REPORT NUMBER: SideNCAPMDB-KAR-22-008

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

TOYOTA MOTOR MANUFACTURING, TEXAS, INC.
2022 TOYOTA TUNDRA CREWMAX 4X2 4-DOOR TRUCK

NHTSA No: M20225105

PREPARED BY:

APPLUS+ IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

NOVEMBER 10, 2022

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

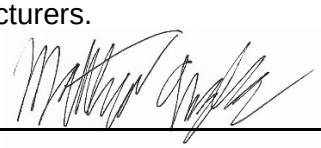
OFFICE OF CRASHWORTHINESS STANDARDS

MAIL CODE: NRM-100

1200 NEW JERSEY AVE, SE

WASHINGTON, D.C. 20590

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

Prepared By: 

Mr. Matthew J. Angeles, Project Engineer
Applus+ IDIADA KARCO Engineering, LLC.

Reviewed By: 

Mr. Alex Beltran, Engineering Manager
Applus+ IDIADA KARCO Engineering, LLC.

Approved By: 

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

Approval Date: November 10, 2022

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date:

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

Date:

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SideNCAPMDB-KAR-22-008		

4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing of a 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105	November 10, 2022
	6. Performing Organization Code KAR
7. Authors Mr. Matthew J. Angeles, Project Engineer, Applus+ IDIADA KARCO Engineering, LLC Mr. Alex Beltran, Engineering Manager, Applus+ IDIADA KARCO Engineer, LLC	**8. Performing Organization Report No.** TR-P42228-01-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, October 27 - November 10, 2022 **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 2022 Toyota Tundra CrewMax 4X2 4-Door Truck 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 October 27, 2022.

The impact velocity of the Moving Deformable Barrier was 61.69 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 19.4°C. The target vehicle's maximum post-test static crush was 180 mm located at level 1. 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	48.674
Maximum Thoracic Rib Deflection	mm	44	15.118
Total Abdominal Force	N	2500	454.931
Pubic Symphysis Force	N	6000	574.000

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	38.727
Resultant Lower Spine Acceleration	g	82	45.638
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	546.887
Maximum Thoracic Rib Deflection	mm	38*	2.423
Maximum Abdominal Rib Deflection	mm	45*	3.411

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

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*

TABLE OF CONTENTS

SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2022 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 2022 Toyota Tundra CrewMax 4X2 4-door truck. 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 2022 Toyota Tundra CrewMax 4X2 4-door truck 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 61.69 km/h (38.33 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 October 27, 2022. 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	48.674
Maximum Thoracic Rib Deflection	mm	44	15.118
Combined Abdominal Force	N	2500	454.931
Pubic Symphysis Force	N	6000	574.000

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	38.727
Lower Spine (T12) Resultant Acceleration	g	82	45.638
Total Pelvic Force (sum of acetabular and iliac forces	N	5525	546.887
Maximum Thoracic Rib Deflection	mm	38*	2.423
Maximum Abdominal Rib Deflection	mm	45*	3.411

**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:

- Left Front Sill, Channel Failed at 4.4 ms
- Left Rear Sill Ay, Channel Failed at 46.8 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

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: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20225105
Model Year	2022
Make	Toyota
Model	Tundra CrewMax 4X2
Body Style	4-Door Truck
VIN	5TFLA5ABXNX015997
Body Color	White
Odometer Reading (km / mi)	10 / 6
Engine Displacement (L)	3.5
Type / No. of Cylinders	V6
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	10
Overdrive	Yes
Final Drive	RWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	Yes
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	No

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Texas, Inc.
Date of Manufacture	22-Aug
Vehicle Type	Truck

GVWR (kg)	3170
GAWR Front (kg)	1850
GAWR Rear (kg)	1750

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				635.0	*A*
DSC x 68.04 (kg)				340.2	*B*
Cargo Weight (RCLW) (kg)				294.8	*A-B**

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

VEHICLE SEAT TYPE

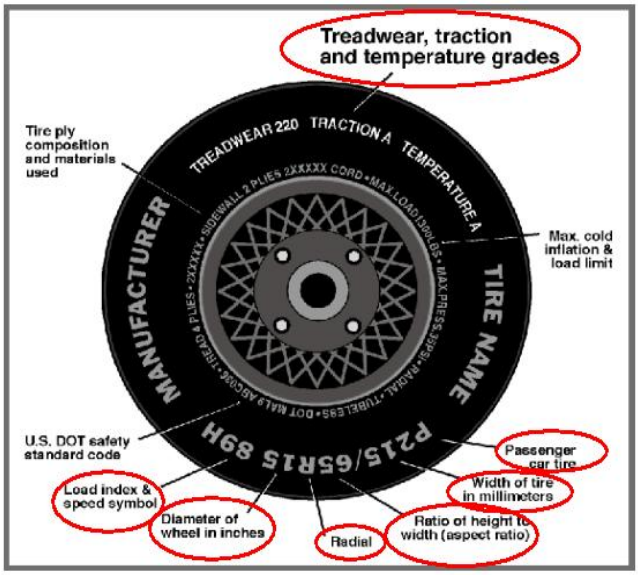
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable w/ Lever	Adjustable w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat			Yes		Yes		
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	265/70R18	265/70R18
Tire Size on Vehicle	265/70R18	265/70R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler H/T	Dueler H/T
Treadware	520	520
Traction Grade	A	A
Temperature Grade	Bridgestone	Bridgestone
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	116T	116T
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	17X H4DHT1 1322	17X H4DHT1 1322
DOT Safety Code Right	17X H4DHT1 1322	17X H4DHT1 1322

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	240	240	240
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

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	657.5	520.0		702.0	640.5		726.5	637.0	
Right	kg	701.0	531.5		699.0	622.0		708.0	599.5	
Ratio	%	56.4%	43.6%		52.6%	47.4%		53.7%	46.3%	
Total	kg	1358.5	1051.5	2410.0	1401.0	1262.5	2663.5	1434.5	1236.5	2671.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2410.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	136.0	C
Calculated Vehicle Target Wt (TVTW)	kg	2671.0	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	915	912	Yes
RF	mm	910	909	Yes
LR	mm	971	967	Yes
RR	mm	970	968	Yes
Vehicle CG (Aft of Front Axle)	mm	1712	1753	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	18	7	

***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: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

Test Height Adjustable Setting (If Applicable)	

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
N/A	N/A

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: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

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	9.0	0.0	4.5
Front Passenger Seat	4.3	0.0	2.2
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	4.5		Max			
			Mid			
			Min			
Front Passenger Seat	2.2		Max			
			Mid			
			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

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

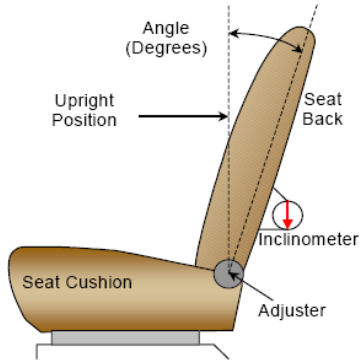
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	262	26	131	12
Front Passenger Seat	260	26	130	12
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.



FRONT SEAT ASSEMBLY

SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/ Seated Dummy	52.3	26	1.5	
Front Passenger Seat	52.3	26	1.5	
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: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

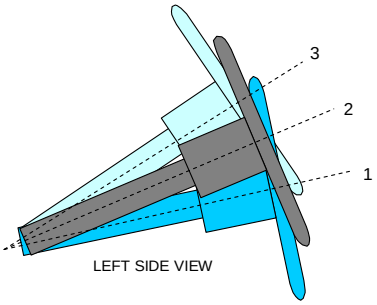
HEAD RESTRAINT ADJUSTMENT

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

	Total No. of Positions	Placed in Position
Driver Seat	3	H
Rear Seat	2	L

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

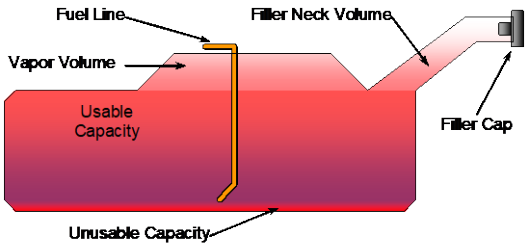
	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.4	80
Geometric Center Position, No. 2	22.4	107
Uppermost Position, No. 3	24.4	134
Telescoping Steering Wheel Travel		54
Test Position	22.4	107

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned to "ON" position.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	32.20
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	32.20
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	29.95
Actual amount of Solvent Used in Test	29.95
1/3 of Usable Capacity	10.73

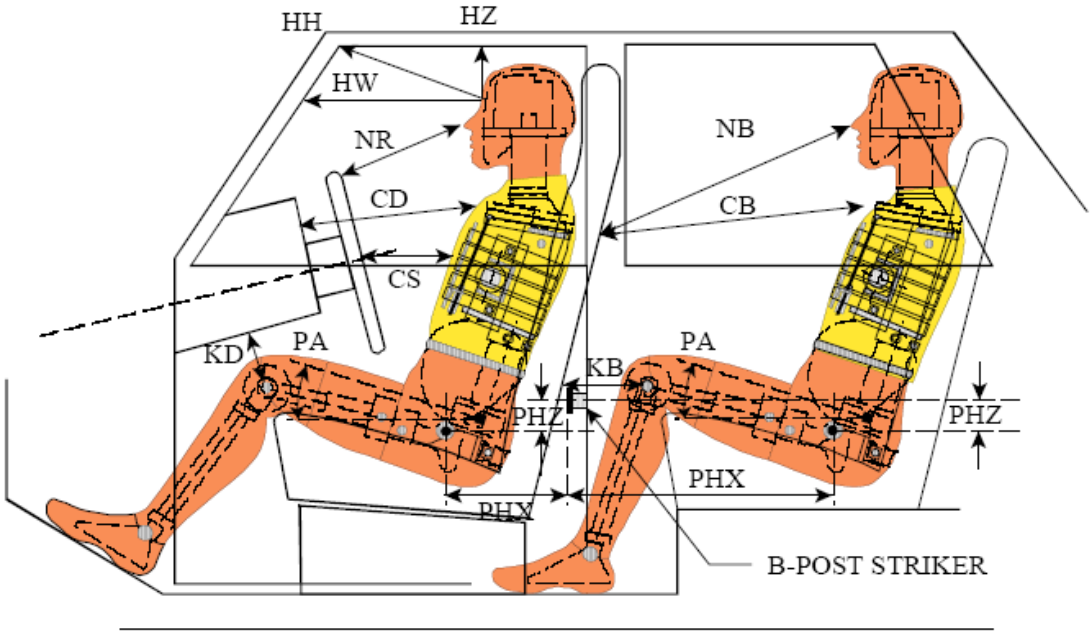
Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



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

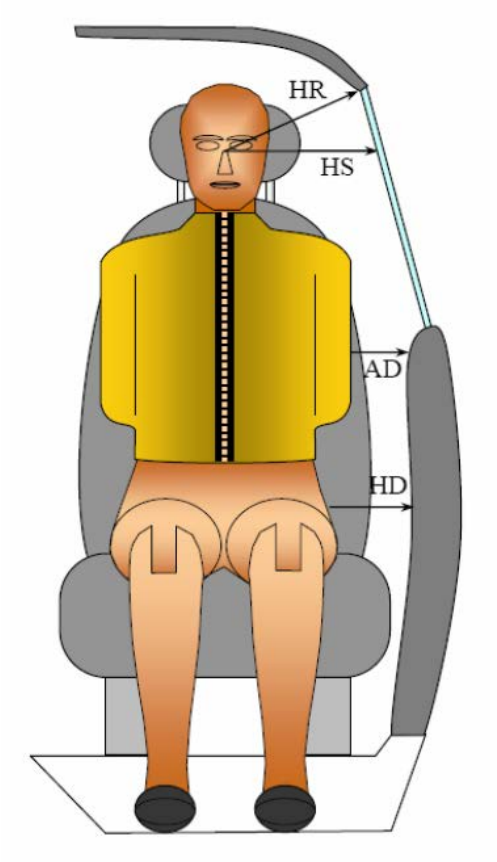
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (º)	Length (mm)	Angle (º)
HH		Head to Header	430			
HW		Head to Windshield	671			
HZ	HZ	Head to Roof	228		292	
NR	NB	Nose to Rim/Seat Back	461		729	
CD	CB	Chest to Dash/Seat Back	575		697	
CS		Chest to Steering Wheel	356			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	88	29.0	425	24.5
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	80	27.0	432	26
PAX°	PAX°	Pelvic Tilt Angle X		5.5		21.8
	PAY°	Pelvic Tilt Angle Y		0.0		0.0
PHX	PHX	Hip Point to Striker (x-axis)	222		285	
PHZ	PHZ	Hip Point to Striker (z-axis)	155		200	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

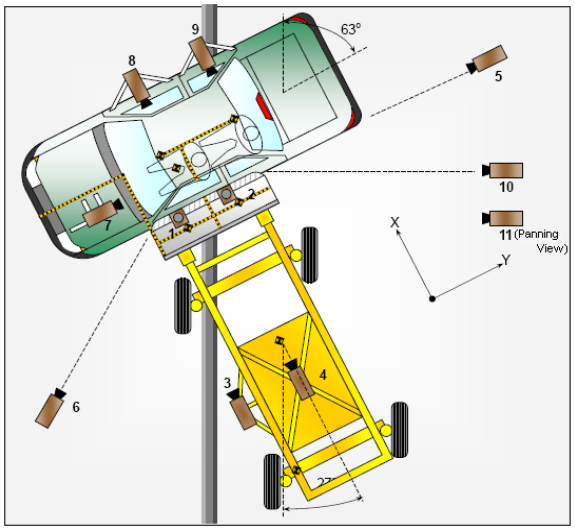
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	224	285
HS	Head to Side Window	mm	355	377
AD	Arm to Door	mm	105	170
HD	H-Point to Door	mm	177	186

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



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

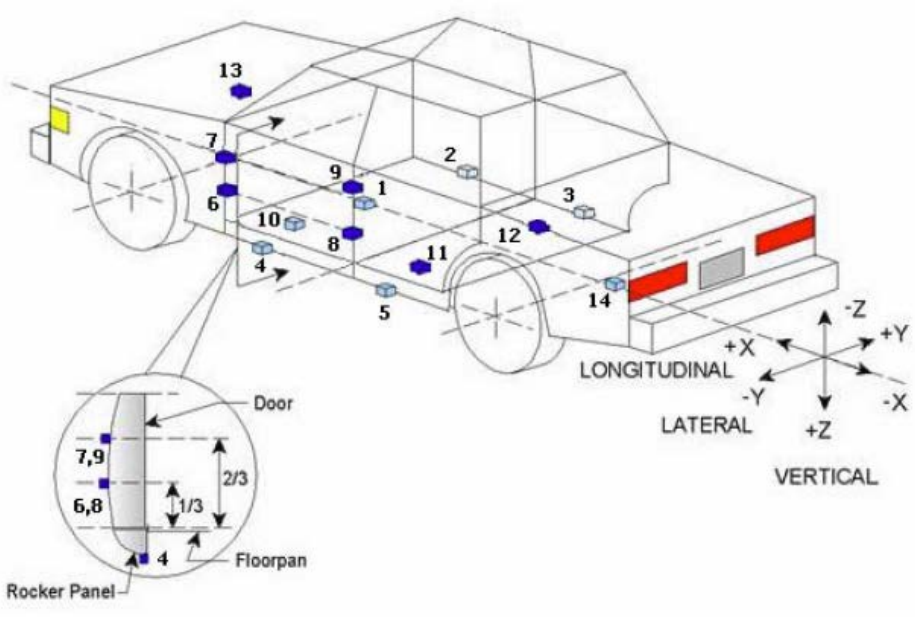
Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Channels	5
Total	63

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2926	0	761
2	Right Sill at Front Seat	3664	782	545
3	Right Sill at Rear Seat	2452	782	545
4	Left Sill at Front Door	3680	-795	448
5	Left Sill at Rear Door	2615	-795	448
6	A-Pillar Lower	4245	-878	722
7	A-Pillar Middle	4245	-878	1165
8	B-Pillar Lower	3147	-794	672
9	B-Pillar Middle	3147	-794	1125
10	Front Seat Track	3391	-275	653
11	Rear Seat Structure	2650	-390	605
12	Right Rear Occupant Compartment	2926	445	577
13	Engine Block	4846	0	1124
14	Rear Floorpan Above Axle	1231	0	820

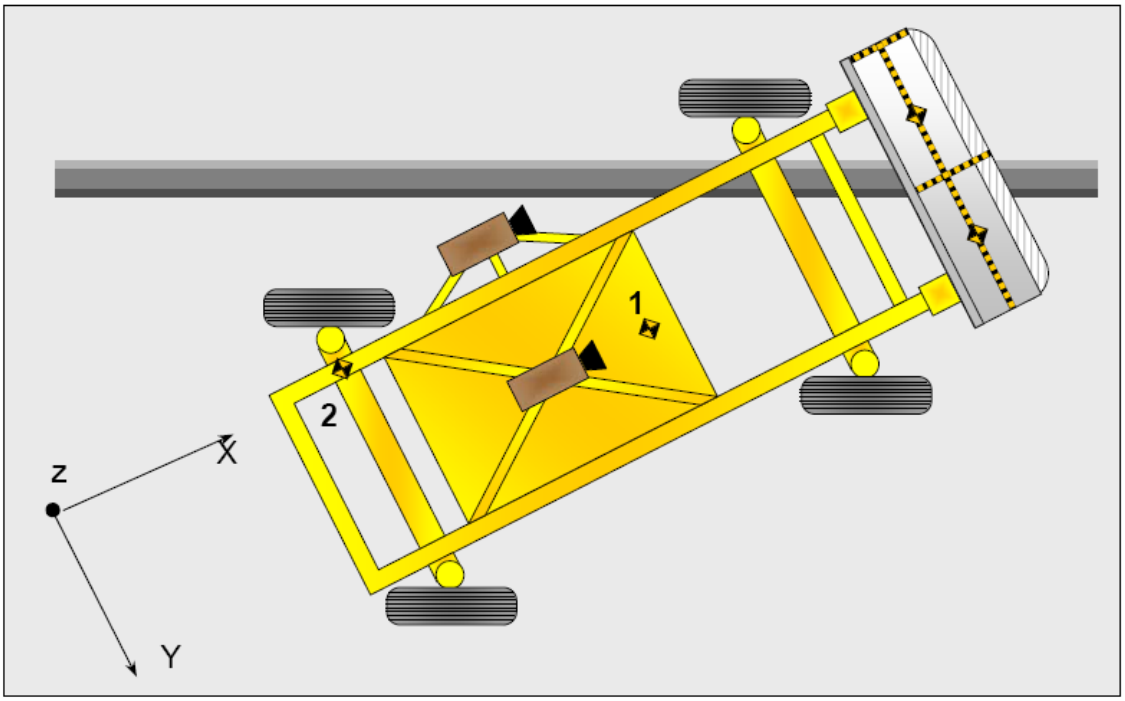
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



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: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Side Header	Curtain Airbag, Head Rest
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headrest, Side Header	Curtain Airbag, Head Rest
Left Shoulder	Side Airbag	Curtain Airbag
Upper Torso	Seat Bolster, Side Airbag	N/A
Lower Torso	Seat Bolster	N/A
Left Hip	Side Airbag, Seat Bolster	Seat Cushion
Left Knee	Curtain, Door Panel	Door Trim

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: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

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	No separation
Windshield Damage	None
Side Window Damage	Broken
Other Notable Effects	None

DATA SHEET NO. 8 … (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

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		3699
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		504
Actual Impact Point (Aft of Front Axle)	mm		519
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-15
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	16

DATA SHEET NO. 9

MDB SUMMARY OF RESULTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

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	61.69
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.74
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	63.2
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.4

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

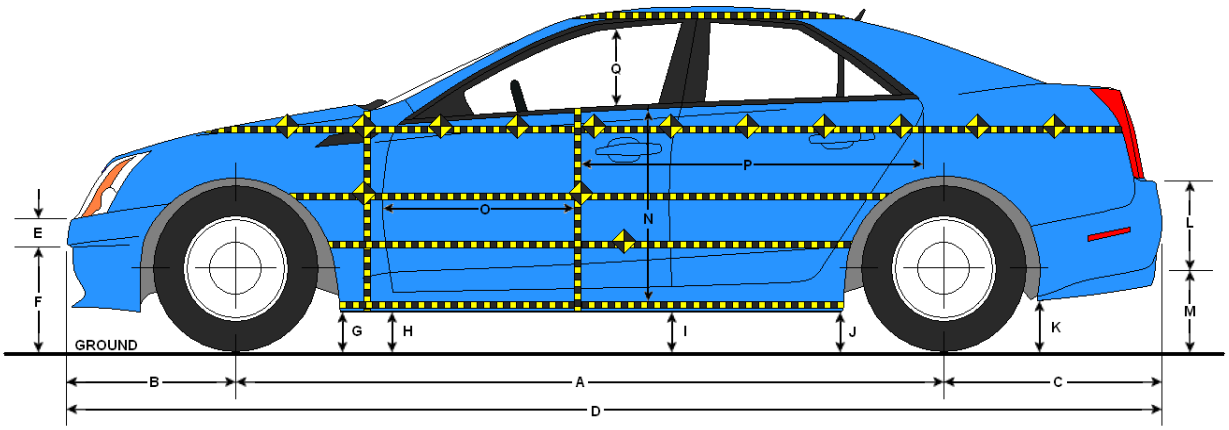
Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	149
B	Top of Bumper	533	800	Left	157
C	Mid Level	686	800	Left	162
D	Top of Stack	813	800	Left	190

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Change
A	Wheelbase	2687	2667	-20
B	Front Axle to FSOV	905	927	22
C	Rear Axle to RSOV	864	859	-5
D	Total Length at Centerline	4455	4453	-2
E	Front Bumper Thickness	115	114	-1
F	Front Bumper Bottom to Ground	523	511	-12
G	Sill Height at Front Wheel Well	300	297	-3
H	Sill Height at Front Door Leading Edge	304	355	51
I	Sill Height at B-Pillar	311	334	23
J1	Sill Height at Rear Wheel Well	317	356	39
J2	Pinch Weld Height at Rear Wheel Well	273	275	2
K	Sill Height Aft of Rear Wheel Well	807	382	-425
L	Rear Bumper Thickness	157	157	0
M	Rear Bumper Bottom to Ground	477	479	2
N	Sill Height to Bottom of Front Window Sill	786	748	-38
O	Front Door Leading Edge to Impact CL	774	759	-15
P	Rear Door Trailing Edge to Impact CL	1338	1318	-20
Q	Front Window Opening	371	397	26
R	Right Side Length	3300	3302	2
S	Left Side Length	3428	3288	-140
T	Vehicle Width at B-Pillar	1785	1712	-73

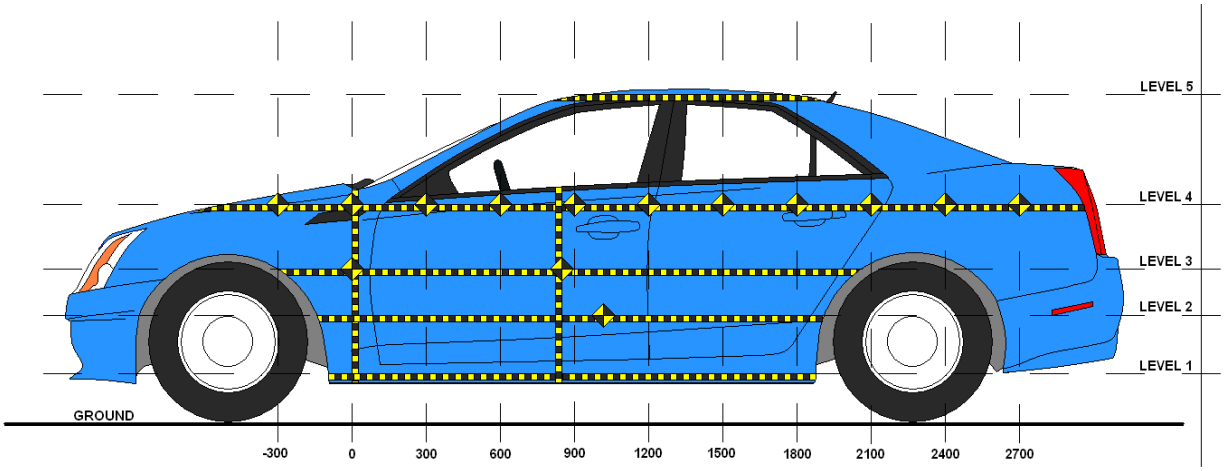
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	520	180	1800
2	Occupant H-Point	932	126	1500
3	Mid-Door	960	123	1500
4	Window Sill	1299	34	1200
5	Window Top	1928	2	1950

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

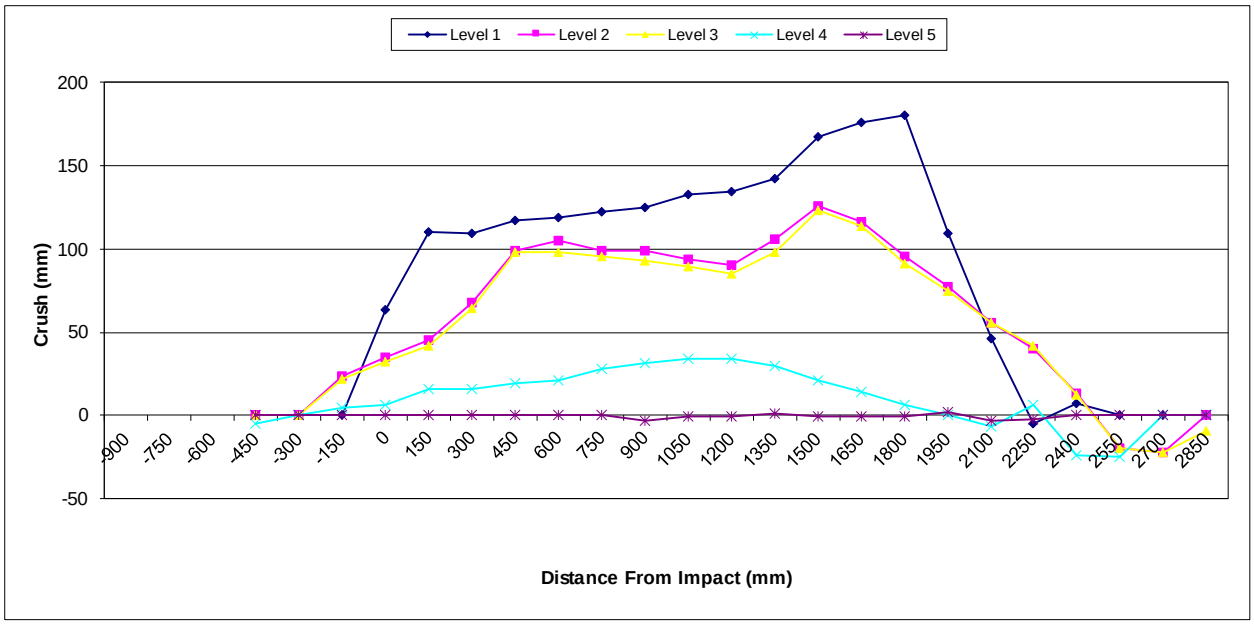
	Pre-Test (mm)					Post-Test (mm)					Crush (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450				554					549					-5	
-300				537					537					0	
-150		464	461	535			488	483	540			24	22	5	
0	509	472	471	537		572	507	503	543		63	35	32	6	
150	532	476	476	539		642	521	518	555		110	45	42	16	
300	538	491	489	536		647	559	553	552		109	68	64	16	
450	538	499	497	533		655	598	595	552		117	99	98	19	
600	537	500	496	530		656	605	594	551		119	105	98	21	
750	536	498	494	524		658	597	589	552		122	99	95	28	
900	536	496	493	521	771	661	595	586	552	768	125	99	93	31	-3
1050	534	496	492	520	772	667	590	581	554	771	133	94	89	34	-1
1200	535	496	492	518	772	669	586	577	552	771	134	90	85	34	-1
1350	533	495	491	516	771	675	601	589	546	772	142	106	98	30	1
1500	533	496	492	515	773	700	622	615	536	772	167	126	123	21	-1
1650	535	497	493	514	775	711	613	607	528	774	176	116	114	14	-1
1800	536	498	494	514	774	716	593	585	520	773	180	95	91	6	-1
1950	536	500	496	513	774	645	577	571	513	776	109	77	75	0	2
2100	539	502	498	514	777	585	558	554	507	774	46	56	56	-7	-3
2250	539	499	497	520	781	534	539	539	526	779	-5	40	42	6	-2
2400	553	504	502	513		560	517	514	489		7	13	12	-24	
2550		484	483	501			464	463	476			-20	-20	-25	
2700		462	466				440	444				-22	-22		
2850			577					568					-9		

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

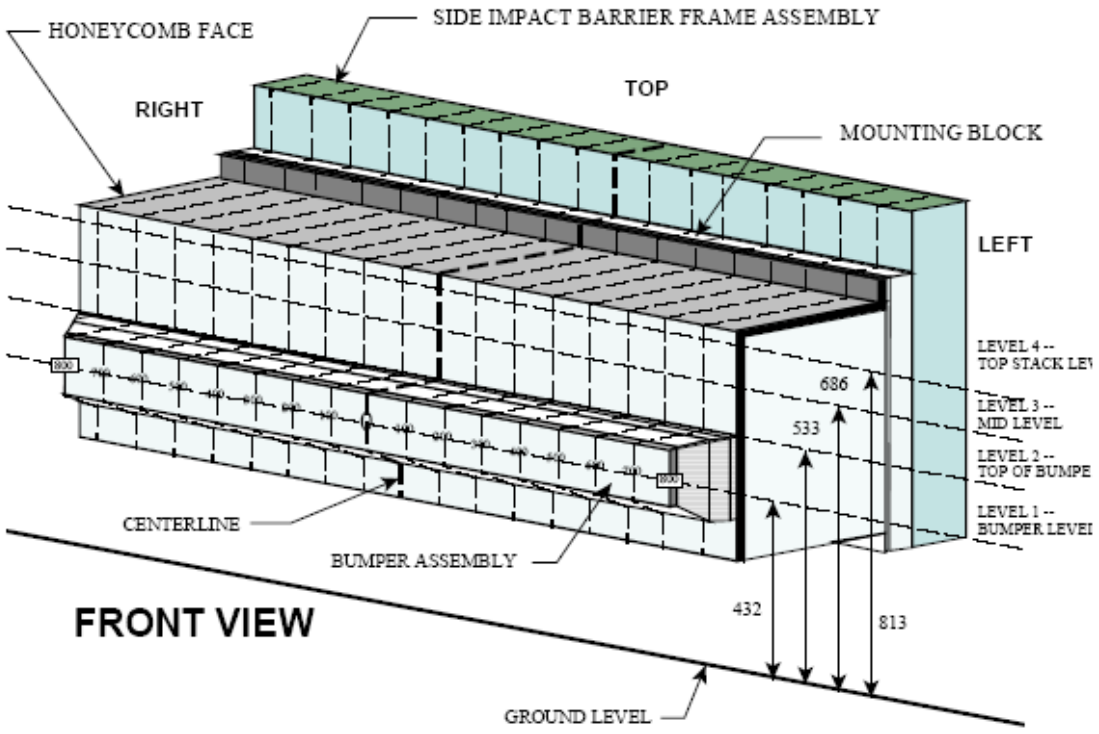


DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



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	123	117	119	122	119	111	111	126	119	119	129	122	129	124	124	127	149
2	121	144	121	127	118	120	117	122	117	117	117	120	122	125	128	146	157
3	117	138	140	118	99	95	98	110	118	109	104	103	107	107	115	132	162
4	124	137	147	114	127	130	140	158	115	107	101	107	122	110	117	135	190

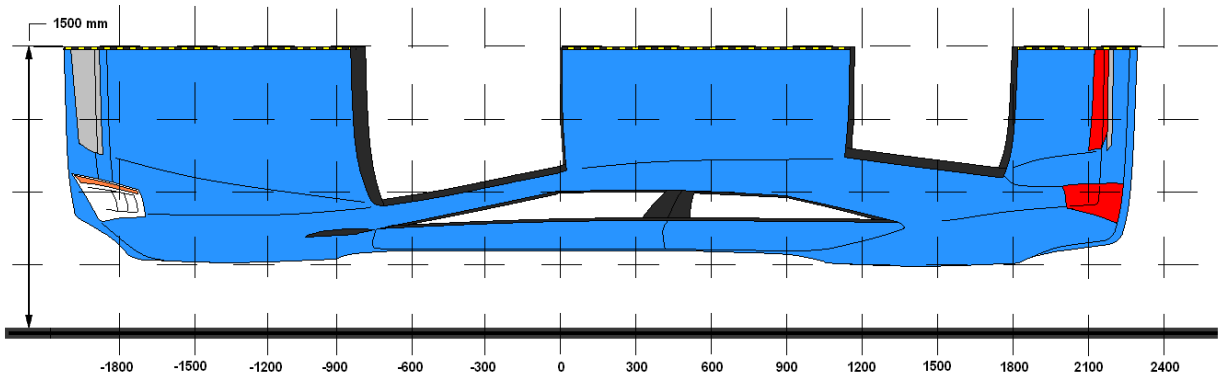
All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2850	4	577	568	-9
2	2100	3	498	554	56
3	1500	1	533	700	167
4	900	1	536	661	125
5	300	1	538	647	109
6	-450	4	554	549	-5

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	190
2	500	Left	2	125
3	200	Left	1	129
4	200	Right	4	140
5	500	Right	2	127
6	800	Right	4	124

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22

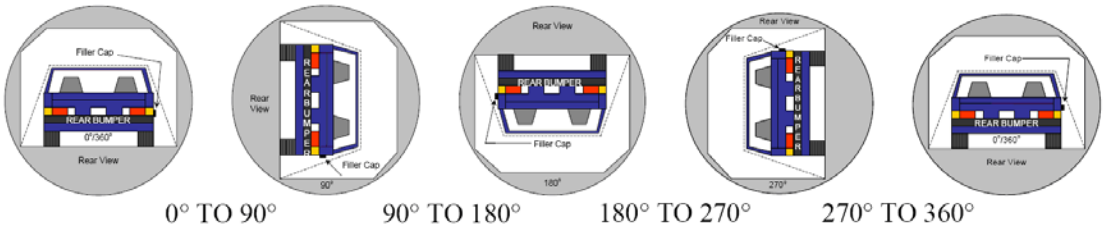
Temperature at Time of Impact: 19.4°C Test Time: 3:51 P.M.

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°	800	300	1100
90° To 180°	81	300	381
180° To 270°	84	300	384
270° To 360°	80	300	380

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

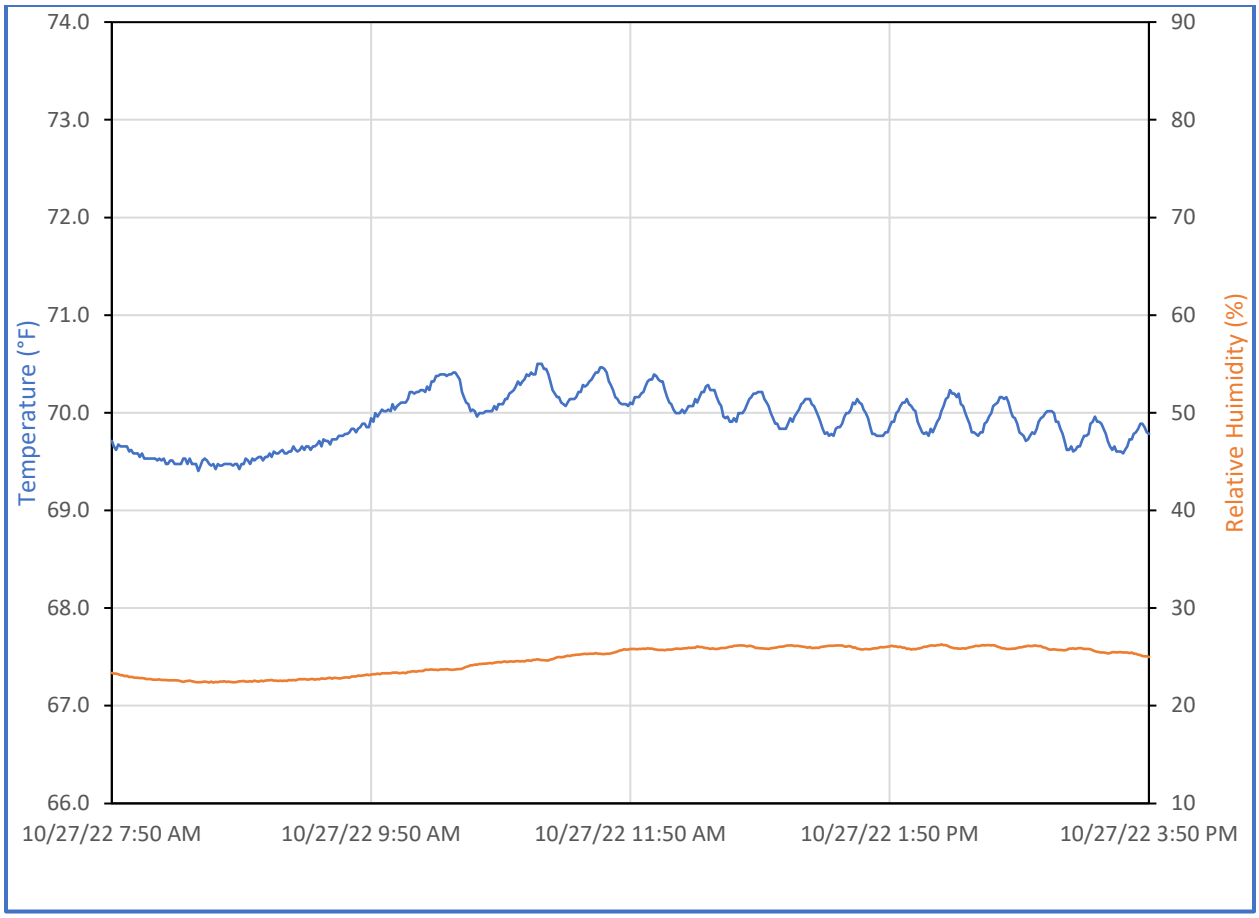
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2022 Toyota Tundra CrewMax 4X2 4-Door Truck NHTSA No. M20225105

Test Program: NCAP MDB Side Impact Test Test Date: 10/27/22



APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS … (CONTINUED)

TABLE OF PHOTOGRAPHS … (CONTINUED)

FIGURE 1. As-Delivered Right Front ¾ View of Test Vehicle

FIGURE 2. As-Delivered Left Rear ¾ 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 ¾ View of Test Vehicle

FIGURE 6. Post-Test Left Front ¾ 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 ¾ View of Test Vehicle

FIGURE 10. Post-Test Left Rear ¾ 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

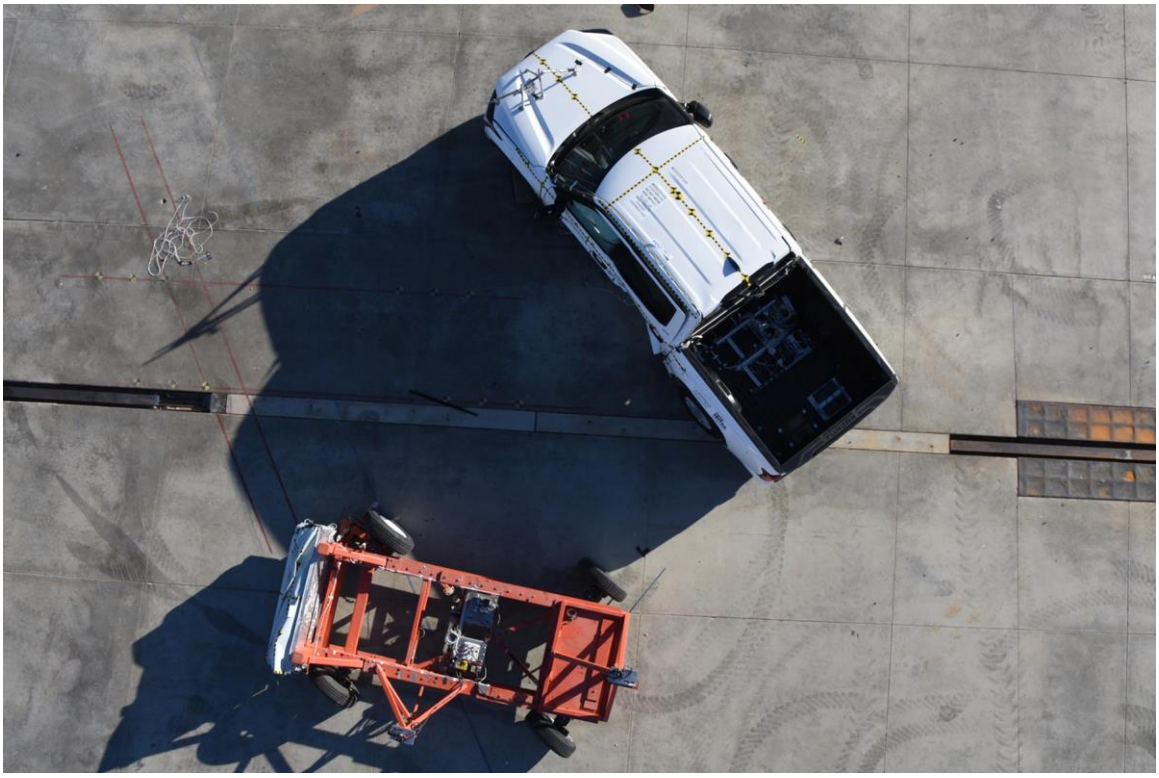


FIGURE 16. Post-Test Overhead View of Test Area

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 Occupant Compartment

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

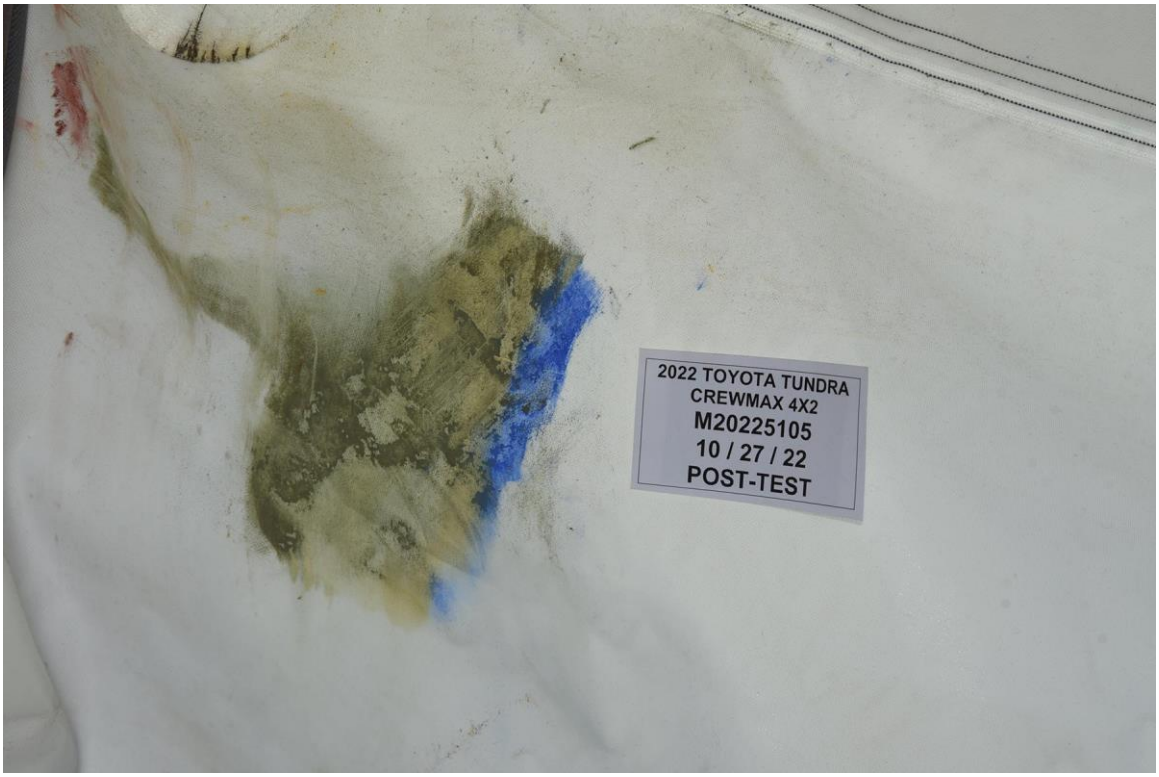


FIGURE 49. Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View

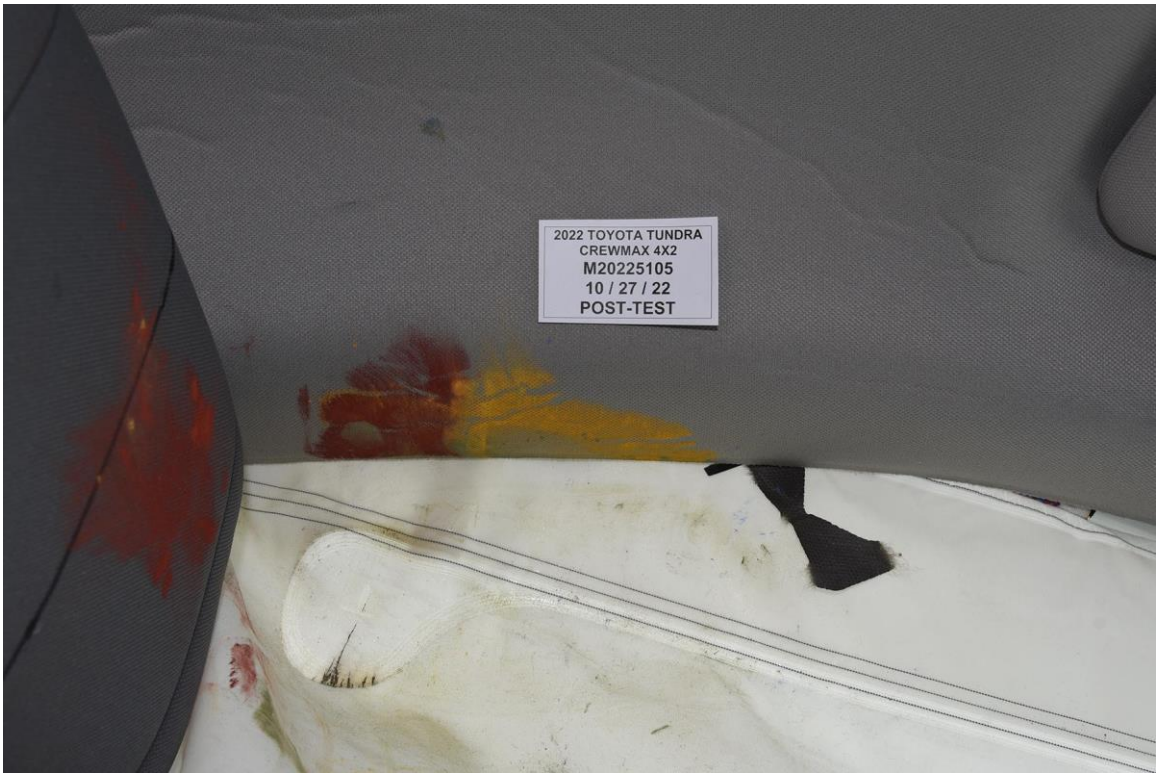


FIGURE 49a. Post-Test Driver Dummy Close-Up Head Contact with Vehicle Interior View

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

Photograph Not Applicable

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

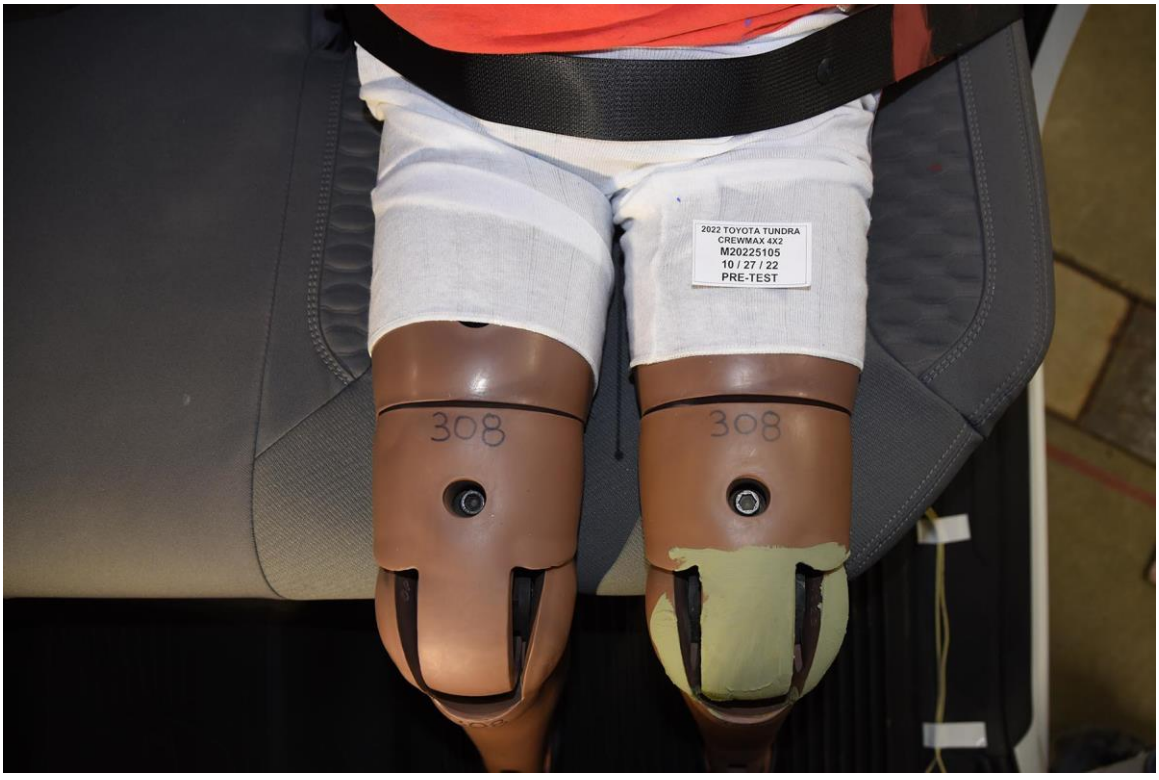


FIGURE 61. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

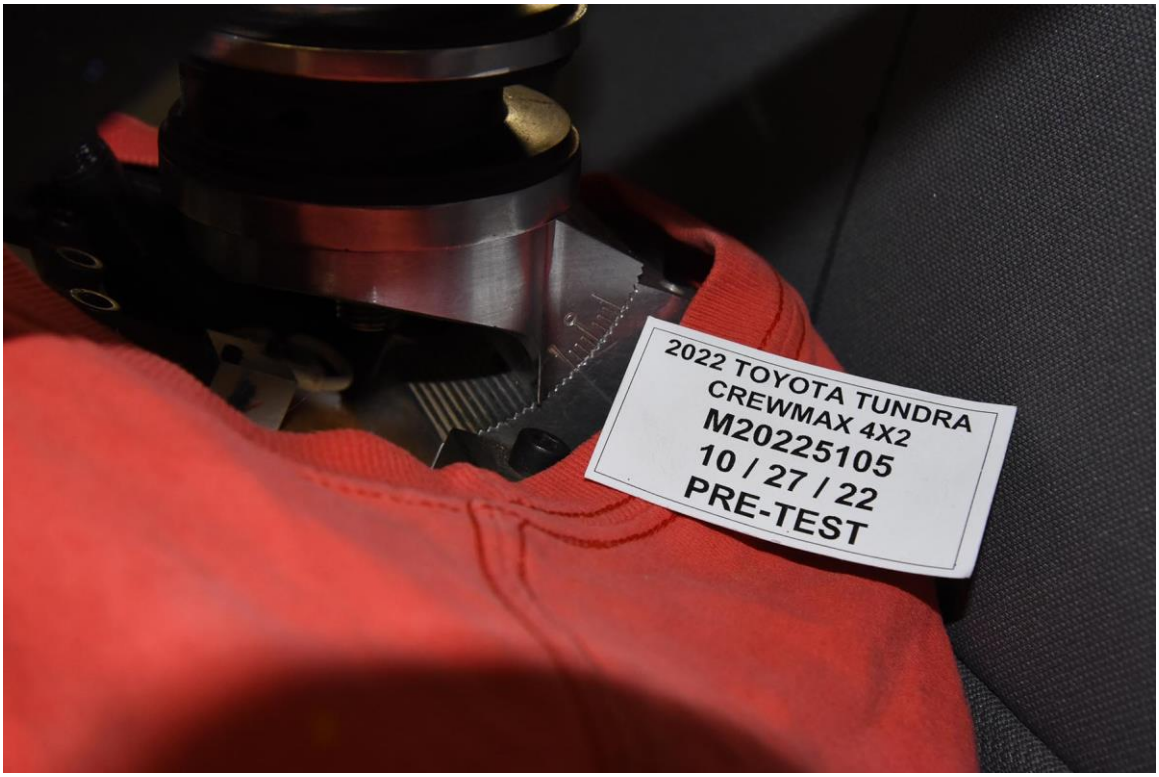


FIGURE 62. Pre-Test View of Rear Passenger Dummy's Neck
Showing Position of Adjustable Neck Bracket

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

Showing Rear Passenger Dummy Contact Locations

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 Airbag View

Photograph Not Applicable

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

Photograph Not Applicable

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

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

Photograph Not Applicable

FIGURE 80. Post-Test Rear Passenger Dummy Close-Up

Pelvis Contact with Side Airbag View

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

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

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

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

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

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

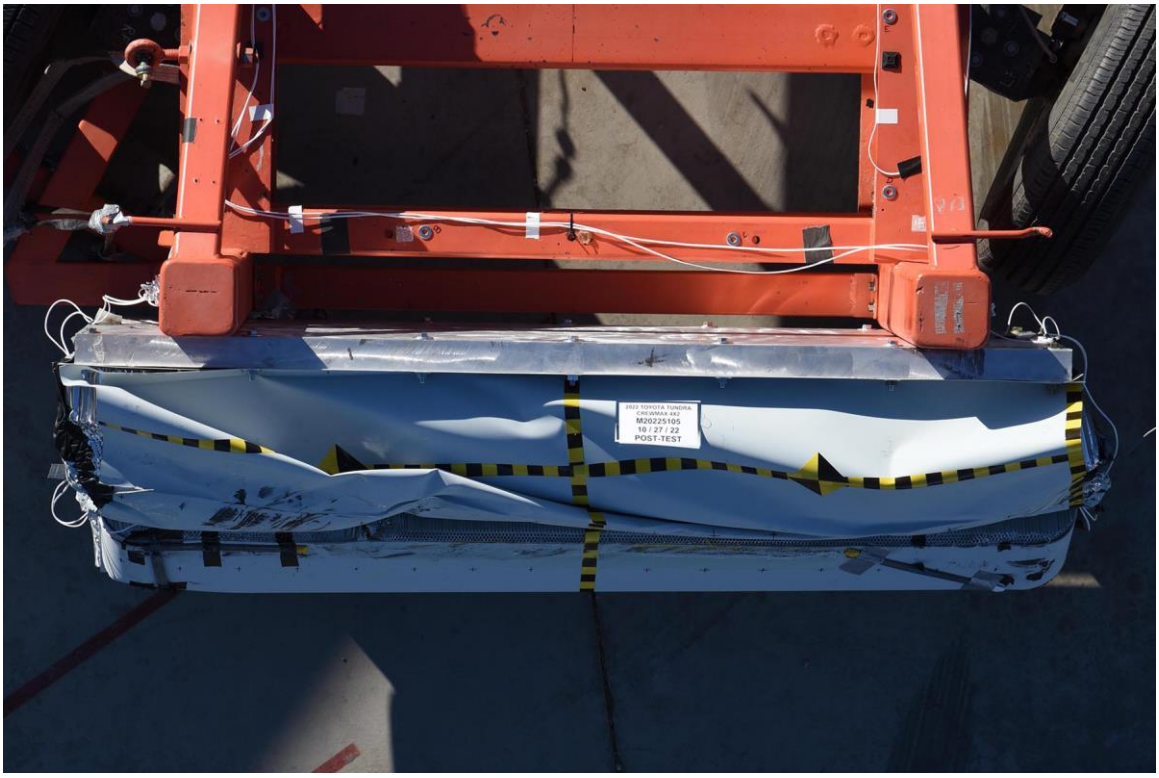


FIGURE 87. Post-Test Top View of MDB Impactor Face

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

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

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

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

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

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

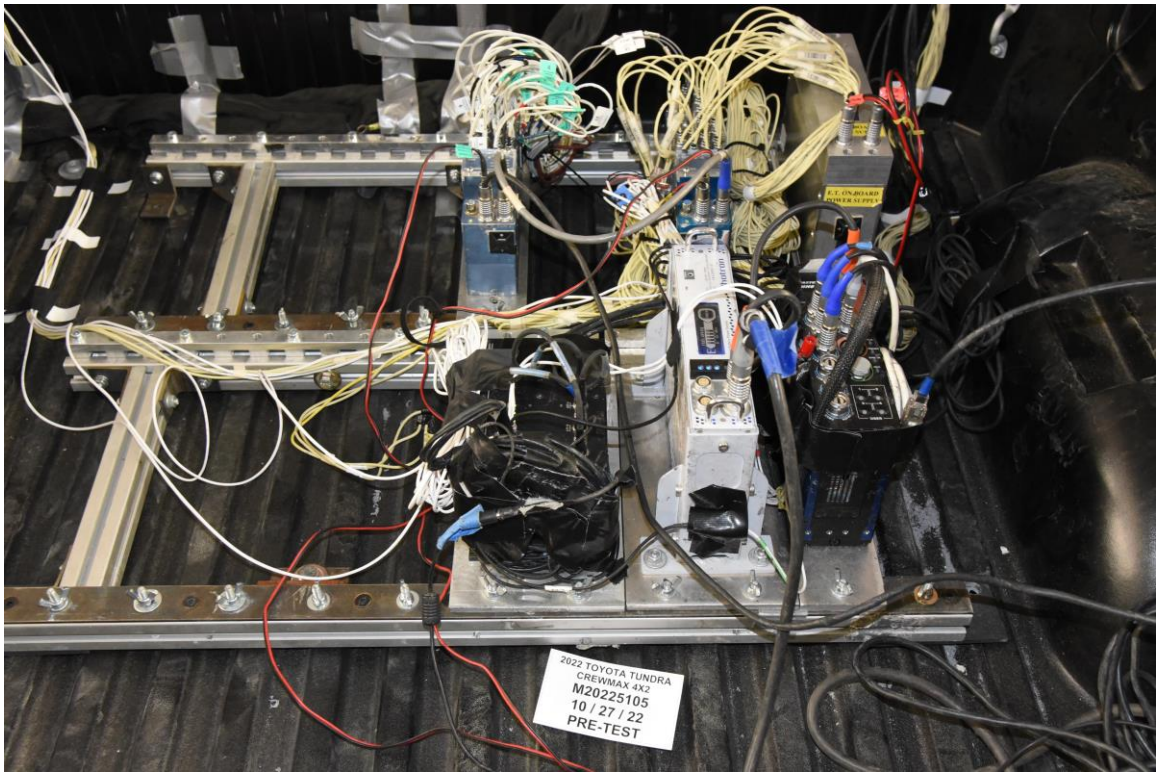


FIGURE 94. Pre-Test Ballast View

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

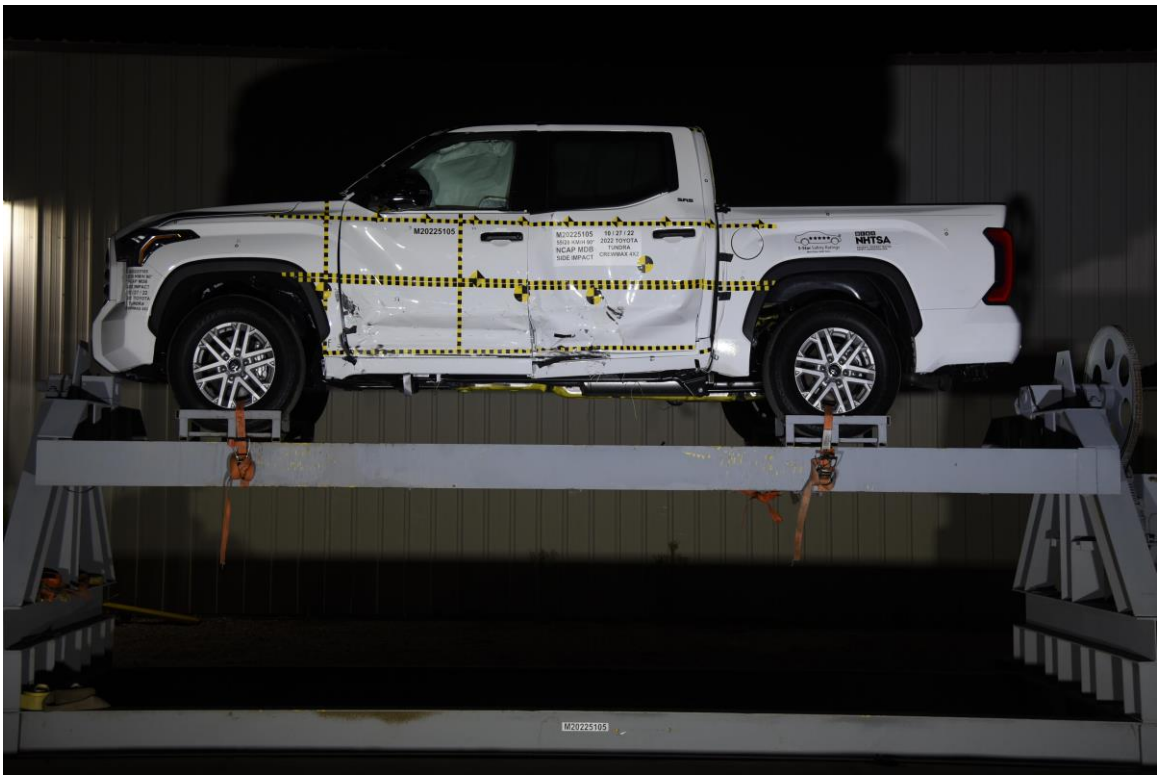


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees

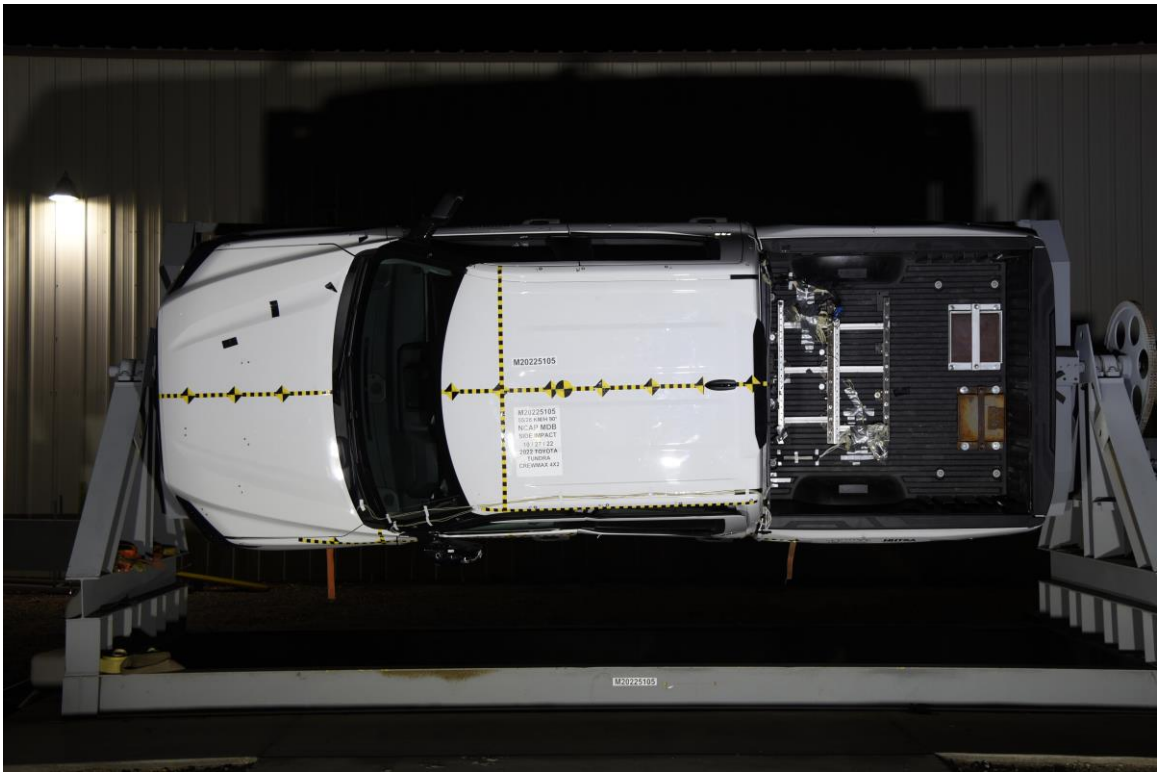


FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees

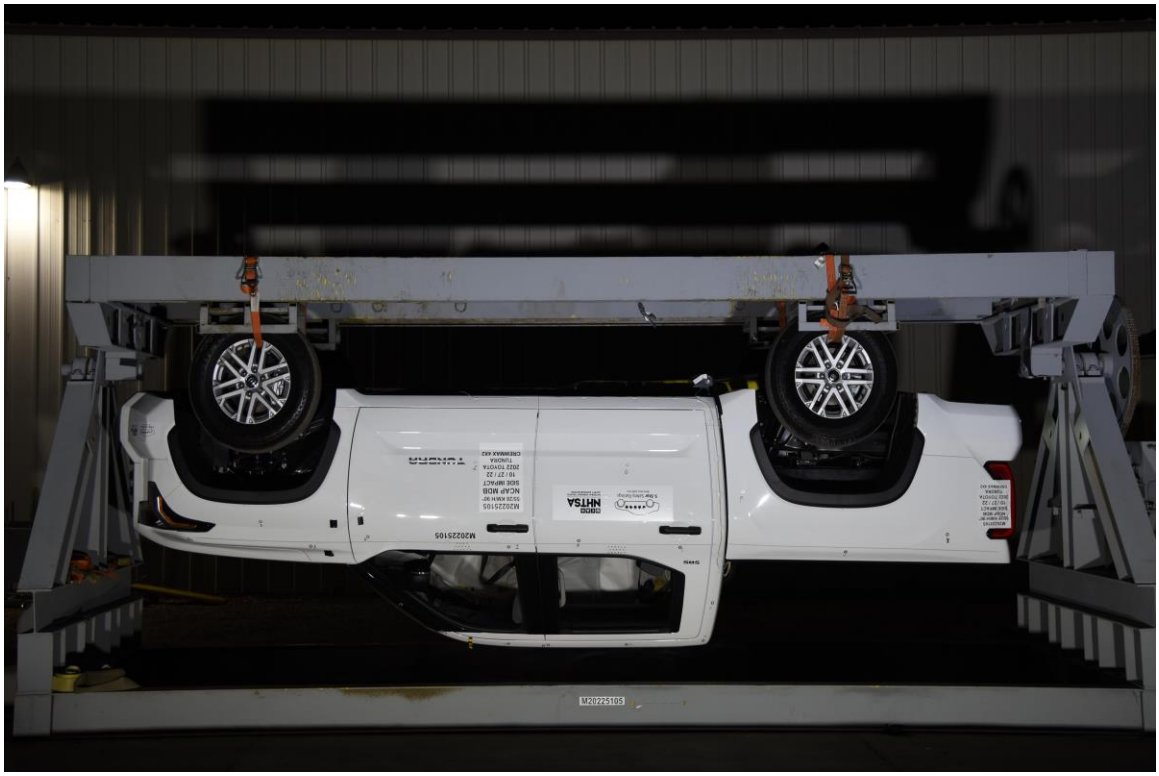


FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

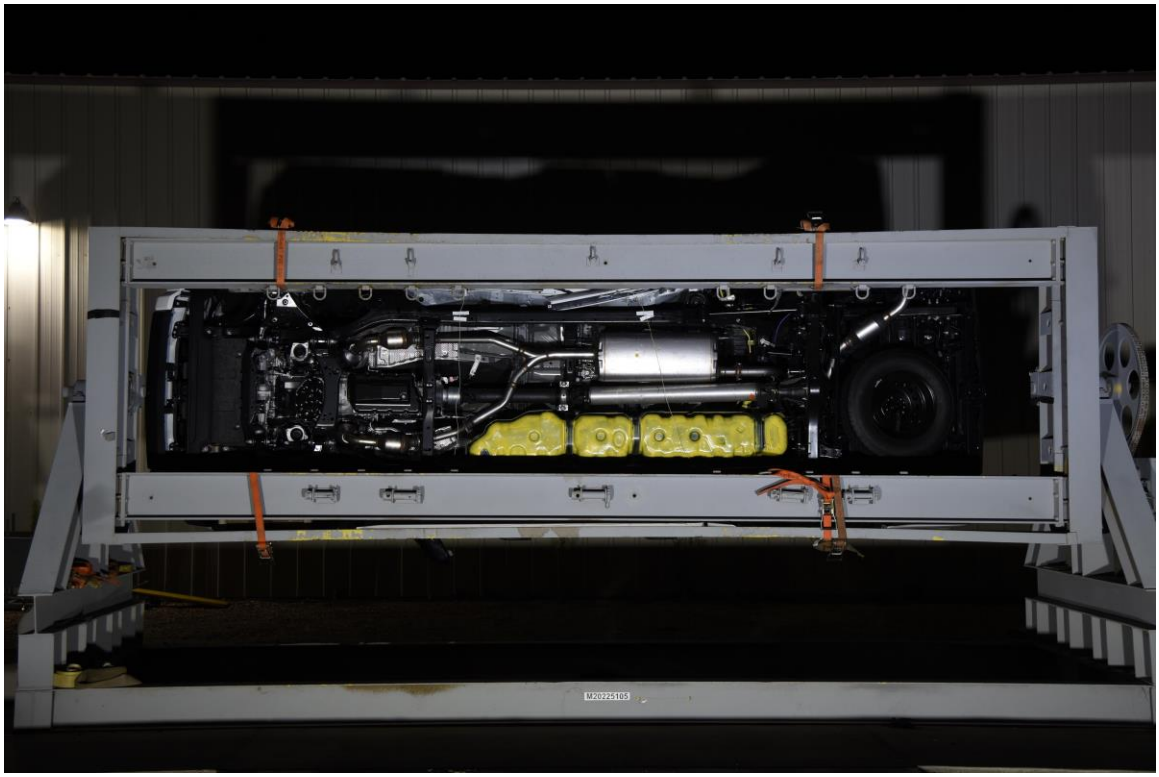


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

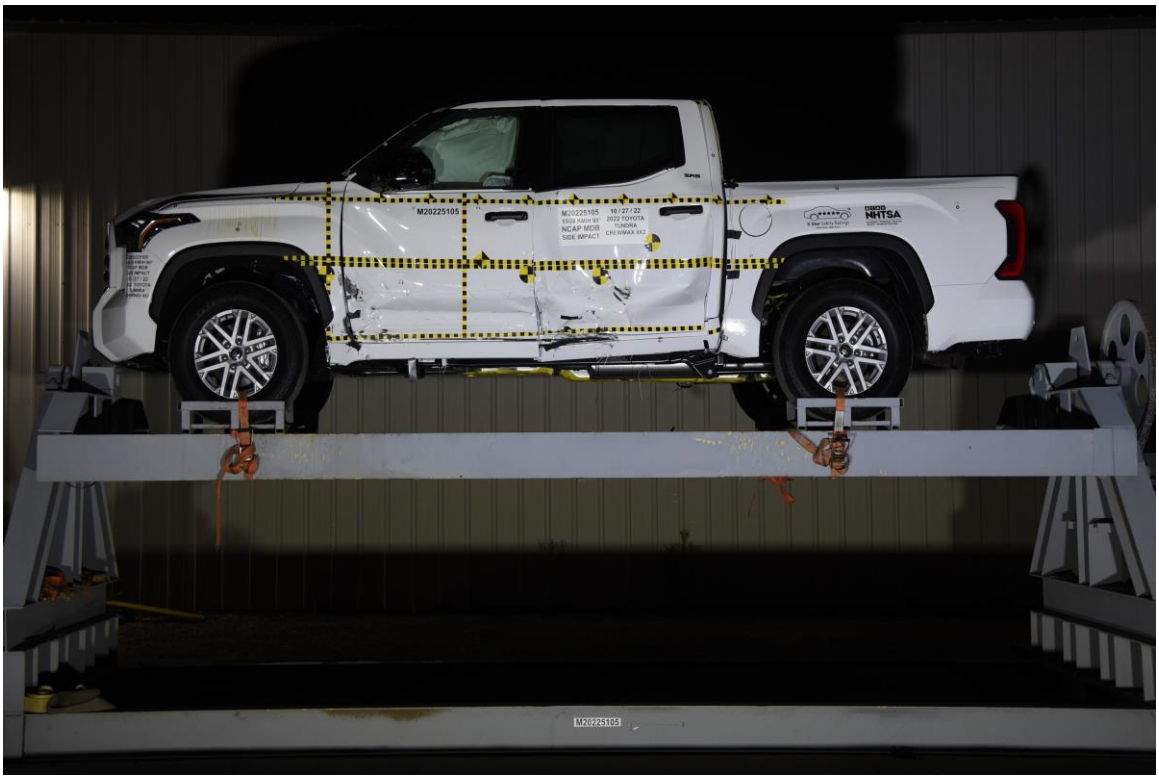


FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees

FIGURE 101. Impact Event

FIGURE 102. Monroney Label

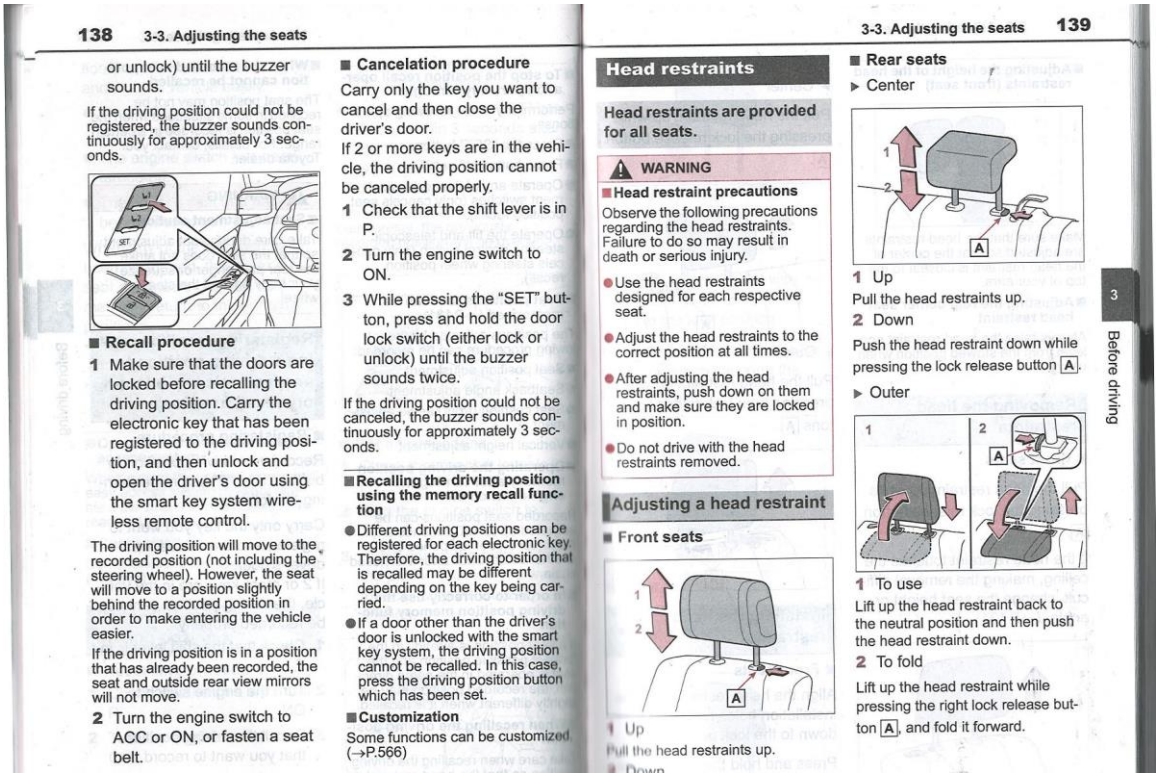
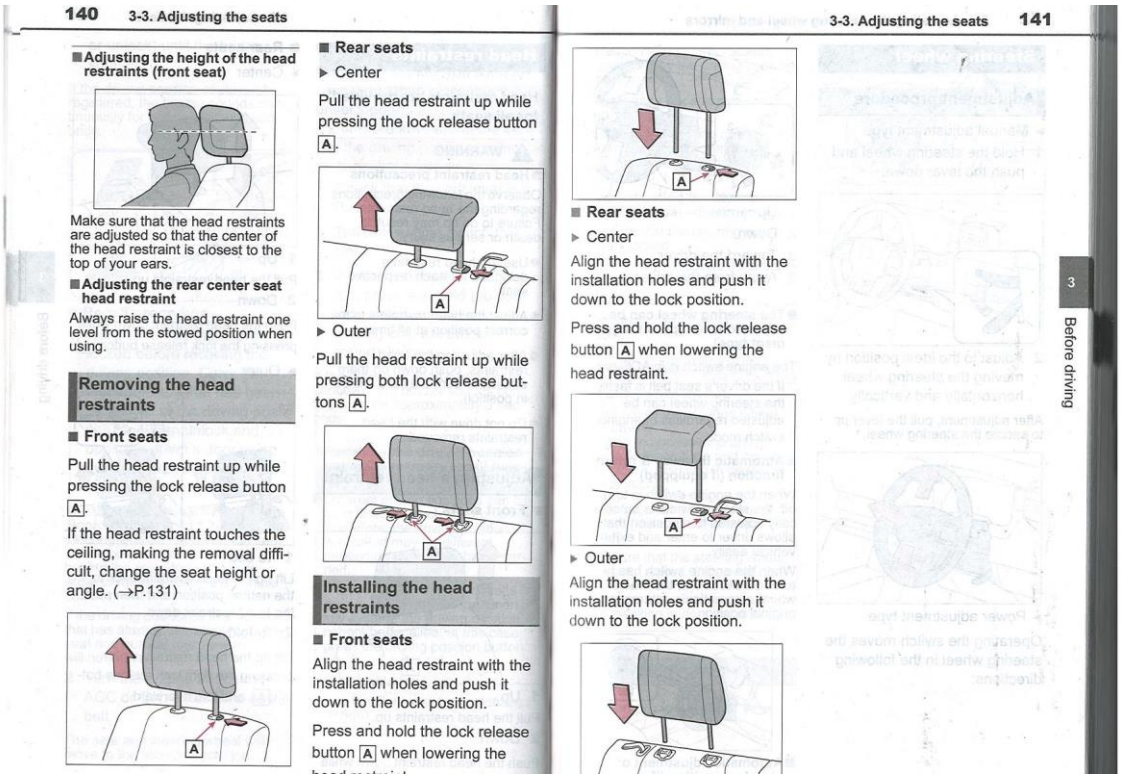


FIGURE 103. Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



140 3-3. Adjusting the seats

■ Adjusting the height of the head restraints (front seat)

Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

■ Adjusting the rear center seat head restraint

Always raise the head restraint one level from the stowed position when using.

Removing the head restraints

■ Front seats

Pull the head restraint up while pressing the lock release button A.

If the head restraint touches the ceiling, making the removal difficult, change the seat height or angle. (→P.131)

■ Rear seats

▸ Center

Pull the head restraint up while pressing the lock release button A.

▸ Outer

Pull the head restraint up while pressing both lock release buttons A.

Installing the head restraints

■ Front seats

Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button A when lowering the

3-3. Adjusting the seats 141

■ Rear seats

▸ Center

Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button A when lowering the head restraint.

▸ Outer

Align the head restraint with the installation holes and push it down to the lock position.

3 Before driving

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)

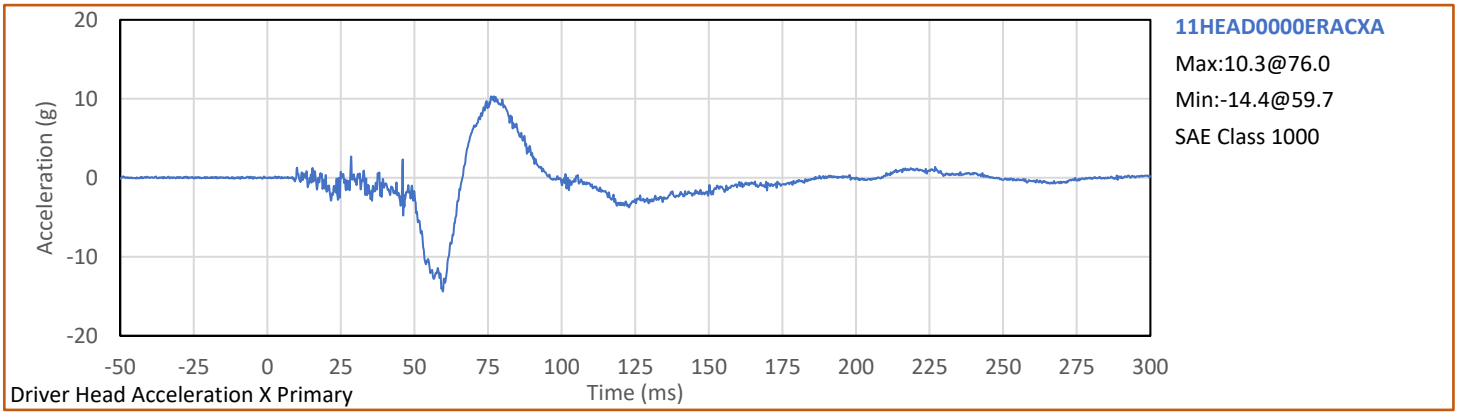
MDB Rear Acceleration (X)

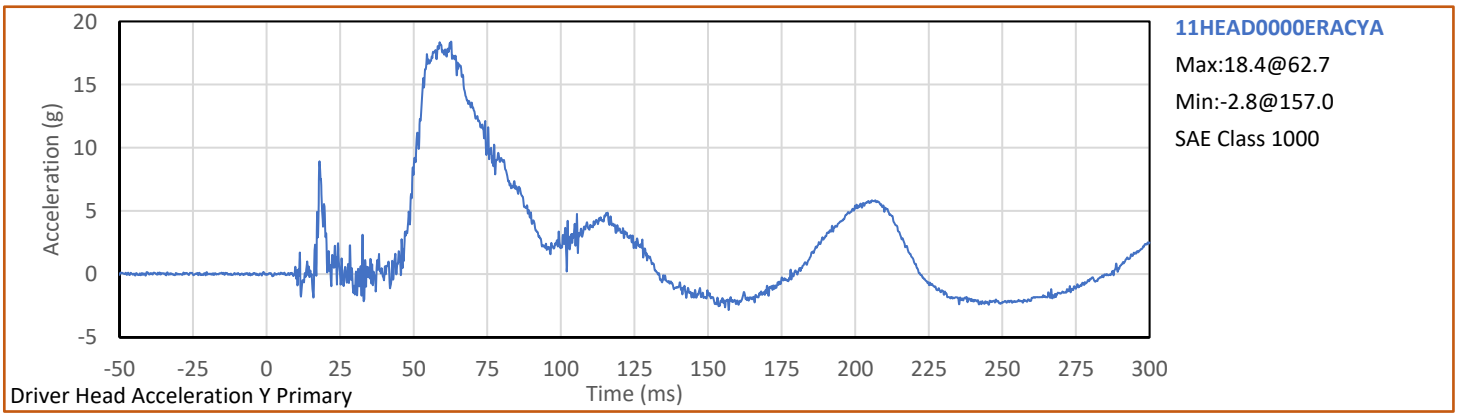
MDB Rear Acceleration (Y)

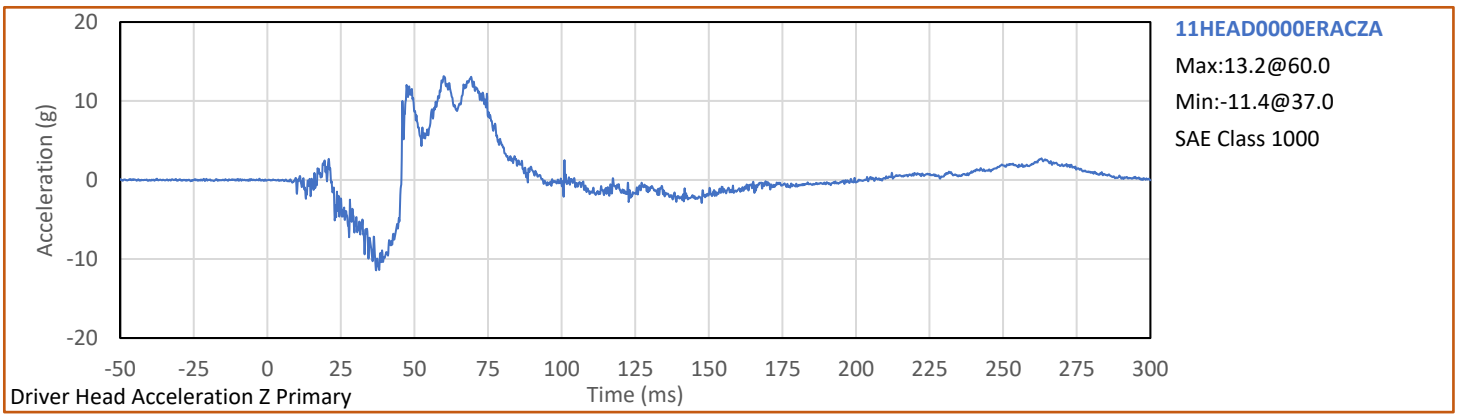
Left MDB Contact Switch

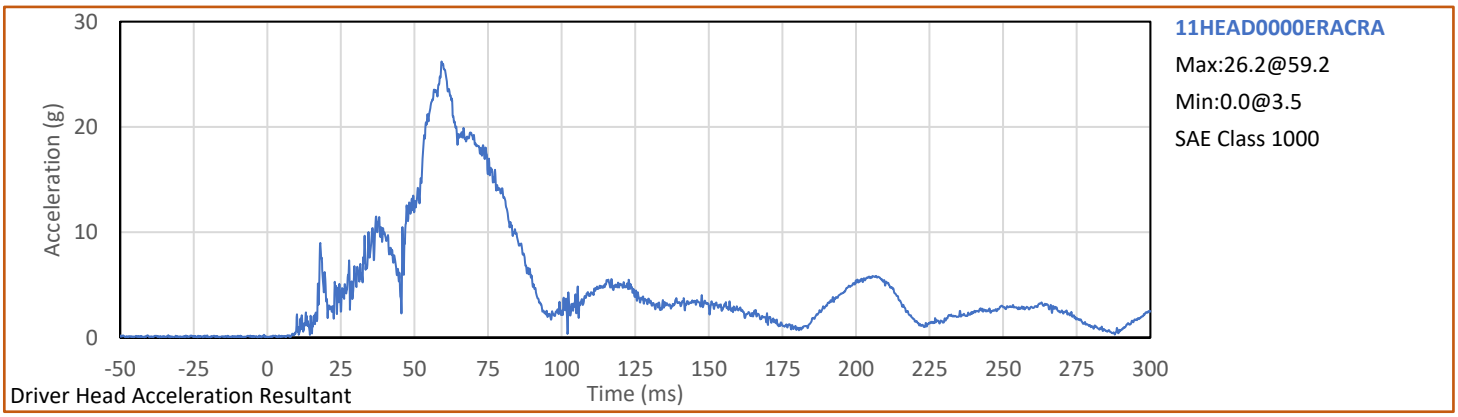
Right MDB Contact Switch

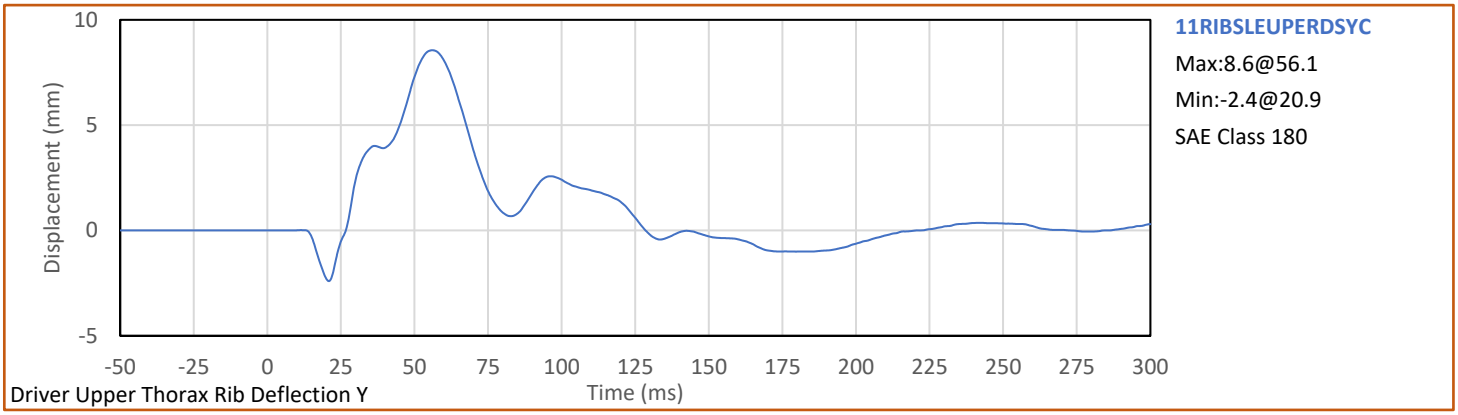
Test Vehicle:	2022 Toyota Tundra CrewMax 4X2 4-Door Truck	NHTSA No.:	M20225105
Test Program:	NCAP MDB Side Impact Test	Test Date:	10/27/2022

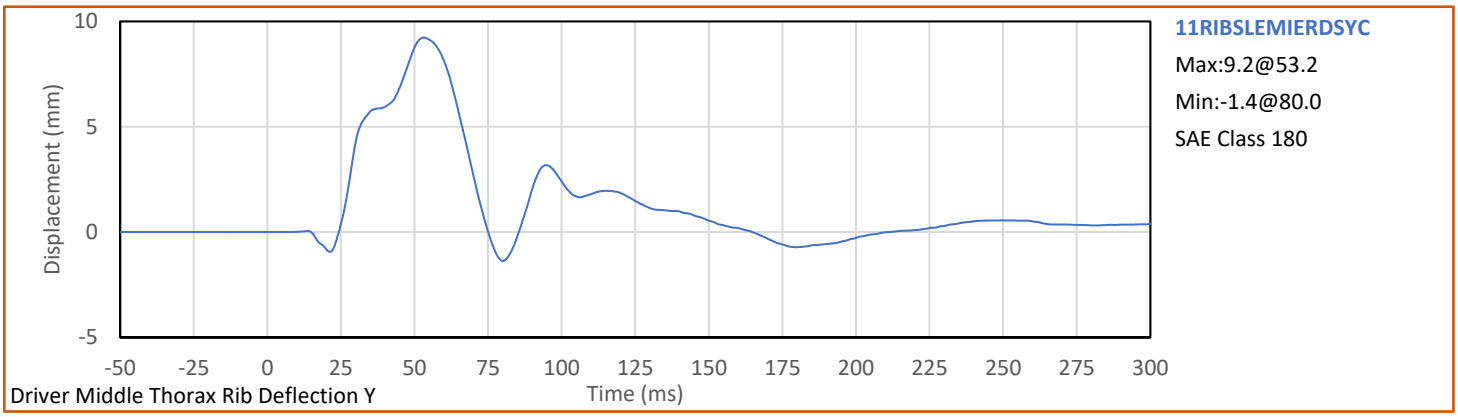


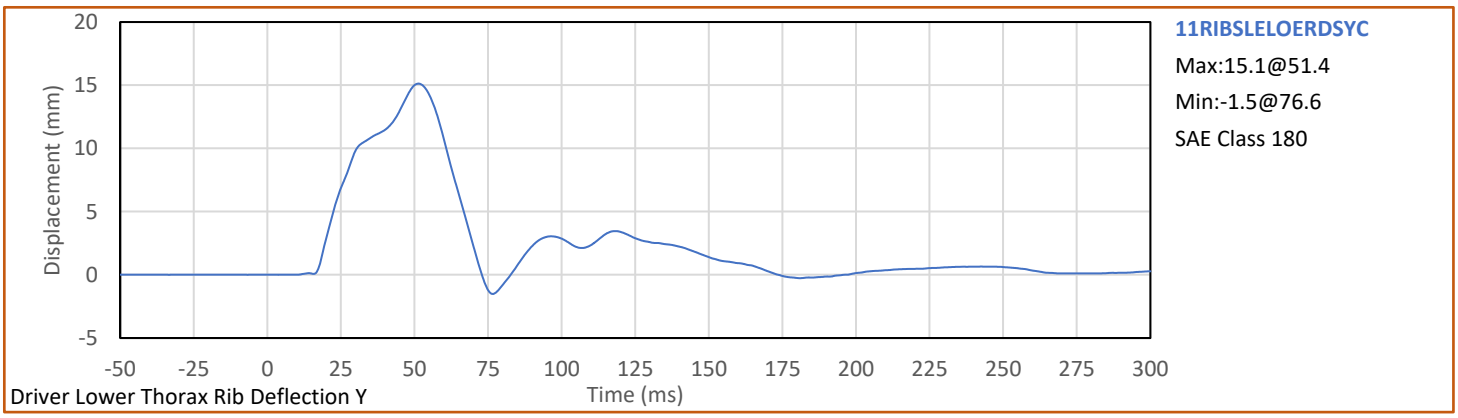


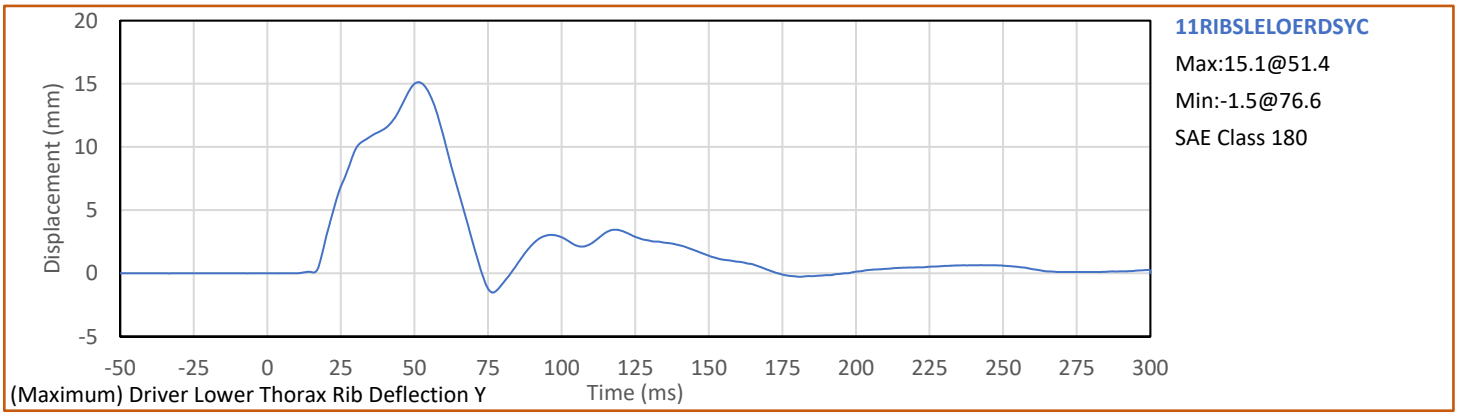


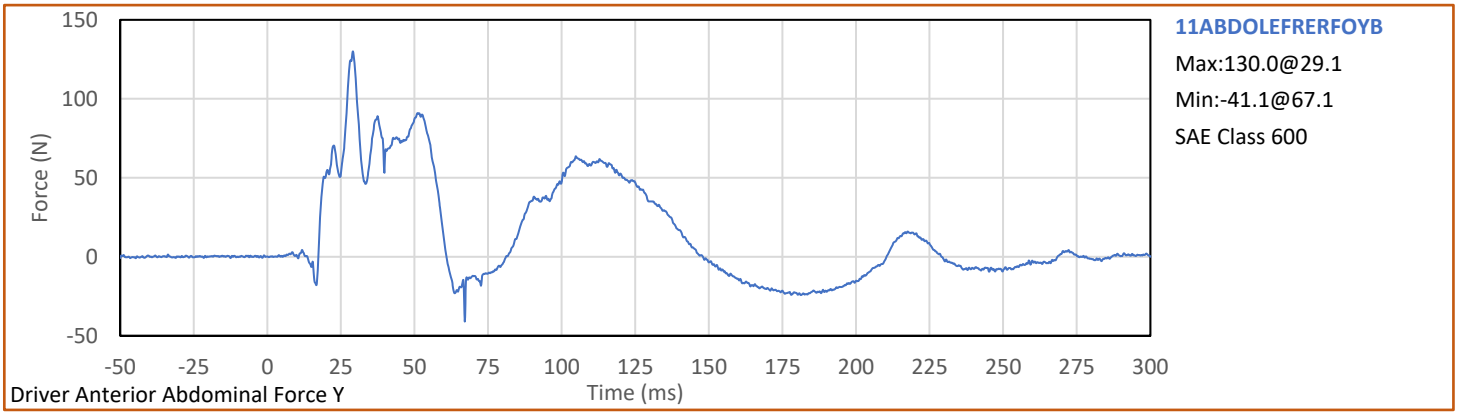



Displacement (mm)
Time (ms)
Driver Upper Thorax Rib Deflection Y
11RIBSLEUPERDSYC
Max:8.6@56.1
Min:-2.4@20.9
SAE Class 180

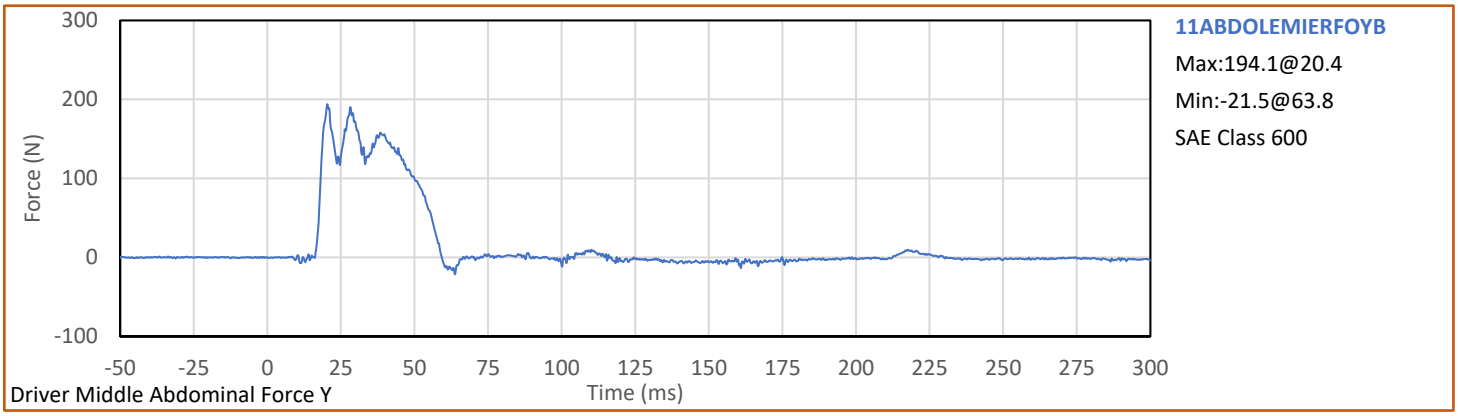

Displacement (mm)
Time (ms)
Driver Middle Thorax Rib Deflection Y
11RIBSLEMIERDSYC
Max:9.2@53.2
Min:-1.4@80.0
SAE Class 180


Displacement (mm)
Time (ms)
Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:15.1@51.4
Min:-1.5@76.6
SAE Class 180

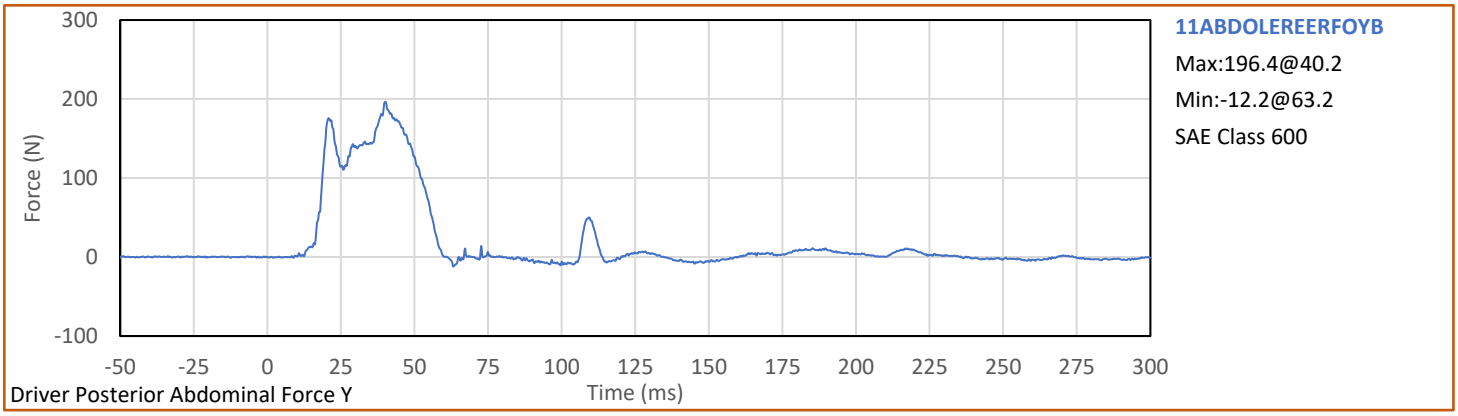

Displacement (mm)
Time (ms)
(Maximum) Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:15.1@51.4
Min:-1.5@76.6
SAE Class 180



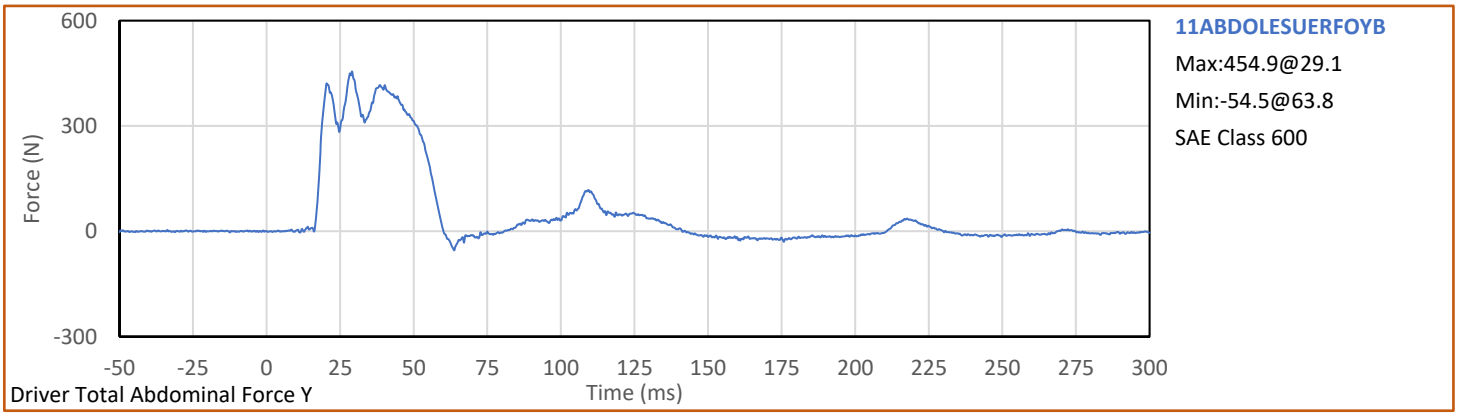
11ABDOLEFRERFOYB
Max:130.0@29.1
Min:-41.1@67.1
SAE Class 600



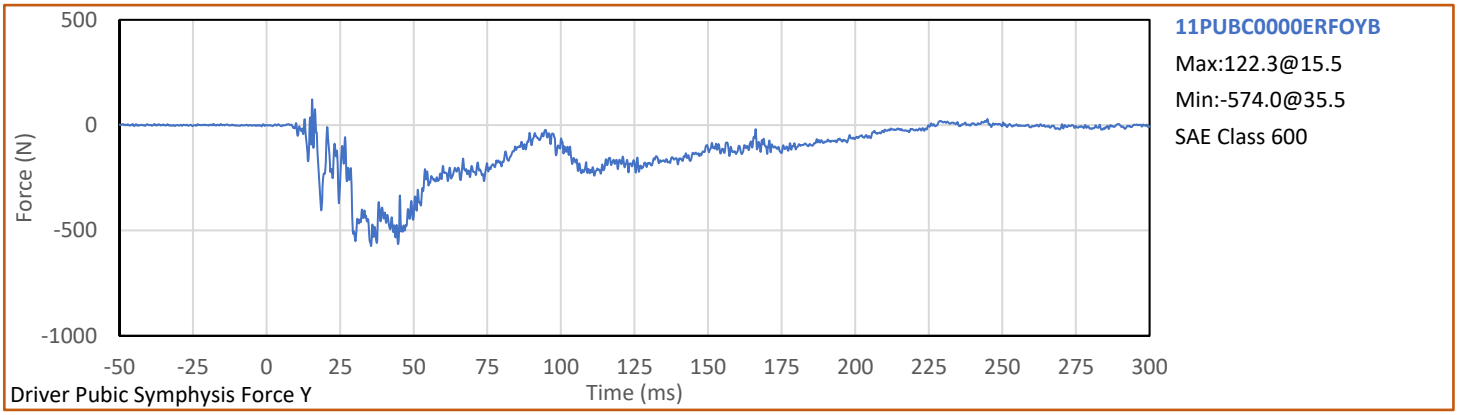
11ABDOLEMIERFOYB
Max:194.1@20.4
Min:-21.5@63.8
SAE Class 600

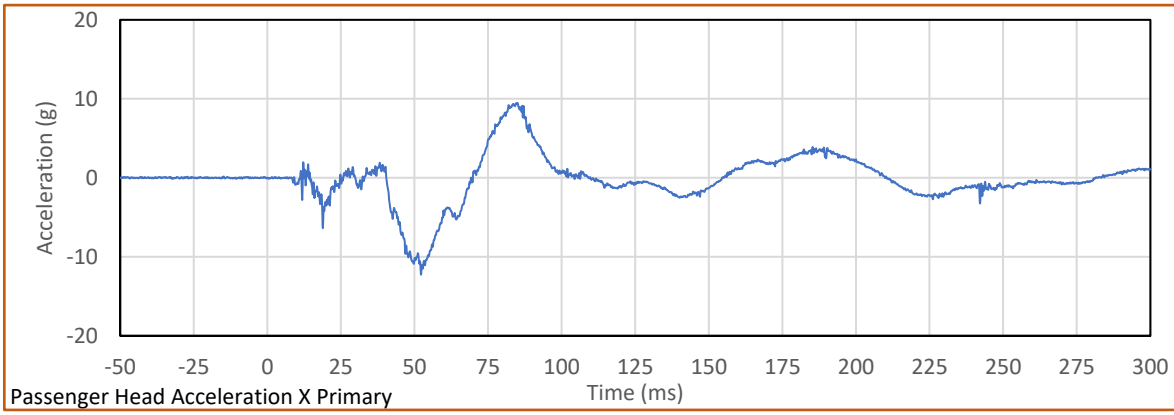


11ABDOLEREERFOYB
Max:196.4@40.2
Min:-12.2@63.2
SAE Class 600



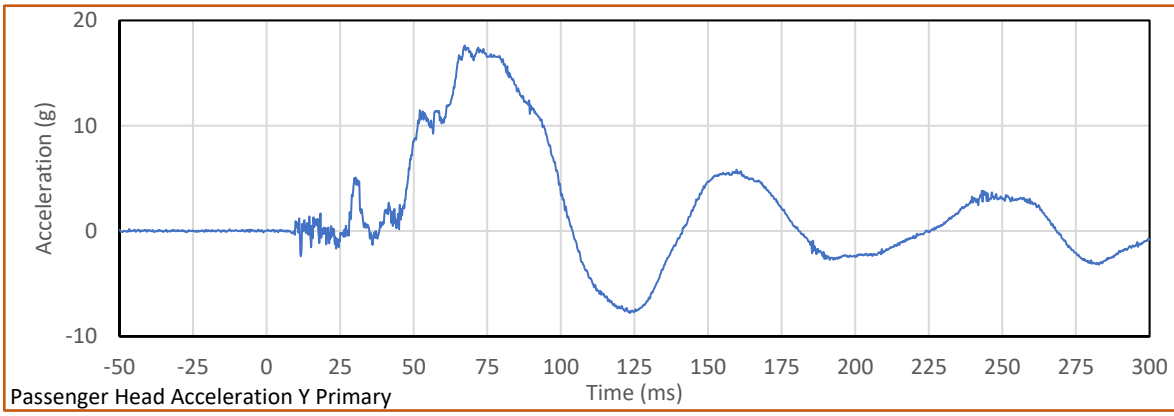
11ABDOLESUERFOYB
Max:454.9@29.1
Min:-54.5@63.8
SAE Class 600


500
0
-500
-1000
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:122.3@15.5
Min:-574.0@35.5
SAE Class 600



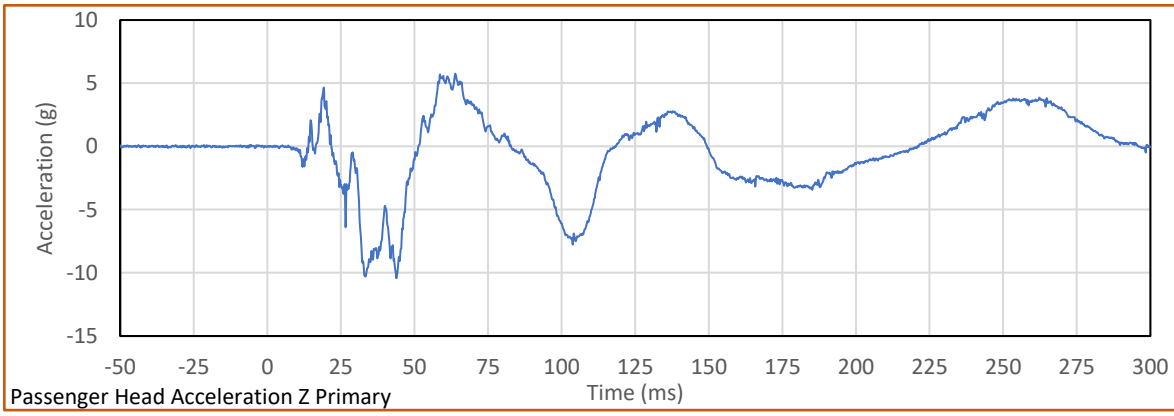
14HEAD0000S2ACXA
Max:9.5@85.0
Min:-12.3@52.2
SAE Class 1000

Passenger Head Acceleration X Primary



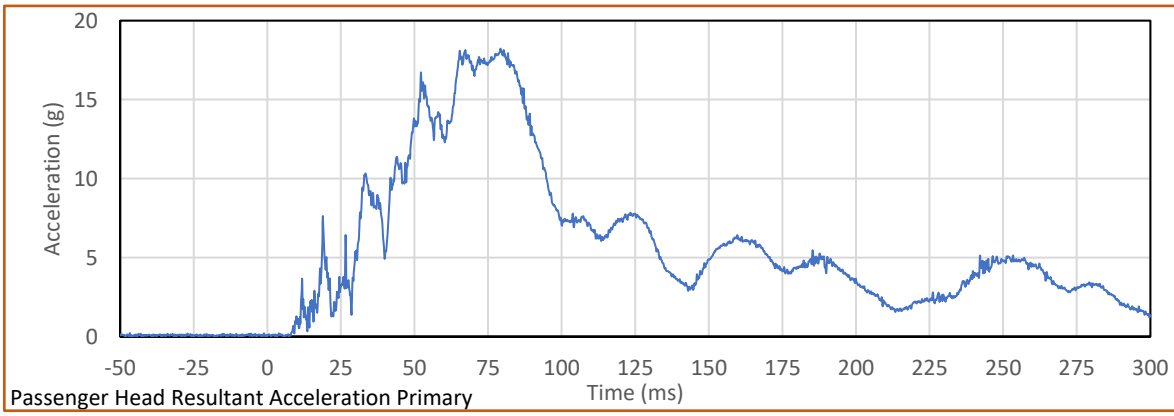
14HEAD0000S2ACYA
Max:17.6@67.3
Min:-7.8@123.4
SAE Class 1000

Passenger Head Acceleration Y Primary



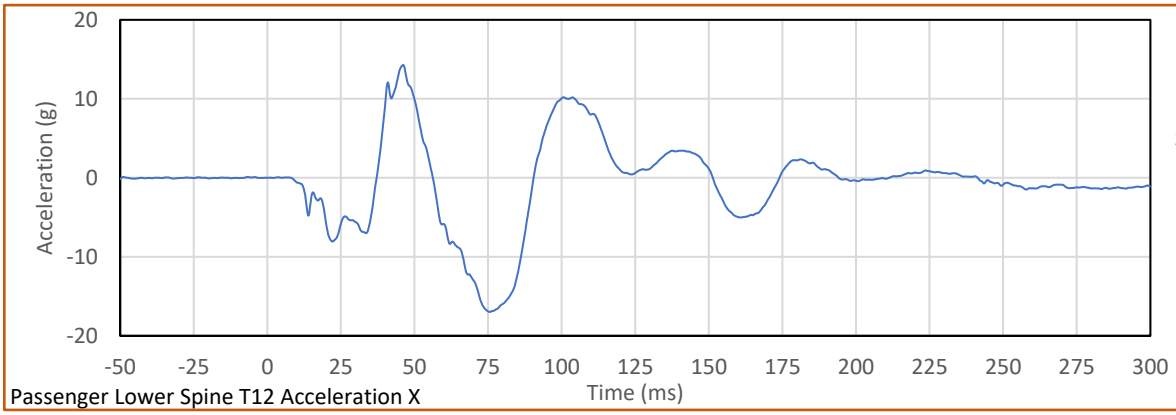
14HEAD0000S2ACZA
Max:5.8@63.9
Min:-10.4@43.9
SAE Class 1000

Passenger Head Acceleration Z Primary



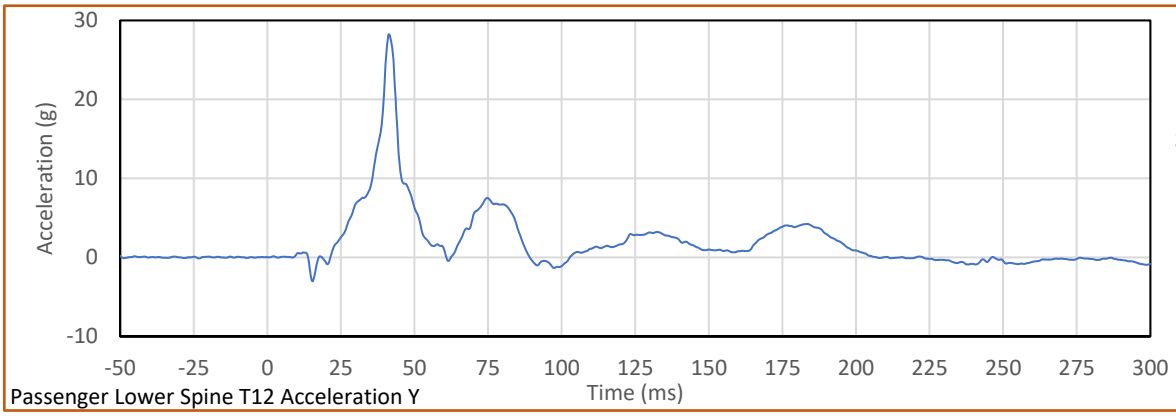
14HEAD0000S2ACRA
Max:18.2@79.3
Min:0.0@3.3
SAE Class 1000

Passenger Head Resultant Acceleration Primary



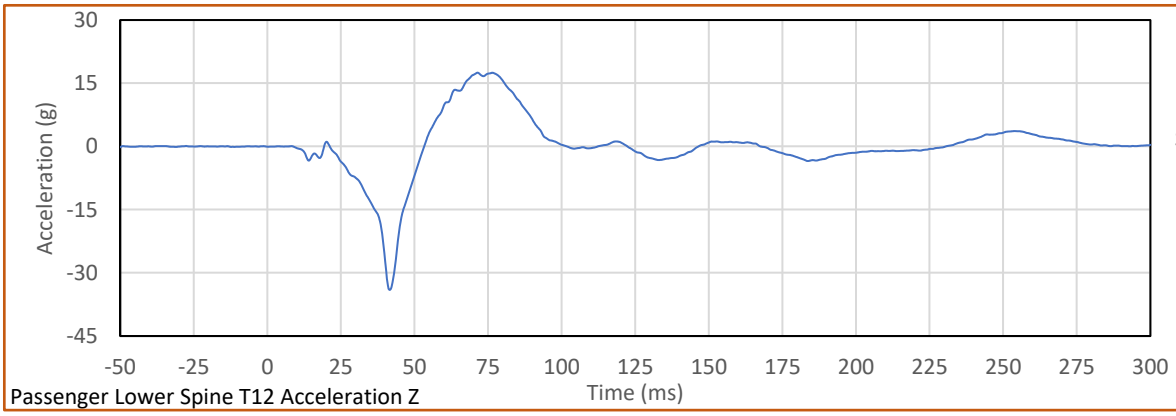
14ABSP01RIS2ACXC
Max:14.3@46.2
Min:-17.0@75.5
SAE Class 180

Passenger Lower Spine T12 Acceleration X



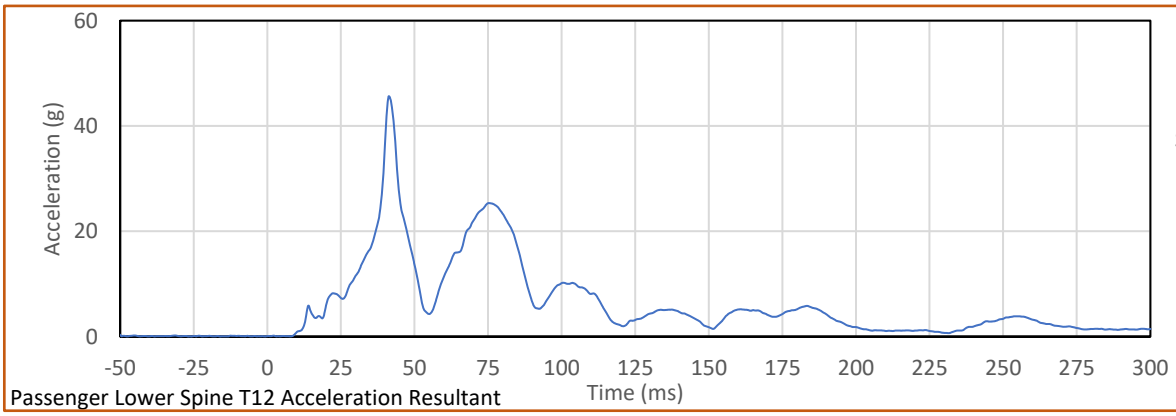
14ABSP01RIS2ACYC
Max:28.2@41.3
Min:-3.0@15.4
SAE Class 180

Passenger Lower Spine T12 Acceleration Y



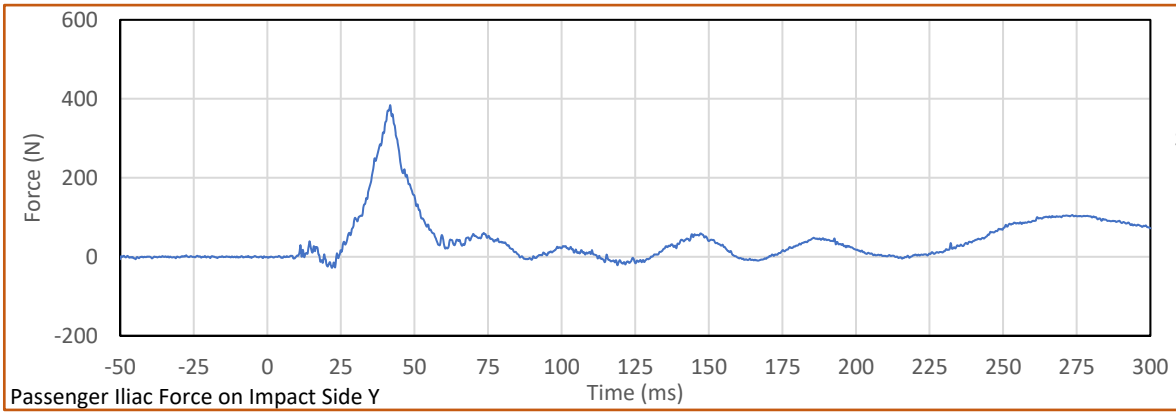
14ABSP01RIS2ACZC
Max:17.5@76.5
Min:-34.1@41.6
SAE Class 180

Passenger Lower Spine T12 Acceleration Z



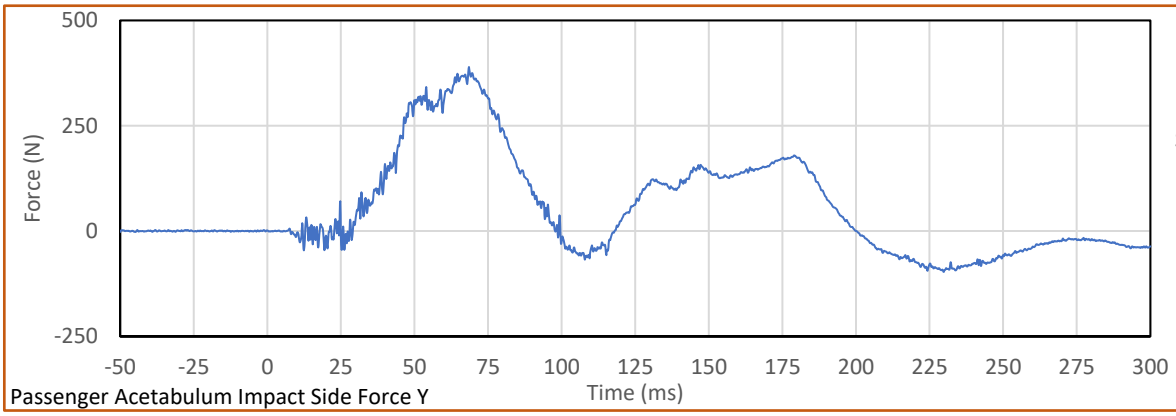
14ABSP01RIS2ACRC
Max:45.6@41.4
Min:0.0@4.3
SAE Class 180

Passenger Lower Spine T12 Acceleration Resultant



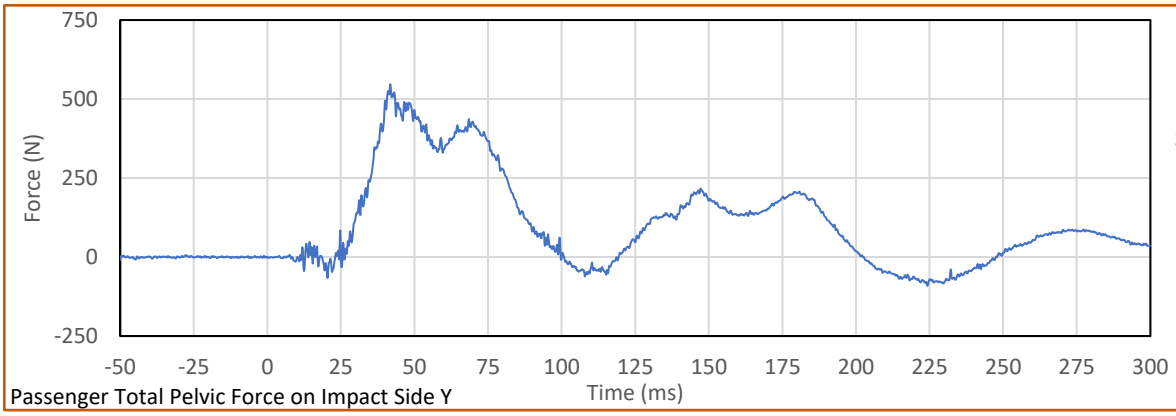
14ILACLE00S2FOYB
Max:384.0@41.8
Min:-27.9@22.0
SAE Class 600

Passenger Iliac Force on Impact Side Y



14ACTBLE00S2FOYB
Max:389.4@68.5
Min:-97.1@229.8
SAE Class 600

Passenger Acetabulum Impact Side Force Y



14PELVLE00S2FOYB
Max:546.9@41.8
Min:-91.3@224.3
SAE Class 600

Passenger Total Pelvic Force on Impact Side Y

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: 2022-10-24

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	29	Pass
1 - Sitting Height	mm	900	918	910	Pass
2 - Seat to Shoulder Joint	mm	558	572	562	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	353	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	98	Pass
5 - Sole to Seat, Sitting	mm	433	451	445	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	472	Pass
8 - Thorax Width	mm	322	332	329	Pass
9 - Abdomen Width	mm	273	287	279	Pass
10 - Pelvis Lap Width	mm	359	373	364	Pass
11 - Head Depth	mm	196	206	201	Pass
12 - Thorax Depth	mm	262	272	271	Pass
13 - Abdomen Depth	mm	194	204	199	Pass
14 - Pelvis Depth	mm	235	245	237	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	157	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	606	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

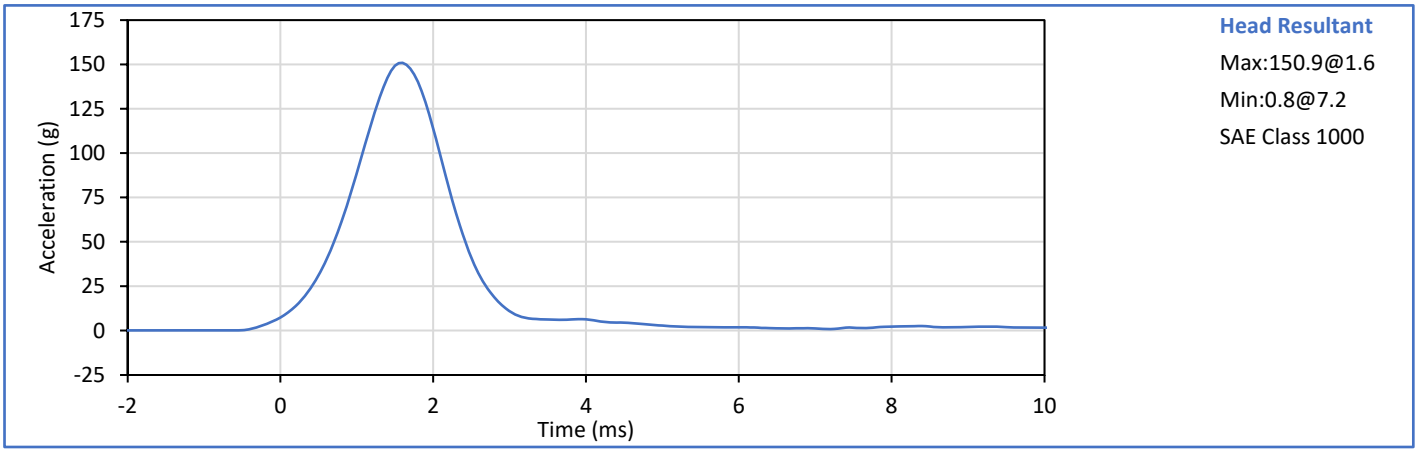
Approved By: J. Hernandez

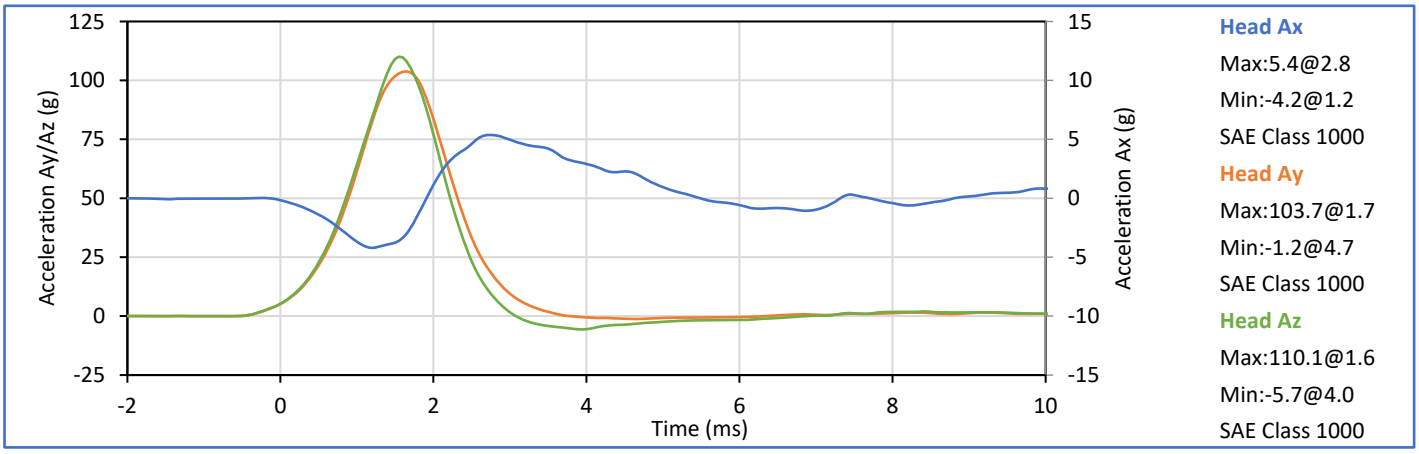
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.3	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Peak Resultant Acceleration	g	125.0	155.0	150.9	Pass
Peak Head Ax	g	-15.0	15.0	5.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

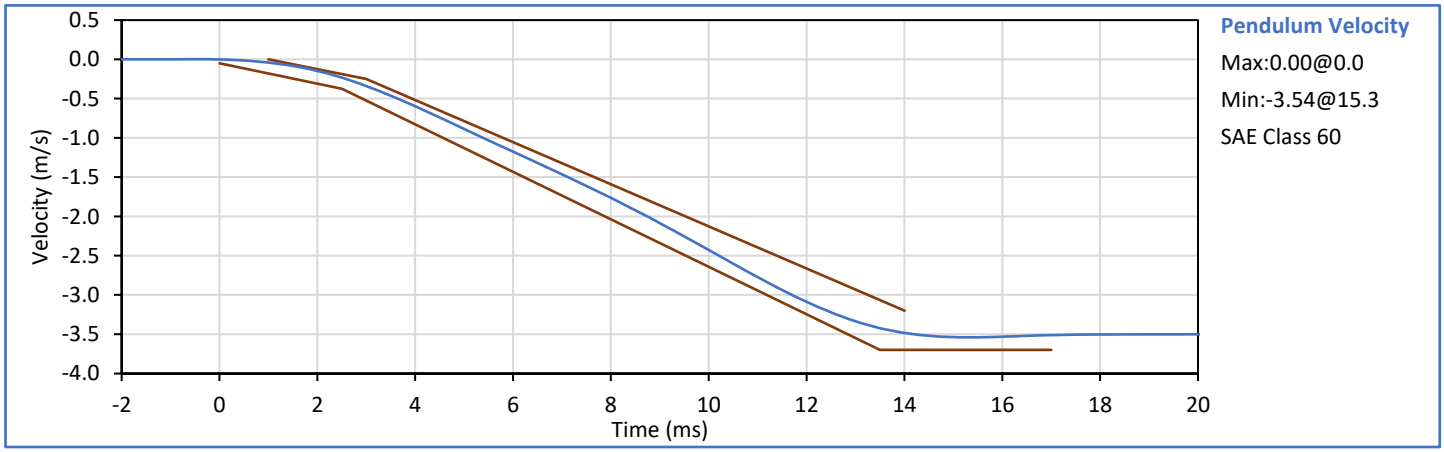
Approved By: J. Hernandez

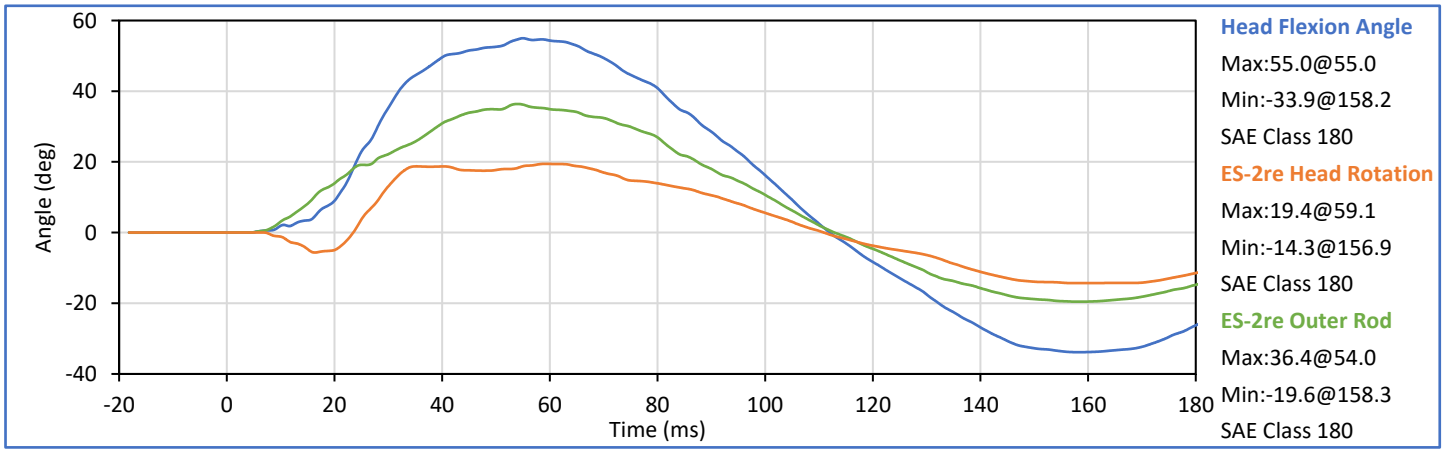
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-26

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	30	Pass
Pendulum Velocity	m/s	3.30	3.50	3.41	Pass
Peak Headform Flexion	deg	49.0	59.0	55.0	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	55.0	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	57.0	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

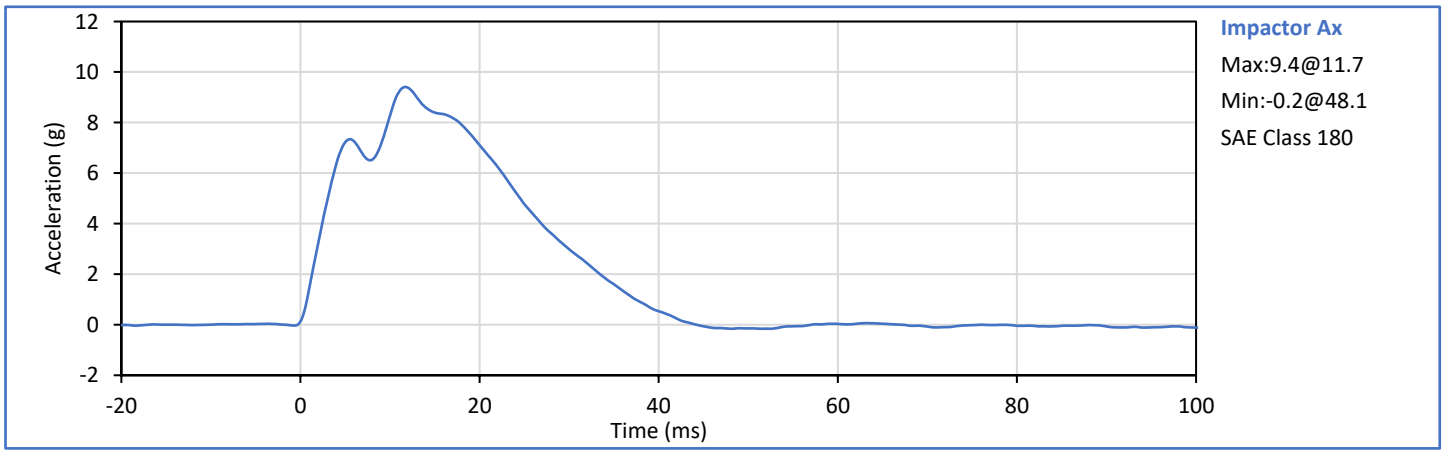
Approved By: J. Hernandez

Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Ax	g	7.5	10.5	9.4	Pass
			Overall Test Results		Pass



Technician: G. Fuentes

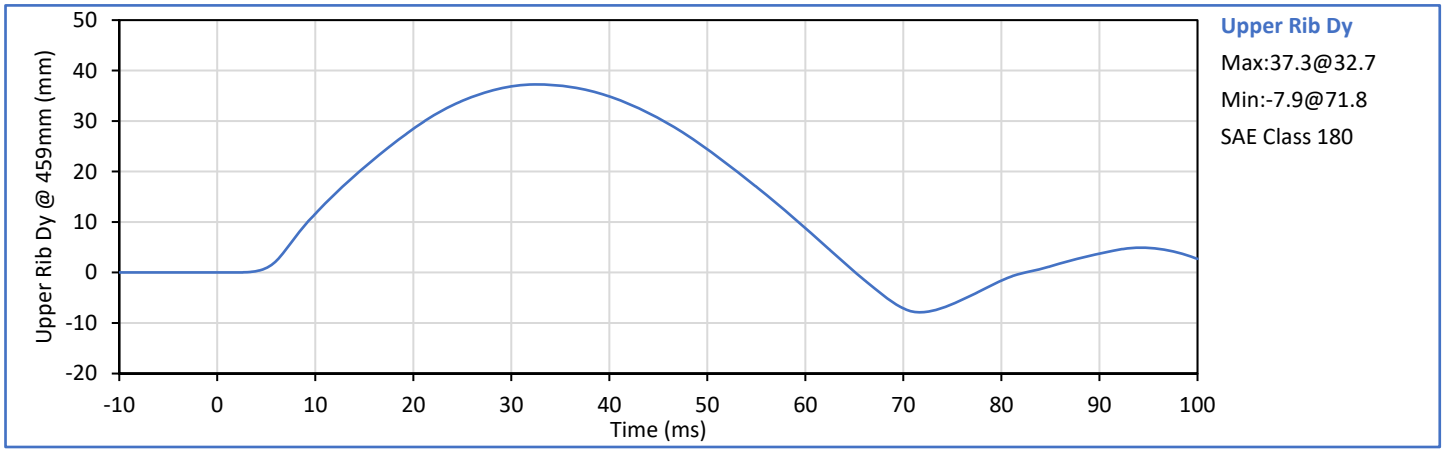
Approved By: J. Hernandez

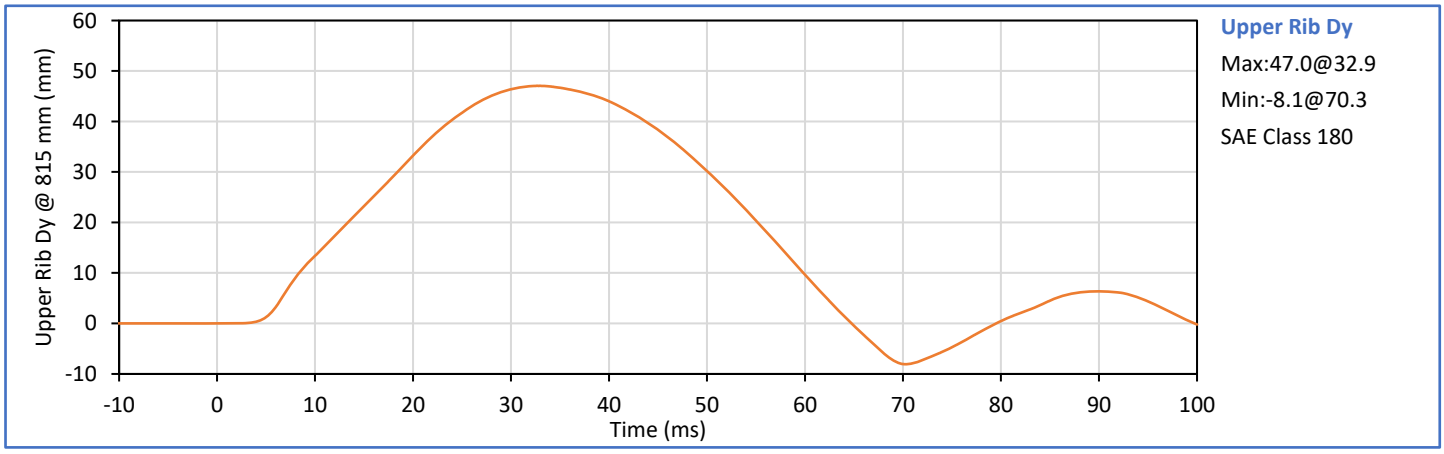
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.3	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	47.0	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

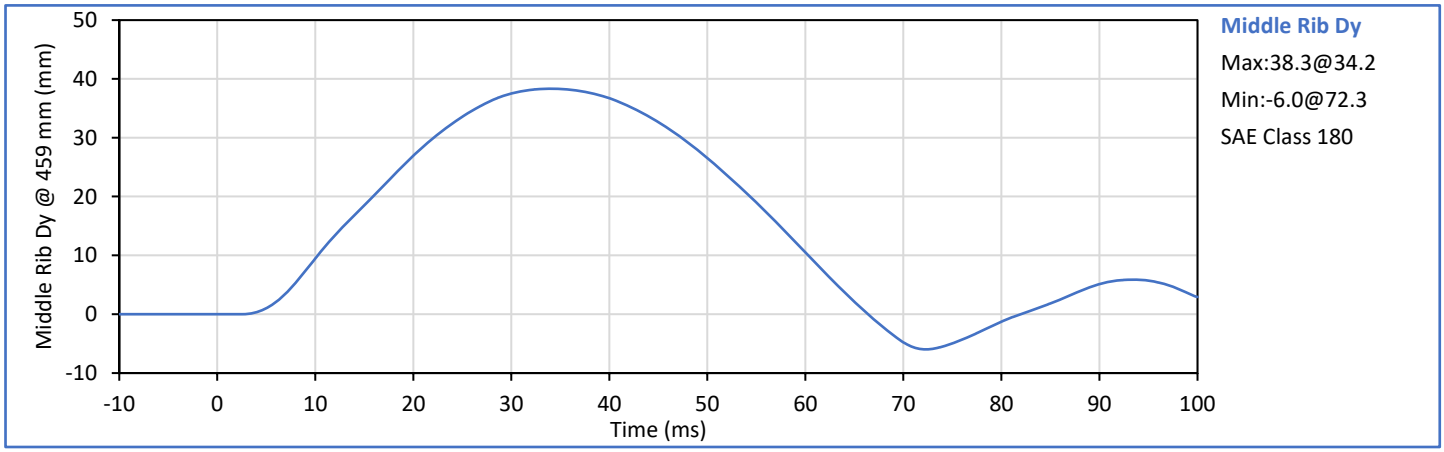
Approved By: J. Hernandez

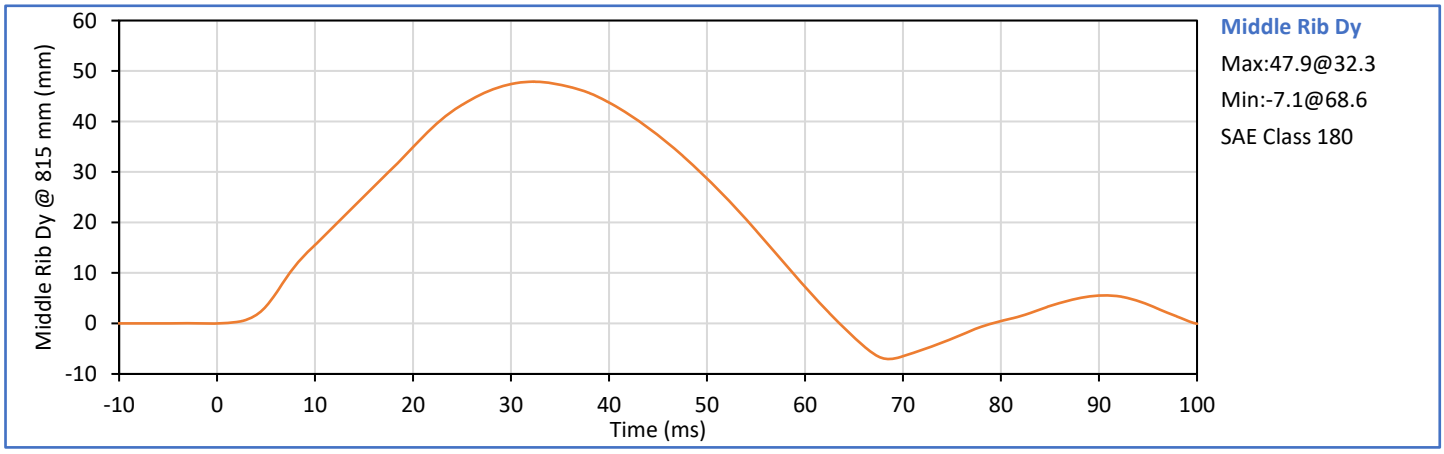
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.3	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.9	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

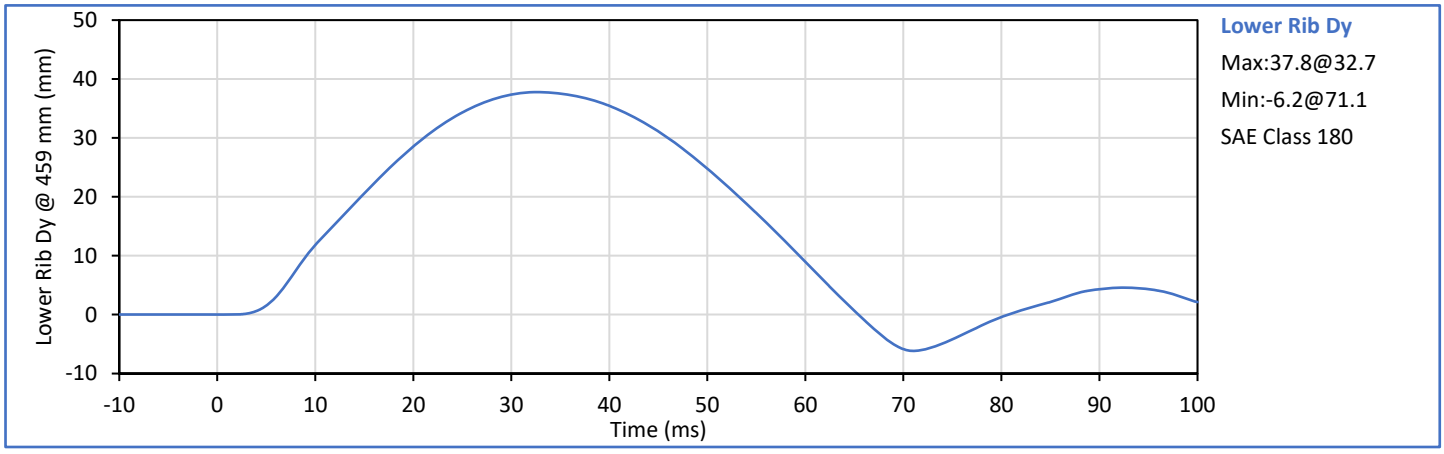
Approved By: J. Hernandez

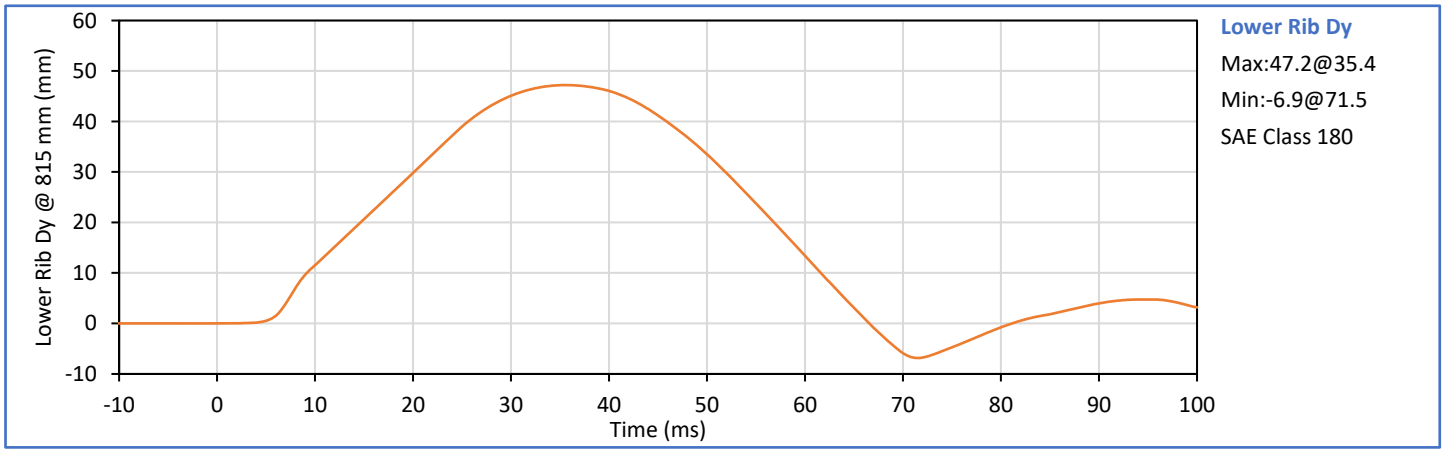
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2025-10-25

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	30	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.8	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	47.2	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

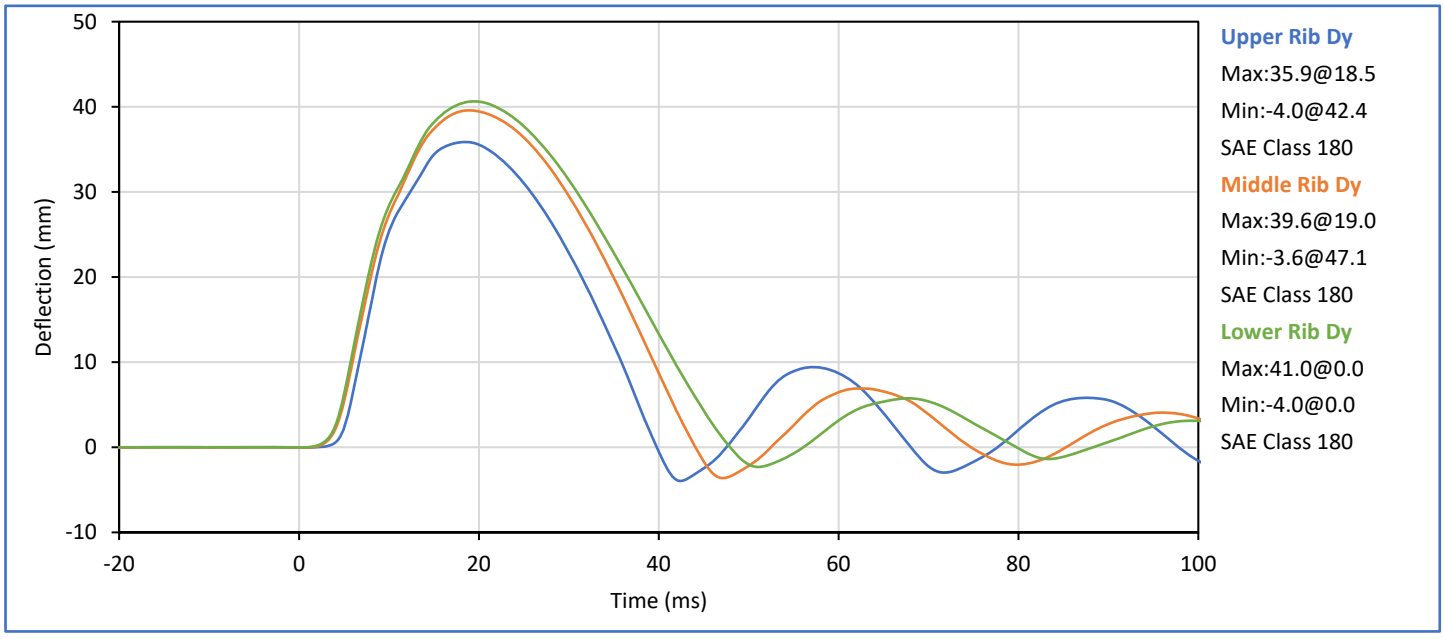
Approved By: J. Hernandez

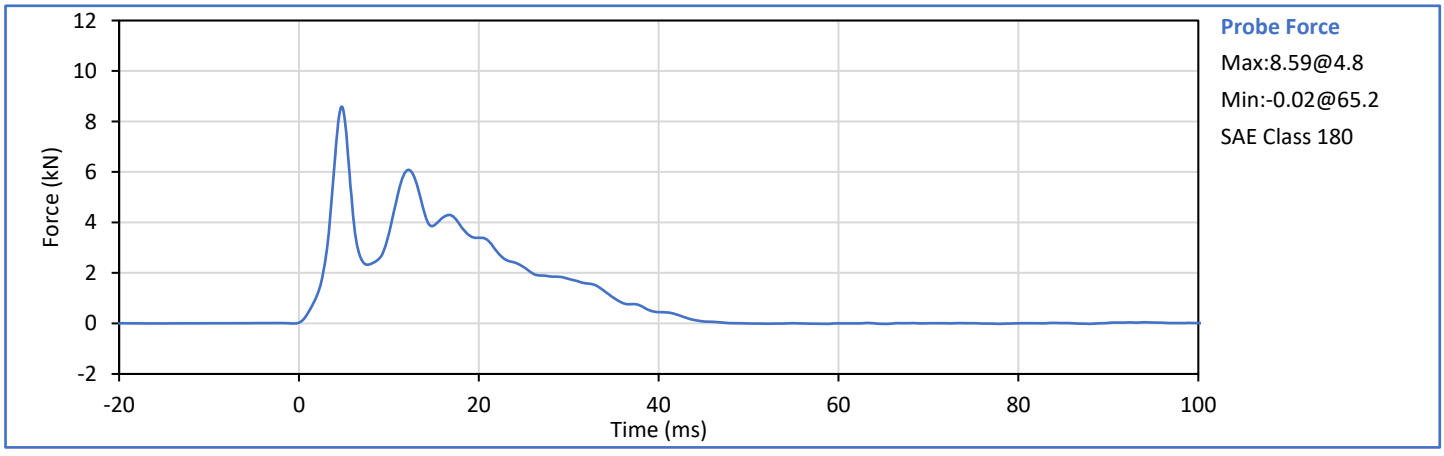
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-24

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	29	Pass
Impactor Velocity	m/s	5.40	5.60	5.58	Pass
Peak Upper Rib Dy	mm	34.0	41.0	35.9	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.6	Pass
Peak Lower Rib Dy	mm	37.0	44.0	40.6	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	6.08	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

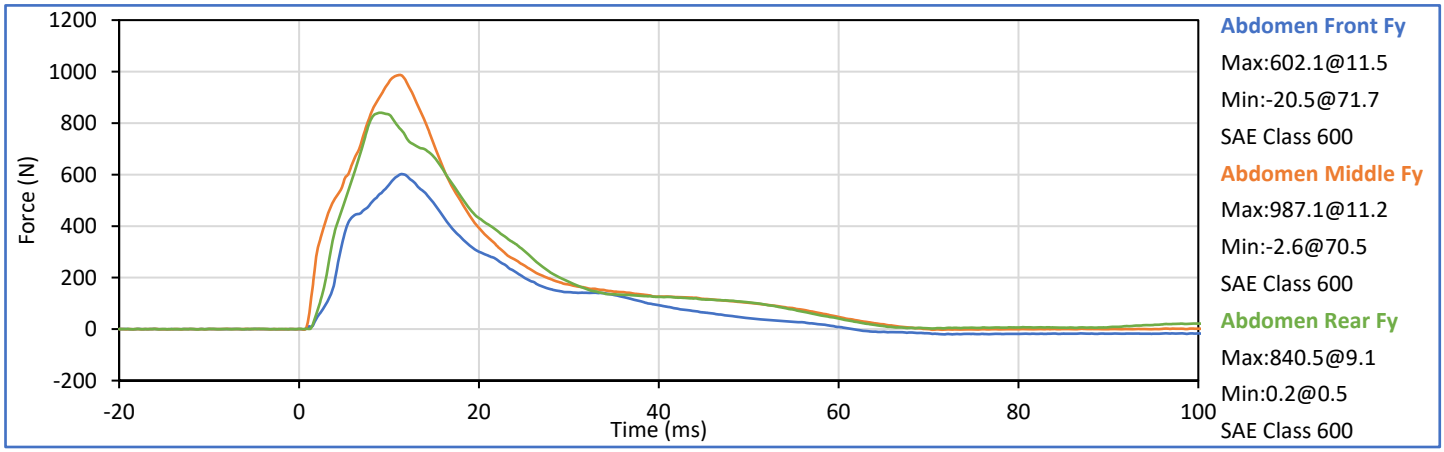
Approved By: J. Hernandez

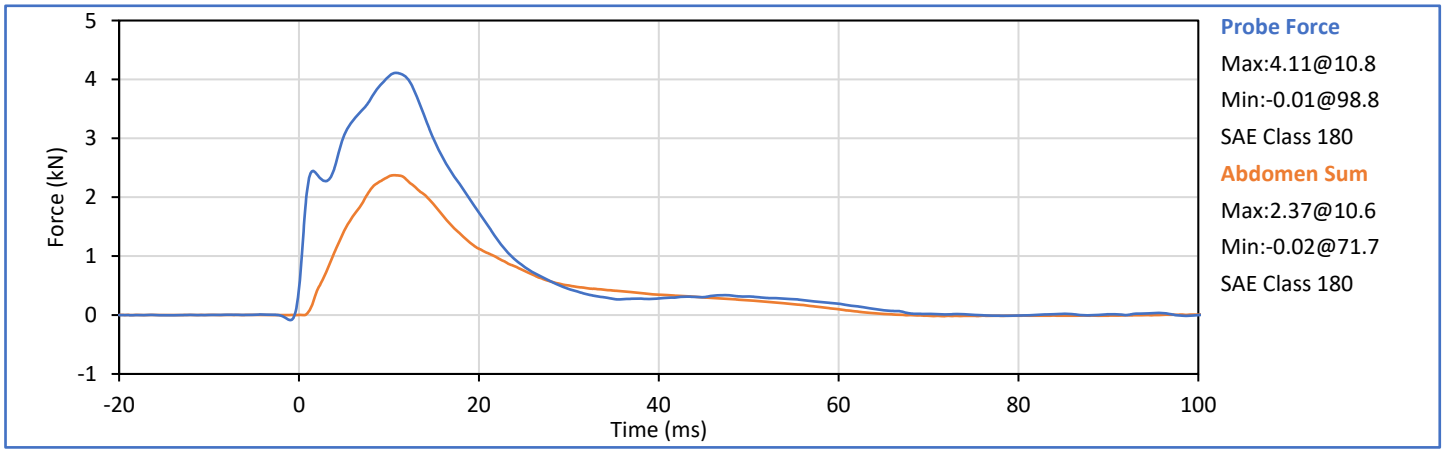
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	3.90	4.10	4.00	Pass
Peak Impactor Force	kN	4.00	4.80	4.11	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.8	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.37	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

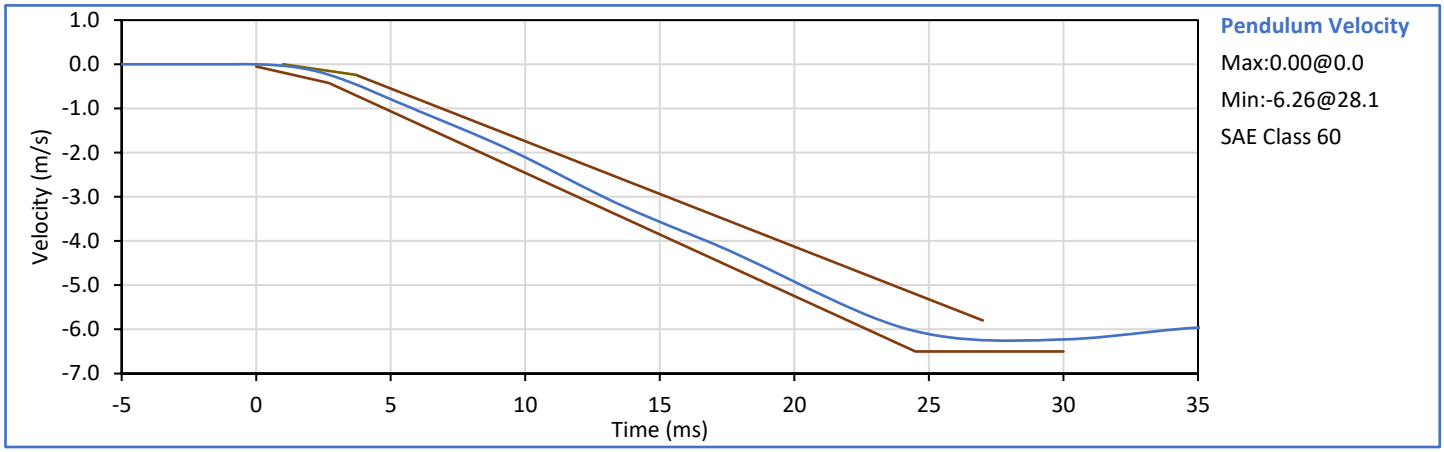
Approved By: J. Hernandez

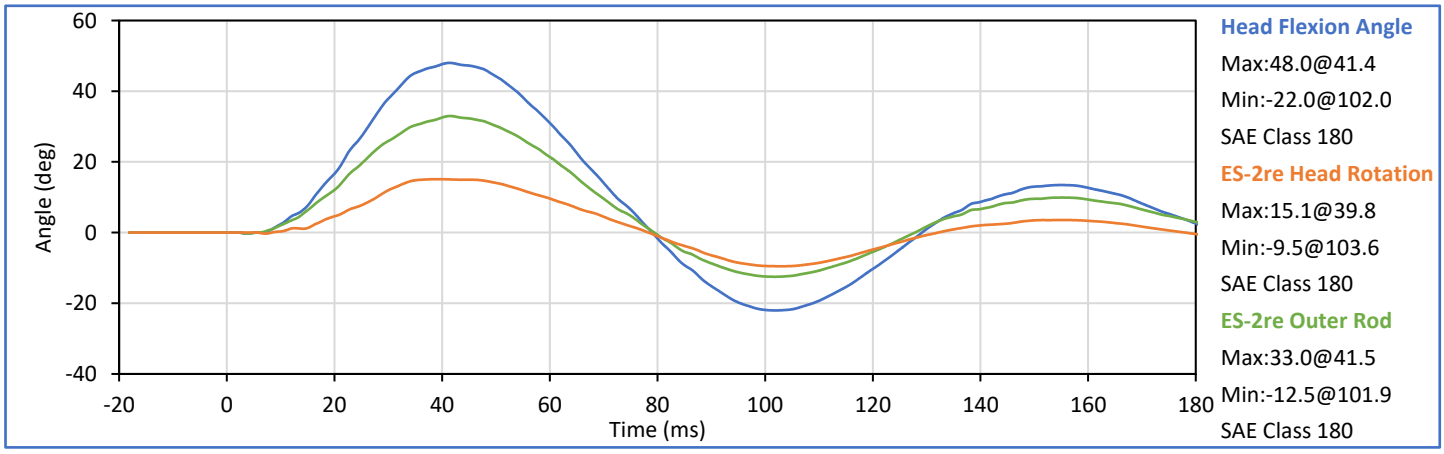
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-26

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Pendulum Velocity	m/s	5.95	6.15	6.12	Pass
Peak Headform Flexion	deg	45.0	55.0	48.0	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	41.4	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	37.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

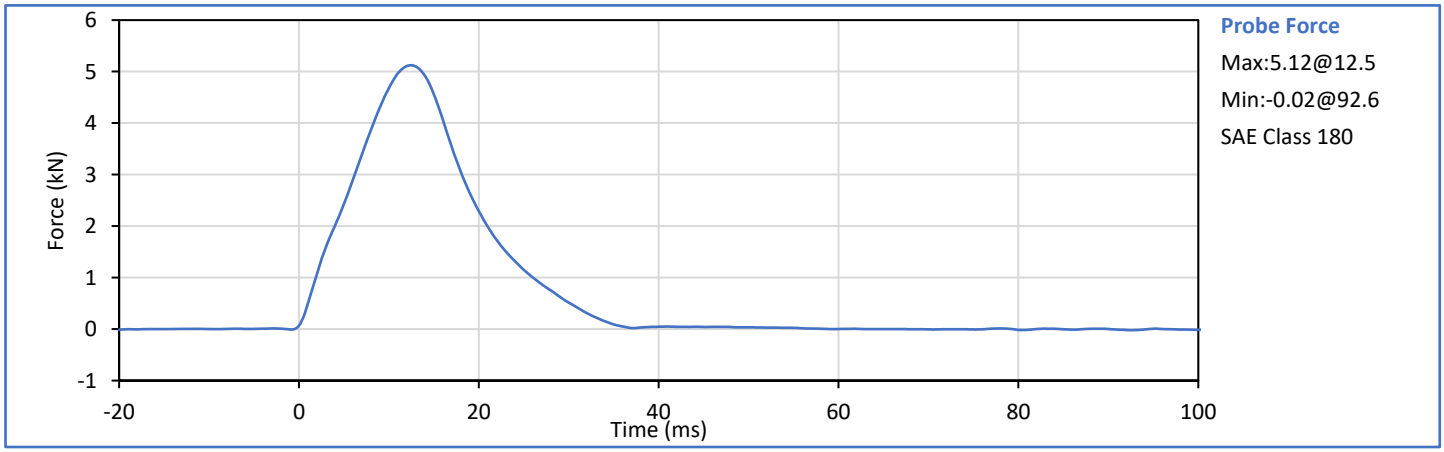
Approved By: J. Hernandez

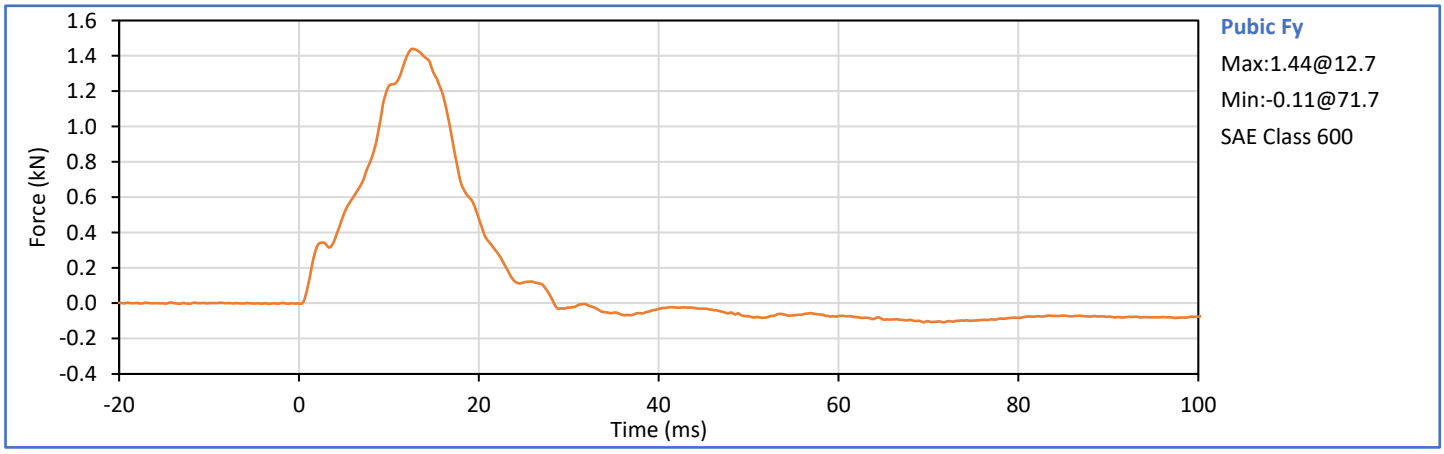
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-10-24

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	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.12	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.5	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.44	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	12.7	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: 308

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 308 Test Date: 2022-10-24

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
A - Sitting Height	mm	772	788	777	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	85	Pass
D - H Point From Seatback	mm	141	151	149	Pass
E - Shoulder Pivot From Backline	mm	97	107	103	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	146	Pass
H - Head Back From Backline	mm	40	46	42	Pass
I - Head Depth	mm	178	188	184	Pass
J - Head Circumference	mm	541	551	543	Pass
K - Buttock To Knee Length	mm	514	540	533	Pass
L - Popliteal Height	mm	343	369	360	Pass
K - Knee Pivot To Floor Height	mm	392	409	399	Pass
N - Buttock Popliteal Length	mm	416	442	427	Pass
O - Chest Depth W/O Jacket	mm	195	211	200	Pass
P - Foot Length	mm	216	232	227	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	253	Pass
S - Knee Joint To Seatback	mm	477	493	486	Pass
V - Shoulder Width	mm	341	357	355	Pass
W - Foot Width	mm	78	94	87	Pass
Y - Chest Circumference W/Jacket	mm	851	881	860	Pass
Z - Waist Circumference	mm	761	791	771	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

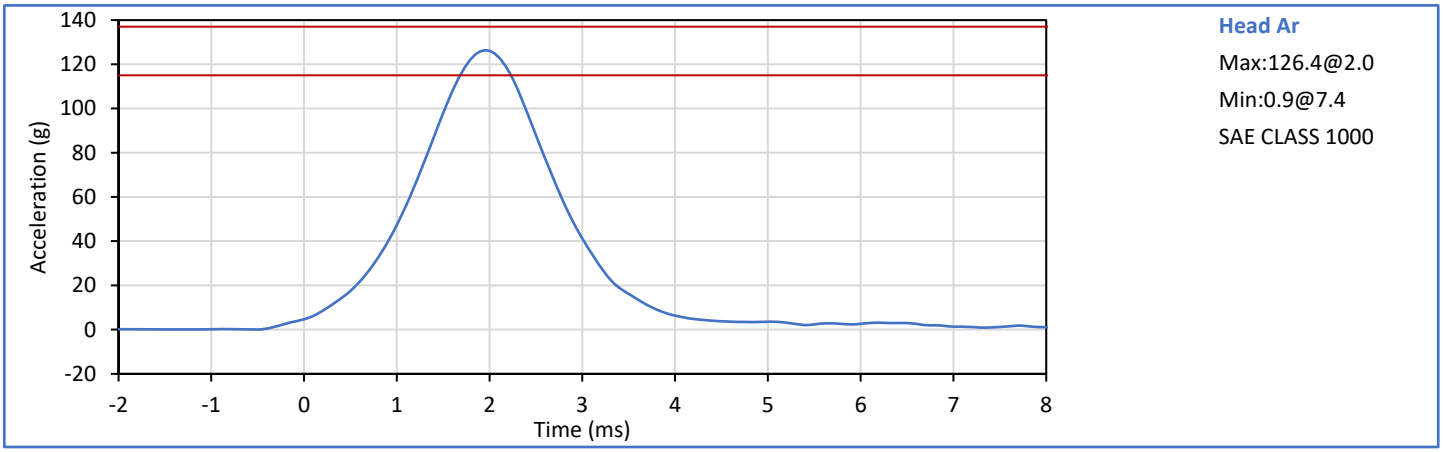
Approved By: J. Hernandez

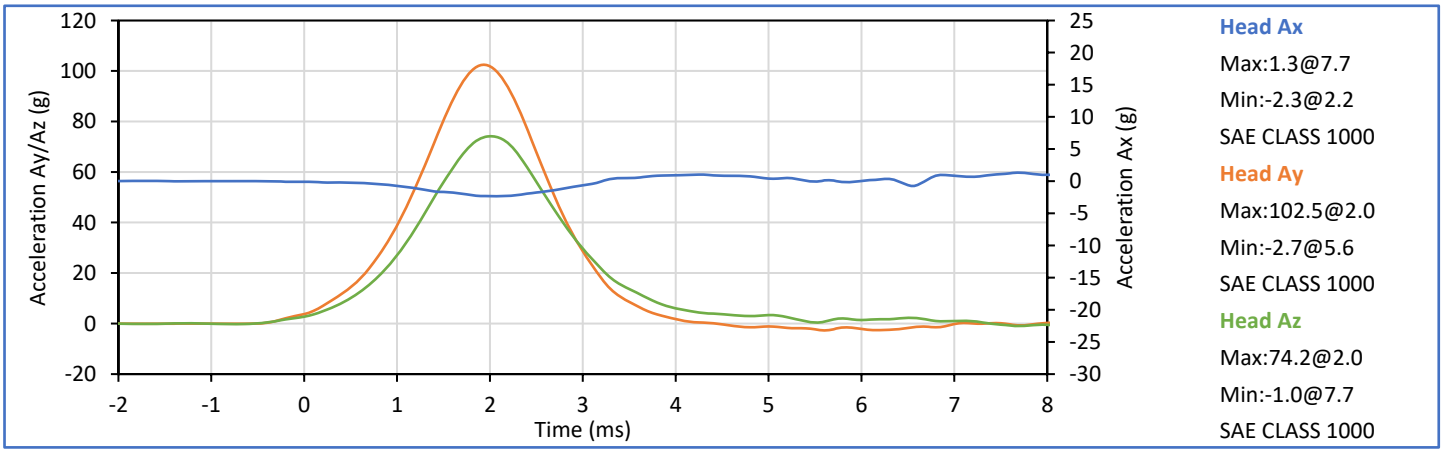
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 308 Test Date: 2022-10-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.5	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Peak Resultant Acceleration	g	115.0	137.0	126.4	Pass
Peak Head Ax	g	-15.0	15.0	-2.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

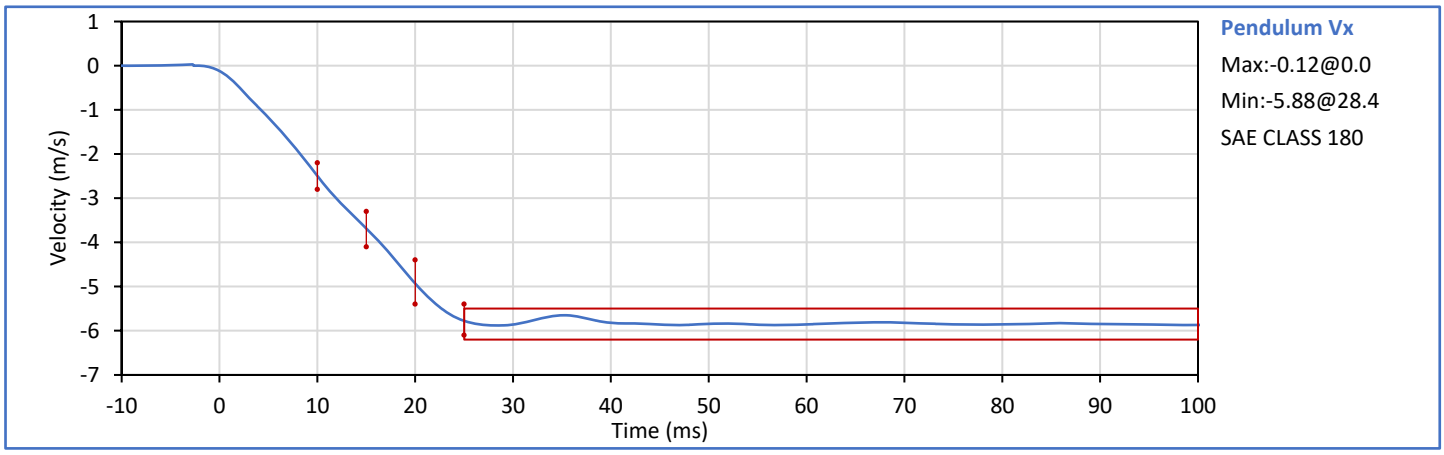
Approved By: J. Hernandez

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2022-10-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.51	5.63	5.55	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.50	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.68	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-4.93	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.78	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-5.88/-5.65	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-73.1	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	61.5	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	39.6	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	113.7	Pass
			Overall Test Results		Pass



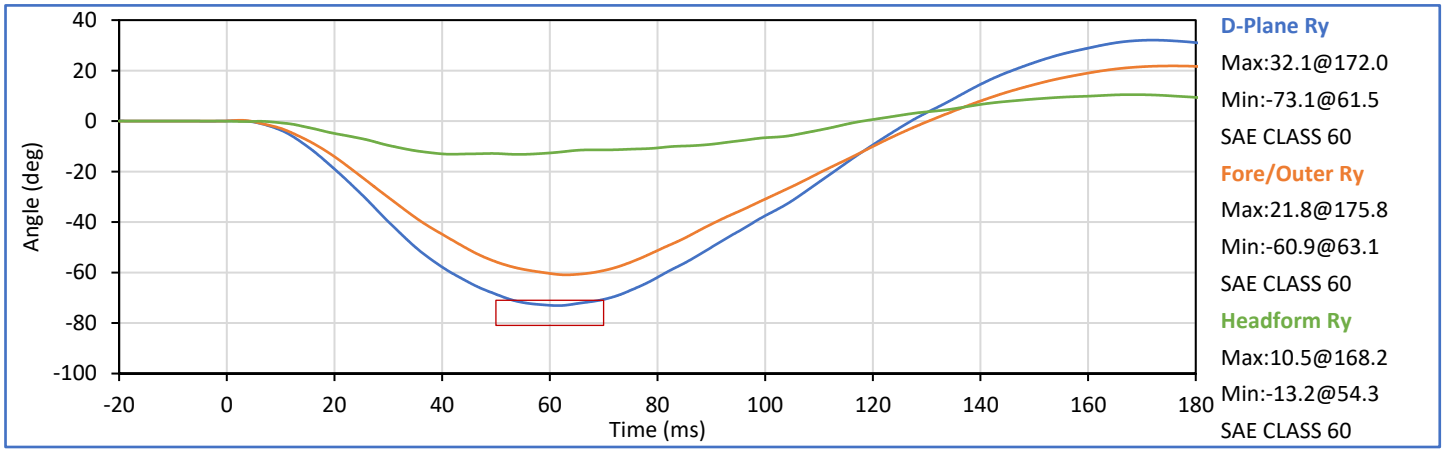
Technician: G. Fuentes

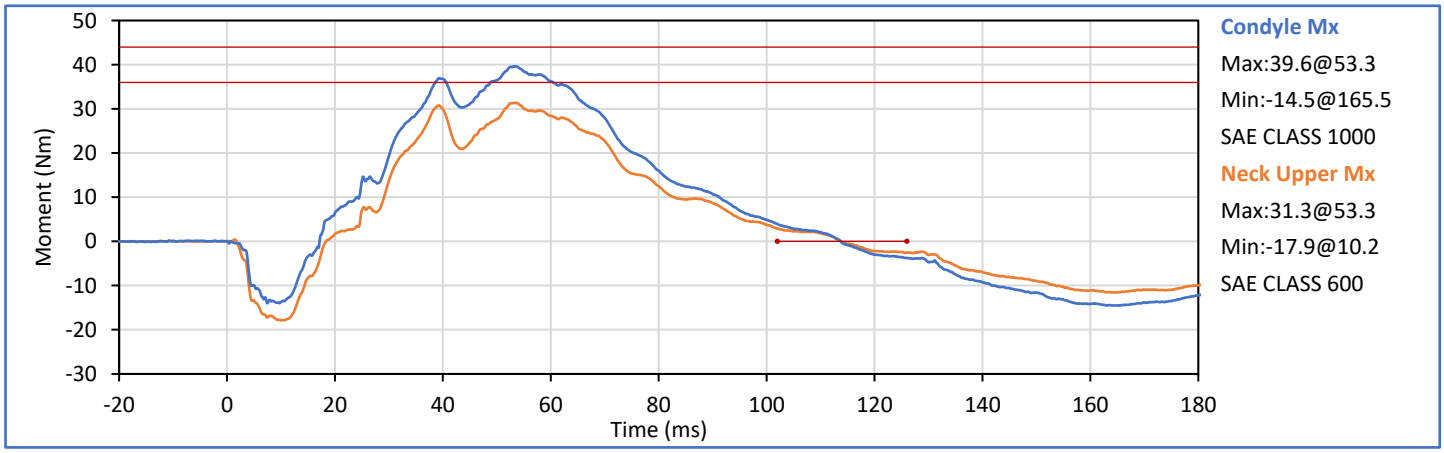
Approved By: J. Hernandez

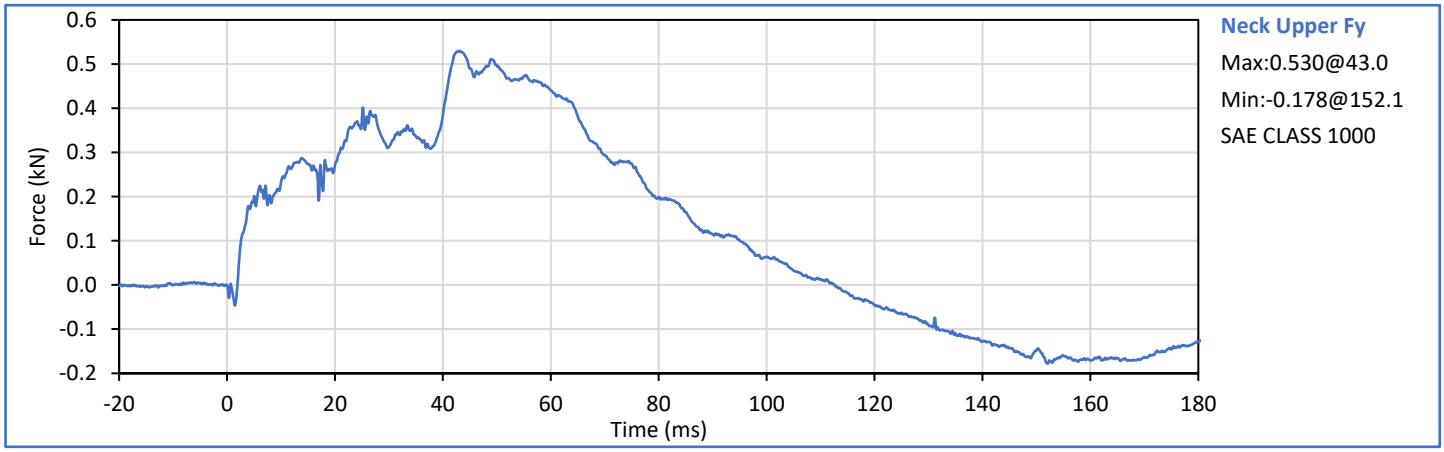
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2022-10-25





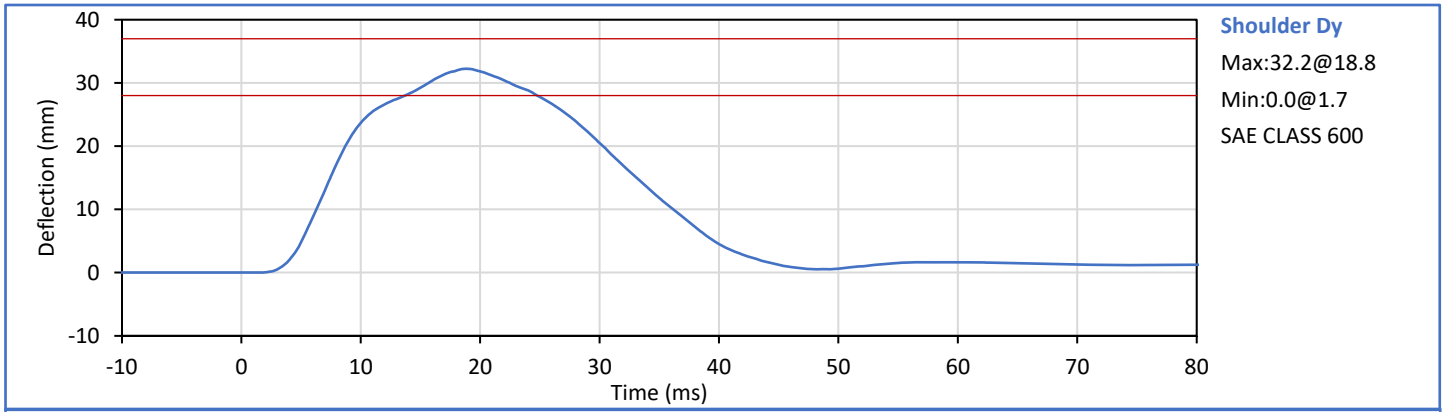


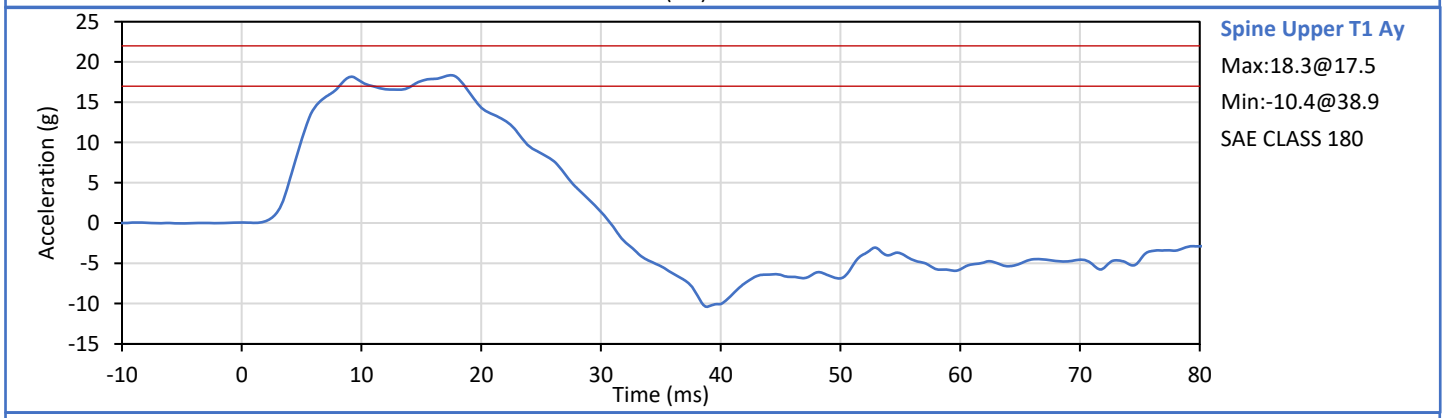
Applus IDIADA KARCO

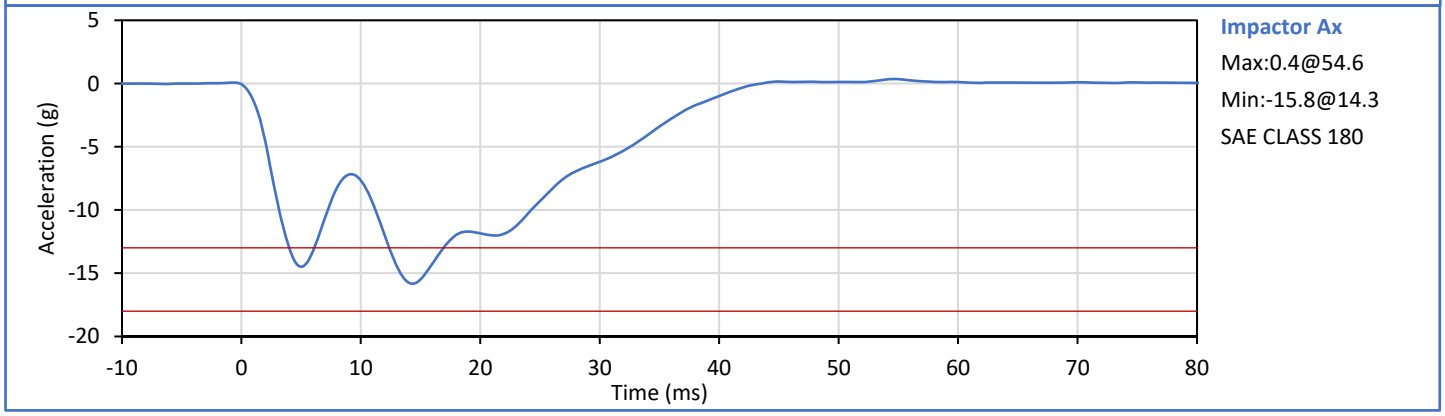
SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 308 Test Date: 2022-10-24

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	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.29	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.2	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.3	Pass
Peak Impactor Ax	g	-18.0	-13.0	-15.8	Pass
			Overall Test Results		Pass







Technician: G. Fuentes

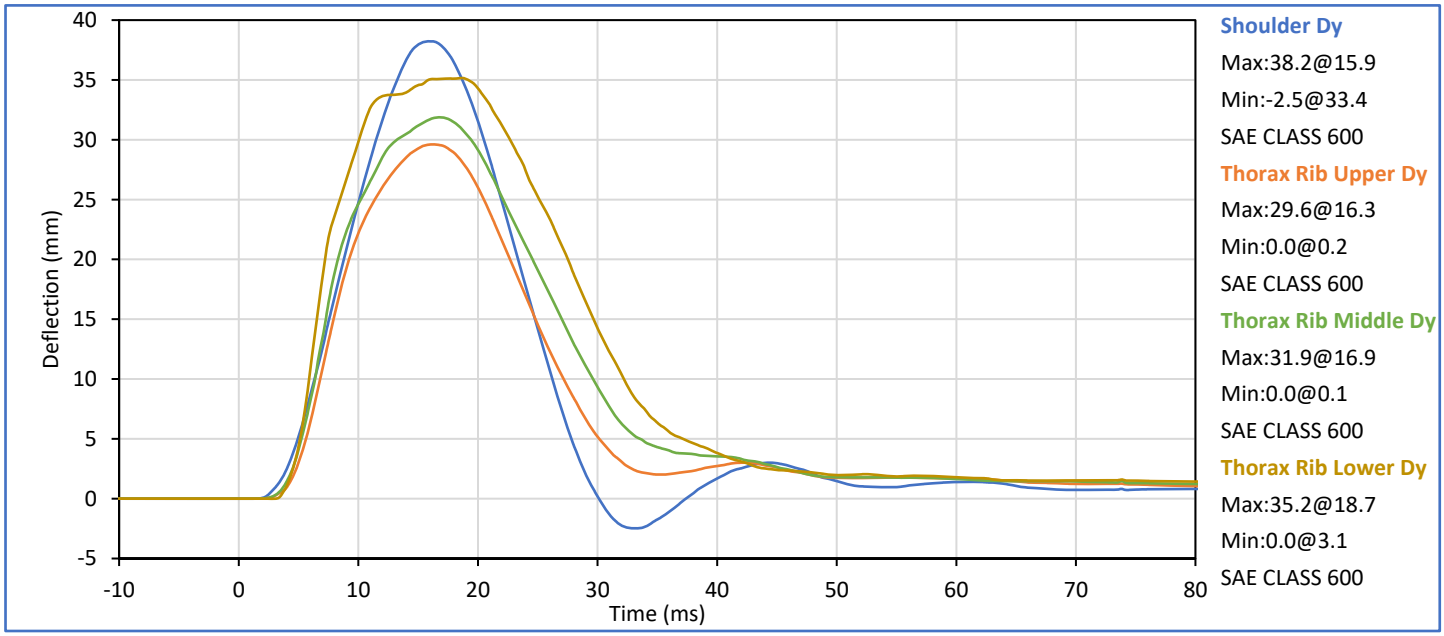
Approved By: J. Hernandez

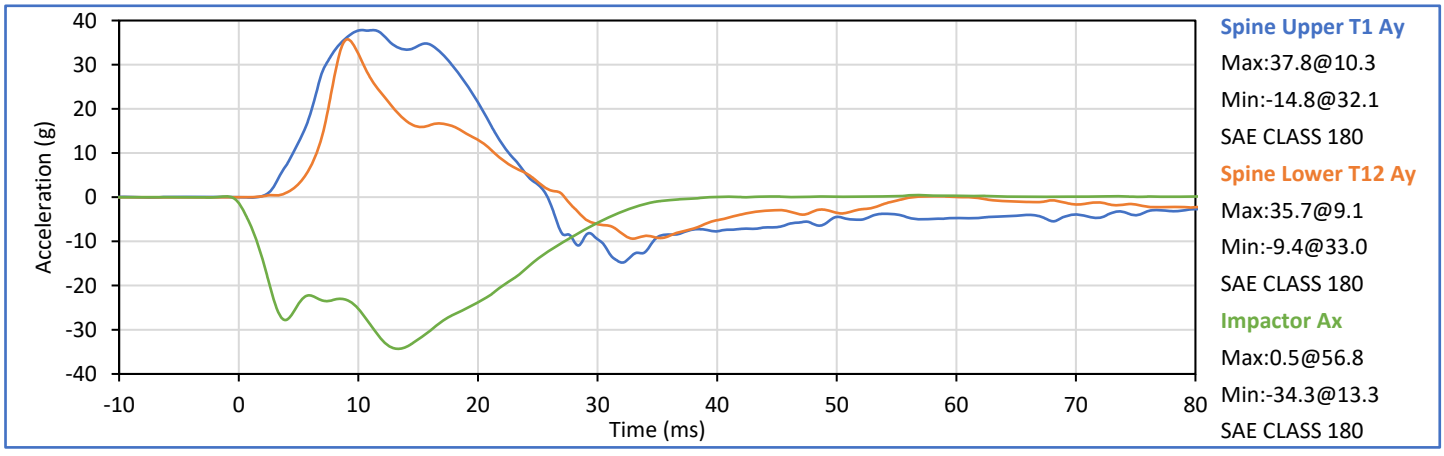
Applus IDIADA KARCO

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

ATD Serial No.: 308 Test Date: 2022-10-24

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	29	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Shoulder Dy	mm	31.0	40.0	38.2	Pass
Peak Upper Rib Dy	mm	25.0	32.0	29.6	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.9	Pass
Peak Lower Rib Dy	mm	32.0	38.0	35.2	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	37.8	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	35.7	Pass
Peak Impactor Ax	g	-36.0	-30.0	-34.3	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

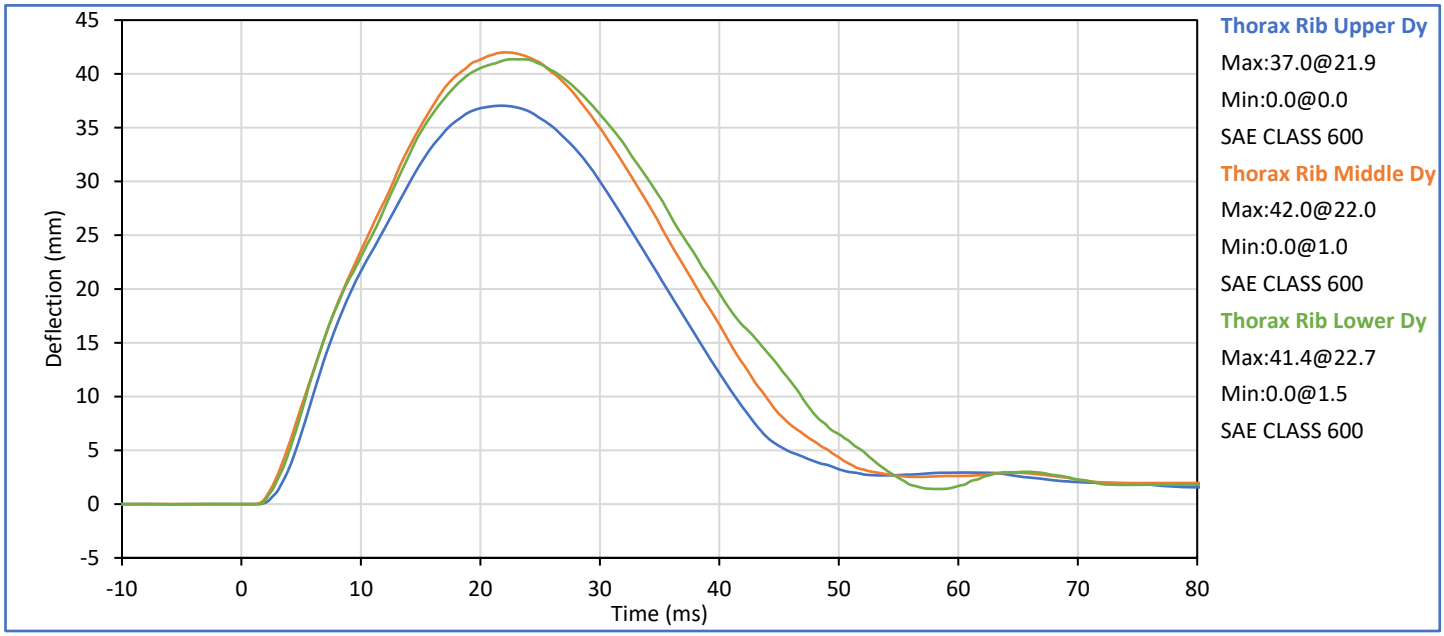
Approved By: J. Hernandez

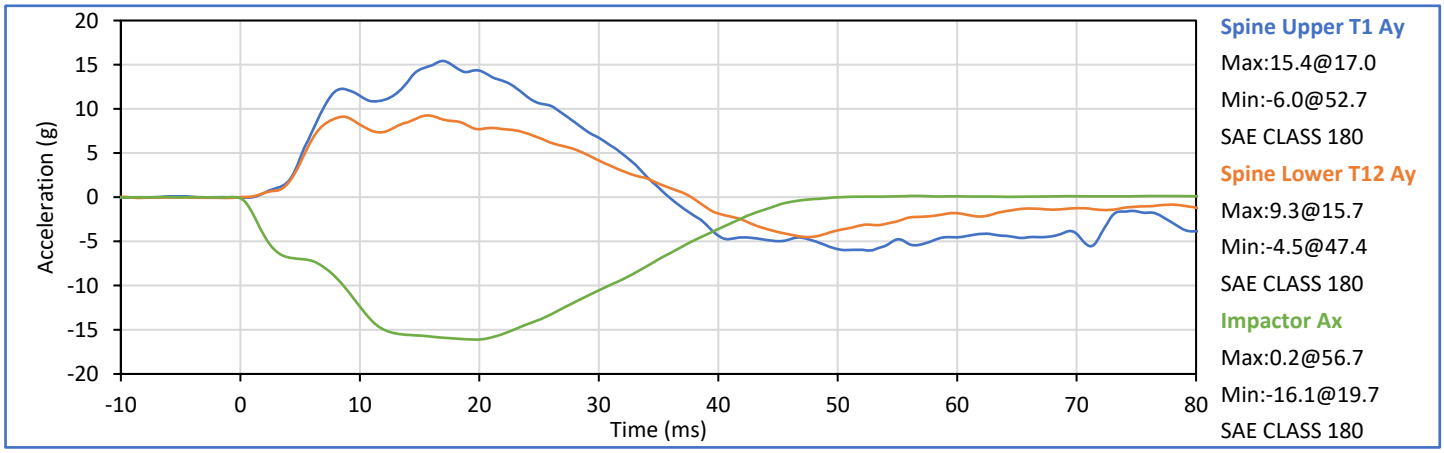
Applus IDIADA KARCO

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

ATD Serial No.: 308 Test Date: 2022-10-24

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	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	37.0	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	42.0	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	41.4	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	15.4	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	9.3	Pass
Peak Impactor Ax	g	-18.0	-14.0	-16.1	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

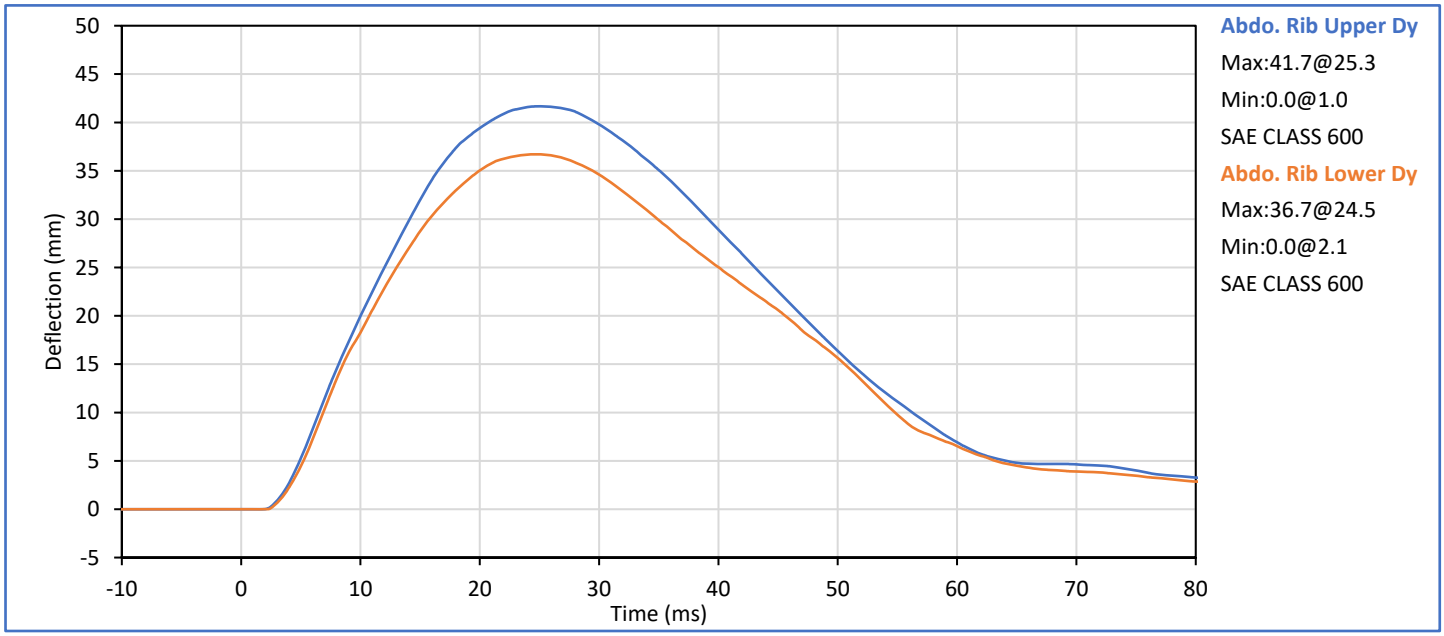
Approved By: J. Hernandez

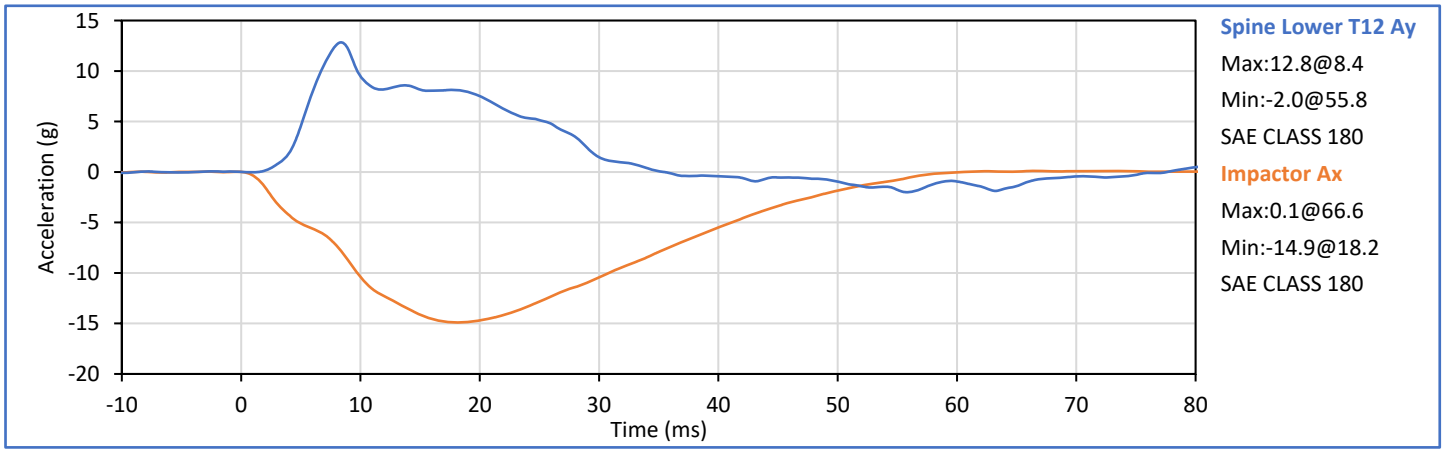
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 308 Test Date: 2022-10-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.7	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	36.7	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	12.8	Pass
Peak Impactor Ax	g	-16.0	-12.0	-14.9	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

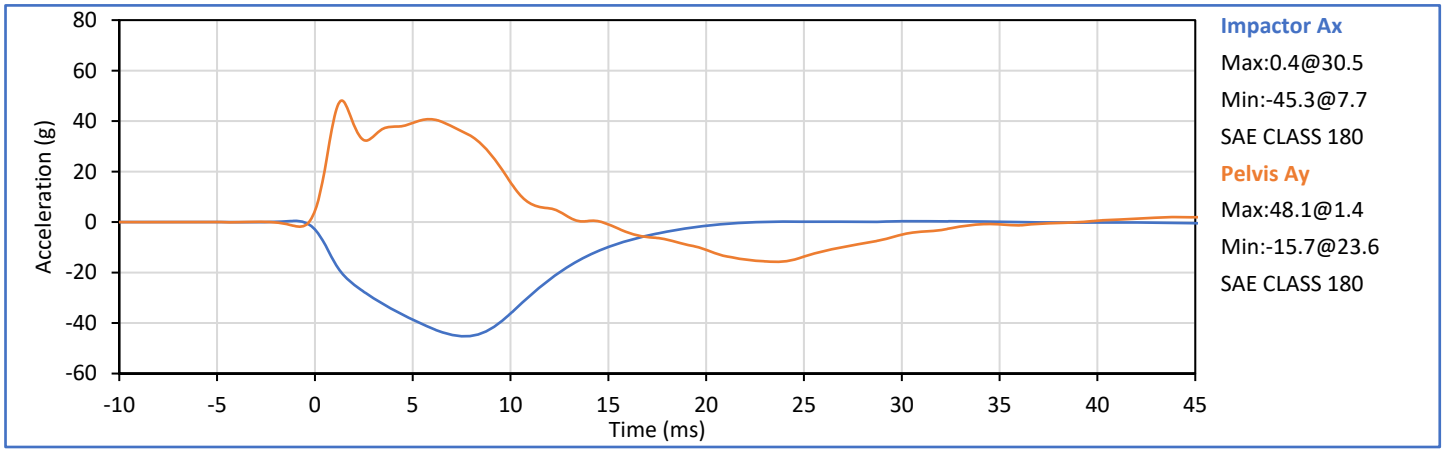
Applus IDIADA KARCO

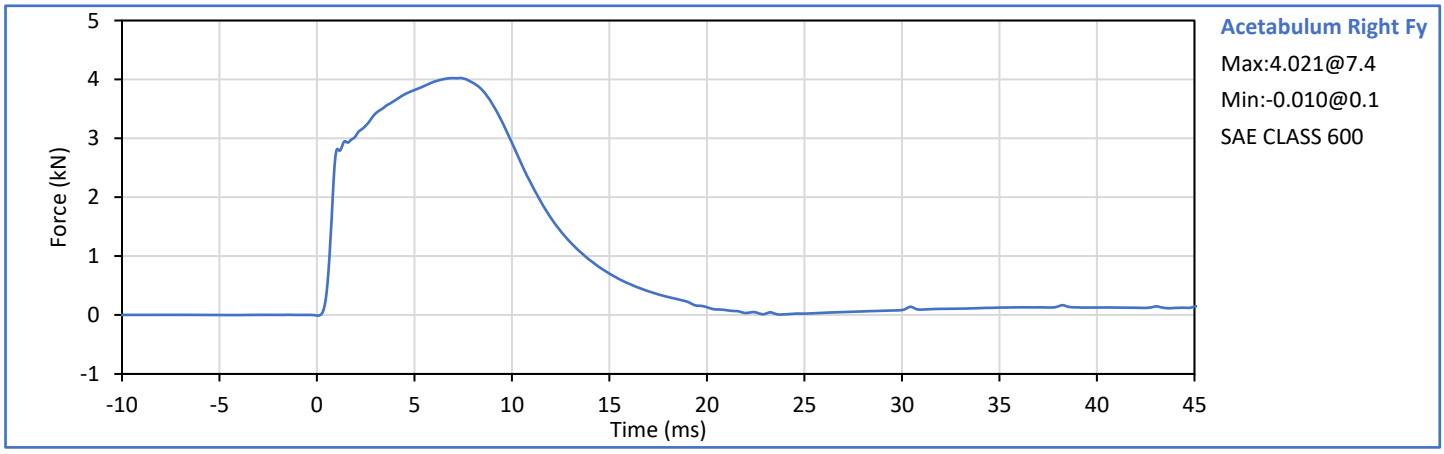
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308 Test Date: 2022-10-24

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	30	Pass
Impactor Velocity	m/s	6.60	6.80	6.69	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.02	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.7	Pass
Peak Impactor Ax	g	-47.0	-38.0	-45.3	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 13659





Technician: G. Fuentes

Approved By: J. Hernandez

ATD Serial No.: 308 Test Date: 2022-10-25

Pelvis Plug S/N: 13659

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13659
Test Number 11307
Report Number 11345
Test Date 9/26/2019 12:20:41 PM

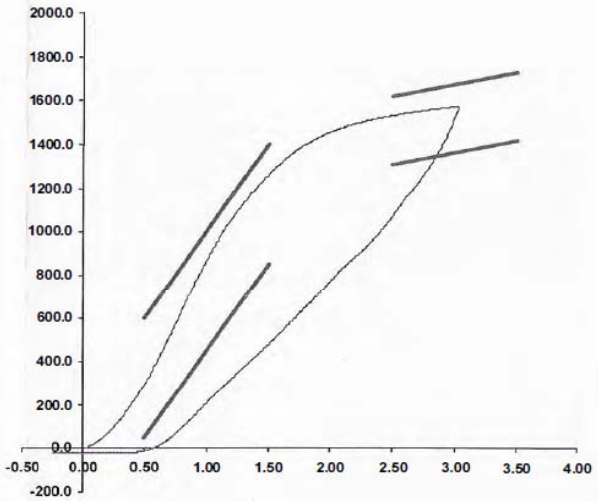
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	302.06	50.00	600.00
Force @ 1.5 mm (N)	1,265.90	850.00	1,400.00
Force @ 2.5 mm (N)	1,532.26	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,573.62	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS 1000

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 26-Sep-19
SACO Research

By : DC Date : 9/26/2019

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

Applus IDIADA KARCO

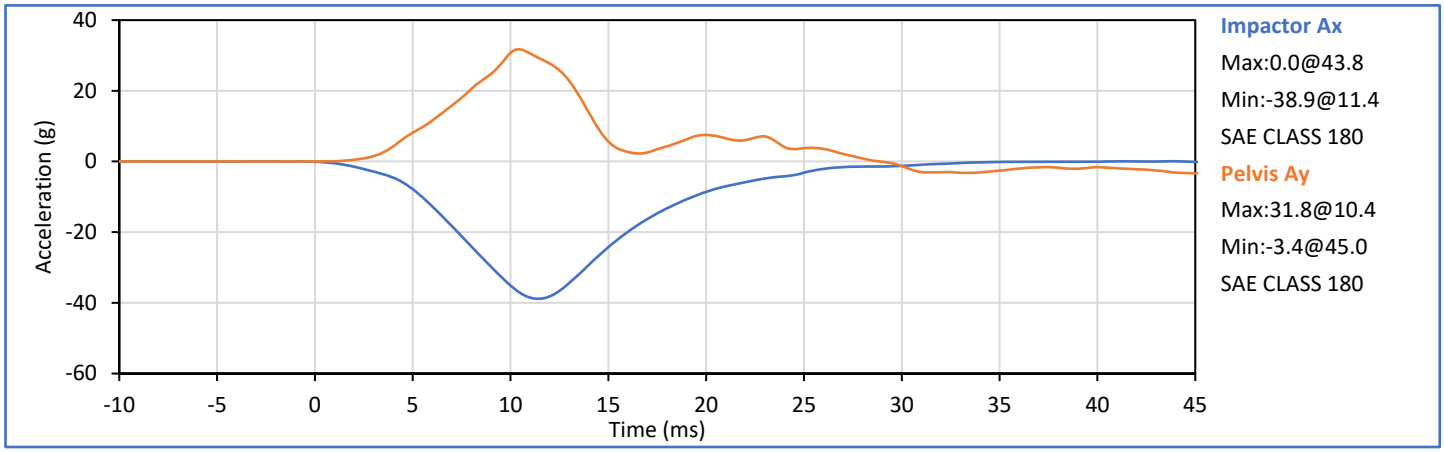
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

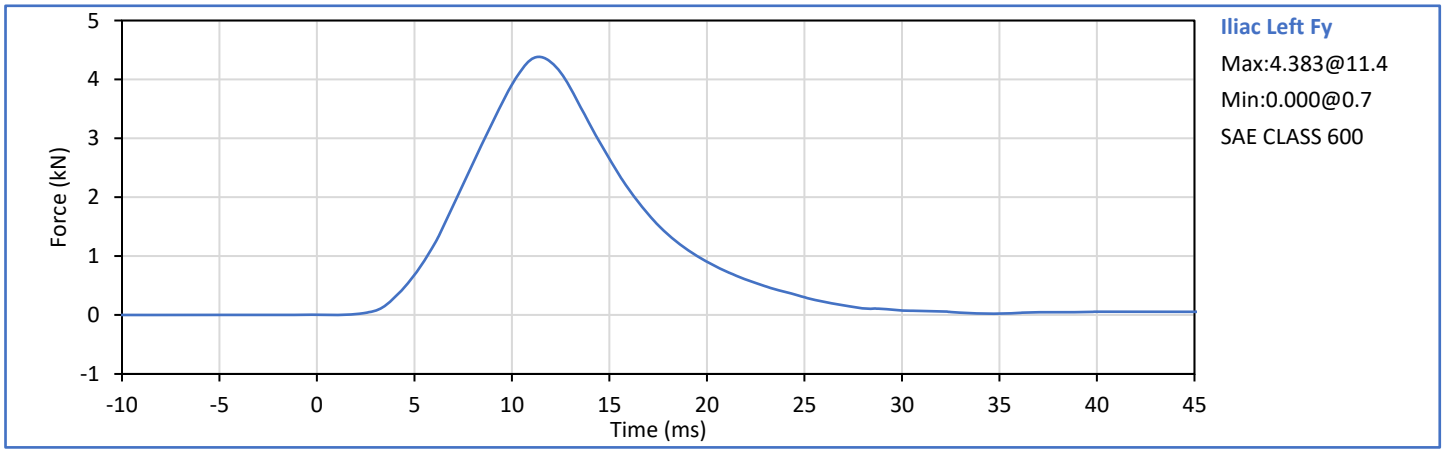
ATD Serial No.: 308 Test Date: 2022-10-25

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	28	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.38	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-38.9	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: 2022-10-31

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	29	Pass
1 - Sitting Height	mm	900	918	909	Pass
2 - Seat to Shoulder Joint	mm	558	572	563	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	349	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	101	Pass
5 - Sole to Seat, Sitting	mm	433	451	439	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	469	Pass
8 - Thorax Width	mm	322	332	326	Pass
9 - Abdomen Width	mm	273	287	280	Pass
10 - Pelvis Lap Width	mm	359	373	368	Pass
11 - Head Depth	mm	196	206	200	Pass
12 - Thorax Depth	mm	262	272	269	Pass
13 - Abdomen Depth	mm	194	204	201	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	604	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

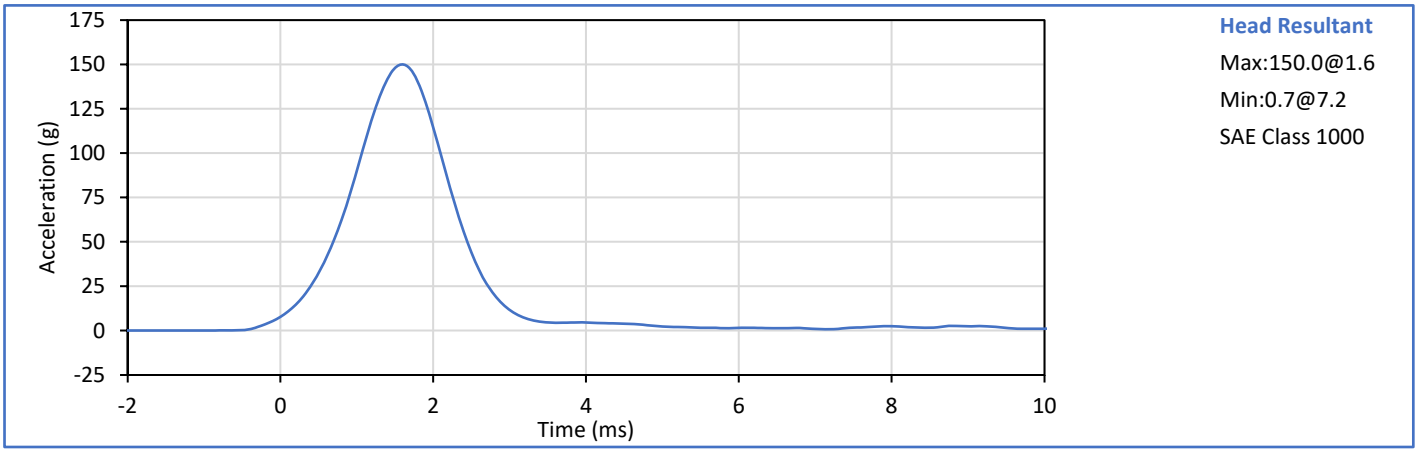
Approved By: J. Hernandez

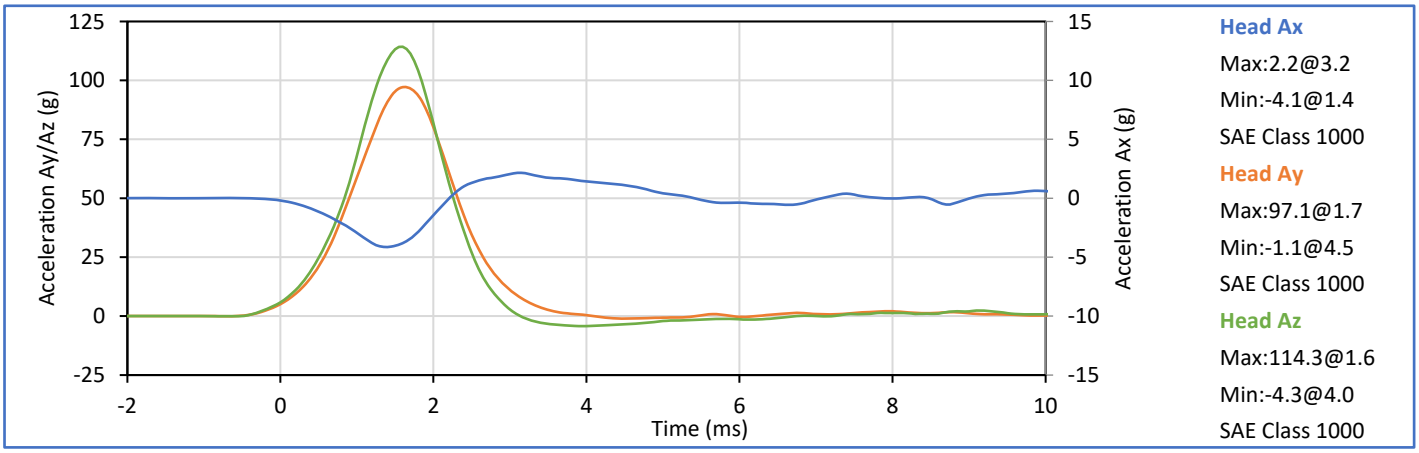
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-03

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.8	Pass
Laboratory Relative Humidity	%	10	70	32	Pass
Peak Resultant Acceleration	g	125.0	155.0	150.0	Pass
Peak Head Ax	g	-15.0	15.0	2.2	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

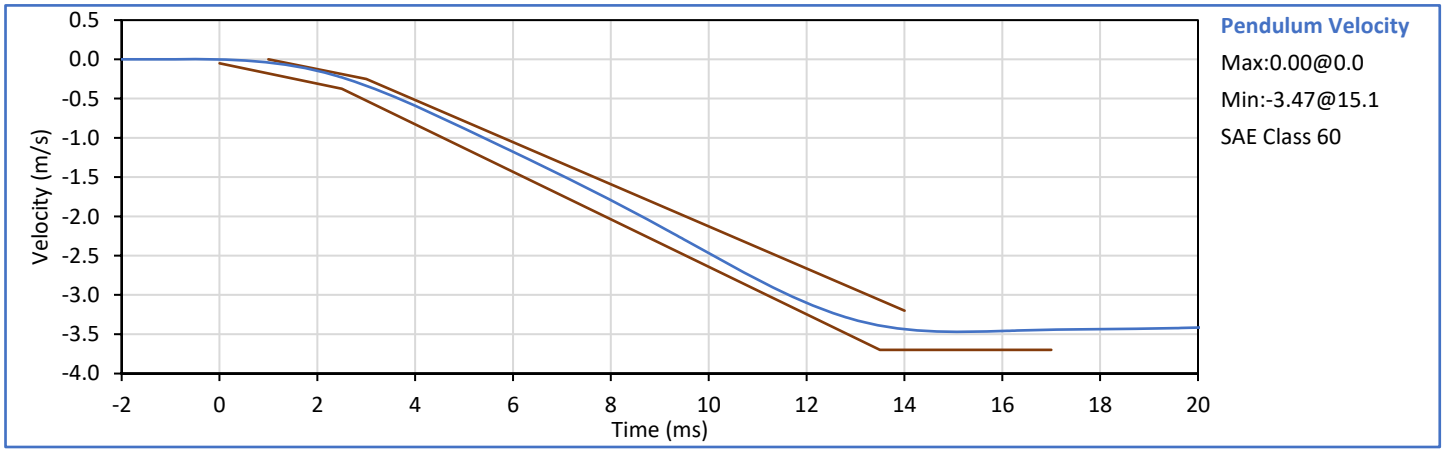
Approved By: J. Hernandez

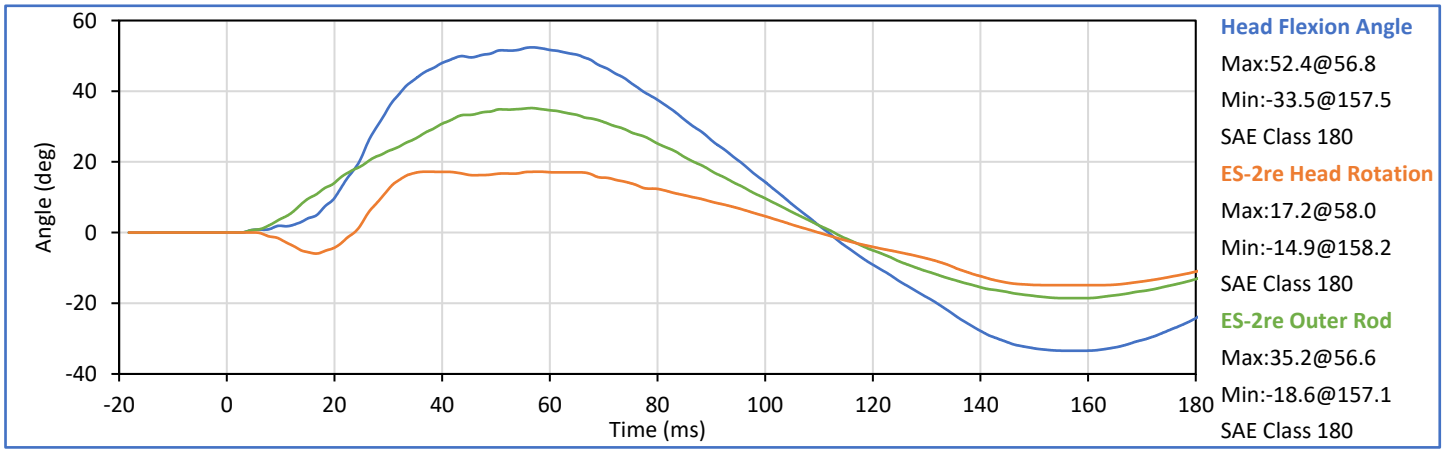
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-03

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Pendulum Velocity	m/s	3.30	3.50	3.44	Pass
Peak Headform Flexion	deg	49.0	59.0	52.4	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.8	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	55.0	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

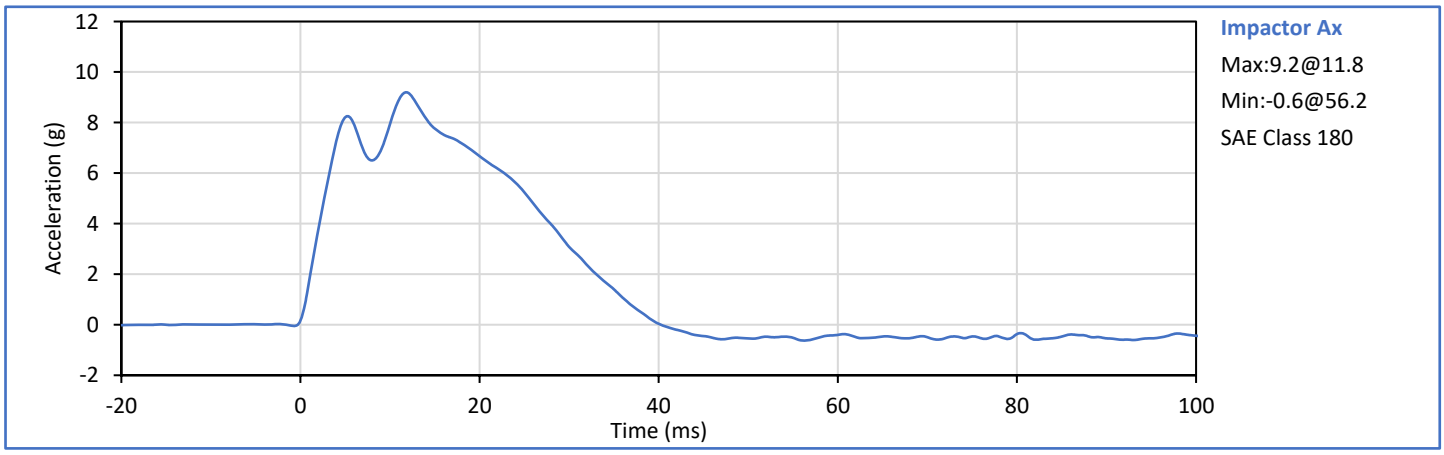
Approved By: J. Hernandez

Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-04

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	31	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Ax	g	7.5	10.5	9.2	Pass
			Overall Test Results		Pass



Technician: G. Fuentes

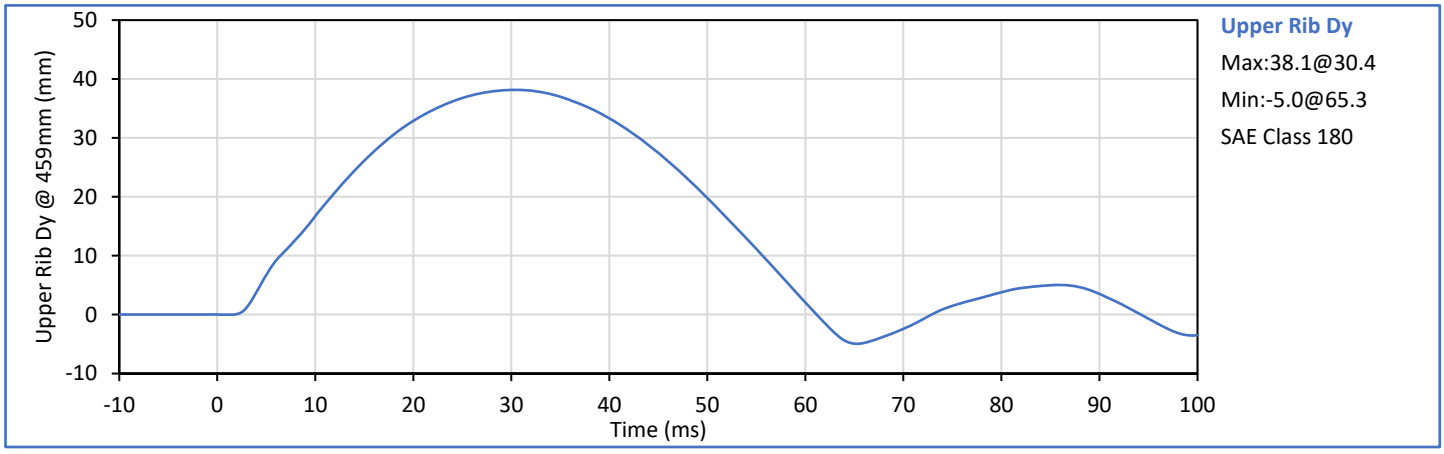
Approved By: J. Hernandez

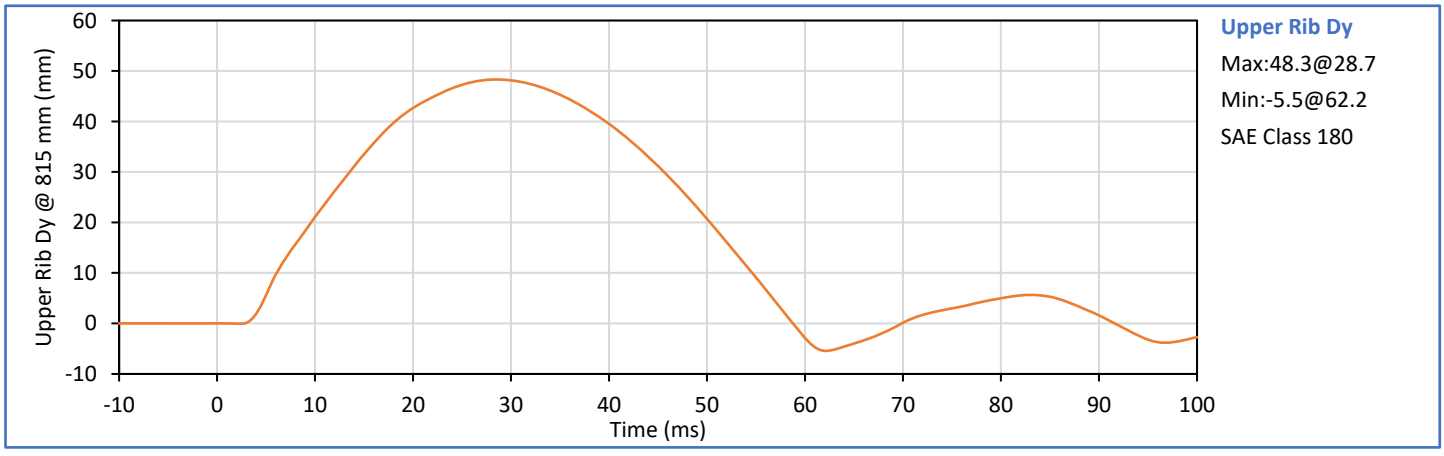
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-03

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
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.1	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.3	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

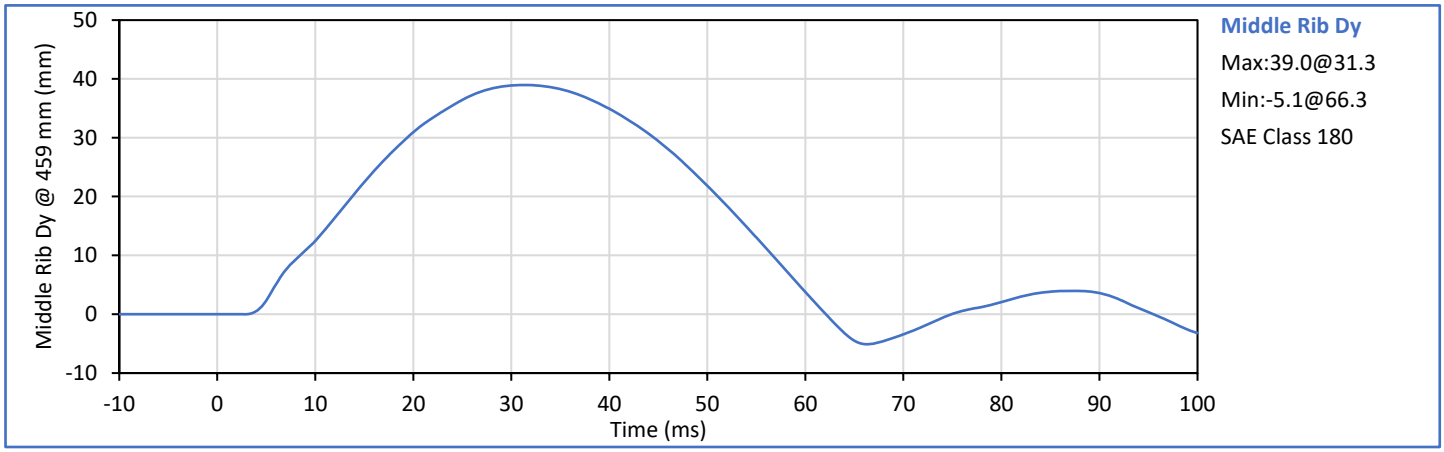
Approved By: J. Hernandez

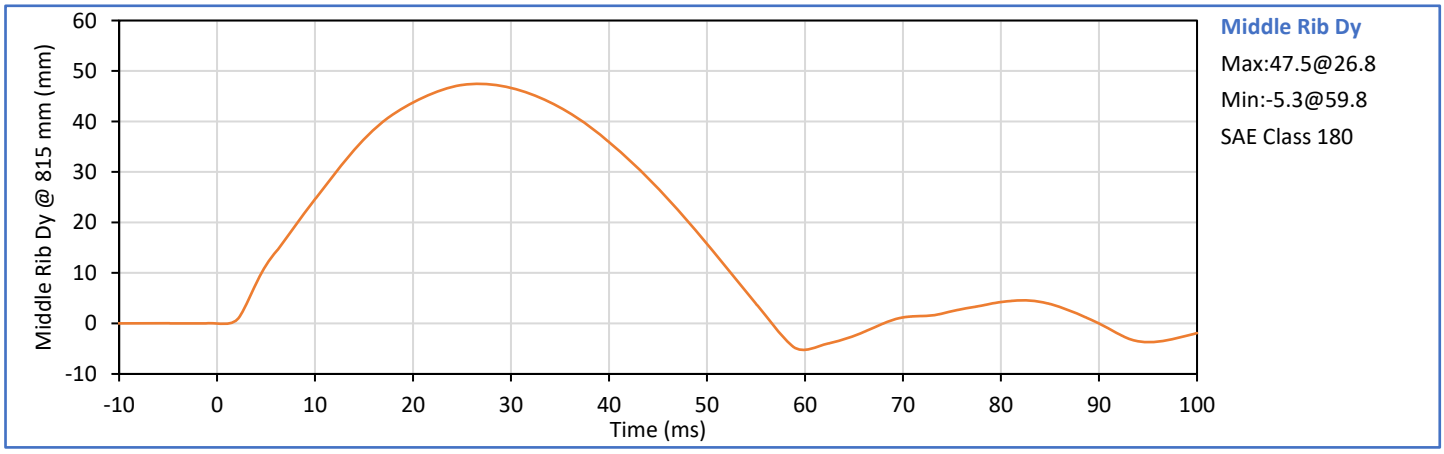
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-03

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
Middle Rib Dy @ 459mm	mm	36.0	40.0	39.0	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.5	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

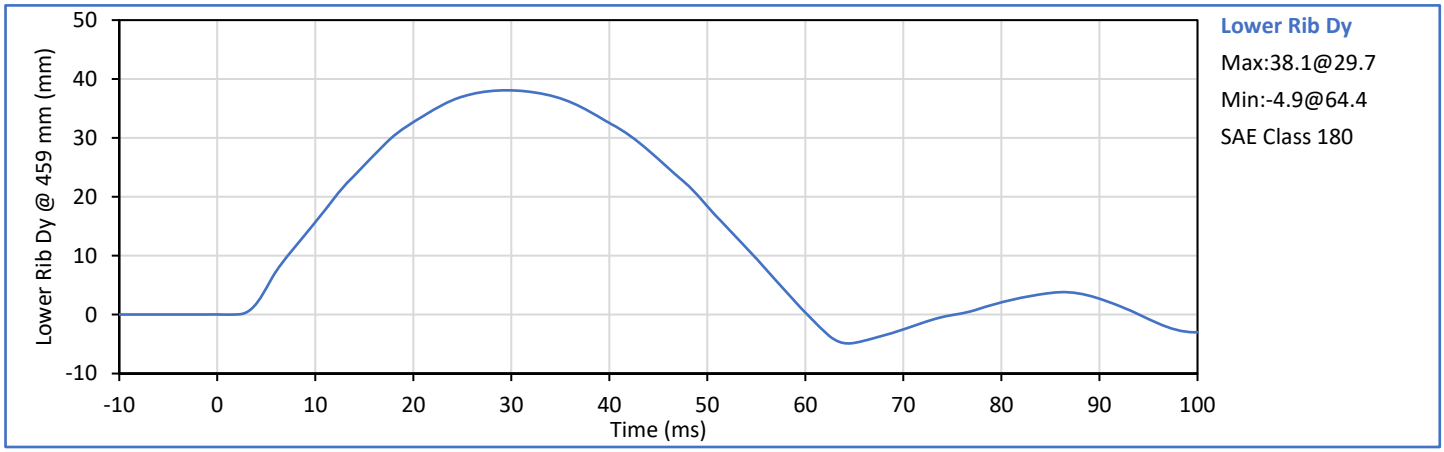
Applus IDIADA KARCO

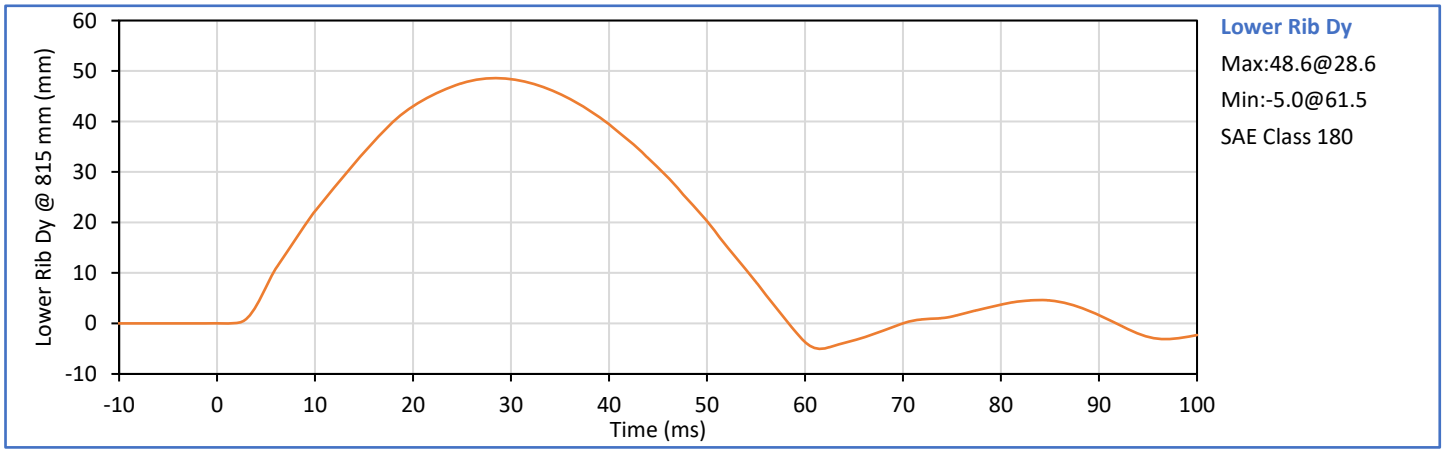
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2022-11-03

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	30	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	38.1	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	48.6	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

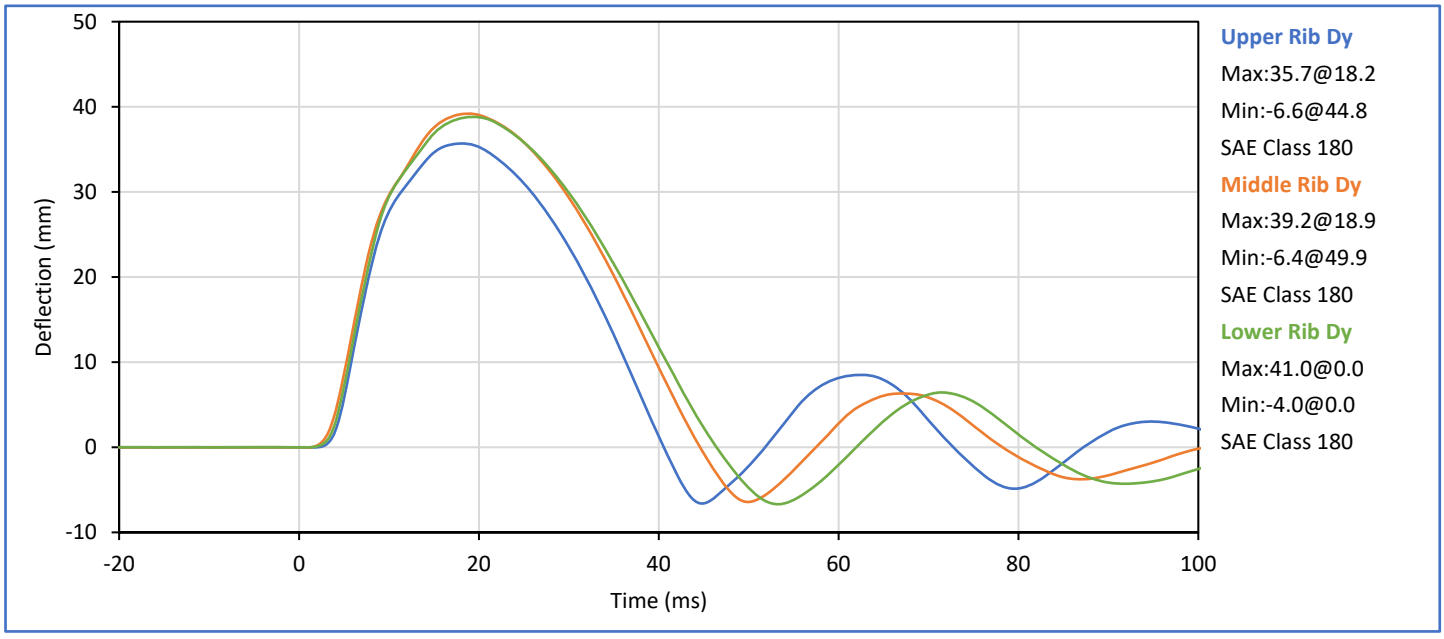
Approved By: J. Hernandez

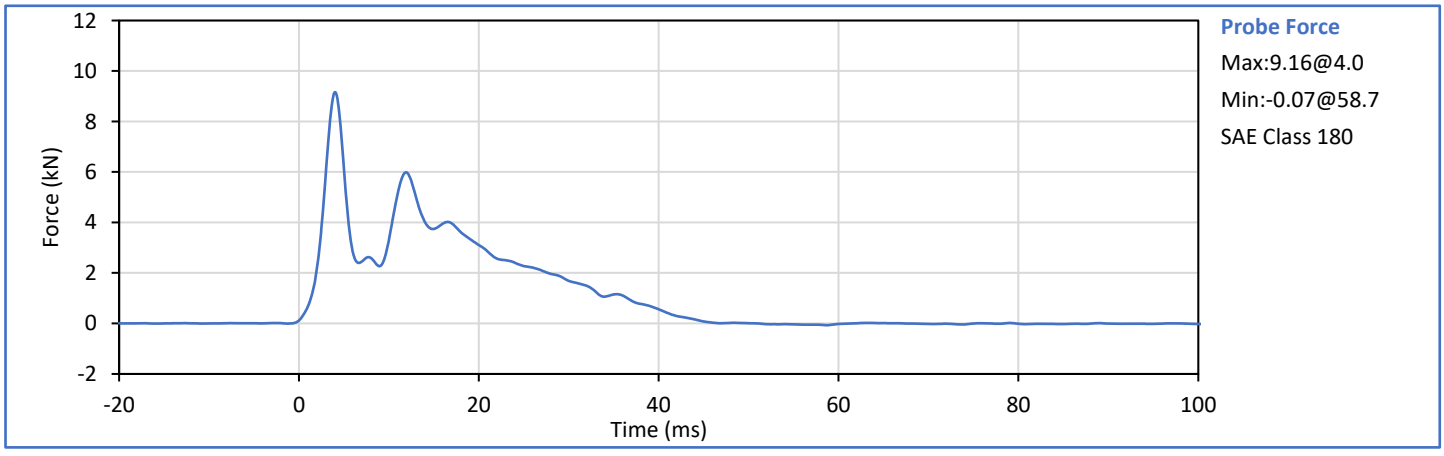
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-04

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
Impactor Velocity	m/s	5.40	5.60	5.57	Pass
Peak Upper Rib Dy	mm	34.0	41.0	35.7	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.2	Pass
Peak Lower Rib Dy	mm	37.0	44.0	38.8	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.98	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

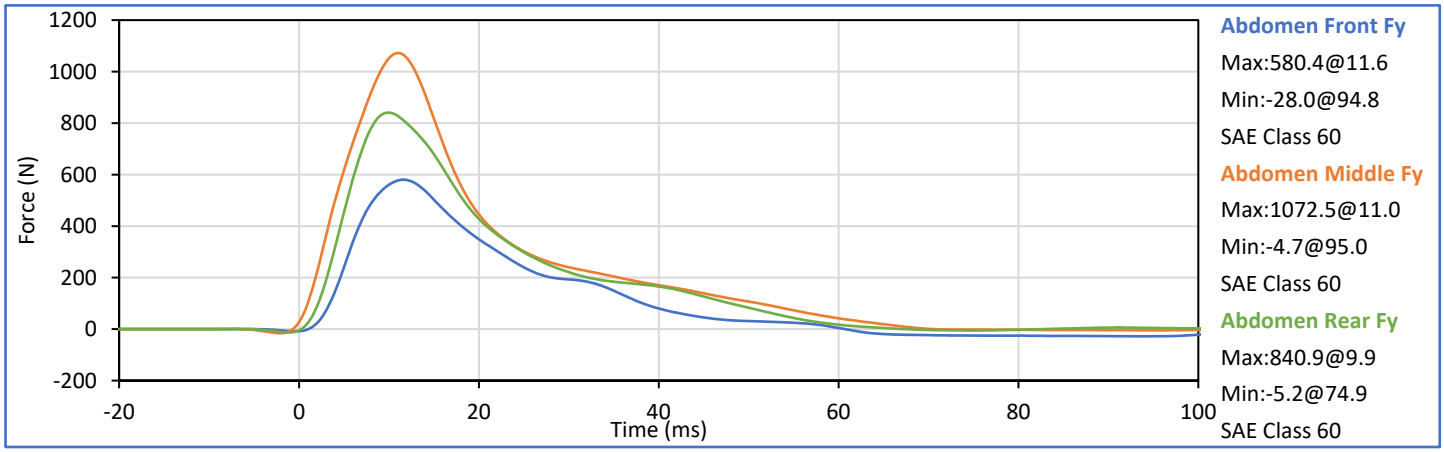
Approved By: J. Hernandez

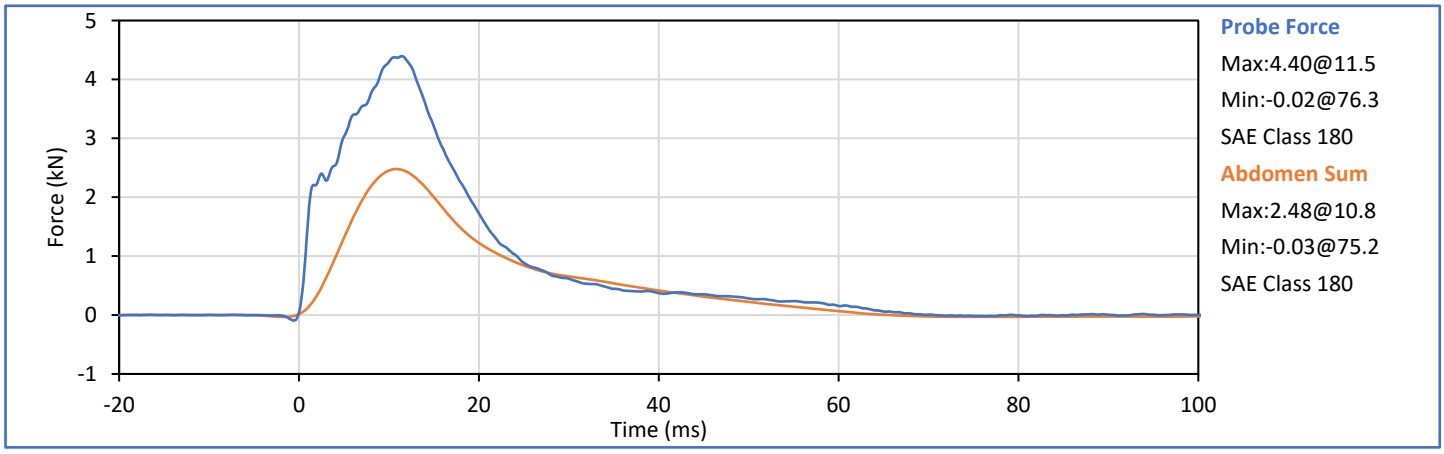
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-04

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	3.90	4.10	4.01	Pass
Peak Impactor Force	kN	4.00	4.80	4.40	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.5	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.48	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.8	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

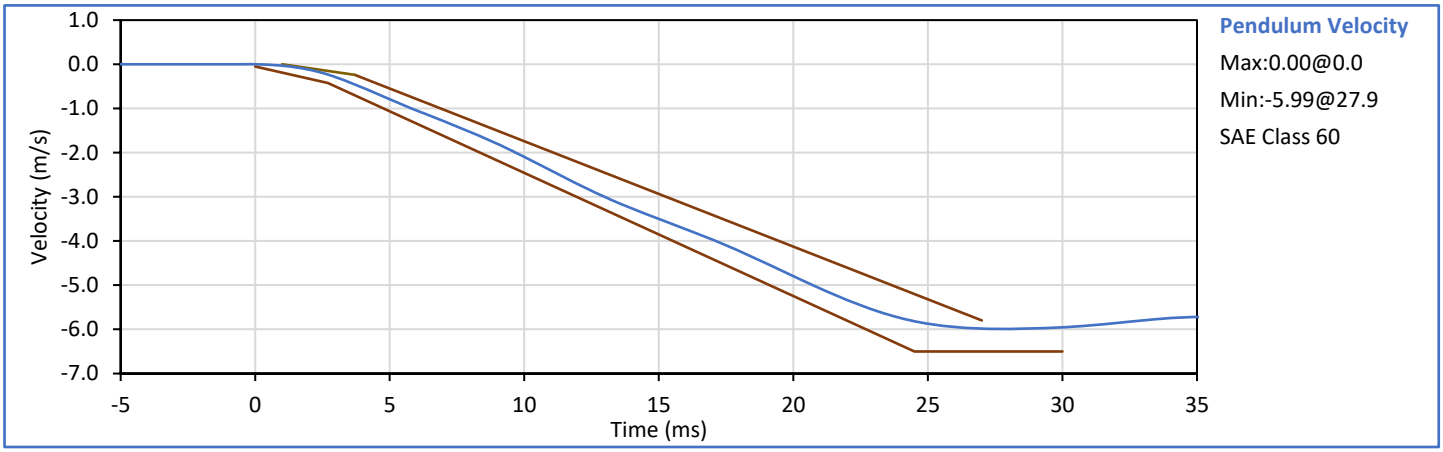
Approved By: J. Hernandez

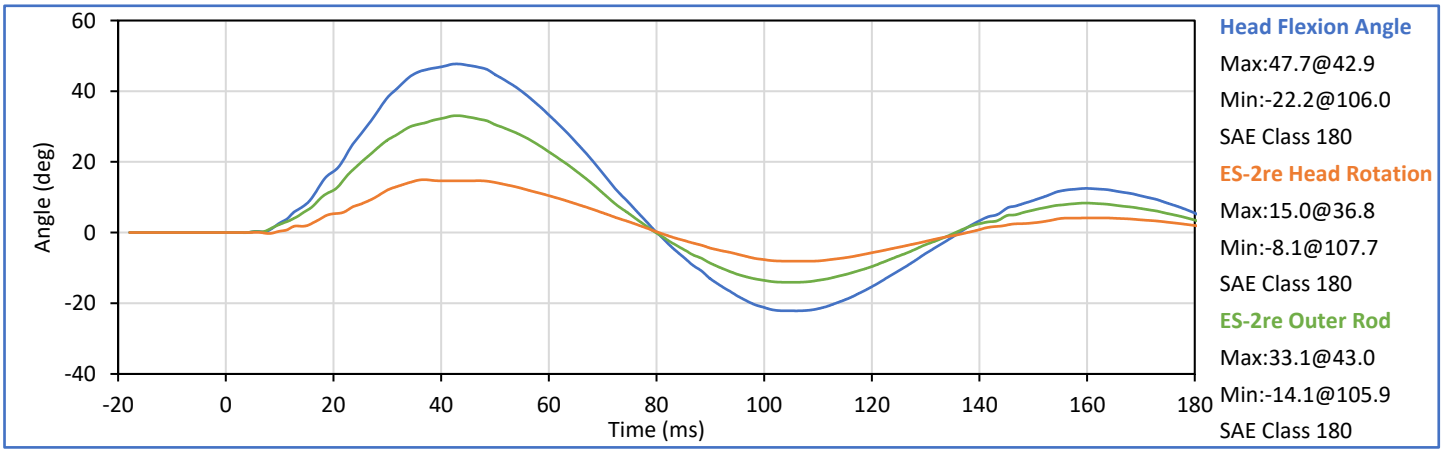
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-04

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Pendulum Velocity	m/s	5.95	6.15	6.13	Pass
Peak Headform Flexion	deg	45.0	55.0	47.7	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	42.9	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	37.2	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

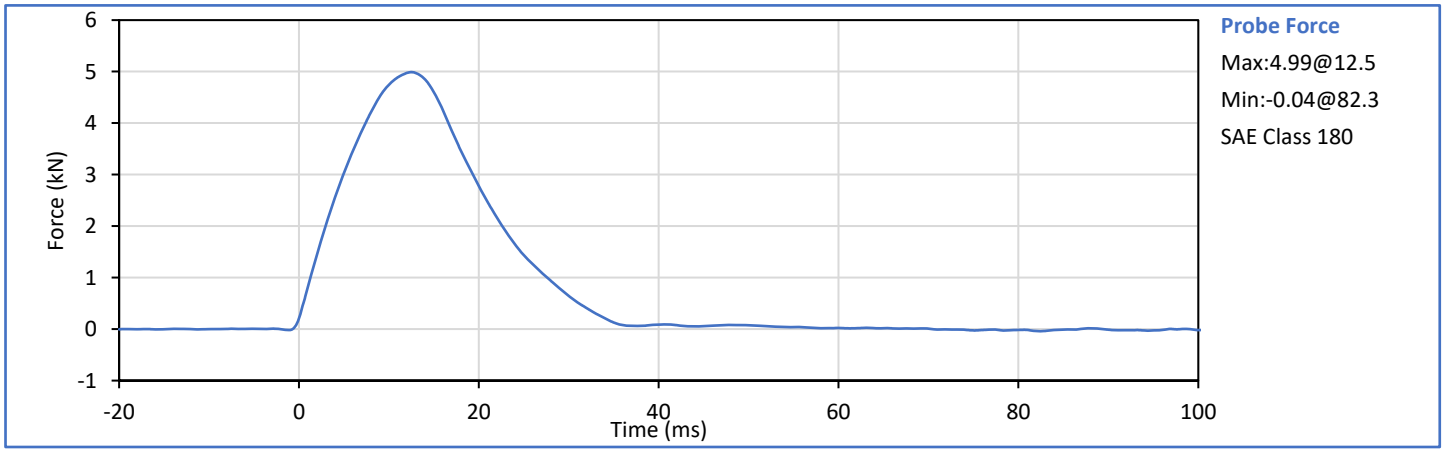
Approved By: J. Hernandez

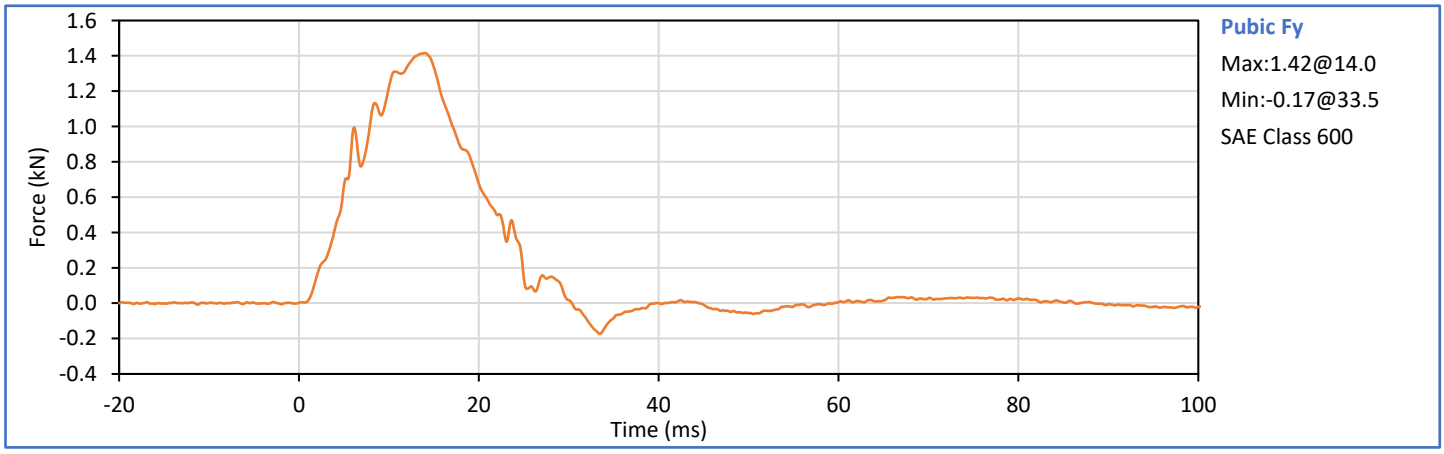
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2022-11-03

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Impactor Force	kN	4.70	5.40	4.99	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.5	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.42	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.0	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: 308

Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 308 Test Date: 2022-10-31

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
A - Sitting Height	mm	772	788	776	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	86	Pass
D - H Point From Seatback	mm	141	151	146	Pass
E - Shoulder Pivot From Backline	mm	97	107	104	Pass
F - Thigh Clearance	mm	119	135	130	Pass
G - Head Breadth	mm	140	148	144	Pass
H - Head Back From Backline	mm	40	46	43	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	527	Pass
L - Popliteal Height	mm	343	369	350	Pass
K - Knee Pivot To Floor Height	mm	392	409	398	Pass
N - Buttock Popliteal Length	mm	416	442	427	Pass
O - Chest Depth W/O Jacket	mm	195	211	203	Pass
P - Foot Length	mm	216	232	225	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	319	Pass
R - Arm Length	mm	249	259	254	Pass
S - Knee Joint To Seatback	mm	477	493	486	Pass
V - Shoulder Width	mm	341	357	353	Pass
W - Foot Width	mm	78	94	84	Pass
Y - Chest Circumference W/Jacket	mm	851	881	860	Pass
Z - Waist Circumference	mm	761	791	776	Pass
			Overall Test Results		Pass

Technician: G. Fuentes

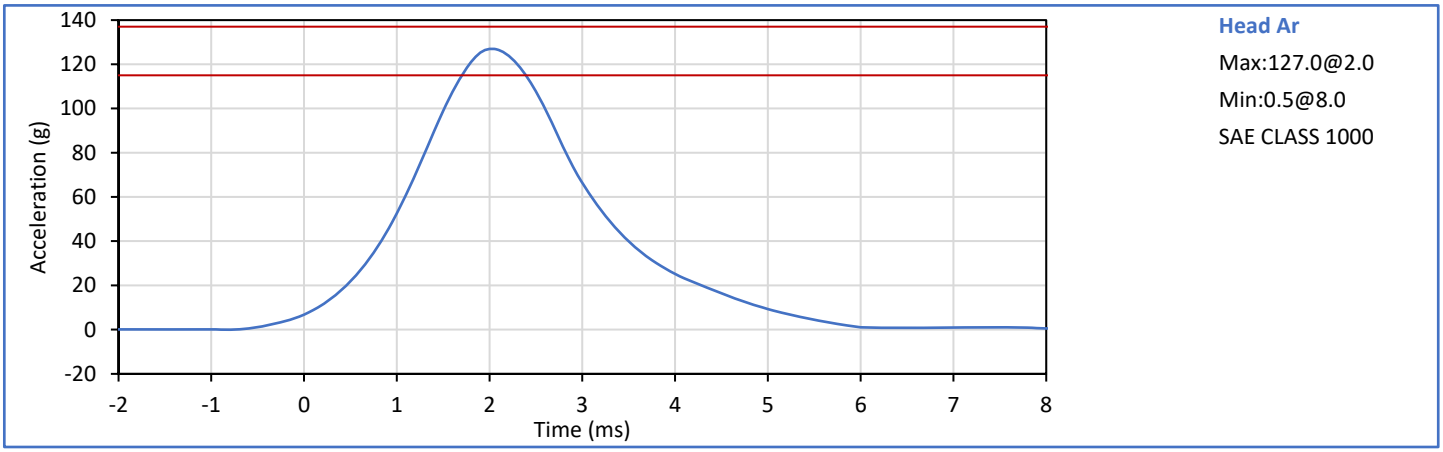
Approved By: J. Hernandez

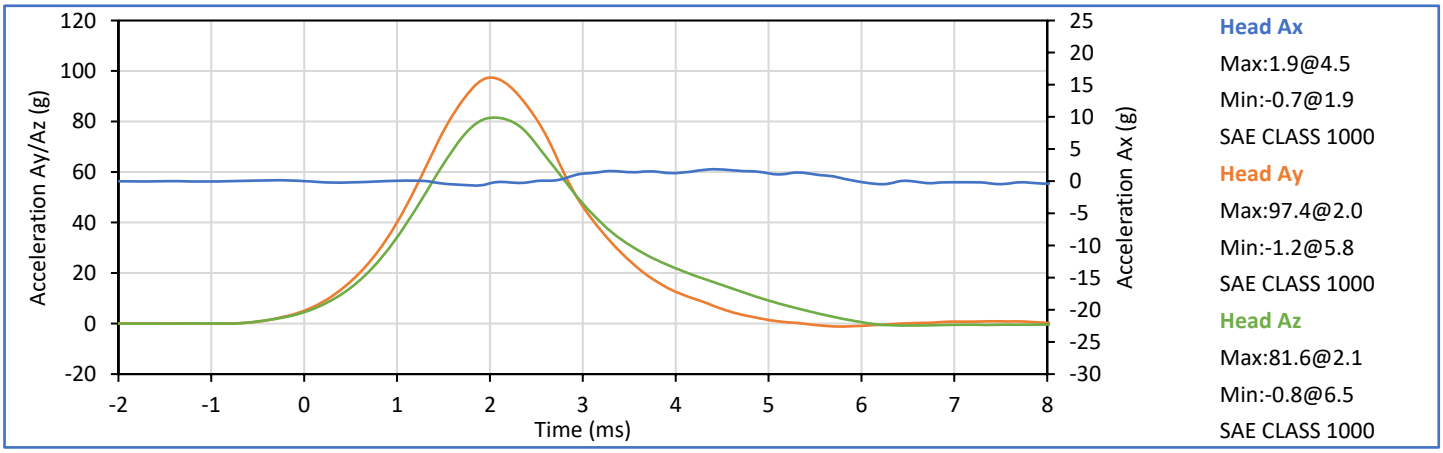
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 308 Test Date: 2022-11-03

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	30	Pass
Peak Resultant Acceleration	g	115.0	137.0	127.0	Pass
Peak Head Ax	g	-15.0	15.0	1.9	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

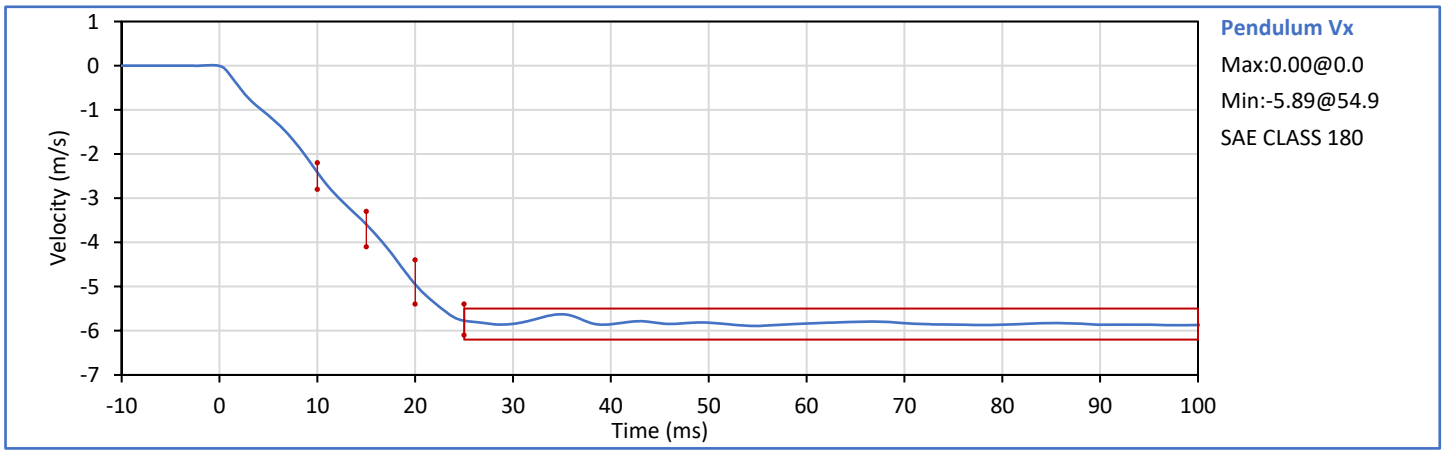
Approved By: J. Hernandez

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2022-11-03

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	31	Pass
Pendulum Velocity	m/s	5.51	5.63	5.57	Pass
Pendulum Decel at 10 ms	m/s	-2.80	-2.20	-2.41	Pass
Pendulum Decel at 15 ms	m/s	-4.10	-3.30	-3.59	Pass
Pendulum Decel at 20 ms	m/s	-5.40	-4.40	-4.95	Pass
Pendulum Decel at 25 ms	m/s	-6.10	-5.40	-5.78	Pass
Pendulum Decel from 25-100 ms	m/s	-6.20	-5.50	-5.89/-5.63	Pass
Peak "D" Plane Rotation	deg	-81.0	-71.0	-76.4	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	62.5	Pass
Peak Occ. Condyle Moment	Nm	36.0	44.0	39.0	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	114.1	Pass
			Overall Test Results		Pass



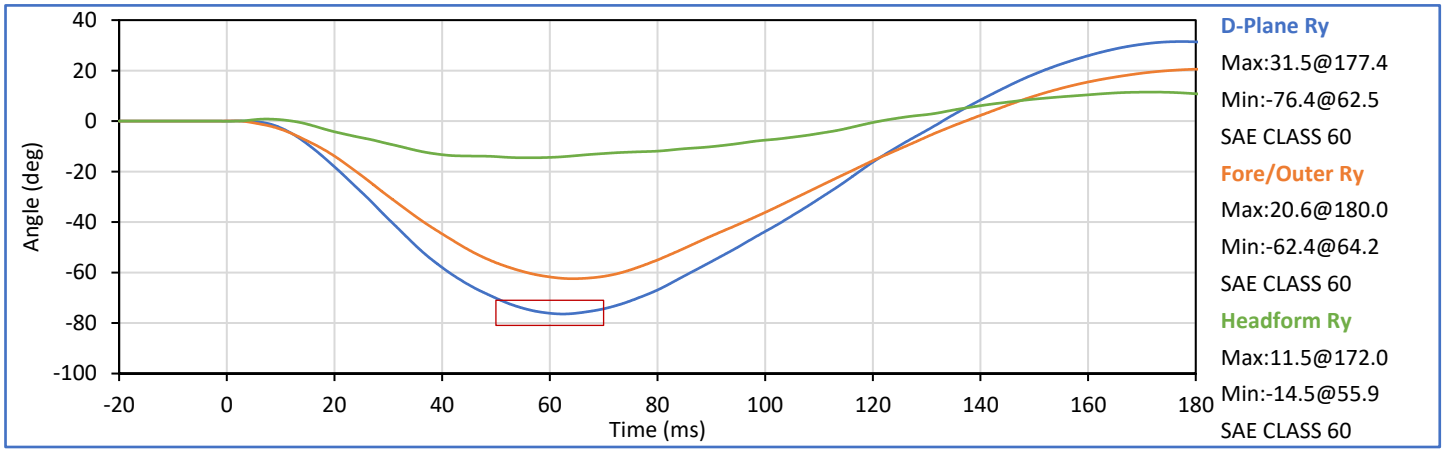
Technician: G. Fuentes

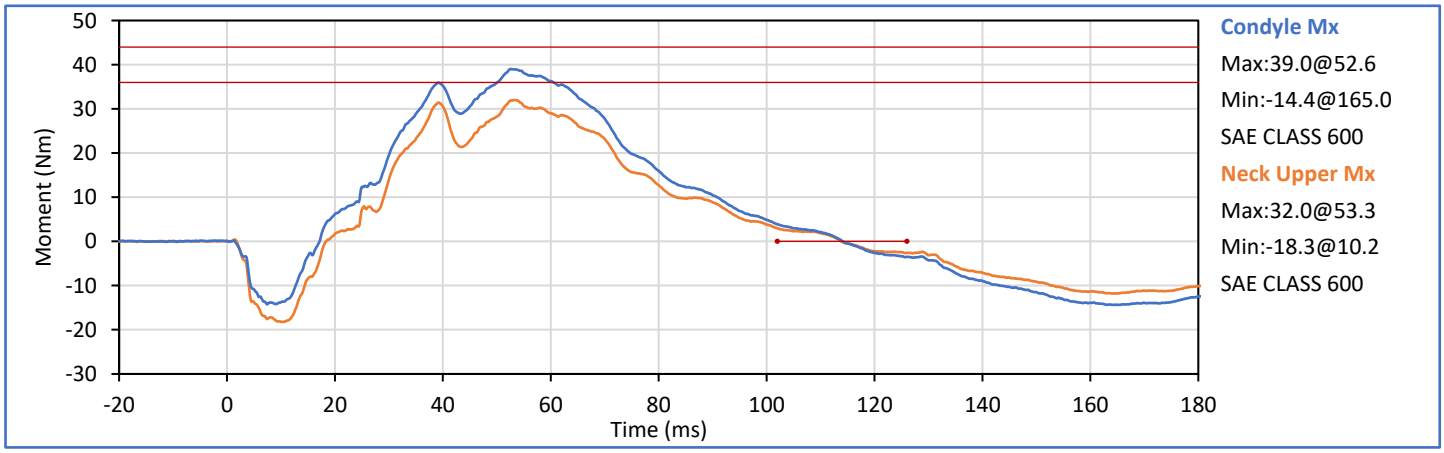
Approved By: J. Hernandez

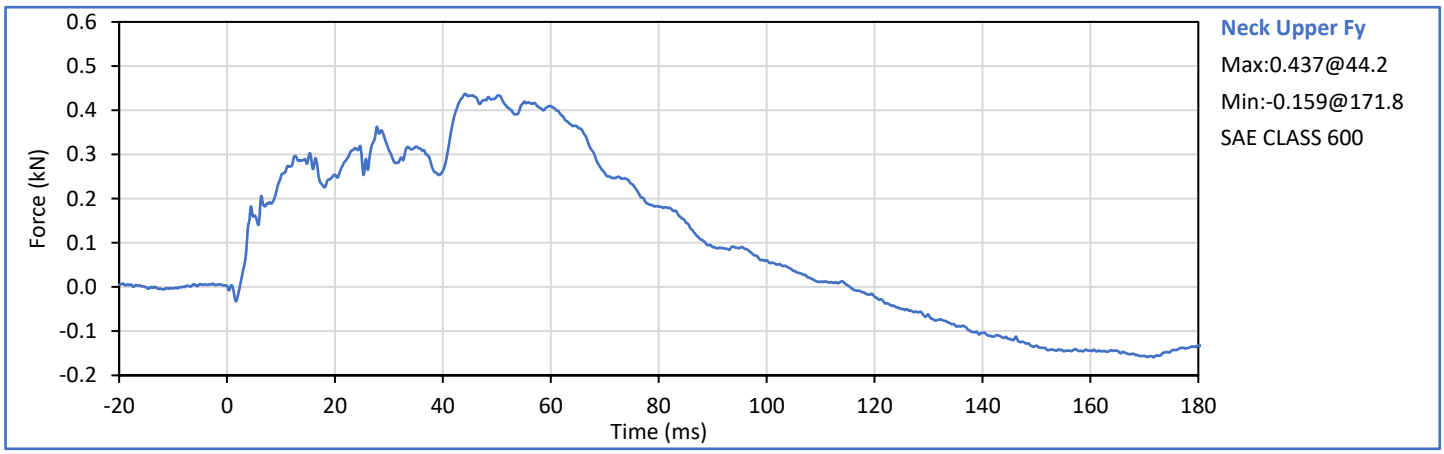
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2022-11-03





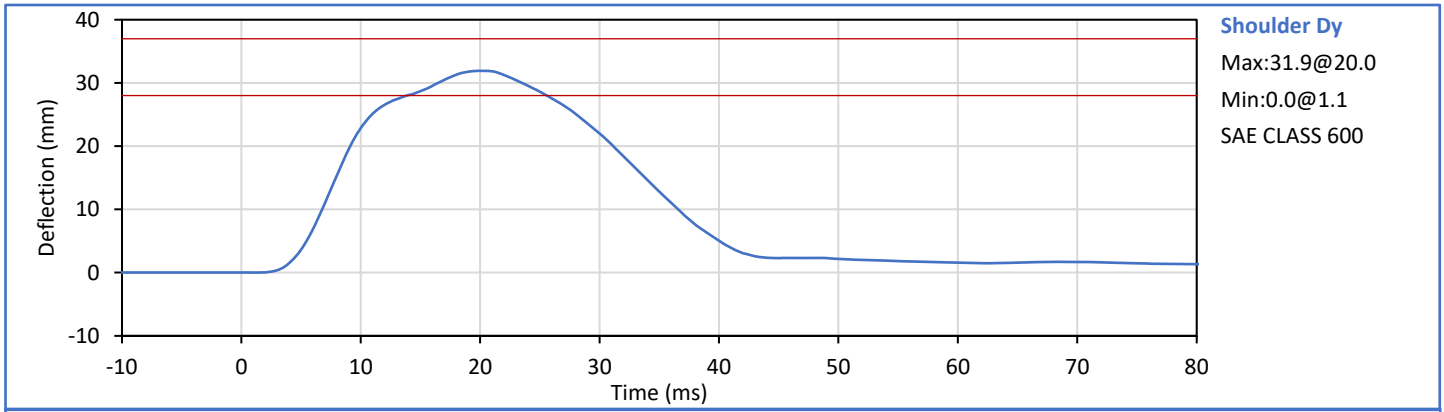


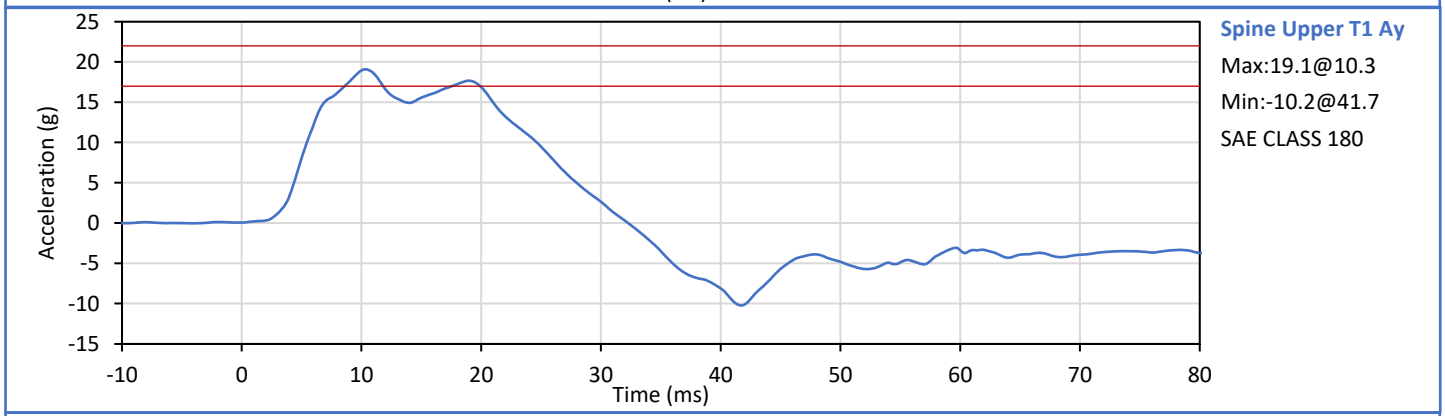
Applus IDIADA KARCO

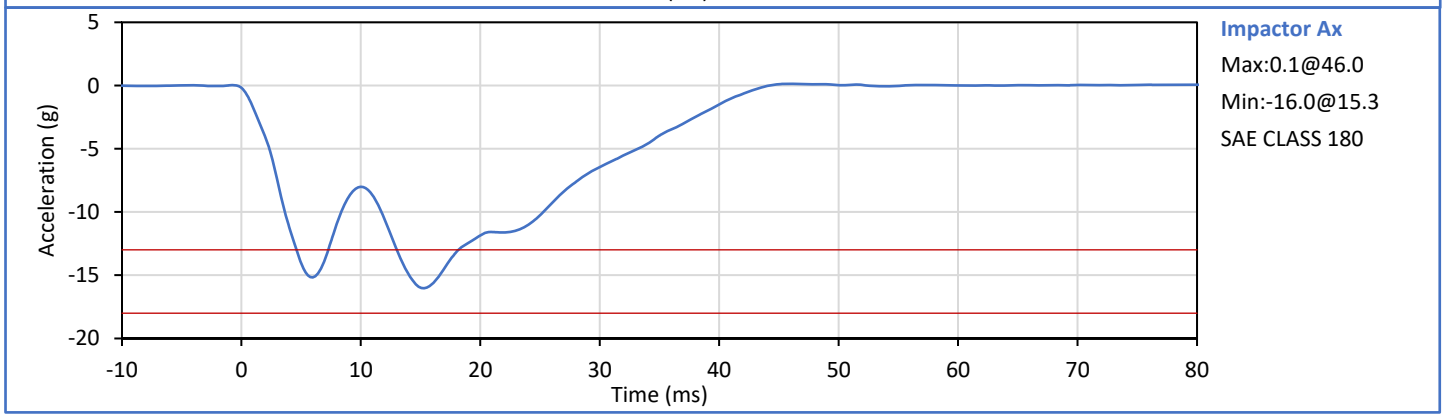
SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 308 Test Date: 2022-11-02

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 Shoulder Dy	mm	28.0	37.0	31.9	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.1	Pass
Peak Impactor Ax	g	-18.0	-13.0	-16.0	Pass
			Overall Test Results		Pass







Technician: G. Fuentes

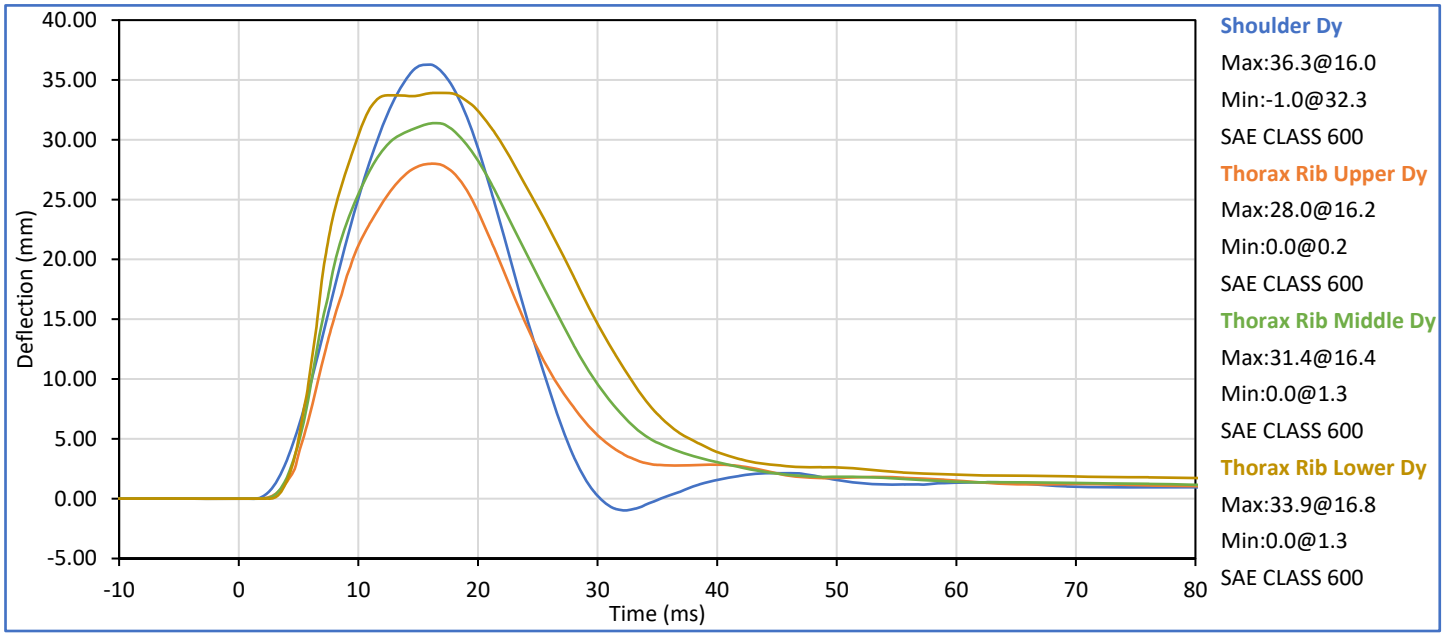
Approved By: J. Hernandez

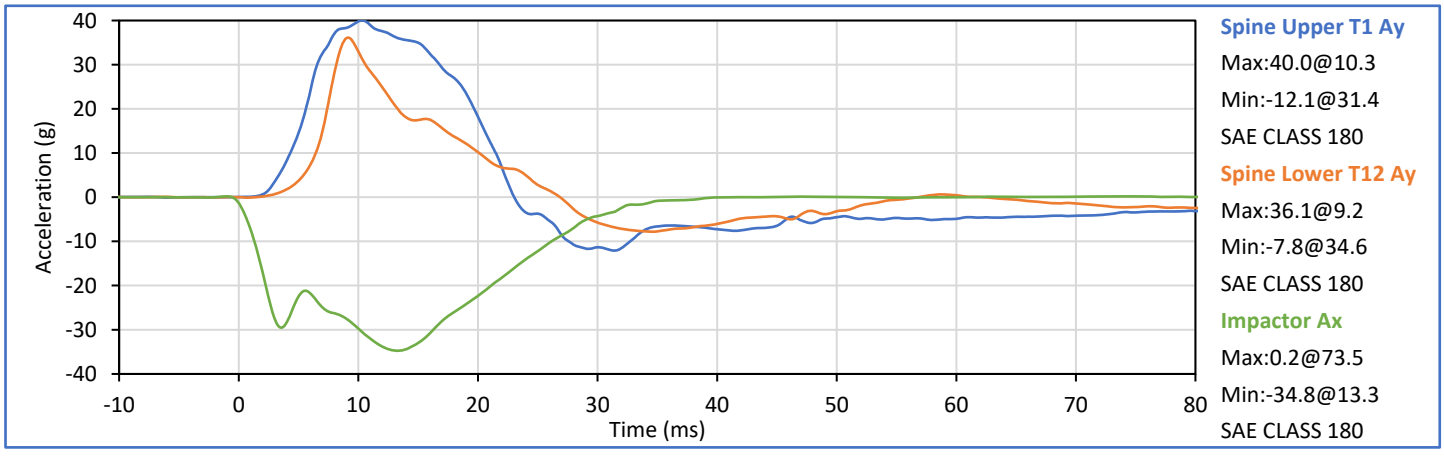
Applus IDIADA KARCO

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

ATD Serial No.: 308 Test Date: 2022-11-02

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	29	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Shoulder Dy	mm	31.0	40.0	36.3	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.4	Pass
Peak Lower Rib Dy	mm	32.0	38.0	33.9	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	40.0	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	36.1	Pass
Peak Impactor Ax	g	-36.0	-30.0	-34.8	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

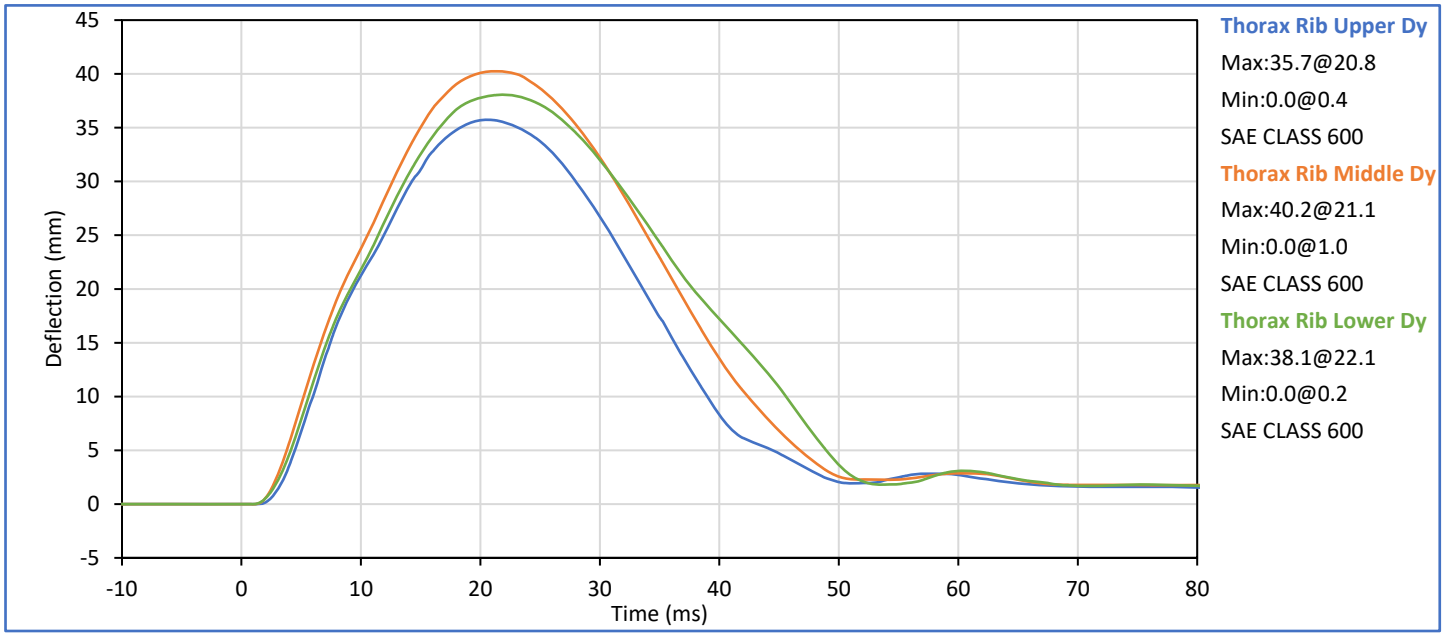
Approved By: J. Hernandez

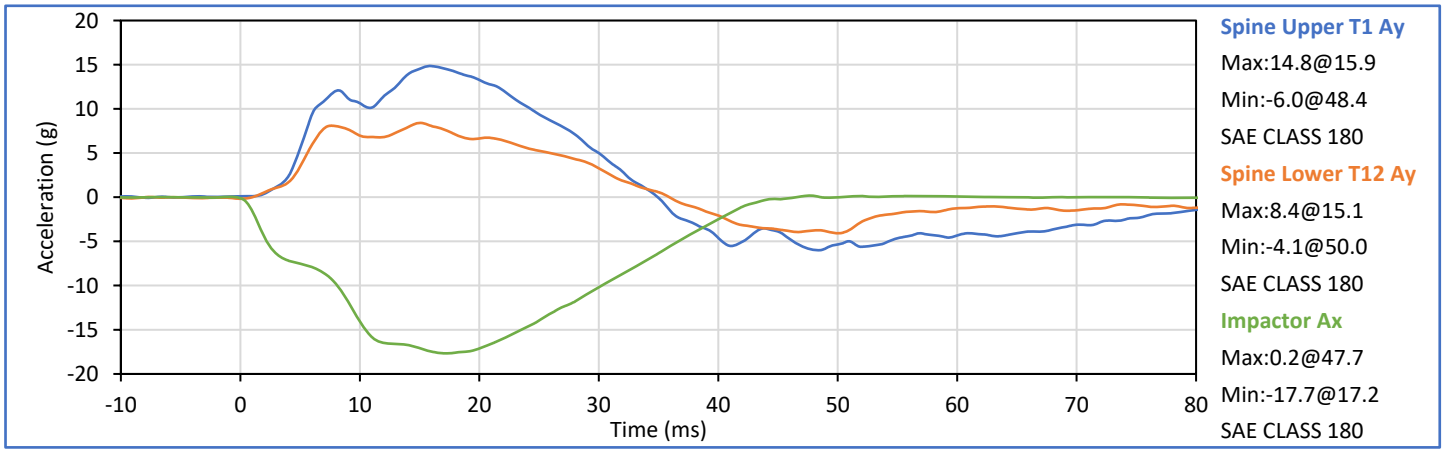
Applus IDIADA KARCO

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

ATD Serial No.: 308 Test Date: 2022-11-02

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	43	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Thorax Rib Upper Dy	mm	32.0	40.0	35.7	Pass
Peak Thorax Rib Middle Dy	mm	39.0	45.0	40.2	Pass
Peak Thorax Rib Lower Dy	mm	35.0	43.0	38.1	Pass
Peak Spine Upper T1 Ay	g	13.0	17.0	14.8	Pass
Peak Spine Lower T12 Ay	g	7.0	11.0	8.4	Pass
Peak Impactor Ax	g	-18.0	-14.0	-17.7	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

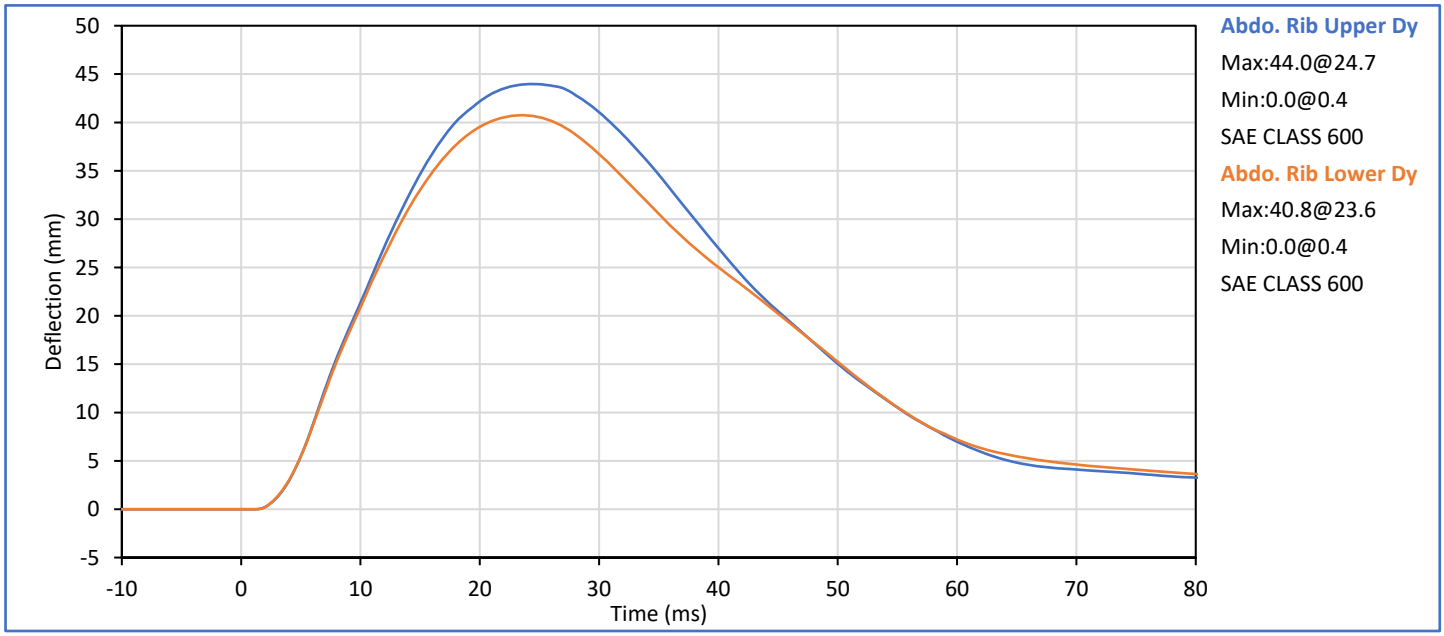
Approved By: J. Hernandez

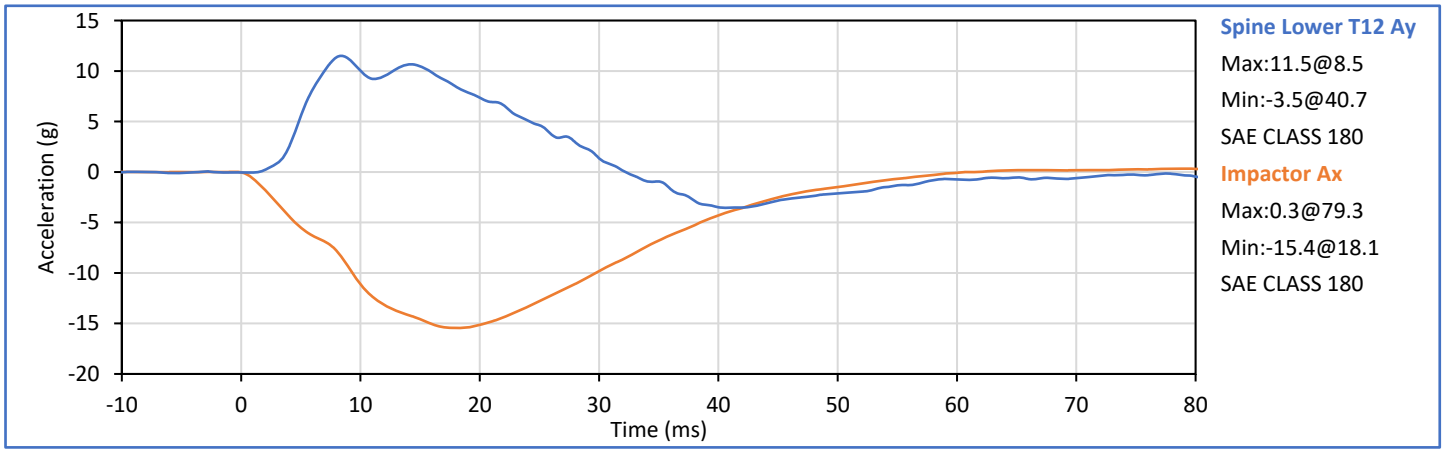
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 308 Test Date: 2022-11-02

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
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	44.0	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	40.8	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	11.5	Pass
Peak Impactor Ax	g	-16.0	-12.0	-15.4	Pass
			Overall Test Results		Pass





Technician: G. Fuentes

Approved By: J. Hernandez

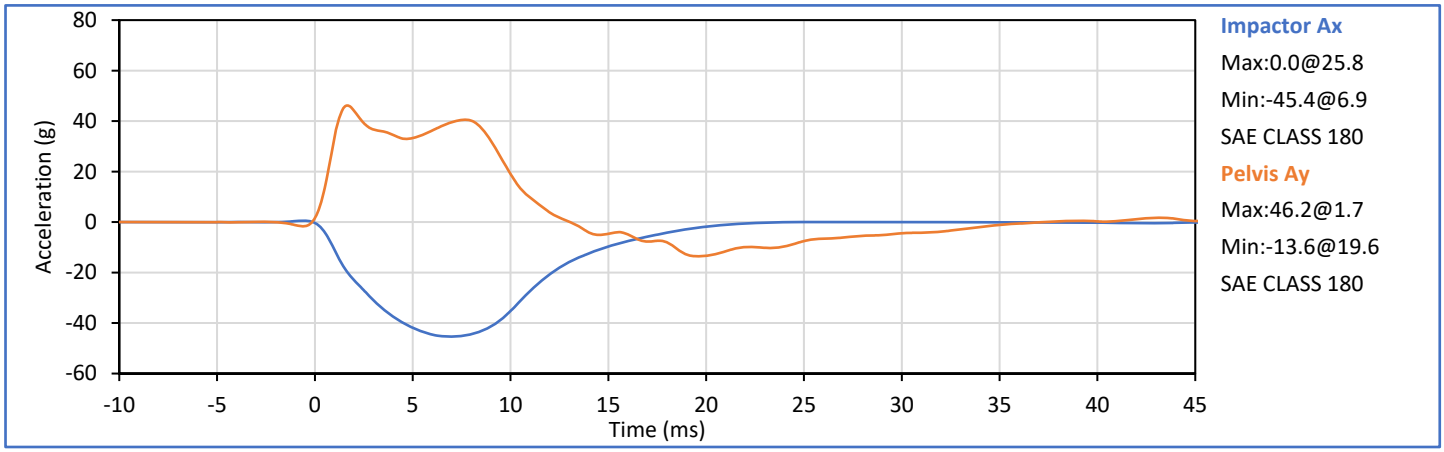
Applus IDIADA KARCO

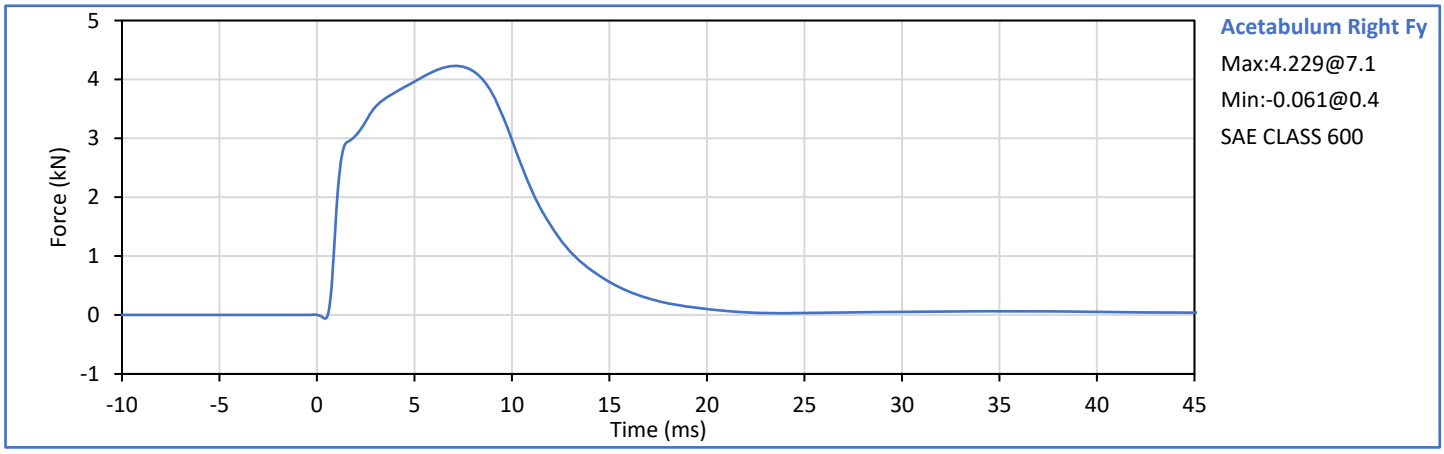
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308 Test Date: 2022-11-02

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	6.60	6.80	6.70	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.23	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.5	Pass
Peak Impactor Ax	g	-47.0	-38.0	-45.4	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 13698





Technician: G. Fuentes

Approved By: J. Hernandez

SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308 Test Date: 2022-11-02

Pelvis Plug S/N: 13698

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13698
Test Number 11346
Report Number 11384
Test Date 9/26/2019 1:55:22 PM

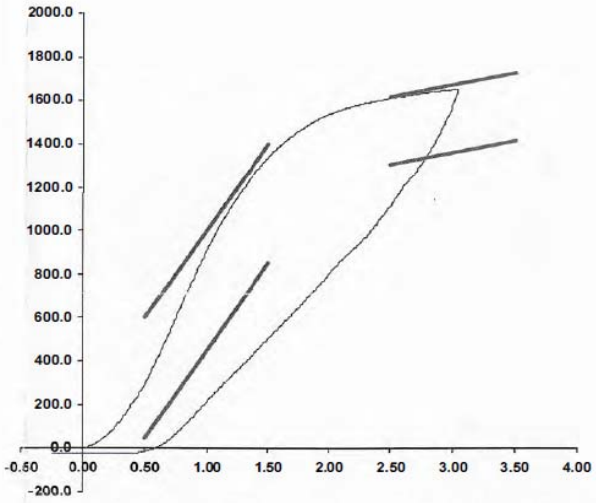
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	302.10	50.00	600.00
Force @ 1.5 mm (N)	1,342.25	850.00	1,400.00
Force @ 2.5 mm (N)	1,614.53	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,652.70	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS 1000

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 26-Sep-19
SACO Research

By : DC Date : 9/26/2019

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

Applus IDIADA KARCO

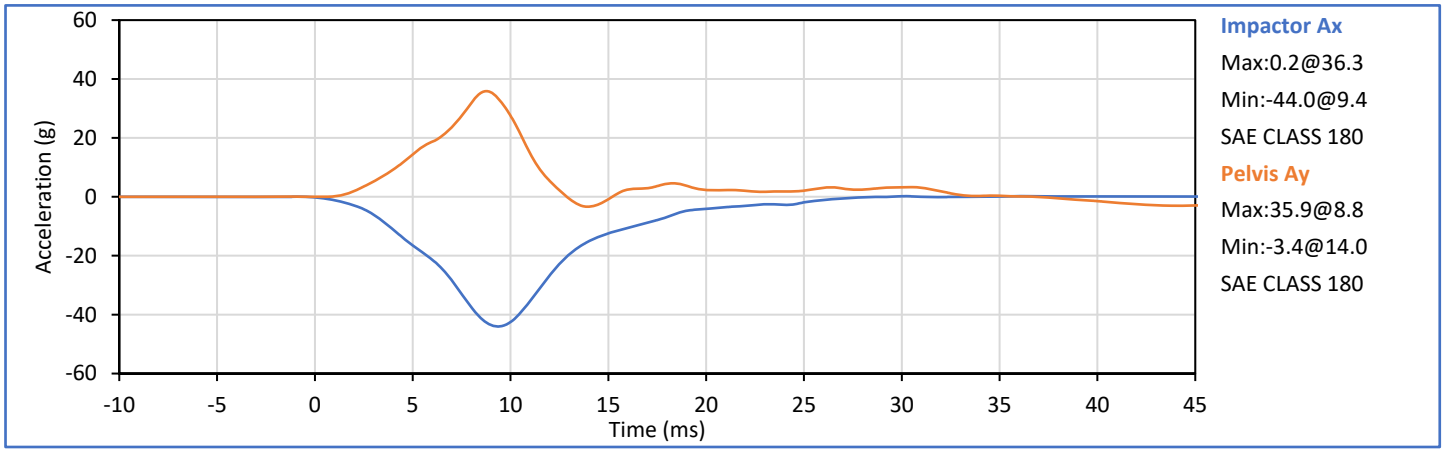
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

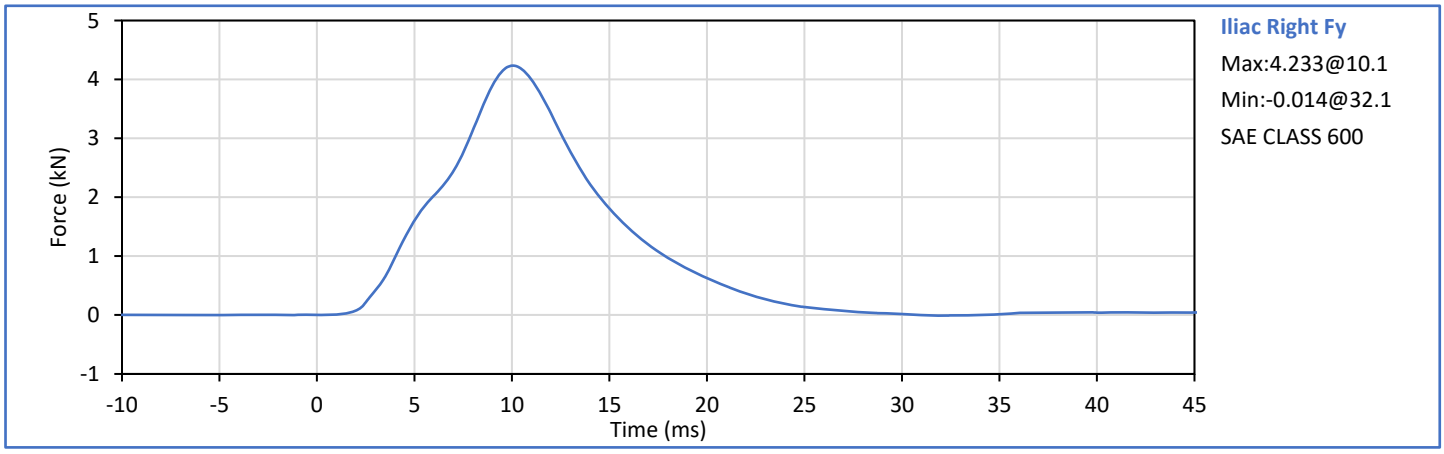
ATD Serial No.: 308 Test Date: 2022-11-02

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	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.23	Pass
Peak Pelvis Ay	g	28.0	39.0	34.7	Pass
Peak Impactor Ax	g	-45.0	-36.0	-44.0	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	2022-10-19
Head Acceleration Y Primary	P58865	Endevco	7264C-2k	2022-10-19
Head Acceleration Z Primary	P58867	Endevco	7264C-2k	2022-10-19
Head Acceleration X Redundant	P58859	Endevco	7264C-2k	2022-10-19
Head Acceleration Y Redundant	P58866	Endevco	7264C-2k	2022-10-19
Head Acceleration Z Redundant	P58873	Endevco	7264C-2k	2022-10-19
Upper Thorax Rib Deflection Y	209 (ES-2 Rib)	Honeywell	F38000203	2022-10-18
Middle Thorax Rib Deflection Y	210 (ES-2 Rib)	Honeywell	F38000203	2022-10-18
Lower Thorax Rib Deflection Y	207 (ES-2 Rib)	Honeywell	F38000203	2022-10-18
Anterior Abdominal Force Y	1514 Fy	R.A. Denton	2631J	2022-03-30
Middle Abdominal Force Y	1510 Fy	R.A. Denton	2631J	2022-03-30
Posterior Abdominal Force Y	1515 Fy	R.A. Denton	2631J	2022-03-30
Lower Spine T12 Acceleration X	P63856	Endevco	7264C-2k	2022-10-19
Lower Spine T12 Acceleration Y	P50063	Endevco	7264C-2k	2022-10-19
Lower Spine T12 Acceleration Z	P51880	Endevco	7264C-2k	2022-10-19
Pubic Symphysis Force Y	506 (Pubic)	R.A. Denton	3096JFL	2022-03-30

SID-IIs ATD S/N: 308

Table 2 - Left Rear Passenger ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P63980	Endevco	7264C-2k	2022-06-04
Head Acceleration Y Primary	P58861	Endevco	7264C-2k	2022-06-04
Head Acceleration Z Primary	P51261	Endevco	7264C-2k	2022-06-04
Head Acceleration X Redundant	P58808	Endevco	7264C-2k	2022-06-03
Head Acceleration Y Redundant	P63310	Endevco	7264C-2k	2022-06-04
Head Acceleration Z Redundant	P49189	Endevco	7264C-2k	2022-06-04
Head Rotation Rate X	ARS7449	DTS	ARS PRO-8k (2kHz)	2022-03-15
Head Rotation Rate Y	ARS7510	DTS	ARS PRO-8k (2kHz)	2022-03-10
Head Rotation Rate Z	ARS7573	DTS	ARS PRO-8k (2kHz)	2022-03-15
Upper Thorax Rib Deflection Y	1249	Servo	08TCI-3725	2022-05-13
Middle Thorax Rib Deflection Y	1219	Servo	08TCI-3725	2022-05-13
Lower Thorax Rib Deflection Y	1221	Servo	08TCI-3725	2022-05-13
Upper Abdomen Rib Deflection Y	1252	Servo	08TCI-3725	2022-05-13
Lower Abdomen Rib Deflection Y	1233	Servo	08TCI-3725	2022-05-13
Lower Spine T12 Acceleration X	P52108	Endevco	7264C-2k	2022-06-03
Lower Spine T12 Acceleration Y	P63970	Endevco	7264C-2k	2022-06-03
Lower Spine T12 Acceleration Z	P51712	Endevco	7264C-2k	2022-06-03
Iliac Wing Impact Side Force Y	289 (Iliac)	R.A. Denton	3228J	2022-04-29
Acetabulum Impact Side Force Y	277 (Acetabulum)	R.A. Denton	3249J	2022-04-29

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	M11093	Endevco	758H-2k	2022-10-11
Vehicle CG Ay	M11291	Endevco	758H-2k	2022-10-11
Vehicle CG Az	M11203	Endevco	758H-2k	2022-10-11
Right Side Sill at Front Seat Ax	M11099	Endevco	758H-2k	2022-10-05
Right Side Sill at Front Seat Ay	M11263	Endevco	758H-2k	2022-10-06
Right Side Sill at Front Seat Az	M11248	Endevco	758H-2k	2022-10-04
Right Side Sill at Rear Seat Ax	M11208	Endevco	758H-2k	2022-10-07
Right Side Sill at Rear Seat Ay	M11267	Endevco	758H-2k	2022-10-11
Right Side Sill at Rear Seat Az	M11266	Endevco	758H-2k	2022-10-16
Left Side Sill at Front Seat Ay	M11056	Endevco	758H-2k	2022-10-11
Left Side Sill at Rear Seat Ay	M11241	Endevco	758H-2k	2022-10-07
Left Lower A-Pillar Ay	M11247	Endevco	758H-2k	2022-10-07
Left Middle A-Pillar Ay	M11249	Endevco	758H-2k	2022-10-07
Left Lower B-Pillar Ay	M11123	Endevco	758H-2k	2022-10-10
Left Middle B-Pillar Ay	M11234	Endevco	758H-2k	2022-10-10
Driver Seat Track at H-Point Ay	M11260	Endevco	758H-2k	2022-10-07
Rear Seat Structure Ay	M11261	Endevco	758H-2k	2022-10-11
Right Rear Occupant Comp. Ay	M11242	Endevco	758H-2k	2022-10-06
Engine Block Top Ax	M11171	Endevco	758H-2k	2022-10-10
Engine Block Top Ay	M11257	Endevco	758H-2k	2022-10-11
Rear Floopan Above Axle Ax	M11202	Endevco	758H-2k	2022-10-07
Rear Floopan Above Axle Ay	M11243	Endevco	758H-2k	2022-10-07
Rear Floopan Above Axle Az	M11265	Endevco	758H-2k	2022-10-07

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
MDB CG Ax	M11095	Endevco	758H-2k	2022-10-08
MDB CG Ay	M11054	Endevco	758H-2k	2022-10-11
MDB CG Az	M11285	Endevco	758H-2k	2022-10-12
MDB Left Side at Rear Axle Ax	M11104	Endevco	758H-2k	2022-10-11
MDB Left Side at Rear Axle Ay	M11194	Endevco	758H-2k	2022-10-07