REPORT NUMBER: SideNCAPMDB-KAR-24-004

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

SUBARU CORPORATION

2024 SUBARU CROSSTREK 5-DOOR SW

NHTSA No: O20245502

PREPARED BY:

APPLUS+ IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

AUGUST 23, 2023

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

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Approval Date: August 23, 2023

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

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Final Report of New Car Assessment Program Side Impact MDB Testing of a 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502	August 24, 2023
	6. Performing Organization Code KAR
7. Authors Mr. Rushlan Amin, Project Engineer, Applus+ IDIADA KARCO Engineering, LLC Mr. Alex Beltran, Engineering Manager, Applus+ IDIADA KARCO Engineering, LLC	**8. Performing Organization Report No.** TR-P43171-01-NC
9. Performing Organization Name and Address Applus+ IDIADA KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301	**10. Work Unit No.**
	11. Contract or Grant No. 693JJ920D000015
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	**13. Type of Report and Period Covered** Final Test Report, August 9 - August 24, 2023
	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 2024 Subaru Crosstrek 5-Door SW 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 August 9, 2023.

The impact velocity of the Moving Deformable Barrier was 61.87 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 30.6°C. The target vehicle's maximum post-test static crush was 154 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	112.803
Maximum Thoracic Rib Deflection	mm	44	11.793
Total Abdominal Force	N	2500	656.729
Pubic Symphysis Force	N	6000	1320.452

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	115.820
Resultant Lower Spine Acceleration	g	82	51.999
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	2992.103
Maximum Thoracic Rib Deflection	mm	38*	16.776
Maximum Abdominal Rib Deflection	mm	45*	19.427

17. Key Words	18. Distribution Statement
New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) ES-2re SID-IIs	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	20. Security Classification of this page	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	153	

**Proposed IARV*

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SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 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 Subaru Crosstrek 5-Door SW. 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 2024 Subaru Crosstrek 5-Door SW 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 61.87 km/h (38.44 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 August 9, 2023. Pre- and post-test photographs of the test vehicle, the MDB and the dummy (ES-2re and SID-IIs) are included in Appendix A of this report.

The 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
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	112.803
Maximum Thoracic Rib Deflection	mm	44	11.793
Combined Abdominal Force	N	2500	656.729
Pubic Symphysis Force	N	6000	1320.452

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	115.820
Lower Spine (T12) Resultant Acceleration	g	82	51.999
Total Pelvic Force (sum of acetabular and iliac forces	N	5525	2992.103
Maximum Thoracic Rib Deflection	mm	38*	16.776
Maximum Abdominal Rib Deflection	mm	45*	19.427

**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	No	
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: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in^2	kPa	6.895
Temperature	General Use	^oF	^oC	=(Tf -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: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	O20245502
Model Year	2024
Make	Subaru
Model	Crosstrek
Body Style	5-Door SW
VIN	JF2GUADC5RH231828
Body Color	White
Odometer Reading (km / mi)	148/92
Engine Displacement (L)	2.0
Type / No. of Cylinders	4 Cylinder
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
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	No
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	Yes

Does Owner's Manual provide instructions to turn off automatic door locks? Yes, Page 134

DATA FROM CERTIFICATION LABEL

Manufactured By	Subaru Corporation
Date of Manufacture	23-Apr
Vehicle Type	MPV

GVWR (kg)	2185
GAWR Front (kg)	1165
GAWR Rear (kg)	1130

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				408.0	*A*
DSC x 68 (kg)				340.0	*B*
Cargo Weight (RCLW) (kg)				68.0	*A-B**

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

VEHICLE SEAT TYPE

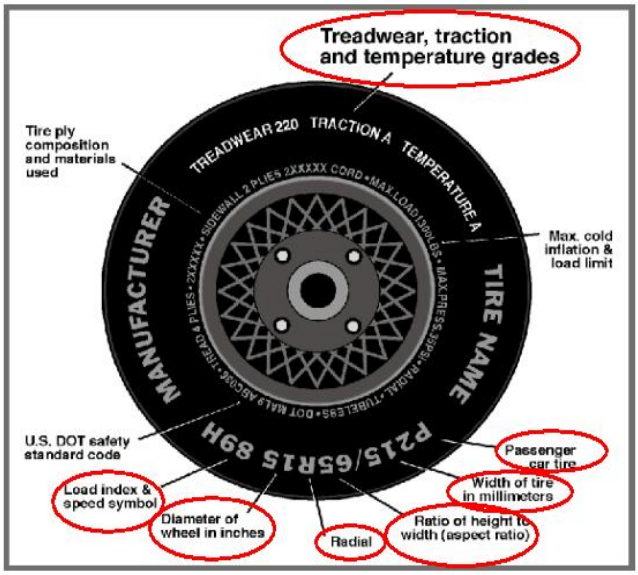
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable w/ Lever	Adjustable w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat		Yes			Yes		
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	230	220
Recommended Tire Size	225/60 R17	225/60 R17
Tire Size on Vehicle	225/60 R17	225/60 R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolander G91	Geolander G91
Treadware	280	280
Traction Grade	B	B
Temperature Grade	A	A
Tire Plies Sidewall	Polyester	Polyester
Tire Plies Body	Polyester, Steel, Nylon	Polyester, Steel, Nylon
Load Index/Speed Symbol	99H	99H
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	IFD FCYL16 1623	IFD FCYL16 1623
DOT Safety Code Right	IFD FCYL16 1623	IFD FCYL16 1623

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	230	230	220	220
Tire Placard	kPa	230	230	220	220
Owner's Manual	kPa	230	230	220	220
As Tested	kPa	230	230	220	220

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

		As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
	Units	Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	463.0	309.0		492.0	387.0		500.0	396.5	
Right	kg	432.0	306.0		430.0	387.5		437.0	369.5	
Ratio	%	59.3%	40.7%		54.3%	45.7%		55.0%	45.0%	
Total	kg	895.0	615.0	1510.0	922.0	774.5	1696.5	937.0	766.0	1703.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1510.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	68.0	C
Calculated Vehicle Target Wt (TVTW)	kg	1703.0	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	862	870	Yes
RF	mm	866	869	Yes
LR	mm	860	857	Yes
RR	mm	865	863	Yes
Vehicle CG (Aft of Front Axle)	mm	1201	1218	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	41	28	

***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: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

Test Height Adjustable Setting (If Applicable)	

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire and Tools Removed	21.0
Rear Trim Removed	8.0

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: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

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	4.2	0.0	2.1
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	2.1	602	Max	647	650	654
			Mid	625	626	634
			Min	602	602	614
Front Passenger Seat	Fixed	Fixed	Max			
			Mid	Fixed	Fixed	Fixed
			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 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

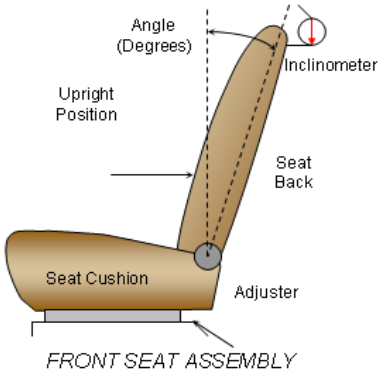
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	262	27	131	13
Front Passenger Seat	258	27	128	13
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 fixed. 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	76.5	37	13.3	8
Front Passenger Seat	73.6	37	12.4	8
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 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

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	M2
Rear Seat	Fixed	Fixed

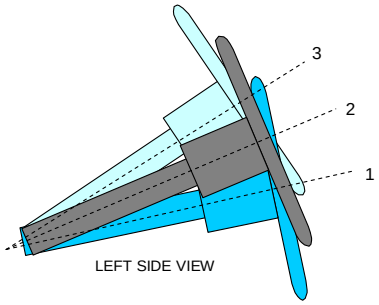
HEAD RESTRAINT ADJUSTMENT

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	3	H
Rear Seat	Fixed	Fixed

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	21.9	160
Geometric Center Position, No. 2	23.7	135
Uppermost Position, No. 3	25.5	110
Telescoping Steering Wheel Travel		50
Test Position	23.7	135

DATA SHEET NO. 2 … (CONTINUED)

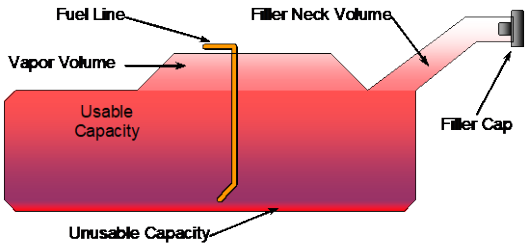
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

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.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	62.84
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	62.84
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	58.44
Actual amount of Solvent Used in Test	58.44
1/3 of Usable Capacity	20.95

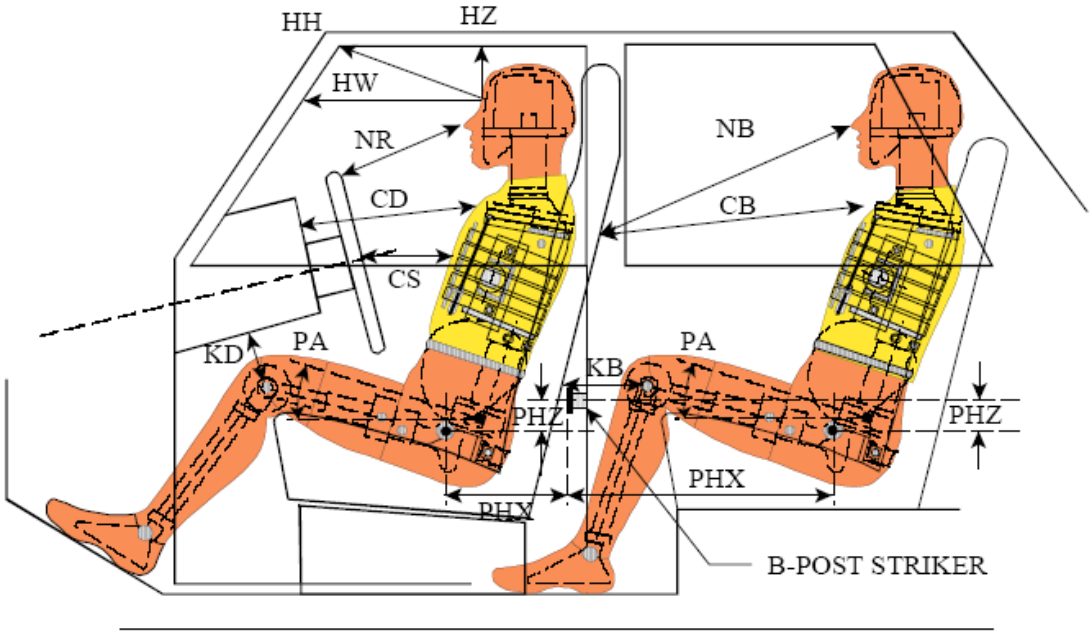
Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



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

LEFT SIDE VIEW

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

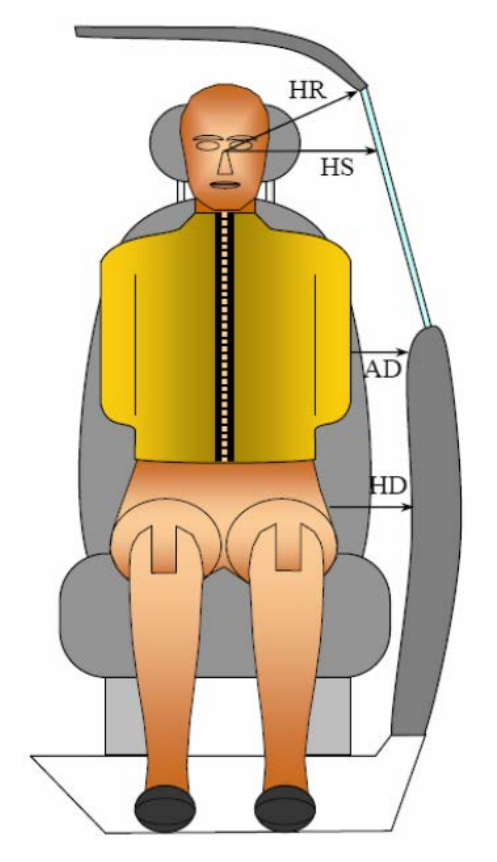
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (º)	Length (mm)	Angle (º)
HH		Head to Header	275			
HW		Head to Windshield	615			
HZ	HZ	Head to Roof	166		275	
NR	NB	Nose to Rim/Seat Back	436		574	
CD	CB	Chest to Dash/Seat Back	565		578	
CS		Chest to Steering Wheel	280			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	165	17.2	338	13.3
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	169	24.7	335	11.8
PAX°	PAX°	Pelvic Tilt Angle X		17.5		22.2
	PAY°	Pelvic Tilt Angle Y		0.0		0.0
PHX	PHX	Hip Point to Striker (x-axis)	243		275	
PHZ	PHZ	Hip Point to Striker (z-axis)	192		324	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

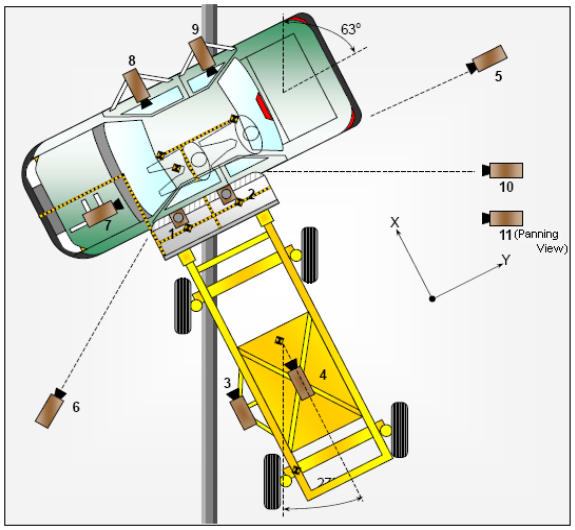
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	243	274
HS	Head to Side Window	mm	385	366
AD	Arm to Door	mm	104	169
HD	H-Point to Door	mm	166	185

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



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

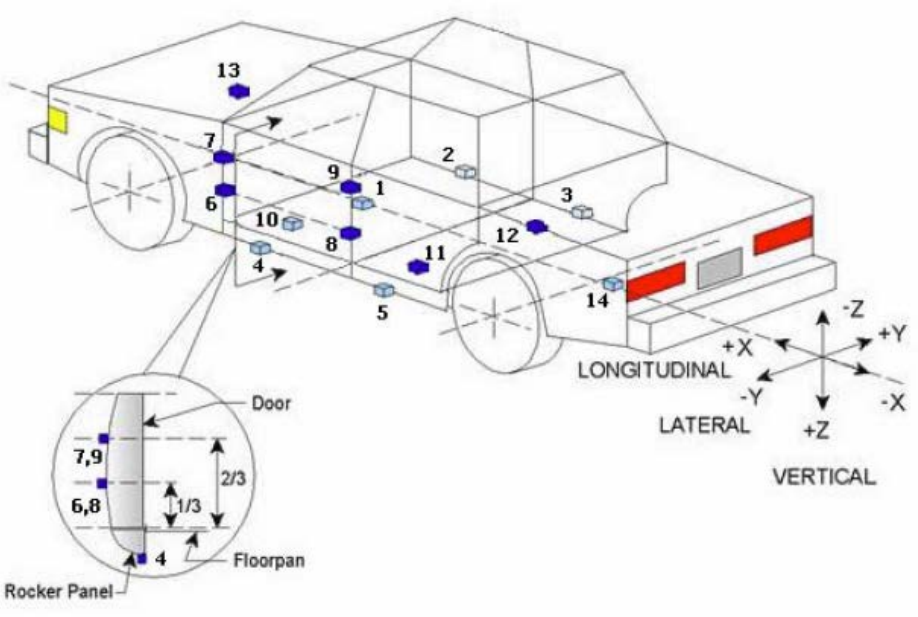
Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Channels	5
Total	63

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2670	0	-430
2	Right Sill at Front Seat	1410	770	-430
3	Right Sill at Rear Seat	2850	770	-430
4	Left Sill at Front Door	1410	-770	-430
5	Left Sill at Rear Door	2850	-770	-430
6	A-Pillar Lower	1400	-730	-610
7	A-Pillar Middle	1410	-730	-410
8	B-Pillar Lower	2520	-730	-610
9	B-Pillar Middle	2530	-730	-1000
10	Front Seat Track	2180	570	-370
11	Rear Seat Structure	2810	-600	-370
12	Right Rear Occupant Compartment	2810	800	-370
13	Engine Block	650	0	-640
14	Rear Floorpan Above Axle	3760	0	-570

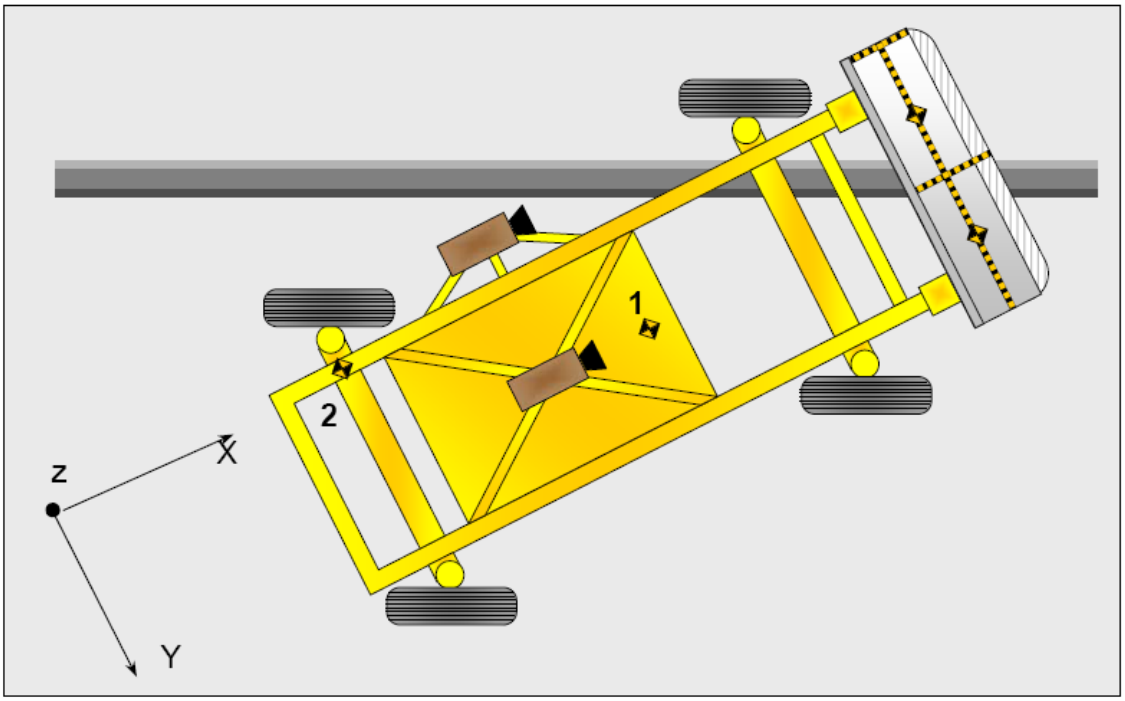
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurement		
		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)

DATA SHEET NO. 8

POST-TEST OBSERVATIONS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag, Side Header	Curtain Airbag
Top of Head	Side Header	Curtain Airbag, Headliner
Left Side of Head	Curtain Airbag, Side Header	Curtain Airbag
Back of Head	Headrest, Curtain Airbag, Side Header	Curtain Airbag, Head Rest
Left Shoulder	Curtain Airbag	Door Panel
Upper Torso	Seat Bolster, Torso/Pelvis Airbag	Door Panel
Lower Torso	Seat Bolster, Torso/Pelvis Airbag	Door Panel
Left Hip	Side Airbag, Door Panel, Seat Bolster	Door Panel
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: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

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: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

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	No	
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		2669
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		586
Actual Impact Point (Aft of Front Axle)	mm		597
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-11
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	9

DATA SHEET NO. 9

MDB SUMMARY OF RESULTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

MDB SPECIFICATIONS

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

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	402.0	297.5	699.5
Right	kg	377.0	290.0	667.0
Ratio	%	57.0%	43.0%	100.0%
Totals	kg	779.0	587.5	1366.5

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.87
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.86
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.6
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

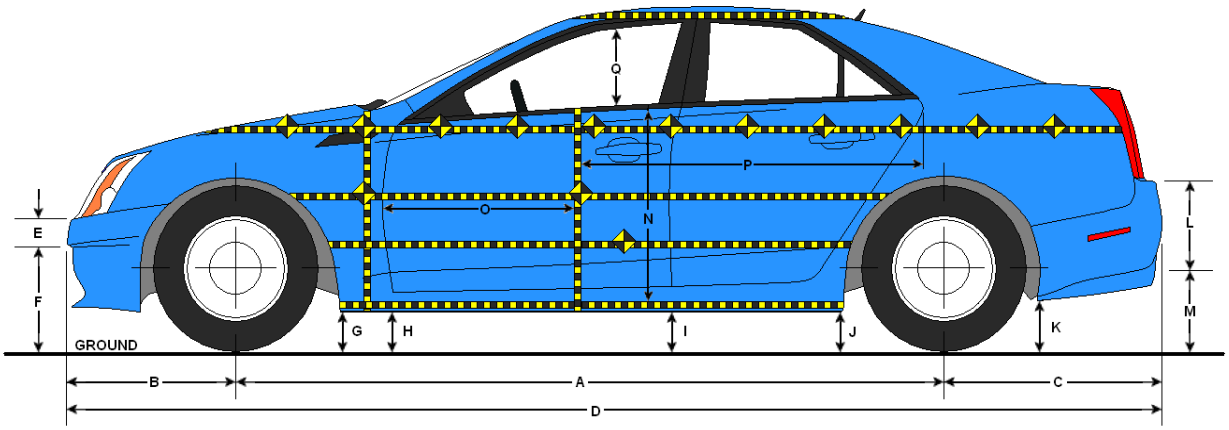
Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	263
B	Top of Bumper	533	800	Right	178
C	Mid Level	686	800	Left	127
D	Top of Stack	813	800	Left	156

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Change
A	Wheelbase	2669	2646	-23
B	Front Axle to FSOV	968	934	-34
C	Rear Axle to RSOV	837	851	14
D	Total Length at Centerline	4474	4432	-42
E	Front Bumper Thickness	72	70	-2
F	Front Bumper Bottom to Ground	467	382	-85
G	Sill Height at Front Wheel Well	344	345	1
H	Sill Height at Front Door Leading Edge	344	322	-22
I	Sill Height at B-Pillar	367	364	-3
J1	Sill Height at Rear Wheel Well	384	386	2
J2	Pinch Weld Height at Rear Wheel Well	268	267	-1
K	Sill Height Aft of Rear Wheel Well	359	357	-2
L	Rear Bumper Thickness	143	144	1
M	Rear Bumper Bottom to Ground	572	575	3
N	Sill Height to Bottom of Front Window Sill	688	677	-11
O	Front Door Leading Edge to Impact CL	766	761	-5
P	Rear Door Trailing Edge to Impact CL	1384	1351	-33
Q	Front Window Opening	385	421	36
R	Right Side Length	3317	3318	1
S	Left Side Length	3317	3308	-9
T	Vehicle Width at B-Pillar	1770	1673	-97

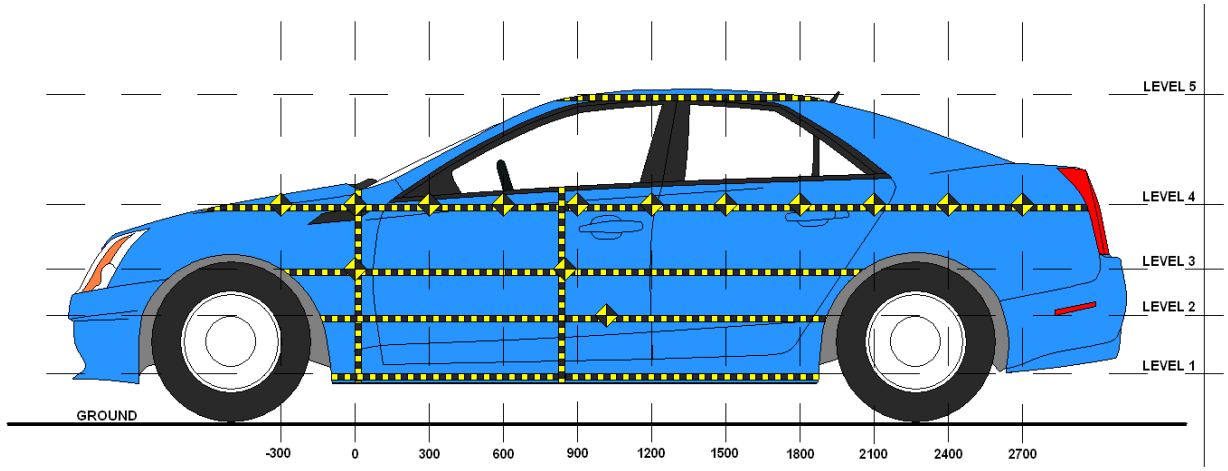
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	341	40	1650
2	Occupant H-Point	627	126	1350
3	Mid-Door	869	154	1500
4	Window Sill	1019	56	1350
5	Window Top	1505	3	1350

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

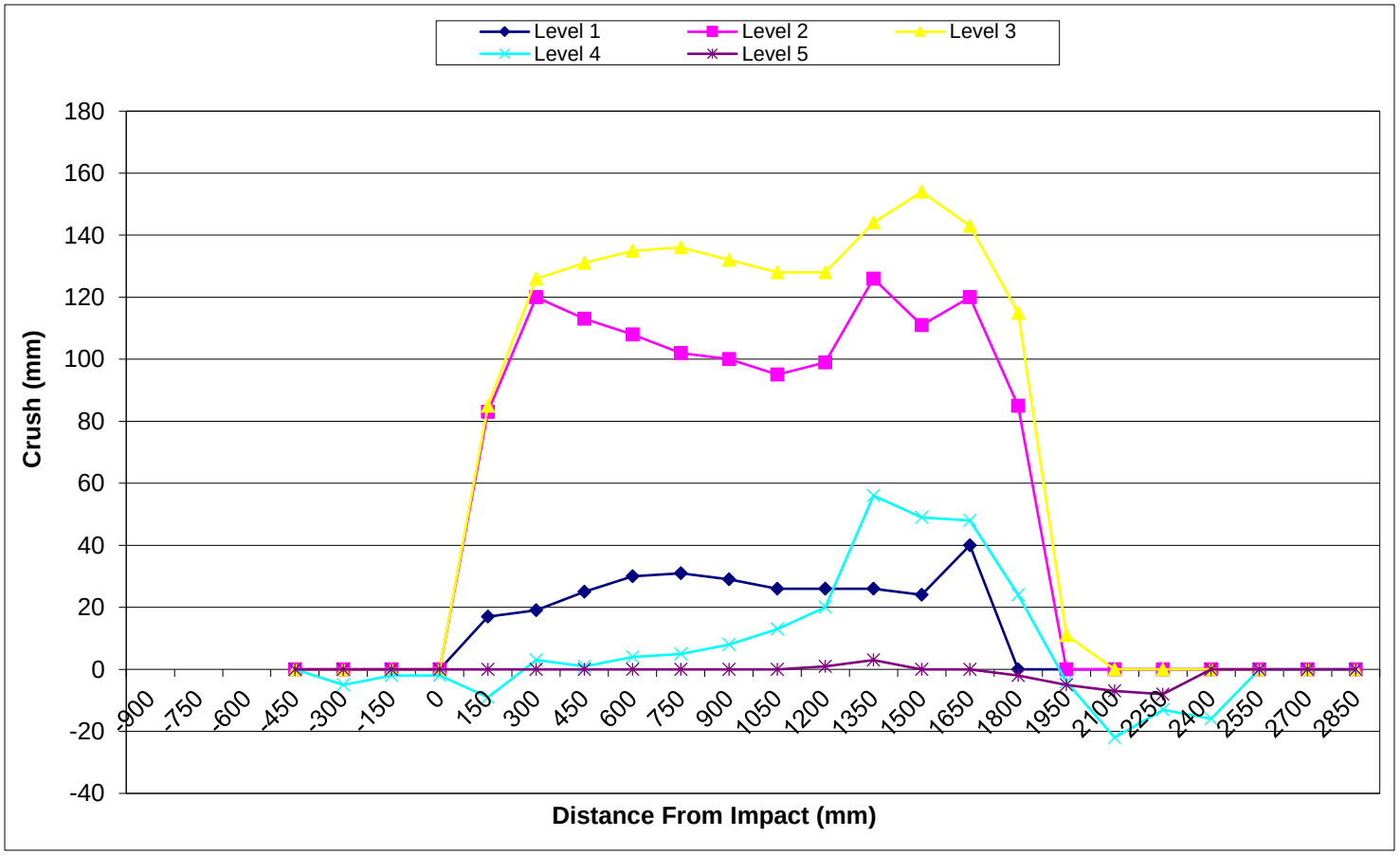
	Pre-Test (mm)					Post-Test (mm)					Crush (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				726					721					-5	
-150				706					704					-2	
0				695				611	693					-2	
150	659	619	619	690		676	702	704	681		17	83	85	-9	
300	660	620	616	642		679	740	742	645		19	120	126	3	
450	659	617	613	683		684	730	744	684		25	113	131	1	
600	657	615	611	673		687	723	746	677		30	108	135	4	
750	656	613	609	665		687	715	745	670	882	31	102	136	5	
900	656	611	608	657	881	685	711	740	665	881	29	100	132	8	0
1050	655	610	606	651	885	681	705	734	664	885	26	95	128	13	0
1200	656	610	607	647	889	682	709	735	667	890	26	99	128	20	1
1350	654	612	609	648	889	680	738	753	704	892	26	126	144	56	3
1500	650	614	612	651	889	674	725	766	700	889	24	111	154	49	0
1650	633	613	613	657	890	673	733	756	705	890	40	120	143	48	0
1800		609	606	661	892		694	721	685	890		85	115	24	-2
1950			589	652	897			600	648	892			11	-4	-5
2100				676	902				654	895				-22	-7
2250				671	909				658	901				-13	-8
2400				669					653					-16	
2550															
2700															
2850															

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

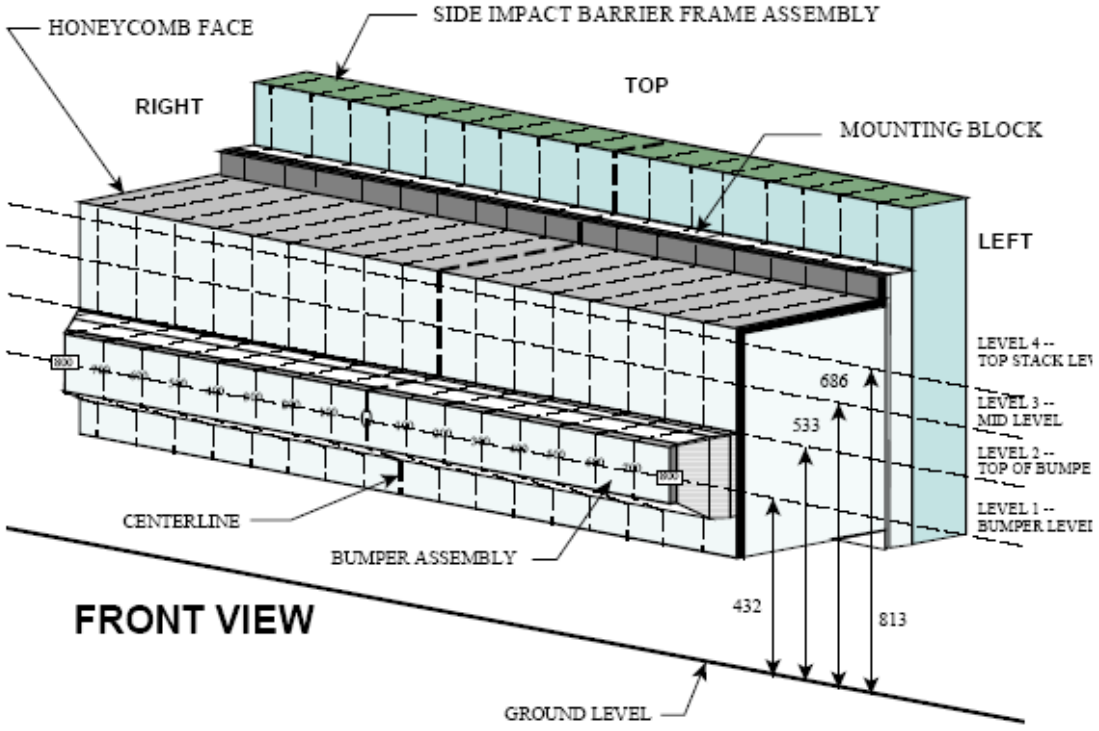


DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



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	0	100	200	300	400	500	600	700	800
1	263	247	231	216	211	208	201	199	196	192	188	183	183	180	178	182	219
2	178	177	156	139	131	119	111	109	110	111	110	105	106	105	102	111	148
3	77	72	68	71	76	76	83	66	59	52	46	43	43	46	56	73	127
4	100	74	52	42	66	96	116	99	81	66	60	59	60	67	89	103	156

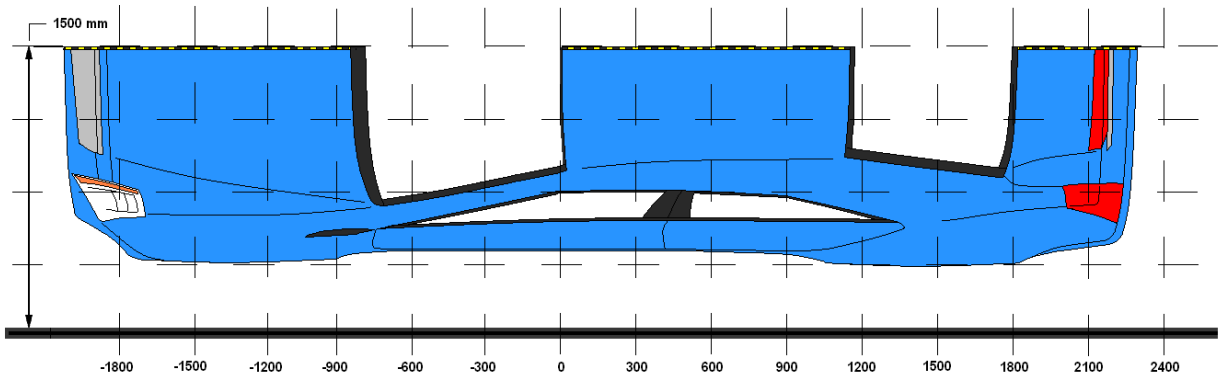
All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2400	4	669	653	-16
2	1800	3	606	721	115
3	1350	3	609	753	144
4	750	3	609	745	136
5	150	3	619	704	85
6	-300	4	726	721	-5

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	219
2	500	Left	1	180
3	200	Left	1	188
4	200	Right	1	201
5	500	Right	1	216
6	800	Right	1	263

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23

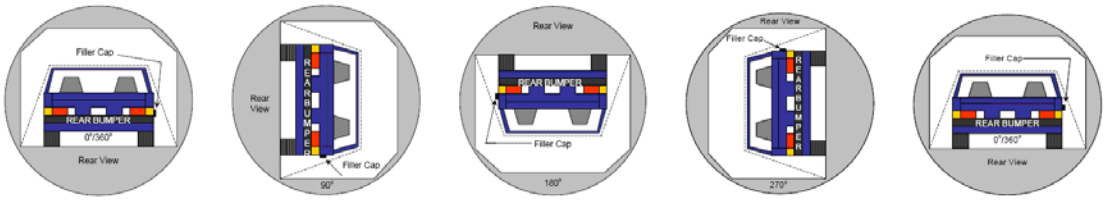
Temperature at Time of Impact: 30.6°C Test Time: 2:30 P.M.

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: _____



0° TO 90° 90° TO 180° 180° TO 270° 270° TO 360°

./;

SOLVENT COLLECTION TIME TABLE IN SECONDS

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

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

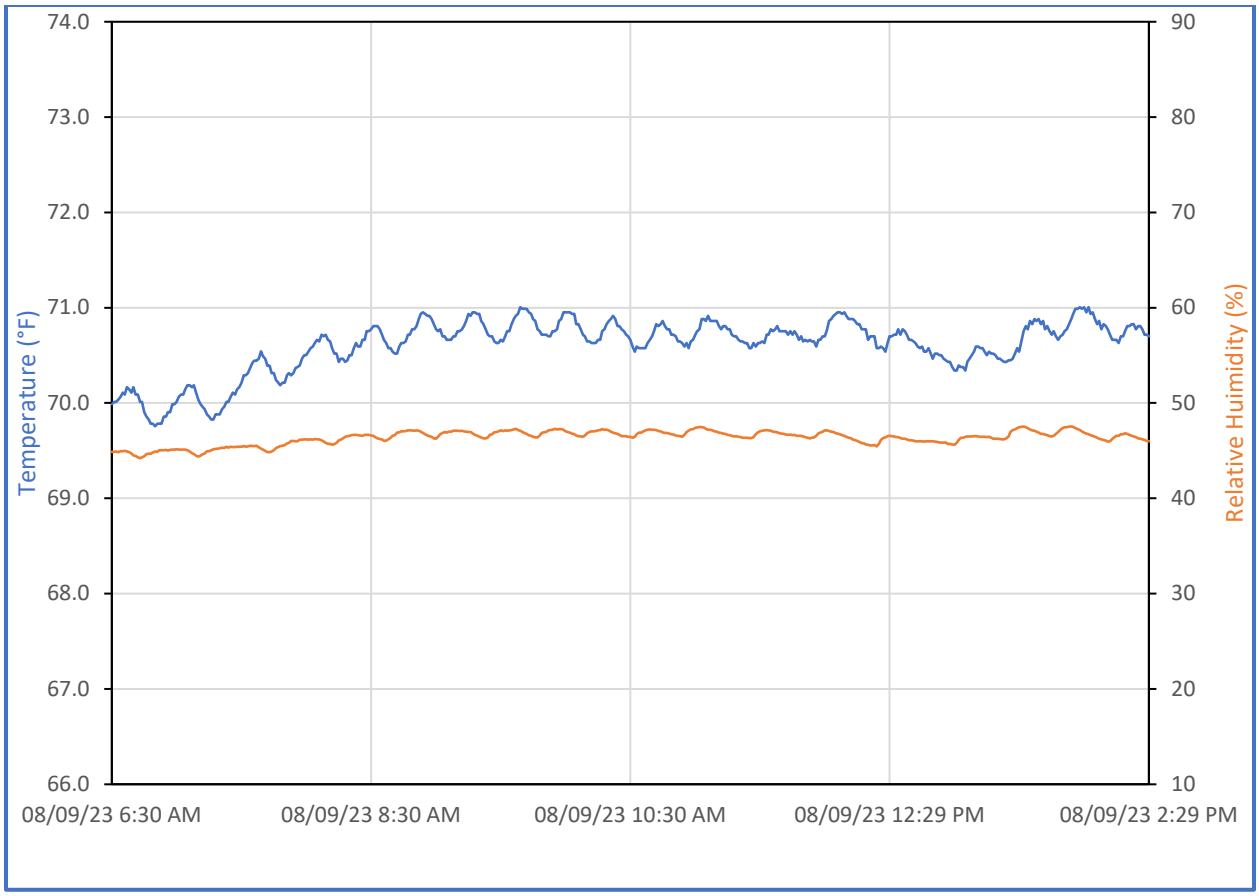
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2024 Subaru Crosstrek 5-Door SW NHTSA No. O20245502

Test Program: NCAP MDB Side Impact Test Test Date: 08/09/23



APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS … (CONTINUED)

TABLE OF PHOTOGRAPHS … (CONTINUED)

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

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

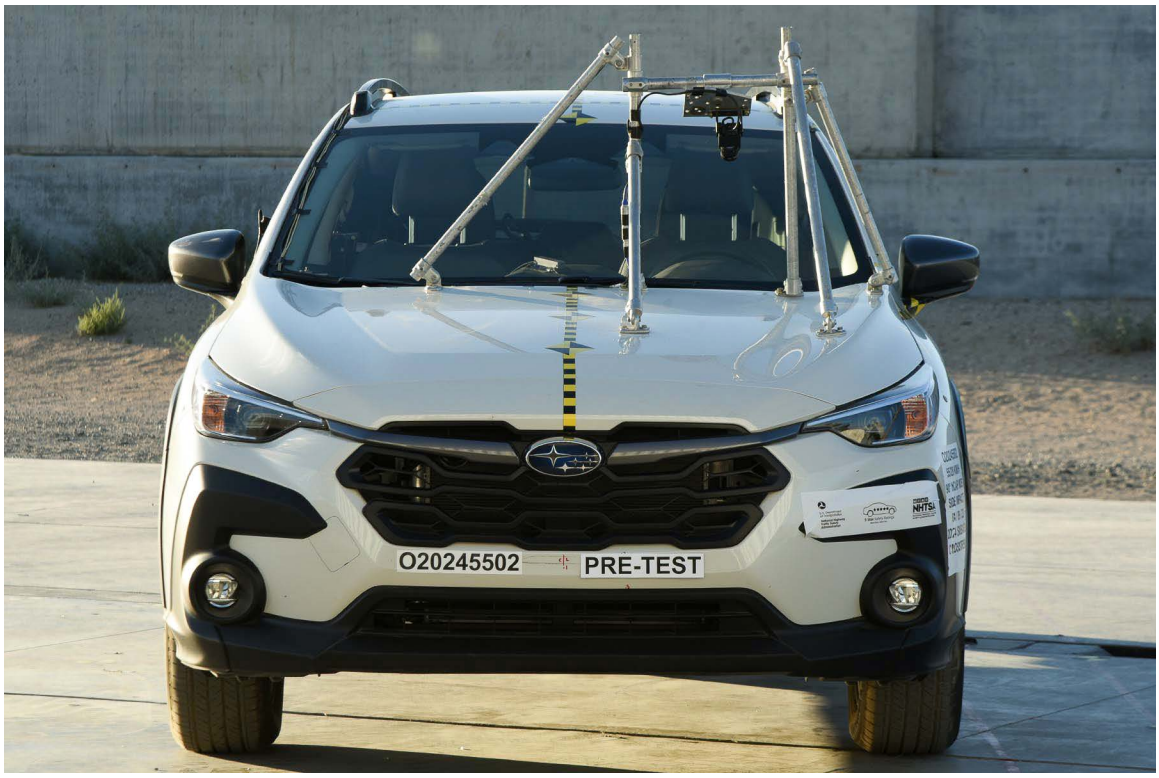


FIGURE 3. Pre-Test Frontal View of Test Vehicle

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

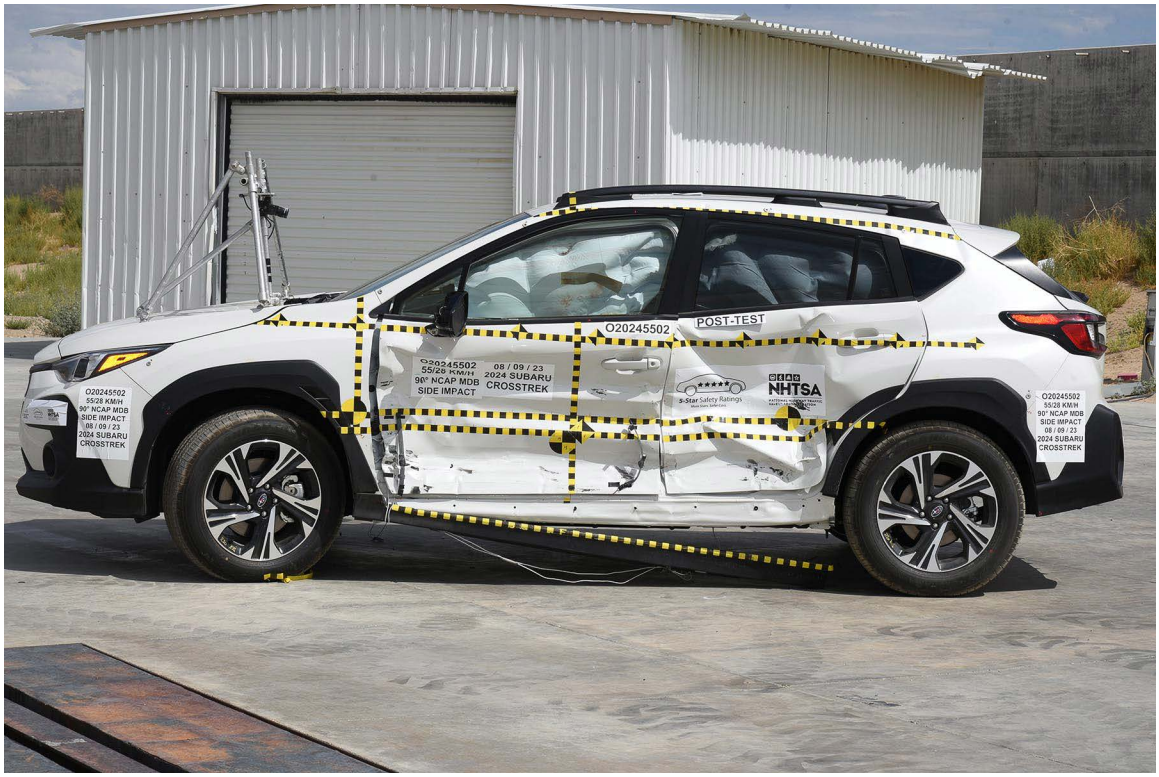


FIGURE 8. Post-Test Left Side View of Test Vehicle

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

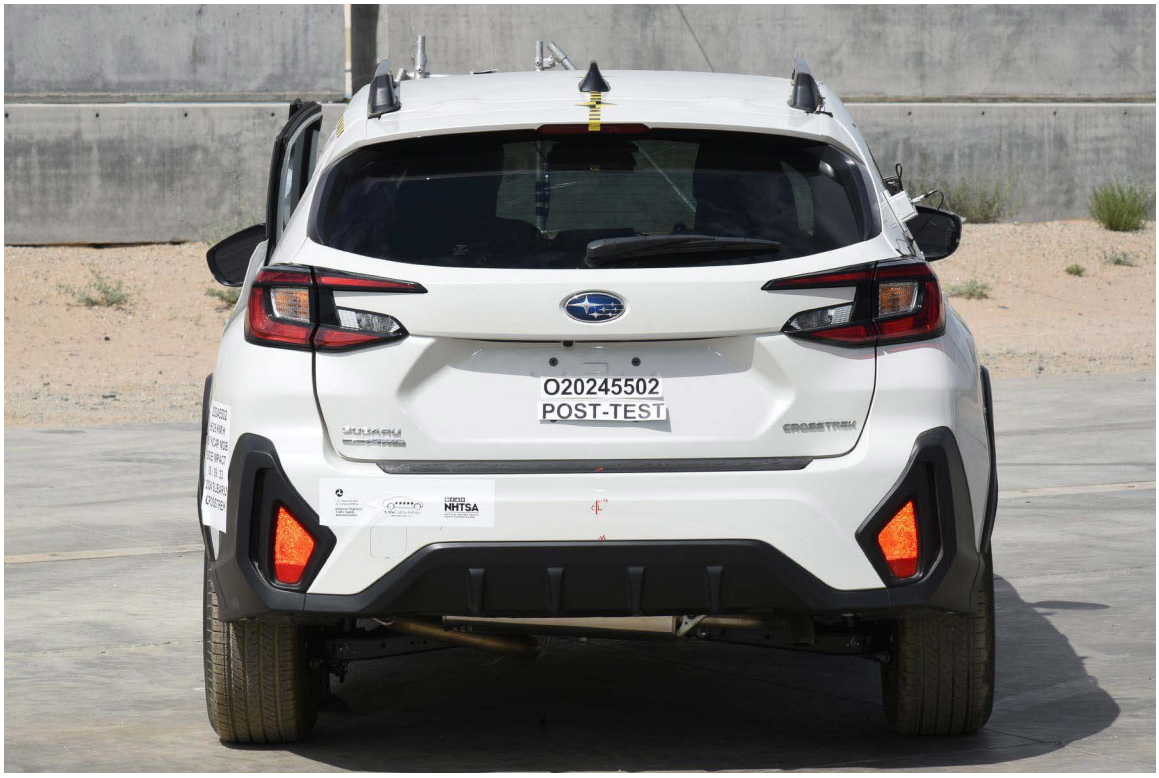


FIGURE 12. Post-Test Rear View of Test Vehicle

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

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

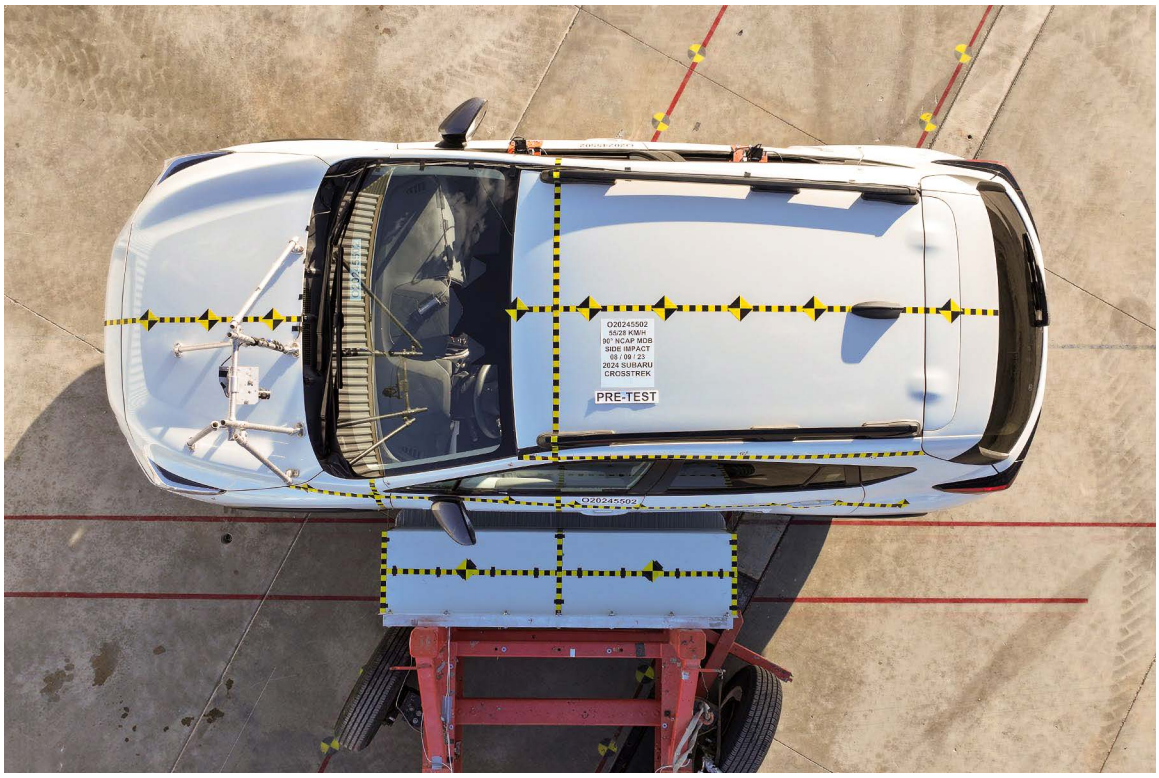


FIGURE 15. Pre-Test Overhead View of Test Area

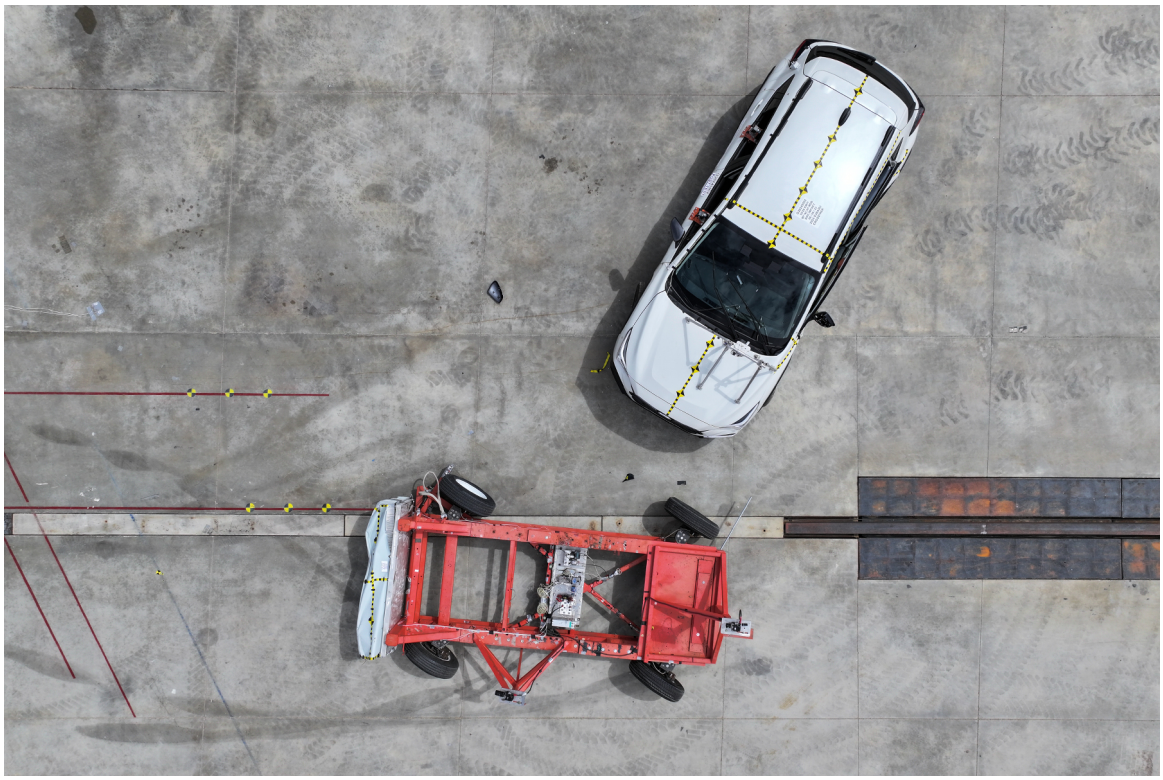


FIGURE 16. Post-Test Overhead View of Test Area

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

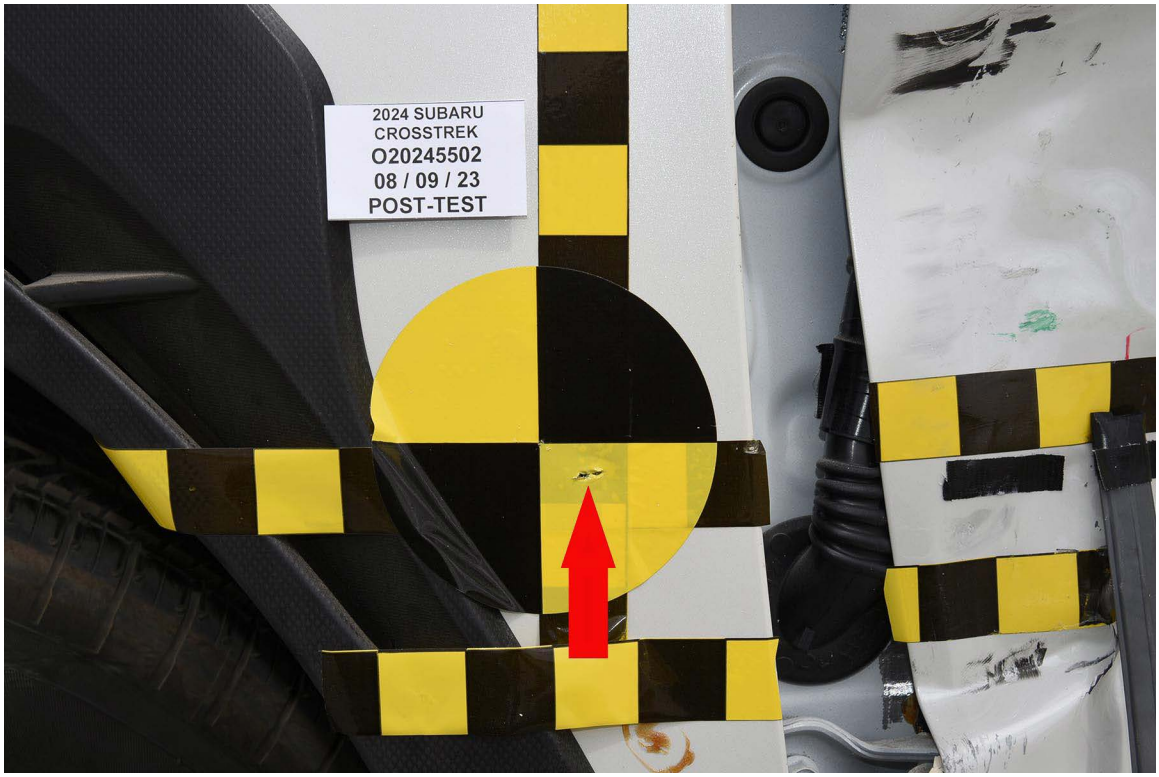


FIGURE 20. Post-Test Close-Up View of Impact Point Target

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

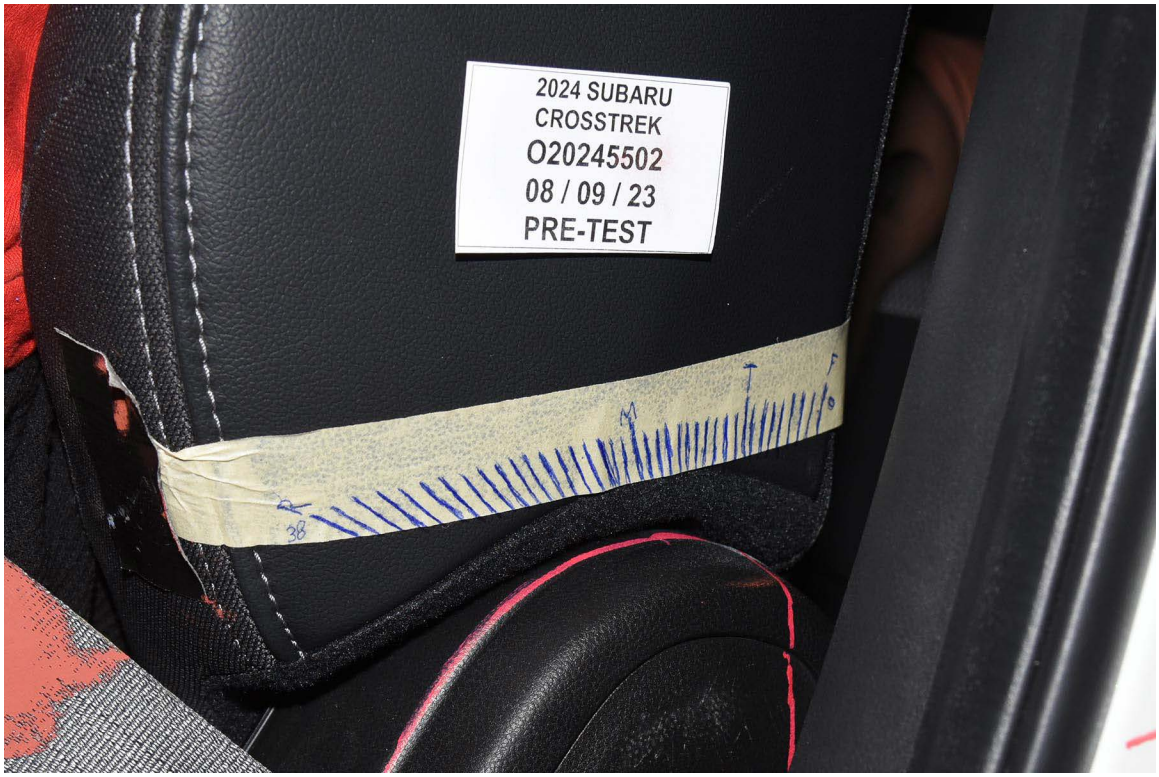


FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back

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 Showing Driver Dummy Contact Locations

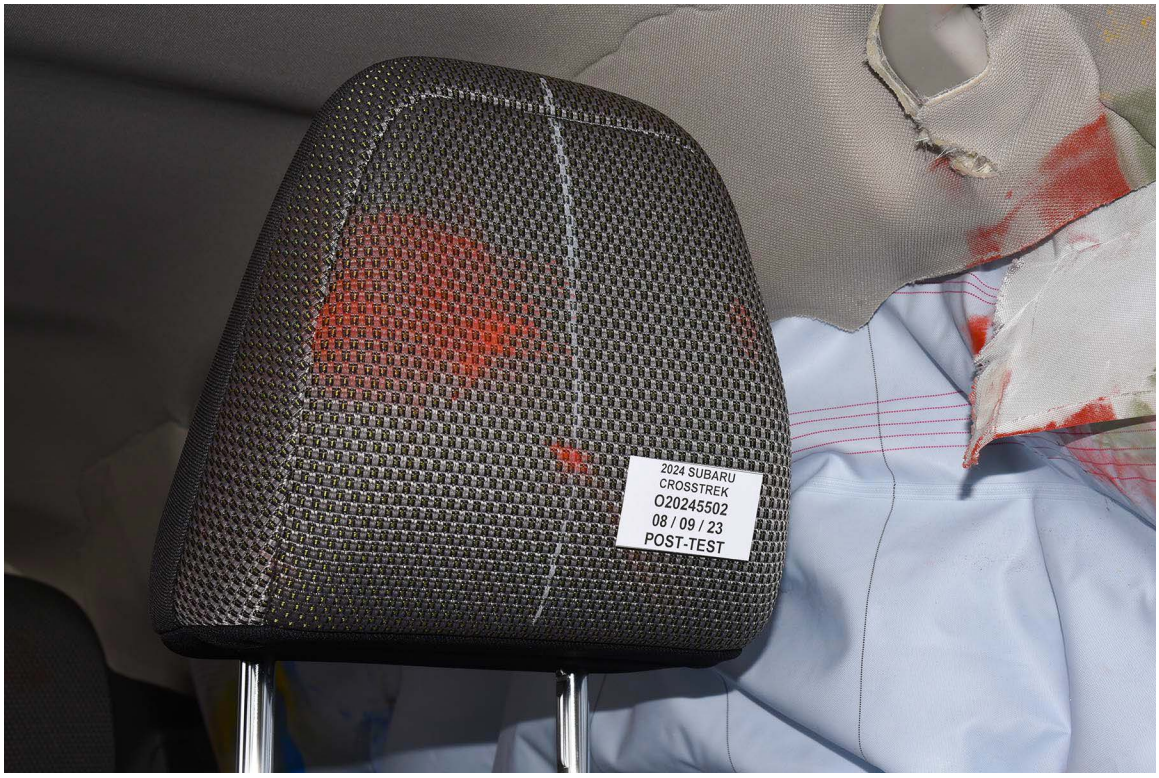


FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact with Vehicle Interior View

FIGURE 48a. 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 Airbag 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 Airbag 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

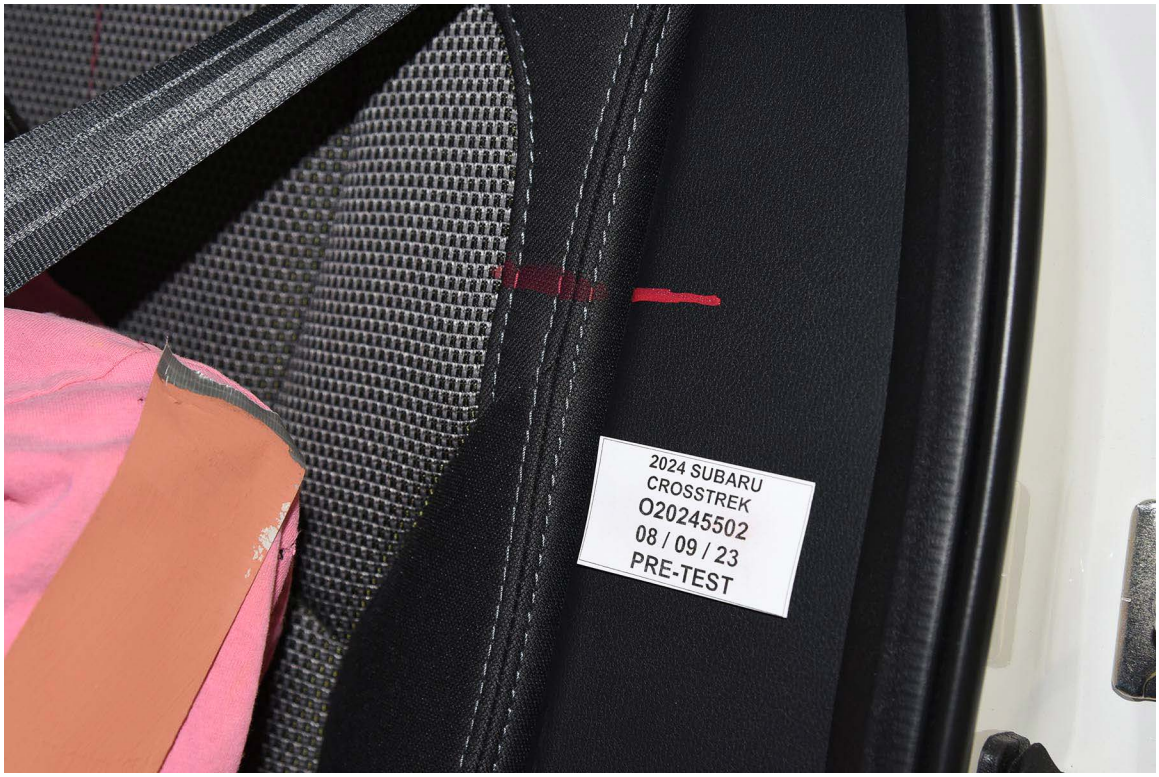


FIGURE 67. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

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

Photograph Not Applicable

Vehicle Not Equipped With Rear Passenger Side Airbag

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

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

Photograph Not Applicable

Vehicle Not Equipped 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 View of MDB Impactor Face

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

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

FIGURE 91. Post-Test Right 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

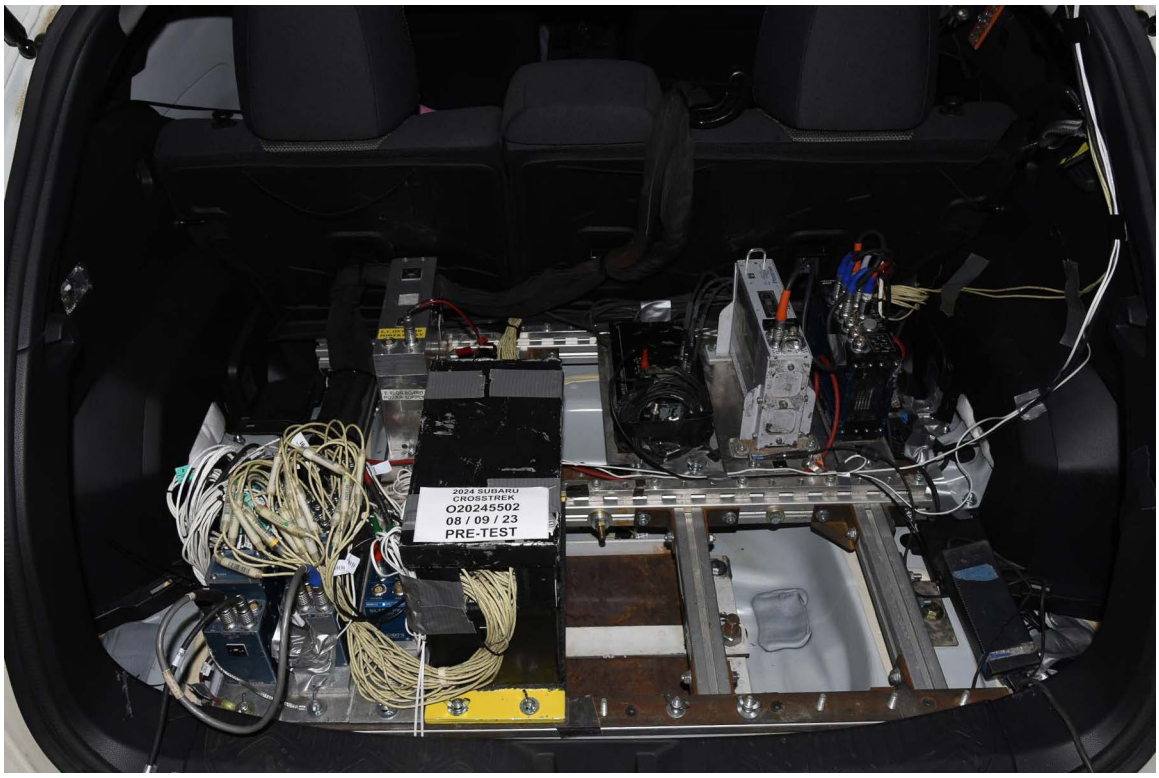


FIGURE 94. Pre-Test Ballast View

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

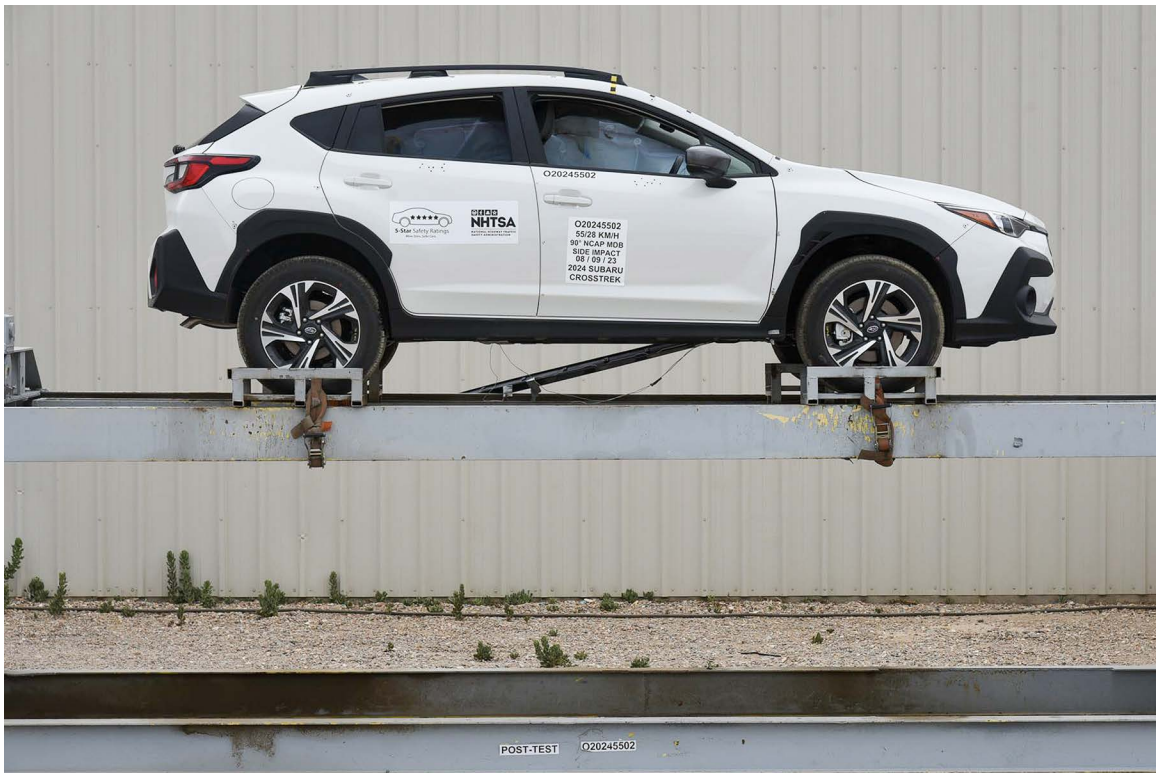


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees

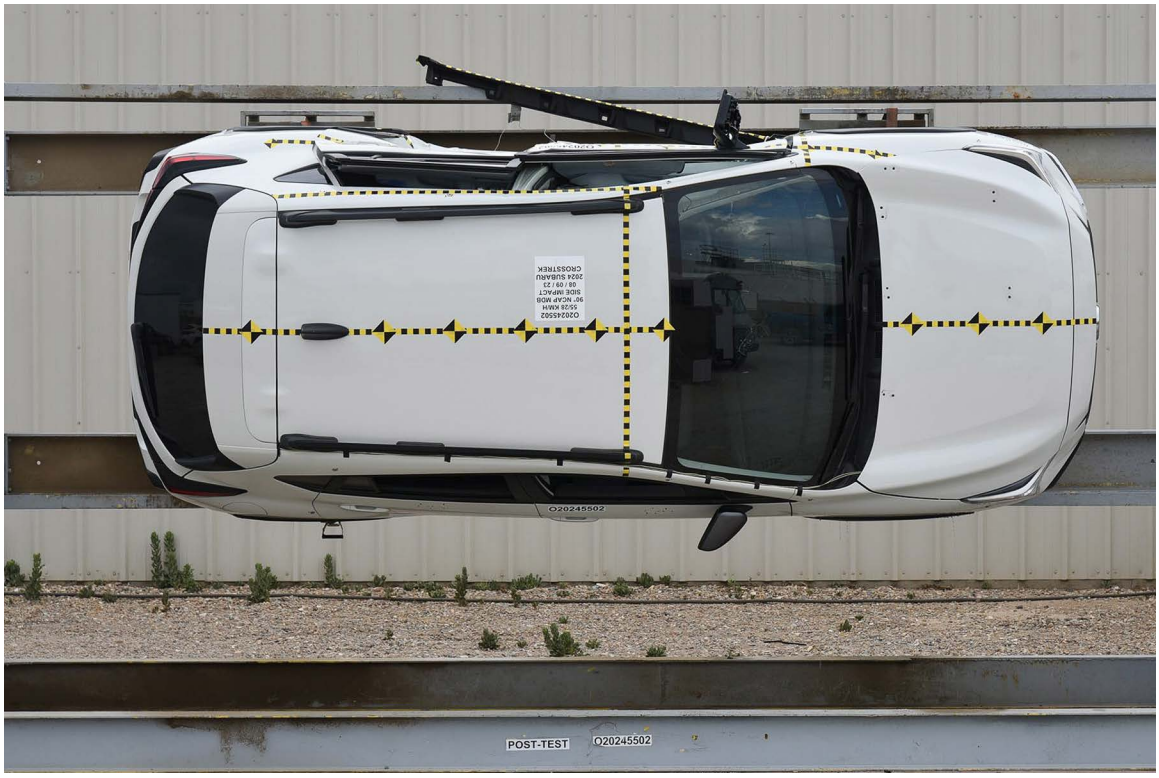


FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees

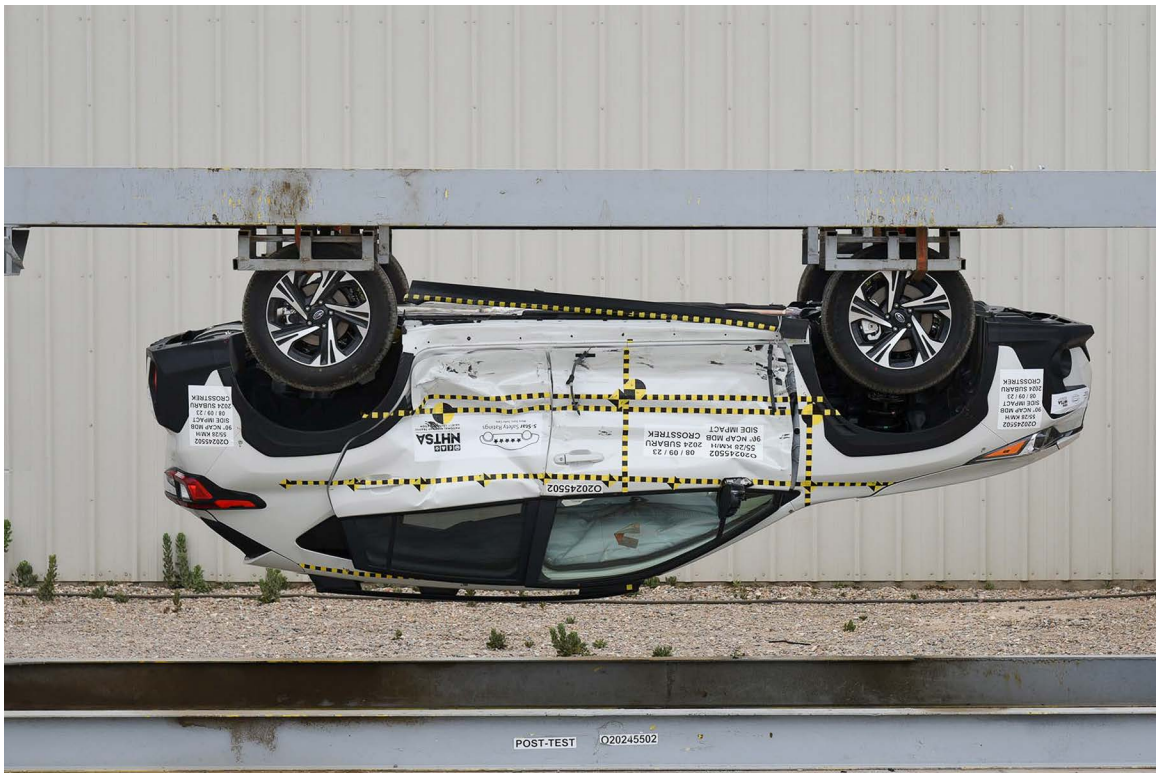


FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

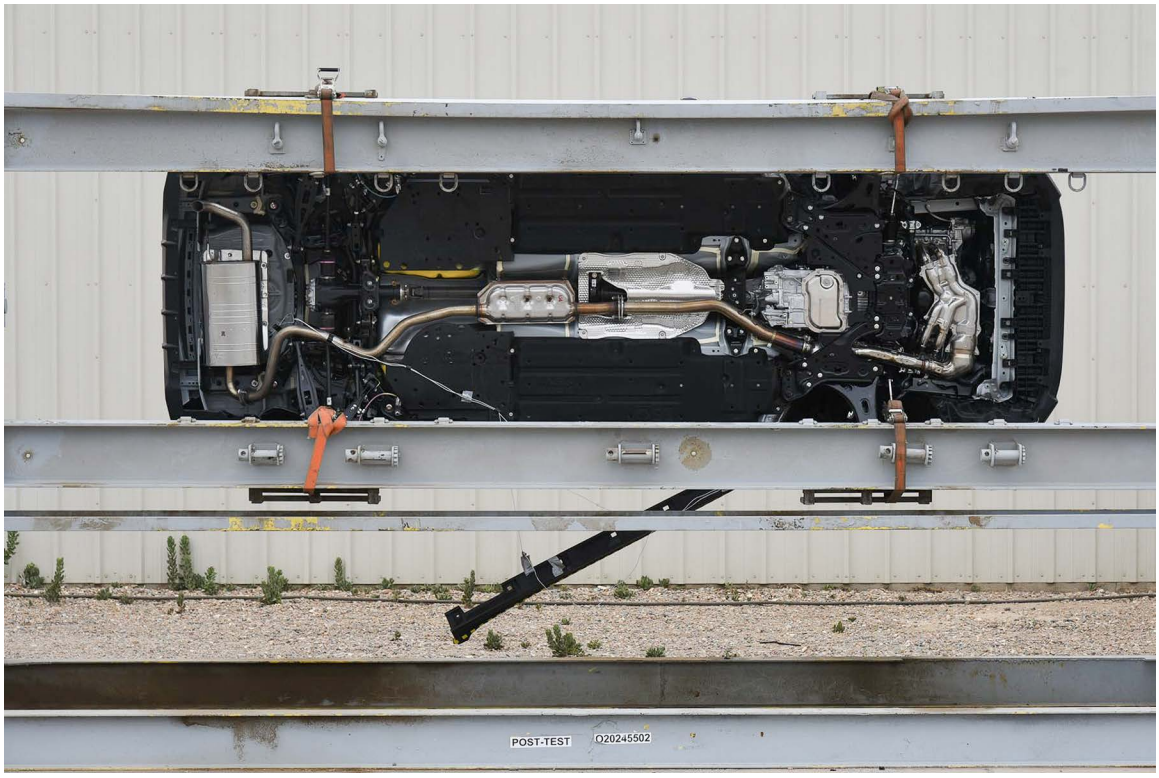


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

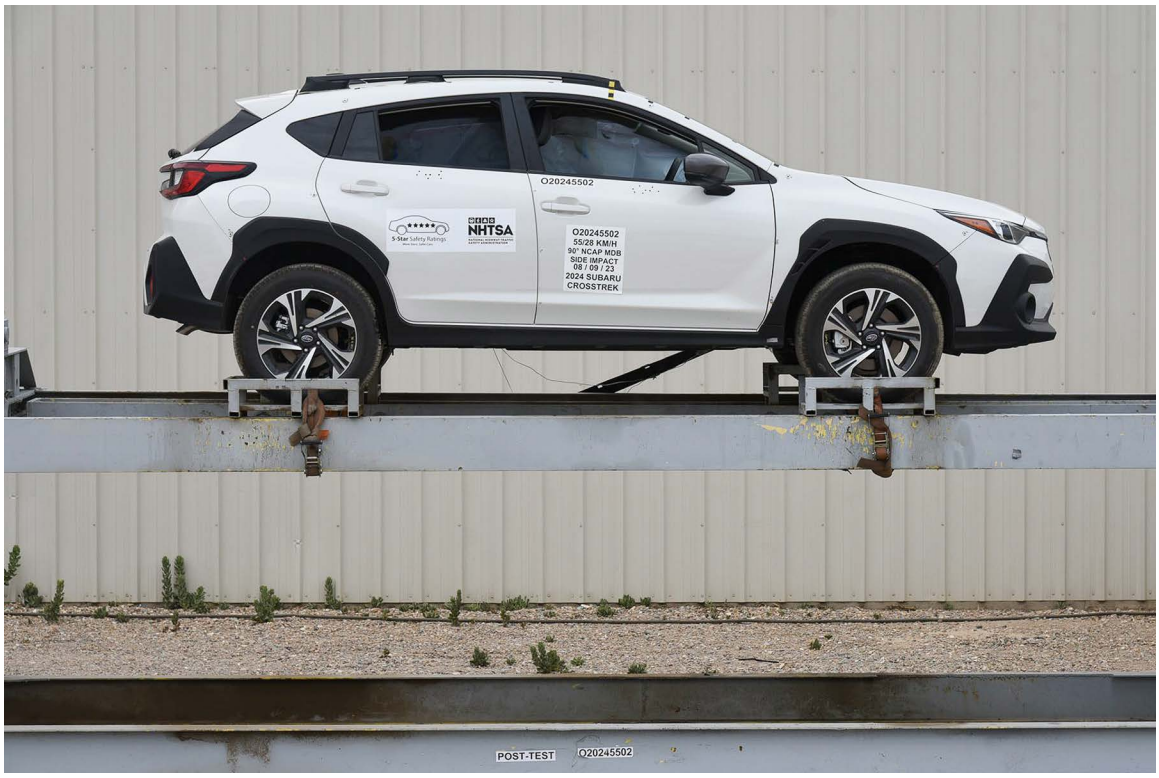
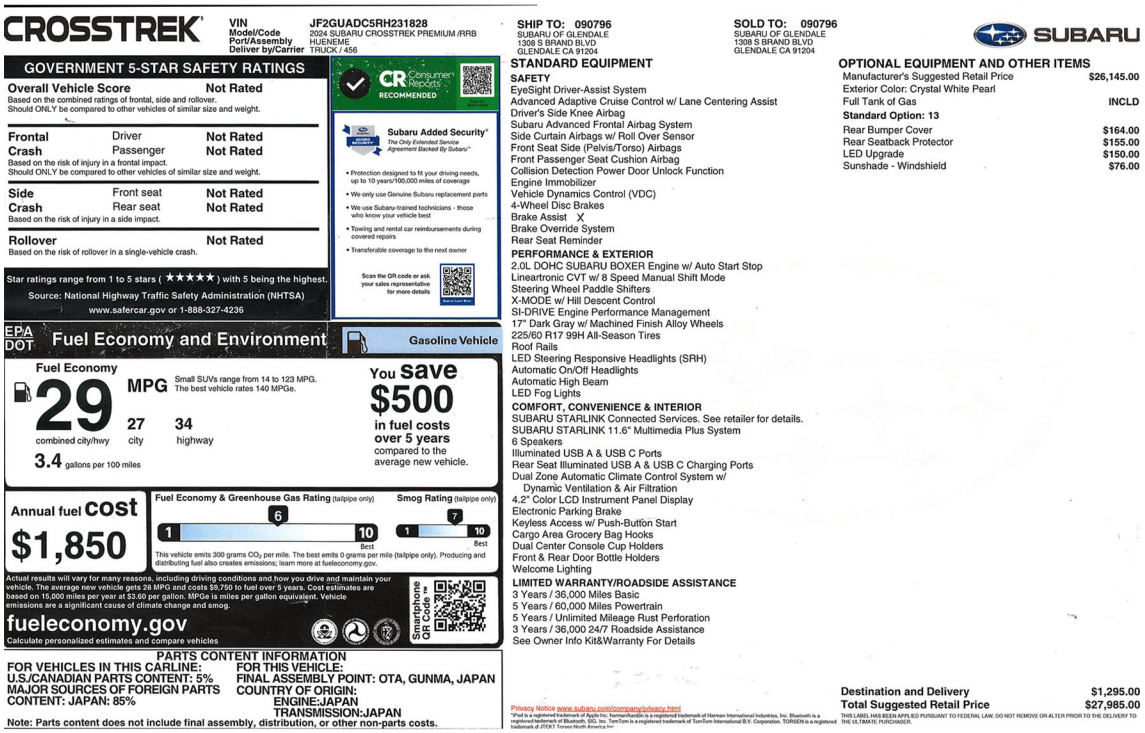


FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees

FIGURE 101. Impact Event



CROSSTREK

VIN JF2GUADC5RH231828
Model/Code 2024 SUBARU CROSSTREK PREMIUM /RRB
Port/Assembly HUENEME
Deliver by/Carrier TRUCK / 456

SHIP TO: 090796
SUBARU OF GLENDALE
1308 S BRAND BLVD
GLENDALE CA 91204

SOLD TO: 090796
SUBARU OF GLENDALE
1308 S BRAND BLVD
GLENDALE CA 91204

SUBARU

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score — Not Rated
Based on the combined ratings of frontal, side and rollover.
Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash — Driver — Not Rated; Passenger — Not Rated
Based on the risk of injury in a frontal impact.
Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat — Not Rated; Rear seat — Not Rated
Based on the risk of injury in a side impact.

Rollover — Not Rated
Based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

CR Consumer Reports RECOMMENDED

Subaru Added Security®
The Only Extended Service Agreement Backed By Subaru™

- Protection designed to fit your driving needs, up to 10 years/100,000 miles of coverage
- We only use Genuine Subaru replacement parts
- We use Subaru-trained technicians - those who know your vehicle best
- Towing and rental car reimbursements during covered repairs
- Transferable coverage to the next owner

Scan the QR code or ask your sales representative for more details

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy
29 MPG
combined city/hwy
27 city
34 highway
3.4 gallons per 100 miles
Small SUVs range from 14 to 123 MPG. The best vehicle rates 140 MPGe.

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

Annual fuel cost $1,850

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 6 (1 — 10 Best)
Smog Rating (tailpipe only): 7 (1 — 10 Best)
This vehicle emits 300 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $6,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.60 per gallon. MPGe is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

PARTS CONTENT INFORMATION
FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 5%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN: 85%
FOR THIS VEHICLE: FINAL ASSEMBLY POINT: OTA, GUNMA, JAPAN
COUNTRY OF ORIGIN: ENGINE:JAPAN TRANSMISSION:JAPAN
Note: Parts content does not include final assembly, distribution, or other non-parts costs.

STANDARD EQUIPMENT

SAFETY
EyeSight Driver-Assist System
Advanced Adaptive Cruise Control w/ Lane Centering Assist
Driver's Side Knee Airbag
Subaru Advanced Frontal Airbag System
Side Curtain Airbags w/ Roll Over Sensor
Front Seat Side (Pelvis/Torso) Airbags
Front Passenger Seat Cushion Airbag
Collision Detection Power Door Unlock Function
Engine Immobilizer
Vehicle Dynamics Control (VDC)
4-Wheel Disc Brakes
Brake Assist X
Brake Override System
Rear Seat Reminder

PERFORMANCE & EXTERIOR
2.0L DOHC SUBARU BOXER Engine w/ Auto Start Stop
Lineartronic CVT w/ 8 Speed Manual Shift Mode
Steering Wheel Paddle Shifters
X-MODE w/ Hill Descent Control
SI-DRIVE Engine Performance Management
17" Dark Gray w/ Machined Finish Alloy Wheels
225/60 R17 99H All-Season Tires
Roof Rails
LED Steering Responsive Headlights (SRH)
Automatic On/Off Headlights
Automatic High Beam
LED Fog Lights

COMFORT, CONVENIENCE & INTERIOR
SUBARU STARLINK Connected Services. See retailer for details.
SUBARU STARLINK 11.6" Multimedia Plus System
6 Speakers
Illuminated USB A & USB C Ports
Rear Seat Illuminated USB A & USB C Charging Ports
Dual Zone Automatic Climate Control System w/ Dynamic Ventilation & Air Filtration
4.2" Color LCD Instrument Panel Display
Electronic Parking Brake
Keyless Access w/ Push-Button Start
Cargo Area Grocery Bag Hooks
Dual Center Console Cup Holders
Front & Rear Door Bottle Holders
Welcome Lighting

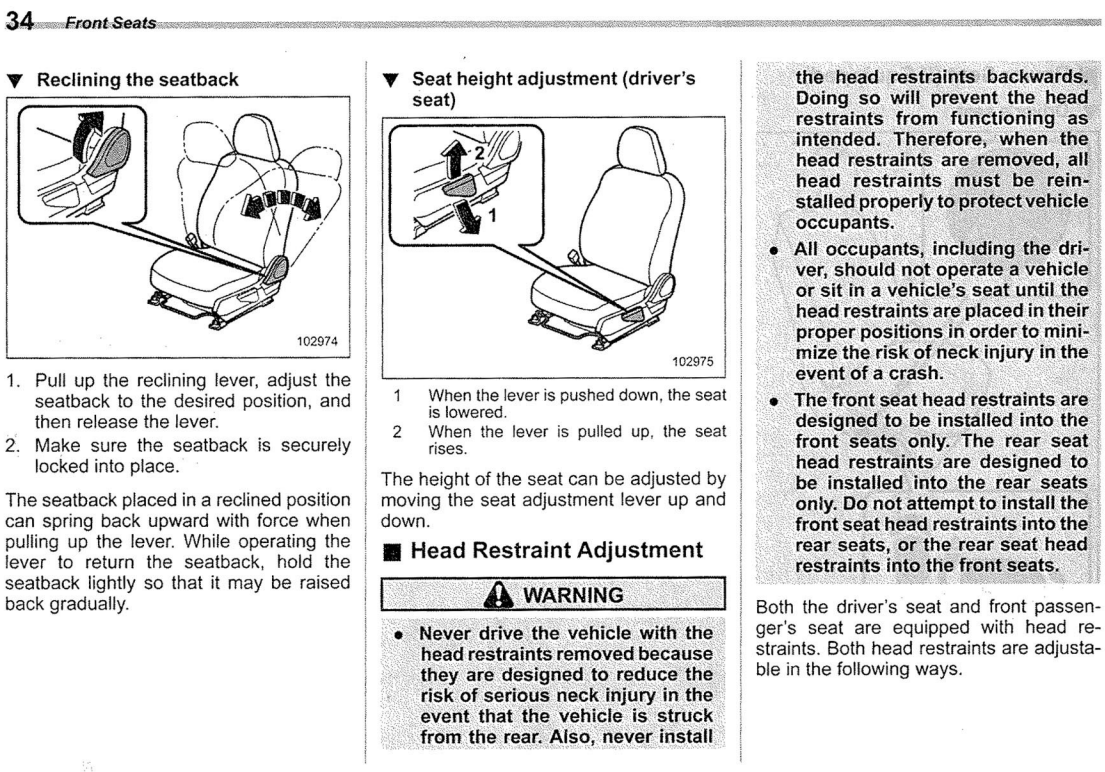
LIMITED WARRANTY/ROADSIDE ASSISTANCE
3 Years / 36,000 Miles Basic
5 Years / 60,000 Miles Powertrain
5 Years / Unlimited Mileage Rust Perforation
3 Years / 36,000 24/7 Roadside Assistance
See Owner Info Kit&Warranty For Details

OPTIONAL EQUIPMENT AND OTHER ITEMS

Manufacturer's Suggested Retail Price	$26,145.00
Exterior Color: Crystal White Pearl	
Full Tank of Gas	INCLD
Standard Option: 13	
Rear Bumper Cover	$164.00
Rear Seatback Protector	$155.00
LED Upgrade	$150.00
Sunshade - Windshield	$76.00
Destination and Delivery	$1,295.00
Total Suggested Retail Price	$27,985.00

Privacy Notice www.subaru.com/company/privacy.html
"iPod is a registered trademark of Apple Inc. harman/kardon is a registered trademark of Harman International Industries, Inc. Bluetooth is a registered trademark of Bluetooth. SIG, Inc. TomTom is a registered trademark of TomTom International B.V. Corporation. TORSEN is a registered trademark of JTEKT Torsen North America Inc."
THIS LABEL HAS BEEN APPLIED PURSUANT TO FEDERAL LAW. DO NOT REMOVE OR ALTER PRIOR TO THE DELIVERY TO THE ULTIMATE PURCHASER.

FIGURE 102. Monroney Label



34 *Front Seats*

▼ **Reclining the seatback**

1. Pull up the reclining lever, adjust the seatback to the desired position, and then release the lever.
2. Make sure the seatback is securely locked into place.

The seatback placed in a reclined position can spring back upward with force when pulling up the lever. While operating the lever to return the seatback, hold the seatback lightly so that it may be raised back gradually.

▼ **Seat height adjustment (driver's seat)**

1 When the lever is pushed down, the seat is lowered.
2 When the lever is pulled up, the seat rises.

The height of the seat can be adjusted by moving the seat adjustment lever up and down.

■ Head Restraint Adjustment

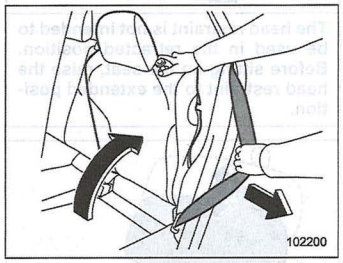
⚠ WARNING

- **Never drive the vehicle with the head restraints removed because they are designed to reduce the risk of serious neck injury in the event that the vehicle is struck from the rear. Also, never install the head restraints backwards. Doing so will prevent the head restraints from functioning as intended. Therefore, when the head restraints are removed, all head restraints must be reinstalled properly to protect vehicle occupants.**
- **All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.**
- **The front seat head restraints are designed to be installed into the front seats only. The rear seat head restraints are designed to be installed into the rear seats only. Do not attempt to install the front seat head restraints into the rear seats, or the rear seat head restraints into the front seats.**

Both the driver's seat and front passenger's seat are equipped with head restraints. Both head restraints are adjustable in the following ways.

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

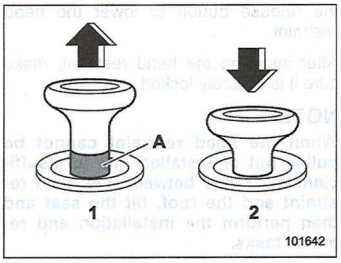
▼ Return the rear seatback



WARNING

- **When returning the seatback to its original position, observe the following precaution.**

  Failure to observe the precaution may damage the seatbelt, impairing its effectiveness, and possibly result in a serious injury.
- **When returning the seatback to its original position, pull the seatbelt out towards the vehicle exterior so that it will not be caught between the seatback and the trim.**



Lock release knob
1 Unlocked
2 Locked
A Unlocking marker in red

To return the seatback to its original position, raise the seatback until it locks into place and make sure that the unlocking marker on the lock release knob is no longer visible.

WARNING

When you return the seatback to its original position, check that the unlocking marker on the lock release knob is not visible. Also, shake the seatback slightly to confirm that it is securely fixed in place. If the seatback is not securely fixed in place, the seatback may suddenly fold down in the event of sudden braking, or objects may move out from the cargo area, which could cause serious injury or death.

■ Head Restraint Adjustment

Both the rear window side seats and the rear center seat are equipped with head restraints.

WARNING

- **Never drive the vehicle with the head restraints removed because they are designed to reduce the risk of serious neck injury in the event that the vehicle is struck from the rear. Therefore, when the head restraints are removed, all head restraints must be reinstalled properly to protect vehicle occupants.**
- **All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.**
- **The front seat head restraints are designed to be installed into the**

– CONTINUED –

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

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

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

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)

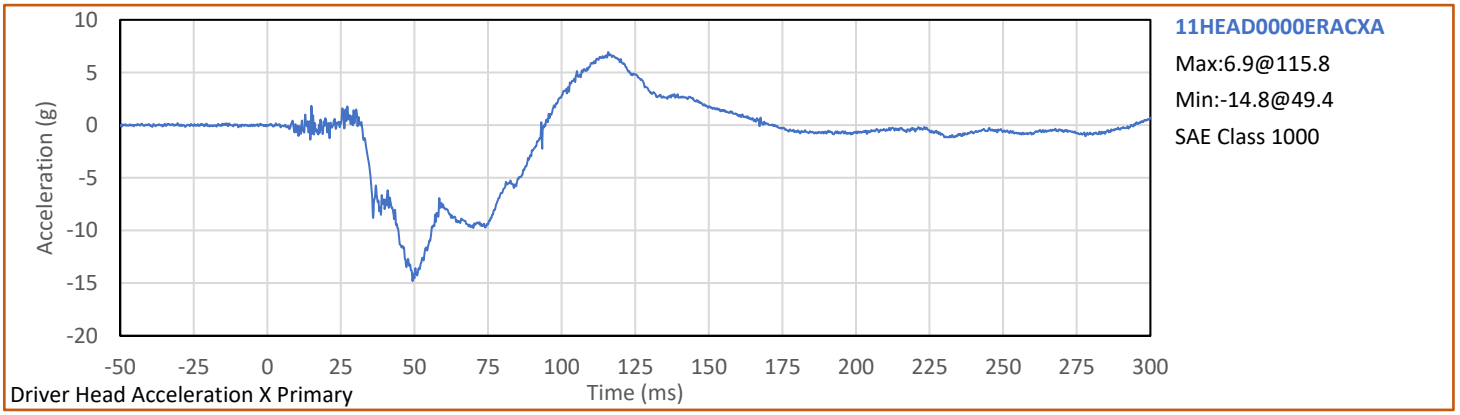
MDB Rear Acceleration (X)

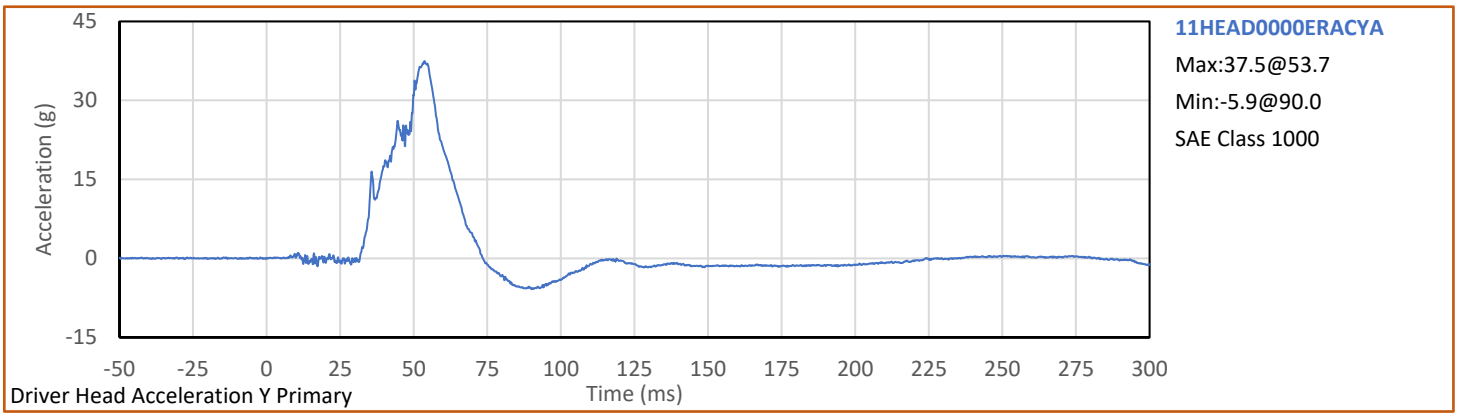
MDB Rear Acceleration (Y)

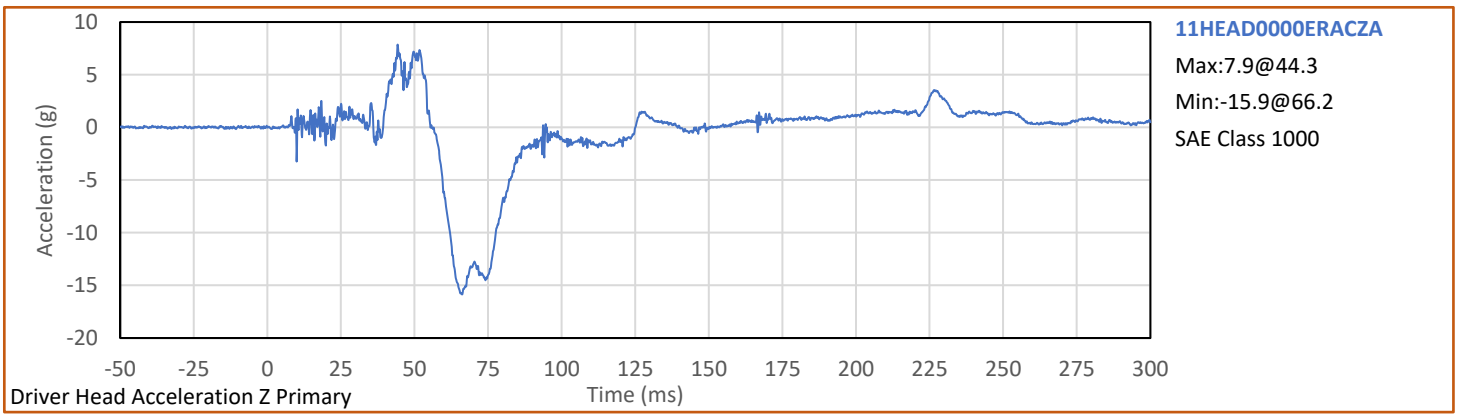
Left MDB Contact Switch

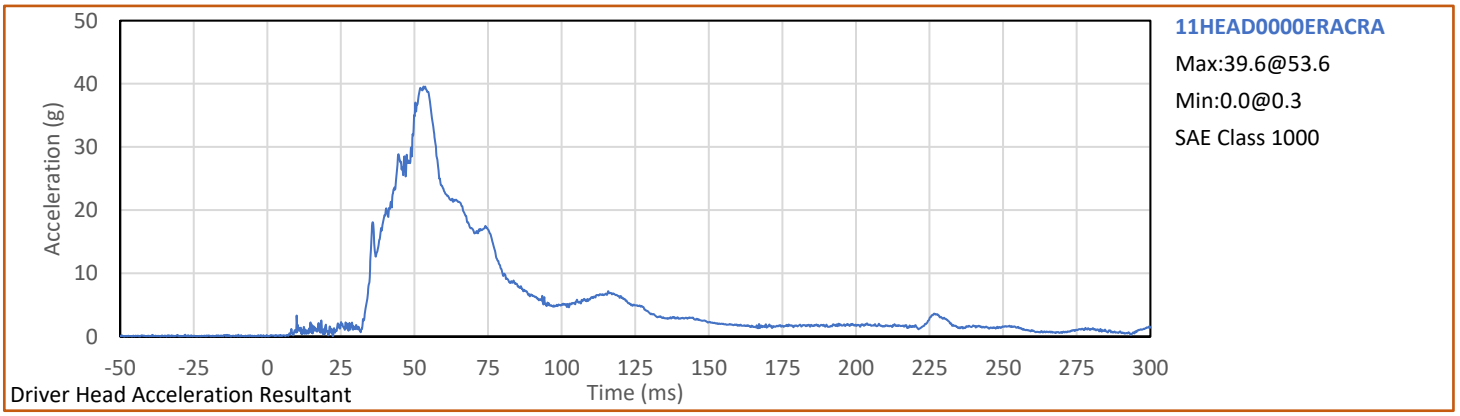
Right MDB Contact Switch

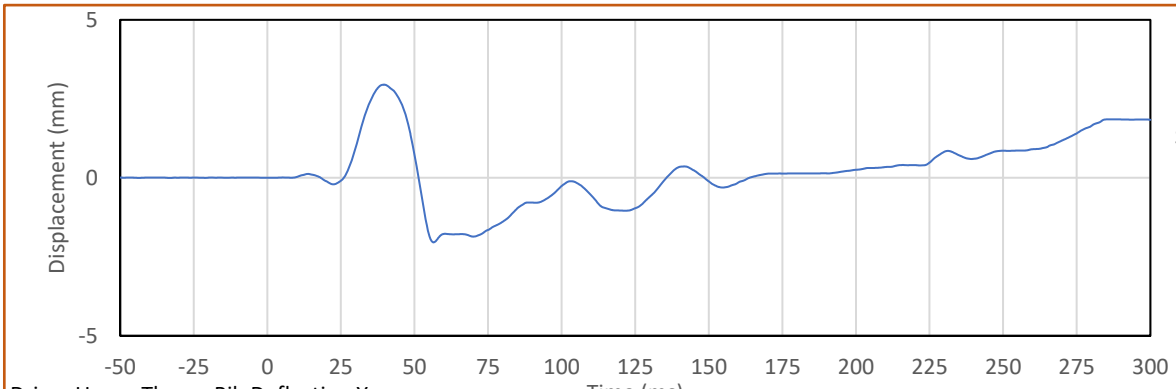
Test Vehicle:	2024 Subaru Crosstrek 5-Door SW	NHTSA No.:	O20245502
Test Program:	NCAP MDB Side Impact Test	Test Date:	8/9/2023





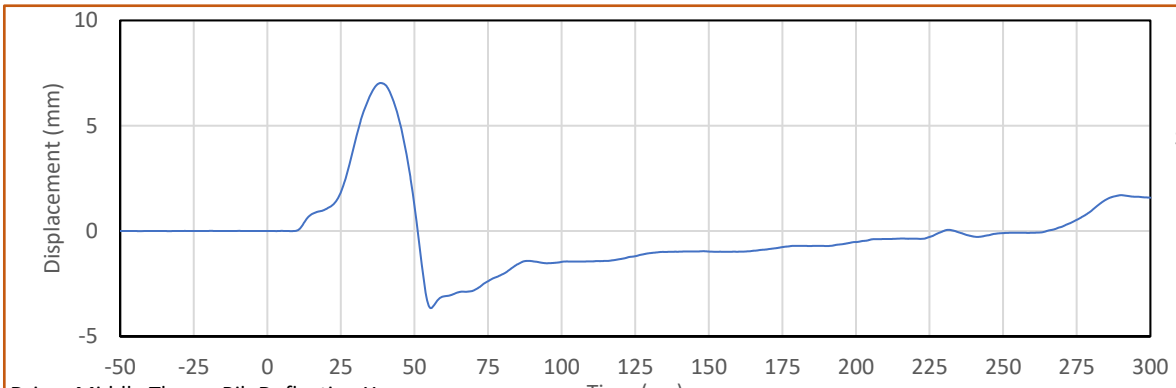






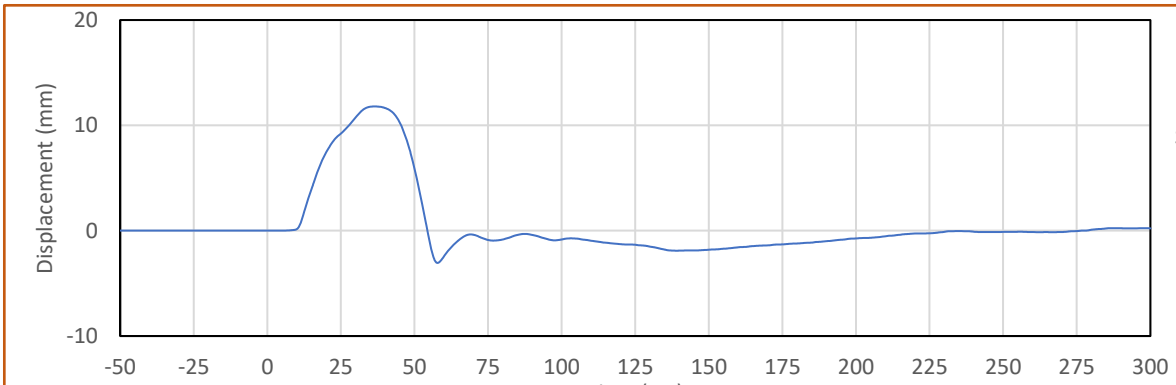
Driver Upper Thorax Rib Deflection Y

11RIBSLEUPERDSYC
Max:2.9@39.6
Min:-2.0@56.5
SAE Class 180



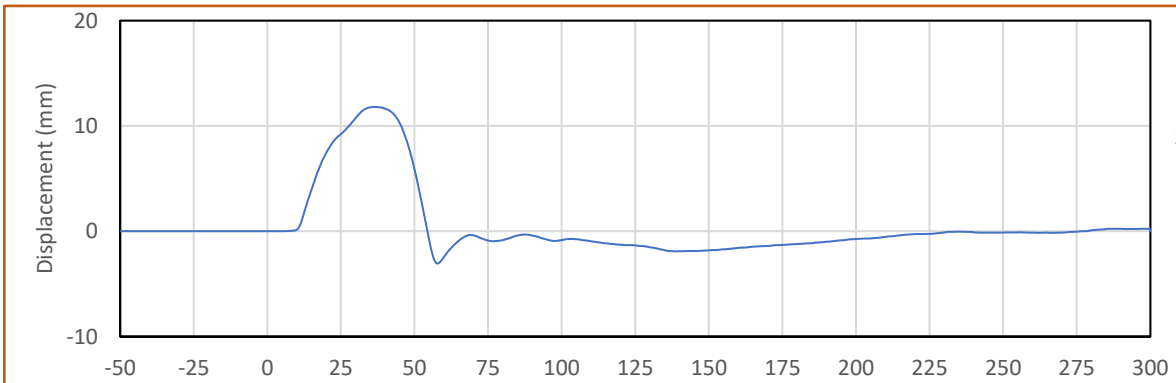
Driver Middle Thorax Rib Deflection Y

11RIBSLEMIERDSYC
Max:7.0@38.5
Min:-3.7@55.6
SAE Class 180



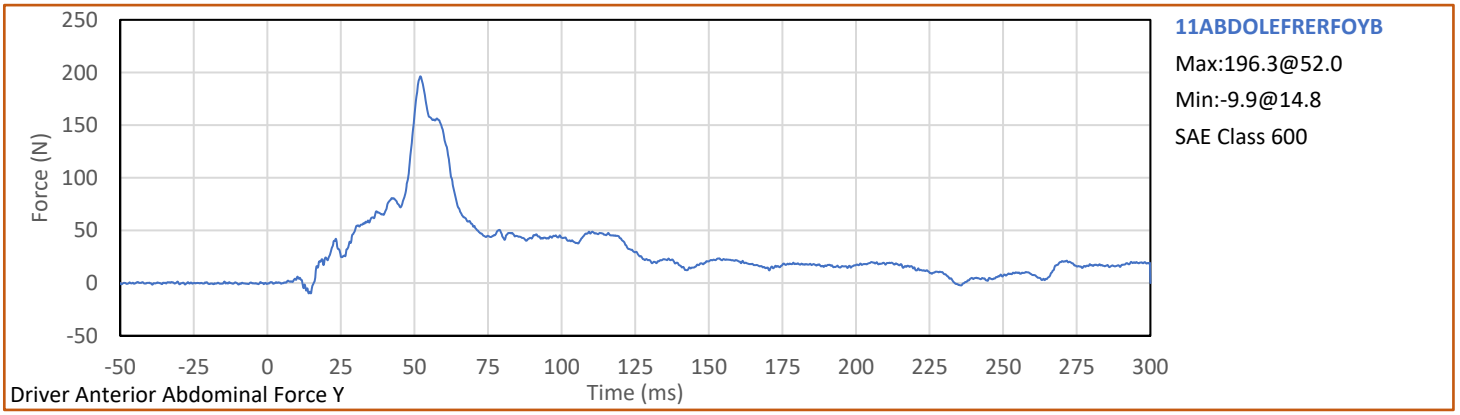
Driver Lower Thorax Rib Deflection Y

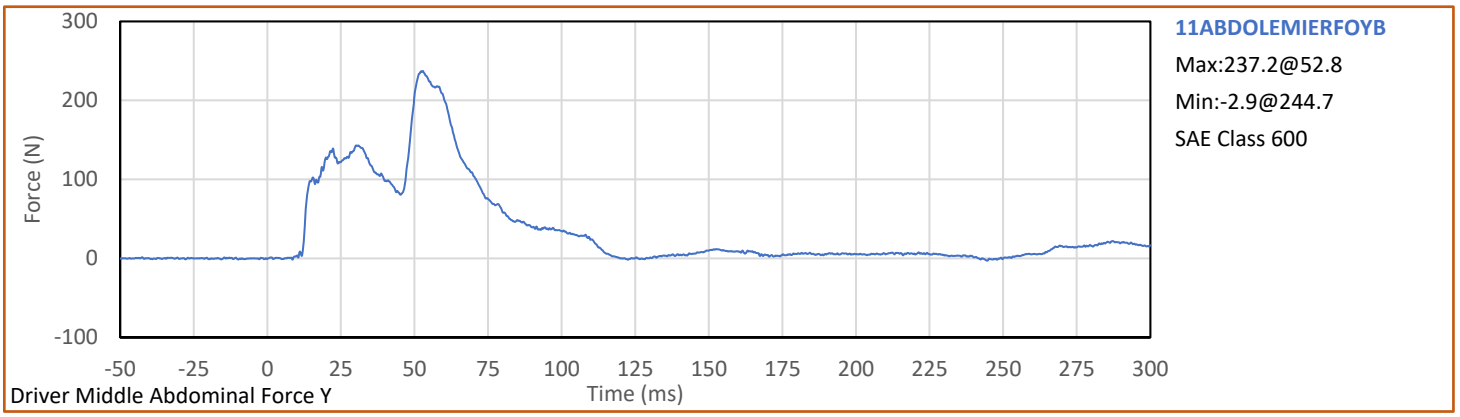
11RIBSLELOERDSYC
Max:11.8@36.5
Min:-3.1@57.8
SAE Class 180

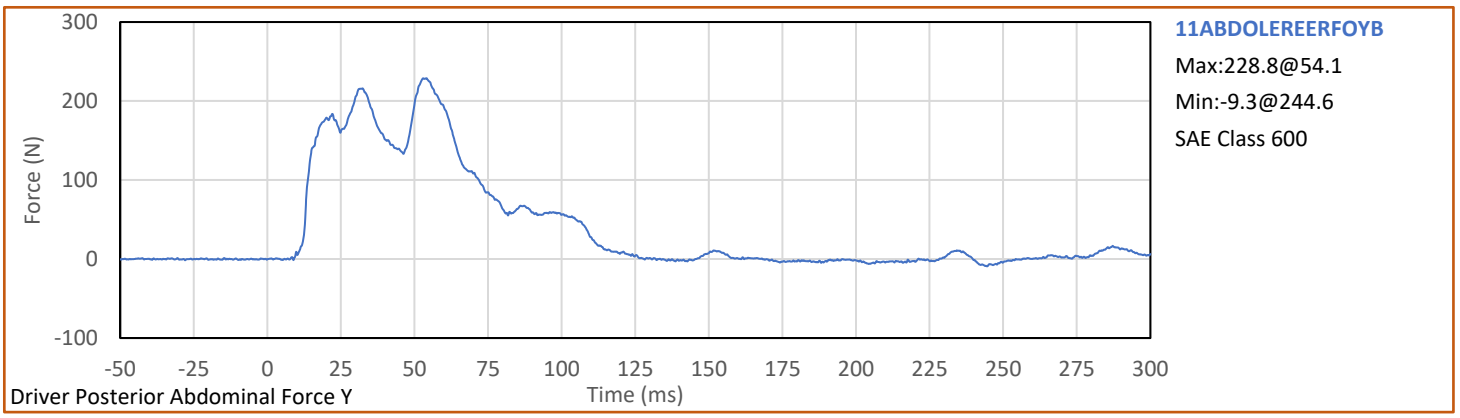


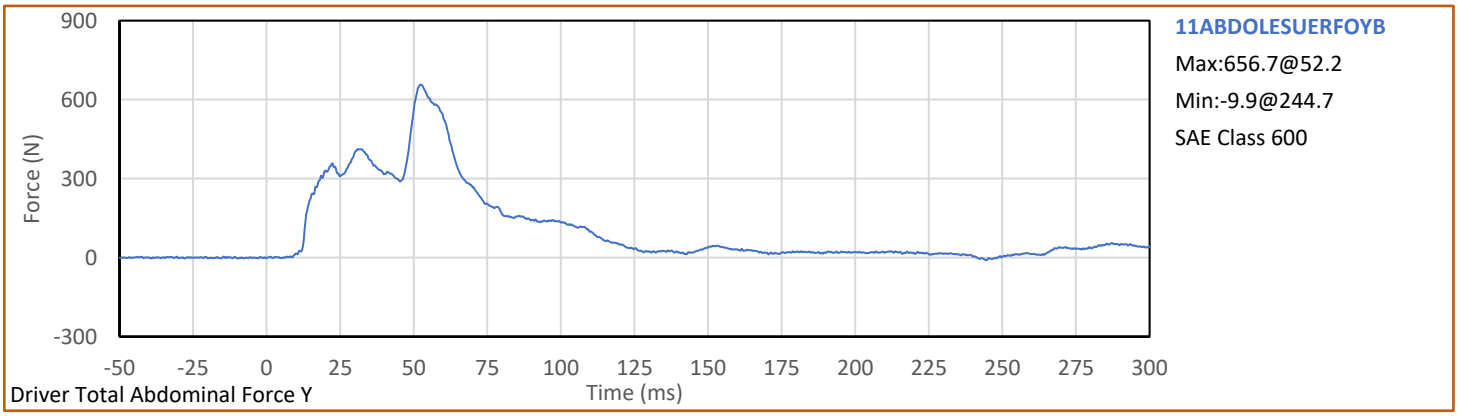
(Maximum) Driver Lower Thorax Rib Deflection Y

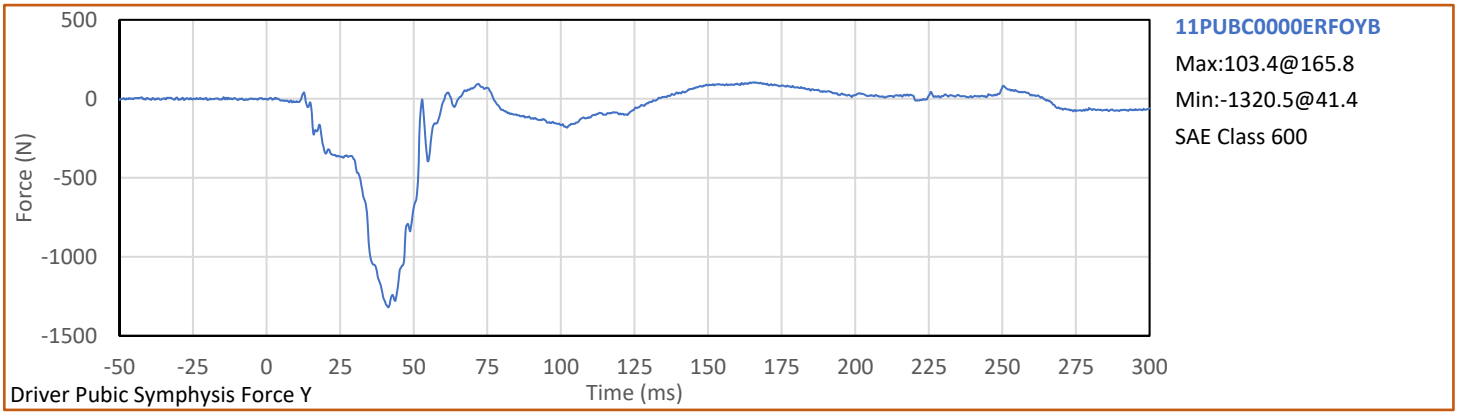
11RIBSLELOERDSYC
Max:11.8@36.5
Min:-3.1@57.8
SAE Class 180

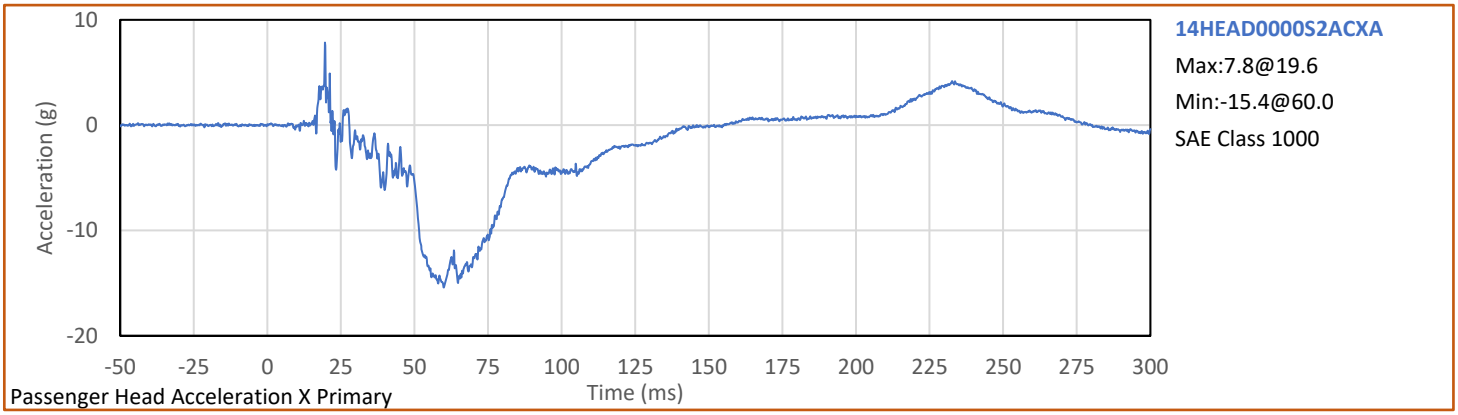

Force (N)
Time (ms)
Driver Anterior Abdominal Force Y
11ABDOLEFRERFOYB
Max:196.3@52.0
Min:-9.9@14.8
SAE Class 600

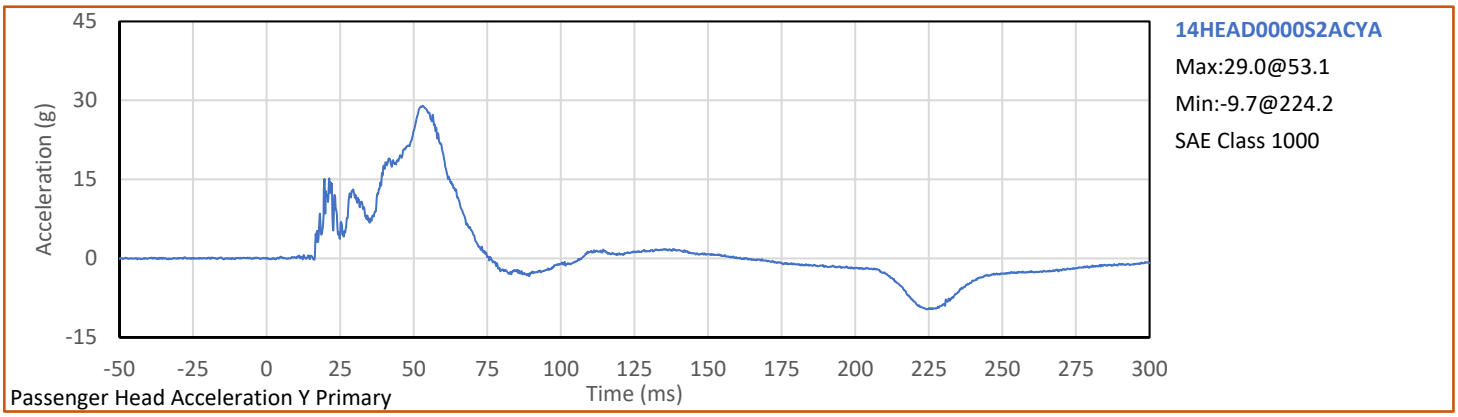

Force (N)
Time (ms)
Driver Middle Abdominal Force Y
11ABDOLEMIERFOYB
Max:237.2@52.8
Min:-2.9@244.7
SAE Class 600

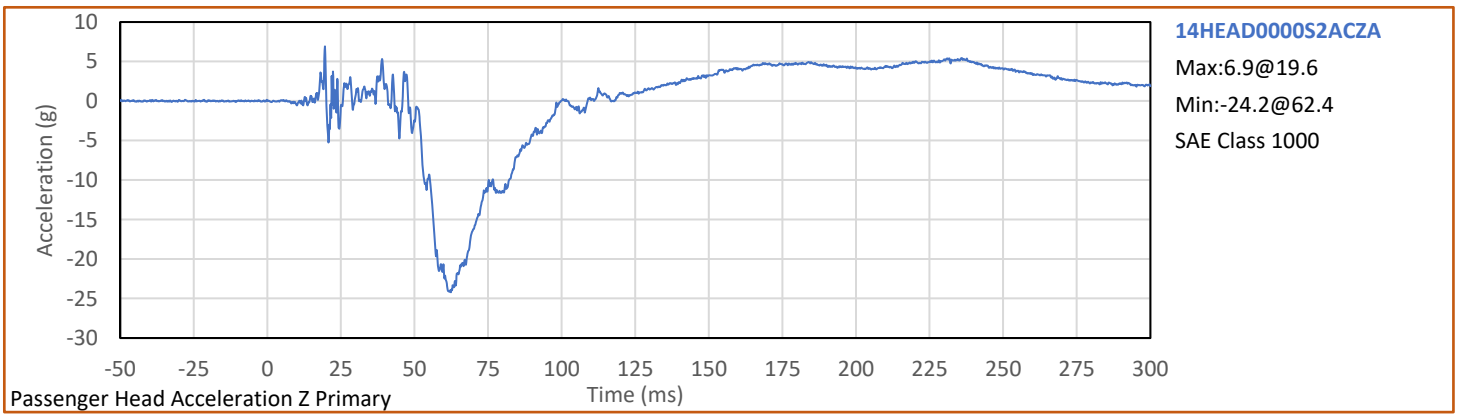

Force (N)
Time (ms)
Driver Posterior Abdominal Force Y
11ABDOLEREERFOYB
Max:228.8@54.1
Min:-9.3@244.6
SAE Class 600

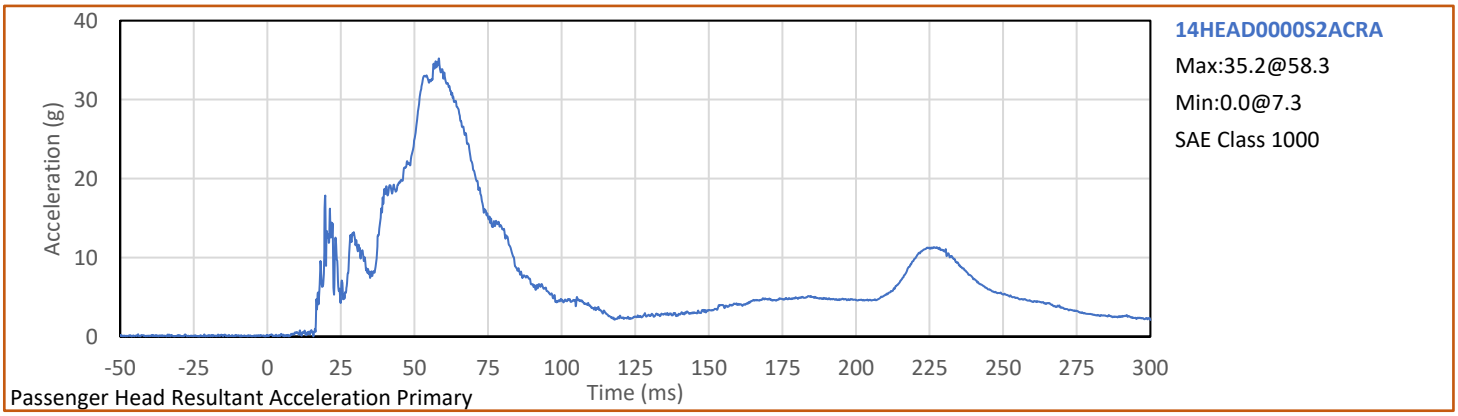

Force (N)
Time (ms)
Driver Total Abdominal Force Y
11ABDOLESUERFOYB
Max:656.7@52.2
Min:-9.9@244.7
SAE Class 600

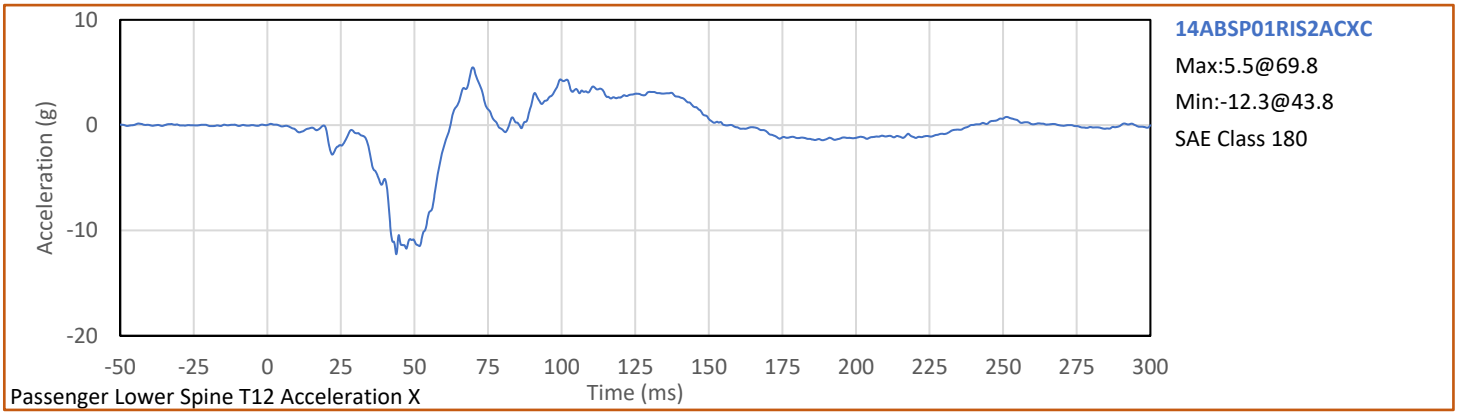

500
0
-500
-1000
-1500
Force (N)
-50
-25
0
25
50
75
100
125
150
175
200
225
250
275
300
Time (ms)
Driver Pubic Symphysis Force Y
11PUBC0000ERFOYB
Max:103.4@165.8
Min:-1320.5@41.4
SAE Class 600

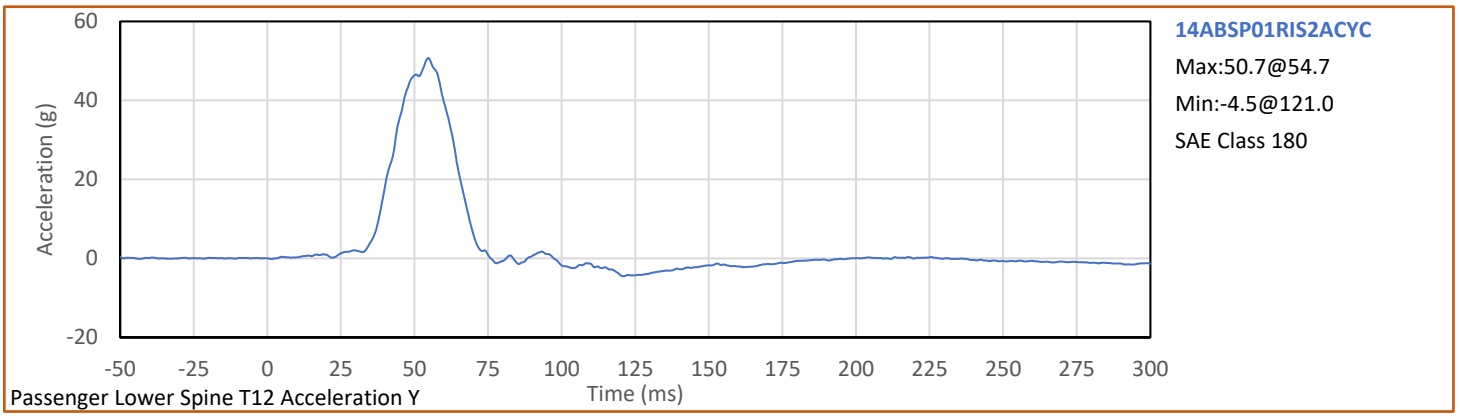

14HEAD0000S2ACXA
Max:7.8@19.6
Min:-15.4@60.0
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Acceleration X Primary

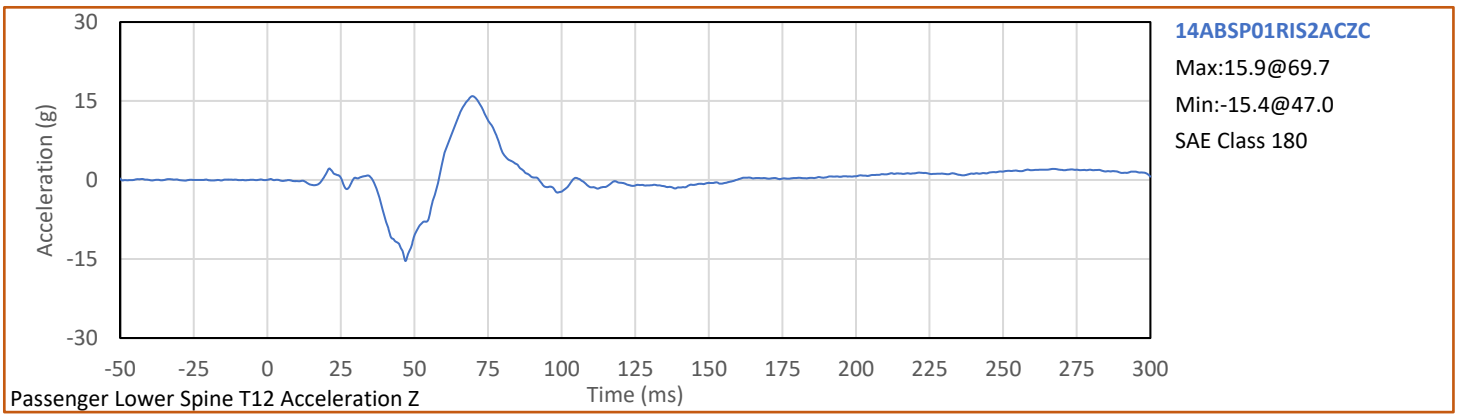

14HEAD0000S2ACYA
Max:29.0@53.1
Min:-9.7@224.2
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Acceleration Y Primary

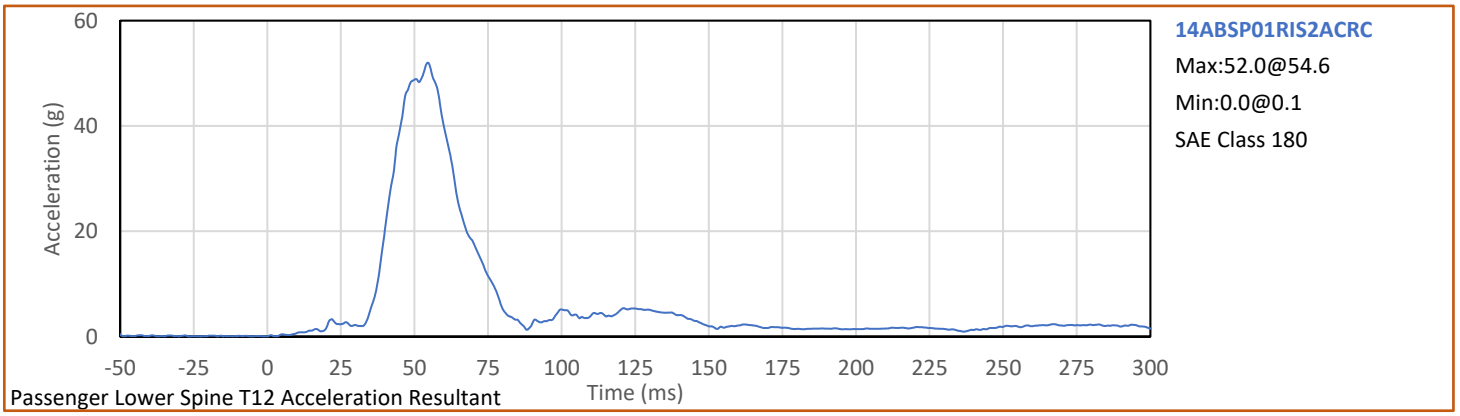

14HEAD0000S2ACZA
Max:6.9@19.6
Min:-24.2@62.4
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Acceleration Z Primary

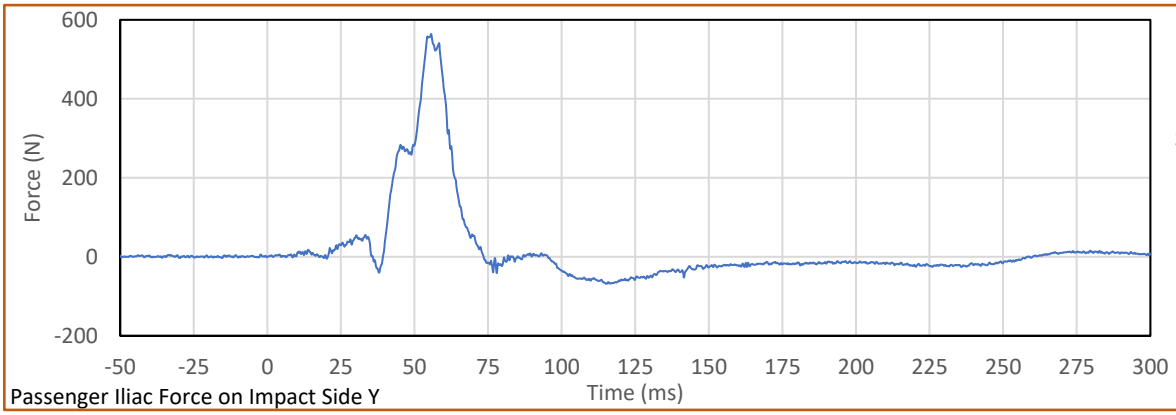

14HEAD0000S2ACRA
Max:35.2@58.3
Min:0.0@7.3
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Resultant Acceleration Primary


14ABSP01RIS2ACXC
Max:5.5@69.8
Min:-12.3@43.8
SAE Class 180
Acceleration (g)
Time (ms)
Passenger Lower Spine T12 Acceleration X


14ABSP01RIS2ACYC
Max:50.7@54.7
Min:-4.5@121.0
SAE Class 180
Acceleration (g)
Time (ms)
Passenger Lower Spine T12 Acceleration Y

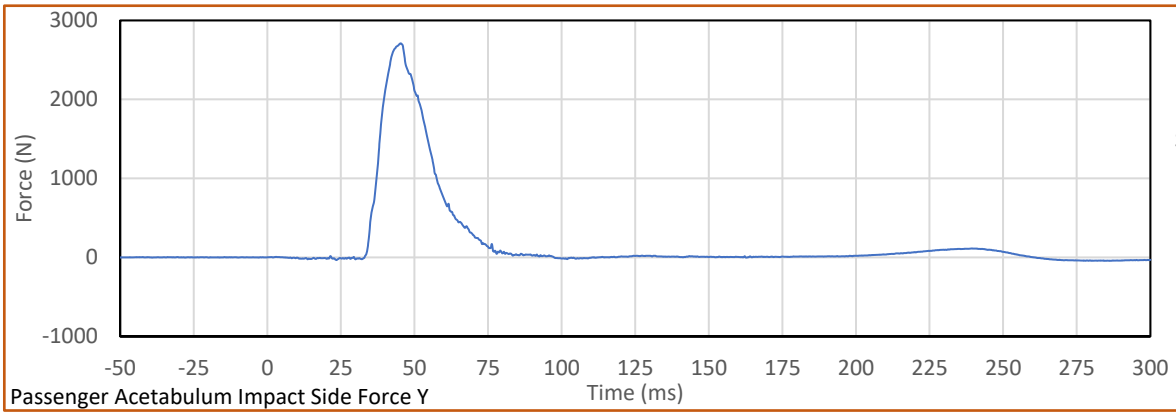

14ABSP01RIS2ACZC
Max:15.9@69.7
Min:-15.4@47.0
SAE Class 180
Acceleration (g)
Time (ms)
Passenger Lower Spine T12 Acceleration Z


14ABSP01RIS2ACRC
Max:52.0@54.6
Min:0.0@0.1
SAE Class 180
Acceleration (g)
Time (ms)
Passenger Lower Spine T12 Acceleration Resultant



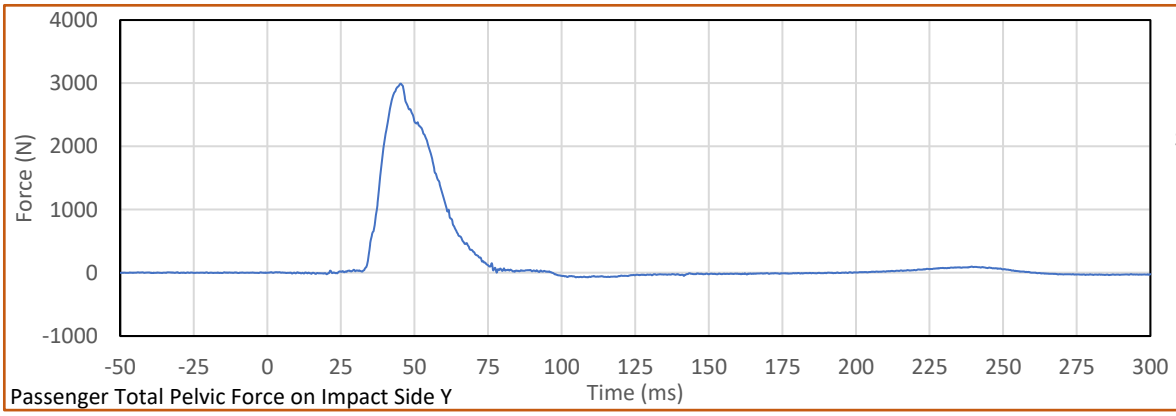
Passenger Iliac Force on Impact Side Y

14ILACLE00S2FOYB
Max:563.8@55.7
Min:-68.5@115.3
SAE Class 600



Passenger Acetabulum Impact Side Force Y

14ACTBLE00S2FOYB
Max:2709.3@45.4
Min:-44.4@286.2
SAE Class 600



Passenger Total Pelvic Force on Impact Side Y

14PELVLE00S2FOYB
Max:2992.1@45.3
Min:-72.2@104.9
SAE Class 600

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

Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
External Measurements

ATD Serial No.: F037 Test Date: 2023-08-07

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	31	Pass
1 - Sitting Height	mm	900	918	910	Pass
2 - Seat to Shoulder Joint	mm	558	572	566	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	443	Pass
6 - Head Width	mm	152	158	157	Pass
7 - Shoulder/Arm Width	mm	461	479	472	Pass
8 - Thorax Width	mm	322	332	328	Pass
9 - Abdomen Width	mm	273	287	285	Pass
10 - Pelvis Lap Width	mm	359	373	366	Pass
11 - Head Depth	mm	196	206	202	Pass
12 - Thorax Depth	mm	262	272	267	Pass
13 - Abdomen Depth	mm	194	204	200	Pass
14 - Pelvis Depth	mm	235	245	239	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	152	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	610	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

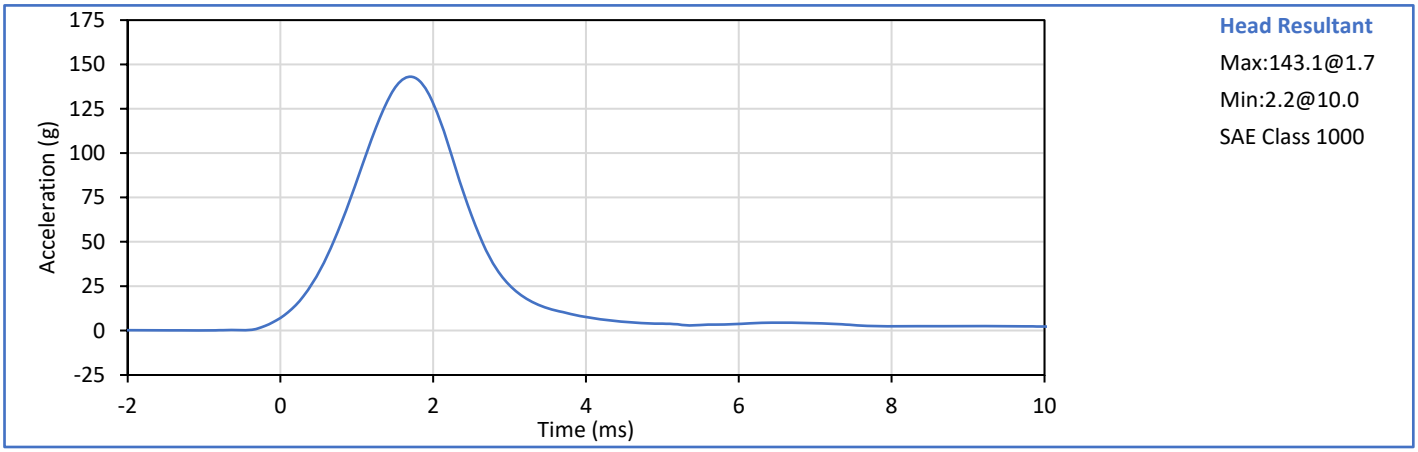
Approved By: J. Hernandez

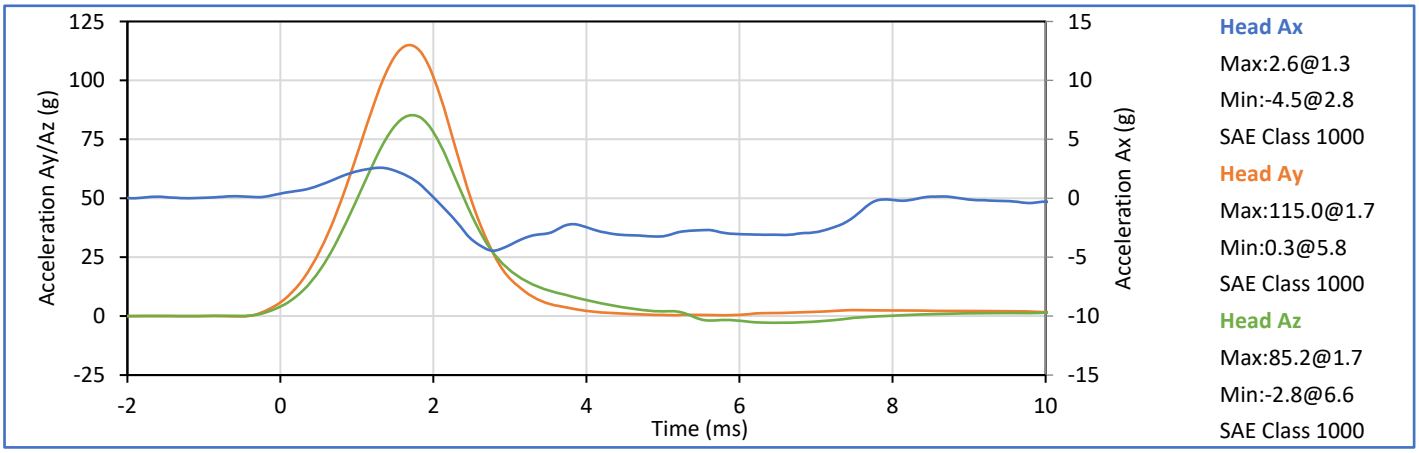
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Head Drop

ATD Serial No.: F037 Test Date: 2023-08-07

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	37	Pass
Peak Resultant Acceleration	g	125.0	155.0	143.1	Pass
Peak Head Ax	g	-15.0	15.0	2.6	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

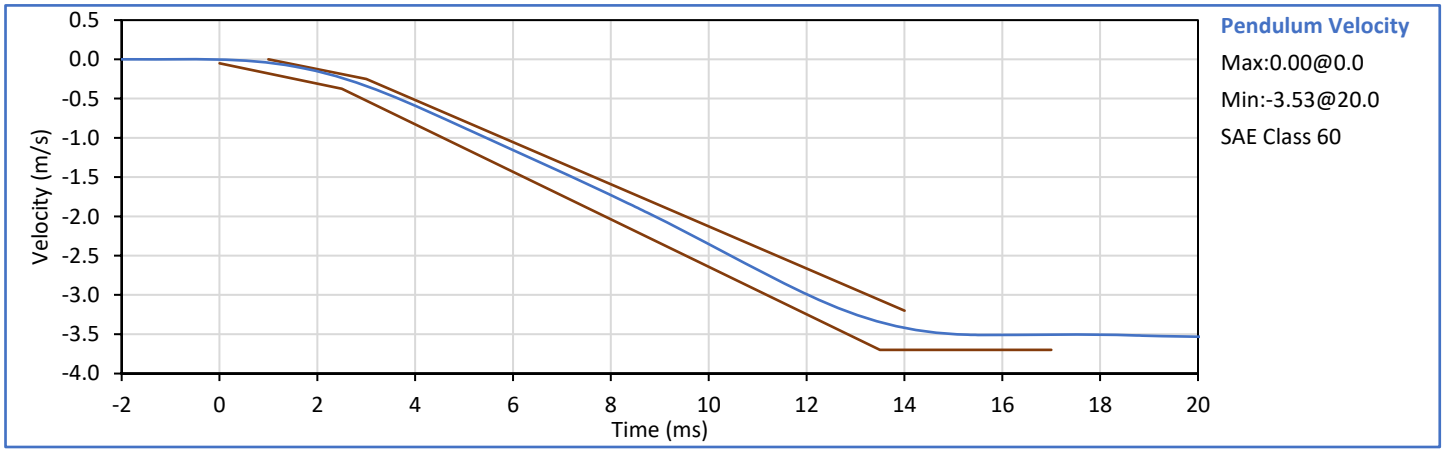
Approved By: J. Hernandez

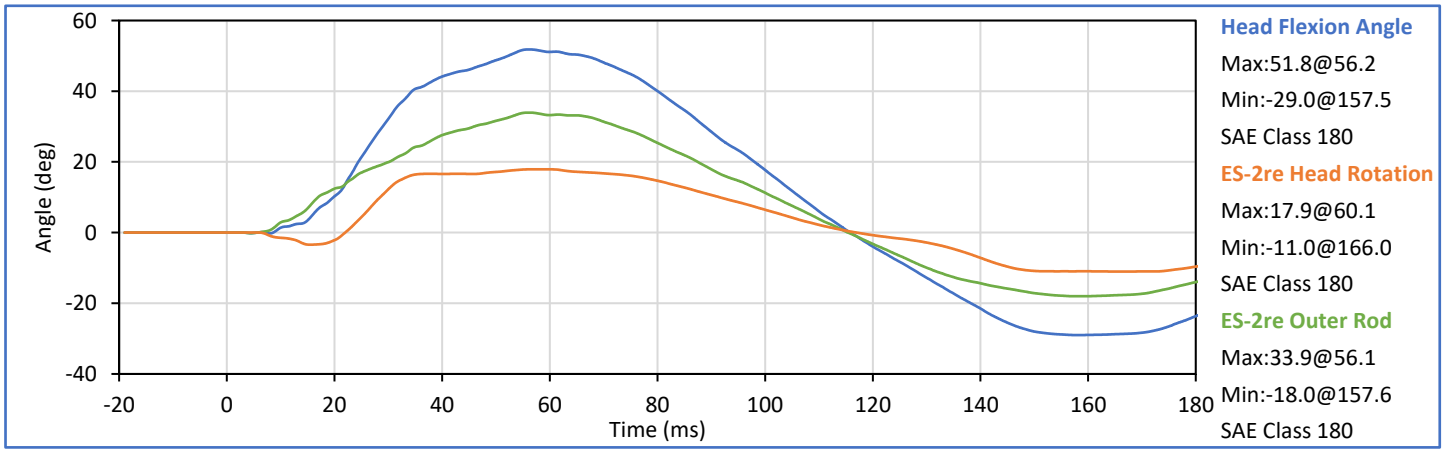
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Neck Flexion

ATD Serial No.: F037 Test Date: 2023-08-07

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Relative Humidity	%	10	70	37	Pass
Pendulum Velocity	m/s	3.30	3.50	3.40	Pass
Peak Headform Flexion	deg	49.0	59.0	51.8	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.2	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	59.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

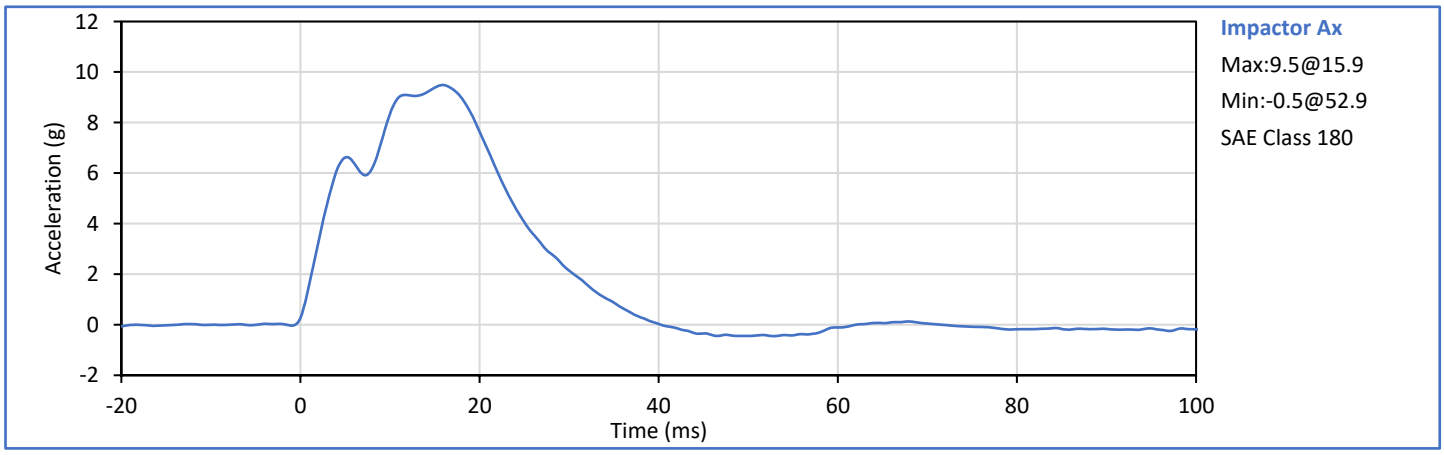
Approved By: J. Hernandez

Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Shoulder Impact Test

ATD Serial No.: F037 Test Date: 2023-08-08

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	37	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Impactor Ax	g	7.5	10.5	9.5	Pass
			Overall Test Results		Pass



Technician: G. Fuentes

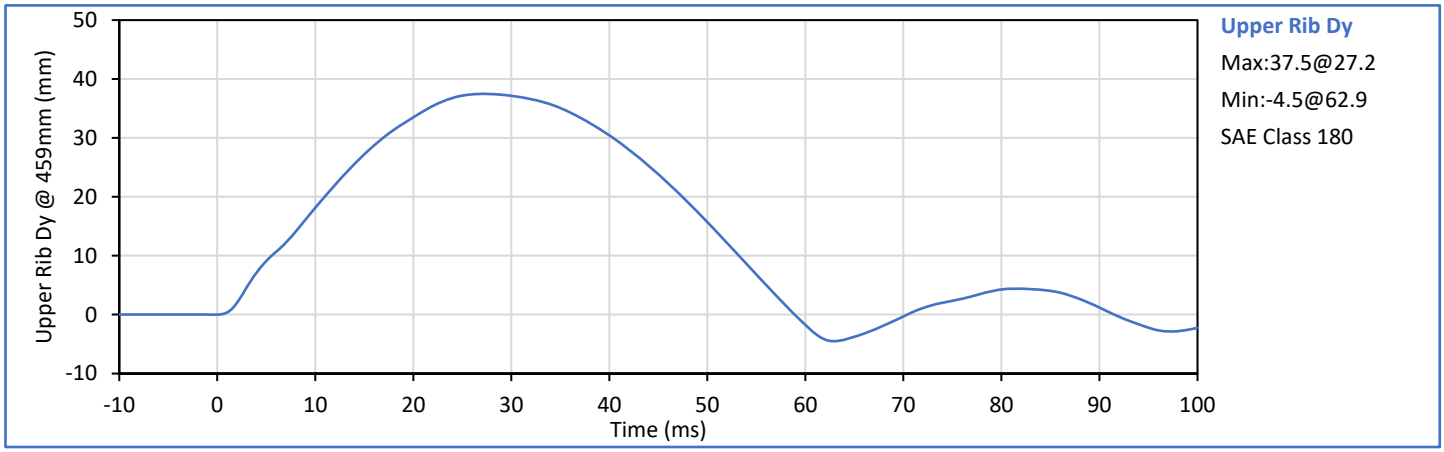
Approved By: J. Hernandez

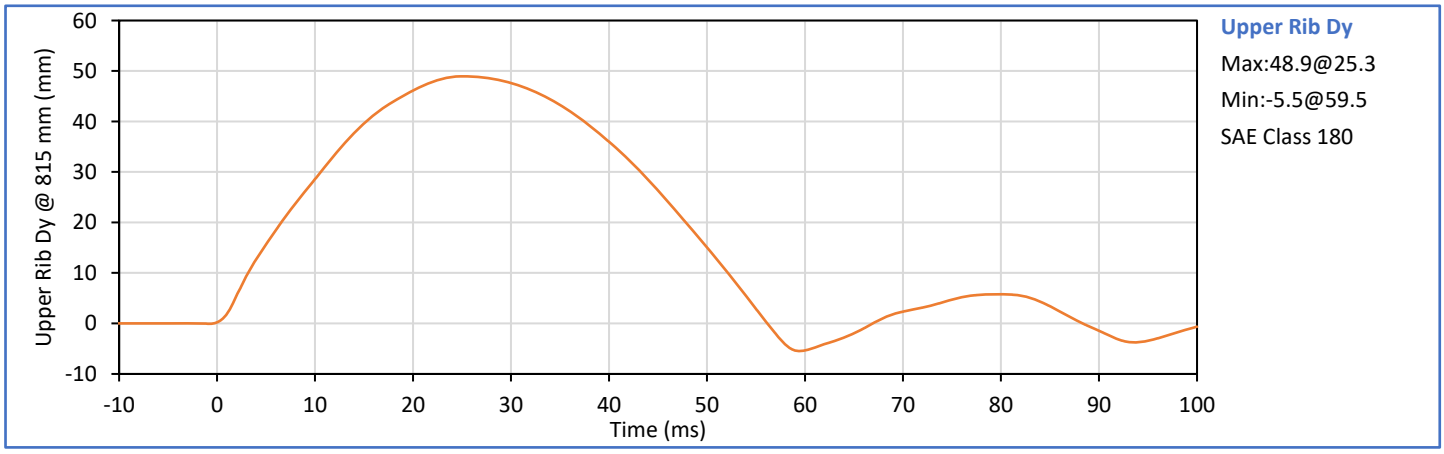
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F037 Test Date: 2023-08-07

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	37	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.5	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.9	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

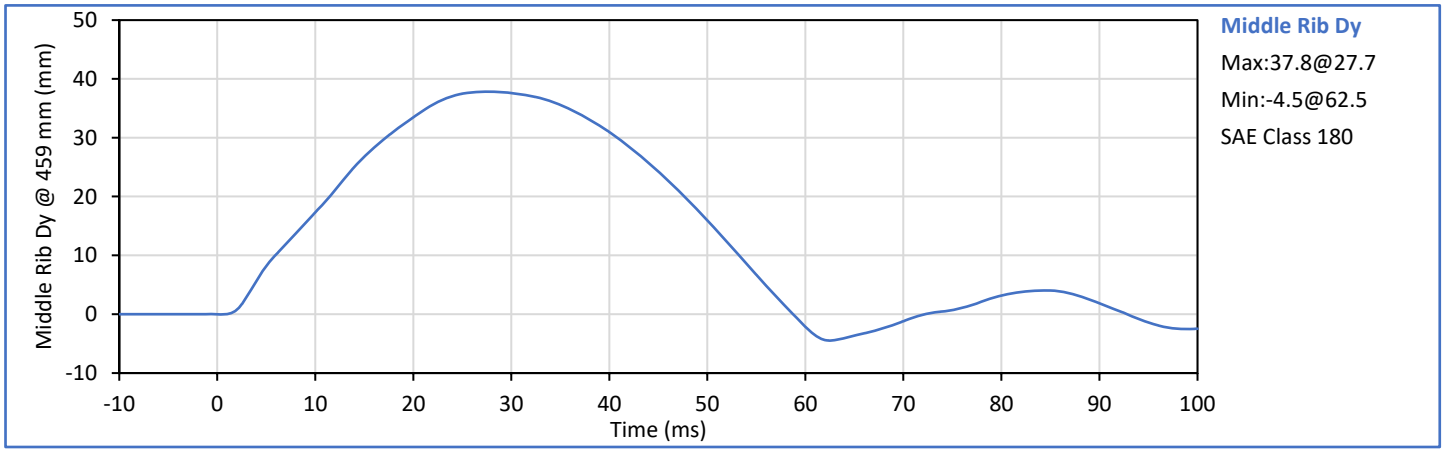
Approved By: J. Hernandez

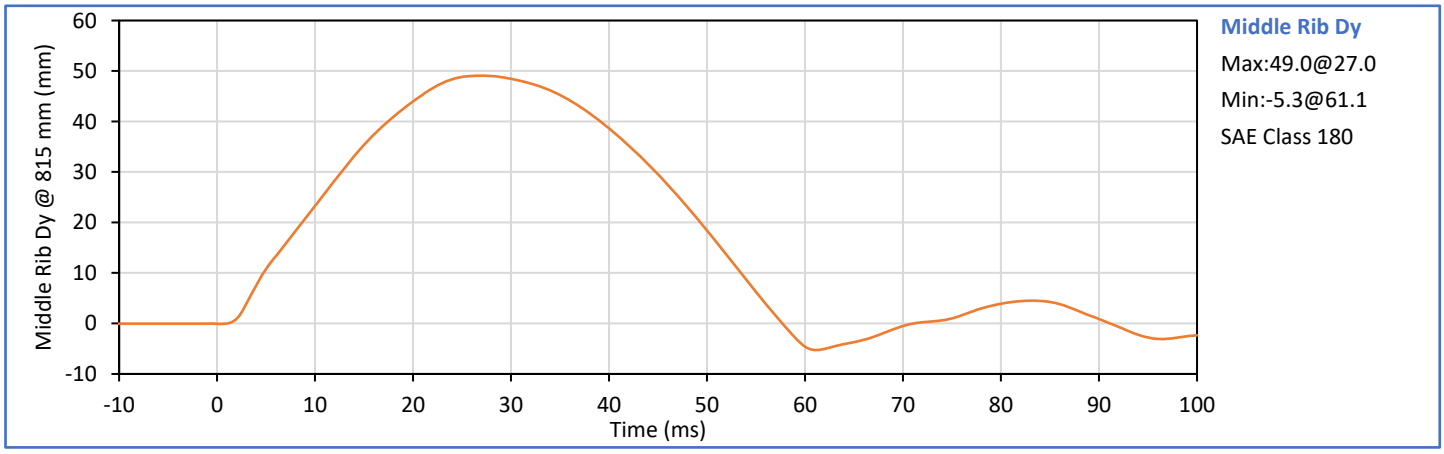
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F037 Test Date: 2023-08-07

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	37	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.8	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	49.0	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

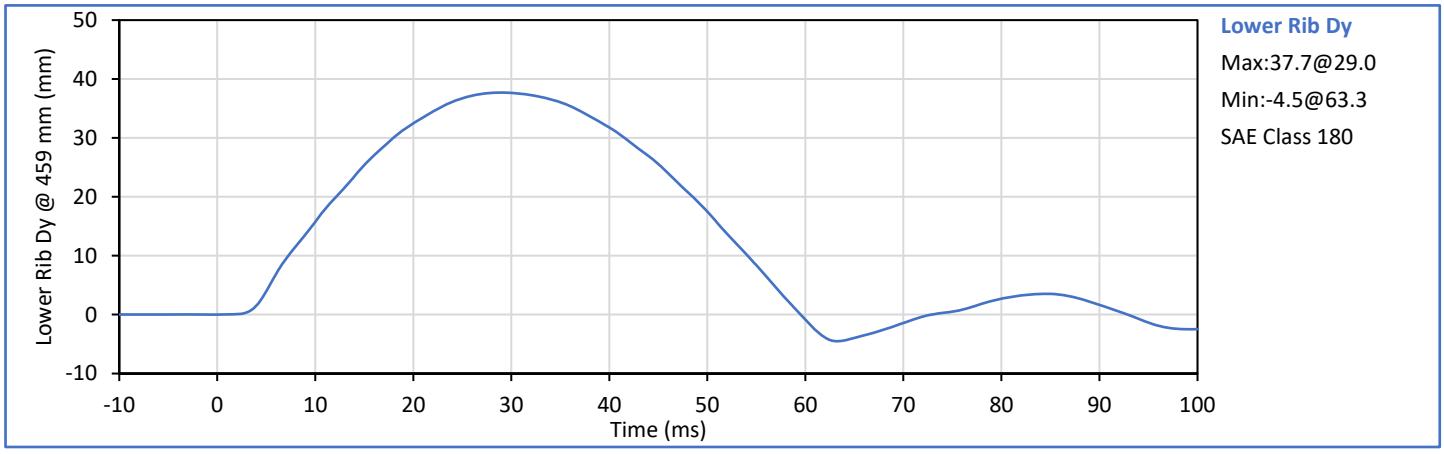
Applus IDIADA KARCO

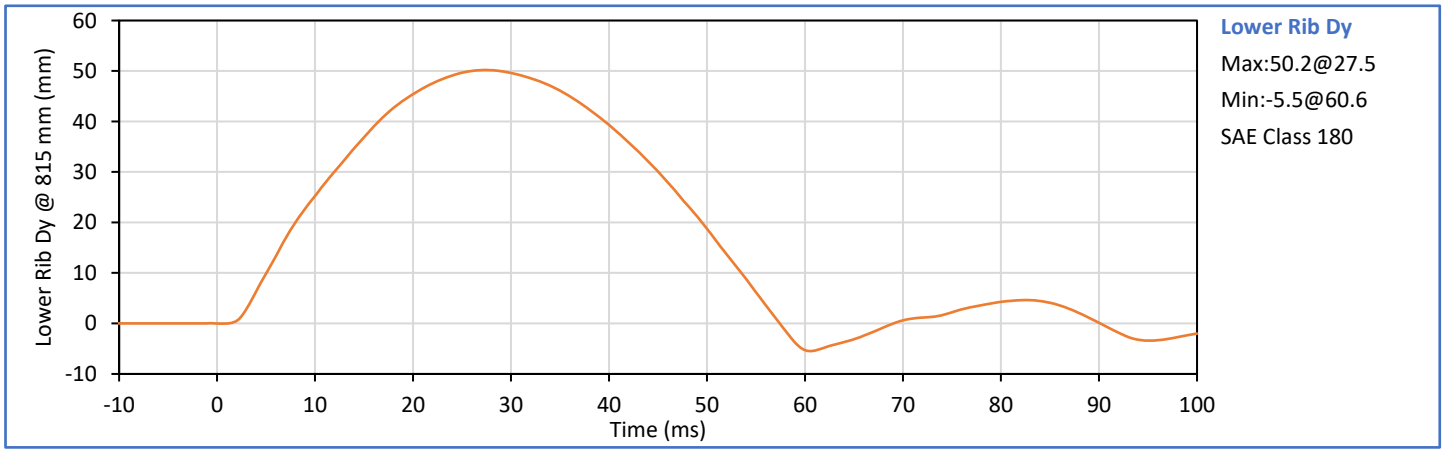
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2023-08-07

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	37	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.7	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	50.2	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

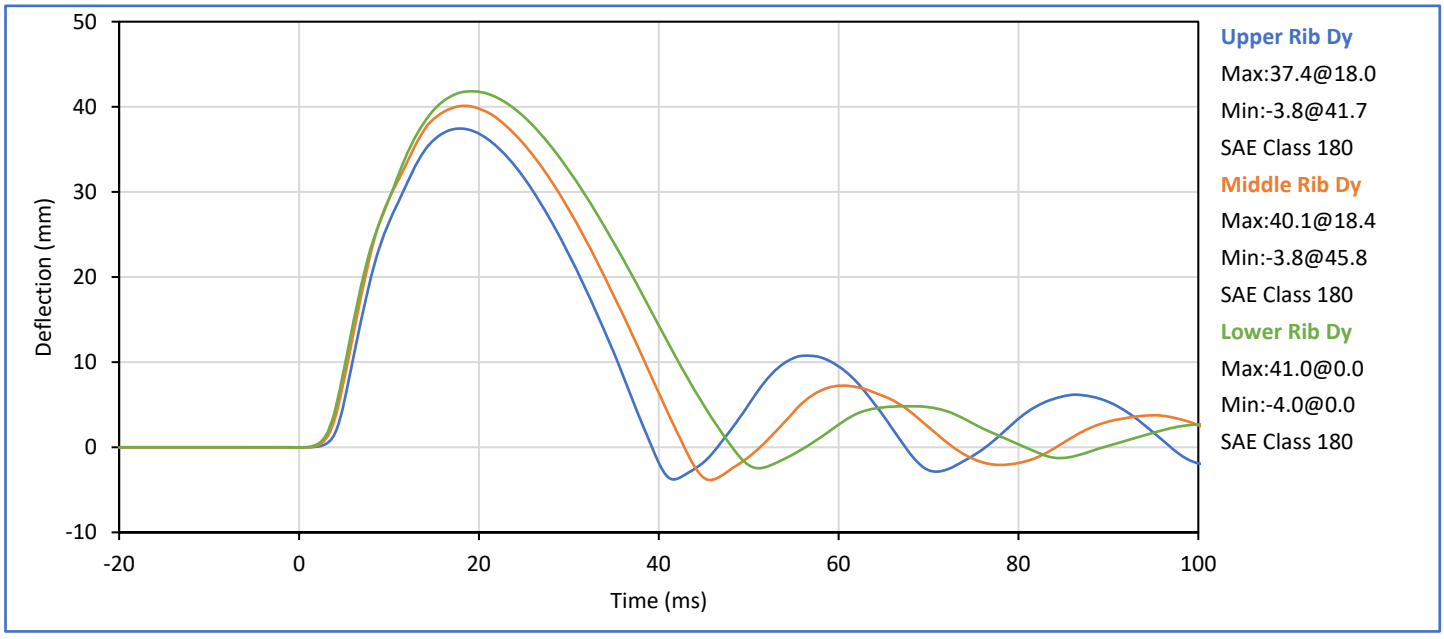
Approved By: J. Hernandez

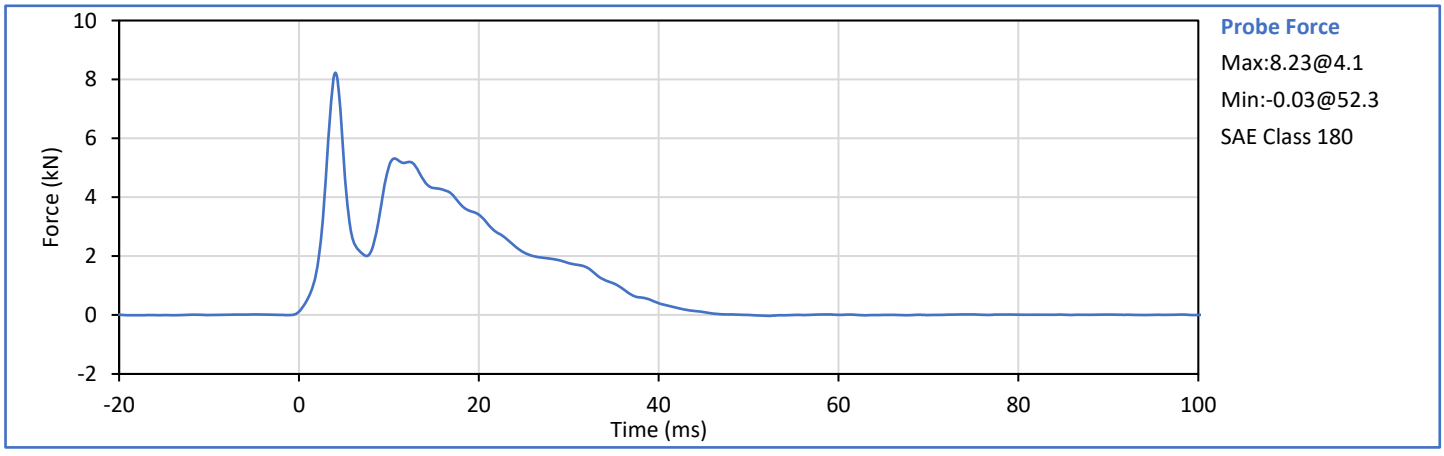
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Thorax Impact (Full Body)

ATD Serial No.: F037 Test Date: 2023-08-08

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	37	Pass
Impactor Velocity	m/s	5.40	5.60	5.53	Pass
Peak Upper Rib Dy	mm	34.0	41.0	37.4	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.1	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.8	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.31	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

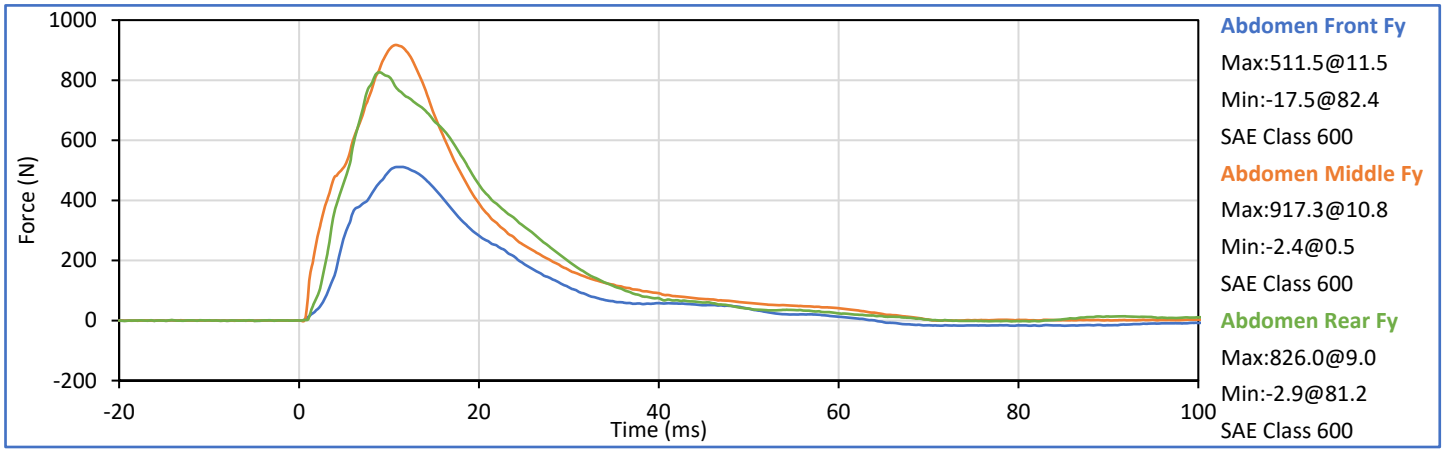
Approved By: J. Hernandez

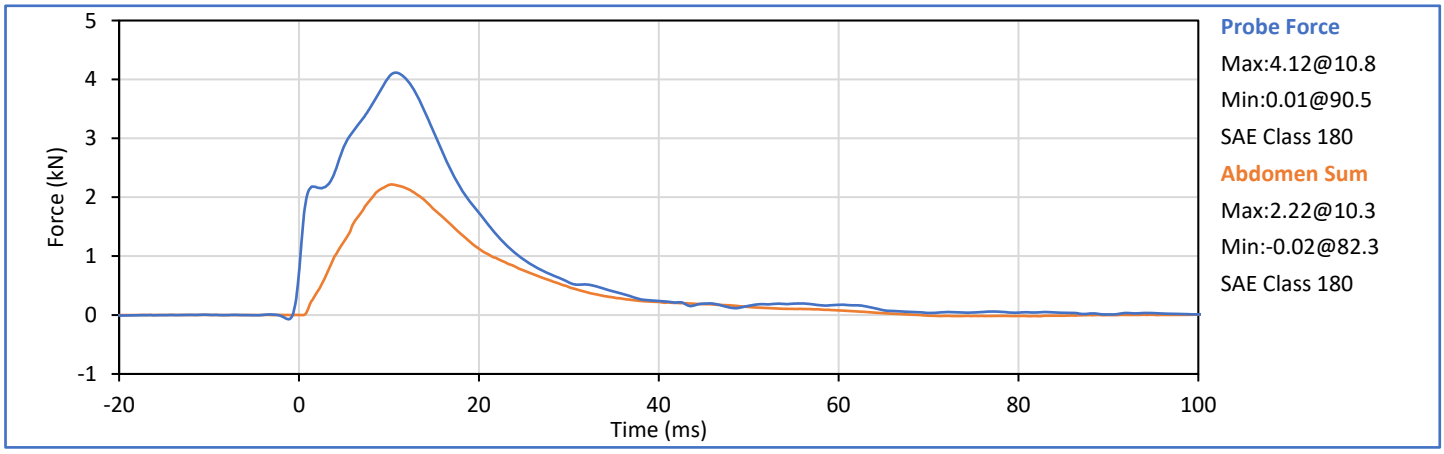
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Abdomen Impact

ATD Serial No.: F037 Test Date: 2023-08-08

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	37	Pass
Impactor Velocity	m/s	3.90	4.10	4.05	Pass
Peak Impactor Force	kN	4.00	4.80	4.12	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.8	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.22	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.3	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

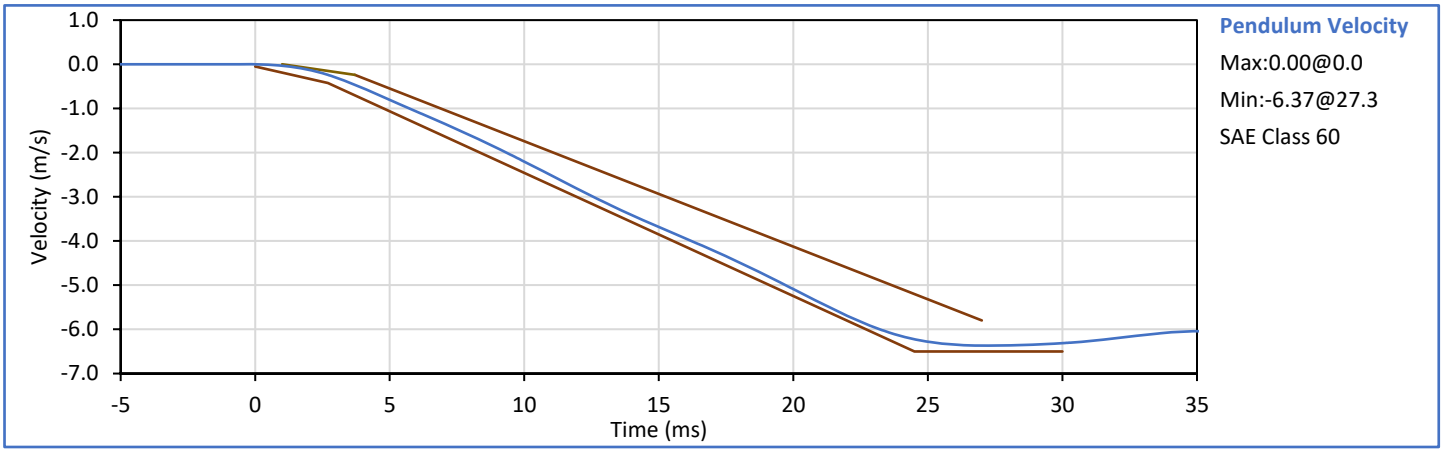
Approved By: J. Hernandez

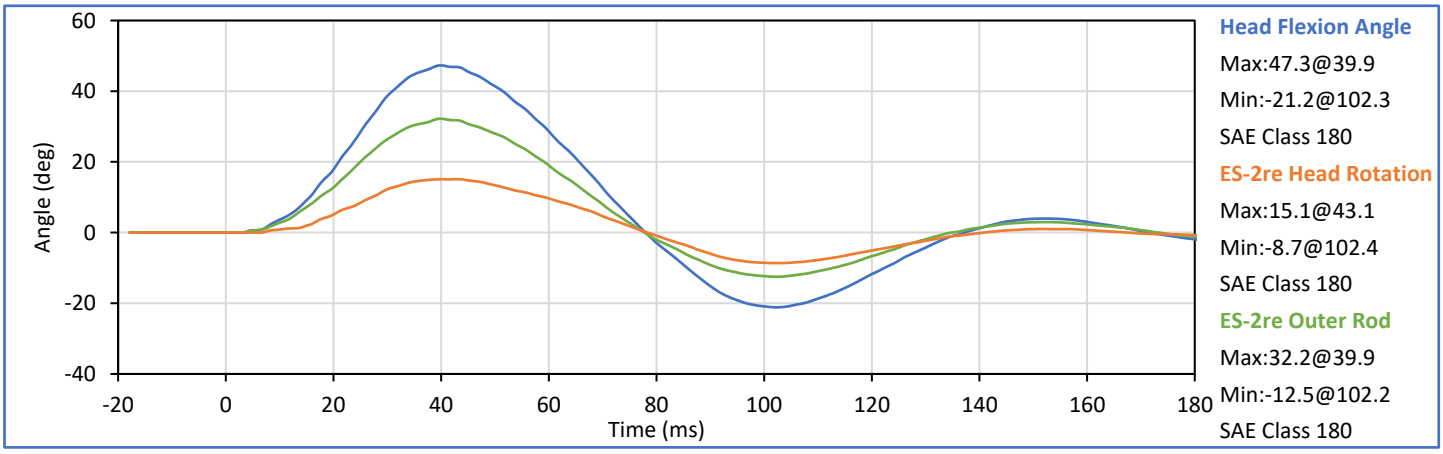
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Lumbar Spine Flexion

ATD Serial No.: F037 Test Date: 2023-08-08

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	30	Pass
Pendulum Velocity	m/s	5.95	6.15	6.08	Pass
Peak Headform Flexion	deg	45.0	55.0	47.3	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	39.9	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	38.1	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

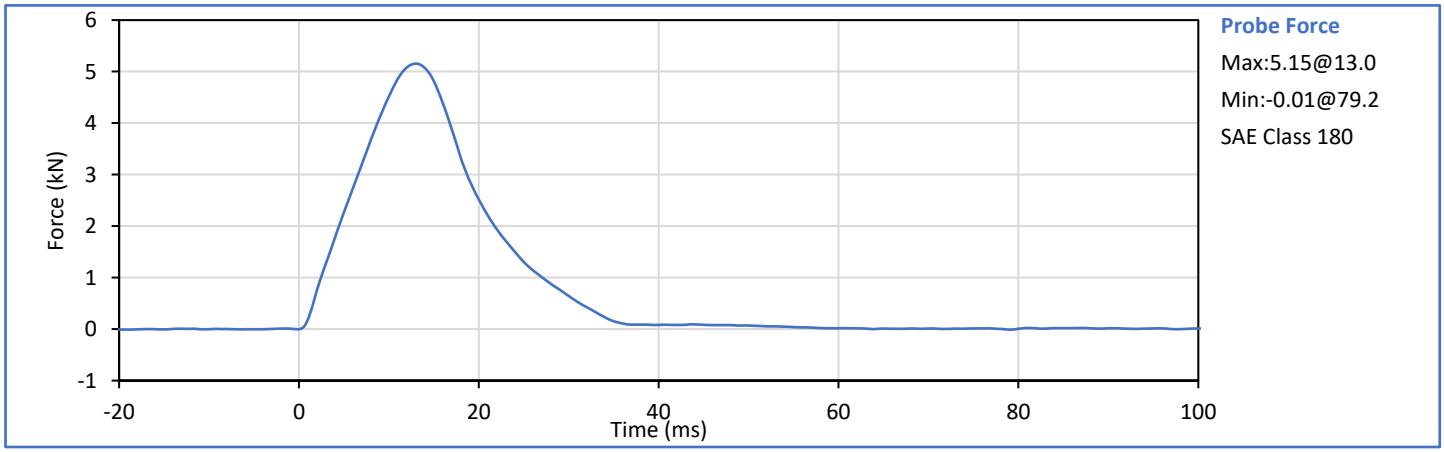
Approved By: J. Hernandez

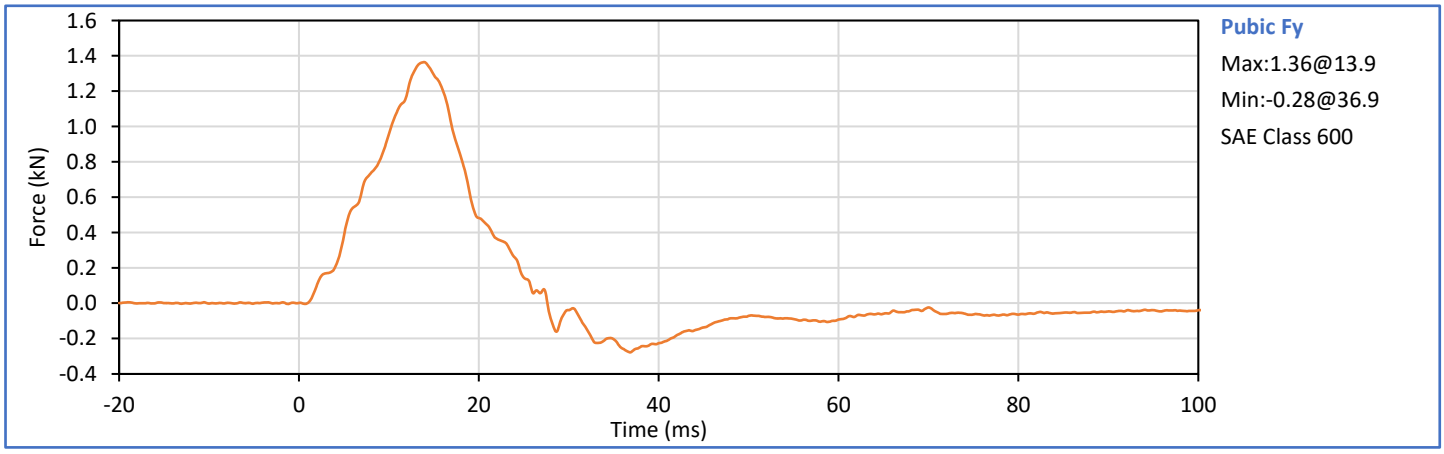
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F037 Test Date: 2023-08-08

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	37	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.15	Pass
Time of Peak Impactor Force	ms	11.8	16.1	13.0	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.36	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	13.9	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

APPENDIX C
Pre-Test ATD Qualification and Performance Verification
SID-IIs Small Side Impact ATD, Left Side Configuration
S/N: 299

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 299 Test Date: 2023-08-07

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	45	Pass
A - Sitting Height	mm	772	788	785	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	83	Pass
D - H Point From Seatback	mm	141	151	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	105	Pass
F - Thigh Clearance	mm	119	135	124	Pass
G - Head Breadth	mm	140	148	146	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	183	Pass
J - Head Circumference	mm	541	551	544	Pass
K - Buttock To Knee Length	mm	514	540	526	Pass
L - Popliteal Height	mm	343	369	356	Pass
K - Knee Pivot To Floor Height	mm	392	409	398	Pass
N - Buttock Popliteal Length	mm	416	442	434	Pass
O - Chest Depth W/O Jacket	mm	195	211	200	Pass
P - Foot Length	mm	216	232	224	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	255	Pass
S - Knee Joint To Seatback	mm	477	493	487	Pass
V - Shoulder Width	mm	341	357	351	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

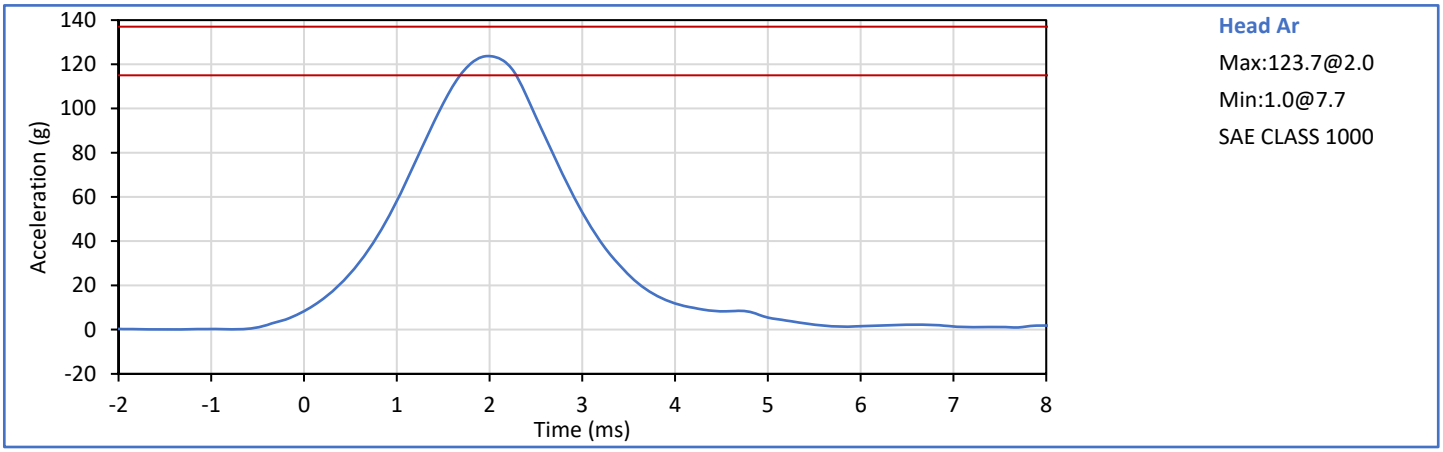
Approved By: J. Hernandez

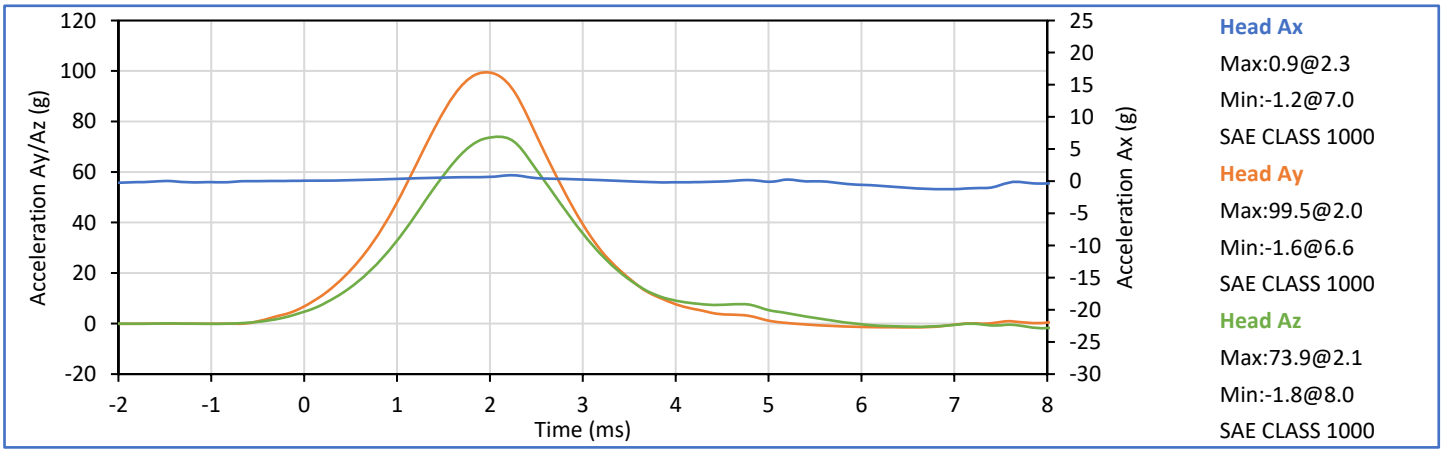
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299 Test Date: 2023-08-07

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	37	Pass
Peak Resultant Acceleration	g	115.0	137.0	123.7	Pass
Peak Head Ax	g	-15.0	15.0	-1.2	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

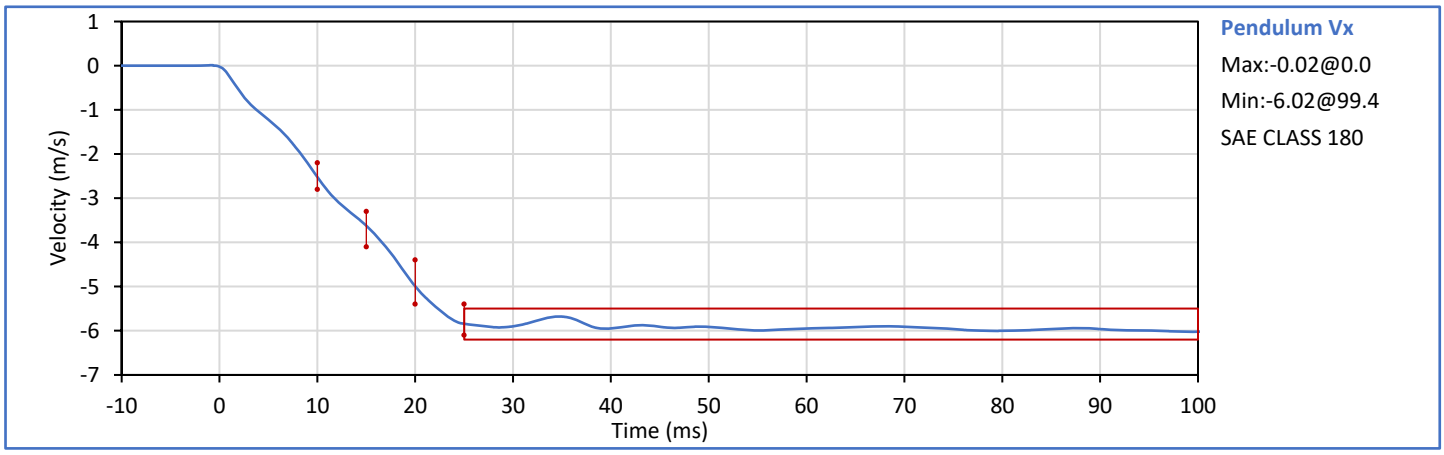
Approved By: J. Hernandez

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2023-08-07

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	36	Pass
Pendulum Velocity	m/s	5.51	5.63	5.56	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.52	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.62	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-5.00	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.85	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-6.02/-5.68	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-78.9	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	58.9	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	42.2	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	110.9	Pass
			Overall Test Results		Pass



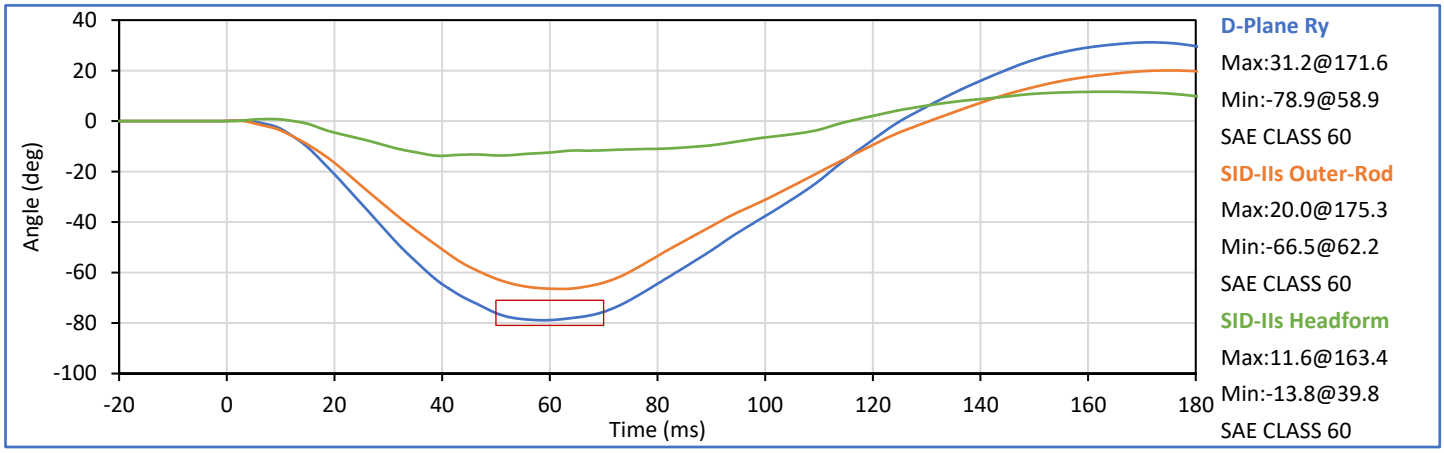
Technician: G. Fuentes

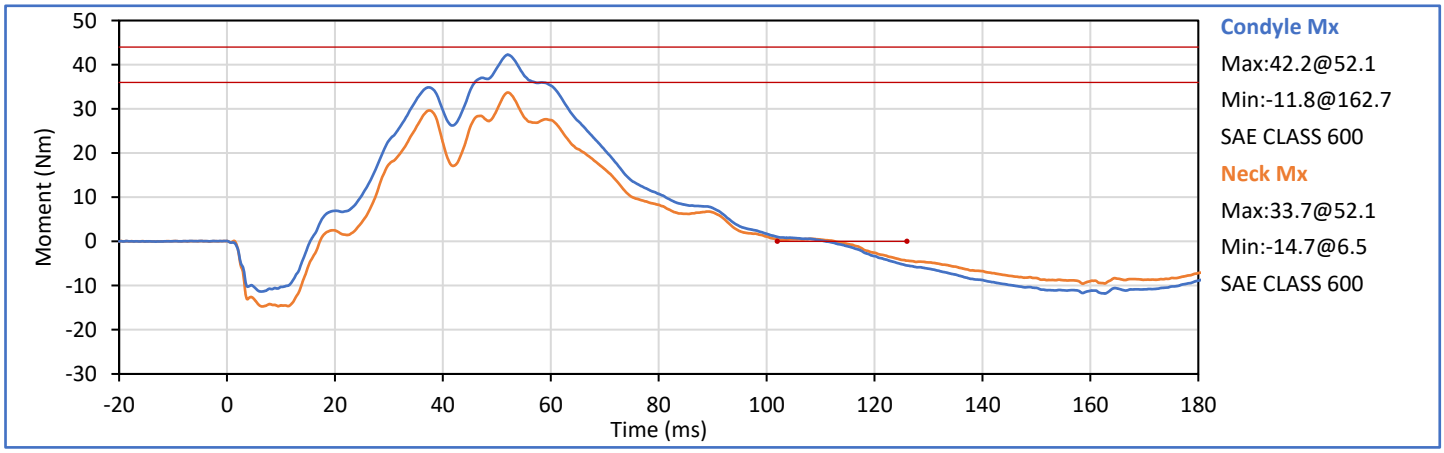
Approved By: J. Hernandez

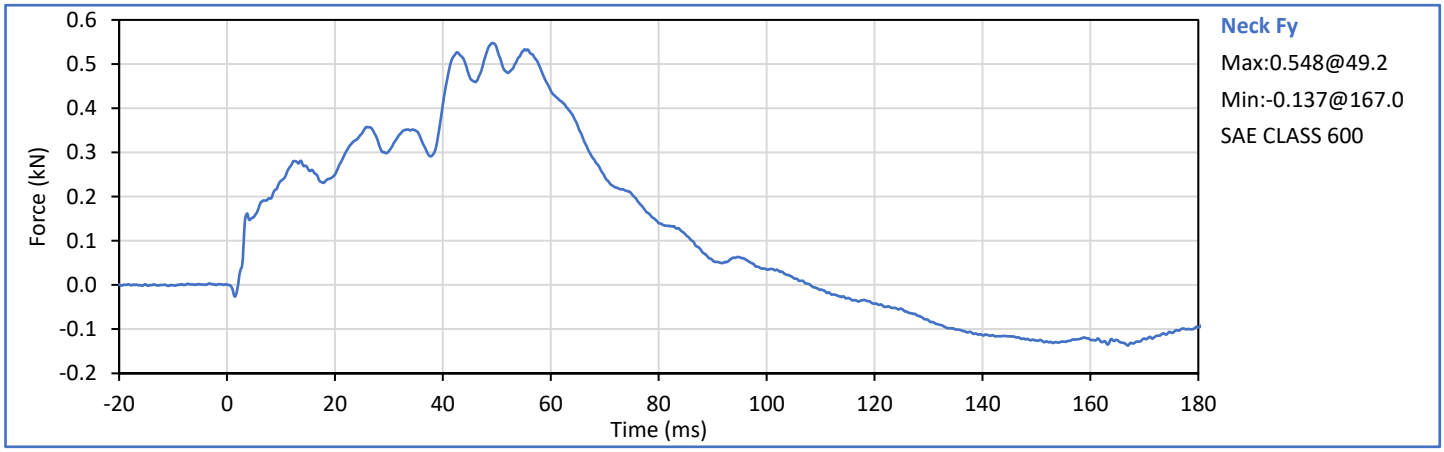
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2023-08-07





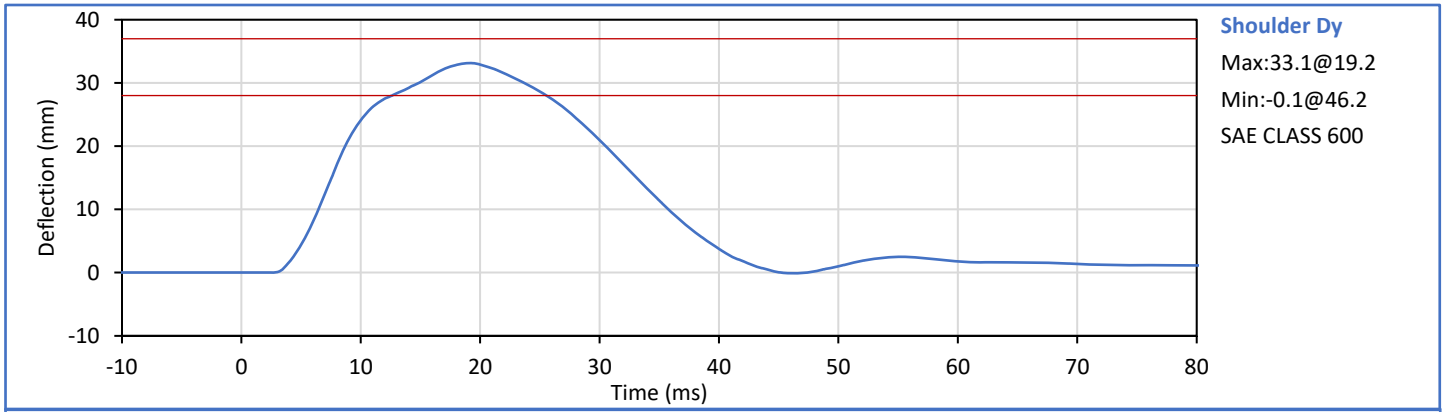


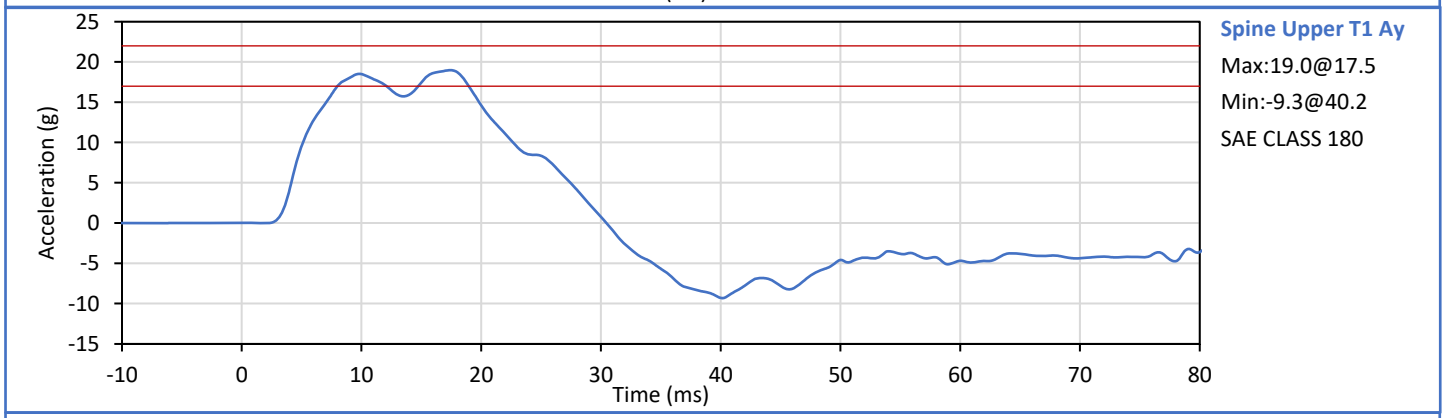
Applus IDIADA KARCO

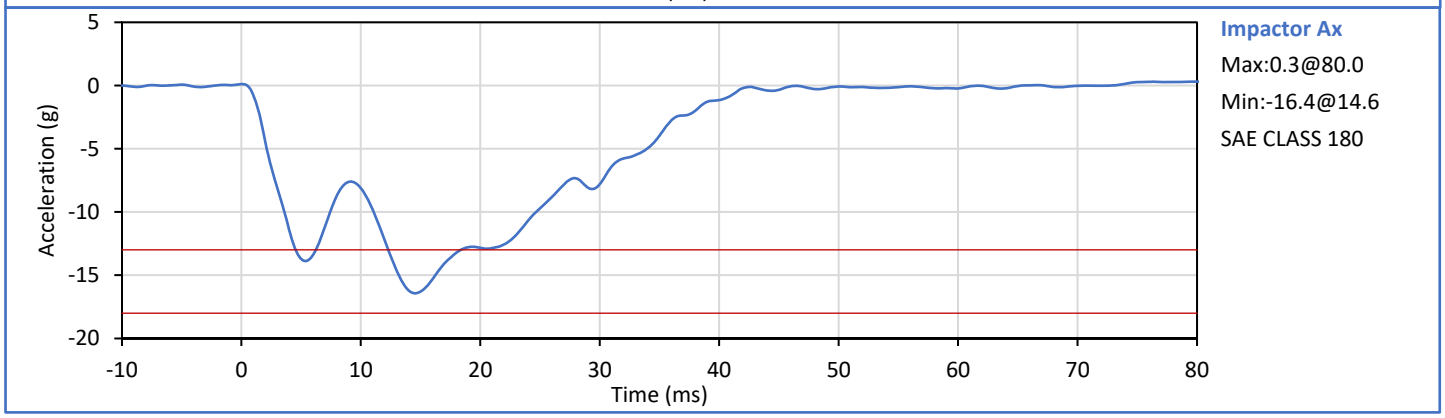
SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299 Test Date: 2023-08-07

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	36	Pass
Impactor Velocity	m/s	4.20	4.40	4.34	Pass
Peak Shoulder Dy	mm	28.0	37.0	33.1	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.0	Pass
Peak Impactor Ax	g	-18.0	-13.0	-16.4	Pass
			Overall Test Results		Pass







Technician: G. Fuentes

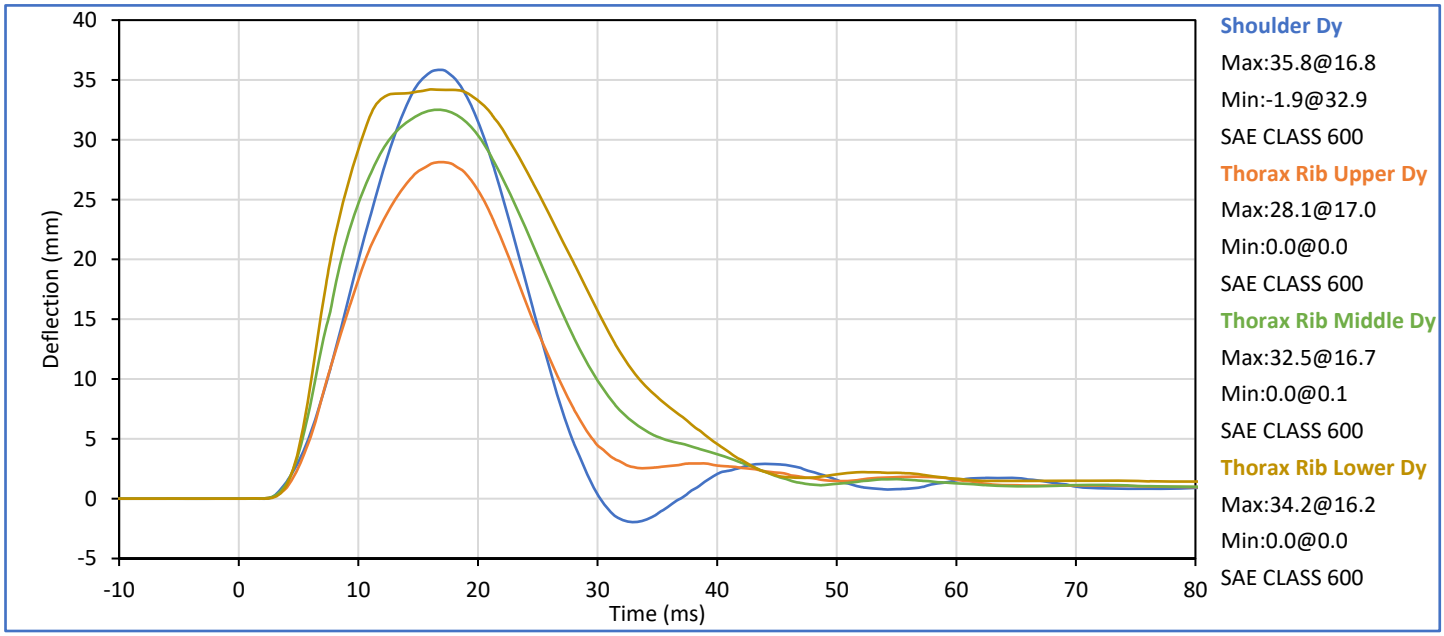
Approved By: J. Hernandez

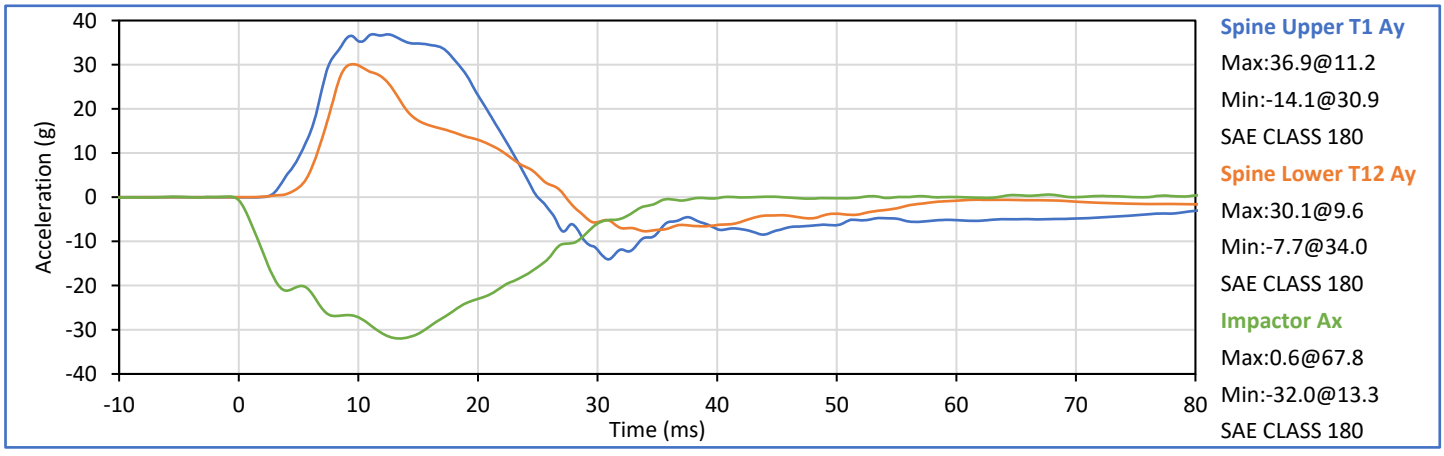
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Thorax (With Arm)

ATD Serial No.: 299 Test Date: 2023-08-07

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	34	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Shoulder Dy	mm	31.0	40.0	35.8	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.1	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.5	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.2	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.9	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	30.1	Pass
Peak Impactor Ax	g	-36.0	-30.0	-32.0	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

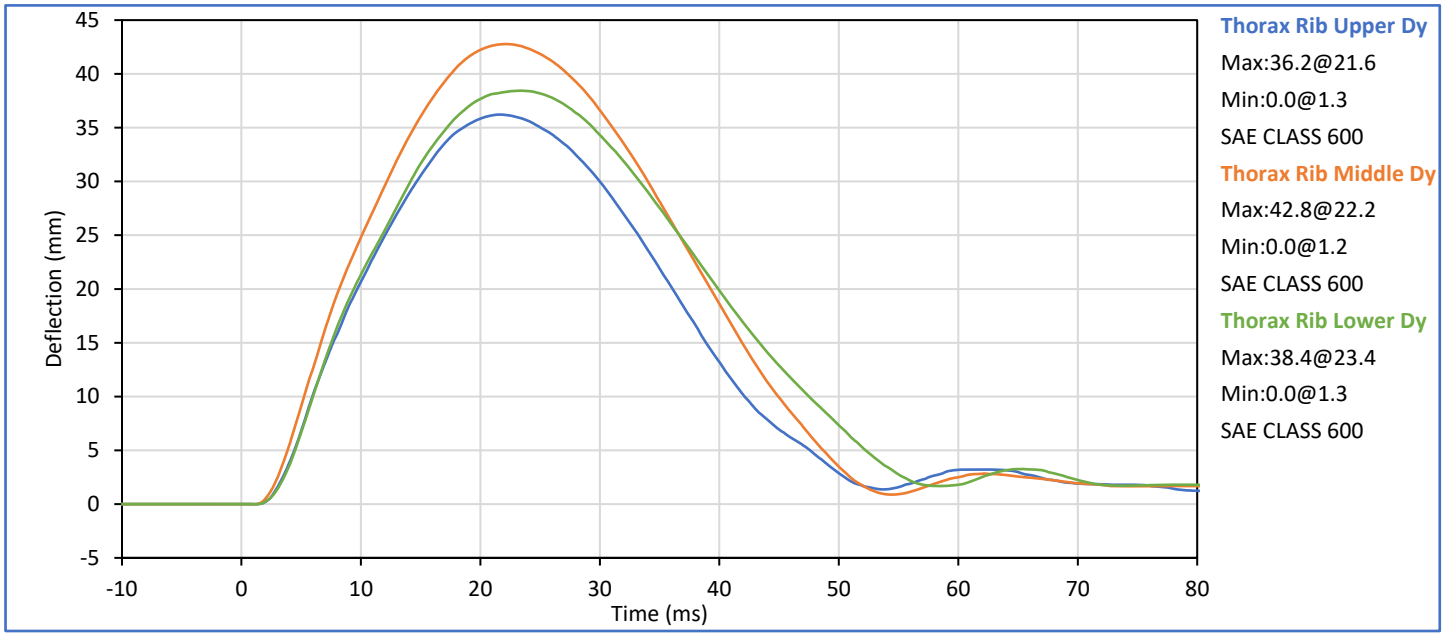
Approved By: J. Hernandez

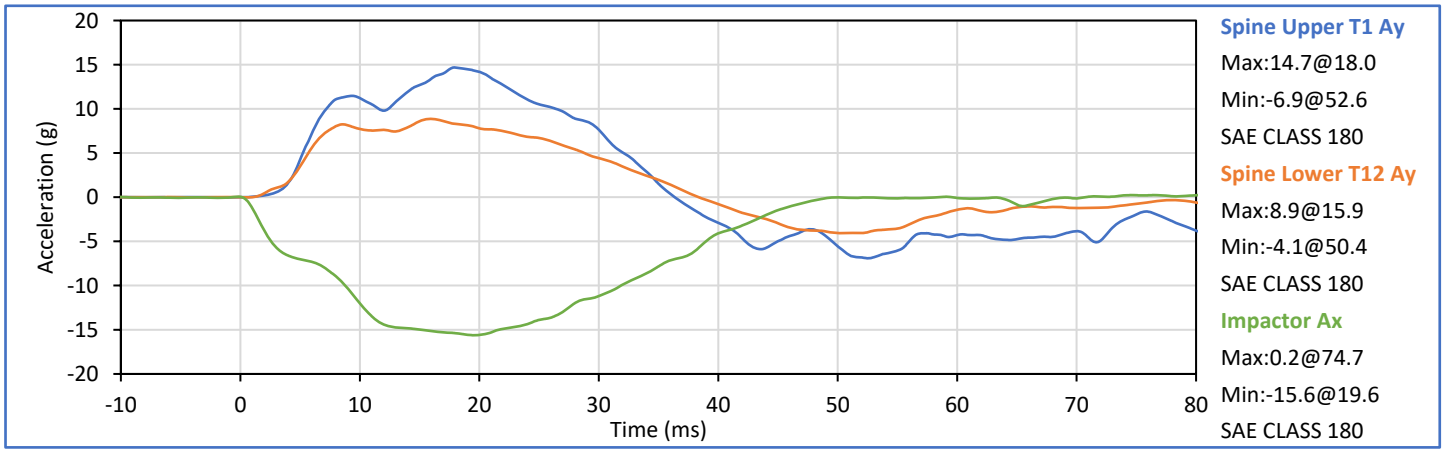
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Thorax (No Arm)

ATD Serial No.: 299 Test Date: 2023-08-07

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	34	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	36.2	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	42.8	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	38.4	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	14.7	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	8.9	Pass
Peak Impactor Ax	g	-18.0	-14.0	-15.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

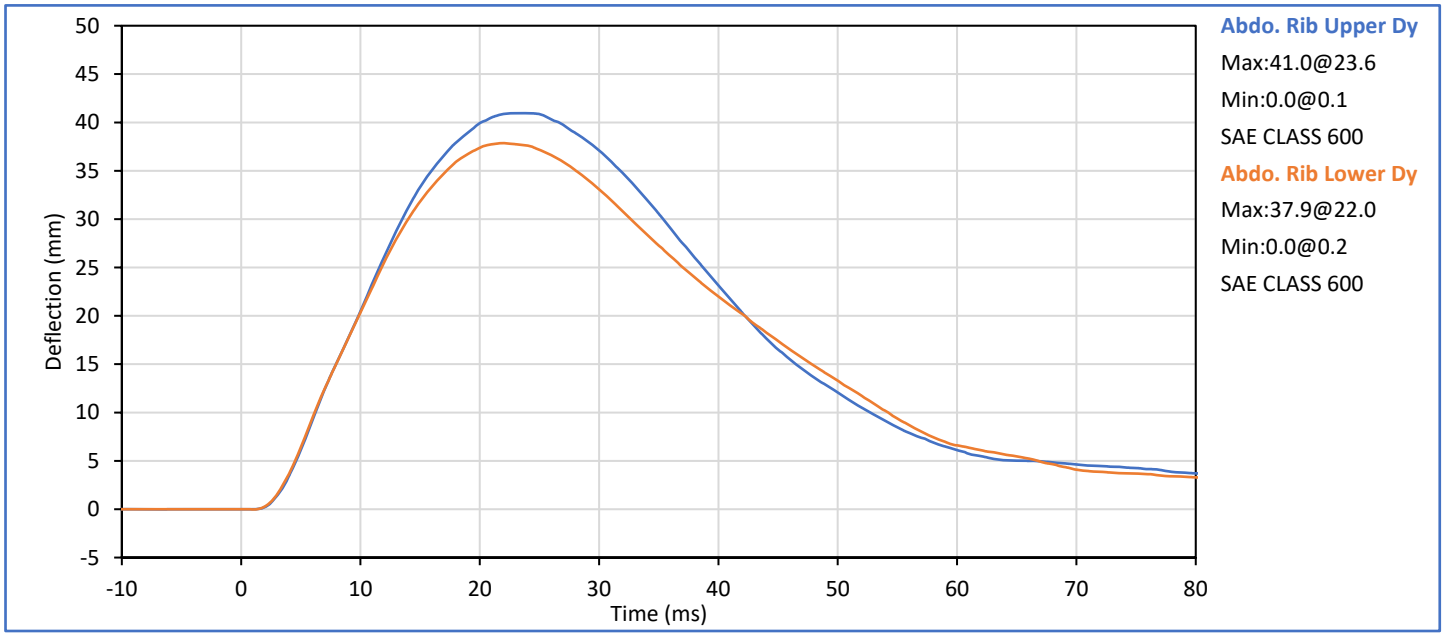
Approved By: J. Hernandez

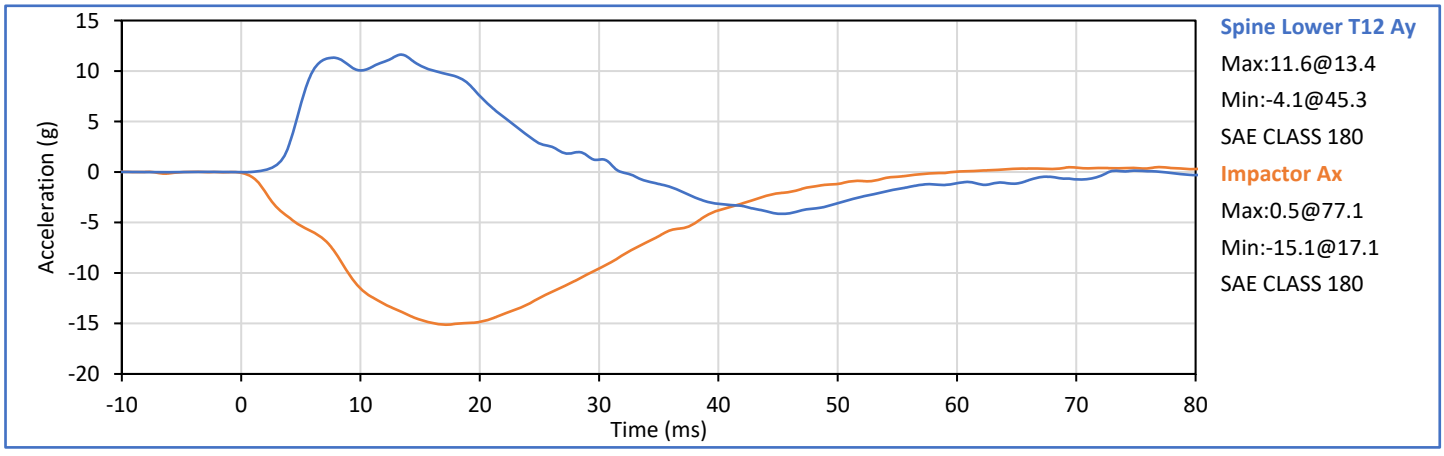
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299 Test Date: 2023-08-07

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	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.0	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	37.9	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	11.6	Pass
Peak Impactor Ax	g	-16.0	-12.0	-15.1	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

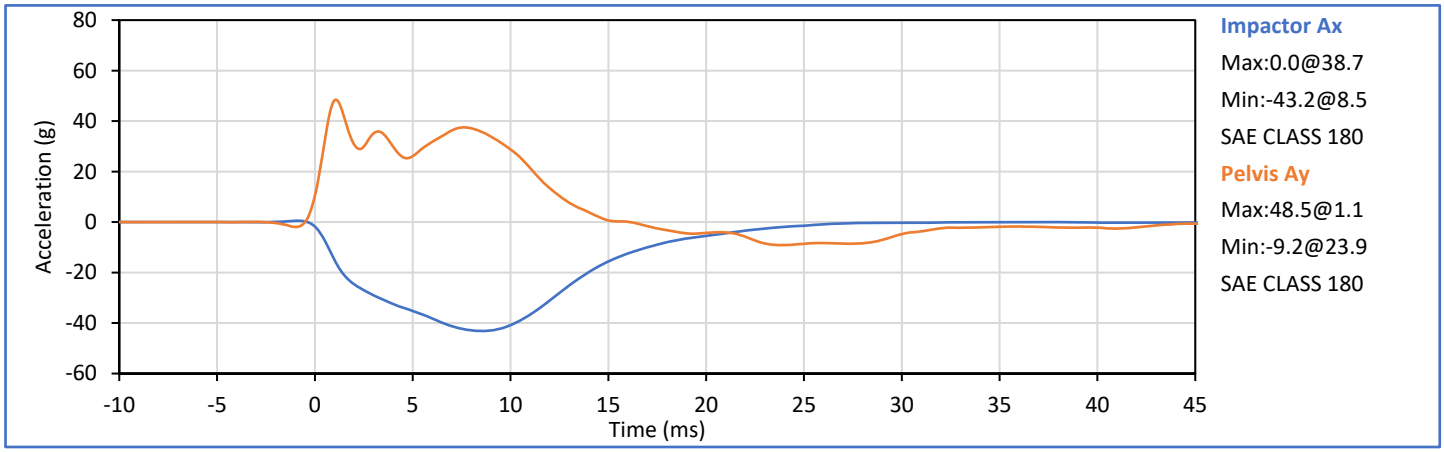
Applus IDIADA KARCO

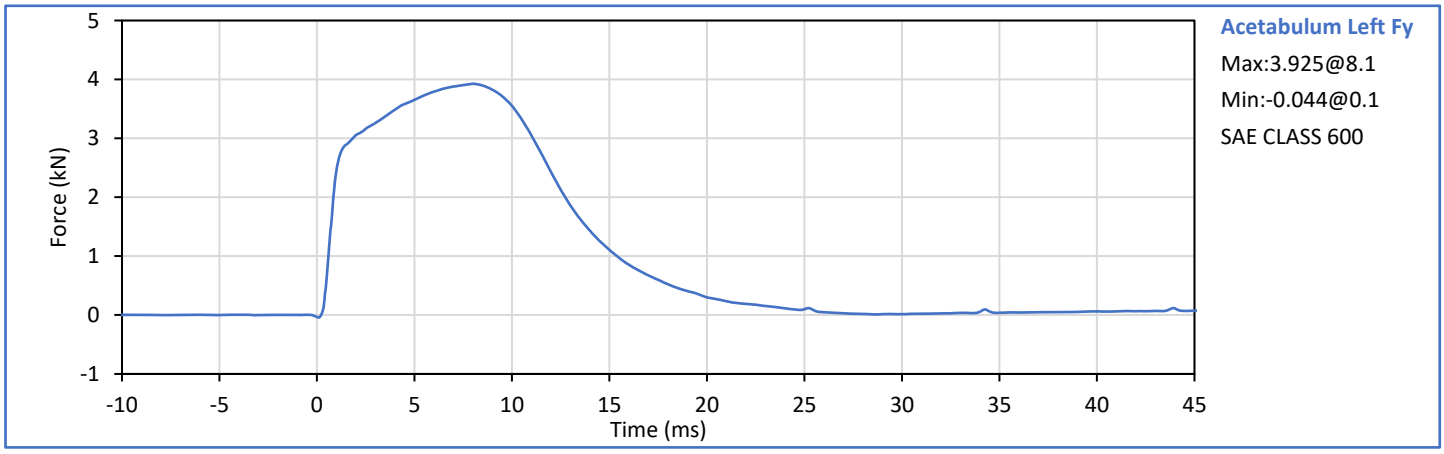
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299 Test Date: 2023-08-08

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	37	Pass
Impactor Velocity	m/s	6.60	6.80	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.92	Pass
Pelvis Ay after 6ms	g	34.0	42.0	37.5	Pass
Peak Impactor Ax	g	-47.0	-38.0	-43.2	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 14771





Technician: G. Fuentes

Approved By: J. Hernandez

ATD Serial No.: 299 Test Date: 2023-08-08

Pelvis Plug S/N: 14771

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

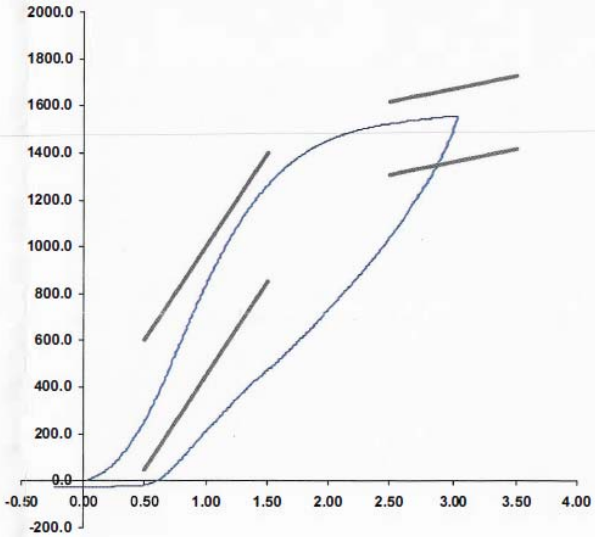
Plug S/N 14771
Test Number 16744
Report Number 16790
Test Date 12/29/2020 10:27:21 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	264.03	50.00	600.00
Force @ 1.5 mm (N)	1,266.82	850.00	1,400.00
Force @ 2.5 mm (N)	1,524.34	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,555.96	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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

Part Number 180-4450

Template No 107 29-Dec-20
SACO Research

By : DC Date : 12/29/20

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

Applus IDIADA KARCO

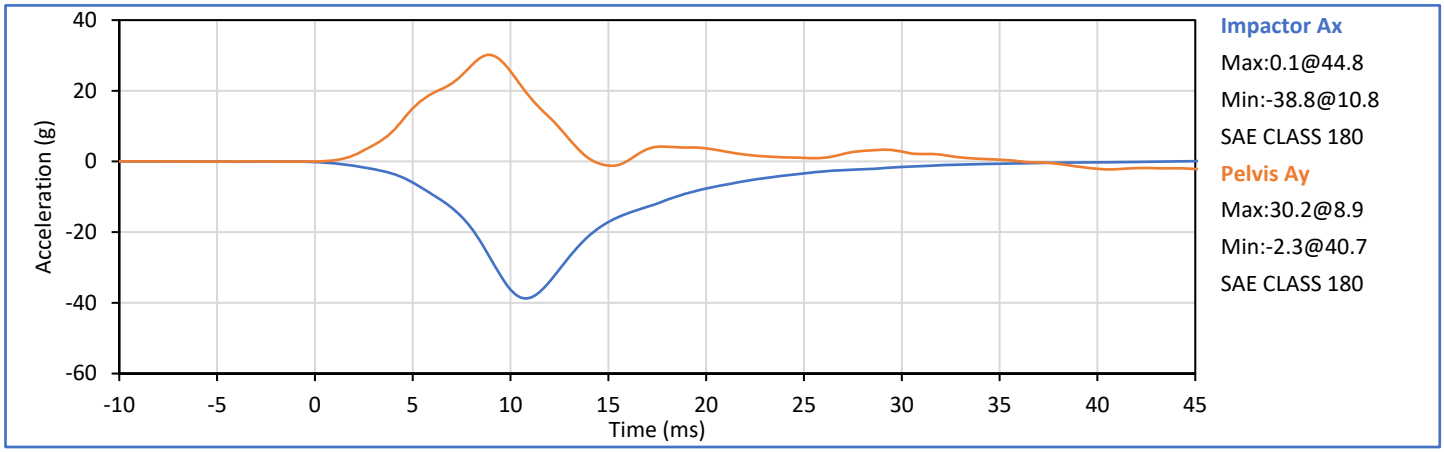
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

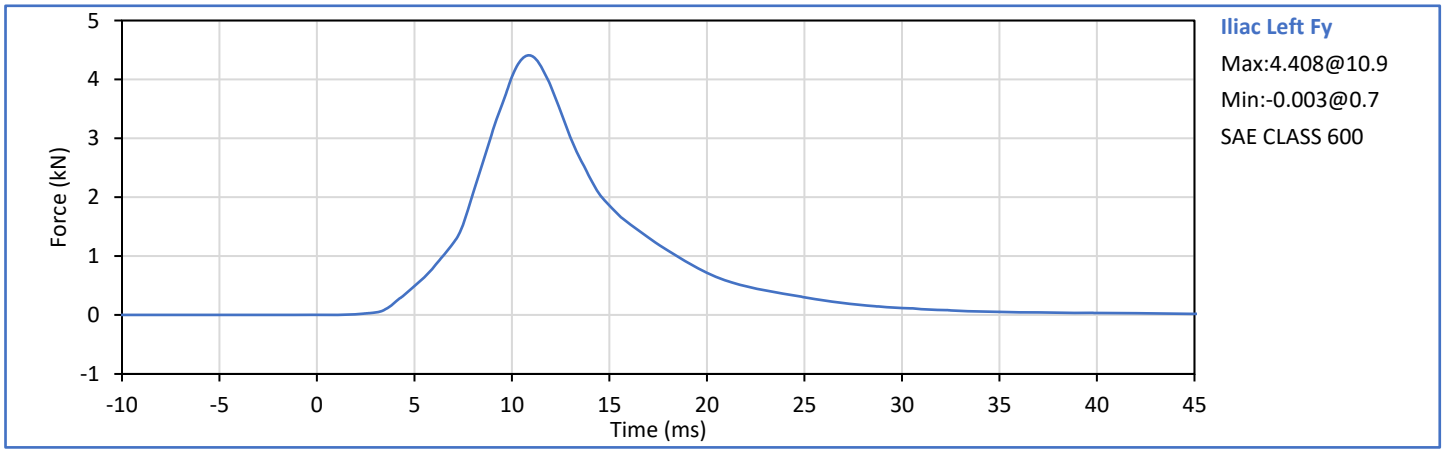
ATD Serial No.: 299 Test Date: 2023-08-08

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	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.41	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-38.8	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 *

* Plug is not impacted and remains certified





Technician: G. Fuentes

Approved By: J. Hernandez

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

Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
External Measurements

ATD Serial No.: F037 Test Date: 2023-08-11

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	45	Pass
1 - Sitting Height	mm	900	918	914	Pass
2 - Seat to Shoulder Joint	mm	558	572	563	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	352	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	102	Pass
5 - Sole to Seat, Sitting	mm	433	451	447	Pass
6 - Head Width	mm	152	158	158	Pass
7 - Shoulder/Arm Width	mm	461	479	473	Pass
8 - Thorax Width	mm	322	332	328	Pass
9 - Abdomen Width	mm	273	287	283	Pass
10 - Pelvis Lap Width	mm	359	373	364	Pass
11 - Head Depth	mm	196	206	201	Pass
12 - Thorax Depth	mm	262	272	268	Pass
13 - Abdomen Depth	mm	194	204	198	Pass
14 - Pelvis Depth	mm	235	245	242	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	613	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

Approved By: J. Hernandez

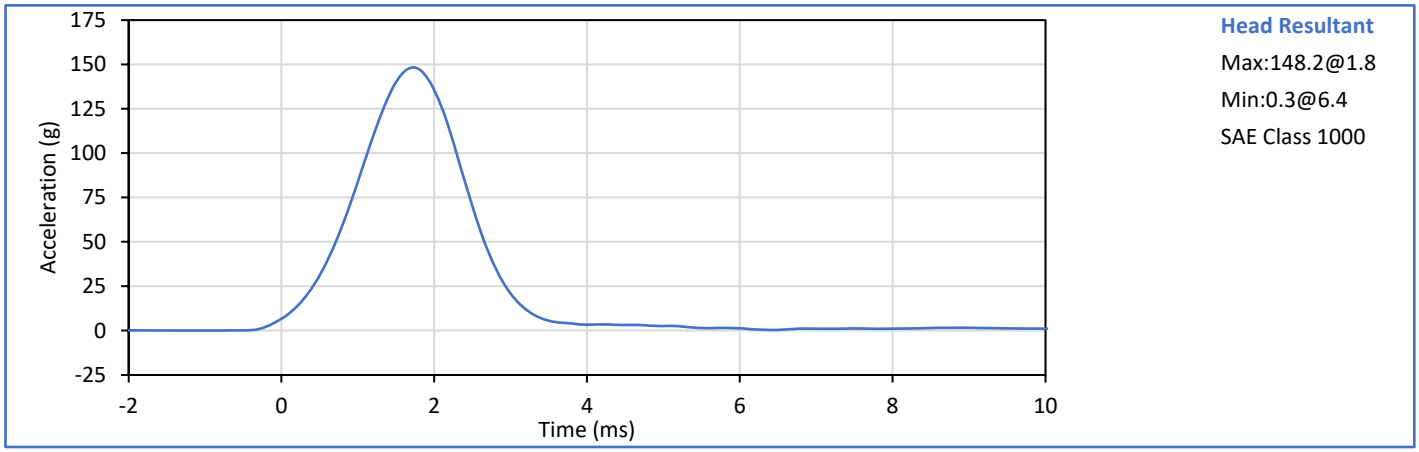
Applus IDIADA KARCO

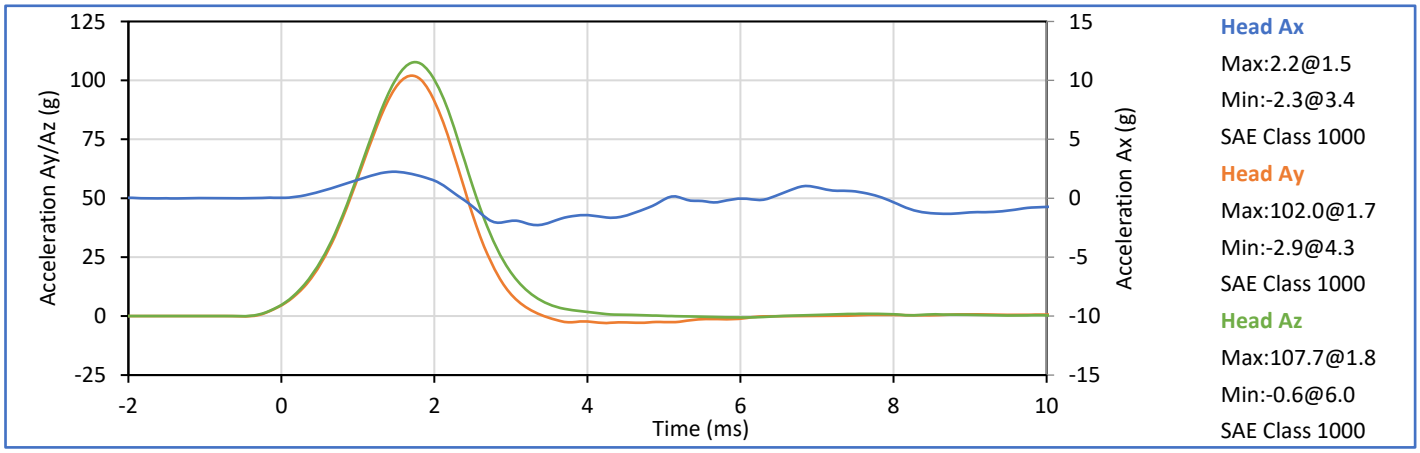
ES-2re 50th Male Side Impact ATD
Head Drop

ATD Serial No.: F037

Test Date: 2023-08-15

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	42	Pass
Peak Resultant Acceleration	g	125.0	155.0	148.2	Pass
Peak Head Ax	g	-15.0	15.0	2.2	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

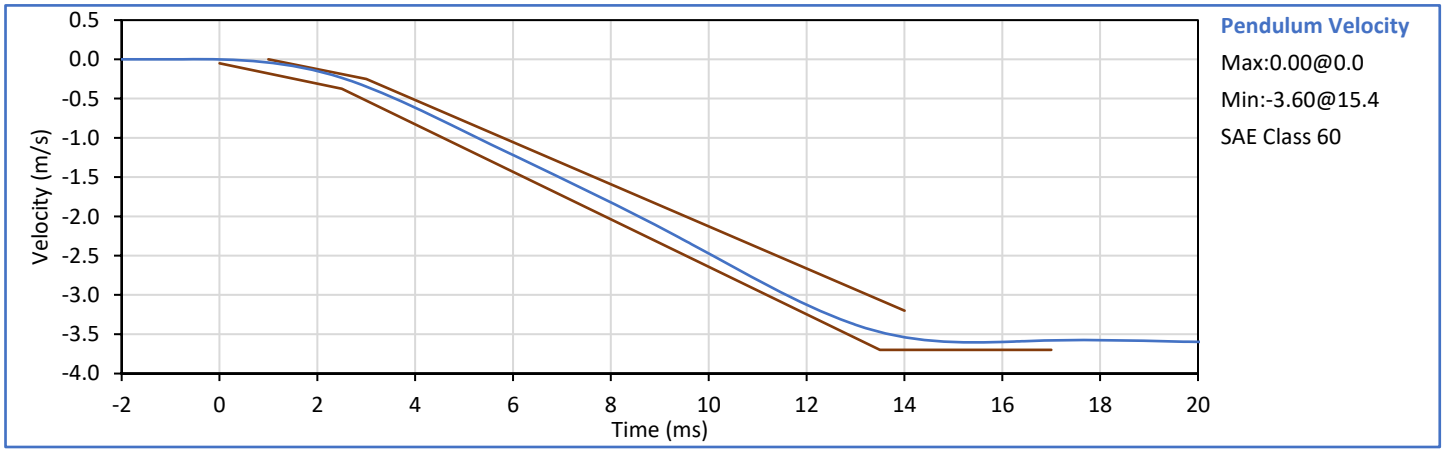
Approved By: J. Hernandez

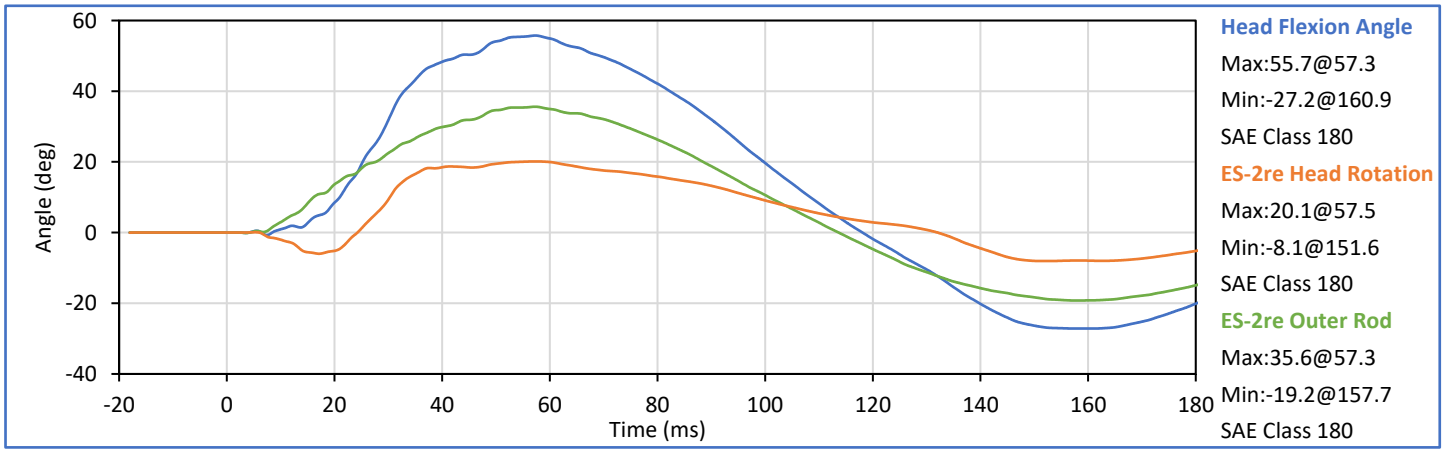
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Neck Flexion

ATD Serial No.: F037 Test Date: 2023-08-15

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	46	Pass
Pendulum Velocity	m/s	3.30	3.50	3.43	Pass
Peak Headform Flexion	deg	49.0	59.0	55.7	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	57.3	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	60.8	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

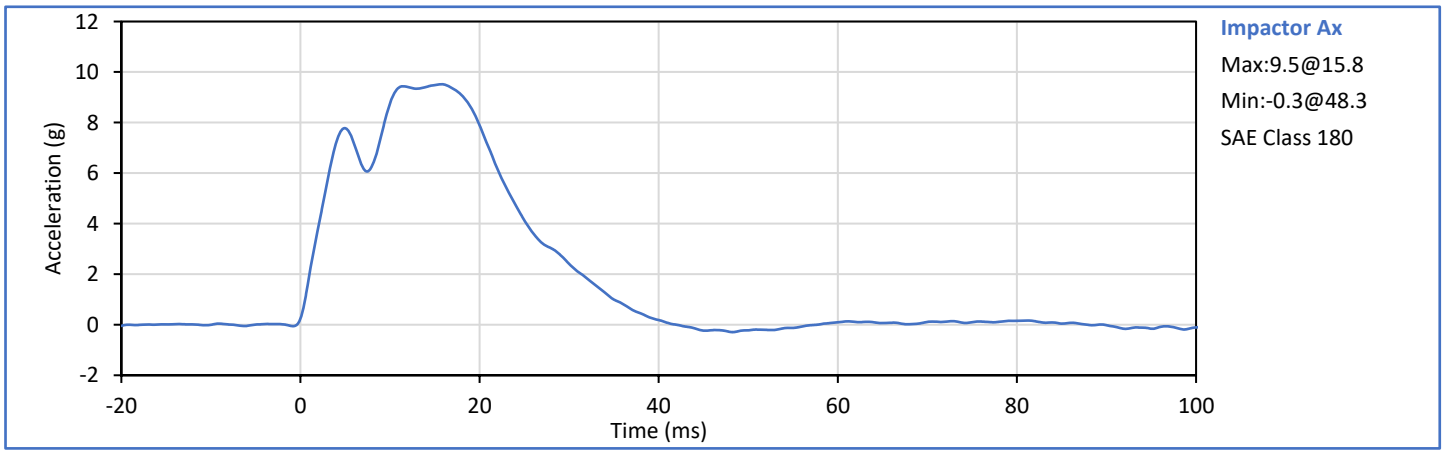
Approved By: J. Hernandez

Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Shoulder Impact Test

ATD Serial No.: F037 Test Date: 2023-08-14

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	45	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Impactor Ax	g	7.5	10.5	9.5	Pass
			Overall Test Results		Pass



Technician: G. Fuentes

Approved By: J. Hernandez

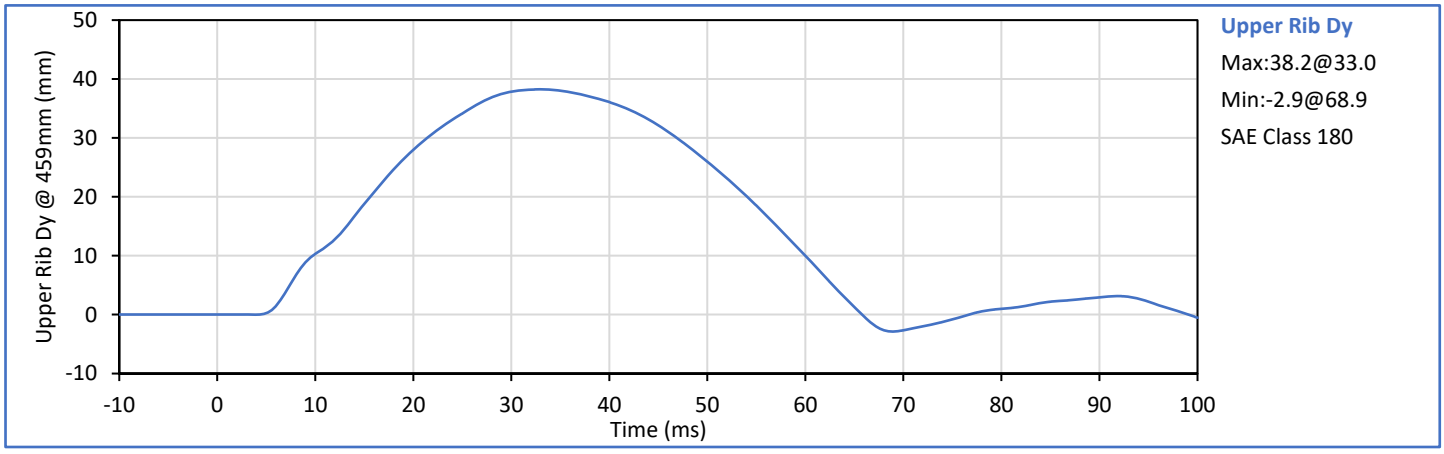
Applus IDIADA KARCO

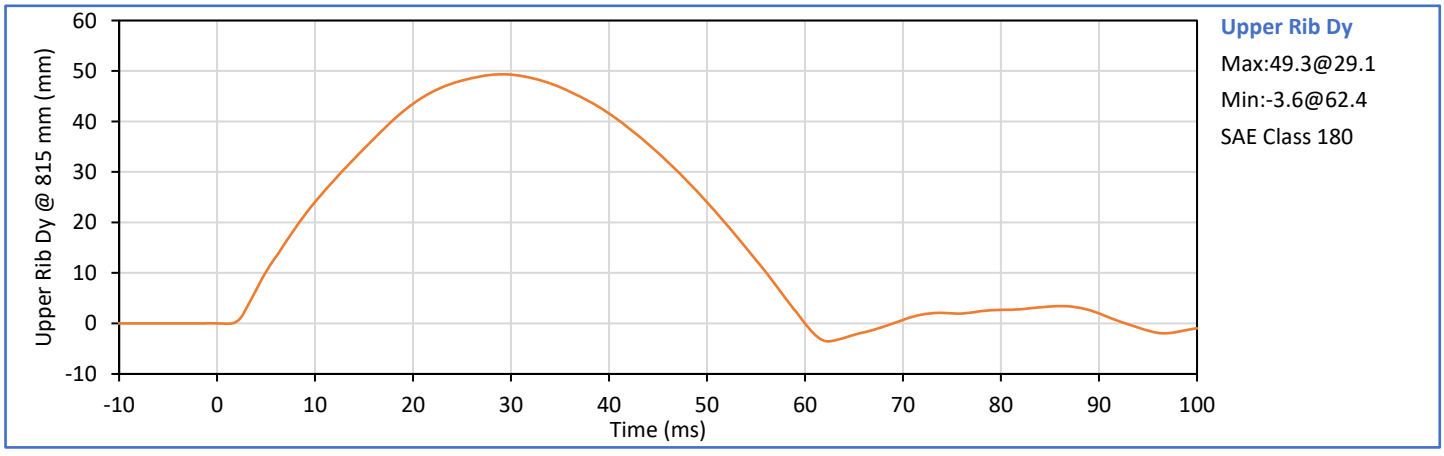
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F037

Test Date: 2023-08-15

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	45	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.2	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	49.3	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

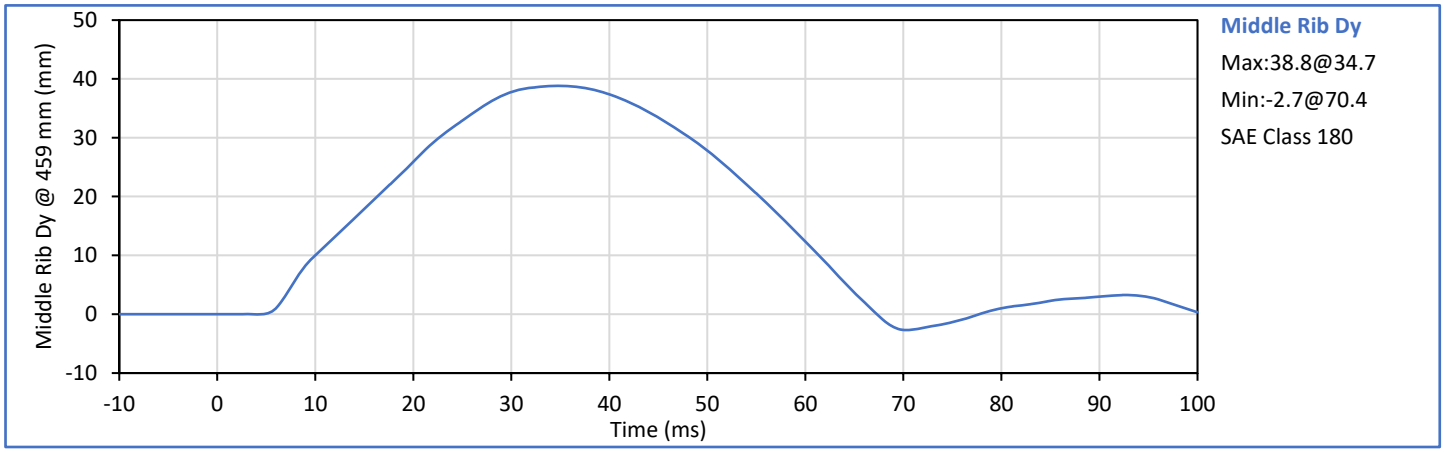
Approved By: J. Hernandez

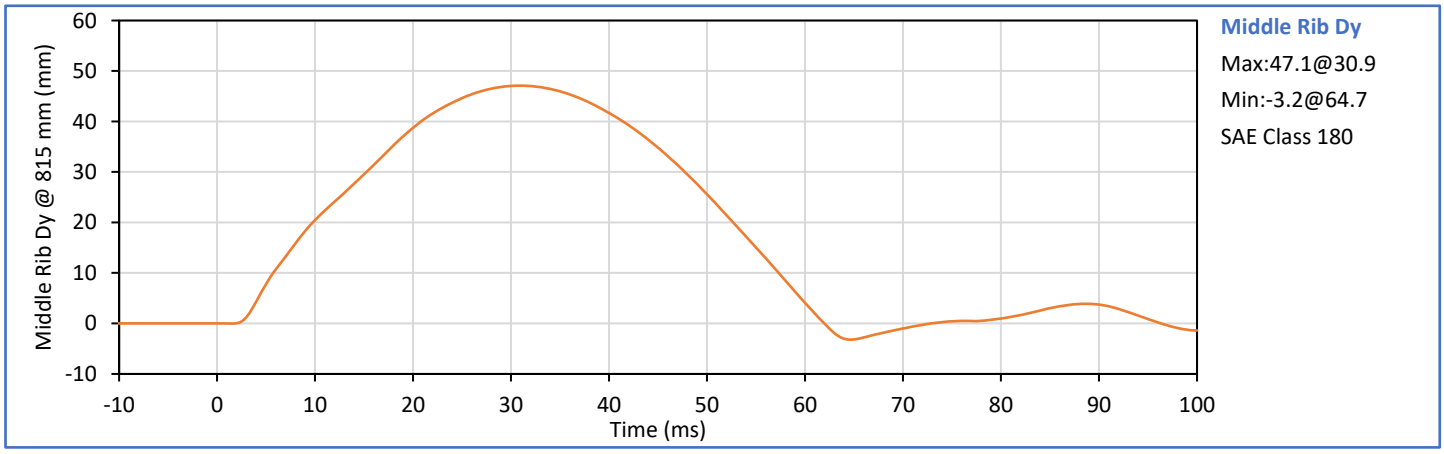
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F037 Test Date: 2023-08-16

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	45	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.8	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.1	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

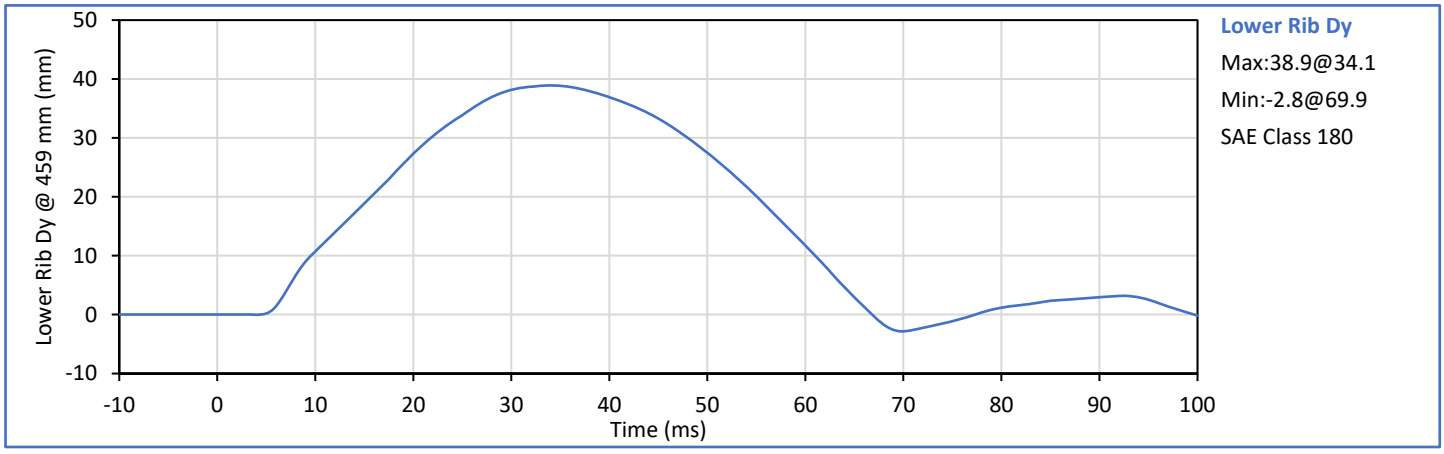
Applus IDIADA KARCO

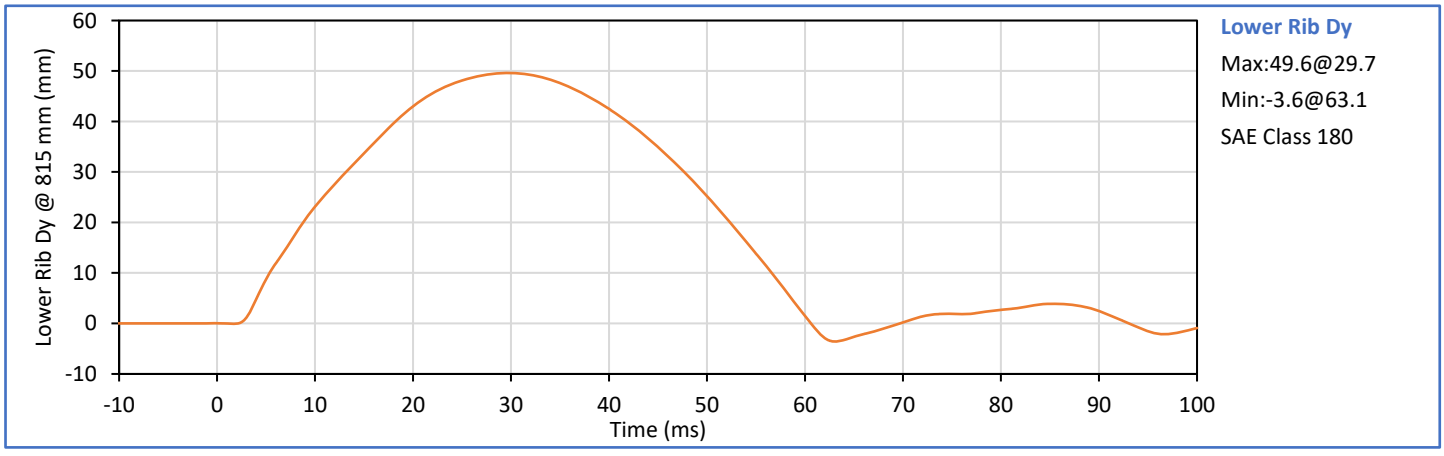
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2023-08-15

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	45	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	38.9	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	49.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

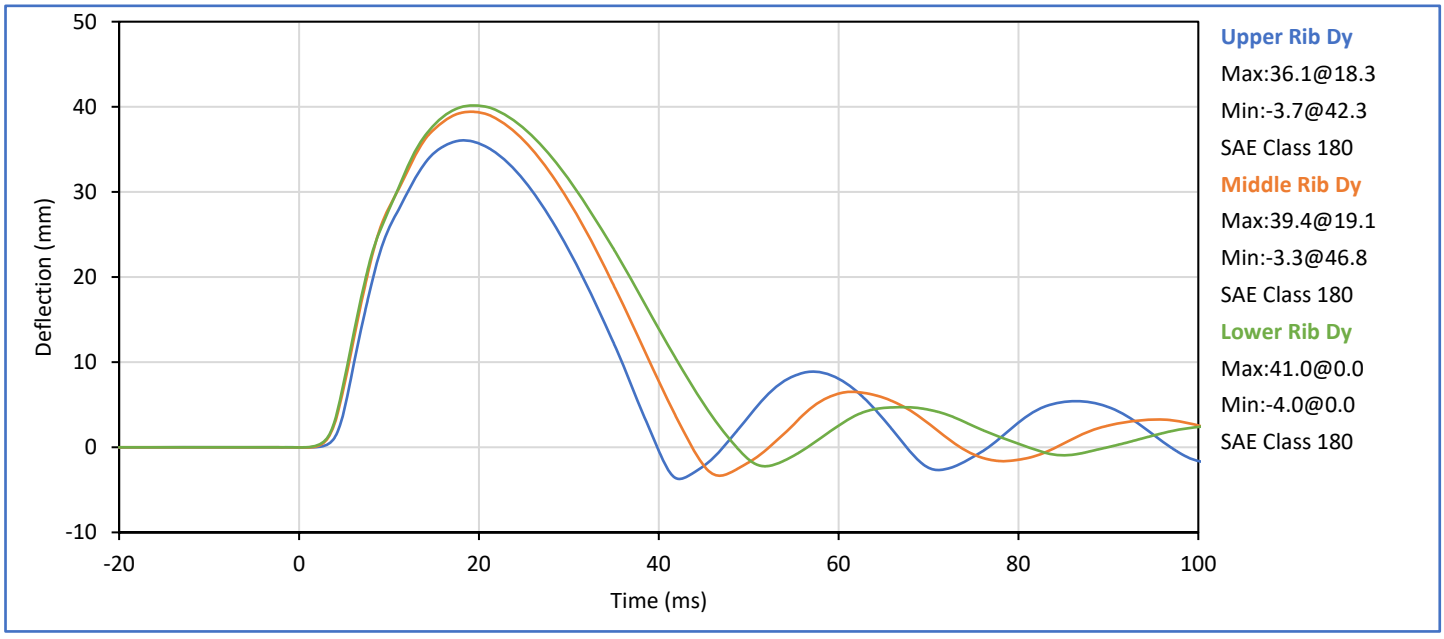
Approved By: J. Hernandez

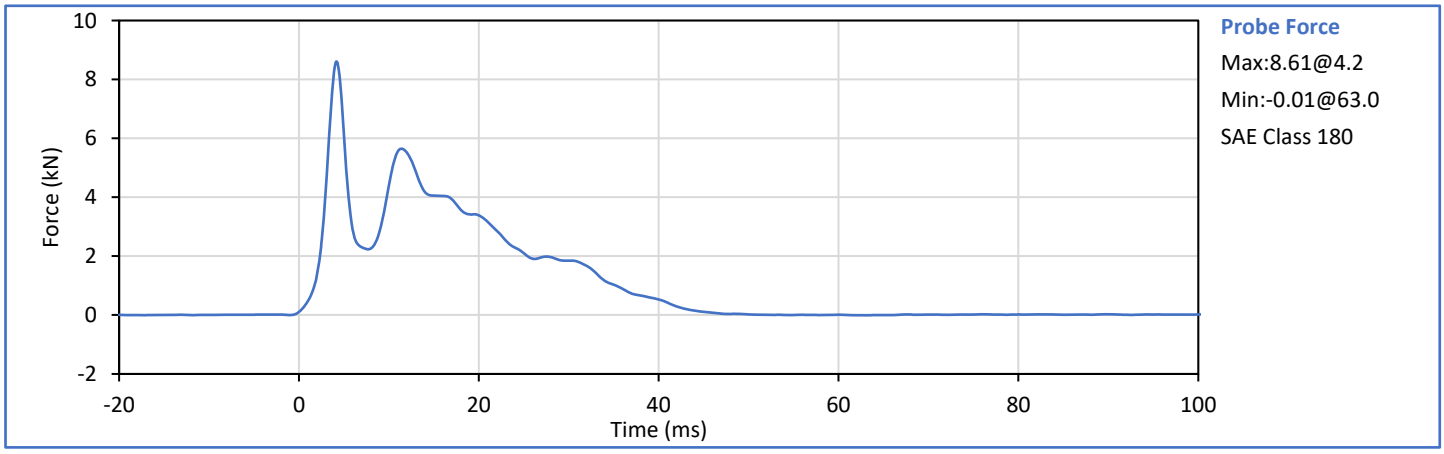
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Thorax Impact (Full Body)

ATD Serial No.: F037 Test Date: 2023-08-14

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	37	Pass
Impactor Velocity	m/s	5.40	5.60	5.53	Pass
Peak Upper Rib Dy	mm	34.0	41.0	36.1	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.4	Pass
Peak Lower Rib Dy	mm	37.0	44.0	40.2	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.65	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

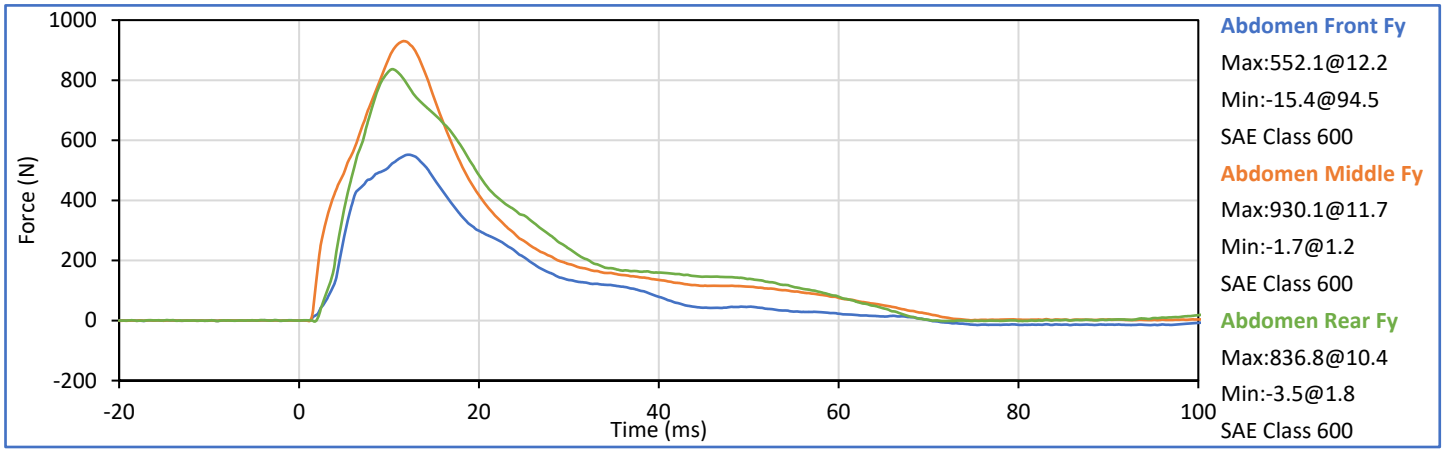
Approved By: J. Hernandez

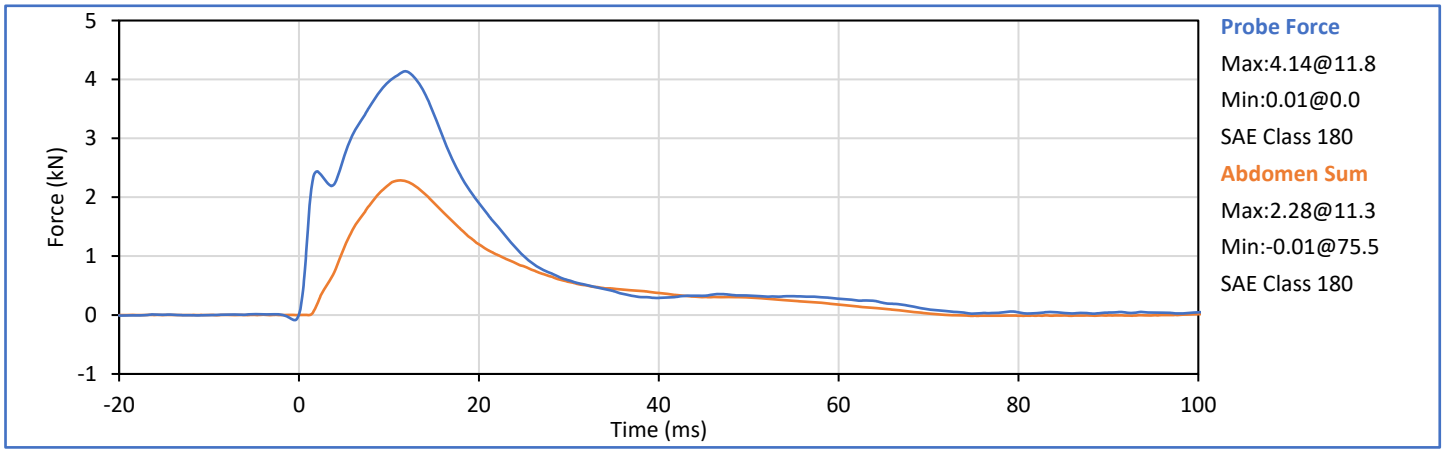
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Abdomen Impact

ATD Serial No.: F037 Test Date: 2023-08-14

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	37	Pass
Impactor Velocity	m/s	3.90	4.10	4.05	Pass
Peak Impactor Force	kN	4.00	4.80	4.14	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.8	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.28	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.3	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

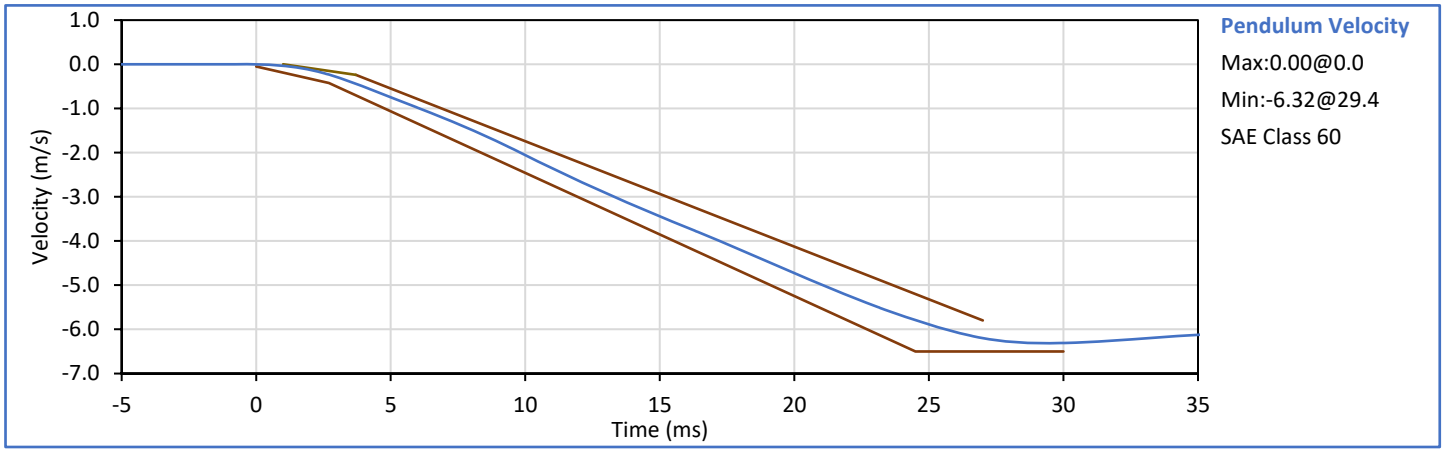
Approved By: J. Hernandez

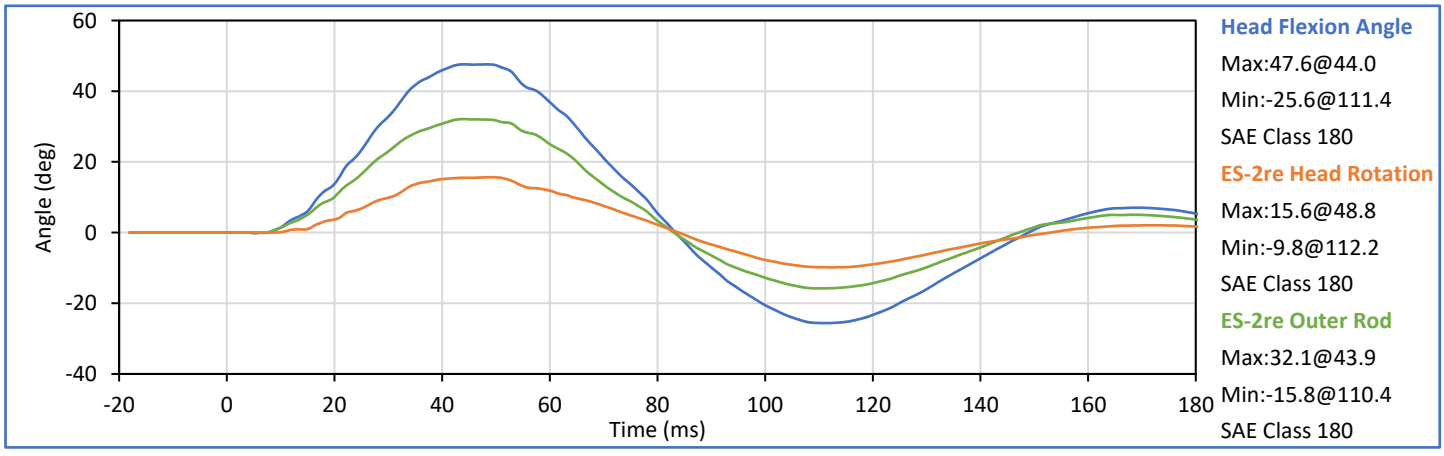
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Lumbar Spine Flexion

ATD Serial No.: F037 Test Date: 2023-08-15

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	45	Pass
Pendulum Velocity	m/s	5.95	6.15	6.08	Pass
Peak Headform Flexion	deg	45.0	55.0	47.6	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: G. Fuentes

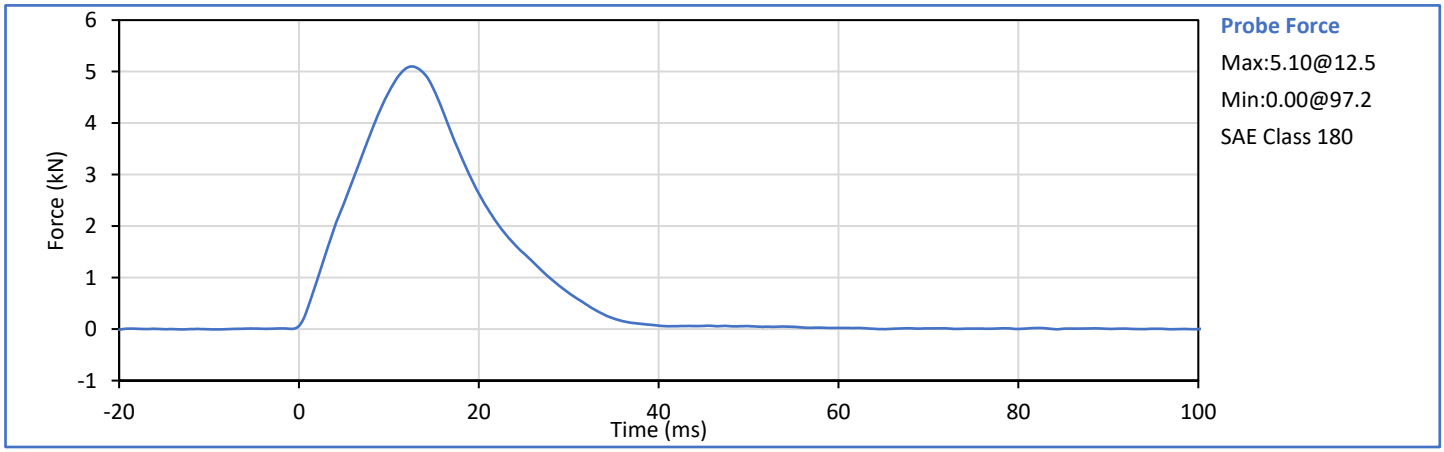
Approved By: J. Hernandez

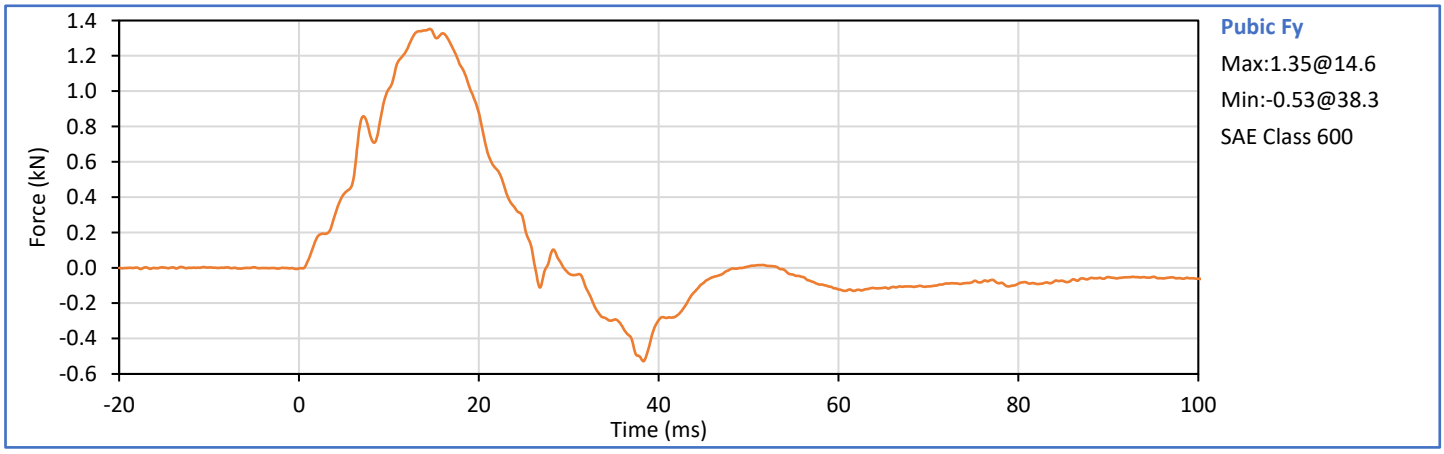
Applus IDIADA KARCO

ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F037 Test Date: 2023-08-14

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	45	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.10	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.5	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.35	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

APPENDIX C
Post-Test ATD Qualification and Performance Verification
SID-IIs Small Side Impact ATD, Left Side Configuration
S/N: 299

Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 299 Test Date: 2023-08-10

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	45	Pass
A - Sitting Height	mm	772	788	780	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	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	102	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	147	Pass
H - Head Back From Backline	mm	40	46	43	Pass
I - Head Depth	mm	178	188	181	Pass
J - Head Circumference	mm	541	551	545	Pass
K - Buttock To Knee Length	mm	514	540	525	Pass
L - Popliteal Height	mm	343	369	354	Pass
K - Knee Pivot To Floor Height	mm	392	409	398	Pass
N - Buttock Popliteal Length	mm	416	442	437	Pass
O - Chest Depth W/O Jacket	mm	195	211	204	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	255	Pass
S - Knee Joint To Seatback	mm	477	493	490	Pass
V - Shoulder Width	mm	341	357	346	Pass
W - Foot Width	mm	78	94	89	Pass
Y - Chest Circumference W/Jacket	mm	851	881	863	Pass
Z - Waist Circumference	mm	761	791	774	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

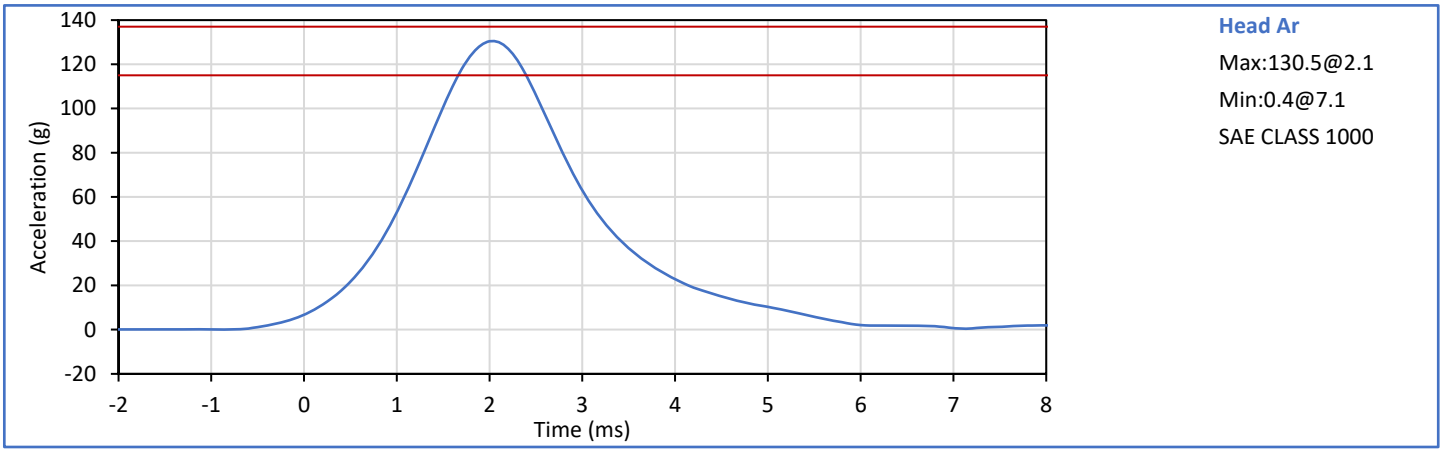
Approved By: J. Hernandez

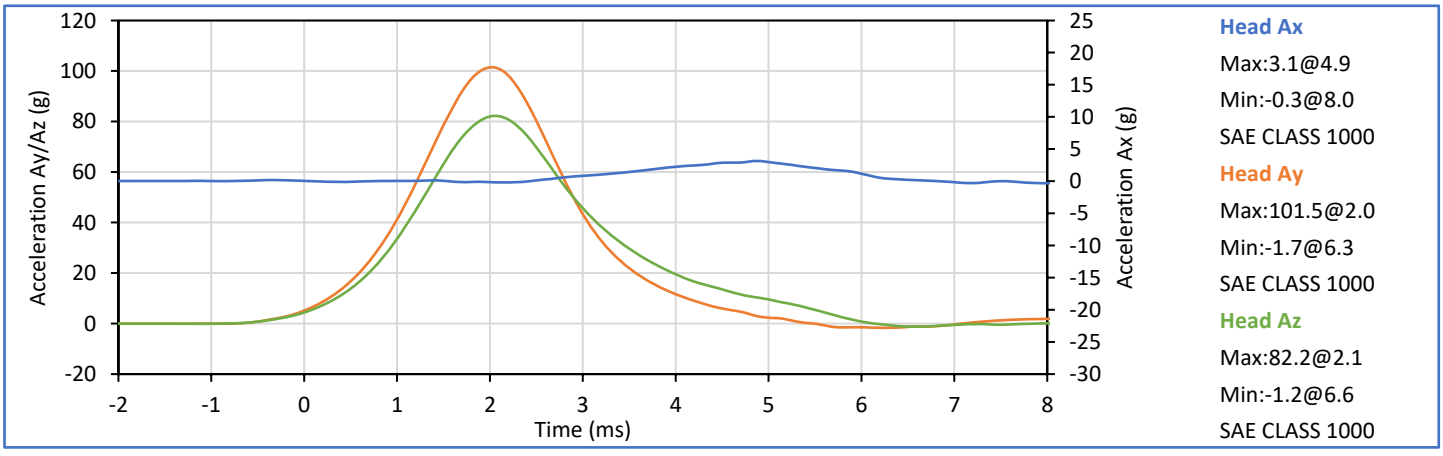
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299 Test Date: 2023-08-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Relative Humidity	%	10	70	45	Pass
Peak Resultant Acceleration	g	115.0	137.0	130.5	Pass
Peak Head Ax	g	-15.0	15.0	3.1	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

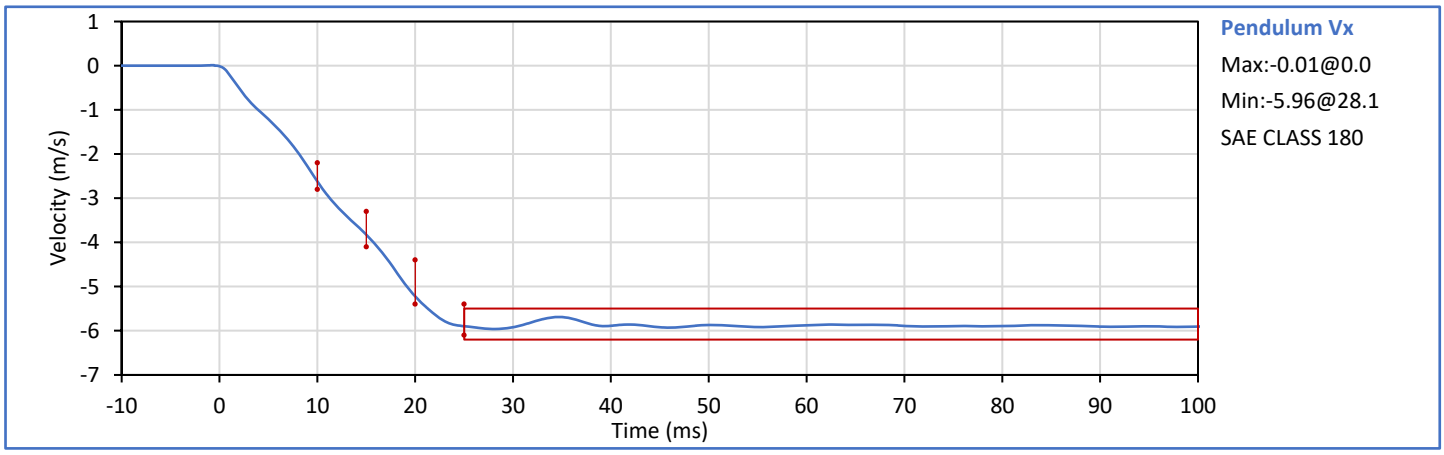
Approved By: J. Hernandez

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2023-08-14

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
Pendulum Velocity	m/s	5.51	5.63	5.56	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.62	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.83	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-5.22	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.90	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-5.96/-5.69	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-74.7	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	57.9	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	42.3	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	107.7	Pass
			Overall Test Results		Pass



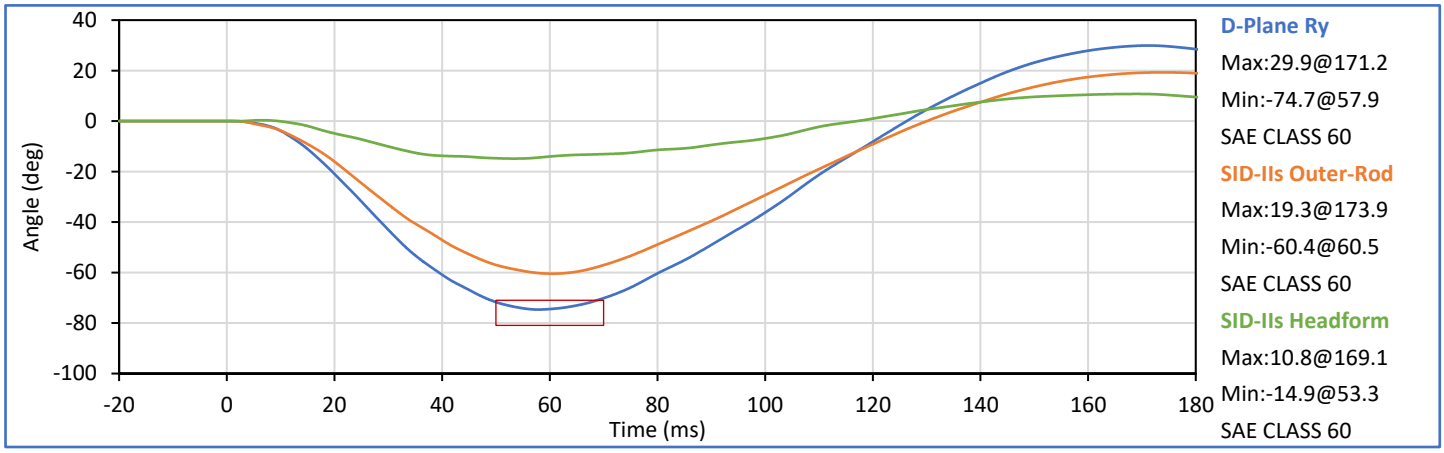
Technician: G. Fuentes

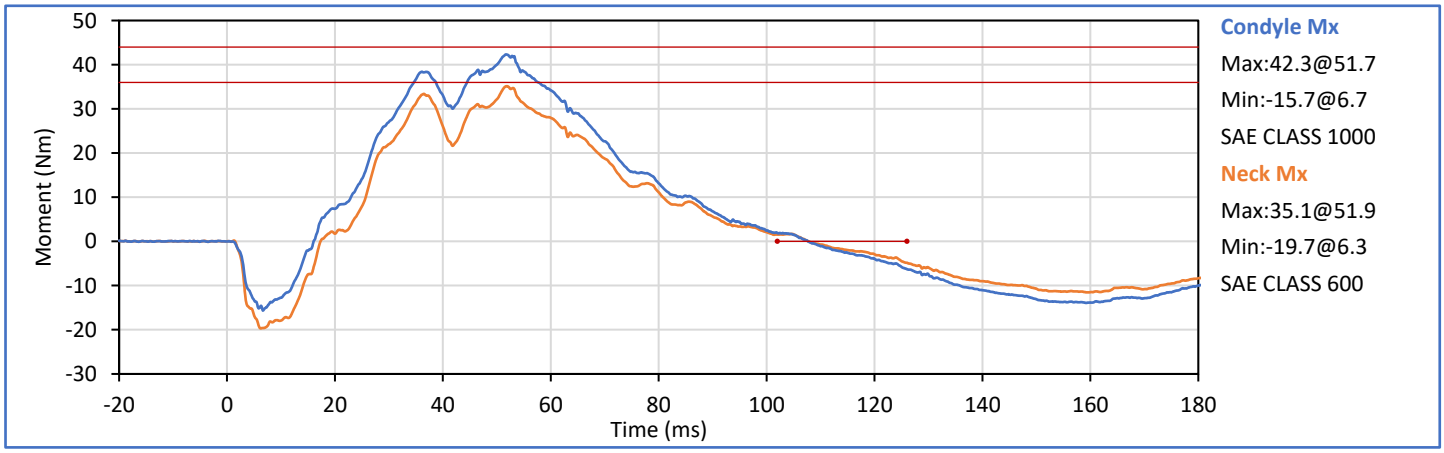
Approved By: J. Hernandez

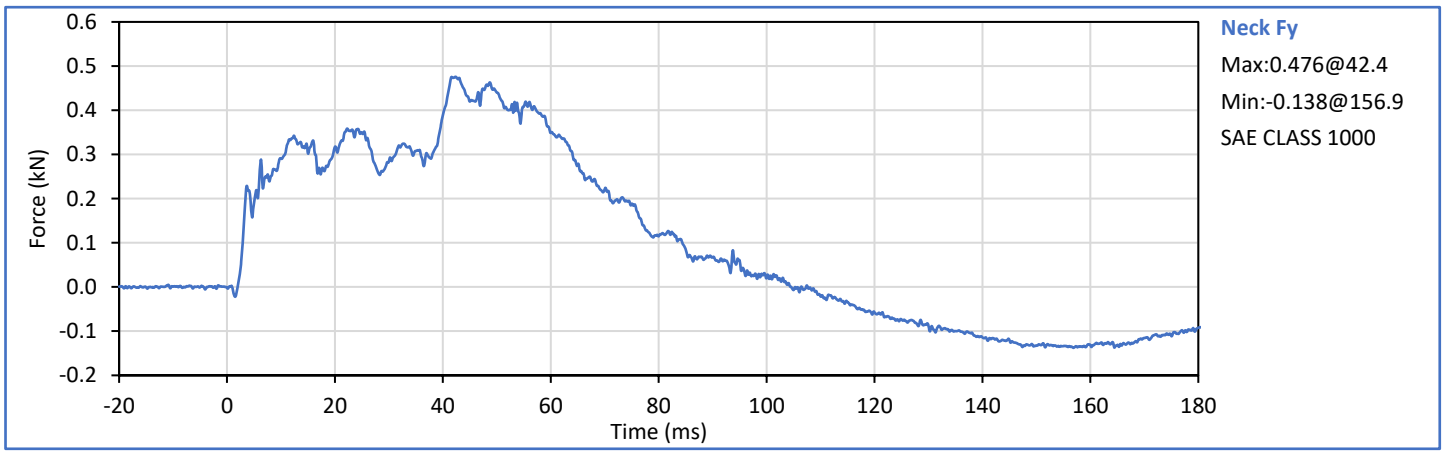
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2023-08-14





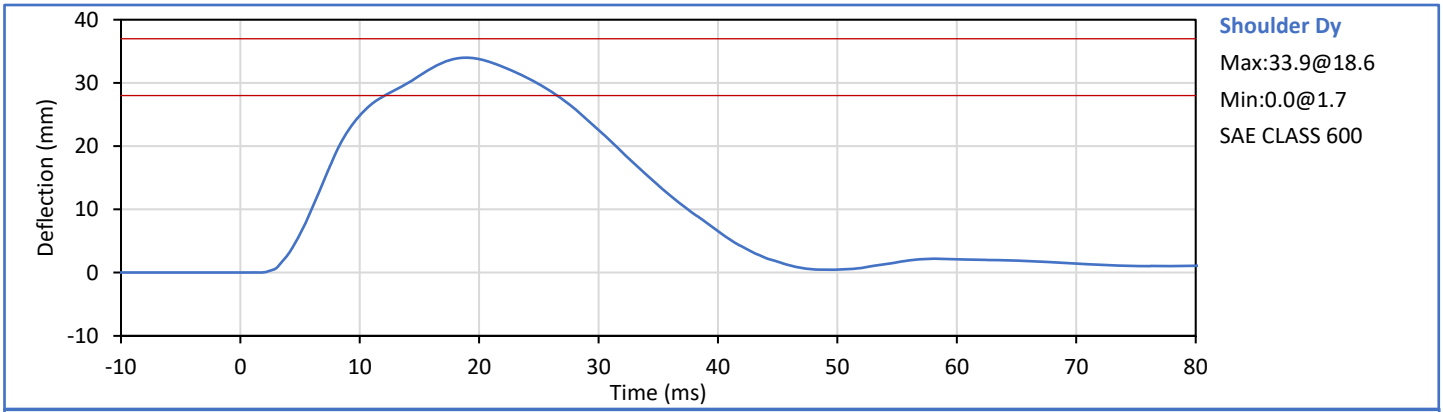


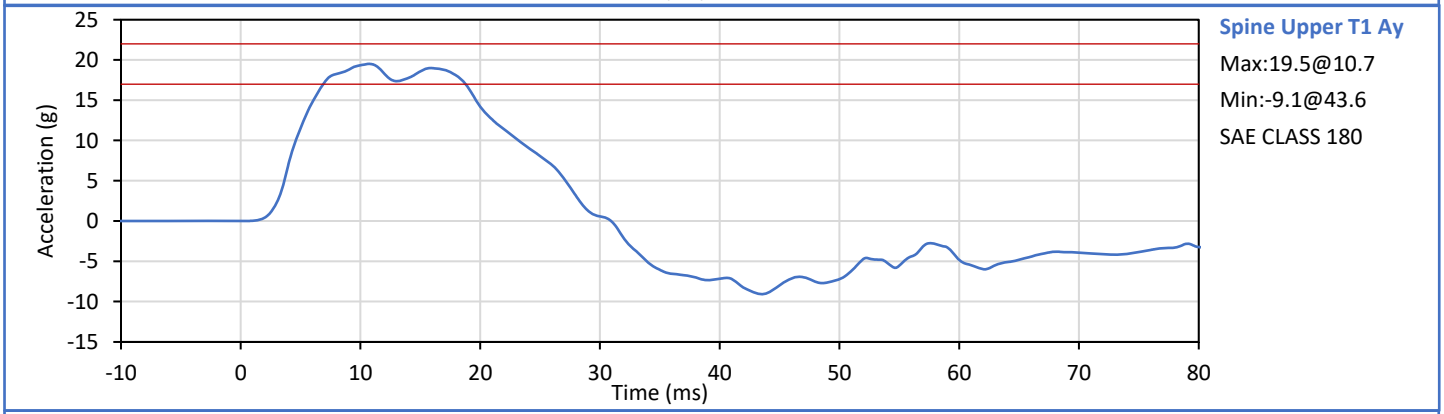
Applus IDIADA KARCO

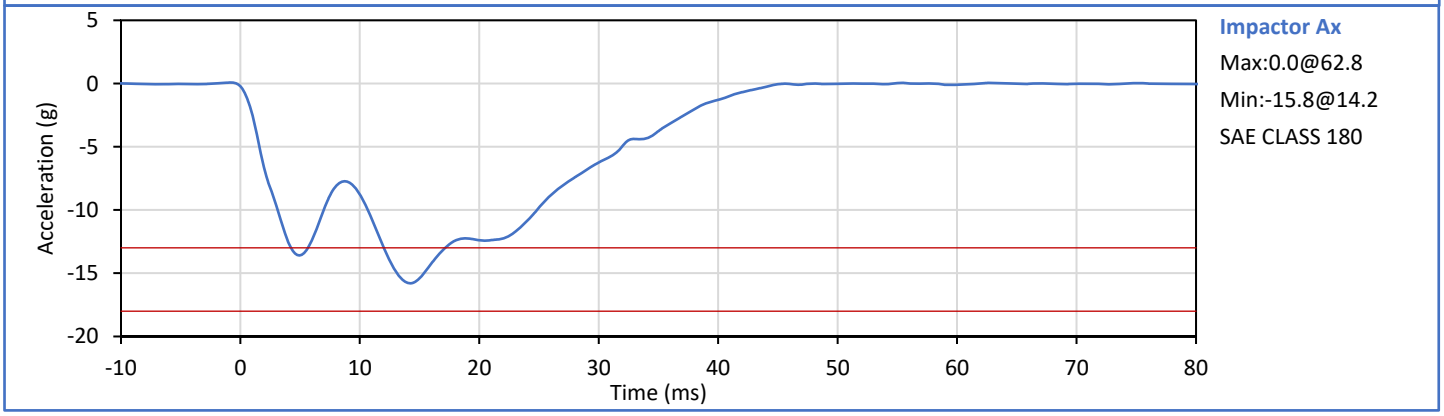
SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299 Test Date: 2023-08-11

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Relative Humidity	%	10	70	48	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Shoulder Dy	mm	28.0	37.0	33.9	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.5	Pass
Peak Impactor Ax	g	-18.0	-13.0	-15.8	Pass
			Overall Test Results		Pass







Technician: G. Fuentes

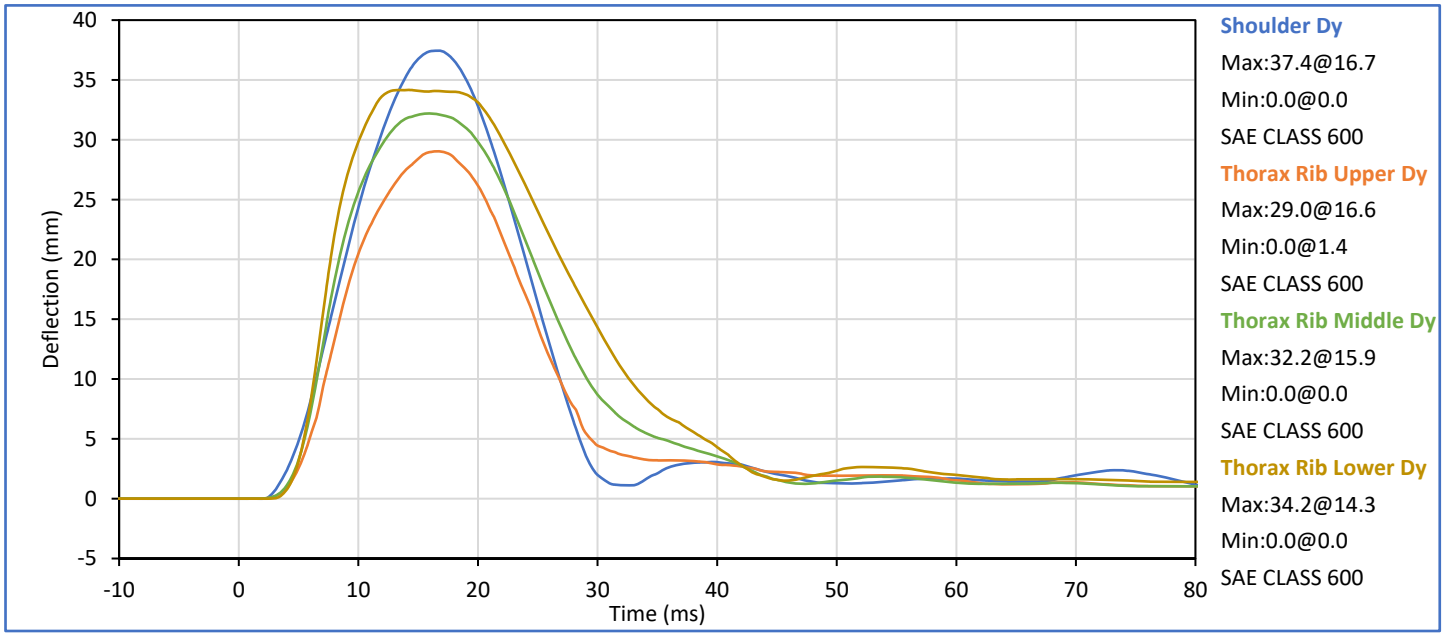
Approved By: J. Hernandez

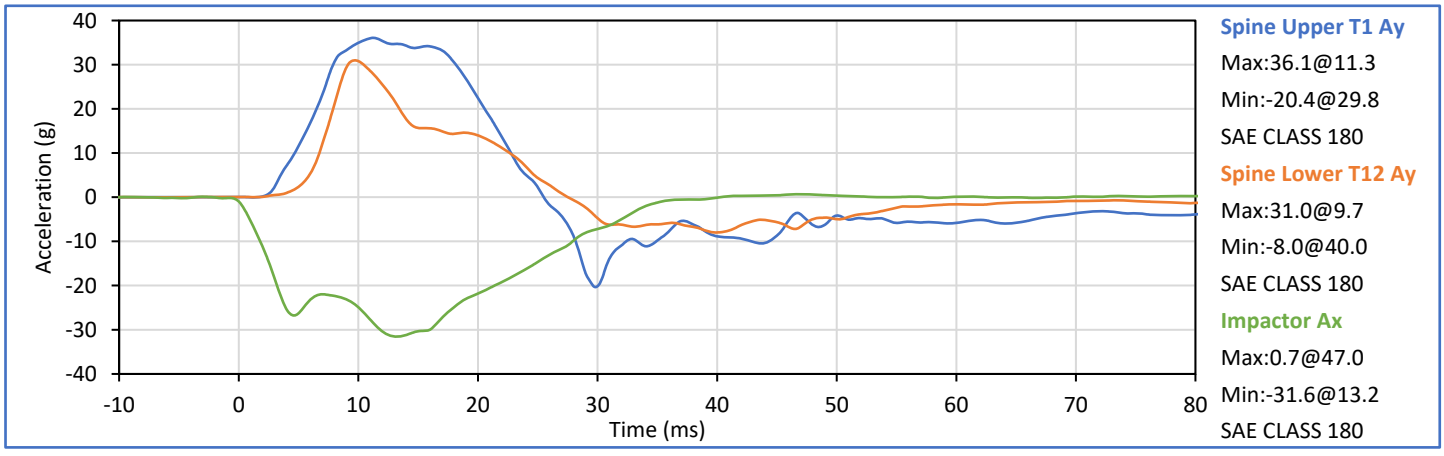
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Thorax (With Arm)

ATD Serial No.: 299 Test Date: 2023-08-11

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	47	Pass
Impactor Velocity	m/s	6.60	6.80	6.70	Pass
Peak Shoulder Dy	mm	31.0	40.0	37.4	Pass
Peak Upper Rib Dy	mm	25.0	32.0	29.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.2	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.2	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.1	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	31.0	Pass
Peak Impactor Ax	g	-36.0	-30.0	-31.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

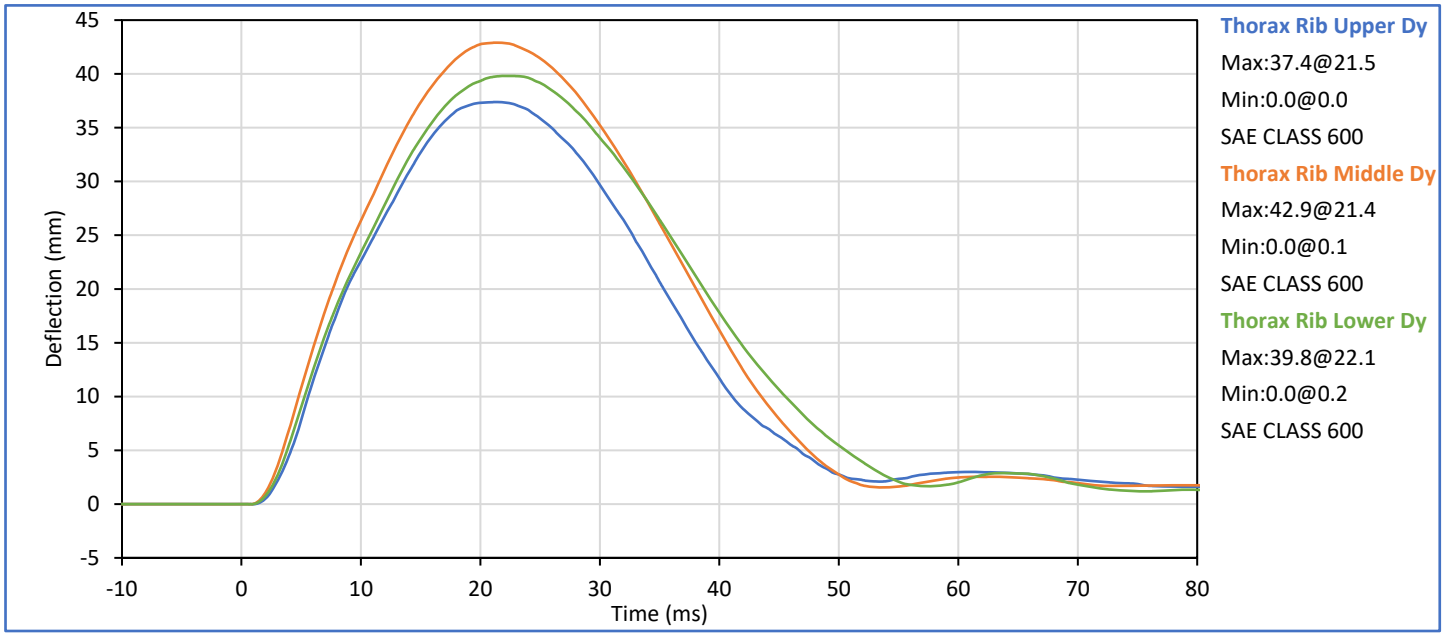
Approved By: J. Hernandez

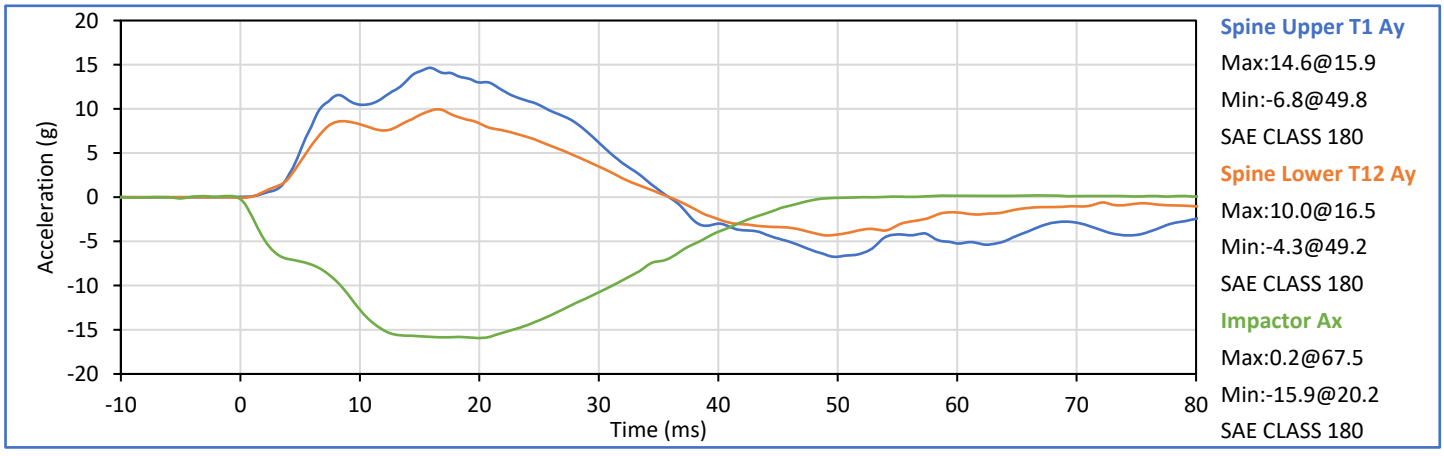
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Thorax (No Arm)

ATD Serial No.: 299 Test Date: 2023-08-11

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	48	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	37.4	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	42.9	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	10.0	Pass
Peak Impactor Ax	g	-18.0	-14.0	-15.9	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

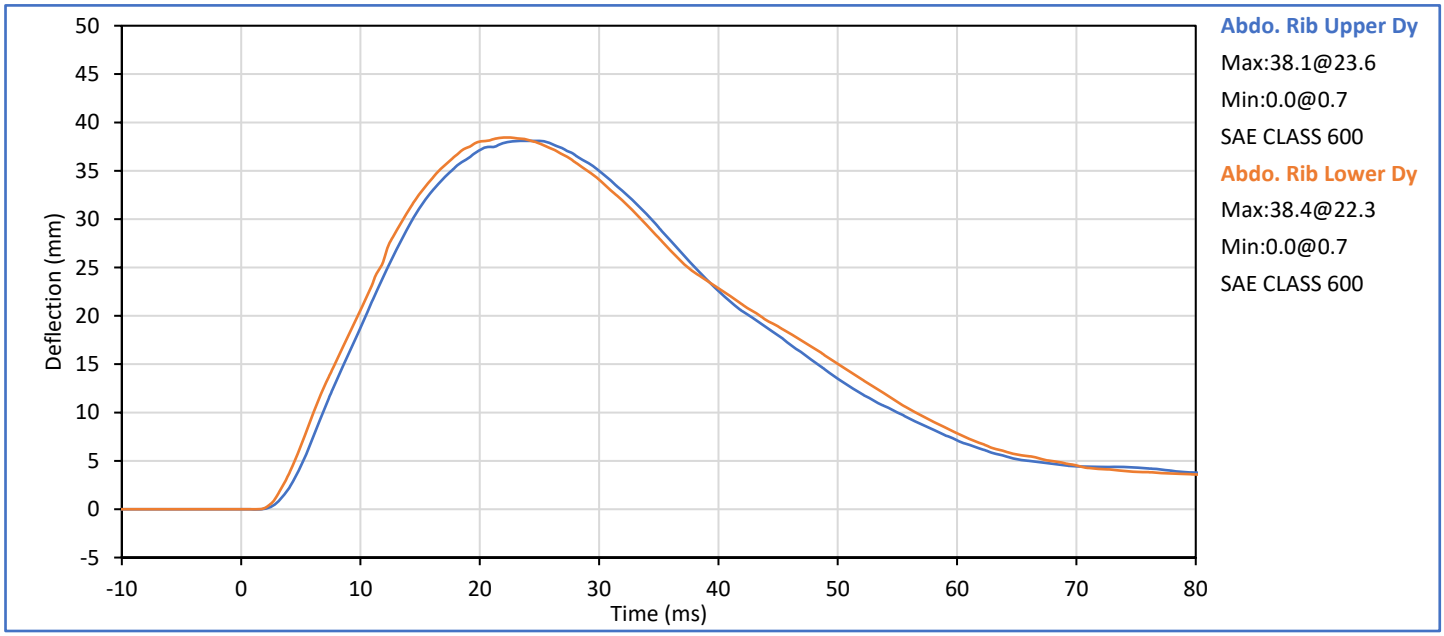
Approved By: J. Hernandez

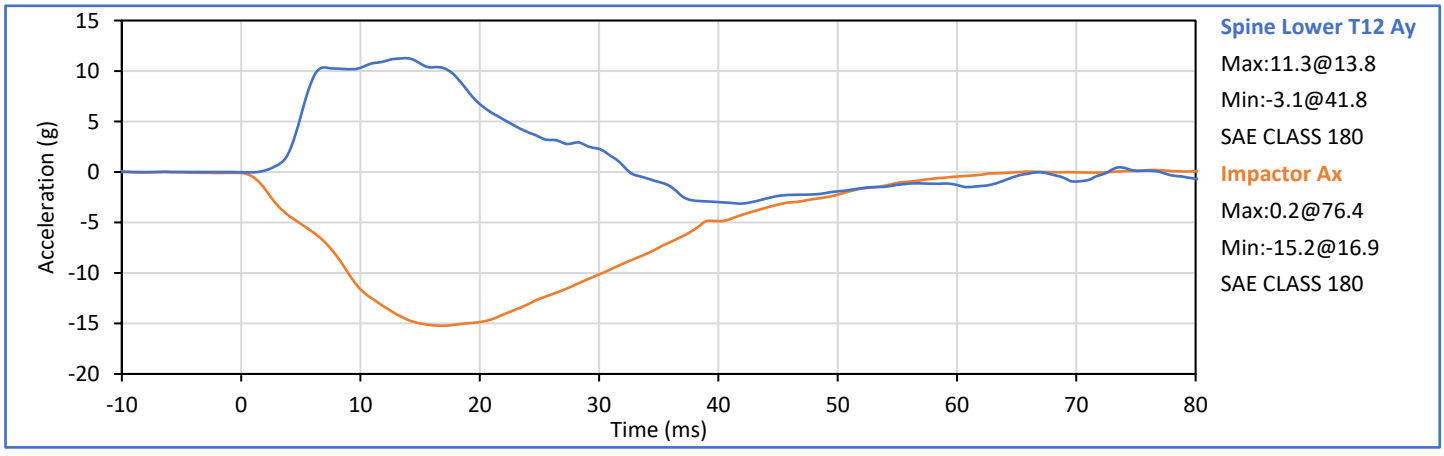
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299 Test Date: 2023-08-11

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	47	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	38.1	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	38.4	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	11.3	Pass
Peak Impactor Ax	g	-16.0	-12.0	-15.2	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

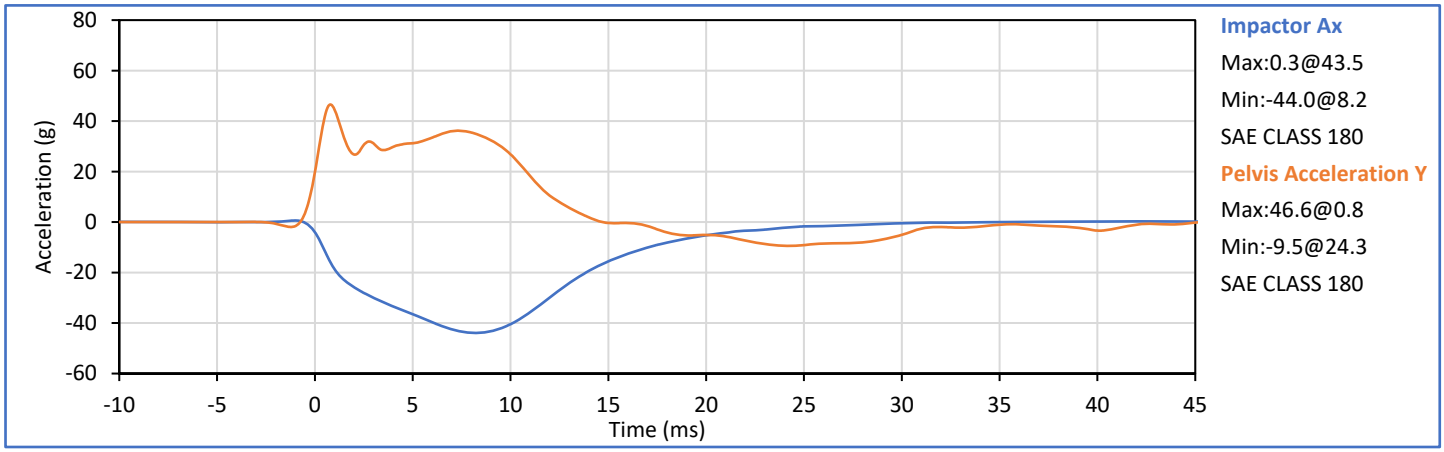
Applus IDIADA KARCO

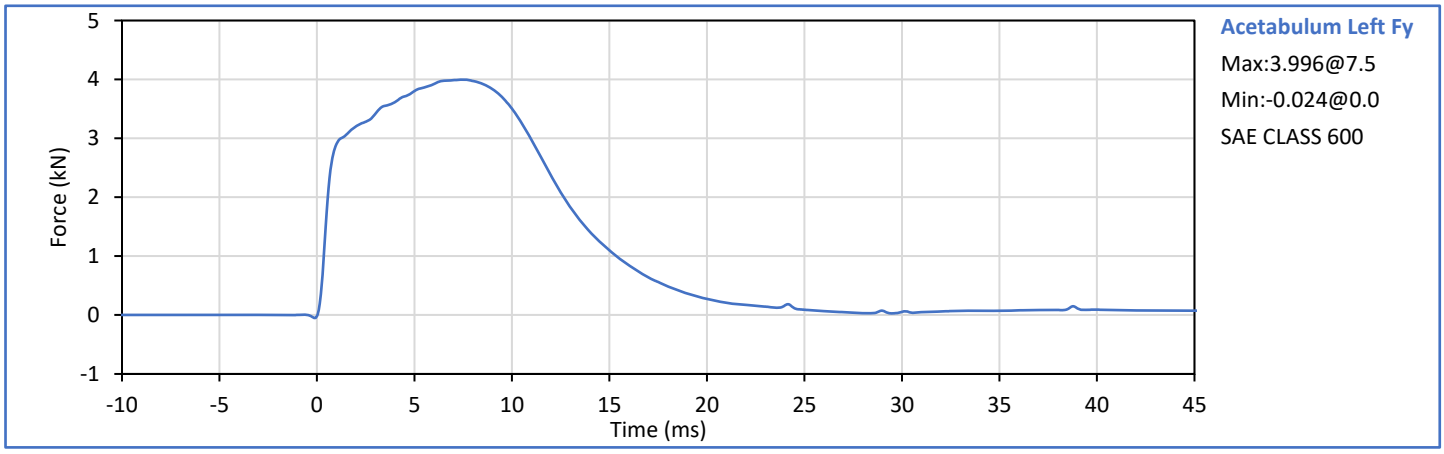
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299 Test Date: 2023-08-11

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	48	Pass
Impactor Velocity	m/s	6.60	6.80	6.73	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.00	Pass
Pelvis Ay after 6ms	g	34.0	42.0	36.2	Pass
Peak Impactor Ax	g	-47.0	-38.0	-44.0	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 14805





Technician: G. Fuentes

Approved By: J. Hernandez

ATD Serial No.: 299 Test Date: 2023-08-11

Pelvis Plug S/N: 14805

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

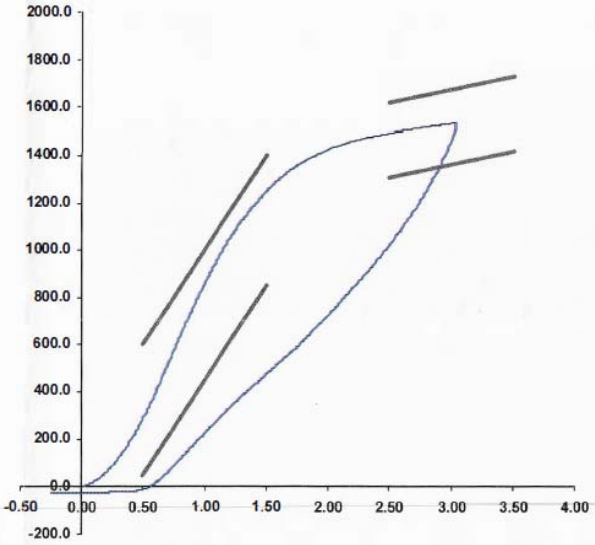
Plug S/N 14805
Test Number 16778
Report Number 16824
Test Date 12/29/2020 12:28:01 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	296.37	50.00	600.00
Force @ 1.5 mm (N)	1,250.80	850.00	1,400.00
Force @ 2.5 mm (N)	1,491.87	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,530.03	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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

Part Number 180-4450

Template No 107 29-Dec-20
SACO Research

By : DC Date : 12/29/20

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

Applus IDIADA KARCO

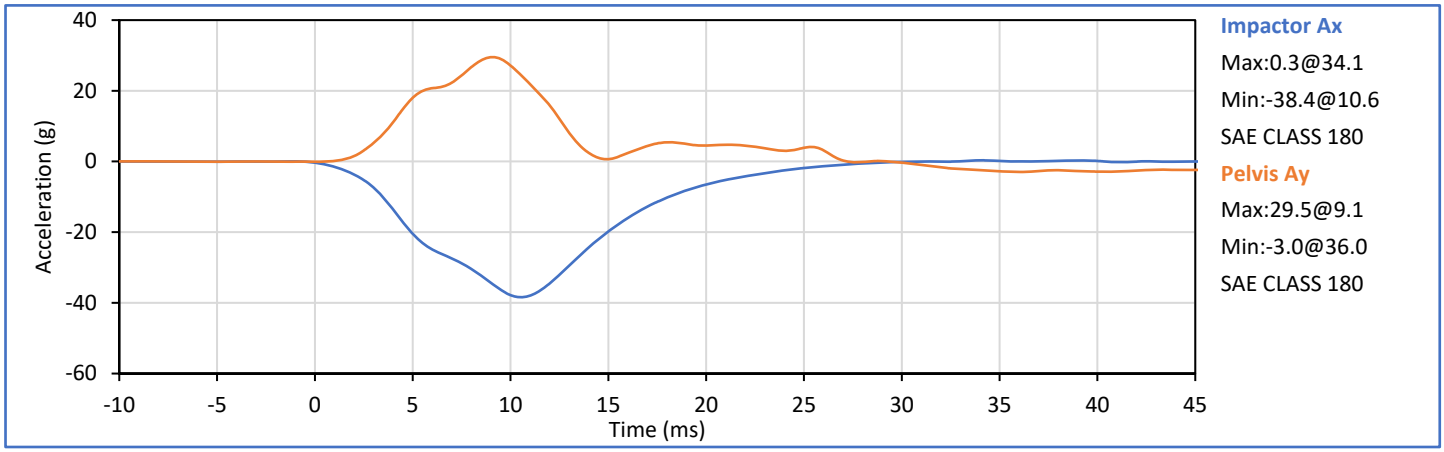
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

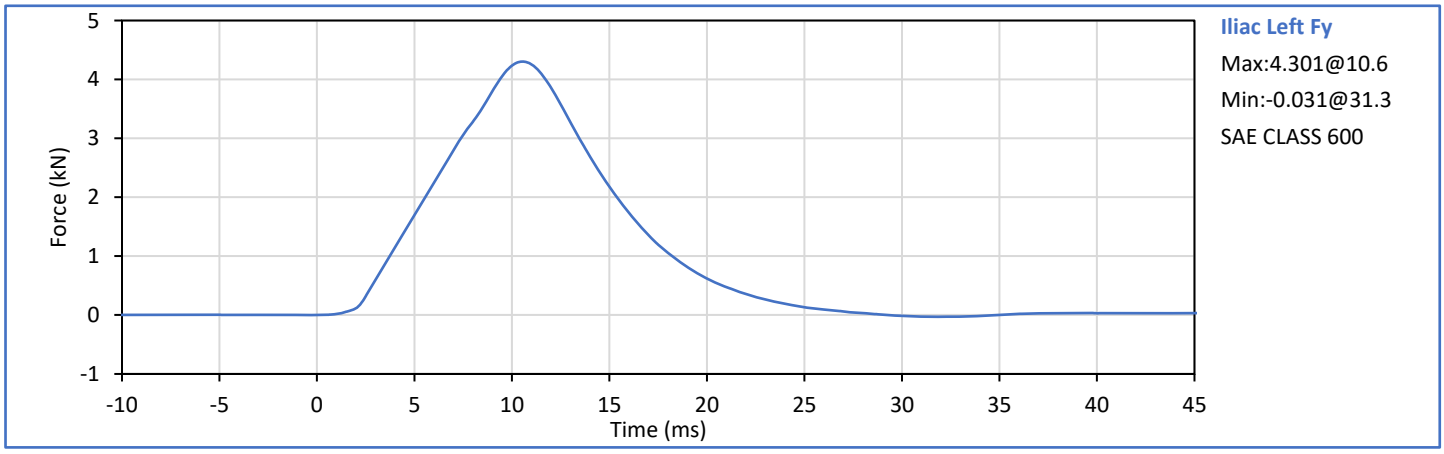
ATD Serial No.: 299 Test Date: 2023-08-14

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	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	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	-38.4	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 *

* Plug is not impacted and remains certified





Technician: G. Fuentes

Approved By: J. Hernandez

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

ES-2re ATD S/N: F037

Table 1 - Driver ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58858	Endevco	7264C-2k	2023-04-05
Head Acceleration Y Primary	P58865	Endevco	7264C-2k	2023-04-05
Head Acceleration Z Primary	P58867	Endevco	7264C-2k	2023-04-05
Head Acceleration X Redundant	P58859	Endevco	7264C-2k	2023-04-05
Head Acceleration Y Redundant	P58866	Endevco	7264C-2k	2023-04-05
Head Acceleration Z Redundant	P58873	Endevco	7264C-2k	2023-04-05
Upper Thorax Rib Deflection Y	209 (ES-2 Rib)	Honeywell	F38000203	2023-04-07
Middle Thorax Rib Deflection Y	210 (ES-2 Rib)	Honeywell	F38000203	2023-04-07
Lower Thorax Rib Deflection Y	207 (ES-2 Rib)	Honeywell	F38000203	2023-04-07
Anterior Abdominal Force Y	1504 Fy	R.A. Denton	2631J	2023-02-16
Middle Abdominal Force Y	1505 Fy	R.A. Denton	2631J	2023-02-16
Posterior Abdominal Force Y	1506 Fy	R.A. Denton	2631J	2023-02-16
Lower Spine T12 Acceleration X	P63856	Endevco	7264C-2k	2023-04-05
Lower Spine T12 Acceleration Y	P50063	Endevco	7264C-2k	2023-04-06
Lower Spine T12 Acceleration Z	P51880	Endevco	7264C-2k	2023-04-06
Pubic Symphysis Force Y	DG6834 Fy	FTSS	IF-556	2023-02-16

SID-IIs ATD S/N: 299

Table 2 - Left Rear Passenger ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P51929	Endevco	7264C-2k	2023-03-29
Head Acceleration Y Primary	P50086	Endevco	7264C-2k	2023-03-29
Head Acceleration Z Primary	P51931	Endevco	7264C-2k	2023-03-29
Head Acceleration X Redundant	P68604	Endevco	7264C-2k	2023-03-29
Head Acceleration Y Redundant	P51934	Endevco	7264C-2k	2023-03-29
Head Acceleration Z Redundant	P58736	Endevco	7264C-2k	2023-03-29
Head Rotation Rate X	ARS14943	DTS	ARS PRO-18k (2kHz)	2022-09-07
Head Rotation Rate Y	ARS14935	DTS	ARS PRO-18k (2kHz)	2022-09-09
Head Rotation Rate Z	ARS14936	DTS	ARS PRO-18k (2kHz)	2022-09-09
Upper Thorax Rib Deflection Y	1143	Servo	08TCI-3725	2023-03-27
Middle Thorax Rib Deflection Y	1075	Servo	08TCI-3725	2023-03-27
Lower Thorax Rib Deflection Y	1213	Servo	08TCI-3725	2023-03-27
Upper Abdomen Rib Deflection Y	1218	Servo	08TCI-3725	2023-03-27
Lower Abdomen Rib Deflection Y	1177	Servo	08TCI-3725	2023-03-27
Lower Spine T12 Acceleration X	P58761	Endevco	7264C-2k	2023-03-29
Lower Spine T12 Acceleration Y	P50077	Endevco	7264C-2k	2023-03-30
Lower Spine T12 Acceleration Z	P58795	Endevco	7264C-2k	2023-03-30
Iliac Wing Impact Side Force Y	278 (Iliac)	R.A. Denton	3228J	2023-02-16
Acetabulum Impact Side Force Y	260 (Acetabulum)	R.A. Denton	3249J	2023-02-16

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	M11234	Endevco	758H-2k	2023-08-01
Vehicle CG Ay	M11156	Endevco	758H-2k	2023-06-22
Vehicle CG Az	M11258	Endevco	758H-2k	2023-06-28
Right Side Sill at Front Seat Ax	M11098	Endevco	758H-2k	2023-08-02
Right Side Sill at Front Seat Ay	M11044	Endevco	758H-2k	2023-08-03
Right Side Sill at Front Seat Az	M11198	Endevco	758H-2k	2023-08-01
Right Side Sill at Rear Seat Ax	M11241	Endevco	758H-2k	2023-08-03
Right Side Sill at Rear Seat Ay	M11131	Endevco	758H-2k	2023-07-31
Right Side Sill at Rear Seat Az	M11210	Endevco	758H-2k	2023-08-01
Left Side Sill at Front Seat Ay	M11248	Endevco	758H-2k	2023-07-31
Left Side Sill at Rear Seat Ay	M11092	Endevco	758H-2k	2023-07-31
Left Lower A-Pillar Ay	M11079	Endevco	758H-2k	2023-08-02
Left Middle A-Pillar Ay	M11274	Endevco	758H-2k	2023-03-17
Left Lower B-Pillar Ay	M11148	Endevco	758H-2k	2023-03-07
Left Middle B-Pillar Ay	M11204	Endevco	758H-2k	2023-07-30
Driver Seat Track at H-Point Ay	M11283	Endevco	758H-2k	2023-07-31
Rear Seat Structure Ay	M11192	Endevco	758H-2k	2023-06-27
Right Rear Occupant Comp. Ay	M11067	Endevco	758H-2k	2023-06-28
Engine Block Top Ax	M11227	Endevco	758H-2k	2023-08-01
Engine Block Top Ay	M11213	Endevco	758H-2k	2023-07-31
Rear Floopan Above Axle Ax	M11094	Endevco	758H-2k	2023-08-02
Rear Floopan Above Axle Ay	M11063	Endevco	758H-2k	2023-03-07
Rear Floopan Above Axle Az	M11182	Endevco	758H-2k	2023-07-31

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
MDB CG Ax	M11284	Endevco	758H-2k	2023-03-08
MDB CG Ay	M11203	Endevco	758H-2k	2023-08-03
MDB CG Az	M11244	Endevco	758H-2k	2023-08-01
MDB Left Side at Rear Axle Ax	M11126	Endevco	758H-2k	2023-06-23
MDB Left Side at Rear Axle Ay	M11045	Endevco	758H-2k	2023-04-01