

REPORT NUMBER: SINCAP-KAR-19-017

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

**BAYERISCHE MOTOREN WERKE AG
2019 BMW X3 SDRIVE30I 5-DOOR MPV**

NHTSA No: M20194102

**PREPARED BY:
APPLUS IDIADA KARCO ENGINEERING, LLC.
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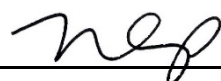
FEBRUARY 27, 2019

FINAL REPORT

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Approval Date: February 27, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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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 BMW X3 sDrive30i 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 February 13, 2019. The impact velocity of the Moving Deformable Barrier was 61.80 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 18.3°C. The target vehicle's maximum post-test static crush was 202 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>63.5</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>44</td> <td>12</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>681</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>1225</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Passenger ATD (SID-IIs)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>132.7</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>45</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetubular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>3534</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>10</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45*</td> <td>6</td> </tr> </tbody> </table> Both the left front driver and left rear passenger doors were jammed shut. The doors on the struck side of the vehicle did not separate from the body at the hinges or latches. The opposite side doors did not open during the side impact event.		Measurement Description	Driver ATD (ES-2re)			Units	IARV	Result	Head Injury Criteria (HIC ₃₆)		1000	63.5	Maximum Thoracic Rib Deflection	mm	44	12	Total Abdominal Force	N	2500	681	Pubic Symphysis Force	N	6000	1225	Measurement Description	Passenger ATD (SID-IIs)			Units	IARV	Result	Head Injury Criteria (HIC ₃₆)		1000	132.7	Resultant Lower Spine Acceleration	g	82	45	Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	3534	Maximum Thoracic Rib Deflection	mm	38*	10	Maximum Abdominal Rib Deflection	mm	45*	6	13. Type of Report and Period Covered Final Test Report, February 13, 2019 - February 27, 2019
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* Proposed IARV

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 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 BMW X3 sDrive30i 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 BMW X3 sDrive30i 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 61.80 km/h (38.40 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 February 13, 2019. Pre- and post-test photographs of the test vehicle, the MDB and the dummy (ES-2re and SID-IIs) are included in Appendix A of this report.

The dummies were placed in the driver and left rear designated seating position according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 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	63.5
Maximum Thoracic Rib Deflection	mm	44	12
Combined Abdominal Force	N	2500	681
Pubic Symphysis Force	N	6000	1225

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	132.7
Lower Spine (T12) Resultant Acceleration	g	82	45
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3534
Maximum Thoracic Rib Deflection	mm	38*	10
Maximum Abdominal Rib Deflection	mm	45*	6

*Proposed IARV

Supplemental restraint information is given below:

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

GENERAL COMMENTS

The doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. The doors on the non-struck side remained closed and latched. There was no ATD value that exceeded its limit. The Left Lower A-Post Y channel failed at 4.5 ms and the Left Mid A-Post Y channel failed at 10.0 ms.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lb/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 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20194102
Model Year	2019
Make	BMW
Model	X3 sDrive30i
Body Style	5-Door MPV
VIN	5UXTR7C53KLF30114
Body Color	Silver
Odometer Reading (km / mi)	71 / 44
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	RWD
Roof Rack	Yes
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	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	Bayerische Motoren Werke AG
Date of Manufacture	Jan-19
Vehicle Type	MPV

GVWR (kg)	2330
GAWR Front (kg)	1090
GAWR Rear (kg)	1365

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				425.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				84.8	A-B

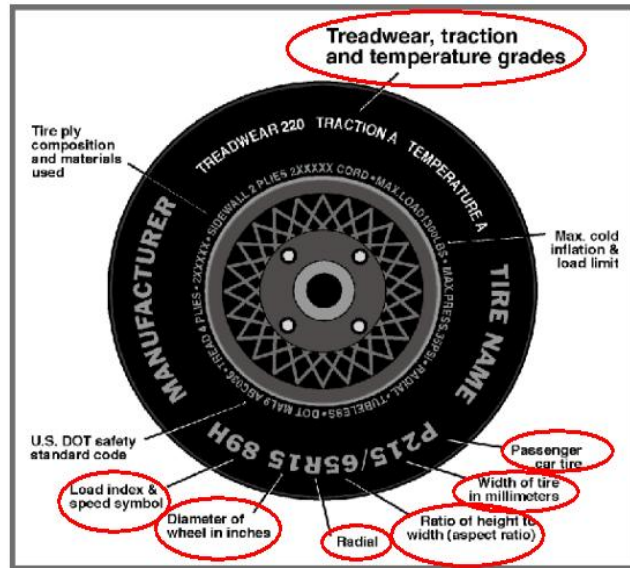
VEHICLE SEAT TYPE

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

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	340	340
Cold Pressure (kPa)	220	240
Recommended Tire Size	P245/50R19	P245/50R19
Tire Size on Vehicle	P245/50R19	P245/50R19
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Cinturato	Cinturato
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Rayon	1 Rayon
Tire Plies Body	1 Rayon, 2 Steel, 1 Polyamide	1 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	105H	105H
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	UN 0F V117 3218	UN 0F V117 3218
DOT Safety Code Right	UN 0F V117 3218	UN 0F V117 3218

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	220	240	240
Tire Placard	kPa	220	220	240	240
Owner's Manual	kPa	220	220	240	240
As Tested	kPa	220	220	240	240

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	430.0	484.5		457.0	582.0		460.5	592.0	
Right	kg	442.5	470.0		448.0	542.0		434.0	552.5	
Ratio	%	47.8%	52.2%	100.0%	44.6%	55.4%	100.0%	43.9%	56.1%	100.0%
Total	kg	872.5	954.5	1827.0	905.0	1124.0	2029.0	894.5	1144.5	2039.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1827.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	84.8	C
Calculated Vehicle Target Wt (TVTW)	kg	2036.8	A+B+C

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e.

Calculated Test Vehicle Target Weight -4.5 kg to -9.0 kg)? ☒ Yes ☐ No

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement***
LF	mm	812	809	Yes
RF	mm	814	812	Yes
LR	mm	790	796	Yes
RR	mm	800	803	Yes
Vehicle CG (Aft of Front Axle)	mm	1606	1585	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	26	19	

***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 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102

Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Trim	8.0
Ballast / Equipment Added	85.0

Test Height Adjustable Setting (If Applicable)	
--	--

DATA SHEET NO. 2**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA**Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19**SEAT POSITIONING**

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	9.3	0.0	4.7
Front Passenger Seat	8.9	0.0	4.5
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 SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	4.7	382	Max	414	425	440
			Mid	394	404	417
			Min	373	382	394
Front Passenger Seat	4.5	389	Max	423	431	448
			Mid	403	410	426
			Min	382	389	403
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

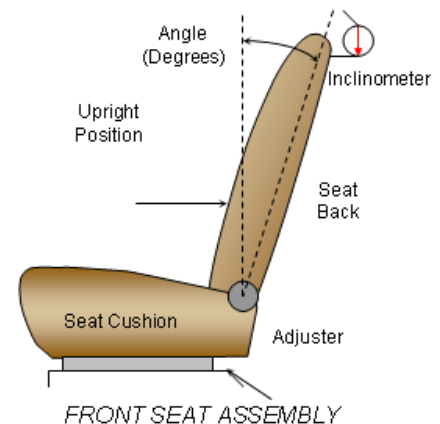
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	250		125	
Front Passenger Seat	233		117	
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

*Detent zero (0) is the forward most detent

SEAT BACK ADJUSTMENT

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



SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/ Seated Dummy	69.9		22.4	
Front Passenger Seat	70.5		22.4	
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	54.2	7	19.5	0
Non-Struck Side Rear Seat	54.3	7	20.4	0
Rear Center Seat	54.2	7	19.5	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 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. The positions are marked H, M3, M2, M1, L from top to bottom.

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

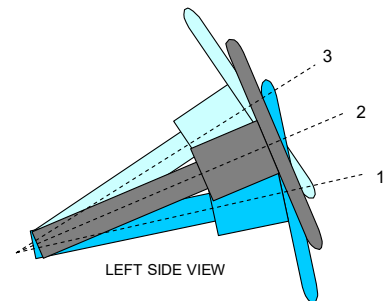
HEAD RESTRAINT ADJUSTMENT

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	3
Rear Seat	3	0

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	22.5	128
Geometric Center - Position 2	24.1	157
Uppermost - Position 3	25.8	185
Telescoping Steering Wheel Travel		57
Test Position	24.1	157

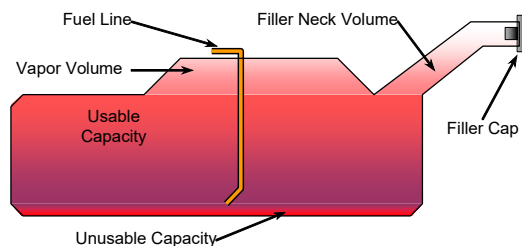
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SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump starts when the ignition is on and will operate for 5 seconds. After pressure has been built up, the fuel pump switches to sleep mode until the engine is started or pressure decreases.



VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

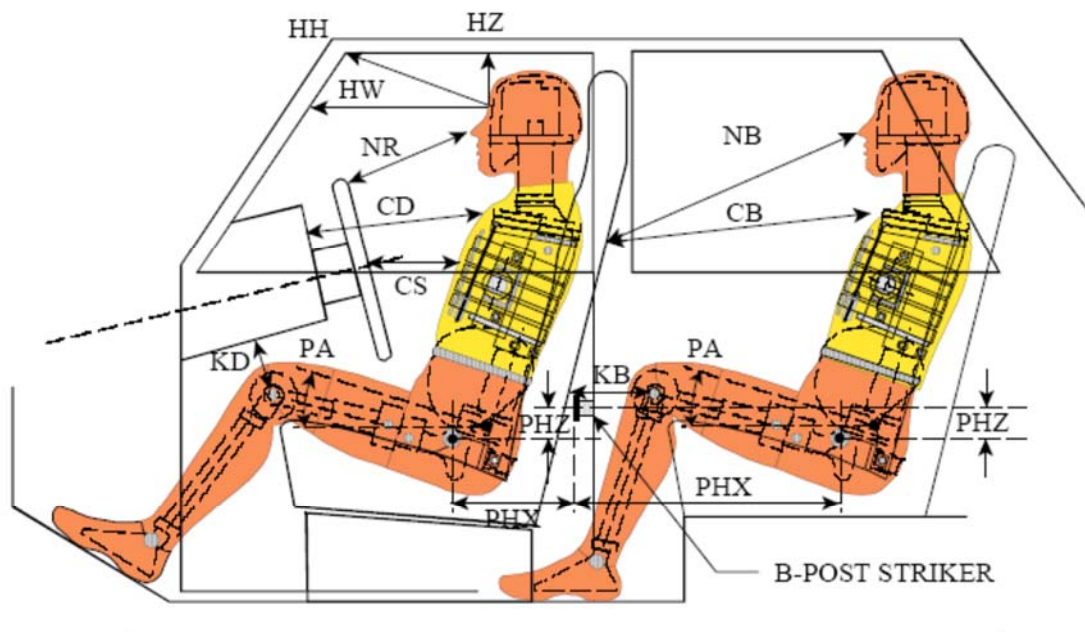
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	67.98
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	67.98
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	63.22
Actual amount of Solvent Used in Test	63.22
1/3 of Usable Capacity	22.66

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 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



LEFT SIDE VIEW

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

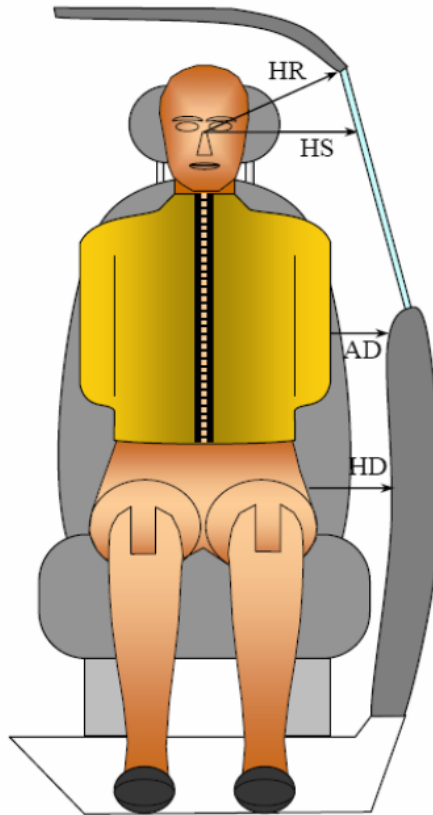
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	448			
HW		Head to Windshield	675			
HZ	HZ	Head to Roof	275		375	
NR	NB	Nose to Rim/Seat Back	430		465	
CD	CB	Chest to Dash/Seat Back	551		485	
CS		Chest to Steering Wheel	370			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	195	28.1	280	13.9
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	160	33.6	267	12.6
PAX°	PAX°	Pelvic Tilt Angle X		15.4		20.2
	PAY°	Pelvic Tilt Angle Y		0.2		0.1
PHX	PHX	Hip Point to Striker (x-axis)	135		748	
PHZ	PHZ	Hip Point to Striker (z-axis)	201		164	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



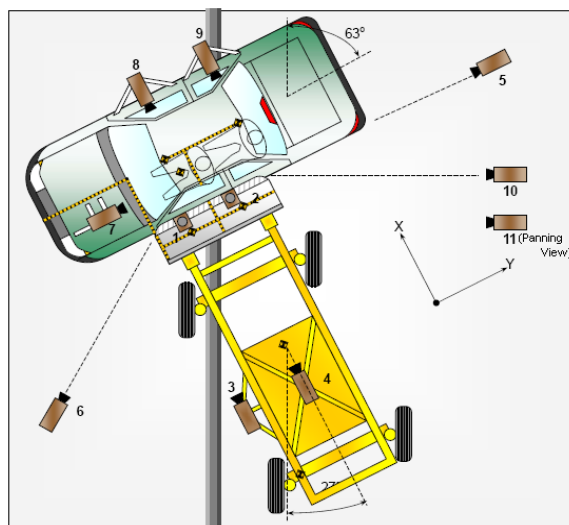
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	212	306
HS	Head to Side Window	mm	375	371
AD	Arm to Door	mm	97	178
HD	H-Point to Door	mm	167	208

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



CAMERA LOCATIONS AND DATA

No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	1220	2287	-5486	14	1000
2	Overhead Close-Up	609	2287	-5102	35	1000
3	Left Impact Point (MDB)	-2134	0	-1143	25	1000
4	Side Overall (MDB)	-3912	838	-1829	12.5	1000
5	Rear	-64	2485	-1348	85	1000
6	Left Front	-2266	-3564	-1475	24	1000
7	Driver Front (On-Board)	560	-292	-755	8.5	1000
8	Driver Side (On-Board)	1969	844	-537	8.5	1000
9	Passenger Side (On-Board)	1904	1698	-589	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

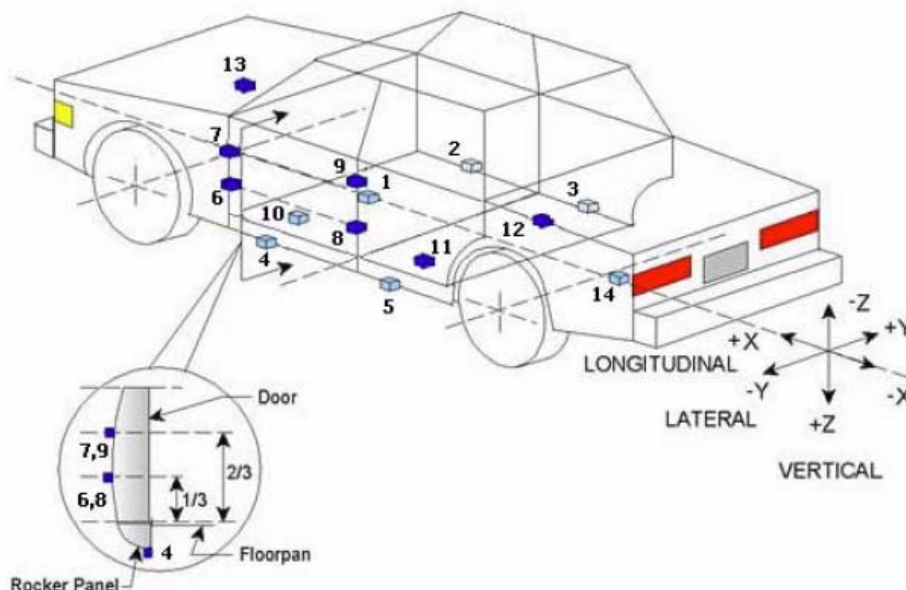
INSTRUMENTATION

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

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

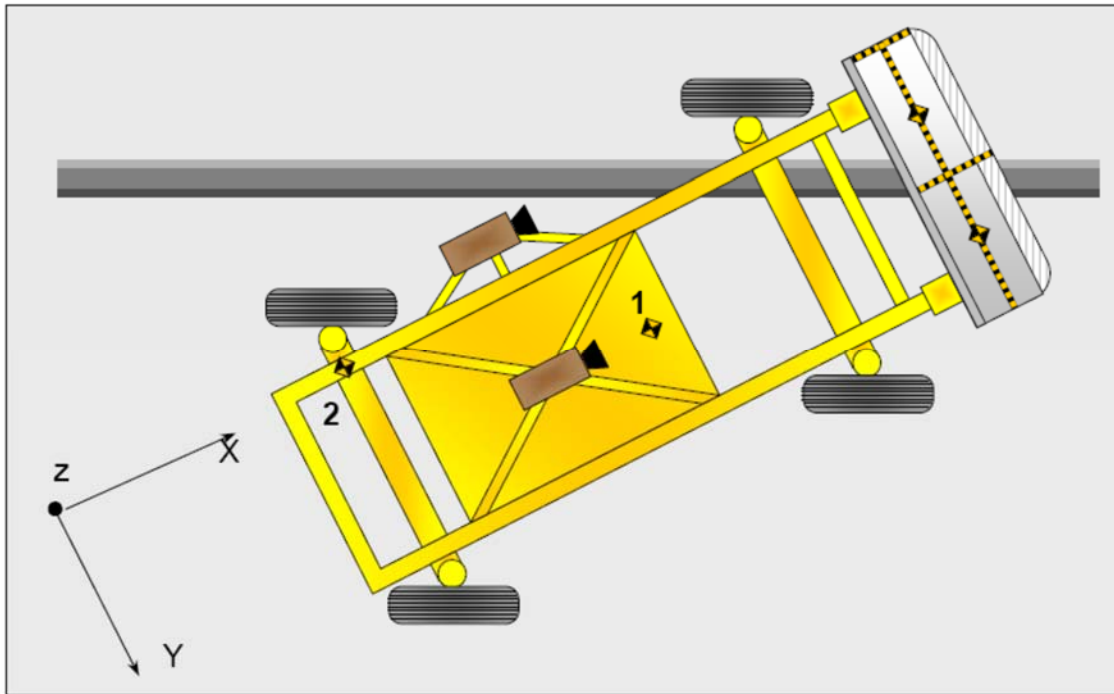
Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2030	0	-590
2	Right Sill at Front Seat	2450	720	-450
3	Right Sill at Rear Seat	1700	740	-465
4	Left Sill at Front Door	2450	-720	-450
5	Left Sill at Rear Door	1700	-740	-465
6	A-Pillar Lower	3250	830	-540
7	A-Pillar Middle	3255	-830	-820
8	B-Pillar Lower	2140	-705	-660
9	B-Pillar Middle	2140	-705	-1010
10	Front Seat Track	2300	-560	-530
11	Rear Seat Structure	1790	-400	-550
12	Right Rear Occupant Compartment	1799	400	-550
13	Engine Block	3800	0	-950
14	Rear Floorpan Above Axle	1160	0	-800

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 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



MDB ACCELEROMETER LOCATIONS

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

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

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

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

DATA SHEET NO. 8 ... (CONTINUED)**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

DATA SHEET NO. 8 ... (CONTINUED)**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

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	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2862
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		490
Actual Impact Point (Aft of Front Axle)	mm		493
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-3
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	8

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

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

MDB SPECIFICATIONS

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

MDB WEIGHTS

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

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.80
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.76
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.9
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.2
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	26.7

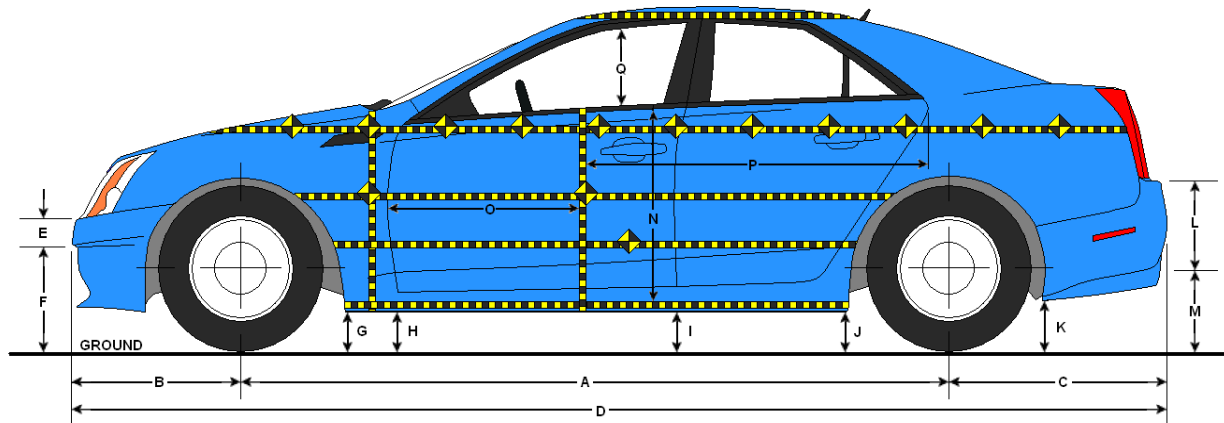
MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	260
B	Top of Bumper	533	800	Left	231
C	Mid Level	686	800	Left	218
D	Top of Stack	813	800	Left	249

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2862	2866	4
B	Front Axle to FSOV	855	847	-8
C	Rear Axle to RSOV	982	985	3
D	Total Length at Centerline	4699	4698	-1
E	Front Bumper Thickness	366	366	0
F	Front Bumper Bottom to Ground	340	341	1
G	Sill Height at Front Wheel Well	385	386	1
H	Sill Height at Front Door Leading Edge	391	409	18
I	Sill Height at B-Pillar	294	278	-16
J1	Sill Height at Rear Wheel Well	459	523	64
J2	Pinch Weld Height at Rear Wheel Well	271	255	-16
K	Sill Height Aft of Rear Wheel Well	527	504	-23
L	Rear Bumper Thickness	152	151	-1
M	Rear Bumper Bottom to Ground	566	527	-39
N	Sill Height to Bottom of Front Window Sill	772	771	-1
O	Front Door Leading Edge to Impact CL	697	690	-7
P	Rear Door Trailing Edge to Impact CL	1426	1370	-56
Q	Front Window Opening	506	524	18
R	Right Side Length	3379	3383	4
S	Left Side Length	3381	3379	-2
T	Vehicle Width at B-Pillar	1877	1758	-119

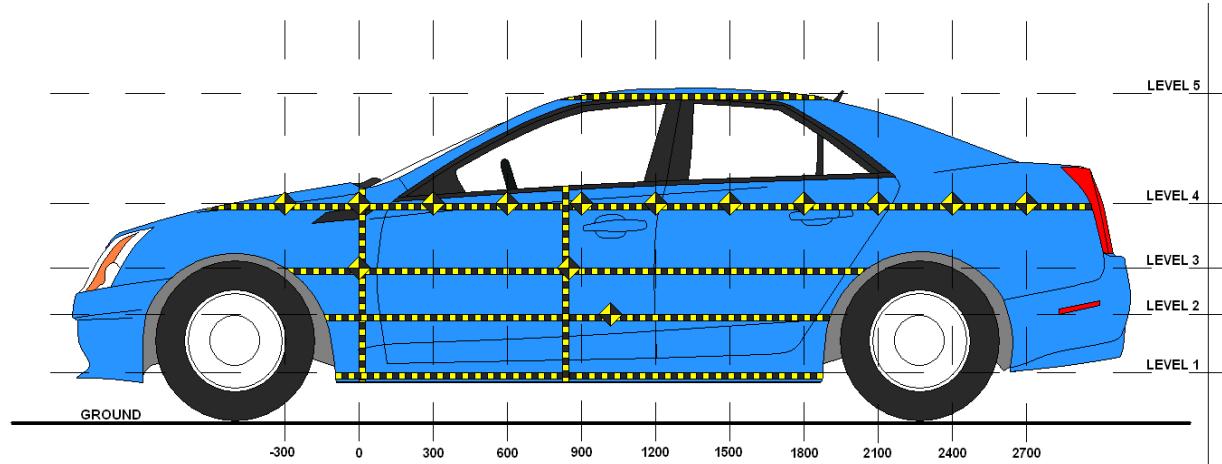
All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102

Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	292	-7	0
2	Occupant H-Point	684	190	1800
3	Mid-Door	740	202	1800
4	Window Sill	1070	43	1650
5	Window Top	1660	11	1650

DATA SHEET NO. 11 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102

Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				679					679					0	
-150		561	562	670			559	562	670			-2	0	0	
0	619	579	567	660		612	594	577	660		-7	15	10	0	
150	643	572	568	652		633	616	627	651		-10	44	59	-1	
300	647	567	564	646		638	633	625	632		-9	66	61	-14	
450	649	564	561	638		639	640	643	633		-10	76	82	-5	
600	648	562	559	632		639	652	672	625		-9	90	113	-7	
750	648	562	558	625		639	676	693	610		-9	114	135	-15	
900	648	562	558	618	877	639	691	698	615	884	-9	129	140	-3	7
1050	647	564	559	612	877	639	675	685	615	884	-8	111	126	3	7
1200	648	567	561	608	879	639	680	684	621	887	-9	113	123	13	8
1350	647	569	564	604	881	639	691	696	634	889	-8	122	132	30	8
1500	648	571	566	600	883	637	710	703	633	891	-11	139	137	33	8
1650	645	571	567	597	885	635	740	745	640	896	-10	169	178	43	11
1800	632	567	563	597	887	619	757	765	637	896	-13	190	202	40	9
1950		560	555	596	889		640	671	584	897		80	116	-12	8
2100				574	890				523	898				-51	8
2250				603	893				509	900				-94	7
2400				610	899				609	903				-1	4
2550				619	904				617	910				-2	6
2700				633	912				630	916				-3	4
2850				651					648					-3	

DATA SHEET NO. 11 ... (CONTINUED)

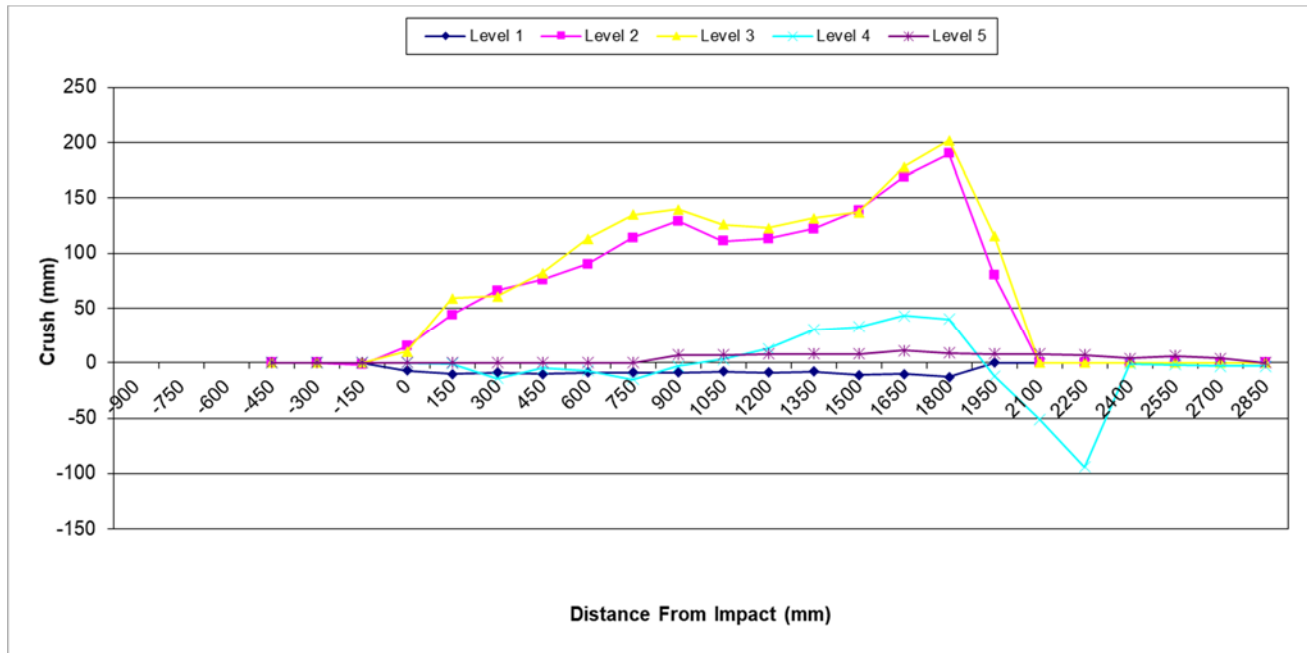
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV

NHTSA No. M20194102

Test Program: NCAP MDB Side Impact Test

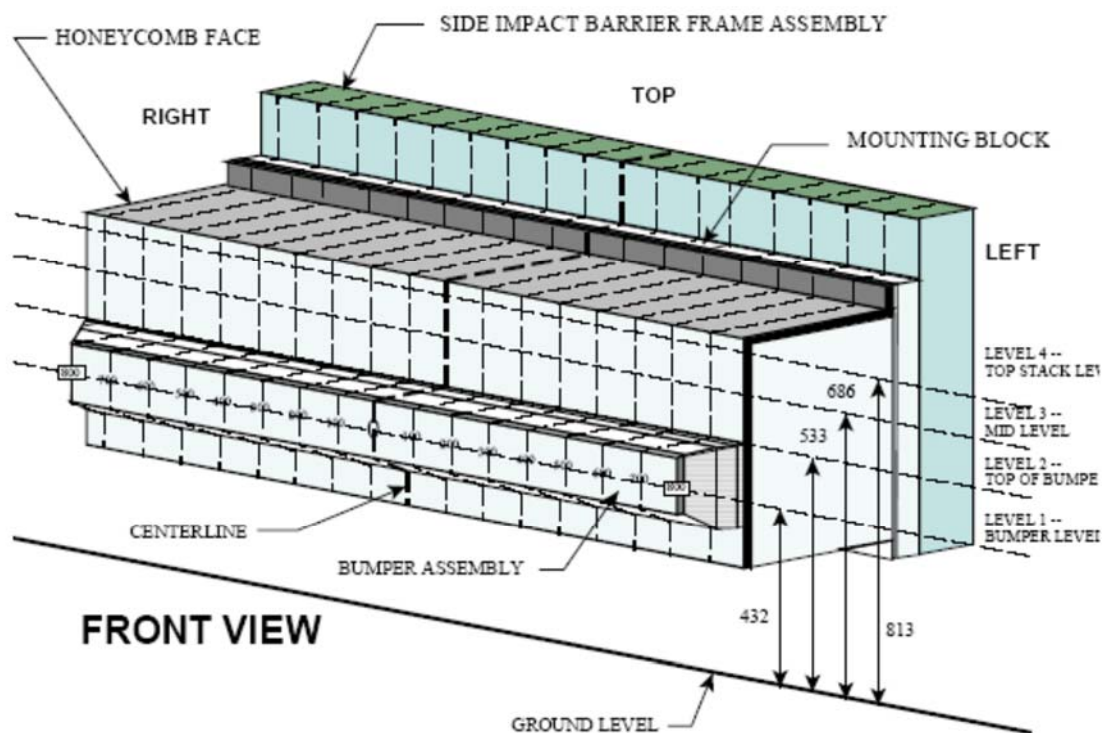
Test Date: 02/13/19



DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



NOTE: Dimensions are shown in millimeters, mm

DEFORMABLE BARRIER STATIC CRUSH

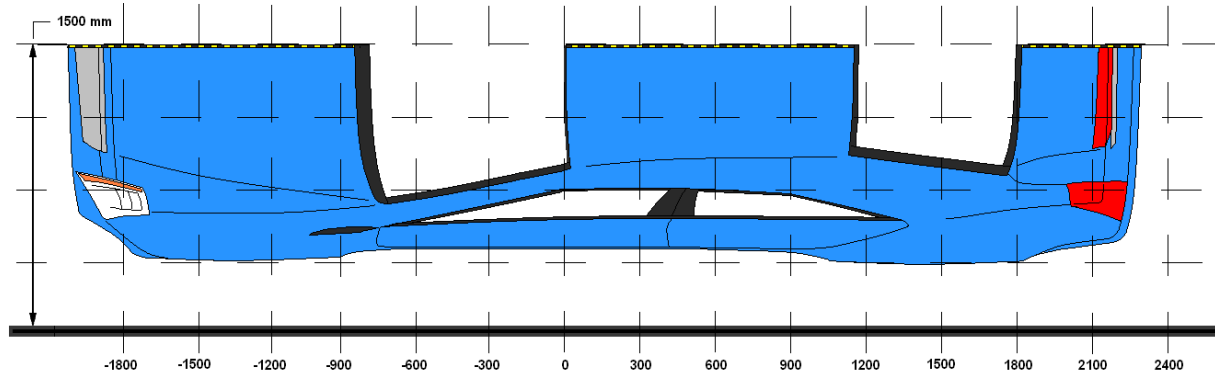
Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	243	244	246	243	243	242	243	240	233	228	226	223	228	231	236	258	260
2	156	161	141	139	148	146	145	139	141	143	148	153	156	157	163	191	231
3	97	114	124	121	144	145	133	124	107	99	104	115	128	141	154	185	218
4	92	107	119	141	171	166	138	111	101	99	100	102	116	134	169	211	249

All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2850	4	651	648	-3
2	2250	5	893	900	7
3	1650	3	567	745	178
4	900	3	558	698	140
5	300	2	567	633	66
6	-300	3	679	679	0

MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	260
2	500	Left	1	231
3	200	Left	1	226
4	200	Right	1	243
5	500	Right	1	243
6	800	Right	1	243

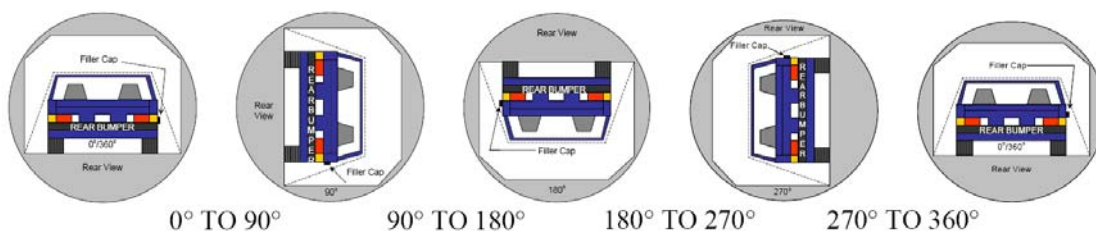
DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102
 Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19

Temperature at Time of Impact: 18.3 °C Test Time: 12:27 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°	81	300	381
180° To 270°	81	300	381
270° To 360°	80	300	380

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

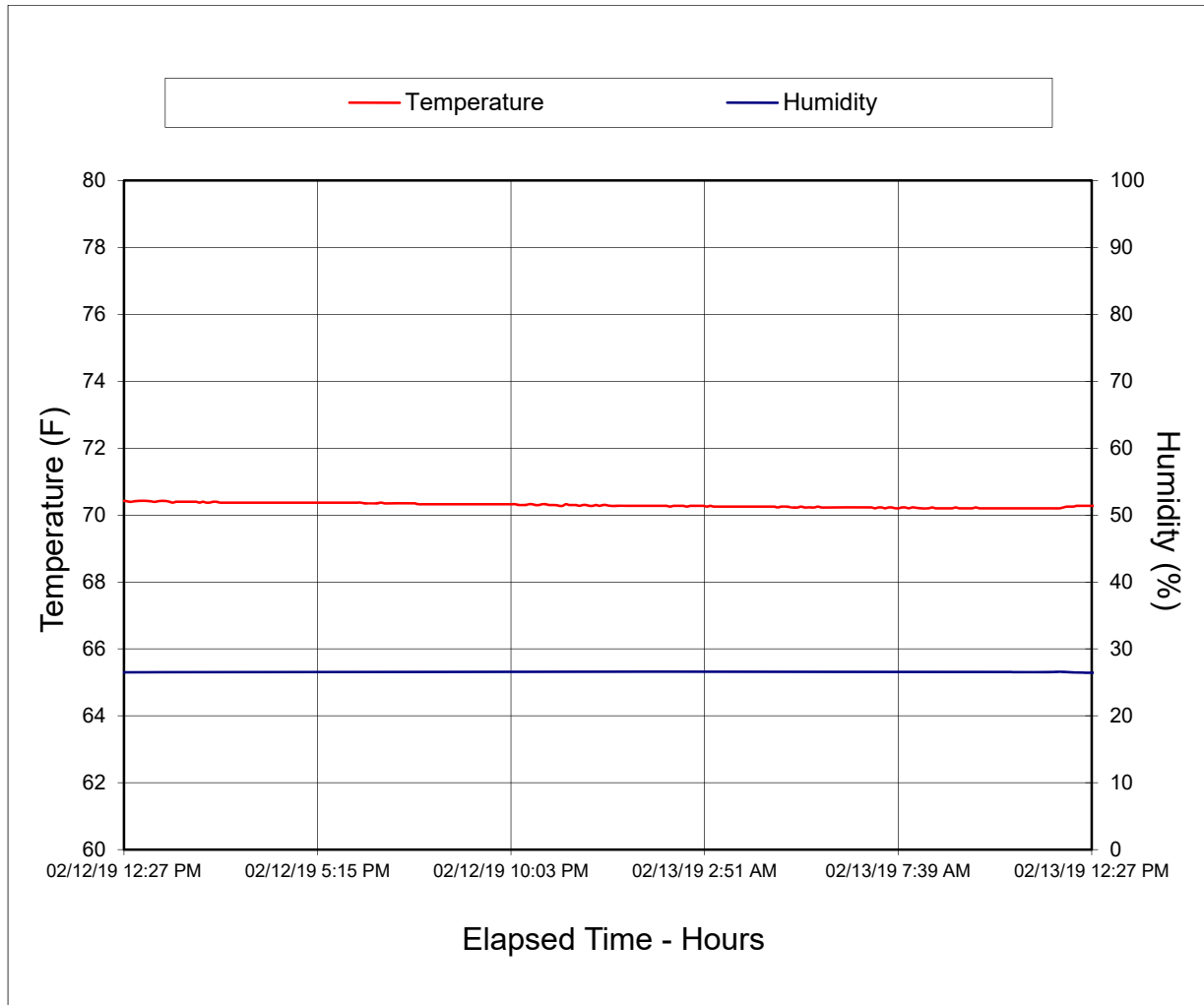
Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV NHTSA No. M20194102

Test Program: NCAP MDB Side Impact Test Test Date: 02/13/19



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

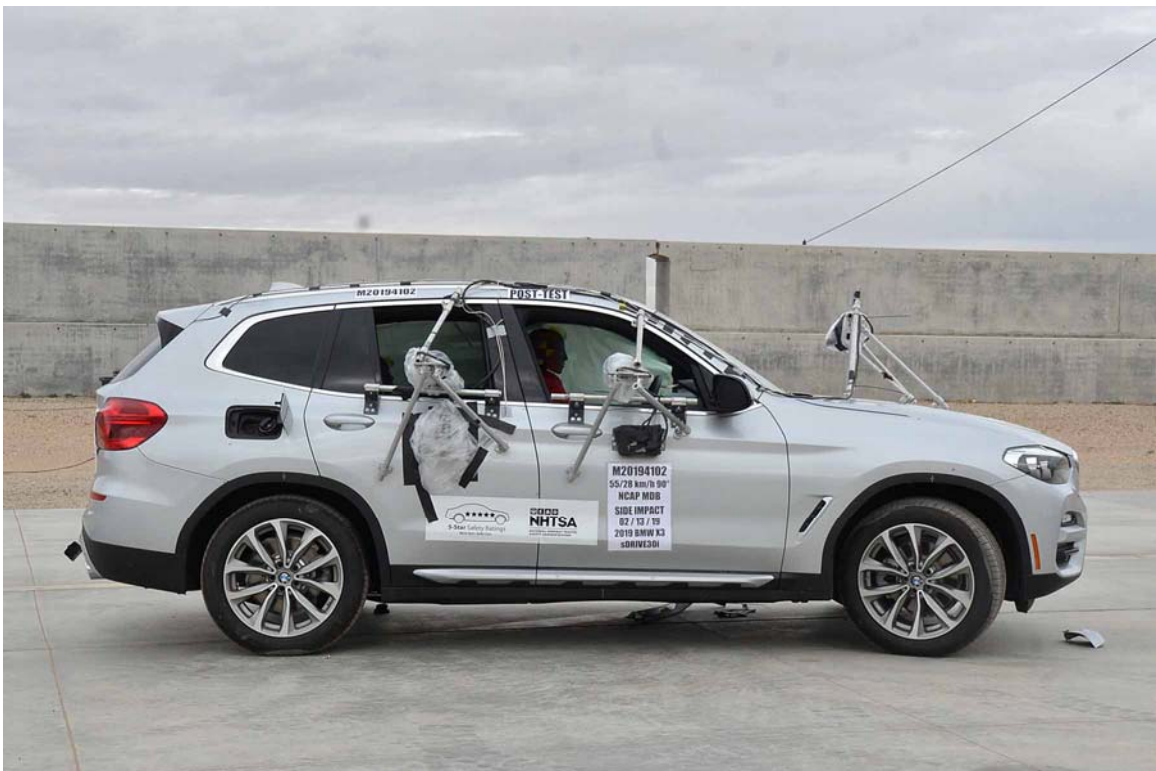


FIGURE 14. Post-Test Right Side View of Test Vehicle



FIGURE 15. Pre-Test Overhead View of Test Area

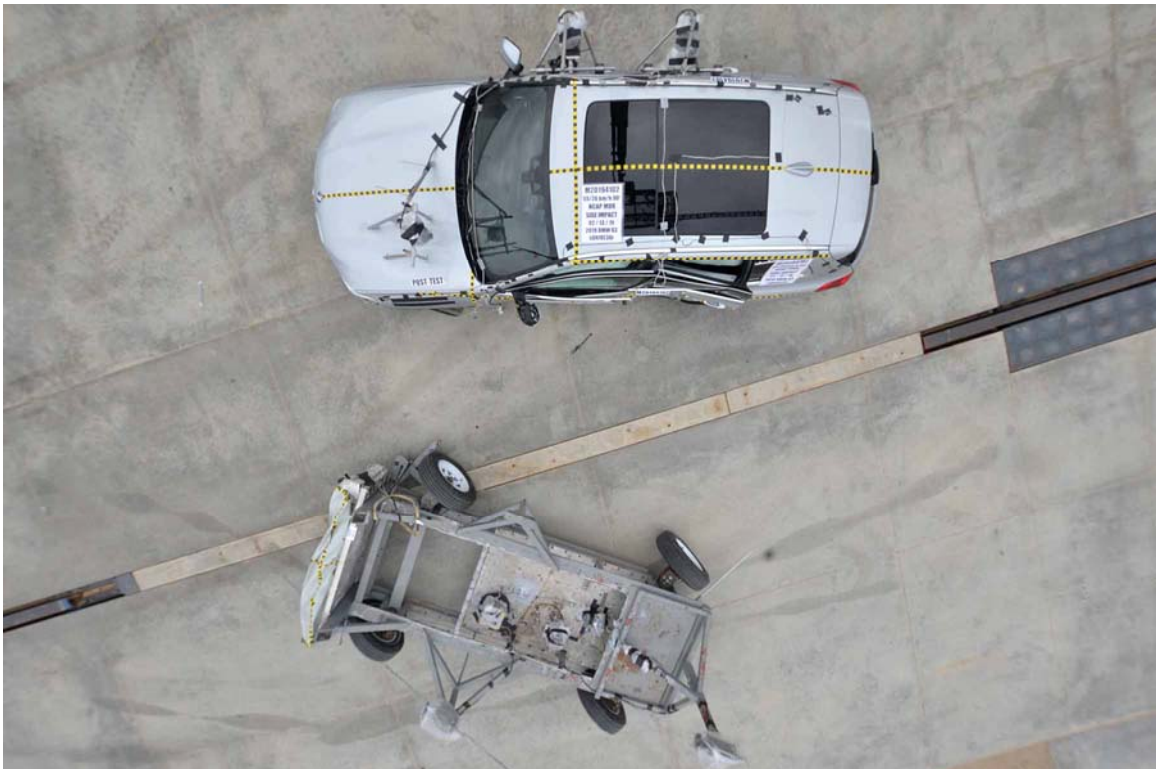


FIGURE 16. Post-Test Overhead View of Test Area



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

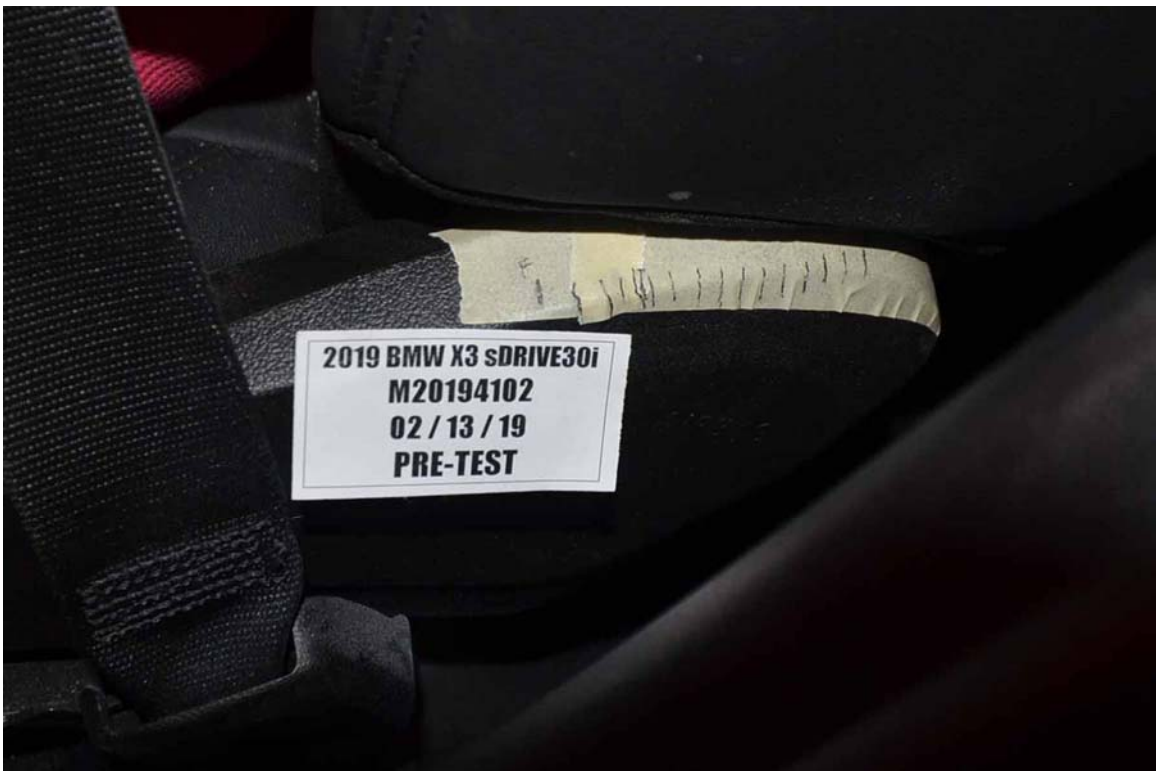


FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back



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



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

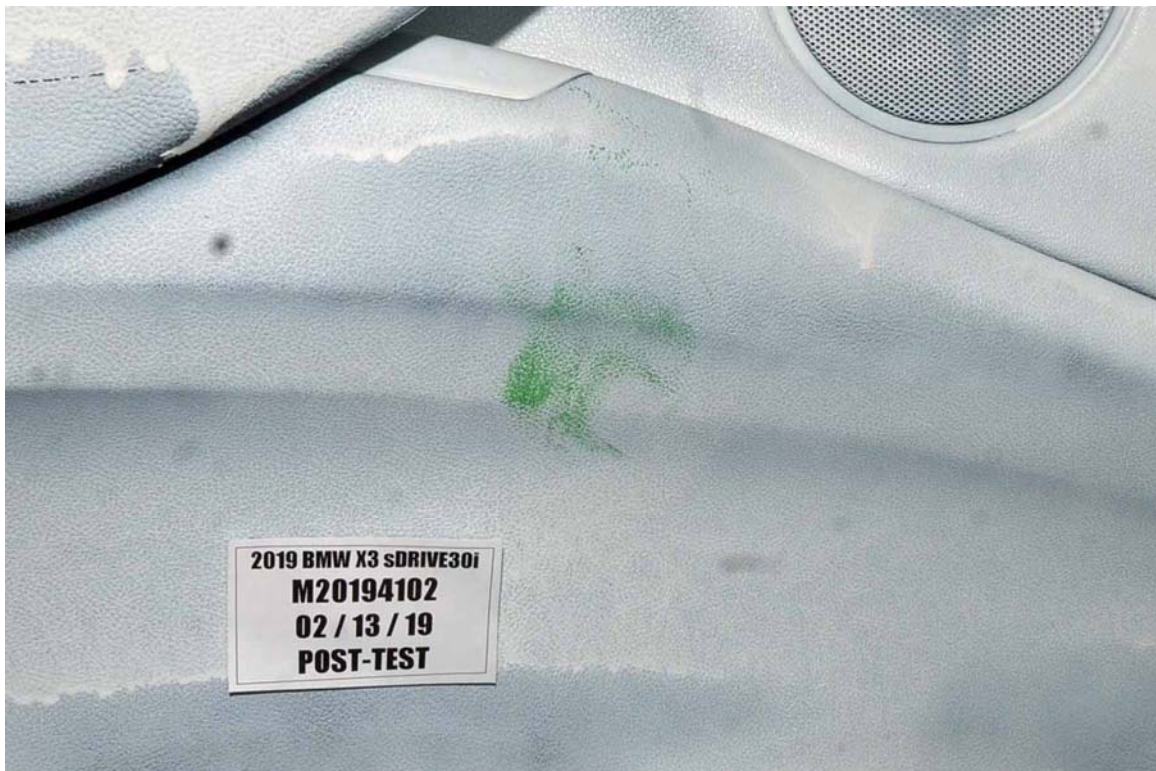


FIGURE 54. Post-Test Driver Dummy Close-Up Knee Contact View



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

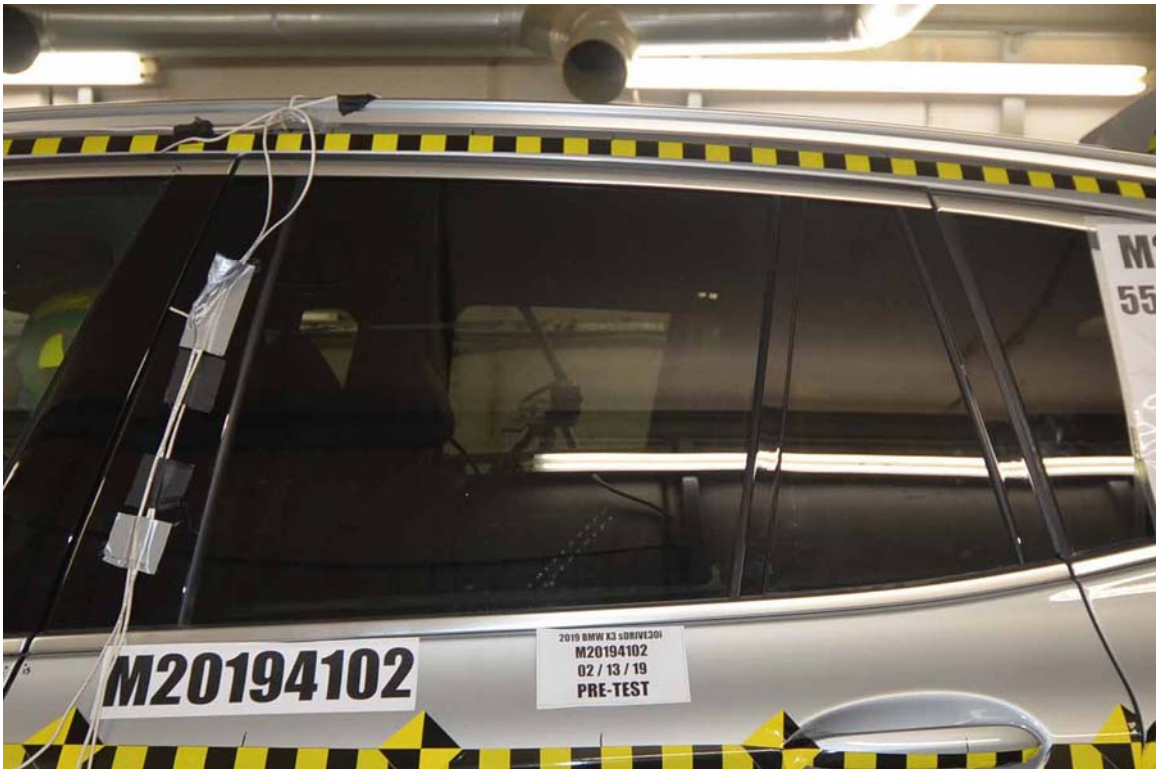


FIGURE 56. Pre-Test Left Side View of Rear Passenger Dummy
Shoulder and Door Top View



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

No Passenger Rear Dummy Pelvis Contact With 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

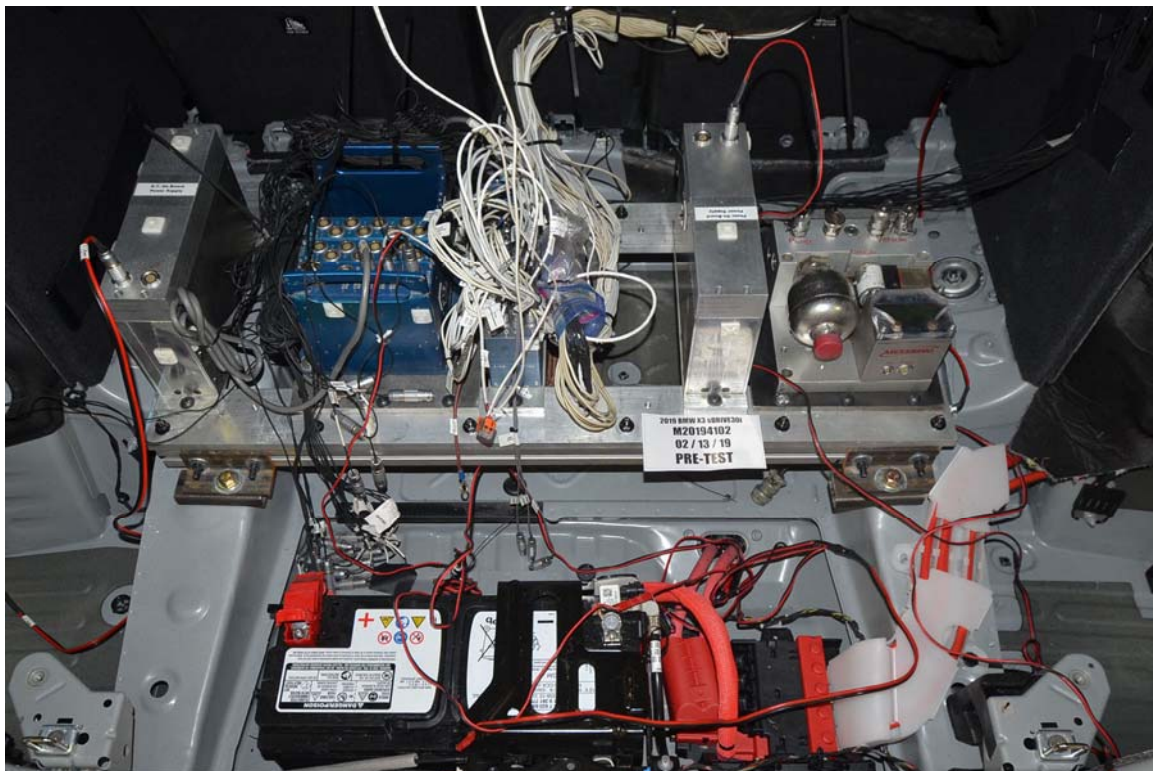


FIGURE 94. Pre-Test Ballast View



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

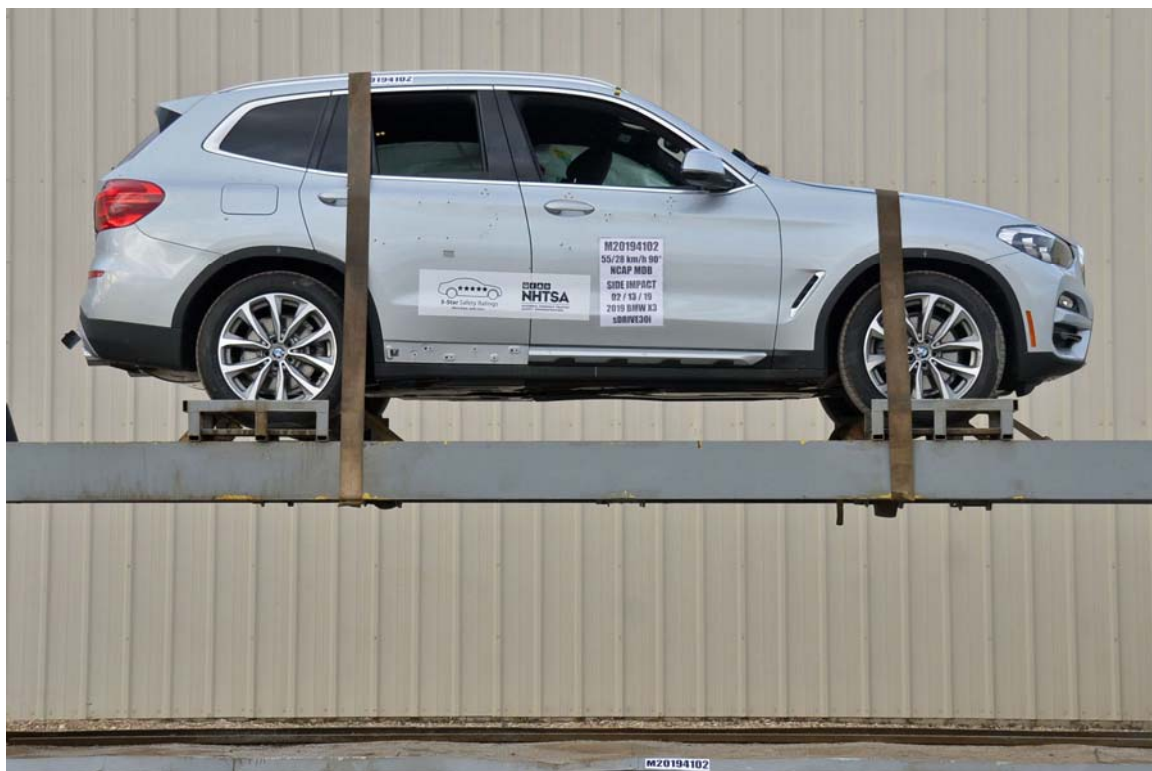


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees



FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

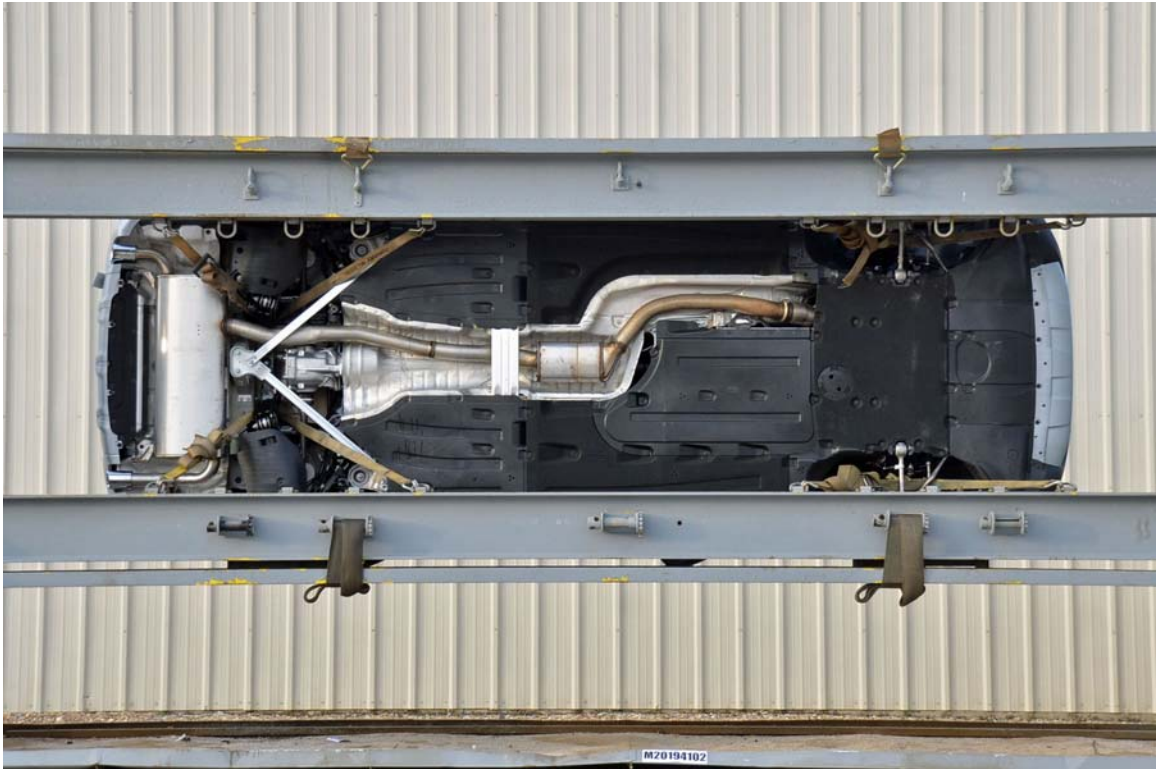


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees

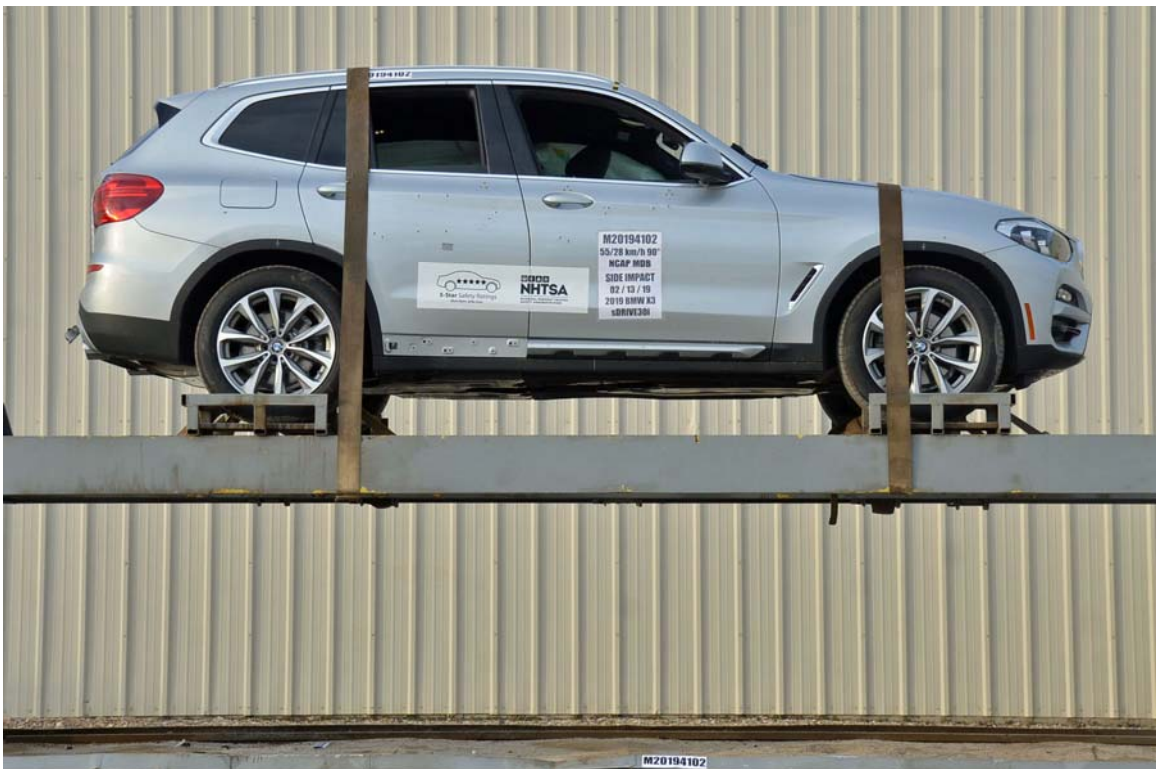


FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 101. Impact Event

The Ultimate Driving Machine™

2019 BMW X3 sDrive30i

Manufacturer's Suggested Retail Price	\$ 41,690.00
Options and Additional Charges: Optional equipment may be purchased at additional equipment. Check with your authorized BMW vendor.	
Glacier Silver Metallic	
Black SensaTec	\$ 550.00
Driving Assistance Package	\$ 600.00
- Active Drive Steering Control - Lane Departure Warning	
Region Sport	Included
Sport Automatic Transmission	
15" wheel 692 w/ 18" tire	\$ 600.00
Sport leather steering wheel	Included
Rearview mirror	Included
Rear view camera	Included
Roof rails in Satin Aluminum	Included
Satin aluminum exterior trim	Included
Universal garage-door opener	Included
Dark Oak Wood Trim	Included
Panoramic moonroof	\$ 1,350.00
Power Front Seats	Included
Rear seat back adjustment	Included
Sport seats	Included
Heated front seats	\$ 500.00
Active Protection	Included
Active Driving Assistant	Included
LED Fog Lights	Included
Park Distance Control	Included
Automatic climate control	Included
Anthracite headliner	Included
Refrigerant	\$ 995.00
Destination Charge	
Total Suggested Retail Price	\$ 43,490.00

Standard Features

Performance and efficiency

- 2.0-liter BMW TwinPower Turbo inline-4, 184-hp engine with variable valve timing (BMW VDO) and Variable Valve Timing (BMW VDO)
- Driving Dynamics package with XDRIVE, COMFORT, and SPORT modes
- 8-Speed Sport Automatic transmission with Sport and Manual (8R) modes and manual shift mode with paddle shifters and Launch Control

Handling, ride and braking

- Dynamic Stability Control (DSC), including Brake Drift Compensation, Cross-Axis Acceleration, Roll-over, and Roll-over Mitigation
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW) and 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)

Exterior

- LED low-beam and high-beam headlights with LED fog lights
- Power windows, heated mirrors
- Satin aluminum exterior trim
- Interior seating and trim
- Automatic climate control
- 4-Door (4-door) with 4-door

Interior

- LED low-beam and high-beam headlights with LED fog lights
- Power windows, heated mirrors
- Satin aluminum exterior trim
- Interior seating and trim
- Automatic climate control
- 4-Door (4-door) with 4-door

Audio system

- 8-Speed Sport Automatic transmission with Sport and Manual (8R) modes and manual shift mode with paddle shifters and Launch Control
- Dynamic Stability Control (DSC), including Brake Drift Compensation, Cross-Axis Acceleration, Roll-over, and Roll-over Mitigation
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW) and 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)

Audio system

- HIFI Sound System with 10 speakers
- Instrumentation and controls
- 8-Speed Sport Automatic transmission with Sport and Manual (8R) modes and manual shift mode with paddle shifters and Launch Control
- Dynamic Stability Control (DSC), including Brake Drift Compensation, Cross-Axis Acceleration, Roll-over, and Roll-over Mitigation
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW) and 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)

Comfort and convenience

- 8-Speed Sport Automatic transmission with Sport and Manual (8R) modes and manual shift mode with paddle shifters and Launch Control
- Dynamic Stability Control (DSC), including Brake Drift Compensation, Cross-Axis Acceleration, Roll-over, and Roll-over Mitigation
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW) and 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)

Safety and security

- Active Protection System and Active Guard
- Front and rear head Protection System (EPS)
- 8-Speed Sport Automatic transmission with Sport and Manual (8R) modes and manual shift mode with paddle shifters and Launch Control
- Dynamic Stability Control (DSC), including Brake Drift Compensation, Cross-Axis Acceleration, Roll-over, and Roll-over Mitigation
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW) and 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)
- 4-wheel drive (BMW xDrive) with automatic shifting system (BMW)

Warranty

- 4-year/50,000-mile BMW Ultimate Limited Warranty for Non-Resident Customers
- 4-year/50,000-mile BMW Ultimate Limited Warranty for Non-Resident Customers
- 4-year/50,000-mile BMW Ultimate Limited Warranty for Non-Resident Customers
- 4-year/50,000-mile BMW Ultimate Limited Warranty for Non-Resident Customers

PARTS CONTENT INFORMATION

For Vehicles in this Car Line:

US/Canadian Parts Content: **30%**

Major Source of Foreign Parts Content:

GERMANY: 30%

MEXICO: 20%

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

For this Vehicle:

Final Assembly Point: **SPARTANBURG, SC, USA**

Country of Origin:

ENGINES: AUSTRIA

TRANSMISSION: GERMANY

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score **Not Rated**

Based on the combined ratings of frontal, side and rollover.

Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash **Driver Passenger** **Not Rated**

Based on the risk of injury in a frontal impact.

Should ONLY be compared to other vehicles of similar size and weight.

Side Crash **Front seat** **Not Rated**

Based on the risk of injury in a side impact.

Rollover **Not Rated**

Based on the risk of rollover in a single vehicle crash.

Star ratings range from 1 to 5 stars (***), with 5 being the highest.

Source: National Highway Traffic Safety Administration (NHTSA)

www.safercar.gov or 1-888-327-4235

See vehicle's owner's manual for more information on safety ratings.

See vehicle's owner's manual for more information on safety ratings.

See vehicle's owner's manual for more information on safety ratings.

See vehicle's owner's manual for more information on safety ratings.

FIGURE 102. Monroney Label

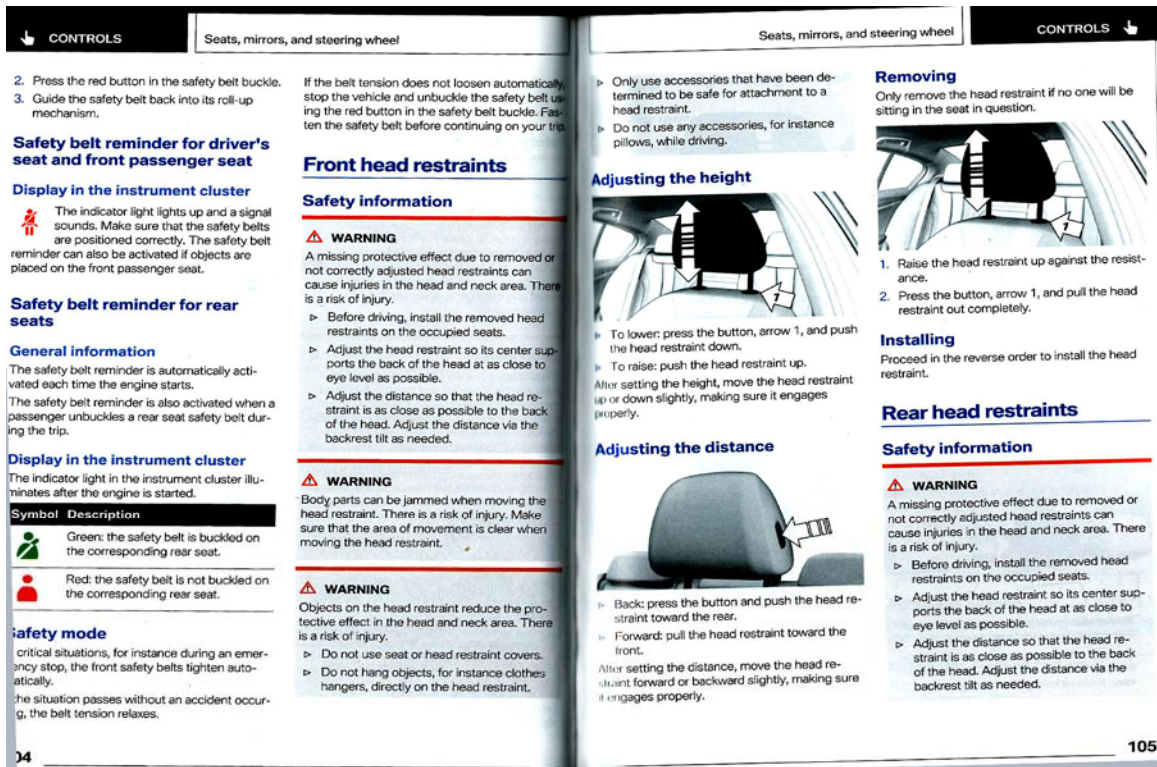


FIGURE 103. Driver Head Restraint Use and Adjustment Information
from Vehicle Owner's Manual

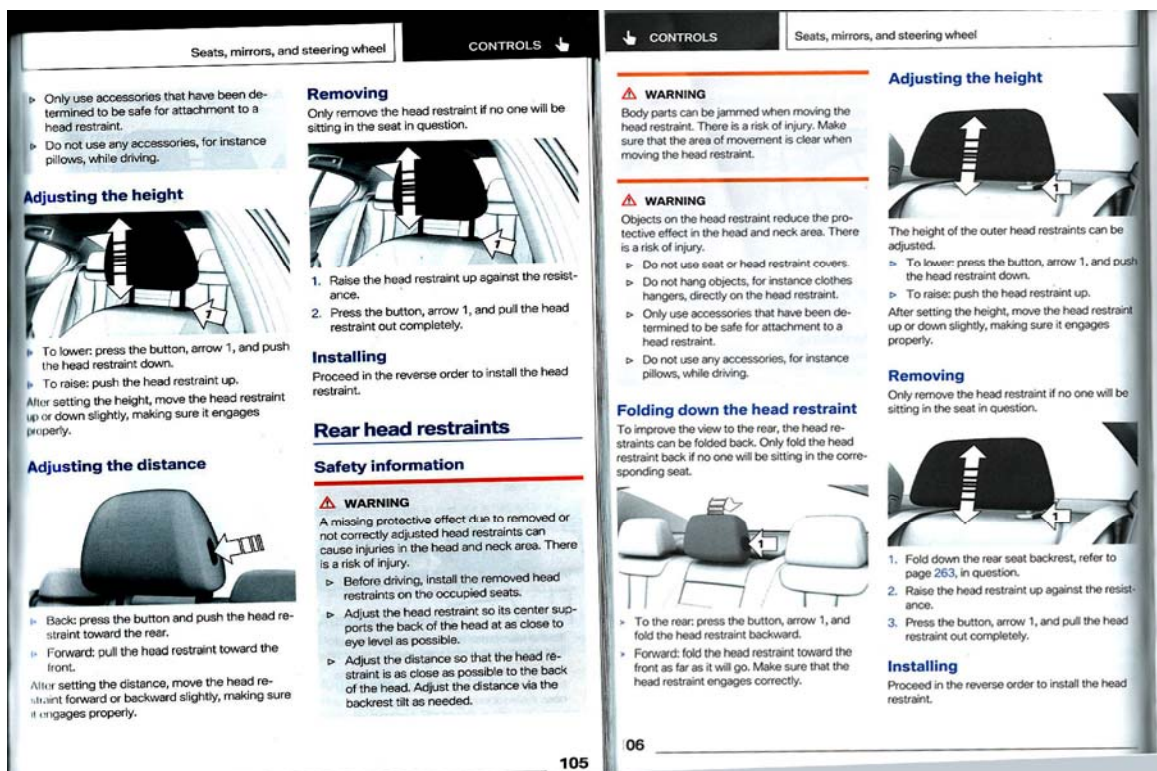


FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information
from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
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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.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)

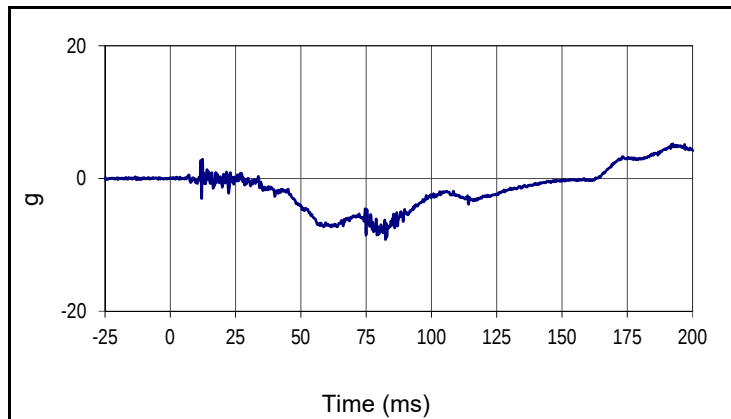
MDB Rear Acceleration (Y)

Left MDB Contact Switch

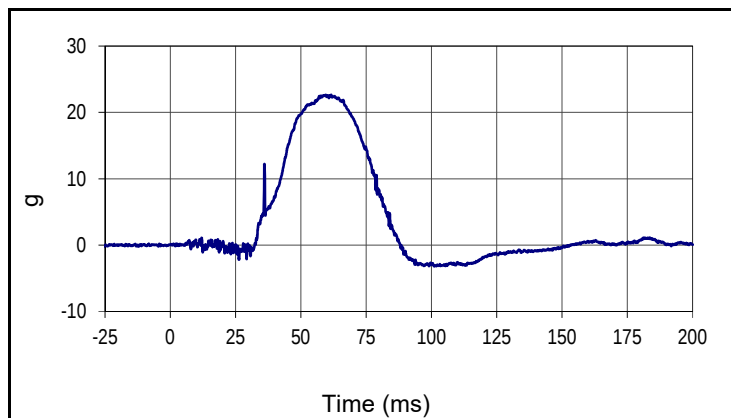
Right MDB Contact Switch

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

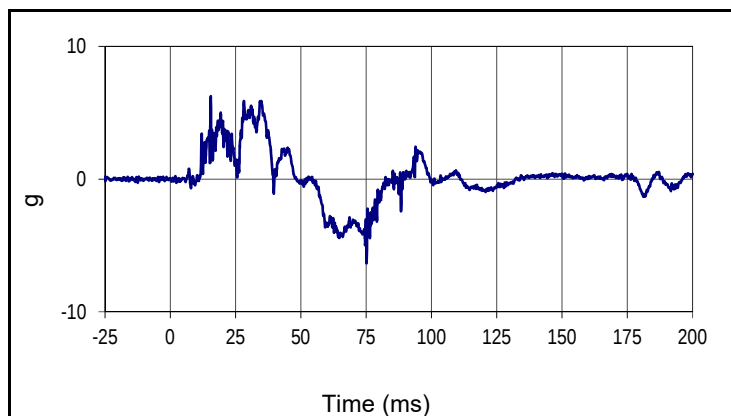
NHTSA No.: M20194102
 Test Date: 02/13/19



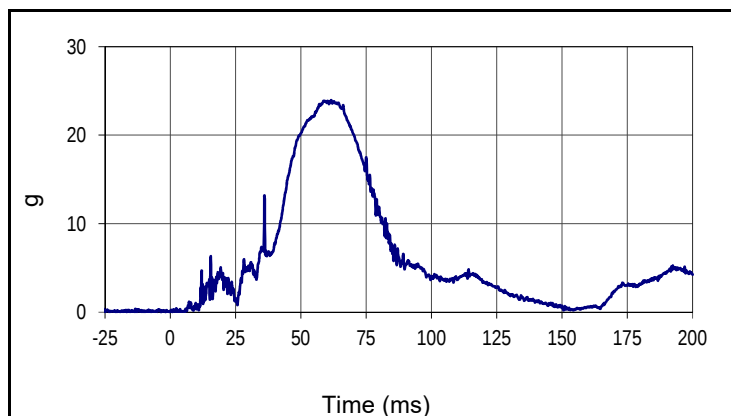
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
5.2	192.4	-9.2	82.4



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
22.6	61.6	-3.2	101.1



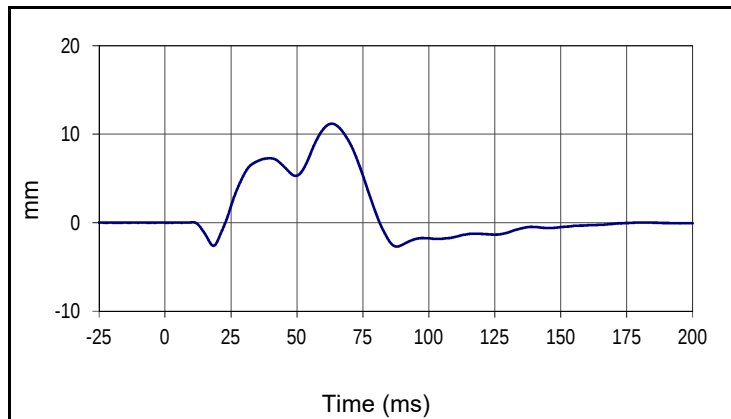
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
6.2	15.5	-6.3	75.1



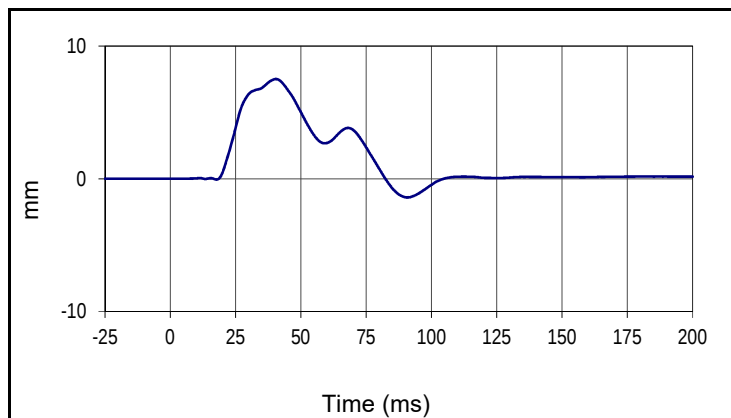
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
24.0	61.6	0.0	0.7

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

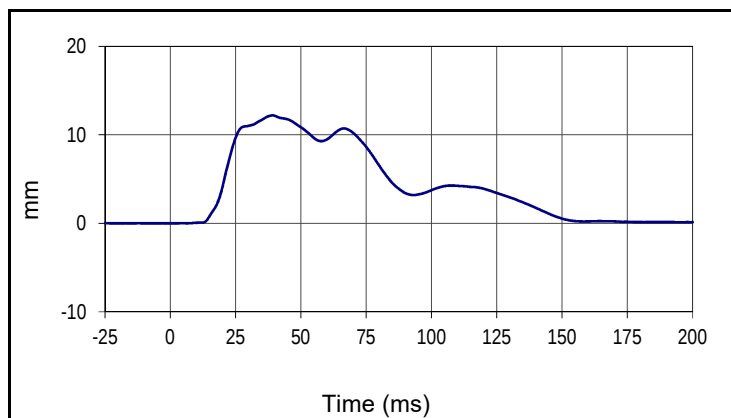
NHTSA No.: M20194102
 Test Date: 02/13/19



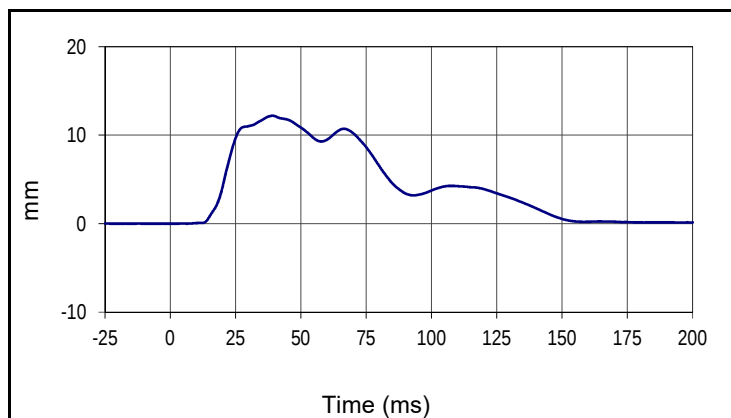
Curve Description			
Driver Upper Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
005		180	mm
Max	Time	Min	Time
11.2	63.2	-2.7	87.9



Curve Description			
Driver Middle Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
006		180	mm
Max	Time	Min	Time
7.5	40.4	-1.4	90.7



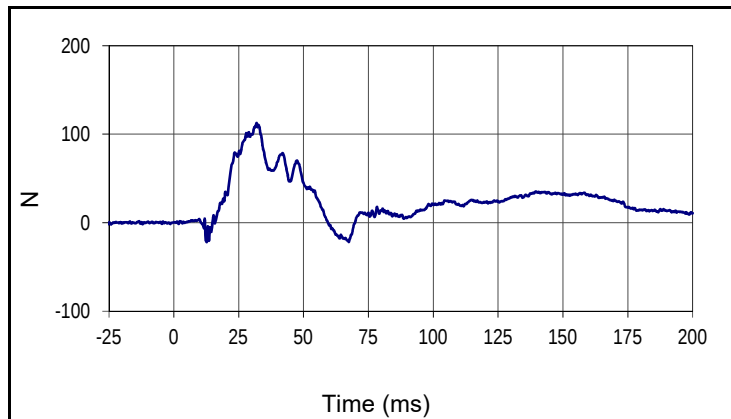
Curve Description			
Driver Lower Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
007		180	mm
Max	Time	Min	Time
12.2	39.1	0.0	2.6



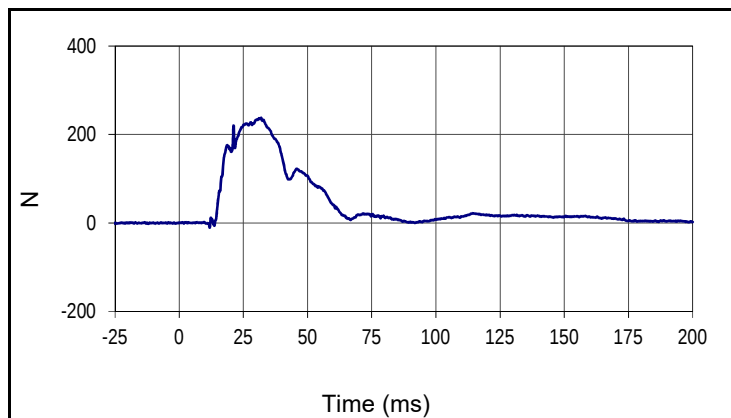
Curve Description			
Driver Thorax Rib Deflection Maximum Y			
Plot No.		SAE Class	Units
008		180	mm
Max	Time	Min	Time
12.2	39.1	0.0	2.6

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

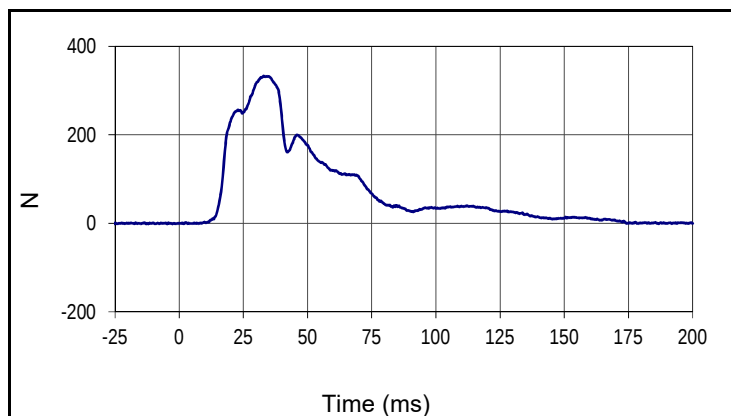
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 Test Date: 02/13/19



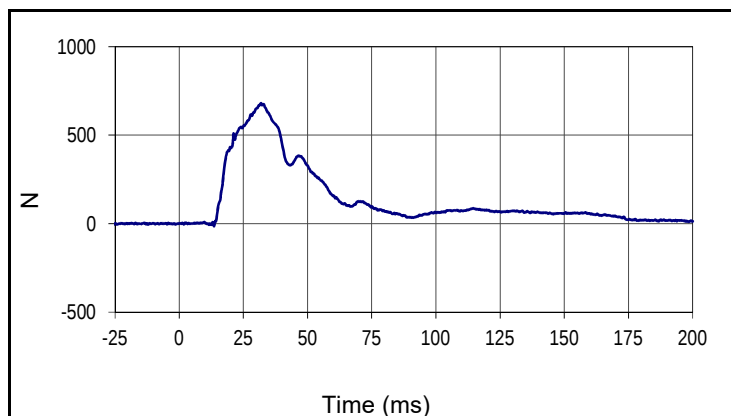
Curve Description			
Driver Anterior Abdominal Force Y			
Plot No.		SAE Class	Units
009		600	N
Max	Time	Min	Time
112.7	31.9	-21.9	12.6



Curve Description			
Driver Middle Abdominal Force Y			
Plot No.		SAE Class	Units
010		600	N
Max	Time	Min	Time
237.7	31.9	-10.6	11.9



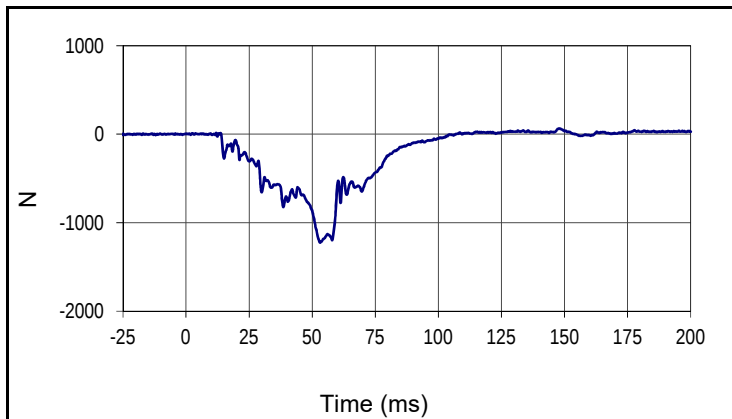
Curve Description			
Driver Posterior Abdominal Force Y			
Plot No.		SAE Class	Units
011		600	N
Max	Time	Min	Time
333.2	32.9	-1.3	1.8



Curve Description			
Driver Total Abdominal Force			
Plot No.		SAE Class	Units
012		600	N
Max	Time	Min	Time
680.5	31.9	-13.9	13.6

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

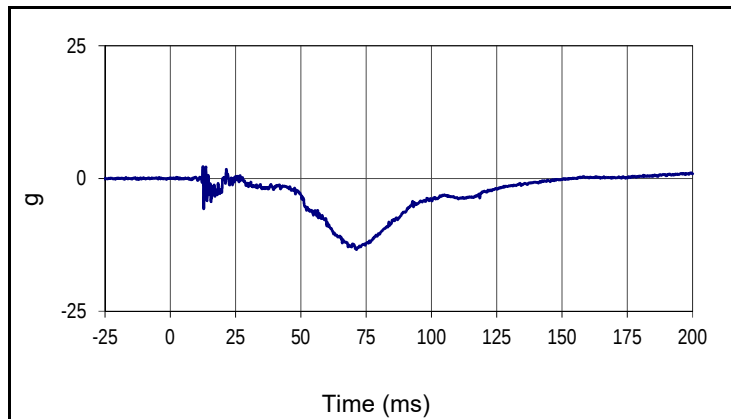
NHTSA No.: M20194102
 Test Date: 02/13/19



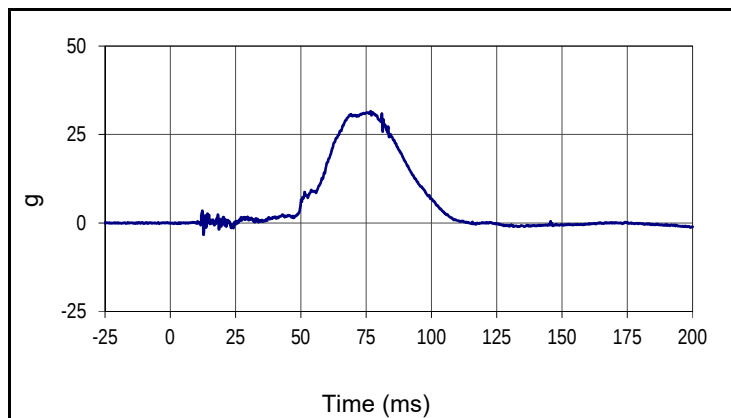
Curve Description			
Driver Pubic Symphysis Force Y			
Plot No.		SAE Class	Units
013		600	N
Max	Time	Min	Time
65.8	147.9	-1224.9	53.1

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

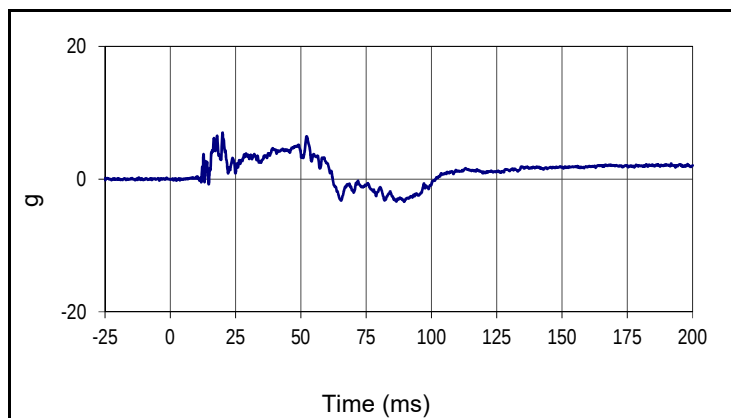
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 Test Date: 02/13/19



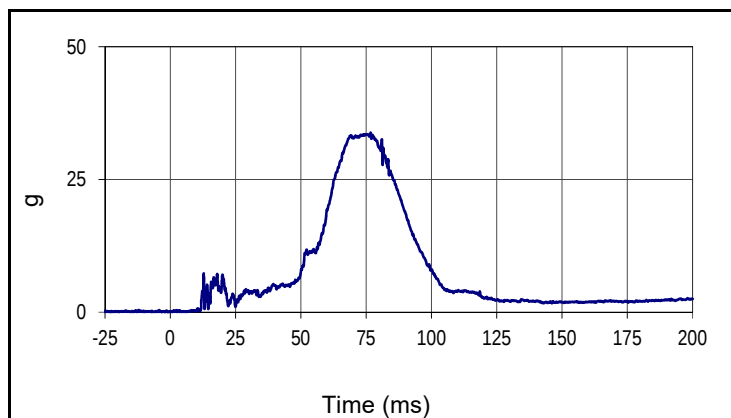
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
014		1000	g
Max	Time	Min	Time
2.2	12.5	-13.4	71.3



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
015		1000	g
Max	Time	Min	Time
31.6	76.7	-3.3	12.7



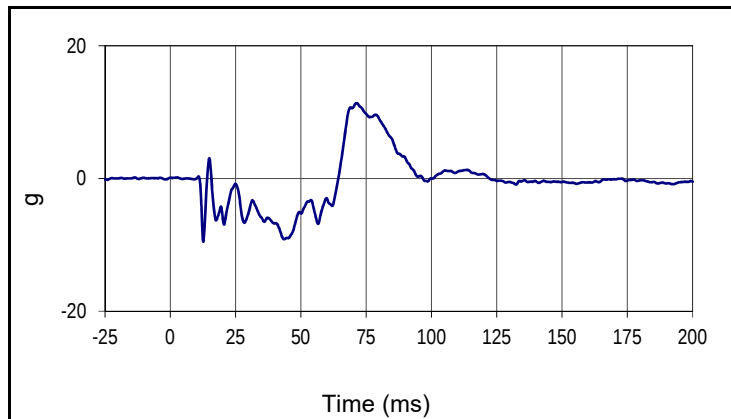
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
7.0	20.0	-3.4	89.6



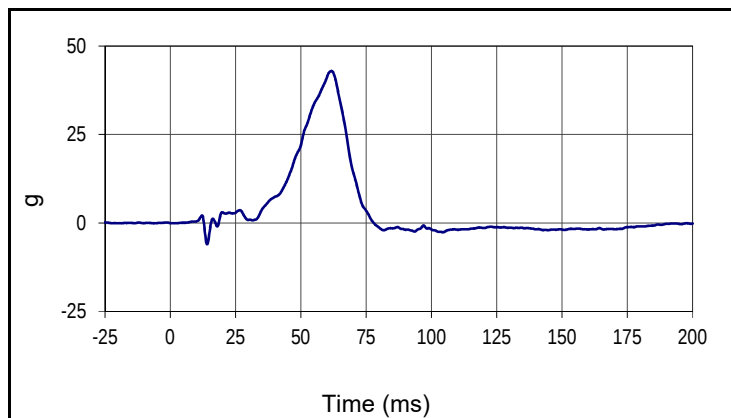
Curve Description			
Passenger Head Acceleration Resultant Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
33.8	76.7	0.0	0.6

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

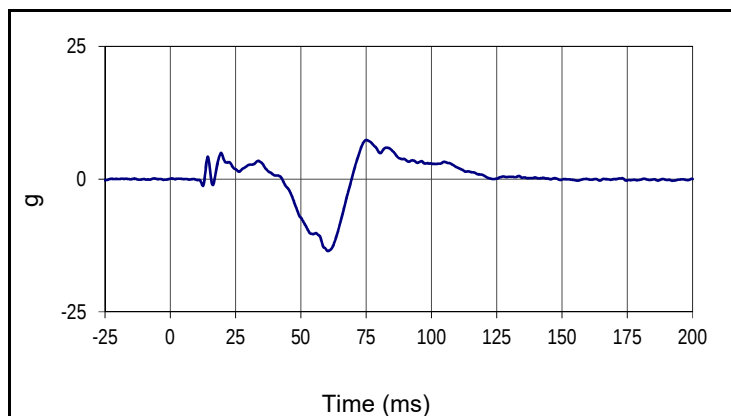
NHTSA No.: M20194102
 Test Date: 02/13/19



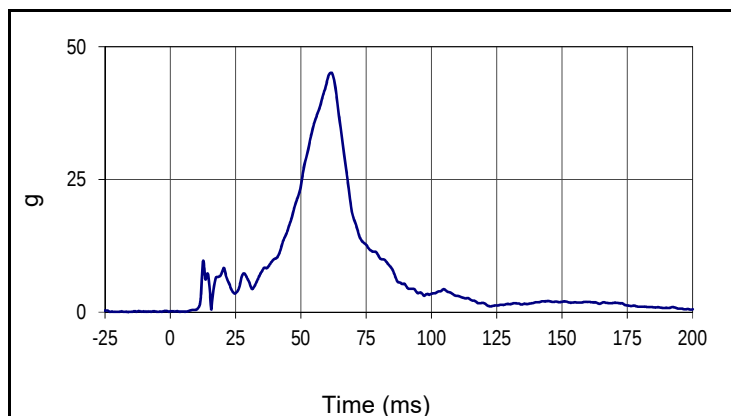
Curve Description			
Passenger Lower Spine T12 Acceleration X			
Plot No.		SAE Class	Units
018		180	g
Max	Time	Min	Time
11.4	71.3	-9.5	12.6



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
Plot No.		SAE Class	Units
019		180	g
Max	Time	Min	Time
42.9	61.7	-6.0	14.1



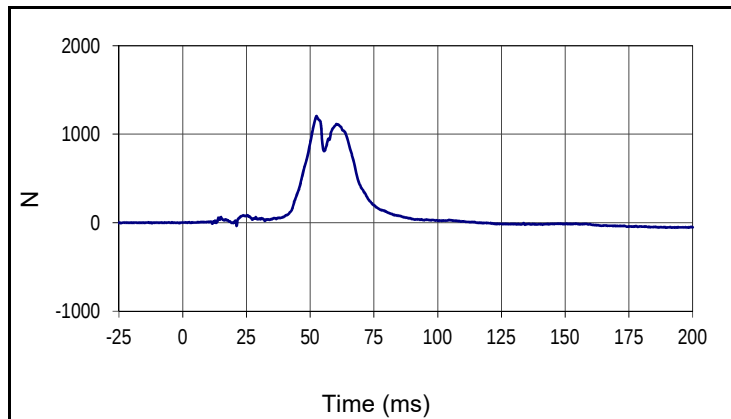
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
Plot No.		SAE Class	Units
020		180	g
Max	Time	Min	Time
7.4	75.1	-13.6	60.3



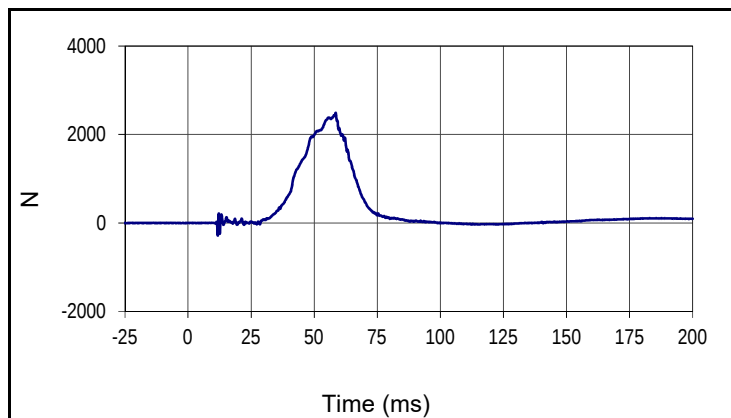
Curve Description			
Passenger Lower Spine T12 Acceleration Res.			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
45.1	61.6	0.1	3.6

Test Vehicle: 2019 BMW X3 sDrive30i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

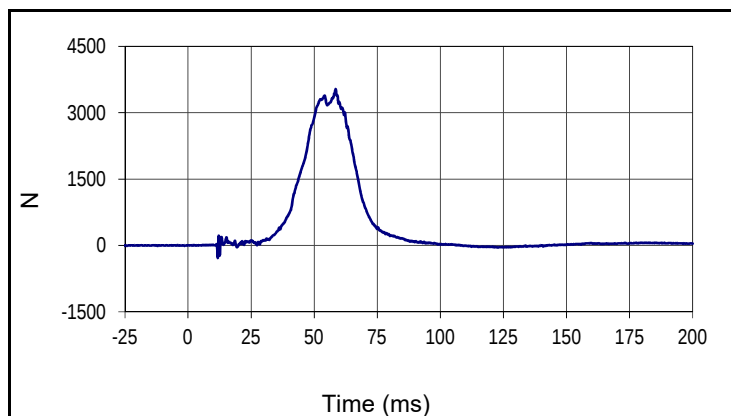
NHTSA No.: M20194102
 Test Date: 02/13/19



Curve Description			
Passenger Iliac Force on Impact Side Y			
Plot No.		SAE Class	Units
022		600	N
Max	Time	Min	Time
1205.1	52.5	-56.2	193.8



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
Plot No.		SAE Class	Units
023		600	N
Max	Time	Min	Time
2489.0	58.5	-283.8	11.8



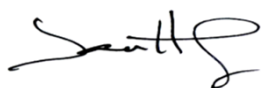
Curve Description			
Passenger Total Pelvic Force			
Plot No.		SAE Class	Units
024		600	N
Max	Time	Min	Time
3533.8	58.5	-282.1	11.8

APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
1 - Sitting Height	mm	900	918	911	Pass
2 - Seat to Shoulder Joint	mm	558	572	566	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	443	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	469	Pass
8 - Thorax Width	mm	322	332	325	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	365	Pass
11 - Head Depth	mm	196	206	203	Pass
12 - Thorax Depth	mm	262	272	266	Pass
13 - Abdomen Depth	mm	194	204	203	Pass
14 - Pelvis Depth	mm	235	245	239	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	605	Pass
			Overall Test Results	Pass	

Technician:



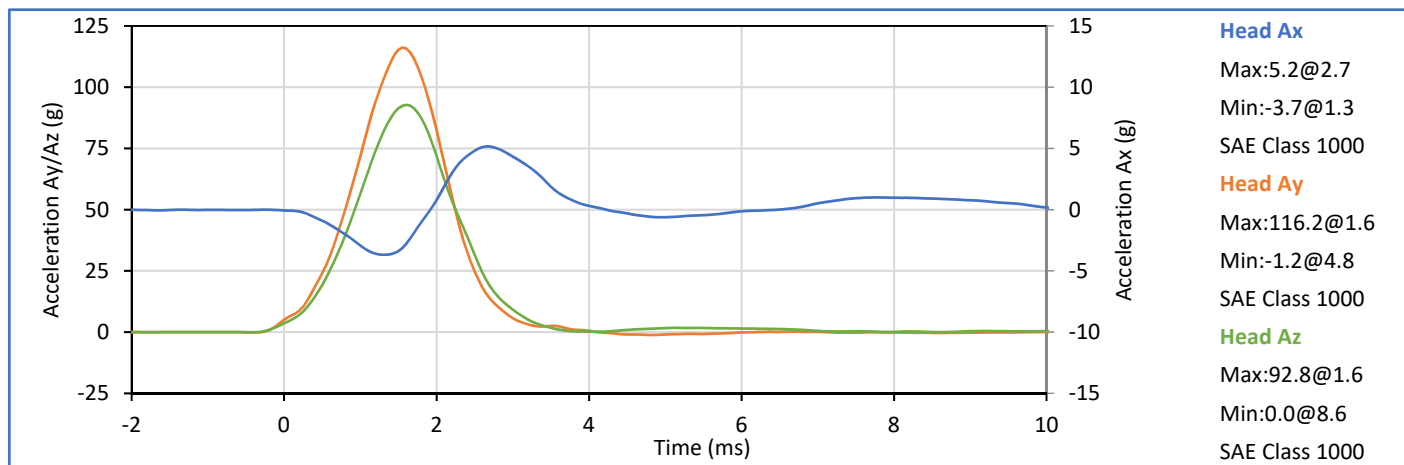
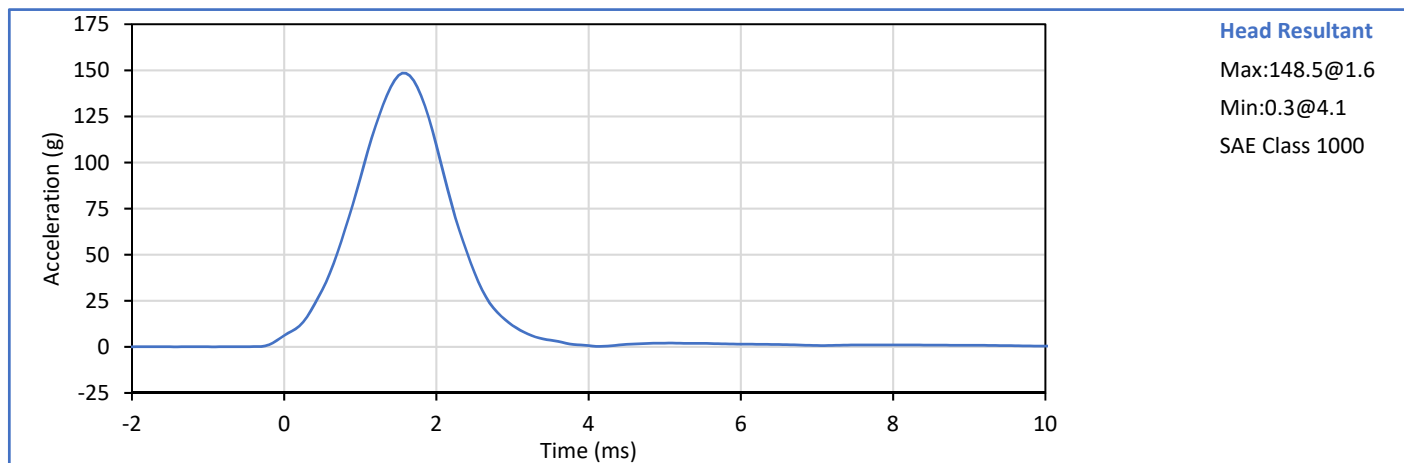
J. Hernandez

Approved By:



P. Puzzuto

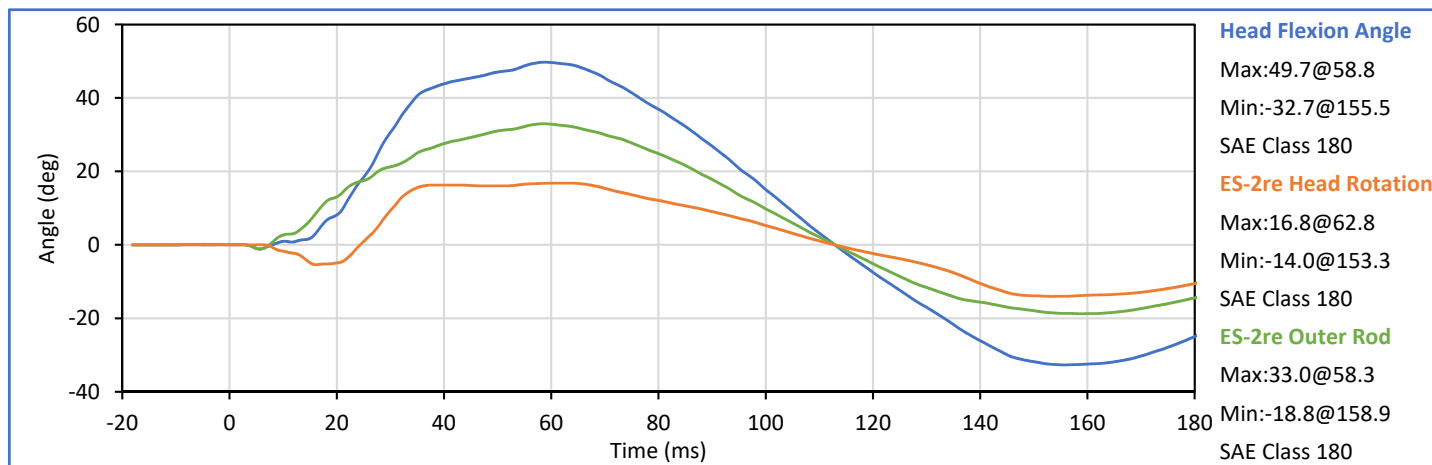
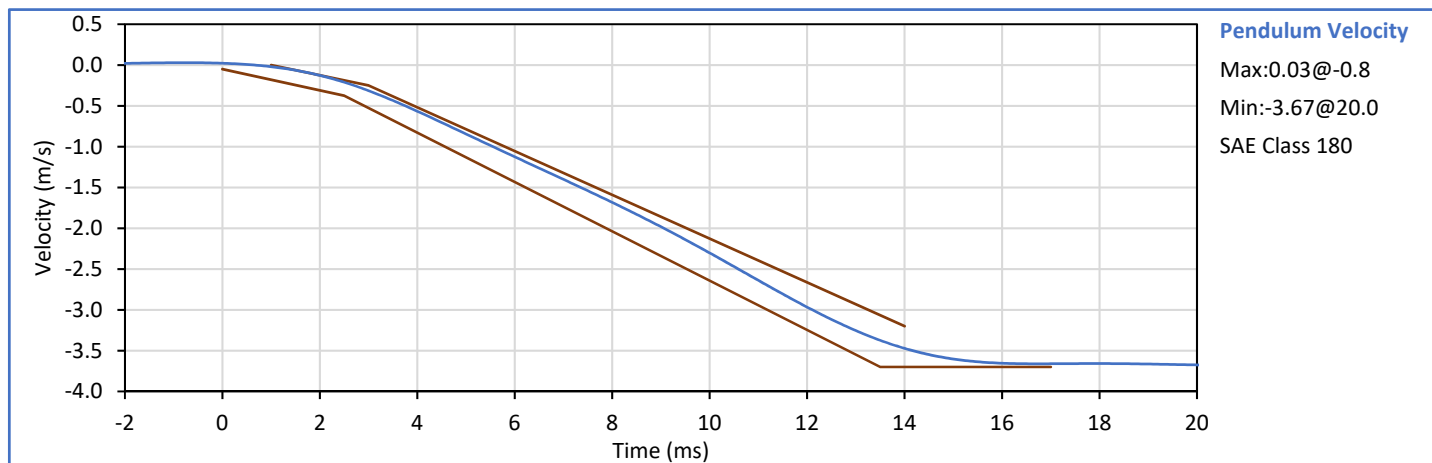
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.9	Pass
Laboratory Humidity	%	10	70	33	Pass
Peak Resultant Acceleration	g	125.0	155.0	148.5	Pass
Peak Head Ax	g	-15.0	15.0	5.2	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	28	Pass
Pendulum Velocity	m/s	3.30	3.50	3.45	Pass
Peak Headform Flexion	deg	49.0	59.0	49.7	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	58.8	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	54.2	Pass
Overall Test Results				Pass	Pass



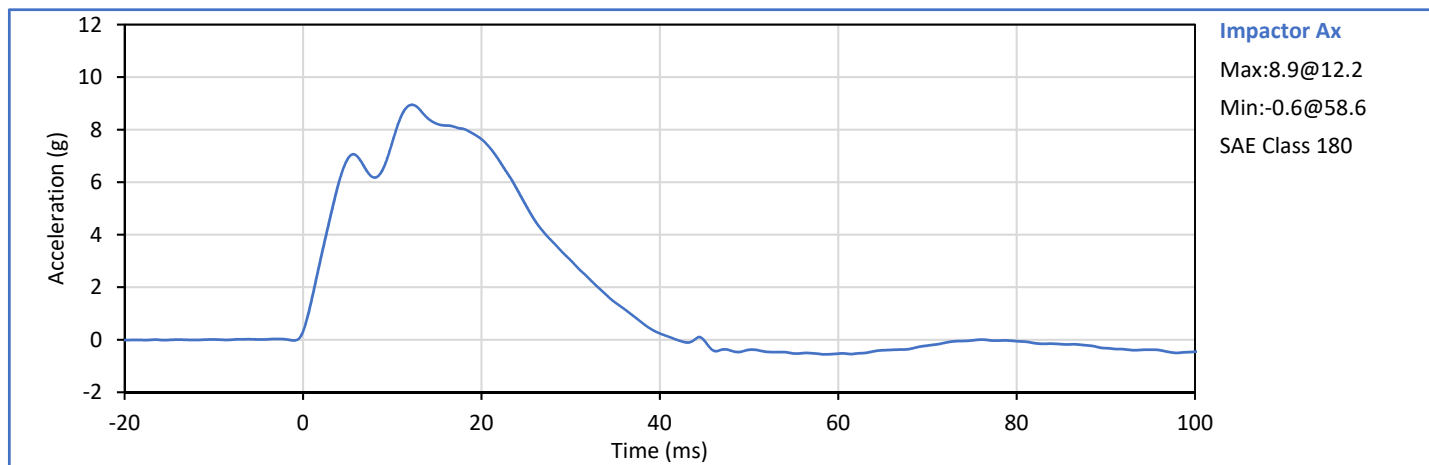
Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: F035

Test Date: 2019-02-07

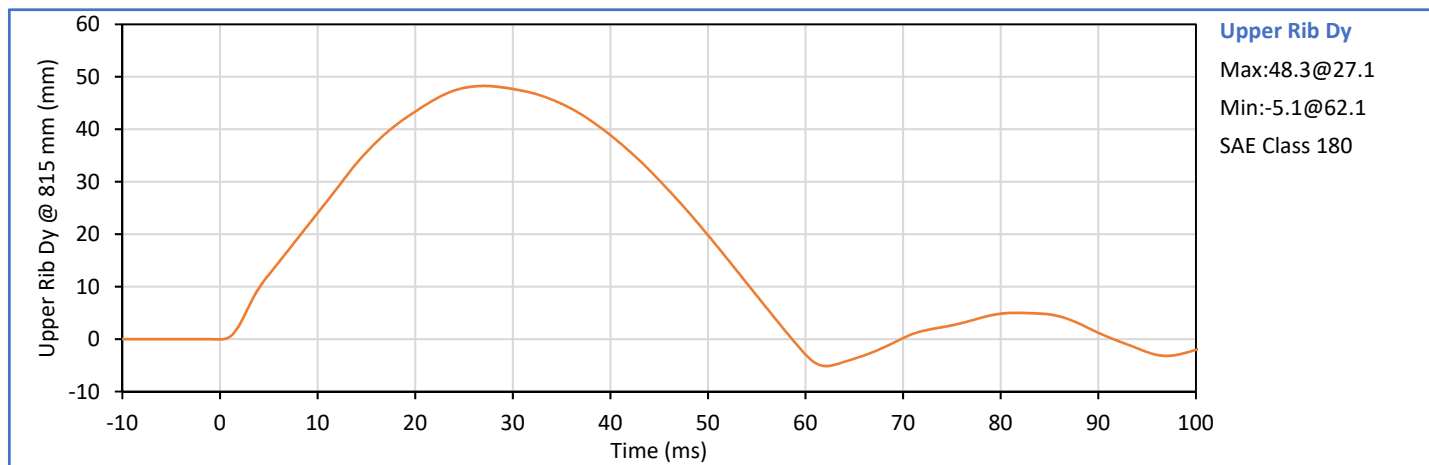
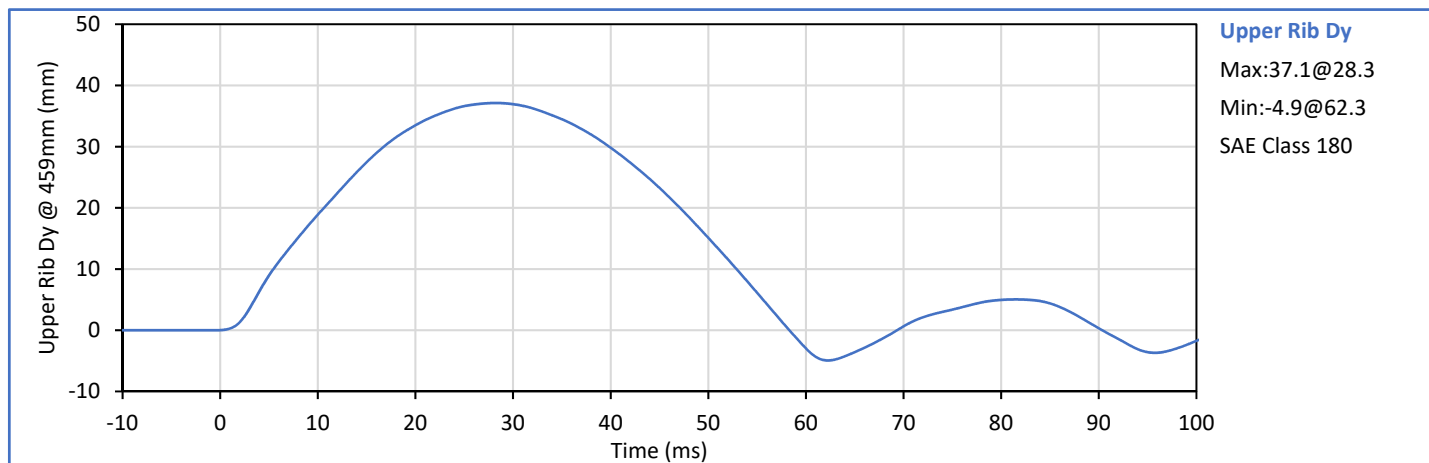
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Ax	g	7.5	10.5	8.9	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

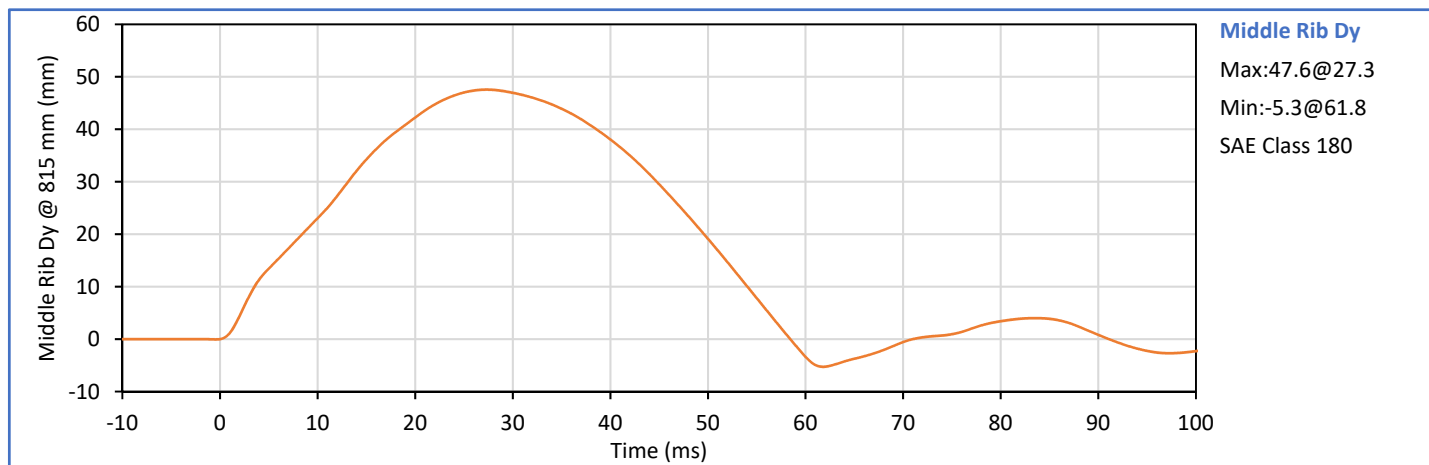
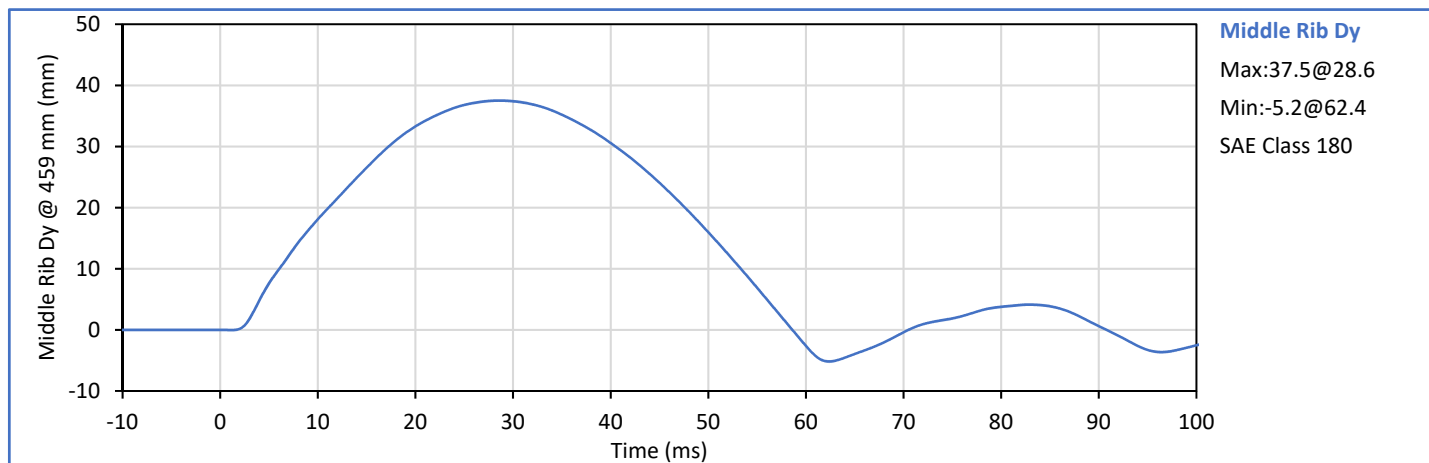
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	34	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.1	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.3	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

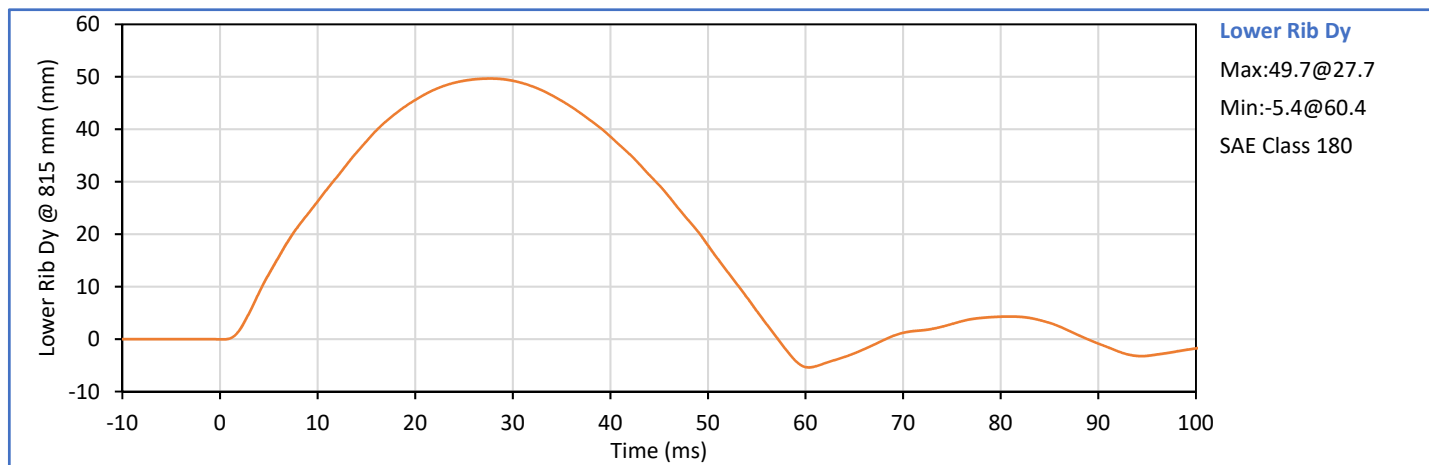
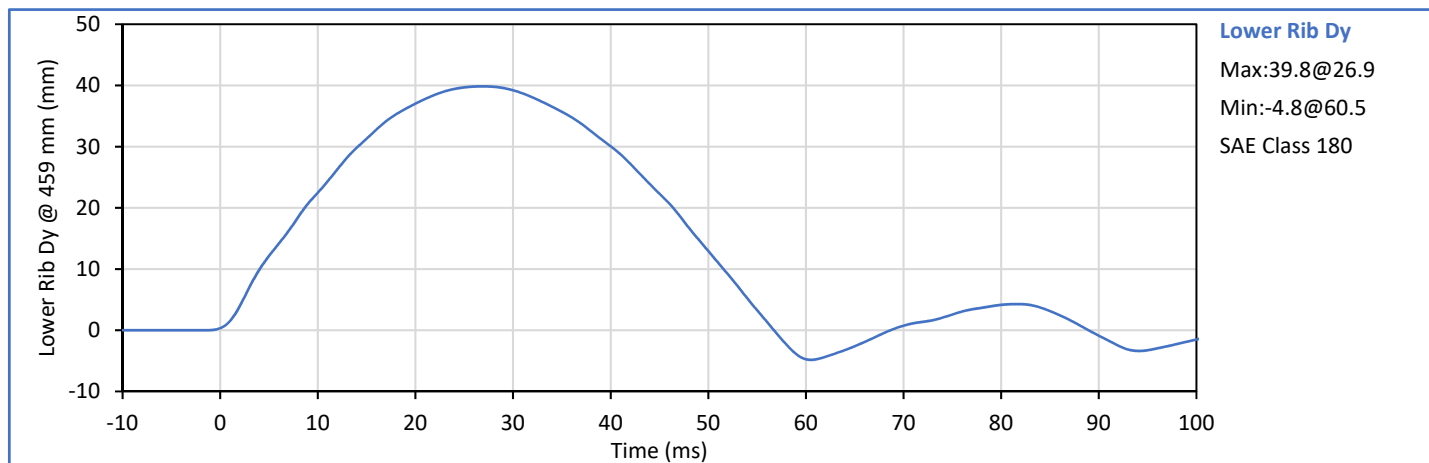
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	34	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.5	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.6	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

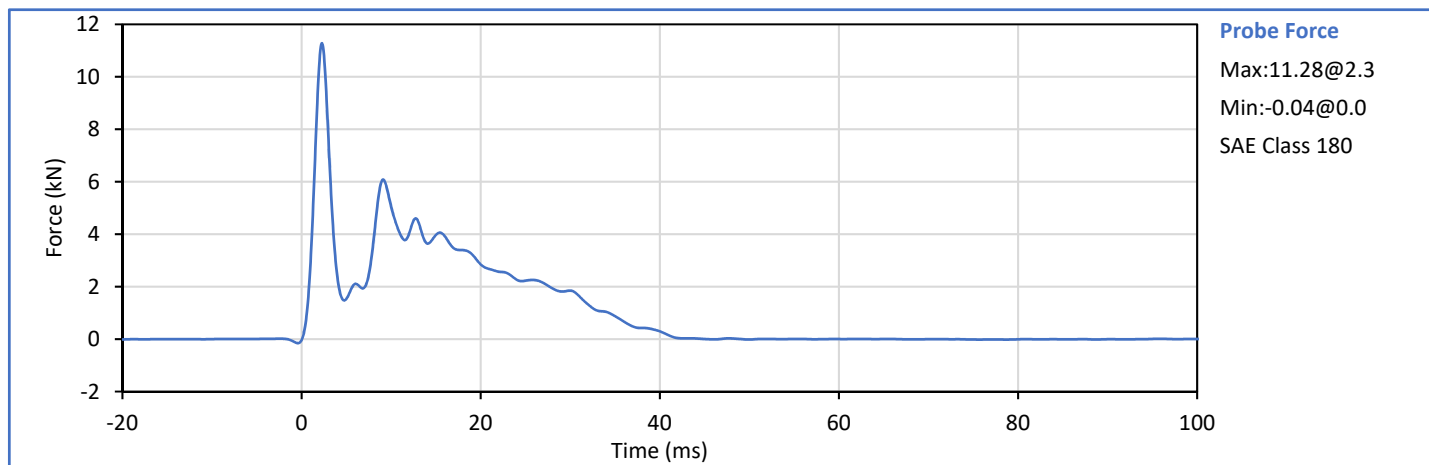
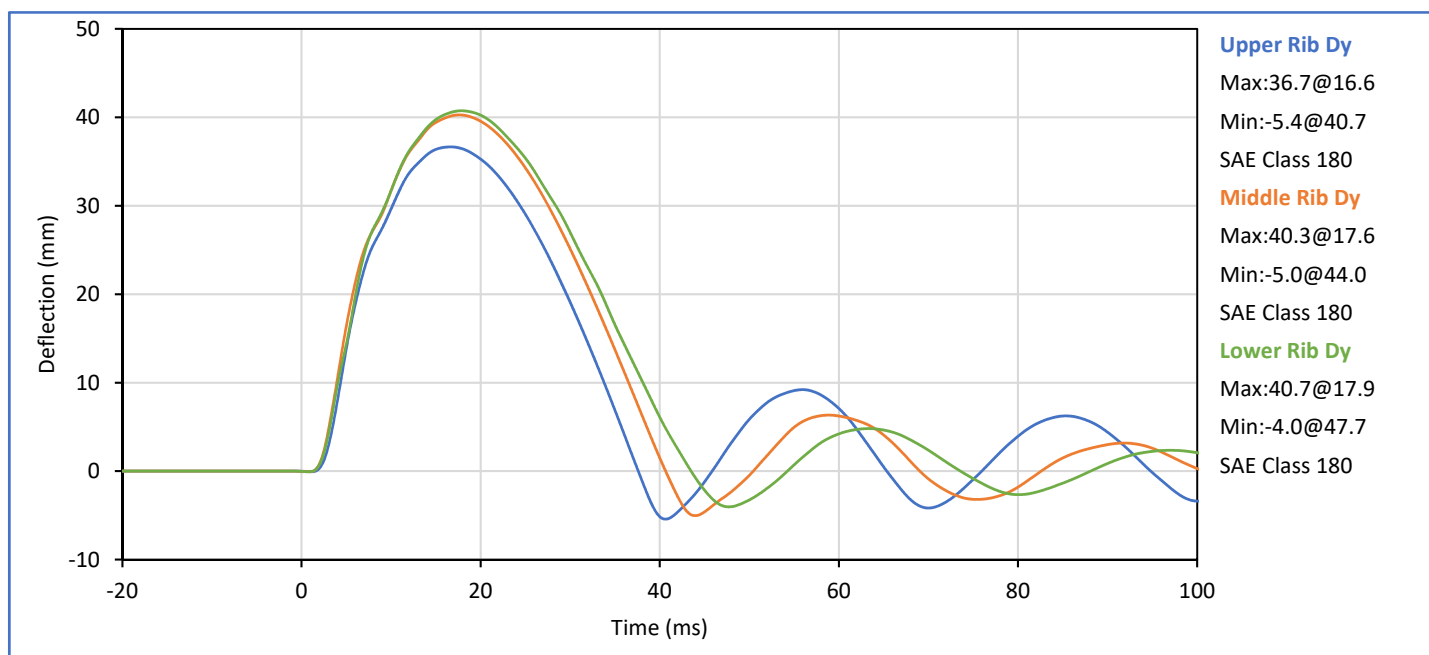
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.8	Pass
Laboratory Humidity	%	10	70	34	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	39.8	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	49.7	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

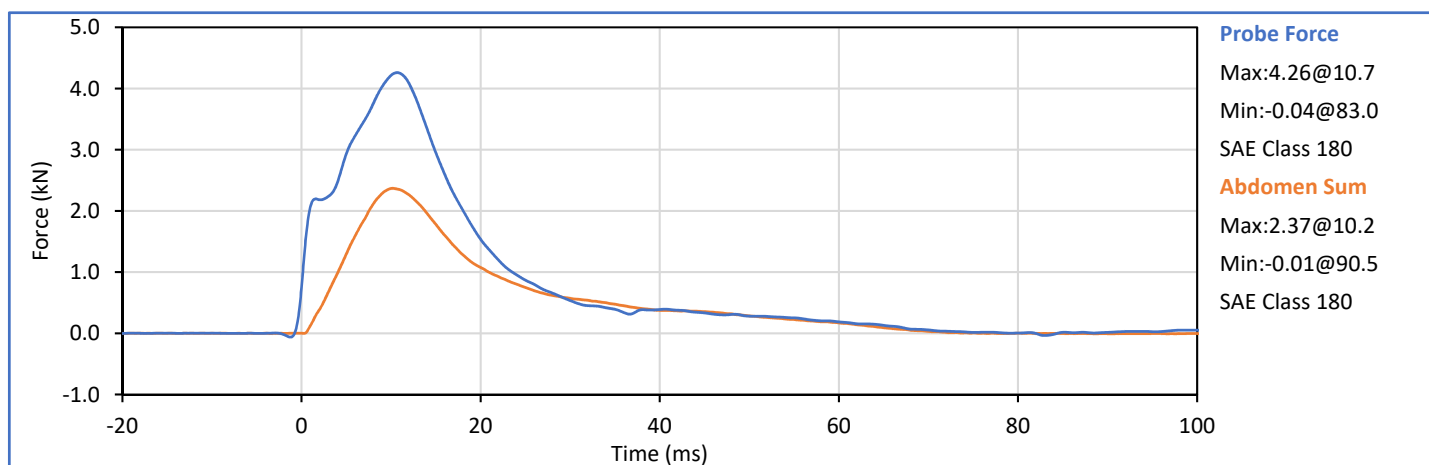
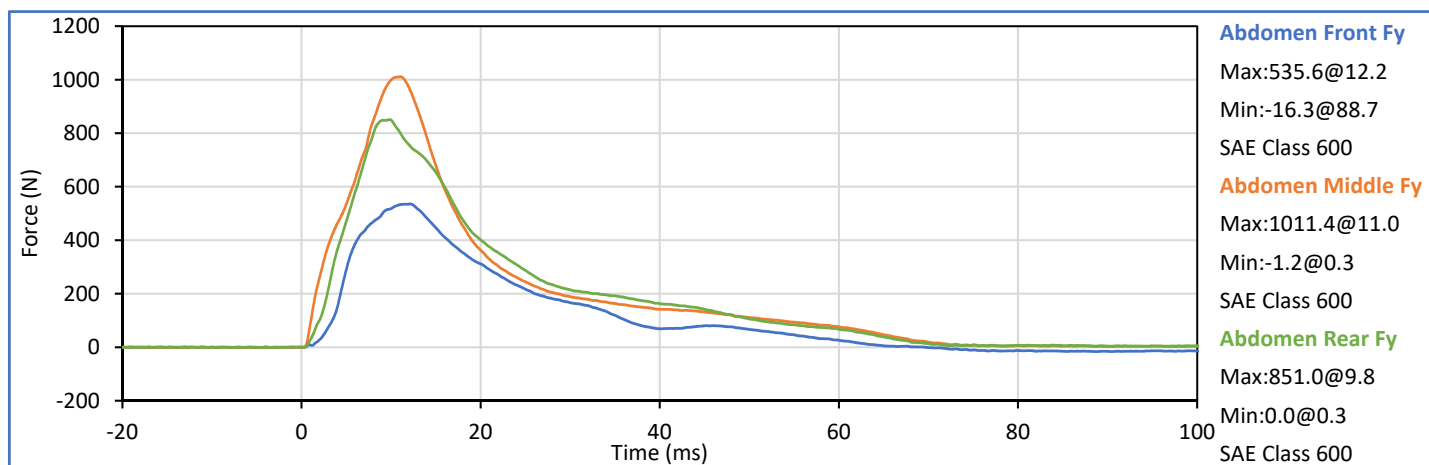
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	5.40	5.60	5.46	Pass
Peak Upper Rib Dy	mm	34.0	41.0	36.7	Pass
Peak Middle Rib Dy	mm	37.0	45.0	40.3	Pass
Peak Lower Rib Dy	mm	37.0	44.0	40.7	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	6.09	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

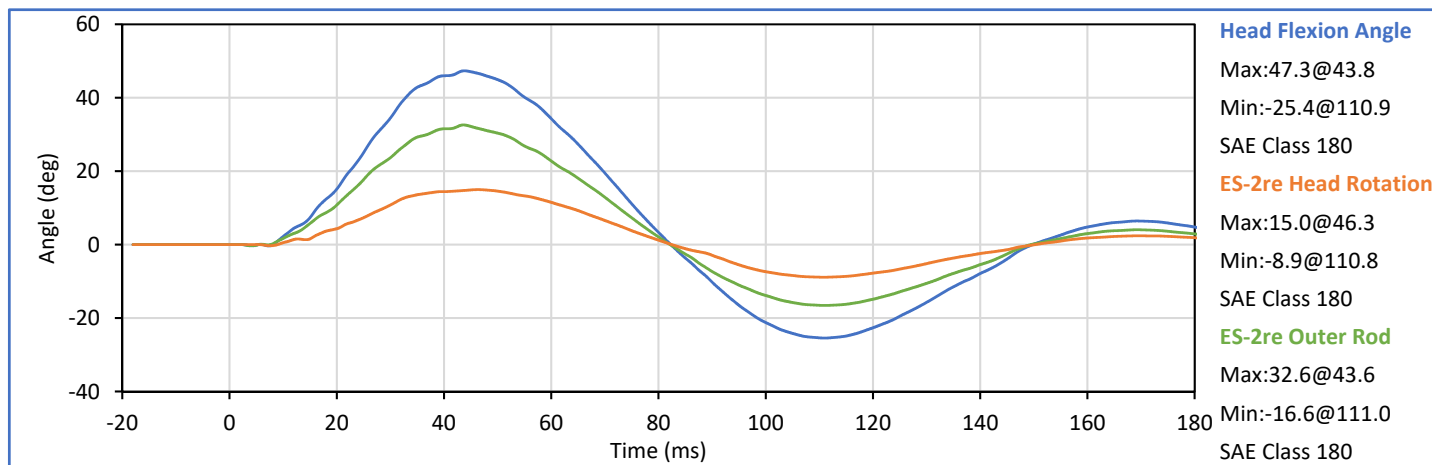
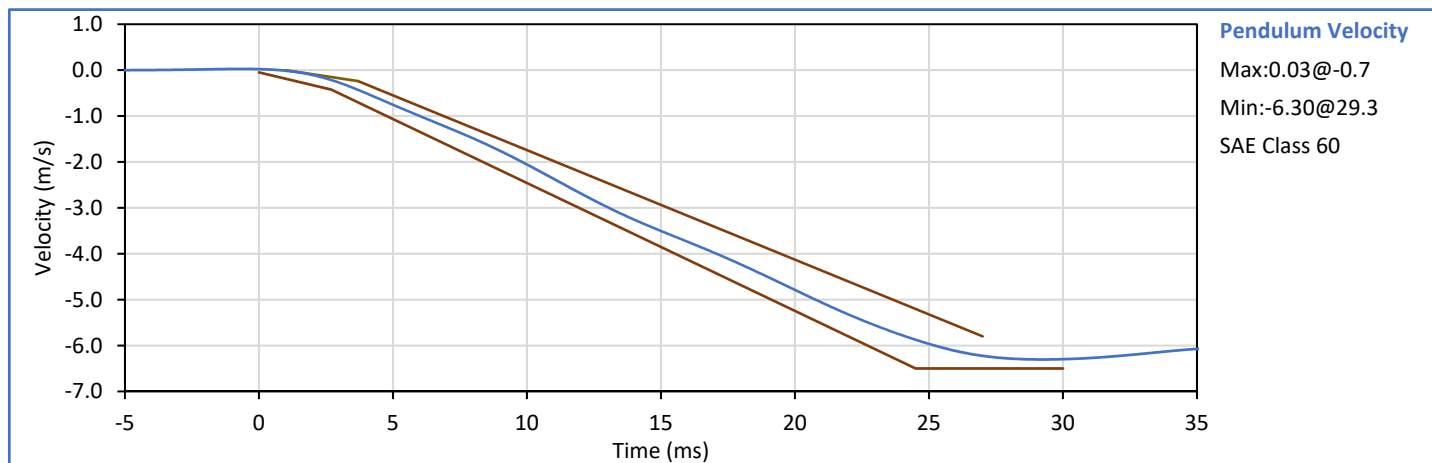
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	28	Pass
Impactor Velocity	m/s	3.90	4.10	4.04	Pass
Peak Impactor Force	kN	4.00	4.80	4.26	Pass
Time of Peak Impactor Force	ms	10.6	13.0	10.7	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.37	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.2	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

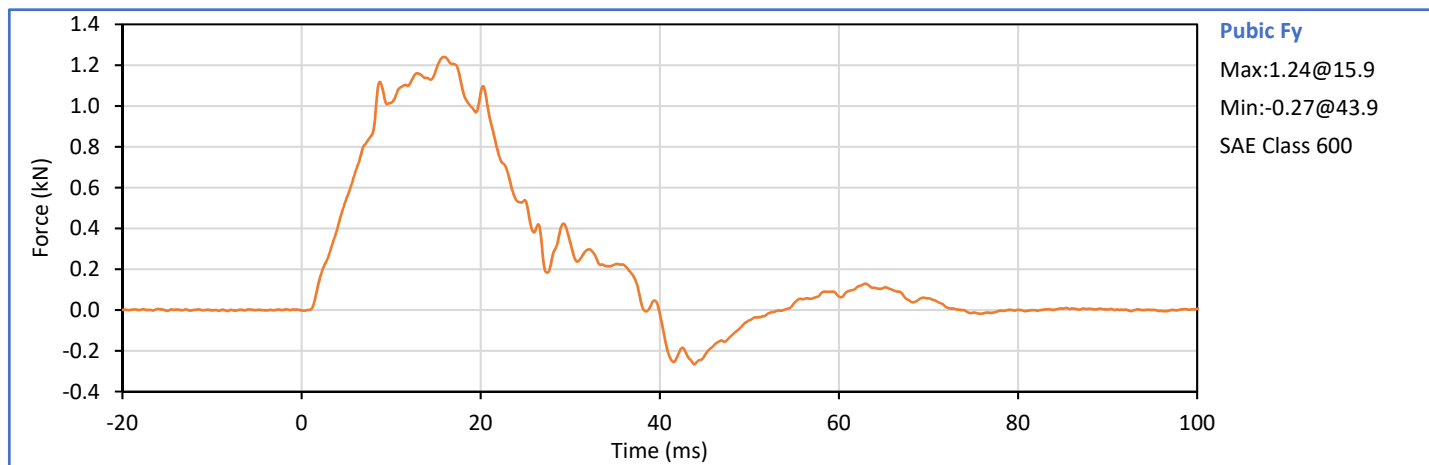
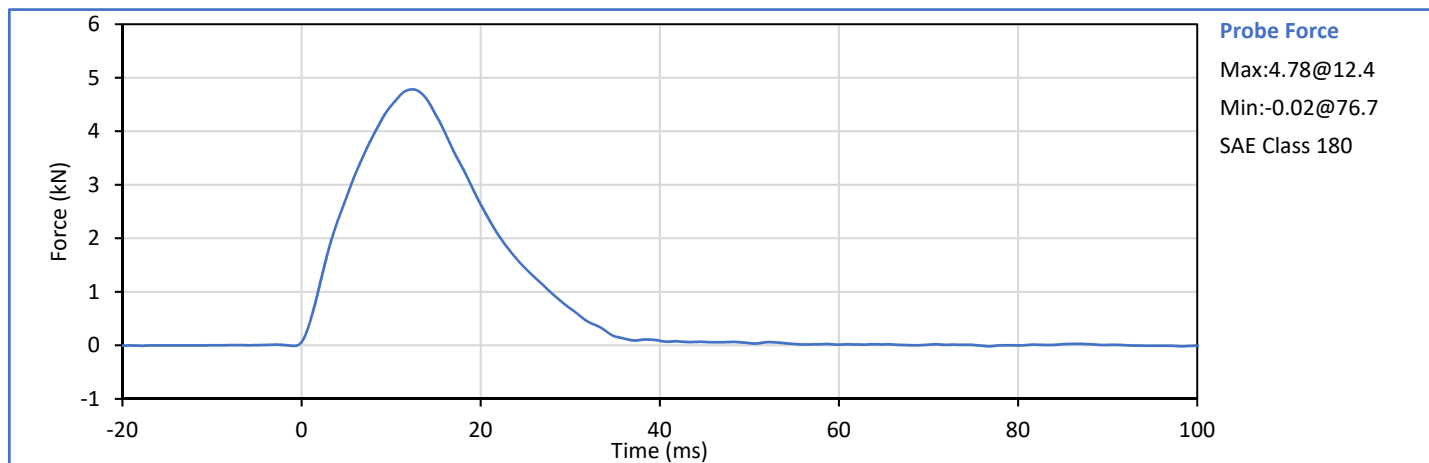
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.95	6.15	6.07	Pass
Peak Headform Flexion	deg	45.0	55.0	47.3	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	43.8	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	38.6	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Impactor Force	kN	4.70	5.40	4.78	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.4	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.24	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	15.9	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 308

Test Date: 2018-02-02

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	33	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

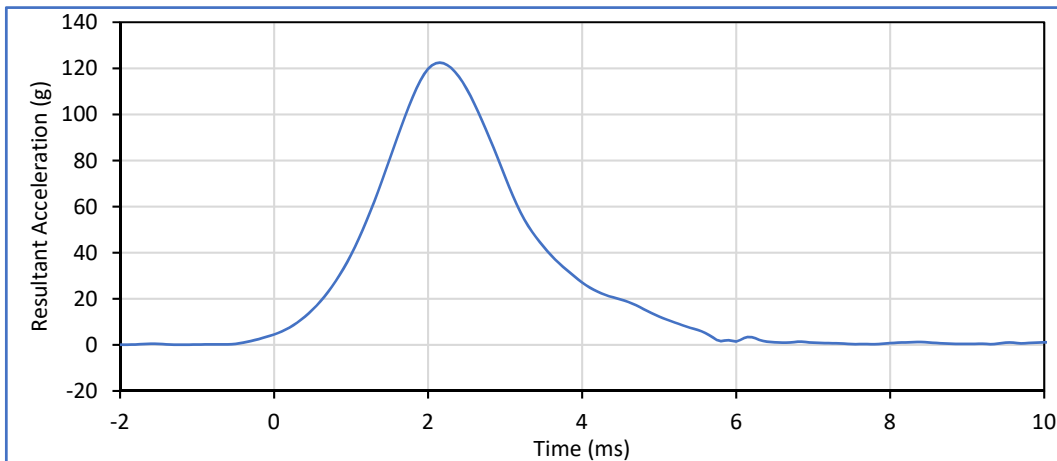


SID-IIs Small Side Impact ATD Head Drop

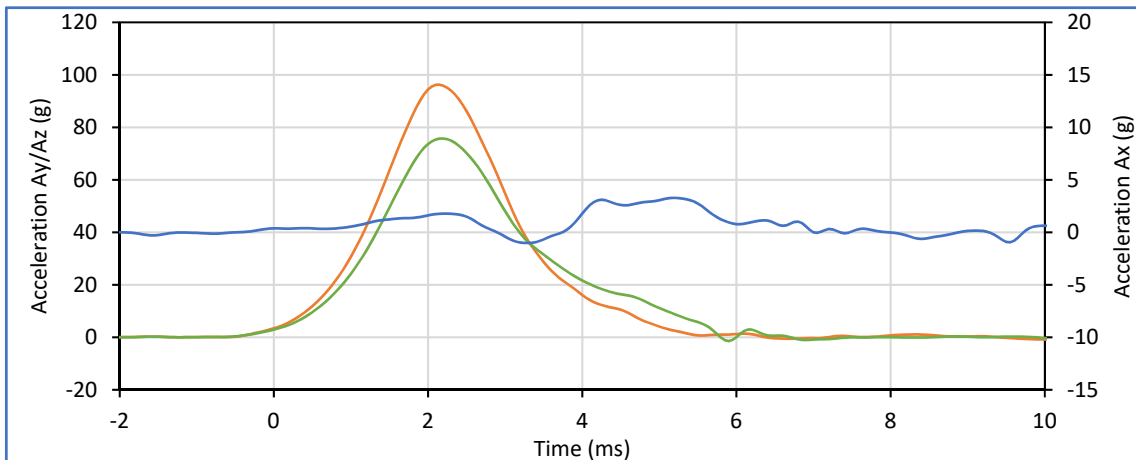
ATD Serial No.: 308

Test Date: 2019-02-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Humidity	%	10	70	29	Pass
Peak Resultant Acceleration	g	115.0	137.0	122.5	Pass
Peak Head Ax	g	-15.0	15.0	-1.0	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
 Max:122.5@2.2
 Min:0.3@7.8
 SAE Class 1000



Head Ax
 Max:3.3@5.2
 Min:-1.0@3.3
 SAE Class 1000
Head Ay
 Max:96.2@2.2
 Min:-0.8@10.0
 SAE Class 1000
Head Az
 Max:75.7@2.2
 Min:-1.4@5.9
 SAE Class 1000

Technician: J. Hernandez

Approved By: P. Puzzuto

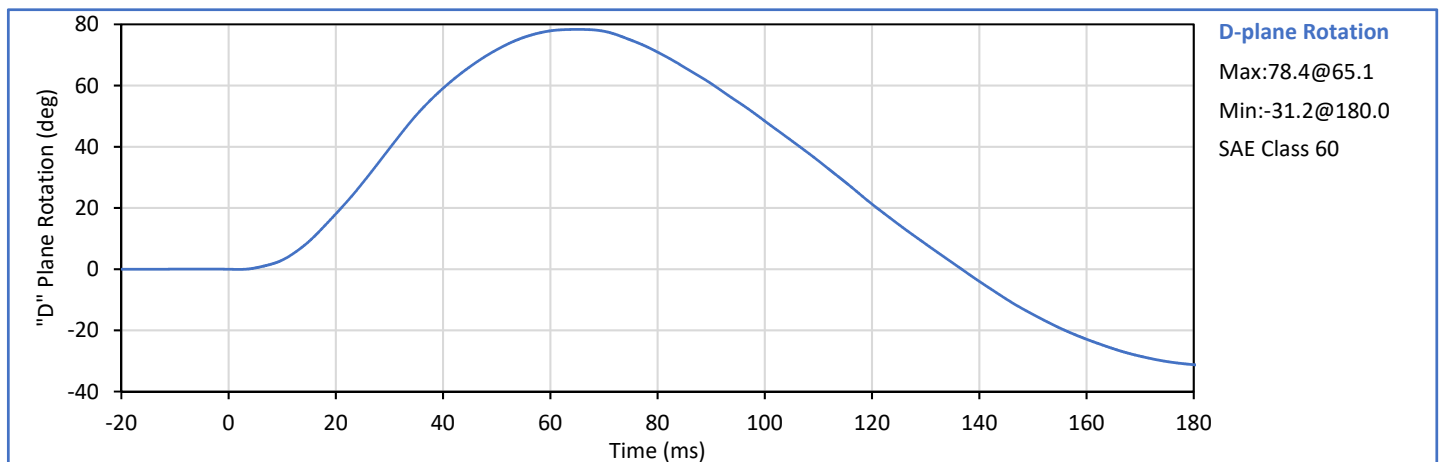
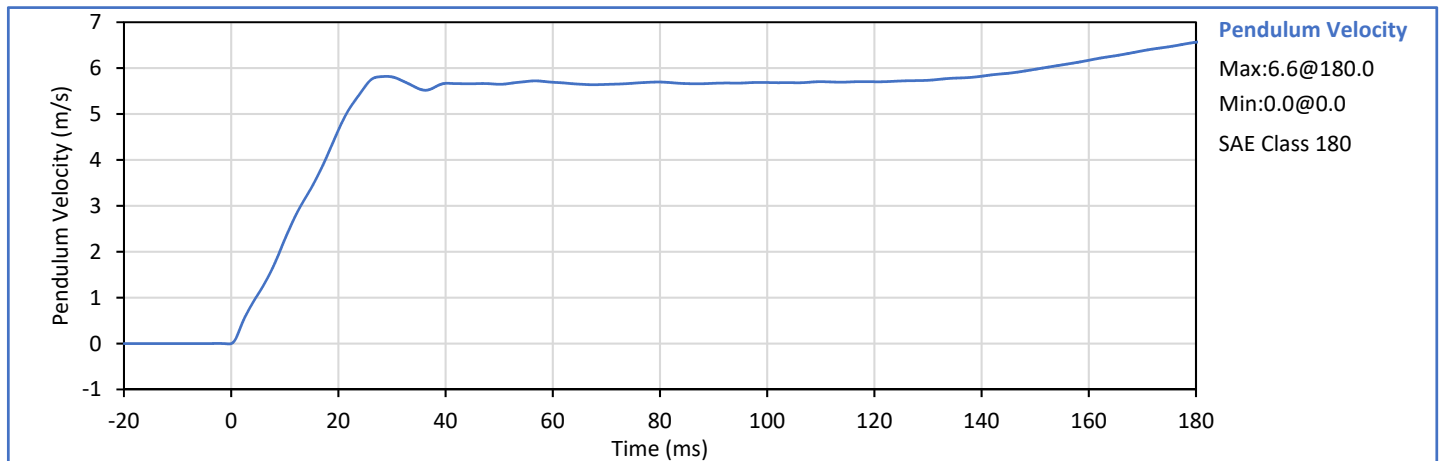


SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 308

Test Date: 2019-02-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.51	5.63	5.54	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.27	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.40	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.65	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.60	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.82	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	78.4	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	65.1	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-40.4	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	117.2	Pass
Overall Test Results				Pass	



Technician: _____

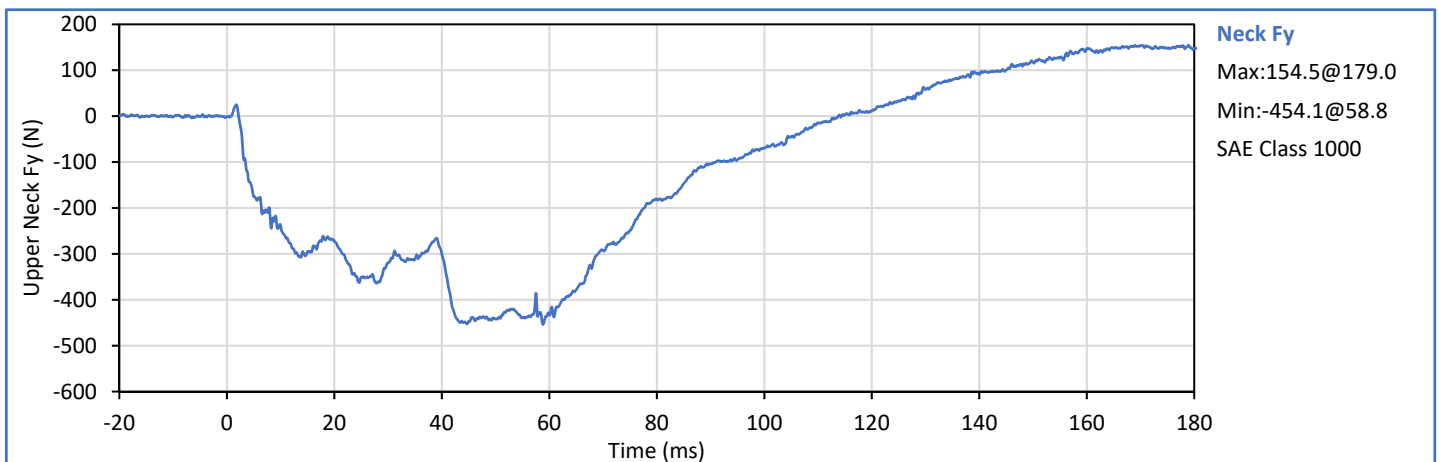
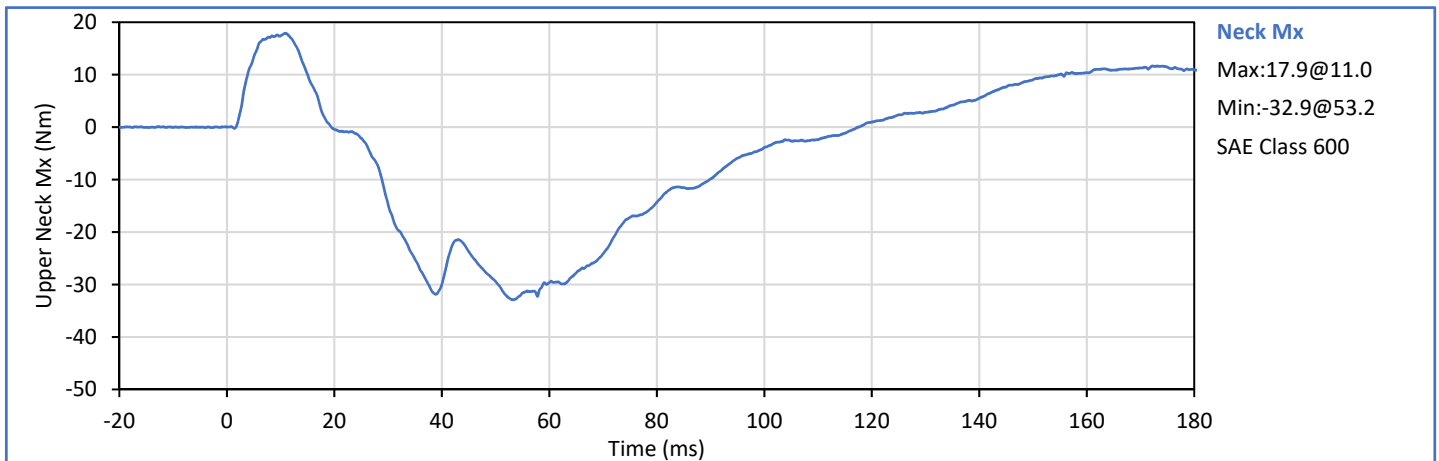
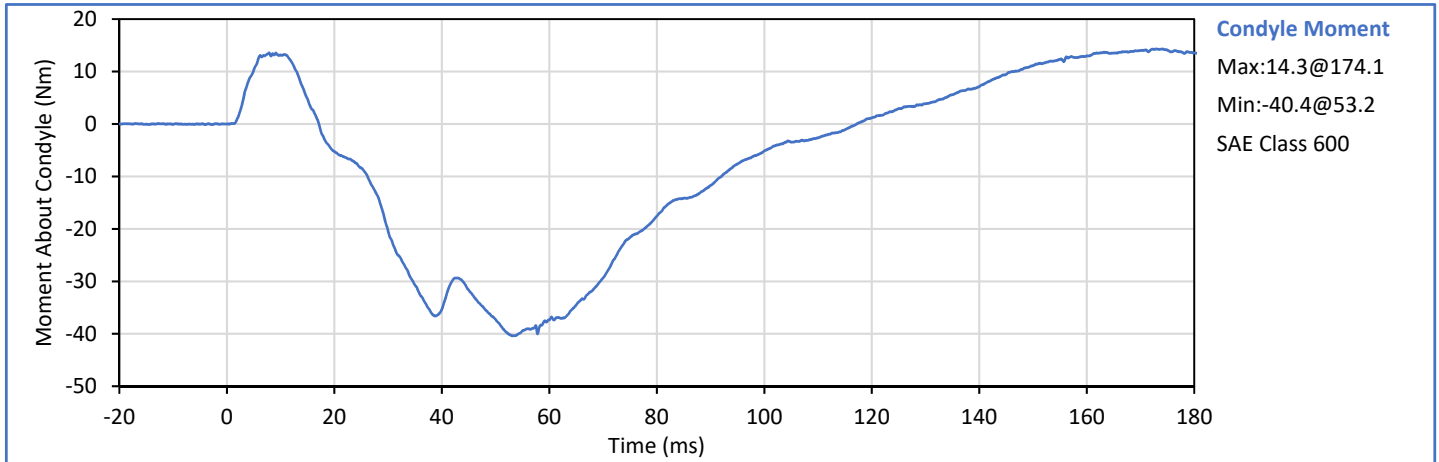
J. Hernandez

Approved By: _____

P. Puzzuto

ATD Serial No.: 308

Test Date: 2019-02-05



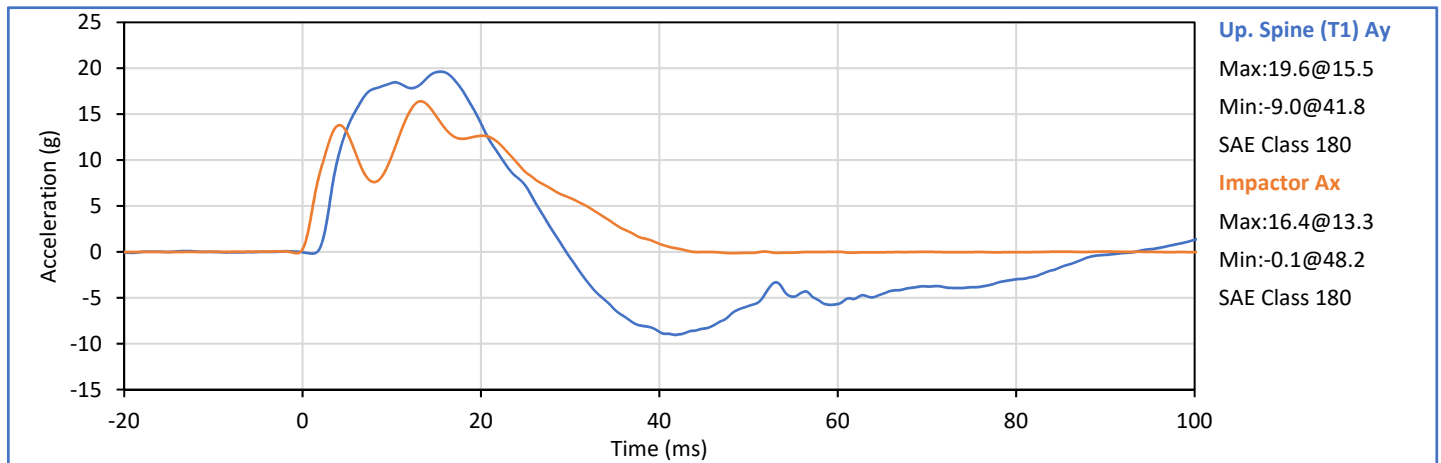
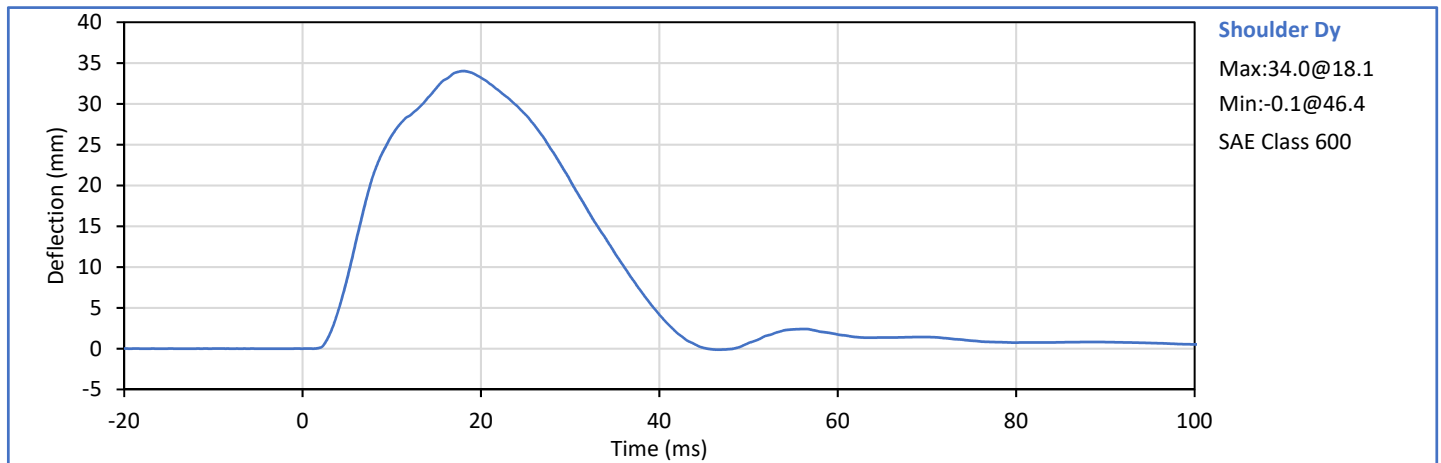


SID-II's Small Side Impact ATD Shoulder Impact Test

ATD Serial No.: 308

Test Date: 2019-02-02

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.29	Pass
Peak Shoulder Dy	mm	28.0	37.0	34.0	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	19.6	Pass
Peak Impactor Ax	g	13.0	18.0	16.4	Pass
Overall Test Results					Pass



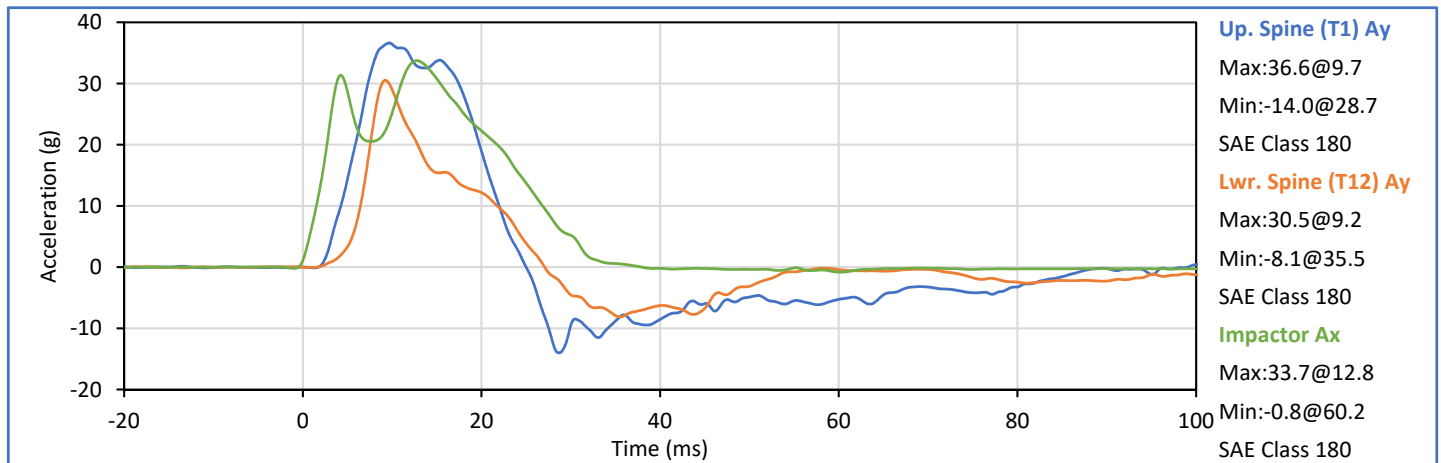
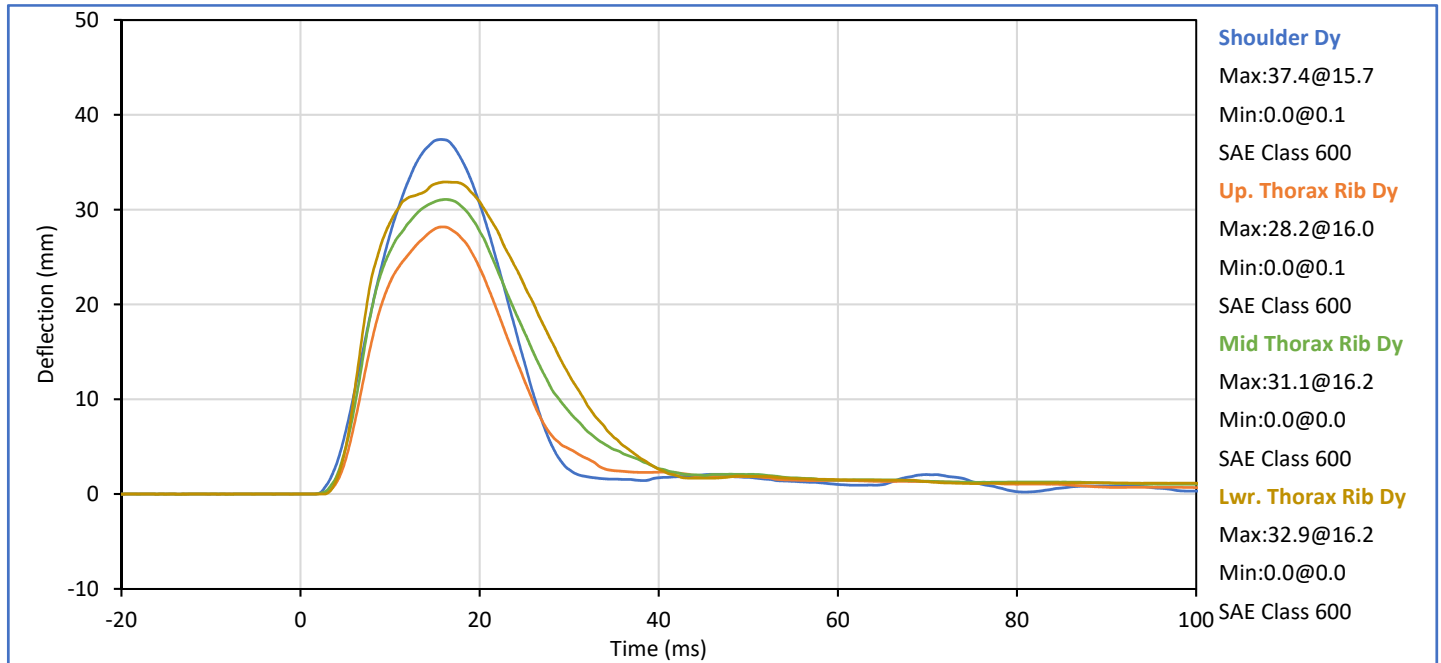
Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308

Test Date: 2019-02-02

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Impactor Velocity	m/s	6.60	6.80	6.63	Pass
Peak Shoulder Dy	mm	31.0	40.0	37.4	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.2	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.1	Pass
Peak Lower Rib Dy	mm	32.0	38.0	32.9	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.6	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	30.5	Pass
Peak Impactor Ax	g	30.0	36.0	33.7	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

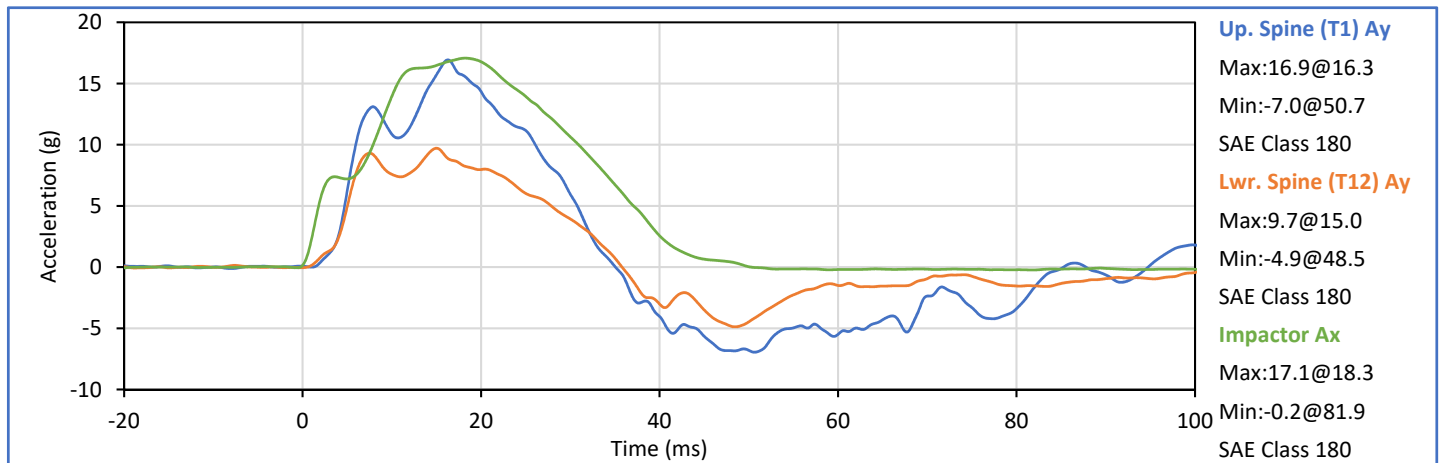
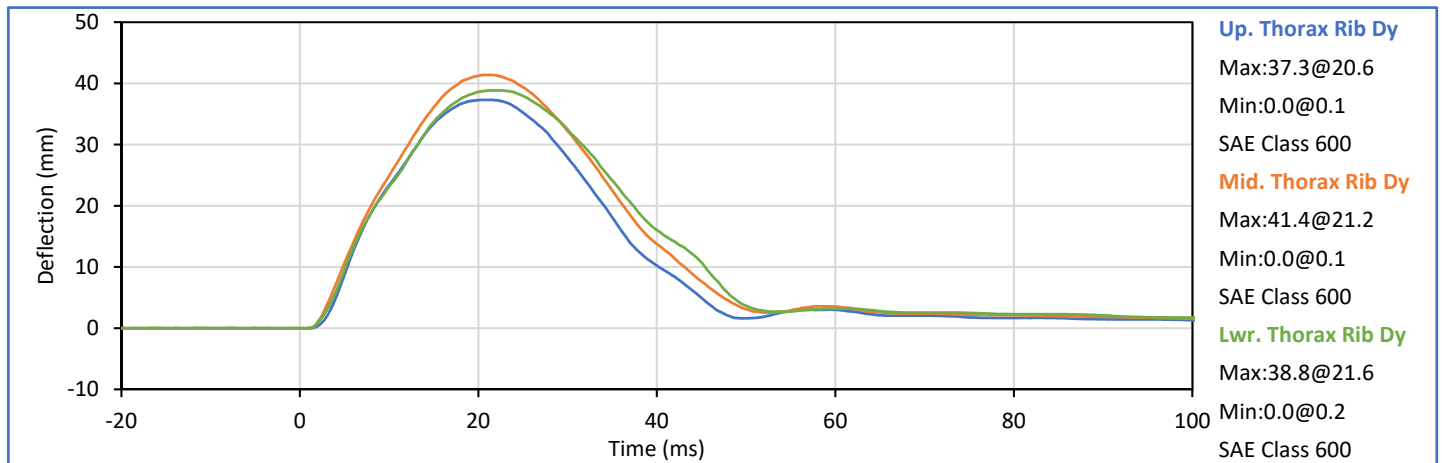


**SID-IIs Small Side Impact ATD
 Thorax (No Arm)**

ATD Serial No.: 308

Test Date: 2019-02-02

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.37	Pass
Peak Upper Rib Dy	mm	32.0	40.0	37.3	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.4	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.8	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	16.9	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.7	Pass
Peak Impactor Ax	g	14.0	18.0	17.1	Pass
Overall Test Results				Pass	



Technician: J. Hernandez

Approved By: P. Puzzuto

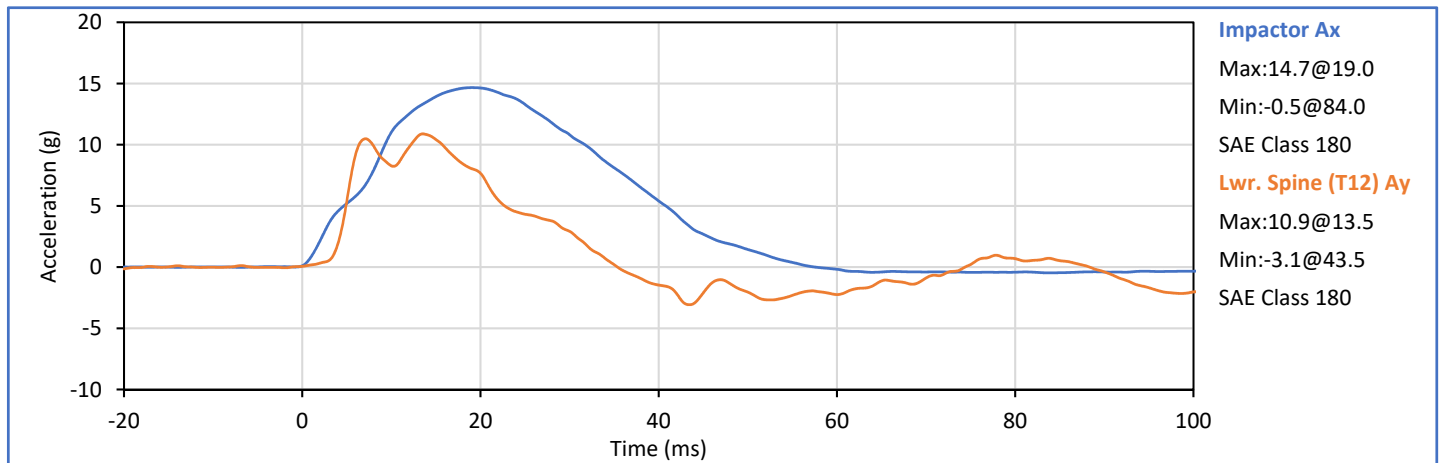
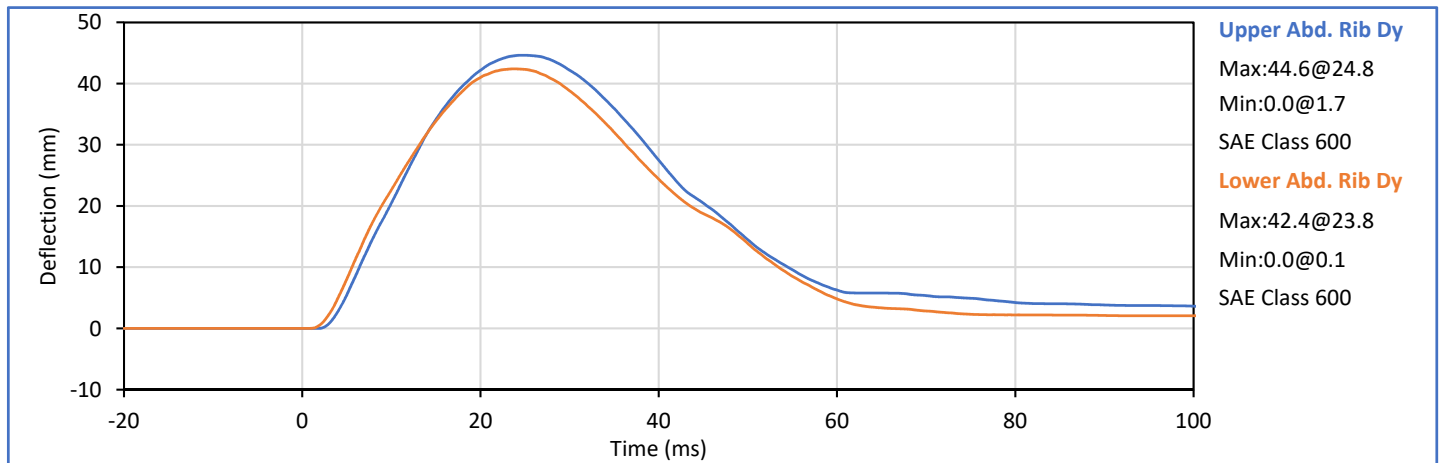


**SID-IIs Small Side Impact ATD
 Abdomen Impact**

ATD Serial No.: 308

Test Date: 2019-02-02

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.35	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	44.6	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	42.4	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.9	Pass
Peak Impactor Ax	g	12.0	16.0	14.7	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



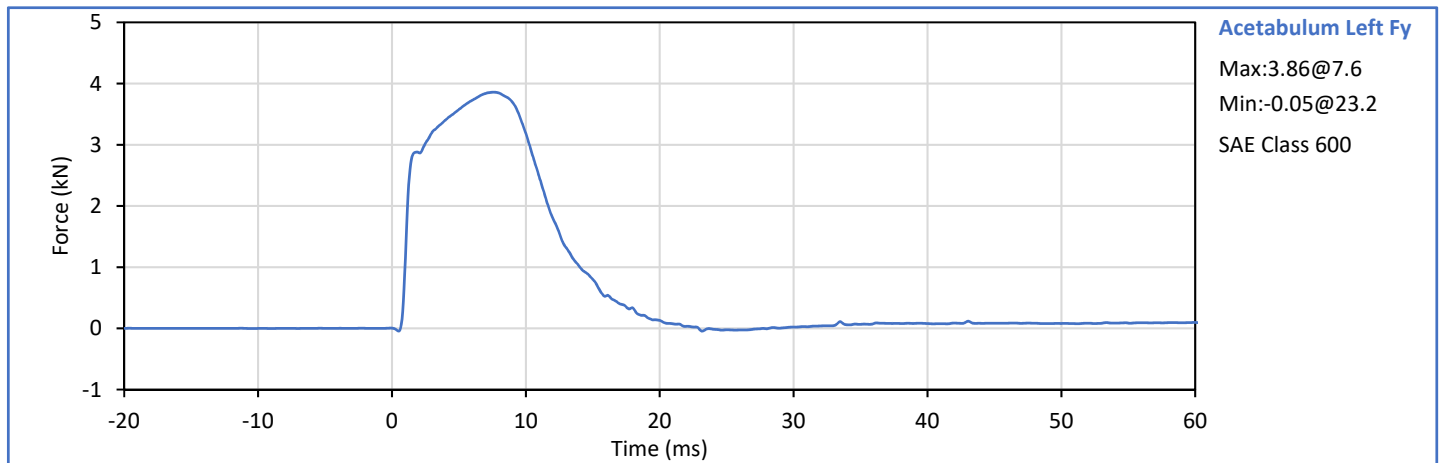
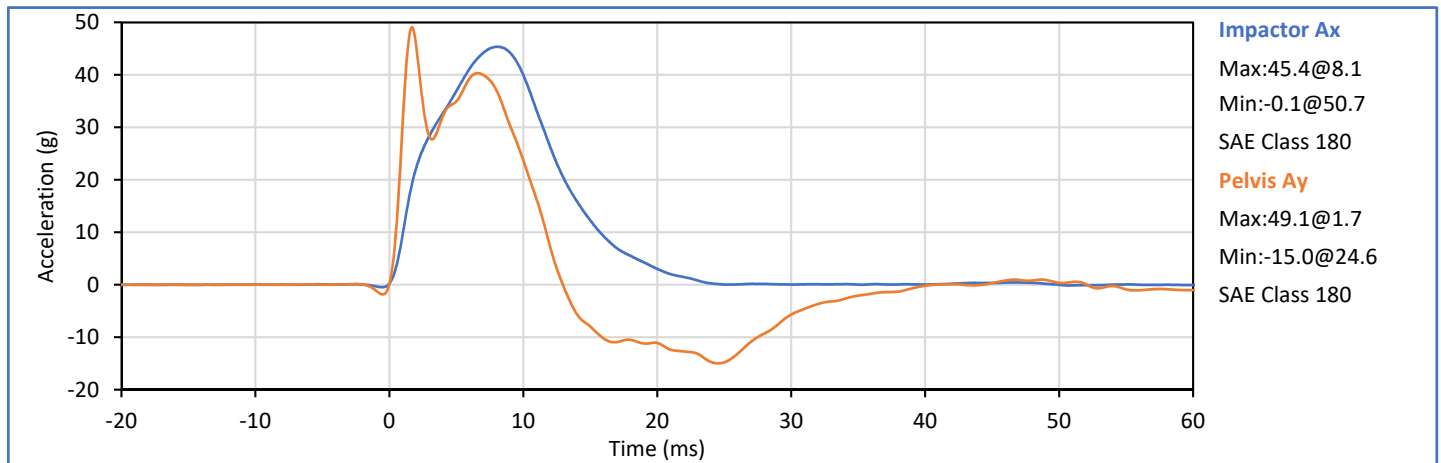
SID-II Small Side Impact ATD
Pelvis Acetabulum Impact

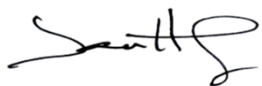
ATD Serial No.: 308

Test Date: 2019-02-02

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	6.69	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.86	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.3	Pass
Peak Impactor Ax	g	38.0	47.0	45.4	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 11351 (SACO)



Technician: 
J. Hernandez

Approved By: 
P. Puzzuto



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Info@karco.com www.karco.com

SID-IIs Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 308

Test Date: 2019-02-02

Pelvis Plug S/N: 11351 (SACO)



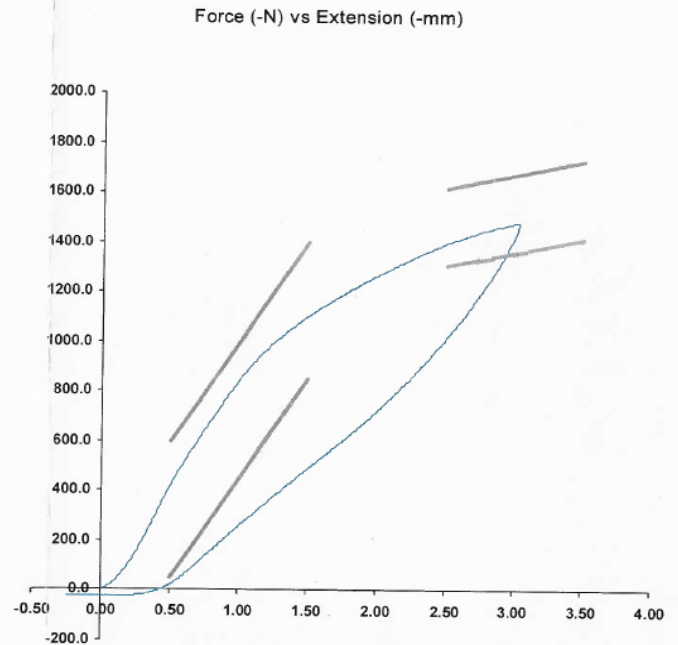
SID-IIs Pelvis Plug Certification Test

Plug S/N 11351
Test Number 2744
Report Number 2741
Test Date 5/3/2016 7:54:46 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	416.66	50.00	600.00
Force @ 1.5 mm (N)	1,101.18	850.00	1,400.00
Force @ 2.5 mm (N)	1,395.69	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,478.03	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (TI240813), Units (LBS) 1000
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator DC

Part Number 180-4450

Template No 107 03-May-16
SACO Research

By: DC Date: 5/3/16

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



SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

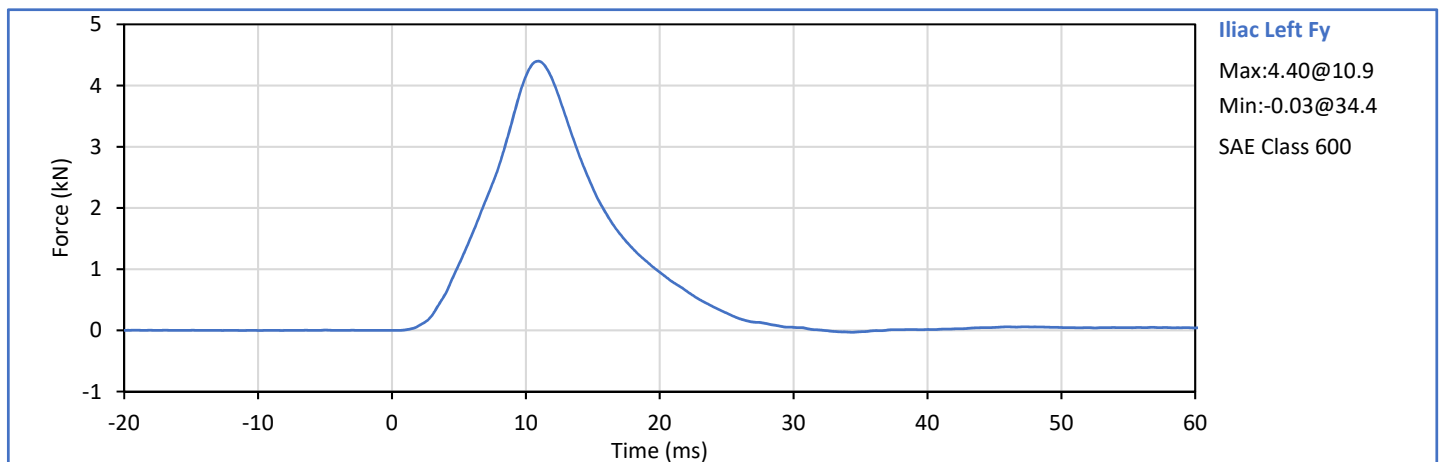
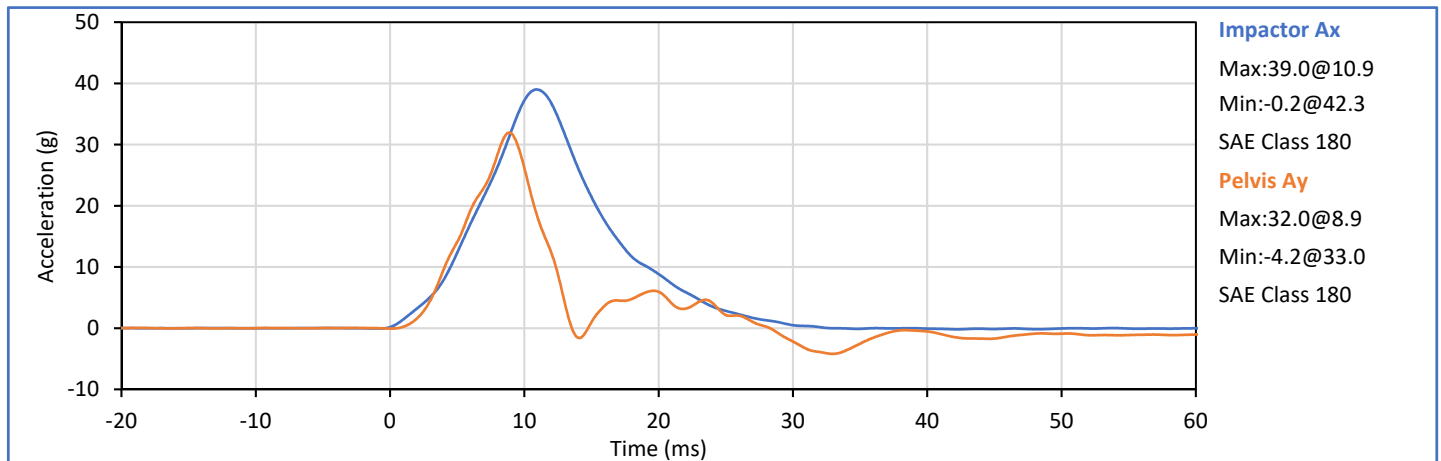
ATD Serial No.: 308

Test Date: 2019-02-02

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.40	Pass
Pelvis Ay after 6ms	g	28.0	39.0	32.0	Pass
Peak Impactor Ax	g	36.0	45.0	39.0	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified



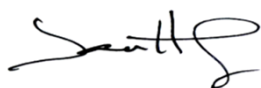
Technician: J. Hernandez

Approved By: P. Puzzuto

APPENDIX C
POST-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	28	Pass
1 - Sitting Height	mm	900	918	906	Pass
2 - Seat to Shoulder Joint	mm	558	572	564	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	350	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	103	Pass
5 - Sole to Seat, Sitting	mm	433	451	446	Pass
6 - Head Width	mm	152	158	155	Pass
7 - Shoulder/Arm Width	mm	461	479	470	Pass
8 - Thorax Width	mm	322	332	329	Pass
9 - Abdomen Width	mm	273	287	278	Pass
10 - Pelvis Lap Width	mm	359	373	366	Pass
11 - Head Depth	mm	196	206	204	Pass
12 - Thorax Depth	mm	262	272	270	Pass
13 - Abdomen Depth	mm	194	204	198	Pass
14 - Pelvis Depth	mm	235	245	237	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	154	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	604	Pass
			Overall Test Results		Pass

Technician:



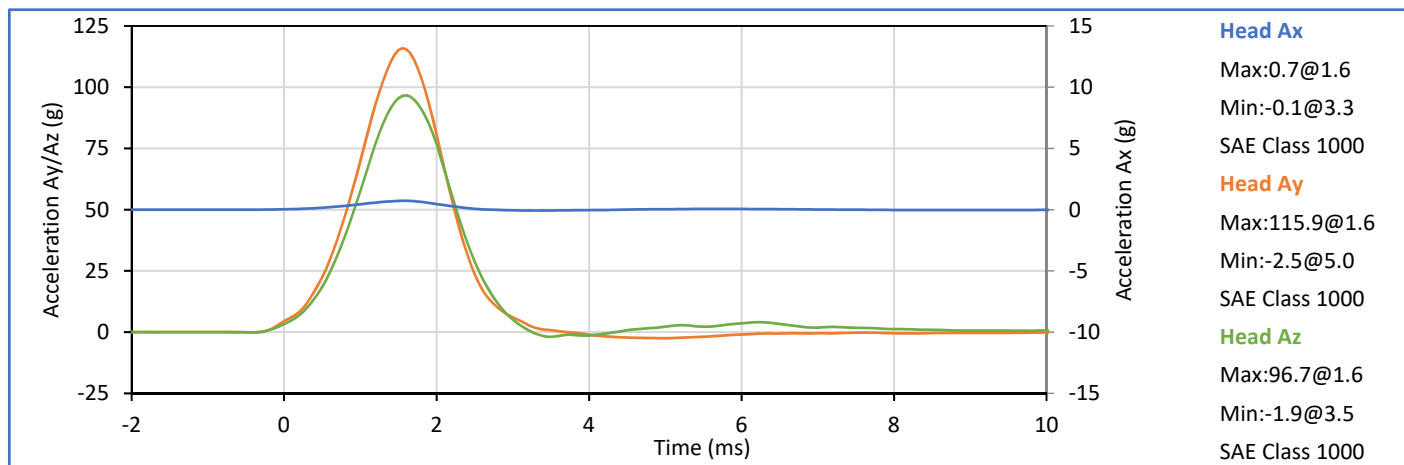
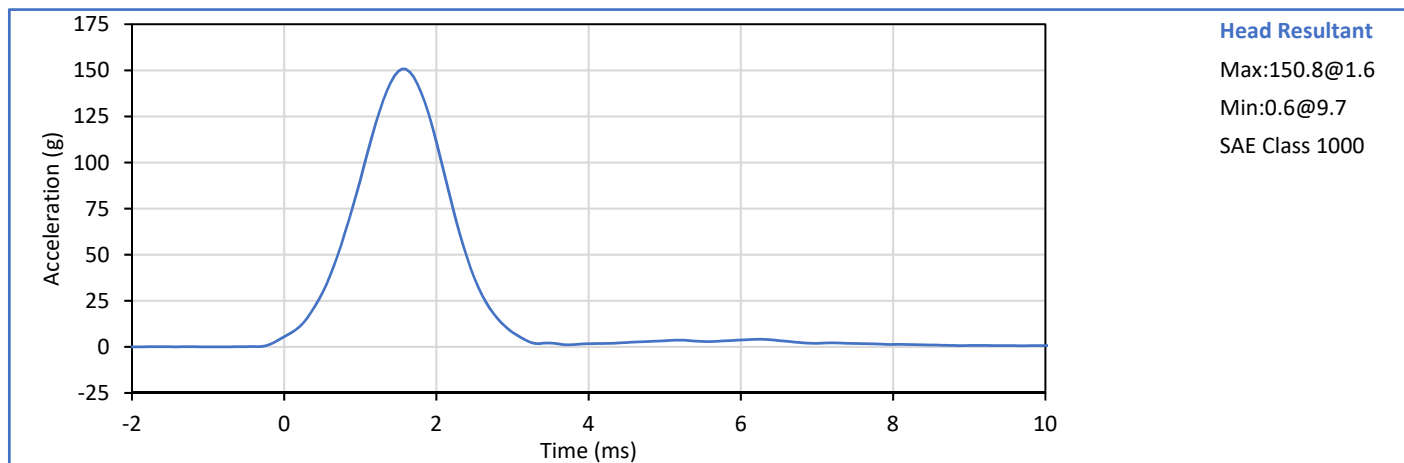
J. Hernandez

Approved By:



P. Puzzuto

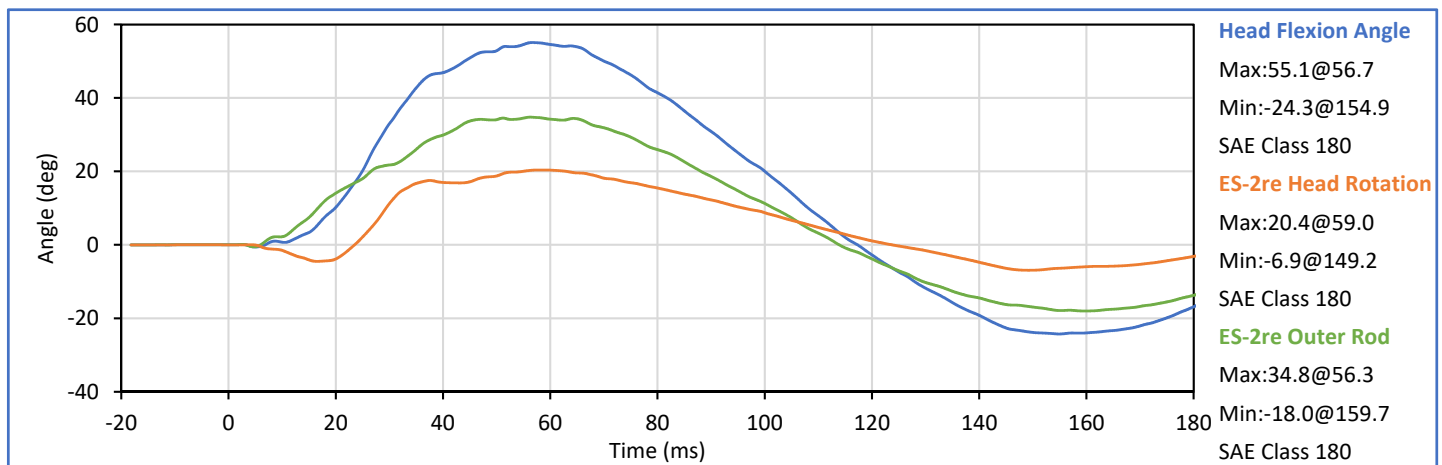
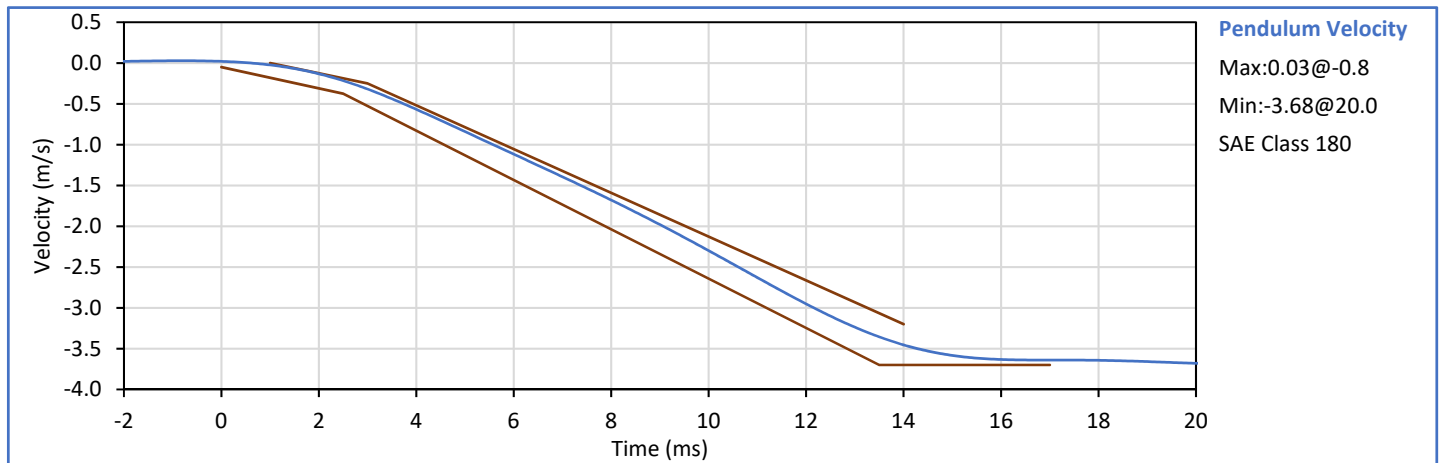
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.9	Pass
Laboratory Humidity	%	10	70	28	Pass
Peak Resultant Acceleration	g	125.0	155.0	150.8	Pass
Peak Head Ax	g	-15.0	15.0	0.7	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	24	Pass
Pendulum Velocity	m/s	3.30	3.50	3.46	Pass
Peak Headform Flexion	deg	49.0	59.0	55.1	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.7	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	60.7	Pass
Overall Test Results				Pass	Pass



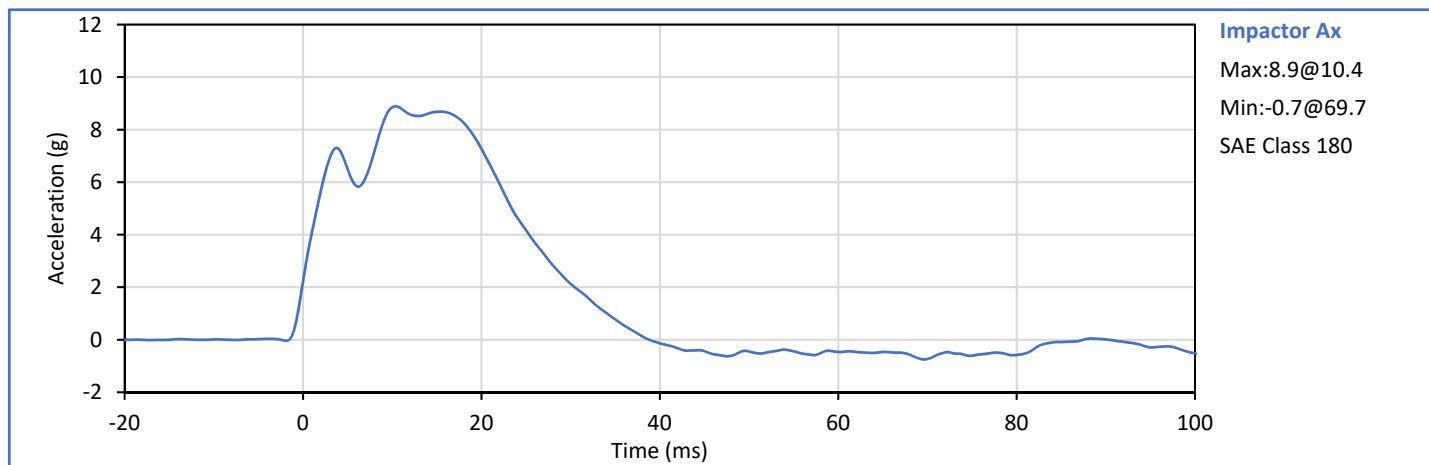
Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: F035

Test Date: 2019-02-26

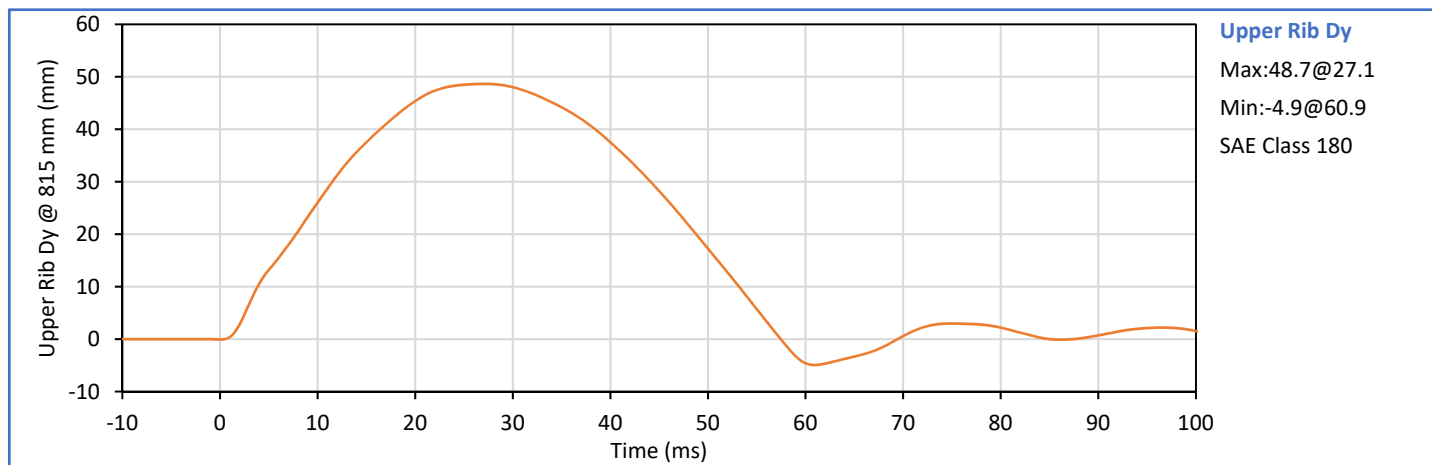
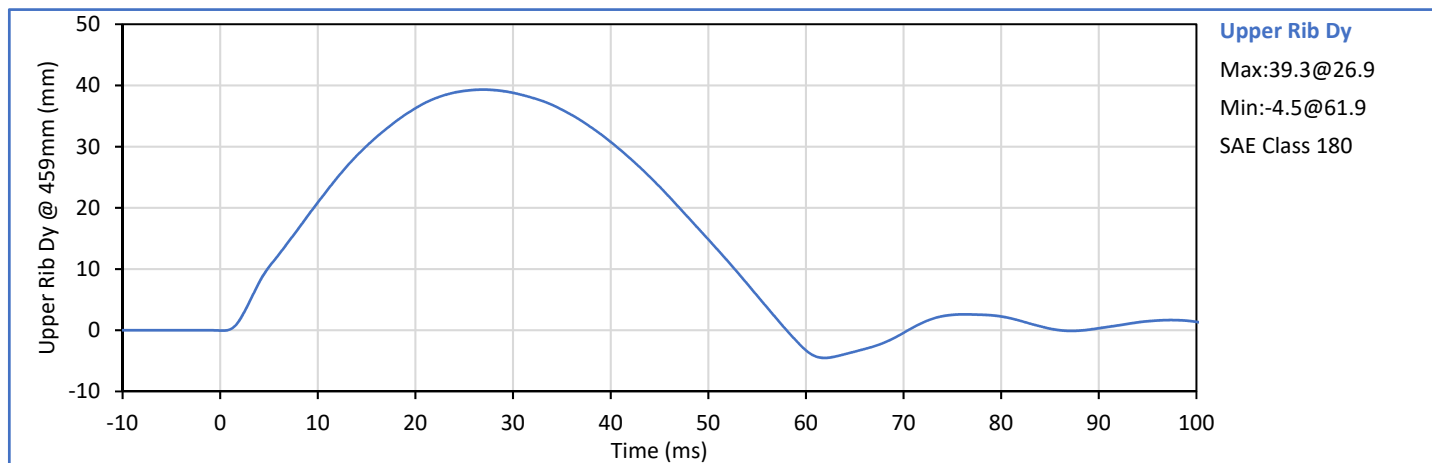
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.29	Pass
Peak Impactor Ax	g	7.5	10.5	8.9	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

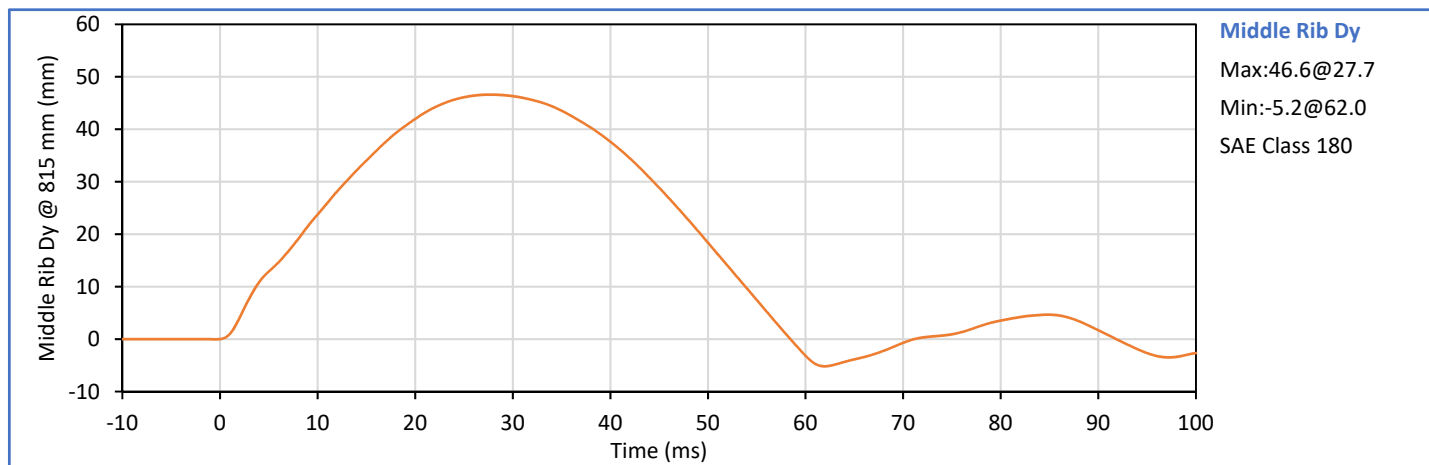
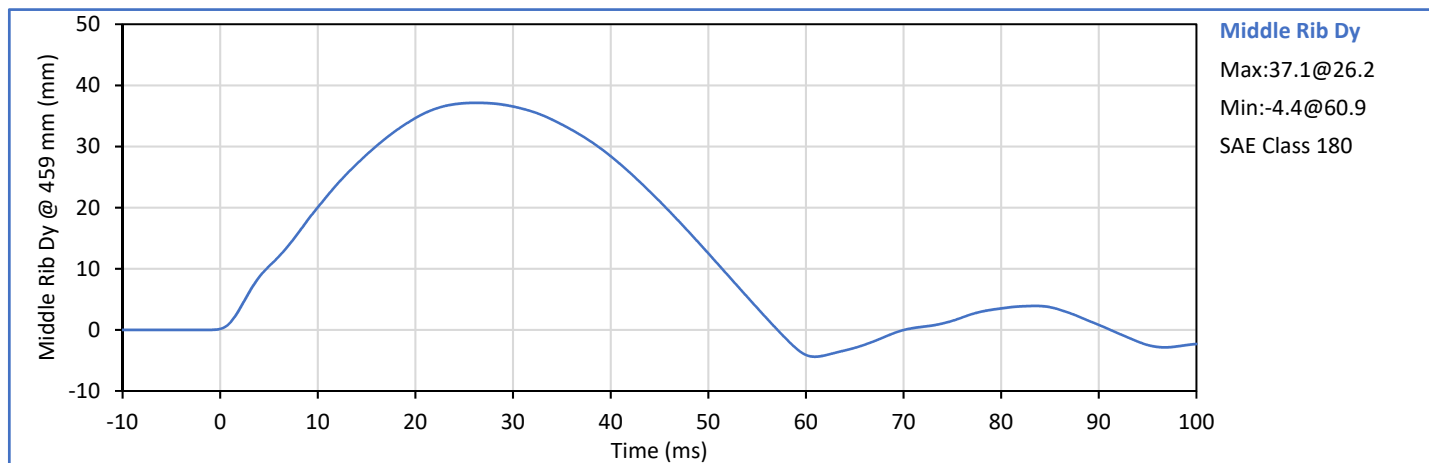
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	28	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	39.3	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.7	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

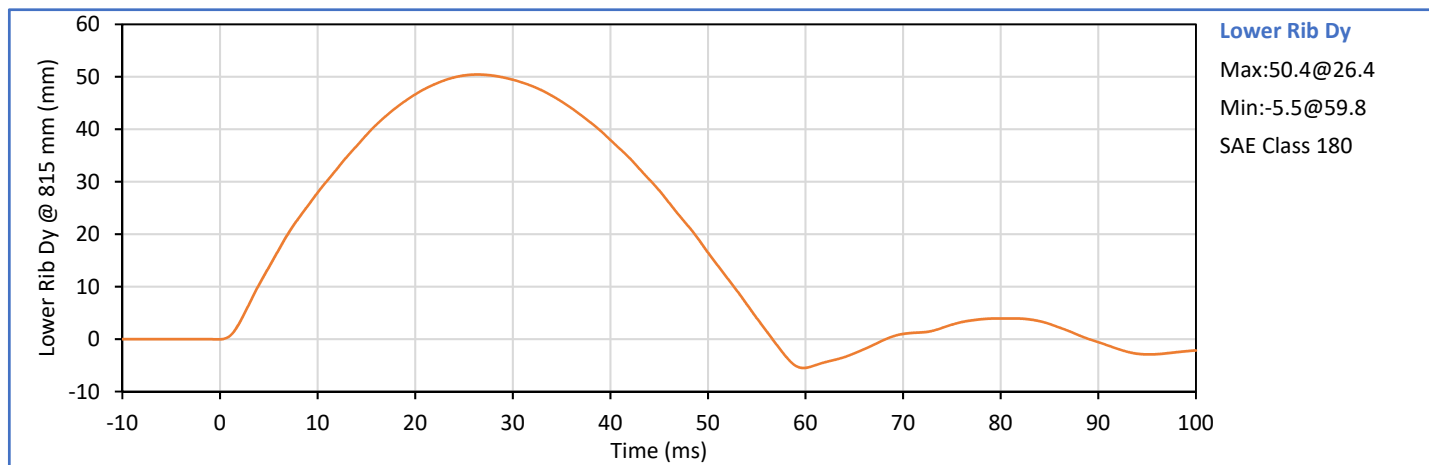
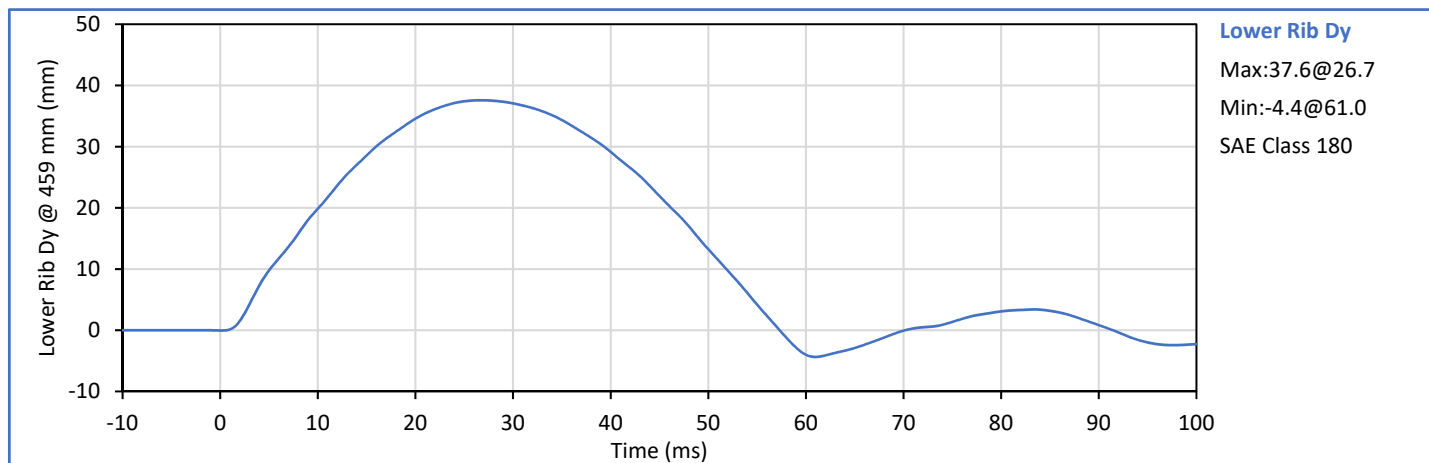
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	28	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	37.1	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	46.6	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

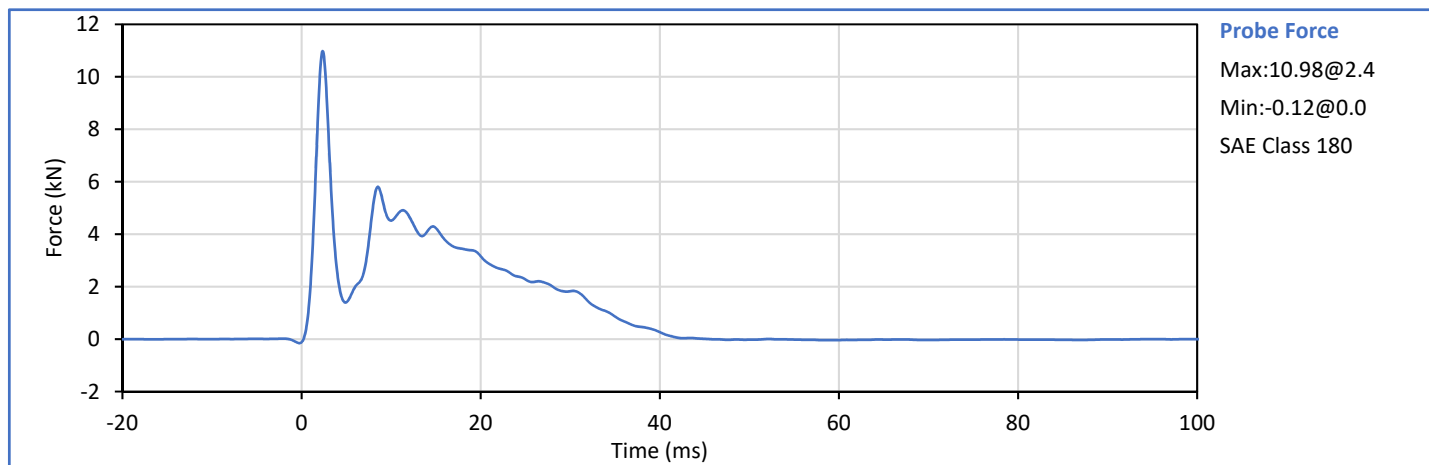
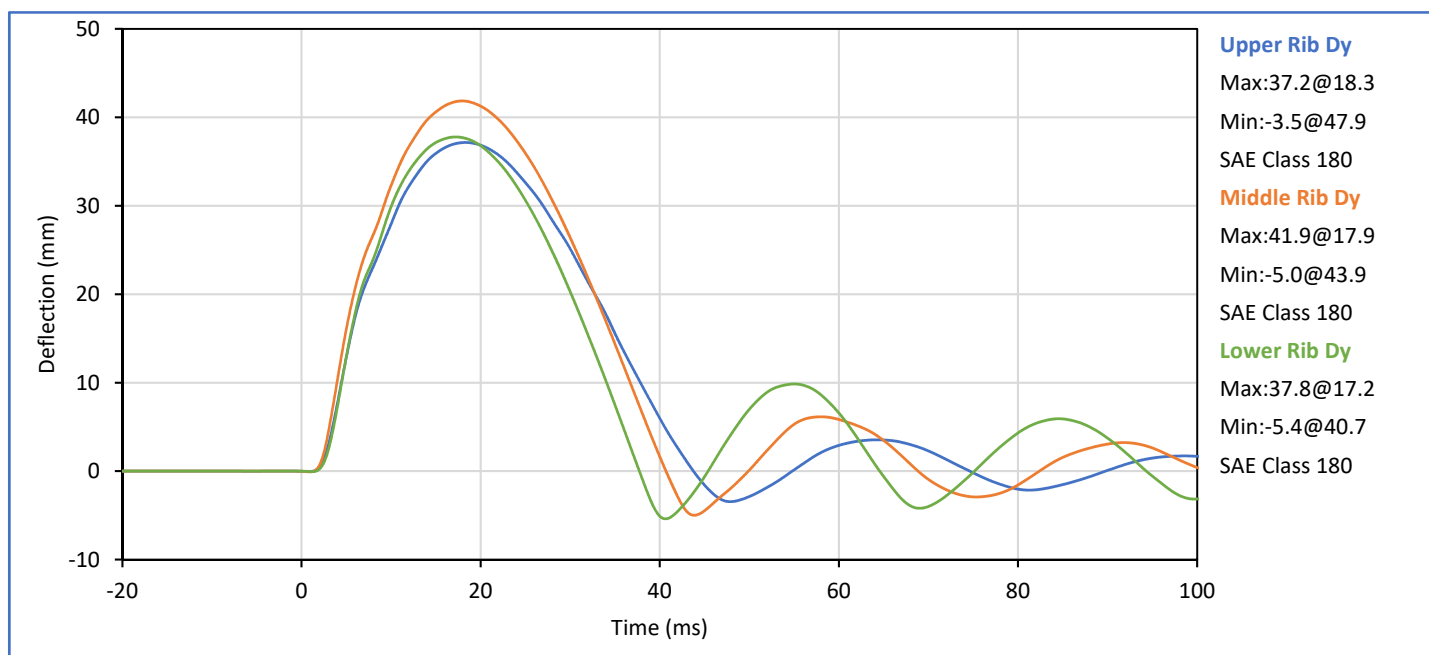
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	28	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.6	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	50.4	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

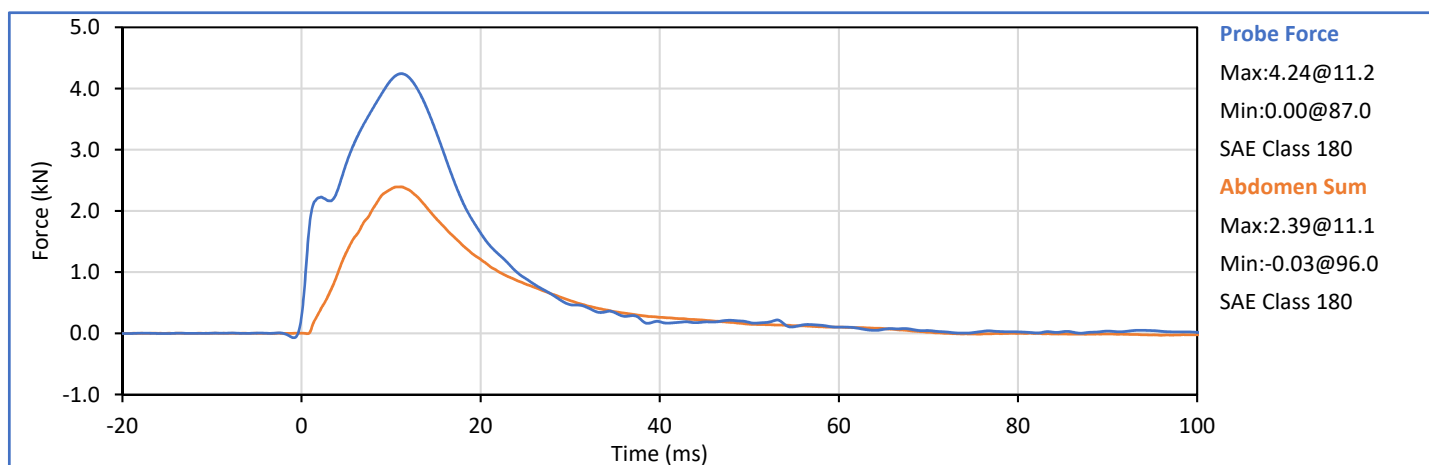
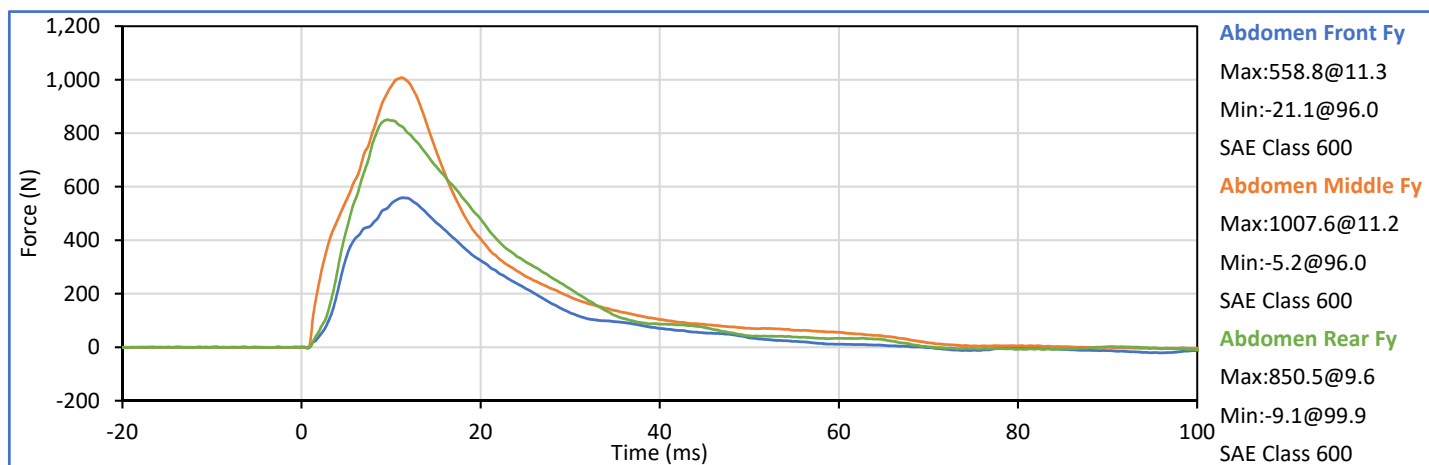
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	5.40	5.60	5.47	Pass
Peak Upper Rib Dy	mm	34.0	41.0	37.2	Pass
Peak Middle Rib Dy	mm	37.0	45.0	41.9	Pass
Peak Lower Rib Dy	mm	37.0	44.0	37.8	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.81	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

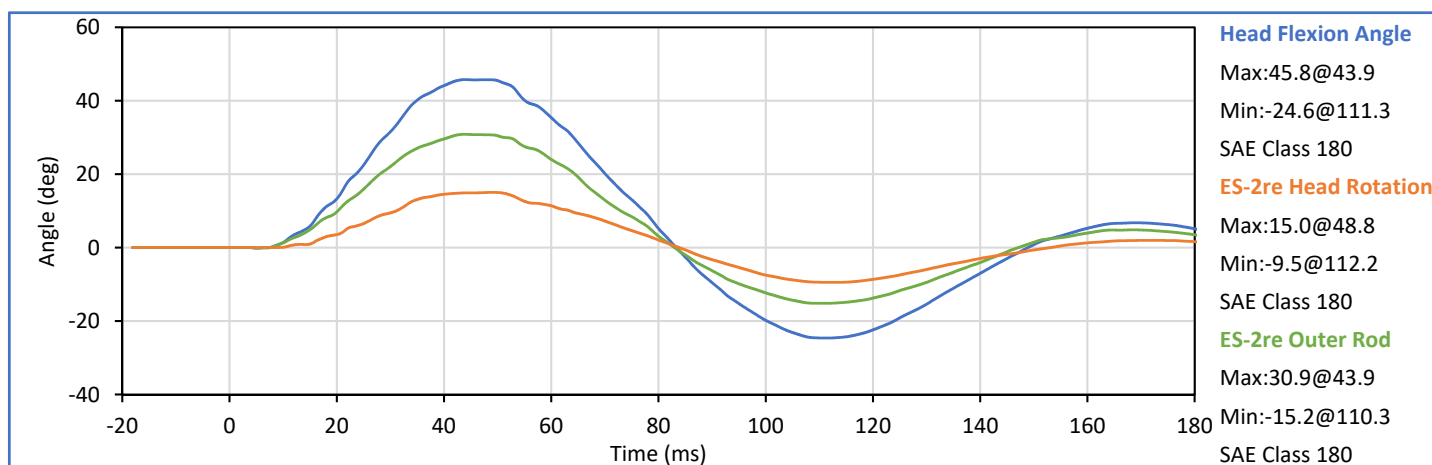
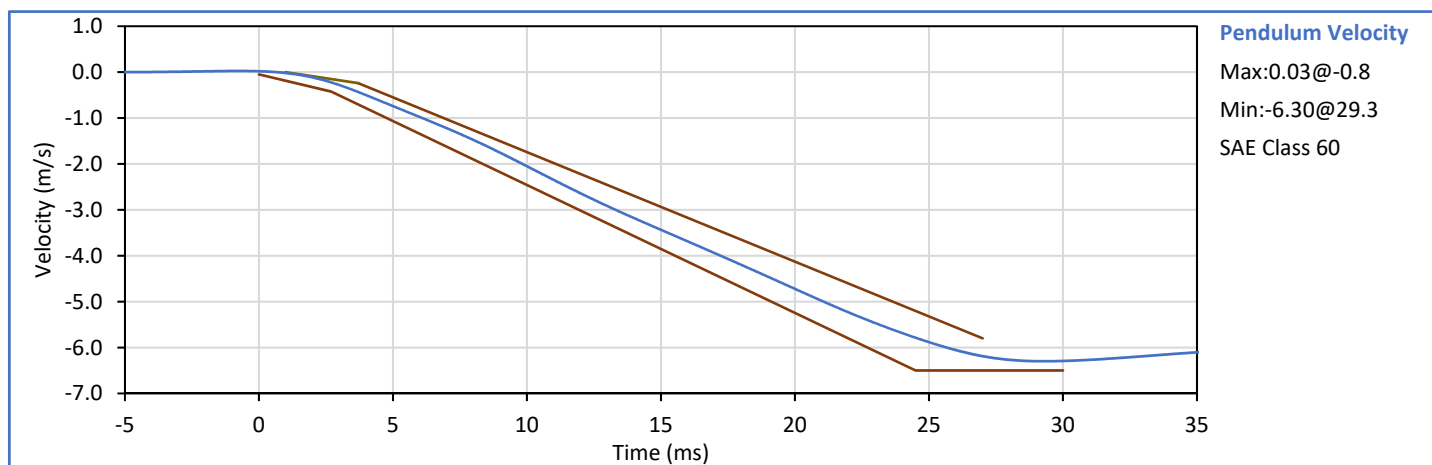
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	28	Pass
Impactor Velocity	m/s	3.90	4.10	3.95	Pass
Peak Impactor Force	kN	4.00	4.80	4.24	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.2	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.39	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.1	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

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
Pendulum Velocity	m/s	5.95	6.15	6.06	Pass
Peak Headform Flexion	deg	45.0	55.0	45.8	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	43.9	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	39.4	Pass
Overall Test Results				Pass	Pass



Technician:

J. Hernandez

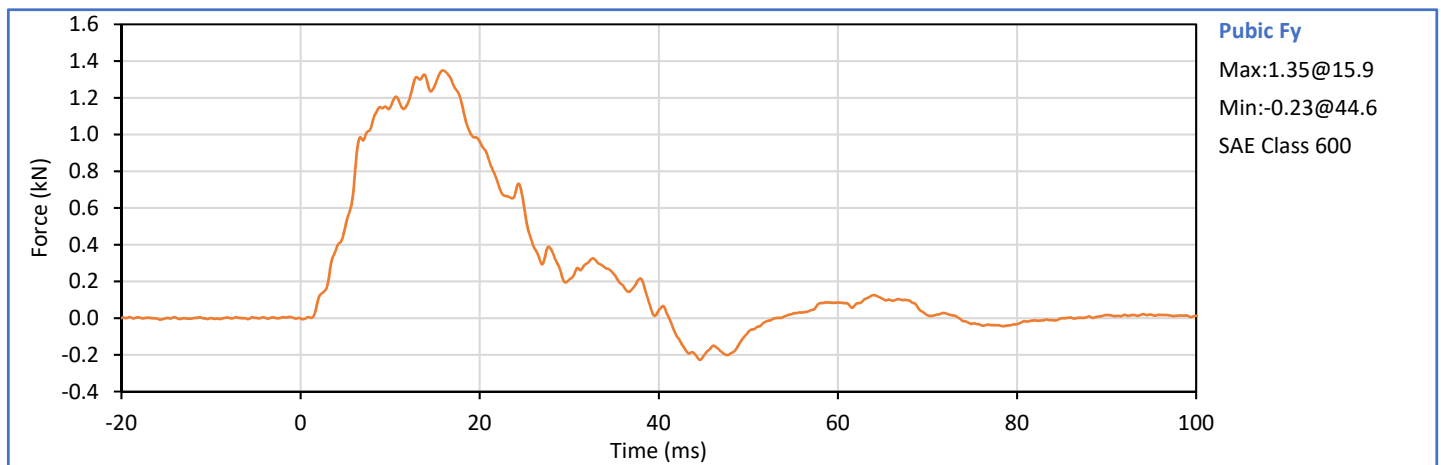
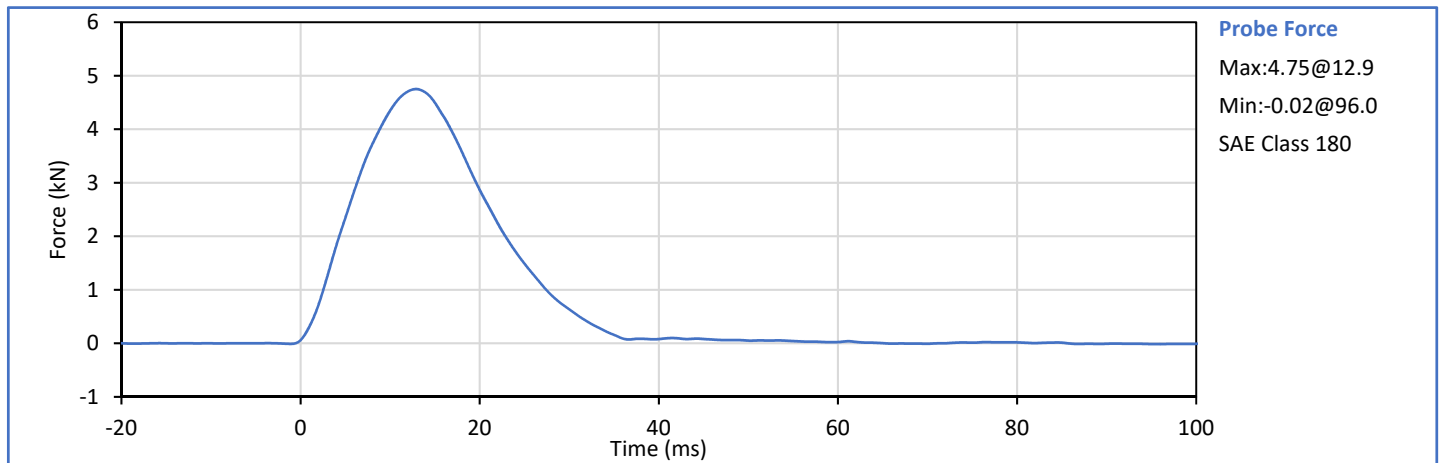
J. Hernandez

Approved By:

P. Puzzuto

P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.24	Pass
Peak Impactor Force	kN	4.70	5.40	4.75	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.9	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.35	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	15.9	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308

Test Date: 2019-02-22

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	785	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	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	104	Pass
F - Thigh Clearance	mm	119	135	129	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	41	Pass
I - Head Depth	mm	178	188	187	Pass
J - Head Circumference	mm	541	551	545	Pass
K - Buttock To Knee Length	mm	514	540	525	Pass
L - Popliteal Height	mm	343	369	351	Pass
K - Knee Pivot To Floor Height	mm	392	409	401	Pass
N - Buttock Popliteal Length	mm	416	442	438	Pass
O - Chest Depth W/O Jacket	mm	195	211	206	Pass
P - Foot Length	mm	216	232	224	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	320	Pass
R - Arm Length	mm	249	259	254	Pass
S - Knee Joint To Seatback	mm	477	493	490	Pass
V - Shoulder Width	mm	341	357	348	Pass
W - Foot Width	mm	78	94	85	Pass
Y - Chest Circumference W/Jacket	mm	851	881	867	Pass
Z - Waist Circumference	mm	761	791	782	Pass
			Overall Test Results		Pass

Technician:



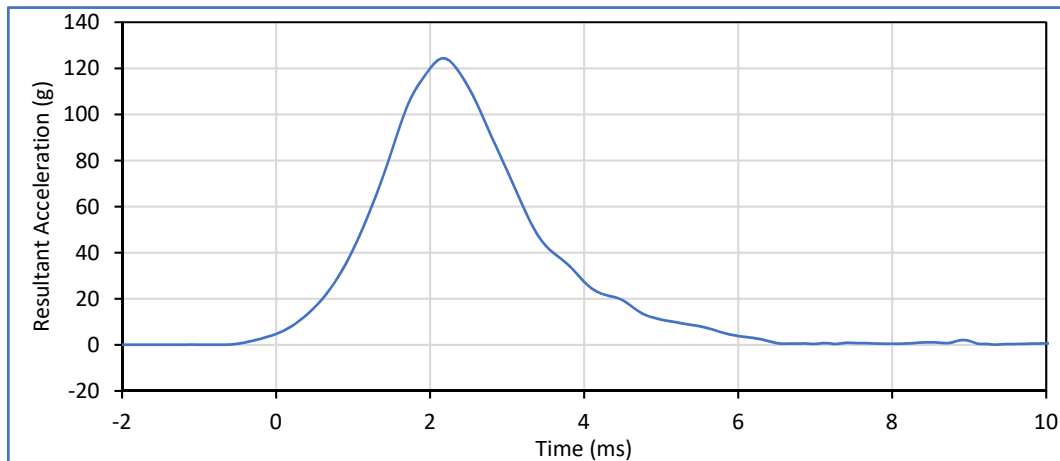
J. Hernandez

Approved By:



P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Humidity	%	10	70	20	Pass
Peak Resultant Acceleration	g	115.0	137.0	124.4	Pass
Peak Head Ax	g	-15.0	15.0	-2.3	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results		Pass

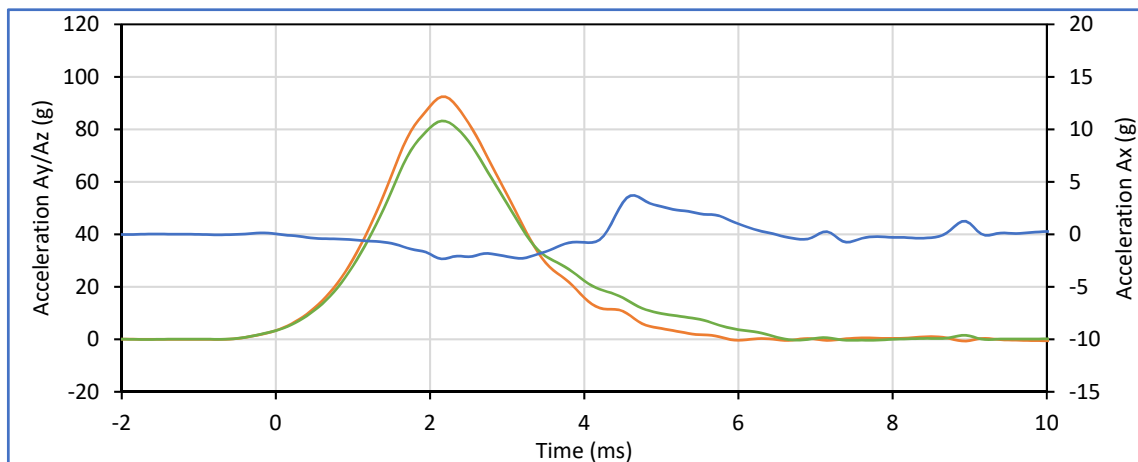


Head Resultant

Max:124.4@2.2

Min:0.1@9.4

SAE Class 1000



Head Ax

Max:3.7@4.7

Min:-2.3@2.2

SAE Class 1000

Head Ay

Max:92.4@2.2

Min:-0.7@9.0

SAE Class 1000

Head Az

Max:83.2@2.2

Min:-0.4@7.5

SAE Class 1000

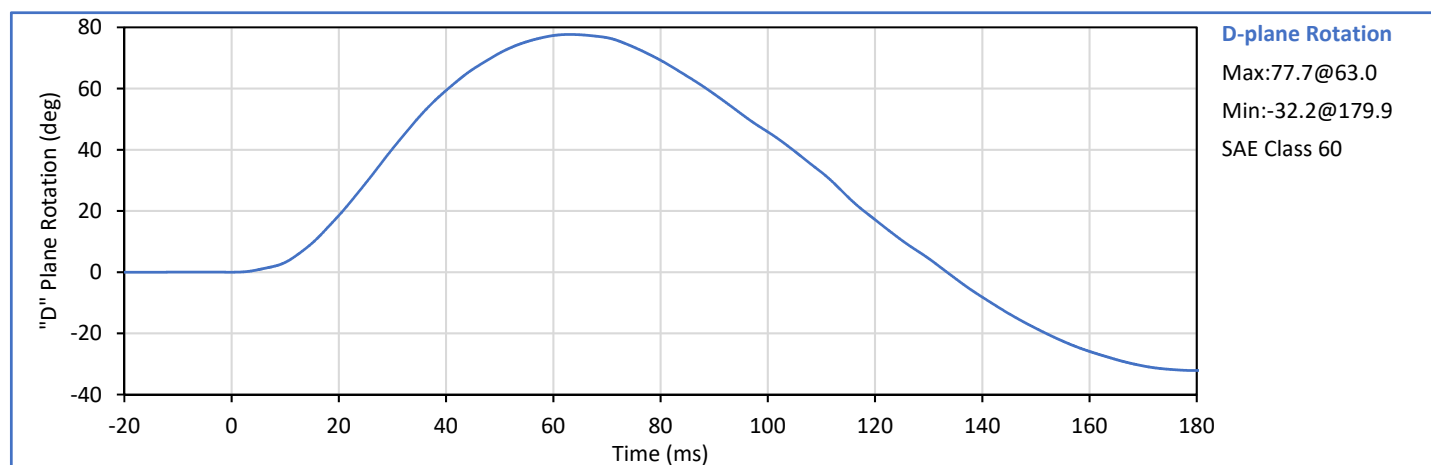
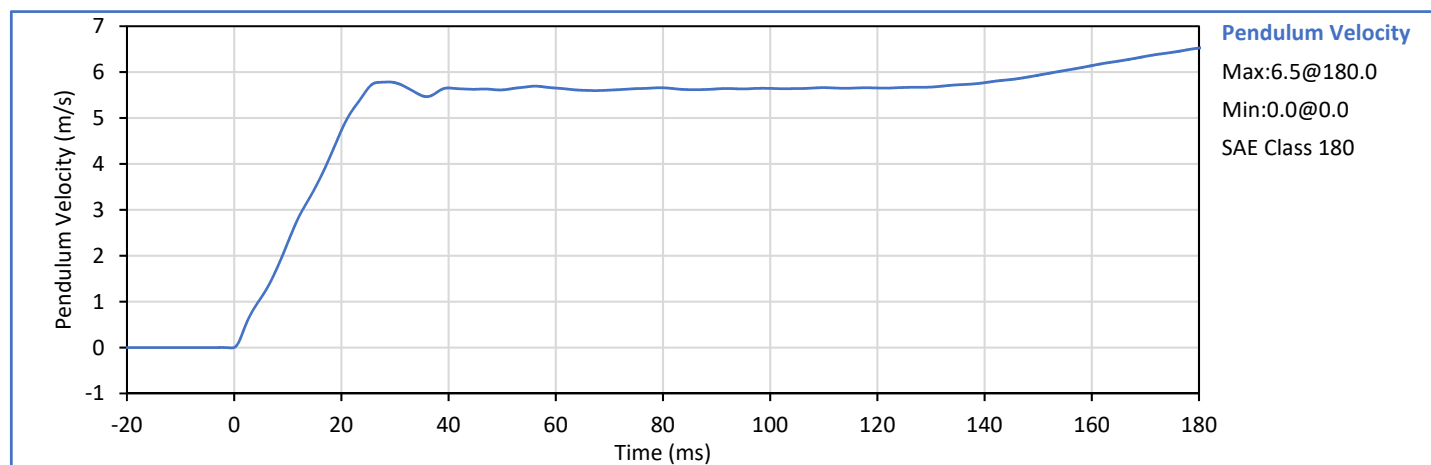
Technician:

J. Hernandez

Approved By:

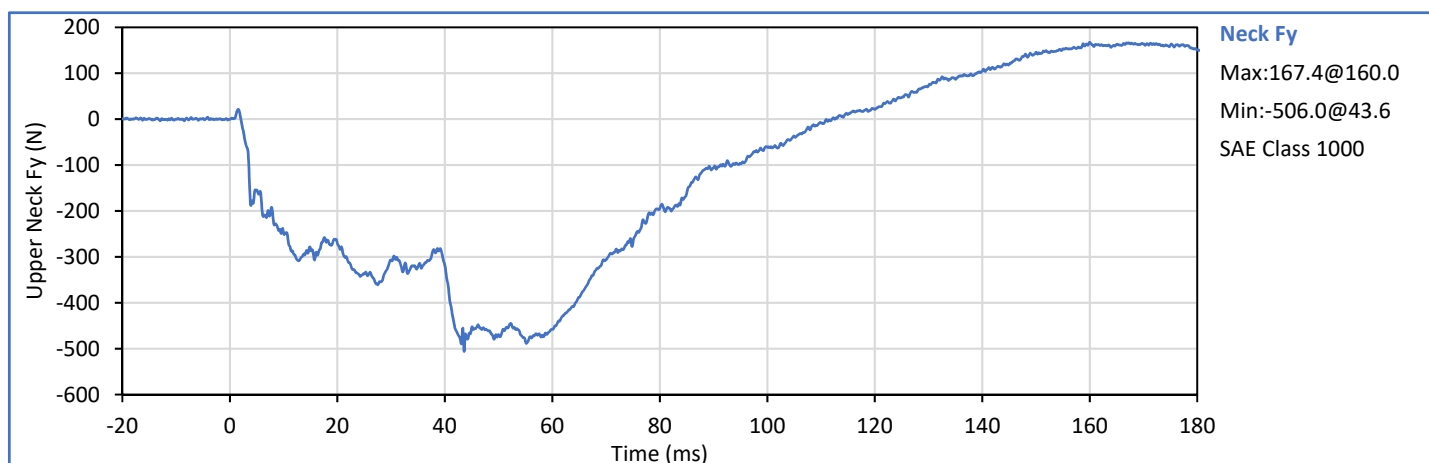
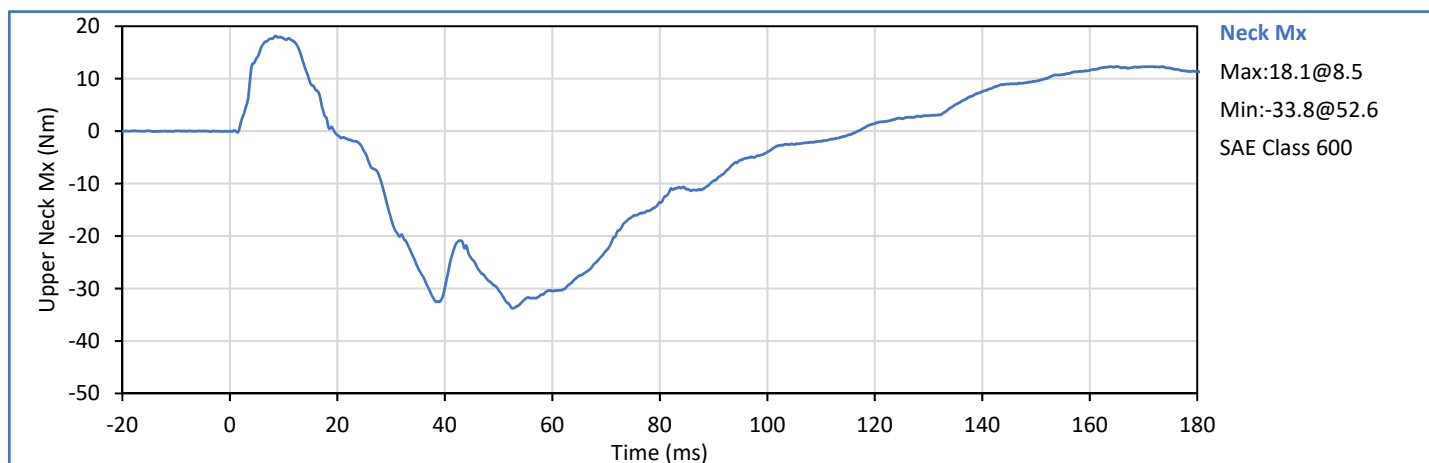
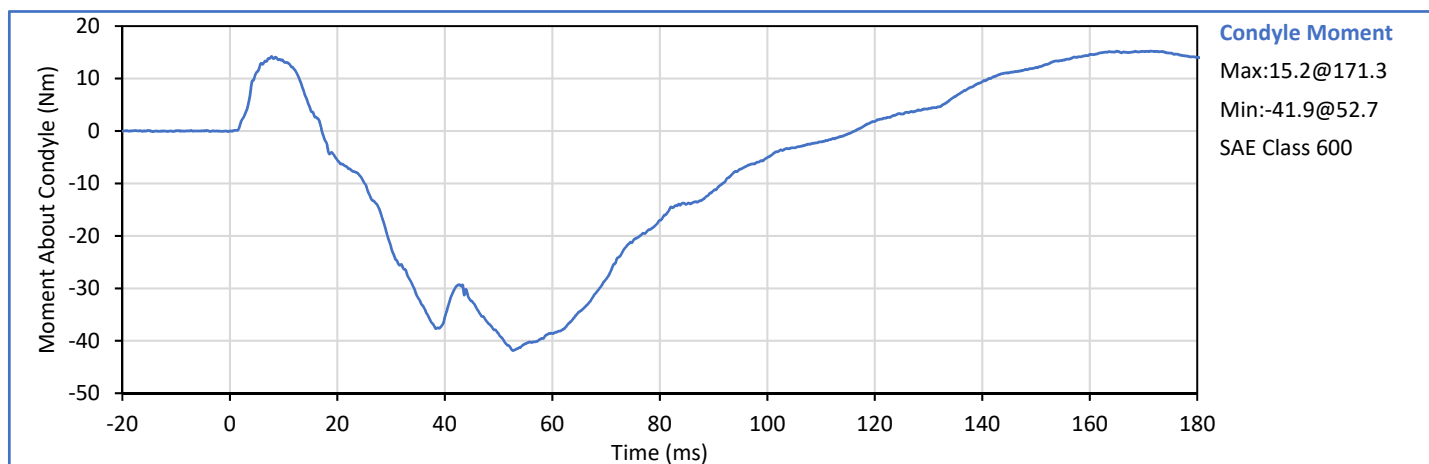
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	23	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.29	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.46	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.73	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.65	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.79	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	77.7	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	63.0	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.9	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	116.3	Pass
Overall Test Results				Pass	Pass

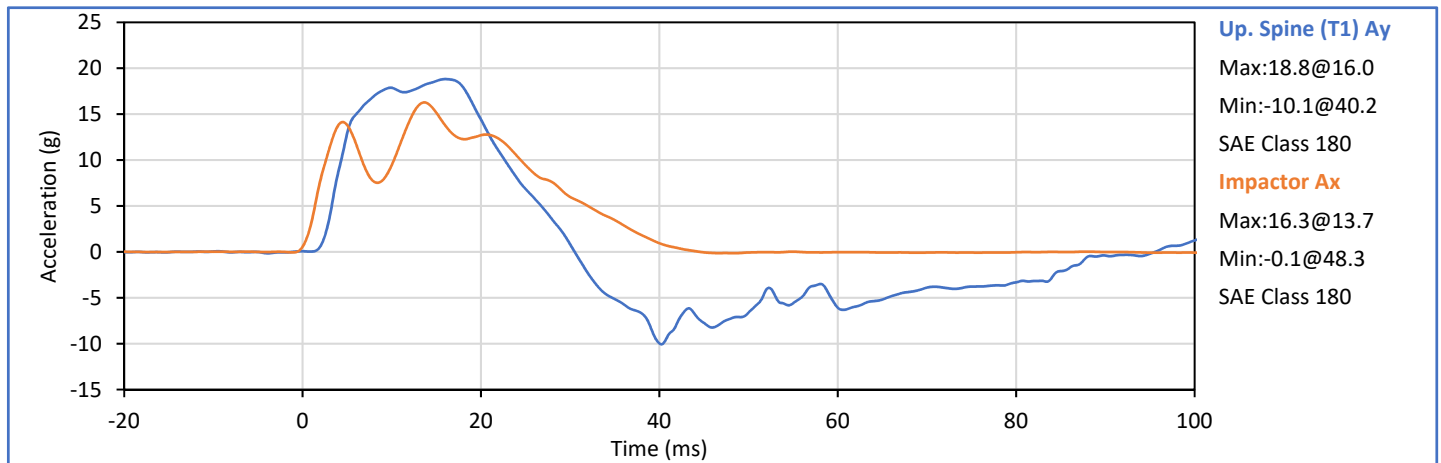
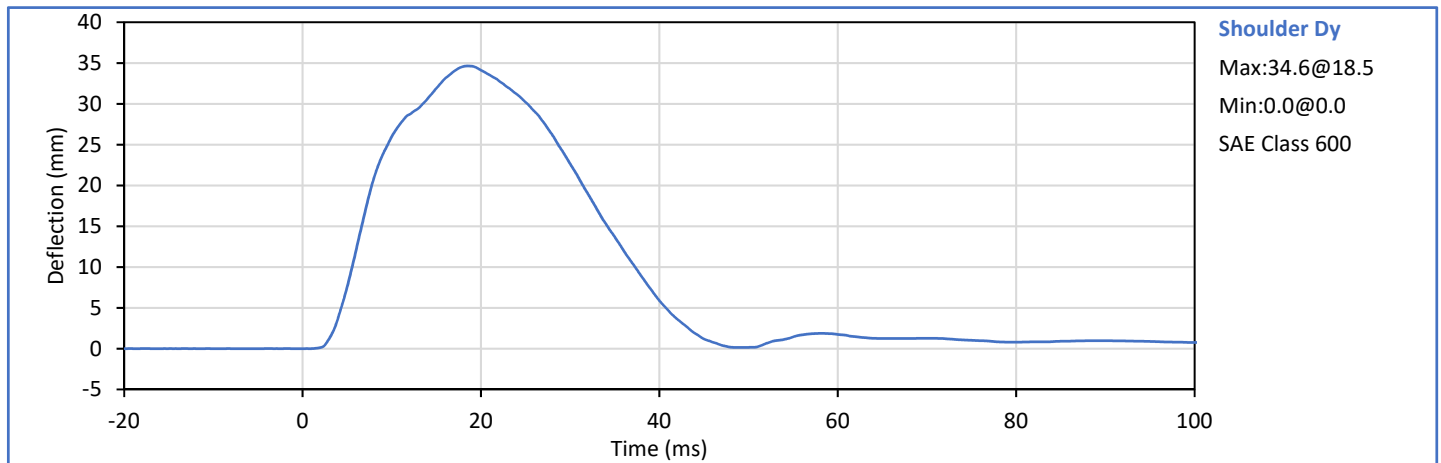


Technician: J. Hernandez

Approved By: P. Puzzuto



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	4.38	Pass
Peak Shoulder Dy	mm	28.0	37.0	34.6	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.8	Pass
Peak Impactor Ax	g	13.0	18.0	16.3	Pass
Overall Test Results					Pass



Technician:

J. Hernandez

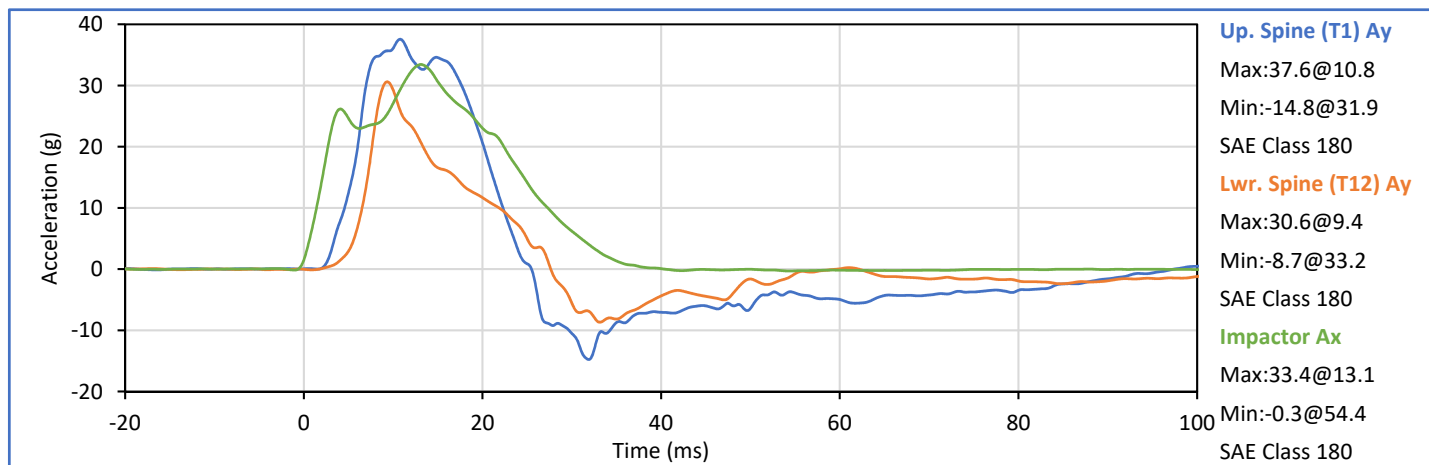
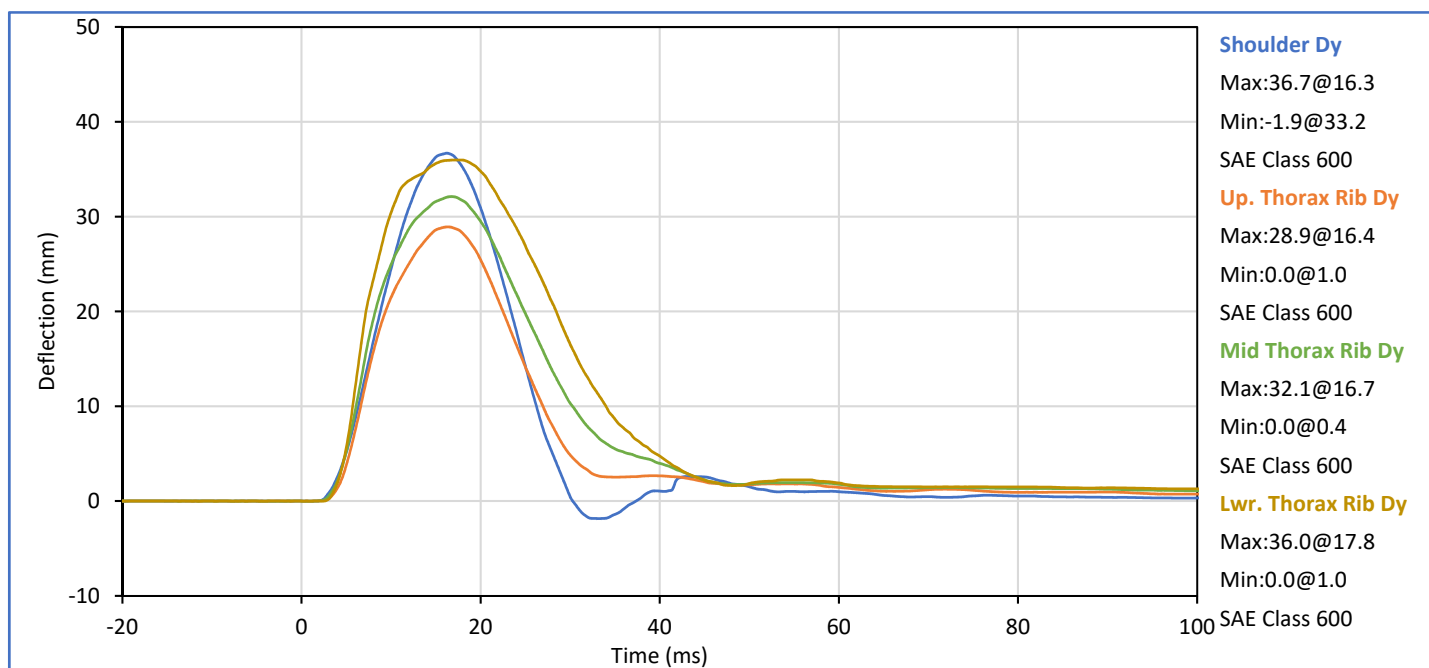
J. Hernandez

Approved By:

P. Puzzuto

P. Puzzuto

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	36.7	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.9	Pass
Peak Middle Rib Dy	mm	30.0	36.0	32.1	Pass
Peak Lower Rib Dy	mm	32.0	38.0	36.0	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	37.6	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	30.6	Pass
Peak Impactor Ax	g	30.0	36.0	33.4	Pass
Overall Test Results				Pass	Pass



Technician:

J. Hernandez

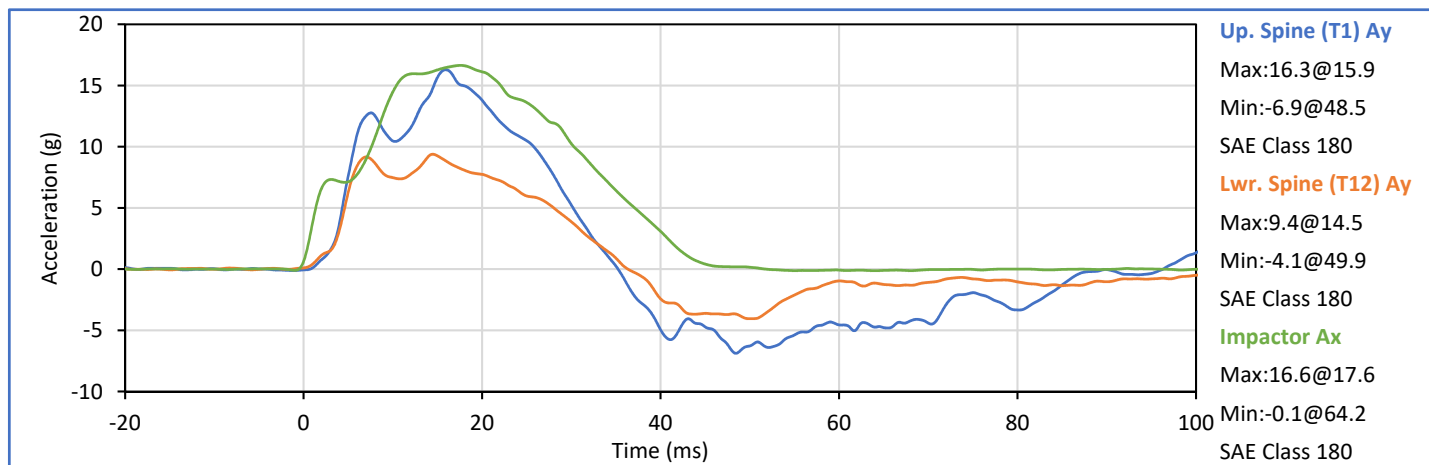
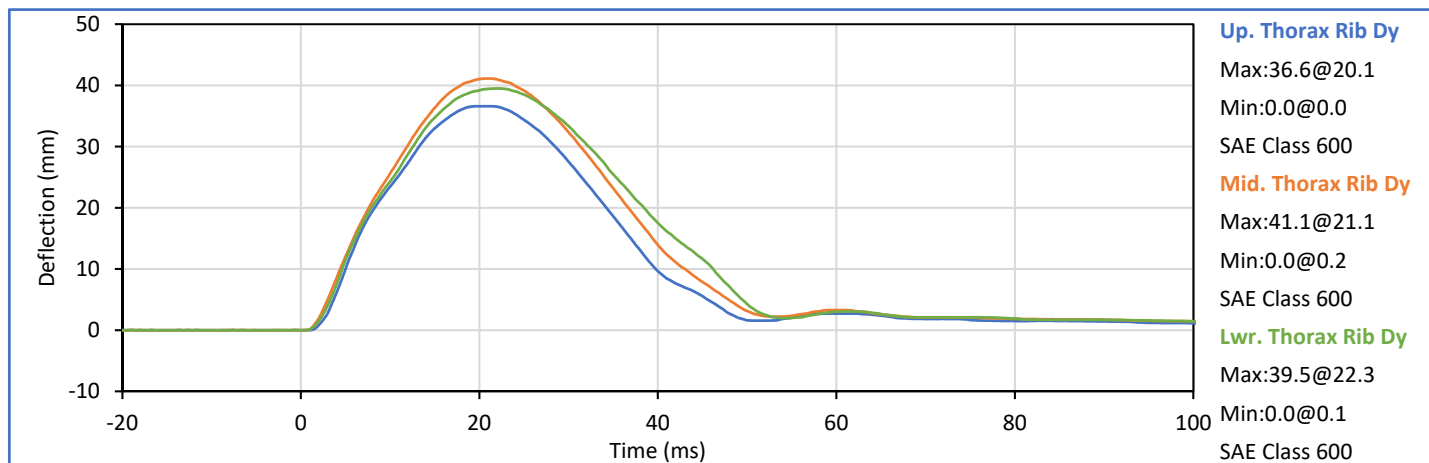
J. Hernandez

Approved By:

P. Puzzuto

P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	23	Pass
Impactor Velocity	m/s	4.20	4.40	4.34	Pass
Peak Upper Rib Dy	mm	32.0	40.0	36.6	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.1	Pass
Peak Lower Rib Dy	mm	35.0	43.0	39.5	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	16.3	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.4	Pass
Peak Impactor Ax	g	14.0	18.0	16.6	Pass
Overall Test Results				Pass	Pass



Technician:

J. Hernandez

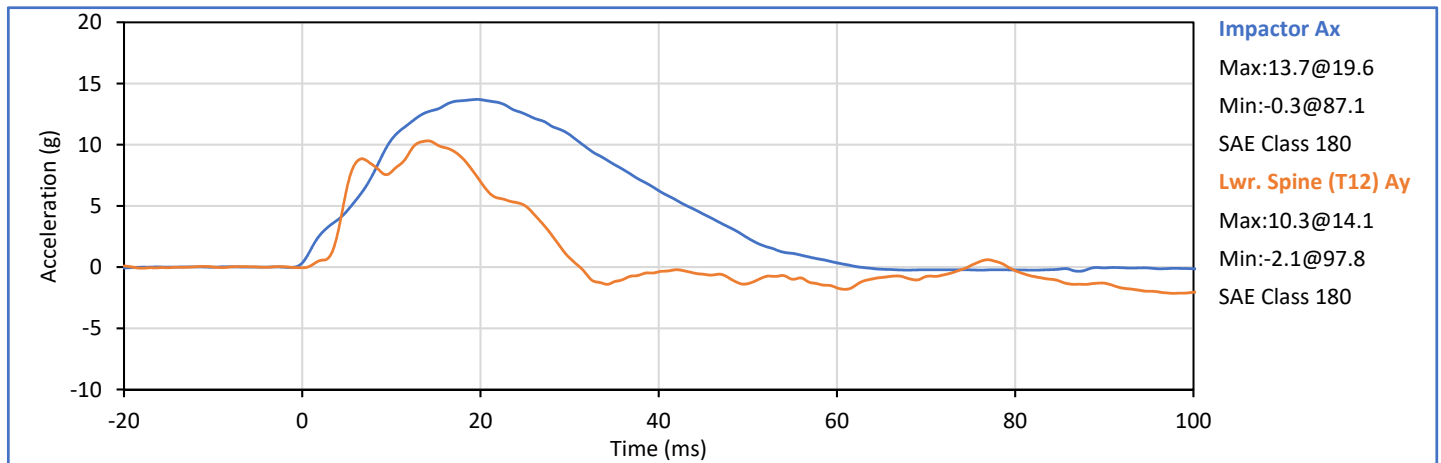
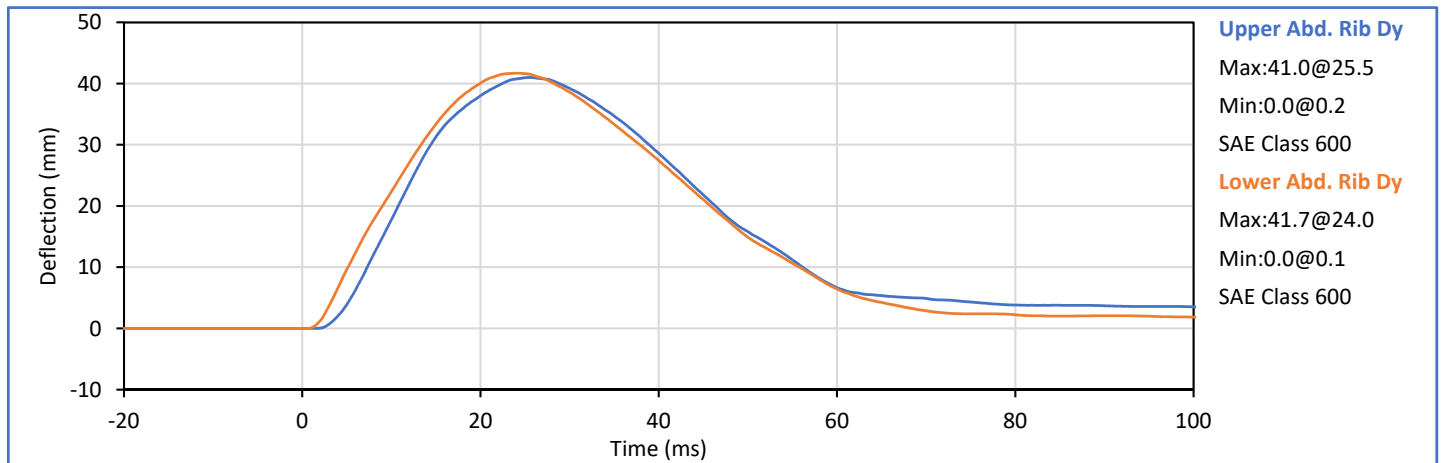
J. Hernandez

Approved By:

P. Puzzuto

P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	23	Pass
Impactor Velocity	m/s	4.20	4.40	4.23	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.0	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	41.7	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.3	Pass
Peak Impactor Ax	g	12.0	16.0	13.7	Pass
Overall Test Results					Pass



Technician:

J. Hernandez

J. Hernandez

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P. Puzzuto

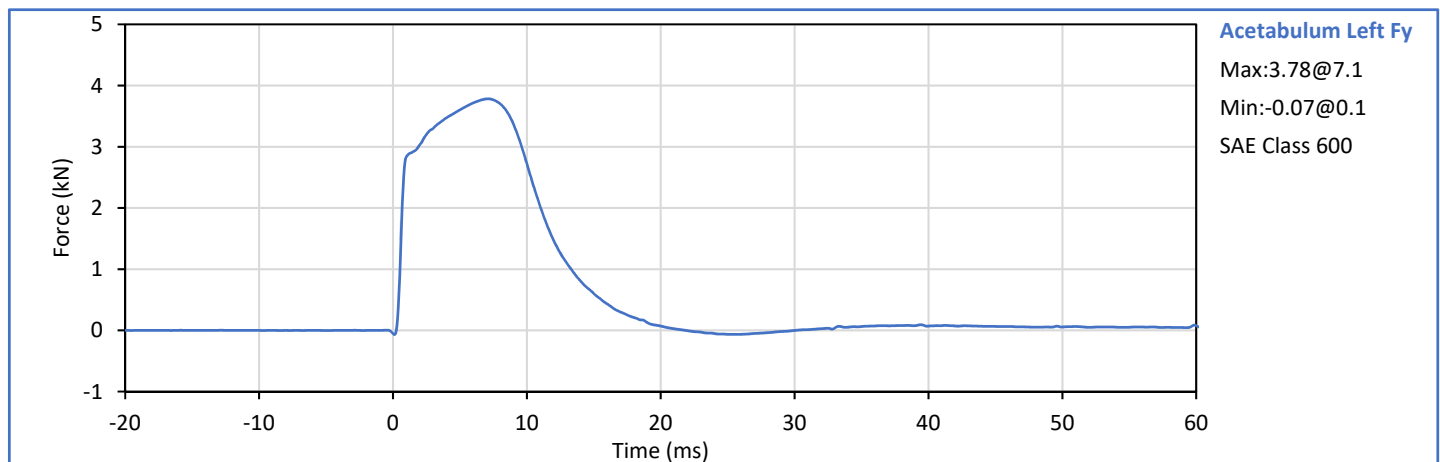
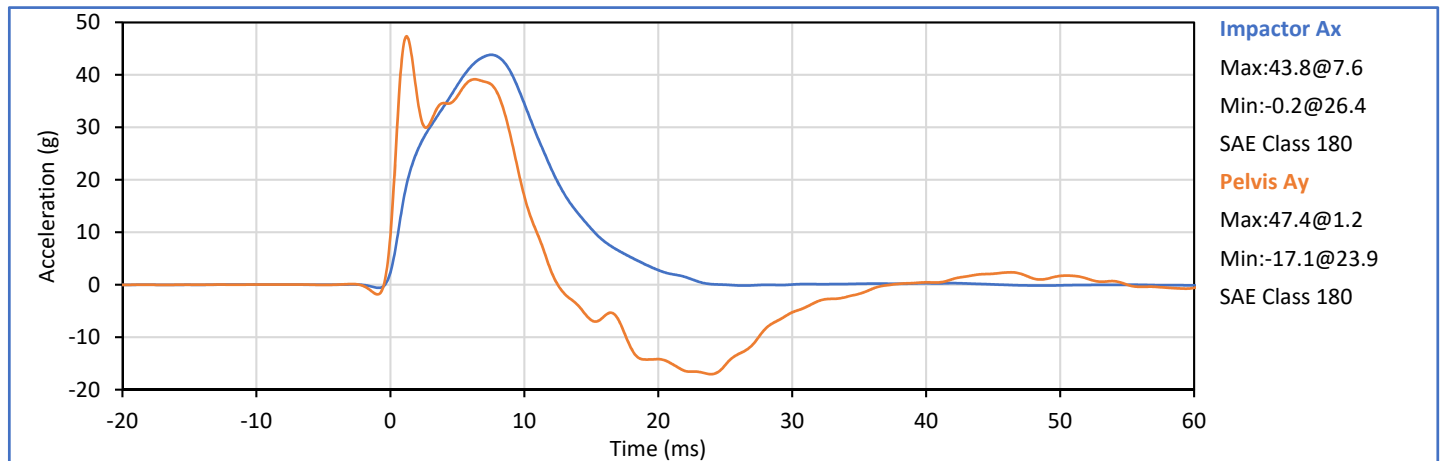
P. Puzzuto

ATD Serial No.: 308

Test Date: 2019-02-22

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	42	Pass
Impactor Velocity	m/s	6.60	6.80	6.72	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.78	Pass
Pelvis Ay after 6ms	g	34.0	42.0	39.2	Pass
Peak Impactor Ax	g	38.0	47.0	43.8	Pass
Overall Test Results				Pass	

Pelvis Plug S/N: 11438 (SACO)



Technician:

J. Hernandez

J. Hernandez

Approved By:

P. Puzzuto

P. Puzzuto



SID-IIs Pelvis Plug Certification Test

Plug S/N 11438

Test Number 2938

Report Number 2935

Test Date 8/30/2016 9:37:27 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	294.59	50.00	600.00
Force @ 1.5 mm (N)	1,138.60	850.00	1,400.00
Force @ 2.5 mm (N)	1,470.91	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,563.00	1,361.00	1,673.00

Testing Machine STM-20 5965542

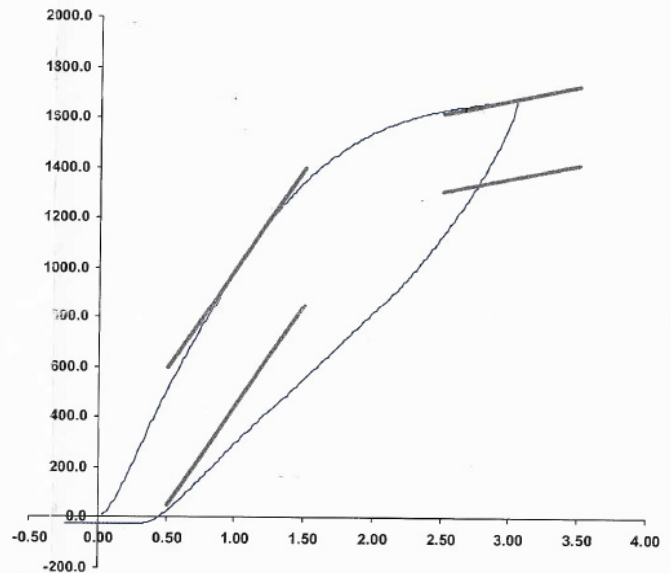
Load Cell S/N (TI240813), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator DC

Part Number 180-4450

Template No 107 30-Aug-16

SACO Research

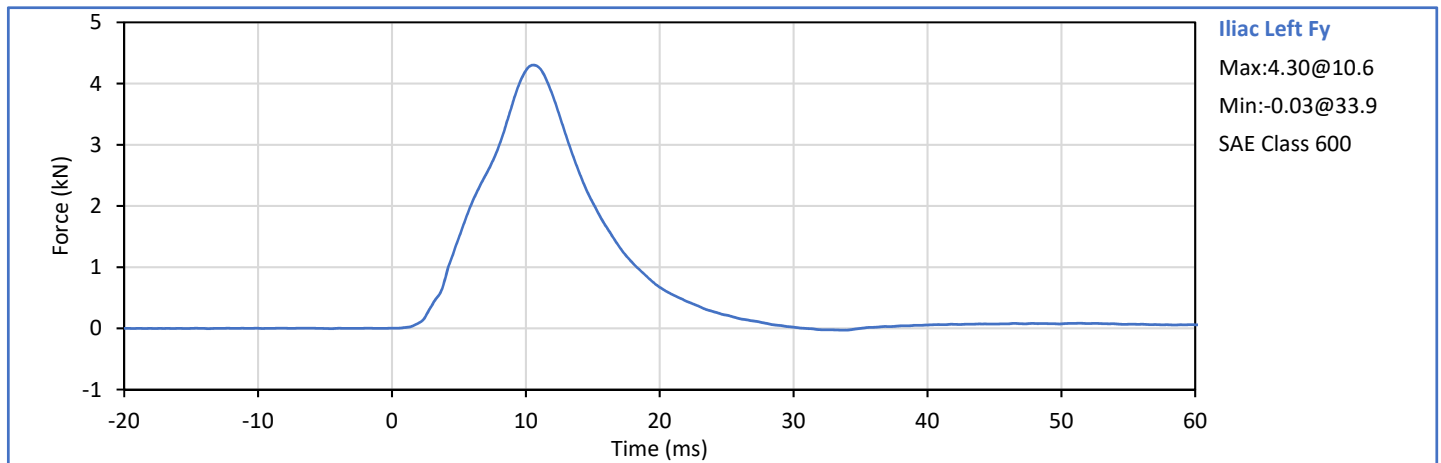
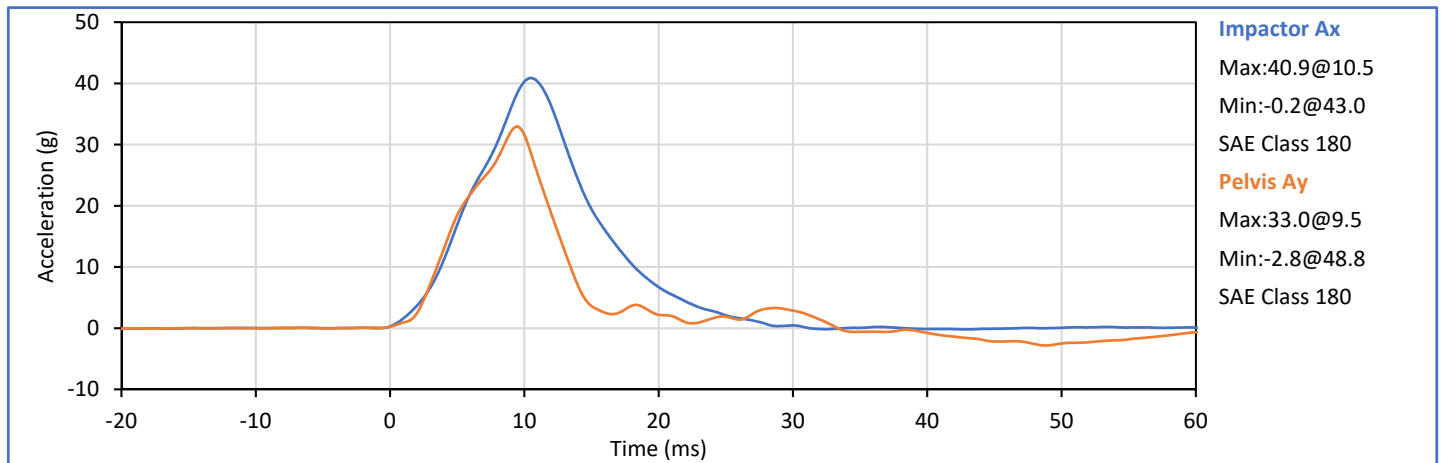
By: DC Date: 8/30/16

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

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	20	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Iliac Fy	kN	4.10	5.10	4.30	Pass
Pelvis Ay after 6ms	g	28.0	39.0	33.0	Pass
Peak Impactor Ax	g	36.0	45.0	40.9	Pass
Overall Test Results				Pass	

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified



Technician:

J. Hernandez

J. Hernandez

Approved By:

P. Puzzuto

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	Cal Due
Head Acceleration X Primary	P58760	Endevco	7264C-2k	2019-07-25
Head Acceleration Y Primary	P58763	Endevco	7264C-2k	2019-07-25
Head Acceleration Z Primary	P52093	Endevco	7264C-2k	2019-07-25
Head Acceleration X Redundant	P52072	Endevco	7264C-2k	2019-07-25
Head Acceleration Y Redundant	P58768	Endevco	7264C-2k	2019-07-25
Head Acceleration Z Redundant	P52074	Endevco	7264C-2k	2019-07-25
Upper Thorax Rib Deflection Y	180 (ES-2 Rib)	Honeywell	F38000203	2019-07-24
Middle Thorax Rib Deflection Y	177 (ES-2 Rib)	Honeywell	F38000203	2019-07-24
Lower Thorax Rib Deflection Y	186 (ES-2 Rib)	Honeywell	F38000203	2019-07-24
Anterior Abdominal Force Y	1504 Fy	R.A. Denton	2631J	2019-10-11
Middle Abdominal Force Y	1505 Fy	R.A. Denton	2631J	2019-10-11
Posterior Abdominal Force Y	1506 Fy	R.A. Denton	2631J	2019-10-11
Lower Spine T12 Acceleration X	P45011	Endevco	7264C-2k	2019-07-25
Lower Spine T12 Acceleration Y	P58992	Endevco	7264C-2k	2019-07-25
Lower Spine T12 Acceleration Z	P51700	Endevco	7264C-2k	2019-07-25
Pubic Symphysis Force Y	DG6784 Fy	FTSS	IF-556	2019-10-11

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

Table 2a - Passenger ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Due
Head Acceleration X Primary	P63980	Endevco	7264C-2k	2019-09-14
Head Acceleration Y Primary	P58861	Endevco	7264C-2k	2019-09-14
Head Acceleration Z Primary	P51261	Endevco	7264C-2k	2019-09-14
Head Acceleration X Redundant	P58808	Endevco	7264C-2k	2019-09-14
Head Acceleration Y Redundant	P63310	Endevco	7264C-2k	2019-09-14
Head Acceleration Z Redundant	P49189	Endevco	7264C-2k	2019-09-14
Upper Thorax Rib Deflection Y	1172	Servo	08TCI-3725	2019-09-13
Middle Thorax Rib Deflection Y	1219	Servo	08TCI-3725	2019-09-13
Lower Thorax Rib Deflection Y	1221	Servo	08TCI-3725	2019-09-13
Upper Abdomen Rib Deflection Y	1252	Servo	08TCI-3725	2019-09-13
Lower Abdomen Rib Deflection Y	1283	Servo	08TCI-3725	2019-09-13
Lower Spine T12 Acceleration X	P52108	Endevco	7264C-2k	2019-09-14
Lower Spine T12 Acceleration Y	P63970	Endevco	7264C-2k	2019-09-14
Lower Spine T12 Acceleration Z	P51712	Endevco	7264C-2k	2019-09-14
Iliac Wing Impact Side Force Y	284 Fy (Iliac)	R.A. Denton	3228J	2019-06-21
Acetabulum Impact Side Force Y	272 Fy (Acetabulum)	R.A. Denton	3249J	2019-06-21

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

Sensor Location	Sensor S\N	Mfr	Model	Cal Due
Head Rotation Rate X	ARS7498	DTS	ARS PRO-8k (2000Hz)	2019-07-25
Head Rotation Rate Y	ARS7367	DTS	ARS PRO-8k (2000Hz)	2019-07-25
Head Rotation Rate Z	ARS7377	DTS	ARS PRO-8k (2000Hz)	2019-07-25

Table 3 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Due
Vehicle CG Ax	A265860	MSI	52F-2000	2019-07-05
Vehicle CG Ay	A265882	MSI	52F-2000	2019-07-05
Vehicle CG Az	A265917	MSI	52F-2000	2019-07-05
Right Side Sill at Front Seat Ax	A265849	MSI	52F-2000	2019-07-05
Right Side Sill at Front Seat Ay	A265871	MSI	52F-2000	2019-07-05
Right Side Sill at Front Seat Az	A265852	MSI	52F-2000	2019-07-05
Right Side Sill at Rear Seat Ax	A265901	MSI	52F-2000	2019-07-05
Right Side Sill at Rear Seat Ay	A265910	MSI	52F-2000	2019-07-05
Right Side Sill at Rear Seat Az	A265924	MSI	52F-2000	2019-07-05
Left Side Sill at Front Seat Ay	10112	Endevco	757F-2k	2020-01-29
Left Side Sill at Rear Seat Ay	10247	Endevco	757F-2k	2020-01-29
Left Lower A-Pillar Ay	10111	Endevco	757F-2k	2020-01-28
Left Middle A-Pillar Ay	10245	Endevco	757F-2k	2020-01-29
Left Lower B-Pillar Ay	A254908	MSI	52F-2000	2019-06-19
Left Middle B-Pillar Ay	A254883	MSI	52F-2000	2019-06-18
Driver Seat Track at H-Point Ay	10416	Endevco	757F-2k	2019-09-05
Rear Seat Structure Ay	10378	Endevco	757F-2k	2019-09-04
Right Rear Occupant Comp. Ay	10376	Endevco	757F-2k	2019-09-05
Engine Block Top Ax	A265887	MSI	52F-2000	2019-07-05
Engine Block Top Ay	A265873	MSI	52F-2000	2019-07-05
Rear Floopan Above Axle Ax	A265878	MSI	52F-2000	2019-07-05
Rear Floopan Above Axle Ay	A265863	MSI	52F-2000	2019-07-05
Rear Floopan Above Axle Az	A265869	MSI	52F-2000	2019-07-05

Table 4 - Moving Deformable Barrier (MDB) Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Due
MDB CG Ax	10390	Endevco	757F-2k	2019-09-04
MDB CG Ay	10405	Endevco	757F-2k	2019-09-04
MDB CG Az	10421	Endevco	757F-2k	2019-09-05
MDB Left Side at Rear Axle Ax	A224516	MSI	52F-2000	2019-09-21
MDB Left Side at Rear Axle Ay	A160734	MSI	52F-2000	2019-11-28