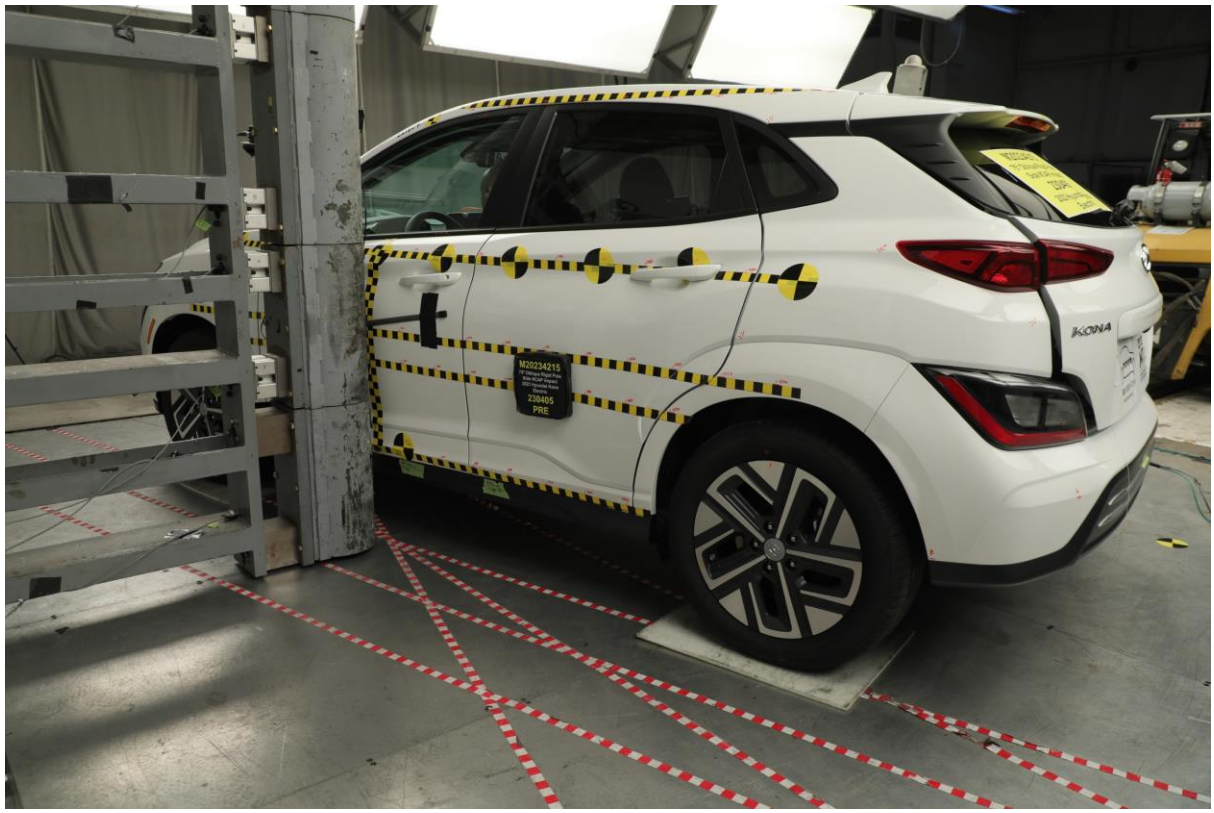
No. 015 Pre-Test Overhead View of Test Area



No. 016 Post-Test Overhead View of Test Area



No. 017 Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



No. 018 Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

No. 019 Pre-Test Close-Up View of Impact Point Target

No. 020 Post-Test Close-Up View of Impact Point Target Showing Impact Location

No. 021 Pre-Test Front Close-Up View of Dummy Head and Chest

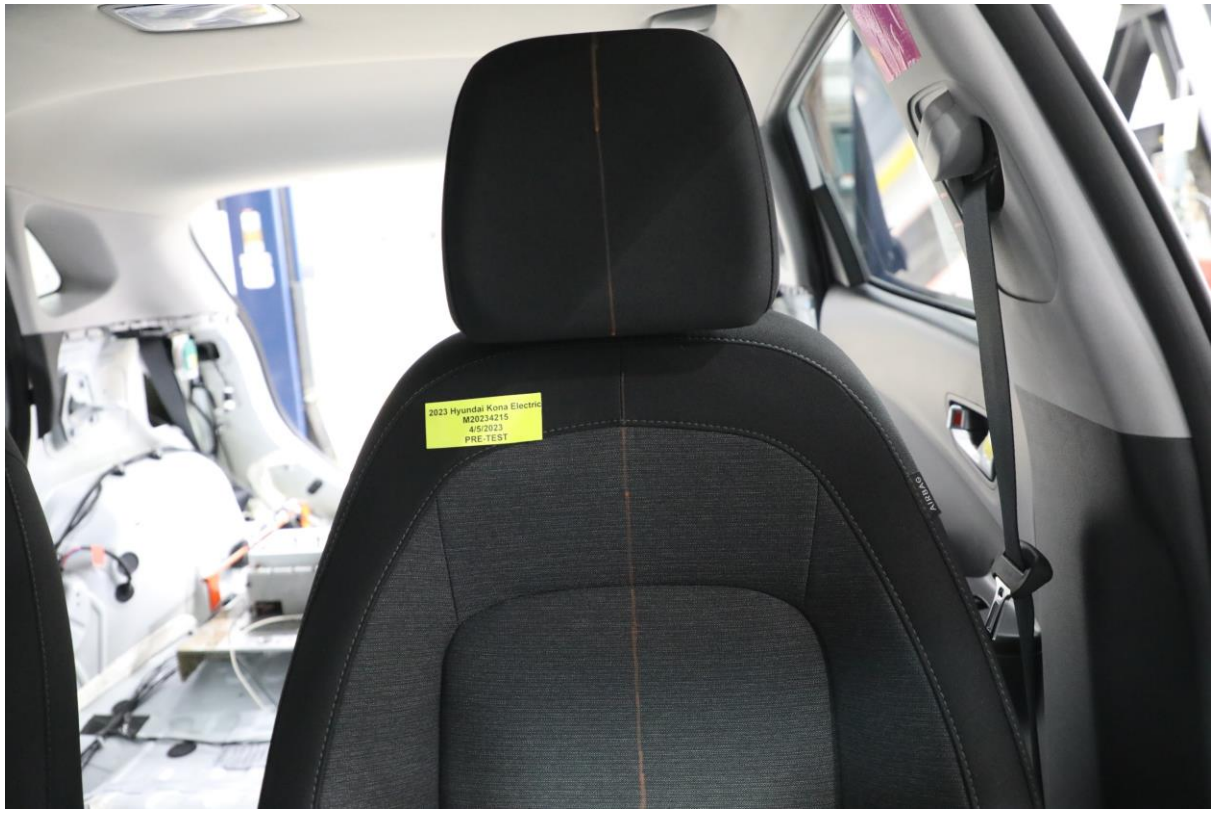
No. 022 Post-Test Front Close-Up View of Dummy

No. 023 Pre-Test Left Side View of Dummy Showing Belt and Chalking

Intentionally Left Blank

No. 024 Pre-Test Left Side View of Dummy Shoulder and Door Top View

No. 025 Post-Test Left Side View of Dummy Shoulder and Door Top View

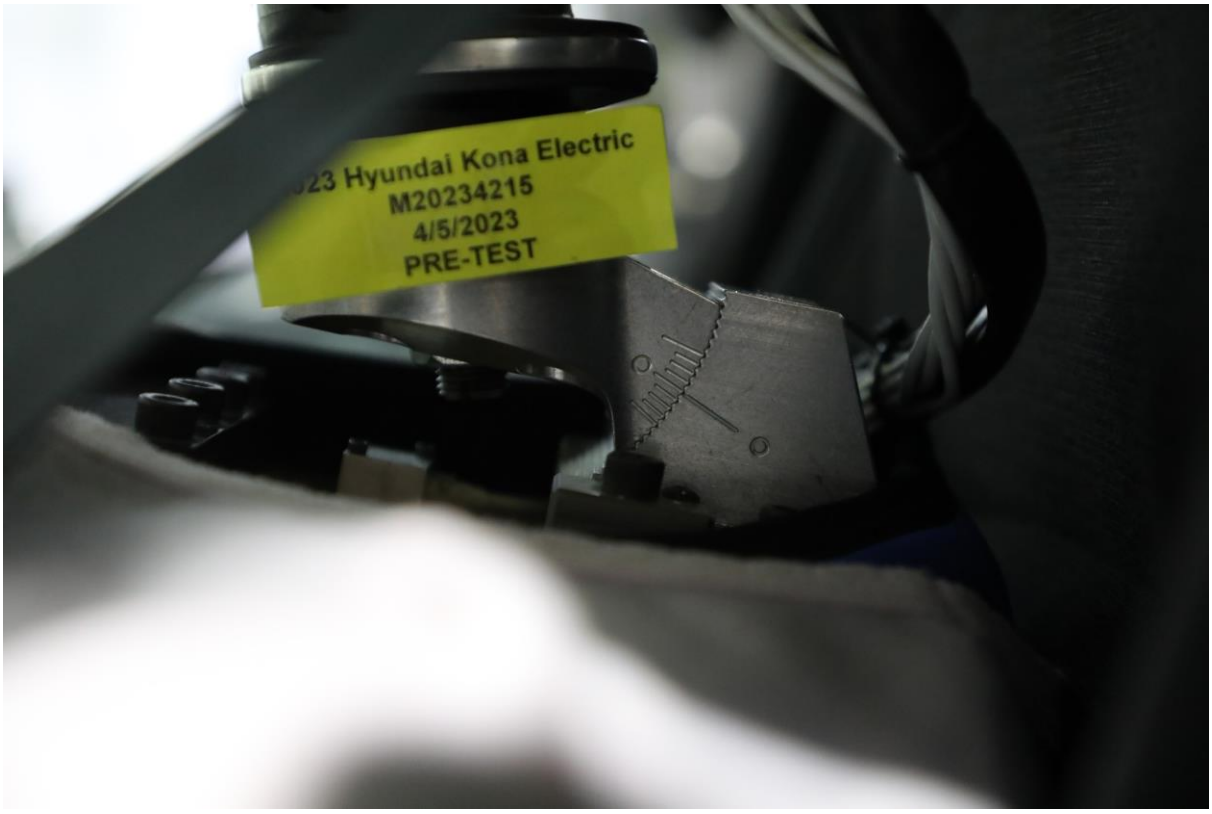


No. 026 Pre-Test Front View of Seat Back Prior to Dummy Positioning

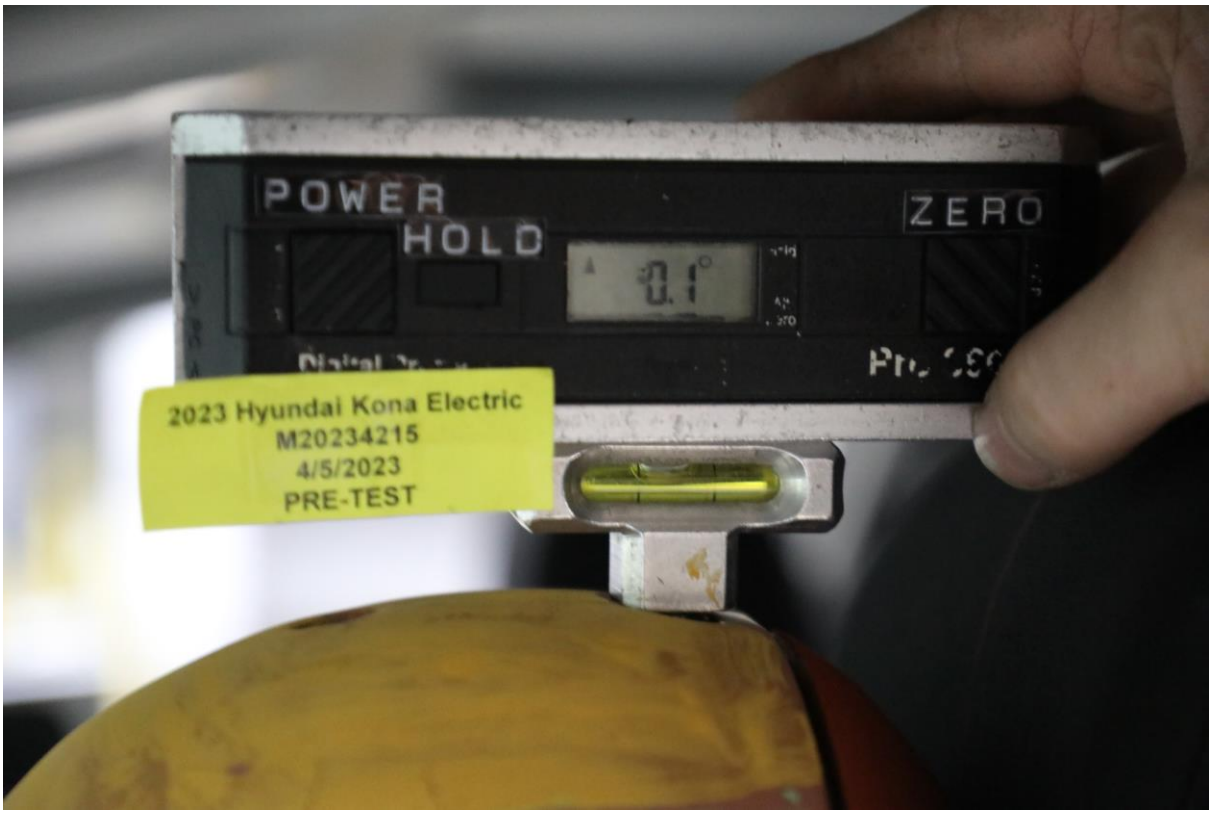
No. 027 Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint

No. 028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning

No. 029 Pre-Test Overhead View of Dummy Thighs on Seat Pan



No. 030 Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket



No. 031 Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level

No. 032 Pre-Test Placement of Dummy Feet

No. 033 Pre-Test View of Belt Anchorage for Dummy

No. 034 Pre-Test Left Side View of Steering Wheel

No. 035 Pre-Test View of Disengaged Parking Brake

No. 036 Pre-Test View of Parking Brake

No. 037 Pre-Test Close-Up Left Side View of Driver Seat Track

No. 038 Pre-Test Close-Up Left Side View of Driver Seat Back

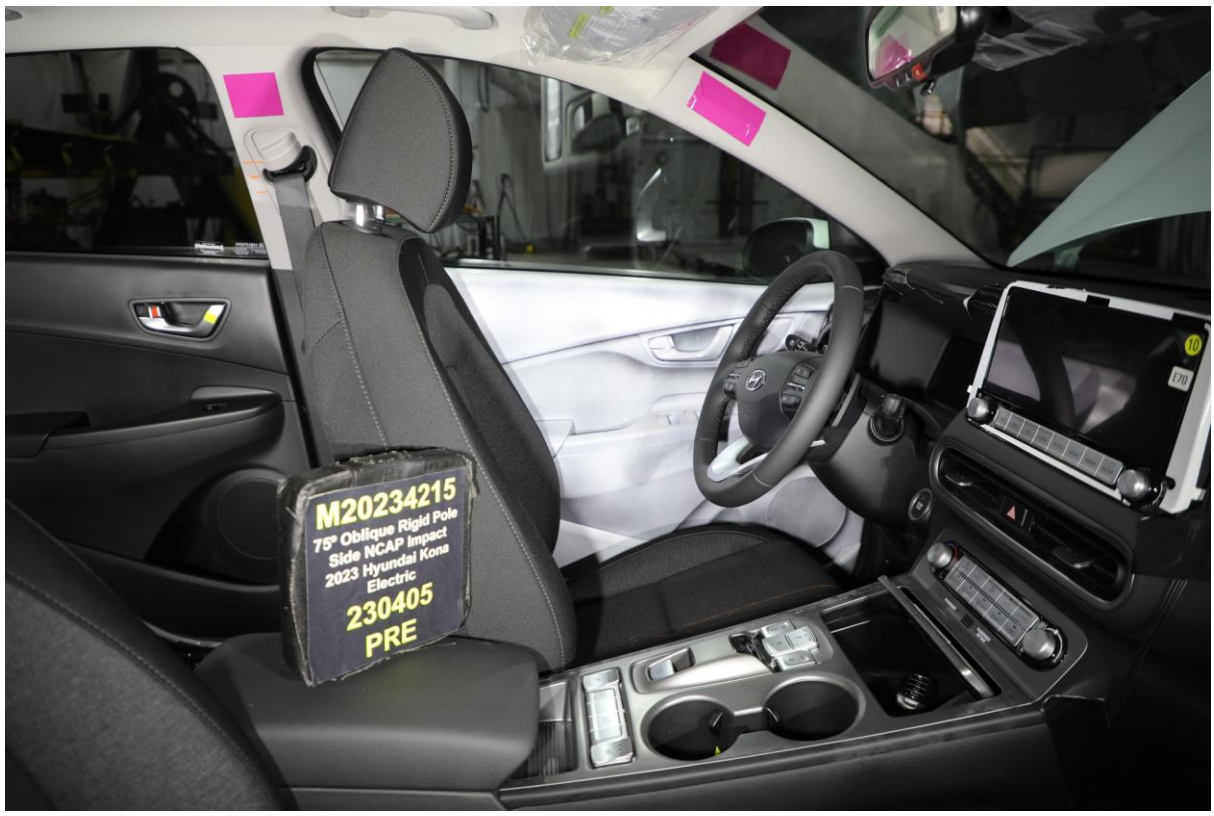
No. 039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint

No. 040 Pre-Test Dummy and Door Clearance View

No. 041 Post-Test Dummy and Door Clearance View

No. 042 Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment

No. 043 Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment

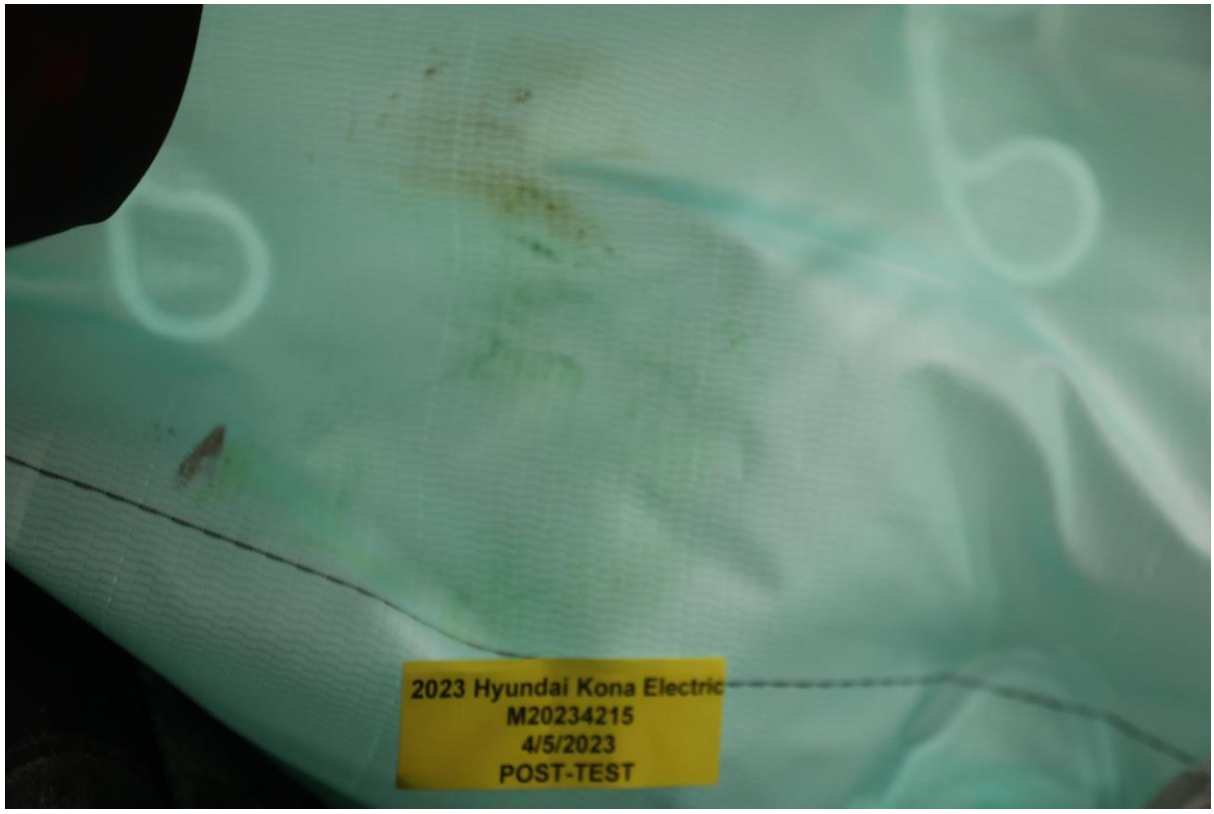


No. 044 Pre-Test Inner Door Panel View

No. 045 Post-Test Inner Door Panel View Showing Dummy Contact Location

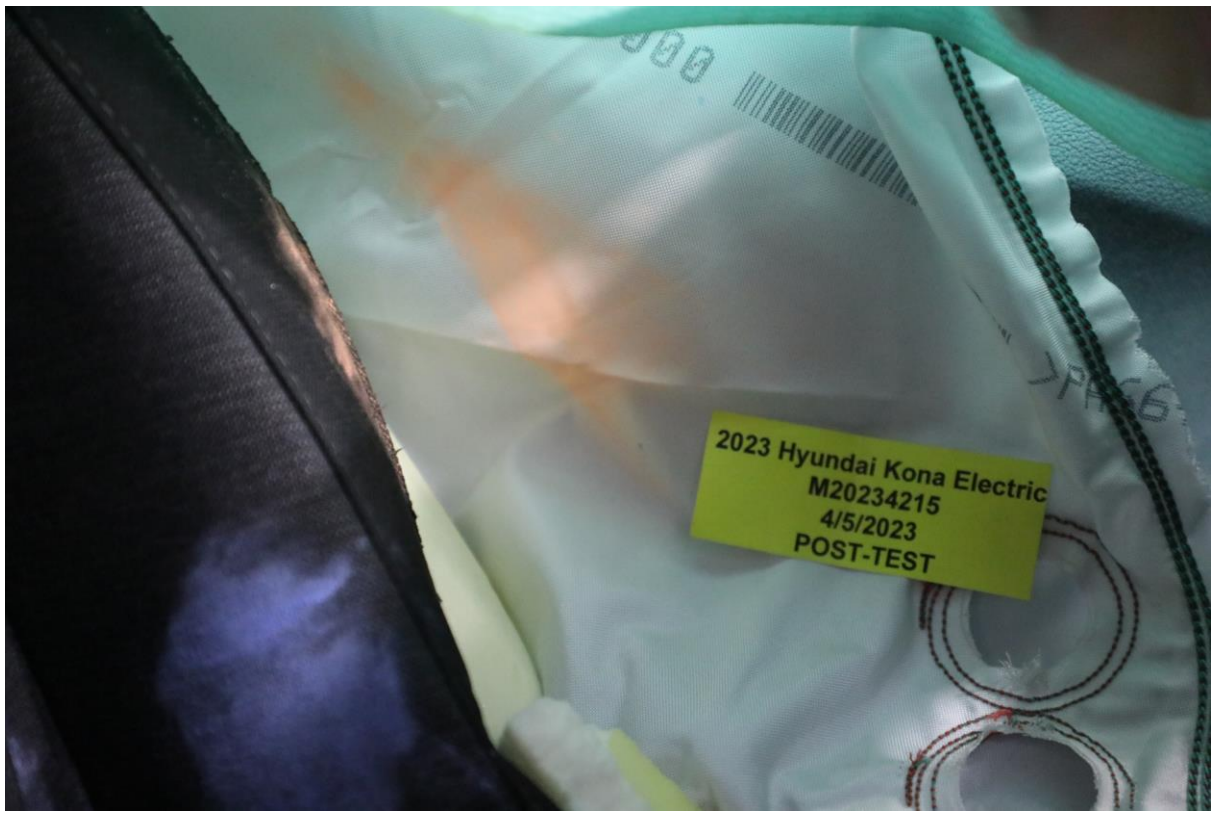
No. 046 Post-Test Dummy Close-Up Head Contact with Vehicle Interior View

Intentionally Left Blank



No. 047 Post-Test Dummy Close-Up Head Contact with Side Airbag View

No. 048 Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



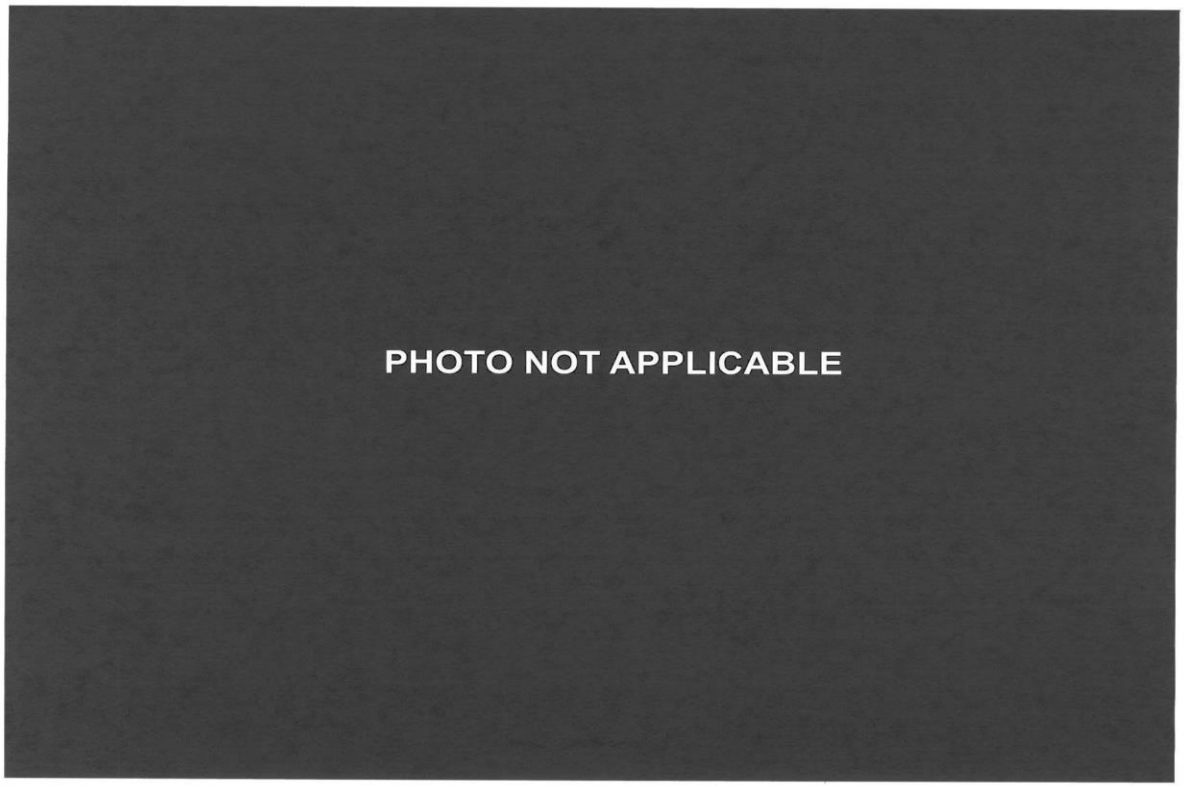
No. 049 Post-Test Dummy Close-Up Torso Contact with Side Airbag View

No. 050 Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View

No. 051 Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View

No. 052 Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View

No. 053 Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment



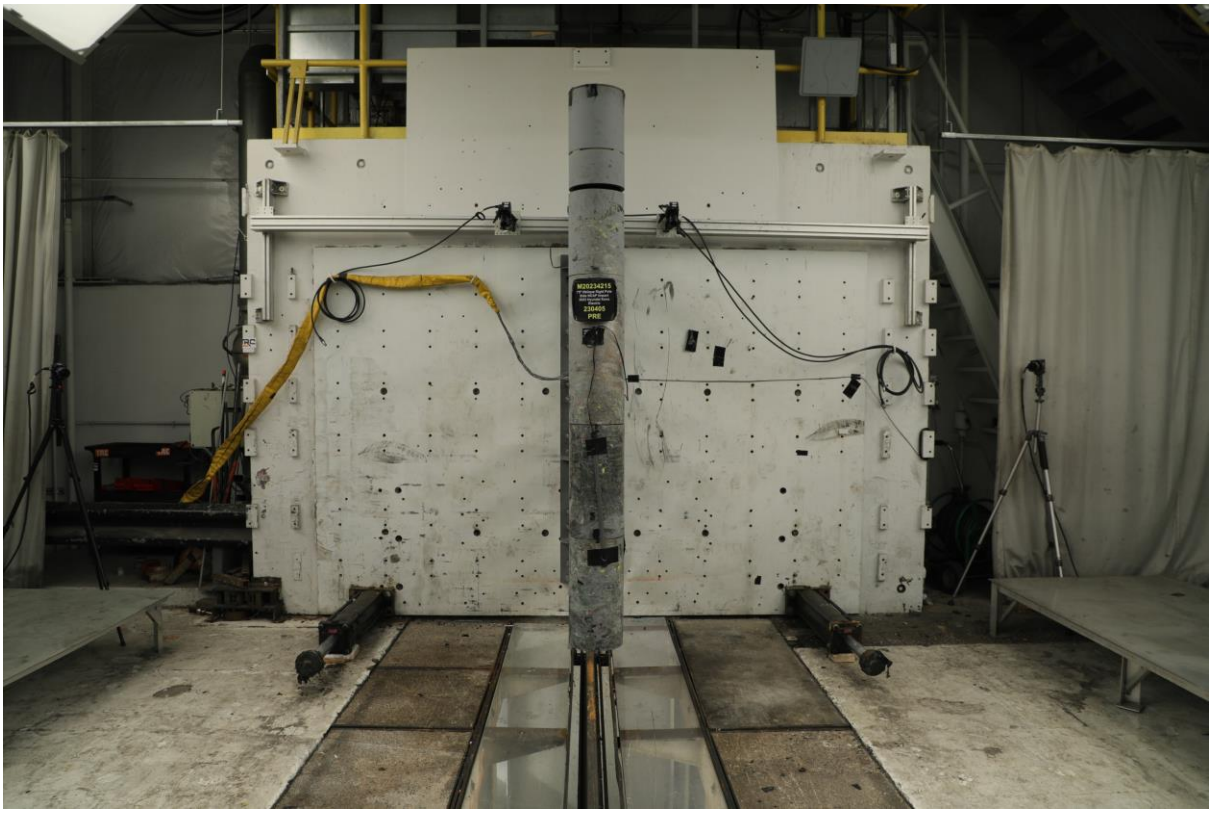
No. 054 Post-Test Inner Rear Passenger Torso Air Bag Deployment View

No. 055 Pre-Test Charge Port View

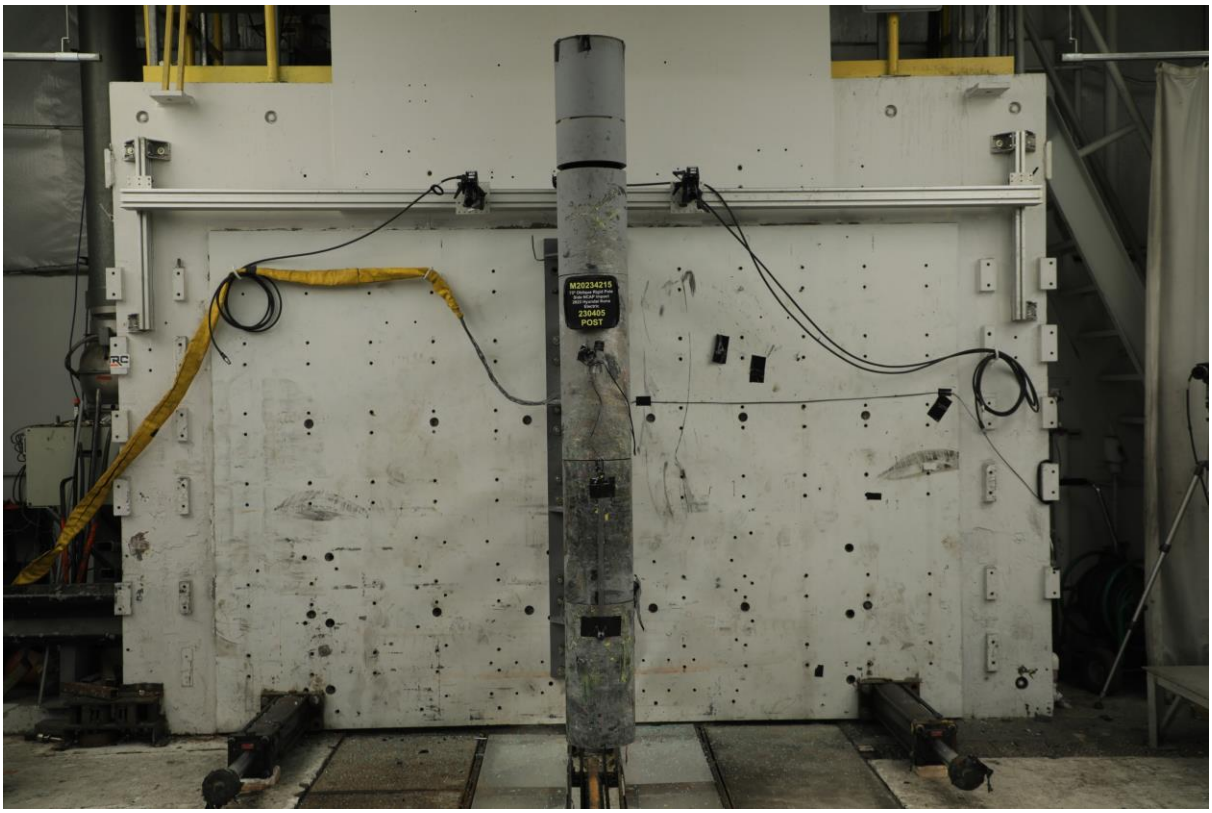
No. 056 Post-Test Charge Port View

No. 057 Close-Up View of Vehicle Certification Label

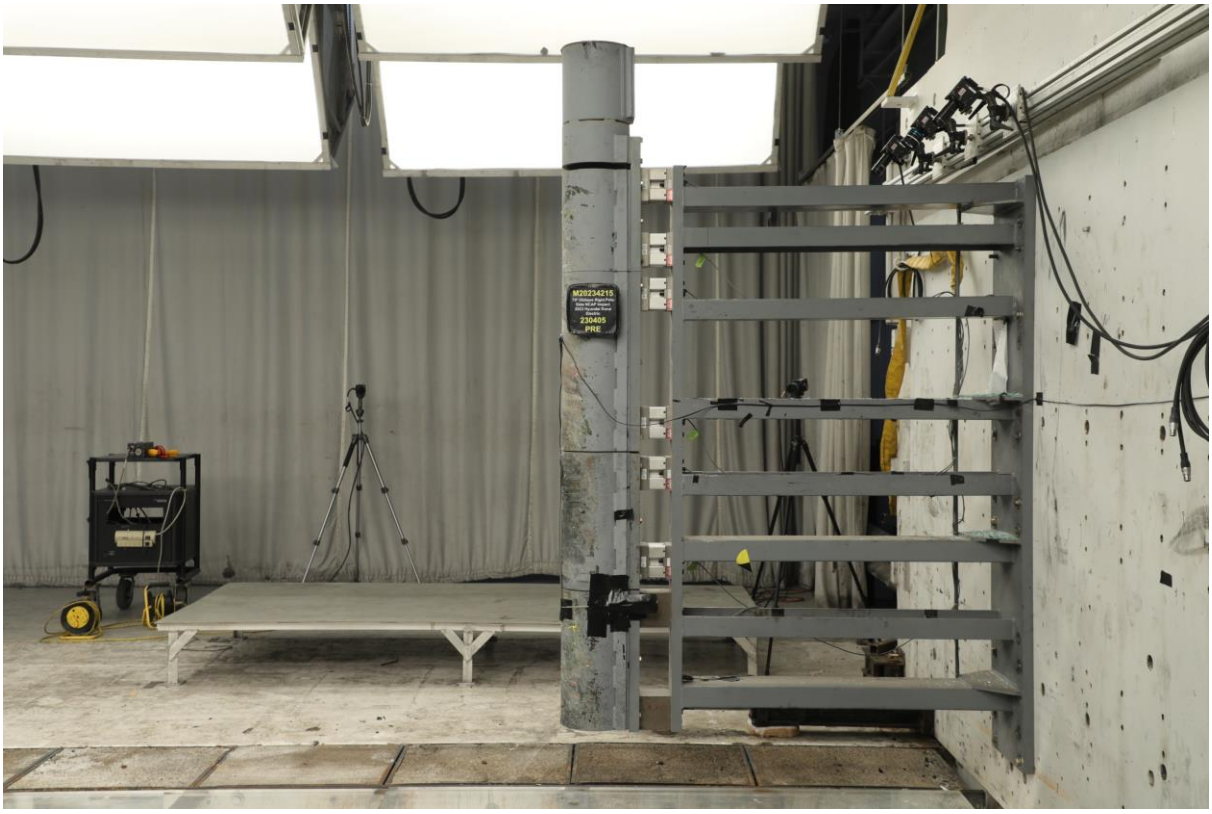
No. 058 Close-Up View of Vehicle Tire Information Placard or Label



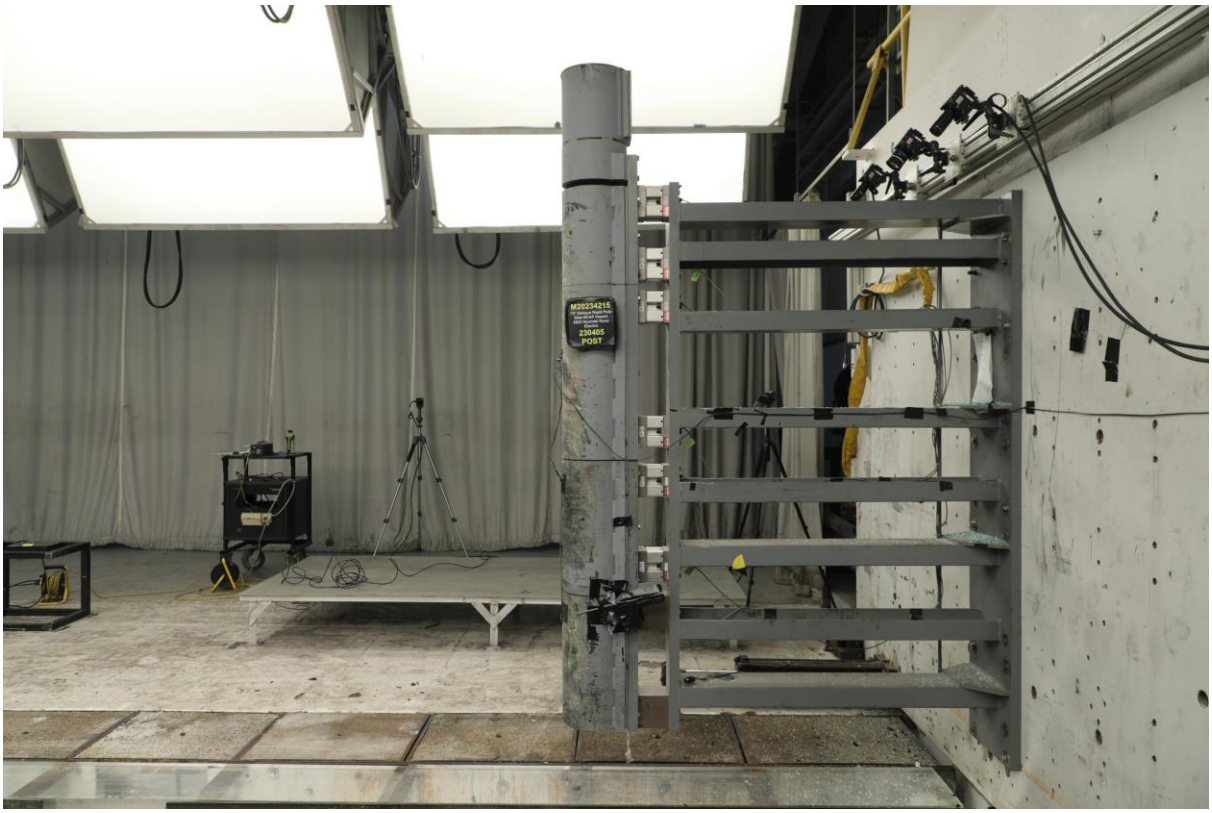
No. 059 Pre-Test Pole Barrier Front View



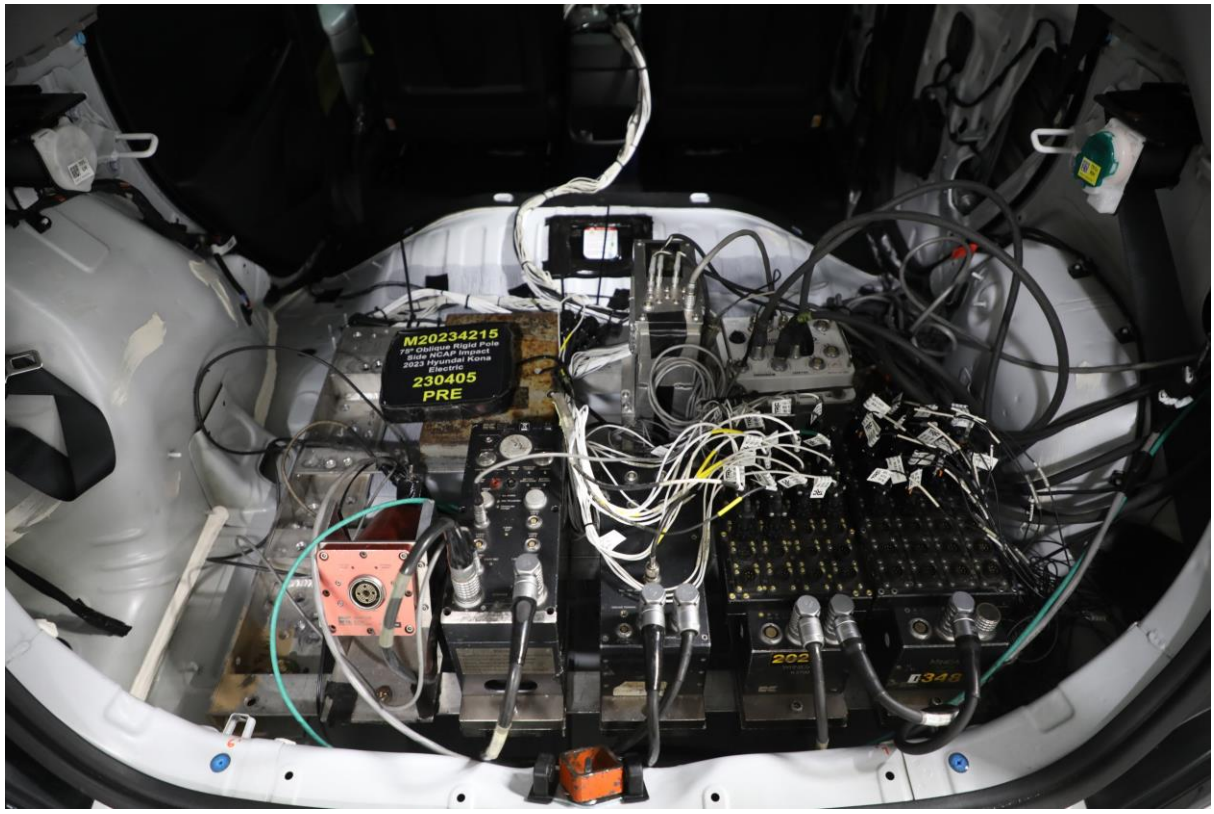
No. 060 Post-Test Pole Barrier Front View



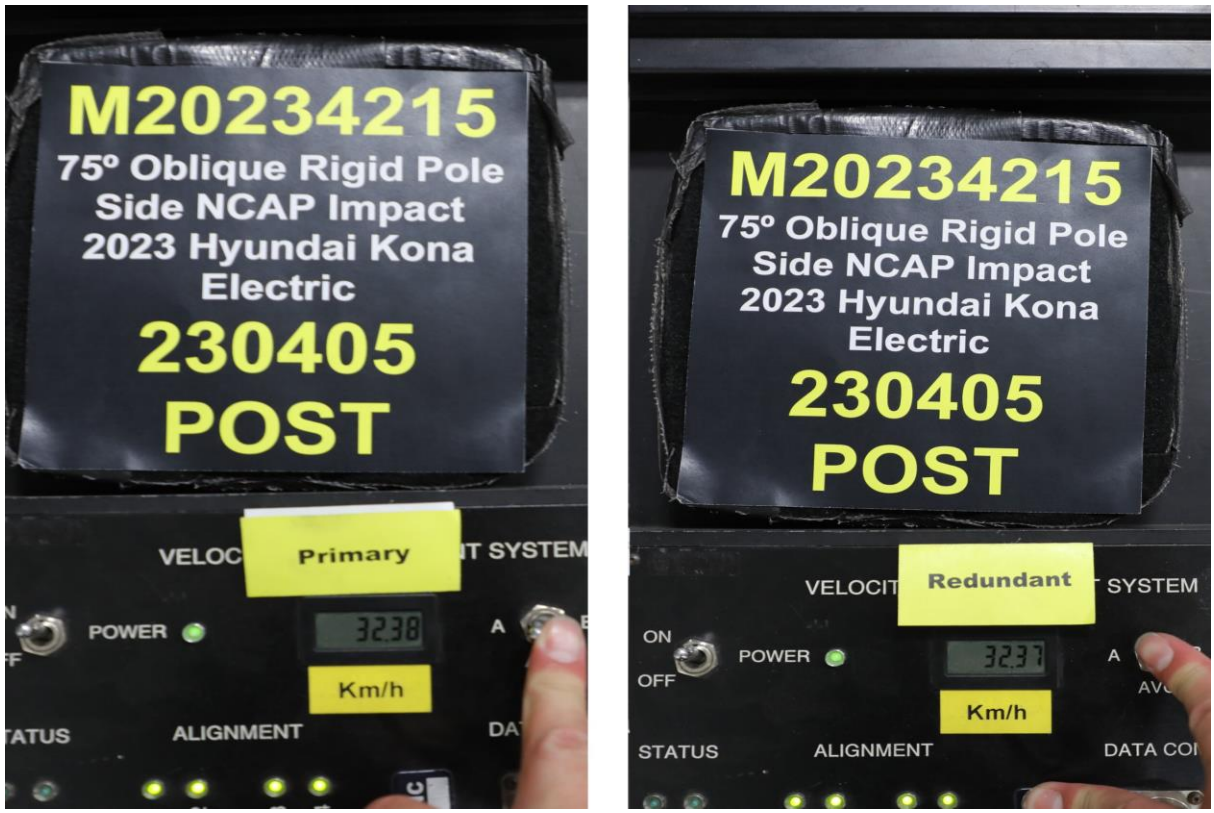
No. 061 Pre-Test Pole Barrier Side View



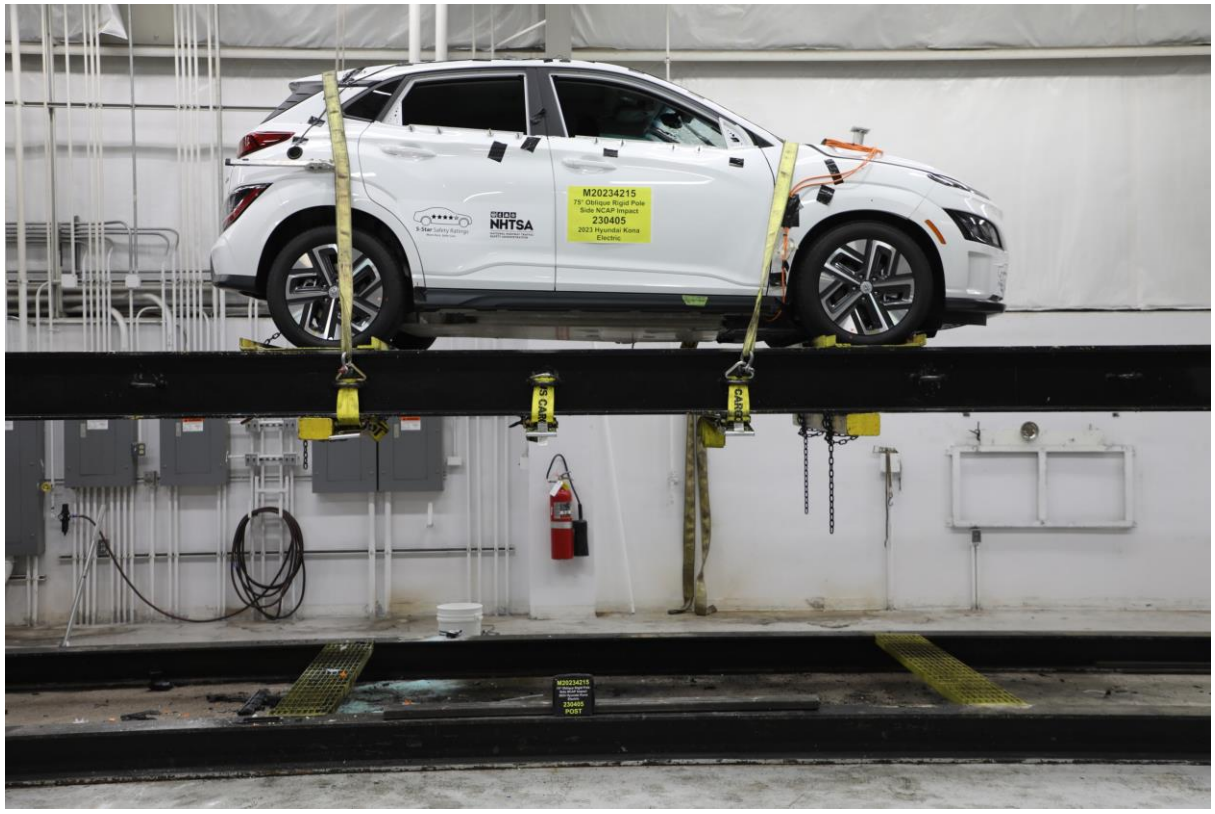
No. 062 Post-Test Pole Barrier Side View



No. 063 Pre-Test Ballast View

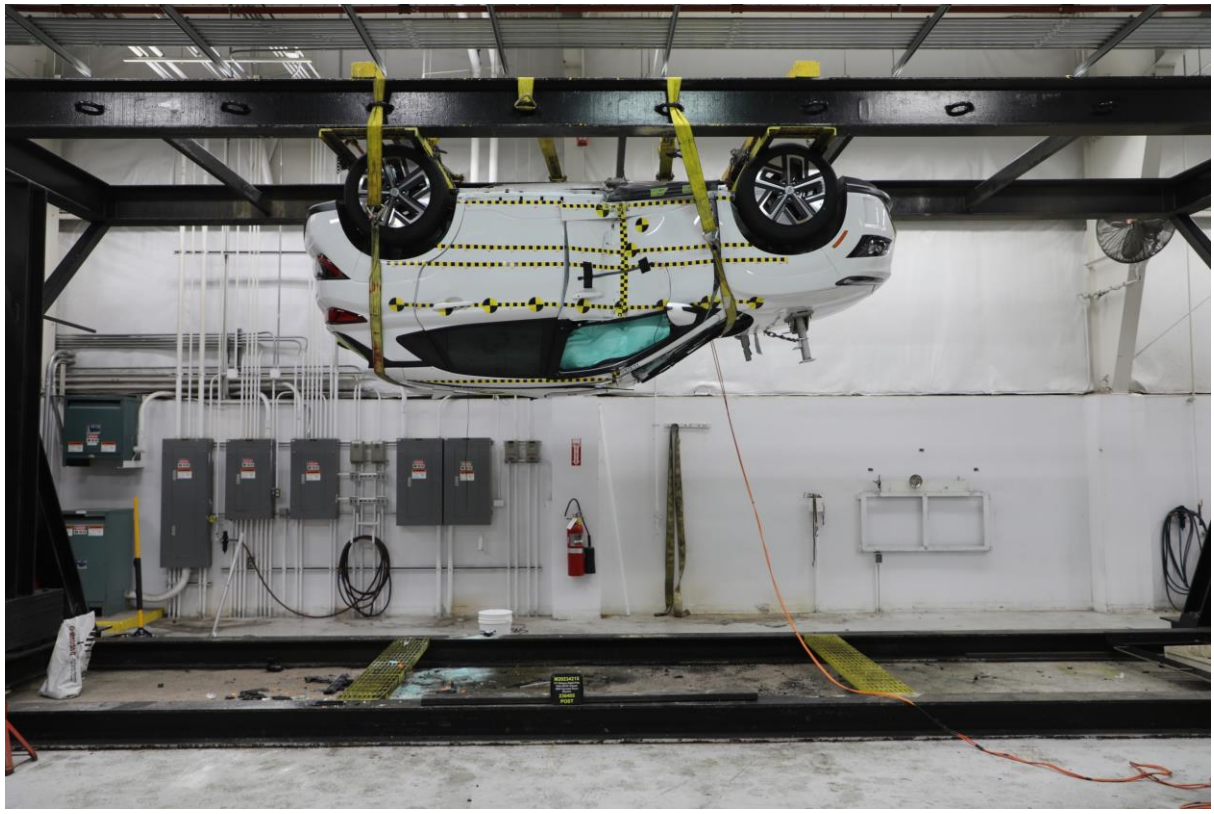


No. 064 Post-Test Primary and Redundant Speed Trap Read Out



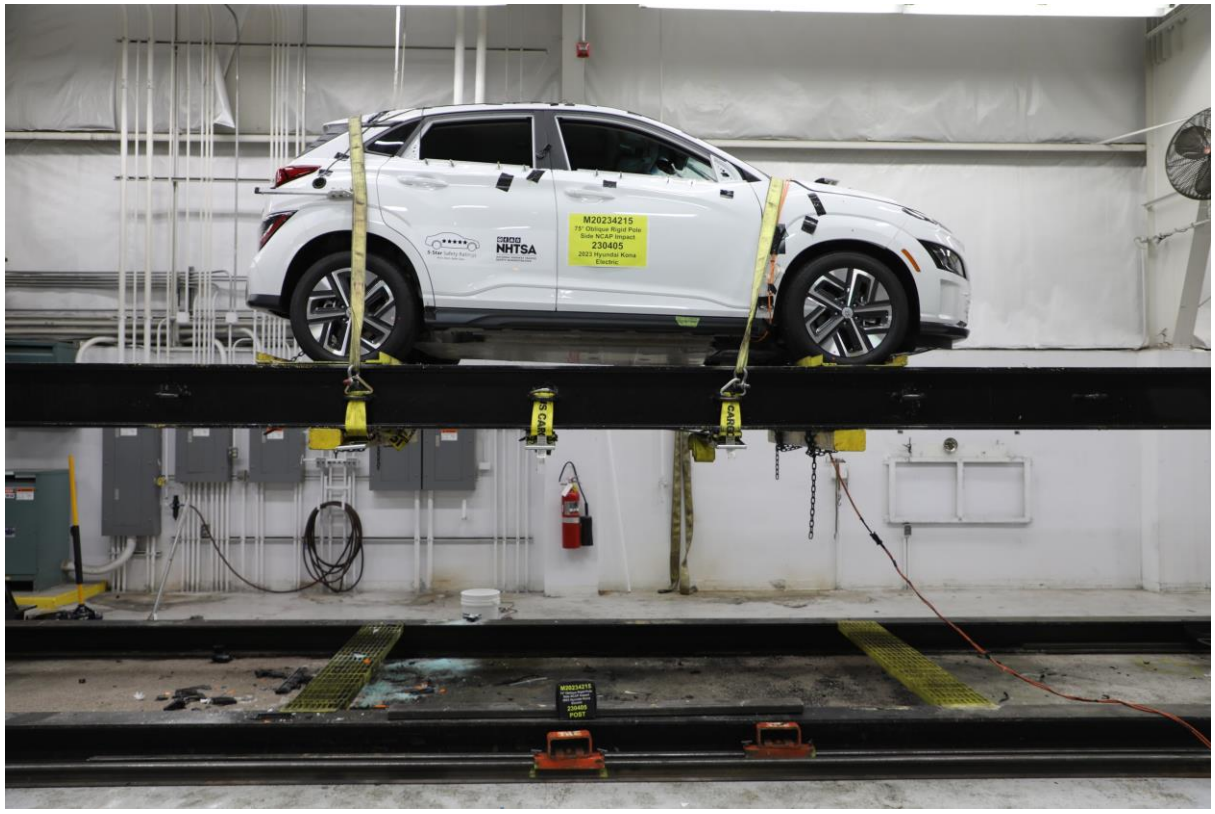
No. 065 FMVSS No. 301 Static Rollover 0 Degrees

No. 066 FMVSS No. 301 Static Rollover 90 Degrees



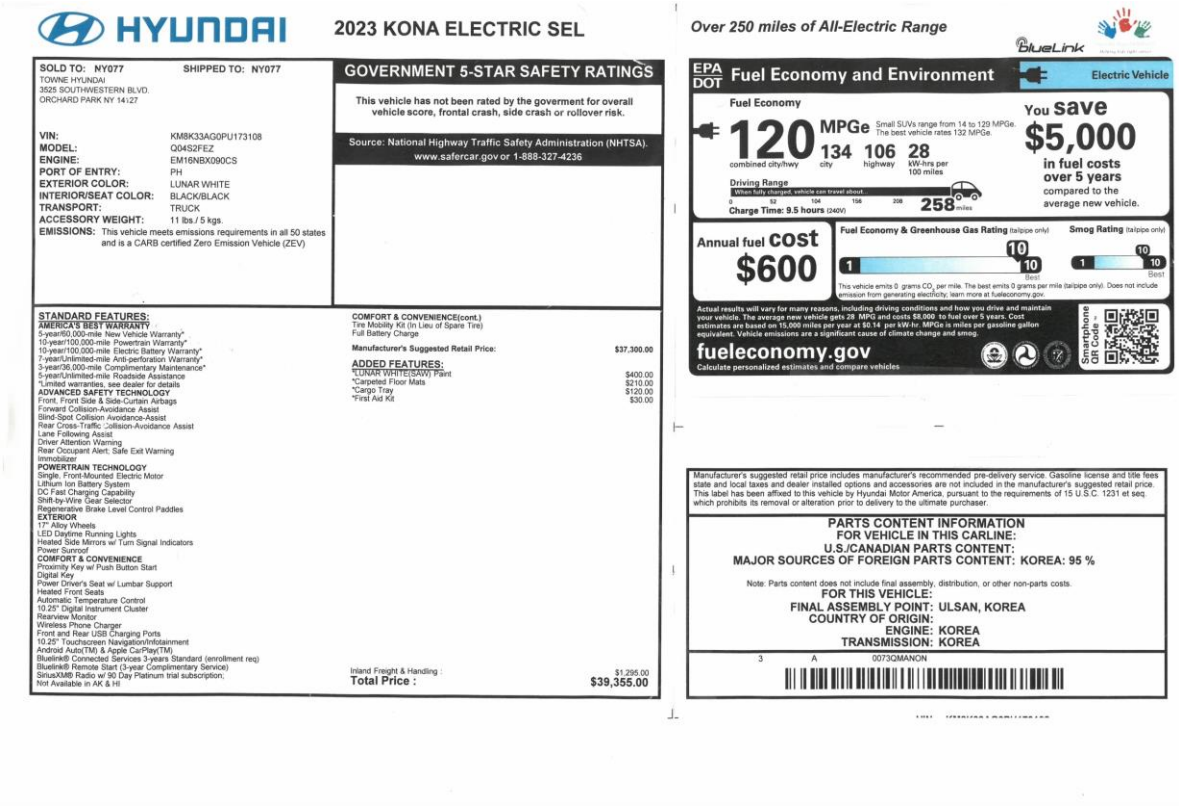
No. 067 FMVSS No. 301 Static Rollover 180 Degrees

No. 068 FMVSS No. 301 Static Rollover 270 Degrees



No. 069 FMVSS No. 301 Static Rollover 360 Degrees

No. 070 Impact Event



HYUNDAI

2023 KONA ELECTRIC SEL

SOLD TO: NY077
TOWNE HYUNDAI
3525 SOUTHWESTERN BLVD.
ORCHARD PARK NY 14127

SHIPPED TO: NY077

VIN: KM8K33AG0PU173108
MODEL: Q04S2FEZ
ENGINE: EM16NBX090CS
PORT OF ENTRY: PH
EXTERIOR COLOR: LUNAR WHITE
INTERIOR/SEAT COLOR: BLACK/BLACK
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 11 lbs./ 5 kgs.
EMISSIONS: This vehicle meets emissions requirements in all 50 states and is a CARB certified Zero Emission Vehicle (ZEV)

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the goverment for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA).
www.safercar.gov or 1-888-327-4236

STANDARD FEATURES:
AMERICA'S BEST WARRANTY
5-year/60,000-mile New Vehicle Warranty*
10-year/100,000-mile Powertrain Warranty*
10-year/100,000-mile Electric Battery Warranty*
7-year/Unlimited-mile Anti-perforation Warranty*
3-year/36,000-mile Complimentary Maintenance*
5-year/Unlimited-mile Roadside Assistance
*Limited warranties, see dealer for details
ADVANCED SAFETY TECHNOLOGY
Front, Front Side & Side-Curtain Airbags
Forward Collision-Avoidance Assist
Blind-Spot Collision Avoidance-Assist
Rear Cross-Traffic Collision-Avoidance Assist
Lane Following Assist
Driver Attention Warning
Rear Occupant Alert; Safe Exit Warning
Immobilizer
POWERTRAIN TECHNOLOGY
Single, Front-Mounted Electric Motor
Lithium Ion Battery System
DC Fast Charging Capability
Shift-by-Wire Gear Selector
Regenerative Brake Level Control Paddles
EXTERIOR
17" Alloy Wheels
LED Daytime Running Lights
Heated Side Mirrors w/ Turn Signal Indicators
Power Sunroof
COMFORT & CONVENIENCE
Proximity Key w/ Push Button Start
Digital Key
Power Driver's Seat w/ Lumbar Support
Heated Front Seats
Automatic Temperature Control
10.25" Digital Instrument Cluster
Rearview Monitor
Wireless Phone Charger
Front and Rear USB Charging Ports
10.25" Touchscreen Navigation/Infotainment
Android Auto(TM) & Apple CarPlay(TM)
Bluelink® Connected Services 3-years Standard (enrollment req)
Bluelink® Remote Start (3-year Complimentary Service)
SiriusXM® Radio w/ 90 Day Platinum trial subscription; Not Available in AK & HI

COMFORT & CONVENIENCE(cont.)
Tire Mobility Kit (In Lieu of Spare Tire)
Full Battery Charge

Manufacturer's Suggested Retail Price: $37,300.00

ADDED FEATURES:
*LUNAR WHITE(SAW) Paint $400.00
*Carpeted Floor Mats $210.00
*Cargo Tray $120.00
*First Aid Kit $30.00

Inland Freight & Handling: $1,295.00
Total Price: $39,355.00

Over 250 miles of All-Electric Range

BlueLink

EPA DOT Fuel Economy and Environment — Electric Vehicle

Fuel Economy
120 MPGe combined city/hwy (Small SUVs range from 14 to 129 MPGe. The best vehicle rates 132 MPGe.)
134 city
106 highway
28 kW-hrs per 100 miles

Driving Range
When fully charged, vehicle can travel about...
258 miles
Charge Time: 9.5 hours (240V)

You save $5,000 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $600

Fuel Economy & Greenhouse Gas Rating (tailpipe only) 1 10 Best
Smog Rating (tailpipe only) 1 10 Best

This vehicle emits 0 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Does not include emission from generating electricity; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $0.14 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone with QR Code

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline license and title fees state and local taxes and dealer installed options and accessories are not included in the manufacturer's suggested retail price. This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements of 15 U.S.C. 1231 et seq. which prohibits its removal or alteration prior to delivery to the ultimate purchaser.

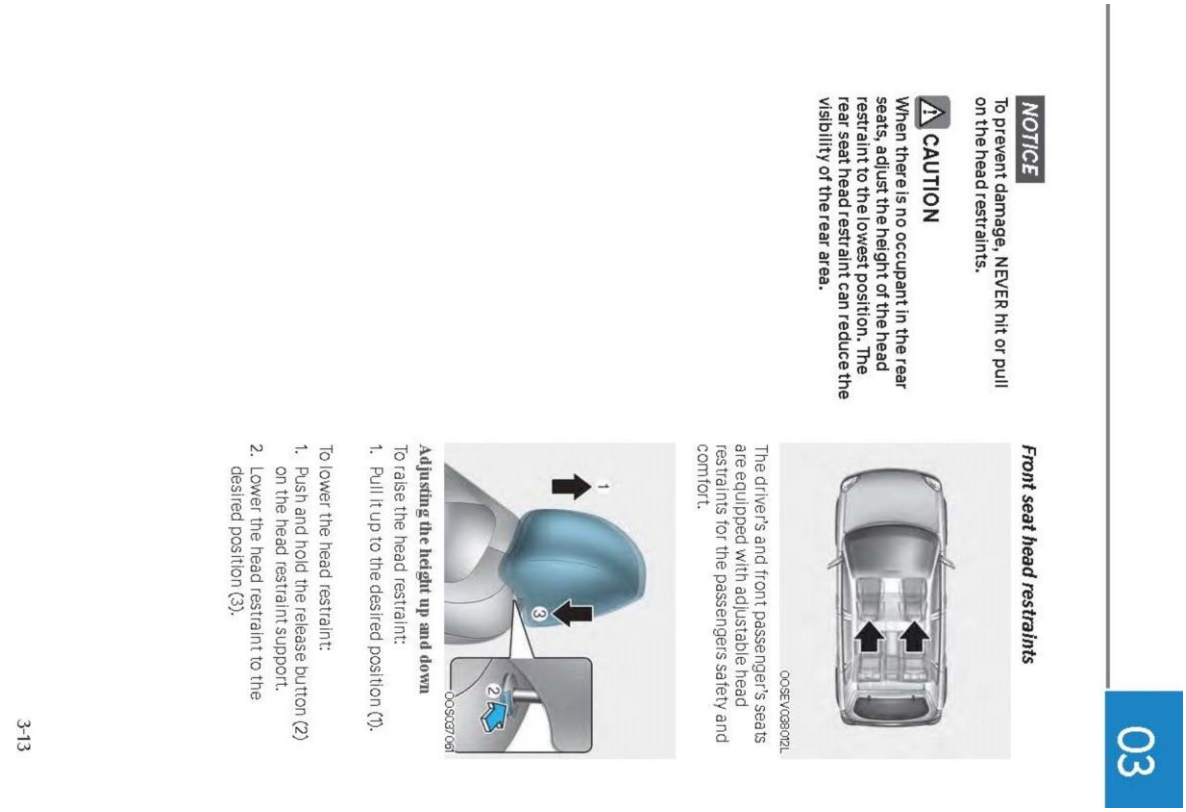
PARTS CONTENT INFORMATION
FOR VEHICLE IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT:
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 95 %

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: ULSAN, KOREA
COUNTRY OF ORIGIN:
ENGINE: KOREA
TRANSMISSION: KOREA

3 A 0073QMANON

No. 071 Monroney Label



NOTICE

To prevent damage, NEVER hit or pull on the head restraints.

CAUTION

When there is no occupant in the rear seats, adjust the height of the head restraint to the lowest position. The rear seat head restraint can reduce the visibility of the rear area.

Front seat head restraints

The driver's and front passenger's seats are equipped with adjustable head restraints for the passengers safety and comfort.

OOSCV080702L

Adjusting the height up and down

To raise the head restraint:

1. Pull it up to the desired position (1).

To lower the head restraint:

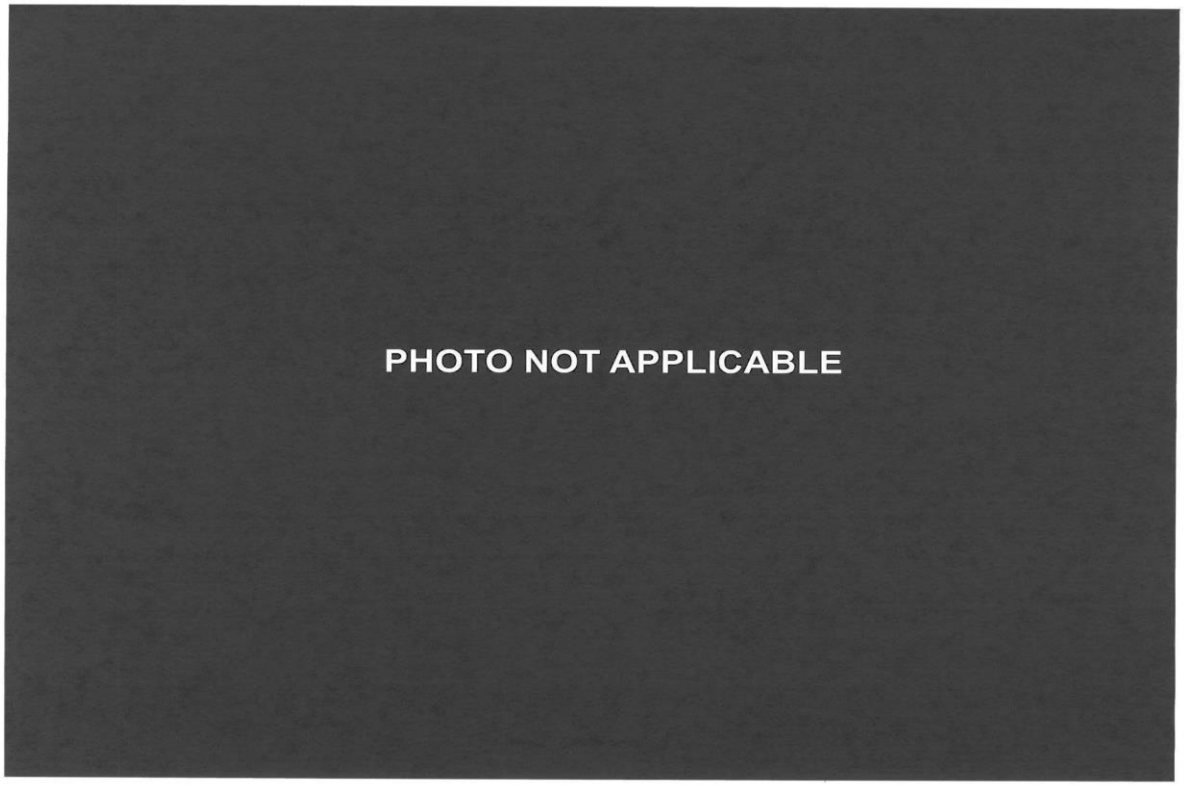
1. Push and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

OOSCJ070

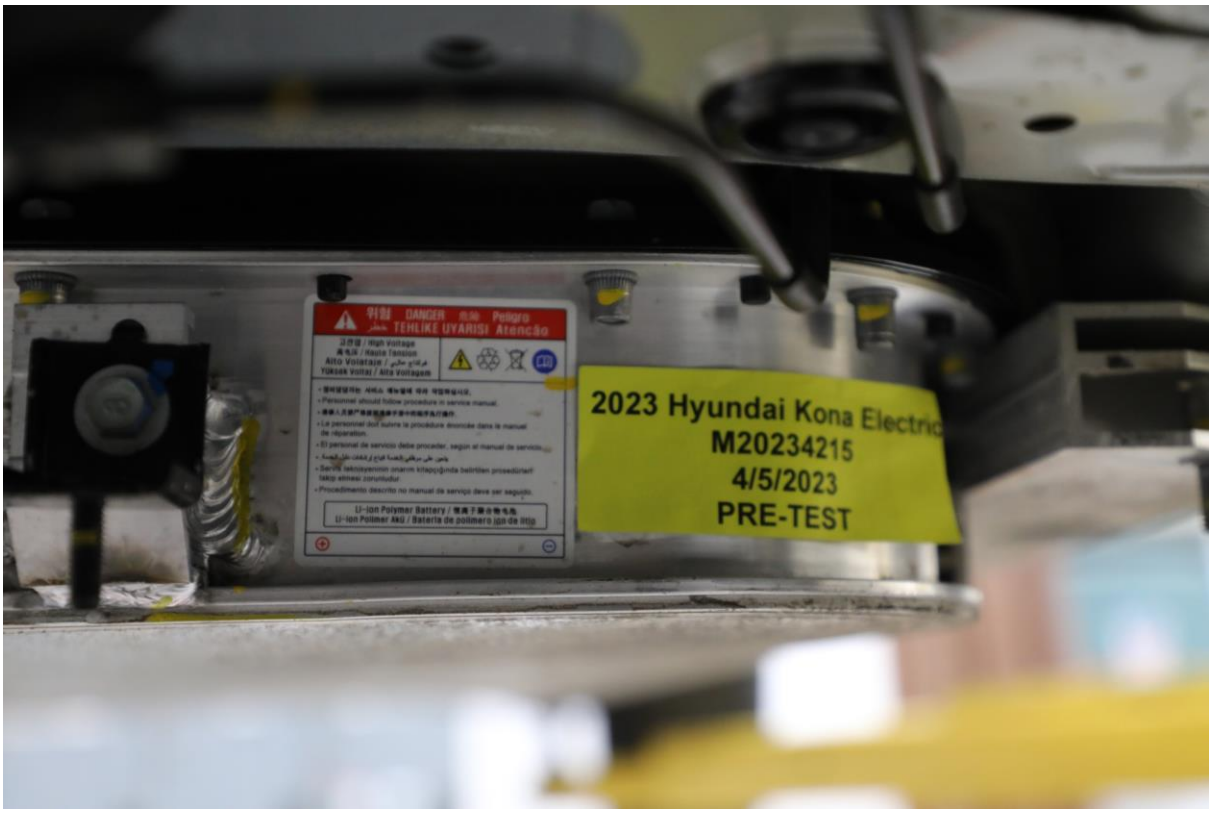
3-13

03

No. 072 Head Restraint Use and Adjustment Information from Vehicle Owner Manual



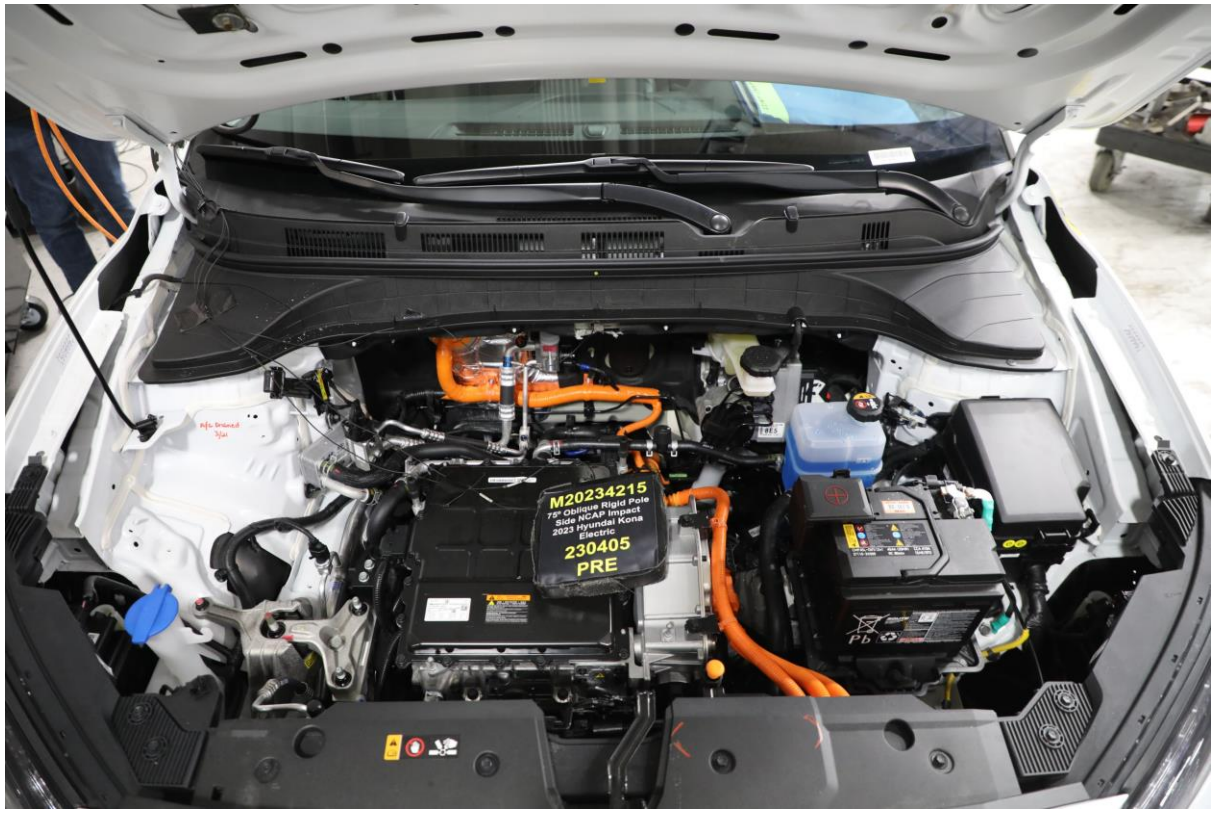
No. 073 Post-Test View of Shattered Vehicle Inner Door Panel



305-01 Auxiliary Power Module Warning Label

305-02 Power Inverter Warning Label

305-03 First Responder Warning Label



305-04 First Responder Warning Location

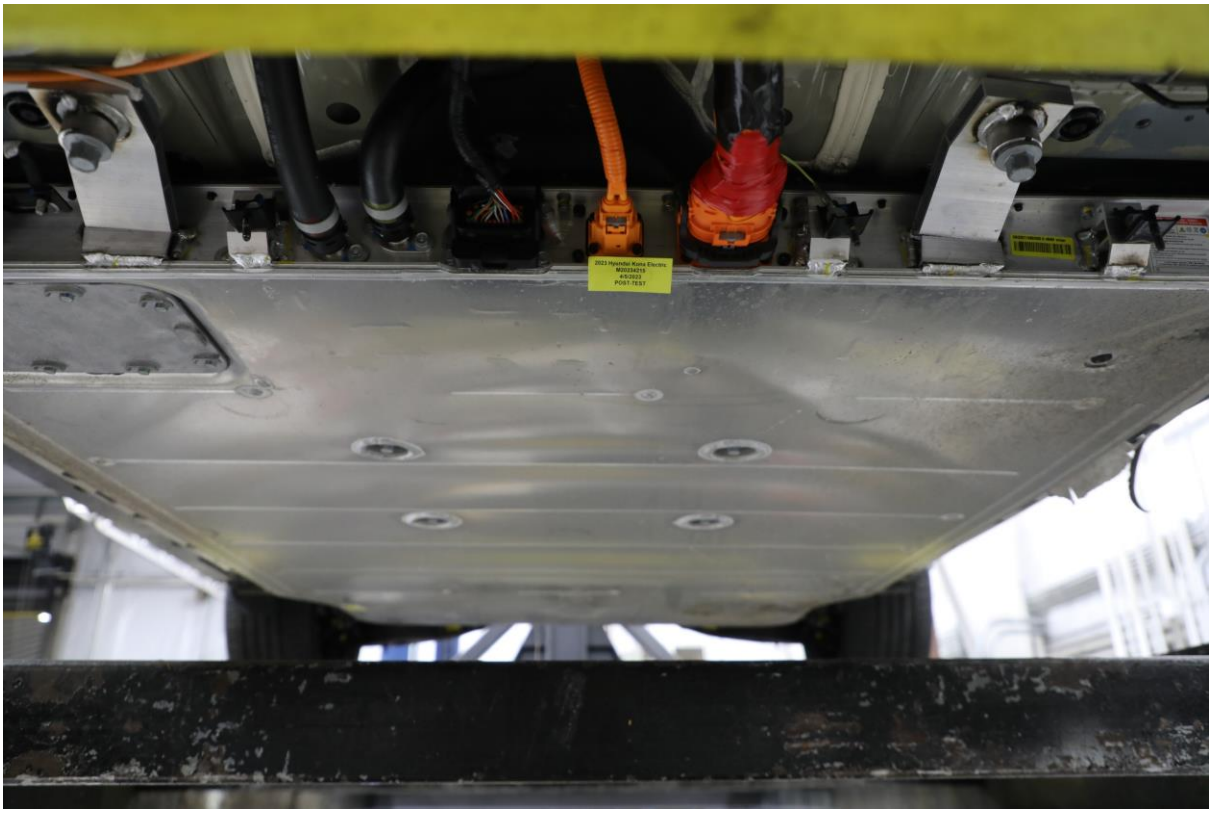
305-05 Other Vehicle Label(s) Related to Electrical Propulsion System

305-06 Manual High Voltage Service Disconnect in Place

305-07 Manual High Voltage Service Disconnect Removed

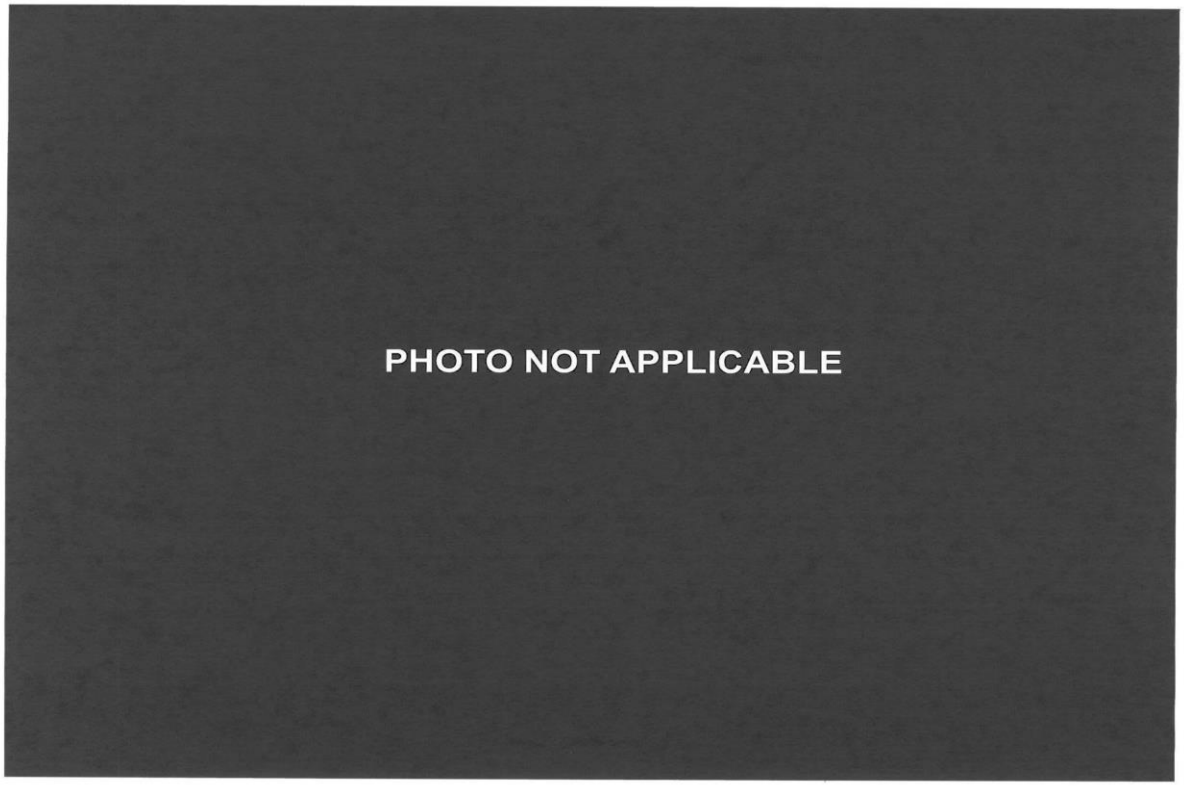
305-08 Manual High Voltage Service Disconnect Removed

305-09 Pre-Impact View of Propulsion Battery



305-10 Post-Impact Front View of Propulsion Battery

305-11 Post-Impact Rear View of Propulsion Battery

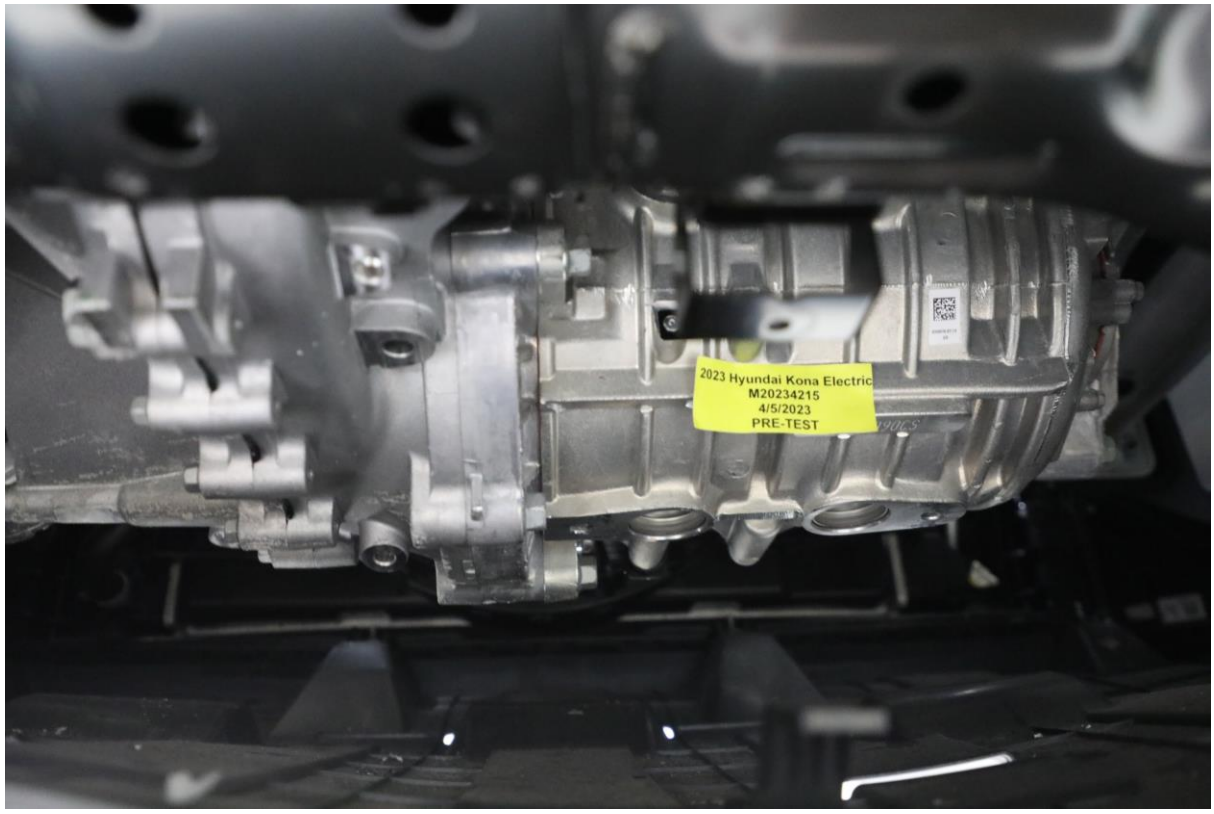


305-12 Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

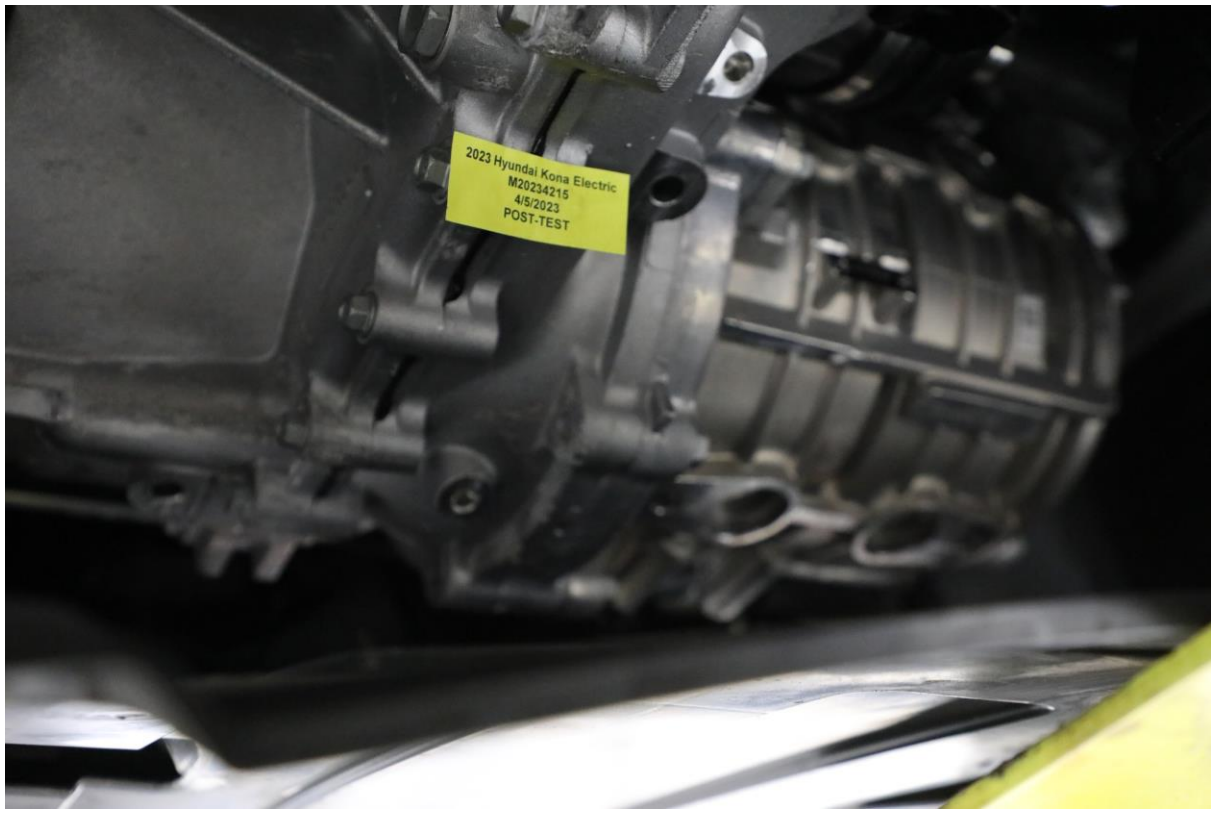
305-13 Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

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

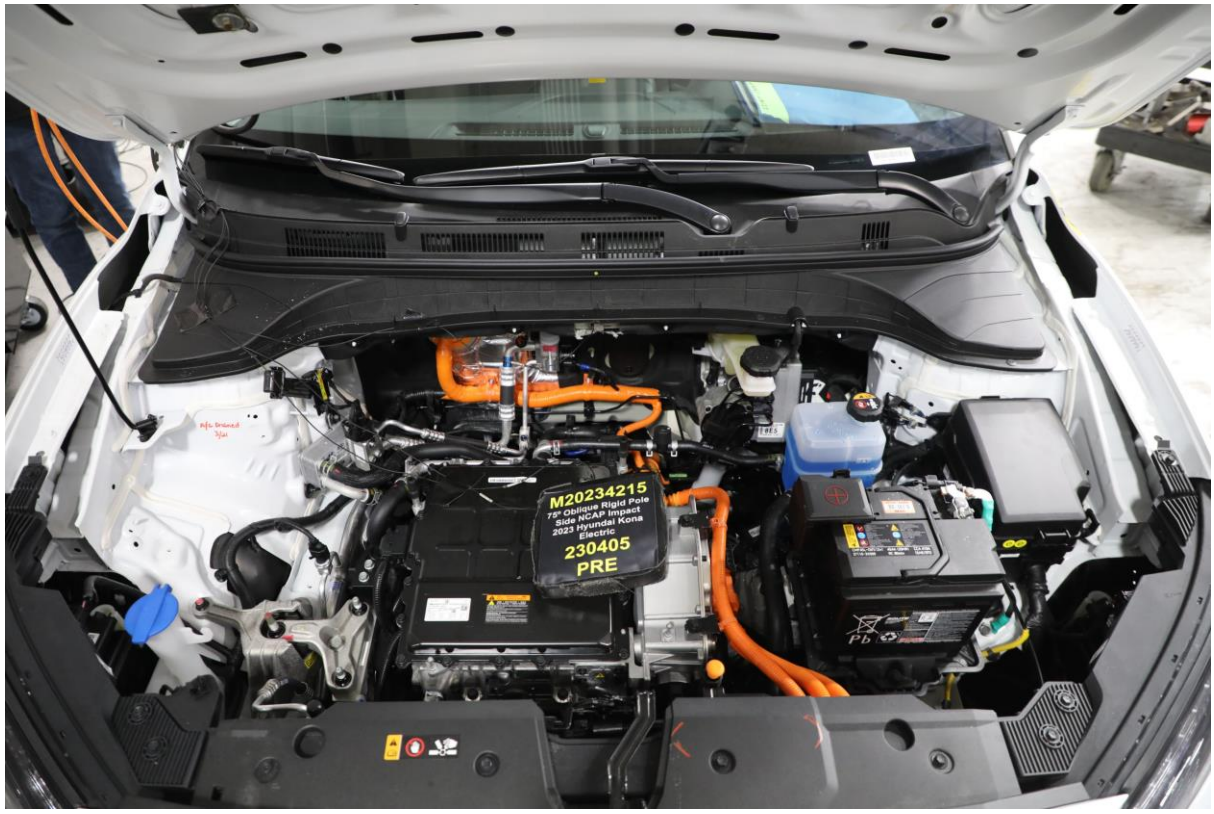
305-15 Post-Impact View of Propulsion Battery Module(s)



305-16 Pre-Impact View of Electric Propulsion Drive

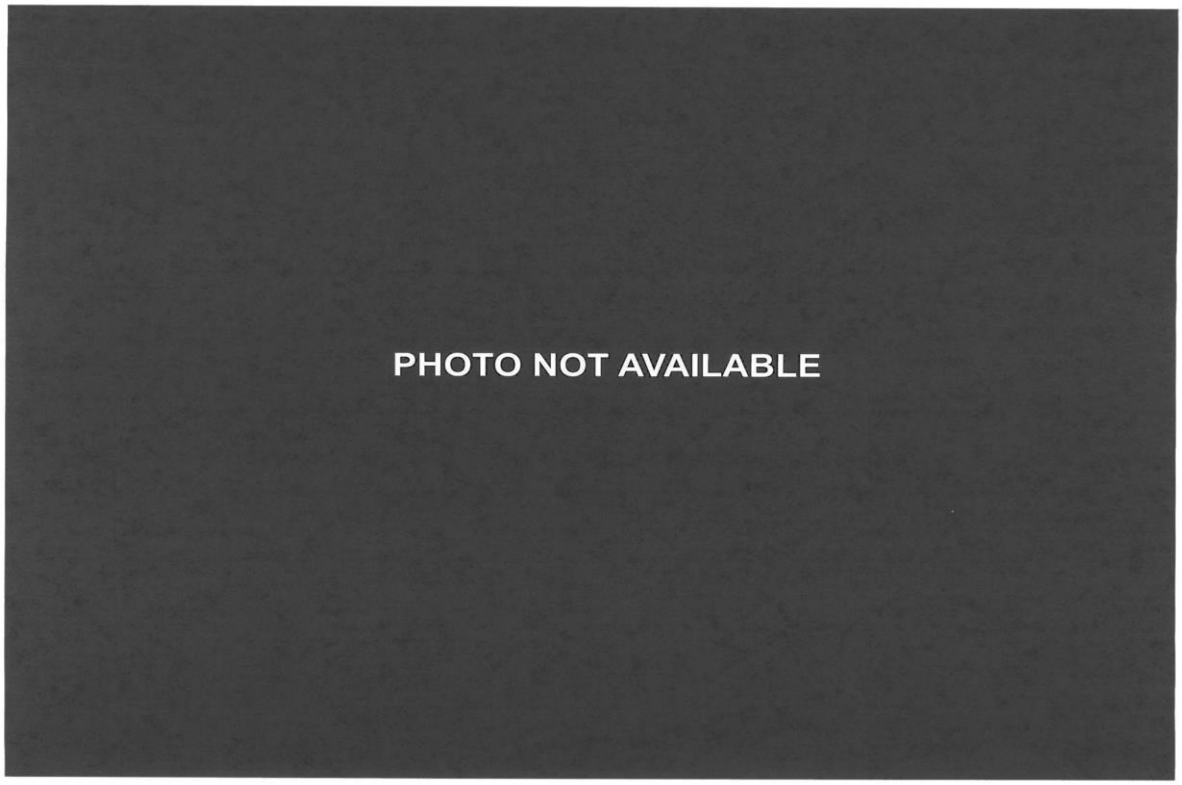


305-17 Post-Impact View of Electric Propulsion Drive



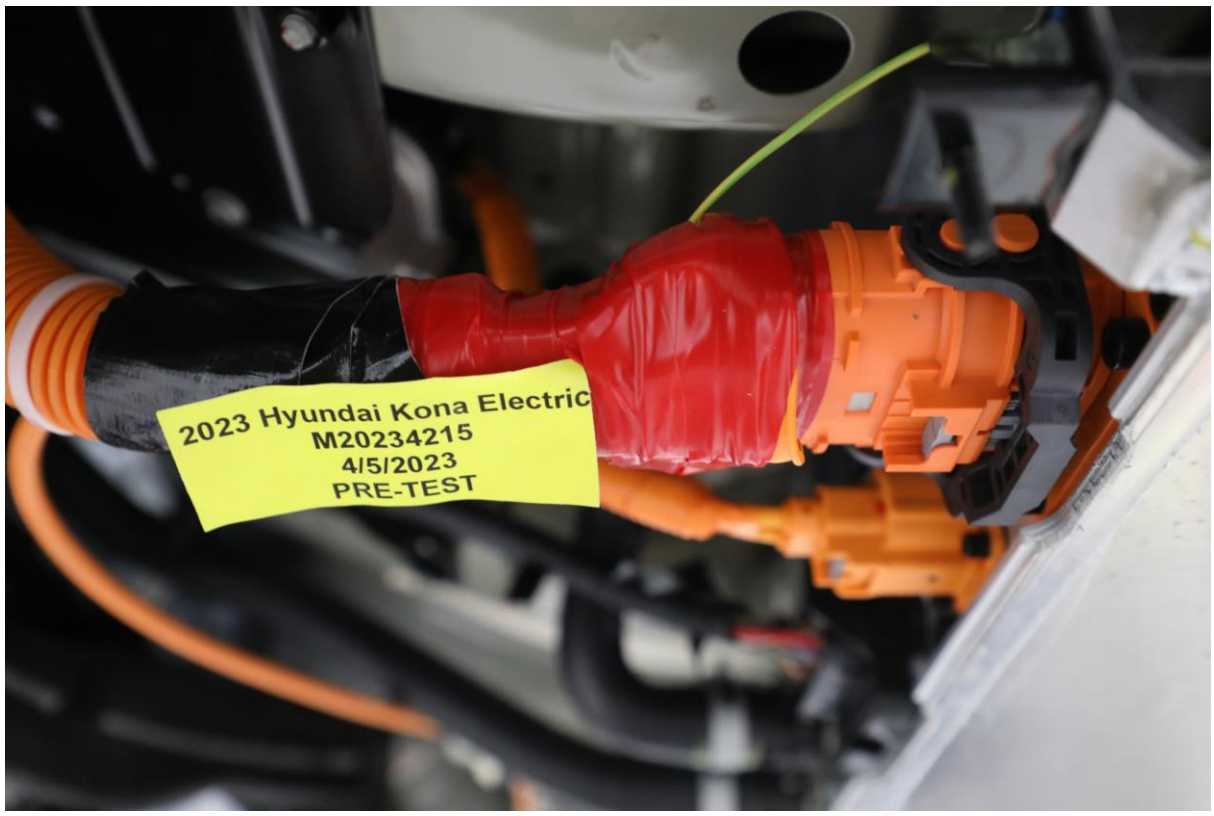
305-18 Pre-Impact View of High Voltage Interconnect(s)

305-19 Pre-Impact View Propulsion Battery Venting System(s)

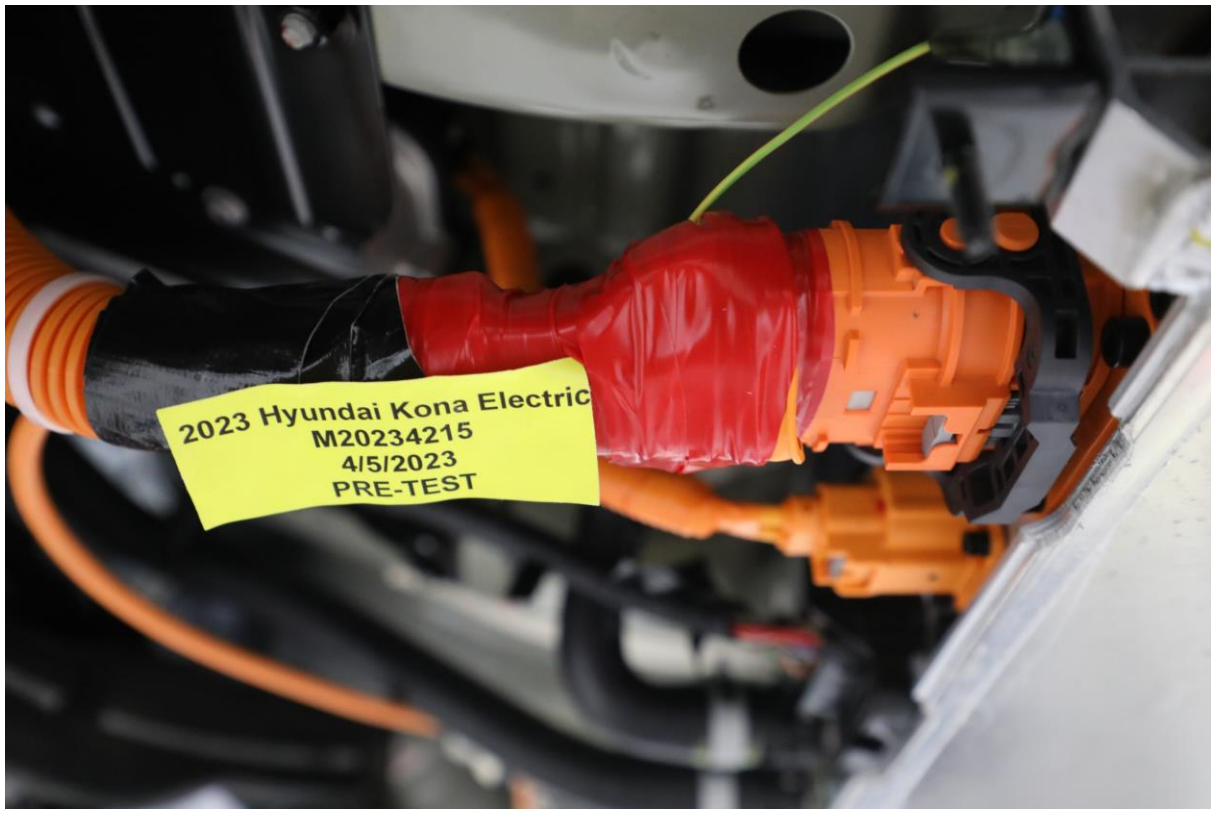


305-20 Pre-Impact View of Other Visible Electric Propulsion Components

305-21 Pre-Impact View of Ground Lead Attached



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

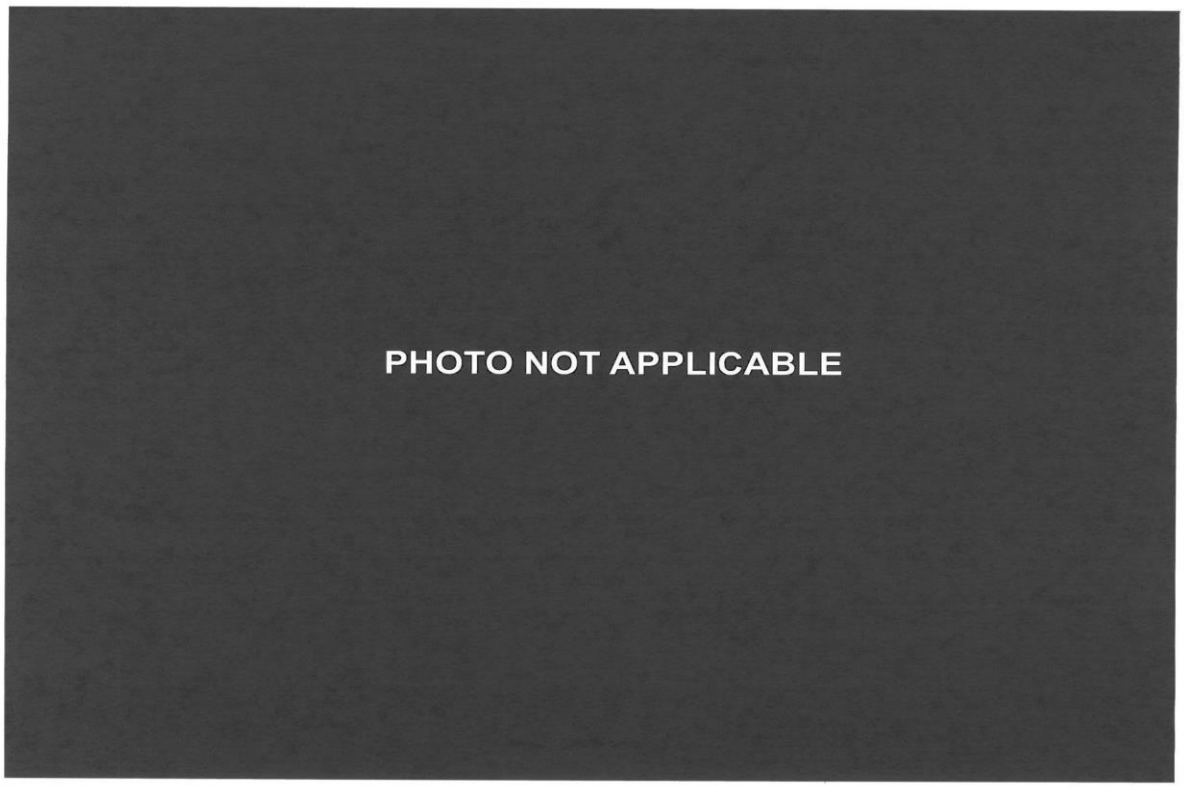


305-23 Pre-Impact Close-Up View of High Voltage Leads Attached

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

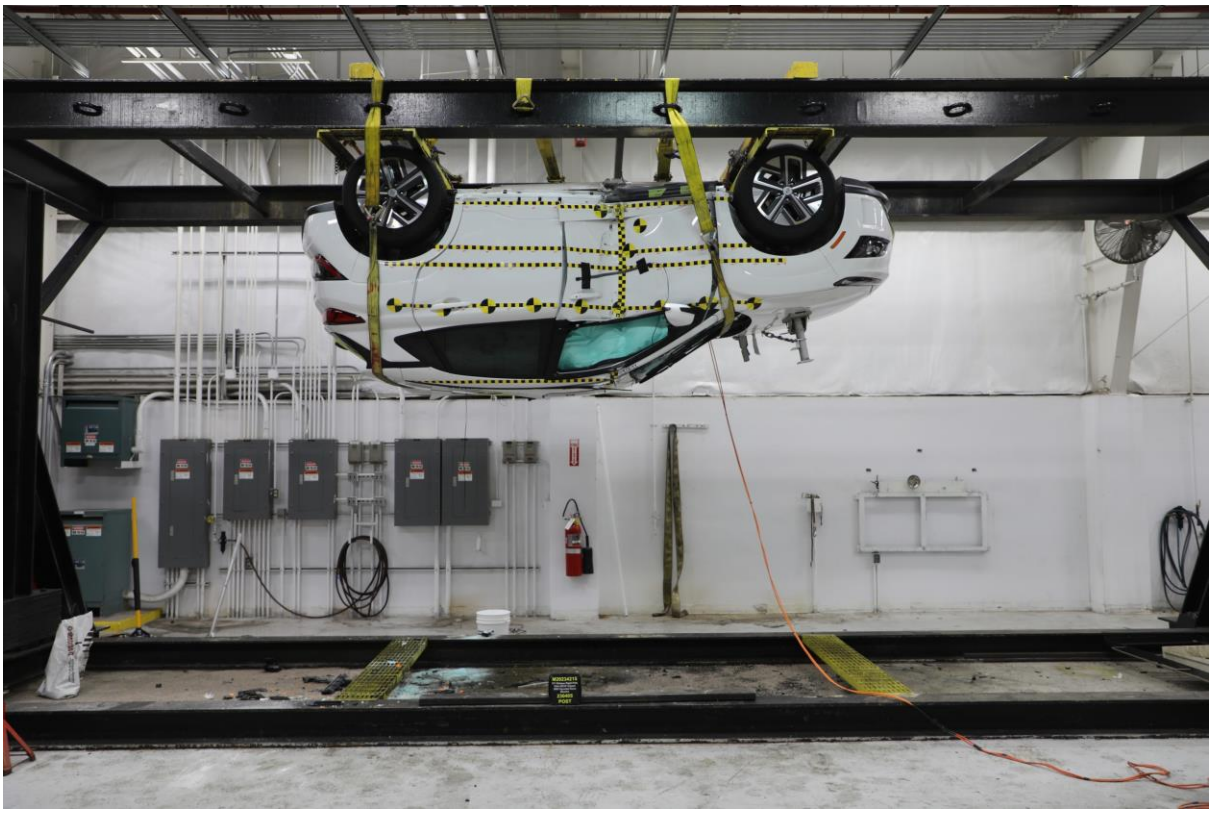
305-25 Post-Impact View of Installed Test Interface Port

305-26 Pre-Impact View of Other Test Devices

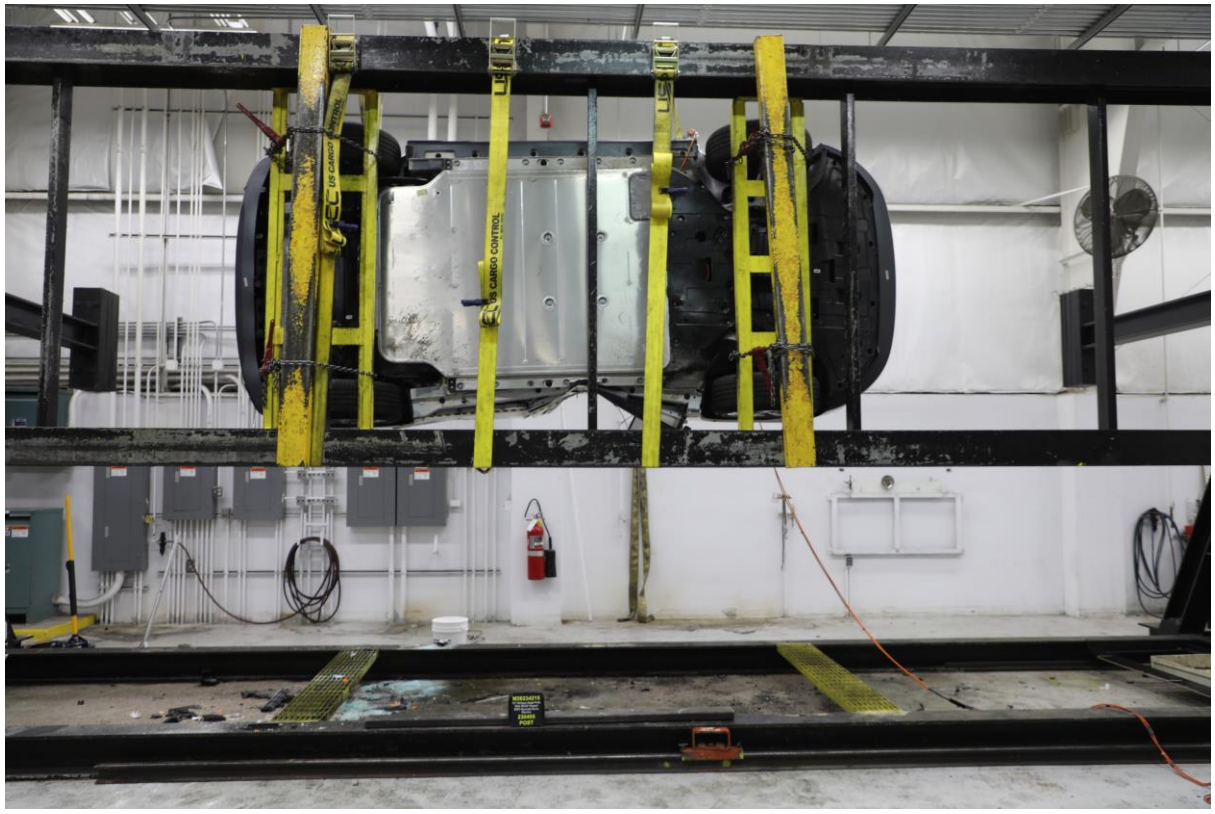


305-27 Post-Impact View of Other Test Devices

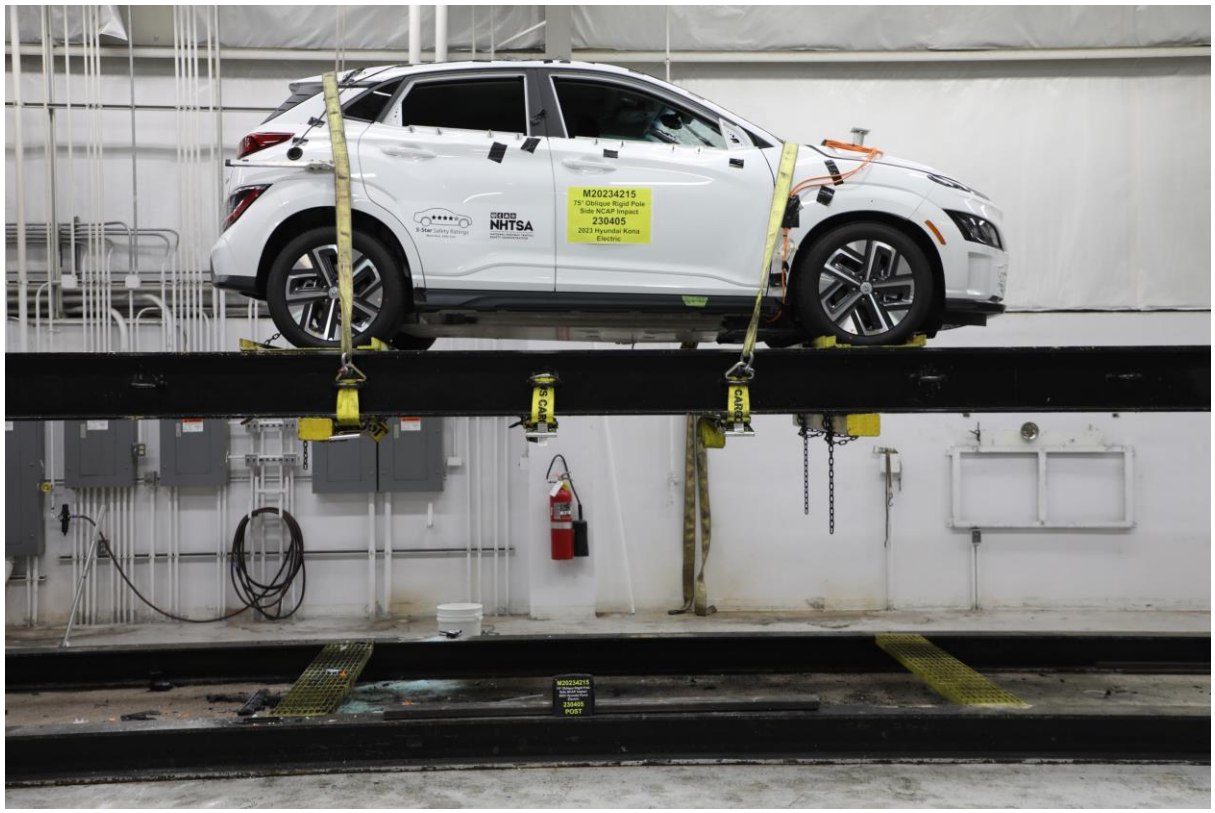
305-28 FMVSS No. 305 Static Rollover at 90°



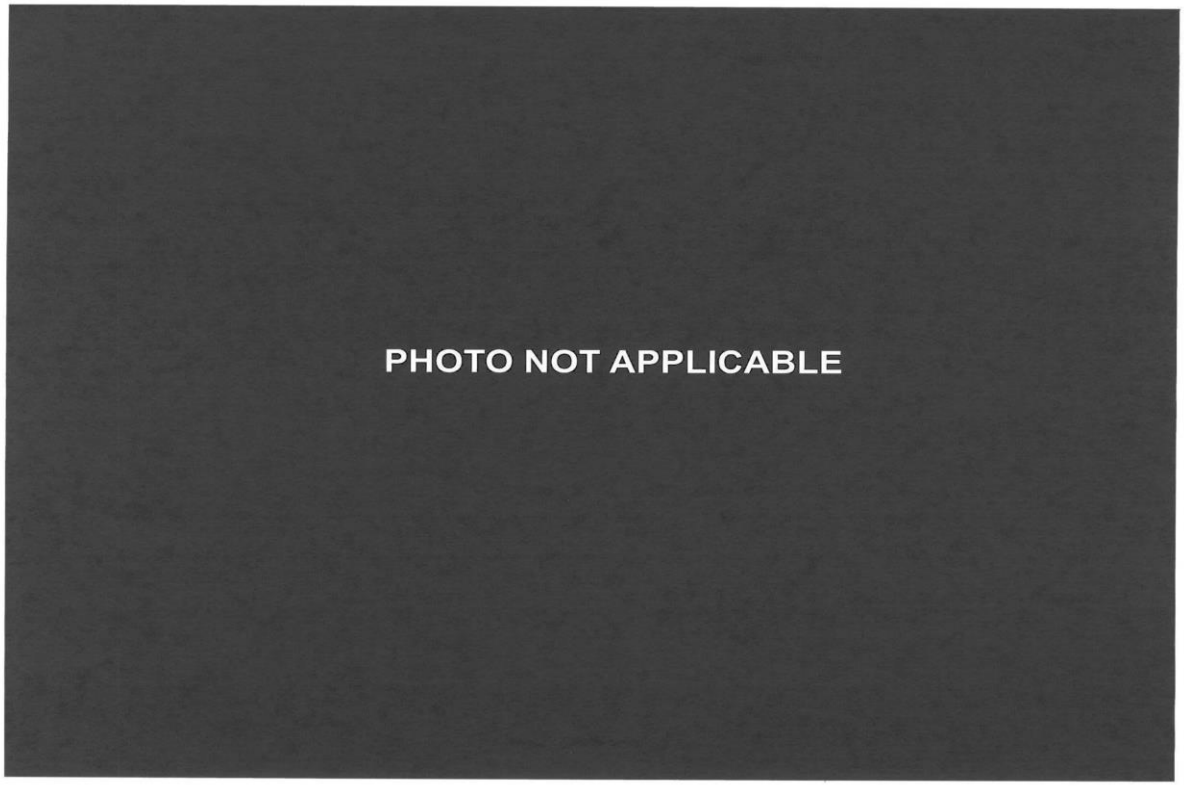
305-29 FMVSS No. 305 Static Rollover at 180°



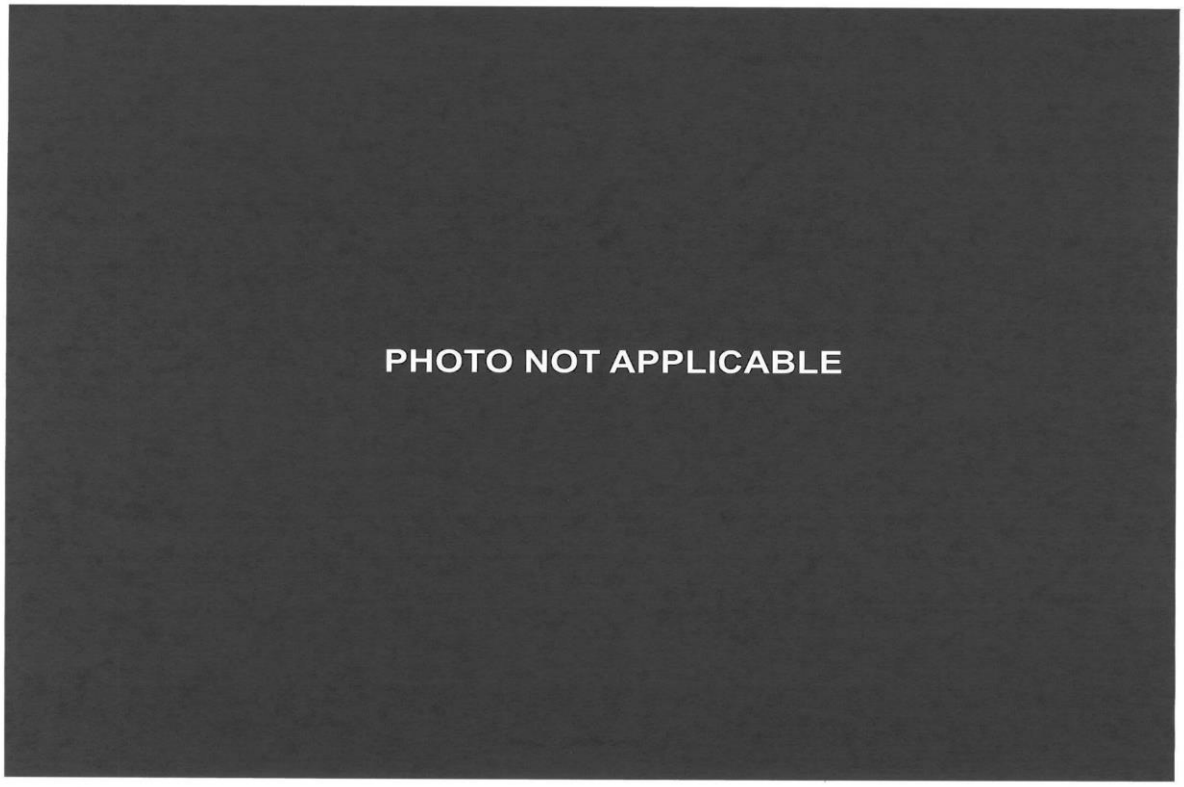
305-30 FMVSS No. 305 Static Rollover at 270°



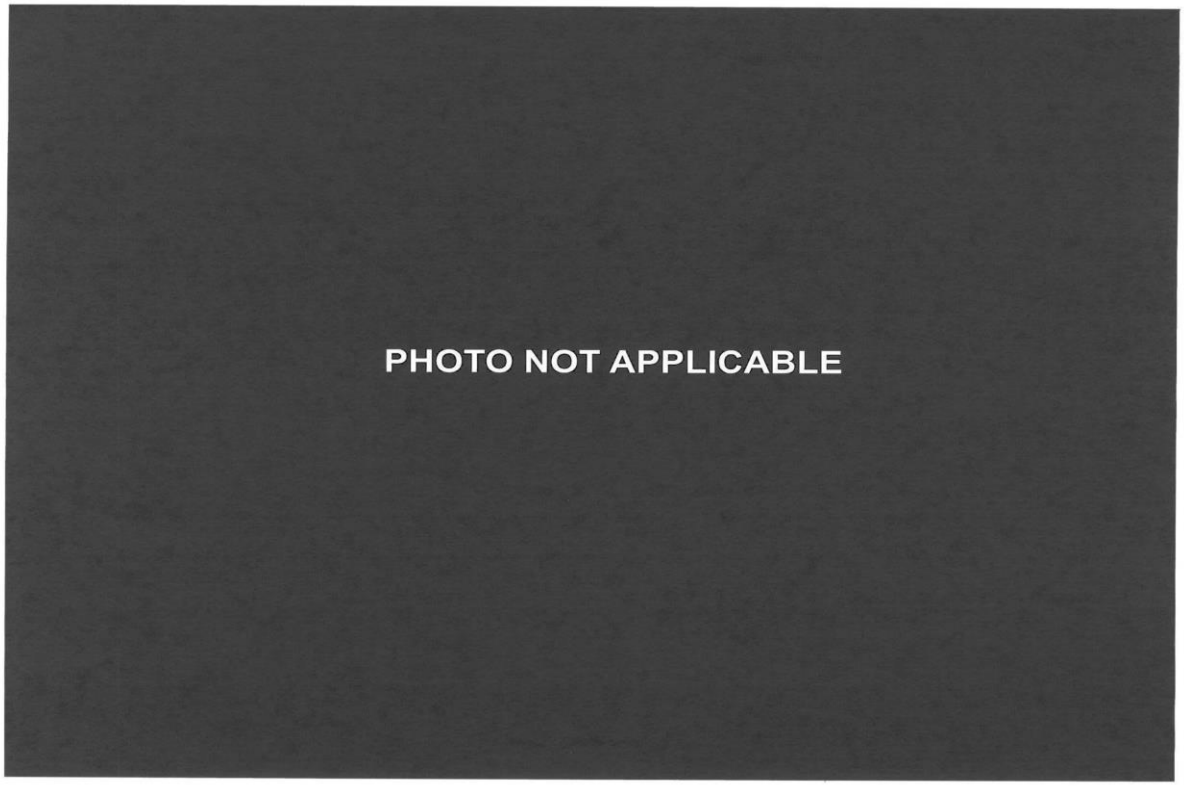
305-31 FMVSS No. 305 Static Rollover at 360°



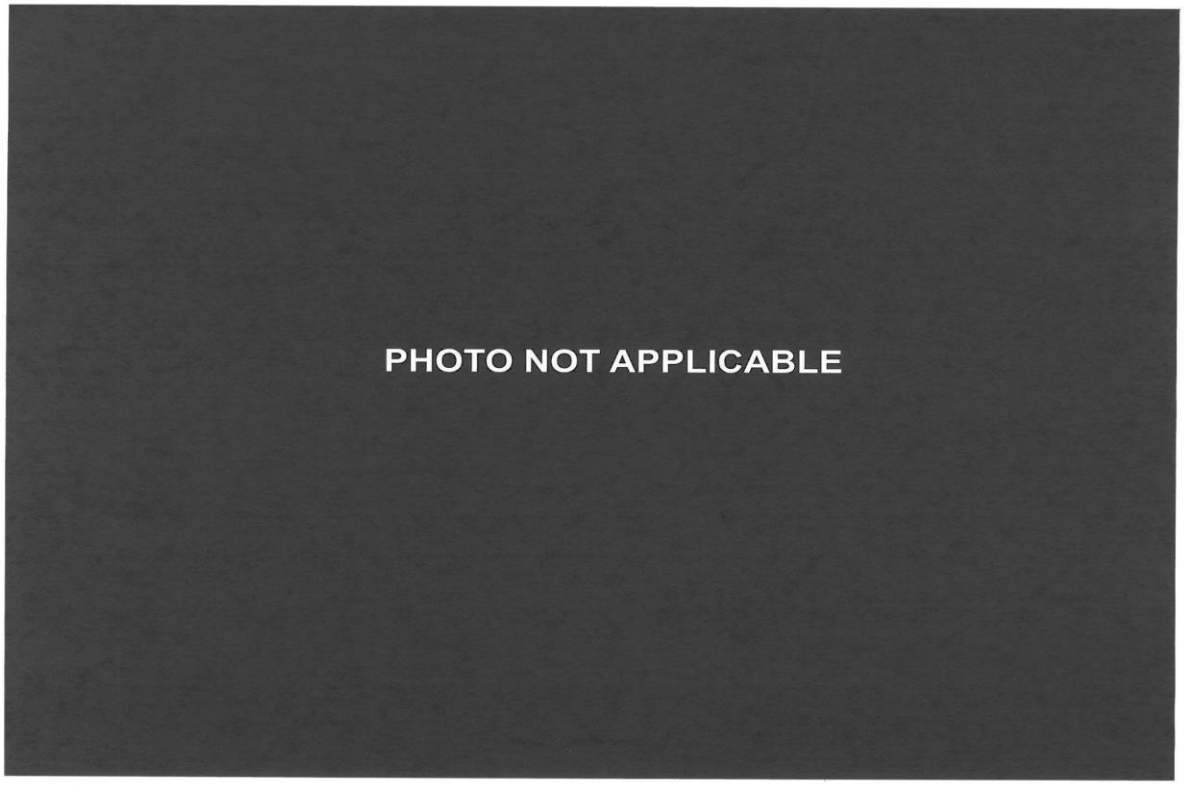
305-32 Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



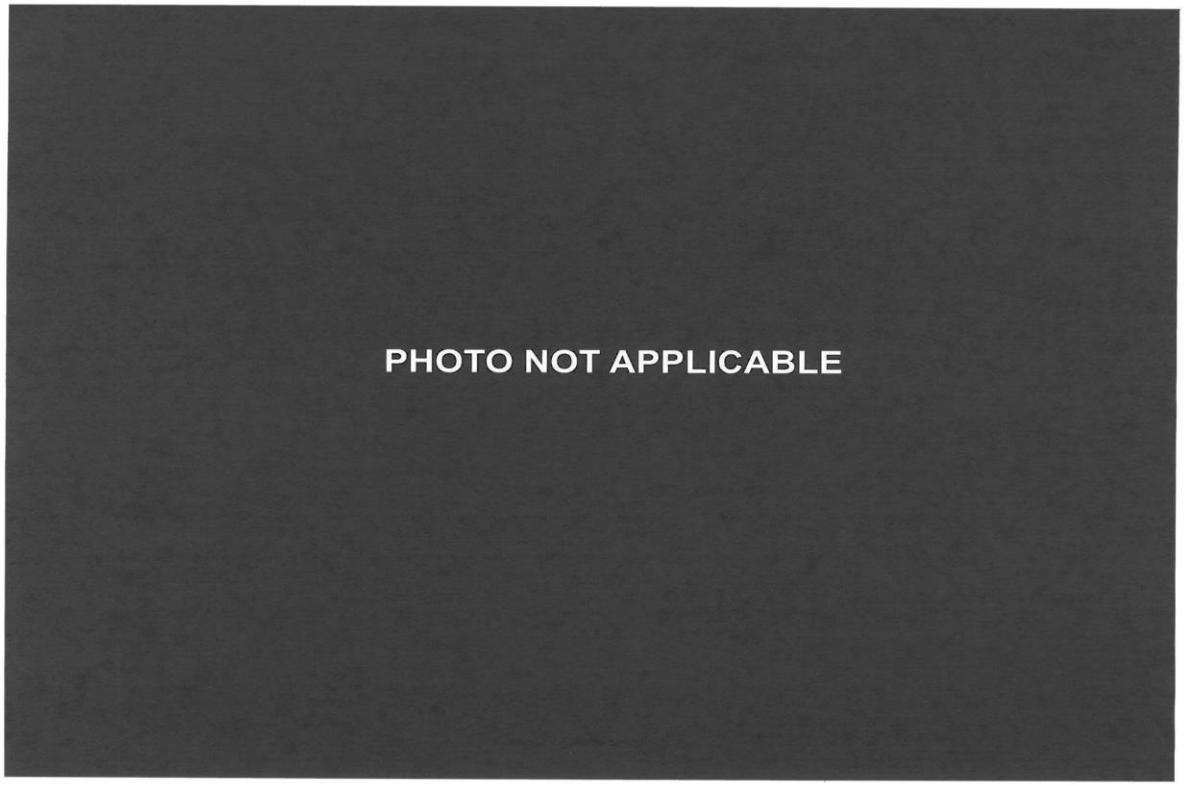
305-33 Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



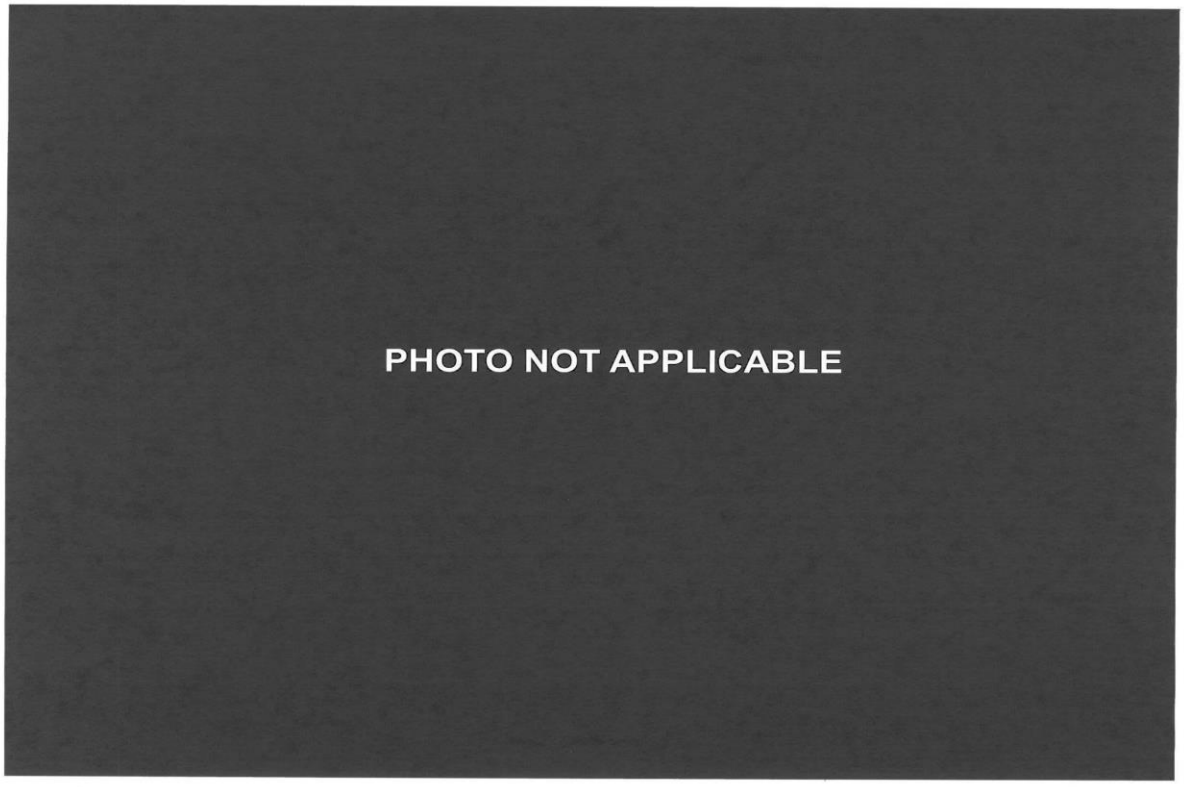
305-34 Post-Impact Propulsion Battery System Mounting and or Intrusion Failure(s)



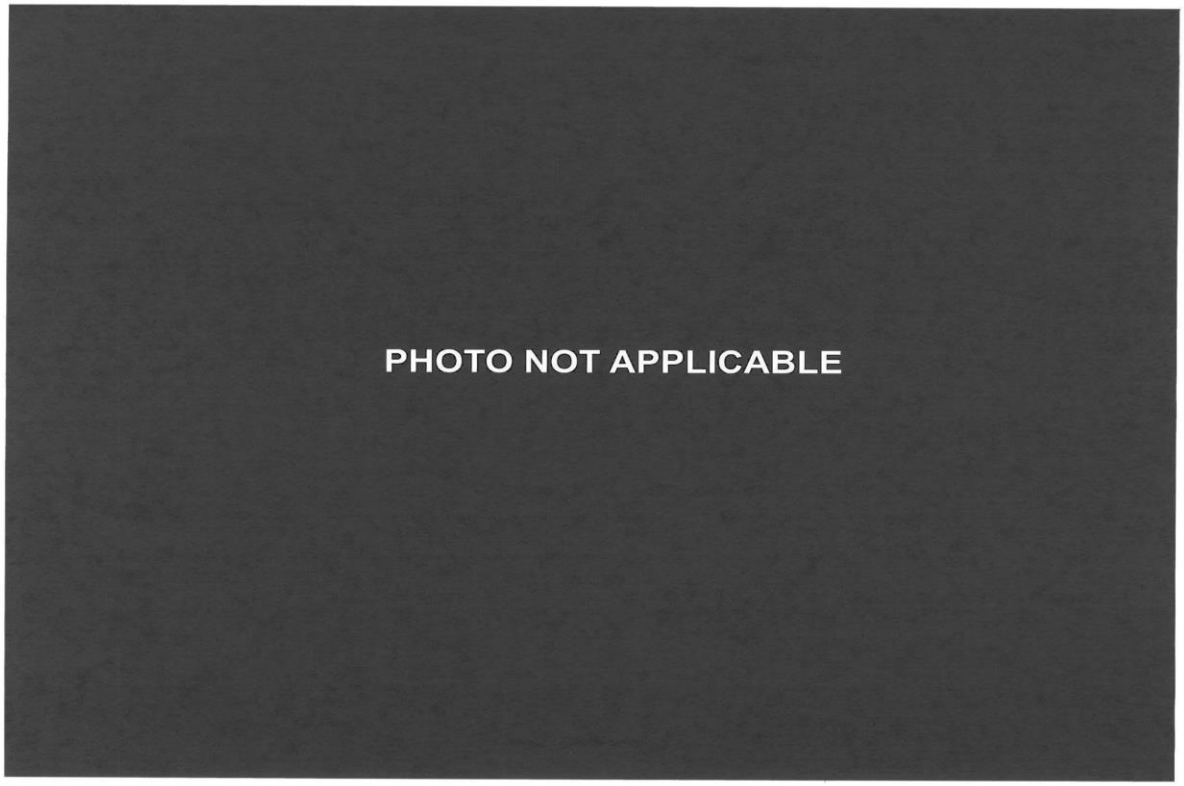
305-35 Post-Impact View of Battery Component Intrusion



305-36 Post-Impact View of Battery Module Movement or Retention Loss



305-37 Post-Impact View of Propulsion Battery Electrolyte Spillage Location



No. 305-38 Post-Test View of Propulsion Battery Electrolyte Spillage Location

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at: www.nhtsa.gov.

Additional Driver Dummy Instrumentation Data

Driver Head Acceleration (X) Redundant
Driver Head Acceleration (Y) Redundant
Driver Head Acceleration (Z) Redundant
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)
Driver Head Angular Velocity (X)
Driver Head Angular Velocity (Y)
Driver Head Angular Velocity (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #3 Force (X)
Load Cell Pole Barrier #4 Force (X)
Load Cell Pole Barrier #5 Force (X)
Load Cell Pole Barrier #6 Force (X)
Load Cell Pole Barrier #7 Force (X)
Load Cell Pole Barrier #8 Force (X)

NHTSA

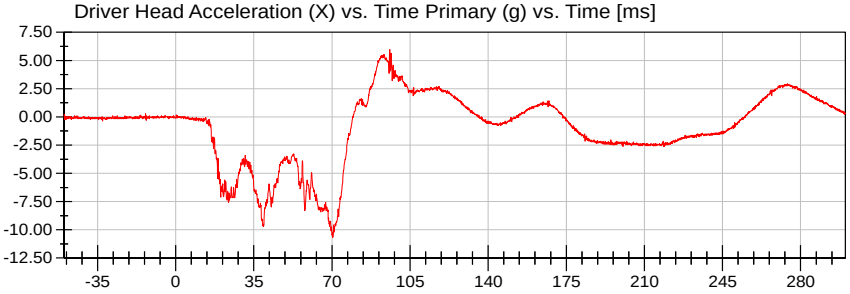
Test Date: 04/05/2023

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 230405 (M20234215)

Driver Head Acceleration (X) vs. Time Primary (g) vs. Time [ms]



<Max>

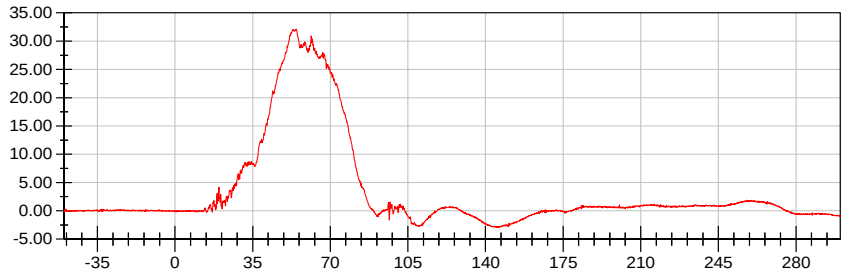
5.97 g at 95.84 ms

<Min>

-10.68 g at 70.40 ms

CFC_1000

Driver Head Acceleration (Y) vs. Time Primary (g) vs. Time [ms]



<Max>

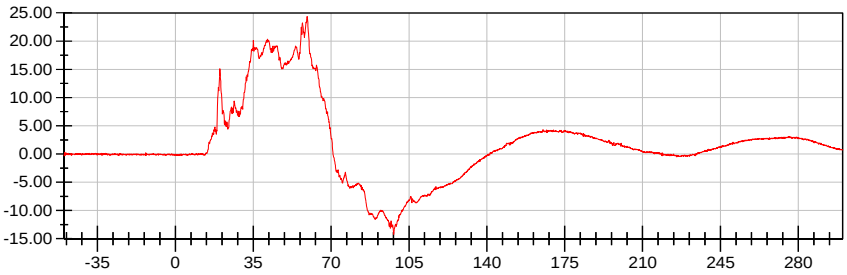
32.16 g at 54.64 ms

<Min>

-2.97 g at 145.92 ms

CFC_1000

Driver Head Acceleration (Z) vs. Time Primary (g) vs. Time [ms]



<Max>

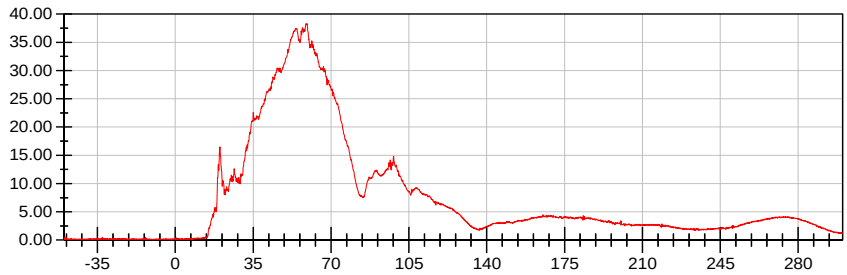
24.35 g at 59.20 ms

<Min>

-14.26 g at 98.08 ms

CFC_1000

Driver Head Acceleration Resultant Primary vs. Time (g) vs. Time [ms]



<Max>

38.31 g at 59.20 ms

<Min>

0.03 g at -17.60 ms

CFC_1000

NHTSA

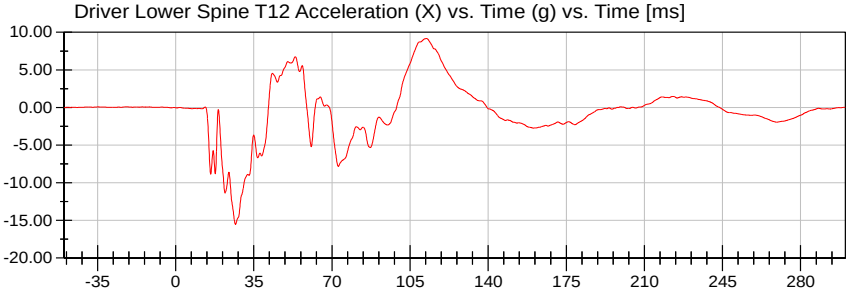
Test Date: 04/05/2023

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 230405 (M20234215)

Driver Lower Spine T12 Acceleration (X) vs. Time (g) vs. Time [ms]



<Max>

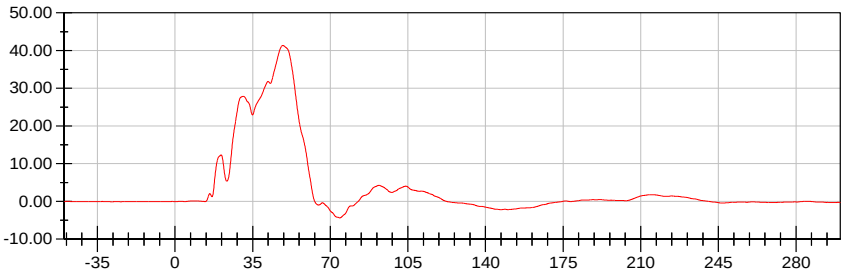
9.16 g at 112.32 ms

<Min>

-15.53 g at 26.80 ms

CFC_180

Driver Lower Spine T12 Acceleration (Y) vs. Time (g) vs. Time [ms]



<Max>

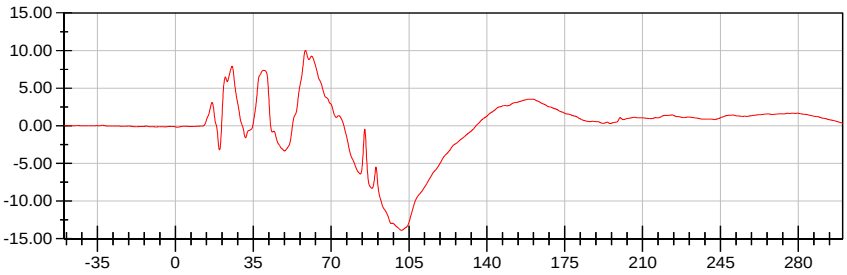
41.34 g at 48.64 ms

<Min>

-4.38 g at 74.32 ms

CFC_180

Driver Lower Spine T12 Acceleration (Z) vs. Time (g) vs. Time [ms]



<Max>

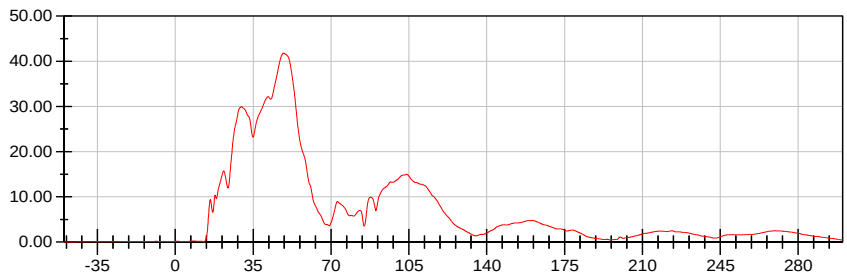
10.02 g at 58.48 ms

<Min>

-13.88 g at 101.60 ms

CFC_180

Driver Lower Spine T12 Acceleration Resultant vs. Time (g) vs. Time [ms]



<Max>

41.80 g at 48.72 ms

<Min>

0.03 g at -49.12 ms

CFC_180

NHTSA

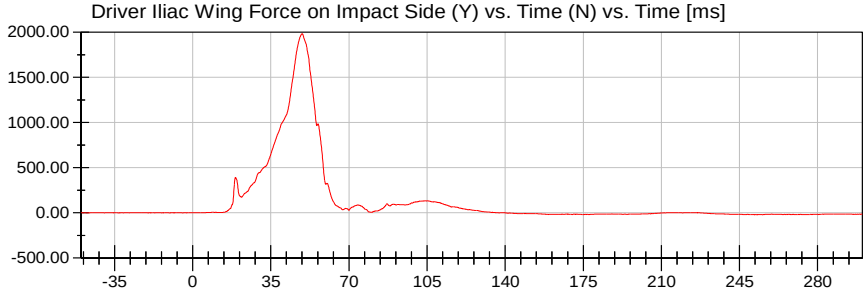
Test Date: 04/05/2023

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 230405 (M20234215)

Driver Iliac Wing Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

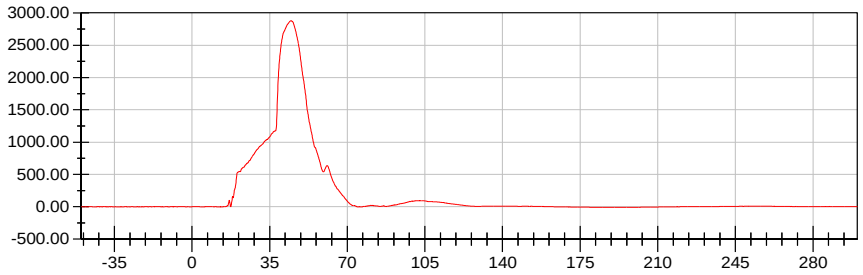
1,983.37 N at 49.04 ms

<Min>

-21.68 N at 252.88 ms

CFC_600

Driver Acetabulum Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

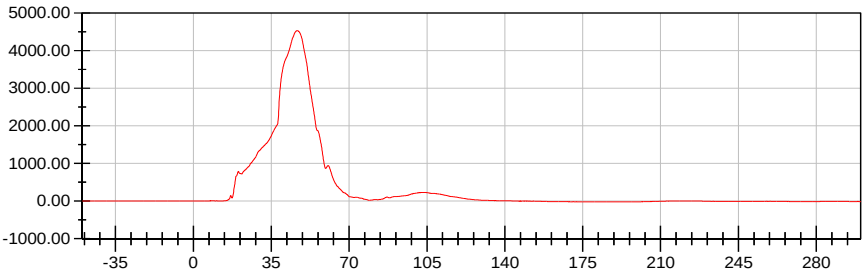
2,879.42 N at 44.56 ms

<Min>

-10.02 N at 189.84 ms

CFC_600

Driver Total Pelvis Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

4,530.59 N at 46.56 ms

<Min>

-25.28 N at 175.04 ms

CFC_600

APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

TABLE OF CALIBRATION MEASUREMENTS AND PLOTS
SID-IIs (Driver) Dummy
Description

Table 1. External Measurements
Table 2. Head Drop Test
- Resultant Head Acceleration (G's) vs. Time (ms)
- Head (X) Acceleration (G's) vs. Time (ms)
- Head (Y) Acceleration (G's) vs. Time (ms)
- Head (Z) Acceleration (G's) vs. Time (ms)

Table 3. Lateral Neck Pendulum Test
- Pendulum Velocity (m/s) vs. Time (ms)
- Flexion Angle (°) vs. Time (ms)
- Moment About Occipital Condyle (Nm) vs. Time (ms)

Table 4. Shoulder Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Shoulder Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)

Table 5. Thorax (With Arm) Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Shoulder Displacement (mm) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

Table 6. Thorax (Without Arm) Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

Table 7. Abdomen Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Upper Abdominal Rib Displacement (mm) vs. Time (ms)
- Lower Abdominal Rib Displacement (mm) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

Table 8. Pelvis Plug Quasi-Static Test (Optional*)
Table 9. Pelvis Acetabulum Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Pelvis (Y) Acceleration (G's) vs. Time (ms)
- Acetabulum Force (N) vs. Time (ms)

Table 10. Pelvis Iliac Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Pelvis (Y) Acceleration (G's) vs. Time (ms)
- Iliac Force (N) vs. Time (ms)

Pre-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 62

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	780	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	102	Yes
F	Thigh Clearance	119.0 - 135.0	129	Yes
G	Head Breadth	140.0 - 148.0	147	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
P	Foot Length (left)	216.0 - 232.0	223	Yes
Q	Hip Breadth	313.0 - 323.0	319	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	347	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	878	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	120.5 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	2.7 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	< 15 %	0.66 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: 1330

Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

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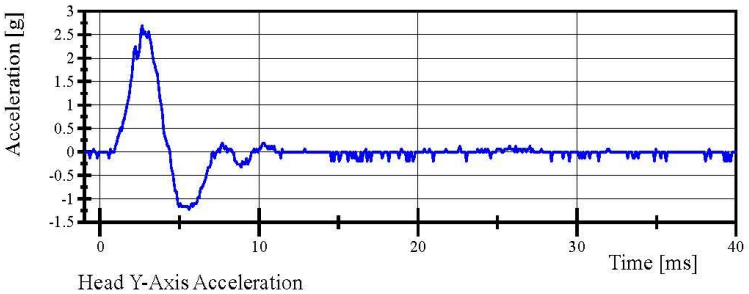
Transportation Research Center Inc.

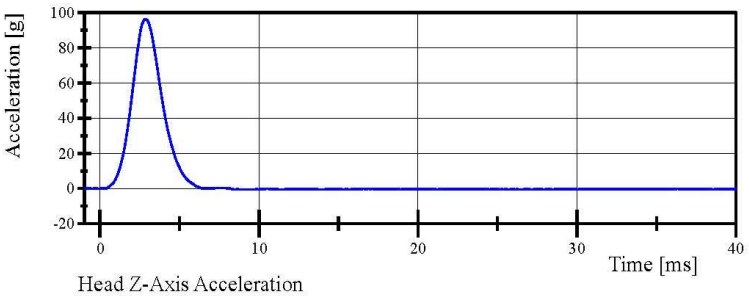
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Head X-Axis Acceleration



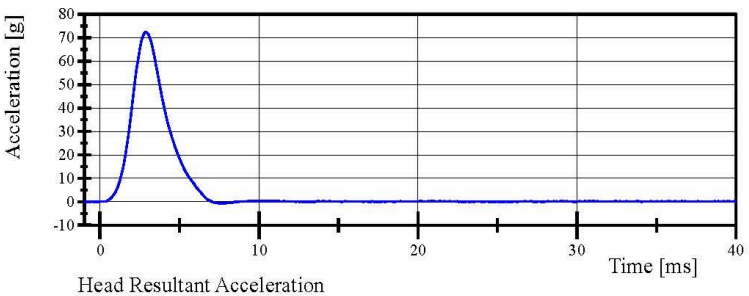
Filter Class: CFC_1000
Max: 2.7 g at 2.6 ms
Min: -1.2 g at 5.6 ms

Head Y-Axis Acceleration



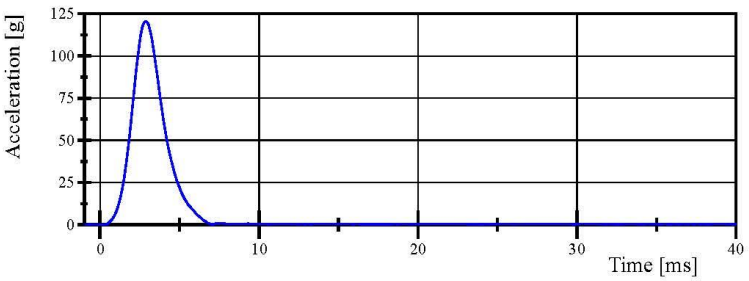
Filter Class: CFC_1000
Max: 96.3 g at 2.9 ms
Min: -0.5 g at 9.3 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 72.4 g at 2.9 ms
Min: -0.7 g at 7.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 120.5 g at 2.9 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 12:40:54 229

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/3/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.604 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.643 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.926 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	5.265 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.828 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.844 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-74.2 deg	Yes
Time of Peak	50 - 70 ms	65.8 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	39.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	118.6 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 779

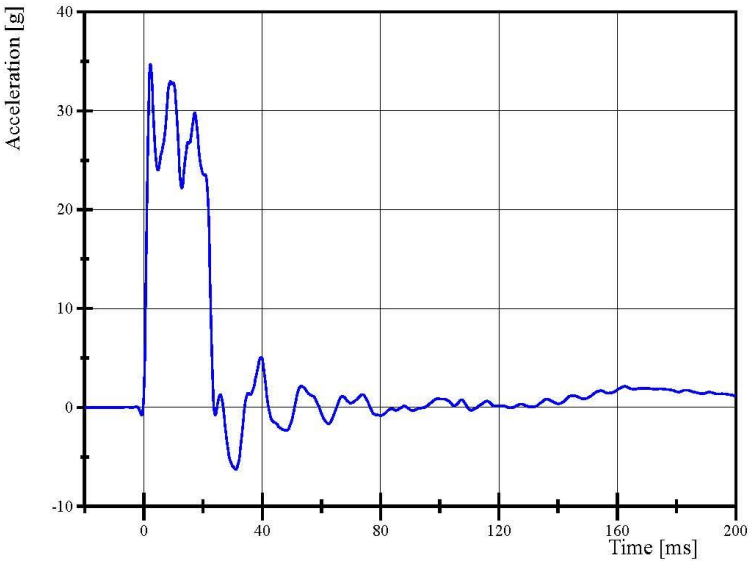
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

03.03.2023 07:25:48 749

Transportation Research Center Inc.

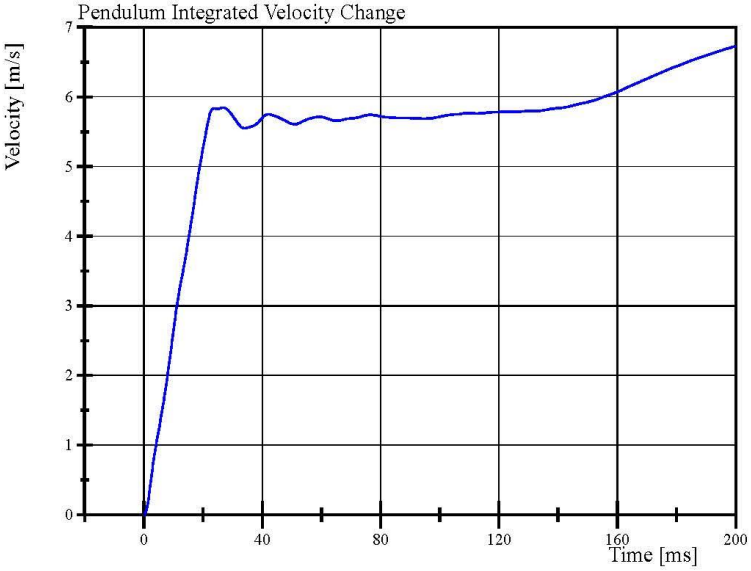
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/3/2023

Pendulum Acceleration



Filter Class: CFC_180
Max: 34.7 g at 2.2 ms
Min: -6.3 g at 31.0 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.7 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

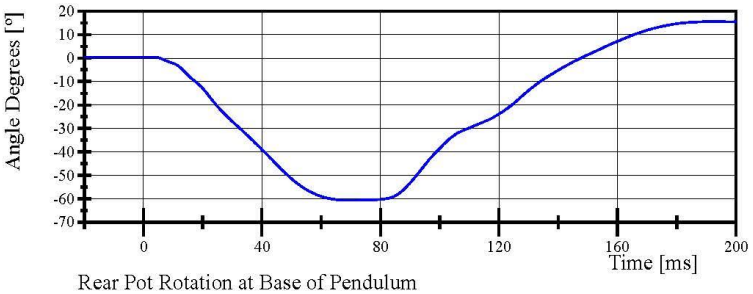
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.03.2023 07:26:14 749

Transportation Research Center Inc.

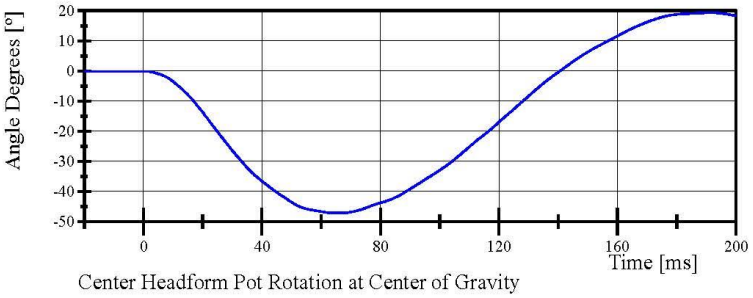
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/3/2023

Forward Pot Rotation at Base of Pendulum



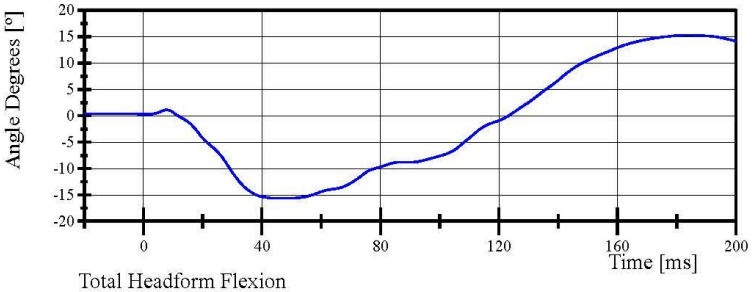
Filter Class: CFC_60
Max: 15.7 ° at 192.6 ms
Min: -60.6 ° at 68.4 ms

Rear Pot Rotation at Base of Pendulum



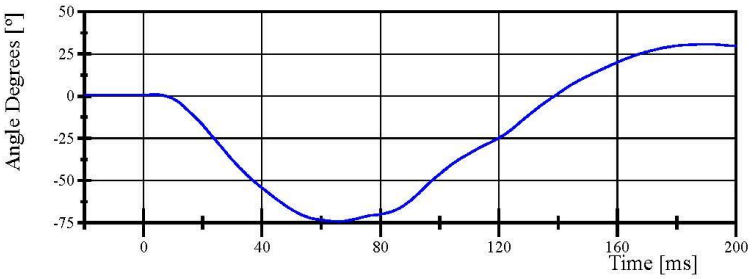
Filter Class: CFC_60
Max: 19.4 ° at 191.5 ms
Min: -47.1 ° at 65.3 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 15.3 ° at 183.8 ms
Min: -15.7 ° at 47.4 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 30.7 ° at 191.0 ms
Min: -74.2 ° at 65.8 ms

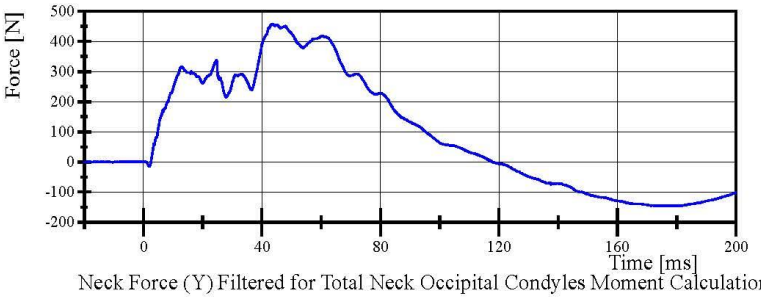
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.03.2023 07:26:14 749

Transportation Research Center Inc.

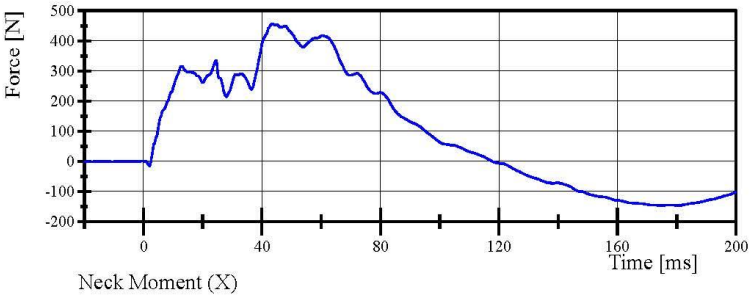
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/3/2023

Neck Force (Y)



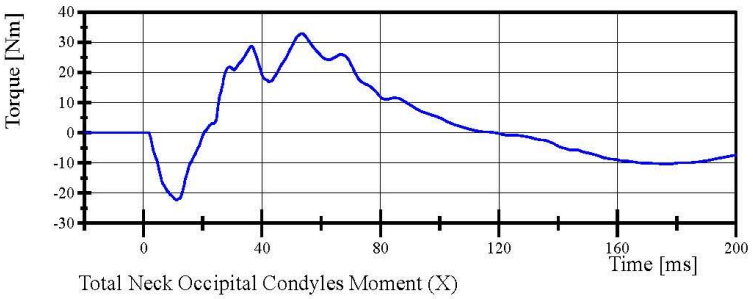
Filter Class: CFC_1000
Max: 456.3 N at 43.4 ms
Min: -146.6 N at 180.8 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



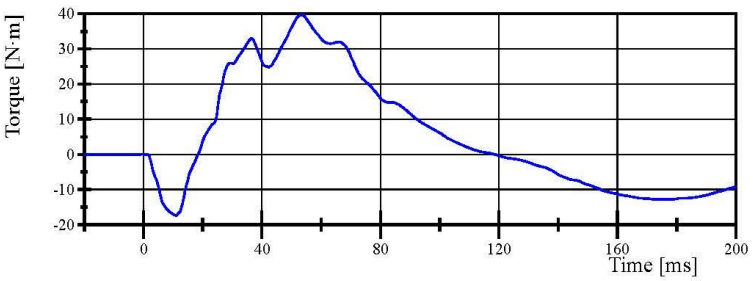
Filter Class: CFC_600
Max: 456.3 N at 43.4 ms
Min: -146.2 N at 181.0 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 32.9 Nm at 53.4 ms
Min: -22.3 Nm at 11.2 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 39.7 N·m at 53.4 ms
Min: -17.4 N·m at 11.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.03.2023 07:26:14 749

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.0 g	Yes
Shoulder Displacement	28 - 37 mm	30.7 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	20.0 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259

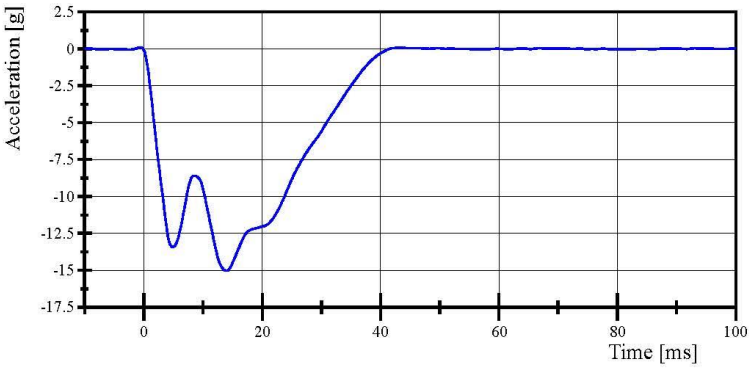
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 09:57:15 858

Transportation Research Center Inc.

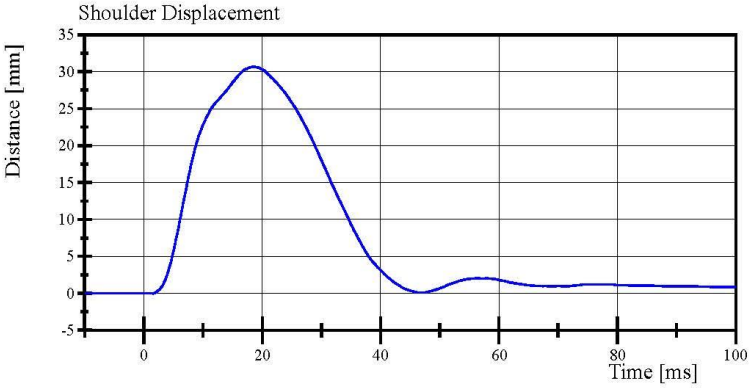
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Probe Acceleration



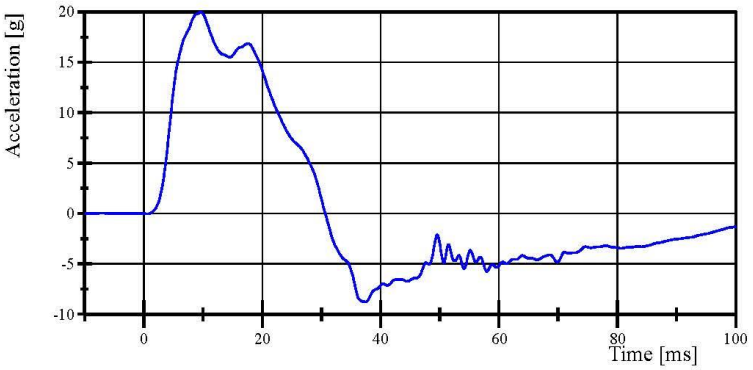
Filter Class: CFC_180
Max: 0.1 g at -0.6 ms
Min: -15.0 g at 13.9 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 30.7 mm at 18.5 ms
Min: -0.0 mm at 1.5 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 20.0 g at 9.6 ms
Min: -8.8 g at 37.5 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 09:57:47 858

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.734 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-33.9 g	Yes
Shoulder Displacement	31 - 40 mm	35.7 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.5 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.2 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.1 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	38.4 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	35.8 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259
Upper Thorax Rib S/N: DM5020
Middle Thorax Rib S/N: DM5021
Lower Thorax Rib S/N: DM5022

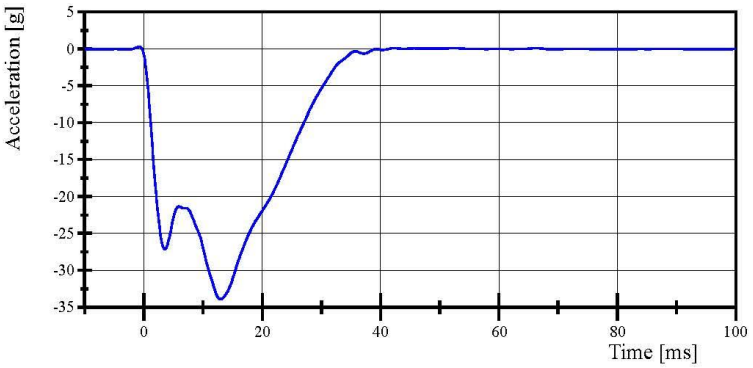
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 11:42:23 600

Transportation Research Center Inc.

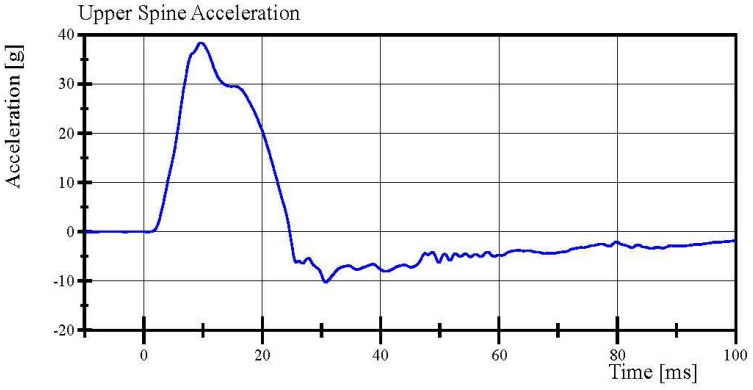
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Probe Acceleration



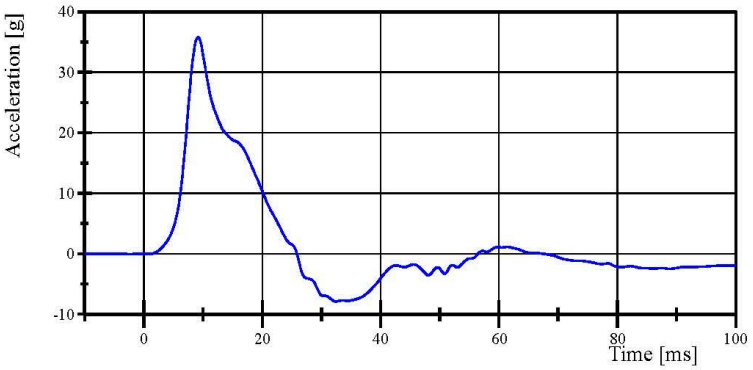
Filter Class: CFC_180
Max: 0.3 g at -0.8 ms
Min: -33.9 g at 13.0 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 38.4 g at 9.6 ms
Min: -10.2 g at 30.7 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 35.8 g at 9.2 ms
Min: -7.9 g at 32.4 ms

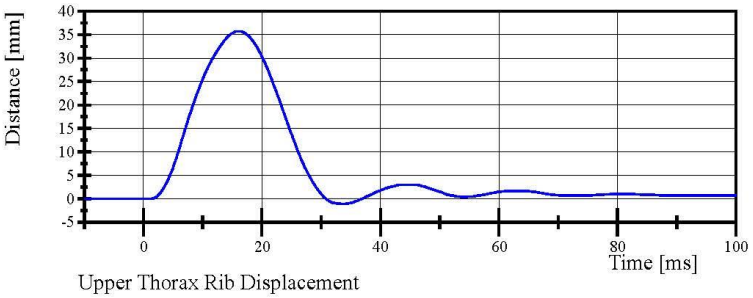
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 11:44:05 600

Transportation Research Center Inc.

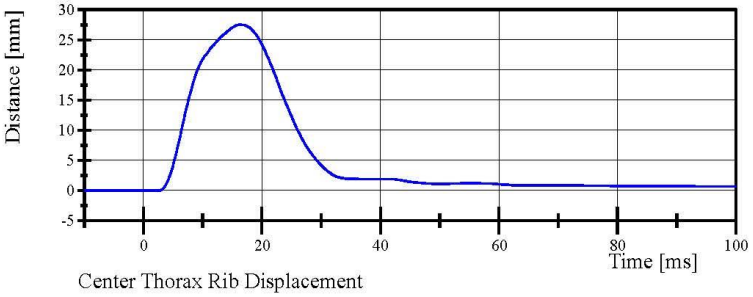
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Shoulder Rib Displacement



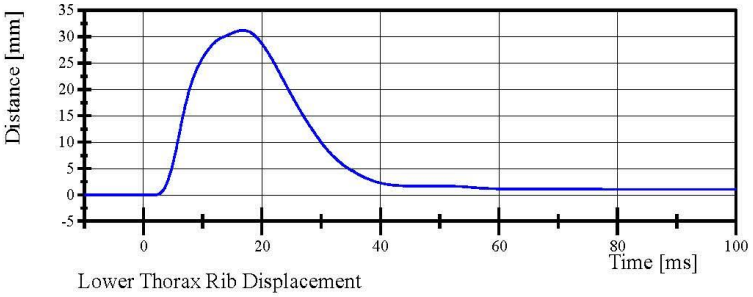
Filter Class: CFC_600
Max: 35.7 mm at 15.8 ms
Min: -1.0 mm at 33.8 ms

Upper Thorax Rib Displacement



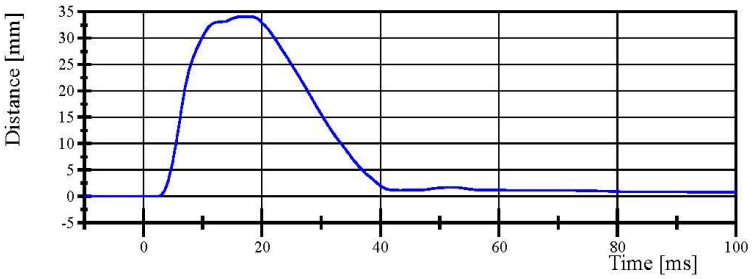
Filter Class: CFC_600
Max: 27.5 mm at 16.3 ms
Min: -0.0 mm at 2.6 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.2 mm at 16.7 ms
Min: -0.0 mm at 0.2 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 34.1 mm at 17.5 ms
Min: -0.0 mm at 2.5 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 11:44:05 600

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.355 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.4 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	37.2 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.4 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	39.2 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.1 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.8 g	Yes

Test meets specifications.

Condition: Used

Comments:
Upper Thorax Rib S/N: DM5020
Middle Thorax Rib S/N: DM5021
Lower Thorax Rib S/N: DM5022

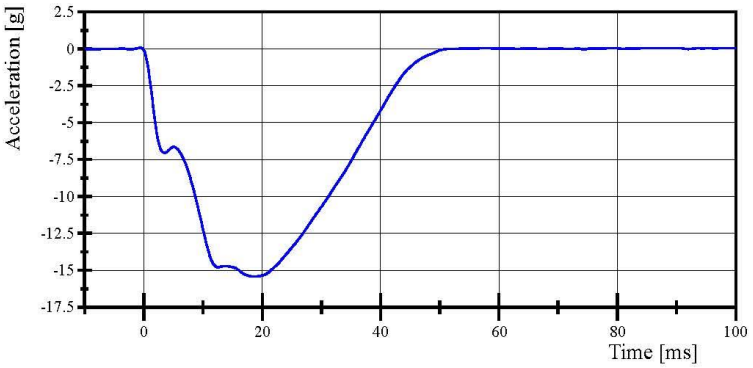
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 10:15:02 783

Transportation Research Center Inc.

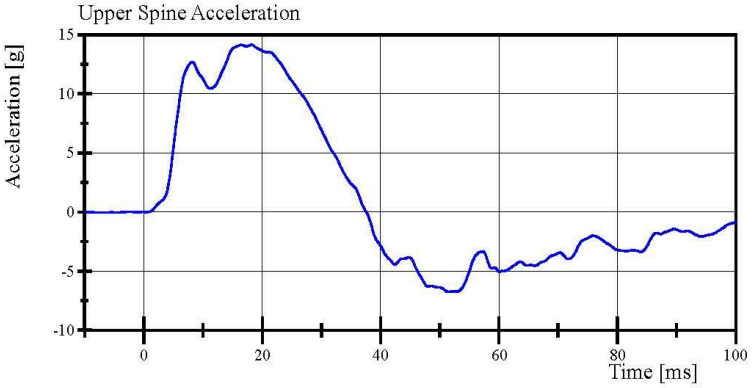
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Probe Acceleration



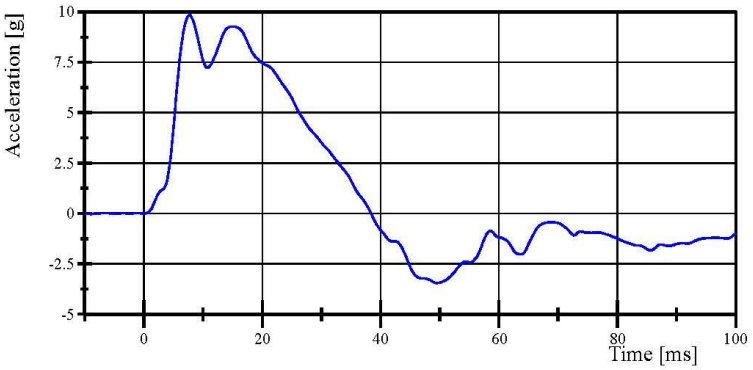
Filter Class: CFC_180
Max: 0.1 g at -0.6 ms
Min: -15.4 g at 18.5 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 14.1 g at 18.2 ms
Min: -6.8 g at 51.4 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.8 g at 7.7 ms
Min: -3.5 g at 49.4 ms

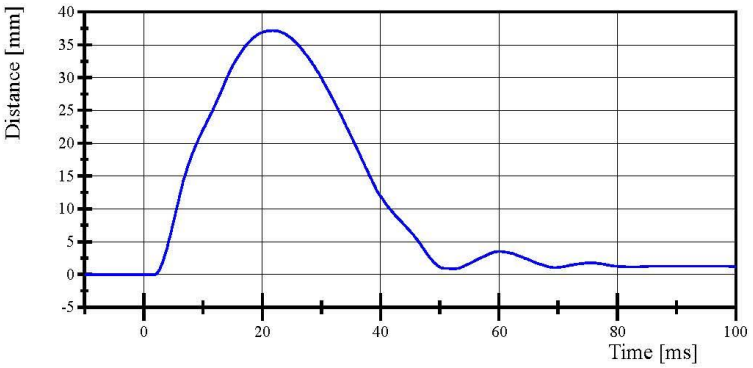
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 10:15:37 783

Transportation Research Center Inc.

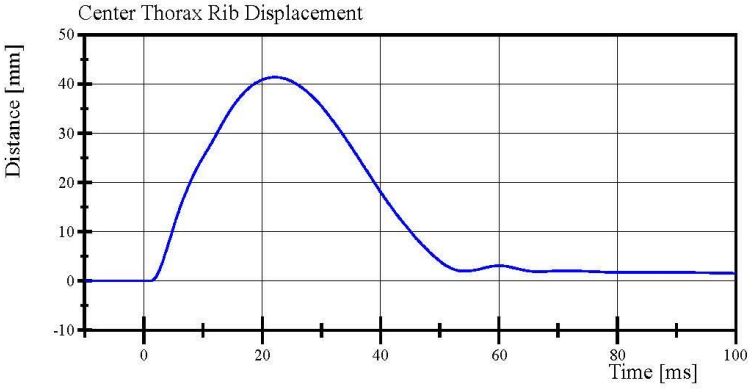
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Upper Thorax Rib Displacement



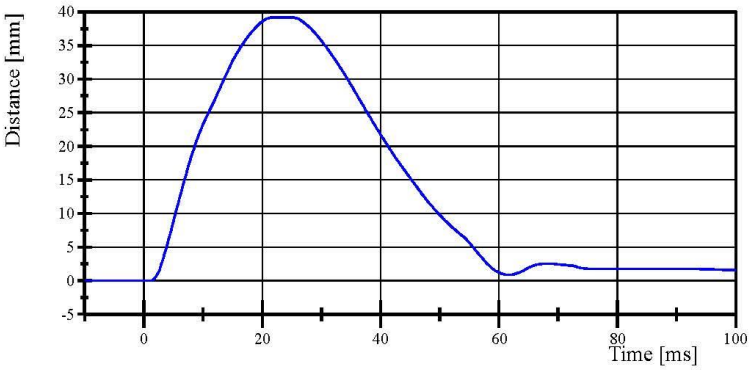
Filter Class: CFC_600
Max: 37.2 mm at 21.8 ms
Min: -0.0 mm at 1.7 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 41.4 mm at 22.1 ms
Min: -0.0 mm at 0.8 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 39.2 mm at 22.2 ms
Min: -0.0 mm at 1.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 10:15:37 783

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.6 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	37.2 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	40.6 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	11.35 g	Yes

Test meets specifications.

Condition: Used
Comments:
Upper Abdominal Rib S/N: DM7281
Lower Abdominal Rib S/N: DM7275

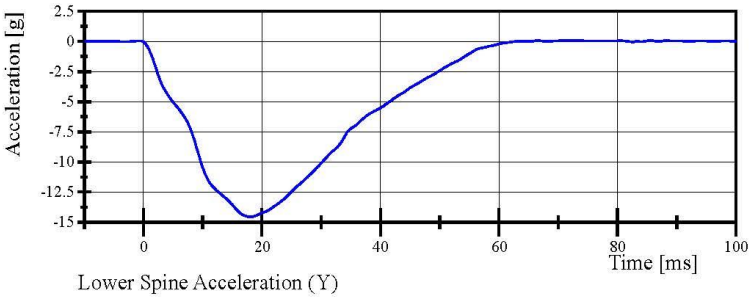
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 10:05:32 638

Transportation Research Center Inc.

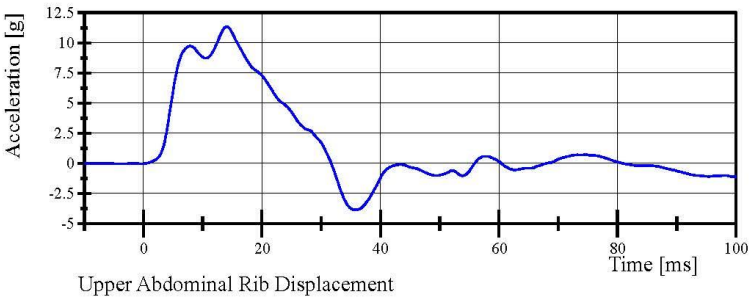
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Probe Acceleration



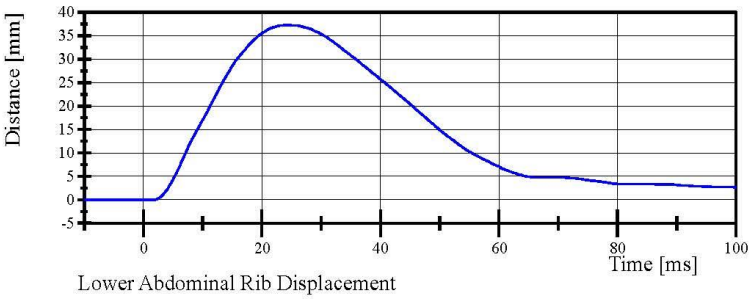
Filter Class: CFC_180
Max: 0.1 g at 66.5 ms
Min: -14.6 g at 18.1 ms

Lower Spine Acceleration (Y)



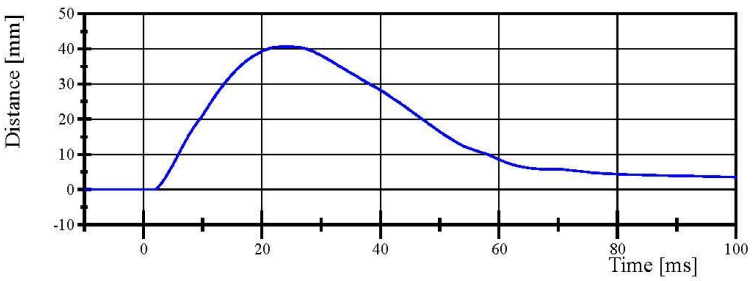
Filter Class: CFC_180
Max: 11.4 g at 14.1 ms
Min: -3.8 g at 35.9 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 37.2 mm at 24.2 ms
Min: -0.0 mm at -6.7 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 40.6 mm at 23.5 ms
Min: -0.0 mm at 1.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 10:06:03 638

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.62 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-42.97 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	37.2 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,877.5 N	Yes

Test meets specifications.

Condition: Used

Comments:
Pelvis Skin S/N: 1171
Pelvis Plug Info:
Manufacturer: Saco
S/N: 13795
Cal Date: 20200508

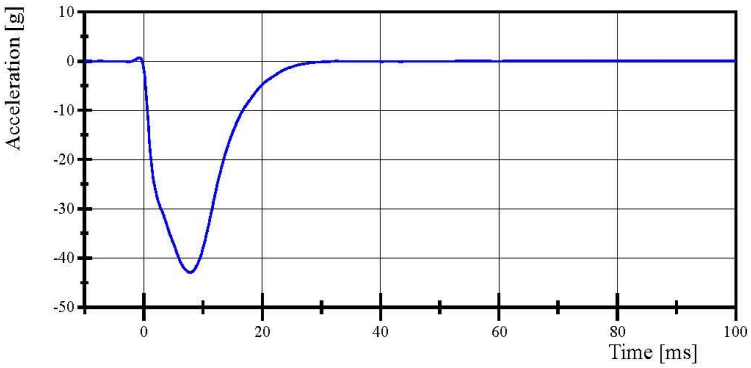
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 09:03:43 438

Transportation Research Center Inc.

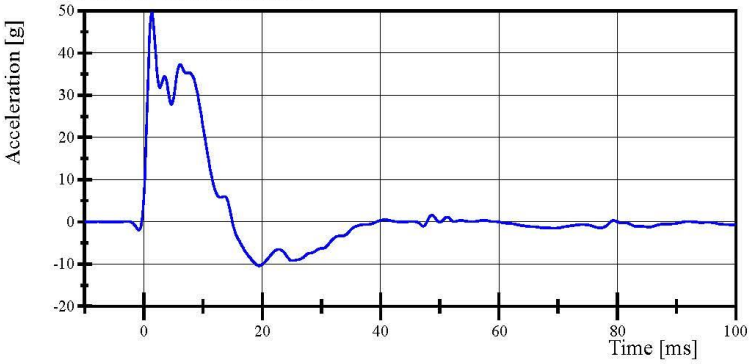
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 61-1
Test Date: 3/2/2023

Probe Acceleration



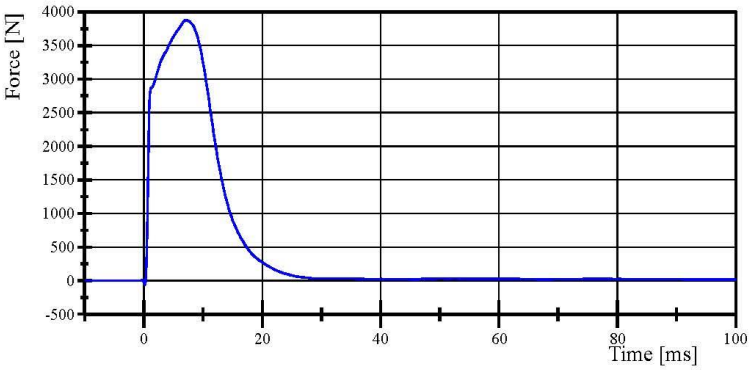
Filter Class: CFC_180
Max: 0.7 g at -0.8 ms
Min: -43.0 g at 7.8 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 49.6 g at 1.4 ms
Min: -10.4 g at 19.4 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 3,877.5 N at 7.2 ms
Min: -62.4 N at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.02.2023 09:04:44 438

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 62-1
Test Date: 3/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.24 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-40.8 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	34.1 g	Yes
Iliac Force	4,100 - 5,100 N	4,801.2 N	Yes

Test meets specifications.

Condition: Used

Comments:
Pelvis Skin S/N: 1171

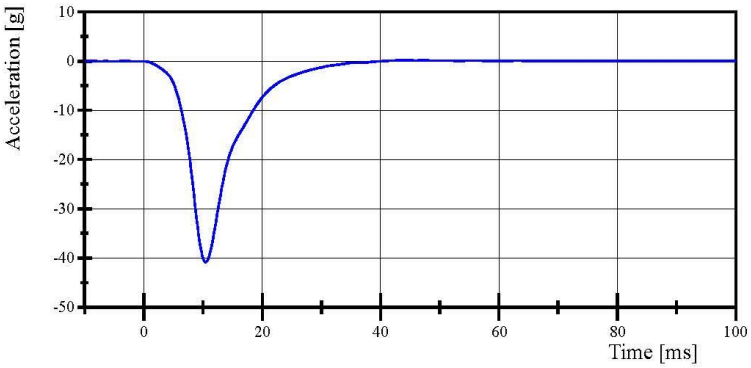
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.30.2023 11:47:02 693

Transportation Research Center Inc.

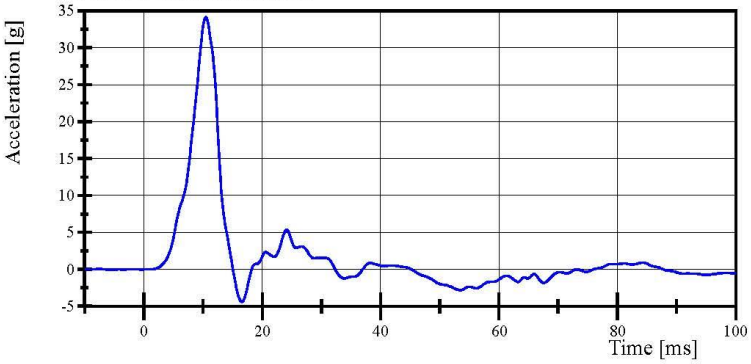
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 62-1
Test Date: 3/30/2023

Probe Acceleration



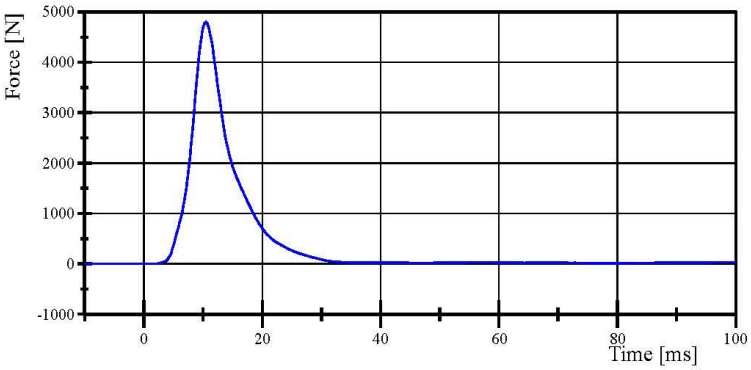
Filter Class: CFC_180
Max: 0.2 g at 44.4 ms
Min: -40.8 g at 10.5 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 34.1 g at 10.5 ms
Min: -4.4 g at 16.6 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,801.2 N at 10.5 ms
Min: -0.7 N at -9.4 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

03.30.2023 11:47:31 693

Post-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 63

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	780	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	102	Yes
F	Thigh Clearance	119.0 - 135.0	130	Yes
G	Head Breadth	140.0 - 148.0	147	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
P	Foot Length (left)	216.0 - 232.0	223	Yes
Q	Hip Breadth	313.0 - 323.0	319	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	347	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	877	Yes
Z	Waist Circumference	761.0 - 791.0	781	Yes

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	124.5 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-4.9 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	< 15 %	0.87 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: 1330

Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

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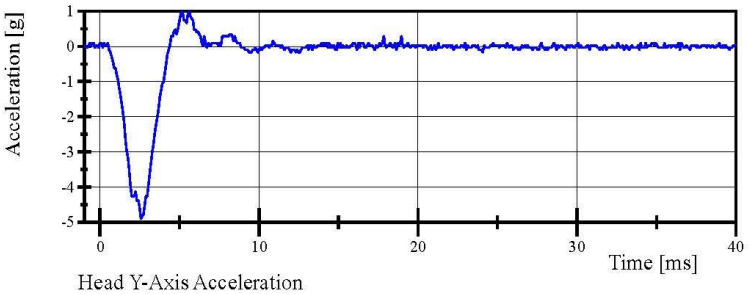
Transportation Research Center Inc.

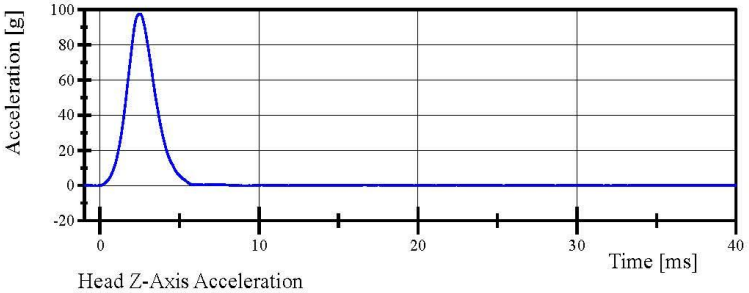
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Head X-Axis Acceleration



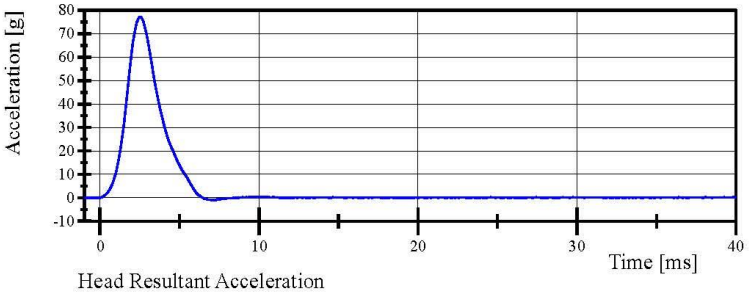
Filter Class: CFC_1000
Max: 1.0 g at 5.1 ms
Min: -4.9 g at 2.6 ms

Head Y-Axis Acceleration



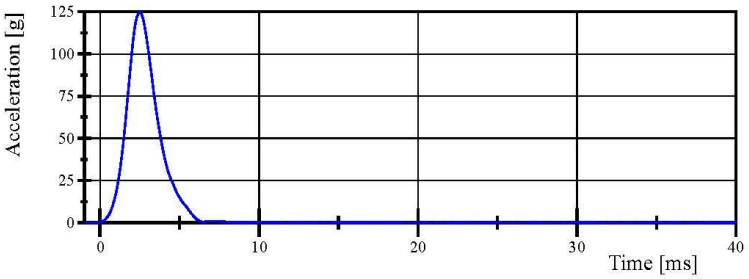
Filter Class: CFC_1000
Max: 97.6 g at 2.5 ms
Min: -0.2 g at 9.1 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 77.1 g at 2.5 ms
Min: -0.9 g at 7.0 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 124.5 g at 2.5 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 12:25:51 233

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 63-3
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.594 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.565 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.831 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	5.106 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.774 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.780 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-78.4 deg	Yes
Time of Peak	50 - 70 ms	62.5 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	41.2 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	115.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 779

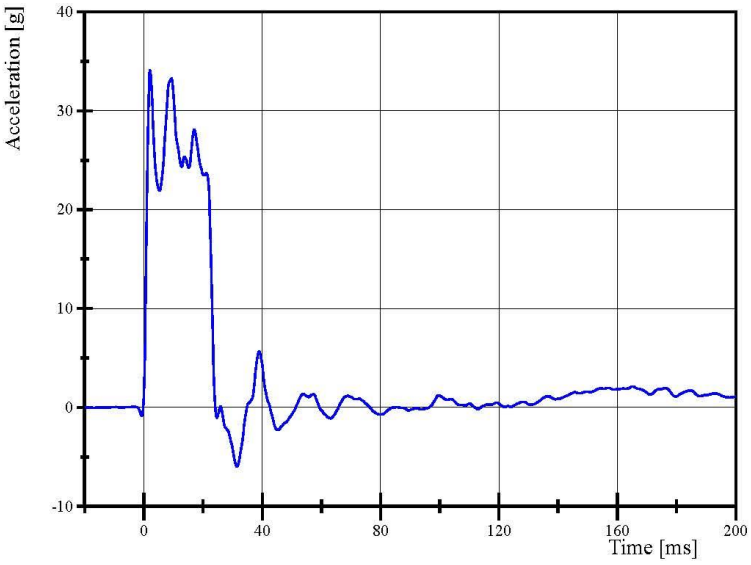
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

04.06.2023 14:19:13 751

Transportation Research Center Inc.

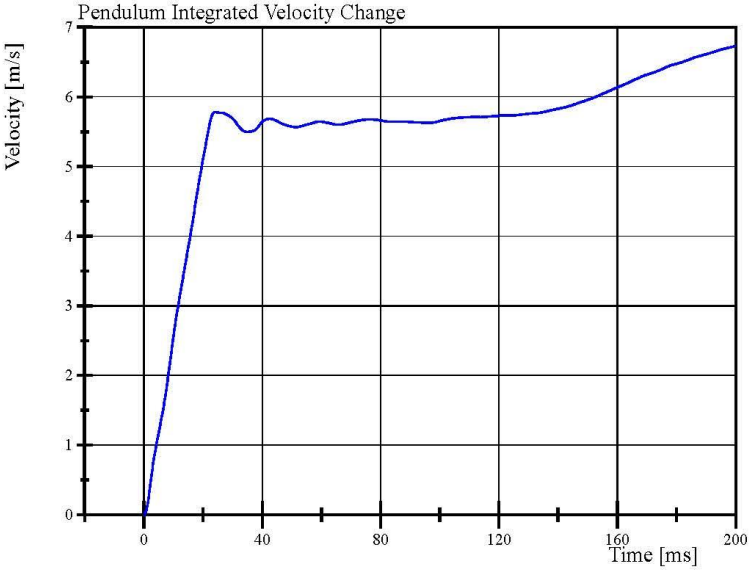
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 63-3
Test Date: 4/6/2023

Pendulum Acceleration



Filter Class: CFC_180
Max: 34.1 g at 2.1 ms
Min: -6.0 g at 31.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.7 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

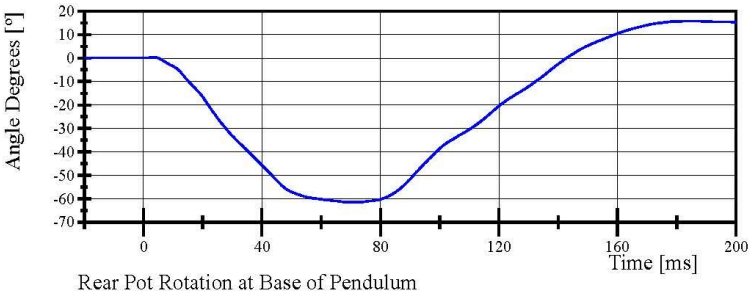
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 14:19:37 751

Transportation Research Center Inc.

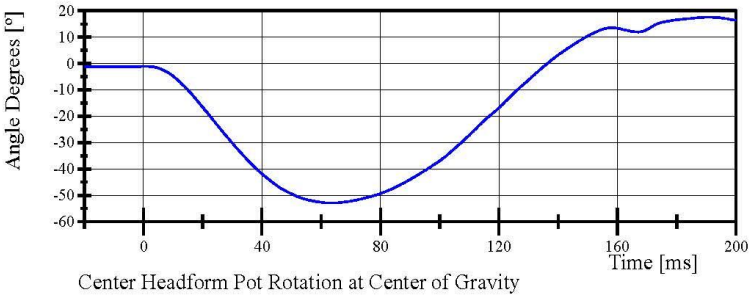
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 63-3
Test Date: 4/6/2023

Forward Pot Rotation at Base of Pendulum



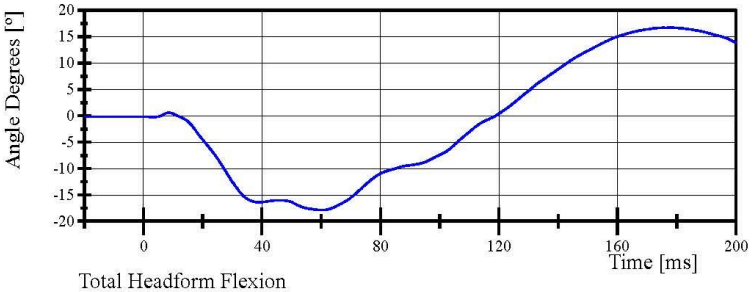
Filter Class: CFC_60
Max: 15.8 ° at 185.4 ms
Min: -61.5 ° at 70.6 ms

Rear Pot Rotation at Base of Pendulum



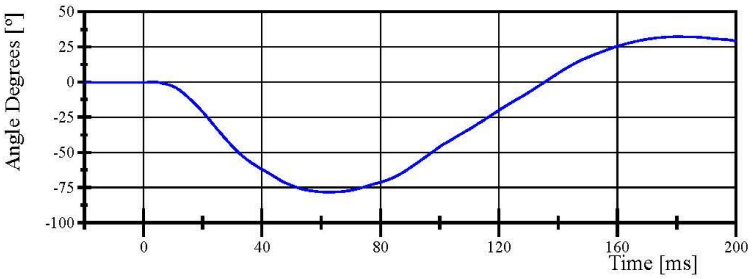
Filter Class: CFC_60
Max: 17.6 ° at 190.6 ms
Min: -52.9 ° at 63.5 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 16.7 ° at 178.2 ms
Min: -17.9 ° at 60.3 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 32.4 ° at 180.1 ms
Min: -78.4 ° at 62.5 ms

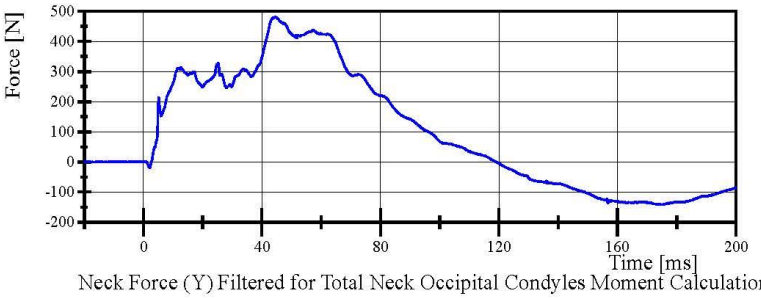
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 14:19:37 751

Transportation Research Center Inc.

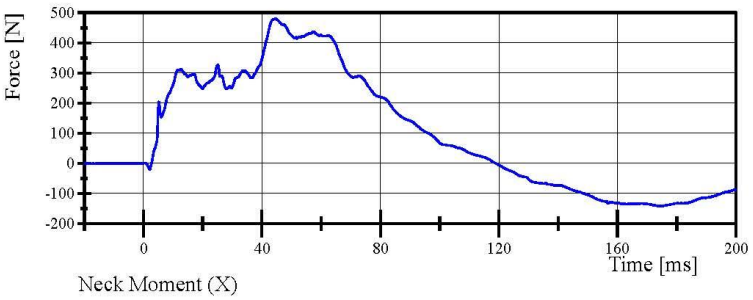
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 63-3
Test Date: 4/6/2023

Neck Force (Y)



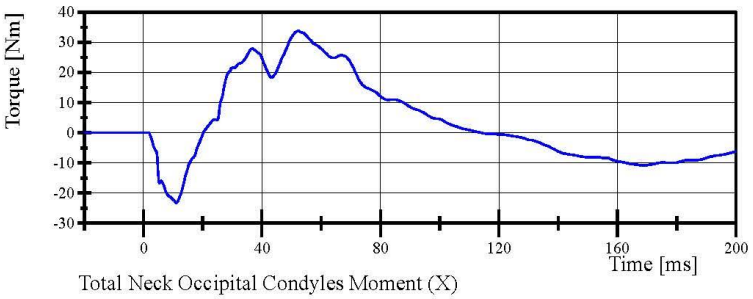
Filter Class: CFC_1000
Max: 480.8 N at 44.5 ms
Min: -141.9 N at 175.2 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



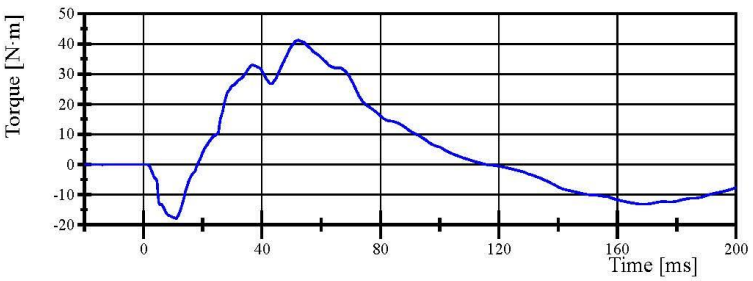
Filter Class: CFC_600
Max: 480.2 N at 44.6 ms
Min: -141.5 N at 175.2 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 33.8 Nm at 52.2 ms
Min: -23.2 Nm at 11.0 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 41.2 N·m at 52.2 ms
Min: -17.9 N·m at 10.9 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 14:19:37 751

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.2 g	Yes
Shoulder Displacement	28 - 37 mm	31.7 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	19.6 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259

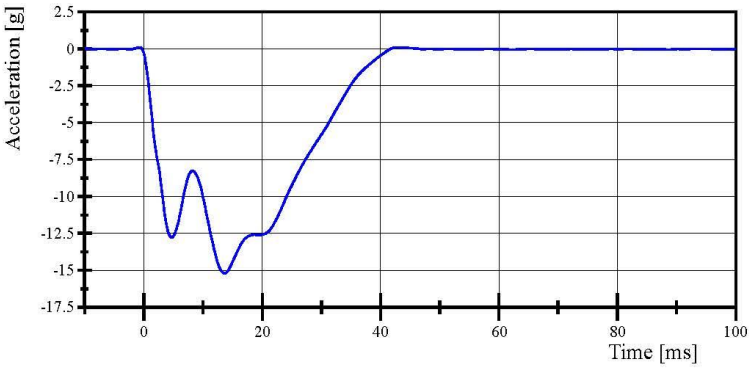
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:29:58 828

Transportation Research Center Inc.

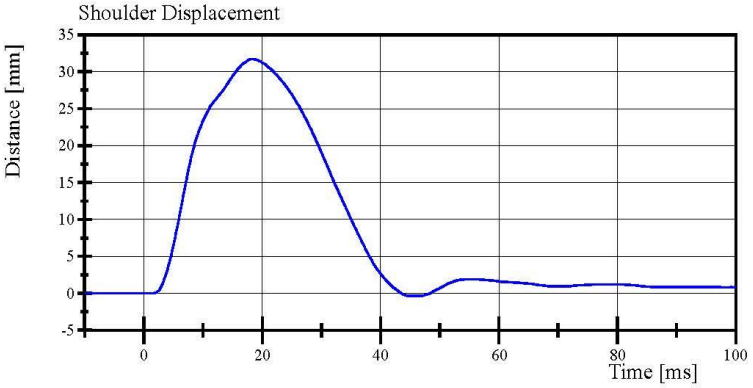
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Probe Acceleration



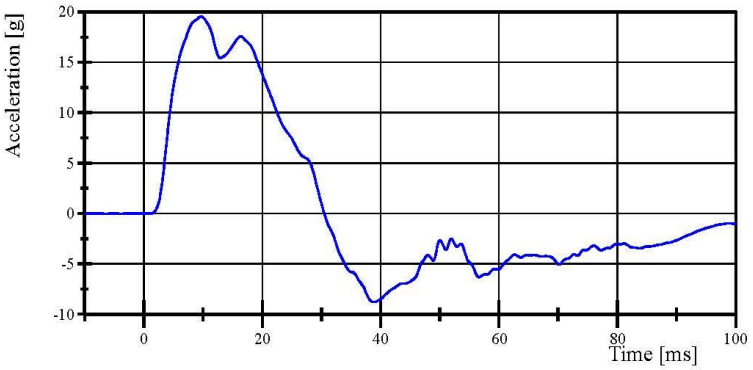
Filter Class: CFC_180
Max: 0.1 g at -0.8 ms
Min: -15.2 g at 13.6 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 31.7 mm at 18.2 ms
Min: -0.4 mm at 45.4 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 19.6 g at 9.7 ms
Min: -8.8 g at 38.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:30:25 828

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.724 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-34.3 g	Yes
Shoulder Displacement	31 - 40 mm	36.6 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.9 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.3 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	33.9 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	39.0 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	35.7 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259
Upper Thorax Rib S/N: DM5020
Middle Thorax Rib S/N: DM5021
Lower Thorax Rib S/N: DM5022

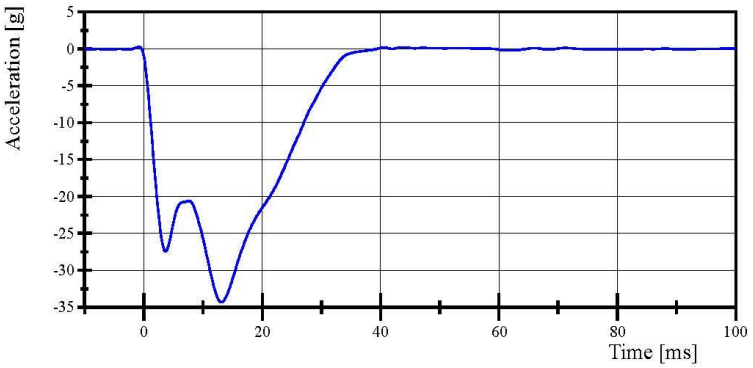
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 10:40:20 633

Transportation Research Center Inc.

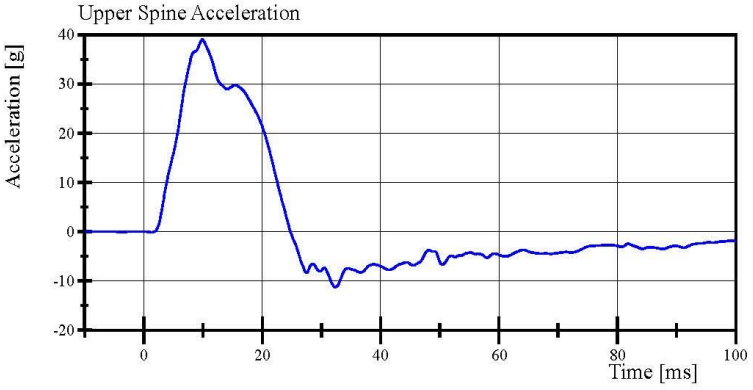
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Probe Acceleration



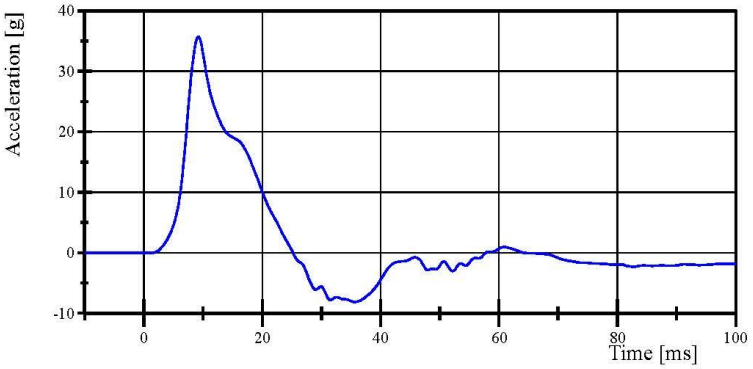
Filter Class: CFC_180
Max: 0.3 g at -0.9 ms
Min: -34.3 g at 13.1 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 39.0 g at 9.8 ms
Min: -11.3 g at 32.3 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 35.7 g at 9.2 ms
Min: -8.1 g at 35.5 ms

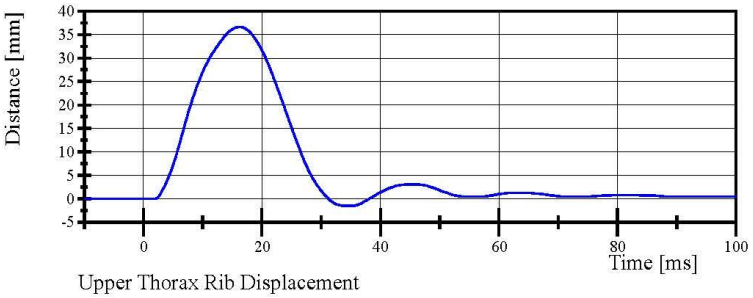
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 10:41:05 633

Transportation Research Center Inc.

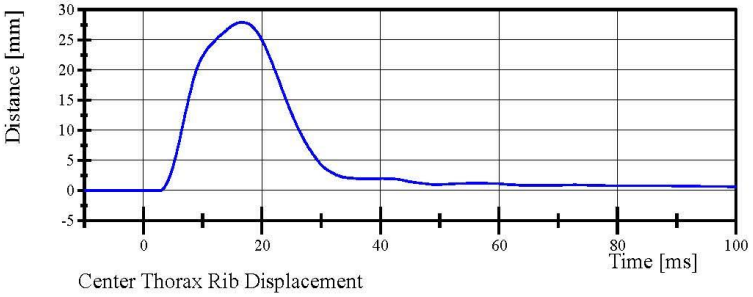
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Shoulder Rib Displacement



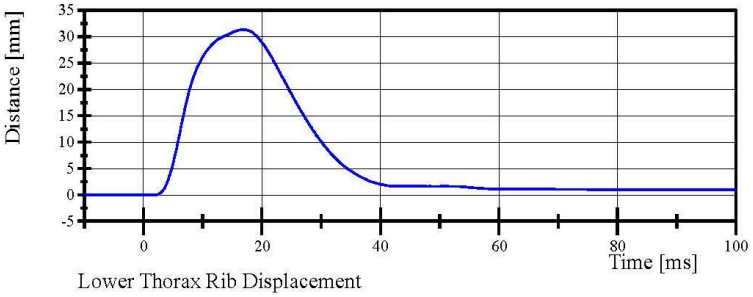
Filter Class: CFC_600
Max: 36.6 mm at 16.1 ms
Min: -1.5 mm at 35.1 ms

Upper Thorax Rib Displacement



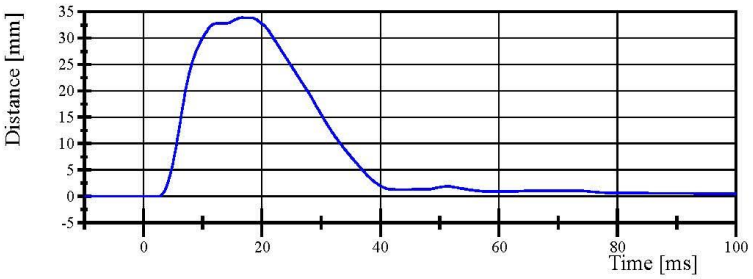
Filter Class: CFC_600
Max: 27.9 mm at 16.5 ms
Min: -0.0 mm at -8.7 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.3 mm at 16.9 ms
Min: -0.0 mm at -1.8 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 33.9 mm at 16.7 ms
Min: -0.0 mm at 2.5 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 10:41:05 633

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.346 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.3 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	39.7 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	42.1 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	37.8 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.6 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	10.0 g	Yes

Test meets specifications.

Condition: Used

Comments:
Upper Thorax Rib S/N: DM5020
Middle Thorax Rib S/N: DM5021
Lower Thorax Rib S/N: DM5022

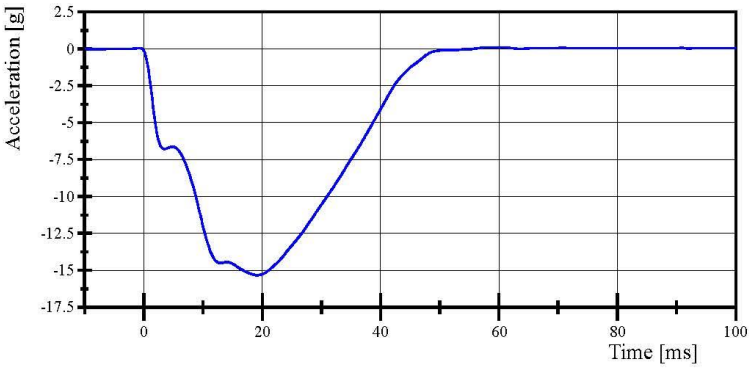
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:47:00 851

Transportation Research Center Inc.

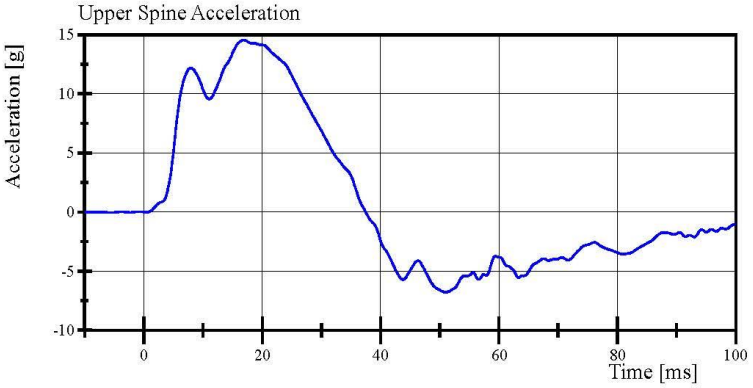
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Probe Acceleration



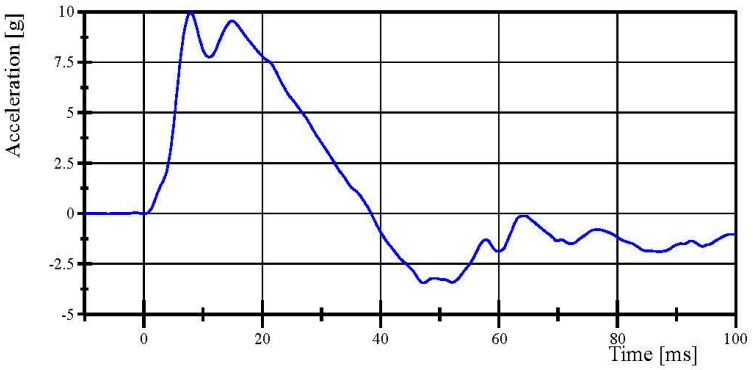
Filter Class: CFC_180
Max: 0.1 g at 59.0 ms
Min: -15.3 g at 19.2 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 14.6 g at 16.9 ms
Min: -6.8 g at 51.0 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 10.0 g at 7.8 ms
Min: -3.4 g at 47.2 ms

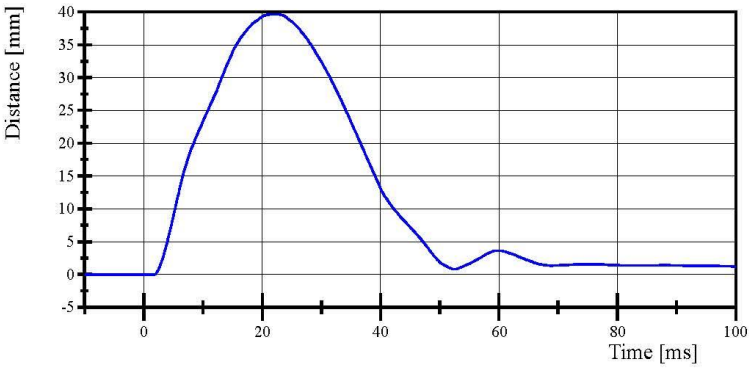
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:47:39 851

Transportation Research Center Inc.

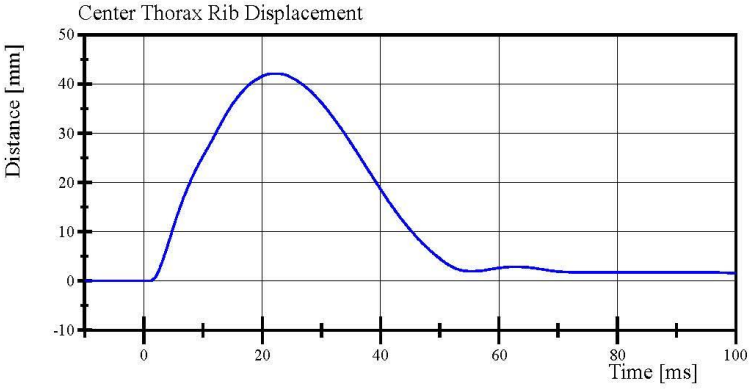
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Upper Thorax Rib Displacement



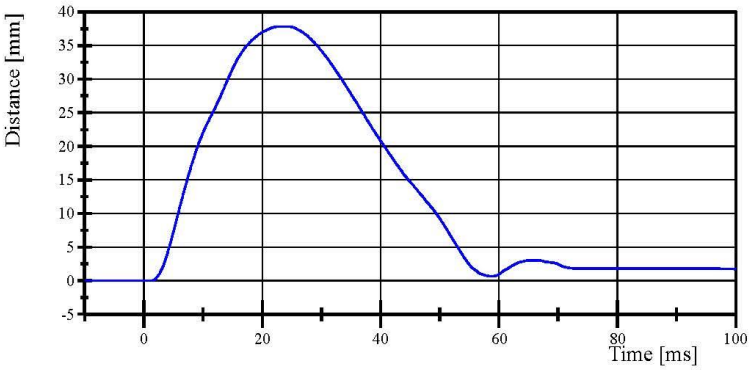
Filter Class: CFC_600
Max: 39.7 mm at 21.9 ms
Min: -0.0 mm at 1.6 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 42.1 mm at 22.2 ms
Min: -0.0 mm at 0.8 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 37.8 mm at 23.2 ms
Min: -0.0 mm at 1.3 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:47:39 851

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.0 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	39.7 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	38.5 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	11.78 g	Yes

Test meets specifications.

Condition: Used
Comments:
Upper Abdominal Rib S/N: DM7281
Lower Abdominal Rib S/N: DM7275

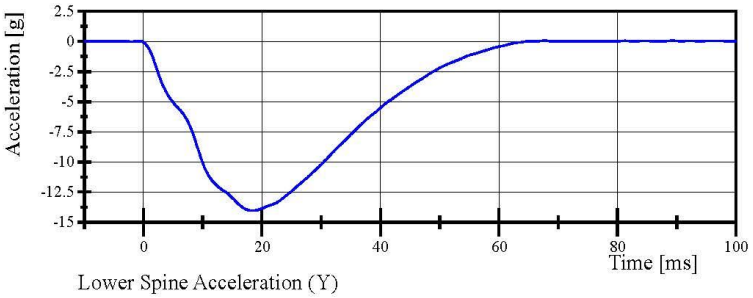
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:37:48 688

Transportation Research Center Inc.

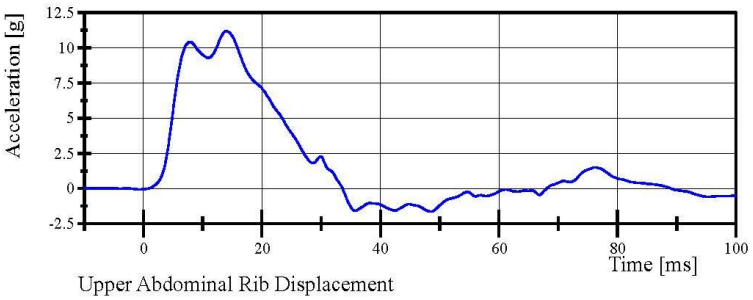
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Probe Acceleration



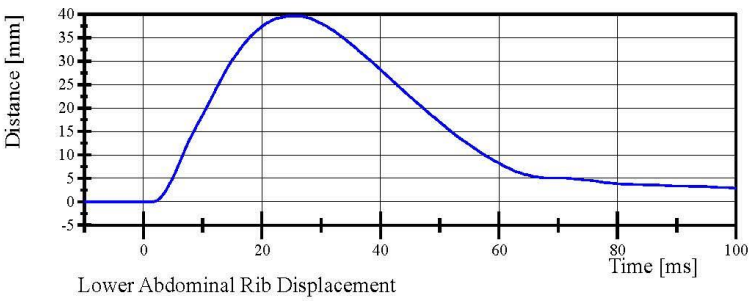
Filter Class: CFC_180
Max: 0.1 g at 67.7 ms
Min: -14.0 g at 18.5 ms

Lower Spine Acceleration (Y)



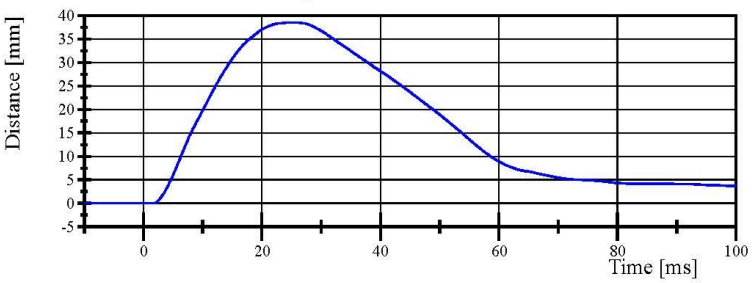
Filter Class: CFC_180
Max: 11.2 g at 14.0 ms
Min: -1.6 g at 48.6 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 39.7 mm at 25.2 ms
Min: -0.0 mm at -1.3 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 38.5 mm at 25.2 ms
Min: -0.0 mm at 1.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:38:16 688

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.61 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-42.97 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	36.1 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,823.1 N	Yes

Test meets specifications.

Condition: Used

Comments:
Pelvis Skin S/N: 1171
Pelvis Plug Info:
Manufacturer: Saco
S/N: 13802
Cal Date: 20200508

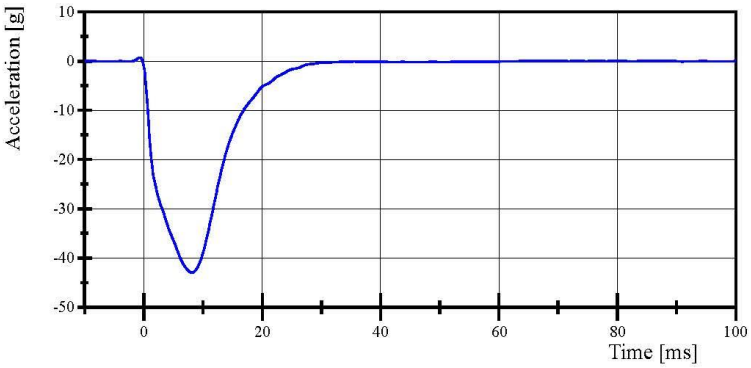
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

04.06.2023 11:25:57 462

Transportation Research Center Inc.

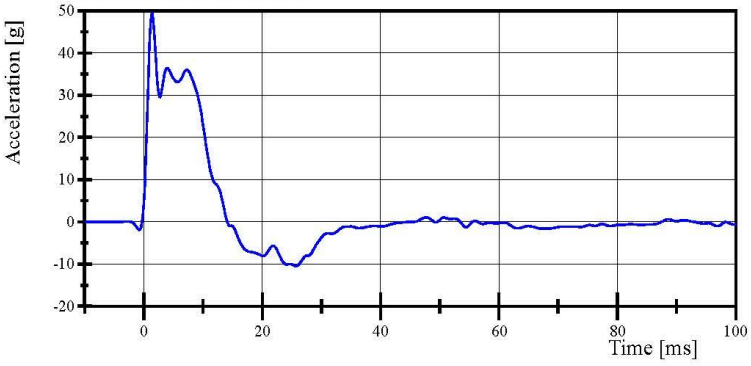
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Probe Acceleration



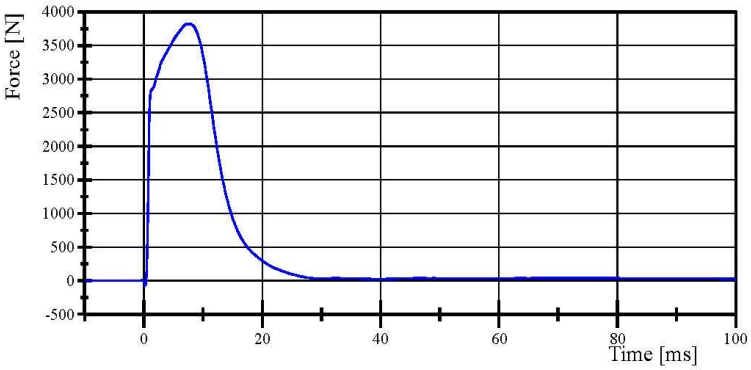
Filter Class: CFC_180
Max: 0.7 g at -0.7 ms
Min: -43.0 g at 8.1 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 49.4 g at 1.4 ms
Min: -10.4 g at 25.7 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 3,823.1 N at 7.4 ms
Min: -67.7 N at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 11:26:56 462

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.24 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-44.3 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	38.2 g	Yes
Iliac Force	4,100 - 5,100 N	5,293.7 N	No

Test does not meet specifications.

Condition: Used
Comments:
Pelvis Skin S/N: 1171

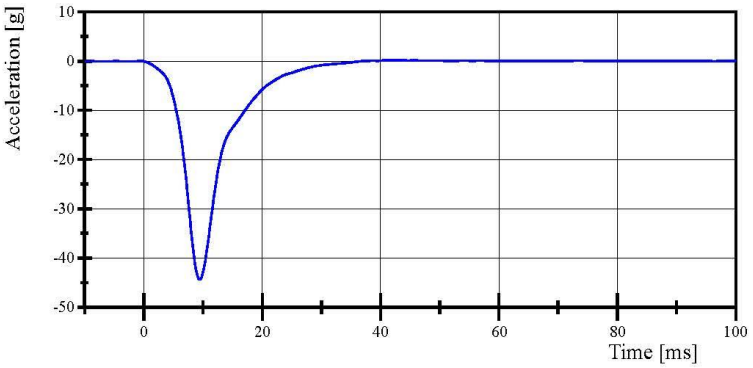
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:21:21 714

Transportation Research Center Inc.

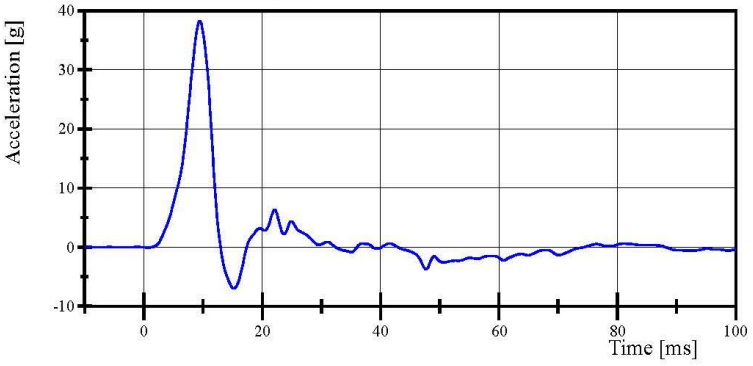
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 63-1
Test Date: 4/6/2023

Probe Acceleration



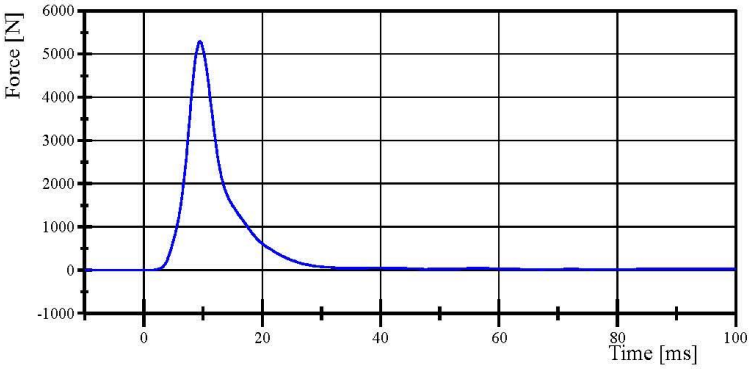
Filter Class: CFC_180
Max: 0.2 g at 41.4 ms
Min: -44.3 g at 9.4 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 38.2 g at 9.4 ms
Min: -7.0 g at 15.2 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 5,293.7 N at 9.5 ms
Min: -1.0 N at -6.6 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

04.06.2023 09:21:53 714

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 297		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	P93539	Endevco	31-Jan-2023
			Y	P93549	Endevco	31-Jan-2023
			Z	P93776	Endevco	31-Jan-2023
Displacement Potentiometers	Shoulder		Y	N/A	N/A	N/A
	Thoracic Rib	Upper	Y	023	Servo	1-Feb-2023
		Middle	Y	063	Servo	1-Feb-2023
		Lower	Y	043	Servo	1-Feb-2023
	Abdominal Rib	Upper	Y	1152	Servo	1-Feb-2023
		Lower	Y	051	Servo	1-Feb-2023
Lower Spine Accelerometers (T12)			X	P94425	Endevco	31-Jan-2023
			Y	P91522	Endevco	31-Jan-2023
			Z	P91511	Endevco	31-Jan-2023
Acetabulum Load Cell			Y	235-FY	FTSS	31-Jan-2023
Iliac Wing Load Cell			Y	320-FY	FTSS	31-Jan-2023
Pelvis Plug (struck side)				13798	SACO	8-May-2020
Pelvis Plug (non-struck side)				13801	SACO	8-May-2020

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A254929	Measurement Specialties	10-Nov-2022
Vehicle Center of Gravity	Y	A349794	Measurement Specialties	28-Mar-2023
Vehicle Center of Gravity	Z	A377448	Measurement Specialties	28-Mar-2023
Left Floor Sill	Y	A300456	Measurement Specialties	28-Mar-2023
A-Pillar Sill	Y	A400122	Measurement Specialties	28-Mar-2023
A-Pillar Low	Y	A349788	Measurement Specialties	27-Mar-2023
A-Pillar Mid	Y	A378323	Measurement Specialties	27-Mar-2023
B-Pillar Sill	Y	A318460	Measurement Specialties	7-Oct-2022
B-Pillar Low	Y	A318461	Measurement Specialties	28-Mar-2023
B-Pillar Mid	Y	A297045	Measurement Specialties	28-Mar-2023
Driver Seat	Y	A318488	Measurement Specialties	28-Mar-2023
Engine Top	X	A377538	Measurement Specialties	28-Mar-2023
Engine Top	Y	A300416	Measurement Specialties	28-Mar-2023
Firewall	Y	A298550	Measurement Specialties	27-Mar-2023
Right Roof	Y	A298323	Measurement Specialties	28-Mar-2023
Right Floor Sill	Y	A381841	Measurement Specialties	27-Mar-2023
Rear Floor Pan	X	A318453	Measurement Specialties	27-Mar-2023
Rear Floor Pan	Y	A400088	Measurement Specialties	28-Mar-2023

TABLE 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	N/A	N/A	N/A
Load Cell 2	N/A	N/A	N/A
Load Cell 3	DK7118S	Humanetics	3-Jan-2023
Load Cell 4	DK7124S	Humanetics	3-Jan-2023
Load Cell 5	DK7111S	Humanetics	3-Jan-2023
Load Cell 6	DK7126S	Humanetics	3-Jan-2023
Load Cell 7	DK7112S	Humanetics	3-Jan-2023
Load Cell 8	DK7074S	Humanetics	3-Jan-2023