

REPORT NUMBER: SINCAP-KAR-19-002

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

**SUBARU CORPORATION
2019 SUBARU ASCENT 5-DOOR MPV**

NHTSA No: O20195505

**PREPARED BY:
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ADELANTO, CA 92301**



OCTOBER 3, 2018

FINAL REPORT

**PREPARED FOR:
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NHTSA, Office of Crashworthiness Standards

Date: _____


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16. Abstract

A 55 / 28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2019 Subaru Ascent 5-door MPV 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 September 19, 2018.

The impact velocity of the Moving Deformable Barrier was 61.59 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 32.2° C. The target vehicle's maximum post-test static crush was 219 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	37.3
Maximum Thoracic Rib Deflection	mm	44	13
Total Abdominal Force	N	2500	324
Pubic Symphysis Force	N	6000	1218

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	81.0
Resultant Lower Spine Acceleration	g	82	27
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	1538
Maximum Thoracic Rib Deflection	mm	38*	5
Maximum Abdominal Rib Deflection	mm	45*	7

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.

* Proposed IARV

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2019 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 2019 Subaru Ascent 5-door MPV. 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 2019 Subaru Ascent 5-door MPV 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 61.59 km/h (38.27 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 September 19, 2018. 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 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen forward, middle, and rear y-axis load cells

Lower spine (12) tri-axial accelerometers

Pubic symphysis y-axis load cell

PASSENGER ATD (SID-IIs)

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen upper rib and lower rib y-axis displacement potentiometers

Lower spine (12) tri-axial accelerometers

Acetabulum and iliac wing y-axis load cells

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

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	37.3
Maximum Thoracic Rib Deflection	mm	44	13
Combined Abdominal Force	N	2500	324
Pubic Symphysis Force	N	6000	1218

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	81.0
Lower Spine (T12) Resultant Acceleration	g	82	27
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1538
Maximum Thoracic Rib Deflection	mm	38*	5
Maximum Abdominal Rib Deflection	mm	45*	7

*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	No	Yes	No
Seat Belt Load Limiter	Yes	No	Yes	No
Other	No		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 NHTSA Number in the placards used in Appendix A of this report are listed incorrectly with the first character as the numeral zero "0" instead of the letter "O".

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in ²	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	O20195505
Model Year	2019
Make	Subaru
Model	Ascent
Body Style	5-Door MPV
VIN	4S4WMAAD8K3408748
Body Color	Ice Silver Metallic
Odometer Reading (km / mi)	24 / 15
Engine Displacement (L)	2.4
Type / No. of Cylinders	Boxer 4 Cylinder
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
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	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	No

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Subaru Corporation
Date of Manufacture	Jun-18
Vehicle Type	MPV

GVWR (kg)	2721
GAWR Front (kg)	1370
GAWR Rear (kg)	1495

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

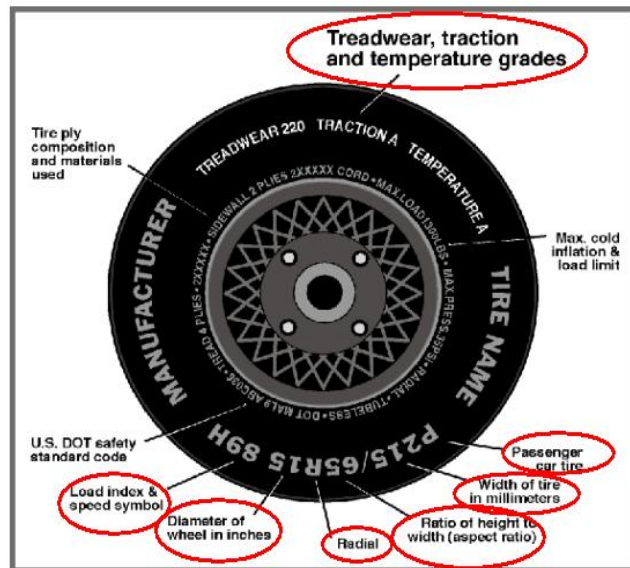
Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3	3	8	
Capacity Weight (VCW) (kg)				600.0	A
DSC x 68.04 (kg)				544.3	B
Cargo Weight (RCLW) (kg)				55.7	A-B

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			Yes			Yes	

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	<u>2019 Subaru Ascent 5-Door MPV</u>	NHTSA No.:	<u>O20195505</u>
Test Program:	<u>NCAP MDB Side Impact Test</u>	Test Date:	<u>09/19/18</u>



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	P245/60R18	P245/60R18
Tire Size on Vehicle	P245/60R18	P245/60R18
Tire Manufacturer	Falken	Falken
Tire Model	ZIEX ZE001A A/S	ZIEX ZE001A A/S
Treadware	360	360
Traction Grade	B	B
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	105H	105H
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	R8L2 DM2R 1718	R8L2 DM2R 1718
DOT Safety Code Right	R8L2 DM2R 1718	R8L2 DM2R 1718

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

TIRE PRESSURES

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

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	548.0	469.5		588.5	544.5		588.0	549.5	
Right	kg	544.5	439.0		552.0	489.0		551.0	493.0	
Ratio	%	54.6%	45.4%	100.0%	52.5%	47.5%	100.0%	52.2%	47.8%	100.0%
Total	kg	1092.5	908.5	2001.0	1140.5	1033.5	2174.0	1139.0	1042.5	2181.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2001.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	55.7	C
Calculated Vehicle Target Wt (TVTW)	kg	2181.7	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	889	890	Yes
RF	mm	900	905	Yes
LR	mm	897	900	Yes
RR	mm	910	911	Yes
Vehicle CG (Aft of Front Axle)	mm	1381	1373	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	35	34	

***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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Trim and Tools	6.0
Ballast / Equipment Added	74.1

Test Height Adjustable Setting (If Applicable)	
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DATA SHEET NO. 2

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

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

SEAT POSITIONING

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

SCRL ANGLE RANGE

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

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	2.2	670	Max			
			Mid	667	670	671
			Min			
Front Passenger Seat	Fixed	662	Max			
			Mid	664	662	667
			Min			
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	672	Max			
			Mid	672	672	672
			Min			
Non-Struck Side Rear Seat	Fixed	685	Max			
			Mid	685	685	685
			Min			
Rear Center Seat	Fixed	672	Max			
			Mid	672	672	672
			Min			

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

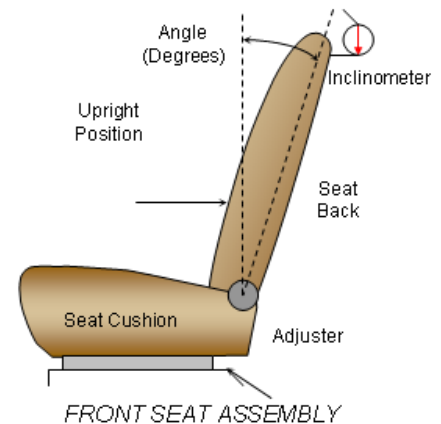
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	260	27	130	13
Front Passenger Seat	260	27	130	13
Front Center Seat				
Struck Side Rear Seat	110	12	110	11
Non-Struck Side Rear Seat	110	12	110	11
Rear Center Seat	110	12	110	11

*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	77.6	24	9.7	10
Front Passenger Seat	73.9	26	10.2	10
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	17.8	10	0.6	0
Non-Struck Side Rear Seat	17.7	10	0.4	0
Rear Center Seat	17.8	10	0.6	0

*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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

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, M1,..., L from top to bottom.

	Total No. of Positions	Placed in Position
Driver Seat	4	M1
Rear Seat	Fixed	Fixed

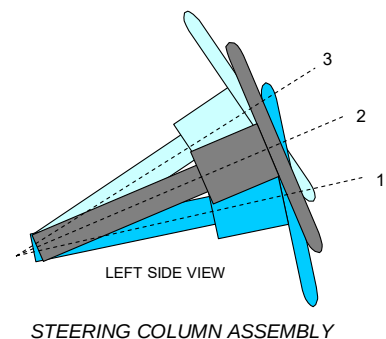
HEAD RESTRAINT ADJUSTMENT

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	Highest Position
Rear Seat	2	Lowest Position

STEERING COLUMN ADJUSTMENT

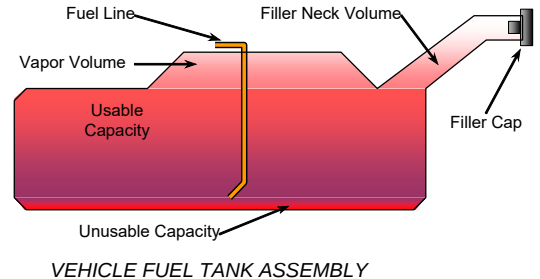
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion. The steering column for this vehicle was fixed.



	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	25.9	76
Geometric Center - Position 2	27.7	102
Uppermost - Position 3	29.4	127
Telescoping Steering Wheel Travel	27.7	51
Test Position	27.7	102

DATA SHEET NO. 2 ... (CONTINUED)**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA**Test Vehicle: 2019 Subaru Ascent 5-Door MPVNHTSA No. O20195505Test Program: NCAP MDB Side Impact TestTest Date: 09/19/18**FUEL PUMP**

The vehicle is equipped with an electronic fuel pump. The fuel pump operates for a few seconds after the ignition switch is turned ON. After that, the fuel pump operates only while the engine is running.

**FUEL TANK CAPACITY**

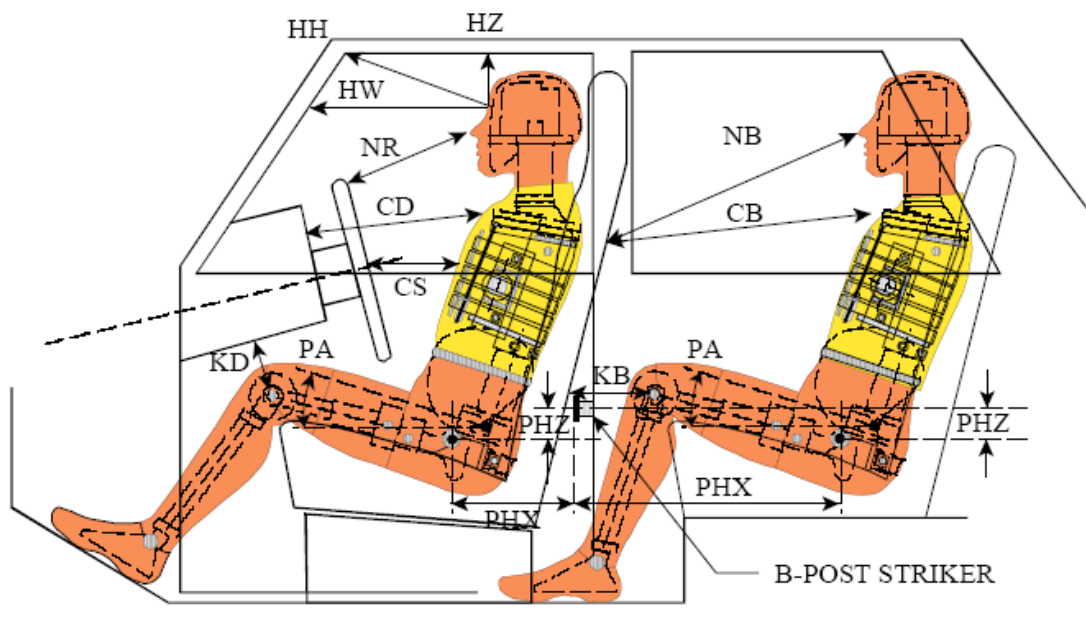
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	73.05
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	73.05
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	67.94
Actual amount of Solvent Used in Test	67.94
1/3 of Usable Capacity	24.35

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

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



LEFT SIDE VIEW

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

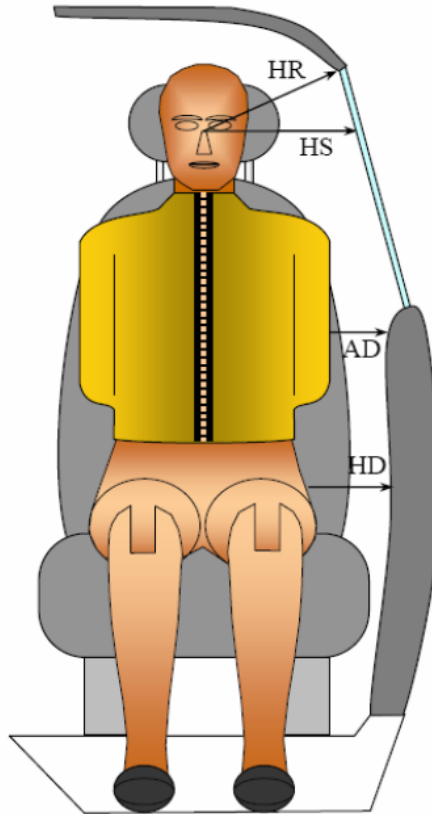
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	452			
HW		Head to Windshield	676			
HZ	HZ	Head to Roof	215		320	
NR	NB	Nose to Rim/Seat Back	497		572	
CD	CB	Chest to Dash/Seat Back	593		570	
CS		Chest to Steering Wheel	394			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	145	33.8	314	6.3
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	142	31.6	321	11.7
PAX°	PAX°	Pelvic Tilt Angle X		13.1		20.2
	PAY°	Pelvic Tilt Angle Y		0.1		0.1
PHX	PHX	Hip Point to Striker (x-axis)	176		358	
PHZ	PHZ	Hip Point to Striker (z-axis)	159		243	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



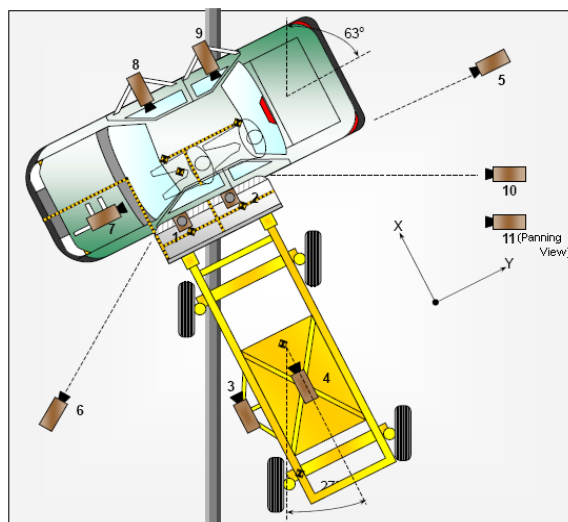
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	243	303
HS	Head to Side Window	mm	390	420
AD	Arm to Door	mm	135	188
HD	H-Point to Door	mm	176	207

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



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)	711	-878	800	8.5	1000
8	Driver Side (On-Board)	1836	625	520	8.5	1000
9	Passenger Side (On-Board)	1820	1549	568	8.5	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

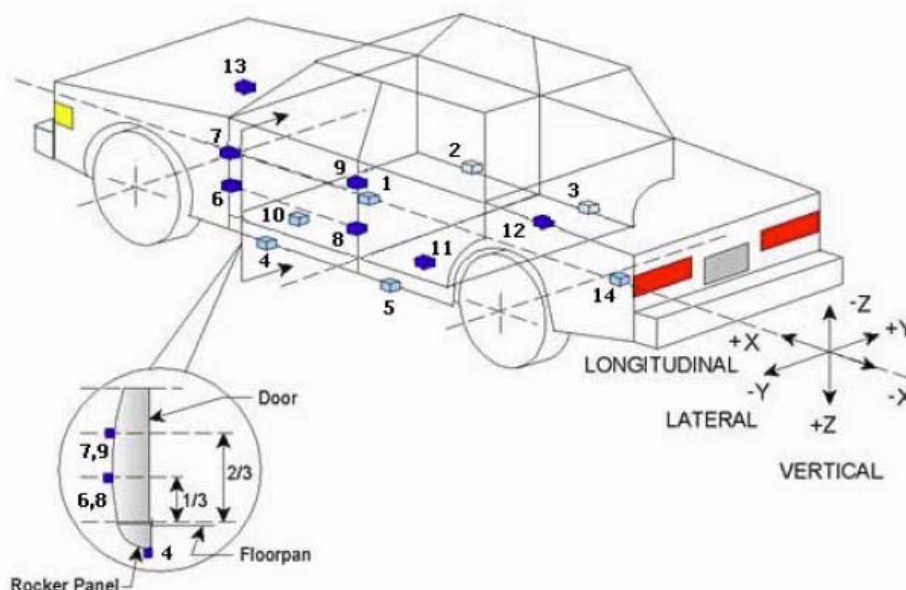
INSTRUMENTATION

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

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

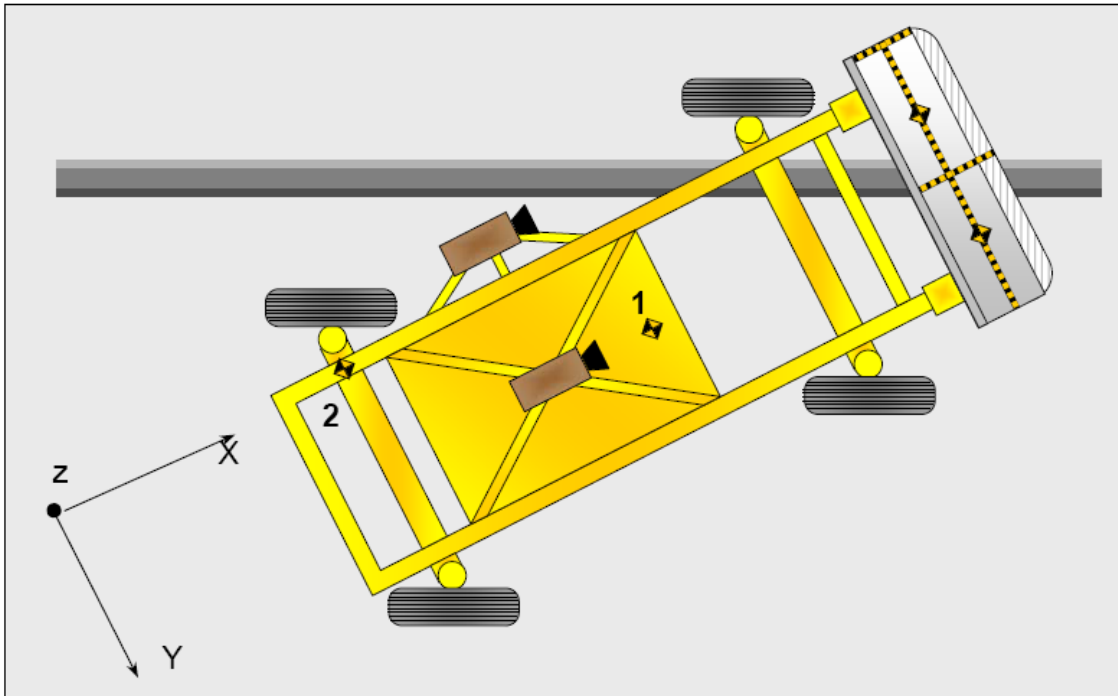
Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2420	0	-500
2	Right Sill at Front Seat	2980	775	-435
3	Right Sill at Rear Seat	2045	770	-530
4	Left Sill at Front Door	2910	-820	-220
5	Left Sill at Rear Door	1890	-820	-220
6	A-Pillar Lower	3400	-860	-610
7	A-Pillar Middle	340	-860	-835
8	B-Pillar Lower	2540	-780	-490
9	B-Pillar Middle	2350	-780	-1030
10	Front Seat Track	2740	-575	-550
11	Rear Seat Structure	2085	-420	-560
12	Right Rear Occupant Compartment	2085	420	-560
13	Engine Block	4320	120	-840
14	Rear Floorpan Above Axle	1300	0	-600

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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

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, Headrest	Curtain Airbag, Headrest
Left Shoulder	Curtain and Side Airbag	Door Panel
Upper Torso	Side Airbag, Seat	Door Panel
Lower Torso	Side Airbag, Seat	Door Panel
Left Hip	Door Panel	Door Panel
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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side		Struck Side	
	Driver		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	No	Yes	No
Seat Belt Load Limiter	Yes	No	Yes	No
Other	No		No	

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2889
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		506
Actual Impact Point (Aft of Front Axle)	mm		506
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	0
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	8

DATA SHEET NO. 9**MDB SUMMARY OF RESULTS**

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

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	298.0	700.0
Right	kg	377.0	290.0	667.0
Ratio	%	57.0%	43.0%	100.0%
Totals	kg	779.0	588.0	1367.0

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.59
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.61
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	91.0
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	27.9

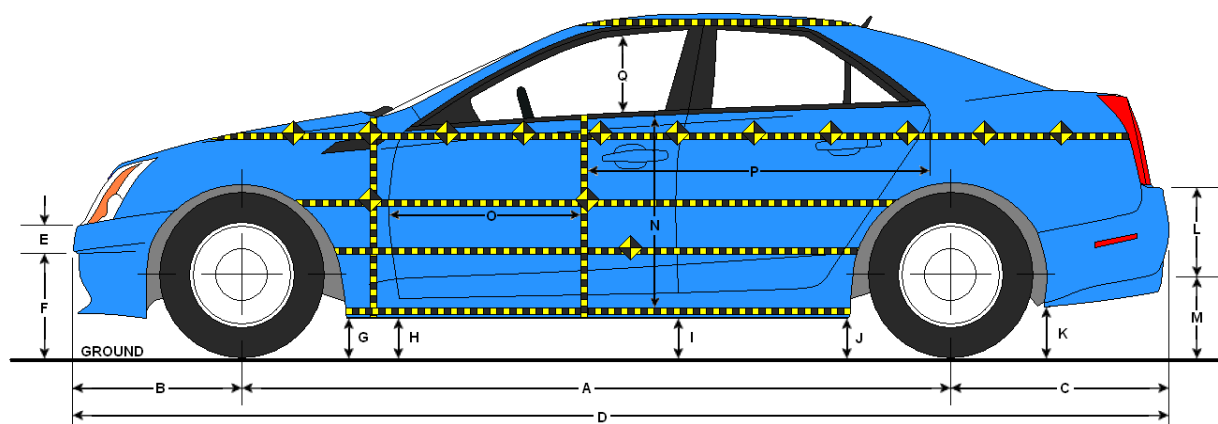
MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	309
B	Top of Bumper	533	800	Left	202
C	Mid Level	686	800	Right	247
D	Top of Stack	813	800	Right	247

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

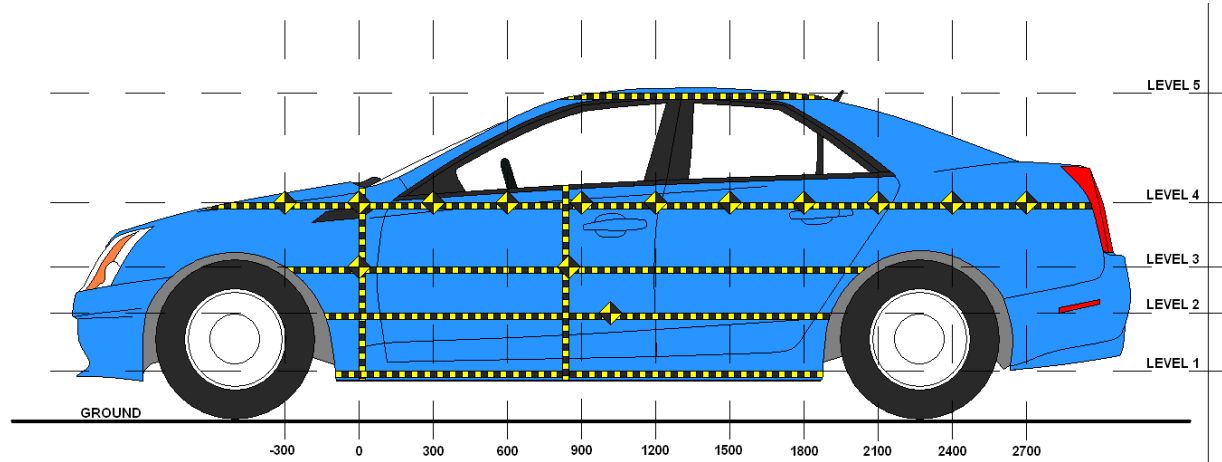
Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2889	2872	-17
B	Front Axle to FSOV	1017	1027	10
C	Rear Axle to RSOV	1077	1082	5
D	Total Length at Centerline	4984	4981	-3
E	Front Bumper Thickness	153	153	0
F	Front Bumper Bottom to Ground	477	479	2
G	Sill Height at Front Wheel Well	243	243	0
H	Sill Height at Front Door Leading Edge	246	253	7
I	Sill Height at B-Pillar	286	386	100
J1	Sill Height at Rear Wheel Well	285	318	33
J2	Pinch Weld Height at Rear Wheel Well	241	253	12
K	Sill Height Aft of Rear Wheel Well	249	244	-5
L	Rear Bumper Thickness	170	170	0
M	Rear Bumper Bottom to Ground	541	539	-2
N	Sill Height to Bottom of Front Window Sill	837	800	-37
O	Front Door Leading Edge to Impact CL	852	838	-14
P	Rear Door Trailing Edge to Impact CL	1360	1329	-31
Q	Front Window Opening	453	465	12
R	Right Side Length	3482	3480	-2
S	Left Side Length	3480	3480	0
T	Vehicle Width at B-Pillar	1930	1867	-63

All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	332	55	600
2	Occupant H-Point	738	219	1350
3	Mid-Door	691	207	1350
4	Window Sill	1070	70	1200
5	Window Top	1661	13	1200

DATA SHEET NO. 11 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505

Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18

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				585					583					-2	
-300				579					575					-4	
-150	584	533	535	589		560	524	525	587		-24	-9	-10	-2	
0	579	536	537	600		568	517	522	578		-11	-19	-15	-22	
150	576	541	543	570		576	610	594	557		0	69	51	-13	
300	574	544	540	588		585	671	650	595		11	127	110	7	
450	573	542	537	581		593	715	700	594		20	173	163	13	
600	575	539	536	575	810	630	732	718	594	819	55	193	182	19	9
750	576	535	535	570	809	625	738	727	595	820	49	203	192	25	11
900	578	532	535	566	814	626	726	727	601	825	48	194	192	35	11
1050	581	532	538	563	819	622	712	720	614	829	41	180	182	51	10
1200	583	531	539	564	822	609	749	744	634	835	26	218	205	70	13
1350	586	534	546	567	824	587	753	753	624	836	1	219	207	57	12
1500		537	549	570	825		726	747	626	837		189	198	56	12
1650		540	550	573	826		701	716	617	838		161	166	44	12
1800		543	545	575	827		693	681	595	838		150	136	20	11
1950		537	540	556	826		624	607	568	837		87	67	12	11
2100				557	827				556	837				-1	10
2250				548	827				554	836				6	9
2400				547	827				551	837				4	10
2550				553					554					1	
2700															
2850															

DATA SHEET NO. 11 ... (CONTINUED)

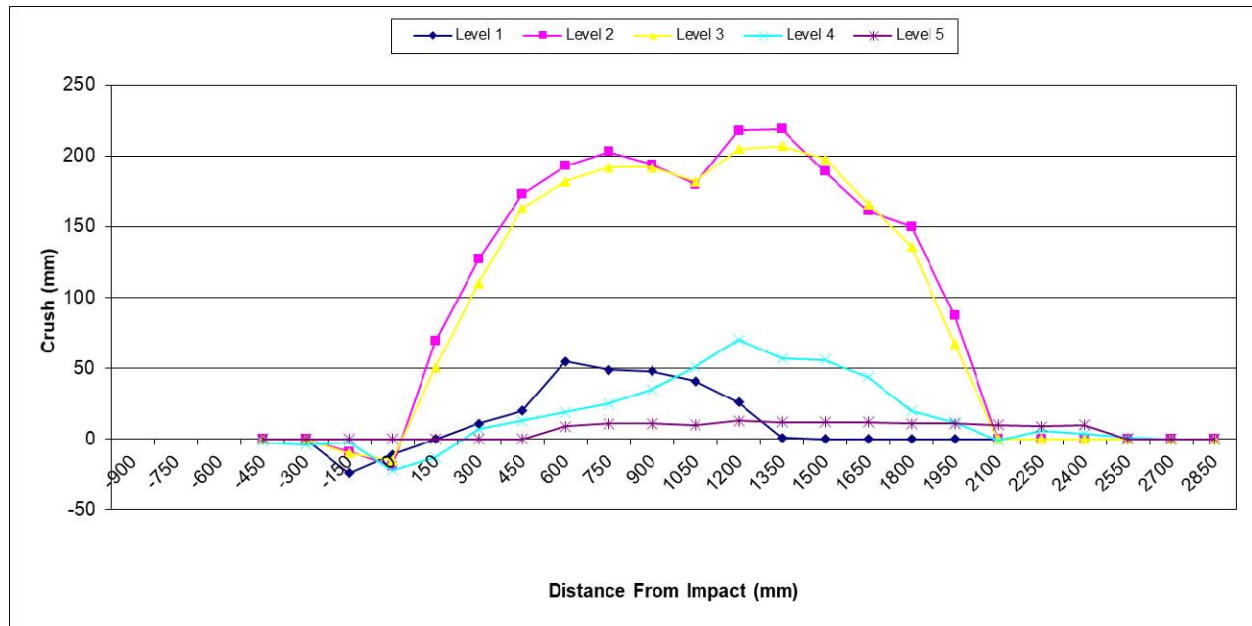
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV

NHTSA No. O20195505

Test Program: NCAP MDB Side Impact Test

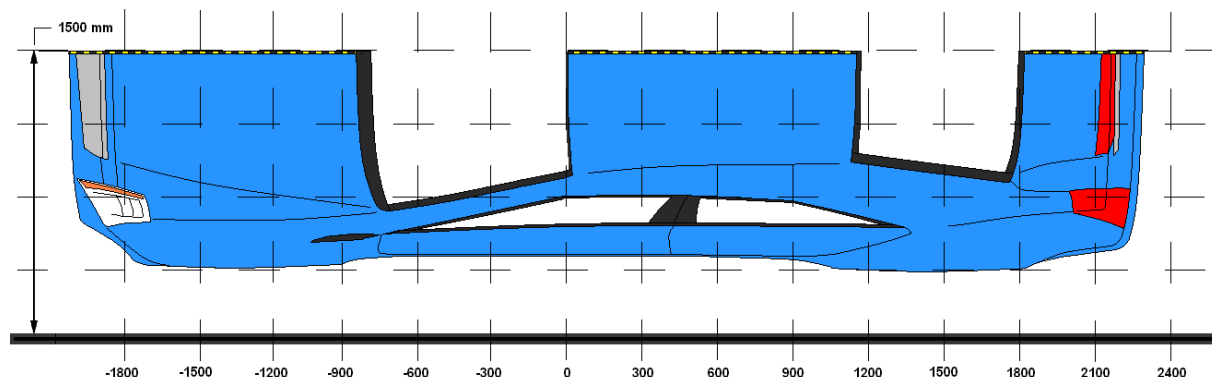
Test Date: 09/19/18



DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2550	4	553	554	1
2	1950	2	537	624	87
3	1350	2	534	753	219
4	750	2	535	738	203
5	150	2	541	610	69
6	-450	4	585	583	-2

MDB DAMAGE PROFILE DISTANCES

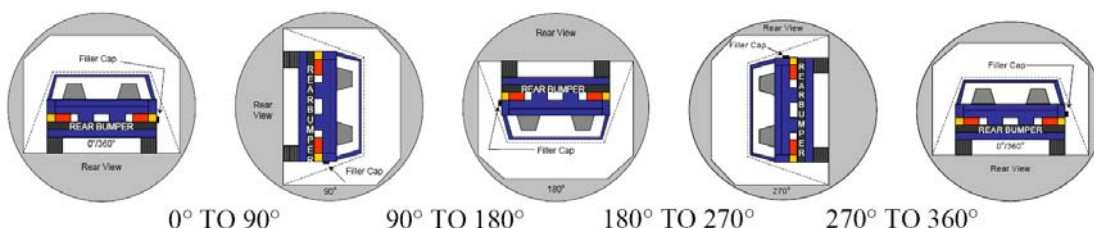
DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	309
2	500	Left	1	284
3	200	Left	1	284
4	200	Right	1	279
5	500	Right	1	269
6	800	Right	1	286

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
 Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18
 Temperature at Time of Impact: 32.2 °C Test Time: 12:45 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°	79	300	379
90° To 180°	78	300	378
180° To 270°	81	300	381
270° To 360°	79	300	379

FMVSS 301 SPILLAGE TABLE

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

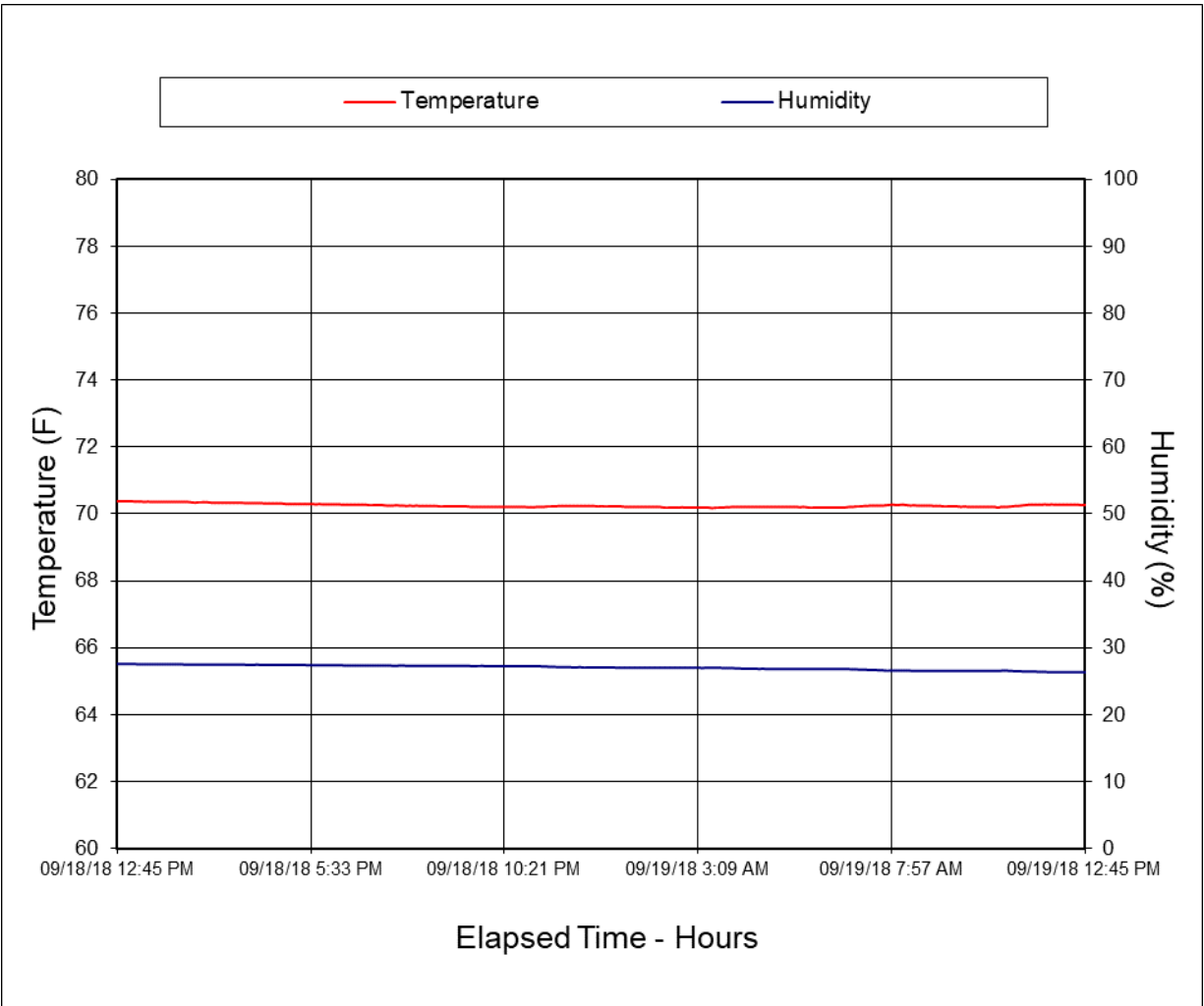
SOLVENT SPILLAGE LOCATION TABLE

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: 2019 Subaru Ascent 5-Door MPV NHTSA No. O20195505
Test Program: NCAP MDB Side Impact Test Test Date: 09/19/18



APPENDIX A
PHOTOGRAPHS

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FIGURE 1. As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 2. As-Delivered Left Rear $\frac{3}{4}$ 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 $\frac{3}{4}$ View of Test Vehicle



FIGURE 6. Post-Test Left Front $\frac{3}{4}$ 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 $\frac{3}{4}$ View of Test Vehicle



FIGURE 10. Post-Test Left Rear $\frac{3}{4}$ 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

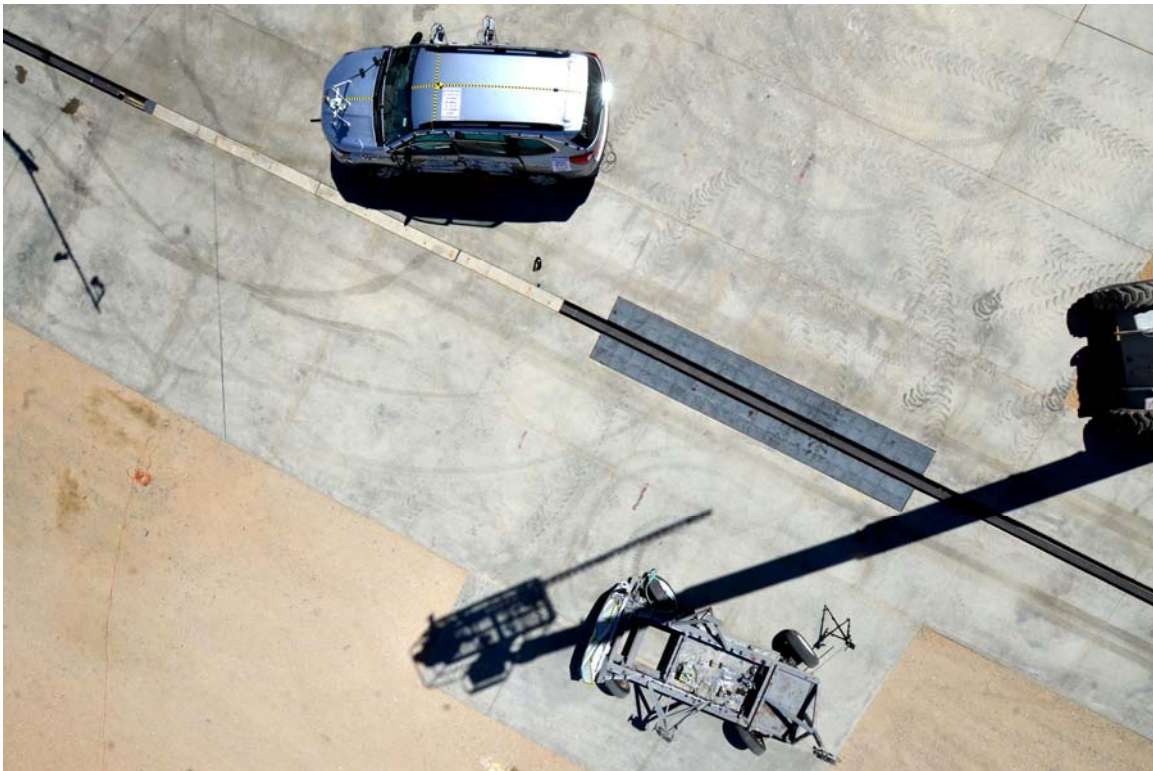


FIGURE 16. Post-Test Overhead View of Test Area



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

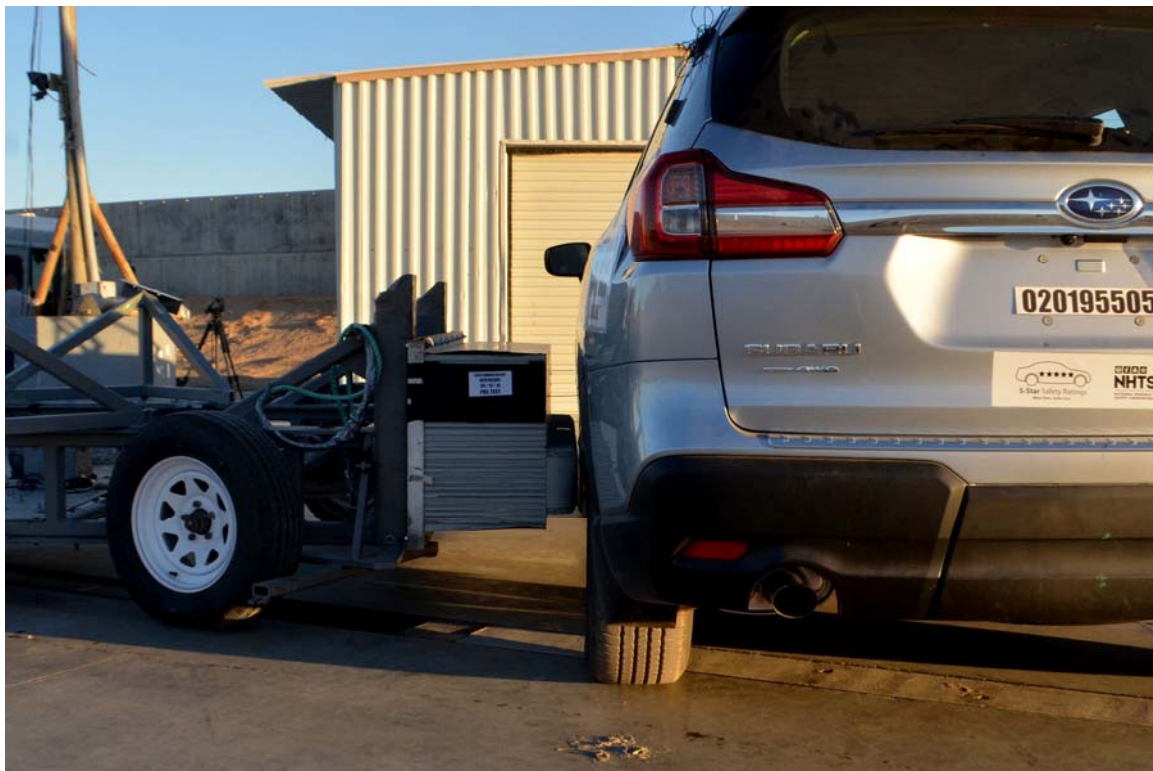


FIGURE 18. Pre-Test Right Side View of MDB Positioned
Against Side of Test Vehicle



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

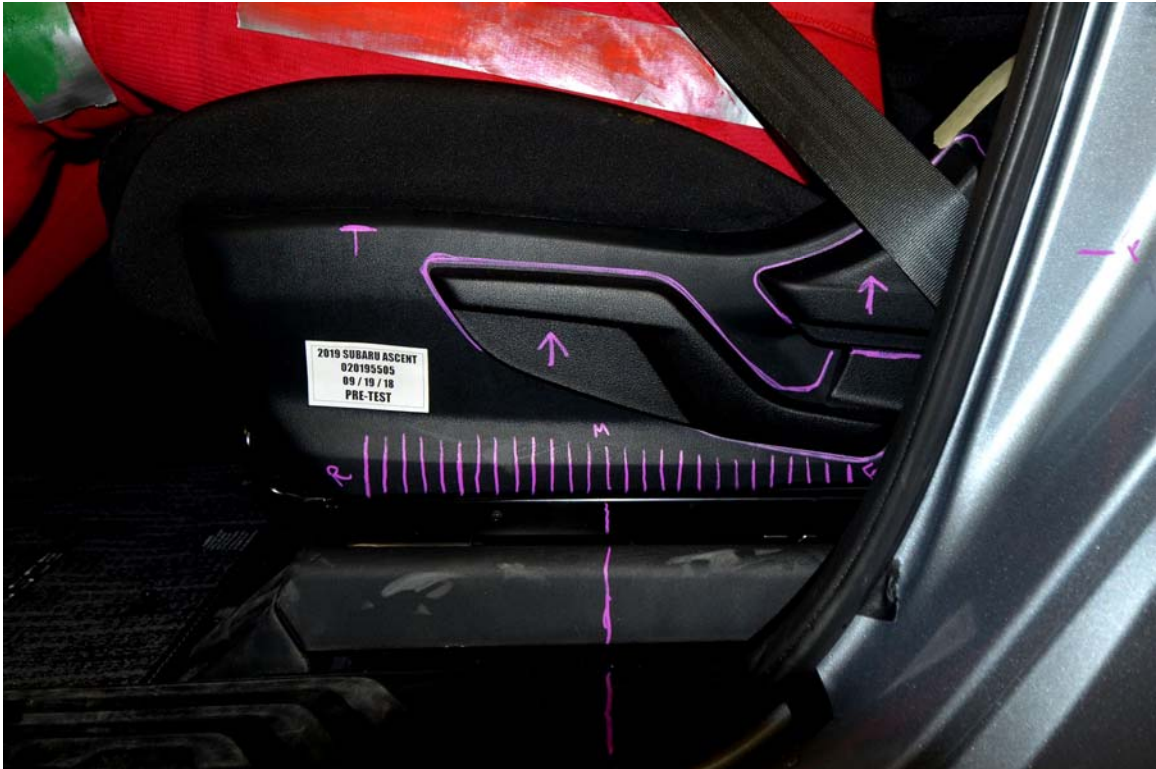


FIGURE 39. Pre-Test Close-Up Left Side View of Driver Seat Track

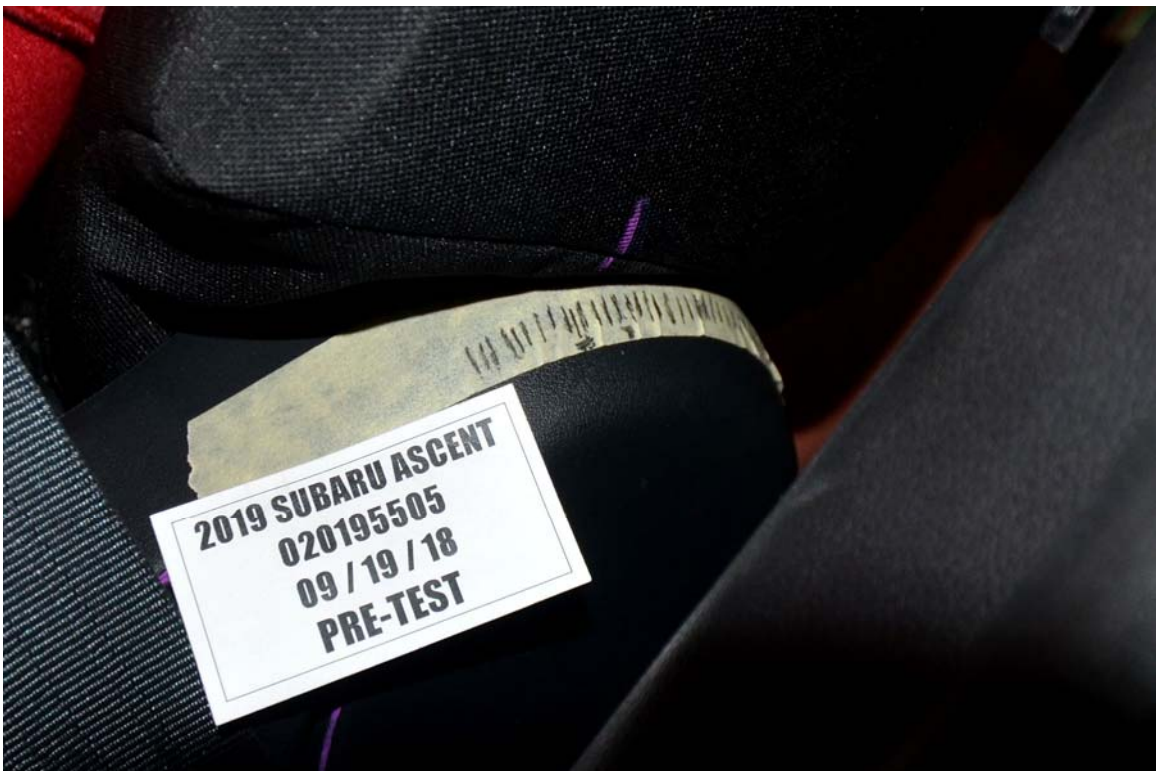


FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back



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

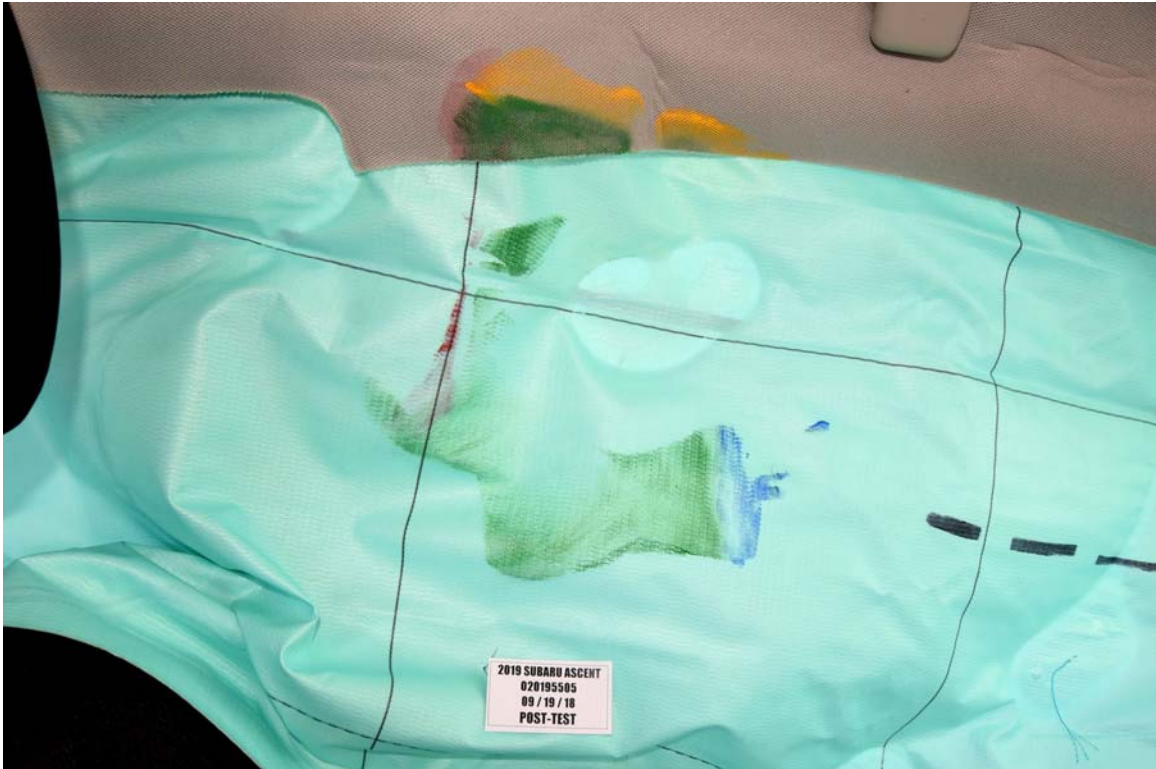


FIGURE 49. Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View

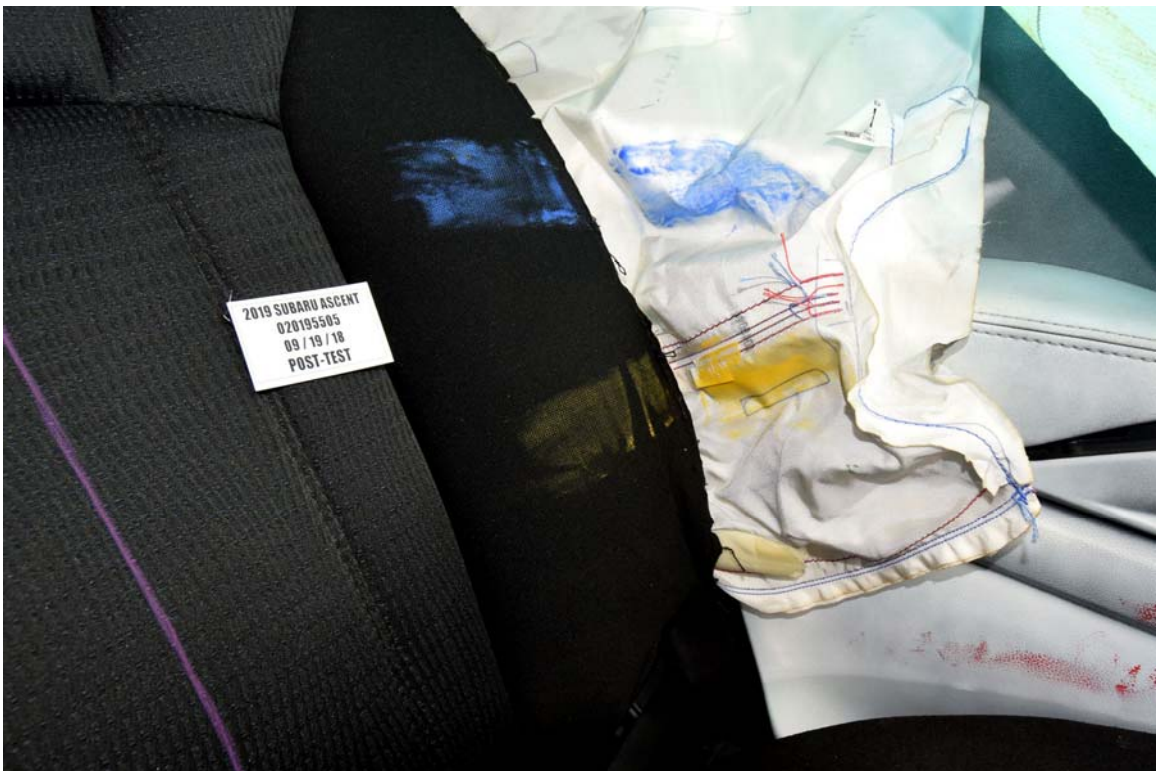


FIGURE 50. Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View



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

Photograph Not Applicable

No Driver Dummy Pelvis Contact with Side Airbag

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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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

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

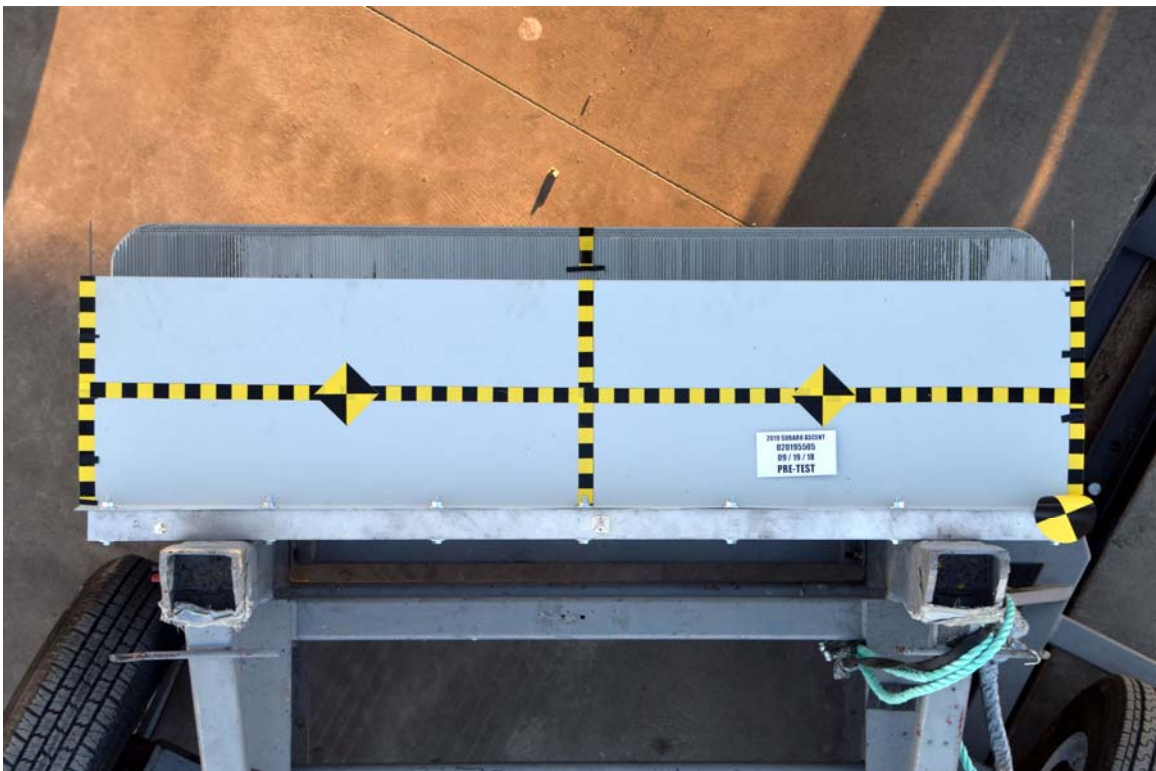


FIGURE 86. Pre-Test Top View of MDB Impactor Face



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

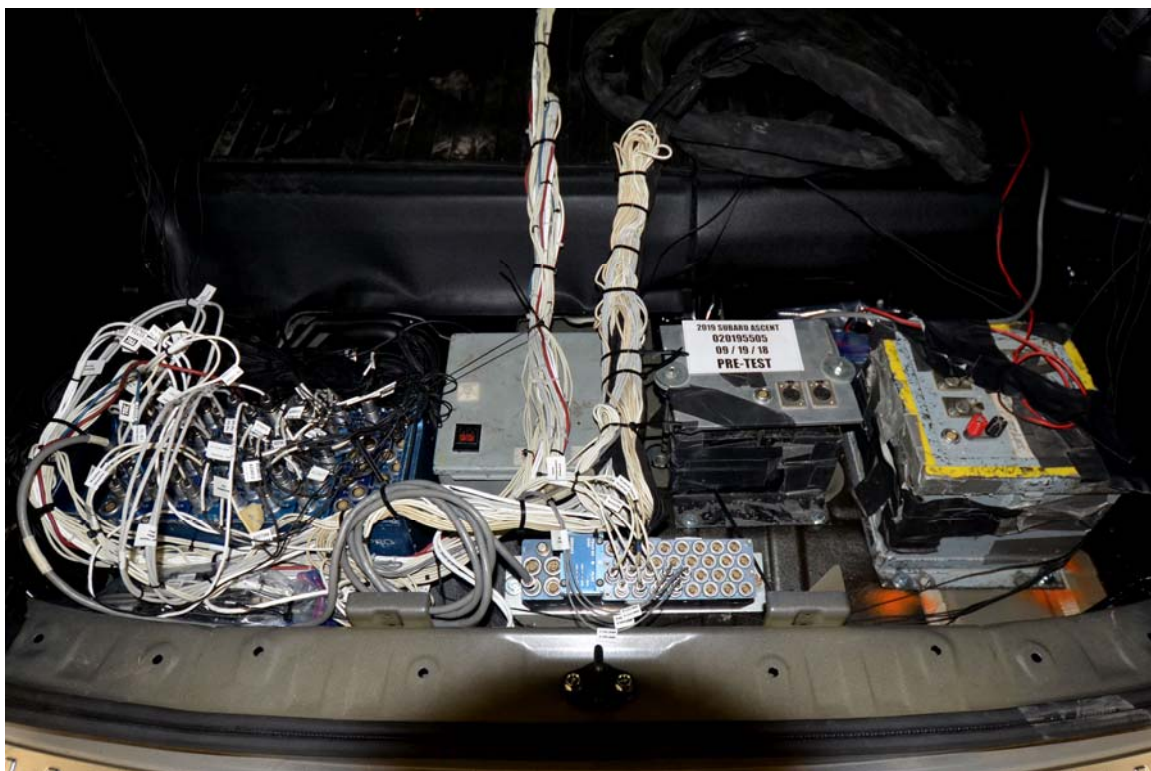


FIGURE 94. Pre-Test Ballast View



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

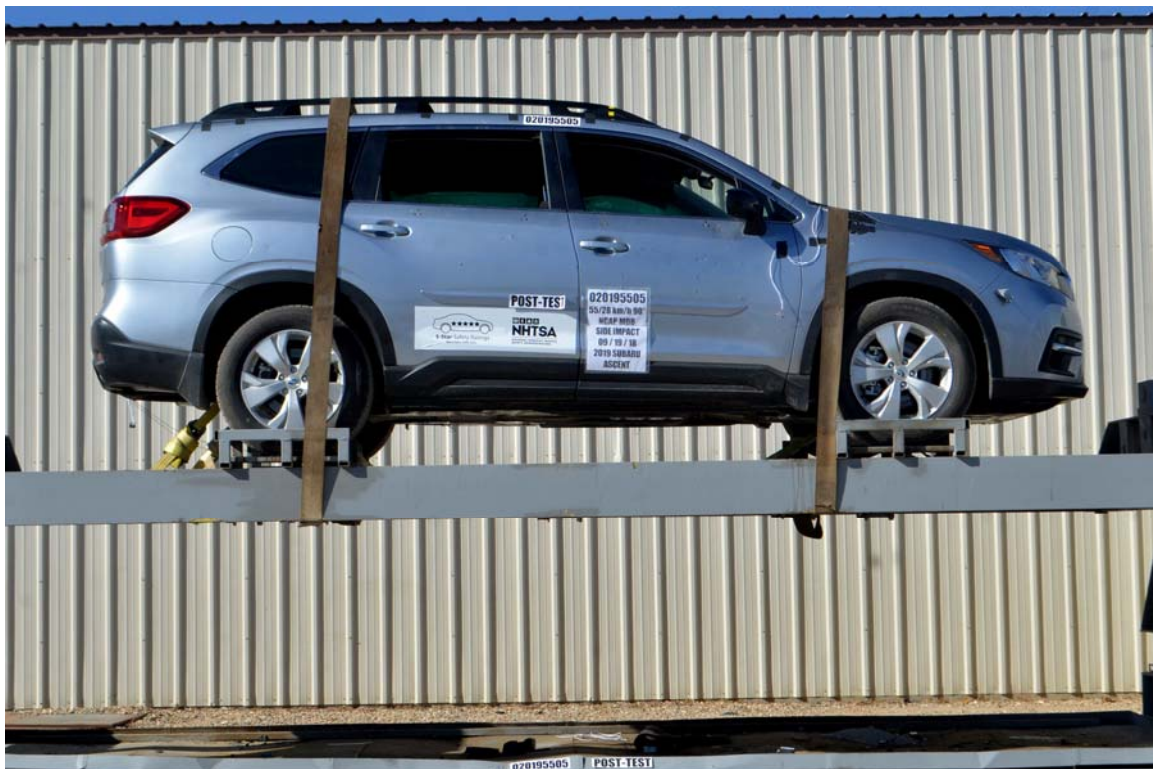


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees



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

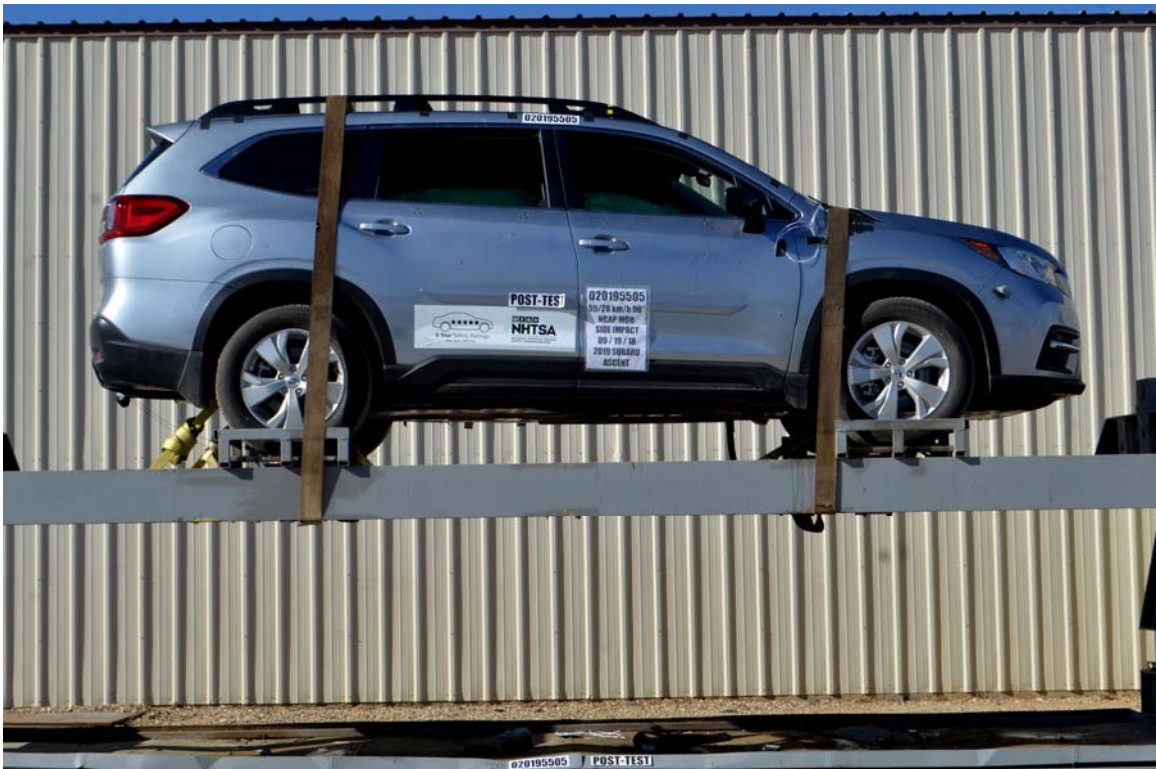


FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 101. Impact Event

Monroney Label not Available

FIGURE 102. Monroney Label

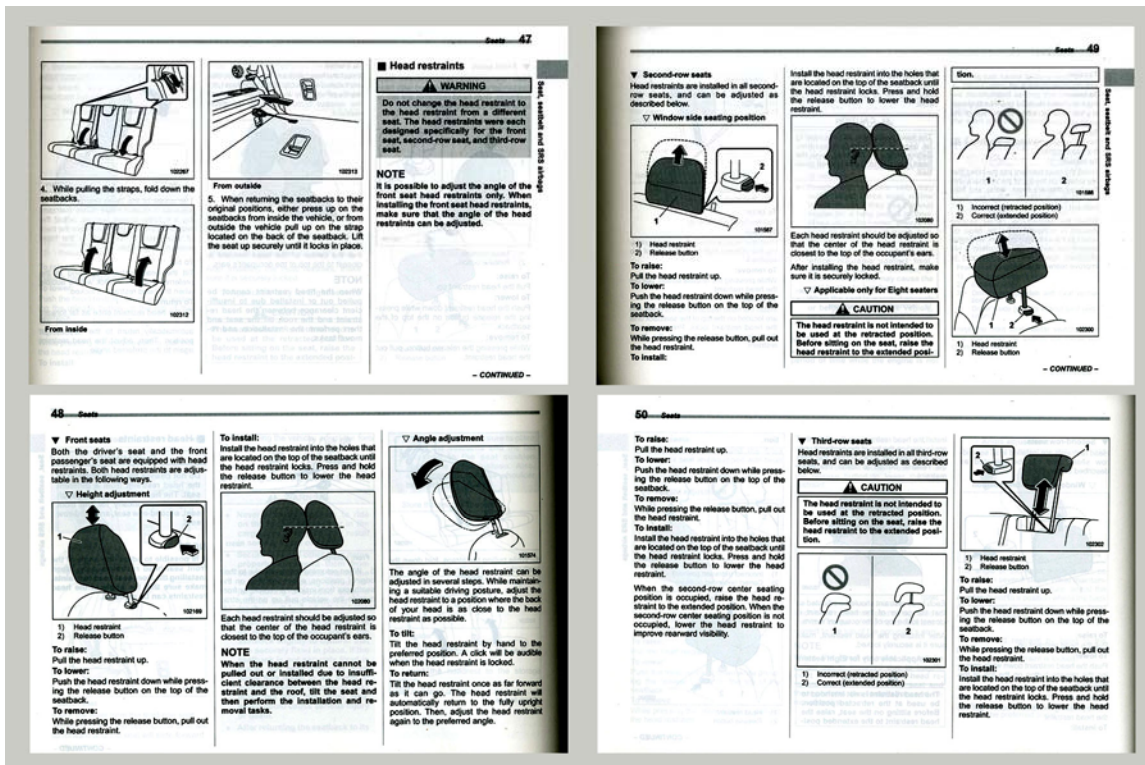


FIGURE 103. Driver Head Restraint Use and Adjustment Information
from Vehicle Owner's Manual

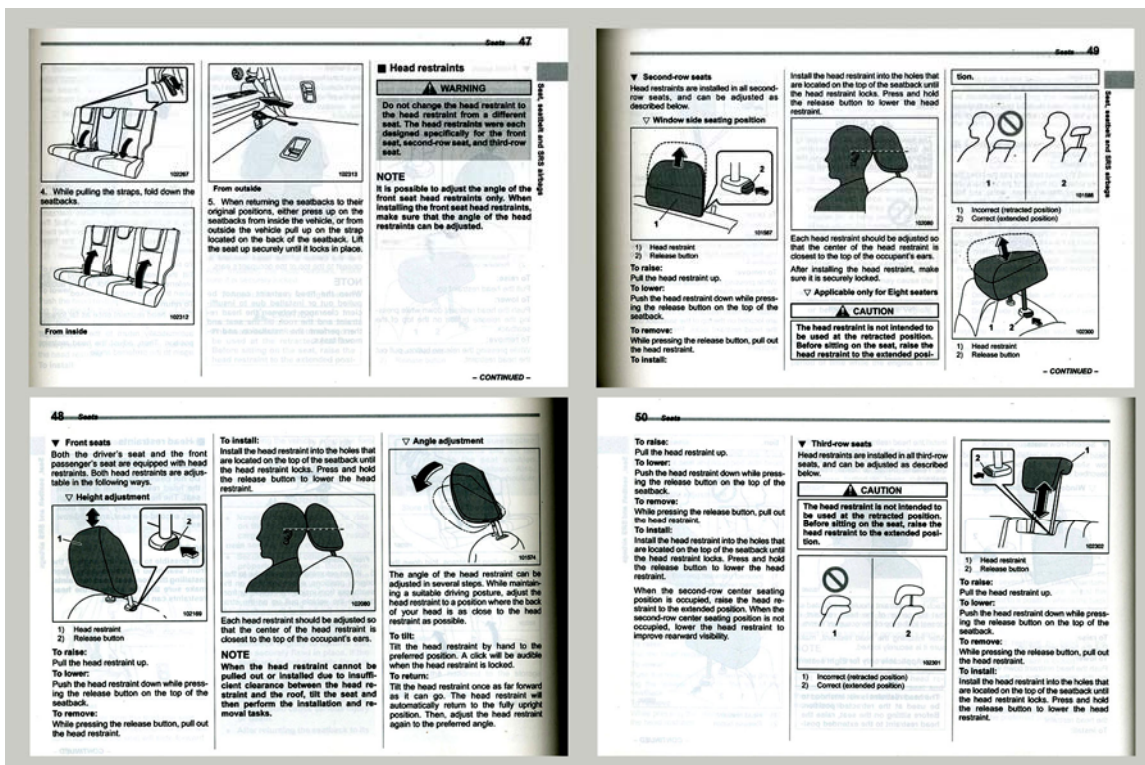


FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information
from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary vs. Time	B-1
2	Driver Head Acceleration (Y) Primary vs. Time	B-1
3	Driver Head Acceleration (Z) Primary vs. Time	B-1
4	Driver Head Resultant Acceleration Primary vs. Time	B-1
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
8	Driver Thorax Rib Deflection Maximum vs. Time	B-2
9	Driver Anterior Abdominal Force (Y) vs. Time	B-3
10	Driver Middle Abdominal Force (Y) vs. Time	B-3
11	Driver Posterior Abdominal Force (Y) vs. Time	B-3
12	Driver Total Abdominal Force (Y) vs. Time	B-3
13	Driver Pubic Symphysis Force (Y) vs. Time	B-4
14	Passenger Head Acceleration (X) vs. Time Primary	B-5
15	Passenger Head Acceleration (Y) vs. Time Primary	B-5
16	Passenger Head Acceleration (Z) vs. Time Primary	B-5
17	Passenger Head Resultant Acceleration Primary vs. Time	B-5
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website (www.NHTSA.dot.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)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)

Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
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)

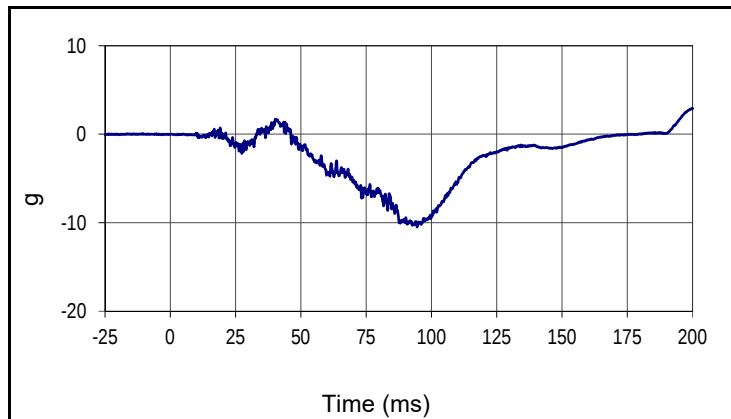
MDB Rear Acceleration (Y)

Left MDB Contact Switch

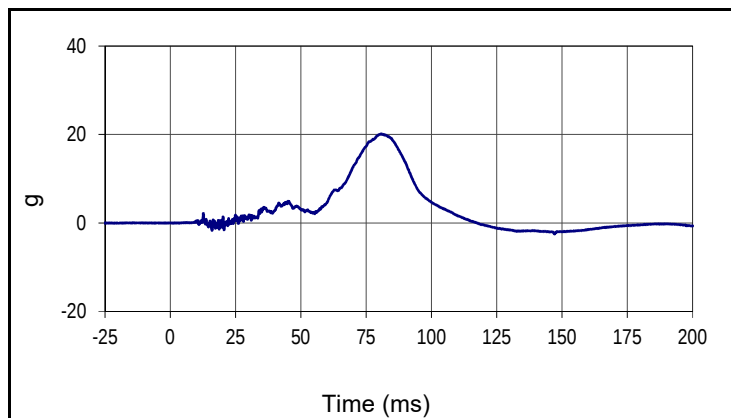
Right MDB Contact Switch

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

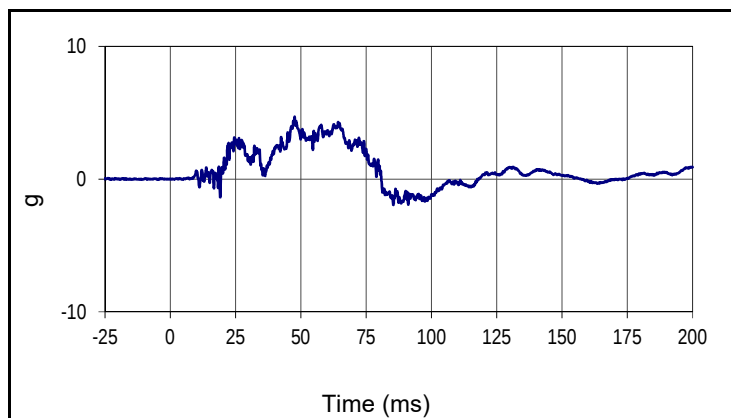
NHTSA No.: O20195505
 Test Date: 09/19/18



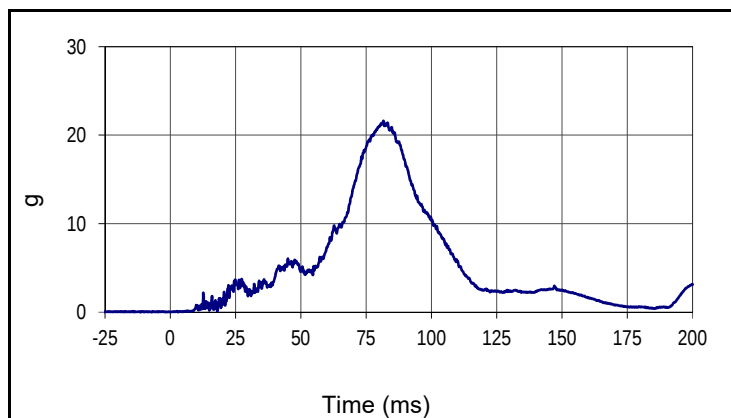
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
2.9	199.8	-10.5	94.5



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
20.2	80.7	-2.5	147.1



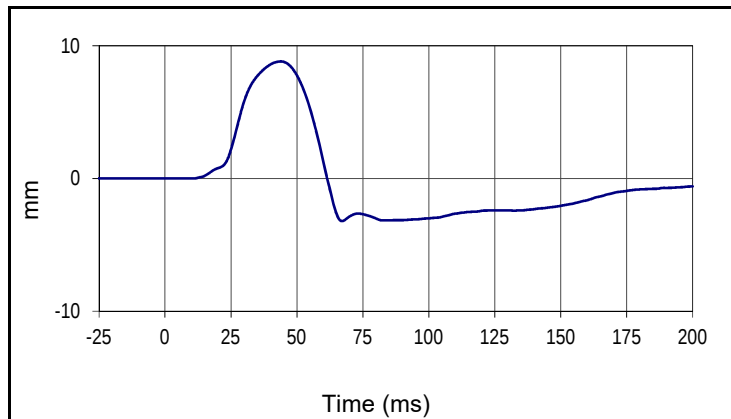
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
4.7	47.6	-1.9	85.4



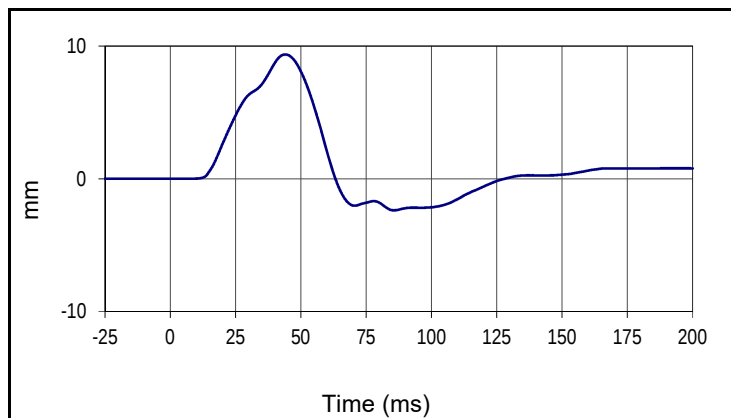
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
21.6	81.6	0.0	2.8

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

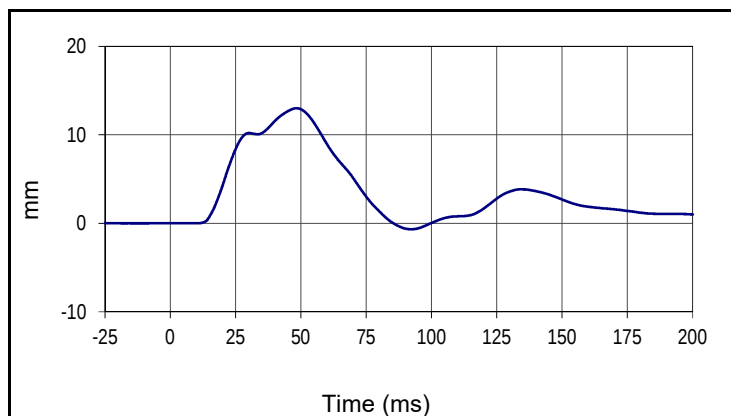
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 Test Date: 09/19/18



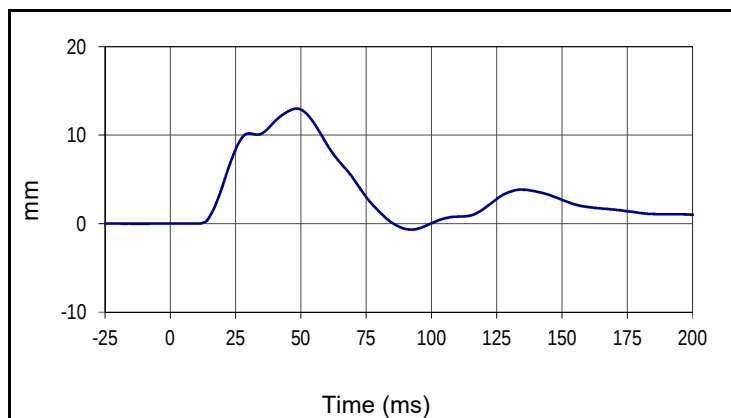
Curve Description			
Driver Upper Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
005		180	mm
Max	Time	Min	Time
8.8	44.0	-3.2	67.1



Curve Description			
Driver Middle Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
006		180	mm
Max	Time	Min	Time
9.4	44.0	-2.4	85.6



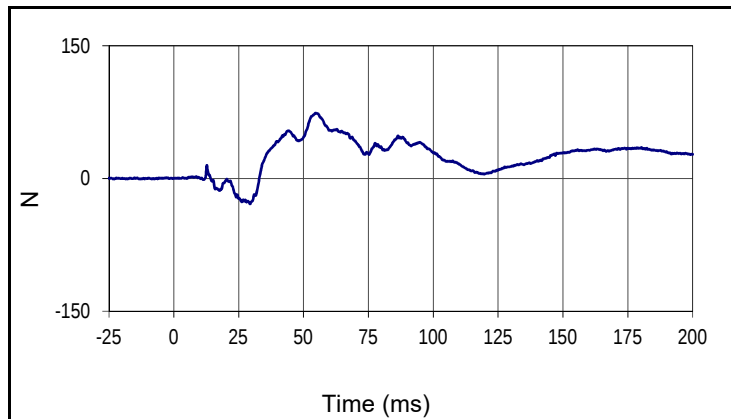
Curve Description			
Driver Lower Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
007		180	mm
Max	Time	Min	Time
13.0	48.3	-0.7	92.2



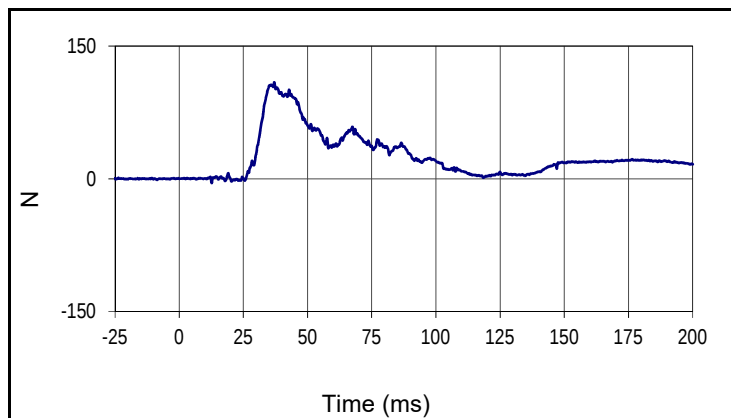
Curve Description			
Driver Thorax Rib Deflection Maximum Y			
Plot No.		SAE Class	Units
008		180	mm
Max	Time	Min	Time
13.0	48.3	-0.7	92.2

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

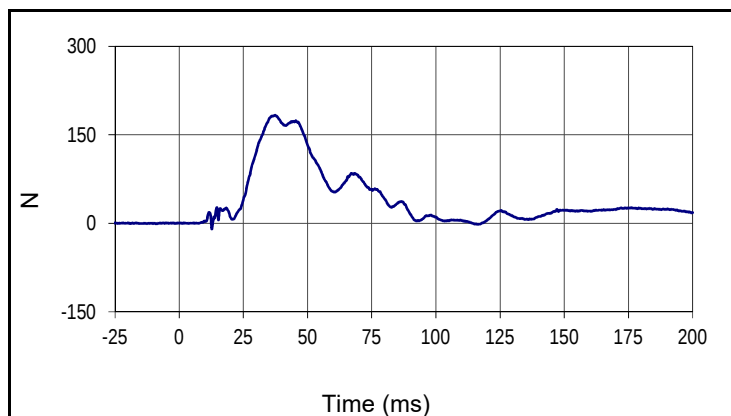
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 Test Date: 09/19/18



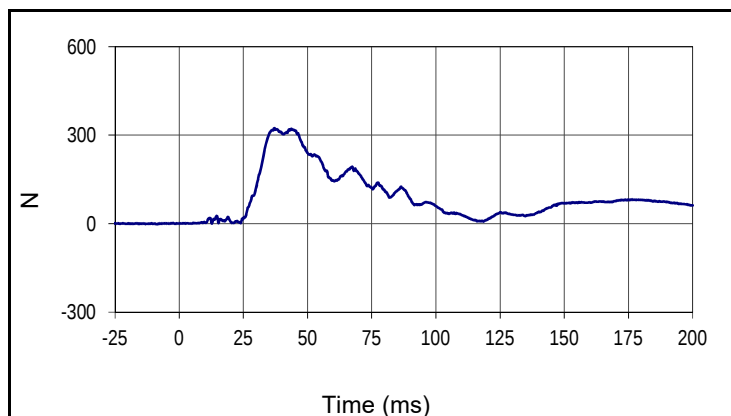
Curve Description			
Driver Anterior Abdominal Force Y			
Plot No.		SAE Class	Units
009		600	N
Max	Time	Min	Time
73.9	54.6	-28.8	29.4



Curve Description			
Driver Middle Abdominal Force Y			
Plot No.		SAE Class	Units
010		600	N
Max	Time	Min	Time
109.0	37.0	-4.8	12.7



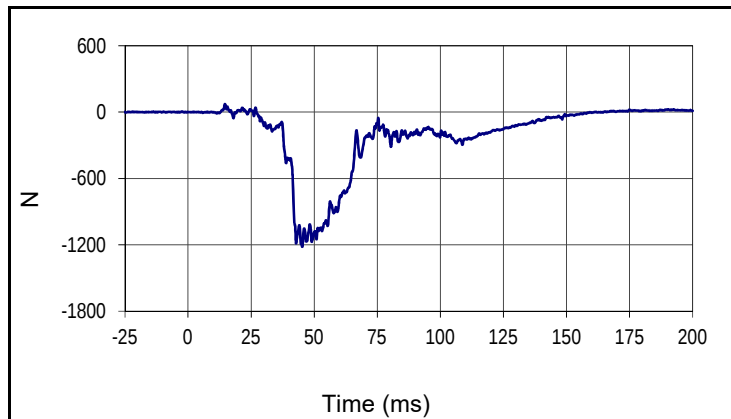
Curve Description			
Driver Posterior Abdominal Force Y			
Plot No.		SAE Class	Units
011		600	N
Max	Time	Min	Time
183.3	37.3	-9.8	12.7



Curve Description			
Driver Total Abdominal Force			
Plot No.		SAE Class	Units
012		600	N
Max	Time	Min	Time
324.1	37.1	0.0	2.5

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

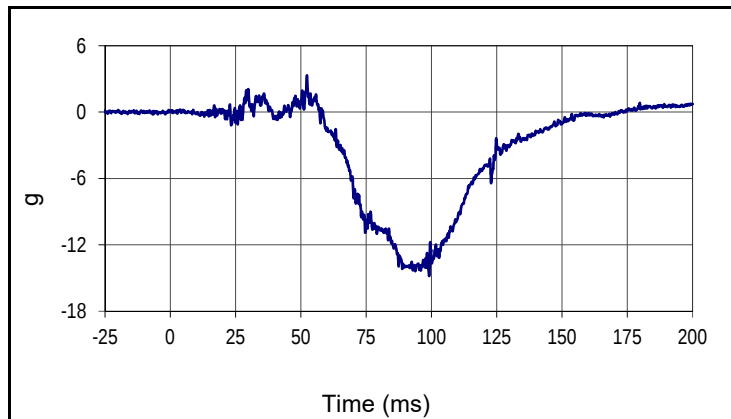
NHTSA No.: O20195505
 Test Date: 09/19/18



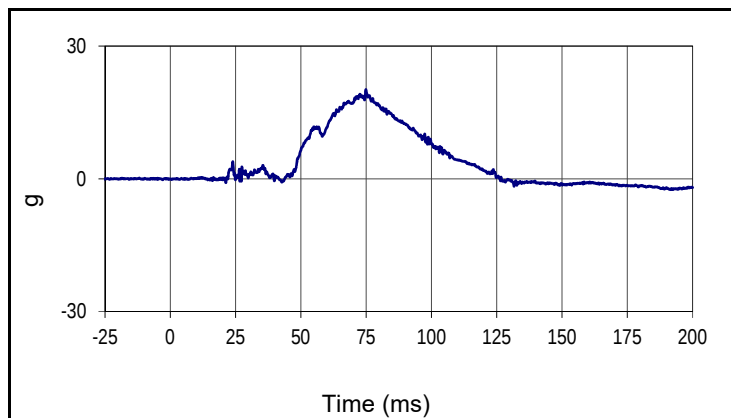
Curve Description			
Driver Pubic Symphysis Force Y			
Plot No.		SAE Class	Units
013		600	N
Max	Time	Min	Time
71.9	14.6	-1218.3	45.3

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

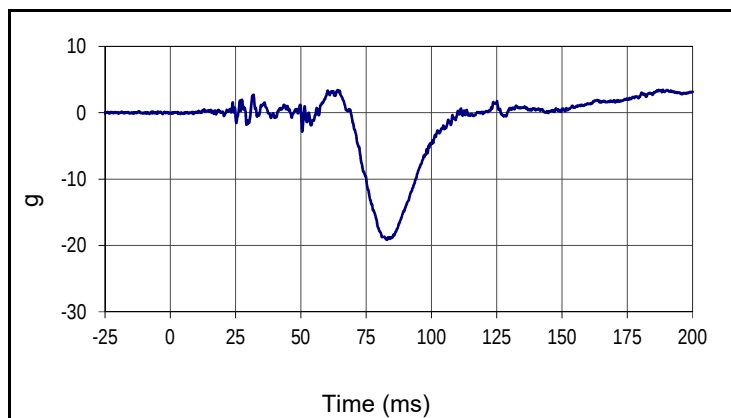
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 Test Date: 09/19/18



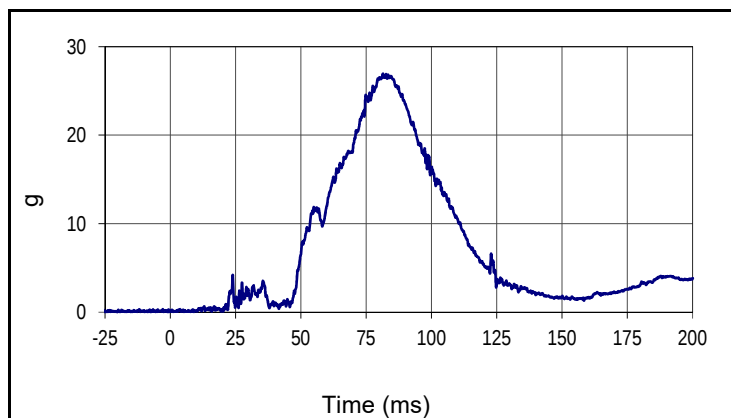
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
014		1000	g
Max	Time	Min	Time
3.3	52.3	-14.8	99.1



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
015		1000	g
Max	Time	Min	Time
20.2	74.9	-2.5	191.3



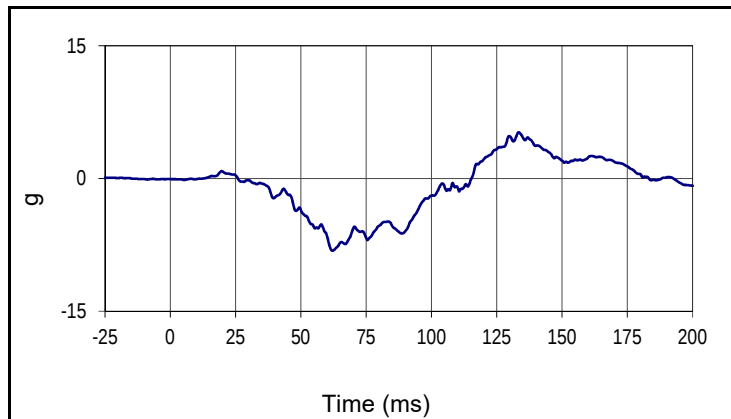
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
3.5	188.6	-19.1	82.9



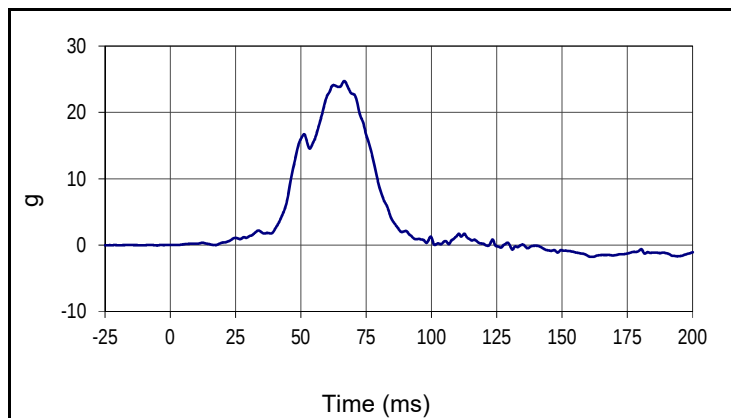
Curve Description			
Passenger Head Acceleration Resultant Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
26.9	81.4	0.0	9.0

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

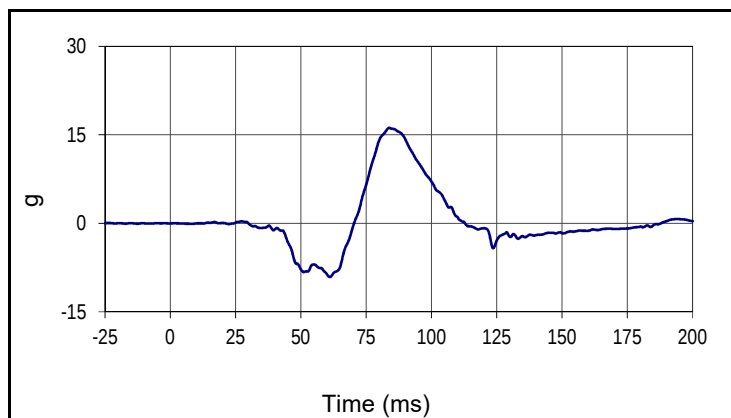
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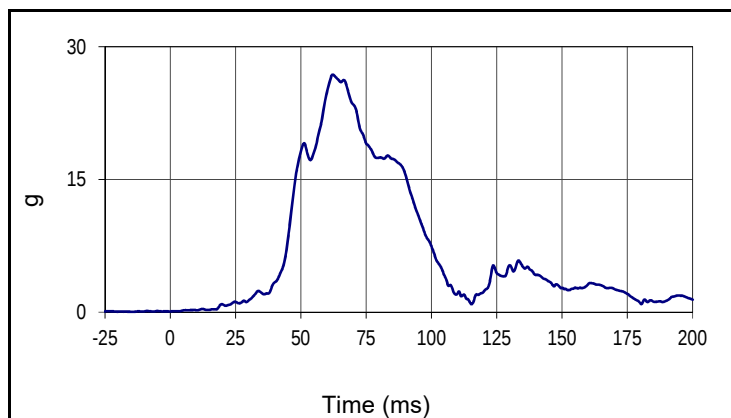
Curve Description			
Passenger Lower Spine T12 Acceleration X			
Plot No.		SAE Class	Units
018		180	g
Max	Time	Min	Time
5.2	133.4	-8.2	62.1



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
Plot No.		SAE Class	Units
019		180	g
Max	Time	Min	Time
24.7	66.6	-1.8	161.7



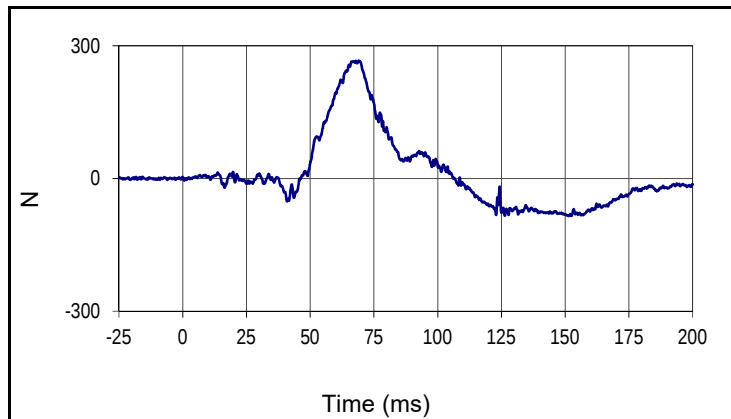
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
Plot No.		SAE Class	Units
020		180	g
Max	Time	Min	Time
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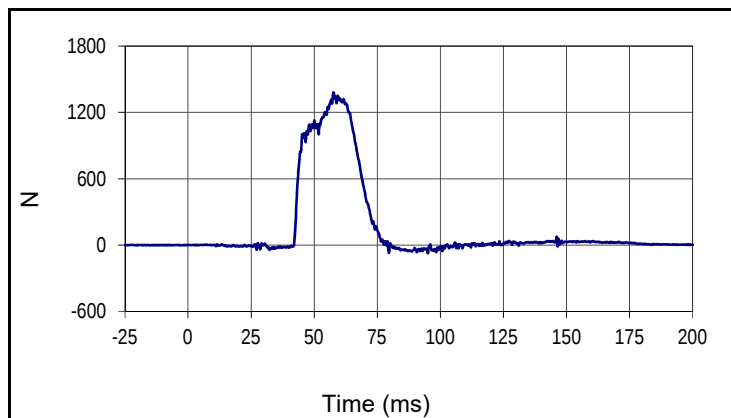
Curve Description			
Passenger Lower Spine T12 Acceleration Res.			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
26.8	62.2	0.1	0.0

Test Vehicle: 2019 Subaru Ascent 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

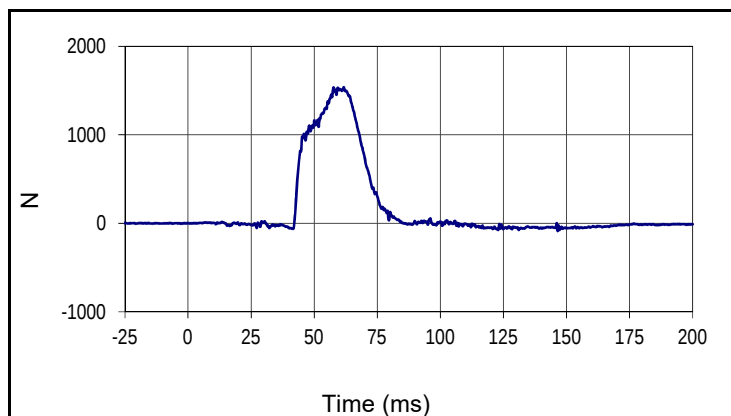
NHTSA No.: 020195505
 Test Date: 09/19/18



Curve Description			
Passenger Iliac Force on Impact Side Y			
Plot No.		SAE Class	Units
022		600	N
Max	Time	Min	Time
266.3	69.1	-84.8	151.2



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
Plot No.		SAE Class	Units
023		600	N
Max	Time	Min	Time
1380.4	57.7	-73.3	95.0



Curve Description			
Passenger Total Pelvic Force			
Plot No.		SAE Class	Units
024		600	N
Max	Time	Min	Time
1537.9	61.7	-87.2	146.5

APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA
LEFT SIDE CONFIGURATION



9270 Holly Road, Adelanto, CA 92301
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Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	34	Pass
1 - Sitting Height	mm	900	918	909	Pass
2 - Seat to Shoulder Joint	mm	558	572	564	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	349	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	101	Pass
5 - Sole to Seat, Sitting	mm	433	451	439	Pass
6 - Head Width	mm	152	158	154	Pass
7 - Shoulder/Arm Width	mm	461	479	471	Pass
8 - Thorax Width	mm	322	332	327	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	368	Pass
11 - Head Depth	mm	196	206	201	Pass
12 - Thorax Depth	mm	262	272	270	Pass
13 - Abdomen Depth	mm	194	204	199	Pass
14 - Pelvis Depth	mm	235	245	240	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	152	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	601	Pass
			Overall Test Results	Pass	

Technician: _____

Approved By: _____



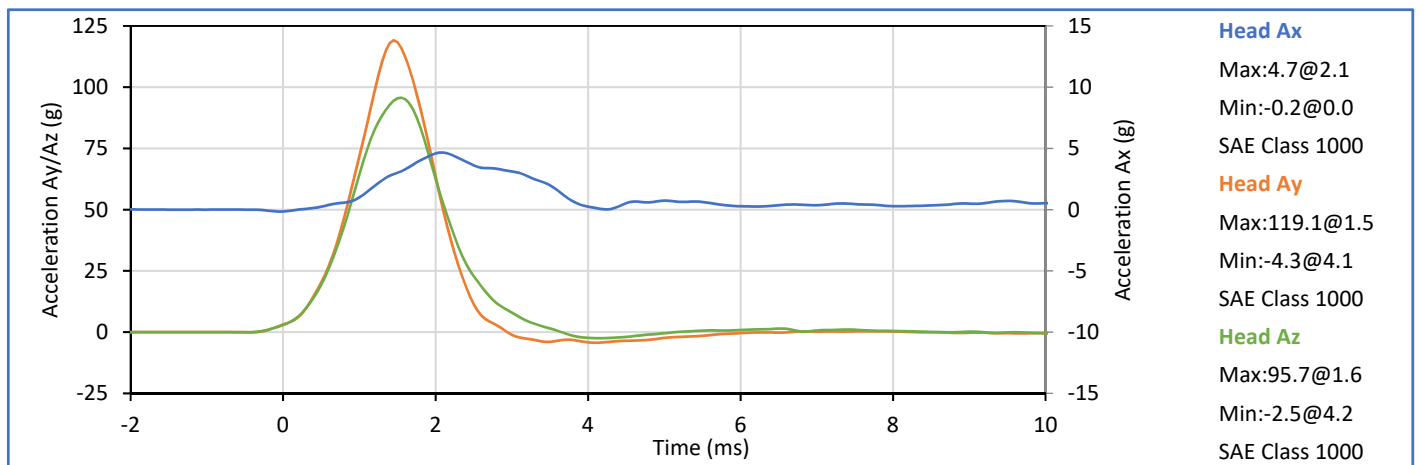
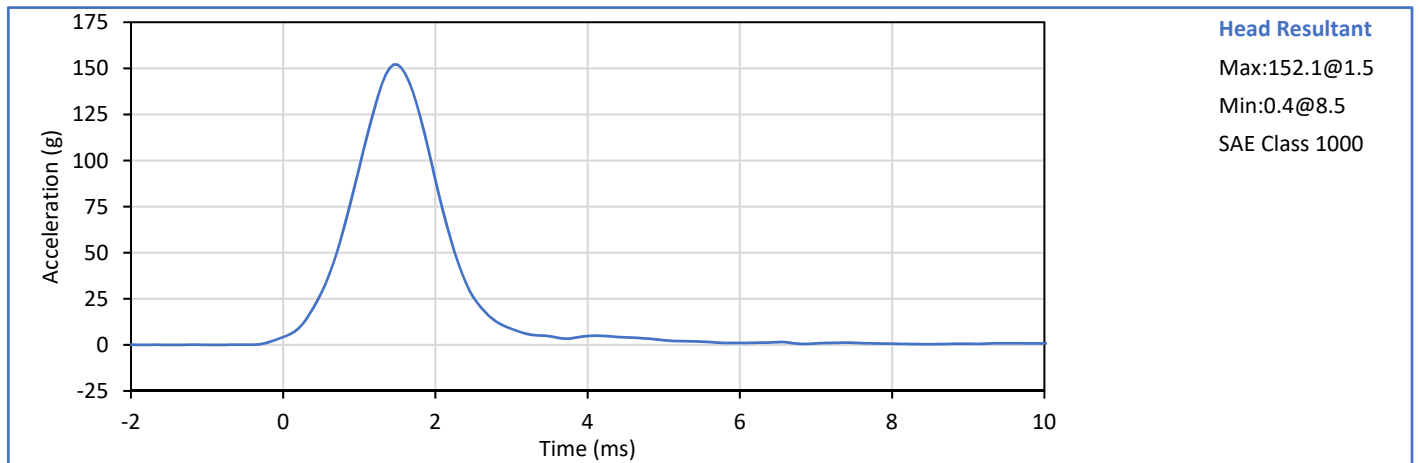
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	28	Pass
Peak Resultant Acceleration	g	125.0	155.0	152.1	Pass
Peak Head Ax	g	-15.0	15.0	4.7	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician: JfJ

Approved By: Pluggito

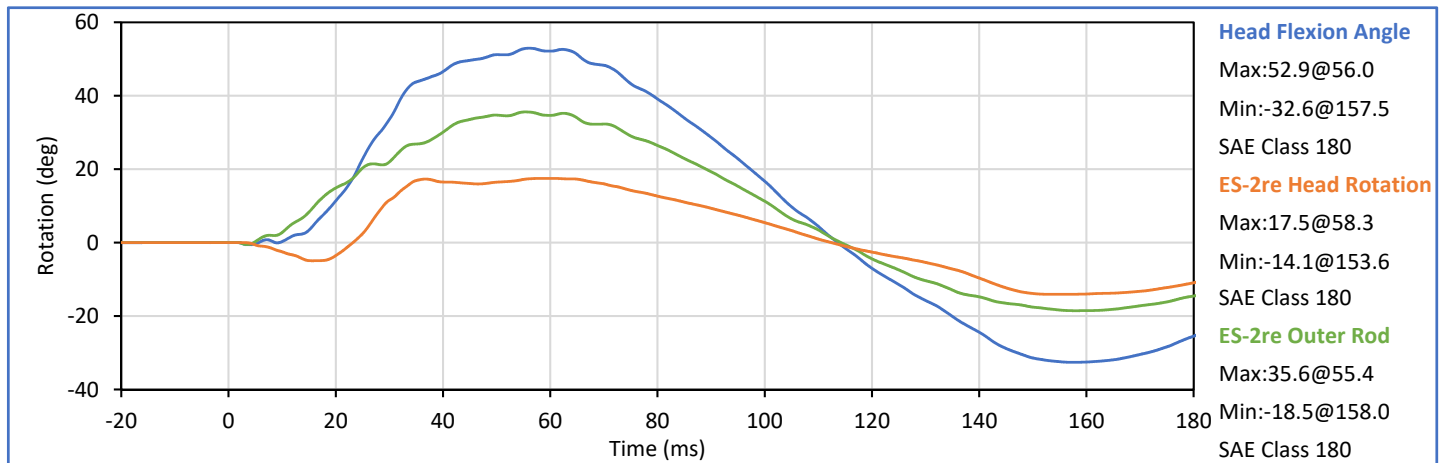
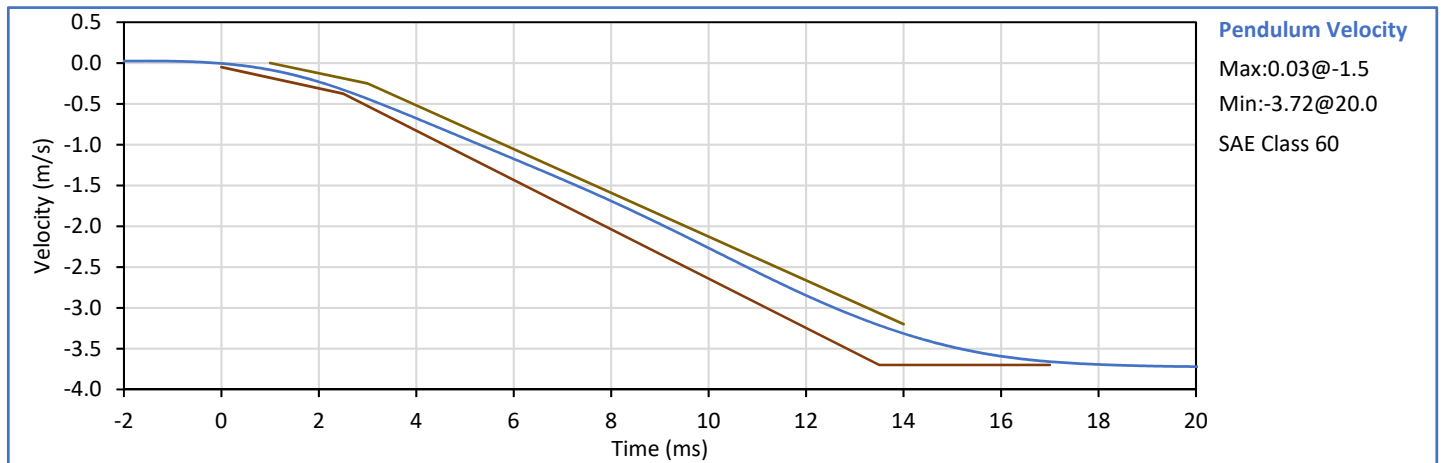


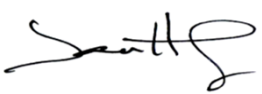
ES-2re 50th Male Side Impact ATD Neck Flexion

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	34	Pass
Pendulum Velocity	m/s	3.30	3.50	3.48	Pass
Peak Headform Flexion	deg	49.0	59.0	52.9	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.0	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	57.6	Pass
Overall Test Results					Pass



Technician: 

Approved By: 



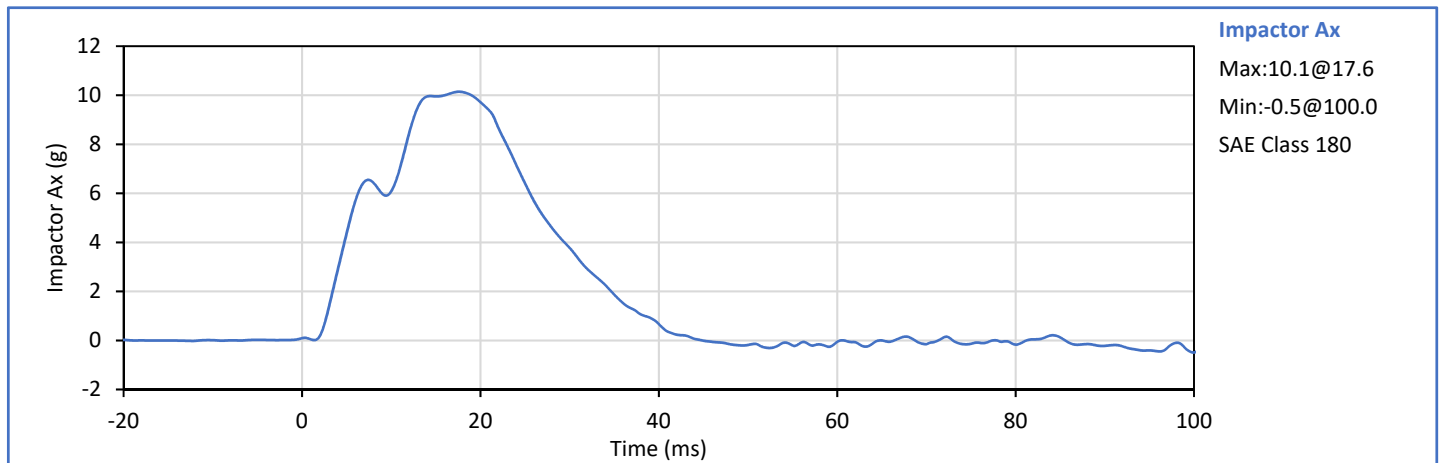
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
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ES-2re 50th Male Side Impact ATD Shoulder Impact Test

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.3	Pass
Laboratory Humidity	%	10	70	33	Pass
Impactor Velocity	m/s	4.20	4.40	4.26	Pass
Peak Impactor Ax	g	7.5	10.5	10.1	Pass
Overall Test Results					Pass



Technician: 

Approved By: 



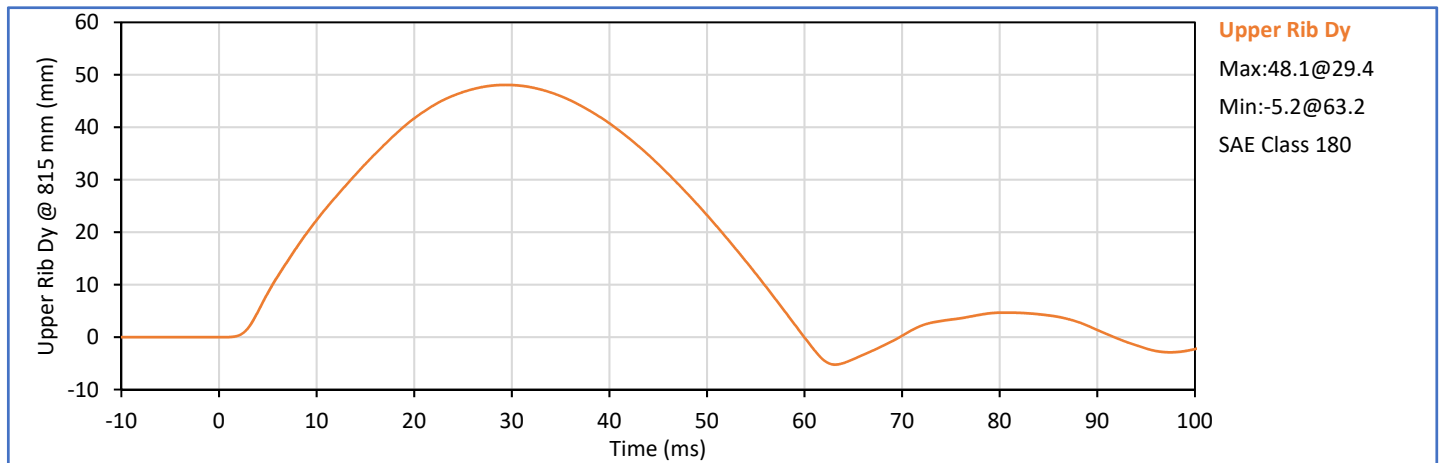
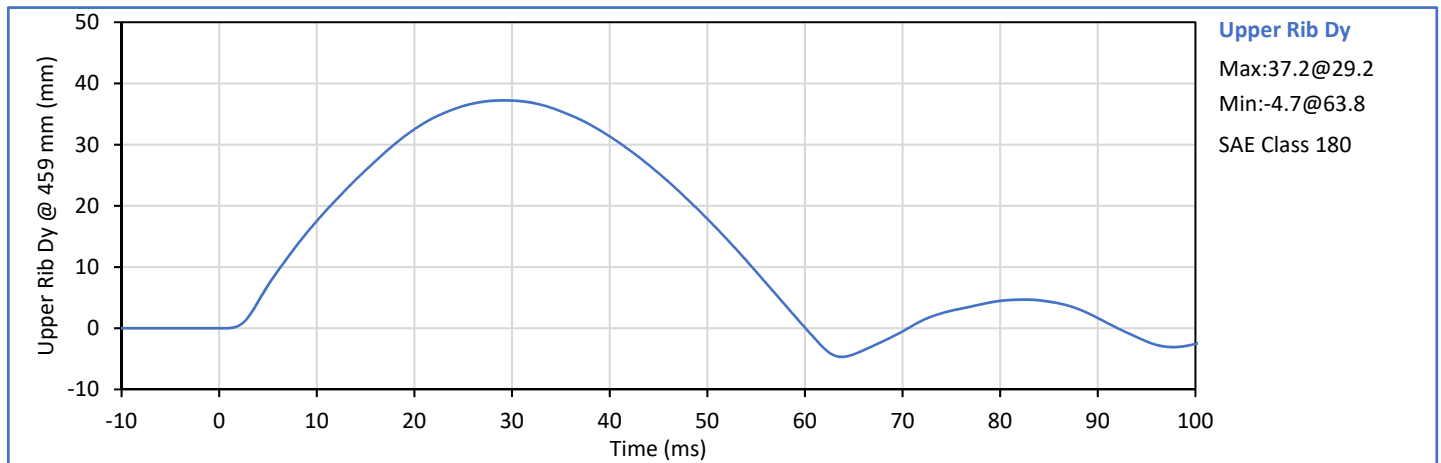
9270 Holly Road, Adelanto, CA 92301
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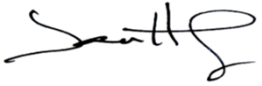
ES-2re 50th Male Side Impact ATD Upper Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	34	Pass
Upper Rib Dy @ (459mm)	mm	36.0	40.0	37.2	Pass
Upper Rib Dy @ (815mm)	mm	46.0	51.0	48.1	Pass
Overall Test Results				Pass	



Technician: 

Approved By: 



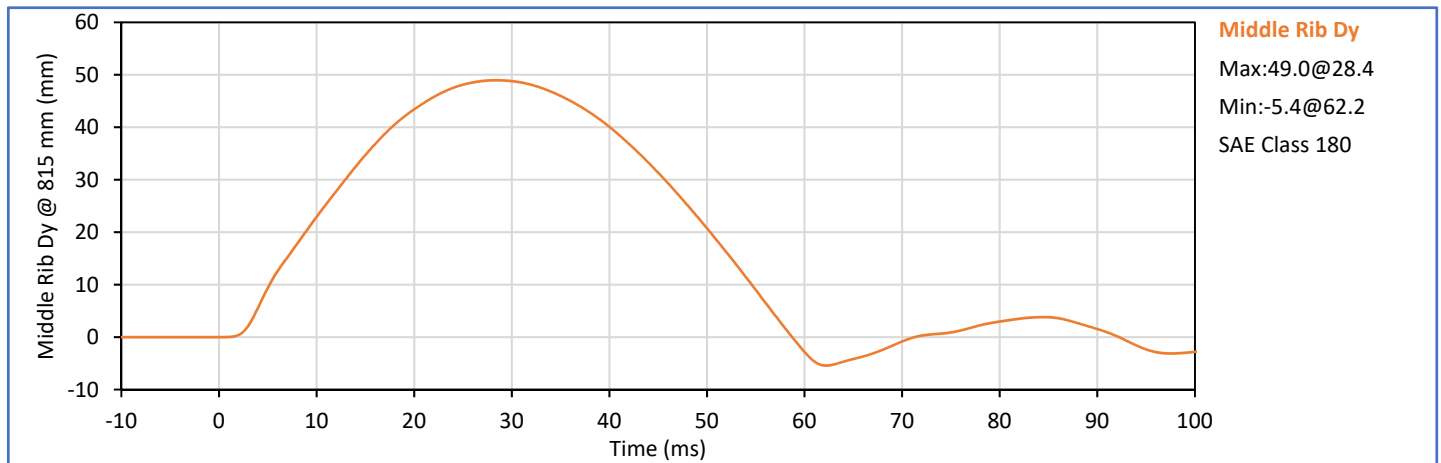
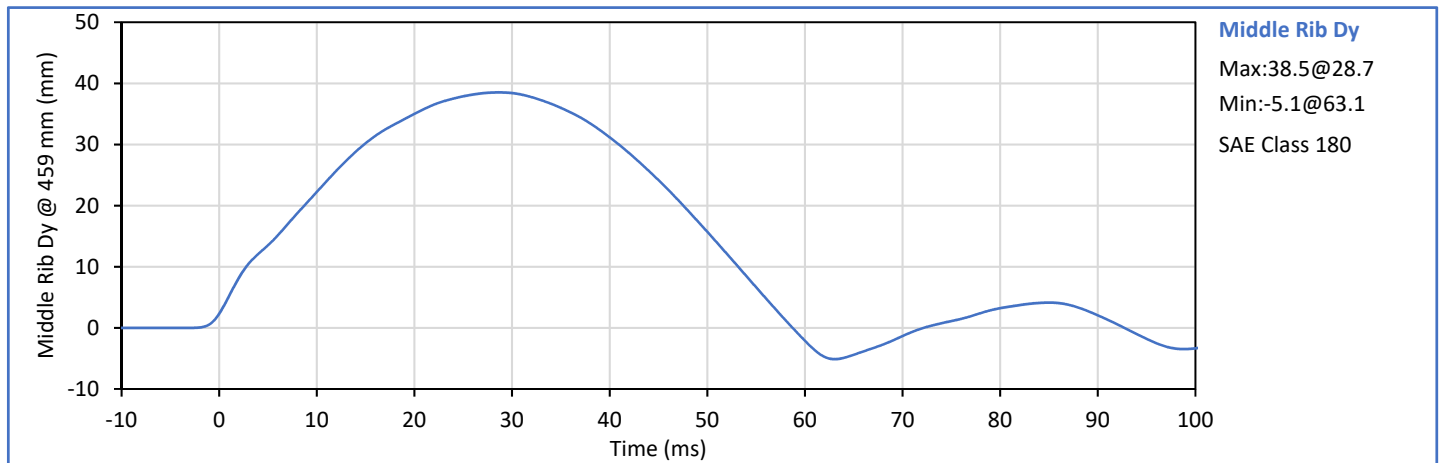
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	34	Pass
Middle Rib Dy @ (459mm)	mm	36.0	40.0	38.5	Pass
Middle Rib Dy @ (815mm)	mm	46.0	51.0	49.0	Pass
Overall Test Results				Pass	



Technician: 

Approved By: 



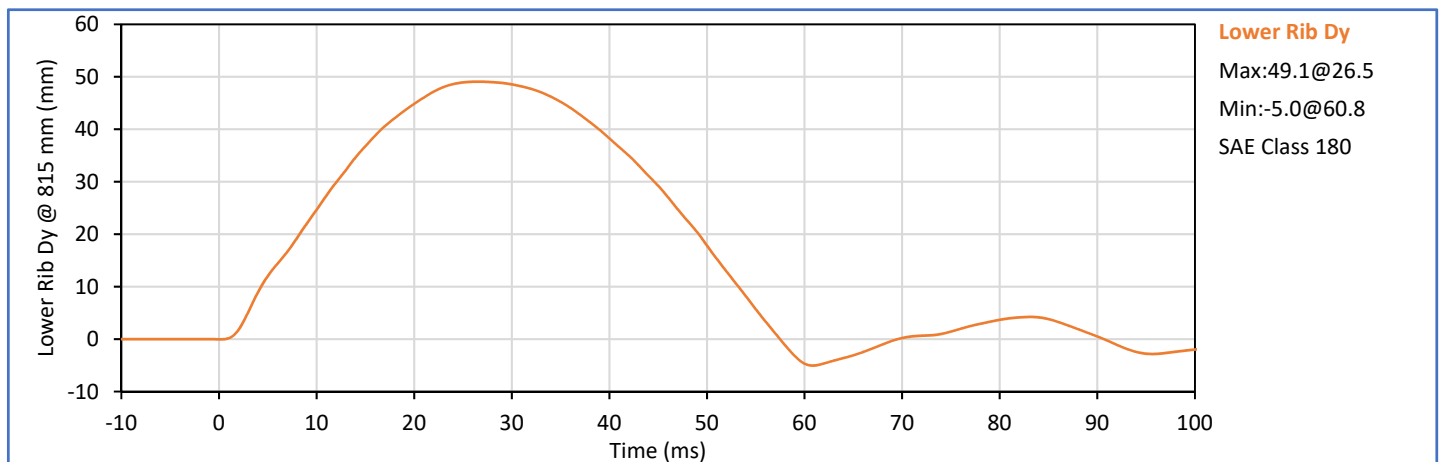
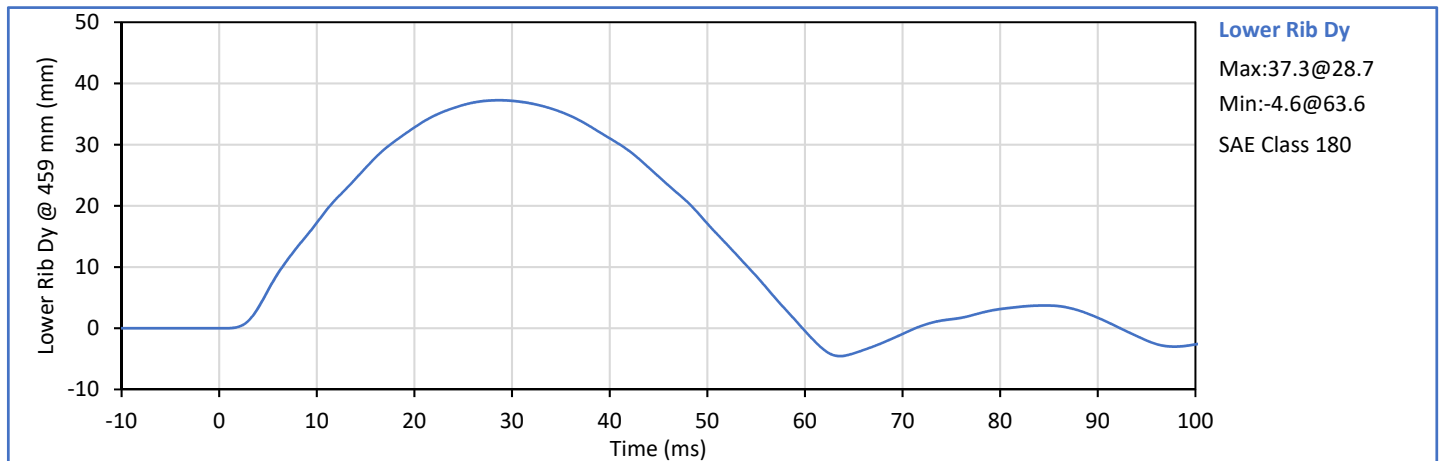
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

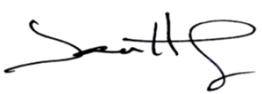
ES-2re 50th Male Side Impact ATD Lower Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	34	Pass
Lower Rib Dy @ (459mm)	mm	36.0	40.0	37.3	Pass
Lower Rib Dy @ (815mm)	mm	46.0	51.0	49.1	Pass
Overall Test Results				Pass	



Technician: 

Approved By: 



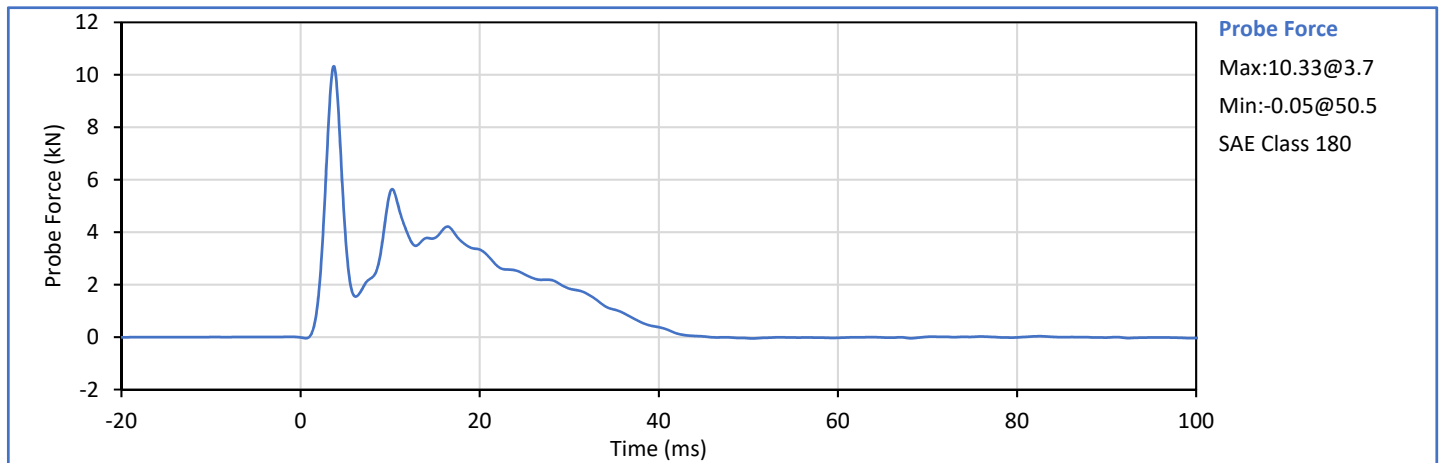
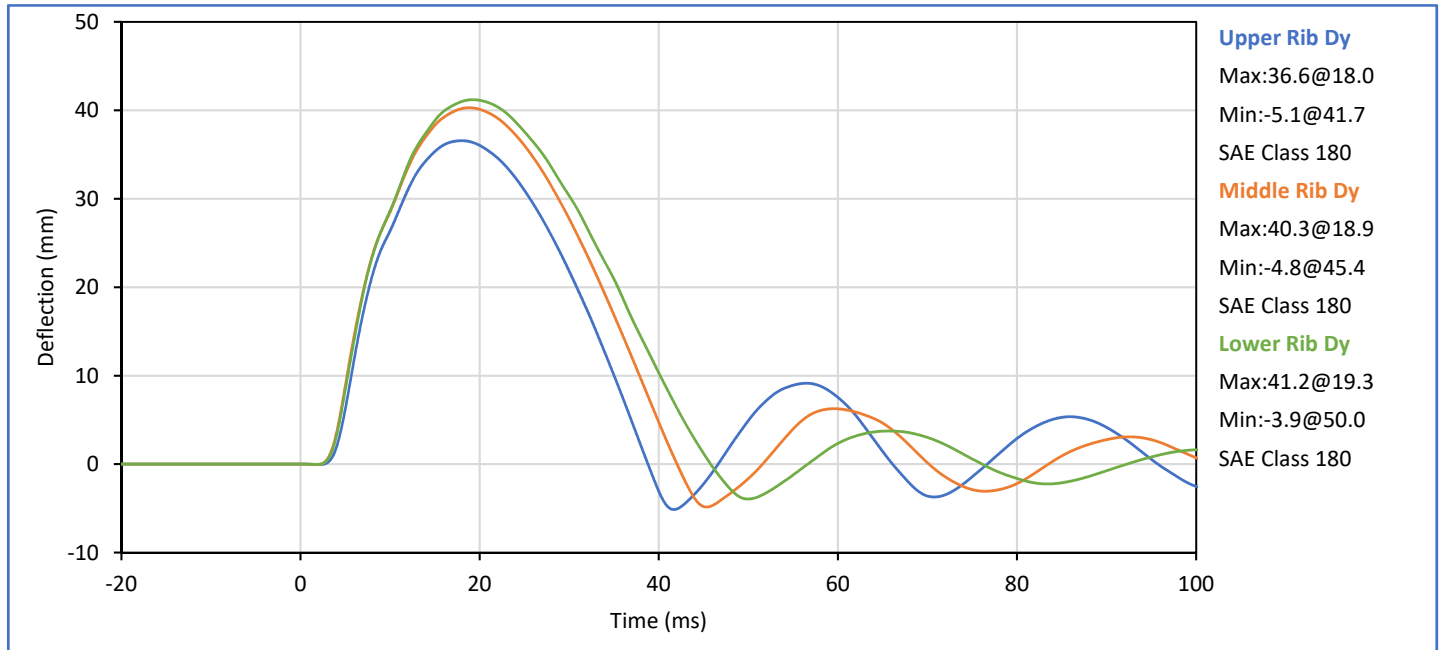
9270 Holly Road, Adelanto, CA 92301
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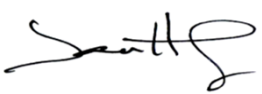
ES-2re 50th Male Side Impact ATD Thorax Impact (Full Body)

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	33	Pass
Impactor Velocity	m/s	5.40	5.60	5.55	Pass
Peak Upper Rib Dy	mm	34.0	41.0	36.6	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.3	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.2	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.64	Pass
Overall Test Results				Pass	Pass



Technician: 

Approved By: 

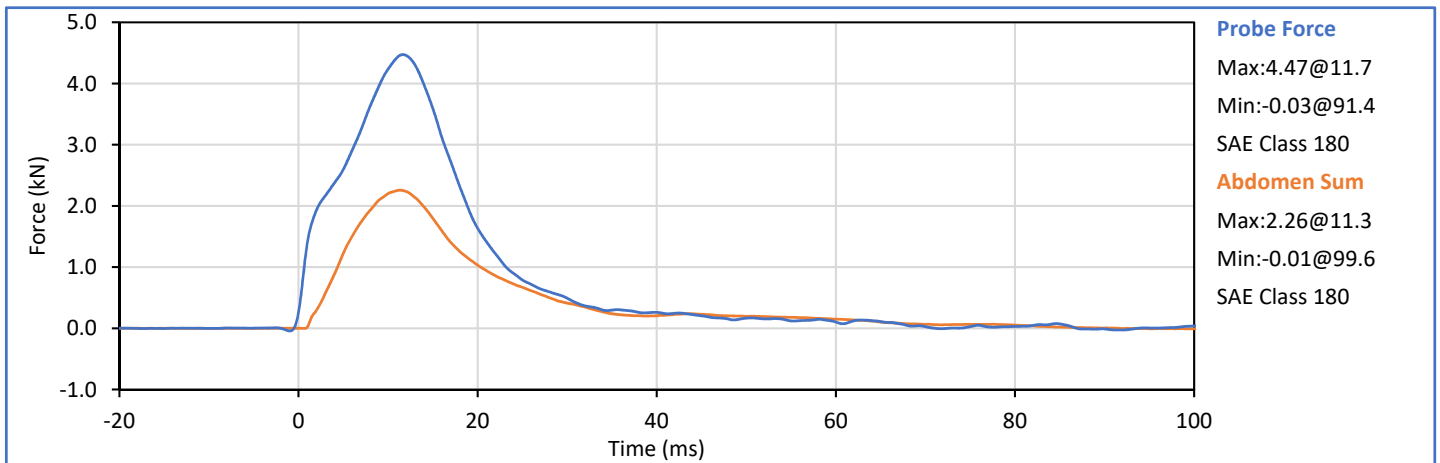
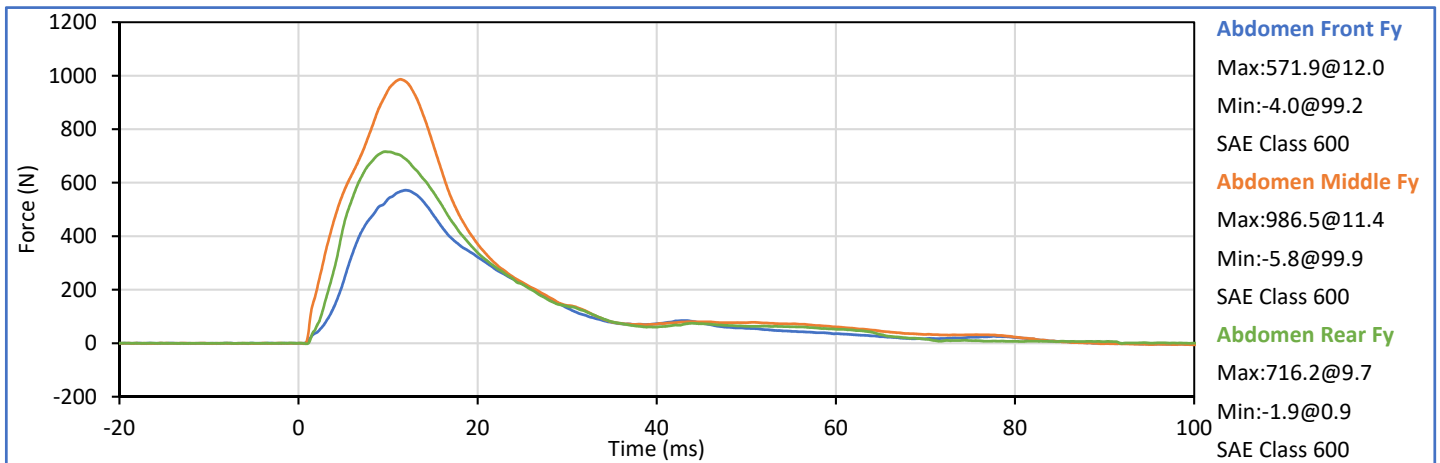


ES-2re 50th Male Side Impact ATD Abdomen Impact

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	33	Pass
Impactor Velocity	m/s	3.90	4.10	4.00	Pass
Peak Impactor Force	kN	4.00	4.80	4.47	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.7	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.26	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.3	Pass
Overall Test Results				Pass	Pass



Technician:

Approved By:



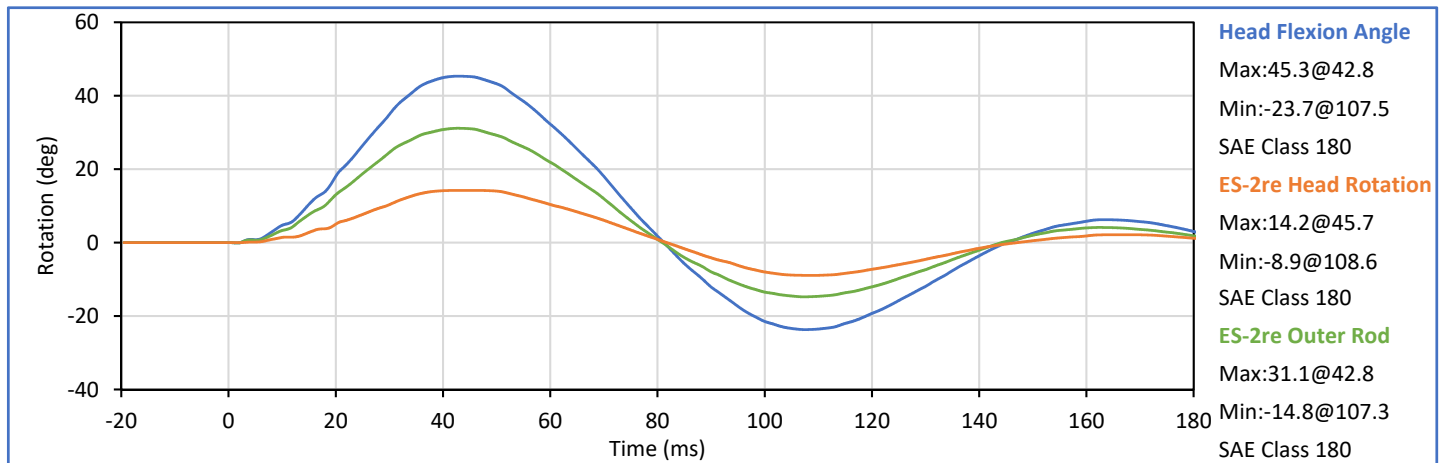
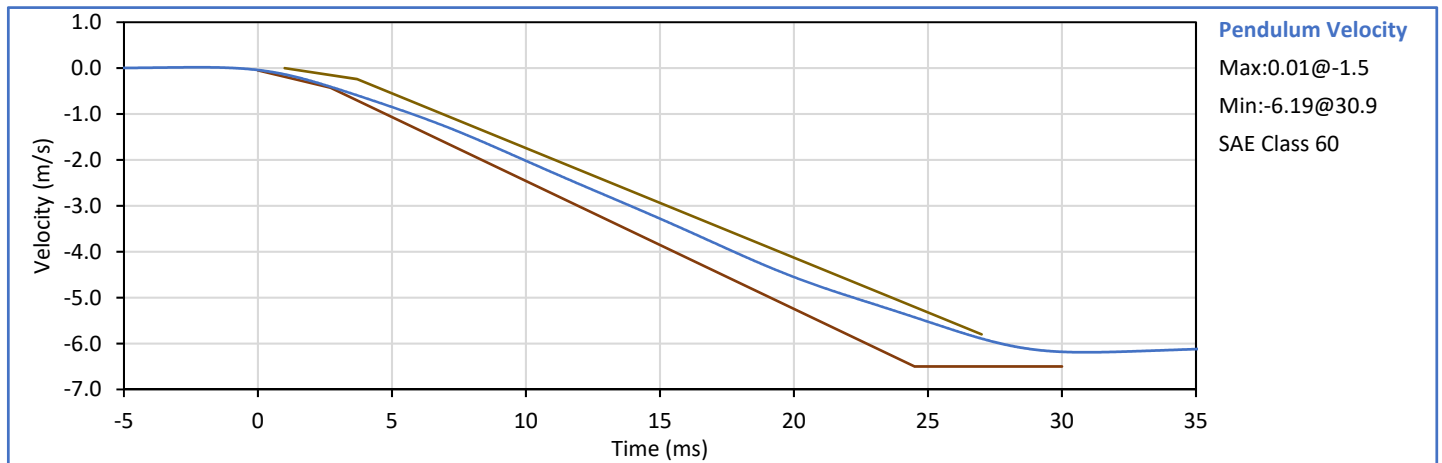
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
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ES-2re 50th Male Side Impact ATD Lumbar Spine Flexion

ATD Serial No.: F035

Test Date: 2018-08-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	5.95	6.15	6.09	Pass
Peak Headform Flexion	deg	45.0	55.0	45.3	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	42.8	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	38.5	Pass
Overall Test Results					Pass



Technician: Smith

Approved By: Plangito

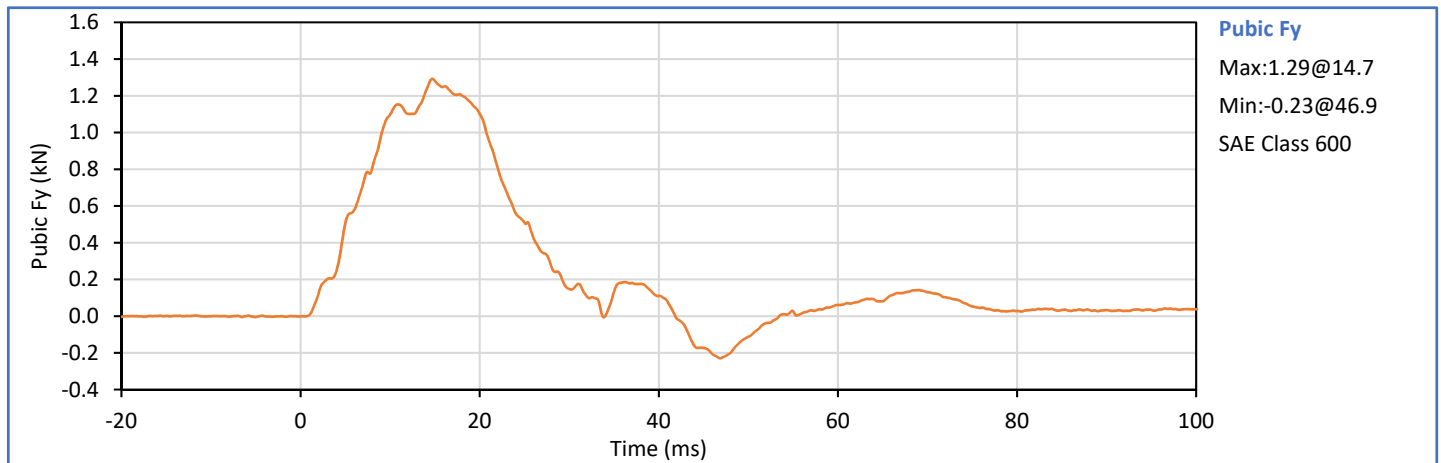
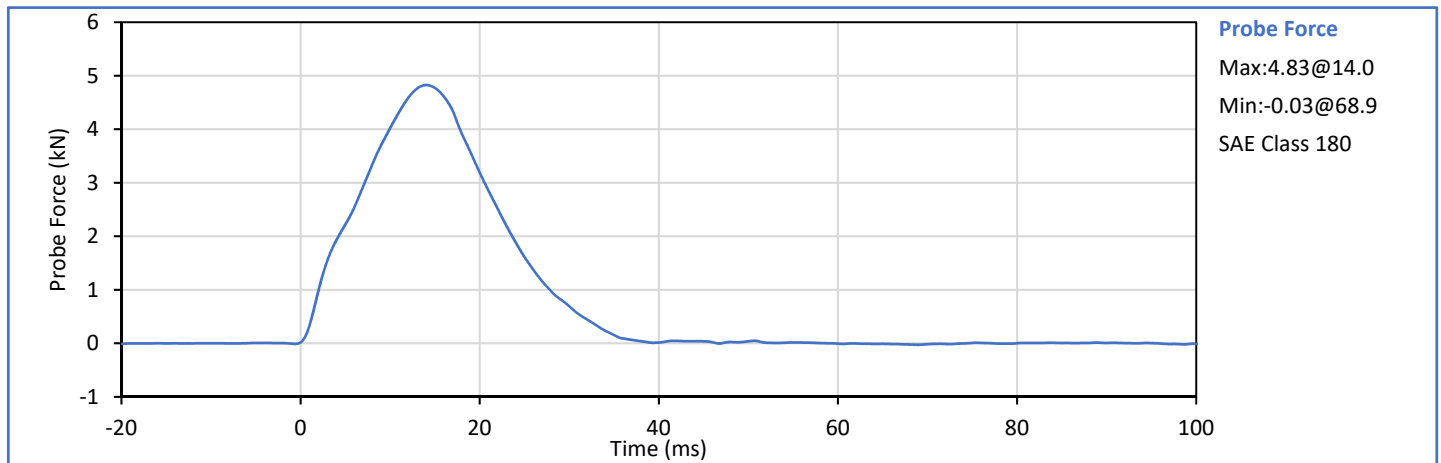


ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F035

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	34	Pass
Impactor Velocity	m/s	4.20	4.40	4.39	Pass
Peak Impactor Force	kN	4.70	5.40	4.83	Pass
Time of Peak Impactor Force	ms	11.8	16.1	14.0	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.29	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.7	Pass
Overall Test Results				Pass	Pass



Technician:

Approved By:



SID-IIs Small Side Impact Dummy
External Measurements

ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
A - Sitting Height	mm	772	788	782	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	83	Pass
D - H Point From Seatback	mm	141	151	149	Pass
E - Shoulder Pivot From Backline	mm	97	107	105	Pass
F - Thigh Clearance	mm	119	135	126	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	42	Pass
I - Head Depth	mm	178	188	186	Pass
J - Head Circumference	mm	541	551	547	Pass
K - Buttock To Knee Length	mm	514	540	524	Pass
L - Popliteal Height	mm	343	369	350	Pass
K - Knee Pivot To Floor Height	mm	392	409	398	Pass
N - Buttock Popliteal Length	mm	416	442	437	Pass
O - Chest Depth W/O Jacket	mm	195	211	207	Pass
P - Foot Length	mm	216	232	221	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	256	Pass
S - Knee Joint To Seatback	mm	477	493	486	Pass
V - Shoulder Width	mm	341	357	345	Pass
W - Foot Width	mm	78	94	84	Pass
Y - Chest Circumference W/Jacket	mm	851	881	862	Pass
Z - Waist Circumference	mm	761	791	779	Pass
Overall Test Results				Pass	

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

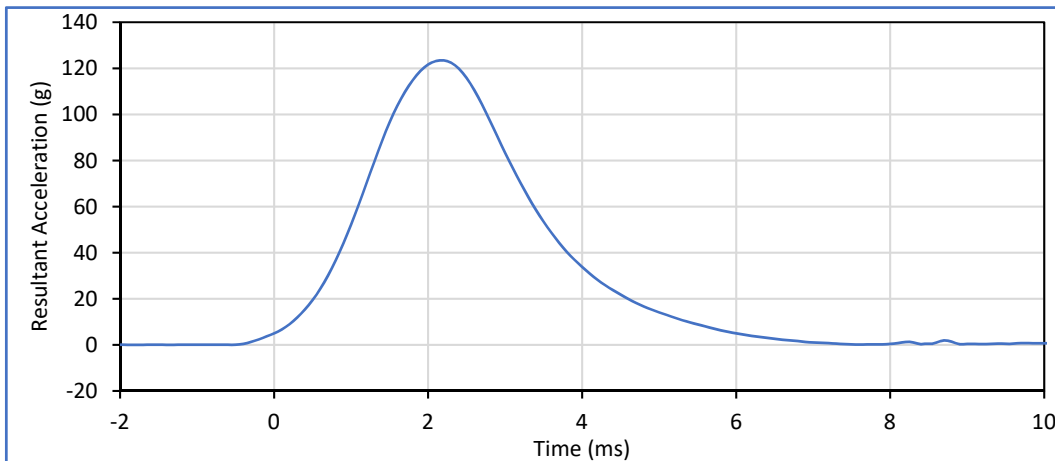


SID-IIs Small Side Impact Dummy Head Drop

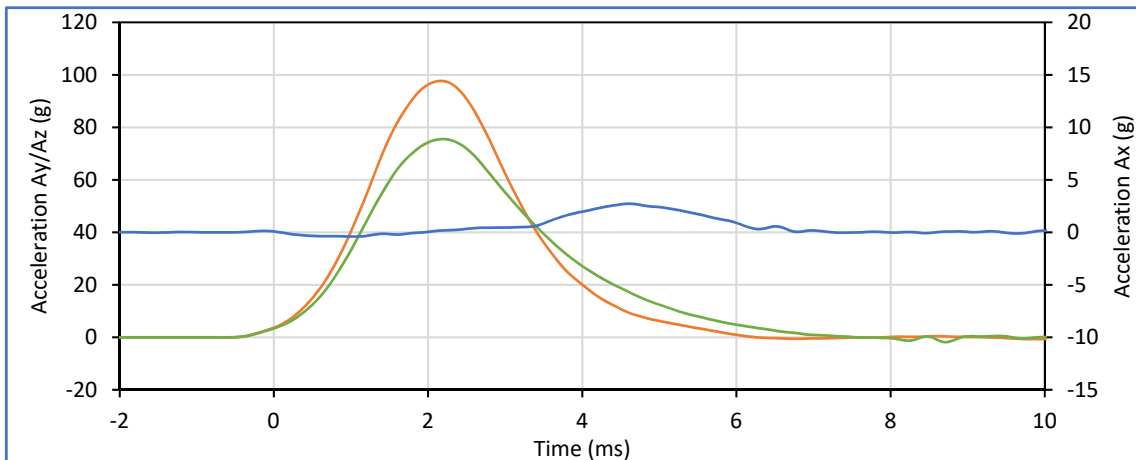
ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Humidity	%	10	70	40	Pass
Peak Resultant Acceleration	g	115.0	137.0	123.5	Pass
Peak Head Ax	g	-15.0	15.0	-0.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
Max:123.5@2.2
Min:0.1@7.6
SAE Class 1000



Head Ax
Max:2.7@4.6
Min:-0.4@1.1
SAE Class 1000
Head Ay
Max:97.7@2.2
Min:-0.7@9.9
SAE Class 1000
Head Az
Max:75.6@2.2
Min:-1.9@8.7
SAE Class 1000

Technician: J. Hernandez

Approved By: P. Puzzuto

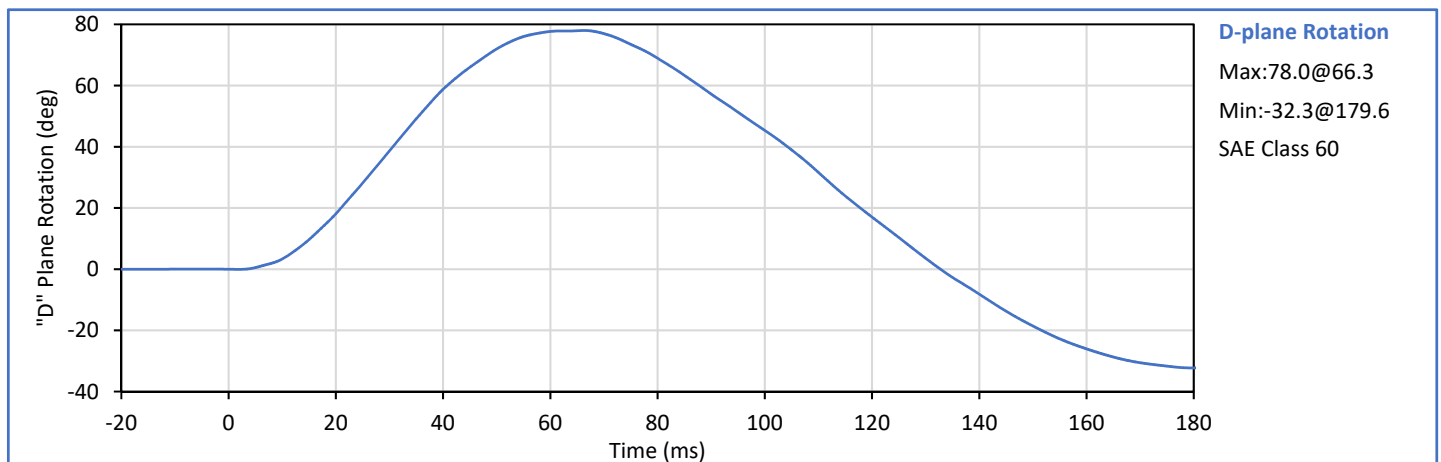
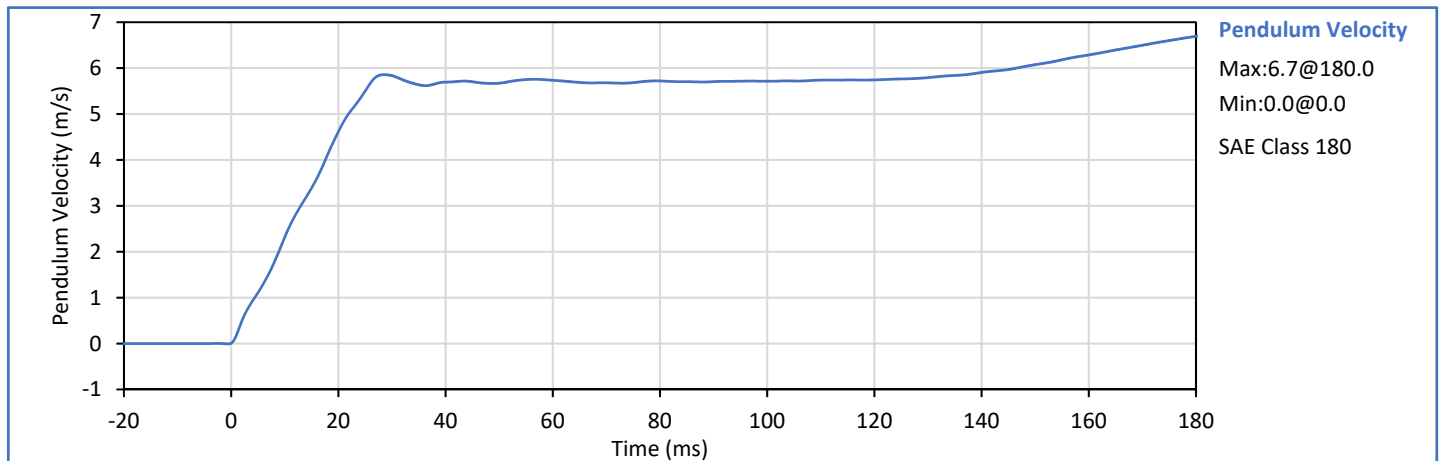


SID-IIs Small Side Impact Dummy Neck Flexion

ATD Serial No.: 308

Test Date: 2018-08-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	34	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.32	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.39	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.61	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.50	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.86	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	78.0	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	66.3	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.8	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	115.5	Pass
Overall Test Results				Pass	

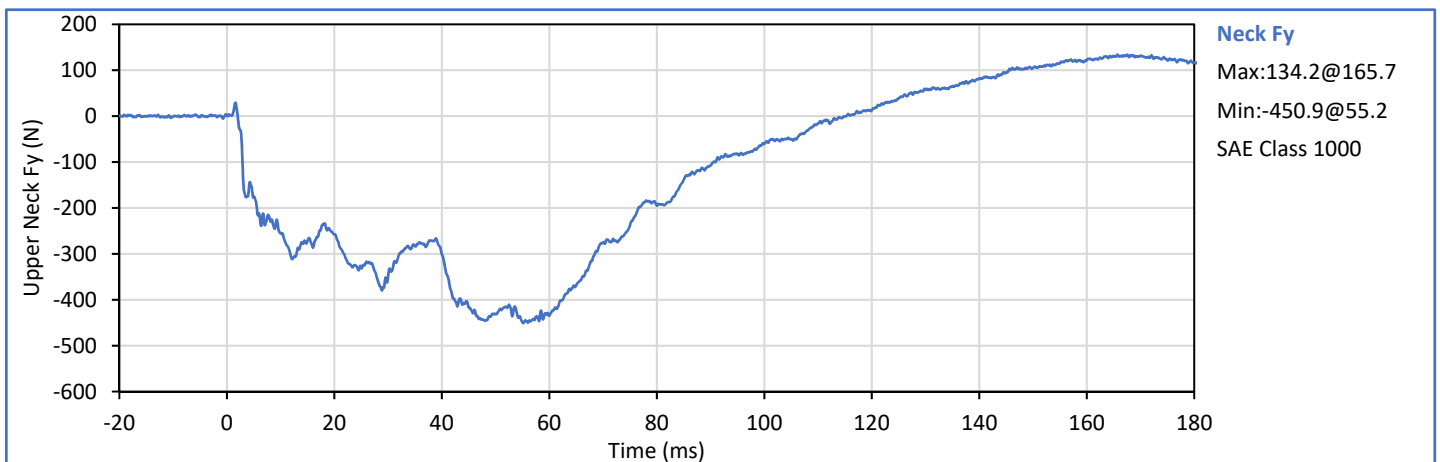
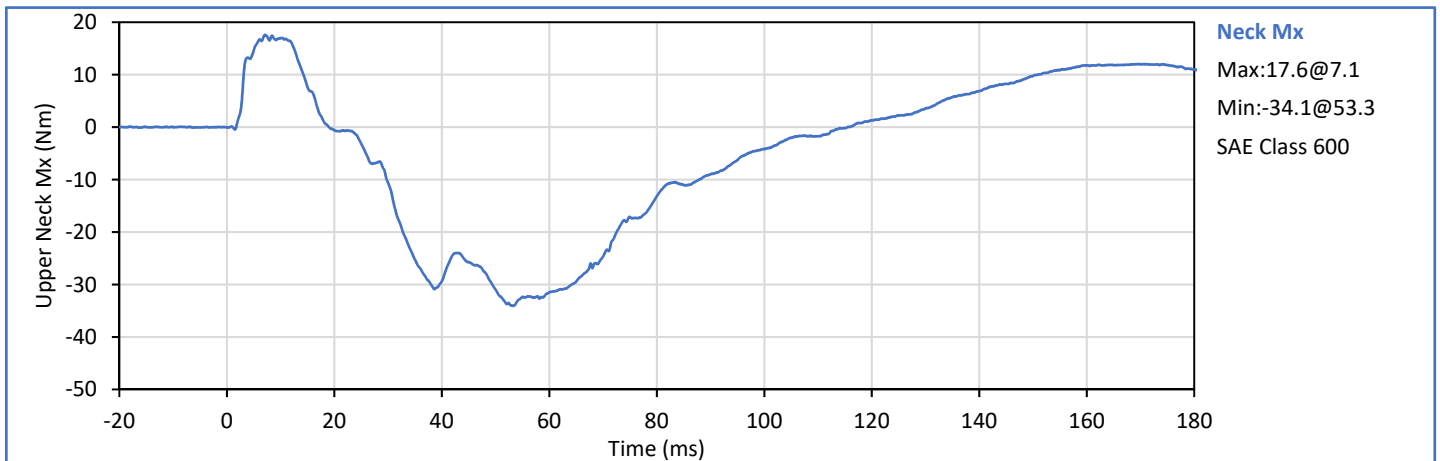
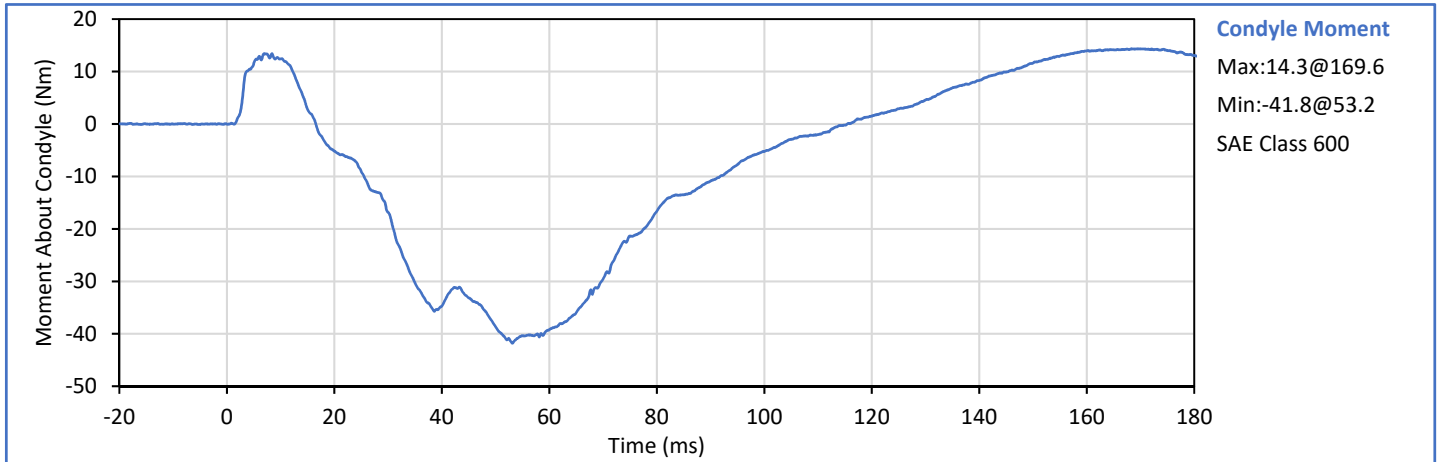


Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308

Test Date: 2018-08-27





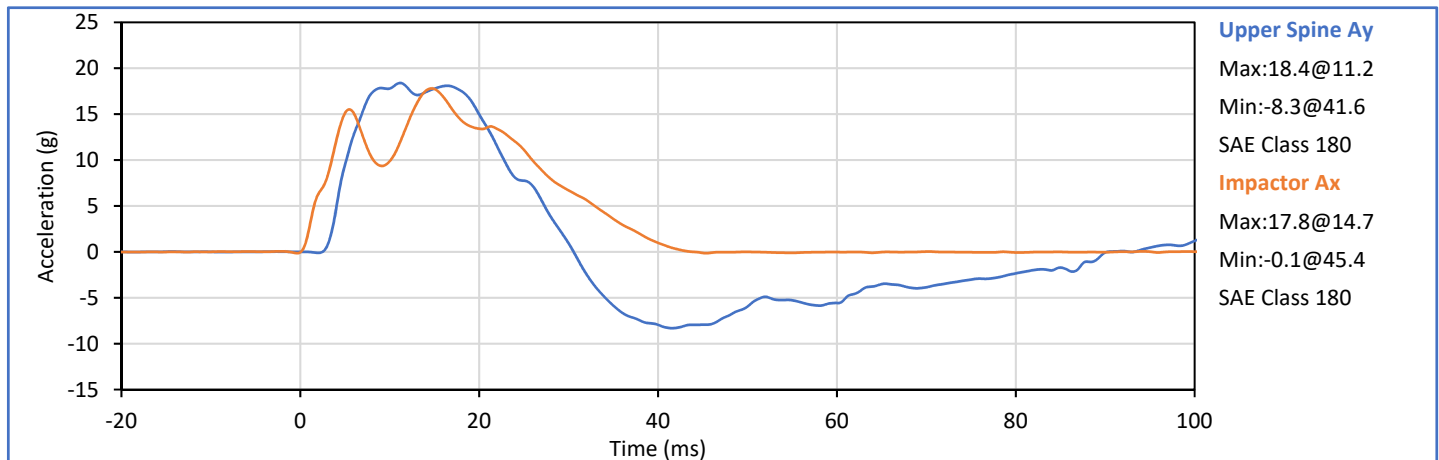
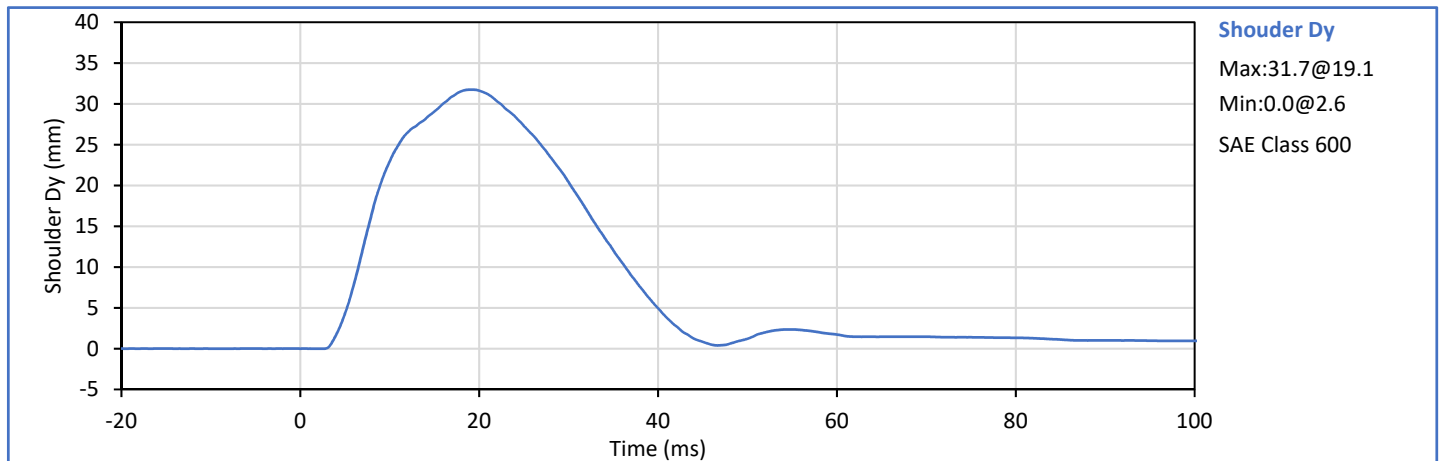
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SID-IIs Small Side Impact Dummy Shoulder Impact Test

ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	39	Pass
Impactor Velocity	m/s	4.20	4.40	4.28	Pass
Peak Shoulder Dy	mm	28.0	37.0	31.7	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.4	Pass
Peak Impactor Ax	g	13.0	18.0	17.8	Pass
Overall Test Results					Pass



Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

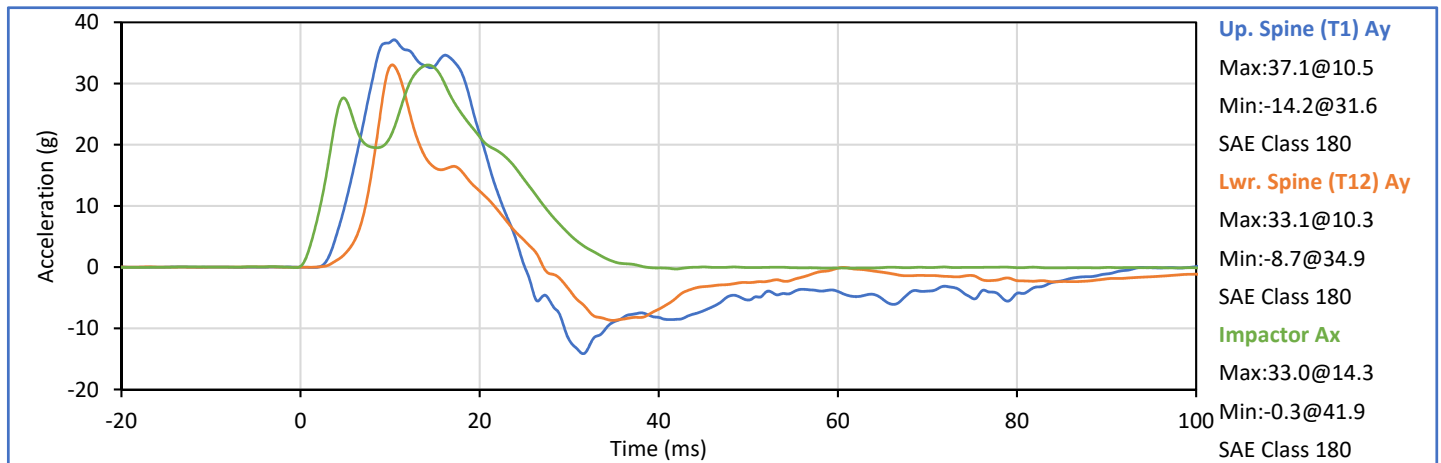
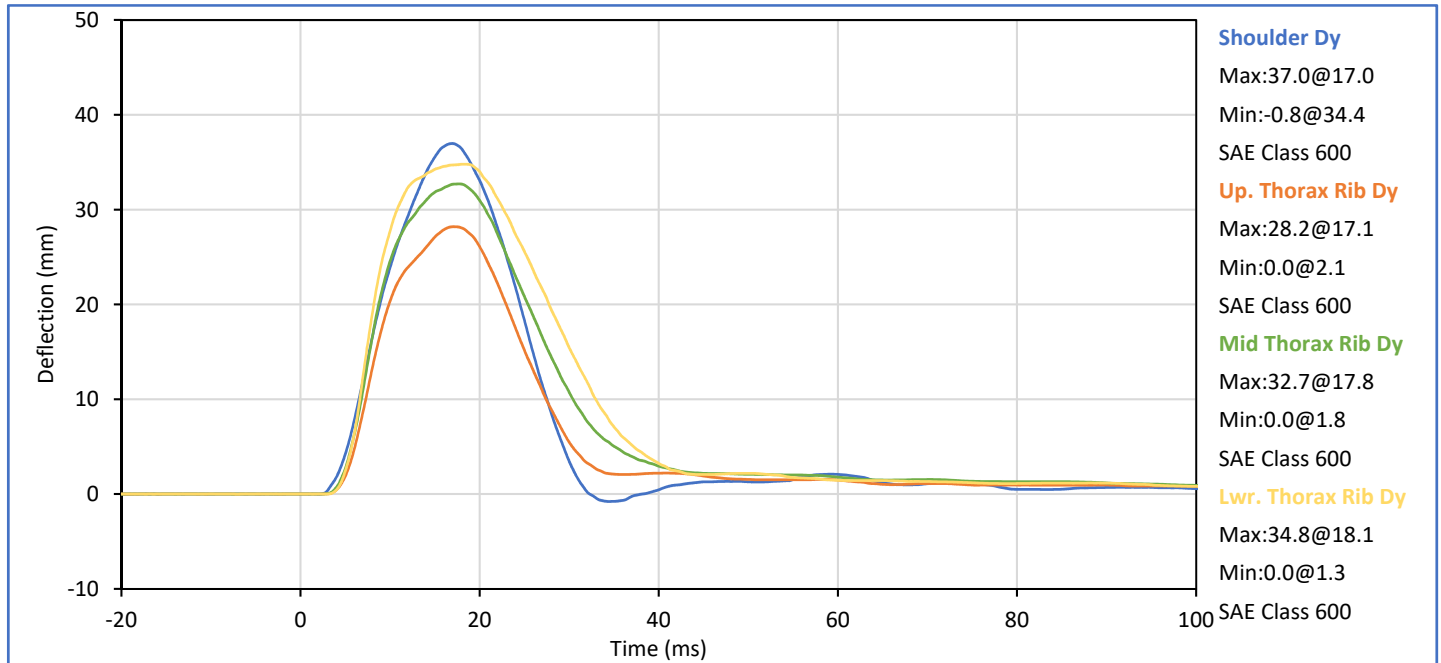


SID-IIs Small Side Impact Dummy Thorax (With Arm)

ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	42	Pass
Impactor Velocity	m/s	6.60	6.80	6.65	Pass
Peak Shoulder Dy	mm	31.0	40.0	37.0	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.2	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.7	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.8	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	37.1	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	33.1	Pass
Peak Impactor Ax	g	30.0	36.0	33.0	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

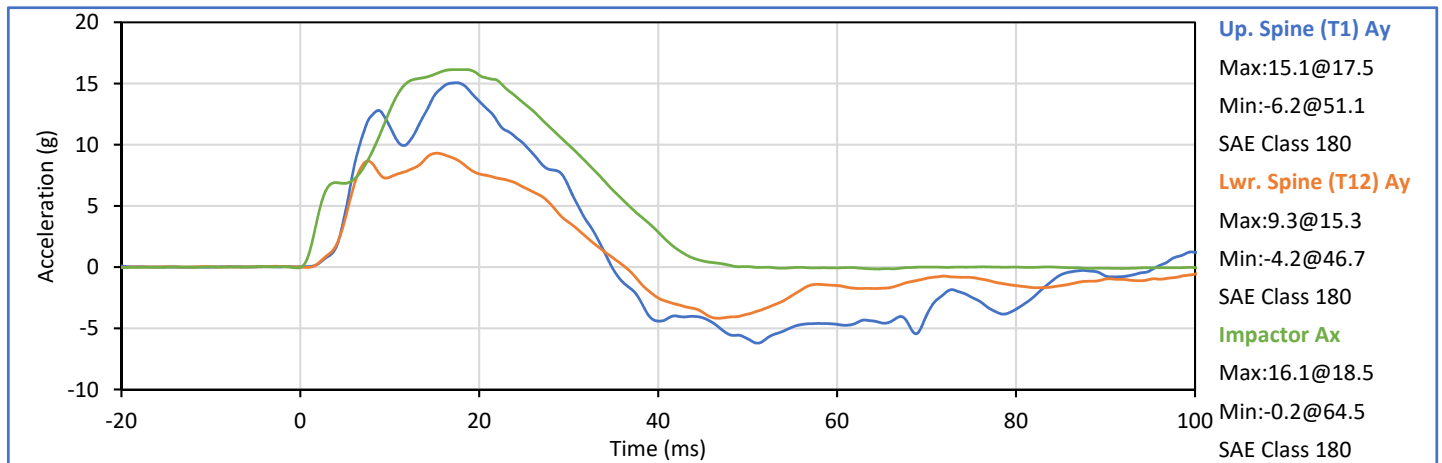
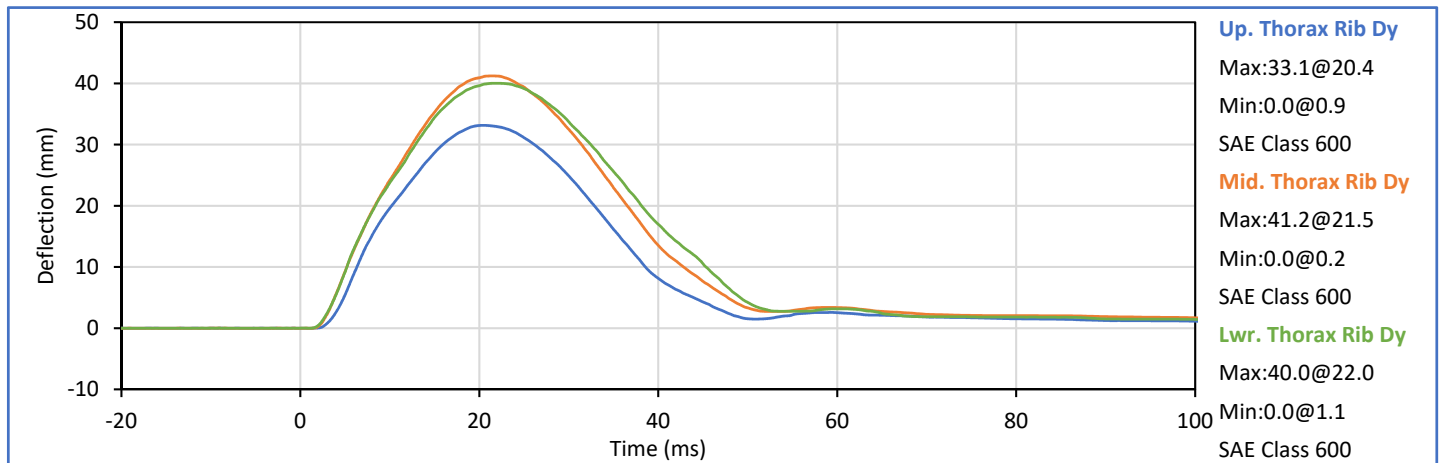


SID-IIs Small Side Impact Dummy **Thorax (No Arm)**

ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Impactor Velocity	m/s	4.20	4.40	4.23	Pass
Peak Upper Rib Dy	mm	32.0	40.0	33.1	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.2	Pass
Peak Lower Rib Dy	mm	35.0	43.0	40.0	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	15.1	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.3	Pass
Peak Impactor Ax	g	14.0	18.0	16.1	Pass
Overall Test Results				Pass	



Technician: J. Hernandez

Approved By: P. Puzzuto

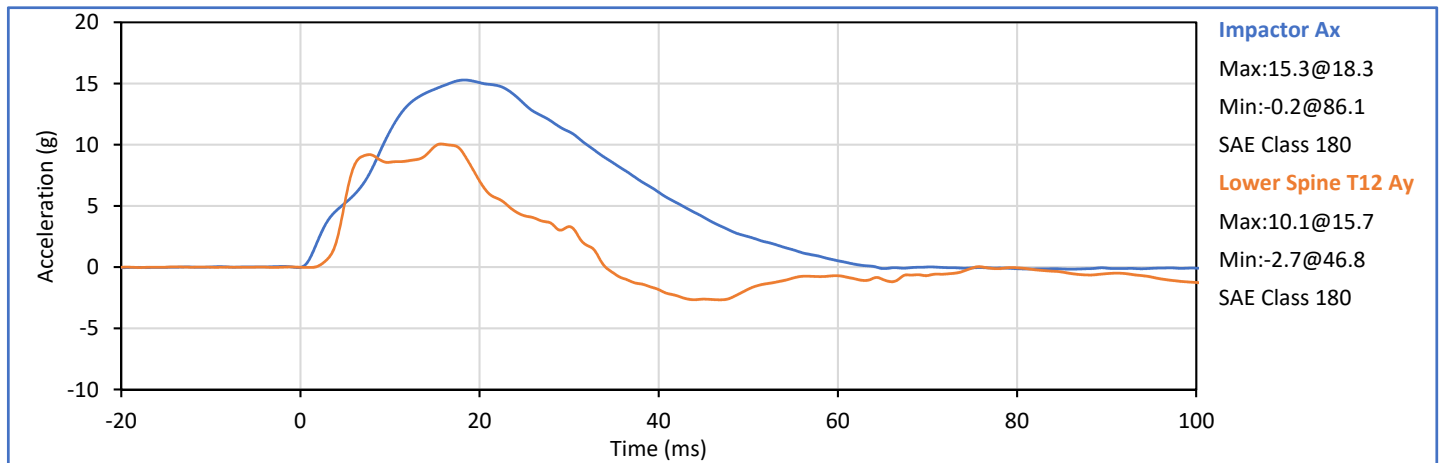
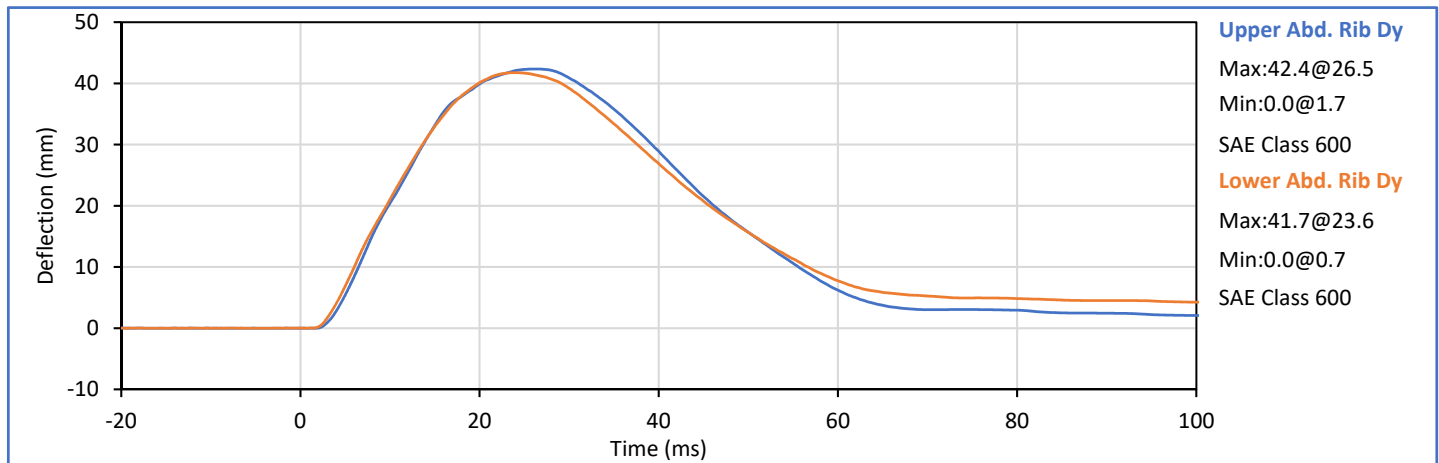


SID-IIs Small Side Impact Dummy Abdomen Impact

ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.4	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.7	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.1	Pass
Peak Impactor Ax	g	12.0	16.0	15.3	Pass
Overall Test Results				Pass	Pass



Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto



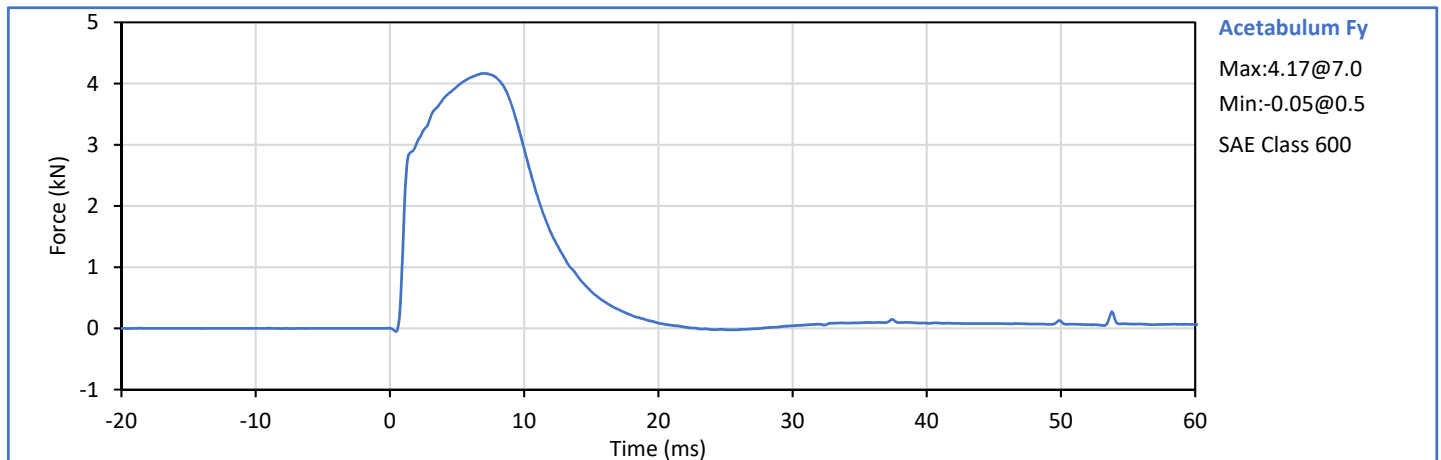
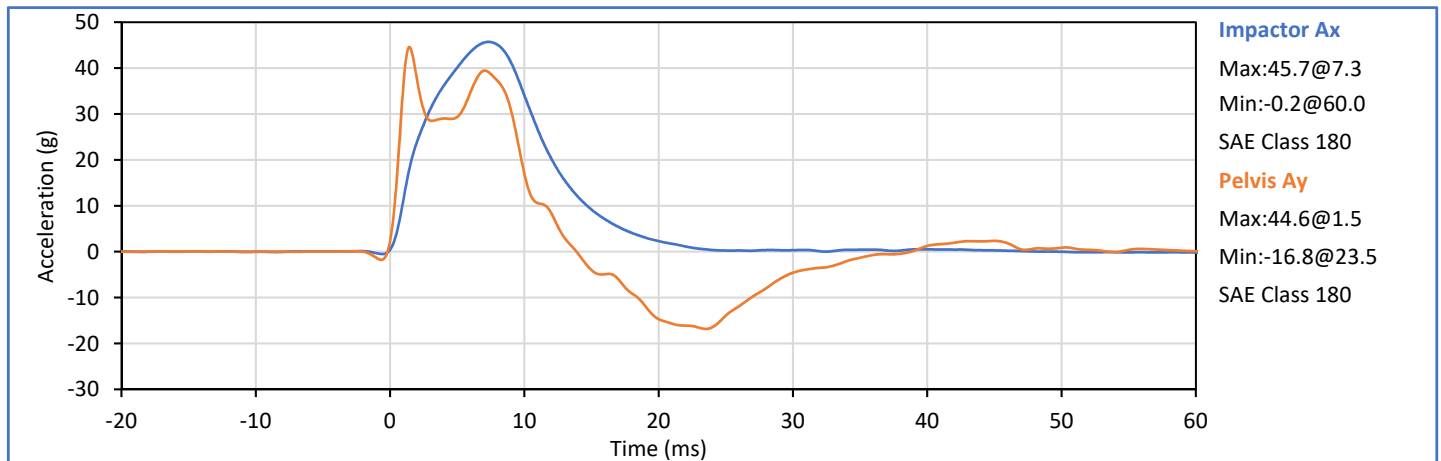
SID-IIs Small Side Impact Dummy Pelvis Acetabulum Impact

ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	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	4.17	Pass
Pelvis Ay after 6ms	g	34.0	42.0	39.5	Pass
Peak Impactor Ax	g	38.0	47.0	45.7	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12264 (SACO)



Technician: J. Hernandez

Approved By: P. Puzzuto



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SID-IIs Small Side Impact Dummy Pelvis Acetabulum Impact

ATD Serial No.: 308

Test Date: 2018-08-24

Pelvis Plug S/N: 12264 (SACO)



SID-IIs Pelvis Plug Certification Test

Plug S/N 12264

Test Number 6649

Report Number 6664

Test Date 3/15/2018 10:54:47 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	347.10	50.00	600.00
Force @ 1.5 mm (N)	1,180.35	850.00	1,400.00
Force @ 2.5 mm (N)	1,429.80	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,476.17	1,361.00	1,673.00

Testing Machine STM-20 5965542

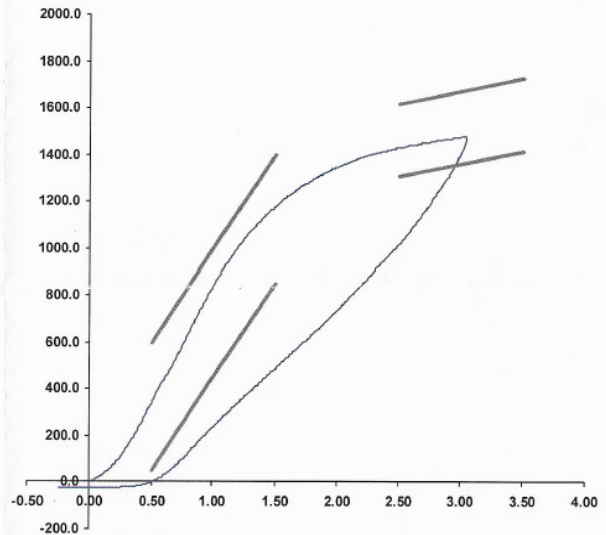
Load Cell S/N (F1360947), Units (LBS) 1000

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 92582 Tel 310-694-2082 FAX



SID-IIs Small Side Impact Dummy Pelvis Iliac Impact

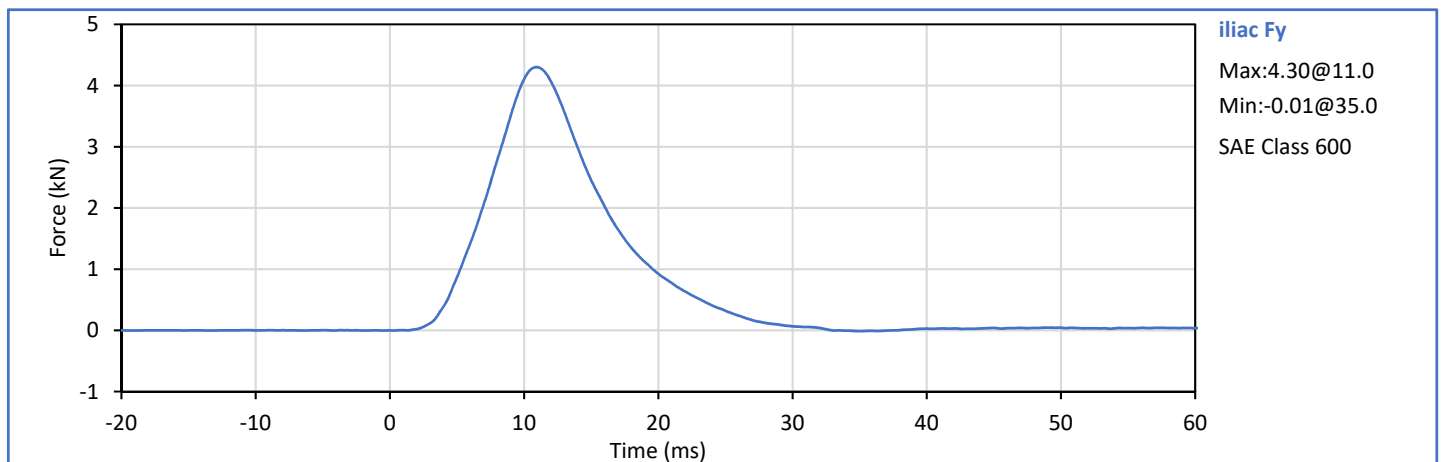
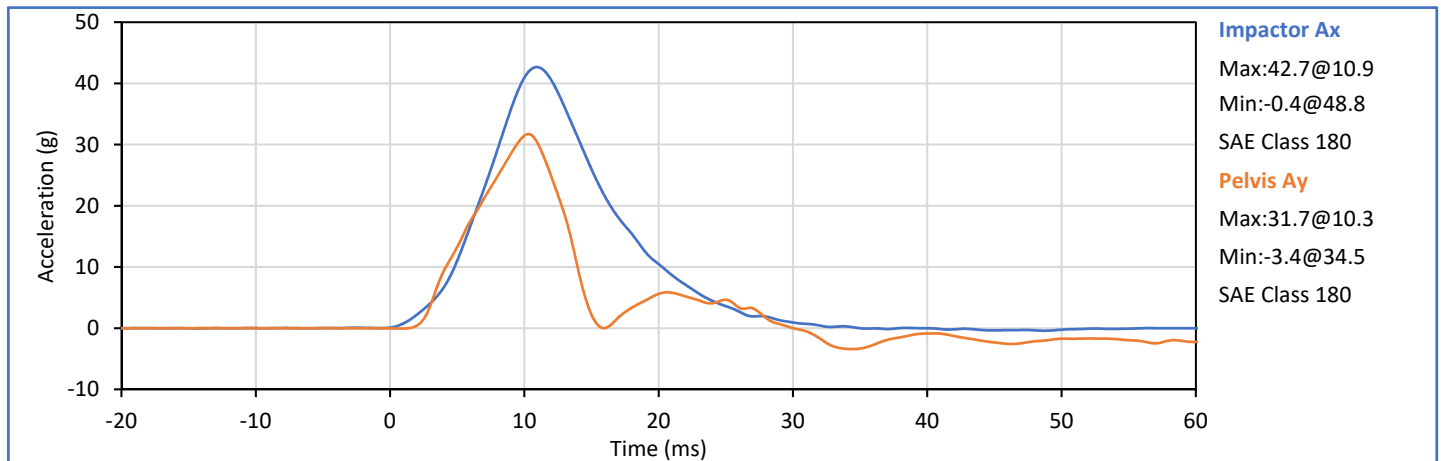
ATD Serial No.: 308

Test Date: 2018-08-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	44	Pass
Impactor Velocity	m/s	4.20	4.40	4.28	Pass
Peak Iliac Fy	kN	4.10	5.10	4.30	Pass
Pelvis Ay after 6ms	g	28.0	39.0	31.7	Pass
Peak Impactor Ax	g	36.0	45.0	42.7	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 CONFIGURATION AND PERFORMANCE VERIFICATION DATA
LEFT SIDE CONFIGURATION



9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-09-20

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	32	Pass
1 - Sitting Height	mm	900	918	912	Pass
2 - Seat to Shoulder Joint	mm	558	572	566	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	102	Pass
5 - Sole to Seat, Sitting	mm	433	451	435	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	472	Pass
8 - Thorax Width	mm	322	332	325	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	371	Pass
11 - Head Depth	mm	196	206	205	Pass
12 - Thorax Depth	mm	262	272	267	Pass
13 - Abdomen Depth	mm	194	204	202	Pass
14 - Pelvis Depth	mm	235	245	242	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	153	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	602	Pass
			Overall Test Results	Pass	

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

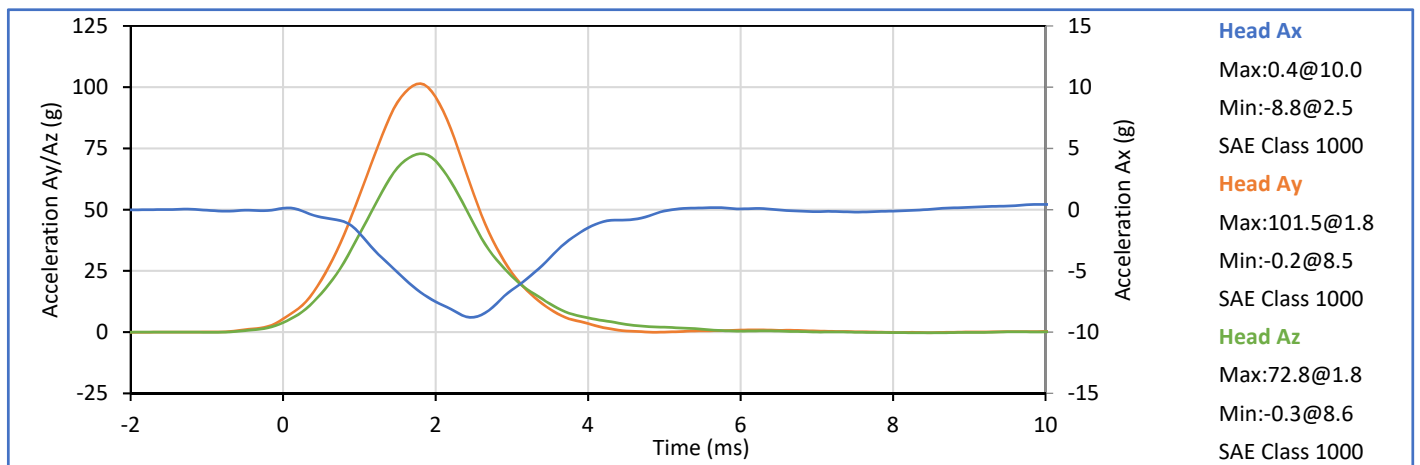
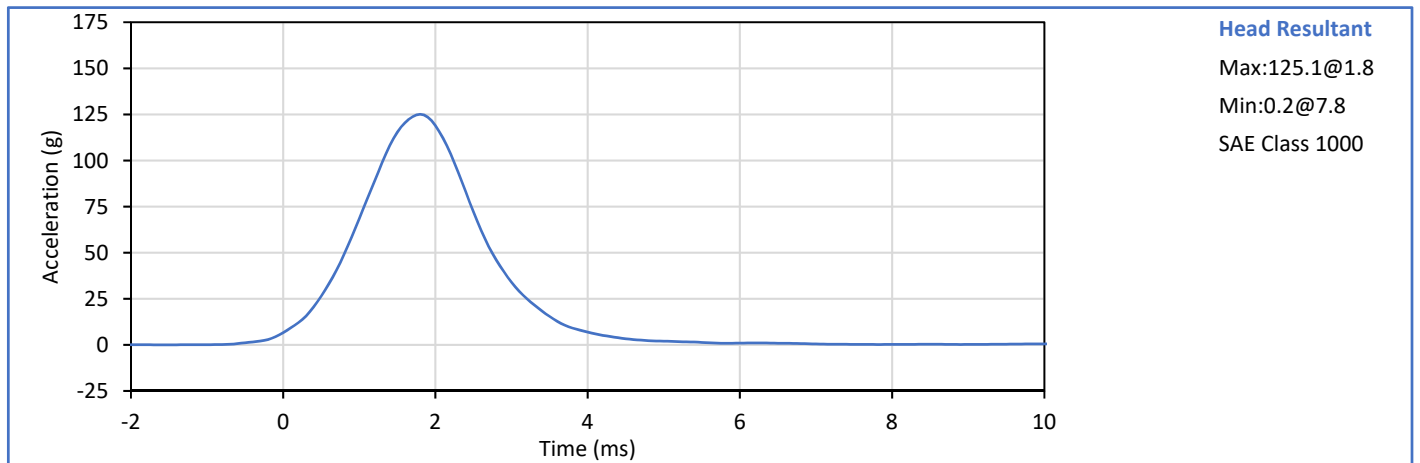


ES-2re 50th Male Side Impact ATD Head Drop

ATD Serial No.: F035

Test Date: 2018-09-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Humidity	%	10	70	28	Pass
Peak Resultant Acceleration	g	125.0	155.0	125.1	Pass
Peak Head Ax	g	-15.0	15.0	0.4	Pass
Oscillations After Main Pulse	%	0.0	15.0	0.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Technician: T. Lowman

Approved By: P. Puzzuto



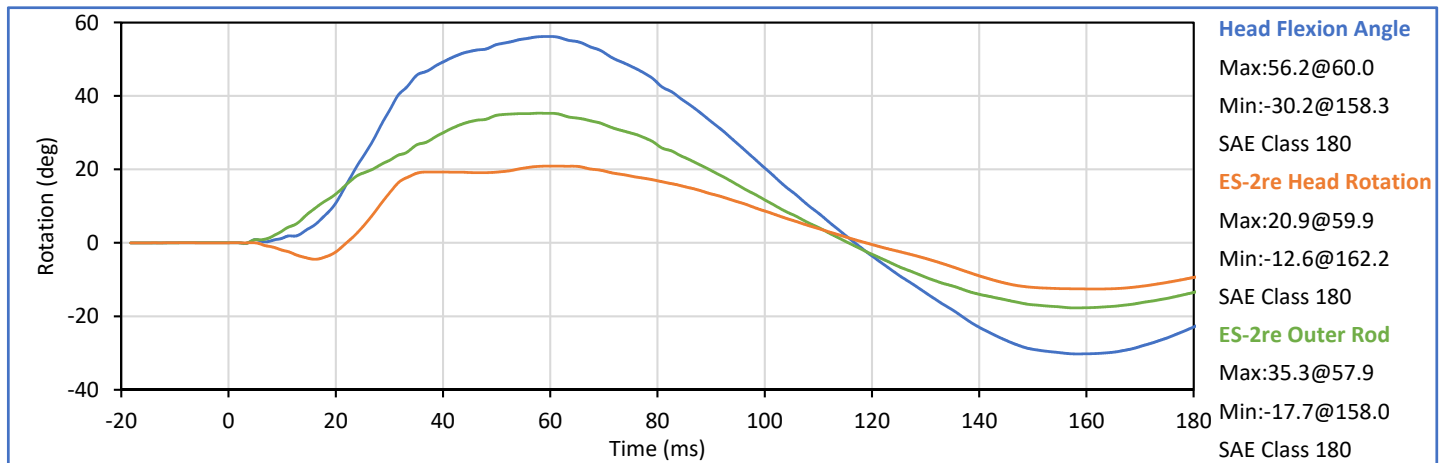
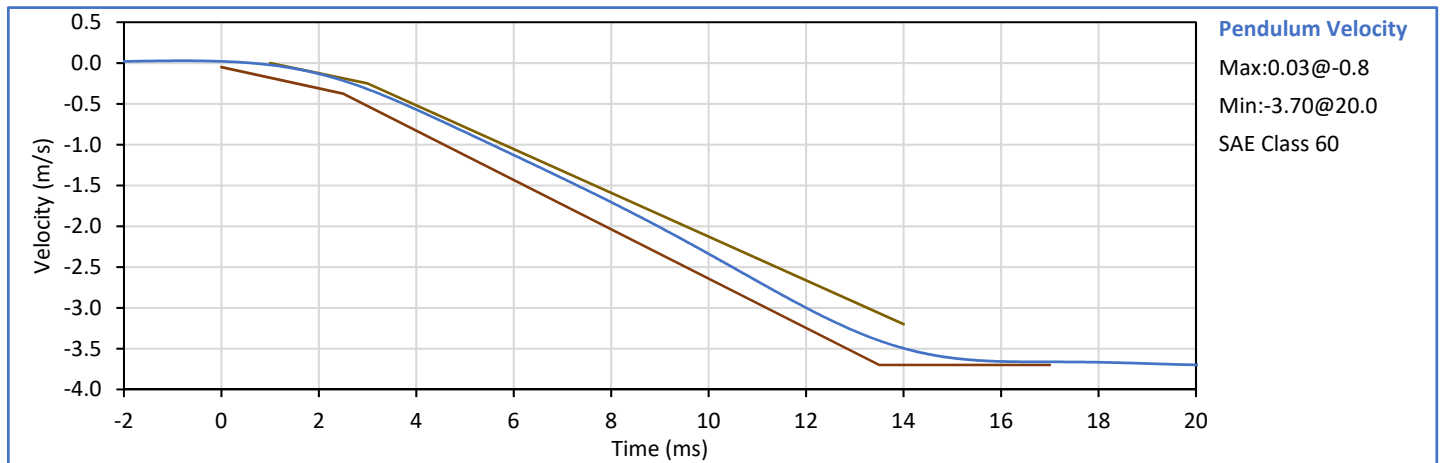
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
 Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	24	Pass
Pendulum Velocity	m/s	3.30	3.50	3.48	Pass
Peak Headform Flexion	deg	49.0	59.0	56.2	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	60.0	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	56.9	Pass
Overall Test Results					Pass



Technician: J. Hernandez

J. Hernandez

Approved By: P. Puzzuto

P. Puzzuto



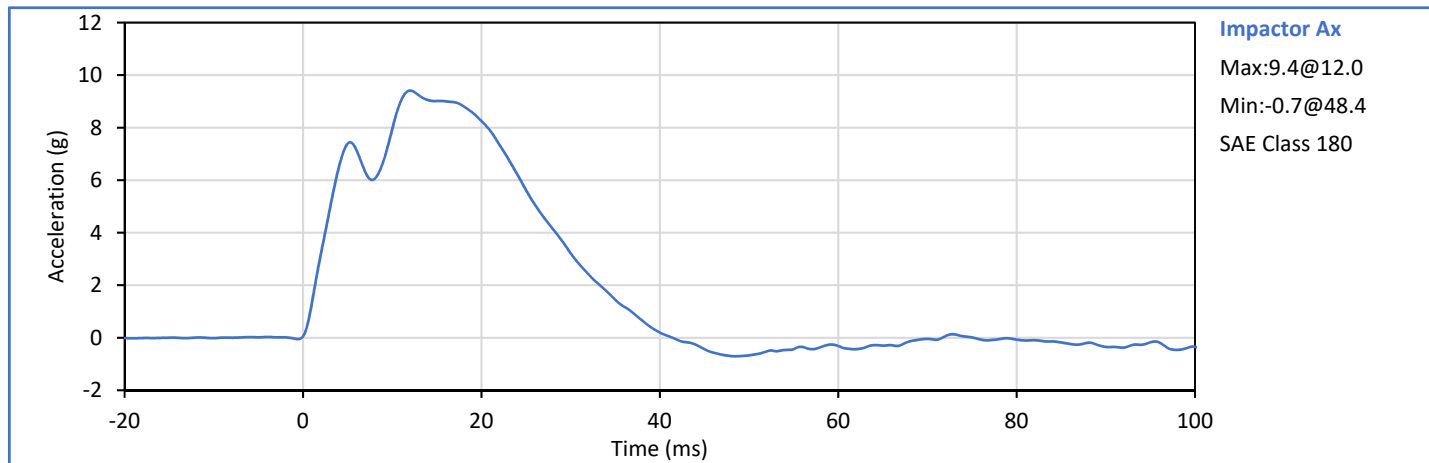
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	33	Pass
Impactor Velocity	m/s	4.20	4.40	4.29	Pass
Peak Impactor Ax	g	7.5	10.5	9.4	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



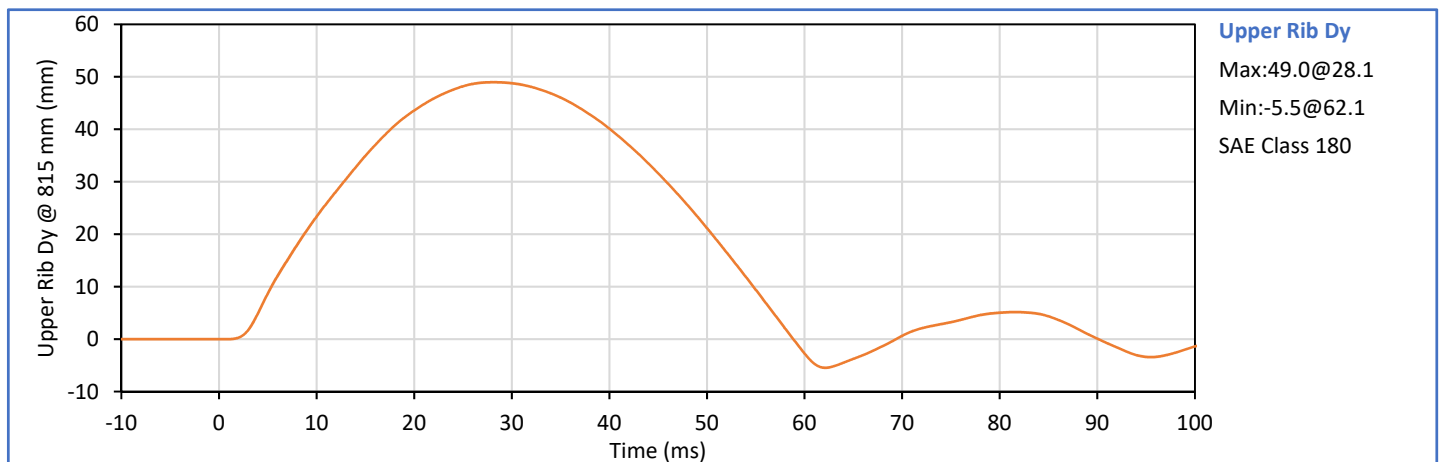
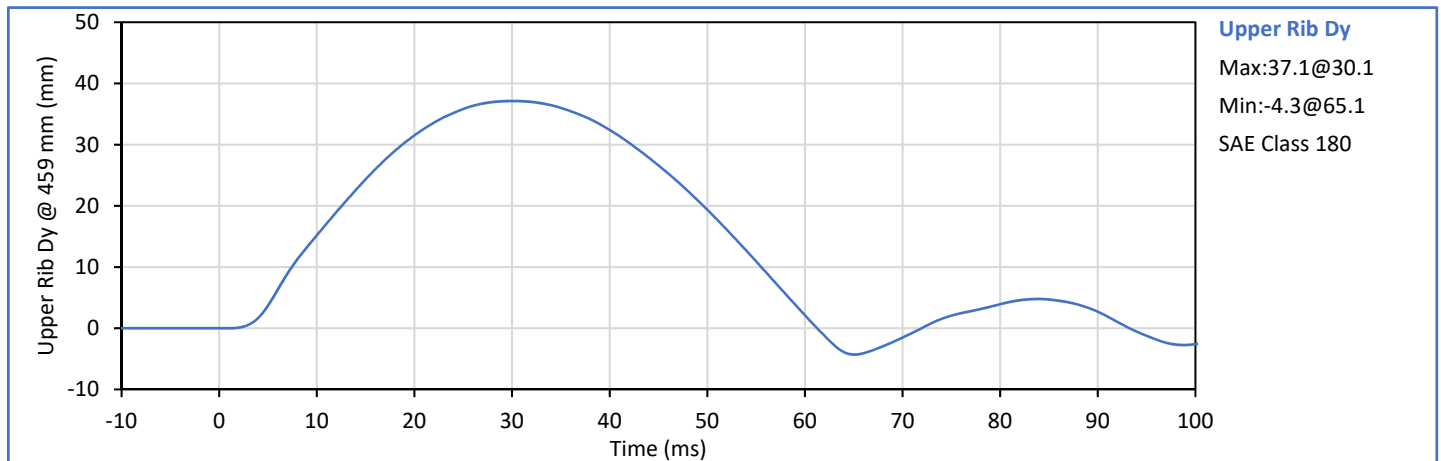
9270 Holly Road, Adelanto, CA 92301
Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	32	Pass
Upper Rib Dy @ (459mm)	mm	36.0	40.0	37.1	Pass
Upper Rib Dy @ (815mm)	mm	46.0	51.0	49.0	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



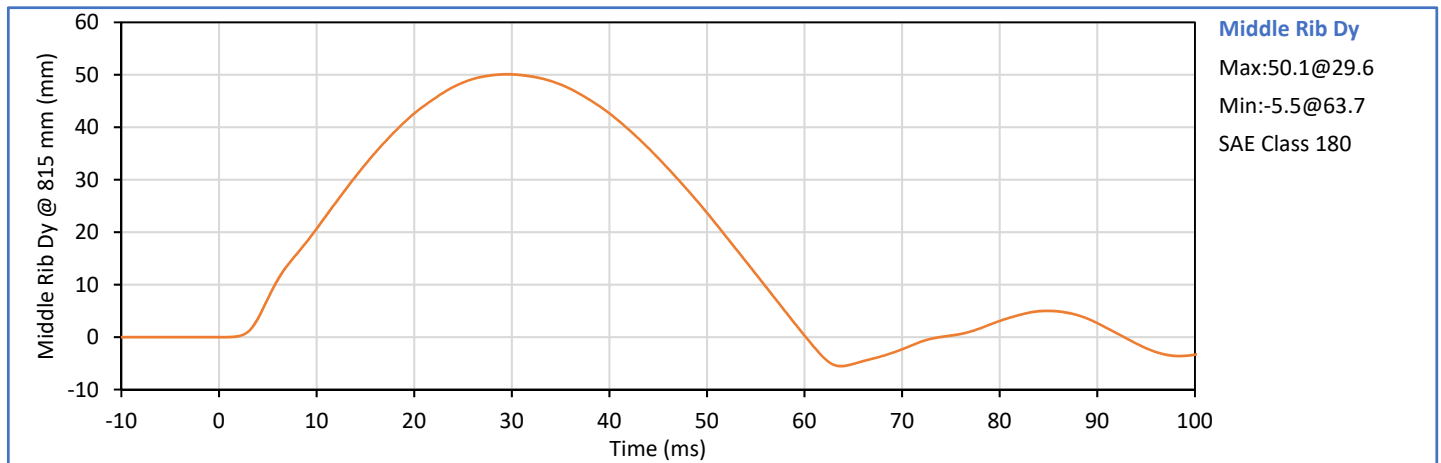
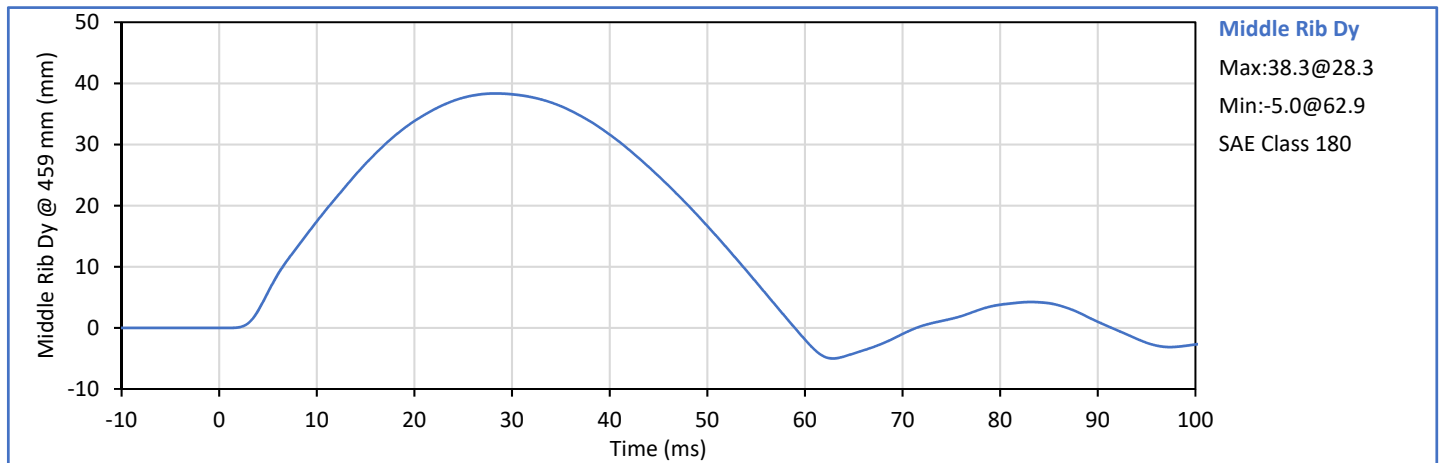
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
 Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	32	Pass
Middle Rib Dy @ (459mm)	mm	36.0	40.0	38.3	Pass
Middle Rib Dy @ (815mm)	mm	46.0	51.0	50.1	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



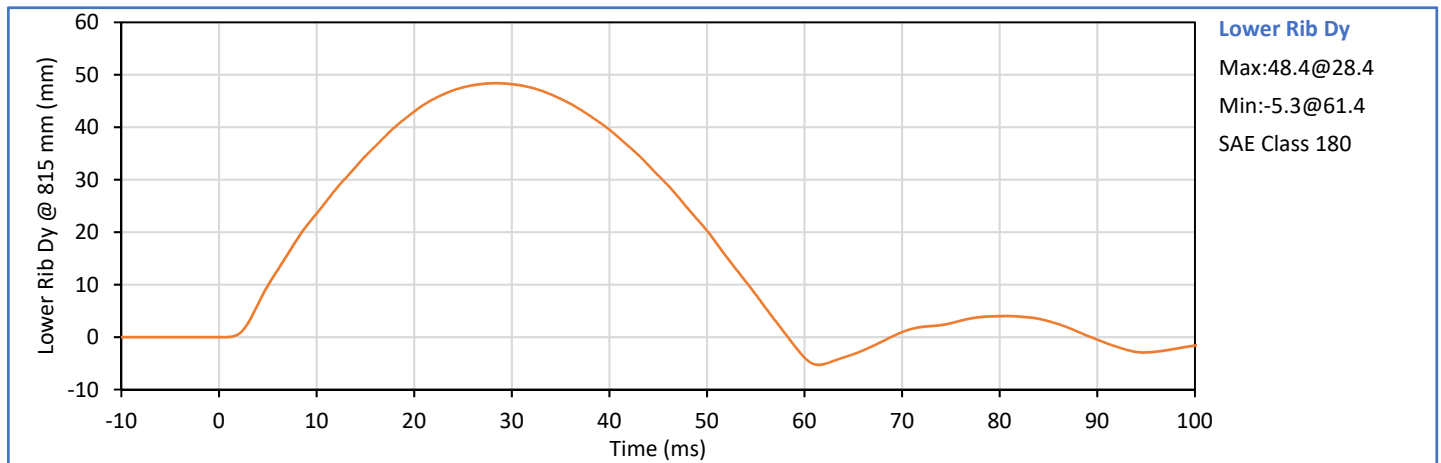
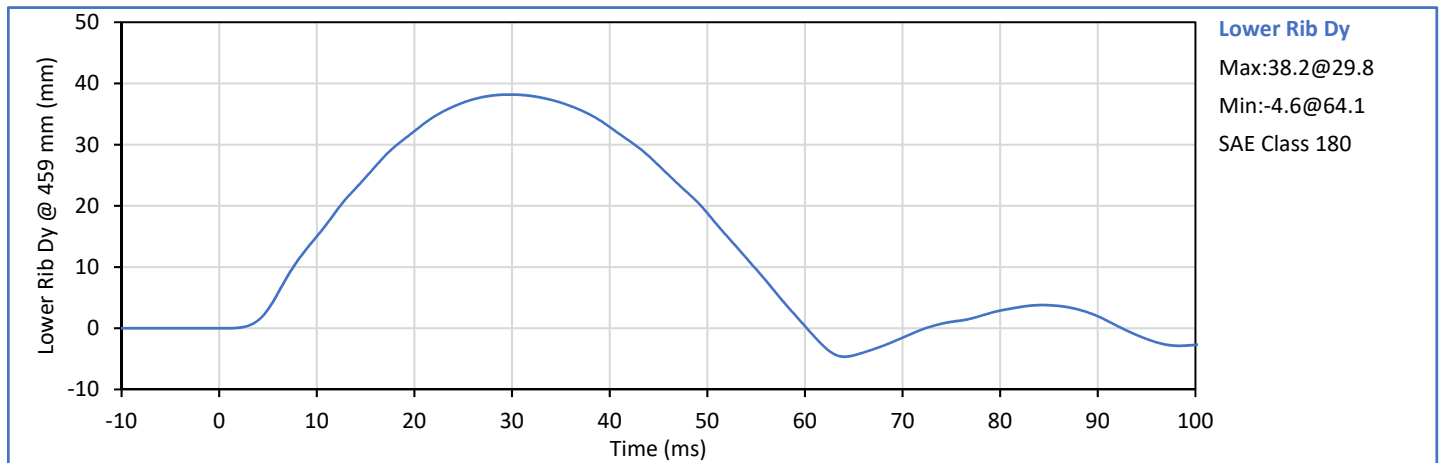
9270 Holly Road, Adelanto, CA 92301
 Tel: +1 760 246 1672 Fax: +1 760 246 8112
 Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	32	Pass
Lower Rib Dy @ (459mm)	mm	36.0	40.0	38.2	Pass
Lower Rib Dy @ (815mm)	mm	46.0	51.0	48.4	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

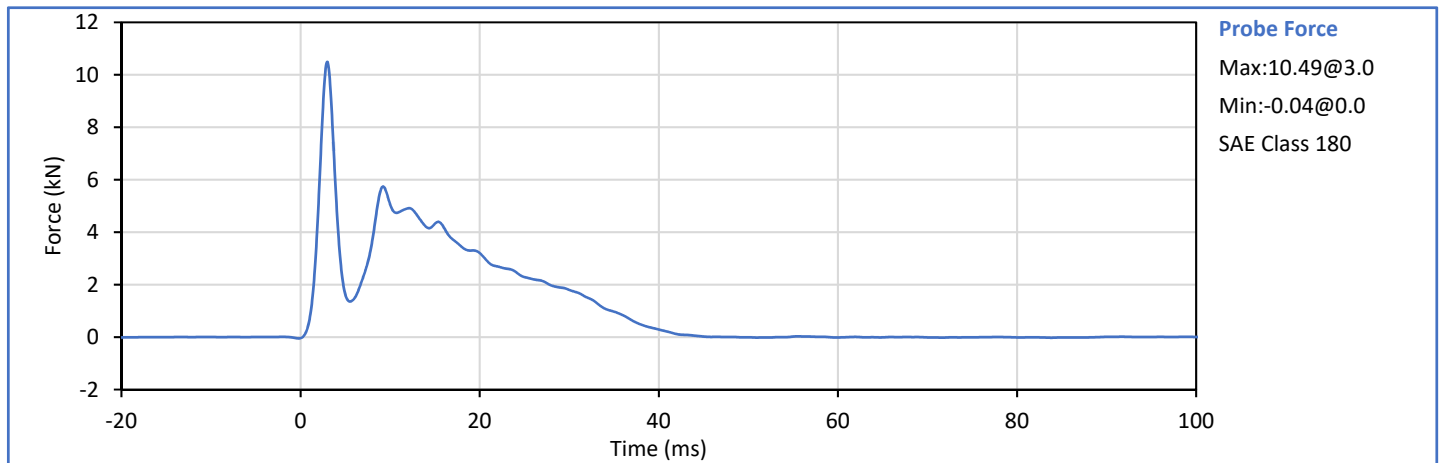
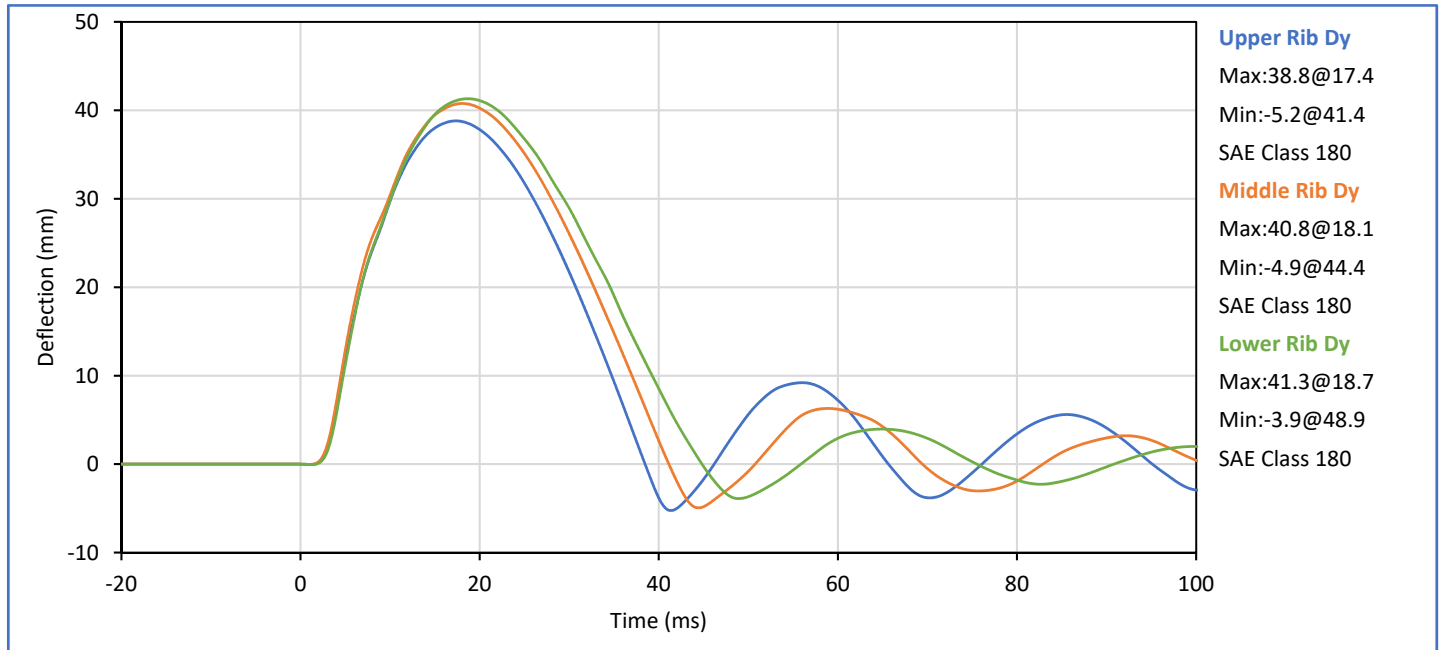


ES-2re 50th Male Side Impact ATD
Thorax Impact (Full Body)

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	5.40	5.60	5.58	Pass
Peak Upper Rib Dy	mm	34.0	41.0	38.8	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.8	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.3	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.74	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

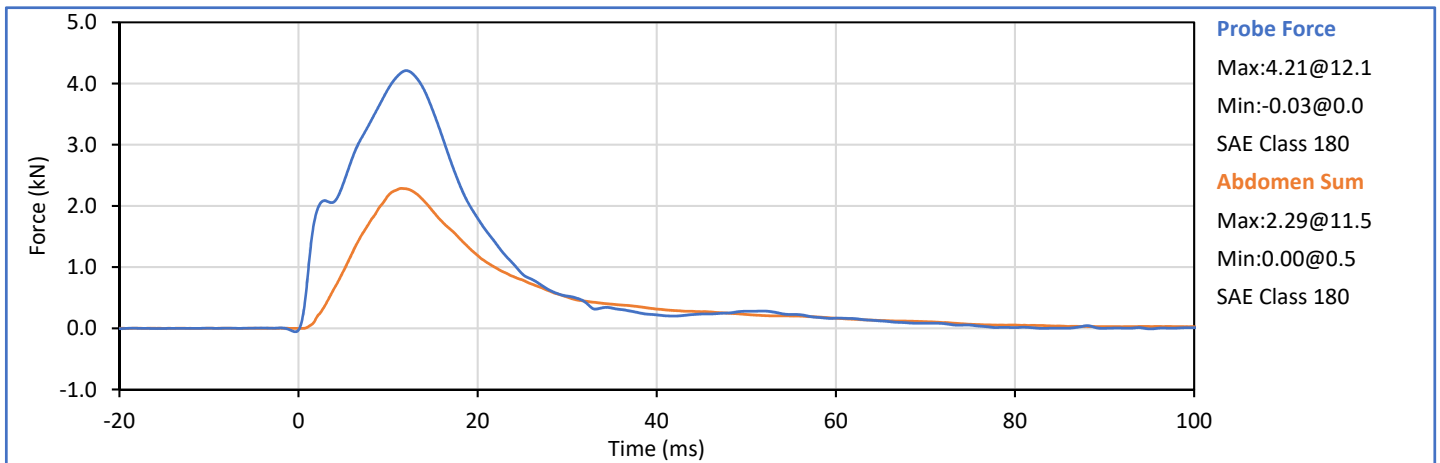
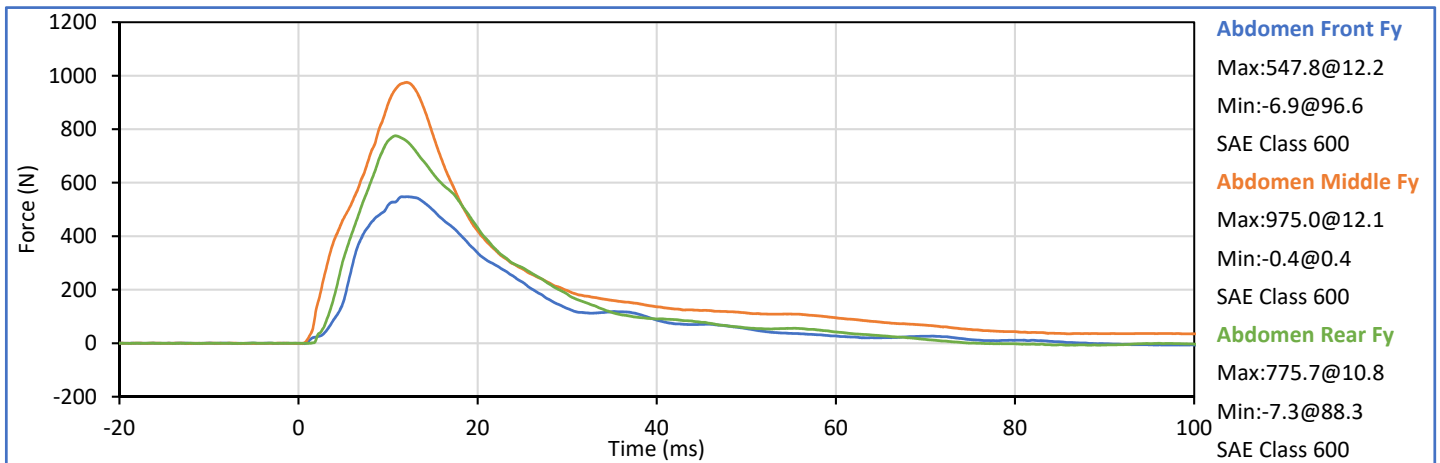


ES-2re 50th Male Side Impact ATD Abdomen Impact

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	3.90	4.10	4.02	Pass
Peak Impactor Force	kN	4.00	4.80	4.21	Pass
Time of Peak Impactor Force	ms	10.6	13.0	12.1	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.29	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.5	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

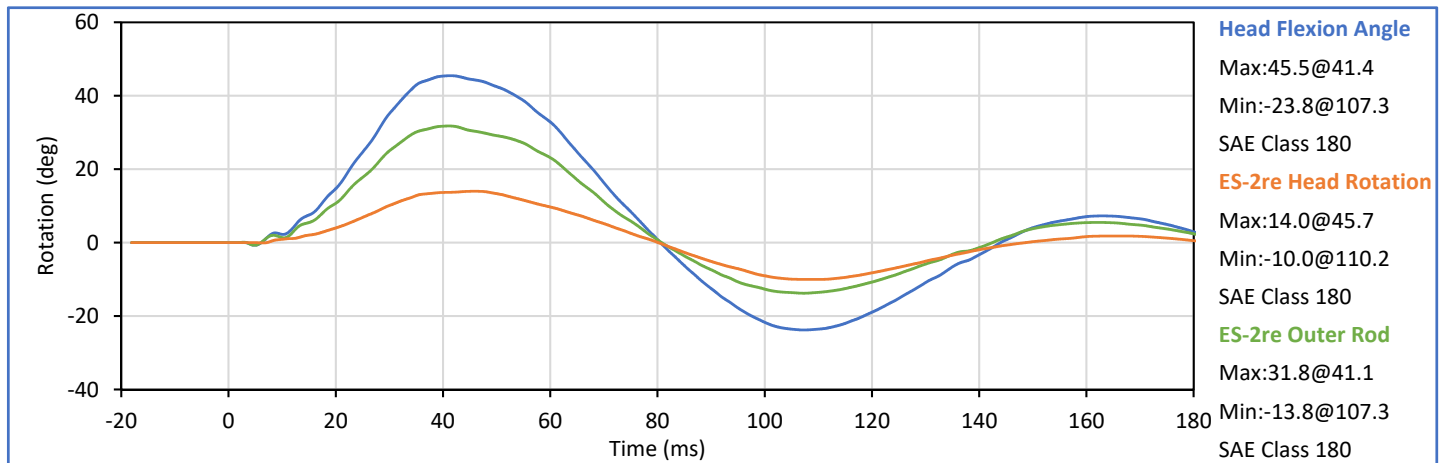
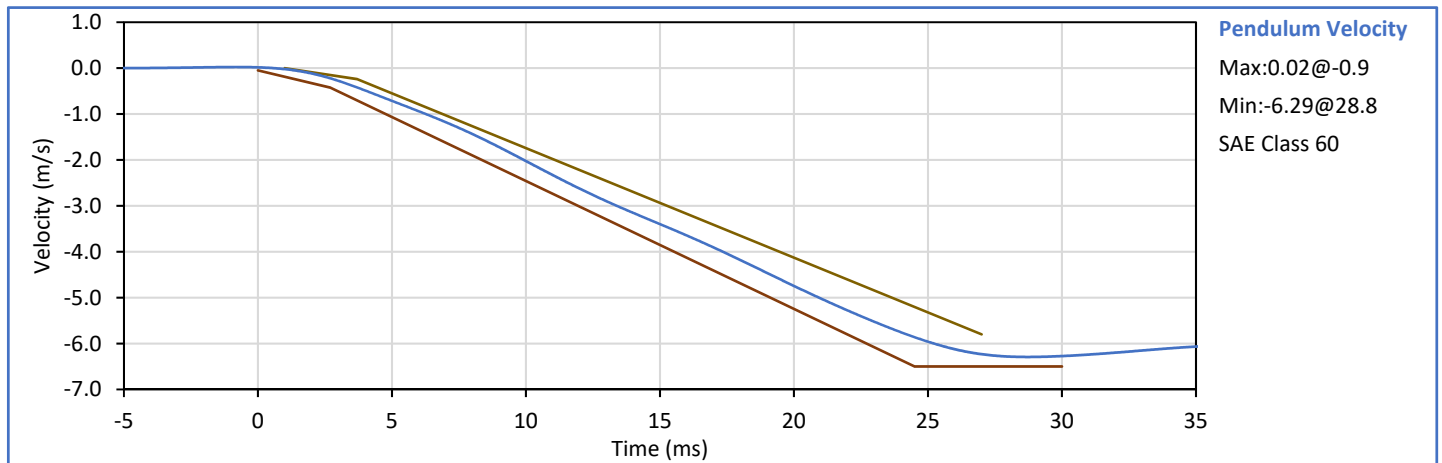


ES-2re 50th Male Side Impact ATD Lumbar Spine Flexion

ATD Serial No.: F035

Test Date: 2018-09-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	25	Pass
Pendulum Velocity	m/s	5.95	6.15	6.14	Pass
Peak Headform Flexion	deg	45.0	55.0	45.5	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	41.4	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	39.2	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

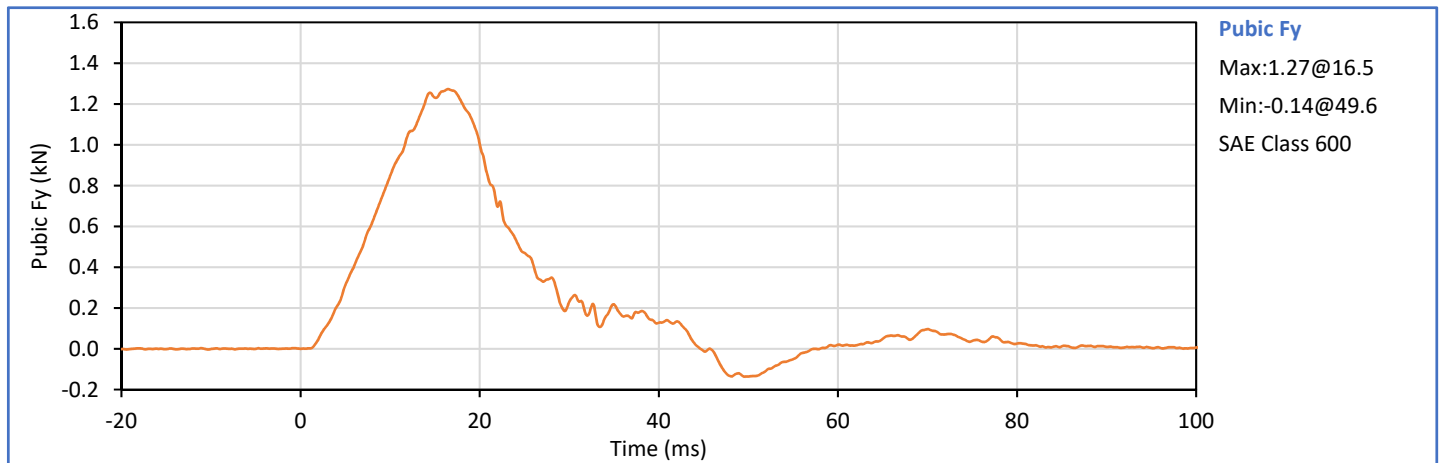
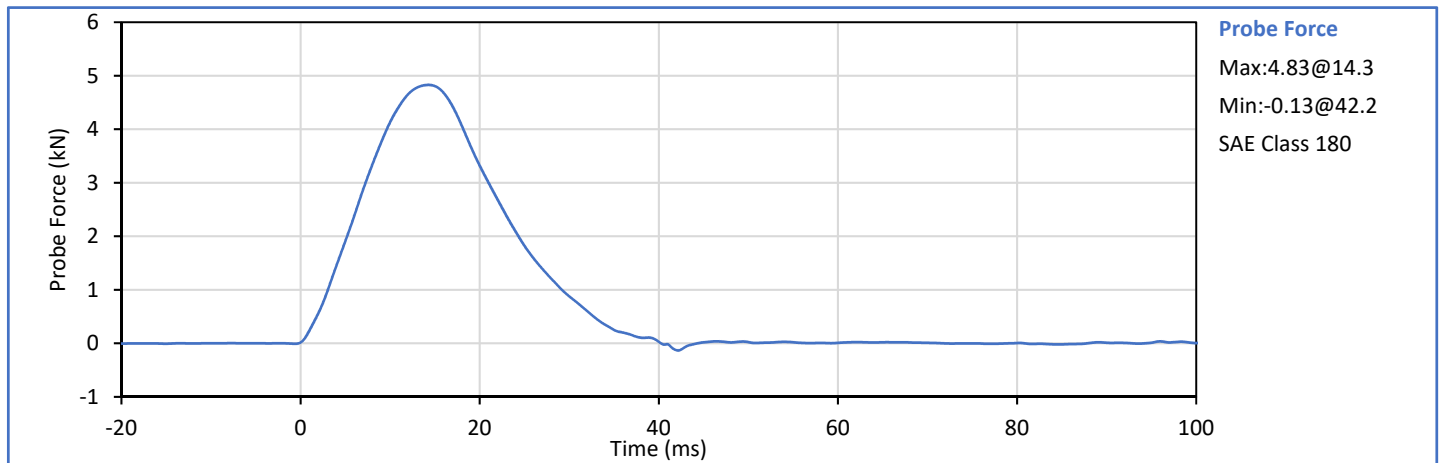


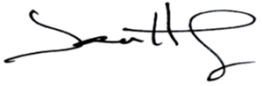
ES-2re 50th Male Side Impact ATD
Pelvis Impact

ATD Serial No.: F035

Test Date: 2018-09-24

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	32	Pass
Impactor Velocity	m/s	4.20	4.40	4.38	Pass
Peak Impactor Force	kN	4.70	5.40	4.83	Pass
Time of Peak Impactor Force	ms	11.8	16.1	14.3	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.27	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	16.5	Pass
Overall Test Results				Pass	



Technician: 
J. Hernandez

Approved By: 
P. Puzzuto



SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
A - Sitting Height	mm	772	788	782	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	87	Pass
D - H Point From Seatback	mm	141	151	146	Pass
E - Shoulder Pivot From Backline	mm	97	107	103	Pass
F - Thigh Clearance	mm	119	135	126	Pass
G - Head Breadth	mm	140	148	145	Pass
H - Head Back From Backline	mm	40	46	42	Pass
I - Head Depth	mm	178	188	185	Pass
J - Head Circumference	mm	541	551	547	Pass
K - Buttock To Knee Length	mm	514	540	520	Pass
L - Popliteal Height	mm	343	369	350	Pass
K - Knee Pivot To Floor Height	mm	392	409	401	Pass
N - Buttock Popliteal Length	mm	416	442	427	Pass
O - Chest Depth W/O Jacket	mm	195	211	206	Pass
P - Foot Length	mm	216	232	227	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	321	Pass
R - Arm Length	mm	249	259	256	Pass
S - Knee Joint To Seatback	mm	477	493	484	Pass
V - Shoulder Width	mm	341	357	348	Pass
W - Foot Width	mm	78	94	84	Pass
Y - Chest Circumference W/Jacket	mm	851	881	871	Pass
Z - Waist Circumference	mm	761	791	776	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

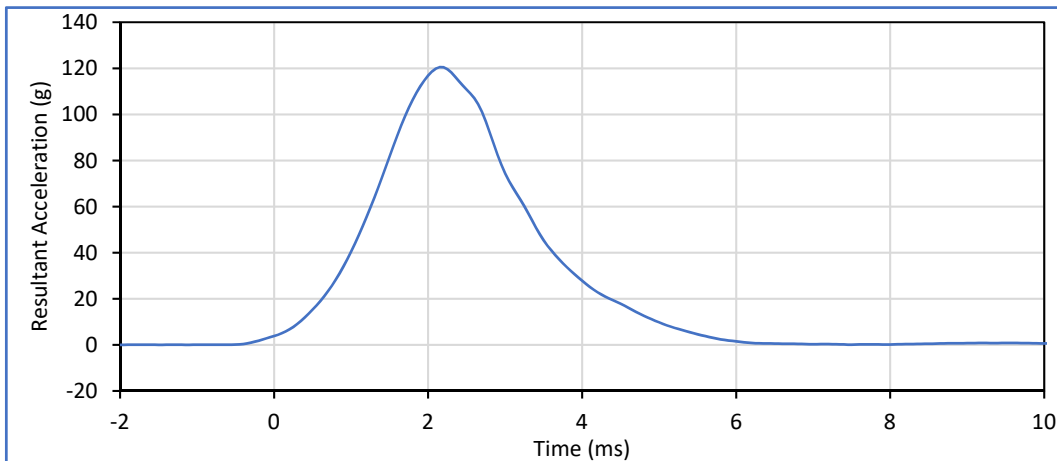


SID-IIs Small Side Impact ATD Head Drop

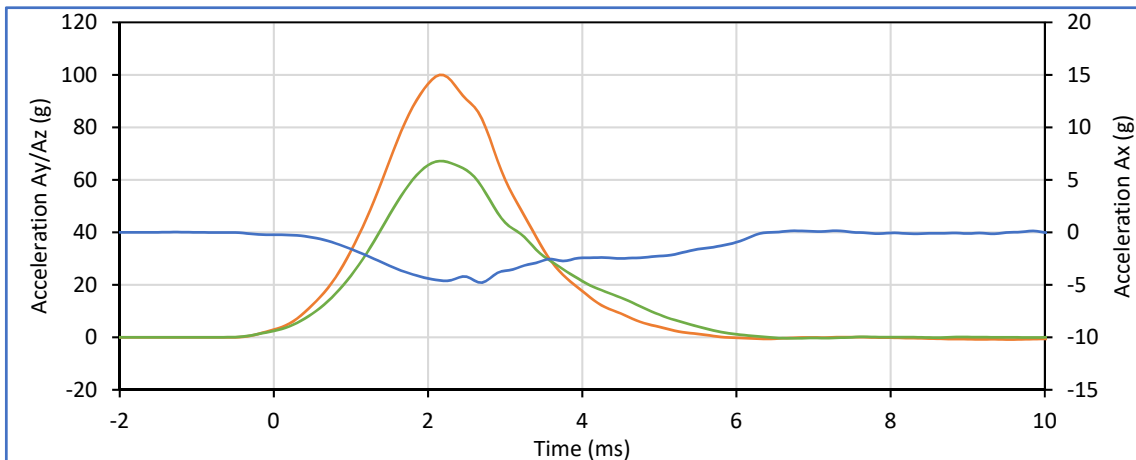
ATD Serial No.: 308

Test Date: 2018-09-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Humidity	%	10	70	28	Pass
Peak Resultant Acceleration	g	115.0	137.0	120.5	Pass
Peak Head Ax	g	-15.0	15.0	-4.8	Pass
Oscillations After Main Pulse	%	0.0	15.0	0.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
Max:120.5@2.2
Min:0.0@7.5
SAE Class 1000



Head Ax
Max:0.2@7.3
Min:-4.8@2.7
SAE Class 1000
Head Ay
Max:100.0@2.2
Min:-0.8@9.6
SAE Class 1000
Head Az
Max:67.2@2.2
Min:-0.4@6.8
SAE Class 1000

Technician: T. Lowman

Approved By: P. Puzzuto

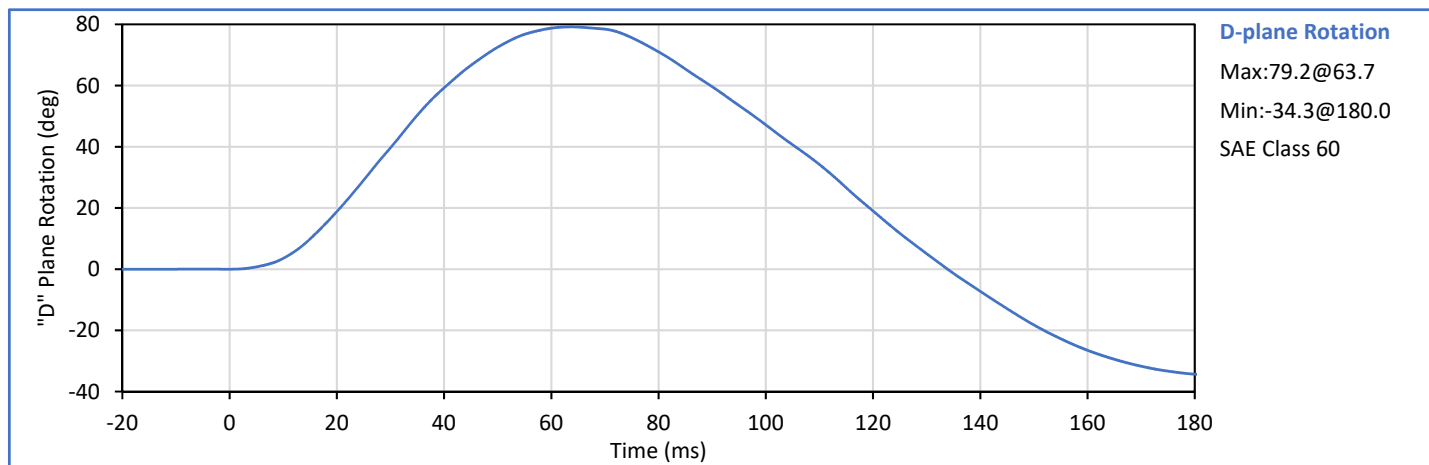
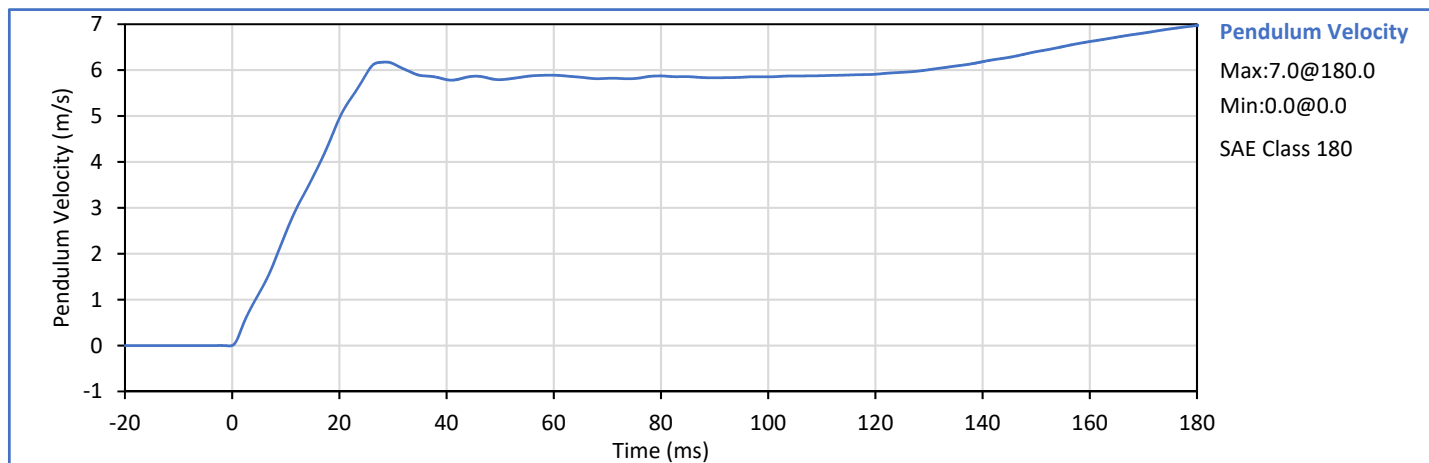


SID-IIs Small Side Impact ATD Neck Flexion

ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	26	Pass
Pendulum Velocity	m/s	5.51	5.63	5.55	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	3.66	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.95	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.91	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	6.18	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	79.2	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	63.7	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.0	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	118.3	Pass
Overall Test Results				Pass	

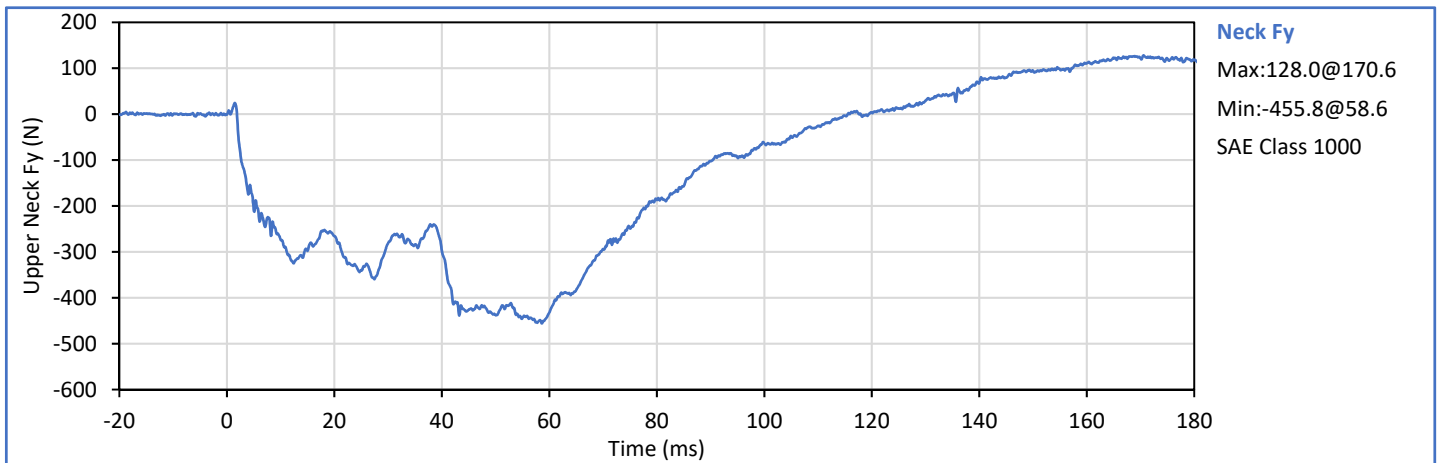
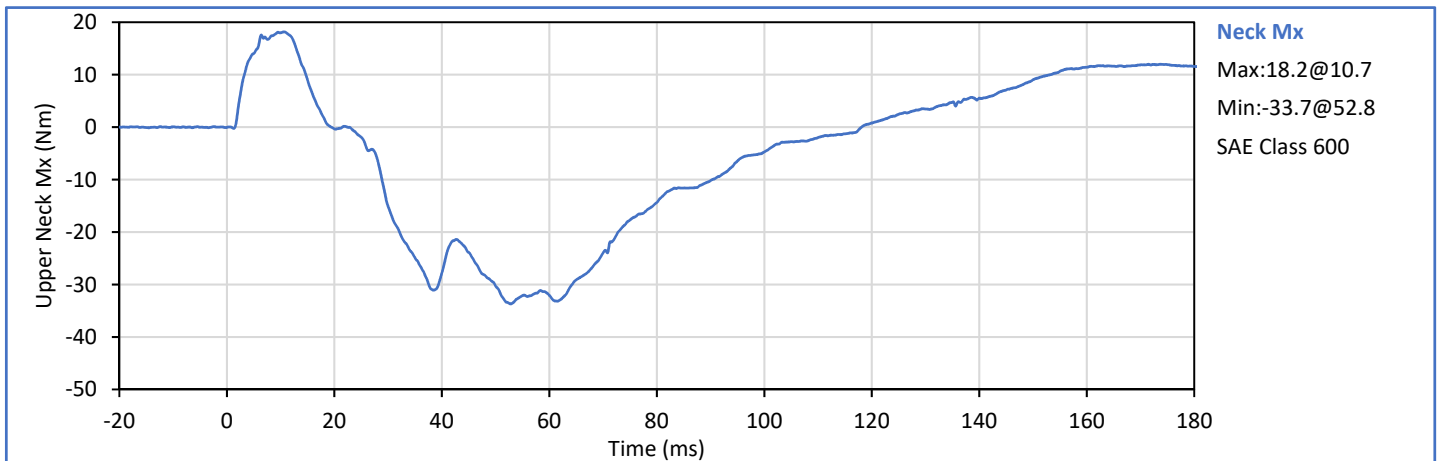
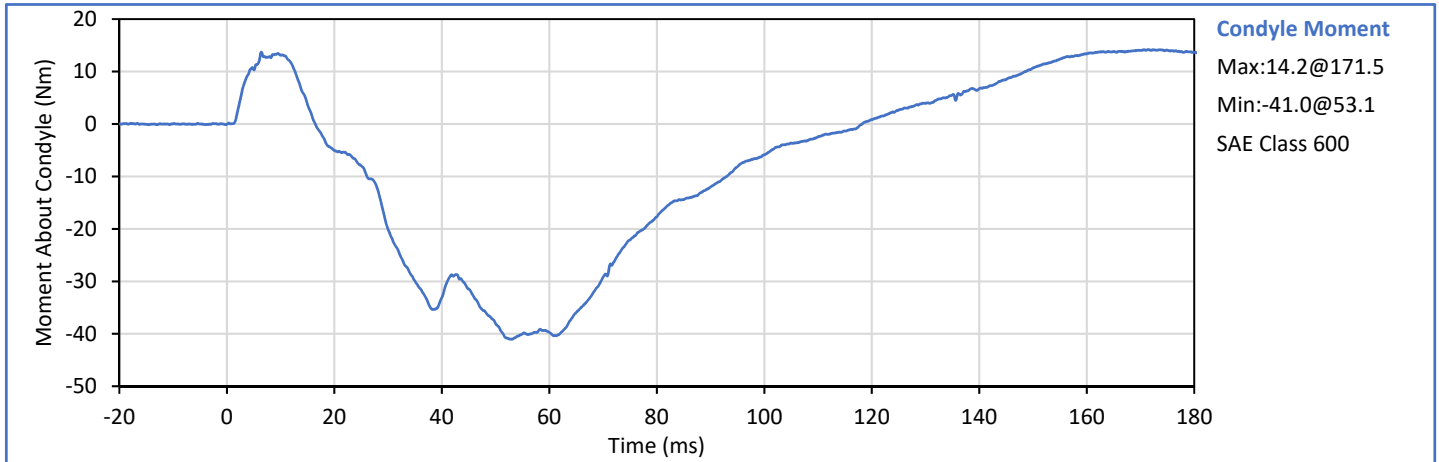


Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308

Test Date: 2018-09-20



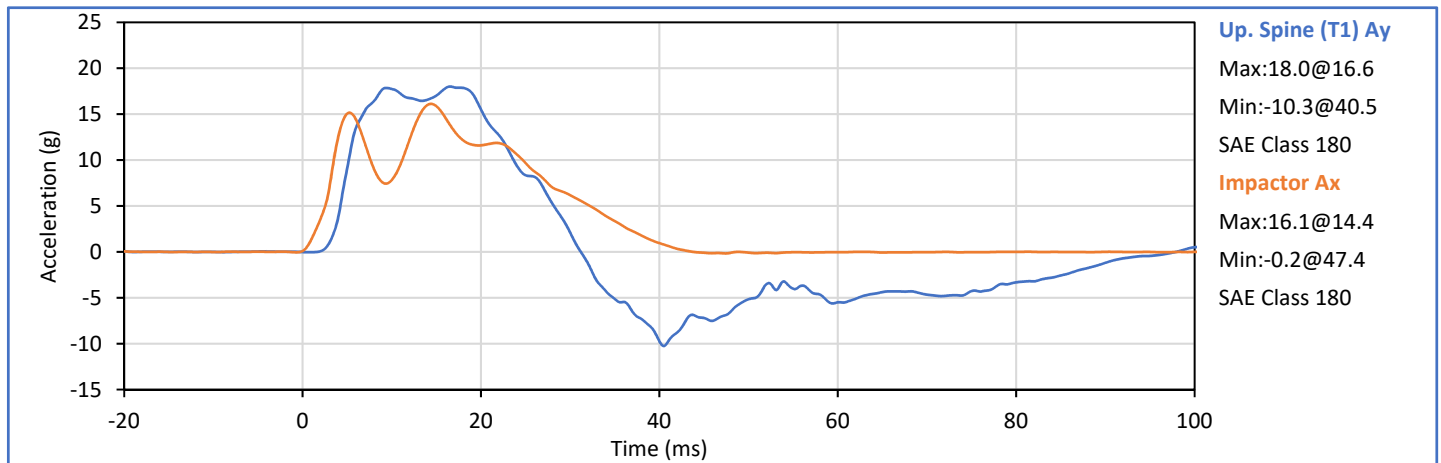
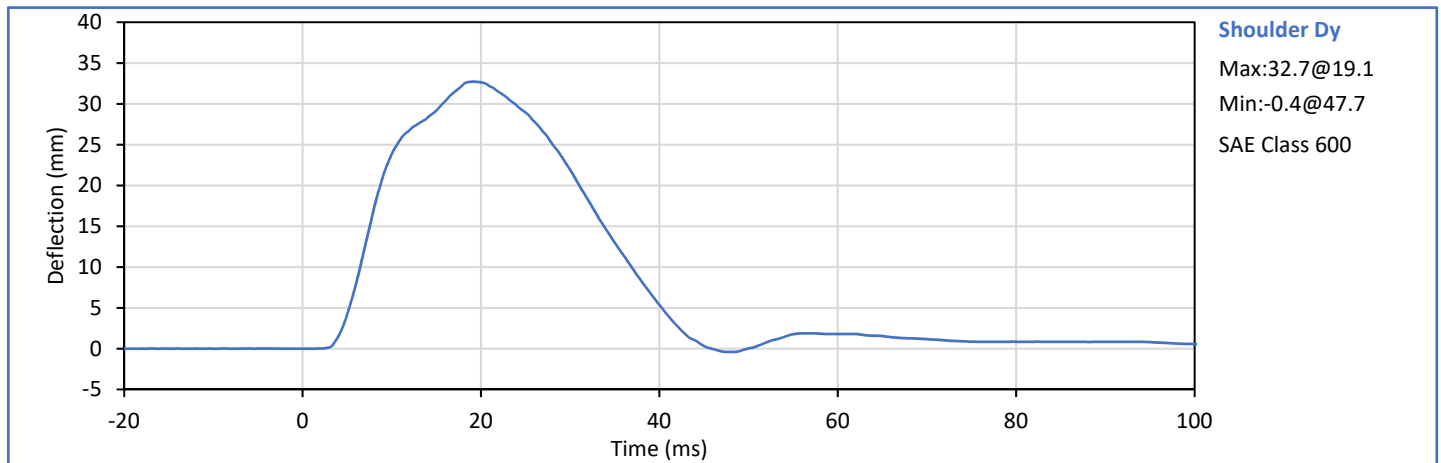


SID-IIs Small Side Impact ATD Shoulder Impact Test

ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	4.20	4.40	4.35	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.7	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.0	Pass
Peak Impactor Ax	g	13.0	18.0	16.1	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

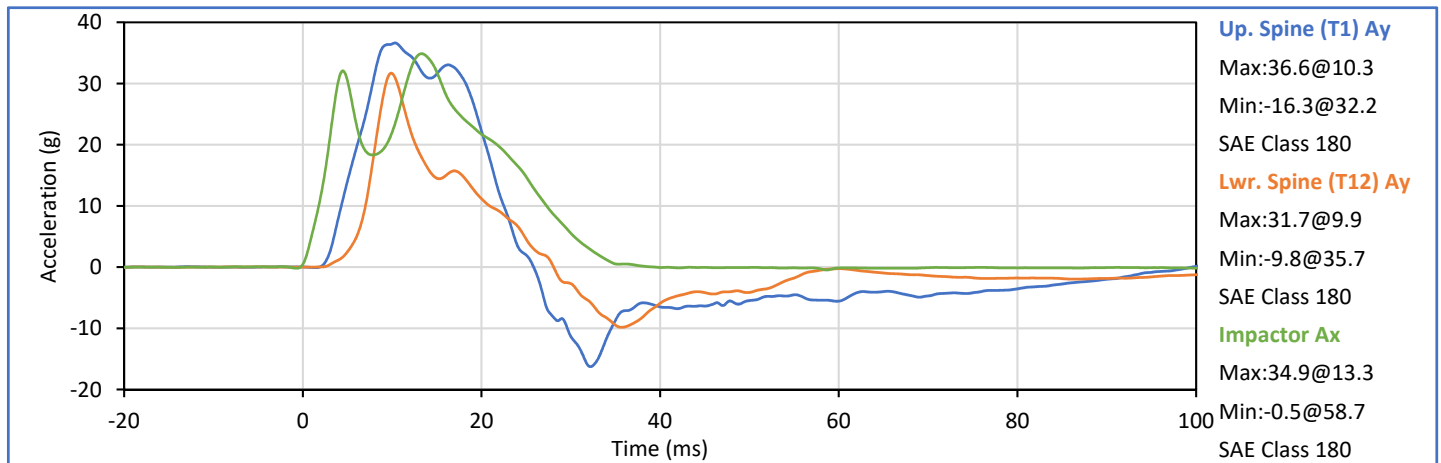
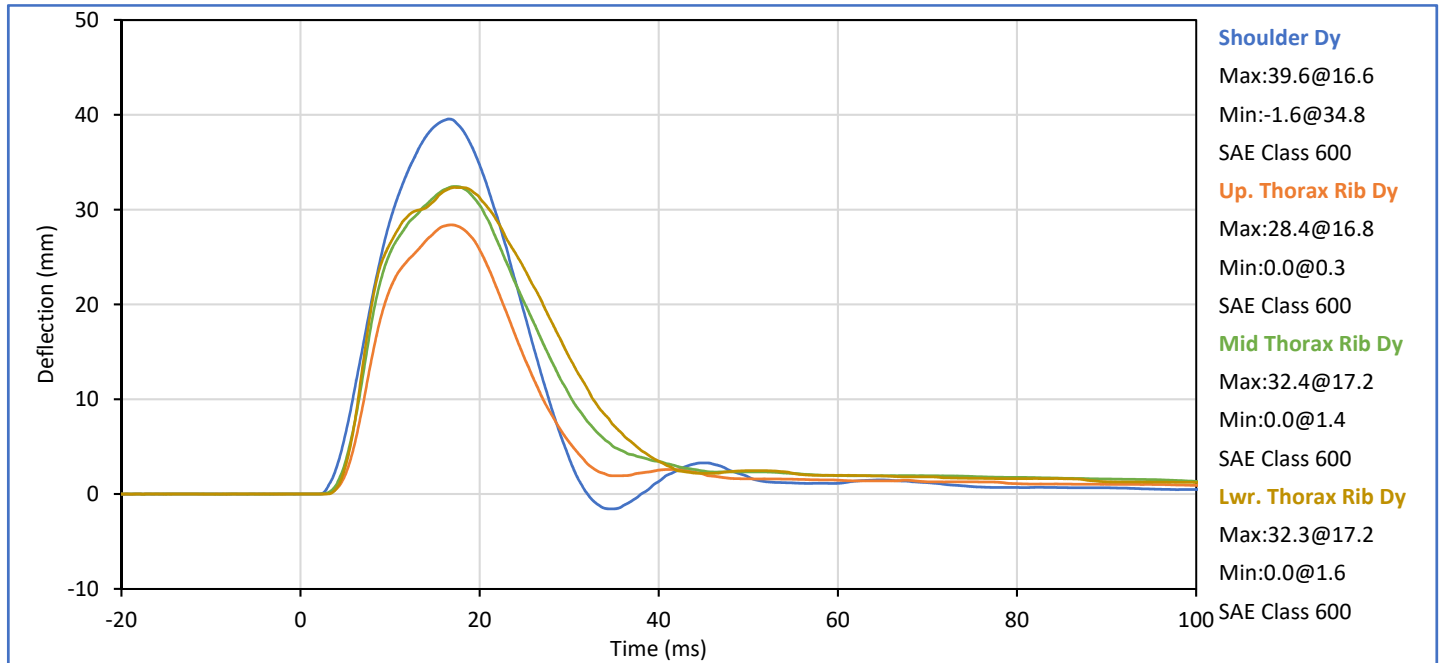


SID-IIs Small Side Impact ATD Thorax (With Arm)

ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	6.60	6.80	6.68	Pass
Peak Shoulder Dy	mm	31.0	40.0	39.6	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.4	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.4	Pass
Peak Lower Rib Dy	mm	32.0	38.0	32.3	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.6	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	31.7	Pass
Peak Impactor Ax	g	30.0	36.0	34.9	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

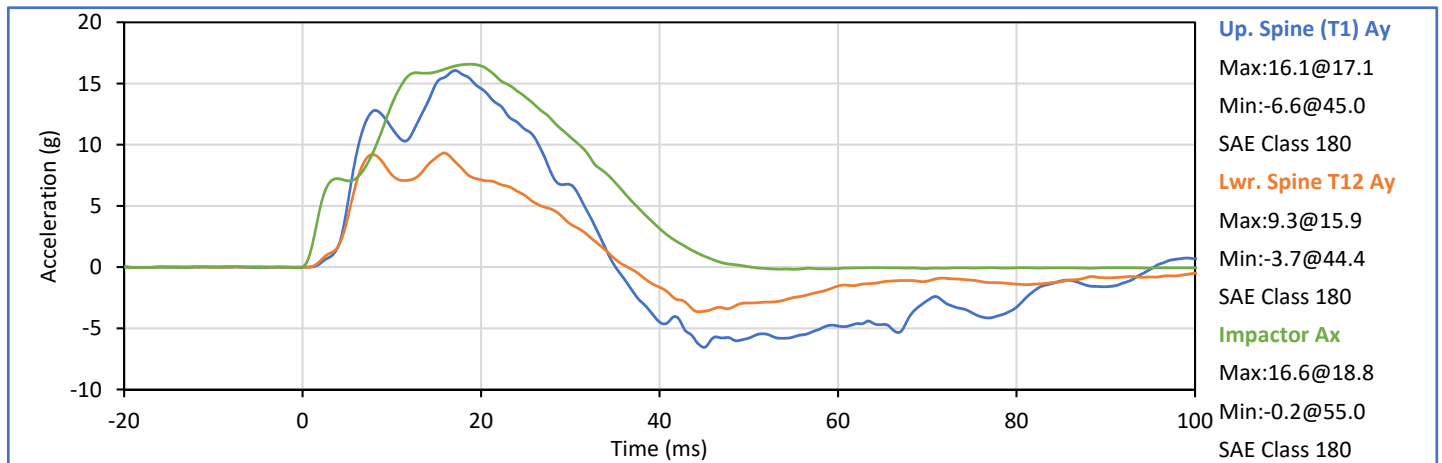
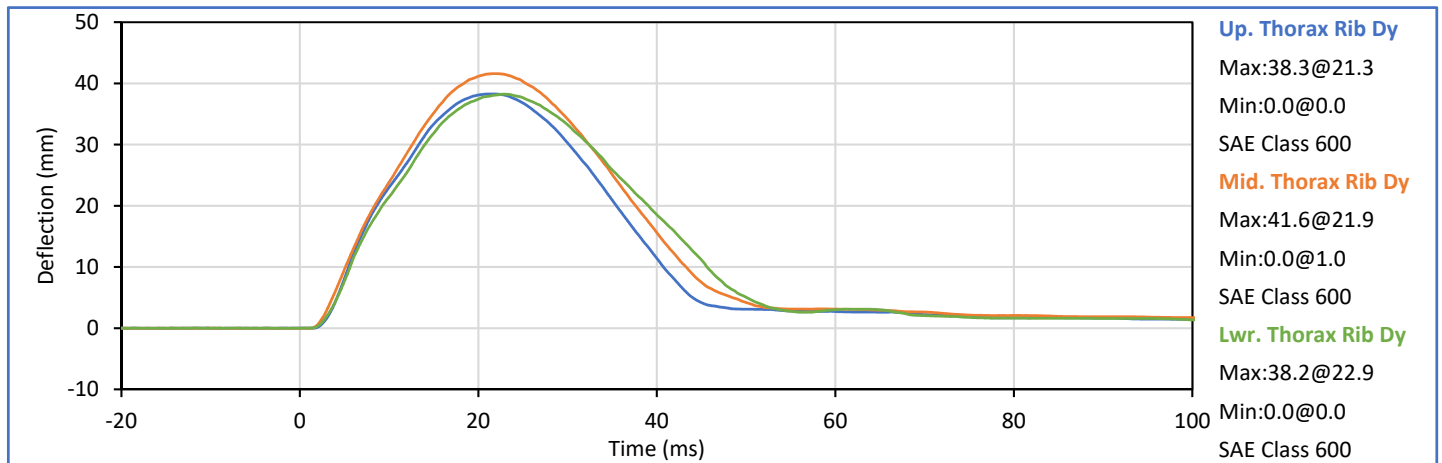
Approved By: P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	4.20	4.40	4.35	Pass
Peak Upper Rib Dy	mm	32.0	40.0	38.3	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.6	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.2	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	16.1	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.3	Pass
Peak Impactor Ax	g	14.0	18.0	16.6	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

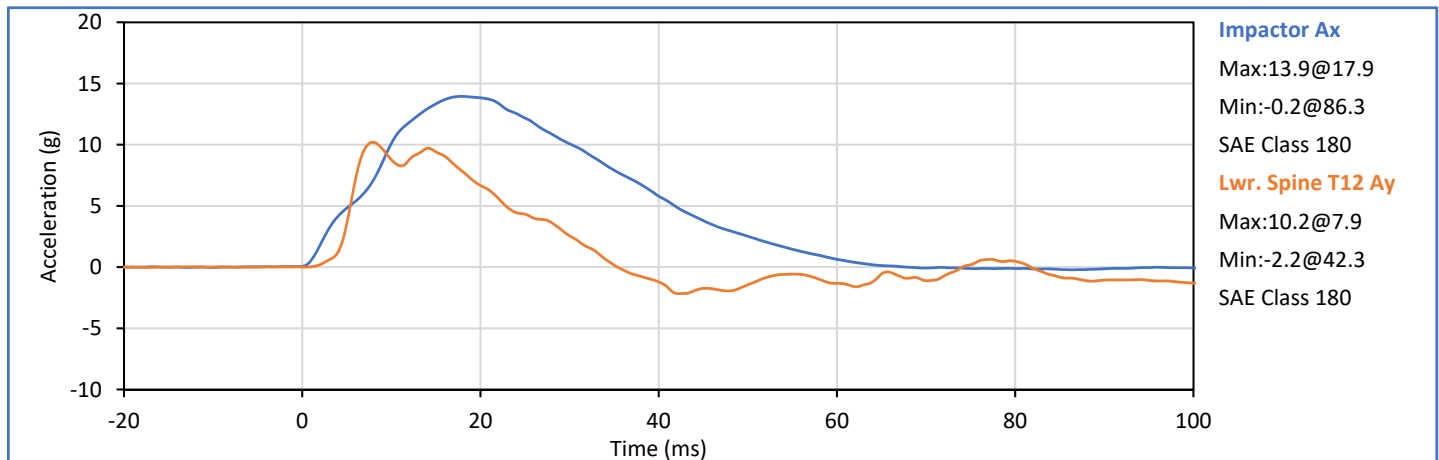
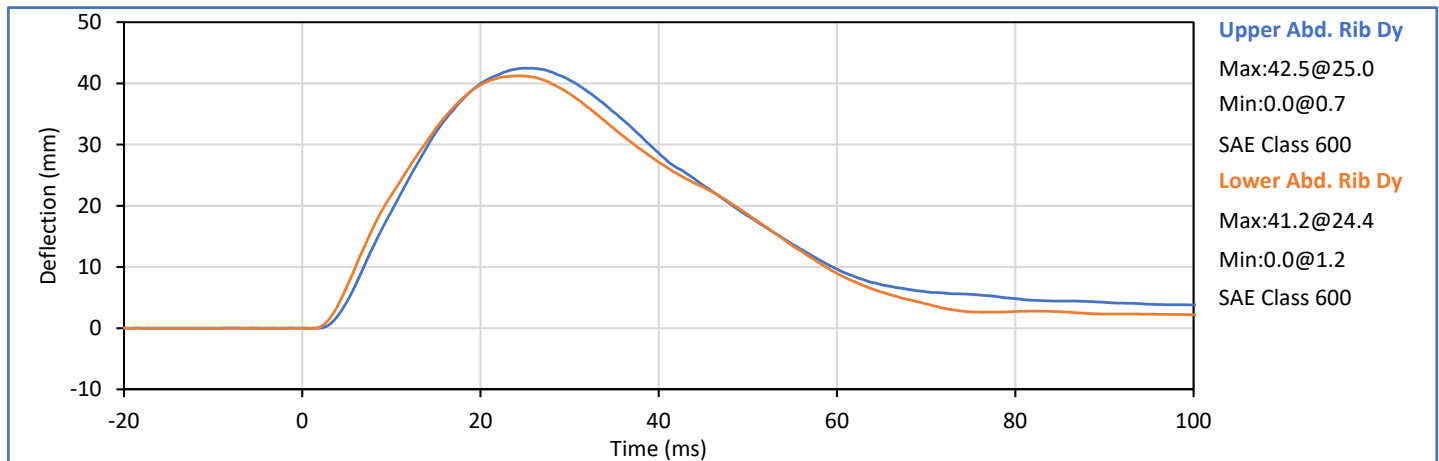


SID-IIs Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	24	Pass
Impactor Velocity	m/s	4.20	4.40	4.35	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.5	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.2	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.2	Pass
Peak Impactor Ax	g	12.0	16.0	13.9	Pass
Overall Test Results				Pass	Pass



Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto



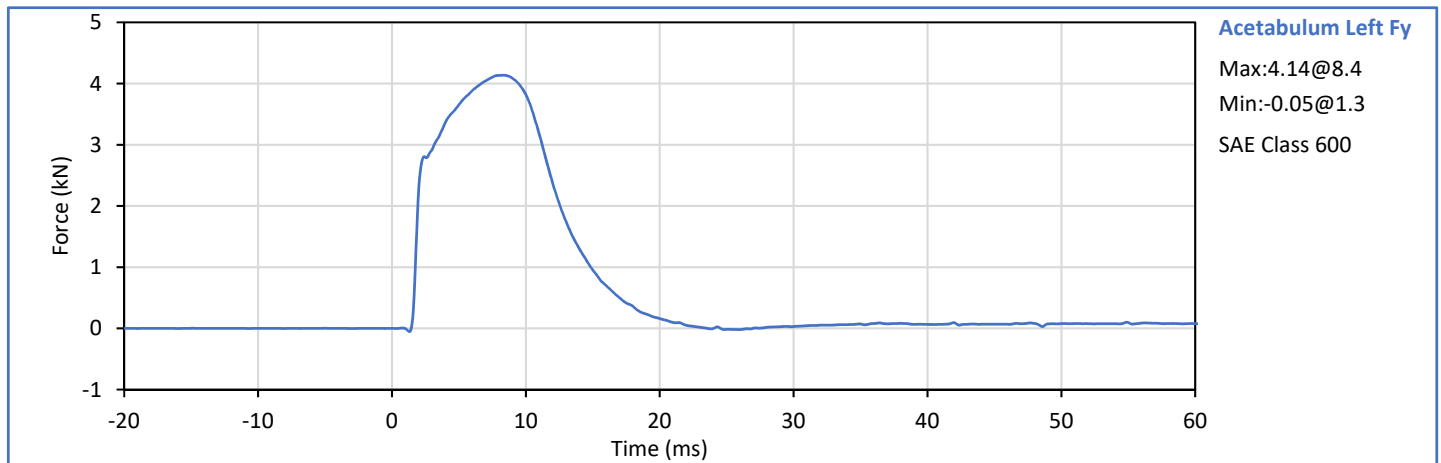
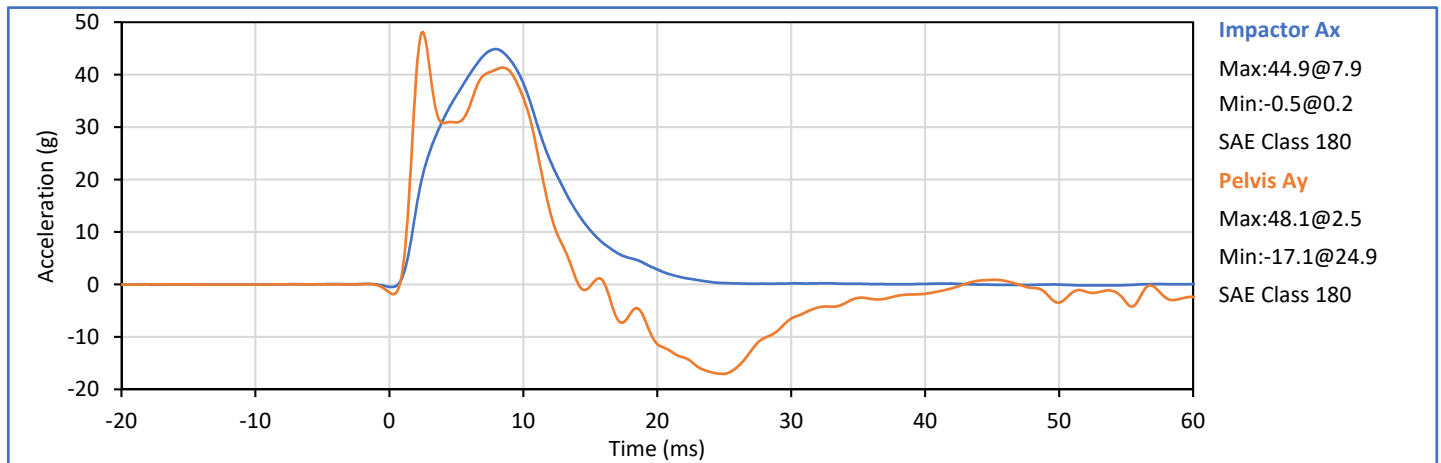
SID-II Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308

Test Date: 2018-09-20

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	6.60	6.80	6.65	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.14	Pass
Pelvis Ay after 6ms	g	34.0	42.0	41.4	Pass
Peak Impactor Ax	g	38.0	47.0	44.9	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12241 (SACO)



Technician: J. Hernandez

Approved By: P. Puzzuto



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SID-IIs Small Side Impact ATD Pelvis Acetabulum Impact

ATD Serial No.: 308

Test Date: 2018-09-20

Pelvis Plug S/N: 12241 (SACO)



SID-IIs Pelvis Plug Certification Test

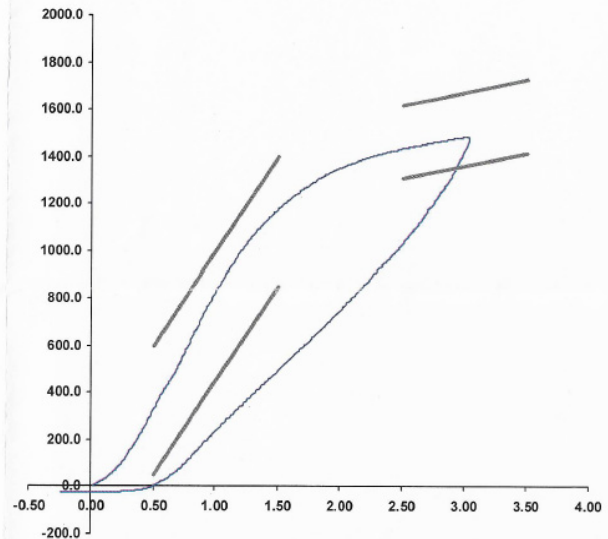
Plug S/N 12241
Test Number 6627
Report Number 6642
Test Date 3/14/2018 1:07:40 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	330.05	50.00	600.00
Force @ 1.5 mm (N)	1,177.90	850.00	1,400.00
Force @ 2.5 mm (N)	1,433.95	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,482.69	1,361.00	1,673.00

Testing Machine STM-20 5965642
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 14-Mar-18
SACO Research

By: DC Date: 3/14/18

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



SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

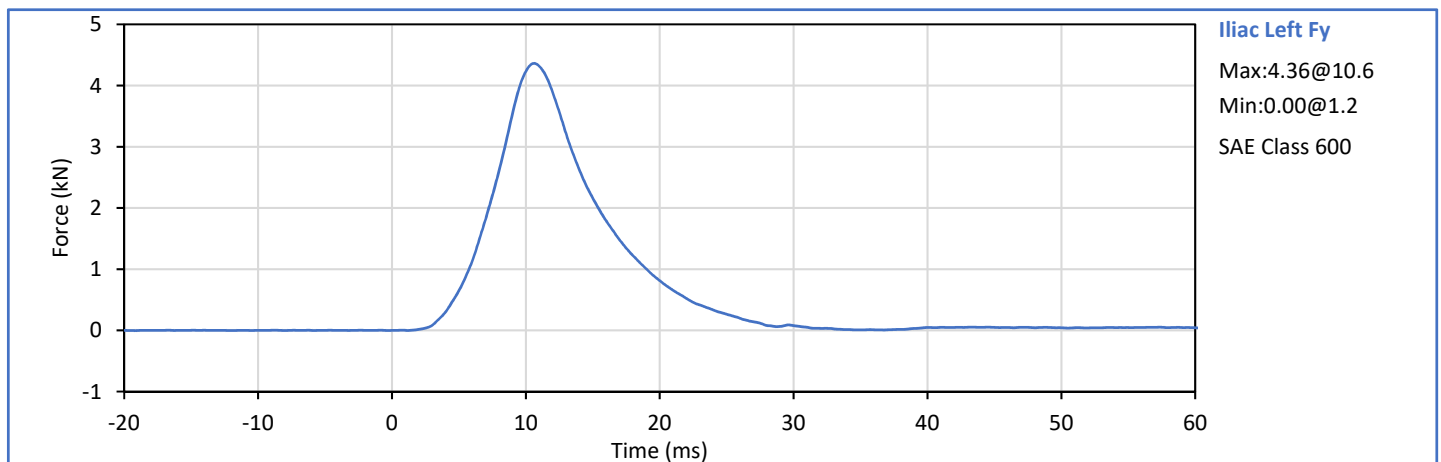
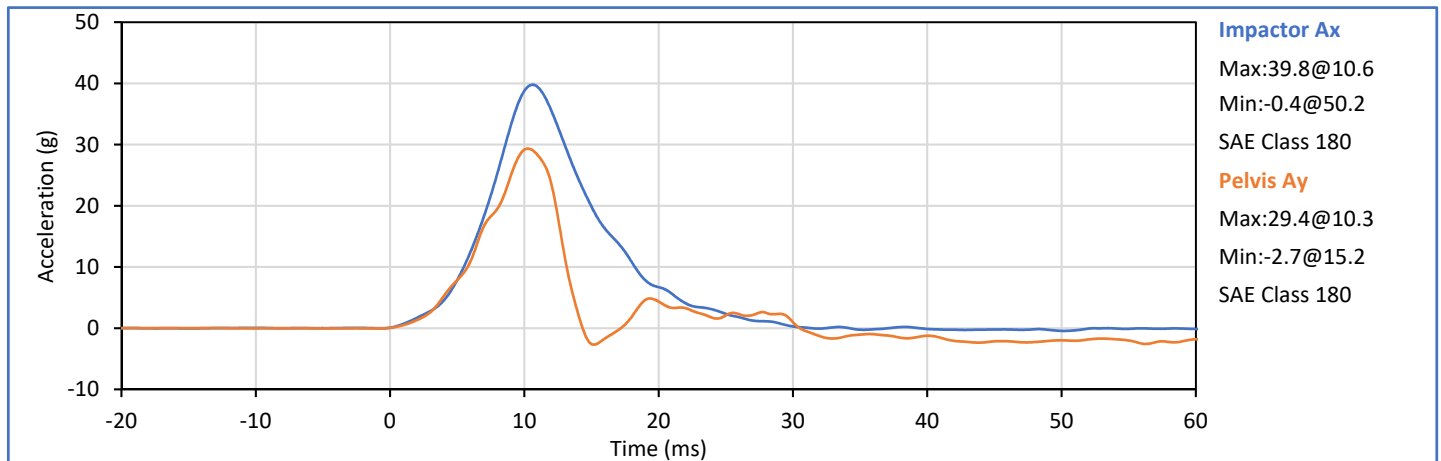
ATD Serial No.: 308

Test Date: 2018-09-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	25	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.36	Pass
Pelvis Ay after 6ms	g	28.0	39.0	29.4	Pass
Peak Impactor Ax	g	36.0	45.0	39.8	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

Position: Driver
 ATD Type: ES-2re
 ATD S/N: F035

Table 1 - Driver ATD Instrumentation

Sensor Location	Sensor S/N	Mfr	Model	Last Cal
Head Acceleration X Primary	P58760	Endevco	7264C-2k	2018-07-25
Head Acceleration Y Primary	P58763	Endevco	7264C-2k	2018-07-25
Head Acceleration Z Primary	P52093	Endevco	7264C-2k	2018-07-25
Head Acceleration X Redundant	P52072	Endevco	7264C-2k	2018-07-25
Head Acceleration Y Redundant	P58768	Endevco	7264C-2k	2018-07-25
Head Acceleration Z Redundant	P52074	Endevco	7264C-2k	2018-07-25
Upper Thorax Rib Deflection Y	180 (ES-2 Rib)	Honeywell	F38000203	2018-07-24
Middle Thorax Rib Deflection Y	177 (ES-2 Rib)	Honeywell	F38000203	2018-07-24
Lower Thorax Rib Deflection Y	186 (ES-2 Rib)	Honeywell	F38000203	2018-07-24
Anterior Abdominal Force Y	1514 Fy	R.A. Denton	2631	2018-06-25
Middle Abdominal Force Y	1510 Fy	R.A. Denton	2631	2018-06-25
Posterior Abdominal Force Y	1515 Fy	R.A. Denton	2631	2018-06-25
Lower Spine T12 Acceleration X	P45011	Endevco	7264C-2k	2018-07-25
Lower Spine T12 Acceleration Y	P58992	Endevco	7264C-2k	2018-07-25
Lower Spine T12 Acceleration Z	P51700	Endevco	7264C-2k	2018-07-25
Pubic Symphysis Force Y	506 Fy	R.A. Denton	3096 JFL	2018-06-25

Position: Rear Pass.
 ATD Type: SID-IIs
 ATD S/N: 308

Table 2a - Passenger ATD Instrumentation

Sensor Location	Sensor S/N	Mfr	Model	Last Cal
Head Acceleration X Primary	P63980	Endevco	7264C-2k	2018-09-14
Head Acceleration Y Primary	P58861	Endevco	7264C-2k	2018-09-14
Head Acceleration Z Primary	P51261	Endevco	7264C-2k	2018-09-14
Head Acceleration X Redundant	P58808	Endevco	7264C-2k	2018-09-14
Head Acceleration Y Redundant	P63310	Endevco	7264C-2k	2018-09-14
Head Acceleration Z Redundant	P49189	Endevco	7264C-2k	2018-09-14
Upper Thorax Rib Deflection Y	1172	Servo	08TCI-3725	2018-09-13
Middle Thorax Rib Deflection Y	1219	Servo	08TCI-3725	2018-09-13
Lower Thorax Rib Deflection Y	1221	Servo	08TCI-3725	2018-09-13
Upper Abdomen Rib Deflection Y	1252	Servo	08TCI-3725	2018-09-13
Lower Abdomen Rib Deflection Y	1283	Servo	08TCI-3725	2018-09-13
Lower Spine T12 Acceleration X	P52108	Endevco	7264C-2k	2018-09-14
Lower Spine T12 Acceleration Y	P63970	Endevco	7264C-2k	2018-09-14
Lower Spine T12 Acceleration Z	P51712	Endevco	7264C-2k	2018-09-14
Iliac Wing Impact Side Force Y	278 Fy (Iliac)	R.A. Denton	3228J	2017-11-08
Acetabulum Impact Side Force Y	272 Fy (Acetabulum)	R.A. Denton	3249J	2018-06-21

Table 2b - Passenger ATD Optional Instrumentation (Research Data Only)

Sensor Location	Sensor S/N	Mfr	Model	Last Cal
Head Rotation Rate X	ARS7498	DTS	ARS PRO-8k (2000Hz)	2017-08-10
Head Rotation Rate Y	ARS7367	DTS	ARS PRO-8k (2000Hz)	2017-08-10
Head Rotation Rate Z	ARS7377	DTS	ARS PRO-8k (2000Hz)	2017-08-10

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S/N	Mfr	Model	Last Cal
Vehicle CG Ax	A185693	MSI	52F-2000	2018-09-17
Vehicle CG Ay	A145925	MSI	52F-2000	2018-09-17
Vehicle CG Az	A224577	MSI	52F-2000	2018-09-17
Right Side Sill at Front Seat Ax	A224575	MSI	52F-2000	2018-09-17
Right Side Sill at Front Seat Ay	A227288	MSI	52F-2000	2018-09-17
Right Side Sill at Front Seat Az	A224565	MSI	52F-2000	2018-09-17
Right Side Sill at Rear Seat Ax	A247063	MSI	52F-2000	2018-09-17
Right Side Sill at Rear Seat Ay	A208760	MSI	52F-2000	2018-09-17
Right Side Sill at Rear Seat Az	A227262	MSI	52F-2000	2018-09-17
Left Side Sill at Front Seat Ay	A248840	MSI	52F-2000	2018-09-15
Left Side Sill at Rear Seat Ay	A224510	MSI	52F-2000	2018-09-17
Left Lower A-Pillar Ay	A227280	MSI	52F-2000	2018-09-17
Left Middle A-Pillar Ay	A224560	MSI	52F-2000	2018-09-15
Left Lower B-Pillar Ay	A147385	MSI	52F-2000	2018-09-17
Left Middle B-Pillar Ay	A227260	MSI	52F-2000	2018-09-17
Driver Seat Track at H-Point Ay	A224524	MSI	52F-2000	2018-09-17
Rear Seat Structure Ay	A224581	MSI	52F-2000	2018-09-17
Right Rear Occupant Comp. Ay	A217449	MSI	52F-2000	2018-09-17
Engine Block Top Ax	A224490	MSI	52F-2000	2018-09-17
Engine Block Top Ay	A248863	MSI	52F-2000	2018-09-17
Rear Floopan Above Axle Ax	A209101	MSI	52F-2000	2018-09-17
Rear Floopan Above Axle Ay	A226925	MSI	52F-2000	2018-09-17
Rear Floopan Above Axle Az	A248837	MSI	52F-2000	2018-09-17

Table 4a - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S/N	Mfr	Model	Last Cal
MDB CG Ax	A224564	MSI	52F-2000	2018-09-18
MDB CG Ay	A248838	MSI	52F-2000	2018-09-15
MDB CG Az	A160702	MSI	52F-2000	2018-09-15
MDB Left Side at Rear Axle Ax	A148277	MSI	52F-2000	2018-09-15
MDB Left Side at Rear Axle Ay	A147401	MSI	52F-2000	2018-09-18

Table 4b - Moving Deformable Barrier (MDB) Instrumentation (No Calibration Required)

Sensor Location	Sensor S/N	Mfr	Model	Last Cal
MDB Left Contact	N/A	Tapeswitch	8 ounce	NCR
MDB Right Contact	N/A	Tapeswitch	8 ounce	NCR