

REPORT NUMBER: SideNCAPMDB-KAR-25-003

**NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST**

**HYUNDAI MOTOR COMPANY
2025 HYUNDAI TUCSON HEV 5-DOOR MPV**

NHTSA No: M20254205

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



JANUARY 31, 2025

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NRM-100
1200 NEW JERSEY AVE, SE
WASHINGTON, D.C. 20590**

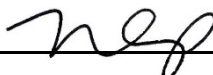
This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department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

Prepared By:  _____

Mr. Rushlan Amin, Project Engineer
Applus+ IDIADA KARCO Engineering, LLC.

Reviewed By:  _____

Mr. René Molina Serrano, Laboratory Manager
Applus+ IDIADA KARCO Engineering, LLC.

Approved By:  _____

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

Approval Date: _____ January 31, 2025 _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SideNCAPMDB-KAR-25-003	2. Government Accession No.	3. Recipient's Catalog No.																																																			
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205		5. Report Date January 31, 2025																																																			
		6. Performing Organization Code KAR																																																			
7. Authors Mr. Rushlan Amin, Project Engineer, Applus+ IDIADA KARCO Engineering, LLC Mr. René Molina Serrano, Laboratory Manager, Applus+ IDIADA KARCO Engineering, LLC		8. Performing Organization Report No. TR-P45008-01-NC																																																			
		10. Work Unit No.																																																			
9. Performing Organization Name and Address Applus+ IDIADA KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		11. Contract or Grant No. 693JJ920D000015																																																			
		13. Type of Report and Period Covered Final Test Report, January 21, - January 31, 2025																																																			
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-100) 1200 New Jersey Ave., SE Washington, D.C. 20590		14. Sponsoring Agency Code NRM-100																																																			
		15. Supplementary Notes																																																			
16. Abstract A 61.9 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2025 Hyundai Tucson HEV 5-Door MPV in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on January 21, 2025. The impact velocity of the Moving Deformable Barrier was 61.70 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 12.2°C. The target vehicle's maximum post-test static crush was 172 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>43.679</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>44</td> <td>15.149</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>491.351</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>1040.591</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Passenger ATD (SID-IIs)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>64.412</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>49.972</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetubular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>2000.087</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>4.672</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45*</td> <td>23.606</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (ES-2re)			Units	IARV	Result	Head Injury Criteria (HIC ₃₆)		1000	43.679	Maximum Thoracic Rib Deflection	mm	44	15.149	Total Abdominal Force	N	2500	491.351	Pubic Symphysis Force	N	6000	1040.591	Measurement Description	Passenger ATD (SID-IIs)			Units	IARV	Result	Head Injury Criteria (HIC ₃₆)		1000	64.412	Resultant Lower Spine Acceleration	g	82	49.972	Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	2000.087	Maximum Thoracic Rib Deflection	mm	38*	4.672	Maximum Abdominal Rib Deflection	mm	45*	23.606
Measurement Description	Driver ATD (ES-2re)																																																				
	Units	IARV	Result																																																		
Head Injury Criteria (HIC ₃₆)		1000	43.679																																																		
Maximum Thoracic Rib Deflection	mm	44	15.149																																																		
Total Abdominal Force	N	2500	491.351																																																		
Pubic Symphysis Force	N	6000	1040.591																																																		
Measurement Description	Passenger ATD (SID-IIs)																																																				
	Units	IARV	Result																																																		
Head Injury Criteria (HIC ₃₆)		1000	64.412																																																		
Resultant Lower Spine Acceleration	g	82	49.972																																																		
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	2000.087																																																		
Maximum Thoracic Rib Deflection	mm	38*	4.672																																																		
Maximum Abdominal Rib Deflection	mm	45*	23.606																																																		
17. Key Words New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division 1200 New Jersey Ave., SE Washington, DC 20590																																																			
		19. Security Classification of this report UNCLASSIFIED																																																			
20. Security Classification of this page UNCLASSIFIED		21. No. of Pages 181	22. Price																																																		

*Proposed IARV

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Occupant and Vehicle Information/Data Sheets	4
<u>Data Sheet</u>		<u>Page</u>
1	General Test and Vehicle Parameter Data	5
2	Seat, Seat Belt, Steering Wheel Adjustment, and Fuel System Data	9
3	Dummy Longitudinal Clearance Dimensions	13
4	Dummy Lateral Clearance Dimensions	14
5	Camera and Instrumentation Data	15
6	Test Vehicle Accelerometer Locations	16
7	MDB Accelerometer Locations	17
8	Post-Test Observations	18
9	MDB Summary of Results	21
10	Test Vehicle Profile Measurements	22
11	Test Vehicle Exterior Crush Measurements	23
12	MDB Exterior Static Crush Measurements	26
13	Vehicle and MDB Damage Profile Distances	27
14	FMVSS No. 301 Static Rollover Results	28
15	Dummy/Vehicle Temperature and Humidity Stabilization	29
305-1	General Test and Vehicle Parameter Data for Indicant FMVSS No. 305 Testing	30
305-2	Pre-Impact Data for Indicant FMVSS No. 305 Testing	32
305-3	Pre-Impact Electrical Isolation Measurements and Calculations for Indicant FMVSS No. 305 Testing	33
305-4	Post-Impact Data for Indicant FMVSS No. 305 Testing	34
305-5	Static Rollover Test Data for Indicant FMVSS No. 305 Testing	35
<u>Appendix</u>		<u>Page</u>
A	Photographs	A
B	Vehicle and Dummy Response Data Plots	B
C	ATD Configuration and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration Data	D

SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2025 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number 693JJ920D000015. The purpose of this test is to generate comparative side impact performance in a 2025 Hyundai Tucson HEV 5-Door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A 2025 Hyundai Tucson HEV 5-Door MPV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.70 km/h (38.34 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by Applus IDIADA KARCO Engineering, LLC. in Adelanto, California, on January 21, 2025. Pre- and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in Appendix A of this report.

Dummies were placed in the driver and left rear designated seating position according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated March 2020. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen forward, middle, and rear y-axis load cells

Lower spine (12) tri-axial accelerometers

Pubic symphysis y-axis load cell

PASSENGER ATD (SID-IIs)

Primary and redundant head CG tri-axial accelerometers

Head triaxial angular rate sensors

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen upper rib and lower rib y-axis displacement potentiometers

Lower spine (12) tri-axial accelerometers

Acetabulum and iliac wing y-axis load cells

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 of this report contains the test equipment and instrumentation calibration data.

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	43.679
Maximum Thoracic Rib Deflection	mm	44	15.149
Combined Abdominal Force	N	2500	491.351
Pubic Symphysis Force	N	6000	1040.591
Lower Spine (T12) Resultant Acceleration	g	82*	17.964

**Proposed IARV*

Measurement Description	Units	Passenger ATD (SID-1Is)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	64.412
Lower Spine (T12) Resultant Acceleration	g	82	49.972
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2000.087
Maximum Thoracic Rib Deflection	mm	38*	4.672
Maximum Abdominal Rib Deflection	mm	45*	23.606

**Proposed IARV*

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver)		Left Rear (Passenger)	
	Occupant Location 1		Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Air Bag	Yes	No		
Knee Air Bag				
Side Air Bag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Air Bag 2 (Torso/Pelvis)	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

GENERAL COMMENTS:

None.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

CONVERSION FACTORS

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

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20254205
Model Year	2025
Make	Hyundai
Model	Tucson HEV
Body Style	5-Door MPV
VIN	KM8JBDD15SU281566
Body Color	Creamy White Pearl
Odometer Reading (km / mi)	195/121
Engine Displacement (L)	1.6
Type / No. of Cylinders	4-Cylinder
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	N/A
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	No
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	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	Yes
Driver Front Air Bag	Yes
Driver Curtain Air Bag	Yes
Driver Head/Torso Air Bag	No
Driver Torso Air Bag	No
Driver Torso/Pelvis Air Bag	Yes
Driver Pelvis Air Bag	No
Driver Knee Air Bag	No
Rear Pass. Curtain Air Bag	Yes
Rear Pass. Head/Torso Air Bag	No
Rear Pass. Torso Air Bag	No
Rear Pass. Torso/Pelvis Air Bag	Yes
Rear Pass. Pelvis Air Bag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	No

Does Owner's Manual provide instructions to turn off automatic door locks?

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company
Date of Manufacture	Oct-2024
Vehicle Type	MPV

GVWR (kg)	2270
GAWR Front (kg)	1260
GAWR Rear (kg)	1200

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				420.0	A
DSC x 68 (kg)				340.0	B
Cargo Weight (RCLW) (kg)				80.0	A-B

**For trucks or MPVs, if A-B>136, RCLW=136 kg

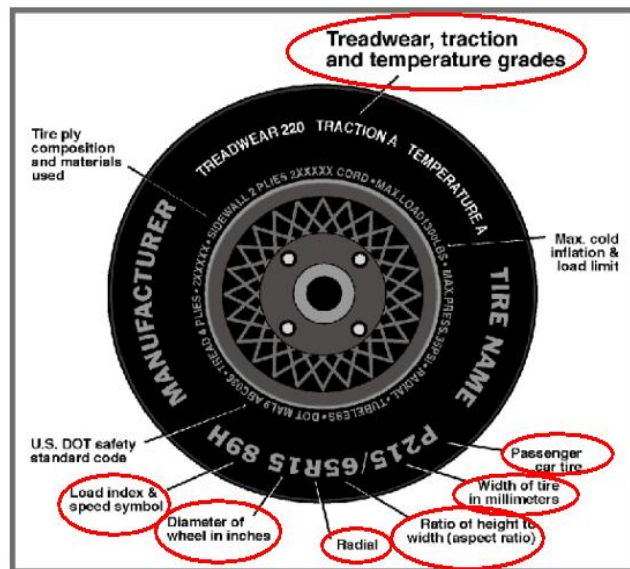
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
Front Seat	Yes					w/ Lever	w/ Knob
Rear or Second Row Seat			Yes			Yes	
Third Row Seat						Yes	

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/65 R17	235/65 R17
Tire Size on Vehicle	235/65 R17	235/65 R17
Tire Manufacturer	Nexen	Nexen
Tire Model	Roadian GTX	Roadian GTX
Treadwear	600	600
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	104 H	104 H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1UA9Y DMLR 3424	1UA9Y DMLR 3424
DOT Safety Code Right	1UA9Y DMLR 3424	1UA9Y DMLR 3424

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	260	260	280	280
Tire Placard	kPa	260	260	280	280
Owner's Manual	kPa	260	260	280	280
As Tested	kPa	260	260	280	280

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	220	220	220	220

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	520.0	341.0		574.0	424.5		553.0	417.5	
Right	kg	509.5	346.5		505.5	410.0		509.5	443.0	
Ratio	%	60.0%	40.0%		56.4%	43.6%		55.3%	44.7%	
Total	kg	1029.5	687.5	1717.0	1079.5	834.5	1914.0	1062.5	860.5	1923.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1717.0	A
Sum of Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	80.0	C
Calculated Target Vehicle Test Weight (TVTW)	kg	1922.0	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 -9.0 kg)? ☒ Yes ☐ No

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement***
LF	mm	791	800	Yes
RF	mm	800	808	Yes
LR	mm	828	835	Yes
RR	mm	836	837	Yes
Vehicle CG (Aft of Front Axle)	mm	1231	1200	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	3	13	

***The "As Tested" vehicle attitude measurements must be equal to or within ±10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirement"

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

Test Height Adjustable Setting (If Applicable)	
--	--

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Rear Trim Removed	3.5

TEST SURFACE MARKINGS

	Distance from 63° Impact Angle Line (mm)
Fore 25 mm target	0
Aft 25 mm target	0
Pre-Impact Angle Line	63°

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	1355	689
C	1355	3756
D	0	3059

DATA SHEET NO. 2

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, 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 rearmost, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	22.1	13.1	17.6
Front Passenger Seat			15.8
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

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	Forwardmost
Driver Seat	17.6	706	Max	728	736	743
			Mid	699	706	711
			Min	667	675	679
Front Passenger Seat	15.8	677	Max			
			Mid	671	677	653
			Min			
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

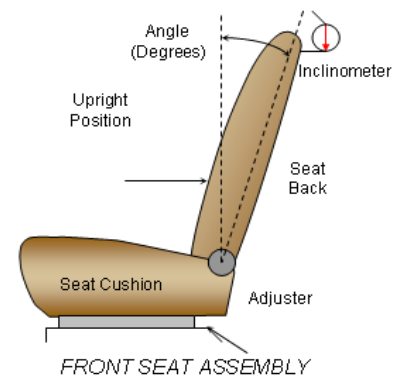
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	34	120	17
Front Passenger Seat	240	34	120	17
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

SEAT BACK ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The right front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is adjustable. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck side rear seat back. Seat back angle is measured at the head rest post.



SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/ Seated Dummy	66.1	45	17.6	12
Front Passenger Seat	59.7	30	13.0	6
Front Center Seat				
Struck Side Rear Seat w/ Seated Dummy	29.1	12	3.7	1
Non-Struck Side Rear Seat	29.1	12	3.7	1
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. The positions are marked H, M2, M1, L from top to bottom.

	Total No. of Positions	Placed in Position
Driver Seat	4	H
Rear Seat	Fixed	Fixed

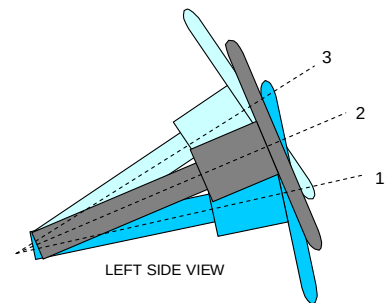
HEAD RESTRAINT ADJUSTMENT

The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total No. of Positions	Placed in Position
Driver Seat	5	Highest
Rear Seat	2	Lowest

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	23.5	0
Geometric Center Position, No. 2	25.8	25
Uppermost Position, No. 3	28.0	50
Telescoping Steering Wheel Travel		50
Test Position	25.8	25

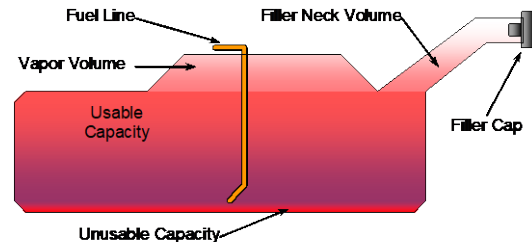
DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

FUEL PUMP

The vehicle is equipped with an electric fuel pump. The pump will work at "ignition on" until pressure in the system has reached working pressure in the system; then it will stop pumping fuel until the engine has been started.



FUEL TANK CAPACITY

VEHICLE FUEL TANK ASSEMBLY

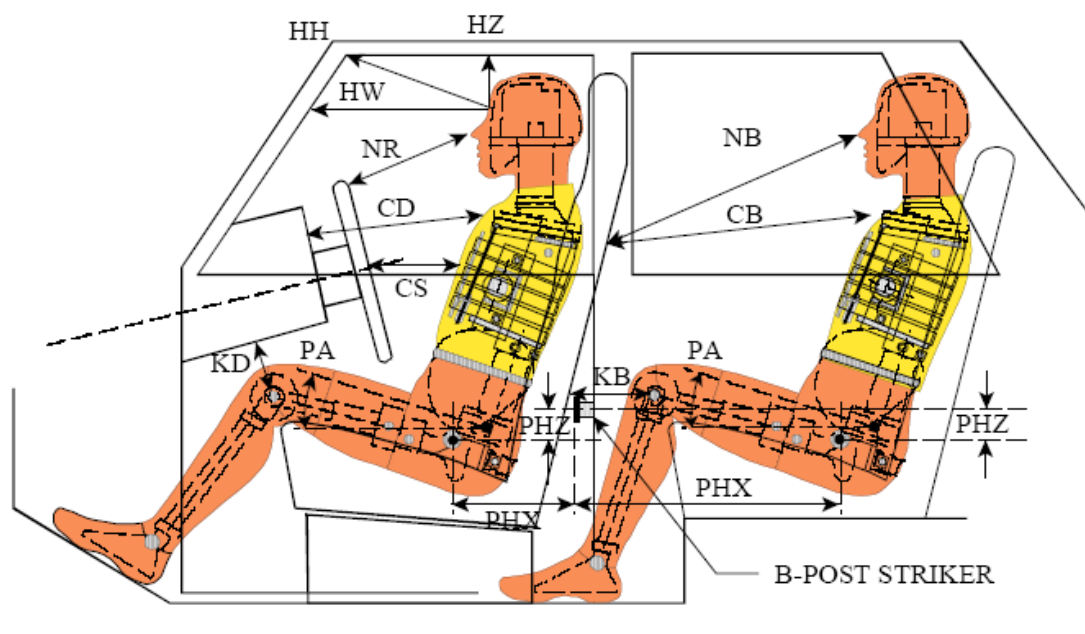
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	51.86
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	51.86
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	48.23
Actual Amount of Solvent Used in Test	48.23
1/3 of Usable Capacity	17.29

Is the Actual Amount of Solvent Used in the test equal to $93\% \pm 1\%$ of the Usable Capacity stated in the Form No. 1? ☒ Yes ☐ No

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	372			
HW		Head to Windshield	607			
HZ	HZ	Head to Roof	187		290	
NR	NB	Nose to Rim/Seat Back	470		529	
CD	CB	Chest to Dash/Seat Back	635		525	
CS		Chest to Steering Wheel	346			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	230	20.0	285	6.0
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	206	6.0	270	8
PAX°	PAX°	Pelvic Tilt Angle X		20.5		19.8
	PAY°	Pelvic Tilt Angle Y		0.0		0.0
PHX	PHX	Hip Point to Striker (x-axis)	159		220	
PHZ	PHZ	Hip Point to Striker (z-axis)	195		134	

DATA SHEET NO. 4

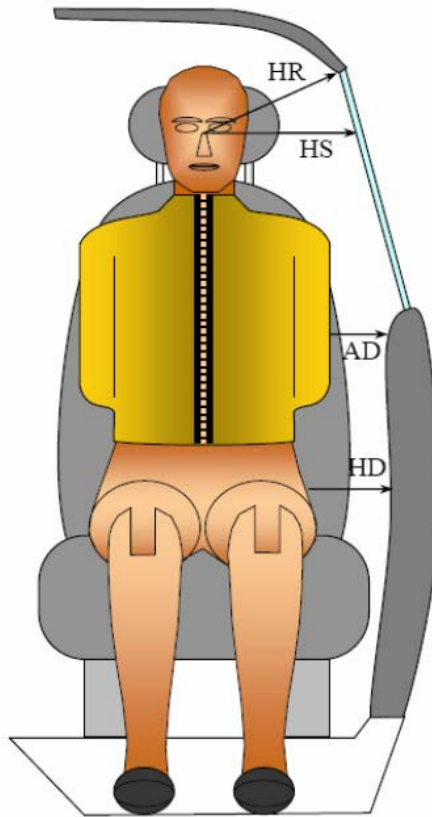
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV

NHTSA No. M20254205

Test Program: NCAP MDB Side Impact Test

Test Date: 01/21/2025



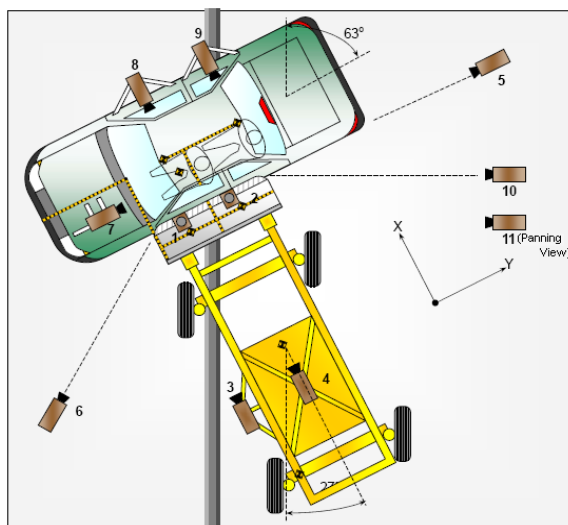
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	240	285
HS	Head to Side Window	mm	350	365
AD	Arm to Door	mm	98	156
HD	H-Point to Door	mm	150	185

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



CAMERA LOCATIONS AND DATA

No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	1220	2287	-5486	14	1000
2	Overhead Close-Up	609	2287	-5102	35	1000
3	Left Impact Point (MDB)	-2134	0	-1143	25	1000
4	Side Overall (MDB)	-3912	838	-1829	12.5	1000
5	Rear	-64	2485	-1348	85	1000
6	Left Front	-2266	-3564	-1475	24	1000
7	Driver Front (On-Board)	316	-1424	608	8.5	1000
8	Driver Side (On-Board)	435	-1451	576	8	1000
9	Passenger Side (On-Board)	342	-1418	650	8	1000
10	Real Time Overall				Zoom	30
11	Real Time Inrun				Zoom	30

Reference: Impact Point Projected to Ground; +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

*All measurements accurate to ± 6 mm

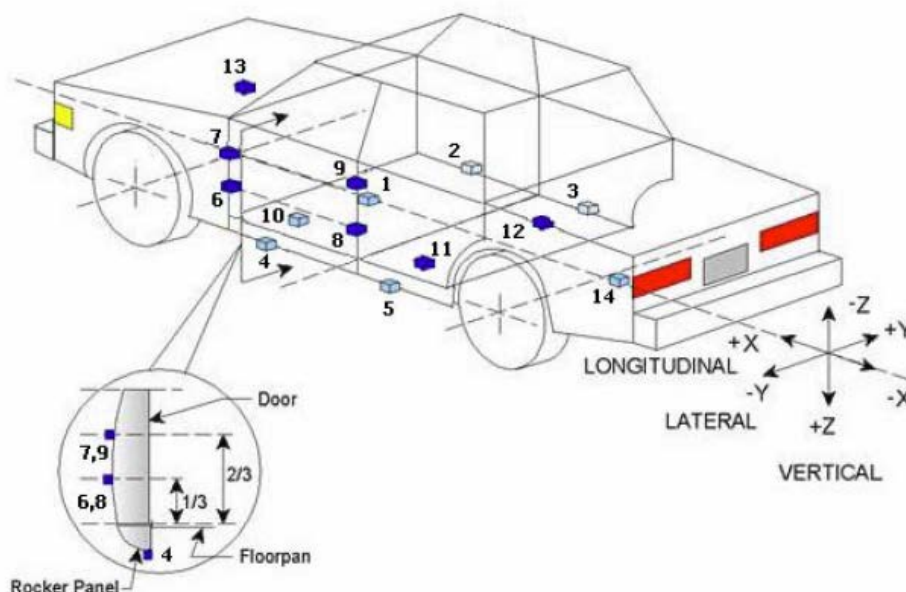
INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Channels	5
Total	63

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

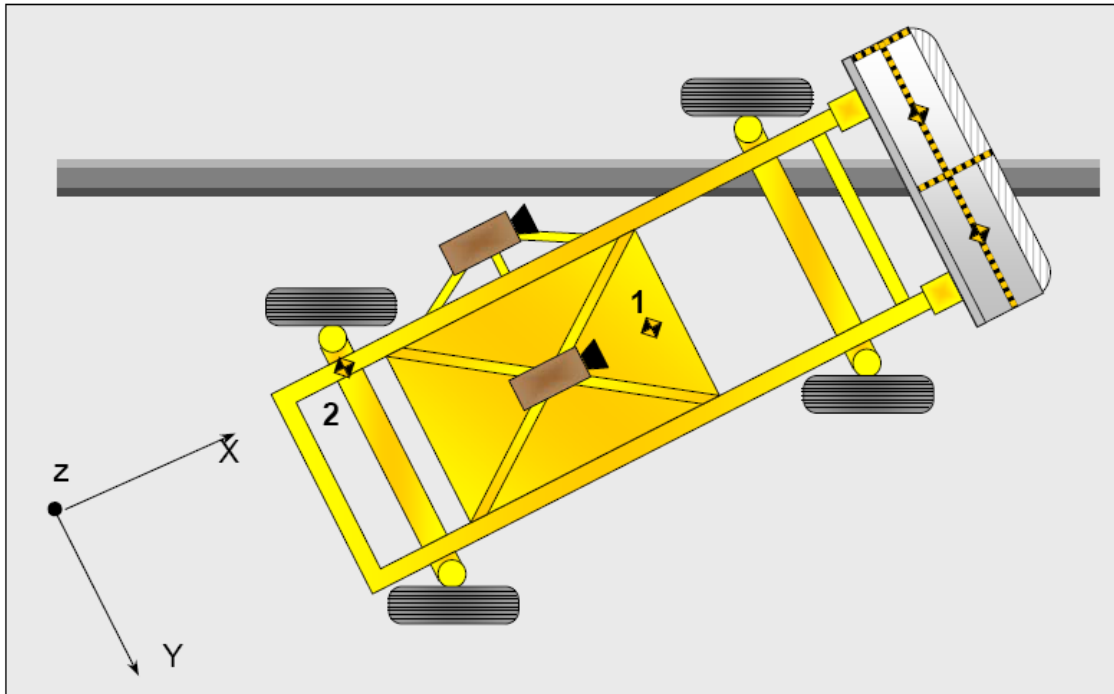
Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1738	0	-465
2	Right Sill at Front Seat	2743	700	-508
3	Right Sill at Rear Seat	1691	700	-508
4	Left Sill at Front Door	2235	-782	-293
5	Left Sill at Rear Door	1742	-782	-293
6	A-Pillar Lower	3044	-822	-690
7	A-Pillar Middle	3044	-822	-933
8	B-Pillar Lower	1985	-716	-844
9	B-Pillar Middle	1985	-716	-1053
10	Front Seat Track	2354	-560	-526
11	Rear Seat Structure	1698	-278	-673
12	Right Rear Occupant Compartment	2247	355	-412
13	Engine Block	3780	-150	-870
14	Rear Floorpan Above Axle	825	0	-482

Reference: X – Rear surface of vehicle (+ forward)
 Y – Vehicle centerline (+ to right)
 Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	-1195	0	-430
2	MDB Rear	-2642	-593	-608

Reference: X – Face of MDB (+ forward)
 Y – MDB centerline (+ to right)
 Z – Ground plane (+ down)

Width between left and right MDB contact switches	mm	1535
---	----	------

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Air Bag	Curtain Air Bag
Top of Head	Curtain Air Bag, Headliner	Curtain Air Bag
Left Side of Head	Curtain Air Bag	Curtain Air Bag
Back of Head	Headrest, Curtain Air Bag	Curtain Air Bag, Headrest
Left Shoulder	Torso/Pelvis Air Bag, Curtain Air Bag	Torso/Pelvis Air Bag
Upper Torso	Torso/Pelvis Air Bag, Seat Bolster	Torso/Pelvis Air Bag, Seat Bolster
Lower Torso	Torso/Pelvis Air Bag, Seat Bolster	Torso/Pelvis Air Bag, Seat Bolster
Left Hip	Torso/Pelvis Air Bag	Torso/Pelvis Air Bag, Seat Bolster
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/Other
	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 System 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

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

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	None
Side Window Damage	None
Other Notable Effects	None

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side		Struck Side	
	Driver		Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Air Bag	Yes	No		
Knee Air Bag				
Side Air Bag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Air Bag 2 (Torso/Pelvis)	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheelbase	mm		2752
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		447
Actual Impact Point (Aft of Front Axle)	mm		441
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	6
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	14

DATA SHEET NO. 9**MDB SUMMARY OF RESULTS**

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1251
Overall Length Including Honeycomb Face	4115
Wheelbase of Framework Carriage	2595
CG location aft of Front Axle	1118

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	398.5	295.0	693.5
Right	kg	379.0	293.0	672.0
Ratio	%	56.9%	43.1%	100.0%
Totals	kg	777.5	588.0	1365.5

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.70
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.66
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.7
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.2
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.5

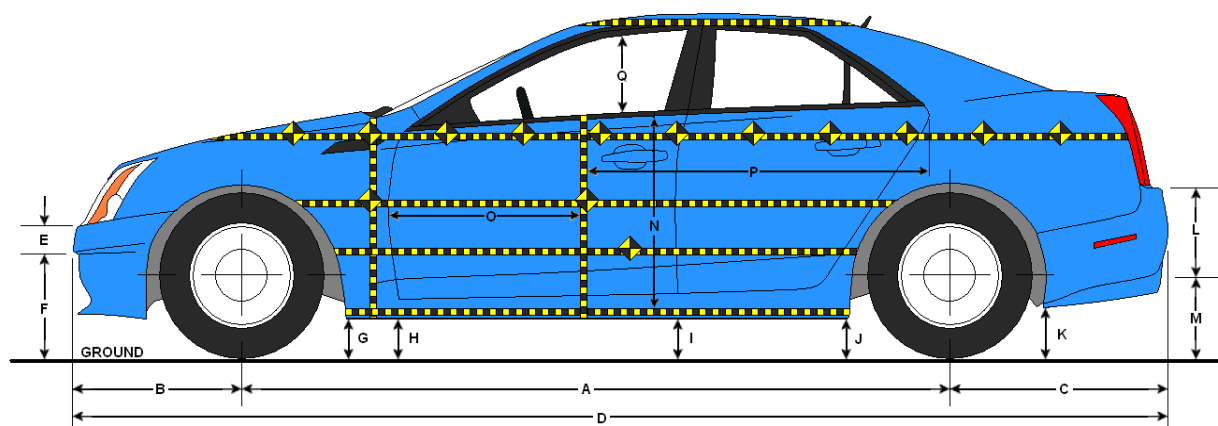
MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	247
B	Top of Bumper	533	800	Left	191
C	Mid Level	686	800	Left	161
D	Top of Stack	813	800	Left	174

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Change
A	Wheelbase	2752	2761	9
B	Front Axle to FSOV	909	901	-8
C	Rear Axle to RSOV	976	981	5
D	Total Length at Centerline	4641	4642	1
E	Front Bumper Thickness	103	103	0
F	Front Bumper Bottom to Ground	423	421	-2
G	Sill Height at Front Wheel Well	522	517	-5
H	Sill Height at Front Door Leading Edge	521	511	-10
I	Sill Height at B-Pillar	531	529	-2
J1	Sill Height at Rear Wheel Well	468	601	133
J2	Pinch Weld Height at Rear Wheel Well	622	628	6
K	Sill Height Aft of Rear Wheel Well	541	538	-3
L	Rear Bumper Thickness	125	125	0
M	Rear Bumper Bottom to Ground	474	472	-2
N	Sill Height to Bottom of Front Window Sill	712	718	6
O	Front Door Leading Edge to Impact CL	768	767	-1
P	Rear Door Trailing Edge to Impact CL	1396	1372	-24
Q	Front Window Opening	449	460	11
R	Right Side Length	3460	3463	3
S	Left Side Length	3457	3454	-3
T	Vehicle Width at B-Pillar	1825	1780	-45

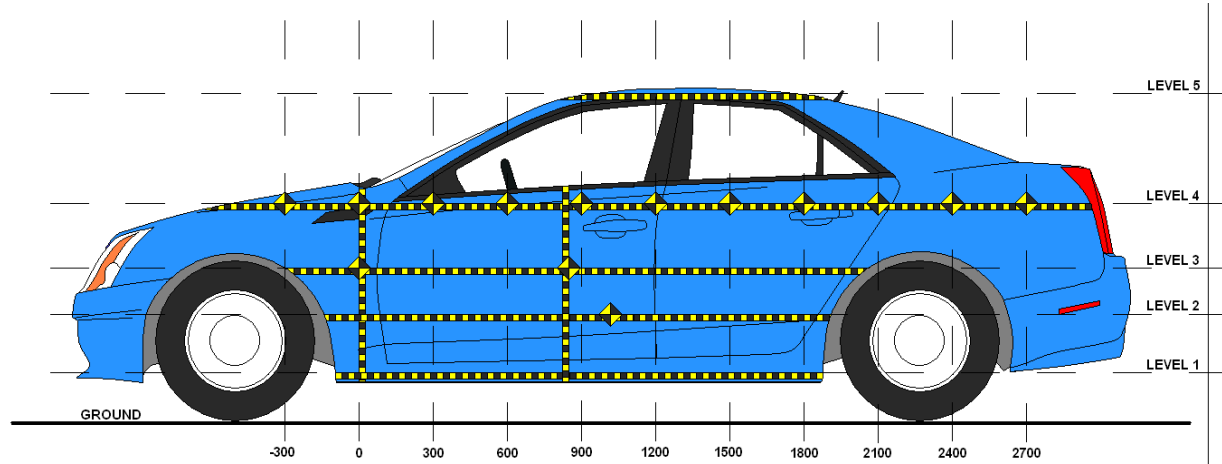
All measurements in mm with tolerance of $\pm 3\text{mm}$

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205

Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	399	147	1650
2	Occupant H-Point	648	170	1650
3	Mid-Door	711	172	1650
4	Window Sill	1063	21	1200
5	Window Top	1570	1	1650

DATA SHEET NO. 11 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test (mm)					Post-Test (mm)					Crush (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150															
0	592	572	570	692		603	588	581	689		11	16	11	-3	
150	607	581	581	686		681	669	678	661		74	88	97	-25	
300	614	595	592	684		700	715	692	662		86	120	100	-22	
450	614	598	598	680		705	706	698	650		91	108	100	-30	
600	615	595	594	674		714	700	723	640		99	105	129	-34	
750	617	594	592	667	874	720	717	732	643	872	103	123	140	-24	-2
900	619	594	592	662	873	721	723	737	644	872	102	129	145	-18	-1
1050	623	596	593	657	877	717	717	714	651	877	94	121	121	-6	0
1200	630	600	596	654	882	718	708	716	675	882	88	108	120	21	0
1350	624	604	599	646	886	747	742	723	658	885	123	138	124	12	-1
1500	613	593	595	633	888	747	721	738	644	888	134	128	143	11	0
1650	600	580	581	624	889	747	750	753	635	890	147	170	172	11	1
1800	584	568	568	627	892	700	729	733	638	891	116	161	165	11	-1
1950		565	567	631	893		622	627	624	893		57	60	-7	0
2100				636	896				626	895				-10	-1
2250				632	898				641	897				9	-1
2400															
2550															
2700															
2850															

DATA SHEET NO. 11 ... (CONTINUED)

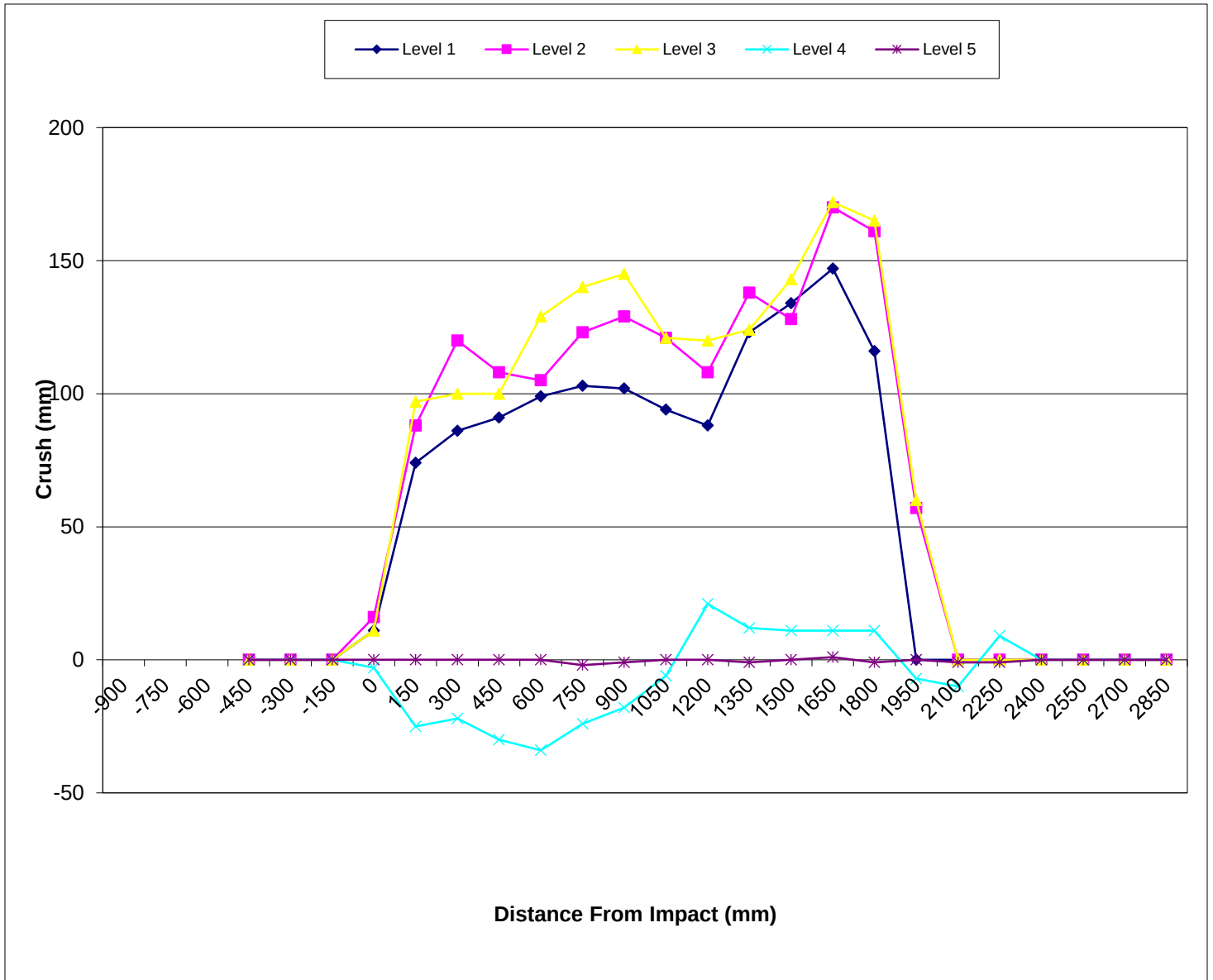
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV

NHTSA No. M20254205

Test Program: NCAP MDB Side Impact Test

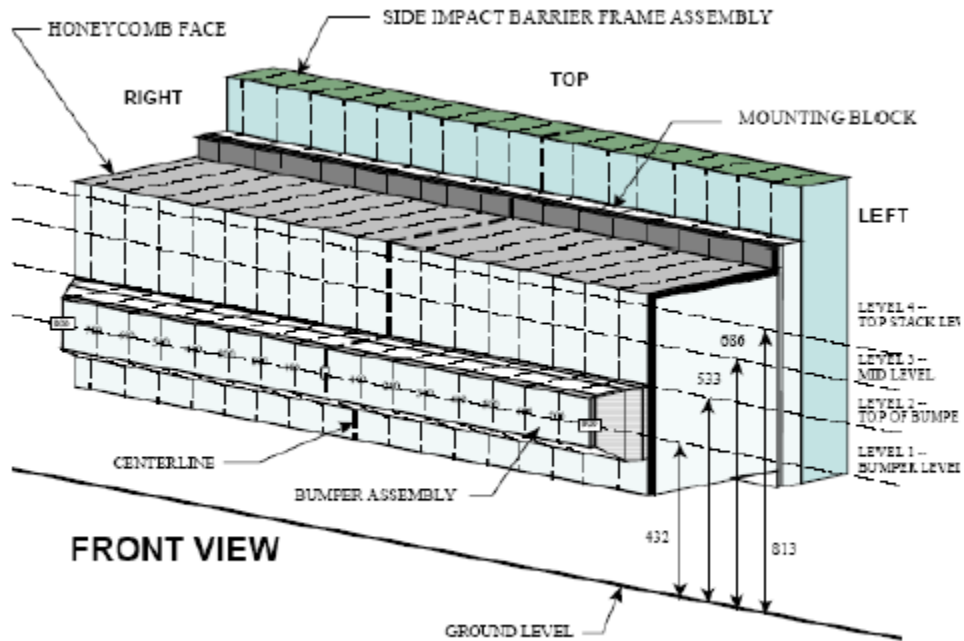
Test Date: 01/21/2025



DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



NOTE: Dimensions are shown in millimeters, mm.

DEFORMABLE BARRIER STATIC CRUSH

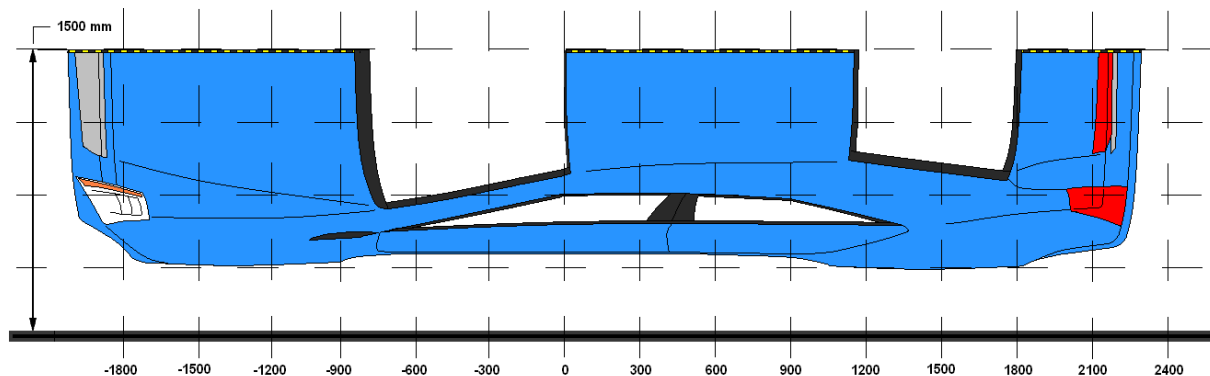
Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	215	203	207	203	211	210	217	212	216	215	213	216	218	222	215	228	247
2	150	142	146	146	142	136	137	133	141	148	153	157	161	164	167	173	191
3	86	91	81	72	82	109	118	94	84	84	79	73	71	75	88	111	161
4	87	84	80	91	105	98	118	95	76	70	70	76	84	90	106	135	174

*All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2250	4	632	641	9
2	1800	3	568	733	165
3	1350	2	604	742	138
4	900	3	592	737	145
5	450	2	598	706	108
6	0	2	572	588	16

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	247
2	500	Left	1	222
3	200	Left	1	213
4	200	Right	1	217
5	500	Right	1	203
6	800	Right	1	215

DATA SHEET NO. 14

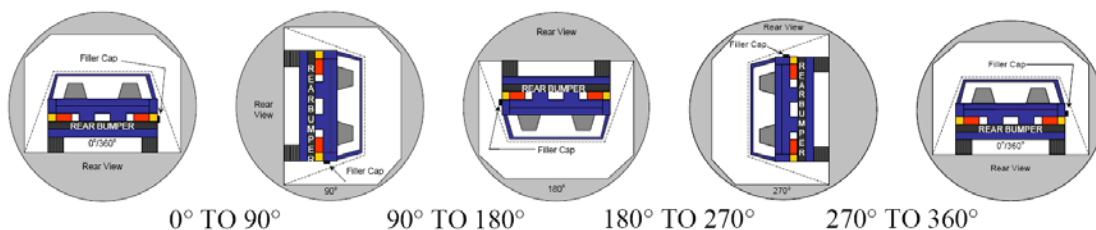
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205

Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

Temperature at Time of Impact: 12.2°C Test Time: 1:36 P.M.

- A. From impact until vehicle motion ceases: N/A oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: N/A oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: N/A oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: No spillage.



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°			
90° To 180°			
180° To 270°			
270° To 360°			

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 15

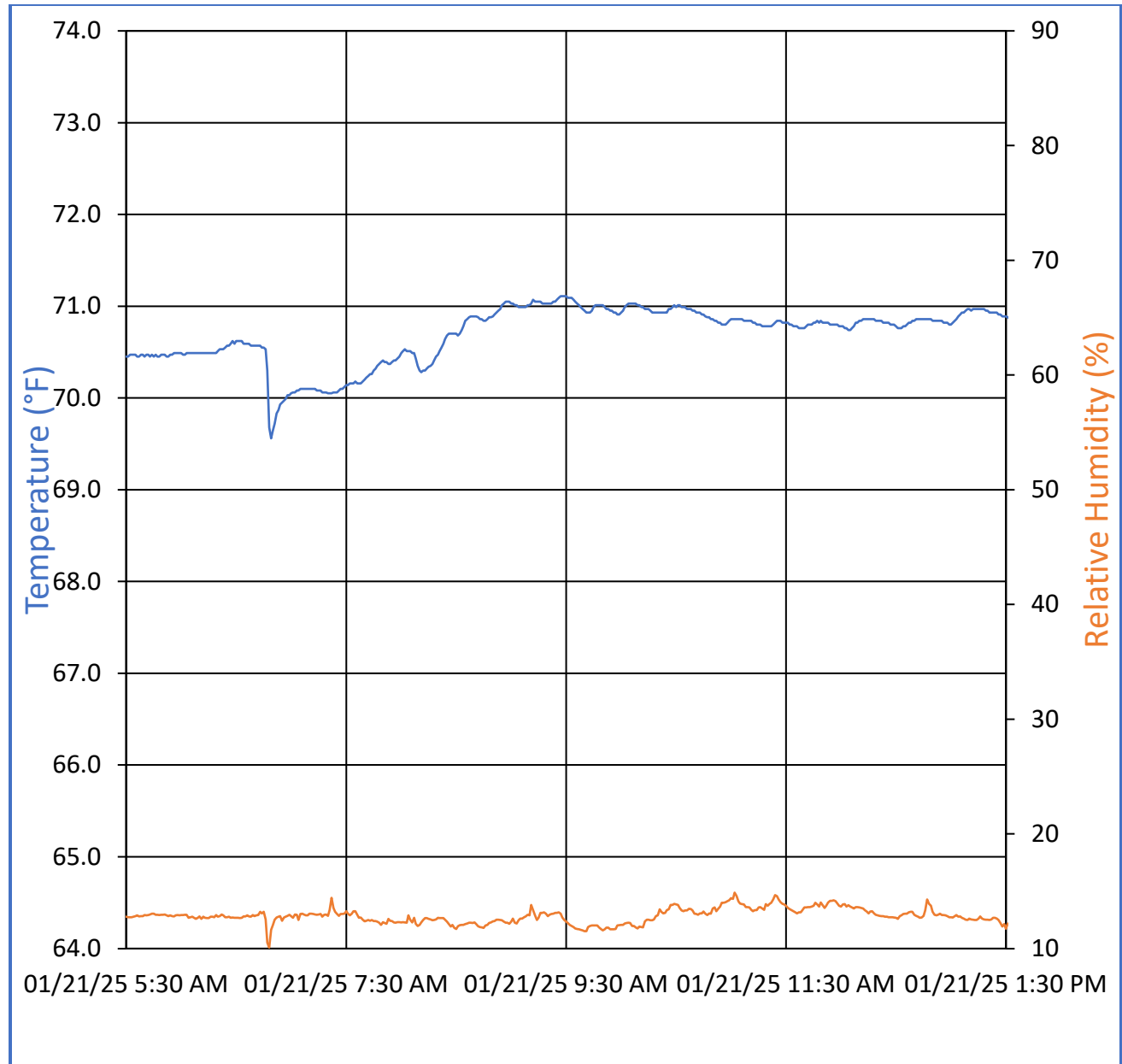
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV

NHTSA No. M20254205

Test Program: NCAP MDB Side Impact Test

Test Date: 01/21/2025



DATA SHEET NO. 305-1**GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS NO. 305****TESTING**Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025**TEST VEHICLE INFORMATION**

NHTSA Number	M20254205
Model Year	2025
Make	Hyundai
Model	Tucson HEV
Body Style	5-Door MPV
Body Color	Creamy White Pearl
Odometer Reading (km / mi)	195/121

DATA FROM VEHICLE'S CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company
Date of Manufacture	Oct-24
VIN	KM8JBDD15SU281566
GVWR (kg)	2270

ELECTRIC VEHICLE PROPULSION SYSTEM

Type of Electrical Vehicle	Gas/Electric Hybrid
Propulsion Battery Type	Lithium-Ion Polymer
Nominal Voltage (V)	270
Automatic Propulsion Battery Disconnect	Yes
Physical Location of Automatic Propulsion Battery Disconnect	Under the 2 nd row seats
Auxiliary Battery Type	

PROPULSION BATTERY SYSTEM DATA

Electrolyte Fluid Type	LiPF6 Salt, Carbonate Solvent
Electrolyte Fluid Specific Gravity (g/cm ³)	1.23
Electrolyte Fluid Kinematic Viscosity (mpa · s)	3.03 at 25° C
Electrolyte Fluid Color	Transparent and Pale Yellow
Propulsion Battery Coolant Type	Unapplied (Air-Cooled Type)
Propulsion Battery Coolant Color	
Propulsion Battery Coolant Specific Gravity	

LOCATION OF BATTERY MODULES

Location	Inside Passenger Compartment
----------	------------------------------

DATA SHEET NO. 305-1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS NO. 305

TESTING

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205

Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

For all battery types:

Description	Volts
Minimum Operating Voltage	180.0
Maximum Operating Voltage	300.0
95% of Maximum Operating Voltage	279.0
Test Voltage (no less than 95% of Maximum)*	284.5

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

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

DATA SHEET NO. 305-2

PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

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

The FMVSS 305 chassis ground point is located under the 2nd row seat, specifically under position 6 of the vehicle.

PROPULSION BATTERY SYSTEM

DETAILS OF PROPULSION BATTERY COMPONENTS:

The physical location of automatic propulsion battery disconnect is located under the 2nd row seat, specifically under positions 4 and 5 of the vehicle.

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

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

VOLTMETER INFORMATION

Make	Fluke
Model	87V MAX
Serial No.	50790043
Internal Impedance Value	50 M Ω
Resolution	0.001

HV BATTERY ELECTRICAL ISOLATION DATA

Code	Units	Threshold	Pre-Test
V_b	V		284.50
V_1	V		206.90
V_2	V		202.70
R_o	Ω		194,000
V_1'	V		6.85
V_2'	V		27.22
R_{i1}	Ω		11,216,288
R_{i2}	Ω		2,527,246
R_i	Ω		2,527,246
R_i/V_b	Ω/V	500	8,883

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

DATA SHEET NO. 305-4**POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING**Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025**VOLTMETER INFORMATION**

Make	Fluke
Model	87V MAX
Serial No.	50790043
Internal Impedance Value	50 MΩ
Resolution	0.001

HV BATTERY ELECTRICAL ISOLATION DATA

Code	Units	Threshold	Post-Test
V_b	V		0.336
V_1	V		3.450
V_2	V		2.810
R_o	Ω		194,000
V_1'	V		0.153
V_2'	V		0.157
R_{i1}	Ω		7,585,505
R_{i2}	Ω		7,303,102
R_i	Ω		7,303,102
R_i/V_b	Ω/V	500	21,735,421

Is the Measured Electrical Isolation Value $\geq$ 500 Ω/V?	Yes
Is V_1 , V_2 , and $V_b \leq 60$ VDC?	Yes

PROPULSION BATTERY SYSTEM COMPONENTS

Has the propulsion battery module moved within the passenger compartment?

NoDescribe any movement: There was no movement of the propulsion battery within the passenger compartment.

Has an outside propulsion battery component intruded into the passenger compartment?

NoDescribe any intrusion: There was no intrusion of the outside propulsion battery into the passenger compartment.

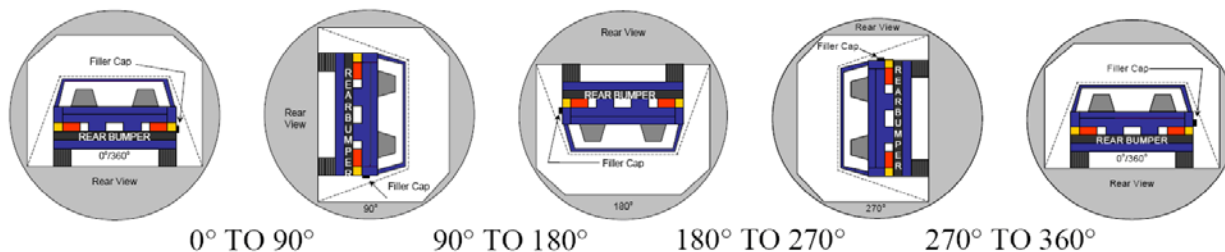
Is there propulsion battery electrolyte spillage visible in the passenger compartment?

No

DATA SHEET NO. 305-5

STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025



PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	80	300	380
90° To 180°	83	300	383
180° To 270°	83	300	383
270° To 360°	82	300	382

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° To 90°	0.0	N/A
90° To 180°	0.0	N/A
180° To 270°	0.0	N/A
270° To 360°	0.0	N/A

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

DATA SHEET NO. 305-5 (CONTINUED...)

STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2025 Hyundai Tucson HEV 5-Door MPV NHTSA No. M20254205
 Test Program: NCAP MDB Side Impact Test Test Date: 01/21/2025

VOLTMETER INFORMATION

Make	Fluke
Model	87V MAX
Serial No.	50790043
Internal Impedance Value	50 MΩ
Resolution	0.001

HV BATTERY ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS

Code	Units	Threshold	0°	90°	180°	270°	360°
V_b	V		0.000	0.000	0.000	0.001	0.000
V_1	V		0.120	0.039	0.046	0.048	0.008
V_2	V		0.010	0.035	0.042	0.040	0.011
R_o	Ω		194,000	194,000	194,000	194,000	194,000
V_1'	V		0.000	0.002	0.003	0.003	0.000
V_2'	V		0.001	0.002	0.002	0.003	0.001
R_{i1}	Ω		*Zero Volts	6,809,897	5,319,536	5,335,000	*Zero Volts
R_{i2}	Ω		22,698,000	6,767,829	8,129,524	5,263,867	3,350,909
R_i	Ω		*Zero Volts	6,767,829	5,319,536	5,263,867	*Zero Volts
R_i/V_b	Ω/V	500	*Zero Volts	*Zero Volts	*Zero Volts	5,263,866,667	*Zero Volts

* "Zero Volts" is considered as being compliant.

Is the Measured Electrical Isolation Value $\geq$ 500 Ω/V?	Yes
Is V_1 , V_2 , and $V_b \leq$ 60 VDC?	Yes

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure		Page
1	As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-1
2	As-Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-1
3	Pre-Test Frontal View of Test Vehicle	A-2
4	Post-Test Frontal View of Test Vehicle	A-2
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
7	Pre-Test Left Side View of Test Vehicle	A-4
8	Post-Test Left Side View of Test Vehicle	A-4
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
11	Pre-Test Rear View of Test Vehicle	A-6
12	Post-Test Rear View of Test Vehicle	A-6
13	Pre-Test Right Side View of Test Vehicle	A-7
14	Post-Test Right Side View of Test Vehicle	A-7
15	Pre-Test Overhead View of Test Area	A-8
16	Post-Test Overhead View of Test Area	A-8
17	Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle	A-9
18	Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle	A-9
19	Pre-Test Close-Up View of Impact Point Target	A-10
20	Post-Test Close-Up View of Impact Point Target	A-10
21	Pre-Test Left Front Door Latch Close-Up	A-11
22	Post-Test Left Front Door Latch Close-Up	A-11
23	Pre-Test Left Rear Door Latch Close-Up	A-12
24	Post-Test Left Rear Door Latch Close-Up	A-12
25	Pre-Test Front Close-Up View of Driver Dummy	A-13
26	Post-Test Front Close-Up View of Driver Dummy	A-13
27	Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking	A-14
28	Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-14
29	Post-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-15
30	Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning	A-15
31	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-16
32	Pre-Test Overhead View of Driver Seat Pan Prior to Dummy Positioning	A-16
33	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-17
34	Pre-Test Placement of Driver Dummy's Feet	A-17
35	Pre-Test View of Belt Anchorage for Driver Dummy	A-18

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
36	Pre-Test Left Side View of Steering Wheel	A-18
37	View of Disengaged Parking Brake	A-19
38	Pre-Test View of Parking Brake	A-19
39	Pre-Test Close-Up Left Side View of Driver Seat Track	A-20
40	Pre-Test Close-Up Left Side View of Driver Seat Back	A-20
41	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-21
42	Pre-Test Driver Dummy and Door Clearance View	A-21
43	Post-Test Driver Dummy and Door Clearance View	A-22
44	Pre-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment	A-22
45	Post-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment	A-23
46	Pre-Test Driver Inner Door Panel View	A-23
47	Post-Test Driver Inner Door Panel View	A-24
48	Post-Test Driver Dummy Close-Up Head Contact with Vehicle Interior View	A-24
49	Post-Test Driver Dummy Close-Up Head Contact with Side Air Bag View	A-25
50	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View	A-25
51	Post-Test Driver Dummy Close-Up Torso Contact with Side Air Bag View	A-26
52	Post-Test Driver Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-26
53	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Air Bag View	A-27
54	Post-Test Driver Dummy Close-Up Knee Contact View	A-27
55	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking	A-28
56	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-28
57	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-29
58	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-29
59	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-30
60	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-30
61	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-31
62	Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket	A-31
63	Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level	A-32
64	Pre-Test Placement of Rear Passenger Dummy's Feet	A-32
65	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-33
66	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-33
67	Pre-Test Close-Up Left Side View of Rear Passenger Seat Back	A-34
68	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint	A-34
69	Pre-Test Rear Passenger Dummy and Door Clearance View	A-35

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
70	Post-Test Rear Passenger Dummy and Door Clearance View	A-35
71	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-36
72	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-36
73	Pre-Test Rear Passenger Inner Door Panel View	A-37
74	Post-Test Rear Passenger Inner Door Panel View	A-37
75	Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle Interior View	A-38
76	Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air Bag View	A-38
77	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-39
78	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Air Bag View	A-39
79	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-40
80	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Air Bag View	A-40
81	Post-Test Rear Passenger Dummy Close-Up Knee Contact View	A-41
82	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-41
83	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-42
84	Pre-Test Front View of MDB Impactor Face	A-42
85	Post-Test Front View of MDB Impactor Face	A-43
86	Pre-Test Top View of MDB Impactor Face	A-43
87	Post-Test Top View of MDB Impactor Face	A-44
88	Pre-Test Left Side View of MDB Impactor Face	A-44
89	Post-Test Left Side View of MDB Impactor Face	A-45
90	Pre-Test Right Side View of MDB Impactor Face	A-45
91	Post-Test Right Side View of MDB Impactor Face	A-46
92	Close-Up View of Vehicle's Certification Label	A-46
93	Close-Up View of Vehicle's Tire Information Placard or Label	A-47
94	Pre-Test Ballast View	A-47
95	Post-Test Primary and Redundant Speed Trap Read-Out	A-48
96	FMVSS No. 301 Static Rollover 0 Degrees	A-48
97	FMVSS No. 301 Static Rollover 90 Degrees	A-49
98	FMVSS No. 301 Static Rollover 180 Degrees	A-49
99	FMVSS No. 301 Static Rollover 270 Degrees	A-50
100	FMVSS No. 301 Static Rollover 360 Degrees	A-50
101	Impact Event	A-51
102	Monroney Label	A-51
103	Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-52
104	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-52

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
305-01	Auxiliary Power Module Warning Label	A-53
305-01a	Auxiliary Power Module Warning Label	A-53
305-02	Power Inverter Warning Label	A-54
305-03	First Responder Warning Label	A-54
305-04	First Responder Warning Location	A-55
305-05	Other Vehicle Label(s) Related to Electrical Propulsion System	A-55
305-05a	Other Vehicle Label(s) Related to Electrical Propulsion System	A-56
305-06	Manual High Voltage Service Disconnect in Place	A-56
305-07	Manual High Voltage Service Disconnect Removed	A-57
305-08	Manual High Voltage Service Disconnect Removed	A-57
305-09	Pre-Impact View of Propulsion Battery	A-58
305-010	Post-Impact Front View of Propulsion Battery	A-58
305-011	Post-Impact Rear View of Propulsion Battery	A-59
305-012	Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-59
305-013	Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-60
305-014	Pre-Impact View of Propulsion Battery Module(s)	A-60
305-015	Post-Impact View of Propulsion Battery Module(s)	A-61
305-016	Pre-Impact View of Electric Propulsion Drive	A-61
305-017	Post-Impact View of Electric Propulsion Drive	A-62
305-018	Pre-Impact View of High Voltage Interconnect(s)	A-62
305-019	Pre-Impact View Propulsion Battery Venting System(s)	A-63
305-020	Pre-Impact View of Other Visible Electric Propulsion Components	A-63
305-021	Pre-Impact View of Ground Lead Attached	A-64
305-022	Pre-Impact View of High Voltage Leads Attached	A-64
305-023	Pre-Impact Close-Up View of High Voltage Leads Attached	A-65
305-024	Pre-Impact View of Installed Test Interface Port	A-65
305-025	Post-Impact View of Installed Test Interface Port	A-66
305-026	Pre-Impact View of Other Test Devices	A-66
305-027	Post-Impact View of Other Test Devices	A-67
305-028	Indicant FMVSS No. 305 Static Rollover at 90°	A-67
305-029	Indicant FMVSS No. 305 Static Rollover at 180°	A-68
305-030	Indicant FMVSS No. 305 Static Rollover at 270°	A-68
305-031	Indicant FMVSS No. 305 Static Rollover at 360°	A-69

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
305-032	Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-69
305-033	Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-70
305-034	Post-Impact Propulsion Battery System Mounting and or Intrusion Failure(s)	A-70
305-035	Post-Impact View of Battery Component Intrusion	A-71
305-036	Post-Impact View of Battery Module Movement or Retention Loss	A-71
305-037	Post-Impact View of Propulsion Battery Electrolyte Spillage Location	A-72
305-038	Post-Test View of Propulsion Battery Electrolyte Spillage Location	A-72



FIGURE 1. As-Delivered Right Front 3/4 View of Test Vehicle



FIGURE 2. As-Delivered Left Rear 3/4 View of Test Vehicle

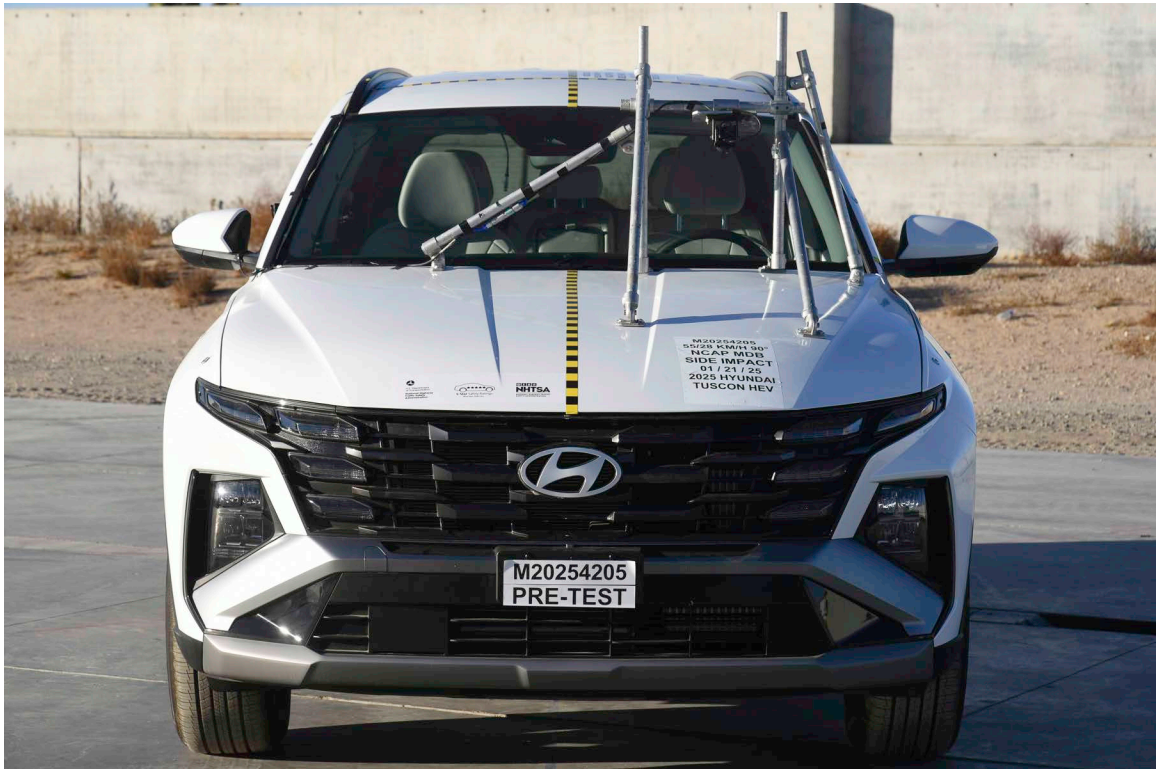


FIGURE 3. Pre-Test Frontal View of Test Vehicle

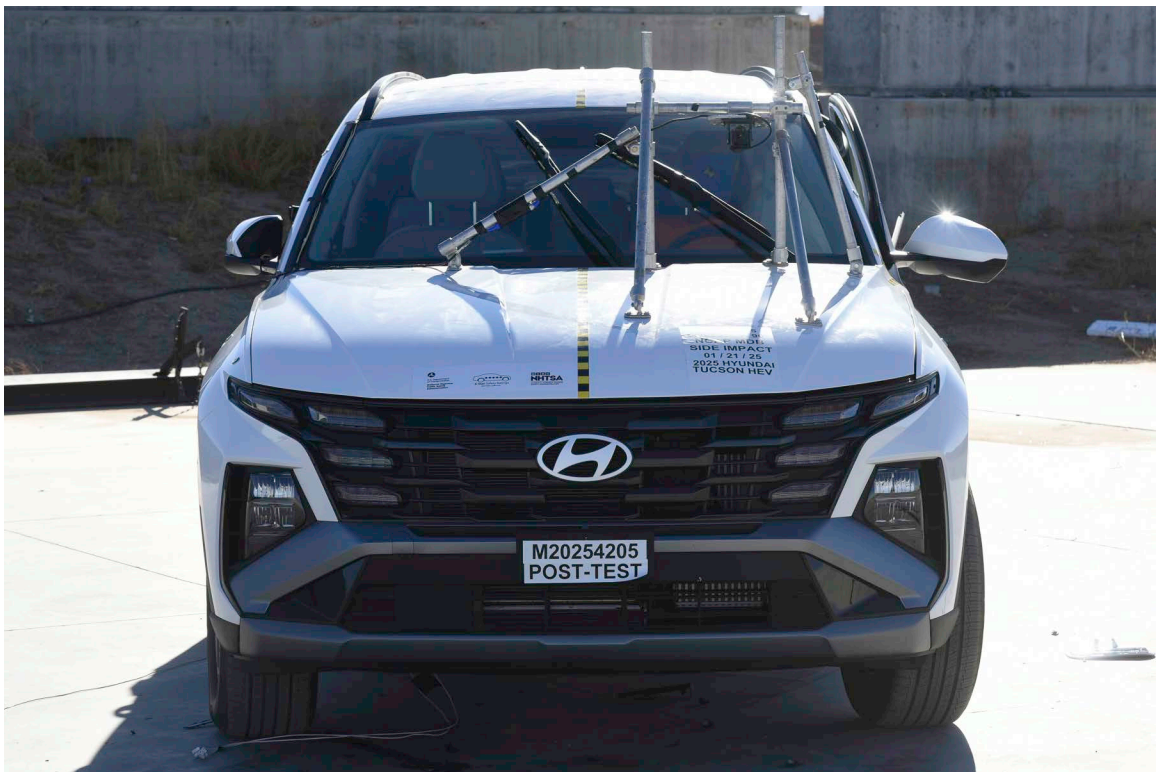


FIGURE 4. Post-Test Frontal View of Test Vehicle



FIGURE 5. Pre-Test Left Front 3/4 View of Test Vehicle



FIGURE 6. Post-Test Left Front 3/4 View of Test Vehicle



FIGURE 7. Pre-Test Left Side View of Test Vehicle



FIGURE 8. Post-Test Left Side View of Test Vehicle



FIGURE 9. Pre-Test Left Rear 3/4 View of Test Vehicle



FIGURE 10. Post-Test Left Rear 3/4 View of Test Vehicle

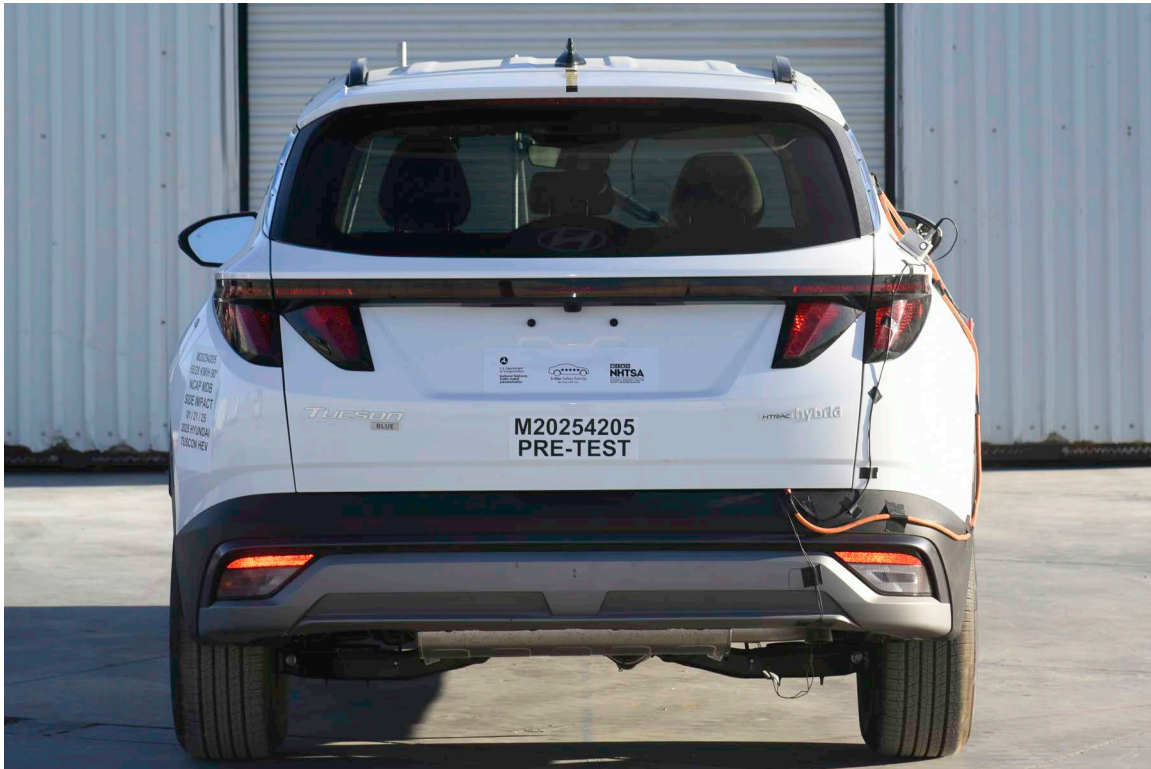


FIGURE 11. Pre-Test Rear View of Test Vehicle

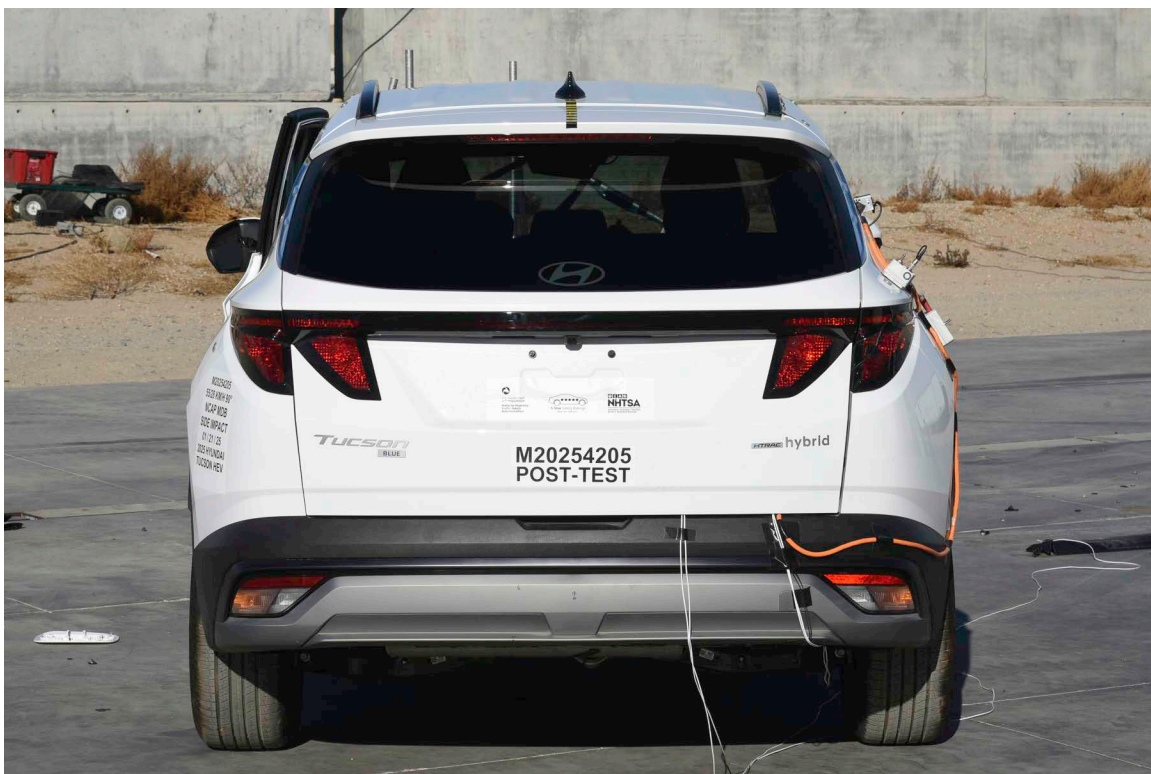


FIGURE 12. Post-Test Rear View of Test Vehicle



FIGURE 13. Pre-Test Right Side View of Test Vehicle



FIGURE 14. Post-Test Right Side View of Test Vehicle



FIGURE 15. Pre-Test Overhead View of Test Area

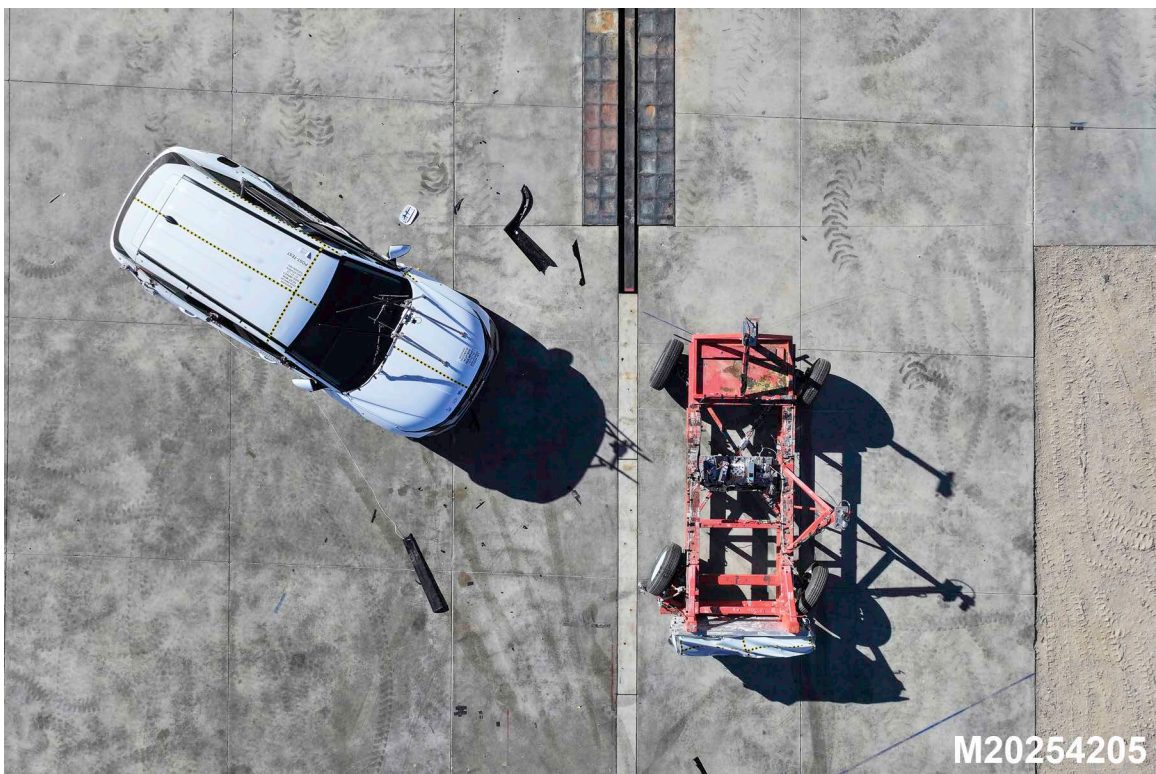


FIGURE 16. Post-Test Overhead View of Test Area



FIGURE 17. Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle



FIGURE 18. Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle



FIGURE 19. Pre-Test Close-Up View of Impact Point Target



FIGURE 20. Post-Test Close-Up View of Impact Point Target



FIGURE 21. Pre-Test Left Front Door Latch Close-Up



FIGURE 22. Post-Test Left Front Door Latch Close-Up



FIGURE 23. Pre-Test Left Rear Door Latch Close-Up



FIGURE 24. Post-Test Left Rear Door Latch Close-Up



FIGURE 25. Pre-Test Front Close-Up View of Driver Dummy



FIGURE 26. Post-Test Front Close-Up View of Driver Dummy



FIGURE 27. Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking



FIGURE 28. Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



FIGURE 29. Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

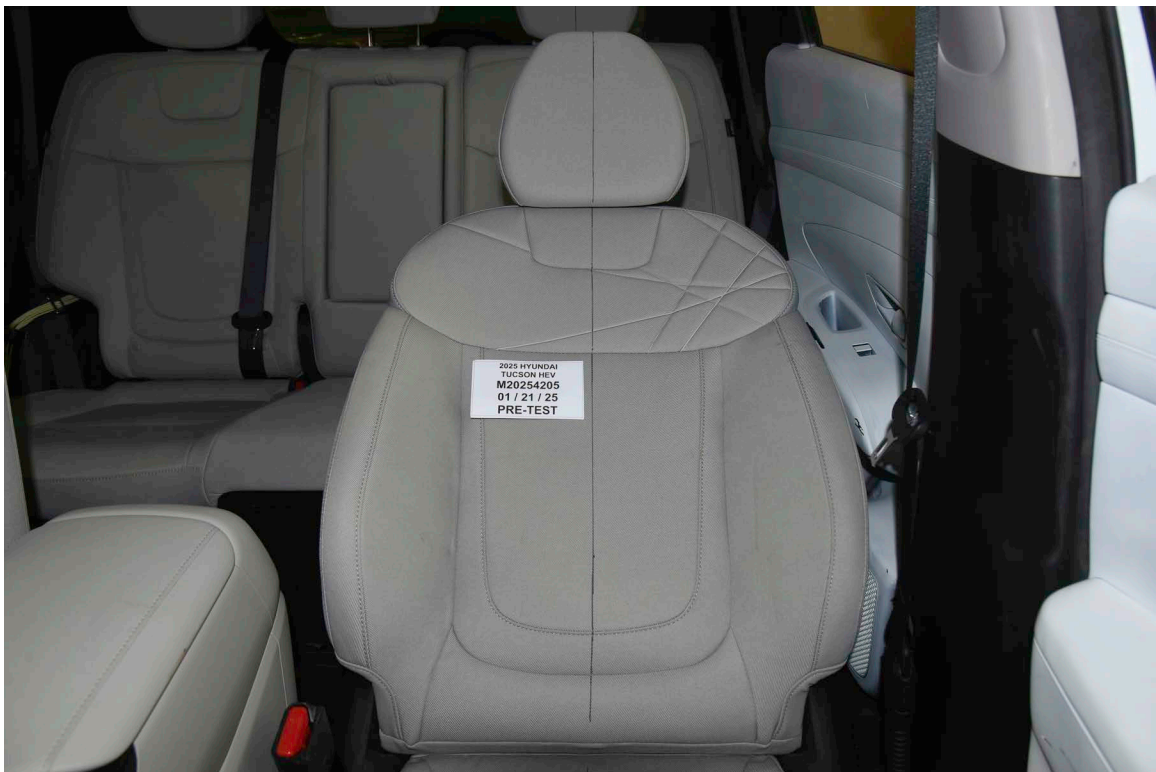


FIGURE 30. Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



FIGURE 31. Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 32. Pre-Test Overhead View of Driver Seat Pan Prior to Dummy Positioning



FIGURE 33. Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



FIGURE 34. Pre-Test Placement of Driver Dummy's Feet



FIGURE 35. Pre-Test View of Belt Anchorage for Driver Dummy



FIGURE 36. Pre-Test Left Side View of Steering Wheel



FIGURE 37. View of Disengaged Parking Brake

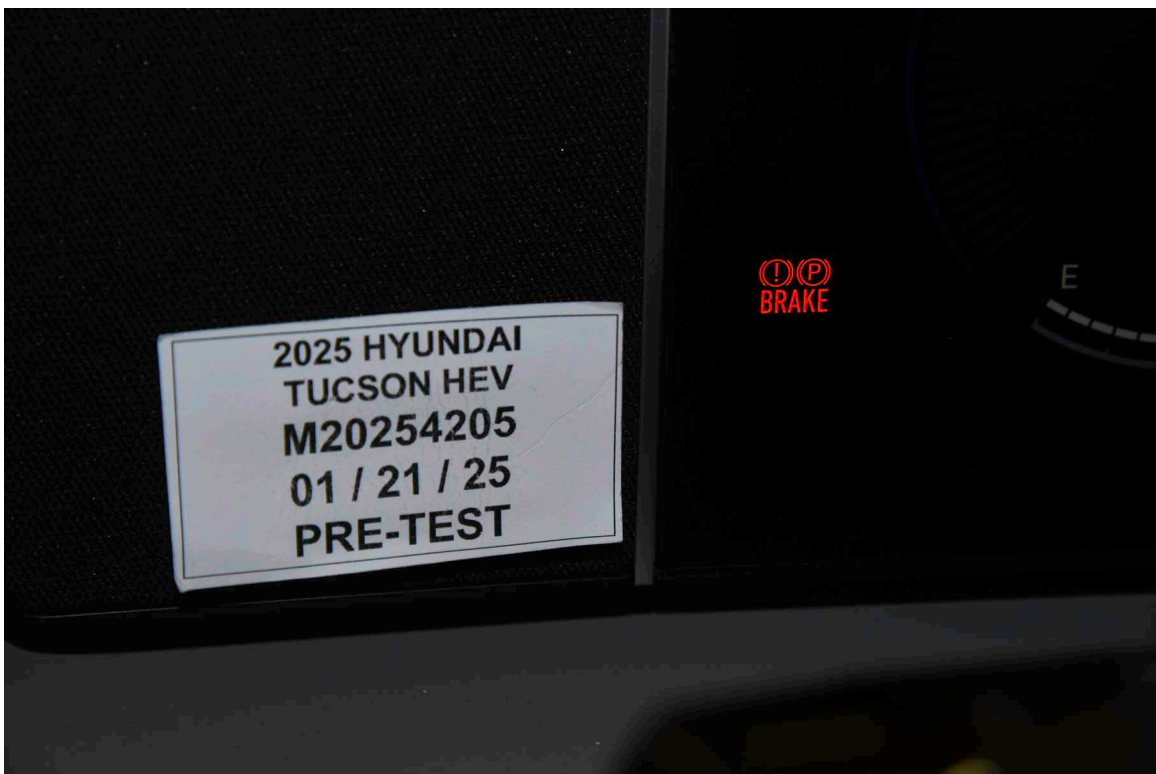


FIGURE 38. Pre-Test View of Parking Brake



FIGURE 39. Pre-Test Close-Up Left Side View of Driver Seat Track



FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back



FIGURE 41. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 42. Pre-Test Driver Dummy and Door Clearance View



FIGURE 43. Post-Test Driver Dummy and Door Clearance View



FIGURE 44. Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



FIGURE 45. Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

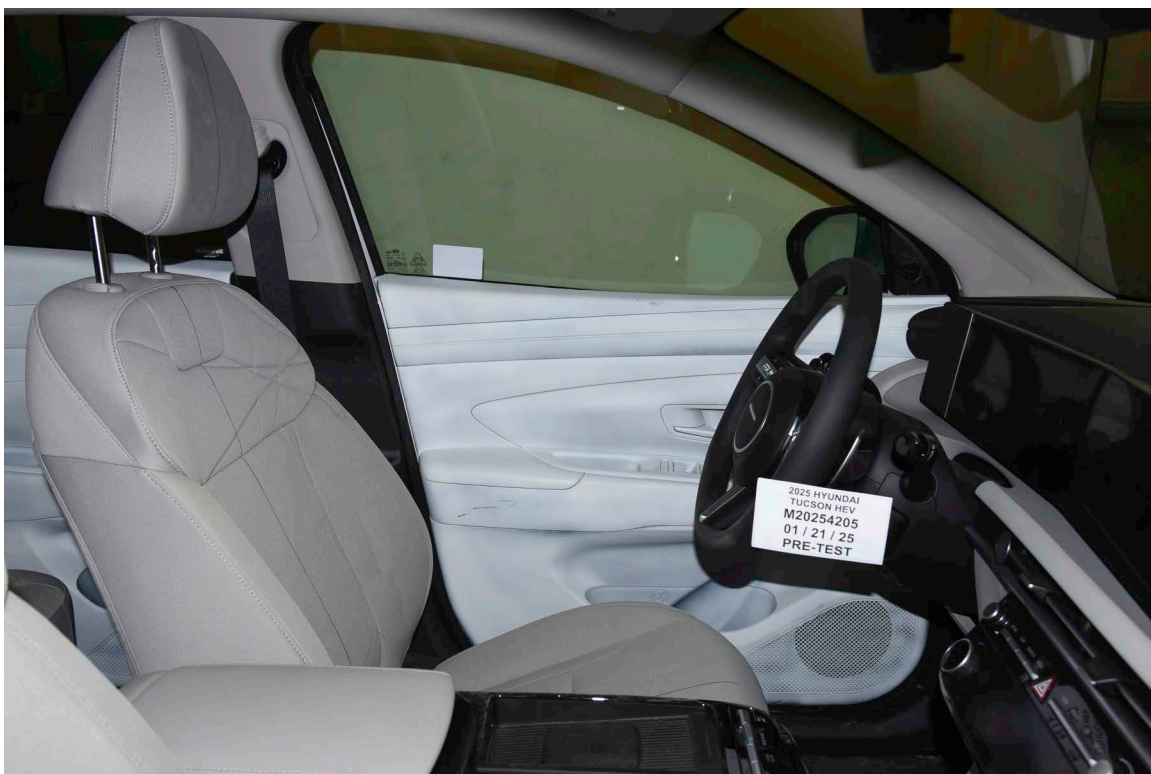


FIGURE 46. Pre-Test Driver Inner Door Panel View



FIGURE 47. Post-Test Driver Inner Door Panel View



FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact with Vehicle Interior View



FIGURE 49. Post-Test Driver Dummy Close-Up Head Contact with Side Air Bag View



FIGURE 50. Post-Test Driver Dummy Close-Up Torso Contact With Vehicle Interior View



FIGURE 51. Post-Test Driver Dummy Close-Up Torso Contact With Side Air Bag View



FIGURE 52. Post-Test Driver Dummy Close-Up Pelvis Contact With Vehicle Interior View



FIGURE 53. Post-Test Driver Dummy Close-Up Pelvis Contact With Side Air Bag View



FIGURE 54. Post-Test Driver Dummy Close-Up Knee Contact View



FIGURE 55. Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking



FIGURE 56. Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



FIGURE 57. Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



FIGURE 58. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



FIGURE 59. Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 60. Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



FIGURE 61. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



FIGURE 62. Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket



FIGURE 63. Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



FIGURE 64. Pre-Test Placement of Rear Passenger Dummy's Feet



FIGURE 65. Pre-Test View of Belt Anchorage for Rear Passenger Dummy



FIGURE 66. Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



FIGURE 67. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



FIGURE 68. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



FIGURE 69. Pre-Test Rear Passenger Dummy and Door Clearance View



FIGURE 70. Post-Test Rear Passenger Dummy and Door Clearance View



FIGURE 71. Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



FIGURE 72. Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



FIGURE 73. Pre-Test Rear Passenger Inner Door Panel View



FIGURE 74. Post-Test Rear Passenger Inner Door Panel View



FIGURE 75. Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle Interior View

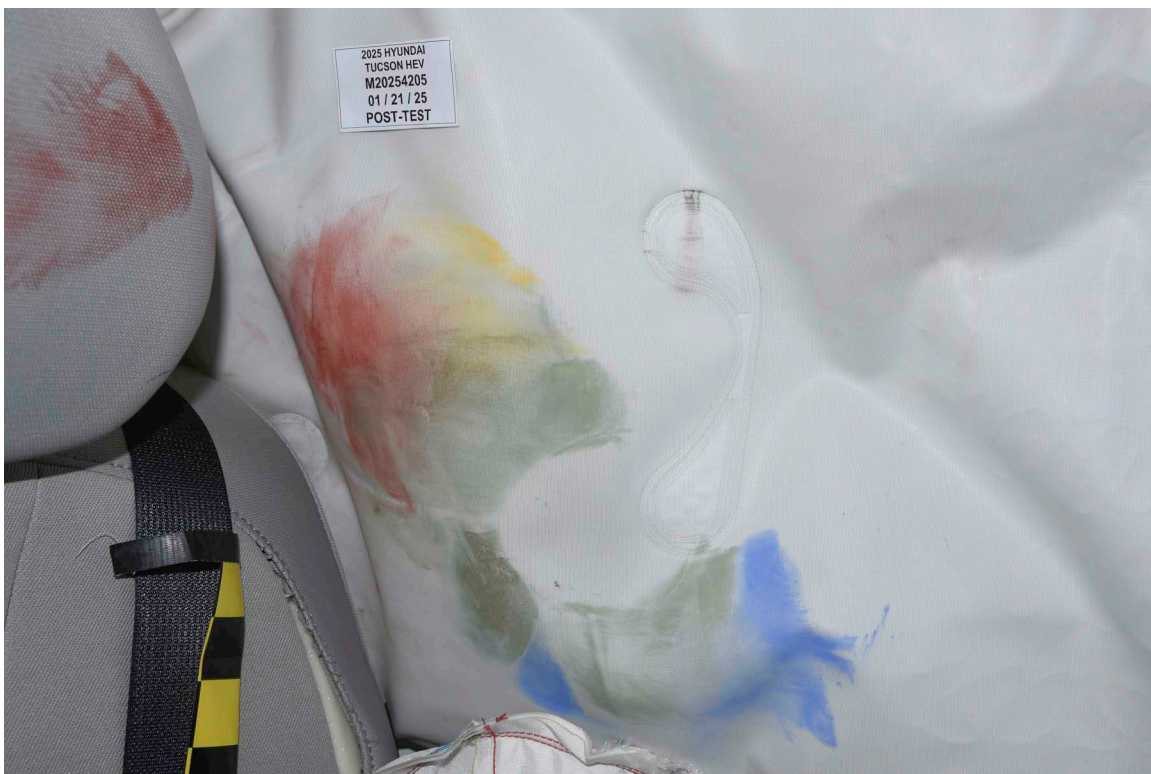


FIGURE 76. Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air Bag View



FIGURE 77. Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View



FIGURE 78. Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Side Air Bag View



FIGURE 79. Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Vehicle Interior View

Photograph Not Applicable

No Pelvis Contact With Rear Passenger Side Airbag

FIGURE 80. Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Air Bag View



FIGURE 81. Post-Test Rear Passenger Dummy Close-Up Knee Contact View



FIGURE 82. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 83. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 84. Pre-Test Front View of MDB Impactor Face



FIGURE 85. Post-Test Front View of MDB Impactor Face



FIGURE 86. Pre-Test Top View of MDB Impactor Face



FIGURE 87. Post-Test Top View of MDB Impactor Face



FIGURE 88. Pre-Test Left Side View of MDB Impactor Face



FIGURE 89. Post-Test Left Side View of MDB Impactor Face



FIGURE 90. Pre-Test Right Side View of MDB Impactor Face



FIGURE 91. Post-Test Right Side View of MDB Impactor Face



FIGURE 92. Close-Up View of Vehicle's Certification Label

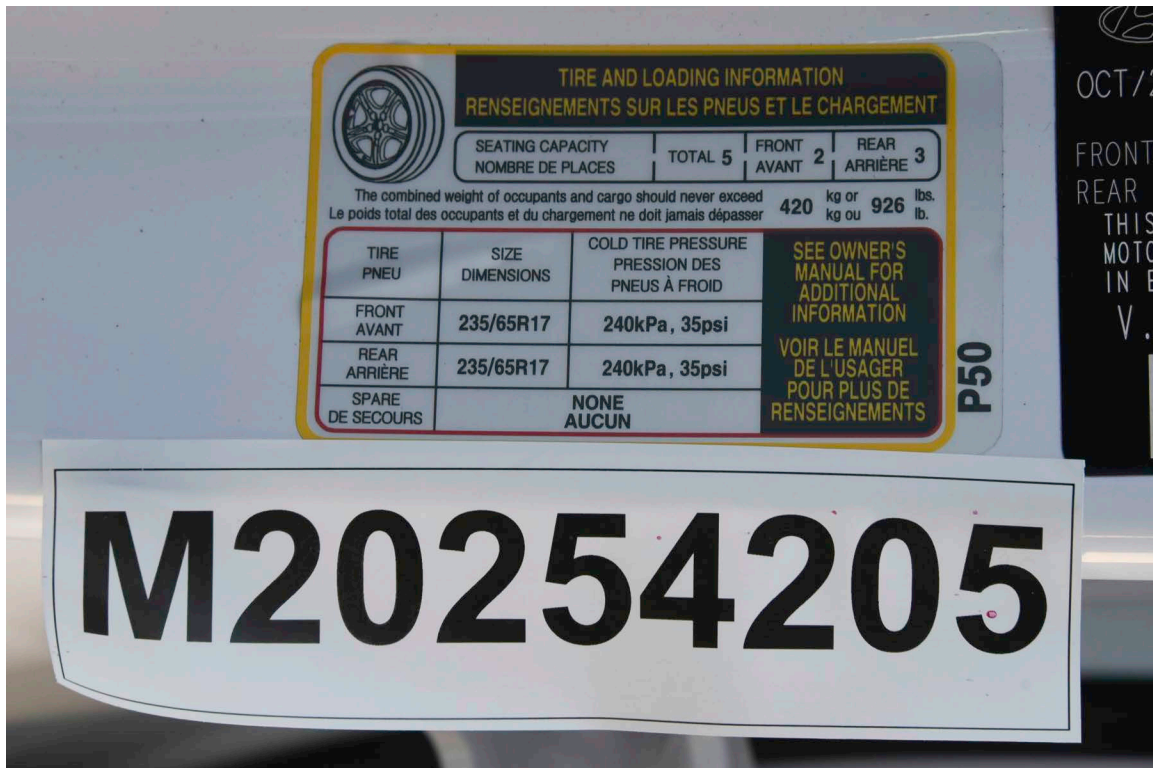


FIGURE 93. Close-Up View of Vehicle's Tire Information Placard or Label

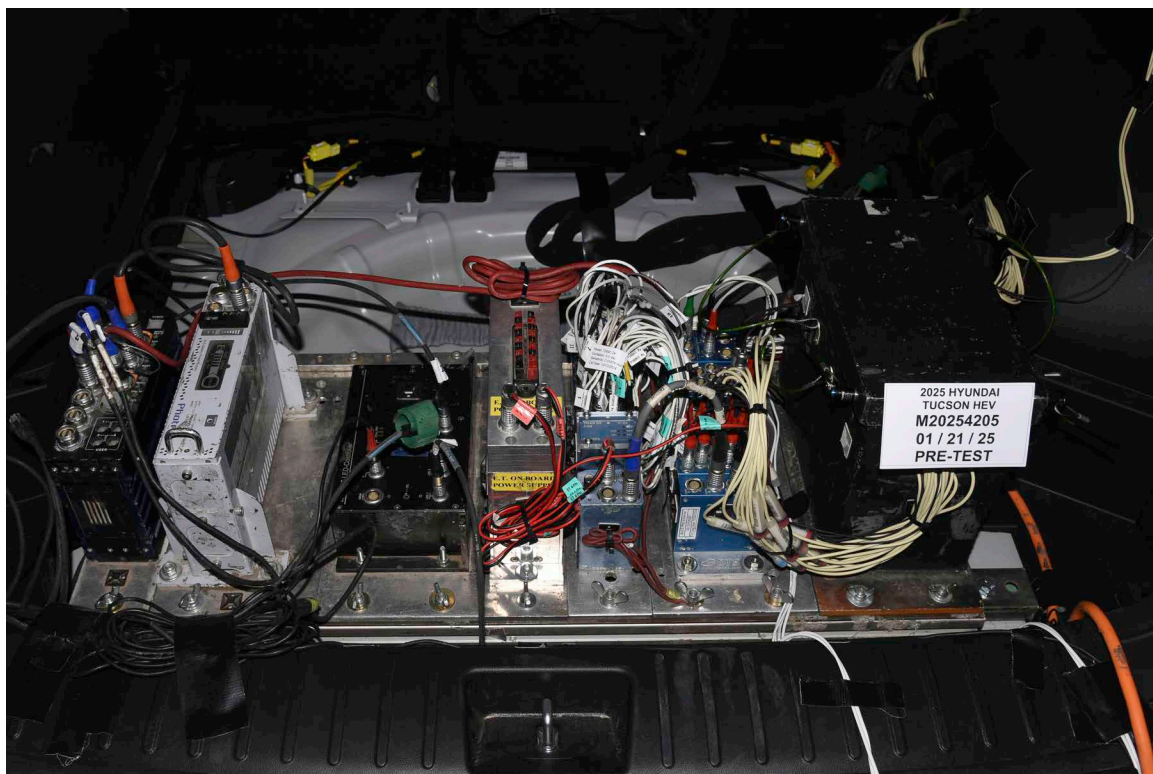


FIGURE 94. Pre-Test Ballast View

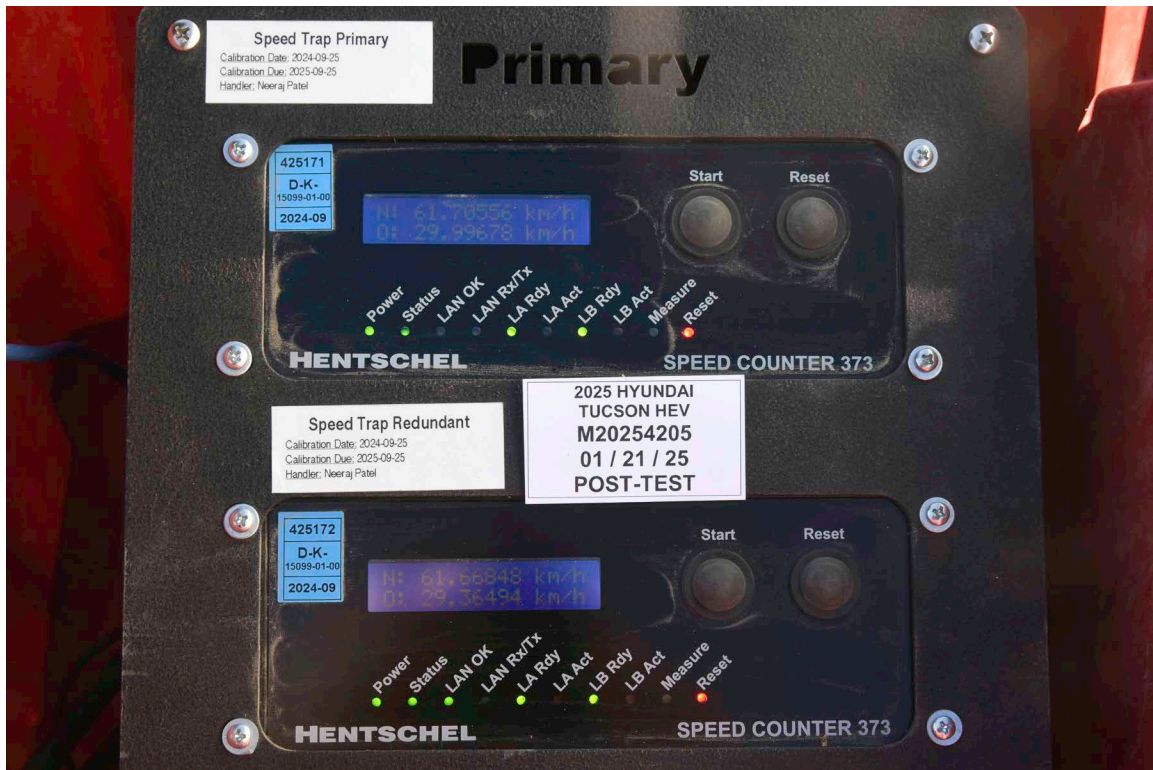


FIGURE 95. Post-Test Primary and Redundant Speed Trap Read-Out

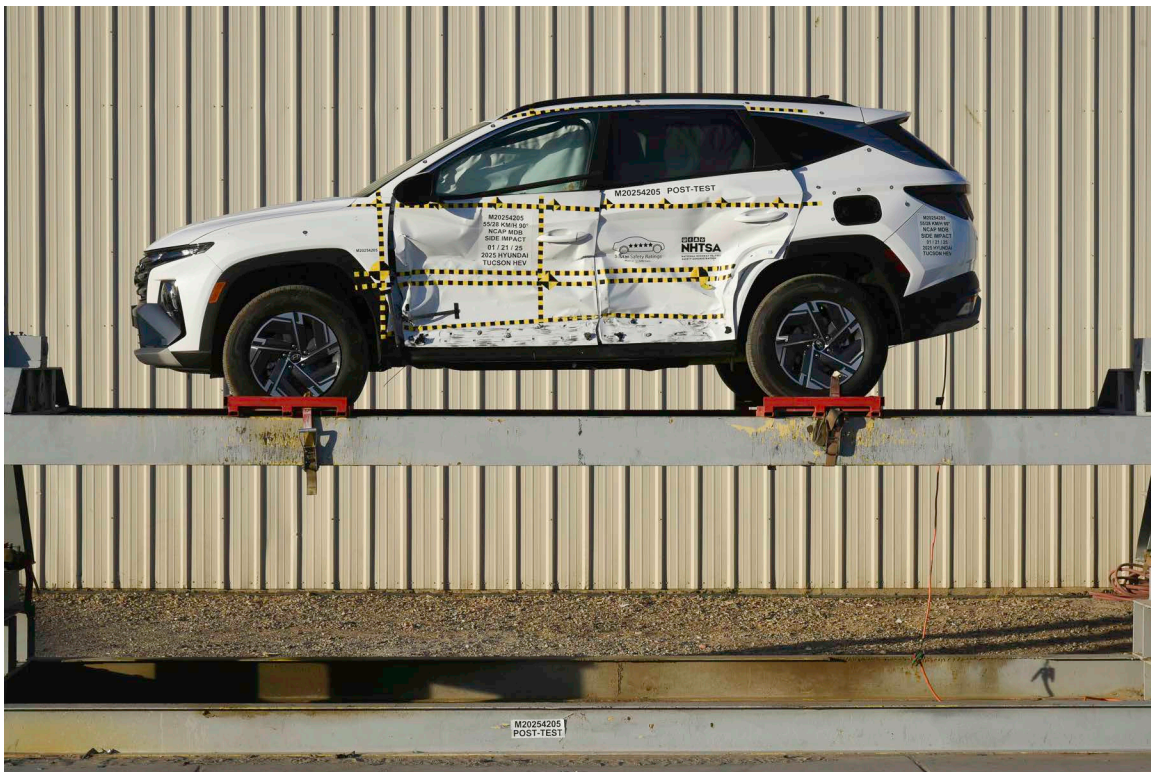


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees

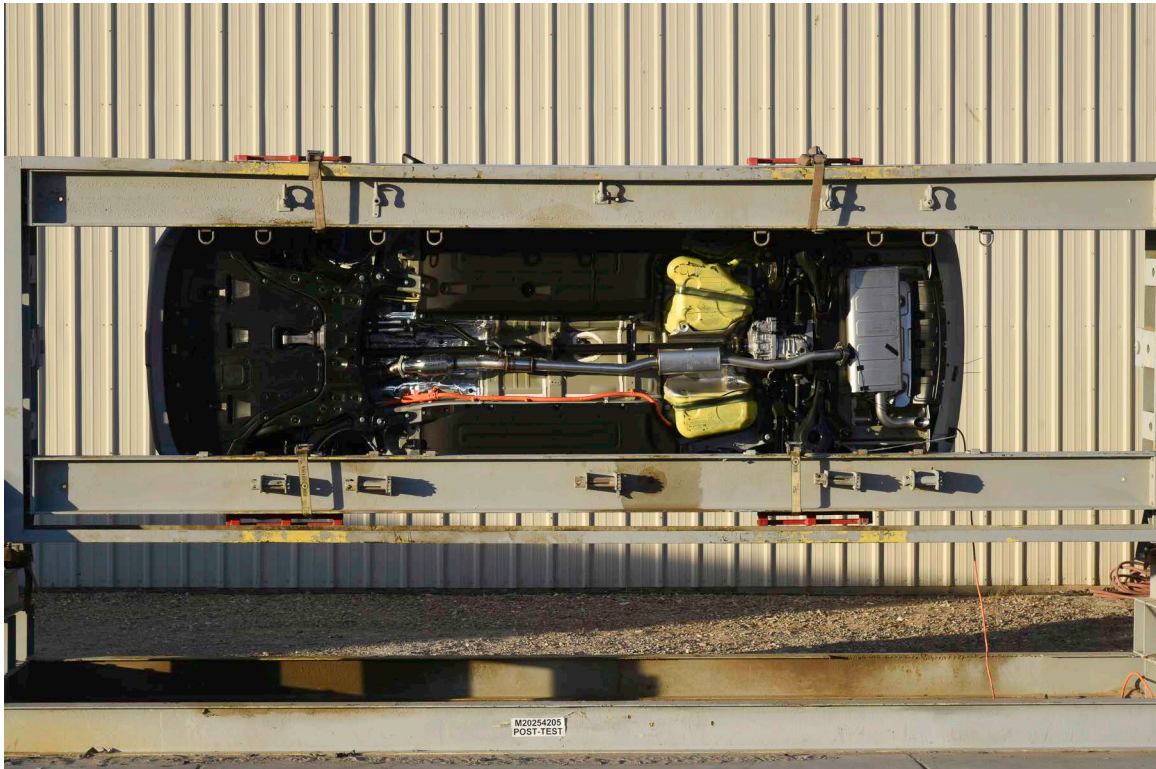


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

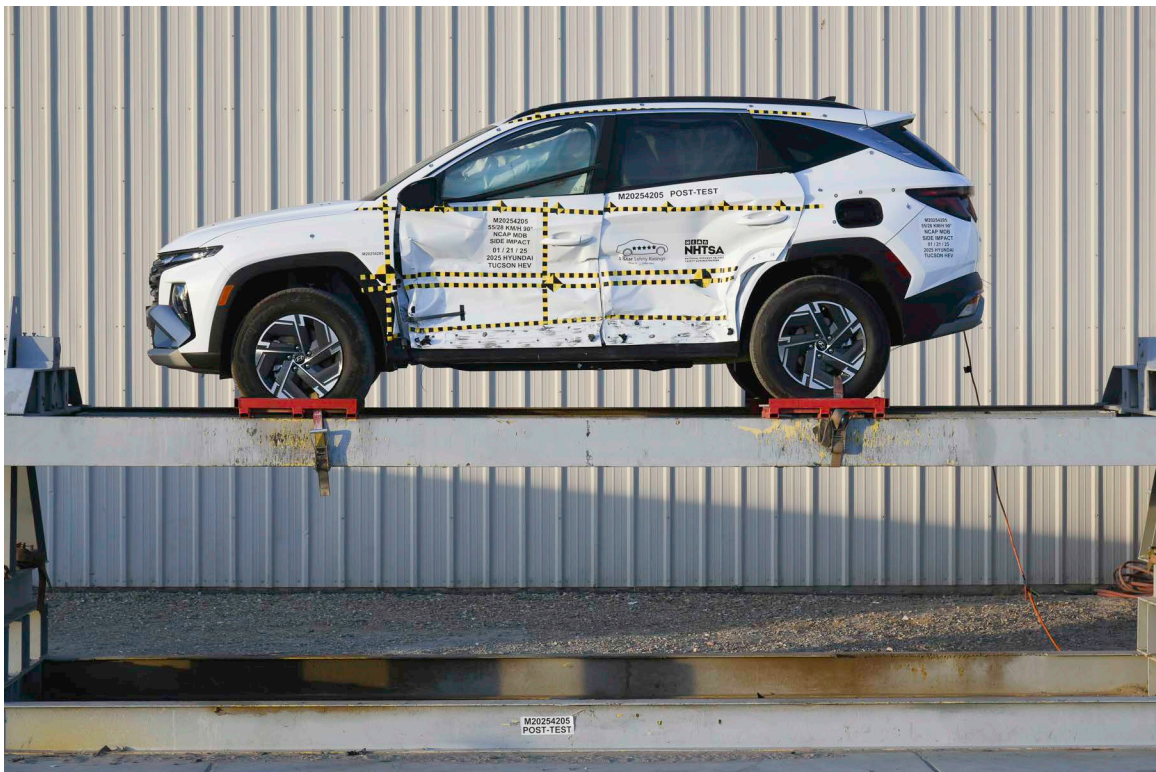


FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 101. Impact Event

HYUNDAI

2025 TUCSON HYBRID BLUE AWD

The 2025 Hyundai TUCSON
Smarter, more capable.

SOLD TO: TX111
HUMBLE HYUNDAI
18877 HIGHWAY 59 N
HUMBLE TX 77338

SHIPPED TO: TX111

VIN: KMHJBD015SU281566
MODEL: 8542ABBS
ENGINE: G4FTRU238050
PORT OF ENTRY: NC
EXTERIOR COLOR: CREAMY WHITE PEARL
INTERIOR/SEAT COLOR: GRAY/GRAY
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 19 lbs./ 9 kgs.
EMISSIONS: This vehicle meets California Emissions regulations and is Certified as a Super Ultra Low Emission Vehicle (SULEV)

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government 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

Fuel Economy and Environment

Fuel Economy

38 MPG
combined city highway
2.6 gallons per 100 miles

You save \$2,500
in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,400

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

This vehicle emits 234 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and consuming fuel also create emissions, from more at fuel-economy.gov.

fuel-economy.gov
Calculate personalized estimates and compare vehicles

STANDARD FEATURES:

AMERICA'S BEST WARRANTY
5-year/100,000-mile New Vehicle Warranty*
10-year/100,000-mile Powertrain Warranty*
10-year/100,000-mile Hybrid System Components Warranty*
10-year/100,000-mile Hybrid Battery Warranty*
7-year/Unlimited-mile Anti-rust/perforation Warranty*
5-year/50,000-mile Complimentary Maintenance*
5-year/Unlimited-mile Roadside Assistance

ADVANCED SAFETY TECHNOLOGIES
Front, Front Side, Side-Curtain, & Rear Side Airbags
Forward Collision-Avoidance Assist
Lane Keeping Assist, Lane Following Assist
Driver Attention Warning
Blind-Spot Collision Warning
Rear Cross-Traffic Collision-Avoidance Assist
Rearview Camera
Safe Exit Warning
Immobilizer

POWERTRAIN TECHNOLOGY
Smartstream 1.6L Turbocharged 4-cylinder Hybrid Engine
8-speed Automatic Transmission w/ Paddle Shifters
Shift-by-Wire Gear Selector

HYUNDAI AWD

EXTERIOR
17" Alloy Wheels
Roof Side Rails
Automatic LED Headlights
LED Daytime Running Lights

COMFORT & CONVENIENCE
Proximity Key w/ Push Button Start
Hands-free Smart Power Liftgate w/ Auto Open
Dual Automatic Temperature Control, Rear Air Vents
Power Driver's Seat w/ Lumbar Support
Heated Front Seats
Smart Cruise Control
Front and Rear USB Ports
Tire Mobility Kit (in Lieu of Spare Tire)

MULTIMEDIA & CONNECTIVITY
12.3" Audio w/ AM/FM/HQ Radio
SiriusXM Radio w/ 90-day trial subscription
Not Available in AK & HI
Wireless Android Auto® & Apple CarPlay®
Wireless Phone Charger

MULTIMEDIA & CONNECTIVITY (cont.)
Hyundai Digital Key
BlueLink® All-Inclusive Connected Services (enrollment required)
Full Tank of Fuel

Manufacturer's Suggested Retail Price: \$33,365.00

ADDED FEATURES:

- *CREAMY WHITE PEARL(TWS) Paint \$470.00
- *Cargo Net \$55.00
- *Cargo Tray \$120.00
- *First Aid Kit \$30.00
- *All Season Fitted Liners \$245.00
- *Illuminated Door Sills \$325.00

Total Price: \$36,005.00

PARTS CONTENT INFORMATION FOR VEHICLE IN THIS CARLINE:

U.S./CANADIAN PARTS CONTENT: 1 %

MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 85 %

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

289 A 3005VGL0V1 43

FIGURE 102. Monroney Label

Head Restraints

The vehicle's front and rear seats have adjustable head restraints. The head restraints are designed to help protect passengers from whiplash and other neck and spinal injuries during a collision, especially a rear impact collision. When there are no occupants in the rear seats, adjust the rear head restraints to the lowest height to improve the driver's visibility.

WARNING

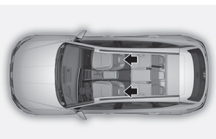
To help reduce the risk of serious injury or death in a crash, take the following precautions when adjusting your head restraints:

- Always adjust the head restraints properly for all passengers **BEFORE** starting the vehicle.
- Never let anyone ride in a seat with the head restraints removed or reversed.
- Adjust the head restraints so that the middle of the head restraint is at the same height as the top of the eyes.



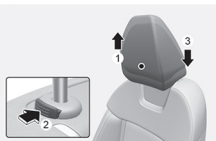
- Never adjust the driver's head restraint when the vehicle is moving.
- Make sure the head restraint is locked in place after adjustment.

Front seat head restraints



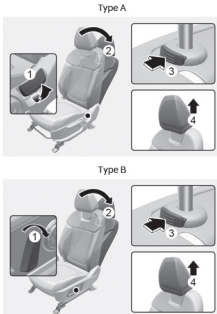
The driver's and front passenger's seats are equipped with adjustable head restraint for the passengers safety and comfort.

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

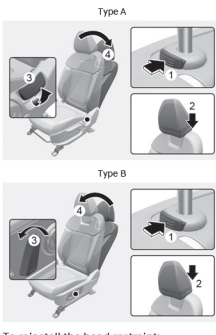
Removal/Reinstallation



- To remove the head restraint:
1. Recline the seatback (2) with the seatback angle lever or switch (1).
 2. Raise the head restraint as far as it can go.
 3. Press the head restraint release button (3) while pulling the head restraint up (4).

WARNING

Never allow anyone to travel in a seat with the head restraint removed.



- To reinstall the head restraint:
1. Recline the seatback.
 2. Put the head restraint poles (2) into the holes while pressing the release button (1).
 3. Adjust the head restraint to the appropriate height.
 4. Return the seatback (4) with the seatback angle lever or switch (3).

WARNING

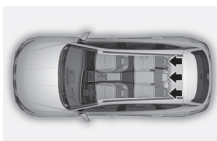
Always make sure the head restraint is locked in place and properly adjusted for the passenger.

3-14

3-15

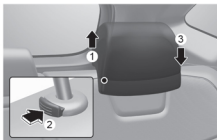
FIGURE 103. Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Rear seat head restraint



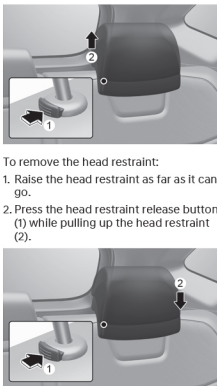
The rear seats are equipped with head restraint in all the seating positions for the passenger's safety and comfort.

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

Removal/Reinstallation



- To remove the head restraint:
1. Raise the head restraint as far as it can go.
 2. Press the head restraint release button (1) while pulling up the head restraint (2).

- To reinstall the head restraint:
1. Put the head restraint poles into the holes (2) while pressing the release button (1).
 2. Adjust the head restraint to the appropriate height.

3-16

FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

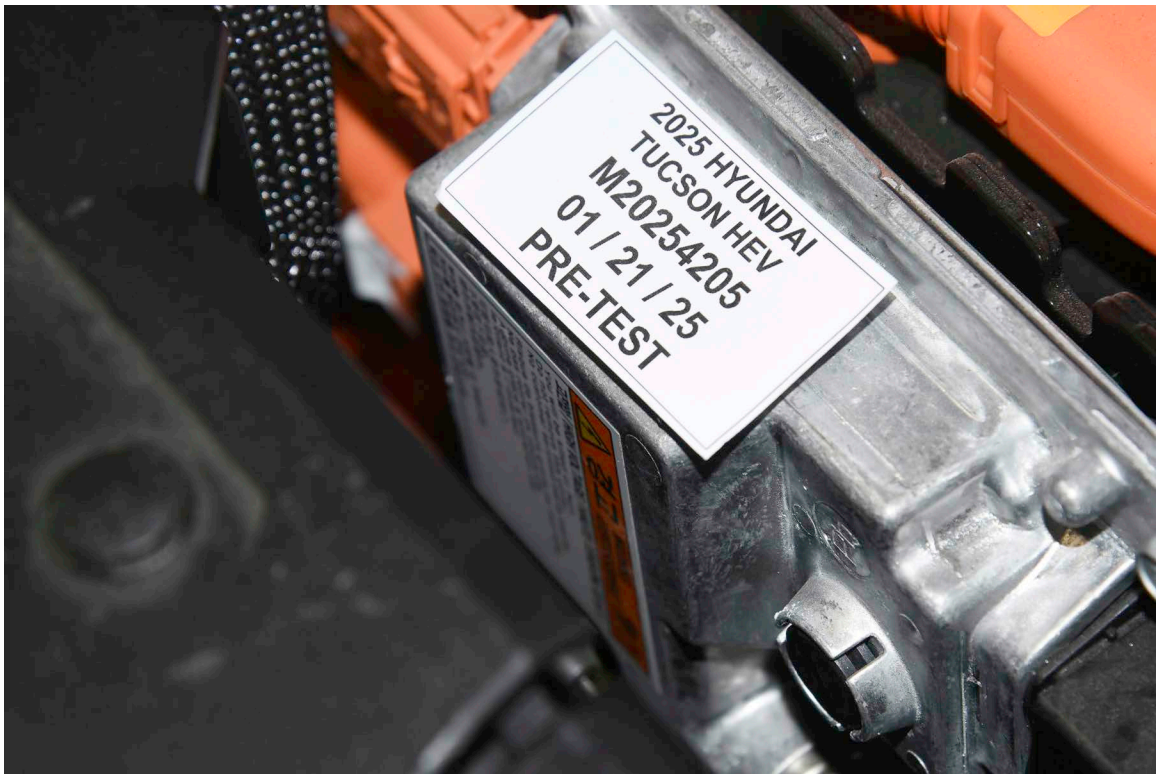


FIGURE 305-01 Auxiliary Power Module Warning Label



FIGURE 305-01a Auxiliary Power Module Warning Label



FIGURE 305-02 Power Inverter Warning Label



FIGURE 305-03 First Responder Warning Label



FIGURE 305-04 First Responder Warning Location



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



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



FIGURE 305-06 Manual High Voltage Service Disconnect in Place

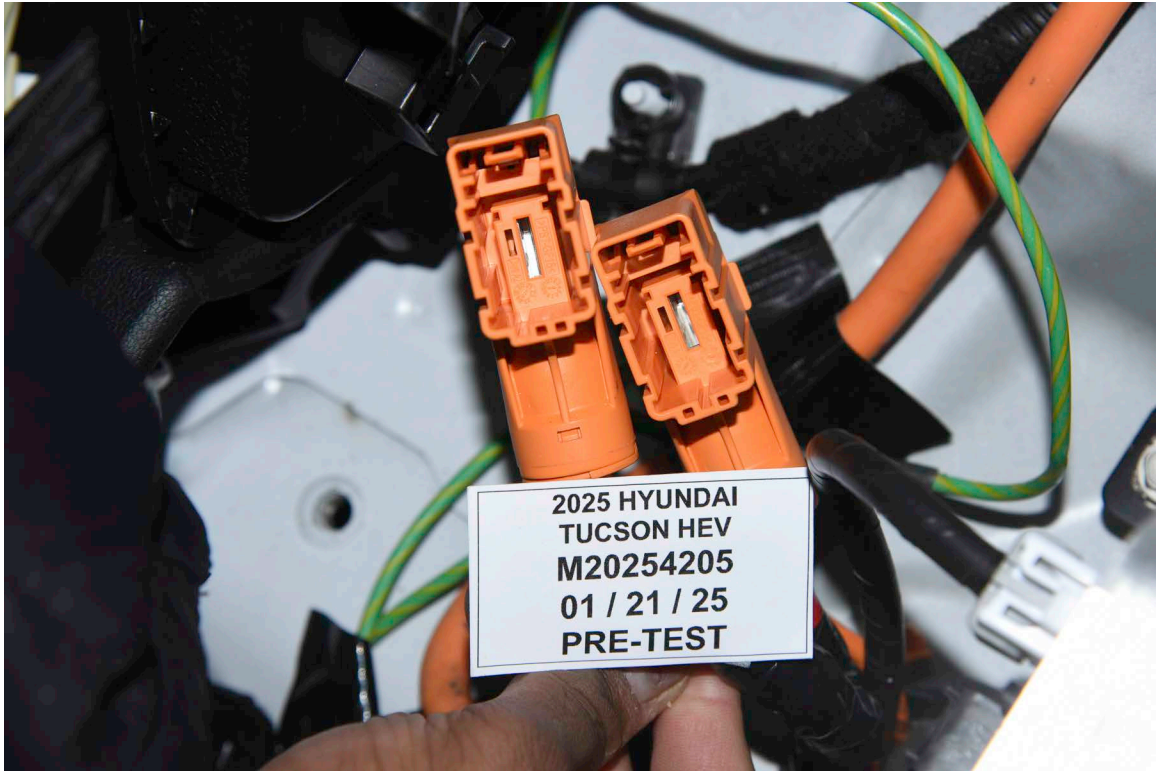


FIGURE 305-07 Manual High Voltage Service Disconnect Removed



FIGURE 305-08 Manual High Voltage Service Disconnect Removed



FIGURE 305-09 Pre-Impact View of Propulsion Battery



FIGURE 305-010 Post-Impact Front View of Propulsion Battery

Photograph Not Applicable

FIGURE 305-011 Post-Impact Rear View of Propulsion Battery

Photograph Not Applicable

FIGURE 305-012 Pre-Impact View of Battery Box(s) or Container(s) Which Holds
Individual Battery Modules

Photograph Not Applicable

FIGURE 305-013 Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

Photograph Not Applicable

Battery Not Removed From Vehicle

FIGURE 305-014 Pre-Impact View of Propulsion Battery Module(s)

Photograph Not Applicable

Battery Not Removed From Vehicle

FIGURE 305-015 Post-Impact View of Propulsion Battery Module(s)

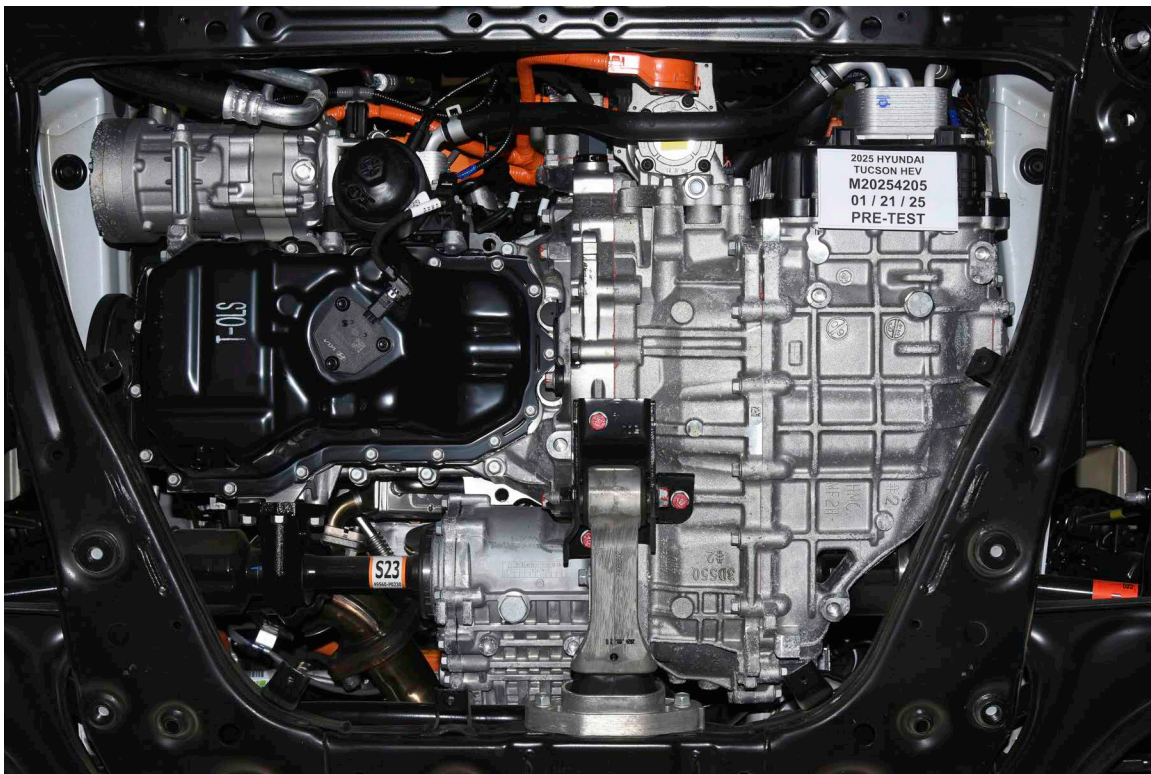


FIGURE 305-016 Pre-Impact View of Electric Propulsion Drive

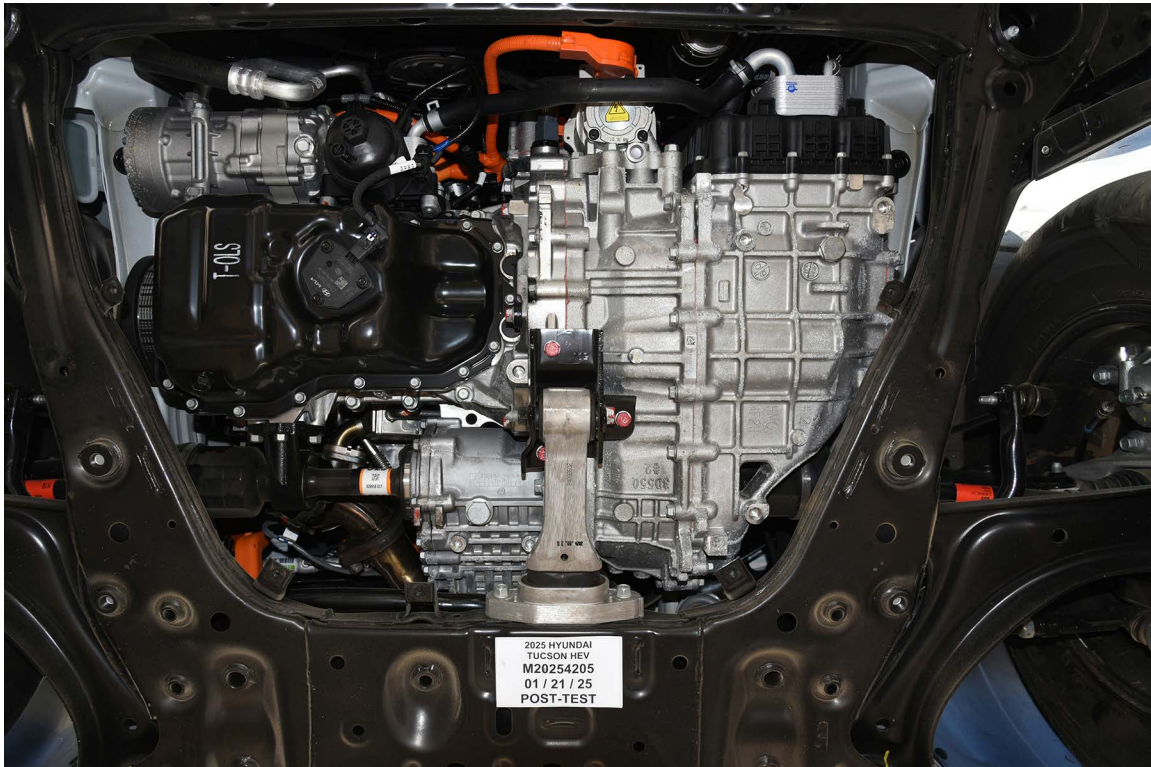


FIGURE 305-017 Post-Impact View of Electric Propulsion Drive

Photograph Not Applicable

FIGURE 305-018 Pre-Impact View of High Voltage Interconnect(s)

Photograph Not Applicable

Propulsion Battery Venting System Not Visible.

FIGURE 305-019 Pre-Impact View Propulsion Battery Venting System(s)

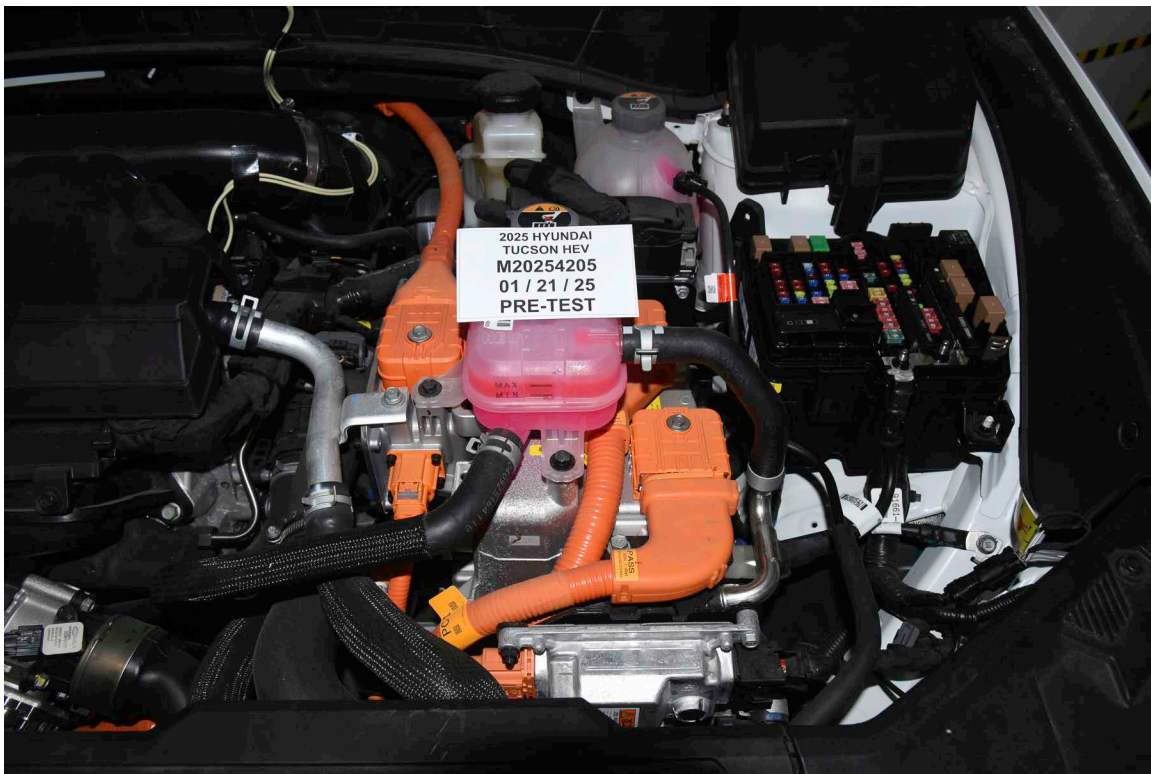


FIGURE 305-020 Pre-Impact View of Other Visible Electric Propulsion Components

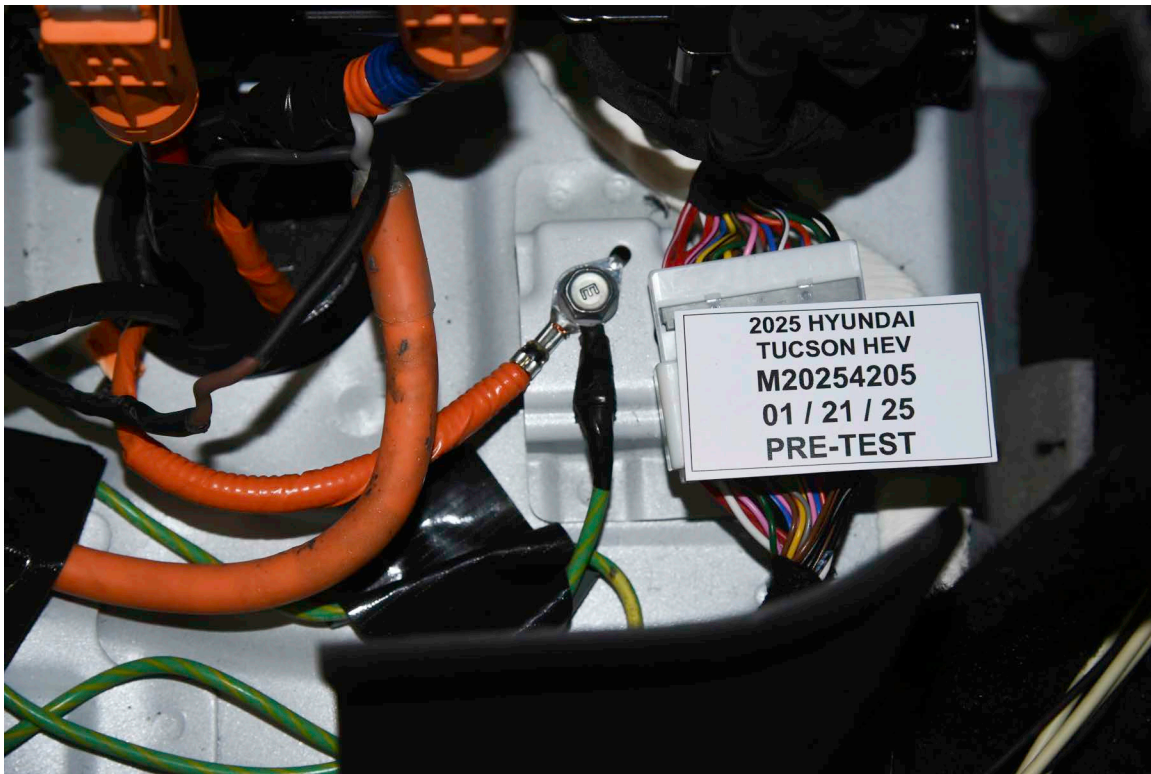


FIGURE 305-021 Pre-Impact View of Ground Lead Attached

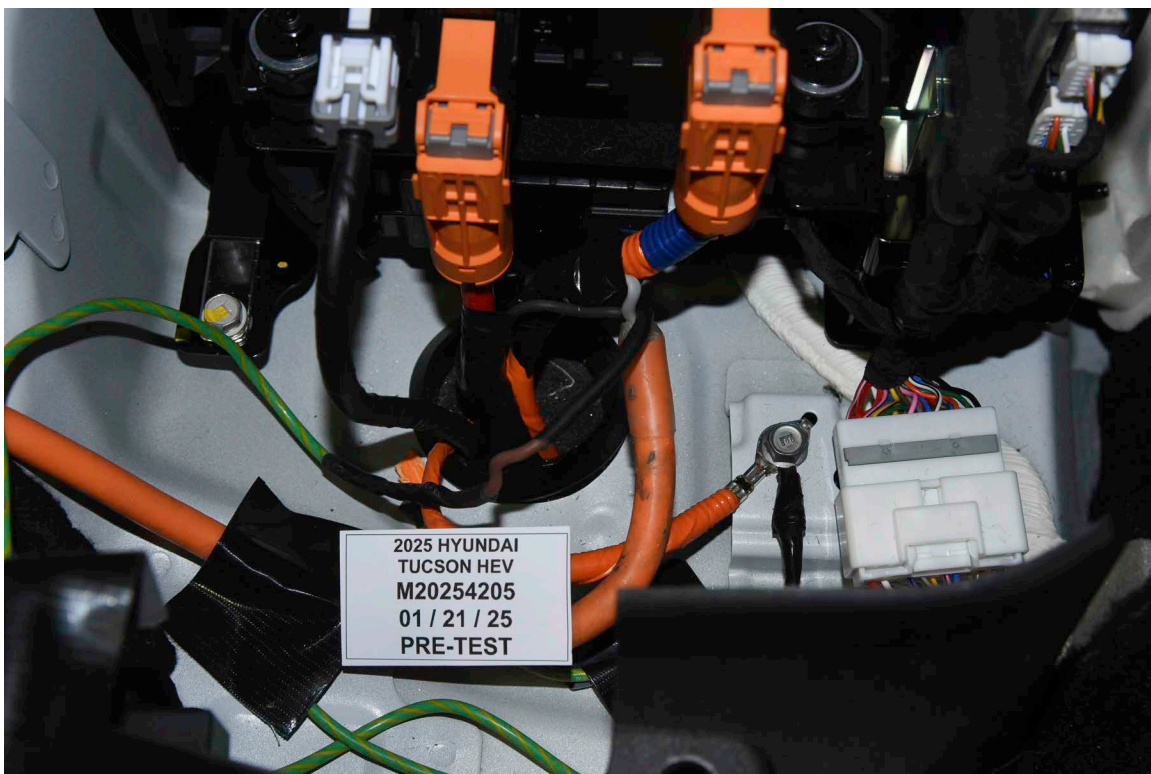


FIGURE 305-022 Pre-Impact View of High Voltage Leads Attached

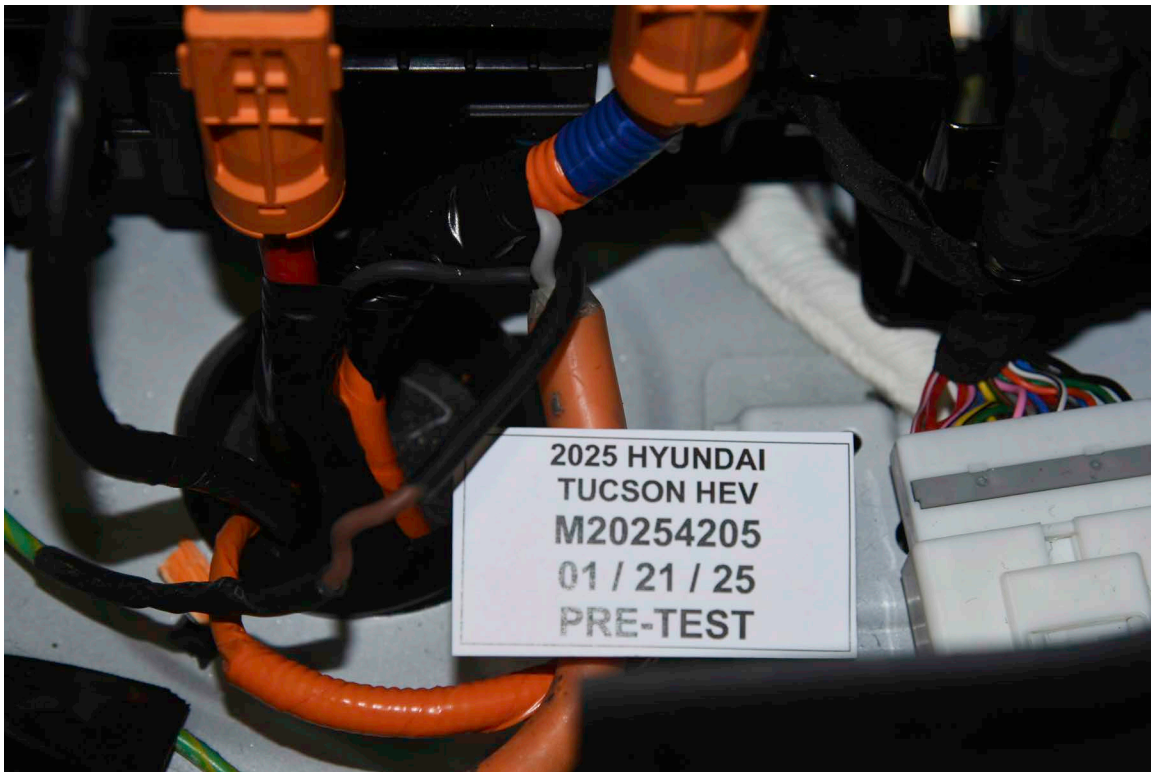


FIGURE 305-023 Pre-Impact Close-Up View of High Voltage Leads Attached



FIGURE 305-024 Pre-Impact View of Installed Test Interface Port

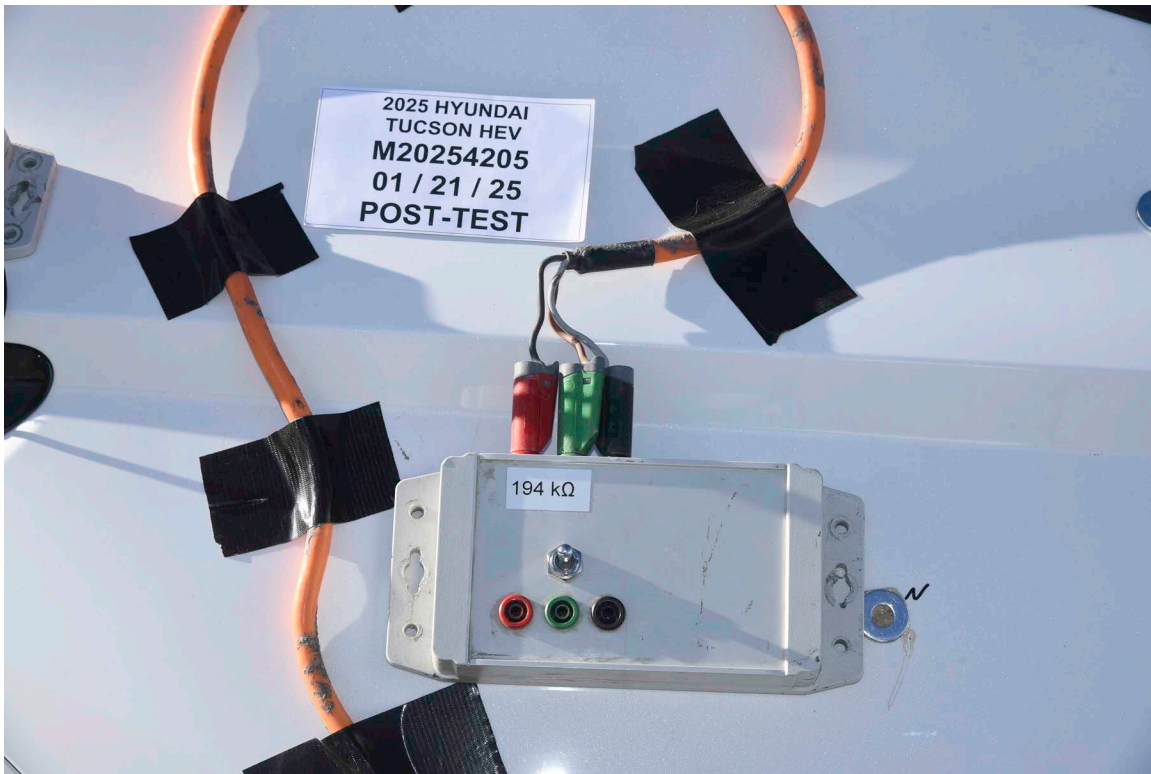


FIGURE 305-025 Post-Impact View of Installed Test Interface Port

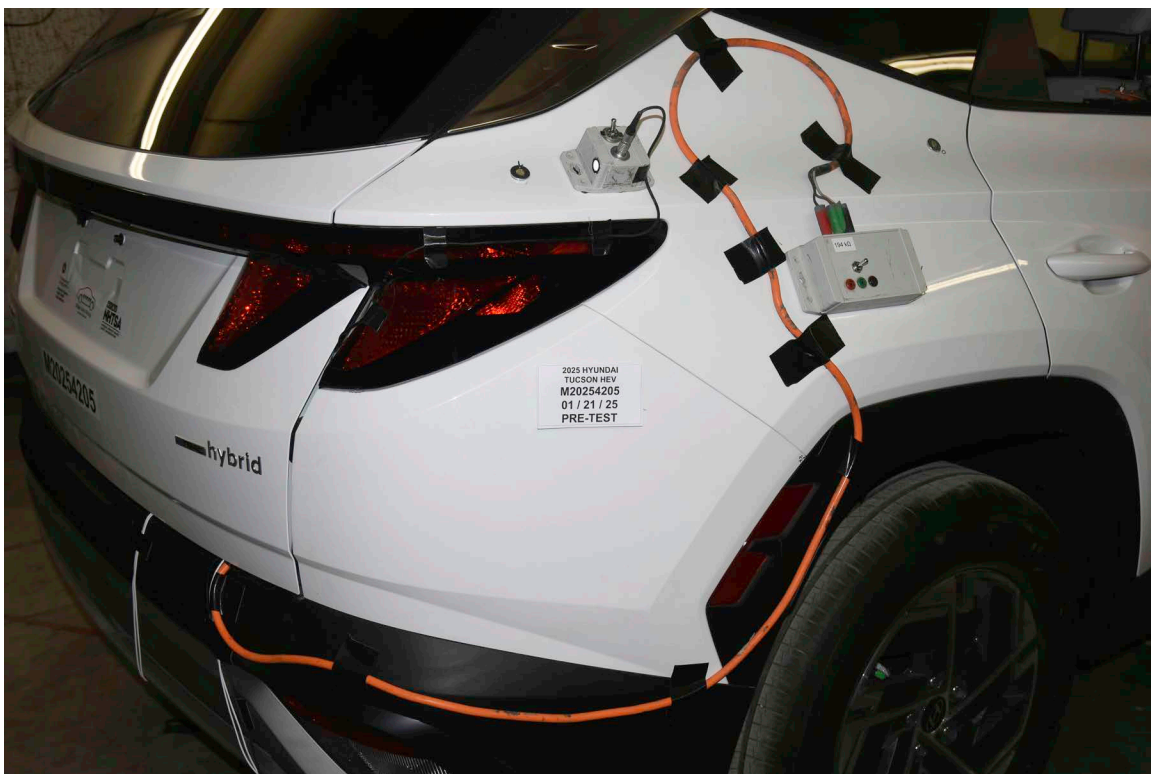


FIGURE 305-026 Pre-Impact View of Other Test Devices



FIGURE 305-027 Post-Impact View of Other Test Devices

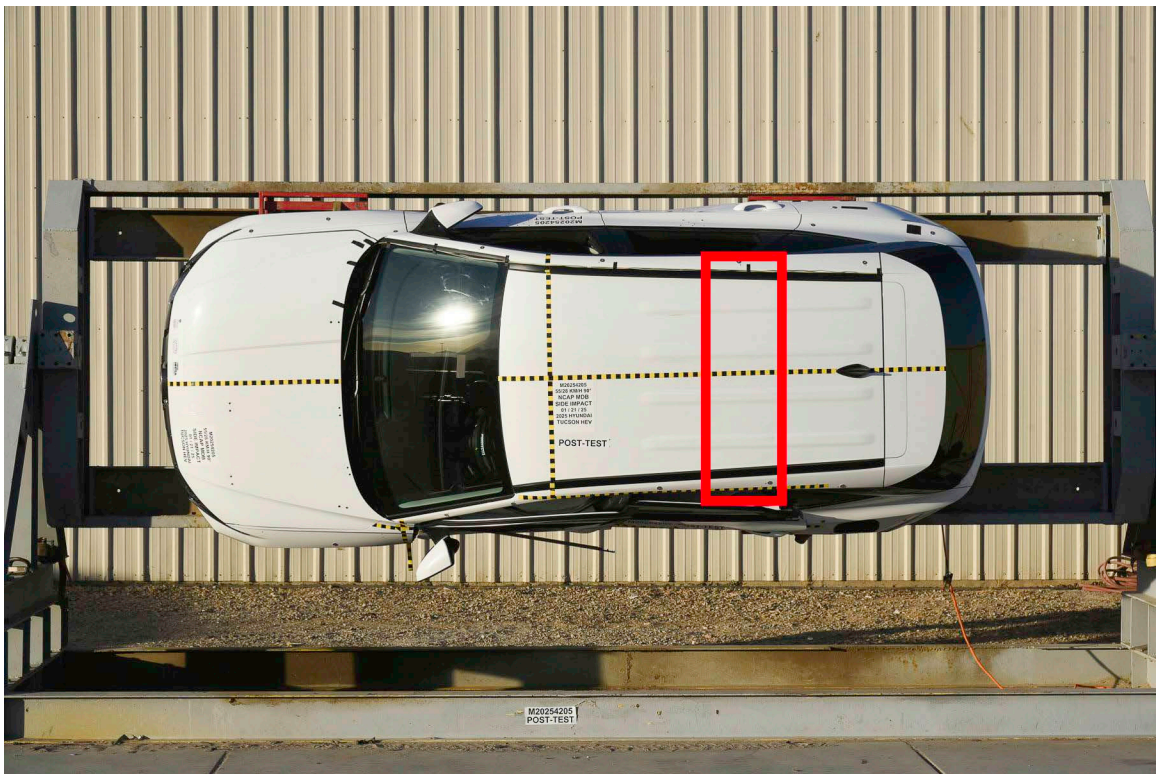


FIGURE 305-028 FMVSS No. 305 Static Rollover at 90°

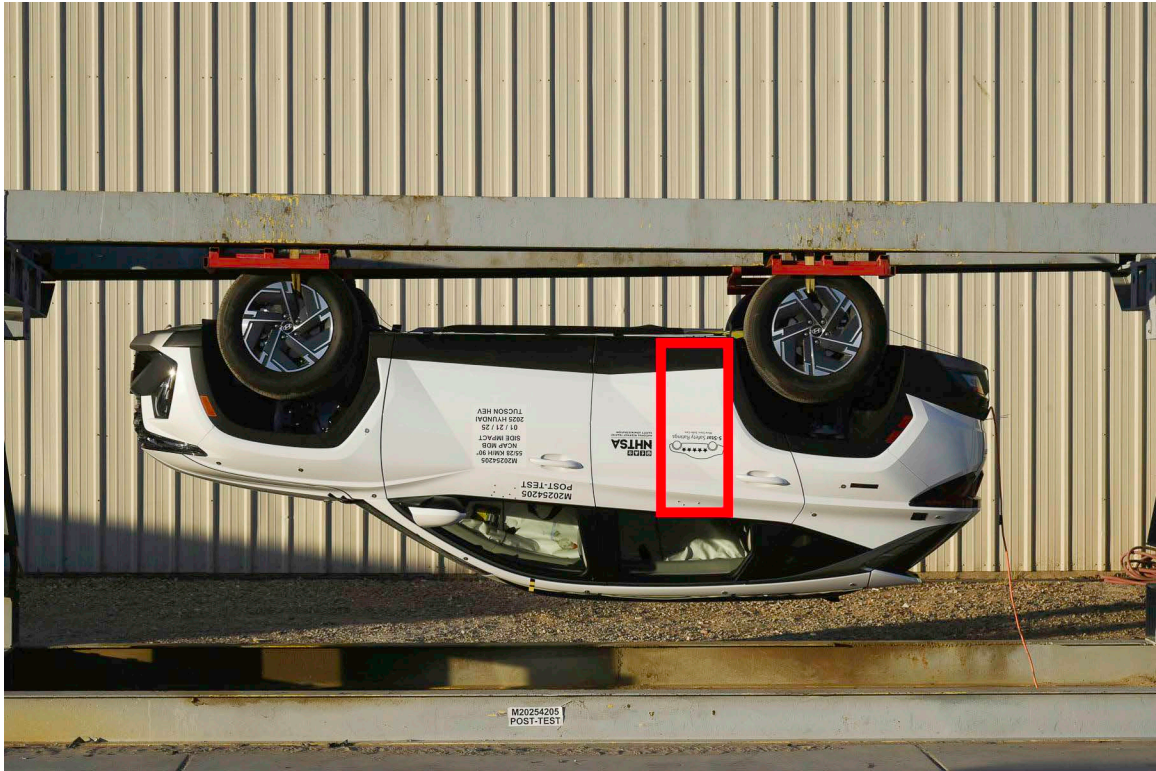


FIGURE 305-029 FMVSS No. 305 Static Rollover at 180°

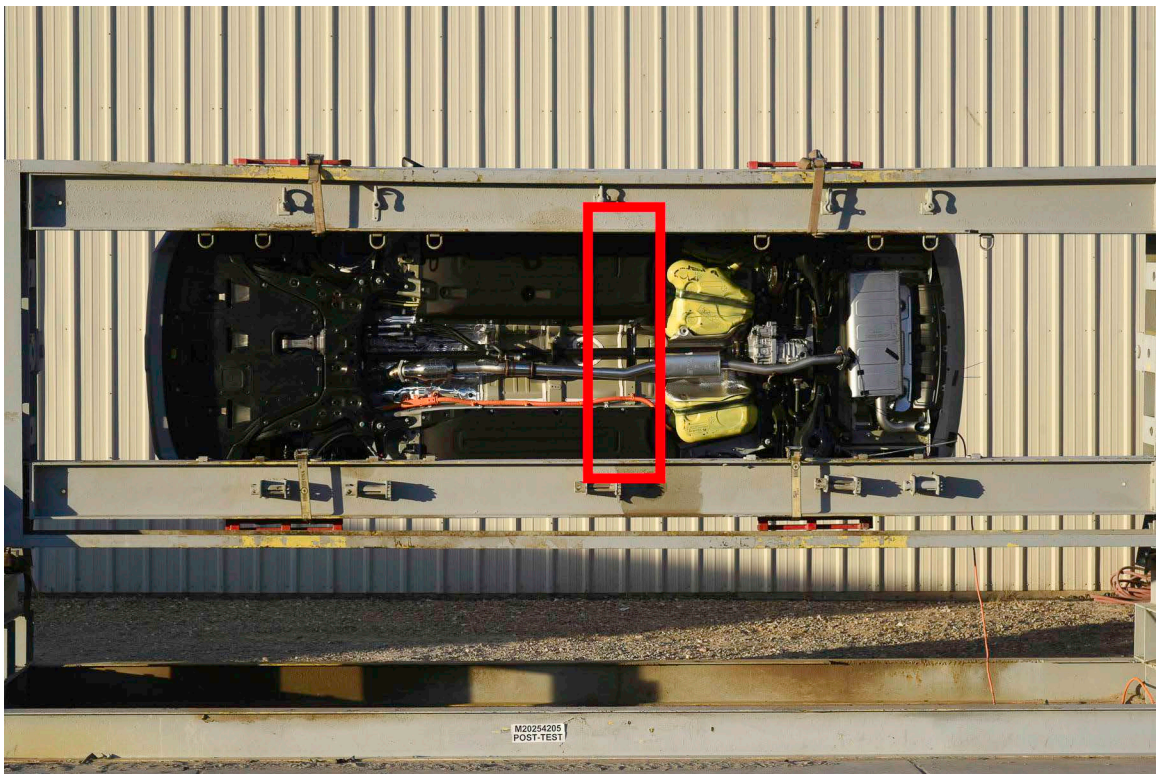


FIGURE 305-030 FMVSS No. 305 Static Rollover at 270°

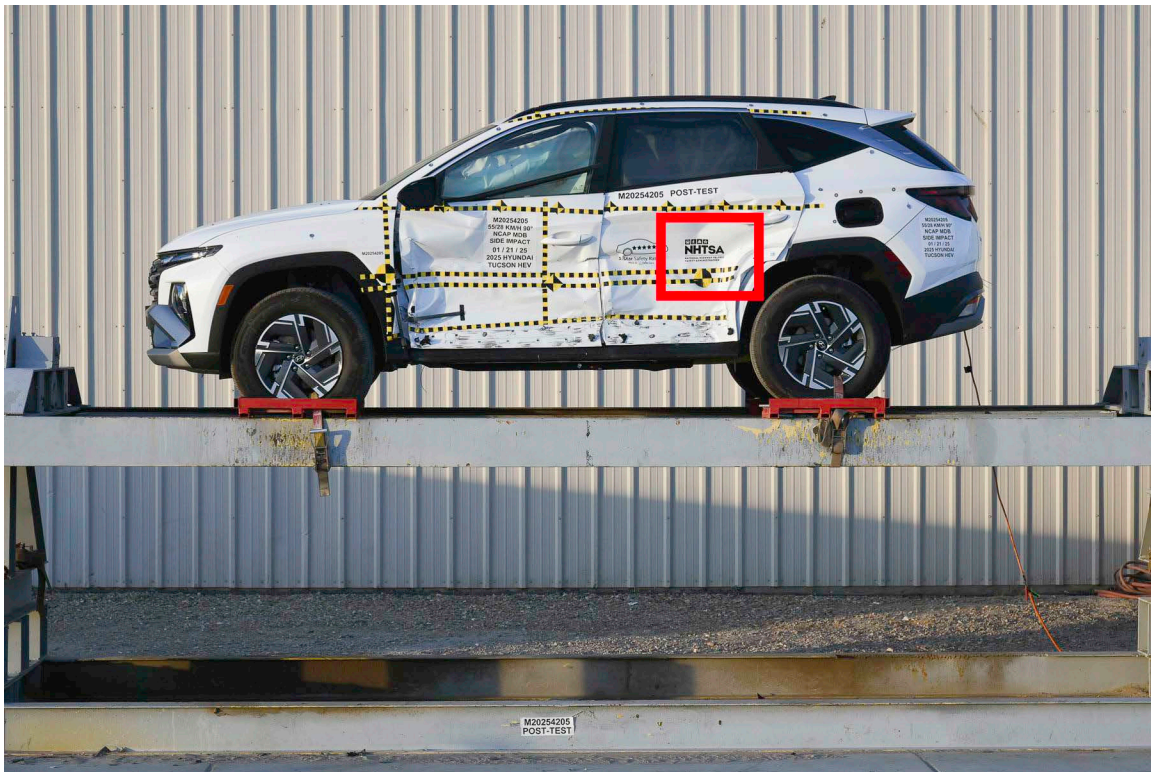


FIGURE 305-031 FMVSS No. 305 Static Rollover at 360°

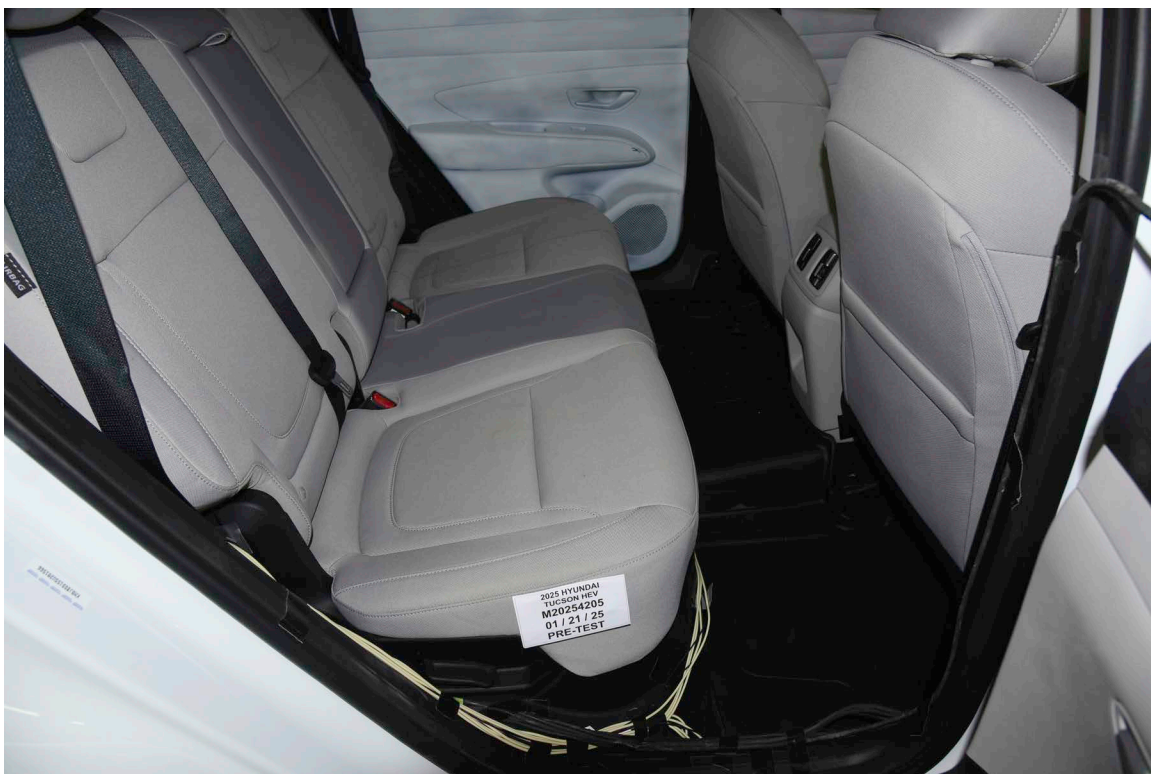


FIGURE 305-032 Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



FIGURE 305-033 Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photograph Not Applicable

No Propulsion Battery Mounting
and/or Intrusion Failure

FIGURE 305-034 Post-Impact Propulsion Battery System Mounting and or Intrusion Failure(s)

Photograph Not Applicable

No Battery Component Intrusion

FIGURE 305-035 Post-Impact View of Battery Component Intrusion

Photograph Not Applicable

No Propulsion Battery Movement or Retention Loss

FIGURE 305-036 Post-Impact View of Battery Module Movement or Retention Loss

Photograph Not Applicable

No Propulsion Battery Electrolyte Spillage

FIGURE 305-037 Post-Impact View of Propulsion Battery Electrolyte Spillage Location

Photograph Not Applicable

No Propulsion Battery Electrolyte Spillage

FIGURE 305-038 Post-Test View of Propulsion Battery Electrolyte Spillage Location

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary vs. Time	B-1
2	Driver Head Acceleration (Y) Primary vs. Time	B-1
3	Driver Head Acceleration (Z) Primary vs. Time	B-1
4	Driver Head Resultant Acceleration Primary vs. Time	B-1
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
8	Driver Thorax Rib Deflection Maximum vs. Time	B-2
9	Driver Anterior Abdominal Force (Y) vs. Time	B-3
10	Driver Middle Abdominal Force (Y) vs. Time	B-3
11	Driver Posterior Abdominal Force (Y) vs. Time	B-3
12	Driver Total Abdominal Force (Y) vs. Time	B-3
13	Driver Pubic Symphysis Force (Y) vs. Time	B-4
14	Passenger Head Acceleration (X) Primary vs. Time	B-5
15	Passenger Head Acceleration (Y) Primary vs. Time	B-5
16	Passenger Head Acceleration (Z) Primary vs. Time	B-5
17	Passenger Head Resultant Acceleration Primary vs. Time	B-5
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7
25	Passenger Upper Thorax Rib Deflection (Y) vs. Time	B-8
26	Passenger Middle Thorax Rib Deflection (Y) vs. Time	B-8
27	Passenger Lower Thorax Rib Deflection (Y) vs. Time	B-8
28	Passenger Upper Abdomen Rib Deflection (Y) vs. Time	B-8
29	Passenger Lower Abdomen Rib Deflection (Y) vs. Time	B-9

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website (www.NHTSA.gov)

Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Structure Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)

Engine Block (X)

Engine Block (Y)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

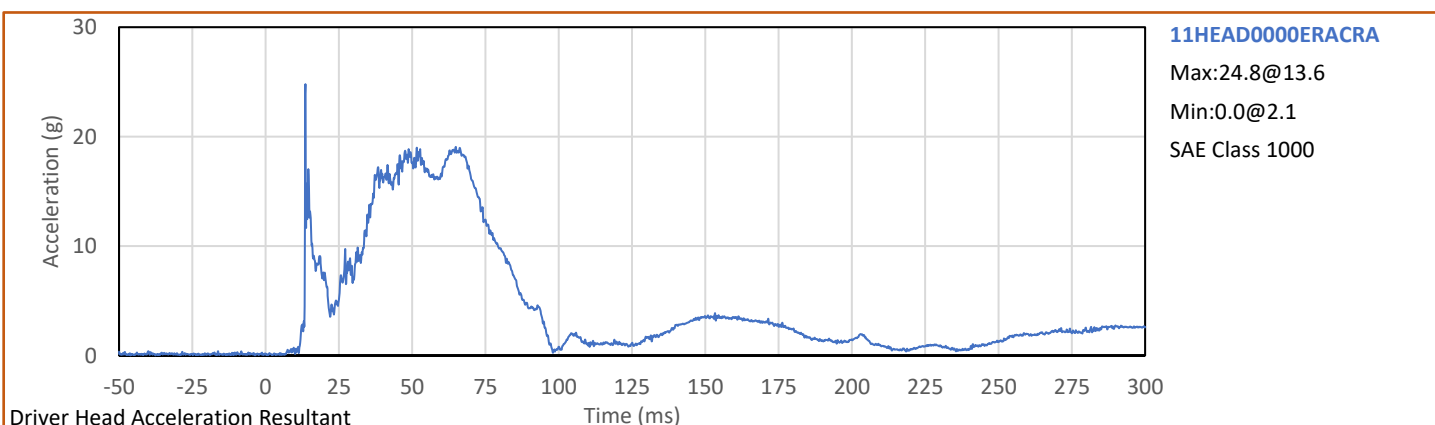
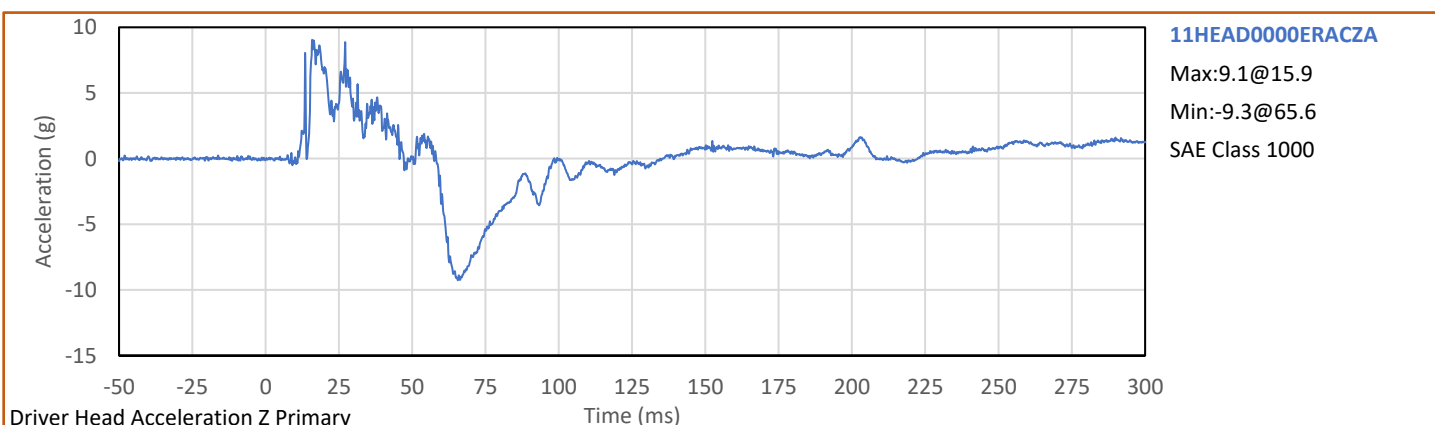
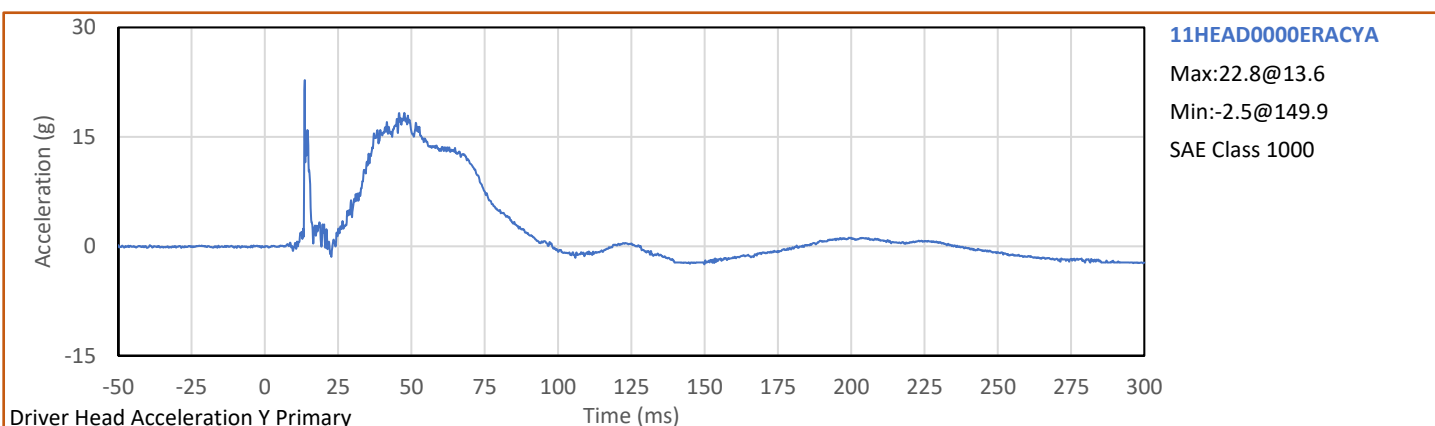
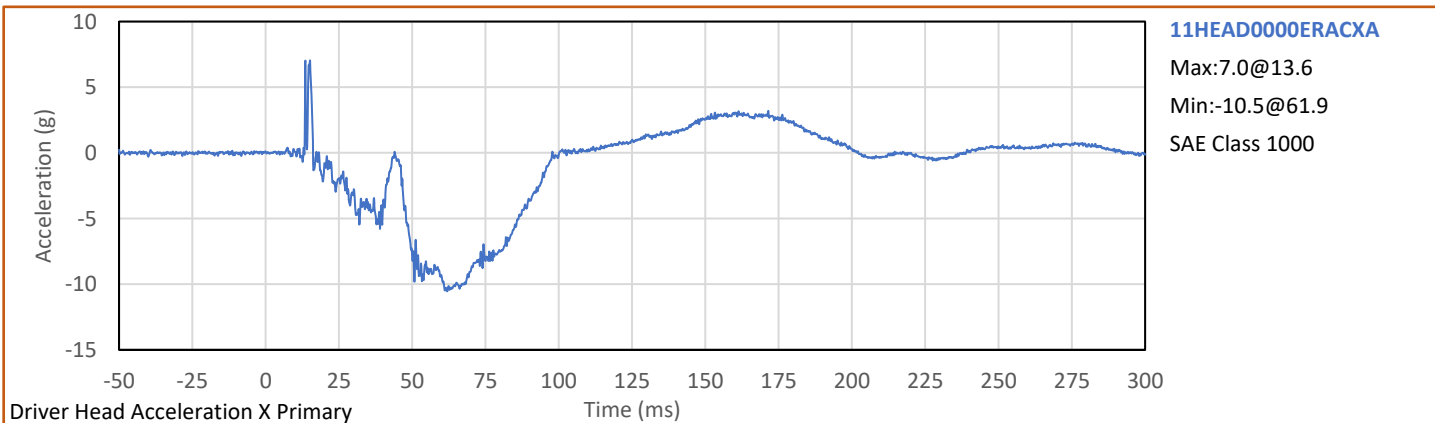
MDB Center of Gravity Acceleration (Z)

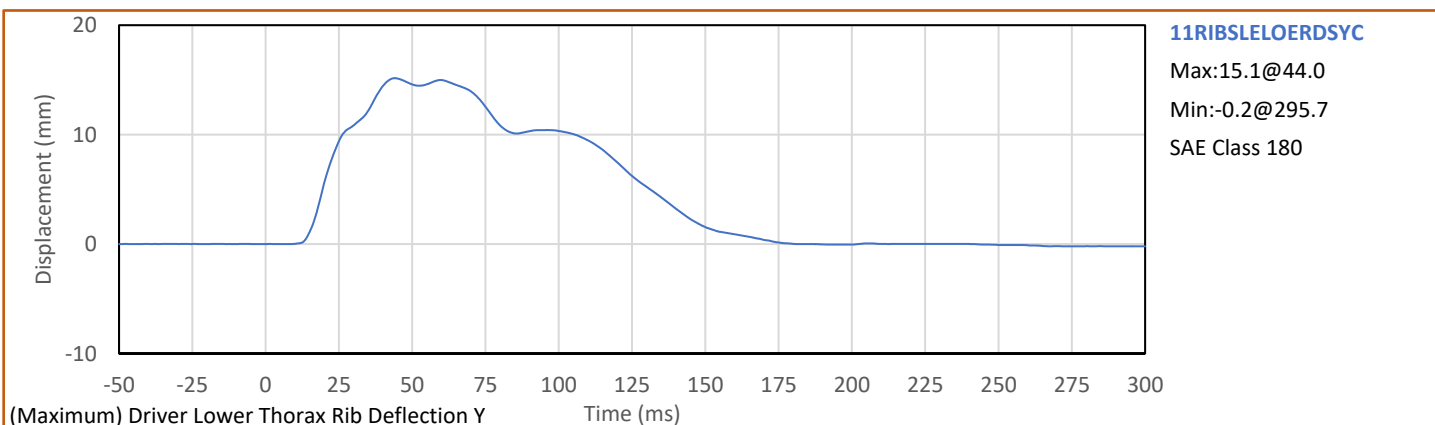
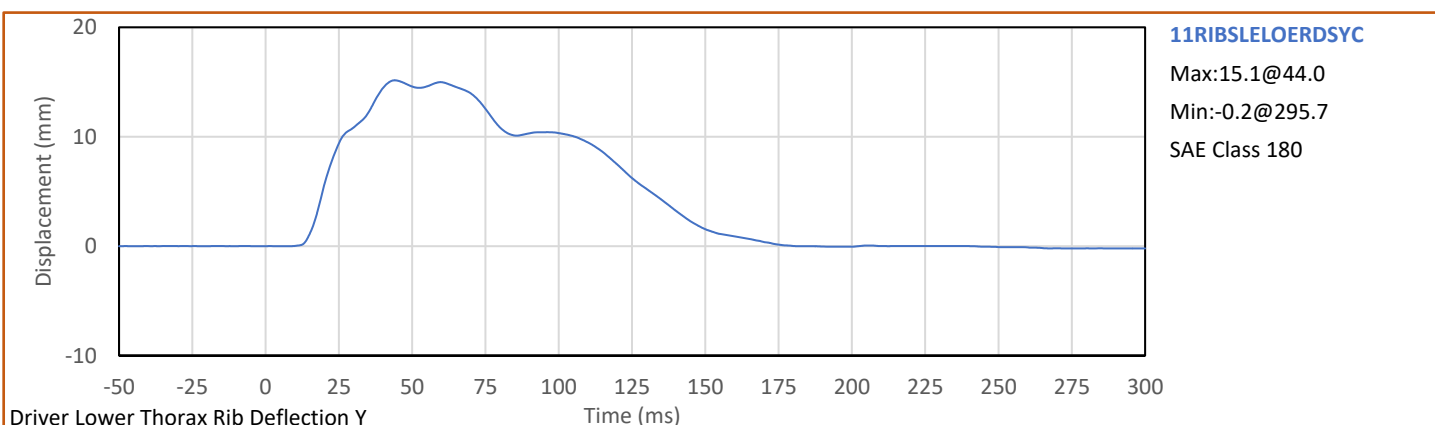
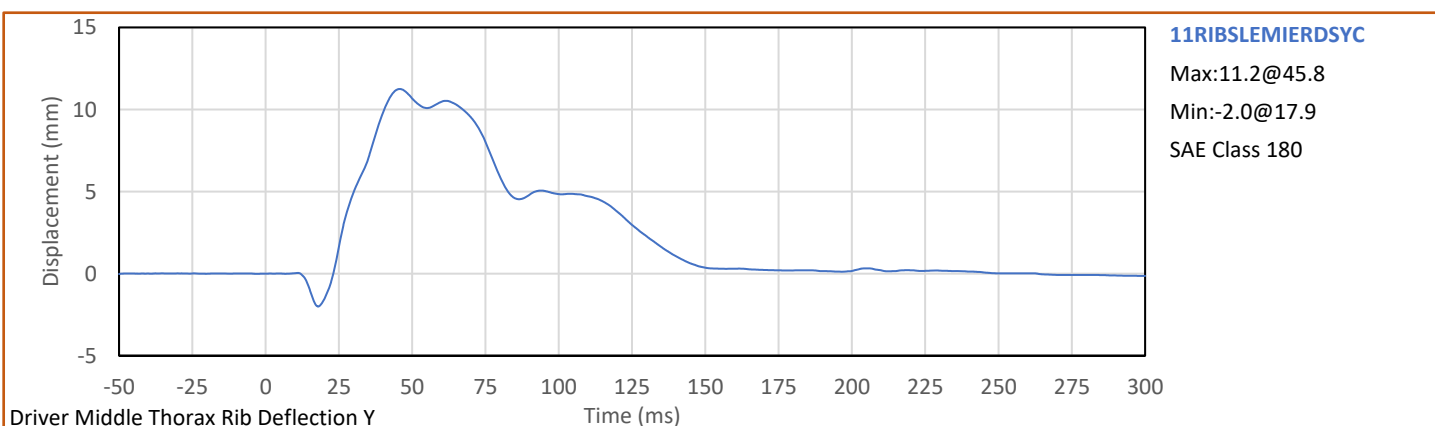
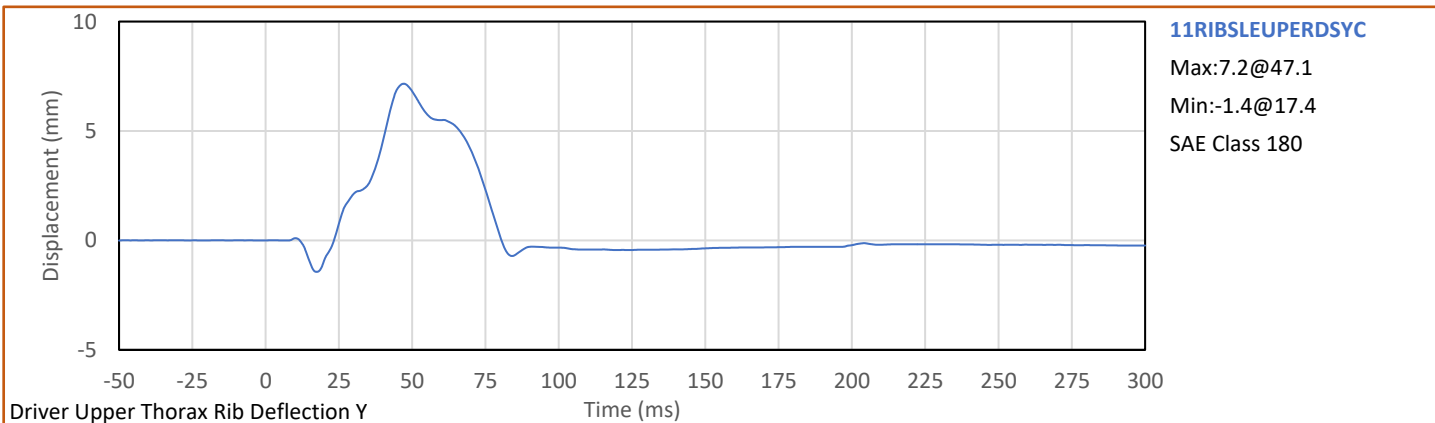
MDB Rear Acceleration (X)

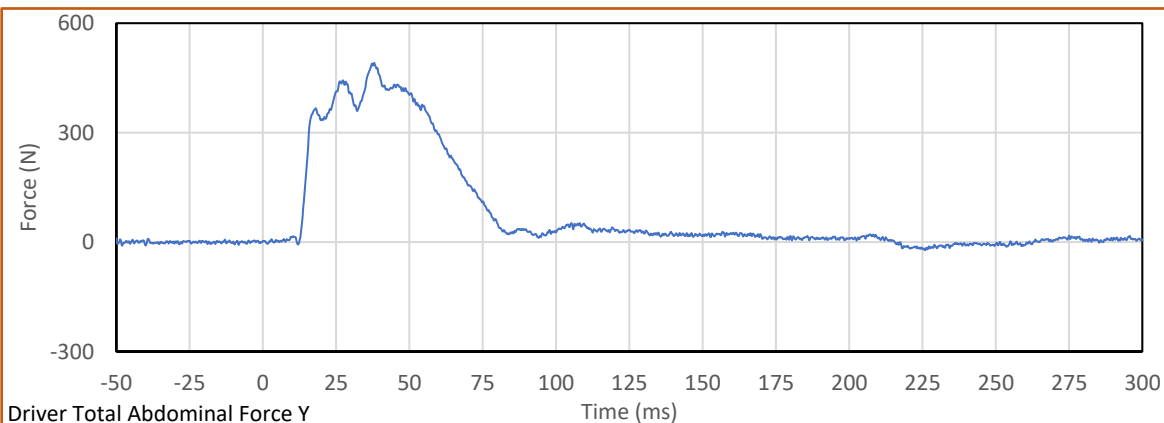
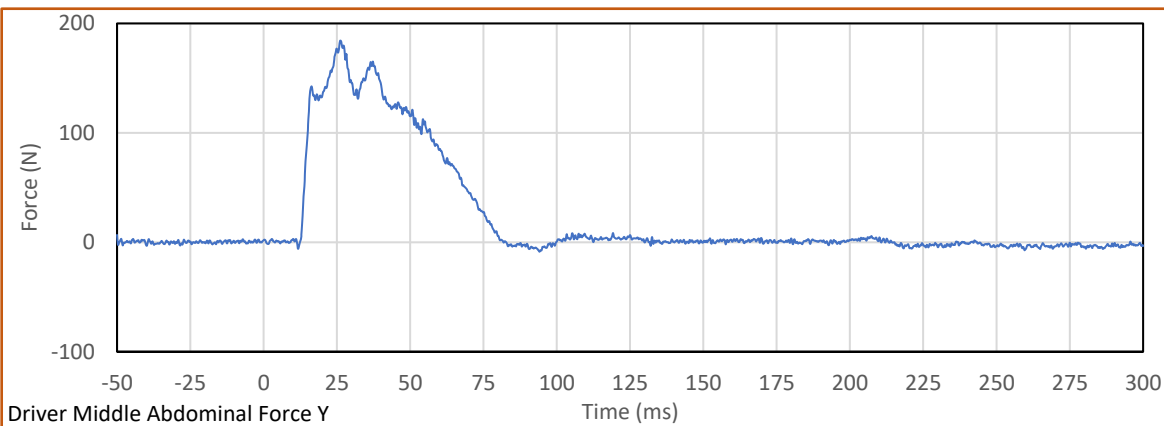
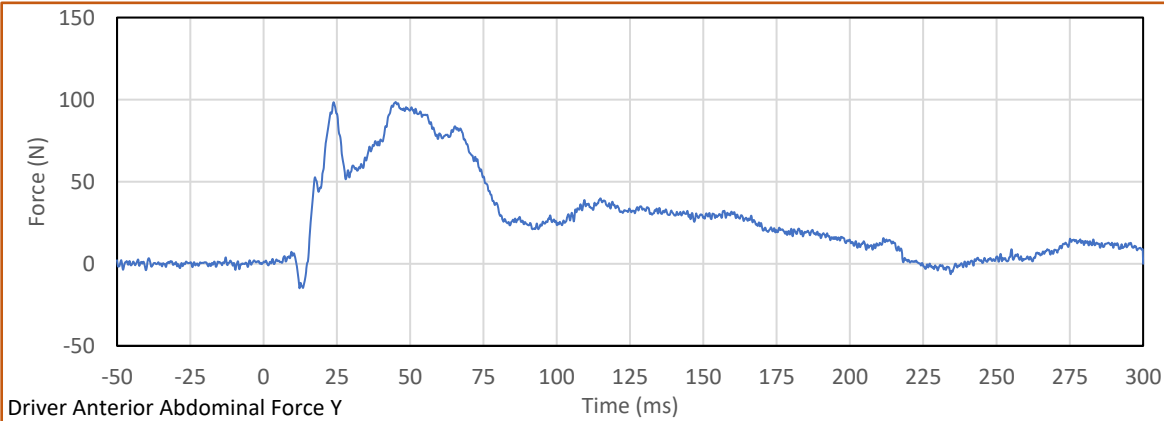
MDB Rear Acceleration (Y)

Left MDB Contact Switch

Right MDB Contact Switch

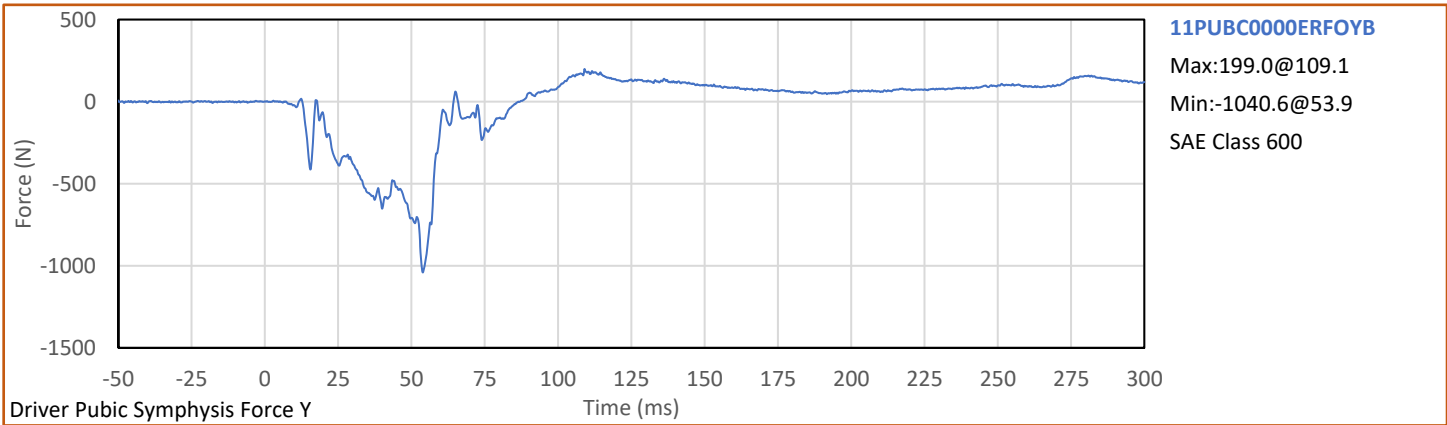


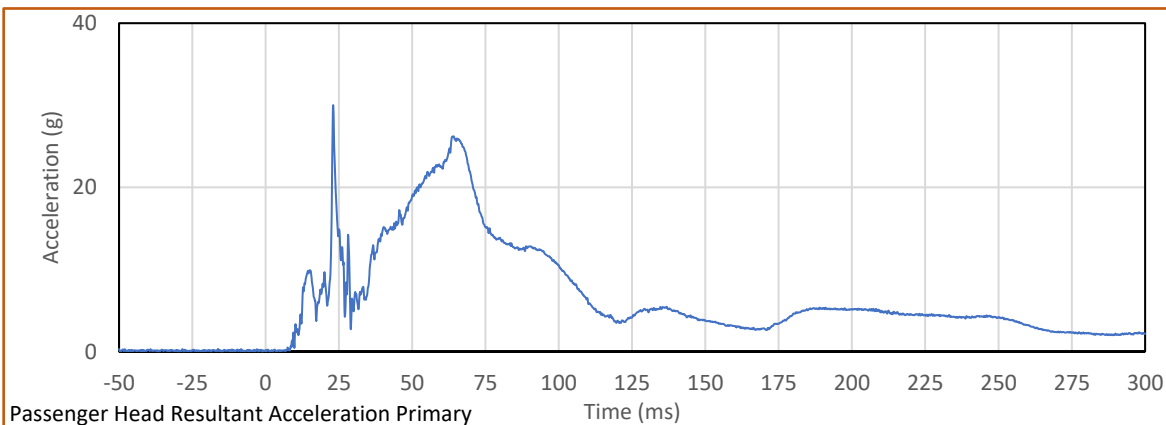
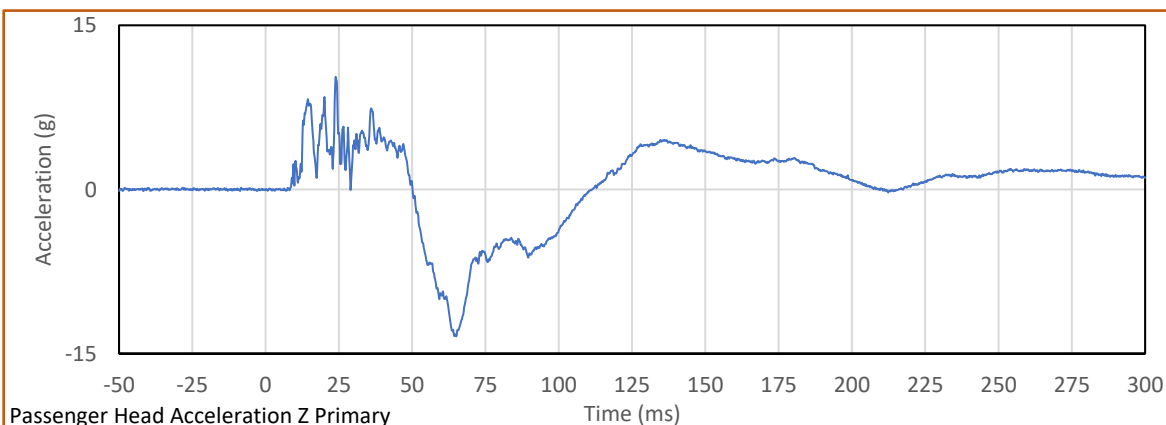
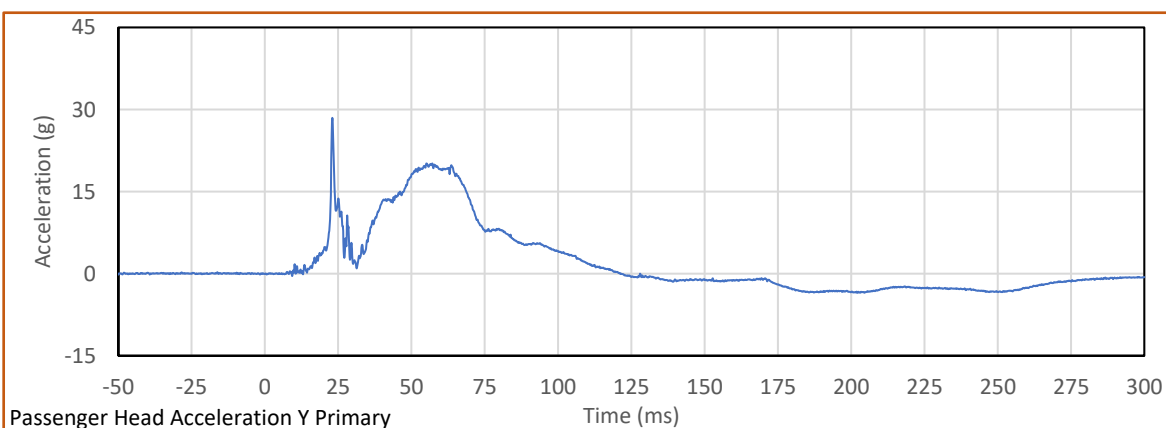
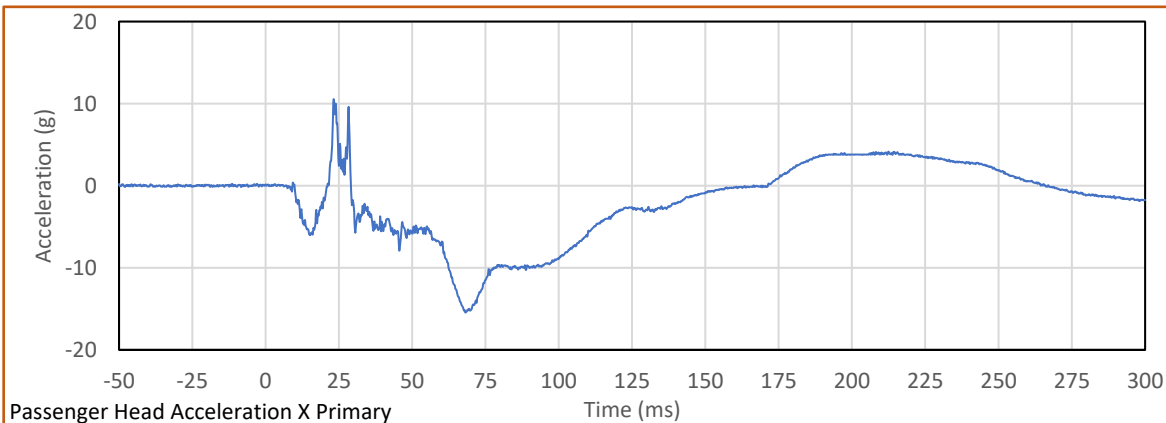


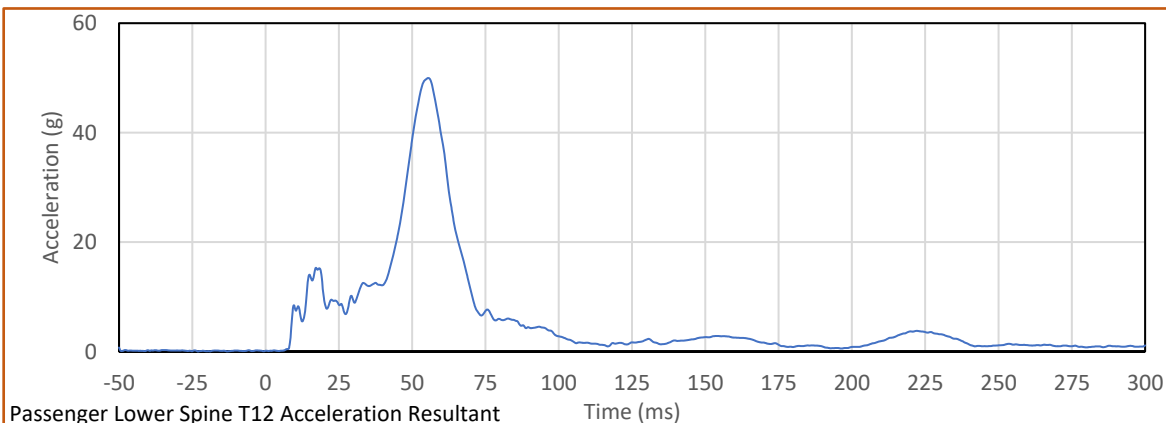
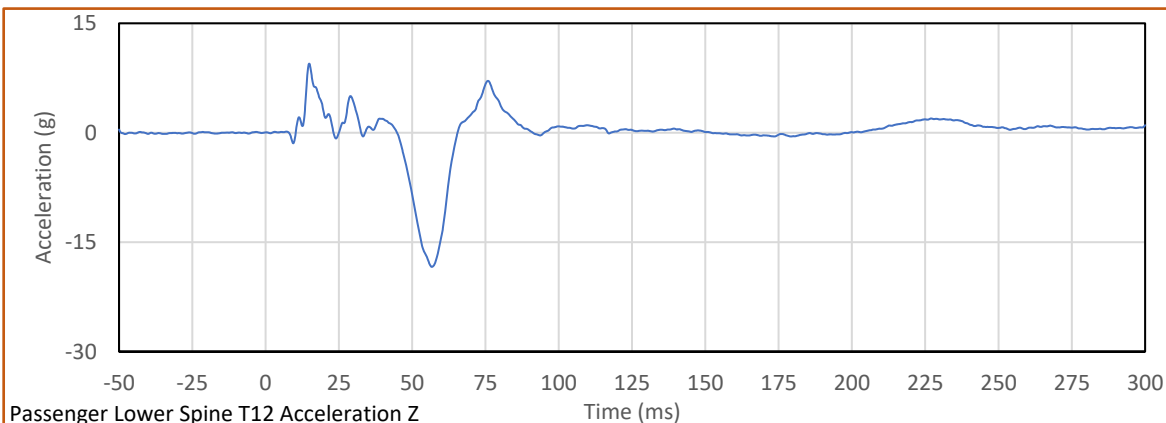
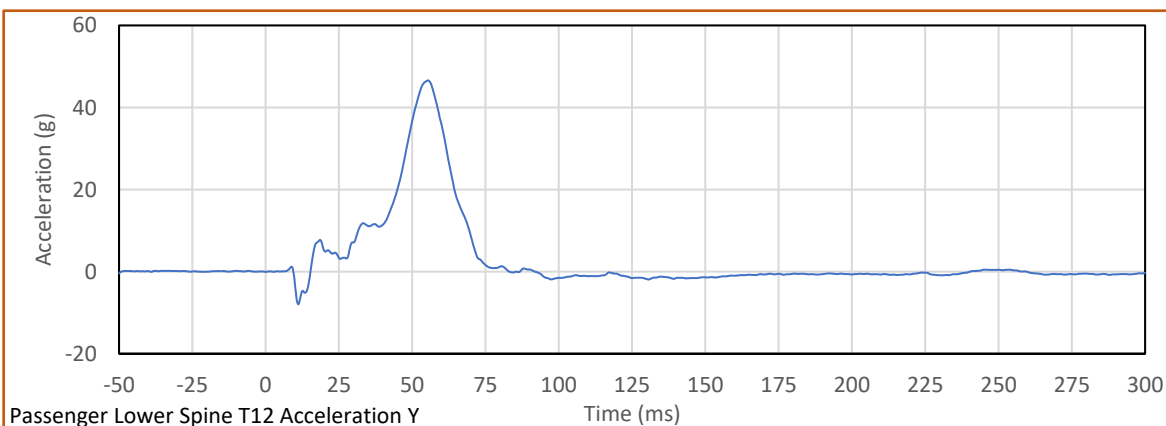
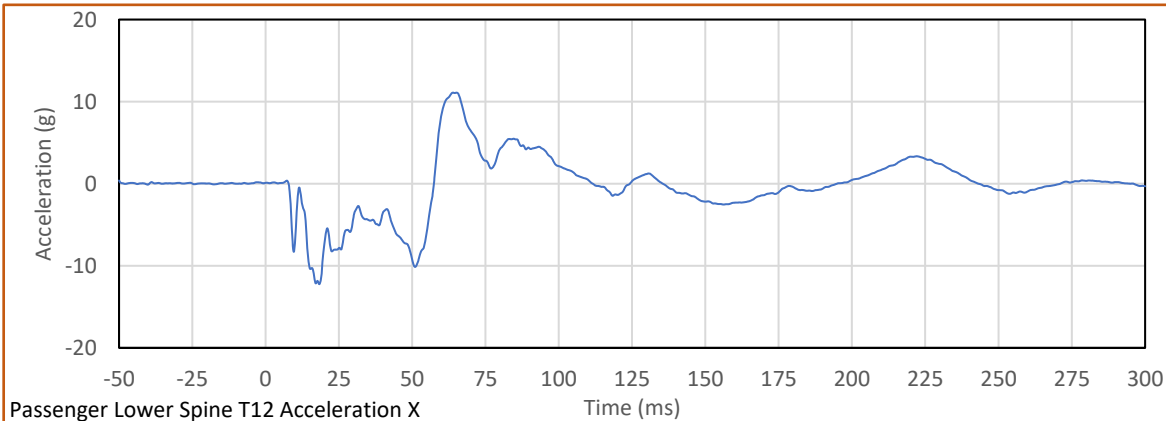


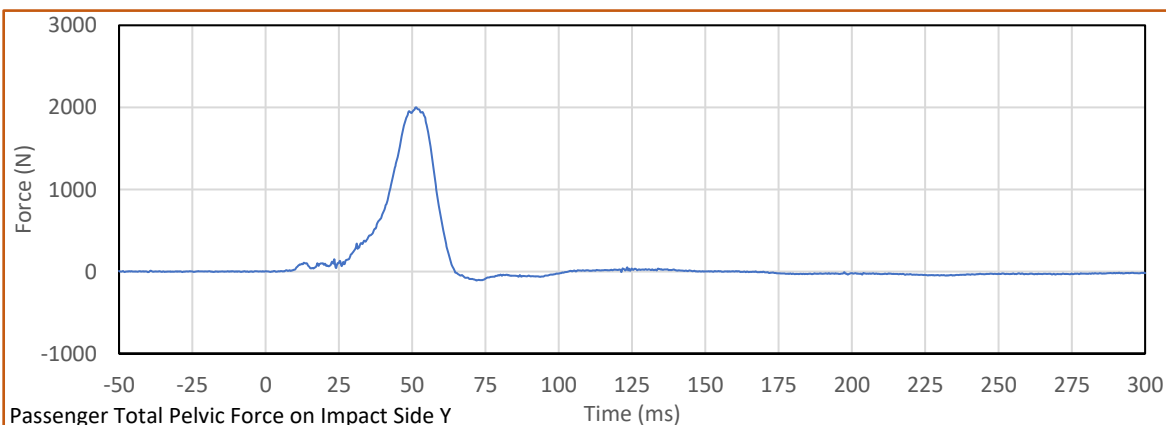
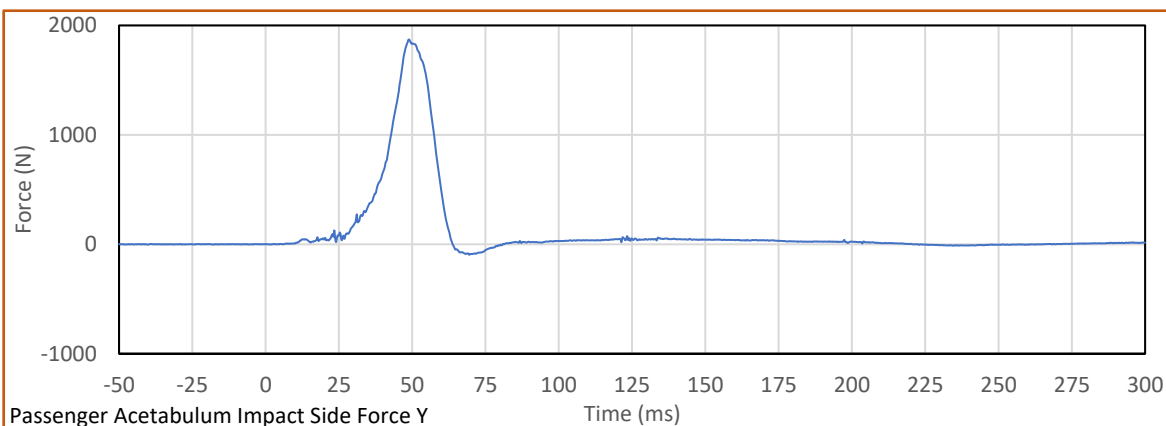
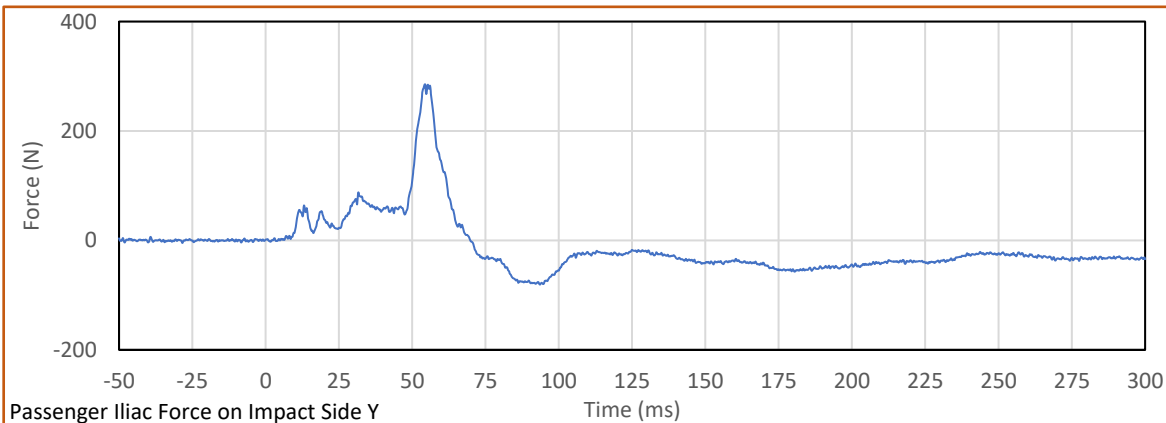
Test Vehicle: 2025 Hyundai Tucson 5-Door MPV
Test Program: NCAP MDB Side Impact Test

NHTSA No.: M20254205
Test Date: 1/21/2025









APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C

**Pre-Test ATD Qualification and Performance Verification
ES-2re 50th Male Side Impact ATD, Left Side Configuration
S/N: F037**

ATD Serial No.: F037

Test Date: 2025-01-15

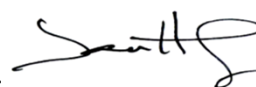
Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
1 - Sitting Height	mm	900	918	910	Pass
2 - Seat to Shoulder Joint	mm	558	572	565	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	351	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	100	Pass
5 - Sole to Seat, Sitting	mm	433	451	440	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	469	Pass
8 - Thorax Width	mm	322	332	331	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	369	Pass
11 - Head Depth	mm	196	206	203	Pass
12 - Thorax Depth	mm	262	272	272	Pass
13 - Abdomen Depth	mm	194	204	201	Pass
14 - Pelvis Depth	mm	235	245	240	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	156	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	609	Pass
				Overall Test Results	Pass

Technician:



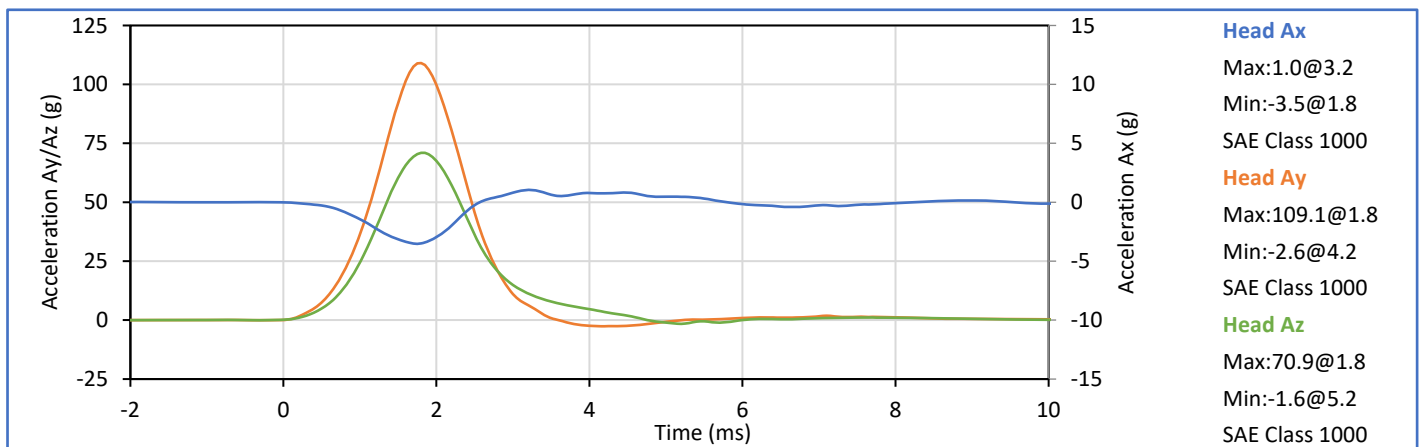
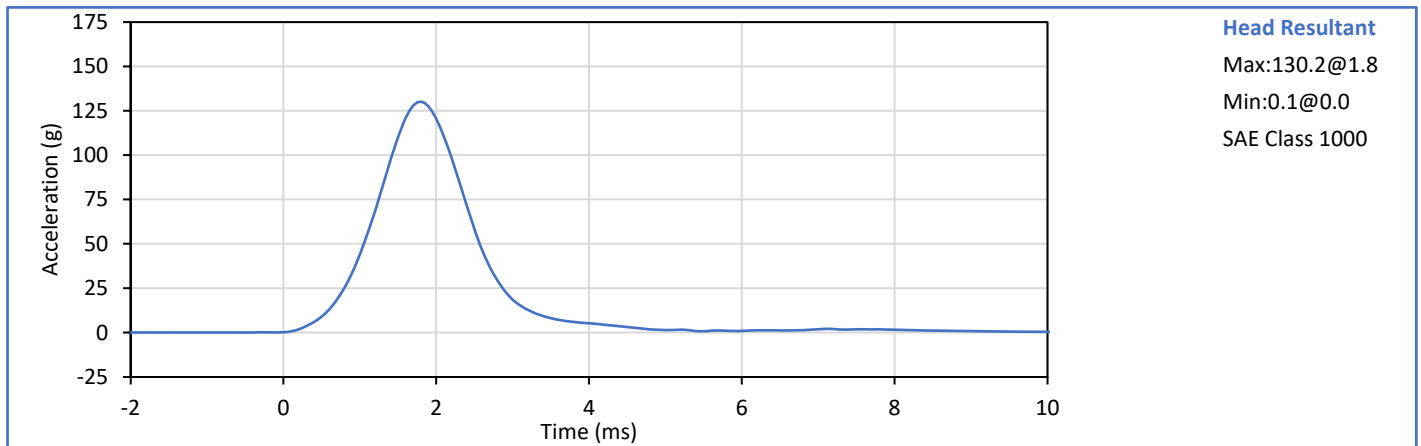
J. Coronel

Approved By:



J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Peak Resultant Acceleration	g	125.0	155.0	130.2	Pass
Peak Head Ax	g	-15.0	15.0	1.0	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician:

J. Coronel

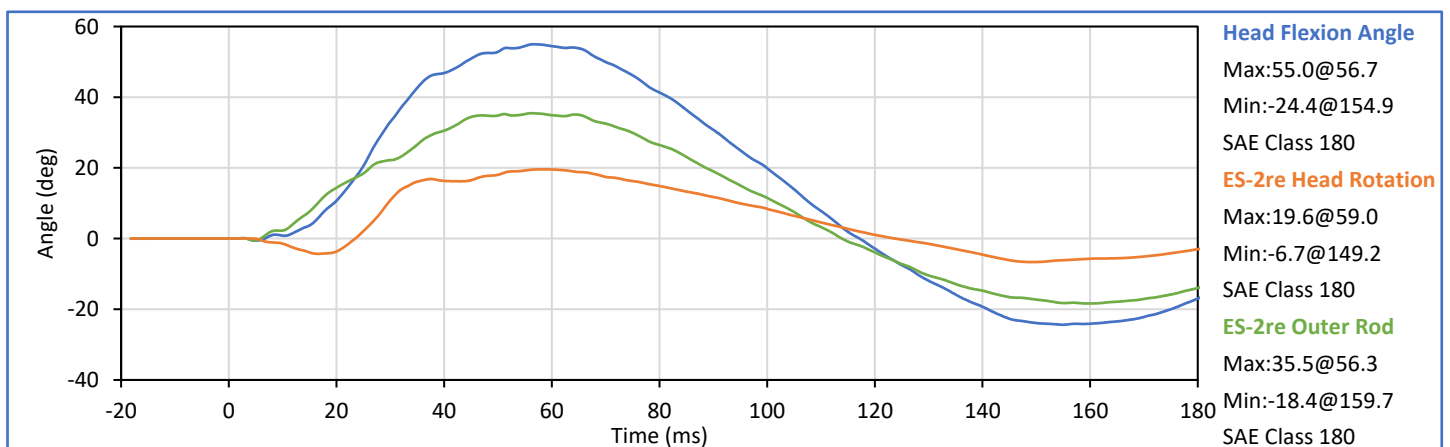
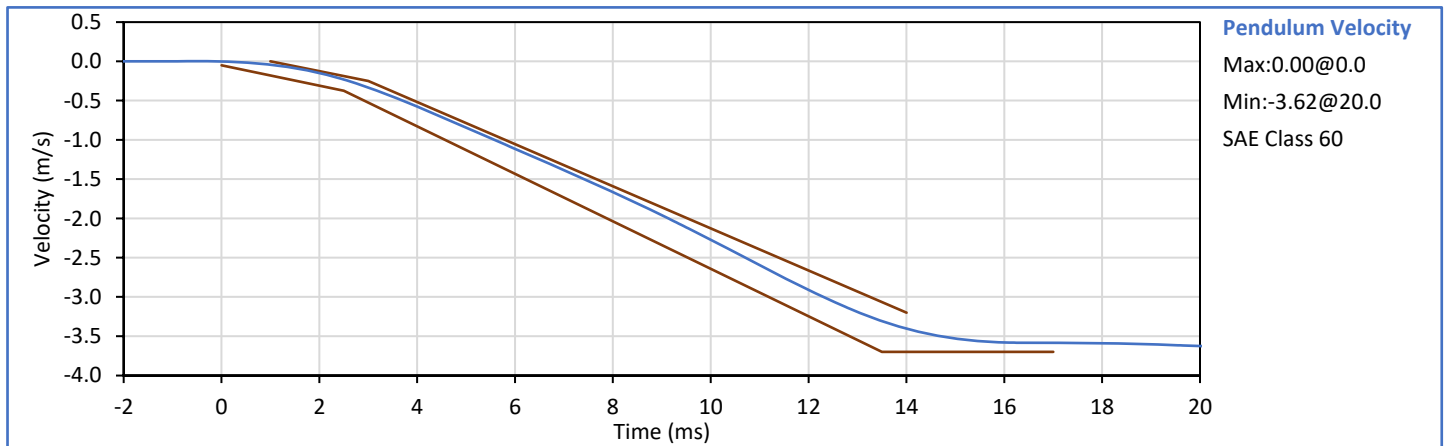
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	3.30	3.50	3.42	Pass
Peak Headform Flexion	deg	49.0	59.0	55.0	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.7	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	60.5	Pass
Overall Test Results					Pass



Technician:

J. Coronel

J. Coronel

Approved By:

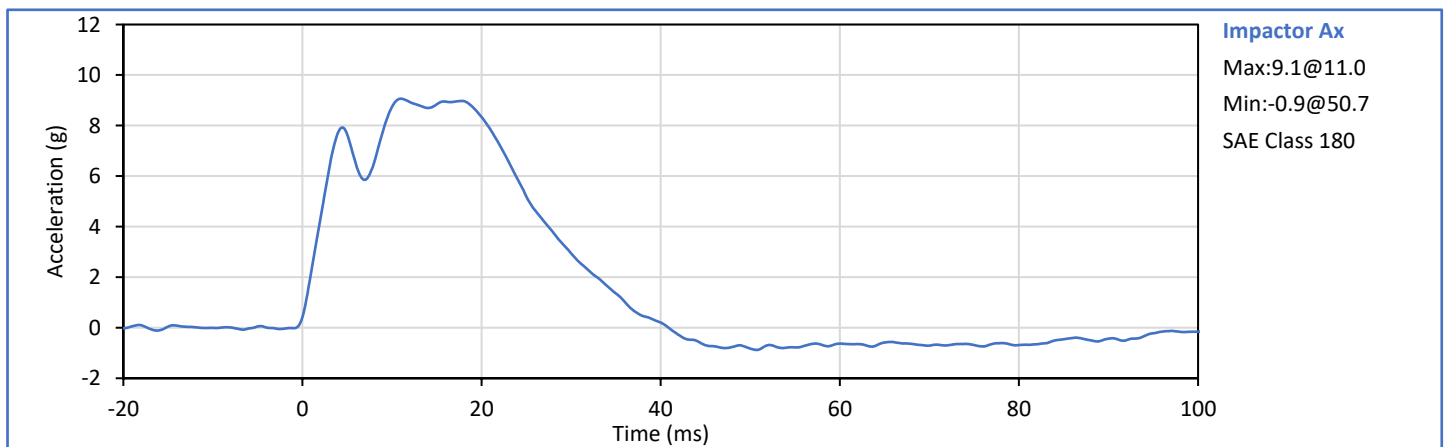
J. Hernandez

J. Hernandez

ATD Serial No.: F037

Test Date: 2025-01-16

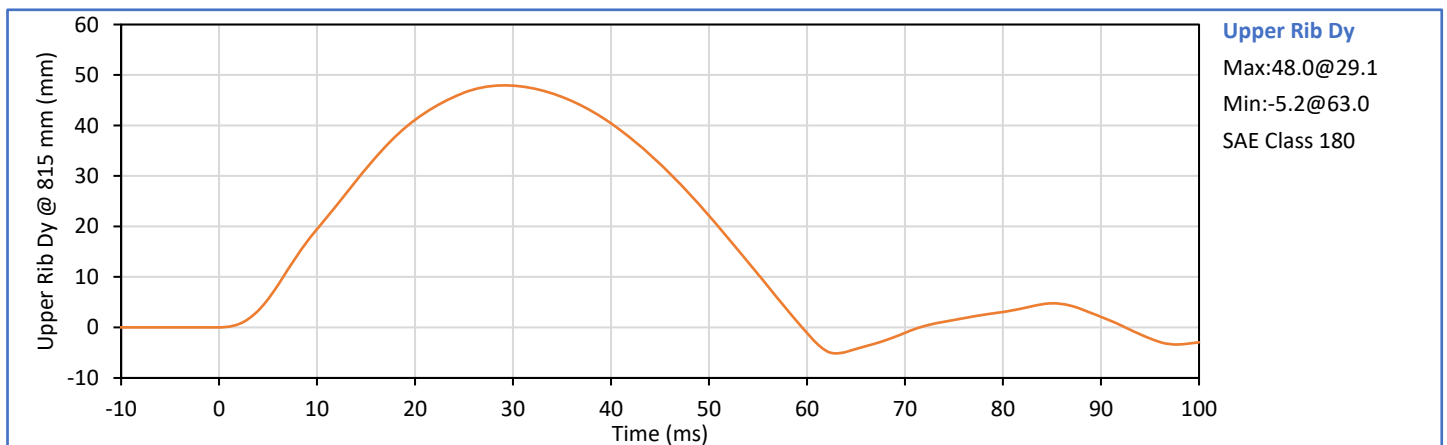
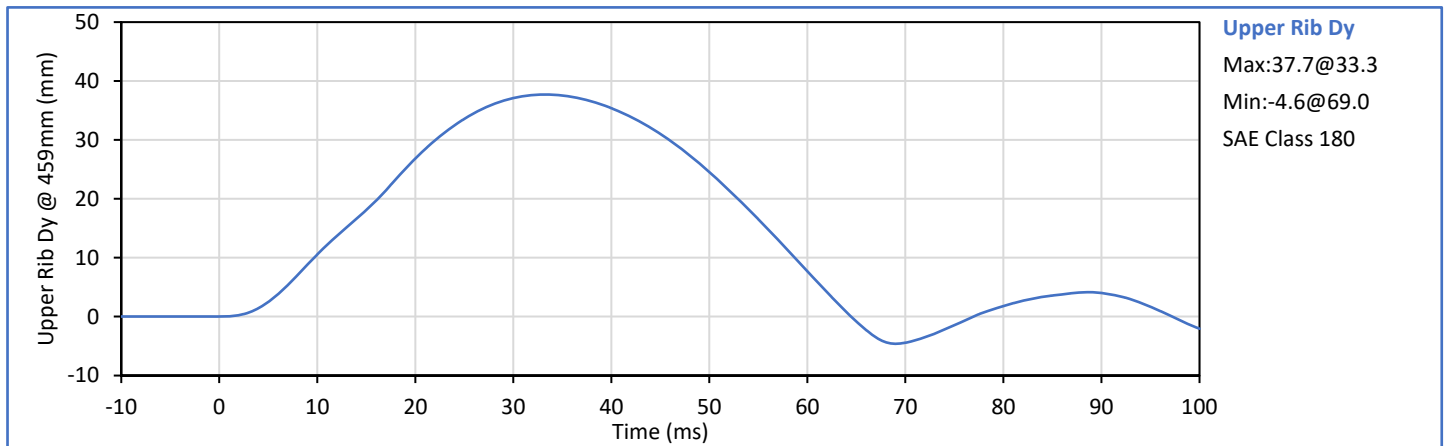
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Ax	g	7.5	10.5	9.1	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

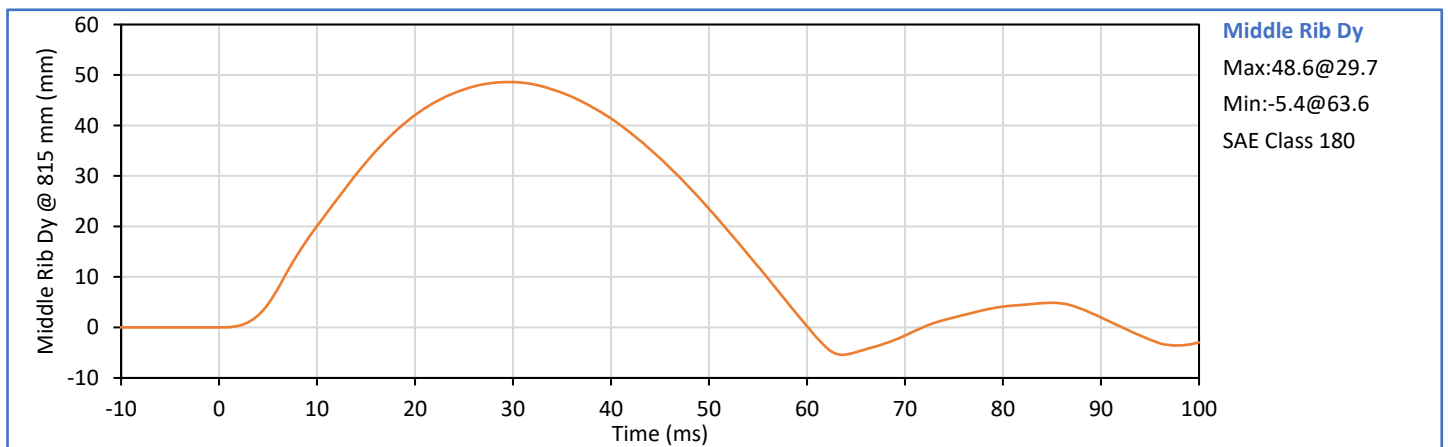
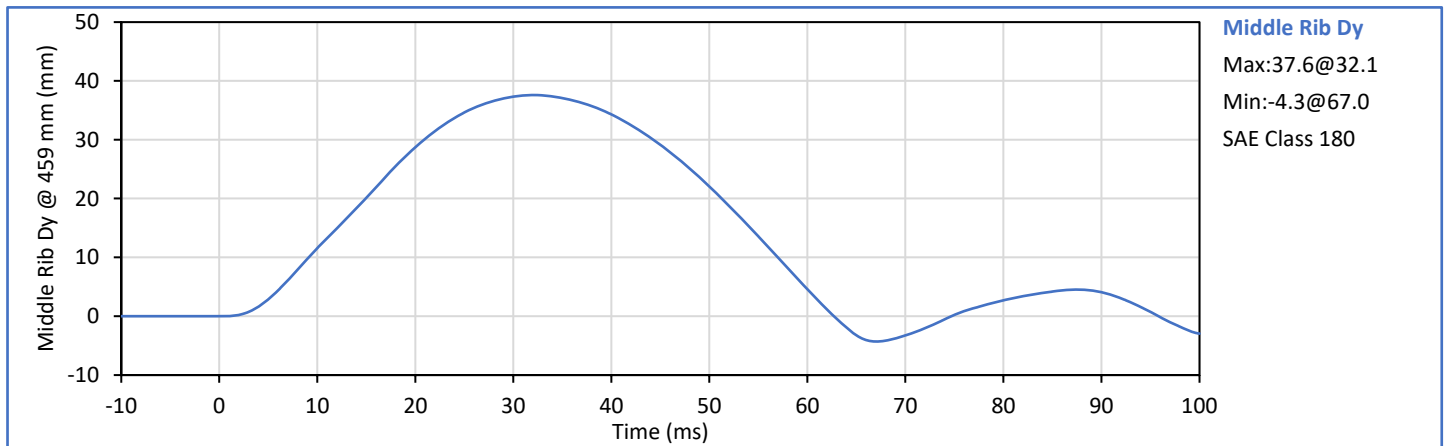
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.7	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.0	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

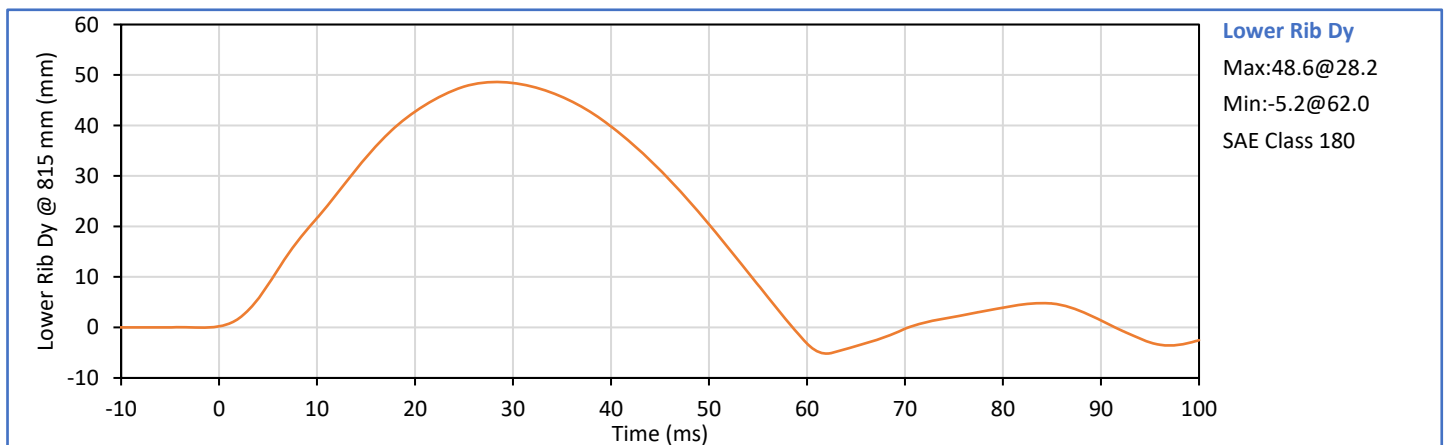
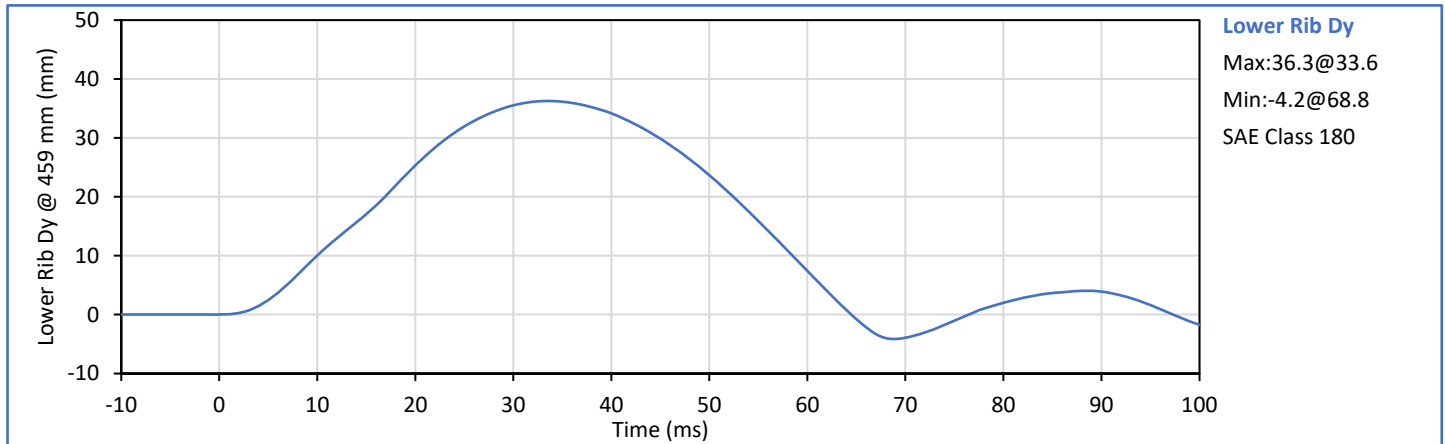
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.6	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	48.6	Pass
Overall Test Results				Pass	Pass



Technician: J. Coronel

Approved By: J. Hernandez

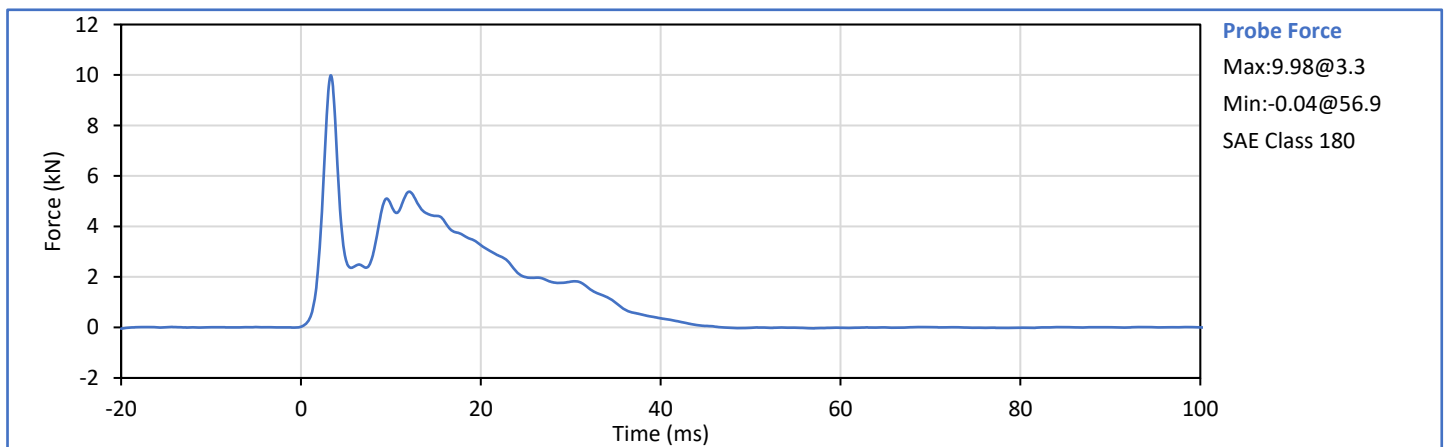
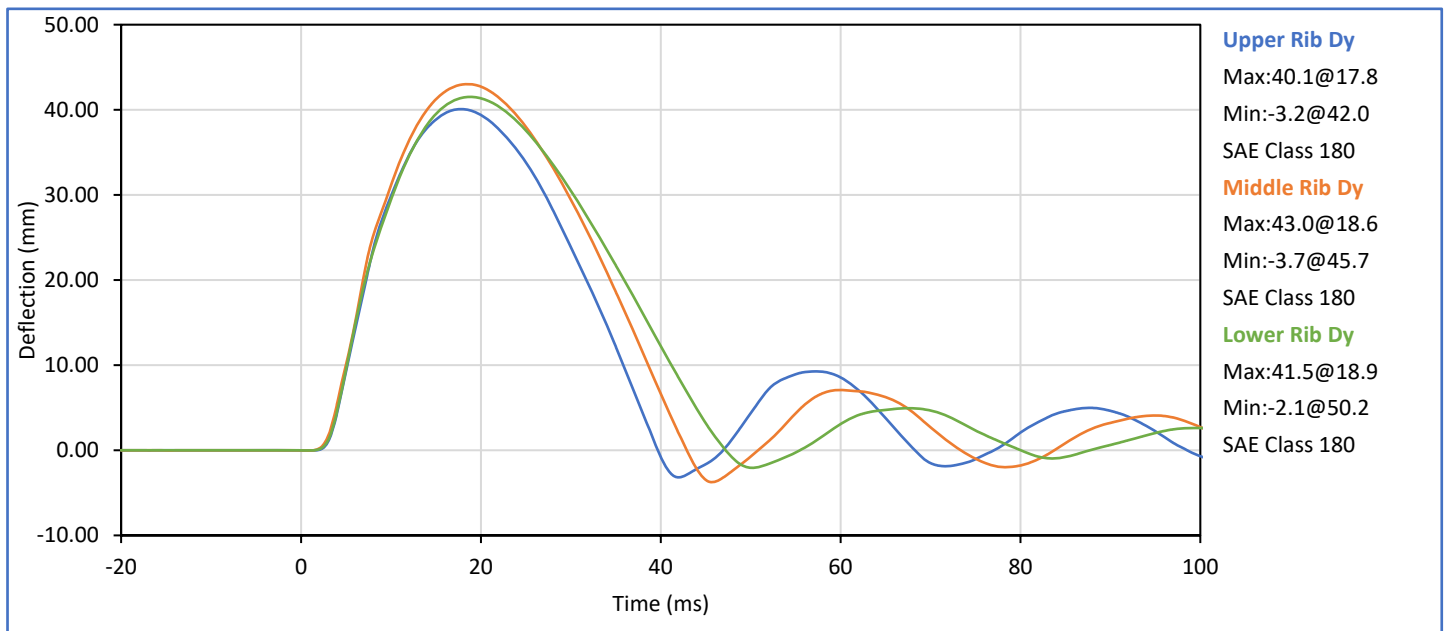
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	36.3	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	48.6	Pass
Overall Test Results				Pass	Pass



Technician: J. Coronel

Approved By: J. Hernandez

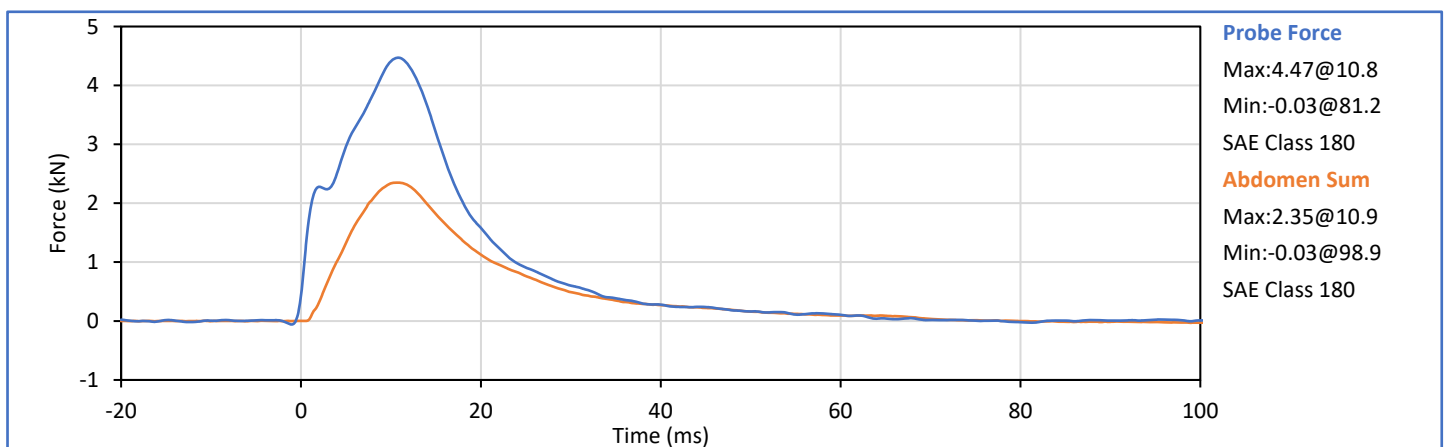
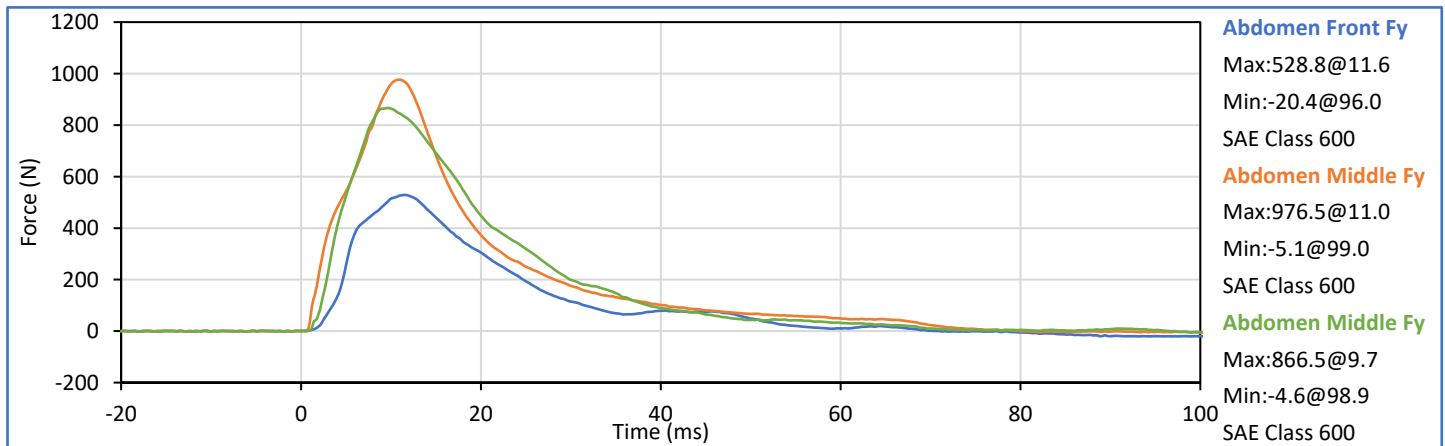
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	5.40	5.60	5.51	Pass
Peak Upper Rib Dy	mm	34.0	41.0	40.1	Pass
Peak Middle Rib Dy	mm	37.0	45.0	43.0	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.5	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.38	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Impactor Velocity	m/s	3.90	4.10	4.01	Pass
Peak Impactor Force	kN	4.00	4.80	4.47	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.8	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.35	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.9	Pass
Overall Test Results					Pass



Technician:

J. Coronel

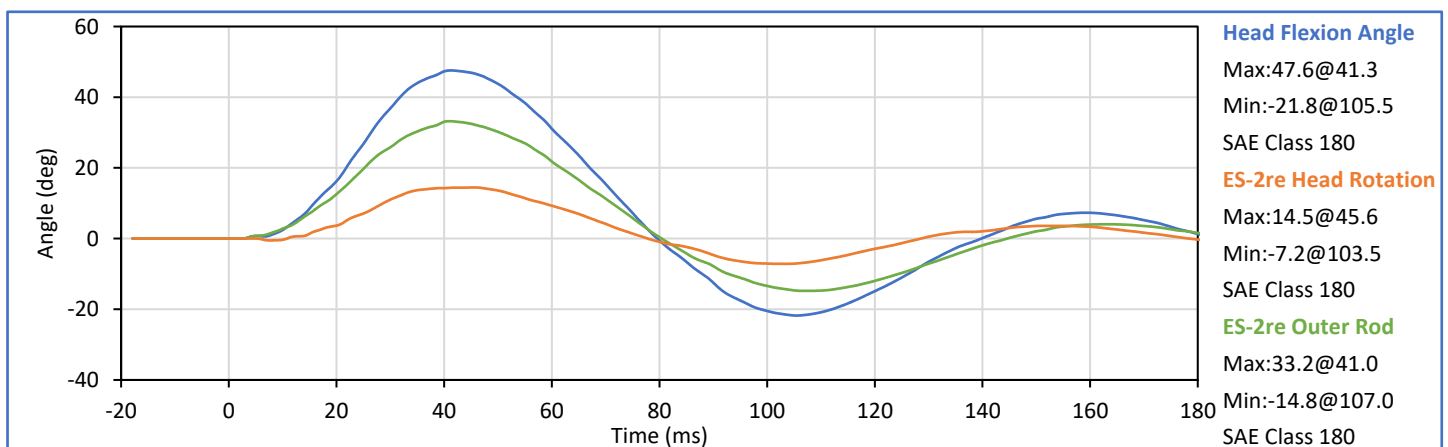
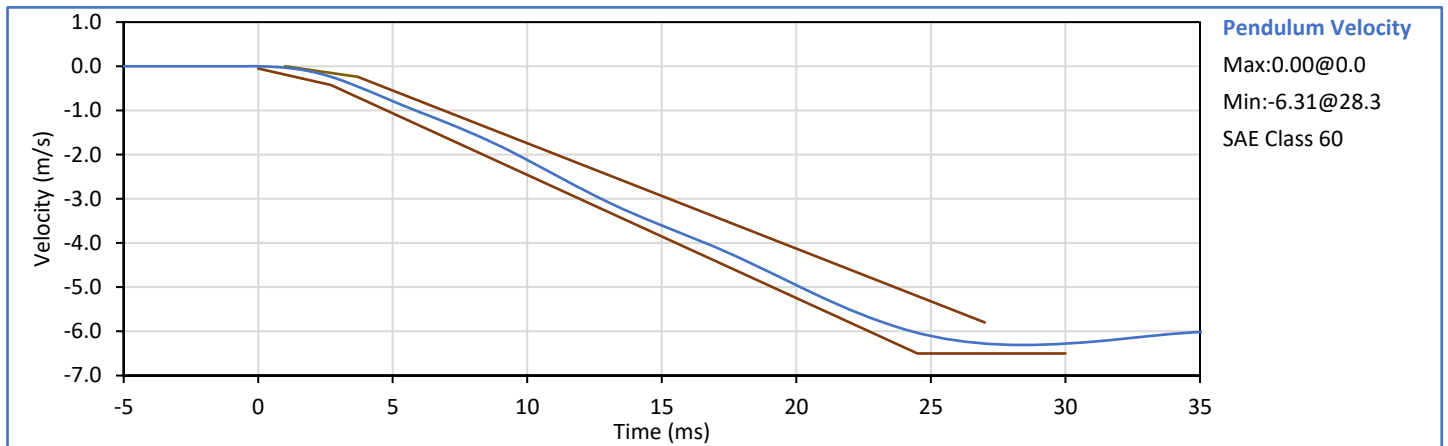
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Pendulum Velocity	m/s	5.95	6.15	6.12	Pass
Peak Headform Flexion	deg	45.0	55.0	47.6	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	41.3	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	38.3	Pass
Overall Test Results					Pass



Technician:

J. Coronel

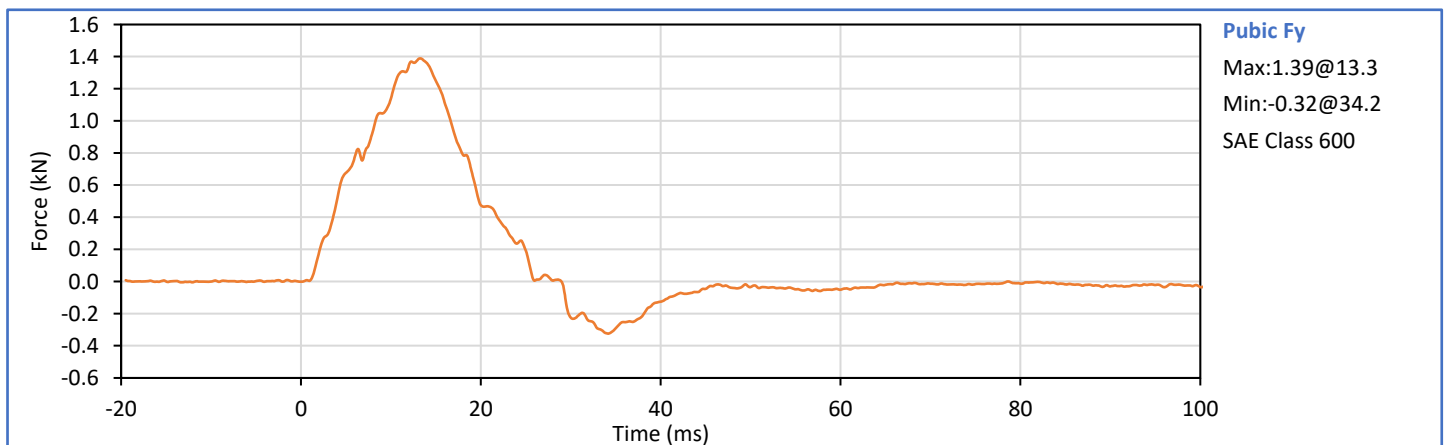
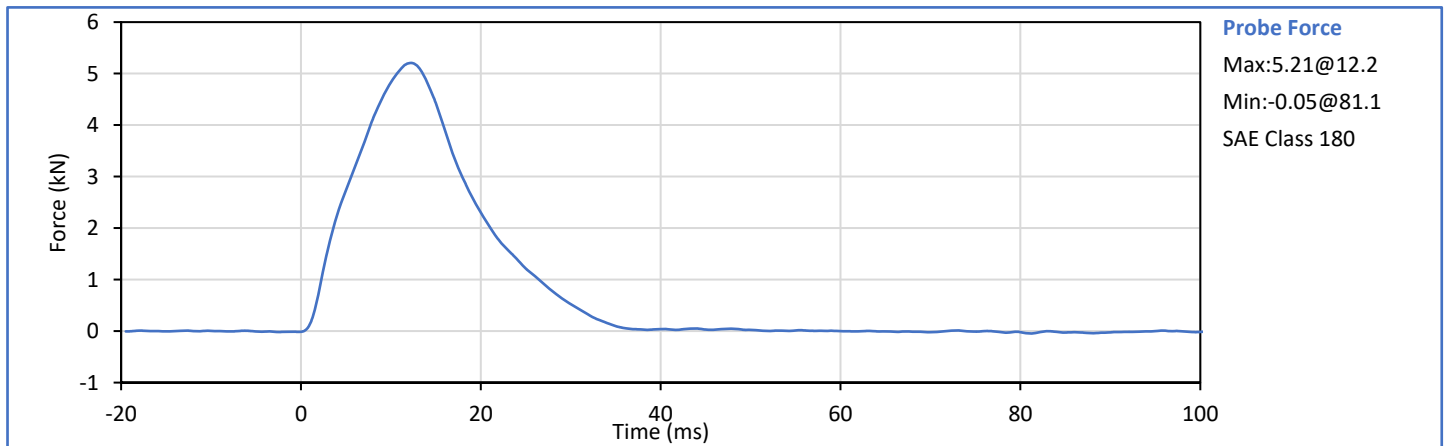
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Force	kN	4.70	5.40	5.21	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.2	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.39	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	13.3	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

APPENDIX C

Pre-Test ATD Qualification and Performance Verification

SID-IIs Small Side Impact ATD, Left Side Configuration

S/N: 308

ATD Serial No.: 308

Test Date: 2025-01-15

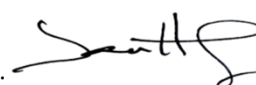
Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	19	Pass
A - Sitting Height	mm	772	788	783	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	82	Pass
D - H Point From Seatback	mm	141	151	149	Pass
E - Shoulder Pivot From Backline	mm	97	107	106	Pass
F - Thigh Clearance	mm	119	135	128	Pass
G - Head Breadth	mm	140	148	145	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	184	Pass
J - Head Circumference	mm	541	551	548	Pass
K - Buttock To Knee Length	mm	514	540	530	Pass
L - Popliteal Height	mm	343	369	355	Pass
K - Knee Pivot To Floor Height	mm	392	409	397	Pass
N - Buttock Popliteal Length	mm	416	442	434	Pass
O - Chest Depth W/O Jacket	mm	195	211	203	Pass
P - Foot Length	mm	216	232	226	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	321	Pass
R - Arm Length	mm	249	259	254	Pass
S - Knee Joint To Seatback	mm	477	493	486	Pass
V - Shoulder Width	mm	341	357	353	Pass
W - Foot Width	mm	78	94	89	Pass
Y - Chest Circumference W/Jacket	mm	851	881	864	Pass
Z - Waist Circumference	mm	761	791	772	Pass
				Overall Test Results	Pass

Technician:



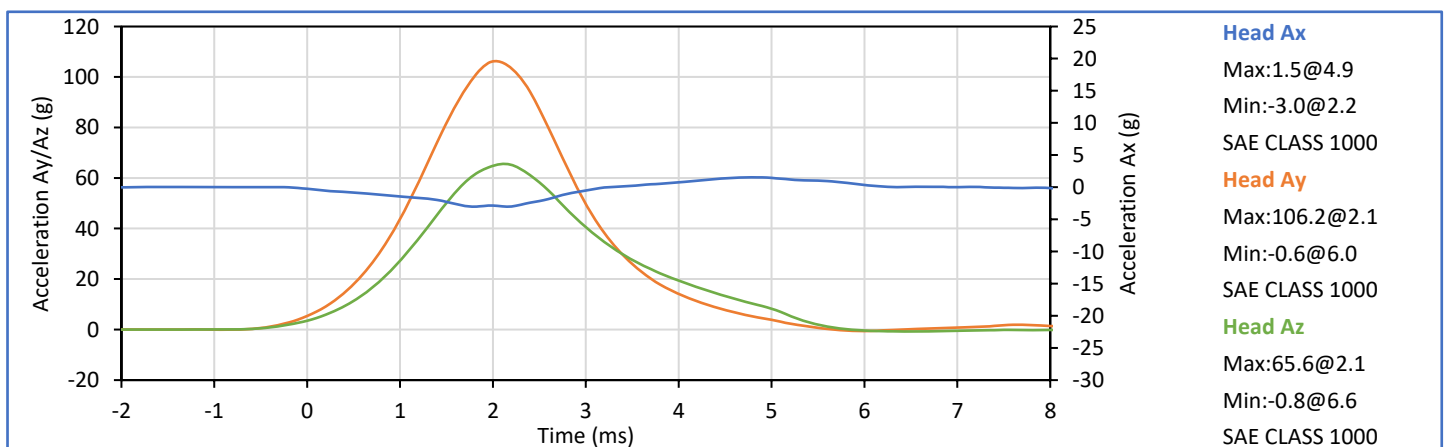
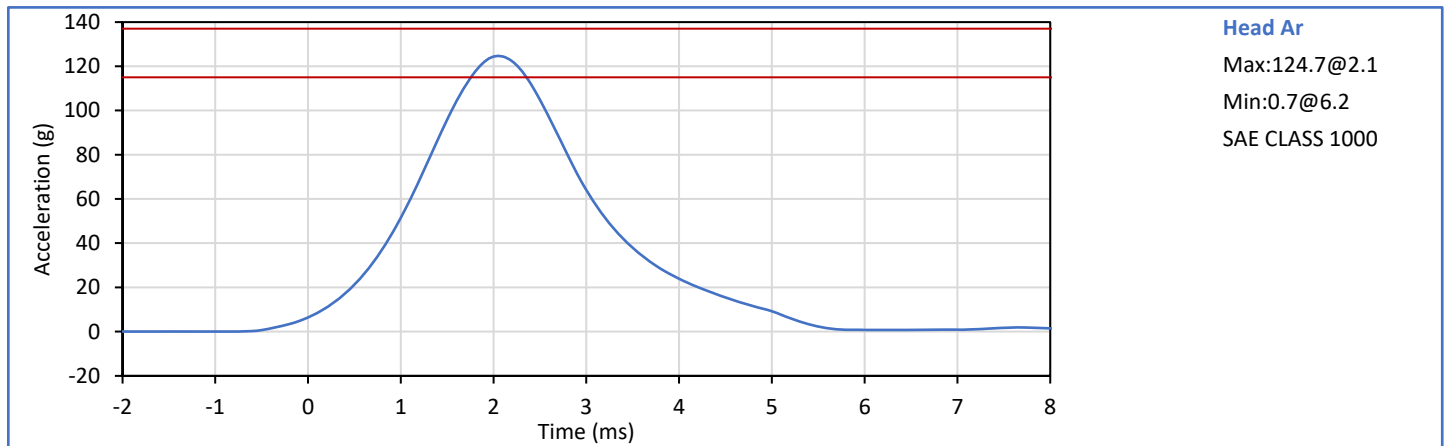
J. Coronel

Approved By:



J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Peak Resultant Acceleration	g	115.0	137.0	124.7	Pass
Peak Head Ax	g	-15.0	15.0	-3.0	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician:

J. Coronel

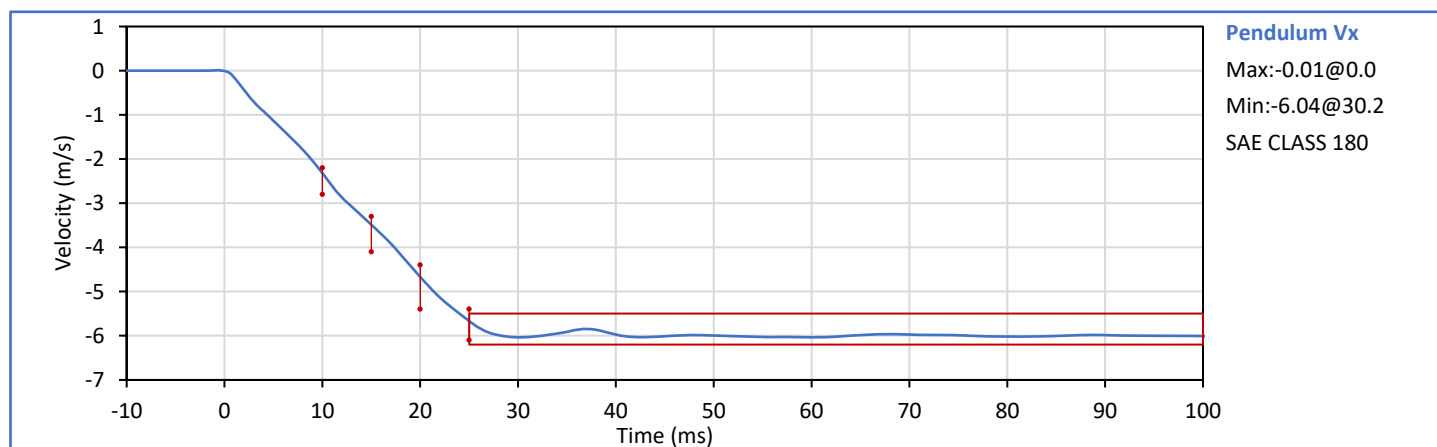
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	41	Pass
Pendulum Velocity	m/s	5.51	5.63	5.59	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.32	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.49	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-4.67	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.67	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-6.04/-5.67	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-76.4	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	58.6	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	43.1	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	111.8	Pass
				Overall Test Results	Pass



Technician:

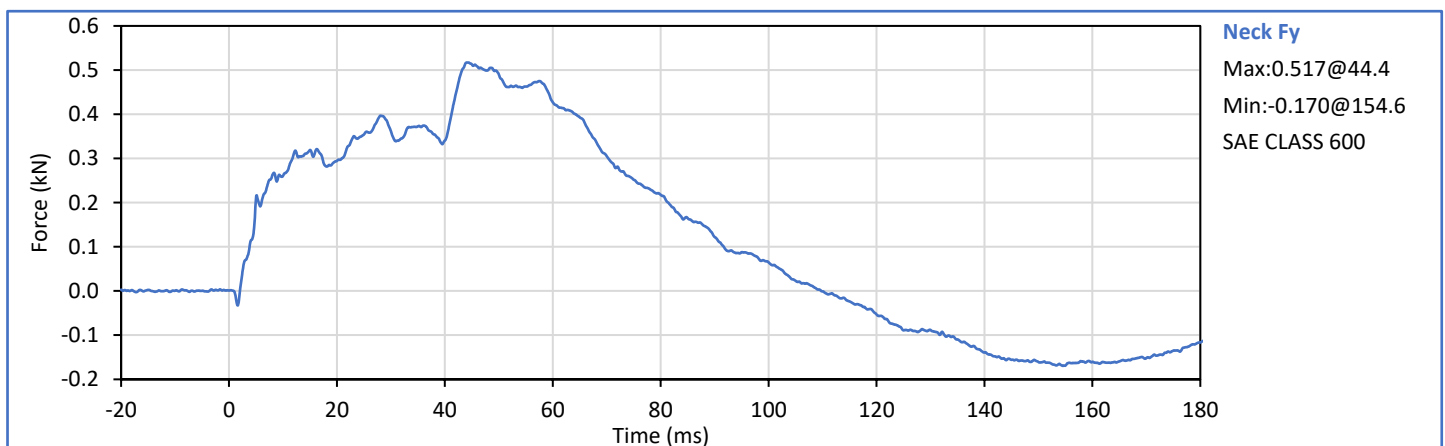
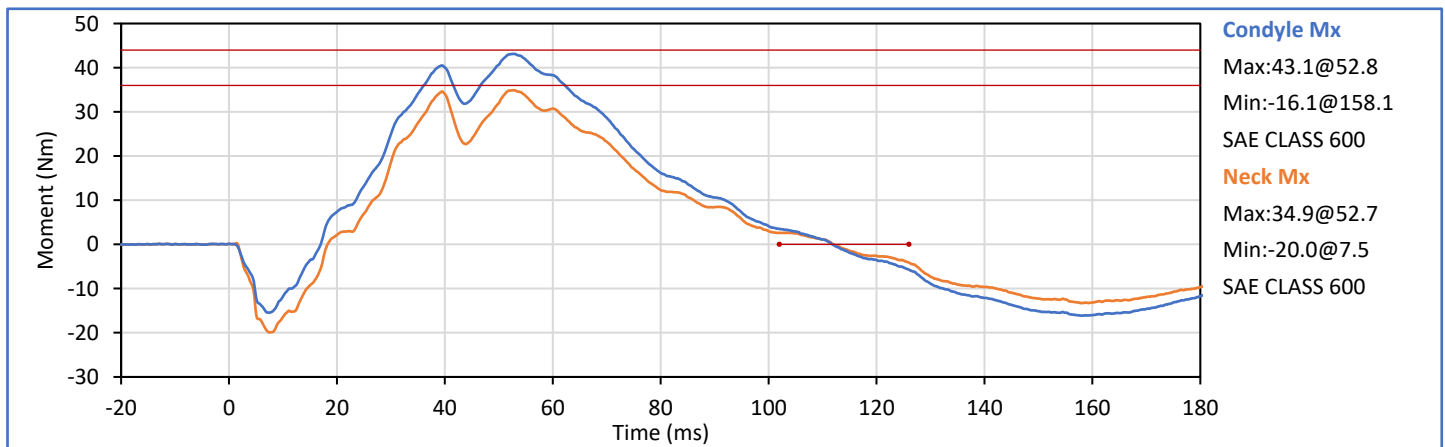
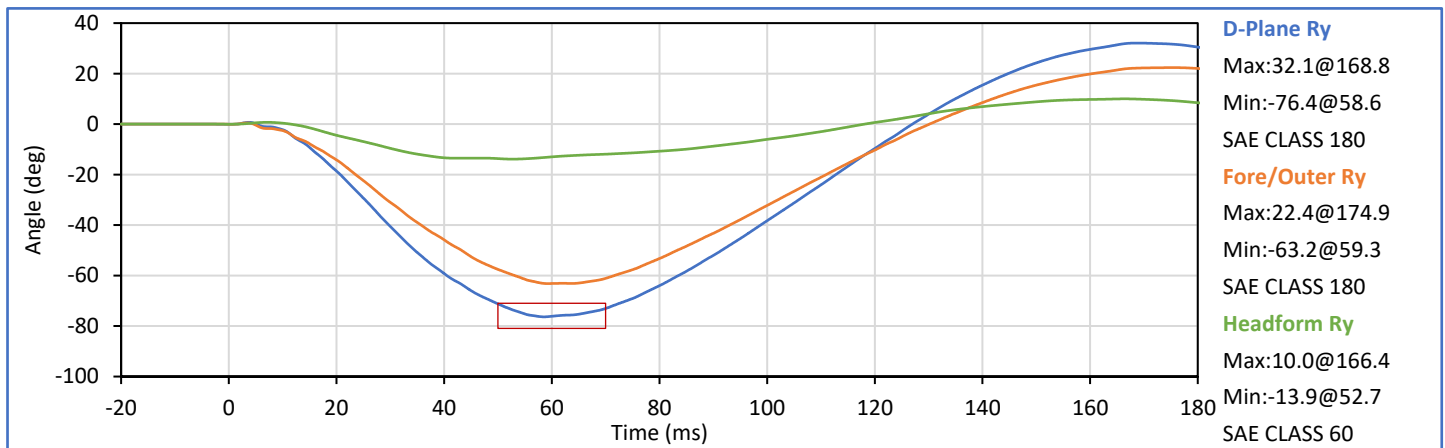
J. Coronel

J. Coronel

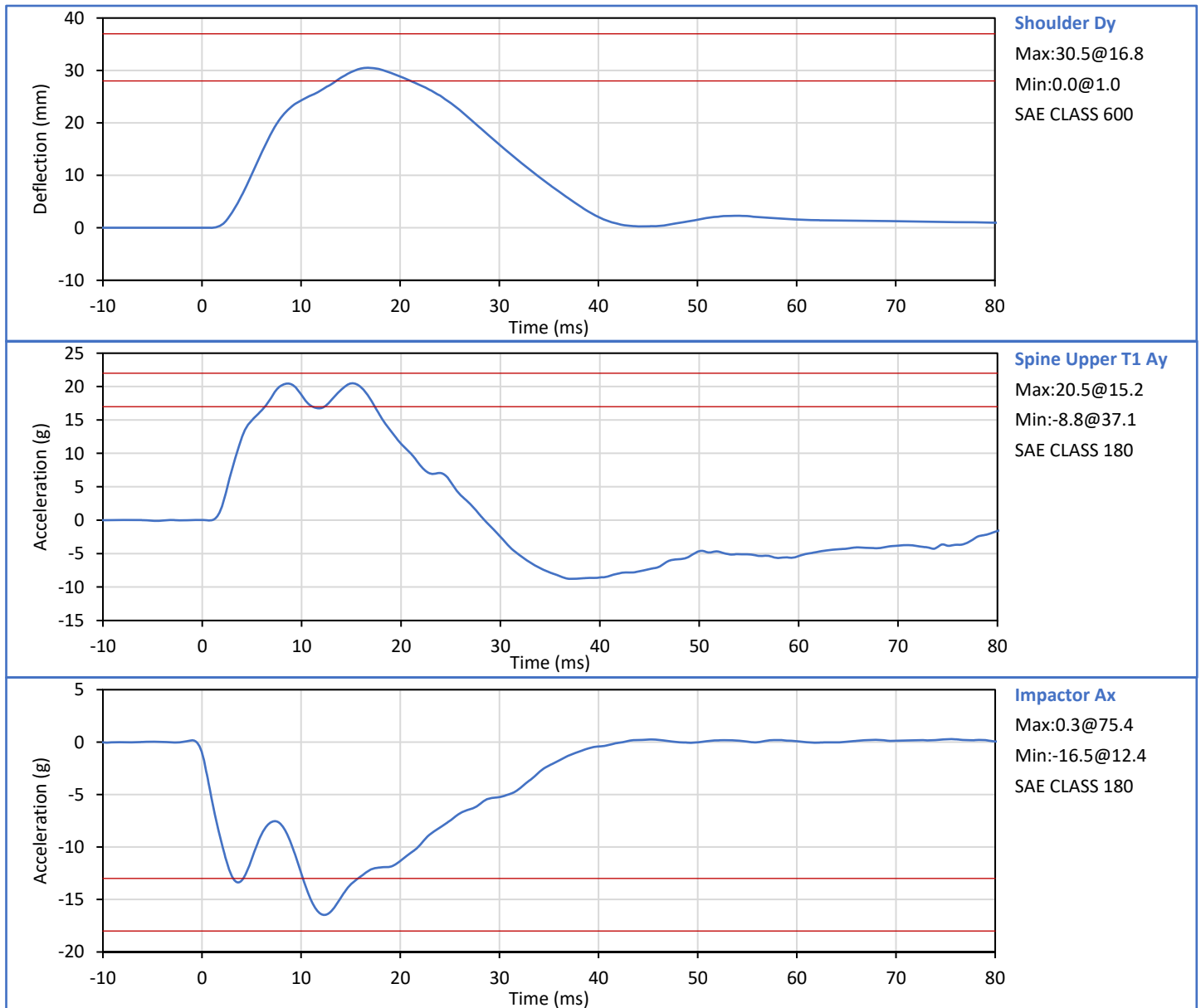
Approved By:

J. Hernandez

J. Hernandez



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Shoulder Dy	mm	28.0	37.0	30.5	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	20.5	Pass
Peak Impactor Ax	g	-18.0	-13.0	-16.5	Pass
Overall Test Results					Pass



Technician:

J. Coronel

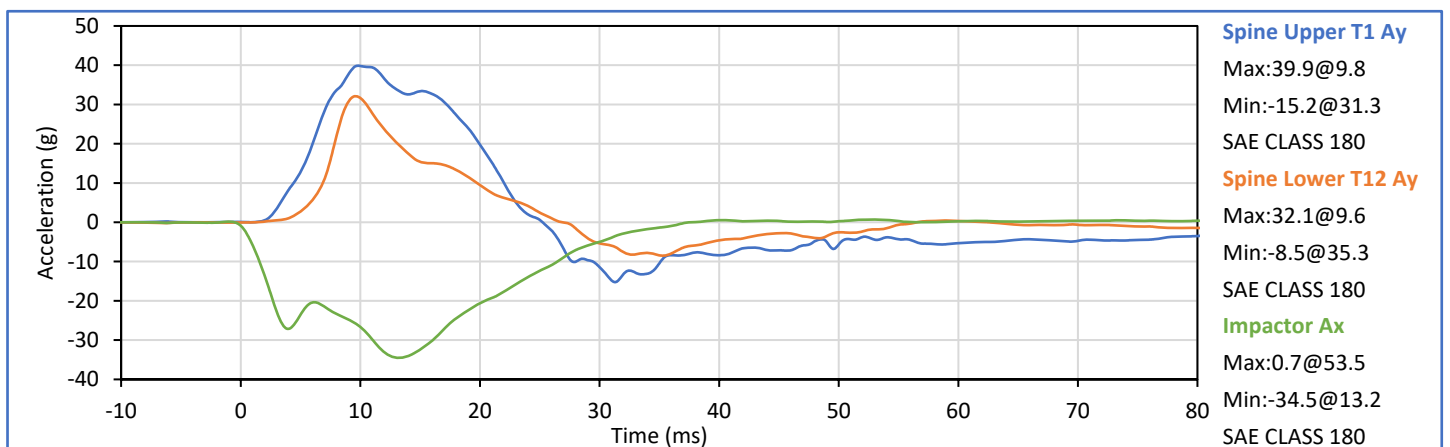
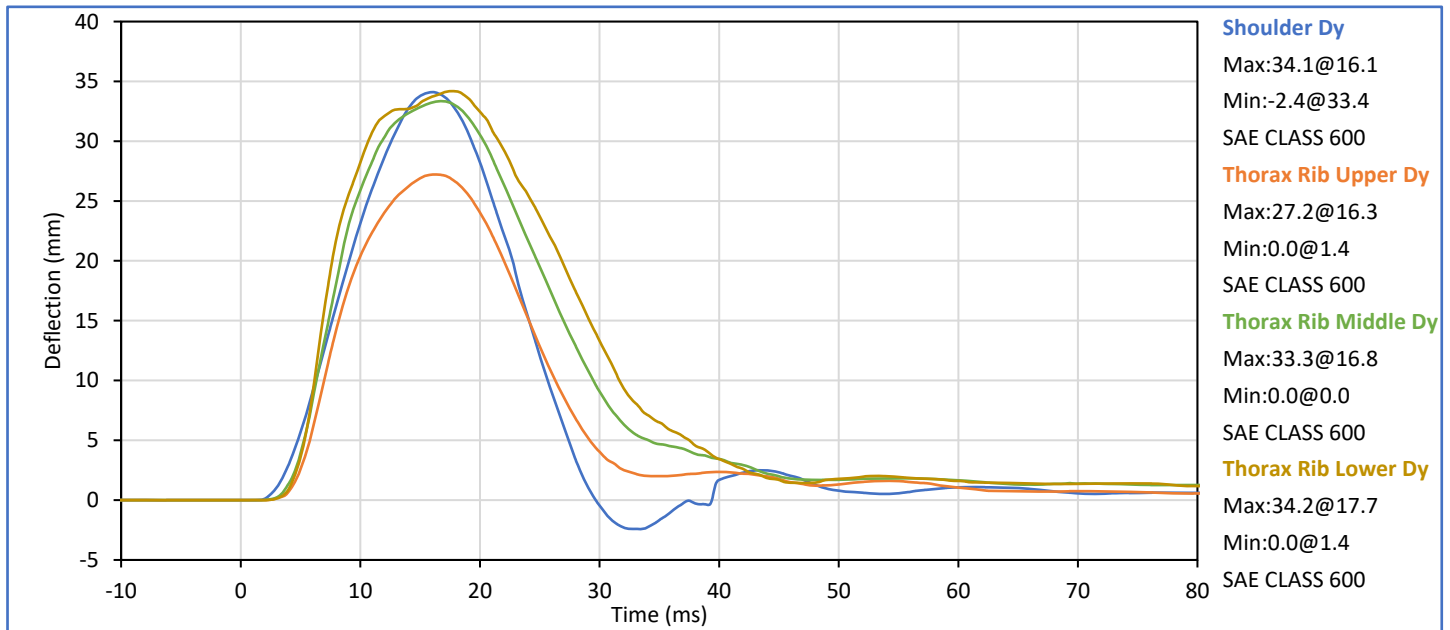
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	19	Pass
Impactor Velocity	m/s	6.60	6.80	6.70	Pass
Peak Shoulder Dy	mm	31.0	40.0	34.1	Pass
Peak Upper Rib Dy	mm	25.0	32.0	27.2	Pass
Peak Middle Rib Dy	mm	30.0	36.0	33.3	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.2	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	39.9	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.1	Pass
Peak Impactor Ax	g	-36.0	-30.0	-34.5	Pass
Overall Test Results				Pass	Pass



Technician:

J. Coronel

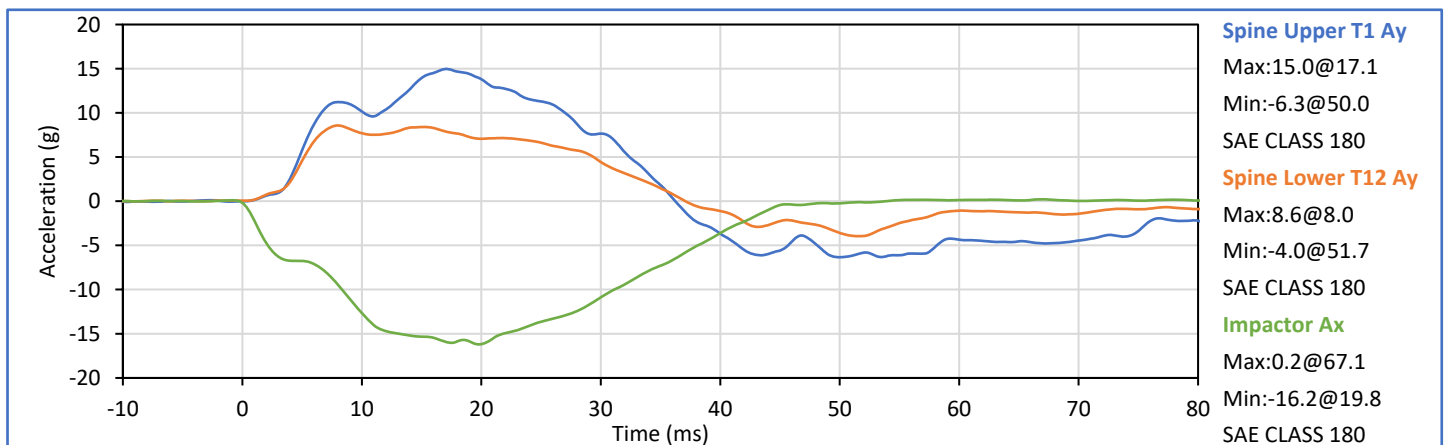
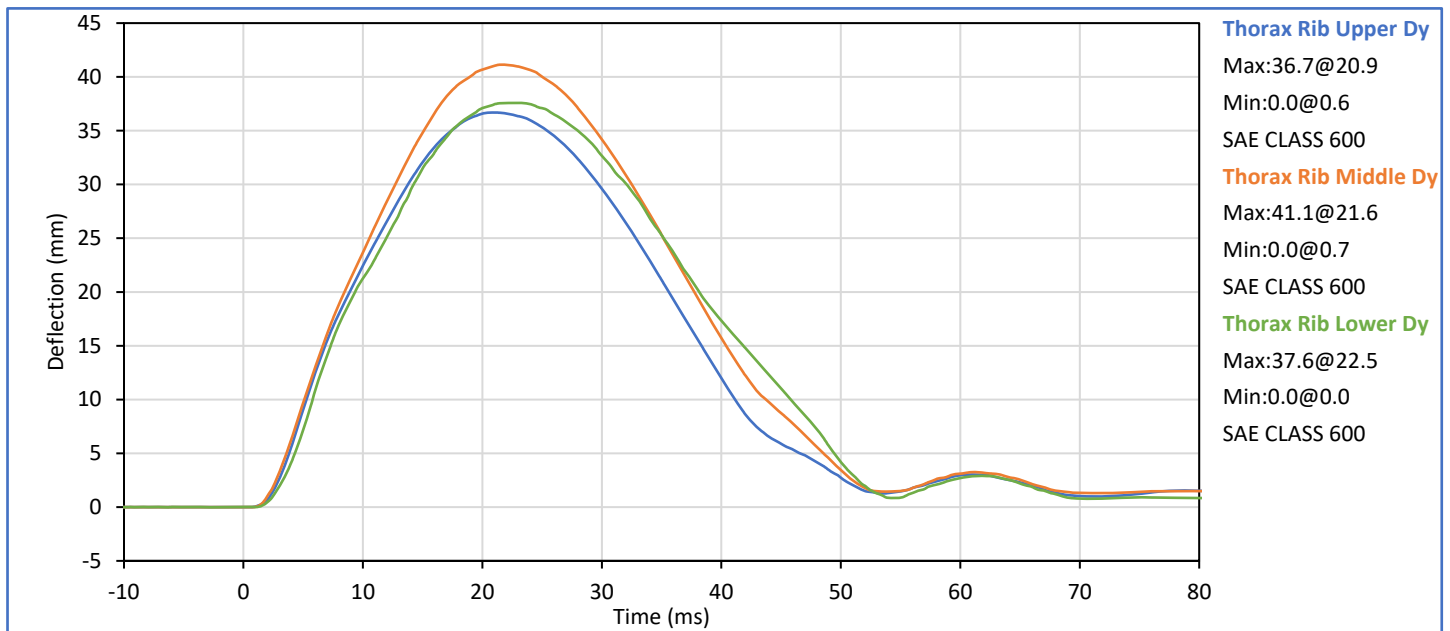
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	36.7	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	41.1	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	37.6	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	15.0	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	8.6	Pass
Peak Impactor Ax	g	-18.0	-14.0	-16.2	Pass
Overall Test Results					Pass



Technician:

J. Coronel

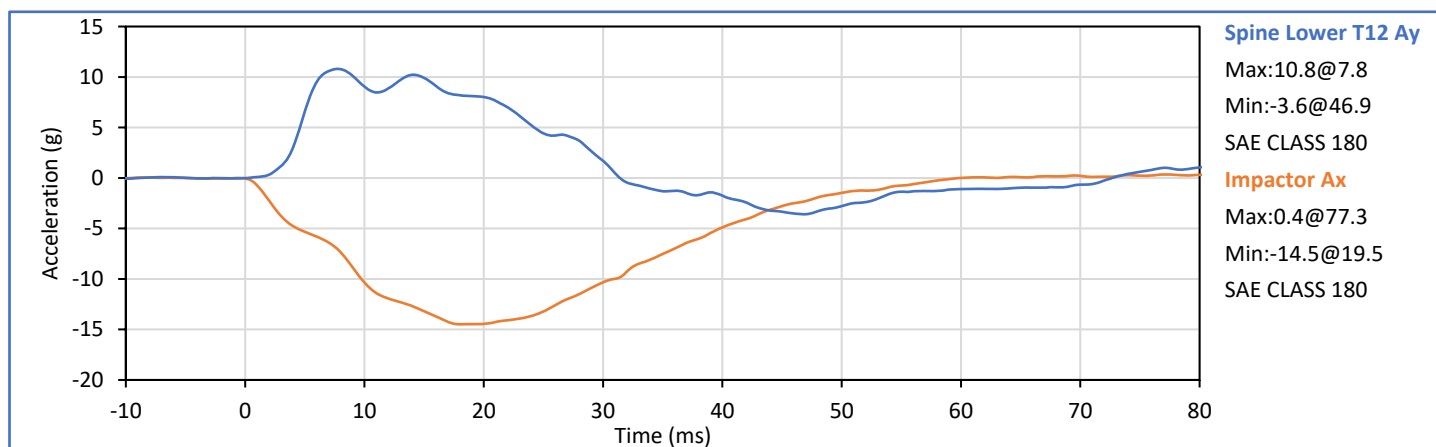
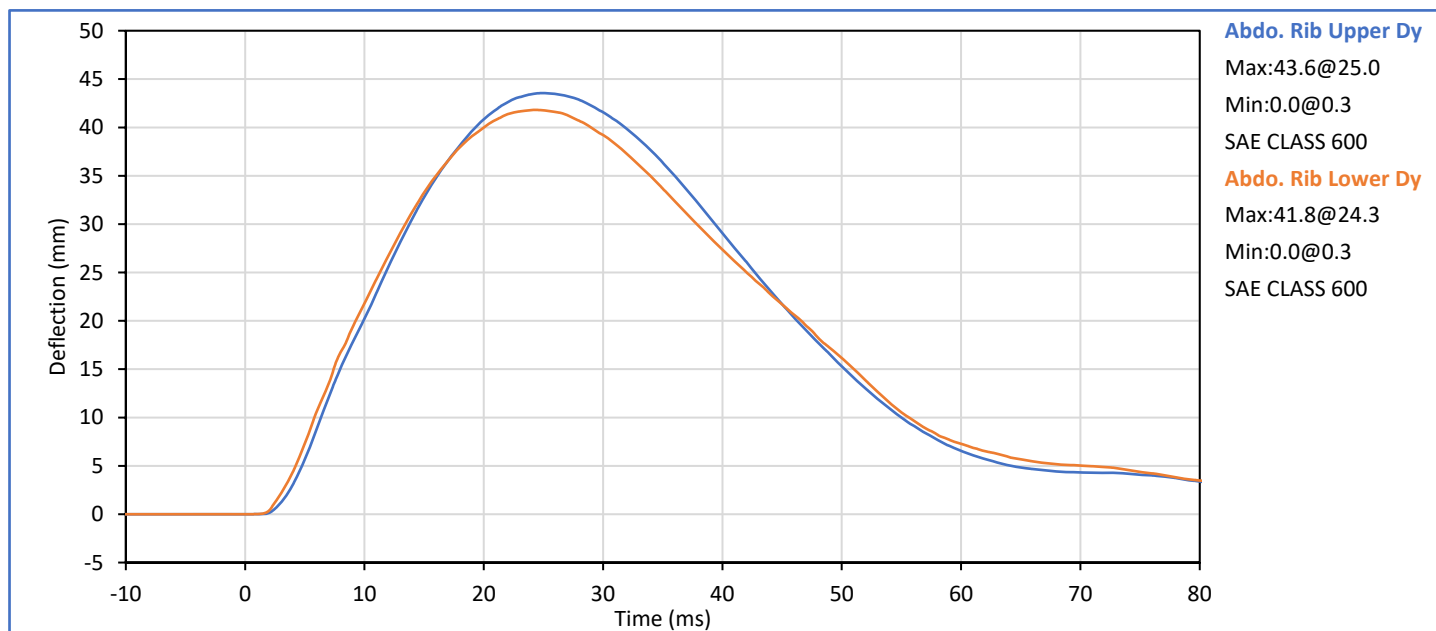
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	43.6	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.8	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.8	Pass
Peak Impactor Ax	g	-16.0	-12.0	-14.5	Pass
Overall Test Results					Pass



Technician:

J. Coronel

Approved By:

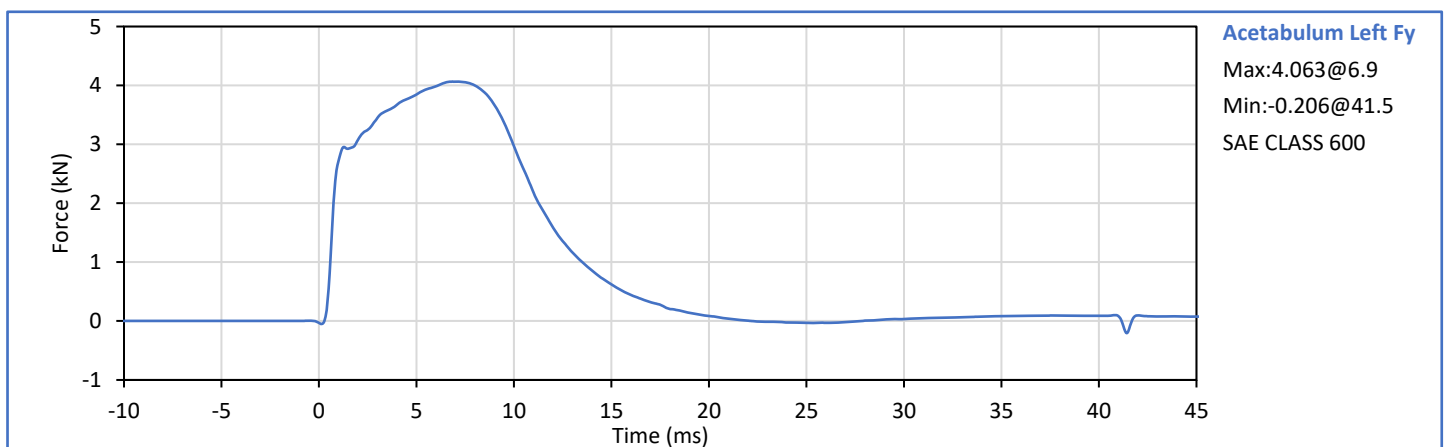
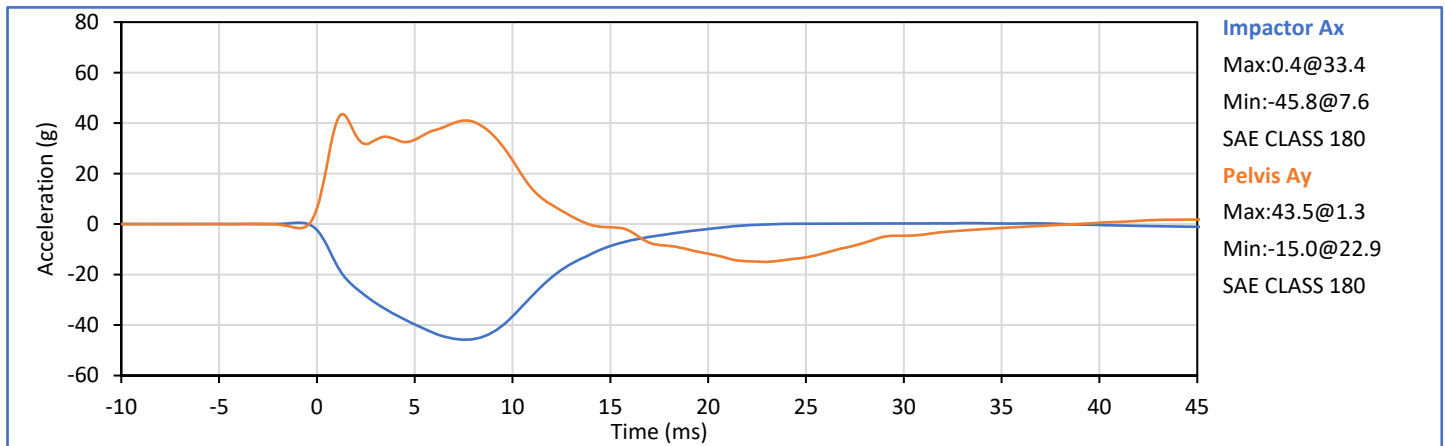
J. Hernandez

ATD Serial No.: 308

Test Date: 2025-01-15

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Impactor Velocity	m/s	6.60	6.80	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.06	Pass
Pelvis Ay after 6ms	g	34.0	42.0	41.0	Pass
Peak Impactor Ax	g	-47.0	-38.0	-45.8	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 17746



Technician:

J. Coronel

J. Coronel

Approved By:

J. Hernandez

J. Hernandez

ATD Serial No.: 308

**SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact**

Test Date: 2025-01-15

Pelvis Plug S/N: 17746



SID-IIs Pelvis Plug Certification Test

Plug S/N 17746

Test Number 25033

Report Number 25090

Test Date 12/9/2022 2:28:42 PM

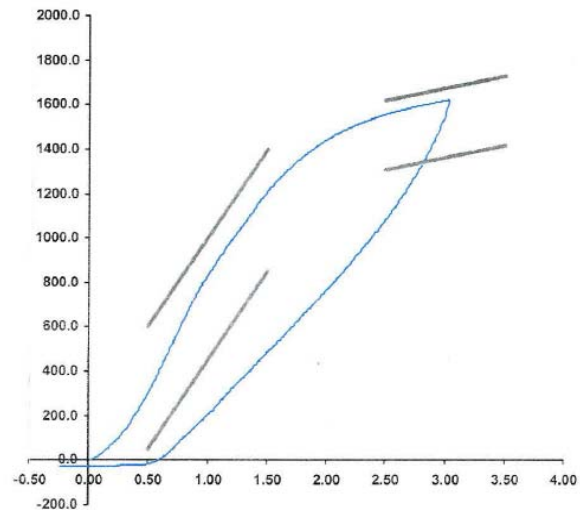
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	308	50	600
Force @ 1.5 mm (N)	1,214	850	1,400
Force @ 2.5 mm (N)	1,560	1,306	1,618
Force @ 3.0 mm (N)	1,621	1,361	1,673

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 09-Dec-22
SACO Research

By: DC Date: 12/9/22
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

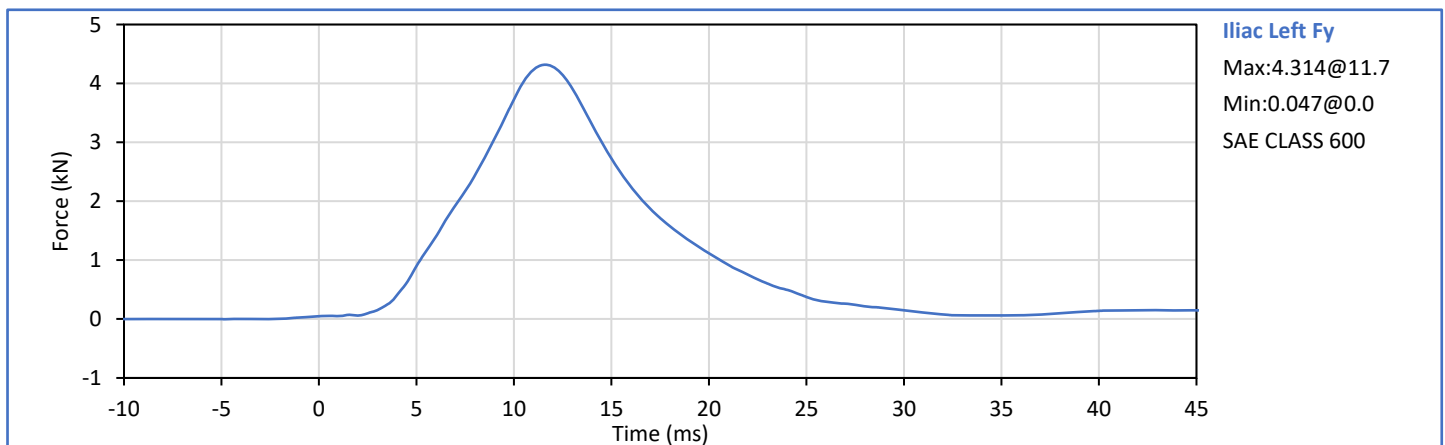
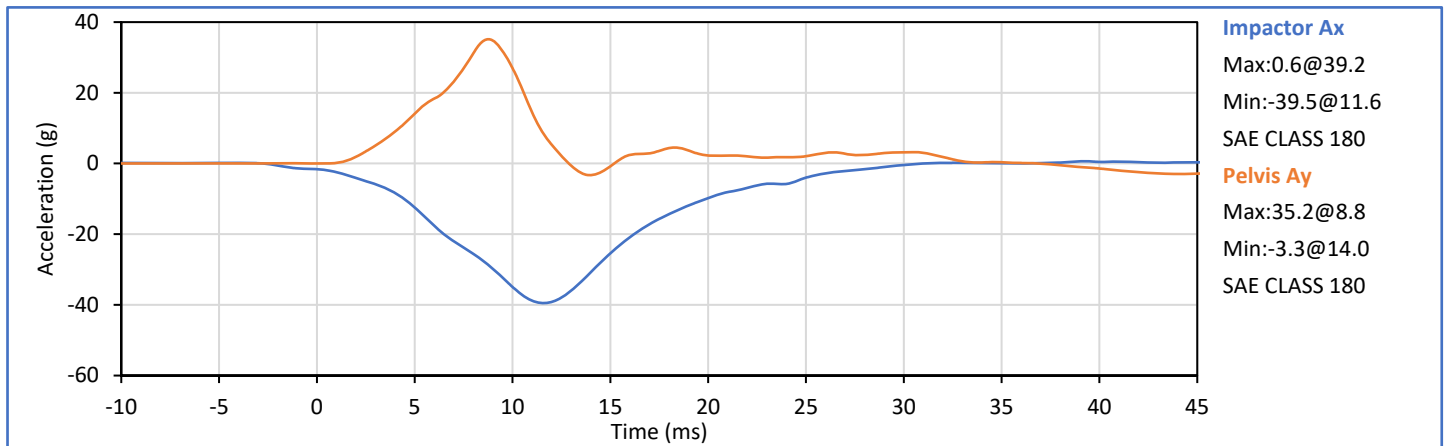
ATD Serial No.: 308

Test Date: 2025-01-15

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Iliac Fy	kN	4.10	5.10	4.31	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-39.5	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 16490 *

* Plug is not impacted and remains certified



Technician:

J. Coronel

J. Coronel

Approved By:

J. Hernandez

J. Hernandez

APPENDIX C

**Post-Test ATD Qualification and Performance Verification
ES-2re 50th Male Side Impact ATD, Left Side Configuration
S/N: F037**

ATD Serial No.: F037

Test Date: 2025-01-27

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
1 - Sitting Height	mm	900	918	914	Pass
2 - Seat to Shoulder Joint	mm	558	572	569	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	350	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	102	Pass
5 - Sole to Seat, Sitting	mm	433	451	445	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	466	Pass
8 - Thorax Width	mm	322	332	327	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	367	Pass
11 - Head Depth	mm	196	206	201	Pass
12 - Thorax Depth	mm	262	272	267	Pass
13 - Abdomen Depth	mm	194	204	203	Pass
14 - Pelvis Depth	mm	235	245	243	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	154	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	609	Pass
				Overall Test Results	Pass

Technician:



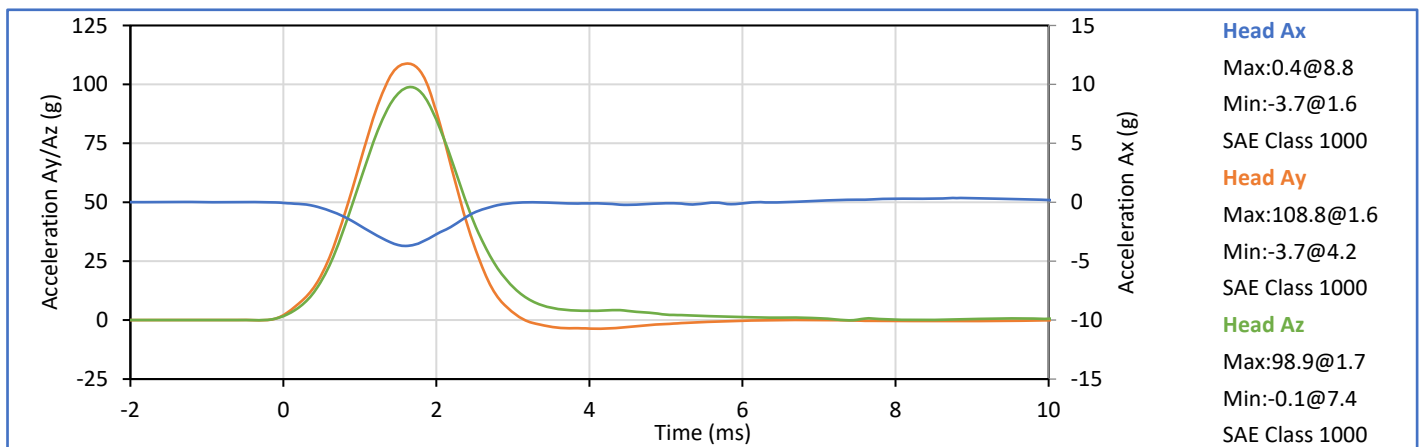
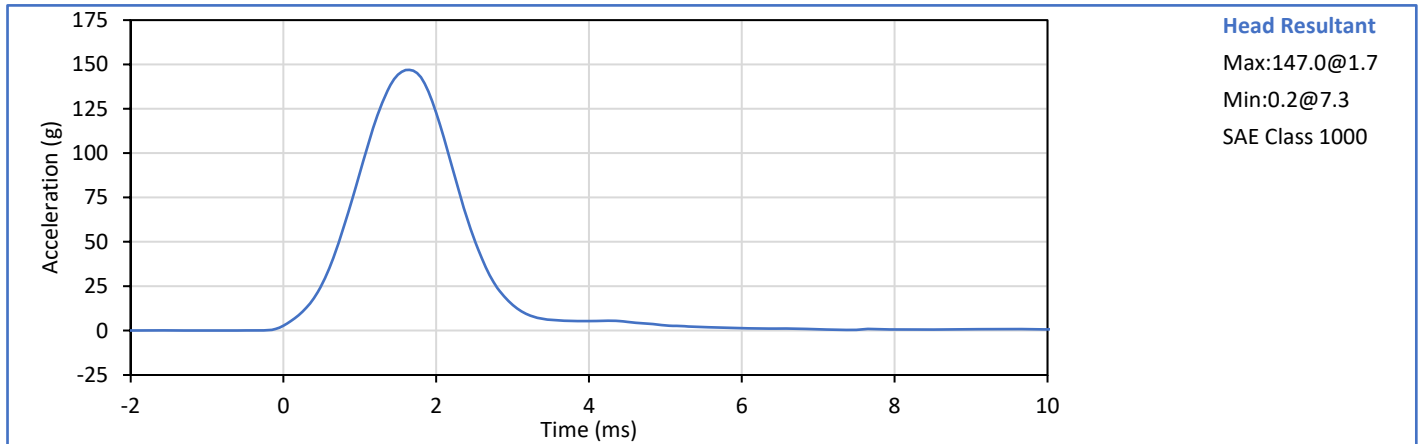
J. Coronel

Approved By:



J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.3	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
Peak Resultant Acceleration	g	125.0	155.0	147.0	Pass
Peak Head Ax	g	-15.0	15.0	0.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician:

J. Coronel

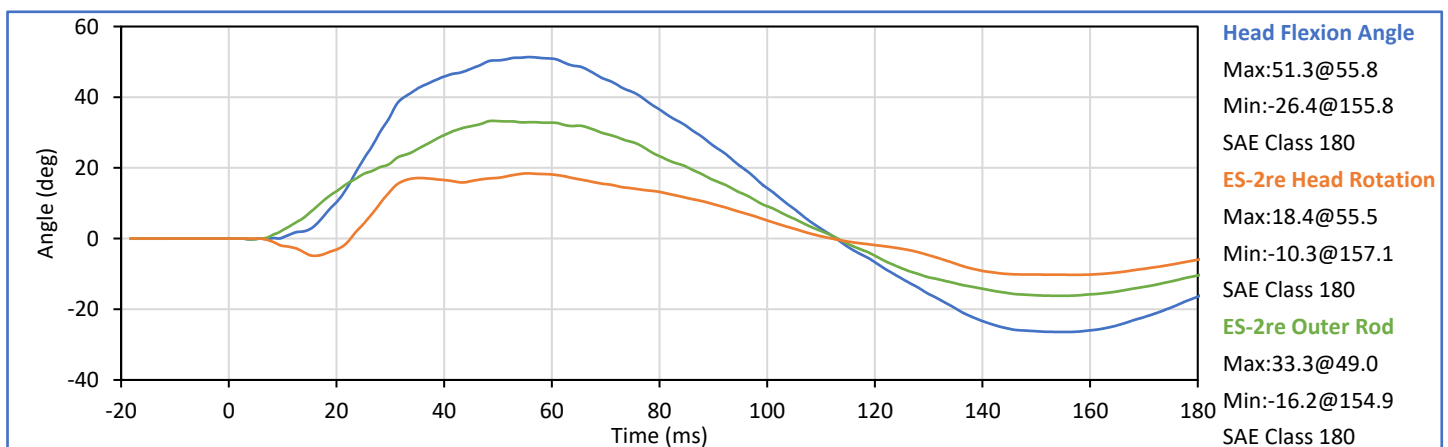
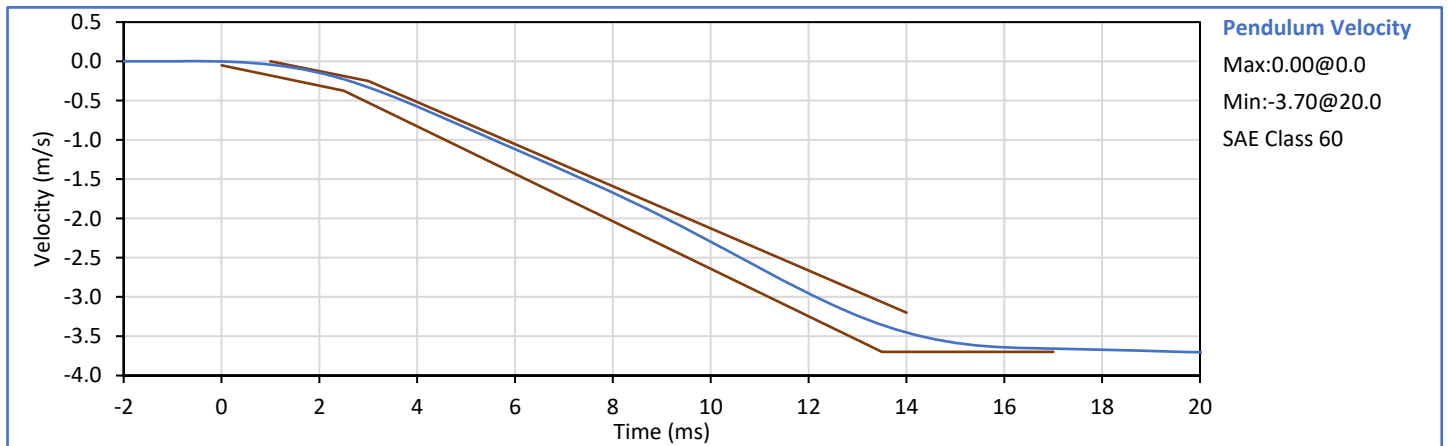
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	3.30	3.50	3.44	Pass
Peak Headform Flexion	deg	49.0	59.0	51.3	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	55.8	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	57.1	Pass
Overall Test Results					Pass



Technician:

J. Coronel

J. Coronel

Approved By:

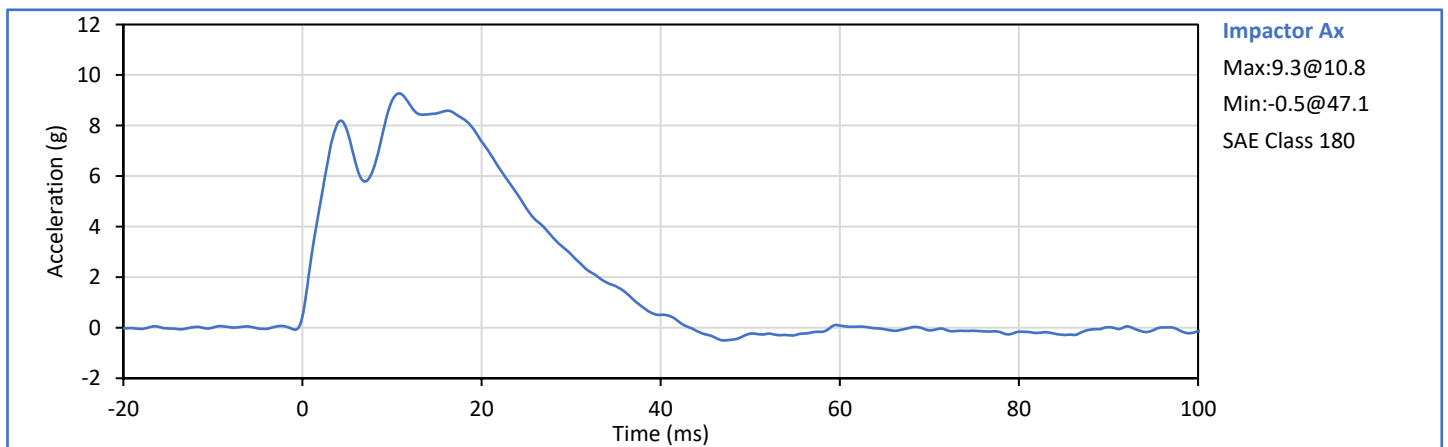
J. Hernandez

J. Hernandez

ATD Serial No.: F037

Test Date: 2025-01-28

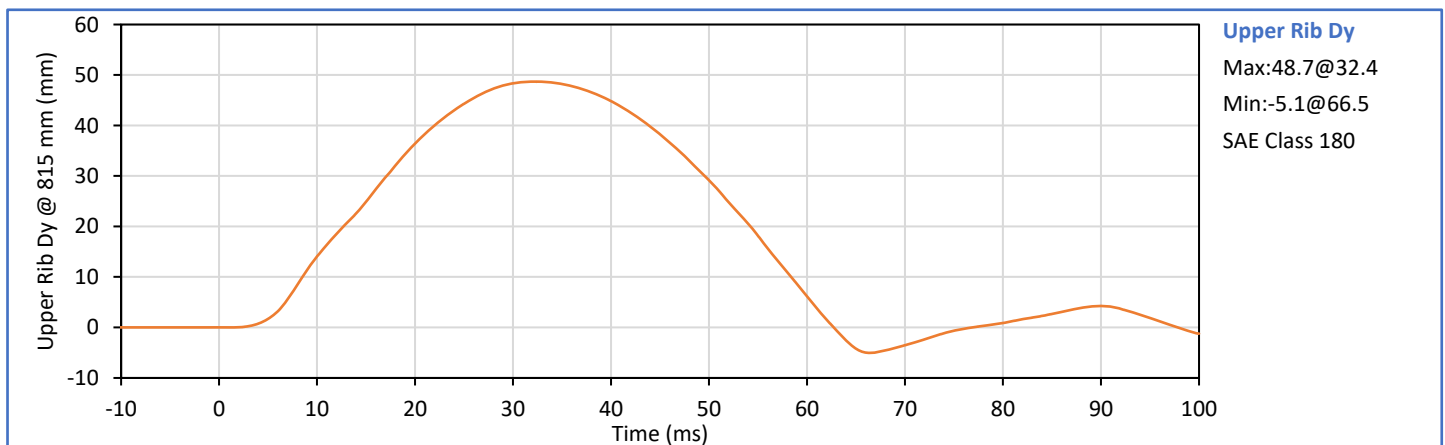
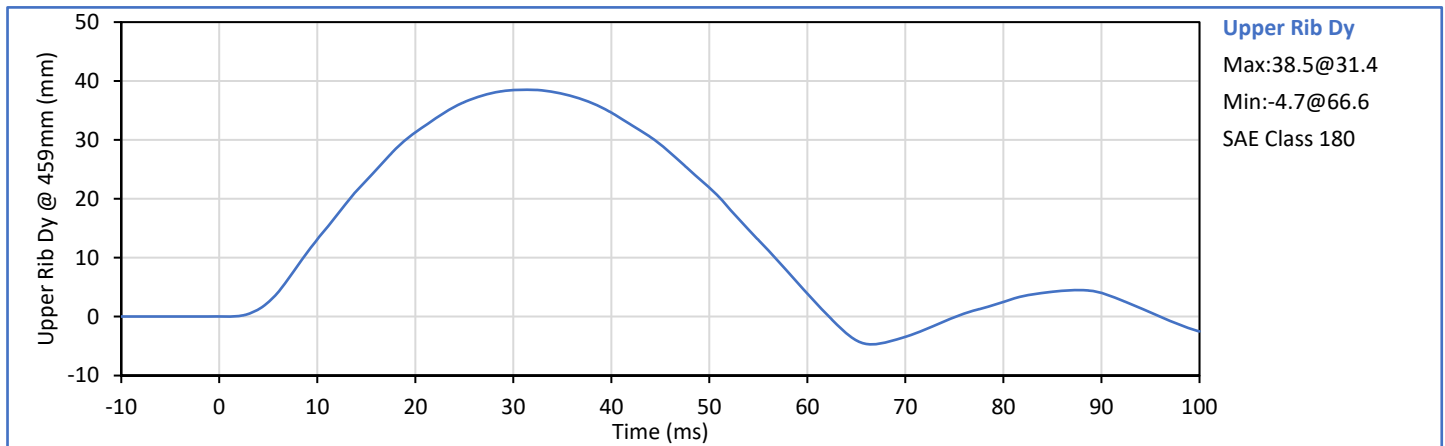
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Ax	g	7.5	10.5	9.3	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.5	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.7	Pass
Overall Test Results				Pass	Pass



Technician:

J. Coronel

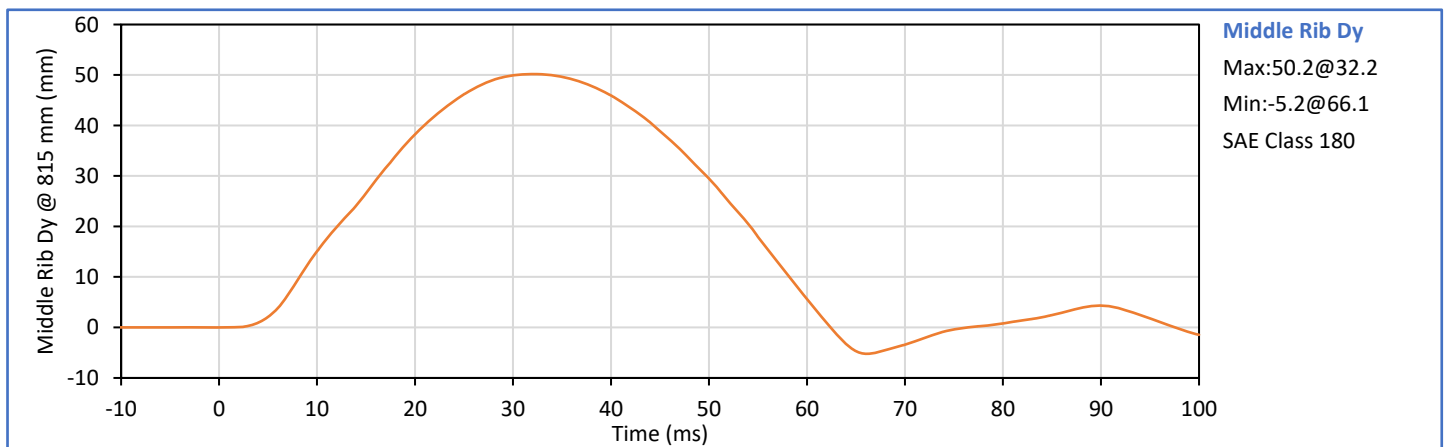
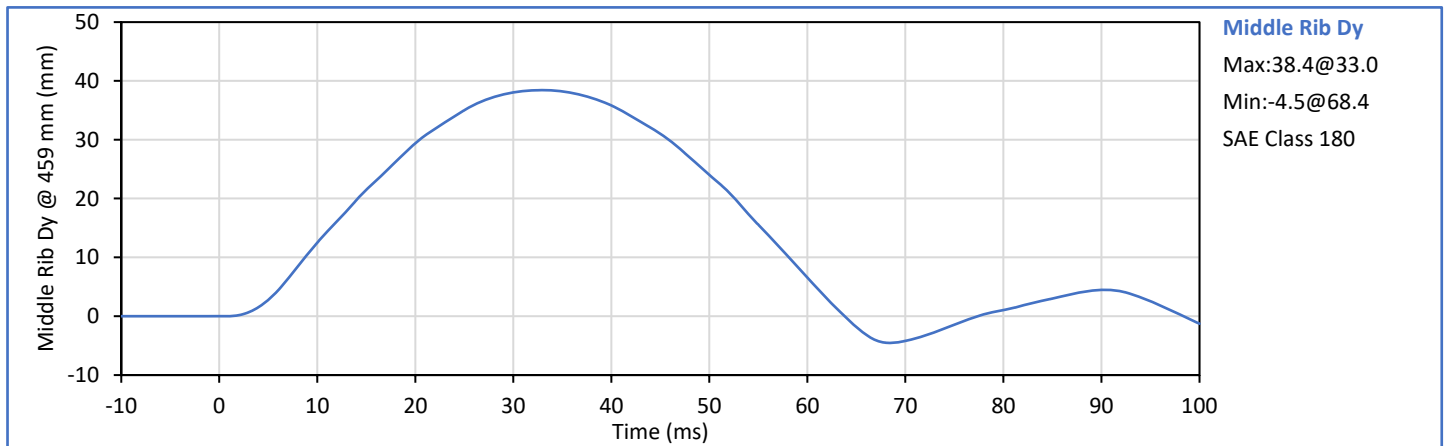
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

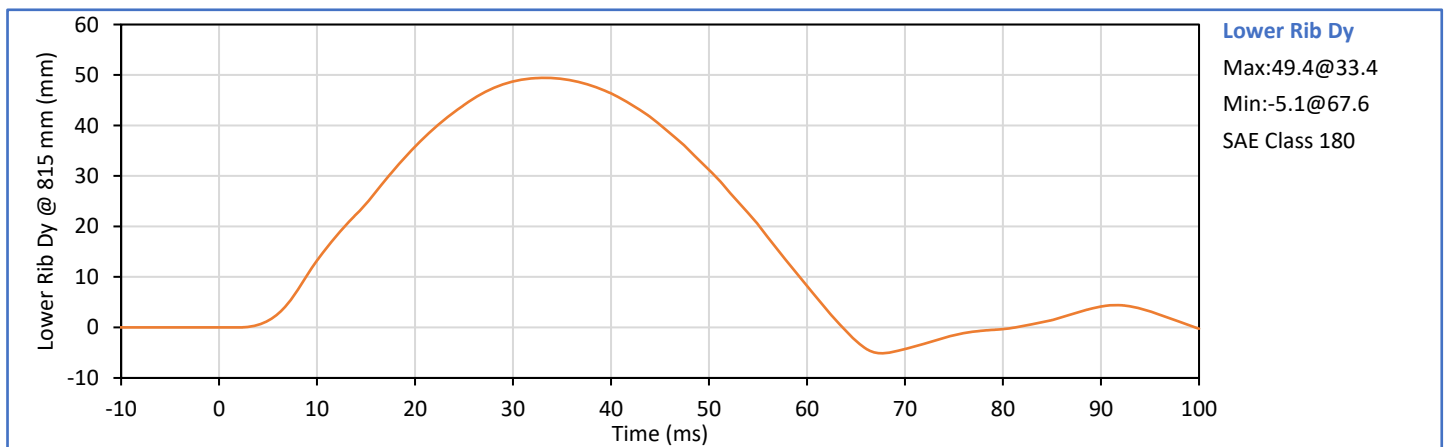
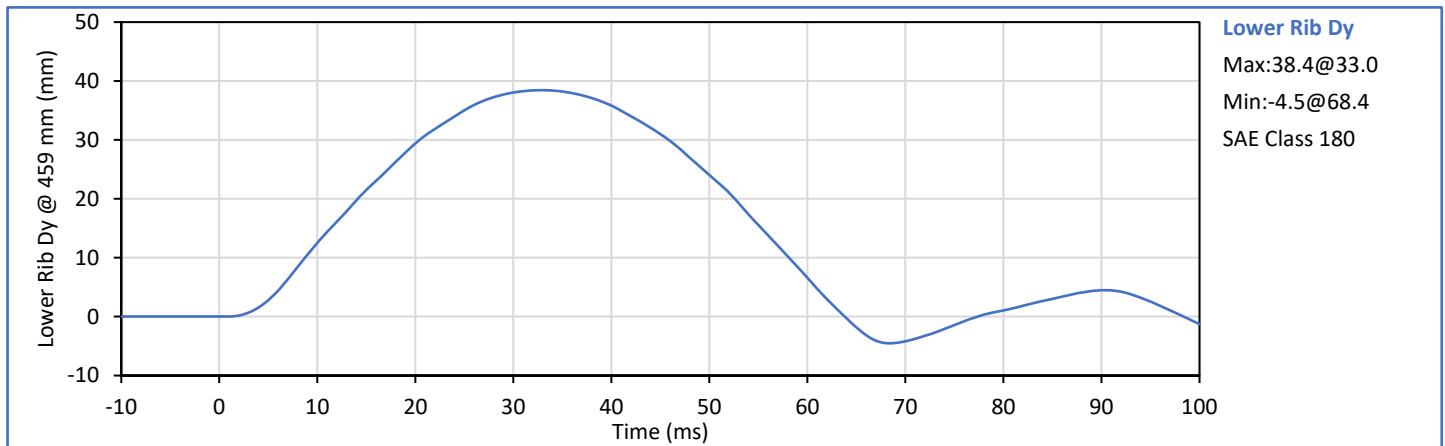
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.4	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	50.2	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

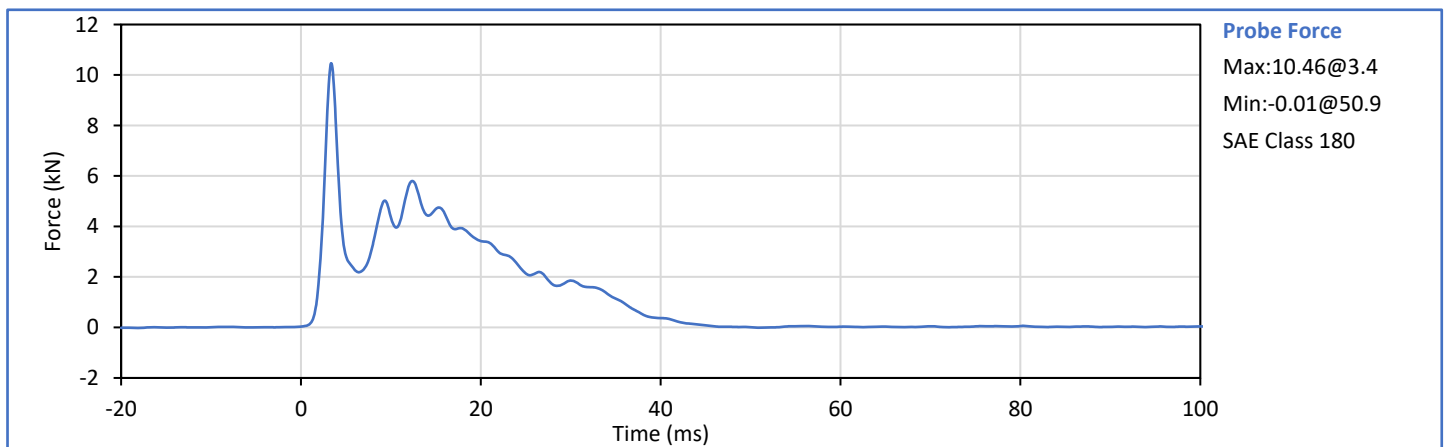
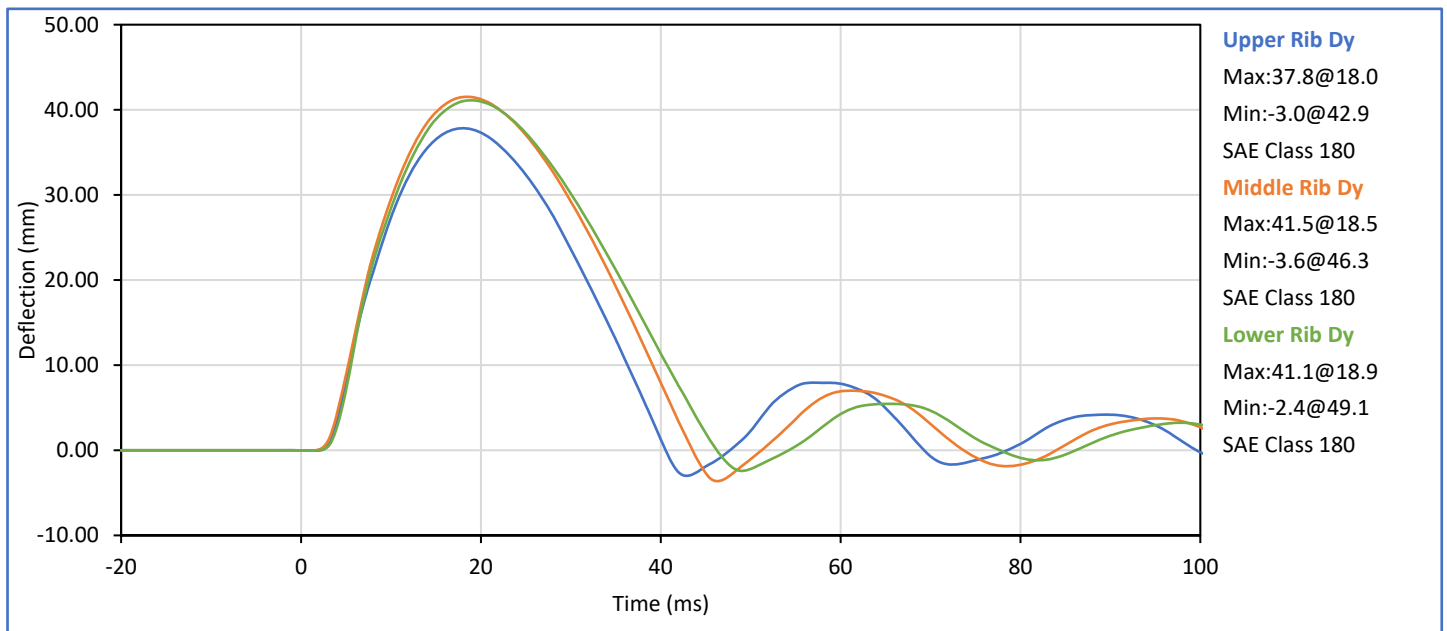
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	38.4	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	49.4	Pass
Overall Test Results				Pass	Pass



Technician: J. Coronel

Approved By: J. Hernandez

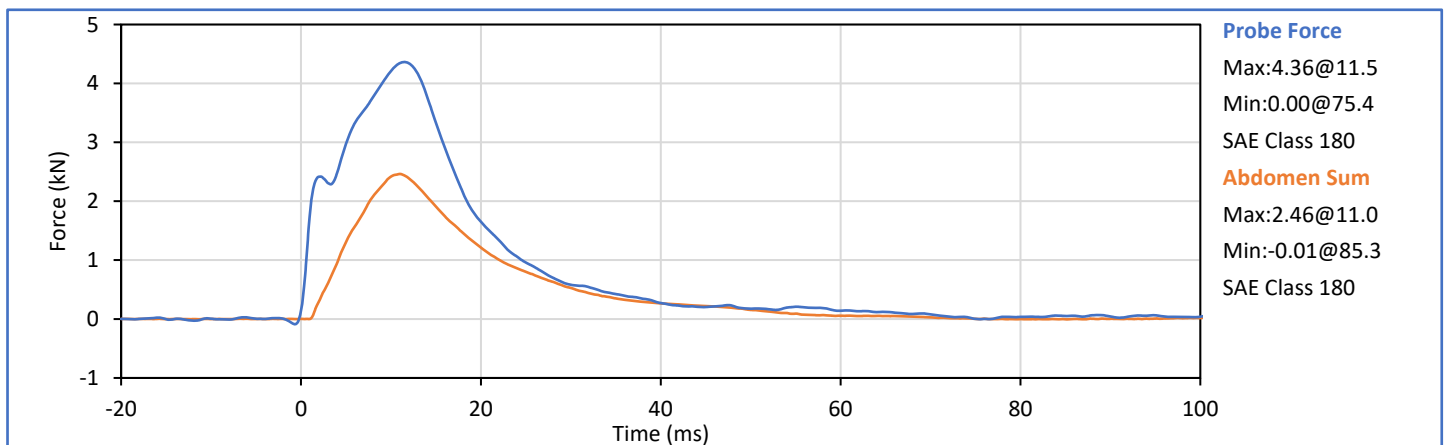
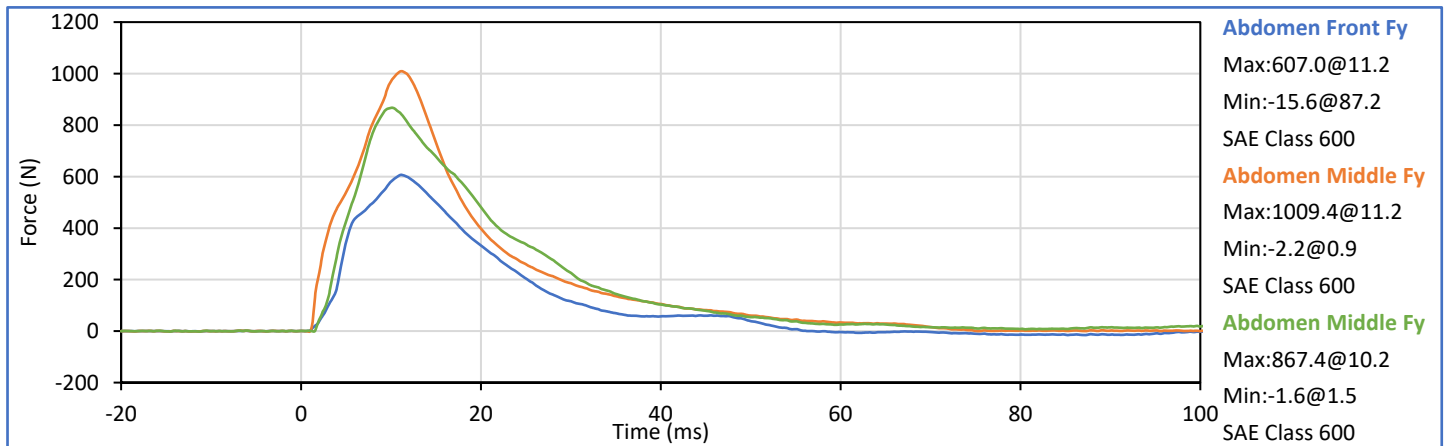
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
Impactor Velocity	m/s	5.40	5.60	5.56	Pass
Peak Upper Rib Dy	mm	34.0	41.0	37.8	Pass
Peak Middle Rib Dy	mm	37.0	45.0	41.5	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.1	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.80	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
Impactor Velocity	m/s	3.90	4.10	4.02	Pass
Peak Impactor Force	kN	4.00	4.80	4.36	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.5	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.46	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.0	Pass
Overall Test Results					Pass



Technician:

J. Coronel

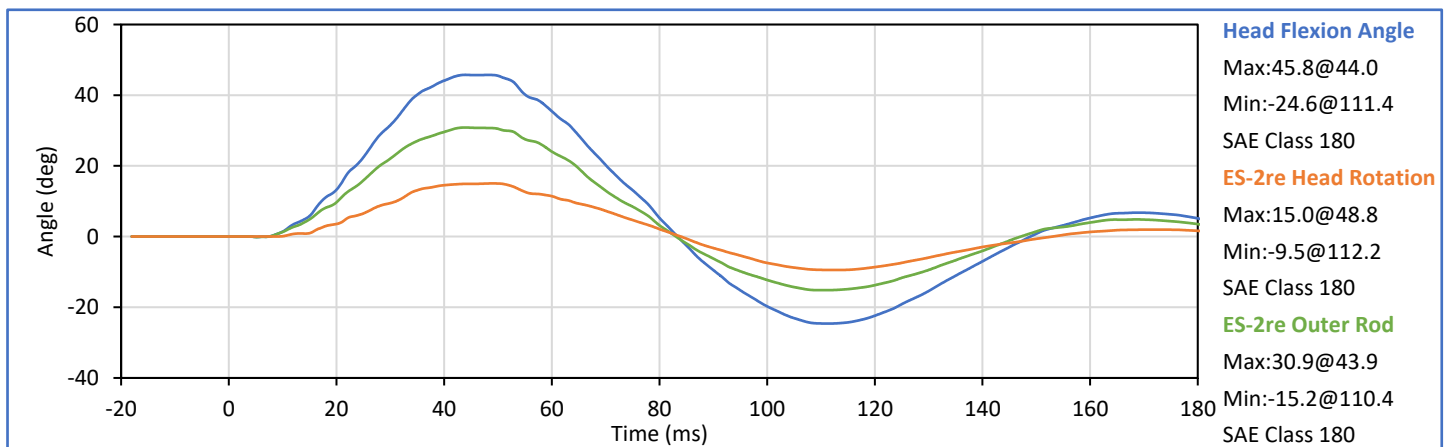
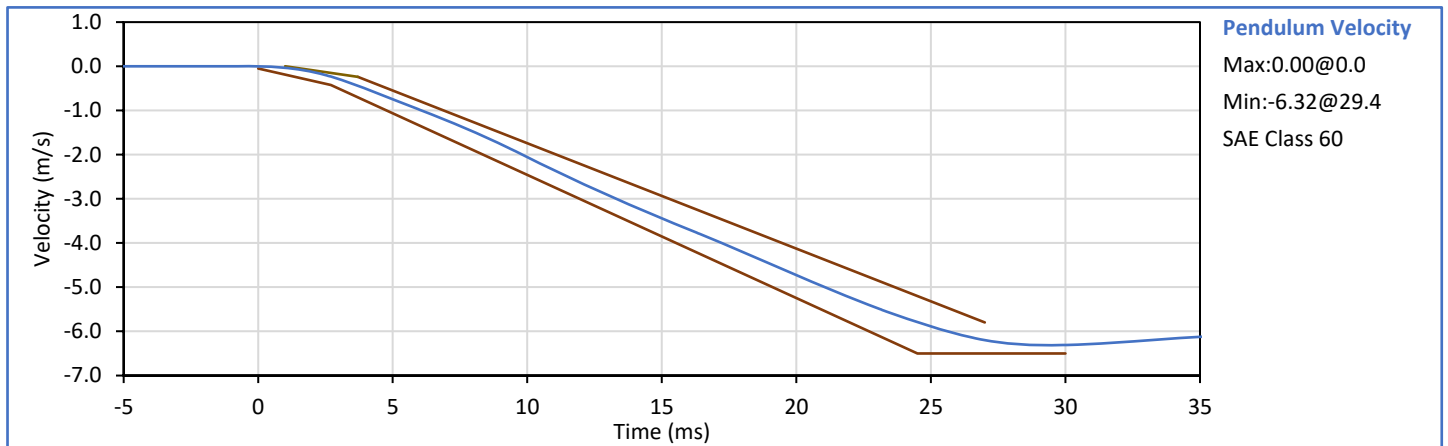
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Pendulum Velocity	m/s	5.95	6.15	6.09	Pass
Peak Headform Flexion	deg	45.0	55.0	45.8	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	44.0	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	39.4	Pass
Overall Test Results					Pass



Technician:

J. Coronel

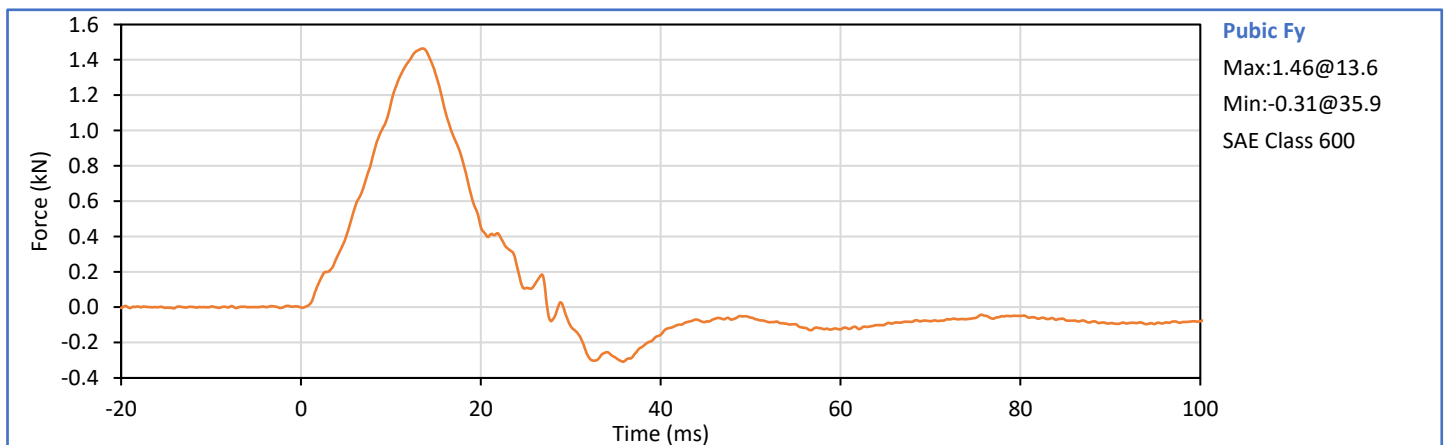
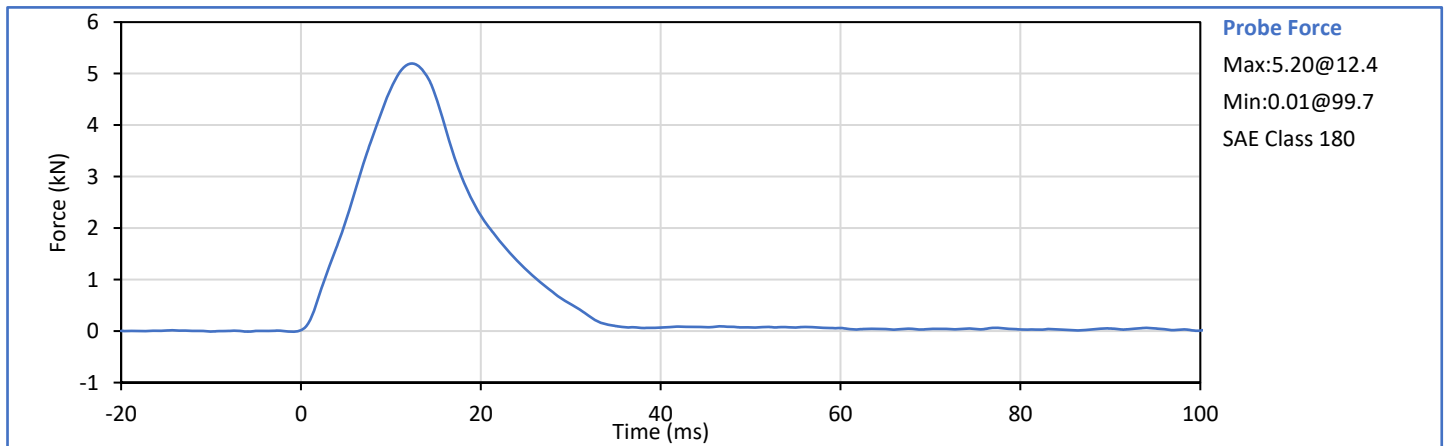
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
Impactor Velocity	m/s	4.20	4.40	4.27	Pass
Peak Impactor Force	kN	4.70	5.40	5.20	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.4	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.46	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	13.6	Pass
Overall Test Results					Pass



Technician: J. Coronel

Approved By: J. Hernandez

APPENDIX C
Post-Test ATD Qualification and Performance Verification
SID-IIs Small Side Impact ATD, Left Side Configuration
S/N: 308

ATD Serial No.: 308

Test Date: 2025-01-28

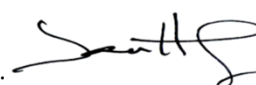
Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
A - Sitting Height	mm	772	788	782	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	81	Pass
D - H Point From Seatback	mm	141	151	145	Pass
E - Shoulder Pivot From Backline	mm	97	107	105	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	43	Pass
I - Head Depth	mm	178	188	186	Pass
J - Head Circumference	mm	541	551	546	Pass
K - Buttock To Knee Length	mm	514	540	530	Pass
L - Popliteal Height	mm	343	369	361	Pass
K - Knee Pivot To Floor Height	mm	392	409	400	Pass
N - Buttock Popliteal Length	mm	416	442	427	Pass
O - Chest Depth W/O Jacket	mm	195	211	203	Pass
P - Foot Length	mm	216	232	227	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	321	Pass
R - Arm Length	mm	249	259	253	Pass
S - Knee Joint To Seatback	mm	477	493	490	Pass
V - Shoulder Width	mm	341	357	354	Pass
W - Foot Width	mm	78	94	85	Pass
Y - Chest Circumference W/Jacket	mm	851	881	858	Pass
Z - Waist Circumference	mm	761	791	777	Pass
				Overall Test Results	Pass

Technician:



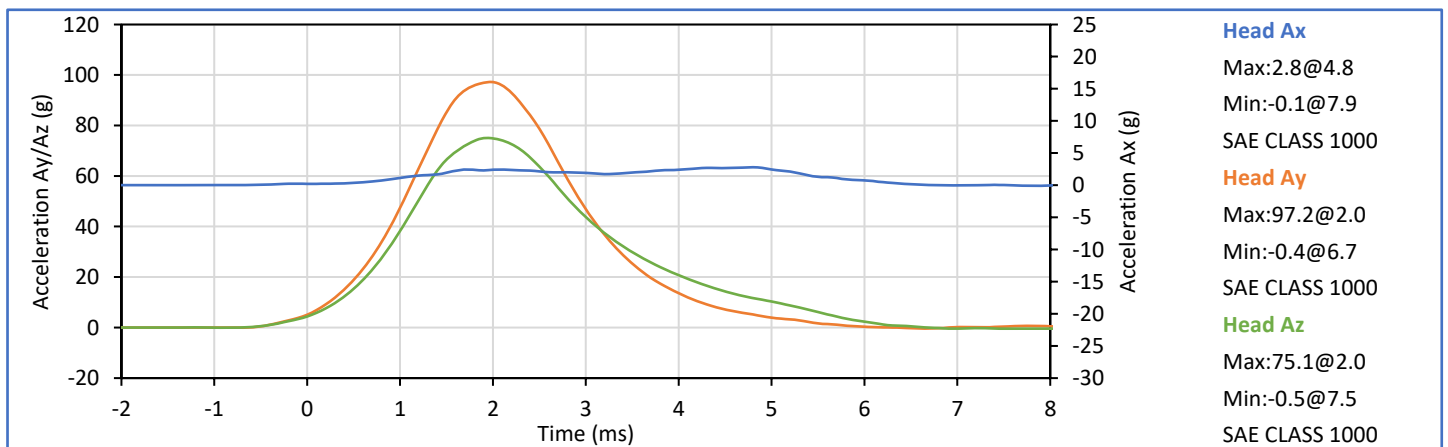
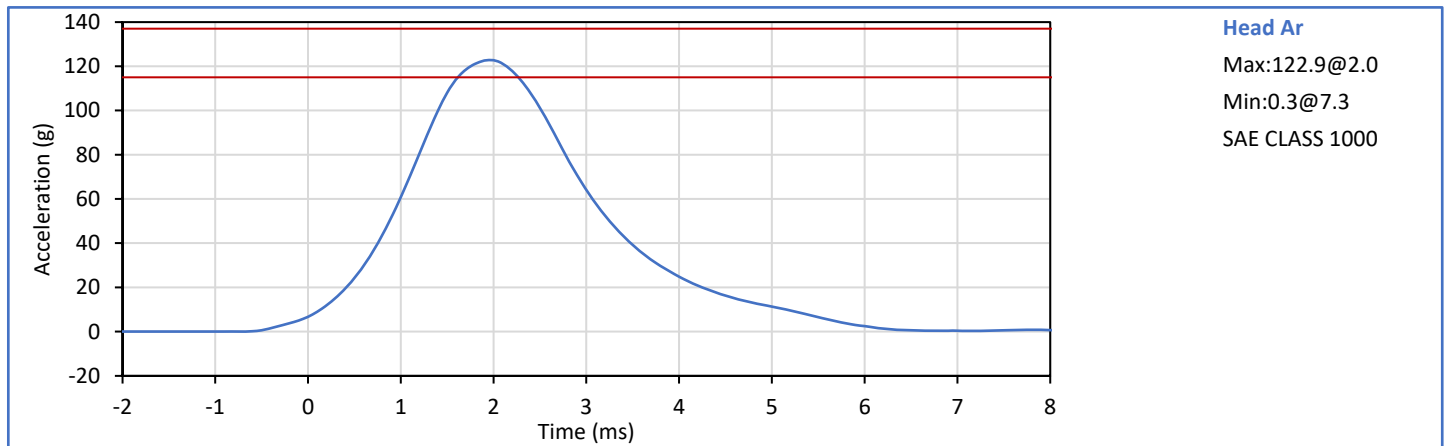
J. Coronel

Approved By:



J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Peak Resultant Acceleration	g	115.0	137.0	122.9	Pass
Peak Head Ax	g	-15.0	15.0	2.8	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician:

J. Coronel

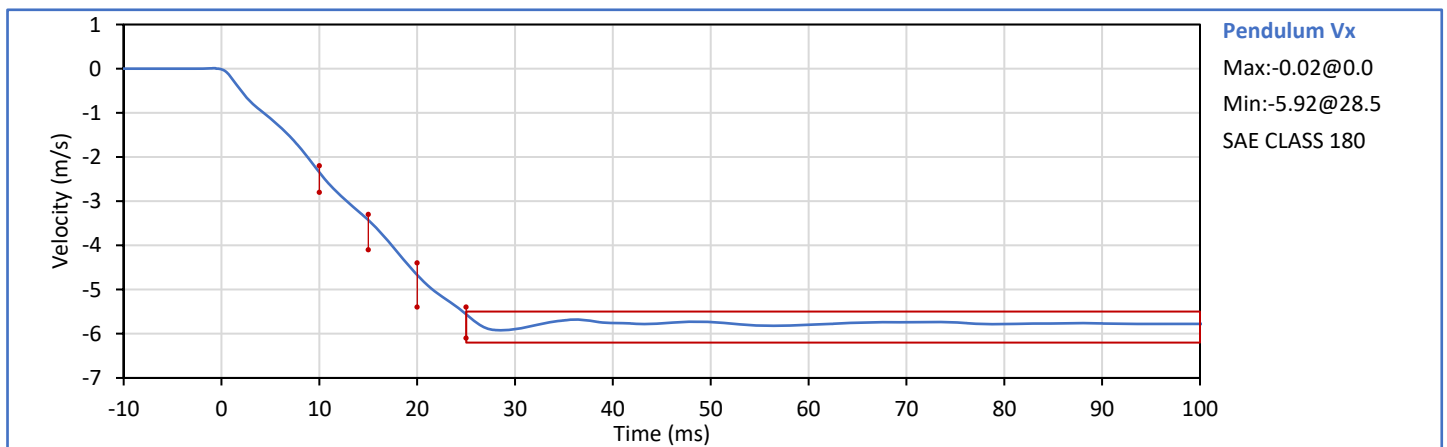
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	41	Pass
Pendulum Velocity	m/s	5.51	5.63	5.56	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.35	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.43	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-4.67	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.56	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-5.92/-5.56	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-78.0	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	66.3	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	41.7	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	115.4	Pass
				Overall Test Results	Pass



Technician:

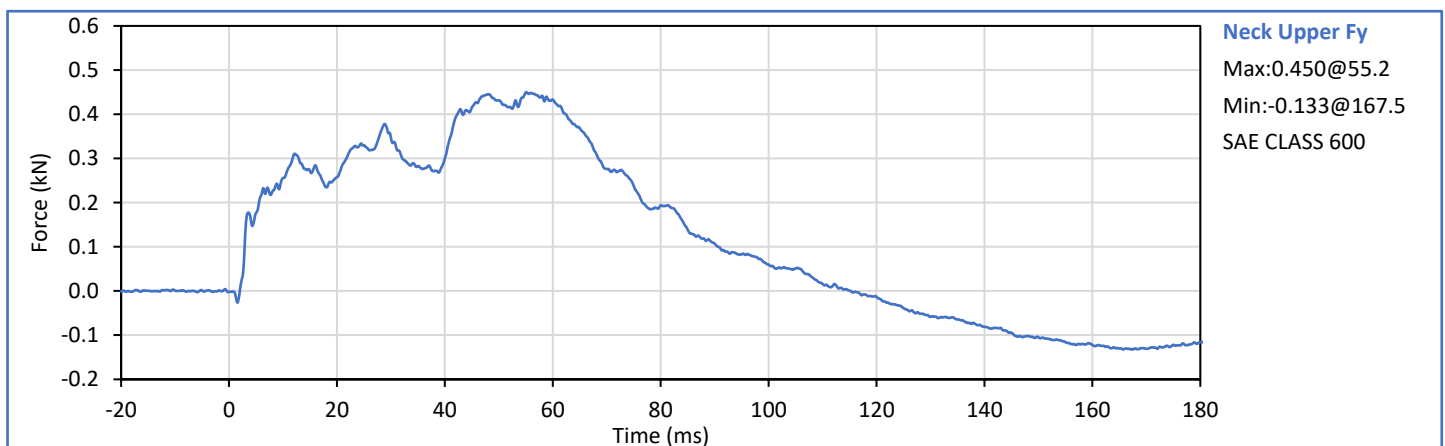
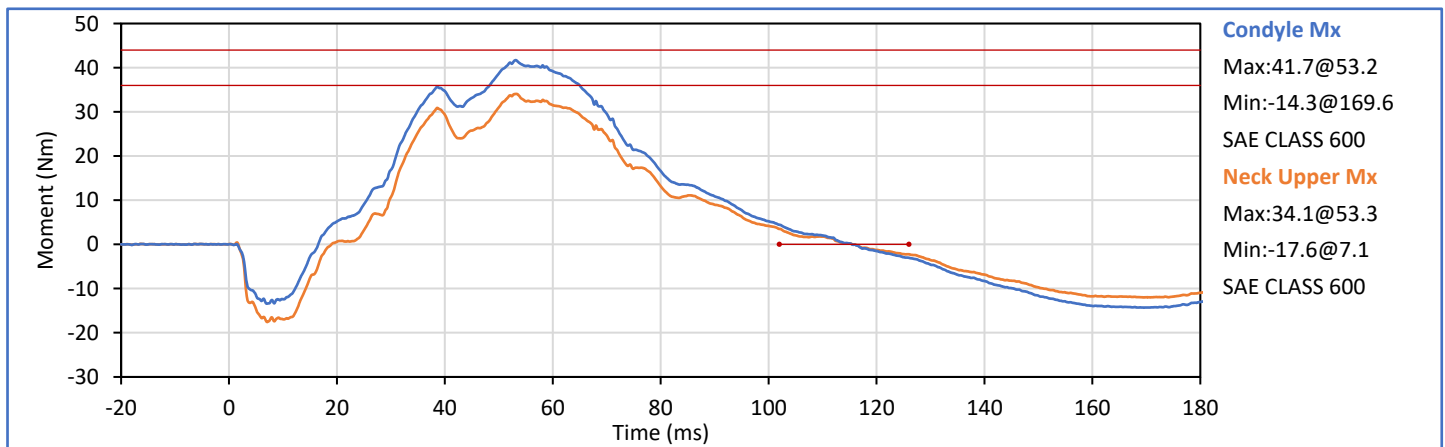
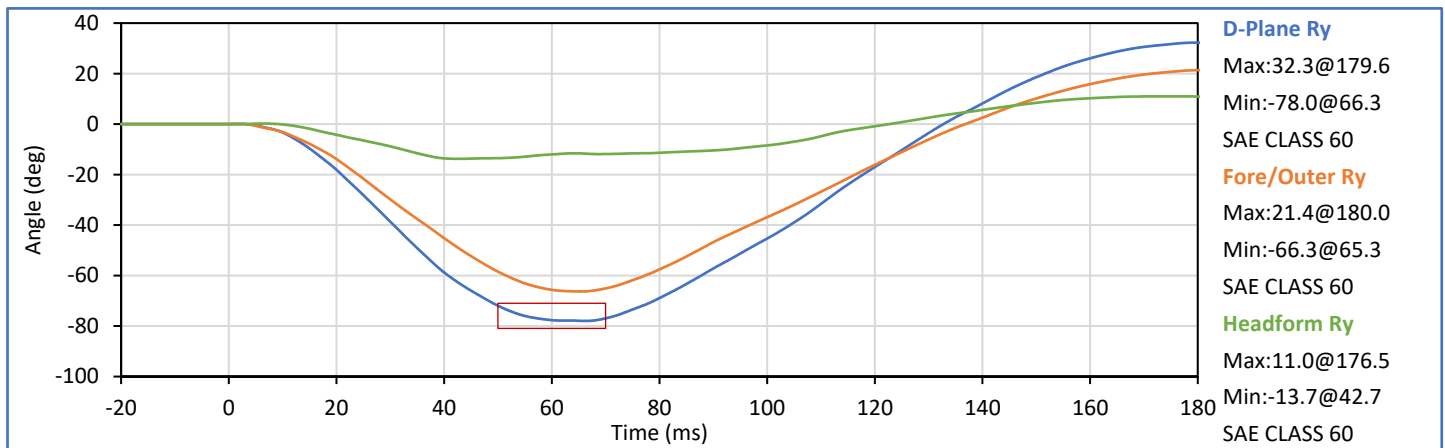
J. Coronel

J. Coronel

Approved By:

J. Hernandez

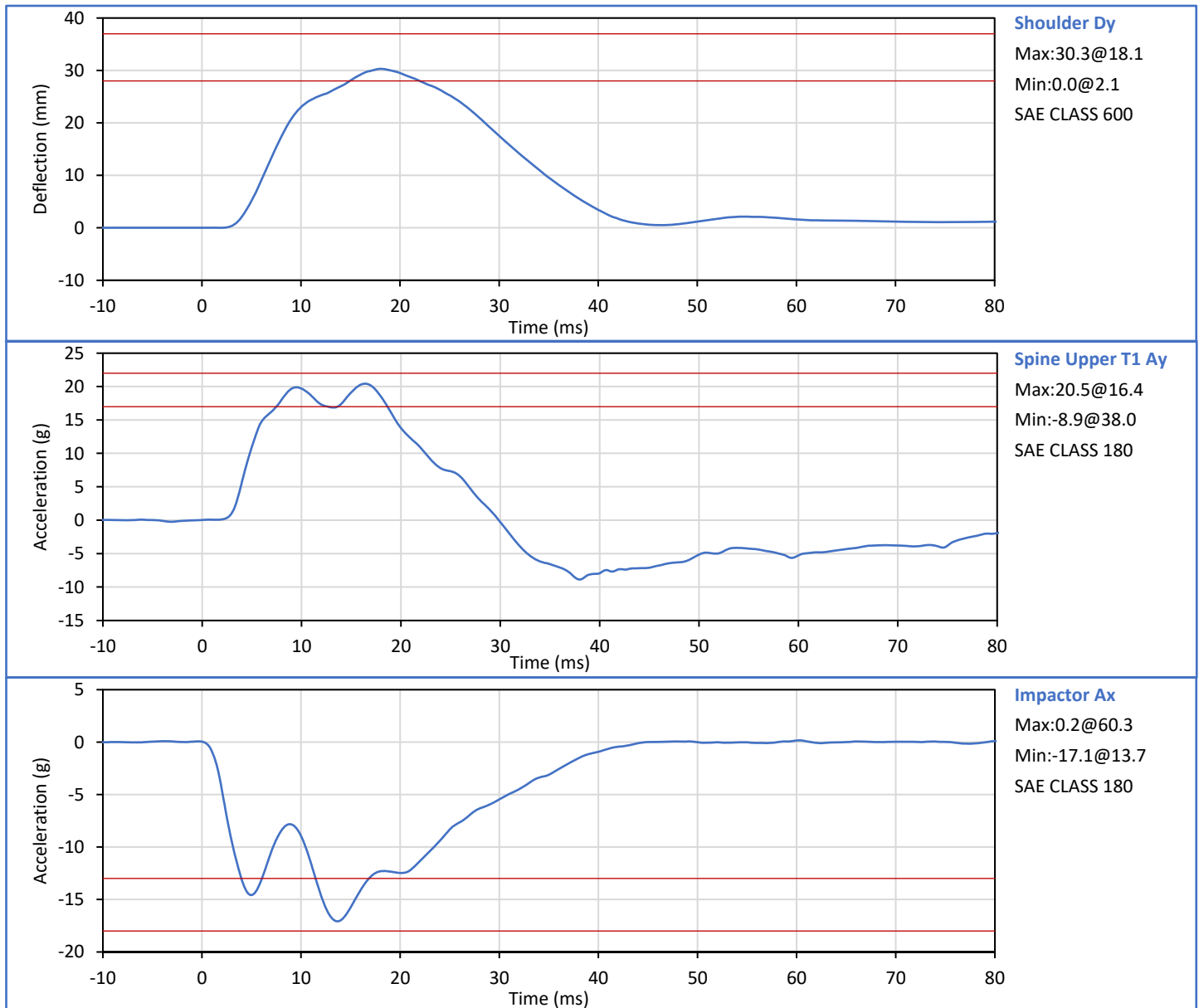
J. Hernandez



ATD Serial No.: 308

Test Date: 2025-01-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Shoulder Dy	mm	28.0	37.0	30.3	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	20.5	Pass
Peak Impactor Ax	g	-18.0	-13.0	-17.1	Pass
Overall Test Results					Pass



Technician:

J. Coronel

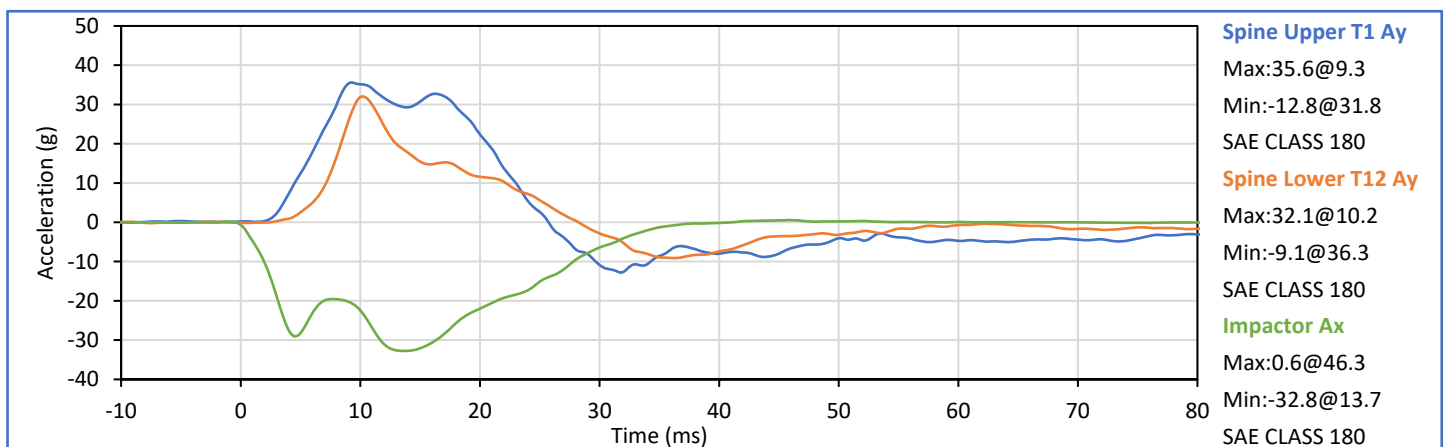
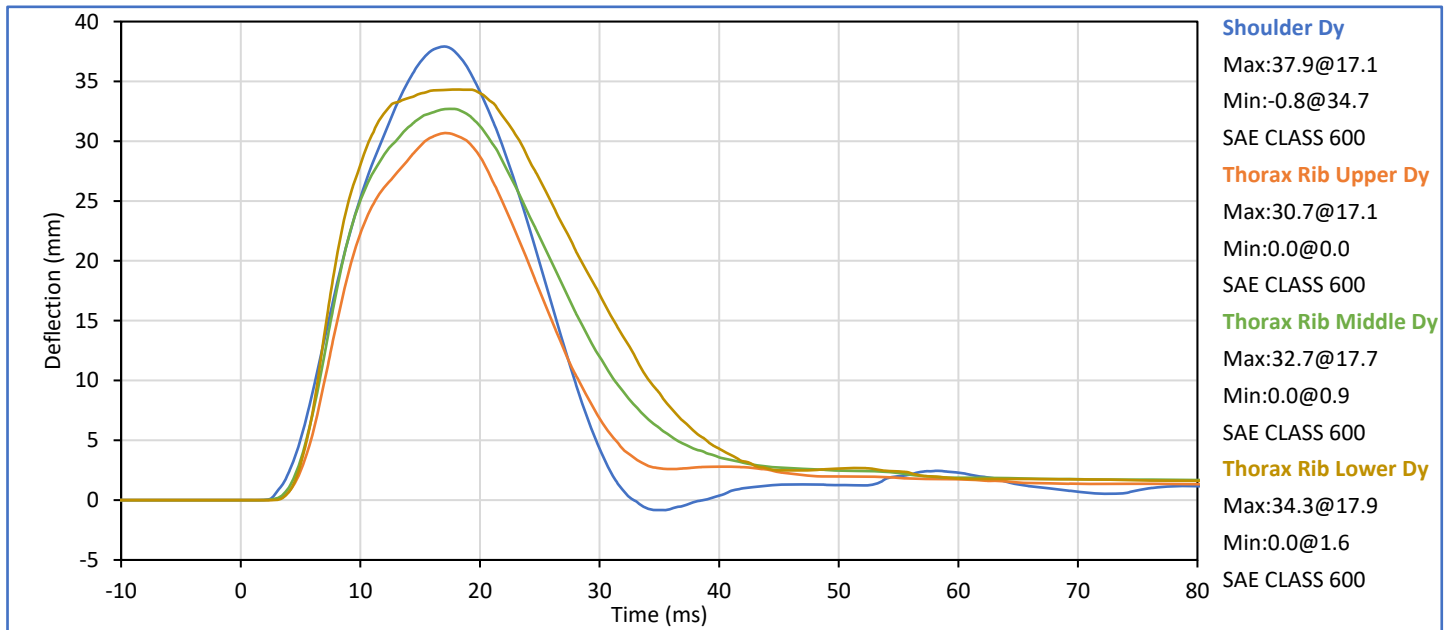
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Impactor Velocity	m/s	6.60	6.80	6.72	Pass
Peak Shoulder Dy	mm	31.0	40.0	37.9	Pass
Peak Upper Rib Dy	mm	25.0	32.0	30.7	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.7	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.3	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	35.6	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.1	Pass
Peak Impactor Ax	g	-36.0	-30.0	-32.8	Pass
Overall Test Results				Pass	Pass



Technician:

J. Coronel

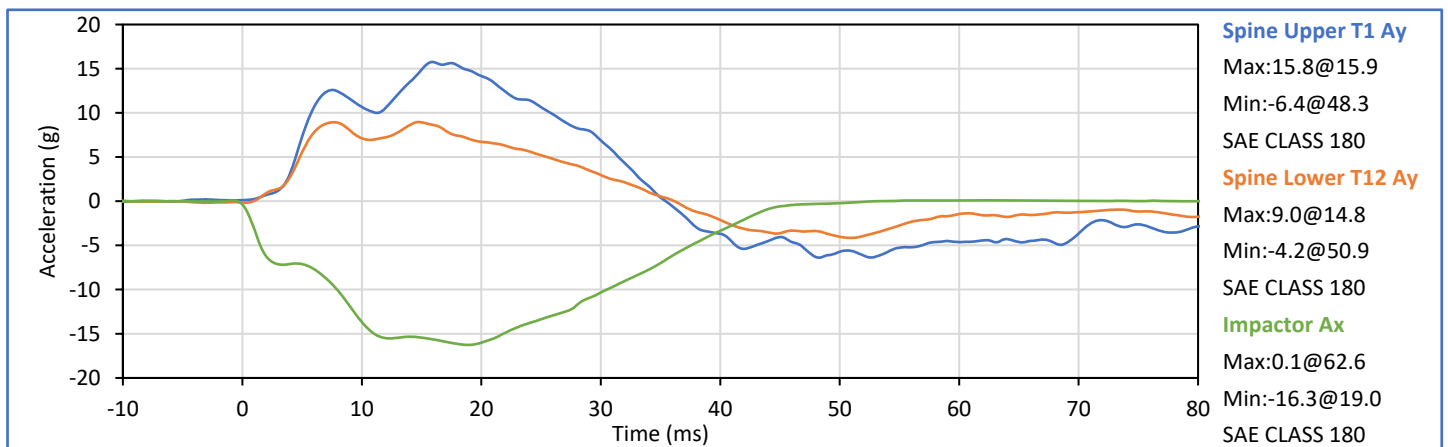
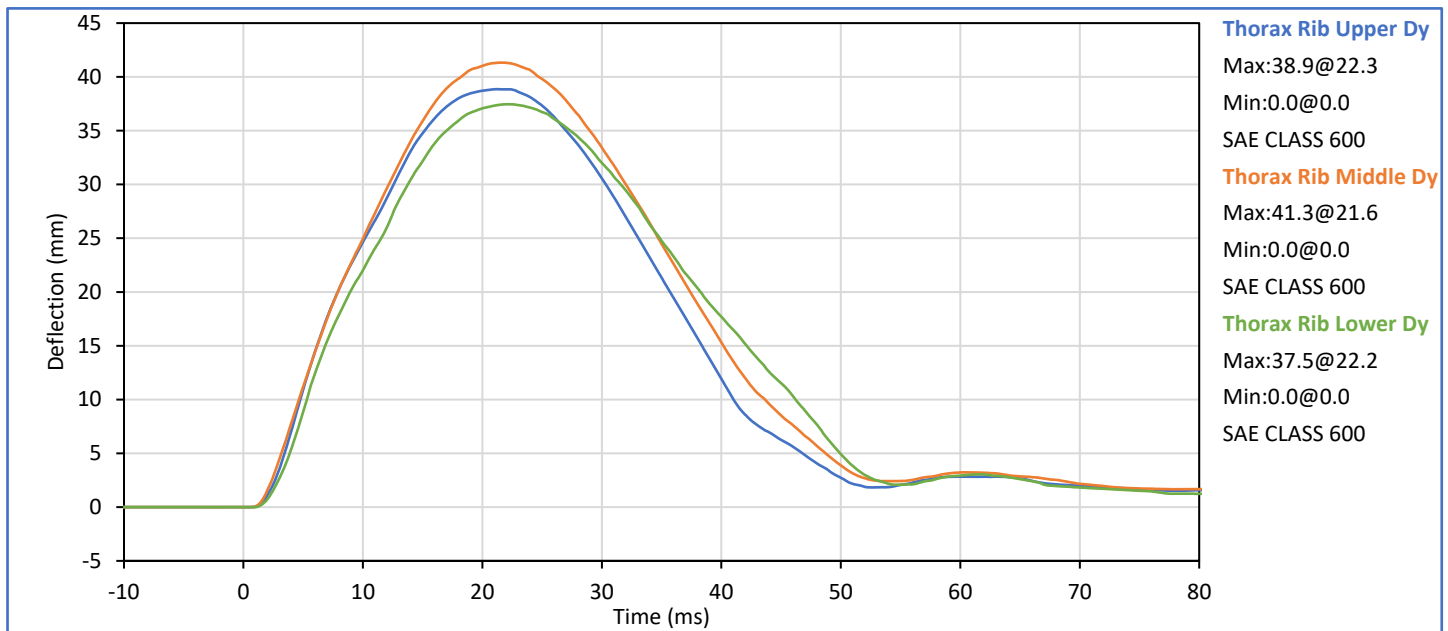
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	38.9	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	41.3	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	37.5	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	15.8	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	9.0	Pass
Peak Impactor Ax	g	-18.0	-14.0	-16.3	Pass
Overall Test Results				Pass	



Technician:

J. Coronel

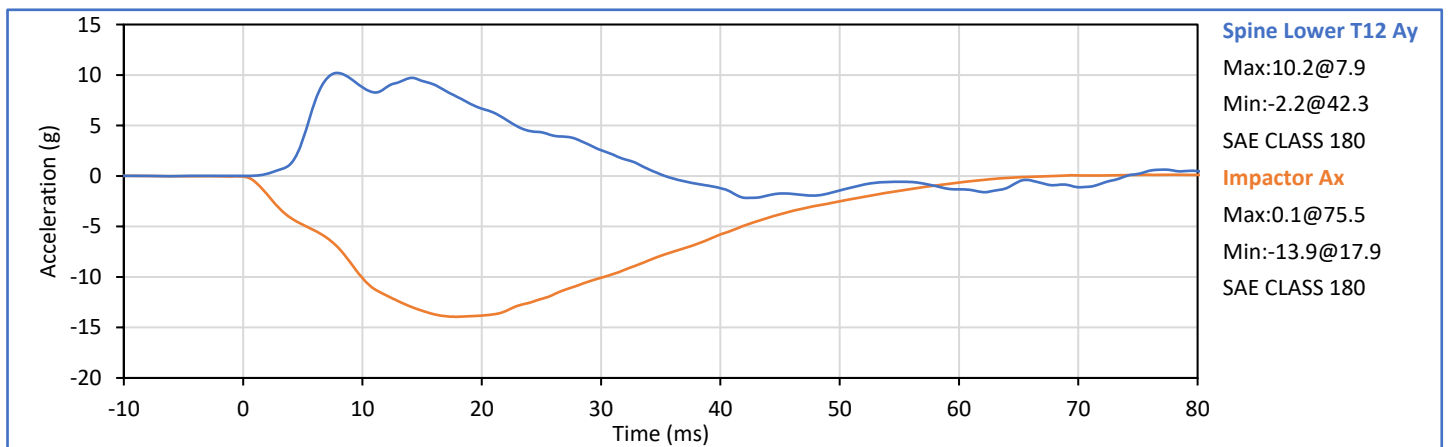
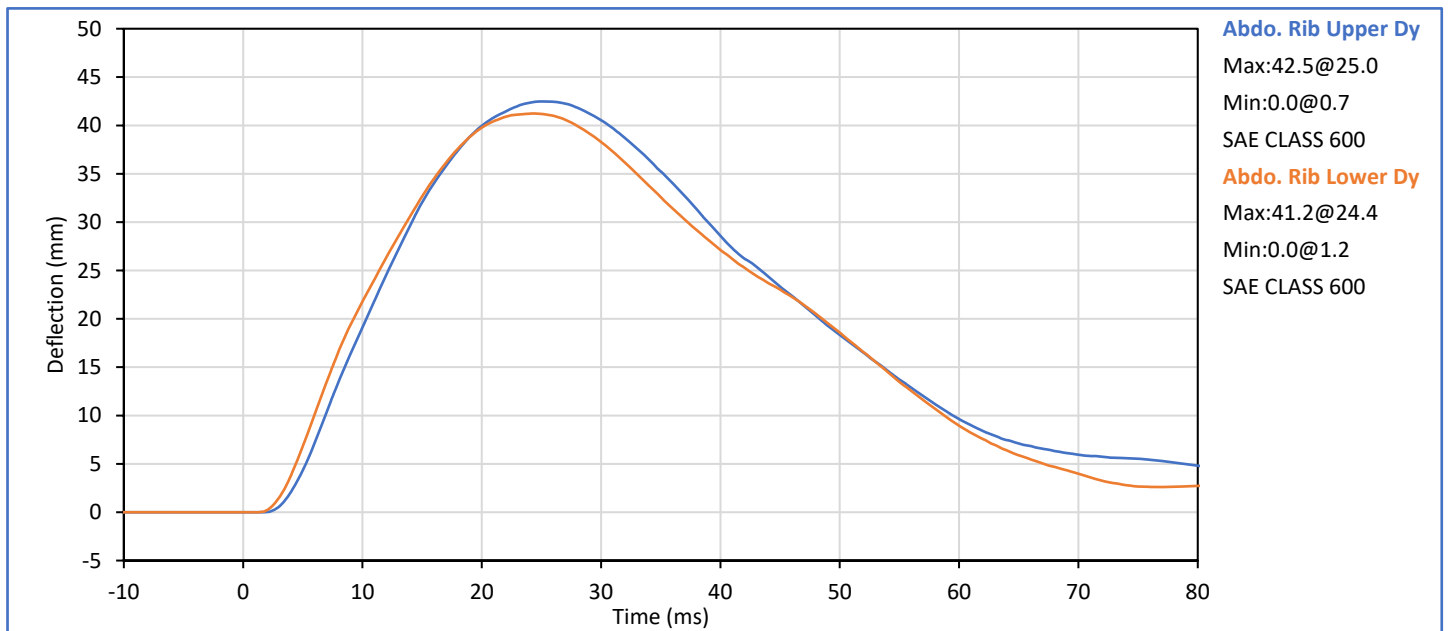
J. Coronel

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.5	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.2	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.2	Pass
Peak Impactor Ax	g	-16.0	-12.0	-13.9	Pass
Overall Test Results					Pass



Technician:

J. Coronel

Approved By:

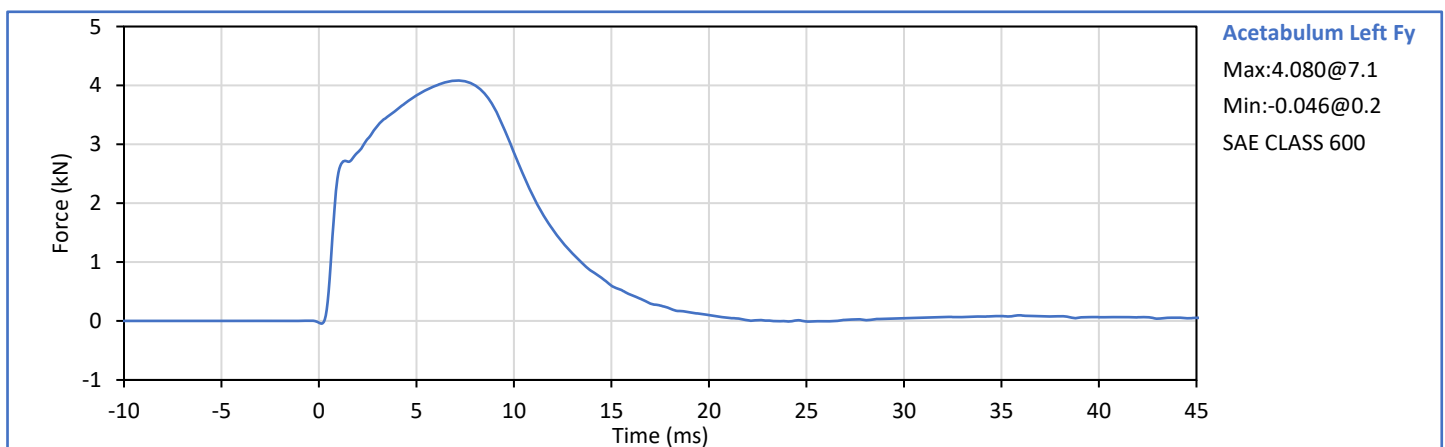
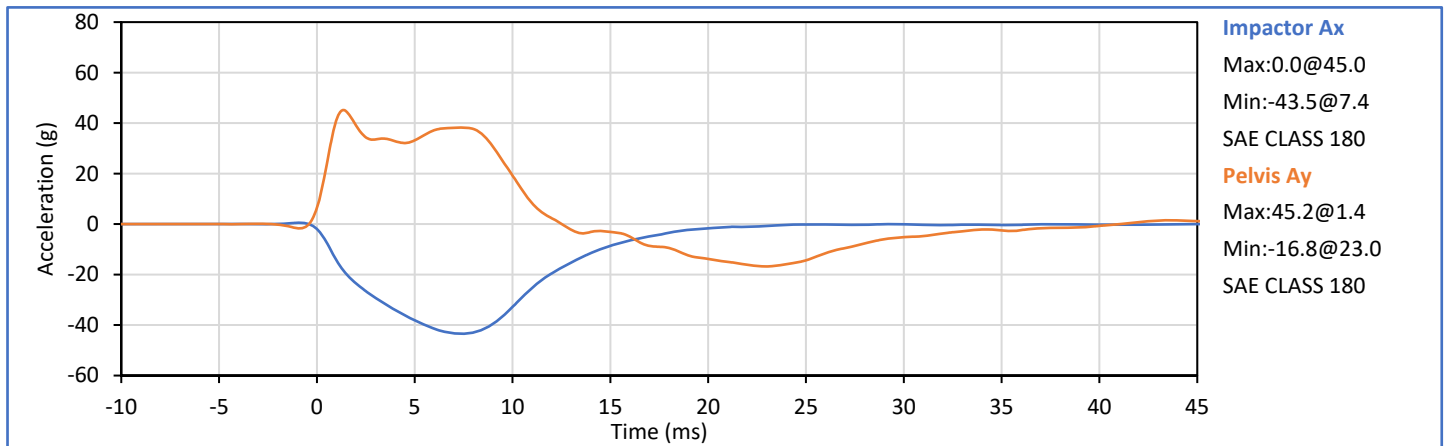
J. Hernandez

ATD Serial No.: 308

Test Date: 2025-01-30

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.08	Pass
Pelvis Ay after 6ms	g	34.0	42.0	38.2	Pass
Peak Impactor Ax	g	-47.0	-38.0	-43.5	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 17338



Technician: J. Coronel

Approved By: J. Hernandez

ATD Serial No.: 308

Test Date: 2025-01-30

Pelvis Plug S/N: 17338



SID-IIs Pelvis Plug Certification Test

Plug S/N 17338

Test Number 24340

Report Number 24397

Test Date 9/14/2022 9:08:41 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	338	50	600
Force @ 1.5 mm (N)	1,186	850	1,400
Force @ 2.5 mm (N)	1,509	1,306	1,618
Force @ 3.0 mm (N)	1,580	1,361	1,673

Testing Machine STM-20 5965542

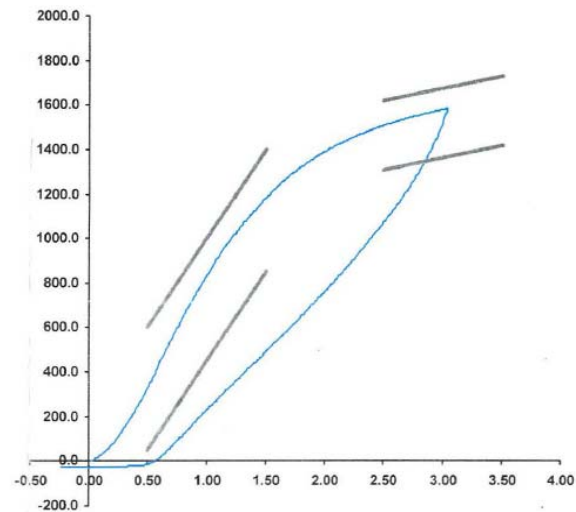
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 14-Sep-22
SACO Research

By: DC

Date: 9/14/22

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

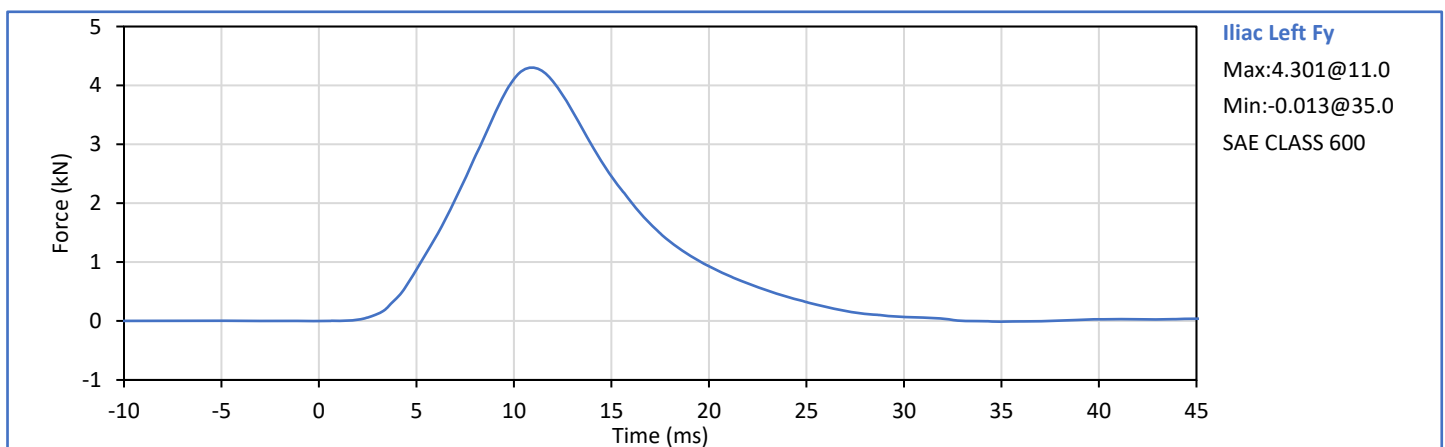
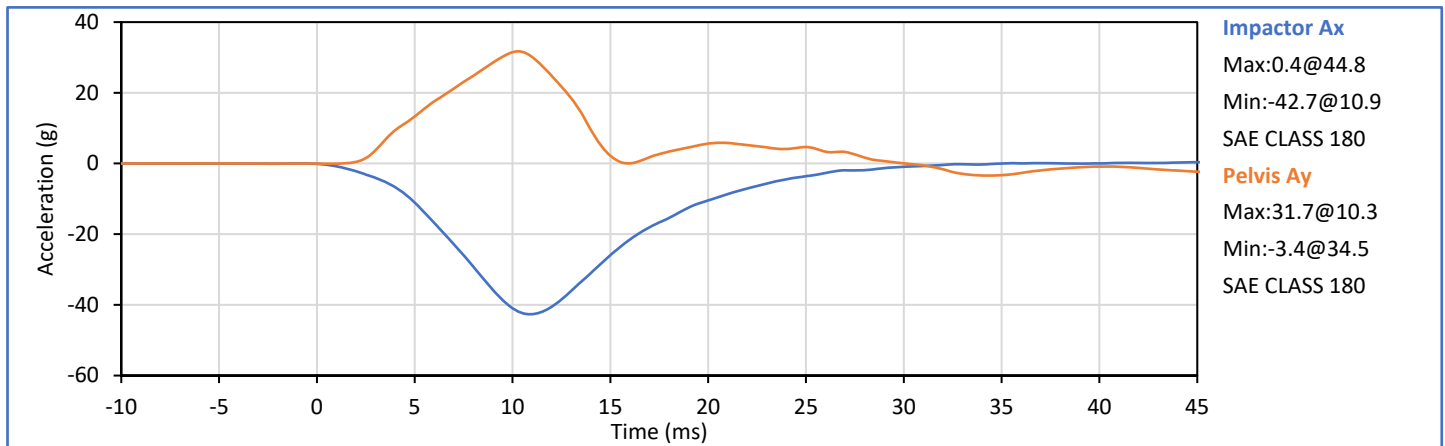
ATD Serial No.: 308

Test Date: 2025-01-30

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Iliac Fy	kN	4.10	5.10	4.30	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-42.7	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 16490 *

* Plug is not impacted and remains certified



Technician:

J. Coronel

Approved By:

J. Hernandez

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 - Driver ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58858	Endevco	7264C-2k	2024-12-12
Head Acceleration Y Primary	P58865	Endevco	7264C-2k	2024-12-12
Head Acceleration Z Primary	P58867	Endevco	7264C-2k	2024-12-12
Head Acceleration X Redundant	P58859	Endevco	7264C-2k	2024-12-12
Head Acceleration Y Redundant	P58866	Endevco	7264C-2k	2024-12-12
Head Acceleration Z Redundant	P58873	Endevco	7264C-2k	2024-12-12
Upper Thorax Rib Deflection Y	209 (ES-2 Rib)	Honeywell	F38000203	2024-10-09
Middle Thorax Rib Deflection Y	210 (ES-2 Rib)	Honeywell	F38000203	2024-10-09
Lower Thorax Rib Deflection Y	207 (ES-2 Rib)	Honeywell	F38000203	2024-10-09
Anterior Abdominal Force Y	1514 Fy	R.A. Denton	2631J	2024-07-25
Middle Abdominal Force Y	1510 Fy	R.A. Denton	2631J	2024-07-25
Posterior Abdominal Force Y	1515 Fy	R.A. Denton	2631J	2024-07-25
Lower Spine T12 Acceleration X	P63856	Endevco	7264C-2k	2024-12-12
Lower Spine T12 Acceleration Y	P50063	Endevco	7264C-2k	2024-12-12
Lower Spine T12 Acceleration Z	P51880	Endevco	7264C-2k	2024-12-12
Pubic Symphysis Force Y	DG6834 Fy	FTSS	IF-556	2024-05-24

Table 2 - Left Rear Passenger ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P63980	Endevco	7264C-2k	2024-12-13
Head Acceleration Y Primary	P58861	Endevco	7264C-2k	2024-12-13
Head Acceleration Z Primary	P51261	Endevco	7264C-2k	2024-12-13
Head Acceleration X Redundant	P58808	Endevco	7264C-2k	2024-12-13
Head Acceleration Y Redundant	P63310	Endevco	7264C-2k	2024-12-13
Head Acceleration Z Redundant	P49189	Endevco	7264C-2k	2024-12-13
Head Rotation Rate X	ARS7367	DTS	ARS PRO-8k (2kHz)	2024-07-31
Head Rotation Rate Y	ARS7377	DTS	ARS PRO-8k (2kHz)	2024-07-31
Head Rotation Rate Z	ARS7498	DTS	ARS PRO-8k (2kHz)	2024-07-31
Upper Thorax Rib Deflection Y	1249	Servo	08TCI-3725	2024-12-14
Middle Thorax Rib Deflection Y	1219	Servo	08TCI-3725	2024-12-14
Lower Thorax Rib Deflection Y	1221	Servo	08TCI-3725	2024-12-14
Upper Abdomen Rib Deflection Y	1252	Servo	08TCI-3725	2024-12-14
Lower Abdomen Rib Deflection Y	1233	Servo	08TCI-3725	2024-12-14
Lower Spine T12 Acceleration X	P52108	Endevco	7264C-2k	2024-12-13
Lower Spine T12 Acceleration Y	P63970	Endevco	7264C-2k	2024-12-13
Lower Spine T12 Acceleration Z	P51712	Endevco	7264C-2k	2024-12-13
Iliac Wing Impact Side Force Y	289 (Iliac)	R.A. Denton	3228J	2024-05-24
Acetabulum Impact Side Force Y	277 (Acetabulum)	R.A. Denton	3249J	2024-05-24

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	M14669	Endevco	7264HM6-2k-360	2024-09-15
Vehicle CG Ay	M14697	Endevco	7264HM6-2k-360	2024-09-16
Vehicle CG Az	M14696	Endevco	7264HM6-2k-360	2024-09-16
Right Side Sill at Front Seat Ax	M14695	Endevco	7264HM6-2k-360	2024-09-16
Right Side Sill at Front Seat Ay	M14670	Endevco	7264HM6-2k-360	2024-09-15
Right Side Sill at Front Seat Az	M14702	Endevco	7264HM6-2k-360	2024-09-16
Right Side Sill at Rear Seat Ax	M14710	Endevco	7264HM6-2k-360	2024-09-16
Right Side Sill at Rear Seat Ay	M14668	Endevco	7264HM6-2k-360	2024-09-15
Right Side Sill at Rear Seat Az	M14693	Endevco	7264HM6-2k-360	2024-09-16
Left Side Sill at Front Seat Ay	A354847	MSI	52F-2k	2024-09-20
Left Side Sill at Rear Seat Ay	A356443	MSI	52F-2k	2024-09-24
Left Lower A-Pillar Ay	A358515	MSI	52F-2k	2024-09-23
Left Middle A-Pillar Ay	223321	BST	11CF-2k	2024-09-23
Left Lower B-Pillar Ay	A224533	MSI	52F-2k	2024-09-24
Left Middle B-Pillar Ay	A356469	MSI	52F-2k	2024-09-24
Driver Seat Track at H-Point Ay	A358509	MSI	52F-2k	2024-09-24
Rear Seat Structure Ay	M14692	Endevco	7264HM6-2k-360	2024-09-16
Right Rear Occupant Comp. Ay	M14679	Endevco	7264HM6-2k-360	2024-09-15
Engine Block Top Ax	M14578	Endevco	7264HM6-2k-360	2024-08-15
Engine Block Top Ay	M14699	Endevco	7264HM6-2k-360	2024-09-16
Rear Floopan Above Axle Ax	M14661	Endevco	7264HM6-2k-360	2024-09-15
Rear Floopan Above Axle Ay	M14667	Endevco	7264HM6-2k-360	2024-09-15
Rear Floopan Above Axle Az	M14694	Endevco	7264HM6-2k-360	2024-09-16

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
MDB CG Ax	M14686	Endevco	7264HM6-2k-360	2024-09-15
MDB CG Ay	M14683	Endevco	7264HM6-2k-360	2024-09-15
MDB CG Az	M14672	Endevco	7264HM6-2k-360	2024-09-15
MDB Left Side at Rear Axle Ax	M14688	Endevco	7264HM6-2k-360	2024-09-15
MDB Left Side at Rear Axle Ay	M14674	Endevco	7264HM6-2k-360	2024-09-15