

**REPORT NUMBER: SPNCAP-KAR-19-007
NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

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

NHTSA No: M20195204

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



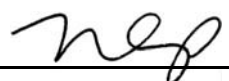
NOVEMBER 14, 2018

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Approval Date: November 14, 2018

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204		5. Report Date November 14, 2018																												
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15. Supplementary Notes																														
16. Abstract A 32.20 km/h 75° rigid pole side NCAP 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 Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on October 31, 2018. The impact velocity was 32.32 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 18.9°C. The target vehicle's maximum post-test static crush was 478 mm located at level 2. The test vehicle's occupant performance data is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>321.4</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>43</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetabular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>2527</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>24</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45</td> <td>23</td> </tr> </tbody> </table> The struck side doors of the vehicle were jammed shut and did not separate from the body at the hinges or latches. The remaining doors did not open during the side impact event.				Measurement Description	Driver ATD (SID-IIs)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	321.4	Resultant Lower Spine Acceleration	g	82	43	Total Pelvic Force (Sum of Acetabular and Iliac Forces)	N	5525	2527	Maximum Thoracic Rib Deflection	mm	38	24	Maximum Abdominal Rib Deflection	mm	45	23
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Information Services Division, NPO-411 1200 New Jersey Ave., SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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SECTION 1

TEST PURPOSE AND PROCEDURE

This 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 date October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2019 Nissan Frontier S Crew Cab 4-door truck. The subject vehicle was towed into the rigid pole at an angle of 75.0° and a velocity of 32.20 km/h. The test was conducted by Applus IDIADA KARCO Engineering, LLC. in Adelanto, California on October 31, 2018. Pre- and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated October 2015. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) was instrumented accordingly:

- Primary and Redundant Head CG tri-axial accelerometers
- Thorax upper, middle and lower rib displacement potentiometers
- Abdomen upper and lower rib displacement potentiometers
- Lower spine (12) tri-axial accelerometers
- Iliac load cell
- Acetabulum load cell

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 contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Units	Passenger ATD (SID-IIs)	
		IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	321.4
Lower Spine (T12) Resultant Acceleration	g	82	43
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2527
Maximum Thoracic Rib Deflection	mm	38*	24
Maximum Abdominal Rib Deflection	mm	45*	23

**Proposed IARV*

Supplemental restraint information is given below:

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

GENERAL COMMENTS

The struck side doors of the vehicle were jammed shut. There was no separation at the hinges or latches. The remaining doors remained closed and latched. There were no ATD values that exceeded limits.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

CONVERSION FACTORS

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

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20195204
Model Year	2019
Make	Nissan
Model	Frontier S Crew Cab
Body Style	4-Door Truck
VIN	1N6AD0ER2KN704235
Body Color	Brilliant Silver
Odometer Reading (km / mi)	39 / 24
Engine Displacement (L)	4.0L
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)*				136.0	A-B

*For Trucks, MPVs, and Buses, if the RCLW is greater than 136.0 kg, 136.0 kg is used

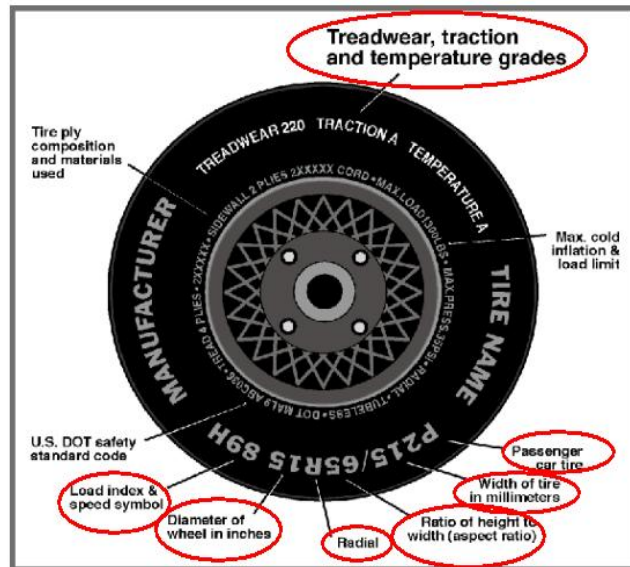
VEHICLE SEAT TYPE

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. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18



Measured Parameter	Front	Front
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	P265/70R16	P265/7/R16
Tire Size on Vehicle	P265/70R16	P265/70R16
Tire Manufacturer	Hankook	Hankook
Tire Model	DynaPro HT	DynaPro HT
Treadware	300	300
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 1818	T79M HUH 1818
DOT Safety Code Right	T79M HUH 1818	T79M HUH 1818

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	513.5	435.0		529.5	522.0		522.5	530.0	
Right	kg	528.0	424.0		524.5	502.5		516.5	514.0	
Ratio	%	54.8%	45.2%	100.0%	50.7%	49.3%	100.0%	49.9%	50.1%	100.0%
Total	kg	1041.5	859.0	1900.5	1054.0	1024.5	2078.5	1039.0	1044.0	2083.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1900.5	A
Actual Weight of 1 P572V ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	136.0	C
Calculated Vehicle Target Wt (TVTW)	kg	2085.5	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	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	°	-0.1	0.3	0.4	Yes
Front Passenger Sill Angle (front-to-rear)*	°	-0.7	-0.1	-0.2	Yes
Front Bumper-Line Angle (left-to-right)**	°	-0.1	0.0	0.0	Yes
Rear Bumper-Line Angle (left-to-right)**	°	0.1	0.0	0.0	Yes
Vehicle CG (Aft of Front Axle)	mm	1446	1577	1604	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	-1	9	8	

*ND=Nose Down (-), NU=Nose Up (+) **LD=Left Down (-), LU=Left Up (+)

***The "As Tested" vehicle attitude angle measurements must be within "As Delivered" and the "Fully Loaded" vehicle attitude measurements at each location. 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. M20195204

Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast / Equipment Added	98.5

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. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and front passenger's seat should be set to the forward most, mid-height, mid-angle position. The struck side rear passenger's seat, rear center seat, and non-struck side rear passenger's seat should be set to the rear most, 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	783	Max			
			Mid	766	774	783
			Min			
Front Passenger Seat	Fixed	773	Max			
			Mid	755	763	773
			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. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18

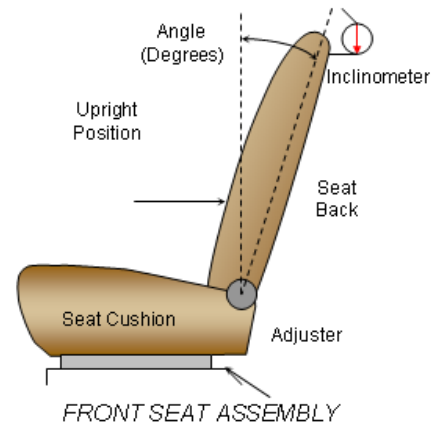
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	220	19	0	0
Front Passenger Seat	240	21	0	0
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 such that the dummy's head is level. The front passenger's seat back is positioned in a similar manner to the driver's seat. The struck side rear passenger seat back is positioned in accordance with the information provided by the manufacturer in Form 1 for the 5th percentile female dummy in a Side NCAP MDB Test. The rear center and non-struck side rear passenger's seat back is set to match the struck side rear seat back. Seat back angle is measured using the outboard head restraint post.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/Seated Dummy	57.4	17	1.5	4
Front Passenger Seat	58.7	18	1.5	4
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. M20195204Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18**SEAT BELT ANCHORAGE ADJUSTMENT**

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

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

HEAD RESTRAINT ADJUSTMENT

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

	Total No. of Positions	Placed in Position
Driver Seat	4	Full Down

DATA SHEET NO. 2 ... (CONTINUED)

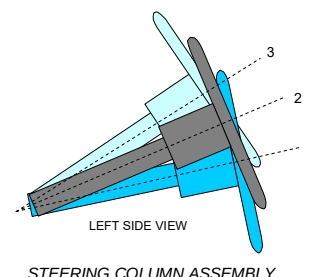
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

STEERING COLUMN ADJUSTMENT

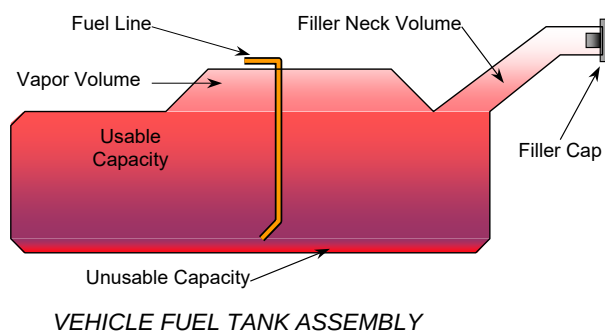
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	15.6	
Geometric Center - Position 2	23.0	
Uppermost - Position 3	30.3	
Telescoping Steering Wheel Travel		
Test Position	23.0	



FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel when the ignition key is turned to the RUN position.



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	26.60

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

DATA SHEET NO. 3

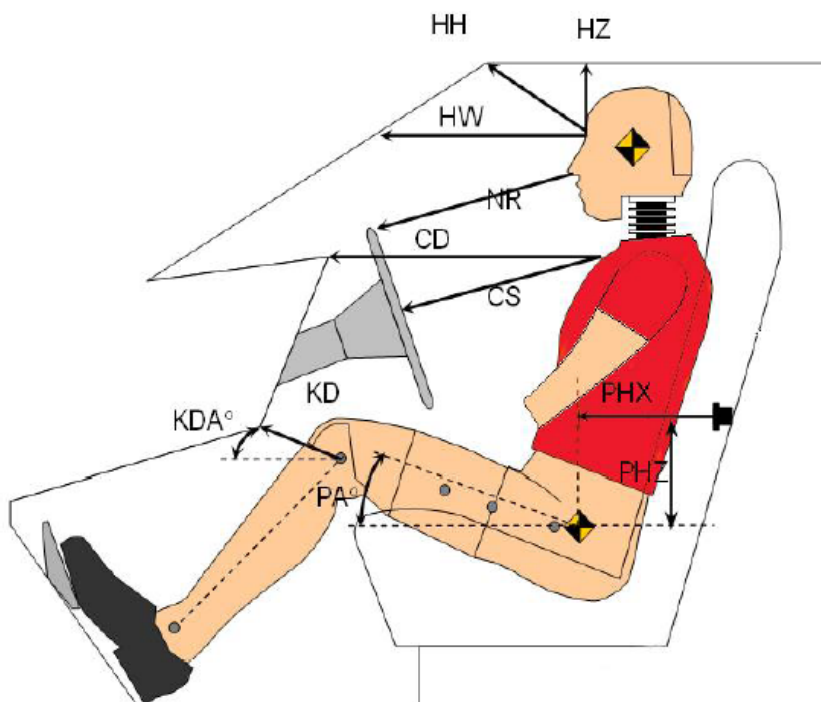
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18



Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	289	
HW	Head to Windshield	567	
HZ	Head to Roof	203	
NR	Nose to Rim	227	
CD	Chest to Dash	423	
CS	Chest to Steering Wheel	158	
KD(L)/KDA(L)°	Left Knee to Dash	98	7.8
KD(R)/KDA(R)°	Right Knee to Dash	73	20.8
PAX°	Pelvic Tilt Angle (x-axis)		19.9
PAY°	Pelvic Tilt Angle (y-axis)		0.1
PHX	Hip Point to Striker (x-axis)	369	
PHZ	Hip Point to Striker (z-axis)	-51	

DATA SHEET NO. 4

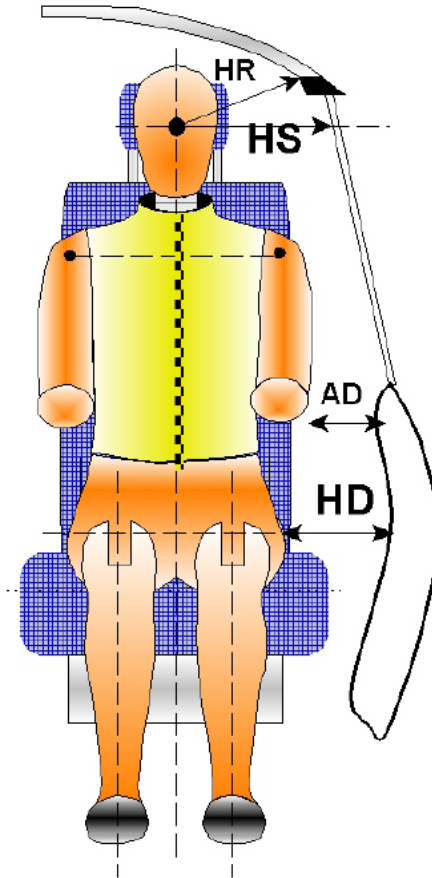
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18

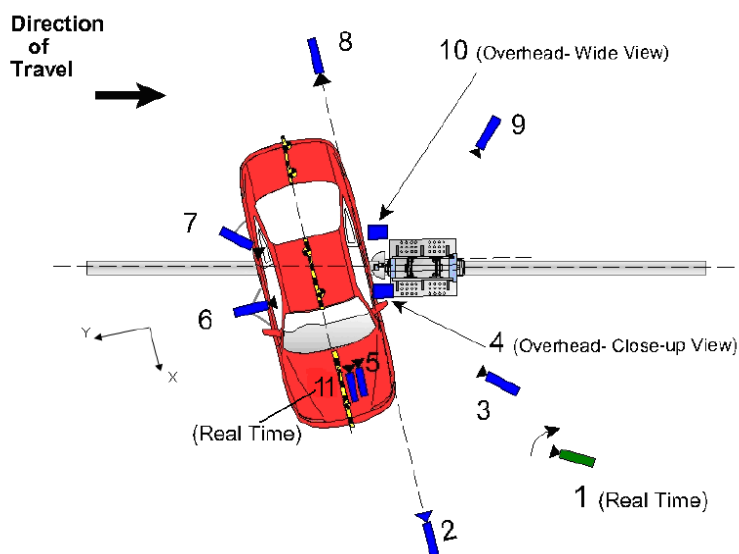


Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	235
HS	Head to Side Window	mm	375
AD	Arm to Door	mm	143
HD	Hip Point to Door	mm	149

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18



Reference from Point of Impact for X and Y; from Ground for Z):
 +X = Forward of Vehicle, +Y = Right of Vehicle, +Z = Down

Camera No.	View	Coordinates (m)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real Time Pan View of Impact	8.89	46.57	-3.04		30
2	Front Ground Level - Impact View	8.34	-0.05	-0.93	24	1000
3	Impact Side 45° - Forward Pole View	4.10	-2.15	-1.15	8.5	1000
4	Overhead Close-Up View of Impact	0.00	0.00	-5.79	12.5	1000
5	On-Board - Dummy Front View	1.15	0.41	-1.54	8.5	1000
6	On-Board - Dummy Side View	1.19	0.35	-1.49	8.5	1000
7	On-Board - Dummy Rear Oblique View	-0.02	1.70	-1.16	8.5	1000
8	Rear Ground Level - Impact View	-6.12	-6.23	-0.96	24	1000
9	Impact Side 45° - Rearward Pole View	-8.02	0.04	-1.01	35	1000
10	Overhead Wide View of Impact	-0.06	0.22	-5.79	14	1000
11	Real Time Dummy Front View	-0.88	1.70	-1.19		30

*All measurements accurate to ± 6 mm

INSTRUMENTATION

Driver Dummy Channels	19
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	45

DATA SHEET NO. 6

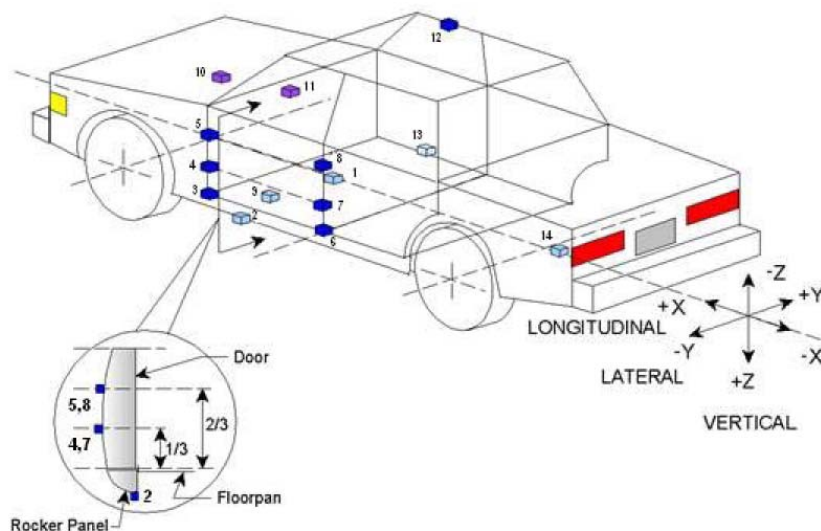
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18

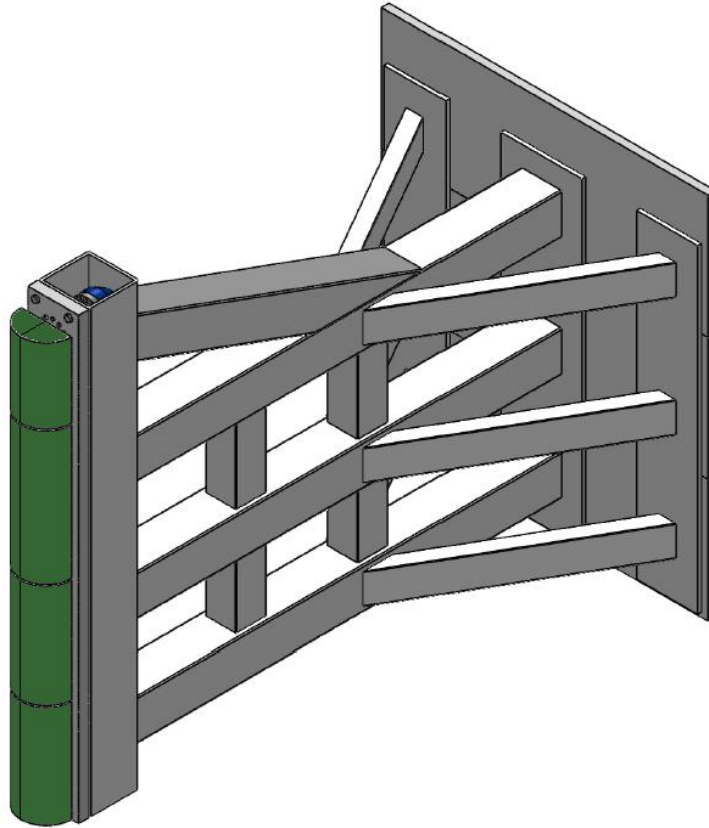


Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2690	0	-520
2	Left Floor Sill	3110	-710	-420
3	A-Pillar Sill	3620	-700	-600
4	A-Pillar Low	3800	-700	-650
5	A-Pillar Mid	3800	-700	-800
6	B-Pillar Sill	2770	-690	-580
7	B-Pillar Low	710	-690	-780
8	B-Pillar Mid	2710	-690	-930
9	Driver Seat Track	3030	-580	-600
10	Engine Top	4300	-50	-1010
11	Firewall	4010	350	-1050
12	Right Roof	2930	550	-1720
13	Right Floor Sill	3160	680	-490
14	Rear Floorpan	1835	0	-700

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

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18



ID	Units	Height From Ground
1	mm	87
2	mm	468
3	mm	648
4	mm	978
5	mm	1168
6	mm	1651
7	mm	1816
8	mm	2057

DATA SHEET NO. 8**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Headrest
Left Shoulder	Curtain Airbag, Side Airbag
Upper Torso	Seat, Side Airbag
Lower Torso	Seat, Side Airbag
Left Hip	Seat, Side Airbag
Left Knee	Knee Bolster

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation occurred
Sill Separation	No separation occurred
Windshield Damage	Broken
Side Window Damage	Left front window broken
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. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	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	No	No	
Seat Belt Load Limiter	Yes	No	No	

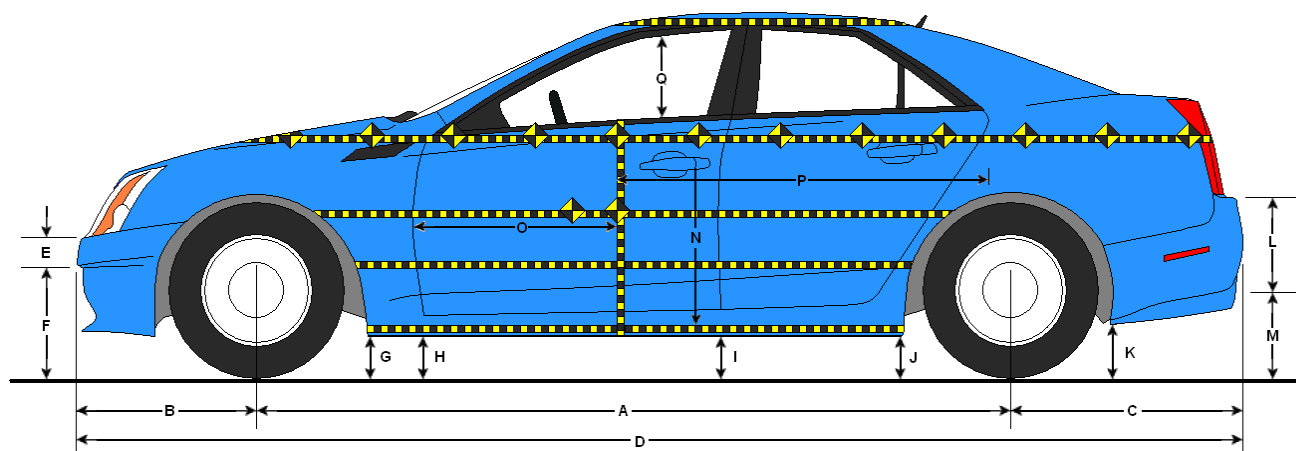
IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1216
Actual Impact Point (Aft of Front Axle)	mm		1220
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	-4
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	74.8
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.32
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.31

DATA SHEET NO. 9

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18



LEFT SIDE VIEW

All measurements in mm with tolerance of ± 3 mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3200	3157	-43
B	Front Axle to FSOV	799	831	32
C	Rear Axle to RSOV	1228	1191	-37
D	Total Length at Centerline	5213	5179	-34
E	Front Bumper Thickness	318	320	2
F	Front Bumper Bottom to Ground	408	332	-76
G	Sill Height at Front Wheel Well	338	253	-85
H	Sill Height at Front Door Leading Edge	372	307	-65
I	Sill Height at B-Pillar	395	358	-37
J1	Sill Height at Rear Wheel Well	379	380	1
J2	Pinch Weld Height at Rear Wheel Well	357	349	-8
K	Sill Height Aft of Rear Wheel Well	419	463	44
L	Rear Bumper Thickness	141	141	0
M	Rear Bumper Bottom to Ground	485	544	59
N	Sill Height to Bottom of Front Window Sill	674	655	-19
O	Front Door Leading Edge to Impact CL	620	501	-119
P	Rear Door Trailing Edge to Impact CL	1365	1245	-120
Q	Front Window Opening	502	535	33
R	Right Side Length	4549	4546	-3
S	Left Side Length	4548	4437	-111
T	Vehicle Width at B-Pillar	1779	1743	-36

DATA SHEET NO. 10

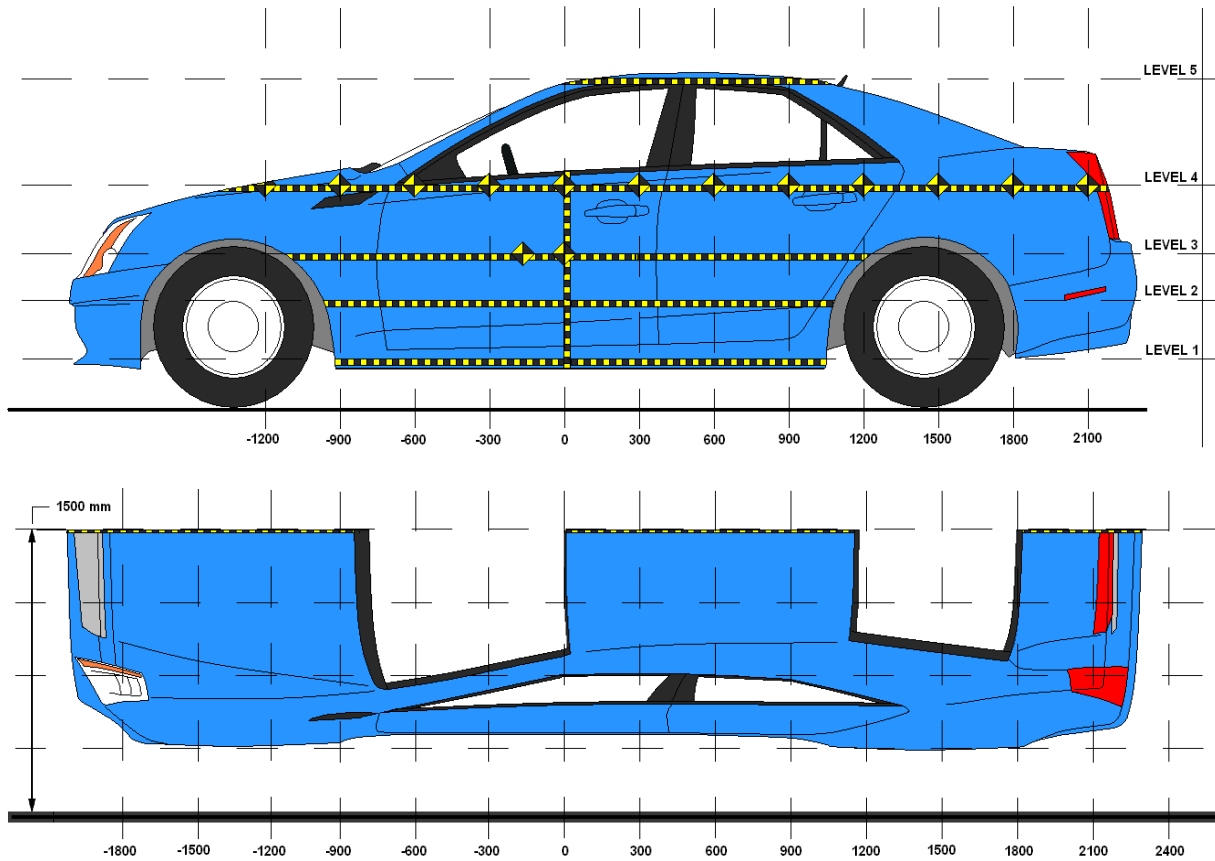
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18



NOTE: All measurements in mm with tolerance of $\pm 3\text{mm}$

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	409	425	0
2	Occupant H-Point	813	478	0
3	Mid-Door	848	475	0
4	Window Sill	1092	440	0
5	Window Top	1687	257	0

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204
 Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18

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		580	589	661			686	692	736			106	103	75	
-750		622	626	655			747	744	745			125	118	90	
-600	680	623	623	649		821	720	715	739		141	97	92	90	
-450	683	619	620	650		898	814	810	816		215	195	190	166	
-300	684	616	616	644		958	911	906	899		274	295	290	255	
-150	680	614	614	641		1025	1003	1003	991		345	389	389	350	
0	678	612	612	636	868	1103	1090	1087	1076	1125	425	478	475	440	257
150	678	610	611	634	869	1073	1053	1054	1044	1095	395	443	443	410	226
300	678	609	609	631	871	967	931	929	920	1042	289	322	320	289	171
450	676	608	609	630	873	892	815	814	810	1004	216	207	205	180	131
600	680	608	609	631	871	857	773	772	783	983	177	165	163	152	112
750	676	609	609	631	870	836	754	753	764	973	160	145	144	133	103
900	675	609	610	631	869	812	736	734	745	967	137	127	124	114	98
1050	677	610	610	631	869	790	717	715	726	961	113	107	105	95	92
1200	673	610	611	630	869	778	698	697	706	956	105	88	86	76	87
1350		611	611	630	866		679	678	686	952		68	67	56	86
1500		616	618	643			652	653	678			36	35	35	
1650		576	584	642			605	614	672			29	30	30	
1800			571	640				597	668				26	28	
1950				639					665					26	
2100															
2250															
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

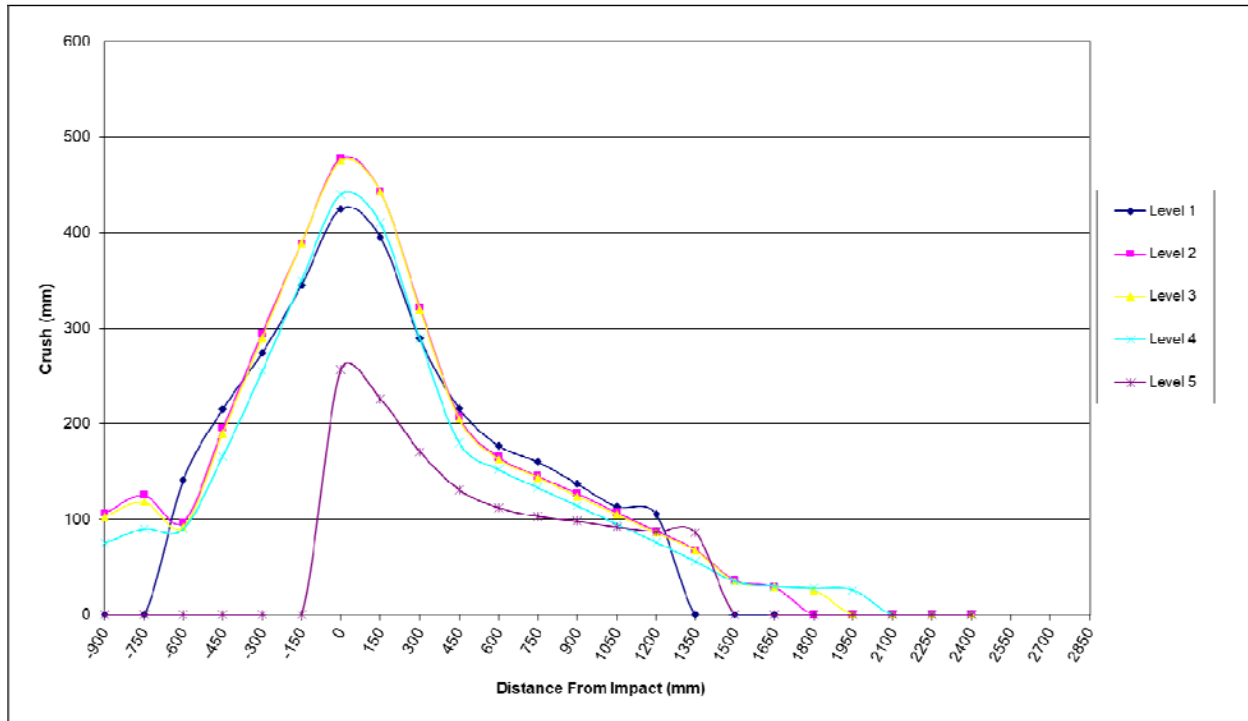
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18

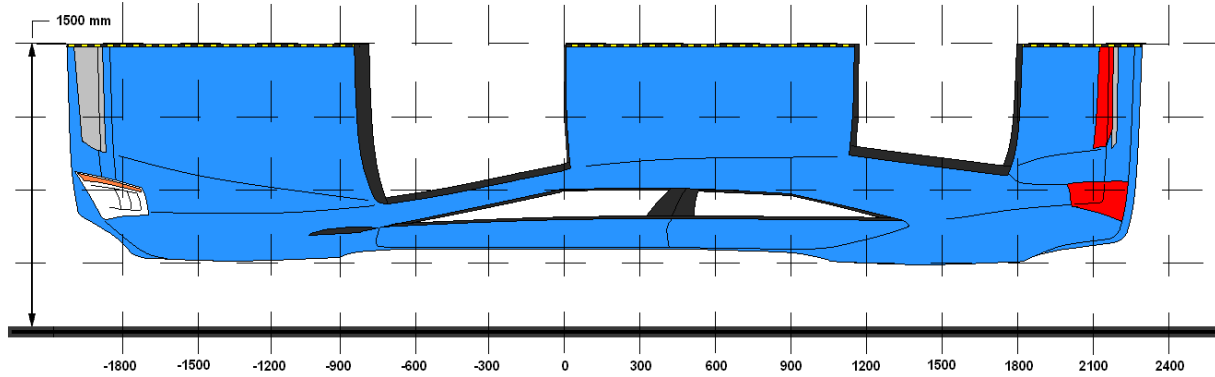


DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test Test Date: 10/31/18



DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	1950	4	639	665	26
2	1350	4	866	952	86
3	750	1	676	836	160
4	300	3	609	931	322
5	-300	2	616	911	295
6	-900	2	580	686	106

DATA SHEET NO. 12

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

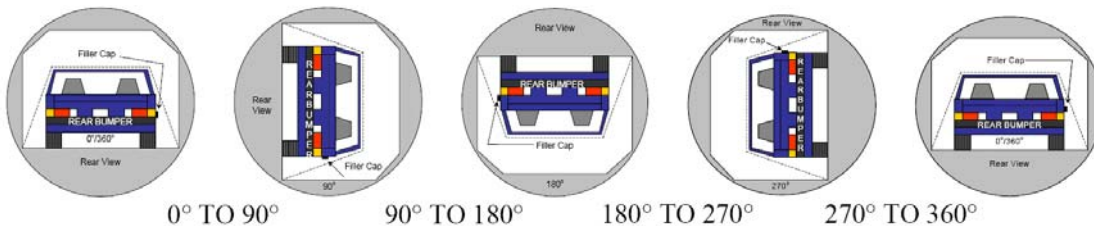
Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18

Temperature at Time of Impact: 18.9° C

Test Time: 1:22 PM

- 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°	79	300	379
180° To 270°	80	300	380
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°	No Spillage Occurred
90° To 180°	No Spillage Occurred
180° To 270°	No Spillage Occurred
270° To 360°	No Spillage Occurred

DATA SHEET NO. 13

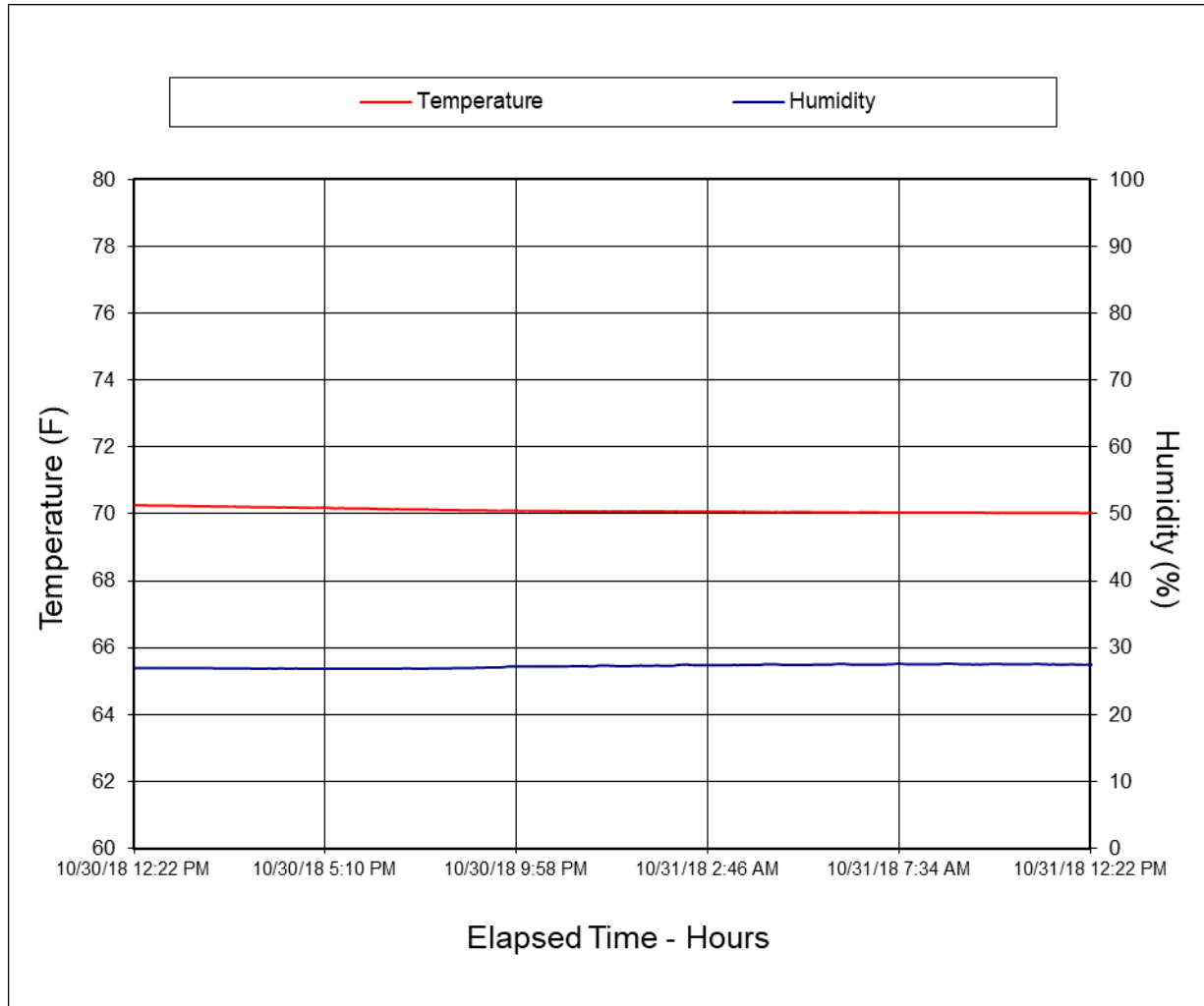
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2019 Nissan Frontier S Crew Cab 4-Door Truck

NHTSA No. M20195204

Test Program: NCAP Side Pole Impact Test

Test Date: 10/31/18



APPENDIX A
PHOTOGRAPHS

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



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



FIGURE 3. Pre-Test Frontal View of Test Vehicle



FIGURE 4. Post-Test Frontal View of Test Vehicle



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



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



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



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



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



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



FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle



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



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



FIGURE 15. Pre-Test Overhead View of Test Area

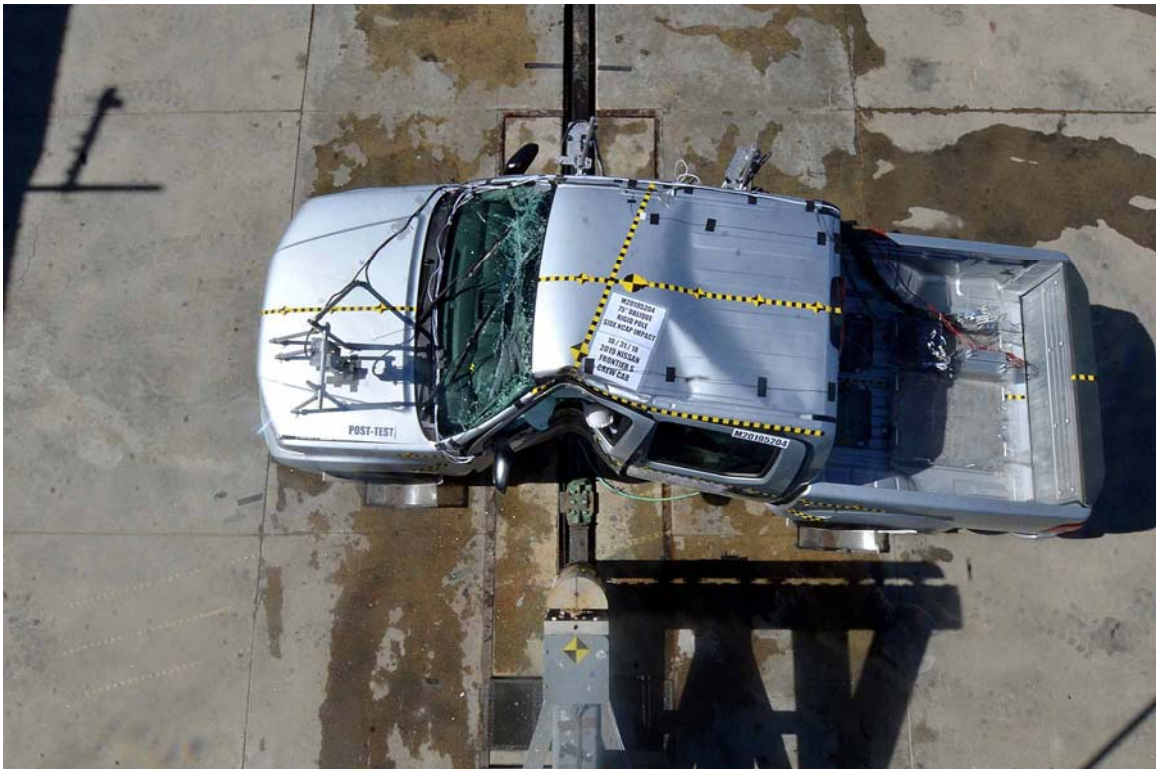


FIGURE 16. Post-Test Overhead View of Test Area



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



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



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



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



FIGURE 21. Pre-Test Front Close-Up View of Dummy Head and Chest

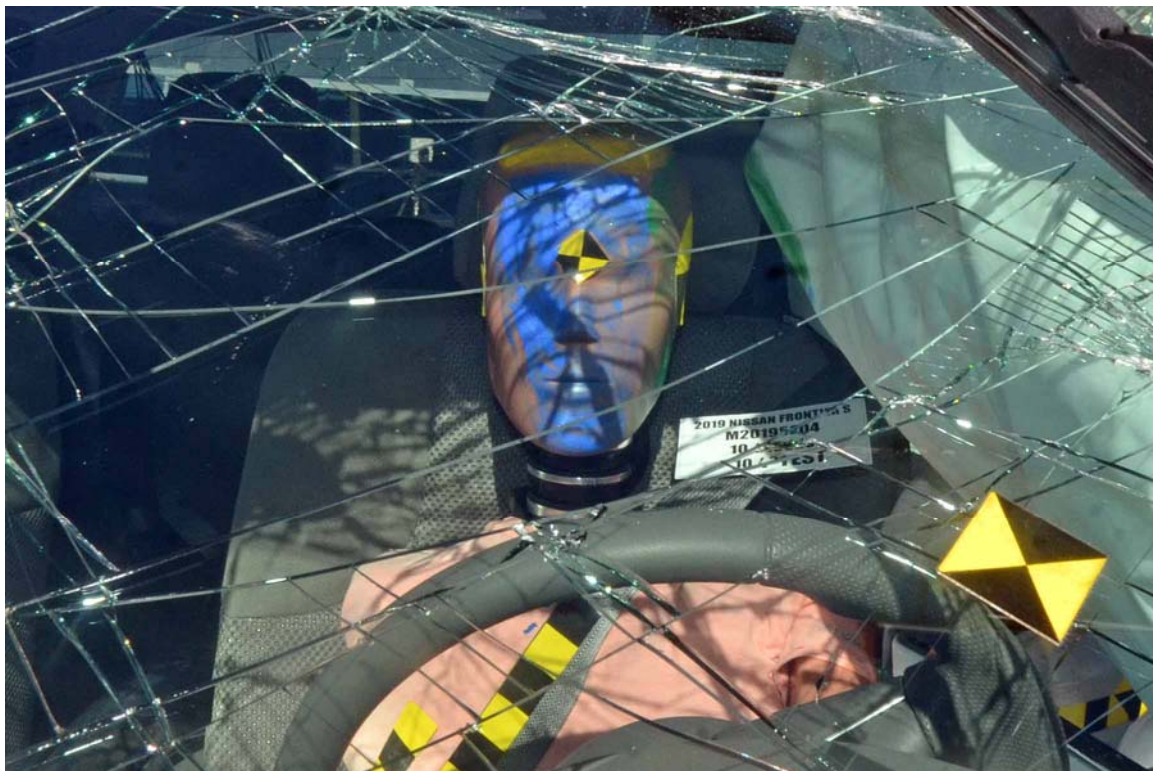


FIGURE 22. Post-Test Front Close-Up View of Dummy



FIGURE 23. Pre-Test Left Side View of Dummy Showing Belt and Chalking



FIGURE 24. Pre-Test Left Side View of Dummy Shoulder and Door Top View



FIGURE 25. Post-Test Left Side View of Dummy Shoulder and Door Top View

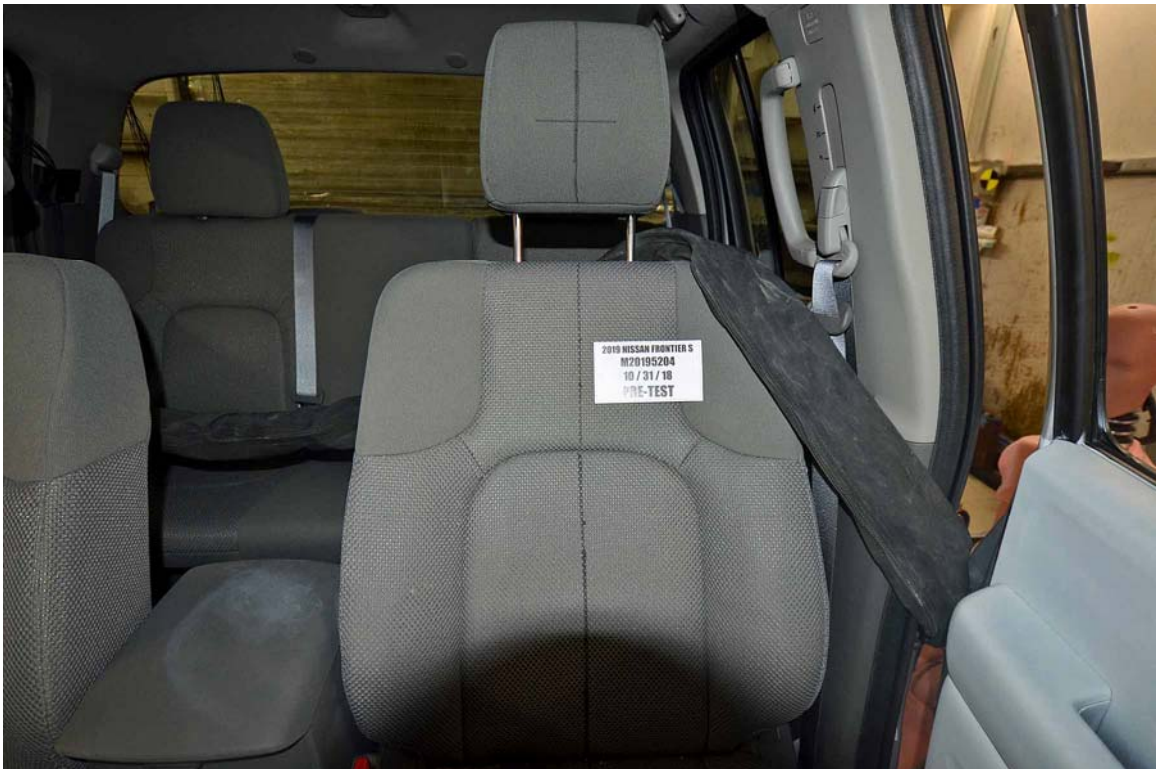


FIGURE 26. Pre-Test Frontal View of Seat Back Prior to Dummy Positioning



FIGURE 27. Pre-Test Frontal Close-Up View of
Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 28. Pre-Test Overhead View of Seat Pan Prior to Dummy Positioning



FIGURE 29. Pre-Test Overhead View of Dummy Thighs on Seat Pan

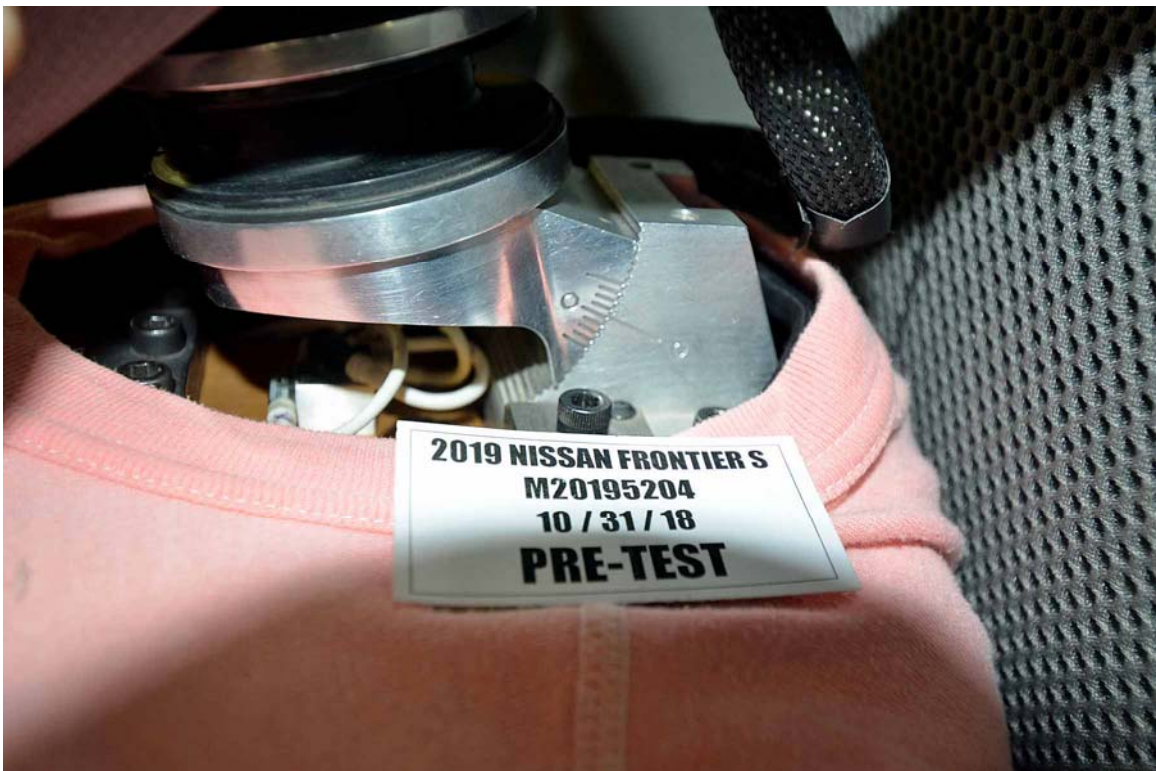


FIGURE 30. Pre-Test Left Side View of Dummy's Neck
Showing Position of Adjustable Neck Bracket

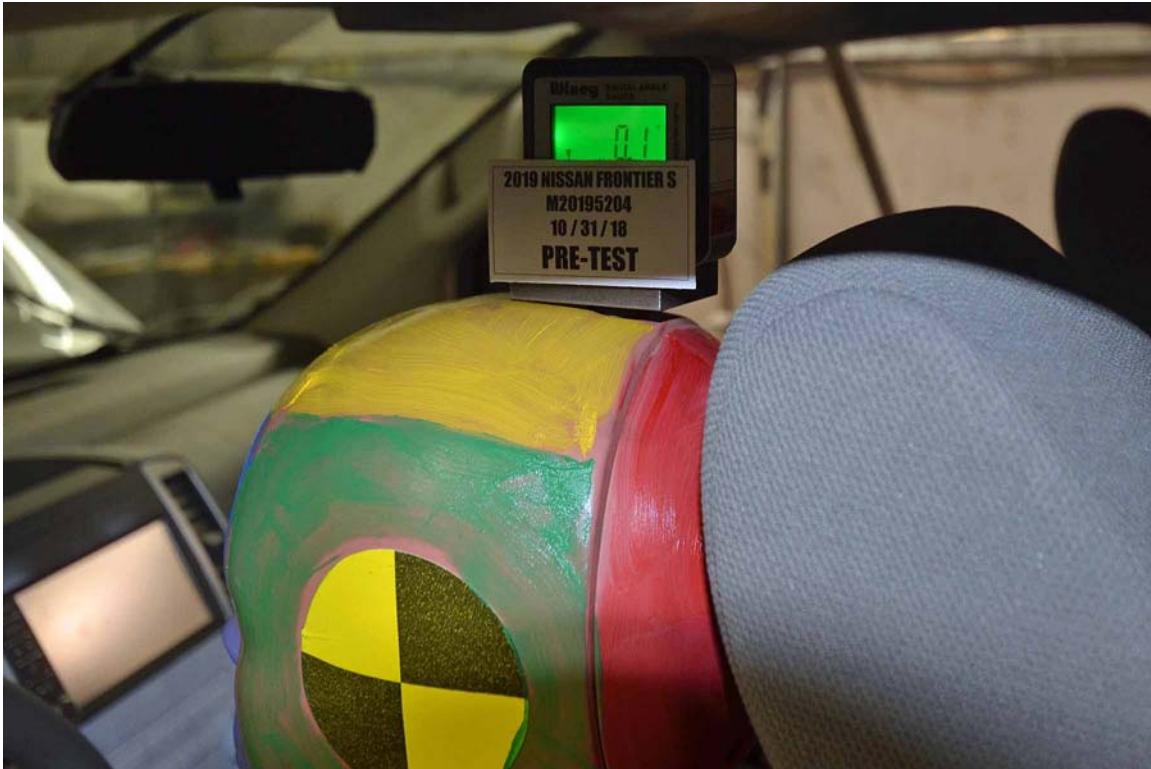


FIGURE 31. Pre-Test Left Side View of Dummy's Head
Showing Dummy's Head is Level



FIGURE 32. Pre-Test Placement of Dummy's Feet



FIGURE 33. Pre-Test View of Belt Anchorage for Dummy

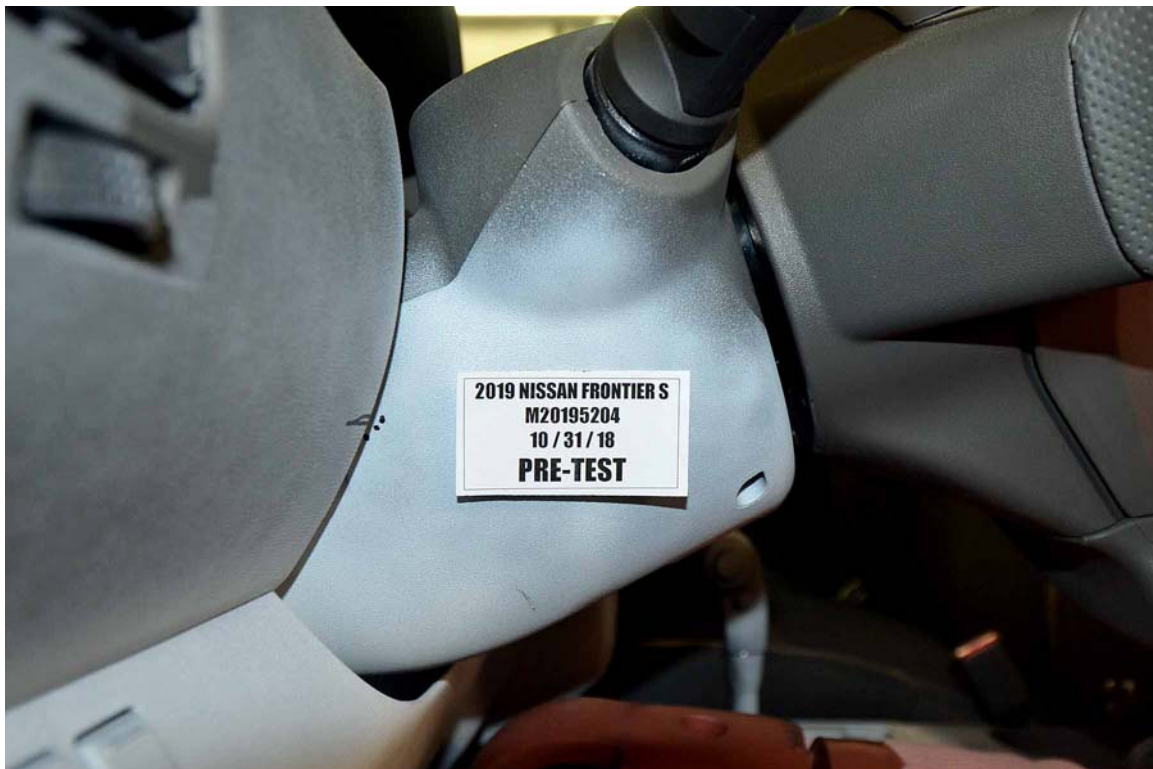


FIGURE 34. Pre-Test Left Side View of Steering Wheel



FIGURE 35. View of Disengaged Parking Brake



FIGURE 36. Pre-Test View of Parking Brake



FIGURE 37. Pre-Test Close-Up Left Side View of Driver Seat Track



FIGURE 38. Pre-Test Close-Up Left Side View of Driver Seat Back



FIGURE 39. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 40. Pre-Test Dummy and Door Clearance View



FIGURE 41. Post-Test Dummy and Door Clearance View



FIGURE 42. Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



FIGURE 43. Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment

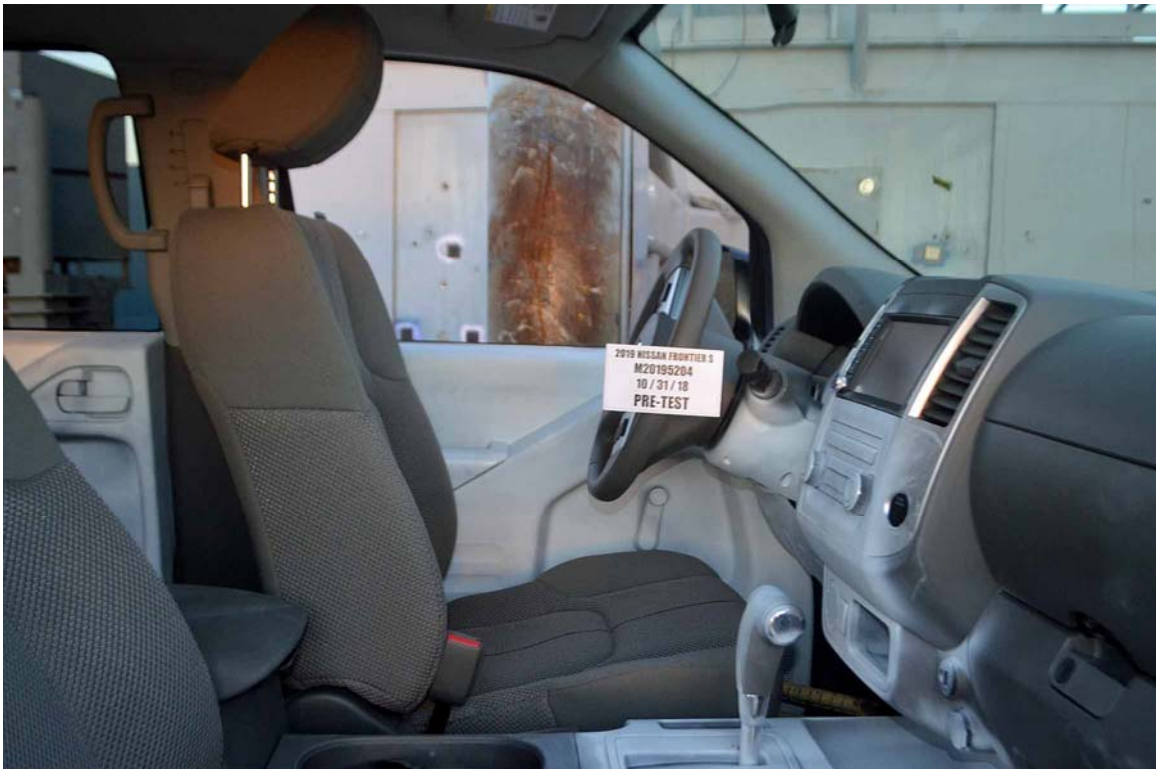


FIGURE 44. Pre-Test Inner Door Panel View



FIGURE 45. Post-Test Inner Door Panel View Showing Dummy Contact Locations



FIGURE 46. Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



FIGURE 47. Post-Test Dummy Close-Up Head Contact With Side Airbag View



FIGURE 48. Post-Test Dummy Close-Up Torso Contact With Vehicle Interior View



FIGURE 49. Post-Test Dummy Close-Up Torso Contact With Side Airbag View



FIGURE 50. Post-Test Dummy Close-Up Pelvis Contact With Vehicle Interior View



FIGURE 51. Post-Test Dummy Close-Up Pelvis Contact With Side Airbag View



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



FIGURE 53. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 54. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 55. Close-Up View of Vehicle's Certification Label

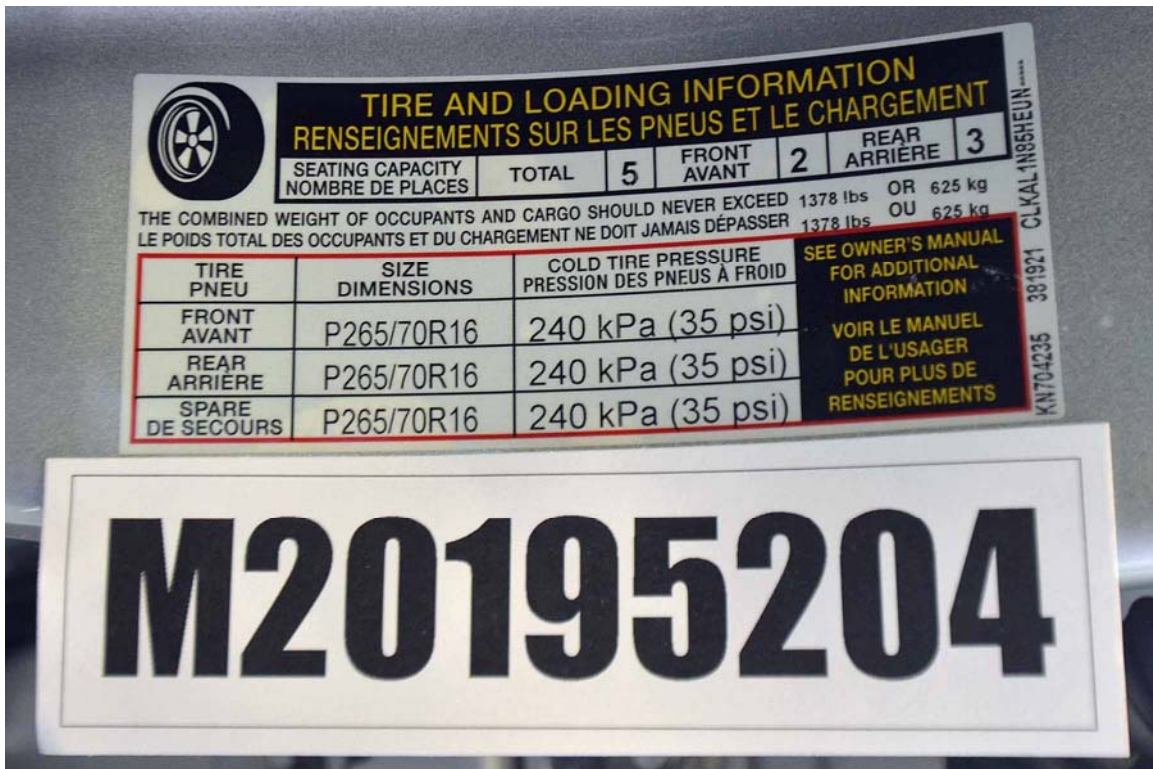


FIGURE 56. Close-Up View of Vehicle's Tire Information Placard or Label



FIGURE 57. Pre-Test Pole Barrier Front View



FIGURE 58. Post-Test Pole Barrier Front View



FIGURE 59. Pre-Test Pole Barrier Side View



FIGURE 60. Post-Test Pole Barrier Side View

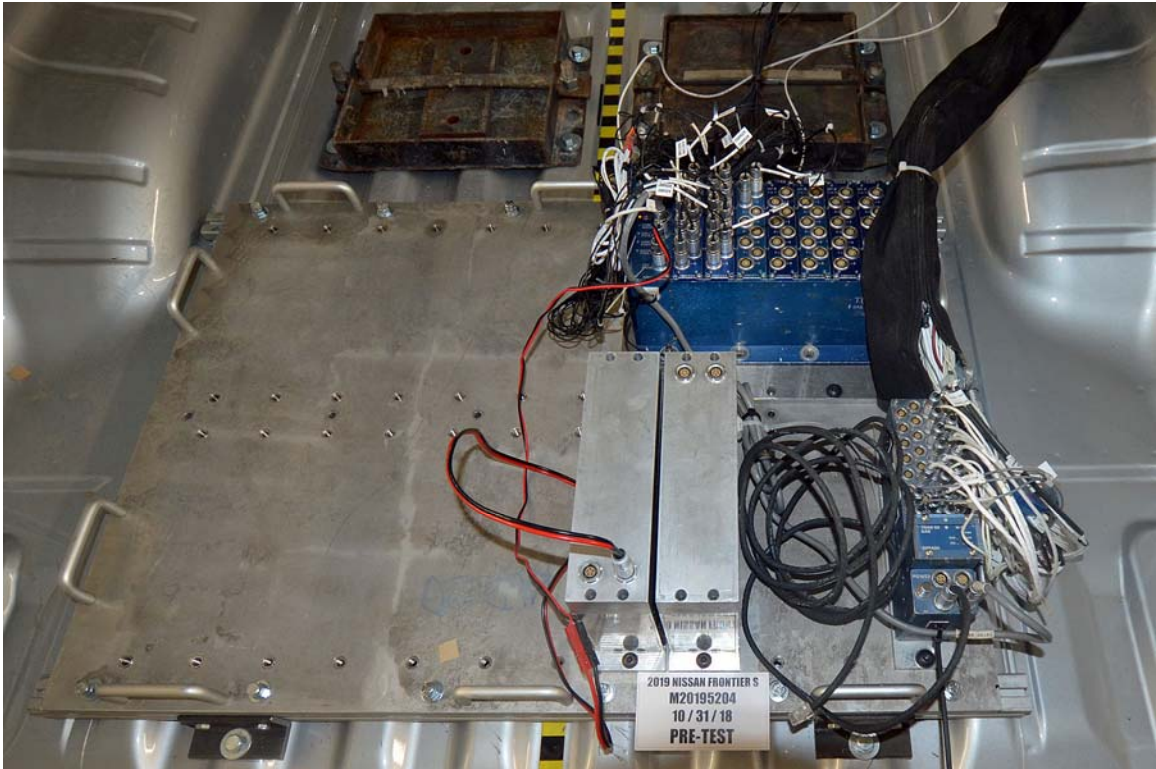


FIGURE 61. Pre-Test Ballast View



FIGURE 62. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 63. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 64. FMVSS No. 301 Static Rollover 90 Degrees



FIGURE 65. FMVSS No. 301 Static Rollover 180 Degrees



FIGURE 66. FMVSS No. 301 Static Rollover 270 Degrees

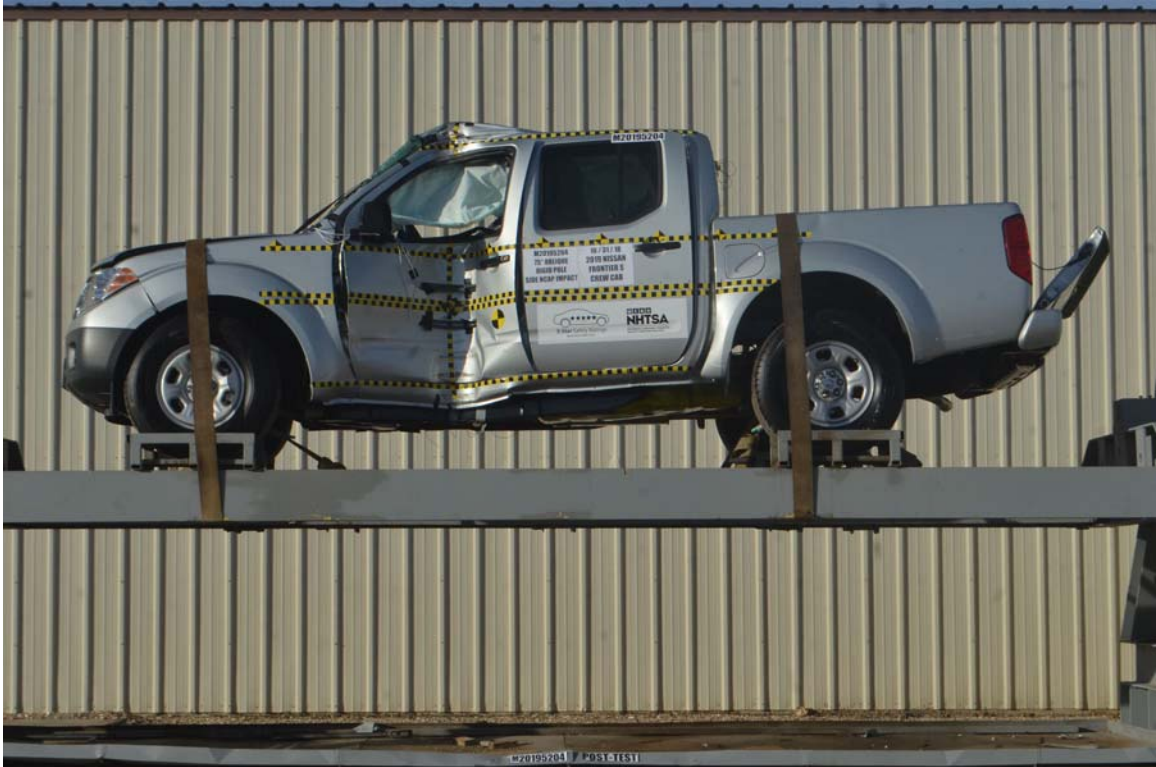


FIGURE 67. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 68. Impact Event

2019 NISSAN FRONTIER

S CREW CAB

4X2 AUTOMATIC V6

Scan QR code for general model information & options

Manufacturer's Suggested Retail Base Price: \$26,000.00

Options Included by Manufacturer:

DESTINATION CHARGES: \$95.00

Total: \$26,995.00

Standard Equipment Included at No Extra Charge

MECHANICAL & PERFORMANCE

- 4.0-liter DOHC V6 Engine
- 261 Horsepower and 281 ft.-lb. of Torque
- 5-Speed Automatic Transmission
- 4-Wheel Vented Disc Brakes
- 3-Wheel Active Brake Limited Slip (ABS)
- 16" Styled Steel Wheels
- Full Size Spare
- POWER/STEER All-Season Tires

SAFETY & SECURITY

- Driver & Front Passenger, Side-Impact, & Curtain Air Bags
- Front Seat Active Head Restraints
- Lower Anchors & Tethers for Children (LATCH)
- Pipe-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)

COMFORT & CONVENIENCE

- 60/40 Split Fold-Down Rear Seat
- Cruise Control
- 6-Speaker AM/FM/UX Audio System
- 7" Color Display Audio
- USB Connection Port for iPod/iPhone and Other Compatible Devices
- Streaming Audio via Bluetooth®
- Bluetooth® Hands-Free Phone System**
- Satellite Eyes Free**
- Hands-Free Text Messaging Assistant**
- Steering Wheel Audio Controls
- Power Windows/Defender w/ Timer
- Full Length Rear Under-Seat Storage
- Multiple 12 Volt DC Power Outlets
- Front Reading/Map Lamps
- Roof Console w/Sunglass Holder
- Rear View Monitor
- Manual Tilt Steering

EXTERIOR

- Cab-Mounted Cargo Bed Lamp
- Black Front Bumper
- Chrome Front Grille
- Body Color Rear Bumper
- Tinted Rear Privacy Glass

** For more information, see dealer, owner's manual or www.nissanusa.com/connected/important-information

Fuel Economy and Environment

Fuel Economy

19 MPG
combined city/hwy

16 MPG
city

23 MPG
highway

5.3 gallons per 100 miles

You spend \$3,000 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,000

Fuel Economy & Greenhouse Gas Rating

3 (out of 10)

Smog Rating

3 (out of 10)

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

Frontal Crash Driver Passenger ***

Side Crash Front seat Not Rated Rear seat Not Rated

Rollover ***

DELIVERY

VEHICLE COLORS: EXT. BRILLIANT SILVER INT. STEEL

FINAL ASSEMBLY POINT: CANTON

TRANSPORT METHOD: TRUCK

DEALER: JET TO NISSAN OF REDLANDS 1998 INDUSTRIAL PARK AVE REDLANDS CA 92374

Star ratings range from 1 to 5 stars (***), with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4226**

Security+Plus Extended Protection Plan

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.

Warranty: 36 MONTH/50,000 MILES

EMISSIONS: EPA EST. 27 CITY/37 HWY MPG

OPTIONAL EQUIPMENT: \$1,995

2019/10/13 13:15:00/03/18

FIGURE 69. Monroney Label

HEAD RESTRAINTS/HEADRESTS

WARNING: Head restraints/seat belts are designed to protect you in the event of a crash. If you do not use them properly, you may increase your risk of injury or death in an accident or collision.

WARNING: Head restraints/seat belts are designed to protect you in the event of a crash. If you do not use them properly, you may increase your risk of injury or death in an accident or collision.

CRASH TEST

1-10 Safety—Seats, seat belts and supplemental restraint system

ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

INSTALL:

- Align the head restraint/headrest with the top of the seat. Head restraints/seat belts are designed to protect you in the event of a crash. If you do not use them properly, you may increase your risk of injury or death in an accident or collision.
- Push and hold the lock knob and pull the head restraint/headrest down.
- Properly adjust the head restraint/headrest before an occupant uses the seating position.

ADJUST:

Adjust the head restraint/headrest to the correct height. The top of your head should be in contact with the head restraint/headrest at the highest position.

REMOVE:

Use the following procedure to remove the head restraint/headrest:

1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not lost in the vehicle.

1-12 Safety—Seats, seat belts and supplemental restraint system

NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

INSTALL:

1. Remove head restraint/headrest.
2. Single notch.
3. Lock knob.
4. Status.

REMOVE:

Use the following procedure to remove the head restraint/headrest:

1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not lost in the vehicle.

1-12 Safety—Seats, seat belts and supplemental restraint system

FRONT-SEAT ACTIVE HEAD RESTRAINTS

INSTALL:

1. Align the head restraint/headrest with the top of the seat. Head restraints/seat belts are designed to protect you in the event of a crash. If you do not use them properly, you may increase your risk of injury or death in an accident or collision.
2. Push and hold the lock knob and pull the head restraint/headrest down.
3. Properly adjust the head restraint/headrest before an occupant uses the seating position.

ADJUST:

Adjust the head restraint/headrest to the correct height. The top of your head should be in contact with the head restraint/headrest at the highest position.

REMOVE:

Use the following procedure to remove the head restraint/headrest:

1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not lost in the vehicle.

1-14 Safety—Seats, seat belts and supplemental restraint system

FIGURE 70. 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	B-1
2	Driver Head Acceleration (Y) Primary	B-1
3	Driver Head Acceleration (Z) Primary	B-1
4	Driver Head Acceleration Primary Resultant	B-1
5	Driver Lower Spine T12 Acceleration (X)	B-2
6	Driver Lower Spine T12 Acceleration (Y)	B-2
7	Driver Lower Spine T12 Acceleration (Z)	B-2
8	Driver Lower Spine T12 Acceleration Resultant	B-2
9	Driver Iliac Wing Force on Impact Side (Y)	B-3
10	Driver Acetabulum Force on Impact Side (Y)	B-3
11	Driver Total Pelvis Force on Impact Side (Y)	B-3

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at

www.NHTSA.dot.gov

Additional Driver Dummy Instrumentation Data

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

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)

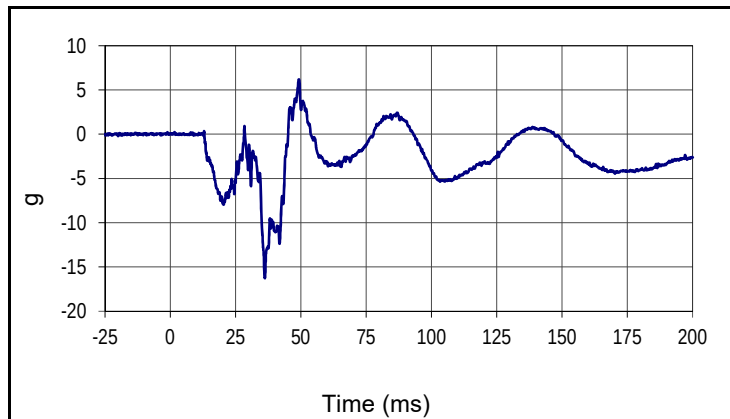
Left B-Pillar Sill Acceleration
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

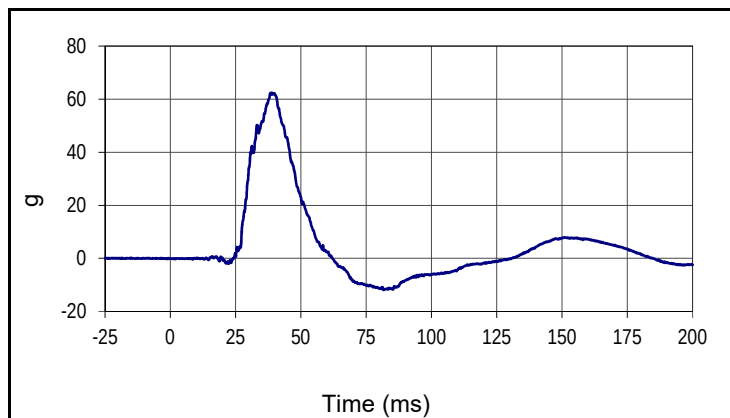
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

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

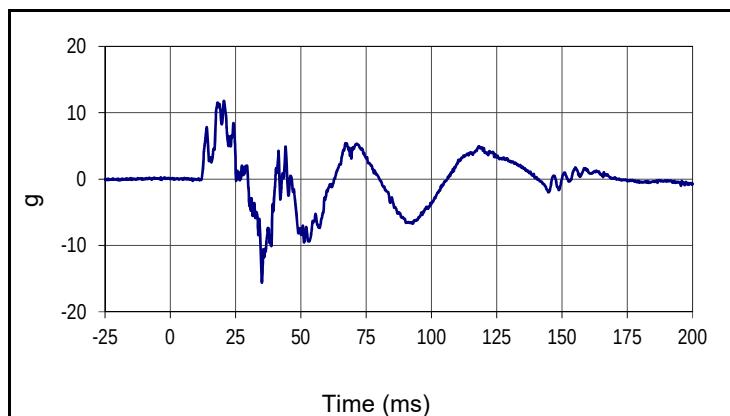
NHTSA No.: M20195204
 Test Date: 10/31/2018



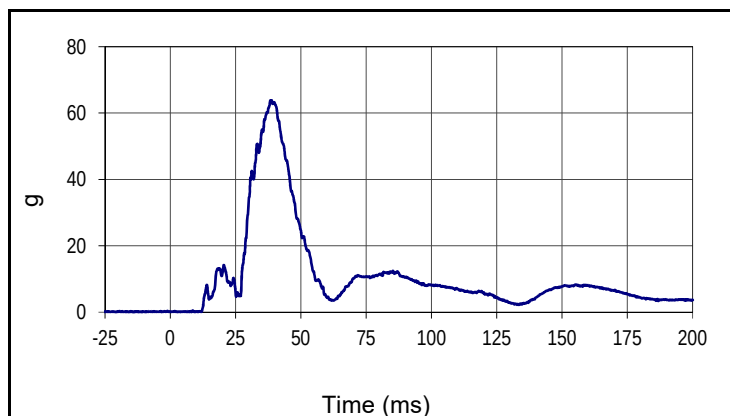
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
6.2	49.2	-16.3	36.2



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
62.4	38.8	-11.9	81.6



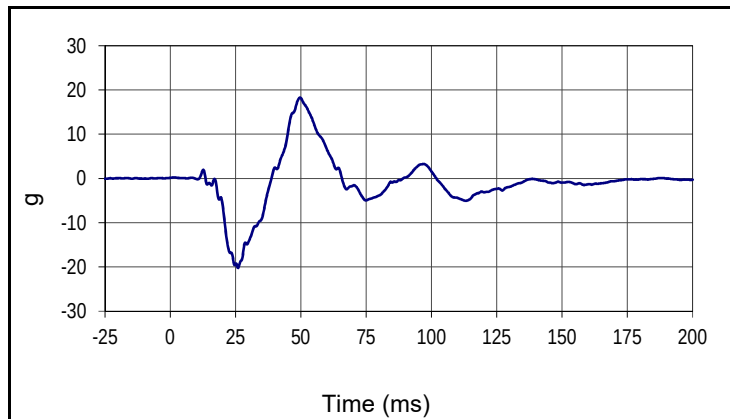
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
11.8	20.5	-15.6	35.1



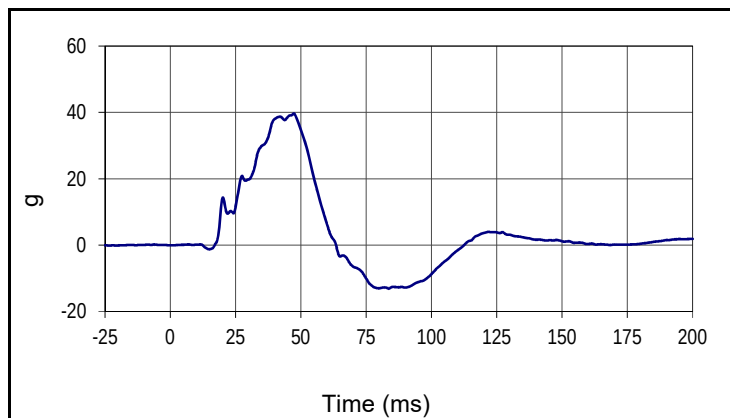
Curve Description			
Driver Head Acceleration Primary Res.			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
63.9	38.8	0.0	8.3

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

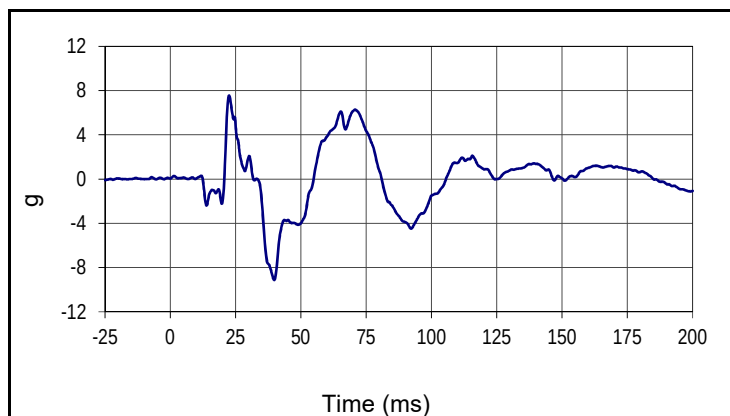
NHTSA No.: M20195204
 Test Date: 10/31/2018



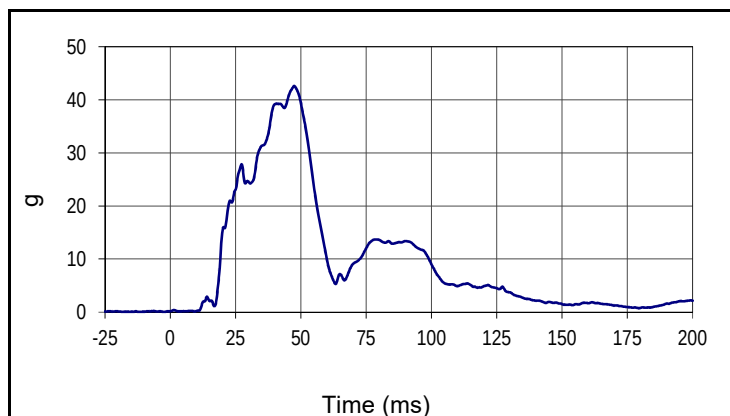
Curve Description			
Driver Lower Spine T12 Acceleration X			
Plot No.		SAE Class	Units
005		180	g
Max	Time	Min	Time
18.3	49.6	-20.2	25.9



Curve Description			
Driver Lower Spine T12 Acceleration Y			
Plot No.		SAE Class	Units
006		180	g
Max	Time	Min	Time
39.7	47.3	-13.1	83.7



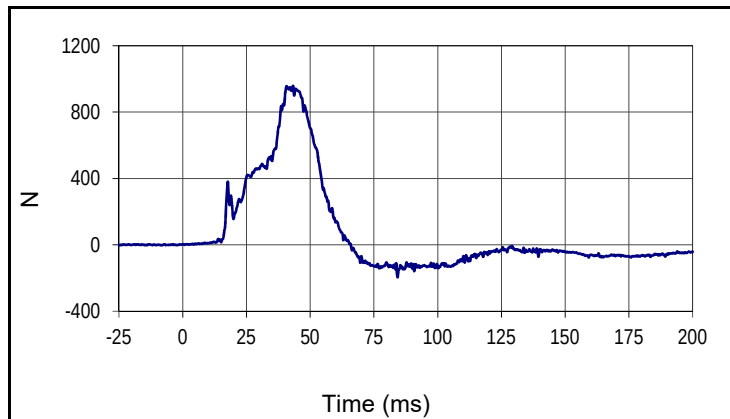
Curve Description			
Driver Lower Spine T12 Acceleration Z			
Plot No.		SAE Class	Units
007		180	g
Max	Time	Min	Time
7.6	22.5	-9.1	39.8



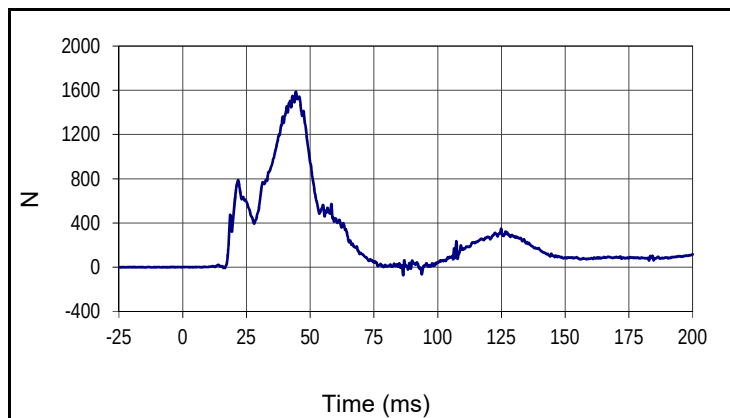
Curve Description			
Driver Lower Spine T12 Acceleration Res.			
Plot No.		SAE Class	Units
008		180	g
Max	Time	Min	Time
42.6	47.4	0.1	9.3

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

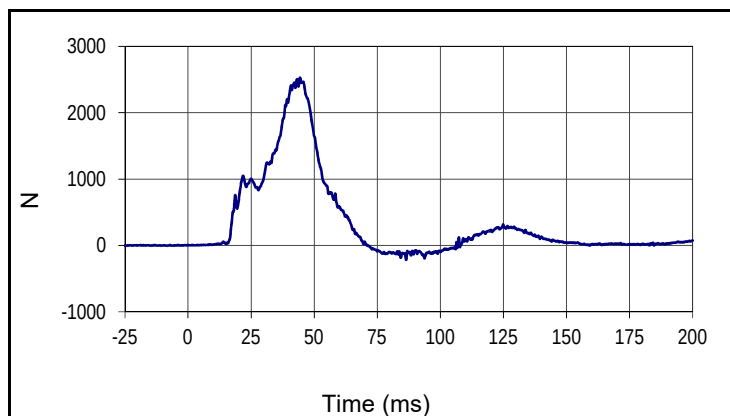
NHTSA No.: M20195204
 Test Date: 10/31/2018



Curve Description			
Driver Iliac Wing Impact Side Force Y			
Plot No.		SAE Class	Units
009		600	N
Max	Time	Min	Time
957.7	43.3	-195.8	84.3



Curve Description			
Driver Acetabulum Impact Side Force Y			
Plot No.		SAE Class	Units
010		600	N
Max	Time	Min	Time
1586.9	44.4	-72.4	86.5



Curve Description			
Driver Total Pelvic Force on Impact Side Y			
Plot No.		SAE Class	Units
011		600	N
Max	Time	Min	Time
2527.0	44.3	-215.1	86.5

APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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



SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 299

Test Date: 2018-10-10

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Relative Humidity	%	10	70	44	Pass
A - Sitting Height	mm	772	788	782	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	83	Pass
D - H Point From Seatback	mm	141	151	148	Pass
E - Shoulder Pivot From Backline	mm	97	107	107	Pass
F - Thigh Clearance	mm	119	135	123	Pass
G - Head Breadth	mm	140	148	142	Pass
H - Head Back From Backline	mm	40	46	45	Pass
I - Head Depth	mm	178	188	182	Pass
J - Head Circumference	mm	541	551	546	Pass
K - Buttock To Knee Length	mm	514	540	524	Pass
L - Popliteal Height	mm	343	369	362	Pass
K - Knee Pivot To Floor Height	mm	392	409	399	Pass
N - Buttock Popliteal Length	mm	416	442	431	Pass
O - Chest Depth W/O Jacket	mm	195	211	207	Pass
P - Foot Length	mm	216	232	227	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	315	Pass
R - Arm Length	mm	249	259	253	Pass
S - Knee Joint To Seatback	mm	477	493	483	Pass
V - Shoulder Width	mm	341	357	349	Pass
W - Foot Width	mm	78	94	87	Pass
Y - Chest Circumference W/Jacket	mm	851	881	866	Pass
Z - Waist Circumference	mm	761	791	776	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

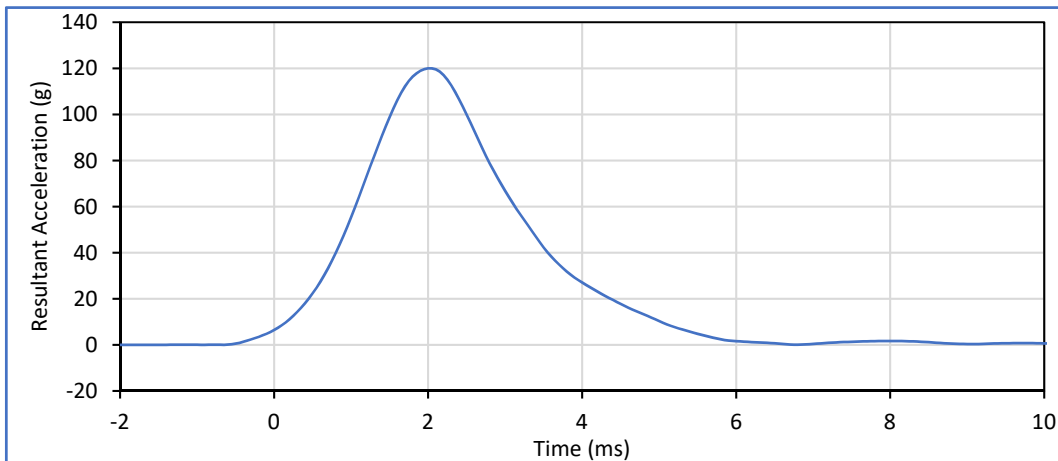


SID-IIs Small Side Impact ATD Head Drop

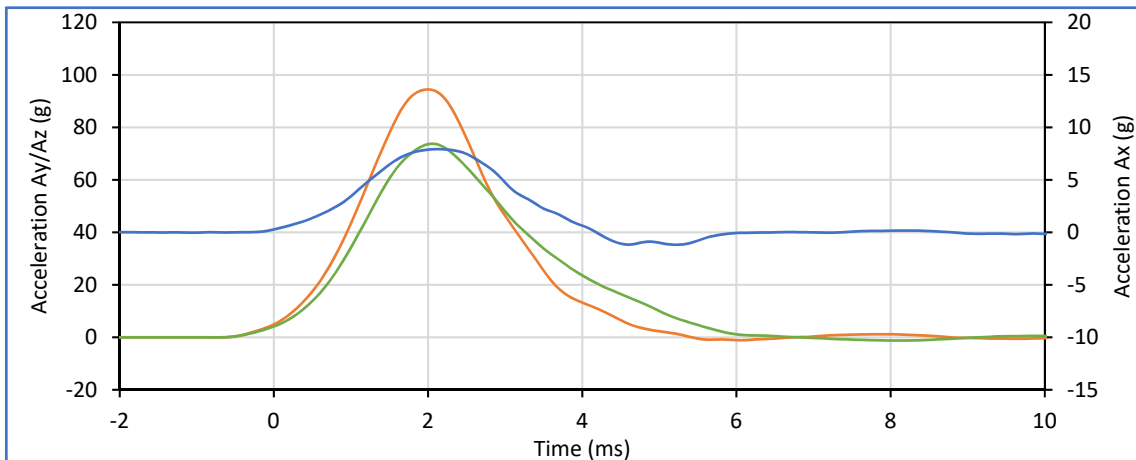
ATD Serial No.: 299

Test Date: 2018-10-12

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	115.0	137.0	120.0	Pass
Peak Head Ax	g	-15.0	15.0	-1.2	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
Max:120.0@2.0
Min:0.0@6.8
SAE Class 1000



Head Ax
Max:7.9@2.1
Min:-1.2@5.2
SAE Class 1000
Head Ay
Max:94.5@2.0
Min:-1.1@6.1
SAE Class 1000
Head Az
Max:73.8@2.1
Min:-1.2@8.2
SAE Class 1000

Technician: J. Hernandez

Approved By: P. Puzzuto

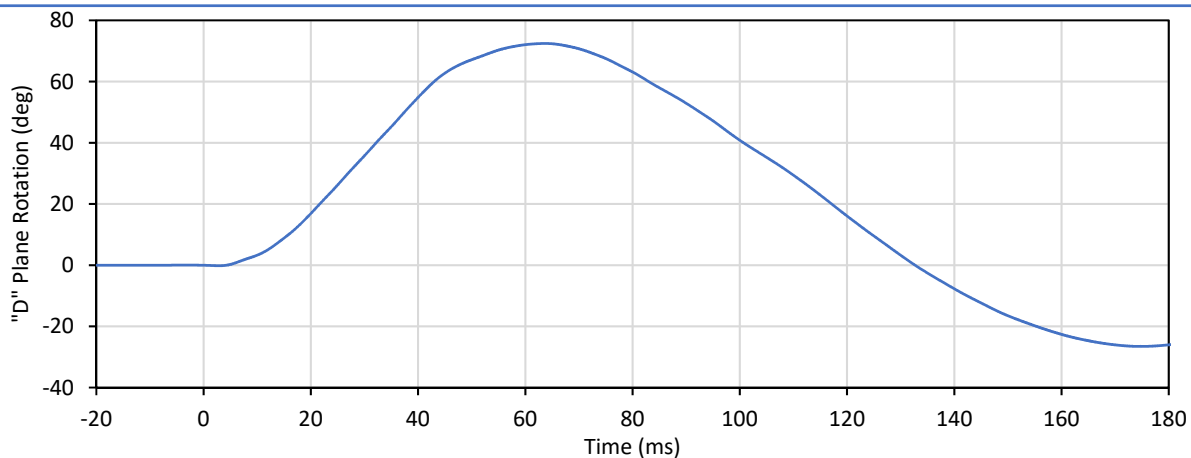
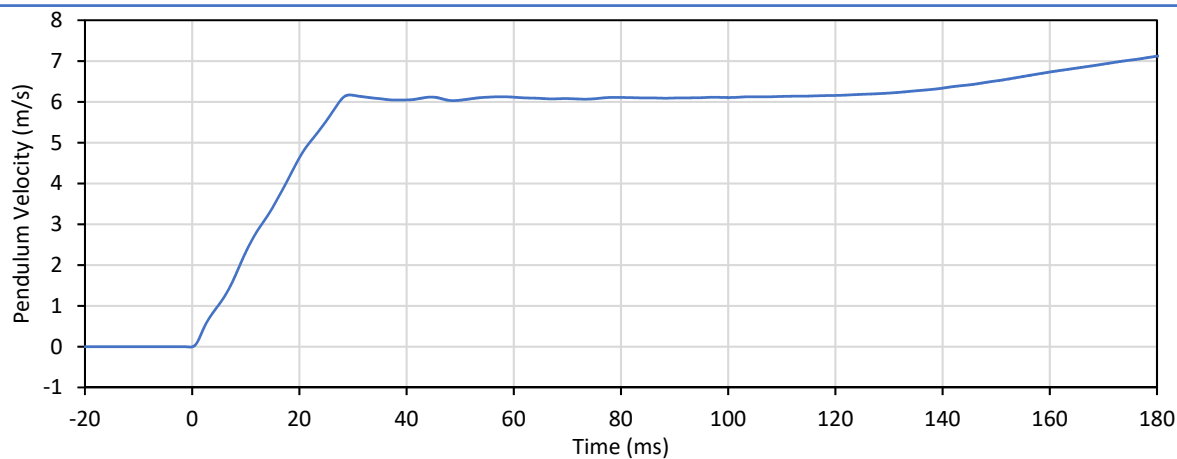


**SID-IIs Small Side Impact ATD
Neck Flexion**

ATD Serial No.: 299

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	35	Pass
Pendulum Velocity	m/s	5.51	5.63	5.61	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.32	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.41	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	5.53	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	6.17	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	72.4	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	63.7	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-43.2	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	112.1	Pass
Overall Test Results				Pass	Pass



Technician: _____

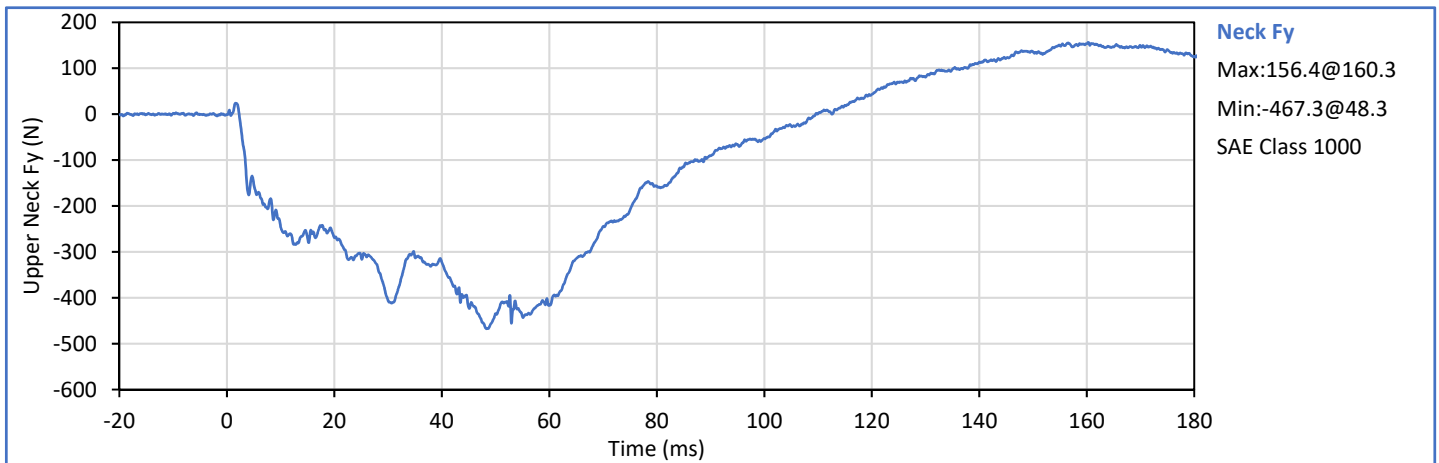
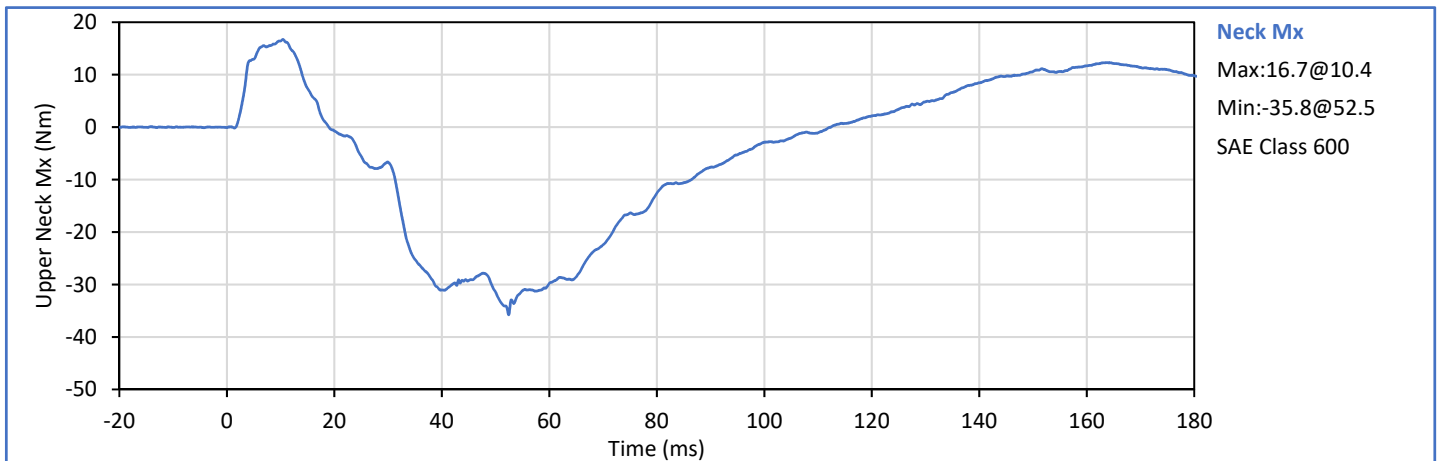
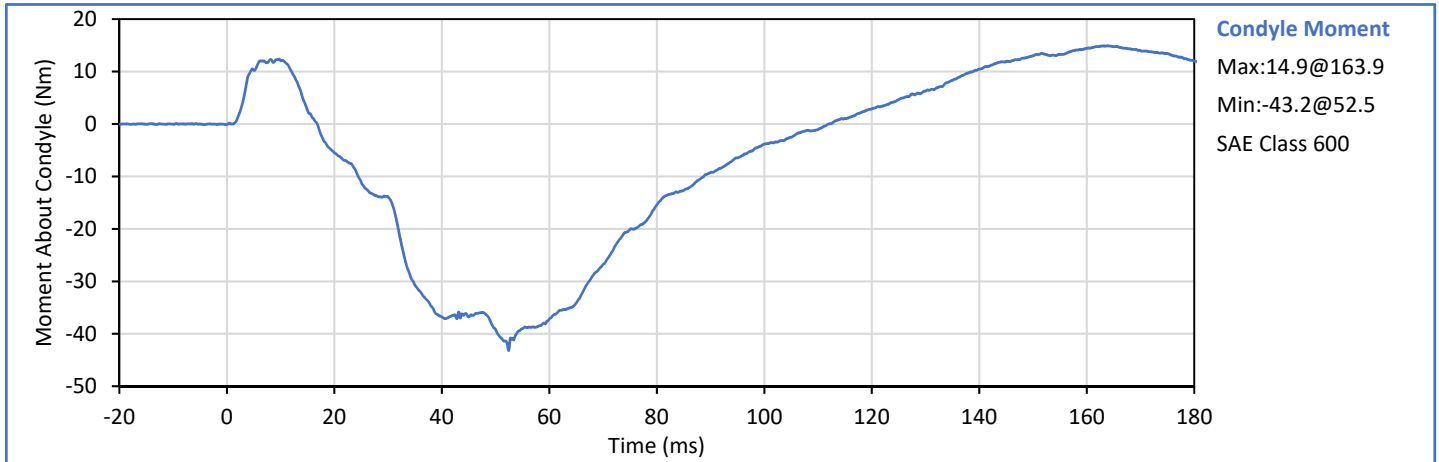
J. Hernandez

Approved By: _____

P. Puzzuto

ATD Serial No.: 299

Test Date: 2018-10-12



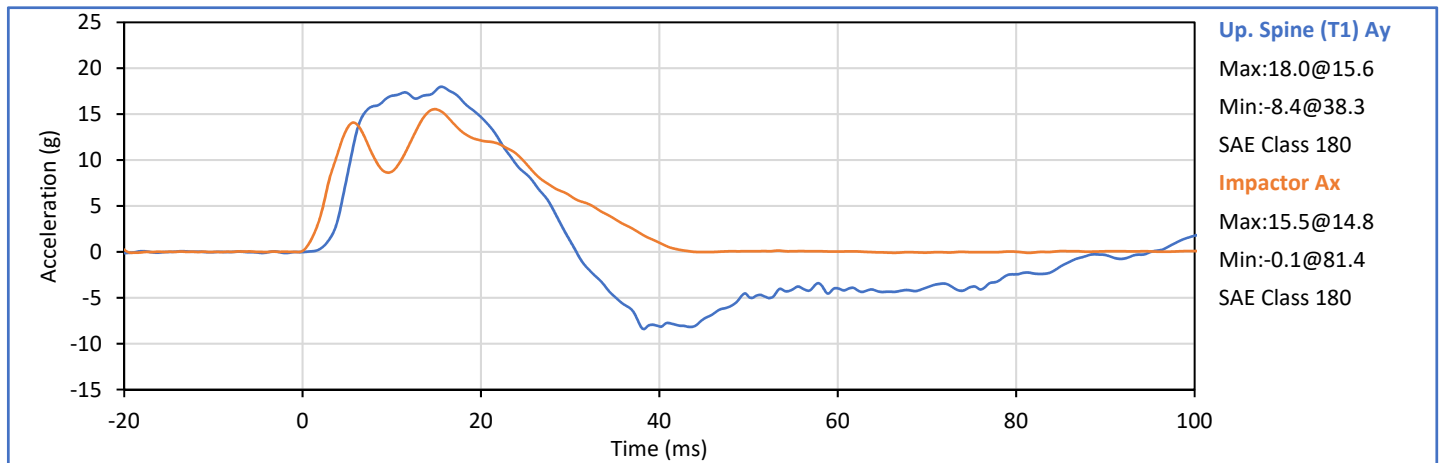
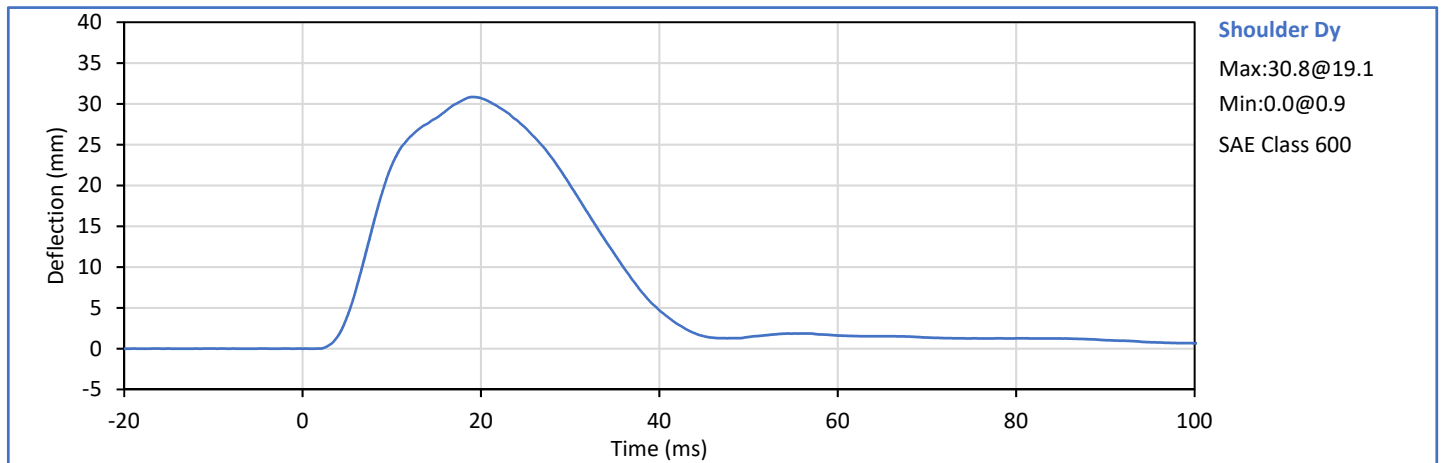


SID-IIs Small Side Impact ATD Shoulder Impact Test

ATD Serial No.: 299

Test Date: 2018-10-10

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
Impactor Velocity	m/s	4.20	4.40	4.28	Pass
Peak Shoulder Dy	mm	28.0	37.0	30.8	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.0	Pass
Peak Impactor Ax	g	13.0	18.0	15.5	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

Approved By:
 P. Puzzuto

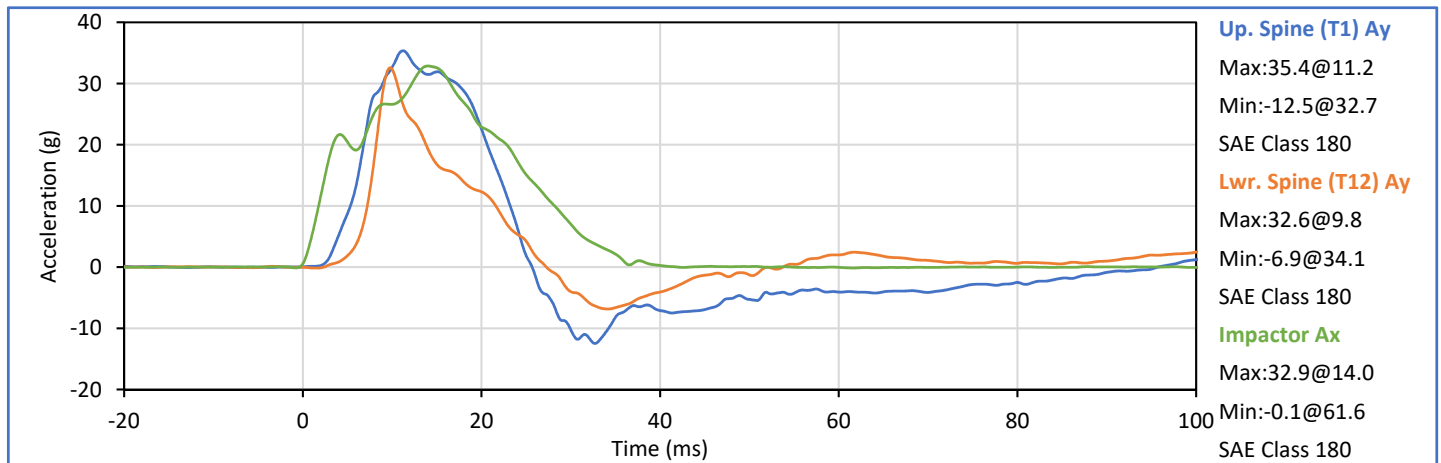
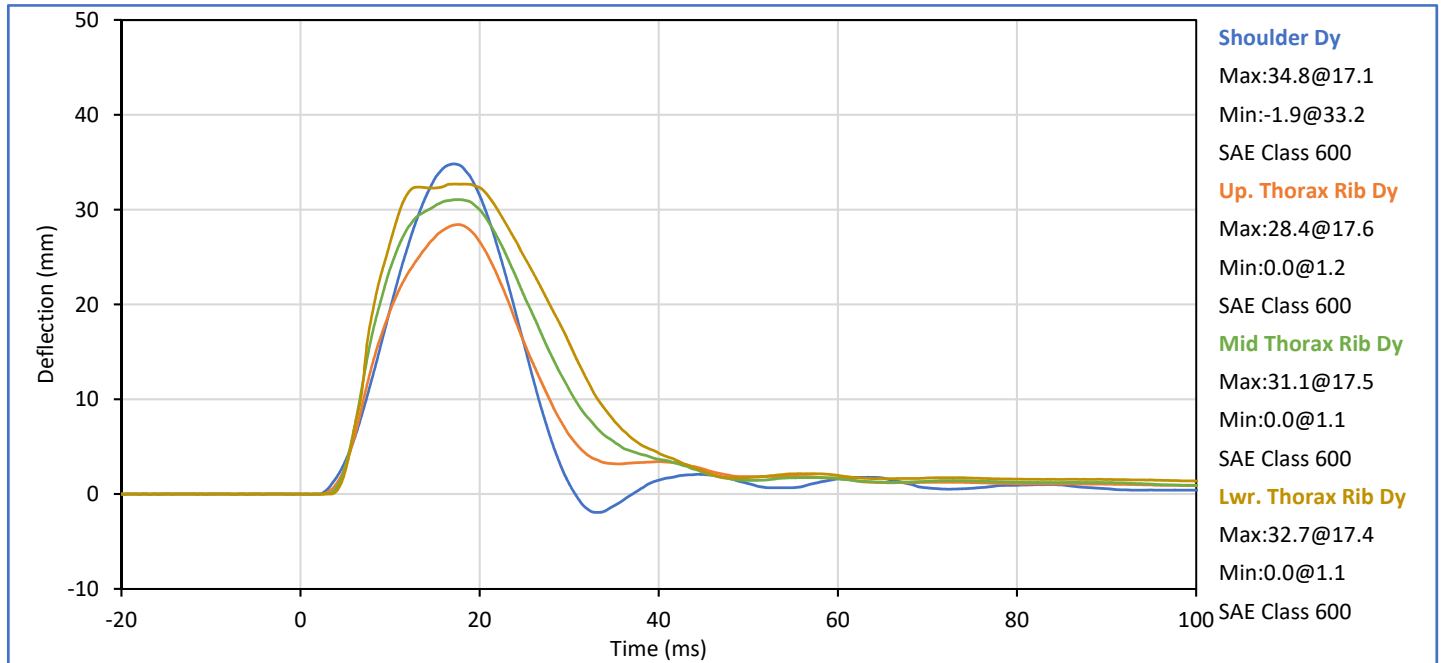


SID-IIs Small Side Impact ATD Thorax (With Arm)

ATD Serial No.: 299

Test Date: 2018-10-11

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
Impactor Velocity	m/s	6.60	6.80	6.65	Pass
Peak Shoulder Dy	mm	31.0	40.0	34.8	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.4	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.1	Pass
Peak Lower Rib Dy	mm	32.0	38.0	32.7	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	35.4	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	32.6	Pass
Peak Impactor Ax	g	30.0	36.0	32.9	Pass
Overall Test Results				Pass	Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

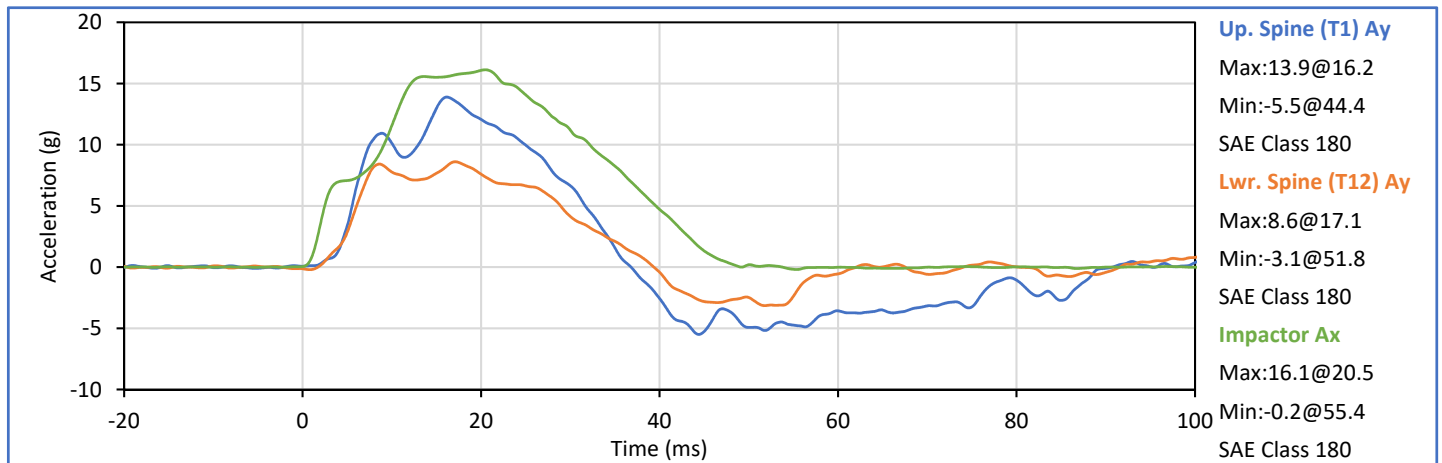
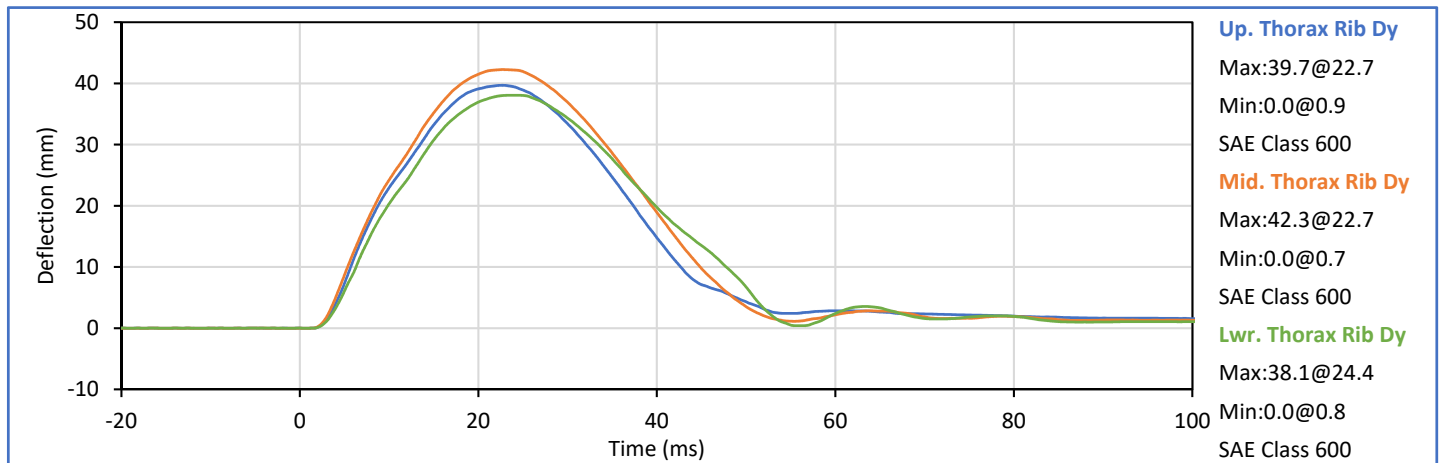


**SID-IIs Small Side Impact ATD
 Thorax (No Arm)**

ATD Serial No.: 299

Test Date: 2018-10-11

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
Impactor Velocity	m/s	4.20	4.40	4.23	Pass
Peak Upper Rib Dy	mm	32.0	40.0	39.7	Pass
Peak Middle Rib Dy	mm	39.0	45.0	42.3	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.1	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.9	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	8.6	Pass
Peak Impactor Ax	g	14.0	18.0	16.1	Pass
Overall Test Results				Pass	



Technician: J. Hernandez

Approved By: P. Puzzuto

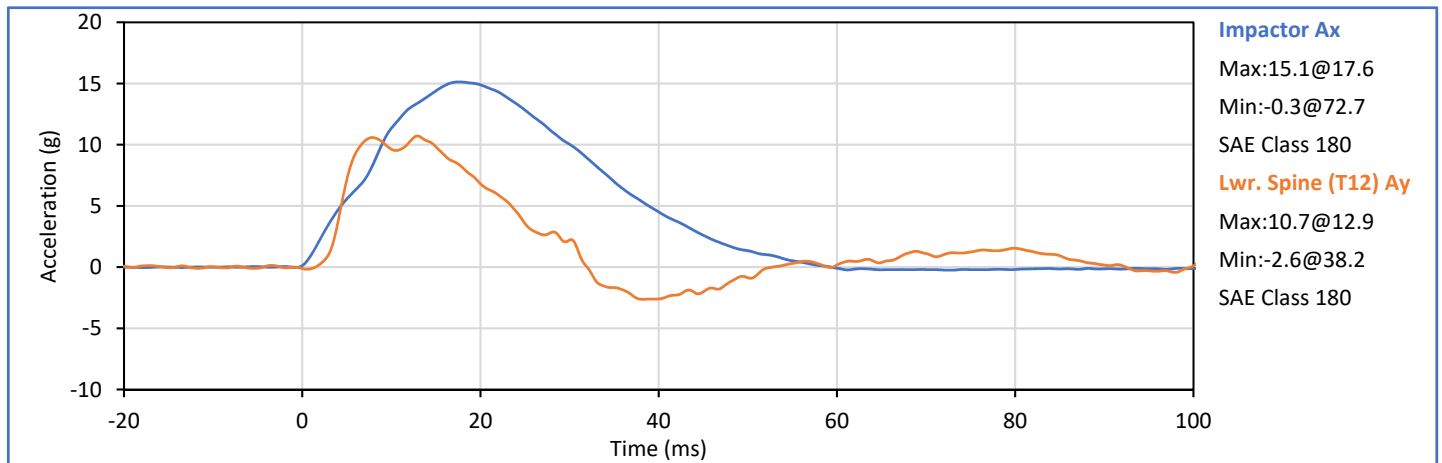
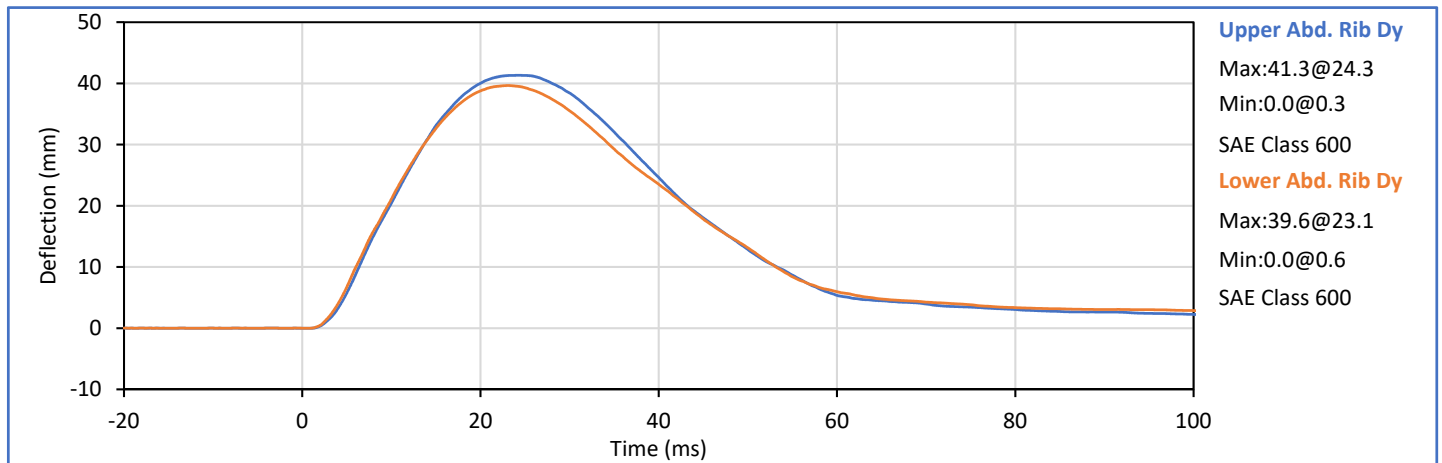


SID-IIs Small Side Impact ATD Abdomen Impact

ATD Serial No.: 299

Test Date: 2018-10-11

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	35	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.3	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	39.6	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.7	Pass
Peak Impactor Ax	g	12.0	16.0	15.1	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto



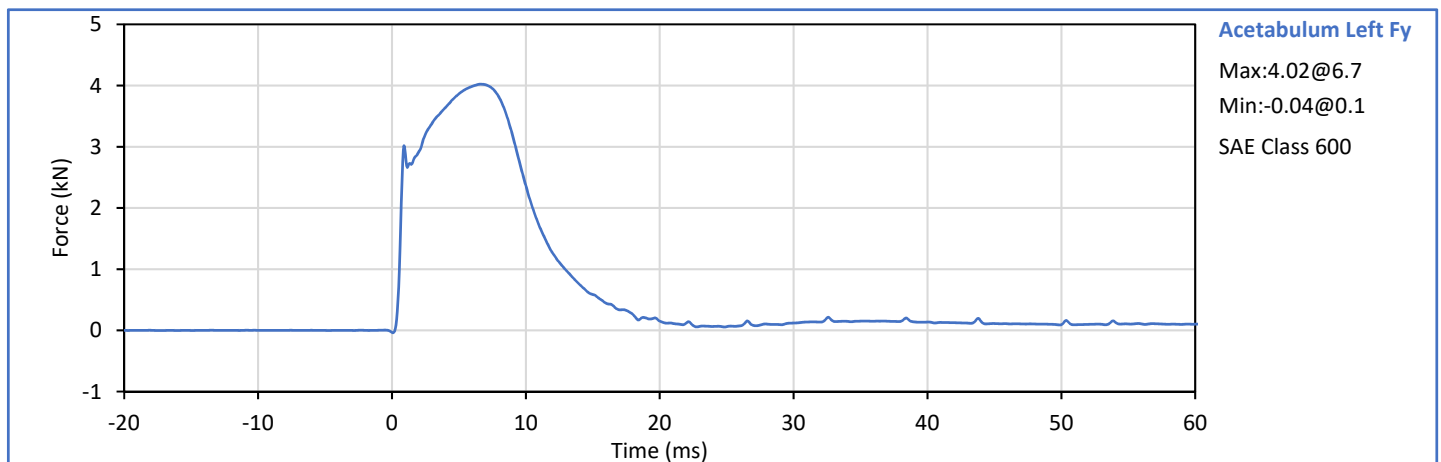
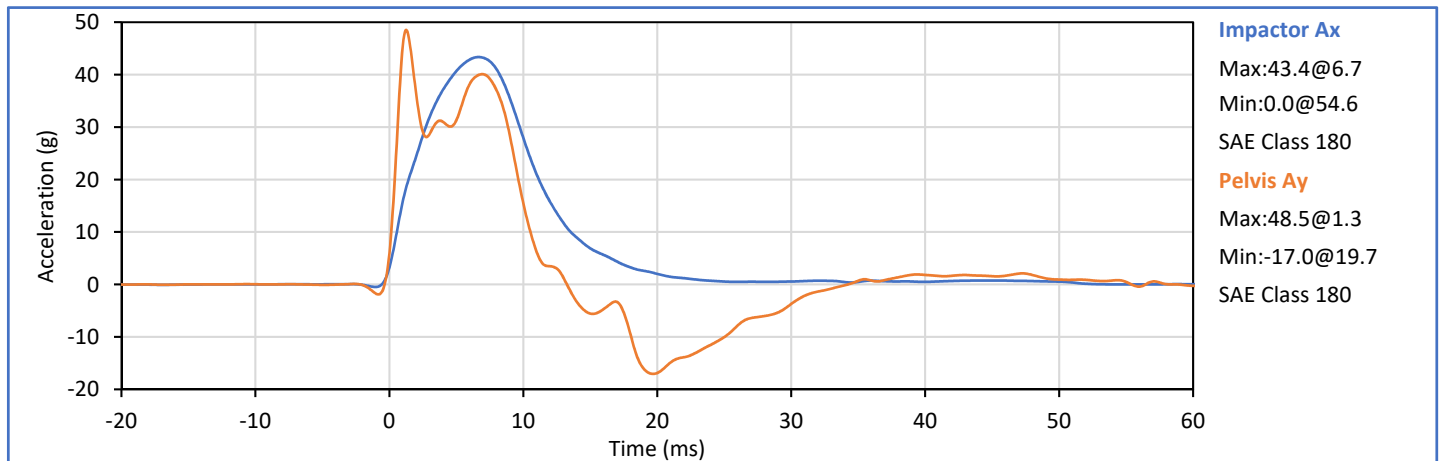
SID-II Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299

Test Date: 2018-10-10

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.7	Pass
Laboratory Humidity	%	10	70	42	Pass
Impactor Velocity	m/s	6.60	6.80	6.66	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.02	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.1	Pass
Peak Impactor Ax	g	38.0	47.0	43.4	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12254 (SACO)



Technician: J. Hernandez

Approved By: P. Puzzuto



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Tel: +1 760 246 1672 Fax: +1 760 246 8112
Info@karco.com www.karco.com

SID-Ils Small Side Impact ATD Pelvis Acetabulum Impact

ATD Serial No.: 299

Test Date: 2018-10-10

Pelvis Plug S/N: 12254 (SACO)



SID-Ils Pelvis Plug Certification Test

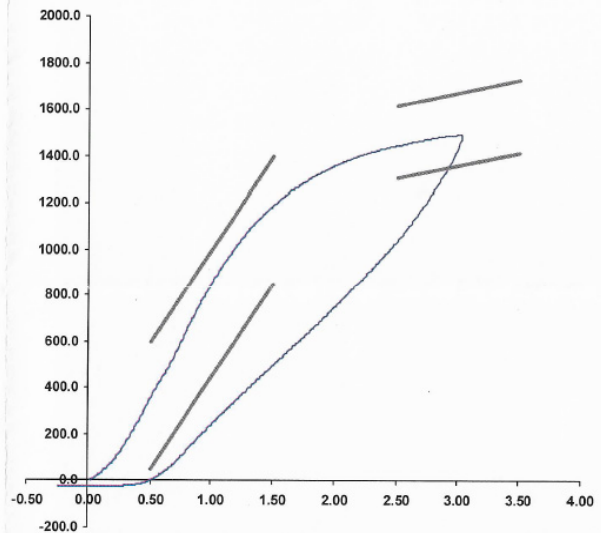
Plug S/N 12254
Test Number 6639
Report Number 6654
Test Date 3/14/2018 1:34:50 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	361.77	50.00	600.00
Force @ 1.5 mm (N)	1,194.05	850.00	1,400.00
Force @ 2.5 mm (N)	1,444.69	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,493.93	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 : 3/14/2018

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



SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

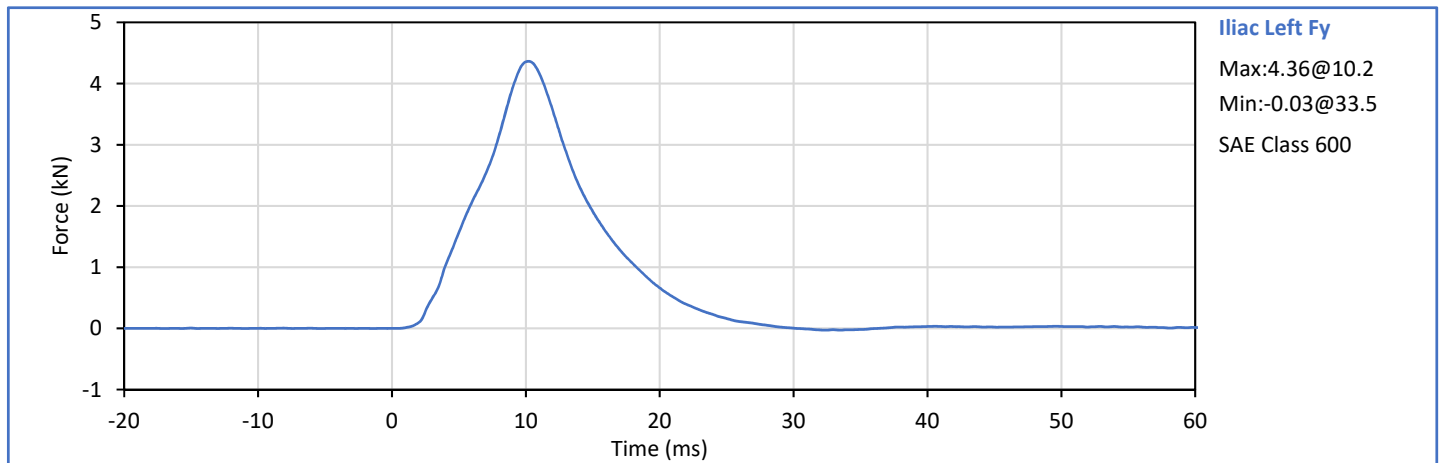
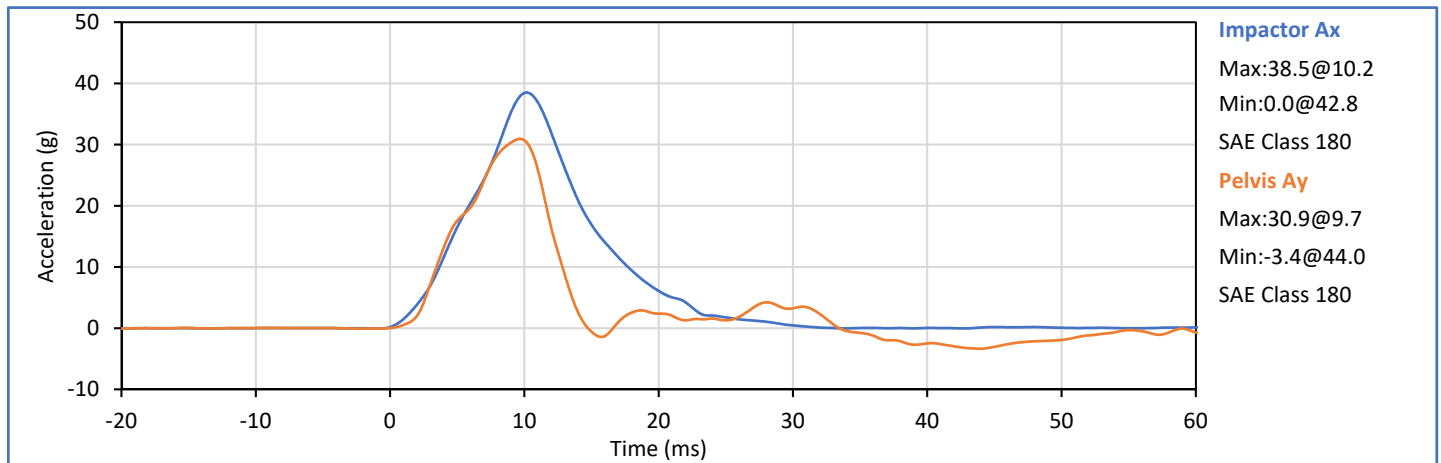
ATD Serial No.: 299

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	4.29	Pass
Peak Iliac Fy	kN	4.10	5.10	4.36	Pass
Pelvis Ay after 6ms	g	28.0	39.0	30.9	Pass
Peak Impactor Ax	g	36.0	45.0	38.5	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified



Technician: J. Hernandez

Approved By: P. Puzzuto

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



SID-IIs Small Side Impact ATD
External Measurements

ATD Serial No.: 299

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 Relative Humidity	%	10	70	30	Pass
A - Sitting Height	mm	772	788	779	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	85	Pass
D - H Point From Seatback	mm	141	151	148	Pass
E - Shoulder Pivot From Backline	mm	97	107	102	Pass
F - Thigh Clearance	mm	119	135	131	Pass
G - Head Breadth	mm	140	148	145	Pass
H - Head Back From Backline	mm	40	46	45	Pass
I - Head Depth	mm	178	188	186	Pass
J - Head Circumference	mm	541	551	543	Pass
K - Buttock To Knee Length	mm	514	540	532	Pass
L - Popliteal Height	mm	343	369	349	Pass
K - Knee Pivot To Floor Height	mm	392	409	400	Pass
N - Buttock Popliteal Length	mm	416	442	430	Pass
O - Chest Depth W/O Jacket	mm	195	211	207	Pass
P - Foot Length	mm	216	232	221	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	257	Pass
S - Knee Joint To Seatback	mm	477	493	490	Pass
V - Shoulder Width	mm	341	357	344	Pass
W - Foot Width	mm	78	94	84	Pass
Y - Chest Circumference W/Jacket	mm	851	881	860	Pass
Z - Waist Circumference	mm	761	791	773	Pass
			Overall Test Results		Pass

Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

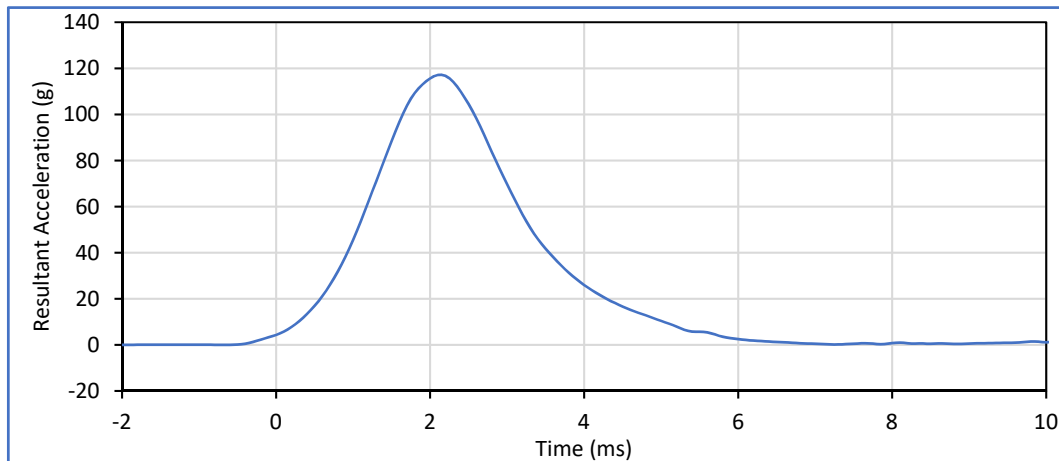


SID-IIs Small Side Impact ATD Head Drop

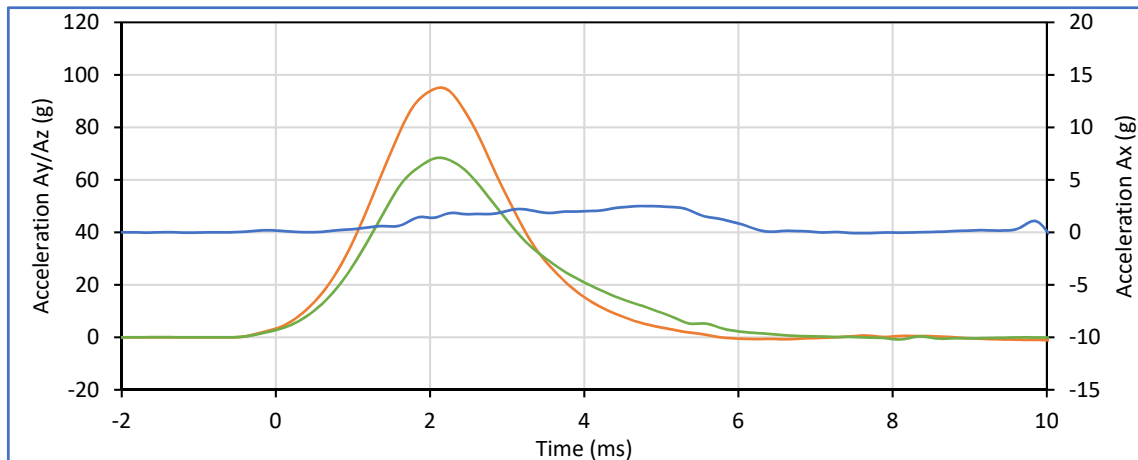
ATD Serial No.: 299

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	117.2	Pass
Peak Head Ax	g	-15.0	15.0	-0.5	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	



Head Resultant
Max:117.2@2.2
Min:0.1@7.3
SAE Class 1000



Head Ax
Max:2.5@4.8
Min:-0.1@7.6
SAE Class 1000
Head Ay
Max:95.2@2.2
Min:-1.1@10.0
SAE Class 1000
Head Az
Max:68.4@2.1
Min:-0.8@8.1
SAE Class 1000

Technician: J. Hernandez

Approved By: P. Puzzuto

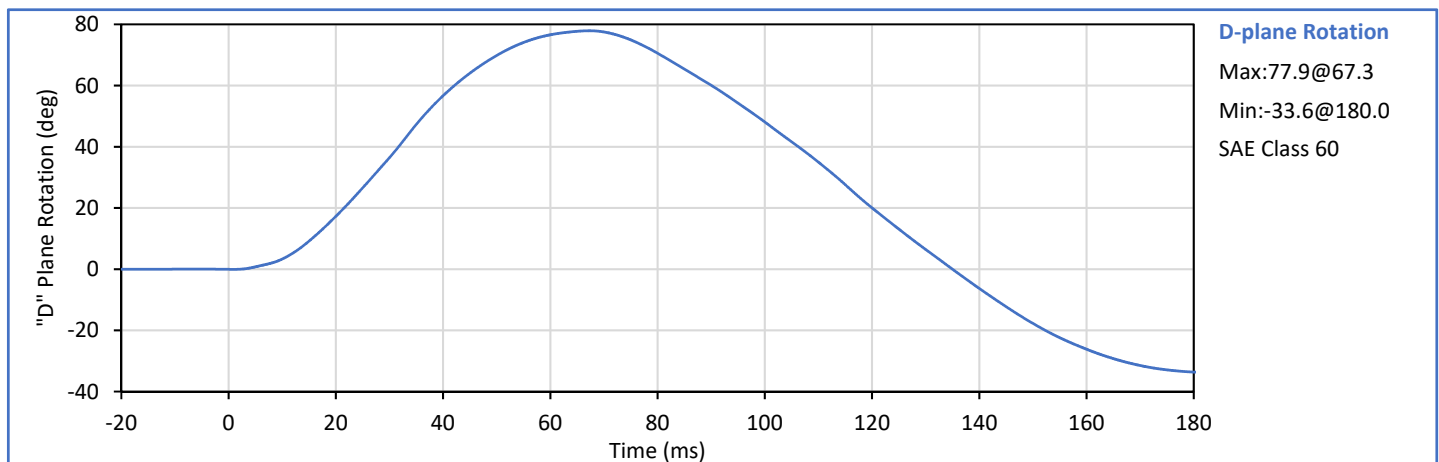
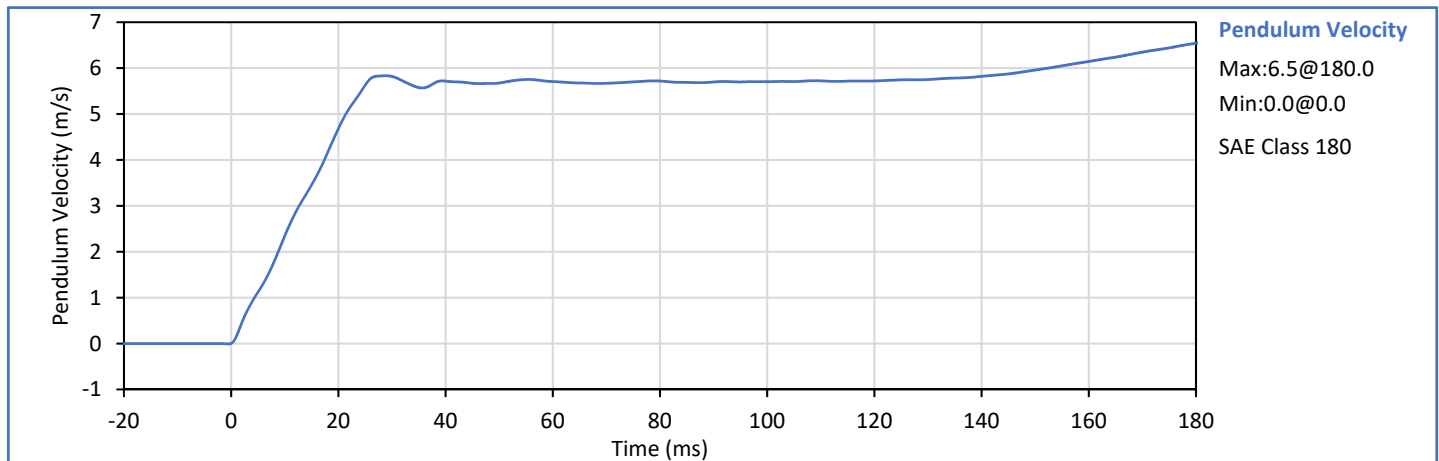


SID-IIs Small Side Impact ATD
Neck Flexion

ATD Serial No.: 299

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	5.51	5.63	5.62	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.34	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.45	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.68	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.63	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.83	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	77.9	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	67.3	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-40.2	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	117.1	Pass
Overall Test Results				Pass	



Technician: _____

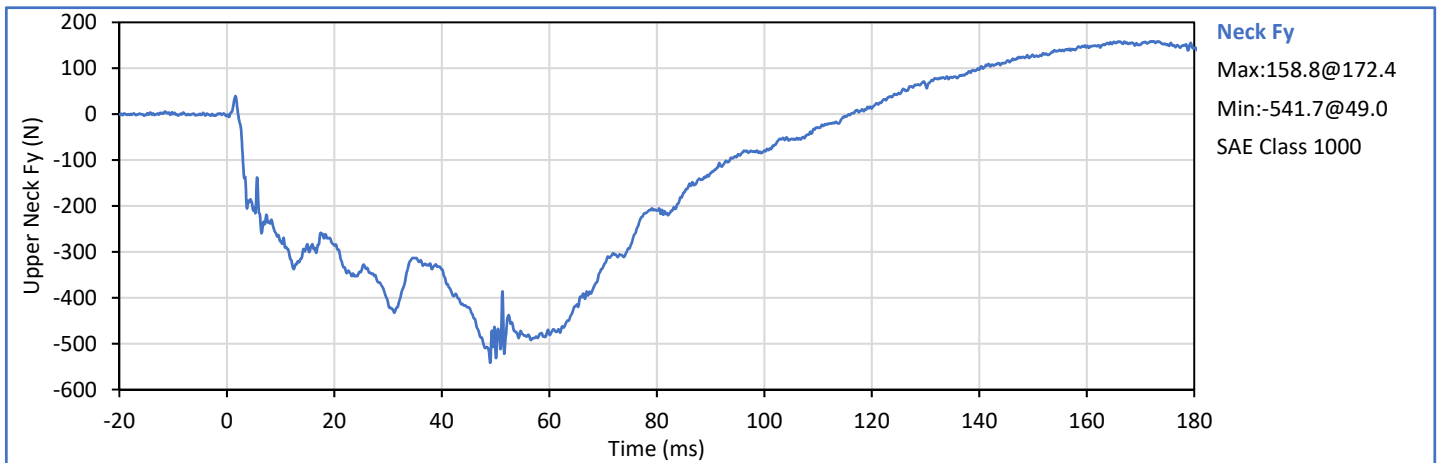
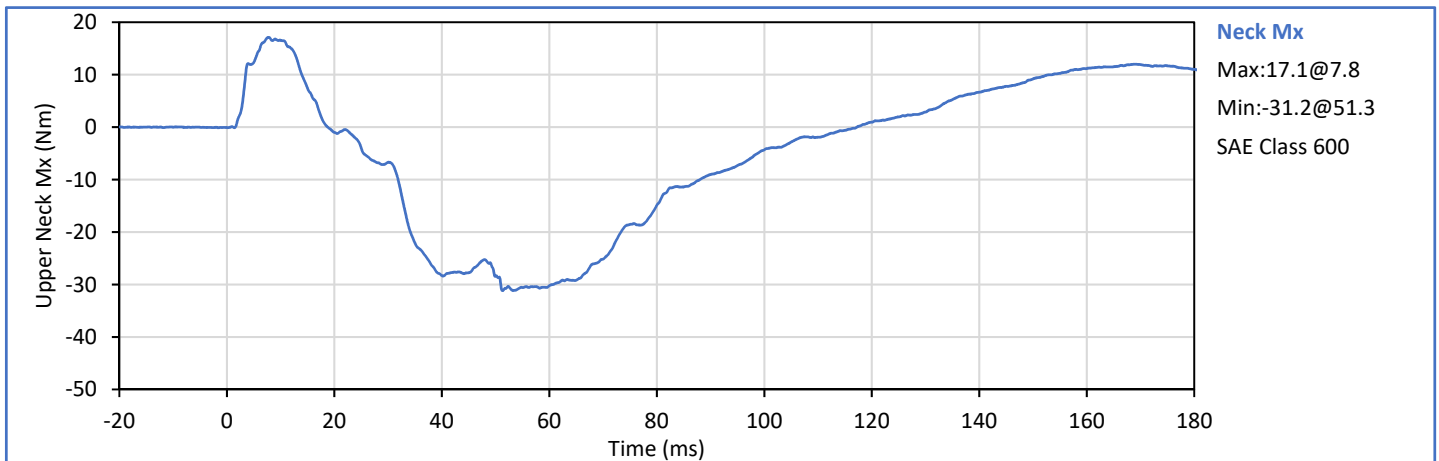
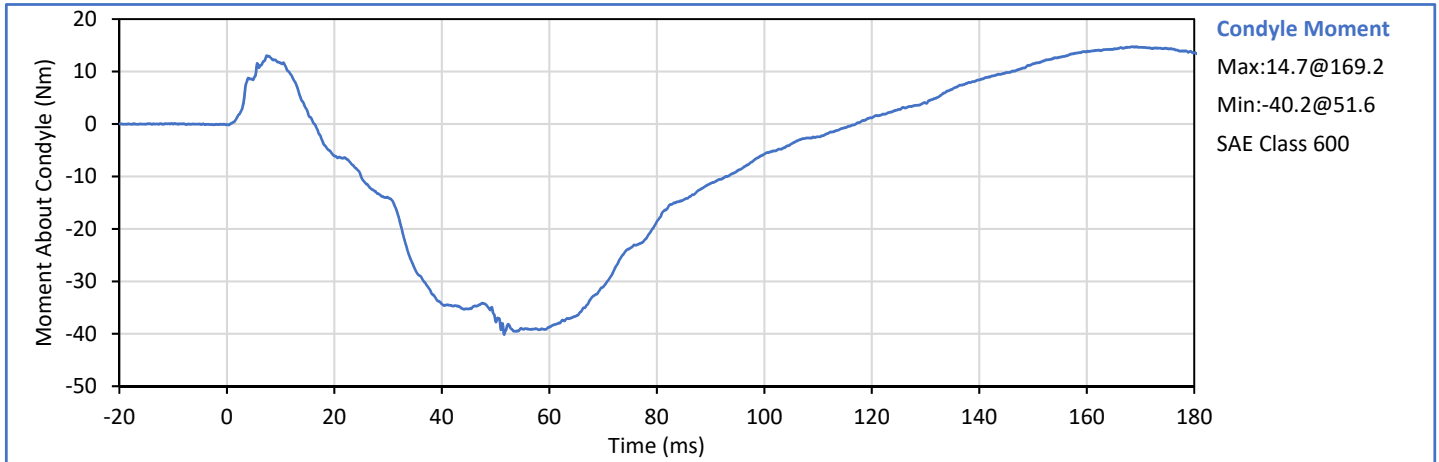
J. Hernandez

Approved By: _____

P. Puzzuto

ATD Serial No.: 299

Test Date: 2018-11-05



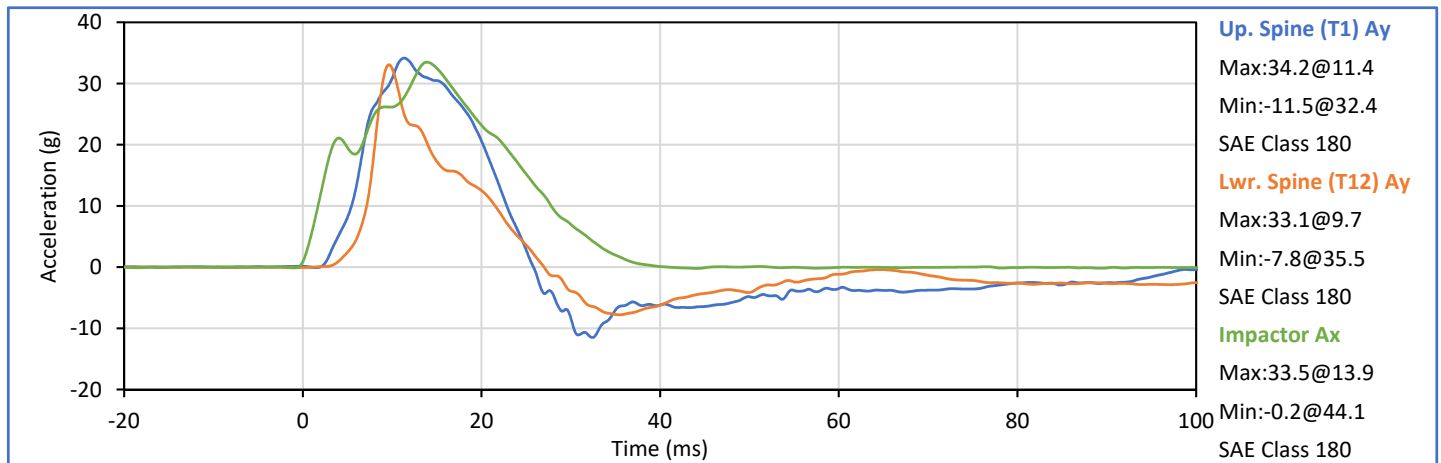
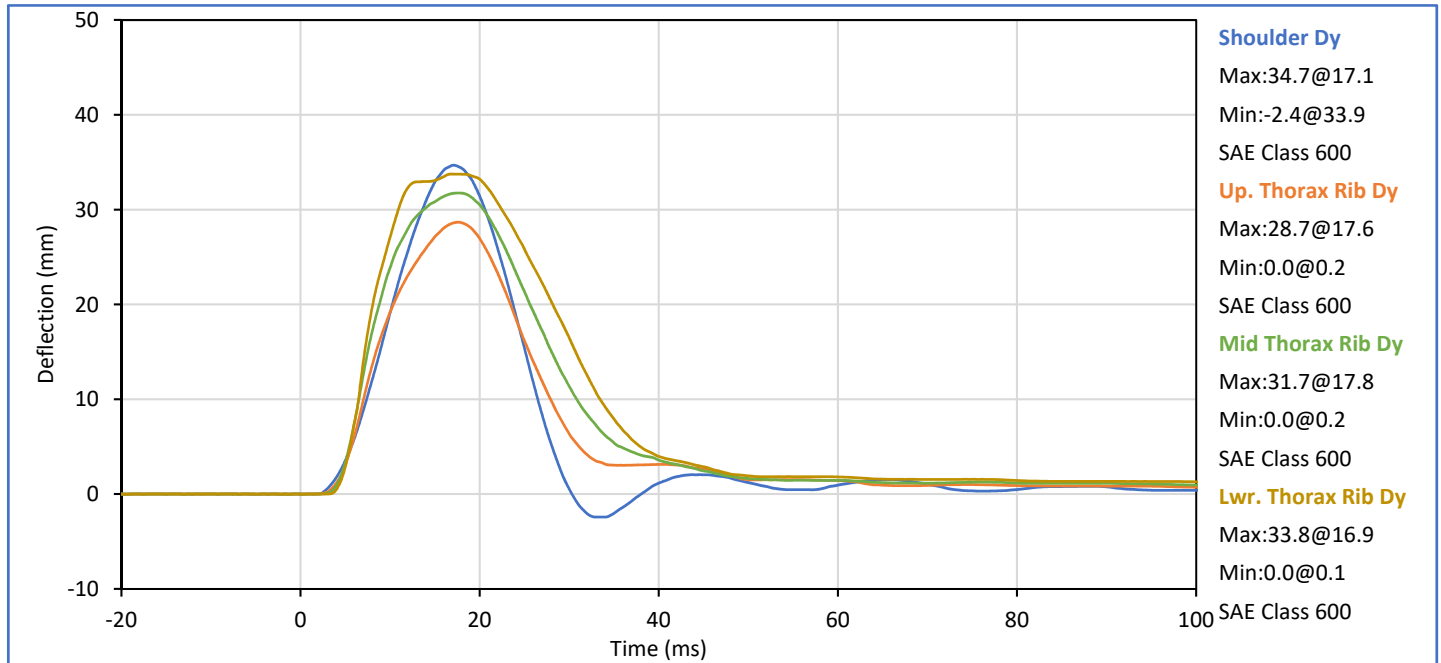


SID-IIs Small Side Impact ATD Thorax (With Arm)

ATD Serial No.: 299

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	6.60	6.80	6.63	Pass
Peak Shoulder Dy	mm	31.0	40.0	34.7	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.7	Pass
Peak Middle Rib Dy	mm	30.0	36.0	31.7	Pass
Peak Lower Rib Dy	mm	32.0	38.0	33.8	Pass
Peak Upper Spine (T1) Ay	g	34.0	43.0	34.2	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	33.1	Pass
Peak Impactor Ax	g	30.0	36.0	33.5	Pass
Overall Test Results					Pass



Technician: J. Hernandez

Approved By: P. Puzzuto

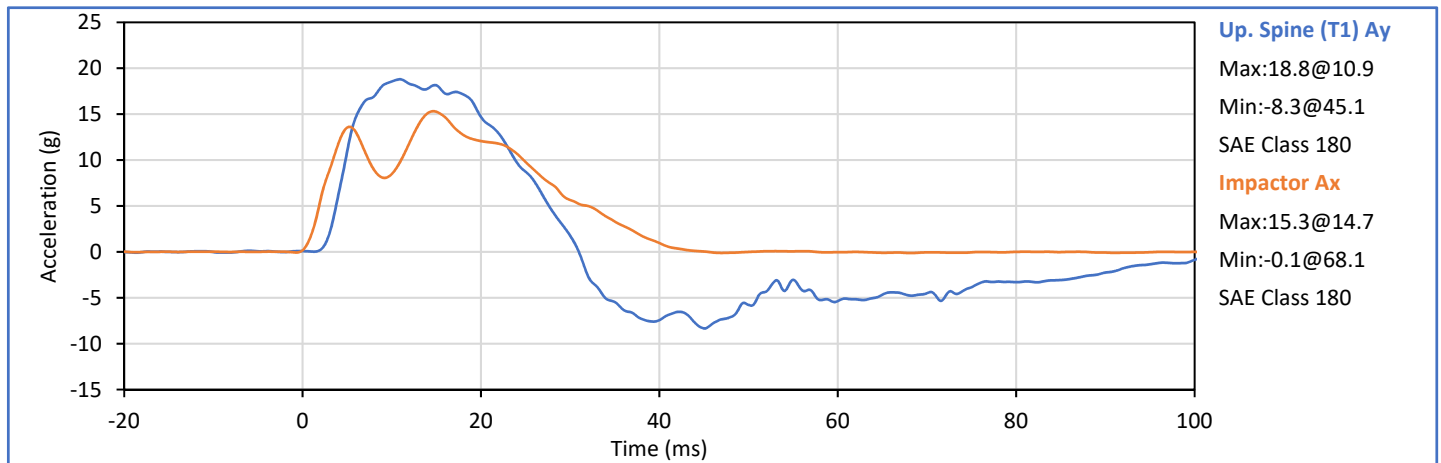
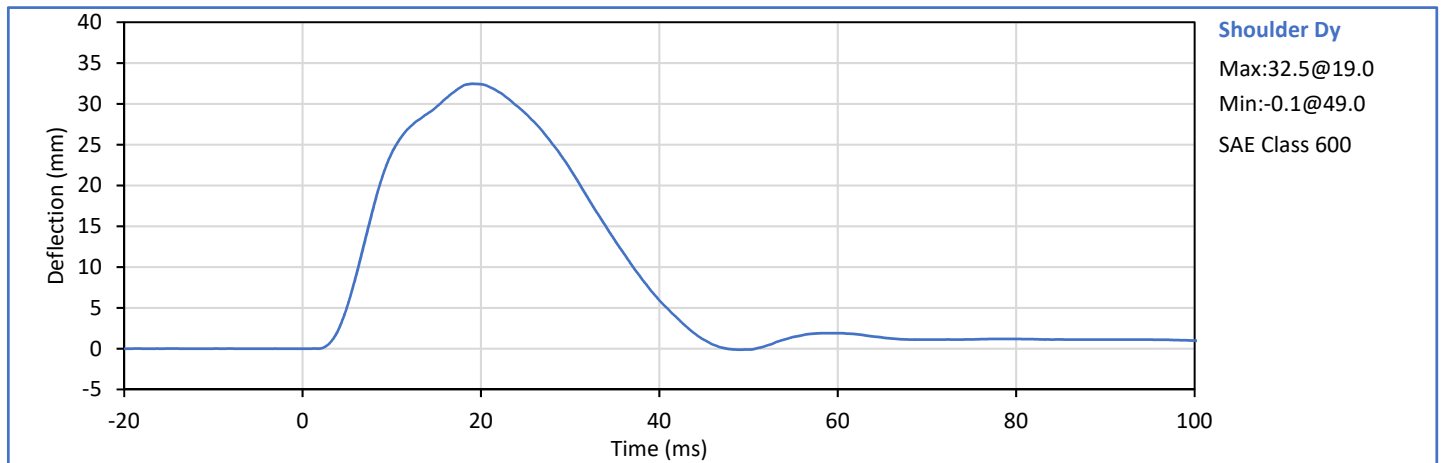


SID-IIs Small Side Impact ATD
Shoulder Impact Test

ATD Serial No.: 299

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	4.31	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.5	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	18.8	Pass
Peak Impactor Ax	g	13.0	18.0	15.3	Pass
Overall Test Results					Pass



Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto

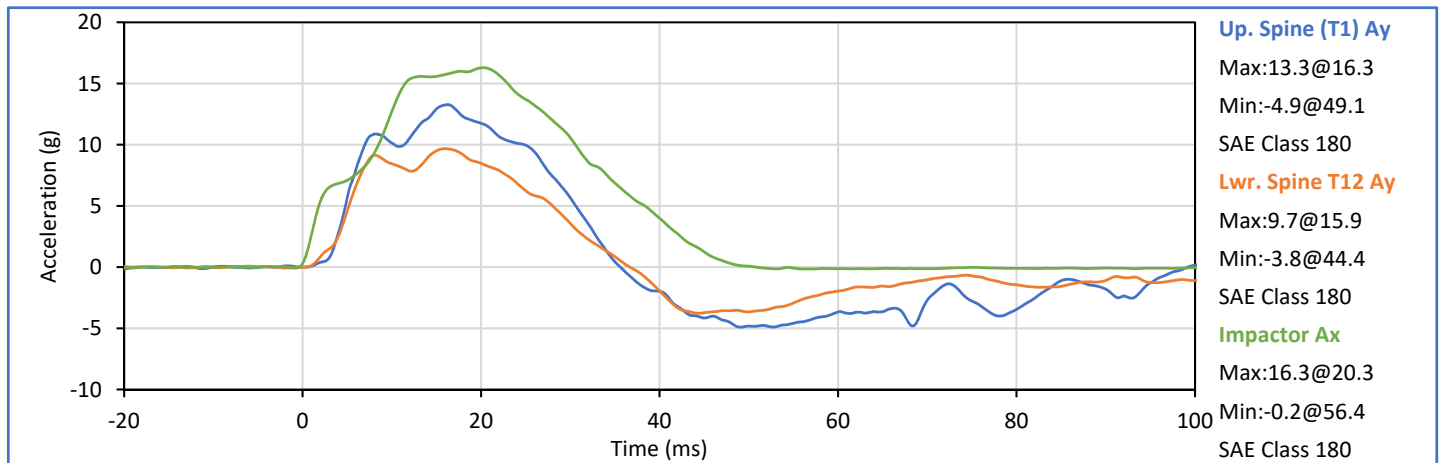
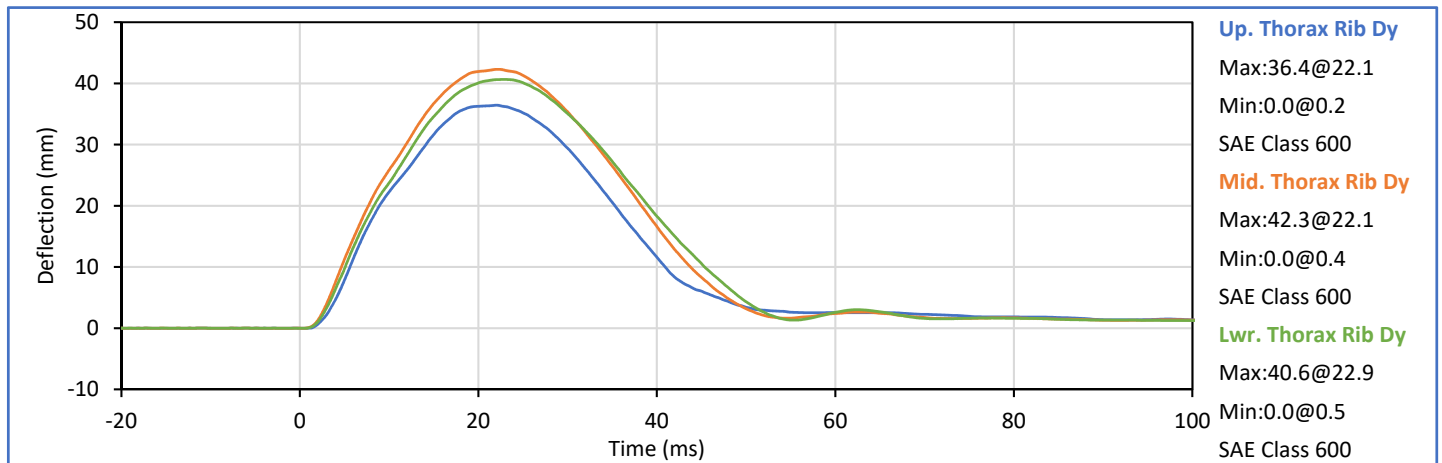


SID-IIs Small Side Impact ATD Thorax (No Arm)

ATD Serial No.: 299

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	4.31	Pass
Peak Upper Rib Dy	mm	32.0	40.0	36.4	Pass
Peak Middle Rib Dy	mm	39.0	45.0	42.3	Pass
Peak Lower Rib Dy	mm	35.0	43.0	40.6	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.3	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.7	Pass
Peak Impactor Ax	g	14.0	18.0	16.3	Pass
Overall Test Results				Pass	



Technician: J. Hernandez

Approved By: P. Puzzuto

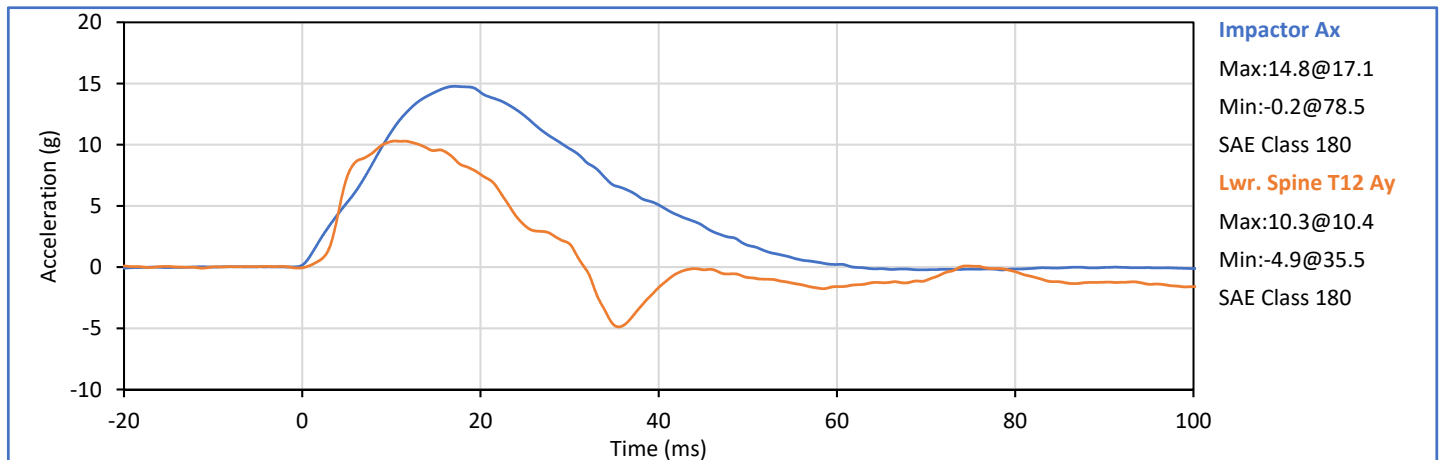
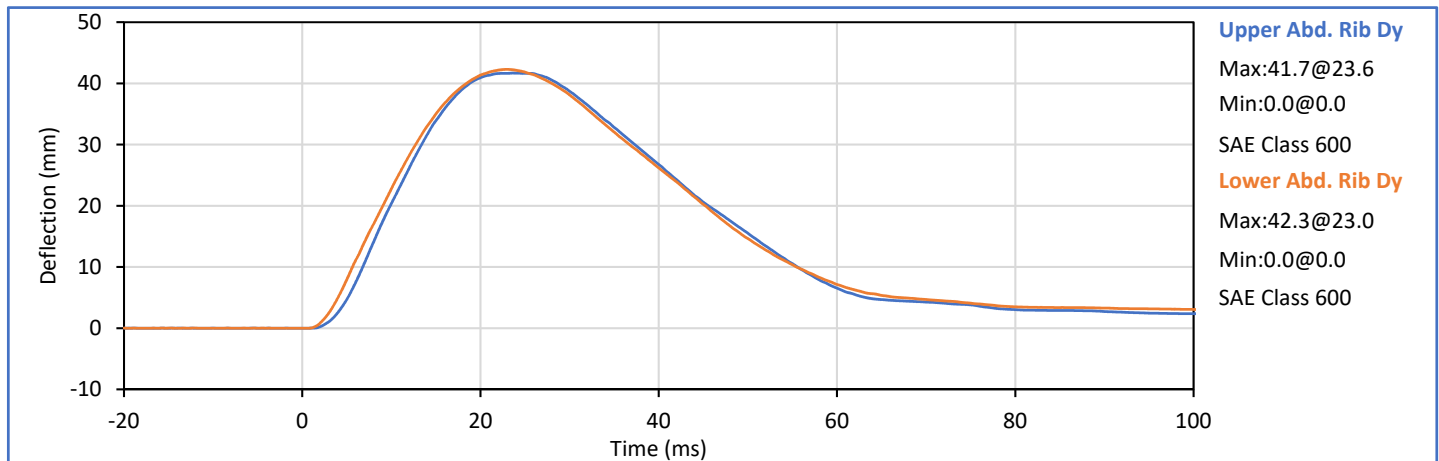


SID-II's Small Side Impact ATD
Abdomen Impact

ATD Serial No.: 299

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	4.34	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.7	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	42.3	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.3	Pass
Peak Impactor Ax	g	12.0	16.0	14.8	Pass
Overall Test Results				Pass	Pass



Technician: _____

J. Hernandez

Approved By: _____

P. Puzzuto



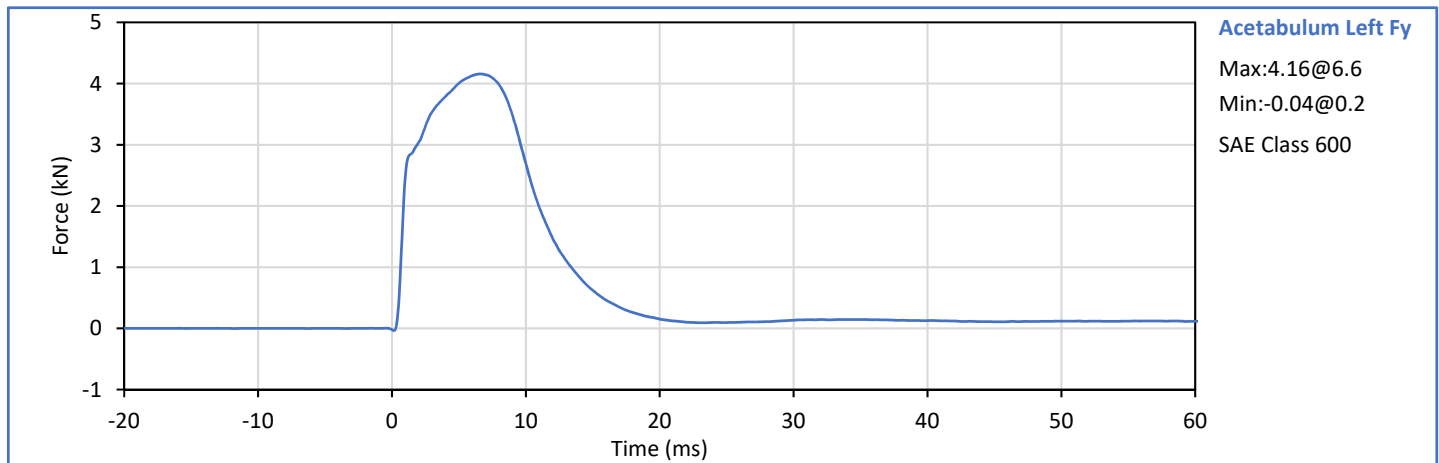
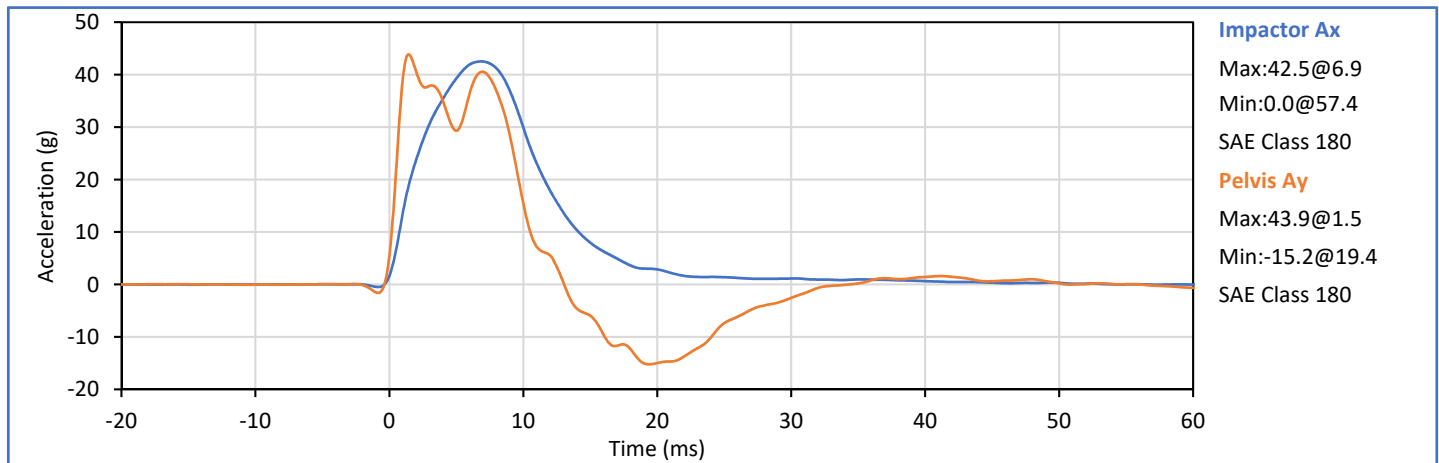
SID-II Small Side Impact ATD
Pelvis Acetabulum Impact

ATD Serial No.: 299

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	6.60	6.80	6.71	Pass
Peak Acetabulum Fy	kN	3.60	4.30	4.16	Pass
Pelvis Ay after 6ms	g	34.0	42.0	40.5	Pass
Peak Impactor Ax	g	38.0	47.0	42.5	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12017 (SACO)



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

SID-IIs Small Side Impact ATD Pelvis Acetabulum Impact

ATD Serial No.: 299

Test Date: 2018-11-05

Pelvis Plug S/N: 12017 (SACO)



SID-IIs Pelvis Plug Certification Test

Plug S/N 12017

Test Number 6367

Report Number 6382

Test Date 2/26/2018 11:46:47 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	230.98	50.00	600.00
Force @ 1.5 mm (N)	1,102.49	850.00	1,400.00
Force @ 2.5 mm (N)	1,418.61	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,478.28	1,361.00	1,673.00

Testing Machine STM-20 5965542

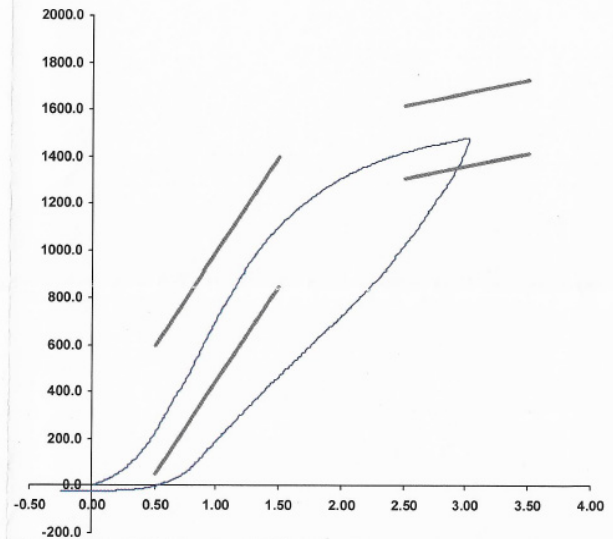
Load Cell S/N (FI360947), Units (LBS) 1000

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 26-Feb-18
SACO Research

By: DC Date: 2/26/18

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



SID-IIs Small Side Impact ATD
Pelvis Iliac Impact

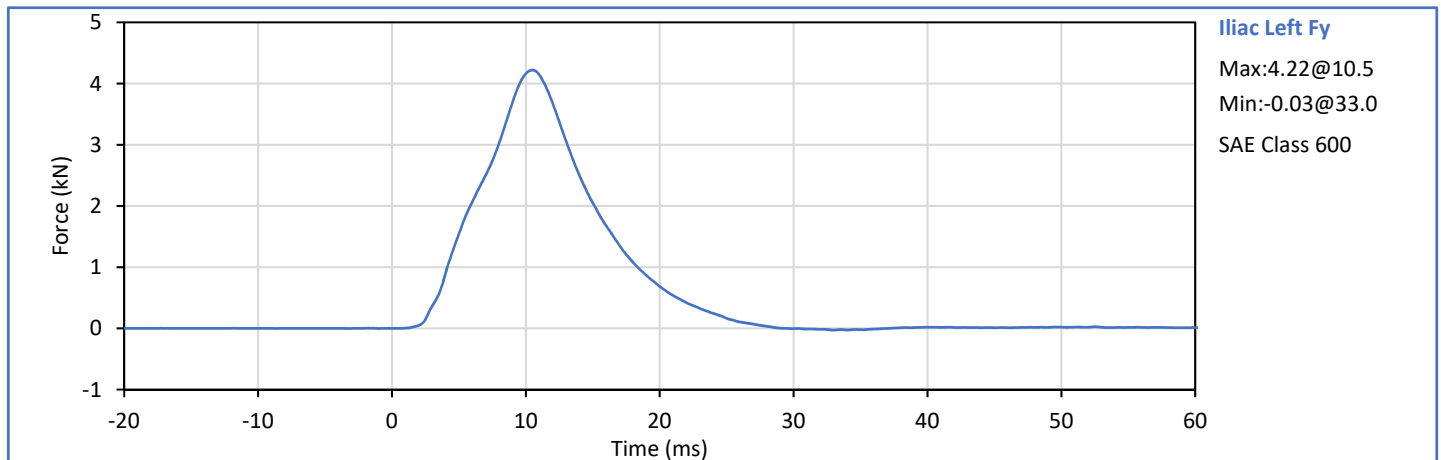
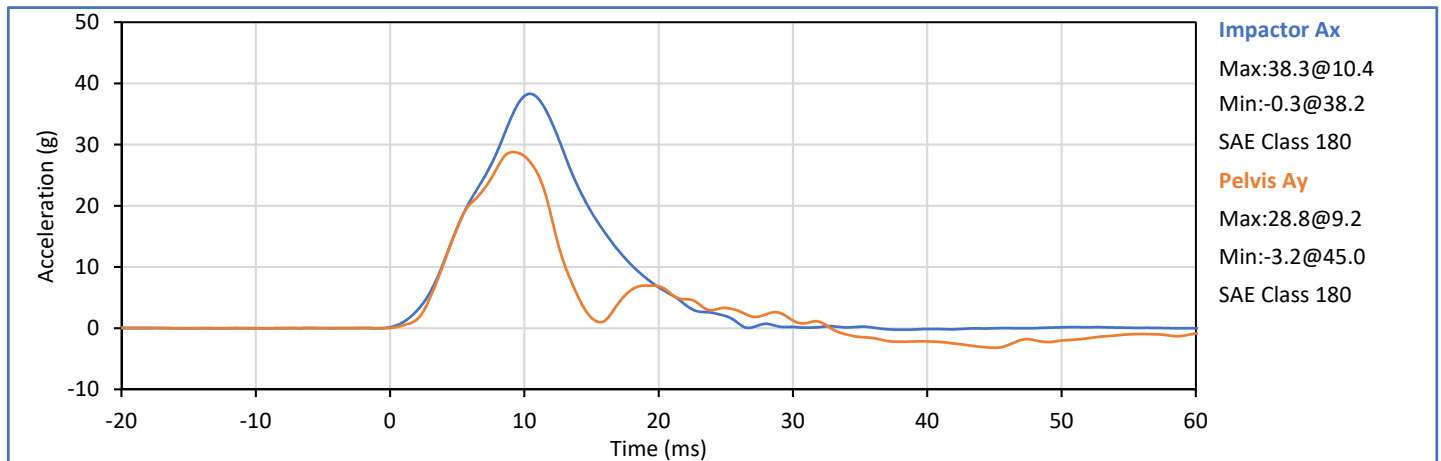
ATD Serial No.: 299

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	4.27	Pass
Peak Iliac Fy	kN	4.10	5.10	4.22	Pass
Pelvis Ay after 6ms	g	28.0	39.0	28.8	Pass
Peak Impactor Ax	g	36.0	45.0	38.3	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:	SID-IIs
ATD S\N:	299

Table 1a - Driver ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Last Cal
Head Acceleration X Primary	P51929	Endevco	7264C-2k	2018-08-08
Head Acceleration Y Primary	P50086	Endevco	7264C-2k	2018-08-08
Head Acceleration Z Primary	P51931	Endevco	7264C-2k	2018-08-08
Head Acceleration X Redundant	P68604	Endevco	7264C-2k	2018-08-08
Head Acceleration Y Redundant	P51934	Endevco	7264C-2k	2018-08-08
Head Acceleration Z Redundant	P58736	Endevco	7264C-2k	2018-08-08
Upper Thorax Rib Deflection Y	1143	Servo	08TCI-3725	2018-08-15
Middle Thorax Rib Deflection Y	1160	Servo	08TCI-3725	2018-08-15
Lower Thorax Rib Deflection Y	1213	Servo	08TCI-3725	2018-08-15
Upper Abdomen Rib Deflection Y	1218	Servo	08TCI-3725	2018-08-15
Lower Abdomen Rib Deflection Y	1177	Servo	08TCI-3725	2018-08-15
Lower Spine T12 Acceleration X	04I20-Z04	Entran	EGEB6Q-2k	2018-08-16
Lower Spine T12 Acceleration Y	06A07-R08	Entran	EGEB6Q-2k	2018-08-16
Lower Spine T12 Acceleration Z	P58795	Endevco	7264C-2k	2018-08-16
Iliac Wing Impact Side Force Y	272 Fy (Iliac)	R.A. Denton	3228J	2017-11-07
Acetabulum Impact Side Force Y	260 Fy (Acetabulum)	R.A. Denton	3249J	2017-11-07

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

Sensor Location	Sensor S\N	Mfr	Model	Last Cal
Head Rotation Rate X	ARS7571	DTS	ARS PRO-8k (2000Hz)	2017-06-09
Head Rotation Rate Y	ARS7316	DTS	ARS PRO-8k (2000Hz)	2017-06-09
Head Rotation Rate Z	ARS7330	DTS	ARS PRO-8k (2000Hz)	2017-06-09

Table 2 - Vehicle Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Last Cal
Vehicle CG Ax	A254901	MSI	52F-2000	2018-06-19
Vehicle CG Ay	A254843	MSI	52F-2000	2018-06-19
Vehicle CG Az	A254852	MSI	52F-2000	2018-06-19
Left Floor Sill Ay	A185686	MSI	52F-2000	2018-09-26
A-Pillar Sill Ay	A247063	MSI	52F-2000	2018-09-17
A-Pillar Low Ay	A224560	MSI	52F-2000	2018-09-15
A-Pillar Mid Ay	10374	Endevco	757F-2k	2018-09-04
B-Pillar Sill Ay	A227265	MSI	52F-2000	2018-09-15
B-Pillar Low Ay	A145534	MSI	52F-2000	2018-09-21
B-Pillar Mid Ay	A185706	MSI	52F-2000	2018-10-01
Driver Seat Track at H-Point Ay	10252	Endevco	757F-2k	2018-03-08
Engine Top Ax	A212049	MSI	52F-2000	2018-10-01
Engine Top Ay	A147385	MSI	52F-2000	2018-09-17
Firewall Ay	A254855	MSI	52F-2000	2018-06-19
Right Roof Ay	A254897	MSI	52F-2000	2018-06-19
Right Floor Sill Ay	A254909	MSI	52F-2000	2018-06-19
Rear Floorpan Ax	A254926	MSI	52F-2000	2018-06-19
Rear Floorpan Ay	A254924	MSI	52F-2000	2018-06-19

Table 3 - Rigid Pole Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Last Cal
Load Cell Pole Barrier #1 Force Y	131822A	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #2 Force Y	132304A	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #3 Force Y	19477	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #4 Force Y	19325	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #5 Force Y	131827A	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #6 Force Y	132302A	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #7 Force Y	19267	Interface	1220-FS	2108-05-02
Load Cell Pole Barrier #8 Force Y	19321	Interface	1220-FS	2108-05-02