REPORT NUMBER: SideNCAPMDB-KAR-21-002

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

MERCEDES-BENZ U.S. INTERNATIONAL INC.

2021 MERCEDES-BENZ GLE350 5-DOOR SUV

NHTSA No: M20214309

PREPARED BY:

APPLUS+ IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

FEBRUARY 9, 2021

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF CRASHWORTHINESS STANDARDS

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Approval Date: February 9, 2021

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date: _____

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16. Abstract

A 61.9 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2021 Mercedes-Benz GLE350 5-Door SUV 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 January 26, 2021.

The impact velocity of the Moving Deformable Barrier was 61.83 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 6.1°C. The target vehicle's maximum post-test static crush was 191 mm located at level 2. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	40.0
Maximum Thoracic Rib Deflection	mm	44	17
Total Abdominal Force	N	2500	671
Pubic Symphysis Force	N	6000	1276

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	102.9
Resultant Lower Spine Acceleration	g	82	40
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	3013
Maximum Thoracic Rib Deflection	mm	38*	3
Maximum Abdominal Rib Deflection	mm	45*	3

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
New Car Assessment Program (NCAP)
Side Impact
Moving Deformable Barrier (MDB)
ES-2re
SID-IIs

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**Proposed IARV*

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SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2021 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 2021 Mercedes-Benz GLE350 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated March 2020.

SECTION 2
SUMMARY OF TEST RESULTS

A 2021 Mercedes-Benz GLE350 5-Door SUV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.83 km/h (38.41 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 January 26, 2021. Pre- and post-test photographs of the test vehicle, the MDB and the dummy (ES-2re and SID-IIs) are included in Appendix A of this report.

The dummies were placed in the driver and left rear designated seating position according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated March 2020. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib and lower rib y-axis displacement potentiometers
Abdomen forward, middle, and rear y-axis load cells
Lower spine (12) tri-axial accelerometers
Pubic symphysis y-axis load cell

PASSENGER ATD (SID-IIs)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib and lower rib y-axis displacement potentiometers
Abdomen upper rib and lower rib y-axis displacement potentiometers
Lower spine (12) tri-axial accelerometers
Acetabulum and iliac wing y-axis load cells

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

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	40.0
Maximum Thoracic Rib Deflection	mm	44	17
Combined Abdominal Force	N	2500	671
Pubic Symphysis Force	N	6000	1276

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	102.9
Lower Spine (T12) Resultant Acceleration	g	82	40
Total Pelvic Force (sum of acetabular and iliac forces	N	5525	3013
Maximum Thoracic Rib Deflection	mm	38*	3
Maximum Abdominal Rib Deflection	mm	45*	3

**Proposed IARV*

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis)	Yes	Yes		
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

GENERAL COMMENTS:

- PASSENGER HEAD AZ, Questionable data from 180-240ms
- PASSENGER HEAD AZ redundant, Questionable data from 195-208ms
- LEFT LOWER A-POST AY, Channel Failed at 17.0ms.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

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	°F	°C	=(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: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20214309
Model Year	2021
Make	Mercedes-Benz
Model	GLE350
Body Style	5-Door SUV
VIN	4JGFB4JB3MA327449
Body Color	Silver Metallic
Odometer Reading (km / mi)	9 / 5
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4-Cylinder
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	9
Overdrive	Yes
Final Drive	RWD
Roof Rack	Yes
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Mercedes-Benz U.S. International Inc.
Date of Manufacture	20-Oct
Vehicle Type	SUV

GVWR (kg)	2570
GAWR Front (kg)	1300
GAWR Rear (kg)	1500

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				432.0	*A*
DSC x 68.04 (kg)				340.2	*B*
Cargo Weight (RCLW) (kg)				91.8	*A-B**

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

VEHICLE SEAT TYPE

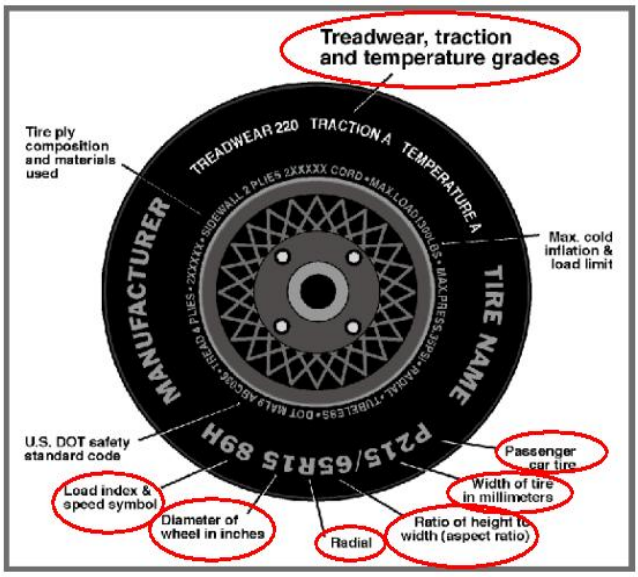
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable w/ Lever	Adjustable w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat			Yes		Yes		
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	340	340
Cold Pressure (kPa)	270	300
Recommended Tire Size	P255/50 R19	P255/50 R19
Tire Size on Vehicle	P255/50 R19	P255/50 R19
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Scorpion Zero	Scorpion Zero
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	2 Rayon, 2 Steel, 1 Polyamide	2 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	107 H	107 H
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	UN64 WII5 2819	UN64 WII5 2819
DOT Safety Code Right	UN64 WII5 2819	UN64 WII5 2819

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	270	270	300	300
Tire Placard	kPa	270	270	300	300
Owner's Manual	kPa	270	270	300	300
As Tested	kPa	270	270	300	300

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	200	200	200	200

TEST VEHICLE AXLE WEIGHTS

		As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
	Units	Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	540.0	538.5		600.0	603.0		600.0	607.0	
Right	kg	541.0	503.0		541.0	589.0		546.0	588.0	
Ratio	%	50.9%	49.1%		48.9%	51.1%		49.0%	51.0%	
Total	kg	1081.0	1041.5	2122.5	1141.0	1192.0	2333.0	1146.0	1195.0	2341.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2122.5	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	91.8	C
Calculated Vehicle Target Wt (TVTW)	kg	2339.3	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	840	838	Yes
RF	mm	851	844	Yes
LR	mm	835	826	Yes
RR	mm	841	832	Yes
Vehicle CG (Aft of Front Axle)	mm	1526	1527	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	27	27	

***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: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

Test Height Adjustable Setting (If Applicable)	

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire	14.0
Trunk Trim	2.0
Spare Tire Tools	6.0

TEST SURFACE MARKINGS

	Distance from 63° Impact Angle Line (mm)
Fore 25 mm target	0
Aft 25 mm target	0
Pre-Impact Angle Line	63°

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	1355	689
C	1355	3756
D	0	3059

DATA SHEET NO. 2

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

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

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	8.0	0.0	4.0
Front Passenger Seat	7.8	0.0	3.9
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	4.0	295	Max	353	360	372
			Mid	320.5	327.5	345
			Min	288	295	318
Front Passenger Seat	3.9	288	Max	350	358	370
			Mid	312.5	323	336
			Min	275	288	302
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: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

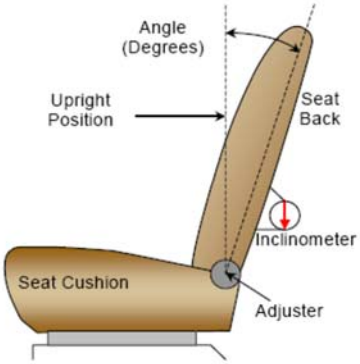
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	235		117.5	
Front Passenger Seat	262		117.5	
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 with a flat edge along the seat back.



FRONT SEAT ASSEMBLY

SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/ Seated Dummy	74.5		21.0	
Front Passenger Seat	78.8		21.0	
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: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

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

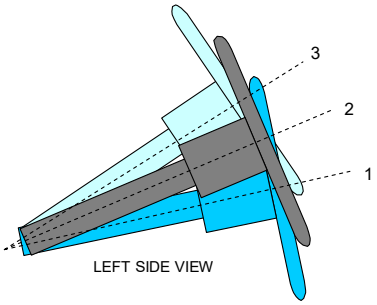
HEAD RESTRAINT ADJUSTMENT

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	Power Control	H
Rear Seat	4	L

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.4	100
Geometric Center Position, No. 2	22.8	128
Uppermost Position, No. 3	25.1	155
Telescoping Steering Wheel Travel		55
Test Position	22.8	128

DATA SHEET NO. 2 … (CONTINUED)

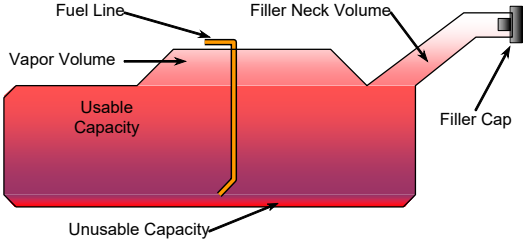
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

FUEL PUMP

The vehicle is equipped with an electric fuel pump. The pump will work at “ignition on” until pressure in the system has reached working pressure in the system; then it will stop pumping fuel until the engine has been started.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	85.17
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	85.17
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	79.23
Actual amount of Solvent Used in Test	79.23
1/3 of Usable Capacity	28.39

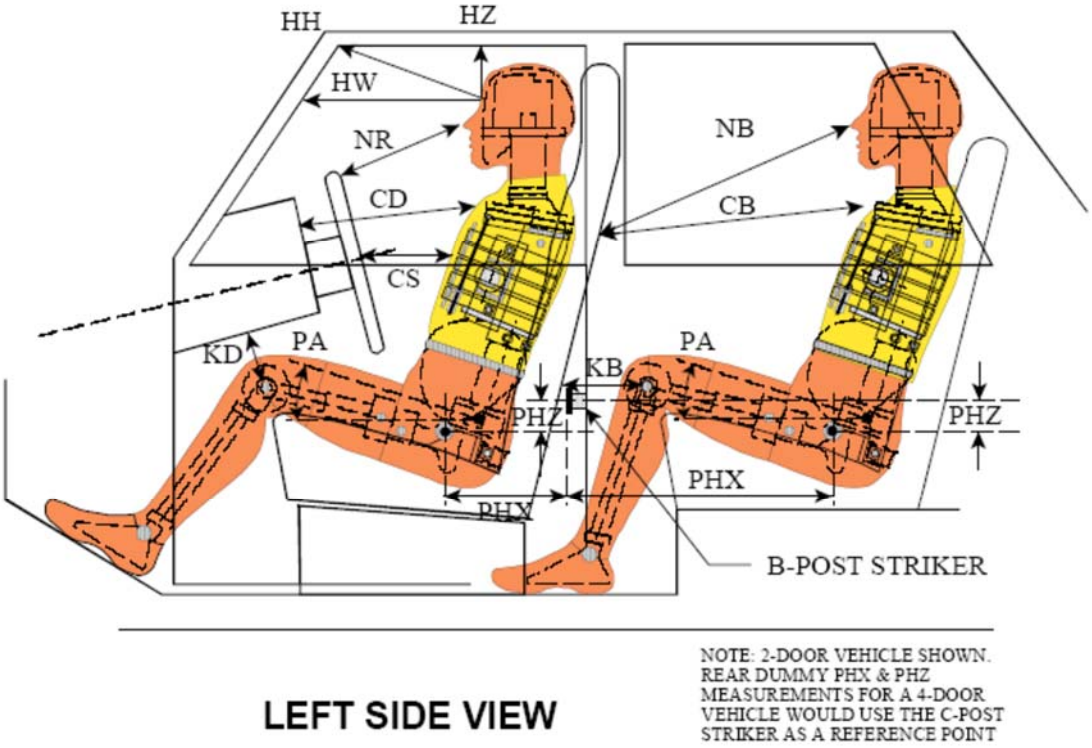
Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

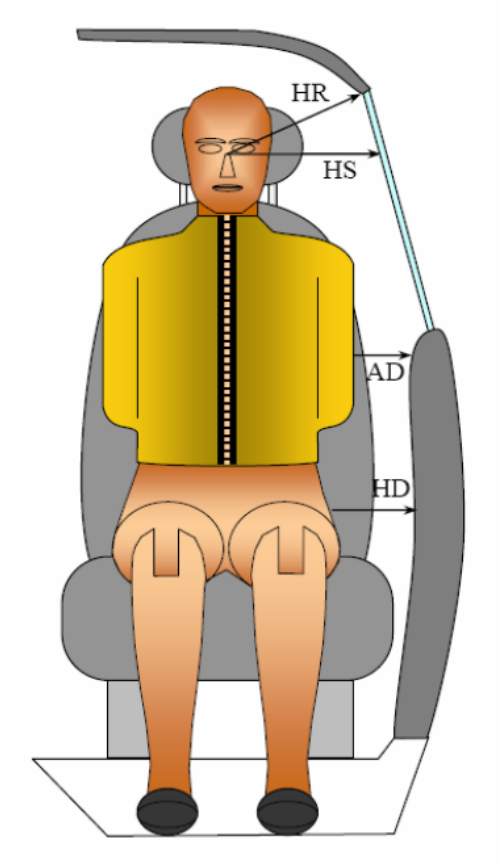
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (º)	Length (mm)	Angle (º)
HH		Head to Header	500			
HW		Head to Windshield	738			
HZ	HZ	Head to Roof	202		313	
NR	NB	Nose to Rim/Seat Back	502		585	
CD	CB	Chest to Dash/Seat Back	721		575	
CS		Chest to Steering Wheel	349			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	191	39.3	355	15.5
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	178	29.8	348	17.9
PAX°	PAX°	Pelvic Tilt Angle X		18.2		26.9
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (x-axis)	138		167	
PHZ	PHZ	Hip Point to Striker (z-axis)	161		176	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

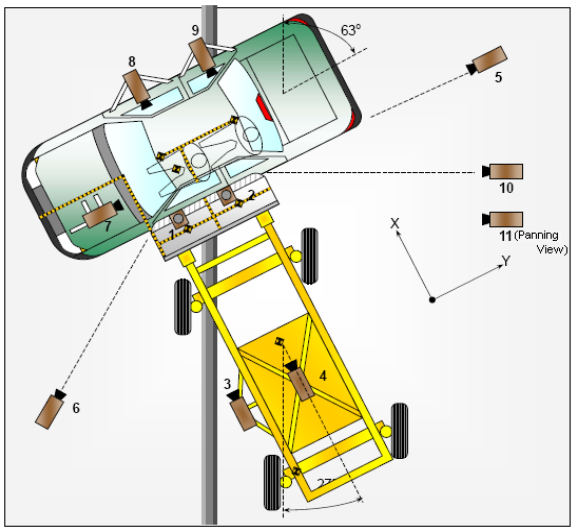
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	222	298
HS	Head to Side Window	mm	353	379
AD	Arm to Door	mm	98	151
HD	H-Point to Door	mm	147	187

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



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)	-1005	451	1544	8	1000
8	Driver Side (On-Board)	-1948	-844	1254	6	1000
9	Passenger Side (On-Board)	-3254	-802	1301	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

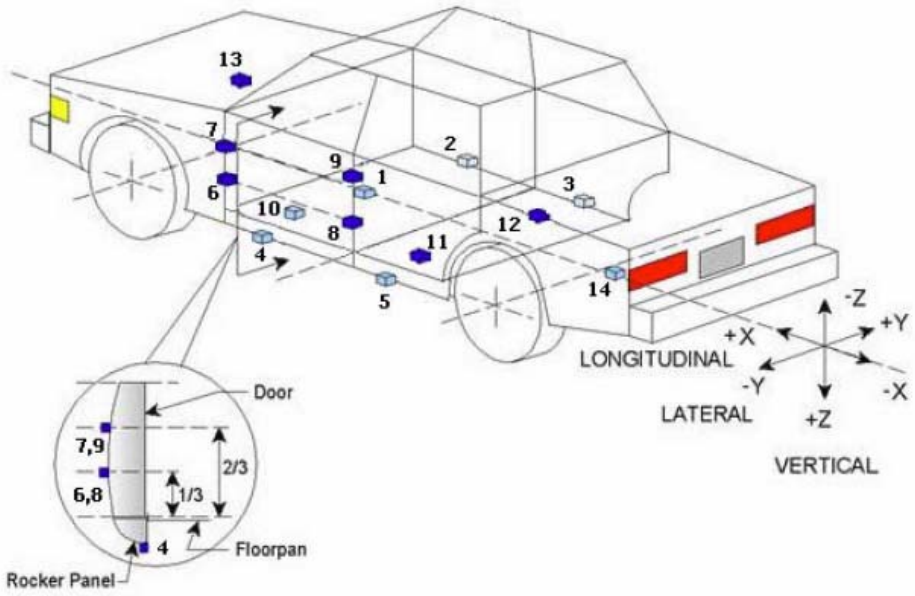
Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Channels	5
Total	63

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	760	0	460
2	Right Sill at Front Seat	1130	370	170
3	Right Sill at Rear Seat	1140	380	170
4	Left Sill at Front Door	1370	420	170
5	Left Sill at Rear Door	530	430	170
6	A-Pillar Lower	1380	770	440
7	A-Pillar Middle	1390	770	180
8	B-Pillar Lower	910	610	190
9	B-Pillar Middle	920	610	450
10	Front Seat Track	1190	220	160
11	Rear Seat Structure	710	110	140
12	Right Rear Occupant Compartment	610	100	220
13	Engine Block	1650	0	440
14	Rear Floorpan Above Axle	110	0	330

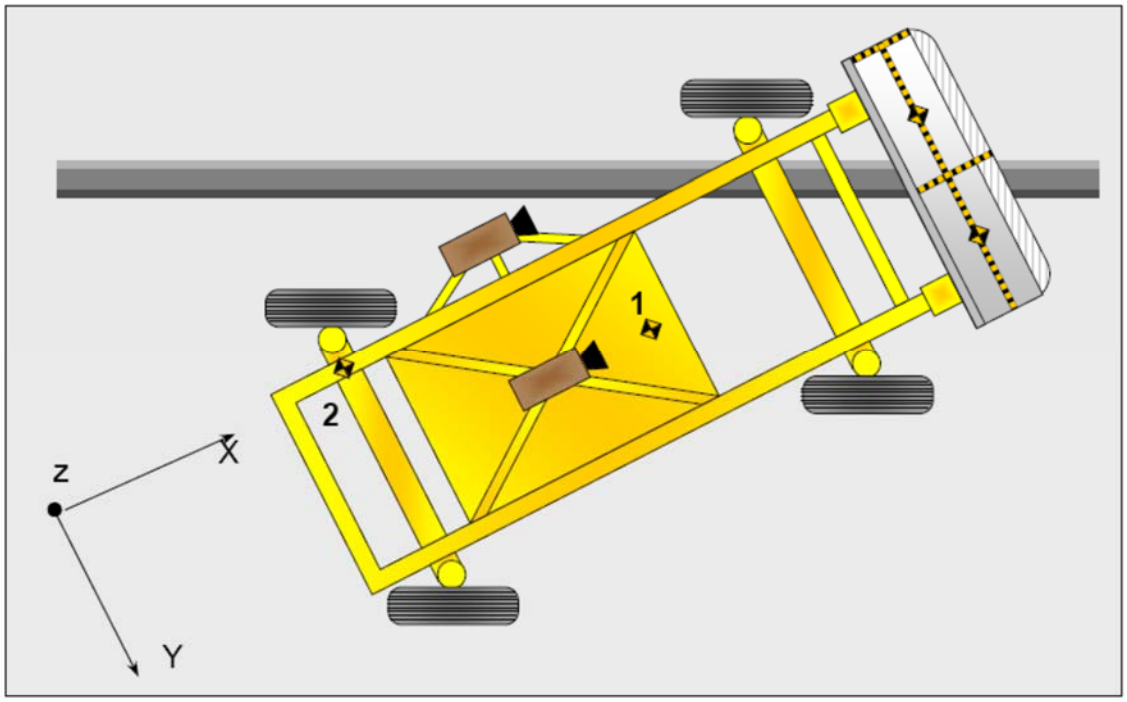
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



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: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag, Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, Seat Back
Left Shoulder	Torso-Pelvis Airbag, Door Panel	Door Panel
Upper Torso	Seat Back, Torso-Pelvis	Seat Back, Door Panel
Lower Torso	Seat Back, Torso-Pelvis	Seat Back, Door Panel
Left Hip	Door Panel	Door Panel, Seat
Left Knee	Door Panel	Door Panel, Seat

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: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	No separation
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

DATA SHEET NO. 8 … (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheelbase	mm		2989
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		507
Actual Impact Point (Aft of Front Axle)	mm		512
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-5
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	3

DATA SHEET NO. 9

MDB SUMMARY OF RESULTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

MDB SPECIFICATIONS

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

MDB WEIGHTS

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

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.83
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.88
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.9
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.9

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

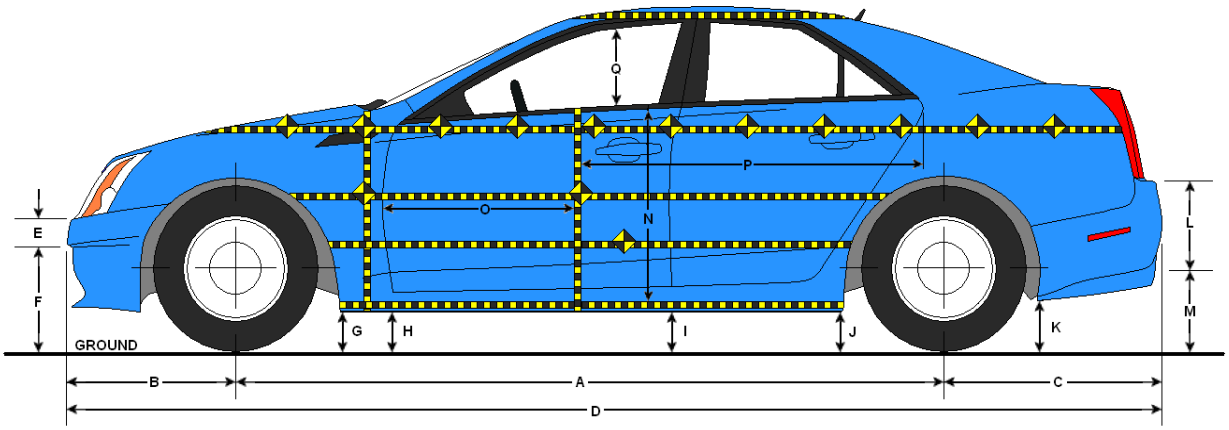
Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	294
B	Top of Bumper	533	800	Right	209
C	Mid Level	686	800	Left	194
D	Top of Stack	813	800	Left	194

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2989	2988	-1
B	Front Axle to FSOV	927	923	-4
C	Rear Axle to RSOV	1013	1014	1
D	Total Length at Centerline	4929	4925	-4
E	Front Bumper Thickness	410	411	1
F	Fromt Bumper Bottom to Ground	410	423	13
G	Sill Height at Front Wheel Well	362	374	12
H	Sill Height at Front Door Leading Edge	365	380	15
I	Sill Height at B-Pillar	385	398	13
J1	Sill Height at Rear Wheel Well	309	311	2
J2	Pinch Weld Height at Rear Wheel Well	292	293	1
K	Sill Height Aft of Rear Wheel Well	405	404	-1
L	Rear Bumper Thickness	212	213	1
M	Rear Bumper Bottom to Ground	525	526	1
N	Sill Height to Bottom of Front Window Sill	777	750	-27
O	Front Door Leading Edge to Impact CL	739	738	-1
P	Rear Door Trailing Edge to Impact CL	1550	1531	-19
Q	Front Window Opening	462	479	17
R	Right Side Length	3566	3567	1
S	Left Side Length	3565	3562	-3
T	Vehicle Width at B-Pillar	1926	1849	-77

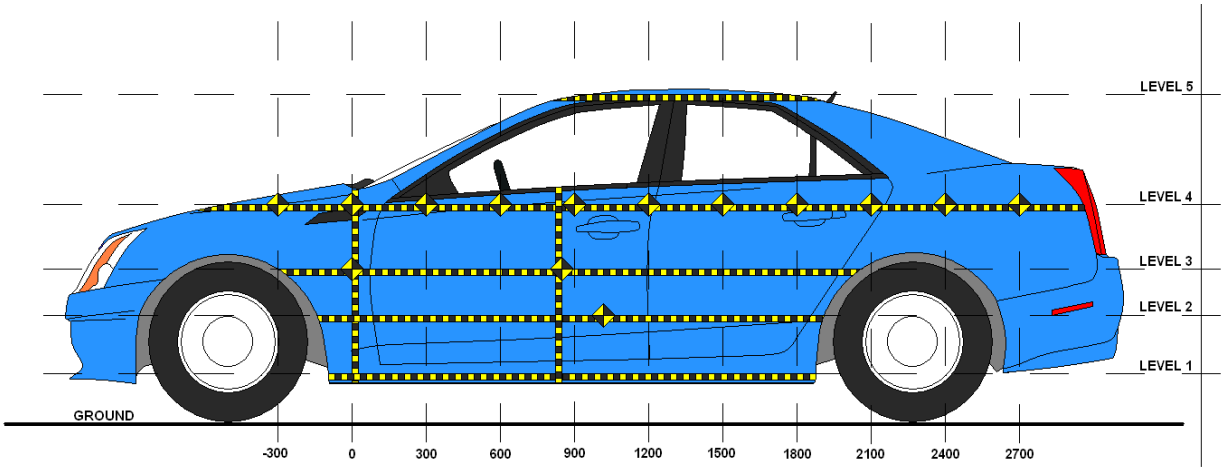
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	428	97	1650
2	Occupant H-Point	778	191	1500
3	Mid-Door	870	169	1650
4	Window Sill	1094	66	1650
5	Window Top	1733	0	1800

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

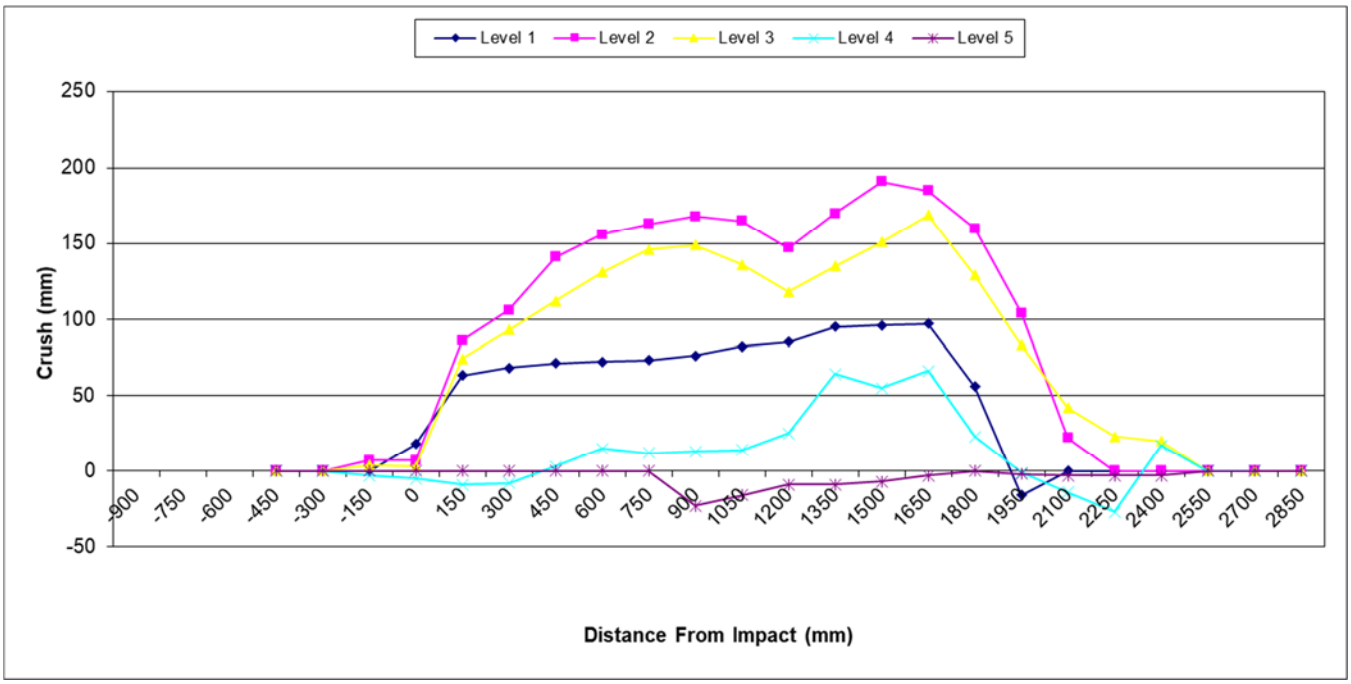
	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150		509	516	598			516	520	595			7	4	-3	
0	546	520	525	592		564	527	528	587		18	7	3	-5	
150	556	528	528	587		619	614	602	578		63	86	74	-9	
300	559	530	528	583		627	636	621	575		68	106	93	-8	
450	561	531	527	578		632	672	639	581		71	141	112	3	
600	562	531	527	575		634	687	658	590		72	156	131	15	
750	563	531	526	571		636	694	672	583		73	163	146	12	
900	563	531	526	567	830	639	699	675	580	807	76	168	149	13	-23
1050	562	532	527	581	842	644	697	663	595	826	82	165	136	14	-16
1200	561	532	529	565	848	646	679	647	590	839	85	147	118	25	-9
1350	561	533	530	566	854	656	703	665	630	845	95	170	135	64	-9
1500	560	533	532	567	858	656	724	683	622	851	96	191	151	55	-7
1650	558	533	532	567	858	655	718	701	633	855	97	185	169	66	-3
1800	554	530	530	565	858	610	690	659	588	858	56	160	129	23	0
1950	549	521	523	561	859	533	625	606	560	857	-16	104	83	-1	-2
2100		513	514	567	862		535	556	553	859		22	42	-14	-3
2250			510	549	864			533	522	861			23	-27	-3
2400			510	548	867			530	565	864			20	17	-3
2550															
2700															
2850															

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

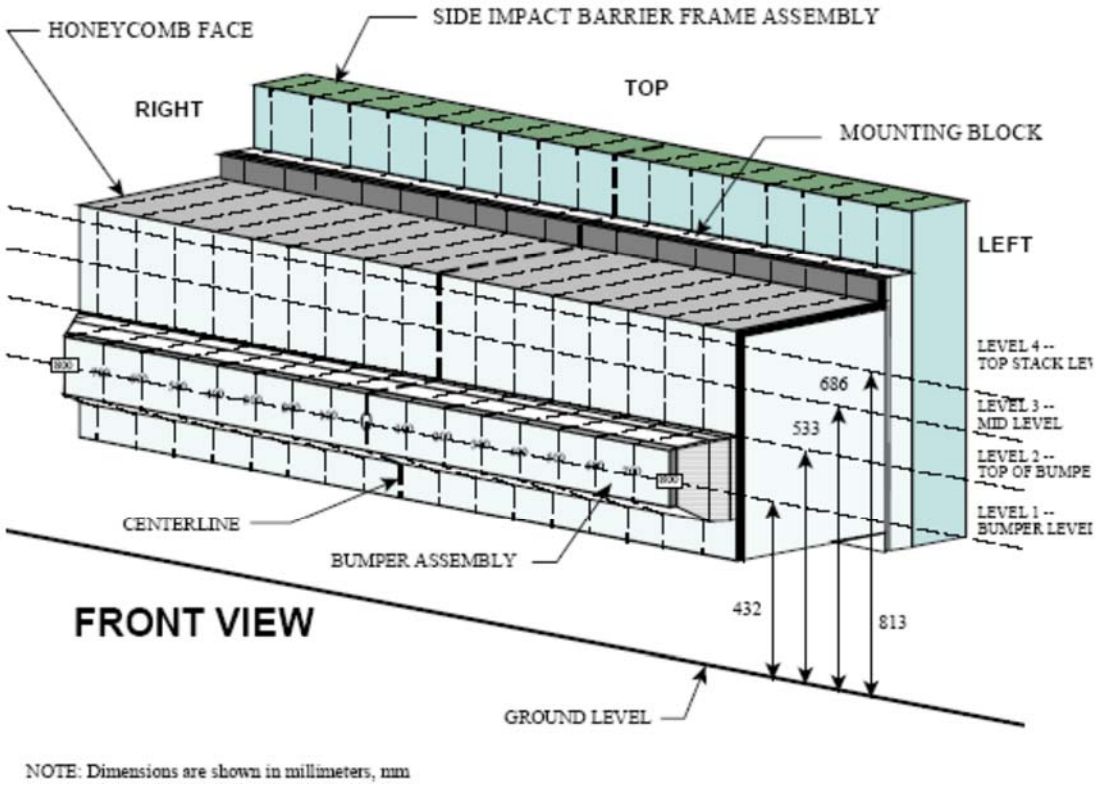


DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



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	294	271	269	266	266	263	256	256	256	249	245	251	230	223	222	246	251
2	209	207	204	201	194	189	186	184	179	176	174	177	179	181	184	184	194
3	154	139	132	134	149	187	164	136	114	121	119	116	116	116	133	149	194
4	144	117	109	114	124	129	139	111	104	101	99	96	101	111	133	159	194

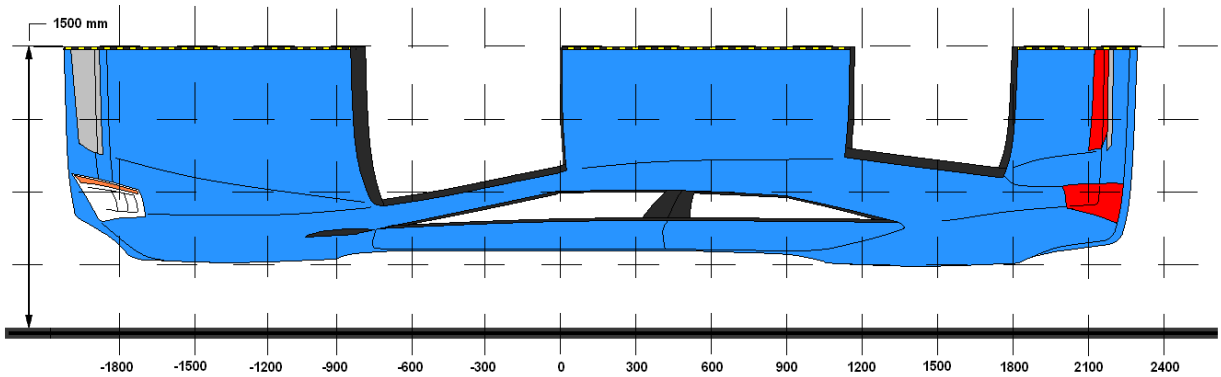
All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2400	3	510	530	20
2	1950	2	521	625	104
3	1350	2	533	703	170
4	900	2	531	699	168
5	300	2	530	636	106
6	-150	2	509	516	7

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	251
2	500	Left	1	223
3	200	Left	1	245
4	200	Right	1	256
5	500	Right	1	266
6	800	Right	1	294

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21

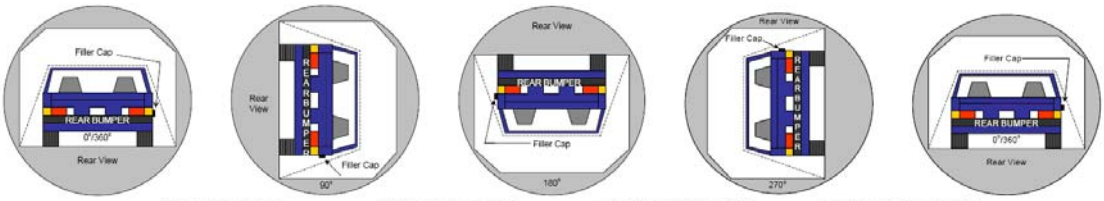
Temperature at Time of Impact: 6.1°C Test Time: 1:24 PM

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

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

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

D. Spillage Details: _____



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

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	80	300	380
90° To 180°	79	300	379
180° To 270°	81	300	381
270° To 360°	78	300	378

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

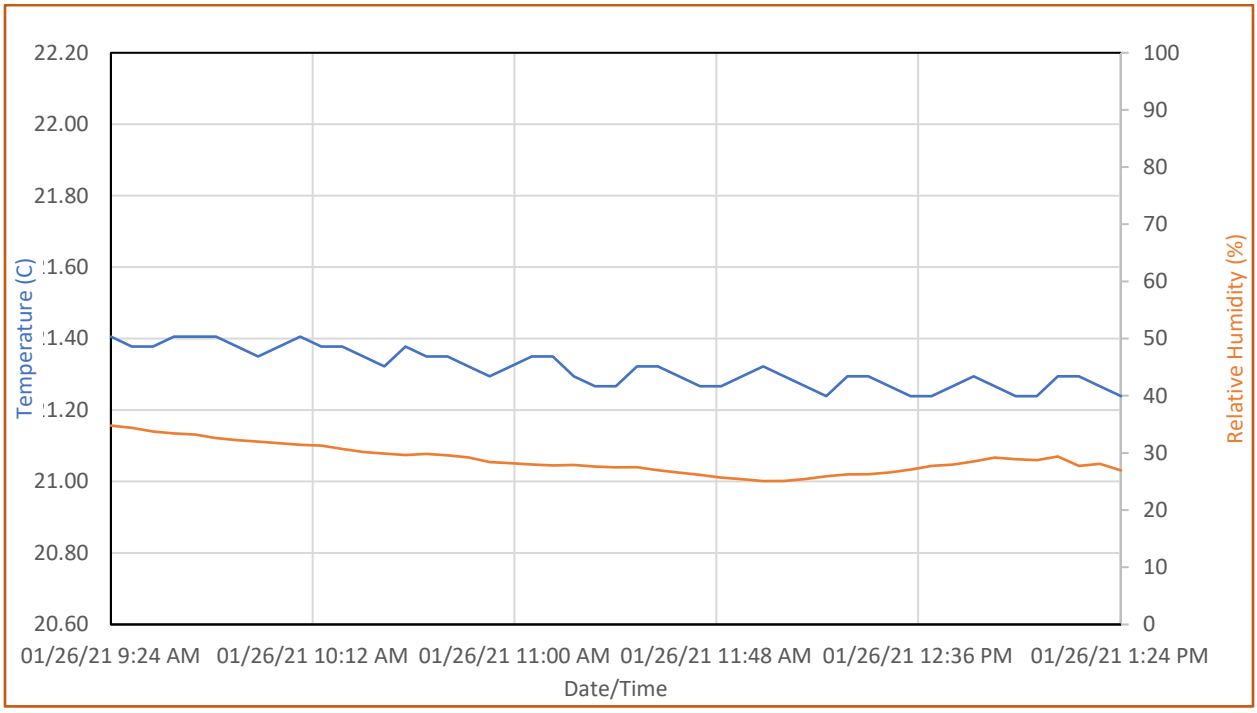
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2021 Mercedes-Benz GLE350 5-Door SUV NHTSA No. M20214309

Test Program: NCAP MDB Side Impact Test Test Date: 01/26/21



APPENDIX A
PHOTOGRAPHS

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FIGURE 3. Pre-Test Frontal View of Test Vehicle

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

FIGURE 7. Pre-Test Left Side View of Test Vehicle

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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

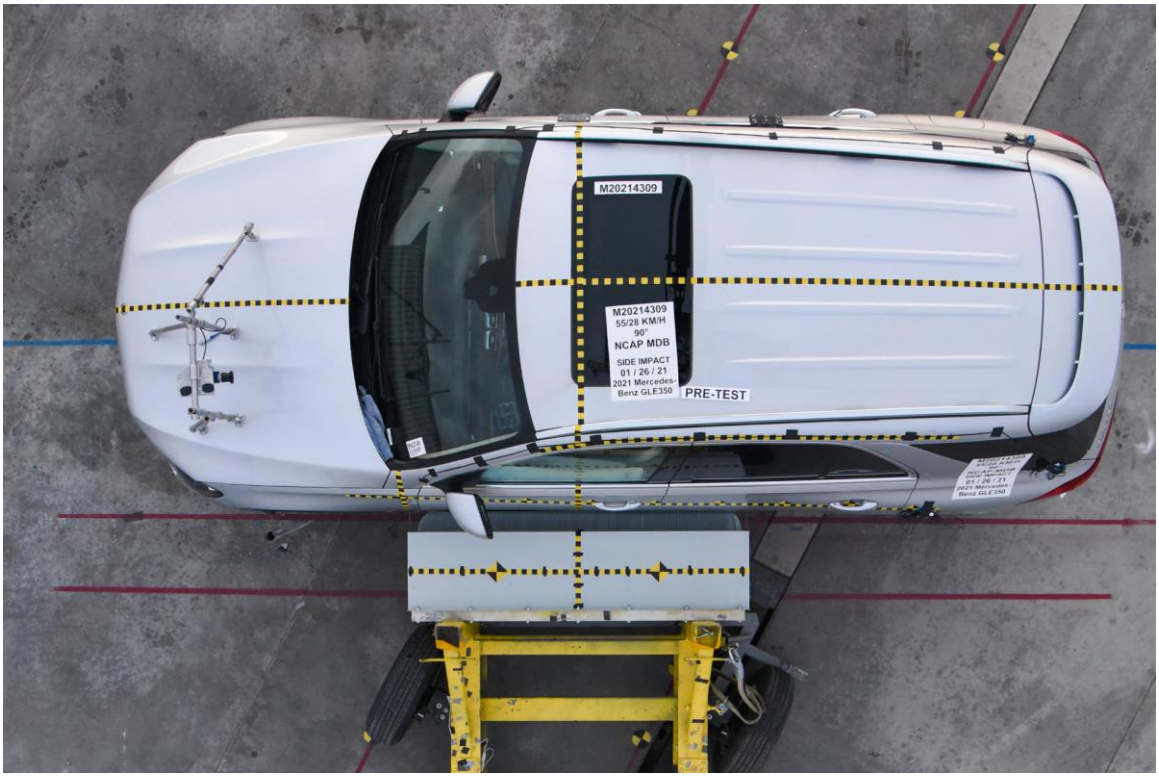

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FIGURE 16. Post-Test Overhead View of Test Area

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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

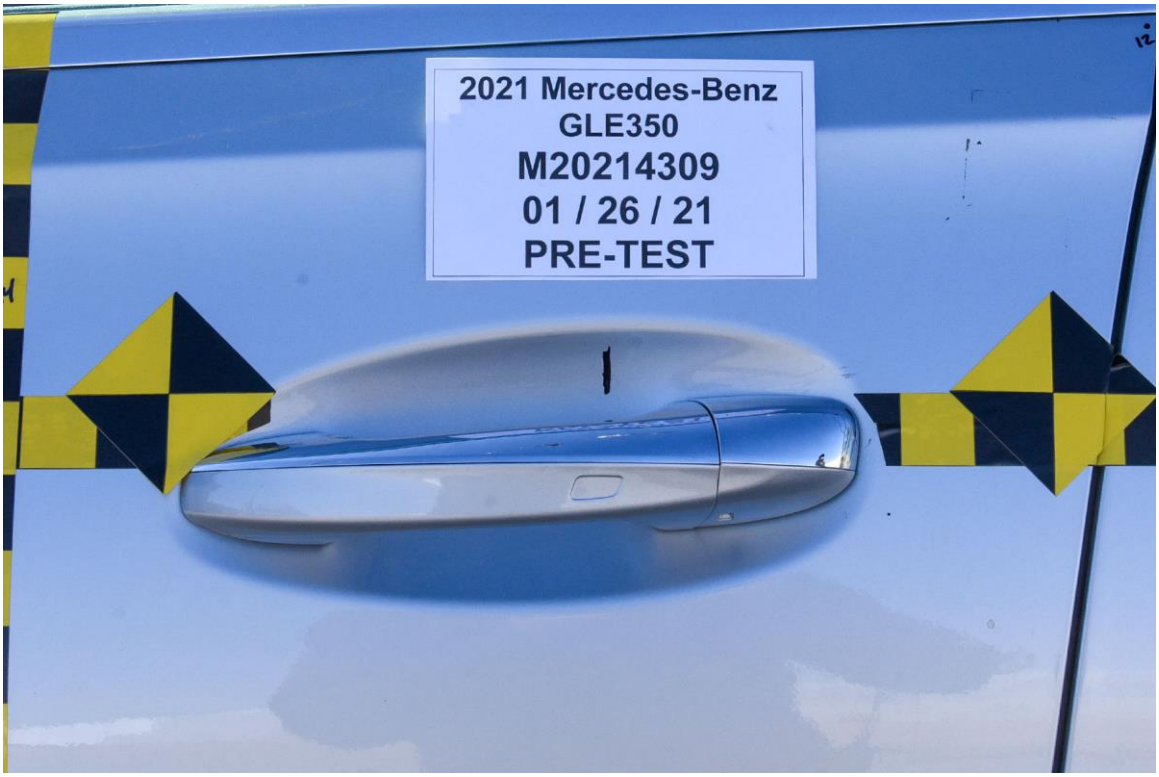

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FIGURE 22. Post-Test Left Front Door Latch Close-Up

FIGURE 23. Pre-Test Left Rear Door Latch Close-Up

FIGURE 24. Post-Test Left Rear Door Latch Close-Up

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Photograph Not Applicable

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Photograph Not Applicable

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Photograph Not Available

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Head Contact with Side Airbag View

FIGURE 77. Post-Test Rear Passenger Dummy Close-Up
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Photograph Not Applicable

FIGURE 78. Post-Test Rear Passenger Dummy Close-Up
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FIGURE 79. Post-Test Rear Passenger Dummy Close-Up
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Photograph Not Applicable

FIGURE 80. Post-Test Rear Passenger Dummy Close-Up
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FIGURE 81. Post-Test Rear Passenger Dummy Close-Up Knee Contact View

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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

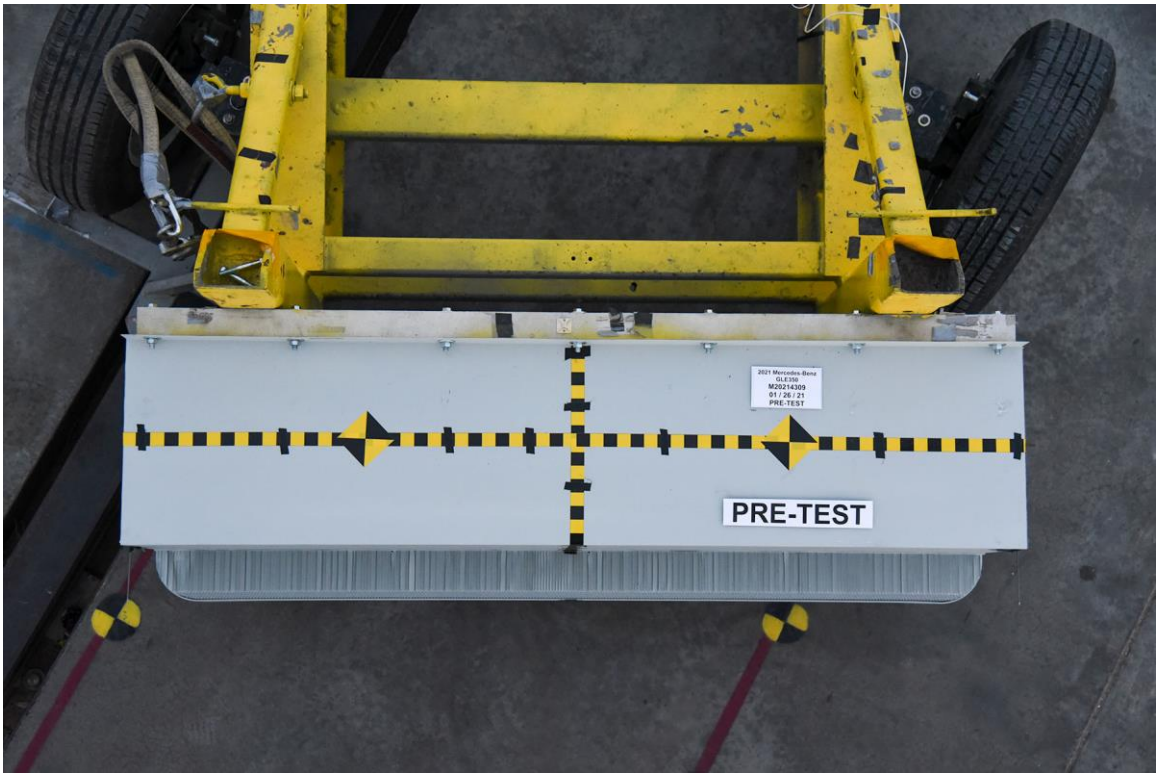

FIGURE 86. Pre-Test Top View of MDB Impactor Face

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

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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

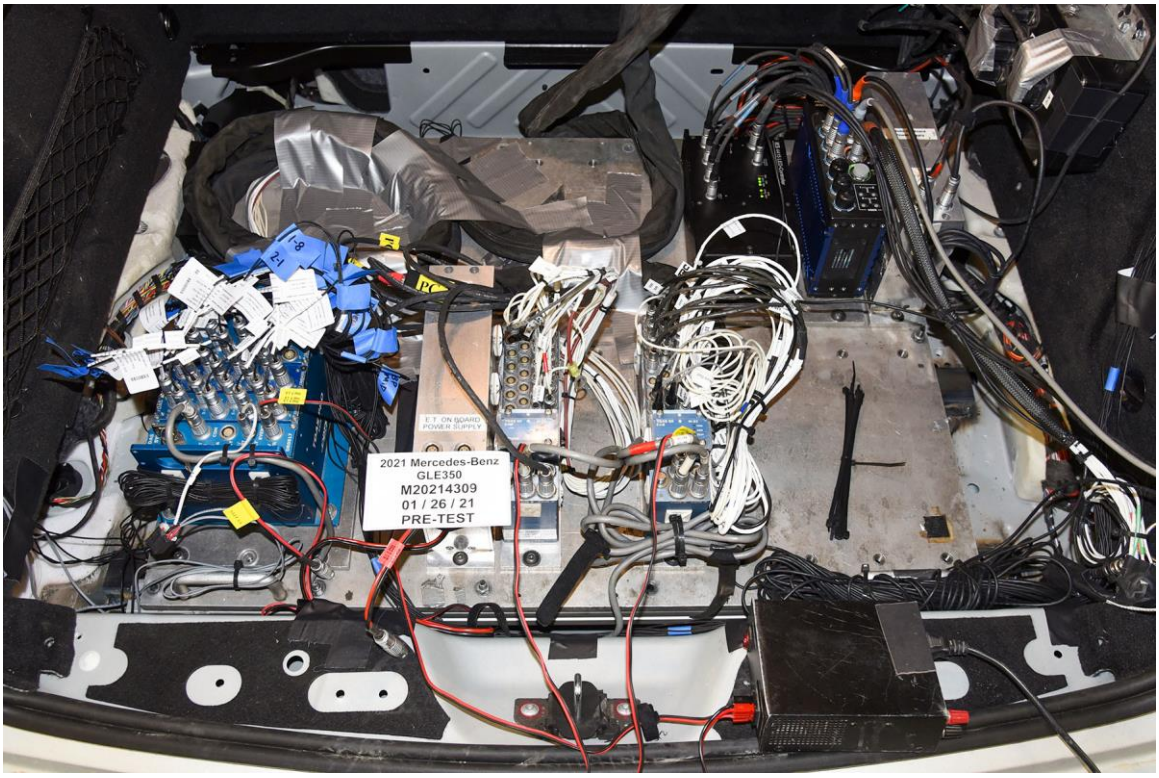


FIGURE 94. Pre-Test Ballast View

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

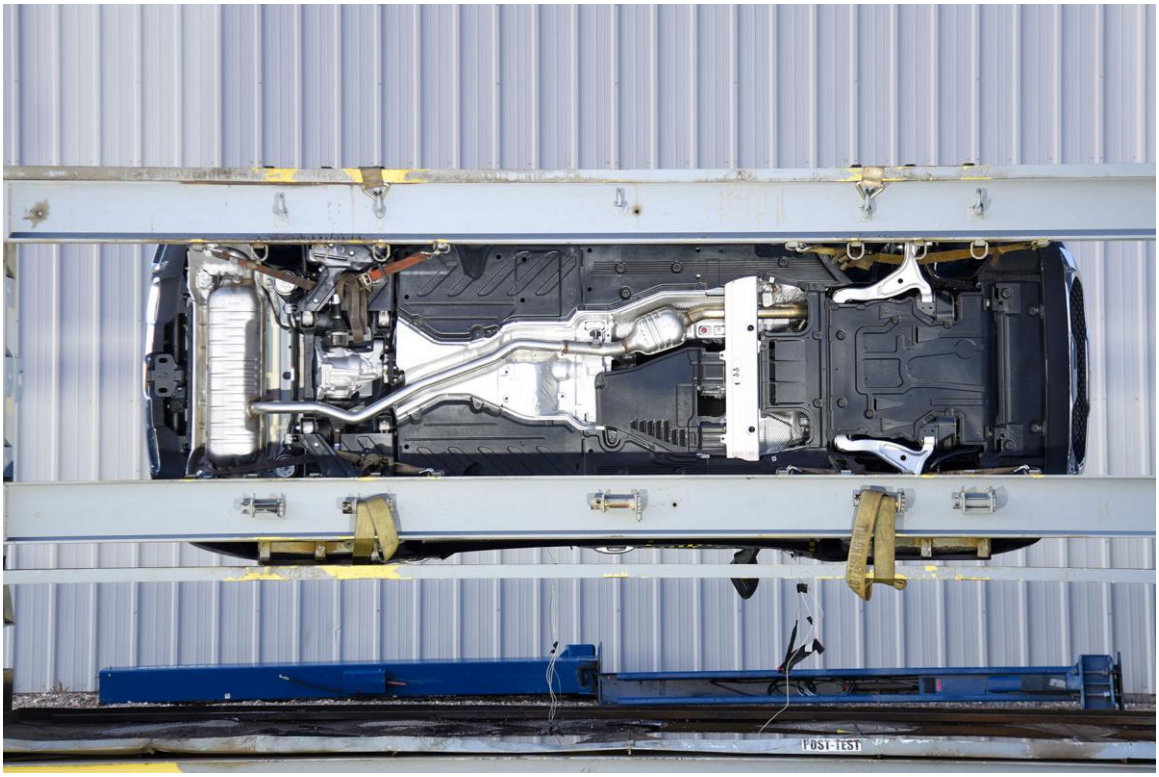
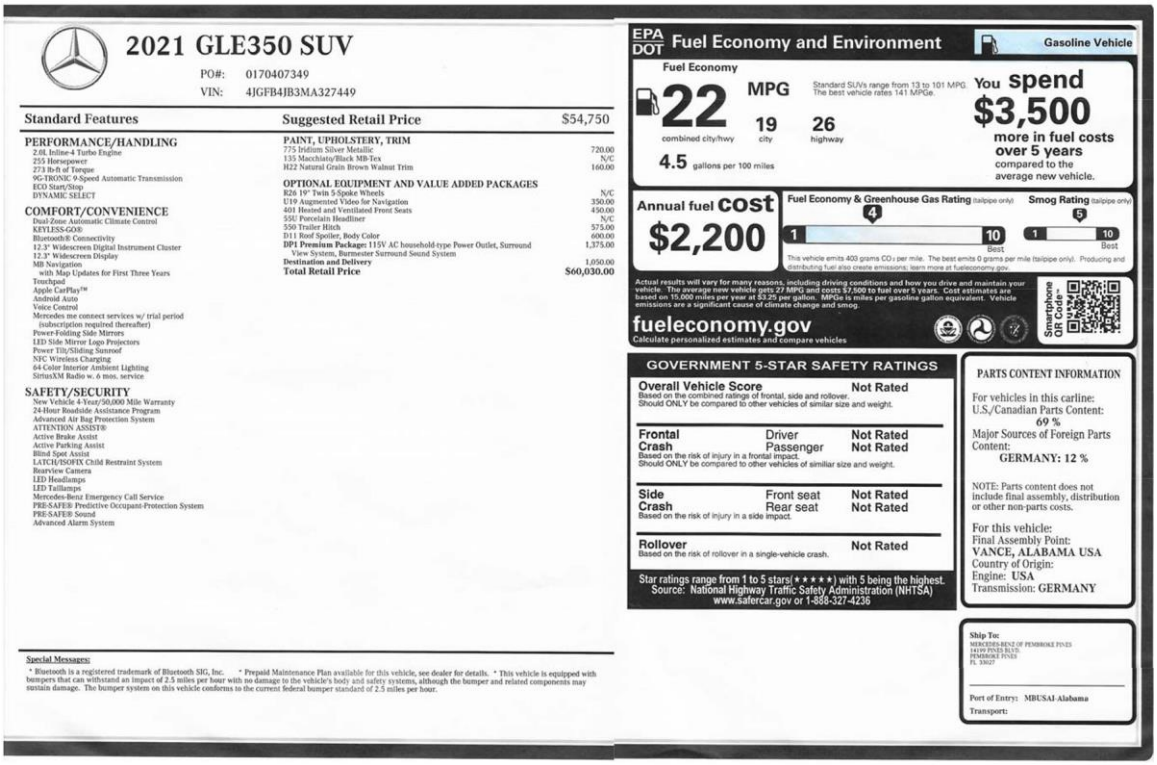


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees

FIGURE 101. Impact Event



2021 GLE350 SUV

PO#: 0170407349
VIN: 4JGFB4JB3MA327449

Standard Features	Suggested Retail Price	$54,750
PERFORMANCE/HANDLING	**PAINT, UPHOLSTERY, TRIM**	
2.0L Inline-4 Turbo Engine	775 Iridium Silver Metallic	720.00
255 Horsepower	135 Macchiato/Black MB-Tex	N/C
273 lb-ft of Torque	H22 Natural Grain Brown Walnut Trim	160.00
9G-TRONIC 9-Speed Automatic Transmission		
ECO Start/Stop	**OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES**	
DYNAMIC SELECT	R26 19" Twin 5-Spoke Wheels	N/C
COMFORT/CONVENIENCE	U19 Augmented Video for Navigation	350.00
Dual-Zone Automatic Climate Control	401 Heated and Ventilated Front Seats	450.00
KEYLESS-GO®	55U Porcelain Headliner	N/C
Bluetooth® Connectivity	550 Trailer Hitch	575.00
12.3" Widescreen Digital Instrument Cluster	D11 Roof Spoiler, Body Color	600.00
12.3" Widescreen Display	**DP1 Premium Package:** 115V AC household-type Power Outlet, Surround	1,375.00
MB Navigation	View System, Burmester Surround Sound System	
with Map Updates for First Three Years	**Destination and Delivery**	1,050.00
Touchpad	**Total Retail Price**	**$60,030.00**
Apple CarPlay™		
Android Auto		
Voice Control		
Mercedes me connect services w/ trial period (subscription required thereafter)		
Power-Folding Side Mirrors		
LED Side Mirror Logo Projectors		
Power Tilt/Sliding Sunroof		
NFC Wireless Charging		
64-Color Interior Ambient Lighting		
SiriusXM Radio w. 6 mos. service		
SAFETY/SECURITY		
New Vehicle 4-Year/50,000 Mile Warranty		
24-Hour Roadside Assistance Program		
Advanced Air Bag Protection System		
ATTENTION ASSIST®		
Active Brake Assist		
Active Parking Assist		
Blind Spot Assist		
LATCH/ISOFIX Child Restraint System		
Rearview Camera		
LED Headlamps		
LED Taillamps		
Mercedes-Benz Emergency Call Service		
PRE-SAFE® Predictive Occupant-Protection System		
PRE-SAFE® Sound		
Advanced Alarm System		

Special Messages:

* Bluetooth is a registered trademark of Bluetooth SIG, Inc. * Prepaid Maintenance Plan available for this vehicle, see dealer for details. * This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **22** MPG combined city/hwy — 19 city — 26 highway
4.5 gallons per 100 miles
Standard SUVs range from 13 to 101 MPG. The best vehicle rates 141 MPGe.
You spend **$3,500** more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$2,200**
Fuel Economy & Greenhouse Gas Rating (tailpipe only): 4 (1–10, Best)
Smog Rating (tailpipe only): 5 (1–10, Best)
This vehicle emits 403 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.25 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov — Calculate personalized estimates and compare vehicles
Smartphone QR Code™

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score (Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.)		Not Rated
Frontal Crash (Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similiar size and weight.)	Driver	Not Rated
	Passenger	Not Rated
Side Crash (Based on the risk of injury in a side impact.)	Front seat	Not Rated
	Rear seat	Not Rated
Rollover (Based on the risk of rollover in a single-vehicle crash.)		Not Rated

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

PARTS CONTENT INFORMATION

For vehicles in this carline:
U.S./Canadian Parts Content: 69 %
Major Sources of Foreign Parts Content: GERMANY: 12 %

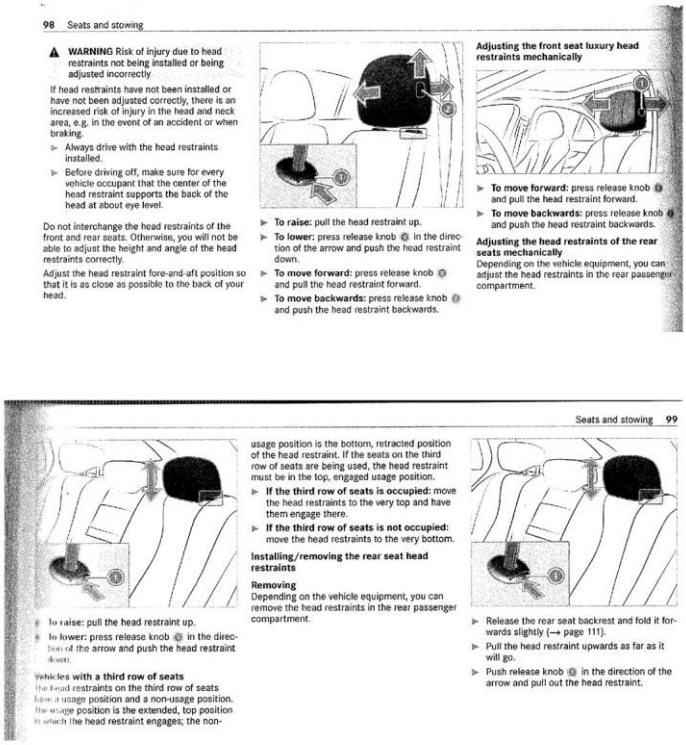
NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

For this vehicle:
Final Assembly Point: VANCE, ALABAMA USA
Country of Origin:
Engine: USA
Transmission: GERMANY

Ship To:
MERCEDES-BENZ OF PEMBROKE PINES
14100 PINES BLVD
PEMBROKE PINES
FL 33027

Port of Entry: MBUSAI-Alabama
Transport:

FIGURE 102. Monroney Label



98 Seats and stowing

WARNING Risk of injury due to head restraints not being installed or being adjusted incorrectly

If head restraints have not been installed or have not been adjusted correctly, there is an increased risk of injury in the head and neck area, e.g. in the event of an accident or when braking.

- Always drive with the head restraints installed.
- Before driving off, make sure for every vehicle occupant that the center of the head restraint supports the back of the head at about eye level.

Do not interchange the head restraints of the front and rear seats. Otherwise, you will not be able to adjust the height and angle of the head restraints correctly.

Adjust the head restraint fore-and-aft position so that it is as close as possible to the back of your head.

- **To raise:** pull the head restraint up.
- **To lower:** press release knob ① in the direction of the arrow and push the head restraint down.
- **To move forward:** press release knob ② and pull the head restraint forward.
- **To move backwards:** press release knob ② and push the head restraint backwards.

Adjusting the front seat luxury head restraints mechanically

- **To move forward:** press release knob ① and pull the head restraint forward.
- **To move backwards:** press release knob ① and push the head restraint backwards.

Adjusting the head restraints of the rear seats mechanically

Depending on the vehicle equipment, you can adjust the head restraints in the rear passenger compartment.

Seats and stowing 99

- **To raise:** pull the head restraint up.
- **To lower:** press release knob ① in the direction of the arrow and push the head restraint down.

Vehicles with a third row of seats

The head restraints on the third row of seats have a usage position and a non-usage position. The usage position is the extended, top position in which the head restraint engages; the non-usage position is the bottom, retracted position of the head restraint. If the seats on the third row of seats are being used, the head restraint must be in the top, engaged usage position.

- **If the third row of seats is occupied:** move the head restraints to the very top and have them engage there.
- **If the third row of seats is not occupied:** move the head restraints to the very bottom.

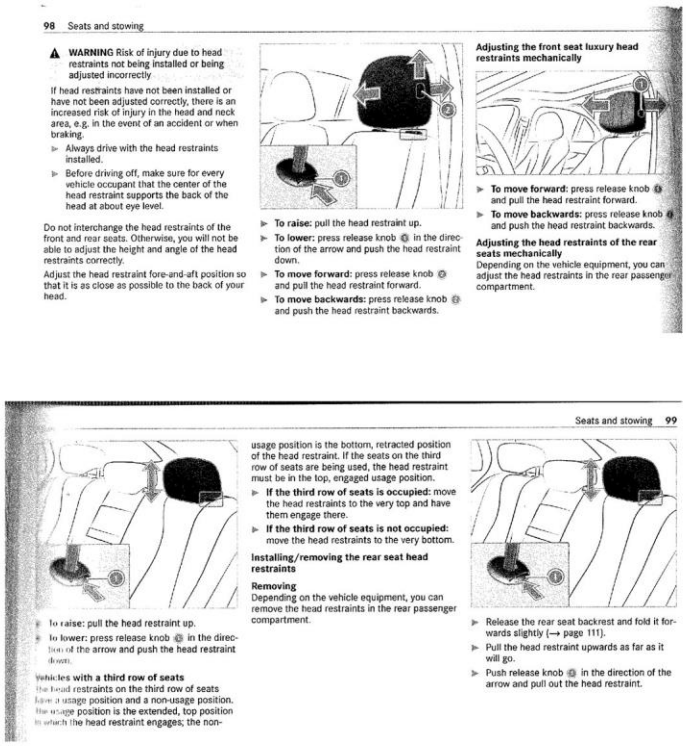
Installing/removing the rear seat head restraints

Removing

Depending on the vehicle equipment, you can remove the head restraints in the rear passenger compartment.

- Release the rear seat backrest and fold it forwards slightly (→ page 111).
- Pull the head restraint upwards as far as it will go.
- Push release knob ① in the direction of the arrow and pull out the head restraint.

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



98 Seats and stowing

WARNING Risk of injury due to head restraints not being installed or being adjusted incorrectly

If head restraints have not been installed or have not been adjusted correctly, there is an increased risk of injury in the head and neck area, e.g. in the event of an accident or when braking.

- Always drive with the head restraints installed.
- Before driving off, make sure for every vehicle occupant that the center of the head restraint supports the back of the head at about eye level.

Do not interchange the head restraints of the front and rear seats. Otherwise, you will not be able to adjust the height and angle of the head restraints correctly.

Adjust the head restraint fore-and-aft position so that it is as close as possible to the back of your head.

- **To raise:** pull the head restraint up.
- **To lower:** press release knob ① in the direction of the arrow and push the head restraint down.
- **To move forward:** press release knob ② and pull the head restraint forward.
- **To move backwards:** press release knob ② and push the head restraint backwards.

Adjusting the front seat luxury head restraints mechanically

- **To move forward:** press release knob ① and pull the head restraint forward.
- **To move backwards:** press release knob ① and push the head restraint backwards.

Adjusting the head restraints of the rear seats mechanically

Depending on the vehicle equipment, you can adjust the head restraints in the rear passenger compartment.

Seats and stowing 99

- **To raise:** pull the head restraint up.
- **To lower:** press release knob ① in the direction of the arrow and push the head restraint down.

Vehicles with a third row of seats

The head restraints on the third row of seats have a usage position and a non-usage position. The usage position is the extended, top position in which the head restraint engages; the non-usage position is the bottom, retracted position of the head restraint. If the seats on the third row of seats are being used, the head restraint must be in the top, engaged usage position.

- **If the third row of seats is occupied:** move the head restraints to the very top and have them engage there.
- **If the third row of seats is not occupied:** move the head restraints to the very bottom.

Installing/removing the rear seat head restraints

Removing

Depending on the vehicle equipment, you can remove the head restraints in the rear passenger compartment.

- Release the rear seat backrest and fold it forwards slightly (→ page 111).
- Pull the head restraint upwards as far as it will go.
- Push release knob ① in the direction of the arrow and pull out the head restraint.

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

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

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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)

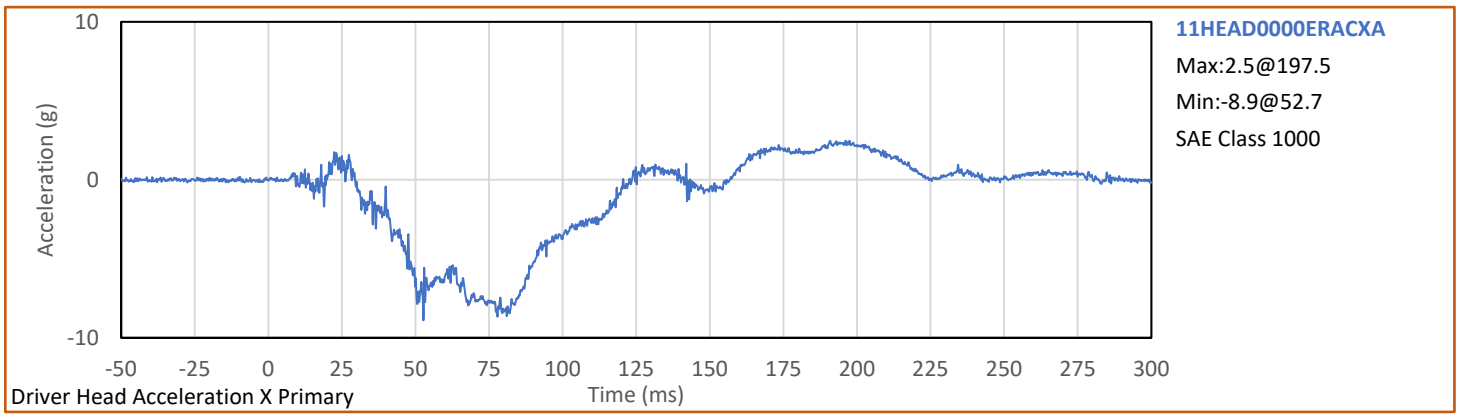
MDB Center of Gravity Acceleration (Z)

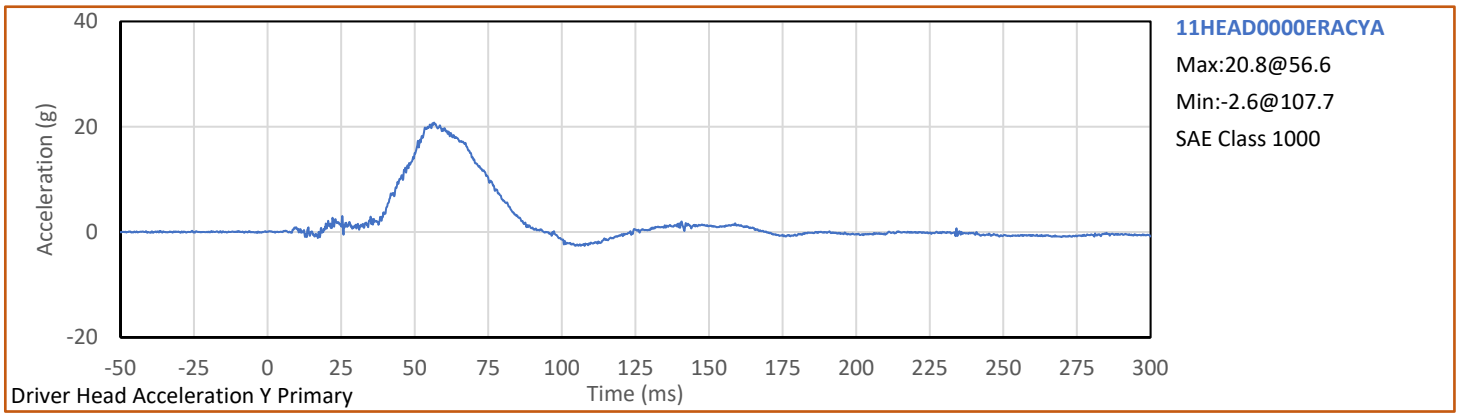
MDB Rear Acceleration (X)

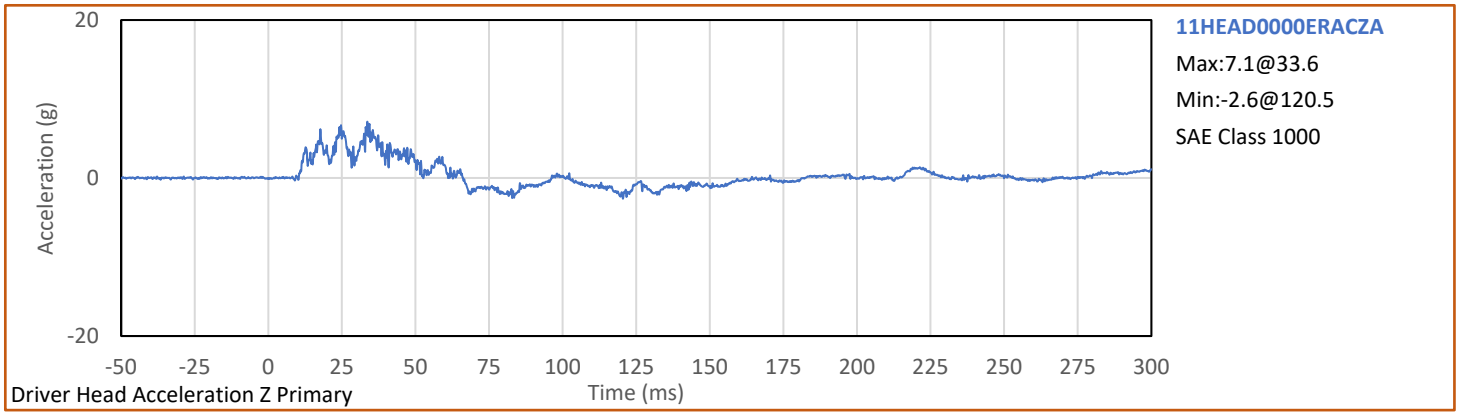
MDB Rear Acceleration (Y)

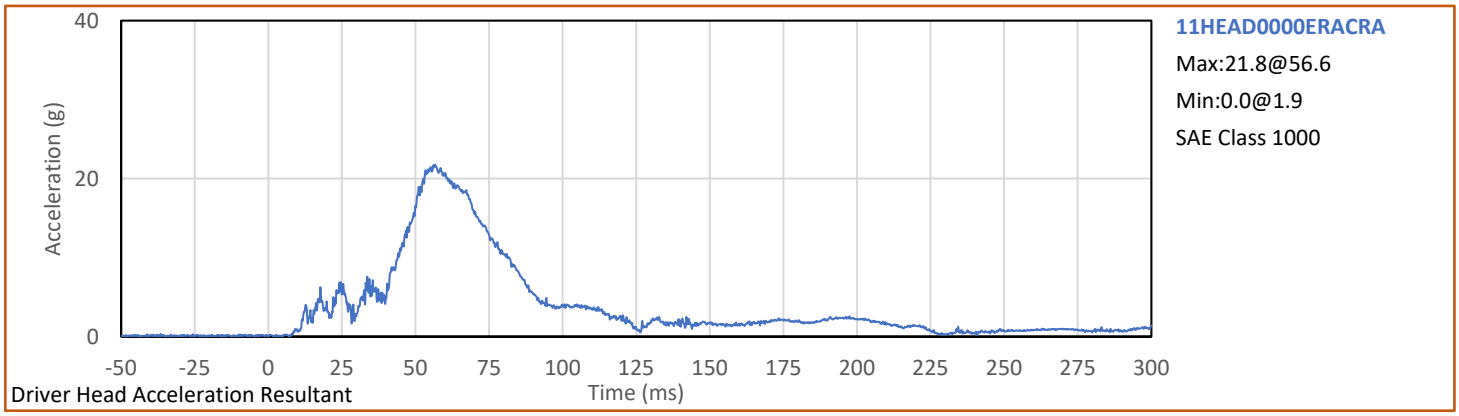
Left MDB Contact Switch

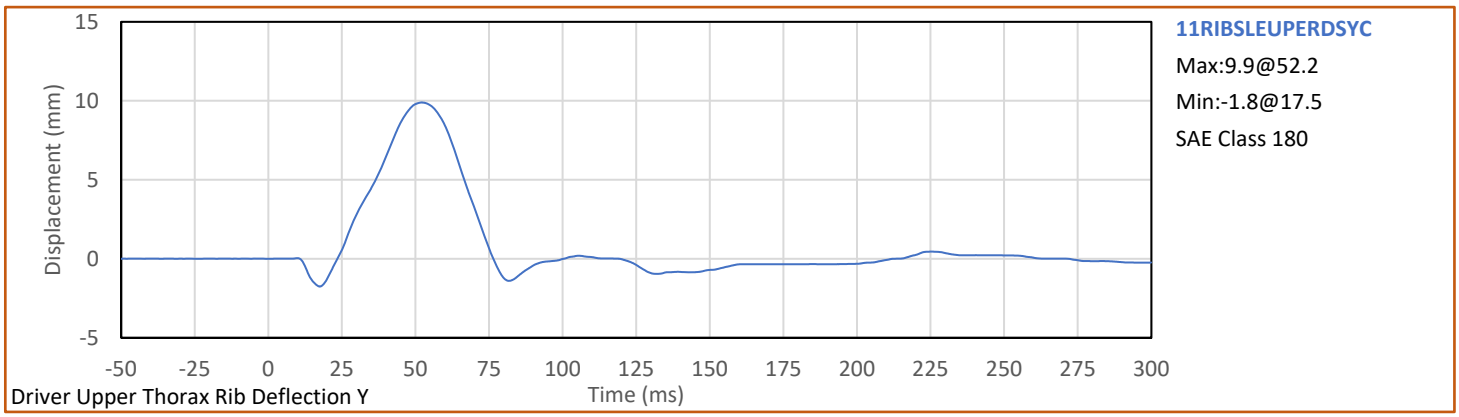
Right MDB Contact Switch

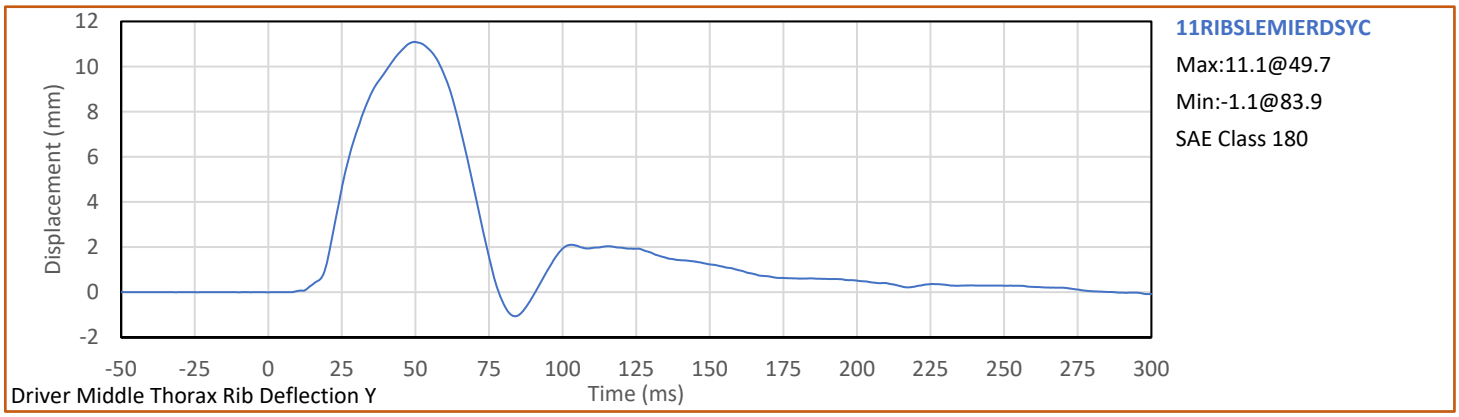

11HEAD0000ERACXA
Max:2.5@197.5
Min:-8.9@52.7
SAE Class 1000
Acceleration (g)
10
0
-10
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Time (ms)
Driver Head Acceleration X Primary

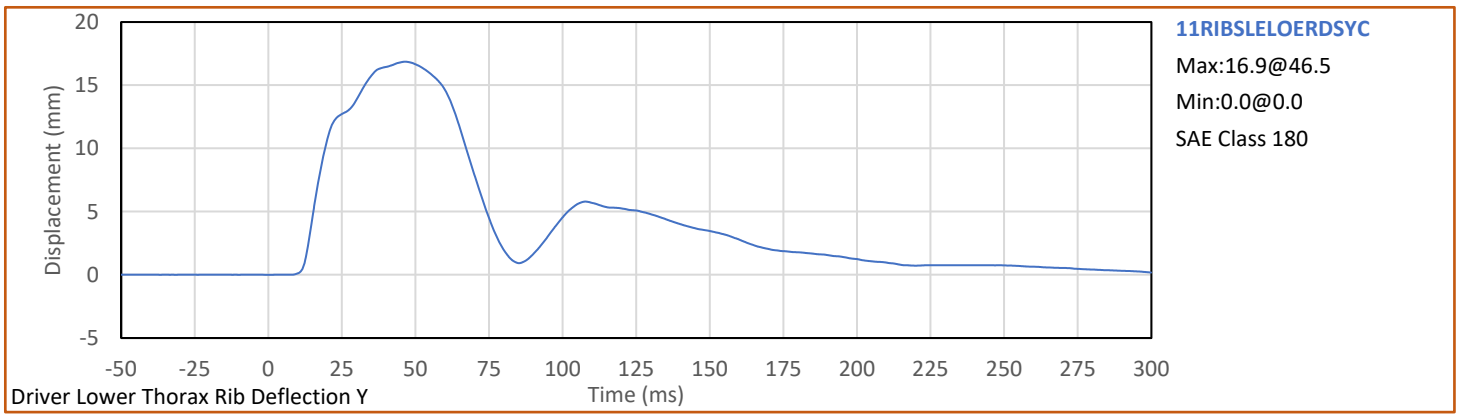

11HEAD0000ERACYA
Max:20.8@56.6
Min:-2.6@107.7
SAE Class 1000
Acceleration (g)
40
20
0
-20
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Time (ms)
Driver Head Acceleration Y Primary

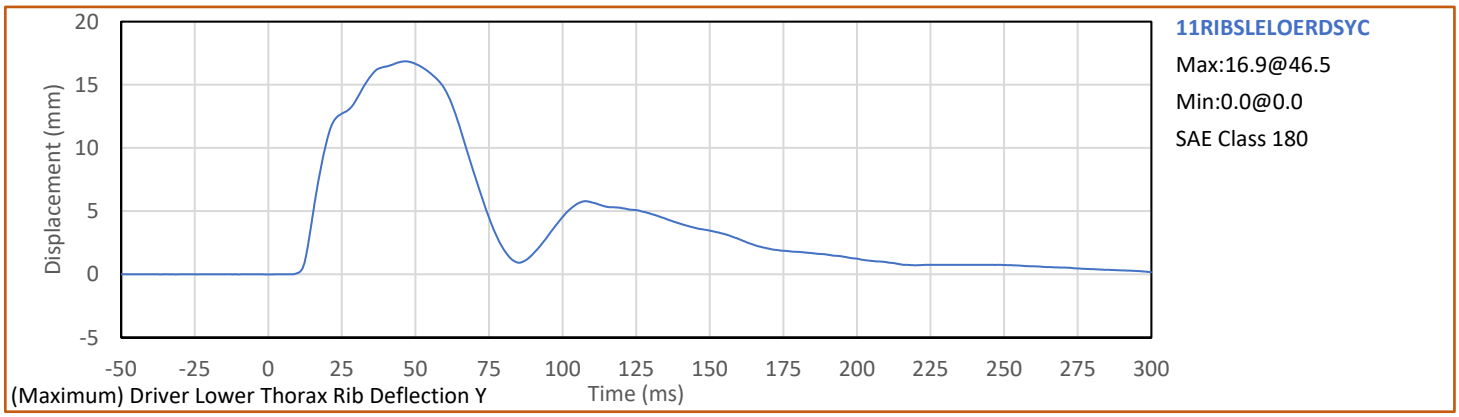

11HEAD0000ERACZA
Max:7.1@33.6
Min:-2.6@120.5
SAE Class 1000
Acceleration (g)
20
0
-20
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Time (ms)
Driver Head Acceleration Z Primary

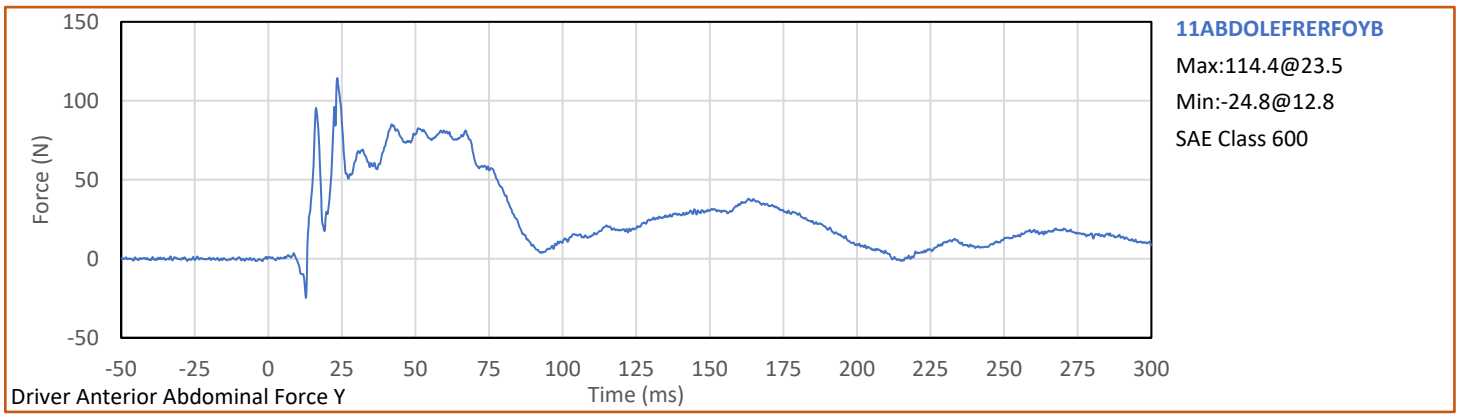

11HEAD0000ERACRA
Max:21.8@56.6
Min:0.0@1.9
SAE Class 1000
Acceleration (g)
40
20
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Time (ms)
Driver Head Acceleration Resultant

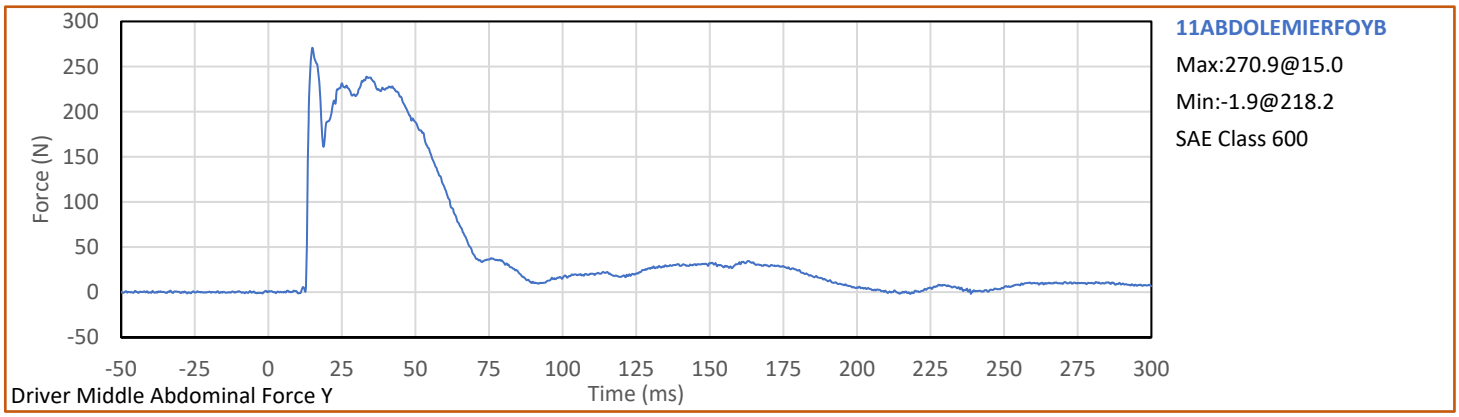

11RIBSLEUPERDSYC
Max:9.9@52.2
Min:-1.8@17.5
SAE Class 180
Displacement (mm)
Time (ms)
Driver Upper Thorax Rib Deflection Y

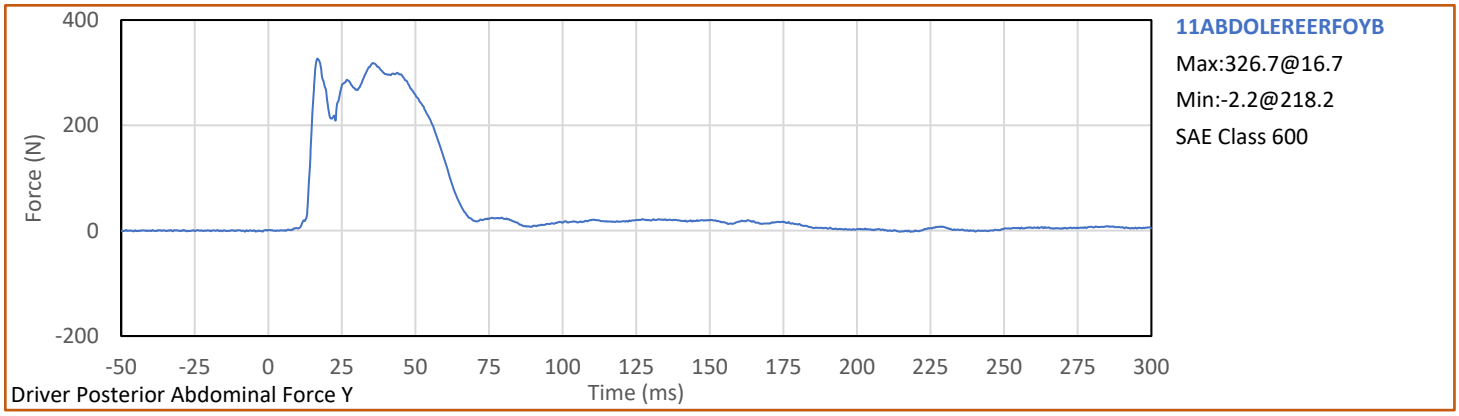

11RIBSLEMIERDSYC
Max:11.1@49.7
Min:-1.1@83.9
SAE Class 180
Displacement (mm)
Time (ms)
Driver Middle Thorax Rib Deflection Y

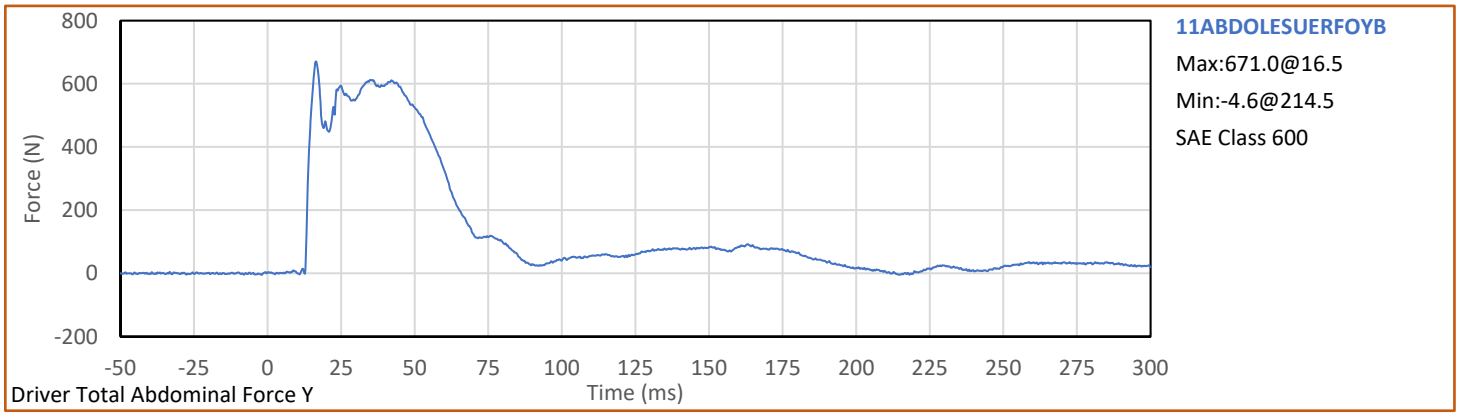

11RIBSLELOERDSYC
Max:16.9@46.5
Min:0.0@0.0
SAE Class 180
Displacement (mm)
Time (ms)
Driver Lower Thorax Rib Deflection Y

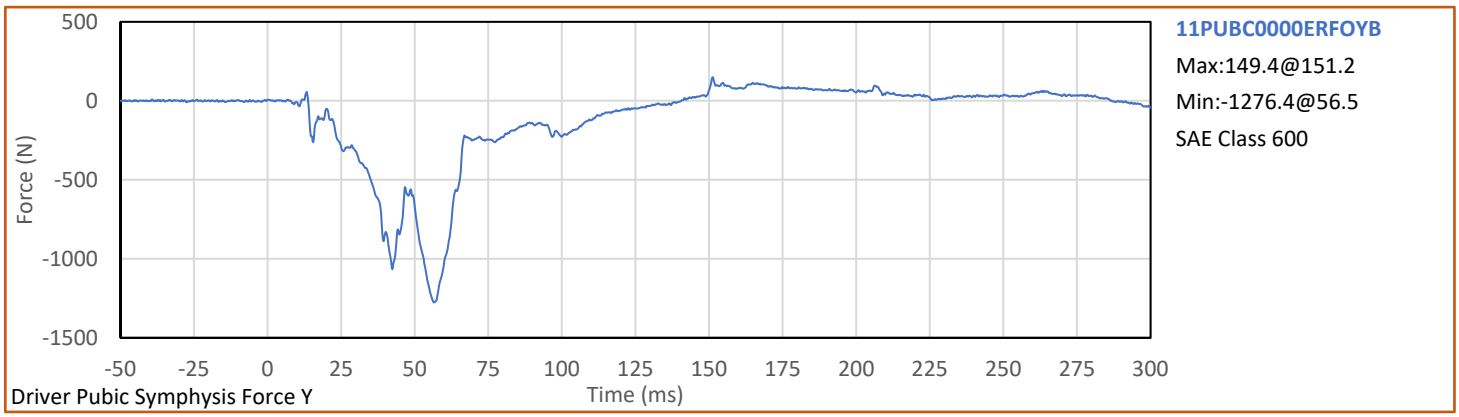

11RIBSLELOERDSYC
Max:16.9@46.5
Min:0.0@0.0
SAE Class 180
Displacement (mm)
Time (ms)
(Maximum) Driver Lower Thorax Rib Deflection Y

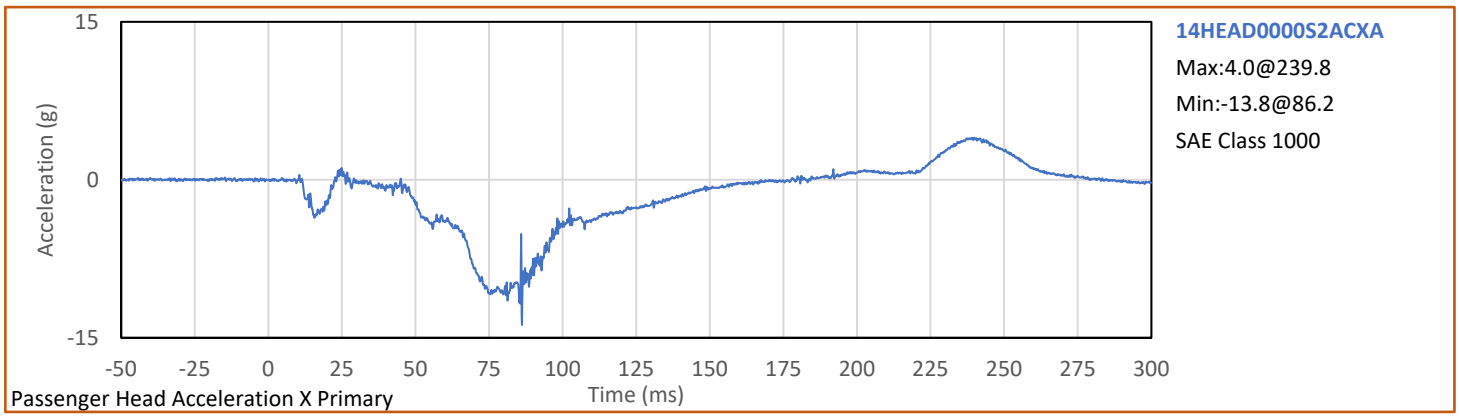

11ABDOLEFRERFOYB
Max:114.4@23.5
Min:-24.8@12.8
SAE Class 600
Force (N)
Time (ms)
Driver Anterior Abdominal Force Y


11ABDOLEMIERFOYB
Max:270.9@15.0
Min:-1.9@218.2
SAE Class 600
Force (N)
Time (ms)
Driver Middle Abdominal Force Y

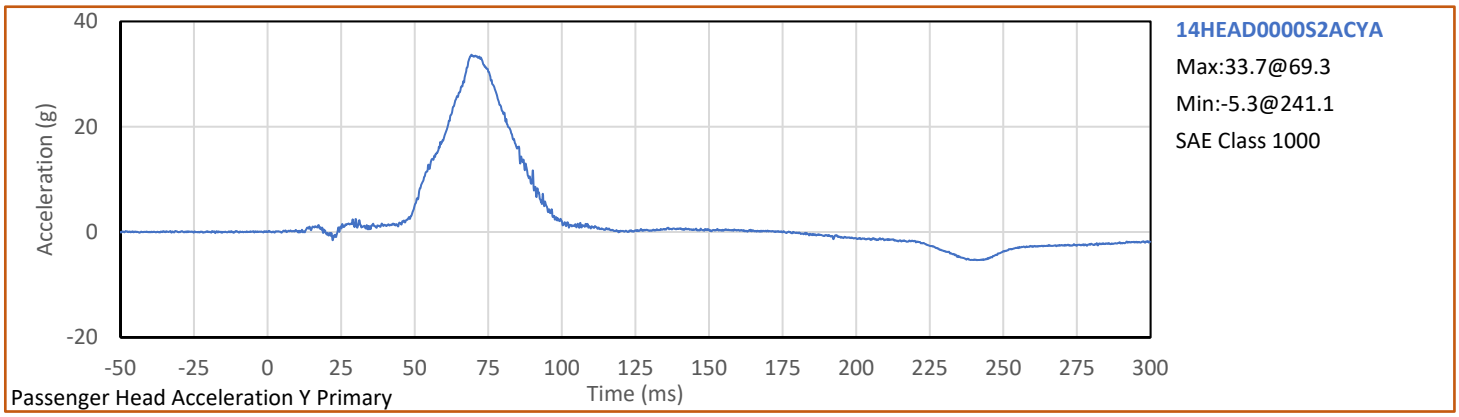

11ABDOLEREERFOYB
Max:326.7@16.7
Min:-2.2@218.2
SAE Class 600
Force (N)
Time (ms)
Driver Posterior Abdominal Force Y


11ABDOLESUERFOYB
Max:671.0@16.5
Min:-4.6@214.5
SAE Class 600
Force (N)
Time (ms)
Driver Total Abdominal Force Y

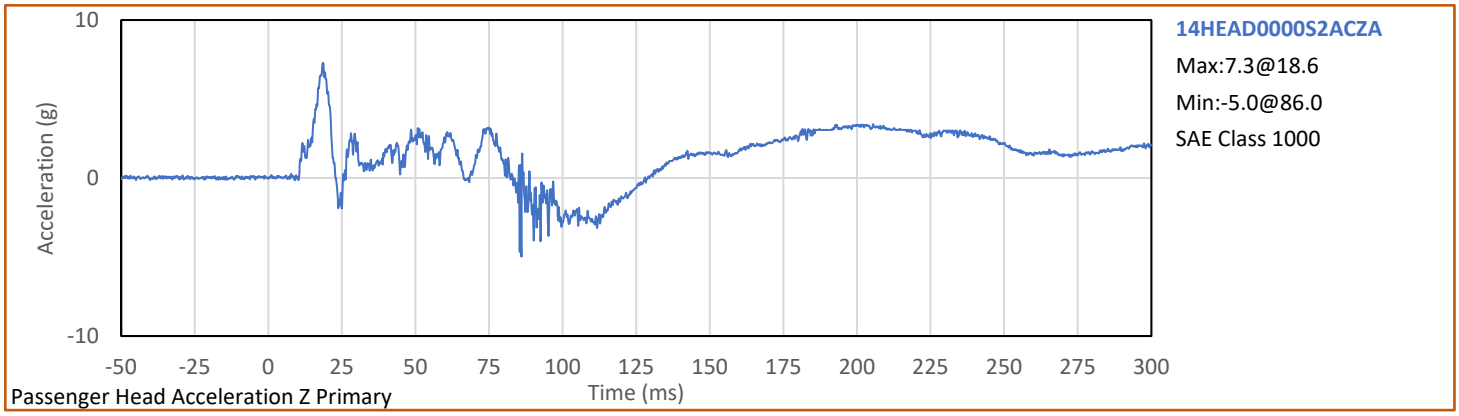

500
0
-500
-1000
-1500
Force (N)
-50
-25
0
25
50
75
100
125
150
175
200
225
250
275
300
Time (ms)
Driver Pubic Symphysis Force Y
11PUBC0000ERFOYB
Max:149.4@151.2
Min:-1276.4@56.5
SAE Class 600



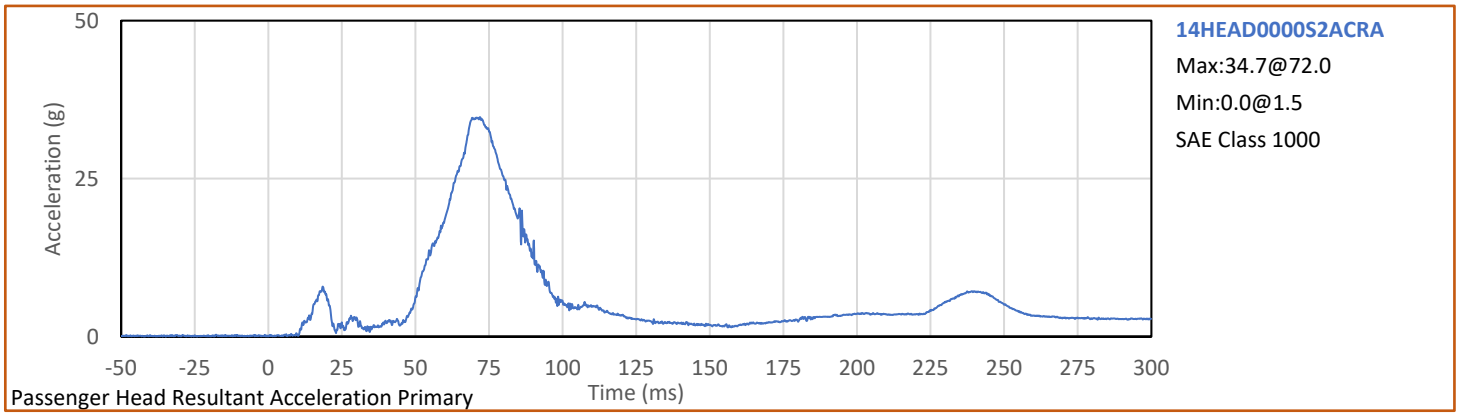
Passenger Head Acceleration X Primary



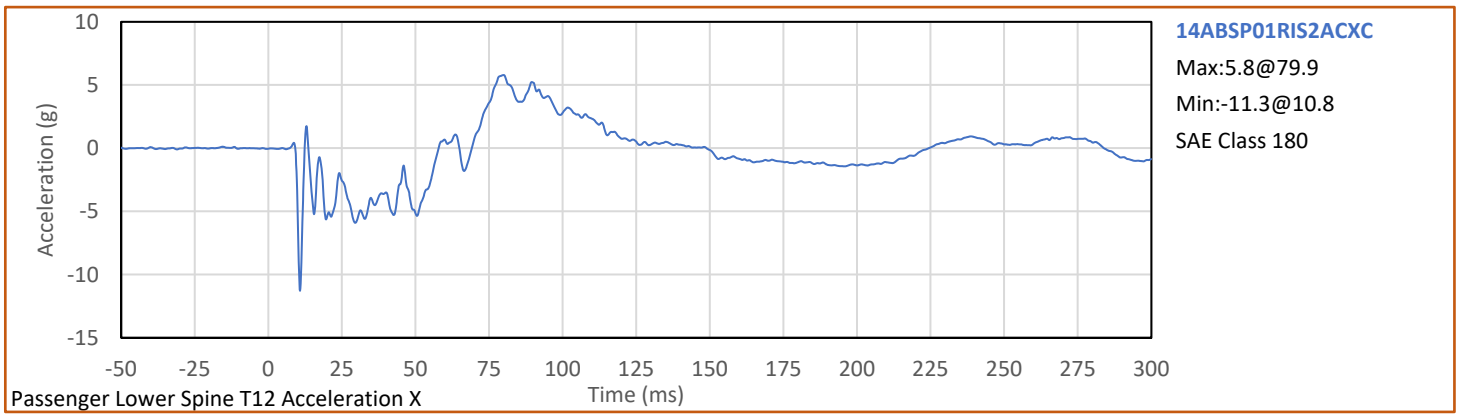
Passenger Head Acceleration Y Primary



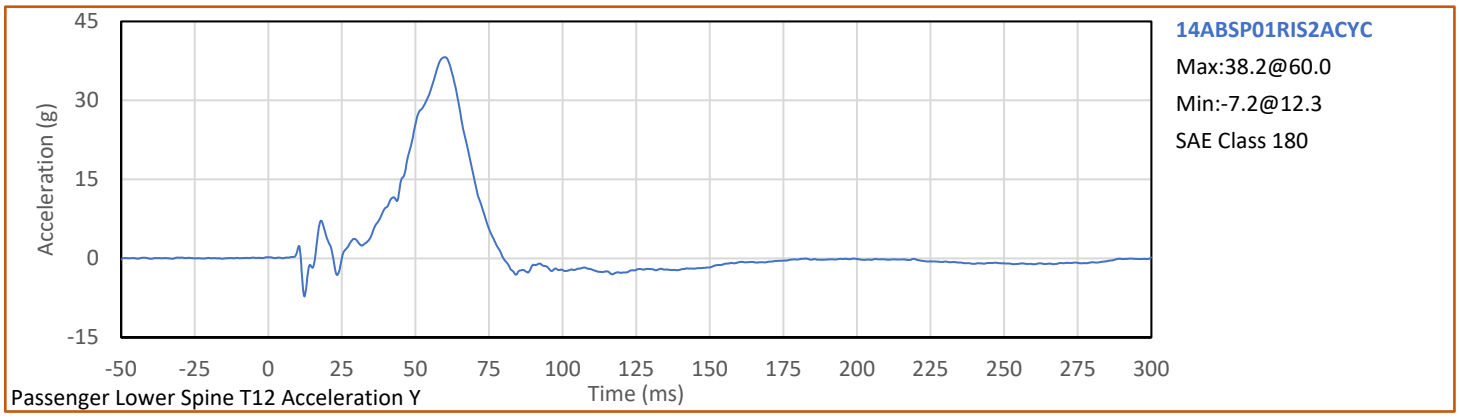
Passenger Head Acceleration Z Primary



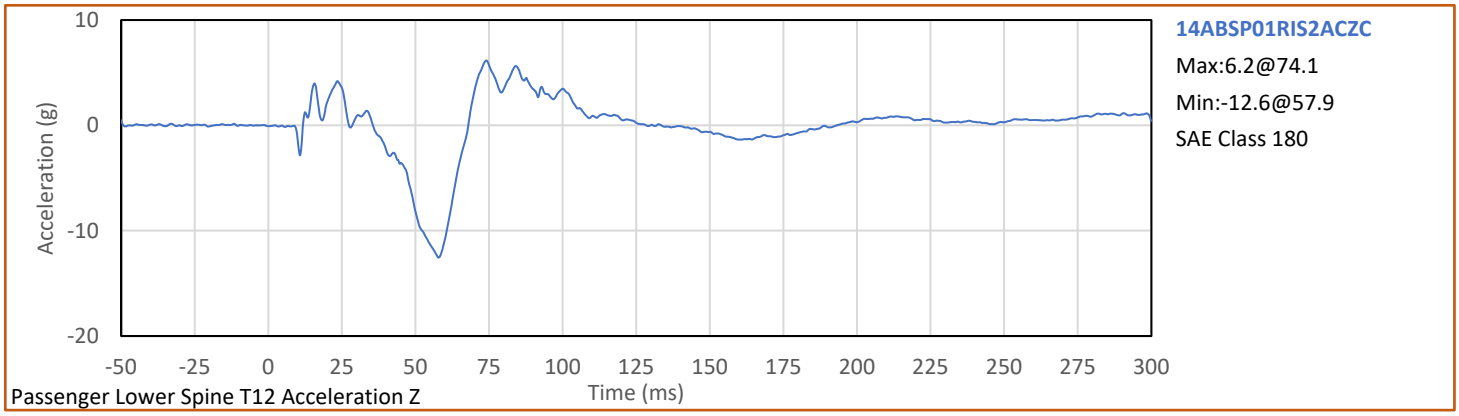
Passenger Head Resultant Acceleration Primary



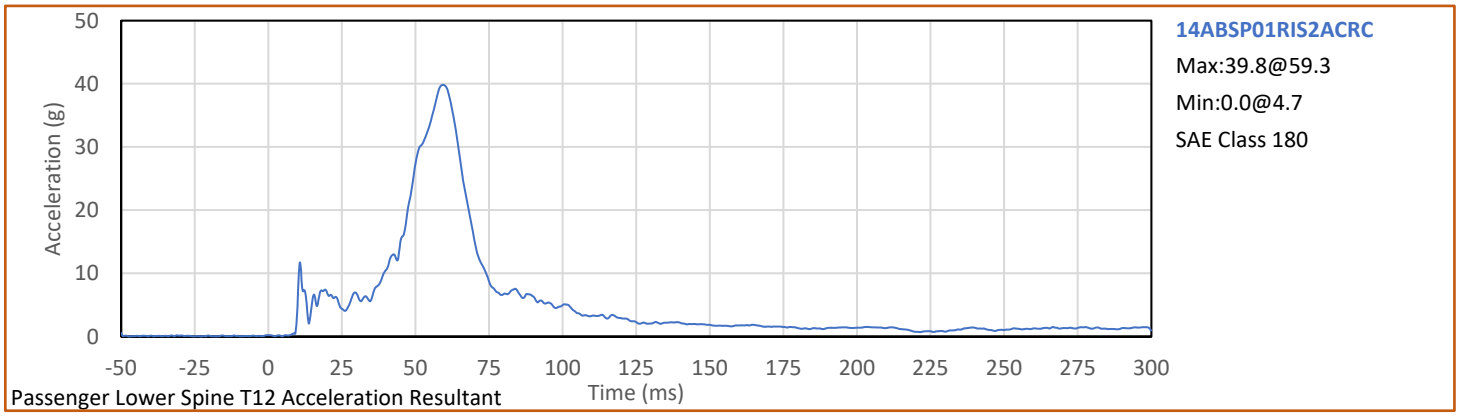
Passenger Lower Spine T12 Acceleration X



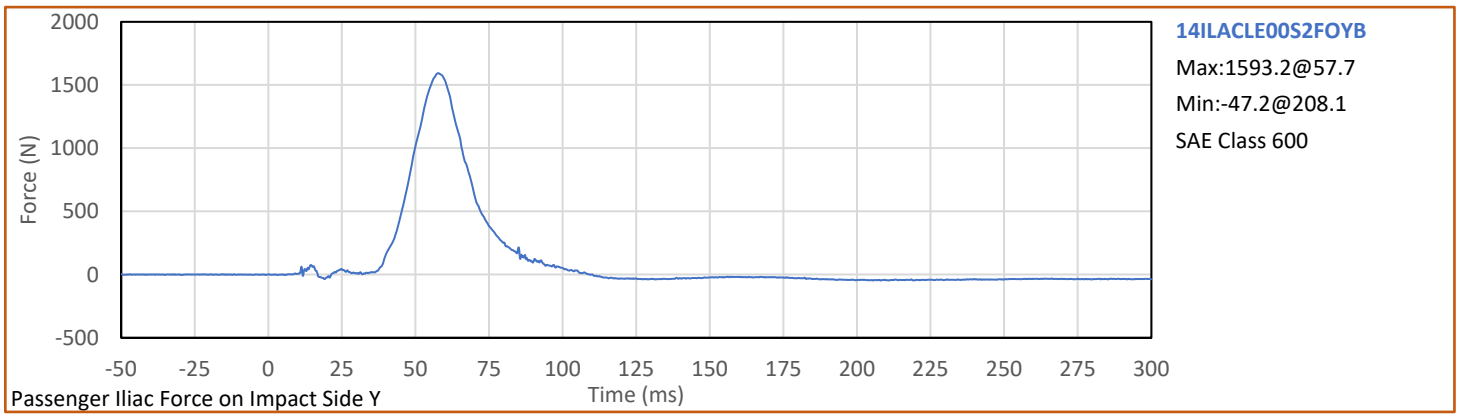
Passenger Lower Spine T12 Acceleration Y

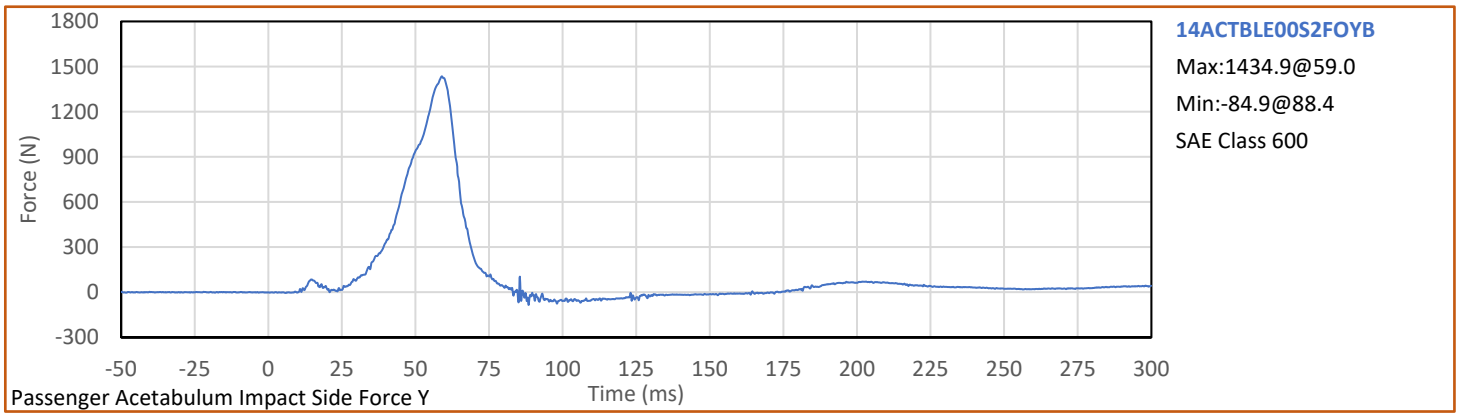


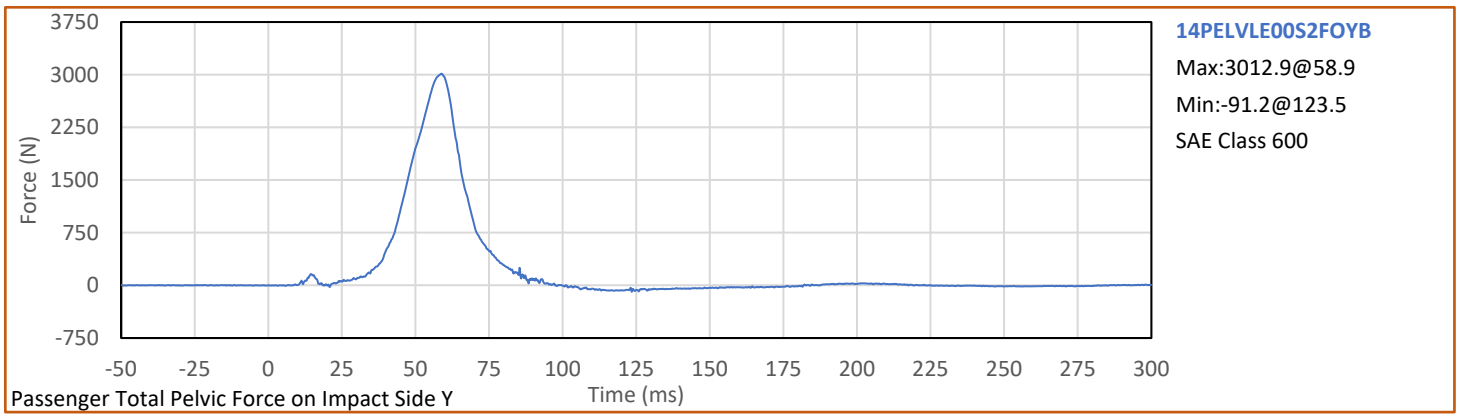
Passenger Lower Spine T12 Acceleration Z



Passenger Lower Spine T12 Acceleration Resultant


14ILACLE00S2FOYB
Max:1593.2@57.7
Min:-47.2@208.1
SAE Class 600
Force (N)
Time (ms)
Passenger Iliac Force on Impact Side Y


14ACTBLE00S2FOYB
Max:1434.9@59.0
Min:-84.9@88.4
SAE Class 600
Force (N)
Time (ms)
Passenger Acetabulum Impact Side Force Y


14PELVLE00S2FOYB
Max:3012.9@58.9
Min:-91.2@123.5
SAE Class 600
Force (N)
Time (ms)
Passenger Total Pelvic Force on Impact Side Y

APPENDIX C

ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Applus IDIADA KARCO

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

ATD Serial No.: F037

Test Date: 2021-01-22

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	909	Pass
2 - Seat to Shoulder Joint	mm	558	572	565	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	350	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	101	Pass
5 - Sole to Seat, Sitting	mm	433	451	443	Pass
6 - Head Width	mm	152	158	156	Pass
7 - Shoulder/Arm Width	mm	461	479	475	Pass
8 - Thorax Width	mm	322	332	326	Pass
9 - Abdomen Width	mm	273	287	277	Pass
10 - Pelvis Lap Width	mm	359	373	365	Pass
11 - Head Depth	mm	196	206	200	Pass
12 - Thorax Depth	mm	262	272	268	Pass
13 - Abdomen Depth	mm	194	204	198	Pass
14 - Pelvis Depth	mm	235	245	240	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	613	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

Approved By: P. Puzzuto

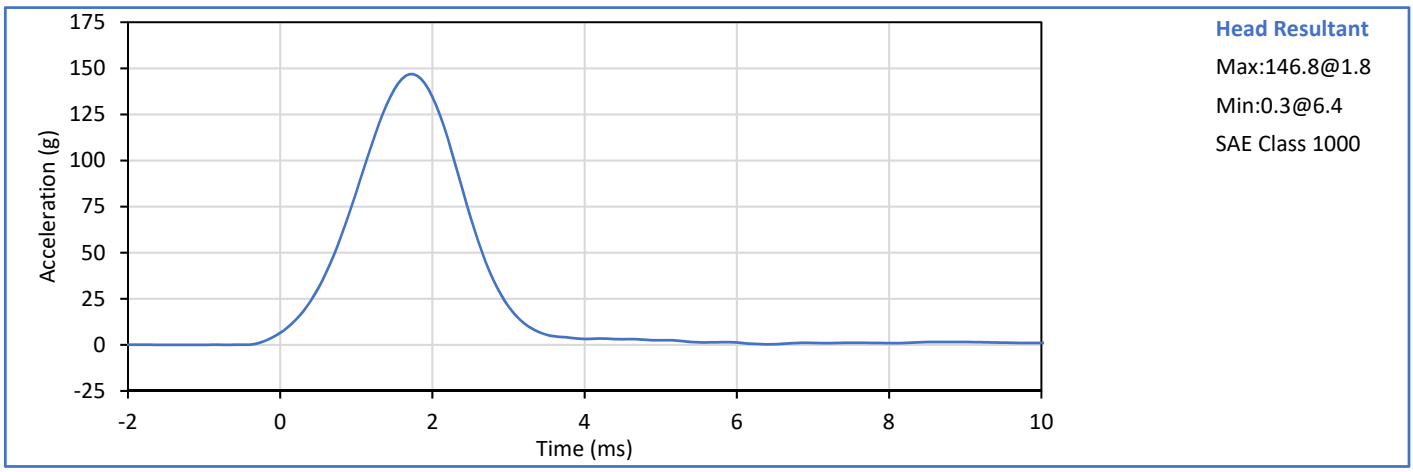
Applus IDIADA
KARCO

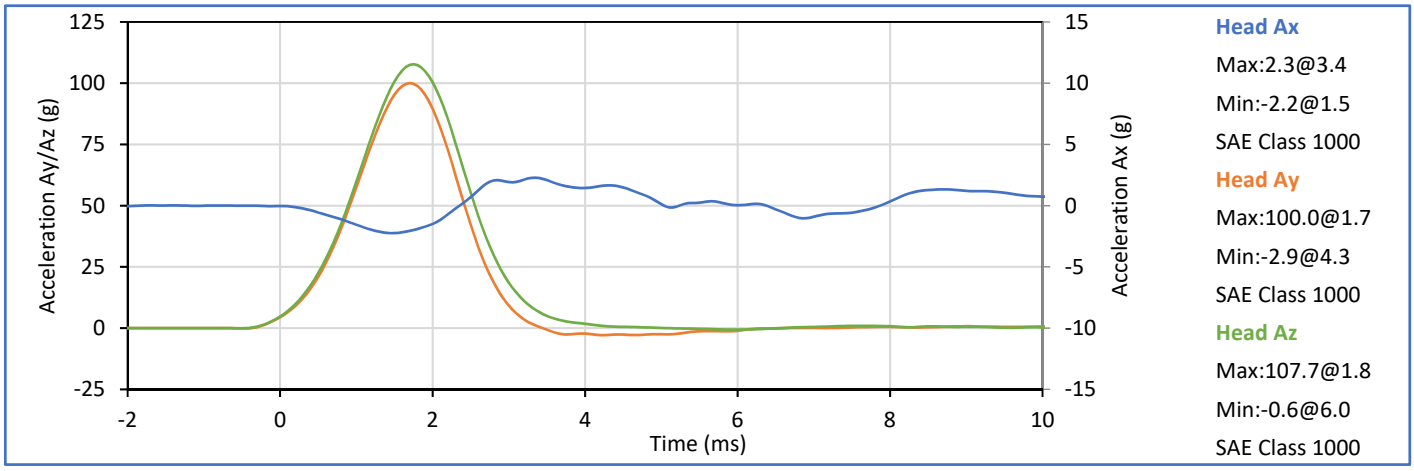
ES-2re 50th Male Side Impact ATD
Head Drop

ATD Serial No.: F037

Test Date: 2021-01-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
Peak Resultant Acceleration	g	125.0	155.0	146.8	Pass
Peak Head Ax	g	-15.0	15.0	2.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

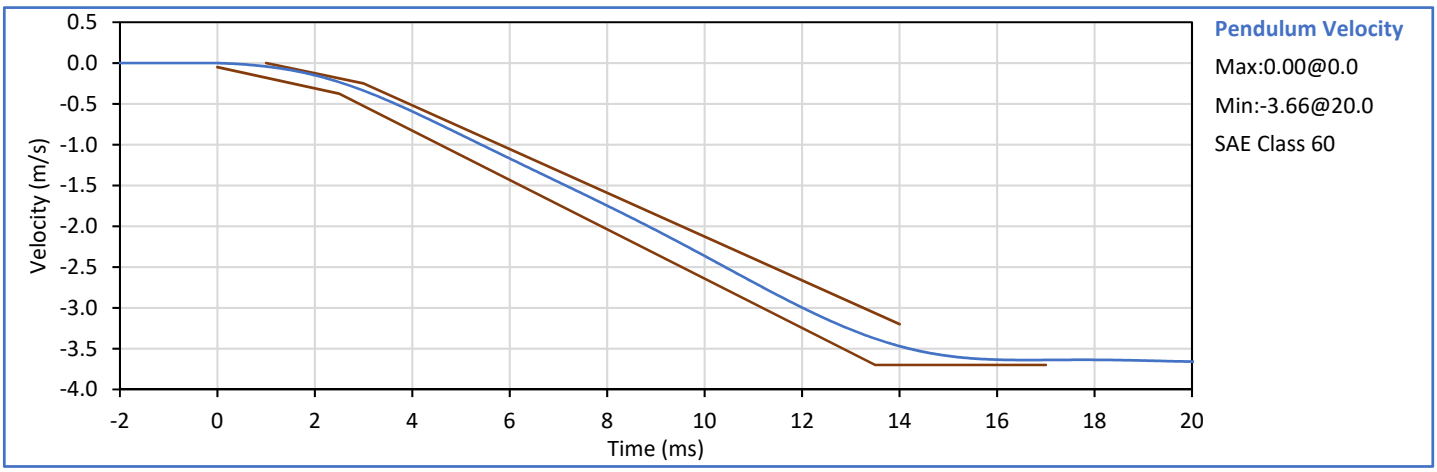
Applus IDIADA KARCO

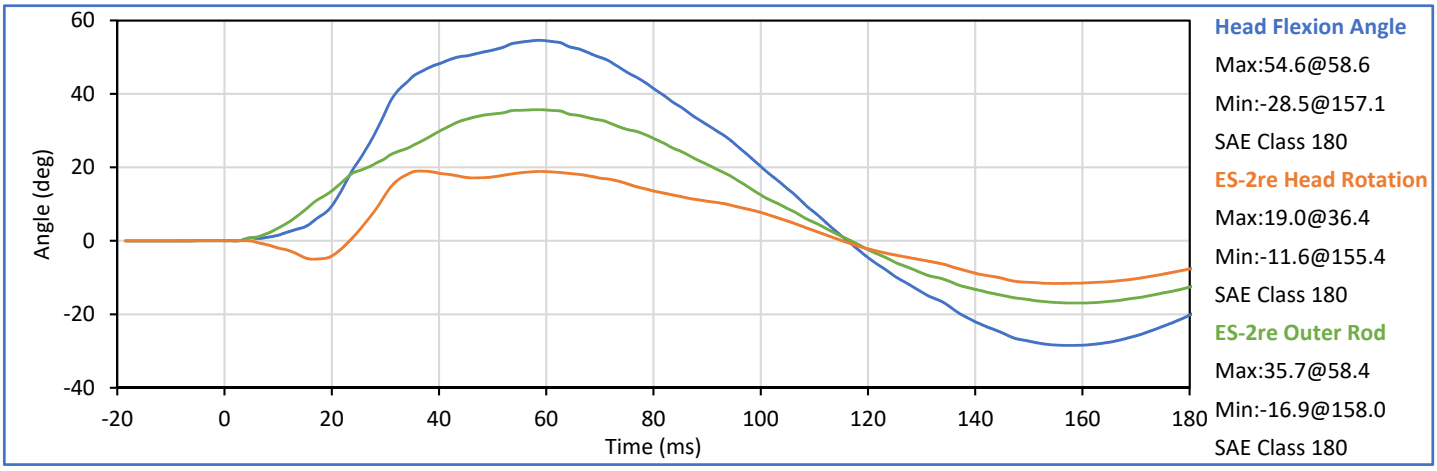
ES-2re 50th Male Side Impact ATD
Neck Flexion

ATD Serial No.: F037

Test Date: 2021-01-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
Pendulum Velocity	m/s	3.30	3.50	3.47	Pass
Peak Headform Flexion	deg	49.0	59.0	54.6	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	58.6	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	57.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

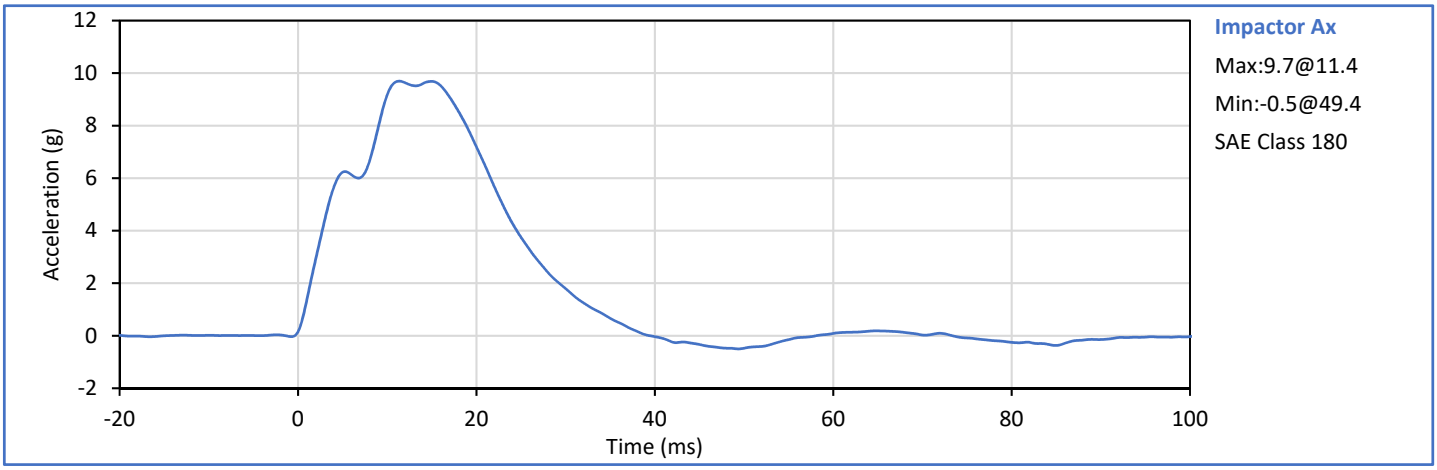
Applus IDIADA KARCO

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

ATD Serial No.: F037

Test Date: 2021-01-23

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	4.20	4.40	4.36	Pass
Peak Impactor Ax	g	7.5	10.5	9.7	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

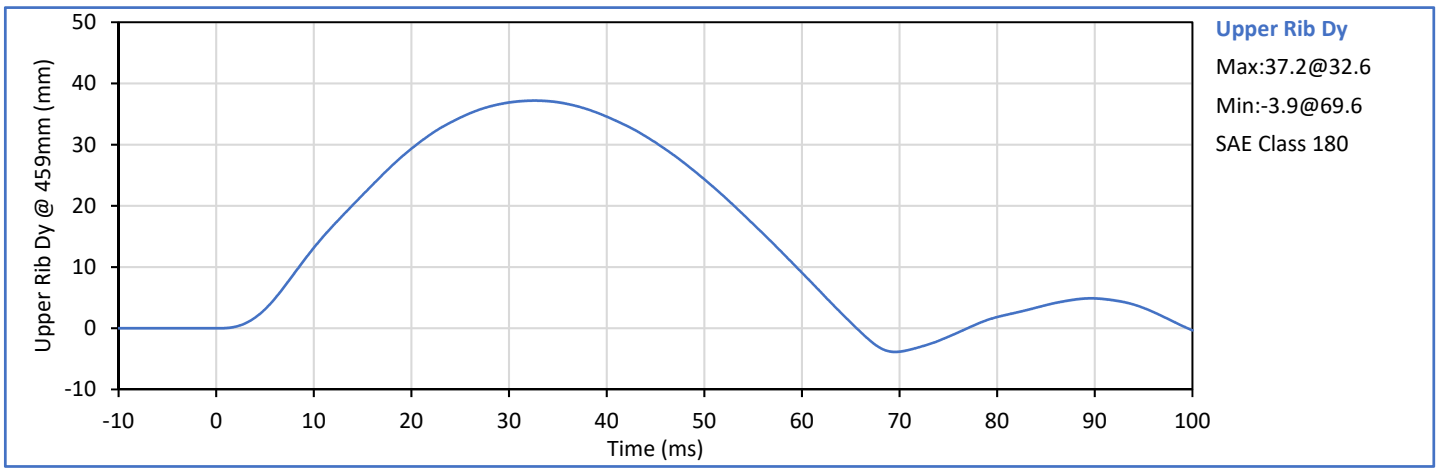
Applus IDIADA KARCO

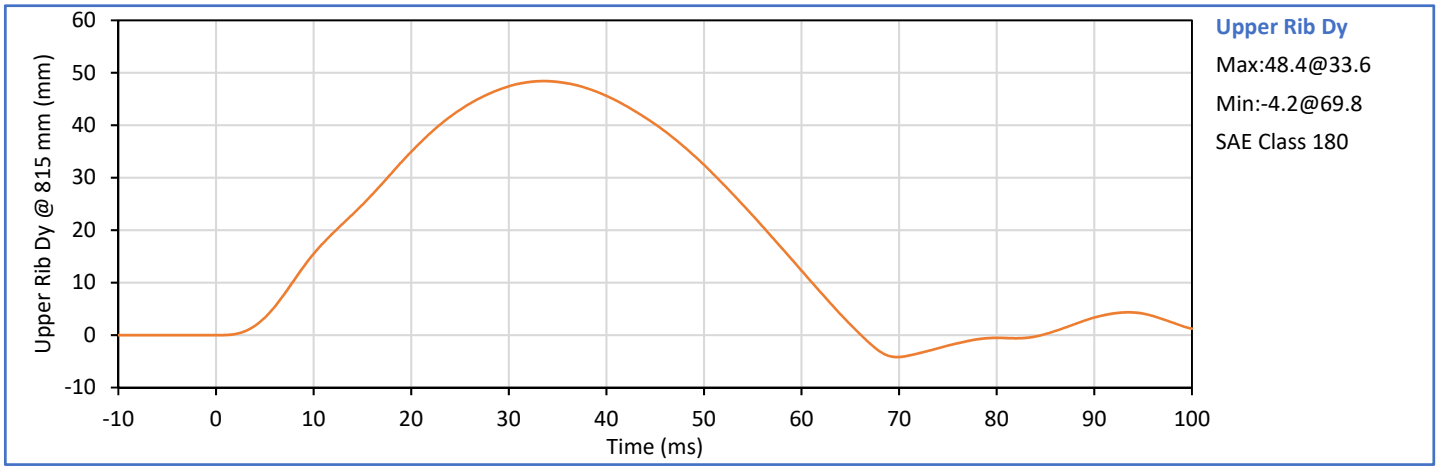
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F037

Test Date: 2021-01-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.2	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

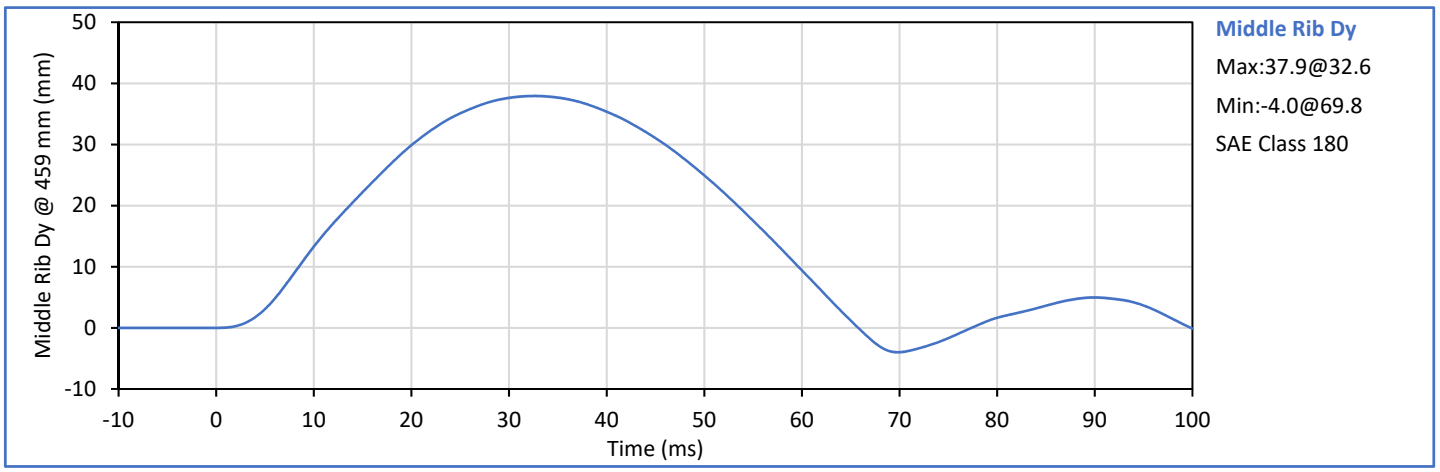
Applus IDIADA KARCO

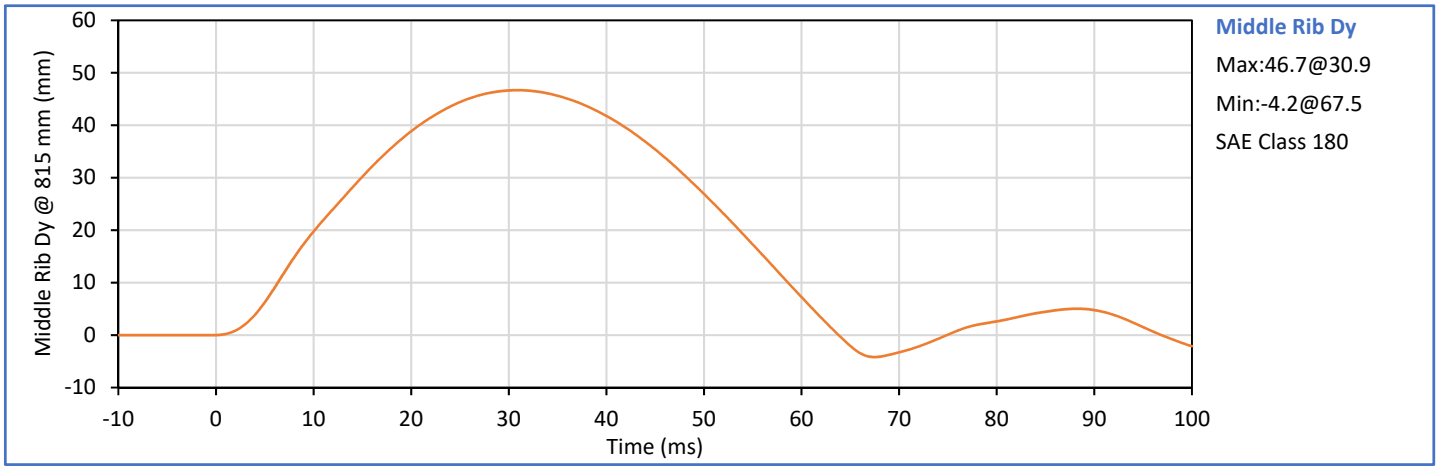
ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F037

Test Date: 2021-01-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.9	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	46.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

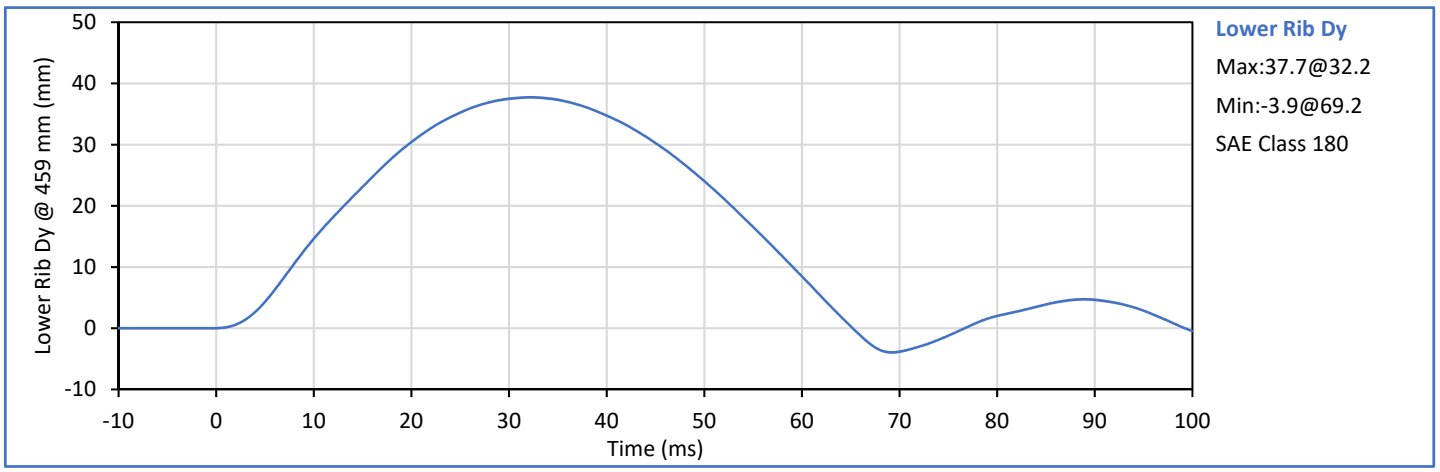
Applus IDIADA KARCO

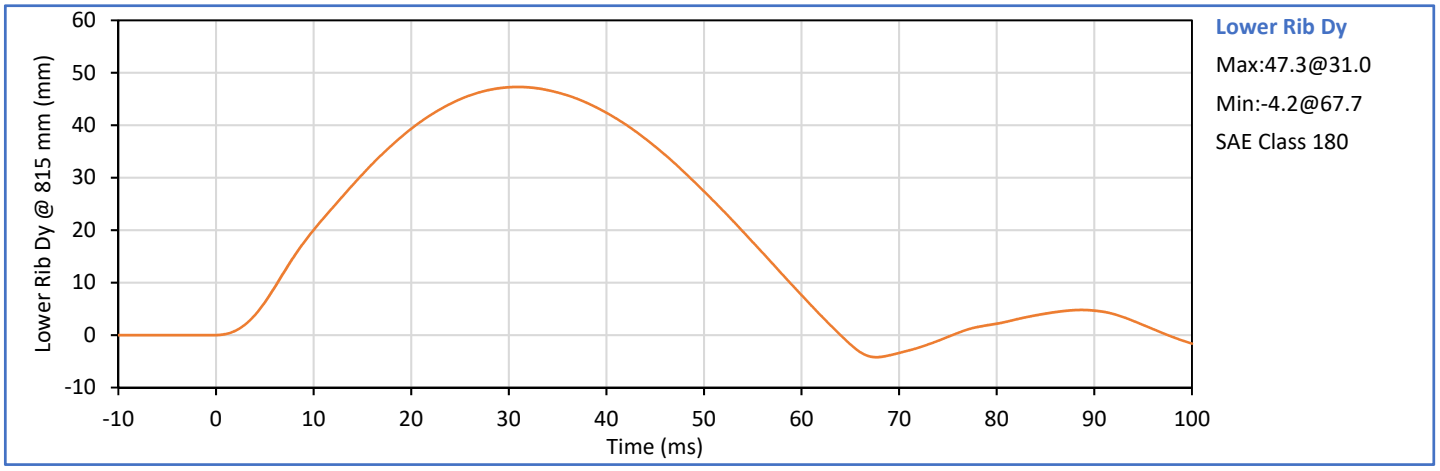
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2021-01-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.7	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	47.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

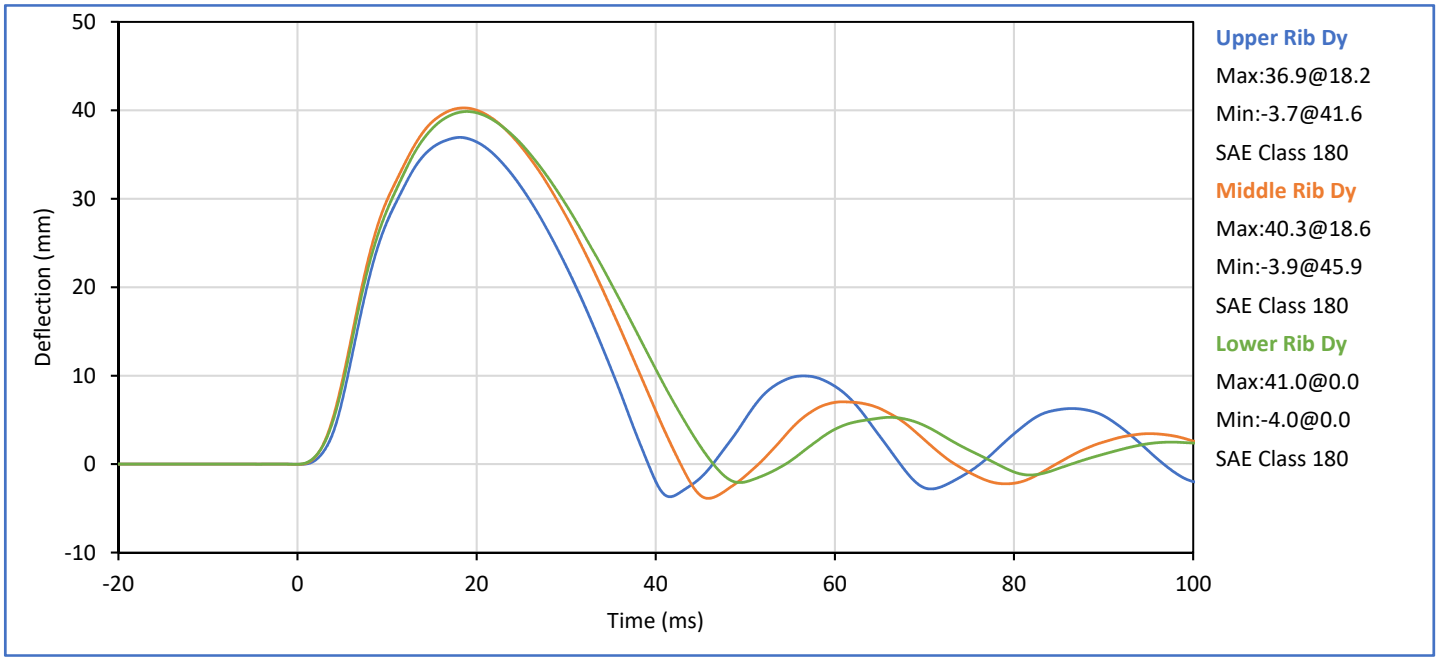
Applus IDIADA KARCO

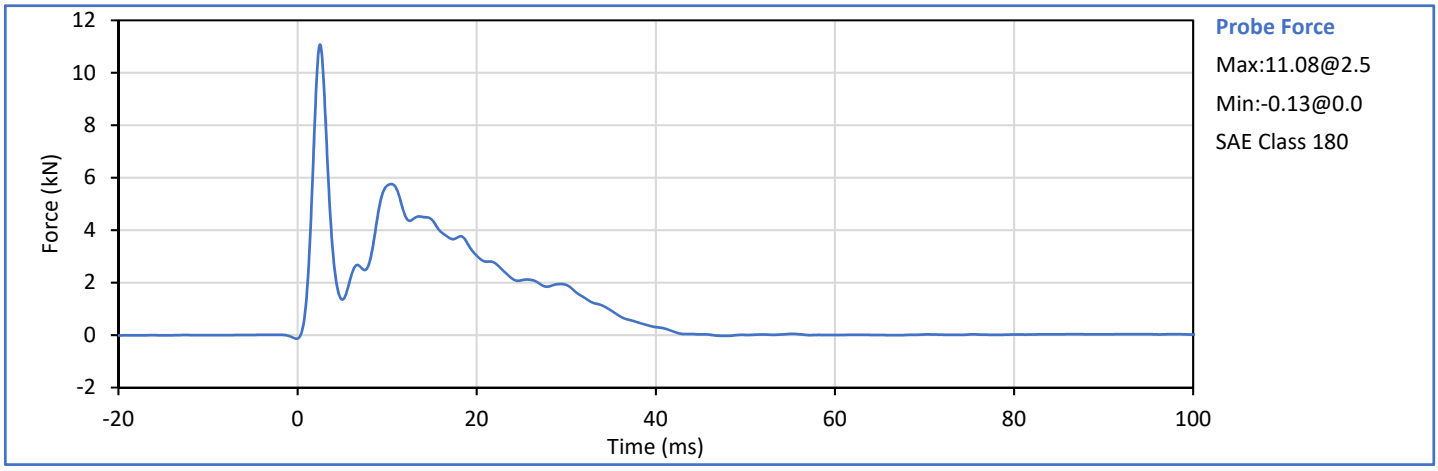
ES-2re 50th Male Side Impact ATD
Thorax Impact (Full Body)

ATD Serial No.: F037

Test Date: 2021-01-23

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	31	Pass
Impactor Velocity	m/s	5.40	5.60	5.50	Pass
Peak Upper Rib Dy	mm	34.0	41.0	36.9	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.3	Pass
Peak Lower Rib Dy	mm	37.0	44.0	39.9	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.76	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

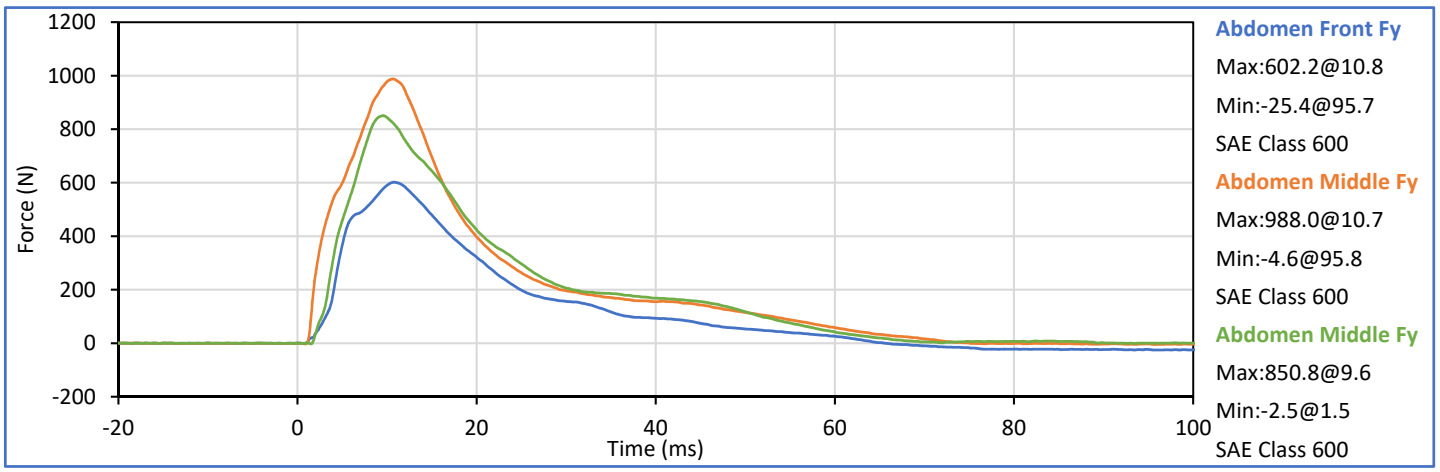
Applus IDIADA
KARCO

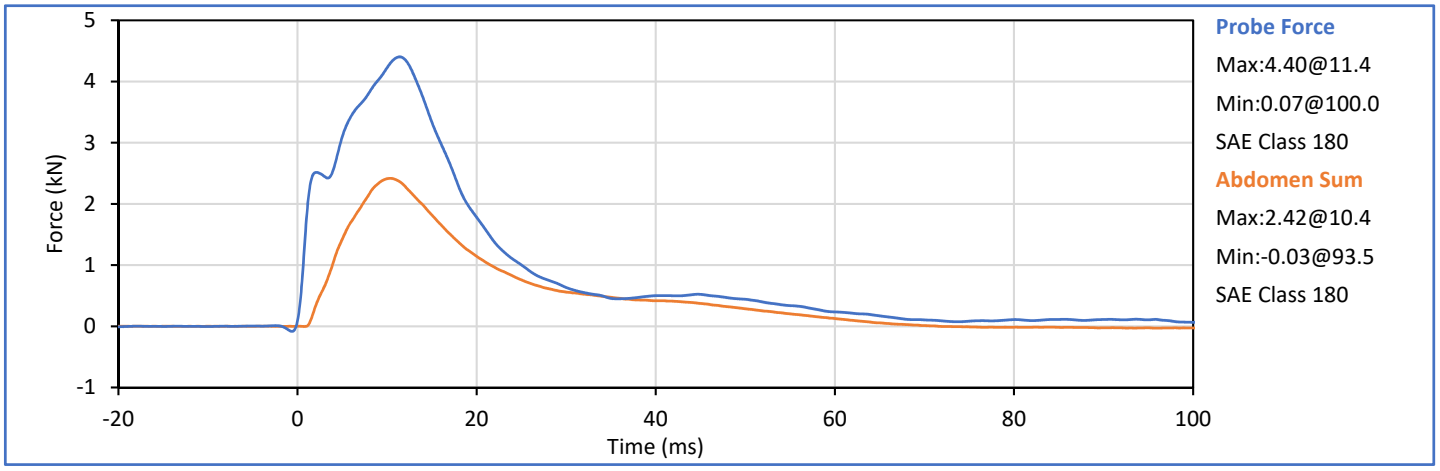
ES-2re 50th Male Side Impact ATD
Abdomen Impact

ATD Serial No.: F037

Test Date: 2021-01-23

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	3.90	4.10	4.01	Pass
Peak Impactor Force	kN	4.00	4.80	4.40	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.4	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.42	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

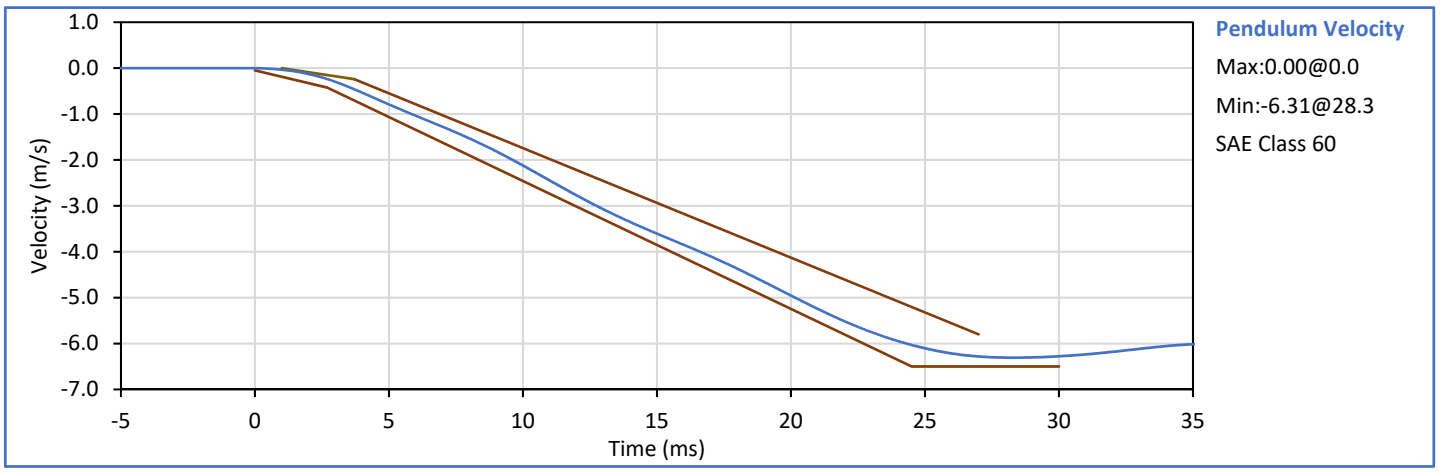
Applus IDIADA KARCO

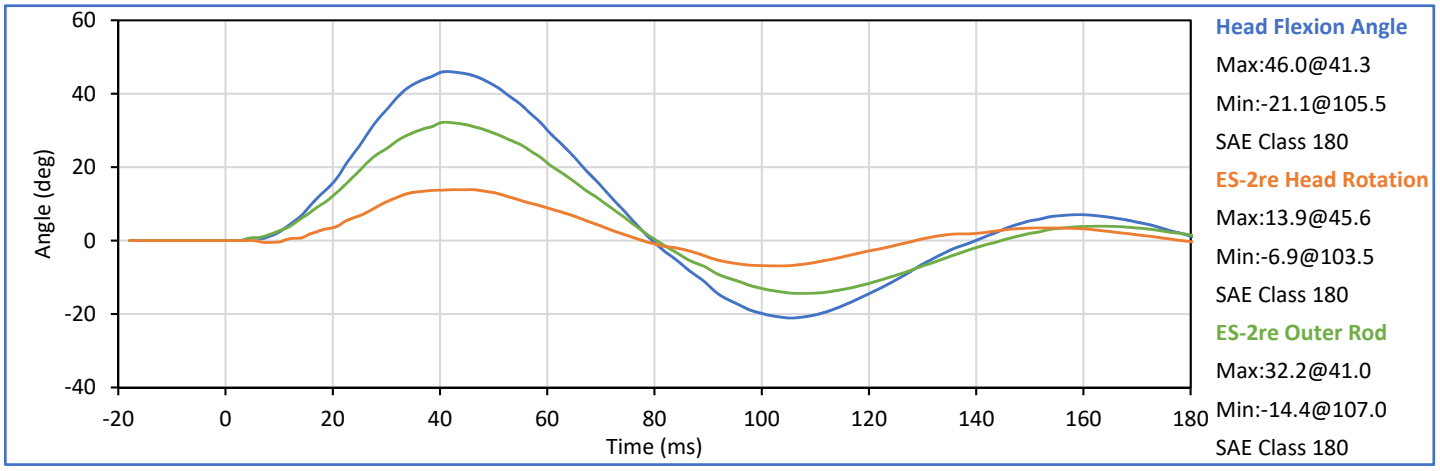
ES-2re 50th Male Side Impact ATD
Lumbar Spine Flexion

ATD Serial No.: F037

Test Date: 2021-01-22

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	6.08	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

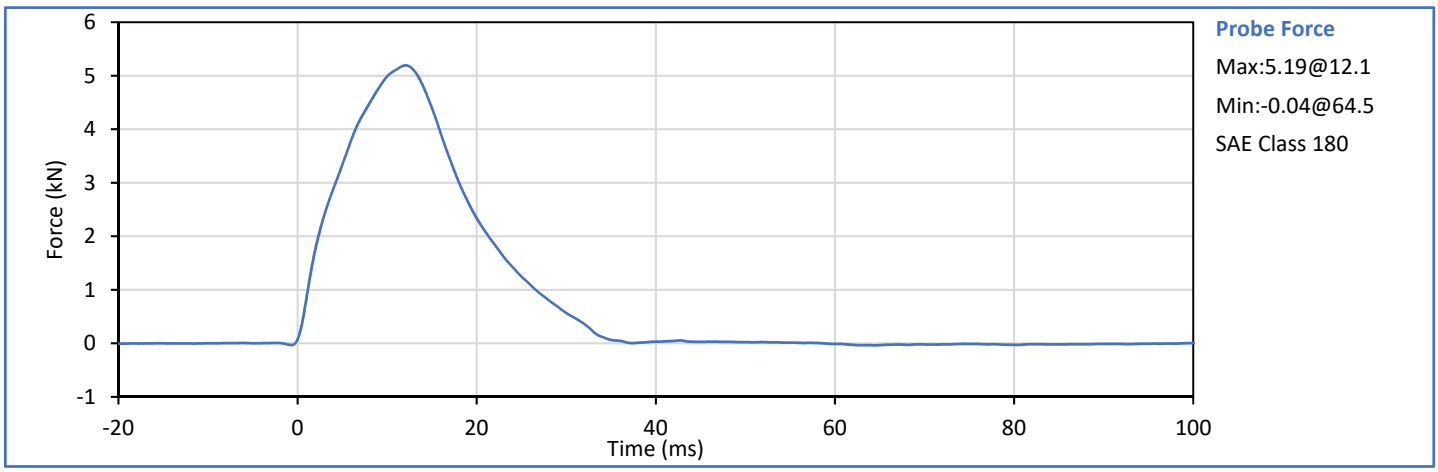
Applus IDIADA KARCO

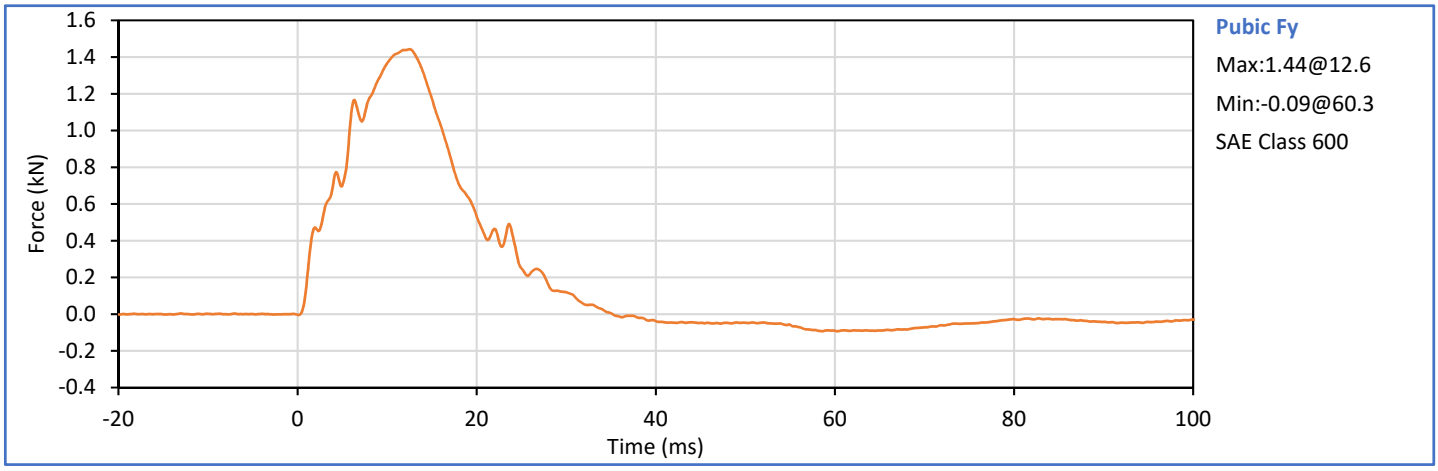
ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F037

Test Date: 2021-01-23

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.19	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.1	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.44	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	12.6	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: 2021-01-18

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

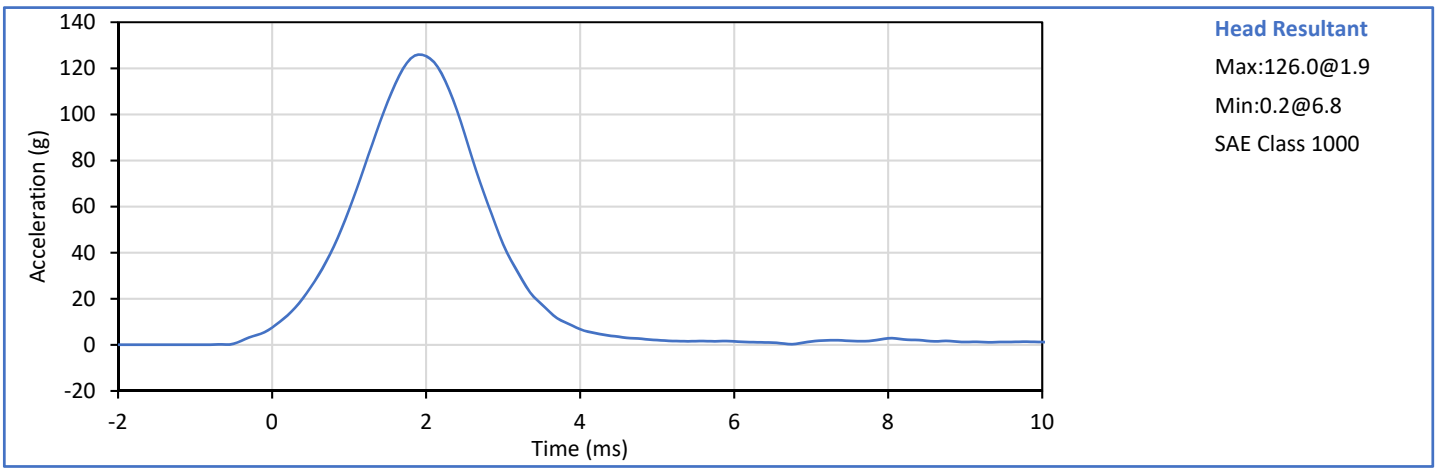
Applus IDIADA KARCO

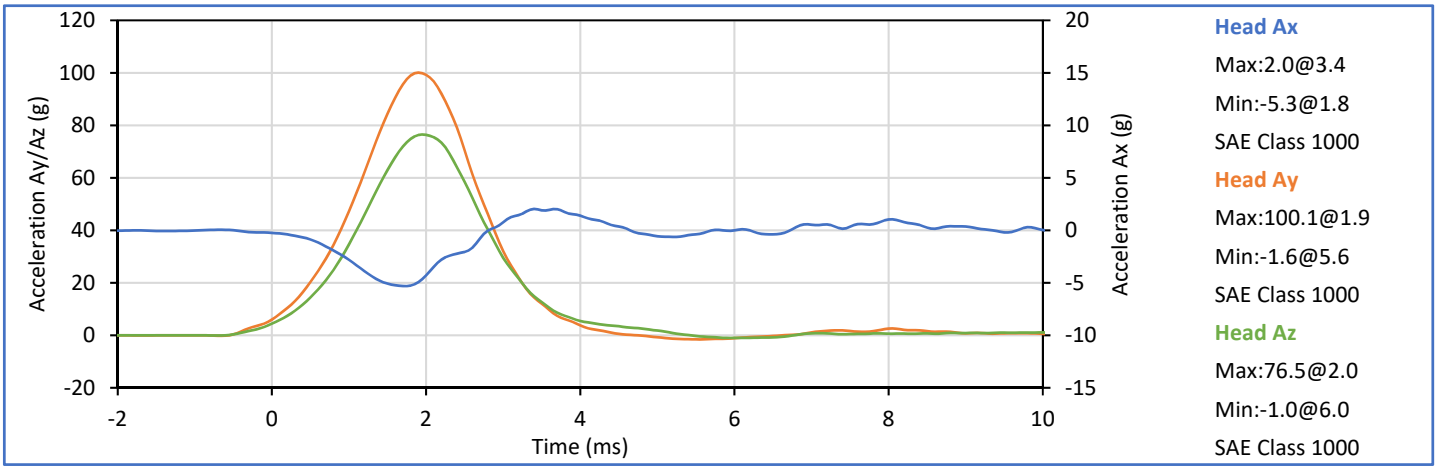
SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299

Test Date: 2021-01-18

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Humidity	%	10	70	21	Pass
Peak Resultant Acceleration	g	115.0	137.0	126.0	Pass
Peak Head Ax	g	-15.0	15.0	-5.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

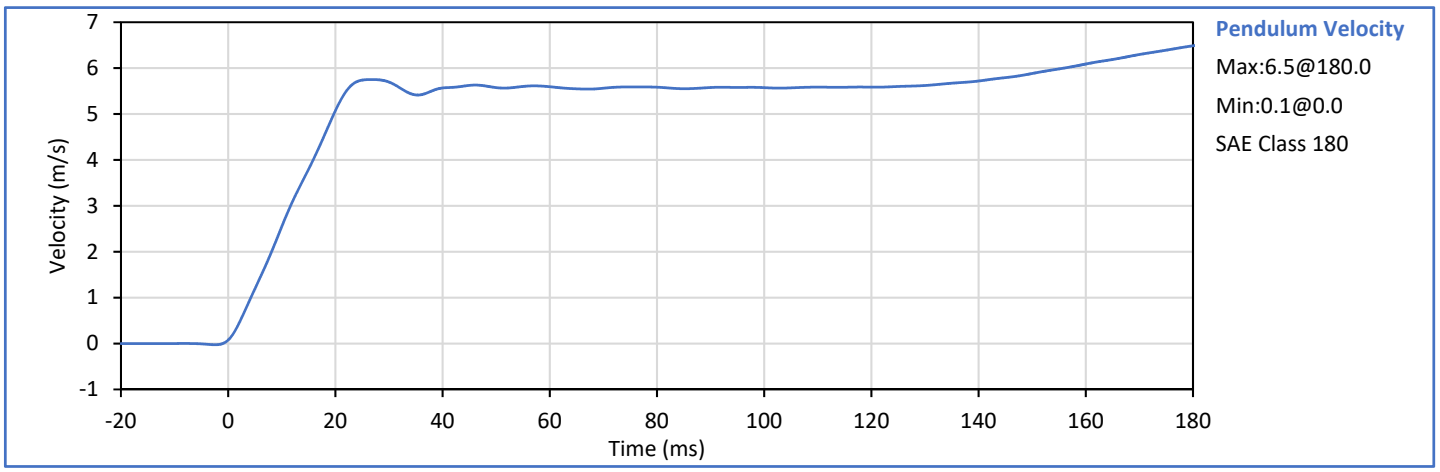
Applus IDIADA KARCO

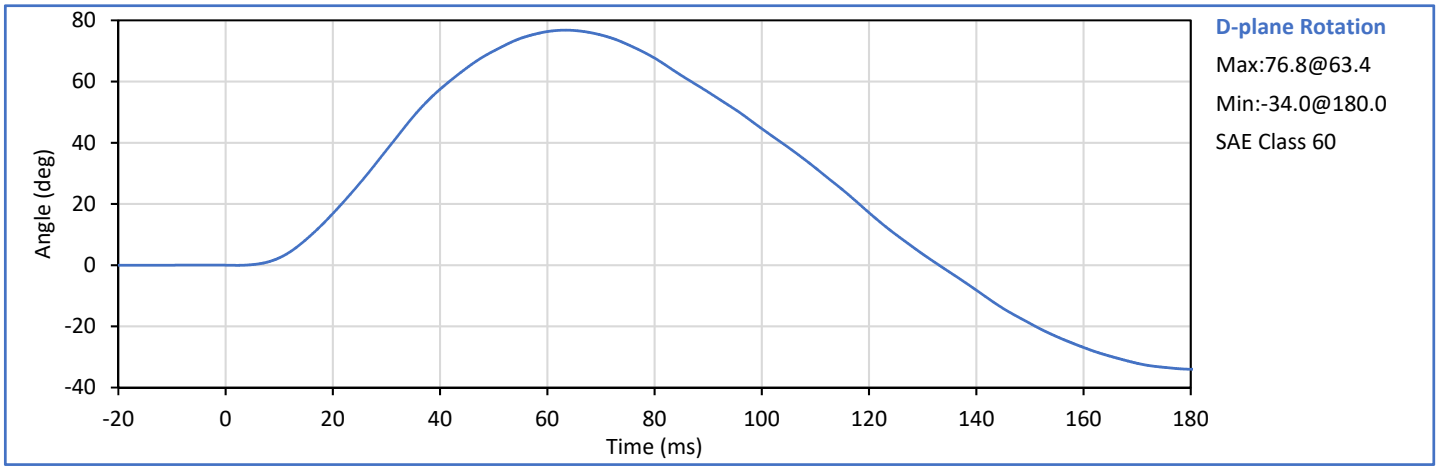
SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299

Test Date: 2021-01-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	26	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.55	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.80	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.07	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.74	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.75	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	76.8	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	63.4	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.3	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	117.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

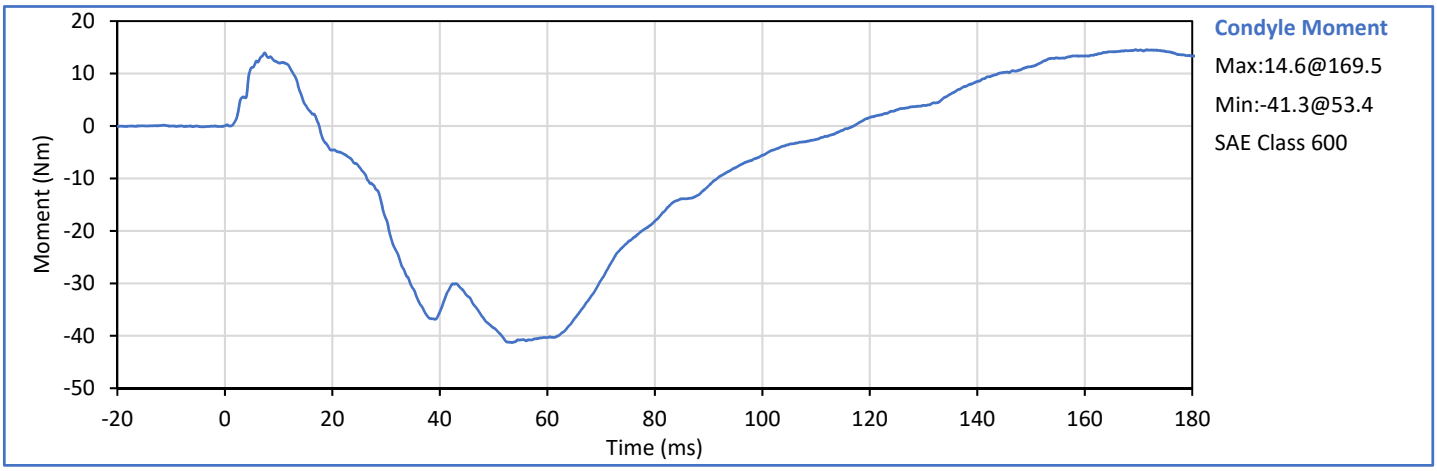
Approved By: P. Puzzuto

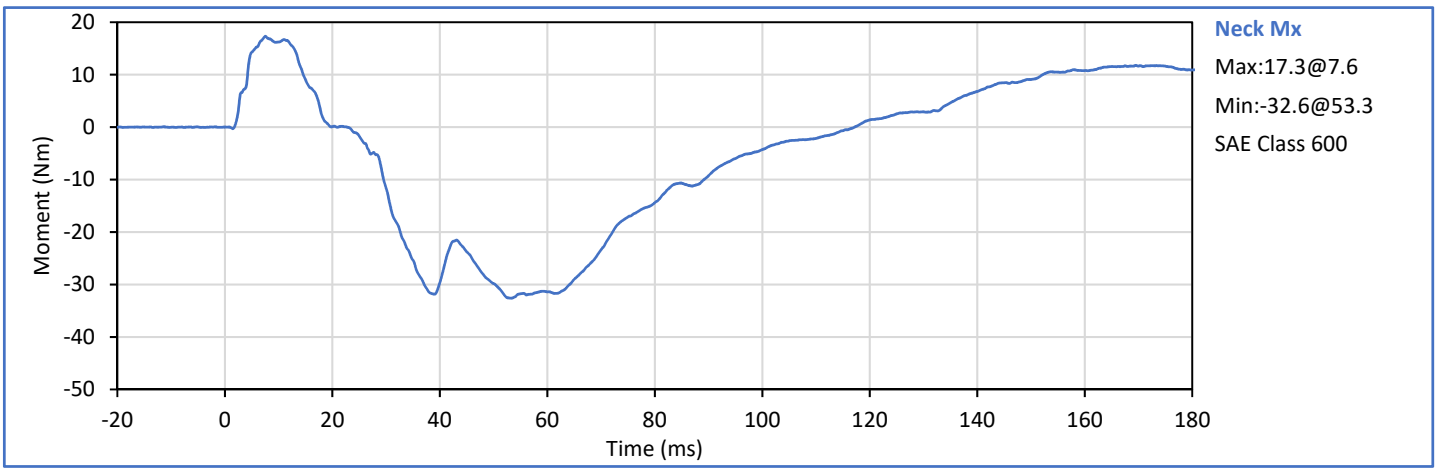
Applus IDIADA KARCO

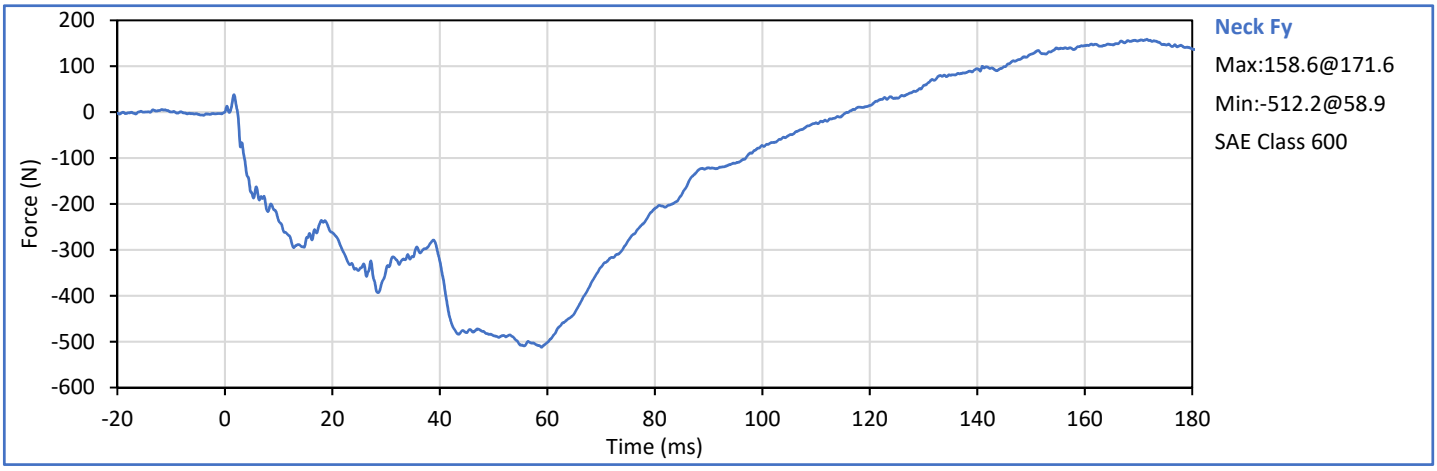
SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299

Test Date: 2021-01-20







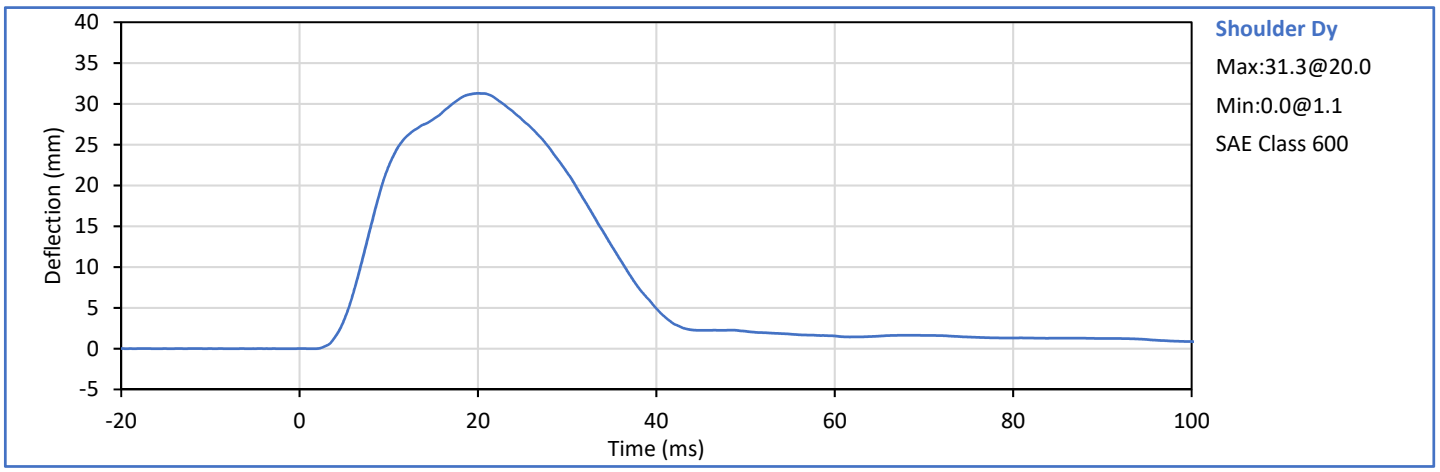
Applus IDIADA KARCO

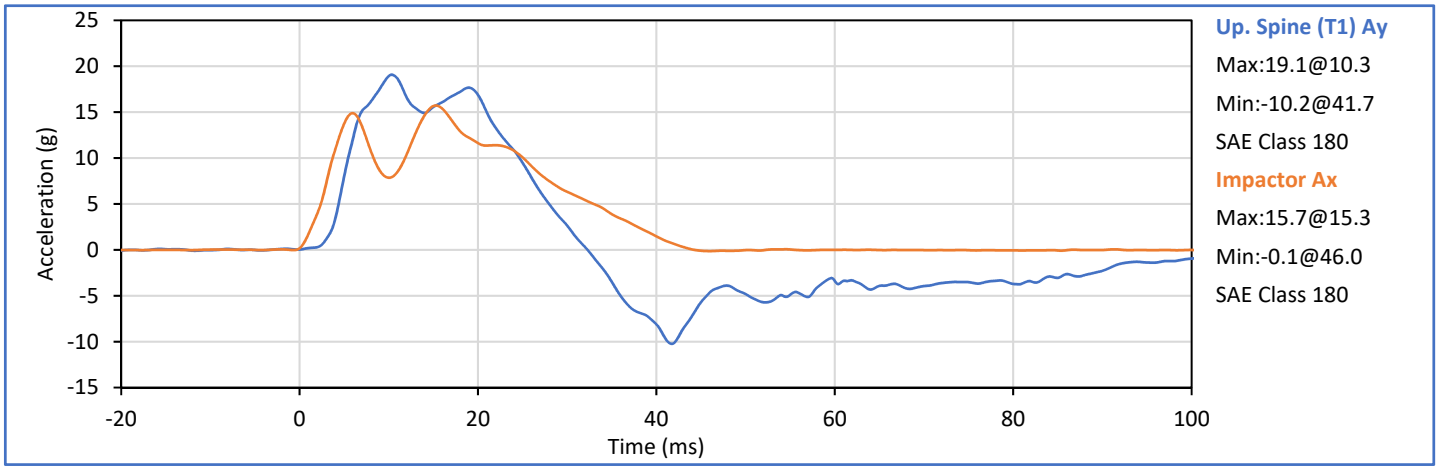
SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299

Test Date: 2021-01-25

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	4.31	Pass
Peak Shoulder Dy	mm	28.0	37.0	31.3	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.1	Pass
Peak Impactor Ax	g	13.0	18.0	15.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

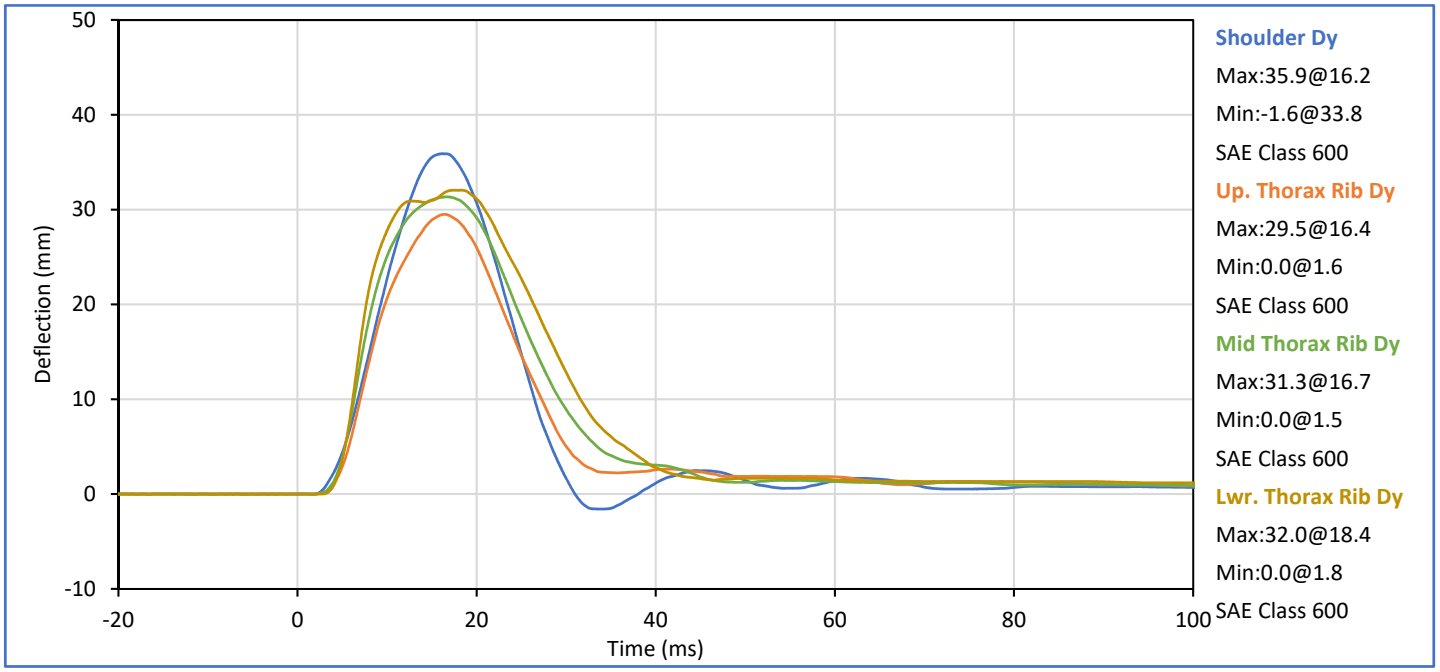
Applus IDIADA KARCO

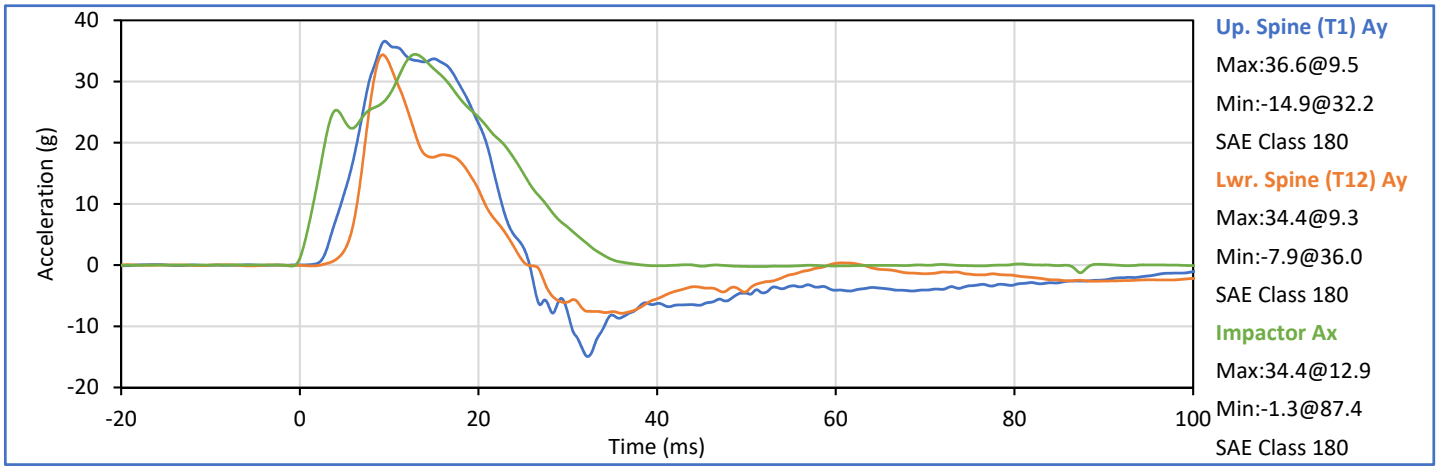
SID-IIs Small Side Impact ATD
Thorax (With Arm)

ATD Serial No.: 299

Test Date: 2021-01-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	42	Pass
Impactor Velocity	m/s	6.60	6.80	6.65	Pass
Peak Shoulder Dy	mm	31.0	40.0	35.9	Pass
Peak Upper Rib Dy	mm	25.0	32.0	29.5	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.3	Pass
Peak Lower Rib Dy	mm	32.0	38.0	32.0	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.6	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	34.4	Pass
Peak Impactor Ax	g	30.0	36.0	34.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

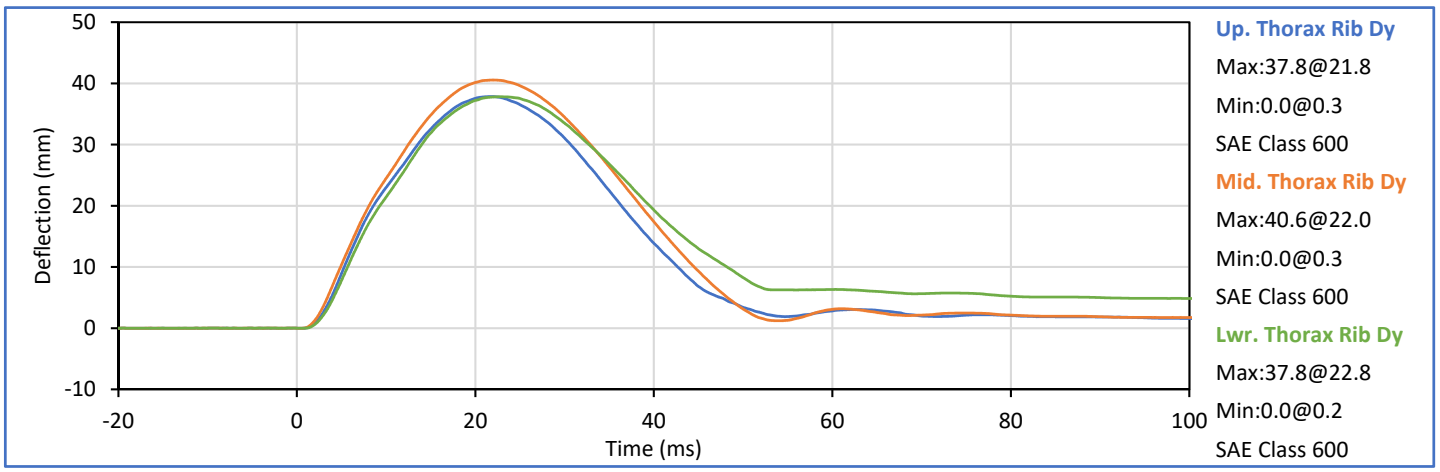
Applus IDIADA KARCO

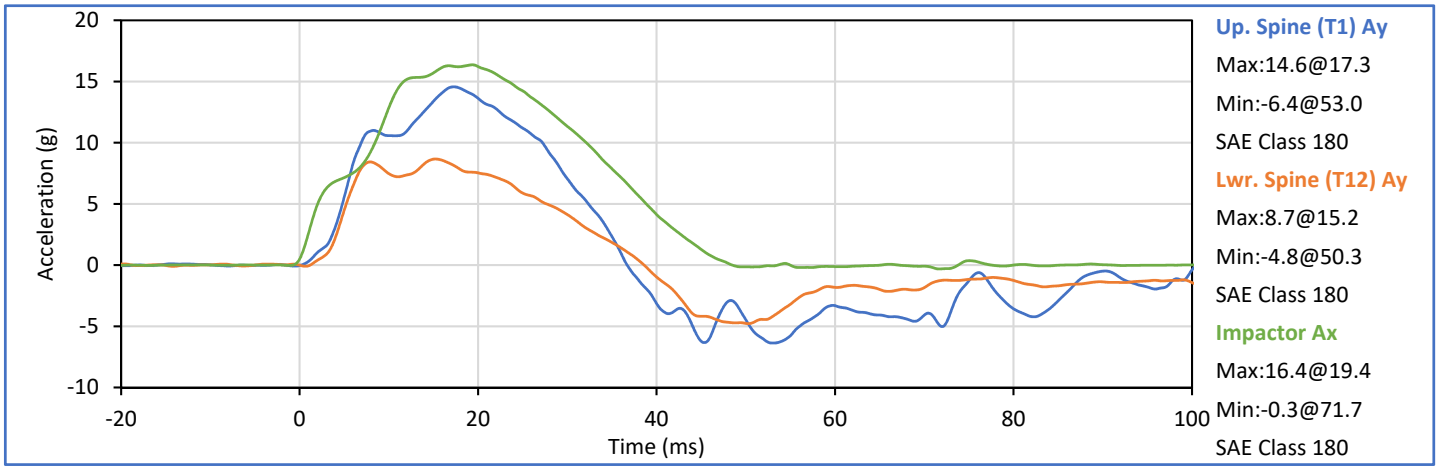
SID-IIs Small Side Impact ATD
Thorax (No Arm)

ATD Serial No.: 299

Test Date: 2021-01-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	26	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Rib Dy	mm	32.0	40.0	37.8	Pass
Peak Middle Rib Dy	mm	39.0	45.0	40.6	Pass
Peak Lower Rib Dy	mm	35.0	43.0	37.8	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	14.6	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	8.7	Pass
Peak Impactor Ax	g	14.0	18.0	16.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

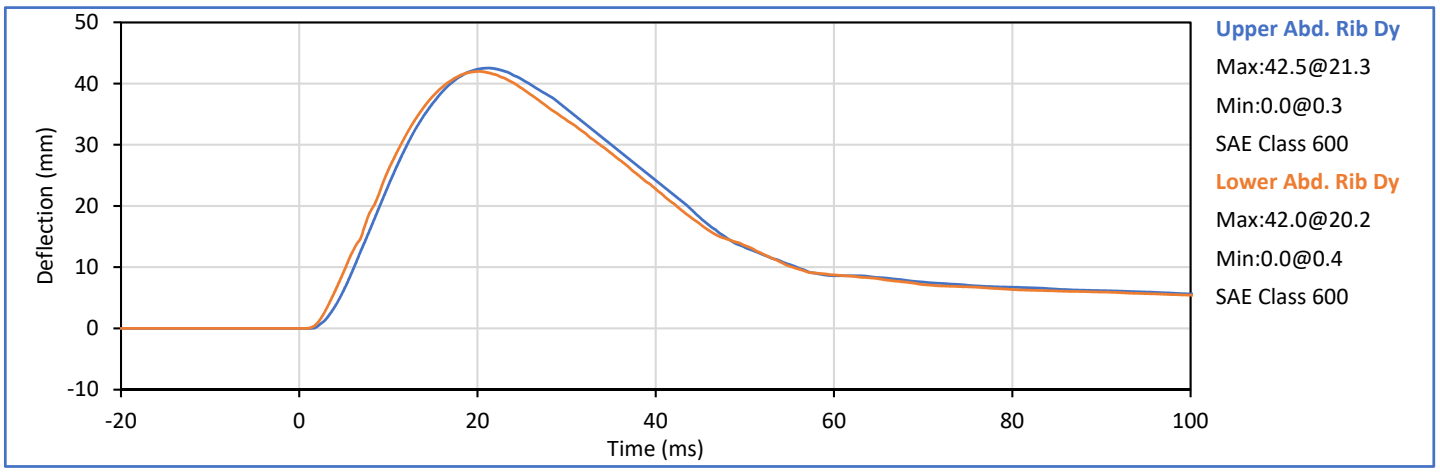
Applus IDIADA KARCO

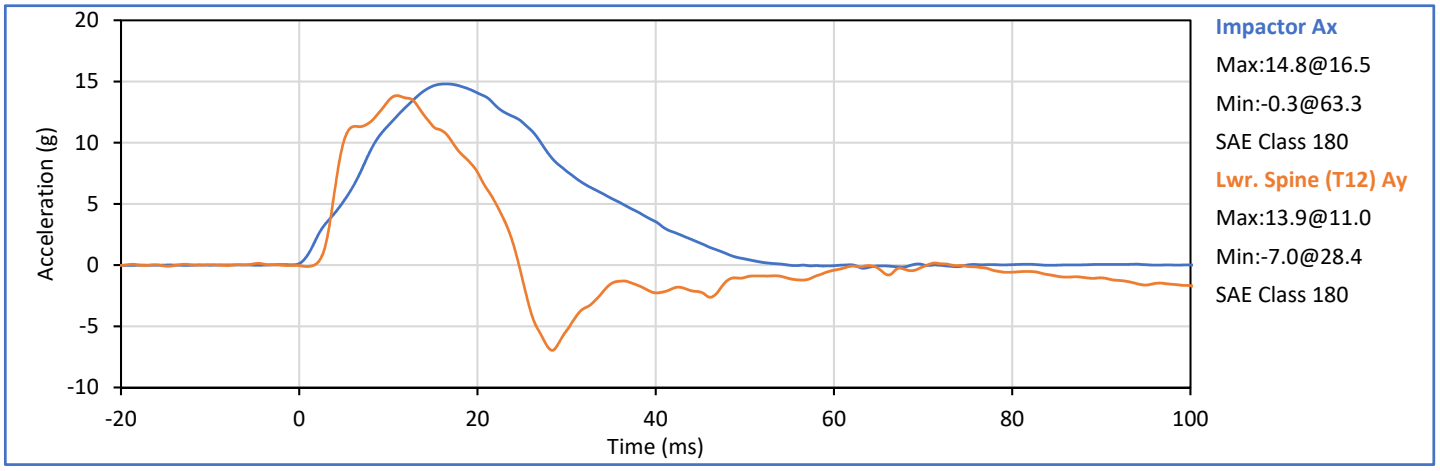
SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299

Test Date: 2021-01-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	26	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.5	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	42.0	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	13.9	Pass
Peak Impactor Ax	g	12.0	16.0	14.8	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

Applus IDIADA KARCO

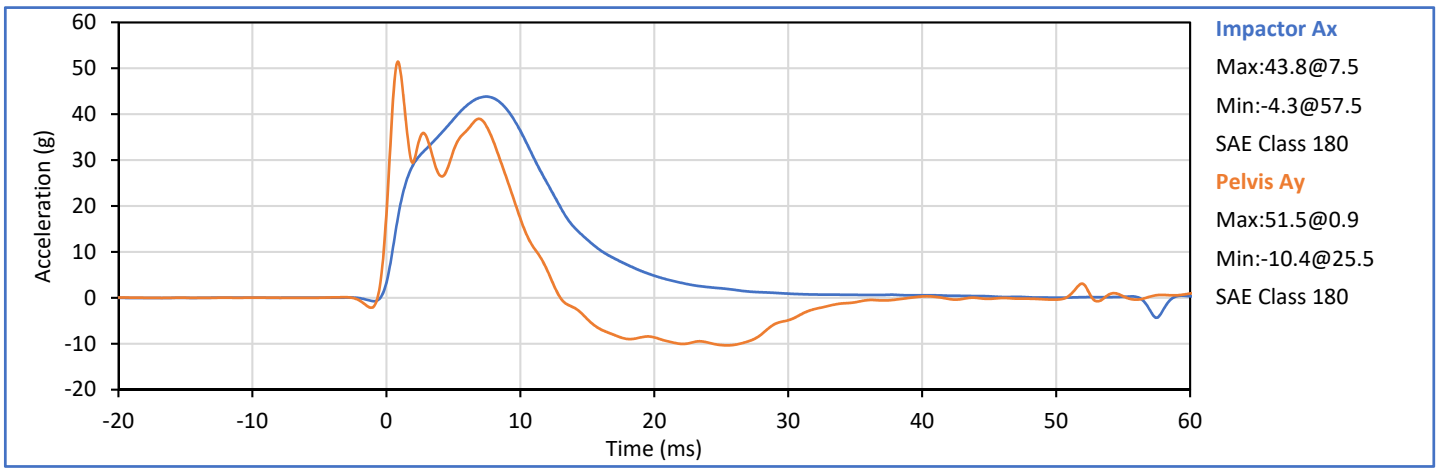
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

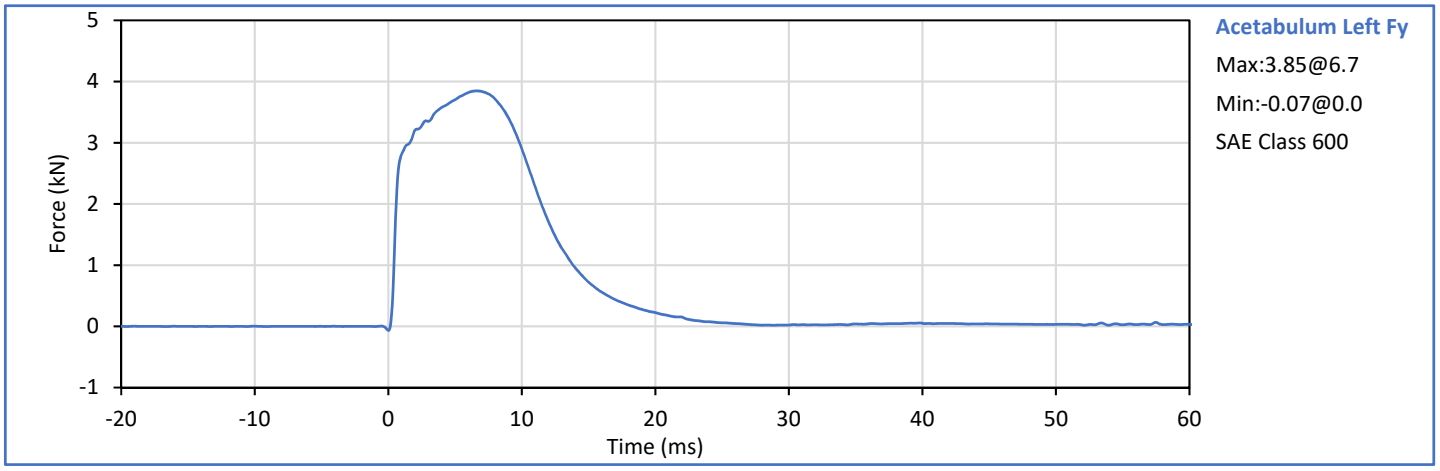
ATD Serial No.: 299

Test Date: 2021-01-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.85	Pass
Pelvis Ay after 6ms	g	34.0	42.0	39.0	Pass
Peak Impactor Ax	g	38.0	47.0	43.8	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 13433





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 299 Test Date: 2021-01-25

Pelvis Plug S/N: 13433

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13433
Test Number 11075
Report Number 11113
Test Date 9/20/2019 8:18:53 AM

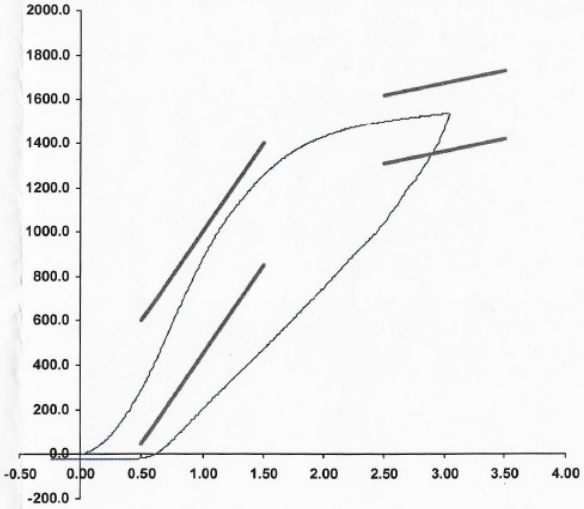
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	300.57	50.00	600.00
Force @ 1.5 mm (N)	1,258.15	850.00	1,400.00
Force @ 2.5 mm (N)	1,501.24	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,538.26	1,361.00	1,673.00

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 b 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

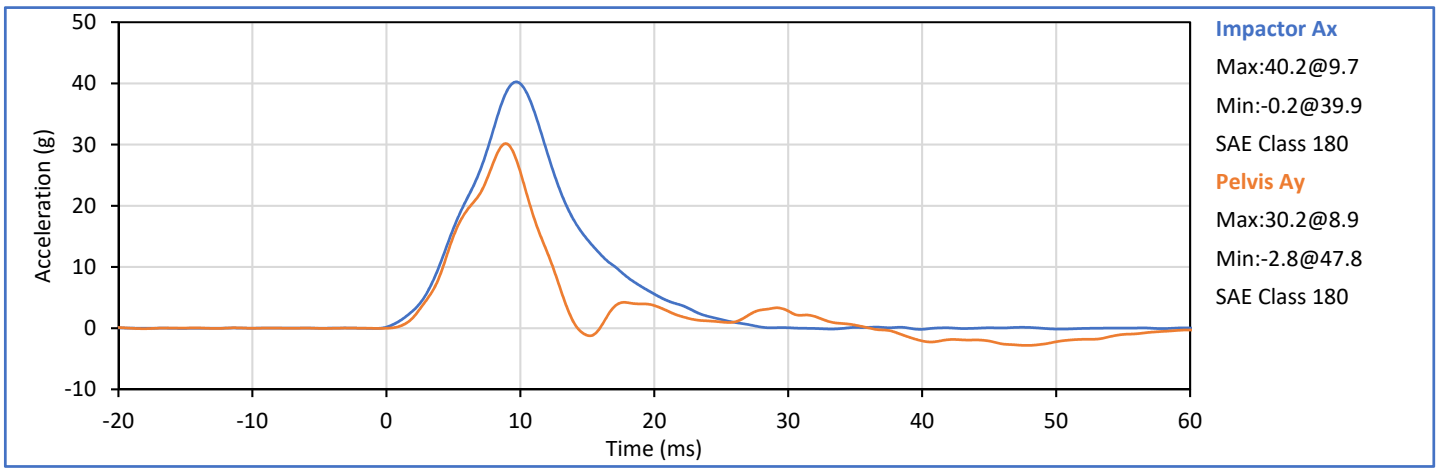
ATD Serial No.: 299

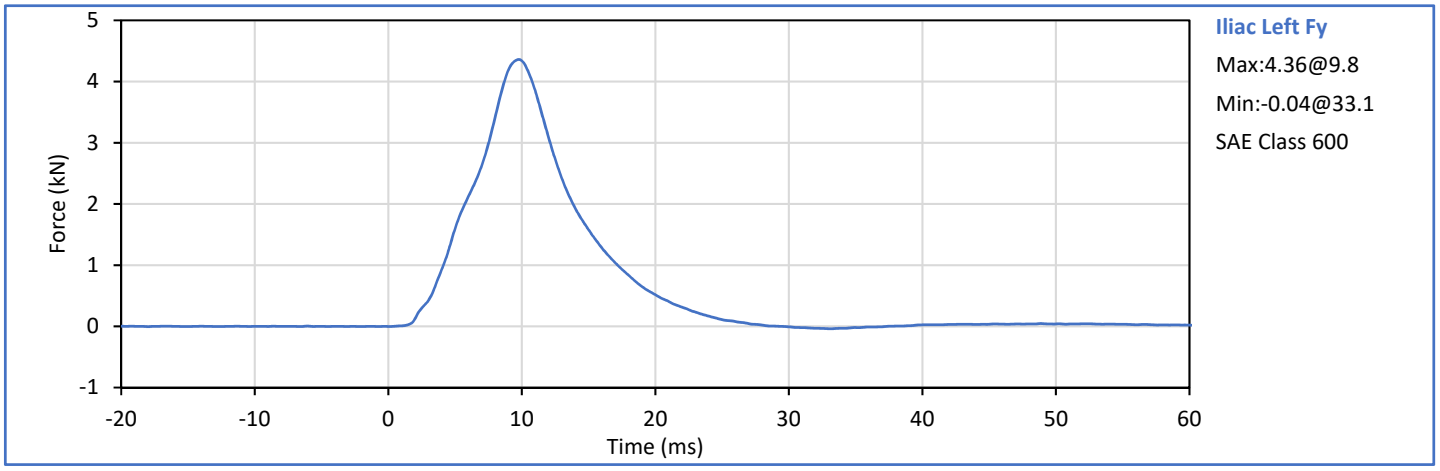
Test Date: 2021-01-25

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	26	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Iliac Fy	kN	4.10	5.10	4.36	Pass
Pelvis Ay after 6ms	g	28.0	39.0	30.2	Pass
Peak Impactor Ax	g	36.0	45.0	40.2	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: F037

Applus IDIADA KARCO

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

ATD Serial No.: F037

Test Date: 2021-01-29

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	909	Pass
2 - Seat to Shoulder Joint	mm	558	572	565	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	350	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	101	Pass
5 - Sole to Seat, Sitting	mm	433	451	443	Pass
6 - Head Width	mm	152	158	156	Pass
7 - Shoulder/Arm Width	mm	461	479	475	Pass
8 - Thorax Width	mm	322	332	326	Pass
9 - Abdomen Width	mm	273	287	277	Pass
10 - Pelvis Lap Width	mm	359	373	365	Pass
11 - Head Depth	mm	196	206	200	Pass
12 - Thorax Depth	mm	262	272	268	Pass
13 - Abdomen Depth	mm	194	204	198	Pass
14 - Pelvis Depth	mm	235	245	240	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	613	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

Approved By: P. Puzzuto

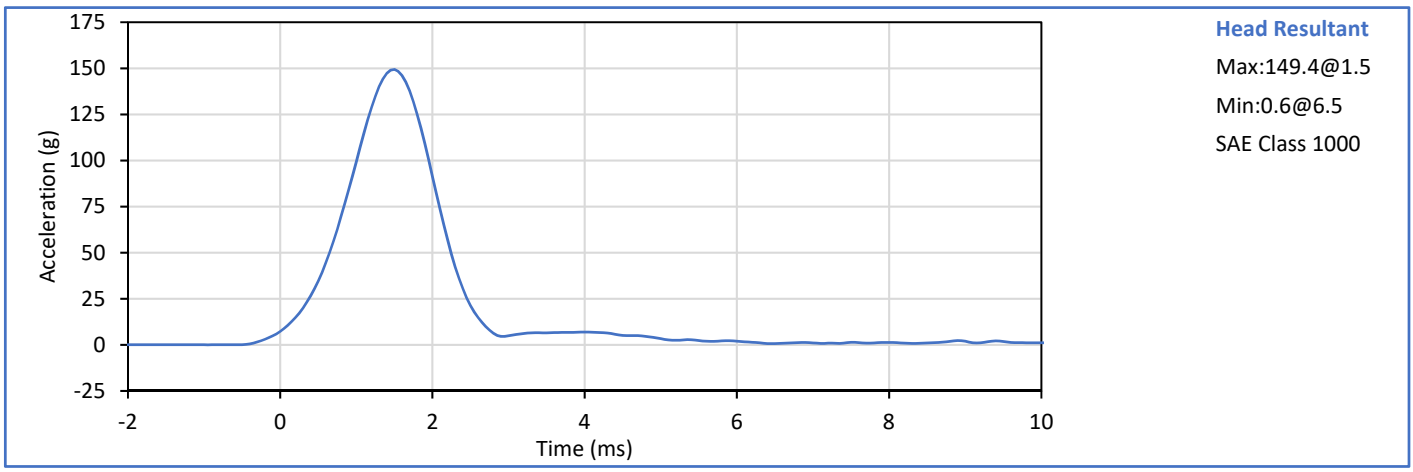
Applus IDIADA
KARCO

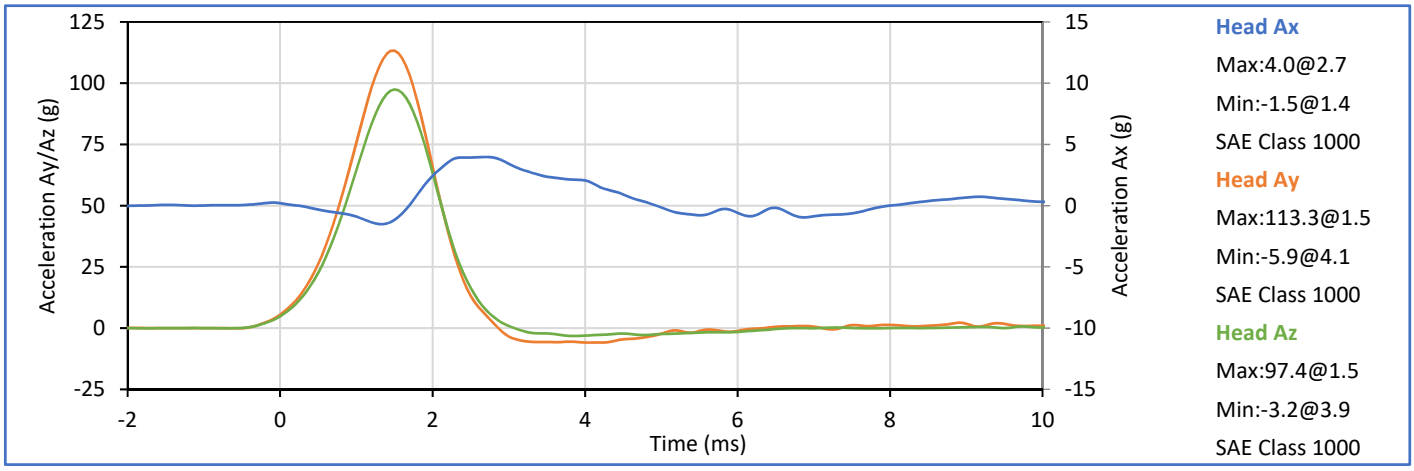
ES-2re 50th Male Side Impact ATD
Head Drop

ATD Serial No.: F037

Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
Peak Resultant Acceleration	g	125.0	155.0	149.4	Pass
Peak Head Ax	g	-15.0	15.0	4.0	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

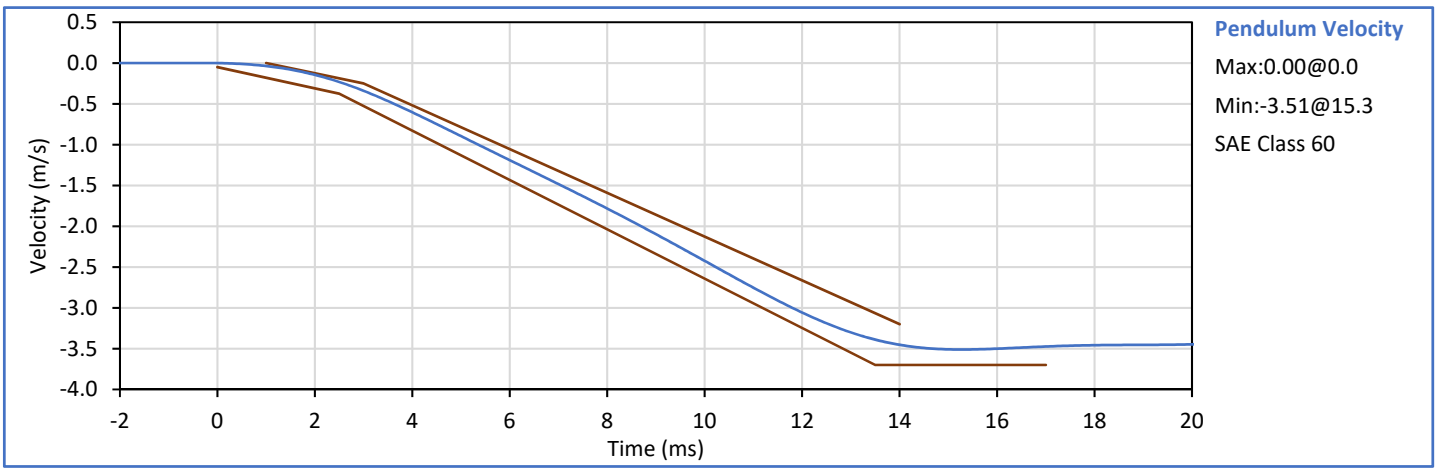
Applus IDIADA KARCO

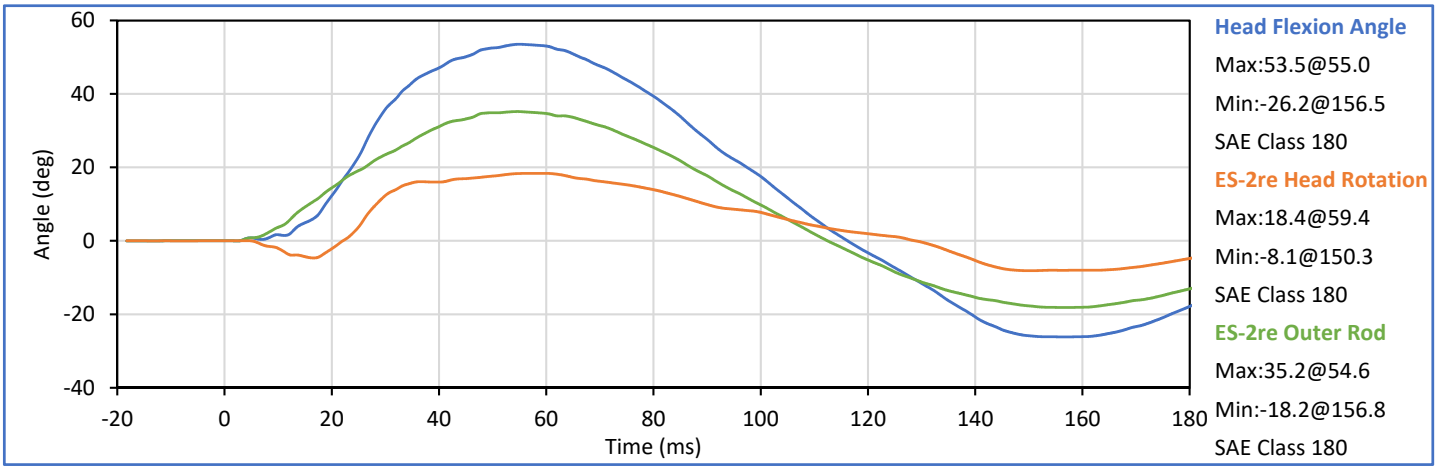
ES-2re 50th Male Side Impact ATD
Neck Flexion

ATD Serial No.: F037

Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	3.30	3.50	3.44	Pass
Peak Headform Flexion	deg	49.0	59.0	53.5	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	55.0	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	61.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

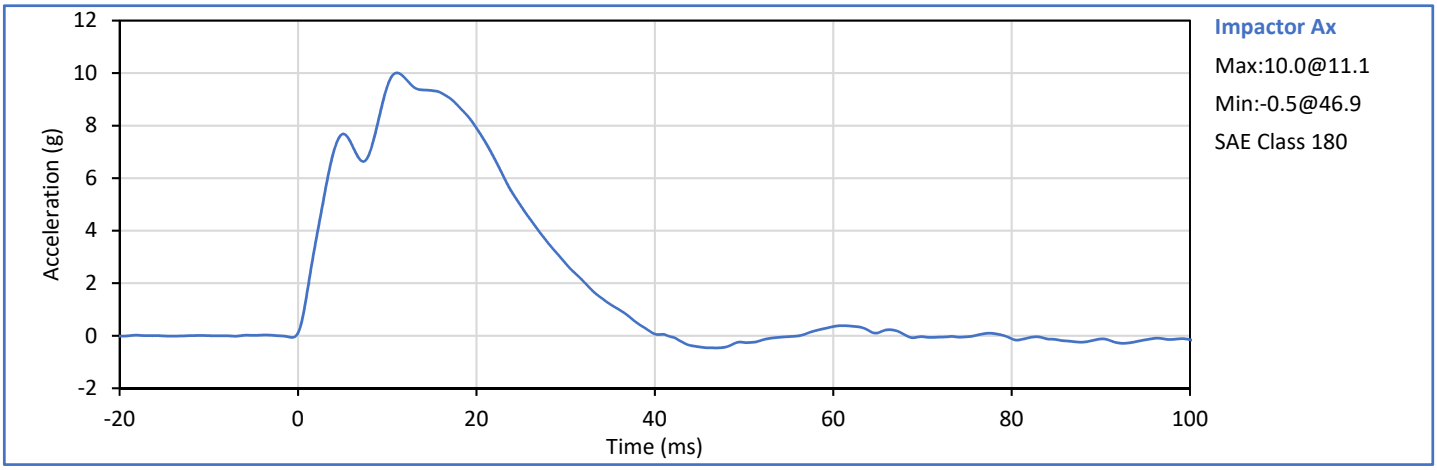
Applus IDIADA KARCO

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

ATD Serial No.: F037

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.0	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Ax	g	7.5	10.5	10.0	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

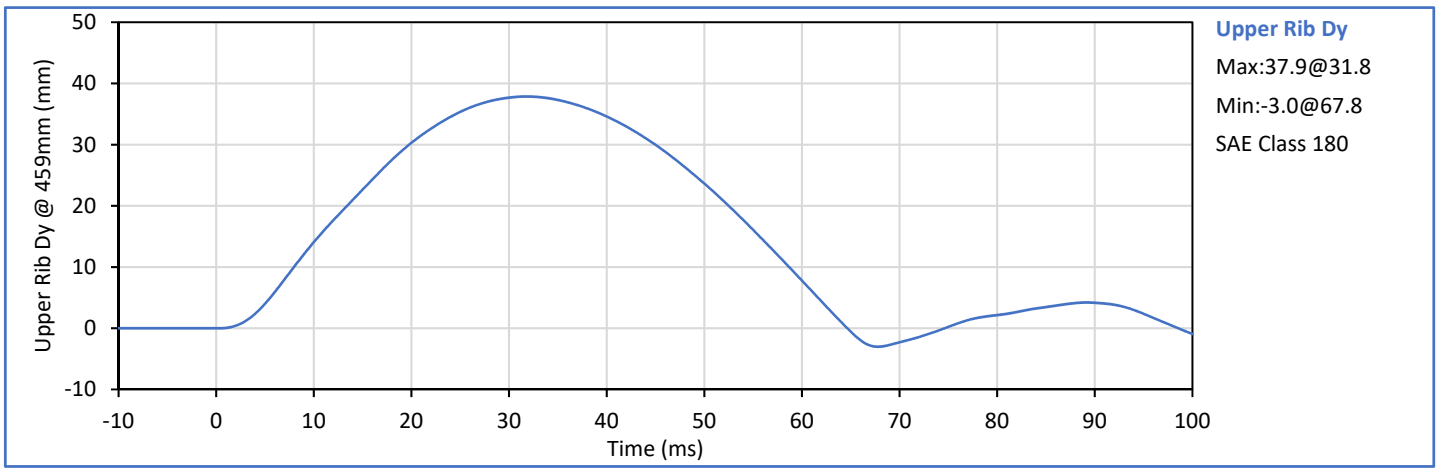
Applus IDIADA KARCO

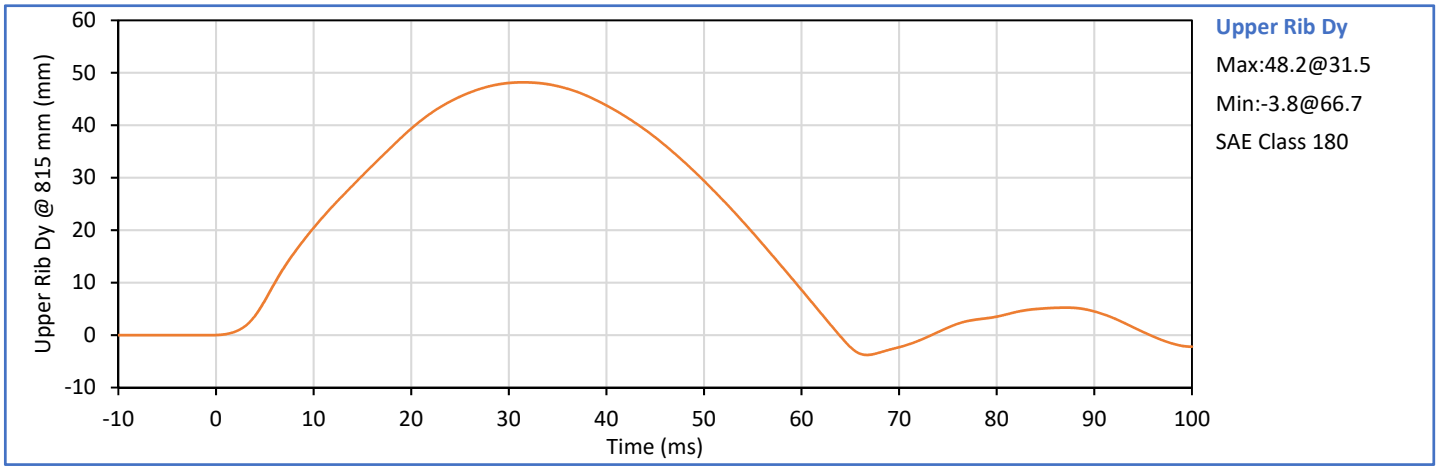
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F037

Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.9	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.2	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

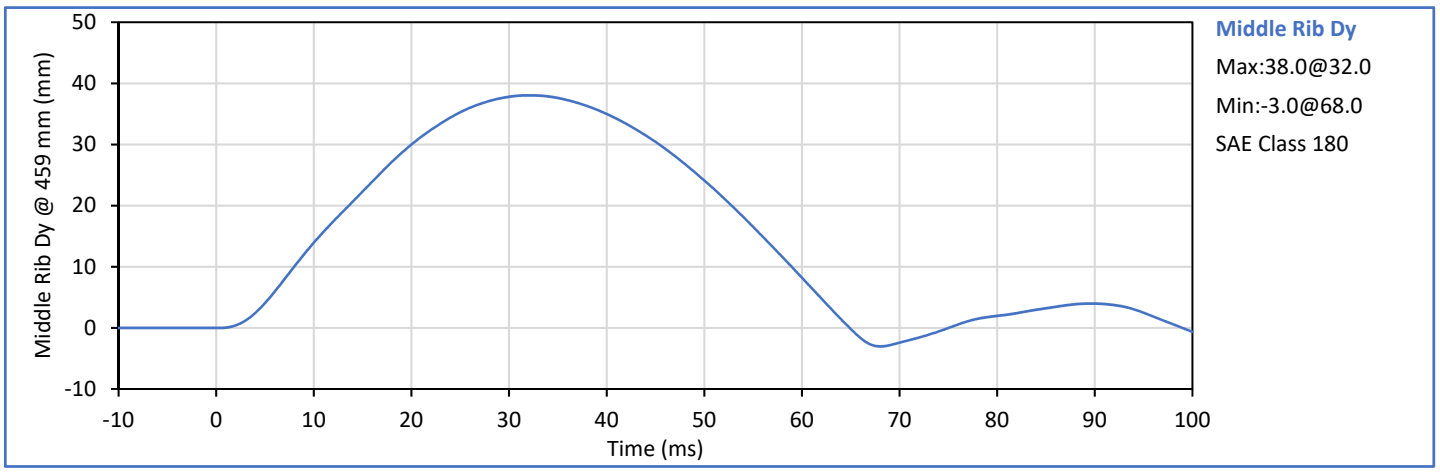
Applus IDIADA KARCO

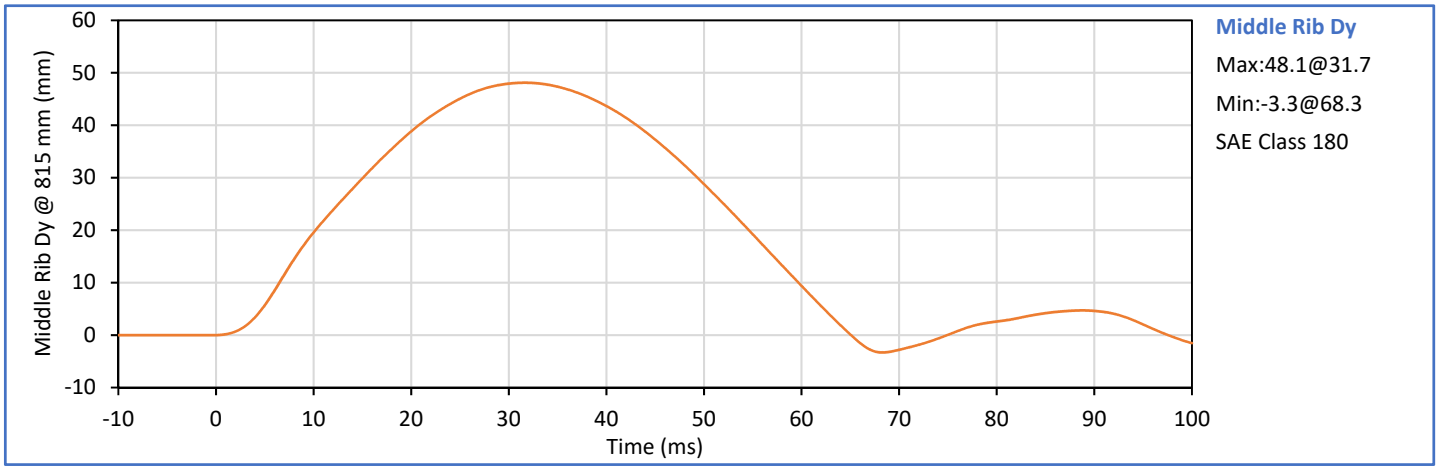
ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F037

Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.0	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	48.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

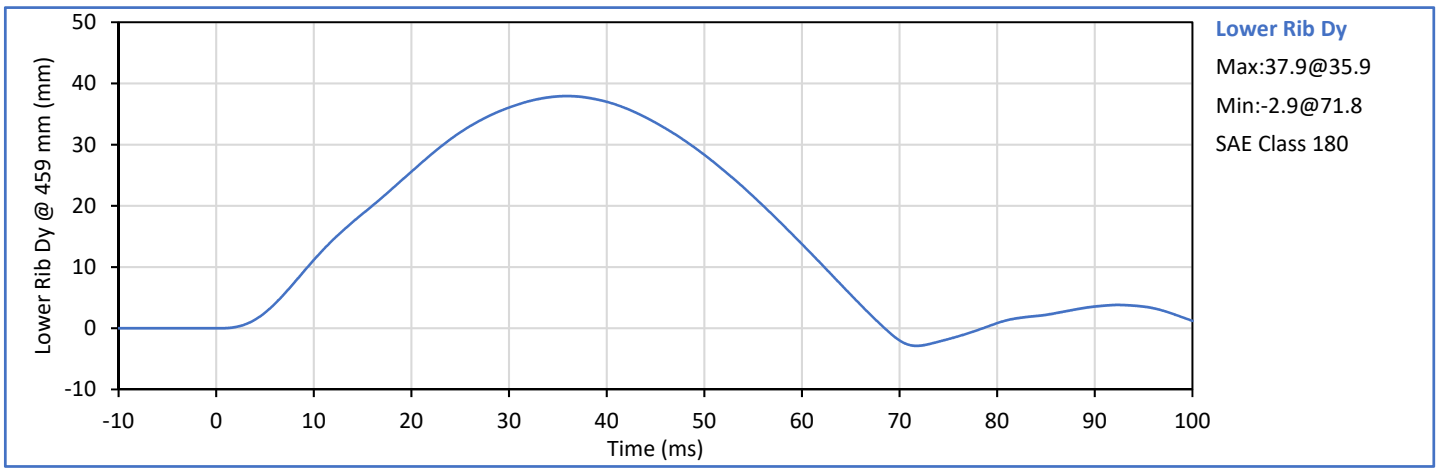
Applus IDIADA KARCO

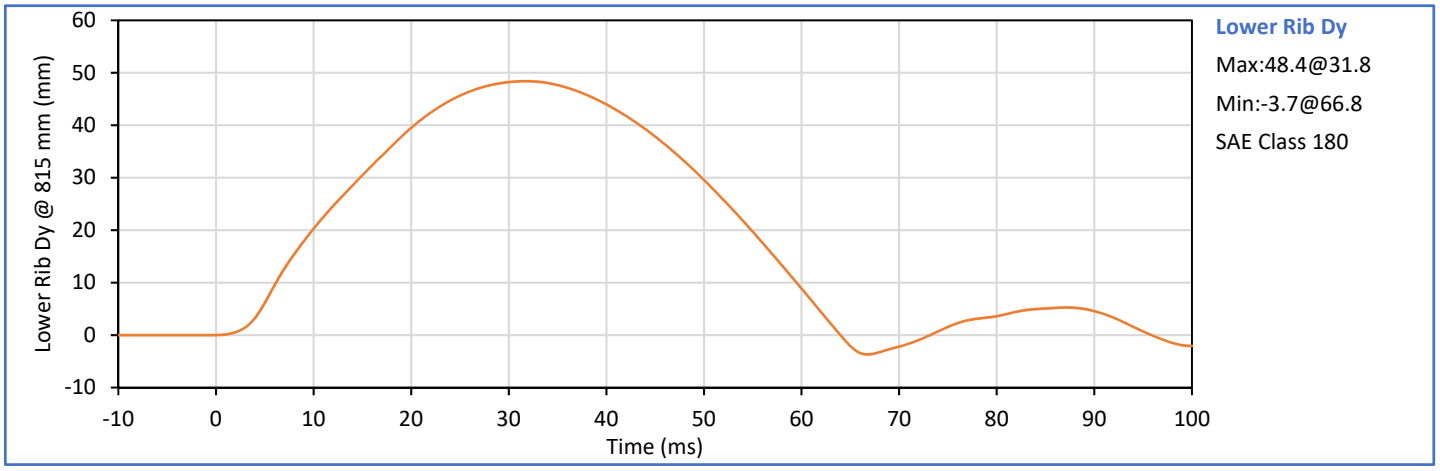
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F037

Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.9	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	48.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

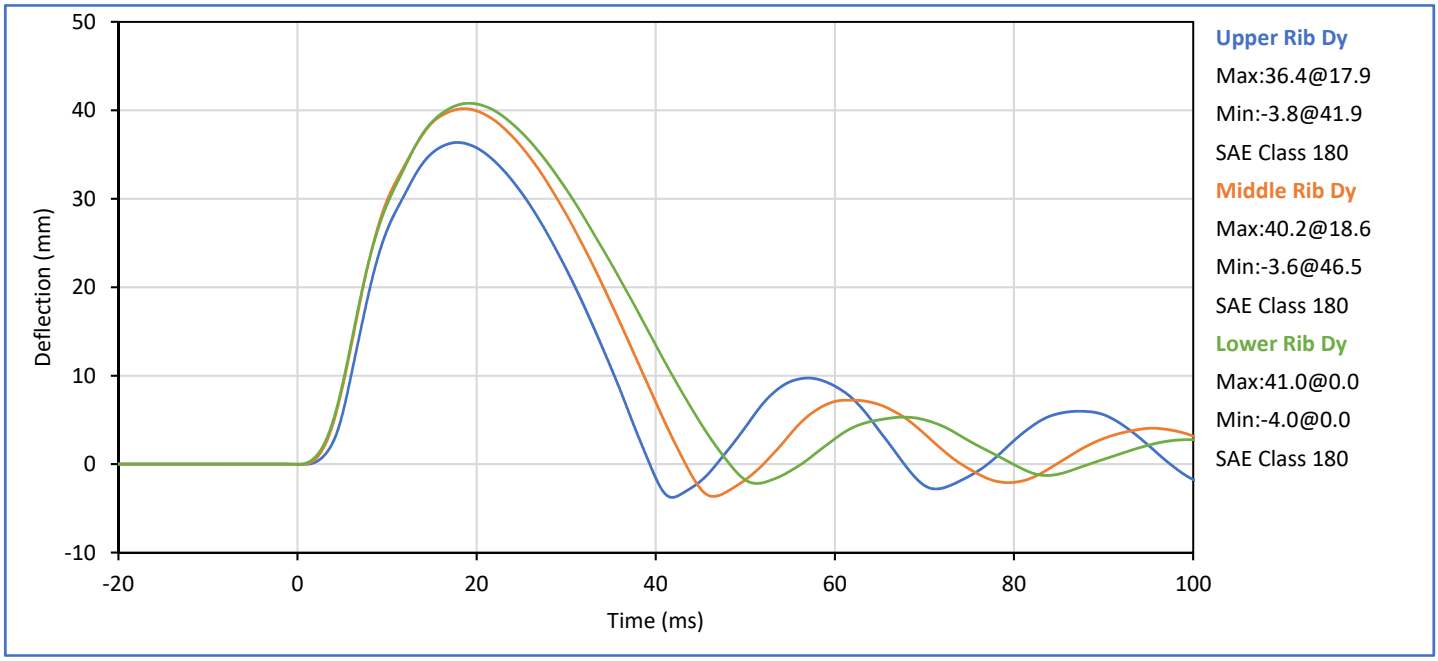
Applus IDIADA
KARCO

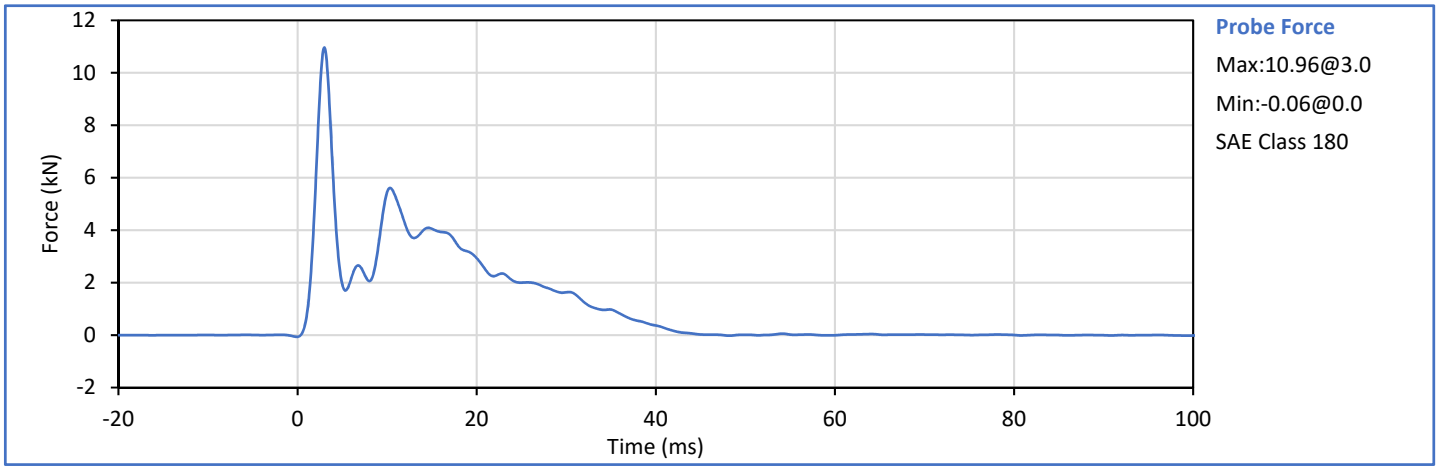
ES-2re 50th Male Side Impact ATD
Thorax Impact (Full Body)

ATD Serial No.: F037

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.0	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Impactor Velocity	m/s	5.40	5.60	5.43	Pass
Peak Upper Rib Dy	mm	34.0	41.0	36.4	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.2	Pass
Peak Lower Rib Dy	mm	37.0	44.0	40.8	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.61	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

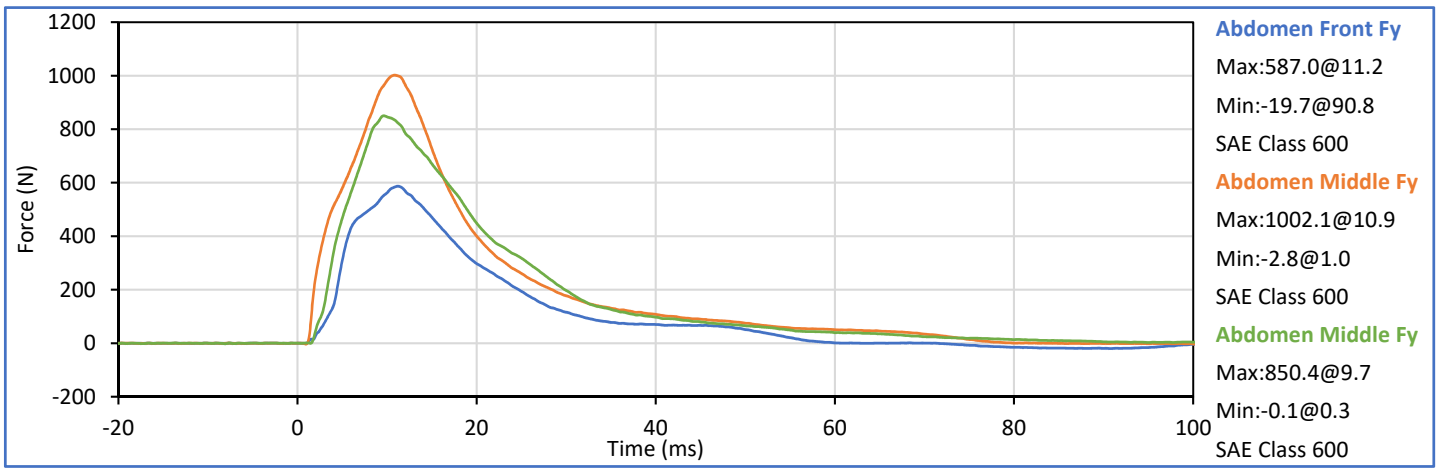
Applus IDIADA
KARCO

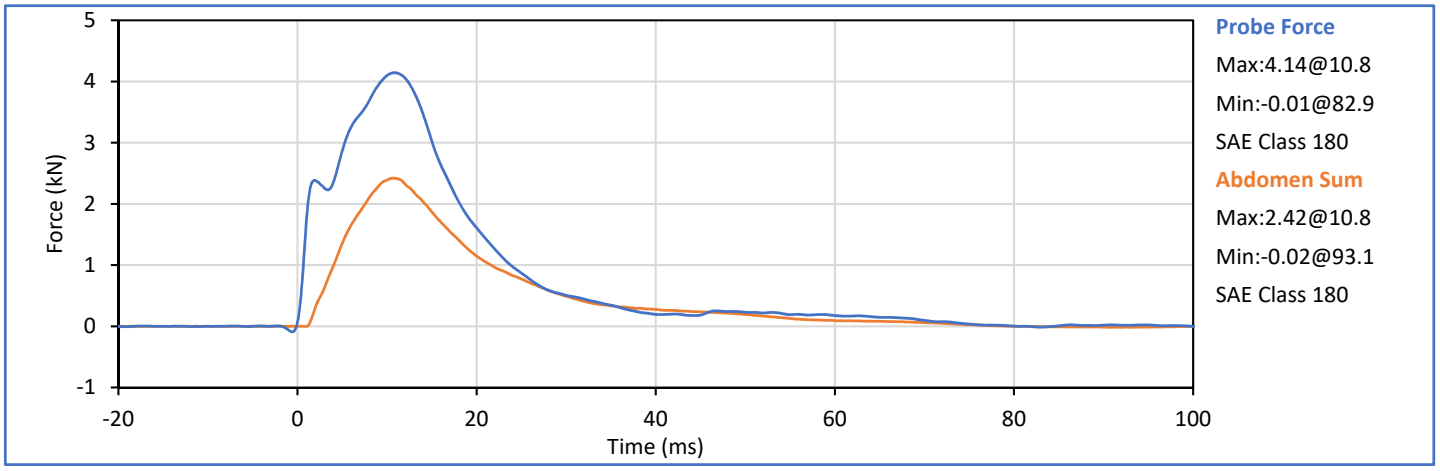
ES-2re 50th Male Side Impact ATD
Abdomen Impact

ATD Serial No.: F037

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	27	Pass
Impactor Velocity	m/s	3.90	4.10	4.06	Pass
Peak Impactor Force	kN	4.00	4.80	4.14	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.8	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.42	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

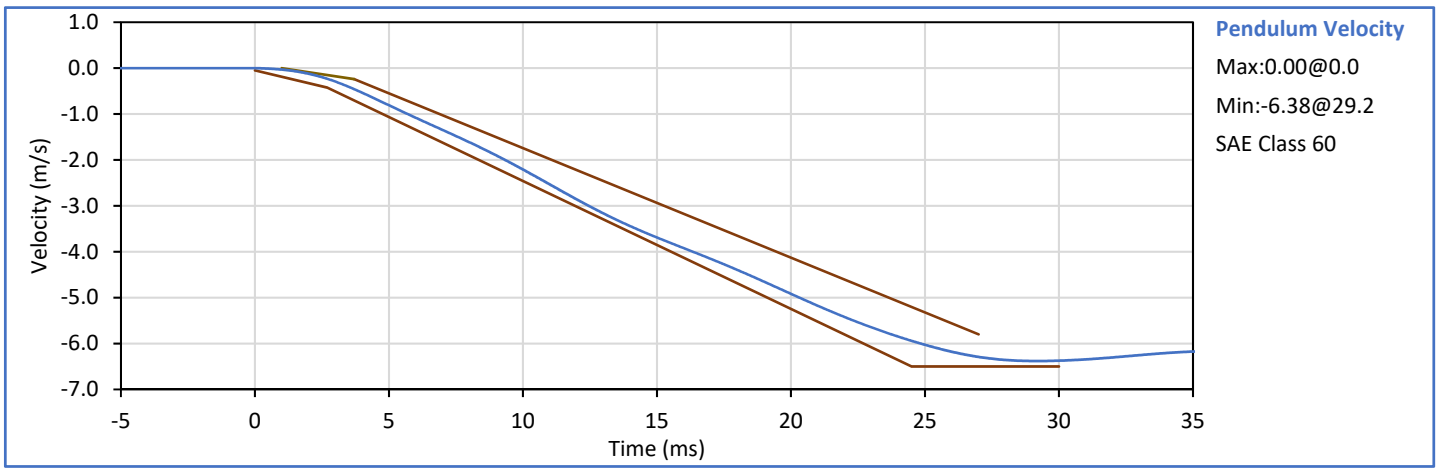
Applus IDIADA KARCO

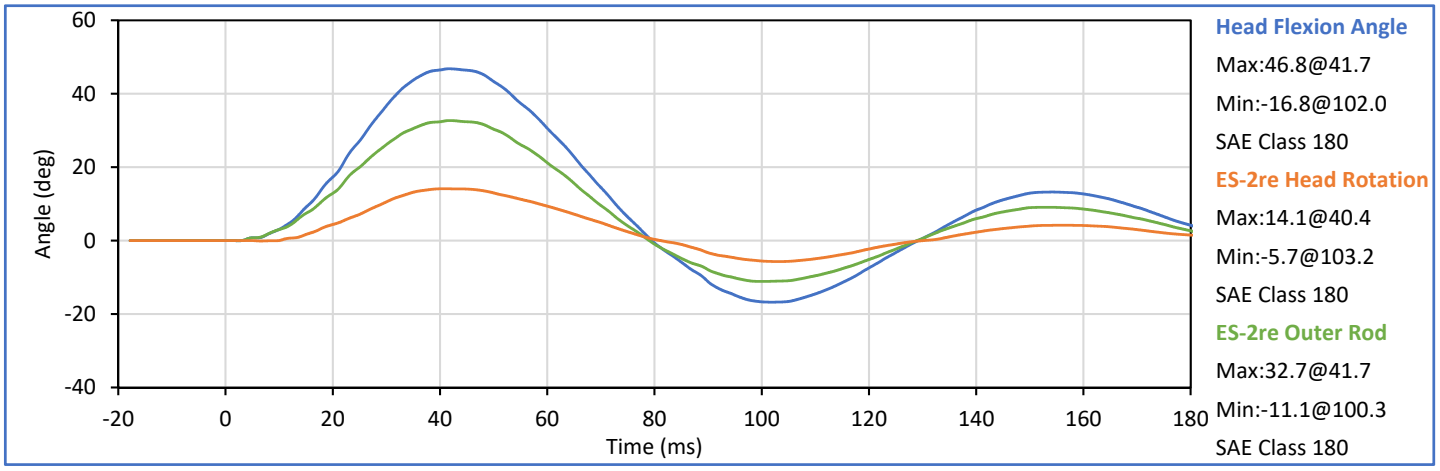
ES-2re 50th Male Side Impact ATD
Lumbar Spine Flexion

ATD Serial No.: F037

Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	5.95	6.15	6.07	Pass
Peak Headform Flexion	deg	45.0	55.0	46.8	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	41.7	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	37.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

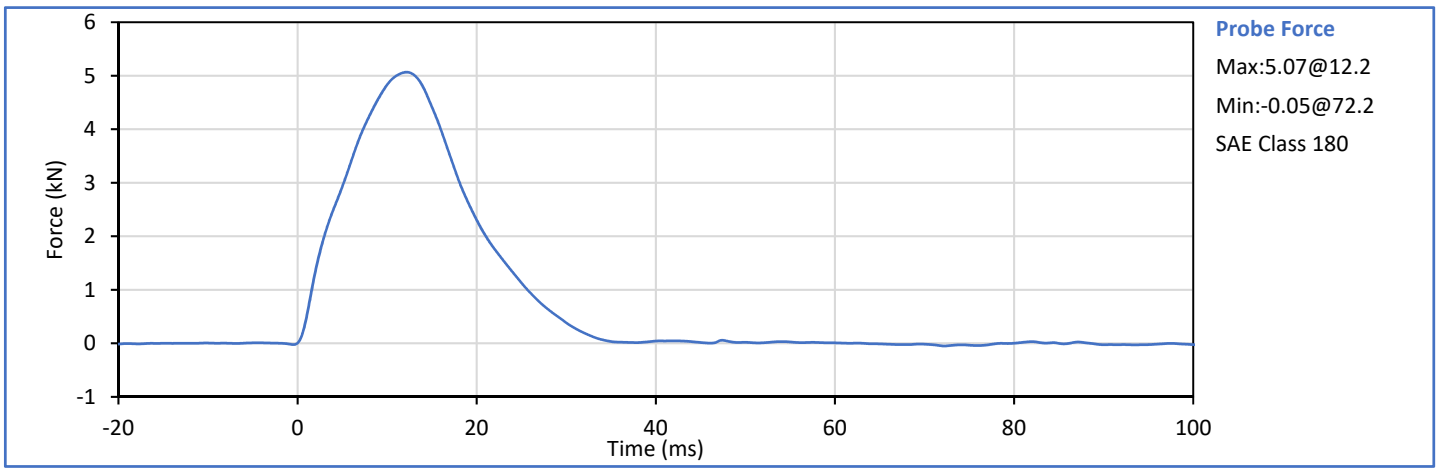
Applus IDIADA
KARCO

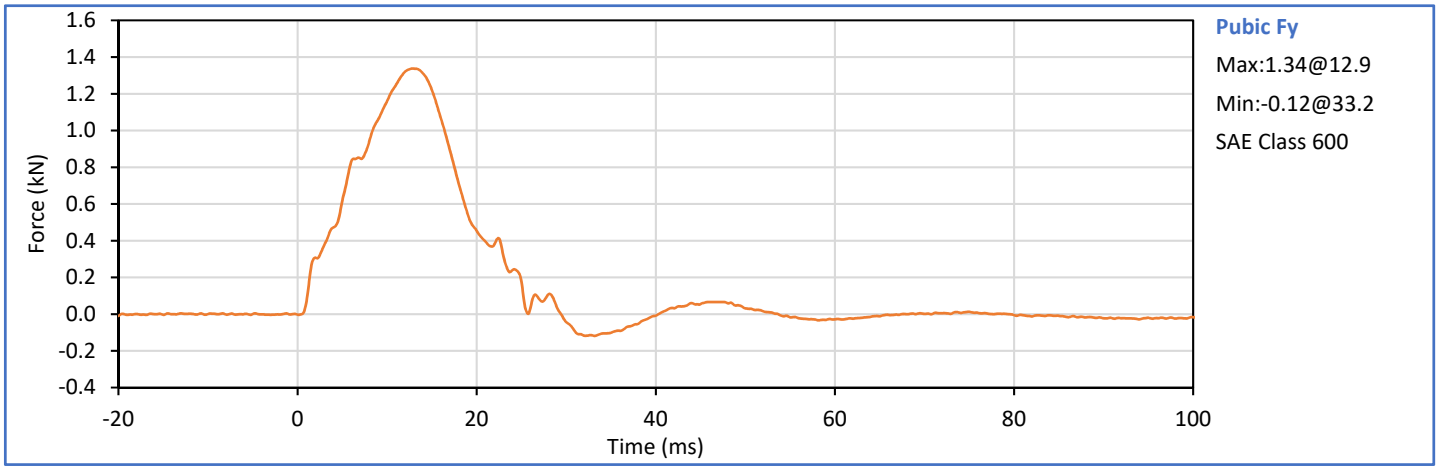
ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F037

Test Date: 2021-01-29

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
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.07	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.2	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.34	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	12.9	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: 2021-01-29

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
A - Sitting Height	mm	772	788	781	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	82	Pass
D - H Point From Seatback	mm	141	151	146	Pass
E - Shoulder Pivot From Backline	mm	97	107	106	Pass
F - Thigh Clearance	mm	119	135	128	Pass
G - Head Breadth	mm	140	148	145	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	185	Pass
J - Head Circumference	mm	541	551	545	Pass
K - Buttock To Knee Length	mm	514	540	530	Pass
L - Popliteal Height	mm	343	369	347	Pass
K - Knee Pivot To Floor Height	mm	392	409	402	Pass
N - Buttock Popliteal Length	mm	416	442	436	Pass
O - Chest Depth W/O Jacket	mm	195	211	201	Pass
P - Foot Length	mm	216	232	222	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	320	Pass
R - Arm Length	mm	249	259	253	Pass
S - Knee Joint To Seatback	mm	477	493	489	Pass
V - Shoulder Width	mm	341	357	349	Pass
W - Foot Width	mm	78	94	89	Pass
Y - Chest Circumference W/Jacket	mm	851	881	870	Pass
Z - Waist Circumference	mm	761	791	782	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

Approved By: P. Puzzuto

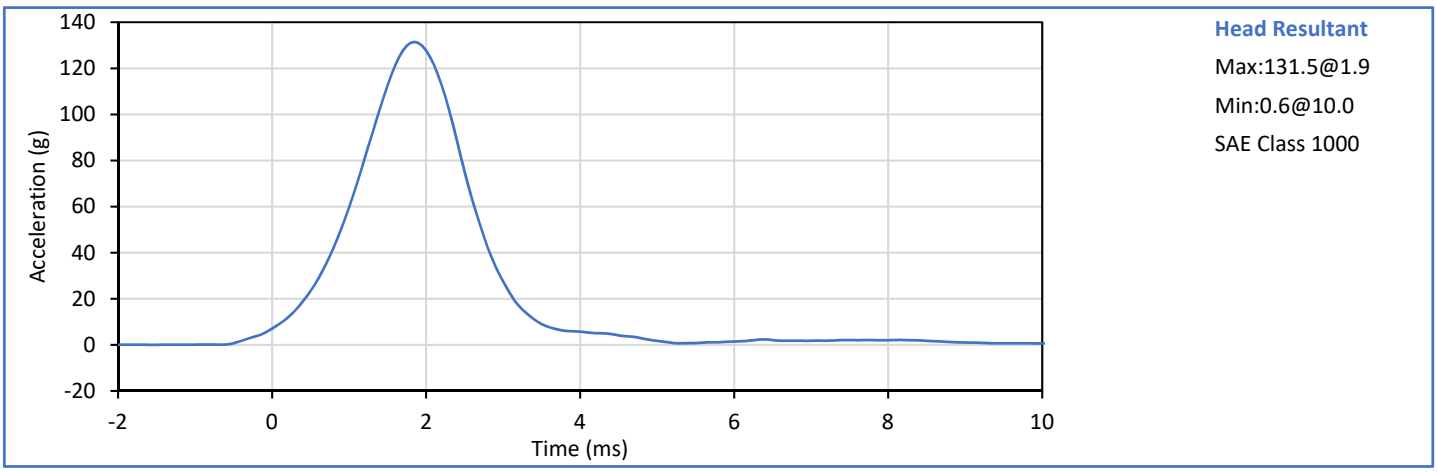
Applus IDIADA
KARCO

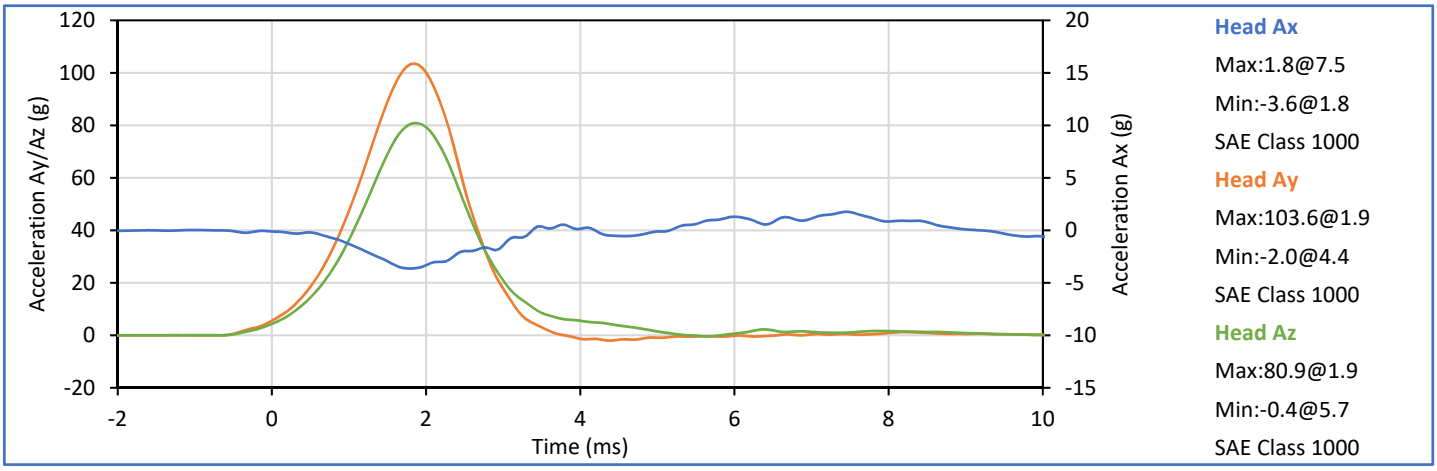
SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 299

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Humidity	%	10	70	27	Pass
Peak Resultant Acceleration	g	115.0	137.0	131.5	Pass
Peak Head Ax	g	-15.0	15.0	-3.6	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

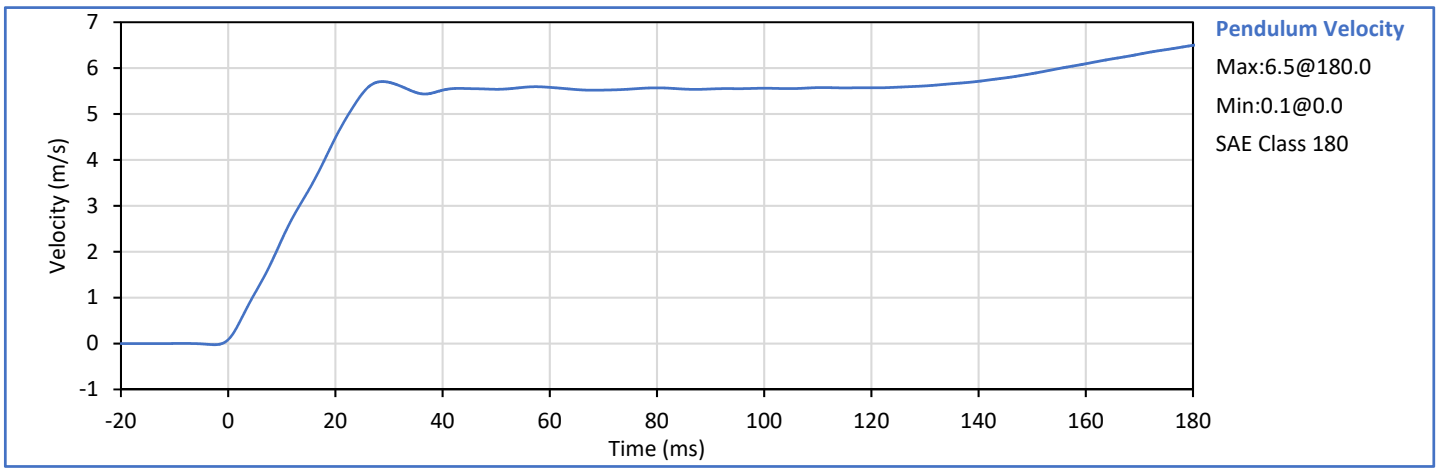
Applus IDIADA
KARCO

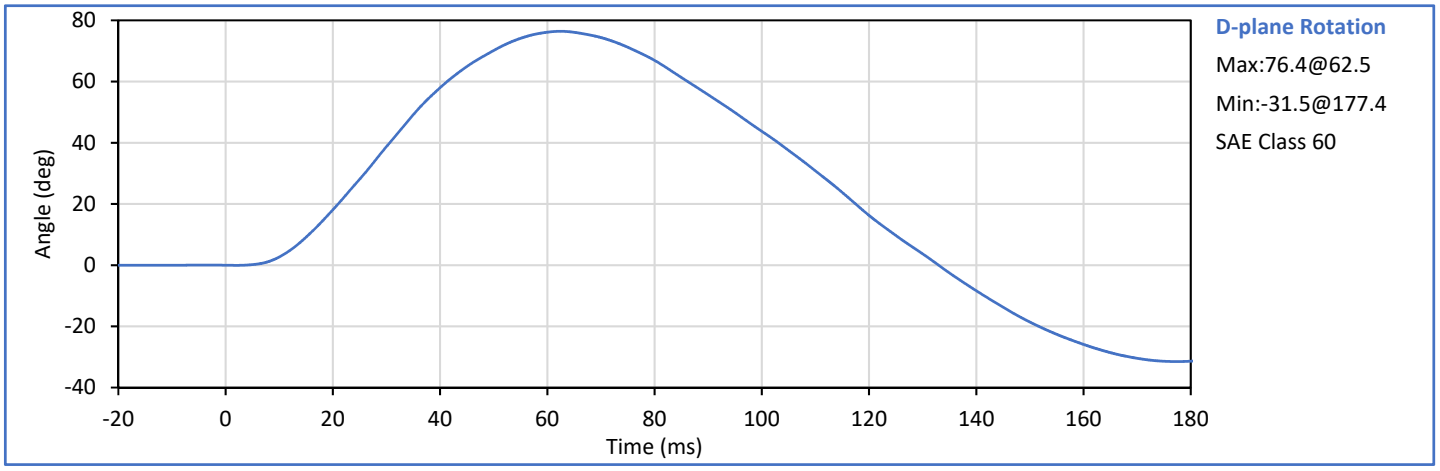
SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	29	Pass
Pendulum Velocity	m/s	5.51	5.63	5.59	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.26	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.34	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.48	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.44	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.71	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	76.4	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	62.5	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-39.0	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	114.2	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

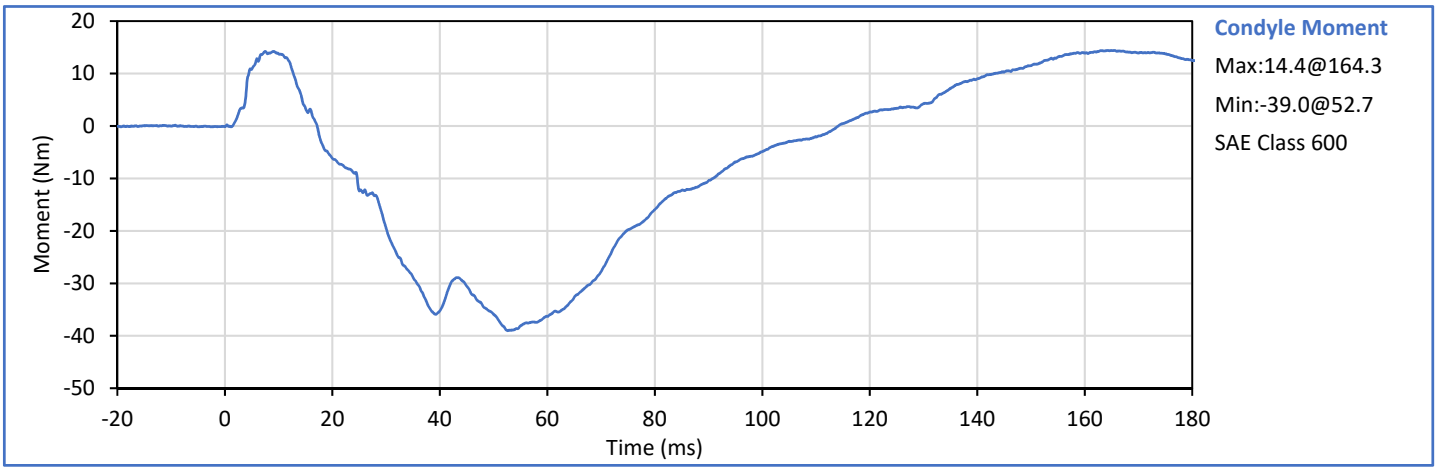
Approved By: P. Puzzuto

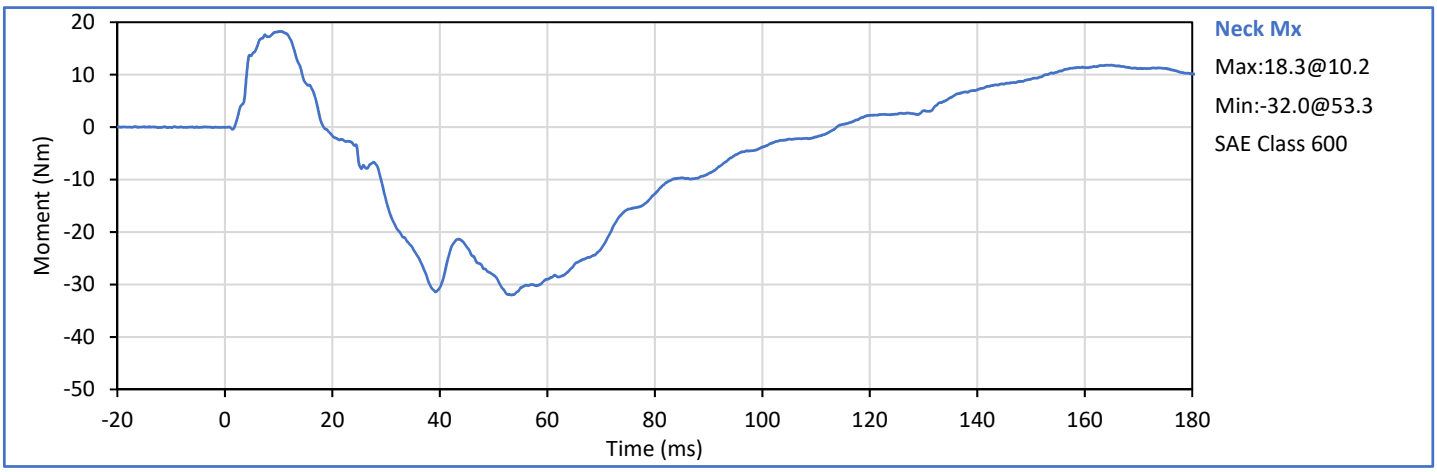
Applus IDIADA KARCO

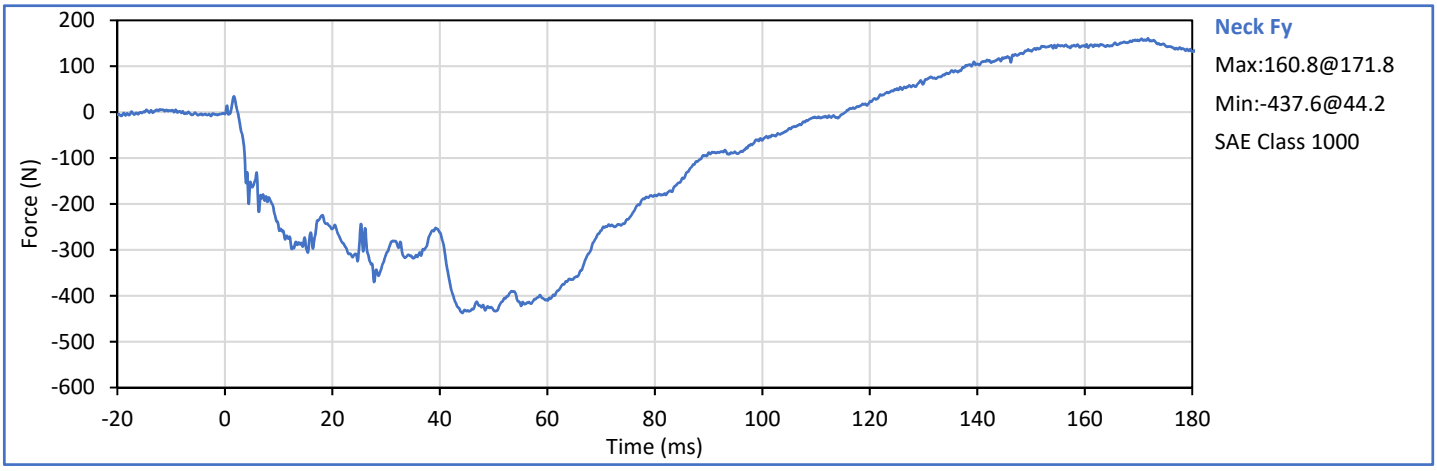
SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299

Test Date: 2021-01-29







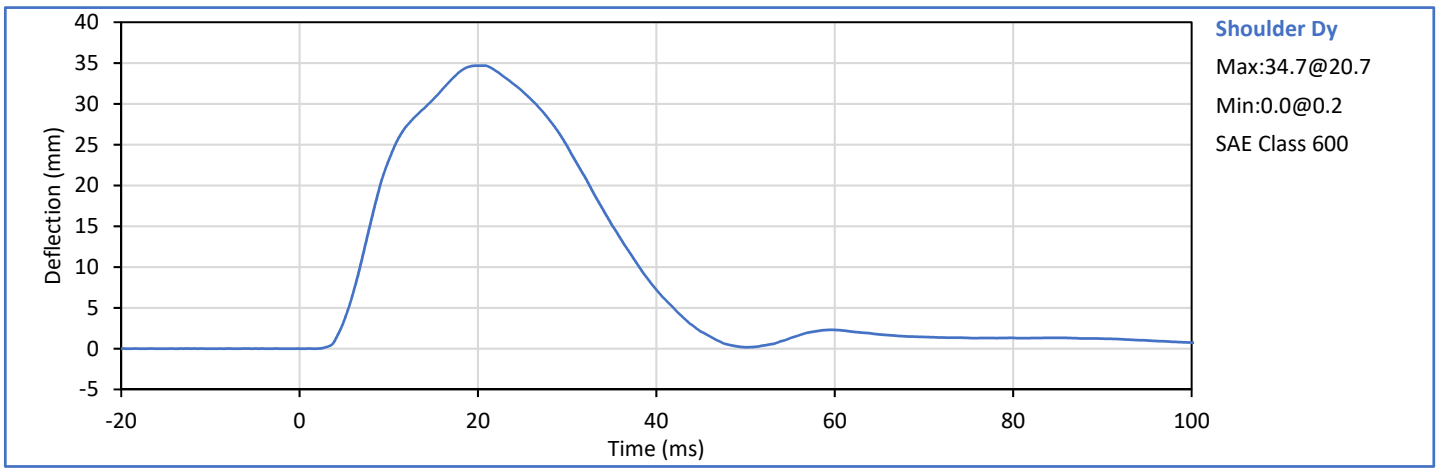
Applus IDIADA KARCO

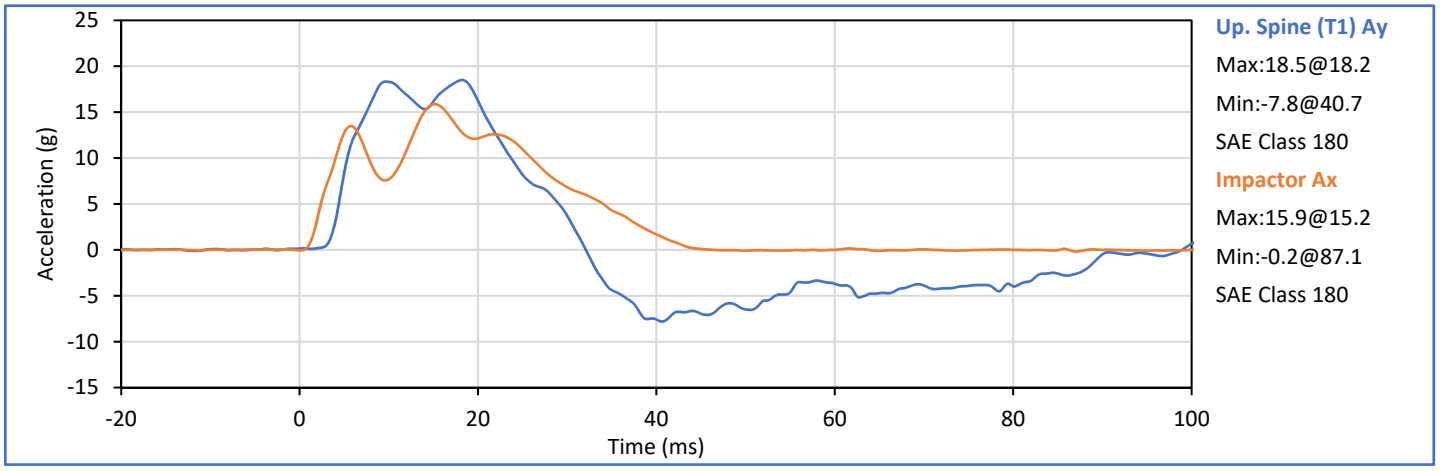
SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Shoulder Dy	mm	28.0	37.0	34.7	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.5	Pass
Peak Impactor Ax	g	13.0	18.0	15.9	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

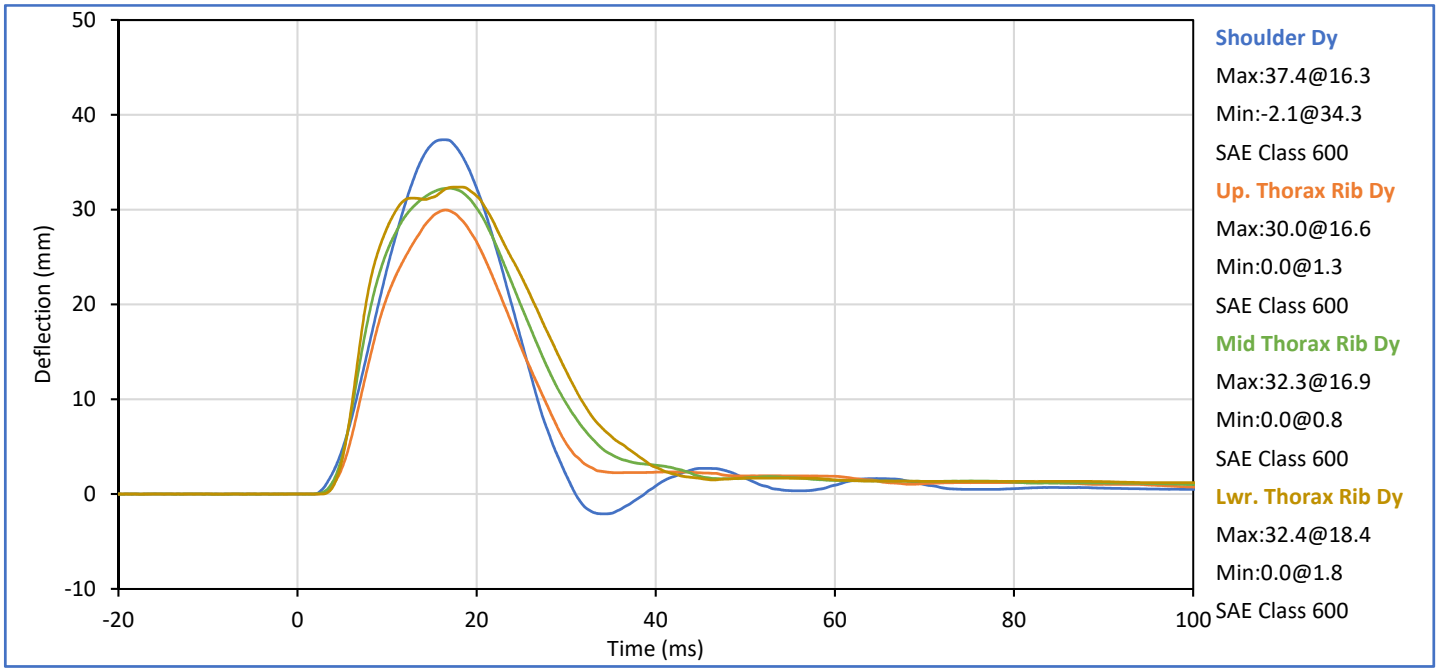
Applus IDIADA KARCO

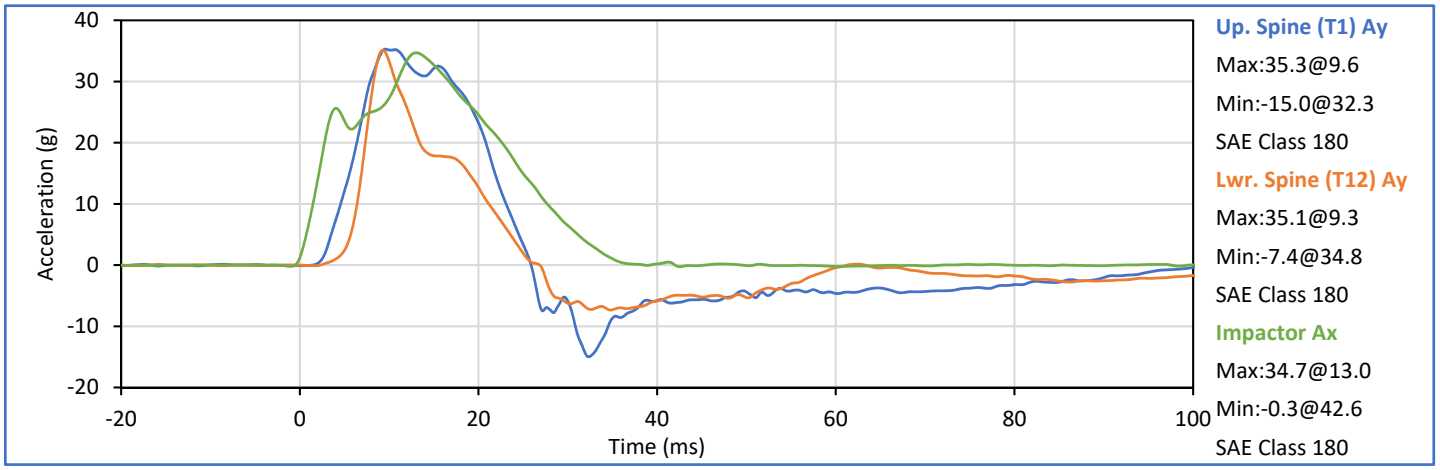
SID-IIs Small Side Impact ATD
Thorax (With Arm)

ATD Serial No.: 299

Test Date: 2021-01-29

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	6.60	6.80	6.71	Pass
Peak Shoulder Dy	mm	31.0	40.0	37.4	Pass
Peak Upper Rib Dy	mm	25.0	32.0	30.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.3	Pass
Peak Lower Rib Dy	mm	32.0	38.0	32.4	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	35.3	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	35.1	Pass
Peak Impactor Ax	g	30.0	36.0	34.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

TR-P40402-01-NC

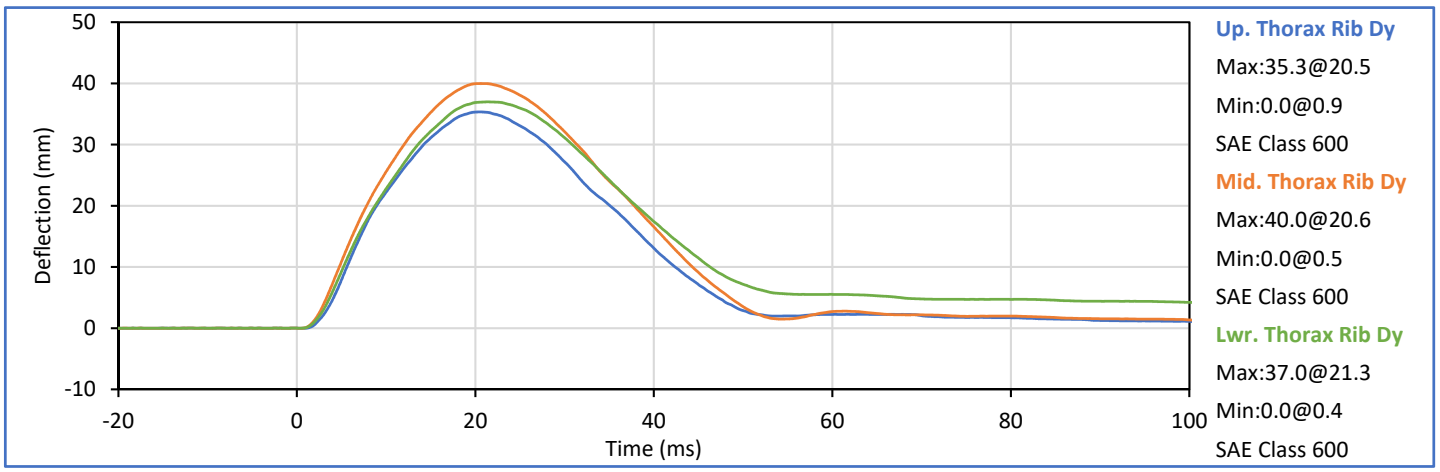
Applus IDIADA KARCO

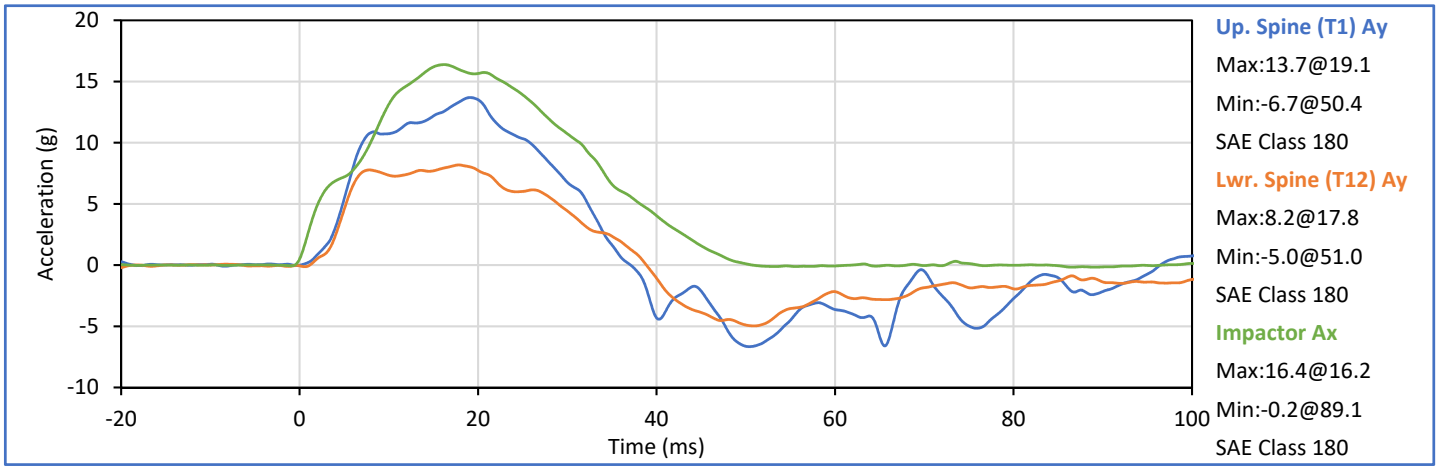
SID-IIs Small Side Impact ATD
Thorax (No Arm)

ATD Serial No.: 299

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	29	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Rib Dy	mm	32.0	40.0	35.3	Pass
Peak Middle Rib Dy	mm	39.0	45.0	40.0	Pass
Peak Lower Rib Dy	mm	35.0	43.0	37.0	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.7	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	8.2	Pass
Peak Impactor Ax	g	14.0	18.0	16.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

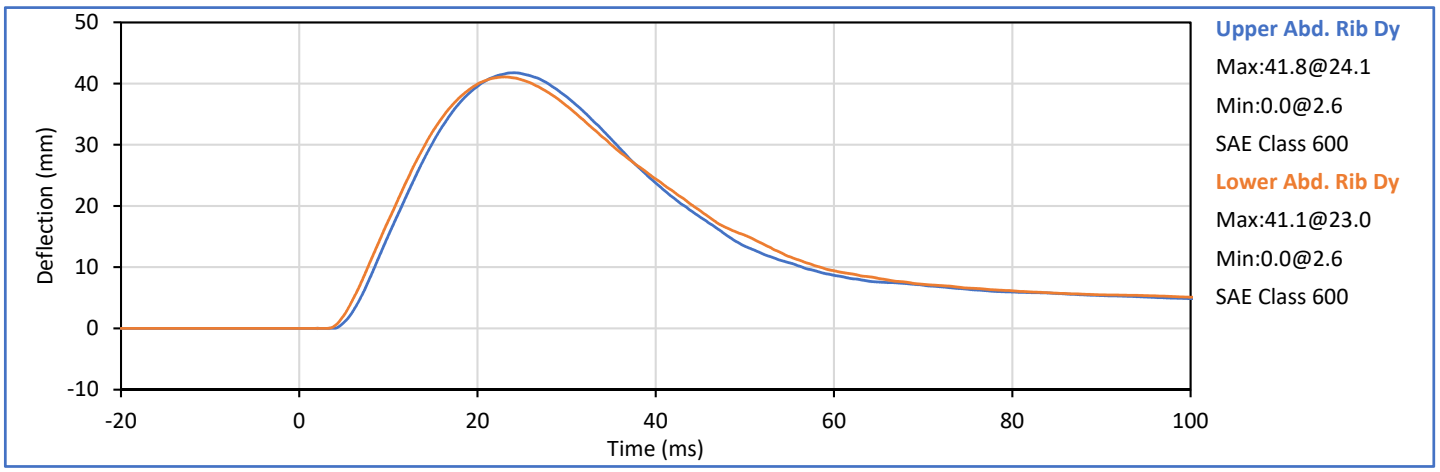
Applus IDIADA KARCO

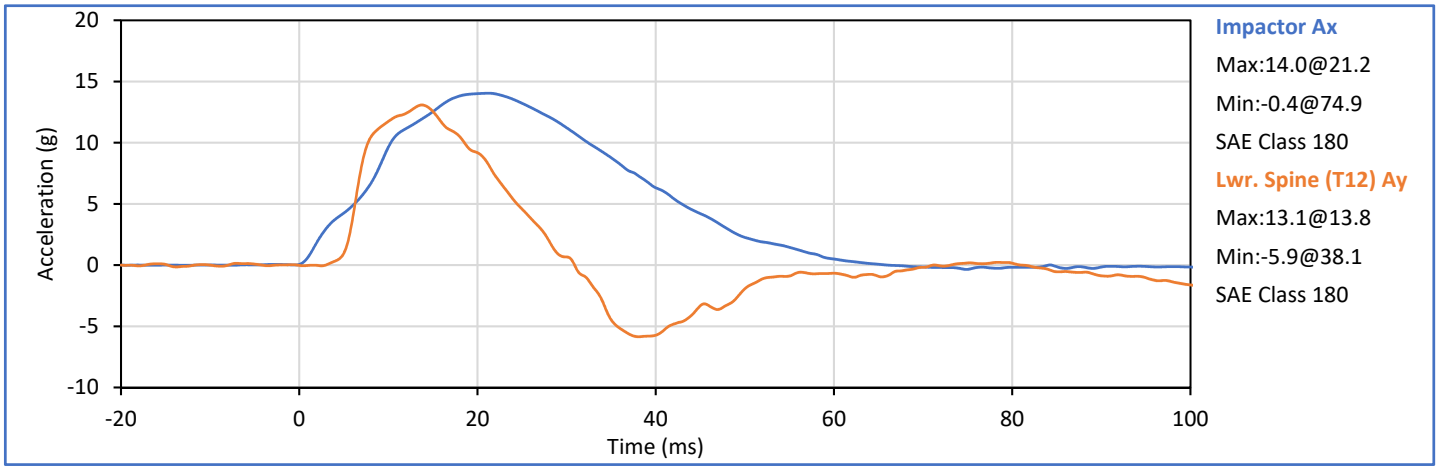
SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.8	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.1	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	13.1	Pass
Peak Impactor Ax	g	12.0	16.0	14.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

Applus IDIADA
KARCO

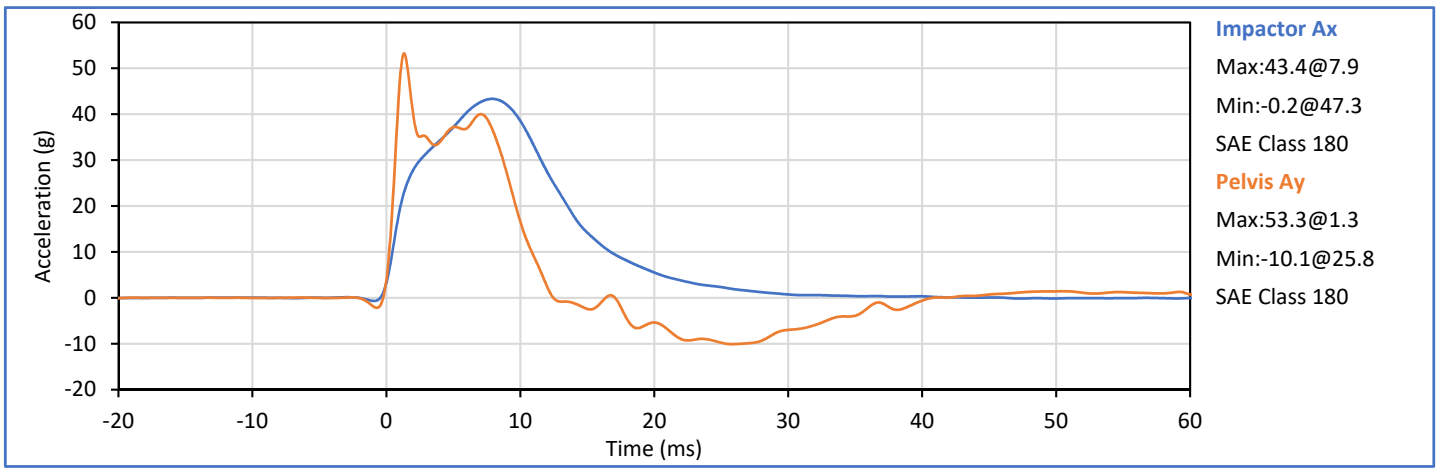
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

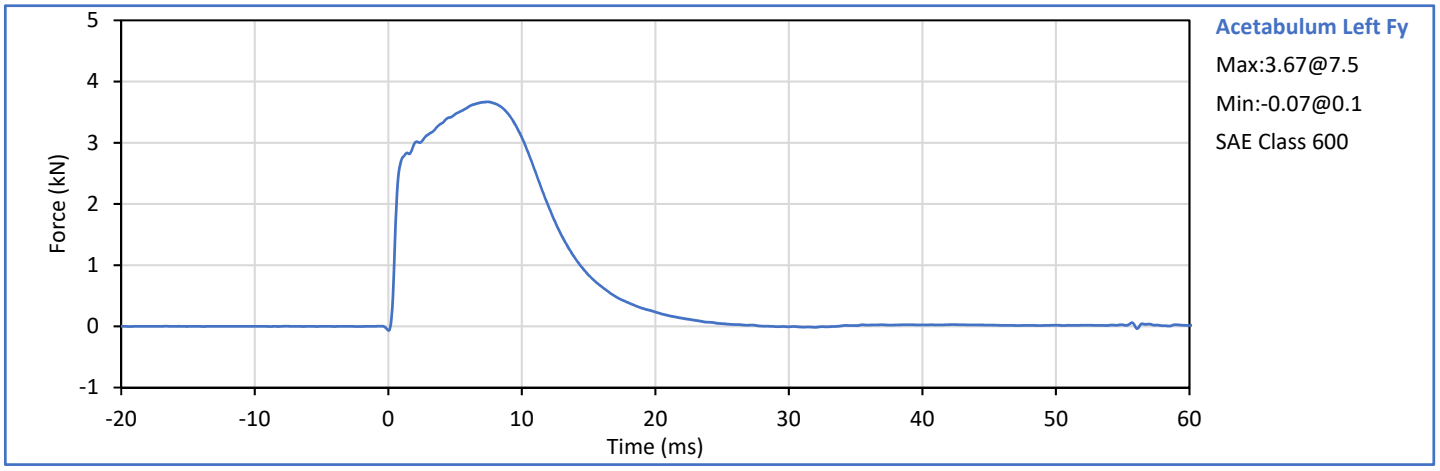
ATD Serial No.: 299

Test Date: 2021-01-29

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	26	Pass
Impactor Velocity	m/s	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.67	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.0	Pass
Peak Impactor Ax	g	38.0	47.0	43.4	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 13666





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 299 Test Date: 2021-01-29

Pelvis Plug S/N: 13666

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13666
Test Number 11314
Report Number 11352
Test Date 9/26/2019 12:53:41 PM

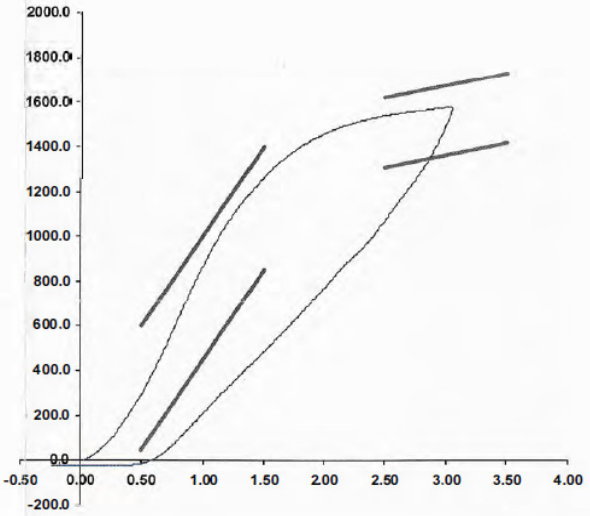
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	297.34	50.00	600.00
Force @ 1.5 mm (N)	1,265.99	850.00	1,400.00
Force @ 2.5 mm (N)	1,538.68	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,576.03	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 26-Sep-19
SACO Research

By : DC Date : 9/26/2019

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

Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

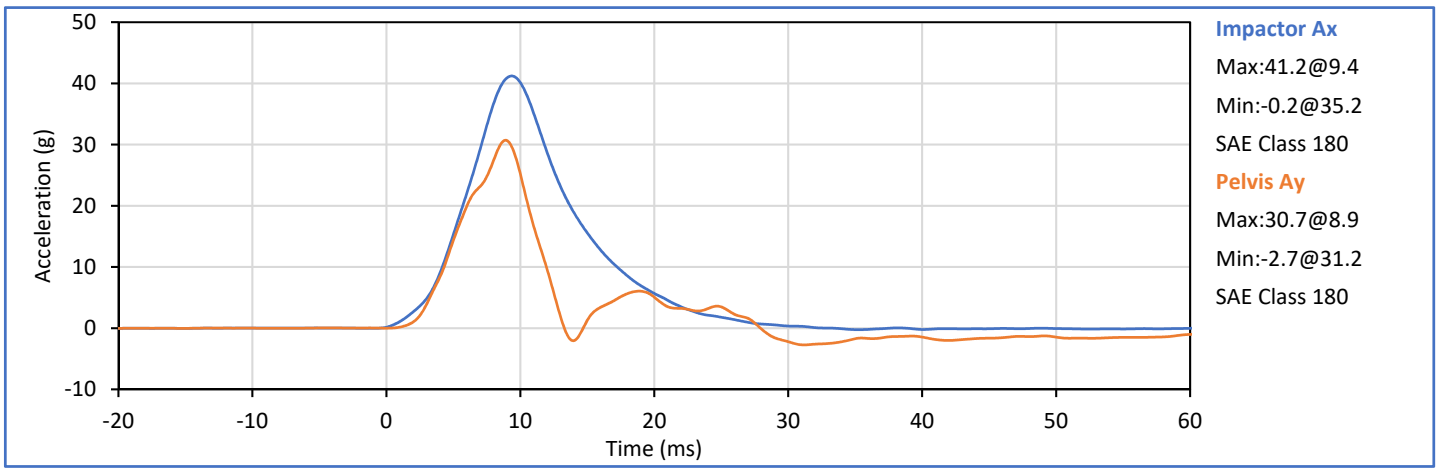
ATD Serial No.: 299

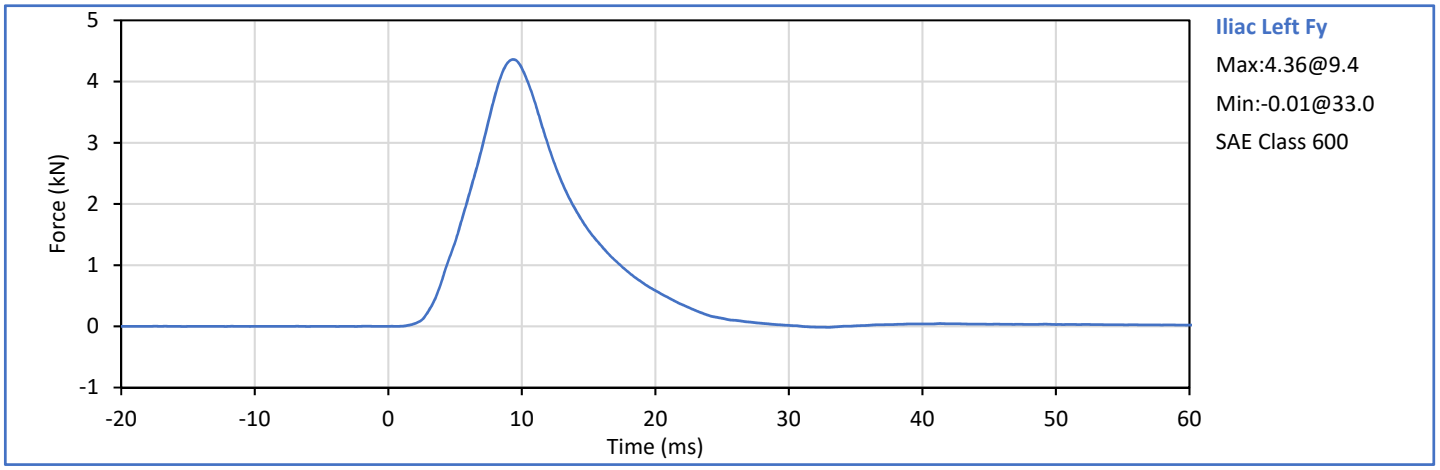
Test Date: 2021-02-01

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	28	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Iliac Fy	kN	4.10	5.10	4.36	Pass
Pelvis Ay after 6ms	g	28.0	39.0	30.7	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 D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

ES-2re ATD S/N: F037

Table 1 - Driver ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58858	Endevco	7264C-2k	2021-01-13
Head Acceleration Y Primary	P58865	Endevco	7264C-2k	2021-01-13
Head Acceleration Z Primary	P58867	Endevco	7264C-2k	2021-01-13
Head Acceleration X Redundant	P58859	Endevco	7264C-2k	2021-01-13
Head Acceleration Y Redundant	P58866	Endevco	7264C-2k	2021-01-13
Head Acceleration Z Redundant	P58873	Endevco	7264C-2k	2021-01-13
Upper Thorax Rib Deflection Y	209 (ES-2 Rib)	Honeywell	F38000203	2021-01-13
Middle Thorax Rib Deflection Y	210 (ES-2 Rib)	Honeywell	F38000203	2021-01-13
Lower Thorax Rib Deflection Y	207 (ES-2 Rib)	Honeywell	F38000203	2021-01-13
Anterior Abdominal Force Y	1504 Fy	R.A. Denton	2631J	2020-02-17
Middle Abdominal Force Y	1505 Fy	R.A. Denton	2631J	2020-02-17
Posterior Abdominal Force Y	1506 Fy	R.A. Denton	2631J	2020-02-17
Lower Spine T12 Acceleration X	P63856	Endevco	7264C-2k	2021-01-13
Lower Spine T12 Acceleration Y	P50063	Endevco	7264C-2k	2021-01-13
Lower Spine T12 Acceleration Z	P51880	Endevco	7264C-2k	2021-01-13
Pubic Symphysis Force Y	DG6784 Fy	FTSS	IF-556	2020-02-17

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	2021-01-13
Head Acceleration Y Primary	P50086	Endevco	7264C-2k	2021-01-13
Head Acceleration Z Primary	P51931	Endevco	7264C-2k	2021-01-13
Head Acceleration X Redundant	P68604	Endevco	7264C-2k	2021-01-13
Head Acceleration Y Redundant	P51934	Endevco	7264C-2k	2021-01-13
Head Acceleration Z Redundant	P58736	Endevco	7264C-2k	2021-01-13
Head Rotation Rate X	ARS4062	DTS	ARS PRO-18k (2kHz)	2020-08-04
Head Rotation Rate Y	ARS5968	DTS	ARS PRO-18k (2kHz)	2020-08-04
Head Rotation Rate Z	ARS11283	DTS	ARS PRO-18k (2kHz)	2020-08-04
Upper Thorax Rib Deflection Y	1143	Servo	08TCI-3725	2021-01-19
Middle Thorax Rib Deflection Y	1075	Servo	08TCI-3725	2021-01-19
Lower Thorax Rib Deflection Y	1213	Servo	08TCI-3725	2021-01-19
Upper Abdomen Rib Deflection Y	1218	Servo	08TCI-3725	2021-01-19
Lower Abdomen Rib Deflection Y	1177	Servo	08TCI-3725	2021-01-19
Lower Spine T12 Acceleration X	P58761	Endevco	7264C-2k	2021-01-13
Lower Spine T12 Acceleration Y	P50077	Endevco	7264C-2k	2021-01-13
Lower Spine T12 Acceleration Z	P58795	Endevco	7264C-2k	2021-01-13
Iliac Wing Impact Side Force Y	289 Fy (Iliac)	R.A. Denton	3228J	2021-01-18
Acetabulum Impact Side Force Y	277 Fy (Acetabulum)	R.A. Denton	3249J	2021-01-18

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	A358565	MSI	52F-2k	2020-09-20
Vehicle CG Ay	A358559	MSI	52F-2k	2020-09-20
Vehicle CG Az	A358534	MSI	52F-2k	2020-09-20
Right Side Sill at Front Seat Ax	A358708	MSI	52F-2k	2020-09-21
Right Side Sill at Front Seat Ay	A356300	MSI	52F-2k	2020-09-16
Right Side Sill at Front Seat Az	A358536	MSI	52F-2k	2020-09-20
Right Side Sill at Rear Seat Ax	A356470	MSI	52F-2k	2020-09-15
Right Side Sill at Rear Seat Ay	A356320	MSI	52F-2k	2020-09-15
Right Side Sill at Rear Seat Az	A361344	MSI	52F-2k	2020-10-21
Left Side Sill at Front Seat Ay	A356308	MSI	52F-2k	2020-09-16
Left Side Sill at Rear Seat Ay	A358709	MSI	52F-2k	2020-09-21
Left Lower A-Pillar Ay	A358483	MSI	52F-2k	2020-09-18
Left Middle A-Pillar Ay	A358693	MSI	52F-2k	2020-09-21
Left Lower B-Pillar Ay	A356465	MSI	52F-2k	2020-09-15
Left Middle B-Pillar Ay	A358733	MSI	52F-2k	2020-09-22
Driver Seat Track at H-Point Ay	A358731	MSI	52F-2k	2020-09-22
Rear Seat Structure Ay	A356307	MSI	52F-2k	2020-09-16
Right Rear Occupant Comp. Ay	A354872	MSI	52F-2k	2020-09-16
Engine Block Top Ax	A358542	MSI	52F-2k	2020-09-20
Engine Block Top Ay	A356471	MSI	52F-2k	2020-09-15
Rear Floopan Above Axle Ax	A358478	MSI	52F-2k	2020-09-18
Rear Floopan Above Axle Ay	A361465	MSI	52F-2k	2020-10-21
Rear Floopan Above Axle Az	A356297	MSI	52F-2k	2020-09-16

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
MDB CG Ax	A356461	MSI	52F-2k	2020-09-15
MDB CG Ay	A354835	MSI	52F-2k	2020-09-08
MDB CG Az	A354807	MSI	52F-2k	2020-09-11
MDB Left Side at Rear Axle Ax	A354865	MSI	52F-2k	2020-09-08
MDB Left Side at Rear Axle Ay	A354852	MSI	52F-2k	2020-09-08