REPORT NUMBER: SINCAP-KAR-20-010

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

MAZDA MOTOR MANUFACTURING DE MEXICO S.A. DE C.V.
2020 MAZDA3 4-DOOR SEDAN

NHTSA No: M20205405

PREPARED BY:

APPLUS IDIADA KARCO ENGINEERING, LLC.

9270 HOLLY ROAD

ADELANTO, CA 92301

JANUARY 23, 2020

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF CRASHWORTHINESS STANDARDS

MAIL CODE: NRM-110

1200 NEW JERSEY AVE, SE, ROOM W43-410

WASHINGTON, D.C. 20590

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Prepared By: _____

Mr. Robert S. Ramos, Program Manager
Applus IDIADA KARCO Engineering, LLC.

Reviewed By: _____

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

Approved By: _____

Mr. Steven D. Matsusaka, Engineering Manager
Applus IDIADA KARCO Engineering, LLC.

Approval Date: January 23, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date: _____

_____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SINCAP-KAR-20-010		

4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing of a 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405	January 23, 2020
	6. Performing Organization Code KAR
7. Authors Mr. Robert S. Ramos, Program Manager, Applus IDIADA KARCO Mr. Steven D. Matsusaka, Engineering Manager, Applus IDIADA KARCO	**8. Performing Organization Report No.** TR-P40006-01-NC
9. Performing Organization Name and Address Applus IDIADA KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301	**10. Work Unit No.** **11. Contract or Grant No.** DTNH22-14-D-00355L
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590	**13. Type of Report and Period Covered** Final Test Report, January 9 - 23, 2020 **14. Sponsoring Agency Code** NRM-110

15. Supplementary Notes

16. Abstract

A 55 / 28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2020 MAZDA3 4-door sedan in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on January 9, 2020.

The impact velocity of the Moving Deformable Barrier was 61.92 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 11.1°C. The target vehicle's maximum post-test static crush was 151 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	112.2
Maximum Thoracic Rib Deflection	mm	44	24
Total Abdominal Force	N	2500	1057
Pubic Symphysis Force	N	6000	1064

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})		1000	370.5
Resultant Lower Spine Acceleration	g	82	71
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	2757
Maximum Thoracic Rib Deflection	mm	38*	26
Maximum Abdominal Rib Deflection	mm	45*	37

Both the left front driver and left rear passenger doors were jammed shut. The doors on the struck side of the vehicle did not separate from the body at the hinges or latches. The opposite side doors did not open during the side impact event.

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

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

** Proposed IARV*

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SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2020 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00355L. The purpose of this test is to generate comparative side impact performance in a 2020 MAZDA3 4-door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

SECTION 2
SUMMARY OF TEST RESULTS

A 2020 MAZDA3 4-door sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.92 km/h (38.48 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 9, 2020. Pre- and post-test photographs of the test vehicle, the MDB and the dummy (ES-2re and SID-IIs) are included in Appendix A of this report.

The dummies were placed in the driver and left rear designated seating position according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 10 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

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

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

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

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	112.2
Maximum Thoracic Rib Deflection	mm	44	24
Combined Abdominal Force	N	2500	1057
Pubic Symphysis Force	N	6000	1064

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	370.5
Lower Spine (T12) Resultant Acceleration	g	82	71
Total Pelvic Force (sum of acetabular and iliac forces	N	5525	2757
Maximum Thoracic Rib Deflection	mm	38*	26
Maximum Abdominal Rib Deflection	mm	45*	37

**Proposed IARV*

Supplemental restraint information is given below:

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

GENERAL COMMENTS

The doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. The doors on the non-struck side remained closed and latched. There was no ATD value that exceeded its limit. The Left Lower A-Post Accelerometer Y channel failed at 15.6 milliseconds and the Floorpan at Rear Axle Accelerometer channels failed at 16.0 milliseconds.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in^2	kPa	6.895
Temperature	General Use	^oF	^oC	=(Tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20205405
Model Year	2020
Make	Mazda
Model	MAZDA3
Body Style	4-Door Sedan
VIN	3MZBPACL9LM119065
Body Color	Soul Red Crystal
Odometer Reading (km / mi)	66 / 41
Engine Displacement (L)	2.5
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Mazda Motor Manufacturing de Mexico S.A. De C.V.
Date of Manufacture	Aug-19
Vehicle Type	Passenger Car

GVWR (kg)	1850
GAWR Front (kg)	1016
GAWR Rear (kg)	839

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

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

VEHICLE SEAT TYPE

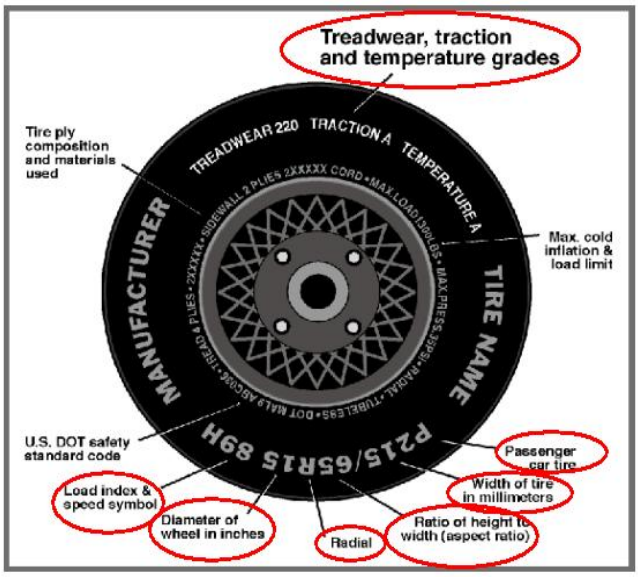
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat		Yes			Yes		
Third Row Seat							

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	215/45 R18	215/45 R18
Tire Size on Vehicle	215/45 R18	215/45 R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Turanza	Turanza
Treadware	480	400
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	87V	87V
Tire Material	Steel, Polyester, Nylon	Steel, Polyester, Nylon
DOT Safety Code Left	V64M JC11 0919	V64M JC11 0919
DOT Safety Code Right	V64M JC11 0919	V64M JC11 0919

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	250	250	250	250
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

		As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
	Units	Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	438.0	263.5		446.0	368.0		471.5	347.0	
Right	kg	419.0	267.0		447.0	289.0		425.5	314.0	
Ratio	%	61.8%	38.2%	100.0%	57.6%	42.4%	100.0%	57.6%	42.4%	100.0%
Total	kg	857.0	530.5	1387.5	893.0	657.0	1550.0	897.0	661.0	1558.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1387.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	44.8	C
Calculated Vehicle Target Wt (TVTW)	kg	1556.8	A+B+C

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight -4.5 kg to -9.0 kg)? ☒ **Yes** ☐ **No**

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement***
LF	mm	695	686	Yes
RF	mm	702	693	Yes
LR	mm	747	740	Yes
RR	mm	735	728	Yes
Vehicle CG (Aft of Front Axle)	mm	1154	1153	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	39	39	

***The "As Tested" vehicle attitude measurements must be equal to or within ±10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirement"

DATA SHEET NO. 1 … (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire and Tools	19.0
Trim	1.0
Ballast / Equipment Added	57.5

Test Height Adjustable Setting (If Applicable)	

DATA SHEET NO. 2

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

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	7.8	0.0	3.9
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	3.9	215	Max			
			Mid	200	215	230
			Min			
Front Passenger Seat	Fixed	223	Max			
			Mid	207	223	238
			Min			
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 … (CONTINUED)

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

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

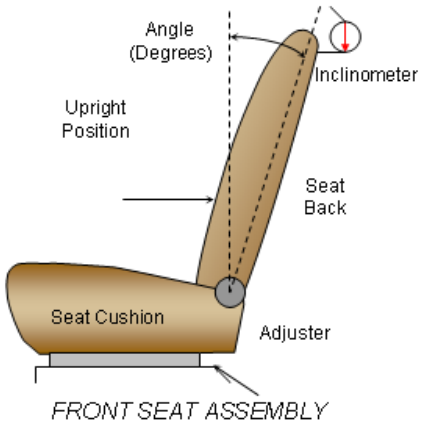
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	260	32	130	16
Front Passenger Seat	260	32	130	16
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

SEAT BACK ADJUSTMENT

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



SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/ Seated Dummy	60.5	21	7.8	5
Front Passenger Seat	60.5	21	7.8	5
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

*Detent zero (0) is the forward most detent

DATA SHEET NO. 2 … (CONTINUED)

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

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

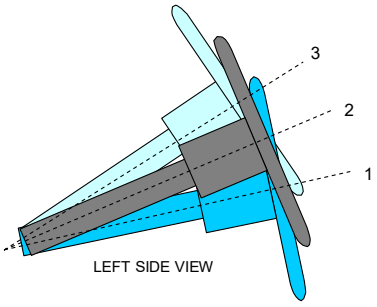
HEAD RESTRAINT ADJUSTMENT

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

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

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	18.2	85
Geometric Center - Position 2	20.8	120
Uppermost - Position 3	23.4	155
Telescoping Steering Wheel Travel		70
Test Position	20.8	120

DATA SHEET NO. 2 … (CONTINUED)

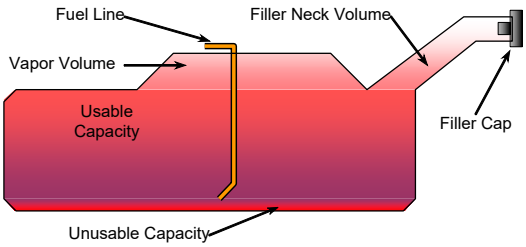
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

FUEL PUMP

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



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	48.07
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	48.07
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	44.71
Actual amount of Solvent Used in Test	44.66
1/3 of Usable Capacity	16.02

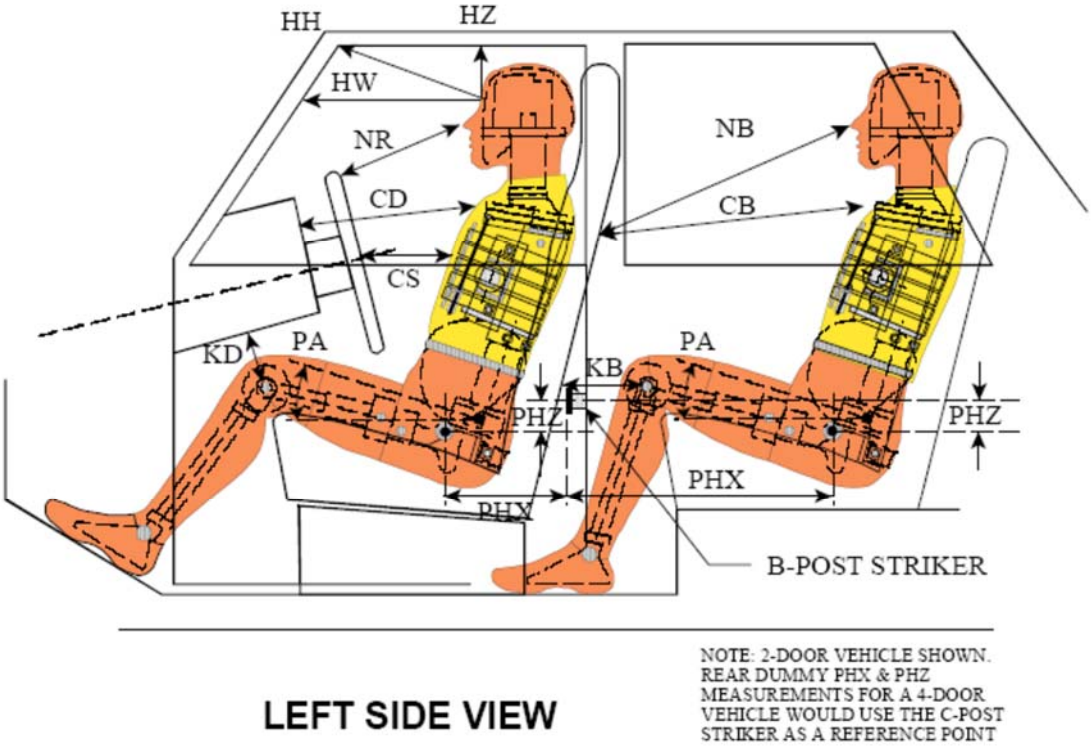
Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in the Form No. 1? ☒ **Yes** ☐ **No**

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



LEFT SIDE VIEW

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

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

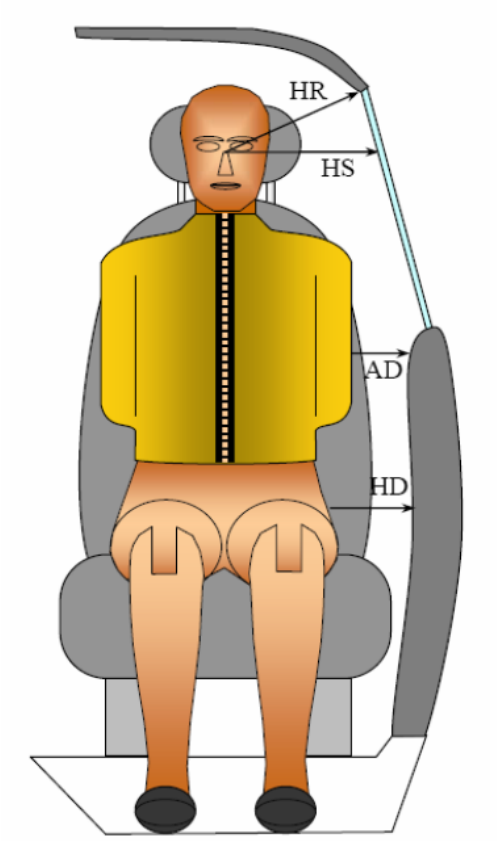
Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (º)	Length (mm)	Angle (º)
HH		Head to Header	284			
HW		Head to Windshield	630			
HZ	HZ	Head to Roof	175		235	
NR	NB	Nose to Rim/Seat Back	479		476	
CD	CB	Chest to Dash/Seat Back	617		456	
CS		Chest to Steering Wheel	339			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	192	31.8	210	24.3
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	190	28.5	205	25.1
PAX°	PAX°	Pelvic Tilt Angle X		20.9		23.3
	PAY°	Pelvic Tilt Angle Y		0.1		0.1
PHX	PHX	Hip Point to Striker (x-axis)	160		235	
PHZ	PHZ	Hip Point to Striker (z-axis)	198		294	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

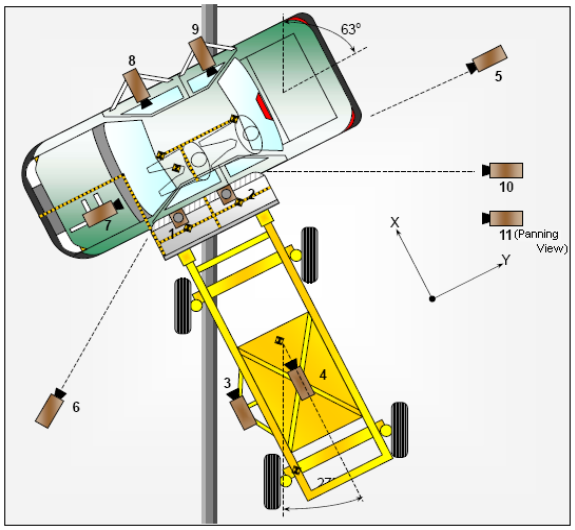
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	181	235
HS	Head to Side Window	mm	350	354
AD	Arm to Door	mm	80	116
HD	H-Point to Door	mm	139	181

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



CAMERA LOCATIONS AND DATA

No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	1220	2287	-5486	14	1000
2	Overhead Close-Up	609	2287	-5102	35	1000
3	Left Impact Point (MDB)	-2134	0	-1143	25	1000
4	Side Overall (MDB)	-3912	838	-1829	12.5	1000
5	Rear	-64	2485	-1348	85	1000
6	Left Front	-2266	-3564	-1475	24	1000
7	Driver Front (On-Board)	503	-498	669	6	1000
8	Driver Side (On-Board)	1671	640	330	6	1000
9	Passenger Side (On-Board)	1654	1550	369	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

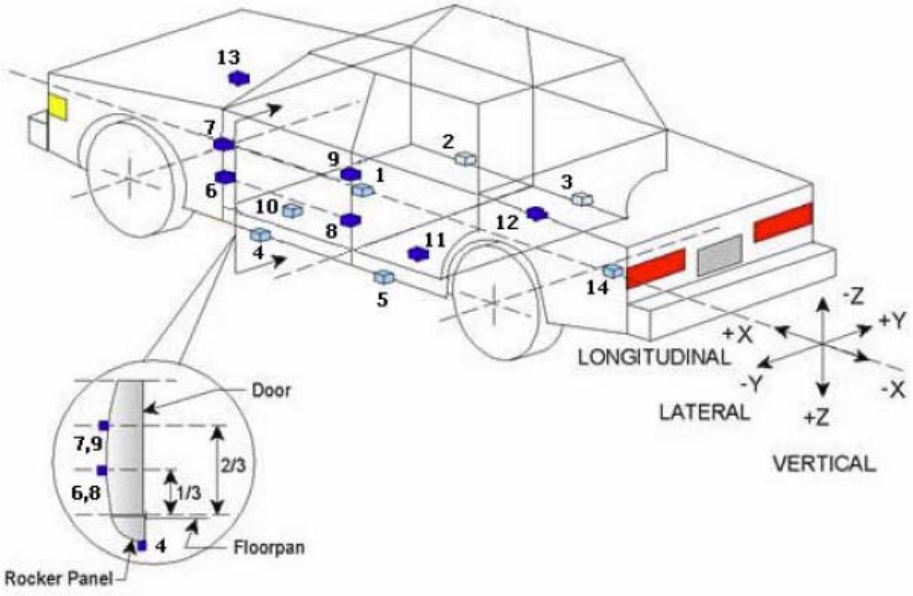
Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Channels	7
Total	65

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2035	90	-400
2	Right Sill at Front Seat	3645	725	-370
3	Right Sill at Rear Seat	1550	730	-355
4	Left Sill at Front Door	2350	-735	-1040
5	Left Sill at Rear Door	1810	-755	-1045
6	A-Pillar Lower	3020	-800	-380
7	A-Pillar Middle	3040	-800	-390
8	B-Pillar Lower	2090	-720	-410
9	B-Pillar Middle	1990	-715	-900
10	Front Seat Track	2250	-570	-340
11	Rear Seat Structure	1720	380	-410
12	Right Rear Occupant Compartment	1720	380	-400
13	Engine Block	3990	-25	-440
14	Rear Floorpan Above Axle	1030	101	-560

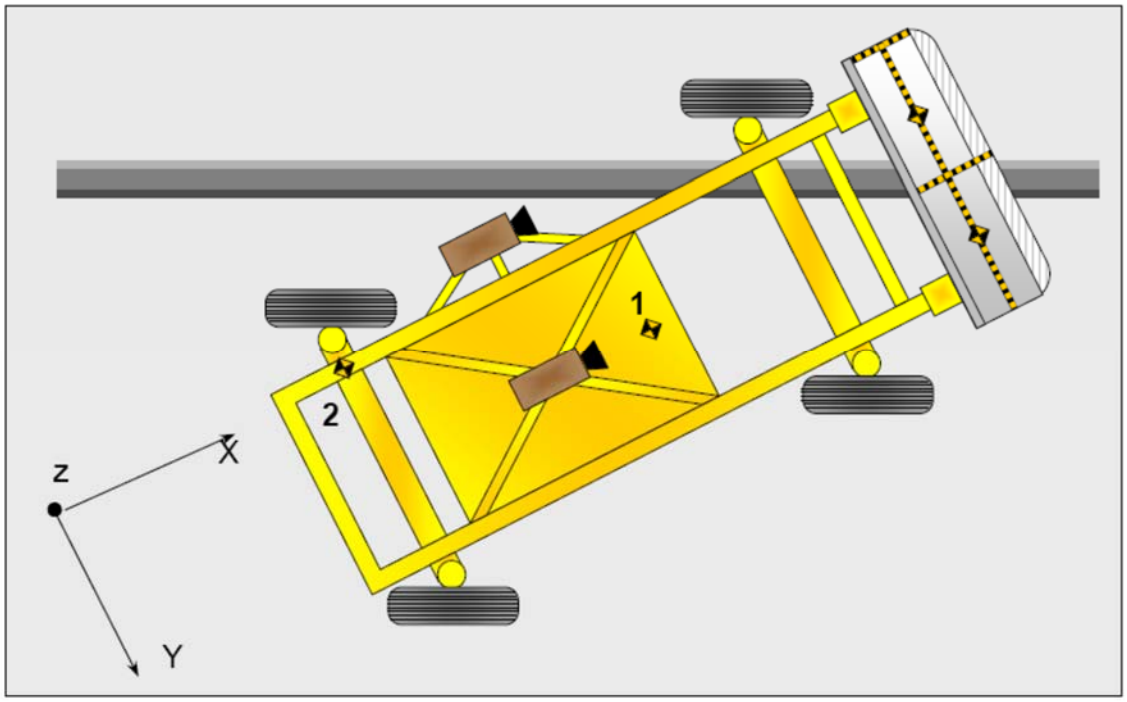
Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurement		
		X	Y	Z
1	MDB CG	-1195	0	-430
2	MDB Rear	-2642	-593	-608

Reference: X – Face of MDB (+ forward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 8

POST-TEST OBSERVATIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

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

DATA SHEET NO. 8 … (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

DATA SHEET NO. 8 … (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2721
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		421
Actual Impact Point (Aft of Front Axle)	mm		400
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	21
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	4

DATA SHEET NO. 9

MDB SUMMARY OF RESULTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

MDB SPECIFICATIONS

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

MDB WEIGHTS

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

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.92
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.06
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.3
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.1
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.2

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

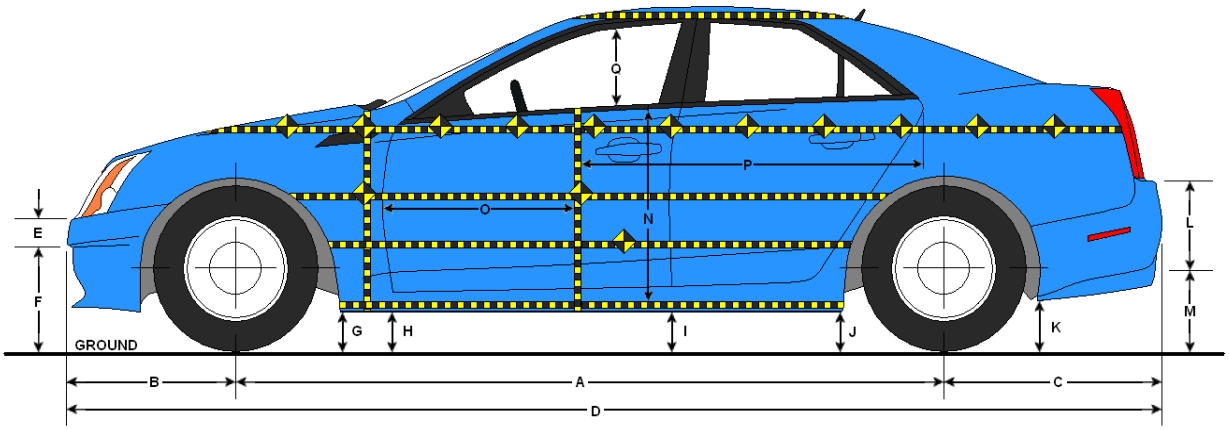
Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	700	Left	242
B	Top of Bumper	533	700	Left	149
C	Mid Level	686	800	Left	156
D	Top of Stack	813	800	Left	197

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2721	2709	-12
B	Front Axle to FSOV	903	916	13
C	Rear Axle to RSOV	1024	1018	-6
D	Total Length at Centerline	4647	4644	-3
E	Front Bumper Thickness	225	224	-1
F	Fromt Bumper Bottom to Ground	492	492	0
G	Sill Height at Front Wheel Well	349	354	5
H	Sill Height at Front Door Leading Edge	357	365	8
I	Sill Height at B-Pillar	372	379	7
J1	Sill Height at Rear Wheel Well	363	365	2
J2	Pinch Weld Height at Rear Wheel Well	309	305	-4
K	Sill Height Aft of Rear Wheel Well	391	388	-3
L	Rear Bumper Thickness	278	279	1
M	Rear Bumper Bottom to Ground	505	506	1
N	Sill Height to Bottom of Front Window Sill	659	660	1
O	Front Door Leading Edge to Impact CL	725	713	-12
P	Rear Door Trailing Edge to Impact CL	1406	1388	-18
Q	Front Window Opening	370	395	25
R	Right Side Length	3274	3278	4
S	Left Side Length	3273	3265	-8
T	Vehicle Width at B-Pillar	1798	1713	-85

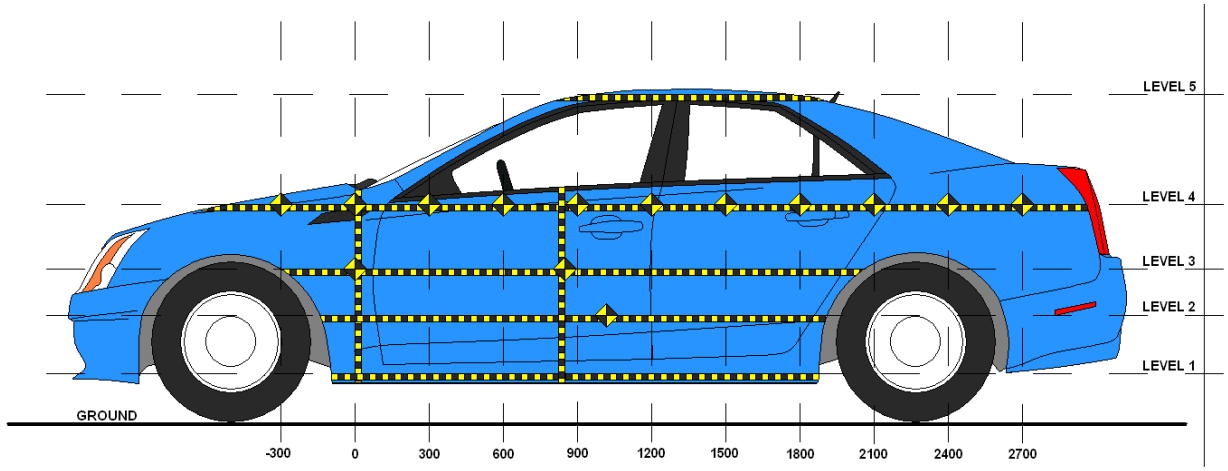
All measurements in mm with tolerance of ± 3mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	394	21	1200
2	Occupant H-Point	630	151	1650
3	Mid-Door	773	141	1500
4	Window Sill	1014	106	1500
5	Window Top	1518	4	1200

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

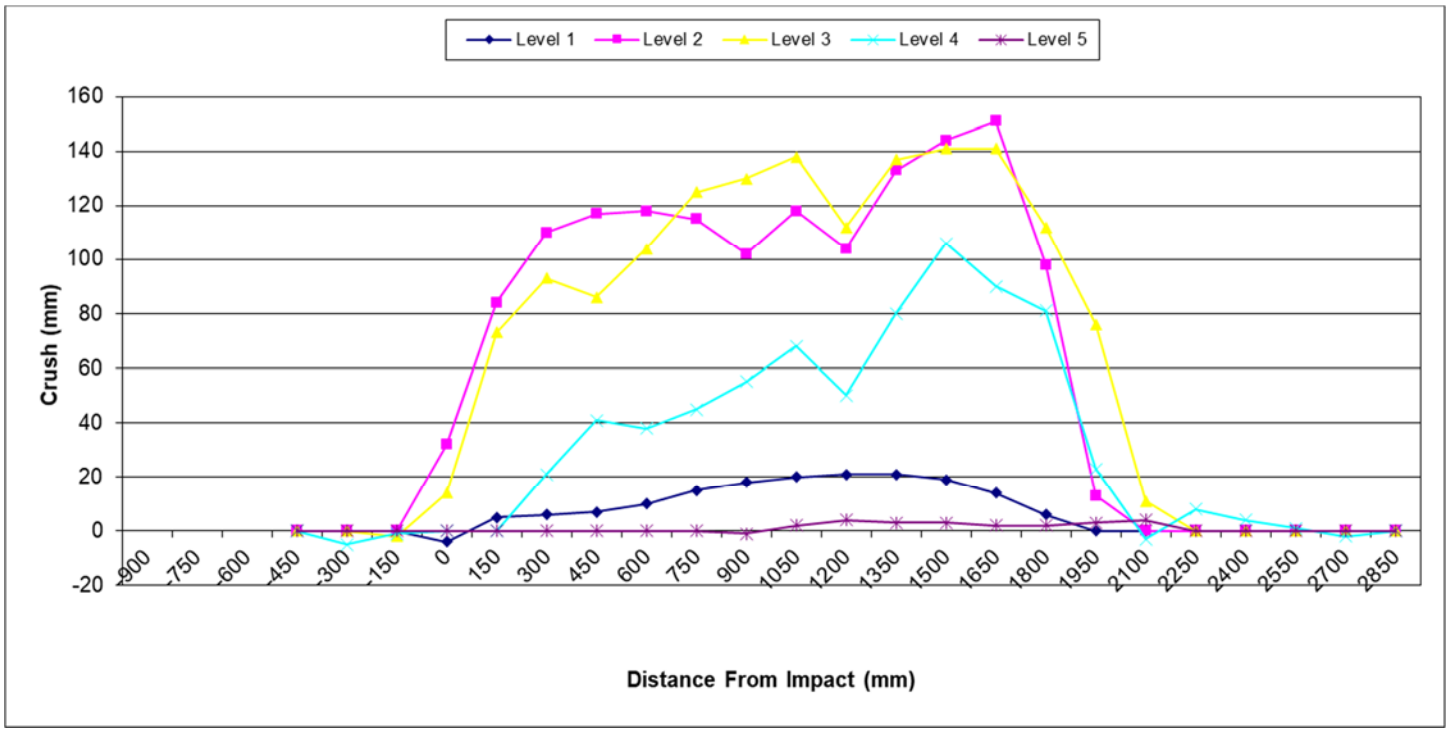
	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				674					669					-5	
-150			603	656				601	655				-2	-1	
0	642	607	611	643		638	639	625	643		-4	32	14	0	
150	639	615	618	638		644	699	691	638		5	84	73	0	
300	639	621	622	634		645	731	715	655		6	110	93	21	
450	639	623	624	632		646	740	710	673		7	117	86	41	
600	640	623	626	631		650	741	730	669		10	118	104	38	
750	639	622	626	631		654	737	751	676		15	115	125	45	
900	639	621	625	632	888	657	723	755	687	887	18	102	130	55	-1
1050	639	619	625	634	892	659	737	763	702	894	20	118	138	68	2
1200	639	617	624	638	900	660	721	736	688	904	21	104	112	50	4
1350	638	616	623	642	907	659	749	760	722	910	21	133	137	80	3
1500	636	614	621	647	912	655	758	762	753	915	19	144	141	106	3
1650	633	611	618	654	919	647	762	759	744	921	14	151	141	90	2
1800	629	605	612	657	925	635	703	724	738	927	6	98	112	81	2
1950		599	603	665	930		612	679	688	933		13	76	23	3
2100			600	657	938			611	654	942			11	-3	4
2250				657					665					8	
2400				663					667					4	
2550				675					676					1	
2700				690					688					-2	
2850															

DATA SHEET NO. 11 … (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

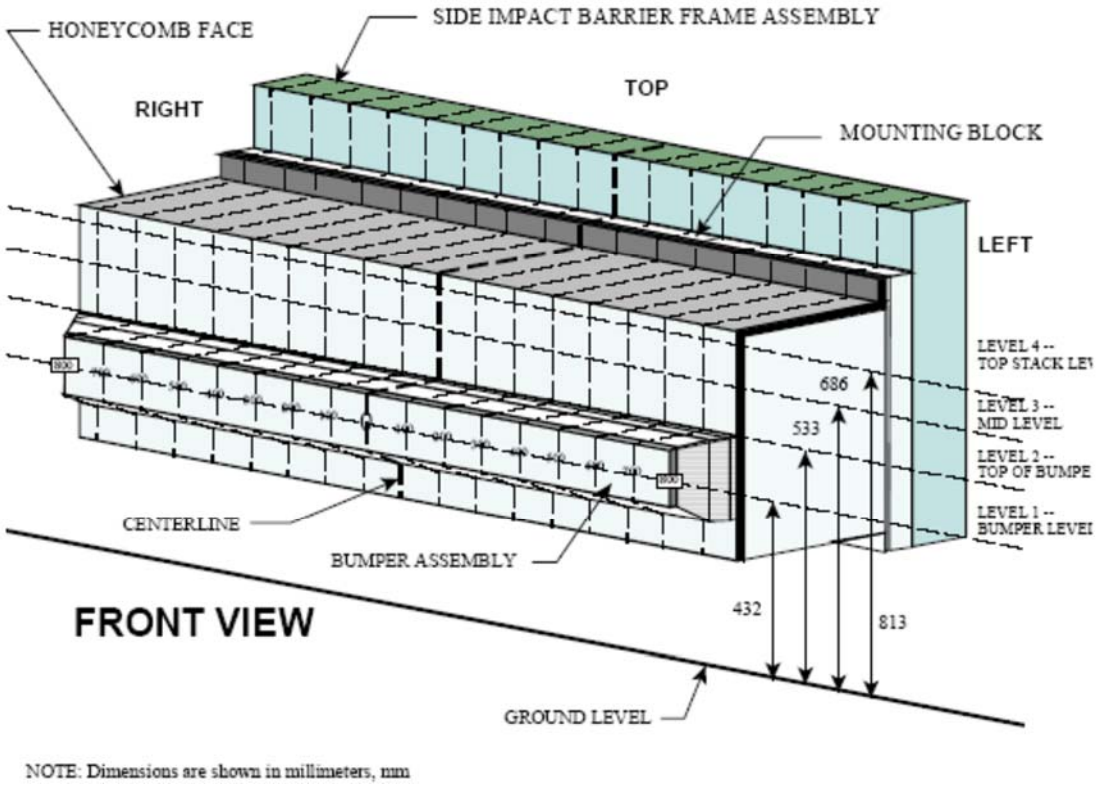


DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



NOTE: Dimensions are shown in millimeters, mm

DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	190	184	187	187	199	199	200	201	198	194	200	205	205	206	218	242	241
2	92	90	87	87	94	91	103	100	104	107	110	118	126	127	136	149	144
3	68	30	28	31	56	73	64	45	142	40	43	48	66	80	101	125	156
4	53	22	19	34	65	108	102	89	64	60	71	77	89	122	144	169	197

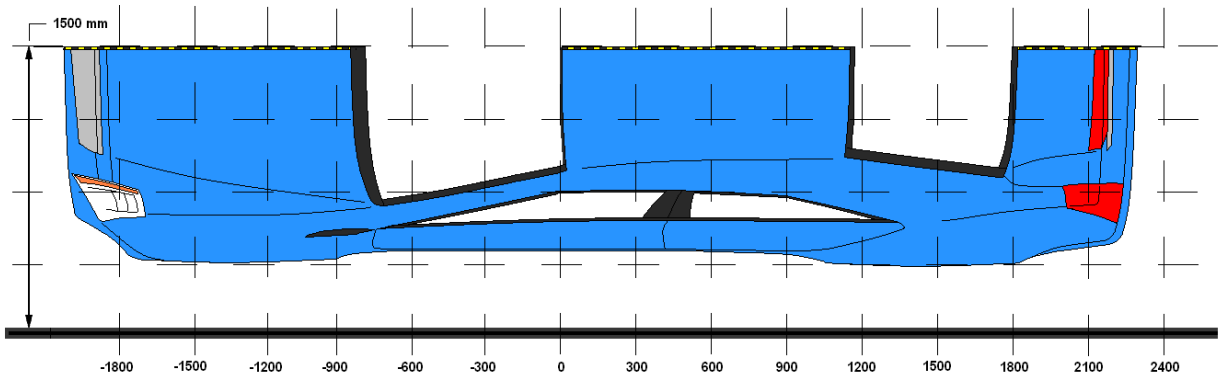
All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2700	4	690	688	-2
2	2100	3	600	611	11
3	1500	2	614	758	144
4	900	3	625	755	130
5	300	2	621	731	110
6	-300	4	674	669	-5

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	241
2	500	Left	1	206
3	200	Left	1	200
4	200	Right	1	200
5	500	Right	1	187
6	800	Right	1	190

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20

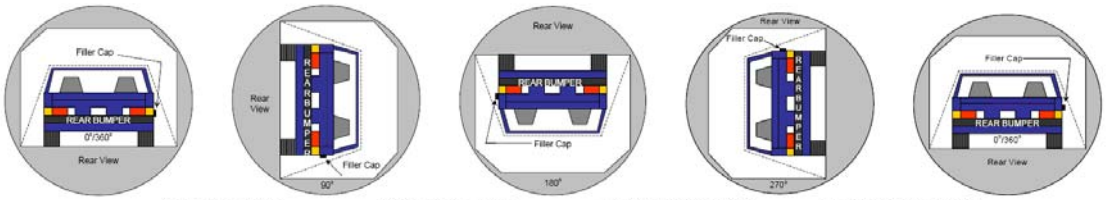
Temperature at Time of Impact: 11.1 °C Test Time: 1:48 P.M.

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

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

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

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



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	86	300	386
90° To 180°	79	300	379
180° To 270°	78	300	378
270° To 360°	81	300	381

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

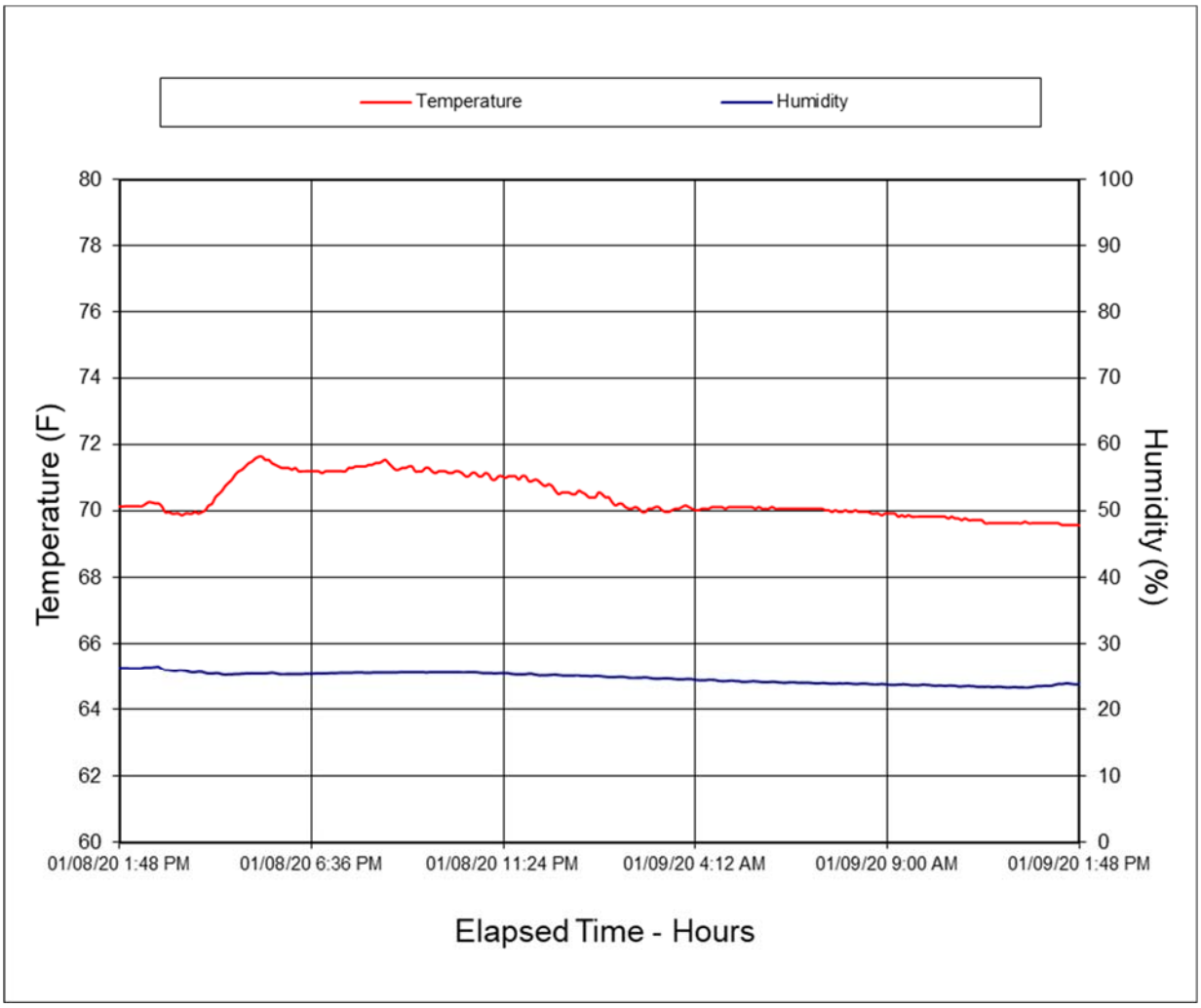
Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2020 MAZDA3 4-Door Sedan NHTSA No. M20205405

Test Program: NCAP MDB Side Impact Test Test Date: 01/09/20



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS … (CONTINUED)

TABLE OF PHOTOGRAPHS … (CONTINUED)

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

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

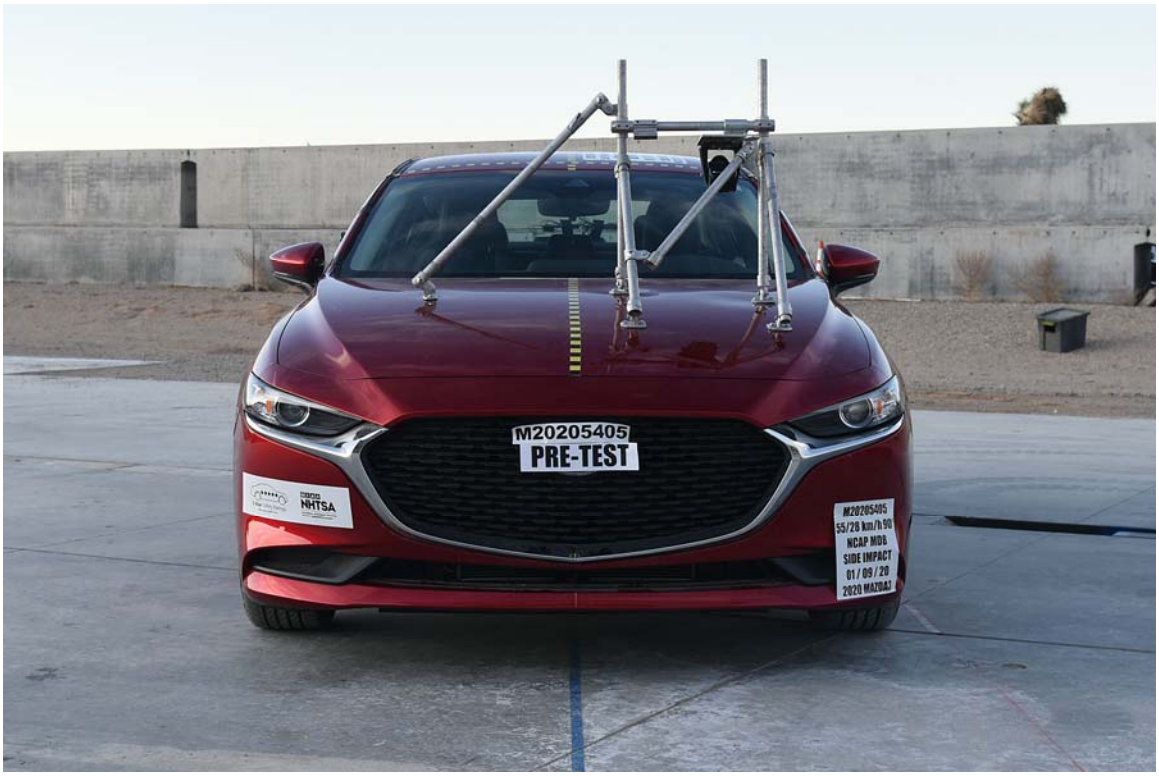


FIGURE 3. Pre-Test Frontal View of Test Vehicle

FIGURE 4. Post-Test Frontal View of Test Vehicle

FIGURE 5. Pre-Test Left Front ¾ View of Test Vehicle

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

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

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

FIGURE 9. Pre-Test Left Rear ¾ View of Test Vehicle

FIGURE 10. Post-Test Left Rear ¾ View of Test Vehicle

FIGURE 11. Pre-Test Rear View of Test Vehicle

FIGURE 12. Post-Test Rear View of Test Vehicle

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

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

FIGURE 15. Pre-Test Overhead View of Test Area

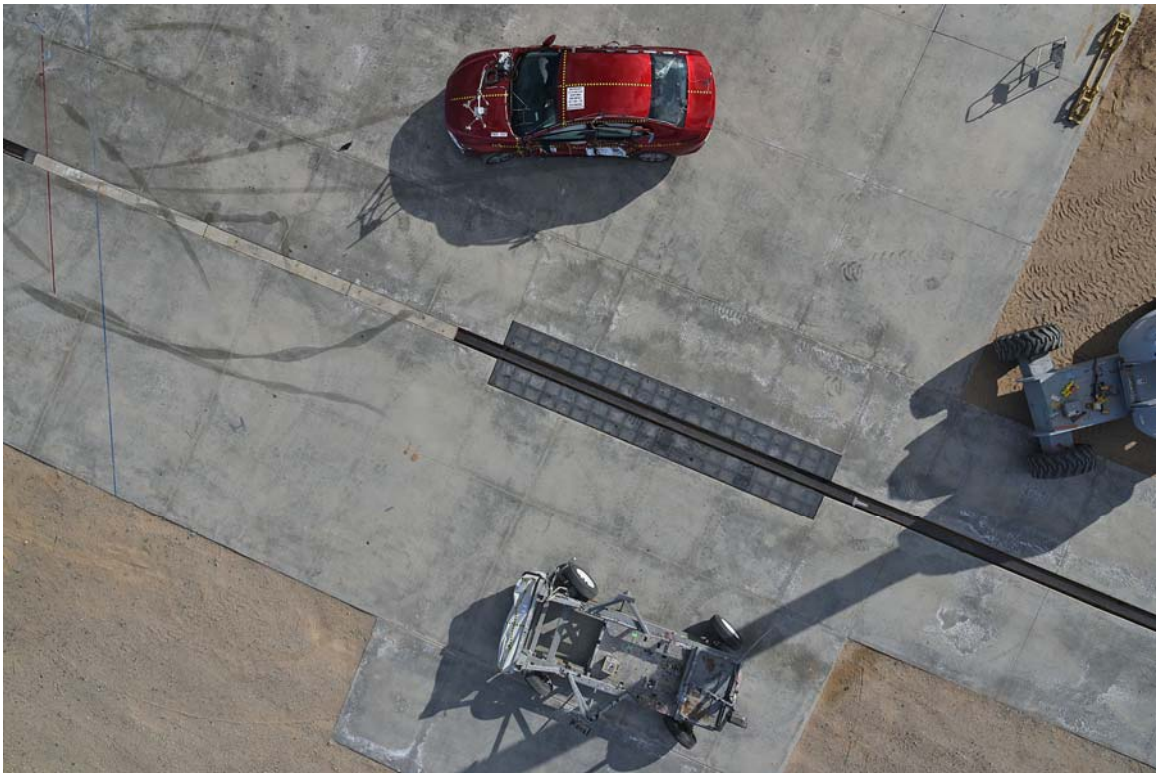


FIGURE 16. Post-Test Overhead View of Test Area

FIGURE 17. Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle

FIGURE 18. Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle

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

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

FIGURE 21. Pre-Test Left Front Door Latch Close-Up

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

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

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

FIGURE 25. Pre-Test Front Close-Up View of Driver Dummy

FIGURE 26. Post-Test Front Close-Up View of Driver Dummy

FIGURE 27. Pre-Test Left Side View of Driver Dummy
Showing Belt and Chalking

FIGURE 28. Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View

FIGURE 29. Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

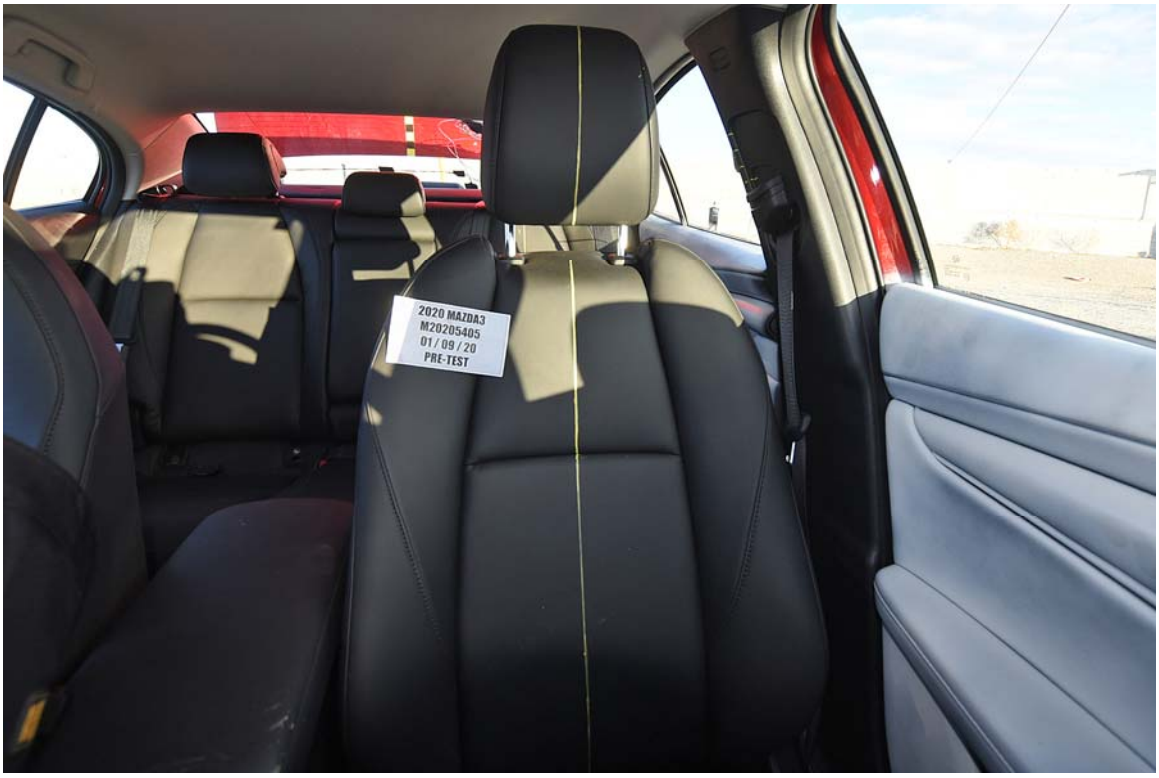


FIGURE 30. Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

FIGURE 31. Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

FIGURE 32. Pre-Test Overhead View of Driver Seat Pan Prior to Dummy Positioning

FIGURE 33. Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

FIGURE 34. Pre-Test Placement of Driver Dummy's Feet

FIGURE 35. Pre-Test View of Belt Anchorage for Driver Dummy

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

FIGURE 37. View of Disengaged Parking Brake

FIGURE 38. Pre-Test View of Parking Brake

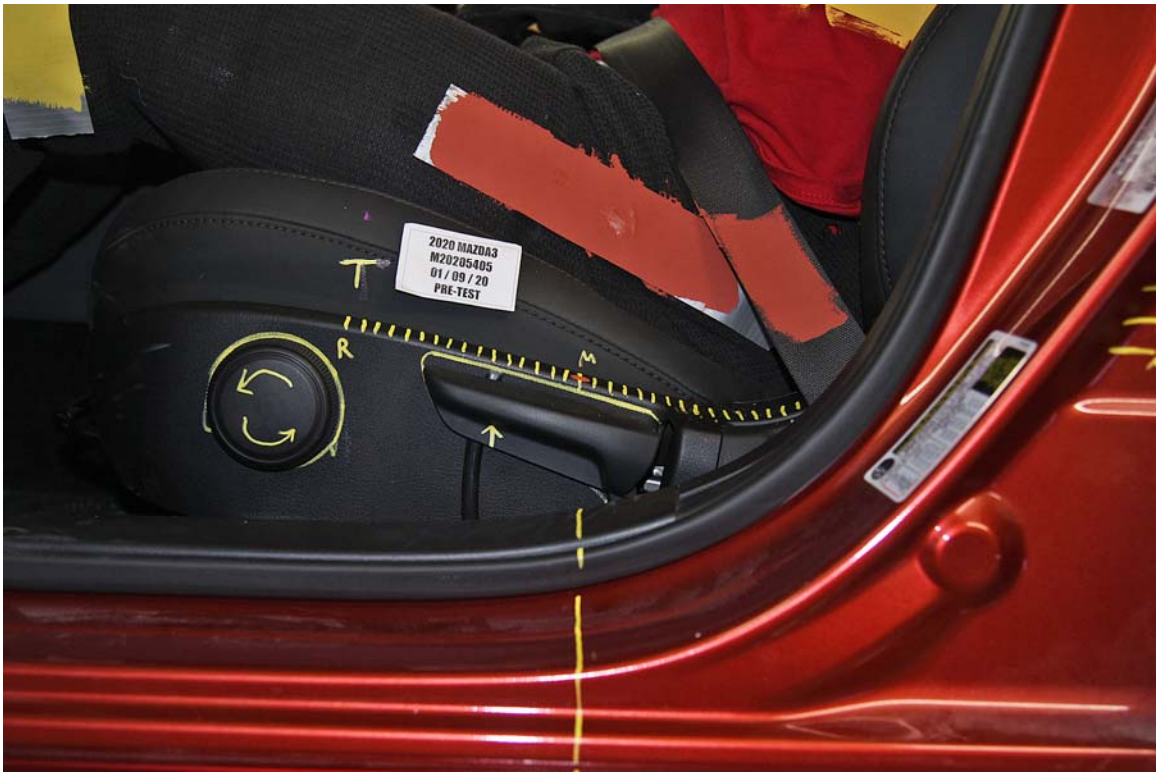


FIGURE 39. Pre-Test Close-Up Left Side View of Driver Seat Track

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

FIGURE 41. Pre-Test Close-Up View of Driver Seat Back or Head Restraint

FIGURE 42. Pre-Test Driver Dummy and Door Clearance View

FIGURE 43. Post-Test Driver Dummy and Door Clearance View

FIGURE 44. Pre-Test Right Side View of Driver Dummy
and Front Seat Occupant Compartment

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

FIGURE 46. Pre-Test Driver Inner Door Panel View

FIGURE 47. Post-Test Driver Inner Door Panel View
Showing Driver Dummy Contact Locations

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

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

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

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

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

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

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

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

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

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

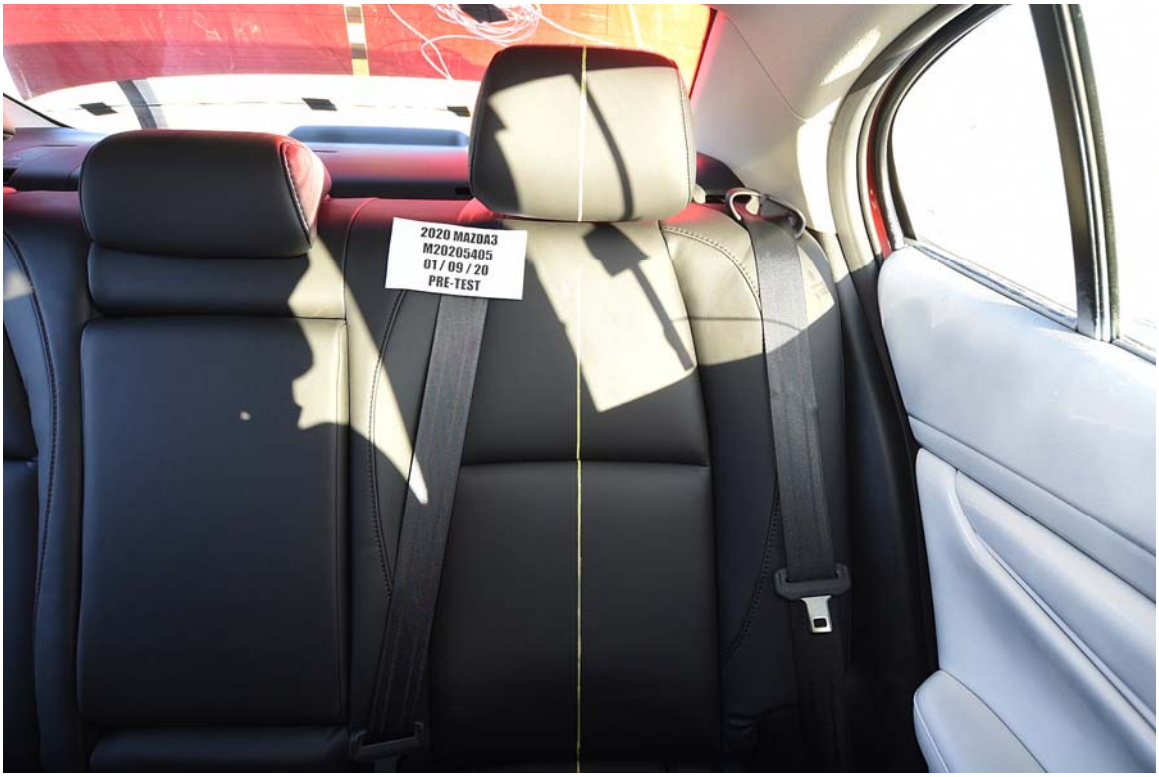


FIGURE 58. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Photograph Not Applicable

Vehicle Not Equipped with
Rear Passenger Side Airbag

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

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

Photograph Not Applicable

Vehicle Not Equipped with
Rear Passenger Side Airbag

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

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

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

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

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

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

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

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

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

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

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

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

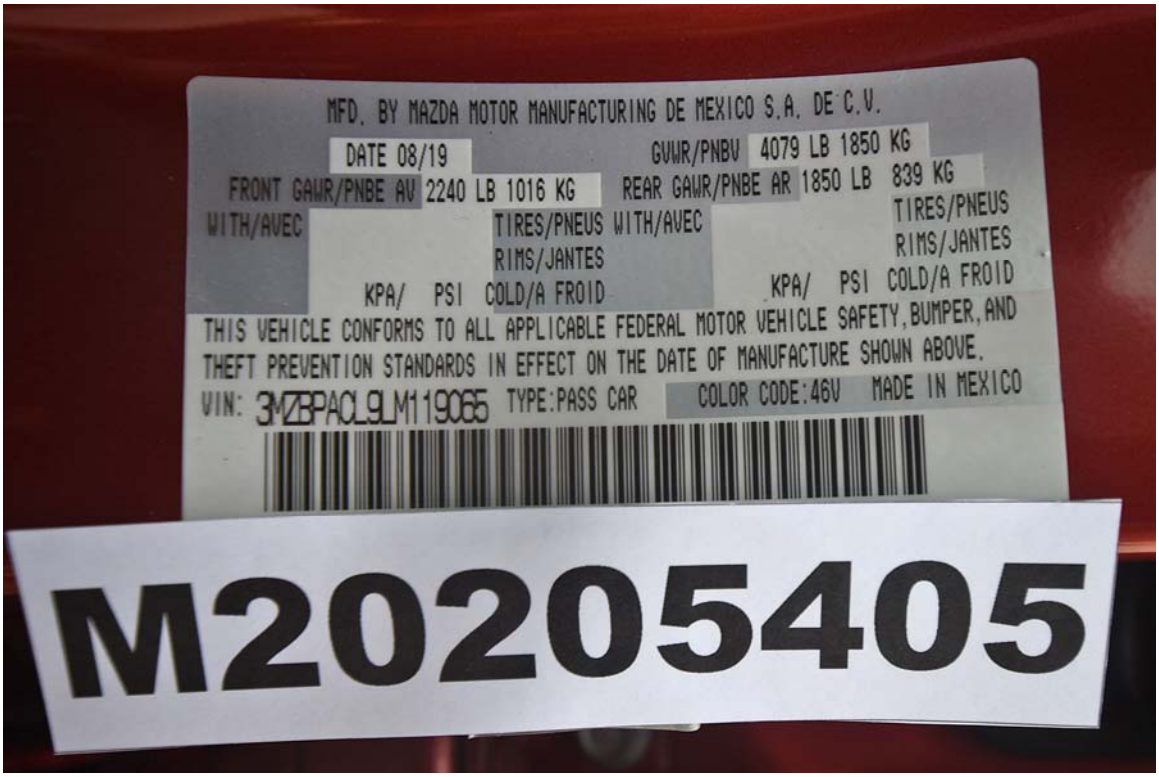


FIGURE 92. Close-Up View of Vehicle's Certification Label

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

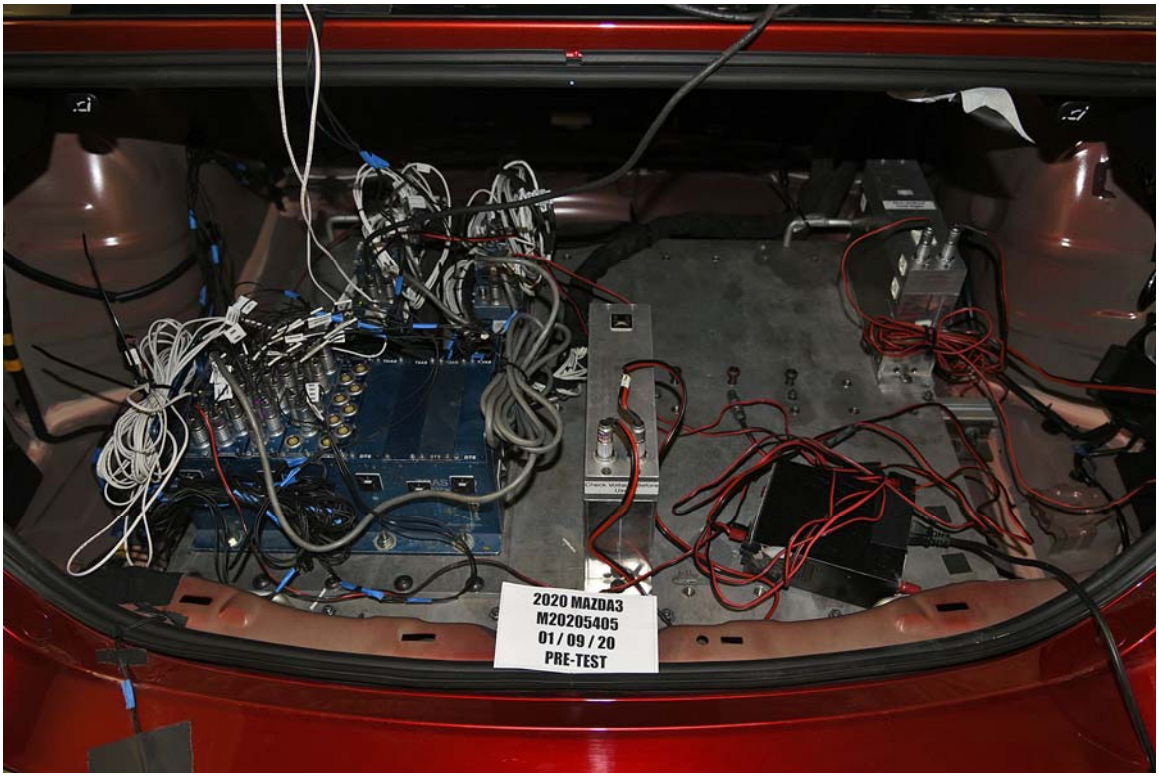


FIGURE 94. Pre-Test Ballast View

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

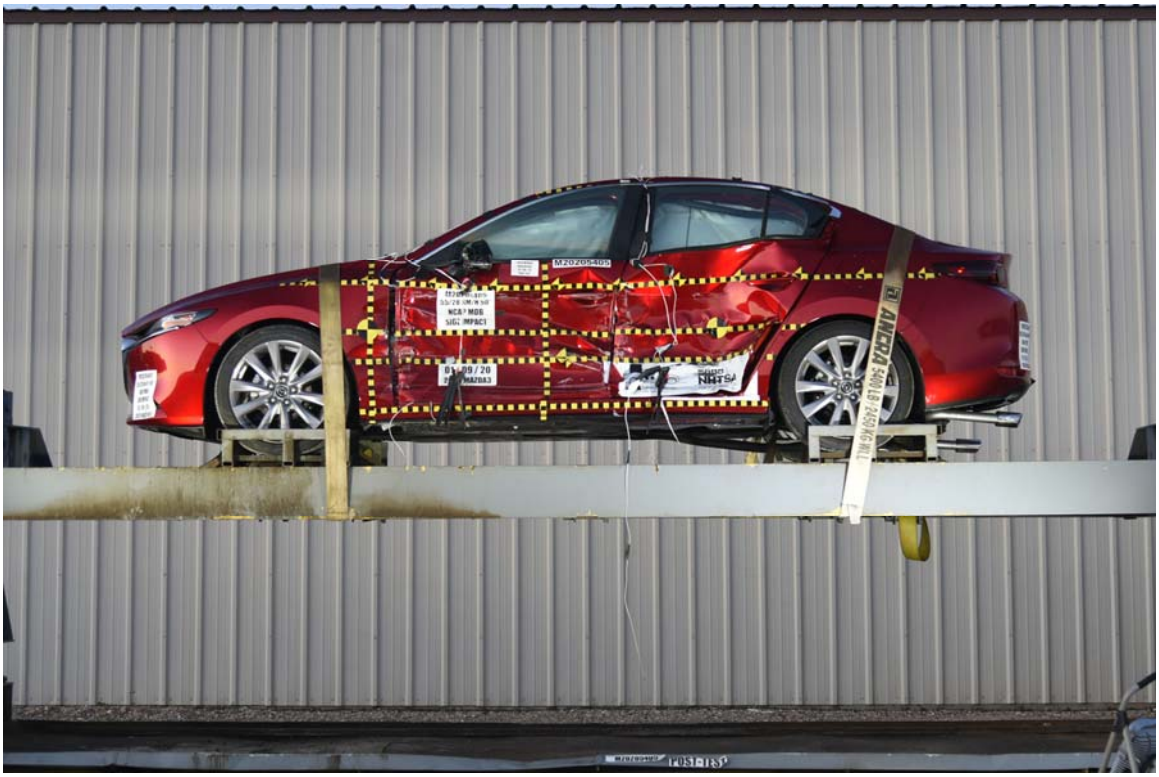


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees

FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees

FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

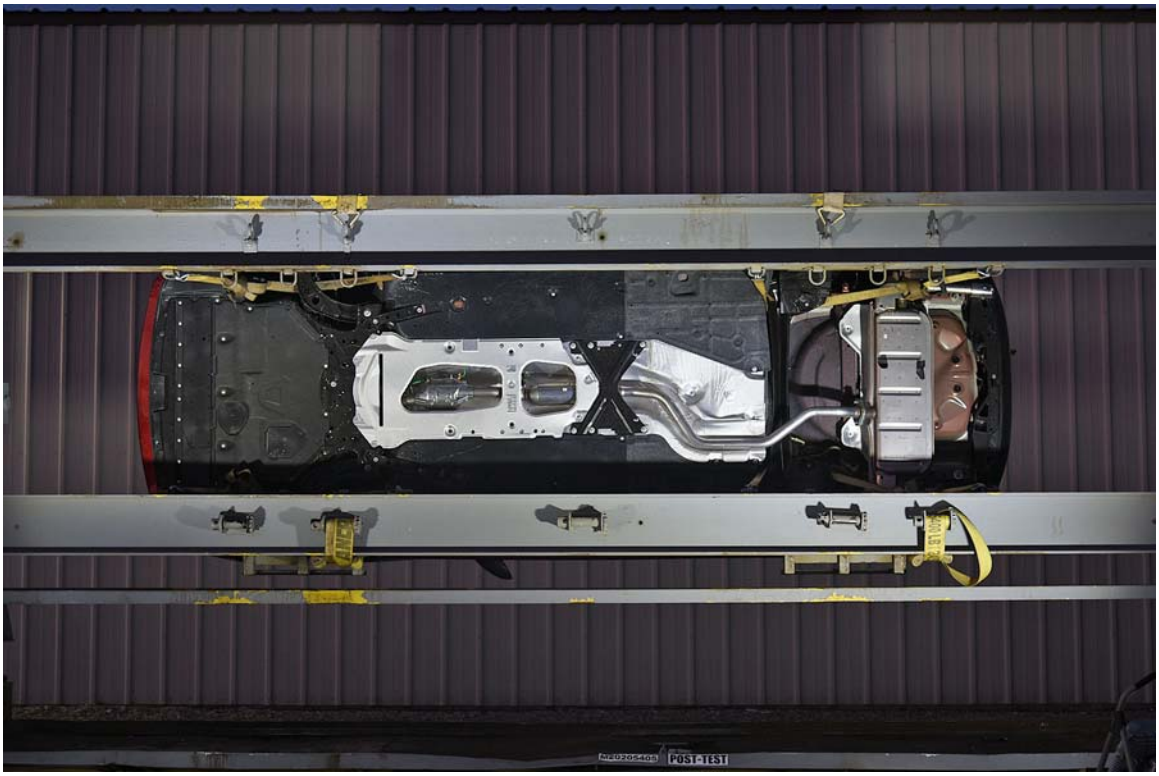


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

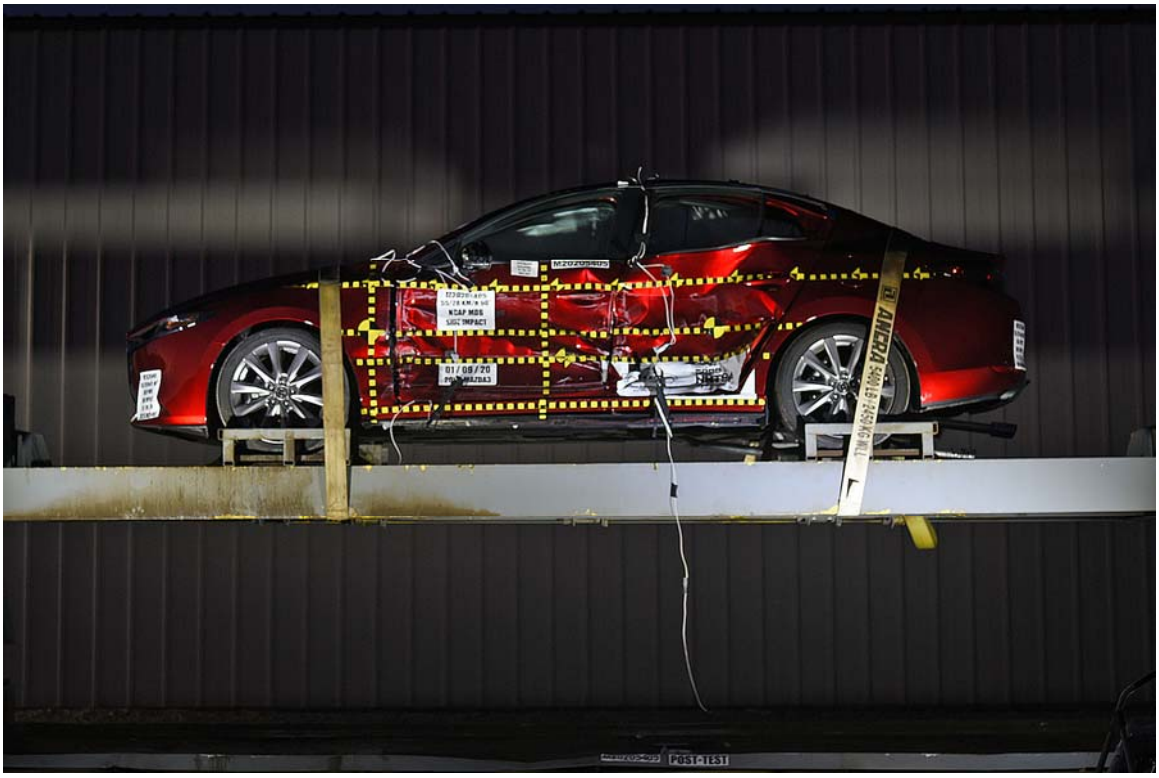


FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees

FIGURE 101. Impact Event

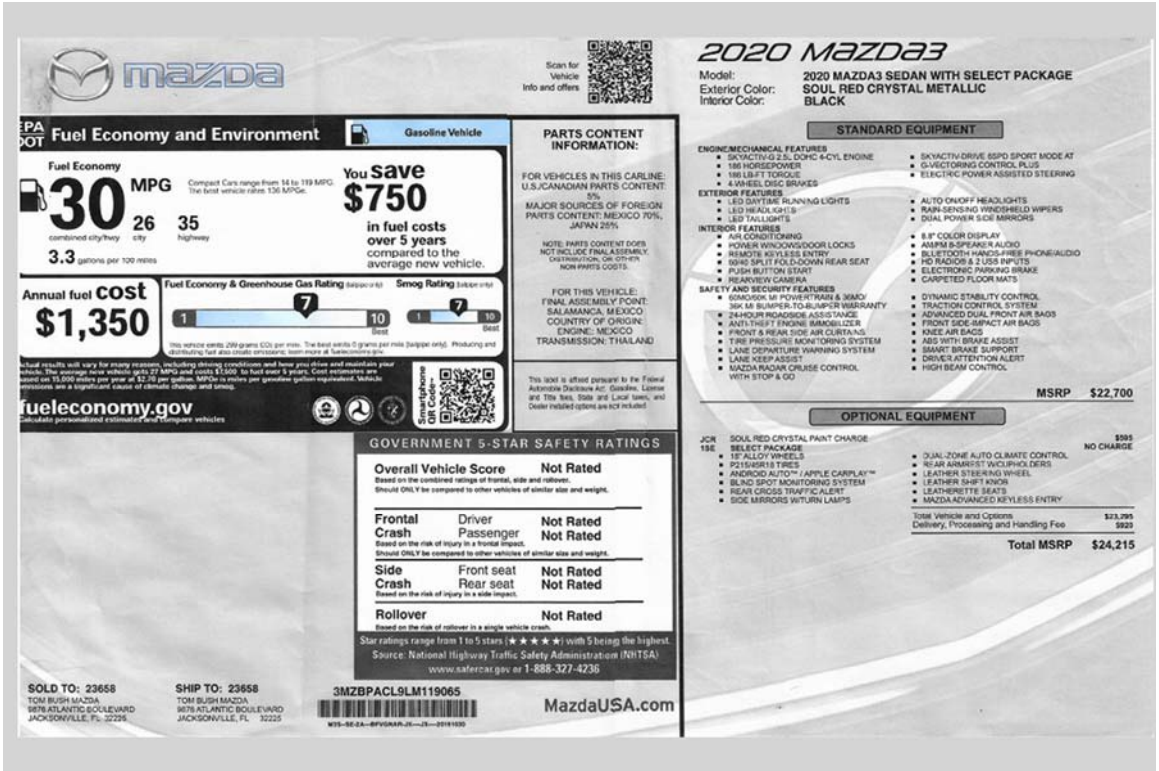
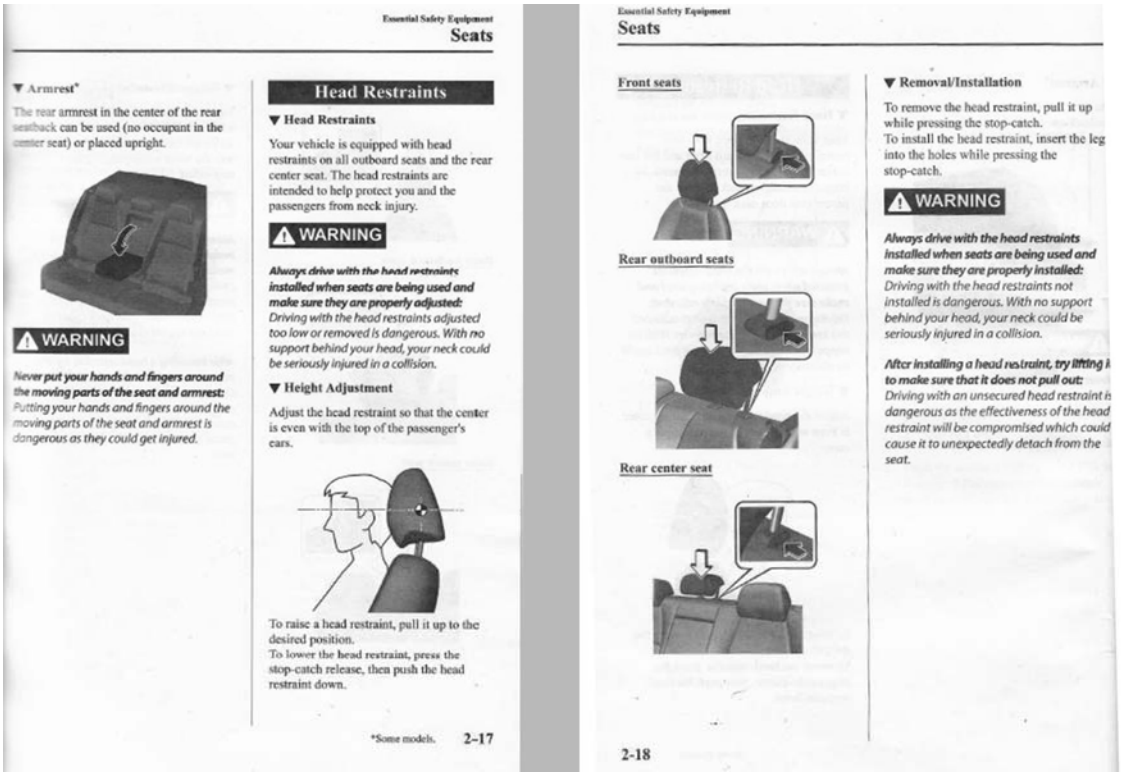


FIGURE 102. Monroney Label



Essential Safety Equipment
Seats

▼ Armrest*

The rear armrest in the center of the rear seatback can be used (no occupant in the center seat) or placed upright.

WARNING

Never put your hands and fingers around the moving parts of the seat and armrest:
Putting your hands and fingers around the moving parts of the seat and armrest is dangerous as they could get injured.

Head Restraints

▼ Head Restraints

Your vehicle is equipped with head restraints on all outboard seats and the rear center seat. The head restraints are intended to help protect you and the passengers from neck injury.

WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly adjusted:
Driving with the head restraints adjusted too low or removed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

▼ Height Adjustment

Adjust the head restraint so that the center is even with the top of the passenger's ears.

To raise a head restraint, pull it up to the desired position.
To lower the head restraint, press the stop-catch release, then push the head restraint down.

*Some models. 2-17

Essential Safety Equipment
Seats

Front seats

Rear outboard seats

Rear center seat

▼ Removal/Installation

To remove the head restraint, pull it up while pressing the stop-catch.
To install the head restraint, insert the leg into the holes while pressing the stop-catch.

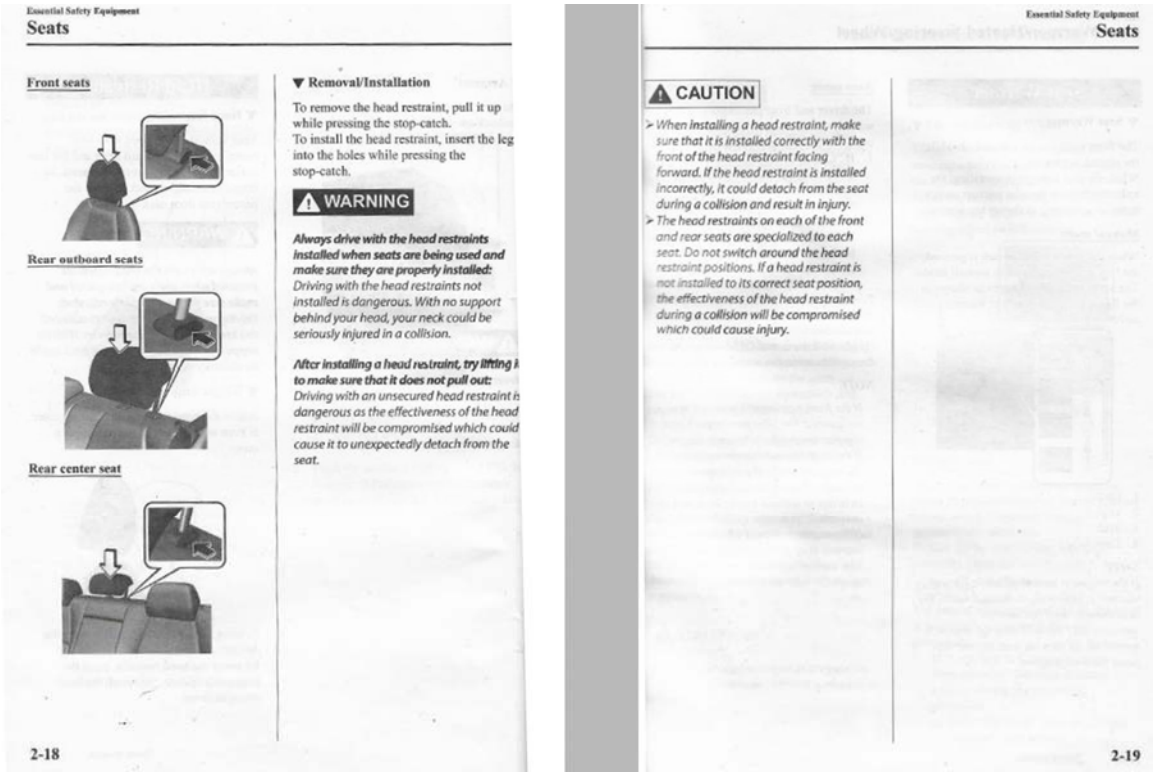
WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly installed:
Driving with the head restraints not installed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

After installing a head restraint, try lifting it to make sure that it does not pull out:
Driving with an unsecured head restraint is dangerous as the effectiveness of the head restraint will be compromised which could cause it to unexpectedly detach from the seat.

2-18

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



Essential Safety Equipment
Seats

Front seats

Rear outboard seats

Rear center seat

▼ Removal/Installation

To remove the head restraint, pull it up while pressing the stop-catch.
To install the head restraint, insert the leg into the holes while pressing the stop-catch.

WARNING

Always drive with the head restraints installed when seats are being used and make sure they are properly installed:
Driving with the head restraints not installed is dangerous. With no support behind your head, your neck could be seriously injured in a collision.

After installing a head restraint, try lifting it to make sure that it does not pull out:
Driving with an unsecured head restraint is dangerous as the effectiveness of the head restraint will be compromised which could cause it to unexpectedly detach from the seat.

2-18

Essential Safety Equipment
Seats

CAUTION

- *When installing a head restraint, make sure that it is installed correctly with the front of the head restraint facing forward. If the head restraint is installed incorrectly, it could detach from the seat during a collision and result in injury.*
- *The head restraints on each of the front and rear seats are specialized to each seat. Do not switch around the head restraint positions. If a head restraint is not installed to its correct seat position, the effectiveness of the head restraint during a collision will be compromised which could cause injury.*

2-19

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

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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

Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Driver Head Acceleration Redundant (X)

Driver Head Acceleration Redundant (Y)

Driver Head Acceleration Redundant (Z)

Passenger Head Acceleration Redundant (X)

Passenger Head Acceleration Redundant (Y)

Passenger Head Acceleration Redundant (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Right Side Sill at Front Seat Acceleration (X)

Right Side Sill at Front Seat Acceleration (Y)

Right Side Sill at Front Seat Acceleration (Z)

Right Side Sill at Rear Seat Acceleration (X)

Right Side Sill at Rear Seat Acceleration (Y)

Right Side Sill at Rear Seat Acceleration (Z)

Left Side Sill at Front Seat Acceleration (Y)

Left Side Sill at Rear Seat Acceleration (Y)

Lower A-Post Acceleration (Y)

Middle A-Post Acceleration (Y)

Lower B-Post Acceleration (Y)

Middle B-Post Acceleration (Y)

Front Seat Track Acceleration (Y)

Rear Seat Structure Acceleration (Y)

Right Rear Occupant Compartment Acceleration (Y)

Engine Block (X)

Engine Block (Y)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

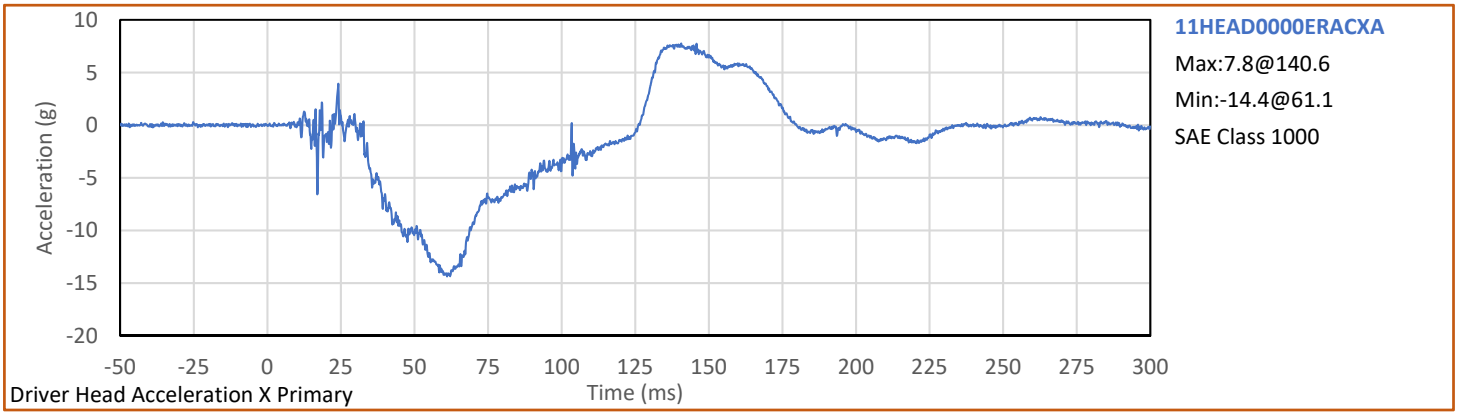
MDB Rear Acceleration (X)

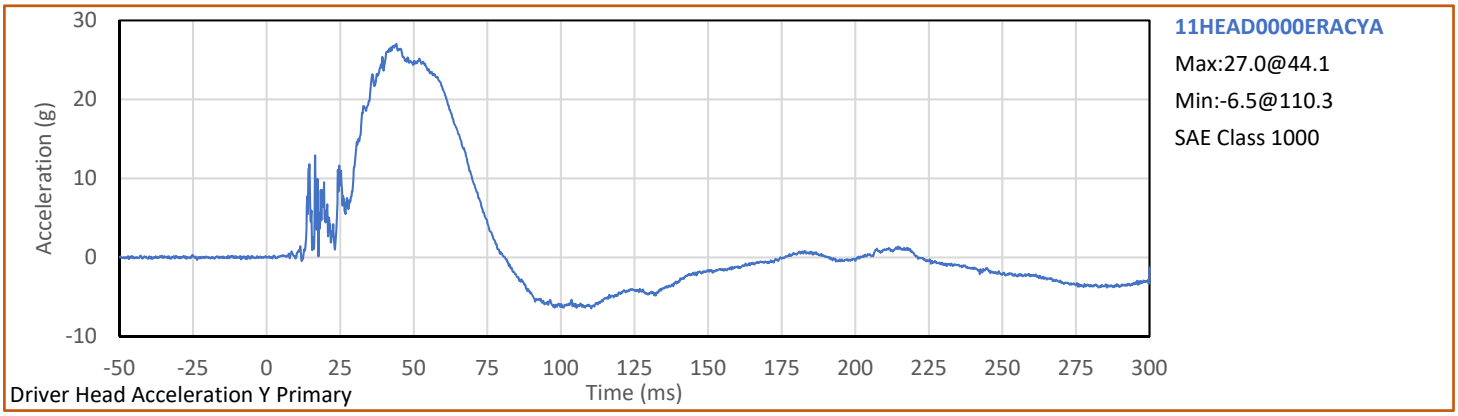
MDB Rear Acceleration (Y)

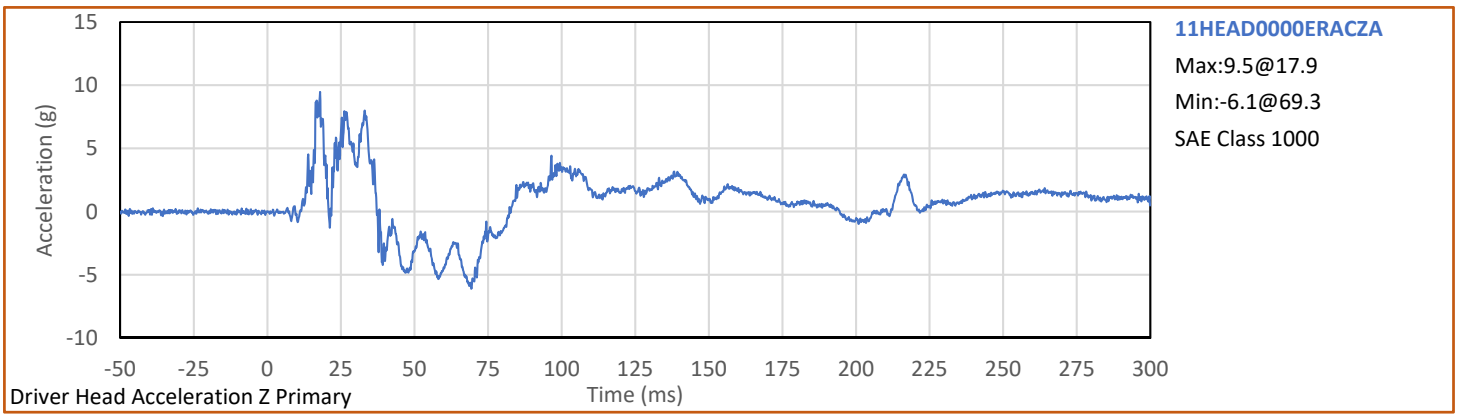
Left MDB Contact Switch

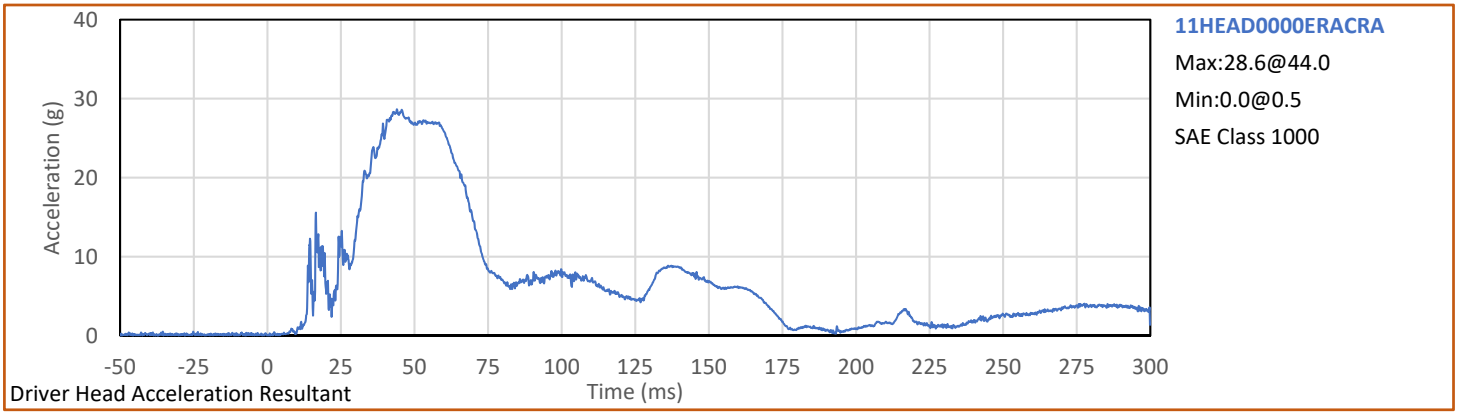
Right MDB Contact Switch

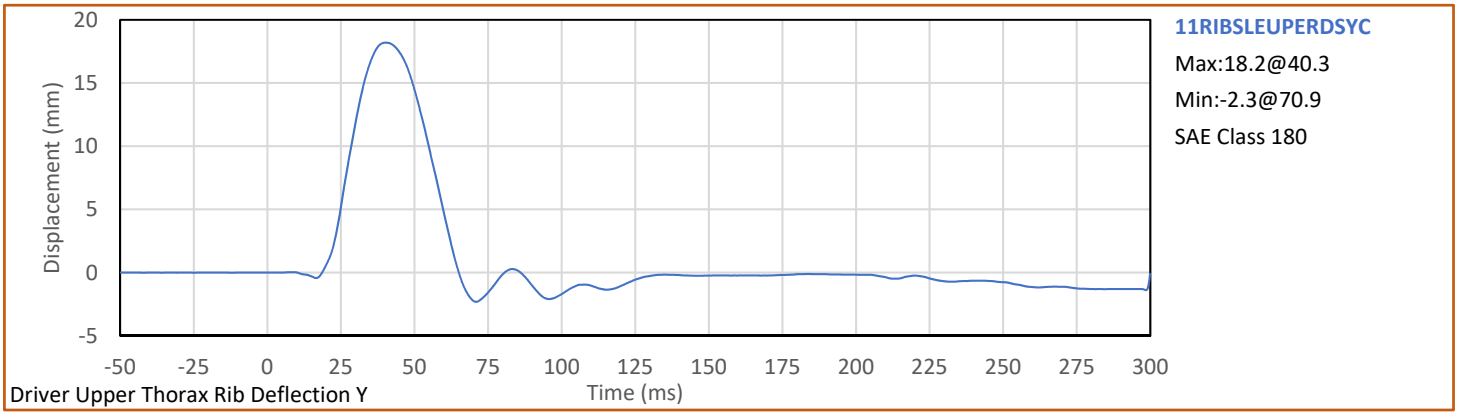
Test Vehicle:	2020 MAZDA3 4-Door Sedan	NHTSA No.:	M20205405
Test Program:	NCAP MDB Side Impact Test	Test Date:	1/9/2020

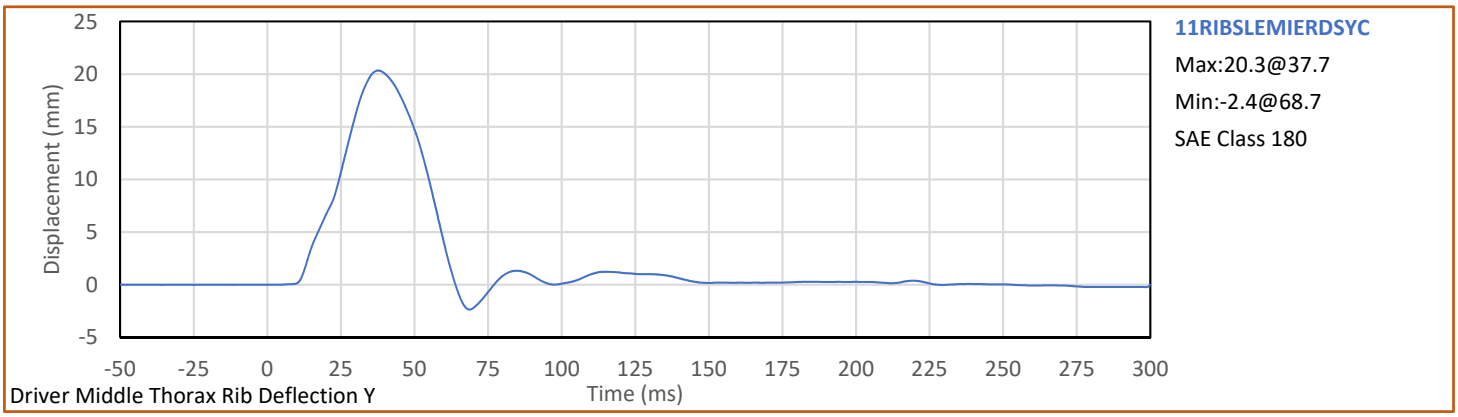


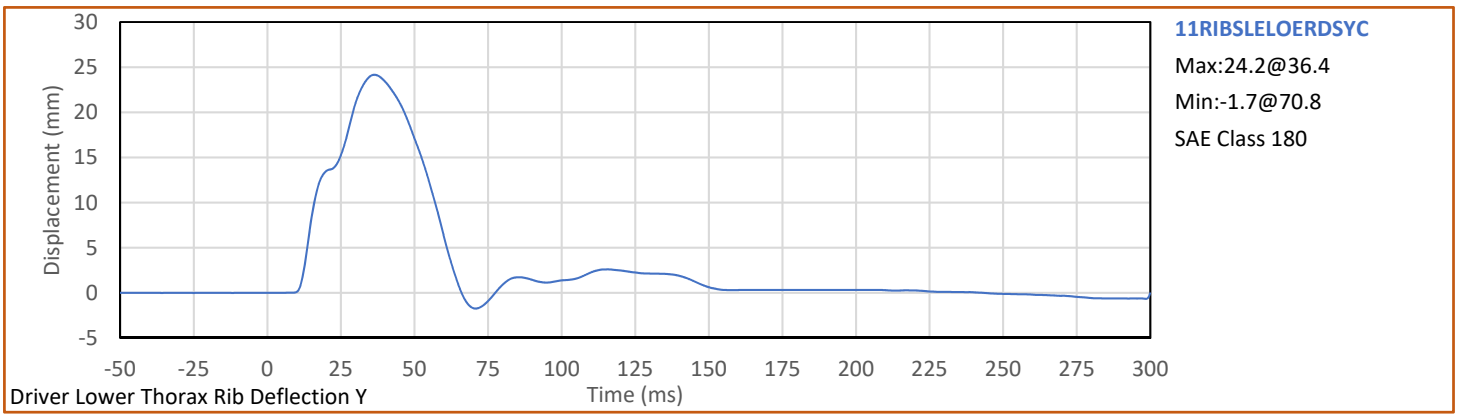


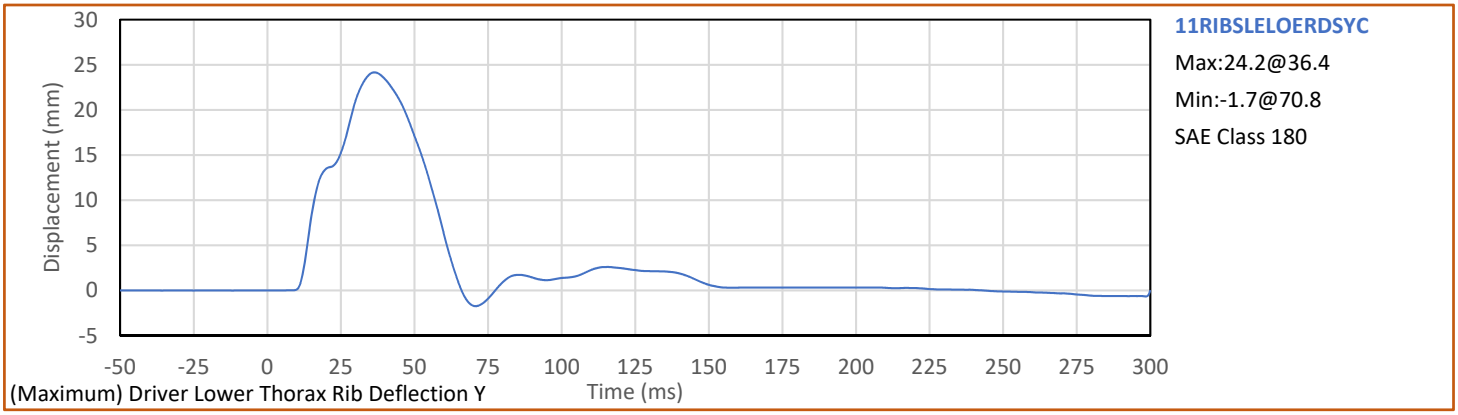


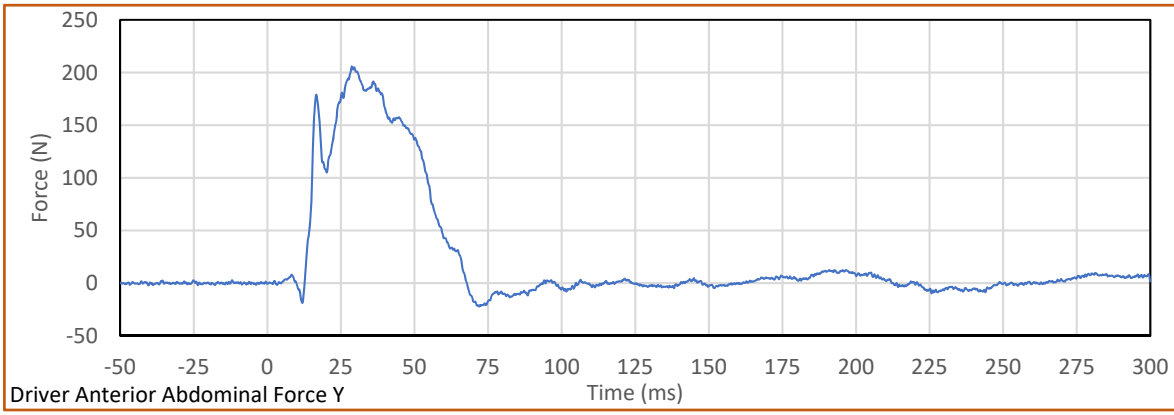



Displacement (mm)
Time (ms)
Driver Upper Thorax Rib Deflection Y
11RIBSLEUPERDSYC
Max:18.2@40.3
Min:-2.3@70.9
SAE Class 180

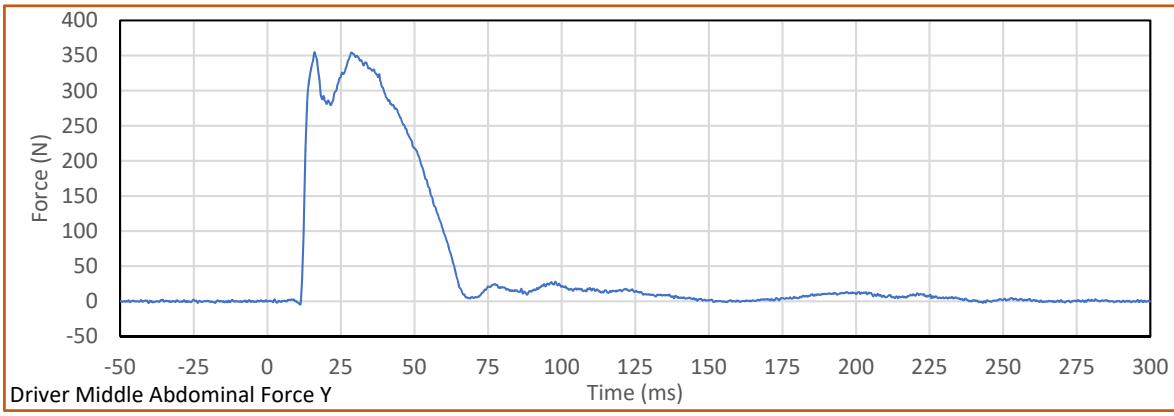

Displacement (mm)
Time (ms)
Driver Middle Thorax Rib Deflection Y
11RIBSLEMIERDSYC
Max:20.3@37.7
Min:-2.4@68.7
SAE Class 180


Displacement (mm)
Time (ms)
Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:24.2@36.4
Min:-1.7@70.8
SAE Class 180

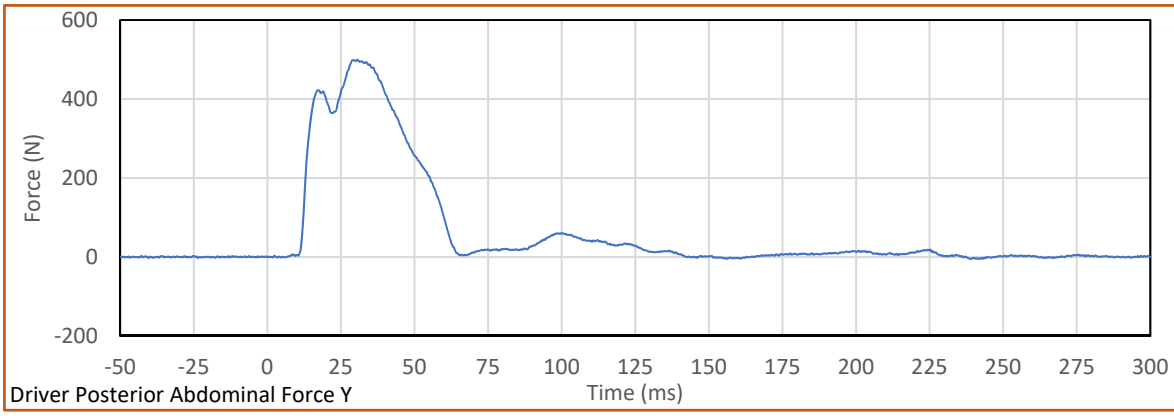

Displacement (mm)
Time (ms)
(Maximum) Driver Lower Thorax Rib Deflection Y
11RIBSLELOERDSYC
Max:24.2@36.4
Min:-1.7@70.8
SAE Class 180



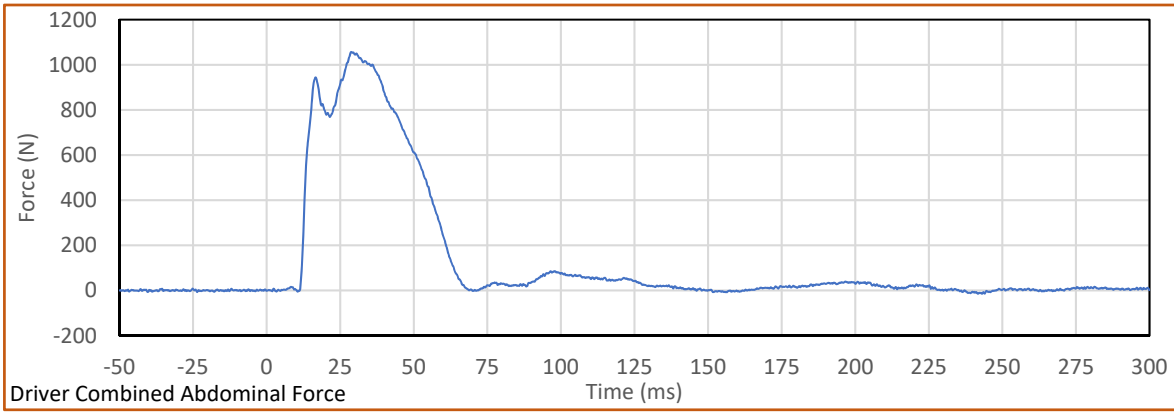
11ABDOLEFRERFOYB
Max:205.7@28.7
Min:-22.2@71.9
SAE Class 600



11ABDOLEMIERFOYB
Max:354.8@16.0
Min:-4.7@11.2
SAE Class 600

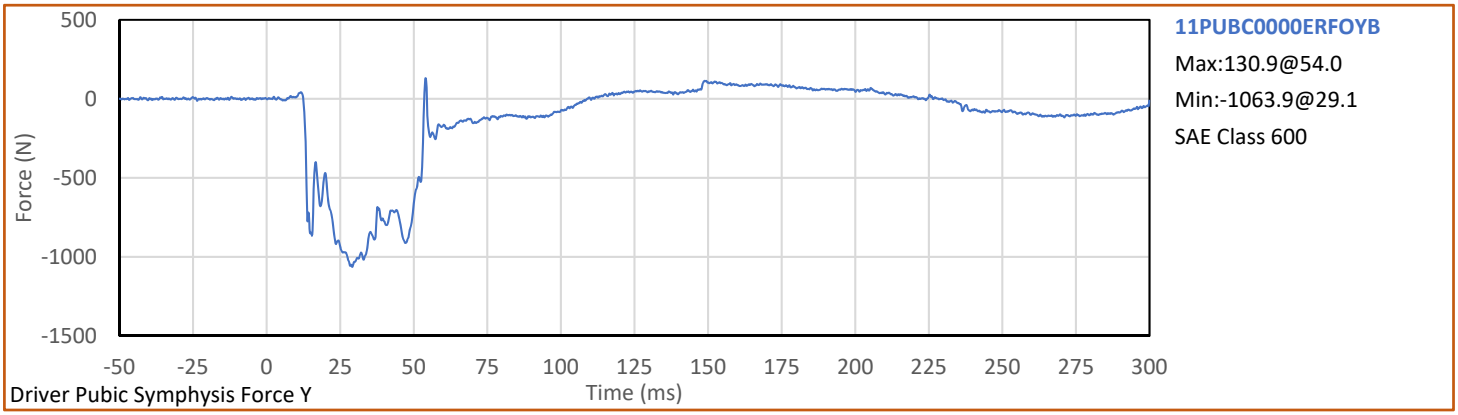


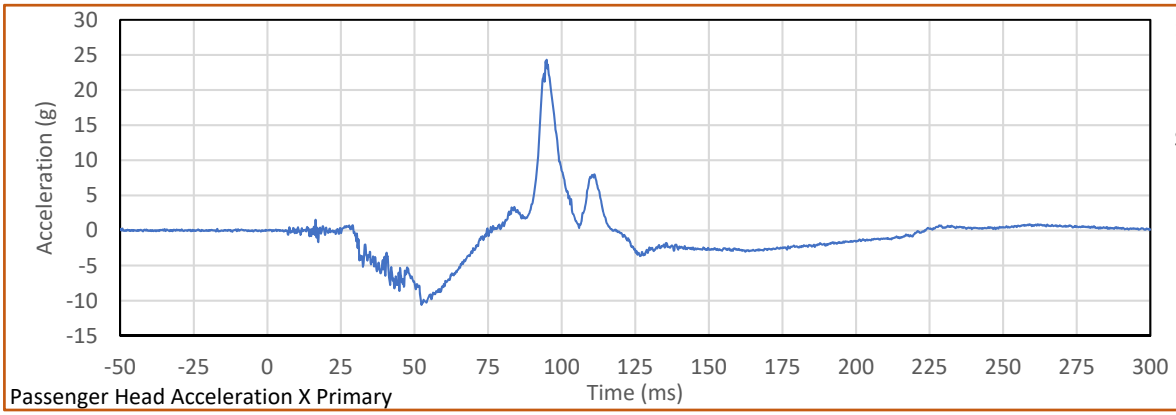
11ABDOLEREERFOYB
Max:499.7@30.6
Min:-5.2@241.7
SAE Class 600



11ABDOLESUERFOYB
Max:1056.9@28.7
Min:-14.7@243.1
SAE Class 600

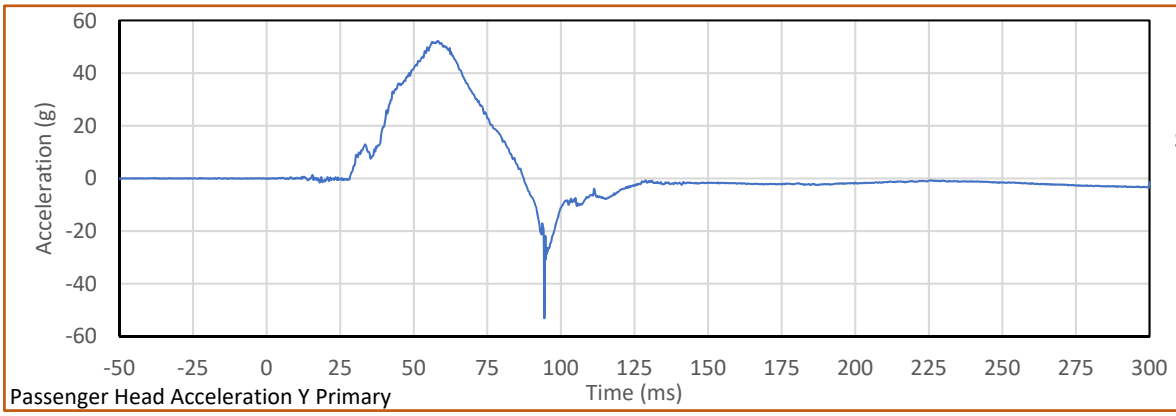
Test Vehicle:	2020 MAZDA3 4-Door Sedan	NHTSA No.:	M20205405
Test Program:	NCAP MDB Side Impact Test	Test Date:	1/9/2020





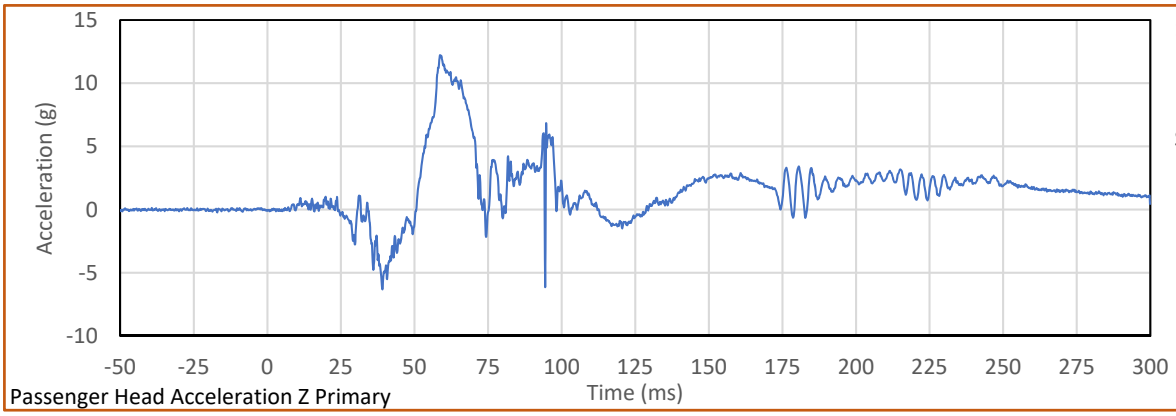
14HEAD0000S2ACXA
Max:24.3@94.9
Min:-10.6@52.4
SAE Class 1000

Passenger Head Acceleration X Primary



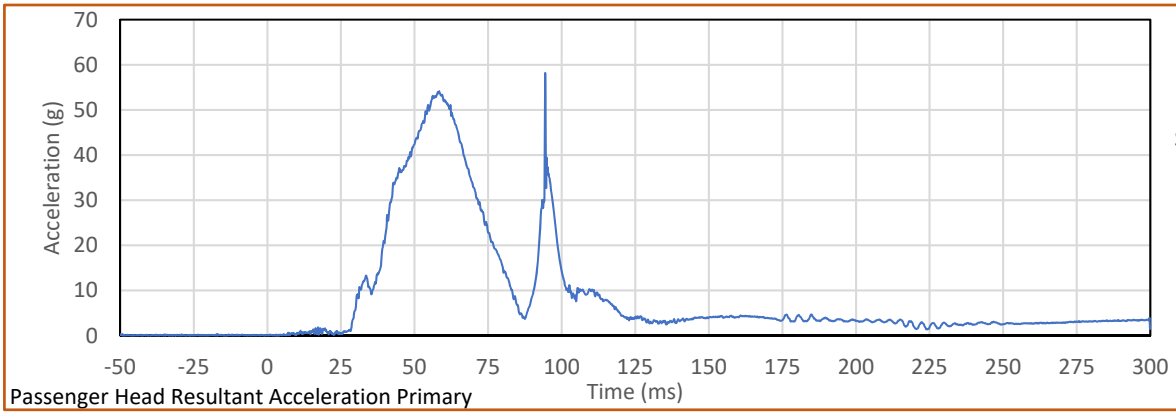
14HEAD0000S2ACYA
Max:52.1@58.4
Min:-53.1@94.4
SAE Class 1000

Passenger Head Acceleration Y Primary



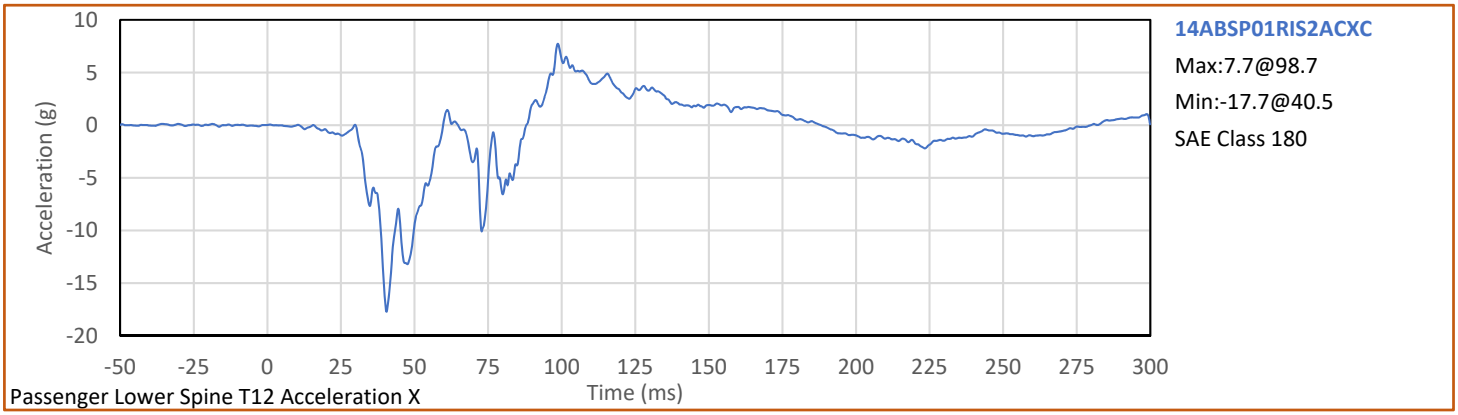
14HEAD0000S2ACZA
Max:12.2@58.7
Min:-6.3@39.1
SAE Class 1000

Passenger Head Acceleration Z Primary

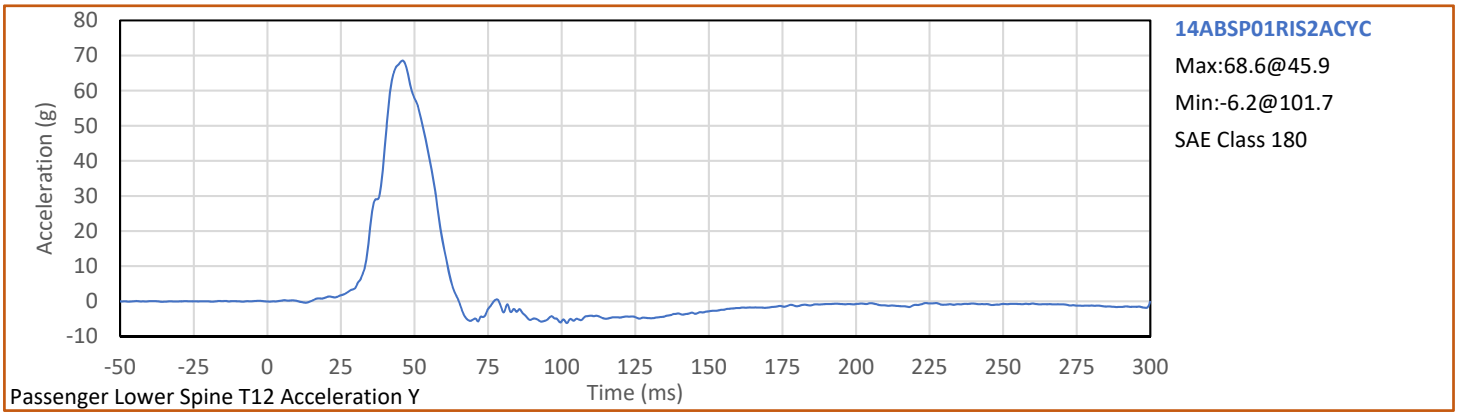


14HEAD0000S2ACRA
Max:58.2@94.4
Min:0.0@3.9
SAE Class 1000

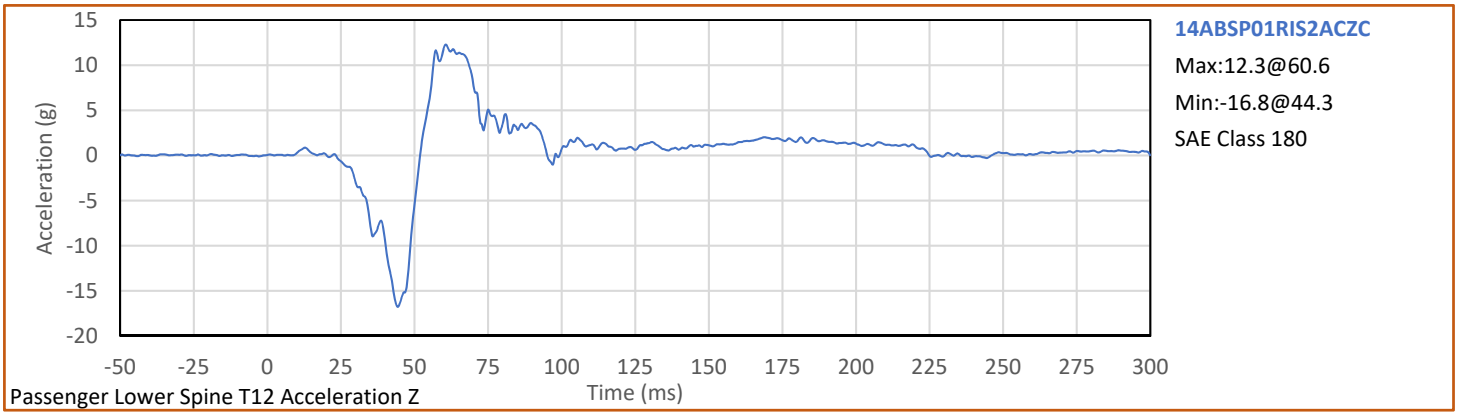
Passenger Head Resultant Acceleration Primary



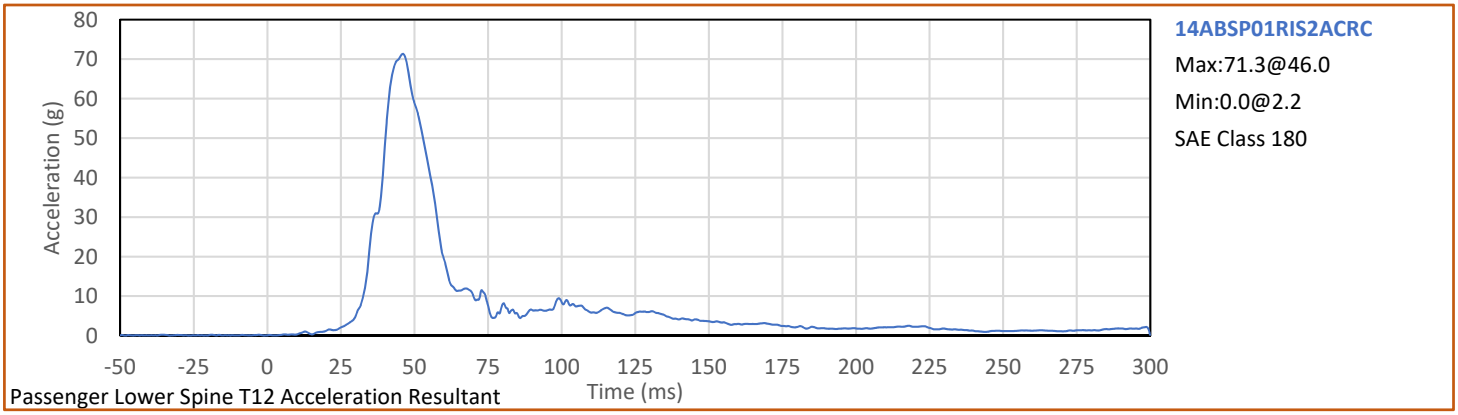
Passenger Lower Spine T12 Acceleration X



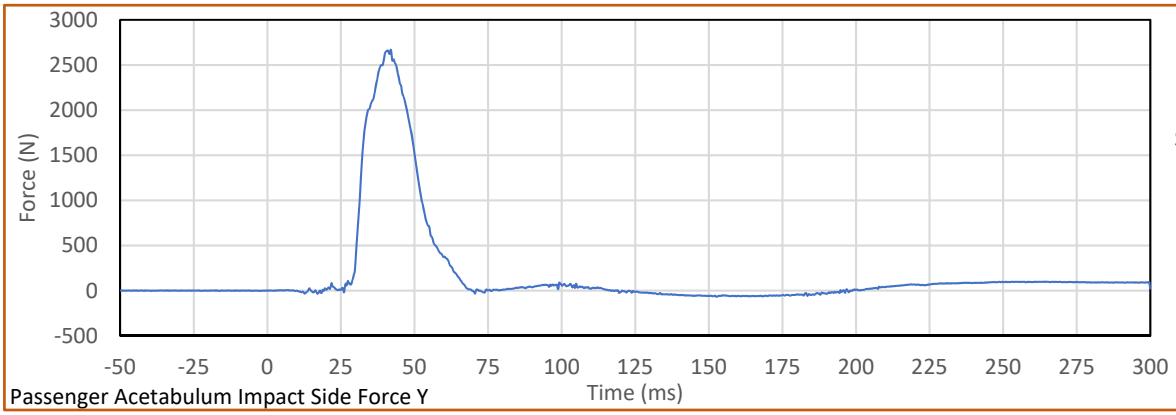
Passenger Lower Spine T12 Acceleration Y



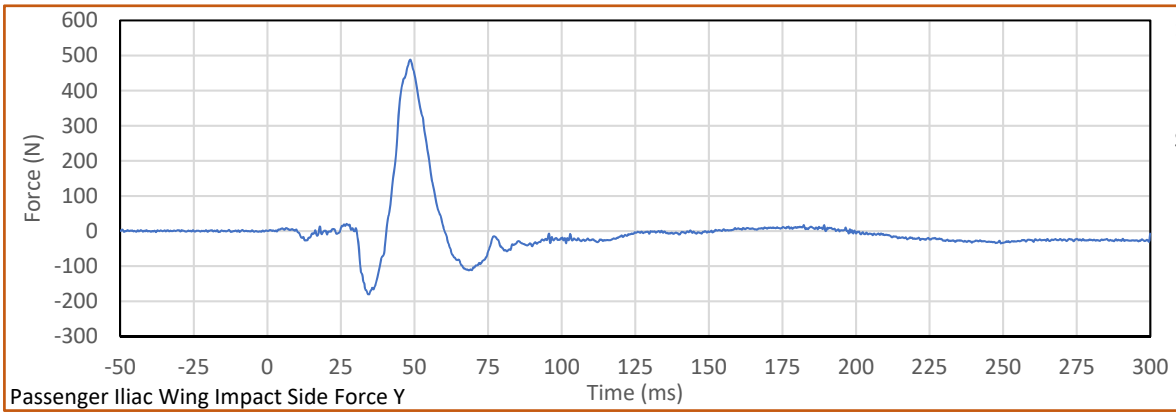
Passenger Lower Spine T12 Acceleration Z



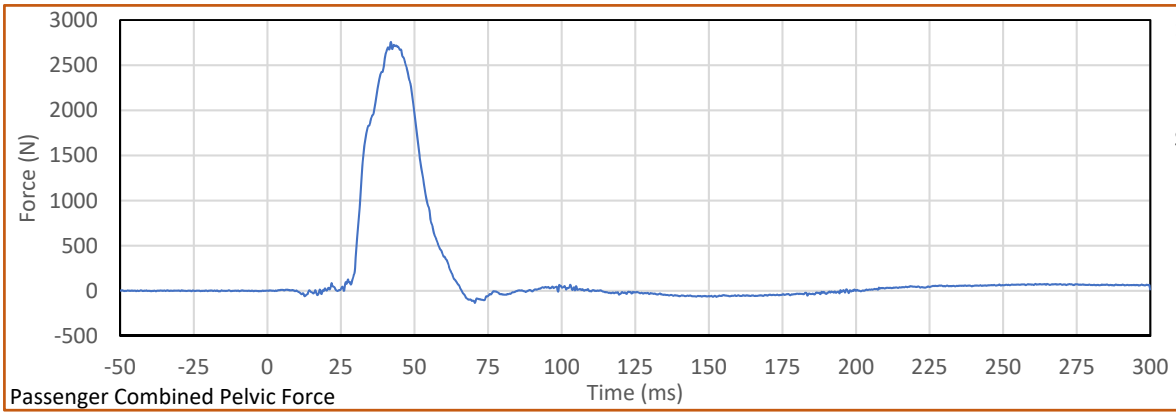
Passenger Lower Spine T12 Acceleration Resultant



Passenger Acetabulum Impact Side Force Y

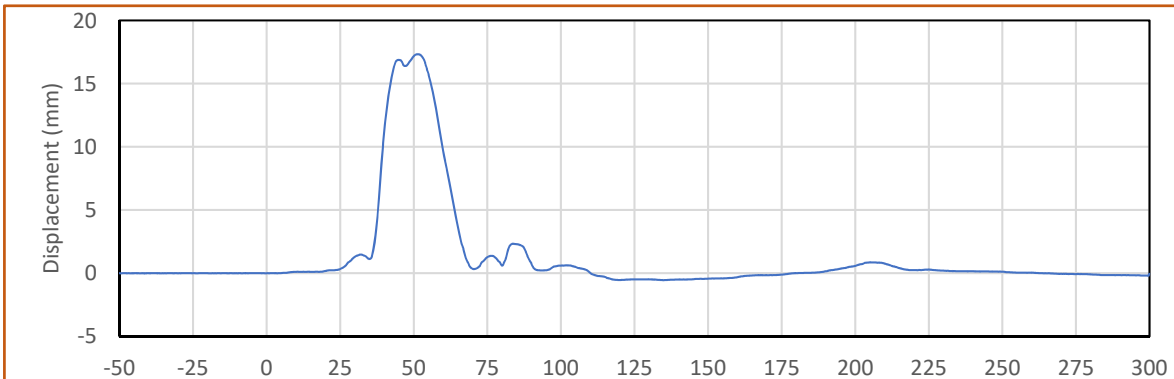


Passenger Iliac Wing Impact Side Force Y

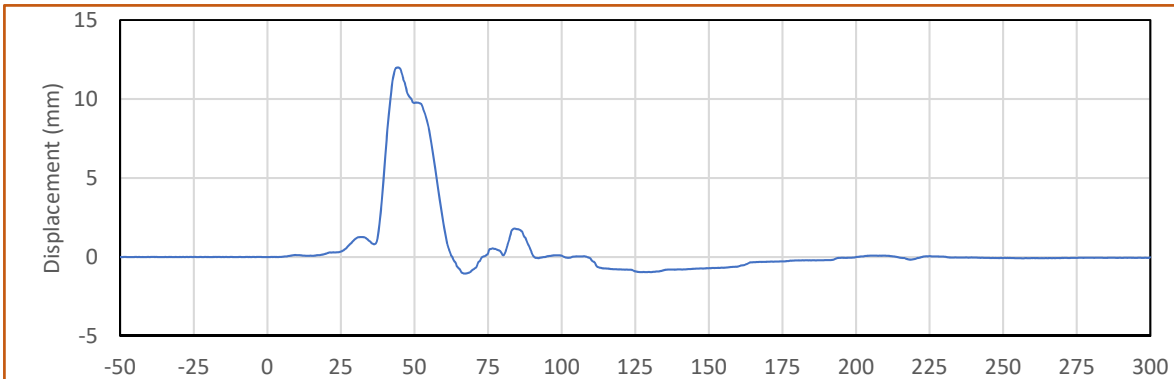


Passenger Combined Pelvic Force

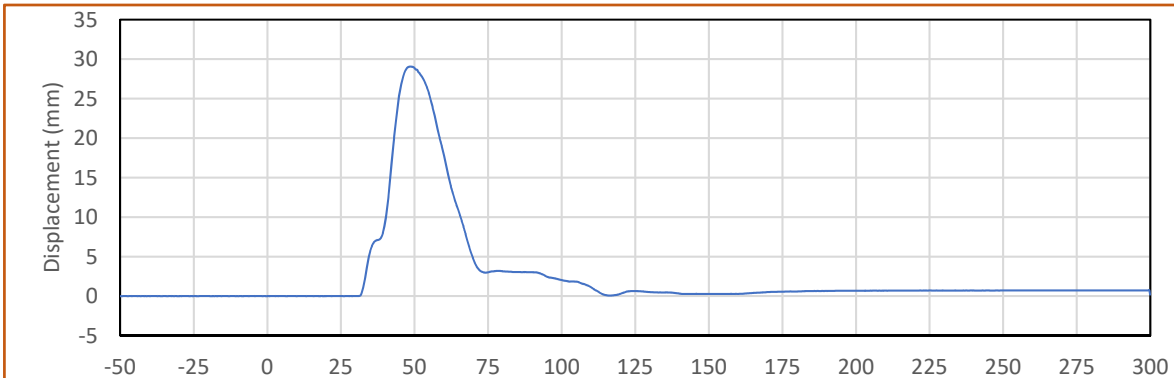
Passenger Upper Thorax Rib Deflection Y



Passenger Middle Thorax Rib Deflection Y

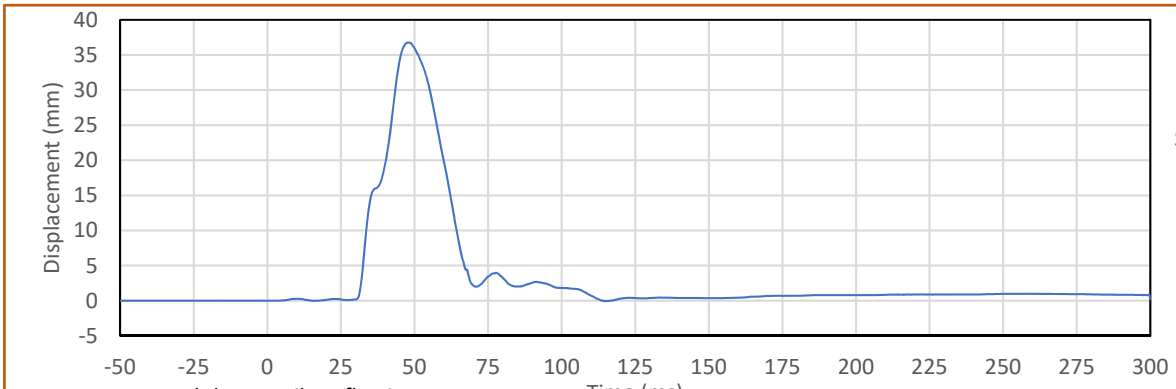


Passenger Lower Thorax Rib Deflection Y



Passenger Upper Abdomen Rib Deflection Y

Test Vehicle:	2020 MAZDA3 4-Door Sedan	NHTSA No.:	M20205405
Test Program:	NCAP MDB Side Impact Test	Test Date:	1/9/2020



Passenger Lower Abdomen Rib Deflection Y

14ABRI02LES2DSYB
Max:36.8@47.9
Min:-0.1@115.2
SAE Class 600

APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
Pre-Test ATD Qualification and Performance Verification
ES-2re 50th Male Side Impact ATD
S/N: F035

Applus IDIADA
KARCO

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

ATD Serial No.: F035 Test Date: 2019-11-20

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory 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

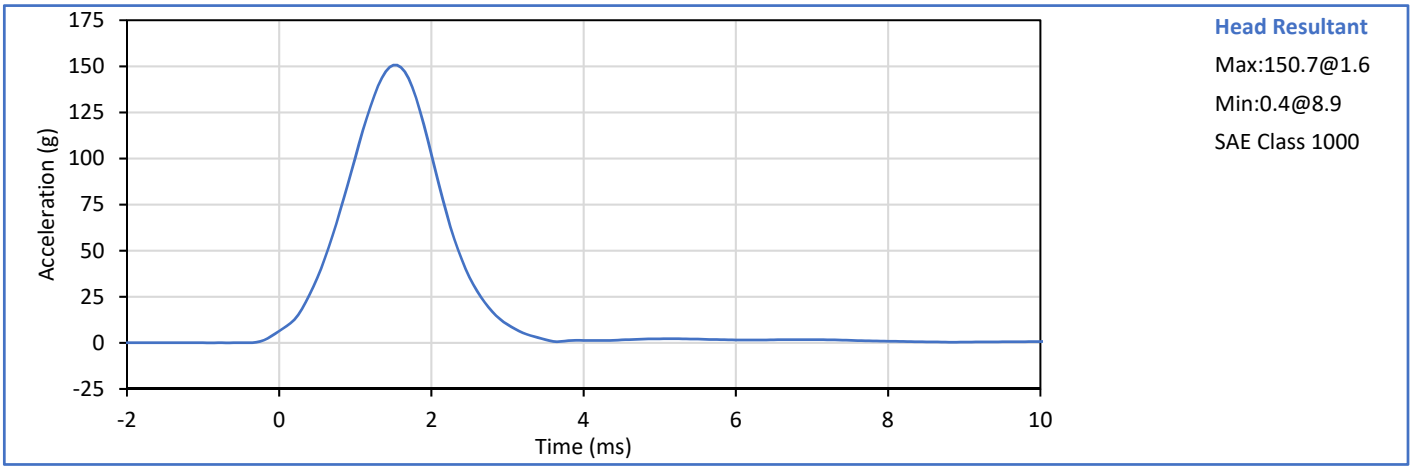
Applus IDIADA KARCO

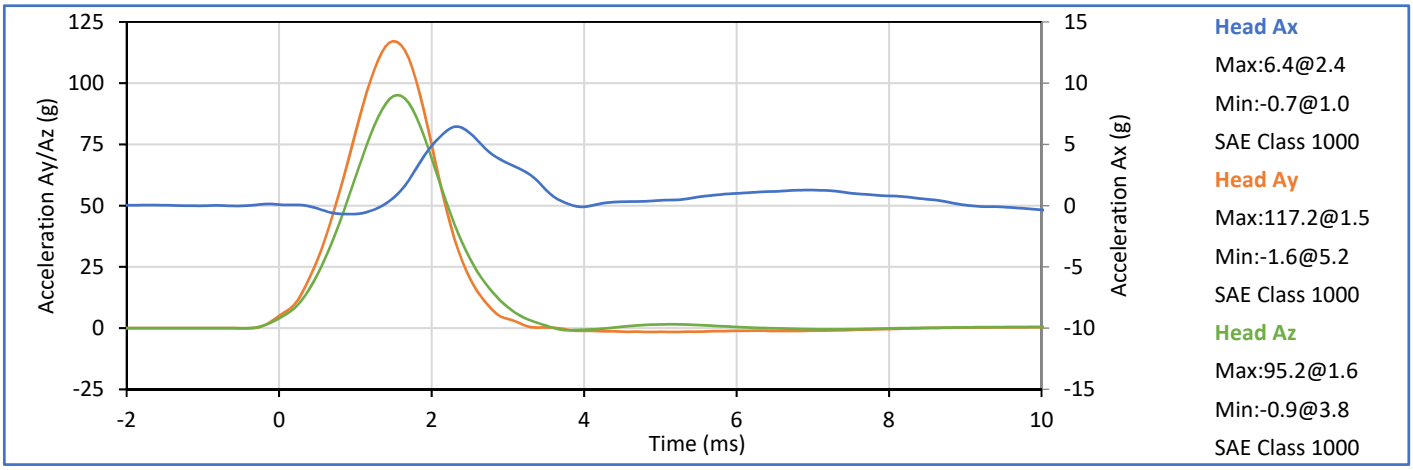
ES-2re 50th Male Side Impact ATD
Head Drop

ATD Serial No.: F035

Test Date: 2019-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Peak Resultant Acceleration	g	125.0	155.0	150.7	Pass
Peak Head Ax	g	-15.0	15.0	6.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

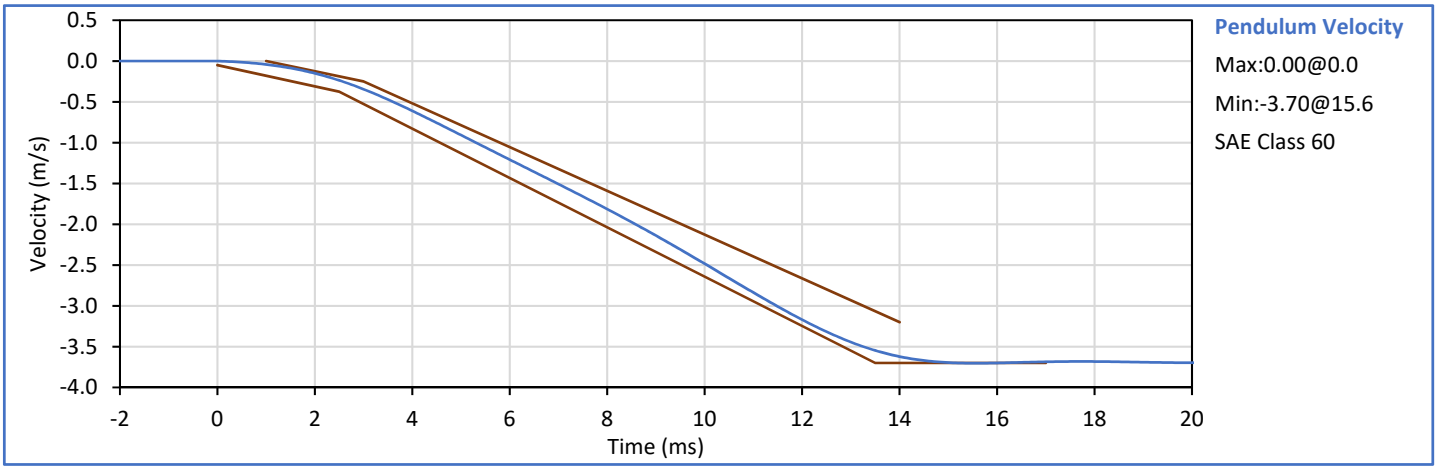
Applus IDIADA
KARCO

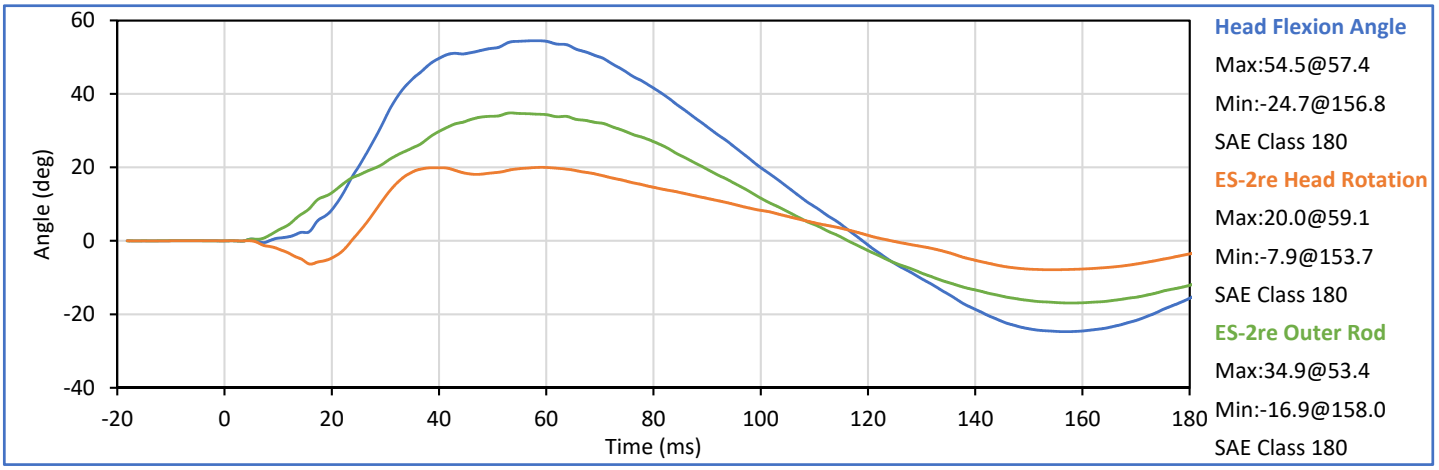
ES-2re 50th Male Side Impact ATD
Neck Flexion

ATD Serial No.: F035

Test Date: 2019-11-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	3.30	3.50	3.46	Pass
Peak Headform Flexion	deg	49.0	59.0	54.5	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	57.4	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	61.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

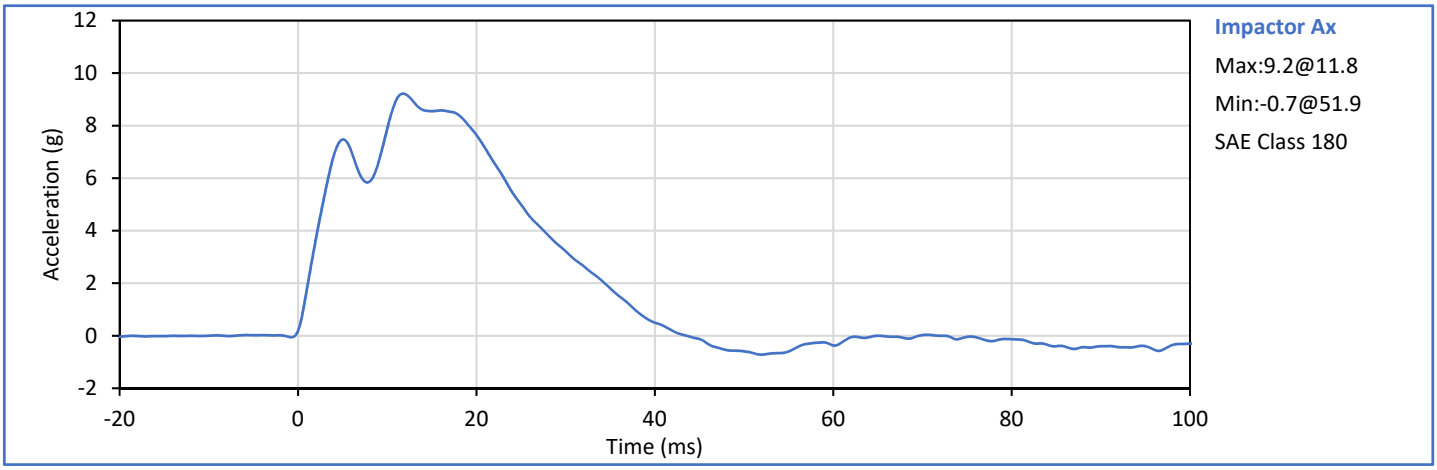
Applus IDIADA KARCO

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

ATD Serial No.: F035

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	4.20	4.40	4.36	Pass
Peak Impactor Ax	g	7.5	10.5	9.2	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

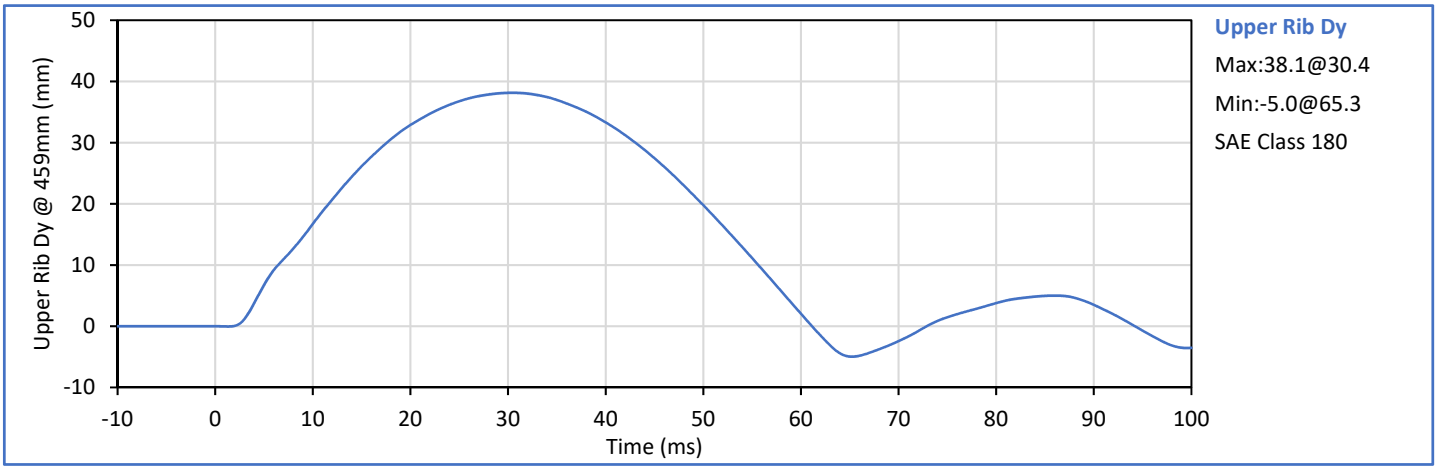
Applus IDIADA KARCO

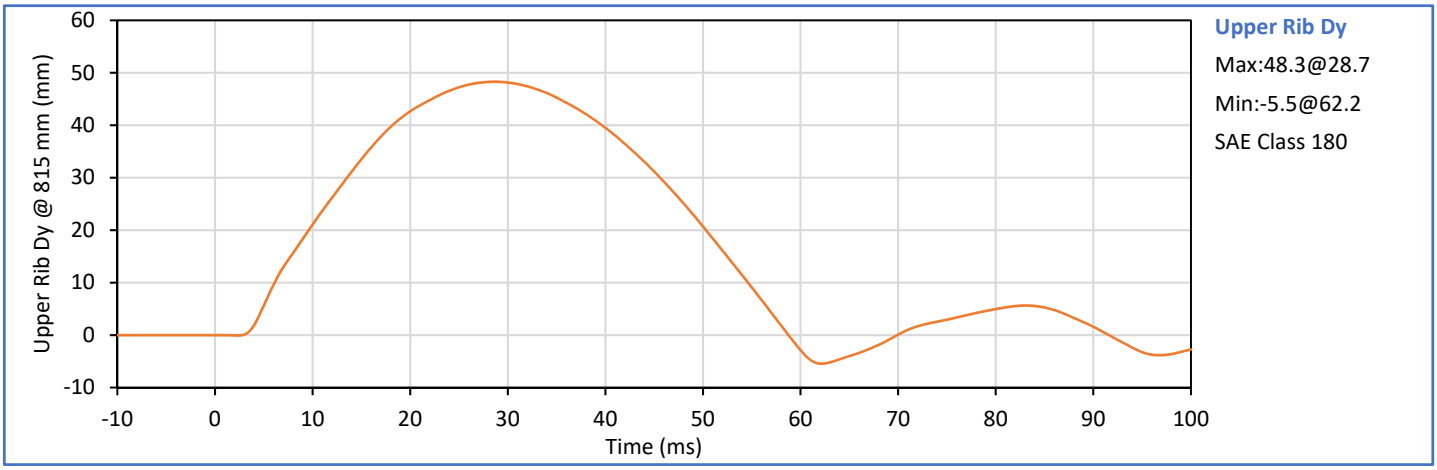
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F035

Test Date: 2019-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.1	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.3	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

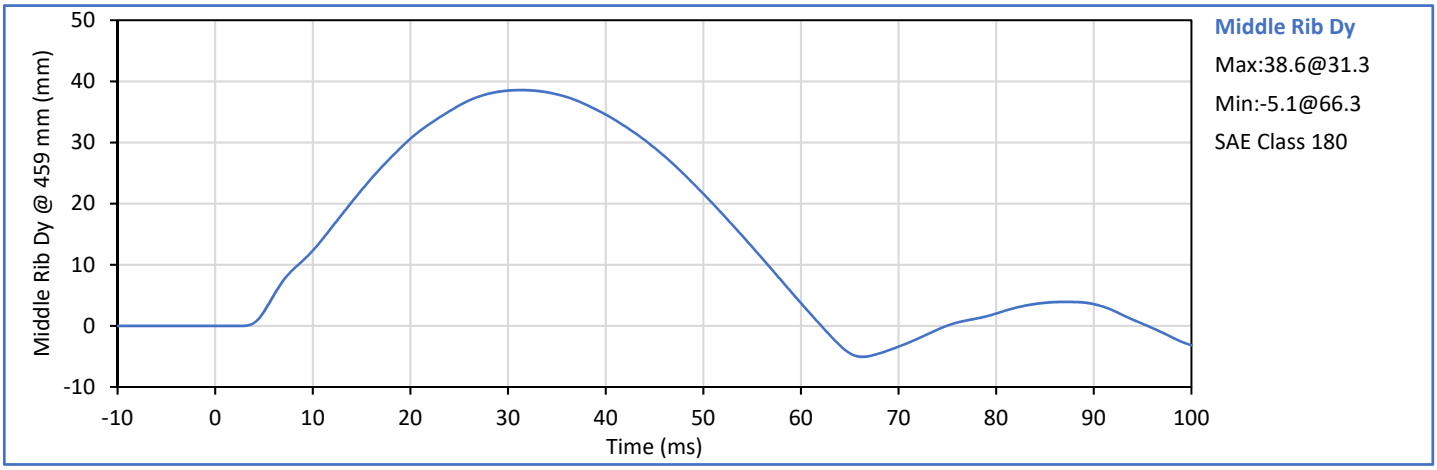
Applus IDIADA
KARCO

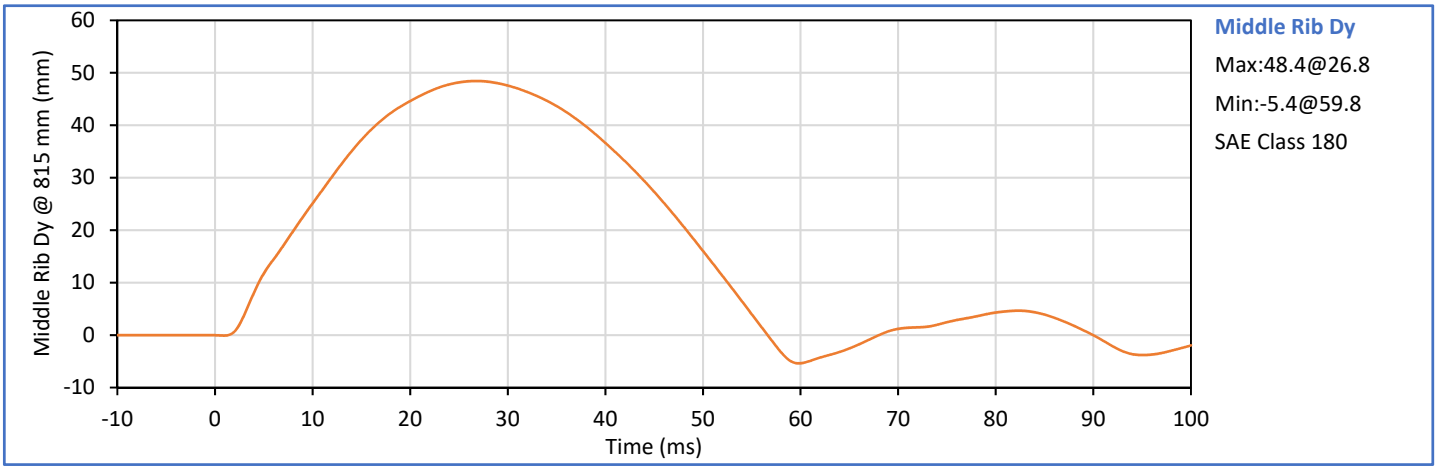
ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F035

Test Date: 2019-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.6	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	48.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

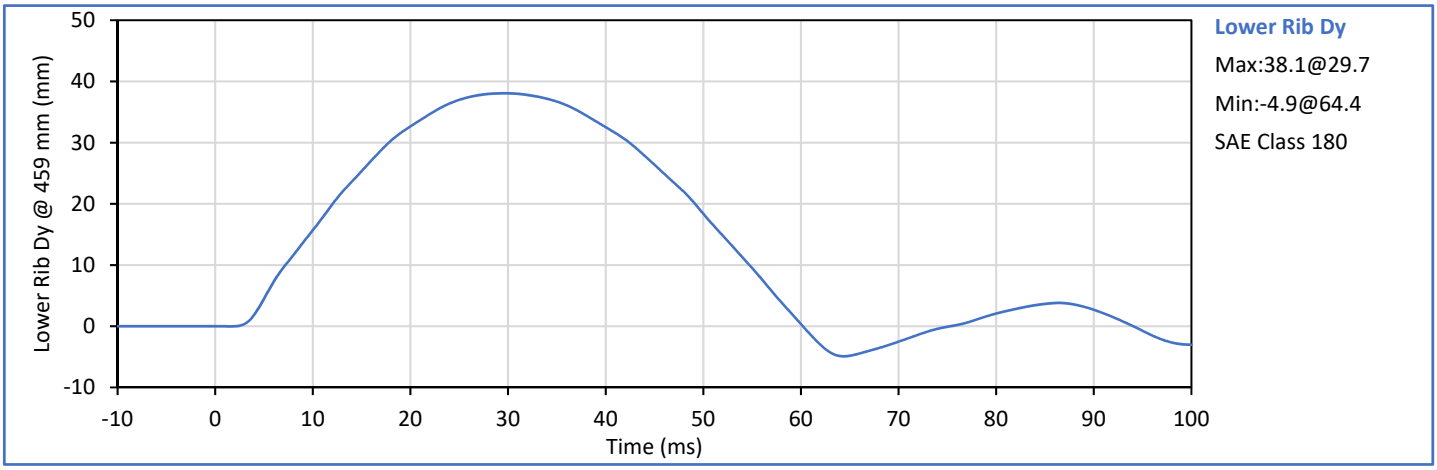
Applus IDIADA
KARCO

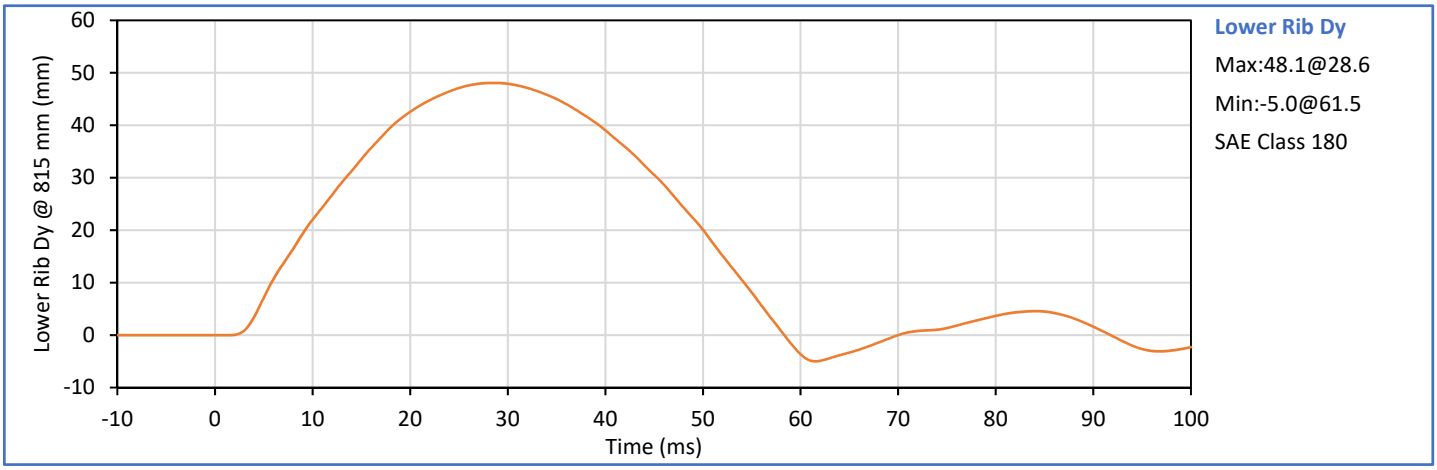
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F035

Test Date: 2019-11-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	38.1	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	48.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

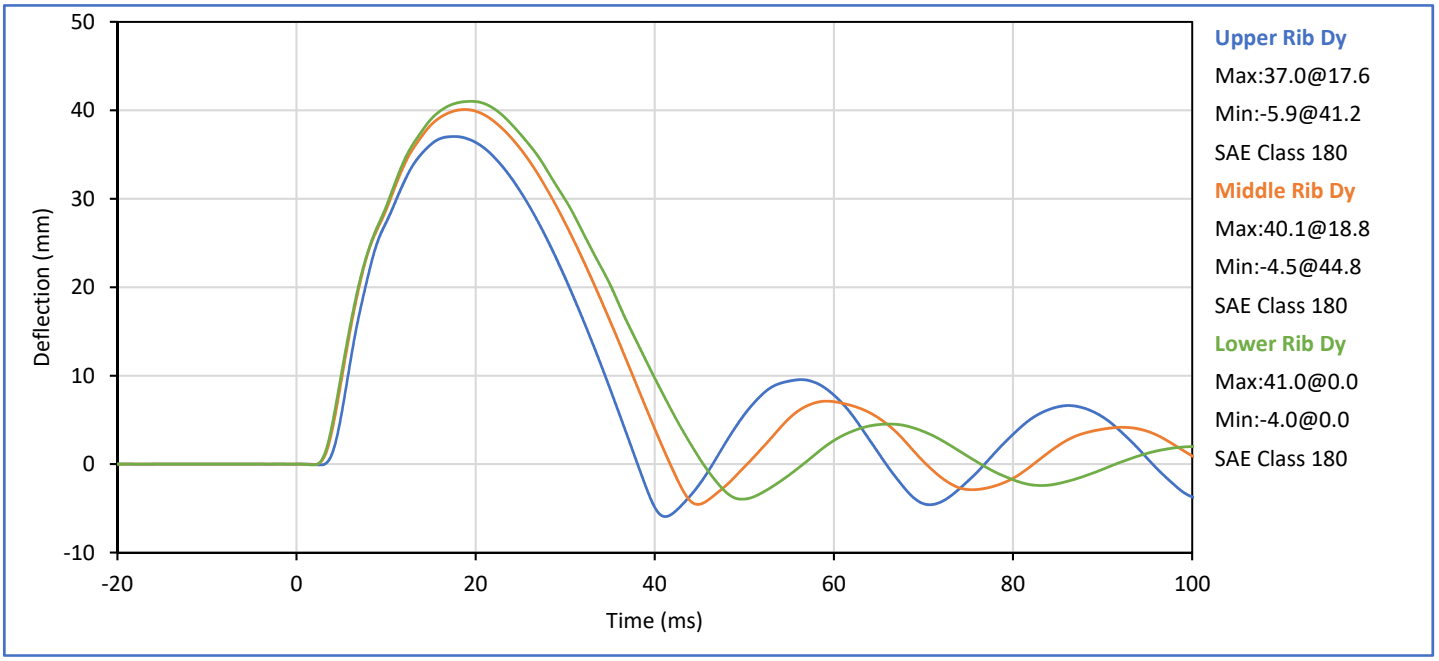
Approved By: P. Puzzuto

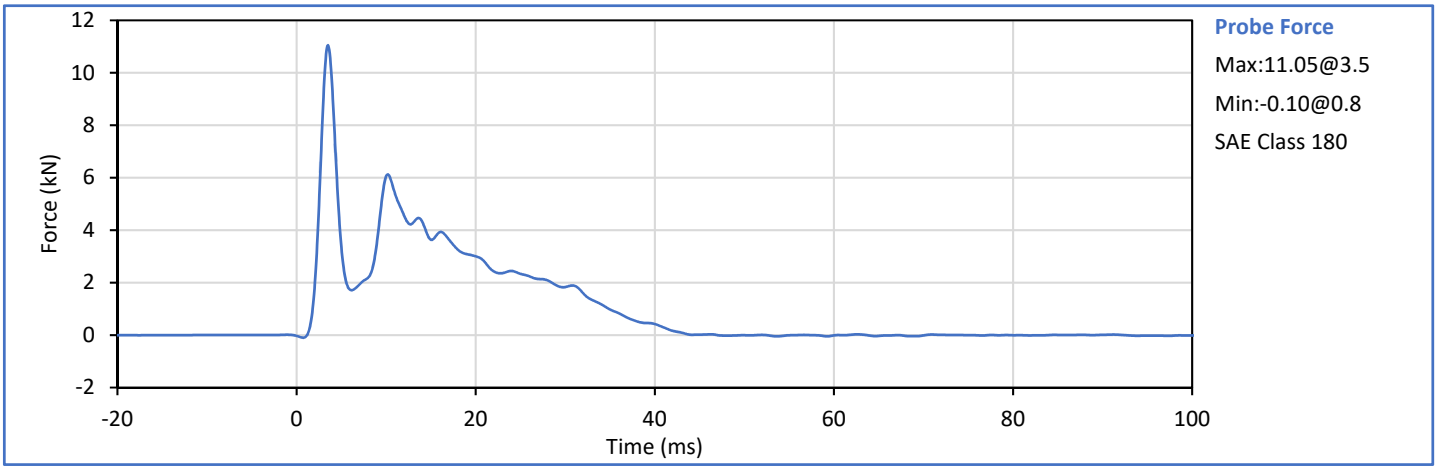
Applus IDIADA
KARCO

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

ATD Serial No.: F035 Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	5.40	5.60	5.50	Pass
Peak Upper Rib Dy	mm	34.0	41.0	37.0	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.1	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.0	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	6.13	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

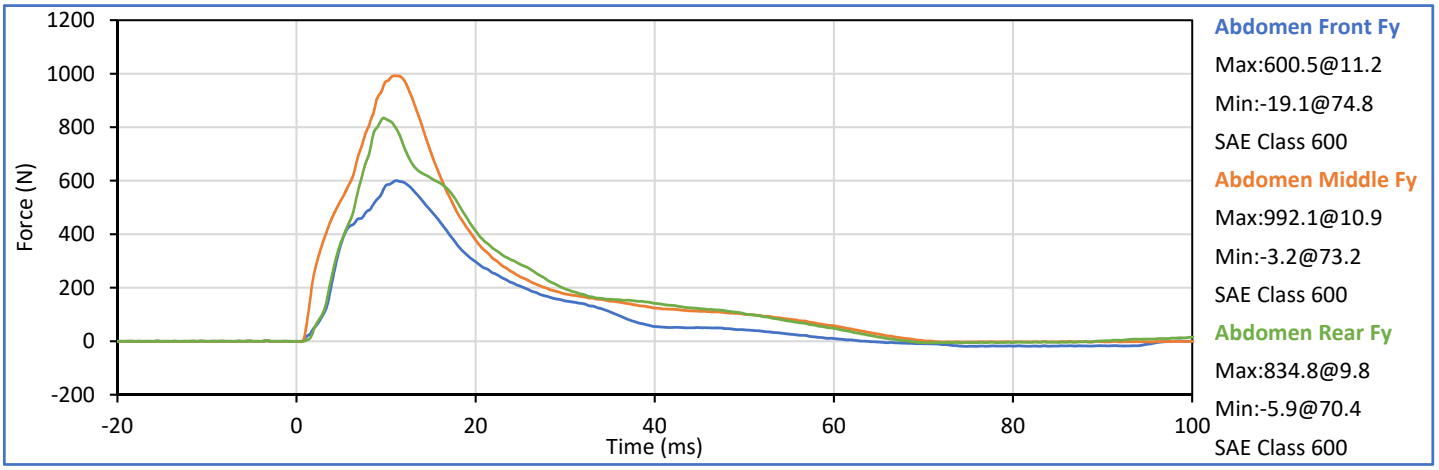
Applus IDIADA
KARCO

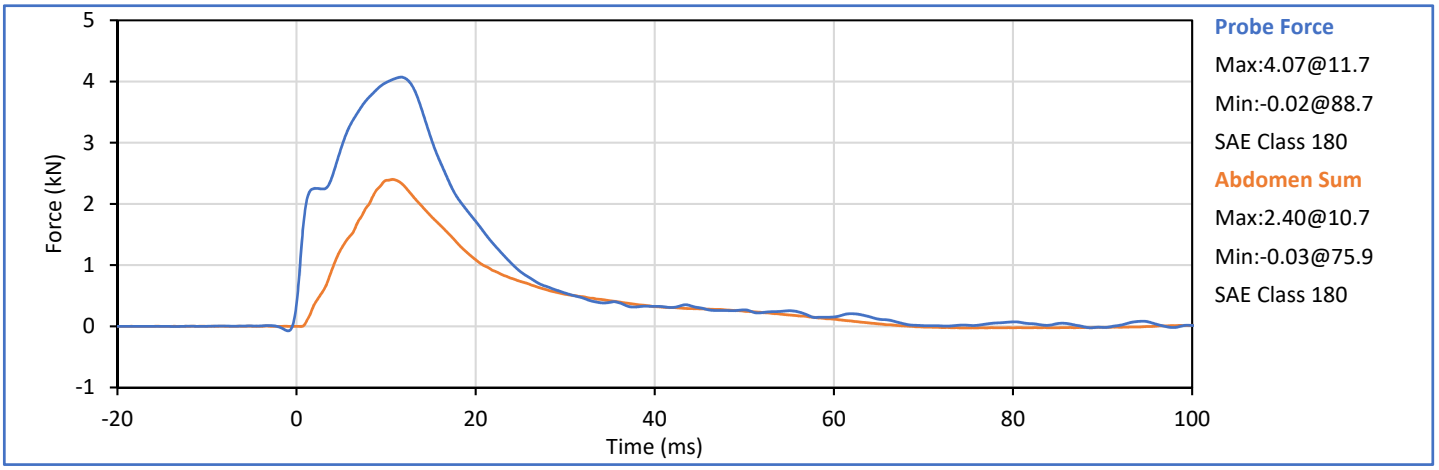
ES-2re 50th Male Side Impact ATD
Abdomen Impact

ATD Serial No.: F035

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	3.90	4.10	3.98	Pass
Peak Impactor Force	kN	4.00	4.80	4.07	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.7	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.40	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.7	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

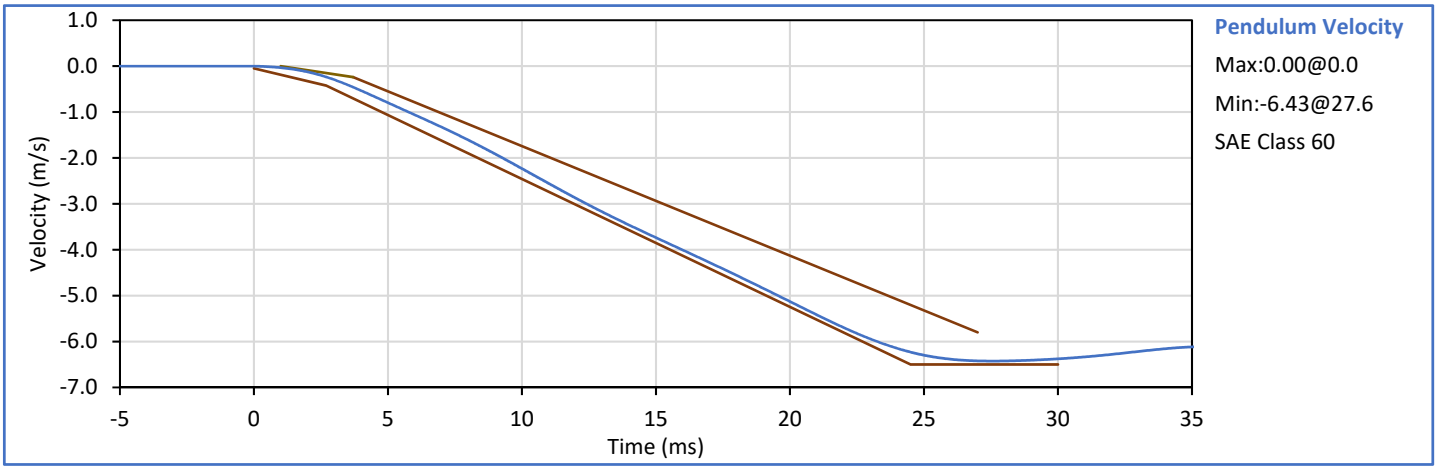
Applus IDIADA
KARCO

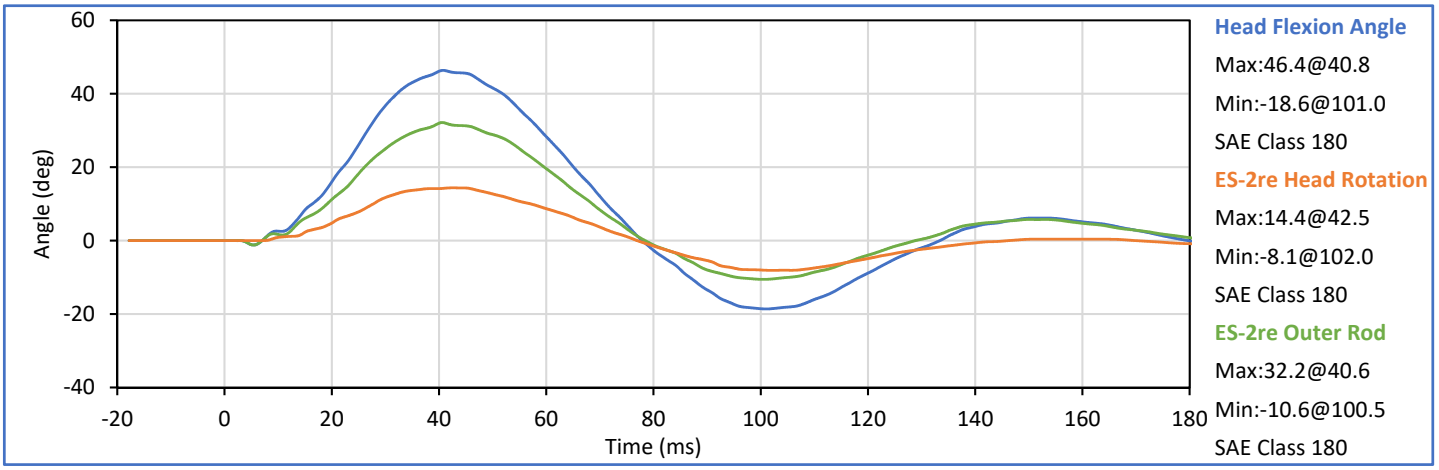
ES-2re 50th Male Side Impact ATD
Lumbar Spine Flexion

ATD Serial No.: F035

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	31	Pass
Pendulum Velocity	m/s	5.95	6.15	6.08	Pass
Peak Headform Flexion	deg	45.0	55.0	46.4	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	40.8	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	37.2	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

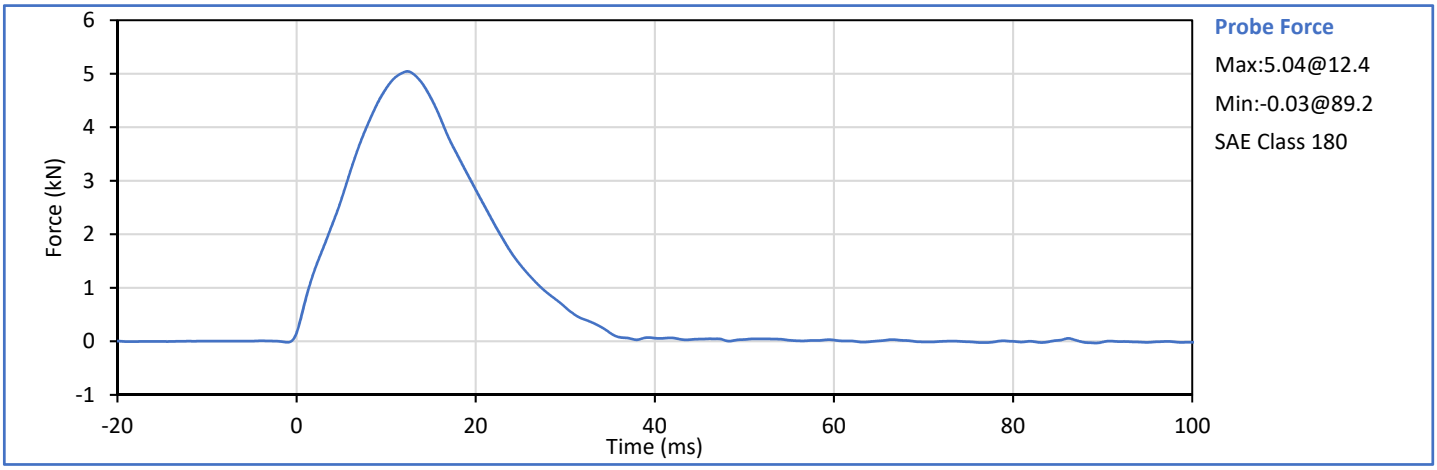
Applus IDIADA KARCO

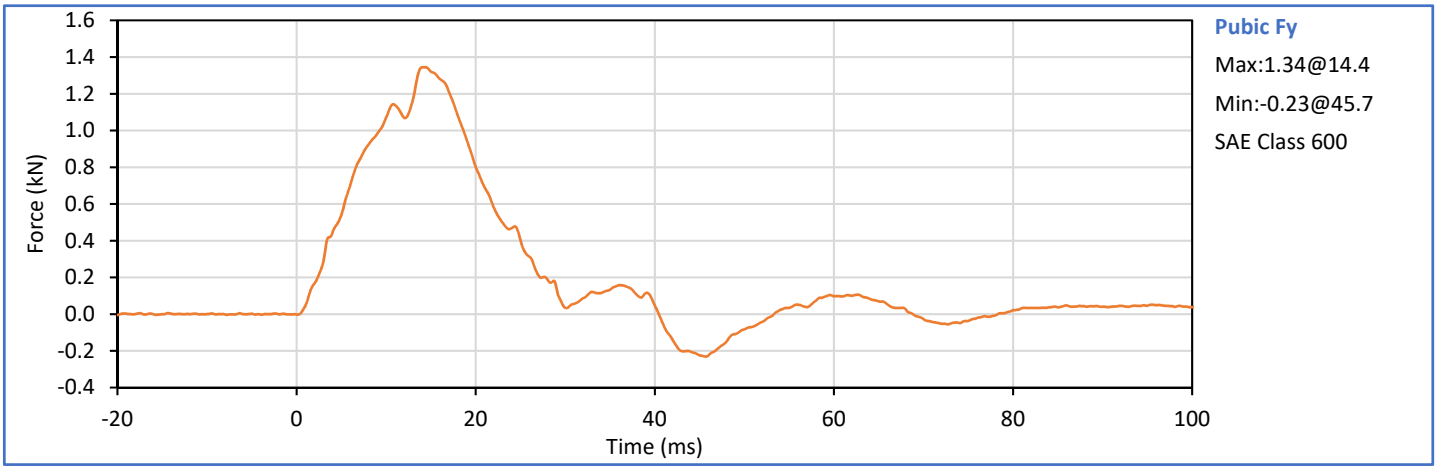
ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F035

Test Date: 2019-11-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Impactor Force	kN	4.70	5.40	5.04	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.4	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.34	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.4	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: 308

Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 308 Test Date: 2019-12-10

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
A - Sitting Height	mm	772	788	778	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	84	Pass
D - H Point From Seatback	mm	141	151	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	102	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	142	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	183	Pass
J - Head Circumference	mm	541	551	545	Pass
K - Buttock To Knee Length	mm	514	540	523	Pass
L - Popliteal Height	mm	343	369	351	Pass
K - Knee Pivot To Floor Height	mm	392	409	403	Pass
N - Buttock Popliteal Length	mm	416	442	435	Pass
O - Chest Depth W/O Jacket	mm	195	211	206	Pass
P - Foot Length	mm	216	232	223	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	316	Pass
R - Arm Length	mm	249	259	258	Pass
S - Knee Joint To Seatback	mm	477	493	488	Pass
V - Shoulder Width	mm	341	357	348	Pass
W - Foot Width	mm	78	94	89	Pass
Y - Chest Circumference W/Jacket	mm	851	881	867	Pass
Z - Waist Circumference	mm	761	791	781	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

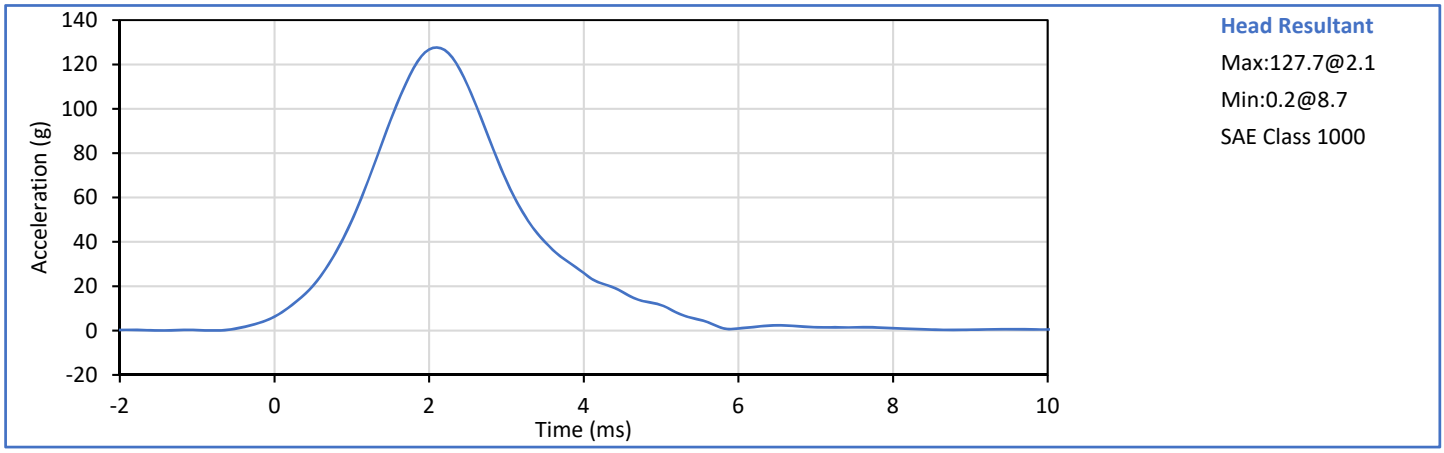
Approved By: P. Puzzuto

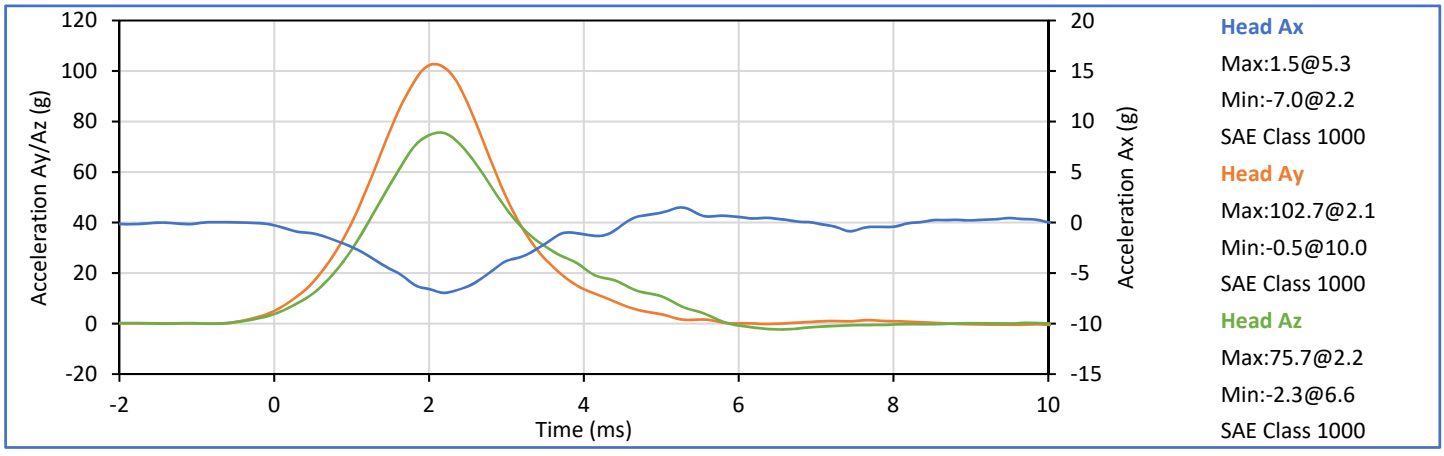
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 308 Test Date: 2019-12-10

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	39	Pass
Peak Resultant Acceleration	g	115.0	137.0	127.7	Pass
Peak Head Ax	g	-15.0	15.0	-7.0	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

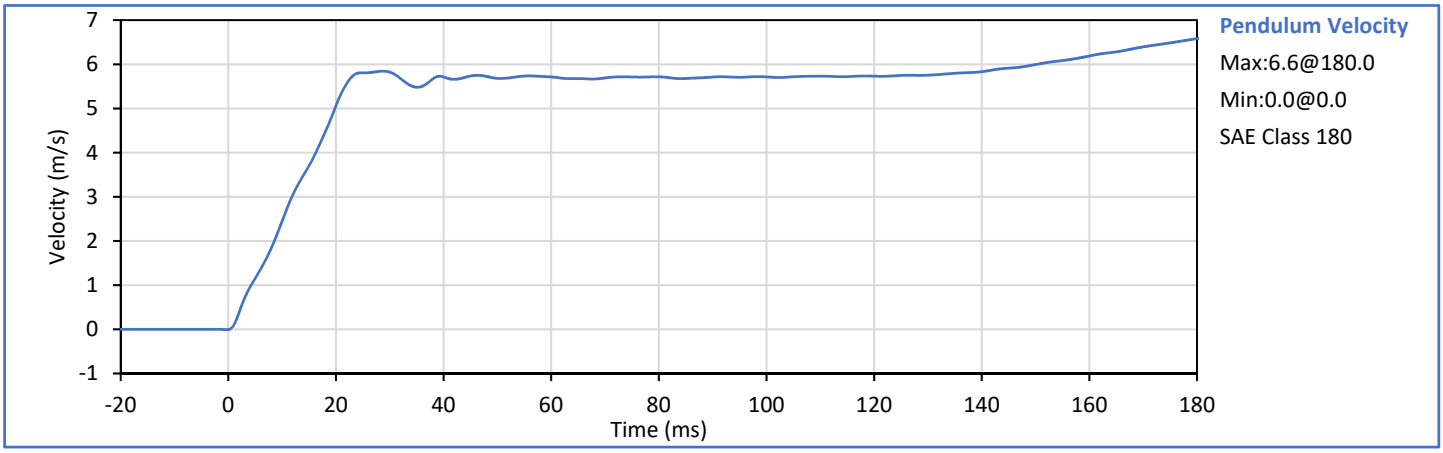
Approved By: P. Puzzuto

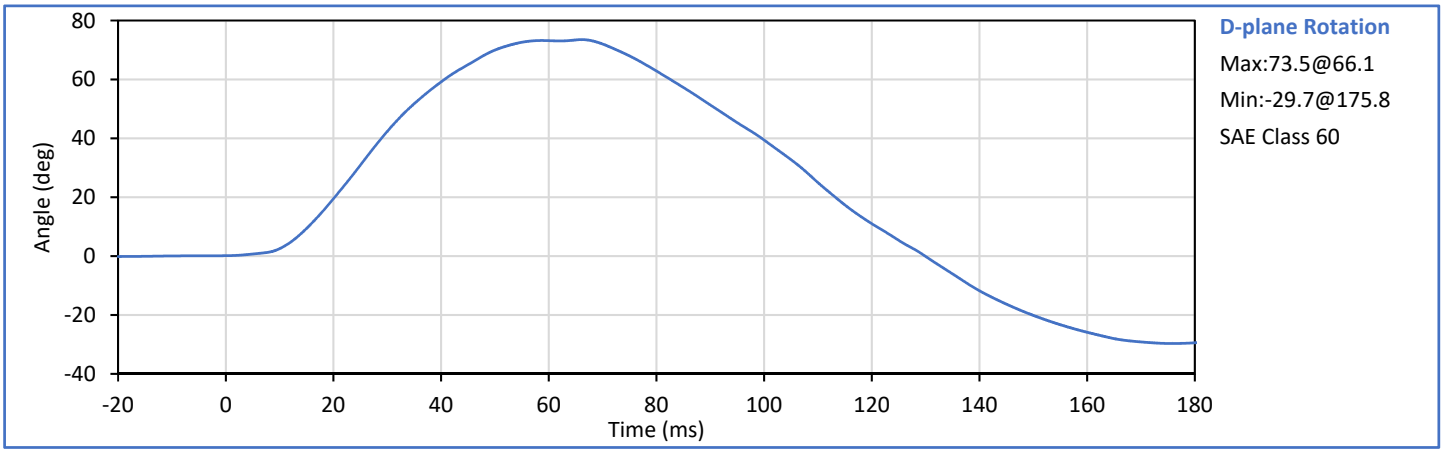
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2019-12-11

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	34	Pass
Pendulum Velocity	m/s	5.51	5.63	5.59	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.45	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.70	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.06	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.81	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.84	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	73.5	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	66.1	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.7	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	111.2	Pass
			Overall Test Results		Pass





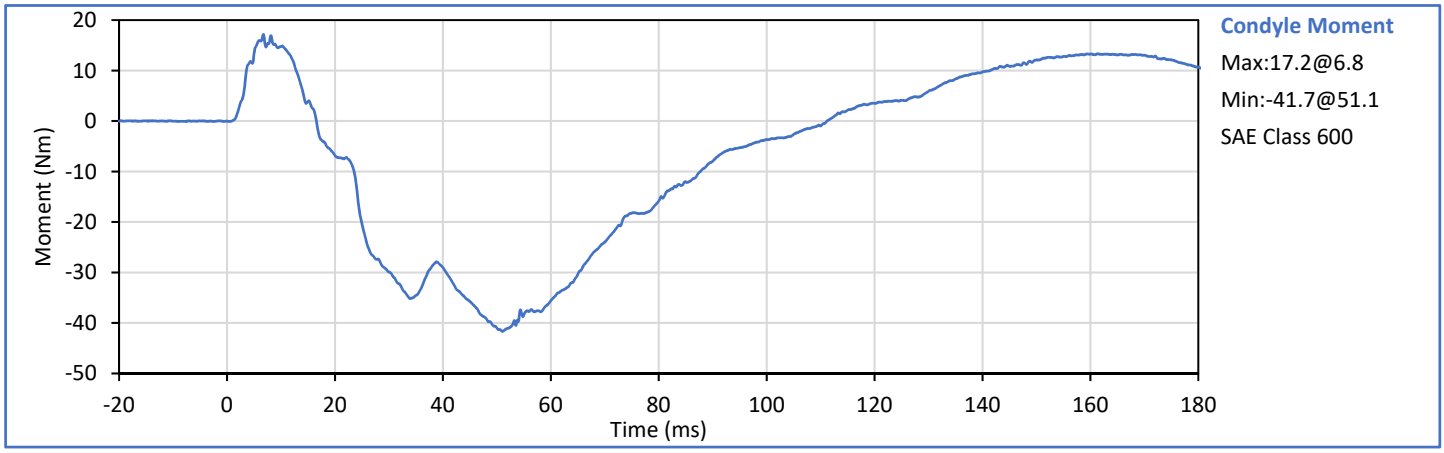
Technician: J. Hernandez

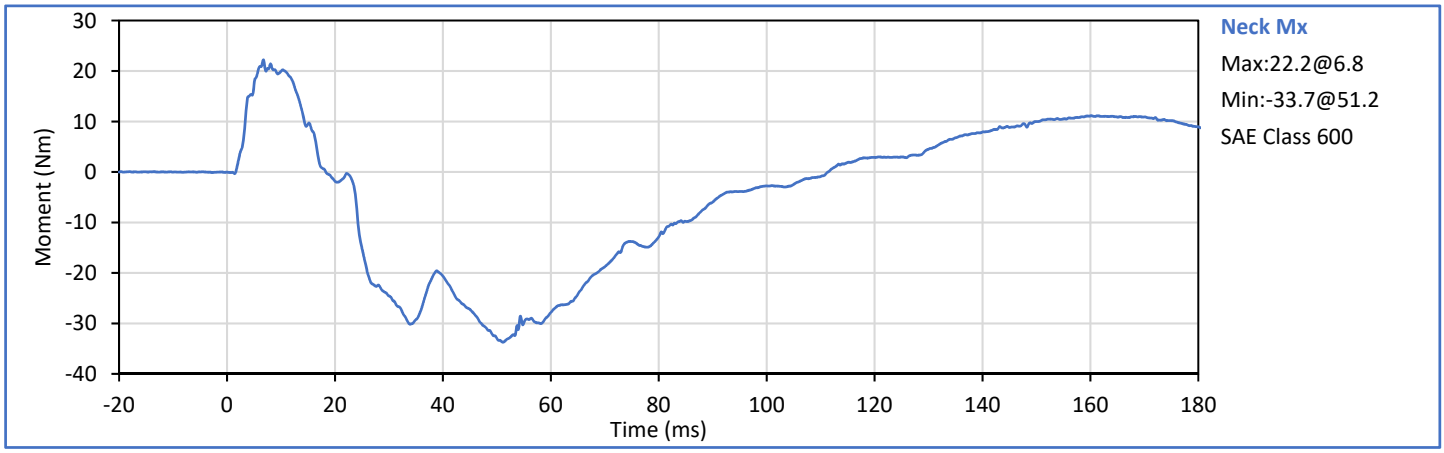
Approved By: P. Puzzuto

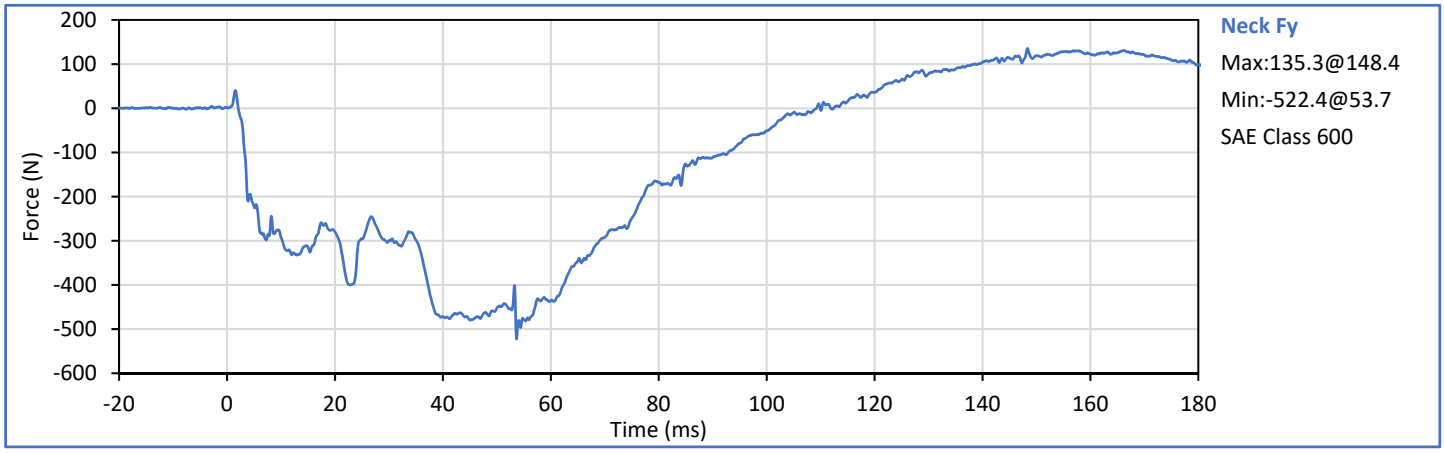
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2019-12-11





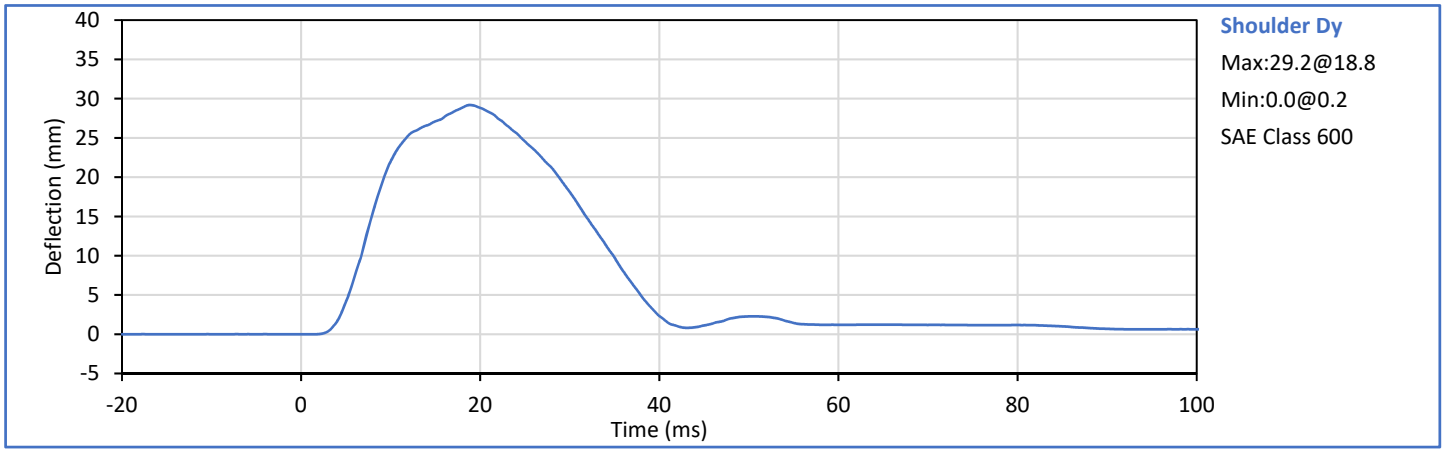


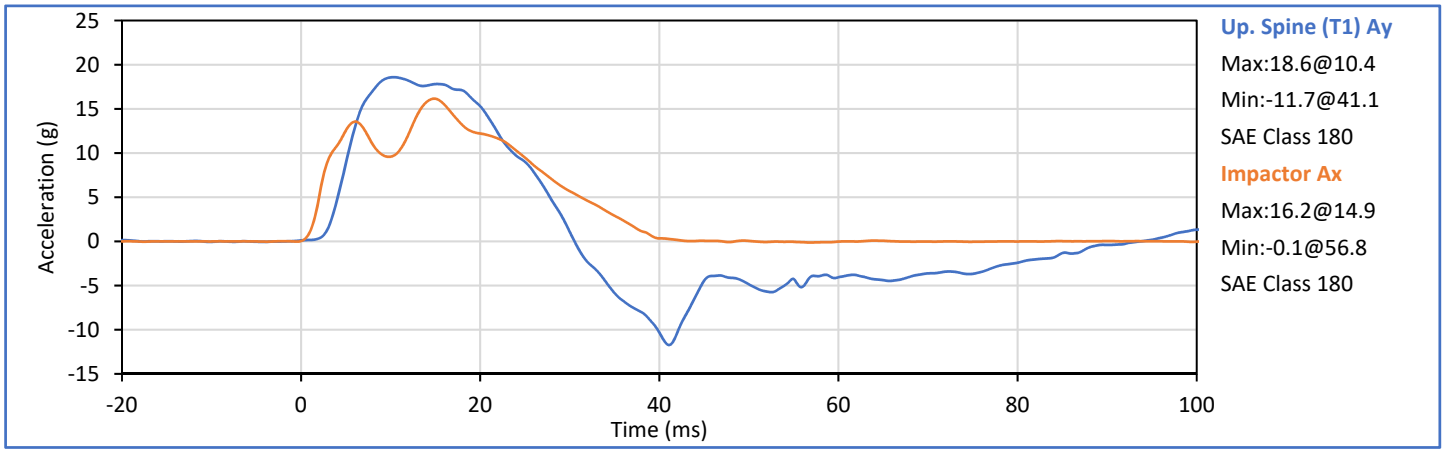
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 308 Test Date: 2019-12-13

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	4.20	4.40	4.32	Pass
Peak Shoulder Dy	mm	28.0	37.0	29.2	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.6	Pass
Peak Impactor Ax	g	13.0	18.0	16.2	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

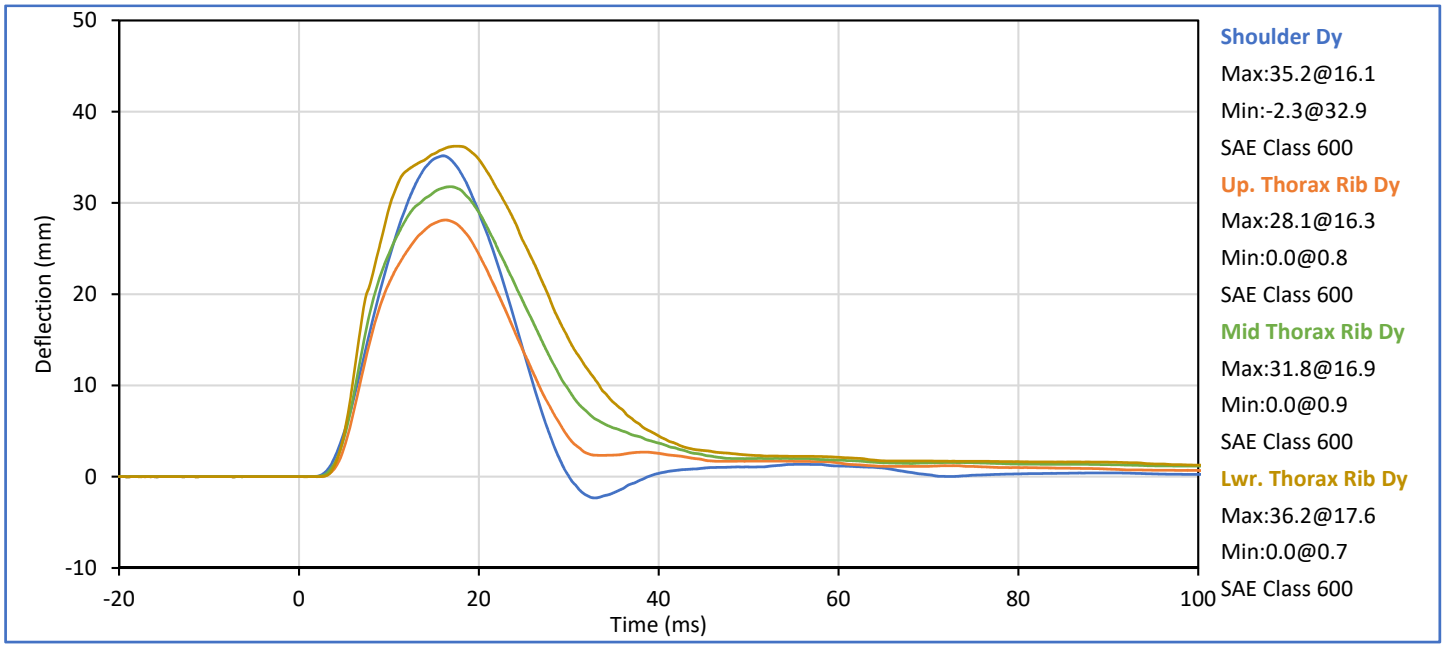
Approved By: P. Puzzuto

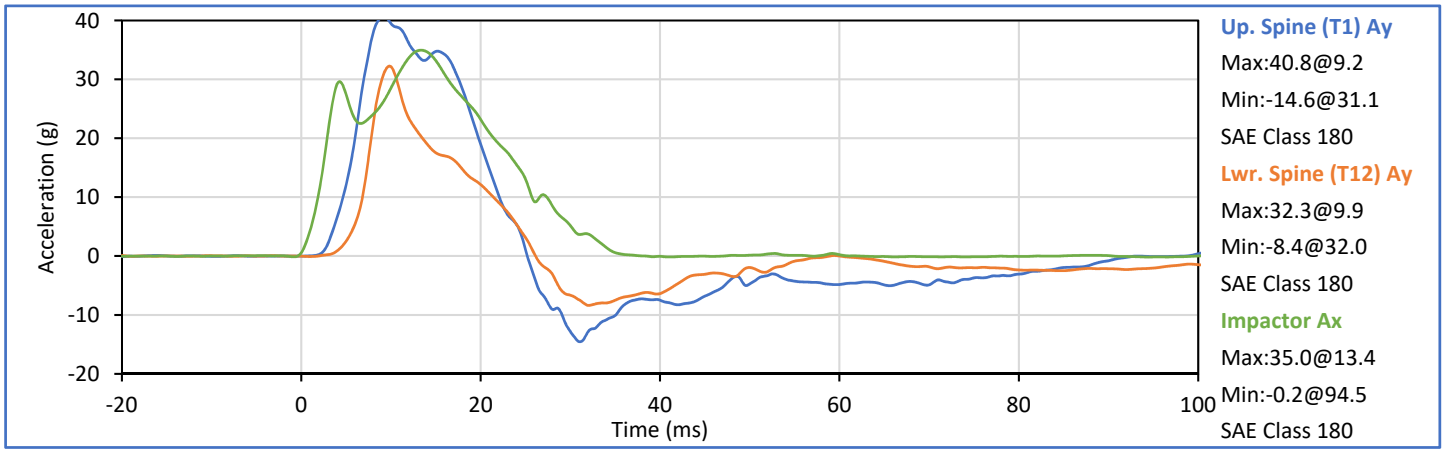
Applus IDIADA KARCO

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

ATD Serial No.: 308 Test Date: 2019-12-13

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	6.66	Pass
Peak Shoulder Dy	mm	31.0	40.0	35.2	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.1	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.8	Pass
Peak Lower Rib Dy	mm	32.0	38.0	36.2	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	40.8	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.3	Pass
Peak Impactor Ax	g	30.0	36.0	35.0	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

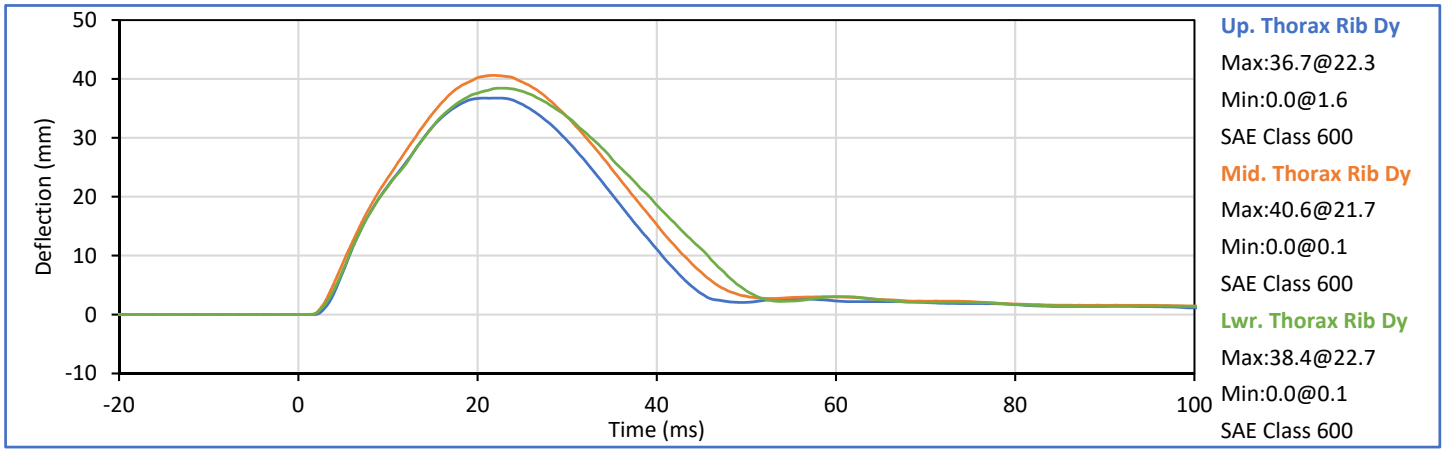
Approved By: P. Puzzuto

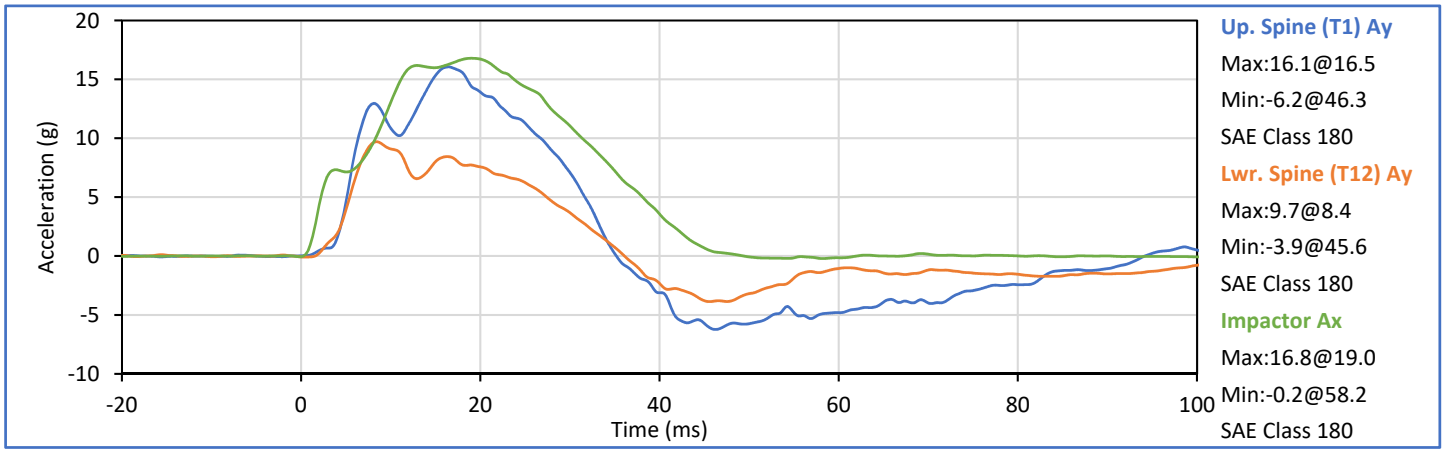
Applus IDIADA KARCO

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

ATD Serial No.: 308 Test Date: 2019-12-13

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	4.20	4.40	4.32	Pass
Peak Upper Rib Dy	mm	32.0	40.0	36.7	Pass
Peak Middle Rib Dy	mm	39.0	45.0	40.6	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.4	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	16.1	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.7	Pass
Peak Impactor Ax	g	14.0	18.0	16.8	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

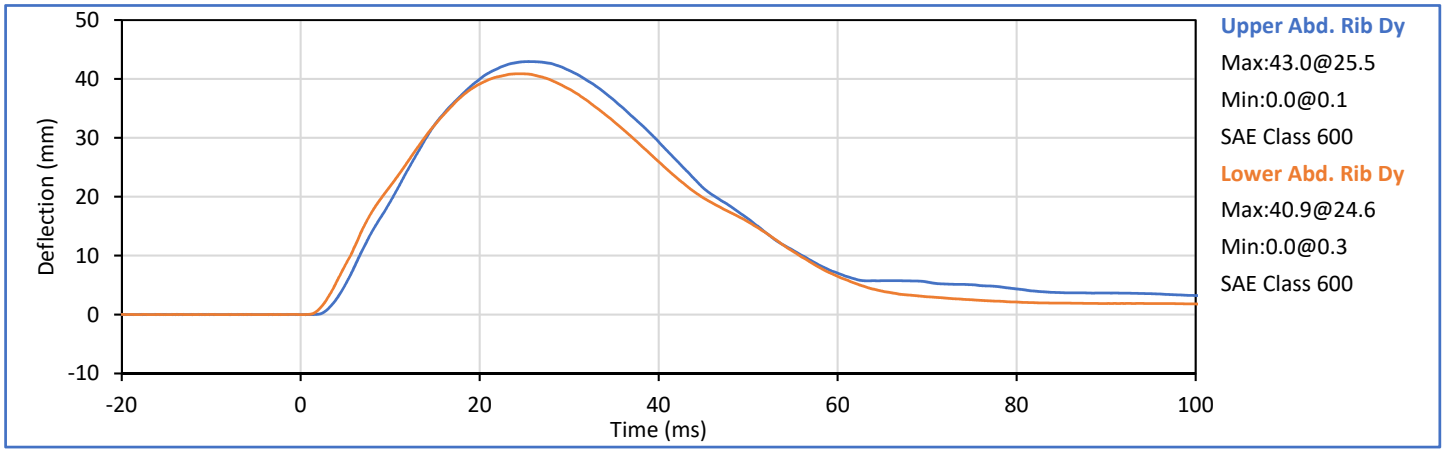
Approved By: P. Puzzuto

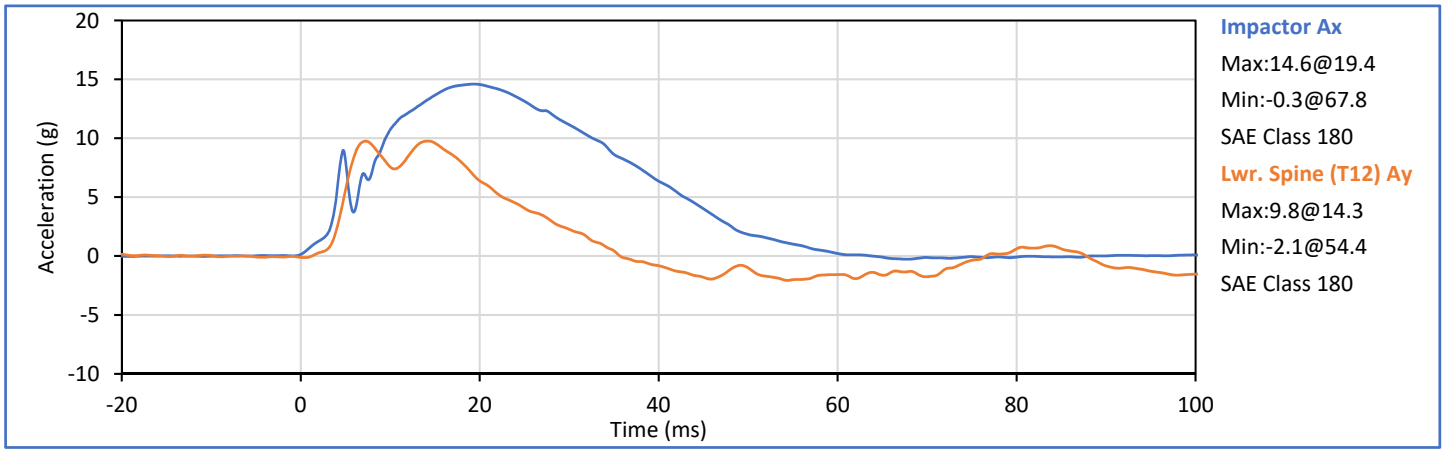
Applus IDIADA KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 308 Test Date: 2019-12-13

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	4.20	4.40	4.34	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	43.0	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	40.9	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	9.8	Pass
Peak Impactor Ax	g	12.0	16.0	14.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

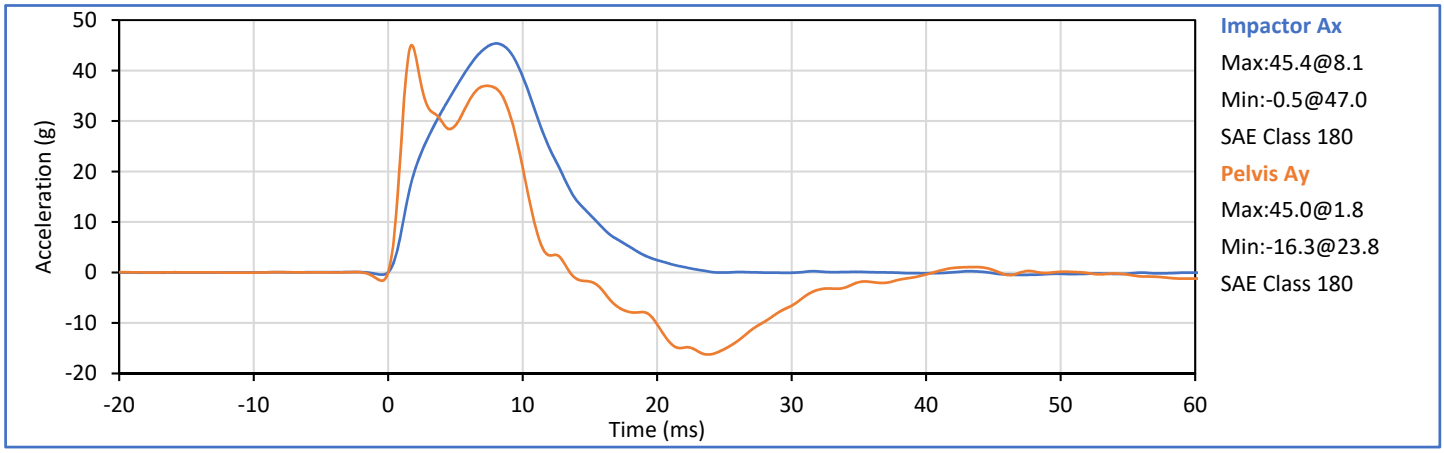
Applus IDIADA KARCO

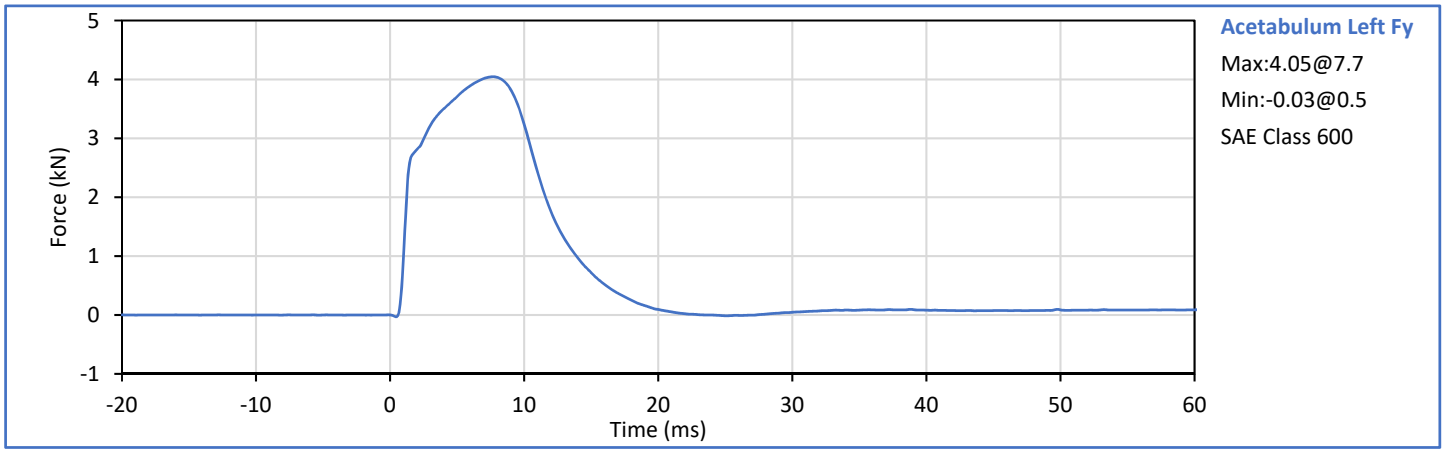
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308 Test Date: 2019-12-13

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	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.05	Pass
Pelvis Ay after 6ms	g	34.0	42.0	37.0	Pass
Peak Impactor Ax	g	38.0	47.0	45.4	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 11709 (SACO)





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308 Test Date: 2019-12-13

Pelvis Plug S/N: 11709 (SACO)

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 11709
Test Number 3451
Report Number 3444
Test Date 3/27/2017 12:48:00 PM

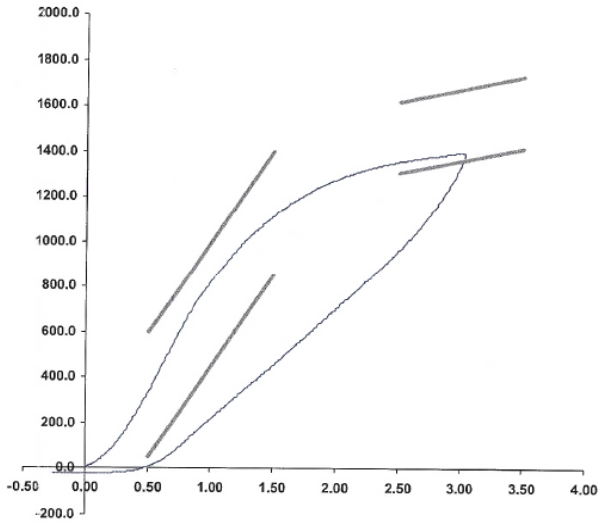
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	329.53	50.00	600.00
Force @ 1.5 mm (N)	1,108.85	850.00	1,400.00
Force @ 2.5 mm (N)	1,353.03	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,393.10	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator DC

Part Number 180-4450

Template No 107 27-Mar-17
SACO Research

By : DC Date : 3/27/17

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

Applus IDIADA KARCO

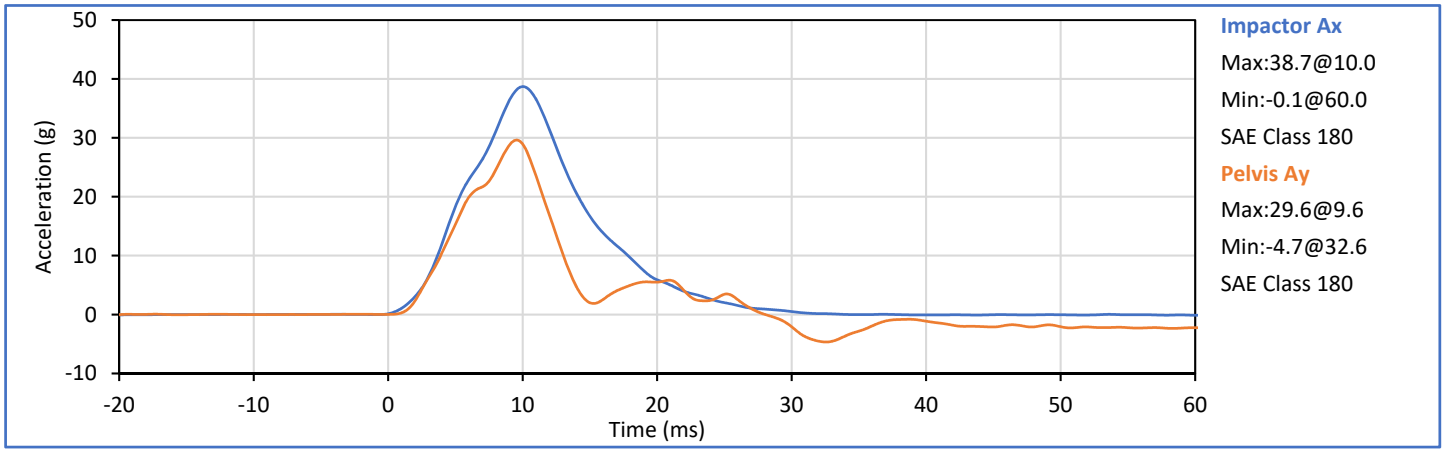
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

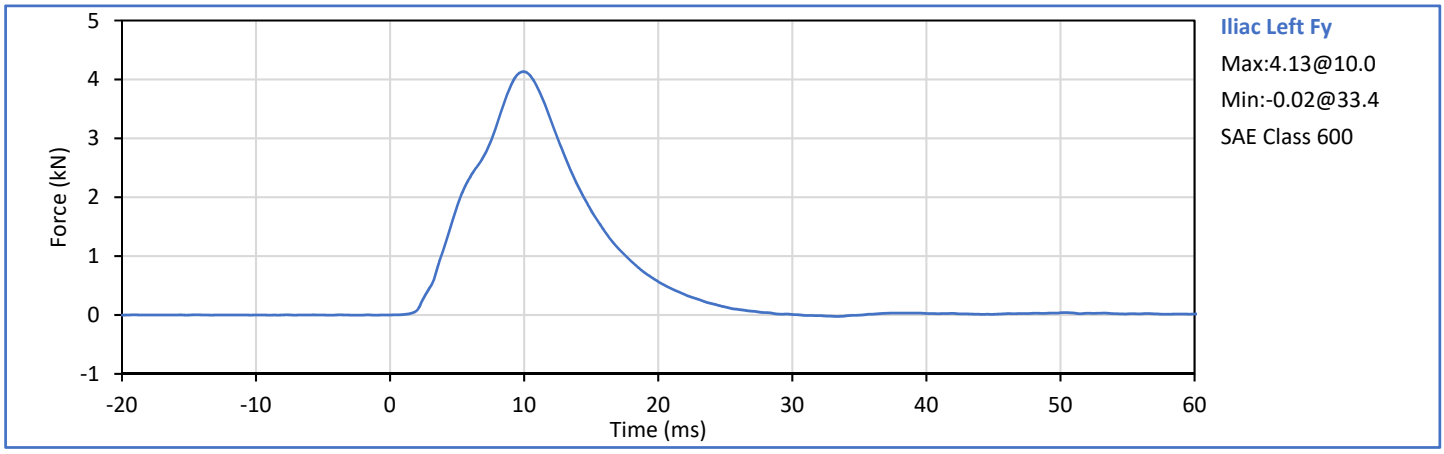
ATD Serial No.: 308 Test Date: 2019-12-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	43	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.13	Pass
Pelvis Ay after 6ms	g	28.0	39.0	29.6	Pass
Peak Impactor Ax	g	36.0	45.0	38.7	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified





Technician: J. Hernandez

Approved By: P. Puzzuto

APPENDIX C
Post-Test ATD Qualification and Performance Verification
ES-2re 50th Male Side Impact ATD
S/N: F035

Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-01-13

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	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

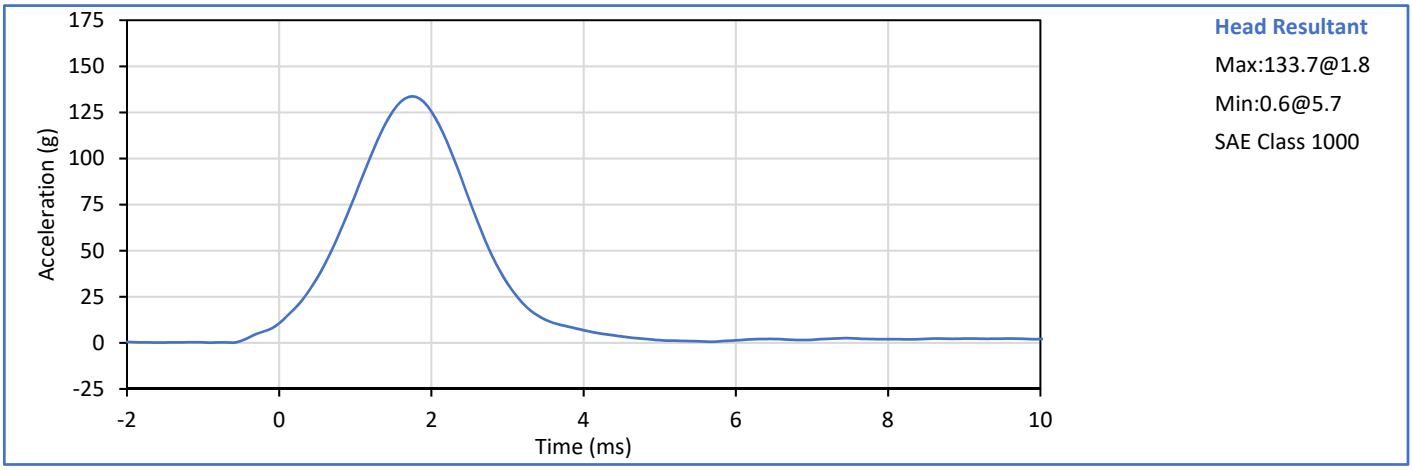
Applus IDIADA KARCO

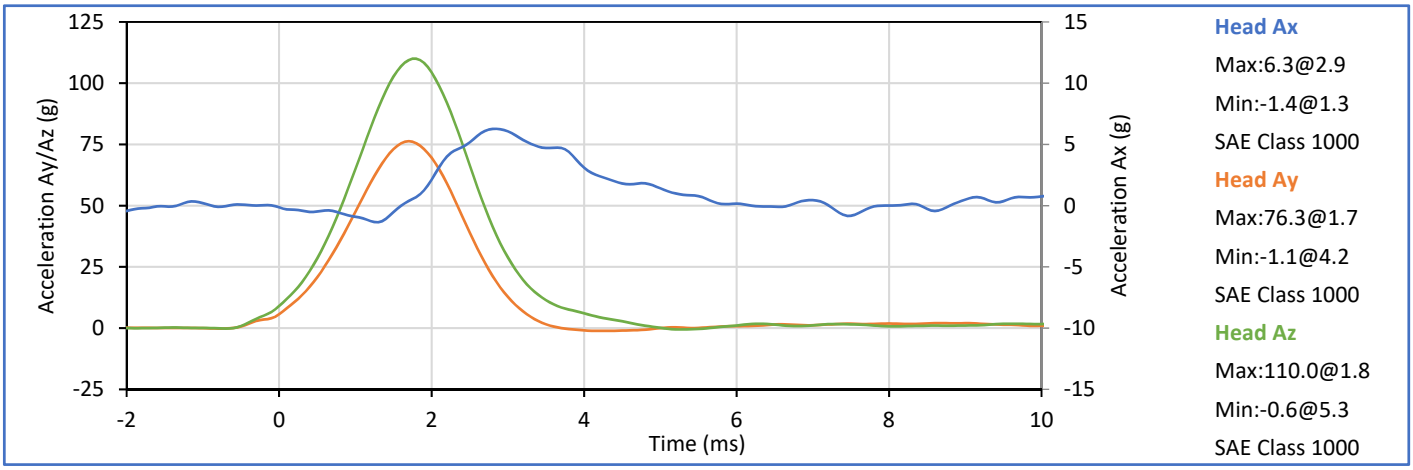
ES-2re 50th Male Side Impact ATD
Head Drop

ATD Serial No.: F035

Test Date: 2020-01-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Relative Humidity	%	10	70	23	Pass
Peak Resultant Acceleration	g	125.0	155.0	133.7	Pass
Peak Head Ax	g	-15.0	15.0	6.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

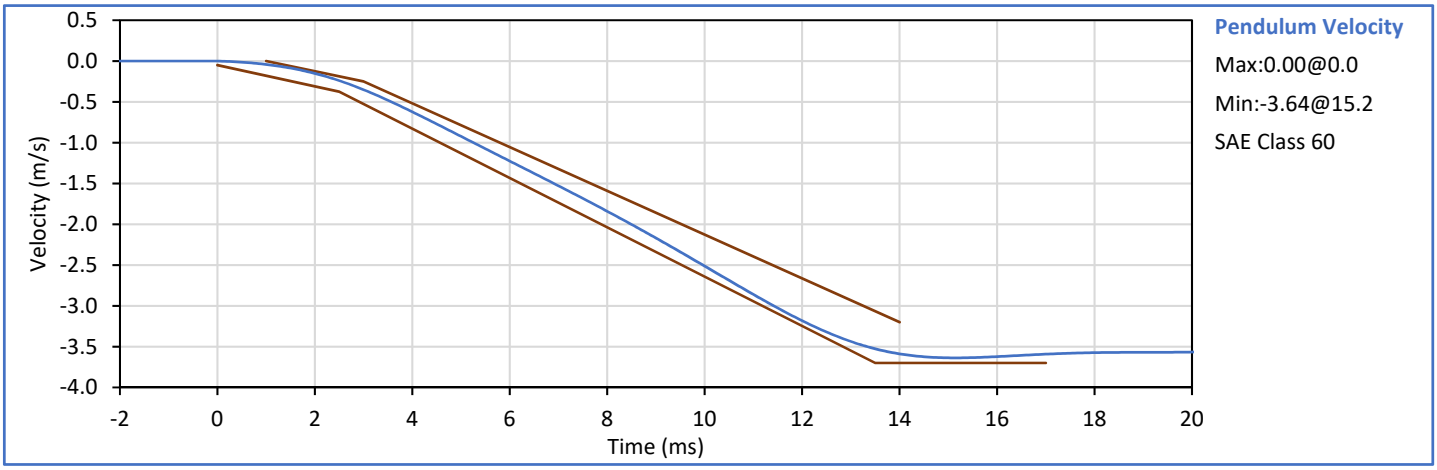
Approved By: P. Puzzuto

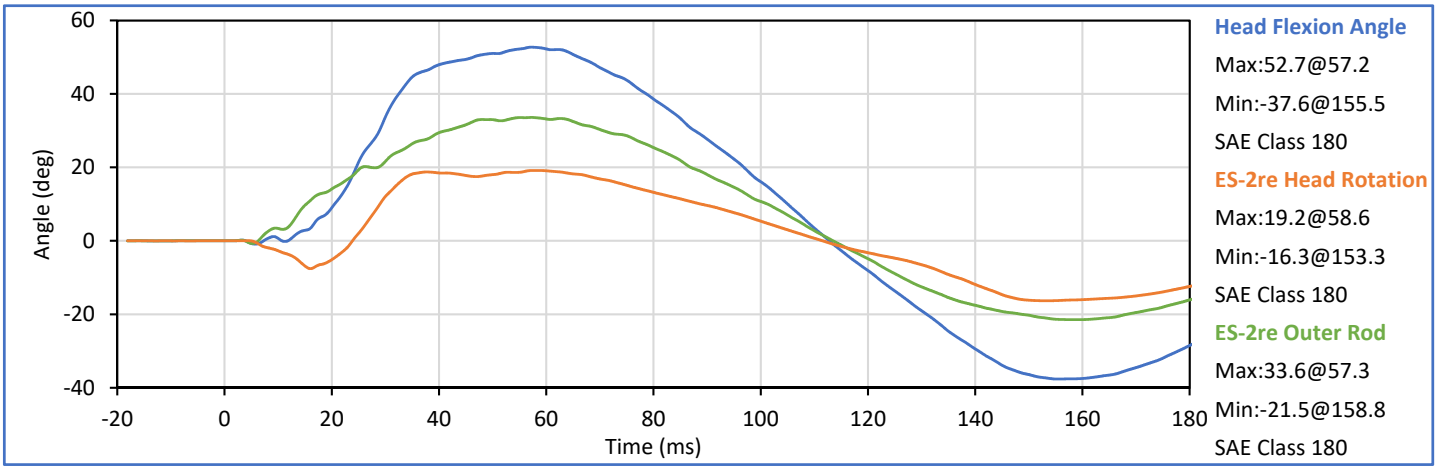
Applus IDIADA KARCO

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

ATD Serial No.: F035 Test Date: 2020-01-15

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
Pendulum Velocity	m/s	3.30	3.50	3.46	Pass
Peak Headform Flexion	deg	49.0	59.0	52.7	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	57.2	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	55.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

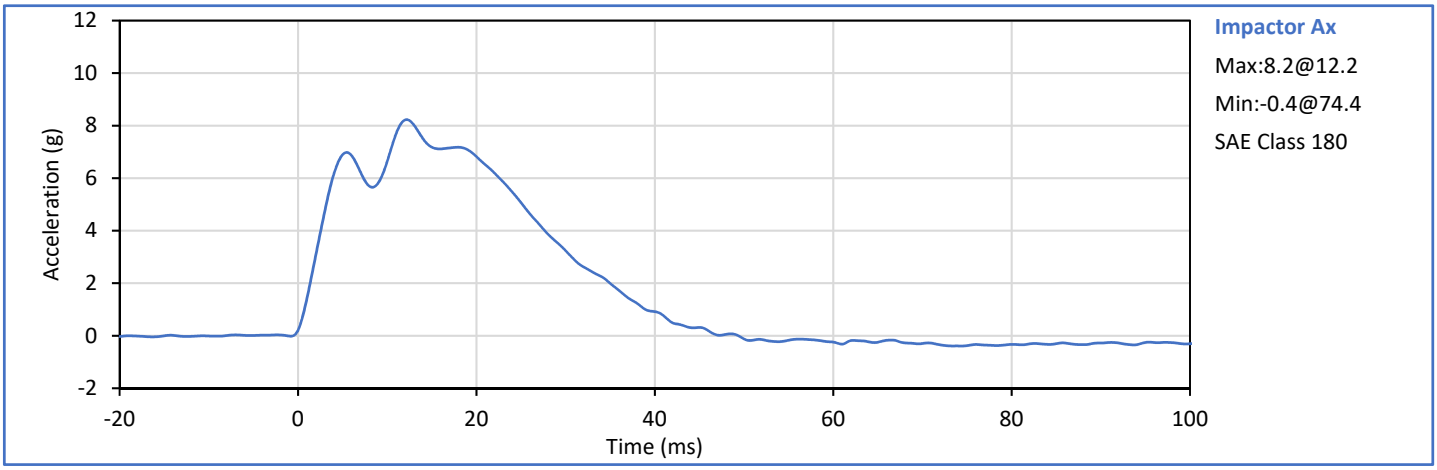
Applus IDIADA KARCO

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

ATD Serial No.: F035

Test Date: 2020-01-15

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	22	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Ax	g	7.5	10.5	8.2	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

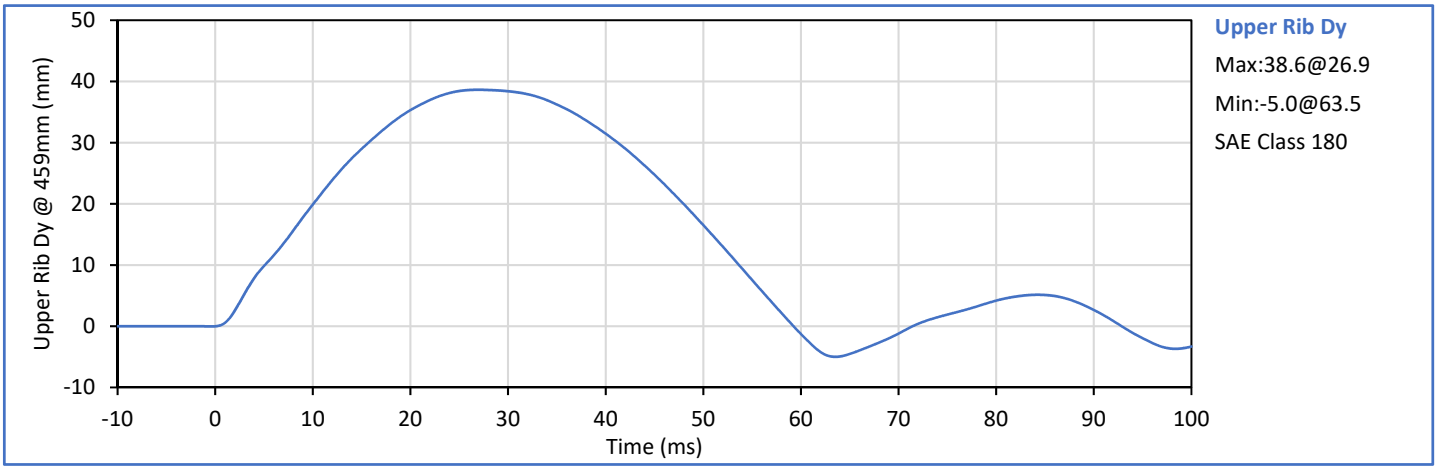
Applus IDIADA KARCO

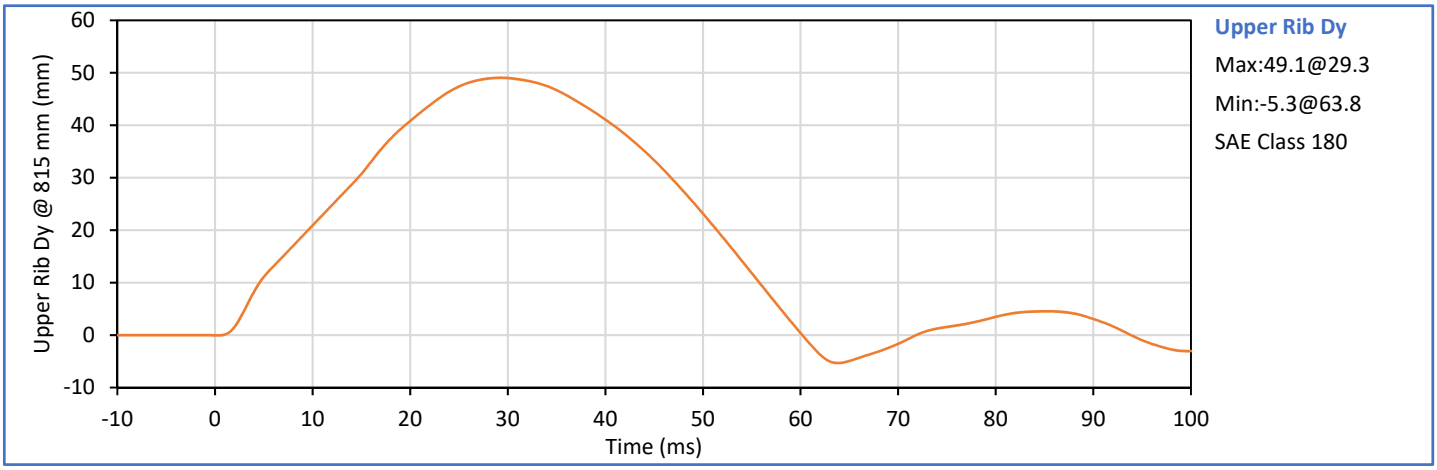
ES-2re 50th Male Side Impact ATD
Upper Rib Drop Test

ATD Serial No.: F035

Test Date: 2020-01-14

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
Upper Rib Dy @ 459mm	mm	36.0	40.0	38.6	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	49.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

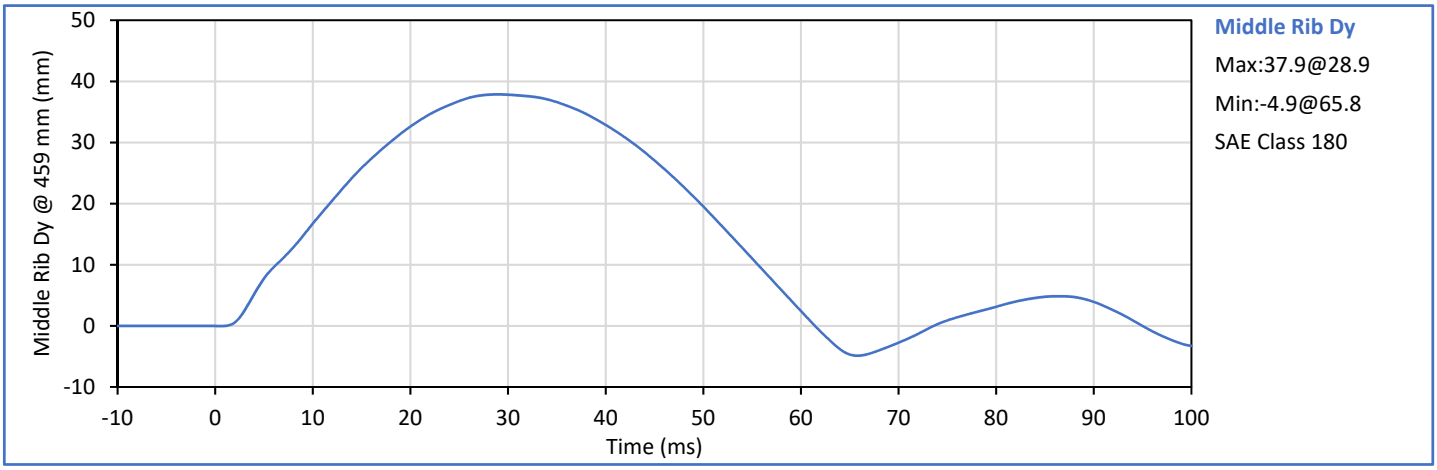
Applus IDIADA
KARCO

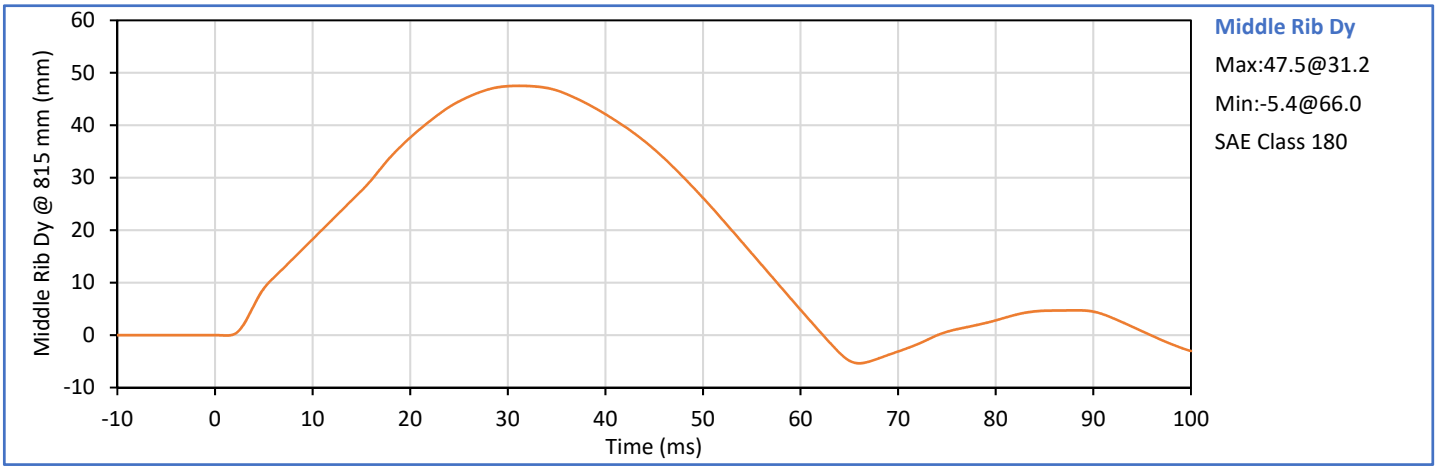
ES-2re 50th Male Side Impact ATD
Middle Rib Drop Test

ATD Serial No.: F035

Test Date: 2020-01-14

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
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.9	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.5	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

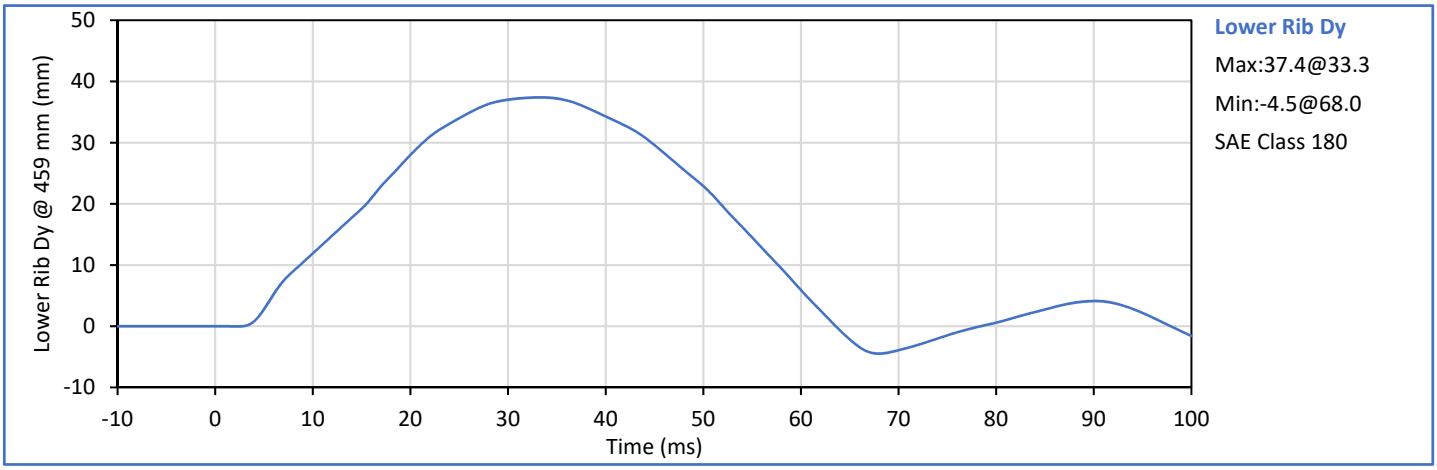
Applus IDIADA
KARCO

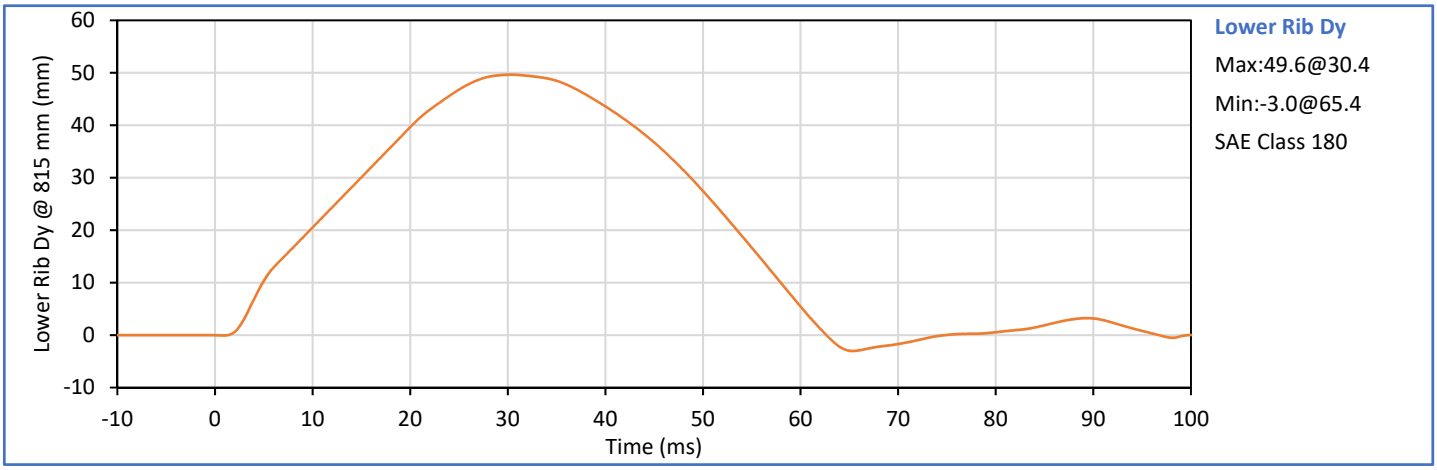
ES-2re 50th Male Side Impact ATD
Lower Rib Drop Test

ATD Serial No.: F035

Test Date: 2020-01-14

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
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.4	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	49.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

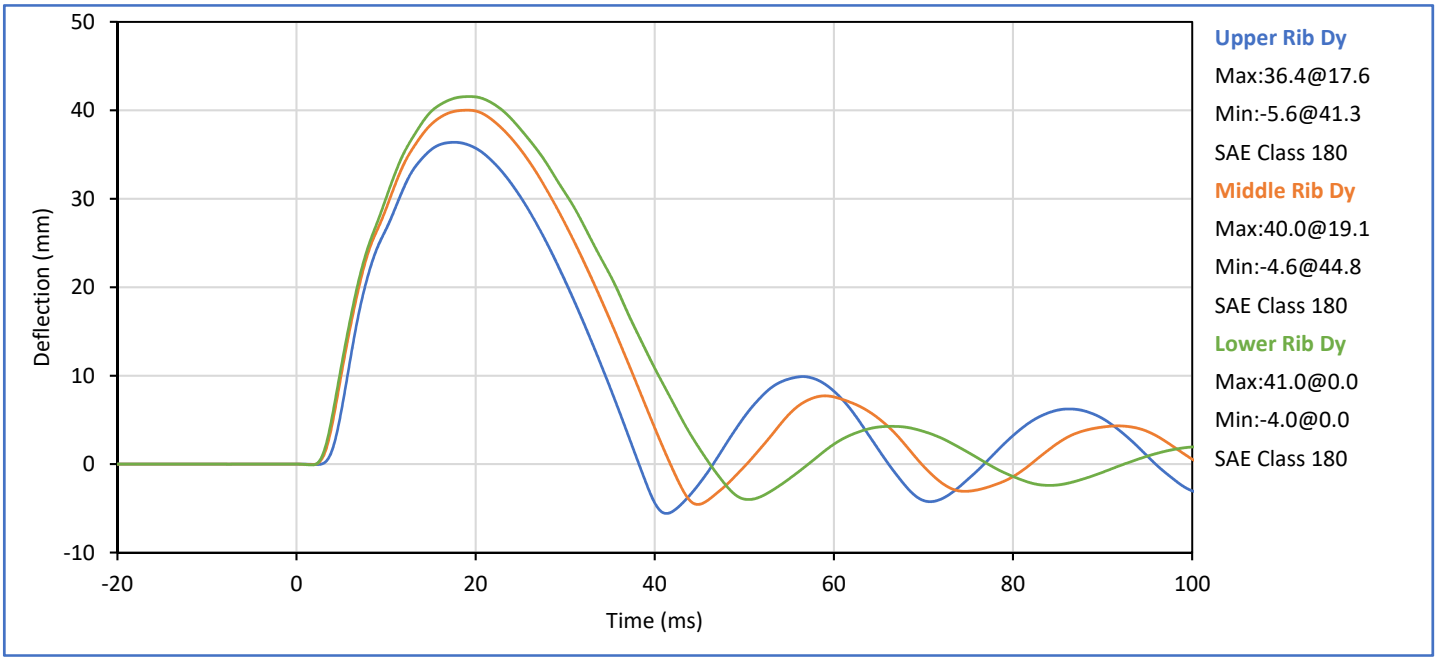
Approved By: P. Puzzuto

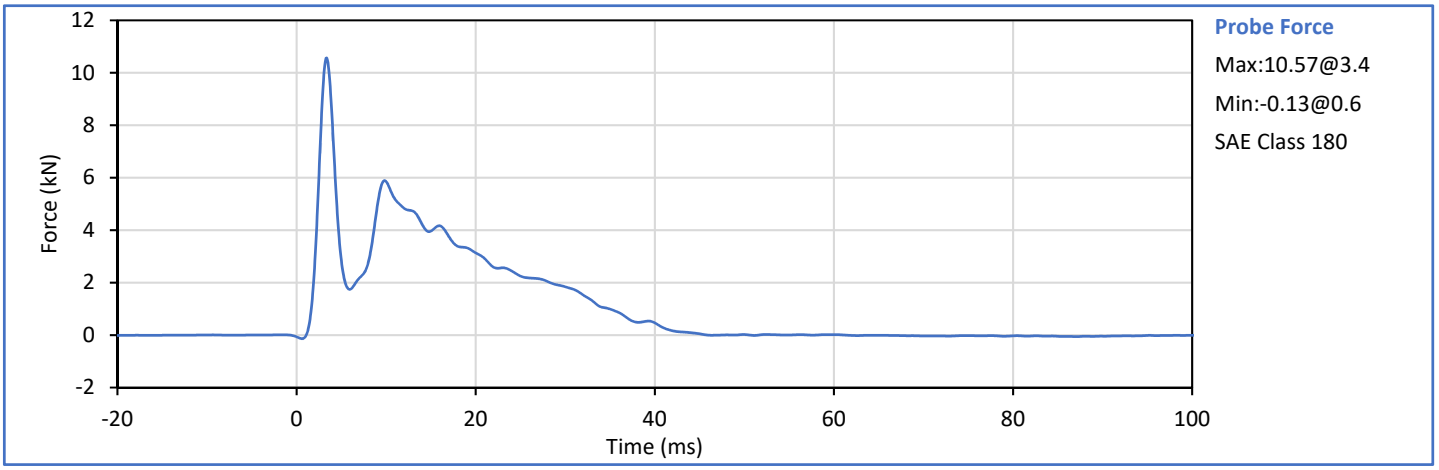
Applus IDIADA
KARCO

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

ATD Serial No.: F035 Test Date: 2020-01-15

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	5.40	5.60	5.52	Pass
Peak Upper Rib Dy	mm	34.0	41.0	36.4	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.0	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.6	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.89	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

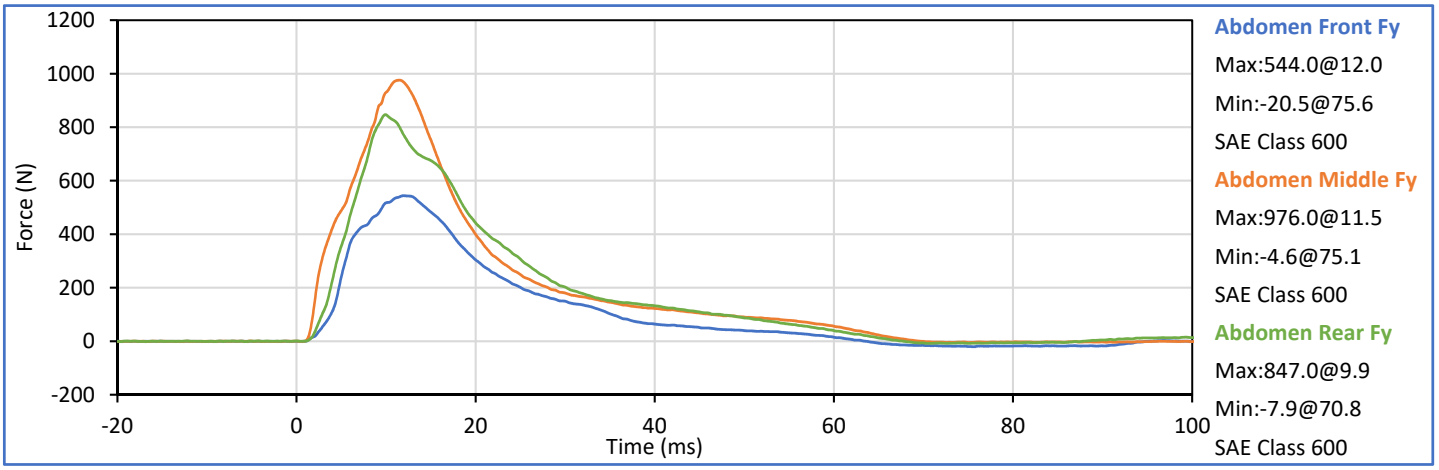
Applus IDIADA
KARCO

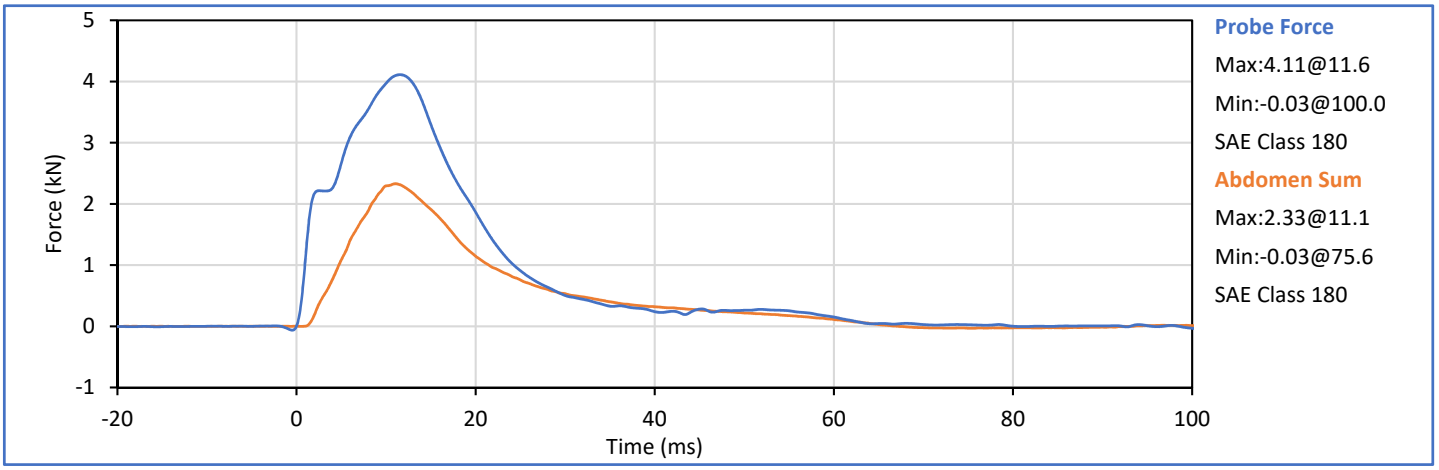
ES-2re 50th Male Side Impact ATD
Abdomen Impact

ATD Serial No.: F035

Test Date: 2020-01-15

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	26	Pass
Impactor Velocity	m/s	3.90	4.10	4.03	Pass
Peak Impactor Force	kN	4.00	4.80	4.11	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.6	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.33	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.1	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

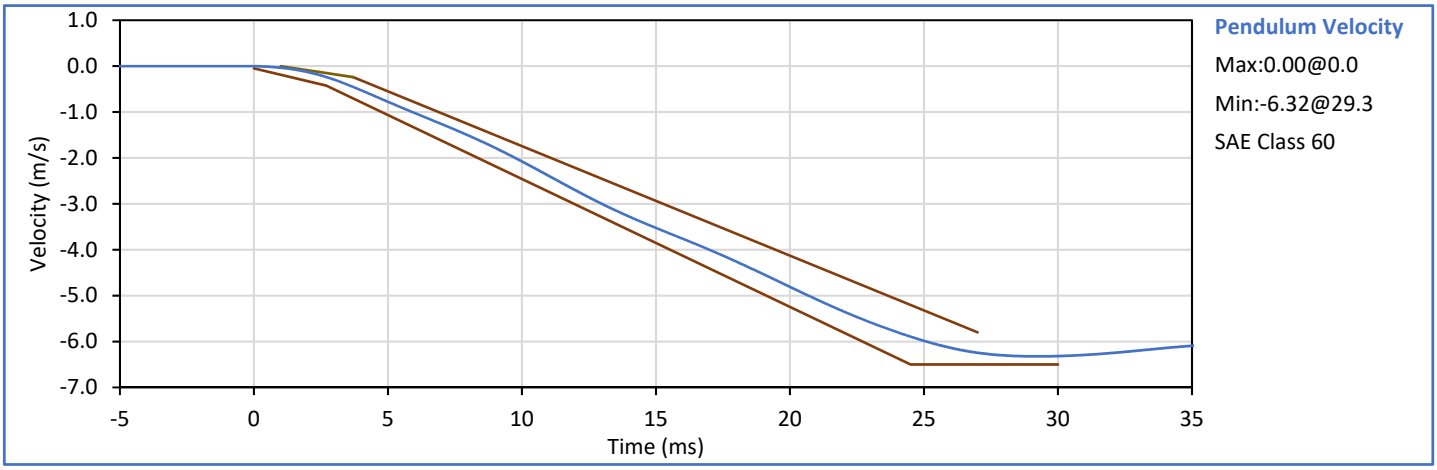
Applus IDIADA
KARCO

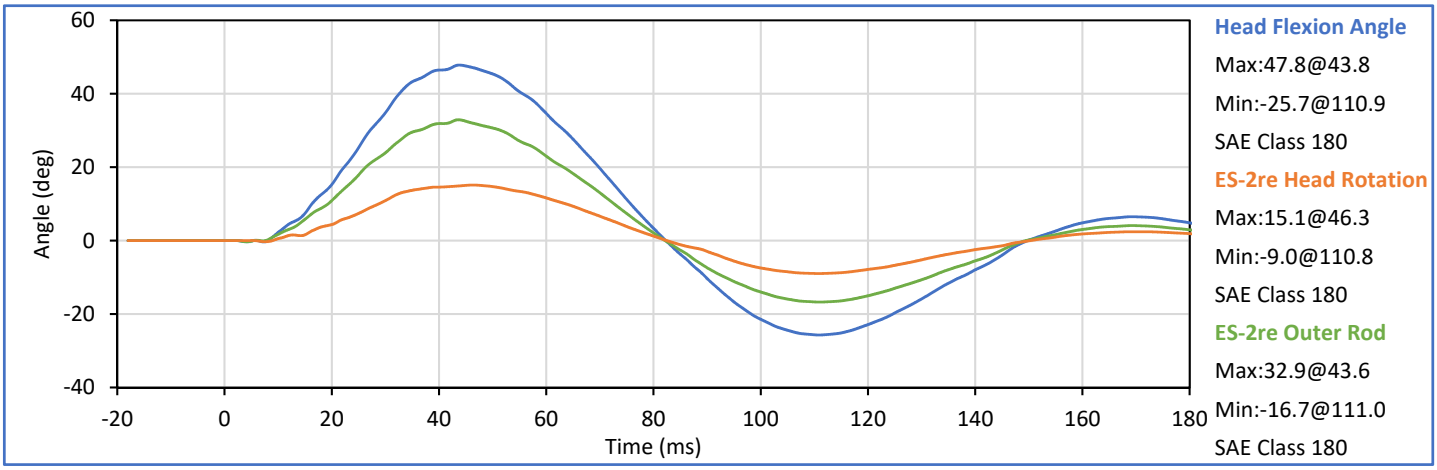
ES-2re 50th Male Side Impact ATD
Lumbar Spine Flexion

ATD Serial No.: F035

Test Date: 2020-01-15

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	47.8	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	43.8	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	38.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

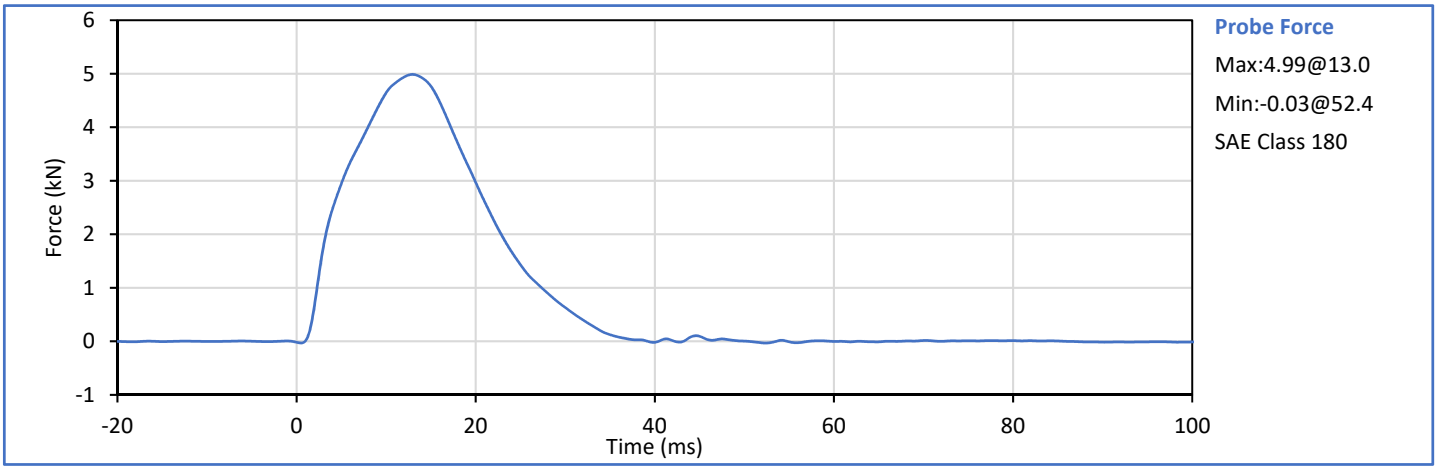
Applus IDIADA
KARCO

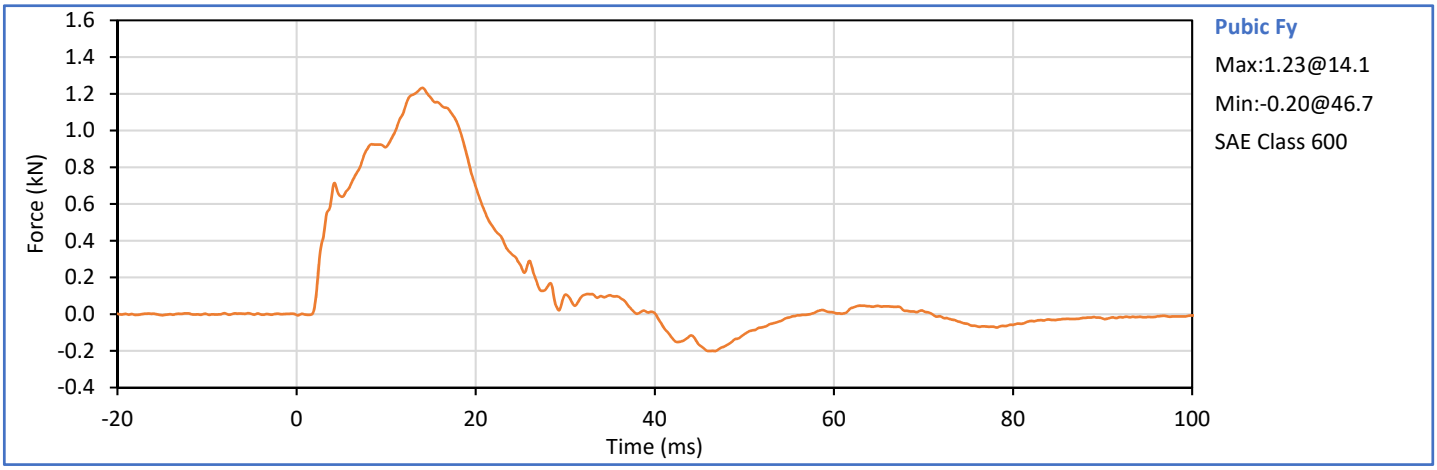
ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F035

Test Date: 2020-01-15

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	26	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Impactor Force	kN	4.70	5.40	4.99	Pass
Time of Peak Impactor Force	ms	11.8	16.1	13.0	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.23	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.1	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: 308

Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 308 Test Date: 2020-01-10

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
A - Sitting Height	mm	772	788	784	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	84	Pass
D - H Point From Seatback	mm	141	151	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	102	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	41	Pass
I - Head Depth	mm	178	188	187	Pass
J - Head Circumference	mm	541	551	548	Pass
K - Buttock To Knee Length	mm	514	540	521	Pass
L - Popliteal Height	mm	343	369	355	Pass
K - Knee Pivot To Floor Height	mm	392	409	400	Pass
N - Buttock Popliteal Length	mm	416	442	435	Pass
O - Chest Depth W/O Jacket	mm	195	211	208	Pass
P - Foot Length	mm	216	232	219	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	316	Pass
R - Arm Length	mm	249	259	258	Pass
S - Knee Joint To Seatback	mm	477	493	489	Pass
V - Shoulder Width	mm	341	357	347	Pass
W - Foot Width	mm	78	94	82	Pass
Y - Chest Circumference W/Jacket	mm	851	881	863	Pass
Z - Waist Circumference	mm	761	791	775	Pass
			Overall Test Results		Pass

Technician: J. Hernandez

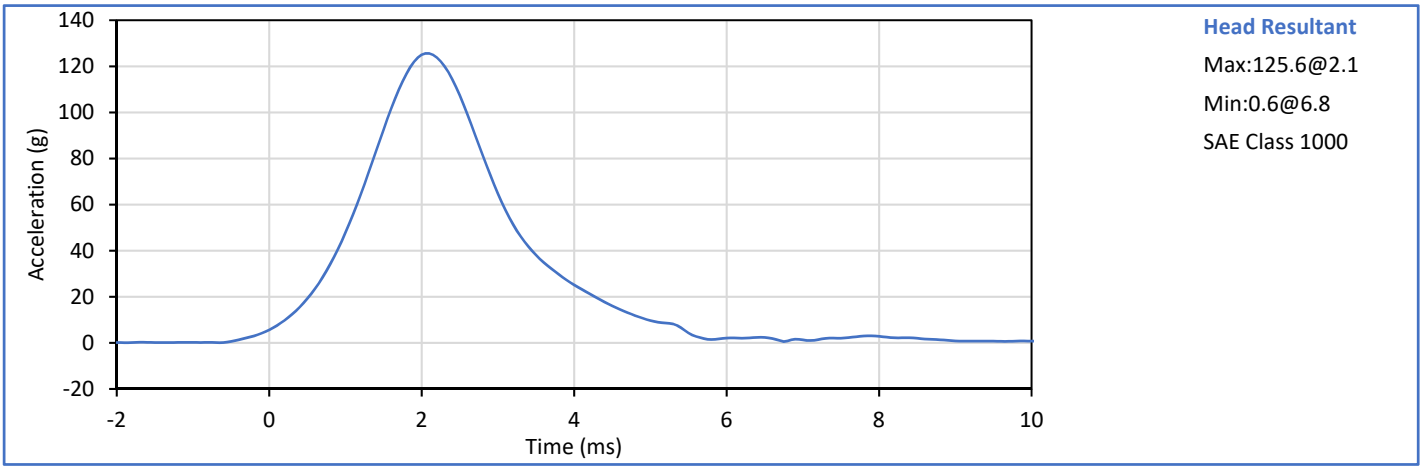
Approved By: P. Puzzuto

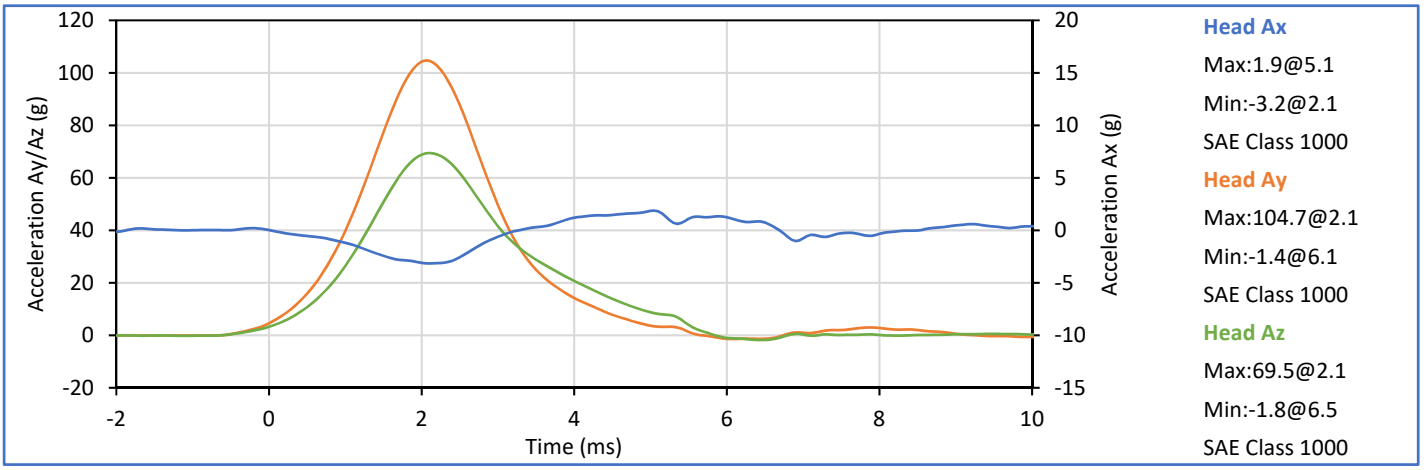
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Head Drop

ATD Serial No.: 308 Test Date: 2020-01-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	26	Pass
Peak Resultant Acceleration	g	115.0	137.0	125.6	Pass
Peak Head Ax	g	-15.0	15.0	-3.2	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

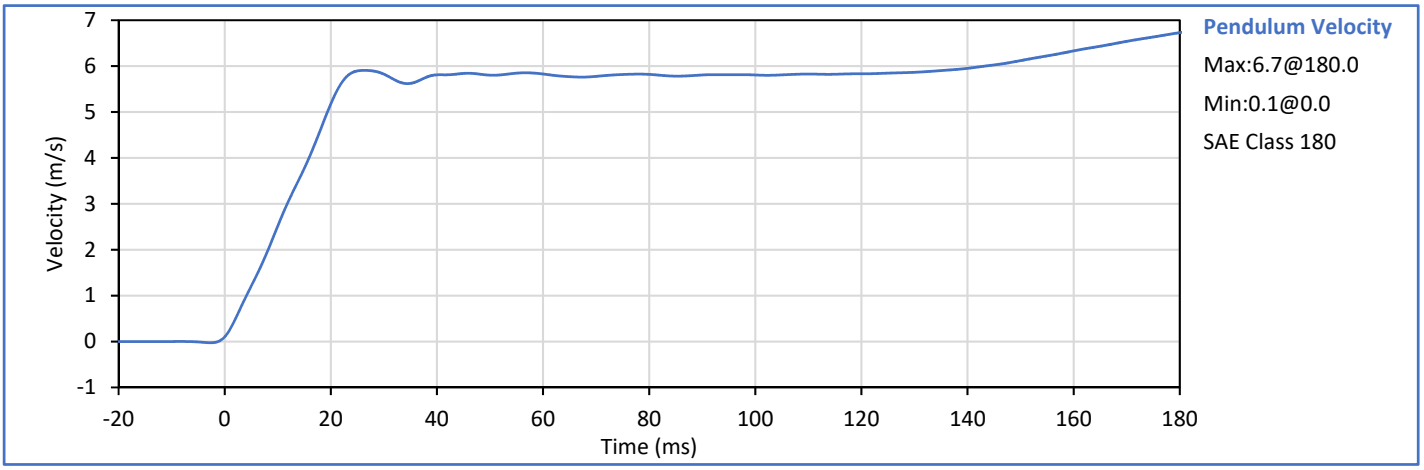
Approved By: P. Puzzuto

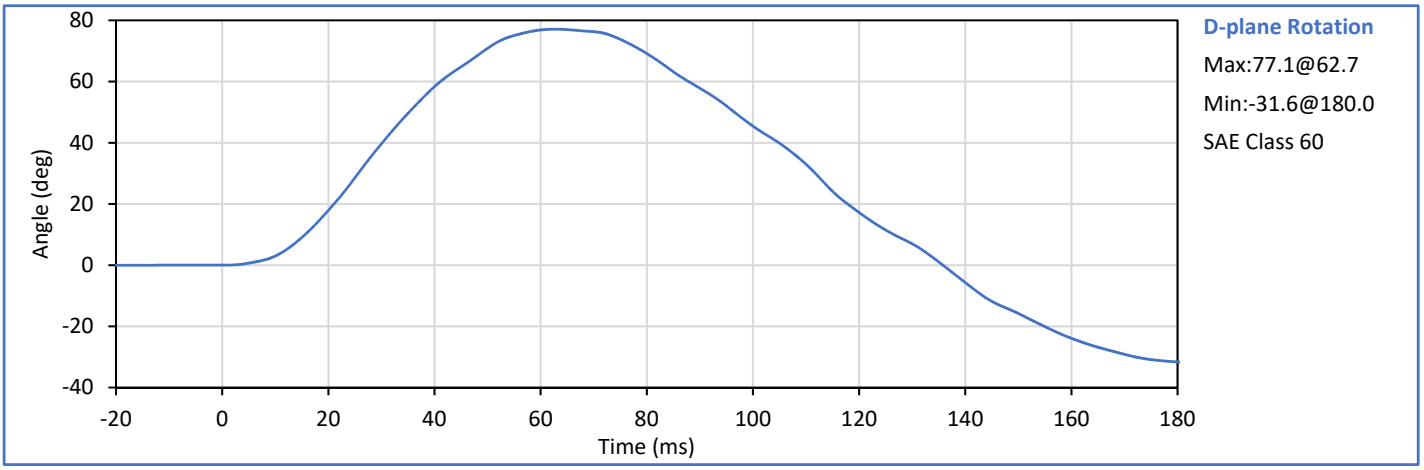
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2020-01-15

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.52	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.77	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.18	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.90	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.91	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	77.1	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	62.7	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-42.1	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	116.7	Pass
			Overall Test Results		Pass





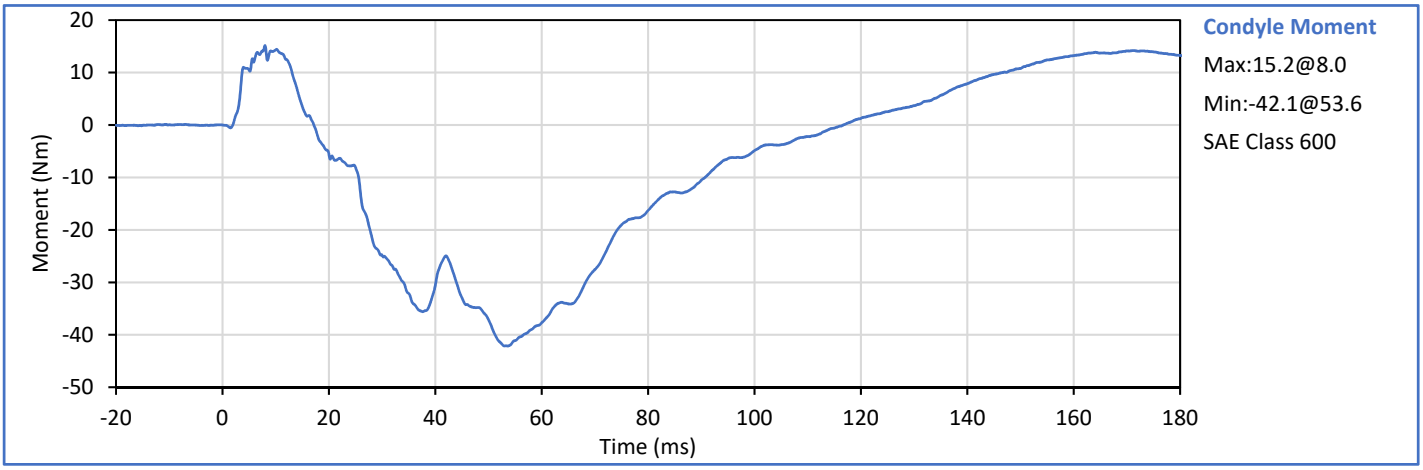
Technician: J. Hernandez

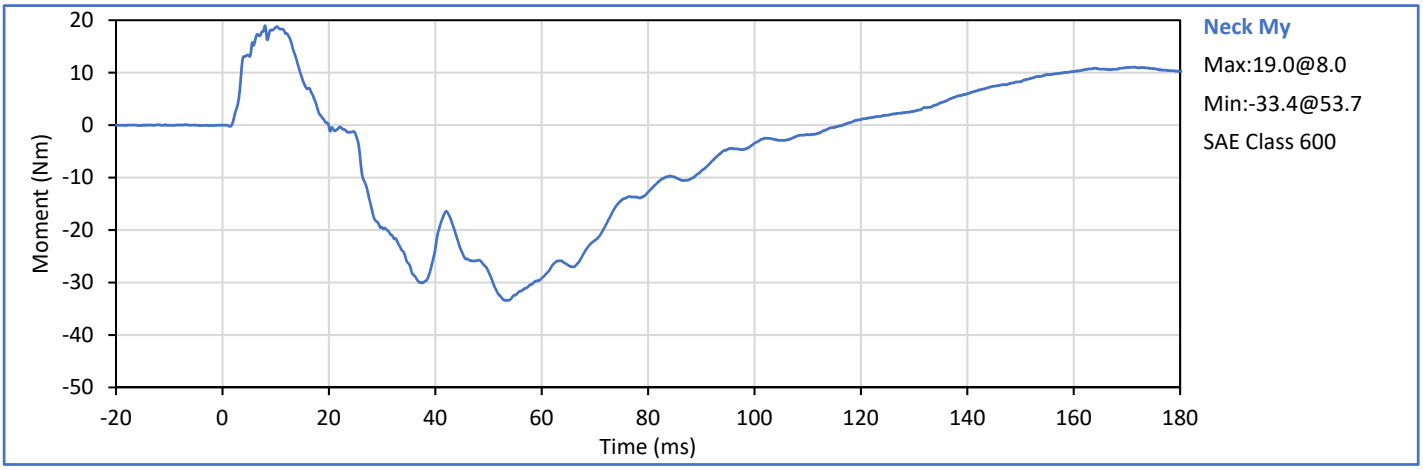
Approved By: P. Puzzuto

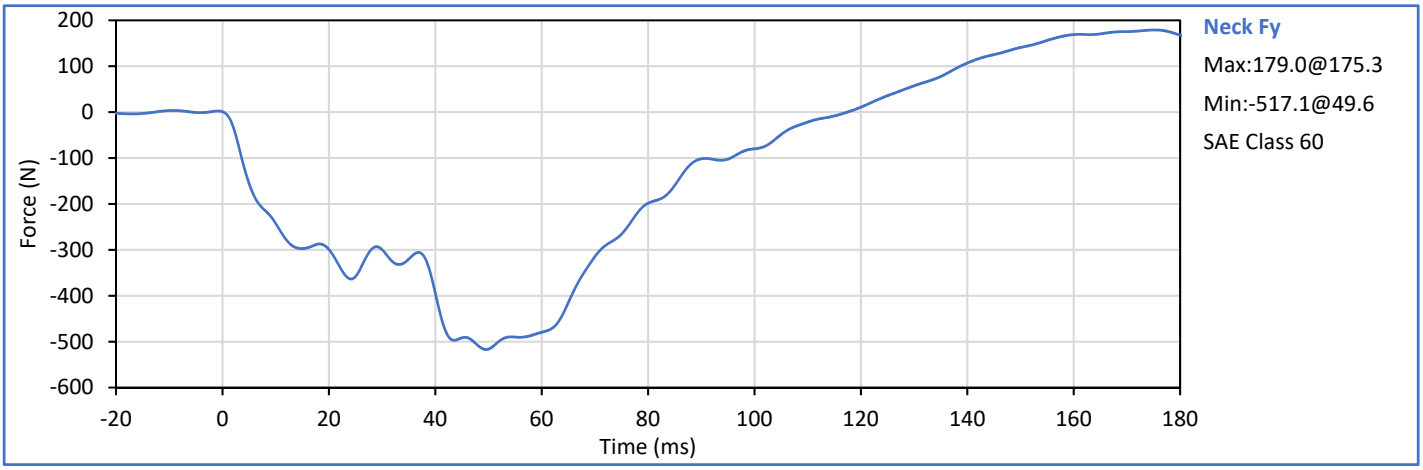
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308 Test Date: 2020-01-15





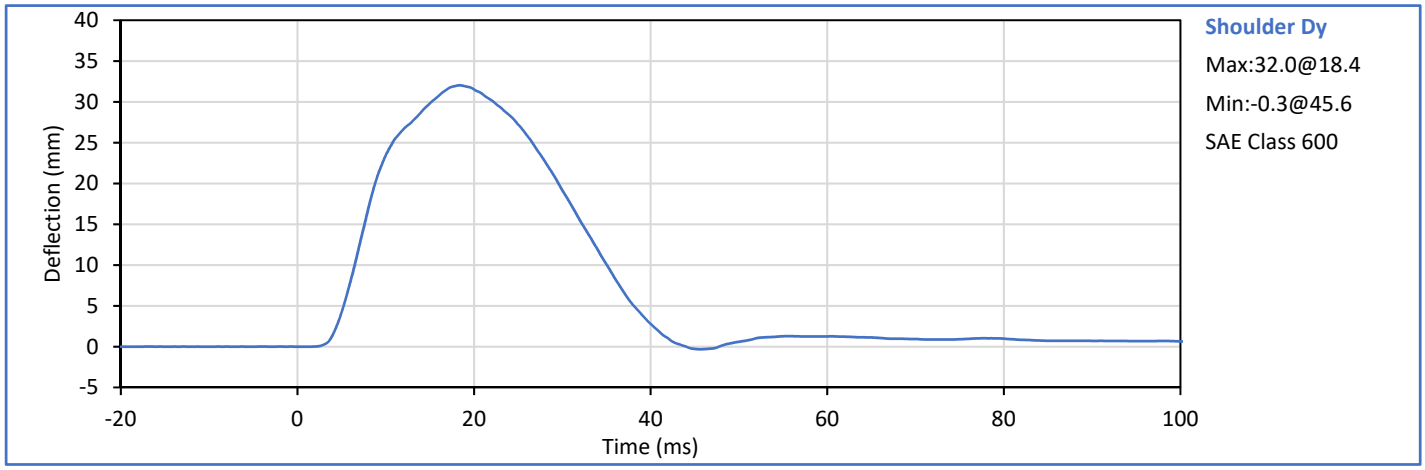


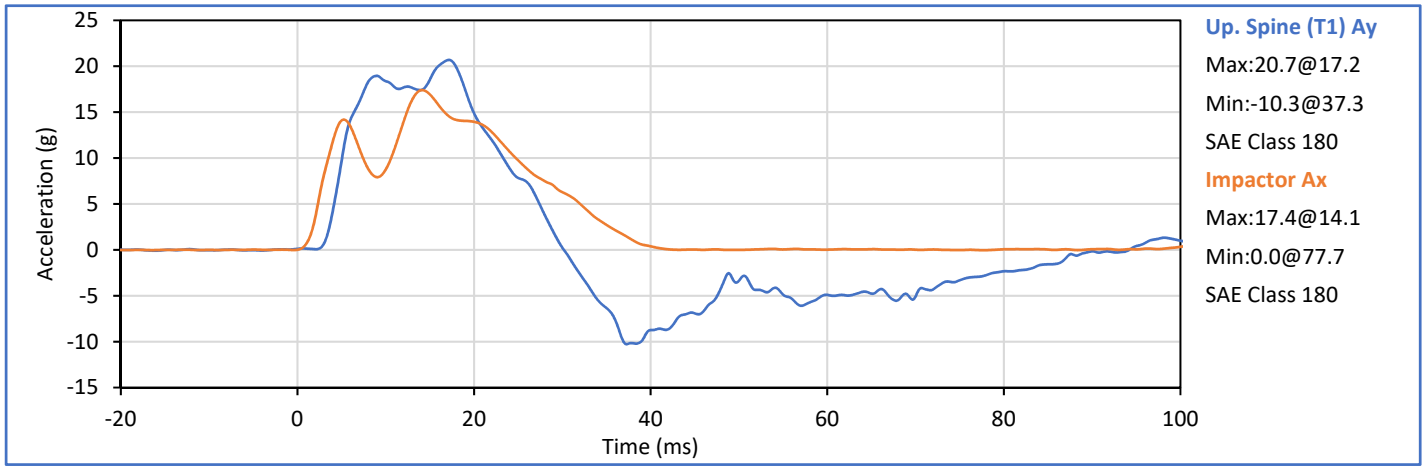
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 308 Test Date: 2020-01-10

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	27	Pass
Impactor Velocity	m/s	4.20	4.40	4.38	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.0	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	20.7	Pass
Peak Impactor Ax	g	13.0	18.0	17.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

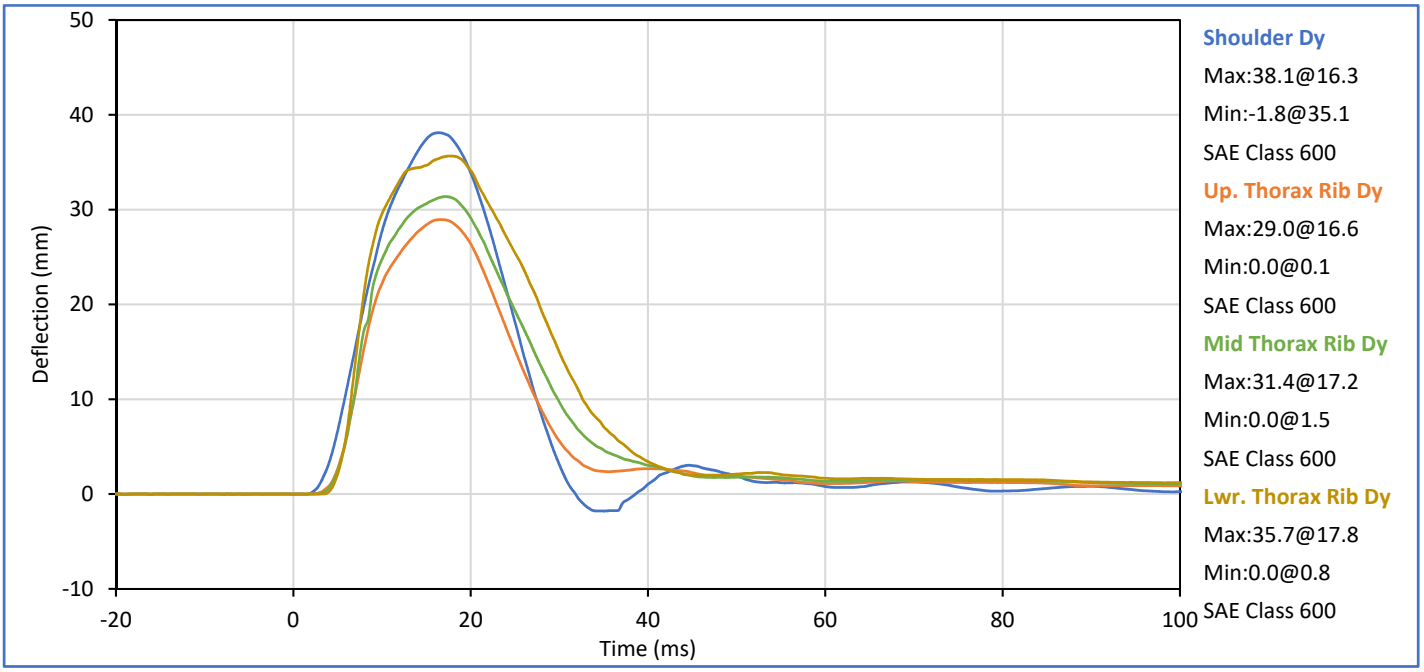
Approved By: P. Puzzuto

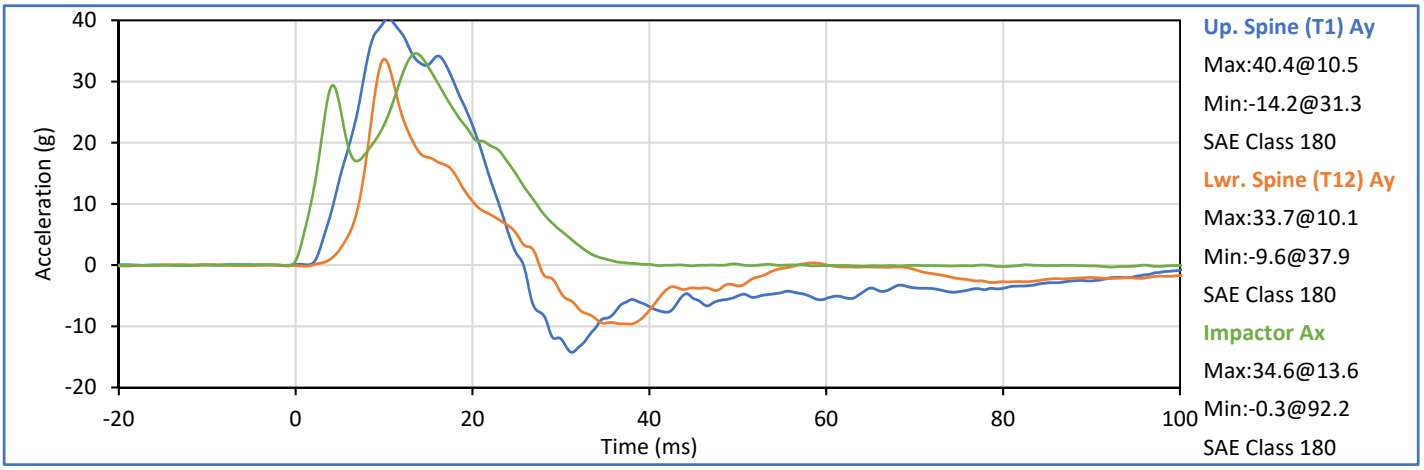
Applus IDIADA
KARCO

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

ATD Serial No.: 308 Test Date: 2020-01-10

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	6.60	6.80	6.71	Pass
Peak Shoulder Dy	mm	31.0	40.0	38.1	Pass
Peak Upper Rib Dy	mm	25.0	32.0	29.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.4	Pass
Peak Lower Rib Dy	mm	32.0	38.0	35.7	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	40.4	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	33.7	Pass
Peak Impactor Ax	g	30.0	36.0	34.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

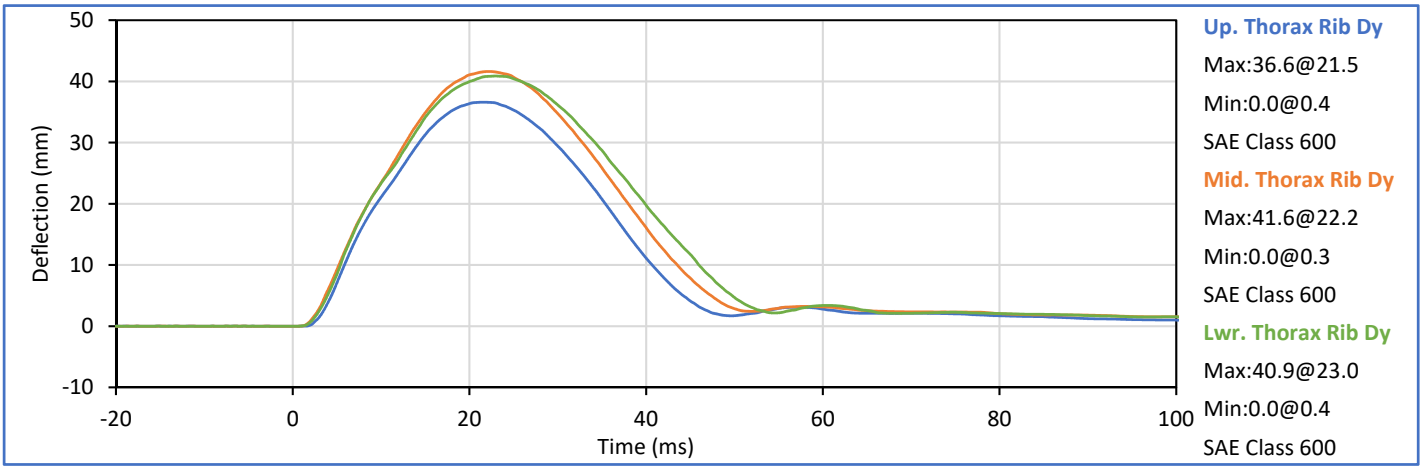
Approved By: P. Puzzuto

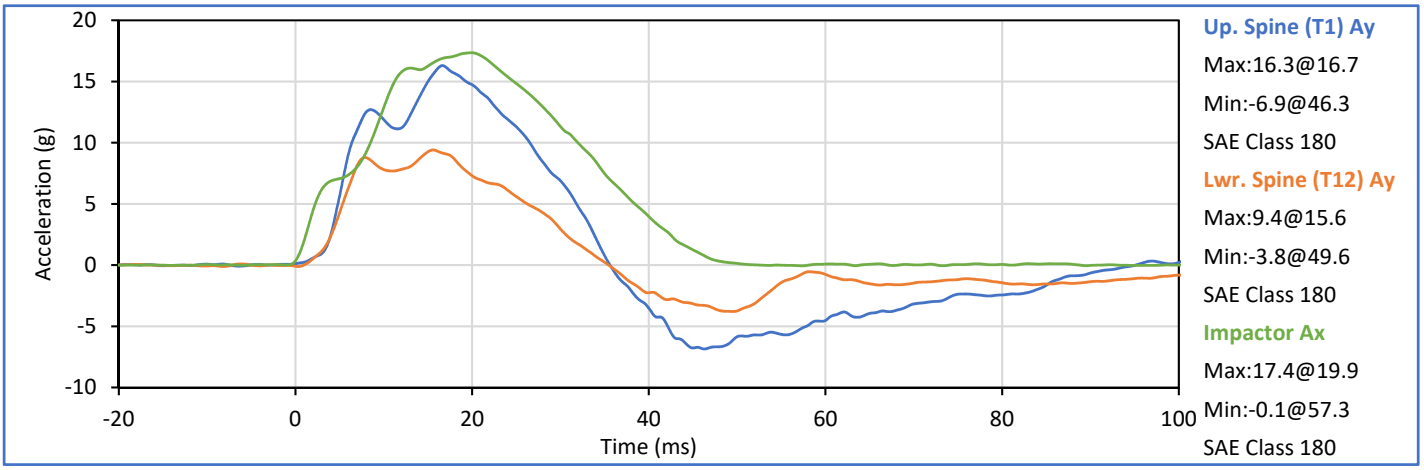
Applus IDIADA
KARCO

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

ATD Serial No.: 308 Test Date: 2020-01-10

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	27	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Rib Dy	mm	32.0	40.0	36.6	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.6	Pass
Peak Lower Rib Dy	mm	35.0	43.0	40.9	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	16.3	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.4	Pass
Peak Impactor Ax	g	14.0	18.0	17.4	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

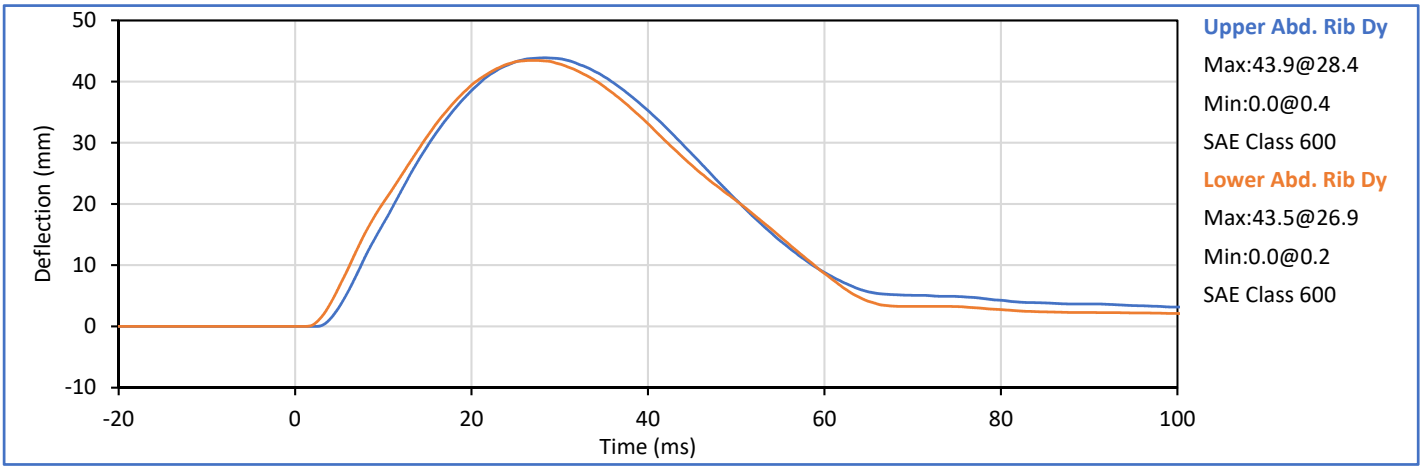
Approved By: P. Puzzuto

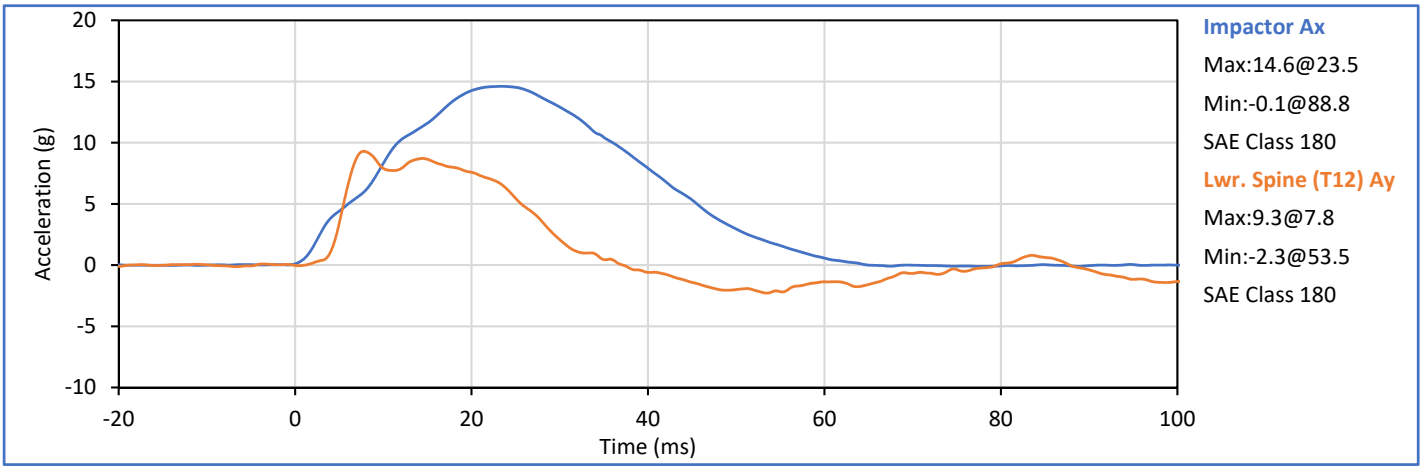
Applus IDIADA
KARCO

SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 308 Test Date: 2020-01-10

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	4.35	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	43.9	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	43.5	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	9.3	Pass
Peak Impactor Ax	g	12.0	16.0	14.6	Pass
			Overall Test Results		Pass





Technician: J. Hernandez

Approved By: P. Puzzuto

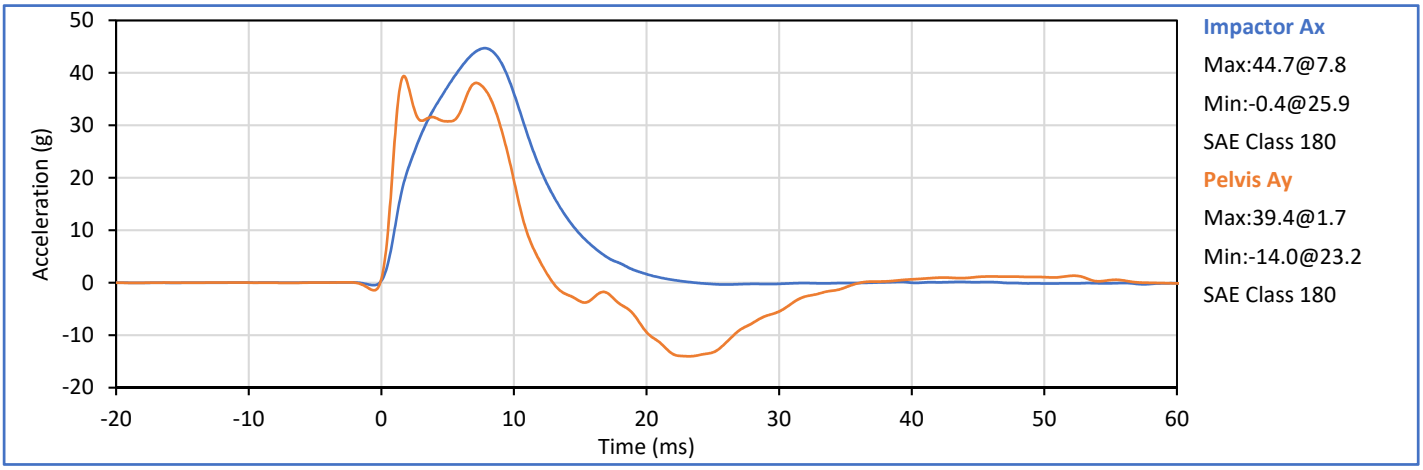
Applus IDIADA
KARCO

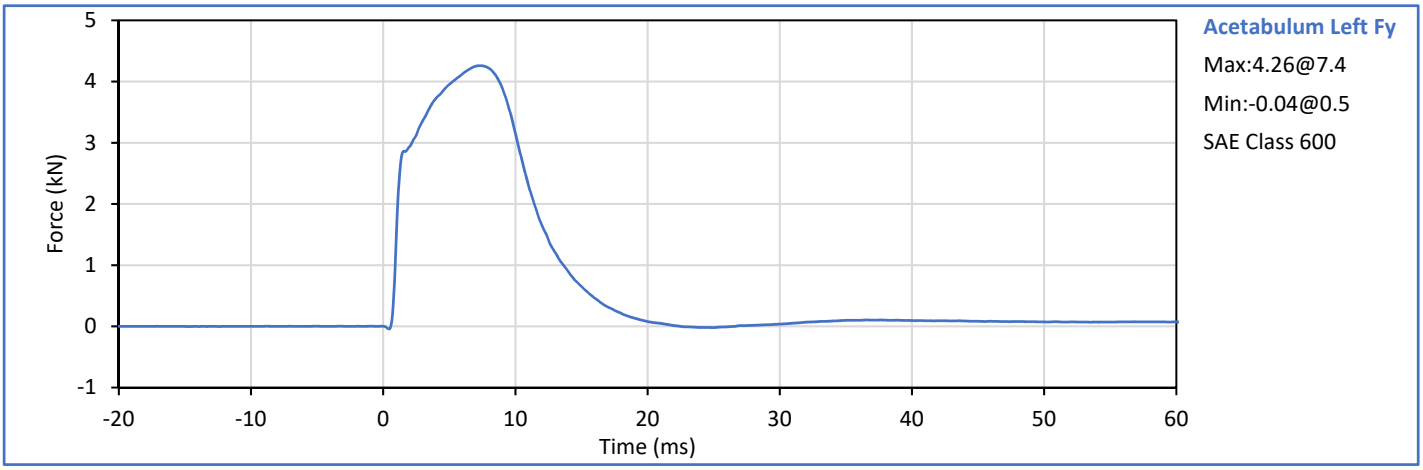
SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308 Test Date: 2020-01-10

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	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.26	Pass
Pelvis Ay after 6ms	g	34.0	42.0	38.1	Pass
Peak Impactor Ax	g	38.0	47.0	44.7	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12297 (SACO)





Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308 Test Date: 2020-01-10

Pelvis Plug S/N: 12297 (SACO)

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 12297
Test Number 6681
Report Number 6696
Test Date 3/15/2018 11:58:42 AM

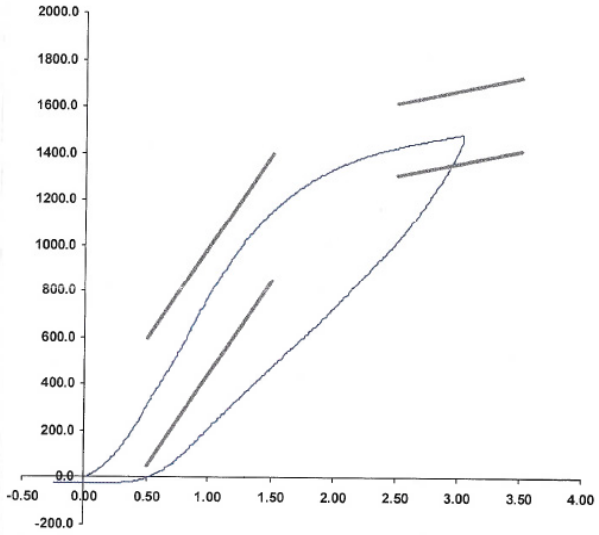
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	316.24	50.00	600.00
Force @ 1.5 mm (N)	1,151.96	850.00	1,400.00
Force @ 2.5 mm (N)	1,427.23	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,480.66	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 15-Mar-18
SACO Research

By : DC Date : 3/15/18

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

Applus IDIADA
KARCO

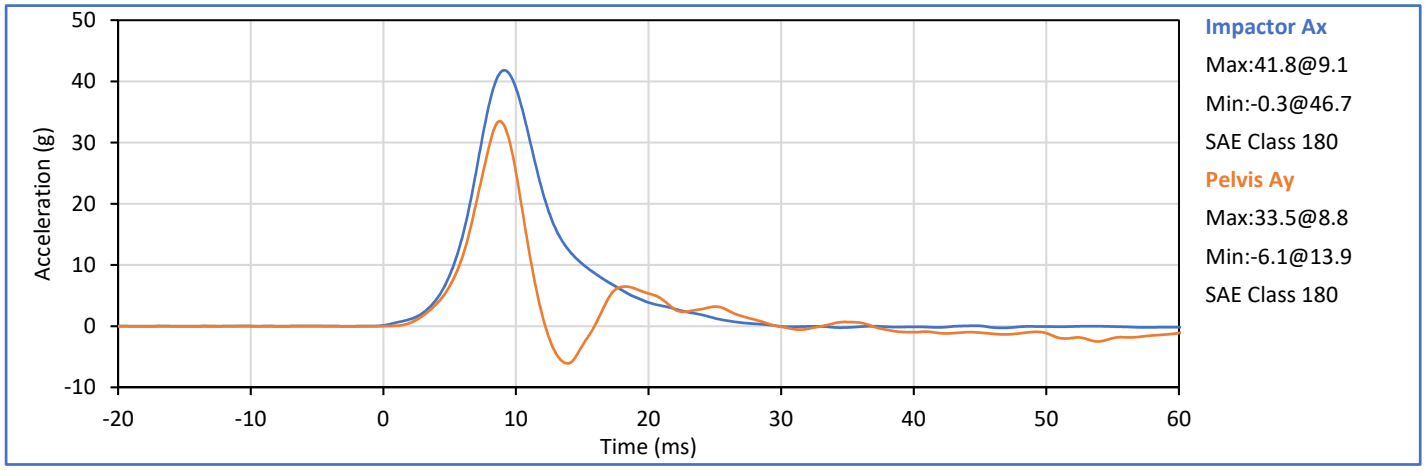
SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

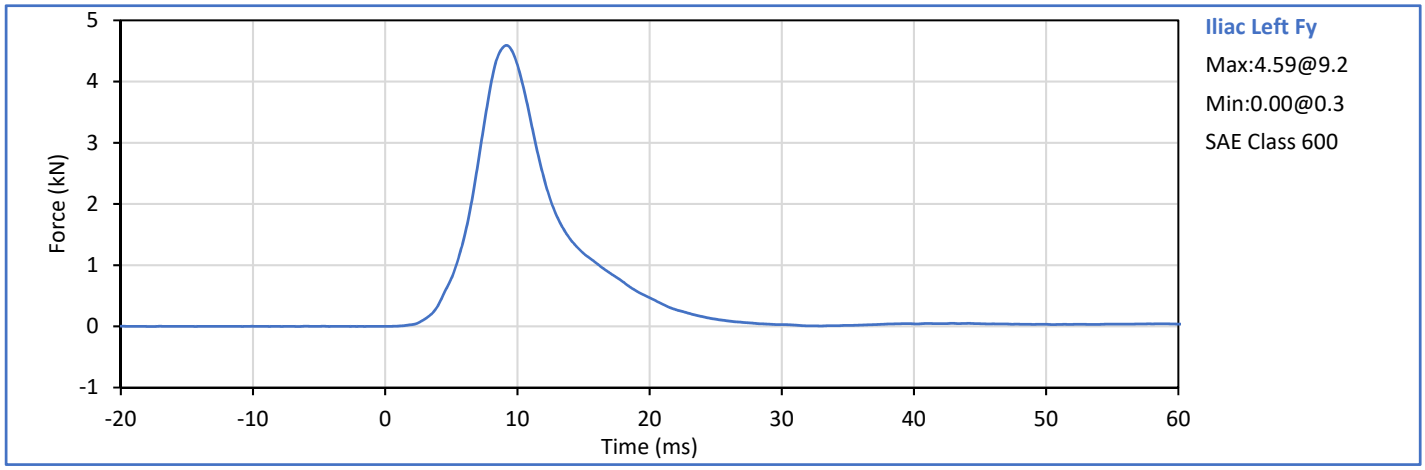
ATD Serial No.: 308 Test Date: 2020-01-10

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	23	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Iliac Fy	kN	4.10	5.10	4.59	Pass
Pelvis Ay after 6ms	g	28.0	39.0	33.5	Pass
Peak Impactor Ax	g	36.0	45.0	41.8	Pass
			Overall Test Results		Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified





Technician: J. Hernandez

Approved By: P. Puzzuto

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

ES-2re ATD S/N: F035

Table 1 - Driver ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58760	Endevco	7264C-2k	2019-12-18
Head Acceleration Y Primary	P58763	Endevco	7264C-2k	2019-12-18
Head Acceleration Z Primary	P52093	Endevco	7264C-2k	2019-12-18
Head Acceleration X Redundant	P52072	Endevco	7264C-2k	2019-12-18
Head Acceleration Y Redundant	P58768	Endevco	7264C-2k	2019-12-18
Head Acceleration Z Redundant	P52074	Endevco	7264C-2k	2019-12-18
Upper Thorax Rib Deflection Y	180 (ES-2 Rib)	Honeywell	F38000203	2019-11-04
Middle Thorax Rib Deflection Y	177 (ES-2 Rib)	Honeywell	F38000203	2019-11-04
Lower Thorax Rib Deflection Y	186 (ES-2 Rib)	Honeywell	F38000203	2019-11-04
Anterior Abdominal Force Y	1504 Fy	R.A. Denton	2631J	2019-10-22
Middle Abdominal Force Y	1505 Fy	R.A. Denton	2631J	2019-10-22
Posterior Abdominal Force Y	1506 Fy	R.A. Denton	2631J	2019-10-22
Lower Spine T12 Acceleration X	P45011	Endevco	7264C-2k	2019-12-18
Lower Spine T12 Acceleration Y	P58992	Endevco	7264C-2k	2019-12-18
Lower Spine T12 Acceleration Z	P51700	Endevco	7264C-2k	2019-11-04
Pubic Symphysis Force Y	DG6784 Fy	FTSS	IF-556	2019-10-22

SID-IIs ATD S/N: 308

Table 2 - Left Rear Passenger ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P63980	Endevco	7264C-2k	2020-01-02
Head Acceleration Y Primary	P58861	Endevco	7264C-2k	2020-01-02
Head Acceleration Z Primary	P51261	Endevco	7264C-2k	2020-01-02
Head Acceleration X Redundant	P58808	Endevco	7264C-2k	2020-01-02
Head Acceleration Y Redundant	P63310	Endevco	7264C-2k	2020-01-02
Head Acceleration Z Redundant	P49189	Endevco	7264C-2k	2020-01-02
Head Rotation Rate X	ARS7498	DTS	ARS PRO-8k (2000Hz)	2019-07-08
Head Rotation Rate Y	ARS7367	DTS	ARS PRO-8k (2000Hz)	2019-07-08
Head Rotation Rate Z	ARS7377	DTS	ARS PRO-8k (2000Hz)	2019-07-08
Upper Thorax Rib Deflection Y	1249	Servo	08TCI-3725	2020-01-02
Middle Thorax Rib Deflection Y	1219	Servo	08TCI-3725	2020-01-02
Lower Thorax Rib Deflection Y	1221	Servo	08TCI-3725	2020-01-02
Upper Abdomen Rib Deflection Y	1252	Servo	08TCI-3725	2020-01-02
Lower Abdomen Rib Deflection Y	1283	Servo	08TCI-3725	2020-01-02
Lower Spine T12 Acceleration X	P52108	Endevco	7264C-2k	2020-01-02
Lower Spine T12 Acceleration Y	P63970	Endevco	7264C-2k	2020-01-02
Lower Spine T12 Acceleration Z	P51712	Endevco	7264C-2k	2020-01-02
Iliac Wing Impact Side Force Y	289 Fy (Iliac)	R.A. Denton	3228J	2019-10-17
Acetabulum Impact Side Force Y	277 Fy (Acetabulum)	R.A. Denton	3249J	2019-10-07

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Vehicle CG Ax	Accels\10913	Endevco	757F-2k	2019-12-17
Vehicle CG Ay	Accels\10884	Endevco	757F-2k	2019-12-17
Vehicle CG Az	Accels\10890	Endevco	757F-2k	2019-12-17
Right Side Sill at Front Seat Ax	Accels\10905	Endevco	757F-2k	2019-12-17
Right Side Sill at Front Seat Ay	Accels\10855	Endevco	757F-2k	2019-12-17
Right Side Sill at Front Seat Az	Accels\11179	Endevco	757F-2k	2019-12-17
Right Side Sill at Rear Seat Ax	Accels\10824	Endevco	757F-2k	2019-12-17
Right Side Sill at Rear Seat Ay	Accels\10906	Endevco	757F-2k	2019-12-17
Right Side Sill at Rear Seat Az	Accels\10908	Endevco	757F-2k	2019-12-17
Left Side Sill at Front Seat Ay	Accels\A273033	MSI	52F-2000	2019-12-13
Left Side Sill at Rear Seat Ay	Accels\A273458	MSI	52F-2000	2019-12-04
Left Lower A-Pillar Ay	Accels\A273401	MSI	52F-2000	2019-12-04
Left Middle A-Pillar Ay	Accels\A254855	MSI	52F-2000	2019-12-09
Left Lower B-Pillar Ay	Accels\A254843	MSI	52F-2000	2019-12-13
Left Middle B-Pillar Ay	Accels\A254901	MSI	52F-2000	2019-12-13
Driver Seat Track at H-Point Ay	Accels\10892	Endevco	757F-2k	2019-12-17
Rear Seat Structure Ay	Accels\10917	Endevco	757F-2k	2019-12-17
Right Rear Occupant Comp. Ay	Accels\A273415	MSI	52F-2000	2019-12-04
Engine Block Top Ax	Accels\A273040	MSI	52F-2000	2019-12-02
Engine Block Top Ay	Accels\A273037	MSI	52F-2000	2019-12-02
Rear Floopan Above Axle Ax	Accels\10889	Endevco	757F-2k	2019-12-17
Rear Floopan Above Axle Ay	Accels\10836	Endevco	757F-2k	2019-12-17
Rear Floopan Above Axle Az	Accels\10858	Endevco	757F-2k	2019-12-17

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

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