

REPORT NUMBER: SideNCAPPole-KAR-24-003
NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

MAZDA MOTOR CORPORATION
2024 MAZDA CX-50 5-DOOR SUV

NHTSA No: M20245400

PREPARED BY:
APPLUS IDIADA KARCO ENGINEERING, LLC.
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ADELANTO, CA 92301



JUNE 20, 2024

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

COTR, New Car Assessment Program
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Date: _____

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15. Supplementary Notes																														
16. Abstract A 32.2 km/h 75° rigid pole side NCAP impact test was conducted on the subject 2024 Mazda CX-50 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on June 6, 2024. The impact velocity was 32.15 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 37.8°C. The target vehicle's maximum post-test static crush was 320 mm located at level 2. 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" style="text-align: center;">Measurement Description</th> <th colspan="3" style="text-align: center;">Driver ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td style="text-align: center;">1000</td> <td style="text-align: center;">214.340</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">g</td> <td style="text-align: center;">82</td> <td style="text-align: center;">27.916</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetabular and Iliac Forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">2316.110</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38</td> <td style="text-align: center;">14.256</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45</td> <td style="text-align: center;">16.918</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (SID-IIs)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	214.340	Resultant Lower Spine Acceleration	g	82	27.916	Total Pelvic Force (Sum of Acetabular and Iliac Forces)	N	5525	2316.110	Maximum Thoracic Rib Deflection	mm	38	14.256	Maximum Abdominal Rib Deflection	mm	45	16.918
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Office of Crashworthiness Standards (NRM-100) 1200 New Jersey Ave., SE Washington, DC 20590																												
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SECTION 1

TEST PURPOSE AND SUMMARY OF TEST

PURPOSE

This side impact test is part of the 2024 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 2024 Mazda CX-50 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure date March 2020.

SUMMARY

A rigid pole side impact test was conducted on a 2024 Mazda CX-50 5-Door SUV. The subject vehicle was towed into the rigid pole at an angle of 74.1° and a velocity of 32.15 km/h. The test was conducted by Applus IDIADA KARCO Engineering, LLC. in Adelanto, California on June 6, 2024. Pre- and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One 299 (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated March 2020. Camera locations and other pertinent camera information are included in this report.

The 299 (SID-IIs) was instrumented accordingly:

- Primary and Redundant Head CG tri-axial accelerometers
- Thorax upper, middle and lower rib displacement potentiometers
- Abdomen upper and lower rib displacement potentiometers
- Lower spine (12) tri-axial accelerometers
- Iliac load cell
- Acetabulum load cell

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

SECTION 1 ...(CONTINUED)
TEST PURPOSE AND SUMMARY OF TEST

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

Measurement Description	Units	Driver ATD (SID-IIs)	
		IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	214.340
Lower Spine (T12) Resultant Acceleration	g	82	27.916
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2316.110
Maximum Thoracic Rib Deflection	mm	38*	14.256
Maximum Abdominal Rib Deflection	mm	45*	16.918

**Proposed IARV*

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 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 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

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 ^f /in ²	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lb ^f	N	4.448
Moment	Torque	lb ^f -ft	N•m	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20245400
Model Year	2024
Make	Mazda
Model	CX-50
Body Style	5-Door SUV
VIN	7MMVABAM4RN211380
Body Color	Machine Gray Metallic
Odometer Reading (km / mi)	14/9
Engine Displacement (L)	2.5
Type / No. of Cylinders	4 Cylinder
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
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 Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	Yes
Rear Pass. Pelvis Airbag	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	Mazda Toyota Manufacturing USA Inc.
Date of Manufacture	Mar-24
Vehicle Type	MPV

GVWR (kg)	2199
GAWR Front (kg)	1133
GAWR Rear (kg)	1079

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				385.0	A
DSC x 68 (kg)				340.0	B
Cargo Weight (RCLW) (kg)				45.0	A-B*

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

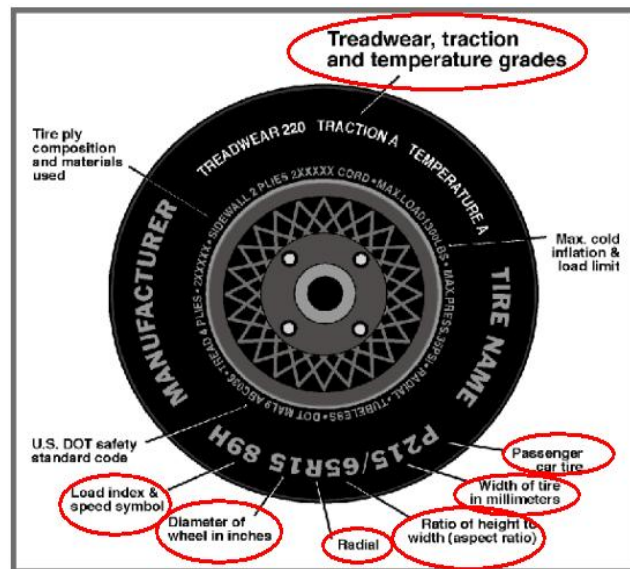
VEHICLE SEAT TYPE

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

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	225/65 R17	225/65 R17
Tire Size on Vehicle	225/65 R17	225/65 R17
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Assurance	Assurance
Treadware	540	540
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	Polyester	Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	102H	102H
Tire Material	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
DOT Safety Code Left	IM62Y NTIR 1024	IM62Y NTIR 1024
DOT Safety Code Right	IM62Y NTIR 1024	IM62Y NTIR 1024

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

TIRE PRESSURES

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	480.5	347.0		487.0	399.0		478.0	365.5	
Right	kg	473.5	331.0		470.5	363.5		492.5	389.0	
Ratio	%	58.5%	41.5%	100.0%	55.7%	44.3%	100.0%	56.3%	43.7%	100.0%
Total	kg	954.0	678.0	1632.0	957.5	762.5	1720.0	970.5	754.5	1725.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1632.0	A
Actual Weight of 1 SID II-s ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	45.0	C
Calculated Vehicle Target Wt (TVTW)	kg	1726.0	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	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	°	0.1	0.1	0.1	Yes
Front Passenger Sill Angle (front-to-rear)*	°	-0.1	-0.1	-0.2	Yes
Front Bumper-Line Angle (left-to-right)**	°	-0.4	-0.4	-0.4	Yes
Rear Bumper-Line Angle (left-to-right)**	°	-0.7	0.1	0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	1170	1249	1232	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	12	25	-18	

*ND=Nose Down (-), NU=Nose Up (+) **LD=Left Down (-), LU=Left Up (+)

***The "As Tested" vehicle attitude angle measurements must be within "As Delivered" and the "Fully Loaded" vehicle attitude measurements at each location. Indicate "Yes" or "No" for "Meets Requirement"

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Rear Trim	2.5
Tire Pump	4.5

TEST SURFACE MARKINGS

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	0
Aft 25 mm target	0

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

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	4.1	0.0	2.0
Front Passenger Seat	Fixed	Fixed	Fixed
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	2.0	595	Max	583	597	612
			Mid	566	577	595
			Min	551	561	576
Front Passenger Seat	Fixed	648	Max			
			Mid	616	632	648
			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: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

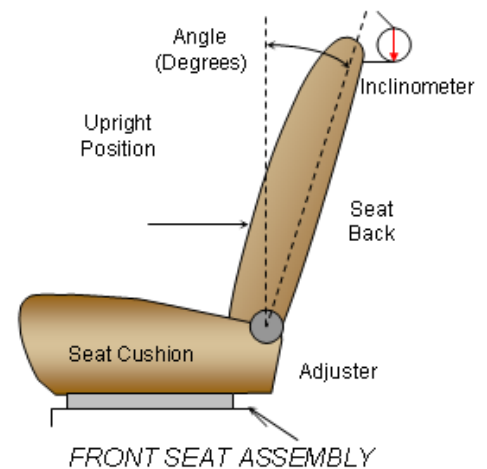
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	250	31	0	0
Front Passenger Seat	250	31	0	0
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 such that the dummy's head is level. The front passenger's seat back is positioned in a similar manner to the driver's seat. The struck side rear passenger seat back is positioned in accordance with the information provided by the manufacturer in Form 1 for the 5th percentile female dummy in a Side NCAP MDB Test. The rear center and non-struck side rear passenger's seat back is set to match the struck side rear seat back. Seat back angle is measured using an inclinometer along the bottom of the headrest post.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/Seated Dummy	60.3	33	6.3	7
Front Passenger Seat	59.1	34	6.3	7
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	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

DATA SHEET NO. 2 ... (CONTINUED)**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA**Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24**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

HEAD RESTRAINT ADJUSTMENT

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

	Total No. of Positions	Placed in Position
Driver Seat	3	L

DATA SHEET NO. 2 ... (CONTINUED)

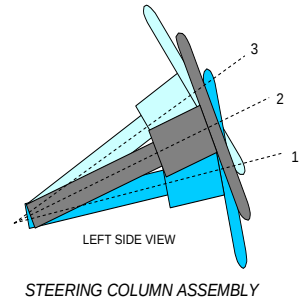
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

STEERING COLUMN ADJUSTMENT

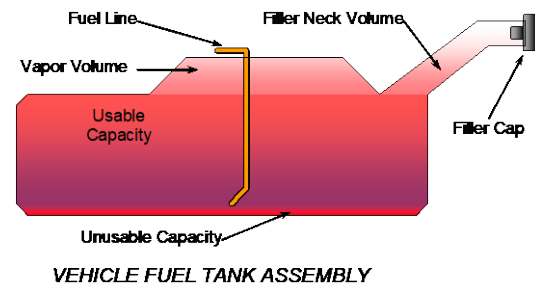
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	22.0	84
Geometric Center - Position 2	24.6	117
Uppermost - Position 3	27.1	150
Telescoping Steering Wheel Travel		66
Test Position	24.6	117



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

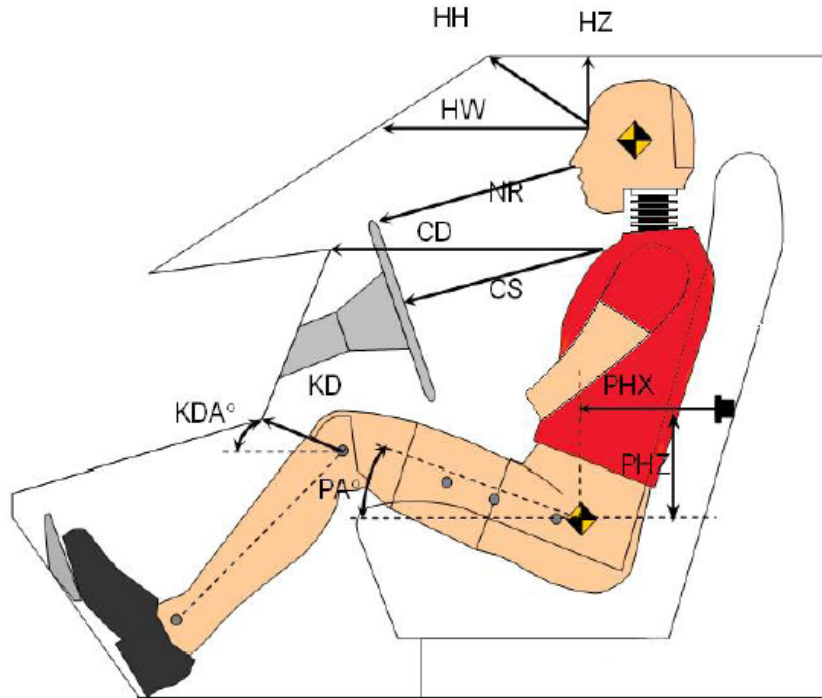
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	60.19
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)*	
Usable Capacity of "Optional Tank" (see Owner's Manual)*	
93% of Usable Capacity	55.98
Actual amount of Solvent Used in Test	55.98
1/3 of Usable Capacity	20.06

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: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24



Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	252	
HW	Head to Windshield	560	
HZ	Head to Roof	198	
NR	Nose to Rim	228	
CD	Chest to Dash	510	
CS	Chest to Steering Wheel	152	
KD(L)/KDA(L)°	Left Knee to Dash	135	17.0
KD(R)/KDA(R)°	Right Knee to Dash	130	17.4
PAX°	Pelvic Tilt Angle (x-axis)		18.2
PAY°	Pelvic Tilt Angle (y-axis)		0.2
PHX	Hip Point to Striker (x-axis)	350	
PHZ	Hip Point to Striker (z-axis)	163	

DATA SHEET NO. 4

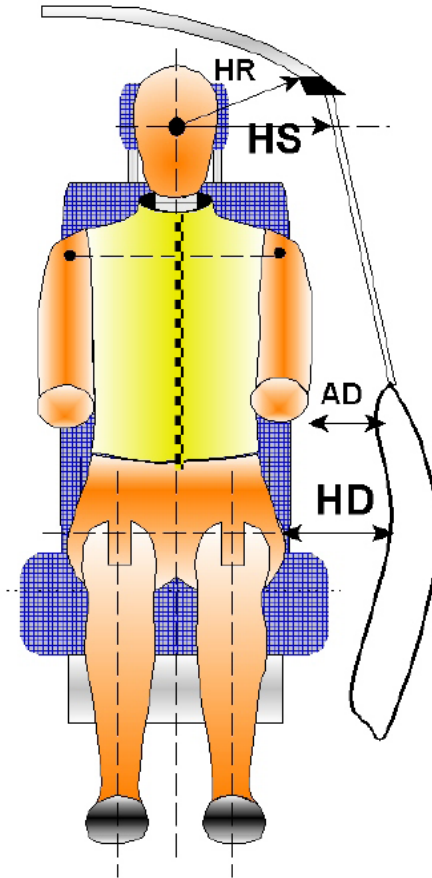
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV

NHTSA No. M20245400

Test Program: NCAP Side Pole Impact Test

Test Date: 06/06/24

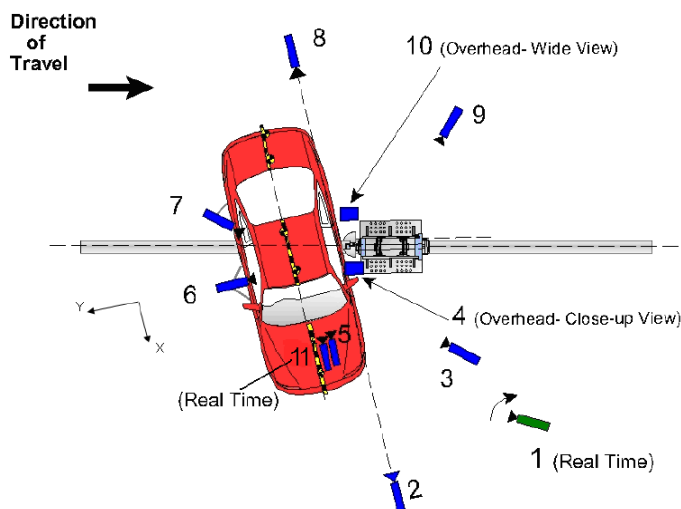


Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	242
HS	Head to Side Window	mm	376
AD	Arm to Door	mm	153
HD	Hip Point to Door	mm	258

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24



Reference from Point of Impact for X and Y; from Ground for Z):
 +X = Forward of Vehicle, +Y = Right of Vehicle, +Z = Down

Camera No.	View	Coordinates (m)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real Time Pan View of Impact	8.89	46.57	-3.04		30
2	Front Ground Level - Impact View	8.34	-0.05	-0.93	35	1000
3	Impact Side 45° - Forward Pole View	4.10	-2.15	-1.15	25	1000
4	Overhead Close-Up View of Impact	0.00	0.00	-5.79	35	1000
5	On-Board - Dummy Front View	-1.18	-0.84	-0.83	8	1000
6	On-Board - Dummy Side View	-1.19	-0.84	-0.82	6	1000
7	On-Board - Dummy Rear Oblique View	0.90	-0.92	-0.55	6	1000
8	Rear Ground Level - Impact View	-1.30	1.68	-1.26	35	1000
9	Impact Side 45° - Rearward Pole View	-8.02	0.04	-1.01	25	1000
10	Overhead Wide View of Impact	-0.06	0.22	-5.79	15	1000
11	Real Time Dummy Front View	0.88	-0.96	-0.54		30

*All measurements accurate to ± 6 mm

NOTE: Vehicle is at a 75 angle to the rigid pole.

If applicable, explain why camera(s) did not operate as intended: N/A

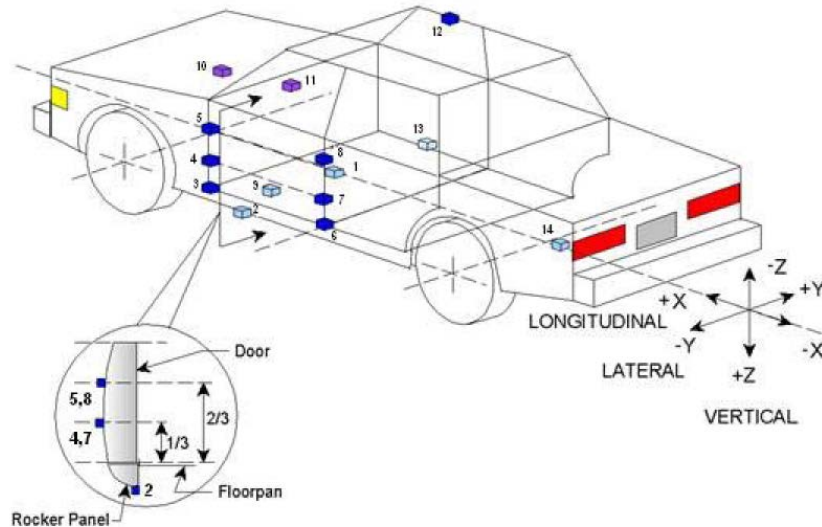
INSTRUMENTATION

Driver Dummy Channels	19
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	45

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

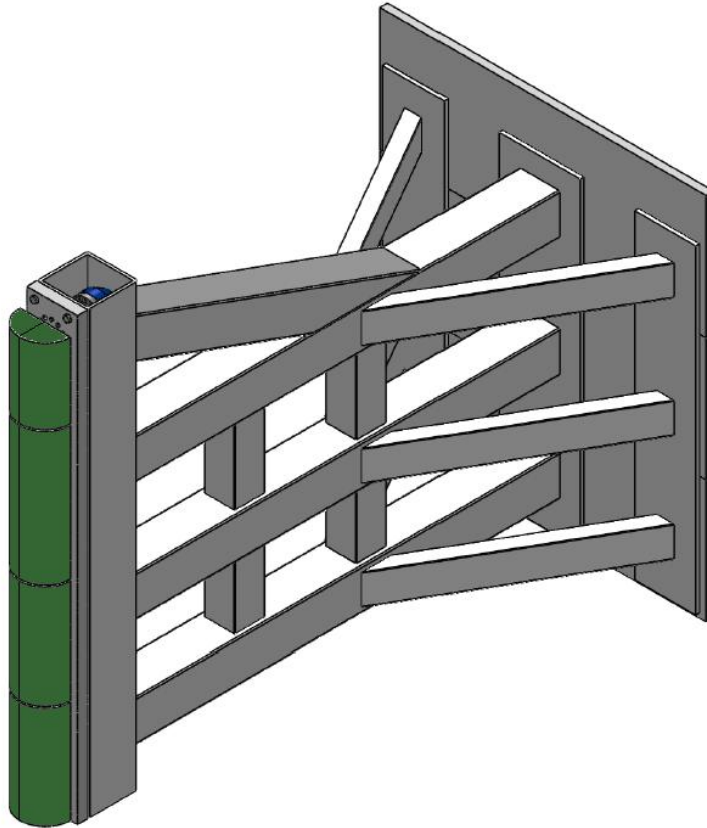


Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2000	0	-420
2	Left Floor Sill	3200	-700	-420
3	A-Pillar Sill	3450	-700	-420
4	A-Pillar Low	3450	-720	-420
5	A-Pillar Mid	3450	-720	-420
6	B-Pillar Sill	2150	-720	-420
7	B-Pillar Low	2150	-720	-420
8	B-Pillar Mid	2150	-720	-420
9	Driver Seat Track	2500	-650	-420
10	Engine Top	4000	0	-1000
11	Firewall	3800	0	-1100
12	Right Roof	2200	600	-1600
13	Right Floor Sill	900	0	-450
14	Rear Floorpan	900	0	-450

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

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24



ID	Units	Height From Ground
1	mm	87
2	mm	468
3	mm	648
4	mm	978
5	mm	1168
6	mm	1651
7	mm	1816
8	mm	2057

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	Curtain Air Bag
Top of Head	Curtain Air Bag
Left Side of Head	Curtain Air Bag
Back of Head	Head Rest, Curtain Air Bag
Left Shoulder	Torso/Pelvis Air Bag
Upper Torso	Torso/Pelvis Air Bag, Seat
Lower Torso	Torso/Pelvis Air Bag, Seat
Left Hip	Torso/Pelvis Air Bag, Seat, Door Panel
Left Knee	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge 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)	No	No	No	No	No

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	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

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

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

POST-TEST STRUCTURAL OBSERVATIONS

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

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

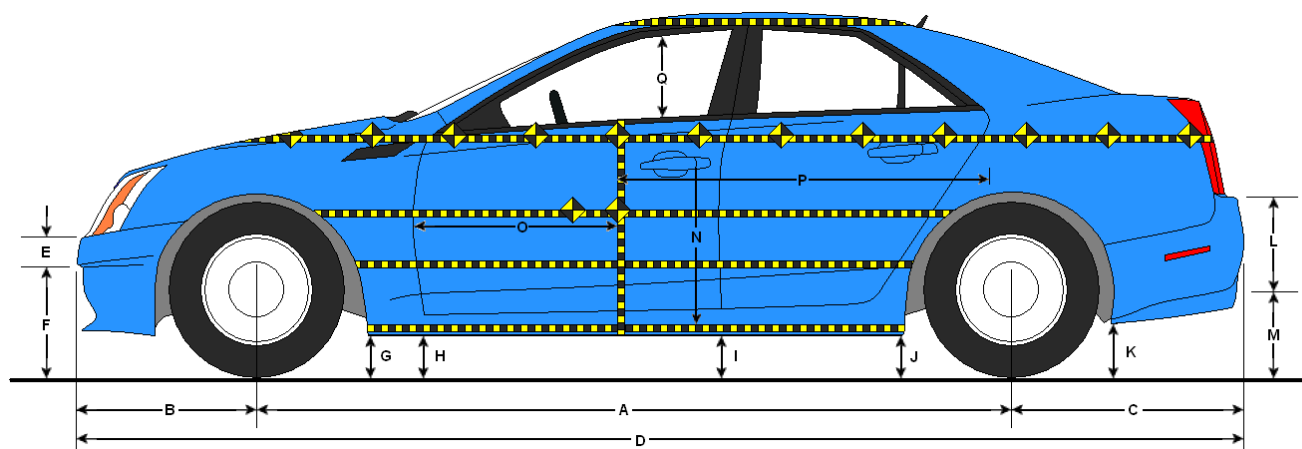
IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1128
Actual Impact Point (Aft of Front Axle)	mm		1138
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	-10
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	74.1
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.15
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.10

DATA SHEET NO. 9

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24



LEFT SIDE VIEW

All measurements in mm with tolerance of ± 3 mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Change
A	Wheelbase	2817	2774	-43
B	Front Axle to FSOV	956	968	12
C	Rear Axle to RSOV	943	939	-4
D	Total Length at Centerline	4715	4680	-35
E	Front Bumper Thickness	173	175	2
F	Front Bumper Bottom to Ground	458	457	-1
G	Sill Height at Front Wheel Well	298	268	-30
H	Sill Height at Front Door Leading Edge	306	277	-29
I	Sill Height at B-Pillar	322	270	-52
J1	Sill Height at Rear Wheel Well	309	319	10
J2	Pinch Weld Height at Rear Wheel Well	263	258	-5
K	Sill Height Aft of Rear Wheel Well	368	371	3
L	Rear Bumper Thickness	136	138	2
M	Rear Bumper Bottom to Ground	512	520	8
N	Sill Height to Bottom of Front Window Sill	717	750	33
O	Front Door Leading Edge to Impact CL	596	537	-59
P	Rear Door Trailing Edge to Impact CL	1510	1376	-134
Q	Front Window Opening	379	382	3
R	Right Side Length	4118	4128	10
S	Left Side Length	4117	4036	-81
T	Vehicle Width at B-Pillar	1834	1706	-128

DATA SHEET NO. 10

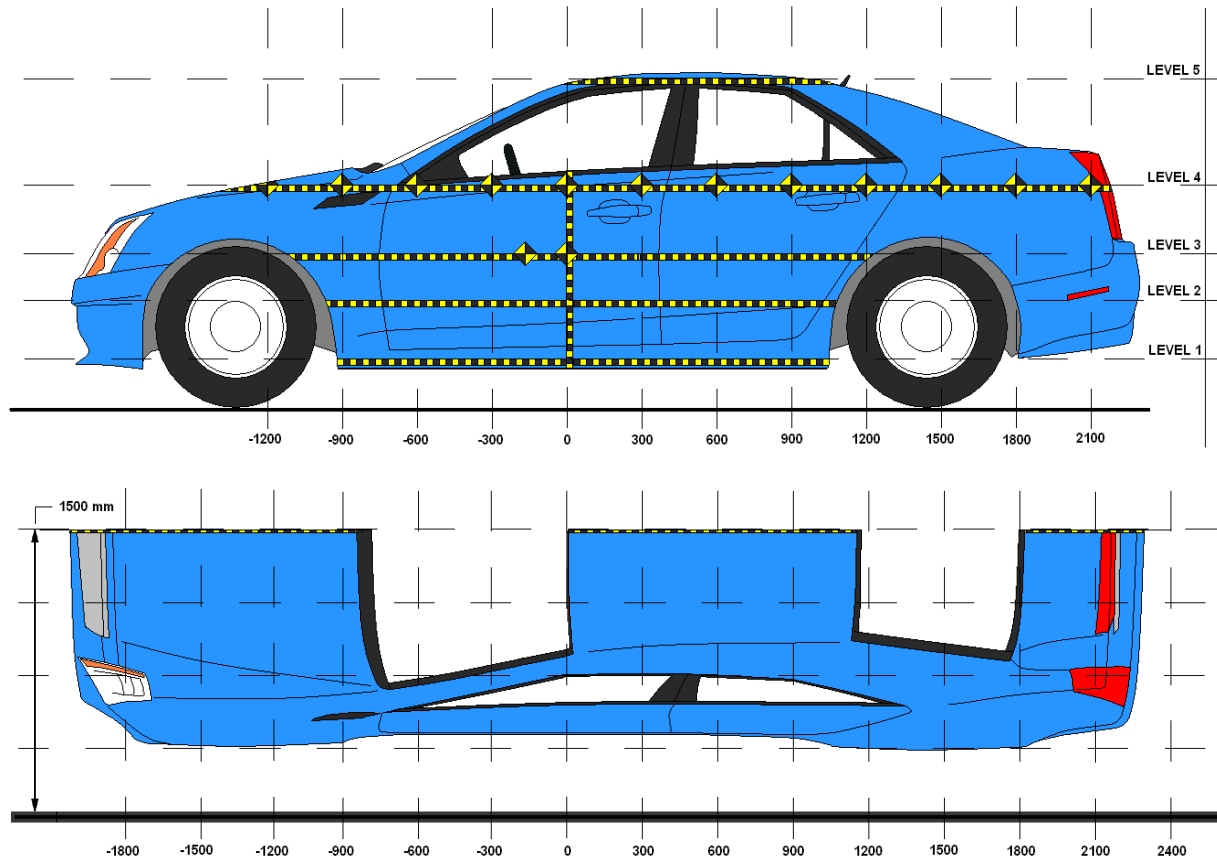
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV

NHTSA No. M20245400

Test Program: NCAP Side Pole Impact Test

Test Date: 06/06/24



NOTE: All measurements in mm with tolerance of ± 3 mm

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	366	295	0
2	Occupant H-Point	679	320	0
3	Mid-Door	724	318	0
4	Window Sill	1083	252	0
5	Window Top	1277	81	150

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400
 Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

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		543	545	715			539	536	692			-4	-9	-23	
-600	574	577	580	698		578	569	560	691		4	-8	-20	-7	
-450	586	602	605	687		647	655	651	712		61	53	46	25	
-300	589	611	612	690		726	744	742	779		137	133	130	89	
-150	588	612	612	676		821	832	833	845		233	220	221	169	
0	587	609	610	671		882	929	928	923		295	320	318	252	
150	583	608	609	666	879	802	905	905	916	960	219	297	296	250	81
300	583	607	607	663	879	716	794	797	820	932	133	187	190	157	53
450	588	606	607	661	883	694	704	705	741	919	106	98	98	80	36
600	585	607	608	661	887	663	686	685	717	906	78	79	77	56	19
750	586	609	609	663	889	641	662	663	718	901	55	53	54	55	12
900	595	608	609	662	890	625	618	634	720	892	30	10	25	58	2
1050	584	592	594	657	893	586	588	587	699	893	2	-4	-7	42	0
1200	574	564	568	646	895	534	547	553	662	893	-40	-17	-15	16	-2
1350		546	544	641	897		538	539	625	897		-8	-5	-16	0
1500				630	901				633	901				3	0
1650				620	907				628	906				8	-1
1800				616	913				618	911				2	-2
1950				621					628					7	
2100				655					658					3	
2250															
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

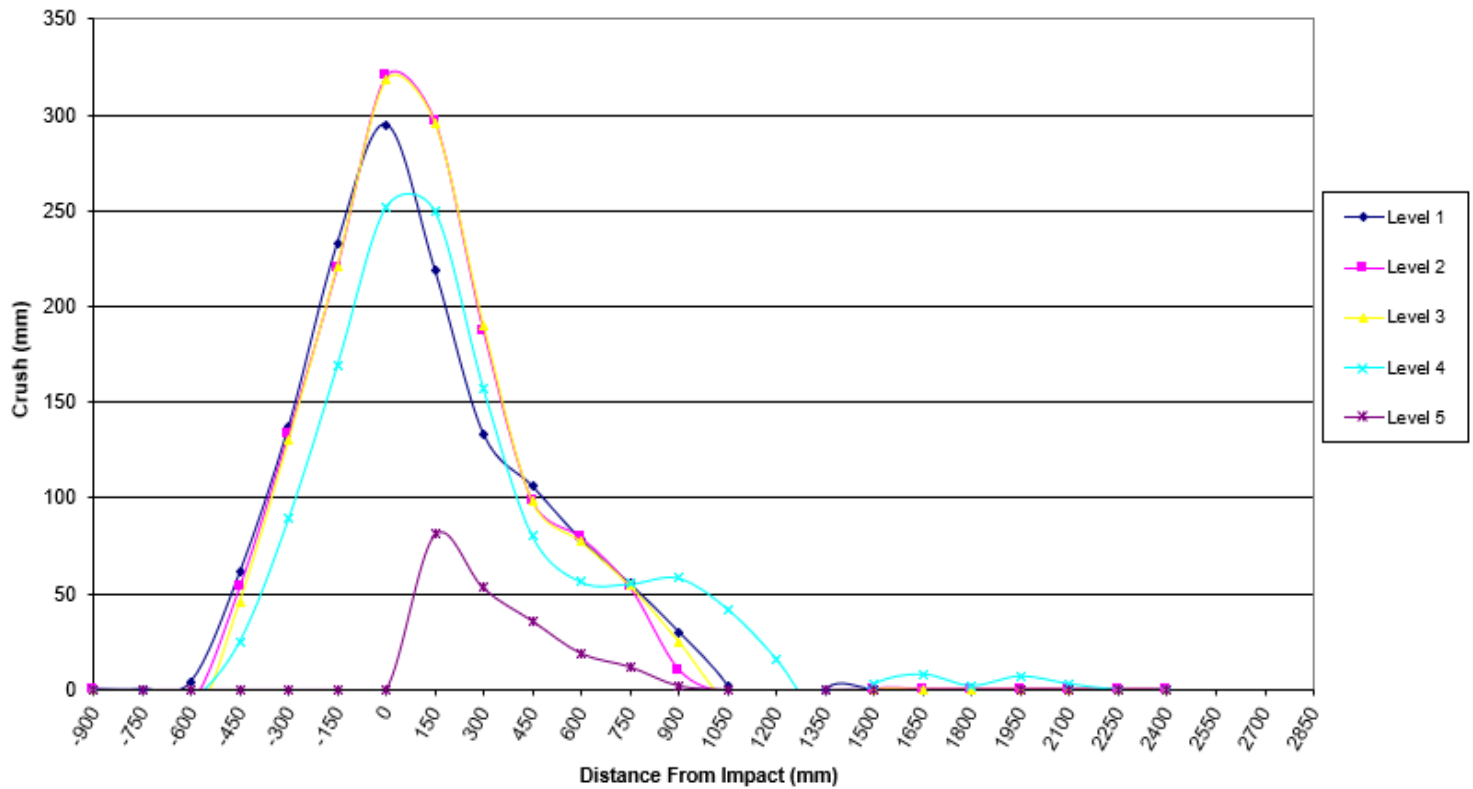
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV

NHTSA No. M20245400

Test Program: NCAP Side Pole Impact Test

Test Date: 06/06/24

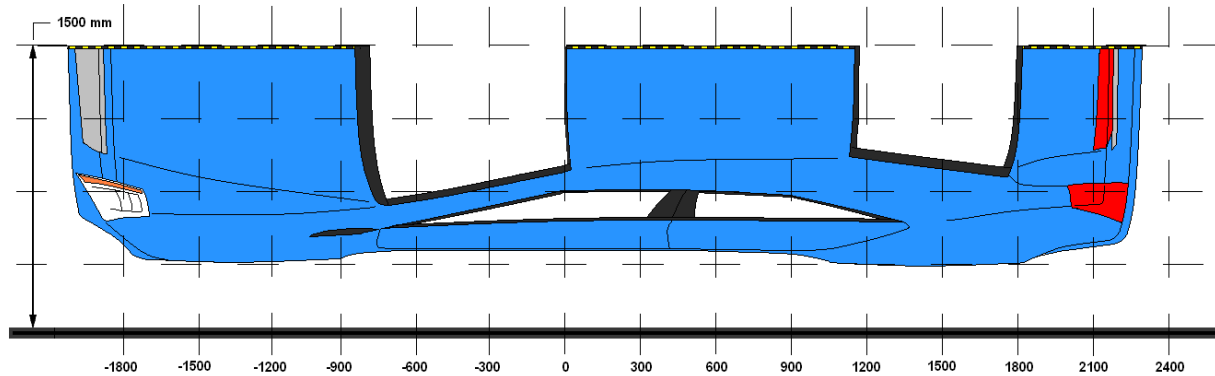


DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400

Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24



DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2100	4	655	658	3
2	1650	4	620	628	8
3	1050	4	657	699	42
4	300	3	607	797	190
5	-300	1	589	726	137
6	-750	2	543	539	-4

DATA SHEET NO. 12

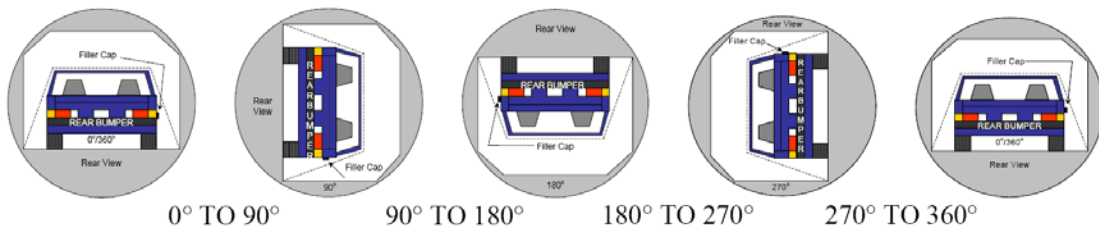
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2024 Mazda CX-50 5-Door SUV NHTSA No. M20245400

Test Program: NCAP Side Pole Impact Test Test Date: 06/06/24

Temperature at Time of Impact: 37.8° C Test Time: 1:30 PM

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: There was no Stoddard solvent spillage.



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	83	300	383
90° To 180°	81	300	381
180° To 270°	85	300	385
270° To 360°	84	300	384

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. 13

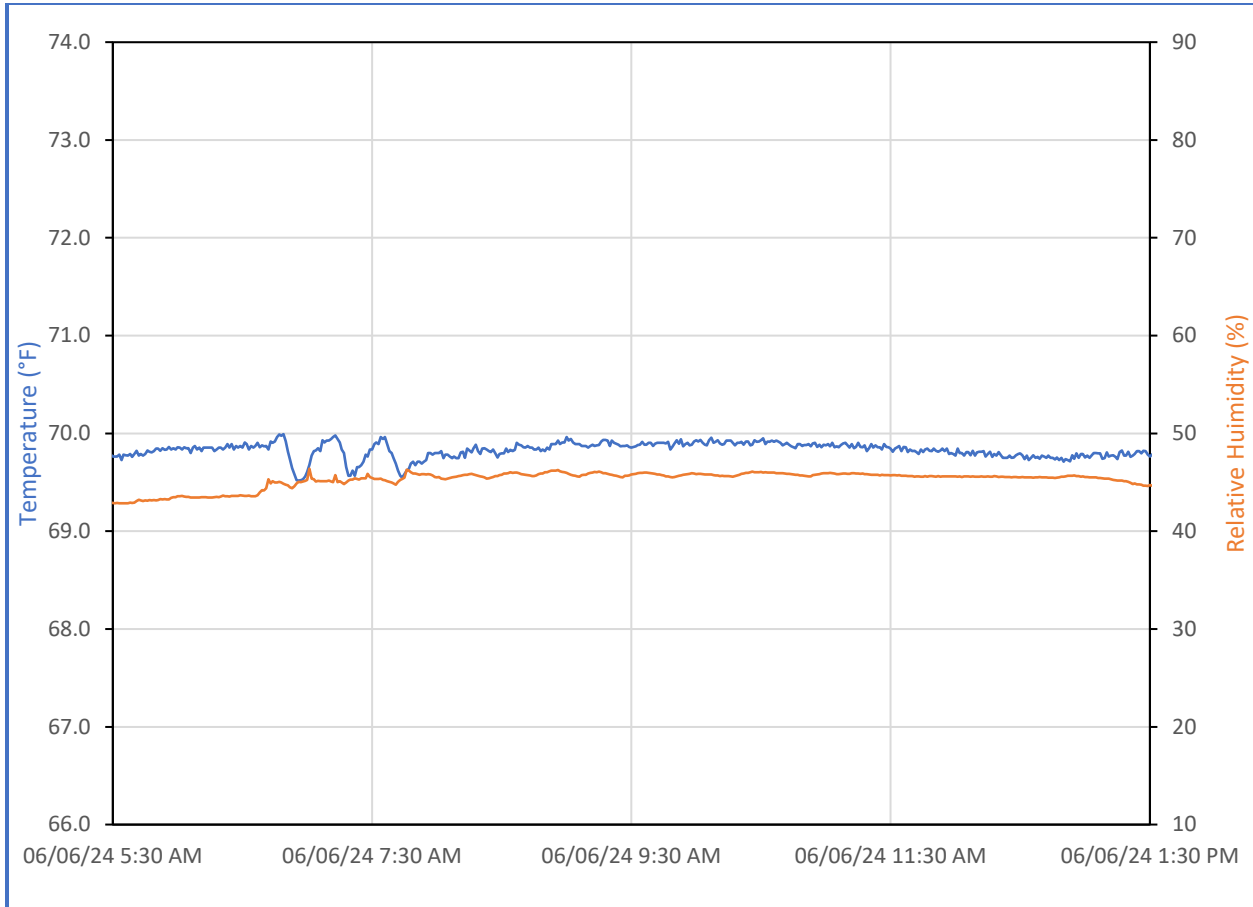
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2024 Mazda CX-50 5-Door SUV

NHTSA No. M20245400

Test Program: NCAP Side Pole Impact Test

Test Date: 06/06/24



APPENDIX A
PHOTOGRAPHS

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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

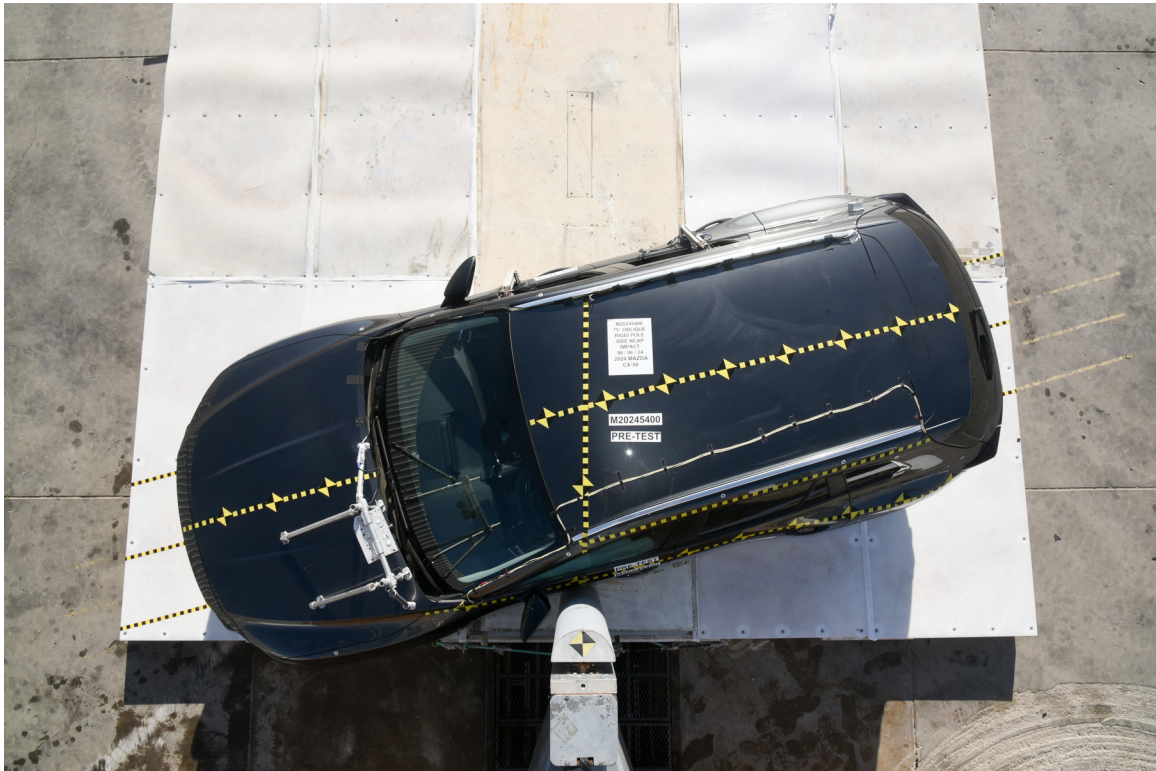


FIGURE 15. Pre-Test Overhead View of Test Area



FIGURE 16. Post-Test Overhead View of Test Area



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



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



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

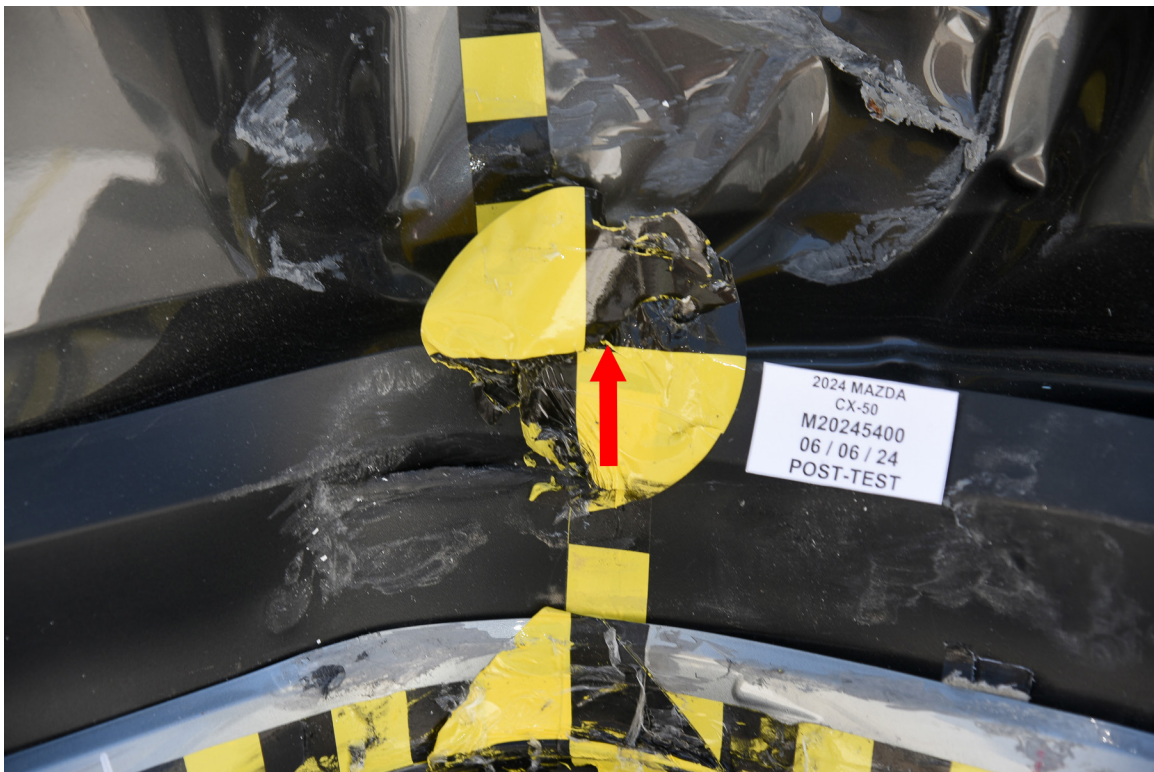


FIGURE 20. Post-Test Close-Up View of Impact Point Target Showing Impact Location



FIGURE 21. Pre-Test Front Close-Up View of Dummy Head and Chest

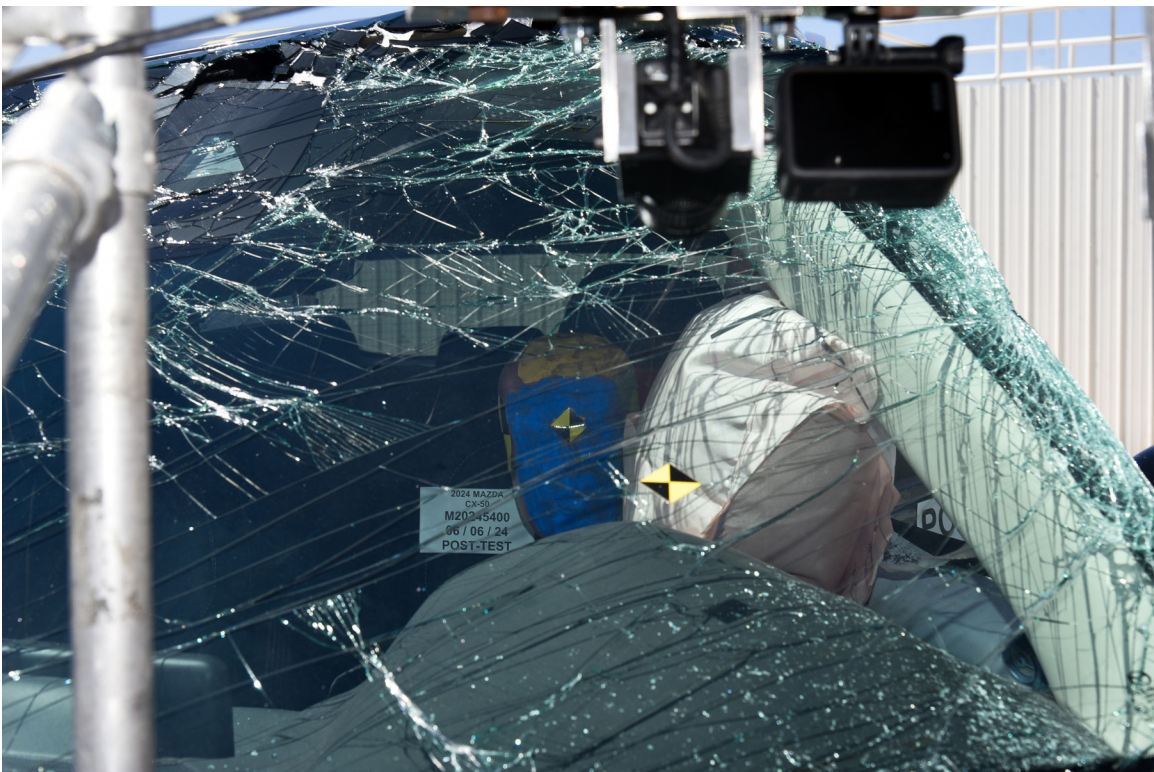


FIGURE 22. Post-Test Front Close-Up View of Dummy



FIGURE 23. Pre-Test Left Side View of Dummy Showing Belt and Chalking



FIGURE 24. Pre-Test Left Side View of Dummy Shoulder and Door Top View



FIGURE 25. Post-Test Left Side View of Dummy Shoulder and Door Top View



FIGURE 26. Pre-Test Frontal View of Seat Back Prior to Dummy Positioning



FIGURE 27. Pre-Test Frontal View of Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 28. Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



FIGURE 29. Pre-Test Overhead View of Dummy Thighs on Seat Pan



FIGURE 30. Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



FIGURE 31. Pre-Test Left Side View of Dummy's Head Showing Head is Level



FIGURE 32. Pre-Test Placement of Dummy's Feet



FIGURE 33. Pre-Test View of Belt Anchorage for Dummy



FIGURE 34. Pre-Test Left Side View of Steering Wheel



FIGURE 35. View of Disengaged Parking Brake



FIGURE 36. Pre-Test View of Parking Brake



FIGURE 37. Pre-Test Close-Up Left Side View of Driver Seat Track



FIGURE 38. Pre-Test Close-Up Left Side View of Driver Seat Back



FIGURE 39. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 40. Pre-Test Dummy and Door Clearance View



FIGURE 41. Post-Test Dummy and Door Clearance View



FIGURE 42. Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



FIGURE 43. Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



FIGURE 44. Pre-Test Inner Door Panel View



FIGURE 45. Post-Test Inner Door Panel View Showing Dummy Contact Locations



FIGURE 46. Post-Test Dummy Close-Up Head Contact With Vehicle Interior View



FIGURE 47. Post-Test Dummy Close-Up Head Contact With Side Airbag View



FIGURE 48. Post-Test Dummy Close-Up Torso Contact With Vehicle Interior View



FIGURE 49. Post-Test Dummy Close-Up Torso Contact With Side Airbag View



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



FIGURE 51. Post-Test Dummy Close-Up Pelvis Contact With Side Airbag View



FIGURE 52. Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



FIGURE 53. Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment



FIGURE 54. Post-Test Inner Rear Passenger Torso Air Bag Deployment View



FIGURE 55. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 56. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 57. Close-Up View of Vehicle's Certification Label



FIGURE 58. Close-Up View of Vehicle's Tire Information Placard or Label



FIGURE 59. Pre-Test Pole Barrier Front View



FIGURE 60. Post-Test Pole Barrier Front View



FIGURE 61. Pre-Test Pole Barrier Side View



FIGURE 62. Post-Test Pole Barrier Side View



FIGURE 63. Pre-Test Ballast View



FIGURE 64. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 65. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 66. FMVSS No. 301 Static Rollover 90 Degrees

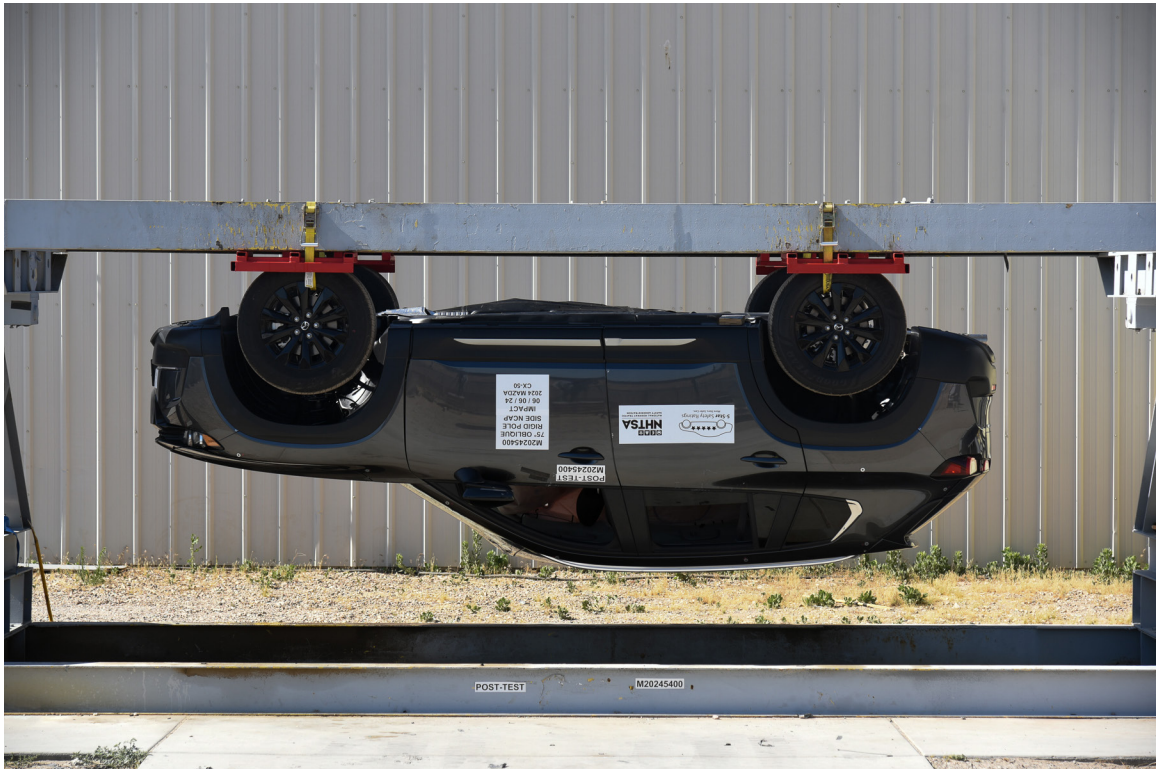


FIGURE 67. FMVSS No. 301 Static Rollover 180 Degrees

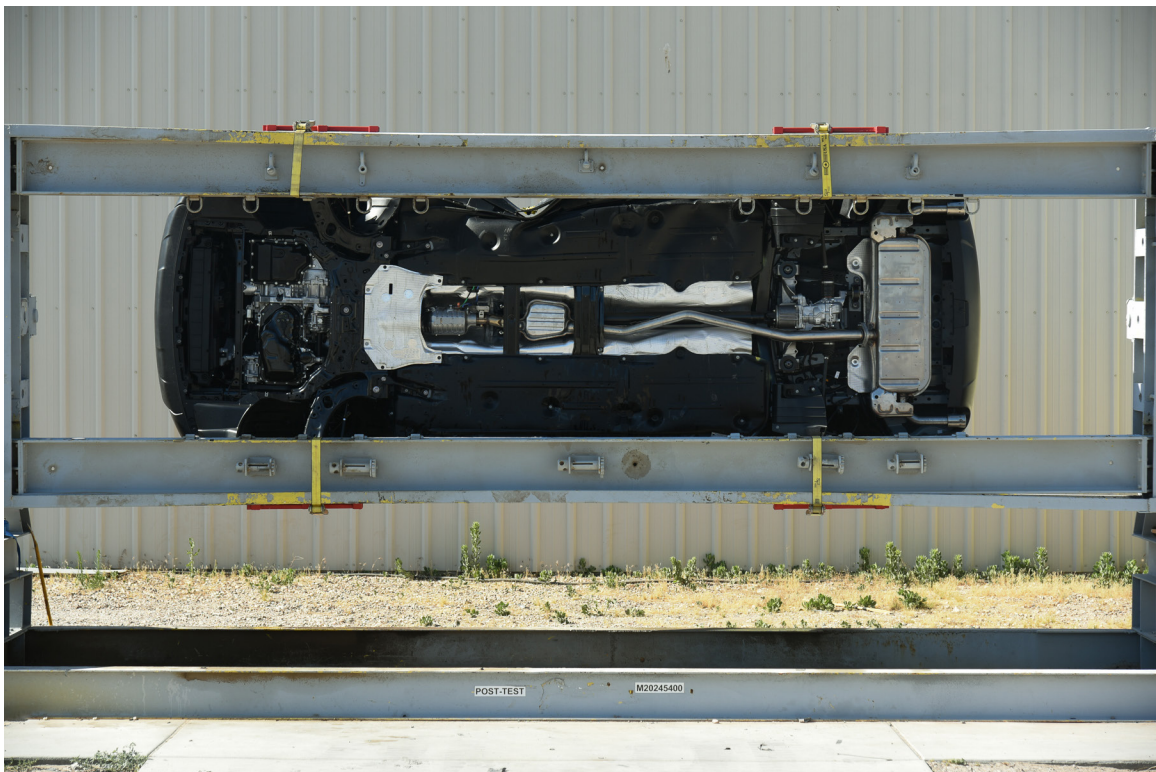


FIGURE 68. FMVSS No. 301 Static Rollover 270 Degrees



FIGURE 69. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 70. Impact Event

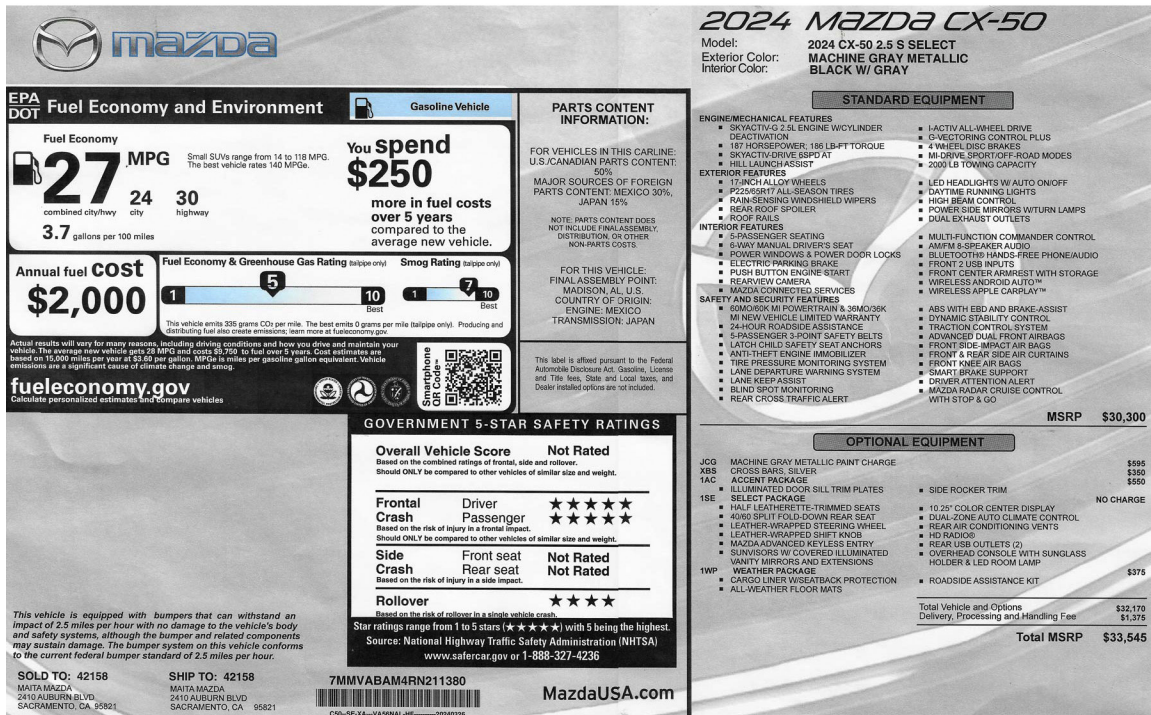


FIGURE 71. Monroney Label

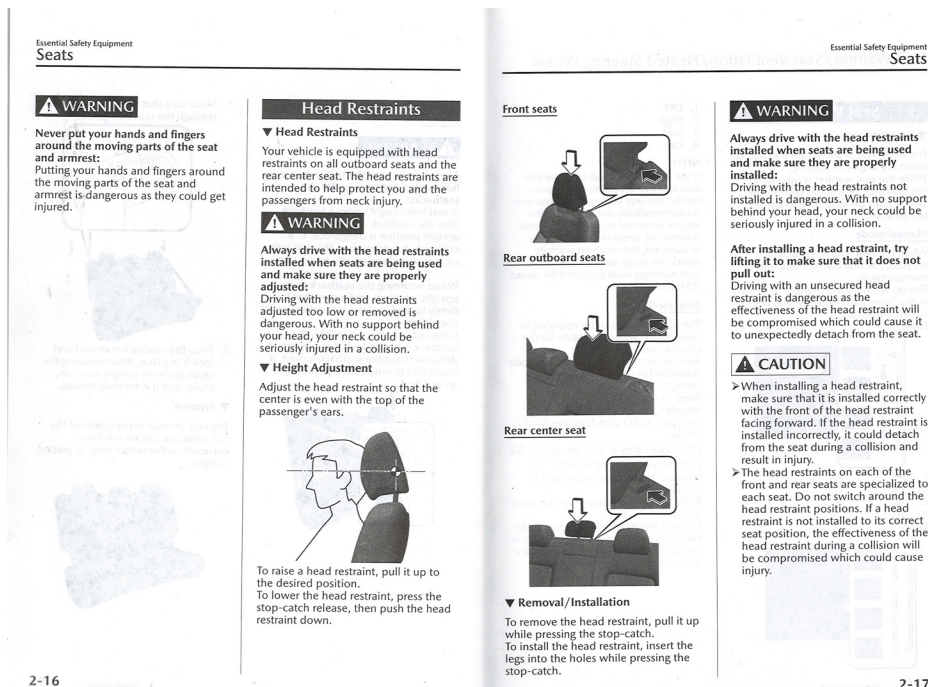


FIGURE 72. Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



FIGURE 73. Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary	B-1
2	Driver Head Acceleration (Y) Primary	B-1
3	Driver Head Acceleration (Z) Primary	B-1
4	Driver Head Acceleration Primary Resultant	B-1
5	Driver Lower Spine T12 Acceleration (X)	B-2
6	Driver Lower Spine T12 Acceleration (Y)	B-2
7	Driver Lower Spine T12 Acceleration (Z)	B-2
8	Driver Lower Spine T12 Acceleration Resultant	B-2
9	Driver Acetabulum Force on Impact Side (Y)	B-3
10	Driver Iliac Wing Force on Impact Side (Y)	B-3
11	Driver Total Pelvis Force on Impact Side (Y)	B-3

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

www.NHTSA.gov

Additional Driver Dummy Instrumentation Data

Driver Head Acceleration Redundant (X)

Driver Head Acceleration Redundant (Y)

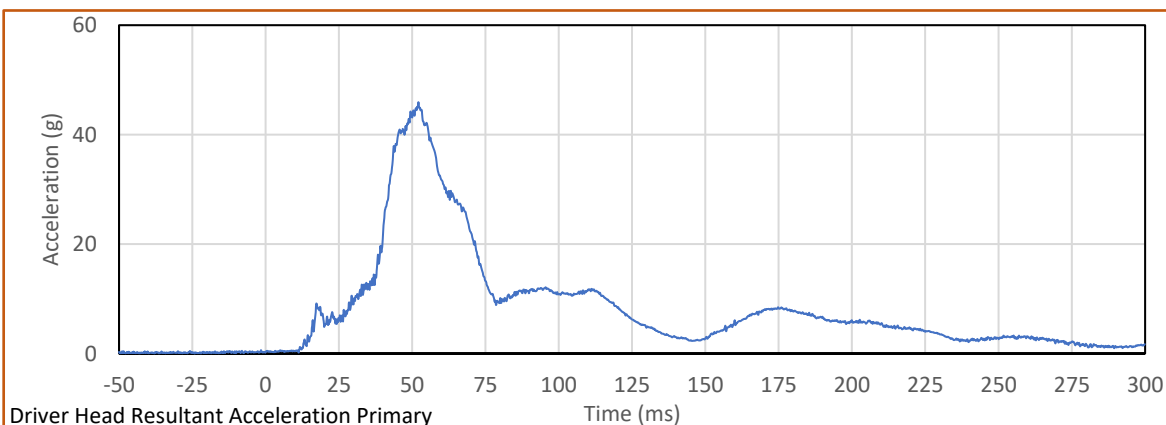
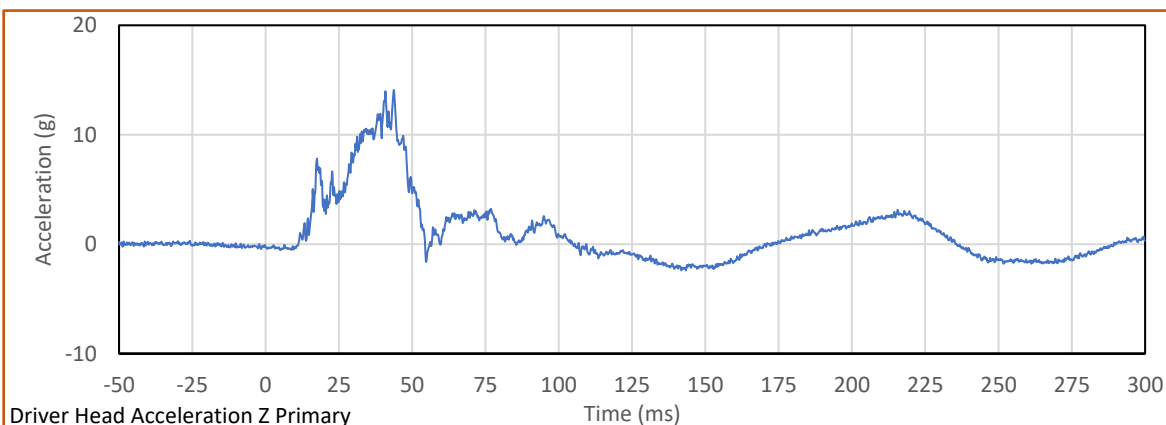
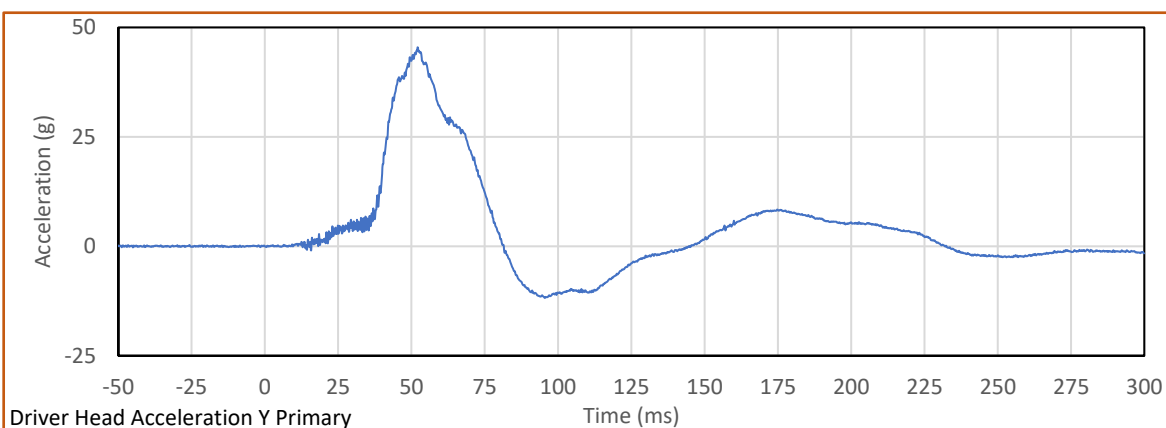
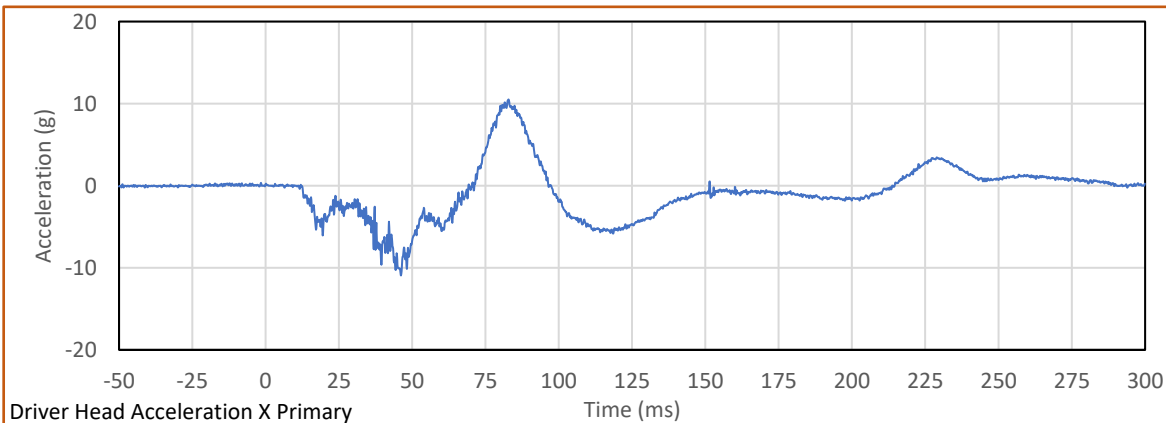
Driver Head Acceleration Redundant (Z)

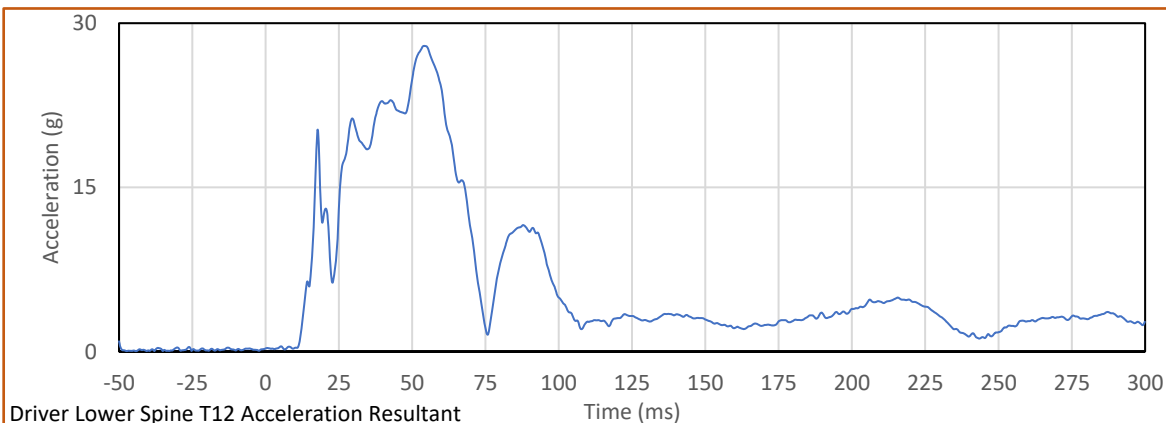
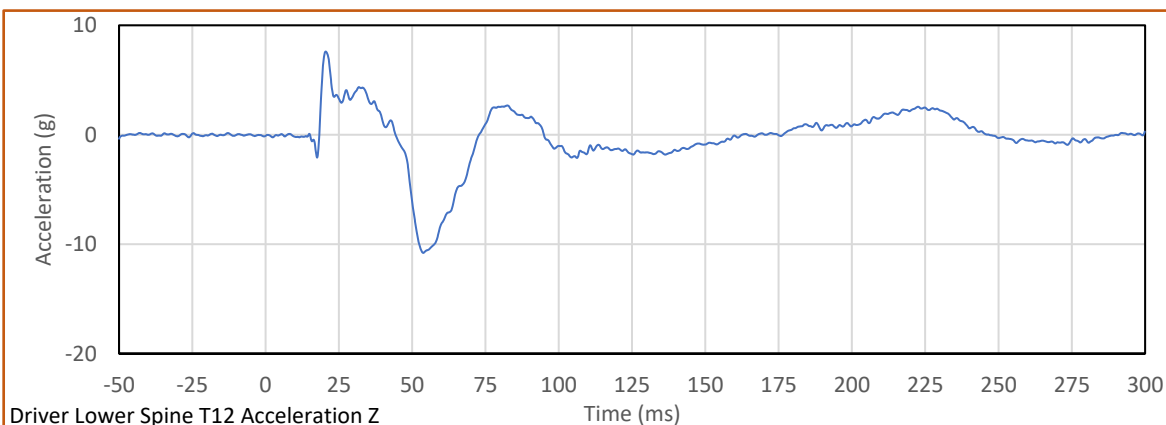
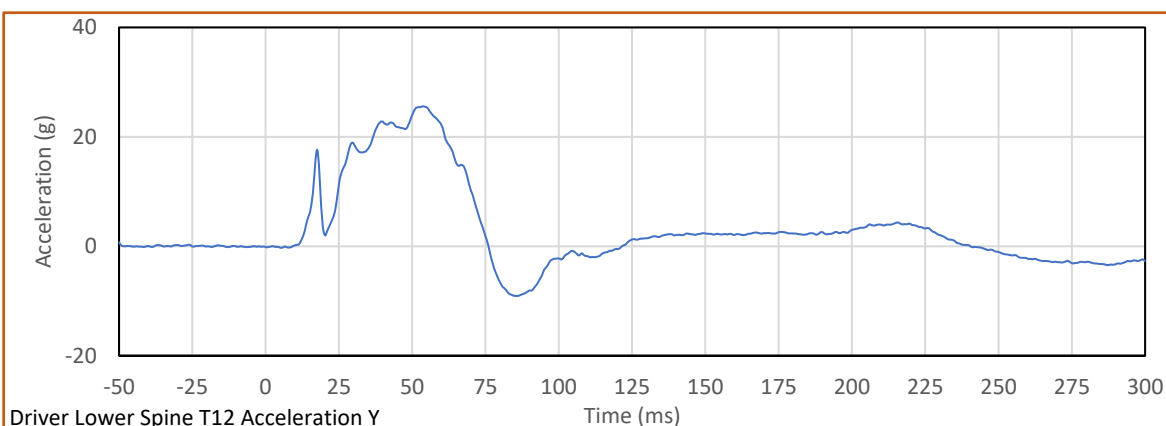
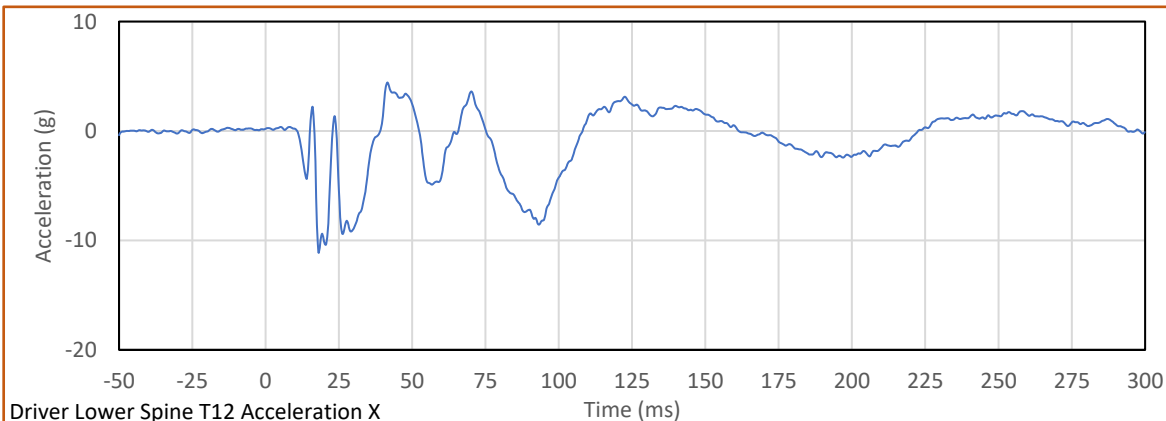
Vehicle Instrumentation Data

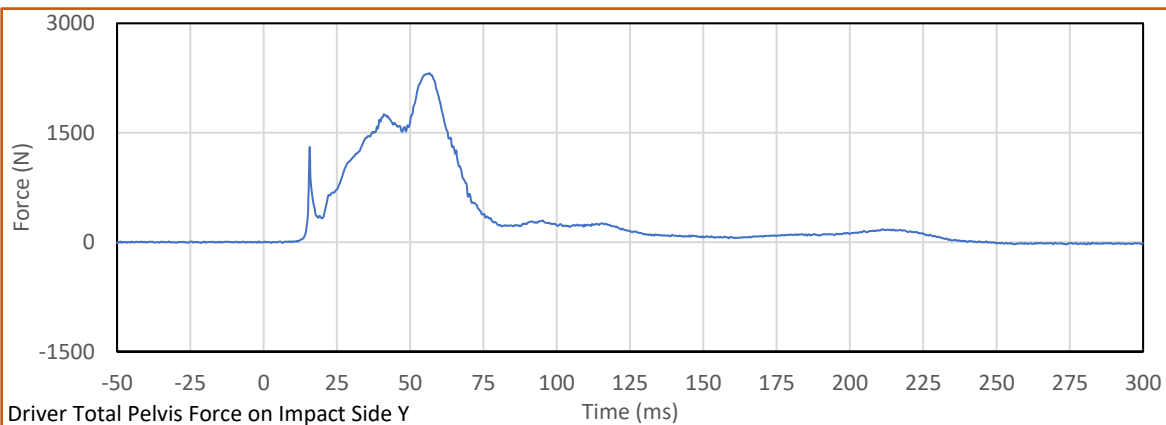
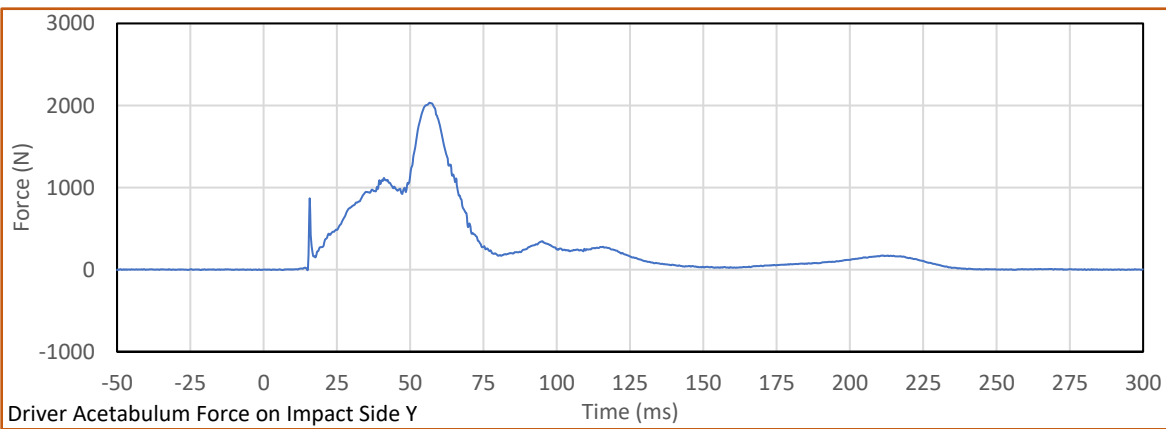
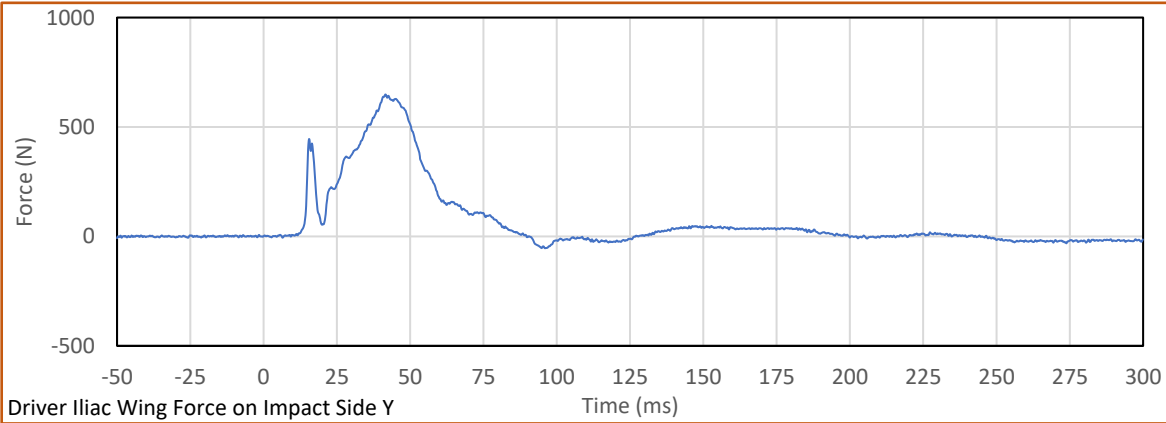
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration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

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)







APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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: 2024-06-03

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	41	Pass
A - Sitting Height	mm	772	788	780	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	84	Pass
D - H Point From Seatback	mm	141	151	146	Pass
E - Shoulder Pivot From Backline	mm	97	107	103	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	180	Pass
J - Head Circumference	mm	541	551	544	Pass
K - Buttock To Knee Length	mm	514	540	528	Pass
L - Popliteal Height	mm	343	369	357	Pass
K - Knee Pivot To Floor Height	mm	392	409	404	Pass
N - Buttock Popliteal Length	mm	416	442	426	Pass
O - Chest Depth W/O Jacket	mm	195	211	201	Pass
P - Foot Length	mm	216	232	222	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	316	Pass
R - Arm Length	mm	249	259	256	Pass
S - Knee Joint To Seatback	mm	477	493	485	Pass
V - Shoulder Width	mm	341	357	348	Pass
W - Foot Width	mm	78	94	89	Pass
Y - Chest Circumference W/Jacket	mm	851	881	861	Pass
Z - Waist Circumference	mm	761	791	770	Pass
				Overall Test Results	Pass

Technician:



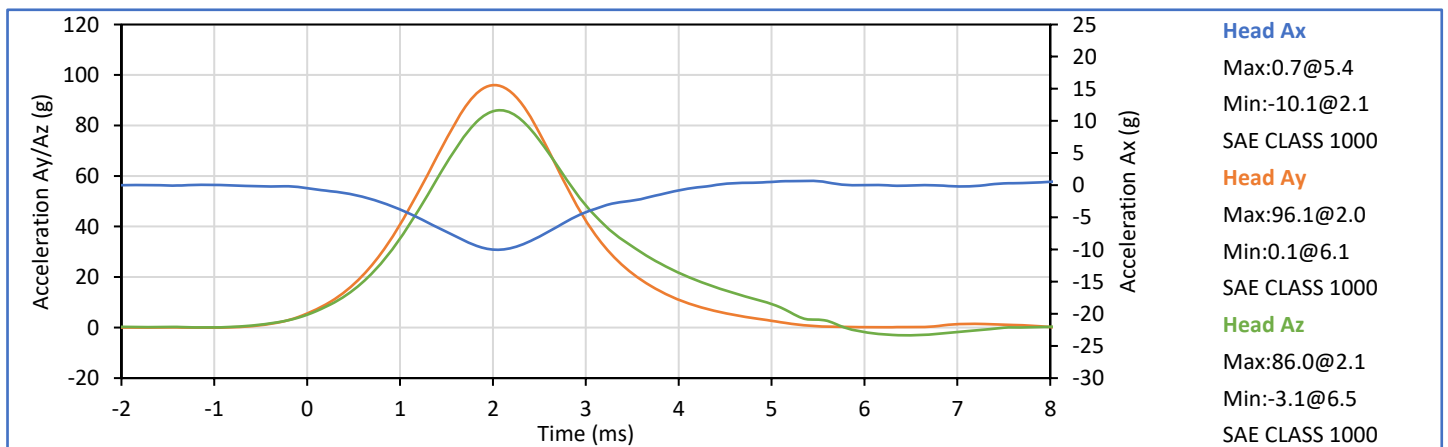
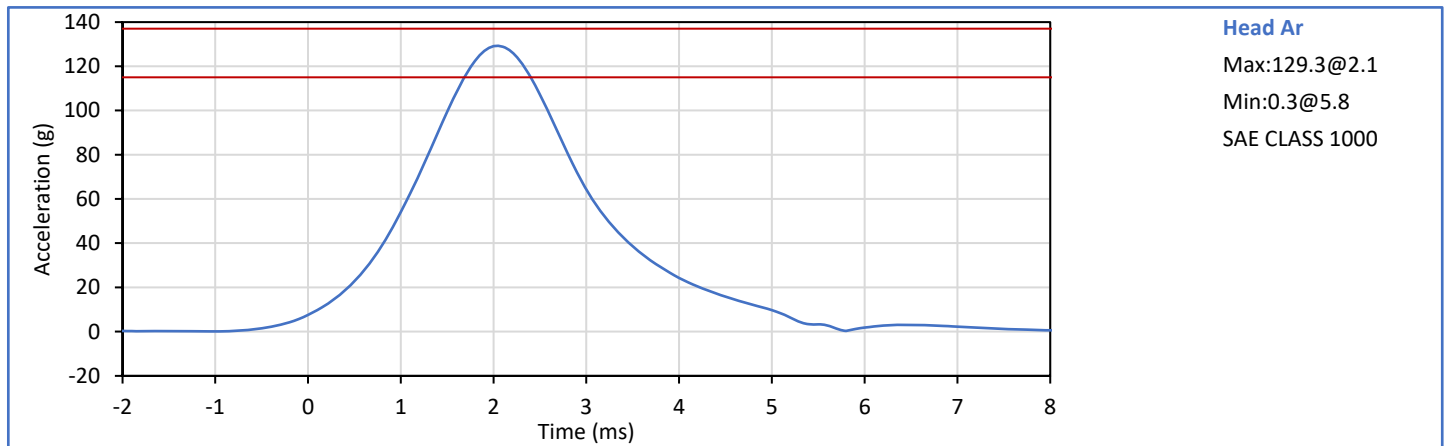
G. Fuentes

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	41	Pass
Peak Resultant Acceleration	g	115.0	137.0	129.3	Pass
Peak Head Ax	g	-15.0	15.0	-10.1	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:

G. Fuentes

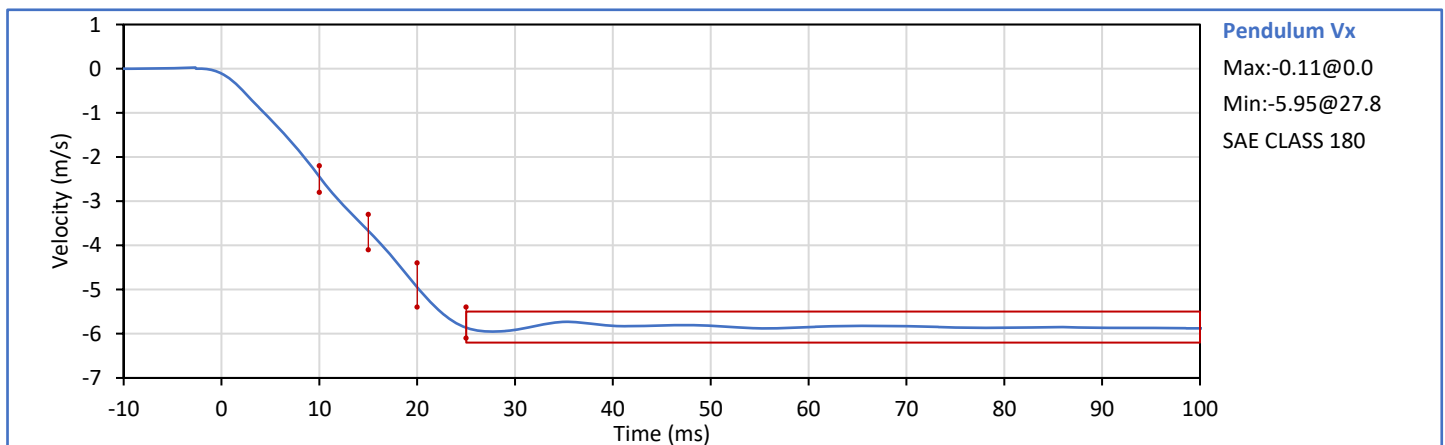
G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	41	Pass
Pendulum Velocity	m/s	5.51	5.63	5.58	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.45	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.67	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-4.95	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.86	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-5.95/-5.73	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-73.8	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	61.5	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	40.0	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	112.3	Pass
				Overall Test Results	Pass



Technician:

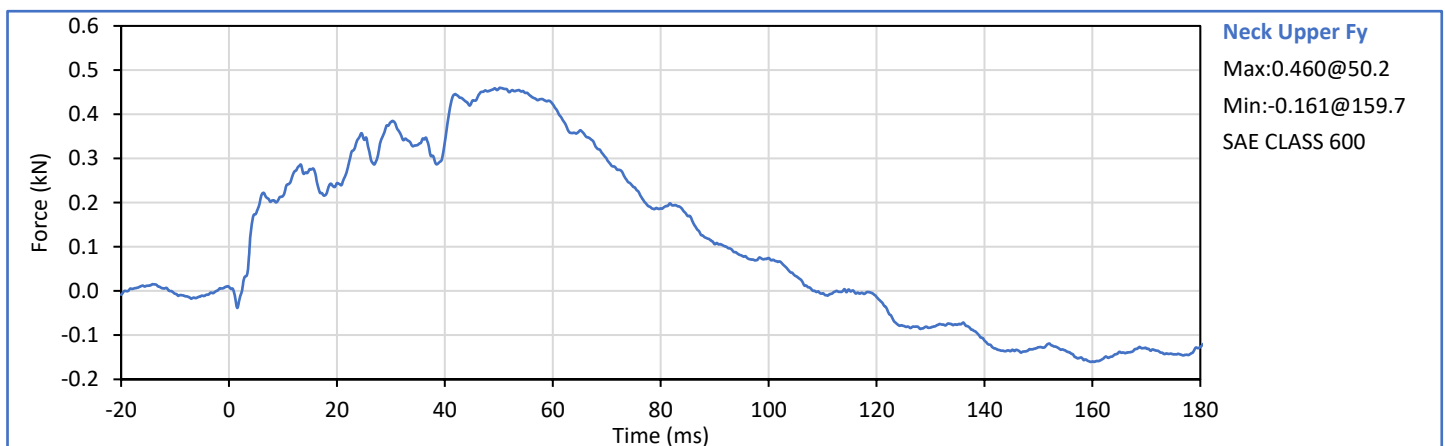
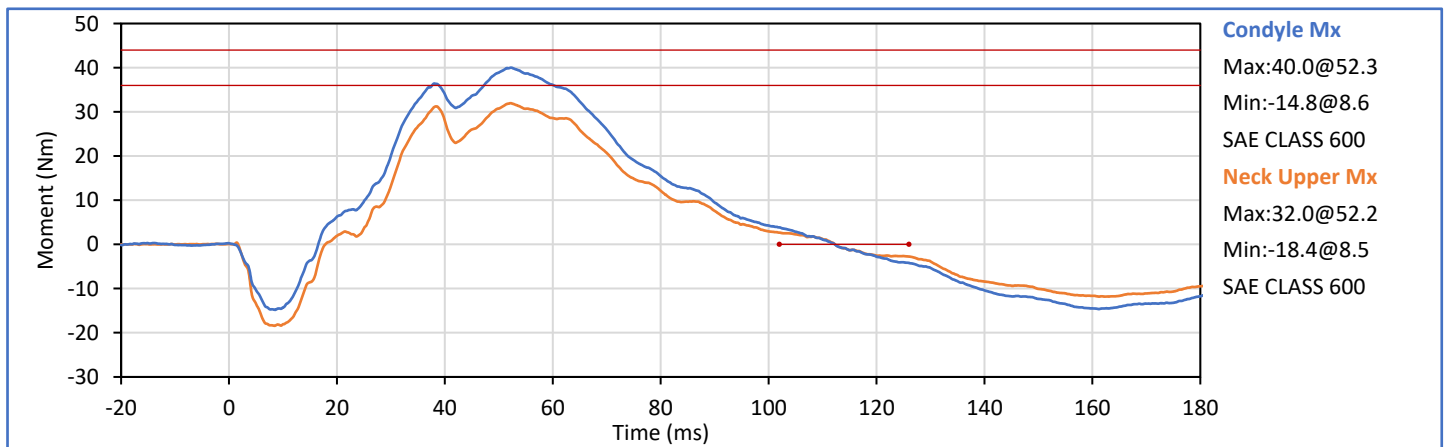
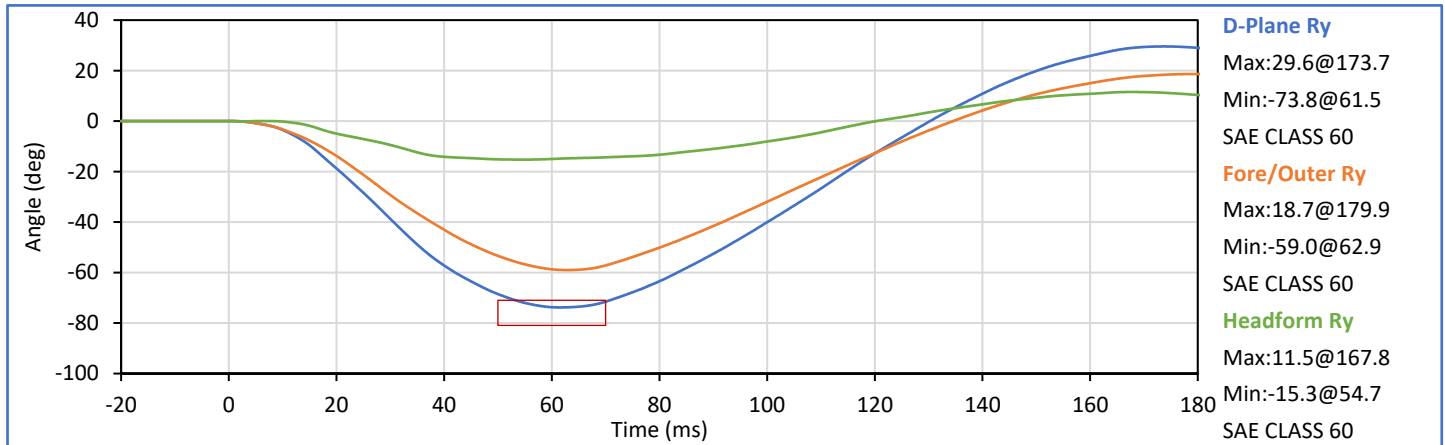
G. Fuentes

G. Fuentes

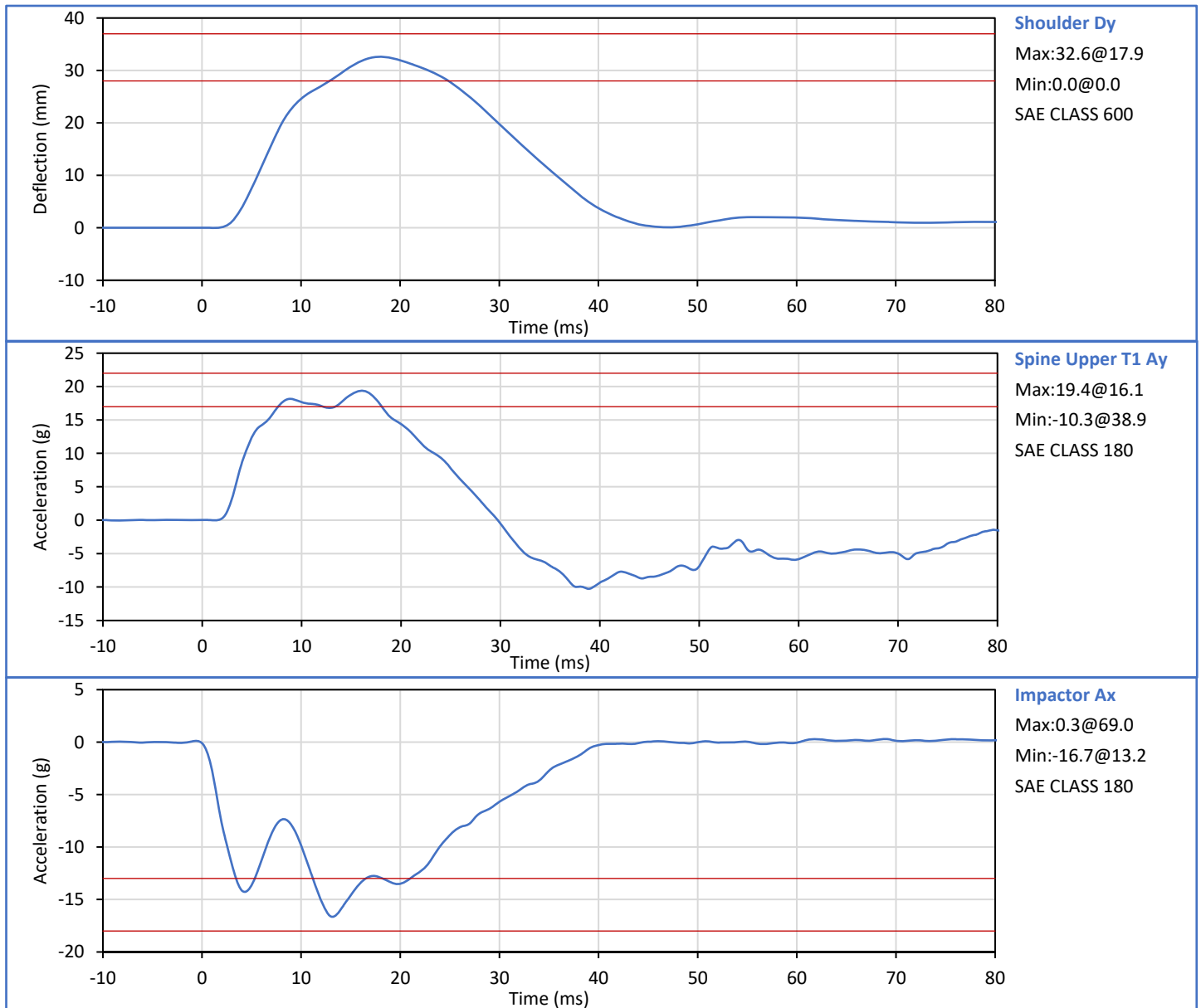
Approved By:

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	41	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.6	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.4	Pass
Peak Impactor Ax	g	-18.0	-13.0	-16.7	Pass
Overall Test Results					Pass



Technician:

G. Fuentes

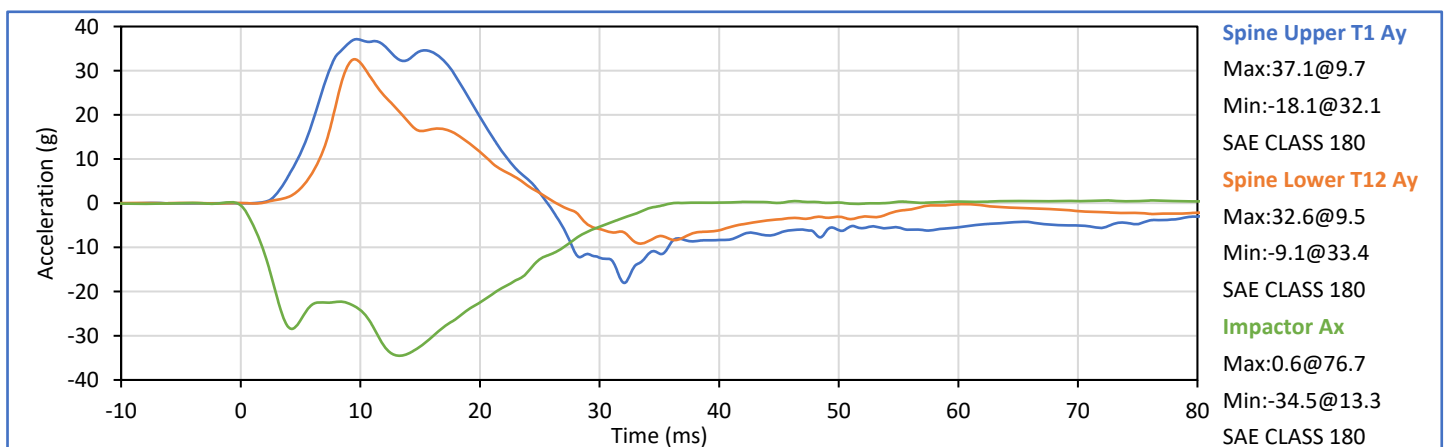
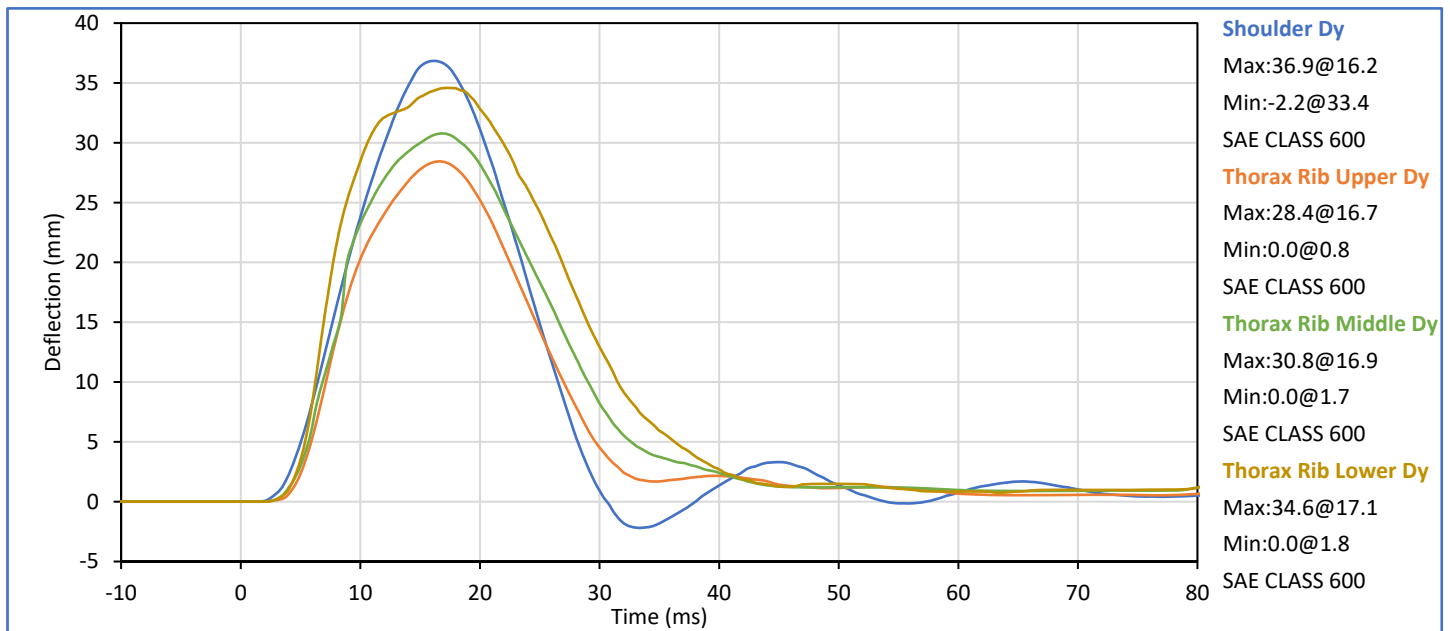
G. Fuentes

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	42	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Shoulder Dy	mm	31.0	40.0	36.9	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.4	Pass
Peak Middle Rib Dy	mm	30.0	36.0	30.8	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.6	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	37.1	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.6	Pass
Peak Impactor Ax	g	-36.0	-30.0	-34.5	Pass
Overall Test Results				Pass	Pass



Technician:

G. Fuentes

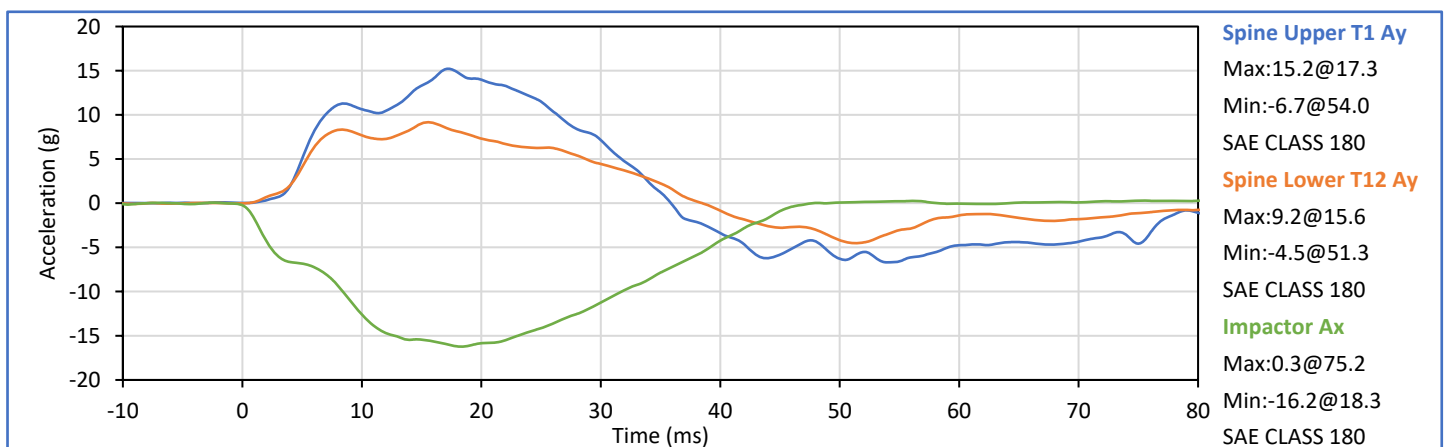
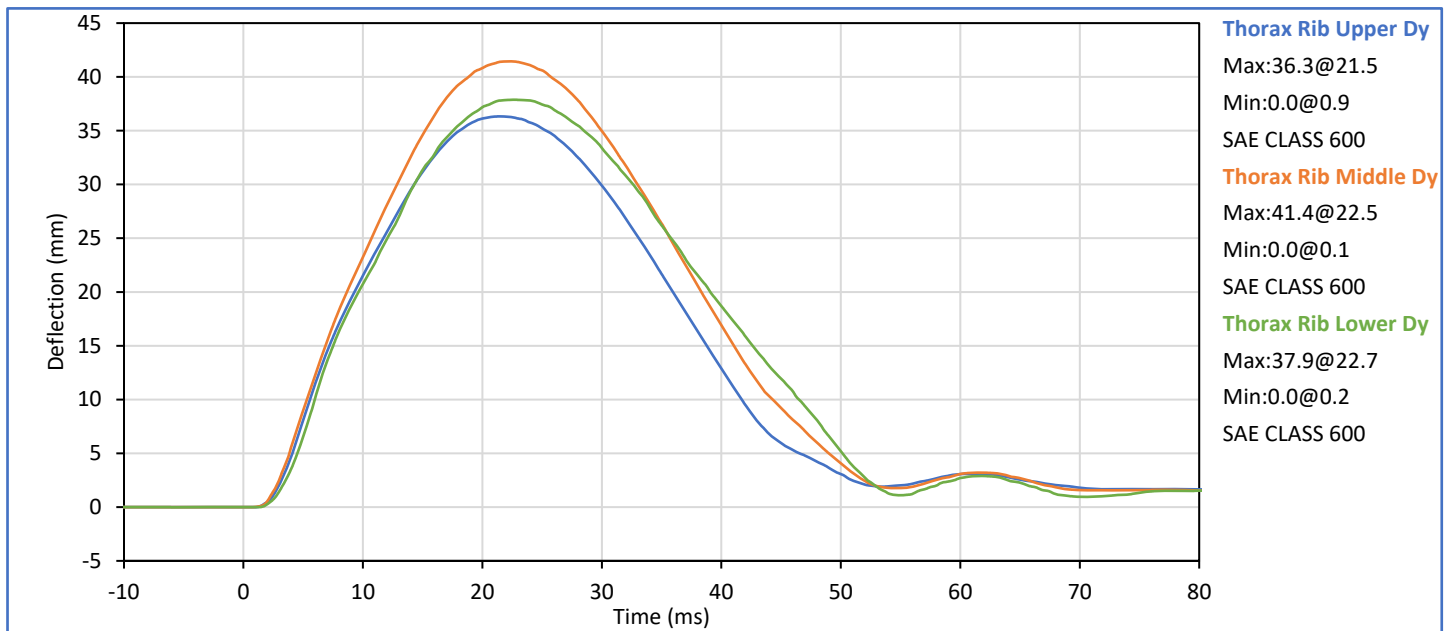
G. Fuentes

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	45	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	36.3	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	41.4	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	37.9	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	15.2	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	9.2	Pass
Peak Impactor Ax	g	-18.0	-14.0	-16.2	Pass
Overall Test Results					Pass



Technician:

G. Fuentes

G. Fuentes

Approved By:

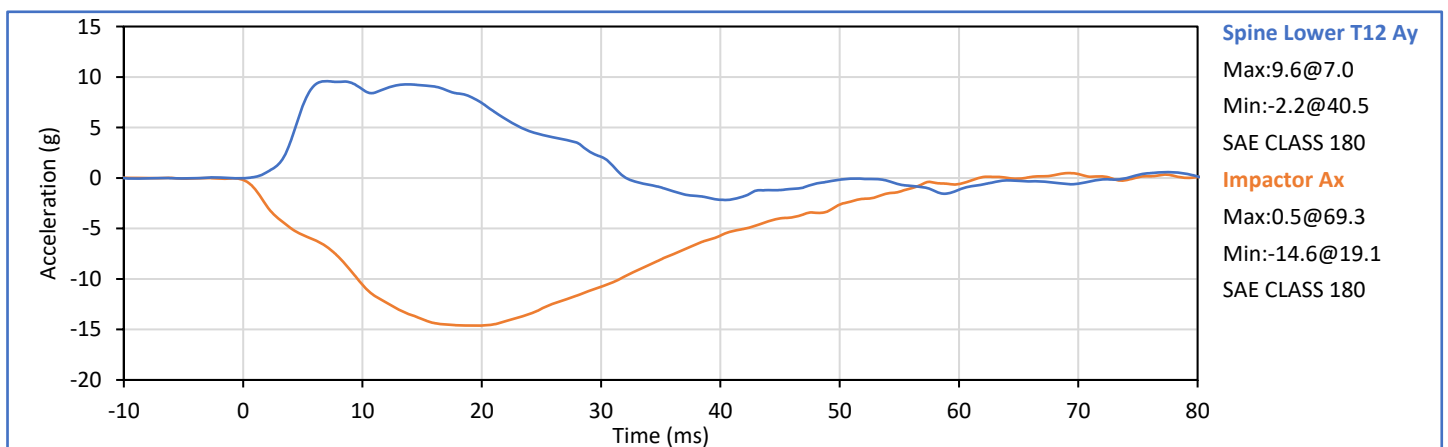
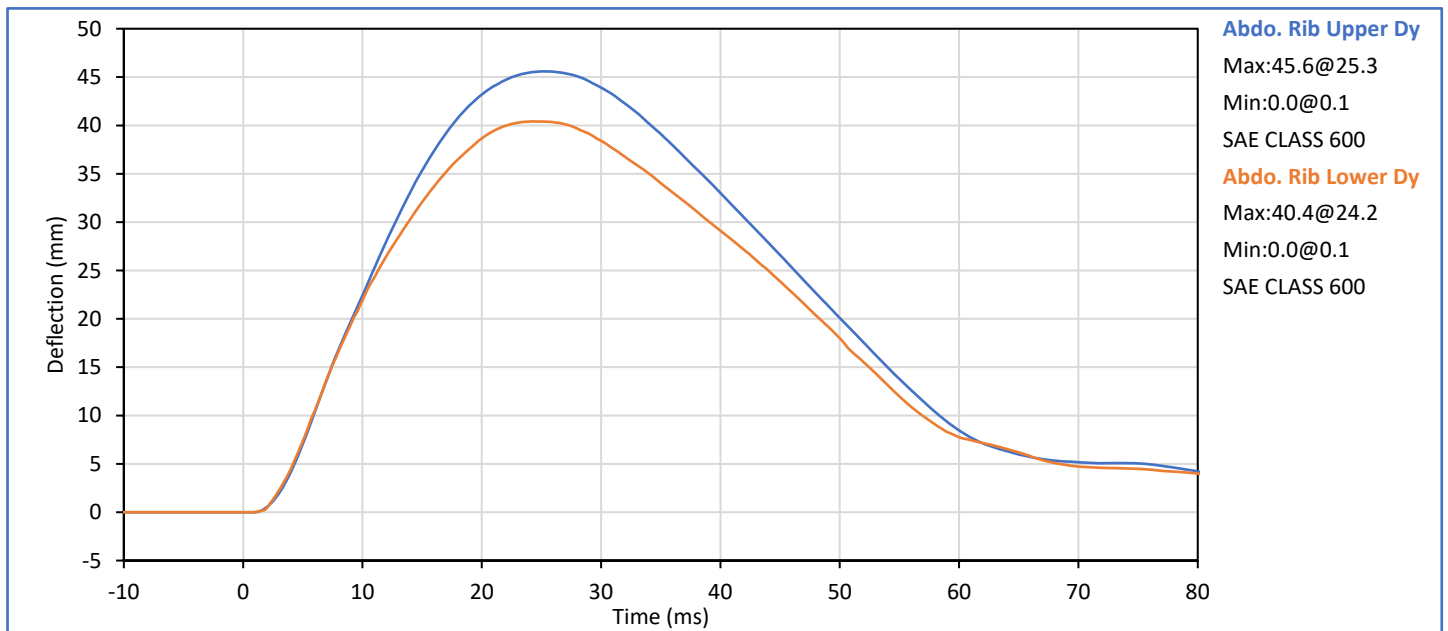
J. Hernandez

J. Hernandez

ATD Serial No.: 308

Test Date: 2024-06-05

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	41	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	45.6	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	40.4	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	9.6	Pass
Peak Impactor Ax	g	-16.0	-12.0	-14.6	Pass
Overall Test Results					Pass



Technician: Mill LLS III
G. Fuentes

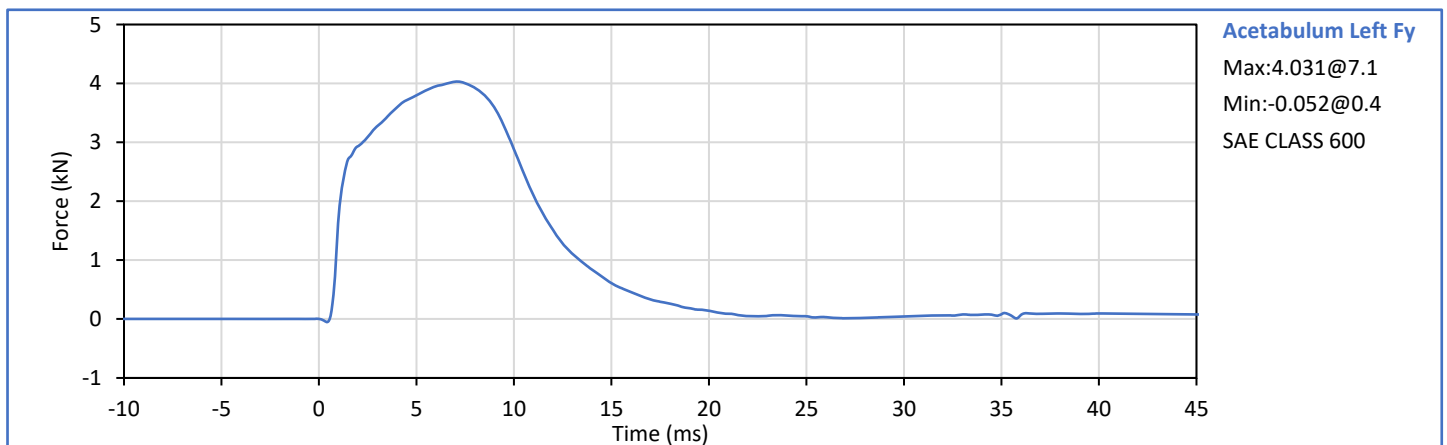
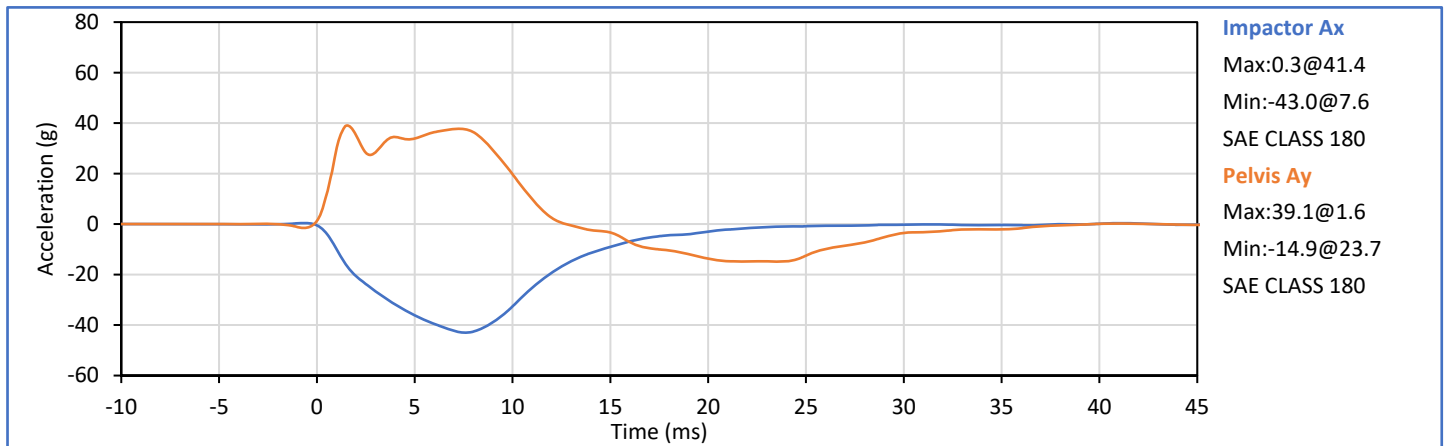
Approved By: J. Hernandez
J. Hernandez

ATD Serial No.: 308

Test Date: 2024-06-05

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	41	Pass
Impactor Velocity	m/s	6.60	6.80	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.03	Pass
Pelvis Ay after 6ms	g	34.0	42.0	37.7	Pass
Peak Impactor Ax	g	-47.0	-38.0	-43.0	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 14653



Technician:

G. Fuentes

G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

ATD Serial No.: 308

SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

Test Date: 2024-06-05

Pelvis Plug S/N: 14653



SID-IIs Pelvis Plug Certification Test

Plug S/N 14653

Test Number 16615

Report Number 16661

Test Date 12/22/2020 8:47:23 AM

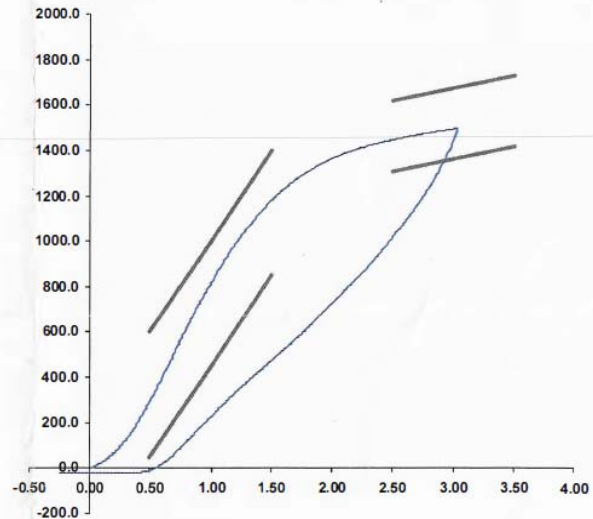
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Force @ 0.5 mm (N)	296.59	50.00	600.00
Force @ 1.5 mm (N)	1,181.59	850.00	1,400.00
Force @ 2.5 mm (N)	1,445.99	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,495.29	1,361.00	1,673.00

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 22-Dec-20
SACO Research

By: DC Date: 12/22/20

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

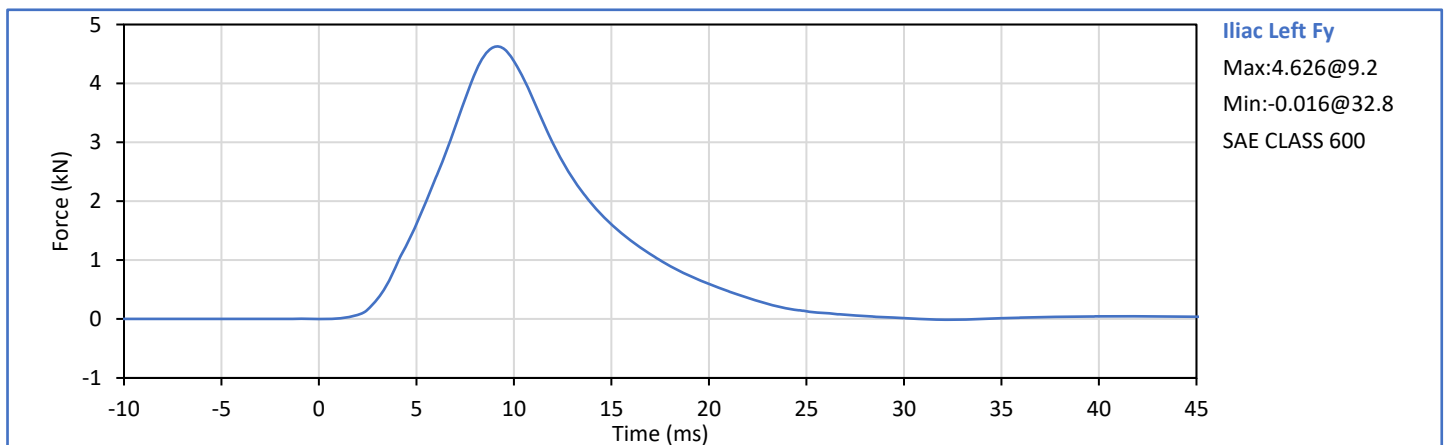
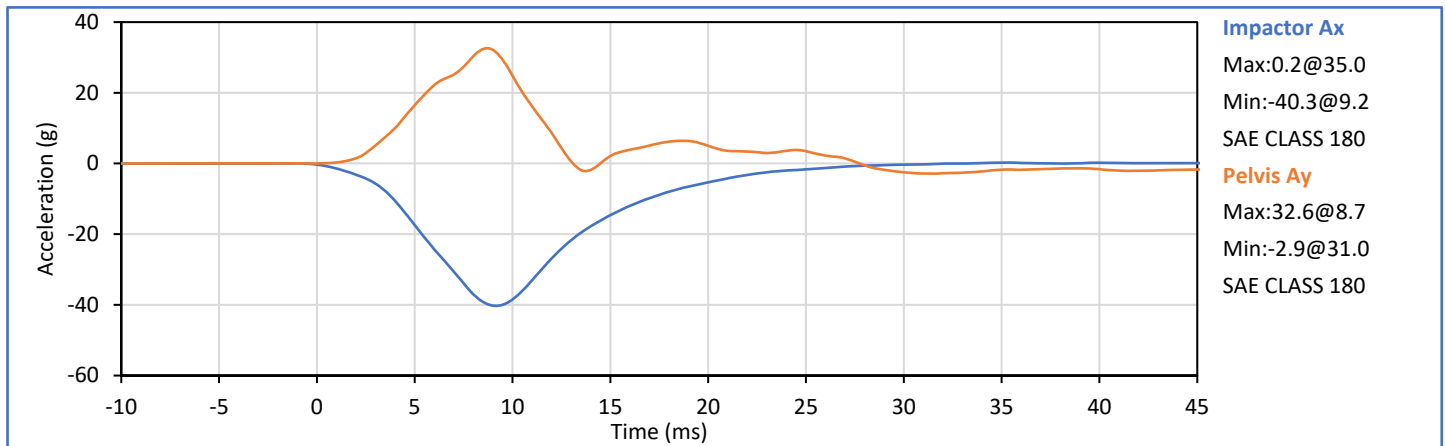
ATD Serial No.: 308

Test Date: 2024-06-05

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
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.63	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-40.3	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12228 *

* Plug is not impacted and remains certified



Technician:

G. Fuentes

G. Fuentes

Approved By:

J. Hernandez

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: 2024-06-11

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
A - Sitting Height	mm	772	788	784	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	146	Pass
E - Shoulder Pivot From Backline	mm	97	107	105	Pass
F - Thigh Clearance	mm	119	135	128	Pass
G - Head Breadth	mm	140	148	144	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	182	Pass
J - Head Circumference	mm	541	551	548	Pass
K - Buttock To Knee Length	mm	514	540	524	Pass
L - Popliteal Height	mm	343	369	360	Pass
K - Knee Pivot To Floor Height	mm	392	409	400	Pass
N - Buttock Popliteal Length	mm	416	442	426	Pass
O - Chest Depth W/O Jacket	mm	195	211	204	Pass
P - Foot Length	mm	216	232	223	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	319	Pass
R - Arm Length	mm	249	259	257	Pass
S - Knee Joint To Seatback	mm	477	493	488	Pass
V - Shoulder Width	mm	341	357	349	Pass
W - Foot Width	mm	78	94	87	Pass
Y - Chest Circumference W/Jacket	mm	851	881	866	Pass
Z - Waist Circumference	mm	761	791	775	Pass
				Overall Test Results	Pass

Technician:



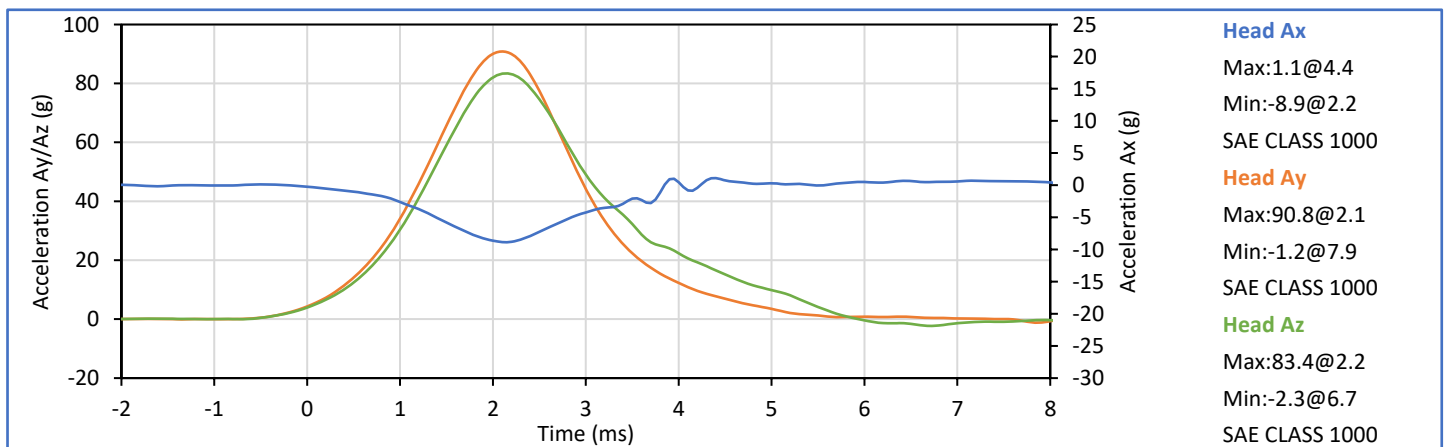
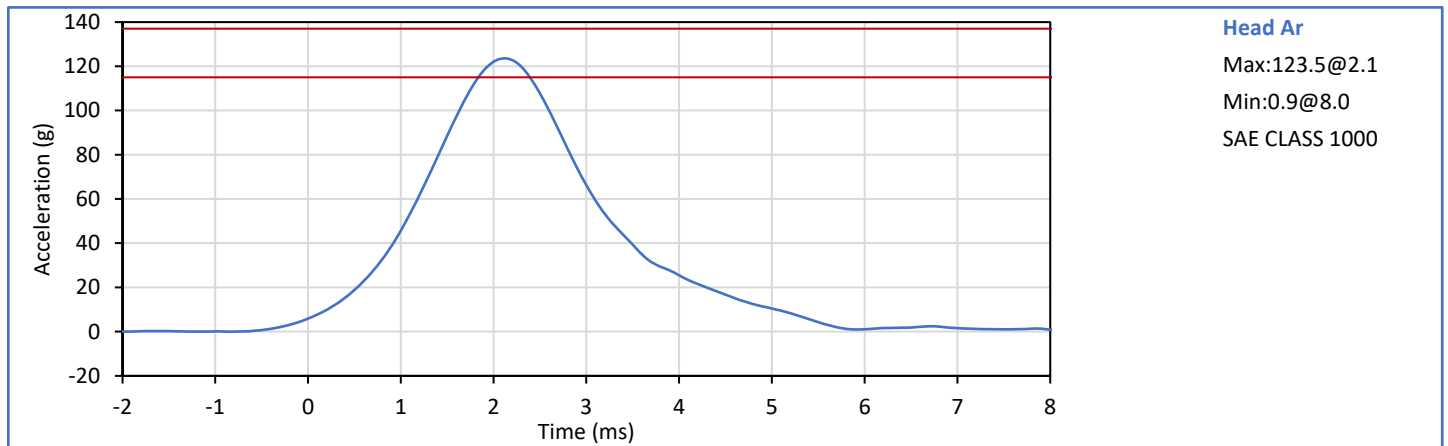
G. Fuentes

Approved By:



J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.6	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
Peak Resultant Acceleration	g	115.0	137.0	123.5	Pass
Peak Head Ax	g	-15.0	15.0	-8.9	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician:

G. Fuentes

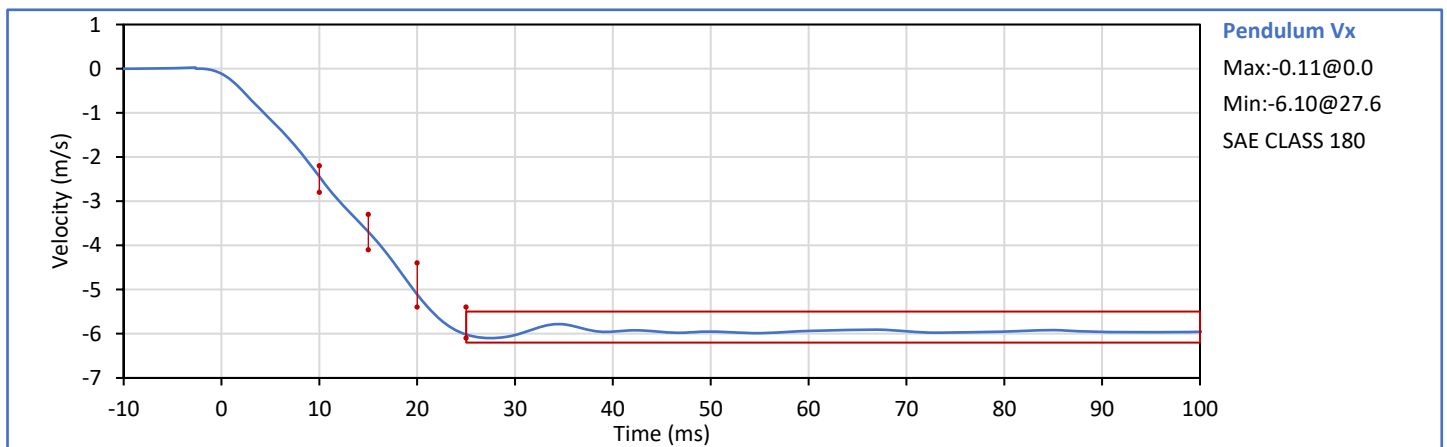
G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	41	Pass
Pendulum Velocity	m/s	5.51	5.63	5.58	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.44	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.69	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-5.11	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-6.02	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-6.1/-5.78	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-74.5	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	59.5	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	41.5	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	115.6	Pass
				Overall Test Results	Pass



Technician:

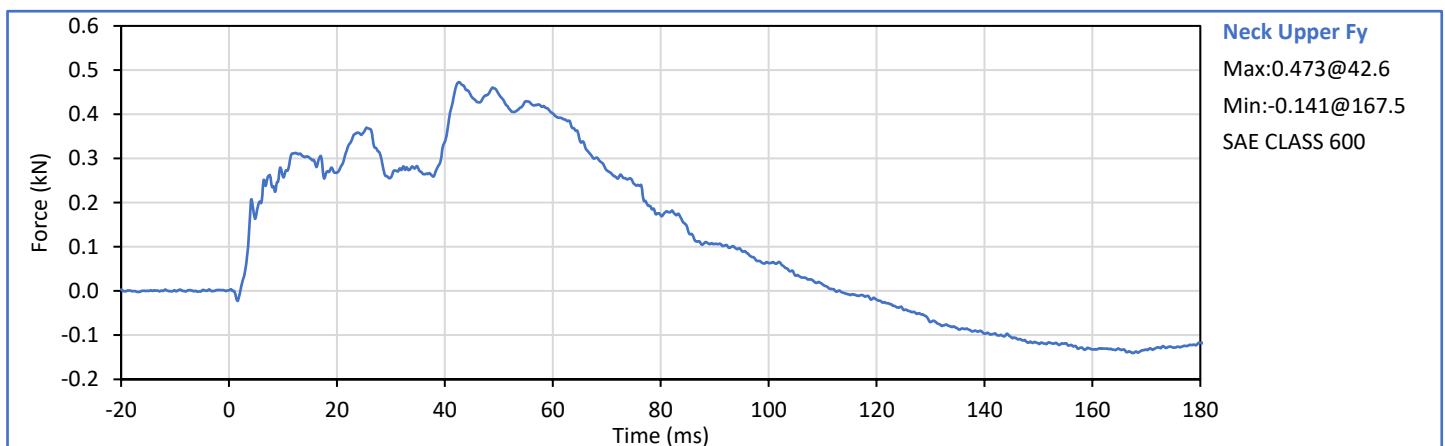
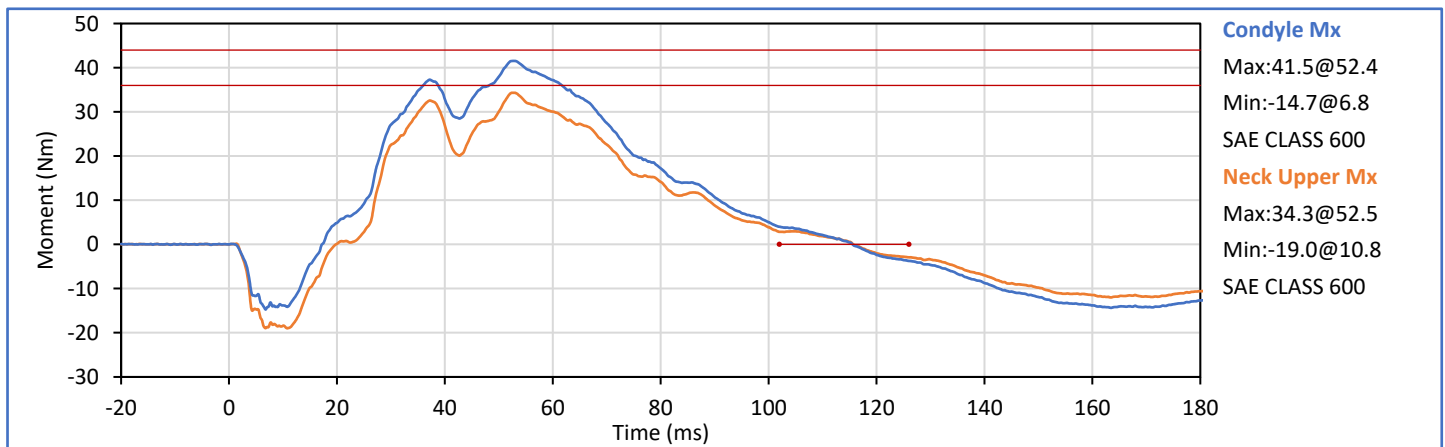
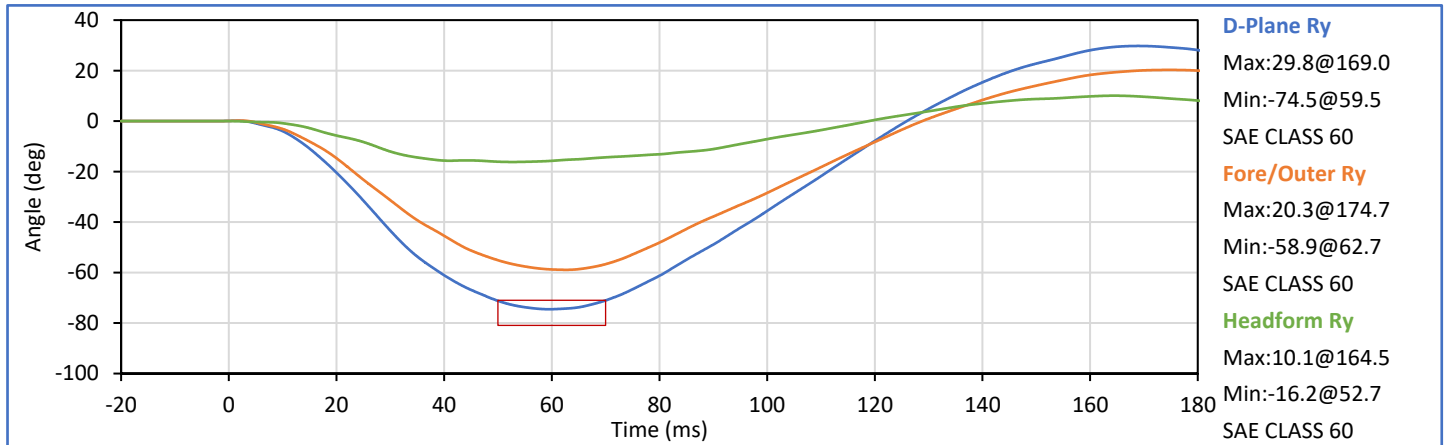
G. Fuentes

G. Fuentes

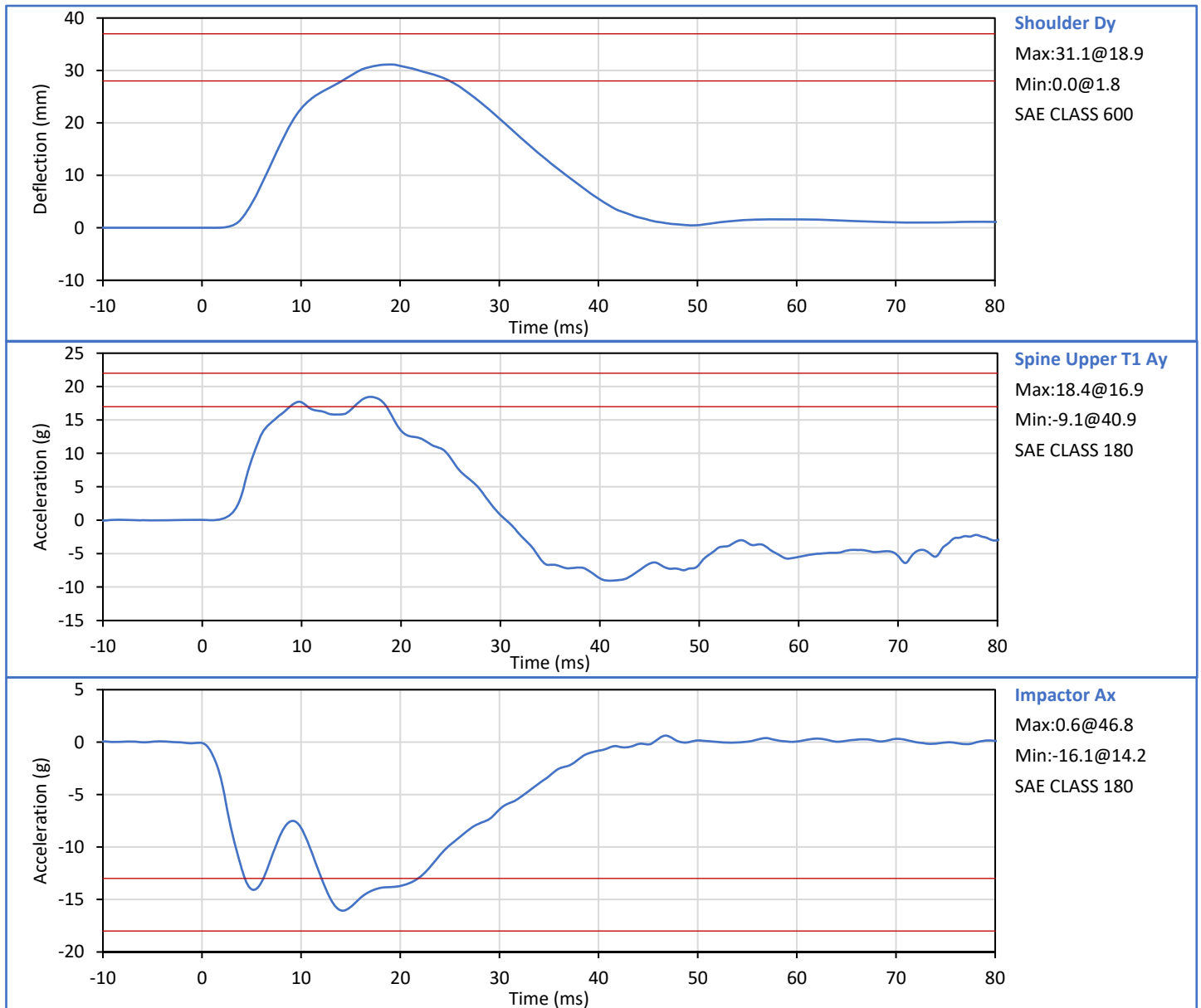
Approved By:

J. Hernandez

J. Hernandez



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Relative Humidity	%	10	70	42	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Shoulder Dy	mm	28.0	37.0	31.1	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.4	Pass
Peak Impactor Ax	g	-18.0	-13.0	-16.1	Pass
Overall Test Results					Pass



Technician:

G. Fuentes

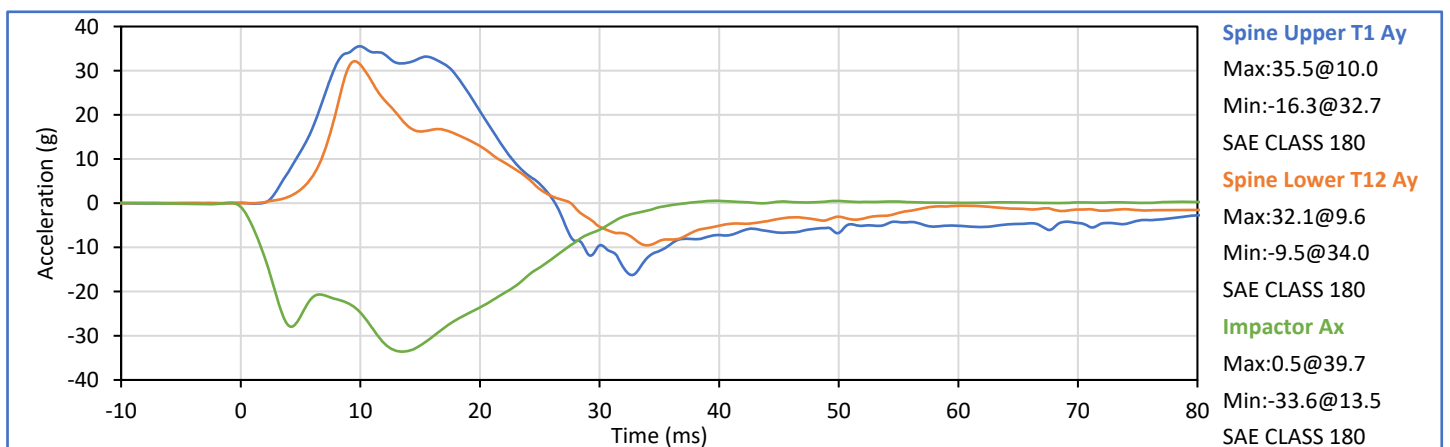
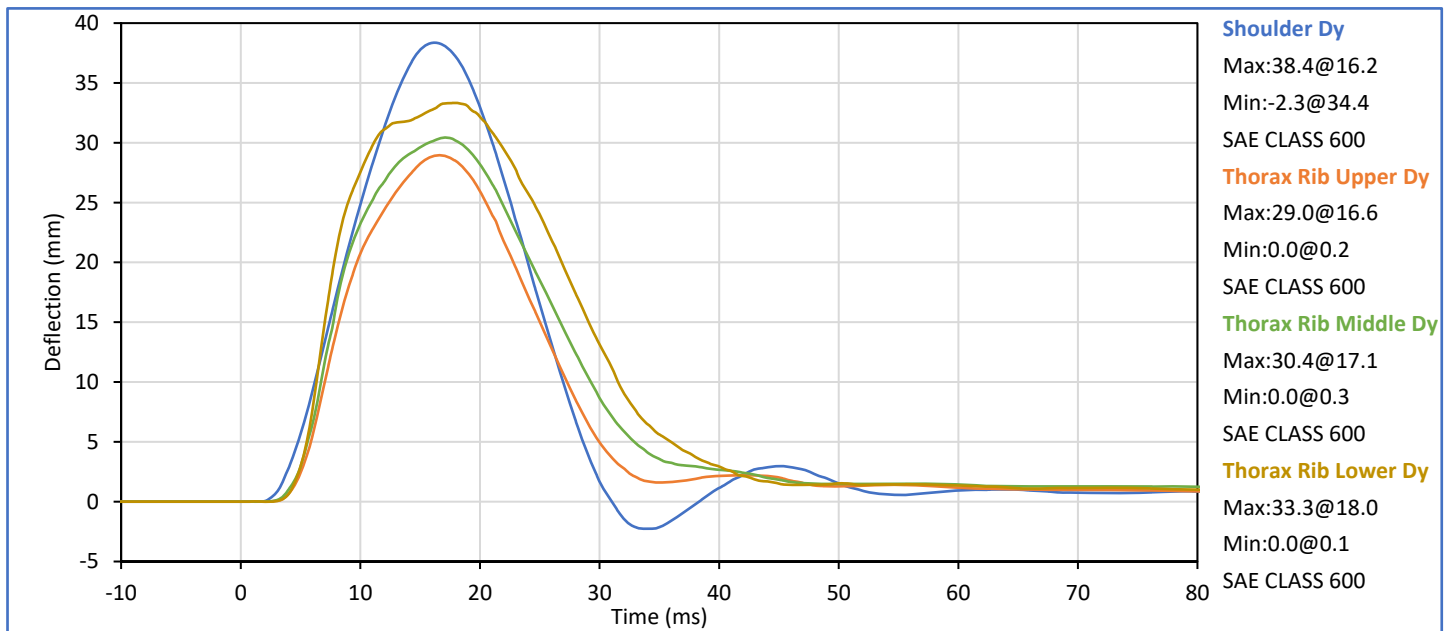
G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
Impactor Velocity	m/s	6.60	6.80	6.68	Pass
Peak Shoulder Dy	mm	31.0	40.0	38.4	Pass
Peak Upper Rib Dy	mm	25.0	32.0	29.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	30.4	Pass
Peak Lower Rib Dy	mm	32.0	38.0	33.3	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	35.5	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.1	Pass
Peak Impactor Ax	g	-36.0	-30.0	-33.6	Pass
Overall Test Results				Pass	Pass



Technician:

G. Fuentes

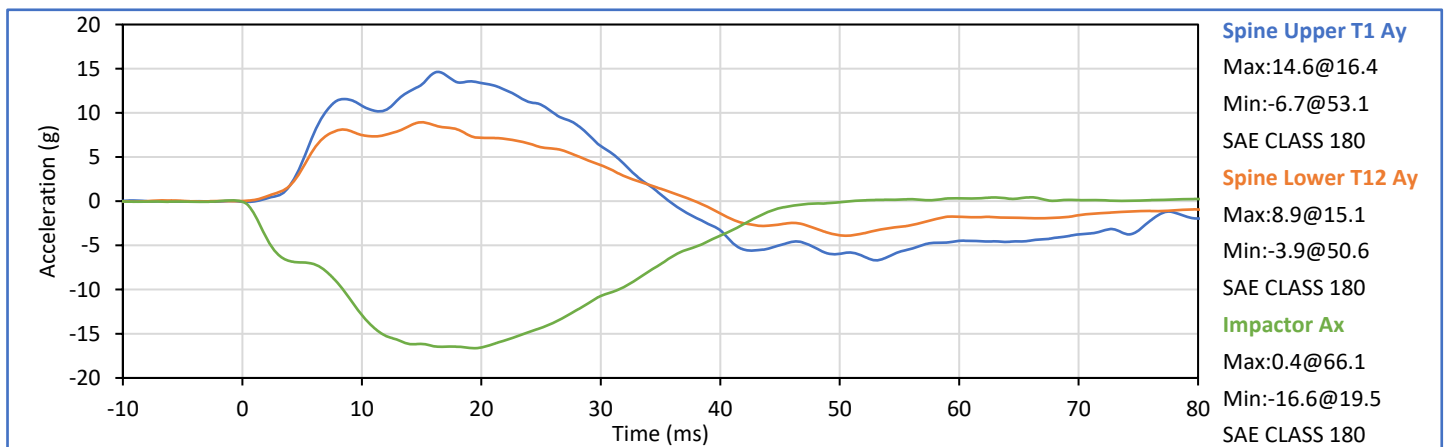
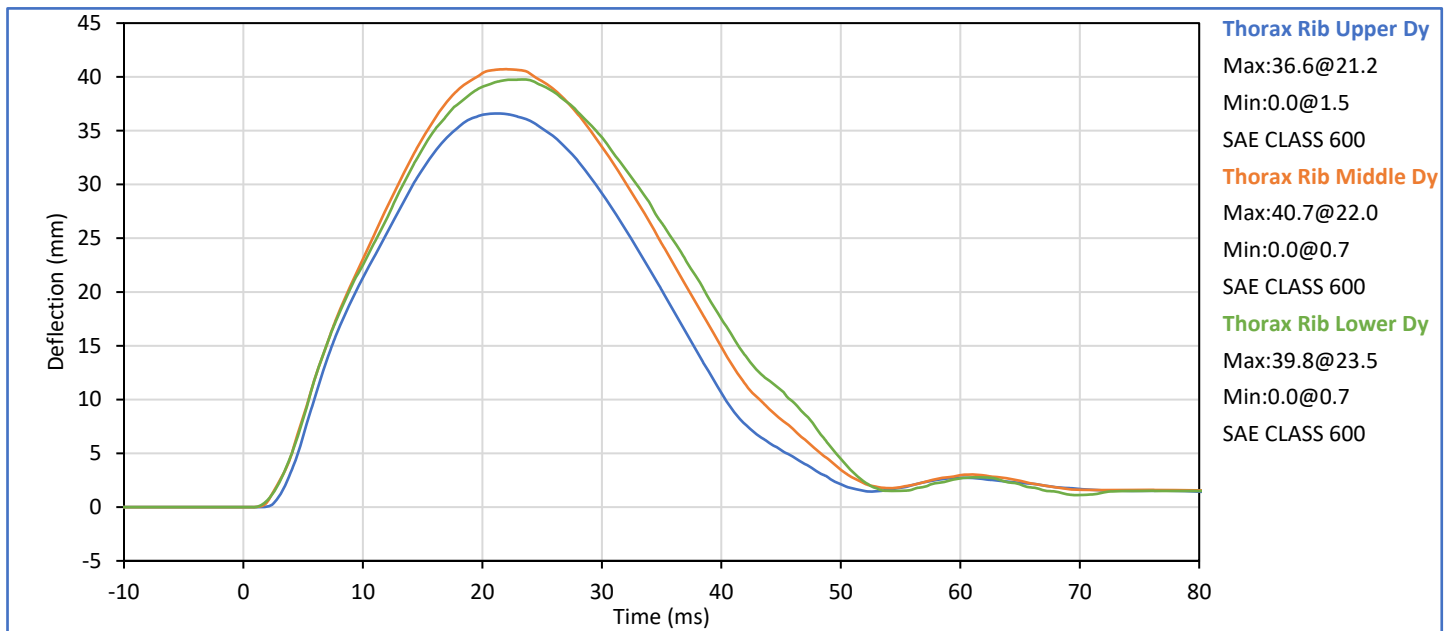
G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

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	42	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	36.6	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	40.7	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	39.8	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	14.6	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	8.9	Pass
Peak Impactor Ax	g	-18.0	-14.0	-16.6	Pass
Overall Test Results					Pass



Technician:

G. Fuentes

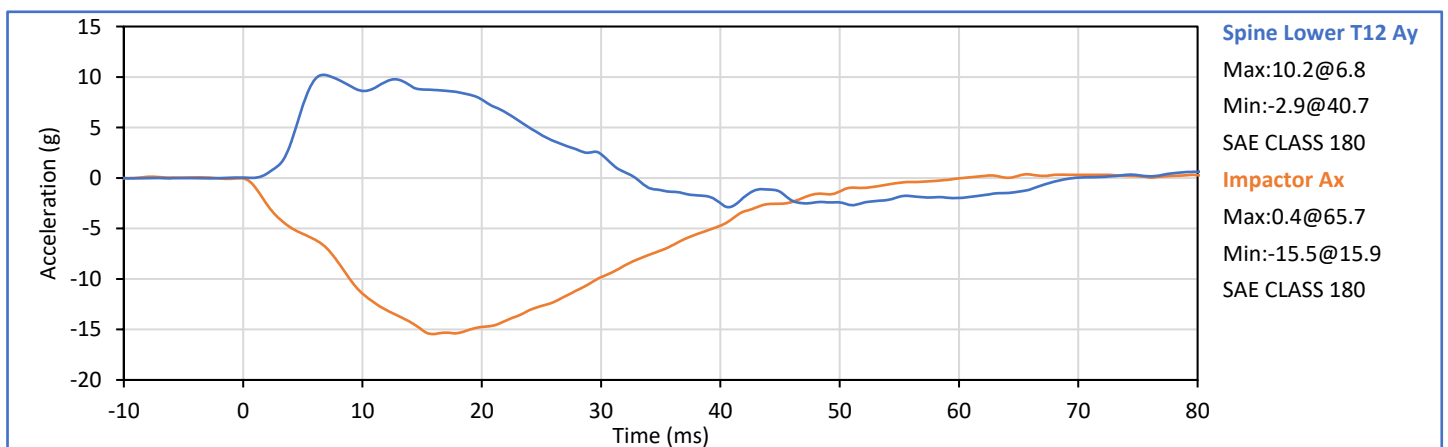
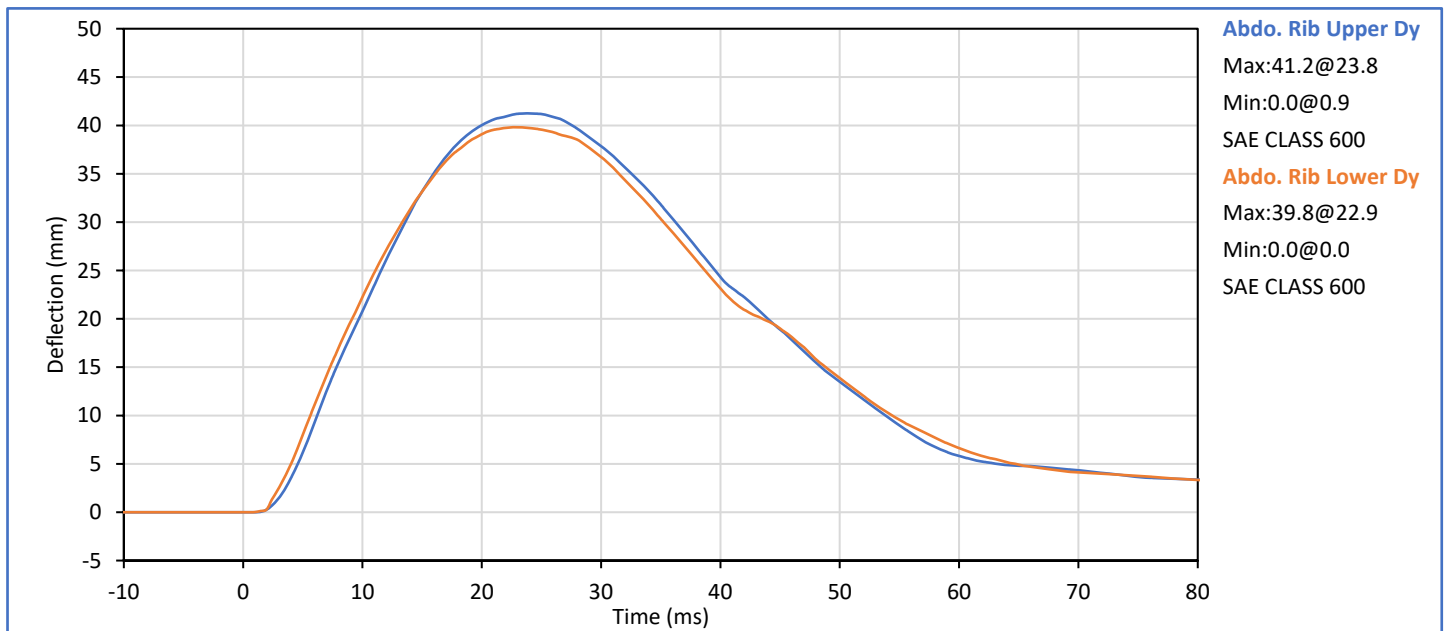
G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.0	Pass
Laboratory Relative Humidity	%	10	70	43	Pass
Impactor Velocity	m/s	4.20	4.40	4.35	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.2	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	39.8	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.2	Pass
Peak Impactor Ax	g	-16.0	-12.0	-15.5	Pass
Overall Test Results					Pass



Technician:

G. Fuentes

G. Fuentes

Approved By:

J. Hernandez

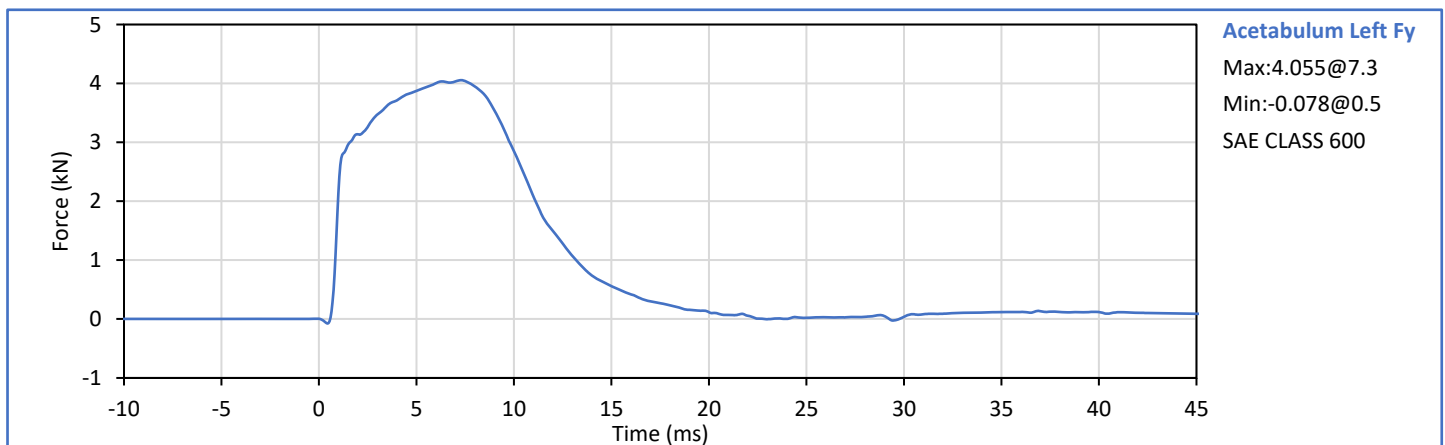
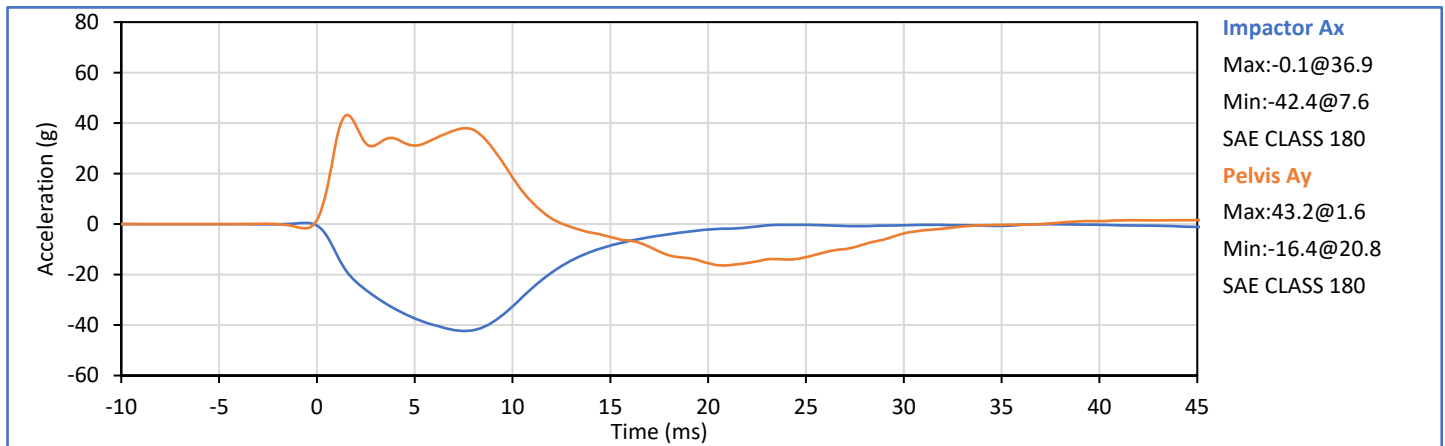
J. Hernandez

ATD Serial No.: 308

Test Date: 2024-06-11

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	41	Pass
Impactor Velocity	m/s	6.60	6.80	6.73	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.06	Pass
Pelvis Ay after 6ms	g	34.0	42.0	38.0	Pass
Peak Impactor Ax	g	-47.0	-38.0	-42.4	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 14714



Technician:

G. Fuentes

G. Fuentes

Approved By:

J. Hernandez

J. Hernandez

ATD Serial No.: 308

Test Date: 2024-06-11

Pelvis Plug S/N: 14714



SID-IIs Pelvis Plug Certification Test

Plug S/N 14714

Test Number 16677

Report Number 16723

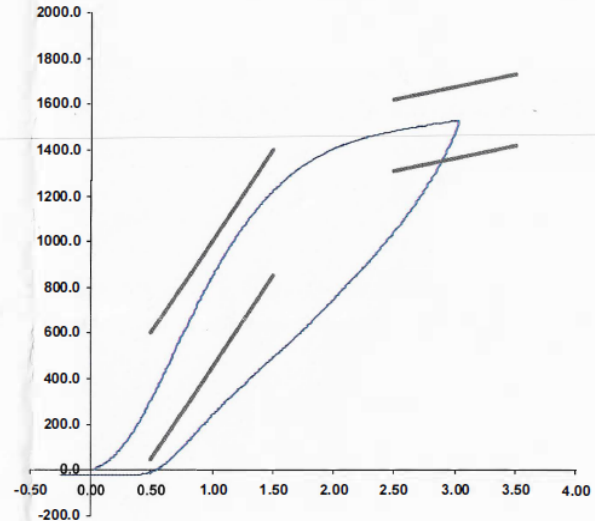
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Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	308.90	50.00 600.00
Force @ 1.5 mm (N)	1,219.51	850.00 1,400.00
Force @ 2.5 mm (N)	1,482.10	1,306.00 1,618.00
Force @ 3.0 mm (N)	1,526.94	1,361.00 1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000
Preload Value (-N) 22.24
Crosshead Speed (mm/min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator 146

Part Number 180-4450

Template No 107 22-Dec-20

SACO Research

By: DC Date: 12/22/20

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

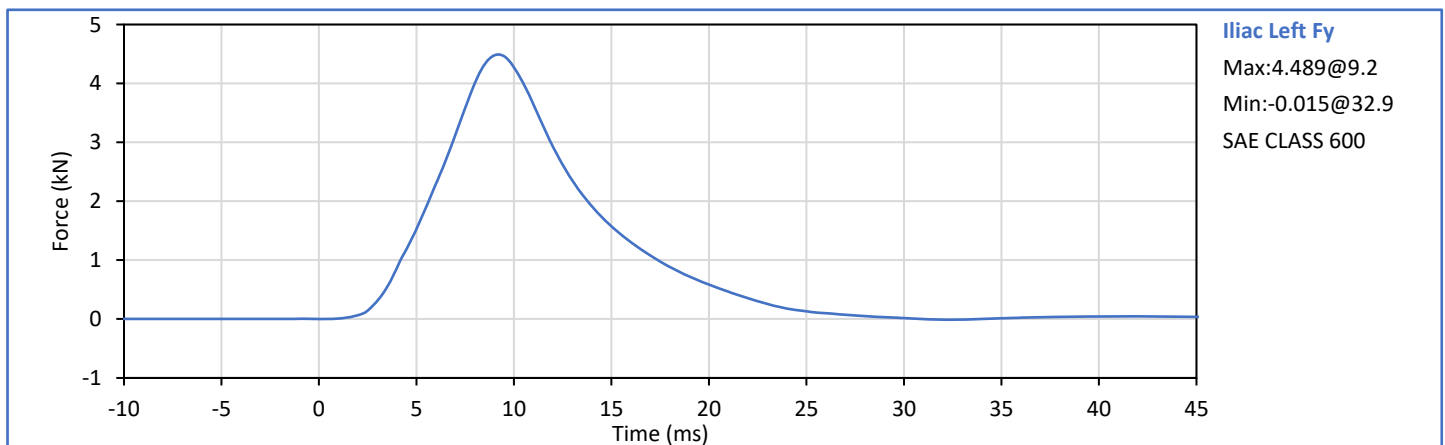
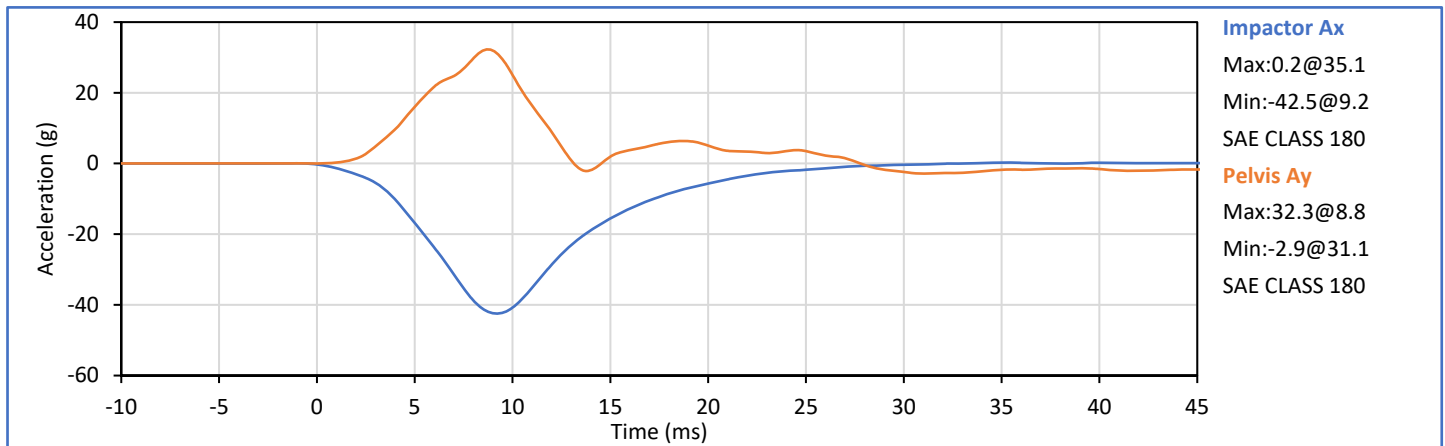
ATD Serial No.: 308

Test Date: 2024-06-11

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
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.49	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-42.5	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12228 *

* Plug is not impacted and remains certified



Technician:

G. Fuentes

G. Fuentes

Approved By:

J. Hernandez

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	P63980	Endevco	7264C-2k	2024-06-04
Head Acceleration Y Primary	P58861	Endevco	7264C-2k	2024-06-04
Head Acceleration Z Primary	P51261	Endevco	7264C-2k	2024-06-04
Head Acceleration X Redundant	P58808	Endevco	7264C-2k	2024-06-04
Head Acceleration Y Redundant	P63310	Endevco	7264C-2k	2024-06-04
Head Acceleration Z Redundant	P49189	Endevco	7264C-2k	2024-06-04
Head Rotation Rate X	ARS14907	DTS	ARS PRO-18k (2kHz)	2023-11-15
Head Rotation Rate Y	ARS14936	DTS	ARS PRO-18k (2kHz)	2023-11-15
Head Rotation Rate Z	ARS5968	DTS	ARS PRO-18k (2kHz)	2023-11-15
Upper Thorax Rib Deflection Y	1249	Servo	08TCI-3725	2024-06-04
Middle Thorax Rib Deflection Y	1219	Servo	08TCI-3725	2024-06-04
Lower Thorax Rib Deflection Y	1221	Servo	08TCI-3725	2024-06-04
Upper Abdomen Rib Deflection Y	1252	Servo	08TCI-3725	2024-06-04
Lower Abdomen Rib Deflection Y	1233	Servo	08TCI-3725	2024-06-04
Lower Spine T12 Acceleration X	P52108	Endevco	7264C-2k	2024-06-04
Lower Spine T12 Acceleration Y	P63970	Endevco	7264C-2k	2024-06-04
Lower Spine T12 Acceleration Z	P51712	Endevco	7264C-2k	2024-06-04
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 2 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	M11341	Endevco	758H-2k	2024-01-08
Vehicle CG Ay	M13713	Endevco	758H-2k	2024-03-12
Vehicle CG Az	M13684	Endevco	758H-2k	2024-01-08
Left Floor Sill Ay	M11097	Endevco	758H-2k	2024-02-09
A-Pillar Sill Ay	M11181	Endevco	758H-2k	2024-03-07
A-Pillar Low Ay	M12859	Endevco	758H-2k	2024-01-08
A-Pillar Mid Ay	M11229	Endevco	758H-2k	2024-02-05
B-Pillar Sill Ay	M12878	Endevco	758H-2k	2024-01-08
B-Pillar Low Ay	M13659	Endevco	758H-2k	2024-01-09
B-Pillar Mid Ay	M11256	Endevco	758H-2k	2024-01-25
Driver Seat Track at H-Point Ay	M11372	Endevco	758H-2k	2024-01-08
Engine Top Ax	M11124	Endevco	758H-2k	2024-02-08
Engine Top Ay	M11246	Endevco	758H-2k	2024-02-07
Firewall Ay	M11120	Endevco	758H-2k	2024-03-22
Right Roof Ay	M12831	Endevco	758H-2k	2024-01-08
Right Floor Sill Ay	M11367	Endevco	758H-2k	2024-01-08
Rear Floorpan Ax	M11137	Endevco	758H-2k	2024-02-01
Rear Floorpan Ay	M12860	Endevco	758H-2k	2024-01-08

Table 3 - Barrier Pole Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Barrier Pole 01 Fx	19461A	Interface	1220FS-50k	2021-11-04
Barrier Pole 02 Fx	131822A	Interface	1220AF-50k	2021-11-04
Barrier Pole 03 Fx	131816A	Interface	1220AF-50k	2021-11-04
Barrier Pole 04 Fx	19325	Interface	1220AF-50k	2021-11-04
Barrier Pole 05 Fx	131827A	Interface	1220AF-50k	2021-11-04
Barrier Pole 06 Fx	19340	Interface	1220AF-50k	2021-11-05
Barrier Pole 07 Fx	19267	Interface	1220AF-50k	2021-11-05
Barrier Pole 08 Fx	19466A	Interface	1220AF-50k	2021-11-05