REPORT NUMBER: SINCAP-KAR-20-022

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

NISSAN MOTOR CO., LTD.

2020 NISSAN SENTRA 4-DOOR SEDAN

NHTSA No: M20205211

PREPARED BY:

APPLUS+ IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

MAY 27, 2020

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF CRASHWORTHINESS STANDARDS

MAIL CODE: NRM-110

1200 NEW JERSEY AVE, SE, ROOM W43-410

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Approval Date: May 27, 2020

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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4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing of a 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211	May 27, 2020
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9. Performing Organization Name and Address Applus+ IDIADA KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301	**10. Work Unit No.**
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	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 Sentra 4-door sedan in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on May 13, 2020.

The impact velocity of the Moving Deformable Barrier was 62.00 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 25.6°C. The target vehicle's maximum post-test static crush was 235 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	161.5
Maximum Thoracic Rib Deflection	mm	44	29
Total Abdominal Force	N	2500	874
Pubic Symphysis Force	N	6000	1879

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	160.1
Resultant Lower Spine Acceleration	g	82	45
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	1975
Maximum Thoracic Rib Deflection	mm	38*	19
Maximum Abdominal Rib Deflection	mm	45*	15

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

17. Key Words	18. Distribution Statement
New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) ES-2re SID-IIs	Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division 1200 New Jersey Ave., SE Washington, DC 20590

19. Security Classification of this report	20. Security Classification of this page	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	154	

**Proposed IARV*

TABLE OF CONTENTS

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 Sentra 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 Nissan Sentra 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 62.00 km/h (38.53 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 May 13, 2020. 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	161.5
Maximum Thoracic Rib Deflection	mm	44	29
Combined Abdominal Force	N	2500	874
Pubic Symphysis Force	N	6000	1878

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	160.1
Lower Spine (T12) Resultant Acceleration	g	82	45
Total Pelvic Force (sum of acetabular and iliac forces	N	5525	1975
Maximum Thoracic Rib Deflection	mm	38*	19
Maximum Abdominal Rib Deflection	mm	45*	15

**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	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

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 following channels failed or were not collected:

- The MDB Left Side at Rear Axle Ax channel failed at 49.5 ms
- The Left Lower B-Post Ay channel was not installed
- The Left Mid B-Post Ay channel was not installed

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

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 Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20205211
Model Year	2020
Make	Nissan
Model	Sentra
Body Style	4-Door Sedan
VIN	3N1AB8CVXLY239668
Body Color	Electric Blue Metallic
Odometer Reading (km / mi)	14 / 9
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
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	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	Yes
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	No

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Co., Ltd.
Date of Manufacture	03/20
Vehicle Type	MPV

GVWR (kg)	1815
GAWR Front (kg)	980
GAWR Rear (kg)	845

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				400.0	*A*
DSC x 68.04 (kg)				340.2	*B*
Cargo Weight (RCLW) (kg)				59.8	*A-B*

VEHICLE SEAT TYPE

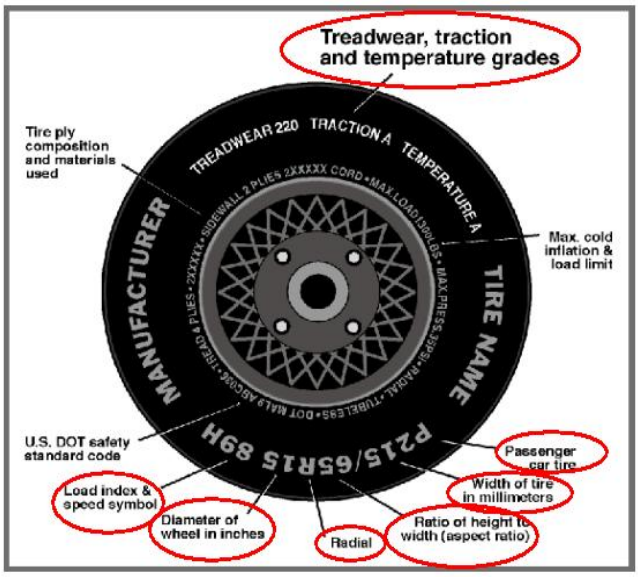
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable w/ Lever	Adjustable w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat		Yes			Yes		
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	205/60R16	205/60R16
Tire Size on Vehicle	205/60R16	205/60R16
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	92H	92H
Tire Material	Steel, Polyester, Nylon	Steel, Polyester, Nylon
DOT Safety Code Left	1BC9X 1BH0 0220	1BC9X 1BH0 0220
DOT Safety Code Right	1BC9X 1BH0 0220	1BC9X 1BH0 0220

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

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	427.5	264.5		459.5	339.5		464.0	343.5	
Right	kg	414.0	273.5		429.0	329.0		424.5	331.0	
Ratio	%	61.0%	39.0%	100.0%	57.1%	42.9%	100.0%	56.8%	43.2%	100.0%
Total	kg	841.5	538.0	1379.5	888.5	668.5	1557.0	888.5	674.5	1563.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1379.5	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	59.8	C
Calculated Vehicle Target Wt (TVTW)	kg	1564.3	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	680	681	Yes
RF	mm	690	690	Yes
LR	mm	676	674	Yes
RR	mm	690	691	Yes
Vehicle CG (Aft of Front Axle)	mm	1170	1164	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	26	21	

***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 Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire	16.0
Trim	2.0
Ballast / Equipment Added	51.5

Test Height Adjustable Setting (If Applicable)	N/A

DATA SHEET NO. 2

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

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	4.4	0.0	2.2
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	2.2	185	Max			
			Mid	181	185	195
			Min			
Front Passenger Seat	Fixed	502	Max			
			Mid	502	502	502
			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 Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

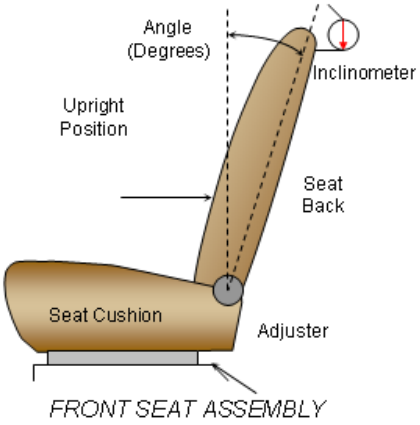
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	25	120	12
Front Passenger Seat	240	25	120	12
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

SEAT BACK ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The right front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is fixed. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck side rear seat back. Seat back angle is measured 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	74.6	41	4.2	9
Front Passenger Seat	69.4	41	4.0	9
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

DATA SHEET NO. 2 … (CONTINUED)

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

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

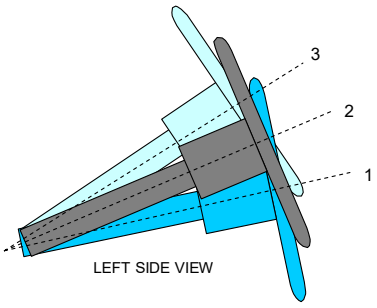
HEAD RESTRAINT ADJUSTMENT

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

	Total No. of Positions	Placed in Position
Driver Seat	3	Full Up
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

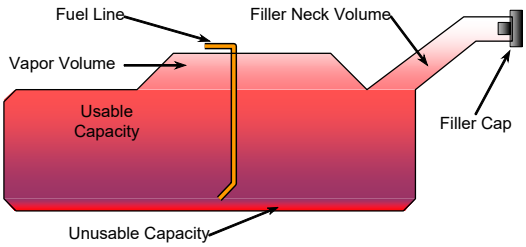
	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	20.9	81
Geometric Center - Position 2	23.3	106
Uppermost - Position 3	25.7	130
Telescoping Steering Wheel Travel		49
Test Position	23.3	106

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel pump operates for 1.0 s after the ignition is switched to the "ON" position, while the engine is running, and for 1.5 s after the engine stops.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	46.56
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	46.56
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	43.30
Actual amount of Solvent Used in Test	43.30
1/3 of Usable Capacity	15.52

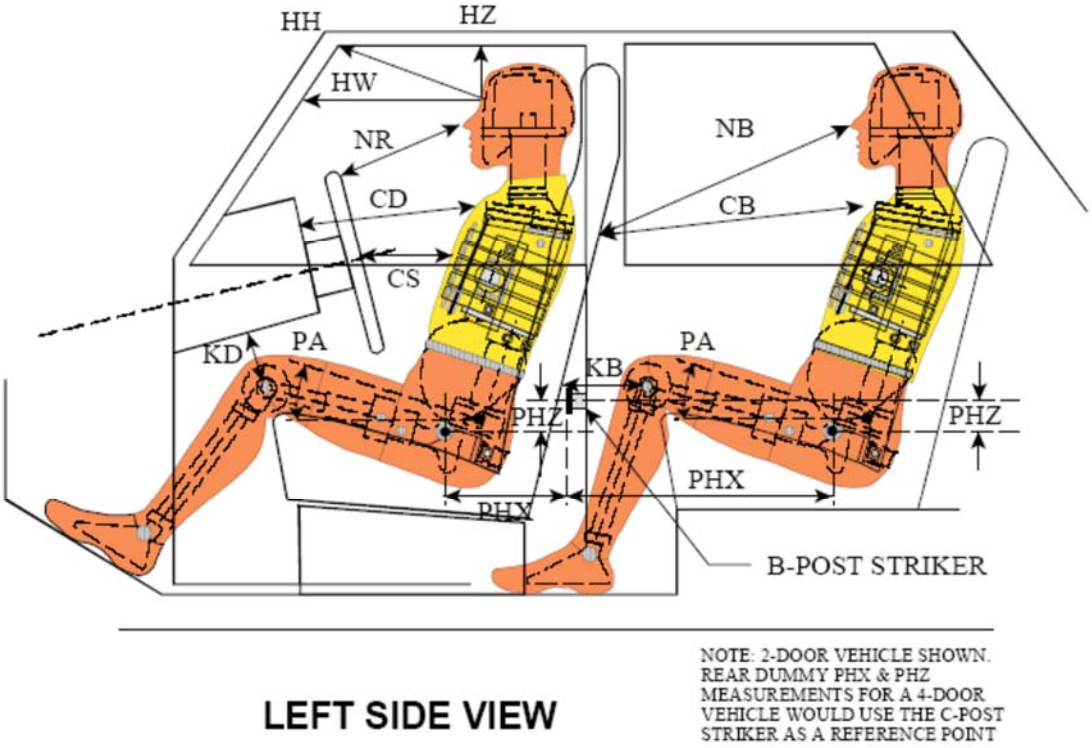
Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



LEFT SIDE VIEW

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

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

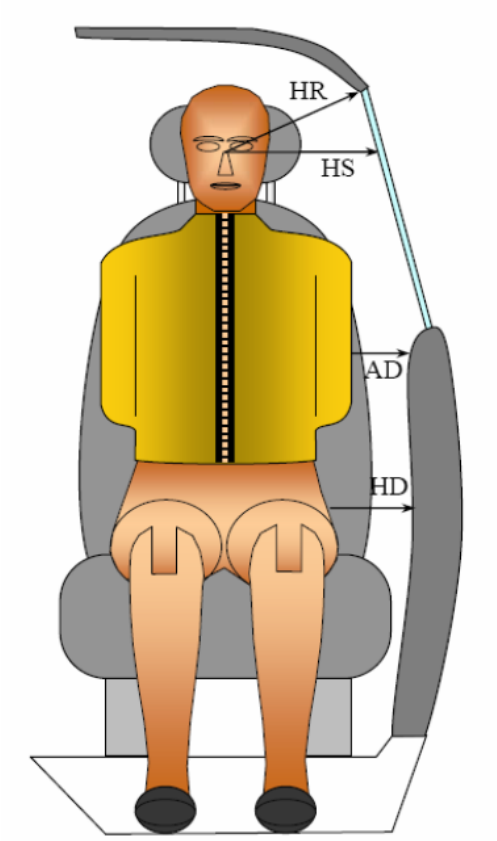
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	343			
HW		Head to Windshield	540			
HZ	HZ	Head to Roof	132		241	
NR	NB	Nose to Rim/Seat Back	425		620	
CD	CB	Chest to Dash/Seat Back	560		628	
CS		Chest to Steering Wheel	296			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	168	27.4	318	13.9
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	102	37.8	317	17.8
PAX°	PAX°	Pelvic Tilt Angle X		14.4		22.5
	PAY°	Pelvic Tilt Angle Y		0.1		0.0
PHX	PHX	Hip Point to Striker (x-axis)	223		242	
PHZ	PHZ	Hip Point to Striker (z-axis)	146		280	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

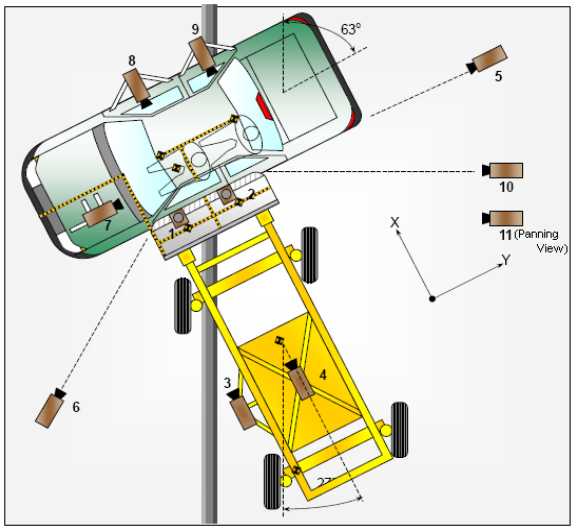
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	185	231
HS	Head to Side Window	mm	345	340
AD	Arm to Door	mm	82	155
HD	H-Point to Door	mm	130	229

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



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)	462	-667	-640	6	1000
8	Driver Side (On-Board)	1639	552	-356	6	1000
9	Passenger Side (On-Board)	1645	1552	-386	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

INSTRUMENTATION

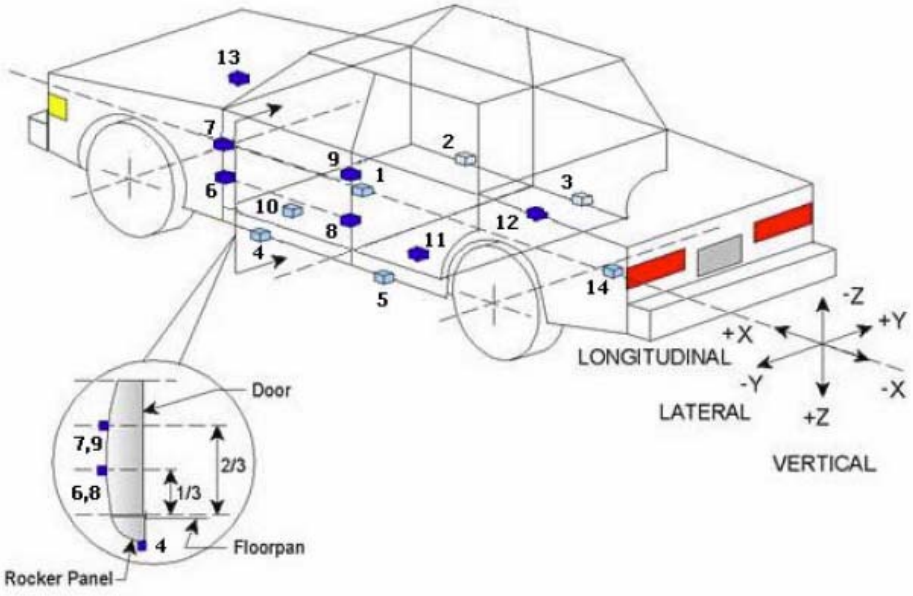
Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	21
MDB Channels	5
Total	61

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1980	0	-330
2	Right Sill at Front Seat	2635	730	-305
3	Right Sill at Rear Seat	1640	730	-305
4	Left Sill at Front Door	2660	-775	-195
5	Left Sill at Rear Door	1840	-775	-195
6	A-Pillar Lower	3170	-840	-525
7	A-Pillar Middle	3170	-840	-710
8	B-Pillar Lower			
9	B-Pillar Middle			
10	Front Seat Track	2530	-155	-240
11	Rear Seat Structure	1750	-335	-285
12	Right Rear Occupant Compartment	2060	405	-210
13	Engine Block	3765	180	-725
14	Rear Floorpan Above Axle	1030	0	-450

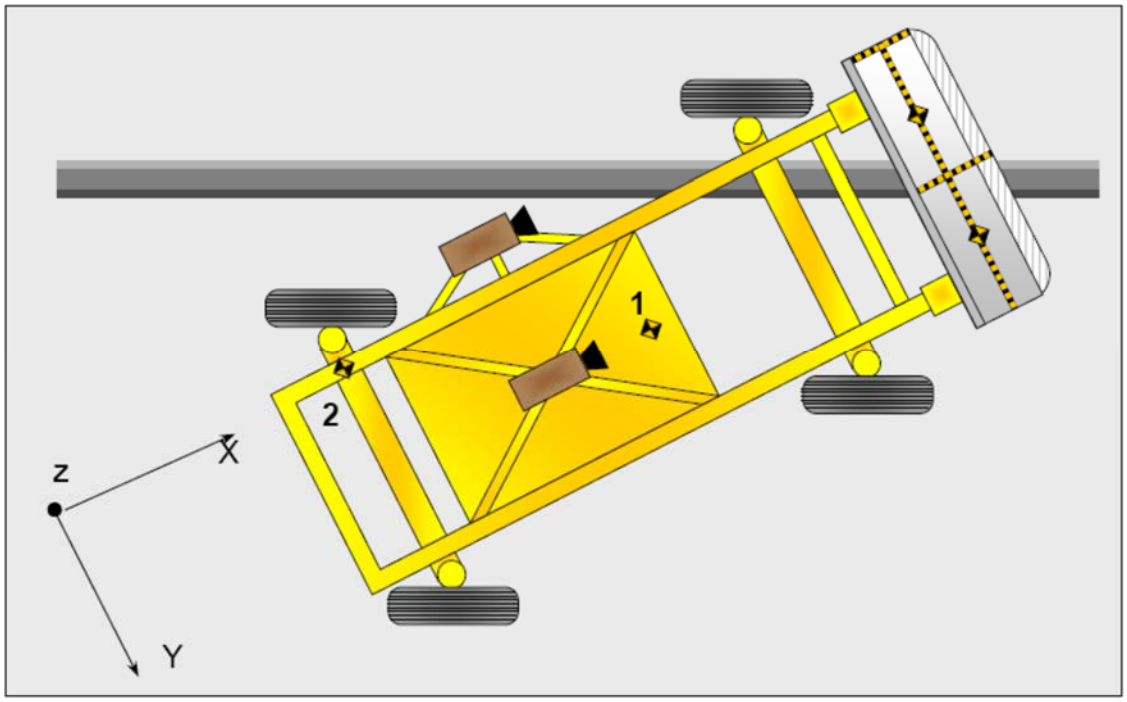
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



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 Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

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	None	Curtain Airbag, Side Header
Left Side of Head	Curtain Airbag, Side Header	Curtain Airbag
Back of Head	Curtain Airbag, Side Header, Headrest	Side Header, Headrest
Left Shoulder	Curtain Airbag, Door Panel	Side Airbag, Seat
Upper Torso	Side Airbag, Seat	Side Airbag, Seat
Lower Torso	Side Airbag, Seat	Side Airbag, Seat
Left Hip	Side Airbag, Seat, Door Panel	Side Airbag, Seat
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge System Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	N/A	N/A	N/A	N/A	N/A

DATA SHEET NO. 8 … (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation
Sill Separation	No separation
Windshield Damage	None
Side Window Damage	Both struck side windows broken
Other Notable Effects	None

DATA SHEET NO. 8 … (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

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	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2712
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		416
Actual Impact Point (Aft of Front Axle)	mm		405
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	11
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	5

DATA SHEET NO. 9

MDB SUMMARY OF RESULTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

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	62.00
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.93
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.1
MDB Forw ard Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.8
MDB Crabbed Angle to MDB Forw ard Line of Motion	degrees	26.0 to 28.0	27.4

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

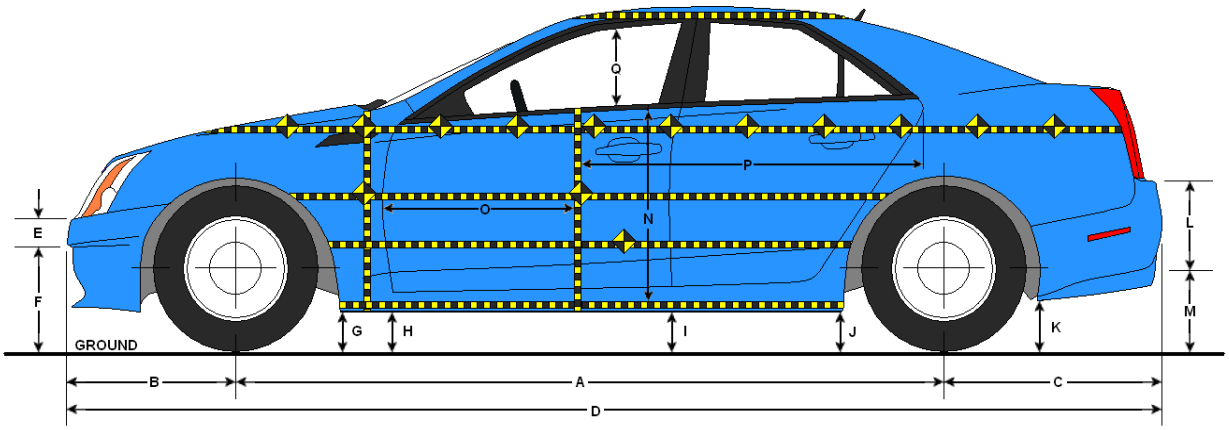
Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	188
B	Top of Bumper	533	800	Left	92
C	Mid Level	686	800	Left	104
D	Top of Stack	813	800	Left	144

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2712	2697	-15
B	Front Axle to FSOV	914	905	-9
C	Rear Axle to RSOV	1020	1033	13
D	Total Length at Centerline	4646	4635	-11
E	Front Bumper Thickness	183	181	-2
F	Fromt Bumper Bottom to Ground	307	296	-11
G	Sill Height at Front Wheel Well	201	214	13
H	Sill Height at Front Door Leading Edge	205	230	25
I	Sill Height at B-Pillar	258	283	25
J1	Sill Height at Rear Wheel Well	195	203	8
J2	Pinch Weld Height at Rear Wheel Well	170	182	12
K	Sill Height Aft of Rear Wheel Well	420	427	7
L	Rear Bumper Thickness	145	143	-2
M	Rear Bumper Bottom to Ground	439	453	14
N	Sill Height to Bottom of Front Window Sill	639	586	-53
O	Front Door Leading Edge to Impact CL	750	695	-55
P	Rear Door Trailing Edge to Impact CL	1381	1328	-53
Q	Front Window Opening	372	400	28
R	Right Side Length	3193	3188	-5
S	Left Side Length	3186	3212	26
T	Vehicle Width at B-Pillar	1805	1756	-49

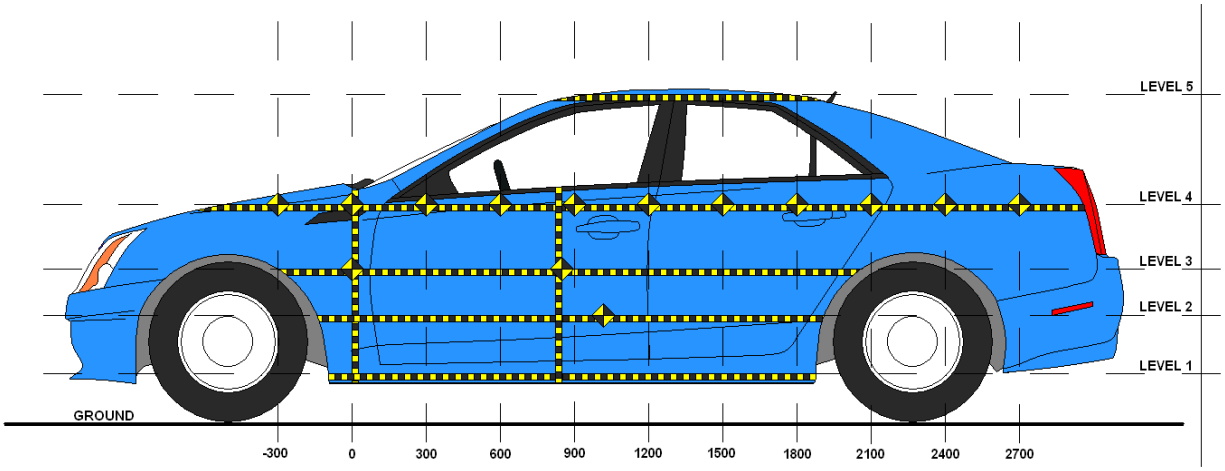
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	237	59	1800
2	Occupant H-Point	515	226	1350
3	Mid-Door	637	235	1650
4	Window Sill	899	205	1650
5	Window Top	1369	9	1500

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

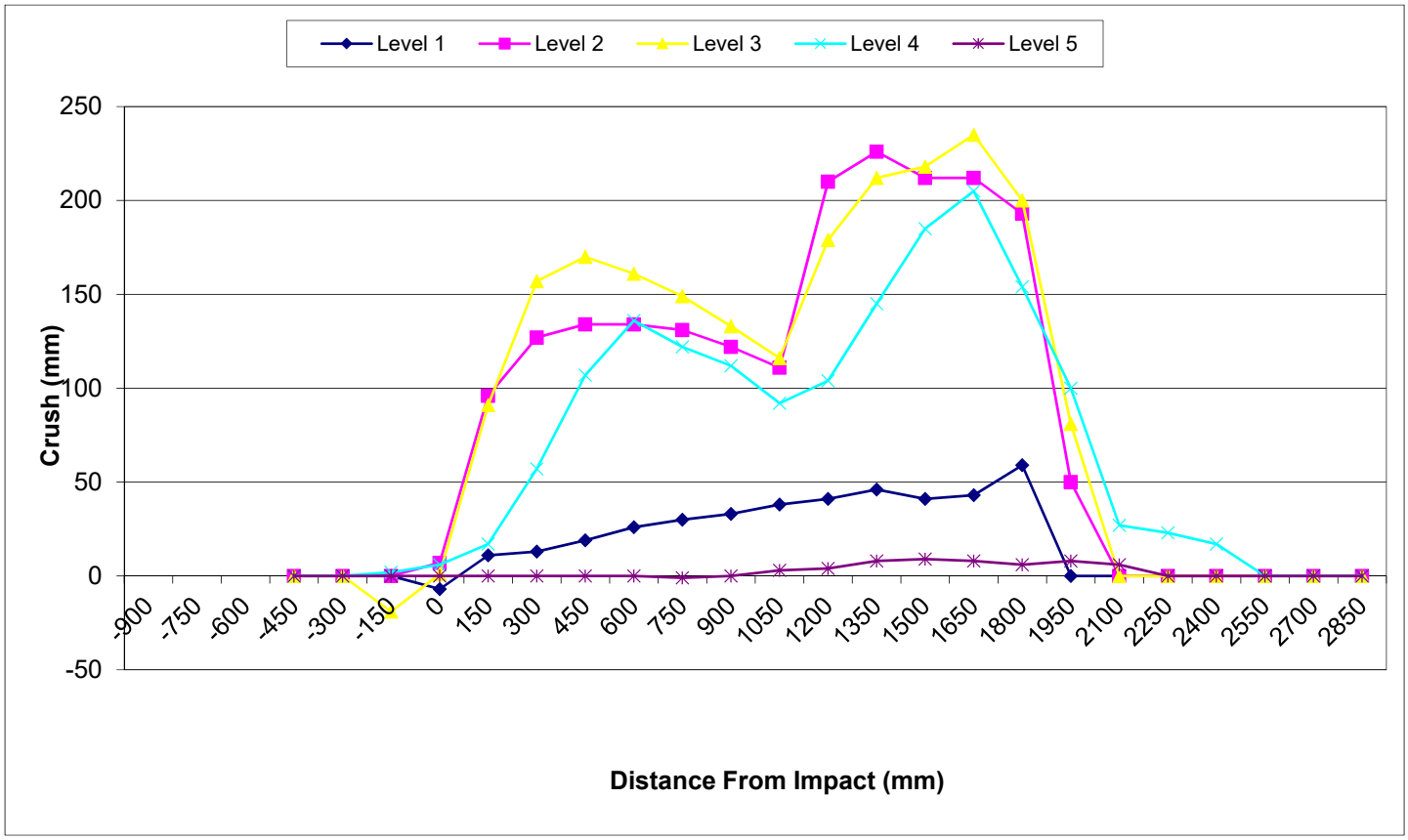
	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150			591	697				572	699				-19	2	
0	611	596	602	689		604	603	603	695		-7	7	1	6	
150	633	604	607	681		644	700	698	698		11	96	91	17	
300	633	607	605	674		646	734	762	731		13	127	157	57	
450	631	606	602	668		650	740	772	775		19	134	170	107	
600	627	604	599	662		653	738	760	798		26	134	161	136	
750	626	603	597	657	903	656	734	746	779	902	30	131	149	122	-1
900	624	601	596	653	903	657	723	729	765	903	33	122	133	112	0
1050	622	601	596	649	906	660	712	712	741	909	38	111	116	92	3
1200	622	599	595	647	910	663	809	774	751	914	41	210	179	104	4
1350	621	600	596	647	910	667	826	808	792	918	46	226	212	145	8
1500	622	600	598	643	912	663	812	816	828	921	41	212	218	185	9
1650	621	599	599	638	914	664	811	834	843	922	43	212	235	205	8
1800	617	593	595	634	919	676	786	795	788	925	59	193	200	154	6
1950		592	588	607	922		642	669	707	930		50	81	100	8
2100				614	931				641	937				27	6
2250				631					654					23	
2400				638					655					17	
2550															
2700															
2850															

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

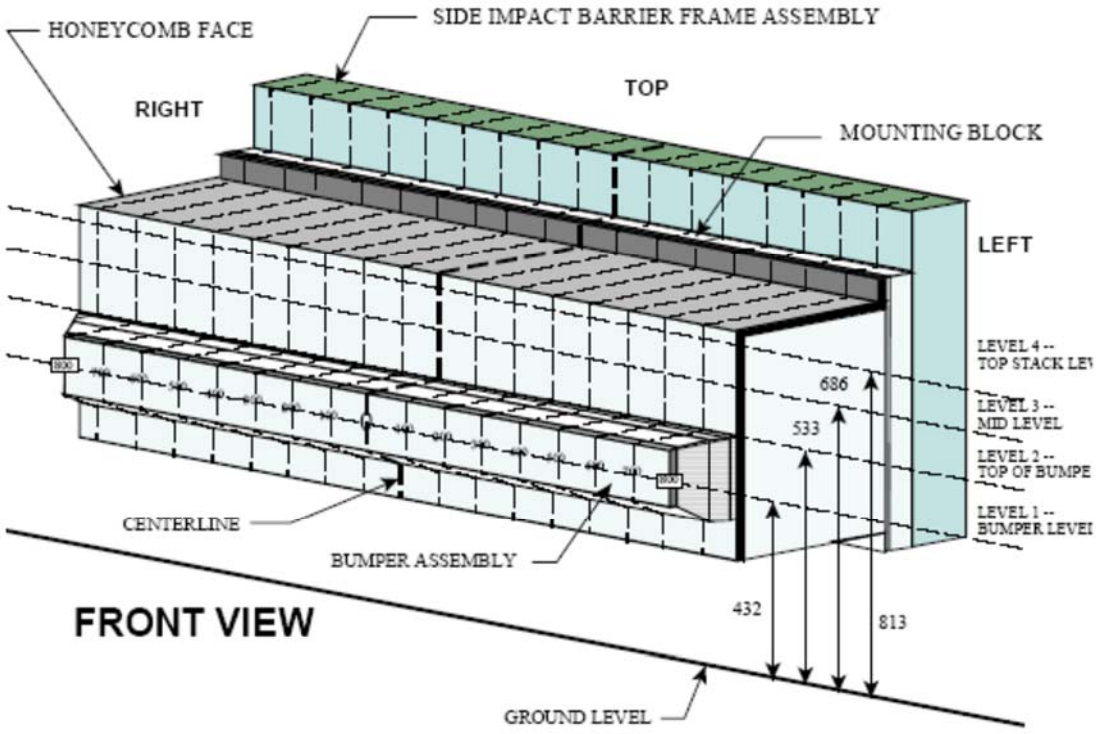


DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



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	175	167	173	166	175	172	166	163	158	149	148	143	140	141	144	158	188
2	84	87	75	65	59	72	85	79	68	57	63	72	75	88	82	86	92
3	52	14	14	25	40	74	70	65	42	25	17	21	16	21	31	54	104
4	67	16	11	26	57	101	120	108	71	31	23	17	16	25	59	95	144

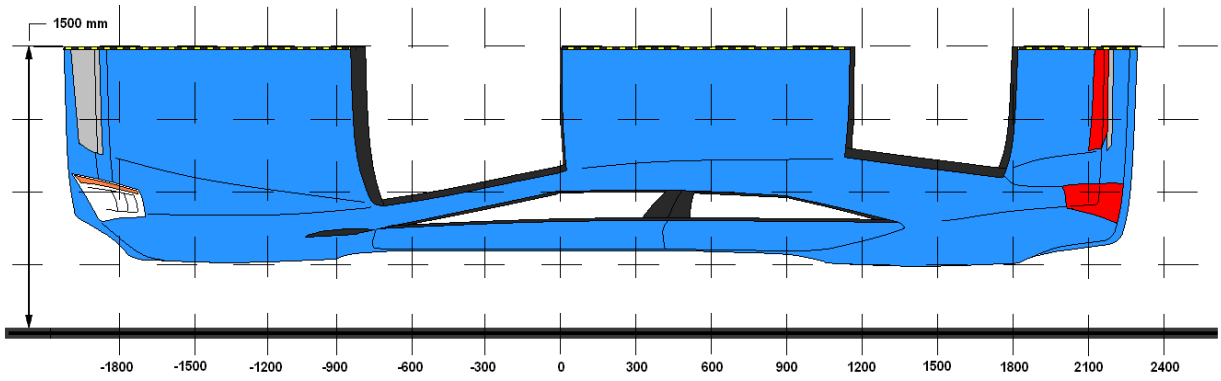
All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2400	4	638	655	17
2	1950	4	607	707	100
3	1350	2	600	826	226
4	600	3	596	729	133
5	300	3	605	762	157
6	-150	4	697	699	2

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	175
2	500	Left	1	166
3	200	Left	1	166
4	200	Right	1	148
5	500	Right	1	141
6	800	Right	1	188

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20

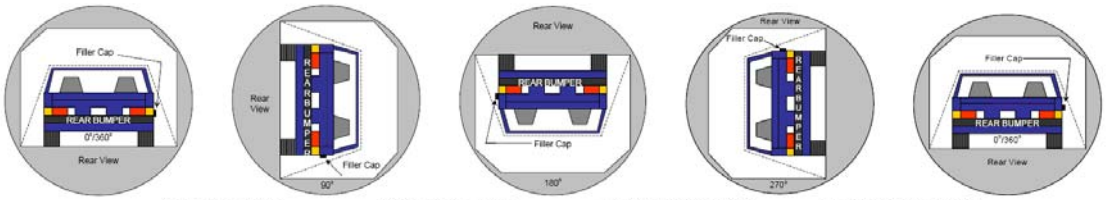
Temperature at Time of Impact: 25.6 °C Test Time: 3:54 P.M.

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.



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	82	300	382
90° To 180°	81	300	381
180° To 270°	79	300	379
270° To 360°	79	300	379

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

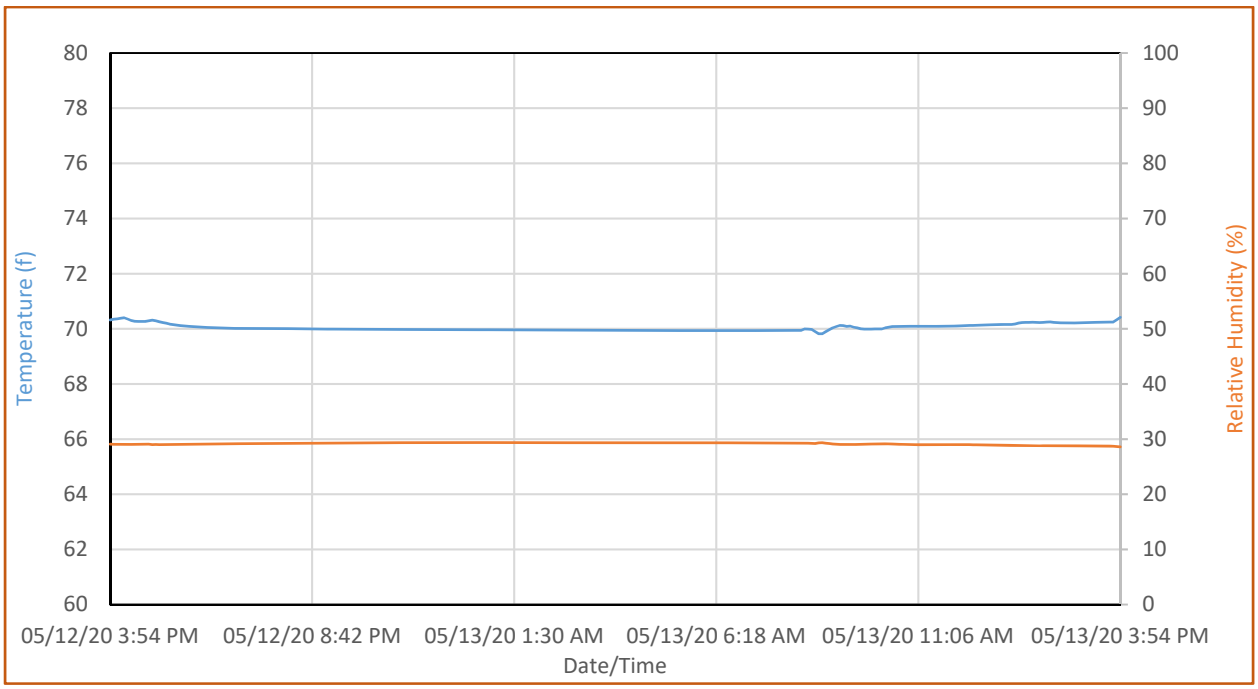
Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No. M20205211

Test Program: NCAP MDB Side Impact Test Test Date: 05/13/20



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

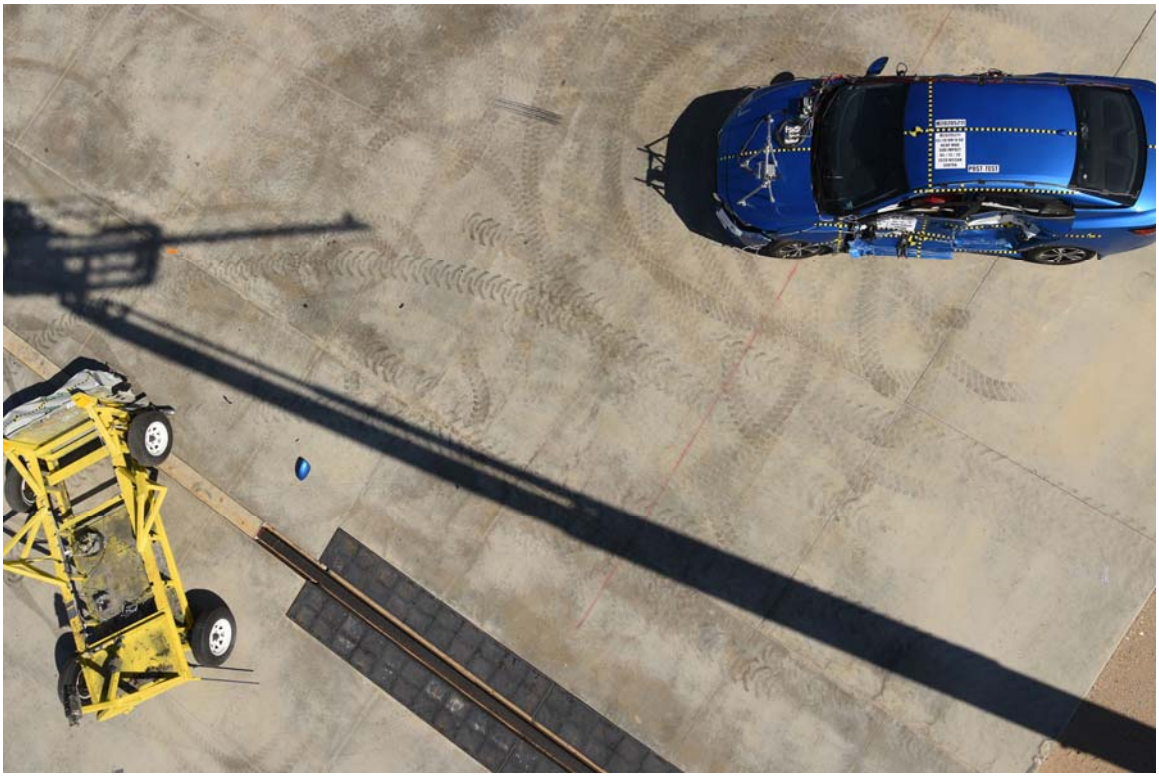


FIGURE 16. Post-Test Overhead View of Test Area

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

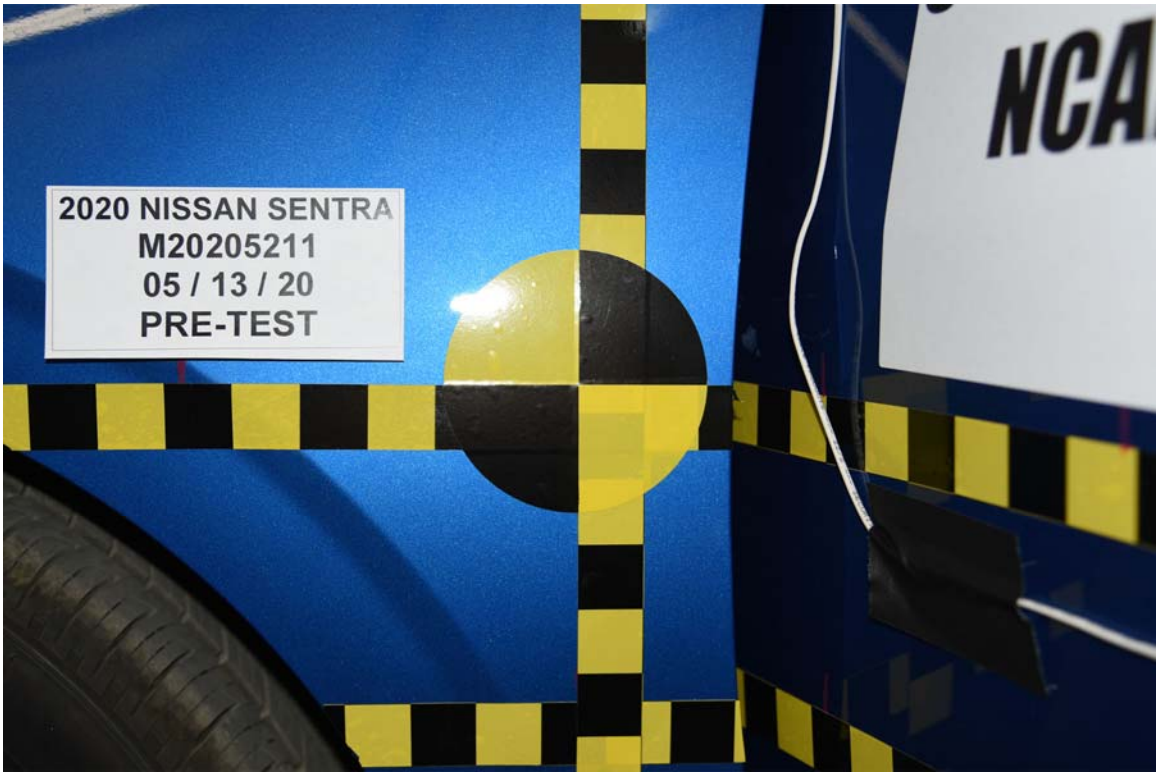


FIGURE 19. Pre-Test Close-Up View of Impact Point Target

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

Photograph Not Available

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

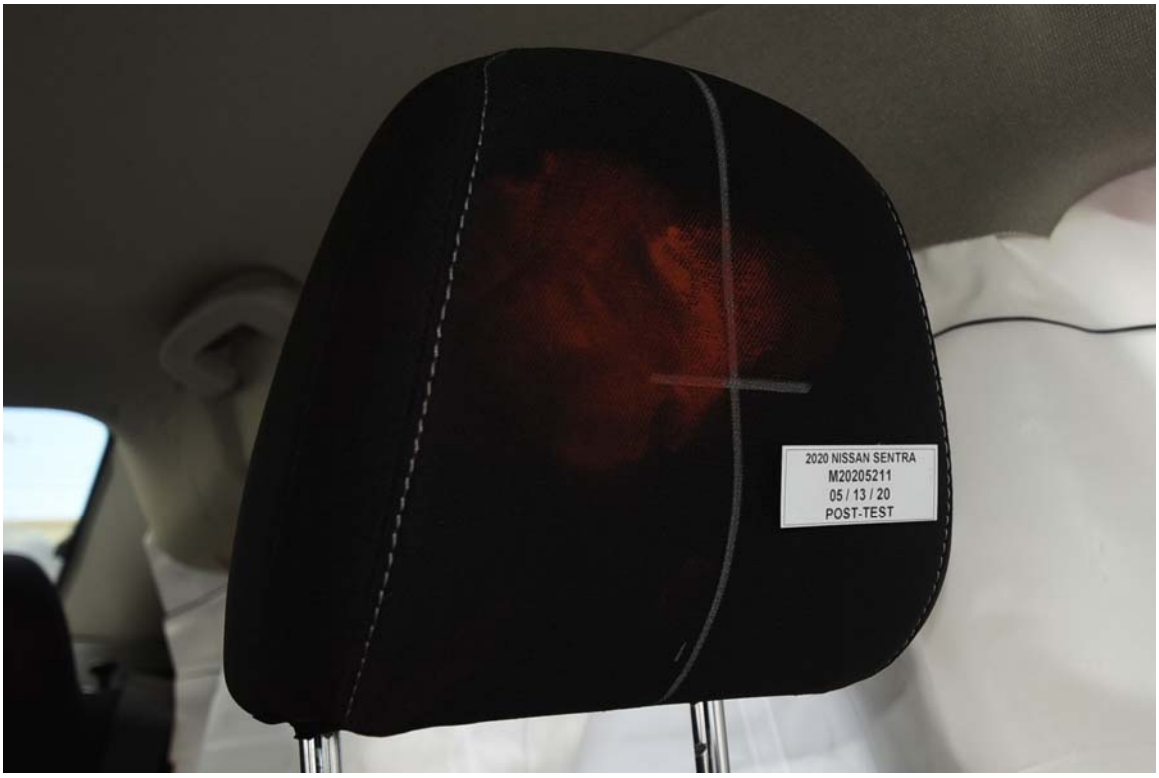


FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact
with Vehicle Interior View

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

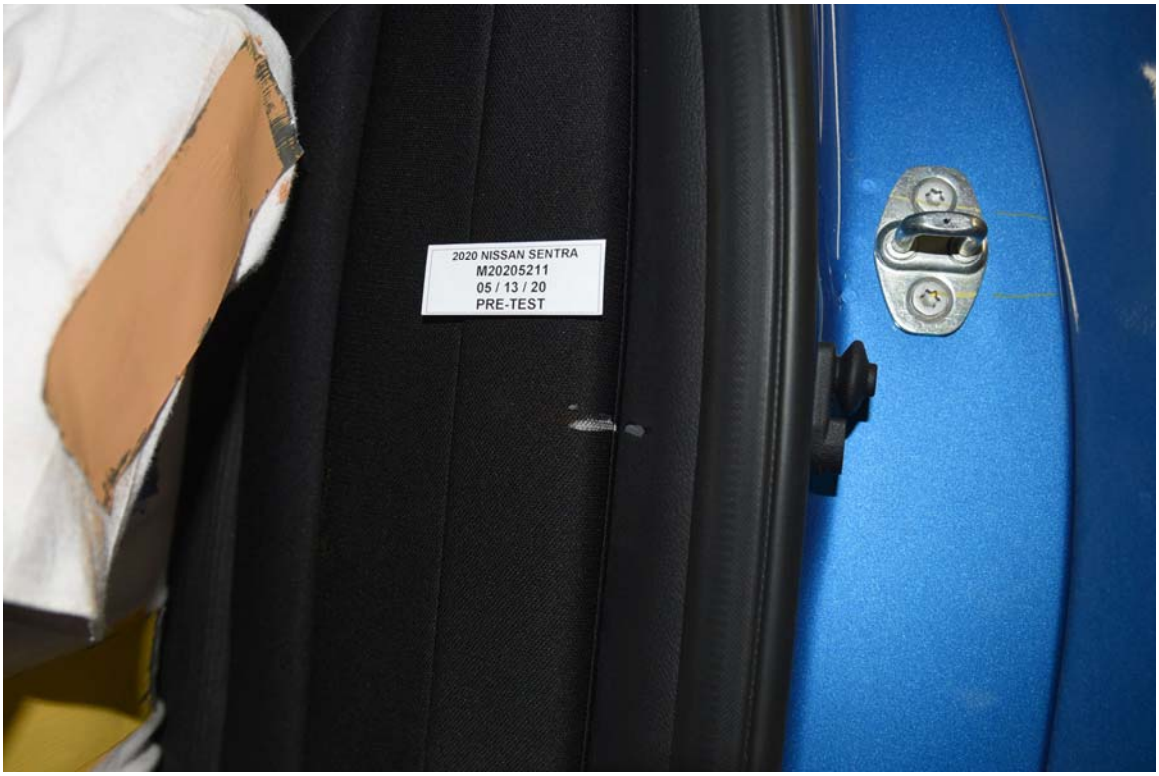


FIGURE 67. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

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

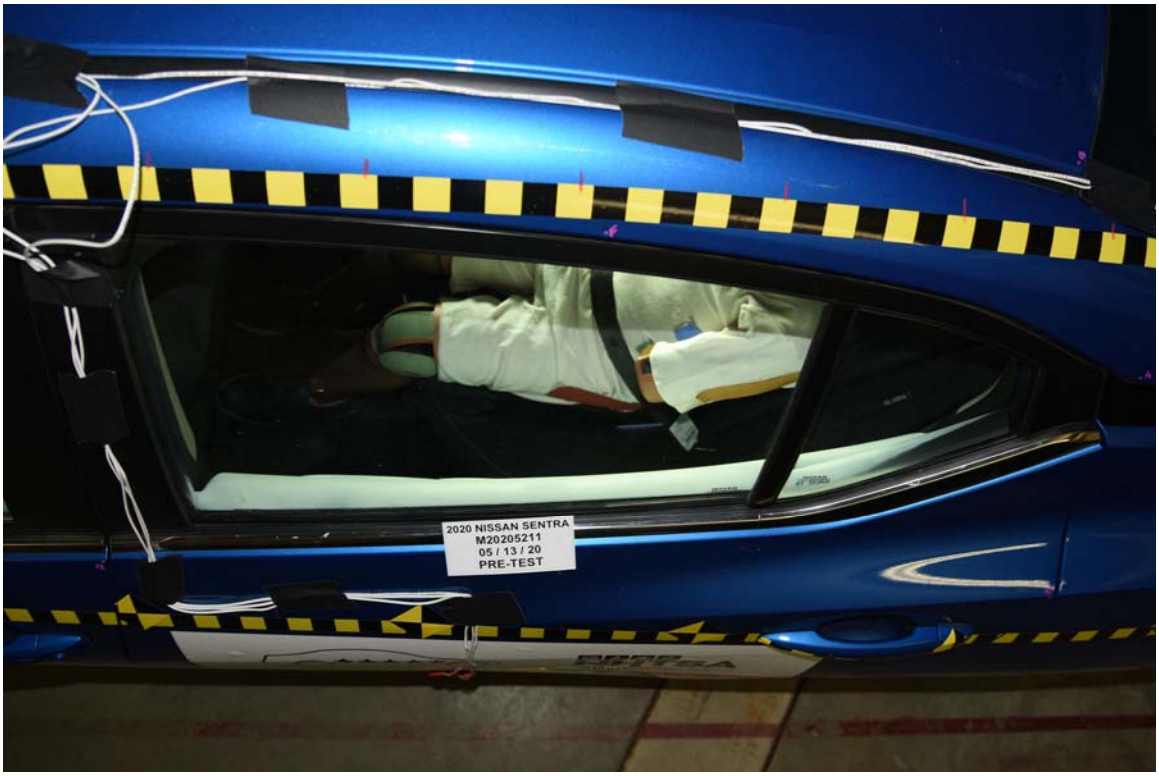


FIGURE 69. Pre-Test Rear Passenger Dummy and Door Clearance View

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

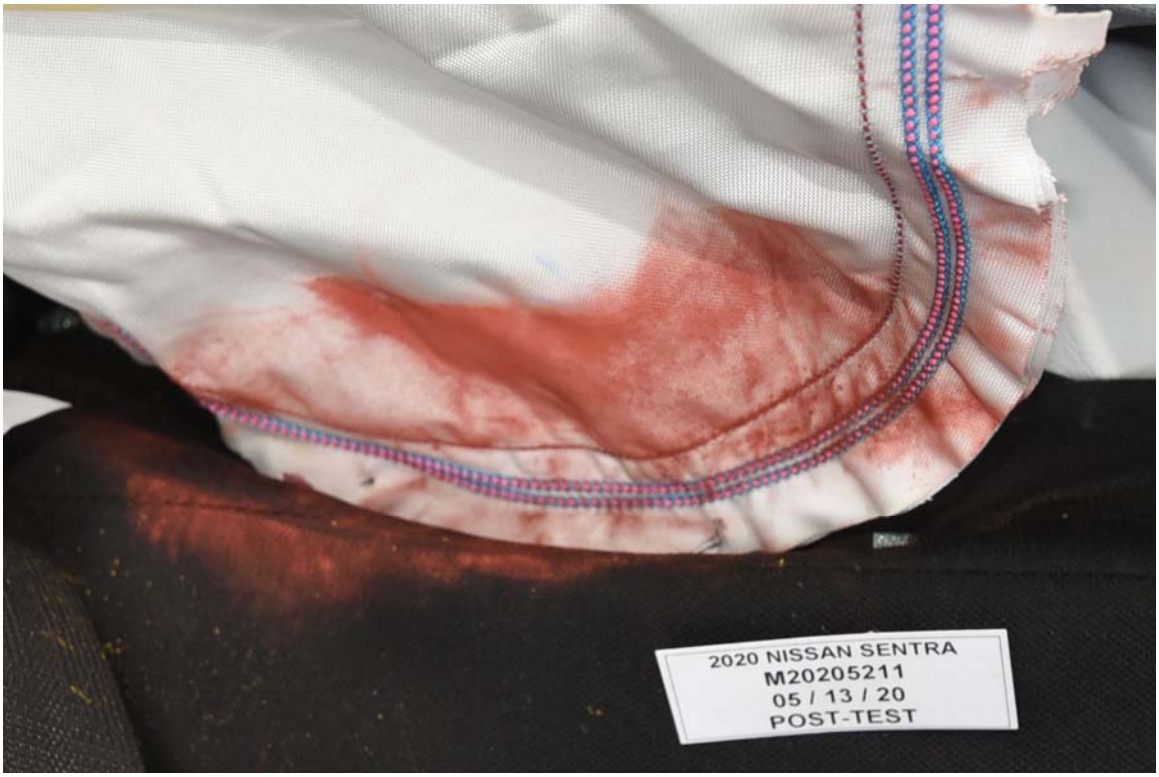


FIGURE 80. Post-Test Rear Passenger Dummy Close-Up
Pelvis Contact with Side Airbag View

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

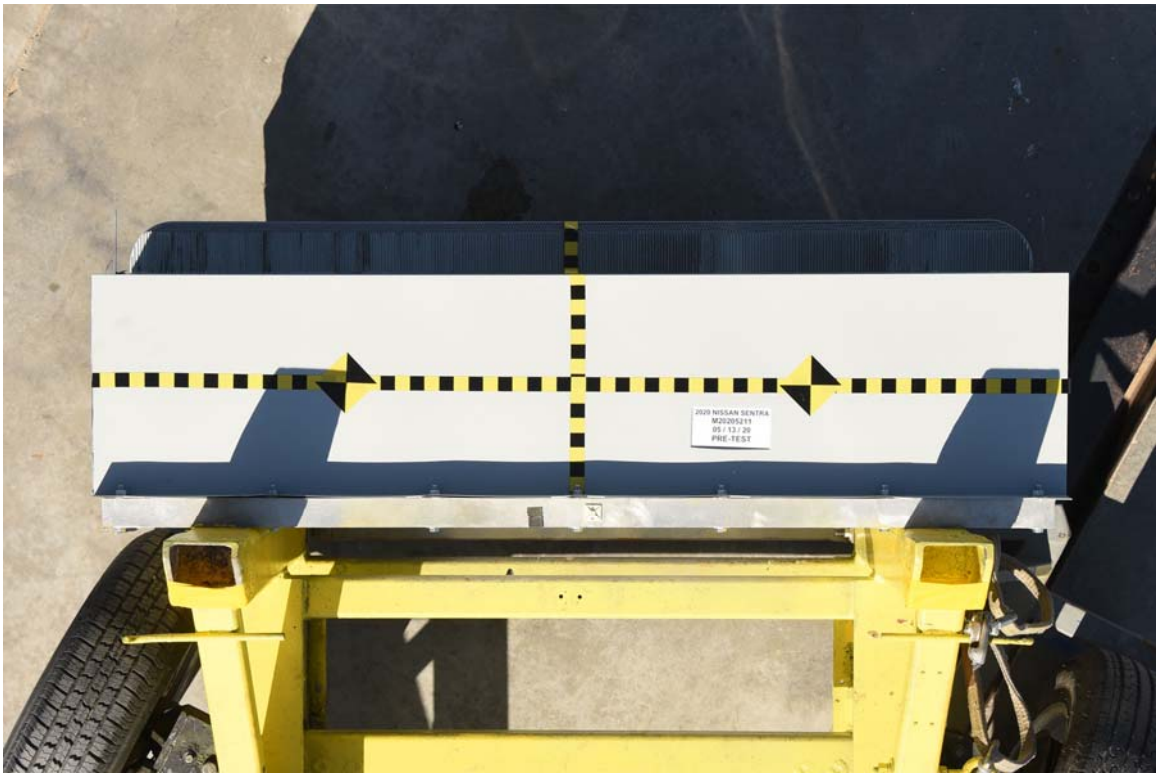


FIGURE 86. Pre-Test Top View of MDB Impactor Face

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

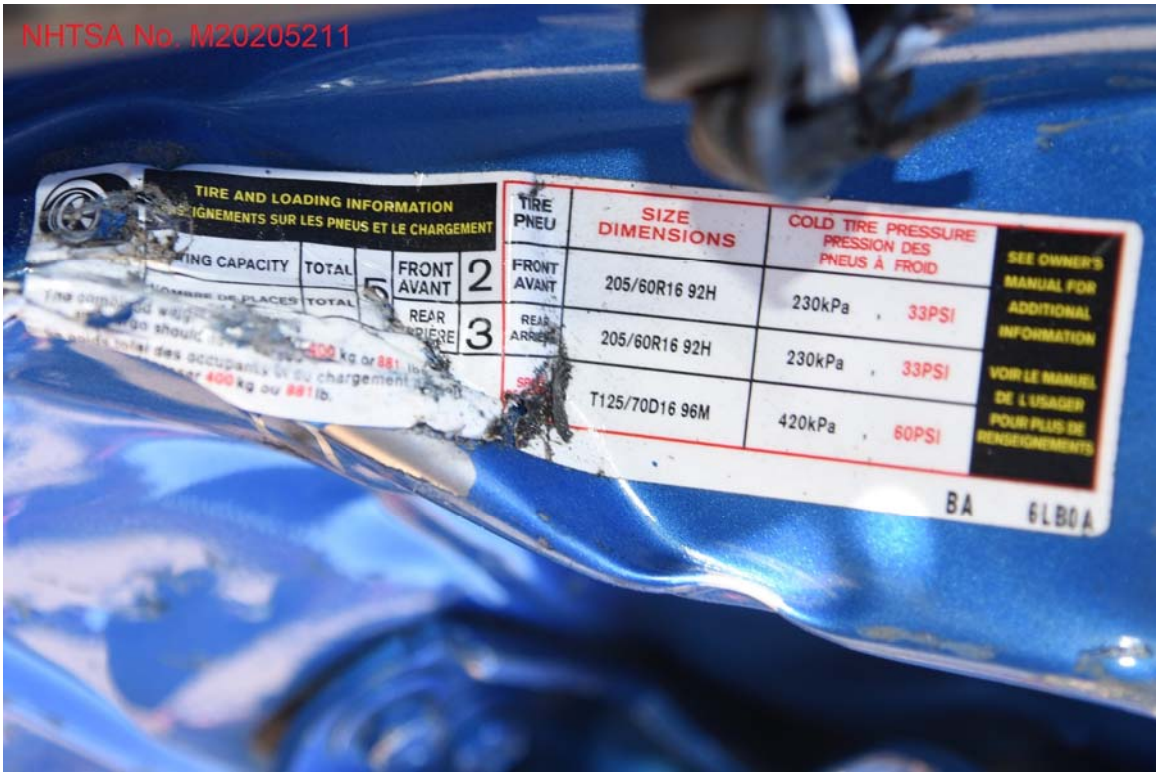


FIGURE 93. Close-Up View of Vehicle's Tire Information Placard or Label

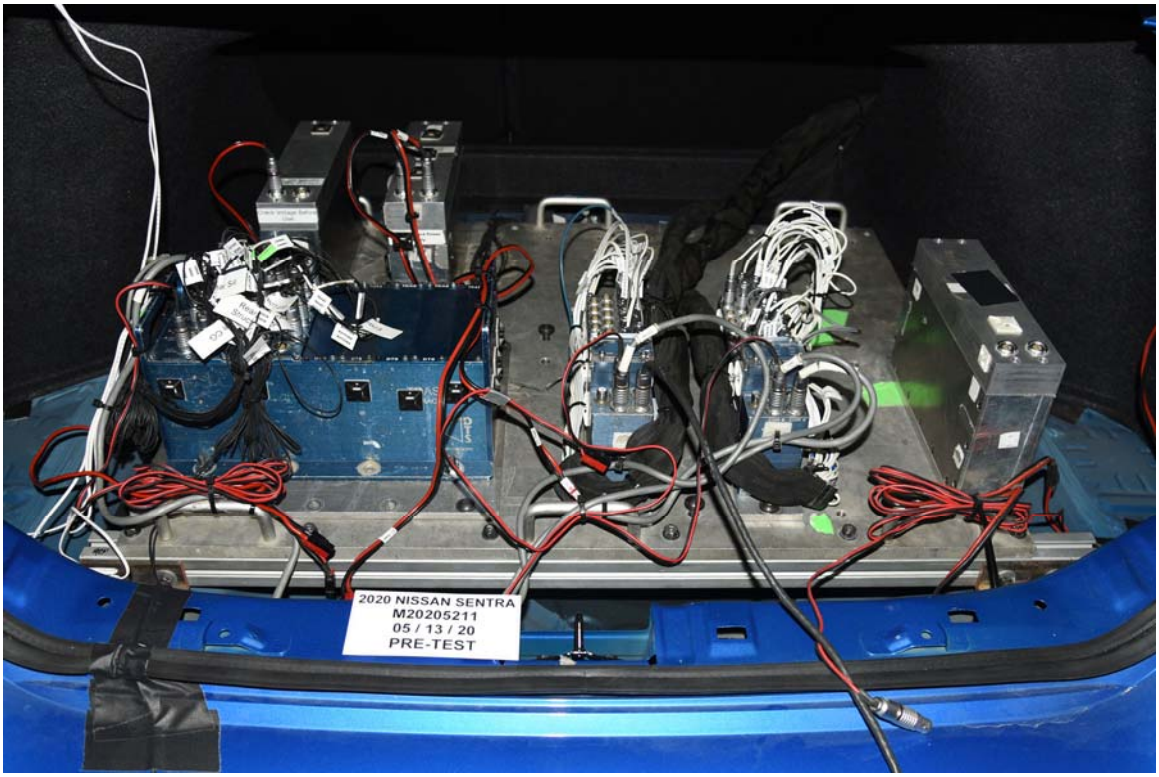


FIGURE 94. Pre-Test Ballast View

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

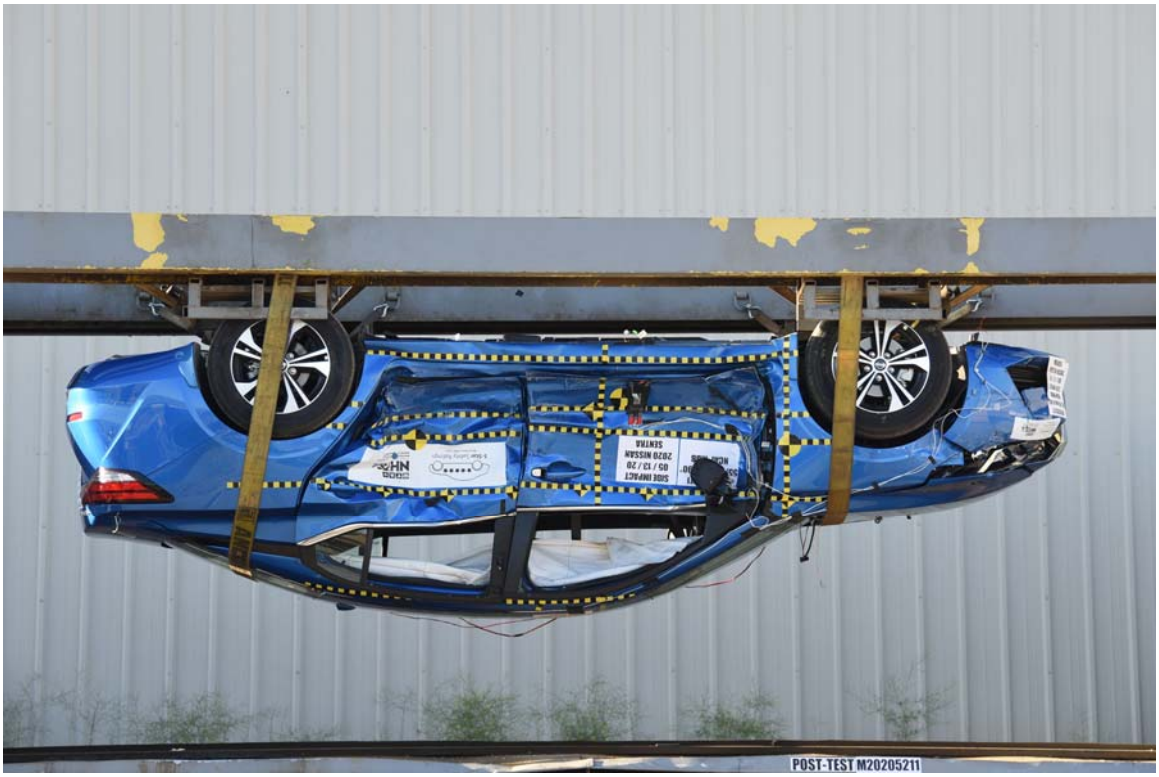


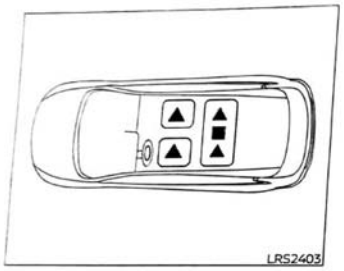
FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

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



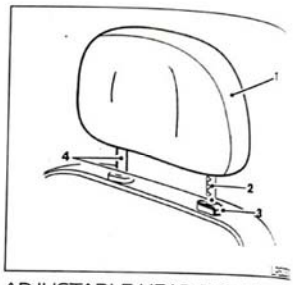
The illustration shows the seating positions equipped with head restraints/headrests.

▲ Indicates the seating position is equipped with a head restraint.

■ Indicates the seating position is equipped with a headrest.

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

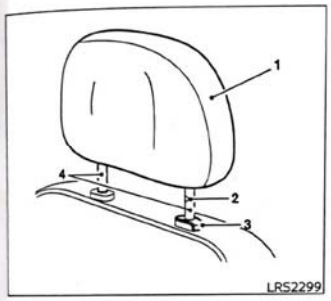
- Your vehicle is equipped with a head restraint/headrest that may be integrated, adjustable or non-adjustable.
- Adjustable head restraints/headrests have multiple notches along the stalk(s) to lock them in a desired adjustment position.
- The non-adjustable head restraints/headrests have a single locking 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.



ADJUSTABLE HEAD RESTRAINT/ HEADREST COMPONENTS

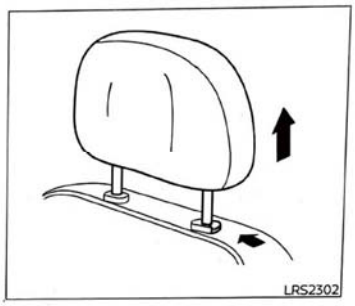
1. Removable head restraint/headrest
2. Multiple notches
3. Lock knob
4. Stalks

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



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

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)

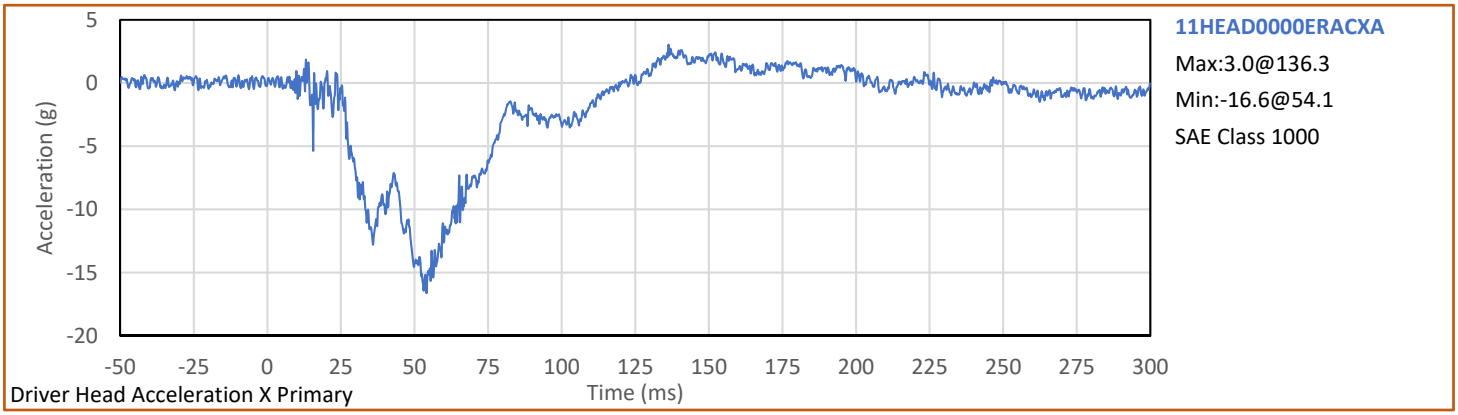
MDB Center of Gravity Acceleration (Z)

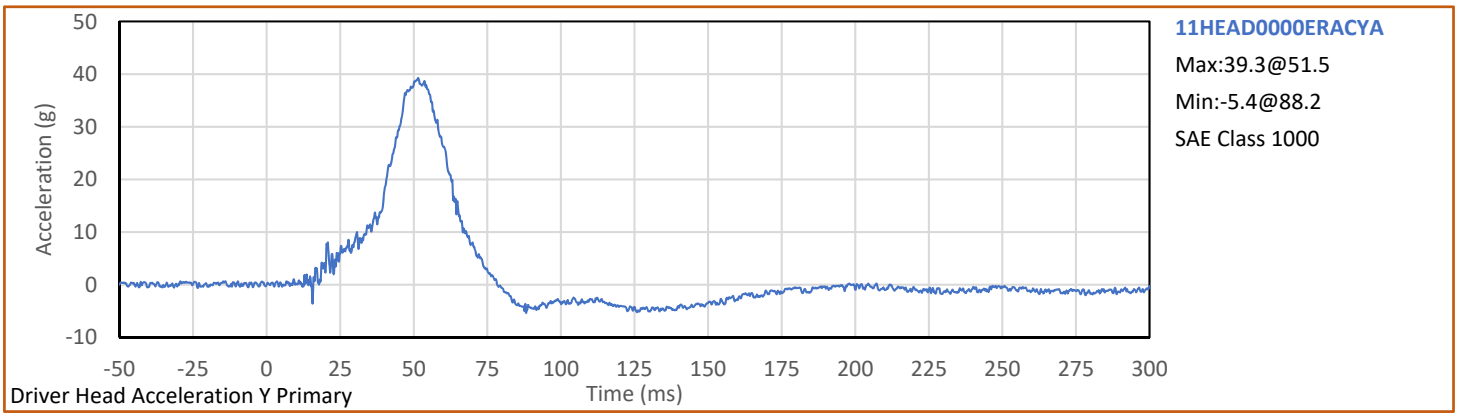
MDB Rear Acceleration (X)

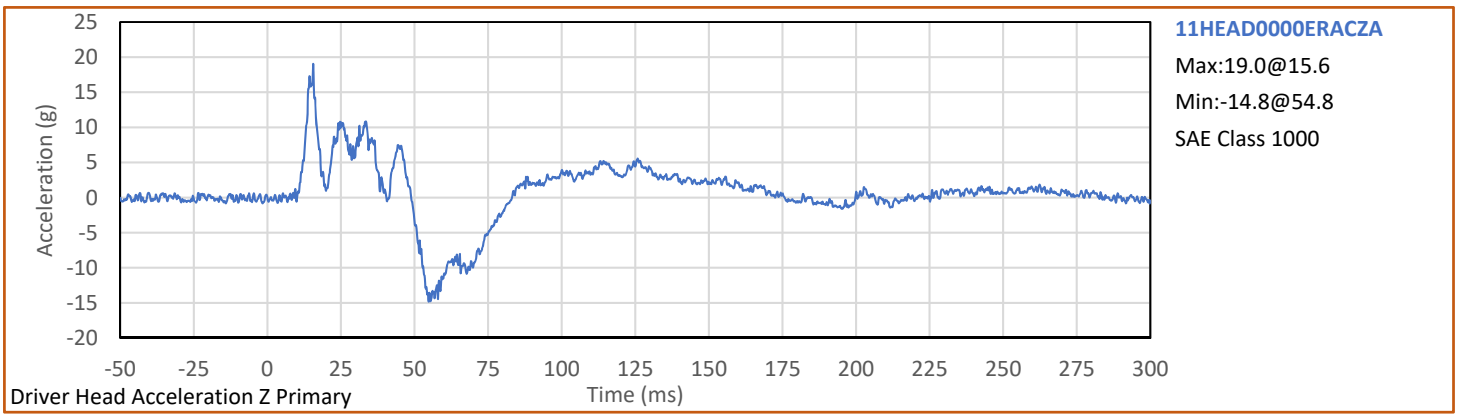
MDB Rear Acceleration (Y)

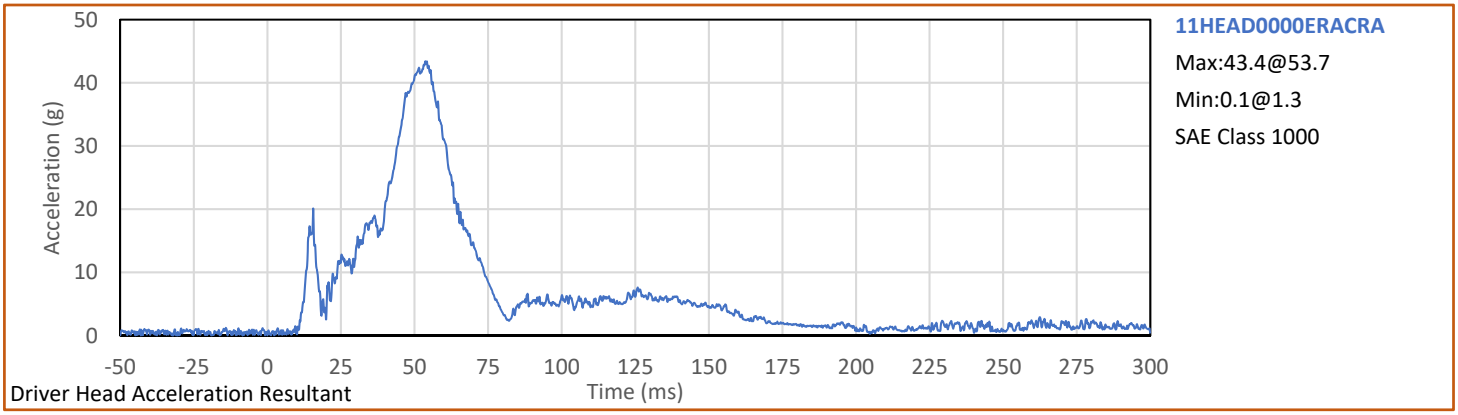
Left MDB Contact Switch

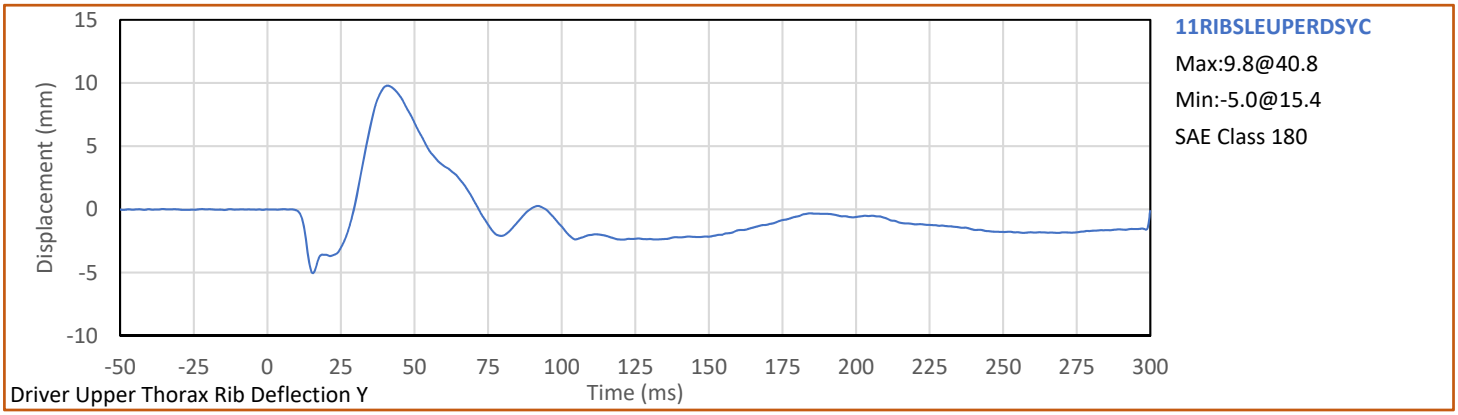
Right MDB Contact Switch

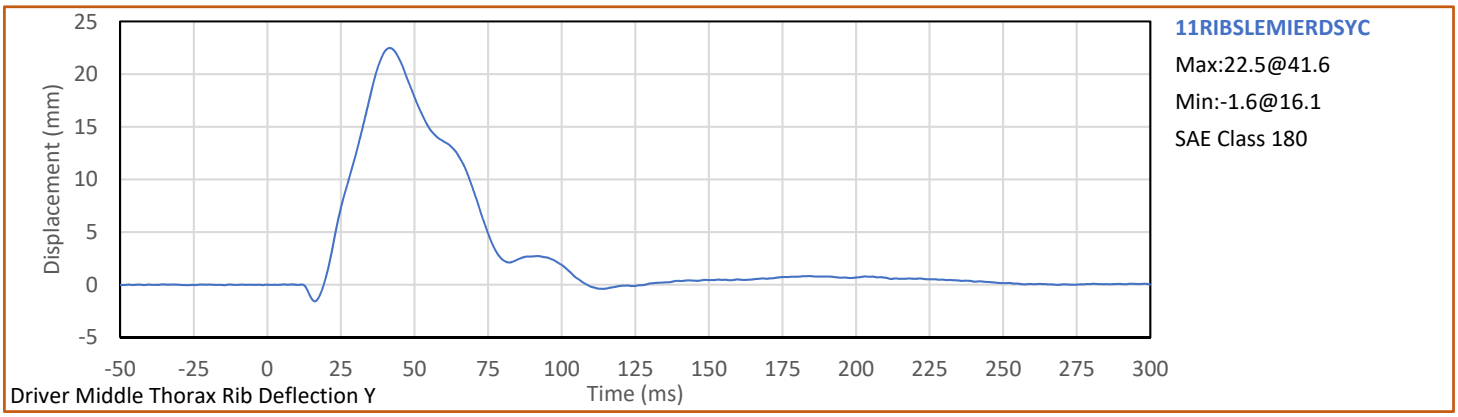

Acceleration (g)
Time (ms)
Driver Head Acceleration X Primary
11HEAD0000ERACXA
Max:3.0@136.3
Min:-16.6@54.1
SAE Class 1000

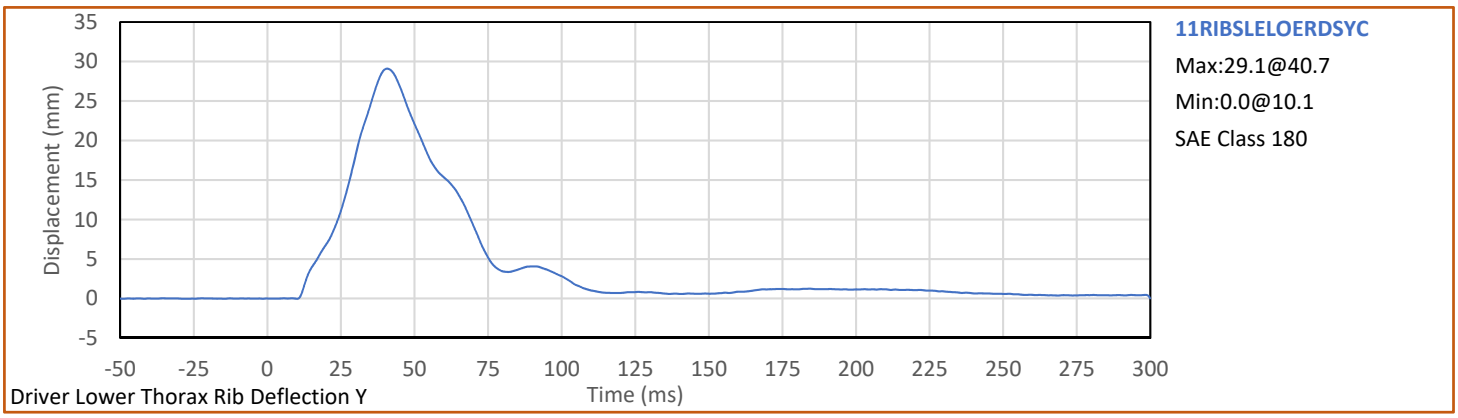

Acceleration (g)
Time (ms)
Driver Head Acceleration Y Primary
11HEAD0000ERACYA
Max:39.3@51.5
Min:-5.4@88.2
SAE Class 1000

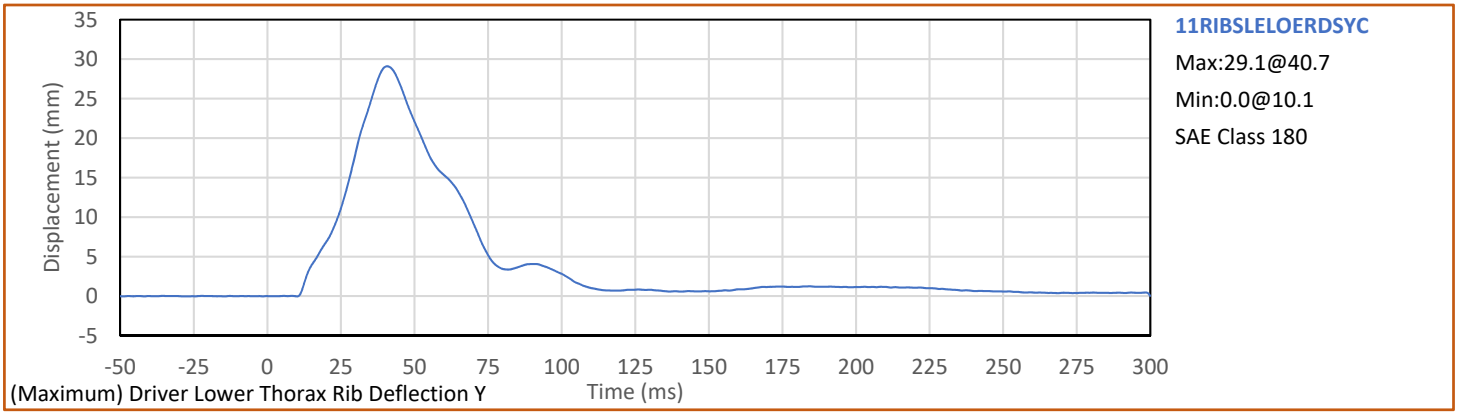

Acceleration (g)
Time (ms)
Driver Head Acceleration Z Primary
11HEAD0000ERACZA
Max:19.0@15.6
Min:-14.8@54.8
SAE Class 1000

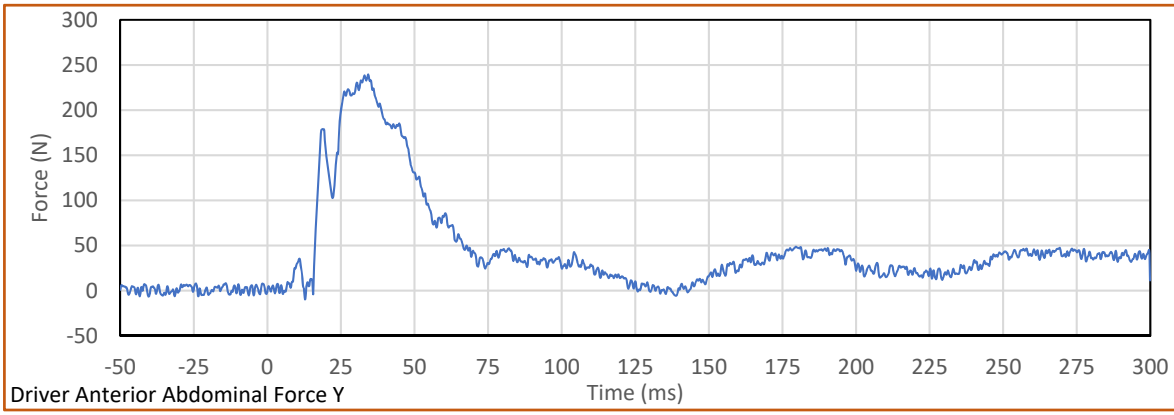

Acceleration (g)
Time (ms)
Driver Head Acceleration Resultant
11HEAD0000ERACRA
Max:43.4@53.7
Min:0.1@1.3
SAE Class 1000


Displacement (mm)
Time (ms)
Driver Upper Thorax Rib Deflection Y
11RIBSLEUPERDSYC
Max:9.8@40.8
Min:-5.0@15.4
SAE Class 180

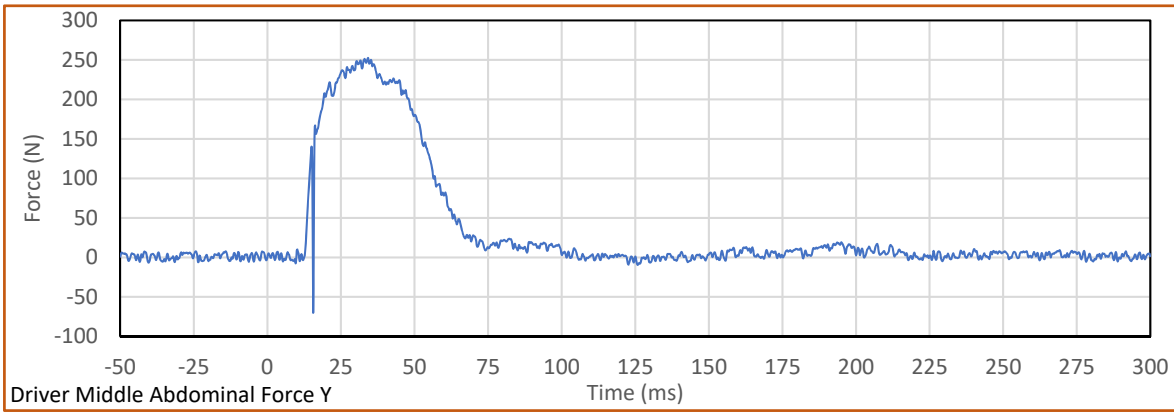

Displacement (mm)
Time (ms)
Driver Middle Thorax Rib Deflection Y
11RIBSLEMIERDSYC
Max:22.5@41.6
Min:-1.6@16.1
SAE Class 180


Displacement (mm)
Time (ms)
Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:29.1@40.7
Min:0.0@10.1
SAE Class 180

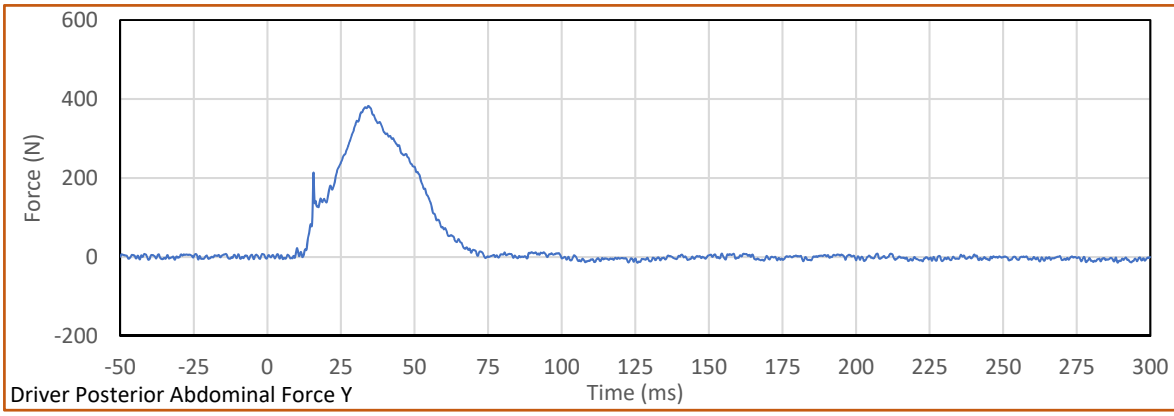

Displacement (mm)
Time (ms)
(Maximum) Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:29.1@40.7
Min:0.0@10.1
SAE Class 180



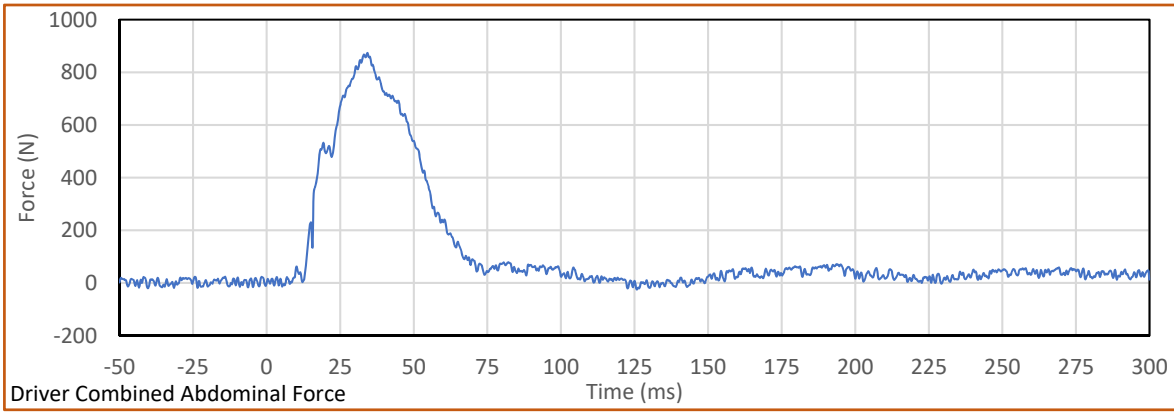
11ABDOLEFRERFOYB
Max:239.5@34.3
Min:-9.8@12.8
SAE Class 600



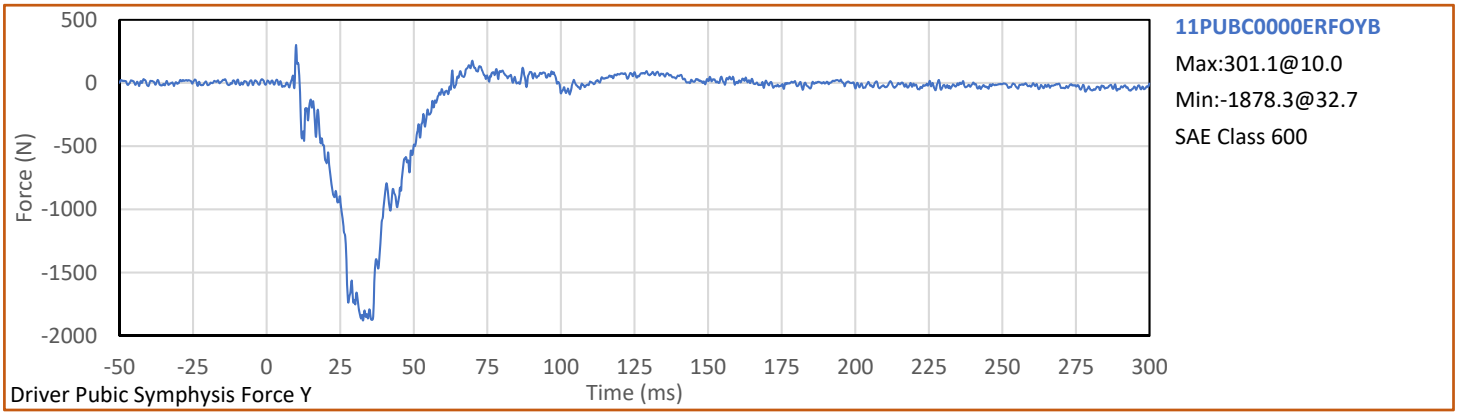
11ABDOLEMIERFOYB
Max:252.6@34.2
Min:-70.1@15.6
SAE Class 600

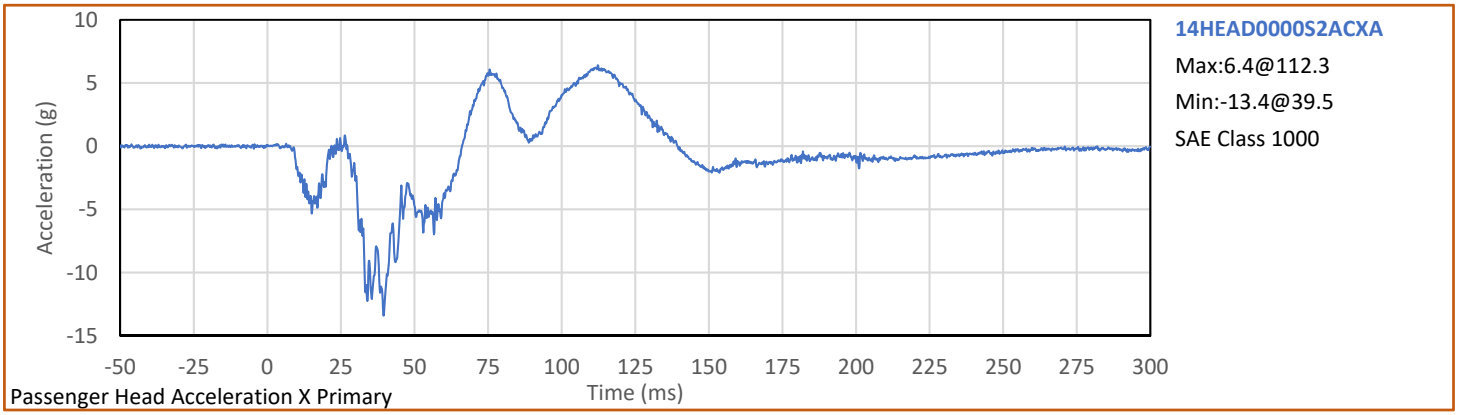


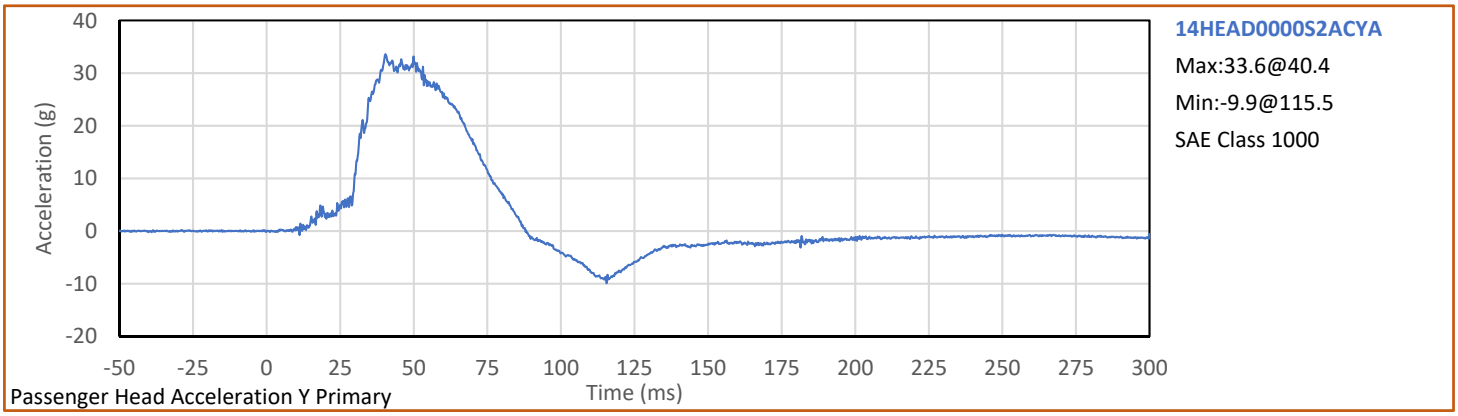
11ABDOLEREERFOYB
Max:382.4@34.3
Min:-14.6@125.8
SAE Class 600

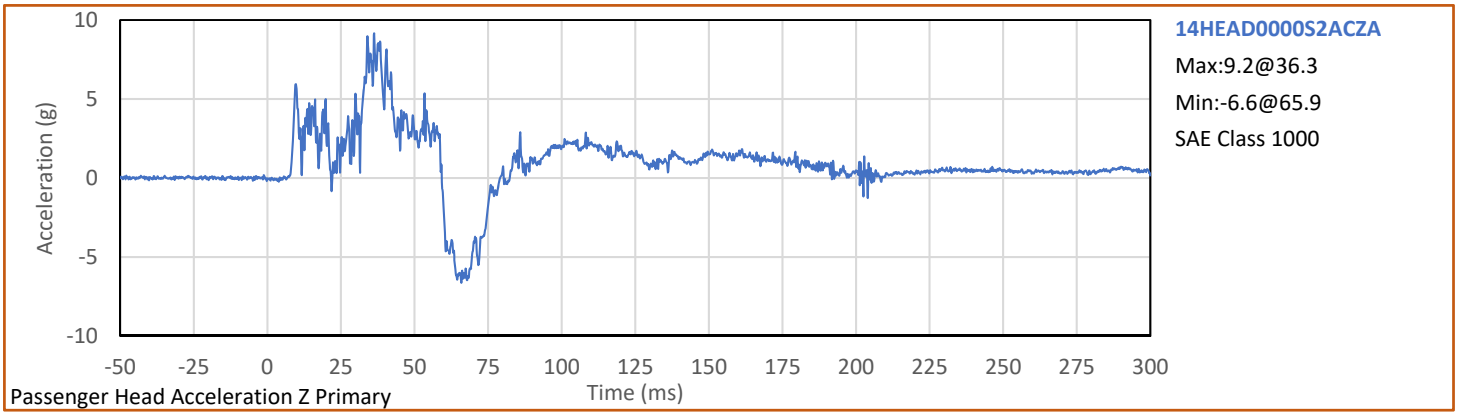


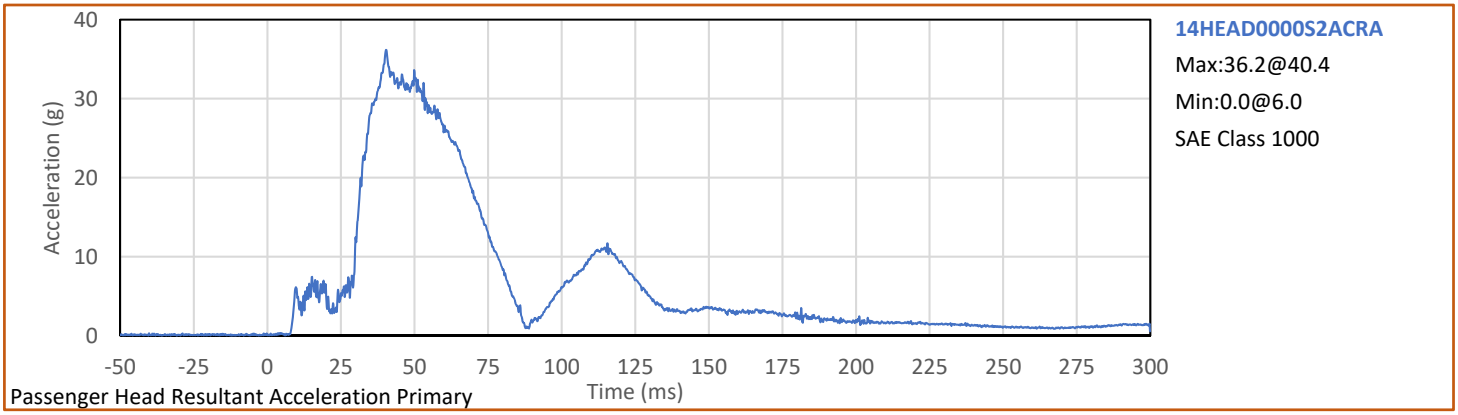
11ABDOLESUERFOYB
Max:873.7@34.3
Min:-25.1@125.8
SAE Class 600

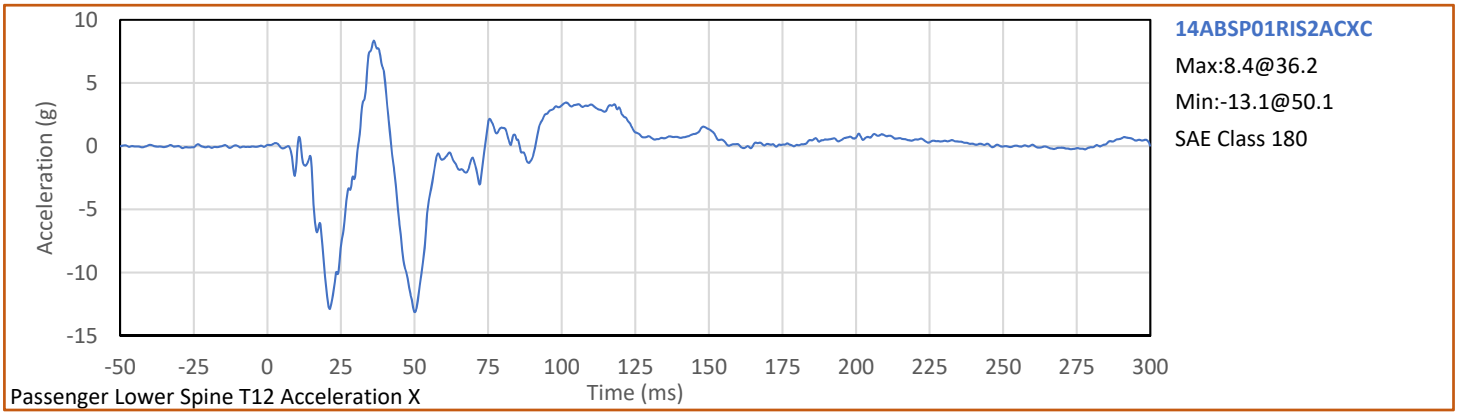

500
0
-500
-1000
-1500
-2000
Force (N)
-50
-25
0
25
50
75
100
125
150
175
200
225
250
275
300
Time (ms)
Driver Pubic Symphysis Force Y
11PUBC0000ERFOYB
Max:301.1@10.0
Min:-1878.3@32.7
SAE Class 600


14HEAD0000S2ACXA
Max:6.4@112.3
Min:-13.4@39.5
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Acceleration X Primary

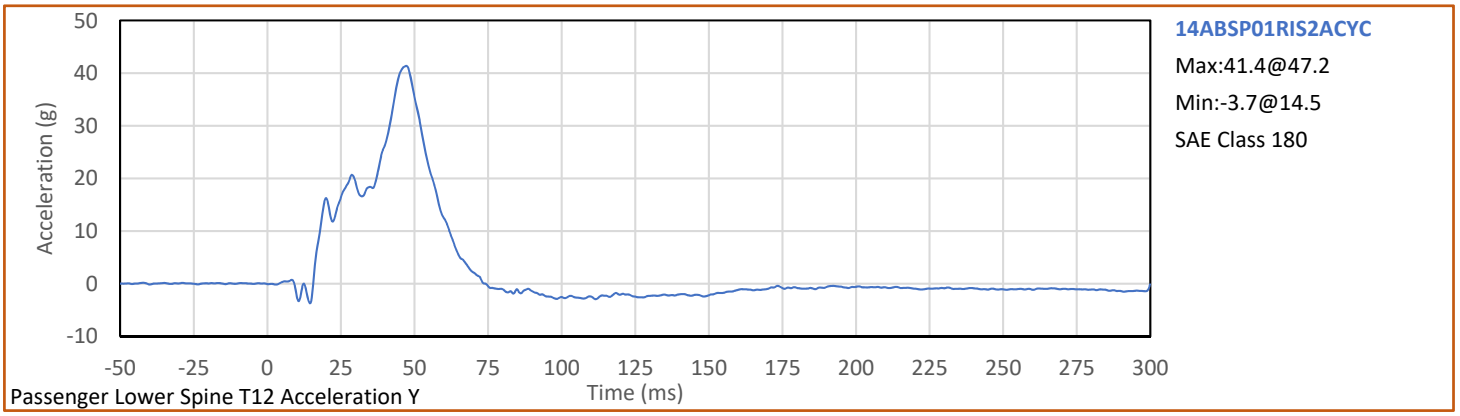

14HEAD0000S2ACYA
Max:33.6@40.4
Min:-9.9@115.5
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Acceleration Y Primary


14HEAD0000S2ACZA
Max:9.2@36.3
Min:-6.6@65.9
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Acceleration Z Primary

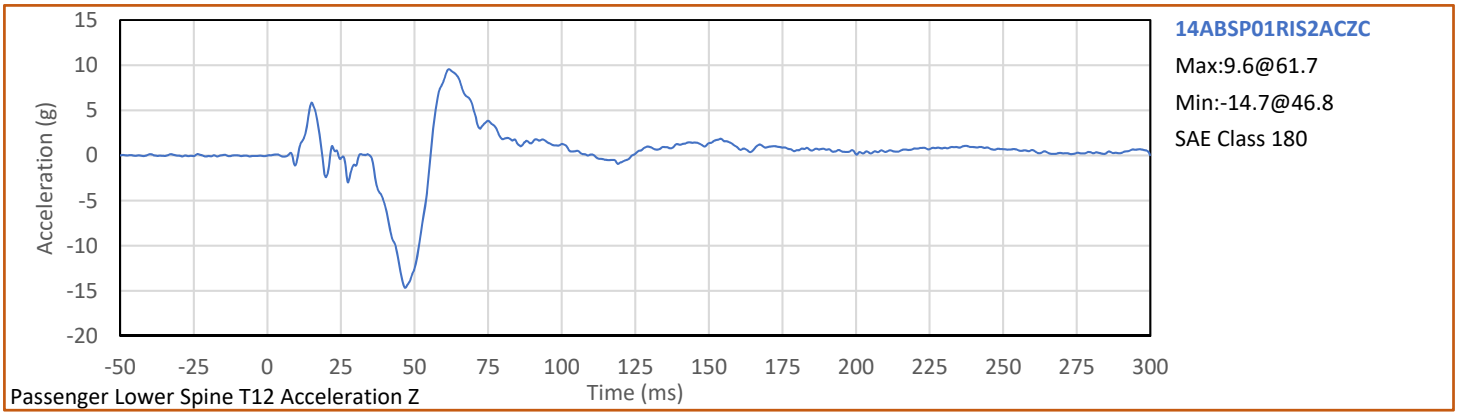

14HEAD0000S2ACRA
Max:36.2@40.4
Min:0.0@6.0
SAE Class 1000
Acceleration (g)
Time (ms)
Passenger Head Resultant Acceleration Primary



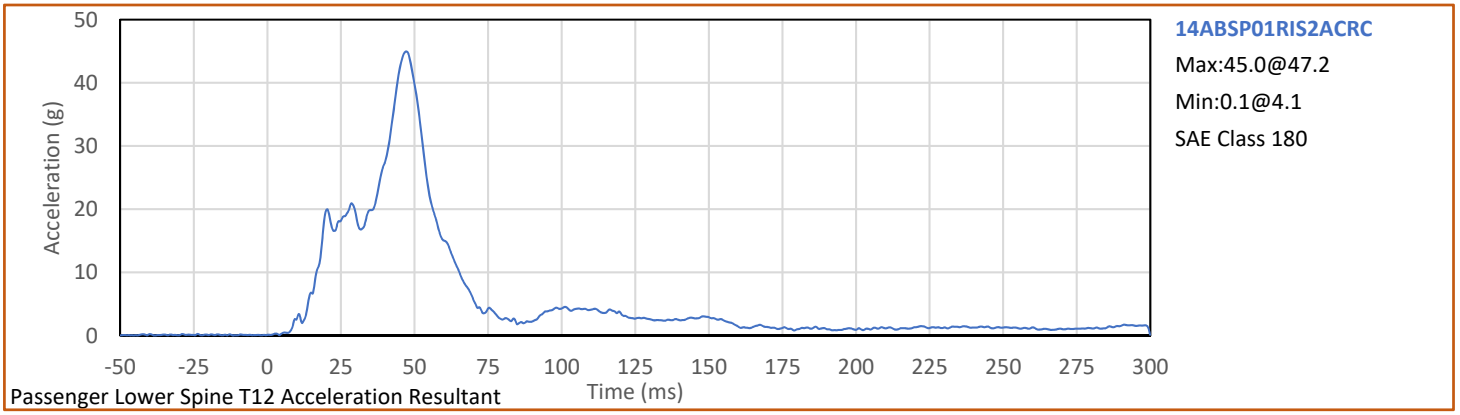
Passenger Lower Spine T12 Acceleration X



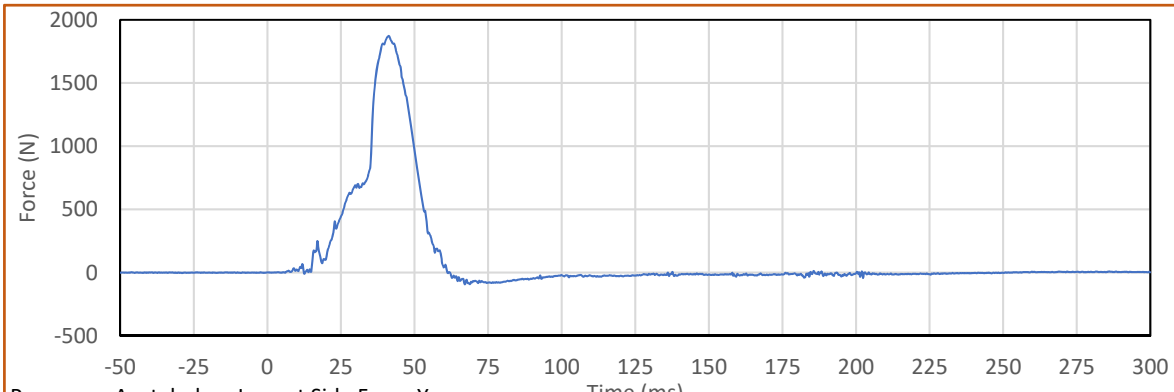
Passenger Lower Spine T12 Acceleration Y



Passenger Lower Spine T12 Acceleration Z

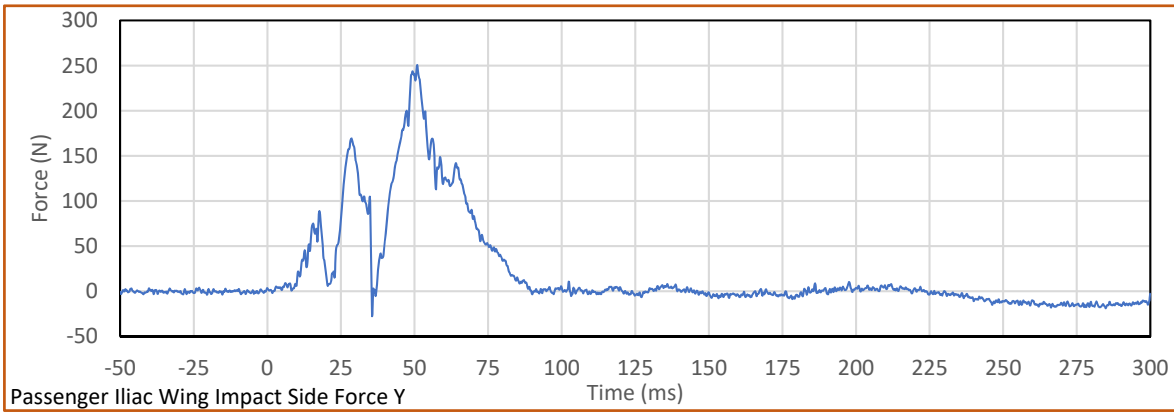


Passenger Lower Spine T12 Acceleration Resultant



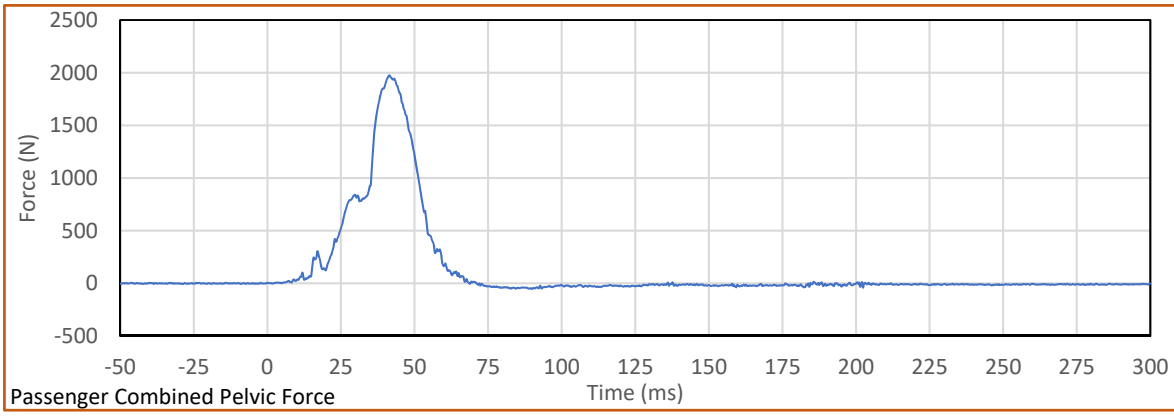
Passenger Acetabulum Impact Side Force Y

14ACTBLE00S2FOYB
Max:1872.2@41.3
Min:-92.9@67.1
SAE Class 600



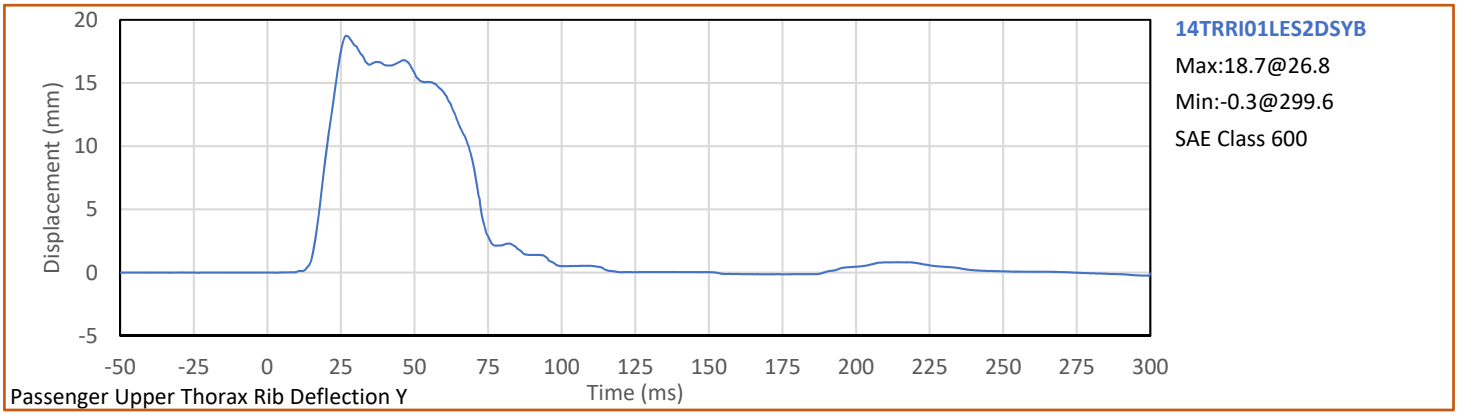
Passenger Iliac Wing Impact Side Force Y

14ILACLE00S2FOYB
Max:250.6@50.9
Min:-27.7@35.6
SAE Class 600



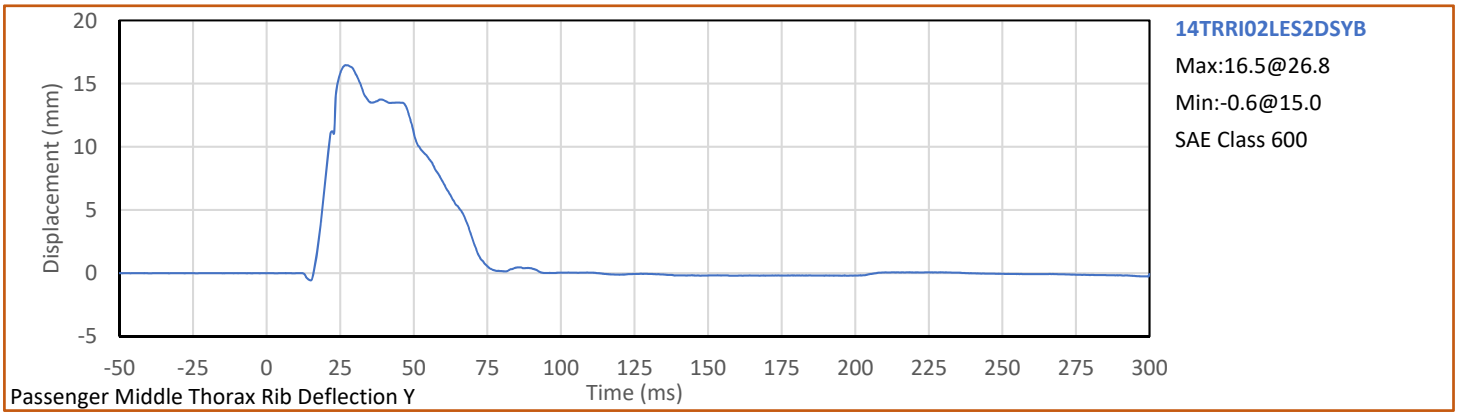
Passenger Combined Pelvic Force

14PELVLE00S2FOYB
Max:1974.9@41.4
Min:-53.4@89.9
SAE Class 600



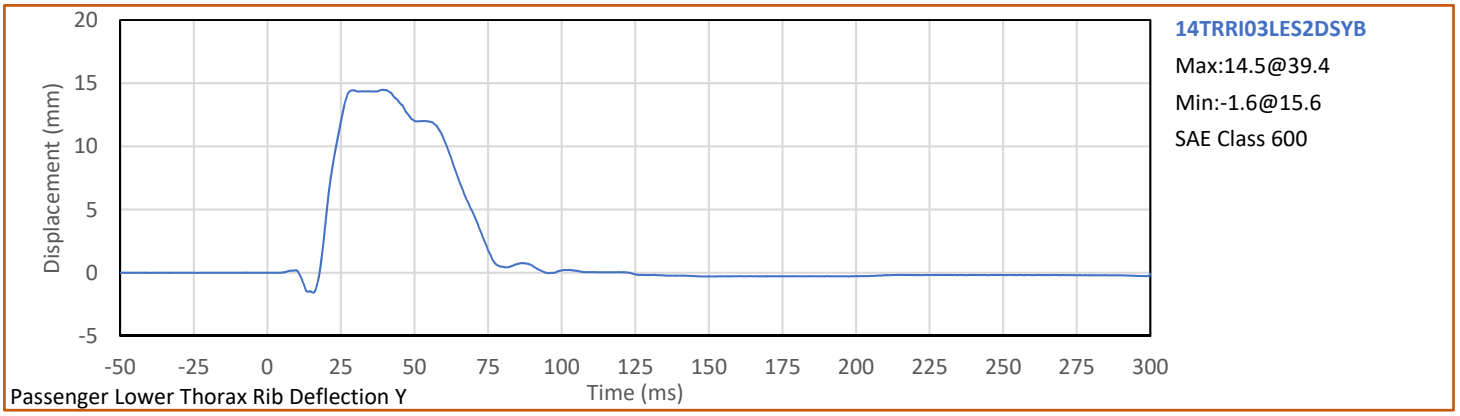
Passenger Upper Thorax Rib Deflection Y

14TRRI01LES2DSYB
Max:18.7@26.8
Min:-0.3@299.6
SAE Class 600



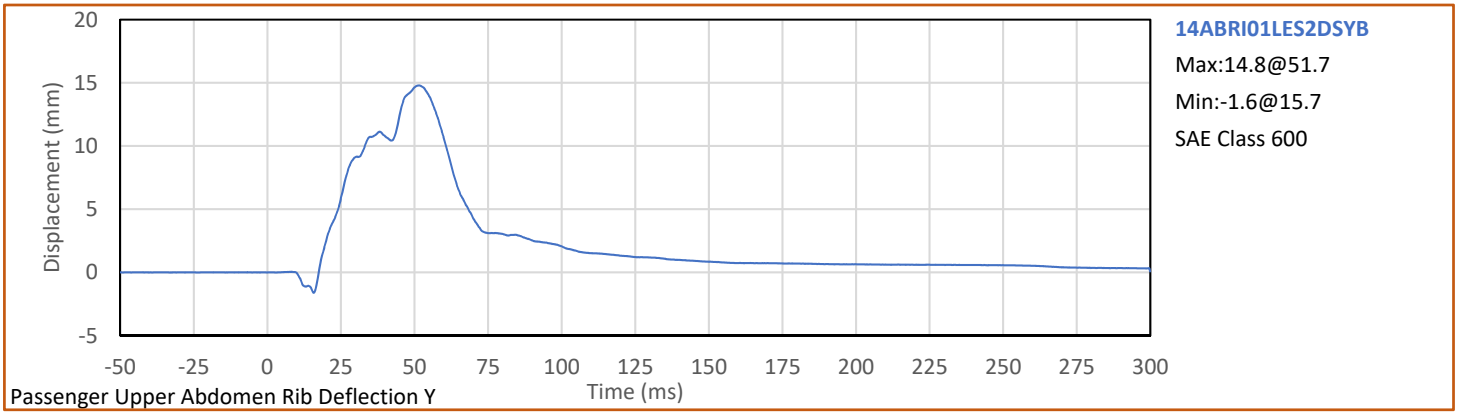
Passenger Middle Thorax Rib Deflection Y

14TRRI02LES2DSYB
Max:16.5@26.8
Min:-0.6@15.0
SAE Class 600



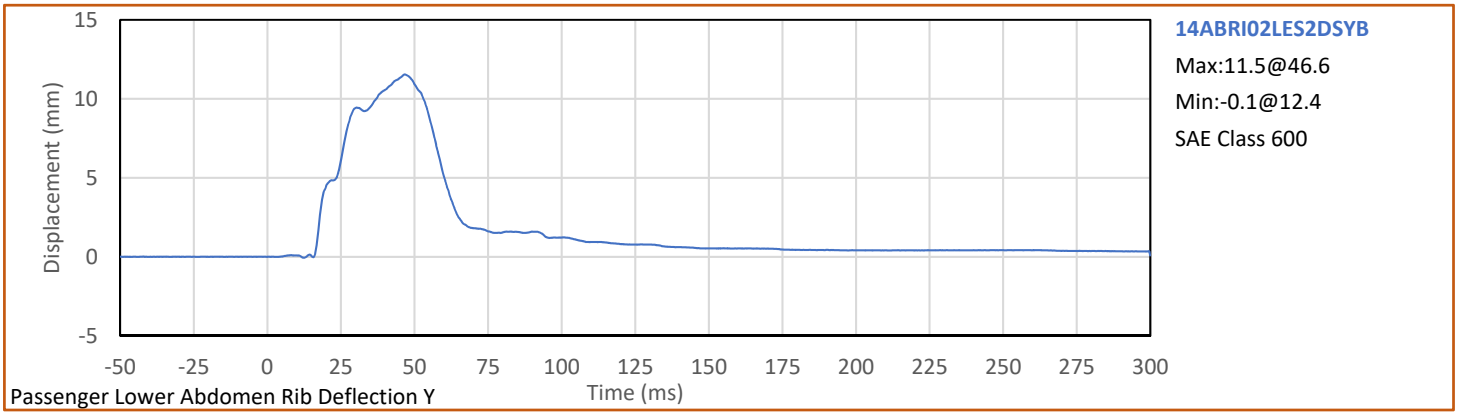
Passenger Lower Thorax Rib Deflection Y

14TRRI03LES2DSYB
Max:14.5@39.4
Min:-1.6@15.6
SAE Class 600



Passenger Upper Abdomen Rib Deflection Y

14ABRI01LES2DSYB
Max:14.8@51.7
Min:-1.6@15.7
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, Left Side Configuration
S/N: F035

Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05- 0

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
1 - Sitting Height	mm	900	918	906	Pass
2 - Seat to Shoulder Joint	mm	558	572	568	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	349	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	99	Pass
5 - Sole to Seat, Sitting	mm	433	451	442	Pass
6 - Head Width	mm	152	158	156	Pass
7 - Shoulder/Arm Width	mm	461	479	468	Pass
8 - Thorax Width	mm	322	332	325	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	364	Pass
11 - Head Depth	mm	196	206	202	Pass
12 - Thorax Depth	mm	262	272	268	Pass
13 - Abdomen Depth	mm	194	204	200	Pass
14 - Pelvis Depth	mm	235	245	242	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	158	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	608	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

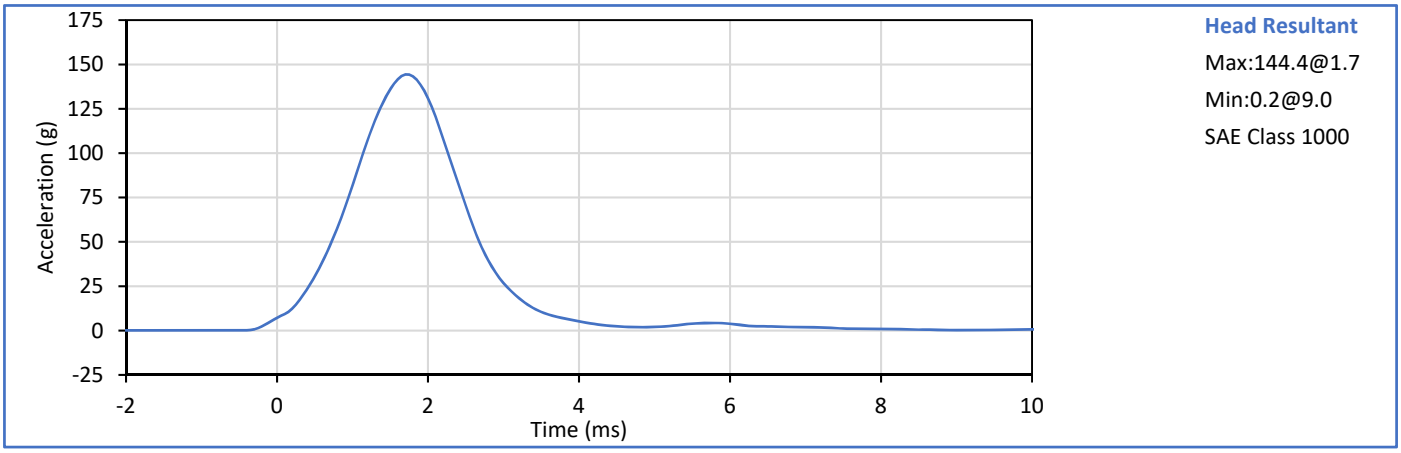
Approved By: P. Puzzuto

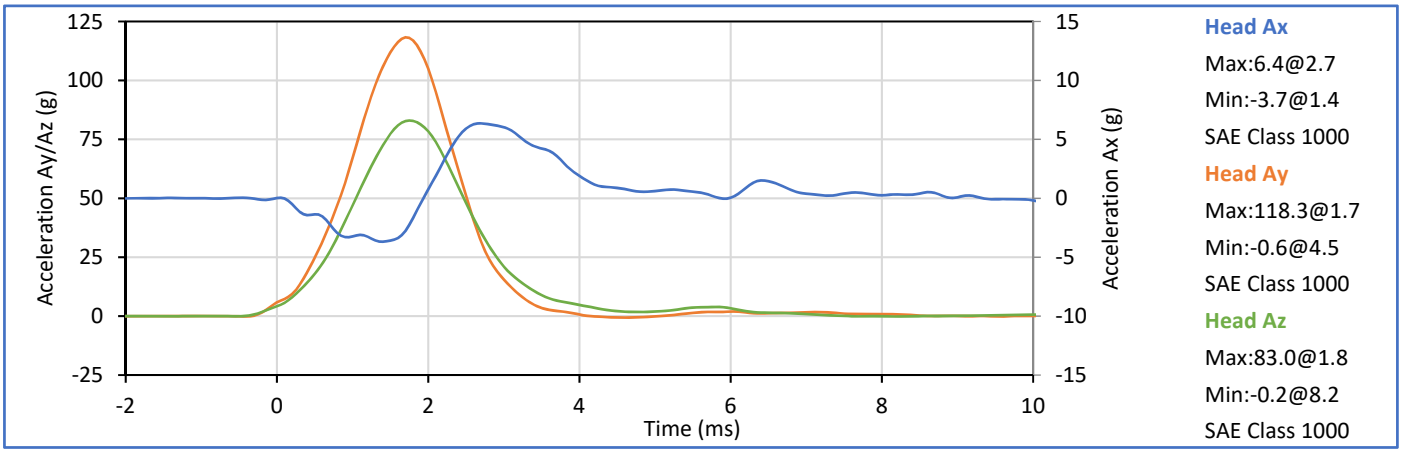
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-04

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	27	Pass
Peak Resultant Acceleration	g	125.0	155.0	144.4	Pass
Peak Head Ax	g	-15.0	15.0	6.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

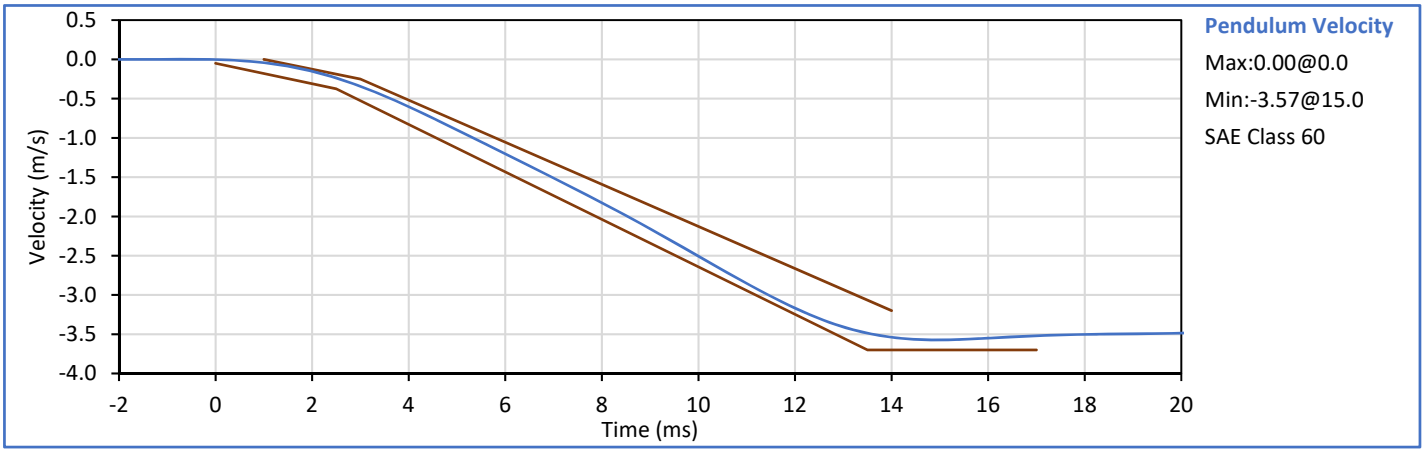
Approved By: P. Puzzuto

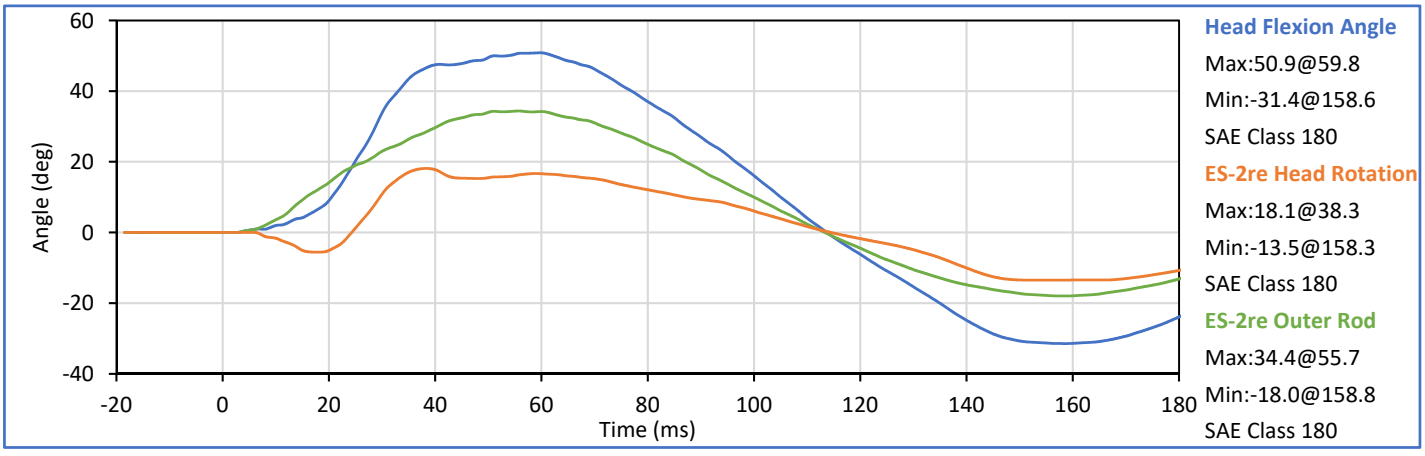
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-06

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
Pendulum Velocity	m/s	3.30	3.50	3.46	Pass
Peak Headform Flexion	deg	49.0	59.0	50.9	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	59.8	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	54.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

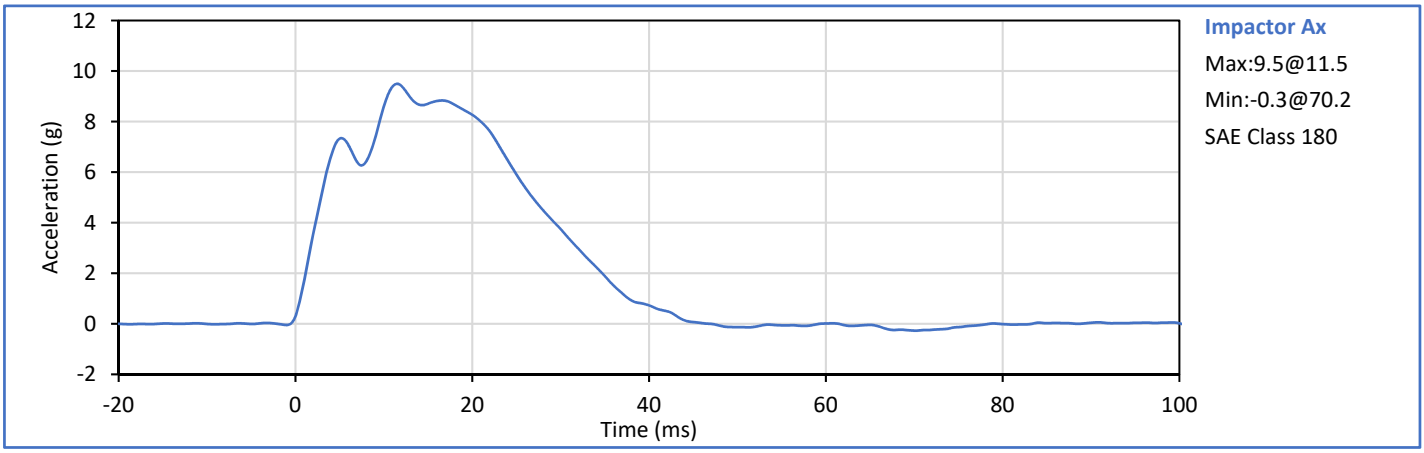
Approved By: P. Puzzuto

Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Ax	g	7.5	10.5	9.5	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

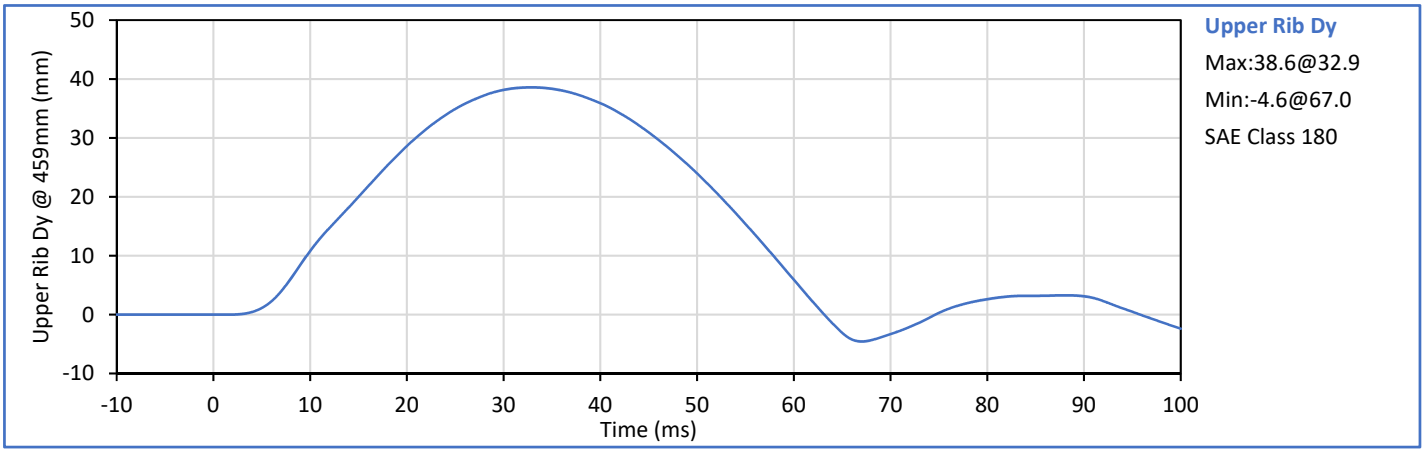
Approved By: P. Puzzuto

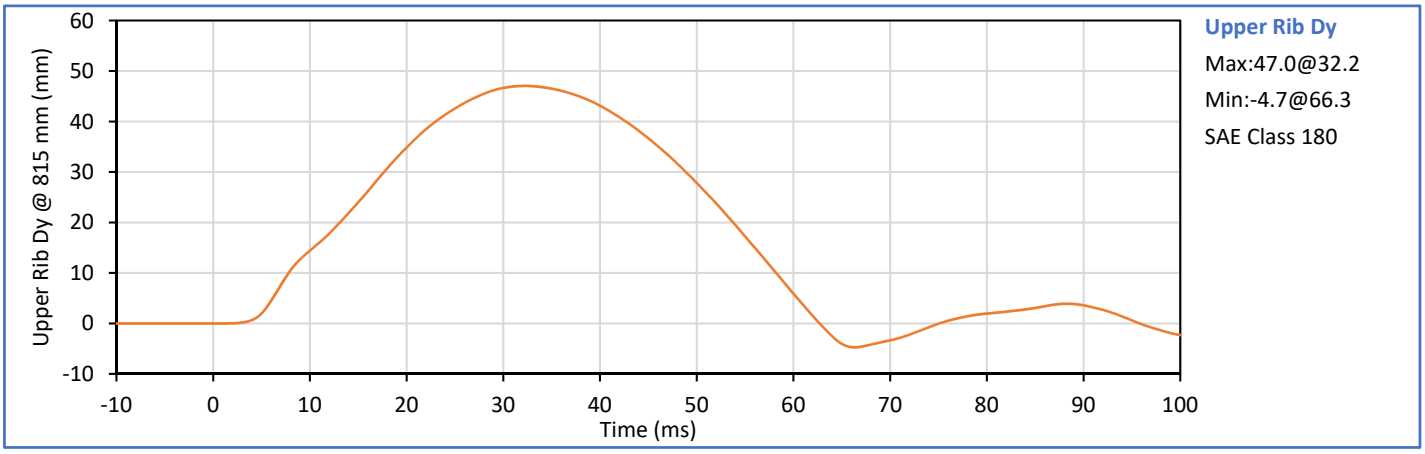
Applus IDIADA
KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-06

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	28	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.6	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	47.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

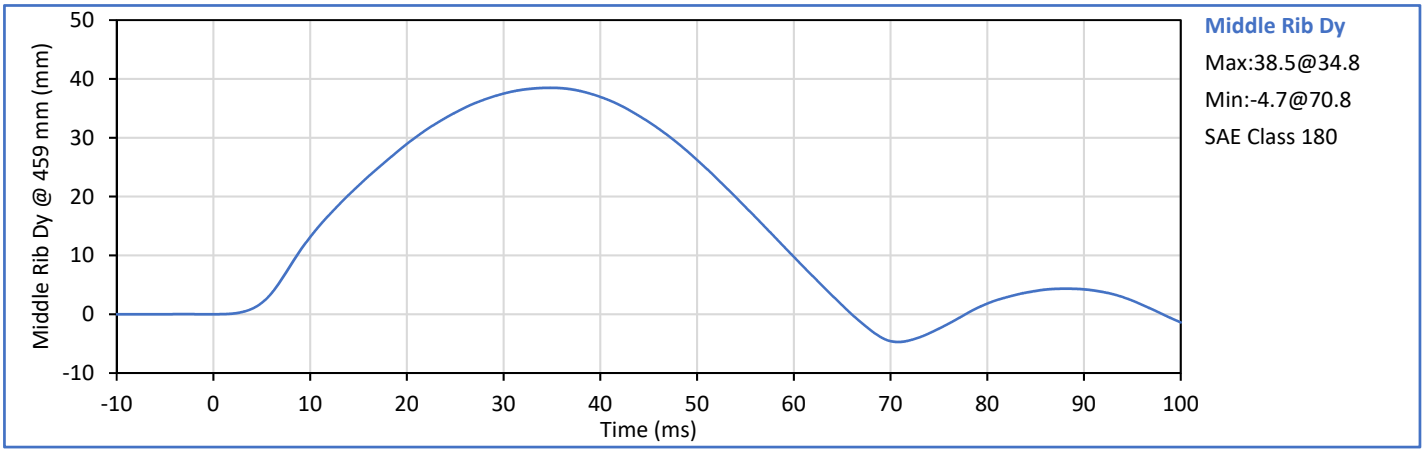
Approved By: P. Puzzuto

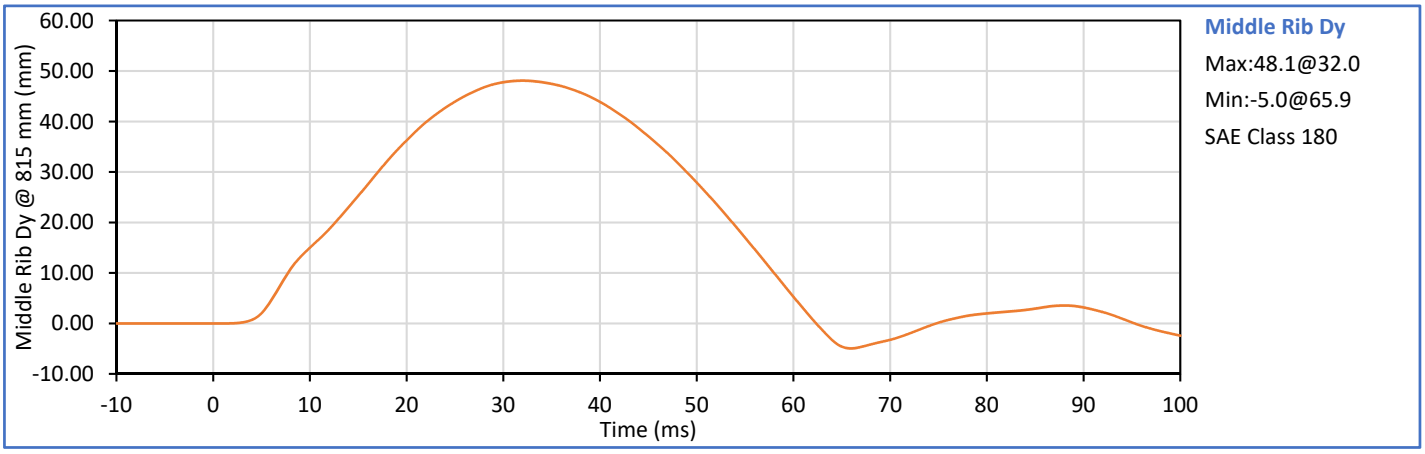
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-06

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	28	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.5	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	48.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

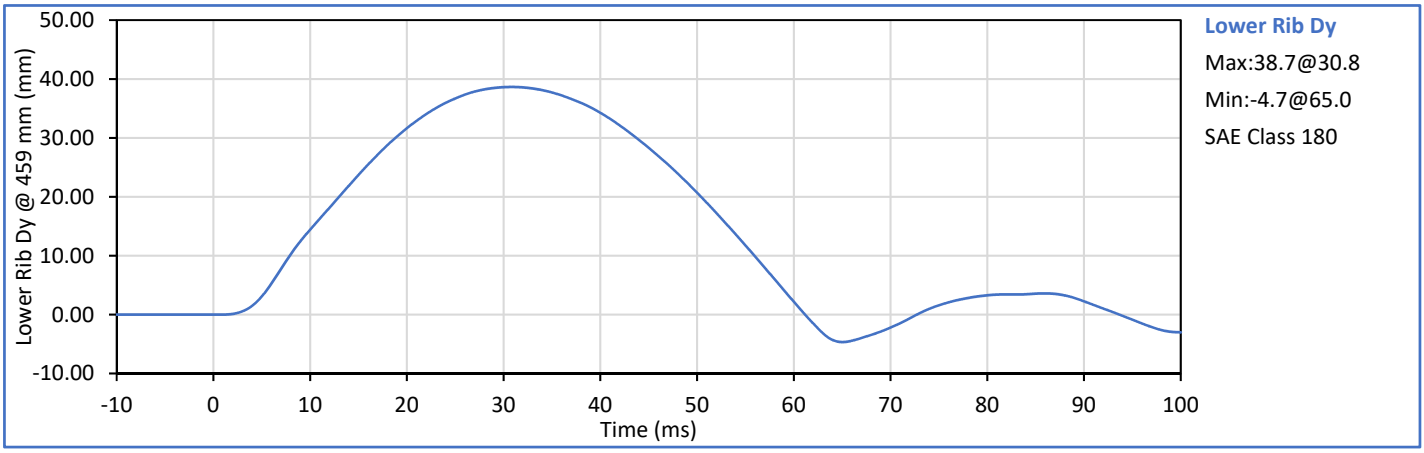
Approved By: P. Puzzuto

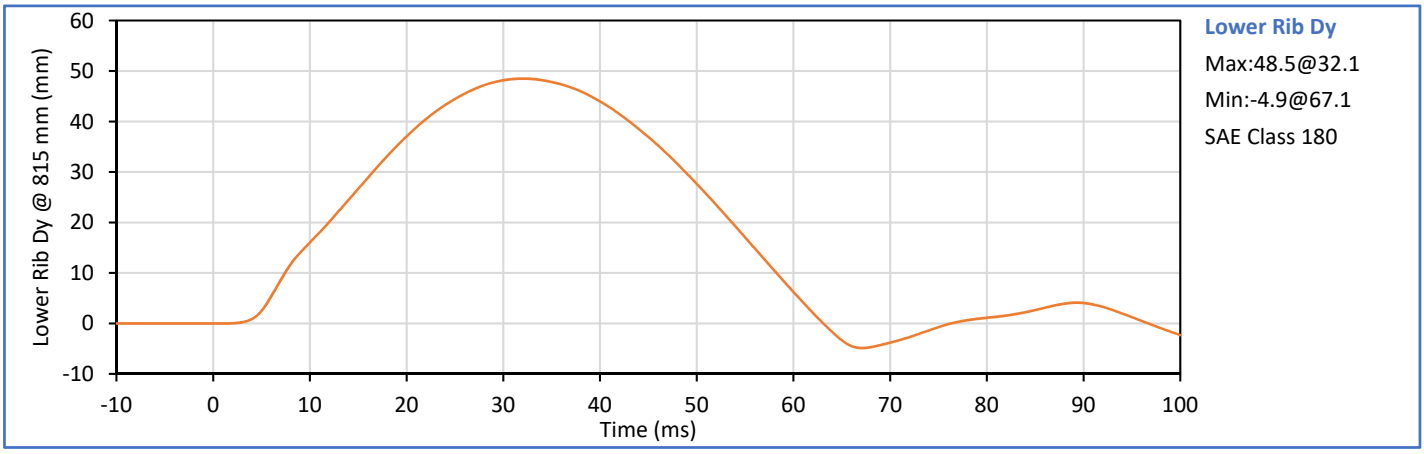
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-06

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	28	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	38.7	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	48.5	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

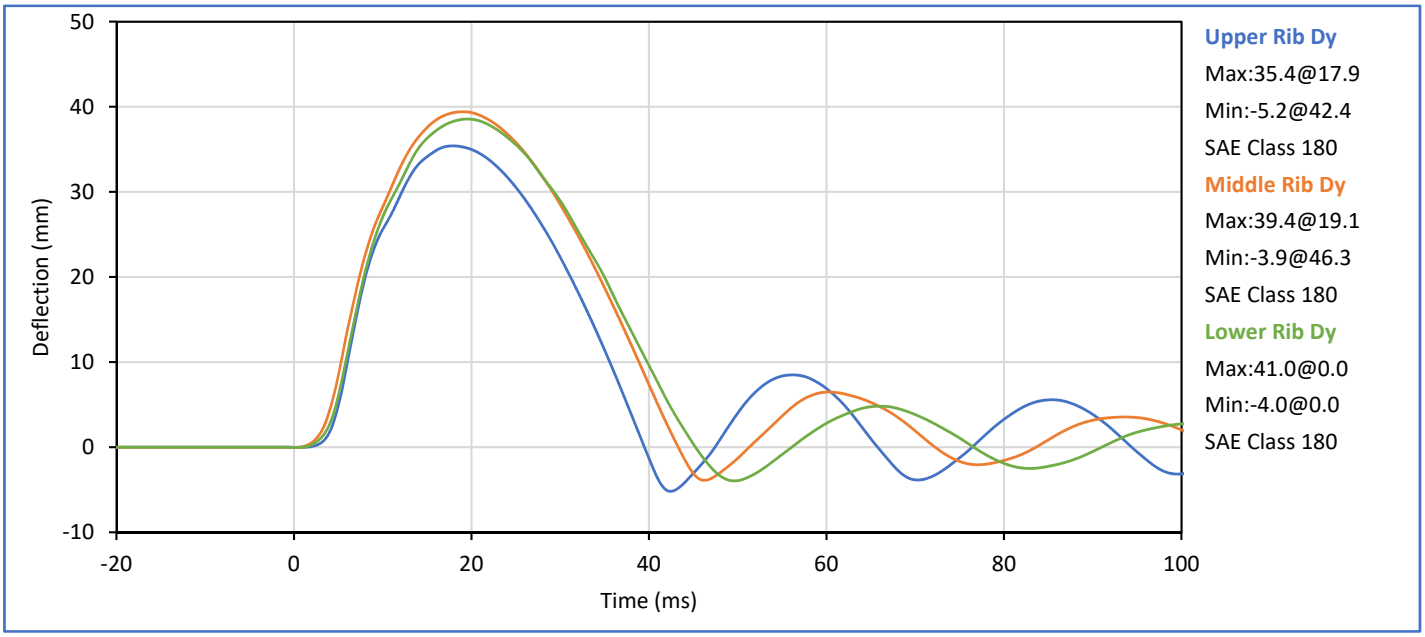
Approved By: P. Puzzuto

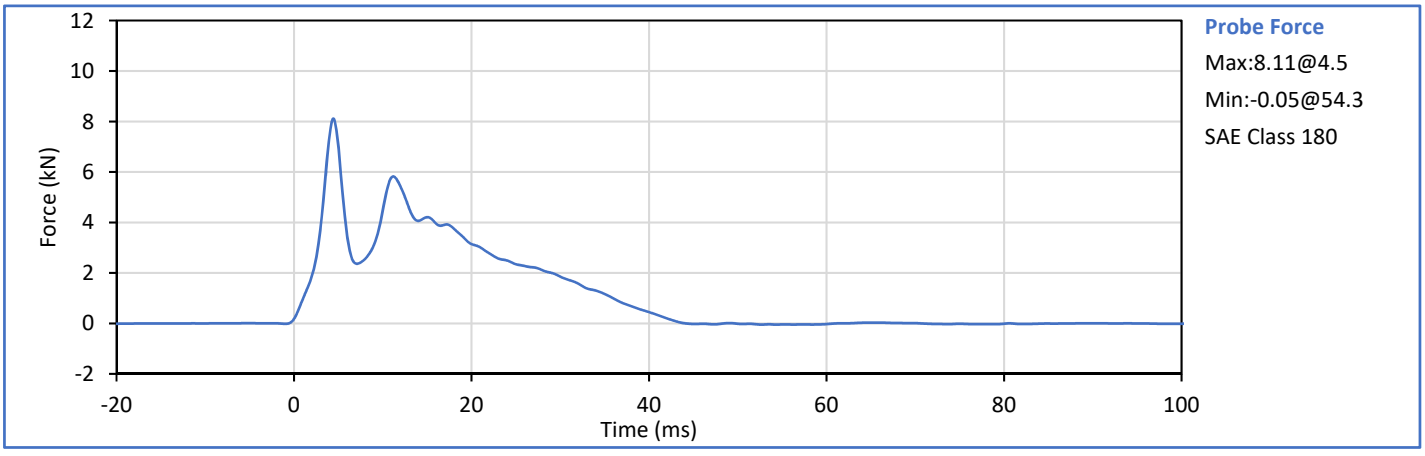
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	5.40	5.60	5.51	Pass
Peak Upper Rib Dy	mm	34.0	41.0	35.4	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.4	Pass
Peak Lower Rib Dy	mm	37.0	44.0	38.6	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.82	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

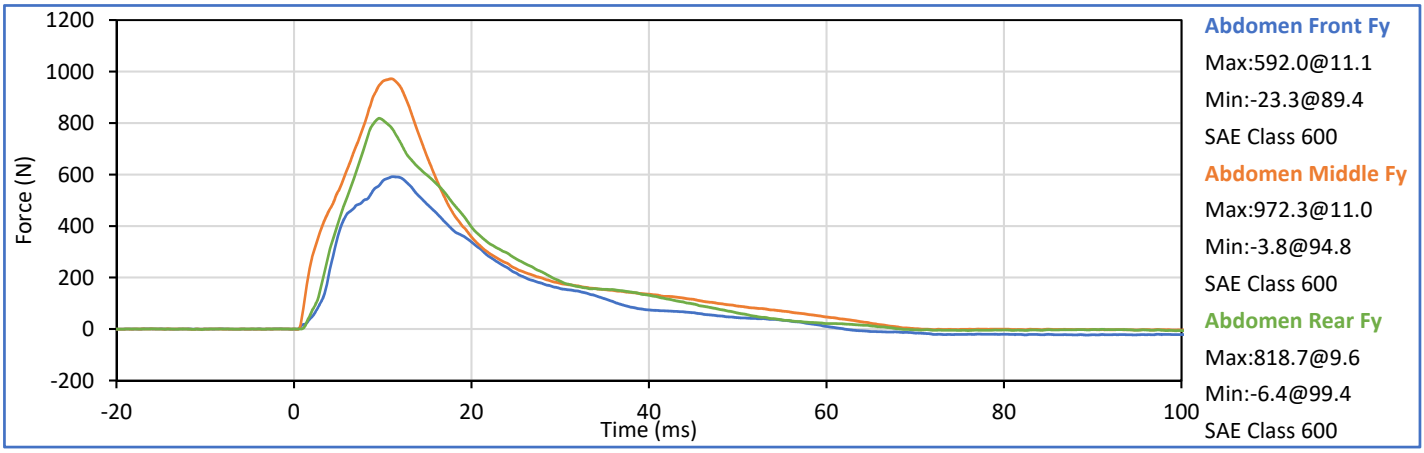
Approved By: P. Puzzuto

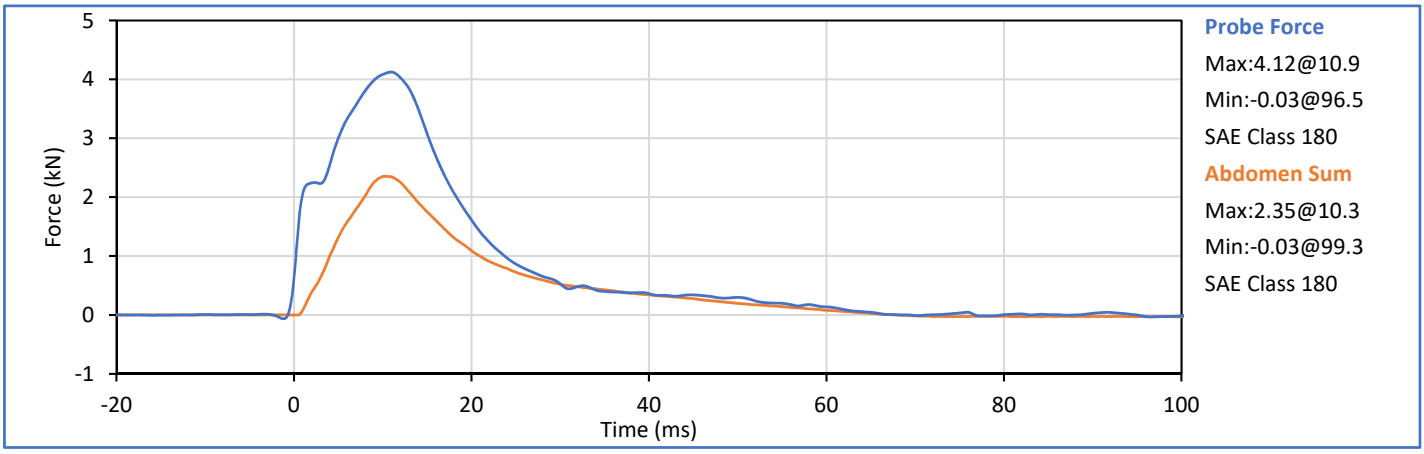
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	3.90	4.10	4.02	Pass
Peak Impactor Force	kN	4.00	4.80	4.12	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.9	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.35	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

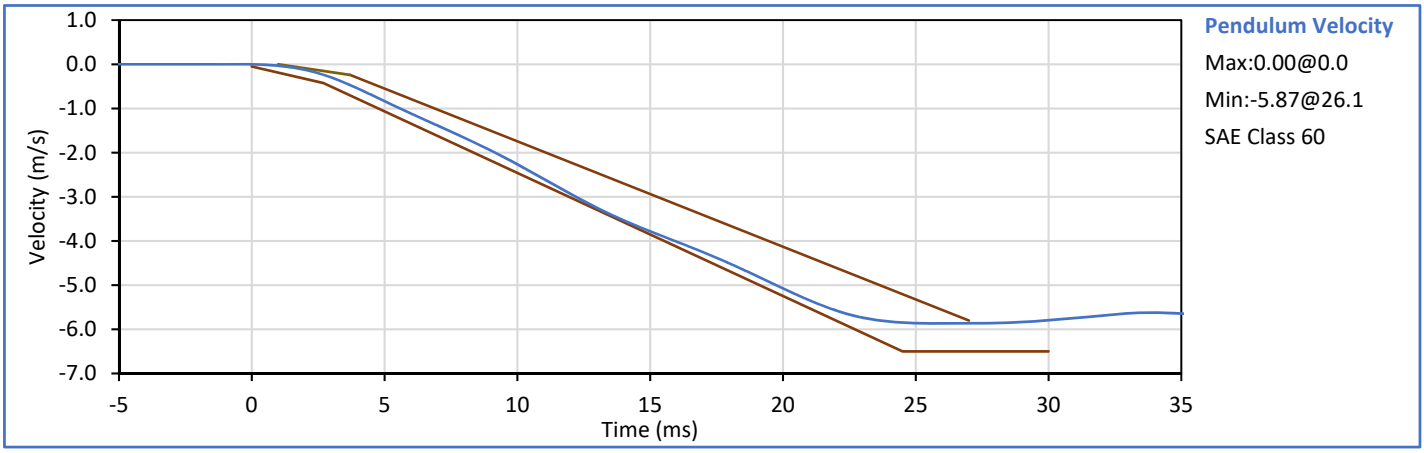
Approved By: P. Puzzuto

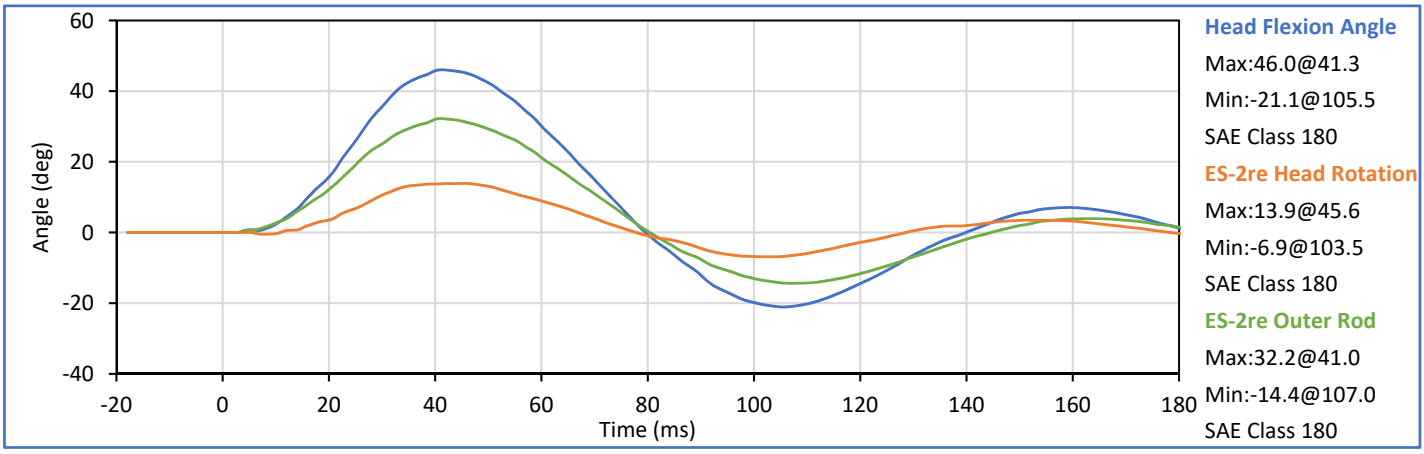
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-06

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
Pendulum Velocity	m/s	5.95	6.15	6.07	Pass
Peak Headform Flexion	deg	45.0	55.0	46.0	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	41.3	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	38.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

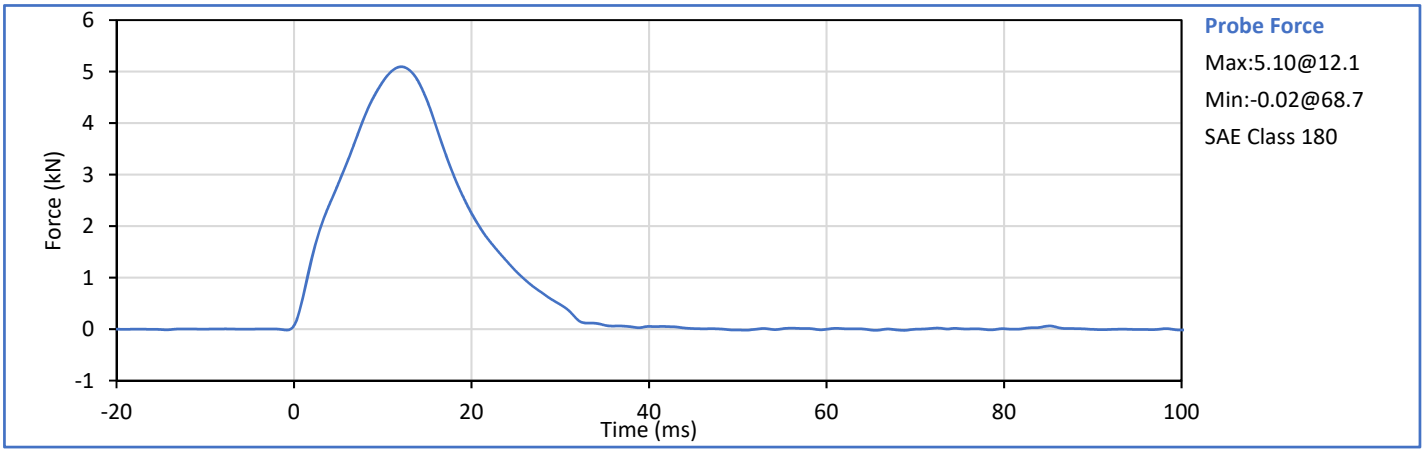
Approved By: P. Puzzuto

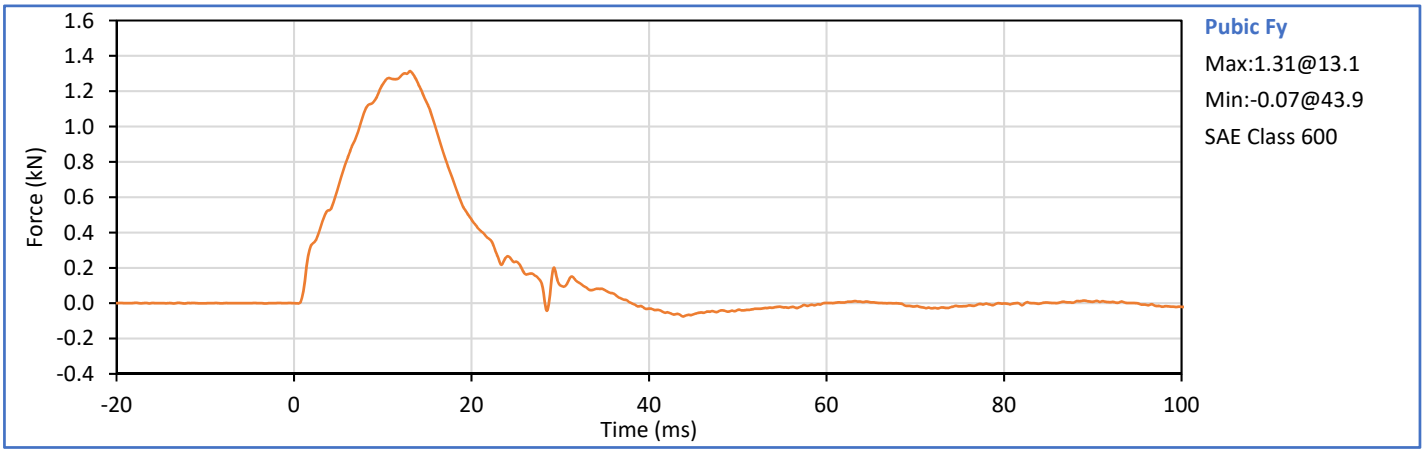
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Force	kN	4.70	5.40	5.10	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.1	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.31	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	13.1	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: 2020-04-30

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	782	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	83	Pass
D - H Point From Seatback	mm	141	151	149	Pass
E - Shoulder Pivot From Backline	mm	97	107	105	Pass
F - Thigh Clearance	mm	119	135	126	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	42	Pass
I - Head Depth	mm	178	188	186	Pass
J - Head Circumference	mm	541	551	547	Pass
K - Buttock To Knee Length	mm	514	540	524	Pass
L - Popliteal Height	mm	343	369	350	Pass
K - Knee Pivot To Floor Height	mm	392	409	398	Pass
N - Buttock Popliteal Length	mm	416	442	437	Pass
O - Chest Depth W/O Jacket	mm	195	211	207	Pass
P - Foot Length	mm	216	232	221	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	256	Pass
S - Knee Joint To Seatback	mm	477	493	486	Pass
V - Shoulder Width	mm	341	357	345	Pass
W - Foot Width	mm	78	94	84	Pass
Y - Chest Circumference W/Jacket	mm	851	881	862	Pass
Z - Waist Circumference	mm	761	791	779	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

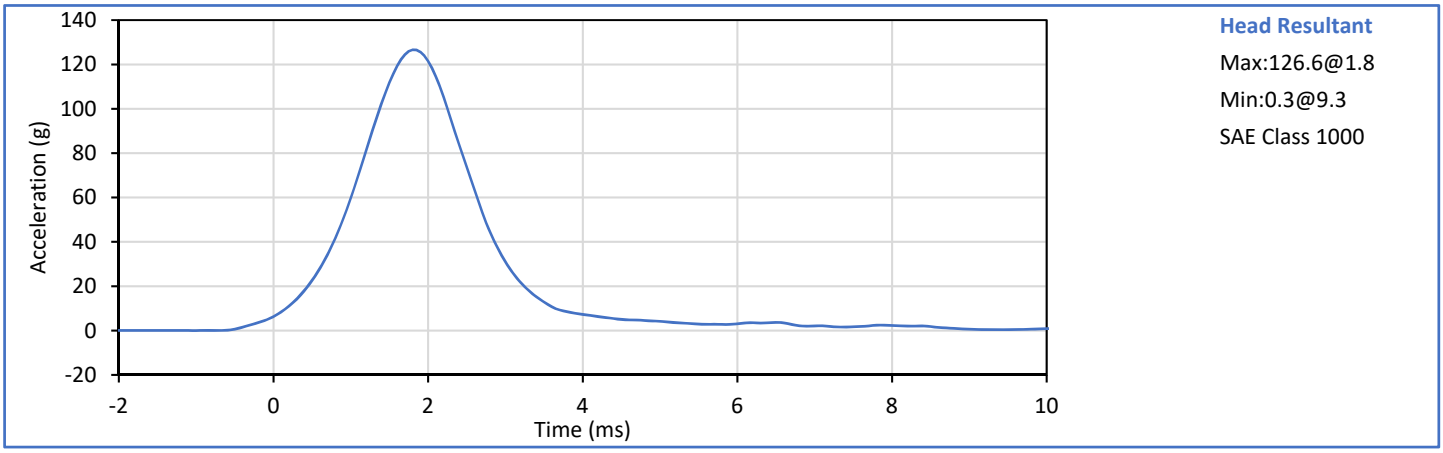
Approved By: P. Puzzuto

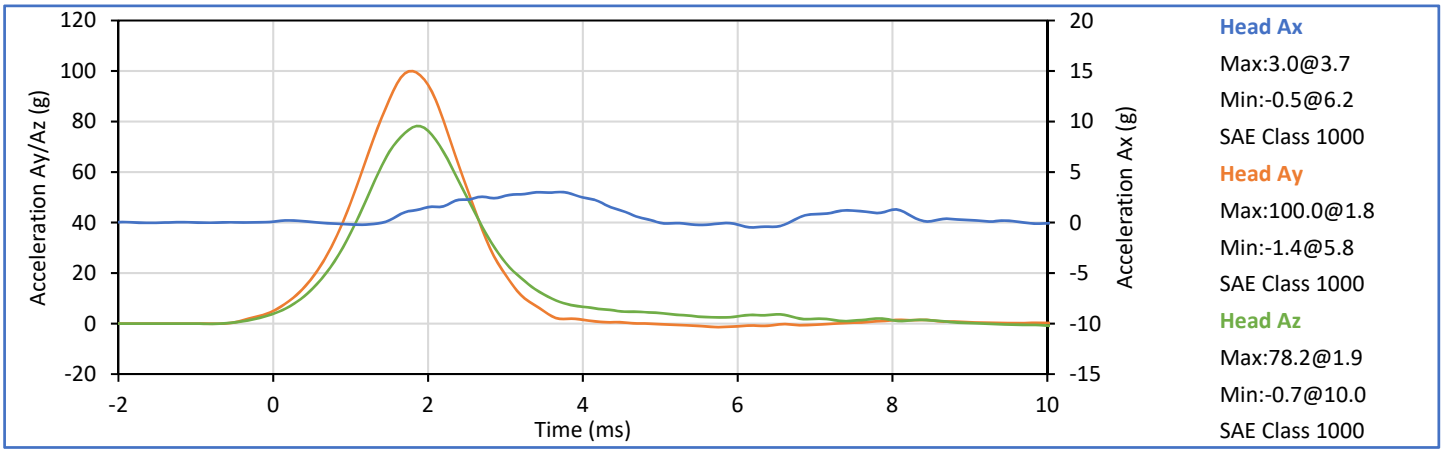
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299 Test Date: 2020-04-30

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	44	Pass
Peak Resultant Acceleration	g	115.0	137.0	126.6	Pass
Peak Head Ax	g	-15.0	15.0	-0.5	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

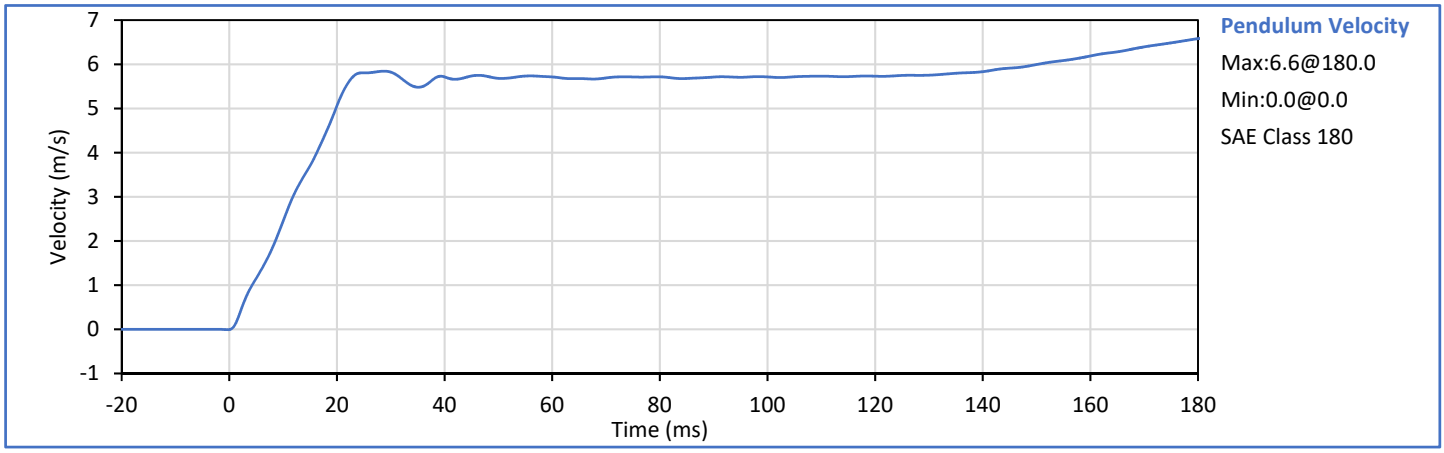
Approved By: P. Puzzuto

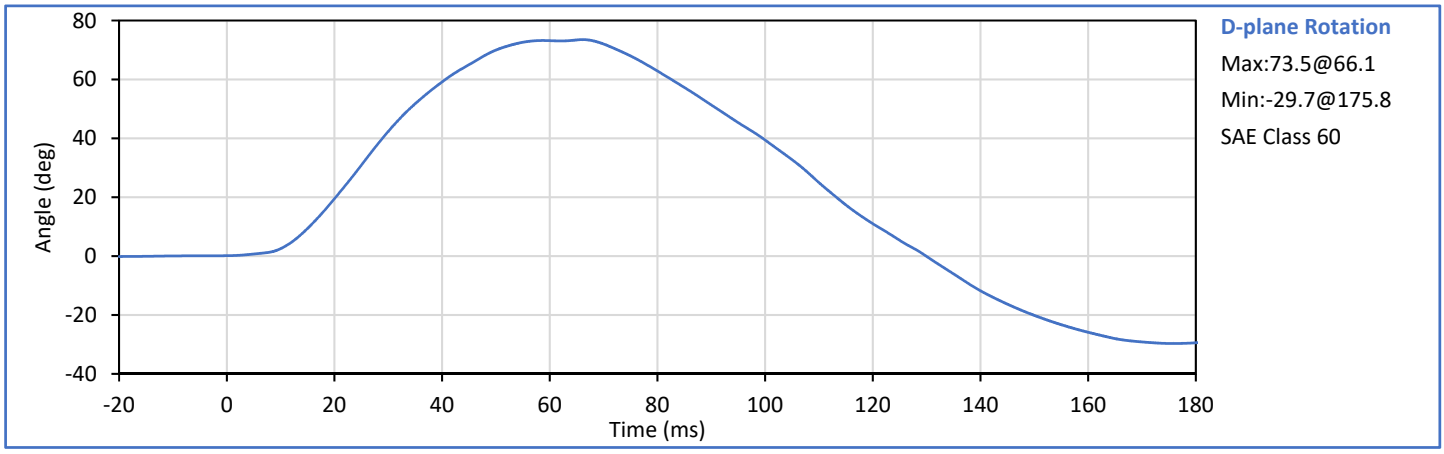
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2020-04-30

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	42	Pass
Pendulum Velocity	m/s	5.51	5.63	5.58	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.45	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.70	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.06	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.81	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.84	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	73.5	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	66.1	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.7	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	111.2	Pass
			Overall Test Results		Pass





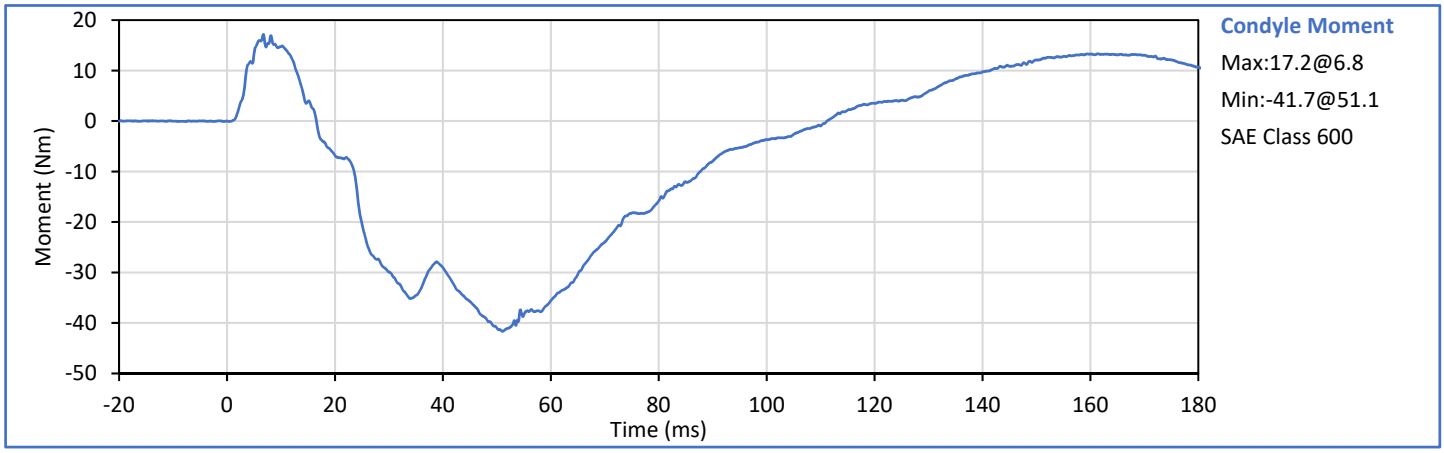
Technician: J. Hernandez

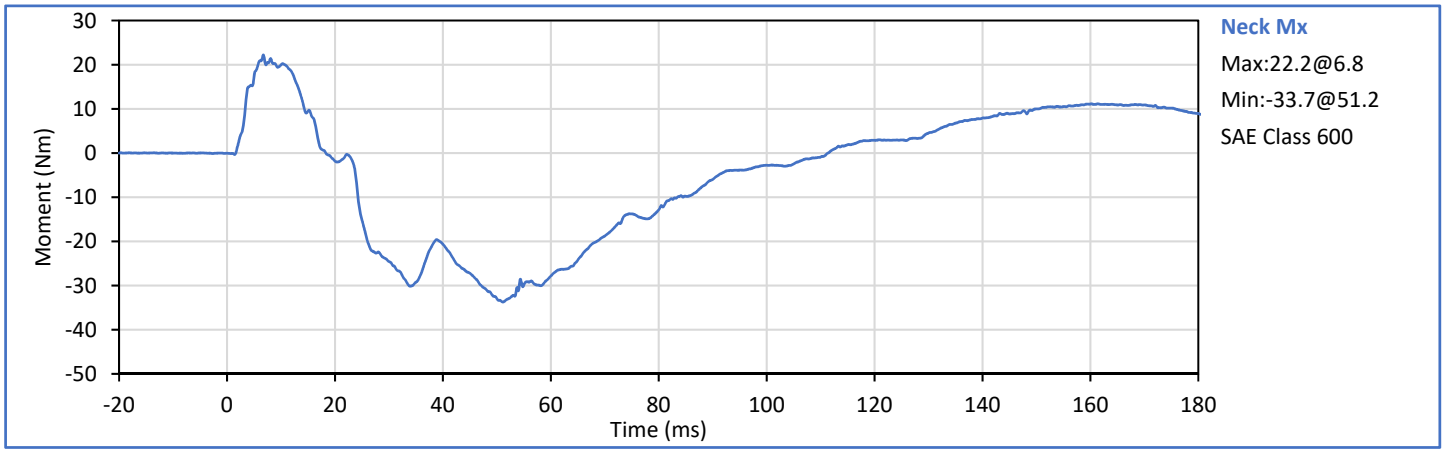
Approved By: P. Puzzuto

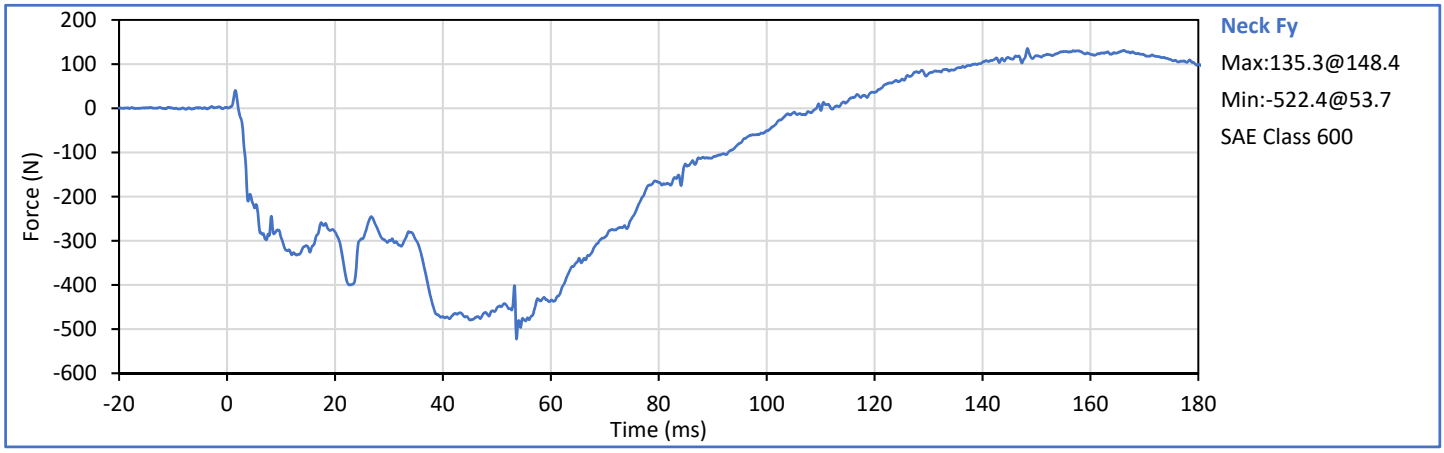
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2020-04-30





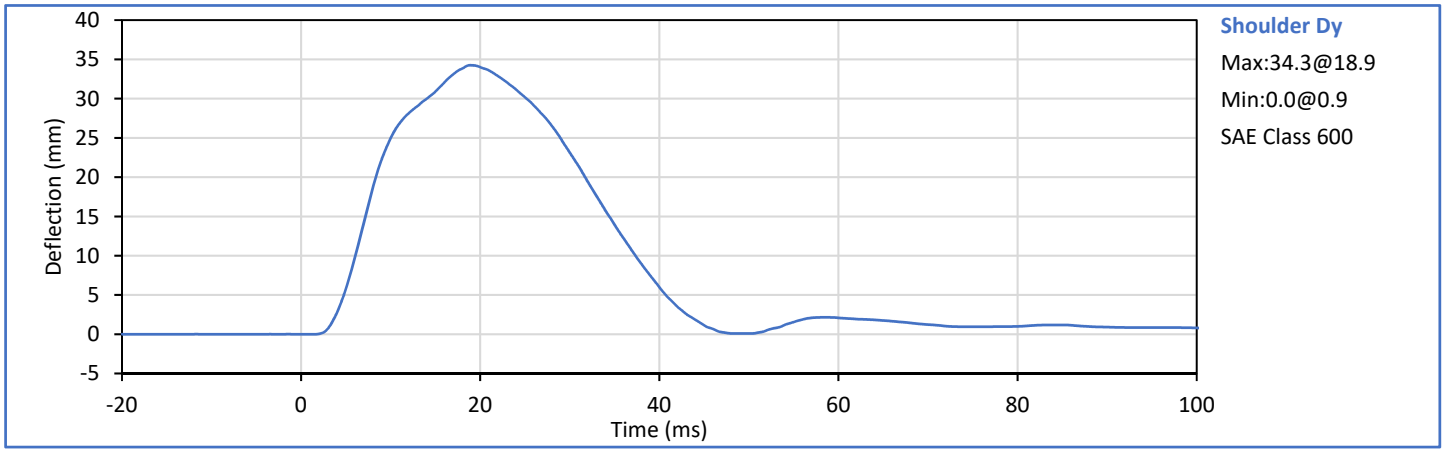


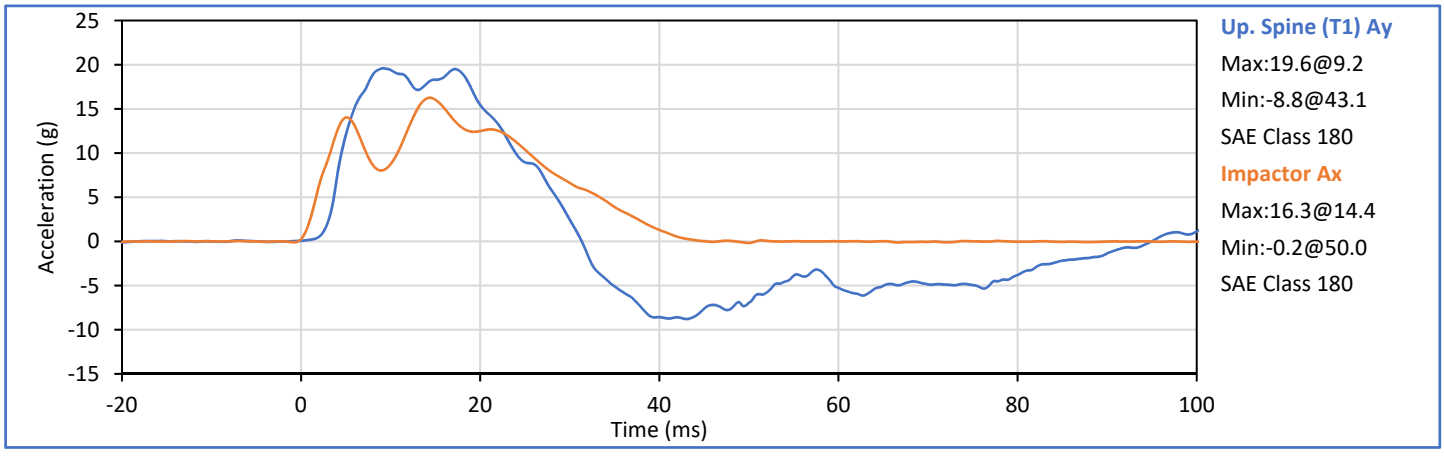
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299 Test Date: 2020-05-05

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	4.32	Pass
Peak Shoulder Dy	mm	28.0	37.0	34.3	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.6	Pass
Peak Impactor Ax	g	13.0	18.0	16.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

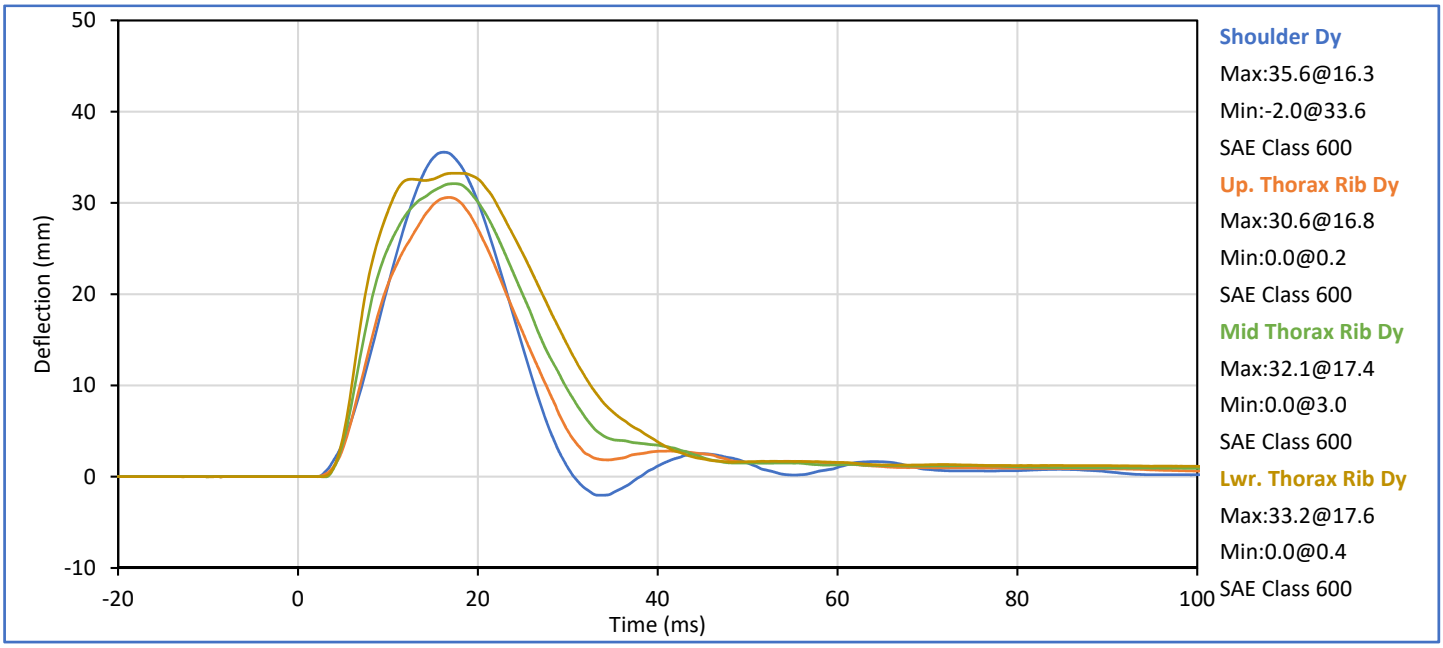
Approved By: P. Puzzuto

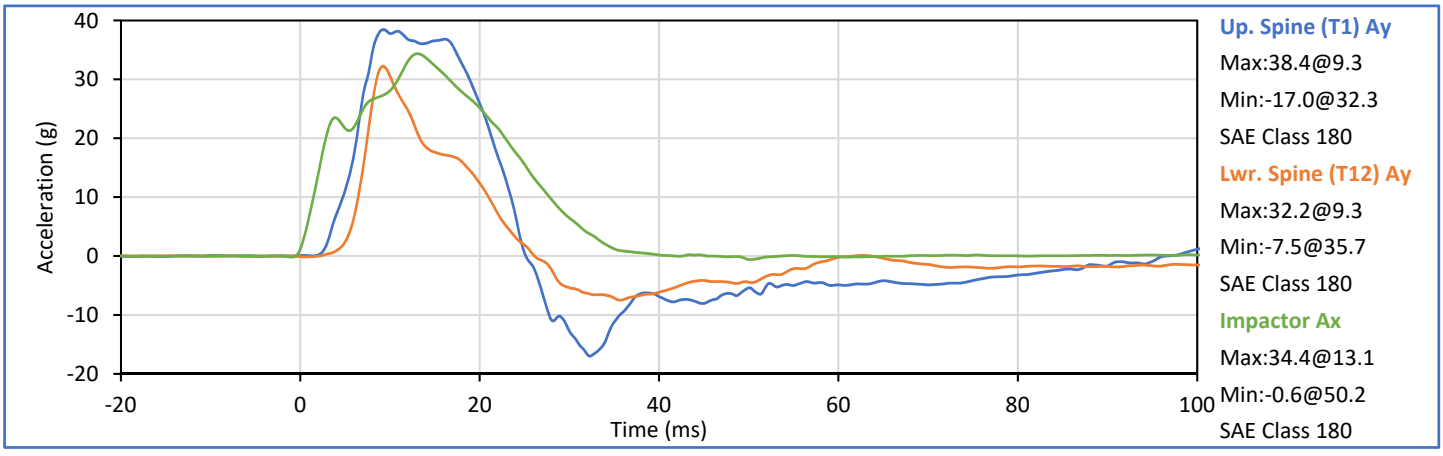
Applus IDIADA KARCO

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

ATD Serial No.: 299 Test Date: 2020-05-05

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	6.60	6.80	6.62	Pass
Peak Shoulder Dy	mm	31.0	40.0	35.6	Pass
Peak Upper Rib Dy	mm	25.0	32.0	30.6	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.1	Pass
Peak Lower Rib Dy	mm	32.0	38.0	33.2	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	38.4	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.2	Pass
Peak Impactor Ax	g	30.0	36.0	34.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

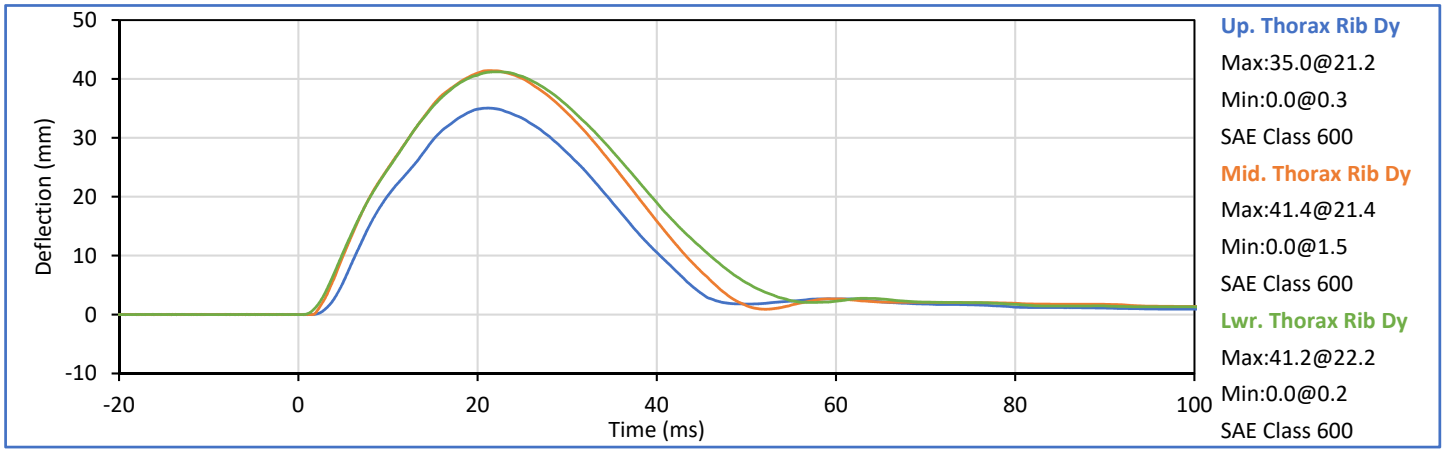
Approved By: P. Puzzuto

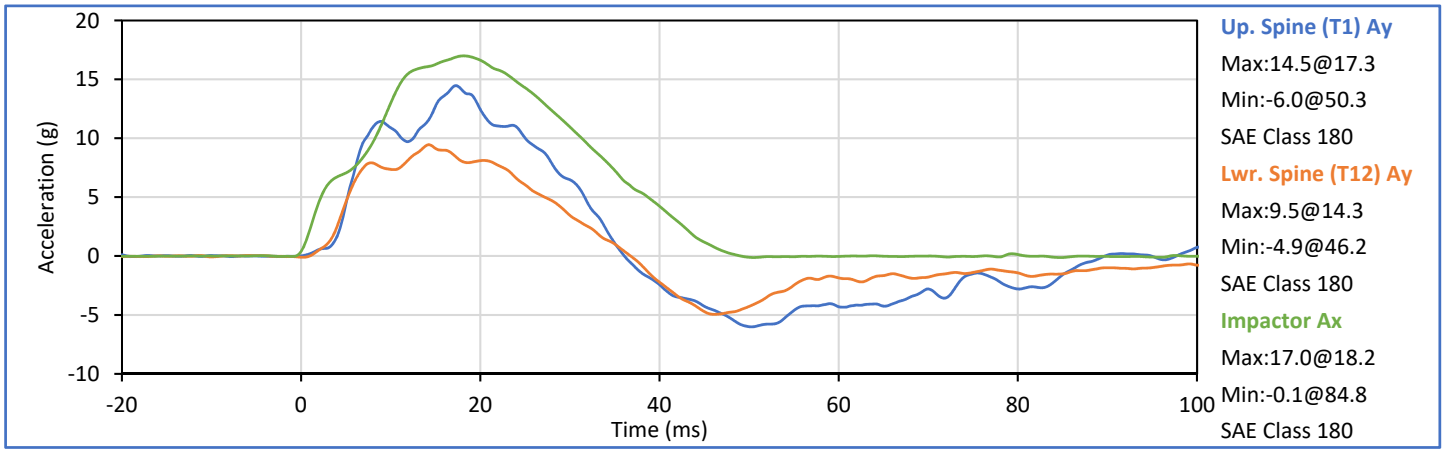
Applus IDIADA KARCO

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

ATD Serial No.: 299 Test Date: 2020-05-05

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 Rib Dy	mm	32.0	40.0	35.0	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.4	Pass
Peak Lower Rib Dy	mm	35.0	43.0	41.2	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	14.5	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.5	Pass
Peak Impactor Ax	g	14.0	18.0	17.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

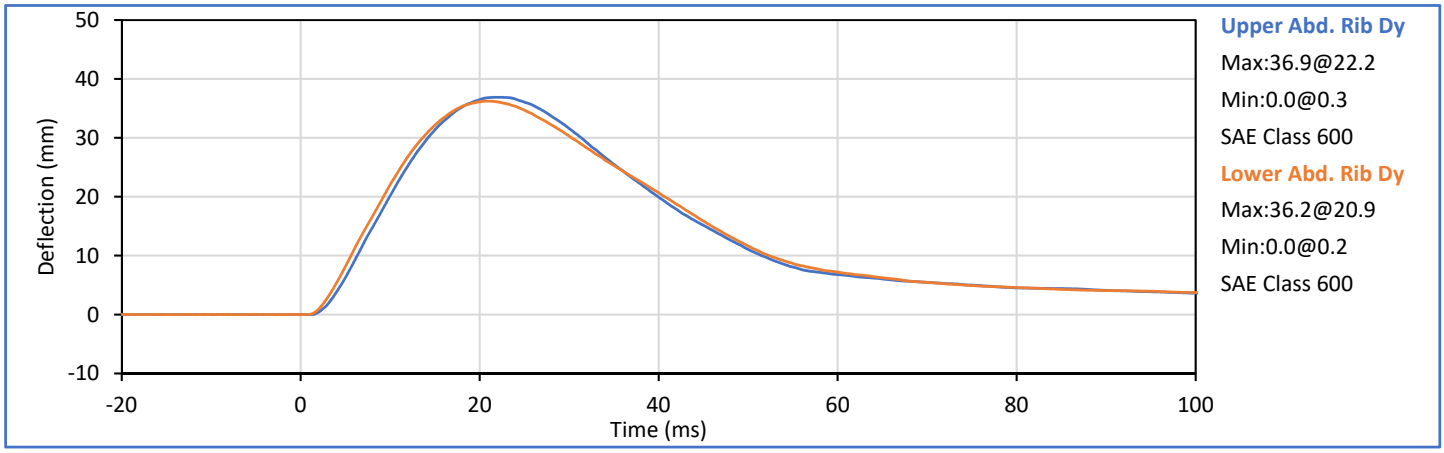
Approved By: P. Puzzuto

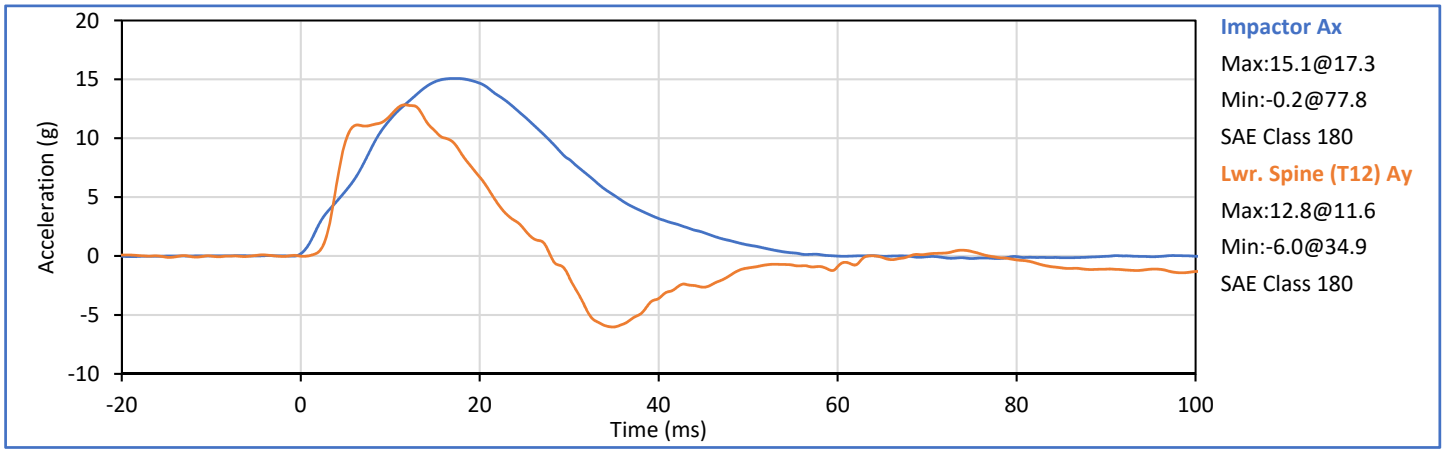
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299 Test Date: 2020-05-05

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	4.33	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	36.9	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	36.2	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	12.8	Pass
Peak Impactor Ax	g	12.0	16.0	15.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

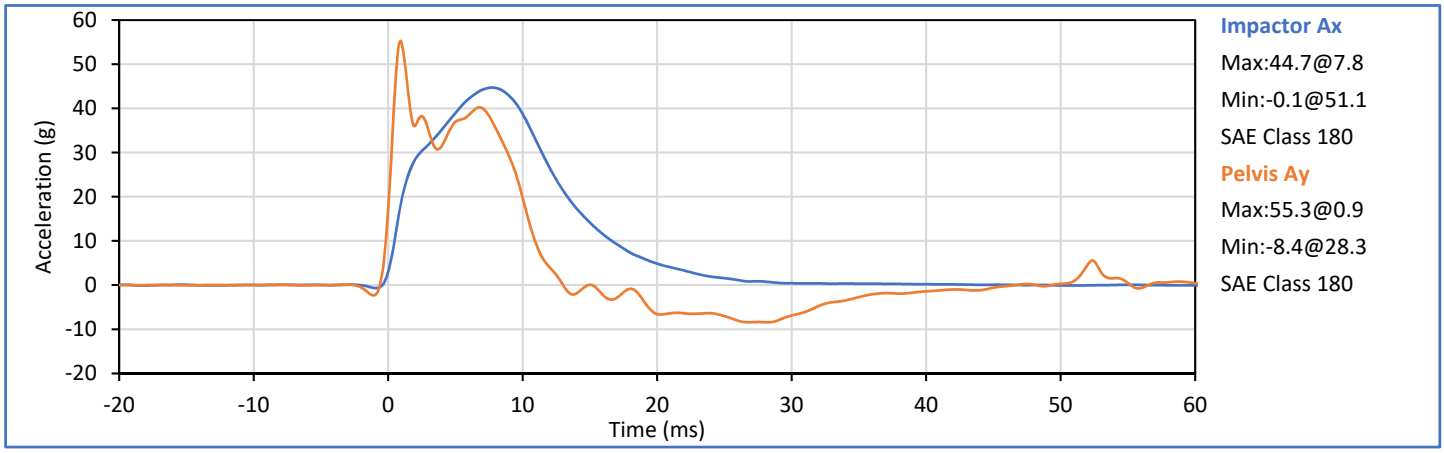
Applus IDIADA KARCO

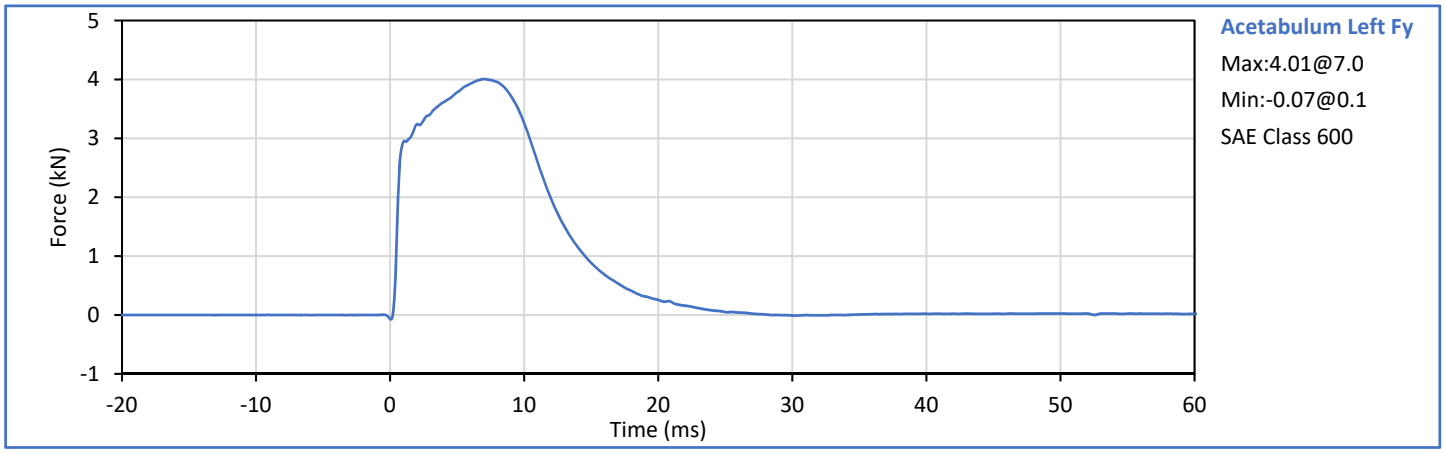
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299 Test Date: 2020-05-05

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	6.60	6.80	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.01	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.3	Pass
Peak Impactor Ax	g	38.0	47.0	44.7	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 13407





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 299 Test Date: 2020-05-05

Pelvis Plug S/N: 13407

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13407
Test Number 11049
Report Number 11087
Test Date 9/20/2019 7:13:16 AM

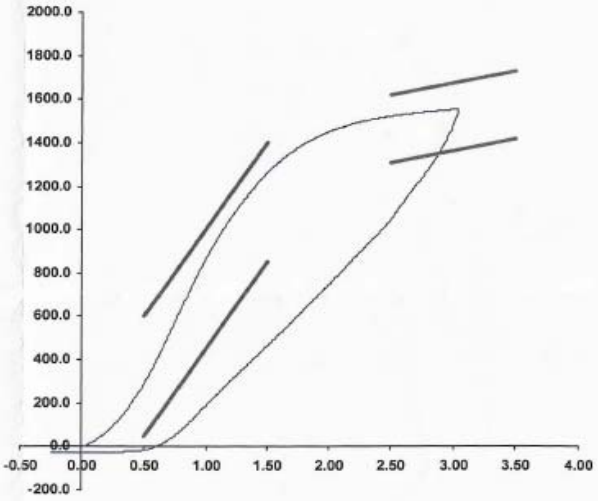
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	295.73	50.00	600.00
Force @ 1.5 mm (N)	1,268.68	850.00	1,400.00
Force @ 2.5 mm (N)	1,523.84	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,554.76	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 20-Sep-19
SACO Research

By : DC Date : 9/20/2019

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

Applus IDIADA KARCO

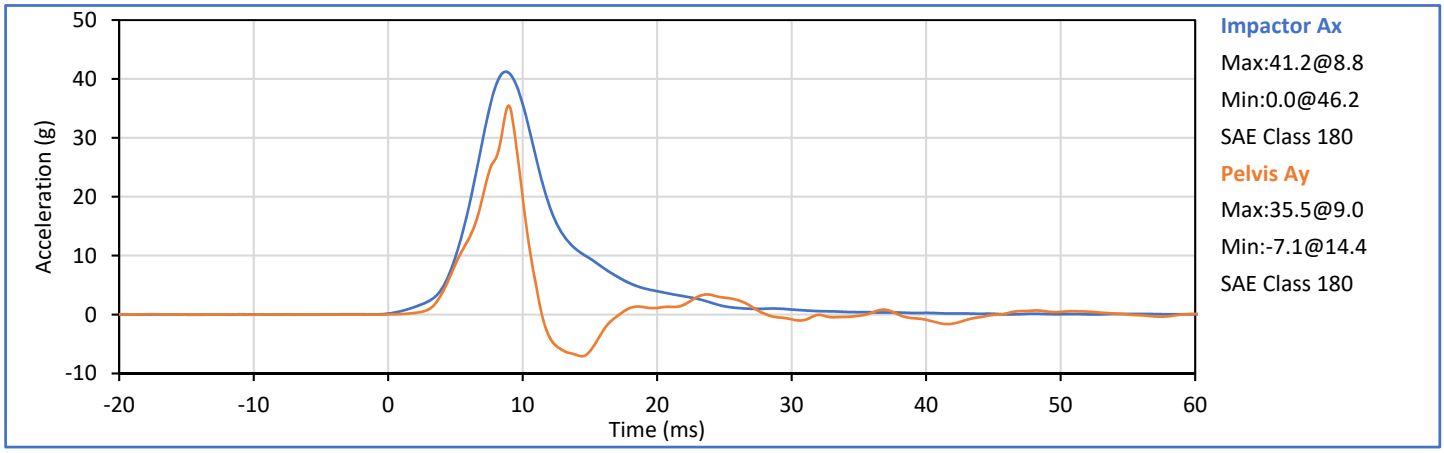
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

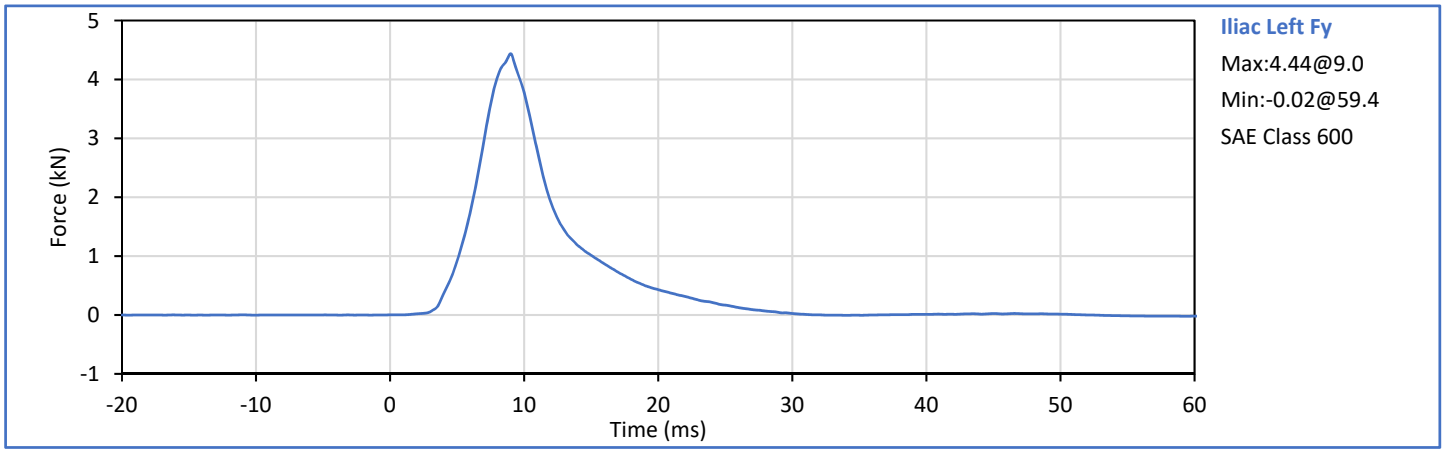
ATD Serial No.: 299 Test Date: 2020-05-06

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Iliac Fy	kN	4.10	5.10	4.44	Pass
Pelvis Ay after 6ms	g	28.0	39.0	35.5	Pass
Peak Impactor Ax	g	36.0	45.0	41.2	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 *

* 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, Left Side Configuration
S/N: F035

Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-19

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
1 - Sitting Height	mm	900	918	907	Pass
2 - Seat to Shoulder Joint	mm	558	572	564	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	351	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	101	Pass
5 - Sole to Seat, Sitting	mm	433	451	442	Pass
6 - Head Width	mm	152	158	156	Pass
7 - Shoulder/Arm Width	mm	461	479	471	Pass
8 - Thorax Width	mm	322	332	328	Pass
9 - Abdomen Width	mm	273	287	277	Pass
10 - Pelvis Lap Width	mm	359	373	362	Pass
11 - Head Depth	mm	196	206	204	Pass
12 - Thorax Depth	mm	262	272	269	Pass
13 - Abdomen Depth	mm	194	204	198	Pass
14 - Pelvis Depth	mm	235	245	239	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	155	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	609	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

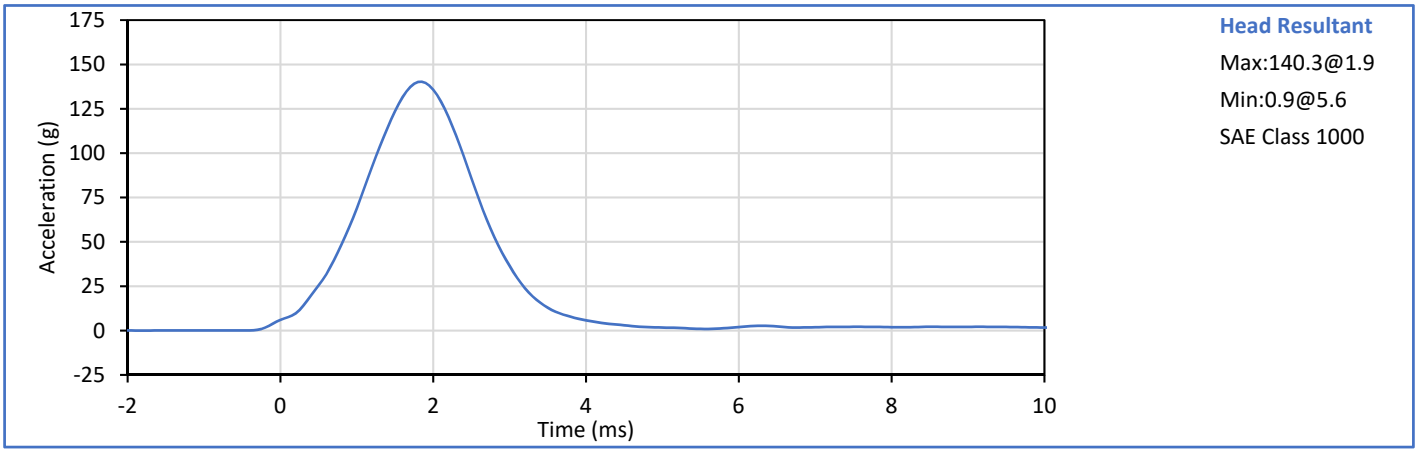
Approved By: P. Puzzuto

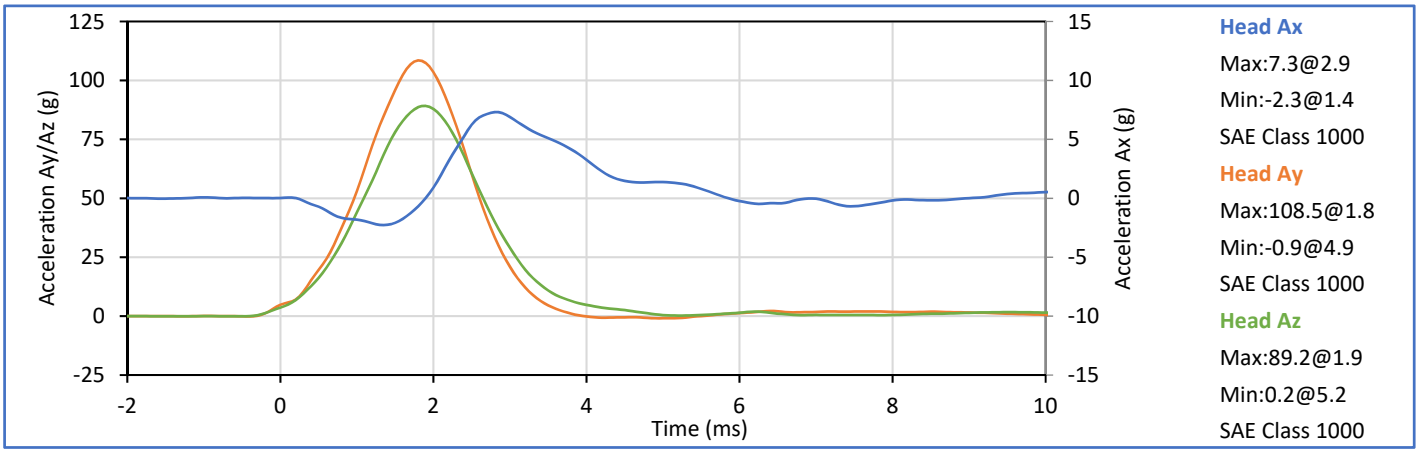
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-19

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	30	Pass
Peak Resultant Acceleration	g	125.0	155.0	140.3	Pass
Peak Head Ax	g	-15.0	15.0	7.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

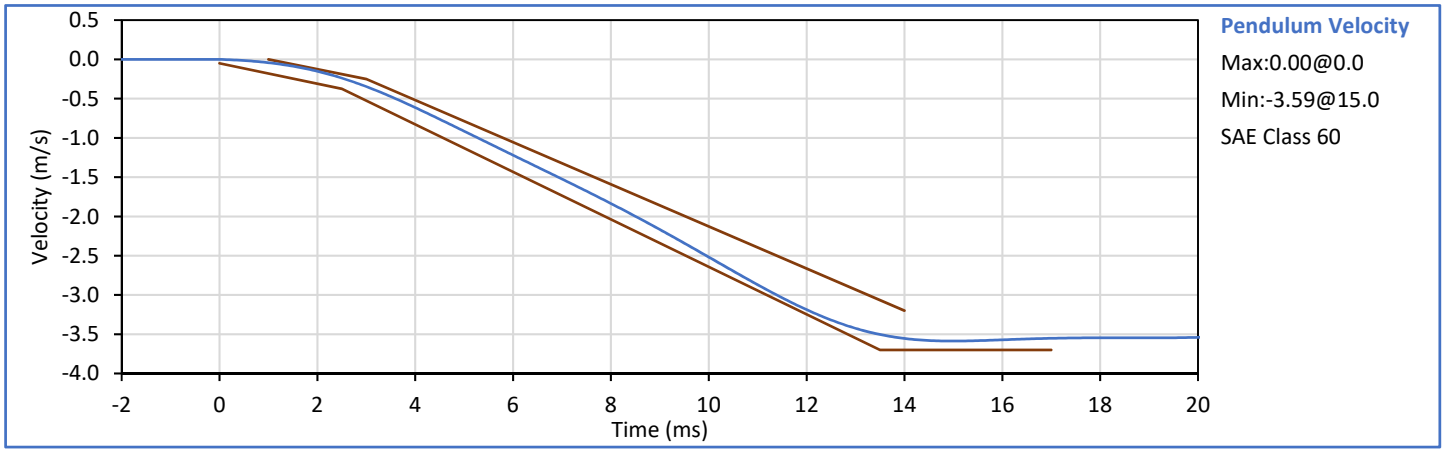
Approved By: P. Puzzuto

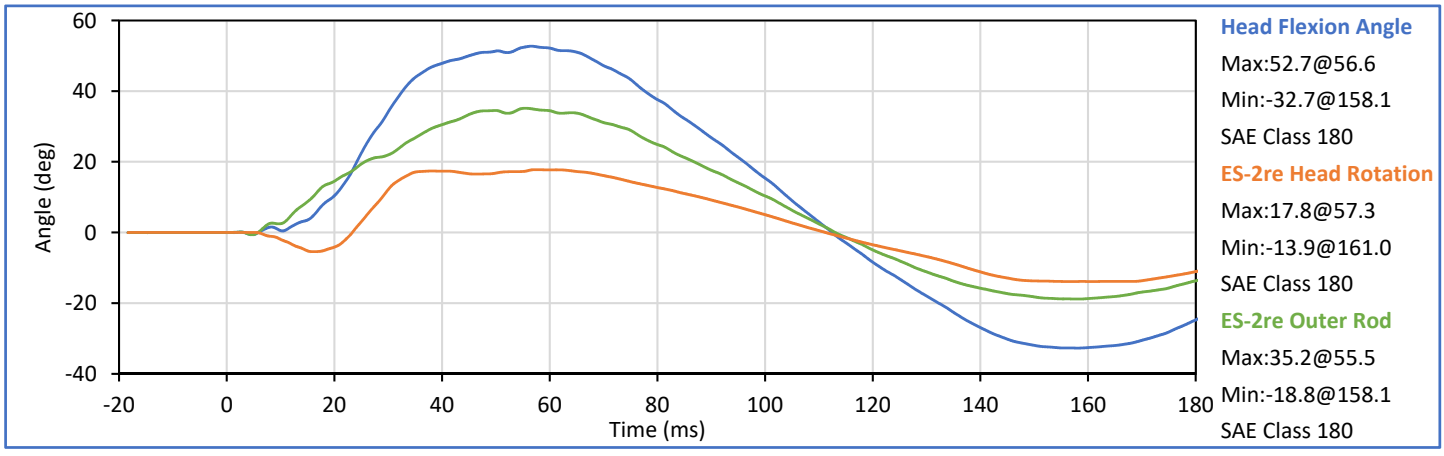
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-19

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	3.30	3.50	3.42	Pass
Peak Headform Flexion	deg	49.0	59.0	52.7	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.6	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	55.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

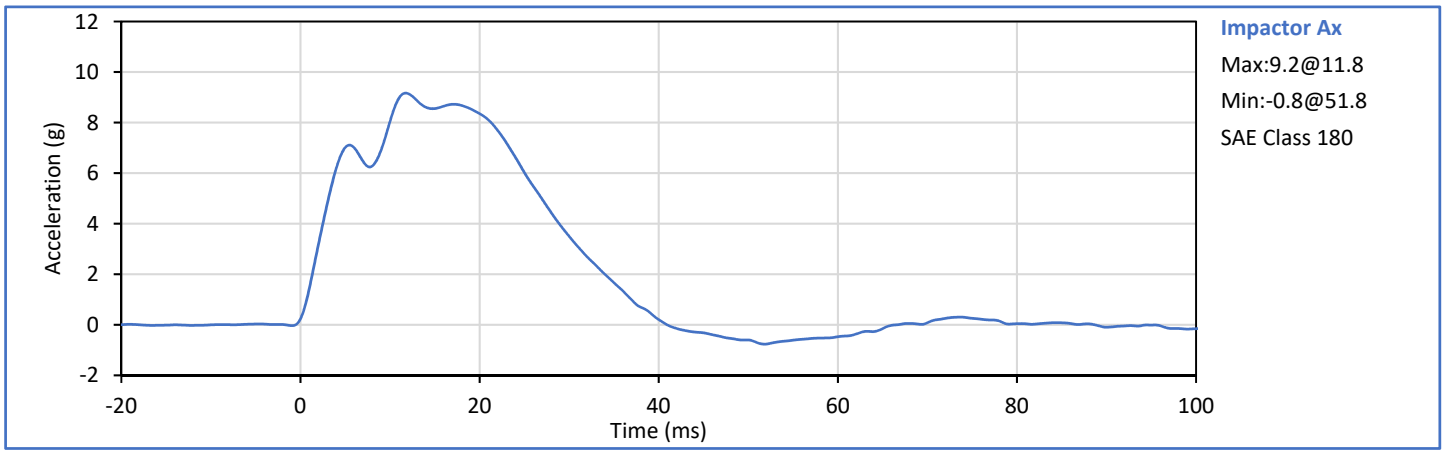
Applus IDIADA KARCO

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

ATD Serial No.: F035

Test Date: 2020-05-19

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	4.31	Pass
Peak Impactor Ax	g	7.5	10.5	9.2	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

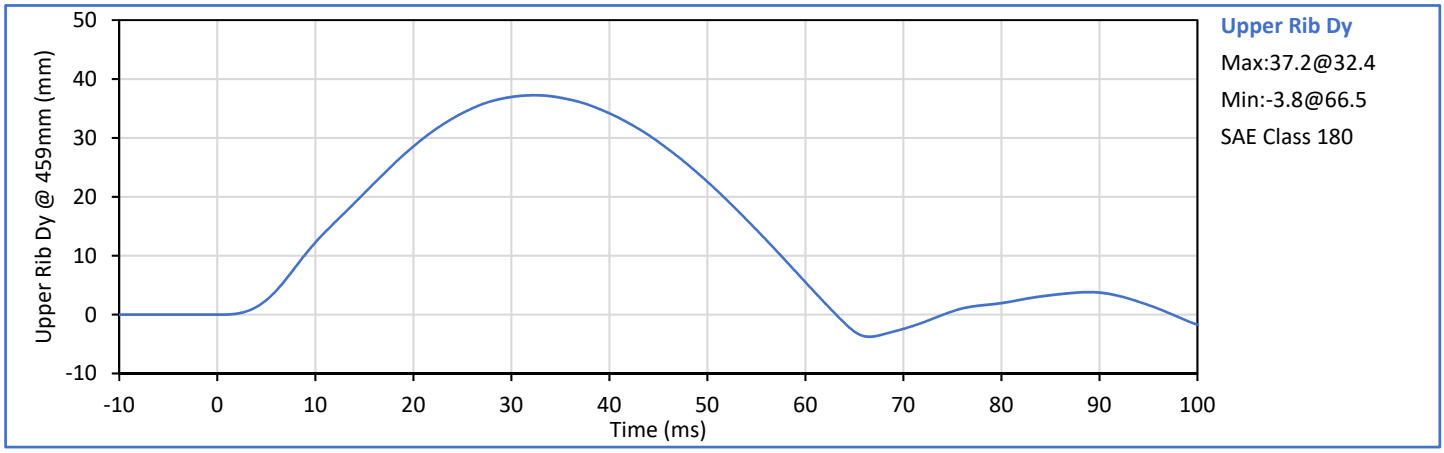
Applus IDIADA KARCO

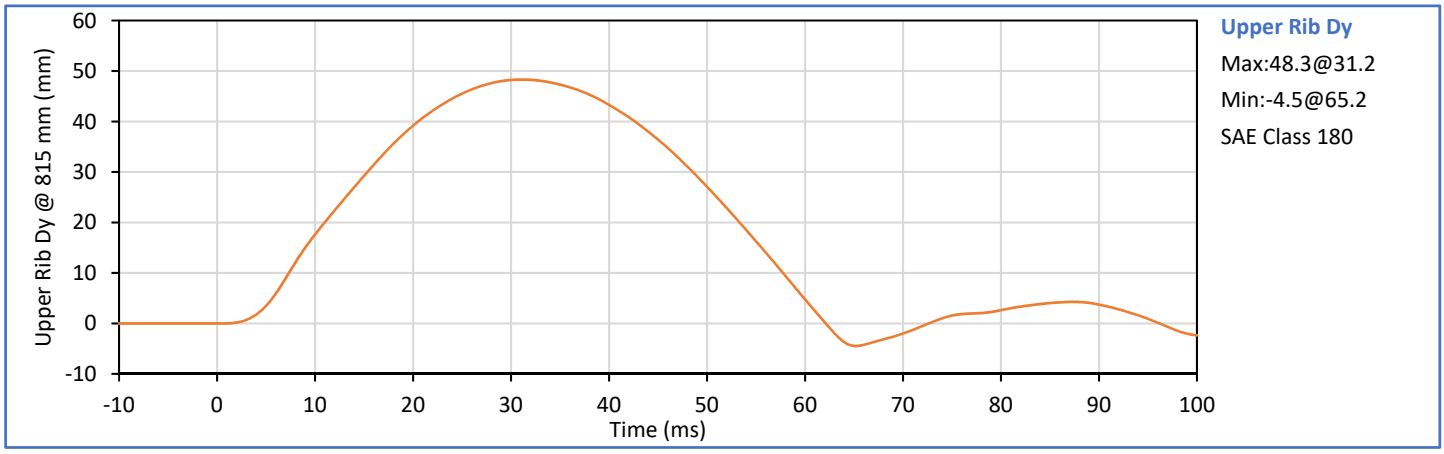
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F035

Test Date: 2020-05-20

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	31	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.2	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

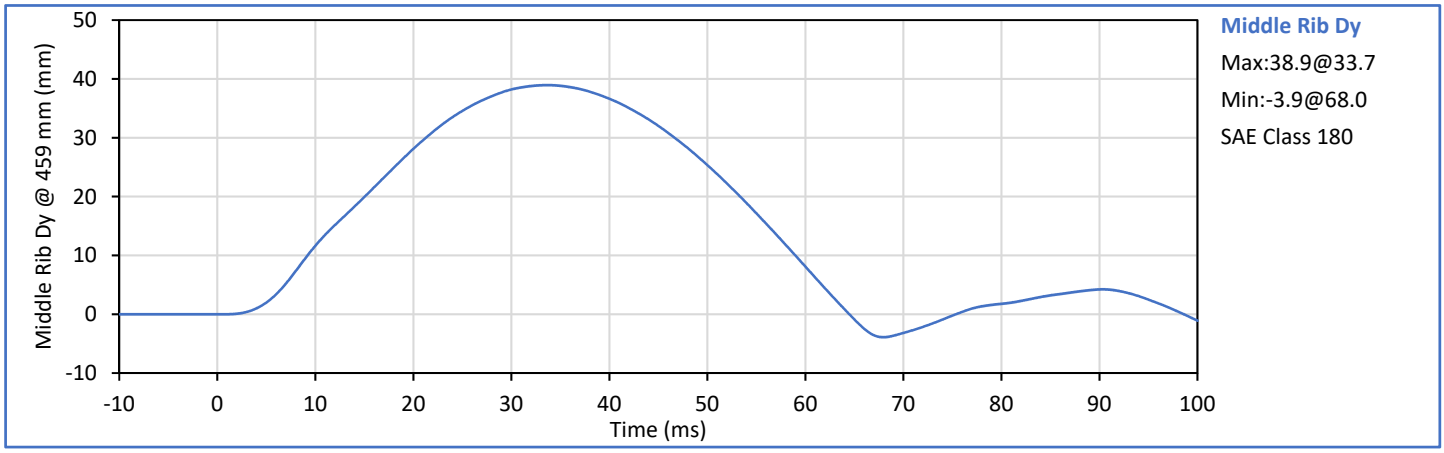
Approved By: P. Puzzuto

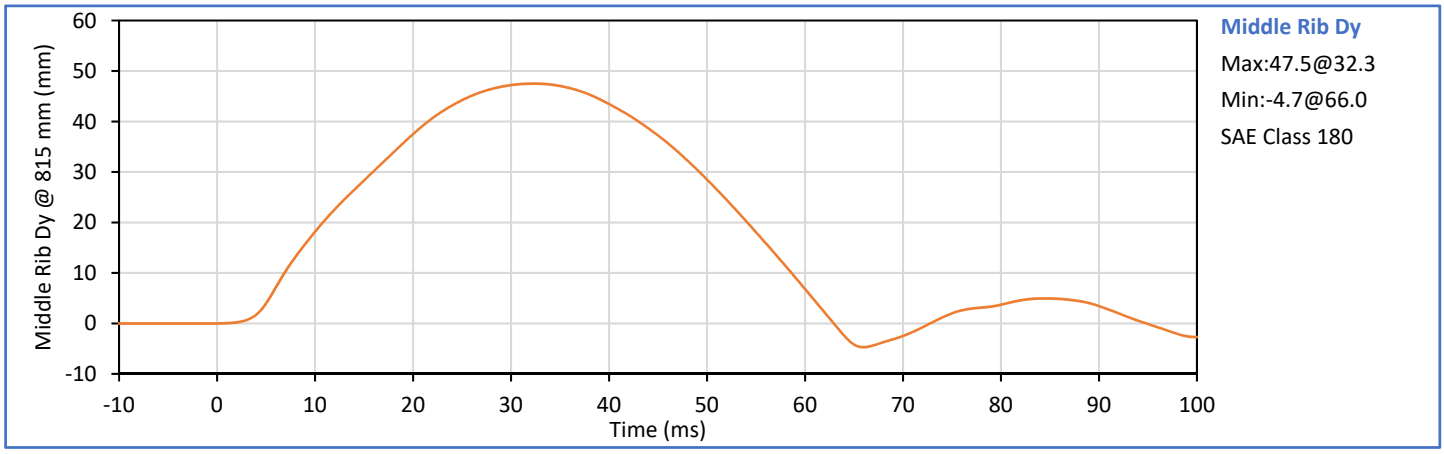
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.9	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.5	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

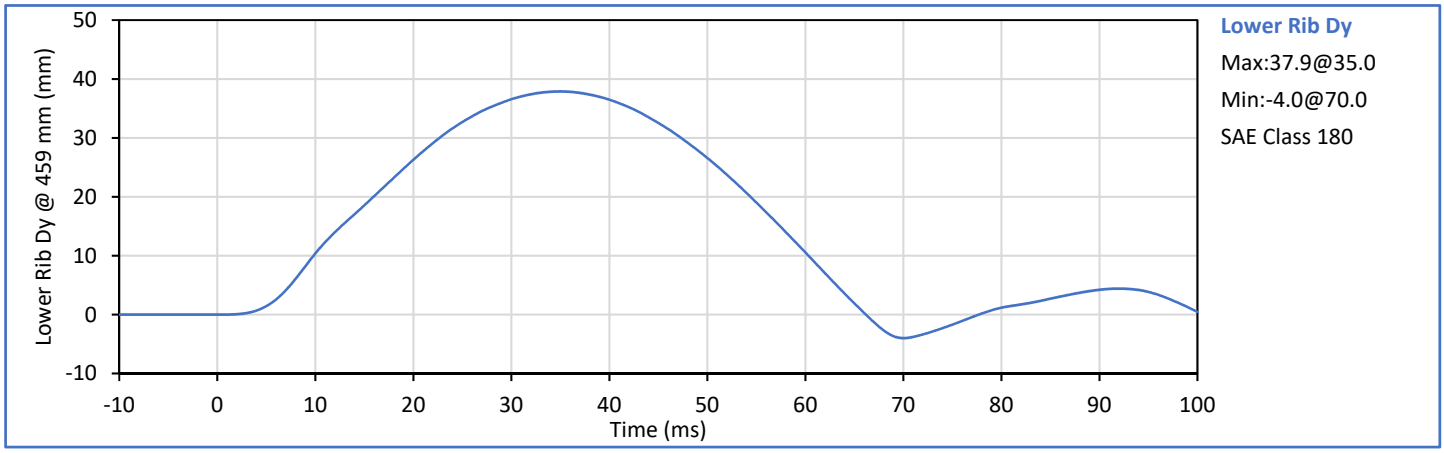
Approved By: P. Puzzuto

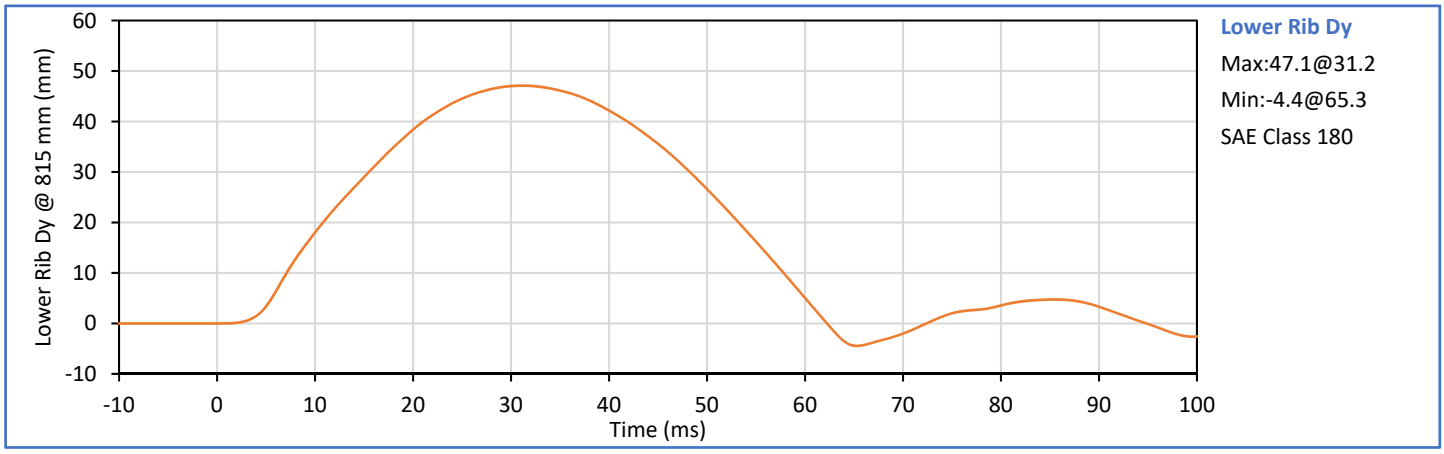
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.9	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	47.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

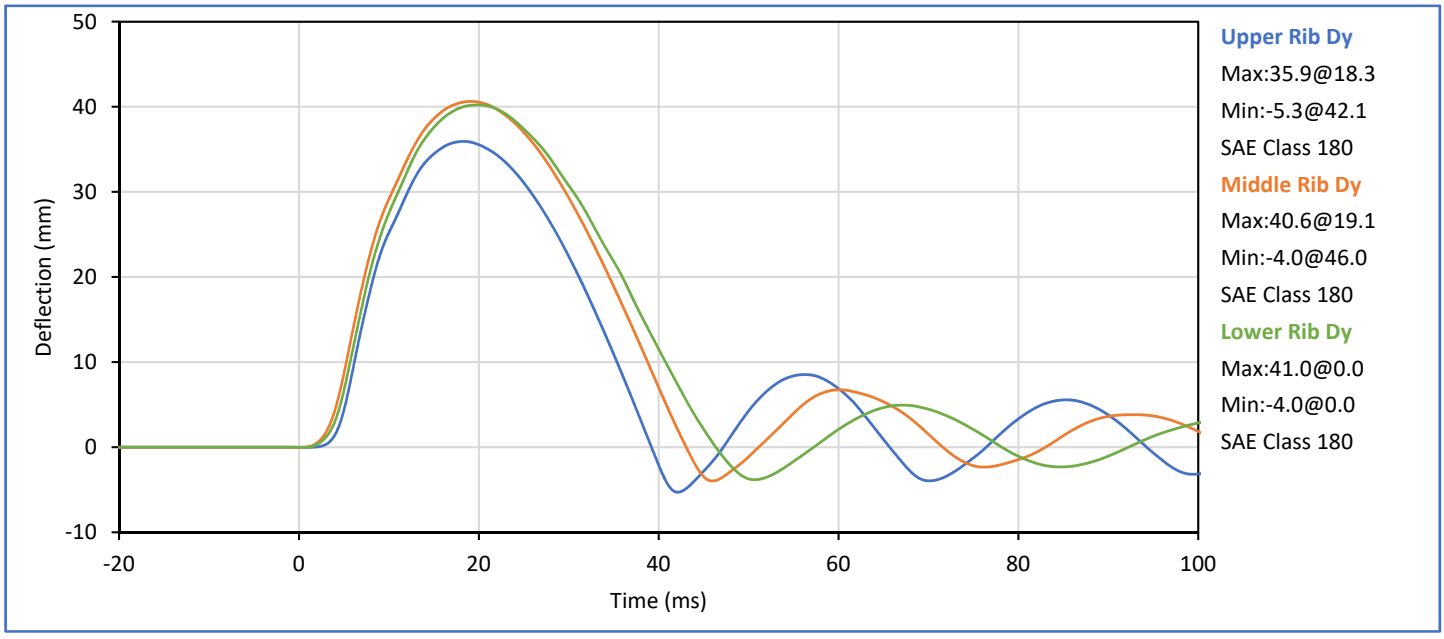
Approved By: P. Puzzuto

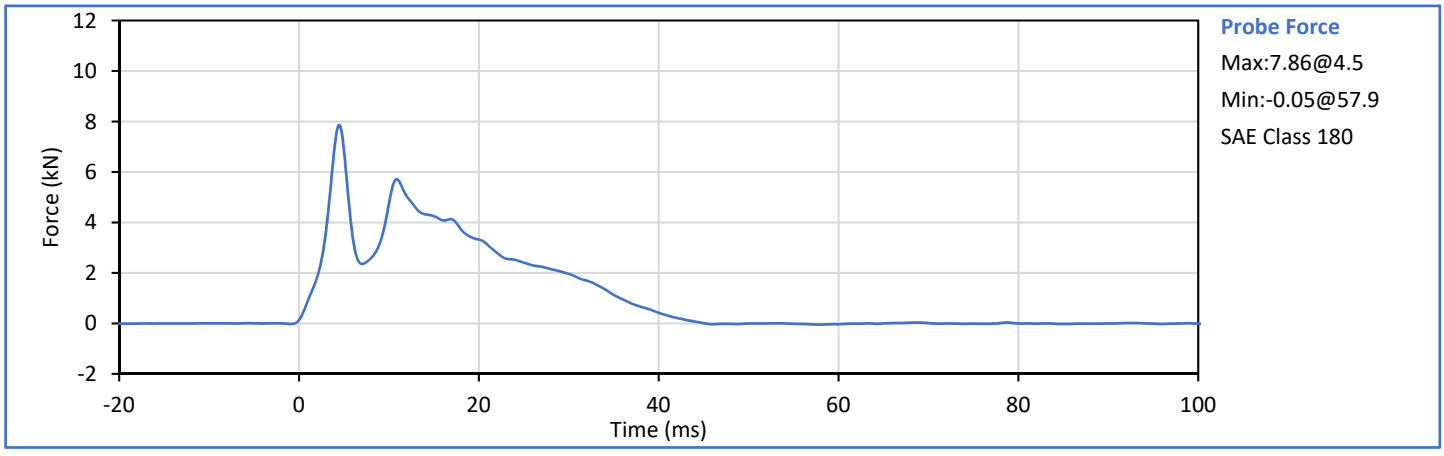
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-19

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	36	Pass
Impactor Velocity	m/s	5.40	5.60	5.51	Pass
Peak Upper Rib Dy	mm	34.0	41.0	35.9	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.6	Pass
Peak Lower Rib Dy	mm	37.0	44.0	40.2	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.71	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

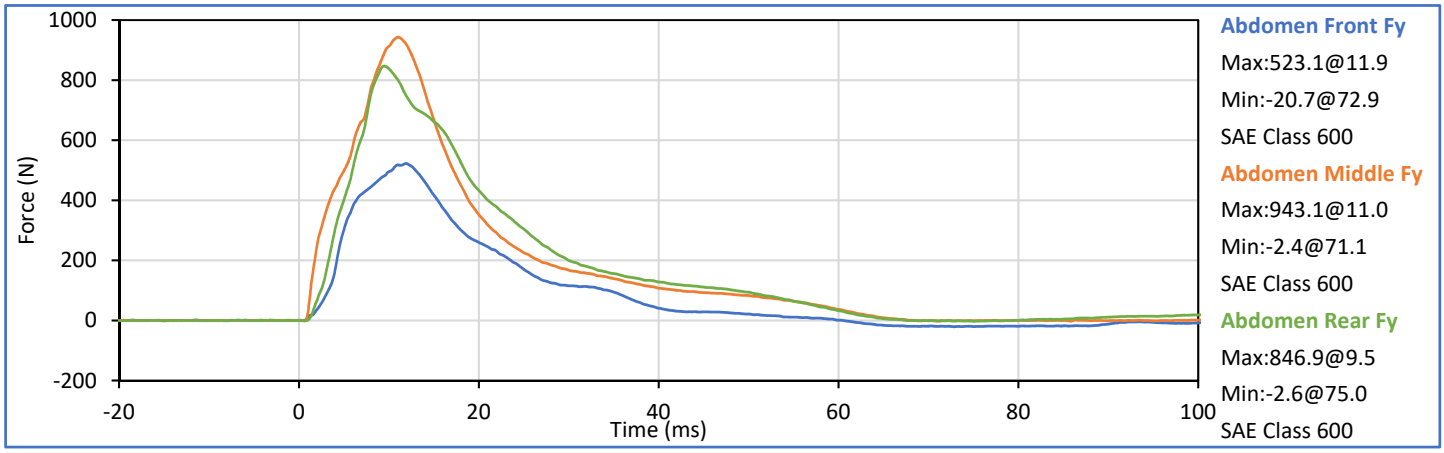
Approved By: P. Puzzuto

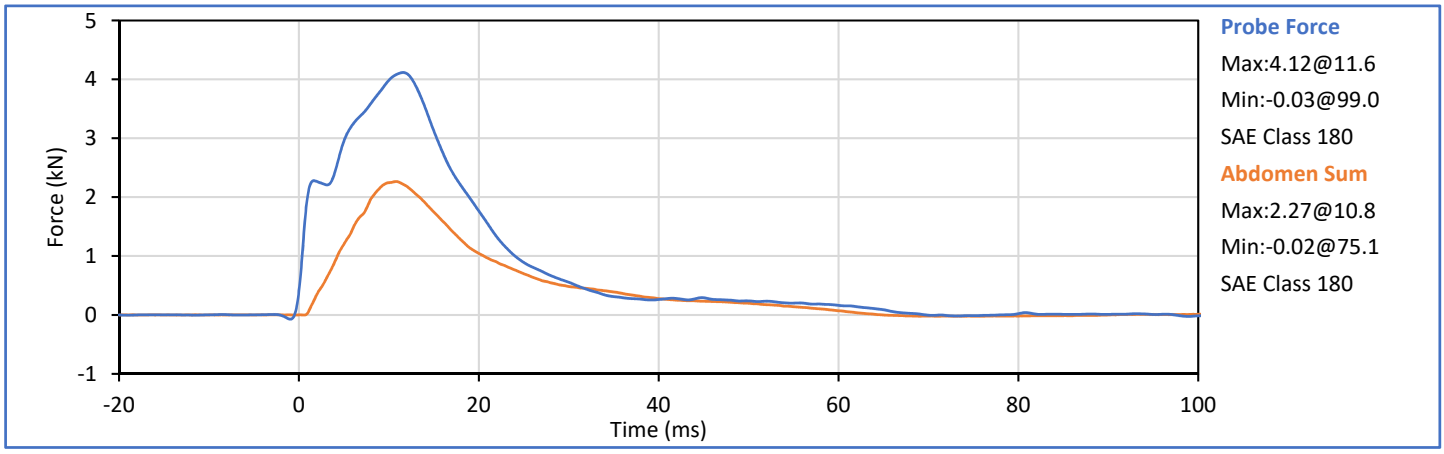
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-19

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	36	Pass
Impactor Velocity	m/s	3.90	4.10	4.02	Pass
Peak Impactor Force	kN	4.00	4.80	4.12	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.6	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.27	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.8	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

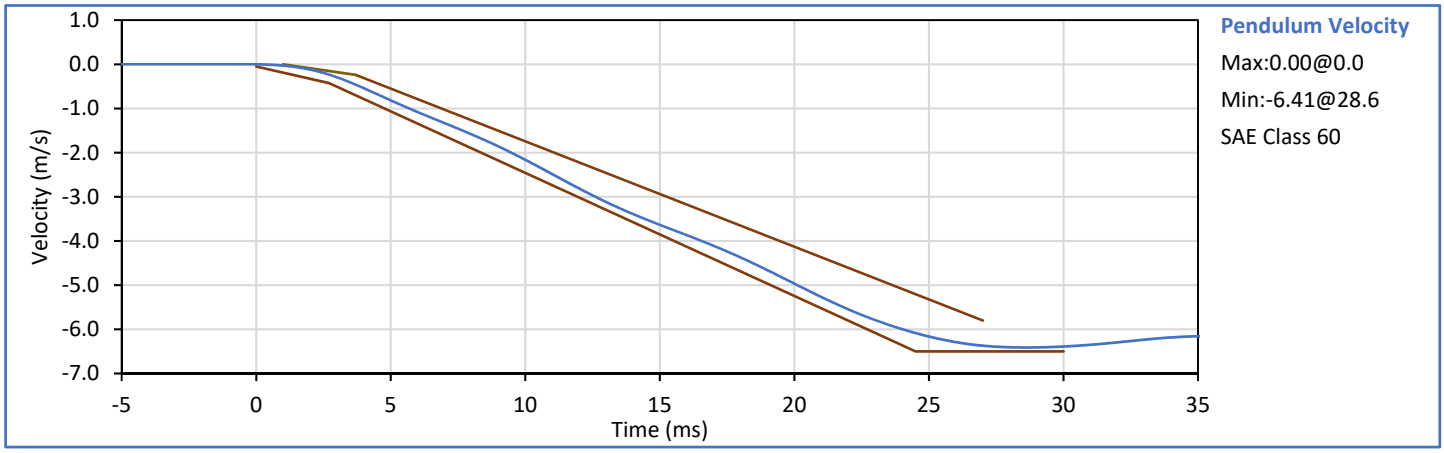
Approved By: P. Puzzuto

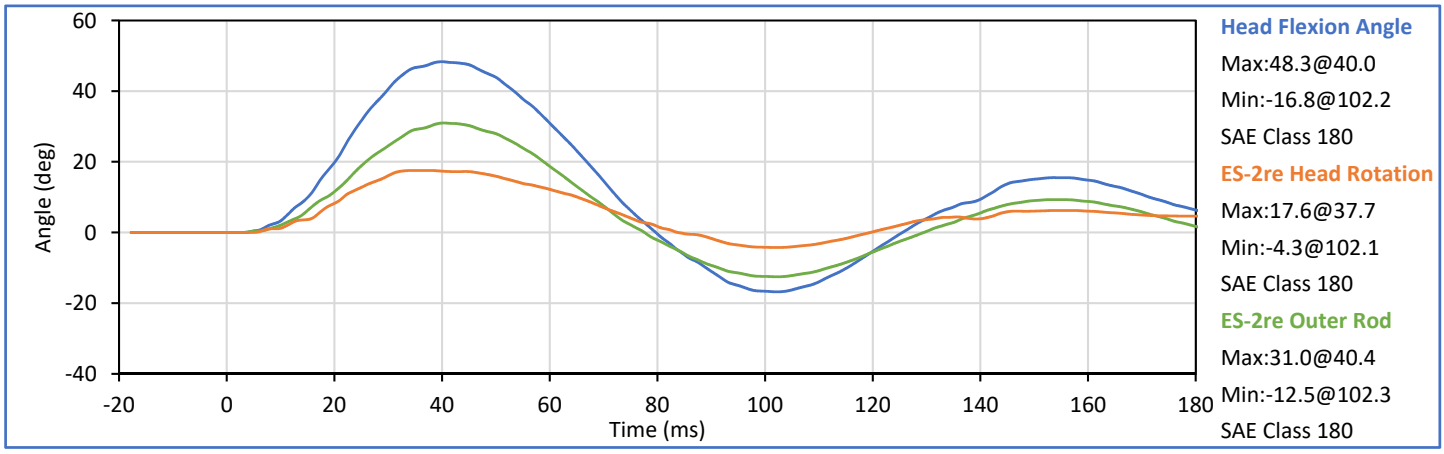
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-20

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	31	Pass
Pendulum Velocity	m/s	5.95	6.15	6.01	Pass
Peak Headform Flexion	deg	45.0	55.0	48.3	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	40.0	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	39.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

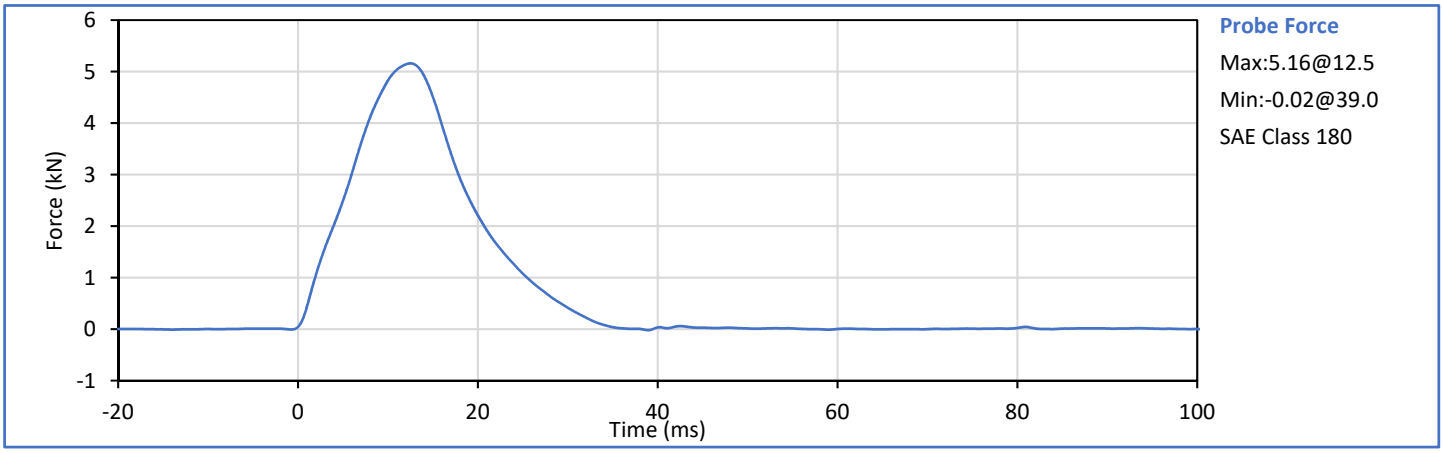
Approved By: P. Puzzuto

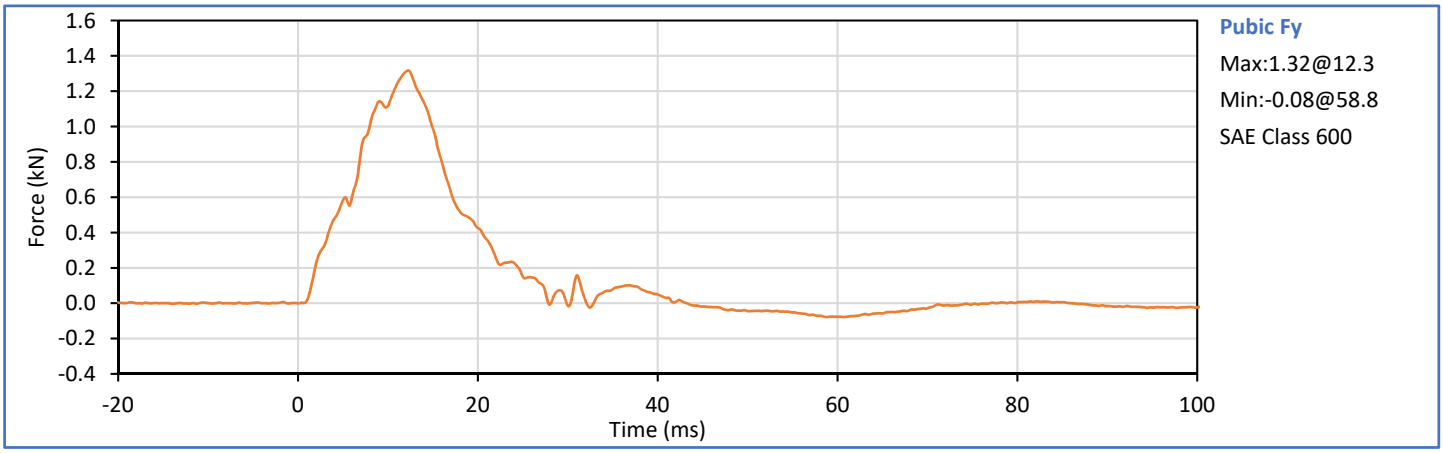
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-05-19

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	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Impactor Force	kN	4.70	5.40	5.16	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.5	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.32	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	12.3	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: 2020-05-18

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
A - Sitting Height	mm	772	788	784	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	85	Pass
D - H Point From Seatback	mm	141	151	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	103	Pass
F - Thigh Clearance	mm	119	135	126	Pass
G - Head Breadth	mm	140	148	145	Pass
H - Head Back From Backline	mm	40	46	42	Pass
I - Head Depth	mm	178	188	185	Pass
J - Head Circumference	mm	541	551	549	Pass
K - Buttock To Knee Length	mm	514	540	530	Pass
L - Popliteal Height	mm	343	369	357	Pass
K - Knee Pivot To Floor Height	mm	392	409	395	Pass
N - Buttock Popliteal Length	mm	416	442	435	Pass
O - Chest Depth W/O Jacket	mm	195	211	202	Pass
P - Foot Length	mm	216	232	221	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	257	Pass
S - Knee Joint To Seatback	mm	477	493	485	Pass
V - Shoulder Width	mm	341	357	351	Pass
W - Foot Width	mm	78	94	85	Pass
Y - Chest Circumference W/Jacket	mm	851	881	863	Pass
Z - Waist Circumference	mm	761	791	781	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

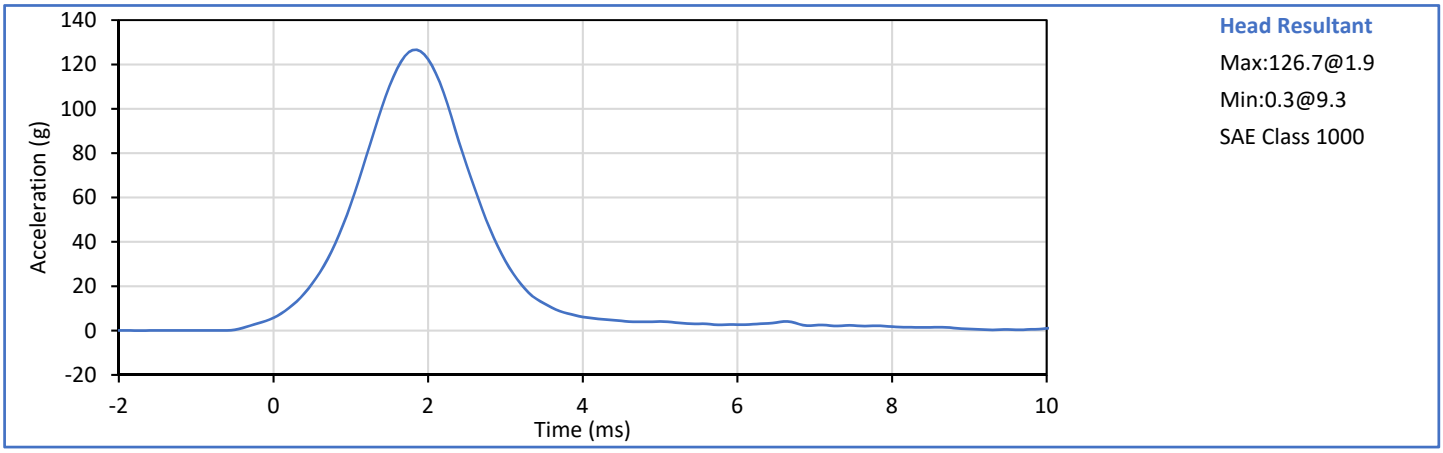
Approved By: P. Puzzuto

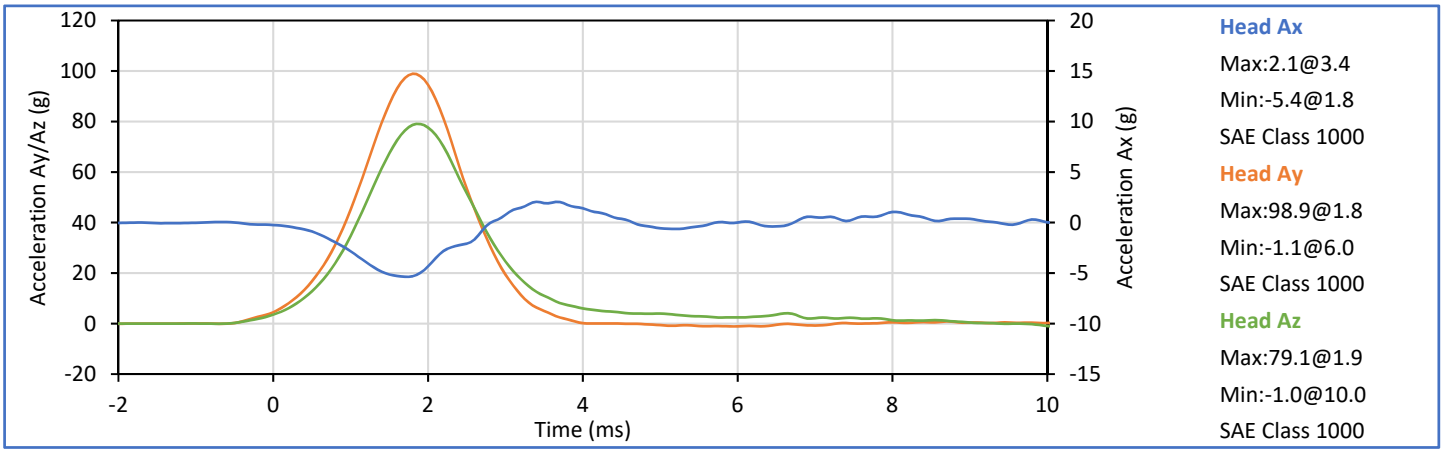
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299 Test Date: 2020-05-18

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	45	Pass
Peak Resultant Acceleration	g	115.0	137.0	126.7	Pass
Peak Head Ax	g	-15.0	15.0	-5.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

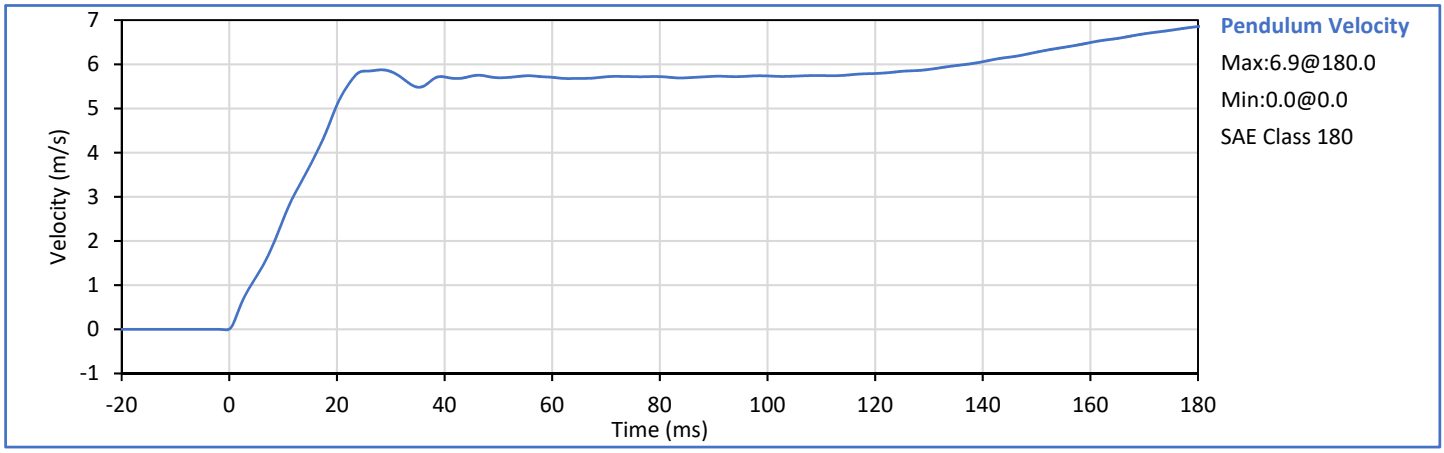
Approved By: P. Puzzuto

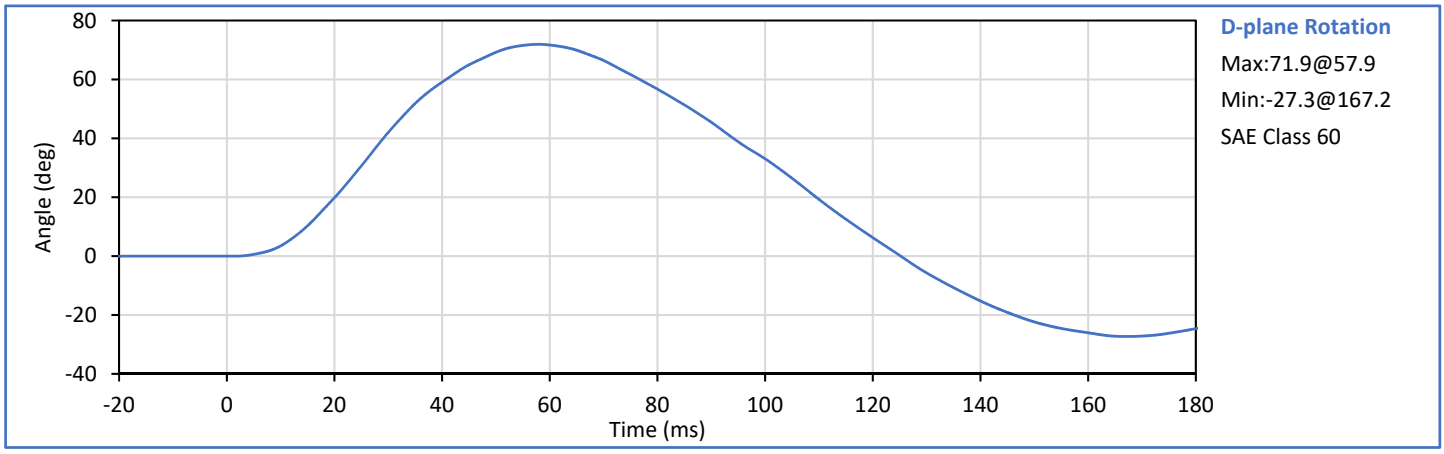
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2020-05-19

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
Pendulum Velocity	m/s	5.51	5.63	5.62	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.48	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.71	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.08	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.85	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.87	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	71.9	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	57.9	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-40.5	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	106.2	Pass
			Overall Test Results		Pass





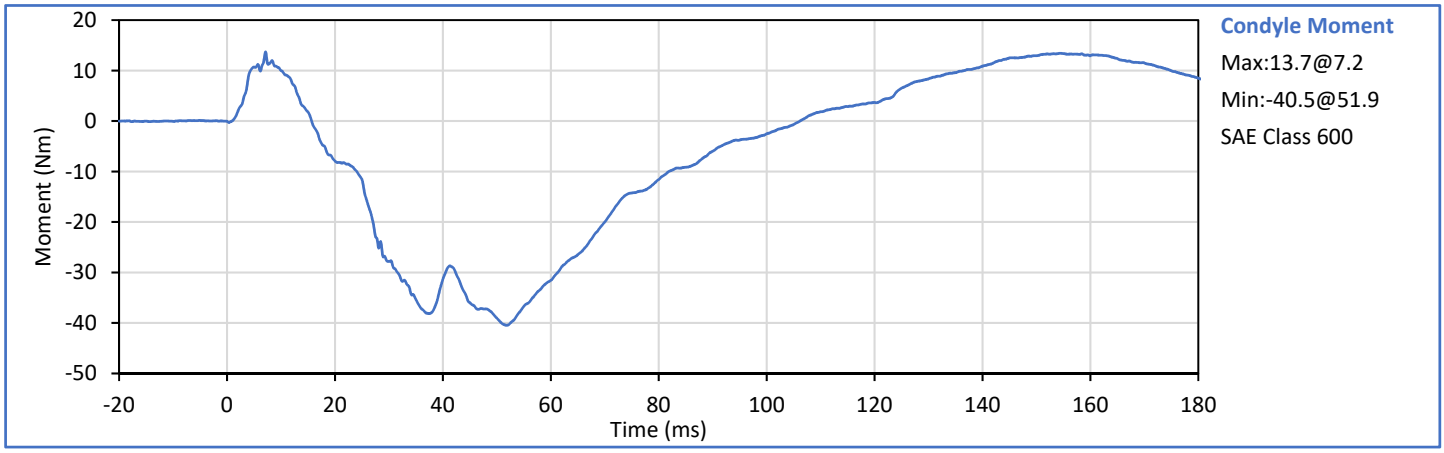
Technician: J. Hernandez

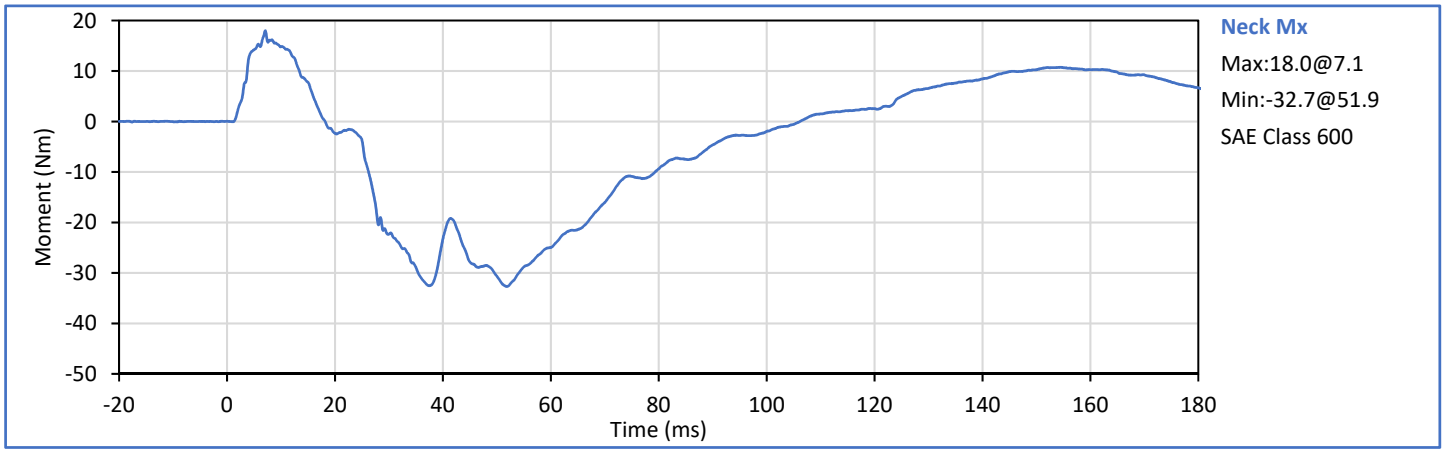
Approved By: P. Puzzuto

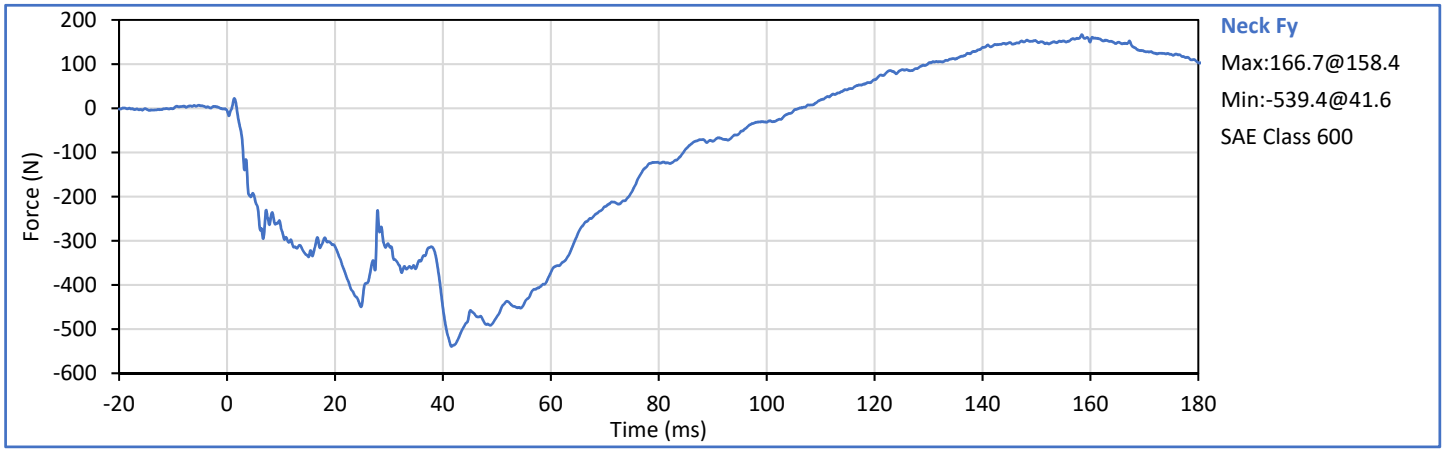
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299 Test Date: 2020-05-19





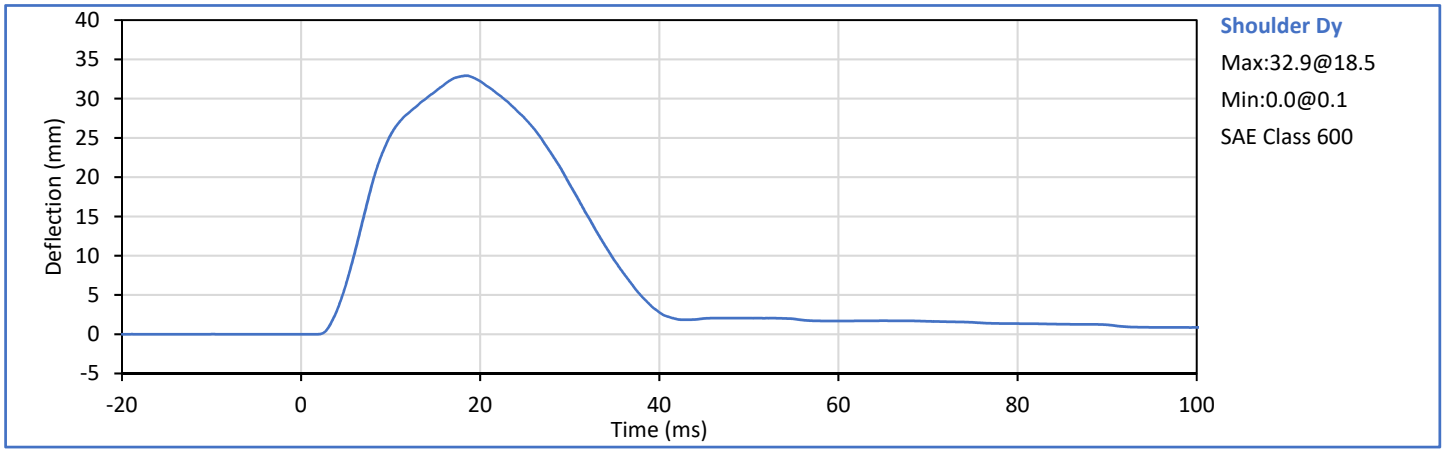


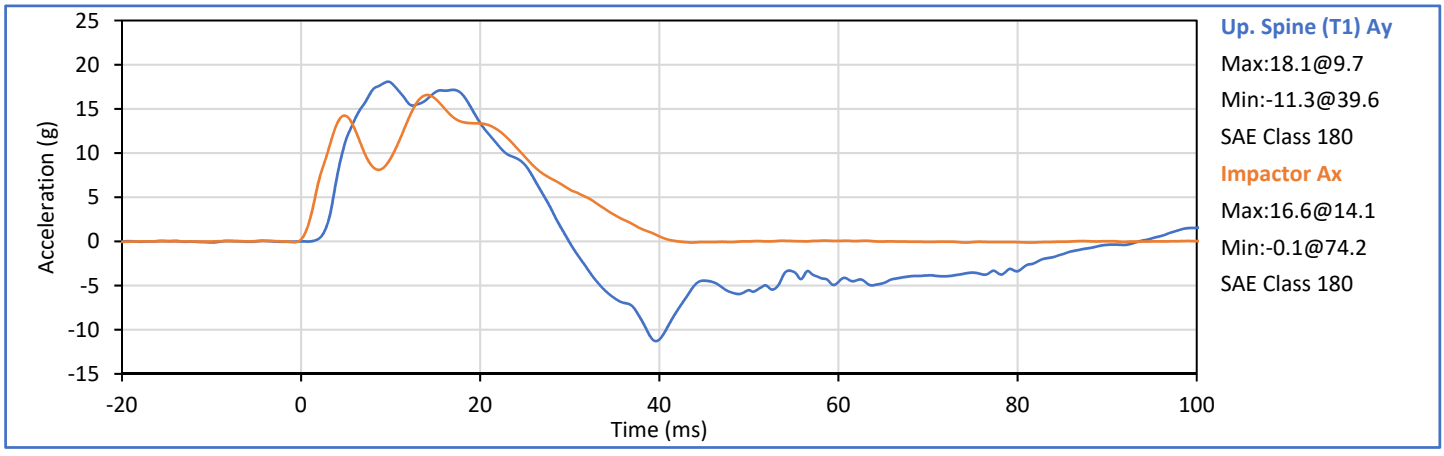
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299 Test Date: 2020-05-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.9	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.1	Pass
Peak Impactor Ax	g	13.0	18.0	16.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

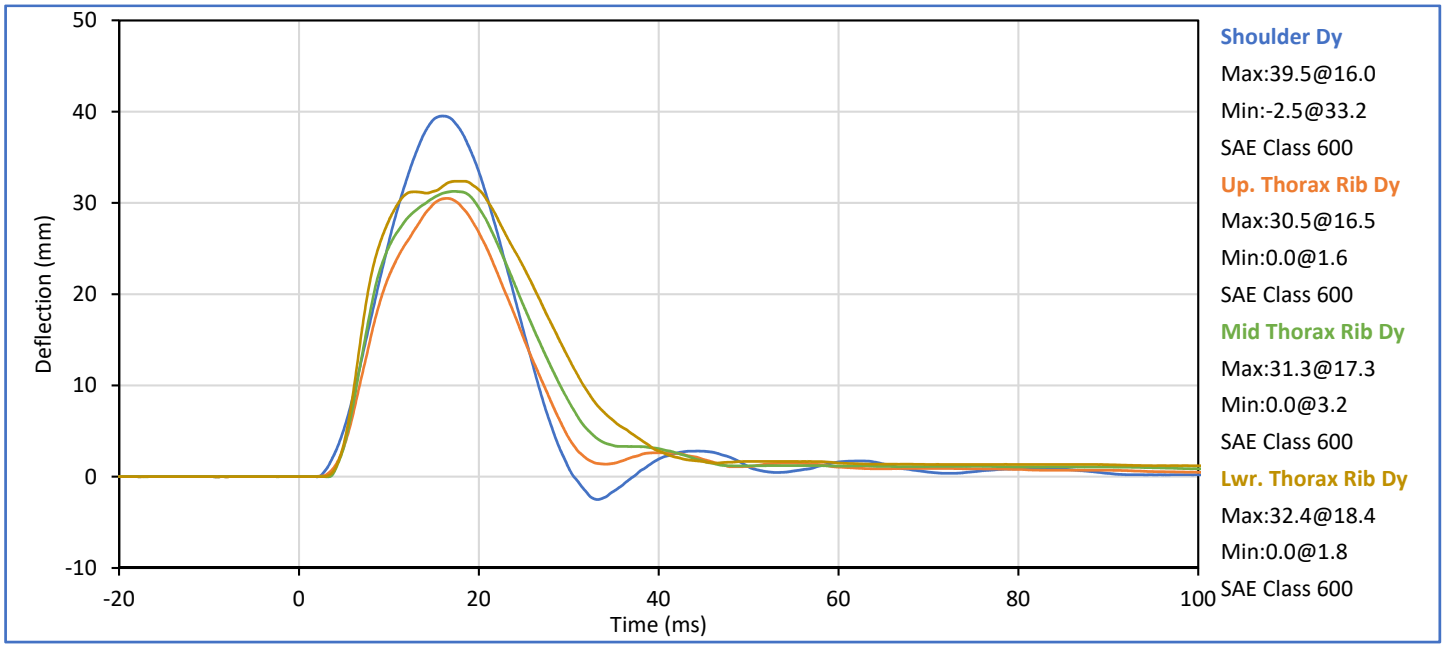
Approved By: P. Puzzuto

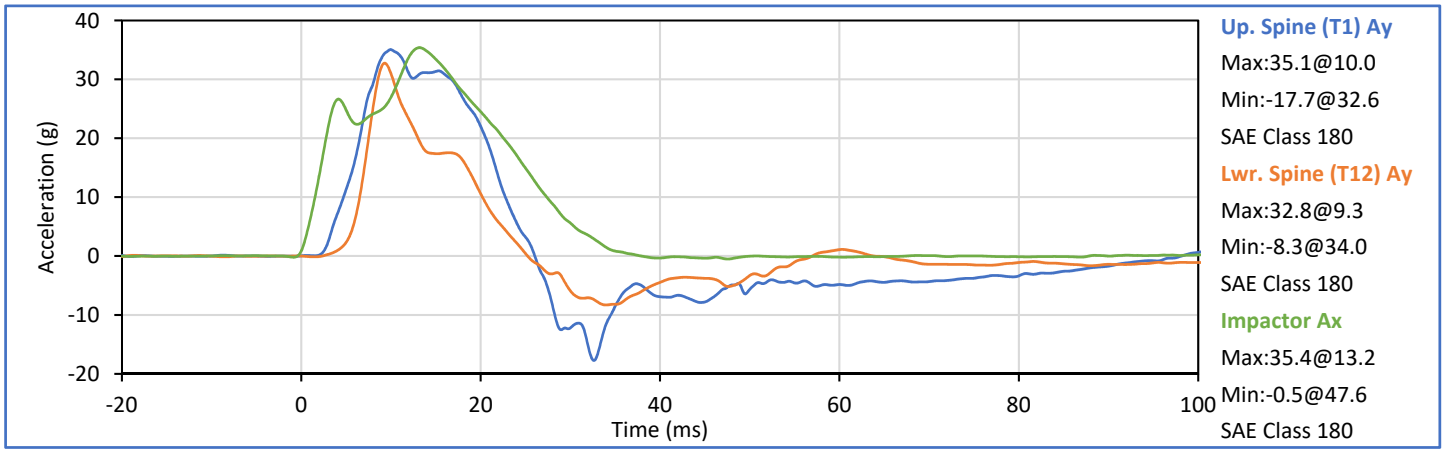
Applus IDIADA KARCO

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

ATD Serial No.: 299 Test Date: 2020-05-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Impactor Velocity	m/s	6.60	6.80	6.65	Pass
Peak Shoulder Dy	mm	31.0	40.0	39.5	Pass
Peak Upper Rib Dy	mm	25.0	32.0	30.5	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.3	Pass
Peak Lower Rib Dy	mm	32.0	38.0	32.4	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	35.1	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.8	Pass
Peak Impactor Ax	g	30.0	36.0	35.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

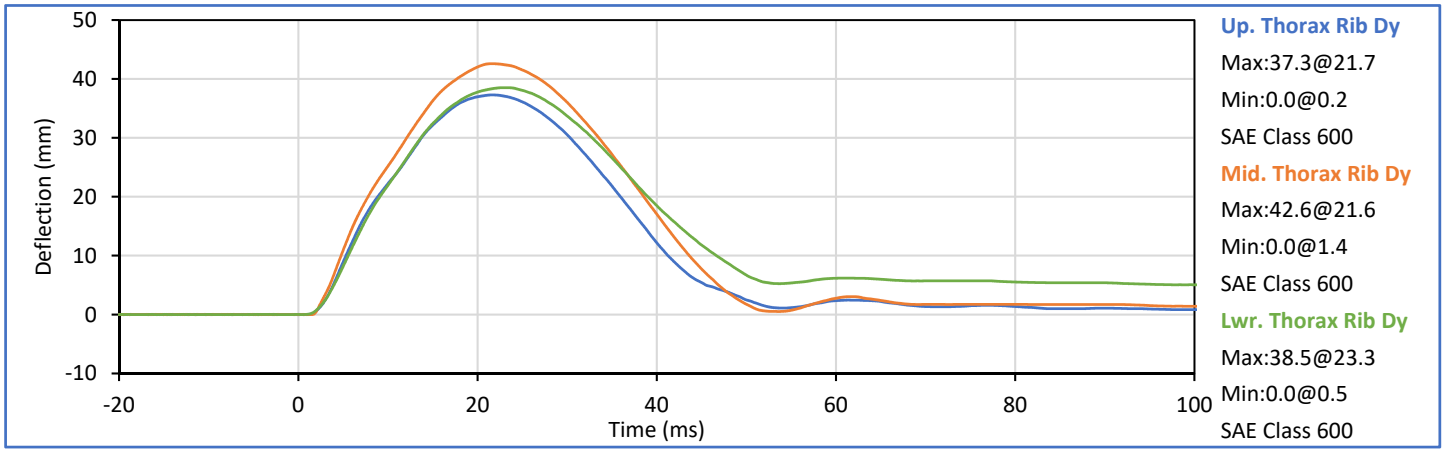
Approved By: P. Puzzuto

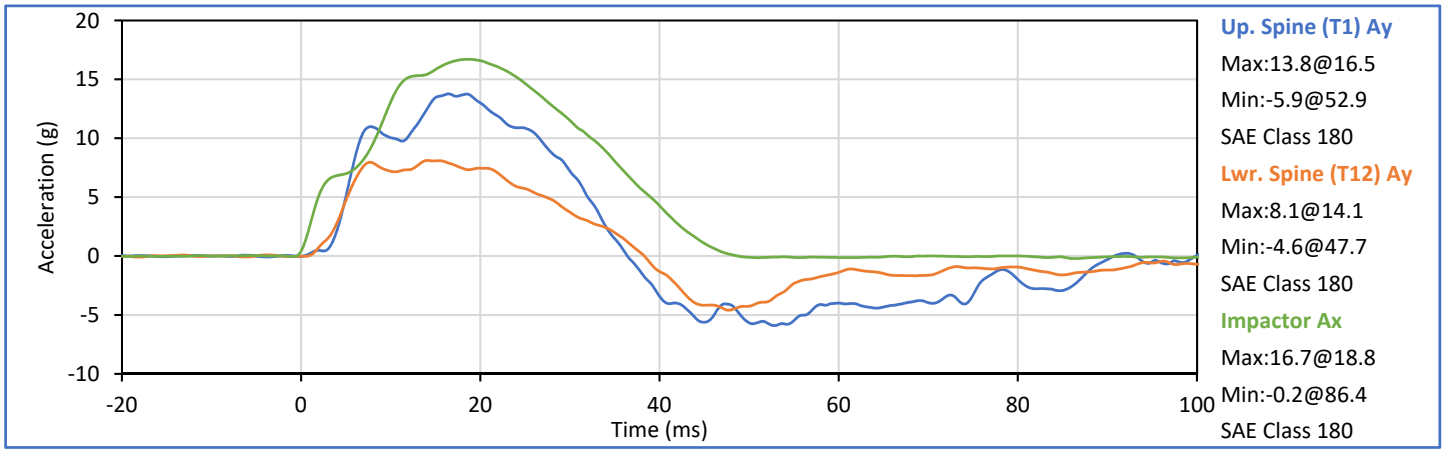
Applus IDIADA
KARCO

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

ATD Serial No.: 299 Test Date: 2020-05-19

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
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Rib Dy	mm	32.0	40.0	37.3	Pass
Peak Middle Rib Dy	mm	39.0	45.0	42.6	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.5	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.8	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	8.1	Pass
Peak Impactor Ax	g	14.0	18.0	16.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

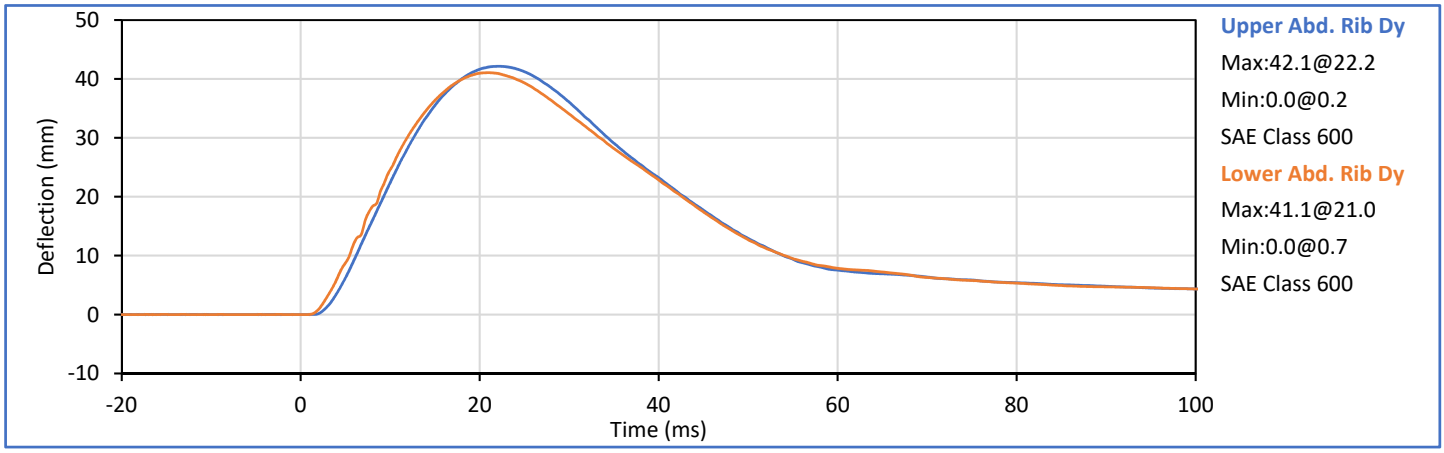
Approved By: P. Puzzuto

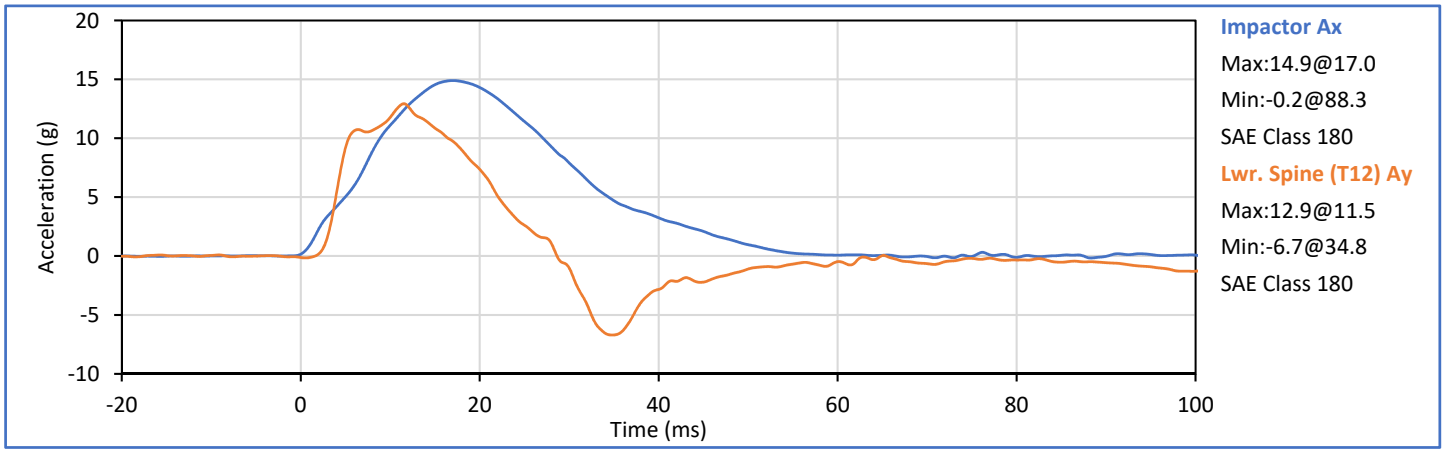
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299 Test Date: 2020-05-19

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	4.33	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.1	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.1	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	12.9	Pass
Peak Impactor Ax	g	12.0	16.0	14.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

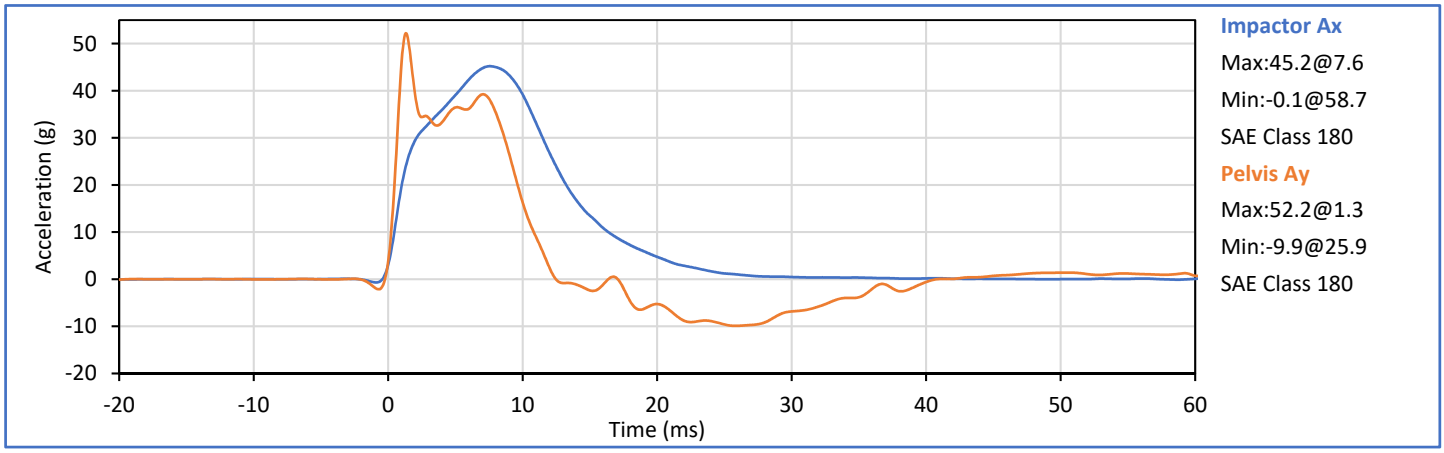
Applus IDIADA KARCO

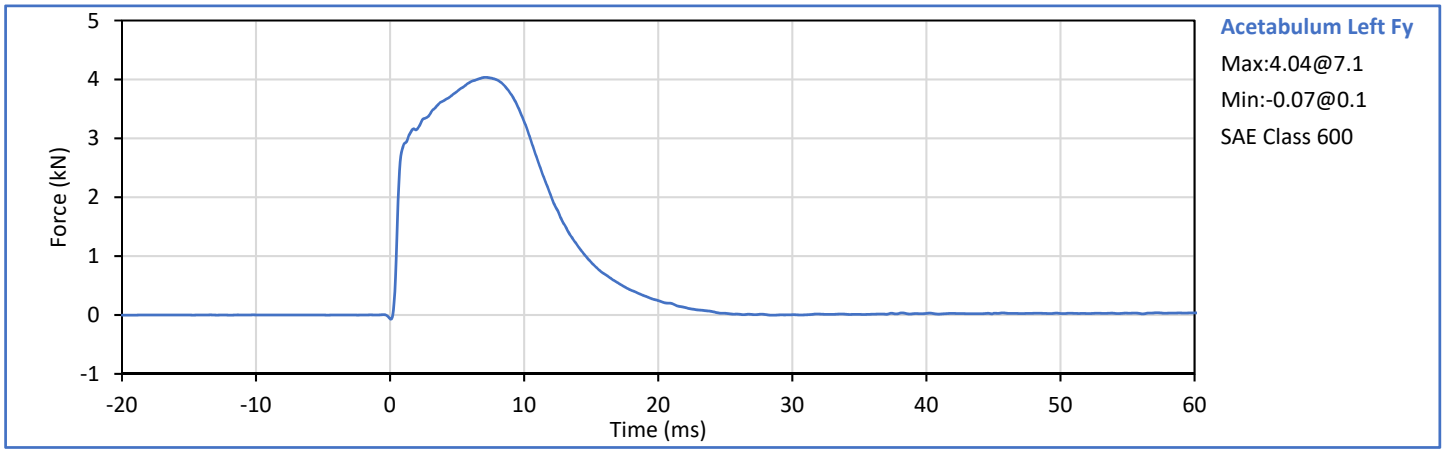
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299 Test Date: 2020-05-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.04	Pass
Pelvis Ay after 6ms	g	34.0	42.0	39.2	Pass
Peak Impactor Ax	g	38.0	47.0	45.2	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 13409





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 299 Test Date: 2020-05-19

Pelvis Plug S/N: 13409

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13409
Test Number 11051
Report Number 11089
Test Date 9/20/2019 7:17:30 AM

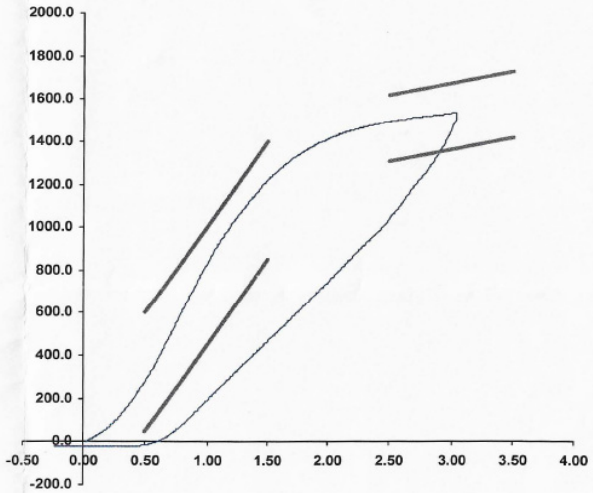
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	283.31	50.00	600.00
Force @ 1.5 mm (N)	1,224.73	850.00	1,400.00
Force @ 2.5 mm (N)	1,494.75	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,536.65	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 20-Sep-19
SACO Research

By : DC Date : 9/20/2019

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

Applus IDIADA KARCO

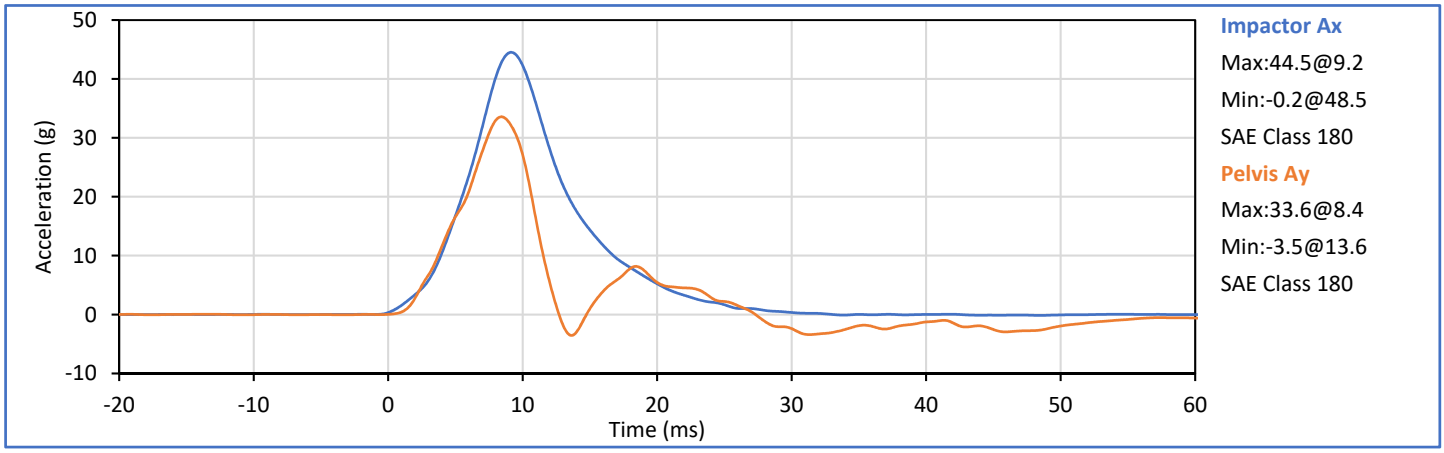
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

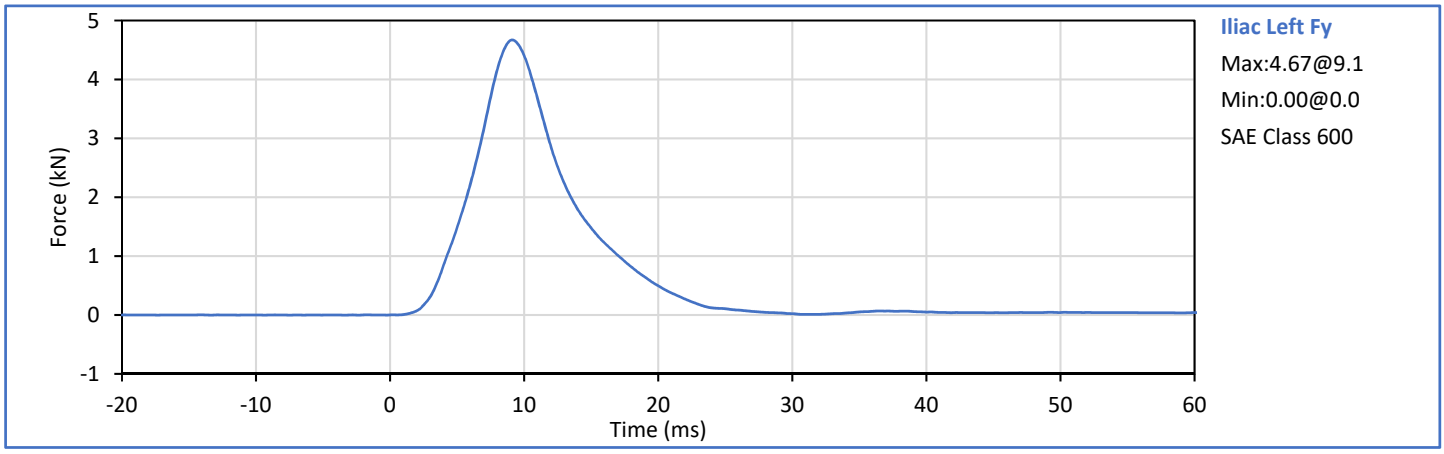
ATD Serial No.: 299 Test Date: 2020-05-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	31	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.67	Pass
Pelvis Ay after 6ms	g	28.0	39.0	33.6	Pass
Peak Impactor Ax	g	36.0	45.0	44.5	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 *

* 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: F035

Table 1 - Driver ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58760	Endevco	7264C-2k	2019-12-18
Head Acceleration Y Primary	P58763	Endevco	7264C-2k	2019-12-18
Head Acceleration Z Primary	P52093	Endevco	7264C-2k	2019-12-18
Head Acceleration X Redundant	P52072	Endevco	7264C-2k	2019-12-18
Head Acceleration Y Redundant	P58768	Endevco	7264C-2k	2019-12-18
Head Acceleration Z Redundant	P52074	Endevco	7264C-2k	2019-12-18
Upper Thorax Rib Deflection Y	180 (ES-2 Rib)	Honeywell	F38000203	2019-11-04
Middle Thorax Rib Deflection Y	177 (ES-2 Rib)	Honeywell	F38000203	2019-11-04
Lower Thorax Rib Deflection Y	186 (ES-2 Rib)	Honeywell	F38000203	2019-11-04
Anterior Abdominal Force Y	1514 Fy	R.A. Denton	2631J	2020-01-07
Middle Abdominal Force Y	1510 Fy	R.A. Denton	2631J	2020-01-07
Posterior Abdominal Force Y	1515 Fy	R.A. Denton	2631J	2020-01-07
Lower Spine T12 Acceleration X	P63850	Endevco	7264C-2KTZ	2020-01-07
Lower Spine T12 Acceleration Y	P51278	Endevco	7264C-2KTZ	2020-01-07
Lower Spine T12 Acceleration Z	P51696	Endevco	7264C-2KTZ	2020-01-07
Pubic Symphysis Force Y	506 Fy	R.A. Denton	3096JFL	2020-01-06

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	2019-12-30
Head Acceleration Y Primary	P50086	Endevco	7264C-2k	2019-12-30
Head Acceleration Z Primary	P51931	Endevco	7264C-2k	2019-12-30
Head Acceleration X Redundant	P68604	Endevco	7264C-2k	2019-12-30
Head Acceleration Y Redundant	P51934	Endevco	7264C-2k	2019-12-30
Head Acceleration Z Redundant	P58736	Endevco	7264C-2k	2019-12-30
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	2019-12-30
Middle Thorax Rib Deflection Y	1075	Servo	08TCI-3725	2019-12-30
Lower Thorax Rib Deflection Y	1213	Servo	08TCI-3725	2019-12-30
Upper Abdomen Rib Deflection Y	1218	Servo	08TCI-3725	2019-12-30
Lower Abdomen Rib Deflection Y	1177	Servo	08TCI-3725	2019-12-31
Lower Spine T12 Acceleration X	P58761	Endevco	7264C-2k	2019-12-30
Lower Spine T12 Acceleration Y	P50077	Endevco	7264C-2k	2019-12-30
Lower Spine T12 Acceleration Z	P58795	Endevco	7264C-2k	2019-12-30
Iliac Wing Impact Side Force Y	284 Fy (Iliac)	R.A. Denton	3228J	2020-01-16
Acetabulum Impact Side Force Y	272 Fy (Acetabulum)	R.A. Denton	3249J	2020-01-16

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	A254915	MSI	52F-2000	2019-11-27
Vehicle CG Ay	10873	Endevco	757F-2k	2019-12-17
Vehicle CG Az	10856	Endevco	757F-2k	2019-12-17
Right Side Sill at Front Seat Ax	A273456	MSI	52F-2000	2019-12-17
Right Side Sill at Front Seat Ay	11178	Endevco	757F-2k	2019-12-17
Right Side Sill at Front Seat Az	10866	Endevco	757F-2k	2019-12-17
Right Side Sill at Rear Seat Ax	A273392	MSI	52F-2000	2019-12-13
Right Side Sill at Rear Seat Ay	10890	Endevco	757F-2k	2019-12-17
Right Side Sill at Rear Seat Az	A273033	MSI	52F-2000	2019-12-13
Left Side Sill at Front Seat Ay	A267247	MSI	52F-2000	2019-12-04
Left Side Sill at Rear Seat Ay	A266328	MSI	52F-2000	2019-12-09
Left Lower A-Pillar Ay	A273421	MSI	52F-2000	2019-12-13
Left Middle A-Pillar Ay	10897	Endevco	757F-2k	2019-12-17
Left Lower B-Pillar Ay	A273455	MSI	52F-2000	2019-11-27
Left Middle B-Pillar Ay	10834	Endevco	757F-2k	2019-12-17
Driver Seat Track at H-Point Ay	A265883	MSI	52F-2000	2019-12-02
Rear Seat Structure Ay	A273415	MSI	52F-2000	2019-12-04
Right Rear Occupant Comp. Ay	A273022	MSI	52F-2000	2019-12-02
Engine Block Top Ax	10250	Endevco	757F-2k	2019-12-13
Engine Block Top Ay	A265849	MSI	52F-2000	2019-12-12
Rear Floopan Above Axle Ax	A273384	MSI	52F-2000	2019-12-02
Rear Floopan Above Axle Ay	10247	Endevco	757F-2k	2019-12-16
Rear Floopan Above Axle Az	A248863	MSI	52F-2000	2019-12-04

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
MDB CG Ax	A265905	MSI	52F-2000	2019-12-09
MDB CG Ay	A254840	MSI	52F-2000	2019-12-09
MDB CG Az	A265892	MSI	52F-2000	2019-12-09
MDB Left Side at Rear Axle Ax	A273028	MSI	52F-2000	2019-11-25
MDB Left Side at Rear Axle Ay	A273442	MSI	52F-2000	2019-11-25