REPORT NUMBER: SINCAP-KAR-20-007

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

NISSAN MOTOR CO., LTD

2020 NISSAN VERSA 4-DOOR SEDAN

NHTSA No: M20205217

PREPARED BY:

APPLUS IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

DECEMBER 19, 2019

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF CRASHWORTHINESS STANDARDS

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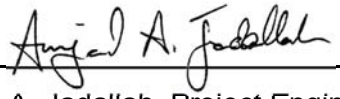
Prepared By: 

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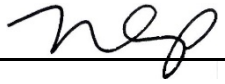
Reviewed By: 

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Approval Date: December 19, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date:

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

Date:

TECHNICAL REPORT DOCUMENTATION PAGE

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SINCAP-KAR-20-007		

4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing of a 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217	December 19, 2019
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7. Authors Mr.Amjad A. Jadallah, Project Engineer, Applus IDIADA KARCO Mr. Steven D. Matsusaka, Engineering Manager, Applus IDIADA KARCO	**8. Performing Organization Report No.** TR-P39328-01-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.** DTNH22-14-D-00355L
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590	**13. Type of Report and Period Covered** Final Test Report, December 5, 2019 - December 19, 2019 **14. Sponsoring Agency Code** NRM-110

15. Supplementary Notes

16. Abstract

A 55 / 28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2020 Nissan Versa 4-door sedan in accordance with the specifications of the Office of Crash Worthiness 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 December 5, 2019.

The impact velocity of the Moving Deformable Barrier was 61.91 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 12.2°C. The target vehicle's maximum post-test static crush was 211 mm located at level 2. 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	145.2
Maximum Thoracic Rib Deflection	mm	44	26
Total Abdominal Force	N	2500	960
Pubic Symphysis Force	N	6000	1414

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	249.9
Resultant Lower Spine Acceleration	g	82	32
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	2050
Maximum Thoracic Rib Deflection	mm	38*	32
Maximum Abdominal Rib Deflection	mm	45*	29

Both the left front driver and left rear passenger doors were jammed shut. The doors on the struck side of the vehicle 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	154	

** Proposed IARV*

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SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2020 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00355L. The purpose of this test is to generate comparative side impact performance in a 2020 Nissan Versa 4-door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

SECTION 2
SUMMARY OF TEST RESULTS

A 2020 Versa 4-door sedan 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 61.91 km/h (38.47 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 December 5, 2019. 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 October 2015. The side impact event was documented by 10 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	145.2
Maximum Thoracic Rib Deflection	mm	44	26
Combined Abdominal Force	N	2500	960
Pubic Symphysis Force	N	6000	1414

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	249.9
Lower Spine (T12) Resultant Acceleration	g	82	32
Total Pelvic Force (sum of acetabular and iliac forces	N	5525	2050
Maximum Thoracic Rib Deflection	mm	38*	32
Maximum Abdominal Rib Deflection	mm	45*	29

**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	No	
Knee Airbag	Yes	No	No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis)	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	

GENERAL COMMENTS

The doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. The doors on the non-struck side remained closed and latched. There was no ATD value that exceeded its limit. The passenger mid thorax rib displacement y channel failed between 26.4 and 53.0 milliseconds. The Y-direction accelerometer on the left lower A-Post channel failed at 4.7 milliseconds. The Y-direction accelerometer on the left lower B-Post failed at 8.9 milliseconds. The Y-direction accelerometer on the Top of engine failed at 89.8 milliseconds.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

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: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20205217
Model Year	2020
Make	Nissan
Model	Versa
Body Style	4-Door Sedan
VIN	3N1CN8BV8LL801288
Body Color	Brilliant Silver
Odometer Reading (km / mi)	16 / 10
Engine Displacement (L)	1.6
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Manual
Transmission Speeds	5
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

Does Owner's Manual provide instructions to turn off automatic door locks?	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Co., LTD
Date of Manufacture	Jul-19
Vehicle Type	Passenger

GVWR (kg)	3461
GAWR Front (kg)	1819
GAWR Rear (kg)	1676

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				385.0	*A*
DSC x 68.04 (kg)				340.2	*B*
Cargo Weight (RCLW) (kg)				44.8	*A-B*

VEHICLE SEAT TYPE

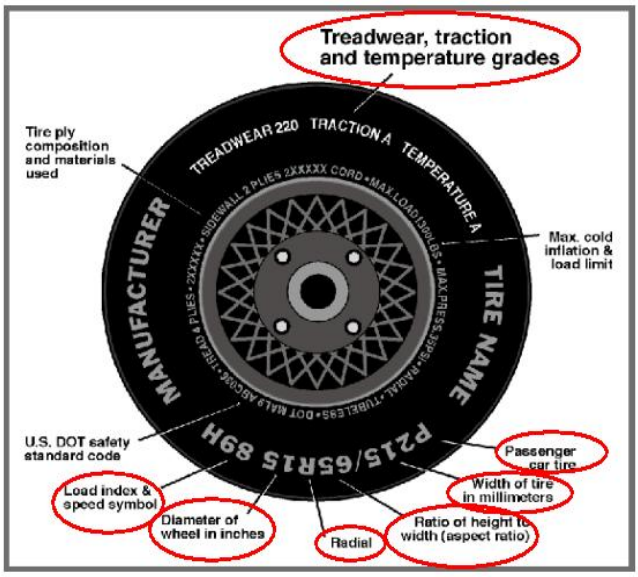
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat		Yes			Yes		
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	195/65R15	195/65R15
Tire Size on Vehicle	195/65R15	195/65R15
Tire Manufacturer	Continental	Continental
Tire Model	Procontact TX	Procontact TX
Treadware	500	400
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	91H	91H
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	P5AE NM1D 1619	P5AE NM1D 1619
DOT Safety Code Right	P5AE NM1D 1619	P5AE NM1D 1619

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

TIRE PRESSURES

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

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/60R16	P205/60R16	P205/60R16	P205/60R16	P205/60R16
Tire Pressure	kPa	230 ± 21	230	230	230	230

TEST VEHICLE AXLE WEIGHTS

		As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
	Units	Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	353.0	247.5		388.0	324.0		384.0	331.5	
Right	kg	350.5	230.0		356.5	276.0		359.5	275.5	
Ratio	%	59.6%	40.4%	100.0%	55.4%	44.6%	100.0%	55.1%	44.9%	100.0%
Total	kg	703.5	477.5	1181.0	744.5	600.0	1344.5	743.5	607.0	1350.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1181.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	44.8	C
Calculated Vehicle Target Wt (TVTW)	kg	1350.8	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	662	654	Yes
RF	mm	677	667	Yes
LR	mm	642	640	Yes
RR	mm	624	634	Yes
Vehicle CG (Aft of Front Axle)	mm	1180	1171	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	45	45	

***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: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire and Tools	19.0
Trim	1.0
Ballast / Equipment Added	38.5

Test Height Adjustable Setting (If Applicable)	

DATA SHEET NO. 2

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

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

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	3.4	0.0	1.7
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	1.7	235	Max			
			Mid	225	235	248
			Min			
Front Passenger Seat	Fixed	231	Max			
			Mid	221	231	240
			Min			
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 … (CONTINUED)

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

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

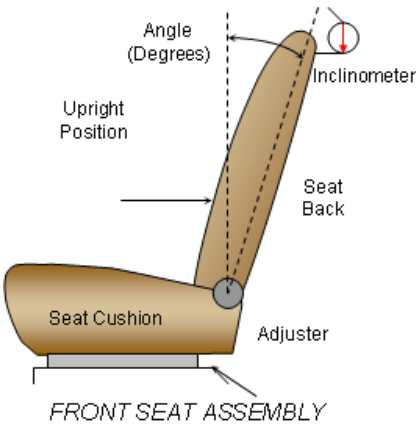
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	25	120	13
Front Passenger Seat	240	25	120	13
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

SEAT BACK ADJUSTMENT

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



SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/ Seated Dummy	61.9	29	3.6	3
Front Passenger Seat	56.8	29	3.6	3
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	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: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

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

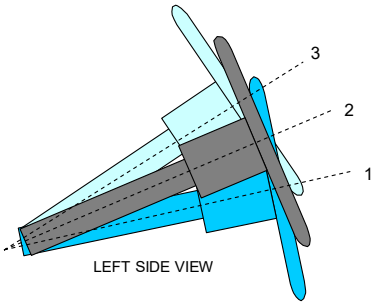
HEAD RESTRAINT ADJUSTMENT

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	4	H
Rear Seat	Fixed	Fixed

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	20.7	83
Geometric Center - Position 2	22.8	101
Uppermost - Position 3	24.9	118
Telescoping Steering Wheel Travel		35
Test Position	22.8	101

DATA SHEET NO. 2 … (CONTINUED)

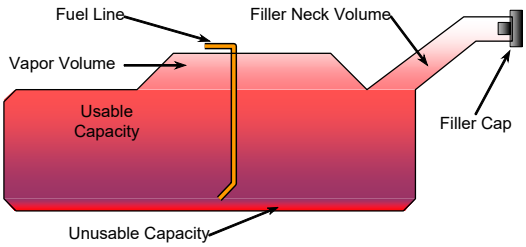
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

FUEL PUMP

The fuel pump operates a few seconds after the ignition switch is turned to the ON position after that the pump operates only when the engine is running.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	40.88
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	40.88
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	38.02
Actual amount of Solvent Used in Test	38.02
1/3 of Usable Capacity	13.63

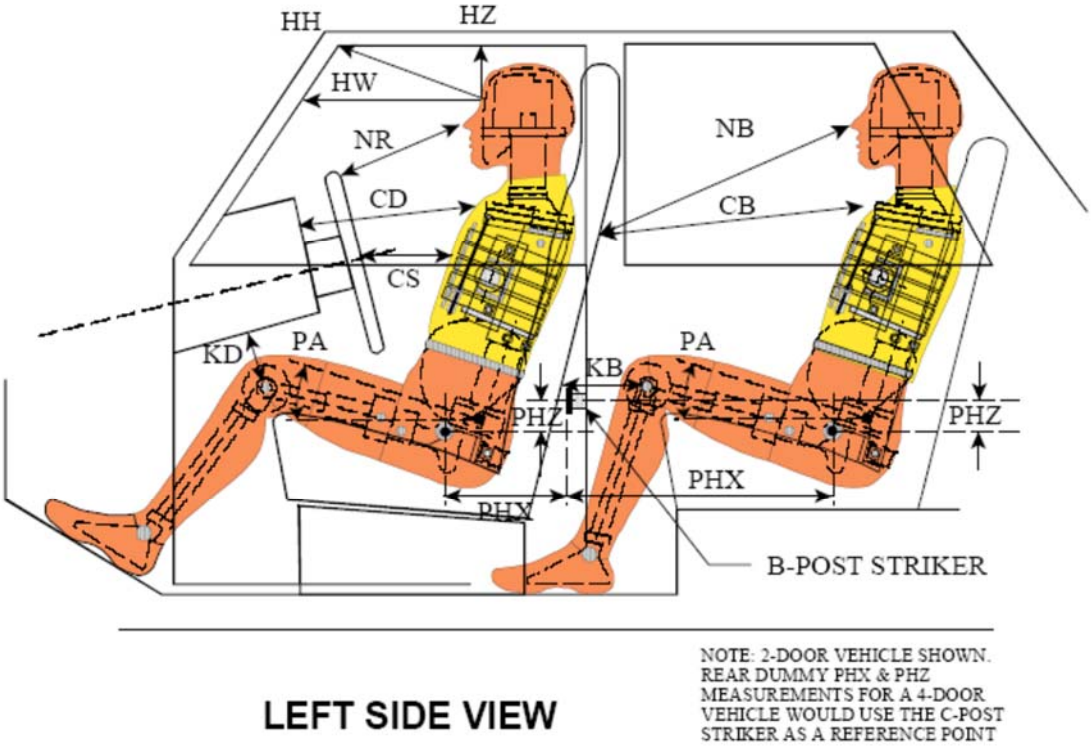
Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



LEFT SIDE VIEW

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

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

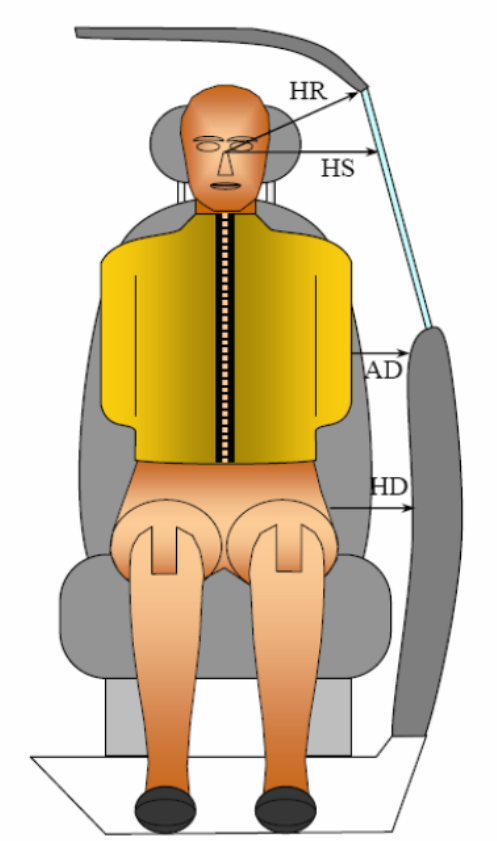
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (º)	Length (mm)	Angle (º)
HH		Head to Header	352			
HW		Head to Windshield	584			
HZ	HZ	Head to Roof	143		228	
NR	NB	Nose to Rim/Seat Back	448		585	
CD	CB	Chest to Dash/Seat Back	588		560	
CS		Chest to Steering Wheel	316			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	189	33.1	284	13.0
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	190	29.1	258	15
PAX°	PAX°	Pelvic Tilt Angle X		15.5		24.1
	PAY°	Pelvic Tilt Angle Y		0.1		0.1
PHX	PHX	Hip Point to Striker (x-axis)	137		243	
PHZ	PHZ	Hip Point to Striker (z-axis)	138		219	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

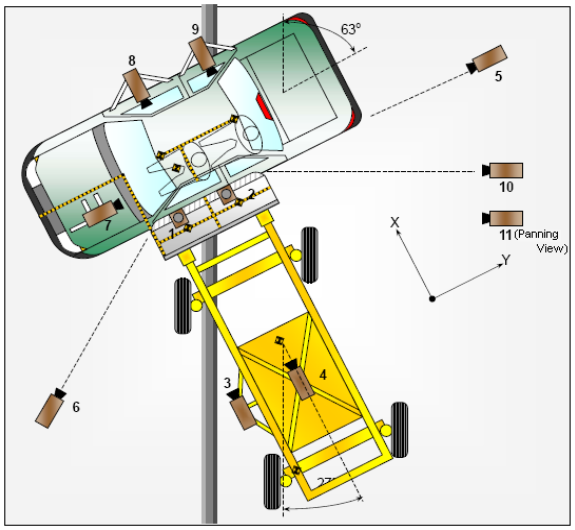
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	185	224
HS	Head to Side Window	mm	350	336
AD	Arm to Door	mm	88	156
HD	H-Point to Door	mm	130	165

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



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)	534	-157	746	6	1000
8	Driver Side (On-Board)	1583	799	344	6	1000
9	Passenger Side (On-Board)	1567	1582	372	6	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

Camera View 3, Left Impact Point on the MDB failed.

INSTRUMENTATION

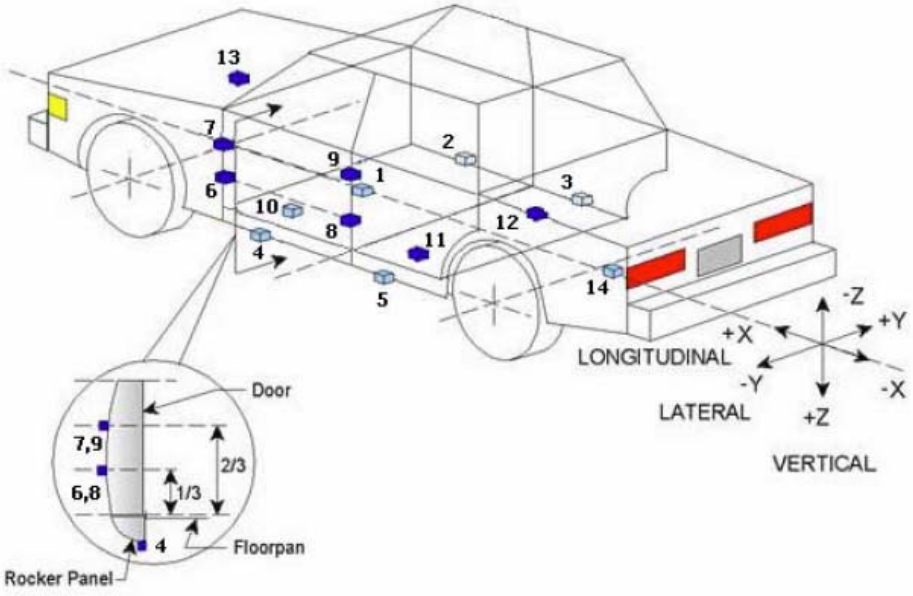
Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Channels	7
Total	65

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	240	0	-370
2	Right Sill at Front Seat	2800	680	-310
3	Right Sill at Rear Seat	1620	690	-320
4	Left Sill at Front Door	2500	-750	-165
5	Left Sill at Rear Door	1720	-740	-170
6	A-Pillar Lower	3020	800	-350
7	A-Pillar Middle	3045	810	-600
8	B-Pillar Lower	2170	885	-450
9	B-Pillar Middle	2100	890	-900
10	Front Seat Track	2135	-530	-350
11	Rear Seat Structure	1740	-320	-410
12	Right Rear Occupant Compartment	1750	320	-410
13	Engine Block	3620	365	-725
14	Rear Floorpan Above Axle	1180	160	-520

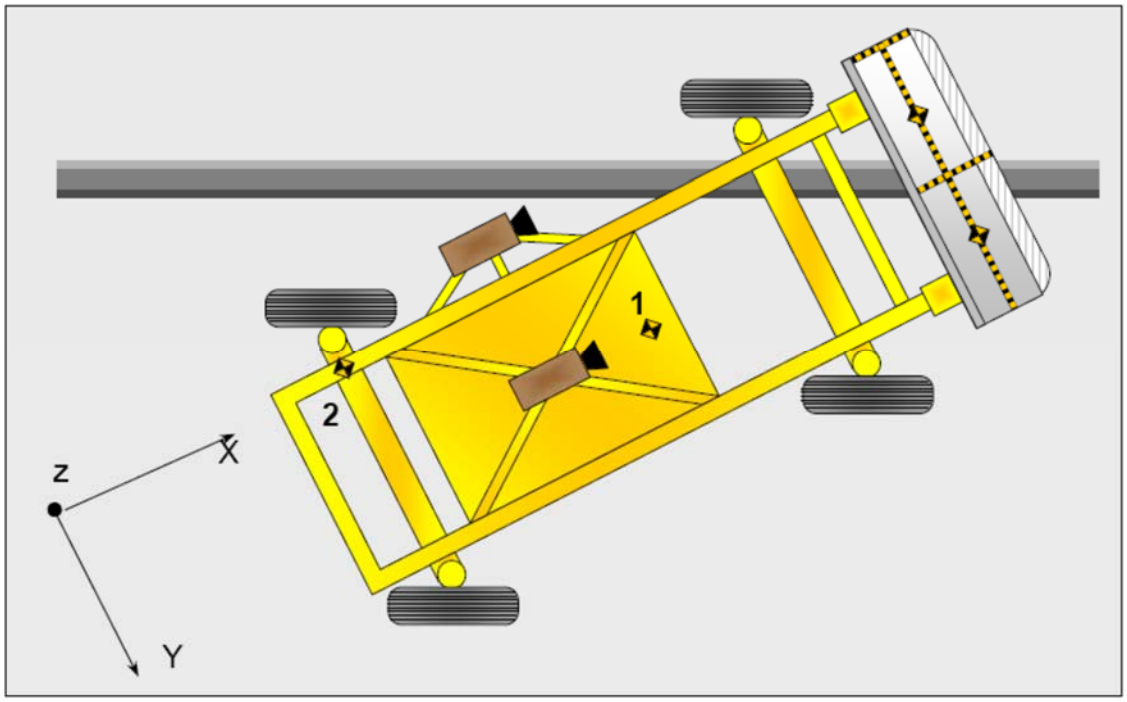
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



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: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

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	Curtain Airbag, Side Header	Curtain Airbag, Side Header
Left Side of Head	Curtain Airbag, Side Header	Curtain Airbag
Back of Head	Curtain Airbag, Side Header	Headrest
Left Shoulder	Curtain Airbag, Side Header, Headrest	Side Airbag
Upper Torso	Side Airbag	Side Airbag
Lower Torso	Side Airbag	Side Airbag
Left Hip	Side Airbag	Door Panel, Side Airbag
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear
	Front	Rear	Front	Rear	Hatch/Other
Remained Closed and Operational	No	No	Yes	Yes	No
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	Yes
Latch or Hinge System Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	Yes
Latch Separated from Striker	No	No	No	No	Yes
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: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation
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: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2625
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		369
Actual Impact Point (Aft of Front Axle)	mm		369
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	0
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	1

DATA SHEET NO. 9

MDB SUMMARY OF RESULTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

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	61.91
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.07
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.8
MDB Forw ard Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.6
MDB Crabbed Angle to MDB Forw ard Line of Motion	degrees	26.0 to 28.0	27.2

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

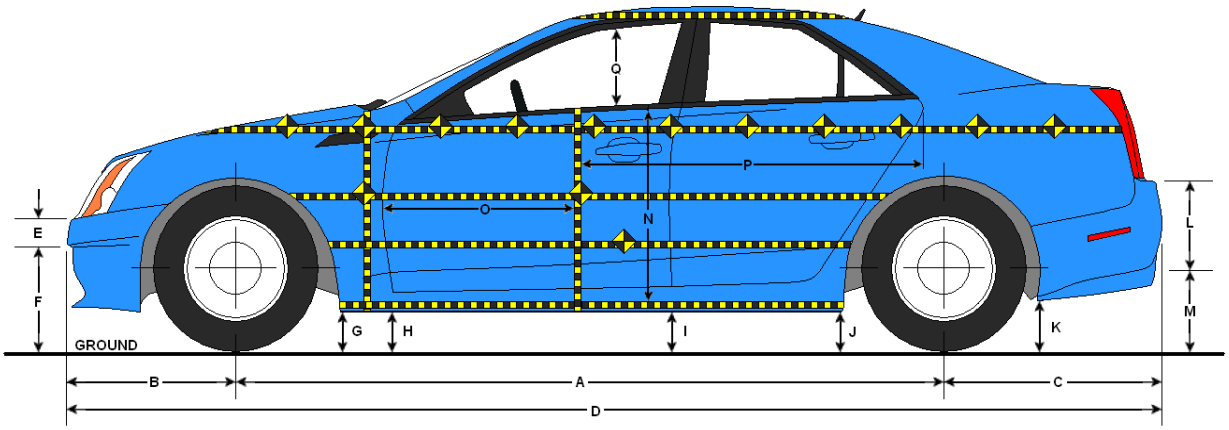
Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	179
B	Top of Bumper	533	800	Left	93
C	Mid Level	686	800	Left	114
D	Top of Stack	813	800	Left	147

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2625	2627	2
B	Front Axle to FSOV	846	831	-15
C	Rear Axle to RSOV	1001	989	-12
D	Total Length at Centerline	4472	4447	-25
E	Front Bumper Thickness	87	86	-1
F	Fromt Bumper Bottom to Ground	571	564	-7
G	Sill Height at Front Wheel Well	366	366	0
H	Sill Height at Front Door Leading Edge	371	375	4
I	Sill Height at B-Pillar	360	398	38
J1	Sill Height at Rear Wheel Well	349	391	42
J2	Pinch Weld Height at Rear Wheel Well	307	317	10
K	Sill Height Aft of Rear Wheel Well	393	402	9
L	Rear Bumper Thickness	131	132	1
M	Rear Bumper Bottom to Ground	579	590	11
N	Sill Height to Bottom of Front Window Sill	637	612	-25
O	Front Door Leading Edge to Impact CL	778	735	-43
P	Rear Door Trailing Edge to Impact CL	1409	1358	-51
Q	Front Window Opening	406	415	9
R	Right Side Length	3049	3057	8
S	Left Side Length	3048	3030	-18
T	Vehicle Width at B-Pillar	1728	1606	-122

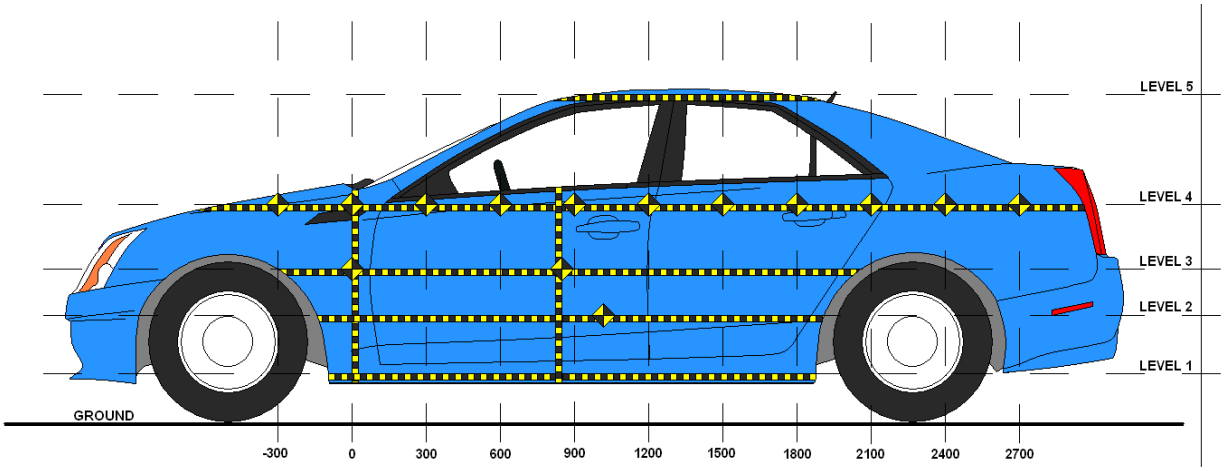
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	402	60	1650
2	Occupant H-Point	662	211	1500
3	Mid-Door	775	200	1350
4	Window Sill	1051	174	1650
5	Window Top	1527	4	1050

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

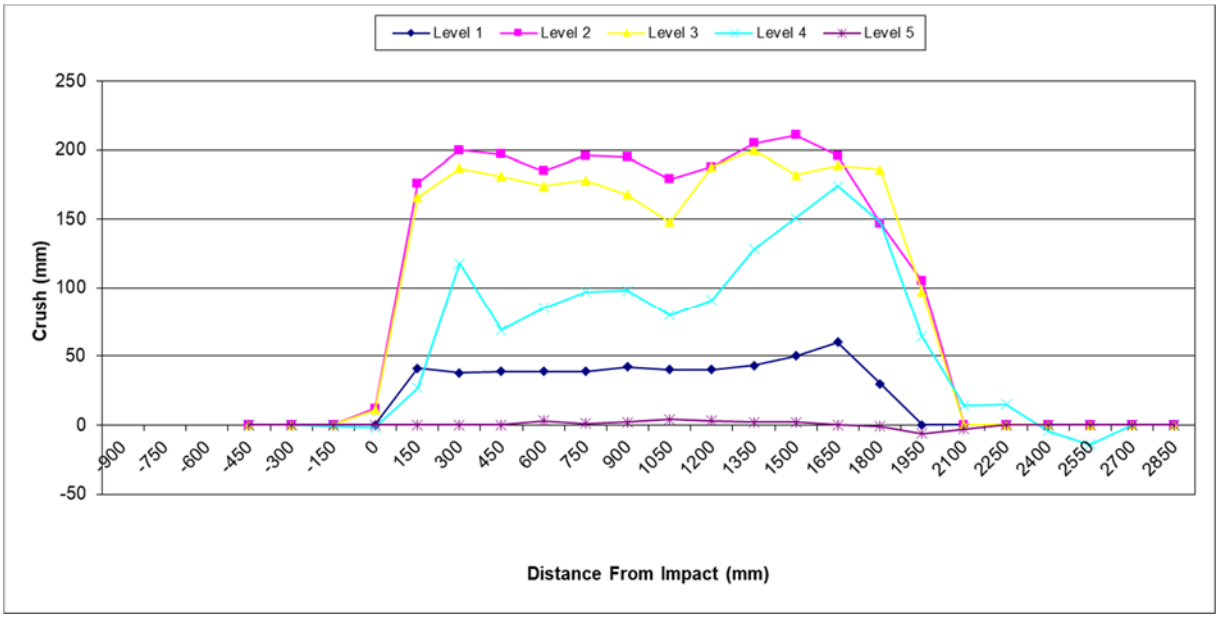
	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150				736					735					-1	
0	670	633	635	725		670	645	646	723		0	12	11	-2	
150	675	641	639	718		716	817	805	745		41	176	166	27	
300	680	642	638	649		718	842	825	767		38	200	187	118	
450	680	641	636	706		719	838	817	775		39	197	181	69	
600	680	641	636	699	915	719	826	810	784	918	39	185	174	85	3
750	681	640	635	693	928	720	836	813	790	929	39	196	178	97	1
900	681	639	635	688	928	723	834	803	786	930	42	195	168	98	2
1050	682	640	635	682	929	722	819	783	762	933	40	179	148	80	4
1200	681	641	637	675	929	721	829	825	766	932	40	188	188	91	3
1350	681	642	639	673	928	724	847	839	801	930	43	205	200	128	2
1500	681	643	641	671	925	731	854	823	822	927	50	211	182	151	2
1650	679	641	639	672	923	739	837	828	846	923	60	196	189	174	0
1800	668	635	635	676	920	698	782	821	824	919	30	147	186	148	-1
1950		630	628	681	925		735	725	745	919		105	97	64	-6
2100				688	936				702	933				14	-3
2250				699					714					15	
2400				712					708					-4	
2550				726					712					-14	
2700															
2850															

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

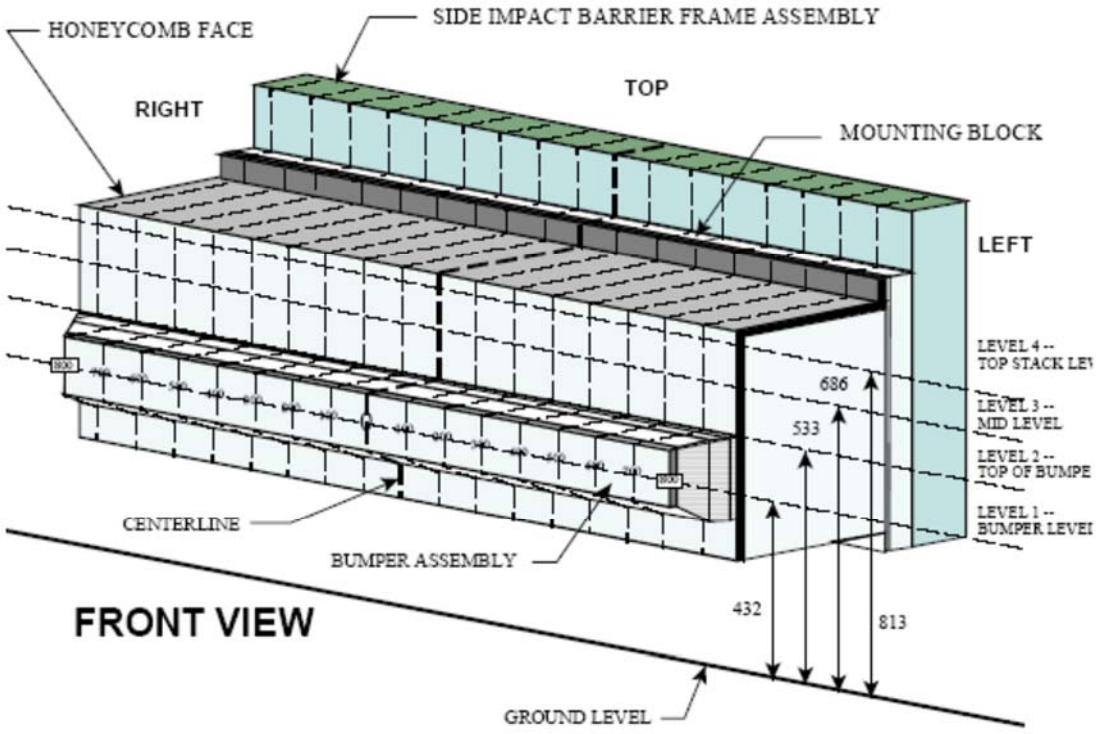


DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



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	149	131	123	125	124	128	132	129	125	122	121	118	119	118	119	134	179
2	84	69	61	62	56	49	53	57	50	53	55	59	64	68	68	76	93
3	17	3	-2	5	12	23	42	41	25	17	16	15	15	23	32	52	114
4	3	-10	-9	-3	17	59	97	83	63	31	27	30	41	53	77	93	147

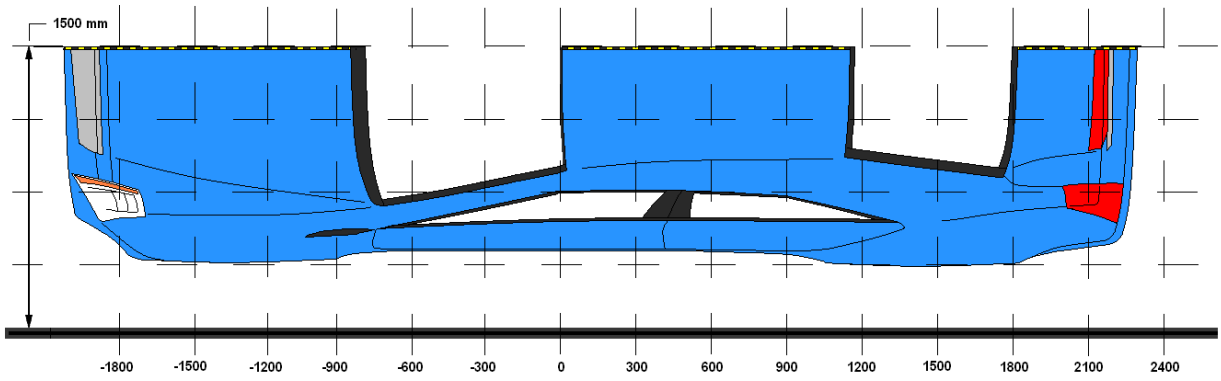
All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2550	4	626	631	5
2	2100	4	688	702	14
3	1500	2	643	854	211
4	900	2	639	834	195
5	300	2	642	842	200
6	-150	4	736	735	-1

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	179
2	500	Left	1	118
3	200	Left	1	121
4	200	Right	1	132
5	500	Right	1	125
6	800	Right	1	149

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19

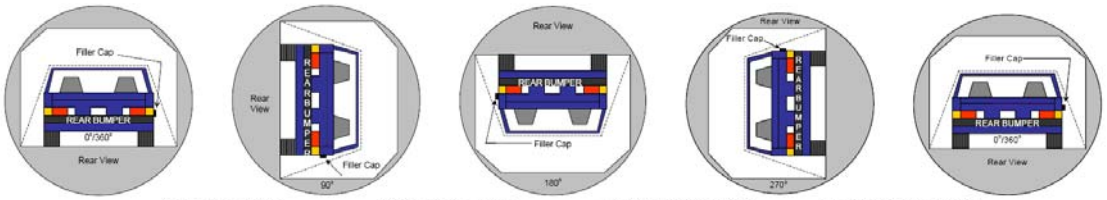
Temperature at Time of Impact: 12.2 °C Test Time: 2:10 P.M.

A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)

B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)

C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)

D. Spillage Details: There was no Stoddard solvent spillage.



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°	84	300	384
90° To 180°	79	300	379
180° To 270°	79	300	379
270° To 360°	80	300	380

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

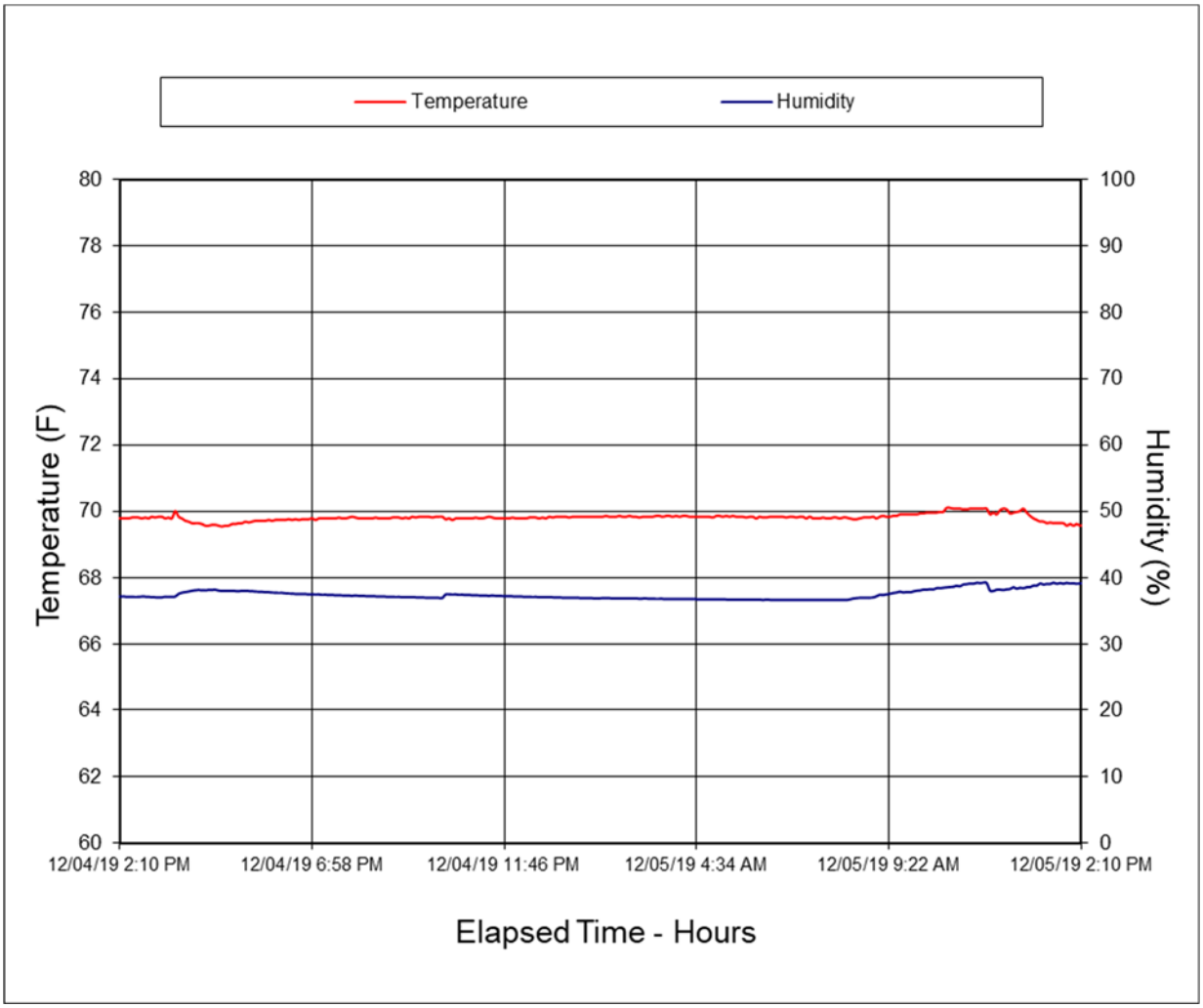
Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2020 Nissan Versa 4-Door Sedan NHTSA No. M20205217

Test Program: NCAP MDB Side Impact Test Test Date: 12/05/19



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

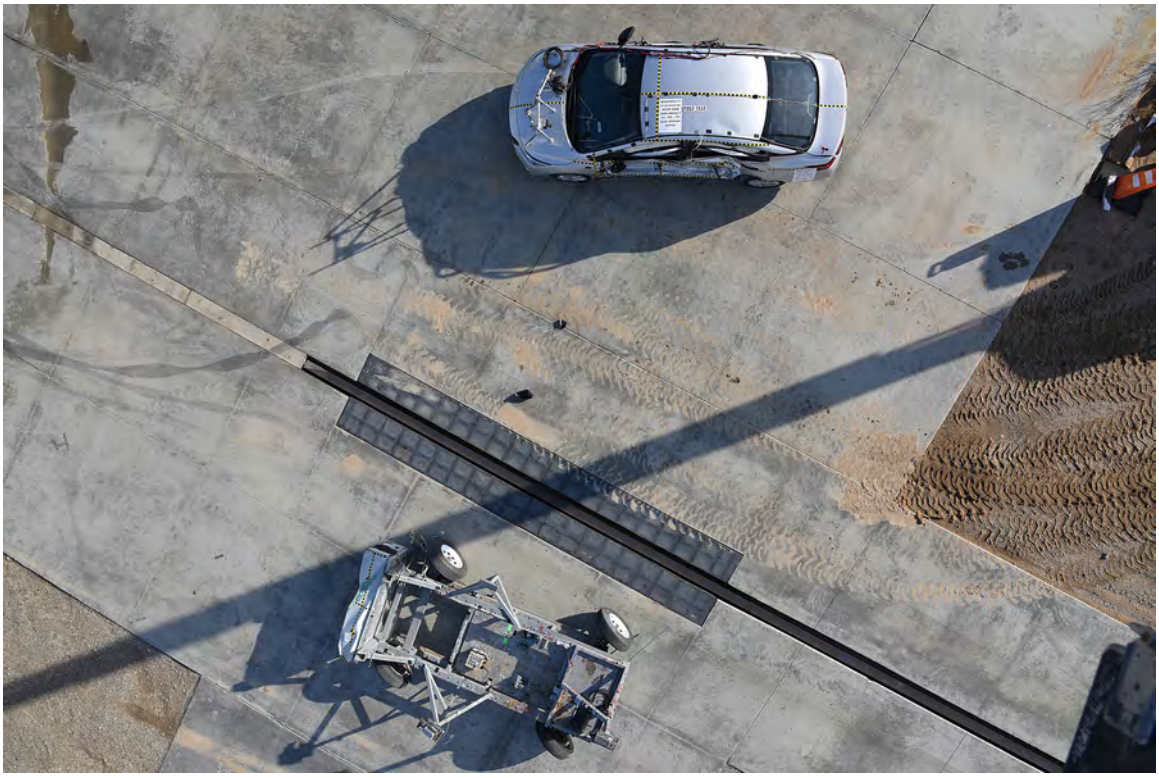


FIGURE 16. Post-Test Overhead View of Test Area

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

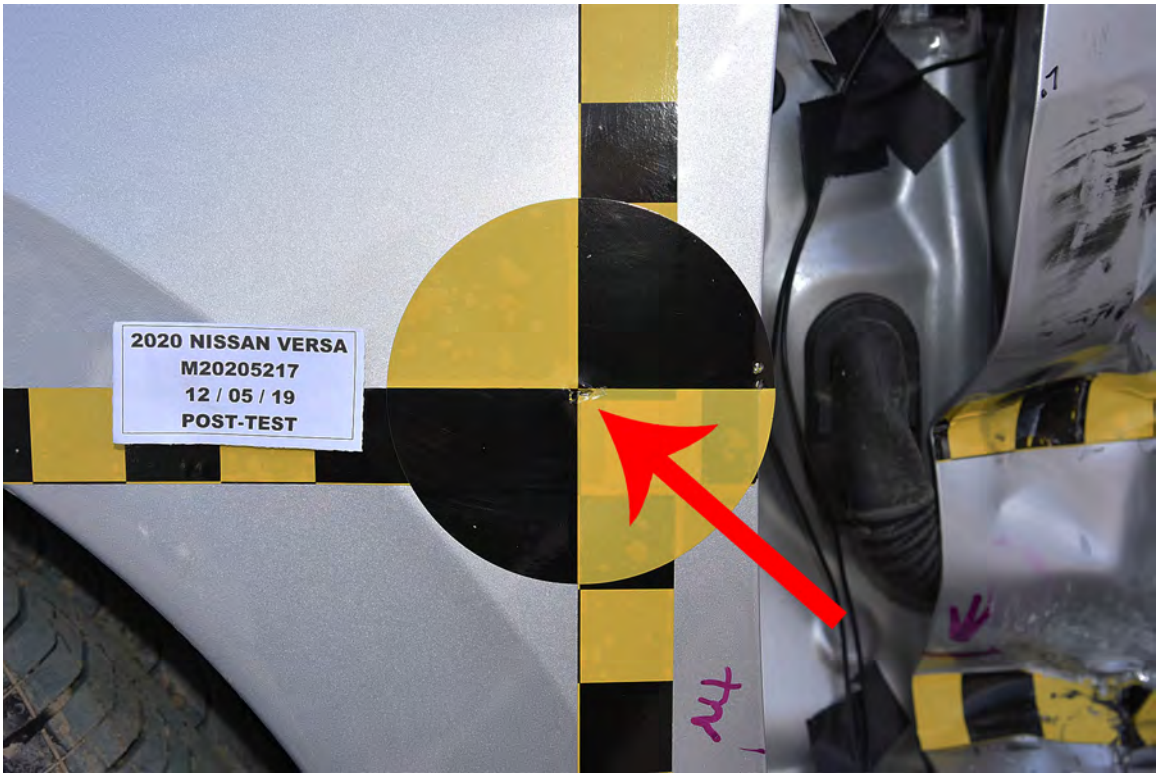


FIGURE 20. Post-Test Close-Up View of Impact Point Target

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

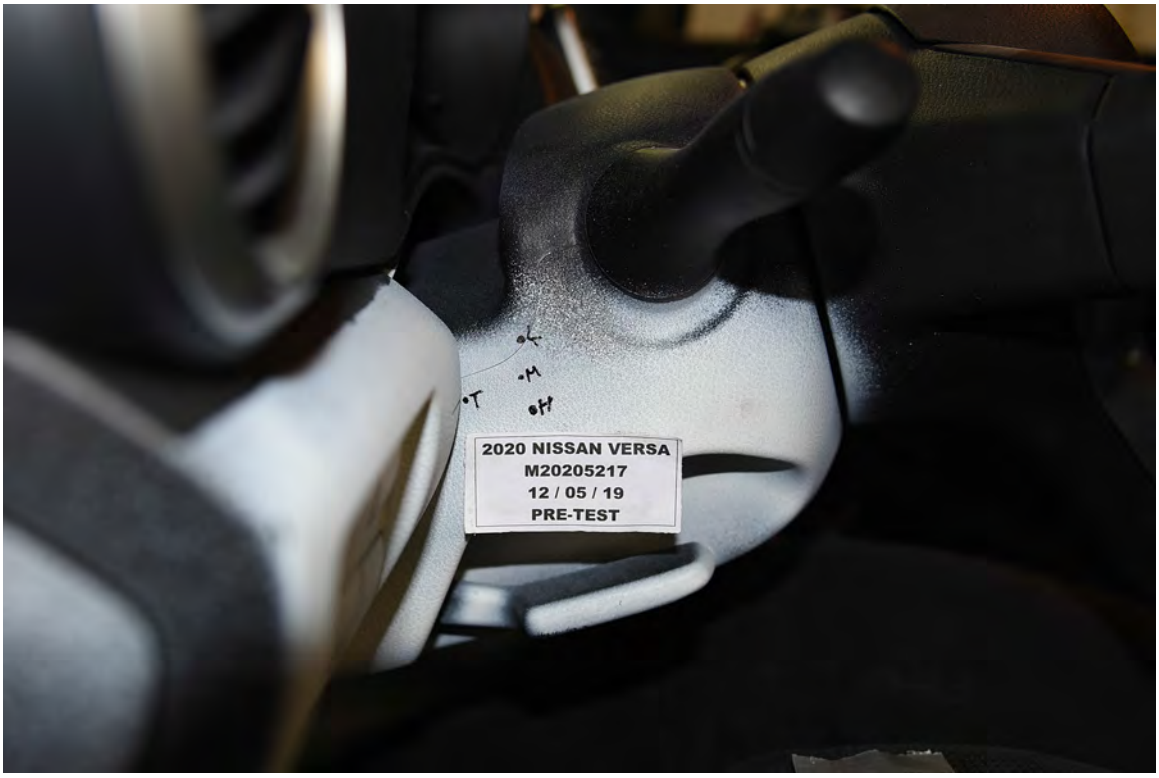


FIGURE 36. Pre-Test Left Side View of Steering Wheel

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

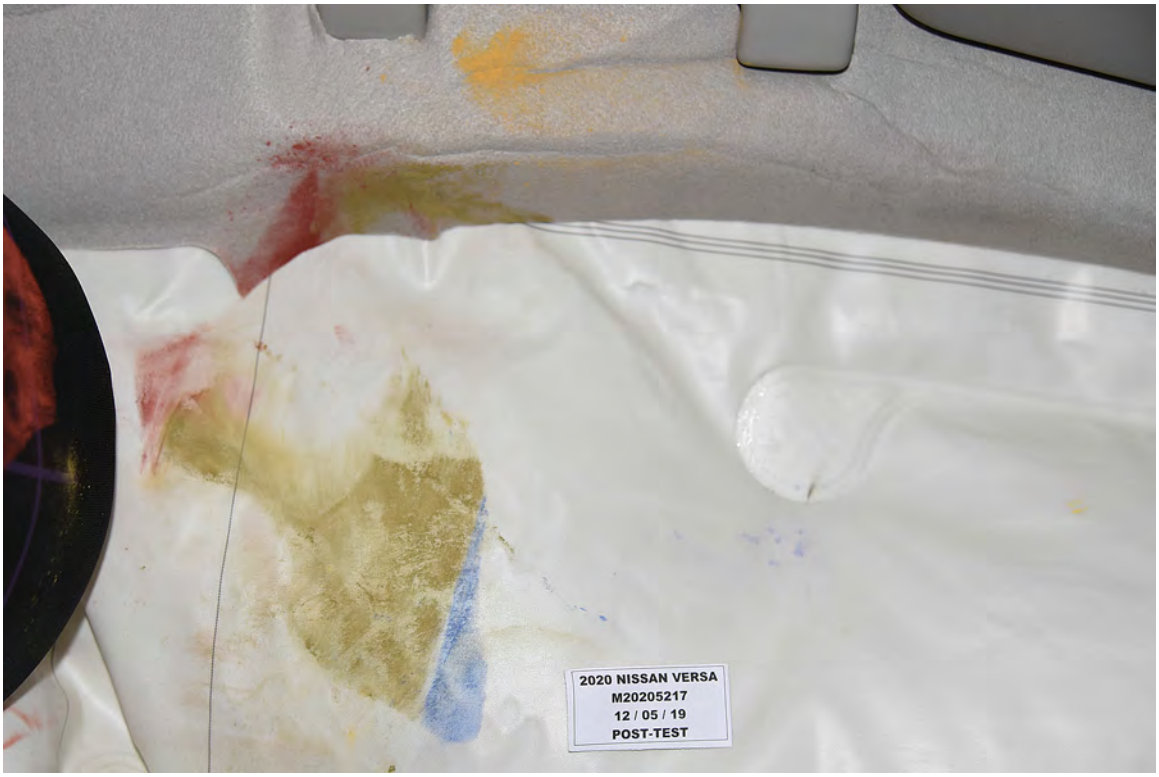


FIGURE 49. Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View

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

FIGURE 51. Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View

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

FIGURE 53. Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

FIGURE 74. Post-Test Rear Passenger Inner Door Panel View
Showing Rear Passenger Dummy Contact Locations

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

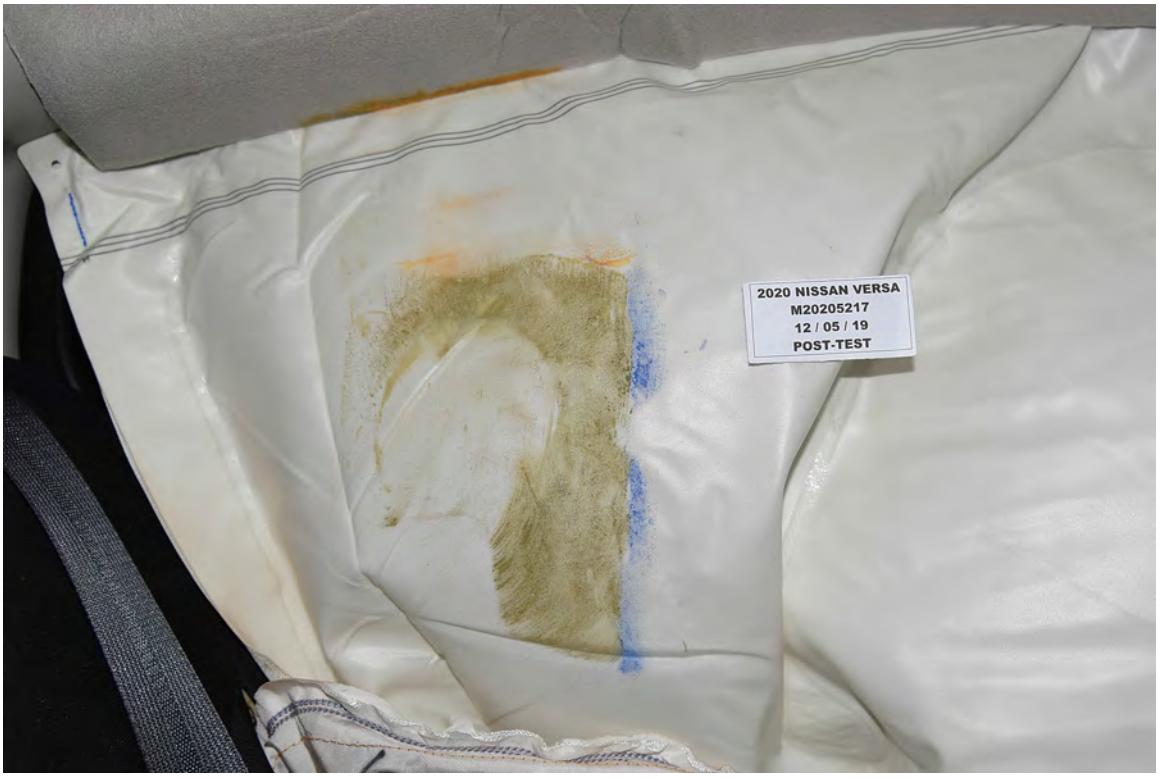


FIGURE 76. Post-Test Rear Passenger Dummy Close-Up
Head Contact with Side Airbag View

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

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

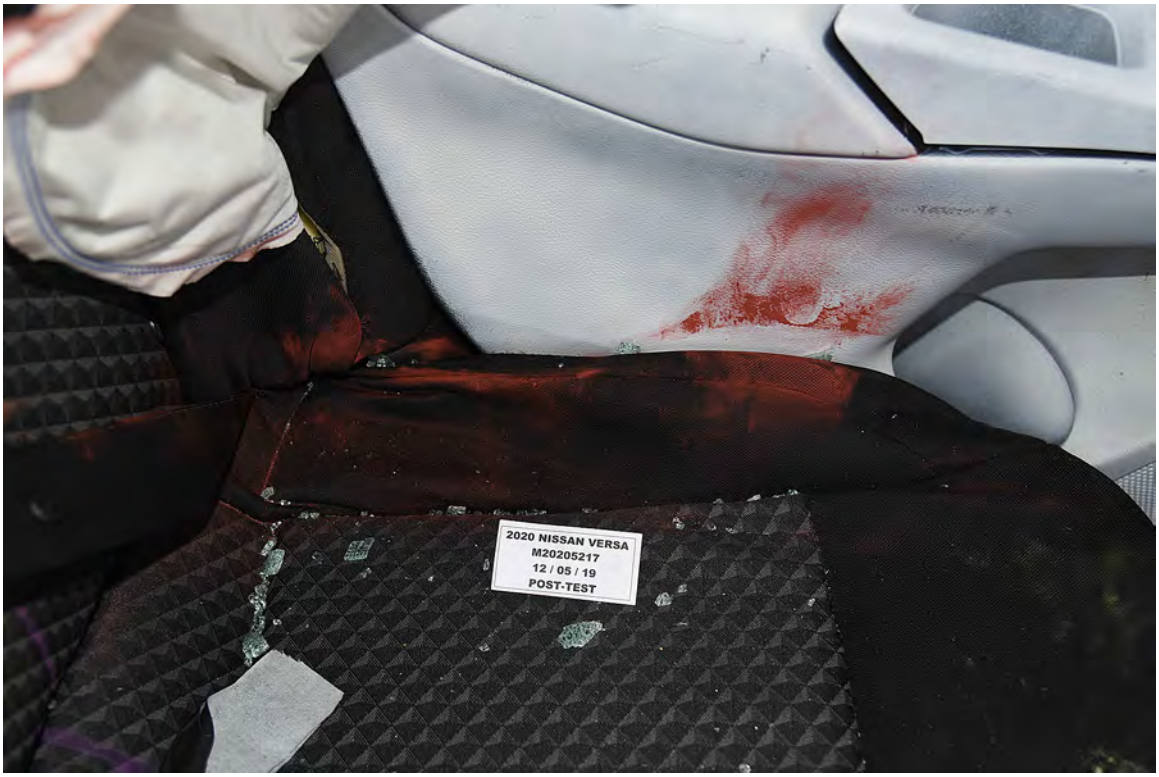


FIGURE 79. Post-Test Rear Passenger Dummy Close-Up
Pelvis Contact with Vehicle Interior View

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

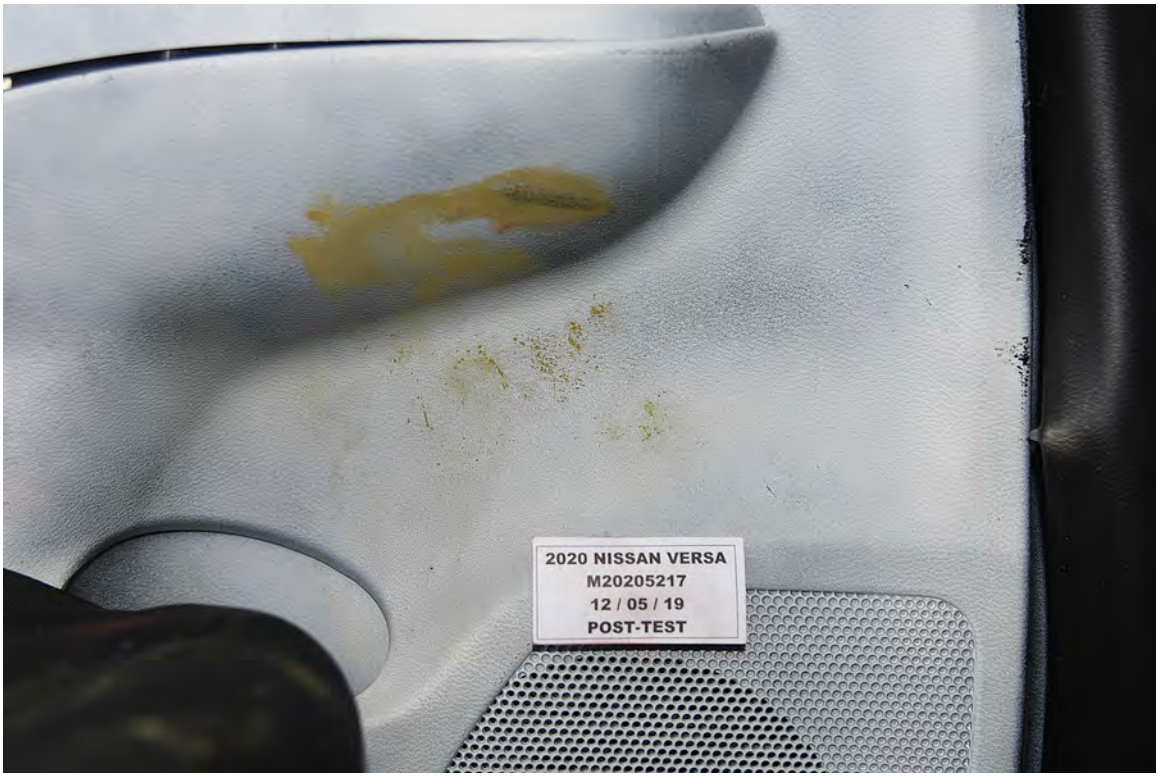


FIGURE 81. Post-Test Rear Passenger Dummy Close-Up Knee Contact View

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

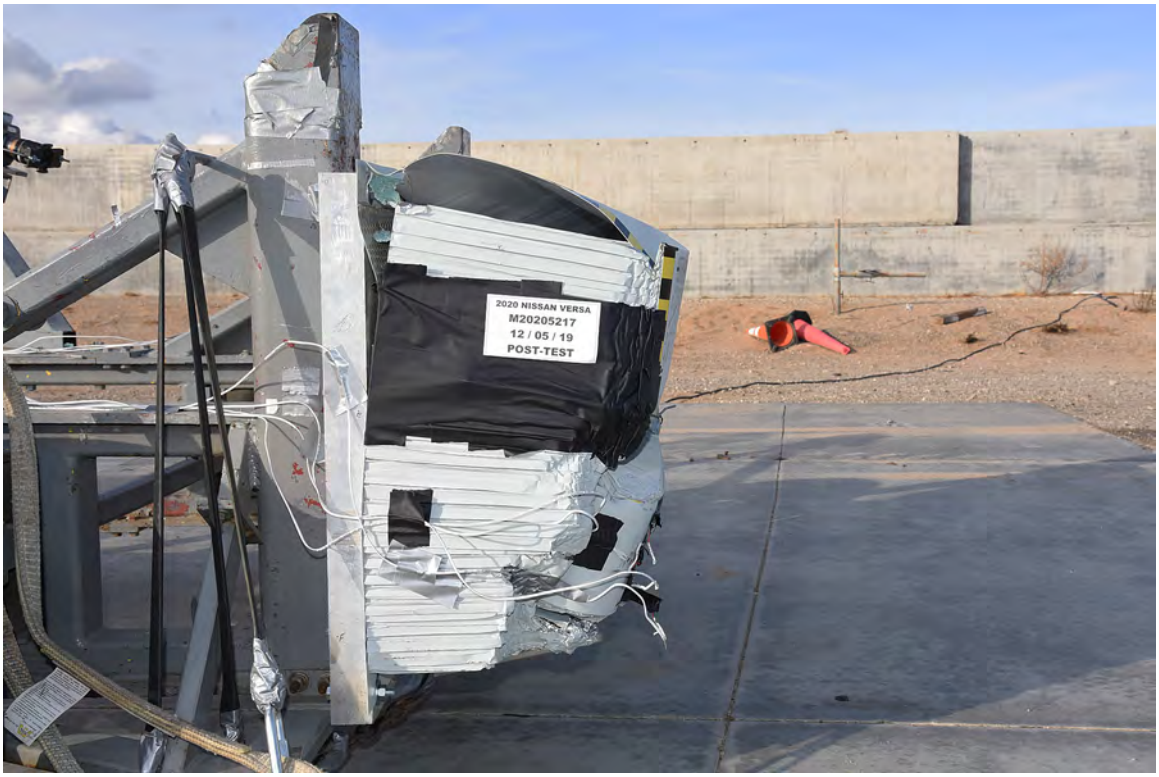


FIGURE 91. Post-Test Right Side View of MDB Impactor Face

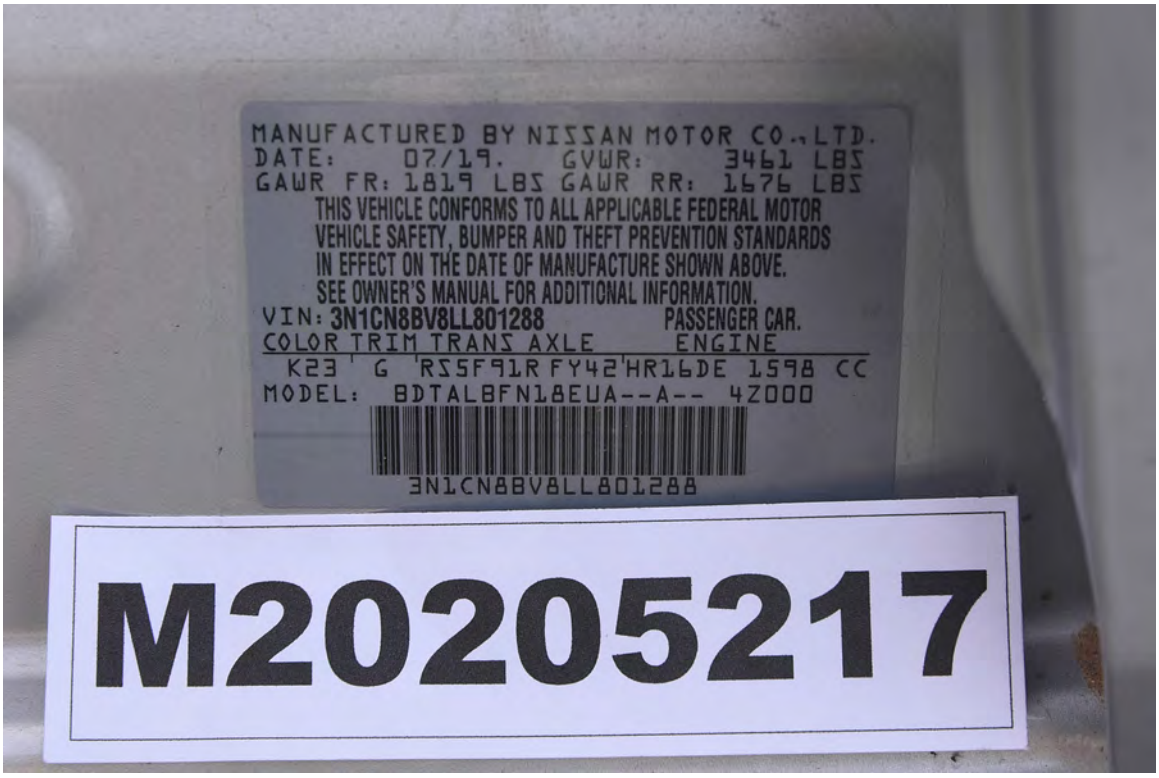


FIGURE 92. Close-Up View of Vehicle's Certification Label

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

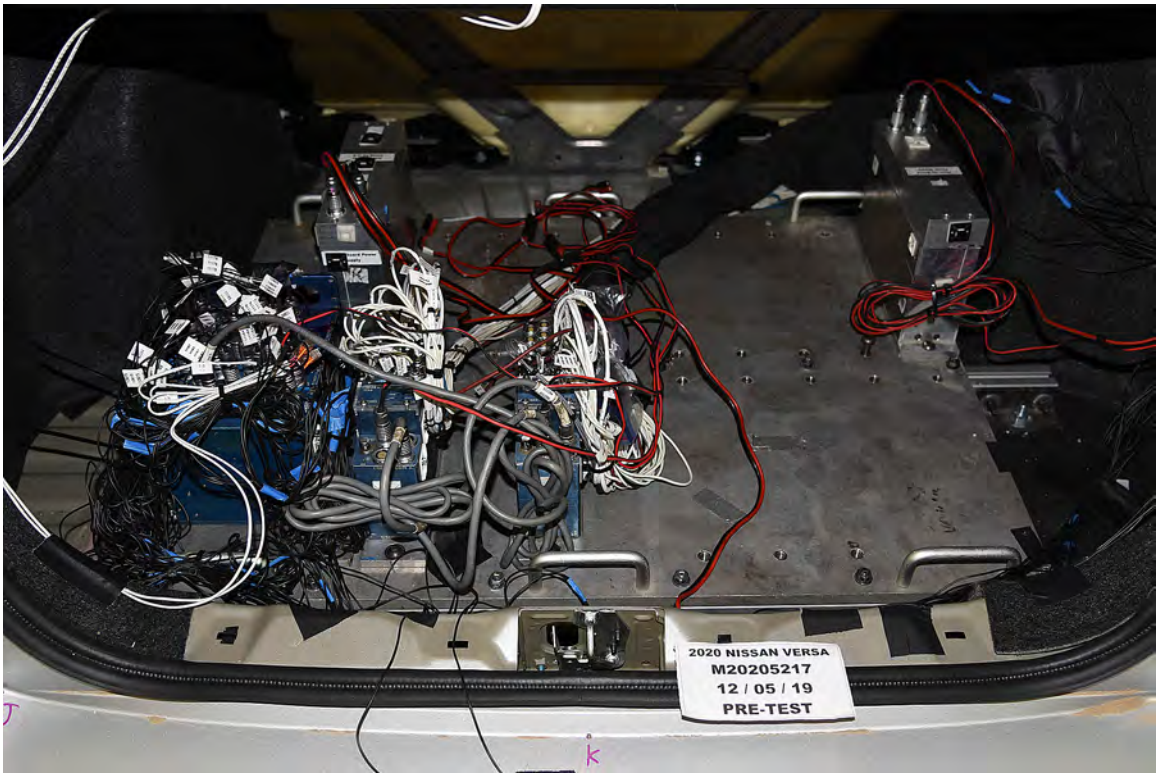


FIGURE 94. Pre-Test Ballast View

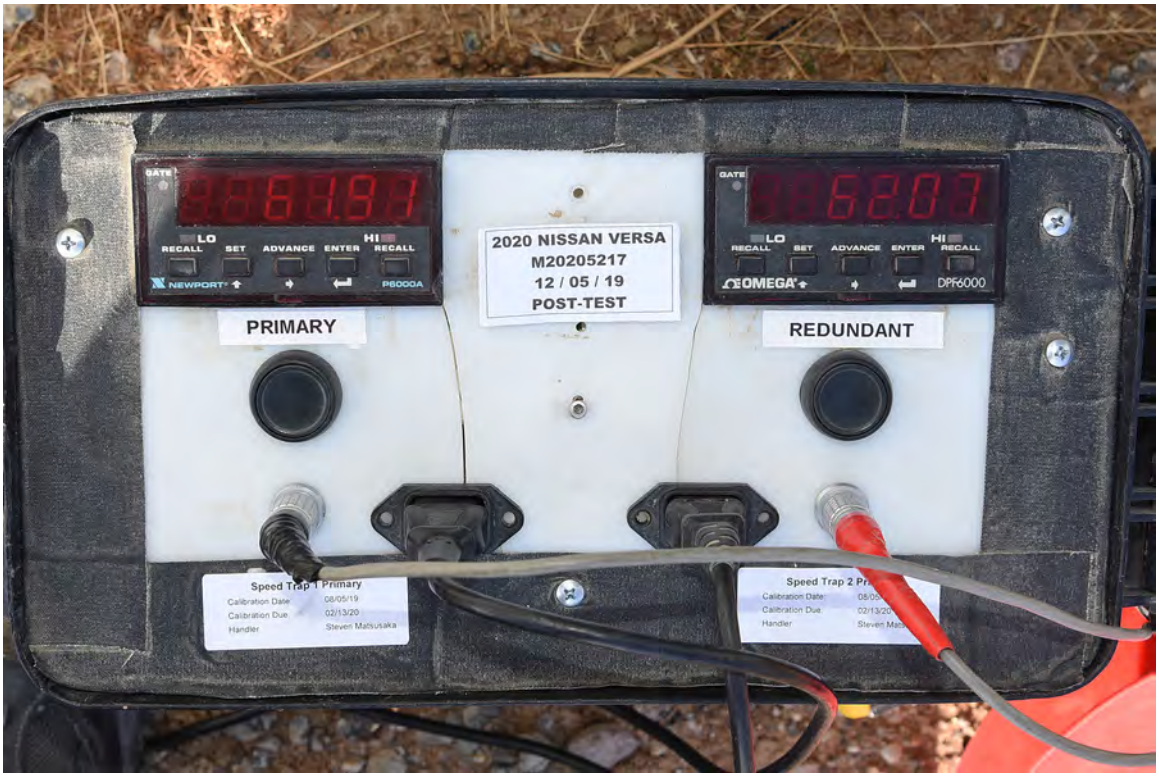


FIGURE 95. Post-Test Primary and Redundant Speed Trap Read-Out

FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees

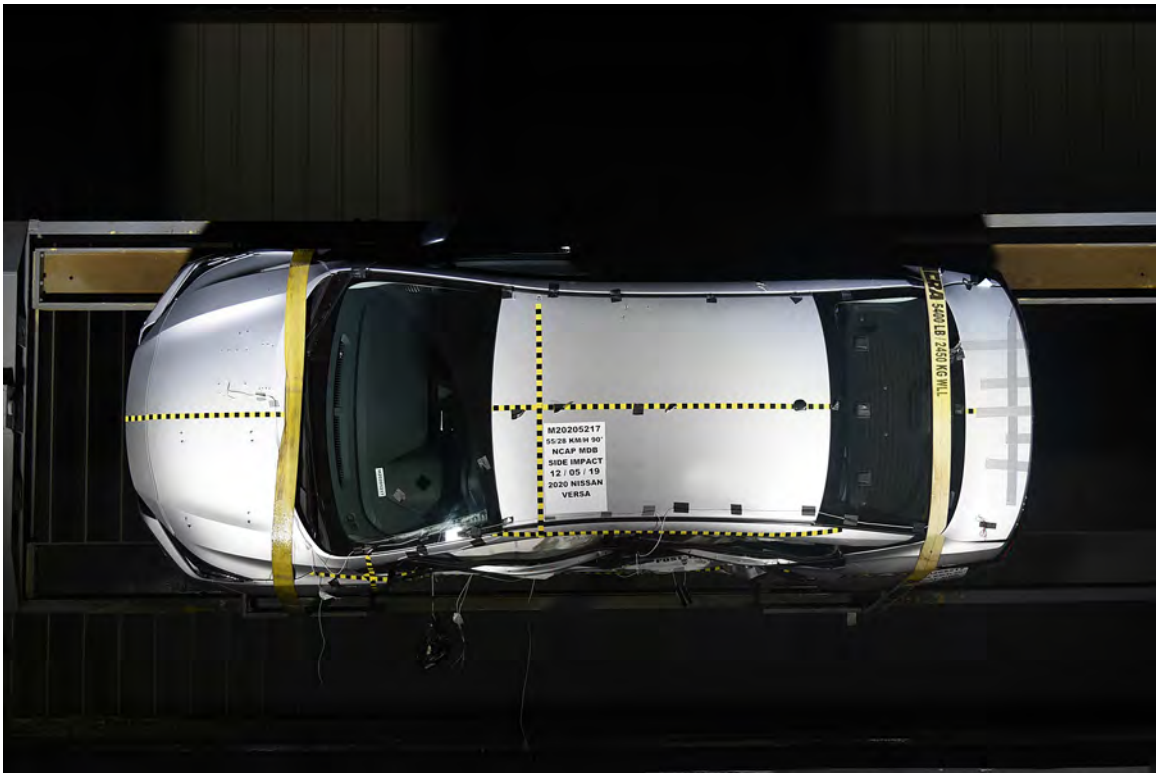


FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees

FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

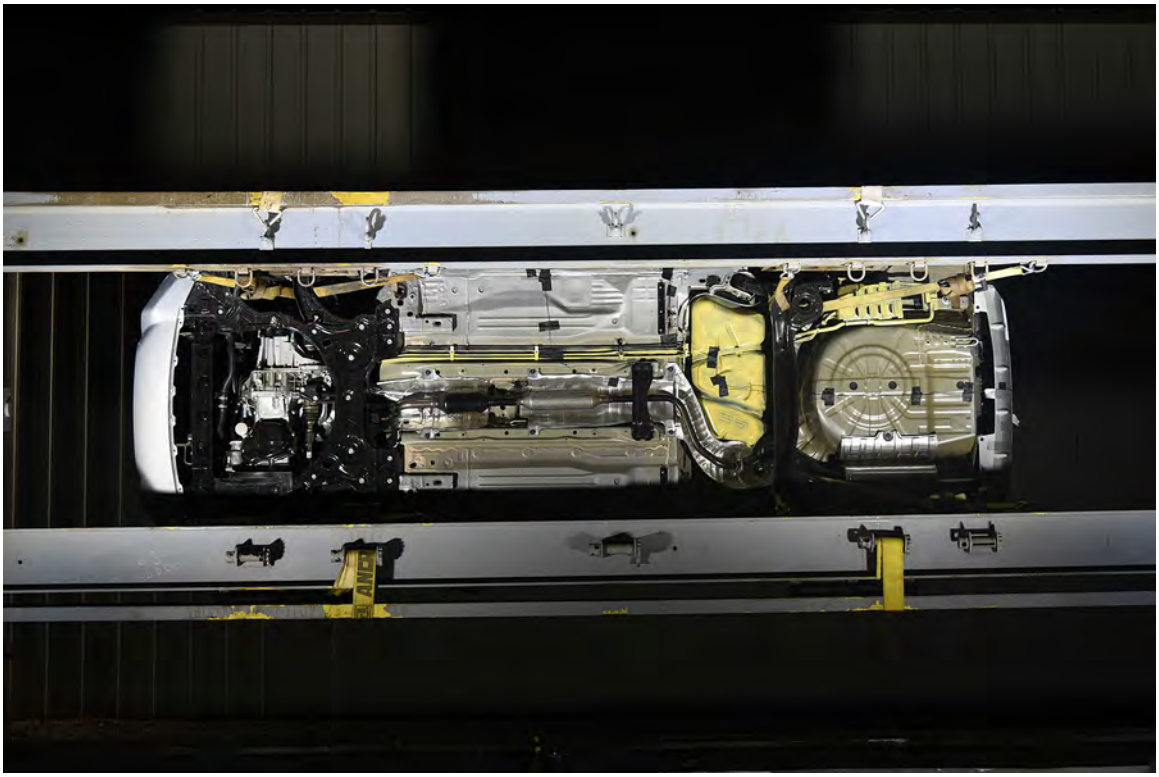


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees

FIGURE 101. Impact Event

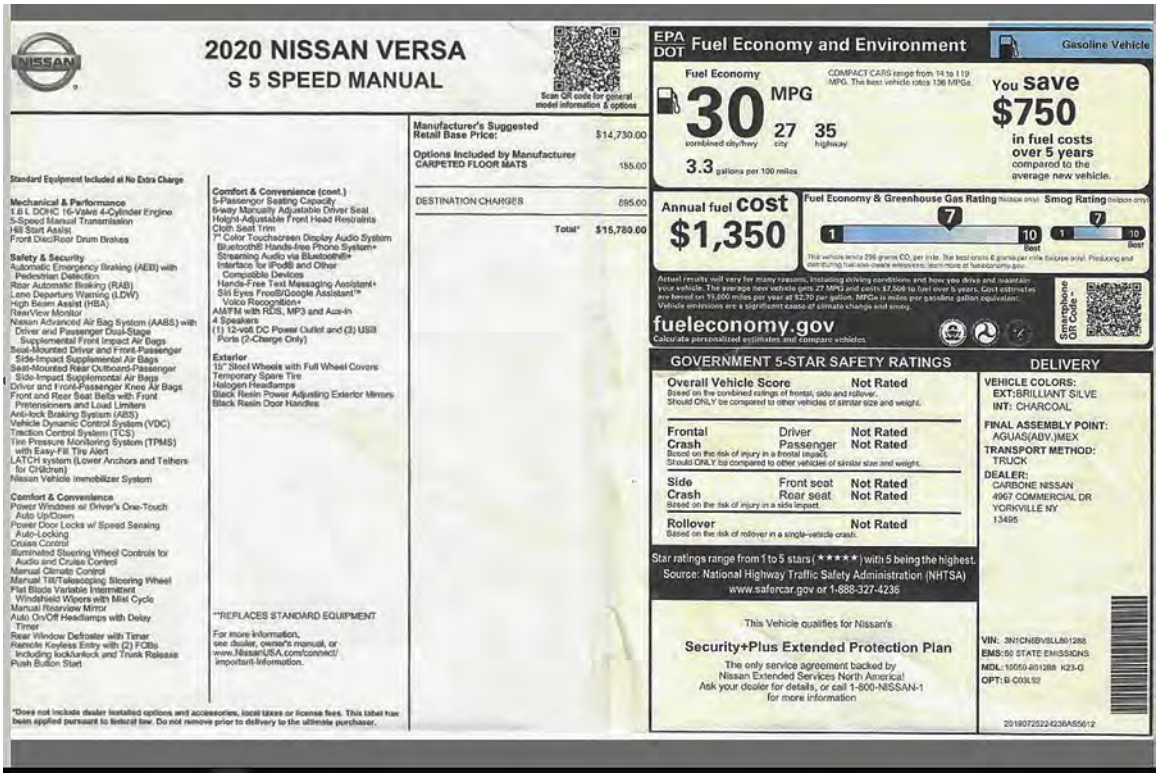
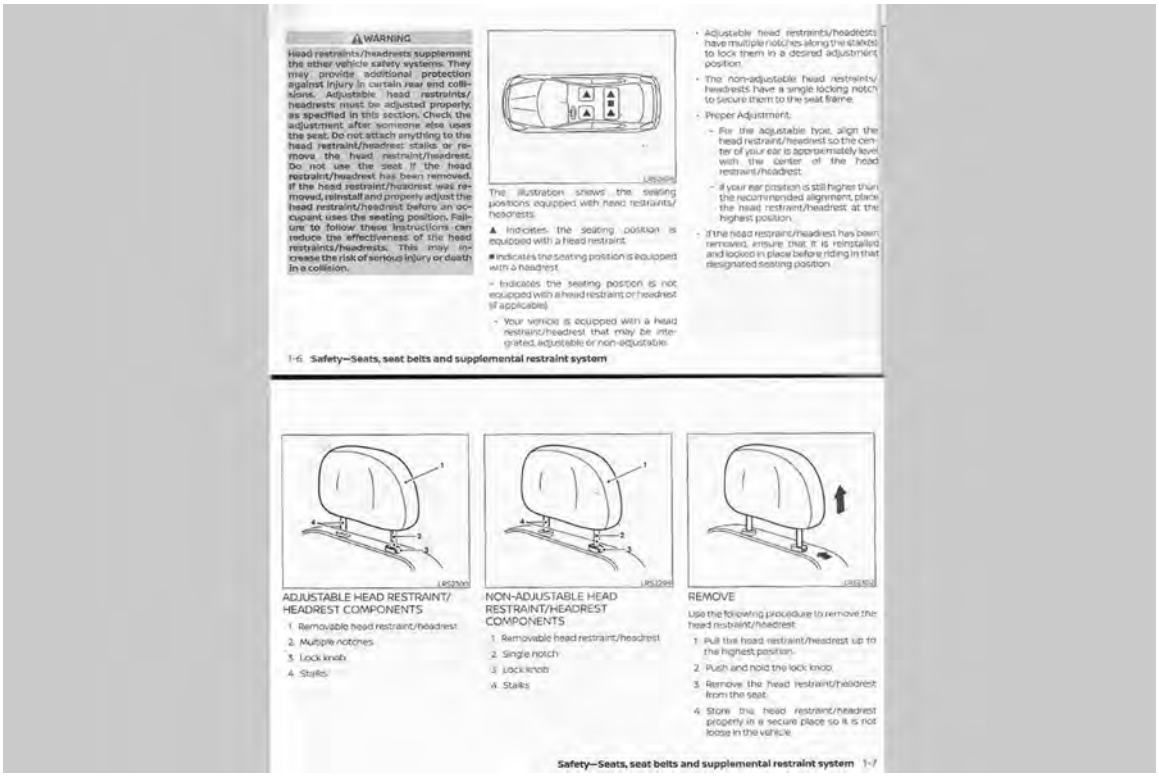


FIGURE 102. Monroney Label



WARNING

Head restraints/headrests supplement the other vehicle safety systems. They may provide additional protection against injury in certain rear end collisions. Adjustable head restraints/headrests must be adjusted properly, as specified in this section. Check the adjustment after someone else uses the seat. Do not attach anything to the head restraint/headrest stalks or remove the head restraint/headrest. Do not use the seat if the head restraint/headrest has been removed. If the head restraint/headrest was removed, reinstall and properly adjust the head restraint/headrest before an occupant uses the seating position. Failure to follow these instructions can reduce the effectiveness of the head restraints/headrests. This may increase the risk of serious injury or death in a collision.

The illustration shows the seating positions equipped with head restraints/headrests.

▲ Indicates the seating position is equipped with a headrest.

■ Indicates the seating position is equipped with a headrest.

– Indicates the seating position is not equipped with a head restraint or headrest (if applicable).

- Your vehicle is equipped with a head restraint/headrest that may be integrated, adjustable or non-adjustable.
- Adjustable head restraints/headrests have multiple notches along the stalks to lock them in a desired adjustment position.
- The non-adjustable head restraints/headrests have a single locking notch to secure them to the seat frame.
- Proper Adjustment:
  - For the adjustable type, align the head restraint/headrest so the center of your ear is approximately level with the center of the head restraint/headrest.
  - If your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.
- If the head restraint/headrest has been removed, ensure that it is reinstalled and locked in place before riding in that designated seating position.

1-6 Safety—Seats, seat belts and supplemental restraint system

ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

1. Removable head restraint/headrest
2. Multiple notches
3. Lock knob
4. Stalks

NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

1. Removable head restraint/headrest
2. Single notch
3. Lock knob
4. Stalks

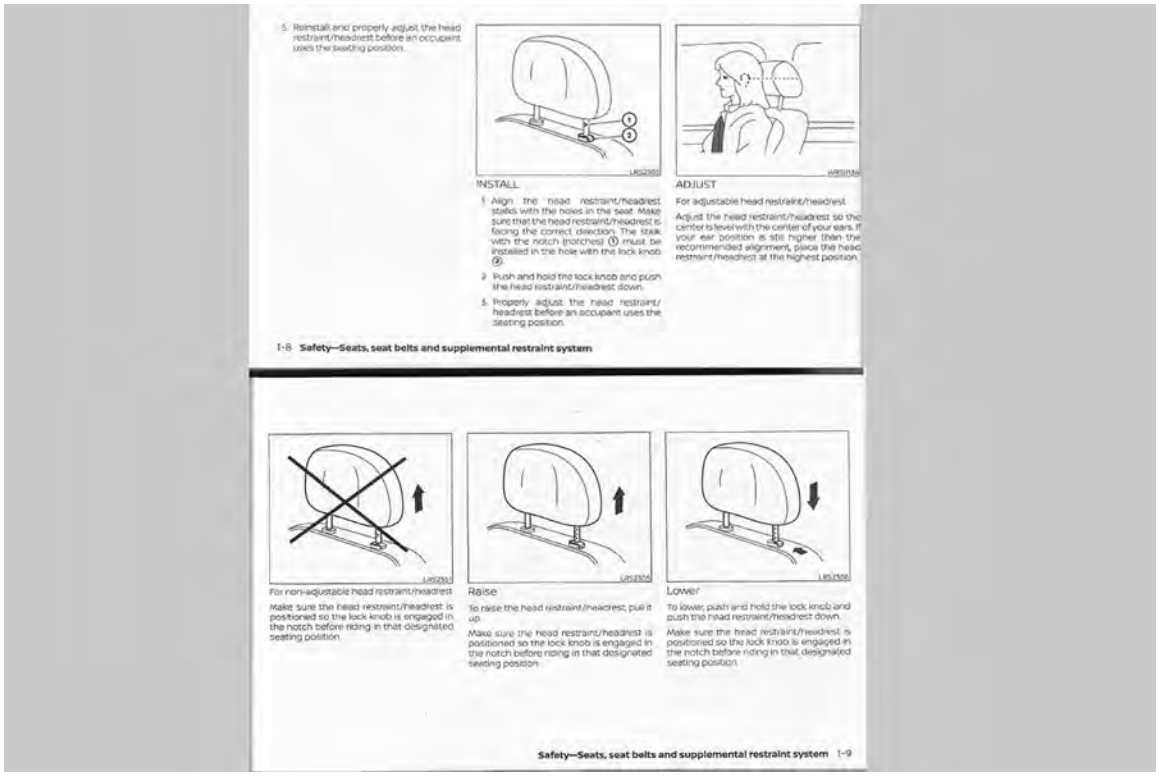
REMOVE

Use the following procedure to remove the head restraint/headrest.

1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not loose in the vehicle.

Safety—Seats, seat belts and supplemental restraint system 1-7

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



5. Reinstall and properly adjust the head restraint/headrest before an occupant uses the seating position.

INSTALL

1. Align the head restraint/headrest stalks with the holes in the seat. Make sure that the head restraint/headrest is facing the correct direction. The stalk with the notch (notches) ① must be installed in the hole with the lock knob ②.
2. Push and hold the lock knob and push the head restraint/headrest down.
3. Properly adjust the head restraint/headrest before an occupant uses the seating position.

ADJUST

For adjustable head restraint/headrest

Adjust the head restraint/headrest so the center is level with the center of your ears. If your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.

1-8 Safety—Seats, seat belts and supplemental restraint system

For non-adjustable head restraint/headrest

Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.

Raise

To raise the head restraint/headrest, pull it up.

Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.

Lower

To lower, push and hold the lock knob and push the head restraint/headrest down.

Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.

Safety—Seats, seat belts and supplemental restraint system 1-9

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

APPENDIX B
DUMMY RESPONSE DATA

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)

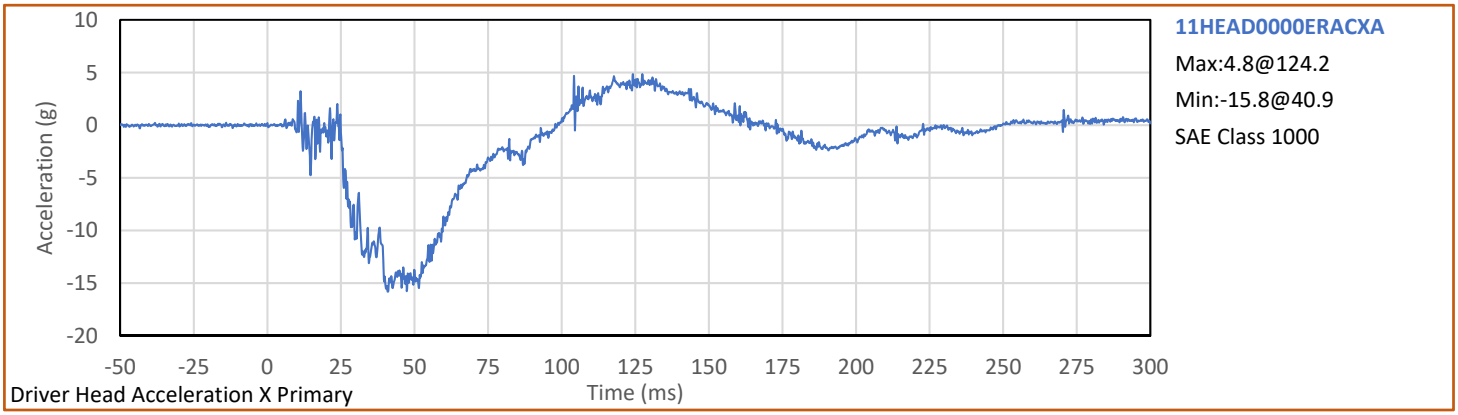
MDB Rear Acceleration (X)

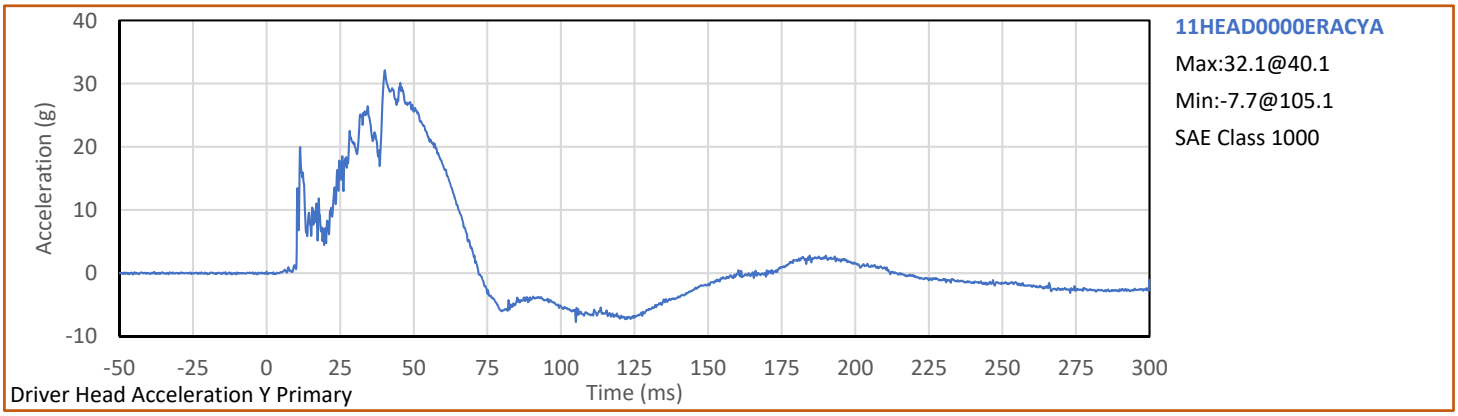
MDB Rear Acceleration (Y)

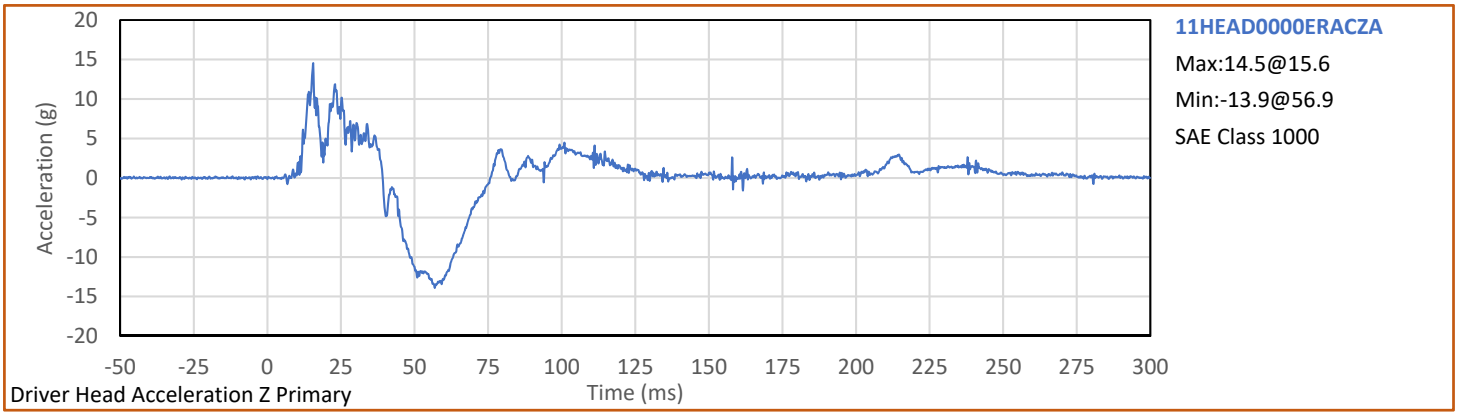
Left MDB Contact Switch

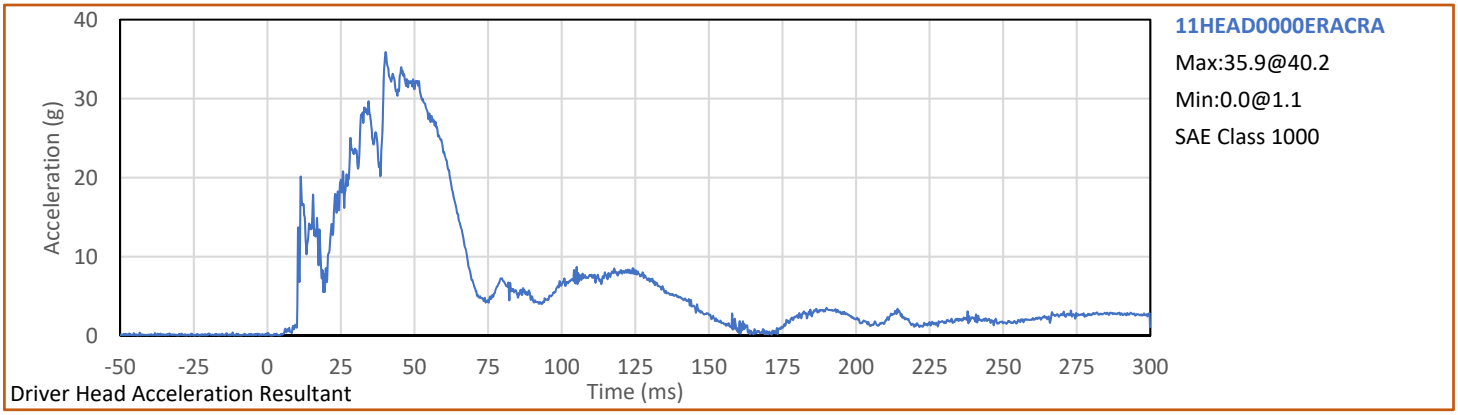
Right MDB Contact Switch

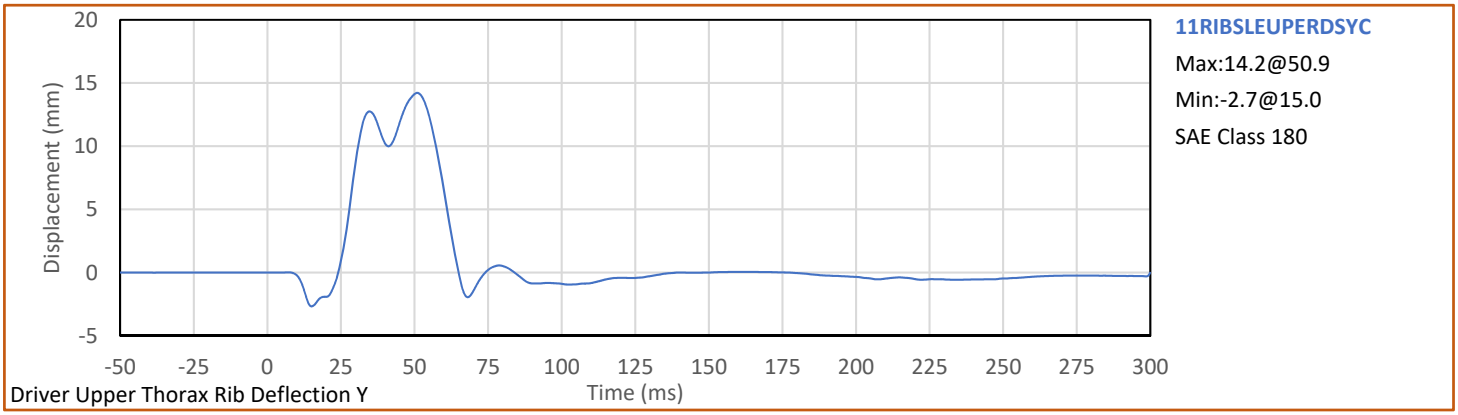
Test Vehicle:	2020 Nissan Versa 4-Door Sedan	NHTSA No.:	M20205217
Test Program:	NCAP MDB Side Impact Test	Test Date:	12/5/2019

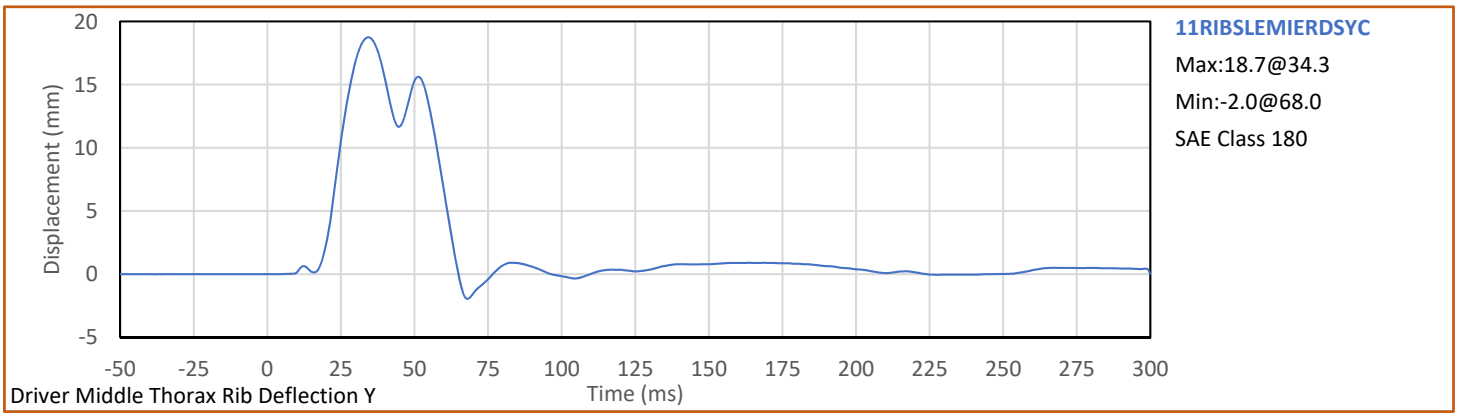


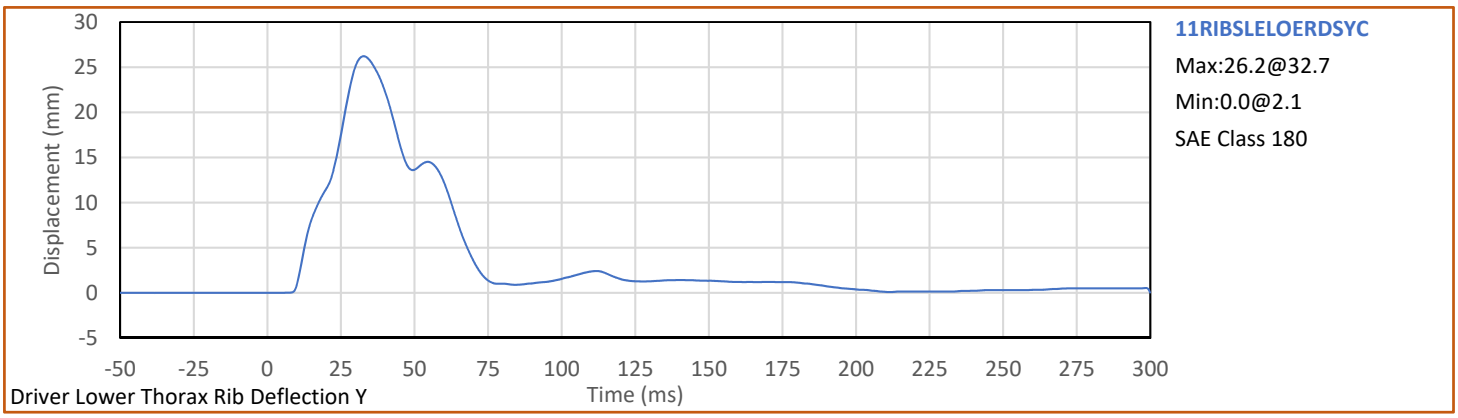


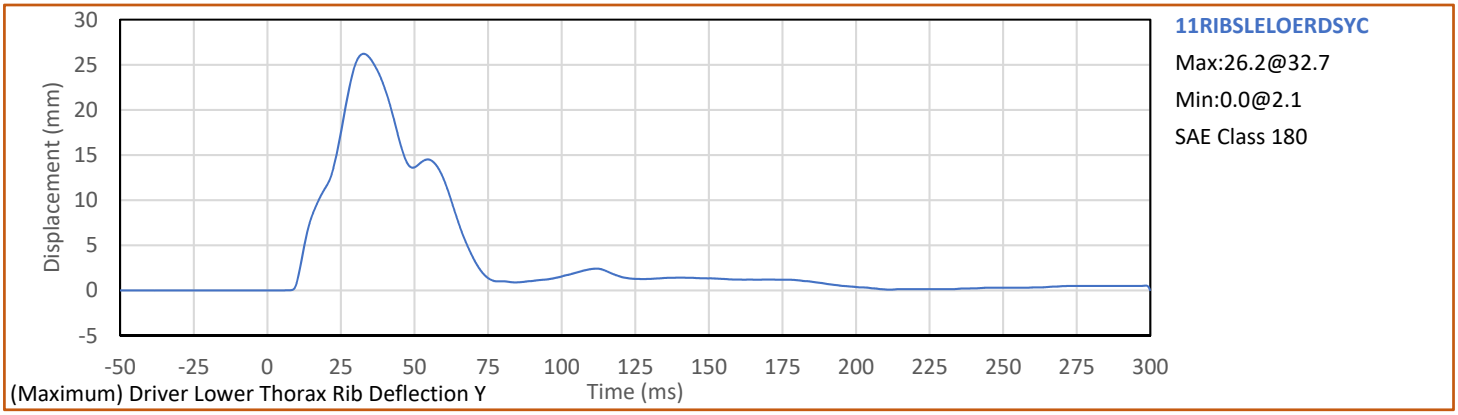




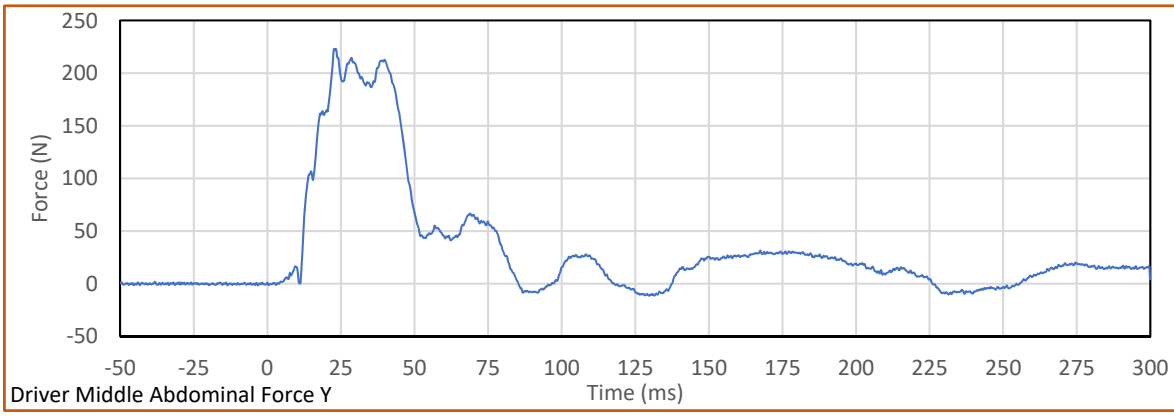

Displacement (mm)
Time (ms)
Driver Upper Thorax Rib Deflection Y
11RIBSLEUPERDSYC
Max:14.2@50.9
Min:-2.7@15.0
SAE Class 180


Displacement (mm)
Time (ms)
Driver Middle Thorax Rib Deflection Y
11RIBSLEMIERDSYC
Max:18.7@34.3
Min:-2.0@68.0
SAE Class 180

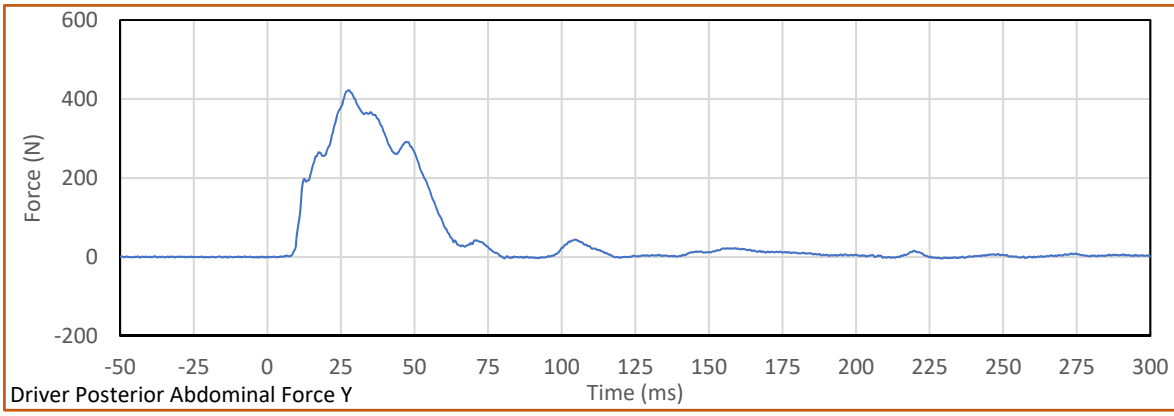

Displacement (mm)
Time (ms)
Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:26.2@32.7
Min:0.0@2.1
SAE Class 180


Displacement (mm)
Time (ms)
(Maximum) Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:26.2@32.7
Min:0.0@2.1
SAE Class 180

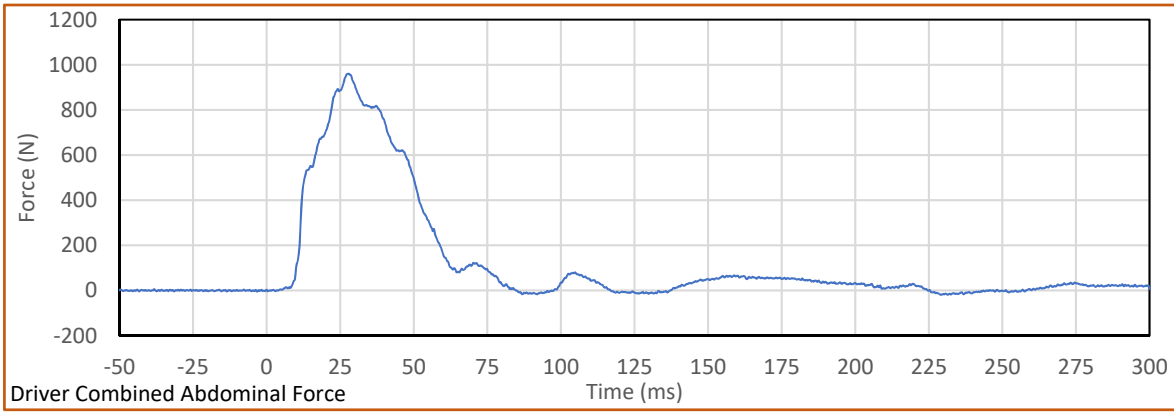
11ABDOLEFRERFOYB
Max:328.3@27.4
Min:-8.6@118.6
SAE Class 600



11ABDOLEMIERFOYB
Max:223.0@23.3
Min:-11.4@129.8
SAE Class 600

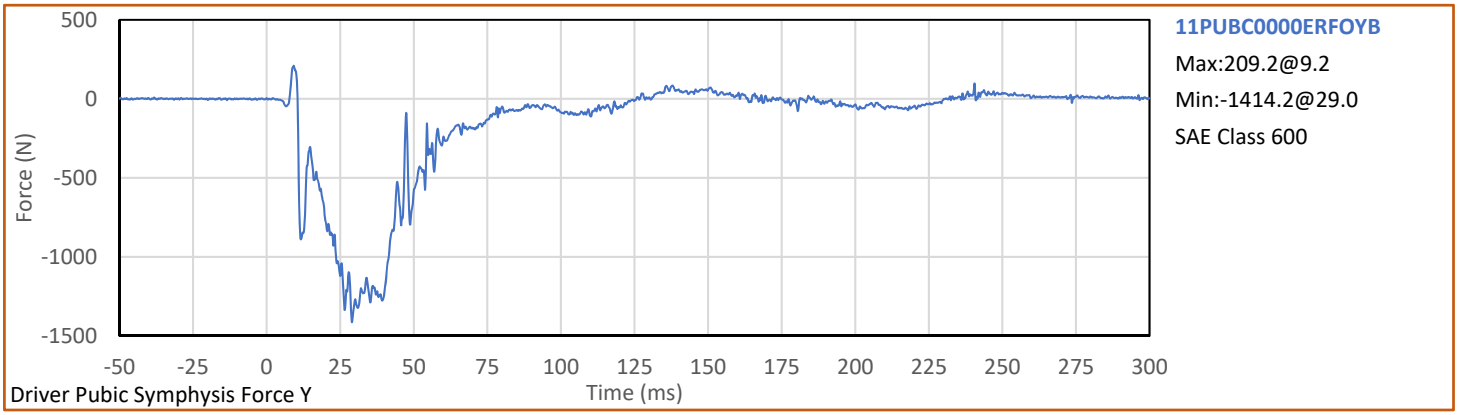


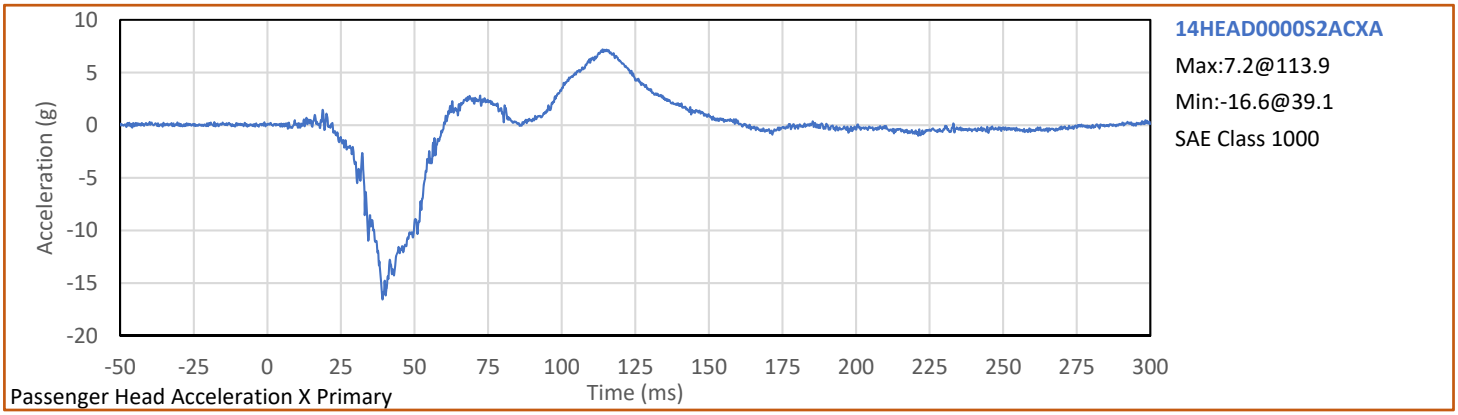
11ABDOLEREERFOYB
Max:422.3@27.7
Min:-3.7@229.3
SAE Class 600



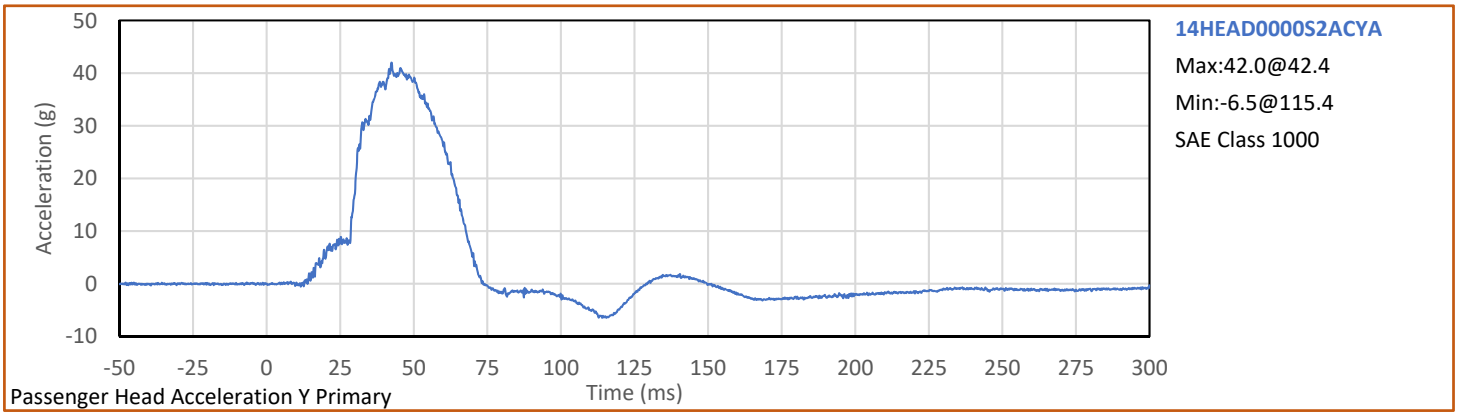
11ABDOLESUERFOYB
Max:960.1@27.9
Min:-19.3@229.1
SAE Class 600

Test Vehicle:	2020 Nissan Versa 4-Door Sedan	NHTSA No.:	M20205217
Test Program:	NCAP MDB Side Impact Test	Test Date:	12/5/2019

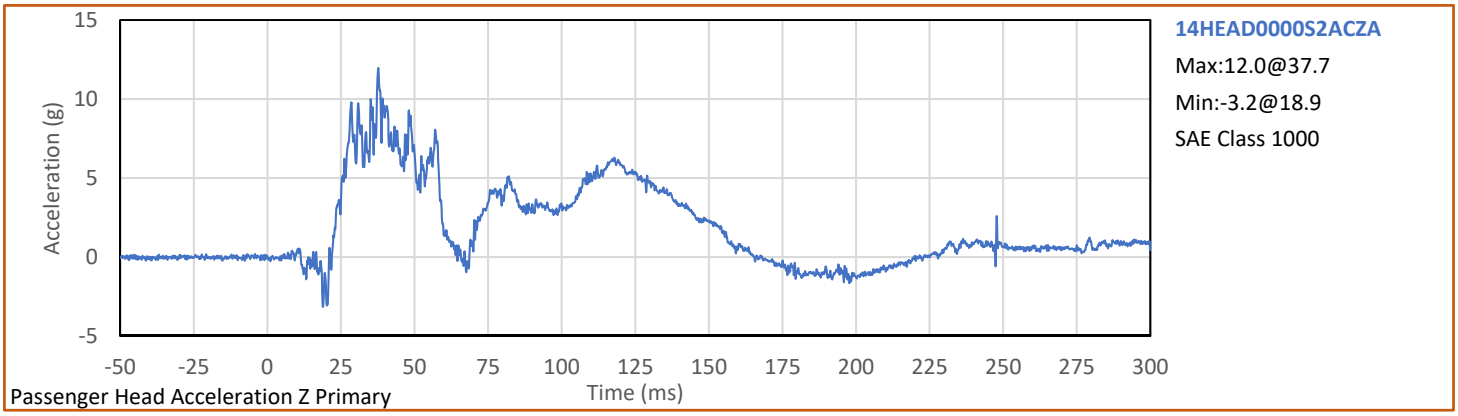




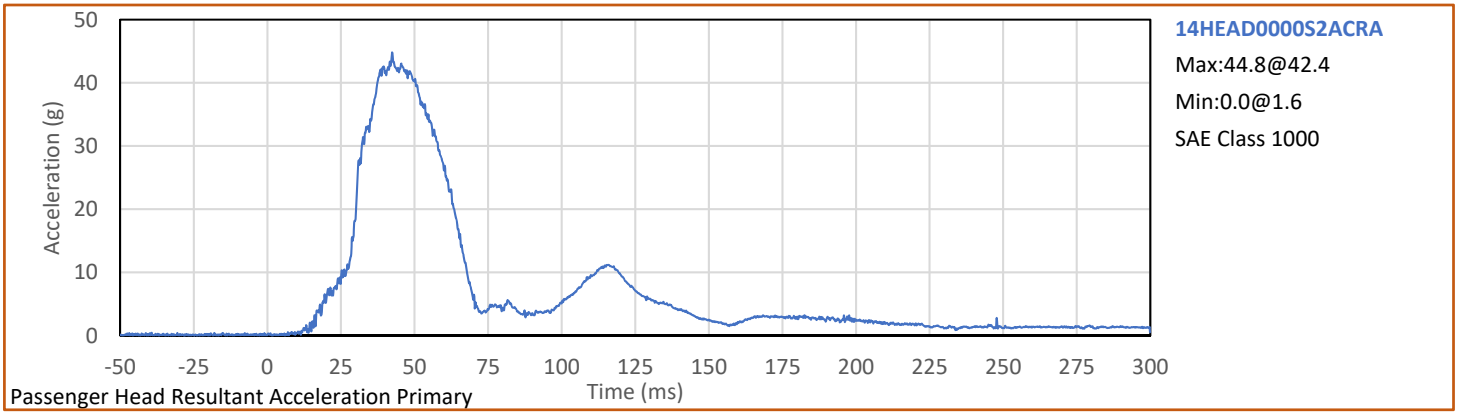
Passenger Head Acceleration X Primary



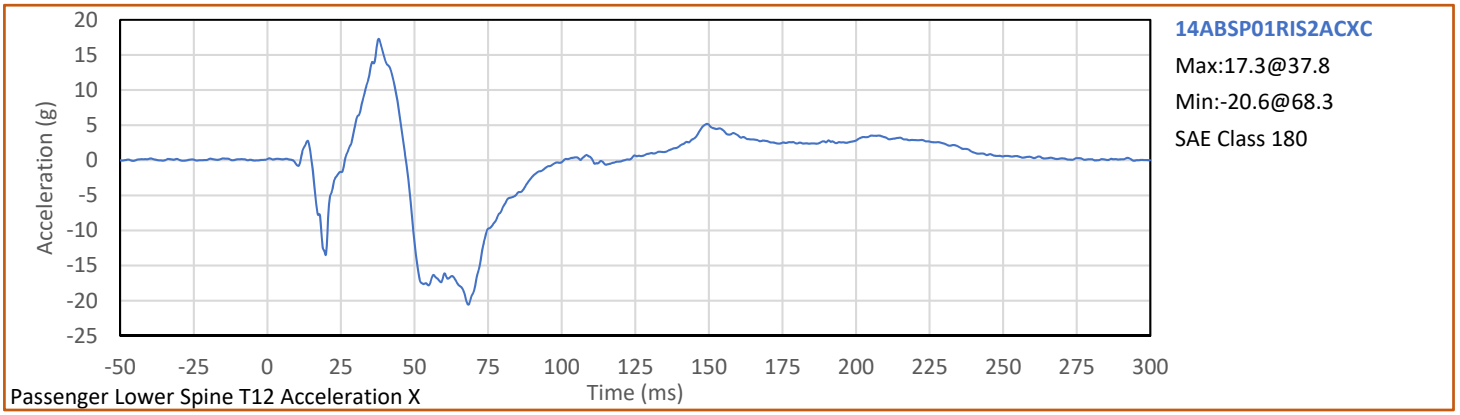
Passenger Head Acceleration Y Primary



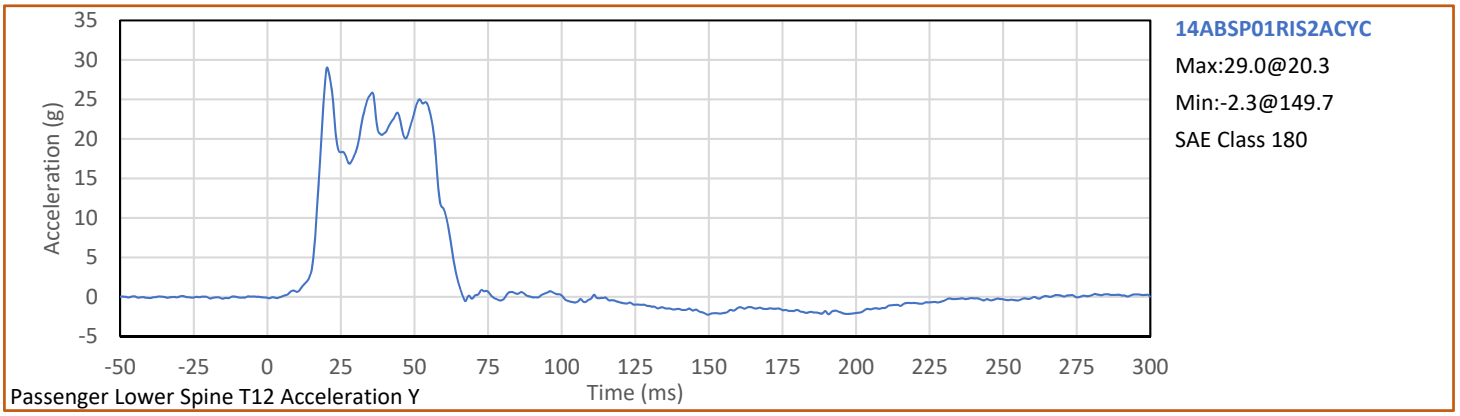
Passenger Head Acceleration Z Primary



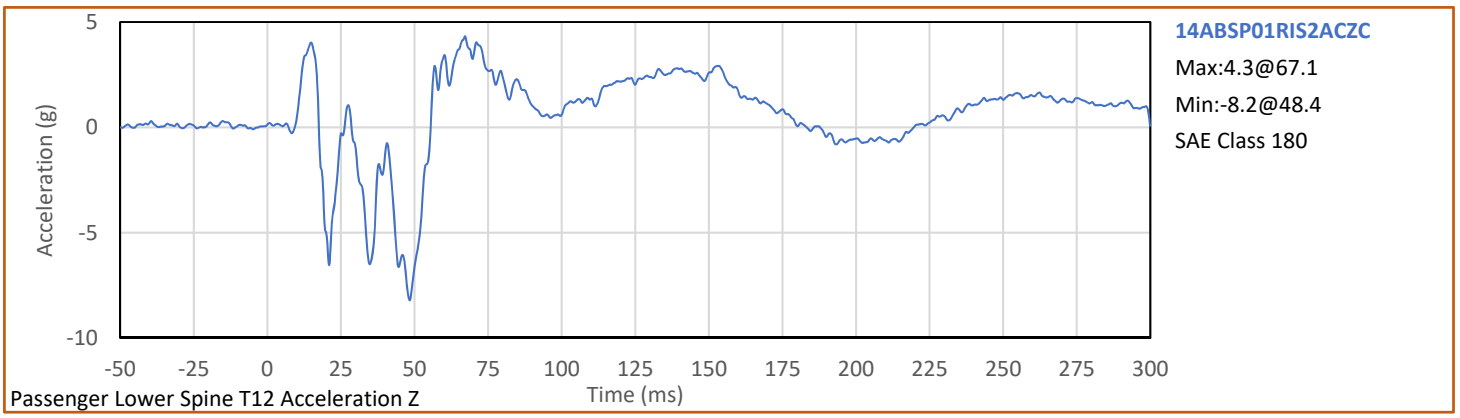
Passenger Head Resultant Acceleration Primary



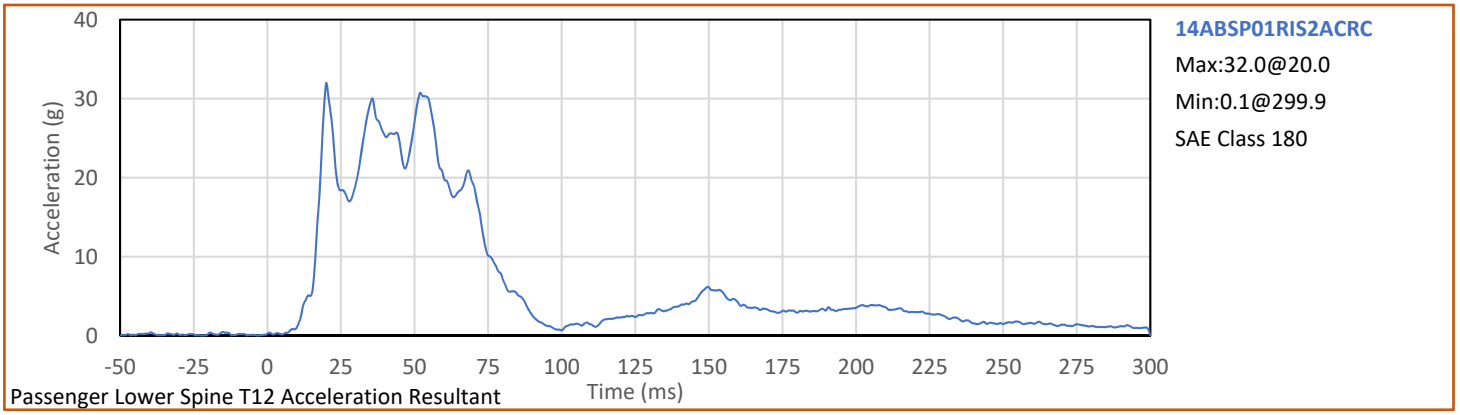
Passenger Lower Spine T12 Acceleration X



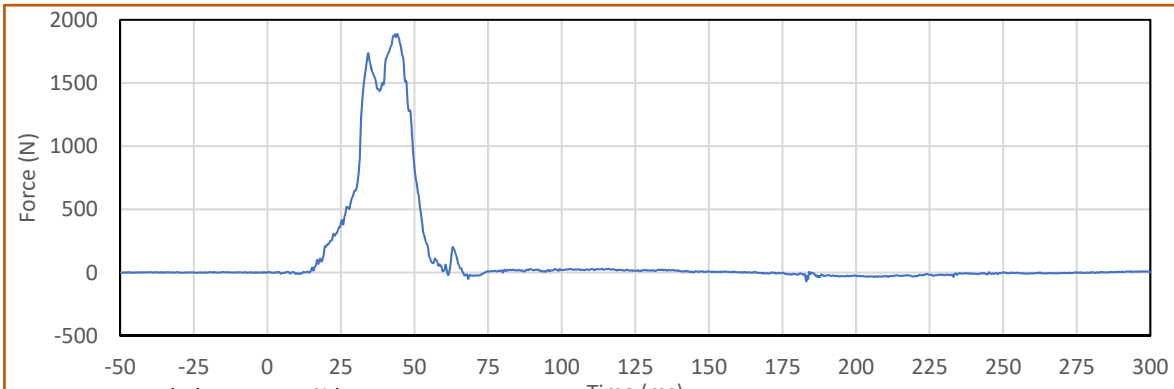
Passenger Lower Spine T12 Acceleration Y



Passenger Lower Spine T12 Acceleration Z

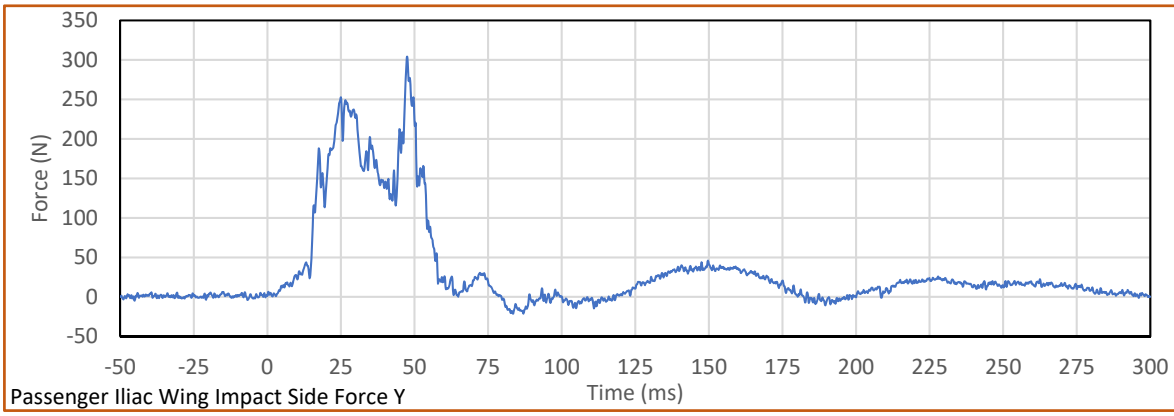


Passenger Lower Spine T12 Acceleration Resultant



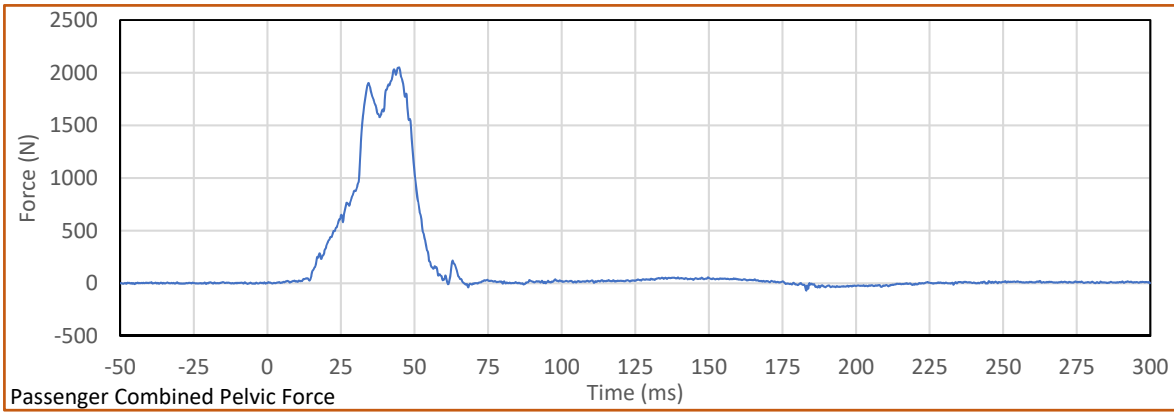
Passenger Acetabulum Impact Side Force Y

14ACTBLE00S2FOYB
Max:1887.7@44.1
Min:-69.6@183.1
SAE Class 600



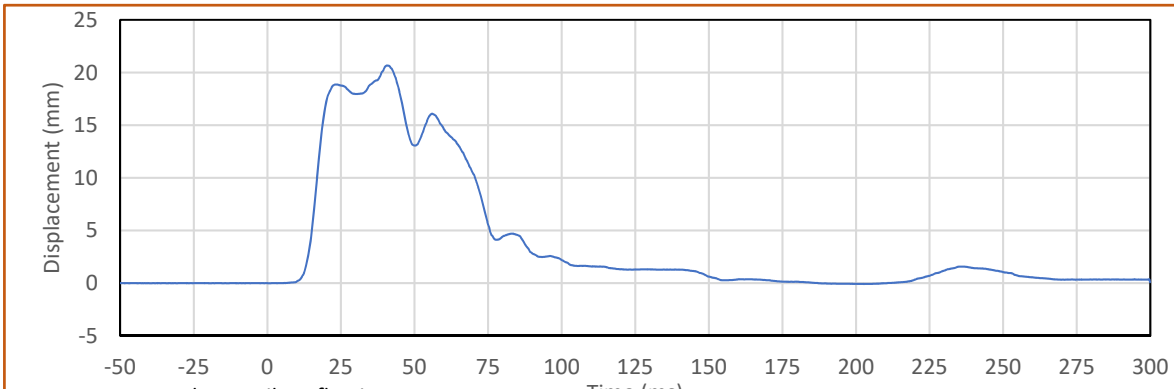
Passenger Iliac Wing Impact Side Force Y

14ILACLE00S2FOYB
Max:304.2@47.5
Min:-21.2@83.5
SAE Class 600



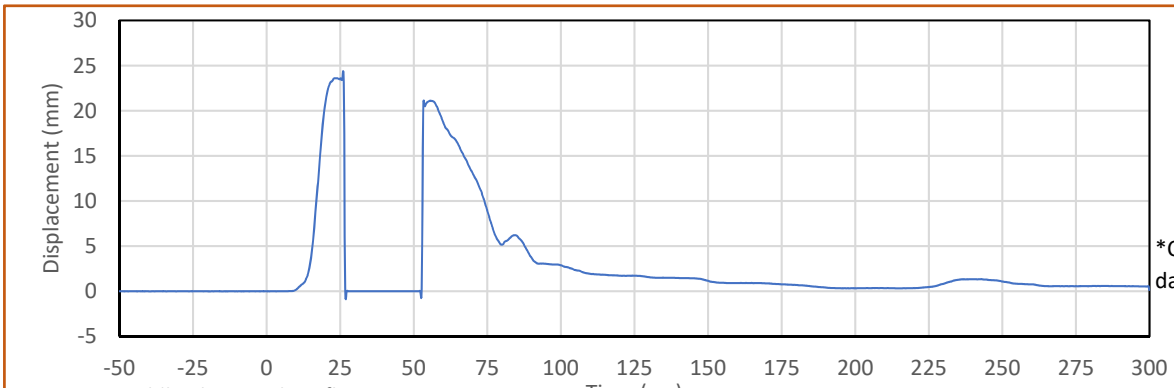
Passenger Combined Pelvic Force

14PELVLE00S2FOYB
Max:2050.1@44.7
Min:-69.1@183.1
SAE Class 600



Passenger Upper Thorax Rib Deflection Y

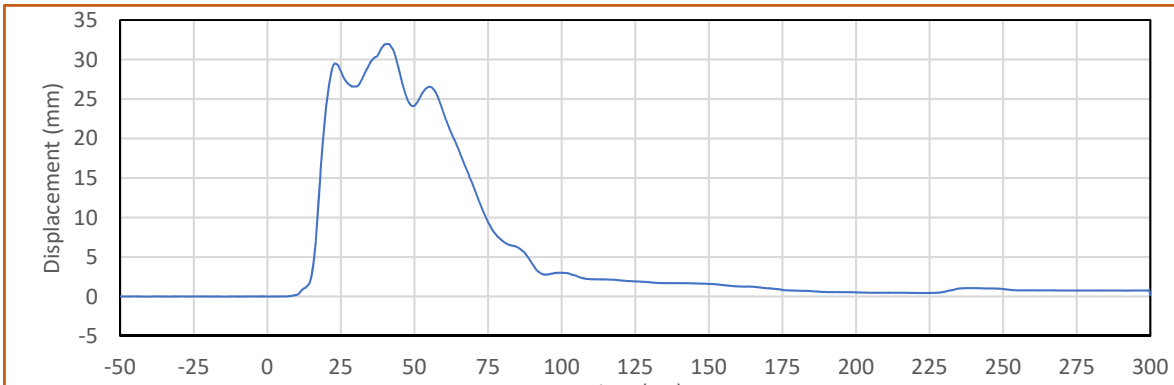
14TRRI01LES2DSYB
Max:20.7@40.6
Min:-0.1@202.6
SAE Class 600



Passenger Middle Thorax Rib Deflection Y

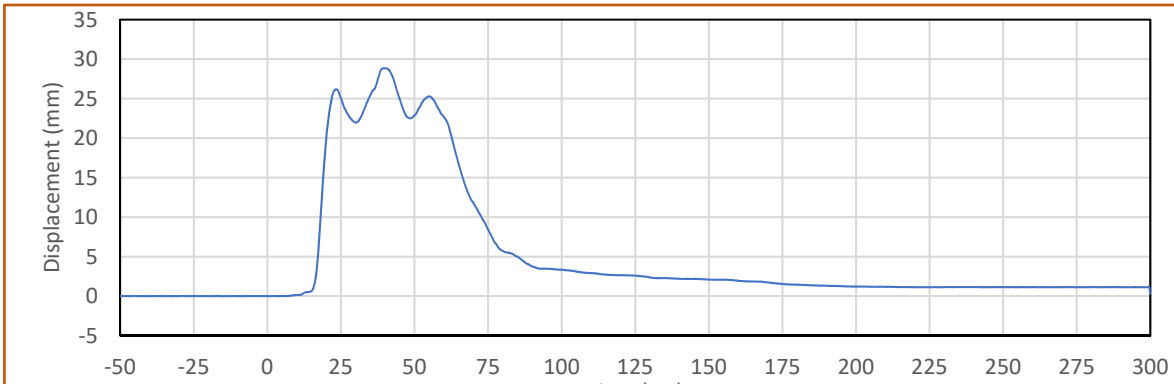
14TRRI02LES2DSYB
Max:24.4@26.0
Min:-0.9@26.9
SAE Class 600

*Channel failed to record data between 26 and 35 ms



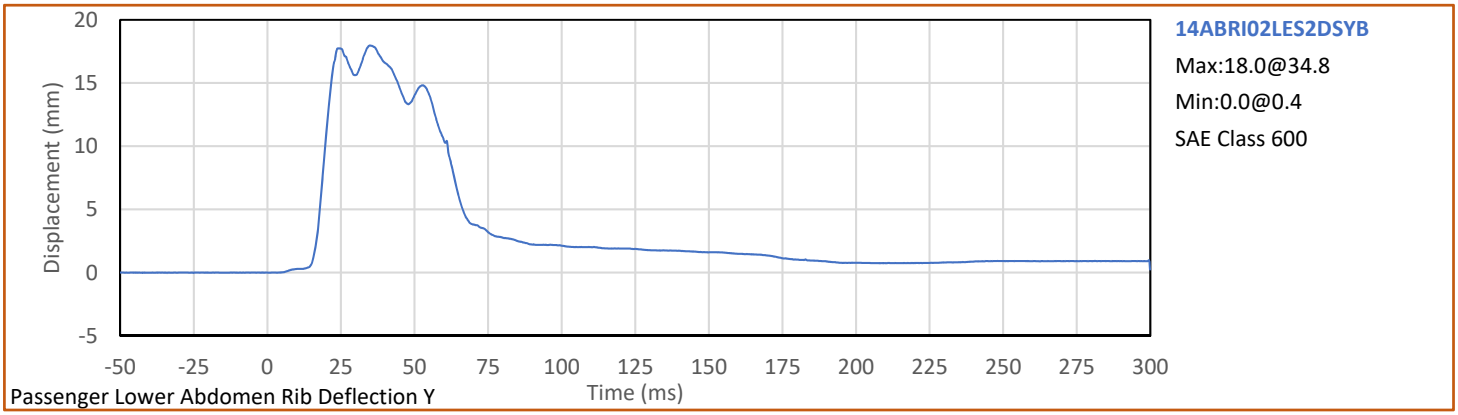
Passenger Lower Thorax Rib Deflection Y

14TRRI03LES2DSYB
Max:32.0@40.5
Min:0.0@3.3
SAE Class 600



Passenger Upper Abdomen Rib Deflection Y

14ABRI01LES2DSYB
Max:28.8@39.6
Min:0.0@0.4
SAE Class 600



Passenger Lower Abdomen Rib Deflection 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
S/N: F037

Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-11-20

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
1 - Sitting Height	mm	900	918	904	Pass
2 - Seat to Shoulder Joint	mm	558	572	564	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	350	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	100	Pass
5 - Sole to Seat, Sitting	mm	433	451	441	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	471	Pass
8 - Thorax Width	mm	322	332	327	Pass
9 - Abdomen Width	mm	273	287	278	Pass
10 - Pelvis Lap Width	mm	359	373	368	Pass
11 - Head Depth	mm	196	206	200	Pass
12 - Thorax Depth	mm	262	272	268	Pass
13 - Abdomen Depth	mm	194	204	201	Pass
14 - Pelvis Depth	mm	235	245	243	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	611	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

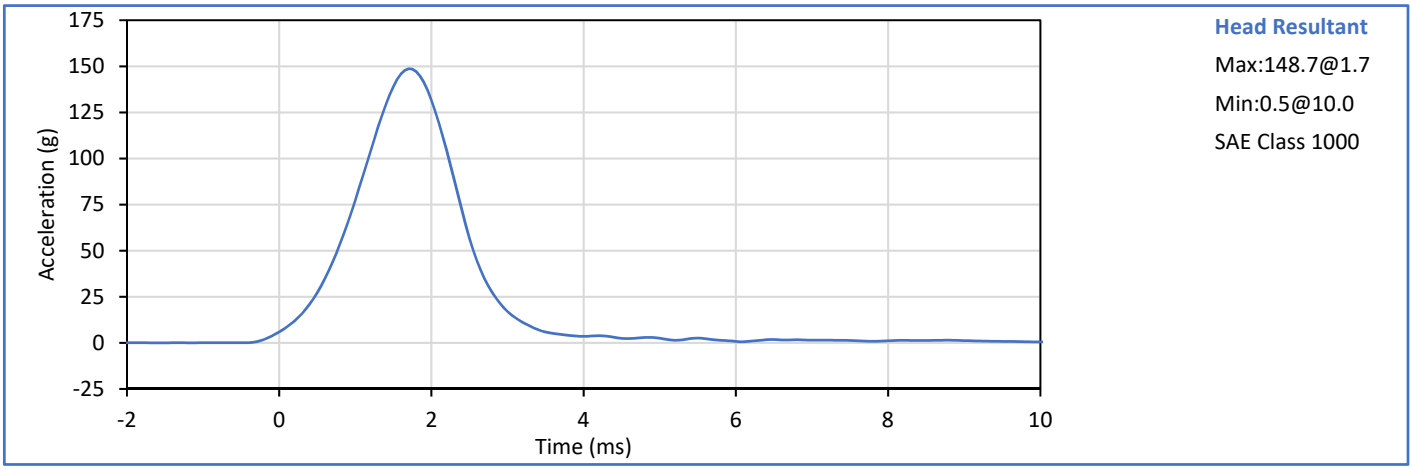
Approved By: P. Puzzuto

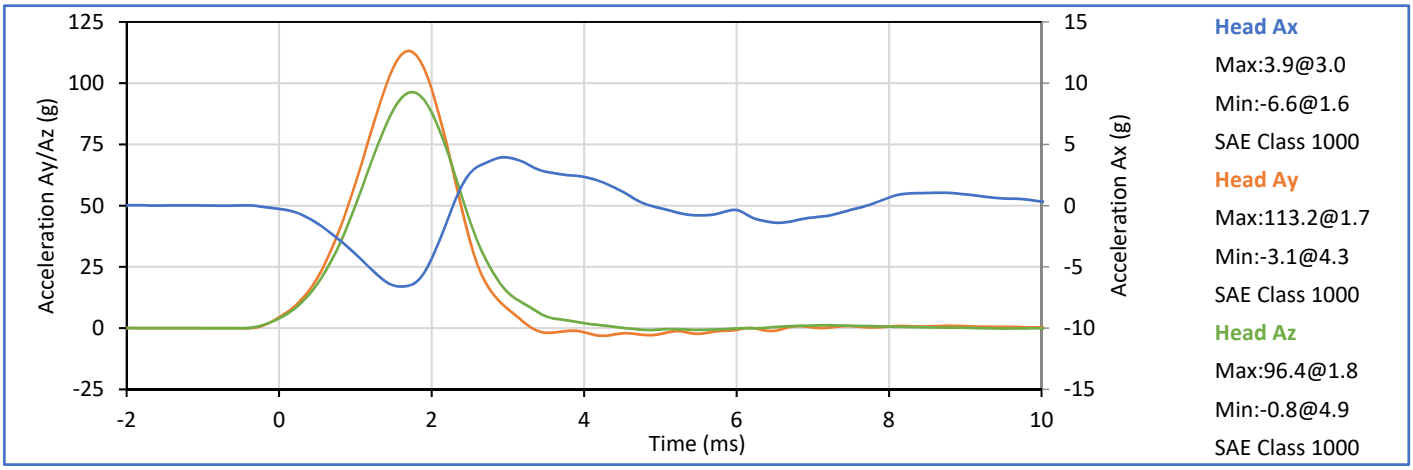
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Peak Resultant Acceleration	g	125.0	155.0	148.7	Pass
Peak Head Ax	g	-15.0	15.0	3.9	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

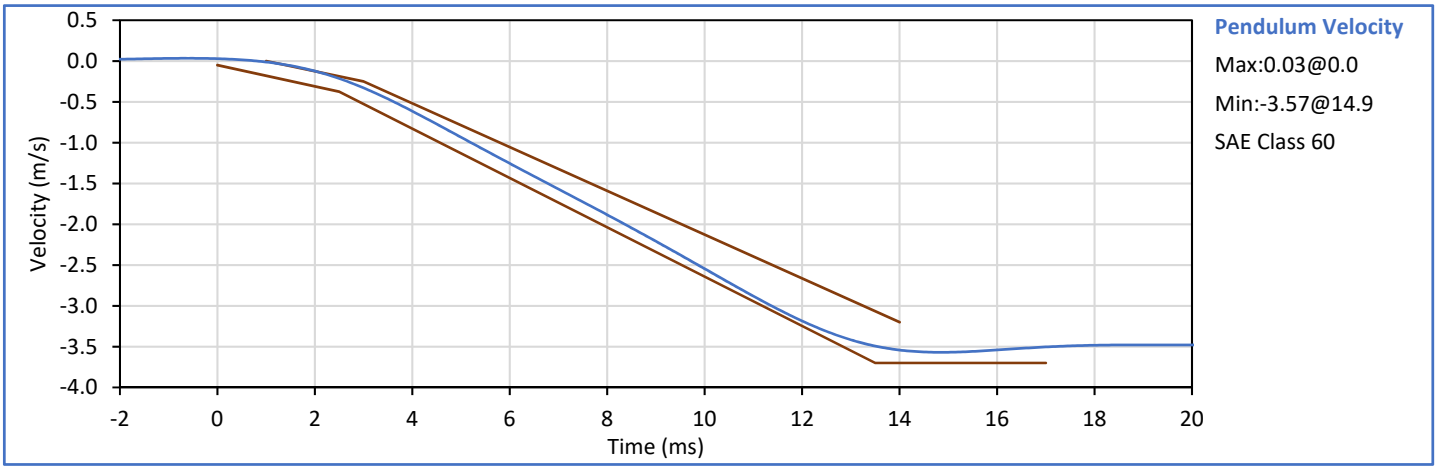
Approved By: P. Puzzuto

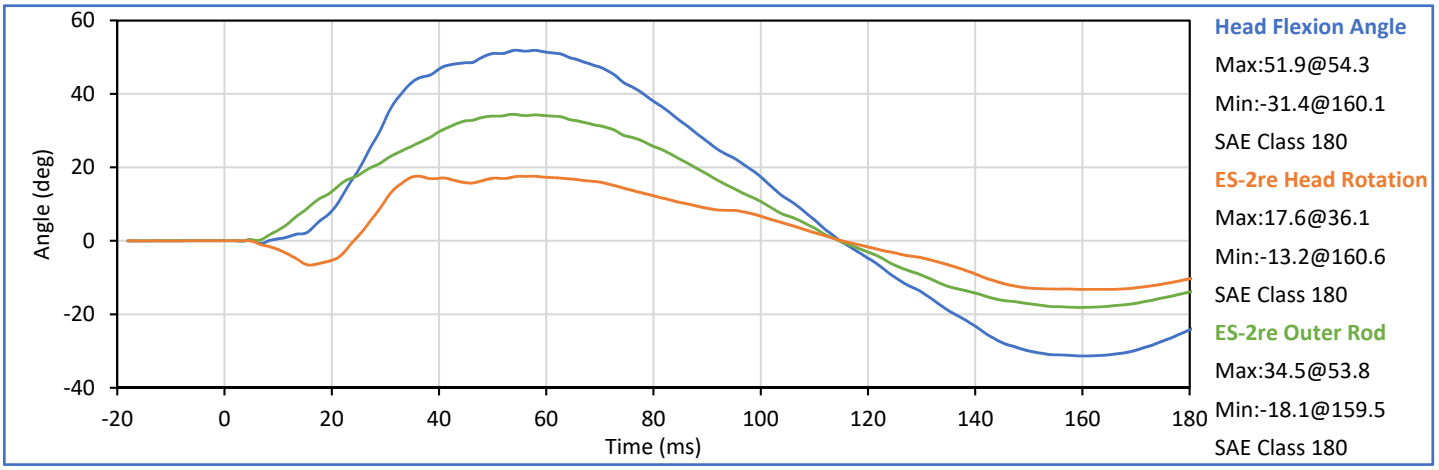
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Pendulum Velocity	m/s	3.30	3.50	3.46	Pass
Peak Headform Flexion	deg	49.0	59.0	51.9	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	54.3	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	60.5	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

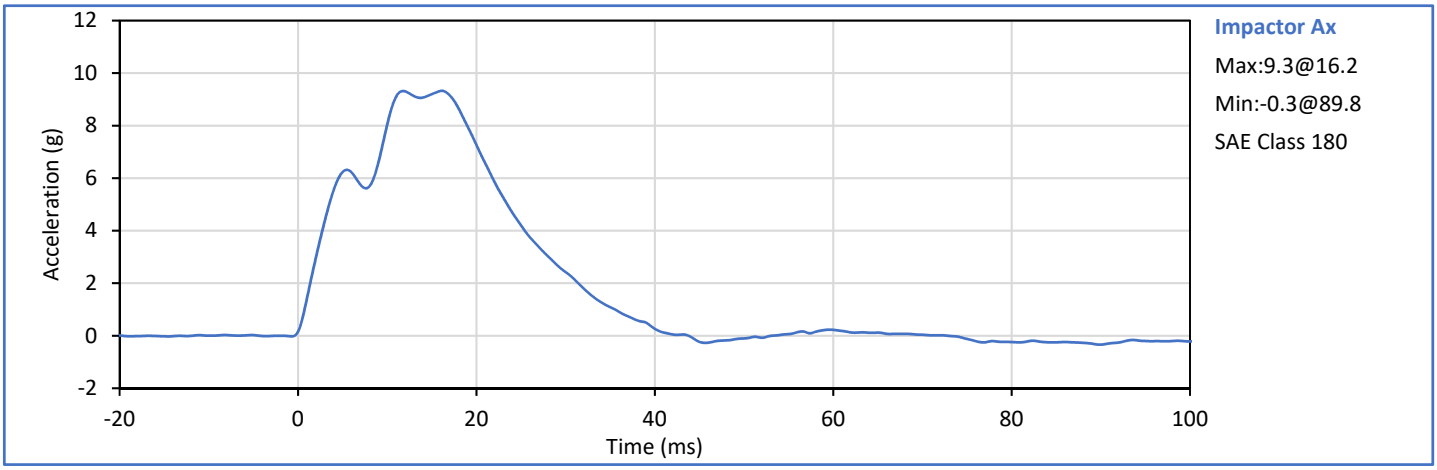
Applus IDIADA KARCO

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

ATD Serial No.: F037

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	31	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Impactor Ax	g	7.5	10.5	9.3	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

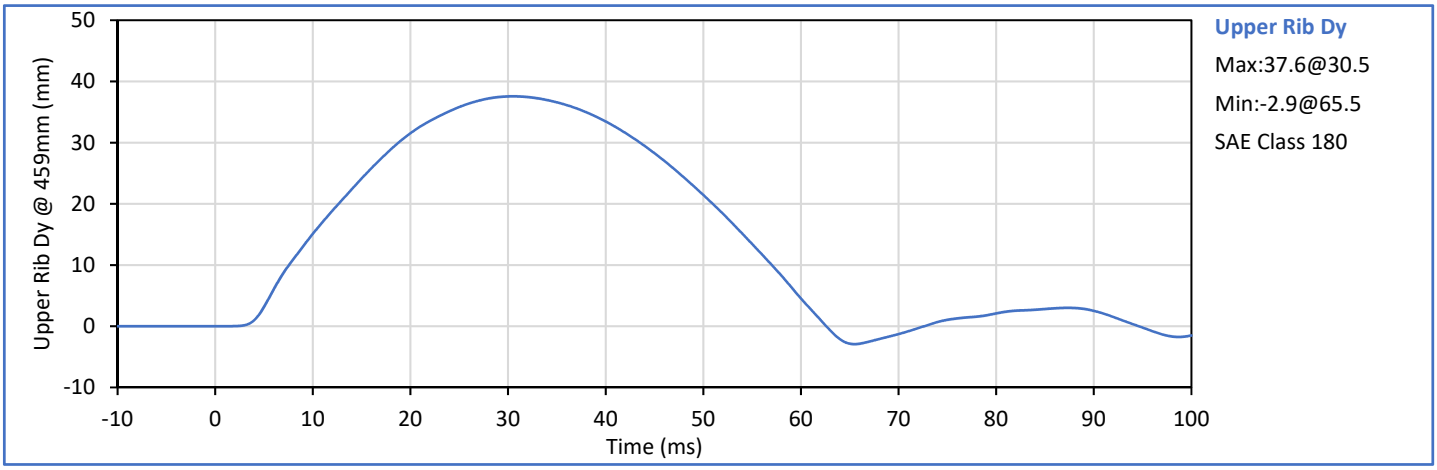
Applus IDIADA KARCO

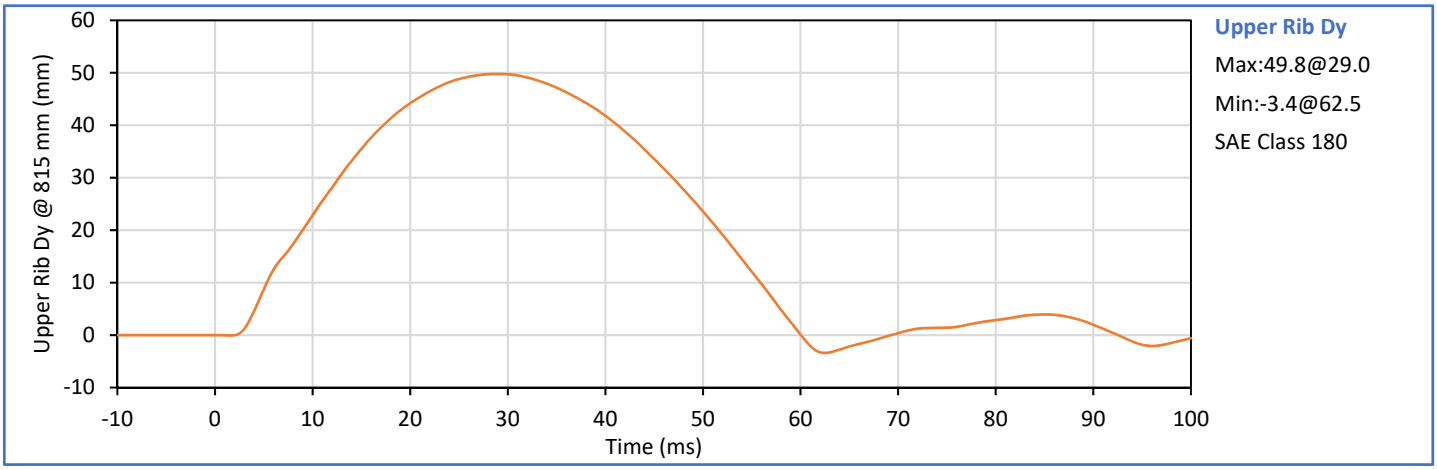
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F037

Test Date: 2019-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	34	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.6	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	49.8	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

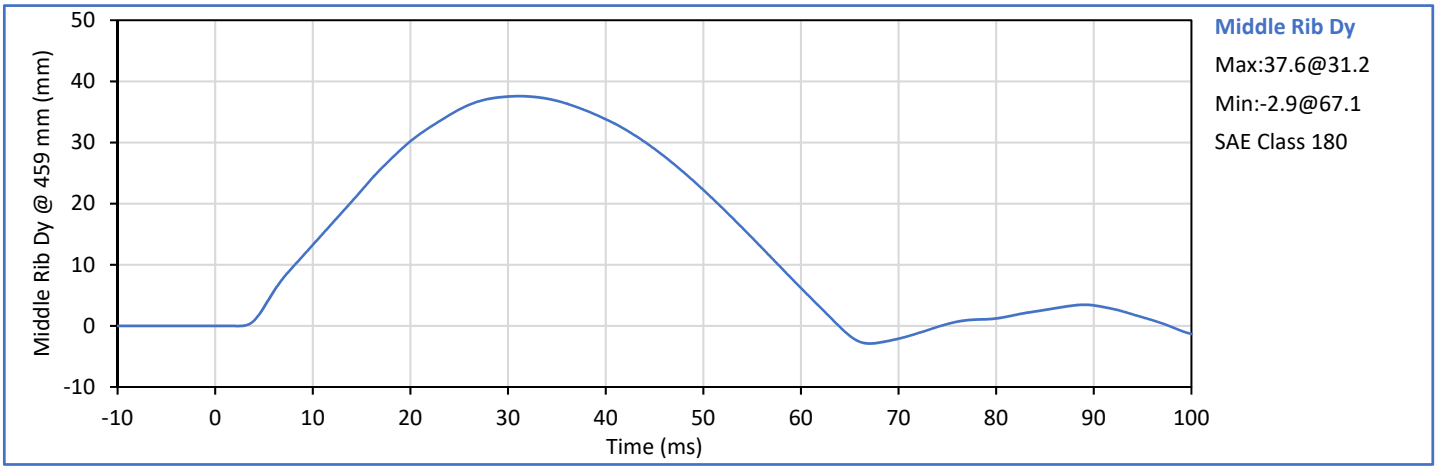
Applus IDIADA
KARCO

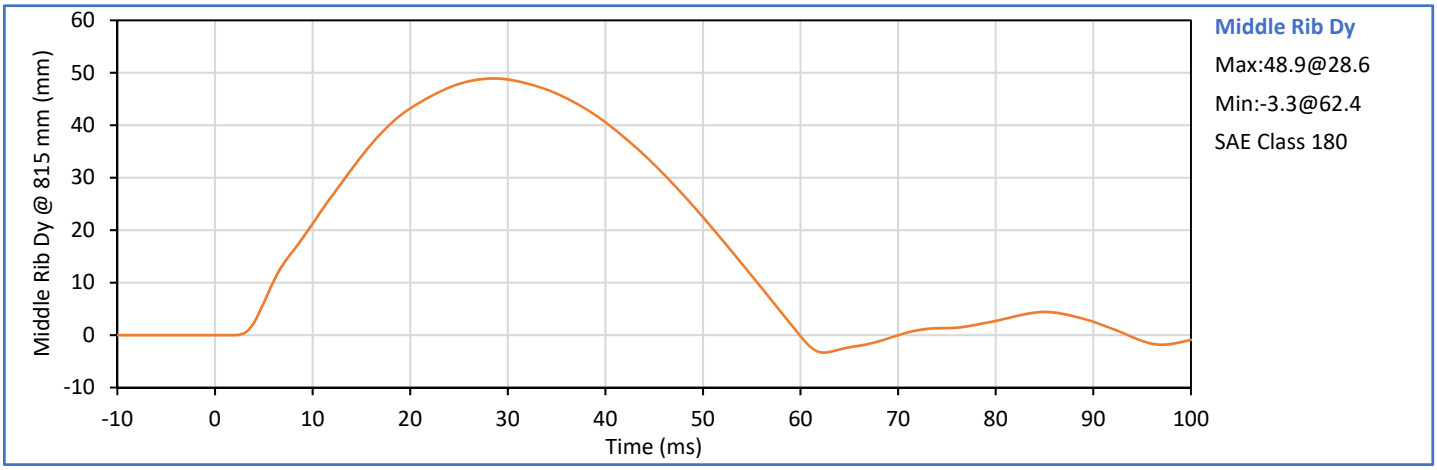
ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F037

Test Date: 2019-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	34	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.6	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	48.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

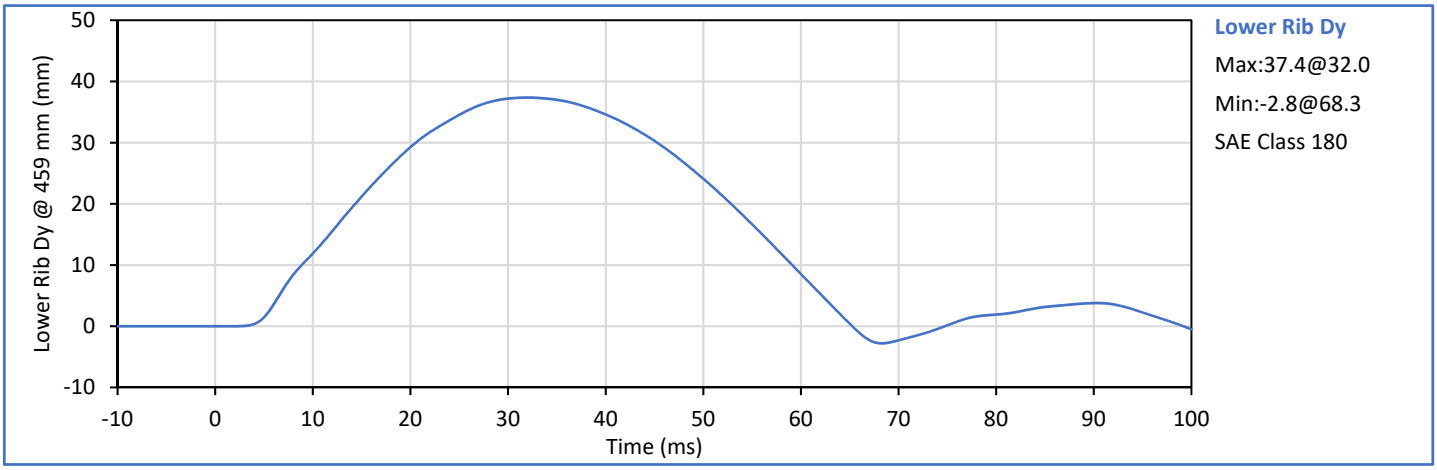
Applus IDIADA
KARCO

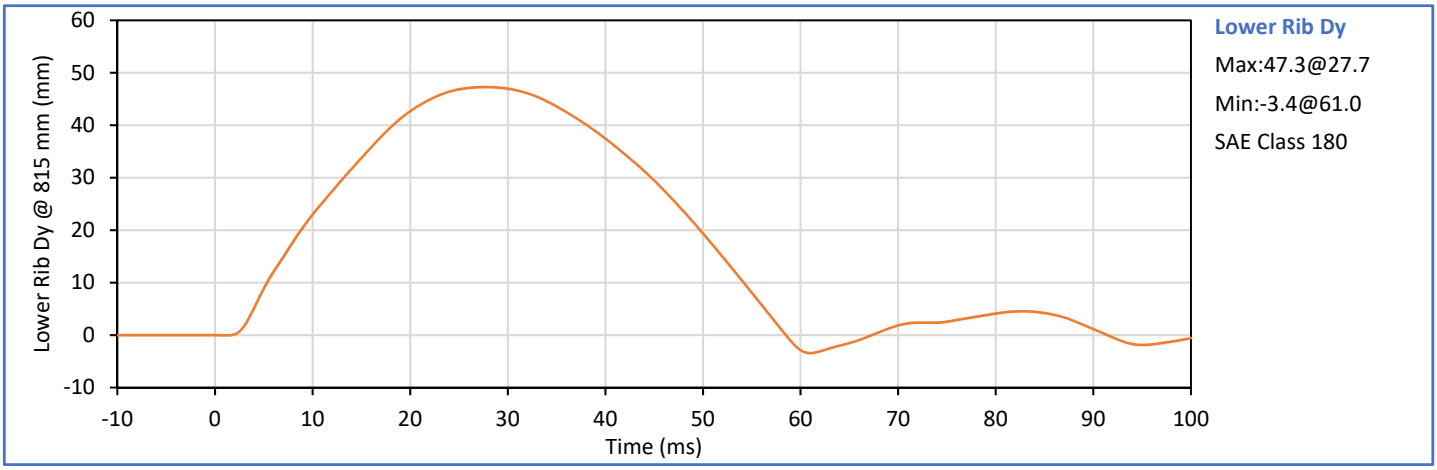
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2019-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	34	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.4	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	47.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

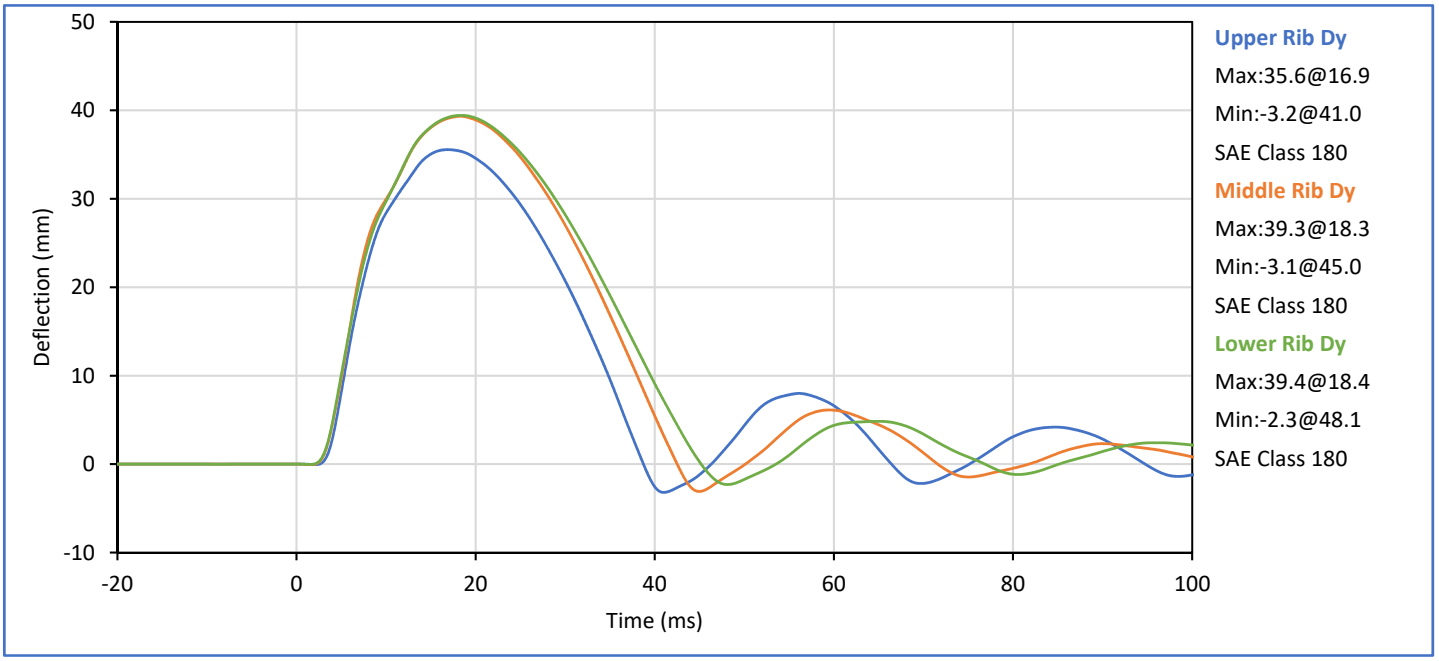
Applus IDIADA
KARCO

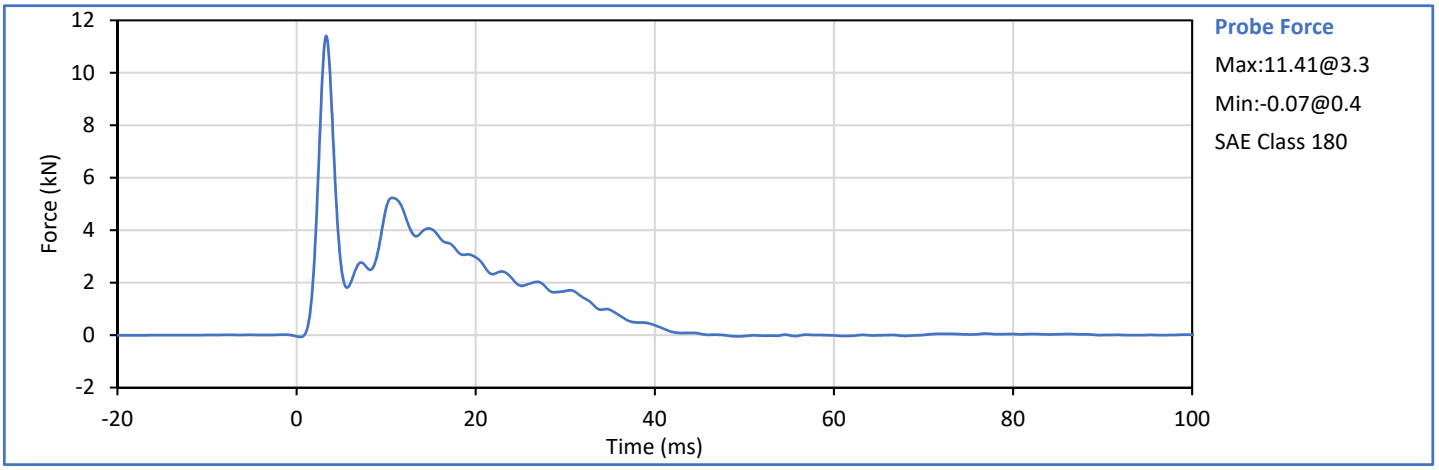
ES-2re 50th Male Side Impact ATD
Thorax Impact (Full Body)

ATD Serial No.: F037

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	31	Pass
Impactor Velocity	m/s	5.40	5.60	5.53	Pass
Peak Upper Rib Dy	mm	34.0	41.0	35.6	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.3	Pass
Peak Lower Rib Dy	mm	37.0	44.0	39.4	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.23	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

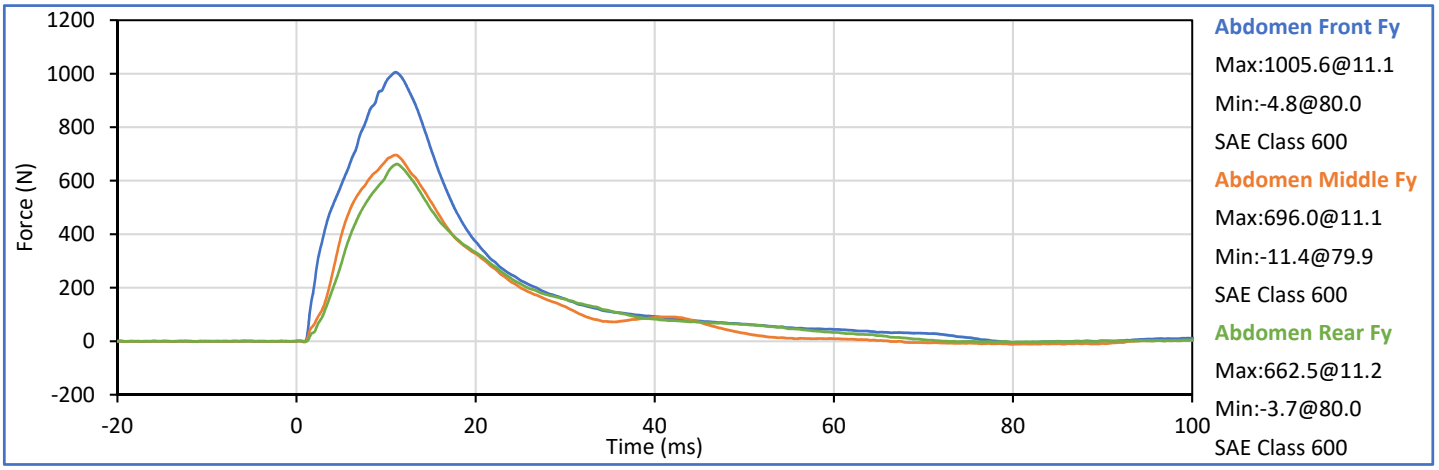
Approved By: P. Puzzuto

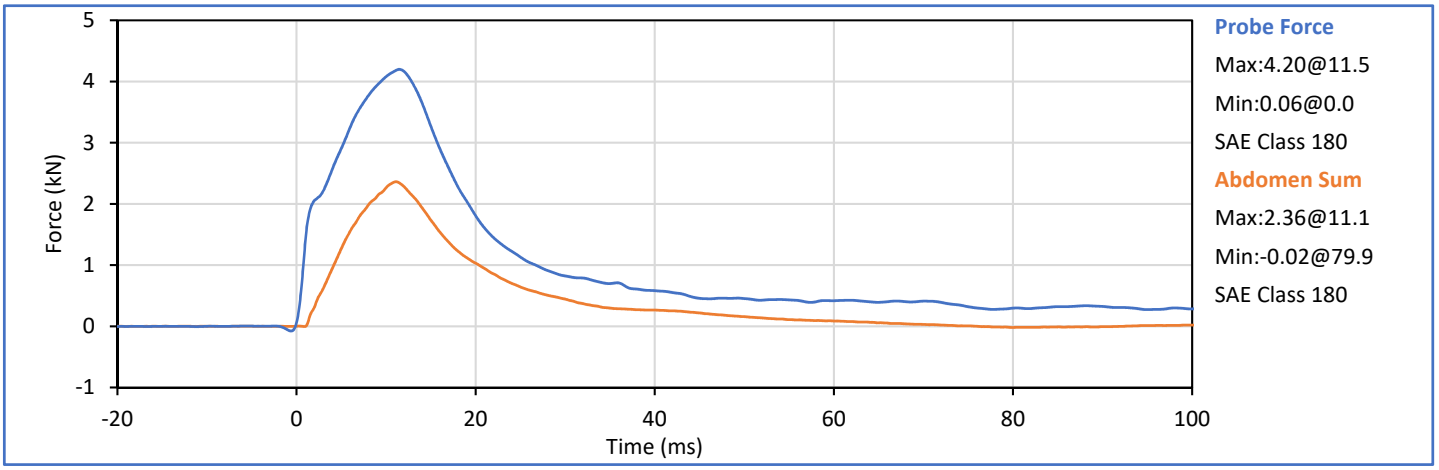
Applus IDIADA
KARCO

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

ATD Serial No.: F037 Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	3.90	4.10	4.02	Pass
Peak Impactor Force	kN	4.00	4.80	4.20	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.5	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.36	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

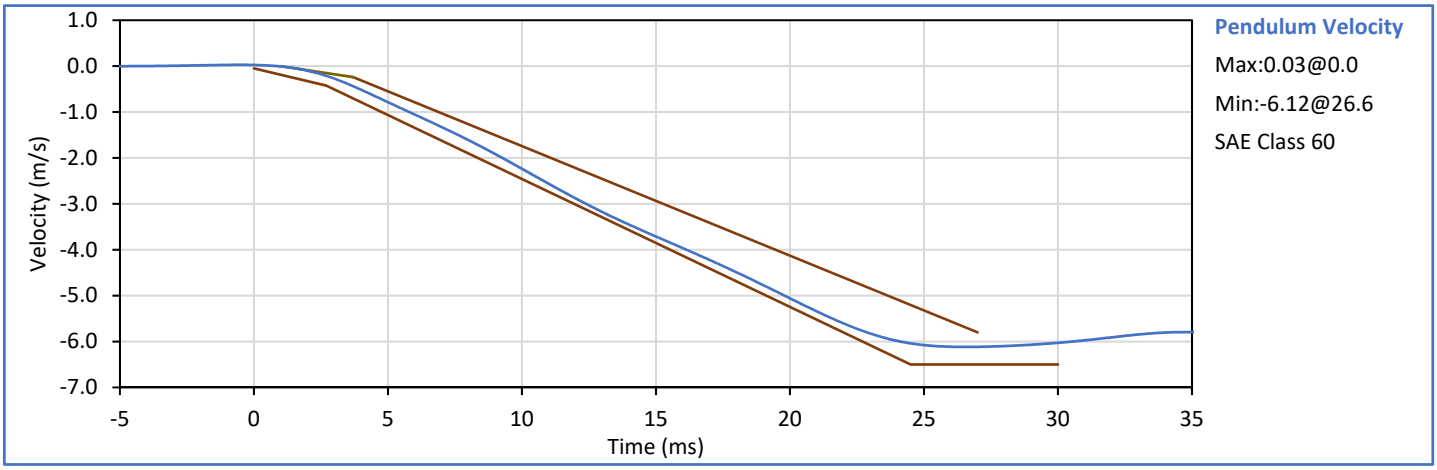
Approved By: P. Puzzuto

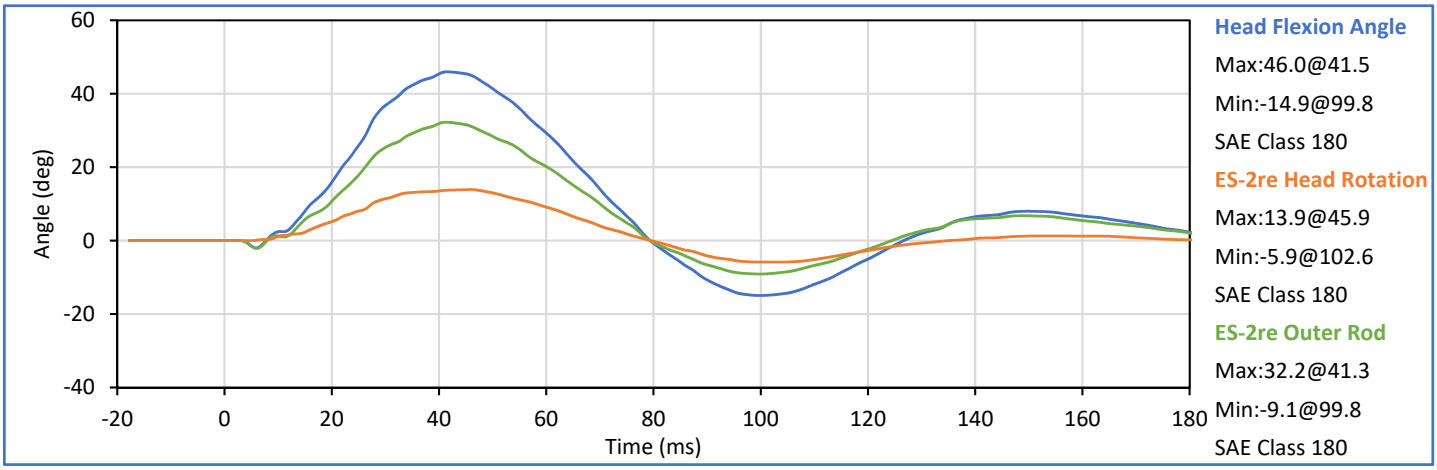
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	31	Pass
Pendulum Velocity	m/s	5.95	6.15	6.14	Pass
Peak Headform Flexion	deg	45.0	55.0	46.0	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	41.5	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	37.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

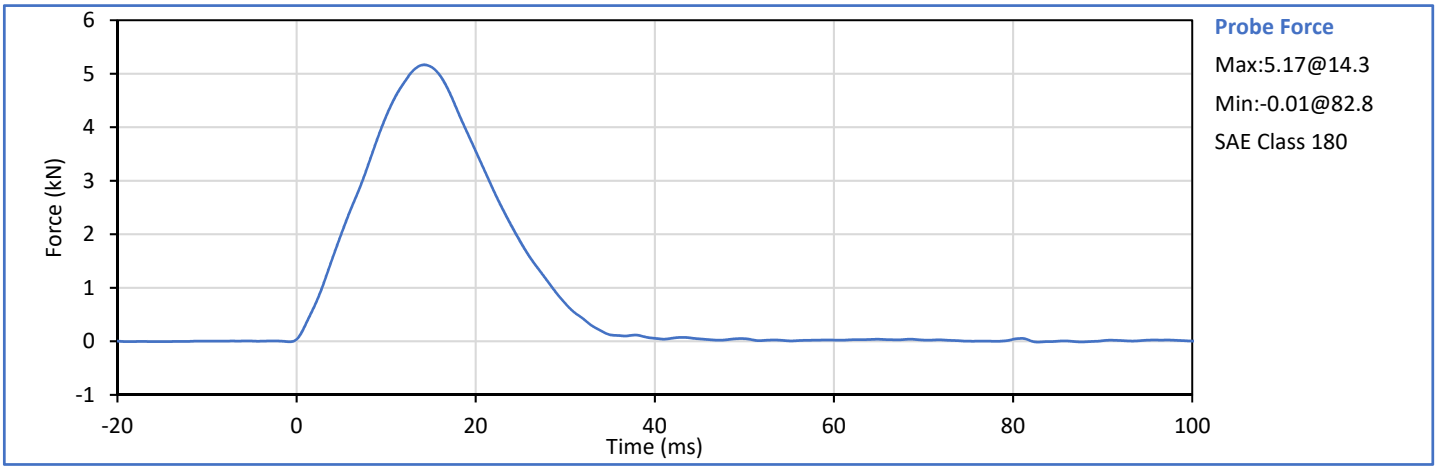
Applus IDIADA KARCO

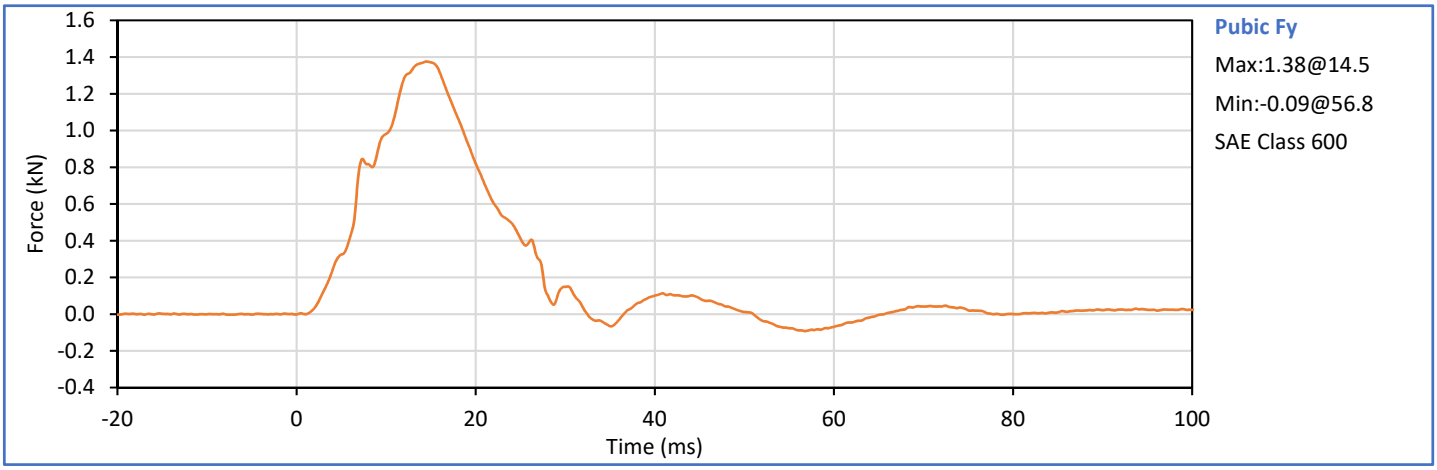
ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F037

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	31	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.17	Pass
Time of Peak Impactor Force	ms	11.8	16.1	14.3	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.38	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.5	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

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

Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 299 Test Date: 2019-11-13

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	25	Pass
A - Sitting Height	mm	772	788	782	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	81	Pass
D - H Point From Seatback	mm	141	151	150	Pass
E - Shoulder Pivot From Backline	mm	97	107	101	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	43	Pass
I - Head Depth	mm	178	188	182	Pass
J - Head Circumference	mm	541	551	547	Pass
K - Buttock To Knee Length	mm	514	540	520	Pass
L - Popliteal Height	mm	343	369	352	Pass
K - Knee Pivot To Floor Height	mm	392	409	401	Pass
N - Buttock Popliteal Length	mm	416	442	436	Pass
O - Chest Depth W/O Jacket	mm	195	211	203	Pass
P - Foot Length	mm	216	232	219	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	319	Pass
R - Arm Length	mm	249	259	255	Pass
S - Knee Joint To Seatback	mm	477	493	490	Pass
V - Shoulder Width	mm	341	357	348	Pass
W - Foot Width	mm	78	94	88	Pass
Y - Chest Circumference W/Jacket	mm	851	881	871	Pass
Z - Waist Circumference	mm	761	791	769	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

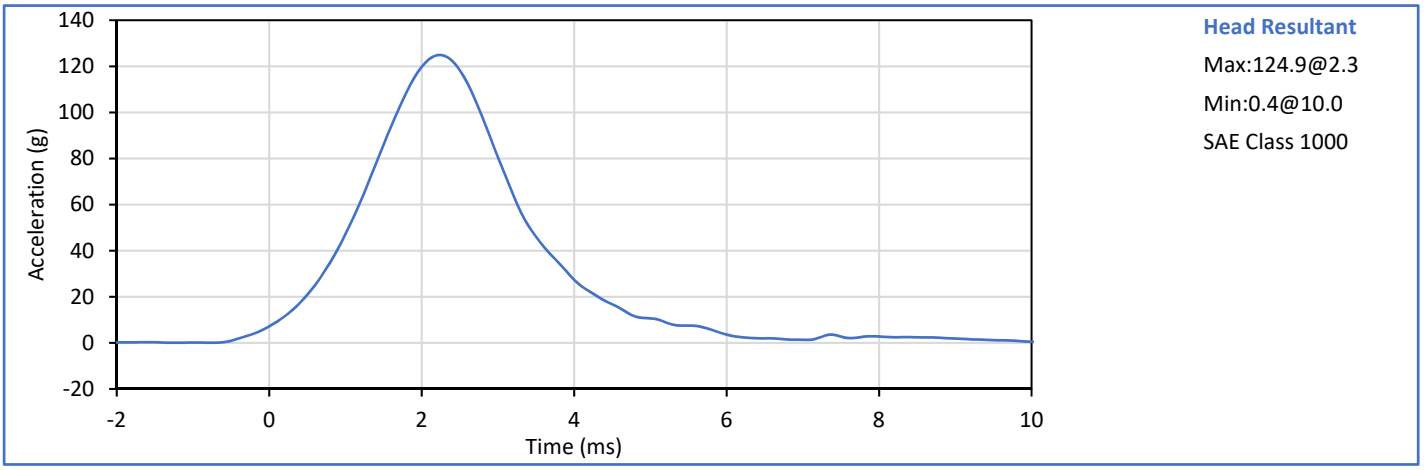
Approved By: P. Puzzuto

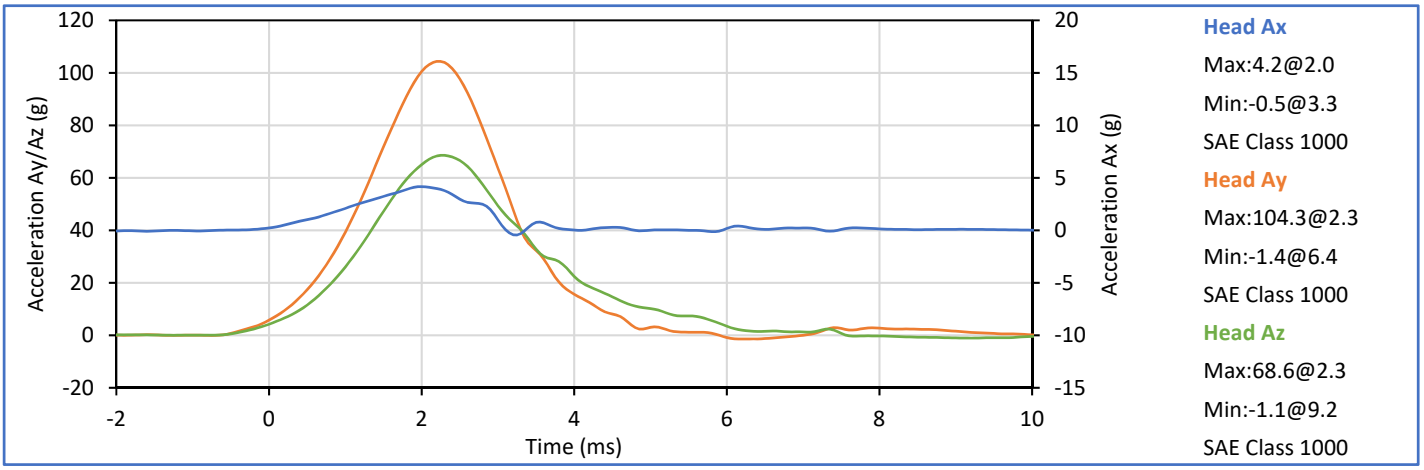
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299 Test Date: 2019-11-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	24	Pass
Peak Resultant Acceleration	g	115.0	137.0	124.9	Pass
Peak Head Ax	g	-15.0	15.0	-0.7	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

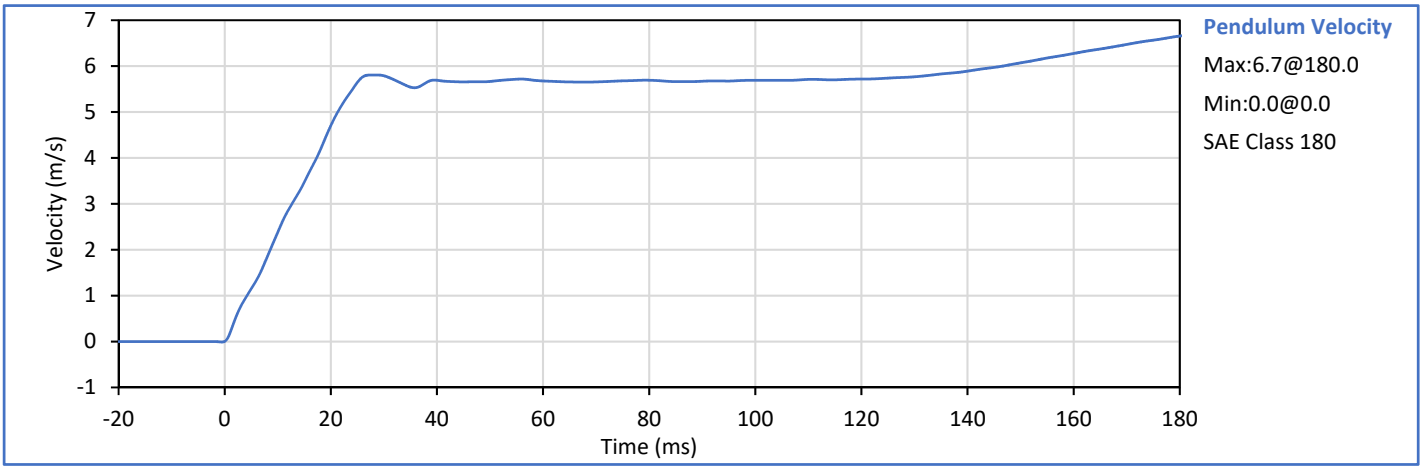
Approved By: P. Puzzuto

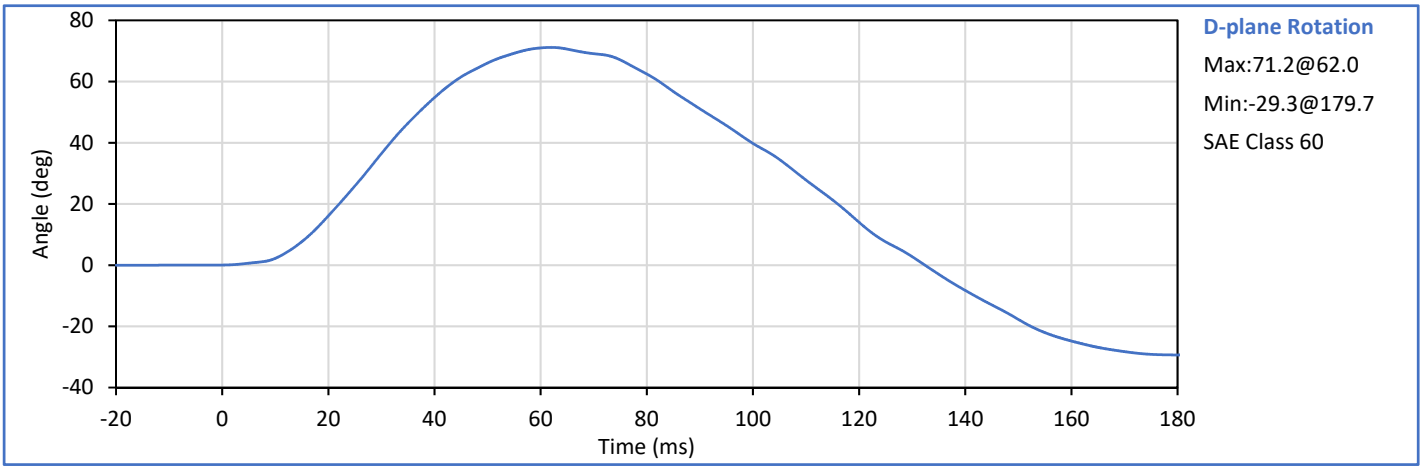
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	5.51	5.63	5.58	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.38	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.47	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.71	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.65	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.81	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	71.2	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	62.0	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.3	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	111.8	Pass
			Overall Test Results		Pass





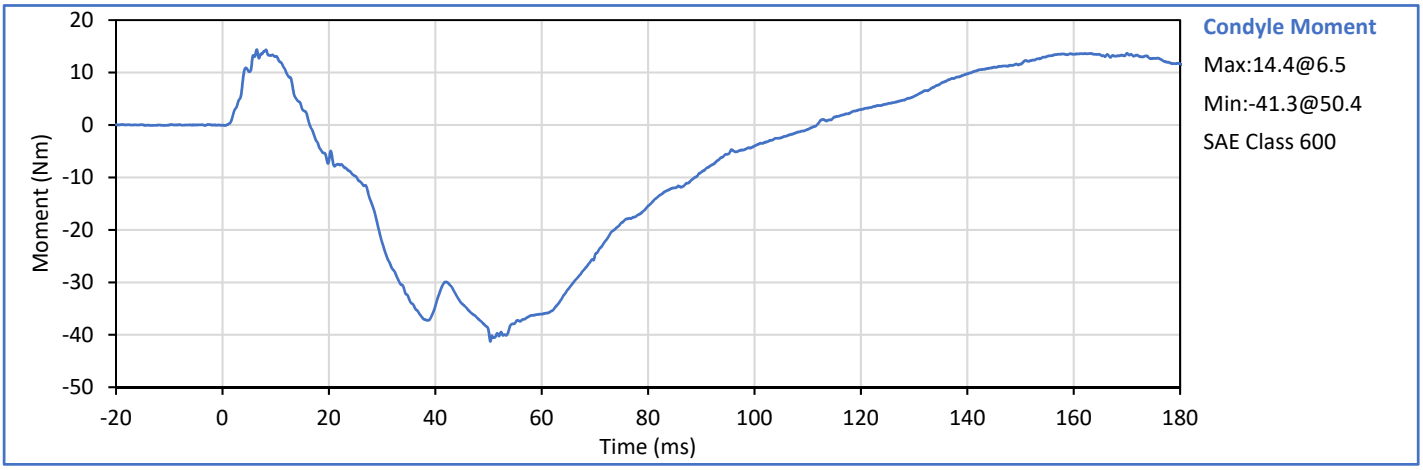
Technician: J. Hernandez

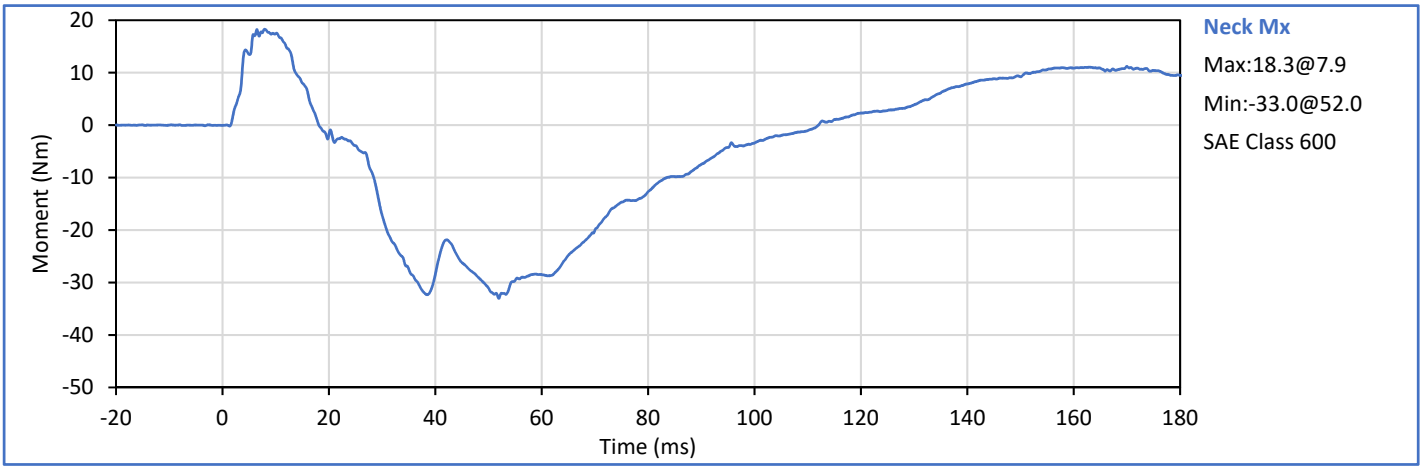
Approved By: P. Puzzuto

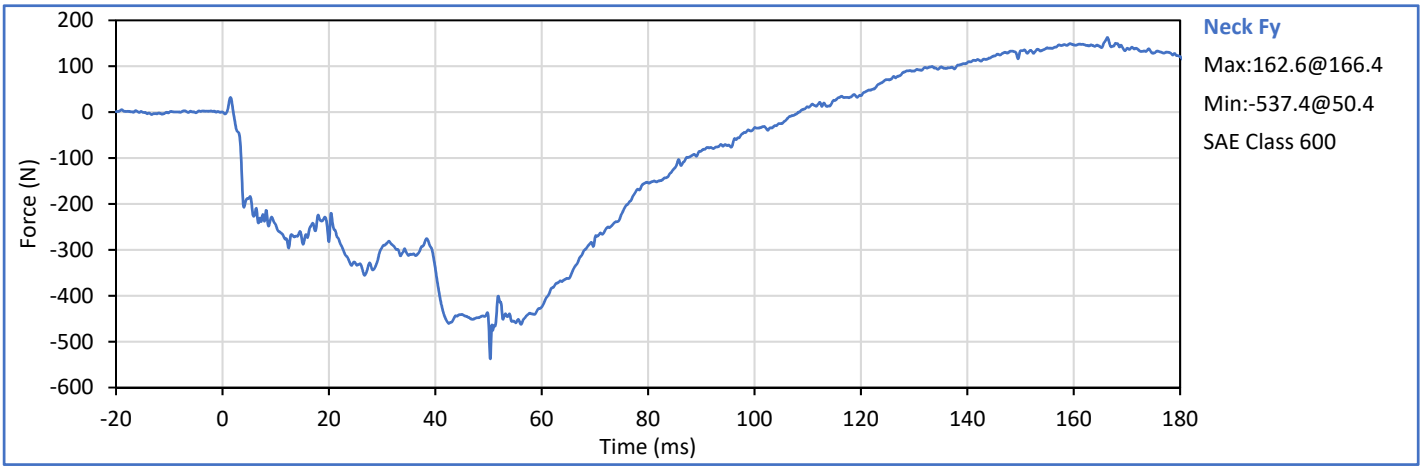
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2019-11-14





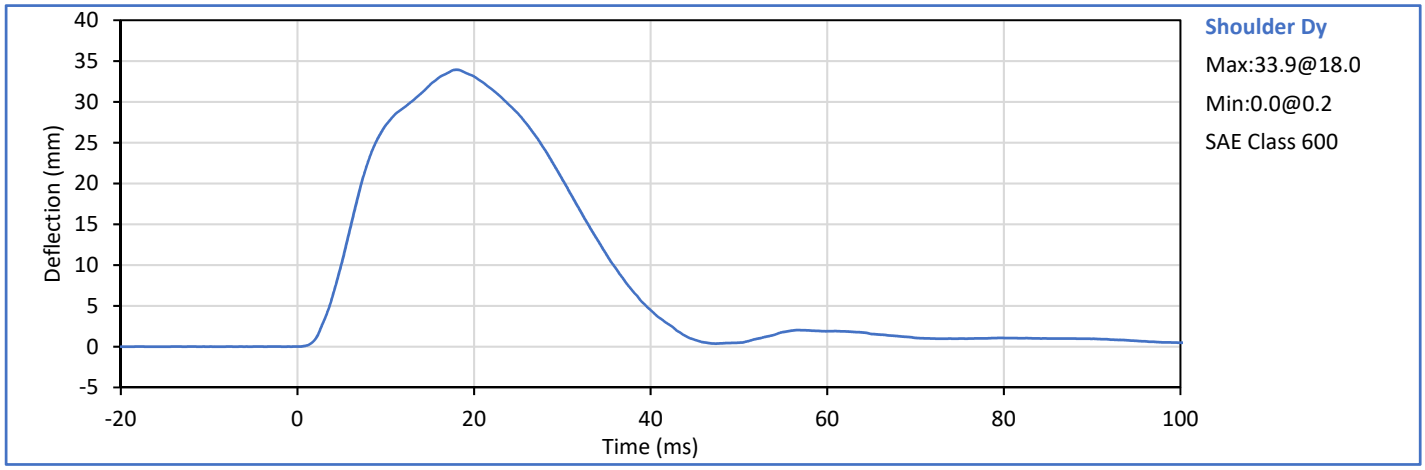


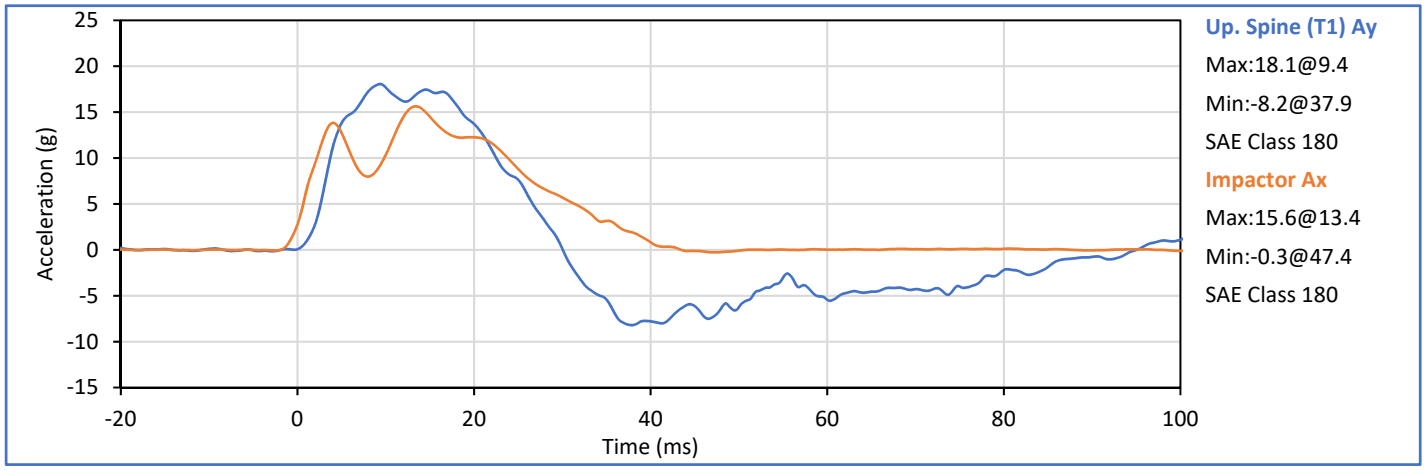
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	24	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Shoulder Dy	mm	28.0	37.0	33.9	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.1	Pass
Peak Impactor Ax	g	13.0	18.0	15.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

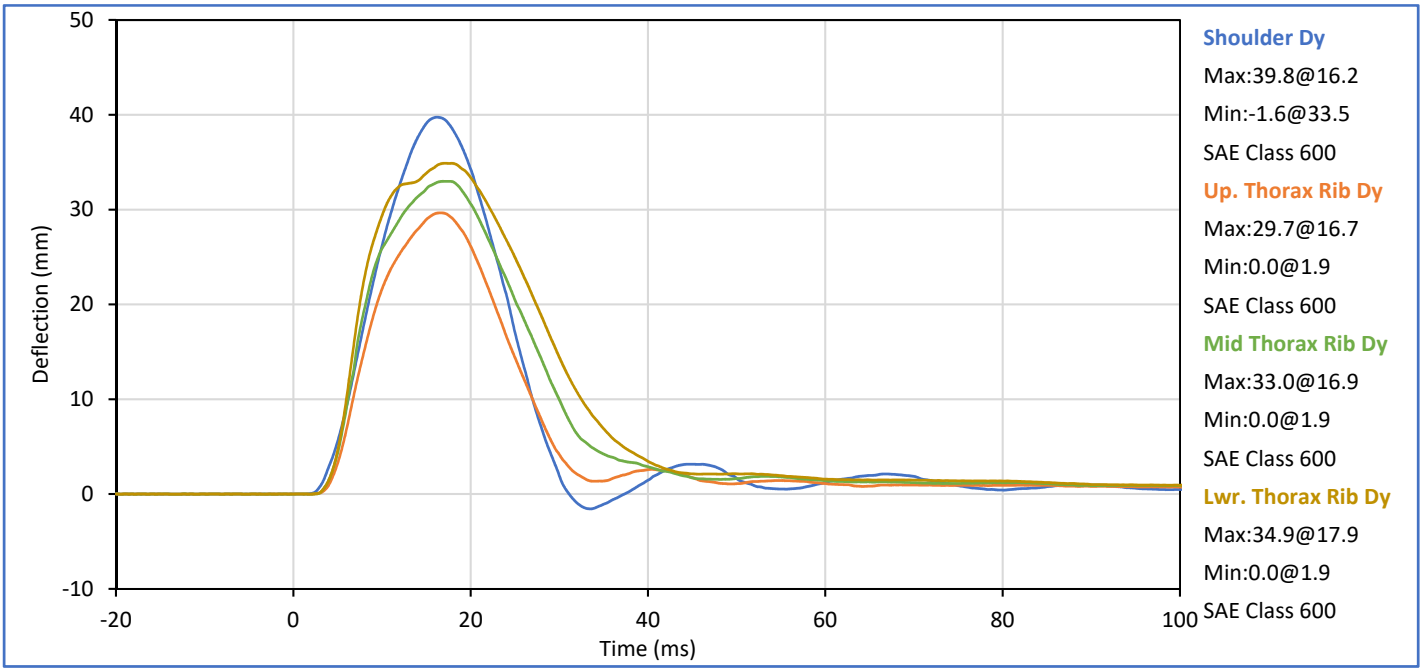
Approved By: P. Puzzuto

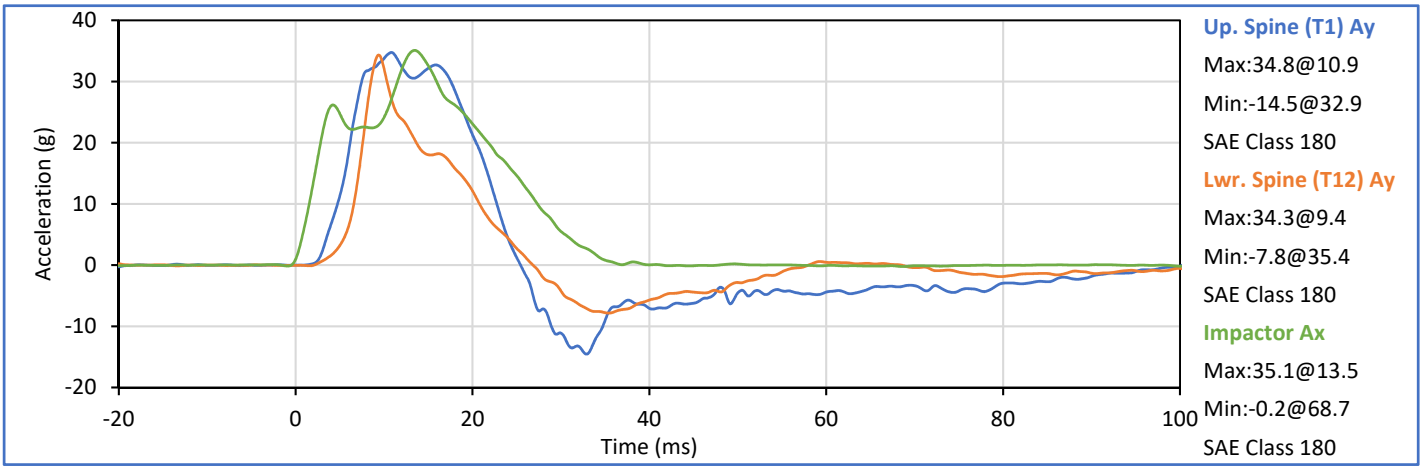
Applus IDIADA
KARCO

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

ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	24	Pass
Impactor Velocity	m/s	6.60	6.80	6.70	Pass
Peak Shoulder Dy	mm	31.0	40.0	39.8	Pass
Peak Upper Rib Dy	mm	25.0	32.0	29.7	Pass
Peak Middle Rib Dy	mm	30.0	36.0	33.0	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.9	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	34.8	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	34.3	Pass
Peak Impactor Ax	g	30.0	36.0	35.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

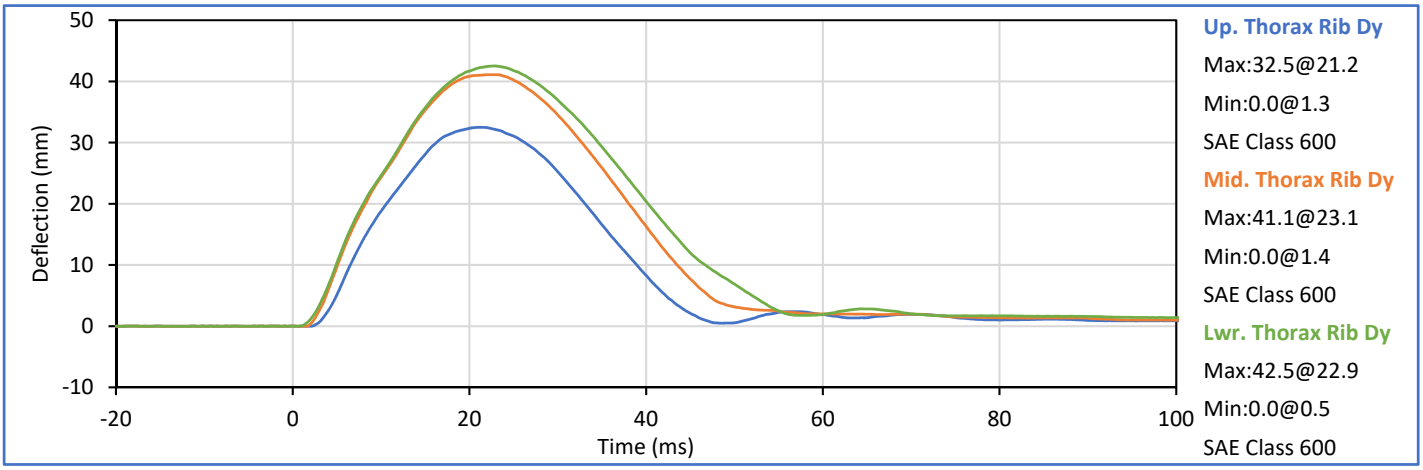
Approved By: P. Puzzuto

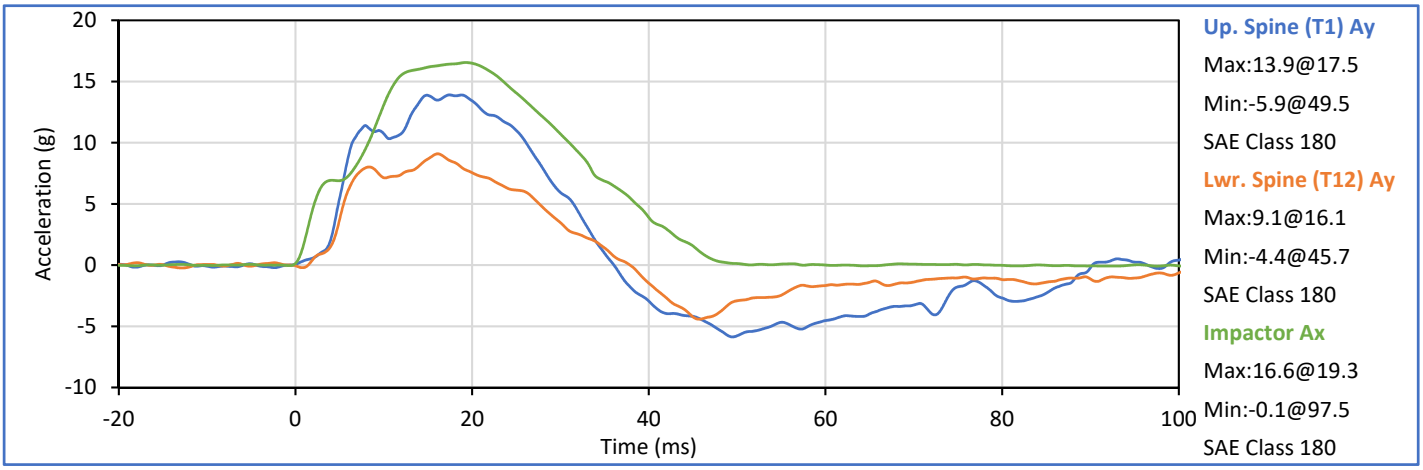
Applus IDIADA
KARCO

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

ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	24	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Rib Dy	mm	32.0	40.0	32.5	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.1	Pass
Peak Lower Rib Dy	mm	35.0	43.0	42.5	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.9	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.1	Pass
Peak Impactor Ax	g	14.0	18.0	16.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

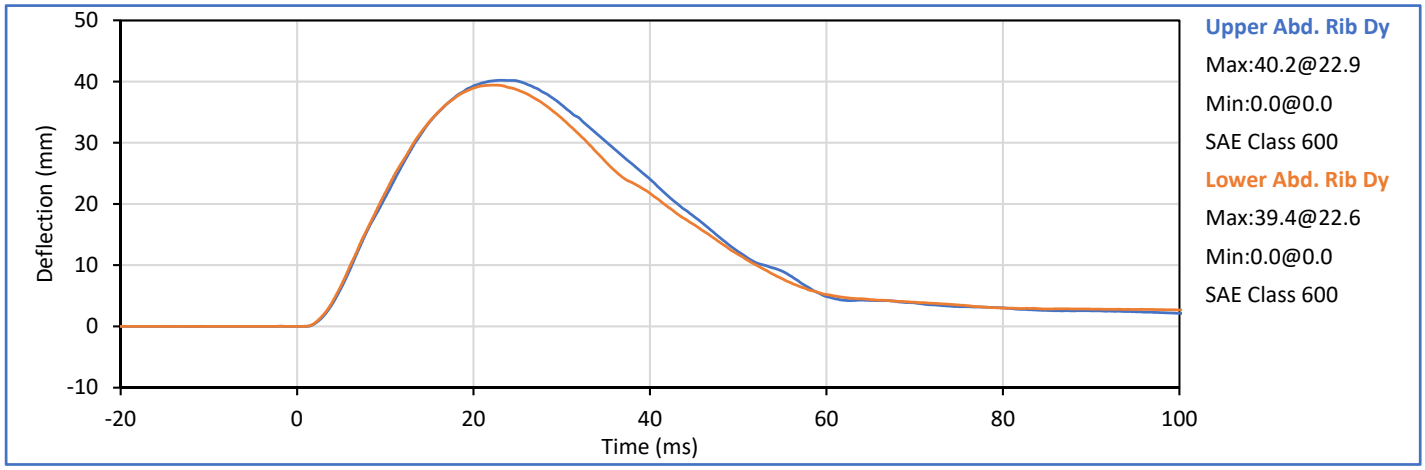
Approved By: P. Puzzuto

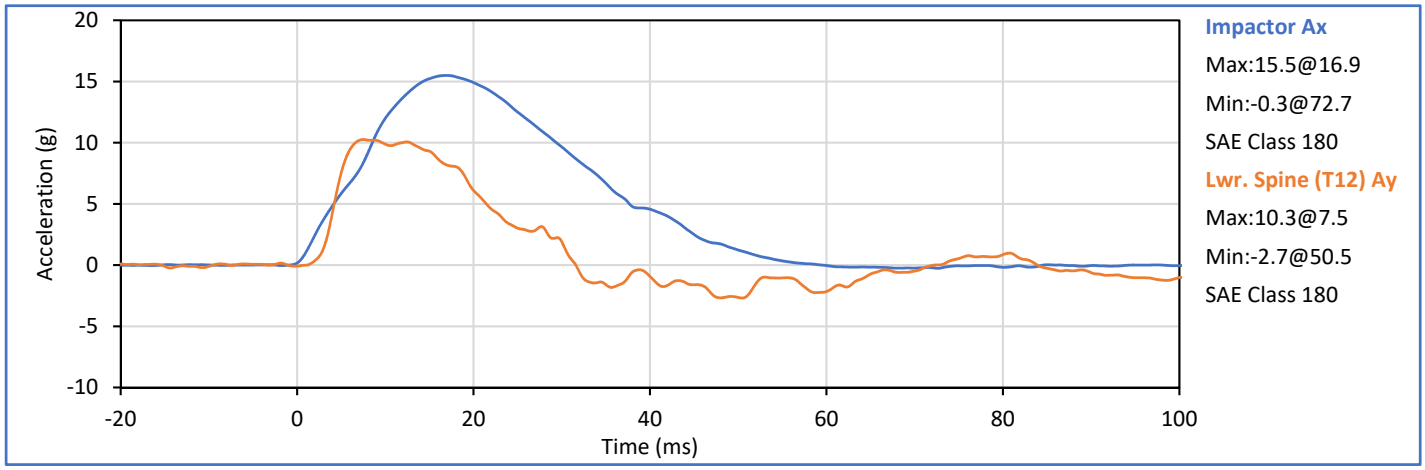
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	4.20	4.40	4.36	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	40.2	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	39.4	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.3	Pass
Peak Impactor Ax	g	12.0	16.0	15.5	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

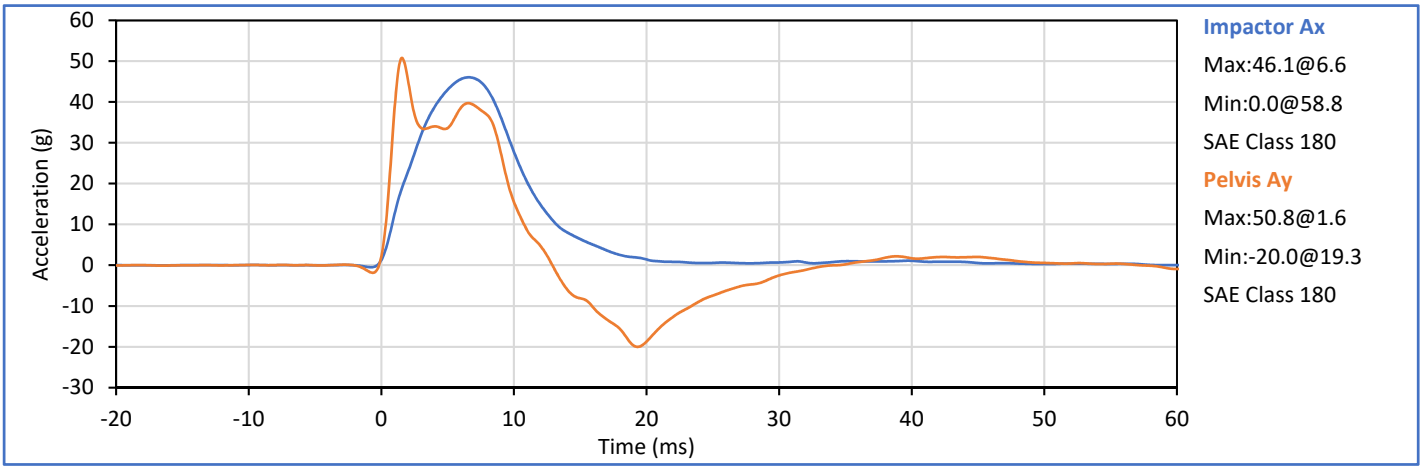
Applus IDIADA
KARCO

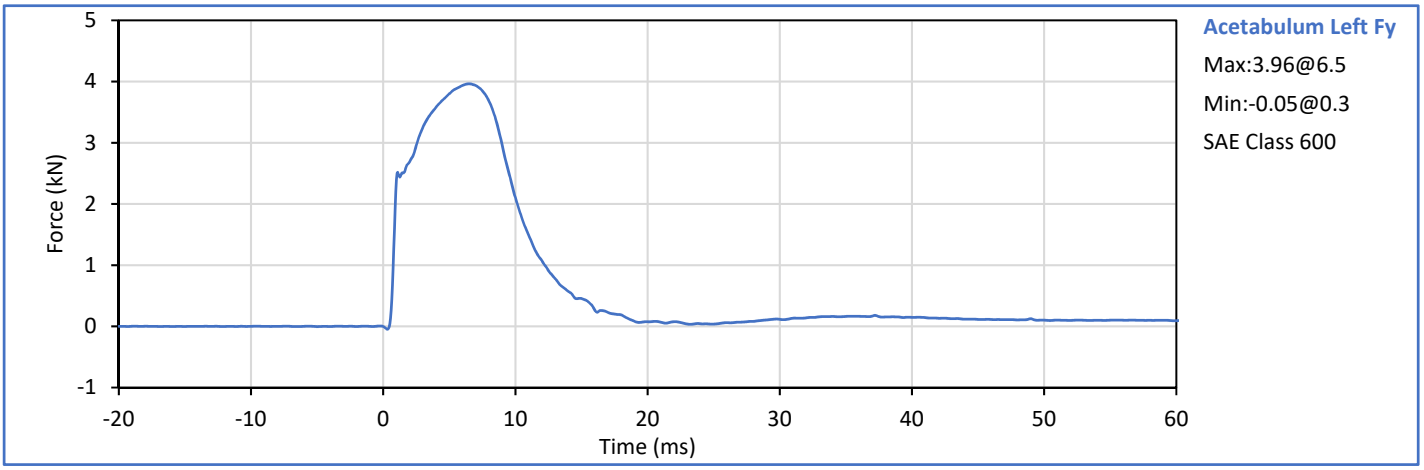
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	24	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.96	Pass
Pelvis Ay after 6ms	g	34.0	42.0	39.7	Pass
Peak Impactor Ax	g	38.0	47.0	46.1	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12345 (SACO)





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 299 Test Date: 2019-11-14

Pelvis Plug S/N: 12345 (SACO)

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 12345
Test Number 6731
Report Number 6746
Test Date 3/21/2018 1:35:00 PM

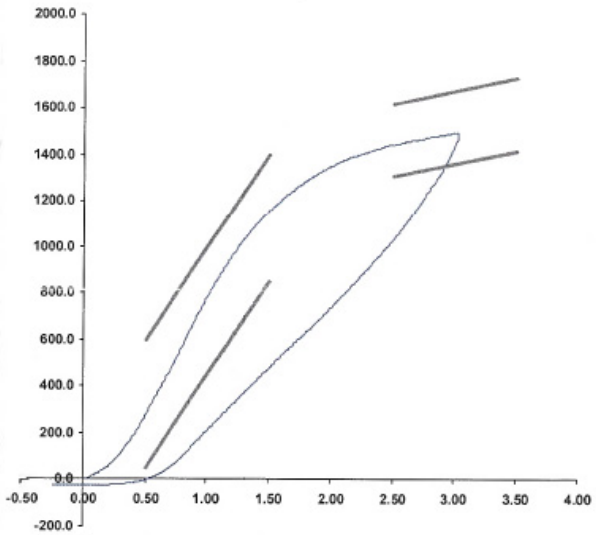
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	281.05	50.00	600.00
Force @ 1.5 mm (N)	1,156.02	850.00	1,400.00
Force @ 2.5 mm (N)	1,441.81	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,494.42	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 21-Mar-18
SACO Research

By : DC Date : 3/21/18

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

Applus IDIADA
KARCO

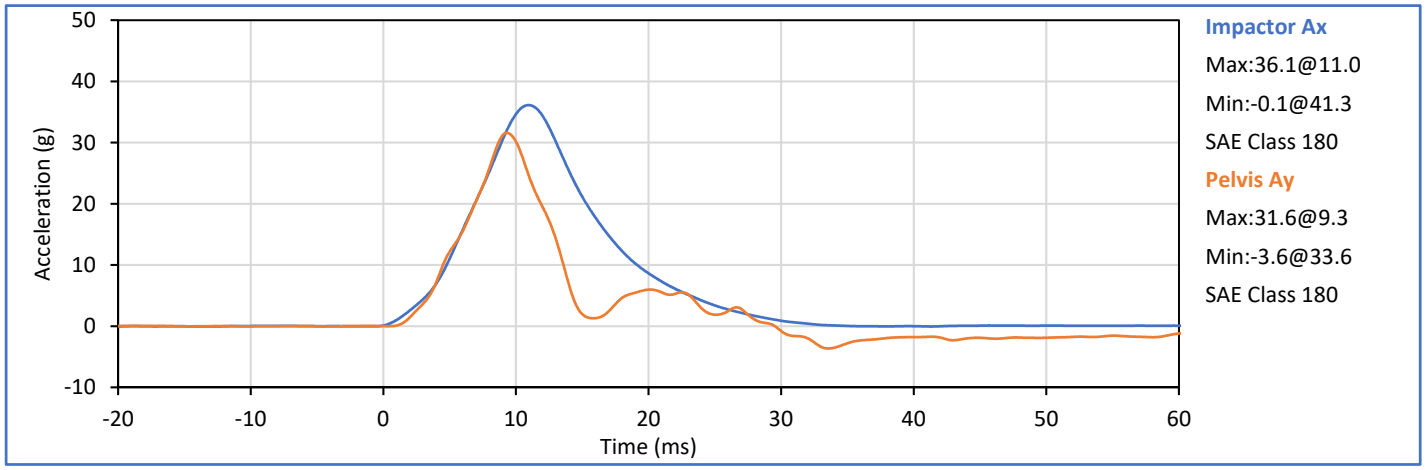
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

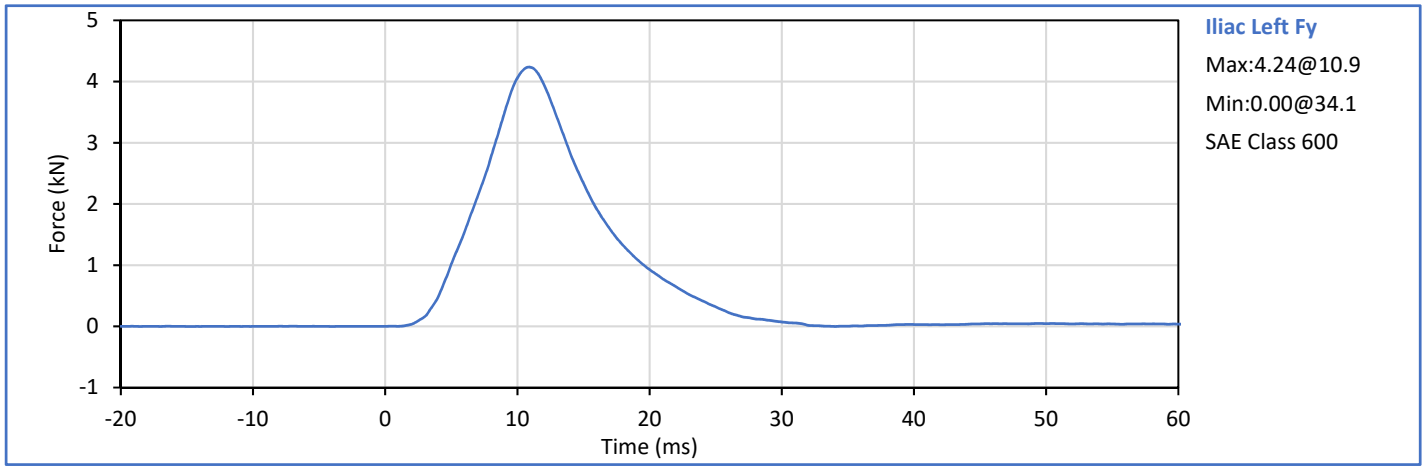
ATD Serial No.: 299 Test Date: 2019-11-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	24	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.24	Pass
Pelvis Ay after 6ms	g	28.0	39.0	31.6	Pass
Peak Impactor Ax	g	36.0	45.0	36.1	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified





Technician: J. Hernandez

Approved By: P. Puzzuto

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

Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-11

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	34	Pass
1 - Sitting Height	mm	900	918	908	Pass
2 - Seat to Shoulder Joint	mm	558	572	568	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	352	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	101	Pass
5 - Sole to Seat, Sitting	mm	433	451	441	Pass
6 - Head Width	mm	152	158	154	Pass
7 - Shoulder/Arm Width	mm	461	479	474	Pass
8 - Thorax Width	mm	322	332	328	Pass
9 - Abdomen Width	mm	273	287	280	Pass
10 - Pelvis Lap Width	mm	359	373	364	Pass
11 - Head Depth	mm	196	206	202	Pass
12 - Thorax Depth	mm	262	272	270	Pass
13 - Abdomen Depth	mm	194	204	201	Pass
14 - Pelvis Depth	mm	235	245	240	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	157	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	605	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

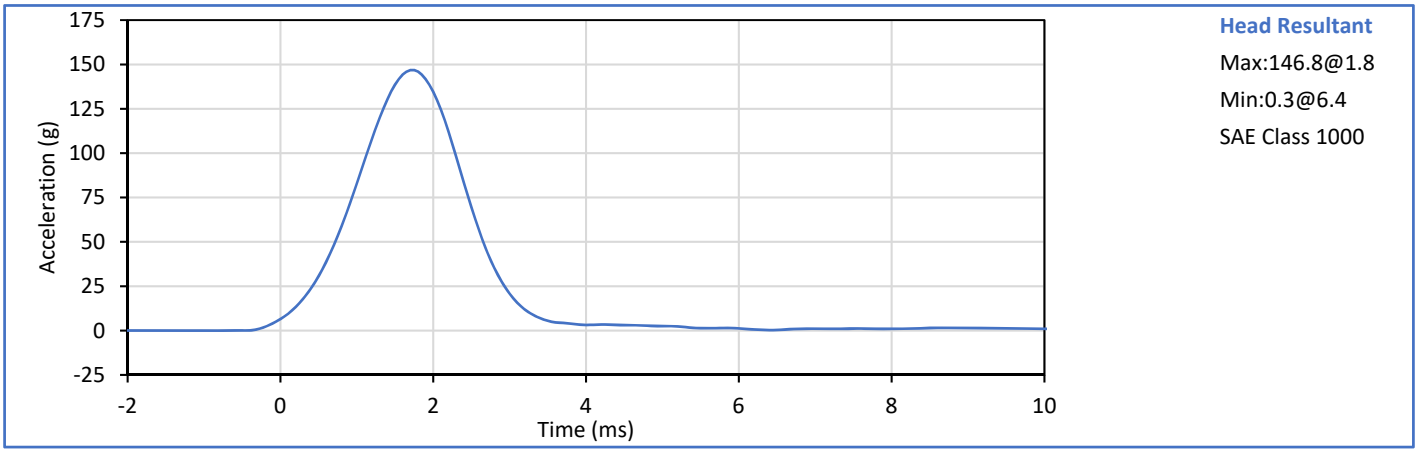
Approved By: P. Puzzuto

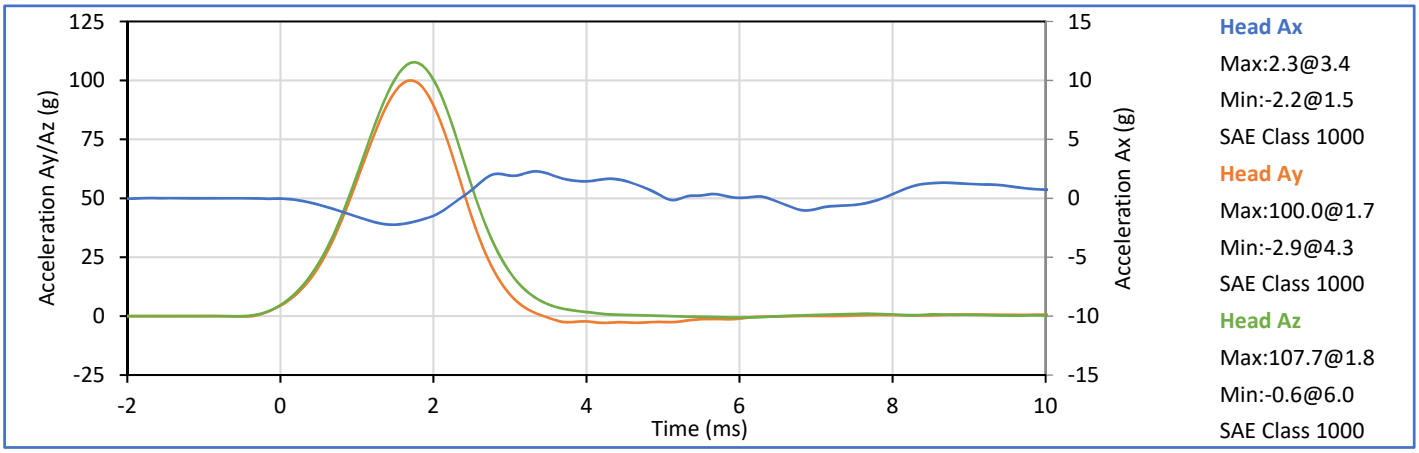
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-11

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Relative Humidity	%	10	70	34	Pass
Peak Resultant Acceleration	g	125.0	155.0	146.8	Pass
Peak Head Ax	g	-15.0	15.0	2.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

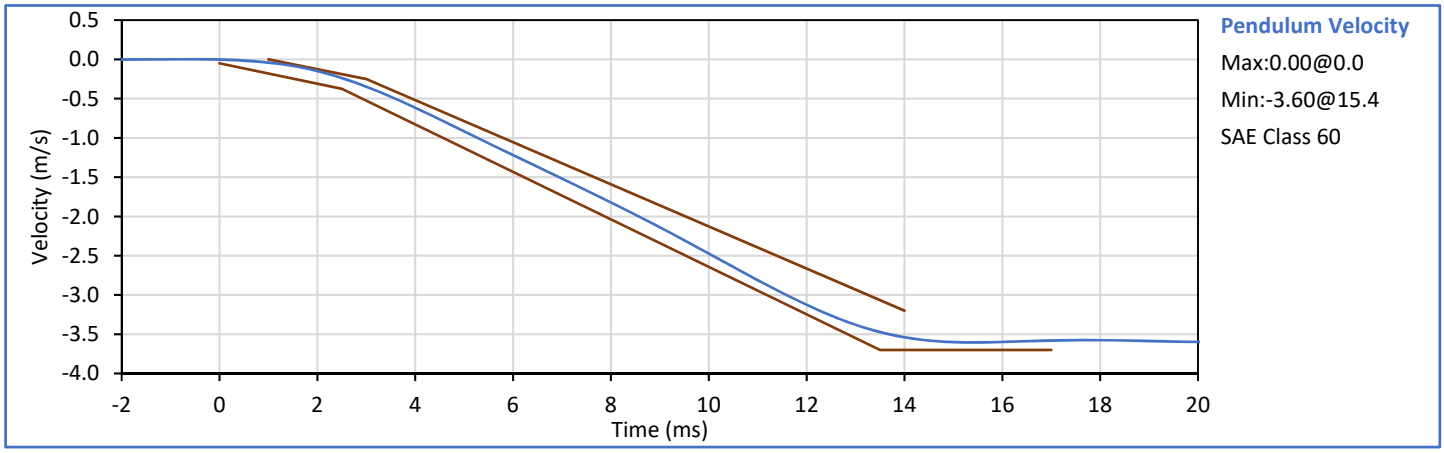
Approved By: P. Puzzuto

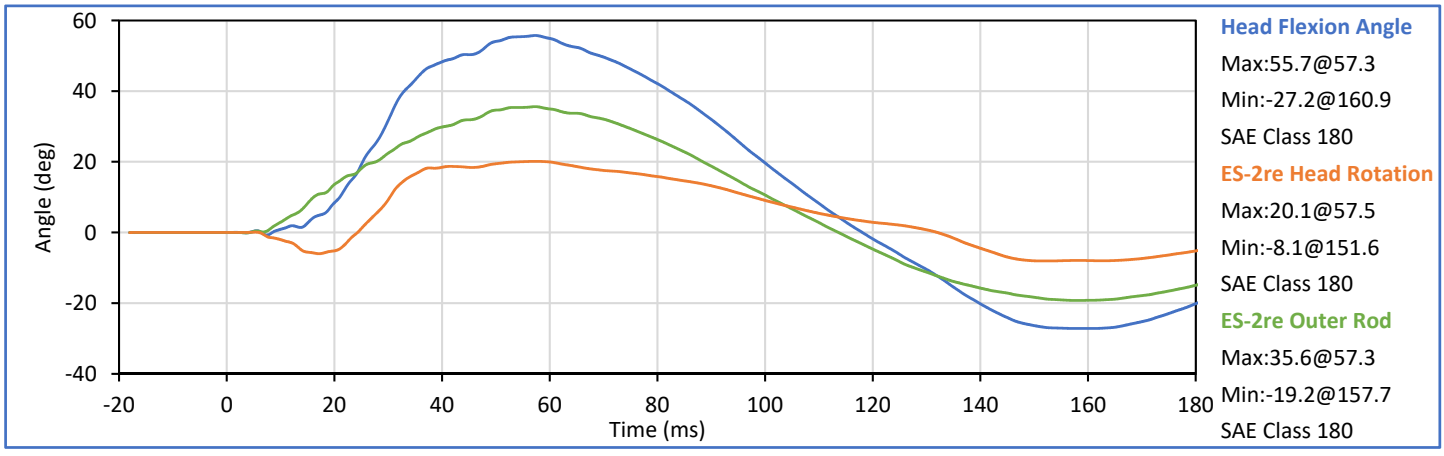
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-12

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	41	Pass
Pendulum Velocity	m/s	3.30	3.50	3.47	Pass
Peak Headform Flexion	deg	49.0	59.0	55.7	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	57.3	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	60.8	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

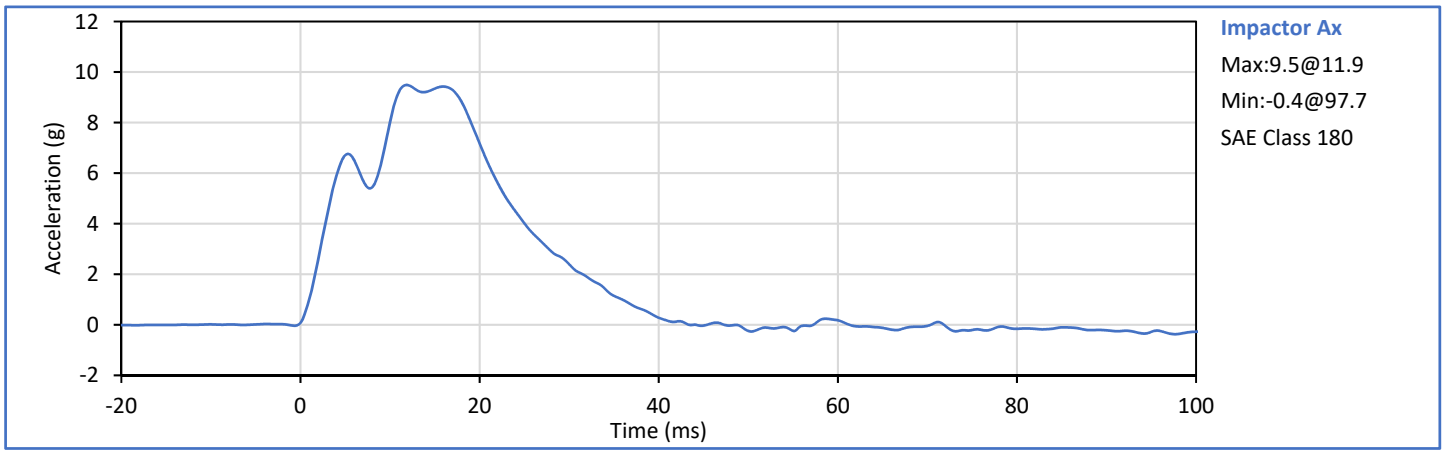
Applus IDIADA KARCO

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

ATD Serial No.: F037

Test Date: 2019-12-12

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	37	Pass
Impactor Velocity	m/s	4.20	4.40	4.35	Pass
Peak Impactor Ax	g	7.5	10.5	9.5	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

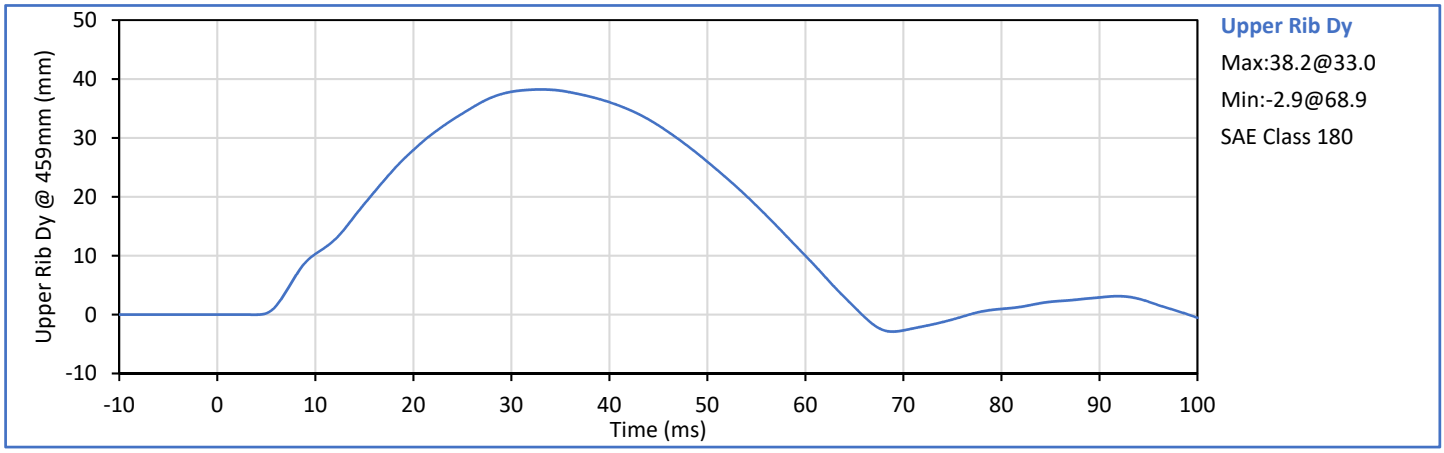
Applus IDIADA KARCO

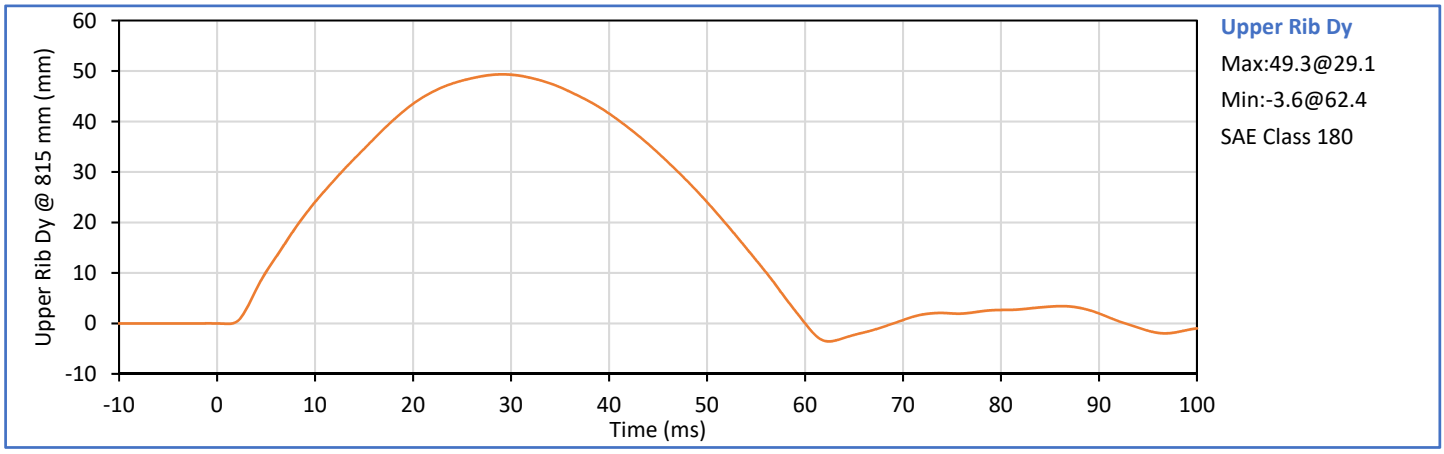
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F037

Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	40	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.2	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	49.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

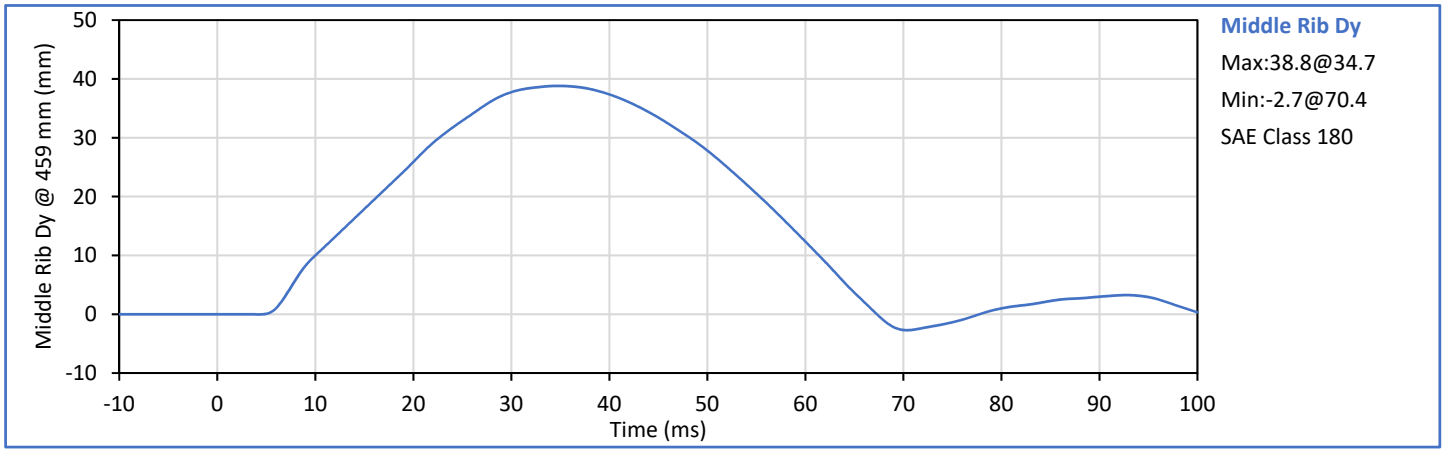
Approved By: P. Puzzuto

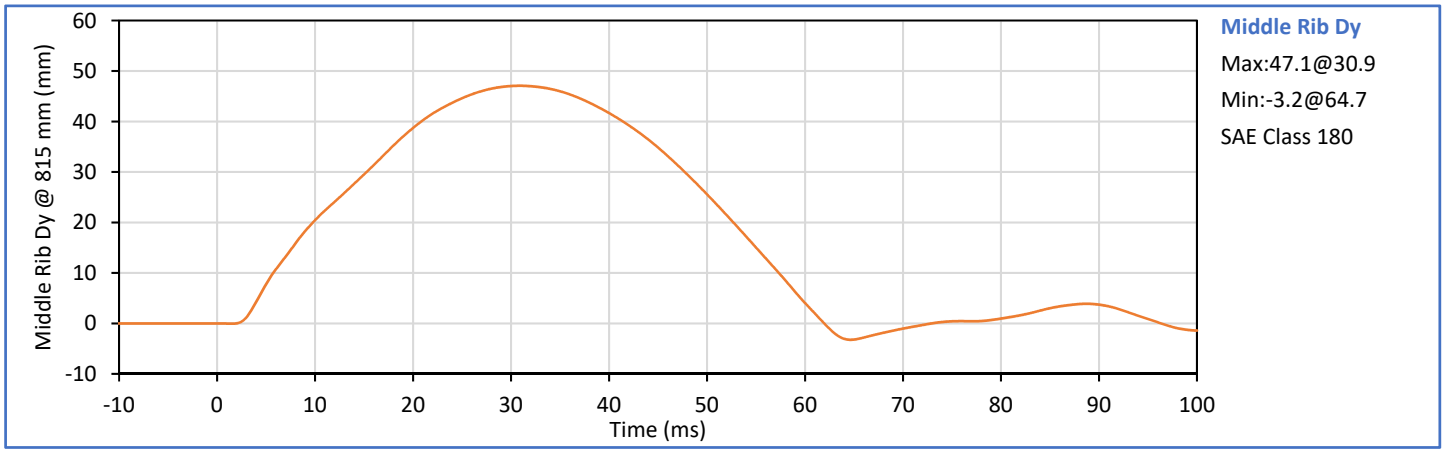
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-12

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





Technician: J. Hernandez

Approved By: P. Puzzuto

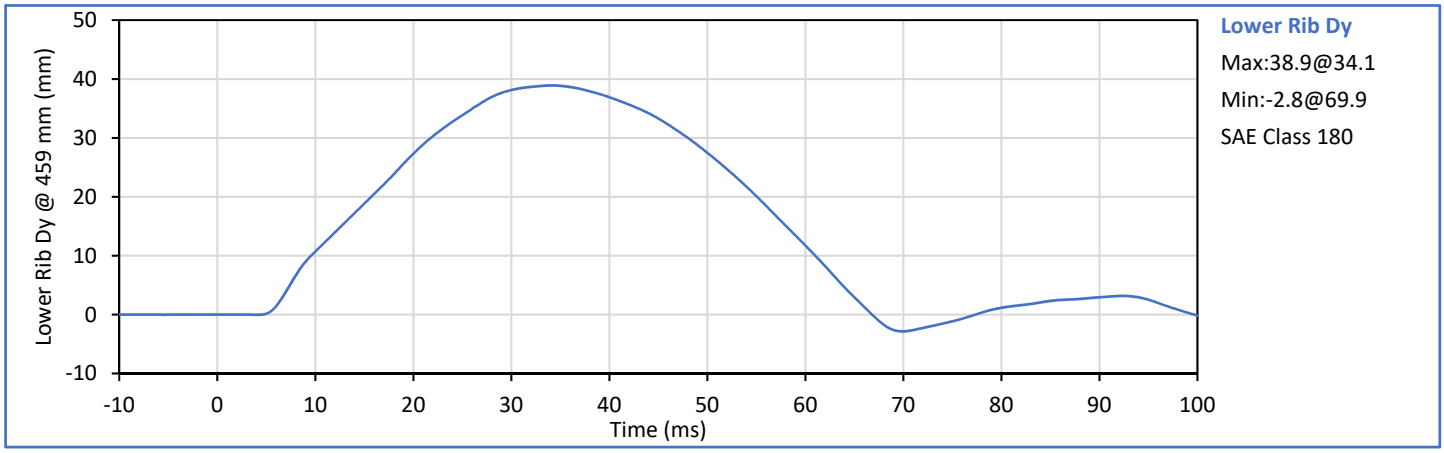
Applus IDIADA KARCO

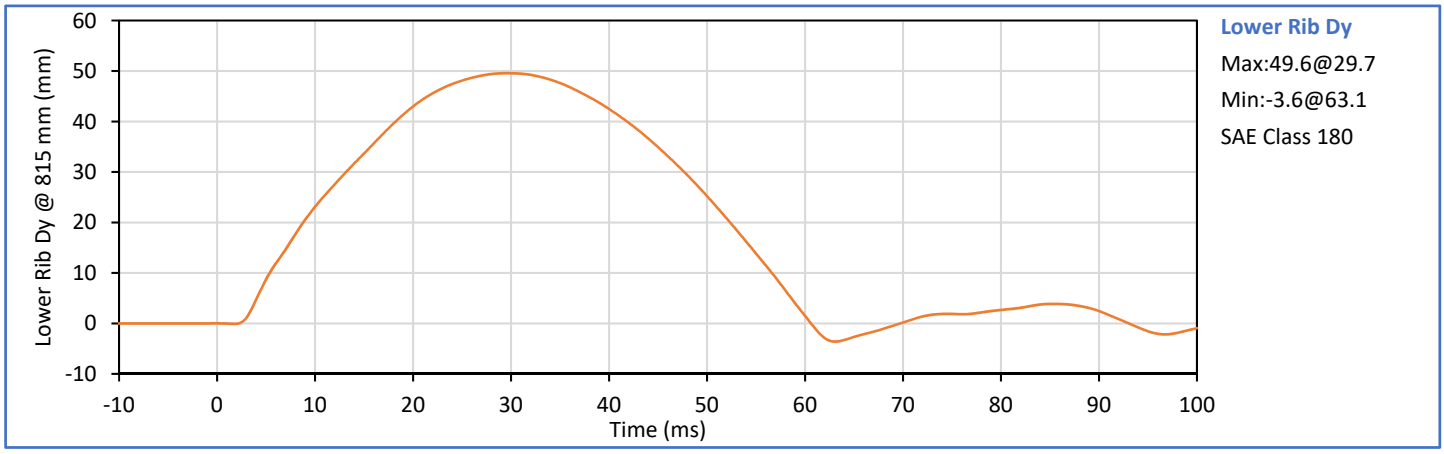
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2019-12-12

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





Technician: J. Hernandez

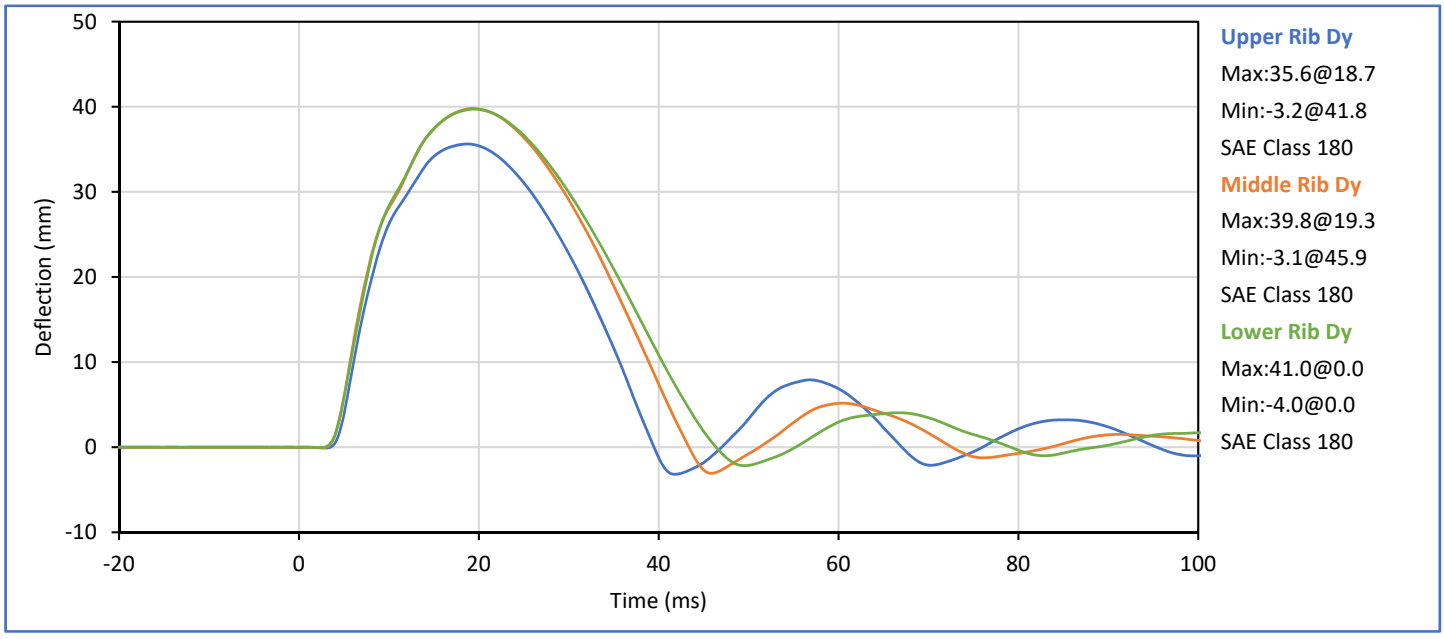
Approved By: P. Puzzuto

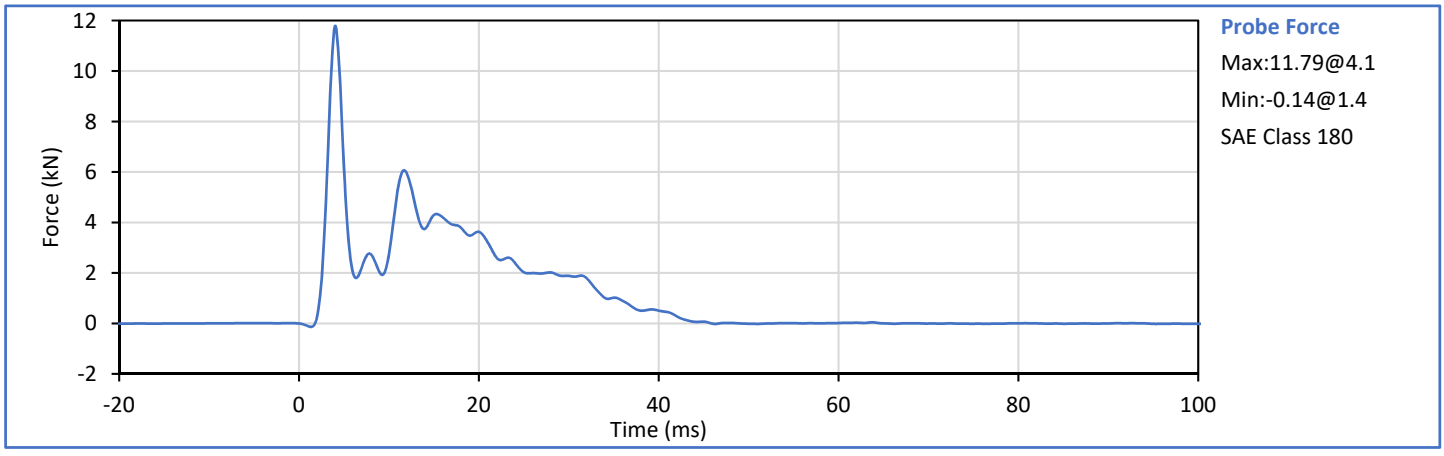
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-12

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	34	Pass
Impactor Velocity	m/s	5.40	5.60	5.56	Pass
Peak Upper Rib Dy	mm	34.0	41.0	35.6	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.8	Pass
Peak Lower Rib Dy	mm	37.0	44.0	39.7	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	6.07	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

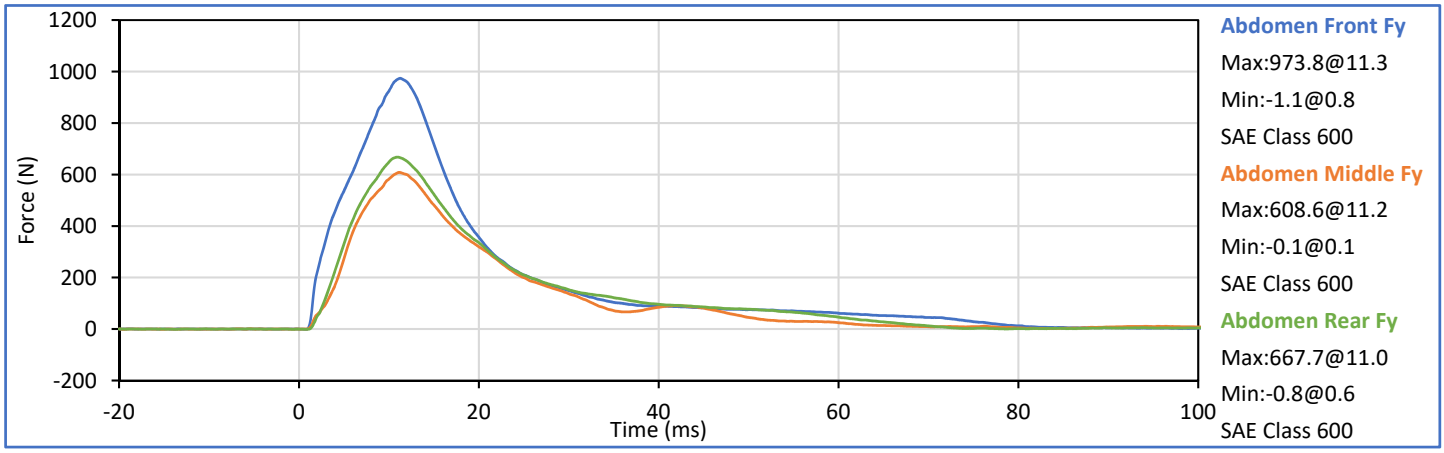
Approved By: P. Puzzuto

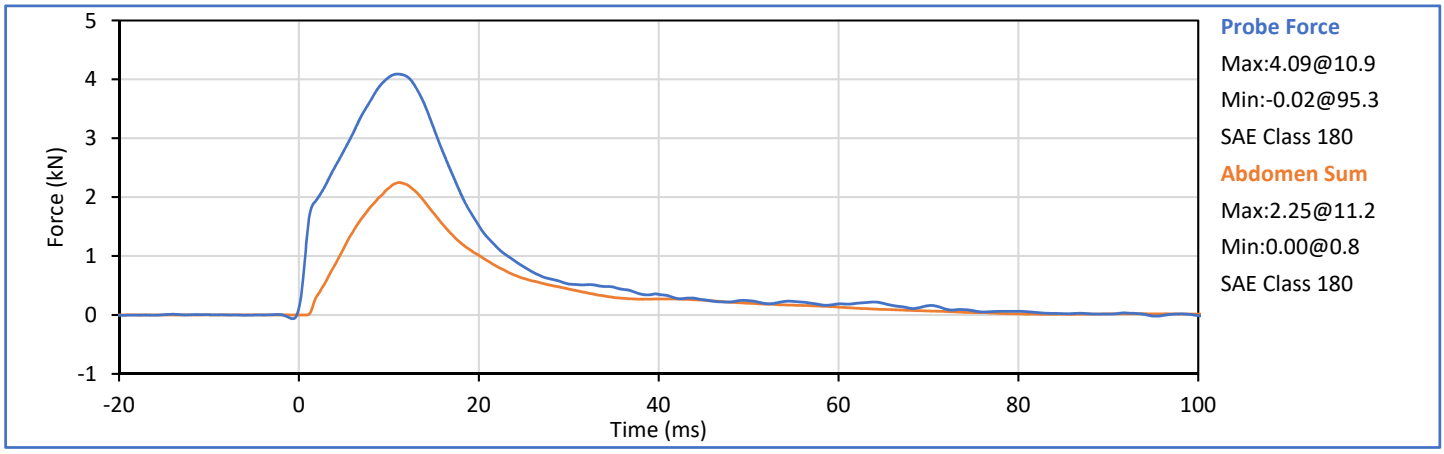
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-12

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	32	Pass
Impactor Velocity	m/s	3.90	4.10	3.98	Pass
Peak Impactor Force	kN	4.00	4.80	4.09	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.9	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.25	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.2	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

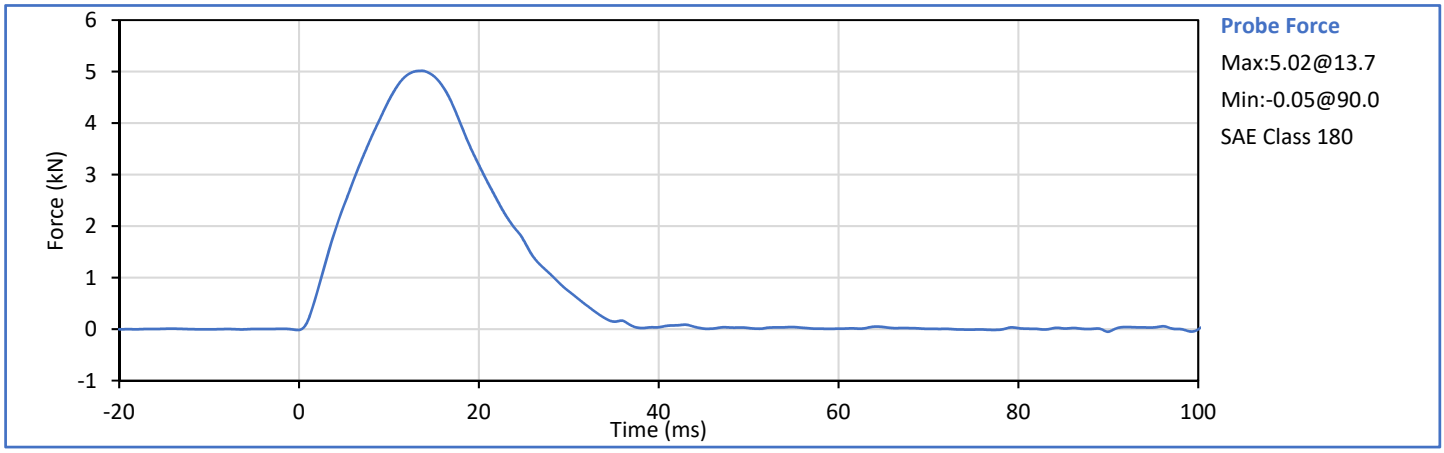
Approved By: P. Puzzuto

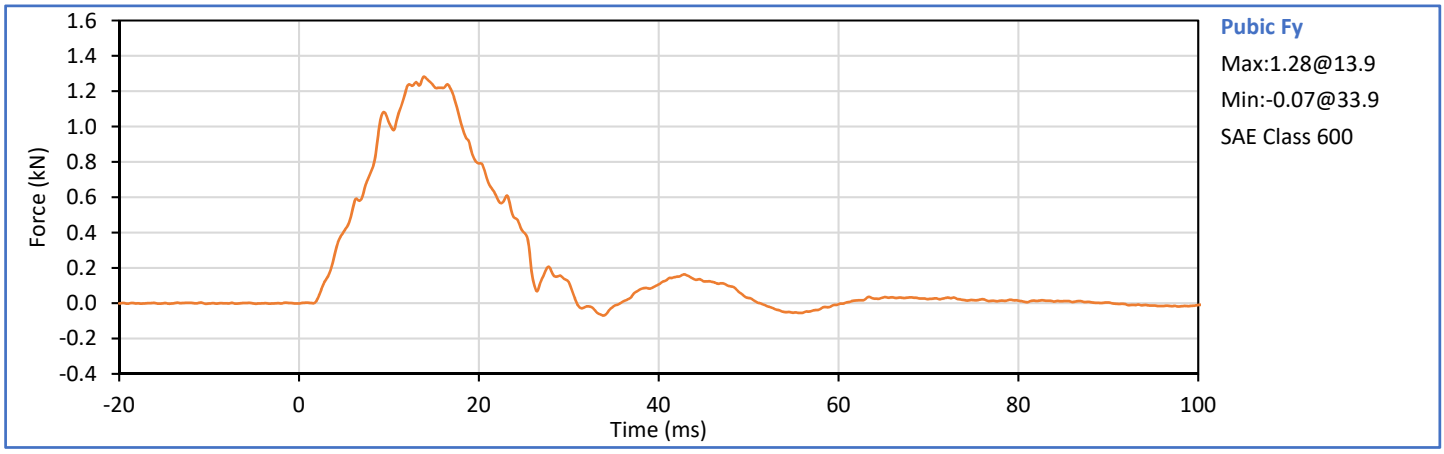
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-12

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	37	Pass
Impactor Velocity	m/s	4.20	4.40	4.26	Pass
Peak Impactor Force	kN	4.70	5.40	5.02	Pass
Time of Peak Impactor Force	ms	11.8	16.1	13.7	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.28	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	13.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

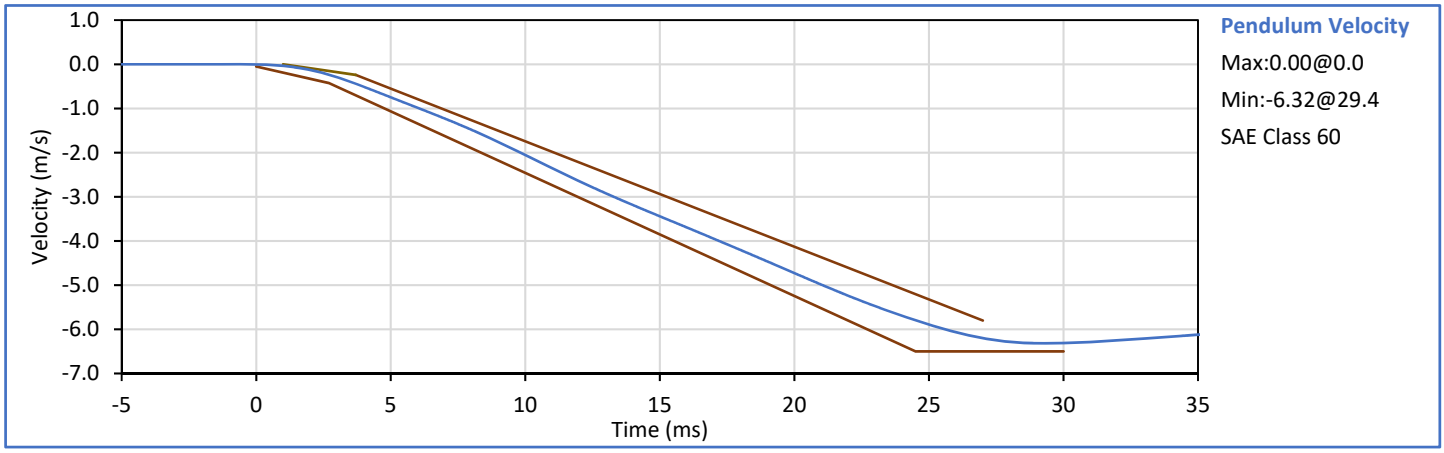
Approved By: P. Puzzuto

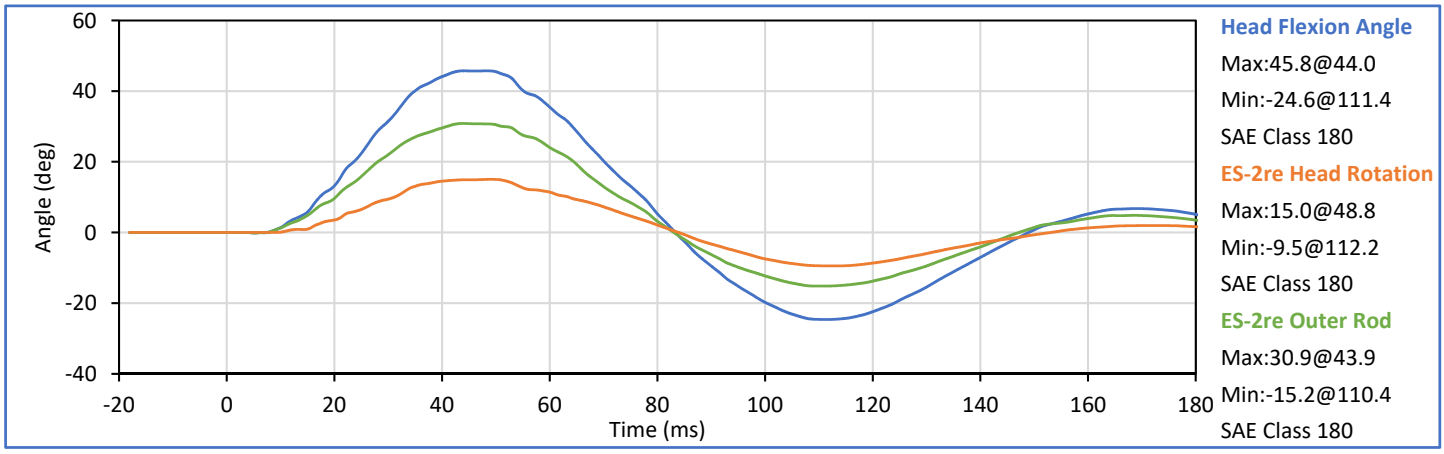
Applus IDIADA KARCO

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

ATD Serial No.: F037 Test Date: 2019-12-12

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	34	Pass
Pendulum Velocity	m/s	5.95	6.15	6.08	Pass
Peak Headform Flexion	deg	45.0	55.0	45.8	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	44.0	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	39.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

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

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 299 Test Date: 2019-12-10

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	44	Pass
A - Sitting Height	mm	772	788	781	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	84	Pass
D - H Point From Seatback	mm	141	151	148	Pass
E - Shoulder Pivot From Backline	mm	97	107	102	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	144	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	187	Pass
J - Head Circumference	mm	541	551	548	Pass
K - Buttock To Knee Length	mm	514	540	530	Pass
L - Popliteal Height	mm	343	369	358	Pass
K - Knee Pivot To Floor Height	mm	392	409	402	Pass
N - Buttock Popliteal Length	mm	416	442	437	Pass
O - Chest Depth W/O Jacket	mm	195	211	209	Pass
P - Foot Length	mm	216	232	220	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	254	Pass
S - Knee Joint To Seatback	mm	477	493	488	Pass
V - Shoulder Width	mm	341	357	348	Pass
W - Foot Width	mm	78	94	82	Pass
Y - Chest Circumference W/Jacket	mm	851	881	860	Pass
Z - Waist Circumference	mm	761	791	772	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

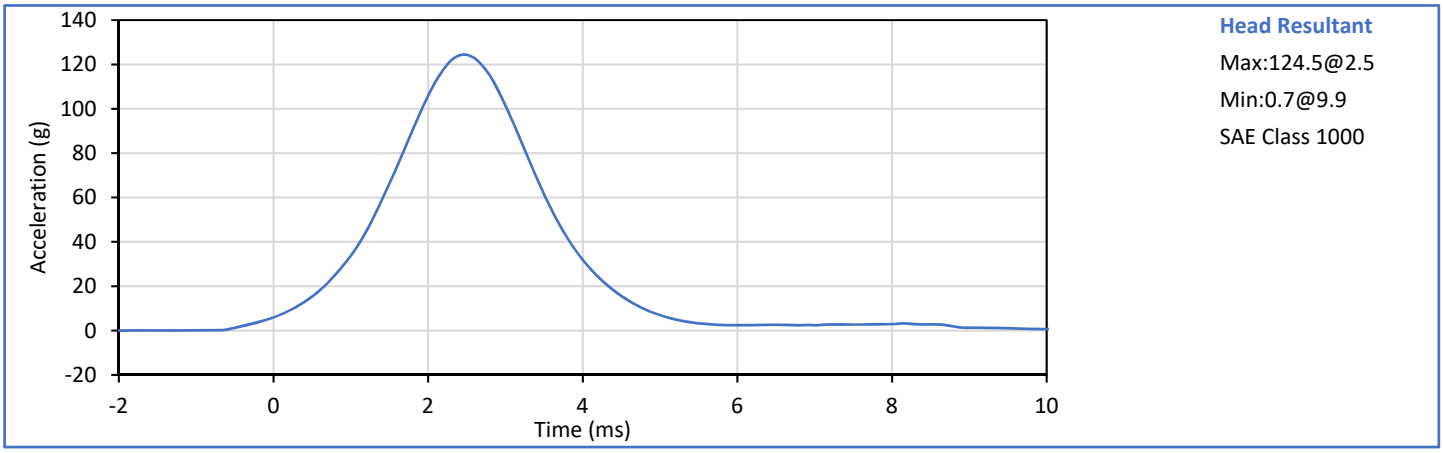
Approved By: P. Puzzuto

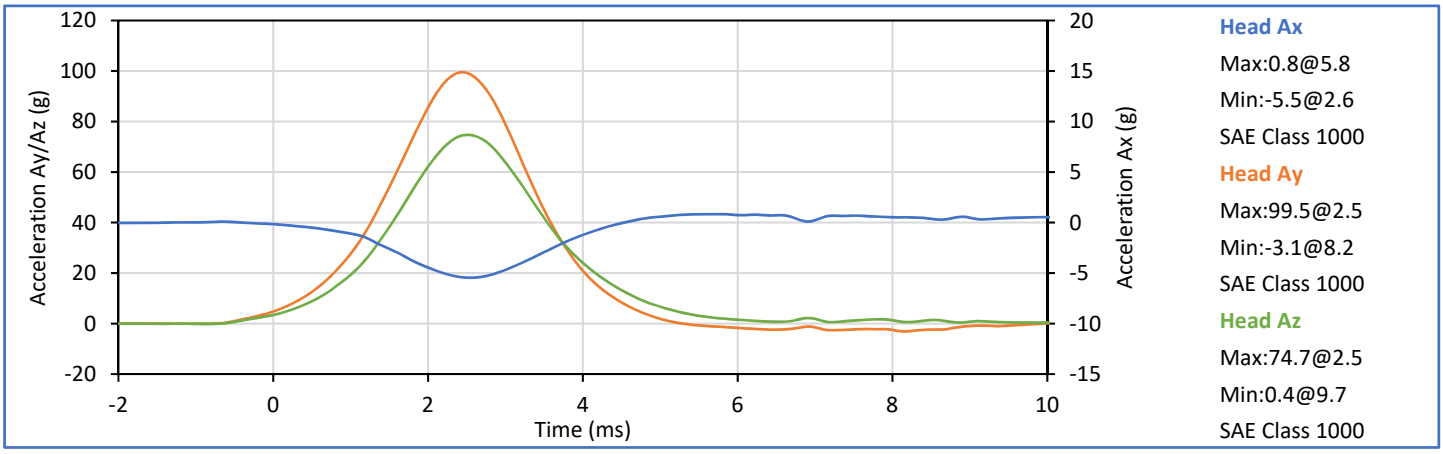
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299 Test Date: 2019-12-10

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	39	Pass
Peak Resultant Acceleration	g	115.0	137.0	124.5	Pass
Peak Head Ax	g	-15.0	15.0	-5.5	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

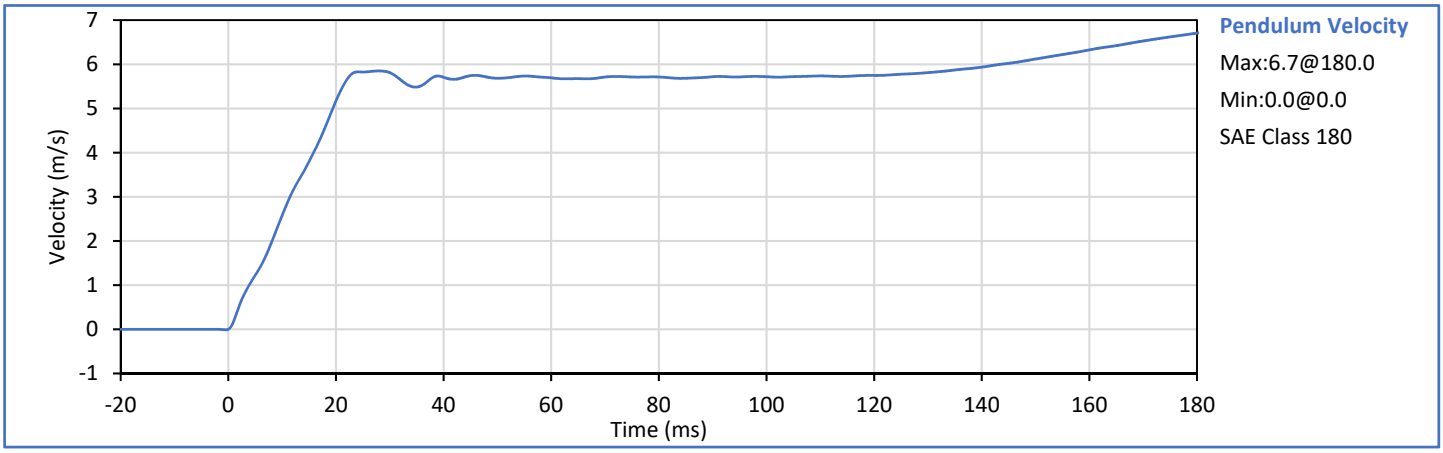
Approved By: P. Puzzuto

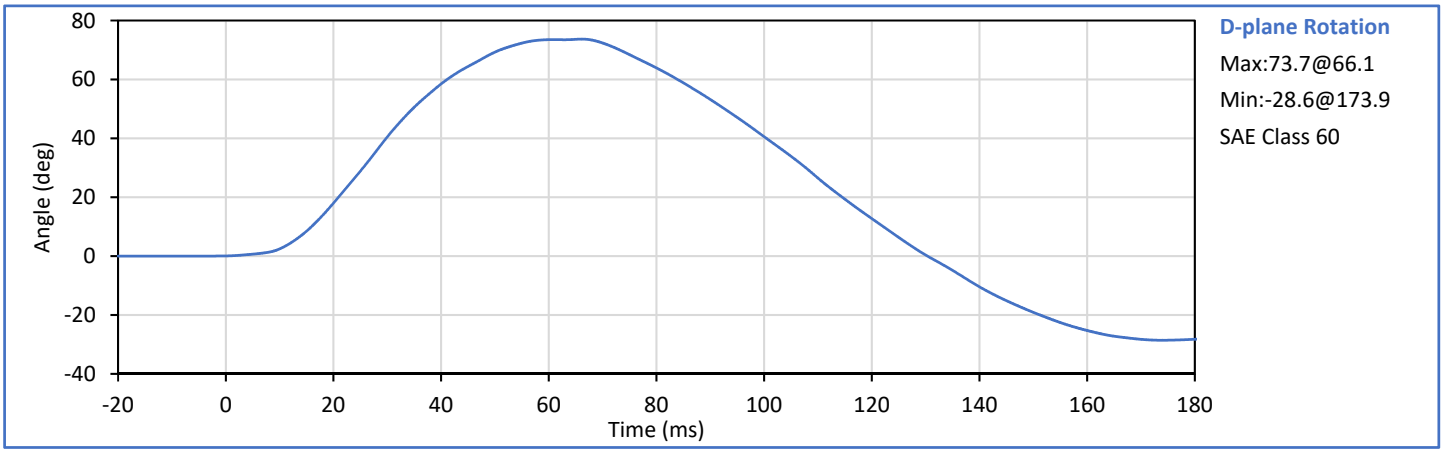
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2019-12-11

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	34	Pass
Pendulum Velocity	m/s	5.51	5.63	5.60	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.58	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.80	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.17	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.83	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.85	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	73.7	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	66.1	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-40.9	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	111.3	Pass
			Overall Test Results		Pass





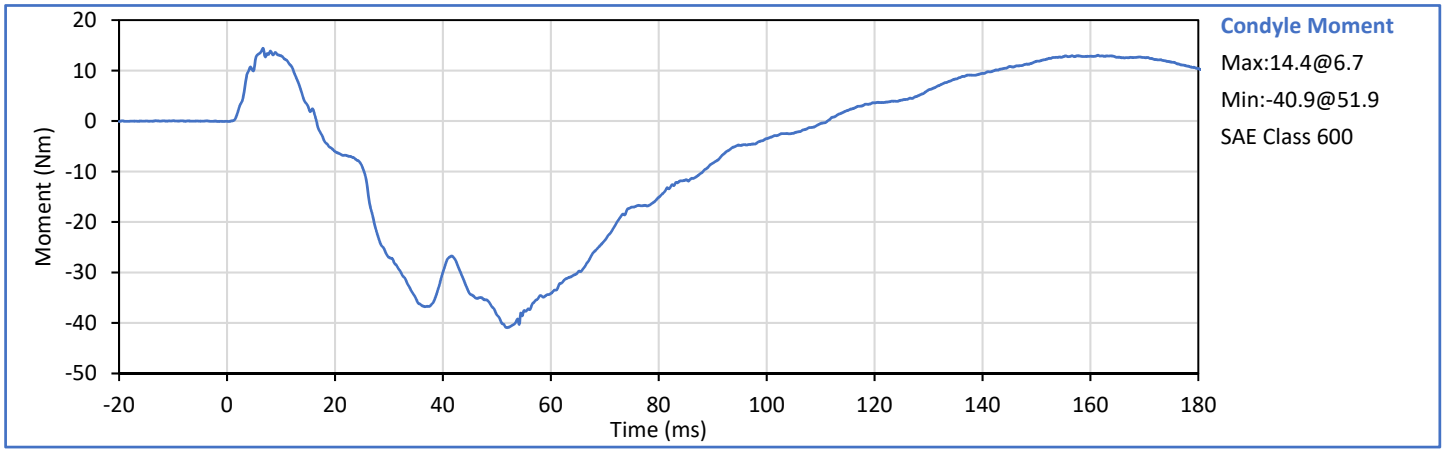
Technician: J. Hernandez

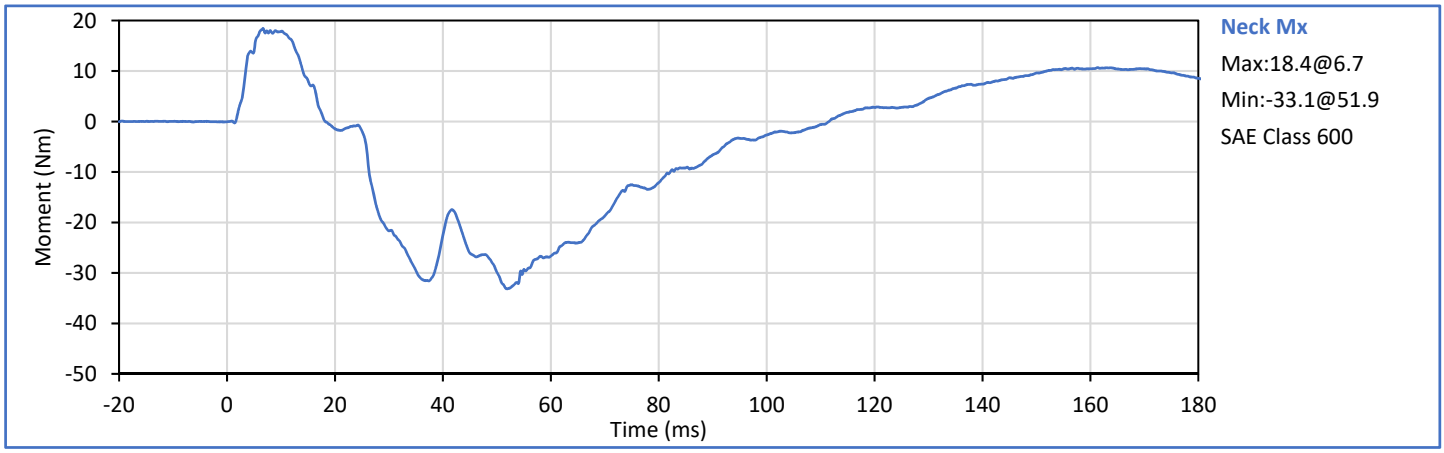
Approved By: P. Puzzuto

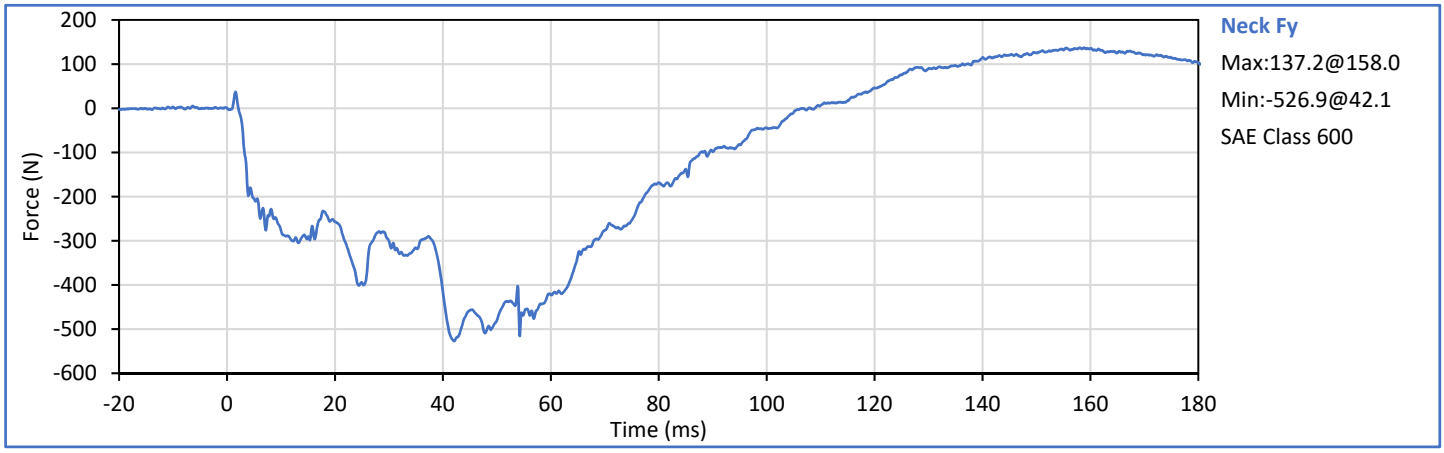
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2019-12-11





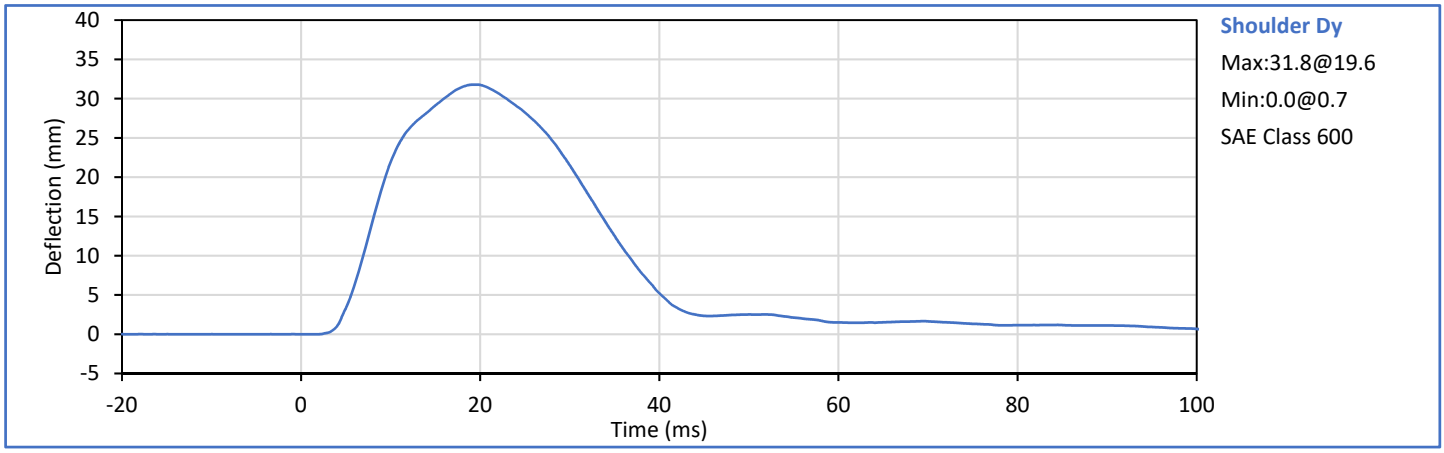


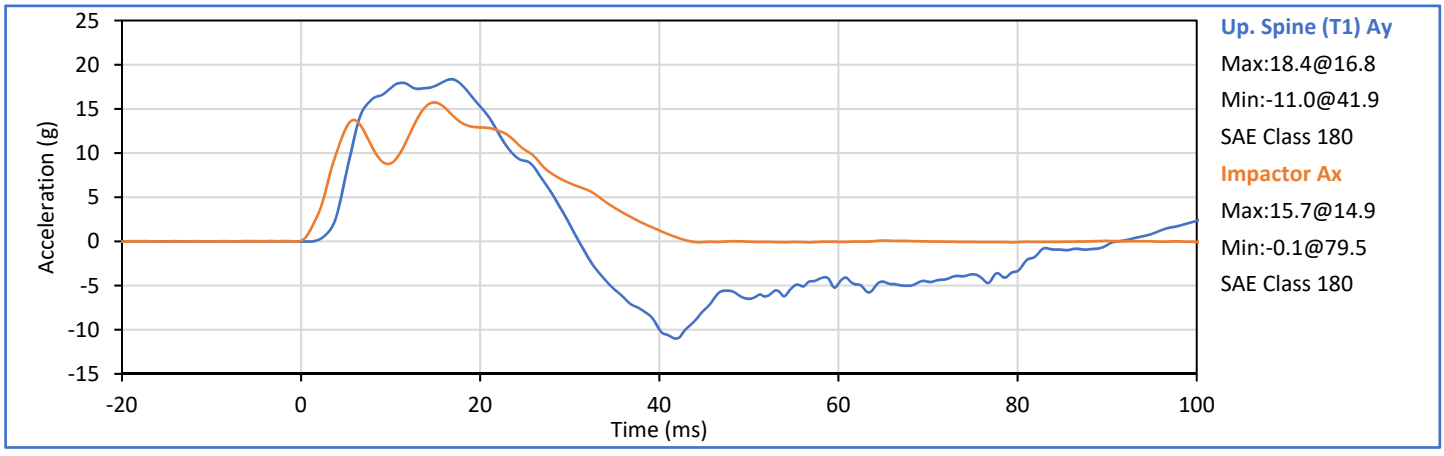
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299 Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	37	Pass
Impactor Velocity	m/s	4.20	4.40	4.28	Pass
Peak Shoulder Dy	mm	28.0	37.0	31.8	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.4	Pass
Peak Impactor Ax	g	13.0	18.0	15.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

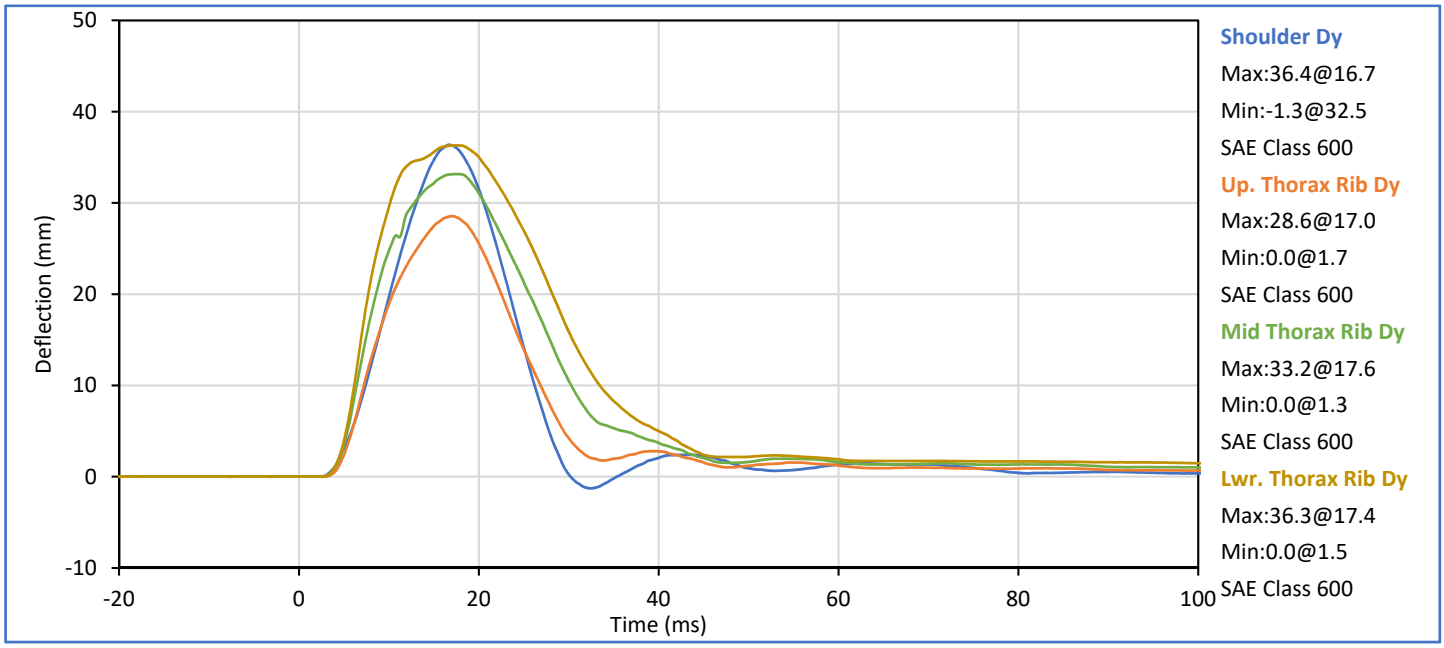
Approved By: P. Puzzuto

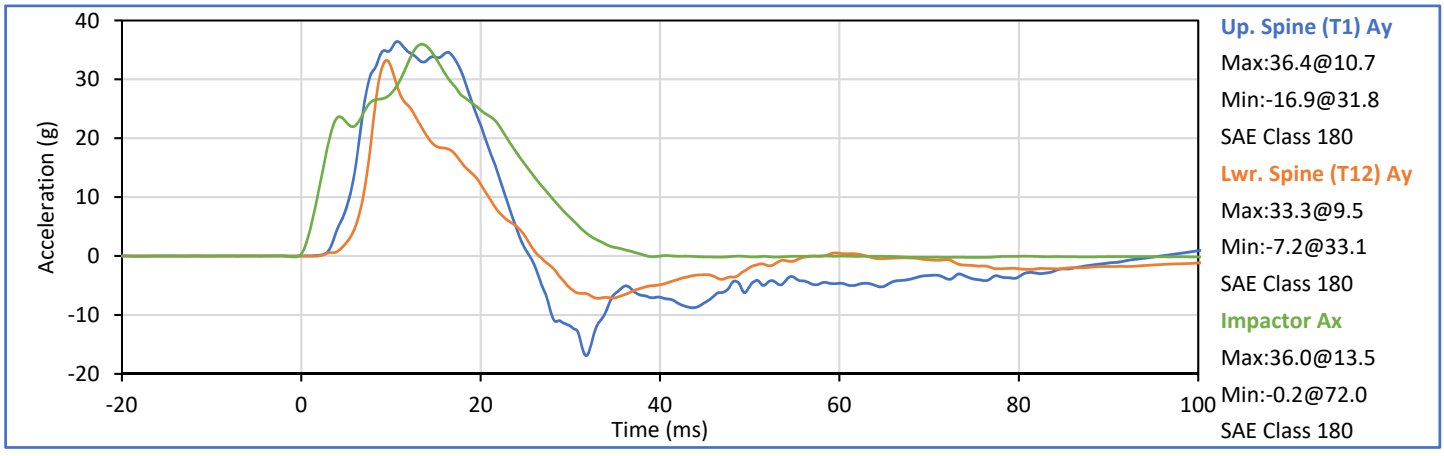
Applus IDIADA
KARCO

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

ATD Serial No.: 299 Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	6.60	6.80	6.67	Pass
Peak Shoulder Dy	mm	31.0	40.0	36.4	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.6	Pass
Peak Middle Rib Dy	mm	30.0	36.0	33.2	Pass
Peak Lower Rib Dy	mm	32.0	38.0	36.3	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.4	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	33.3	Pass
Peak Impactor Ax	g	30.0	36.0	36.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

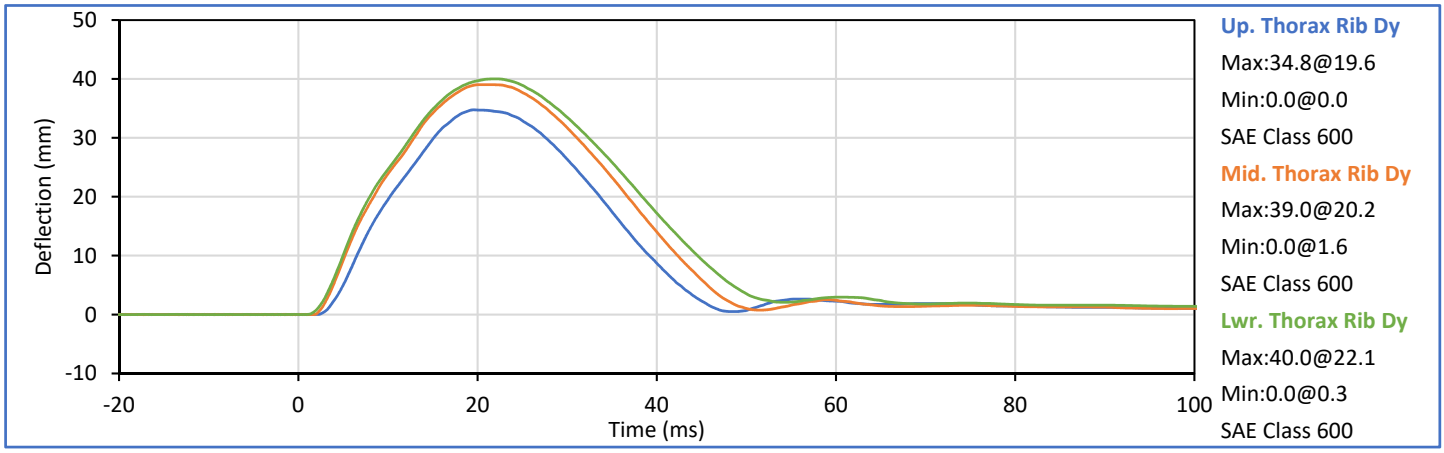
Approved By: P. Puzzuto

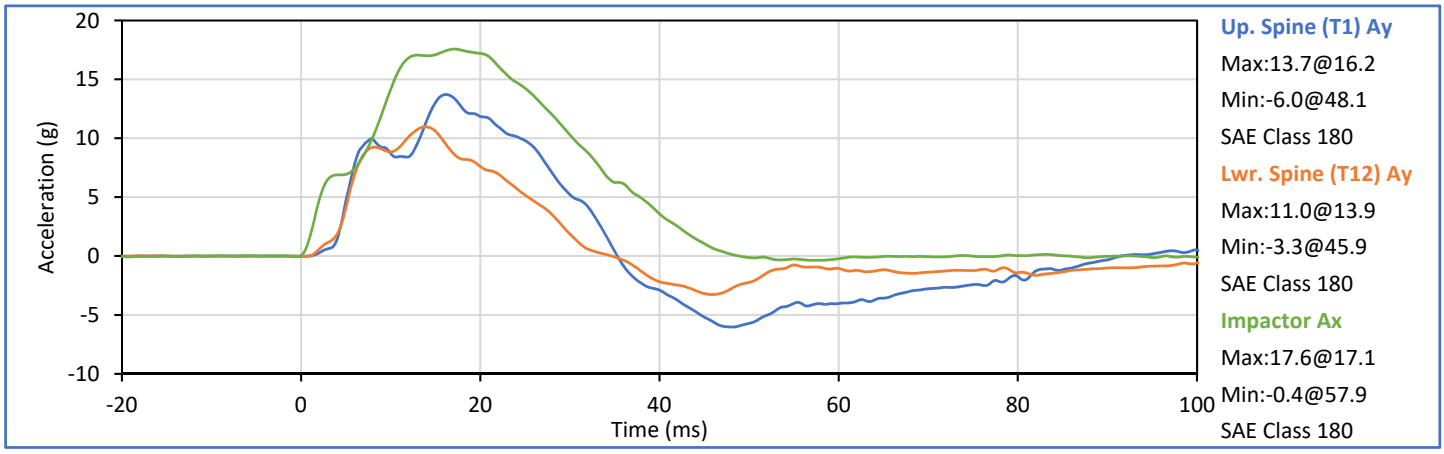
Applus IDIADA KARCO

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

ATD Serial No.: 299 Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Impactor Velocity	m/s	4.20	4.40	4.23	Pass
Peak Upper Rib Dy	mm	32.0	40.0	34.8	Pass
Peak Middle Rib Dy	mm	39.0	45.0	39.0	Pass
Peak Lower Rib Dy	mm	35.0	43.0	40.0	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.7	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	11.0	Pass
Peak Impactor Ax	g	14.0	18.0	17.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

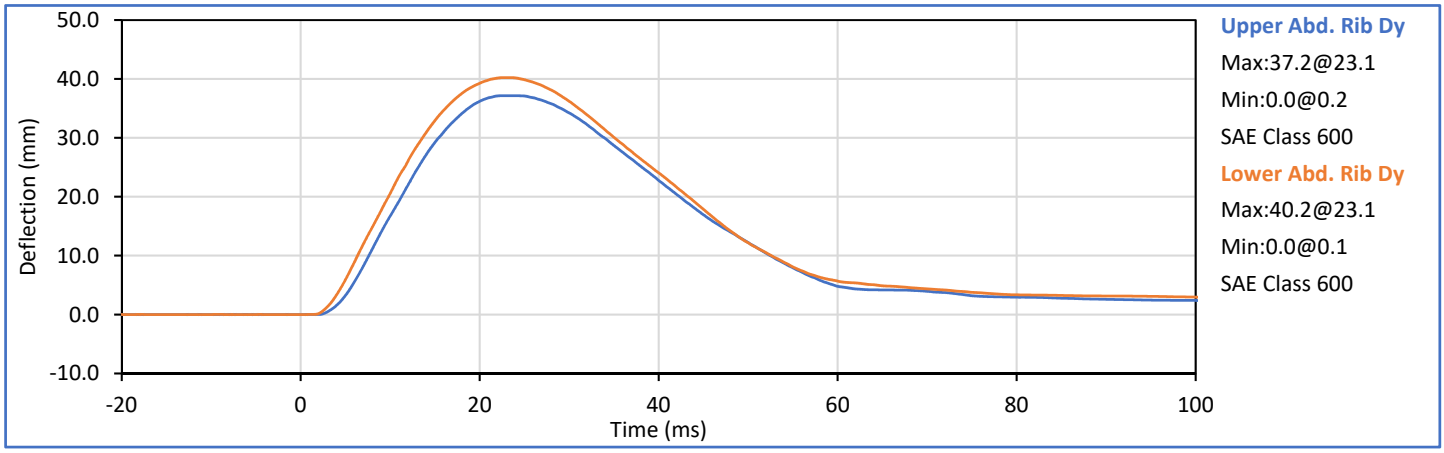
Approved By: P. Puzzuto

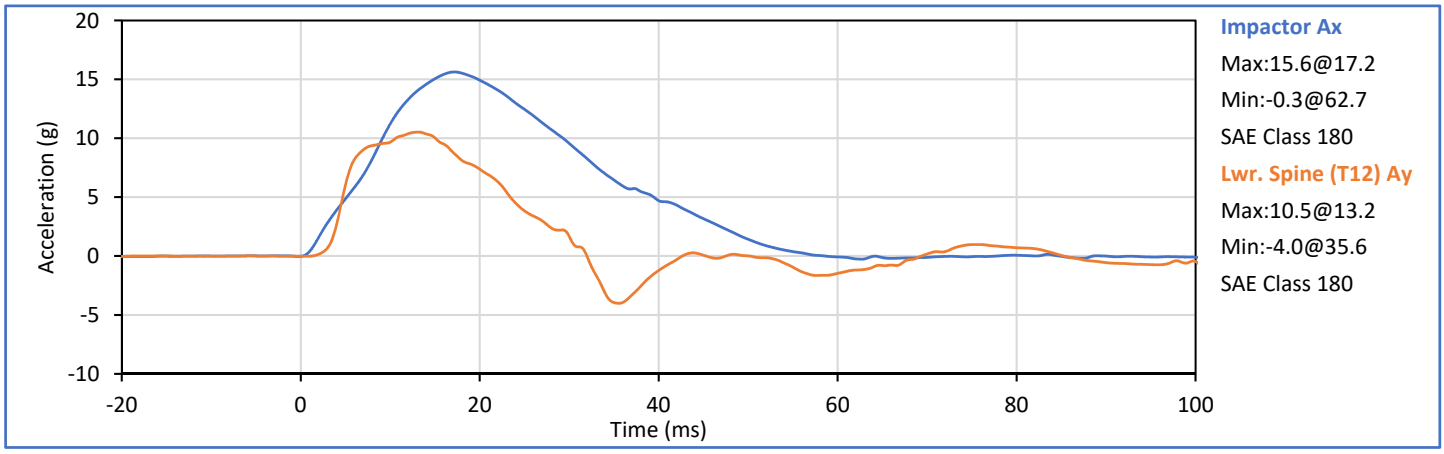
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299 Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	37.2	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	40.2	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.5	Pass
Peak Impactor Ax	g	12.0	16.0	15.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

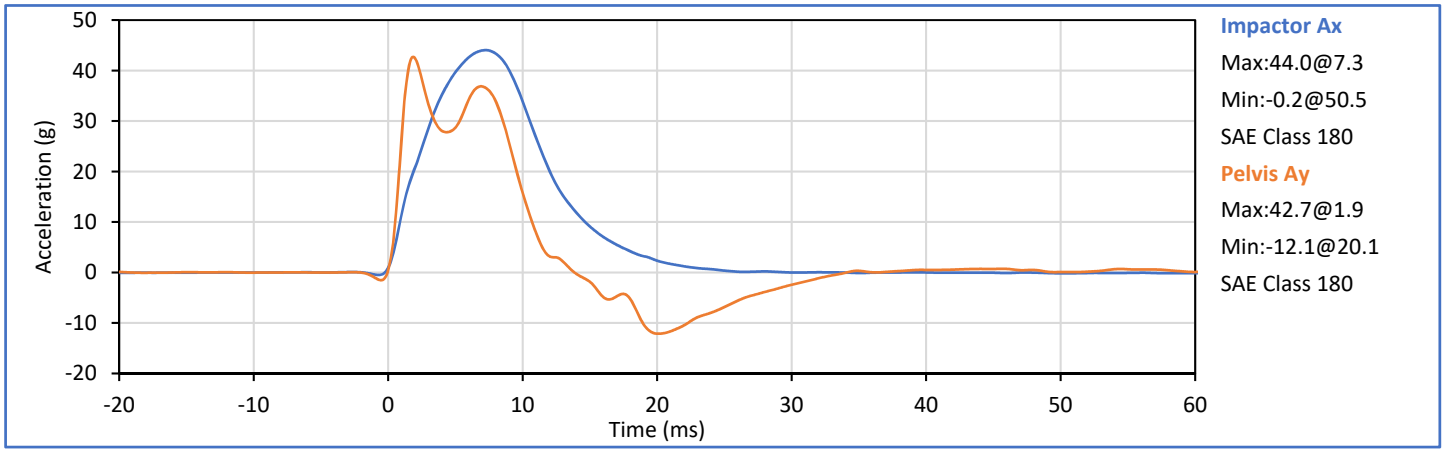
Applus IDIADA KARCO

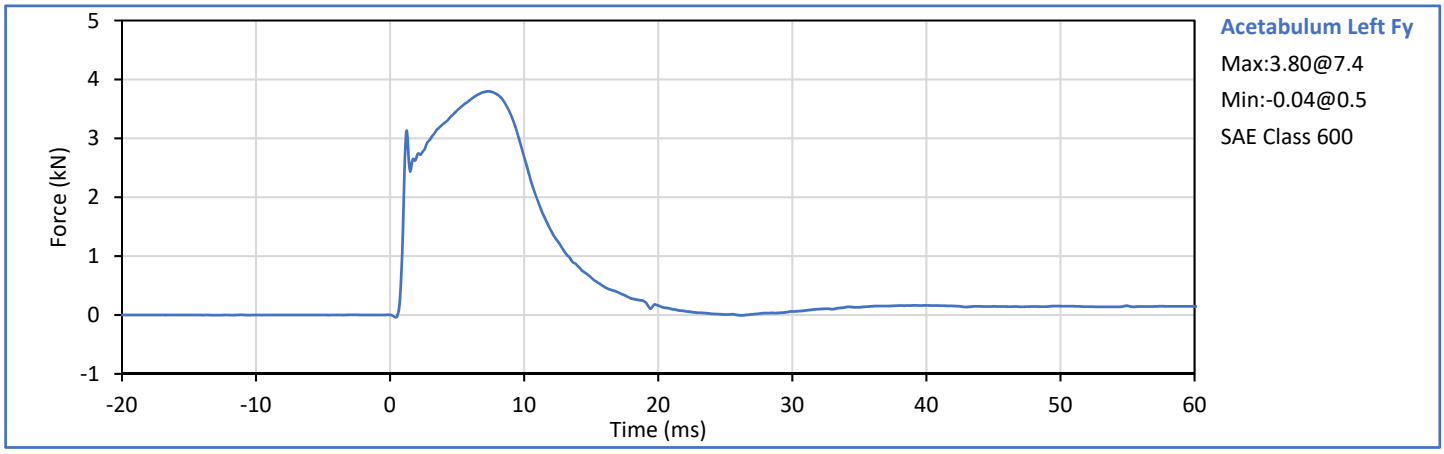
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299 Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	40	Pass
Impactor Velocity	m/s	6.60	6.80	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.80	Pass
Pelvis Ay after 6ms	g	34.0	42.0	36.9	Pass
Peak Impactor Ax	g	38.0	47.0	44.0	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 11542 (SACO)





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 299 Test Date: 2019-12-12

Pelvis Plug S/N: 11542 (SACO)

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 11542
Test Number 3083
Report Number 3076
Test Date 9/29/2016 9:07:20 AM

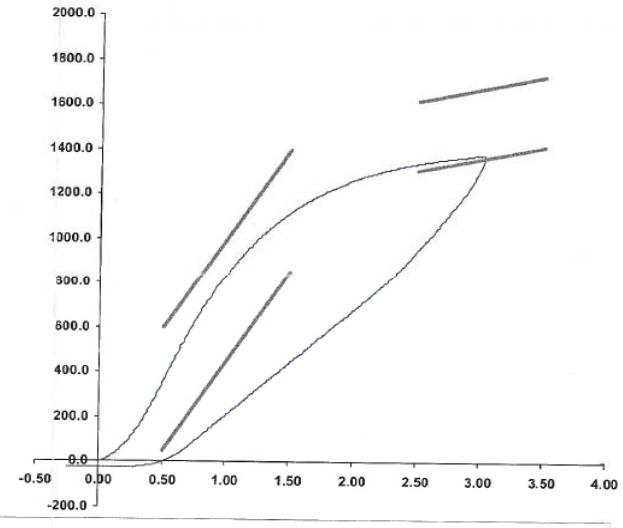
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	360.52	50.00	600.00
Force @ 1.5 mm (N)	1,115.47	850.00	1,400.00
Force @ 2.5 mm (N)	1,337.67	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,376.81	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (TI240813), Units (LBS) 1000

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

Notes:

Force (-N) vs Extension (-mm)



Operator DC

Part Number 180-4450

Template No 107 29-Sep-16
SACO Research

By : DC Date : 9/29/16

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

Applus IDIADA KARCO

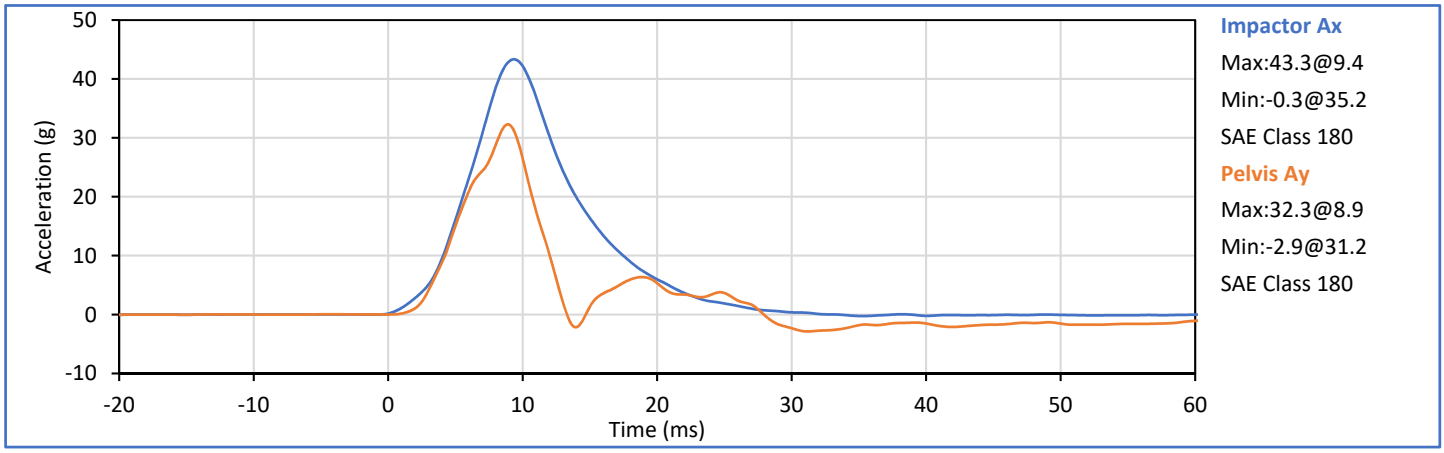
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

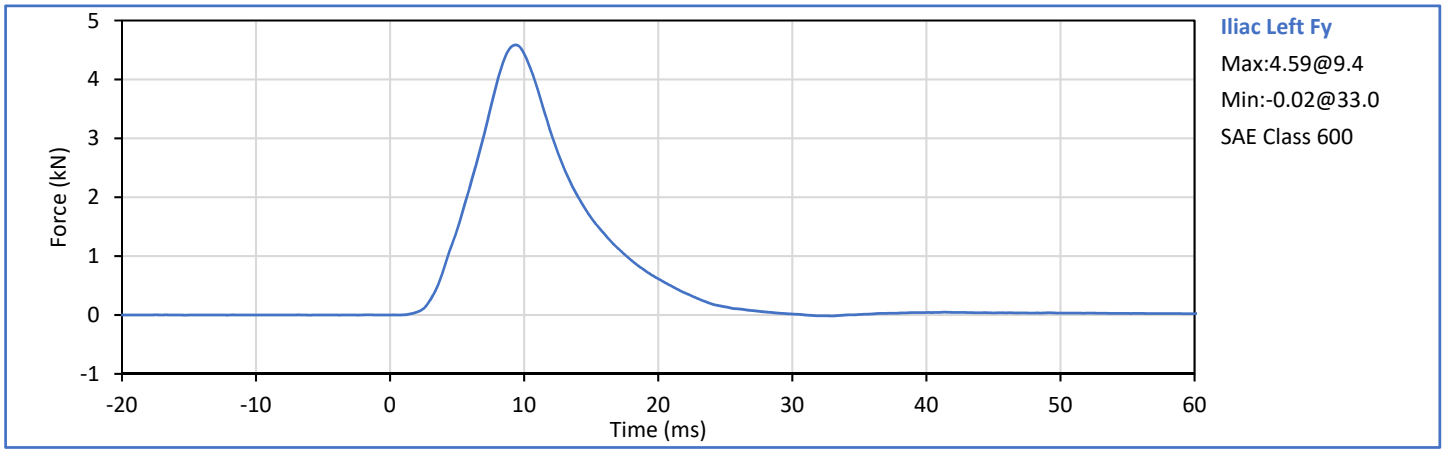
ATD Serial No.: 299 Test Date: 2019-12-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	40	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.59	Pass
Pelvis Ay after 6ms	g	28.0	39.0	32.3	Pass
Peak Impactor Ax	g	36.0	45.0	43.3	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified





Technician: J. Hernandez

Approved By: P. Puzzuto

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	2019-11-05
Head Acceleration Y Primary	P58865	Endevco	7264C-2k	2019-11-05
Head Acceleration Z Primary	P58867	Endevco	7264C-2k	2019-11-05
Head Acceleration X Redundant	P58859	Endevco	7264C-2k	2019-11-05
Head Acceleration Y Redundant	P58866	Endevco	7264C-2k	2019-11-05
Head Acceleration Z Redundant	P58873	Endevco	7264C-2k	2019-11-05
Upper Thorax Rib Deflection Y	209 (ES-2 Rib)	Honeywell	F38000203	2019-11-05
Middle Thorax Rib Deflection Y	210 (ES-2 Rib)	Honeywell	F38000203	2019-11-05
Lower Thorax Rib Deflection Y	207 (ES-2 Rib)	Honeywell	F38000203	2019-11-05
Anterior Abdominal Force Y	1504 Fy	R.A. Denton	2631J	2019-10-22
Middle Abdominal Force Y	1505 Fy	R.A. Denton	2631J	2019-10-22
Posterior Abdominal Force Y	1506 Fy	R.A. Denton	2631J	2019-10-22
Lower Spine T12 Acceleration X	P63856	Endevco	7264C-2k	2019-11-05
Lower Spine T12 Acceleration Y	P50063	Endevco	7264C-2k	2019-11-05
Lower Spine T12 Acceleration Z	P51880	Endevco	7264C-2k	2019-11-05
Pubic Symphysis Force Y	DG6784 Fy	FTSS	IF-556	2019-10-22

SID-IIs ATD S/N: 299

Table 2 - Left Rear Passenger ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P51929	Endevco	7264C-2k	2019-10-30
Head Acceleration Y Primary	P50086	Endevco	7264C-2k	2019-10-30
Head Acceleration Z Primary	P51931	Endevco	7264C-2k	2019-10-30
Head Acceleration X Redundant	P68604	Endevco	7264C-2k	2019-10-30
Head Acceleration Y Redundant	P51934	Endevco	7264C-2k	2019-10-30
Head Acceleration Z Redundant	P58736	Endevco	7264C-2k	2019-10-30
Head Rotation Rate X	ARS7571	DTS	ARS PRO-8k (2000Hz)	2019-07-08
Head Rotation Rate Y	ARS7316	DTS	ARS PRO-8k (2000Hz)	2019-07-08
Head Rotation Rate Z	ARS7330	DTS	ARS PRO-8k (2000Hz)	2019-07-08
Upper Thorax Rib Deflection Y	1143	Servo	08TCI-3725	2019-10-30
Middle Thorax Rib Deflection Y	1160	Servo	08TCI-3725	2019-10-30
Lower Thorax Rib Deflection Y	1213	Servo	08TCI-3725	2019-10-30
Upper Abdomen Rib Deflection Y	1218	Servo	08TCI-3725	2019-10-30
Lower Abdomen Rib Deflection Y	1177	Servo	08TCI-3725	2019-10-30
Lower Spine T12 Acceleration X	04I20-Z04	Entran	EGEB6Q-2k	2019-10-30
Lower Spine T12 Acceleration Y	06A07-R08	Entran	EGEB6Q-2k	2019-10-30
Lower Spine T12 Acceleration Z	P58795	Endevco	7264C-2k	2019-10-30
Iliac Wing Impact Side Force Y	278 Fy (Iliac)	R.A. Denton	3228J	2019-04-11
Acetabulum Impact Side Force Y	260 Fy (Acetabulum)	R.A. Denton	3249J	2019-04-11

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	A254936	MSI	52F-2000	2019-12-02
Vehicle CG Ay	A254937	MSI	52F-2000	2019-12-02
Vehicle CG Az	A256305	MSI	52F-2000	2019-11-13
Right Side Sill at Front Seat Ax	A264073	MSI	52F-2000	2019-12-02
Right Side Sill at Front Seat Ay	A264816	MSI	52F-2000	2019-12-02
Right Side Sill at Front Seat Az	A265843	MSI	52F-2000	2019-10-09
Right Side Sill at Rear Seat Ax	A265844	MSI	52F-2000	2019-12-02
Right Side Sill at Rear Seat Ay	A265846	MSI	52F-2000	2019-12-02
Right Side Sill at Rear Seat Az	A265883	MSI	52F-2000	2019-12-02
Left Side Sill at Front Seat Ay	A265850	MSI	52F-2000	2019-10-09
Left Side Sill at Rear Seat Ay	A265851	MSI	52F-2000	2019-10-09
Left Lower A-Pillar Ay	A265888	MSI	52F-2000	2019-10-10
Left Middle A-Pillar Ay	A265853	MSI	52F-2000	2019-11-13
Left Lower B-Pillar Ay	A265857	MSI	52F-2000	2019-12-02
Left Middle B-Pillar Ay	A265858	MSI	52F-2000	2019-11-13
Driver Seat Track at H-Point Ay	A265859	MSI	52F-2000	2019-10-09
Rear Seat Structure Ay	A265890	MSI	52F-2000	2019-12-02
Right Rear Occupant Comp. Ay	A265863	MSI	52F-2000	2019-10-09
Engine Block Top Ax	A265891	MSI	52F-2000	2019-12-02
Engine Block Top Ay	A265869	MSI	52F-2000	2019-10-09
Rear Floopan Above Axle Ax	A265892	MSI	52F-2000	2019-10-09
Rear Floopan Above Axle Ay	A265872	MSI	52F-2000	2019-11-27
Rear Floopan Above Axle Az	A265897	MSI	52F-2000	2019-10-10

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
MDB CG Ax	10390	Endevco	757F-2k	2019-11-07
MDB CG Ay	10405	Endevco	757F-2k	2019-11-07
MDB CG Az	10421	Endevco	757F-2k	2019-11-07
MDB Left Side at Rear Axle Ax	A224516	MSI	52F-2000	2019-11-08
MDB Left Side at Rear Axle Ay	A160734	MSI	52F-2000	2019-11-07