

**REPORT NUMBER: SINCAP-KAR-19-006**

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

**NISSAN MOTOR CO., LTD.  
2019 NISSAN FRONTIER S CREW CAB 4-DOOR TRUCK**

**NHTSA No: M20195205**

**PREPARED BY:  
APPLUS IDIADA KARCO ENGINEERING, LLC.  
9270 HOLLY ROAD  
ADELANTO, CA 92301**



**NOVEMBER 13, 2018**

**FINAL REPORT**

**PREPARED FOR:  
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Approval Date: \_\_\_\_\_ November 13, 2018 \_\_\_\_\_

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

Date: \_\_\_\_\_

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

Date: \_\_\_\_\_

## TECHNICAL REPORT DOCUMENTATION PAGE

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### 16. Abstract

A 55 / 28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2019 Nissan Frontier S Crew Cab 4-door truck 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 October 30, 2018.

The impact velocity of the Moving Deformable Barrier was 61.88 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 21.7° C. The target vehicle's maximum post-test static crush was 293 mm located at level 1. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	28.5
Maximum Thoracic Rib Deflection	mm	44	20
Total Abdominal Force	N	2500	489
Pubic Symphysis Force	N	6000	1134

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	47.8
Resultant Lower Spine Acceleration	g	82	33
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	411
Maximum Thoracic Rib Deflection	mm	38*	16
Maximum Abdominal Rib Deflection	mm	45*	14

The driver's door opened during the side impact event. The left rear passenger door was 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.

\* 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 Nissan Frontier S Crew Cab 4-door truck. 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 Nissan Frontier S Crew Cab 4-door truck 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 61.88 km/h (38.45 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 October 30, 2018. Pre- and post-test photographs of the test vehicle, the MDB and the dummy (ES-2re and SID-IIs) are included in Appendix A of this report.

The dummies were placed in the driver and left rear designated seating position according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Primary and redundant head CG tri-axial accelerometers

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

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

Lower spine (12) tri-axial accelerometers

Pubic symphysis y-axis load cell

PASSENGER ATD (SID-IIs)

Primary and redundant head CG tri-axial accelerometers

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

Abdomen upper rib and lower rib y-axis displacement potentiometers

Lower spine (12) tri-axial accelerometers

Acetabulum and iliac wing y-axis load cells

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

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	28.5
Maximum Thoracic Rib Deflection	mm	44	20
Combined Abdominal Force	N	2500	489
Pubic Symphysis Force	N	6000	1134

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	47.8
Lower Spine (T12) Resultant Acceleration	g	82	33
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	411
Maximum Thoracic Rib Deflection	mm	38*	16
Maximum Abdominal Rib Deflection	mm	45*	14

\*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	Yes	No	
Knee Airbag	No		No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	No	No	
Other	No		No	

### GENERAL COMMENTS

The rear door on the struck side of the vehicle remained closed and latched, the driver door opened and unlatched during impact. 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.

### SECTION 3

#### OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205

Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18

#### CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in <sup>2</sup>	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 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA Number	M20195205
Model Year	2019
Make	Nissan
Model	Frontier S Crew Cab
Body Style	4-Door Truck
VIN	1N6AD0ER2KN700590
Body Color	Brilliant Silver
Odometer Reading (km / mi)	45 / 28
Engine Displacement (L)	4.0
Type / No. of Cylinders	V6
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	5
Overdrive	Yes
Final Drive	RWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

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

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Nissan Motor Co., Ltd.
Date of Manufacture	Aug-18
Vehicle Type	Truck

GVWR (kg)	2599
GAWR Front (kg)	1495
GAWR Rear (kg)	1511

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				625.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				284.8*	A-B

\*For trucks or MPVs, if A-B > 136.0kg, RCLW = 136.0kg

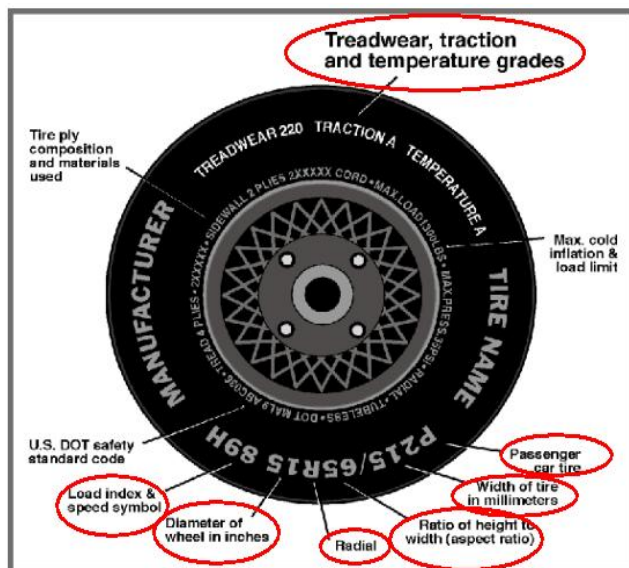
**VEHICLE SEAT TYPE**

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 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	P265/70R16	P265/70R16
Tire Size on Vehicle	P265/70R16	P265/70R16
Tire Manufacturer	Hankook	Hankook
Tire Model	DynaPro HT	DynaPro HT
Treadware	700	700
Traction Grade	A	A
Temperature Grade	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 2 Nylon	2 Polyester, 2 Steel, 2 Nylon
Load Index/Speed Symbol	111T	111T
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	T79M HUH 0618	T79M HUH 0618
DOT Safety Code Right	T79M HUH 0618	T79M HUH 0618

**DATA SHEET NO. 1 ... (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

**TIRE PRESSURES**

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

**MDB TIRE SPECIFICATIONS**

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

**TEST VEHICLE AXLE WEIGHTS**

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	524.5	430.0		570.0	539.0		569.5	556.5	
Right	kg	521.0	426.5		521.5	524.0		503.0	532.0	
Ratio	%	55.0%	45.0%	100.0%	50.7%	49.3%	100.0%	49.6%	50.4%	100.0%
Total	kg	1045.5	856.5	1902.0	1091.5	1063.0	2154.5	1072.5	1088.5	2161.0

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1902.0	A
Actual Weight of 2 P572 ATD Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	136.0	C
Calculated Vehicle Target Wt (TVTWT)	kg	2163.0	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	875	865	Yes
RF	mm	883	875	Yes
LR	mm	861	859	Yes
RR	mm	875	874	Yes
Vehicle CG (Aft of Front Axle)	mm	1614	1581	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	33	23	

\*\*\*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 Nissan Frontier S Crew Cab 4-Door Truck    NHTSA No. M20195205  
Test Program: NCAP MDB Side Impact Test    Test Date: 10/30/18

**WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW**

Component Description	Weight (kg)
Ballast / Equipment Added	50.0

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

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

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck    NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test    Test Date: 10/30/18

**SEAT POSITIONING**

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

**SCRL ANGLE RANGE**

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

**SEAT HEIGHT AND ANGLE**

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	Fixed	315	Max			
			Mid	324	315	306
			Min			
Front Passenger Seat	Fixed	318	Max			
			Mid	327	318	308
			Min			
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

**DATA SHEET NO. 2 ... (CONTINUED)**

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

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

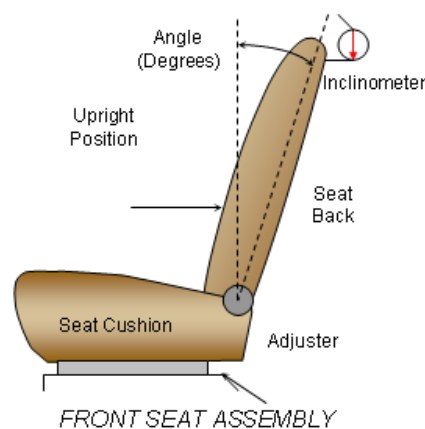
**SEAT FORE/AFT POSITION**

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	219	19	109.5	9
Front Passenger Seat	240	21	120	10
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	57.9	31	7.9	6
Front Passenger Seat	64.1	24	7.9	6
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

\*Detent zero (0) is the forward most detent

**DATA SHEET NO. 2 ... (CONTINUED)**

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

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

**SEAT BELT ANCHORAGE ADJUSTMENT**

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

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

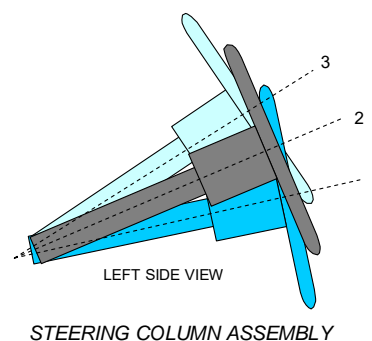
**HEAD RESTRAINT ADJUSTMENT**

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

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

**STEERING COLUMN ADJUSTMENT**

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



	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	17.0	
Geometric Center - Position 2	24.3	
Uppermost - Position 3	31.6	
Telescoping Steering Wheel Travel		
Test Position	24.3	

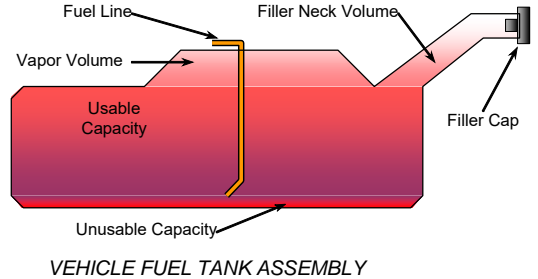
**DATA SHEET NO. 2 ... (CONTINUED)**

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

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

**FUEL PUMP**

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



**FUEL TANK CAPACITY**

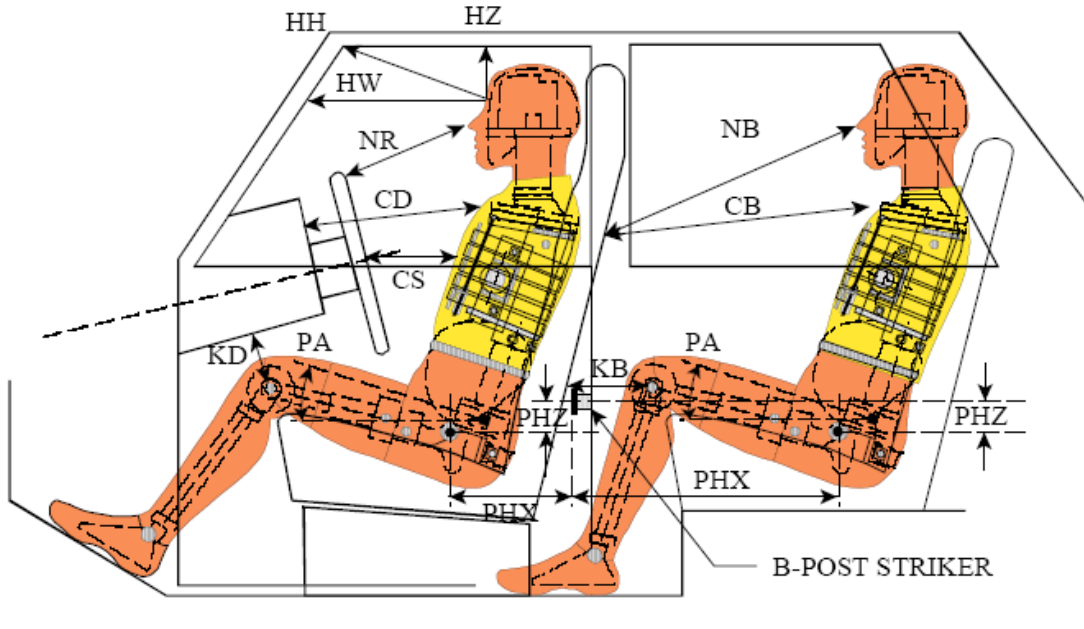
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	79.87
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	79.87
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	74.19
Actual amount of Solvent Used in Test	74.19
1/3 of Usable Capacity	23.96

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

### DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**LEFT SIDE VIEW**

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

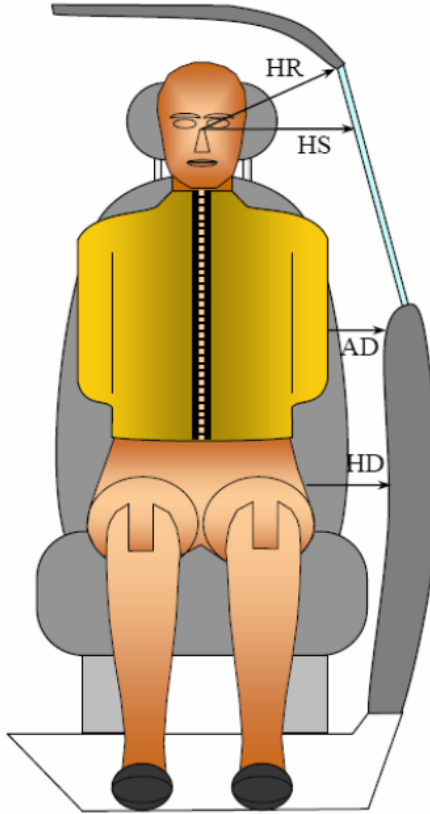
### DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	353			
HW		Head to Windshield	554			
HZ	HZ	Head to Roof	157		282	
NR	NB	Nose to Rim/Seat Back	406		486	
CD	CB	Chest to Dash/Seat Back	567		494	
CS		Chest to Steering Wheel	333			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	125	21.8	267	8
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	129	17.2	271	6.8
PAX°	PAX°	Pelvic Tilt Angle X		15.7		19.6
	PAY°	Pelvic Tilt Angle Y		0.1		0.2
PHX	PHX	Hip Point to Striker (x-axis)	225		202	
PHZ	PHZ	Hip Point to Striker (z-axis)	63		57	

**DATA SHEET NO. 4**

**DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**DUMMY LATERAL CLEARANCE DIMENSION INFORMATION**

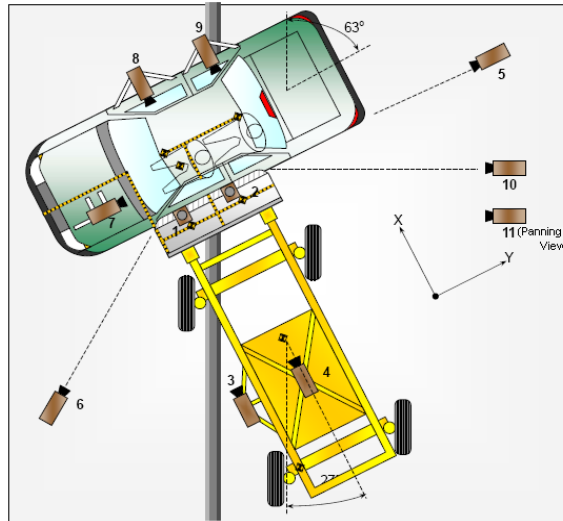
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	201	257
HS	Head to Side Window	mm	352	348
AD	Arm to Door	mm	95	120
HD	H-Point to Door	mm	124	189

**DATA SHEET NO. 5**

**CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205

Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**CAMERA LOCATIONS AND DATA**

No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	1220	2287	-5486	14	1000
2	Overhead Close-Up	609	2287	-5102	35	1000
3	Left Impact Point (MDB)	-2134	0	-1143	25	1000
4	Side Overall (MDB)	-3912	838	-1829	12.5	1000
5	Rear	-64	2485	-1348	85	1000
6	Left Front	-2266	-3564	-1475	24	1000
7	Driver Front (On-Board)	405	-493	704	8.5	1000
8	Driver Side (On-Board)	1820	747	409	8.5	1000
9	Passenger Side (On-Board)	1845	1623	432	8.5	1000
10	Real Time Overall				Zoom	30
11	Real Time Inrun				Zoom	30

Reference: Impact Point Projected to Ground; +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

\*All measurements accurate to ±6 mm

**INSTRUMENTATION**

Driver Dummy Channels	16
Passenger Dummy Channels	19
Vehicle Structure Accelerometers	23
MDB Accelerometers	5
<b>Total</b>	<b>63</b>

**DATA SHEET NO. 6**

**TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2690	0	-600
2	Right Sill at Front Seat	3280	750	-480
3	Right Sill at Rear Seat	2350	750	-490
4	Left Sill at Front Door	3280	-700	-340
5	Left Sill at Rear Door	2350	-700	-350
6	A-Pillar Lower	3830	-830	-640
7	A-Pillar Middle	3830	-830	-780
8	B-Pillar Lower	2820	-730	-680
9	B-Pillar Middle	2800	-730	-950
10	Front Seat Track	3300	-580	-670
11	Rear Seat Structure	2120	-420	-640
12	Right Rear Occupant Compartment	2130	420	-640
13	Engine Block	4410	-55	-985
14	Rear Floorpan Above Axle	1940	0	-625

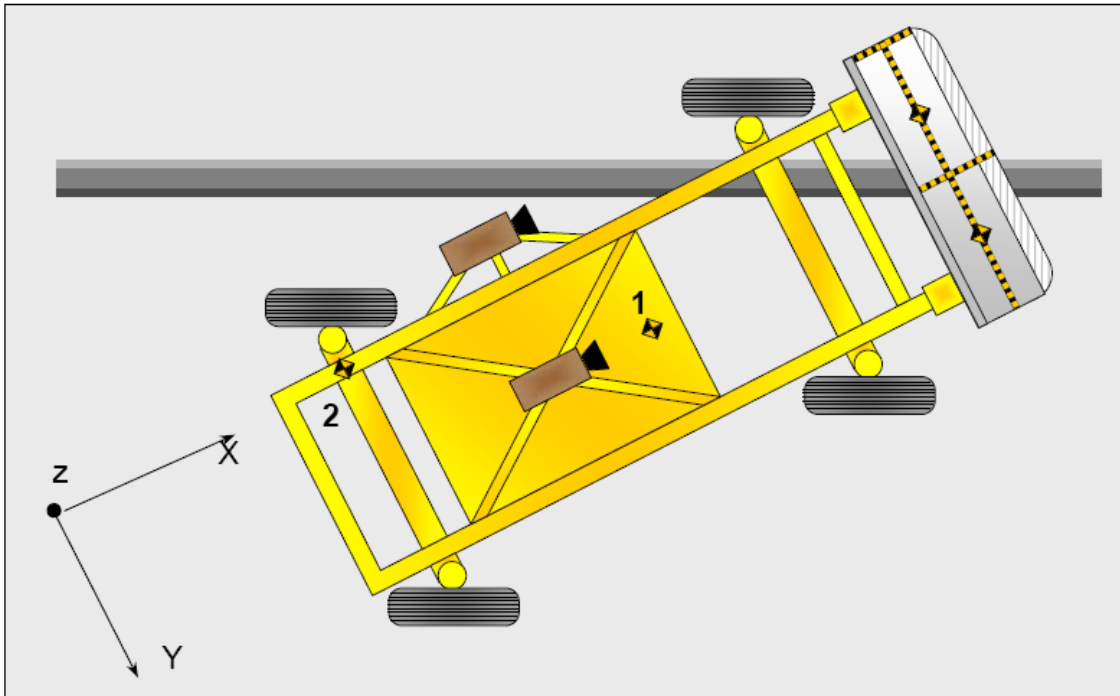
Reference: X – Rear surface of vehicle (+ forward)  
 Y – Vehicle centerline (+ to right)  
 Z – Ground plane (+ down)

**DATA SHEET NO. 7**

**MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205

Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**MDB ACCELEROMETER LOCATIONS**

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

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

**DATA SHEET NO. 8**

**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

**TEST DUMMY INFORMATION AND CONTACT POINTS**

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag, Side Header	None
Top of Head	Side Header	Curtain Airbag
Left Side of Head	Curtain Airbag, Side Header	Curtain Airbag
Back of Head	Curtain Airbag, Side Header	Curtain, Headrest
Left Shoulder	Curtain Airbag, Side Airbag	Curtain Airbag
Upper Torso	Side Airbag	Door Panel
Lower Torso	Seat, Side Airbag	Door Panel
Left Hip	Seat, Side Airbag	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	Yes	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	No	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	994	N/A	N/A	N/A	N/A

**DATA SHEET NO. 8 ... (CONTINUED)**

**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18

**POST-TEST SEAT PERFORMANCE**

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

**POST-TEST STRUCTURAL OBSERVATIONS**

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

**DATA SHEET NO. 8 ... (CONTINUED)**

**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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

**IMPACT POINT LOCATION DATA**

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3204
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		507
Actual Impact Point (Aft of Front Axle)	mm		527
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-20
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	15

**DATA SHEET NO. 9**

**MDB SUMMARY OF RESULTS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18

**MDB SPECIFICATIONS**

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

**MDB WEIGHTS**

	Units	Front Axle	Rear Axle	Total
Left	kg	402.0	298.0	700.0
Right	kg	377.0	290.0	667.0
Ratio	%	57.0%	43.0%	100.0%
Totals	kg	779.0	588.0	1367.0

**SPEED AND IMPACT DATA**

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.88
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.99
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.7
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.8
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.9

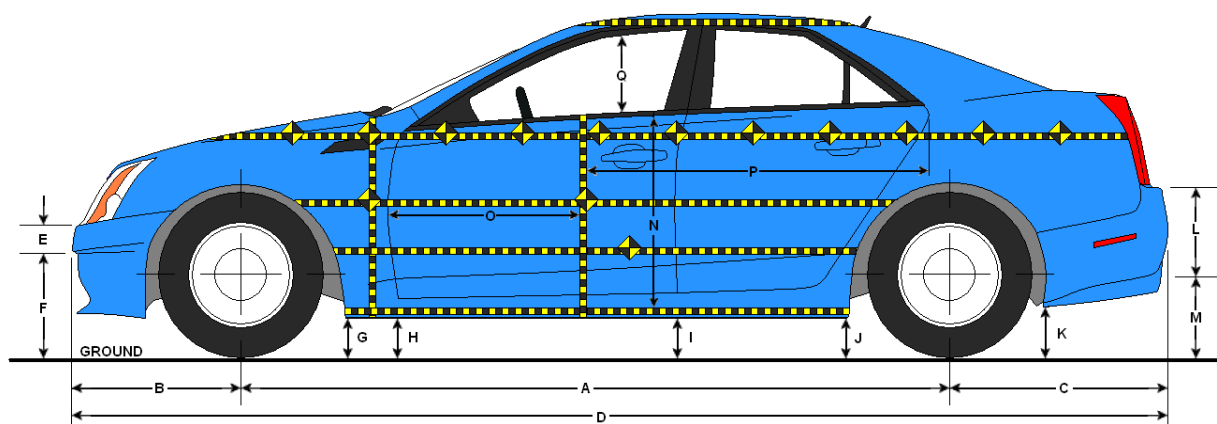
**MAXIMUM STATIC CRUSH OF HONEYCOMB FACE**

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	153
B	Top of Bumper	533	800	Left	135
C	Mid Level	686	200	Right	123
D	Top of Stack	813	800	Right	161

## DATA SHEET NO. 10

### TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18



**LEFT SIDE VIEW**

#### VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

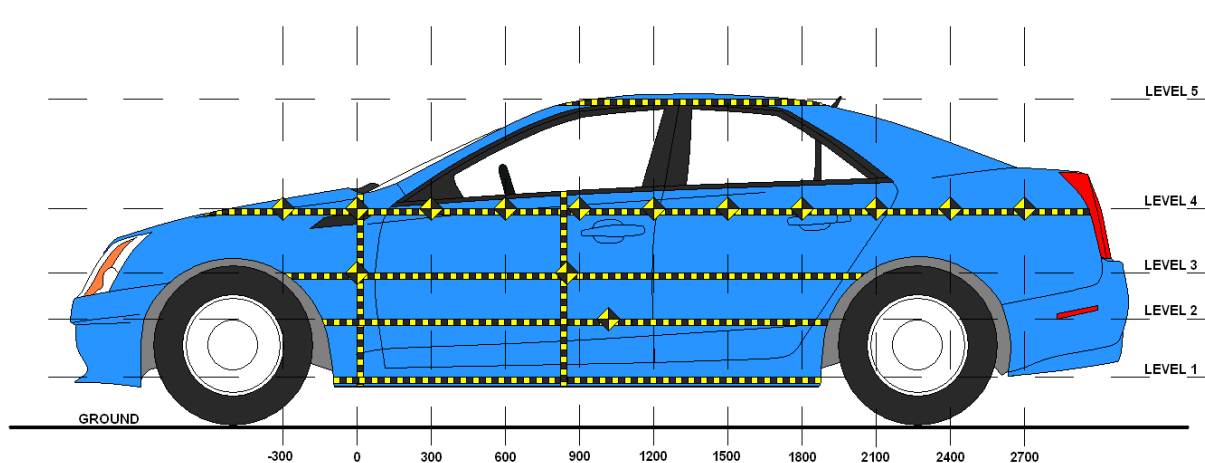
Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3204	3171	-33
B	Front Axle to FSOV	804	856	52
C	Rear Axle to RSOV	1220	1179	-41
D	Total Length at Centerline	5228	5205	-23
E	Front Bumper Thickness	102	106	4
F	Front Bumper Bottom to Ground	419	377	-42
G	Sill Height at Front Wheel Well	403	364	-39
H	Sill Height at Front Door Leading Edge	388	367	-21
I	Sill Height at B-Pillar	401	385	-16
J1	Sill Height at Rear Wheel Well	389	360	-29
J2	Pinch Weld Height at Rear Wheel Well	363	346	-17
K	Sill Height Aft of Rear Wheel Well	435	427	-8
L	Rear Bumper Thickness	146	149	3
M	Rear Bumper Bottom to Ground	473	474	1
N	Sill Height to Bottom of Front Window Sill	696	668	-28
O	Front Door Leading Edge to Impact CL	745	720	-25
P	Rear Door Trailing Edge to Impact CL	1241	1212	-29
Q	Front Window Opening	494	519	25
R	Right Side Length	4552	4547	-5
S	Left Side Length	4547	4519	-28
T	Vehicle Width at B-Pillar	1772	1707	-65

All measurements in mm with tolerance of  $\pm 3$ mm

**DATA SHEET NO. 11**

**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**LEFT SIDE VIEW**

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	419	293	1800
2	Occupant H-Point	794	211	1350
3	Mid-Door	840	242	1350
4	Window Sill	1120	125	1350
5	Window Top	1716	96	2100

**DATA SHEET NO. 11 ... (CONTINUED)**

**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck    NHTSA No. M20195205

Test Program: NCAP MDB Side Impact Test    Test Date: 10/30/18

**EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL**

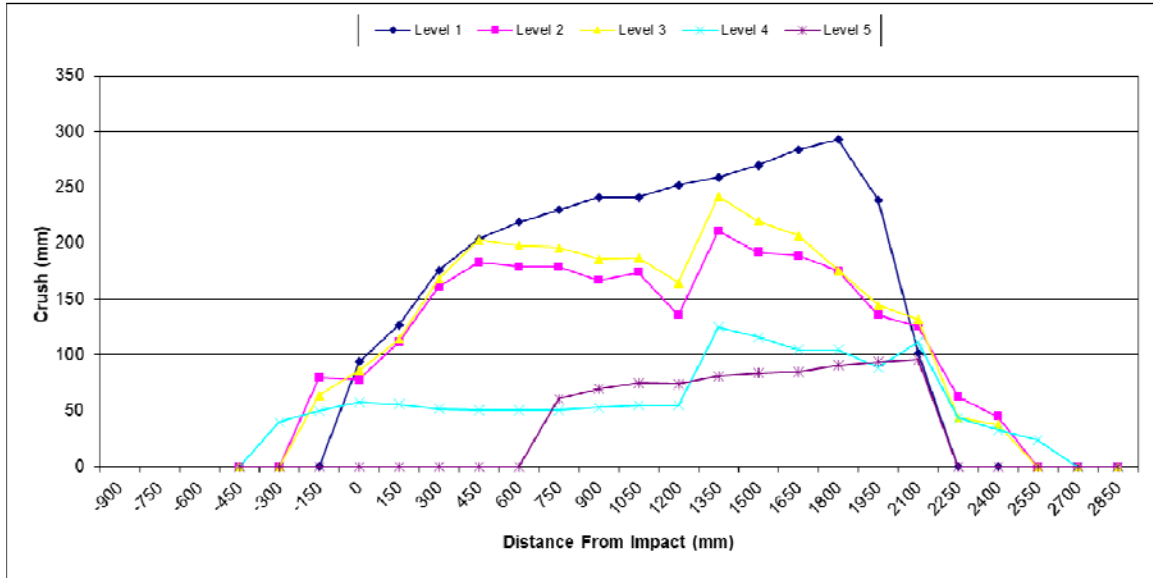
	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				671					711					40	
-150		582	592	664			662	656	714			80	64	50	
0	635	629	626	658		729	707	712	716		94	78	86	58	
150	684	624	624	652		811	736	738	708		127	112	114	56	
300	683	621	621	660		859	782	789	712		176	161	168	52	
450	681	618	618	654		885	801	821	705		204	183	203	51	
600	680	616	616	649		899	795	814	700		219	179	198	51	
750	679	614	614	645	890	909	793	810	696	951	230	179	196	51	61
900	678	613	613	641	884	919	780	799	694	954	241	167	186	53	70
1050	678	612	612	638	880	919	786	799	693	955	241	174	187	55	75
1200	677	612	612	638	882	929	748	777	693	956	252	136	165	55	74
1350	676	611	612	639	882	935	822	854	764	963	259	211	242	125	81
1500	677	612	612	638	880	947	804	832	754	964	270	192	220	116	84
1650	676	612	613	639	882	960	801	820	744	967	284	189	207	105	85
1800	675	613	614	638	883	968	788	790	743	974	293	175	176	105	91
1950	674	614	614	639	886	913	750	759	728	980	239	136	145	89	94
2100	684	616	616	640	902	786	742	748	752	998	102	126	132	112	96
2250		601	611	653			664	655	697			63	44	44	
2400		575	579	652			620	617	685			45	38	33	
2550				651					675					24	
2700															
2850															

DATA SHEET NO. 11 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205

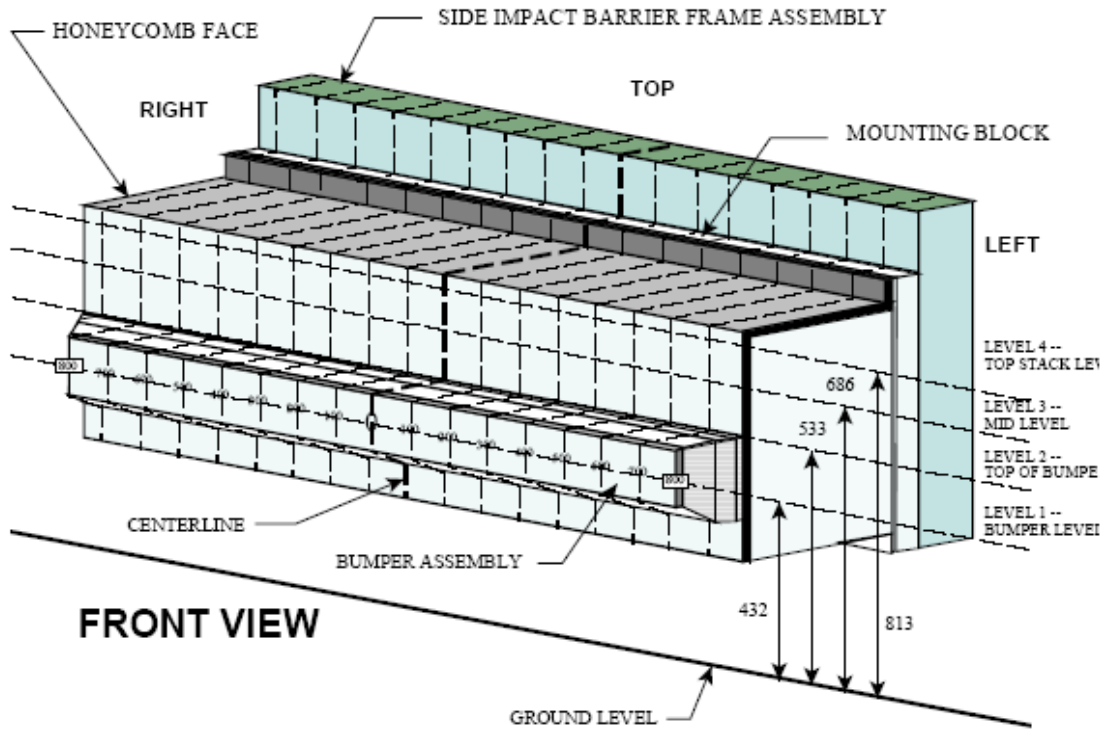
Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**DATA SHEET NO. 12**

**MDB EXTERIOR STATIC CRUSH MEASUREMENTS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



NOTE: Dimensions are shown in millimeters, mm

**DEFORMABLE BARRIER STATIC CRUSH**

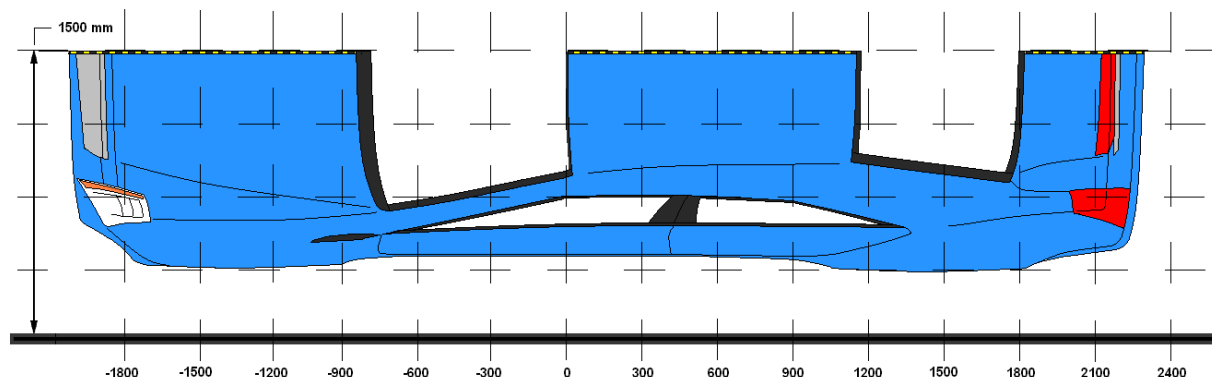
Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	119	82	86	92	97	99	106	111	112	102	101	105	109	117	119	131	153
2	87	92	96	107	109	66	92	123	117	114	114	115	119	124	127	129	135
3	112	67	34	30	43	78	123	113	109	95	87	82	79	78	81	87	110
4	161	119	91	67	72	97	138	121	110	78	69	64	67	70	77	90	119

All dimensions in millimeters.

### DATA SHEET NO. 13

#### VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck      NHTSA No. M20195205  
 Test Program: NCAP MDB Side Impact Test      Test Date: 10/30/18



#### VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2550	4	651	675	24
2	1950	1	674	913	239
3	1350	1	676	935	259
4	900	1	678	919	241
5	300	1	683	859	176
6	-300	4	671	711	40

#### MDB DAMAGE PROFILE DISTANCES

DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	153
2	500	Left	2	124
3	200	Left	2	114
4	200	Right	4	138
5	500	Right	2	107
6	800	Right	4	161

**DATA SHEET NO. 14**

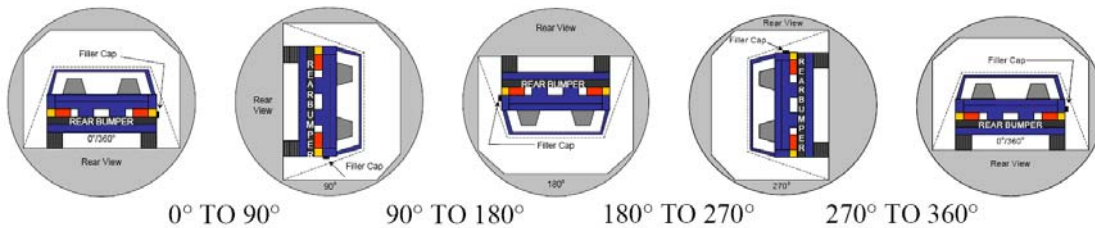
**FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205

Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18

Temperature at Time of Impact: 21.7 °C Test Time: 1:27 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°	78	300	378
180° To 270°	77	300	377
270° To 360°	79	300	379

**FMVSS 301 SPILLAGE TABLE**

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

**SOLVENT SPILLAGE LOCATION TABLE**

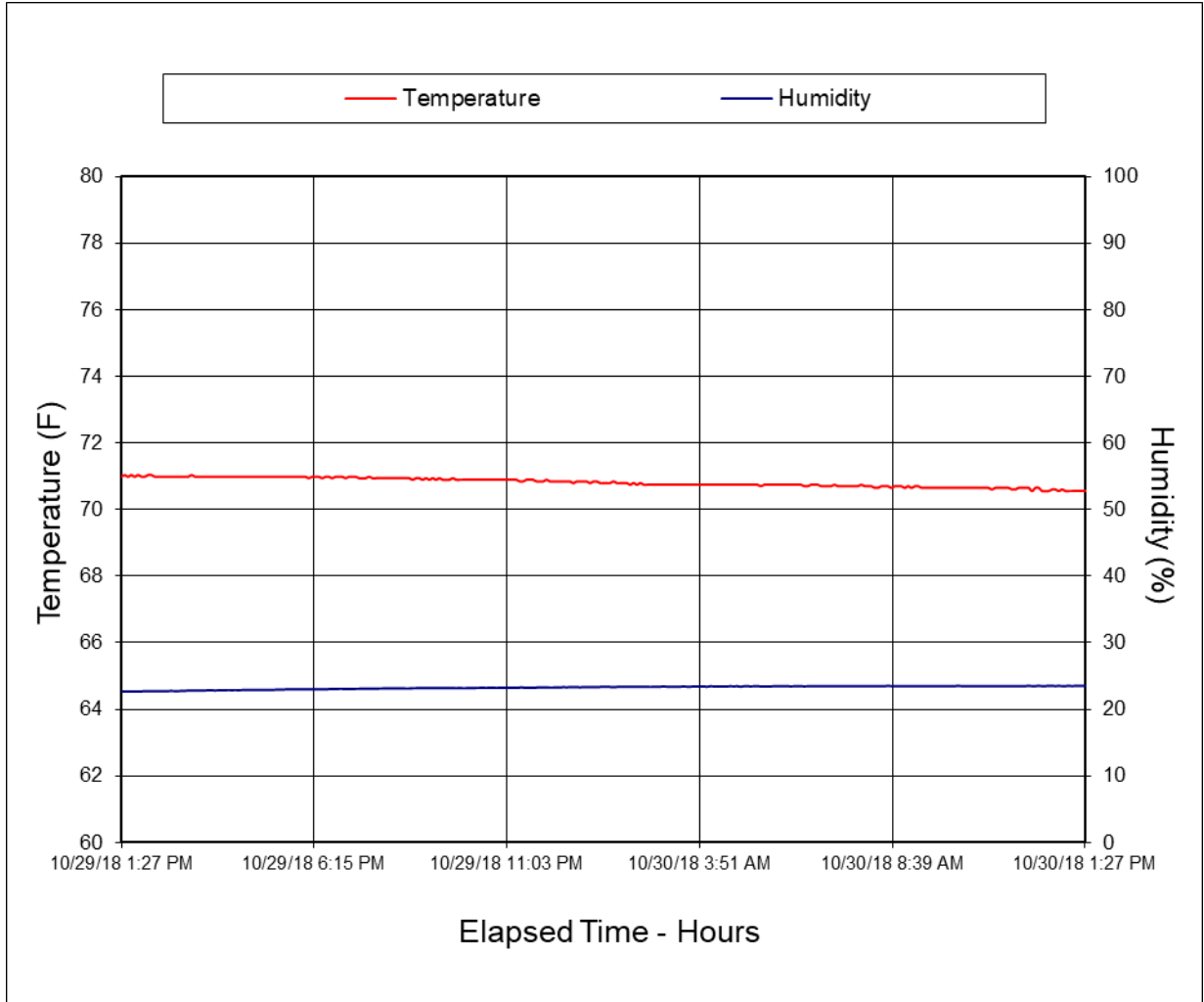
Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

**DATA SHEET NO. 15**

**DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195205

Test Program: NCAP MDB Side Impact Test Test Date: 10/30/18



**APPENDIX A  
PHOTOGRAPHS**

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



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



FIGURE 3. Pre-Test Frontal View of Test Vehicle



FIGURE 4. Post-Test Frontal View of Test Vehicle



FIGURE 5. Pre-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



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



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



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



FIGURE 9. Pre-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



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





FIGURE 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

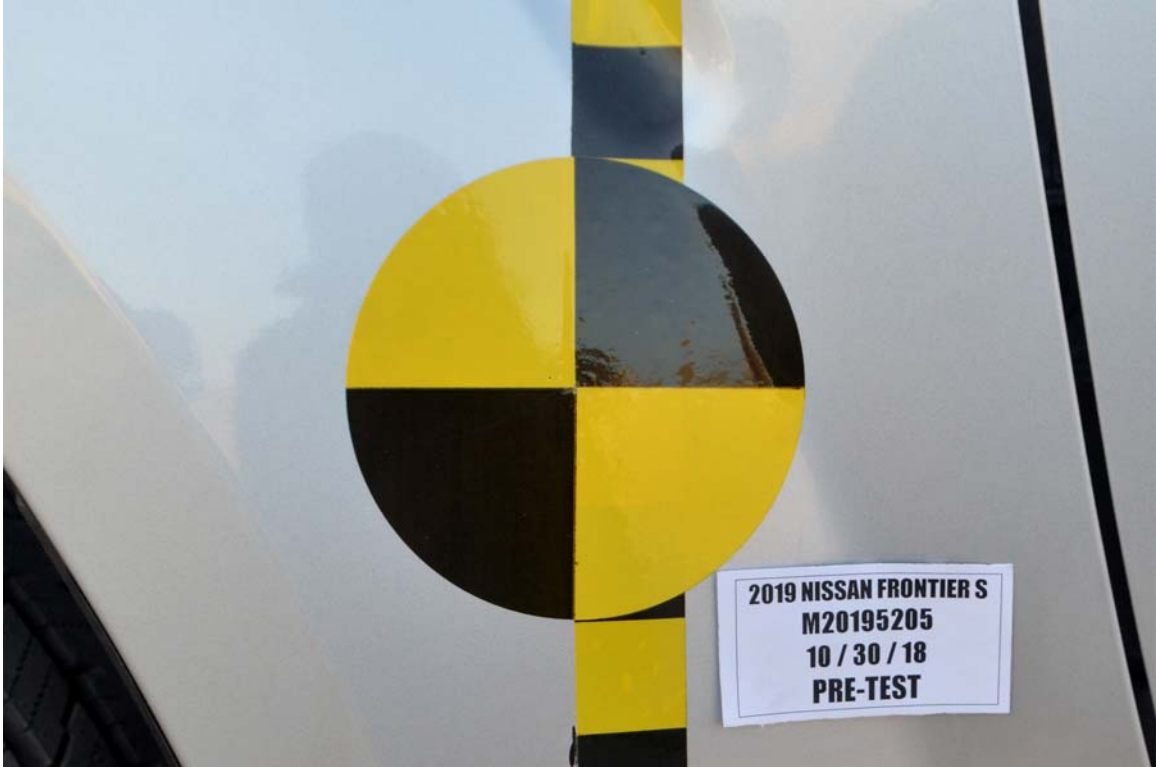


FIGURE 19. Pre-Test Close-Up View of Impact Point Target

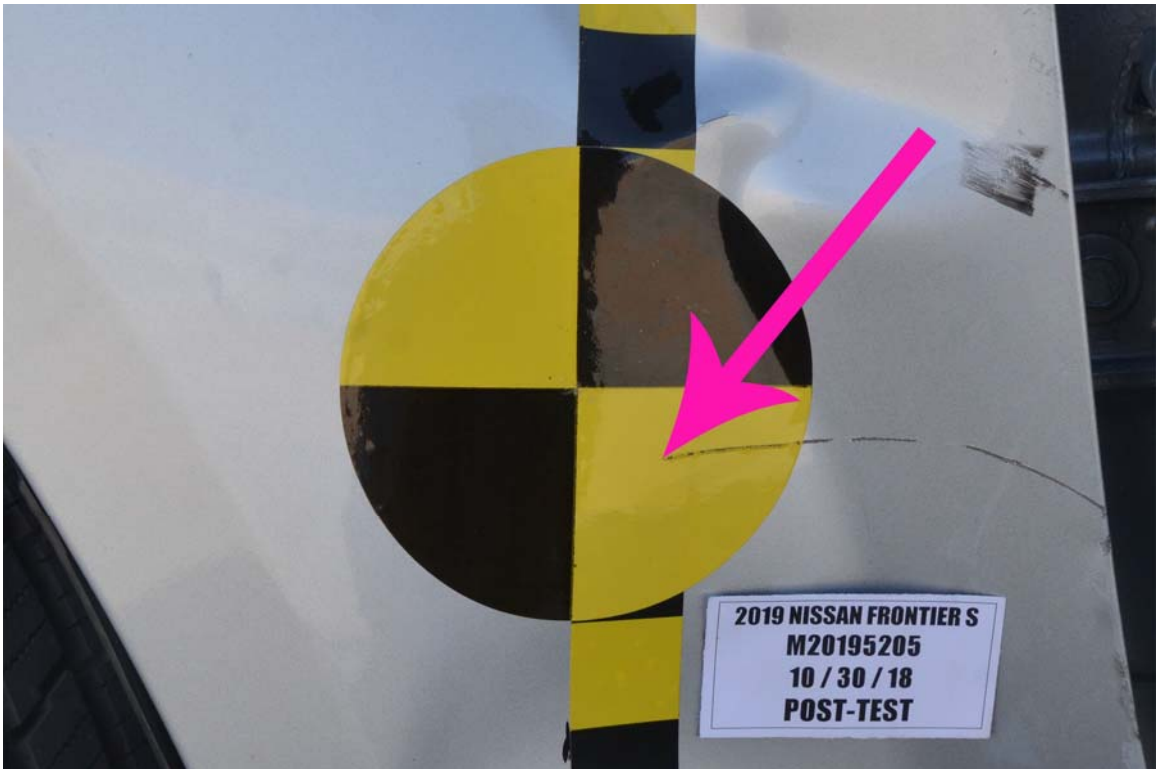


FIGURE 20. Post-Test Close-Up View of Impact Point Target



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

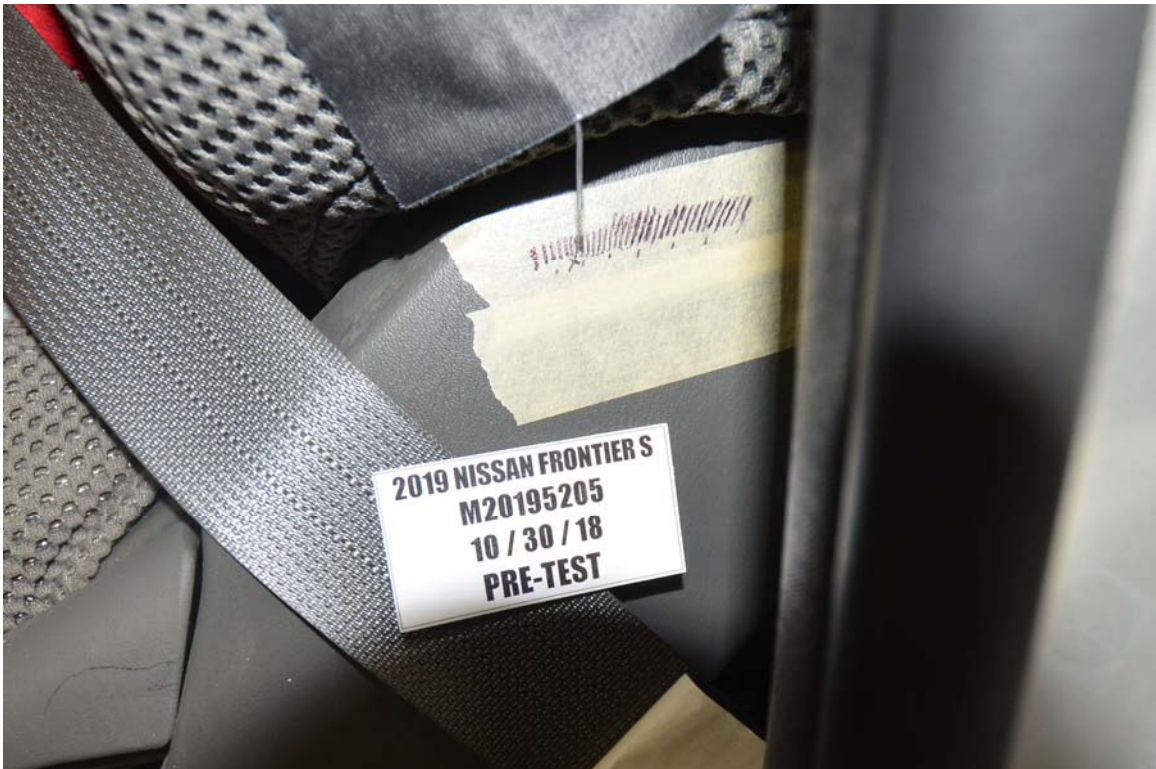


FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back



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

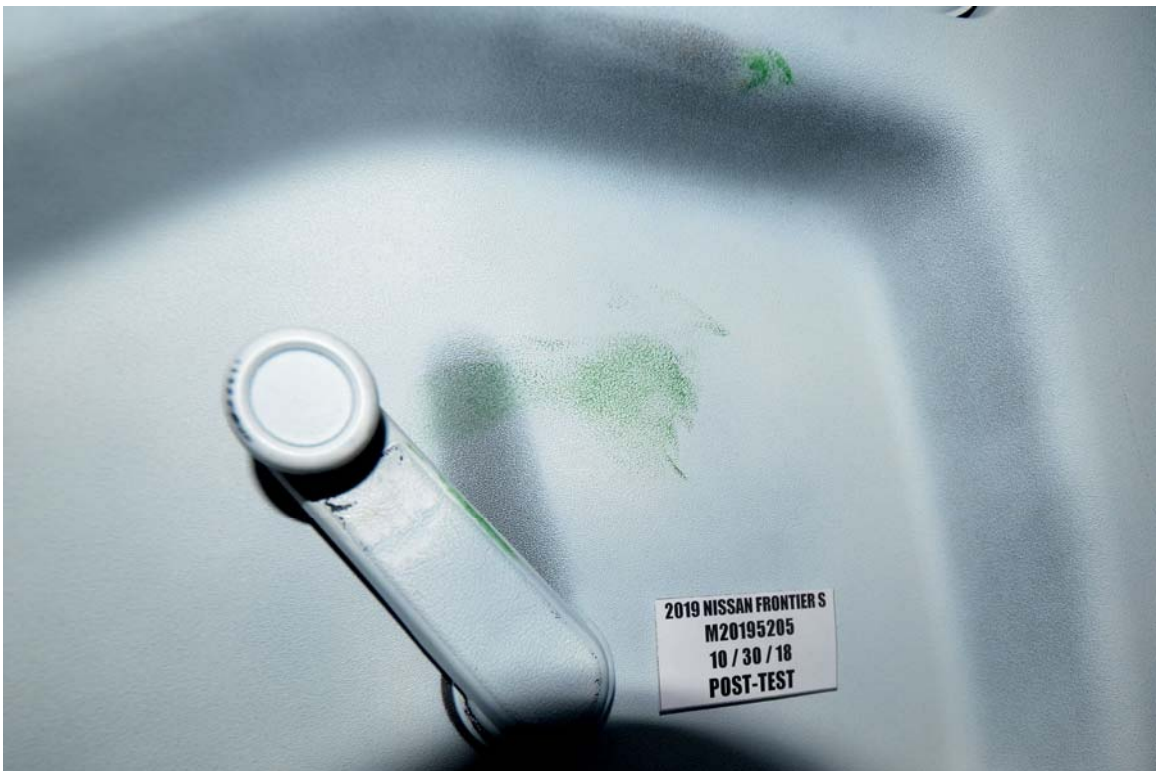


FIGURE 54. Post-Test Driver Dummy Close-Up Knee Contact View



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



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



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

**Photograph Not Applicable**

**Vehicle Not Equipped with  
Rear Passenger Side Airbags**

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

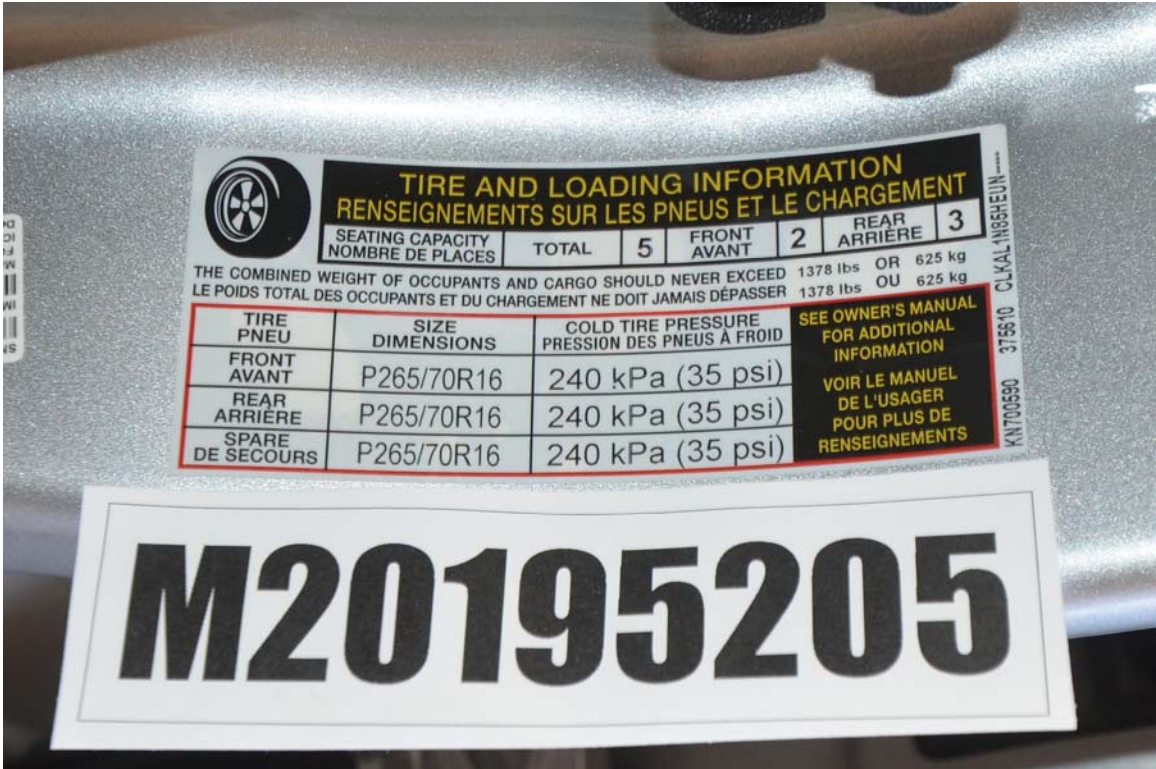


FIGURE 93. Close-Up View of Vehicle's Tire Information Placard or Label

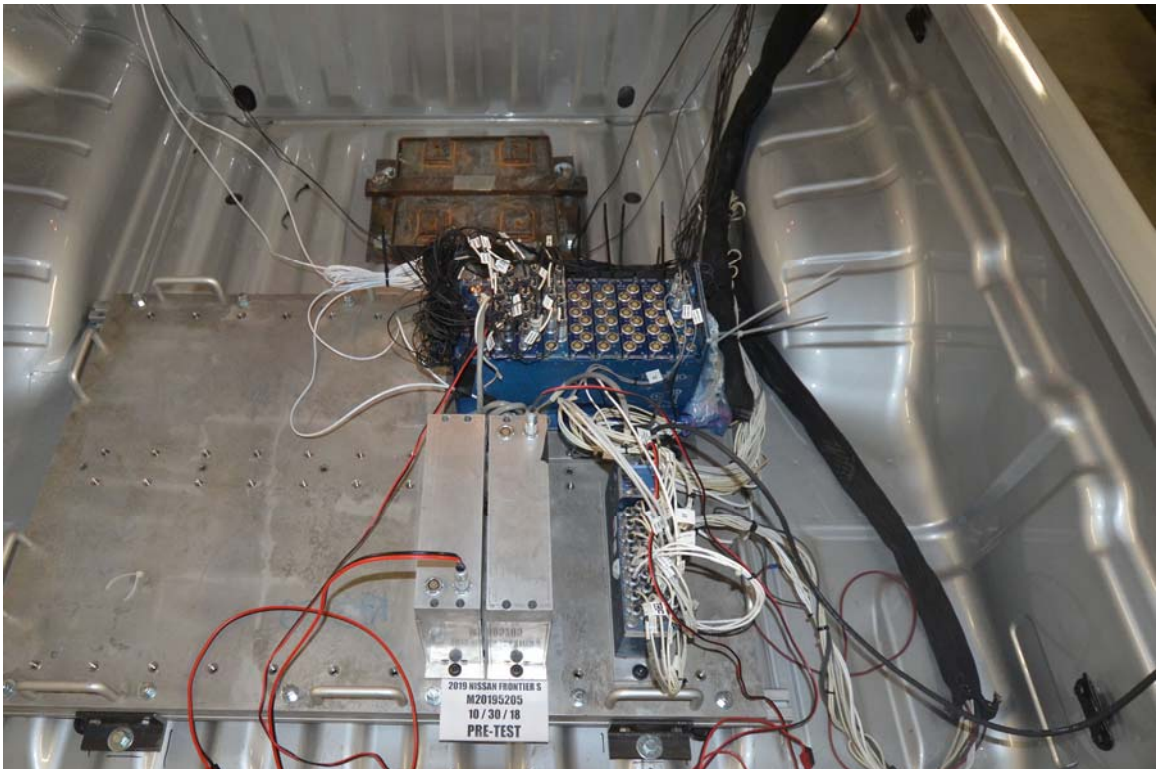


FIGURE 94. Pre-Test Ballast View



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

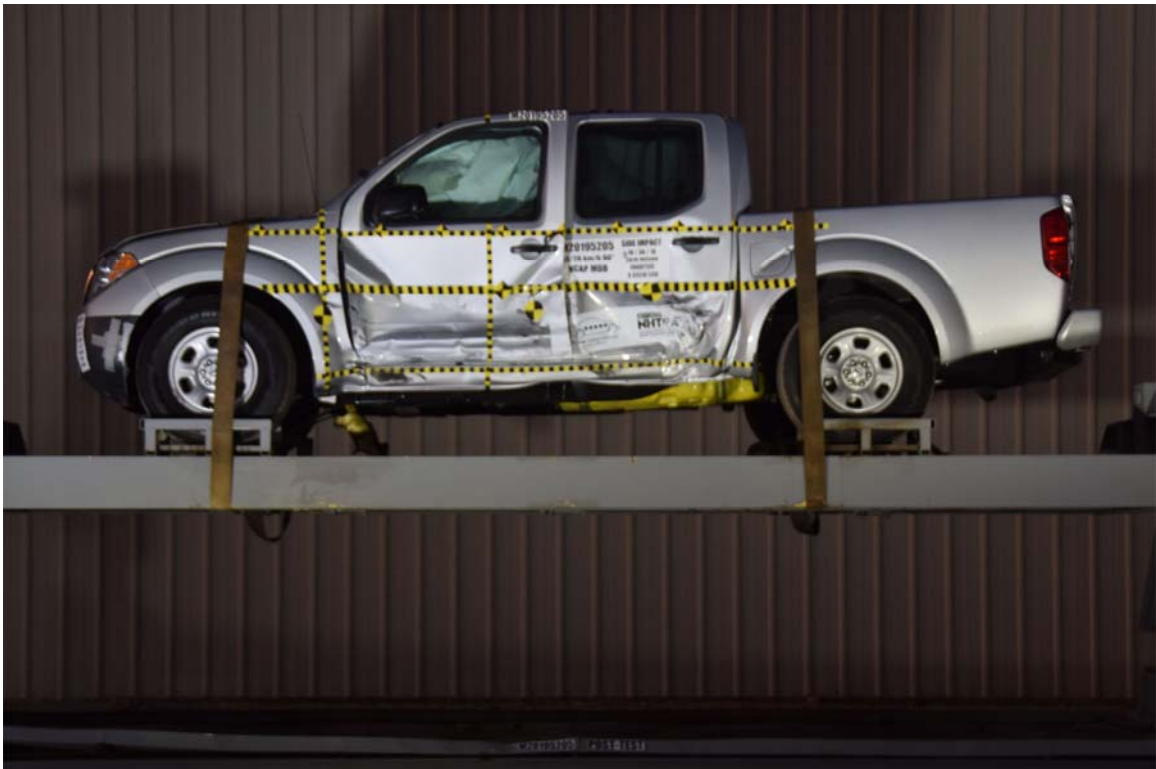


FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees

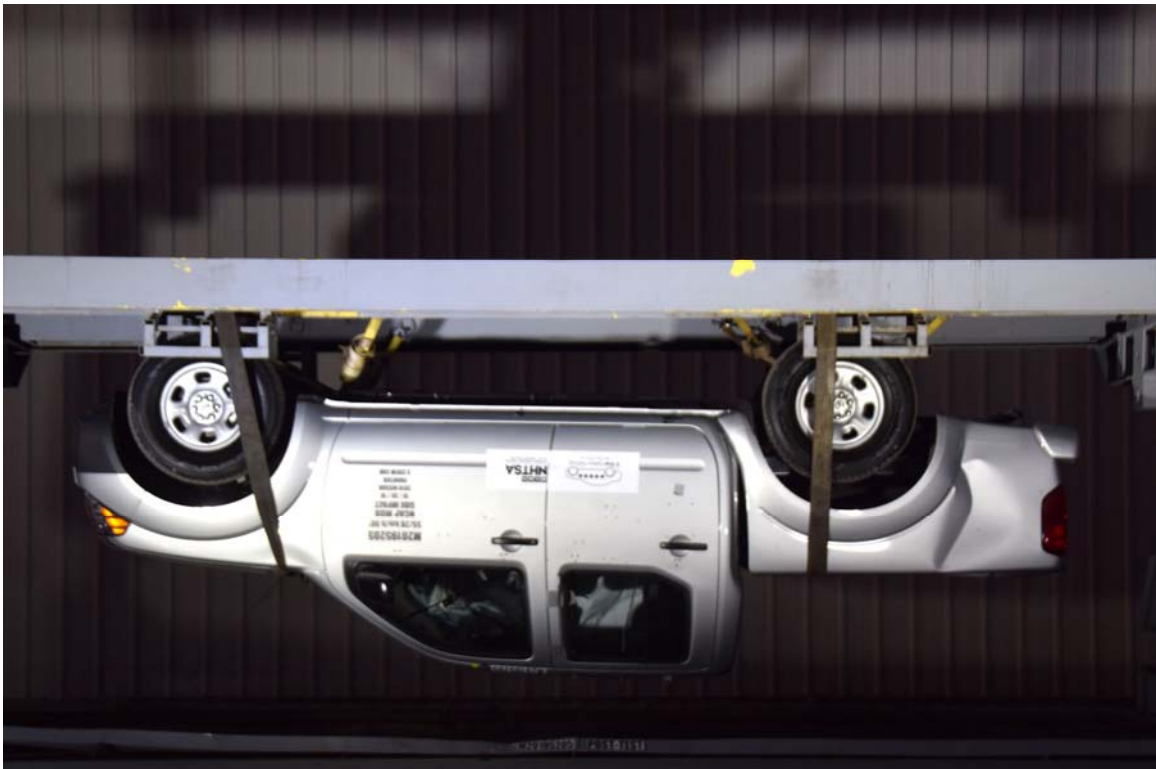


FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

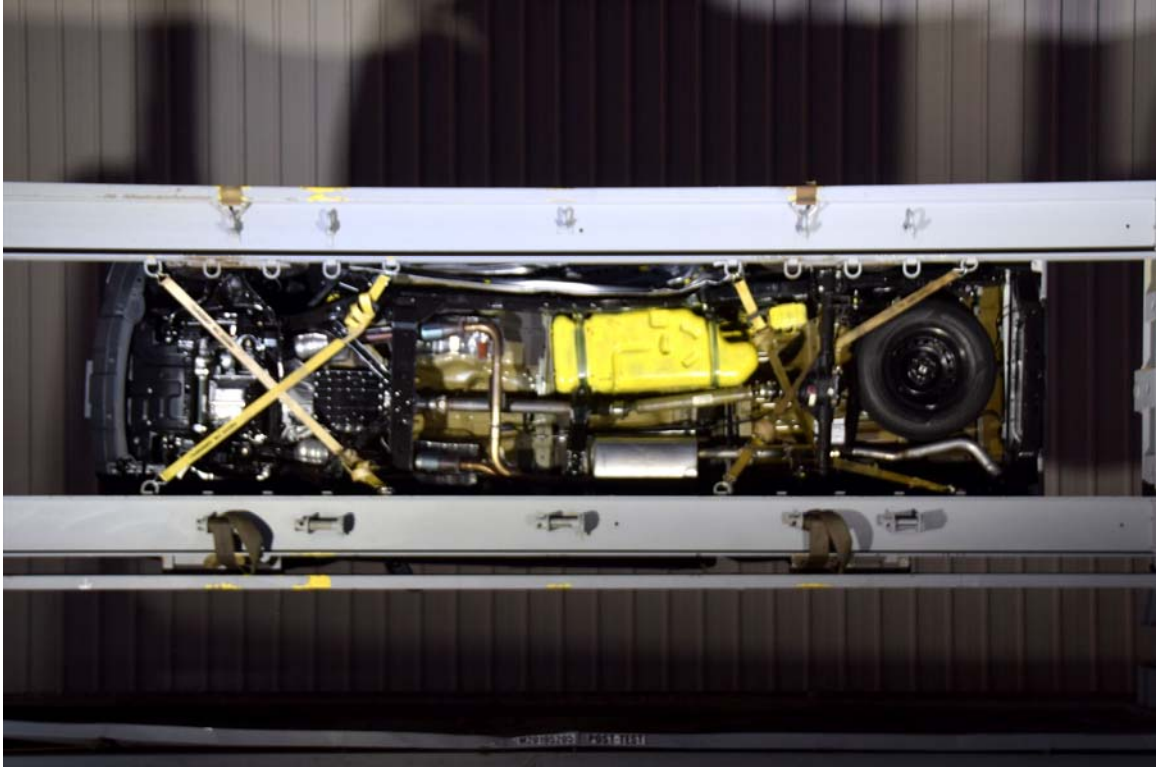


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees



FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 101. Impact Event

<h3>2019 NISSAN FRONTIER S CREW CAB 4X2 AUTOMATIC V6</h3>		<p>Scan QR code for general model information &amp; options</p>	<h4>EPA DOT Fuel Economy and Environment</h4> <p><b>19</b> MPG combined city/hwy</p> <p>16 city 23 highway</p> <p>5.3 gallons per 100 miles</p> <p><b>You spend \$3,000 more in fuel costs over 5 years</b> compared to the average new vehicle.</p>
<p><b>Standard Equipment Included at No Extra Charge</b></p> <p><b>MECHANICAL &amp; PERFORMANCE</b> 4.0-Liter DOHC V6 Engine 261 Horsepower and 281 lb-ft of Torque 5-Speed Automatic Transmission 4-Wheel Vented Disc Brakes 2-Wheel Active Brake Limited Slip (ABLE) 16" Styled Steel Wheels Full Size Spare P265/70R16 All-Season Tires</p> <p><b>SAFETY &amp; SECURITY</b> Driver &amp; Front Passenger, Side-Impact, &amp; Curtain Air Bags Front-Seat Active Head Restraints Lower Anchors &amp; Tethers for Children (LATCH) Pole-Style Steel Side-Door Guard Beams 4-Wheel Anti-Lock Braking System (ABS) Electronic Brake Force Distribution (EBD) Vehicle Dynamic Control (VDC) Tire Pressure Monitoring System (TPMS)</p>	<p><b>COMFORT &amp; CONVENIENCE</b> 60/40 Split Fold-Down Rear Seat Cruise Control 6-Speaker AM/FM/ALX Audio System 7" Color Display Audio USB Connection Port for iPod® Interface and Other Compatible Devices Streaming Audio via Bluetooth® Bluetooth® Hands-free Phone System** Sirio Eyes Free** Hands-free Text Messaging Assistant** Steering Wheel Audio Controls Air Conditioning Rear Window Defroster w/ Timer Full Length Rear Under-Seat Storage Multiple 12 Volt DC Power Outlets Front Reading/Map Lamps Roof Console w/Sunglasses Holder Rear/View Monitor Manual Tilt Steering</p> <p><b>EXTERIOR</b> Cabin-Mounted Cargo Bed Lamp Black Front Bumper Chrome Front Grille Body Color Rear Bumper Tinted Rear Privacy Glass</p>	<p>Manufacturer's Suggested Retail Base Price: \$26,000.00</p> <p>Options Included by Manufacturer</p> <p>DESTINATION CHARGES 995.00</p> <p>Total* \$26,995.00</p>	<p><b>Annual fuel Cost \$2,000</b></p> <p><b>Fuel Economy &amp; Greenhouse Gas Rating</b></p> <p>1 3 10 1 3 10</p> <p><b>GOVERNMENT 5-STAR SAFETY RATINGS</b></p> <p><b>Overall Vehicle Score Not Rated</b> Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.</p> <p><b>Frontal Crash</b> Driver Passenger ★★★ Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.</p> <p><b>Side Crash</b> Front seat Rear seat Not Rated Not Rated Based on the risk of injury in a side impact.</p> <p><b>Rollover</b> ★★★ Based on the risk of rollover in a single-vehicle crash.</p> <p>Star ratings range from 1 to 5 stars (*****) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236</p> <p>This Vehicle qualifies for Nissan's <b>Security+Plus Extended Protection Plan</b> The only service agreement backed by Nissan Extended Services North America! Ask your dealer for details, or call 1-800-NISSAN-1 for more information.</p>
<p>*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.</p>		<p>DELIVERY</p> <p><b>VEHICLE COLORS:</b> EXT-BRILLIANT SILVER INT: STEEL</p> <p><b>FINAL ASSEMBLY POINT:</b> CANTON</p> <p><b>TRANSPORT METHOD:</b> TRUCK</p> <p><b>DEALER:</b> RIVERSIDE NISSAN 8330 INDIANA AVE RIVERSIDE, GA 30504</p> <p>VIN: 1N6AD0R22N700590 EMS: 50 STATE EMISSIONS MDL: 32119 700590 #23-W OPT: C-003</p> <p>20180913151430R02753</p>	

FIGURE 102. Monroney Label

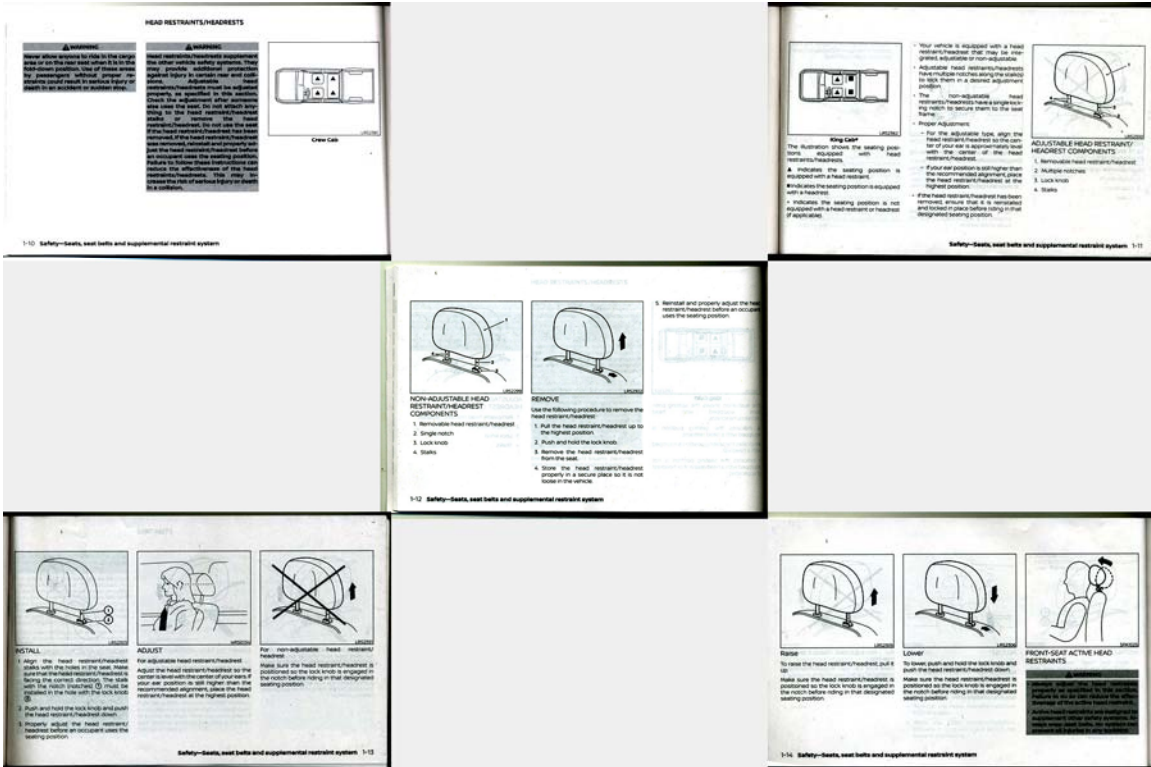


FIGURE 103. Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

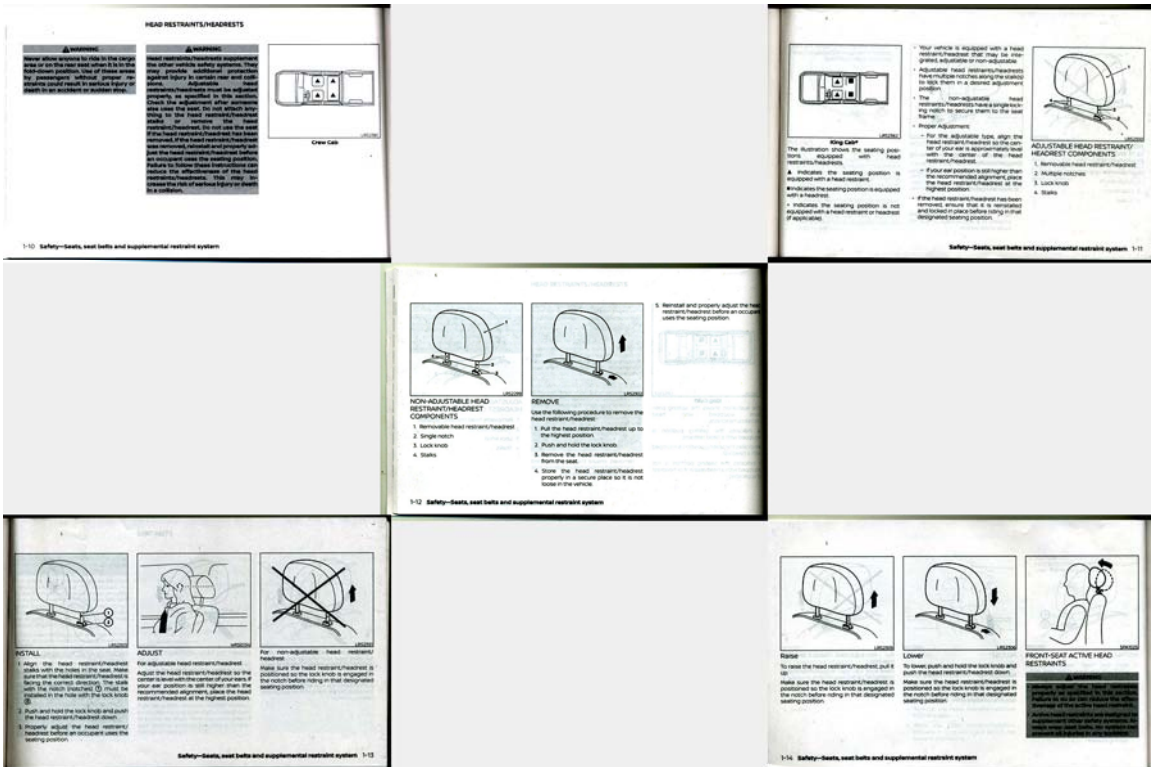


FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

**APPENDIX B**  
**DUMMY RESPONSE DATA**

## TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary vs. Time	B-1
2	Driver Head Acceleration (Y) Primary vs. Time	B-1
3	Driver Head Acceleration (Z) Primary vs. Time	B-1
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19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
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21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

**The following additional data for this test can be obtained from the Research and Development section of the NHTSA website ([www.NHTSA.dot.gov](http://www.NHTSA.dot.gov))**

### **Additional Driver & Passenger Dummy Instrumentation Data**

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)

Passenger Upper Abdomen Rib Deflection (Y)  
Passenger Lower Abdomen Rib Deflection (Y)  
Driver Head Acceleration Redundant (X)  
Driver Head Acceleration Redundant (Y)  
Driver Head Acceleration Redundant (Z)  
Passenger Head Acceleration Redundant (X)  
Passenger Head Acceleration Redundant (Y)  
Passenger Head Acceleration Redundant (Z)

### **Vehicle Instrumentation Data**

Vehicle Center of Gravity Acceleration (X)  
Vehicle Center of Gravity Acceleration (Y)  
Vehicle Center of Gravity Acceleration (Z)  
Right Side Sill at Front Seat Acceleration (X)  
Right Side Sill at Front Seat Acceleration (Y)  
Right Side Sill at Front Seat Acceleration (Z)  
Right Side Sill at Rear Seat Acceleration (X)  
Right Side Sill at Rear Seat Acceleration (Y)  
Right Side Sill at Rear Seat Acceleration (Z)  
Left Side Sill at Front Seat Acceleration (Y)  
Left Side Sill at Rear Seat Acceleration (Y)  
Lower A-Post Acceleration (Y)  
Middle A-Post Acceleration (Y)  
Lower B-Post Acceleration (Y)  
Middle B-Post Acceleration (Y)  
Front Seat Track Acceleration (Y)  
Rear Seat Structure Acceleration (Y)  
Right Rear Occupant Compartment Acceleration (Y)  
Engine Block (X)  
Engine Block (Y)  
Rear Floorpan Above Axle Acceleration (X)  
Rear Floorpan Above Axle Acceleration (Y)  
Rear Floorpan Above Axle Acceleration (Z)

### **MDB Instrumentation Data**

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

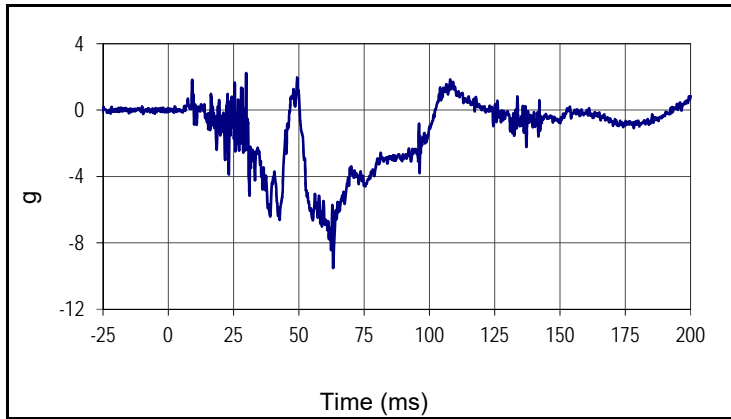
MDB Rear Acceleration (Y)

Left MDB Contact Switch

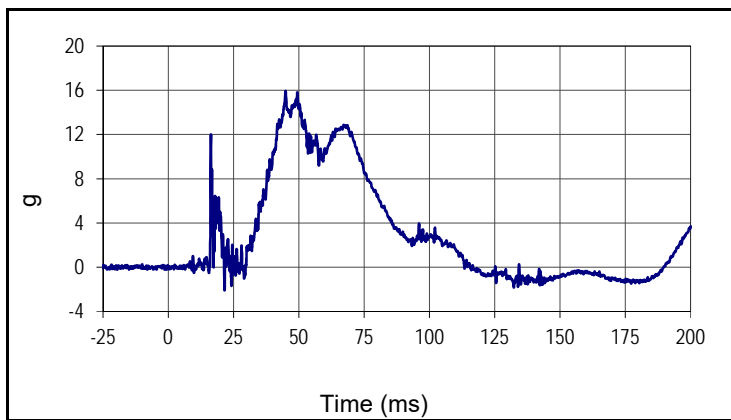
Right MDB Contact Switch

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

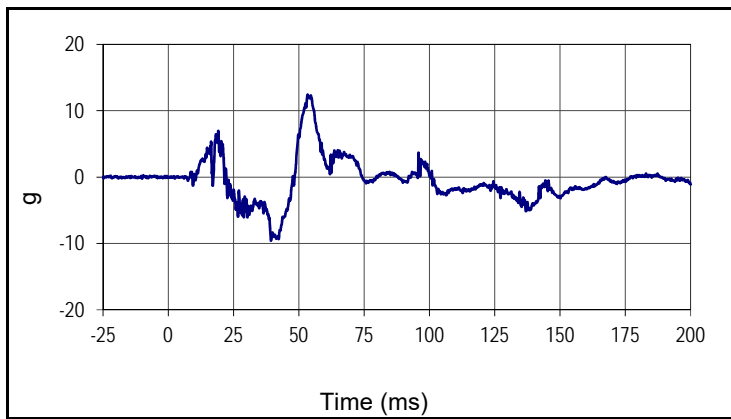
NHTSA No.: M20195205  
 Test Date: 10/30/2018



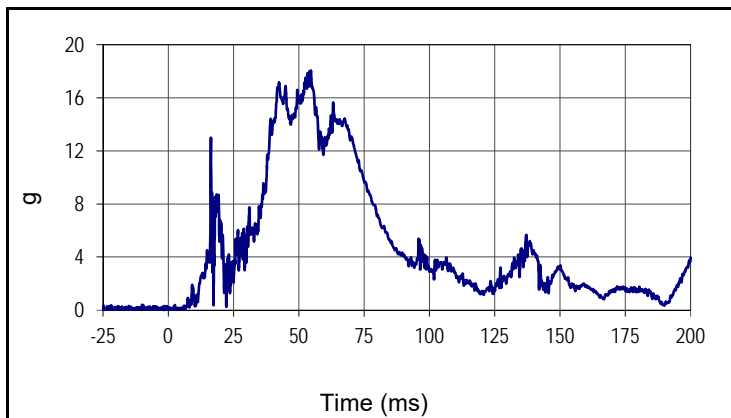
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
2.2	29.8	-9.5	63.1



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
15.9	44.9	-2.1	21.5



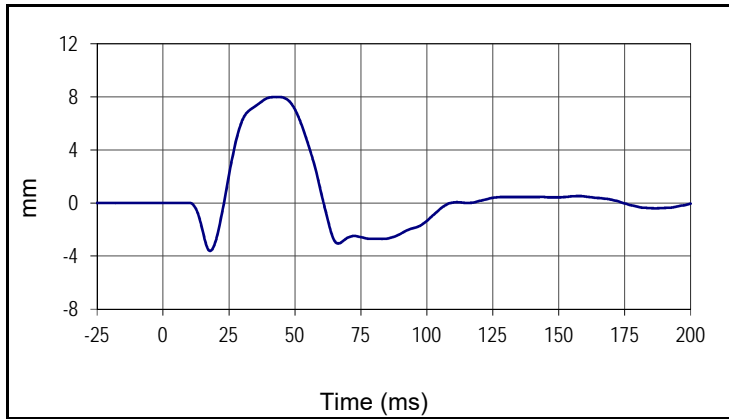
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
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Max	Time	Min	Time
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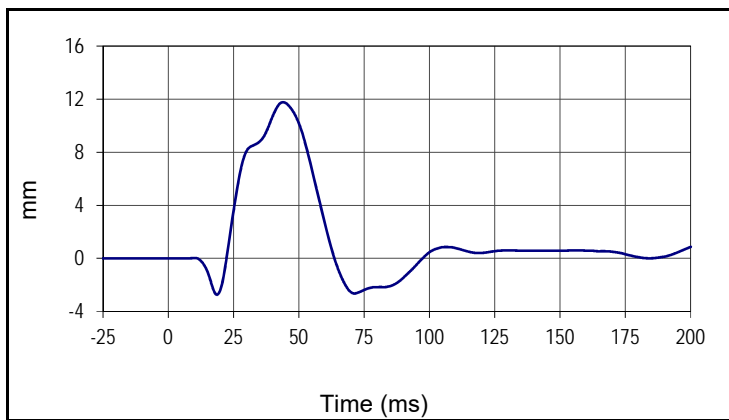
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
18.0	54.6	0.0	1.1

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

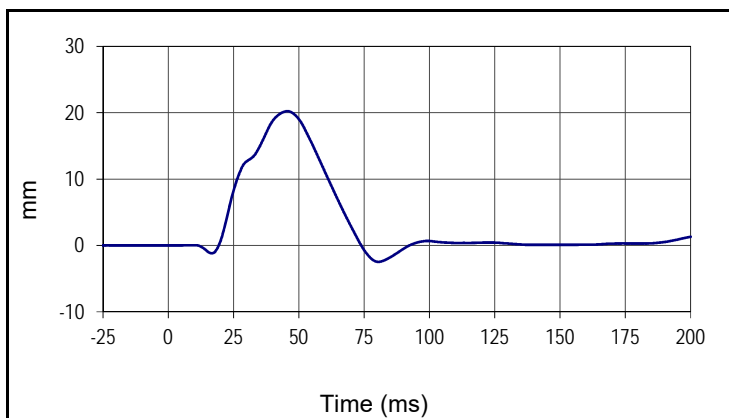
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 Test Date: 10/30/2018



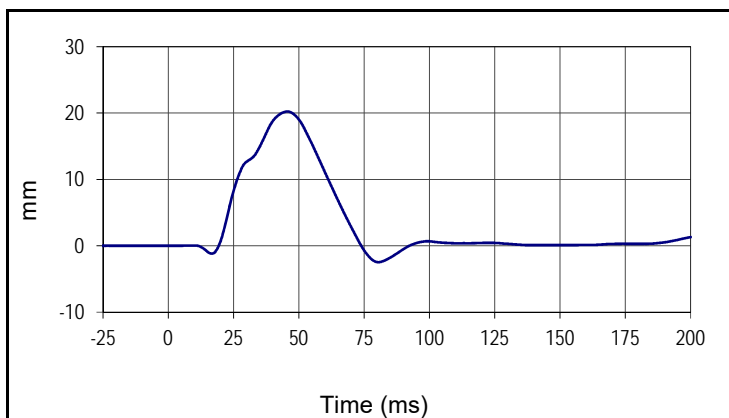
Curve Description			
Driver Upper Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
005		180	mm
Max	Time	Min	Time
8.0	43.0	-3.6	17.8



Curve Description			
Driver Middle Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
006		180	mm
Max	Time	Min	Time
11.8	43.9	-2.7	18.6



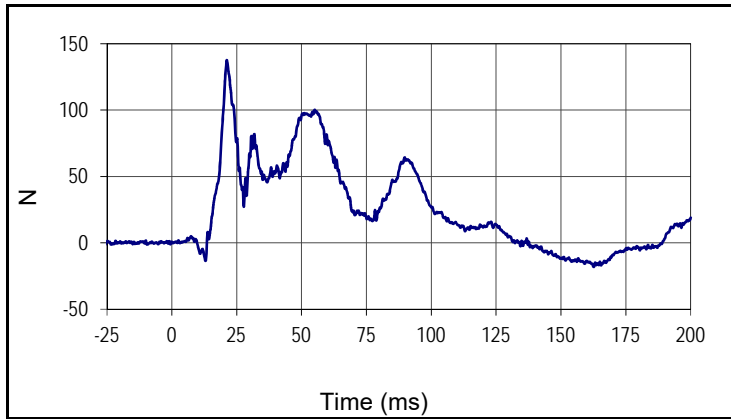
Curve Description			
Driver Lower Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
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Max	Time	Min	Time
20.2	45.6	-2.5	80.4



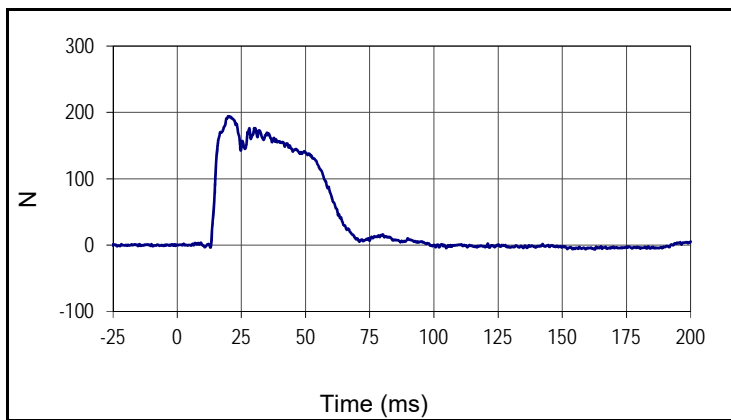
Curve Description			
Driver Thorax Rib Deflection Maximum Y			
Plot No.		SAE Class	Units
008		180	mm
Max	Time	Min	Time
20.2	45.6	-2.5	80.4

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

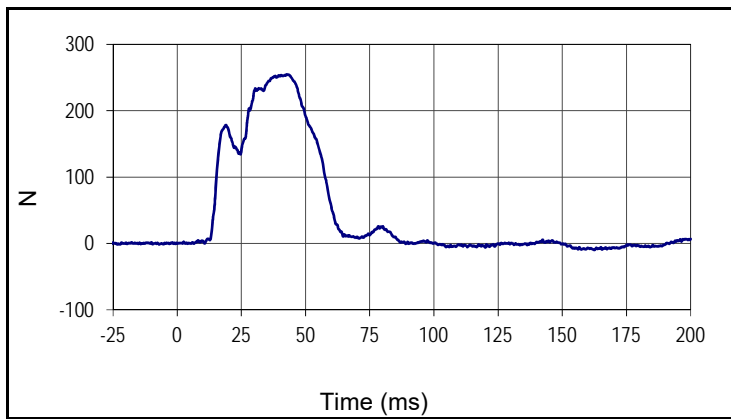
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 Test Date: 10/30/2018



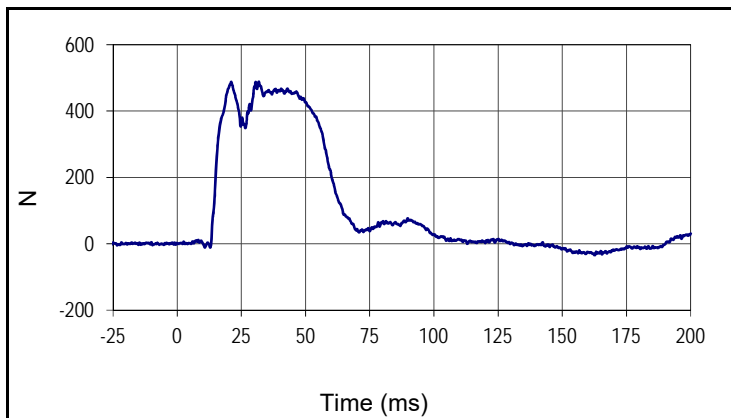
Curve Description			
Driver Anterior Abdominal Force Y			
Plot No.		SAE Class	Units
009		600	N
Max	Time	Min	Time
137.6	21.2	-18.2	162.6



Curve Description			
Driver Middle Abdominal Force Y			
Plot No.		SAE Class	Units
010		600	N
Max	Time	Min	Time
194.2	19.9	-6.6	162.6



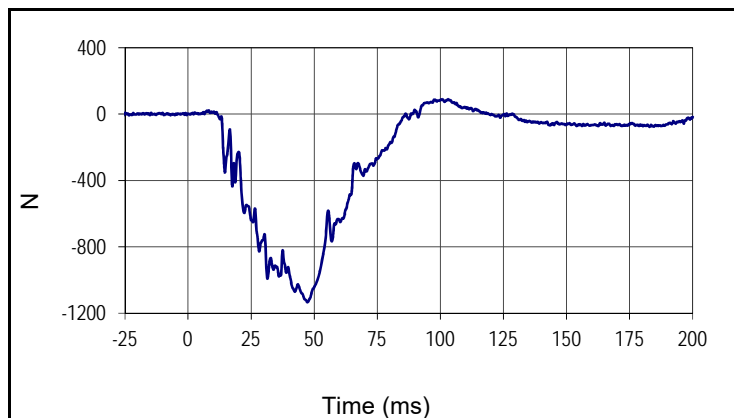
Curve Description			
Driver Posterior Abdominal Force Y			
Plot No.		SAE Class	Units
011		600	N
Max	Time	Min	Time
254.6	42.9	-9.9	162.5



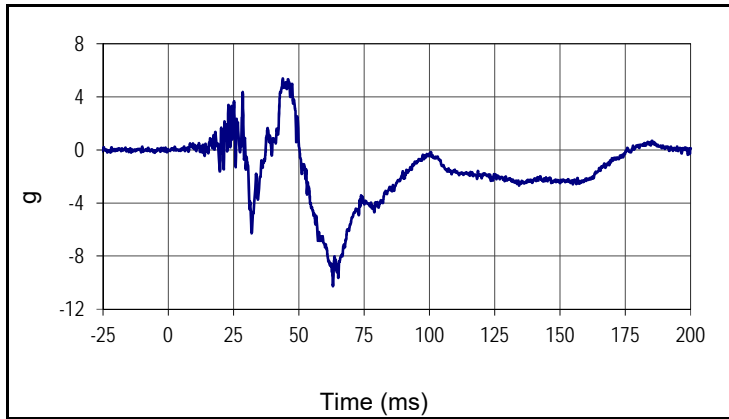
Curve Description			
Driver Total Abdominal Force			
Plot No.		SAE Class	Units
012		600	N
Max	Time	Min	Time
488.5	31.8	-34.5	162.6

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

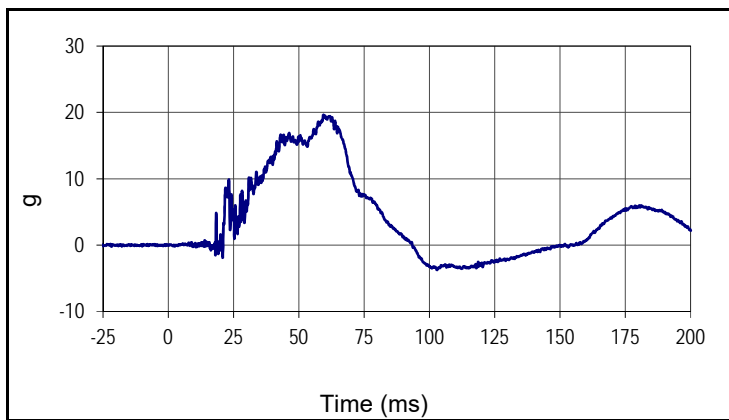
NHTSA No.: M20195205  
 Test Date: 10/30/2018



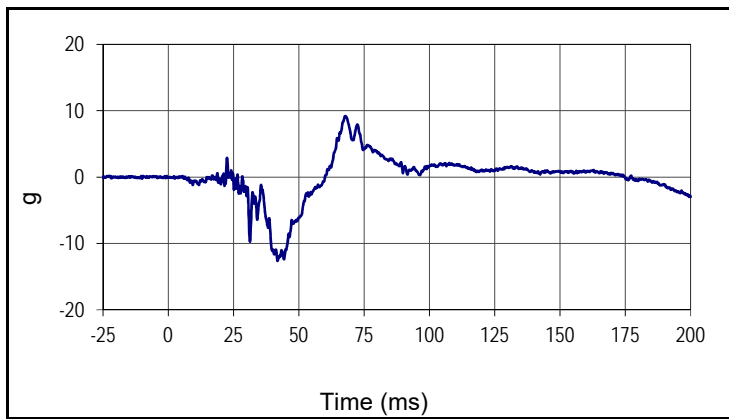
Curve Description			
Driver Pubic Symphysis Force Y			
Plot No.		SAE Class	Units
013		600	N
Max	Time	Min	Time
89.2	103.1	-1134.2	47.2



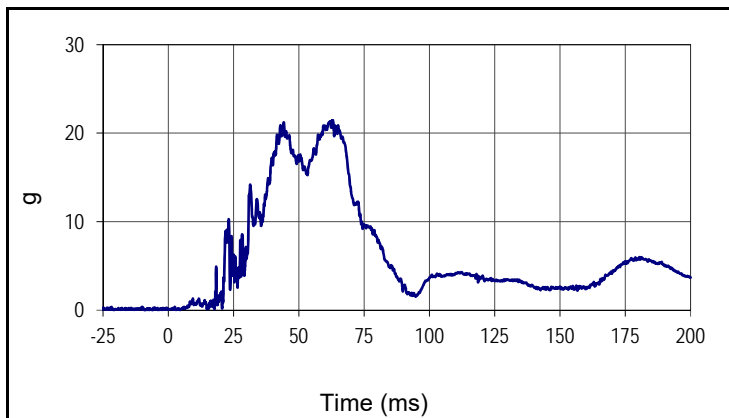
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
014		1000	g
Max	Time	Min	Time
5.4	43.8	-10.3	63.0



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
015		1000	g
Max	Time	Min	Time
19.6	59.4	-3.8	102.9



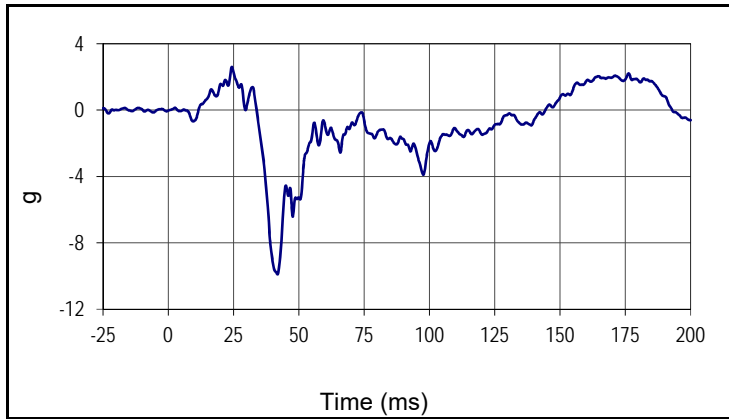
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
9.2	67.8	-12.6	41.8



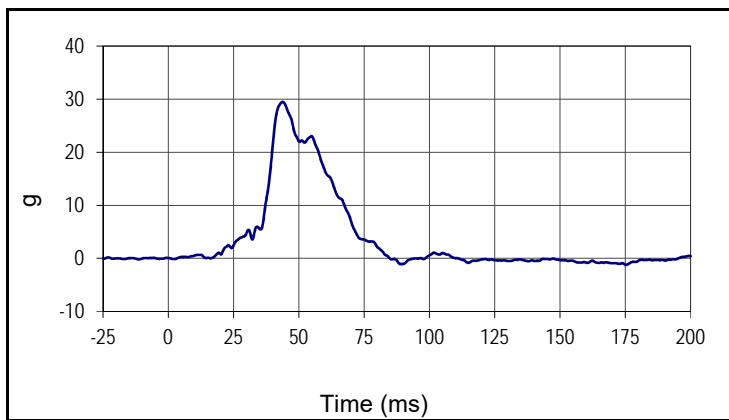
Curve Description			
Passenger Head Acceleration Resultant Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
21.5	63.0	0.0	4.5

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

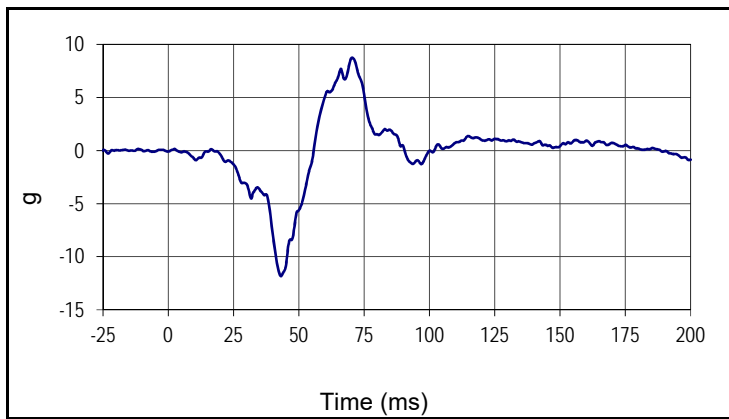
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 Test Date: 10/30/2018



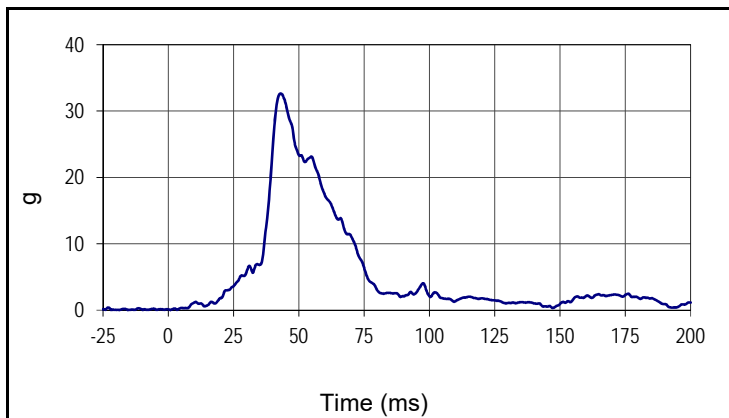
Curve Description			
Passenger Lower Spine T12 Acceleration X			
Plot No.		SAE Class	Units
018		180	g
Max	Time	Min	Time
2.6	24.3	-9.9	41.8



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
Plot No.		SAE Class	Units
019		180	g
Max	Time	Min	Time
29.5	43.8	-1.3	175.2



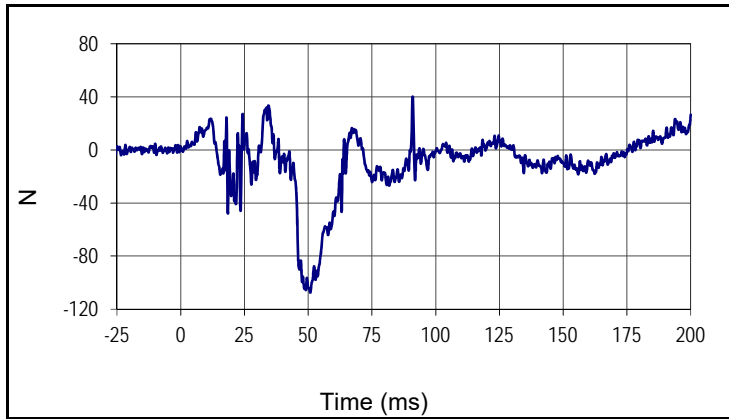
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
Plot No.		SAE Class	Units
020		180	g
Max	Time	Min	Time
8.7	70.4	-11.8	43.1



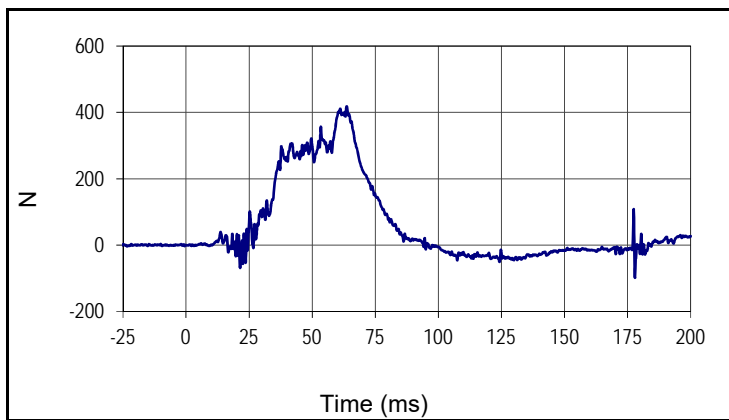
Curve Description			
Passenger Lower Spine T12 Acceleration Resultant			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
32.6	43.0	0.0	0.8

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

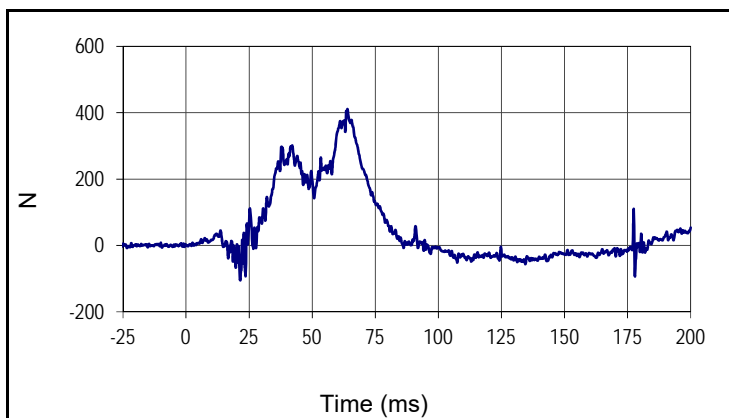
NHTSA No.: M20195205  
 Test Date: 10/30/2018



Curve Description			
Passenger Iliac Wing Impact Side Force Y			
Plot No.		SAE Class	Units
022		600	N
Max	Time	Min	Time
40.0	91.0	-107.6	50.8



Curve Description			
Passenger Acetabulum Impact Side Force Y			
Plot No.		SAE Class	Units
023		600	N
Max	Time	Min	Time
417.9	63.7	-98.6	177.9



Curve Description			
Passenger Total Pelvic Force			
Plot No.		SAE Class	Units
024		600	N
Max	Time	Min	Time
411.1	64.0	-104.8	21.5

**APPENDIX C**  
**ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

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



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


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

ATD Serial No.:           F035          

Test Date:           2018-10-13          

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	909	Pass
2 - Seat to Shoulder Joint	mm	558	572	566	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	351	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	100	Pass
5 - Sole to Seat, Sitting	mm	433	451	444	Pass
6 - Head Width	mm	152	158	156	Pass
7 - Shoulder/Arm Width	mm	461	479	470	Pass
8 - Thorax Width	mm	322	332	329	Pass
9 - Abdomen Width	mm	273	287	282	Pass
10 - Pelvis Lap Width	mm	359	373	367	Pass
11 - Head Depth	mm	196	206	202	Pass
12 - Thorax Depth	mm	262	272	269	Pass
13 - Abdomen Depth	mm	194	204	199	Pass
14 - Pelvis Depth	mm	235	245	243	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	152	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	603	Pass
				Overall Test Results	Pass

Technician:                       
 J. Hernandez

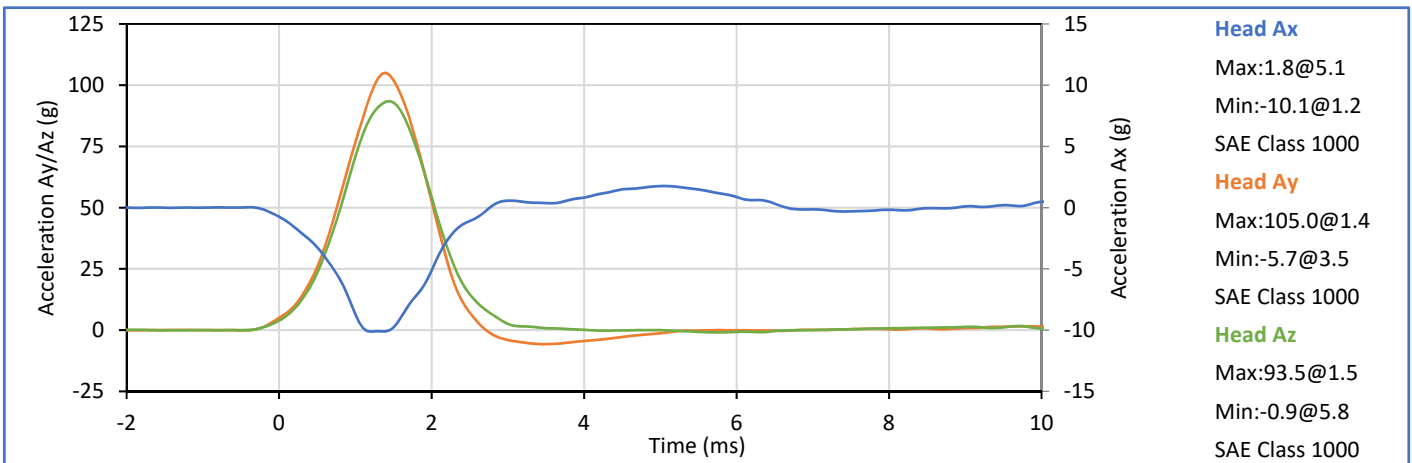
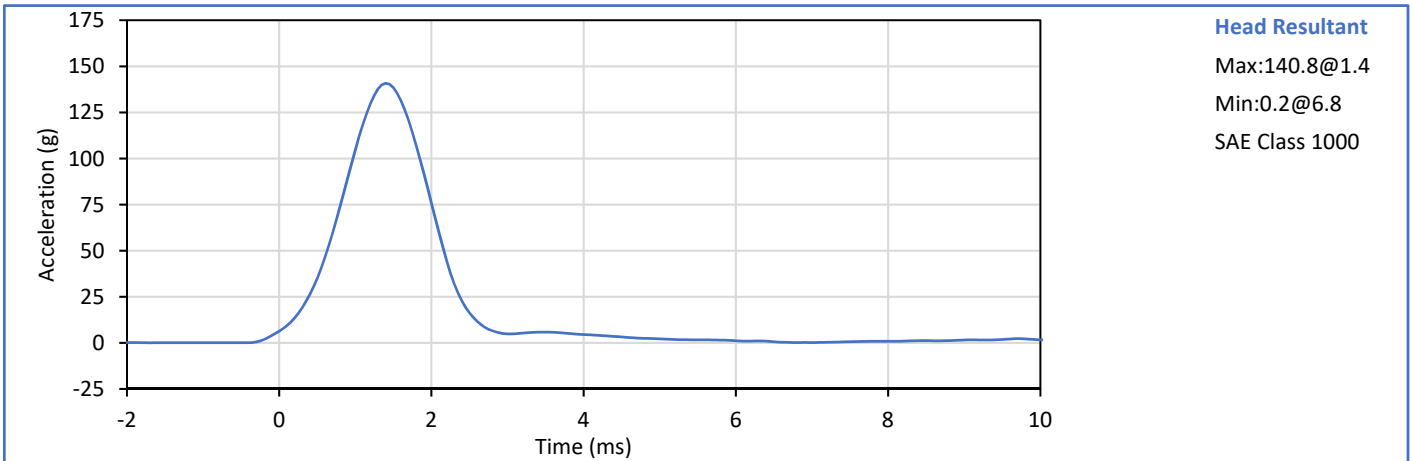
Approved By:                       
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-15

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.9	Pass
Laboratory Humidity	%	10	70	35	Pass
Peak Resultant Acceleration	g	125.0	155.0	140.8	Pass
Peak Head Ax	g	-15.0	15.0	1.8	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

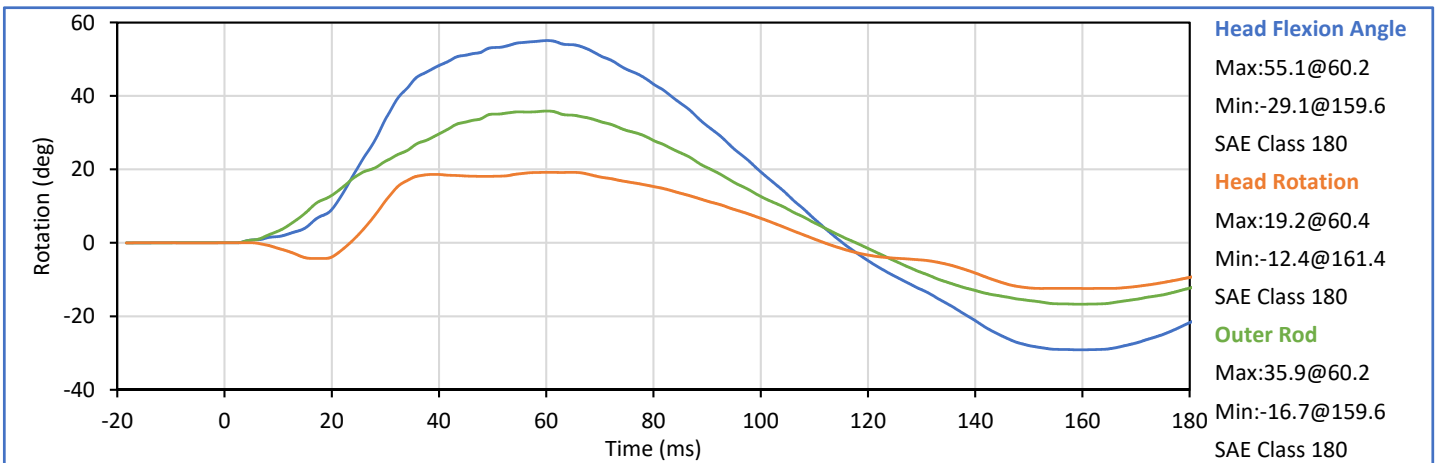
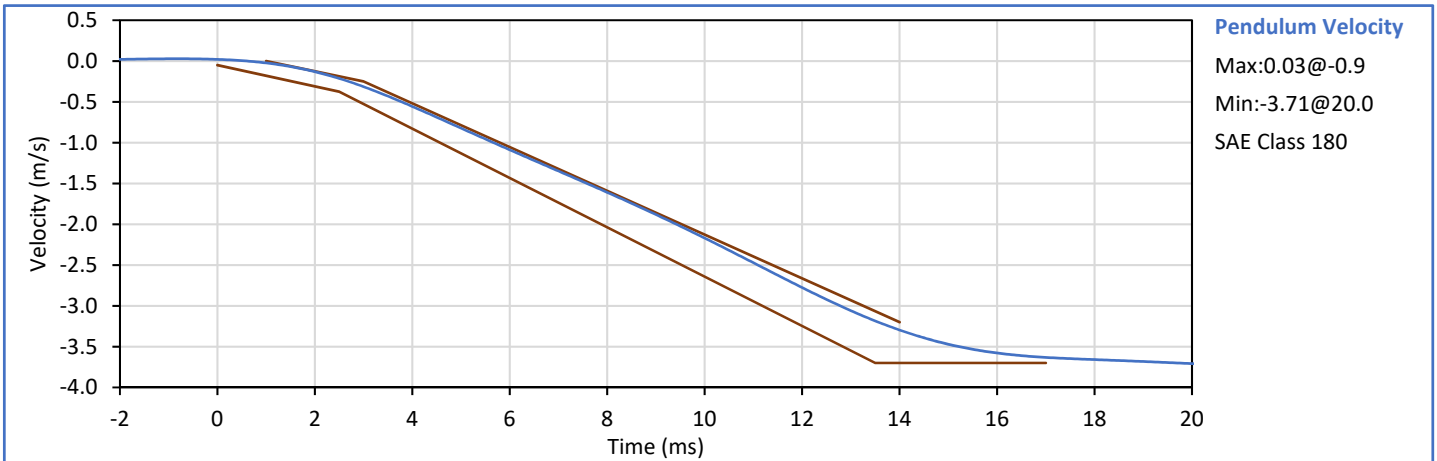
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-16

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	27	Pass
Pendulum Velocity	m/s	3.30	3.50	3.45	Pass
Peak Headform Flexion	deg	49.0	59.0	55.1	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	60.2	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	55.1	Pass
				Overall Test Results	Pass



Technician:   
 J. Hernandez

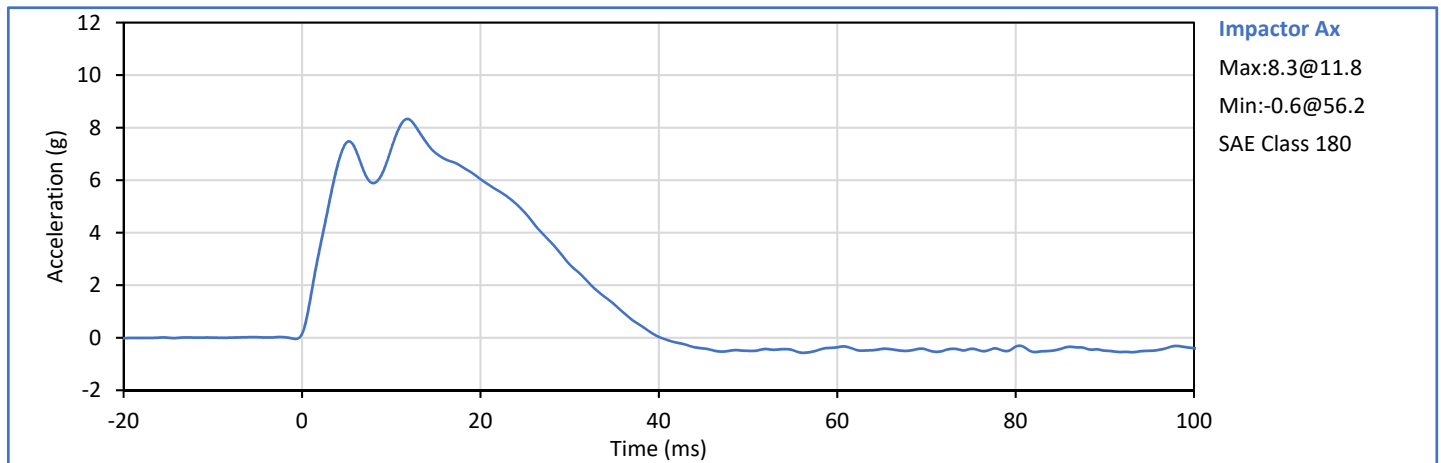
Approved By:   
 P. Puzzuto



ATD Serial No.:           F035          

Test Date:           2018-10-13          

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	41	Pass
Impactor Velocity	m/s	4.20	4.40	4.24	Pass
Peak Impactor Ax	g	7.5	10.5	8.3	Pass
Overall Test Results					Pass



Technician:           *J. Hernandez*            
J. Hernandez

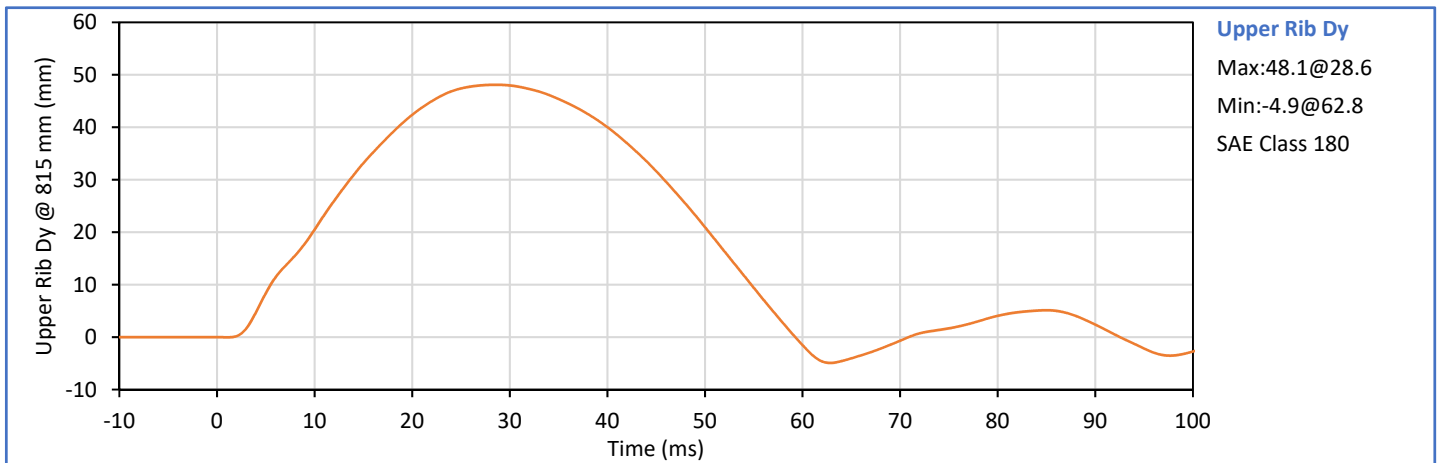
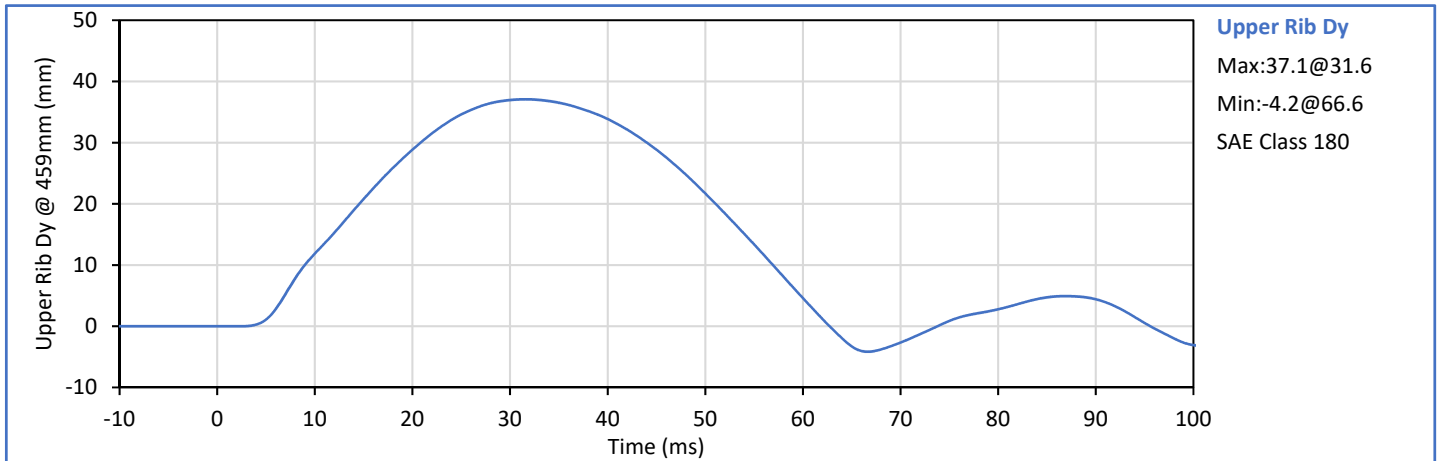
Approved By:           *P. Puzzuto*            
P. Puzzuto



ATD Serial No.:           F035          

Test Date:           2018-10-15          

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.7	Pass
Laboratory Humidity	%	10	70	35	Pass
Upper Rib Dy @ 459mm	mm	36.0	40.0	37.1	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	48.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:           *J. Hernandez*            
 J. Hernandez

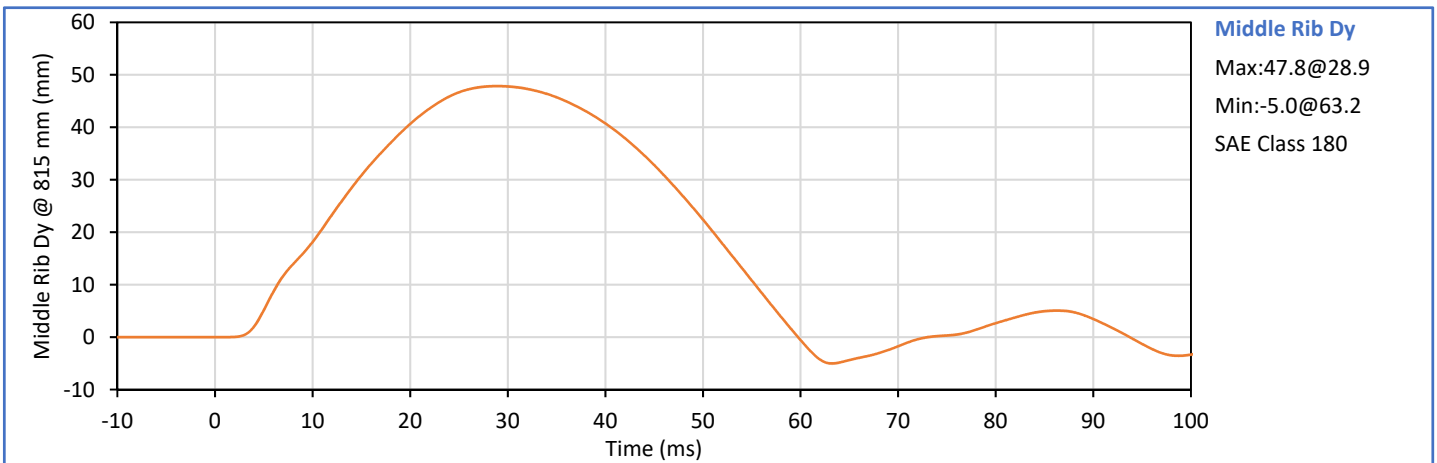
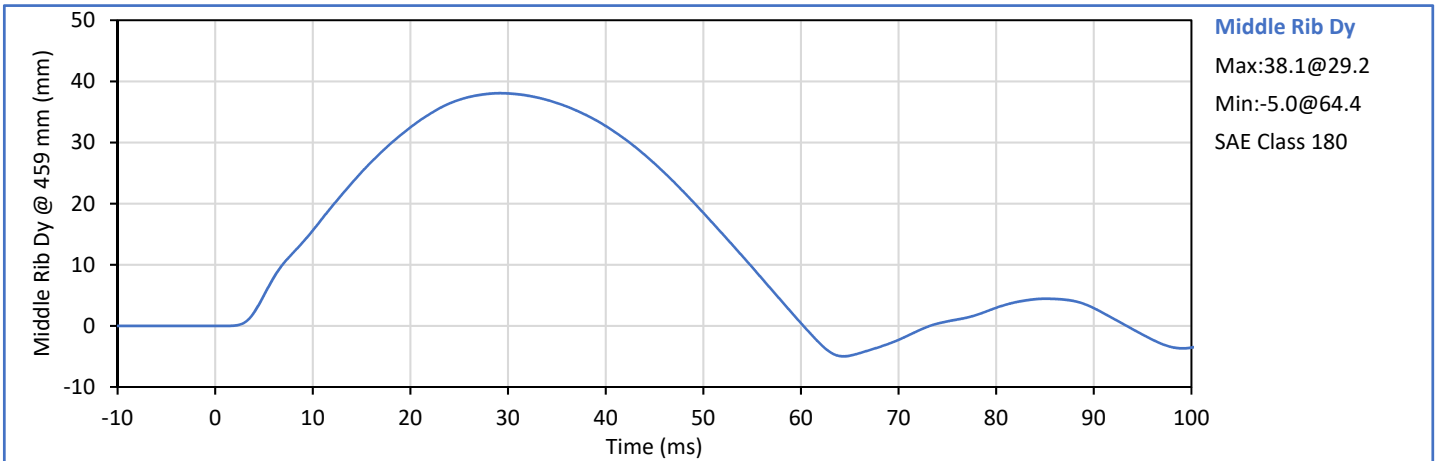
Approved By:           *P. Puzzuto*            
 P. Puzzuto



ATD Serial No.:           F035          

Test Date:           2018-10-15          

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.7	Pass
Laboratory Humidity	%	10	70	35	Pass
Middle Rib Dy @ 459mm	mm	36.0	40.0	38.1	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	47.8	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:           *J. Hernandez*            
 J. Hernandez

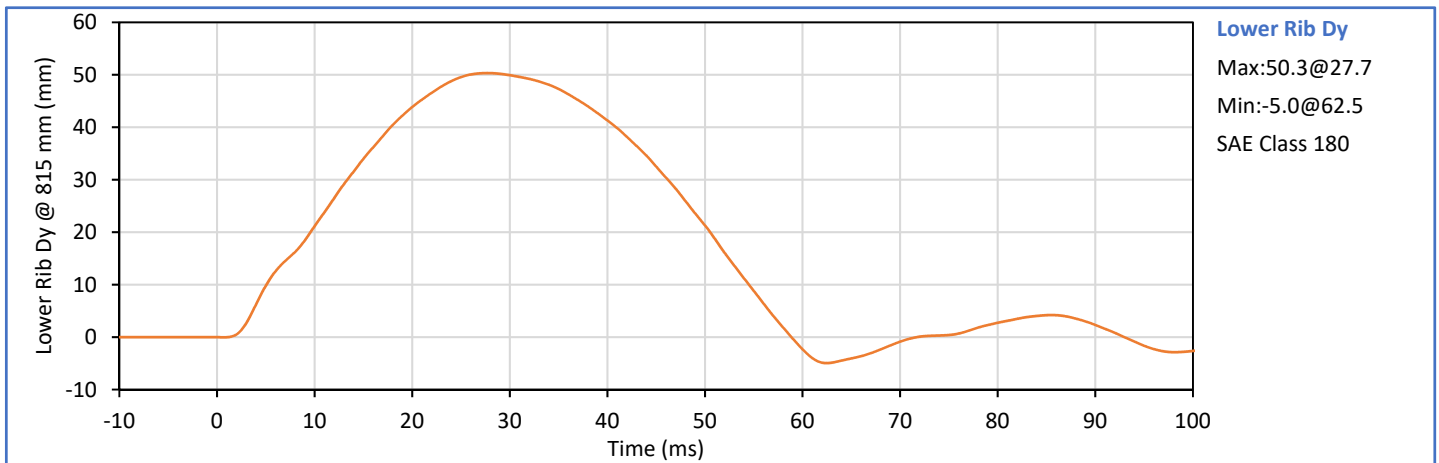
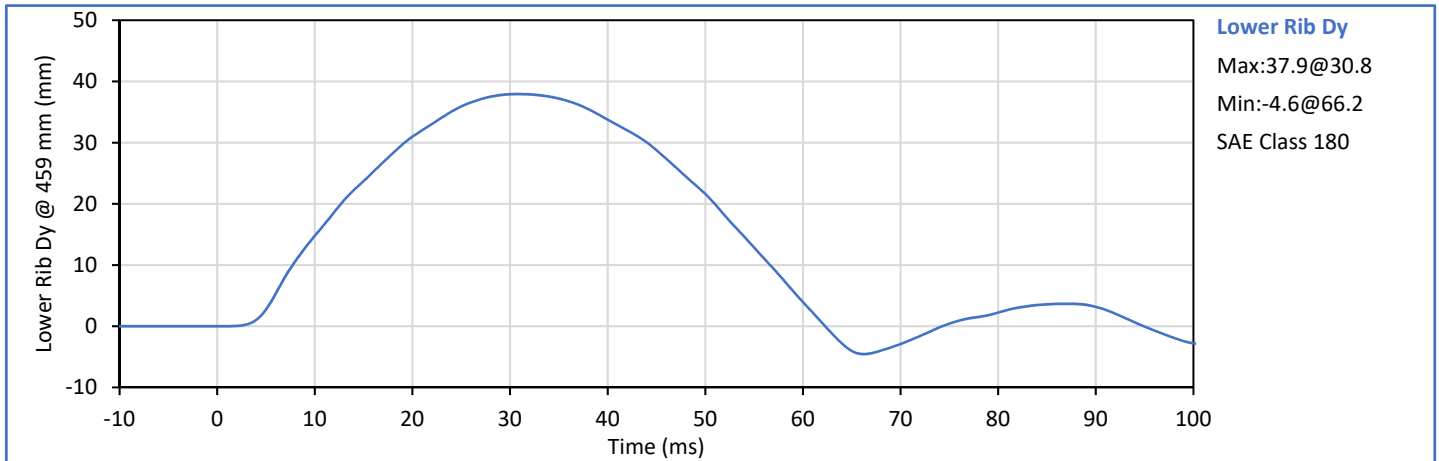
Approved By:           *P. Puzzuto*            
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-15

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	35	Pass
Lower Rib Dy @ 459mm	mm	36.0	40.0	37.9	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	50.3	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*  
 J. Hernandez

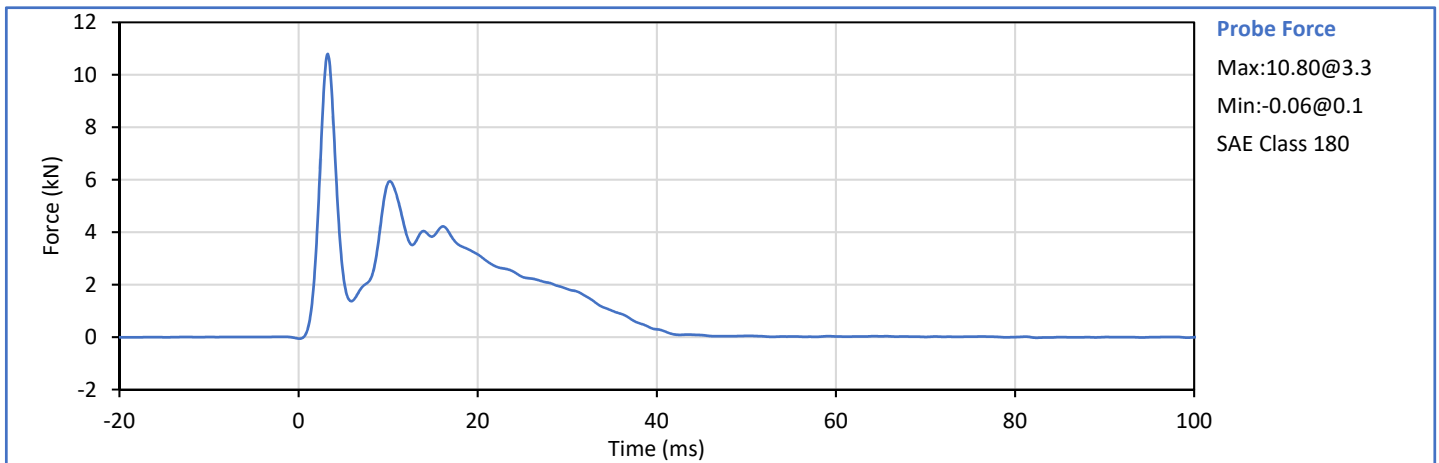
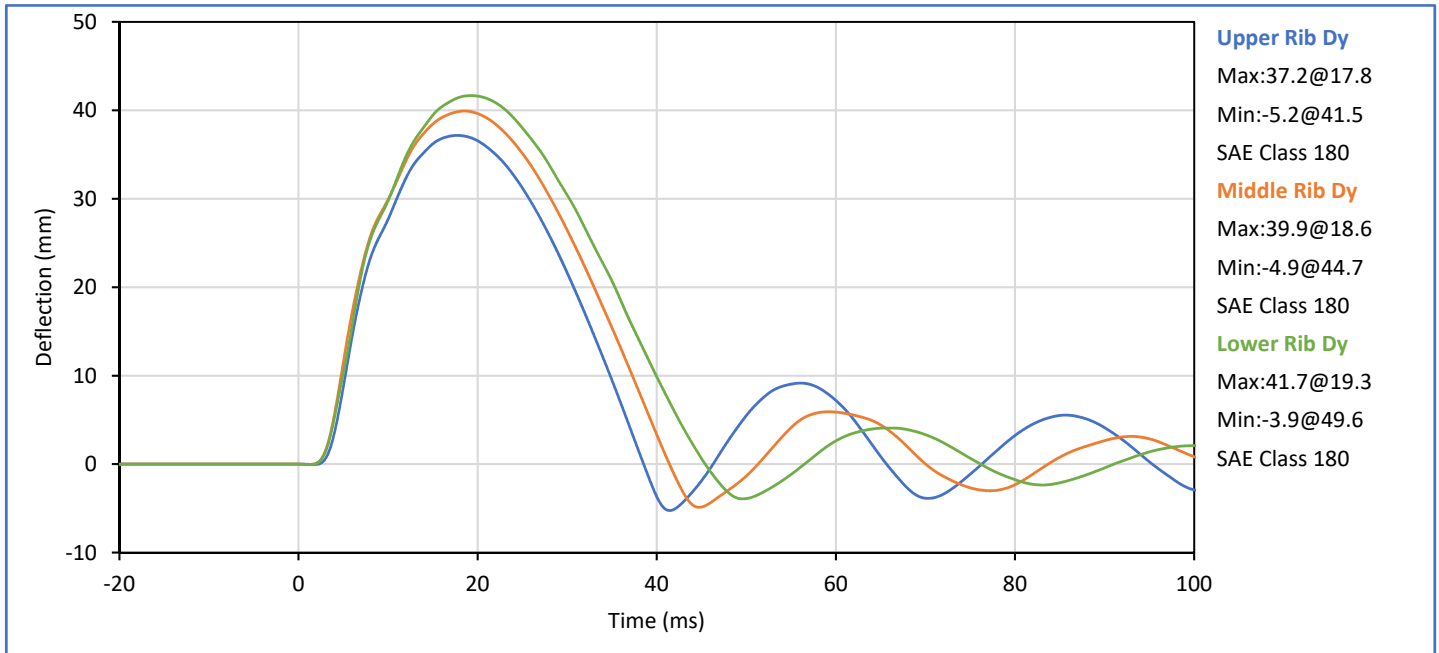
Approved By: *P. Puzzuto*  
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	41	Pass
Impactor Velocity	m/s	5.40	5.60	5.56	Pass
Peak Upper Rib Dy	mm	34.0	41.0	37.2	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.9	Pass
Peak Lower Rib Dy	mm	37.0	44.0	41.7	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	5.94	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician: *J. Hernandez*  
 J. Hernandez

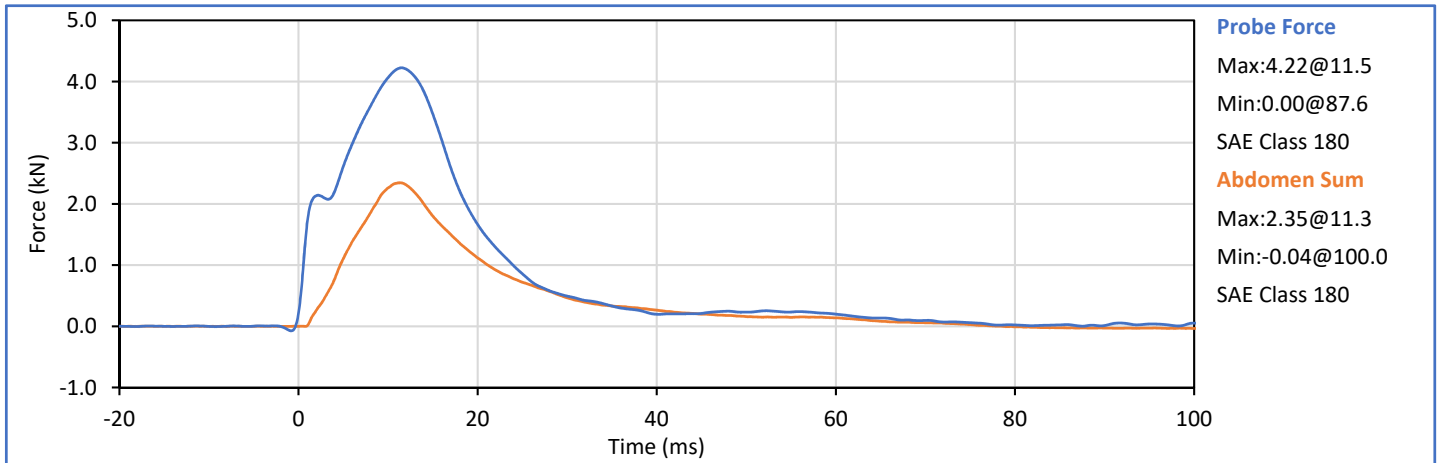
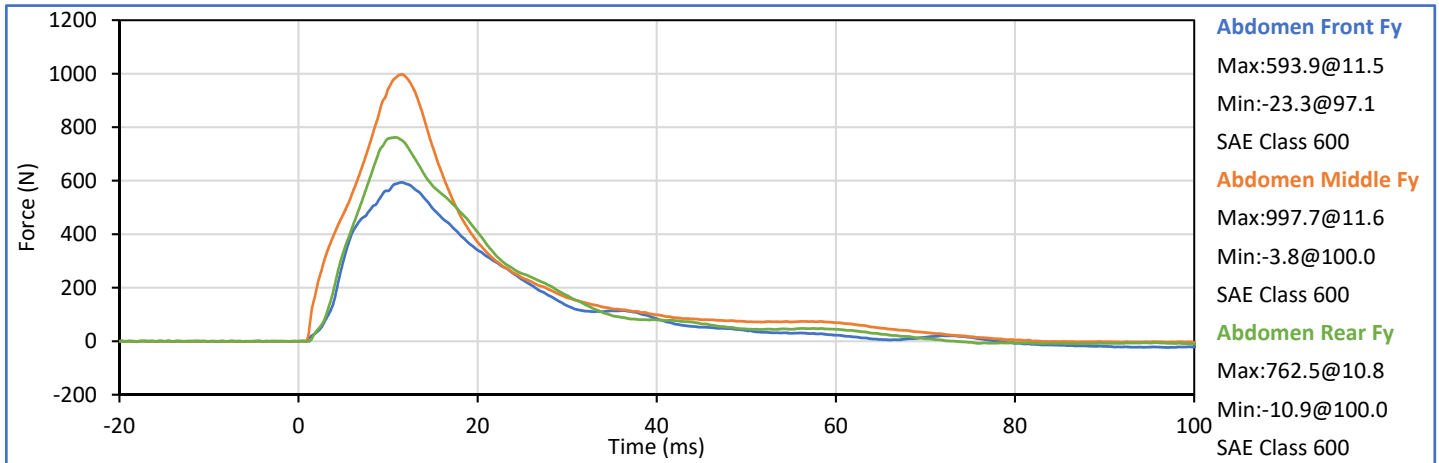
Approved By: *P. Puzzuto*  
 P. Puzzuto




ATD Serial No.: F035

Test Date: 2018-10-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	41	Pass
Impactor Velocity	m/s	3.90	4.10	4.08	Pass
Peak Impactor Force	kN	4.00	4.80	4.22	Pass
Time of Peak Impactor Force	ms	10.6	13.0	11.5	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.35	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	11.3	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

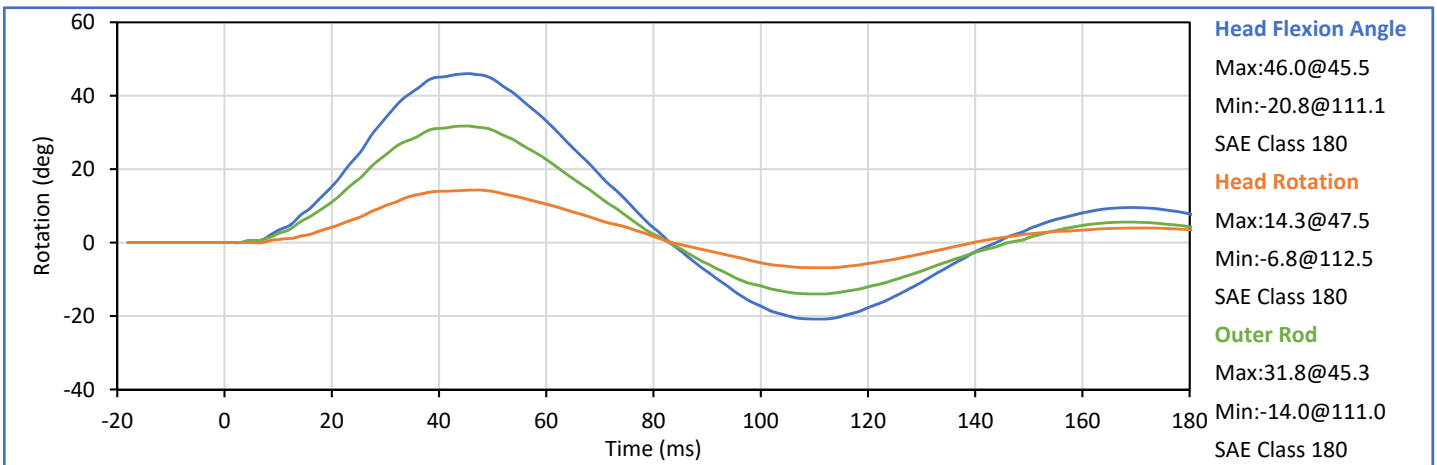
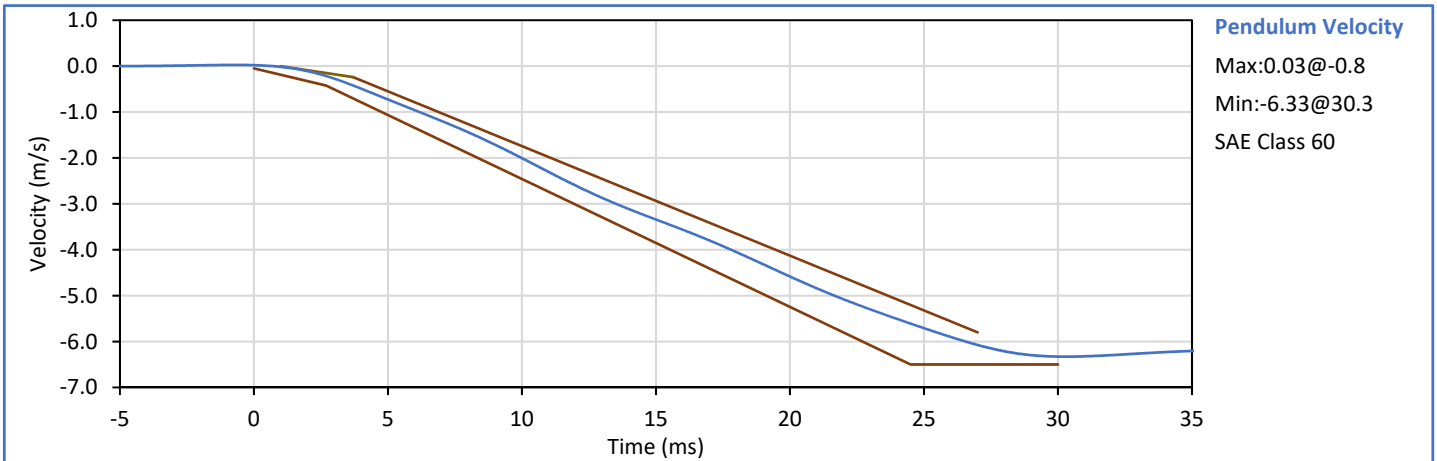
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-16

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.7	Pass
Laboratory Humidity	%	10	70	35	Pass
Pendulum Velocity	m/s	5.95	6.15	6.15	Pass
Peak Headform Flexion	deg	45.0	55.0	46.0	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	45.5	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	37.7	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*  
 J. Hernandez

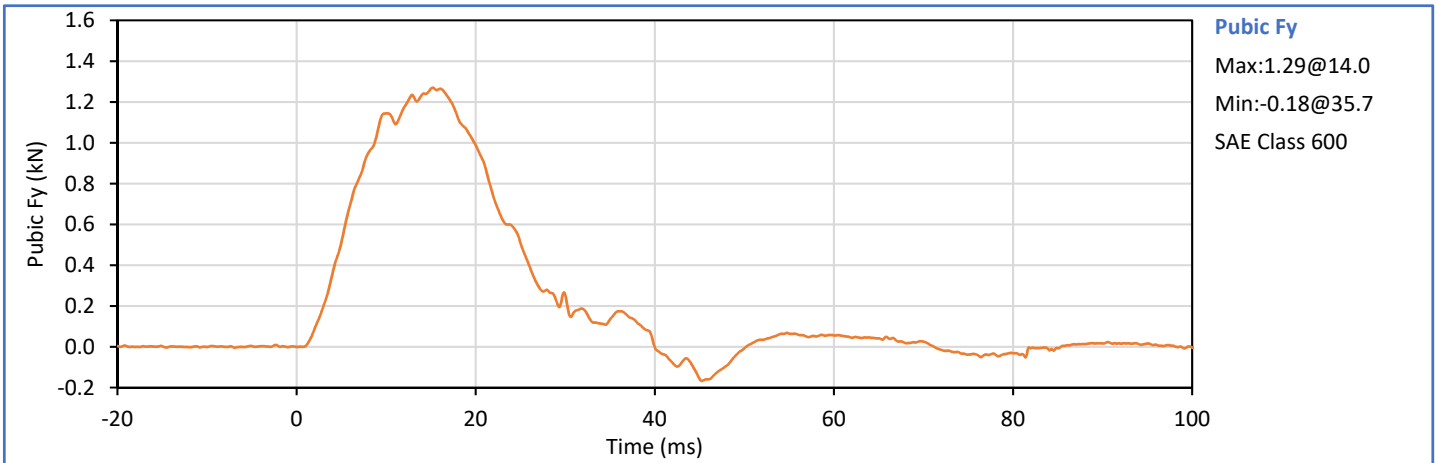
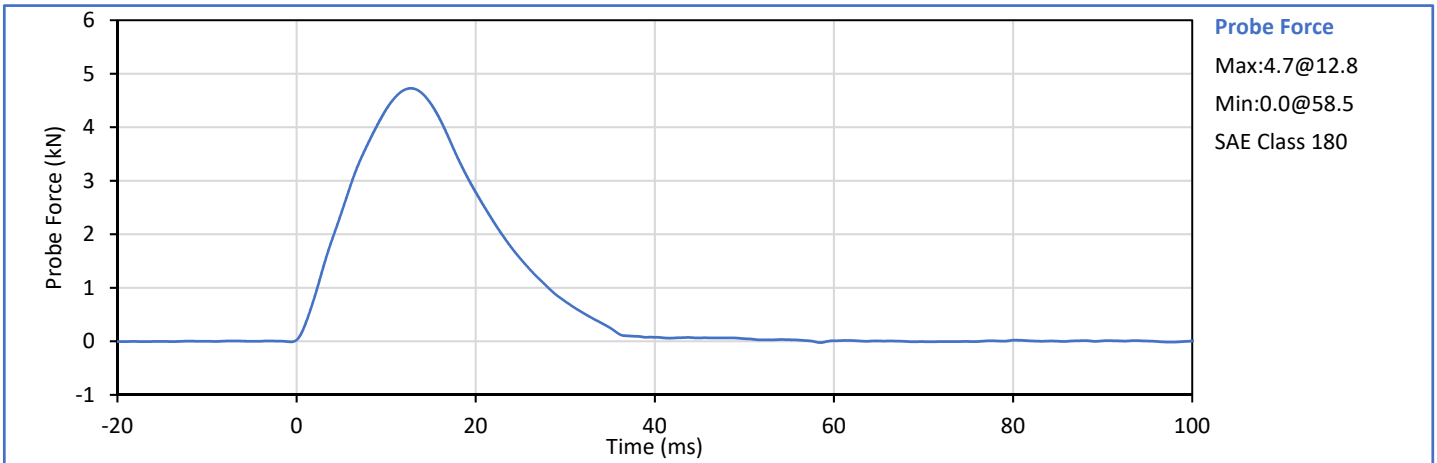
Approved By: *P. Puzzuto*  
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	41	Pass
Impactor Velocity	m/s	4.20	4.40	4.38	Pass
Peak Impactor Force	kN	4.70	5.40	4.73	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.8	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.27	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	15.2	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

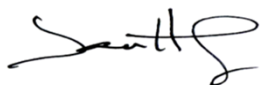



**SID-IIs Small Side Impact ATD  
 External Measurements**

ATD Serial No.: 308

Test Date: 2018-10-12

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	35	Pass
A - Sitting Height	mm	772	788	777	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	87	Pass
D - H Point From Seatback	mm	141	151	144	Pass
E - Shoulder Pivot From Backline	mm	97	107	101	Pass
F - Thigh Clearance	mm	119	135	122	Pass
G - Head Breadth	mm	140	148	143	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	183	Pass
J - Head Circumference	mm	541	551	543	Pass
K - Buttock To Knee Length	mm	514	540	529	Pass
L - Popliteal Height	mm	343	369	354	Pass
K - Knee Pivot To Floor Height	mm	392	409	400	Pass
N - Buttock Popliteal Length	mm	416	442	432	Pass
O - Chest Depth W/O Jacket	mm	195	211	204	Pass
P - Foot Length	mm	216	232	221	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	257	Pass
S - Knee Joint To Seatback	mm	477	493	490	Pass
V - Shoulder Width	mm	341	357	353	Pass
W - Foot Width	mm	78	94	86	Pass
Y - Chest Circumference W/Jacket	mm	851	881	865	Pass
Z - Waist Circumference	mm	761	791	774	Pass
<b>Overall Test Results</b>					<b>Pass</b>

Technician:   
 J. Hernandez

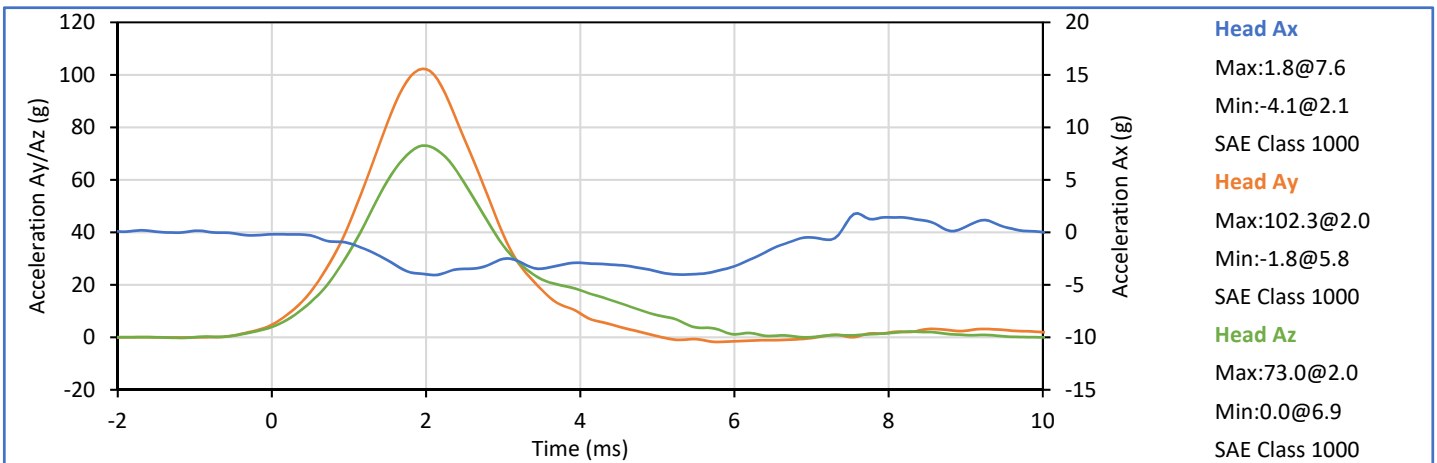
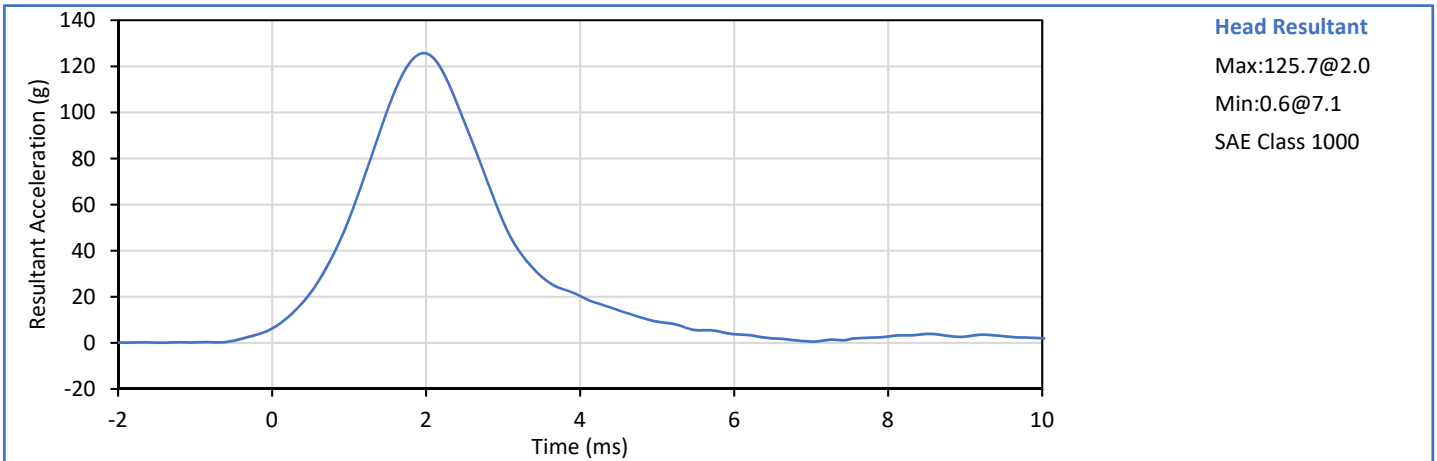
Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.8	Pass
Laboratory Humidity	%	10	70	35	Pass
Peak Resultant Acceleration	g	115.0	137.0	125.7	Pass
Peak Head Ax	g	-15.0	15.0	-4.1	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician: *J. Hernandez*  
 J. Hernandez

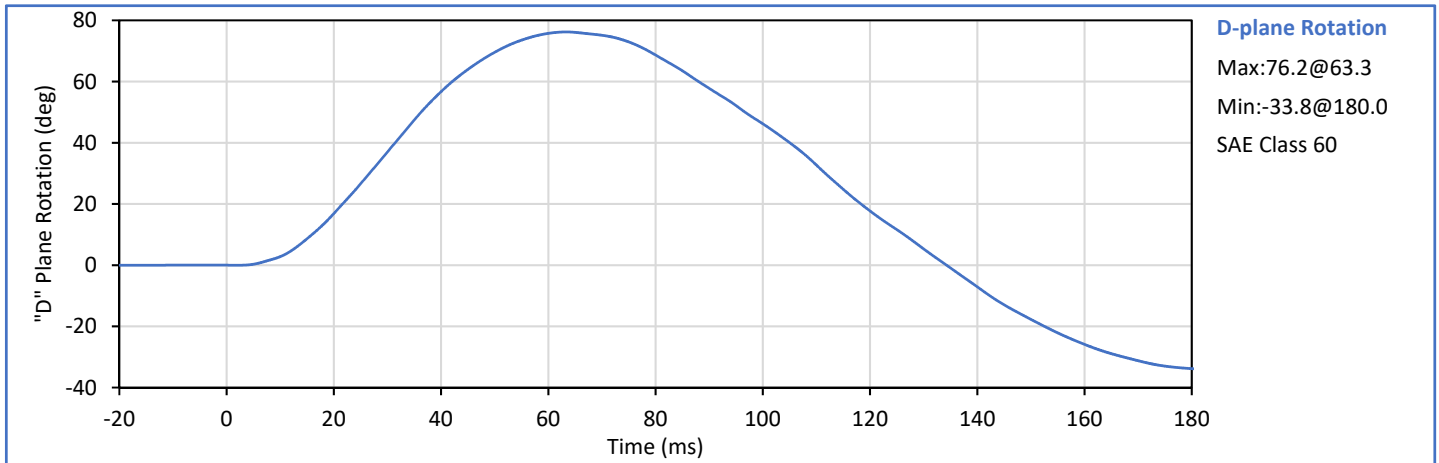
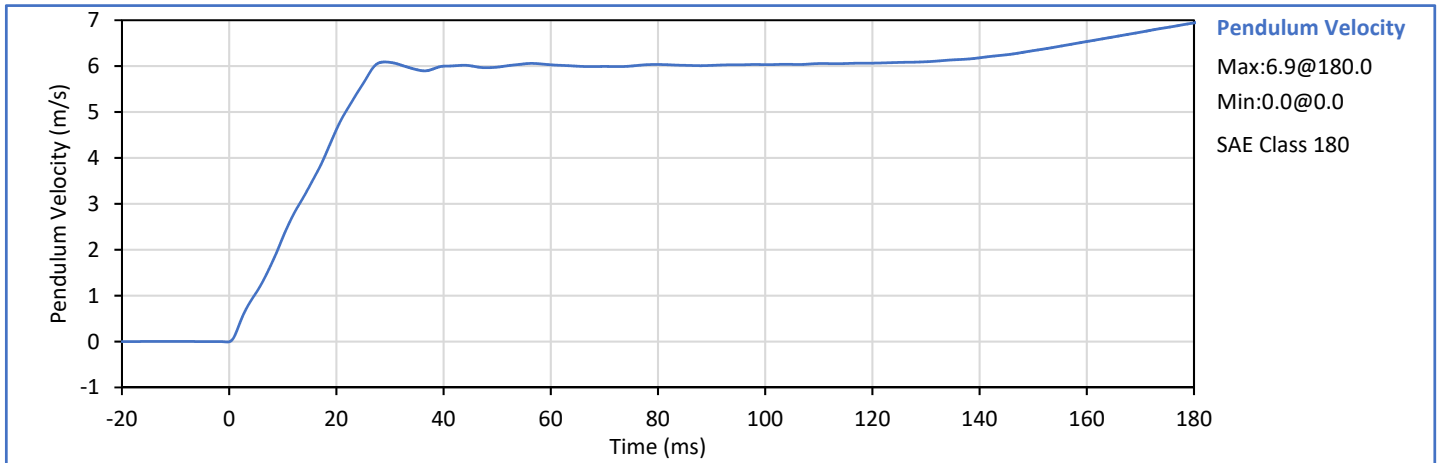
Approved By: *P. Puzzuto*  
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	36	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	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	3.39	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.62	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.62	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	6.09	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	76.2	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	63.3	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-40.1	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	118.4	Pass
<b>Overall Test Results</b>					<b>Pass</b>



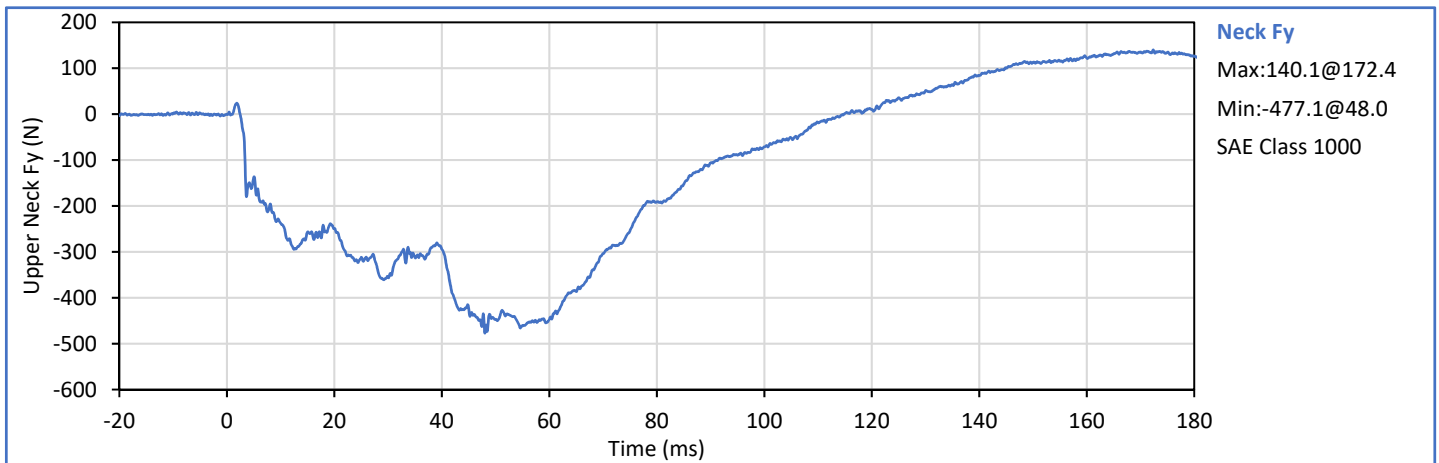
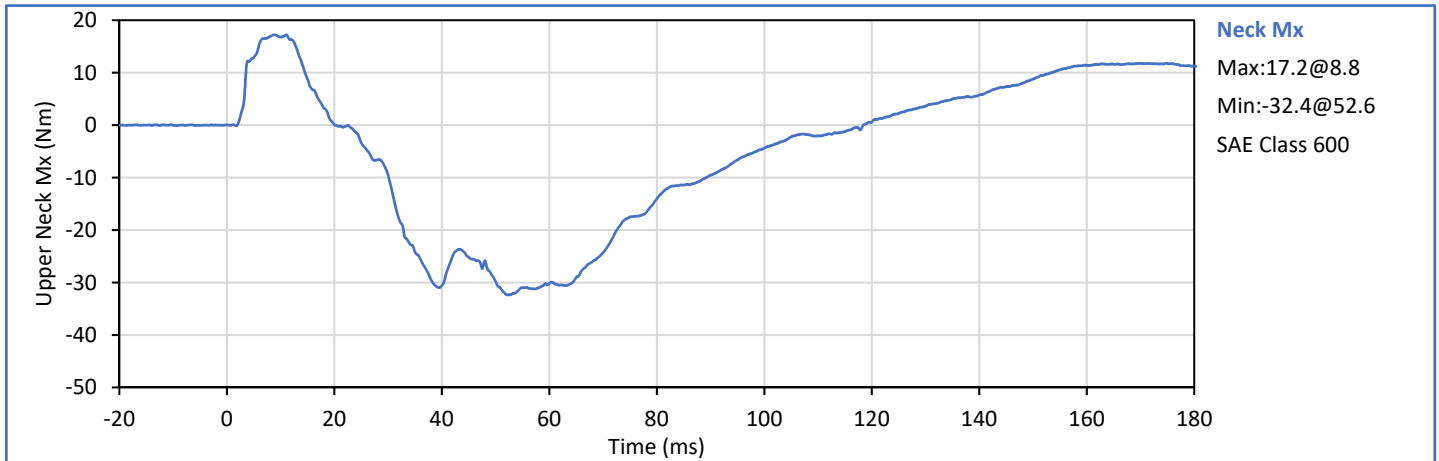
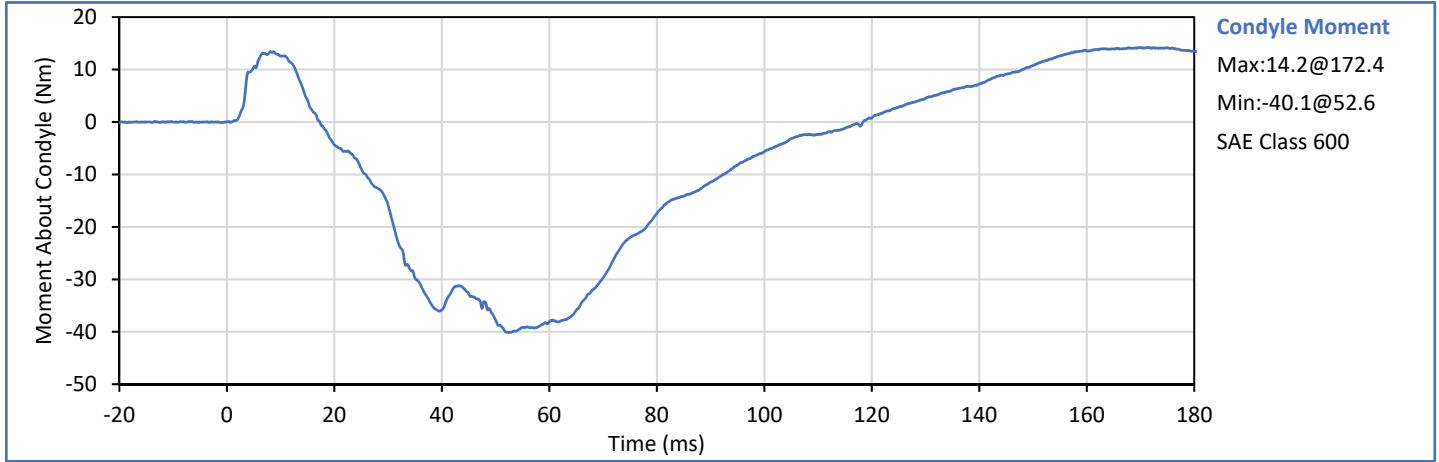
Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-10-12

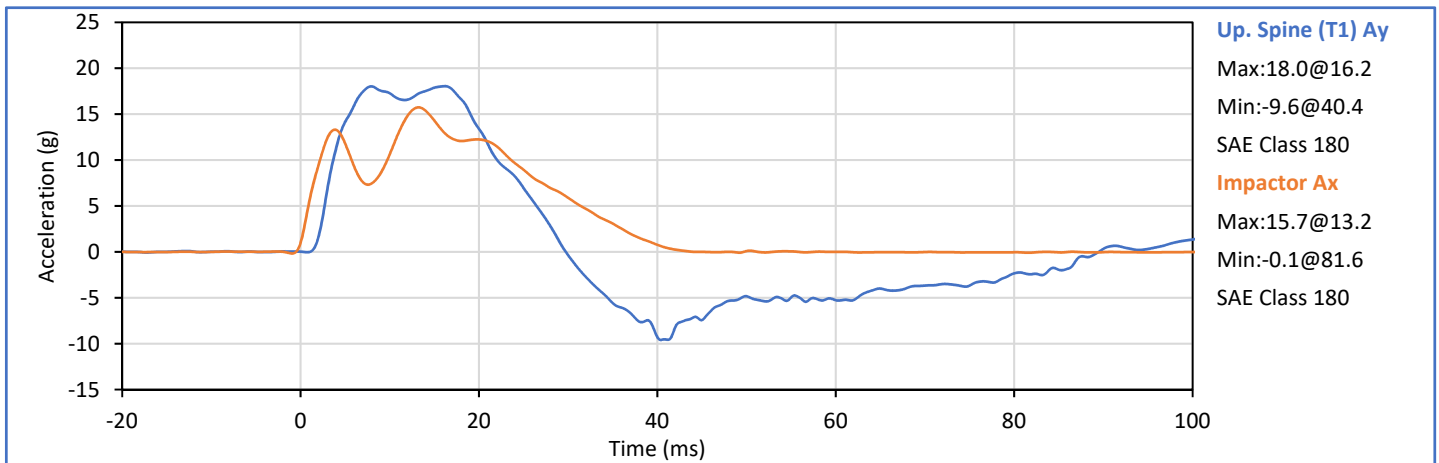
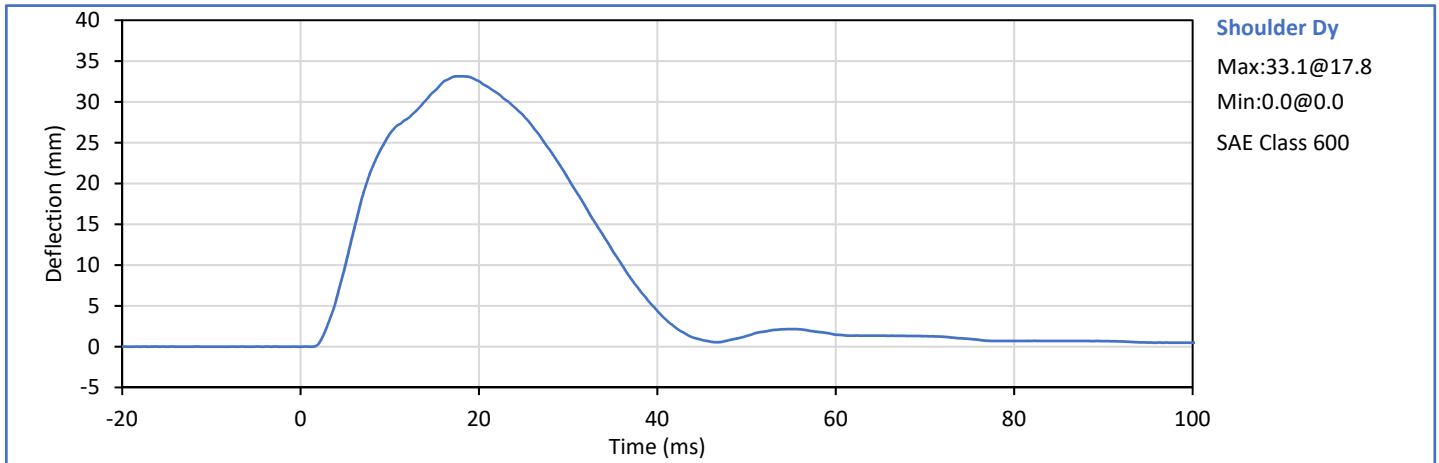




ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Shoulder Dy	mm	28.0	37.0	33.1	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.0	Pass
Peak Impactor Ax	g	13.0	18.0	15.7	Pass
Overall Test Results					Pass



Technician:   
 J. Hernandez

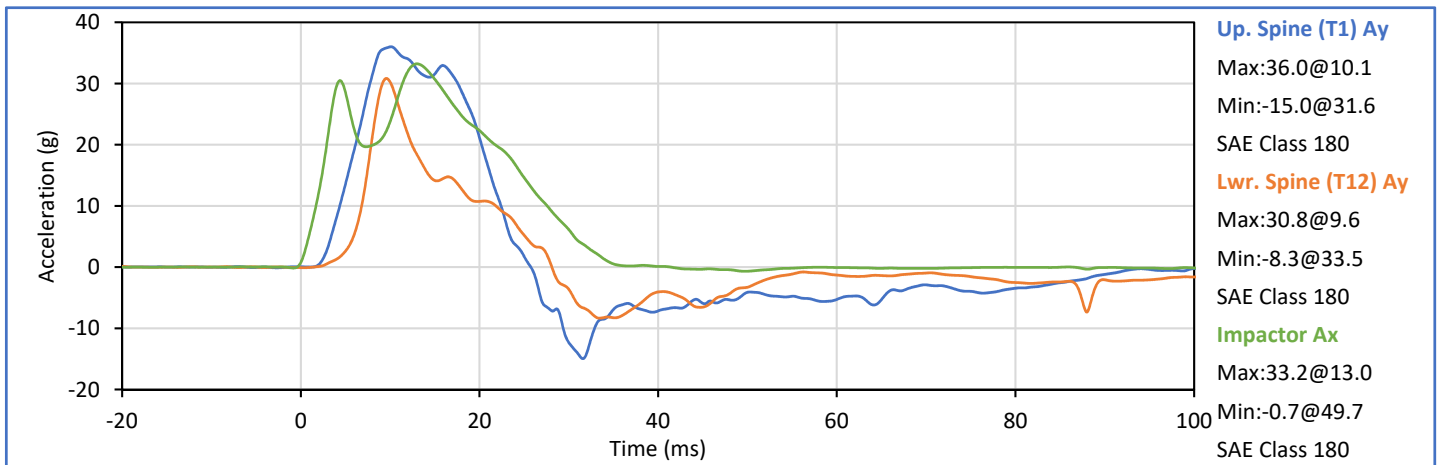
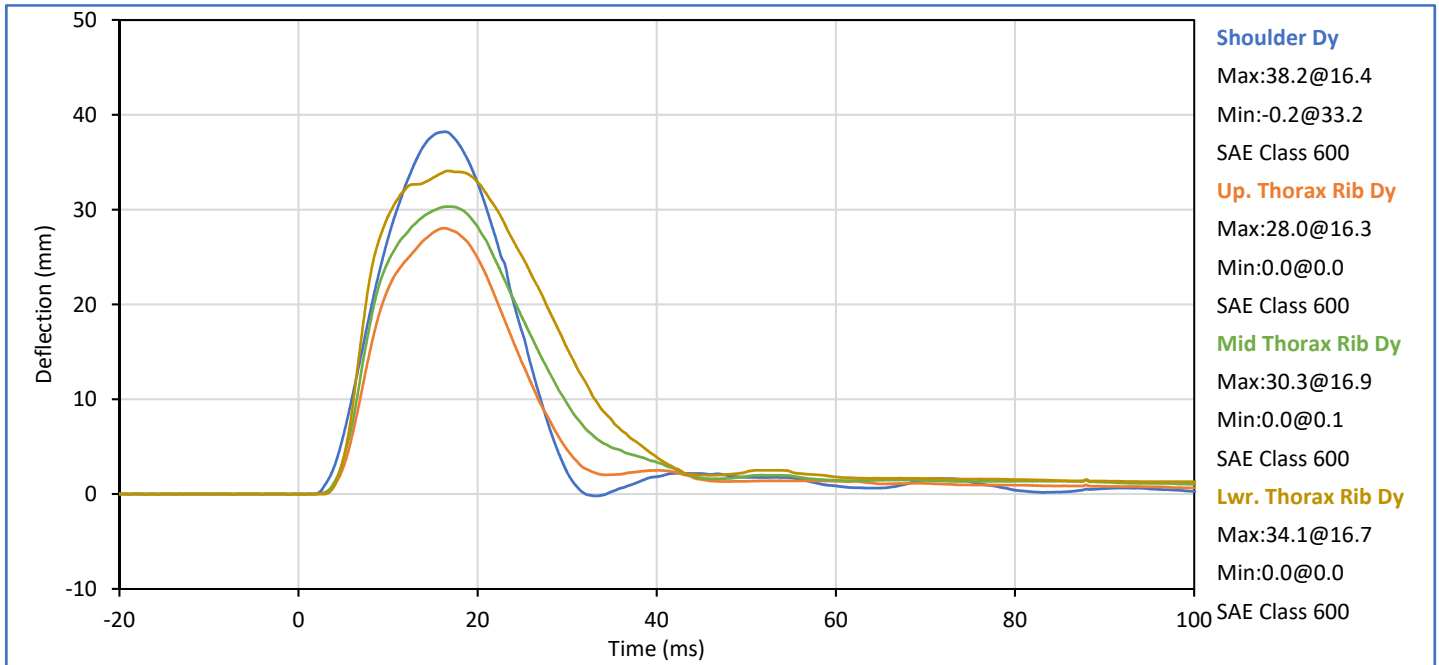
Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	6.60	6.80	6.67	Pass
Peak Shoulder Dy	mm	31.0	40.0	38.2	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	30.3	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.1	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.0	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	30.8	Pass
Peak Impactor Ax	g	30.0	36.0	33.2	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

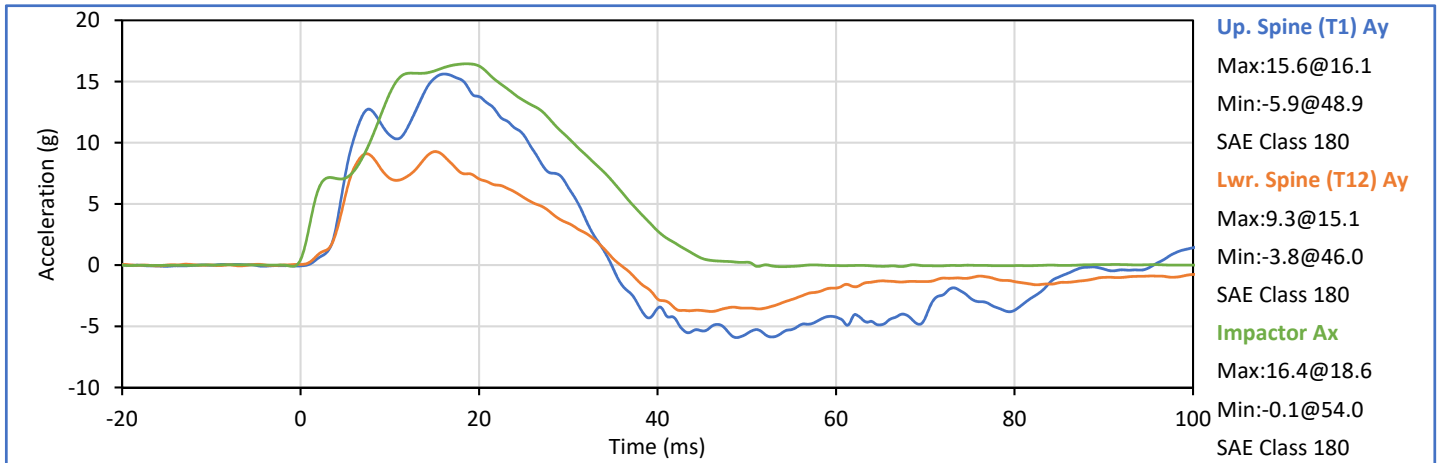
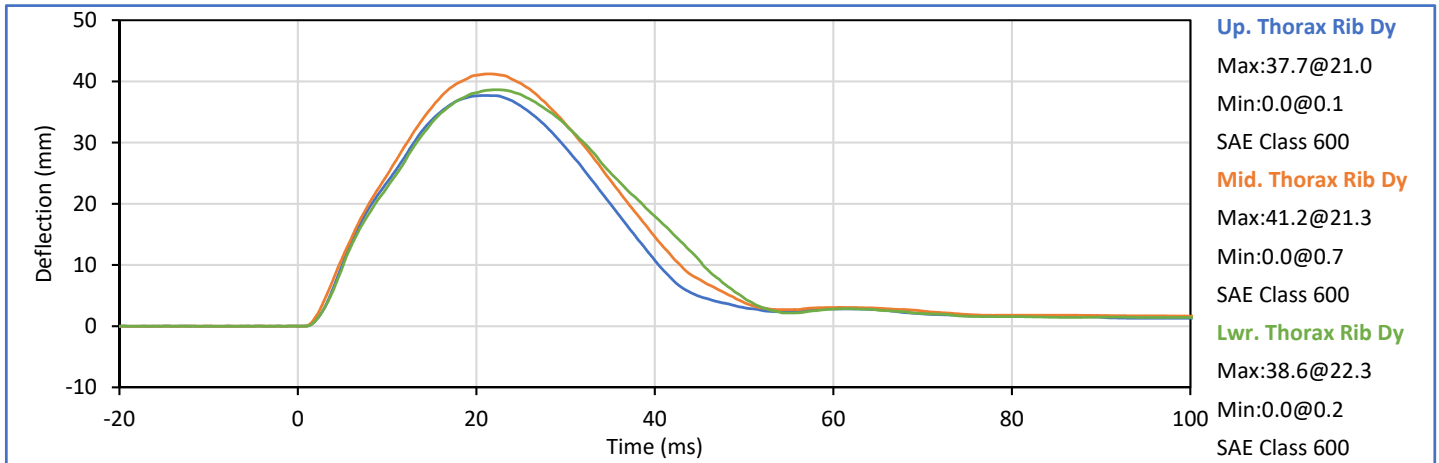
Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.8	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	4.20	4.40	4.30	Pass
Peak Upper Rib Dy	mm	32.0	40.0	37.7	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.2	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.6	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	15.6	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.3	Pass
Peak Impactor Ax	g	14.0	18.0	16.4	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

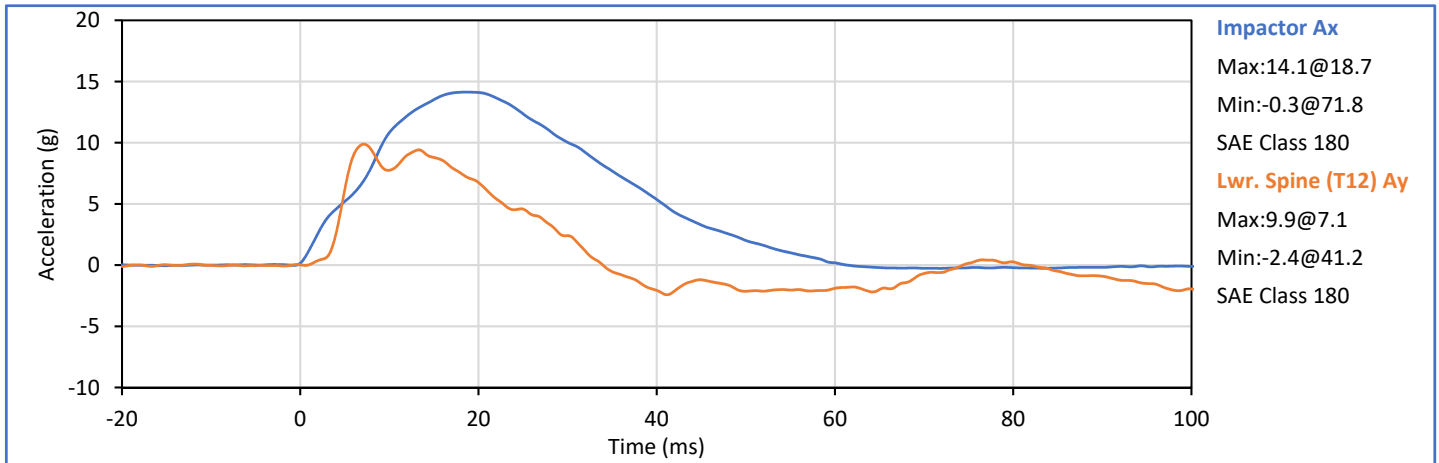
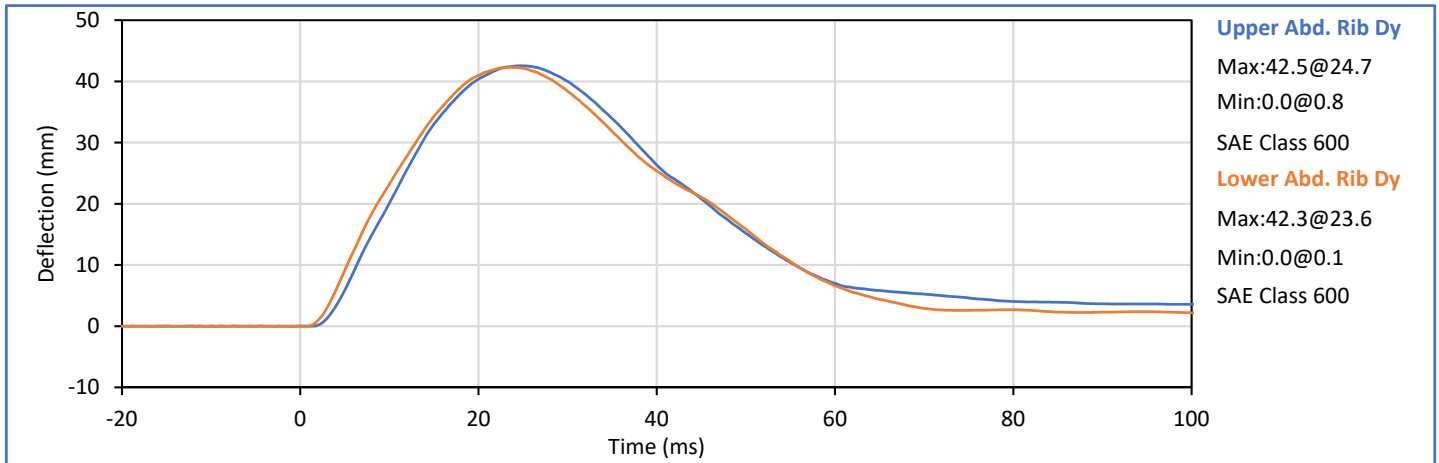
Approved By:   
 P. Puzzuto

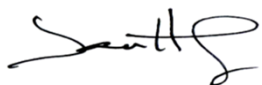



ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.7	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.5	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	42.3	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	9.9	Pass
Peak Impactor Ax	g	12.0	16.0	14.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

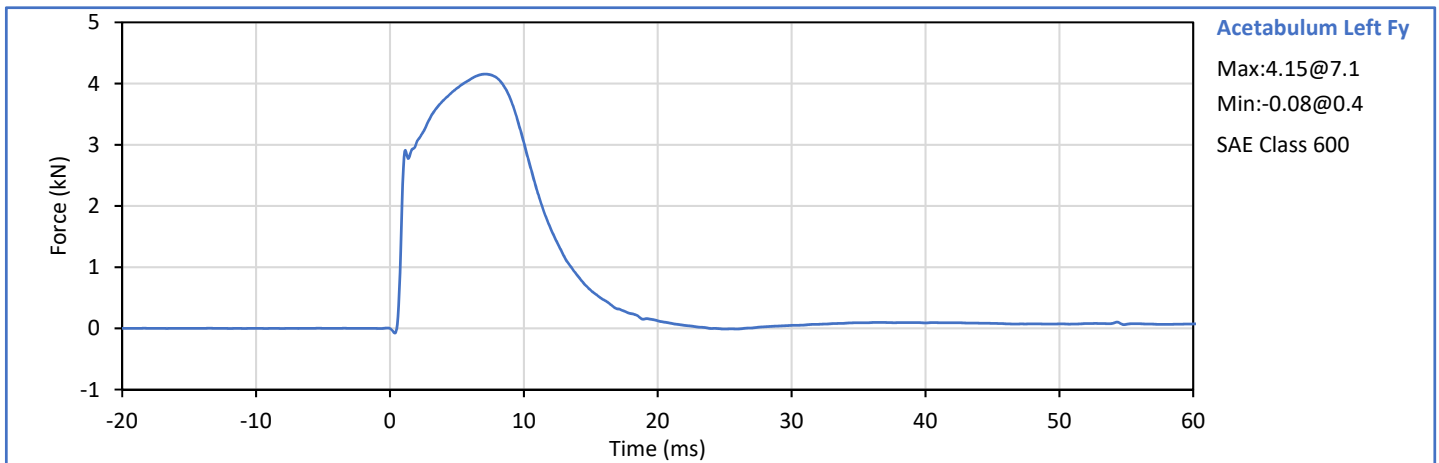
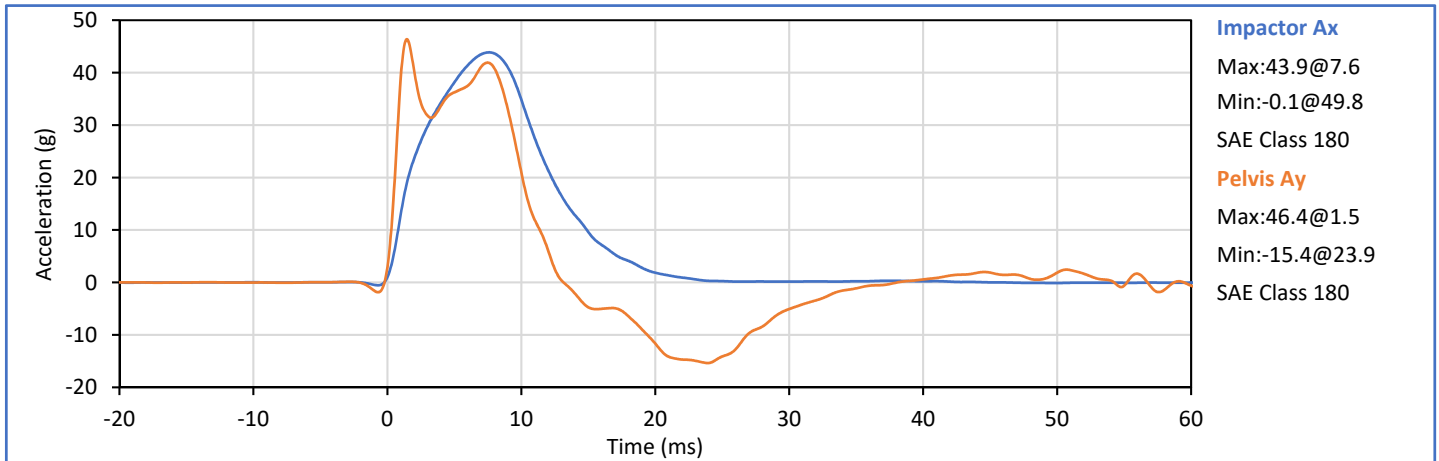


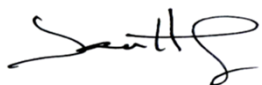
ATD Serial No.: 308


Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.0	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	6.60	6.80	6.61	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.15	Pass
Pelvis Ay after 6ms	g	34.0	42.0	41.9	Pass
Peak Impactor Ax	g	38.0	47.0	43.9	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12246 (SACO)



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-10-12

Pelvis Plug S/N: 12246 (SACO)



**SID-IIs Pelvis Plug Certification Test**

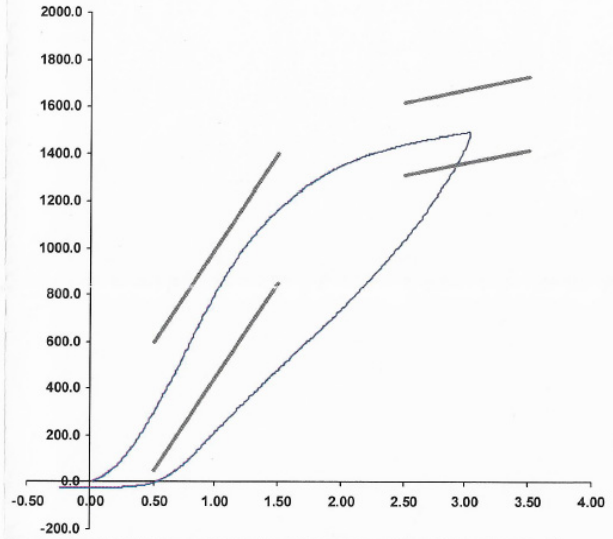
Plug S/N 12246  
 Test Number 6632  
 Report Number 6647  
 Test Date 3/14/2018 1:18:36 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	302.29	50.00	600.00
Force @ 1.5 mm (N)	1,185.71	850.00	1,400.00
Force @ 2.5 mm (N)	1,438.87	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,491.94	1,361.00	1,673.00

Testing Machine STM-20 5965542  
 Load Cell S/N (FI360947), Units (LBS) 1000  
 Crosshead Speed ( mm / min ) or Rate 12.7  
 Extension or Position Measured by XHD\_100 ( XHD100 )

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 14-Mar-18  
 SACO Research

By: DC Date: 3/14/18



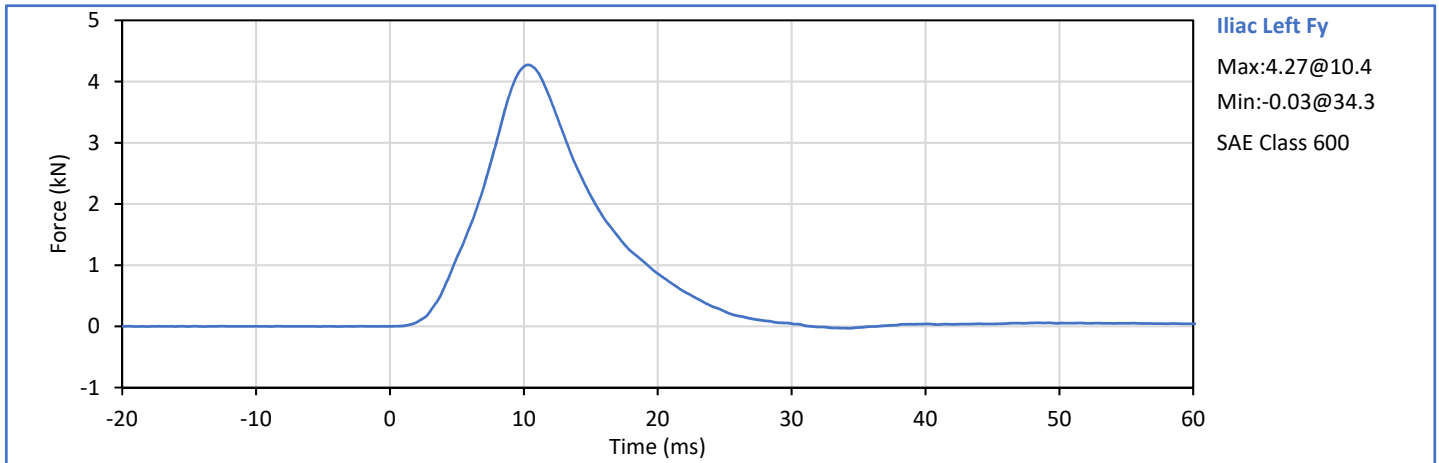
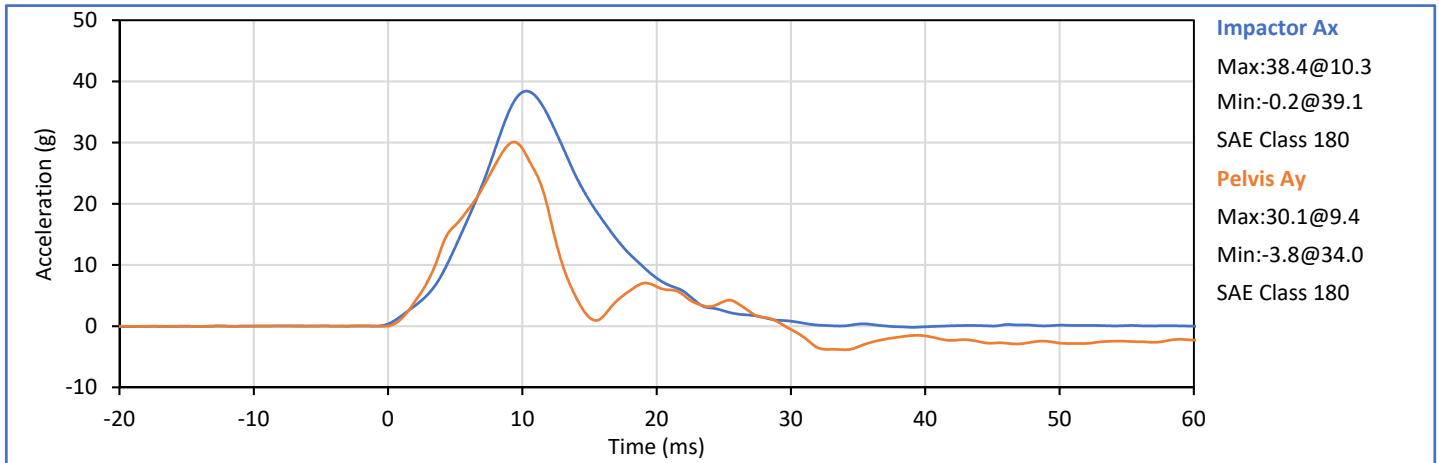
ATD Serial No.: 308

Test Date: 2018-10-12

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	38	Pass
Impactor Velocity	m/s	4.20	4.40	4.27	Pass
Peak Iliac Fy	kN	4.10	5.10	4.27	Pass
Pelvis Ay after 6ms	g	28.0	39.0	30.1	Pass
Peak Impactor Ax	g	36.0	45.0	38.4	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

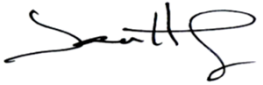
**APPENDIX C**  
**POST-TEST ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA**  
**LEFT SIDE CONFIGURATION**




ATD Serial No.:           F035          

Test Date:           2018-10-31          

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	564	Pass
3 - Seat to Lower Face of Thoracic Spine Box	mm	346	356	349	Pass
4 - Seat to Hip Joint (bolt center)	mm	97	103	102	Pass
5 - Sole to Seat, Sitting	mm	433	451	445	Pass
6 - Head Width	mm	152	158	157	Pass
7 - Shoulder/Arm Width	mm	461	479	470	Pass
8 - Thorax Width	mm	322	332	326	Pass
9 - Abdomen Width	mm	273	287	283	Pass
10 - Pelvis Lap Width	mm	359	373	368	Pass
11 - Head Depth	mm	196	206	204	Pass
12 - Thorax Depth	mm	262	272	266	Pass
13 - Abdomen Depth	mm	194	204	198	Pass
14 - Pelvis Depth	mm	235	245	243	Pass
15 - Back of Buttocks to Hip Joint (bolt Center)	mm	150	160	155	Pass
16 - Back of Buttocks to Front Knee	mm	597	615	606	Pass
				Overall Test Results	Pass

Technician:   
 J. Hernandez

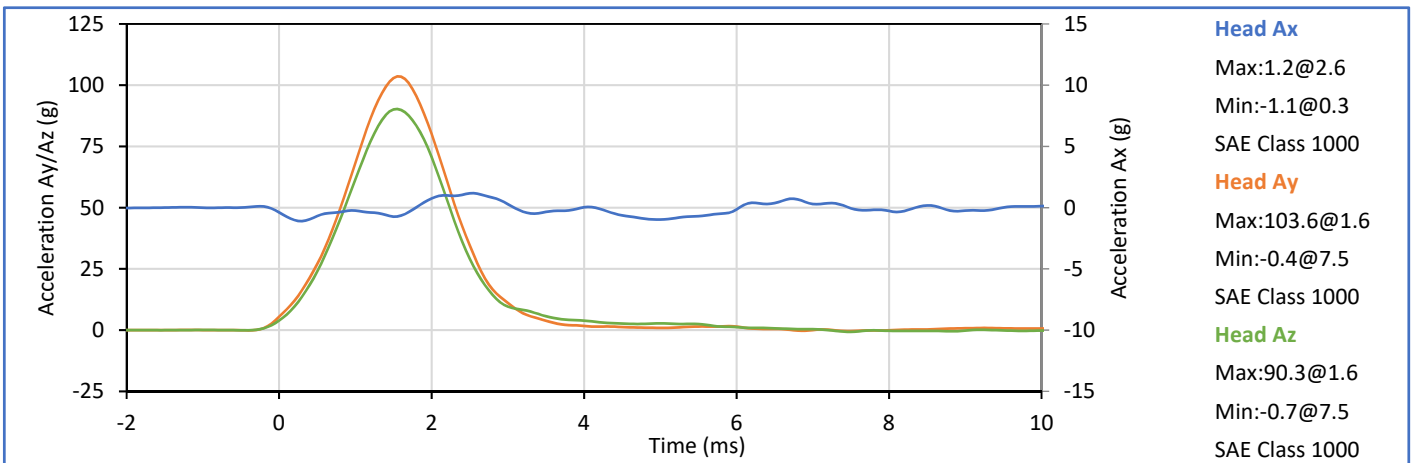
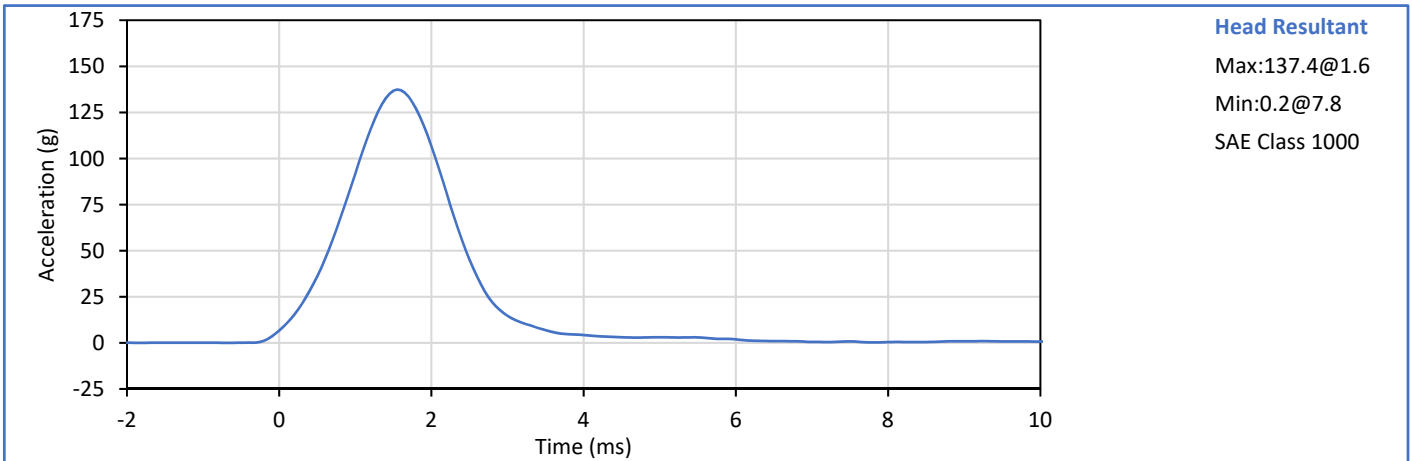
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Peak Resultant Acceleration	g	125.0	155.0	137.4	Pass
Peak Head Ax	g	-15.0	15.0	1.2	Pass
Oscillations After Main Pulse	%	0.0	15.0	2.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

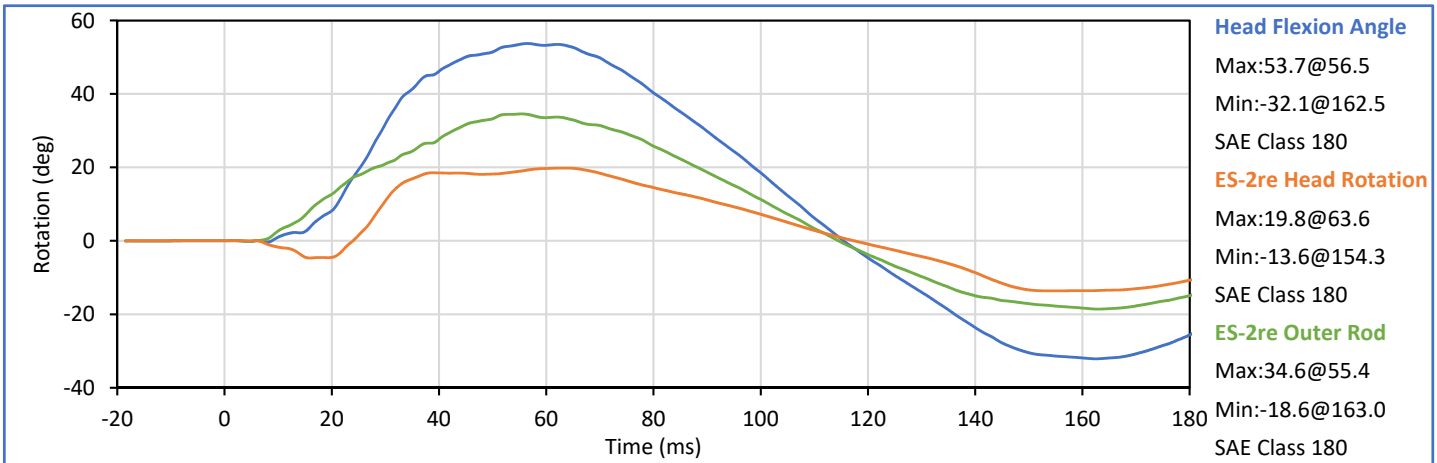
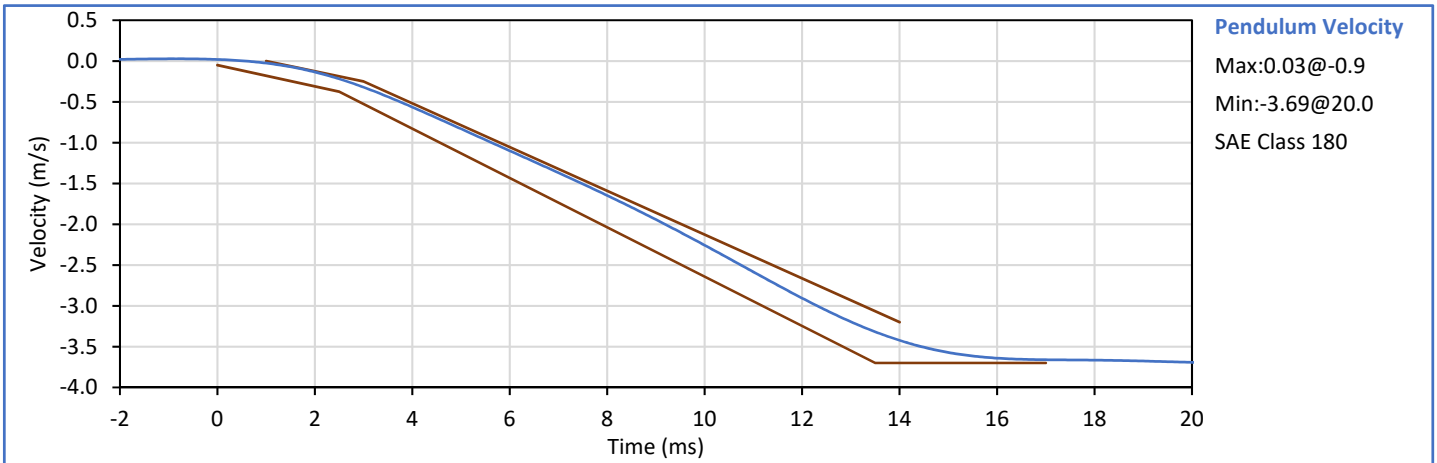
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	3.30	3.50	3.44	Pass
Peak Headform Flexion	deg	49.0	59.0	53.7	Pass
Time of Peak Headform Flexion	ms	54.0	66.0	56.5	Pass
Flexion Decay (Peak to zero)	ms	53.0	88.0	59.0	Pass
Overall Test Results					Pass



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto



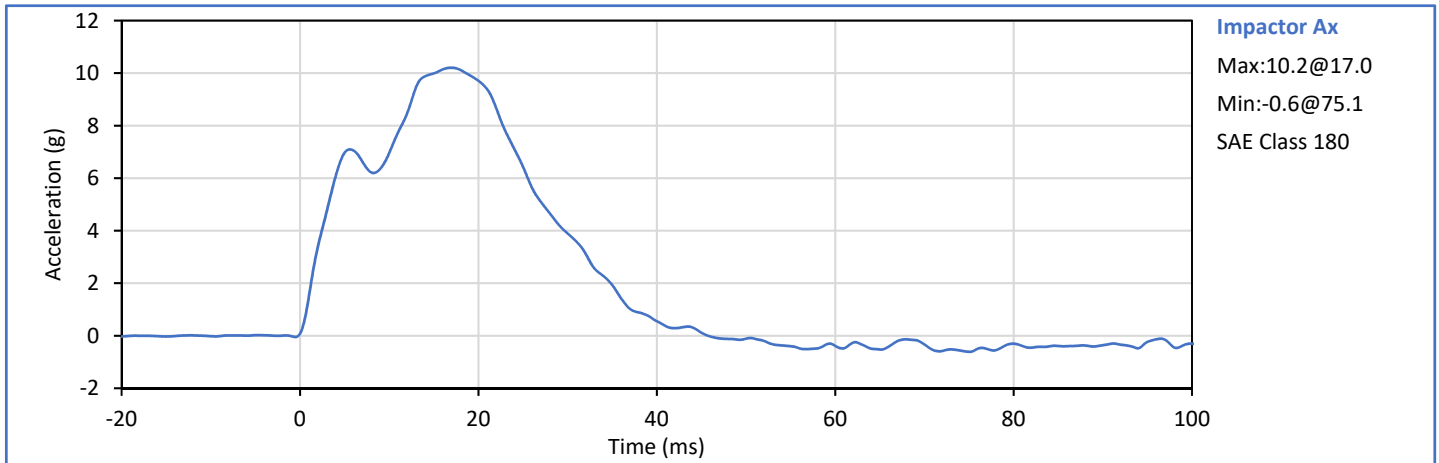
9270 Holly Road, Adelanto, CA 92301  
Tel: +1 760 246 1672 Fax: +1 760 246 8112  
Info@karco.com www.karco.com

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

ATD Serial No.: F035

Test Date: 2018-10-31

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	4.20	4.40	4.23	Pass
Peak Impactor Ax	g	7.5	10.5	10.2	Pass
Overall Test Results					Pass



Technician:   
J. Hernandez

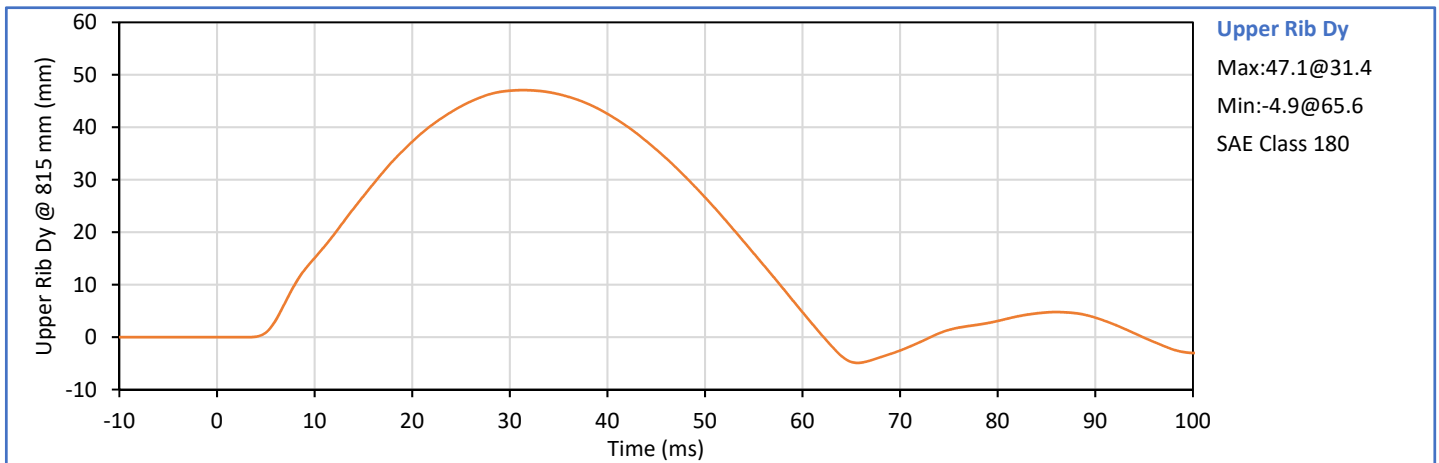
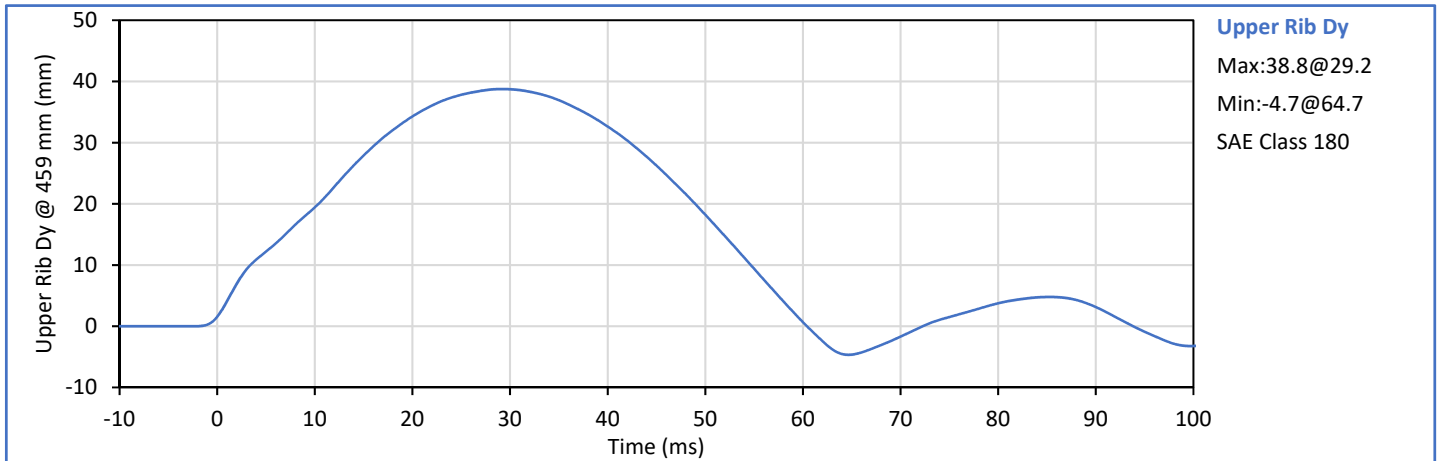
Approved By:   
P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-31

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	38.8	Pass
Upper Rib Dy @ 815mm	mm	46.0	51.0	47.1	Pass
Overall Test Results					Pass



Technician:   
 J. Hernandez

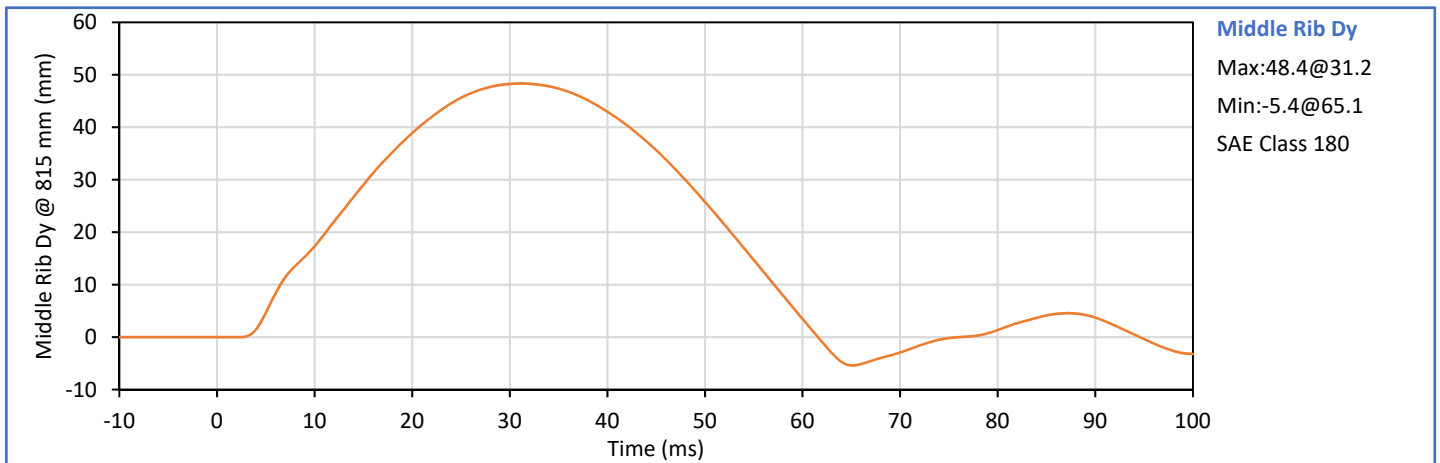
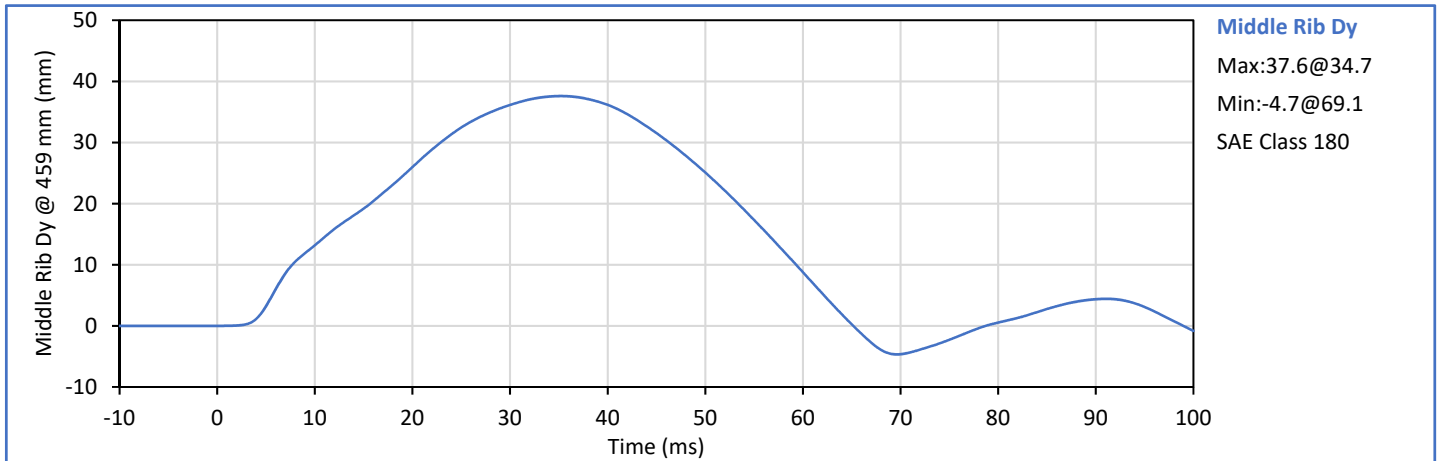
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-31

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	37.6	Pass
Middle Rib Dy @ 815mm	mm	46.0	51.0	48.4	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*  
 J. Hernandez

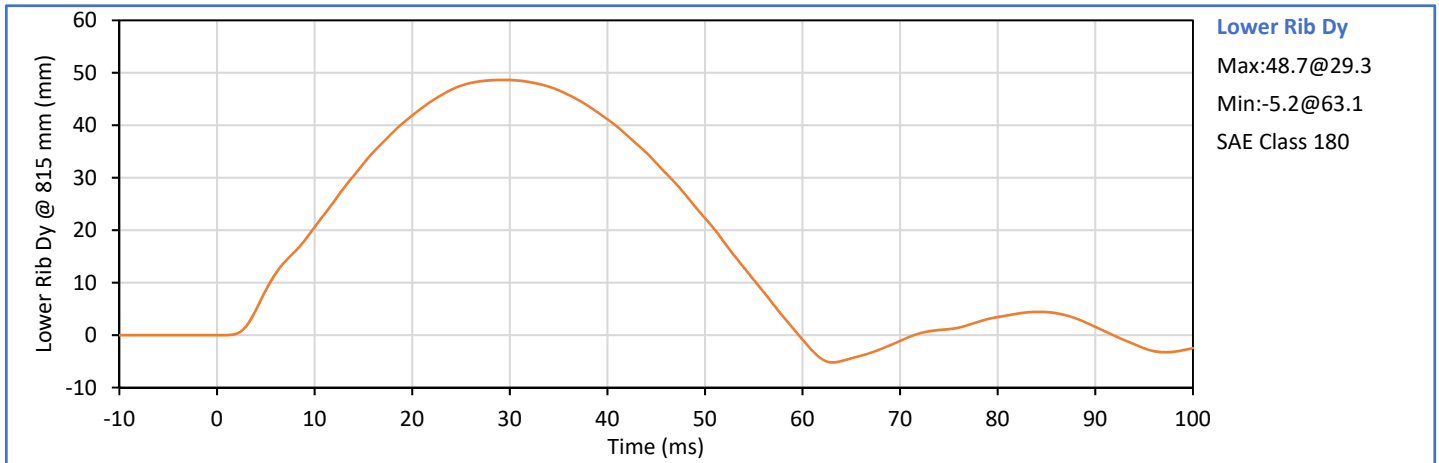
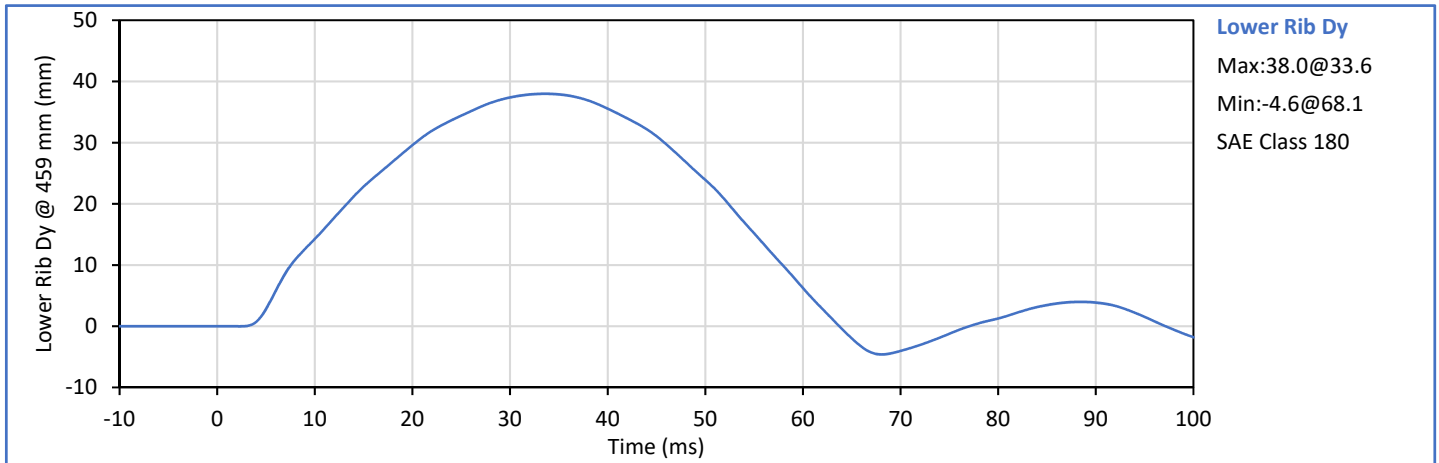
Approved By: *P. Puzzuto*  
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-31

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	38.0	Pass
Lower Rib Dy @ 815mm	mm	46.0	51.0	48.7	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*  
 J. Hernandez

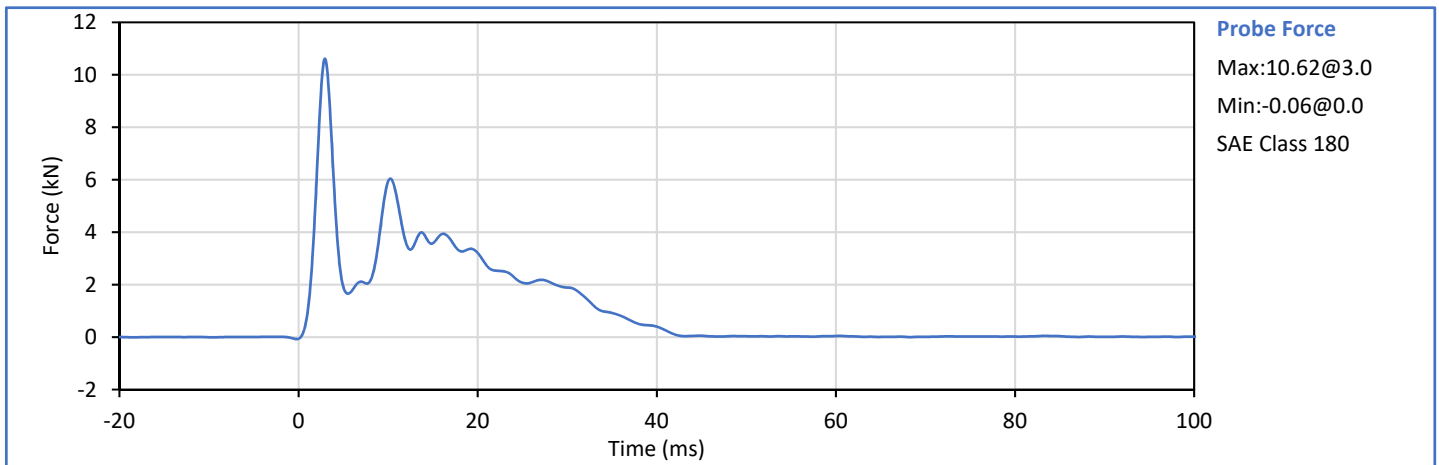
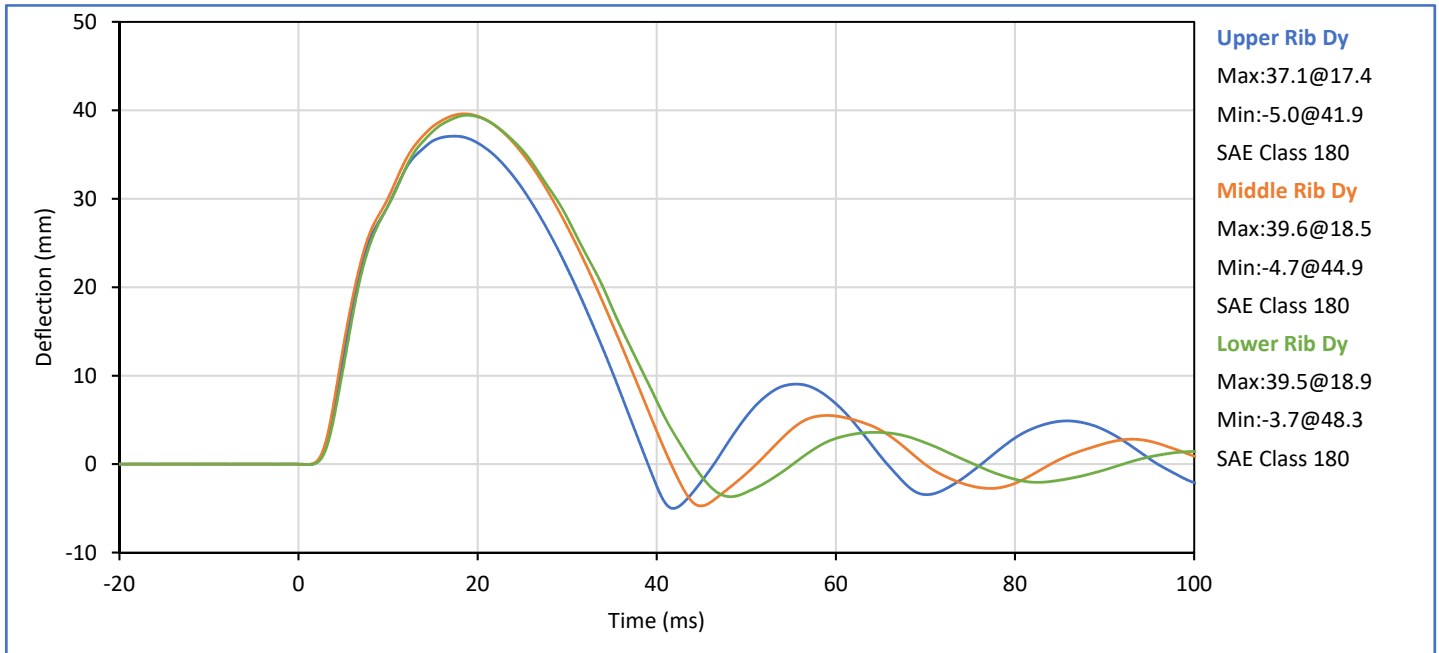
Approved By: *P. Puzzuto*  
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-31

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
Impactor Velocity	m/s	5.40	5.60	5.55	Pass
Peak Upper Rib Dy	mm	34.0	41.0	37.1	Pass
Peak Middle Rib Dy	mm	37.0	45.0	39.6	Pass
Peak Lower Rib Dy	mm	37.0	44.0	39.5	Pass
Peak Impactor Force After 6 ms	kN	5.10	6.20	6.04	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician: *J. Hernandez*  
 J. Hernandez

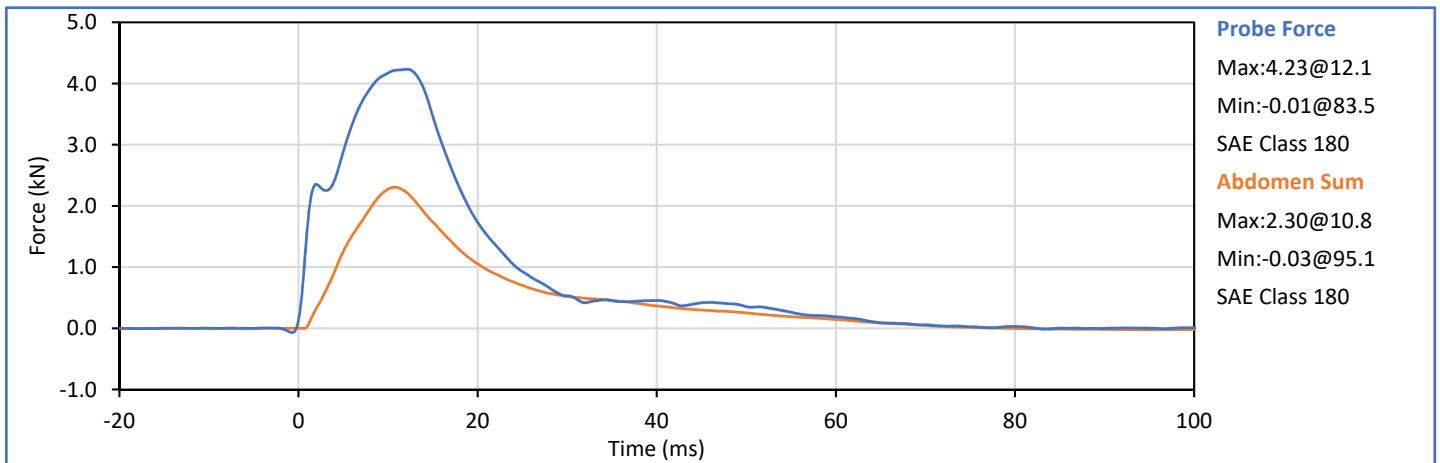
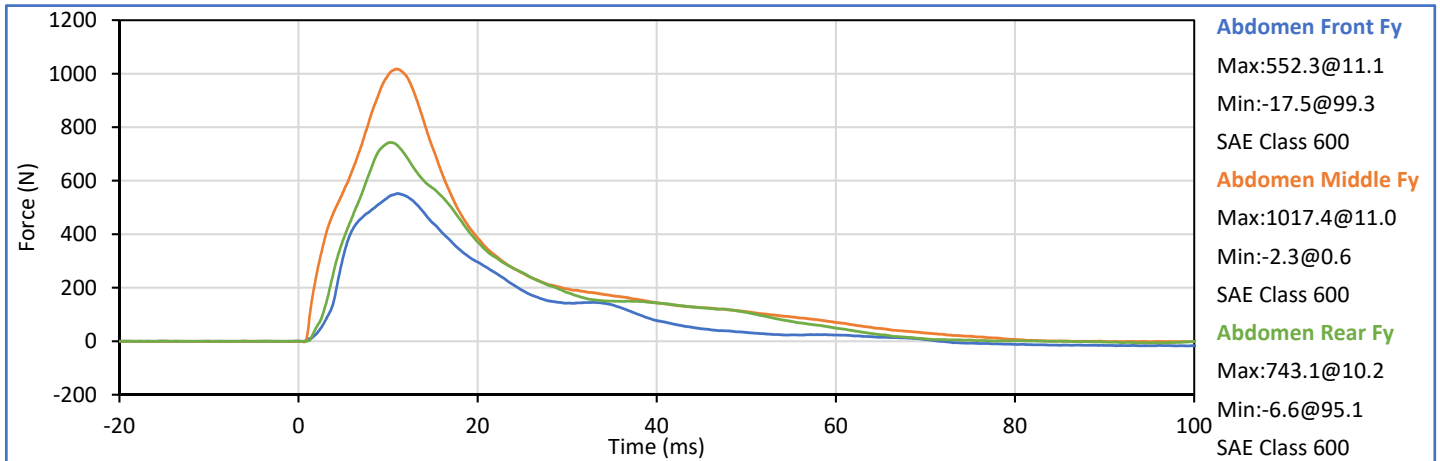
Approved By: *P. Puzzuto*  
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-31

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	4.05	Pass
Peak Impactor Force	kN	4.00	4.80	4.23	Pass
Time of Peak Impactor Force	ms	10.6	13.0	12.1	Pass
Sum of Abdomen Forces	kN	2.20	2.70	2.30	Pass
Time of Peak Sum Abdomen Force	ms	10.0	12.3	10.8	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

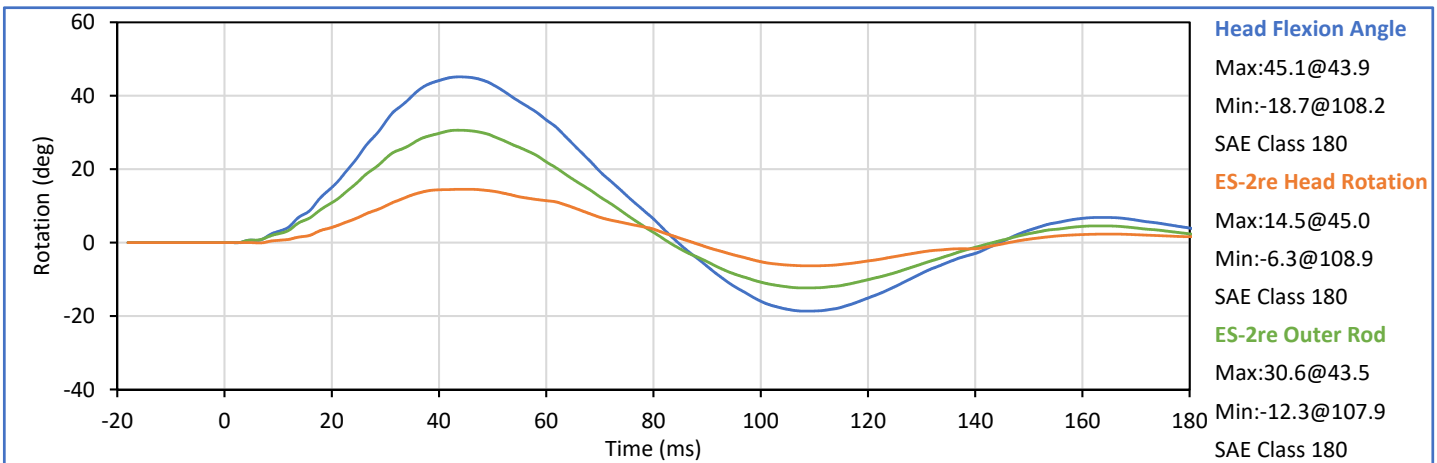
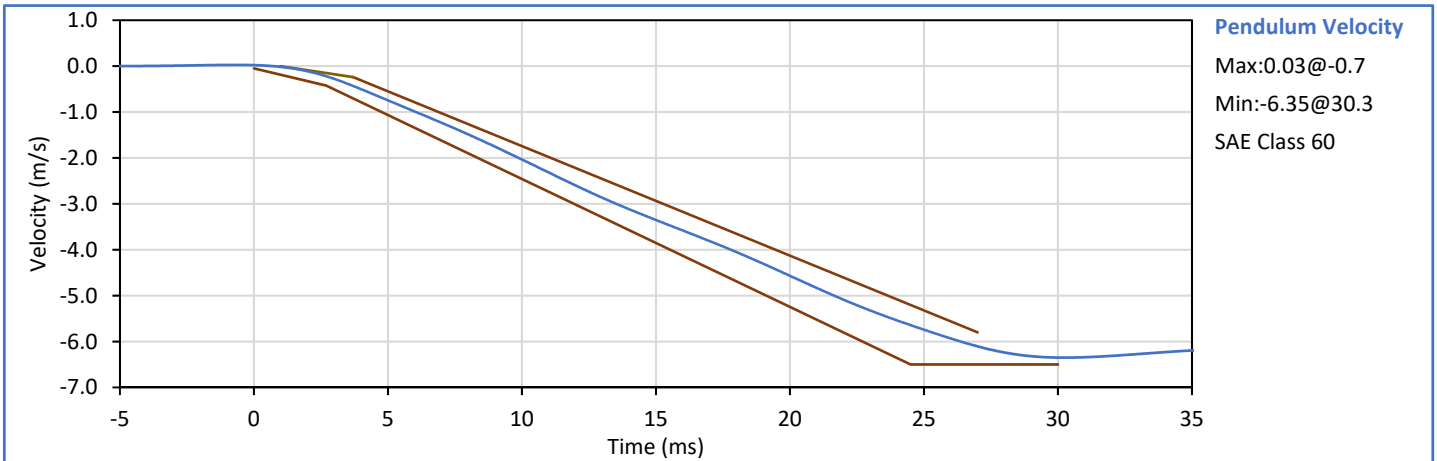
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.95	6.15	6.14	Pass
Peak Headform Flexion	deg	45.0	55.0	45.1	Pass
Time of Peak Headform Flexion	ms	39.0	53.0	43.9	Pass
Flexion Decay (Peak to zero)	ms	37.0	57.0	40.7	Pass
Overall Test Results					Pass



Technician:   
 J. Hernandez

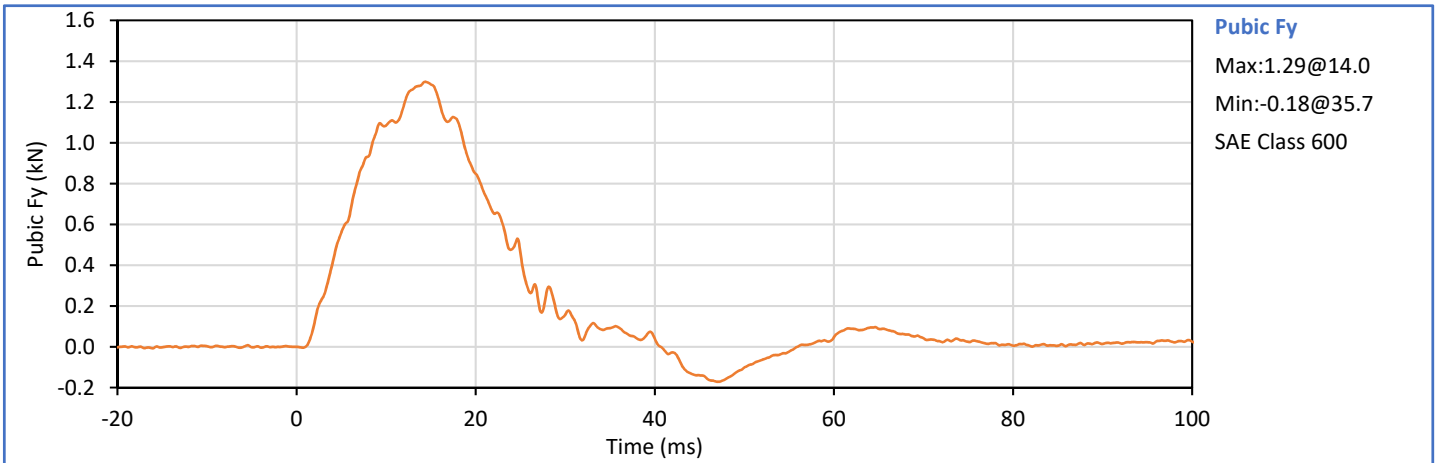
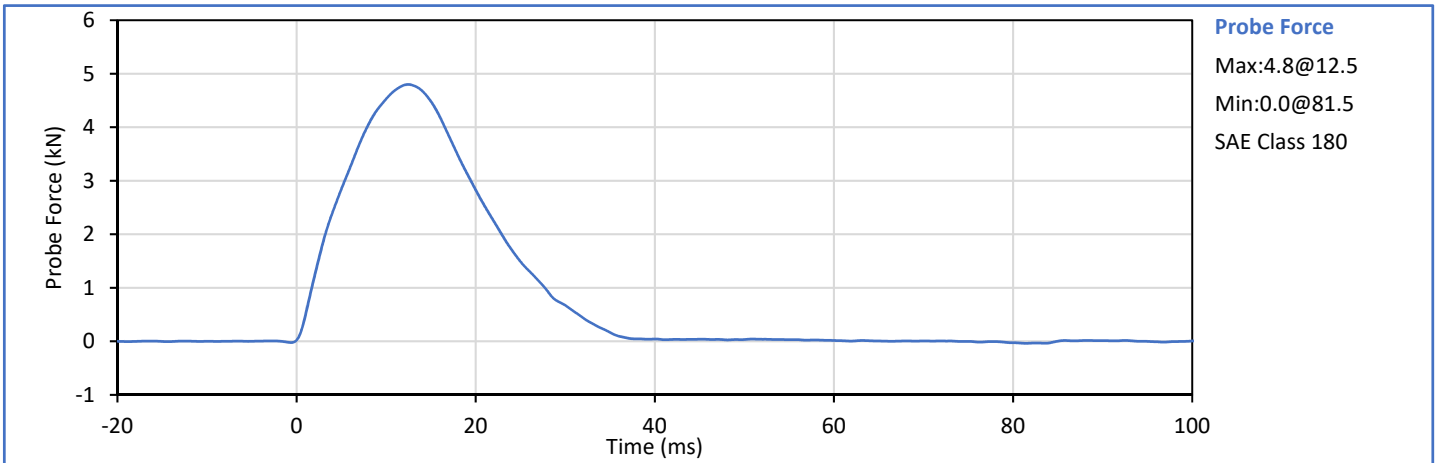
Approved By:   
 P. Puzzuto



ATD Serial No.: F035

Test Date: 2018-10-31

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	4.20	4.40	4.37	Pass
Peak Impactor Force	kN	4.70	5.40	4.80	Pass
Time of Peak Impactor Force	ms	11.8	16.1	12.5	Pass
Pubic Symphysis Fy	kN	1.23	1.59	1.30	Pass
Time of Peak Pubic Symphysis Fy	ms	12.2	17.0	14.4	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

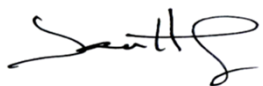



**SID-IIs Small Side Impact ATD  
 External Measurements**

ATD Serial No.: 308

Test Date: 2018-11-04

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	30	Pass
A - Sitting Height	mm	772	788	781	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	82	Pass
D - H Point From Seatback	mm	141	151	149	Pass
E - Shoulder Pivot From Backline	mm	97	107	102	Pass
F - Thigh Clearance	mm	119	135	128	Pass
G - Head Breadth	mm	140	148	146	Pass
H - Head Back From Backline	mm	40	46	42	Pass
I - Head Depth	mm	178	188	185	Pass
J - Head Circumference	mm	541	551	544	Pass
K - Buttock To Knee Length	mm	514	540	531	Pass
L - Popliteal Height	mm	343	369	355	Pass
K - Knee Pivot To Floor Height	mm	392	409	399	Pass
N - Buttock Popliteal Length	mm	416	442	428	Pass
O - Chest Depth W/O Jacket	mm	195	211	204	Pass
P - Foot Length	mm	216	232	230	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	254	Pass
S - Knee Joint To Seatback	mm	477	493	489	Pass
V - Shoulder Width	mm	341	357	345	Pass
W - Foot Width	mm	78	94	83	Pass
Y - Chest Circumference W/Jacket	mm	851	881	866	Pass
Z - Waist Circumference	mm	761	791	777	Pass
<b>Overall Test Results</b>					<b>Pass</b>

Technician:   
 J. Hernandez

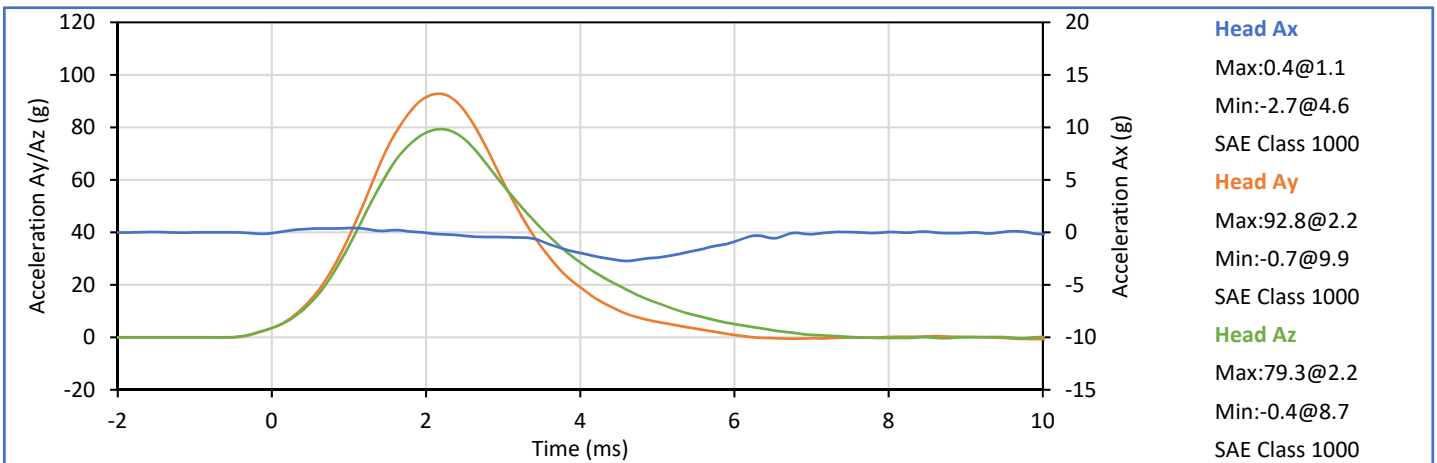
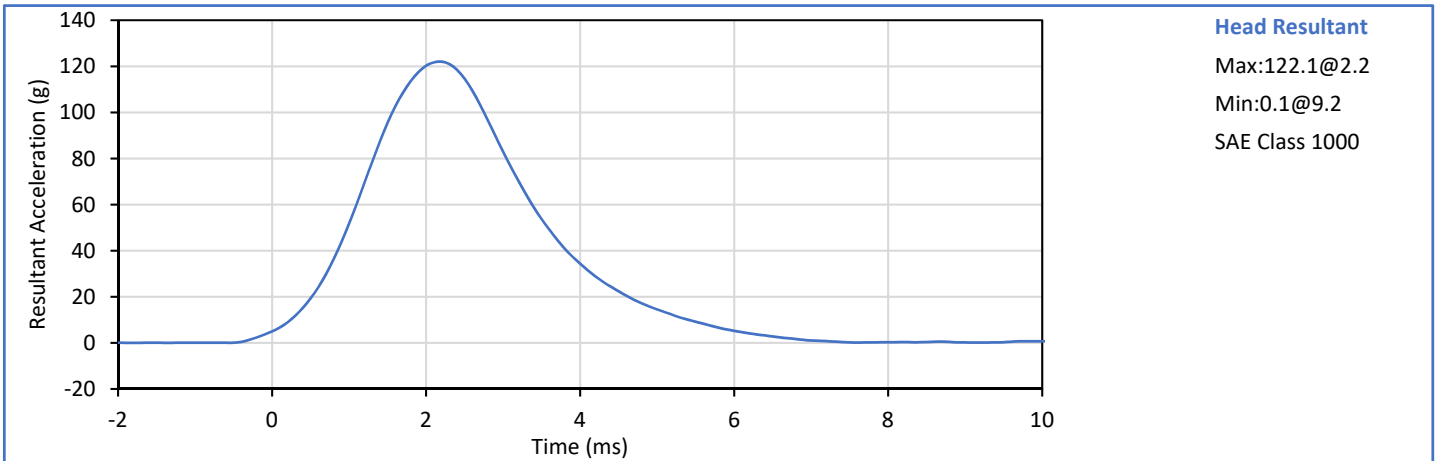
Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Peak Resultant Acceleration	g	115.0	137.0	122.1	Pass
Peak Head Ax	g	-15.0	15.0	-2.7	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

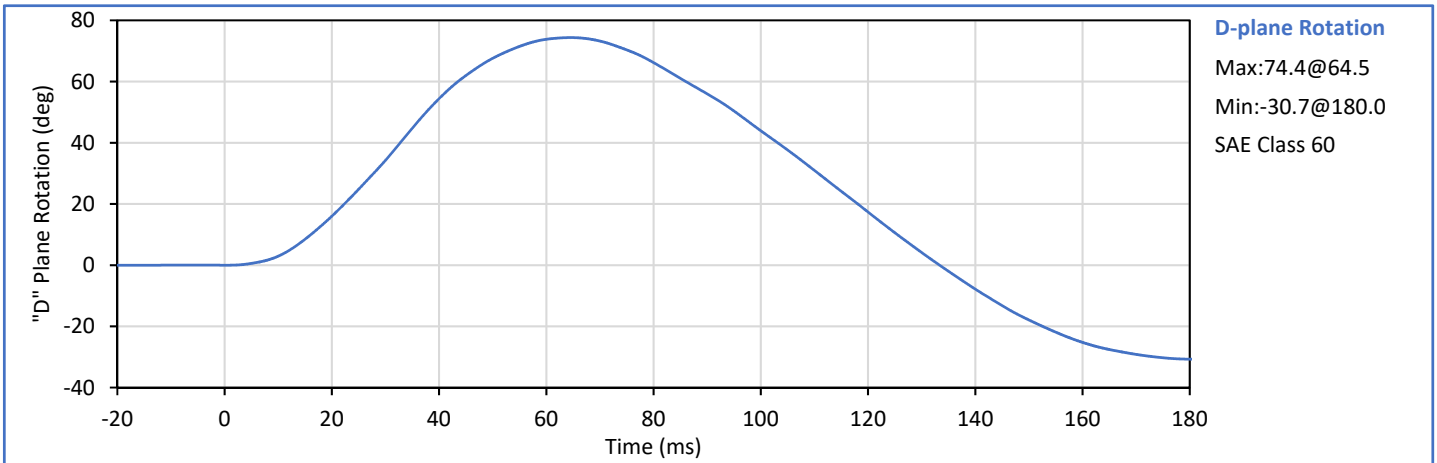
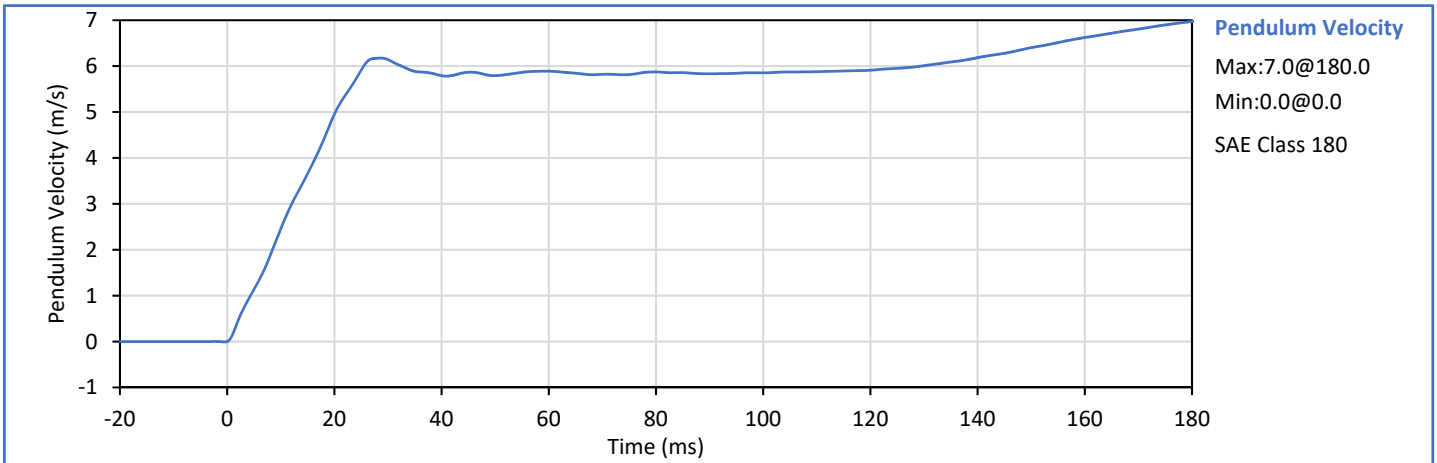


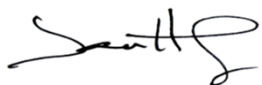
**SID-IIs Small Side Impact ATD  
 Neck Flexion**


ATD Serial No.: 308

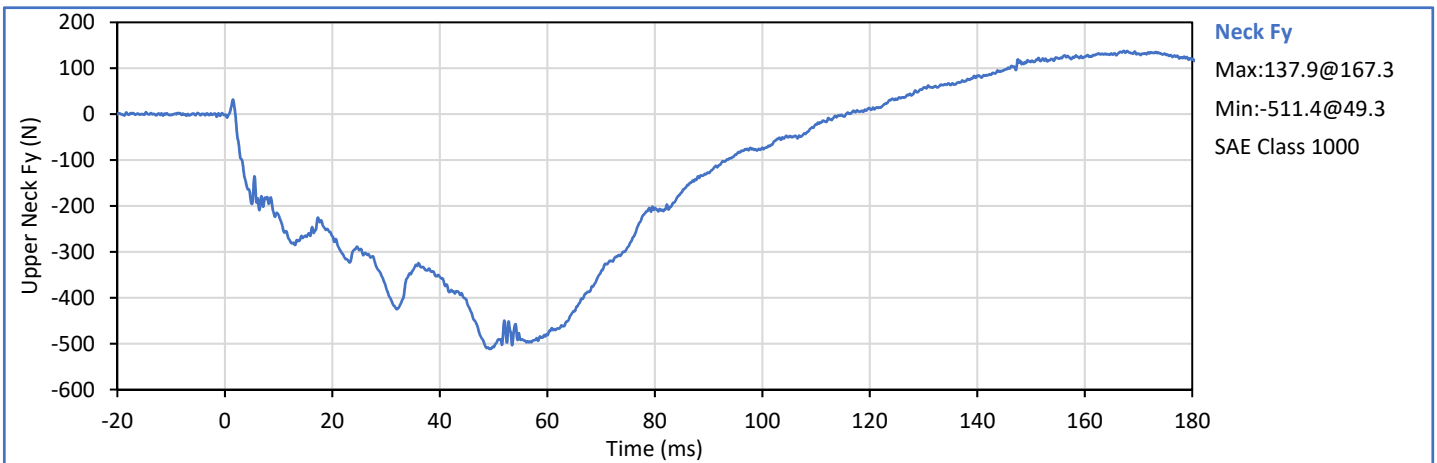
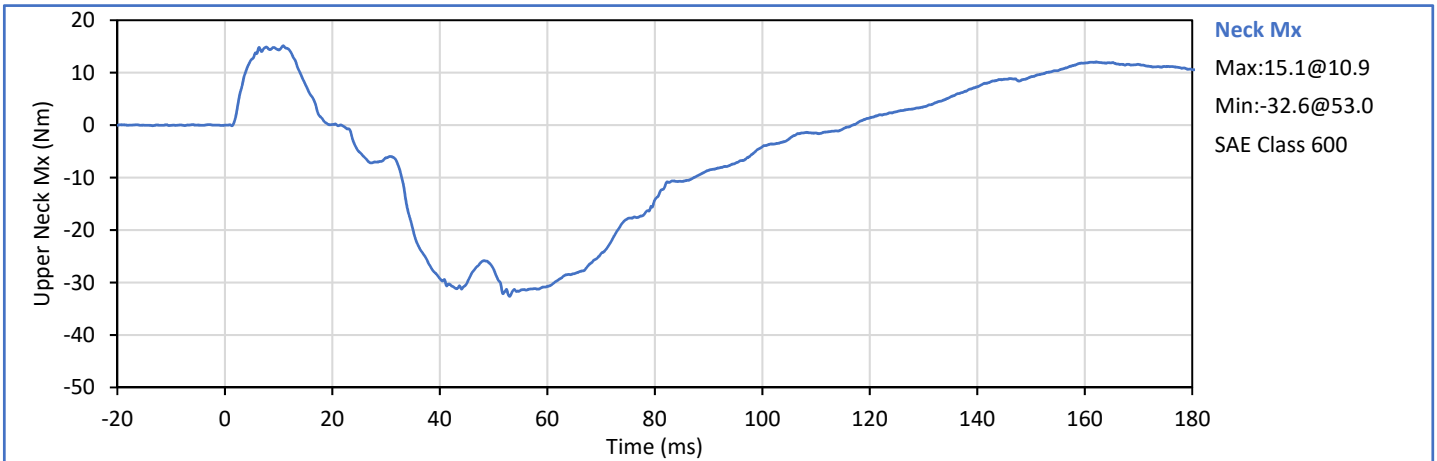
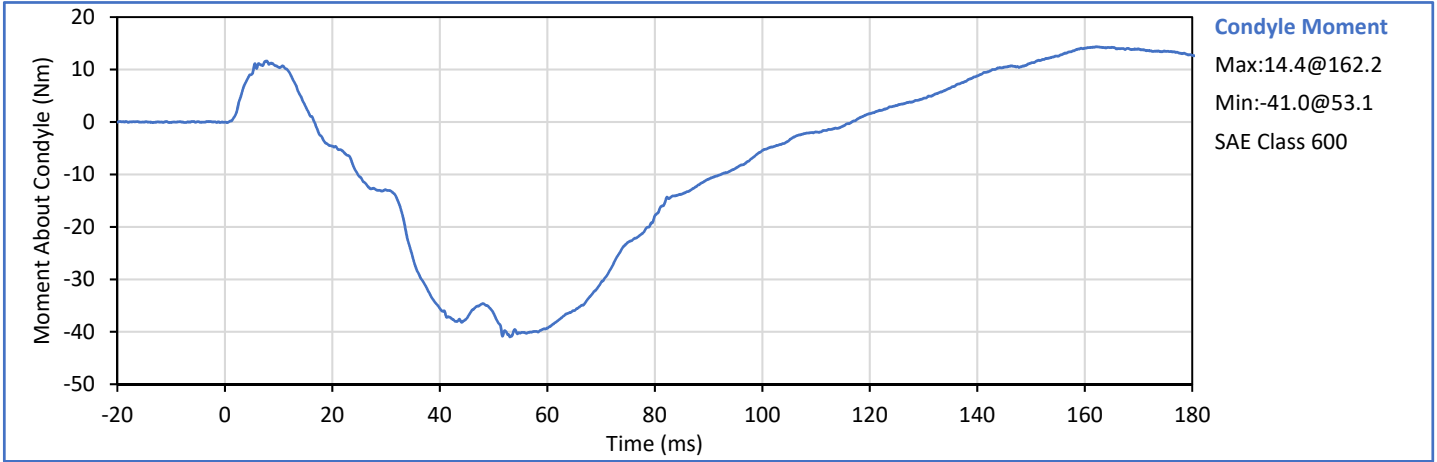
Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.45	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.66	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.95	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.91	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	6.18	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	74.4	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	64.5	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-41.0	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	116.7	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

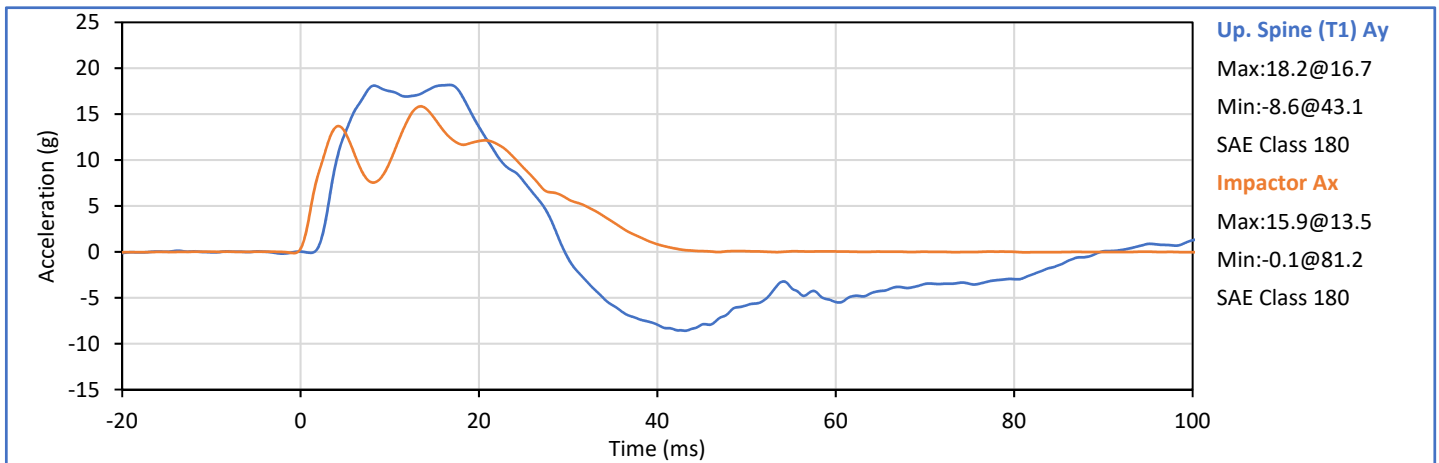
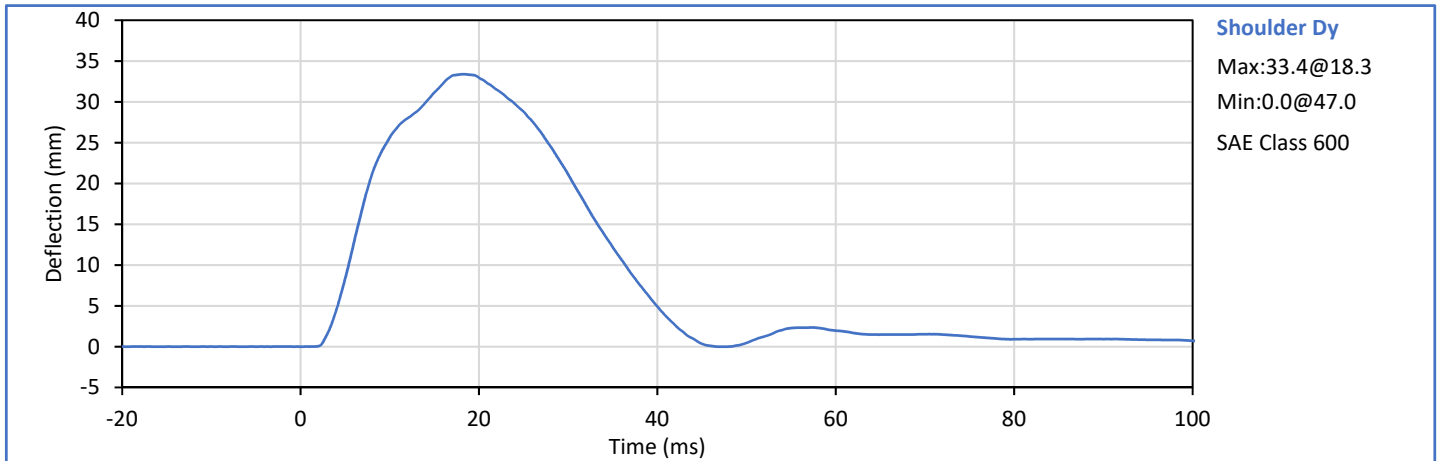




ATD Serial No.: 308

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.29	Pass
Peak Shoulder Dy	mm	28.0	37.0	33.4	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.2	Pass
Peak Impactor Ax	g	13.0	18.0	15.9	Pass
Overall Test Results					Pass



Technician:   
 J. Hernandez

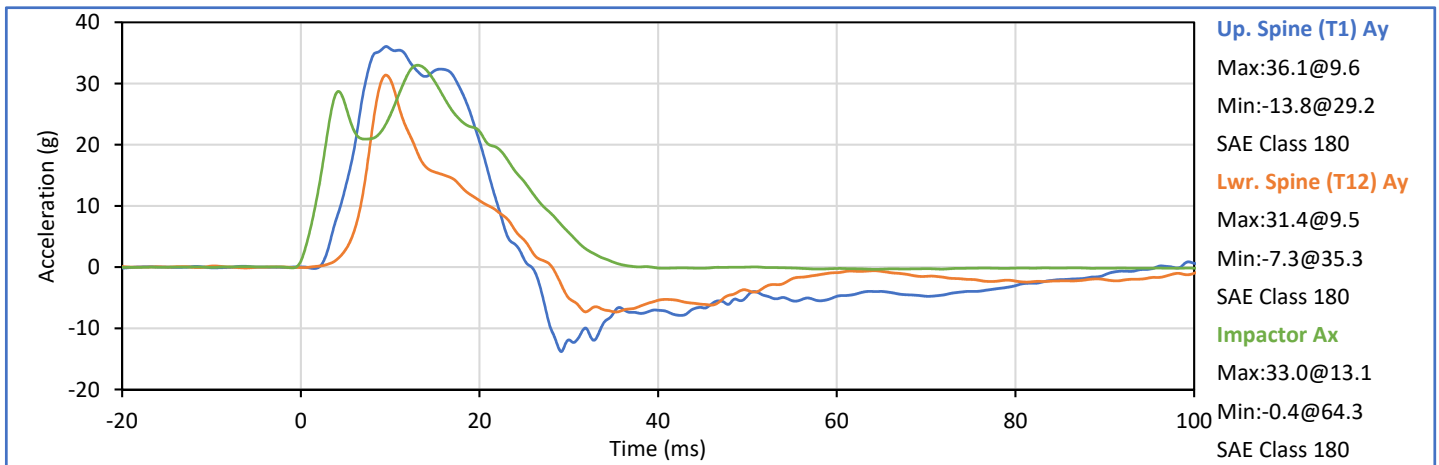
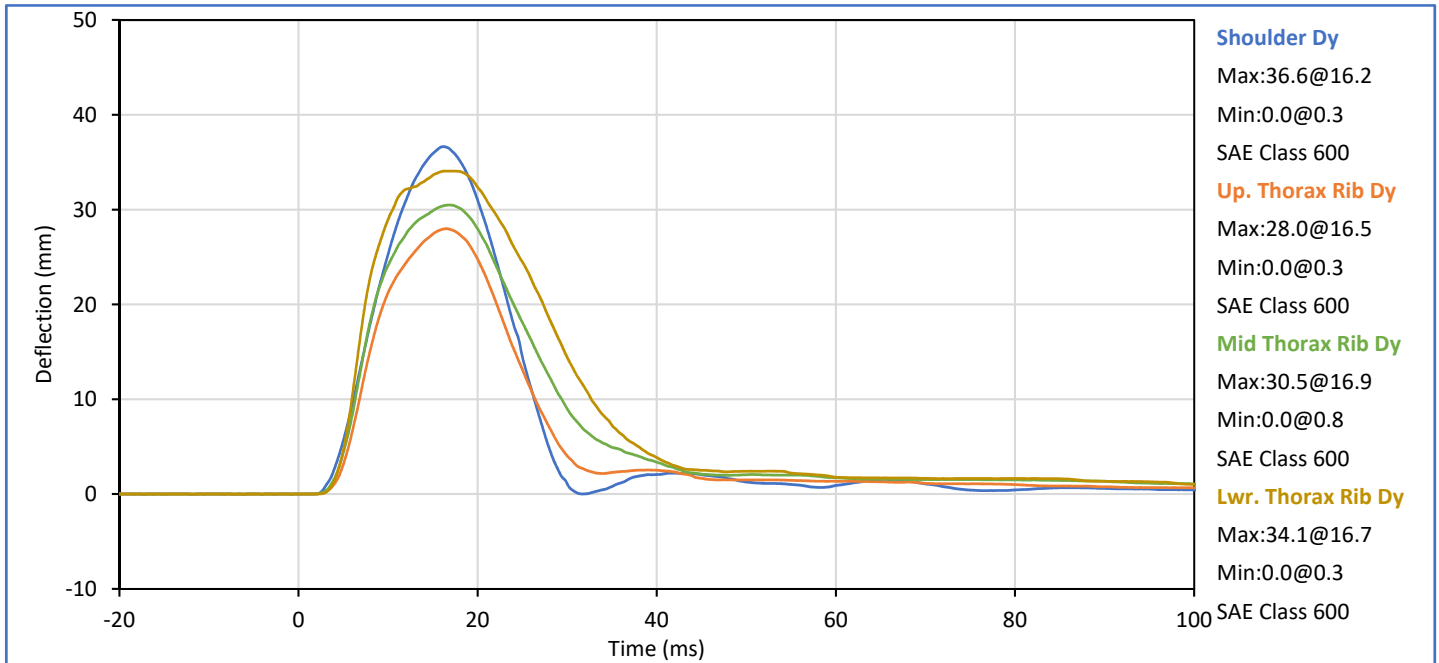
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 P. Puzzuto

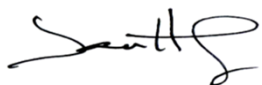



ATD Serial No.: 308

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	6.60	6.80	6.67	Pass
Peak Shoulder Dy	mm	31.0	40.0	36.6	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.0	Pass
Peak Middle Rib Dy	mm	30.0	36.0	30.5	Pass
Peak Lower Rib Dy	mm	32.0	38.0	34.1	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	36.1	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	31.4	Pass
Peak Impactor Ax	g	30.0	36.0	33.0	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

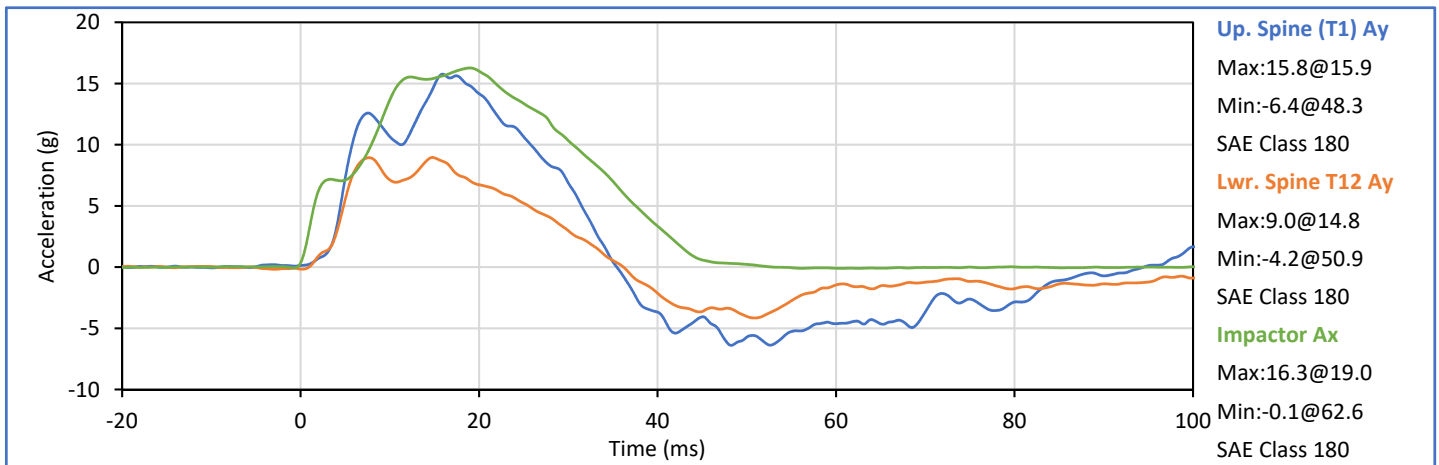
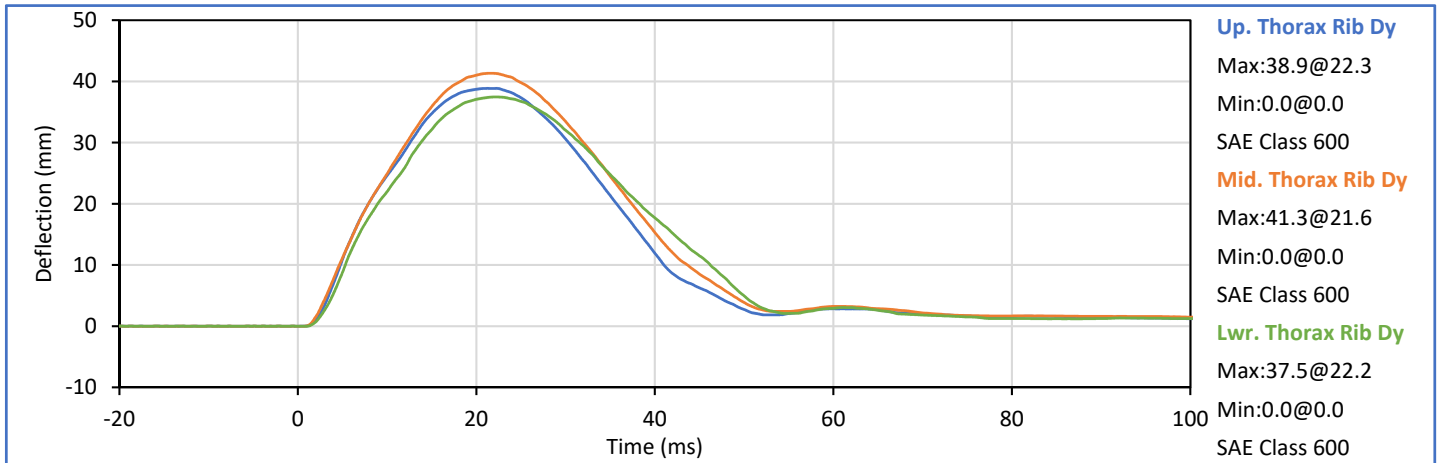
Approved By:   
 P. Puzzuto



ATD Serial No.: 308

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Upper Rib Dy	mm	32.0	40.0	38.9	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.3	Pass
Peak Lower Rib Dy	mm	35.0	43.0	37.5	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	15.8	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.0	Pass
Peak Impactor Ax	g	14.0	18.0	16.3	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

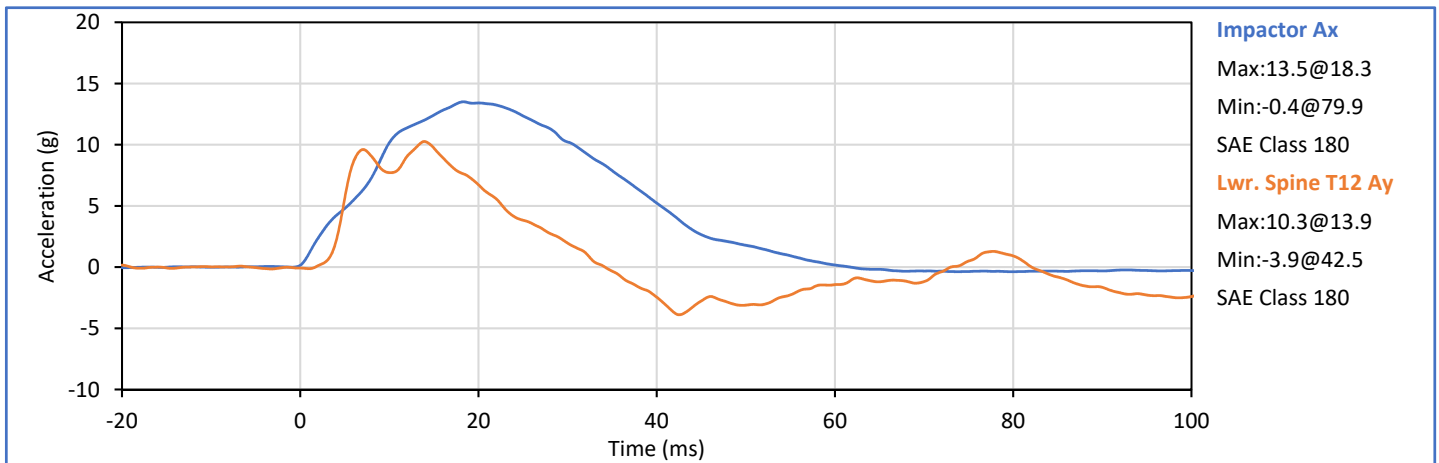
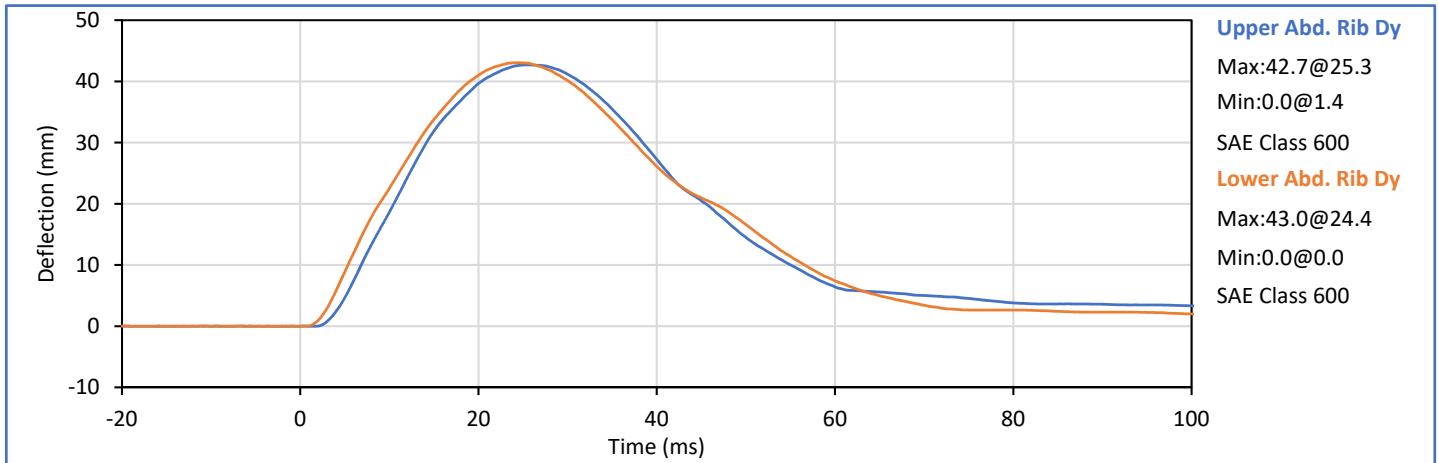
Approved By:   
 P. Puzzuto

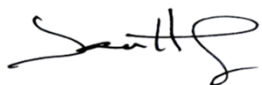



ATD Serial No.: 308

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.33	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	42.7	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	43.0	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.3	Pass
Peak Impactor Ax	g	12.0	16.0	13.5	Pass
<b>Overall Test Results</b>					<b>Pass</b>



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

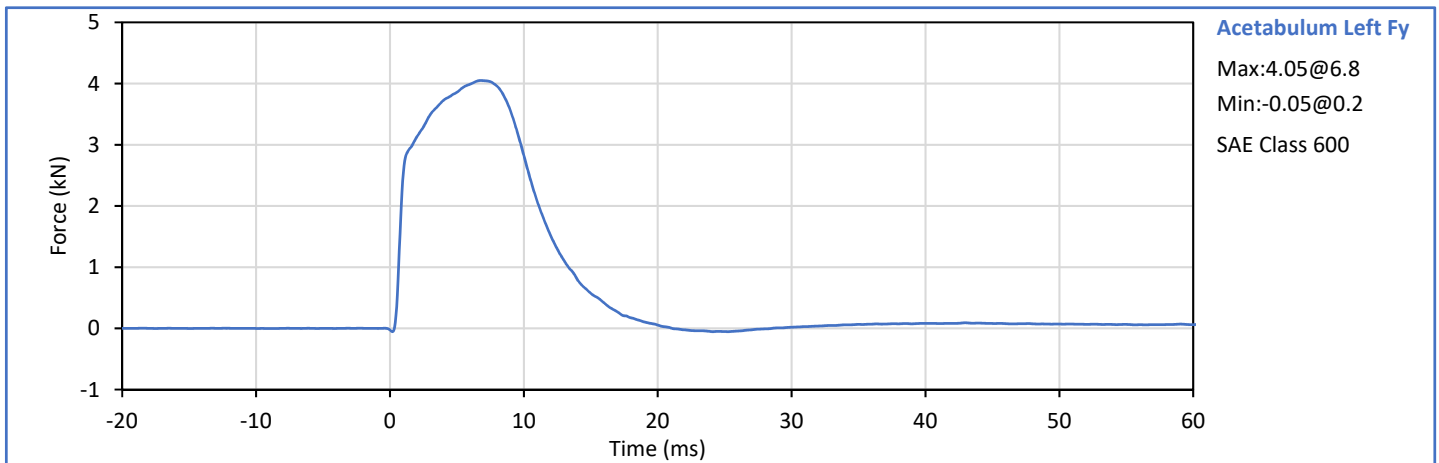
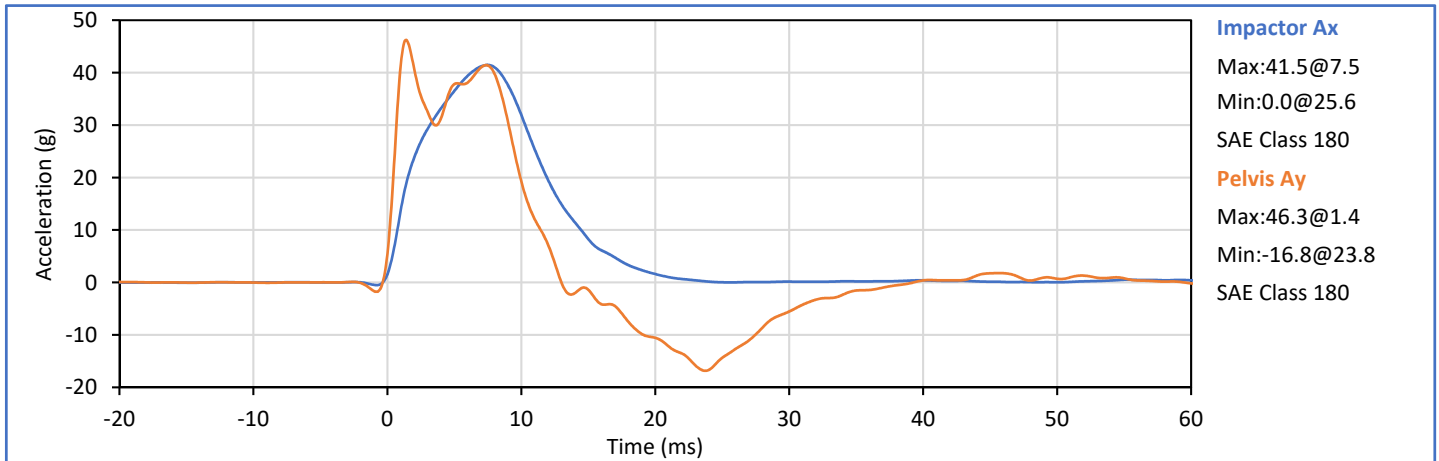


ATD Serial No.: 308

Test Date: 2018-11-05

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	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.05	Pass
Pelvis Ay after 6ms	g	34.0	42.0	41.4	Pass
Peak Impactor Ax	g	38.0	47.0	41.5	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 11916 (SACO)



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto



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 Tel: +1 760 246 1672 Fax: +1 760 246 8112  
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**SID-IIs Small Side Impact ATD  
 Pelvis Acetabulum Impact**

ATD Serial No.: 308

Test Date: 2018-11-05

Pelvis Plug S/N: 11916 (SACO)



**SID-IIs Pelvis Plug Certification Test**

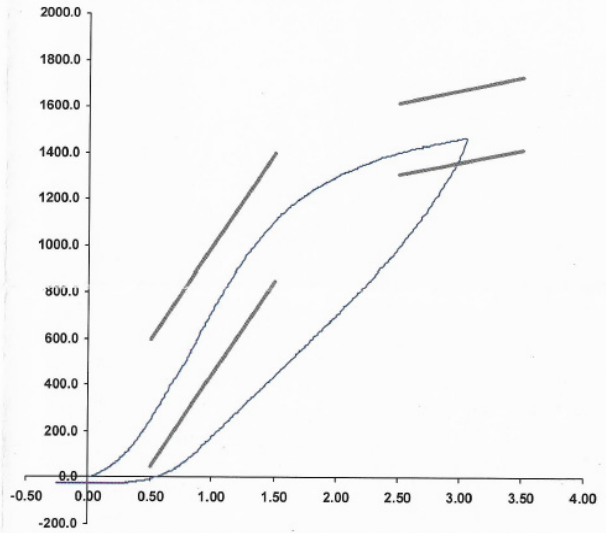
Plug S/N 11916  
 Test Number 6078  
 Report Number 6094  
 Test Date 1/31/2018 1:53:55 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	251.32	50.00	600.00
Force @ 1.5 mm (N)	1,109.63	850.00	1,400.00
Force @ 2.5 mm (N)	1,402.45	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,465.18	1,361.00	1,673.00

Testing Machine STM-20 5965542  
 Load Cell S/N (F1360947), Units (LBS) 1000  
 Crosshead Speed ( mm / min ) or Rate 12.7  
 Extension or Position Measured by XHD\_100 ( XHD100 )

Notes:

Force (-N) vs Extension (-mm)



Operator \_\_\_\_\_  
 Part Number 180-4450

Template No 107 31-Jan-18  
 SACO Research

By: DC Date: 1/31/18  
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



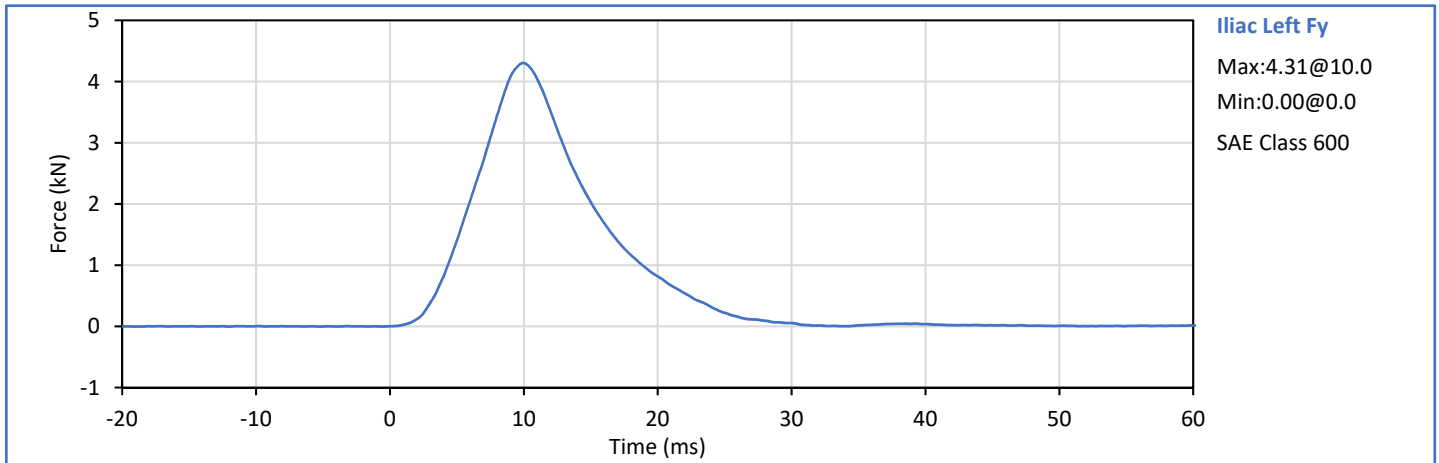
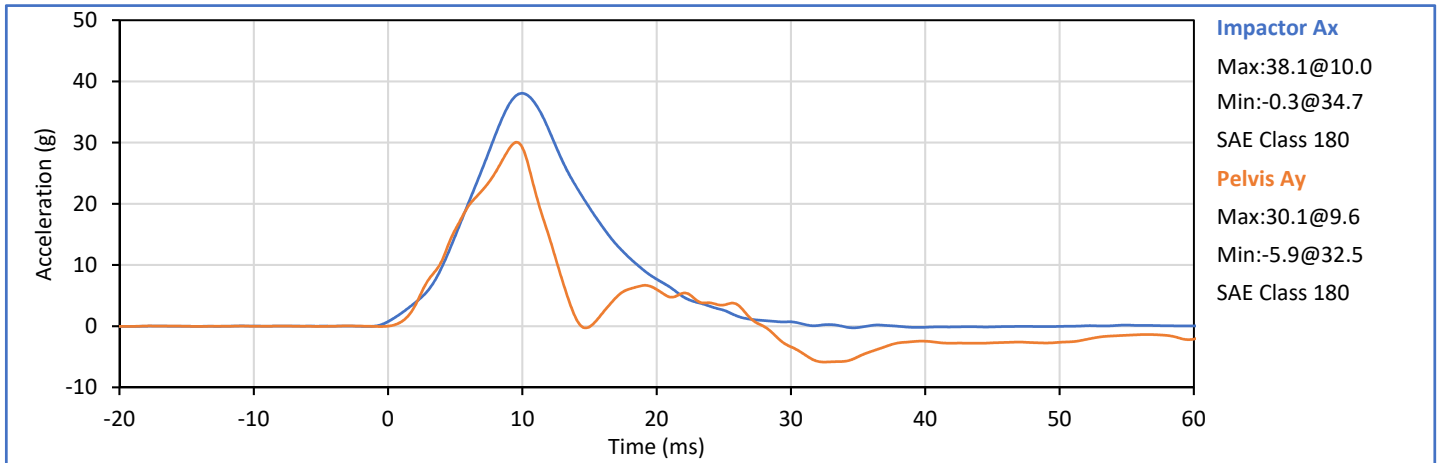
ATD Serial No.: 308

Test Date: 2018-11-05

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.28	Pass
Peak Iliac Fy	kN	4.10	5.10	4.31	Pass
Pelvis Ay after 6ms	g	28.0	39.0	30.1	Pass
Peak Impactor Ax	g	36.0	45.0	38.1	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12228 (SACO) \*

\* Plug is not impacted and remains certified



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

**APPENDIX D**  
**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA**

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

**Table 1 - Driver ATD Instrumentation**

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

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

**Table 2a - Passenger ATD Instrumentation**

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

**Table 1b - Passenger ATD Optional Instrumentation (Research Data Only)**

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

**Table 3 - Vehicle Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Last Cal
Vehicle CG Ax	10103	Endevco	757F-2k	2018-02-21
Vehicle CG Ay	10250	Endevco	757F-2k	2018-03-08
Vehicle CG Az	10248	Endevco	757F-2k	2018-03-08
Right Side Sill at Front Seat Ax	A254881	MSI	52F-2000	2018-06-19
Right Side Sill at Front Seat Ay	A254883	MSI	52F-2000	2018-06-18
Right Side Sill at Front Seat Az	A254887	MSI	52F-2000	2018-06-18
Right Side Sill at Rear Seat Ax	A254879	MSI	52F-2000	2018-06-19
Right Side Sill at Rear Seat Ay	A254863	MSI	52F-2000	2018-06-19
Right Side Sill at Rear Seat Az	A254871	MSI	52F-2000	2018-06-19
Left Side Sill at Front Seat Ay	A185604	MSI	52F-2000	2018-09-15
Left Side Sill at Rear Seat Ay	A254915	MSI	52F-2000	2018-06-19
Left Lower A-Pillar Ay	A185596	MSI	52F-2000	2018-09-18
Left Middle A-Pillar Ay	A248865	MSI	52F-2000	2018-09-18
Left Lower B-Pillar Ay	A185568	MSI	52F-2000	2018-09-25
Left Middle B-Pillar Ay	A227277	MSI	52F-2000	2018-09-25
Driver Seat Track at H-Point Ay	A160343	MSI	52F-2000	2018-09-26
Rear Seat Structure Ay	A224577	MSI	52F-2000	2018-09-17
Right Rear Occupant Comp. Ay	A185706	MSI	52F-2000	2018-10-01
Engine Block Top Ax	10089	Endevco	757F-2k	2018-02-12
Engine Block Top Ay	10090	Endevco	757F-2k	2018-02-12
Rear Floopan Above Axle Ax	A254886	MSI	52F-2000	2018-06-18
Rear Floopan Above Axle Ay	10375	Endevco	757F-2k	09-04-2018
Rear Floopan Above Axle Az	10420	Endevco	757F-2k	09-04-2018

**Table 4 - Moving Deformable Barrier (MDB) Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Last Cal
MDB CG Ax	A217449	MSI	52F-2000	2018-09-17
MDB CG Ay	A224545	MSI	52F-2000	2018-09-25
MDB CG Az	A224490	MSI	52F-2000	2018-09-17
MDB Left Side at Rear Axle Ax	A248838	MSI	52F-2000	2018-09-15
MDB Left Side at Rear Axle Ay	A224564	MSI	52F-2000	2018-09-18